## Typical X-Section Table of Contents

**September 1, 2021**

<table>
<thead>
<tr>
<th>Plan No.</th>
<th>Title</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1100-2-E-04</td>
<td>Rural Intersections and Driveways</td>
<td></td>
</tr>
<tr>
<td>1110-2-E-00</td>
<td>Typical Cross Sections of Old Road Obliteration</td>
<td></td>
</tr>
<tr>
<td>1700-2-E-01</td>
<td>Grading for Guardrail End Treatments</td>
<td>July 2020 - Revision</td>
</tr>
<tr>
<td>1702-2-E-00</td>
<td>Grading for Terminal Anchorage Section</td>
<td></td>
</tr>
<tr>
<td>1910-2-E-00</td>
<td>Details of Maintenance Turnaround with 40’ Median</td>
<td>July 2020 - New Plan</td>
</tr>
<tr>
<td>1911-2-E-00</td>
<td>Details of Maintenance Turnaround with 64’ Median</td>
<td>July 2020 - New Plan</td>
</tr>
<tr>
<td>3850-2-E-24</td>
<td>Joint/Pavement Repair</td>
<td>July 2020 - Revision</td>
</tr>
<tr>
<td>3851-2-E-18</td>
<td>Joint/Pavement Repair (Overlay)</td>
<td>July 2020 - Revision</td>
</tr>
</tbody>
</table>
PROFILES FOR DRIVEWAY OR INTERSECTION GRADE EXCEEDING 8%
TYPICAL CROSS SECTIONS OF OLD ROAD OBLITERATION

CUT SECTION
(Old road away from new construction)

FILL SECTION
(Old road away from new construction)

HALF CUT SECTION & HALF FILL SECTION
(Old road away from new construction)

CUT SECTION
(Old road near cut section, new construction)

CUT SECTION
(Old road near fill section, new construction)

FILL SECTION
(Old road near cut section, new construction)

FILL SECTION
(Old road near fill section, new construction)

EXISTING GROUND

OLD ROAD

OBLITERATION LINE

NEW CONSTRUCTION

MAINLINE GRADING

E - OLD ROAD

E - NEW CONSTRUCTION

MAINLINE GRADING

E - OLD ROAD

MAINLINE GRADING

E - NEW CONSTRUCTION

MAINLINE GRADING

E - OLD ROAD

MAINLINE GRADING

E - NEW CONSTRUCTION
TYPICAL CROSS SECTIONS

GRADING FOR GUARDRAIL END TREATMENTS

PLAN

SECTION A-A

SECTION B-B

FOR 3R PROJECTS ONLY
**Typical Cross Sections**

**Project No.**

**Date:** 06-06-2021 09:29

**File:** 17022-e00.dgn

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**Shoulder Slope**

**Extension of Section B-B**

**Lane Width**

**Grading**

**Section A-A**

**Section B-B**

**Grading for Terminal Anchorage Sections**

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**Plan**

**Edge of Roadway**

**Edge of Earth Shoulder**

**Taper**

**Terminal Anchorage Section**

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**Width**

**1:1.5 Slope Max.**

**1:3 Slope or Flatter**

**Transition**

**25'-0"**

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**Width**

**4'-0" Min.**

**Slope Transition**

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**Width**

**4'-0" Min.**

---

**Width**

**4'-0" Min.**

---

**Width**

**4'-0" Min.**

---

**Width**

**4'-0" Min.**
TYPICAL CROSS SECTIONS

DETAILS OF MAINTENANCE TURNAROUND
(40'-0" MEDIAN)

NOTE: 16'-0" RADIUS BASED ON 4'-0" SHOULDER.

THIS PLAN IS DRAWN AT 100 SCALE.
DETAILS OF MAINTENANCE TURNAROUND

(64'-0" MEDIAN)

*NOTE: 28'-0" RADIUS BASED ON 4'-0" SHOULDER

THIS PLAN IS DRAWN AT 100 SCALE.
DETAILS OF MAINTENANCE TURNAROUND
(64' MEDIAN)

* NOTE: 26'-0" RADIUS BASED ON 4'-0" SHOULDERS WITH 2'-0" LUGOUT

THIS PLAN IS DRAWN AT 100 SCALE
**Typical Cross Sections**

**Concrete Pavement Joint Repair, Partial Lane**

1. **Bond Breaker**
2. **Full Depth Diamond Saw Cut**
3. **Install Dowel Bars at New Transverse Joint Nearest to Existing Transverse Joint**
4. **Install Bond Breaker Material**
5. **Shovel the Base of New Transverse Joint Opposite of Dowel Panel**
6. **The Base Required**
7. **Longitudinal Joint**
8. **Bond Breaker Will Be Installed on Longitudinal Joint Between the New Doweled Transverse Joint and the Existing Transverse Joint**

**Notes:**
- All Doweled Bars and the Bars Will Be epoxy Coated.
- The Existing Transverse Joint Shall Not Be re-establishing by the Joint Repair.

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**Tooled Longitudinal Joint**

**Legend**
- $W$: Width of Panel
- $L$: Length of Panel
- $T$: Thickness of Concrete

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**Concrete Pavement Joint Repair**

**Notes:**
- For Joint Repair Locations, See Sheet C
- Thickness of Concrete
- Length of Panel
- Width of Panel

---

**Thermo-Setting Polyurethane Bond Breaker**

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**Formed Joint**

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**NOTE:**
- Construction and/or to saw or tool longitudinal joint on existing opening projects.
LONGITUDINAL JOINT SEALING DETAIL

ASPHALT TO CONCRETE

- 3" maximum squegee (hot poured)
- Joint sealant
- Fill with concrete
- No overlay ties, dowels, and sealing

NOTE:
- Double bar shall be 1" below the surface
- "T" = 10" or more (3" dia. 18" dowel bars)
- 1" dia. 18" dowel bars "T" = 8" to 9"

EXISTING CONCRETE PAVEMENT
TREATED FOUNDATION COURSE
EXISTING PORTLAND CEMENT
FORMED JOINT

NOTE:
- Approx. ..." to "" recessed joint sealant
- Remove all existing or other method to diamond blade sawing
- Early saw cut: 1" to 1.5" wider than existing, up to 3" maximum

TRANSVERSE AND LONGITUDINAL JOINT DETAILS

- "T" = 
- JV: 3"
- Note: may be same 3" noted than existing, up to 3" maximum
- Depth to facilitate existing joint sealant removal

TYPICAL TRANSVERSE AND LONGITUDINAL CRACK

NOTE: For crack sealing locations, see Sheet C

TYPICAL TRANSVERSE AND LONGITUDINAL CRACK

NOTE: For crack sealing locations, see Sheet C
**Typical Cross Sections**

**NO OVERLAY PARTIAL DEPTH REPAIR**

- **Hammer to provide vertical edges all around**
- **Cuts to be removed with a 15# maximum chipping**
- **Indicates material left at margins of holes**
- **Need to provide vertical edges all around**

**Typical Section of Partial Depth Repairs**

- **Bond breaker**
- **Concrete pavement repair, type "A", type "B" and type "C", partial depth**

**NOTE:**
- For concrete pavement repair (partial depth) locations, see sheet C.
**TYPICAL CROSS SECTIONS**

1. **FULL DEPTH DIAMOND SAW CUT.**
2. **INSTALL DOWEL BARS AT NEW TRANSVERSE JOINT OPPOSITE OF EXISTING TRANSVERSE JOINT.**
3. **INSTALL THE BARS AT NEW TRANSVERSE JOINT OPPOSITE OF DOWEL BARS.**
4. **MINIMUM 2-TIE BARS PER SIDE.**

**LONGITUDINAL JOINT**

- **MINIMUM 2-TIE BARS PER SIDE.**
- **JOINT OPPOSITE OF DOWEL BARS.**
- **INSTALL TIE BARS AT NEW TRANSVERSE JOINT.**
- **INSTALL DOWEL BARS AT NEW TRANSVERSE JOINT NEAREST TO EXISTING TRANSVERSE JOINT.**
- **FULL DEPTH DIAMOND SAW CUT.**

**DIMENSIONS AS THE EXISTING CURB SHALL BE CONSTRUCTED TO THE SAME THROUGH INTEGRAL CURB, THE NEW CURB IF PAVERMEN **REPAIR SHOULD EXTEND BEYOND THE EXISTING TRANSVERSE JOINTS.**

**TRANSVERSE JOINT**

- **NOTE: FORMED JOINTS ARE NOT REQUIRED ON DIAMOND GRINDING PROJECTS.**
- **LONGITUDINAL JOINT WHEN APPROVED MAY BE SUBSTITUTED AT FULL DEPTH STRUCTURE OR STYROFOAM.**
- **POLYURETHANE OF CLOSED CELL COMPOUNDS OF A THERMO-SETTING BOND BREAKER WILL BE INSTALLED ON THE LONGITUDINAL JOINT BETWEEN THE NEW DOWELED JOINT AND THE EXISTING TRANSVERSE JOINT.**
- **LONGITUDINAL JOINT BOND BREAKER CONSISTS OF A TAR-LIKE SEALANT (HOT POURED) AND FILL WITH JOINT SEALANT (HOT POURED).**

**LONGITUDINAL JOINT**

- **NOTE: THE EXISTING TRANSVERSE JOINT SHALL NOT BE RE-ESTABLISHED IN THE REPAIR SECTION.**
- **NOTE: FORMED JOINTS ARE NOT REQUIRED ON DIAMOND GRINDING PROJECTS.**
- **CONTRACTOR HAS OPTION TO SAW OR TOOL LONGITUDINAL JOINT FOR ACTUAL REPAIR DIMENSIONS.**
- **NOTE: FOR PAVEMENT REPAIR LOCATIONS, SEE SHEET C.**
- **LEGEND**
  - "L" = LENGTH OF PANEL
  - "W" = WIDTH OF PANEL
  - "T" = THICKNESS OF CONCRETE
  - "N" = NUMBER OF PANELS
  - "C" = NUMBER OF COLUMNS
  - "R" = NUMBER OF ROWS

**E X I S T I N G 8" AND 9" REINFORCED CONCRETE PAVEMENT REPAIR**

- **NOTE: 8" AND 9" REINFORCED CONCRETE PAVEMENT MUST BE SEALED.**
- **NOTE: FORMED JOINTS ARE NOT REQUIRED ON DIAMOND GRINDING PROJECTS.**
- **NOTE: FOR PAVEMENT REPAIR LOCATIONS, SEE SHEET C.**
- **CONTRACTOR HAS OPTION TO SAW OR TOOL LONGITUDINAL JOINT FOR ACTUAL REPAIR DIMENSIONS.**
- **NOTE: FOR PAVERMEN **REPAIR LOCATIONS, SEE SHEET C.**
- **NOTE: FORMED JOINTS ARE NOT REQUIRED ON DIAMOND GRINDING PROJECTS.**
- **NOTE: FOR PAVEMENT REPAIR LOCATIONS, SEE SHEET C.**
- **CONTRACTOR HAS OPTION TO SAW OR TOOL LONGITUDINAL JOINT FOR ACTUAL REPAIR DIMENSIONS.**
- **NOTE: FORMED JOINTS ARE NOT REQUIRED ON DIAMOND GRINDING PROJECTS.**
- **NOTE: FOR PAVEMENT REPAIR LOCATIONS, SEE SHEET C.**
**Typical Cross Sections**

**Repair Section**

**Joint Sealant (Hot Poured)**

The same time and fill with the joint location are placed at saw joint when both sides of the transverse joint.

**Note:** Formed joints are not required for this tooled longitudinal joint.

The adjoining panels. See joint detail for joint to match the longitudinal joints of widened, constructed a tooled longitudinal joint if the width of panel ("W") was previously.

*If the length of repair is 6'-0" or less and the joint opposite of the transverse joint is greater than 6'-0", construct a tooled longitudinal joint at the midpoint of the joint.*

OR

*If the width of panel ("W") is 9'-0" or less and the joint opposite of the existing transverse joint is 4'-0" or greater, construct a tooled longitudinal joint.*

**Note:** For pavement repair locations, see sheet C.

**Legends**

- **"T"** - Thickness of concrete
- **"W"** - Length of panel
- **"H"** - Height of panel
- **"L"** - Length of panel
- **"P"** - Existing transverse joint
- **"C"** - Concrete removal (partial lane width)
**TYPICAL CROSS SECTIONS**

**DETAIL A**

- Bond breakers will be installed on the longitudinal joint between the old concrete joint and the existing transverse joint.
- Bond breaker will be installed on the transverse joint with joint sealant hot poured.
- Transverse joint with joint sealant hot poured.

**Dowel Bar**

- All dowel bars will be epoxy coated.
- D = Dowel Diameter

**Transverse Joint Details**

- No. 5 18" tie bars to be drilled and epoxy coated into existing pavement.
- Dowel bars to be drilled and epoxy coated into existing pavement.
- Dowel bar barrettes will be installed on the existing joint and between the existing and new dowel. (IF length is greater than 3'-0" from joint nearest to existing transverse joint, then 2 tie bars will be installed.)
- Dowel bars must be sealed.
- Bond breakers on opposite longitudinal joint.

**Skewed Transverse Joint Details**

- Dowel bars to be drilled and epoxy coated into existing pavement.
- Dowel bars to be drilled and epoxy coated into existing pavement.
- Dowel bar barrettes to be installed on the existing joint and between the existing and new dowel. (IF length is greater than 3'-0" from joint nearest to existing transverse joint, then 2 tie bars will be installed.)
- Tie bars to be drill and epoxy coated.

**Tie Bar**

- Note: All tie bars will be epoxy coated.
- All tie bars are epoxy coated.
- Dowel bar barrettes will be installed on the existing joint and between the existing and new dowel. (IF length is greater than 3'-0" from joint nearest to existing transverse joint, then 2 tie bars will be installed.)
- Tie bar spacing.

**Tie Bar Spacing**

- No. 5 18" tie bars to be drilled and epoxy coated into existing pavement.
- Dowel bars to be drilled and epoxy coated into existing pavement.
- Dowel bar barrettes will be installed on the existing joint and between the existing and new dowel. (IF length is greater than 3'-0" from joint nearest to existing transverse joint, then 2 tie bars will be installed.)
- Tie bars to be drill and epoxy coated.
**REPAIR SECTION**

**JOIN SEALANT (HOT POURED)**

STAGE AND FILL WITH CONCRETE IS IN PLASTIC FORM JOINT WHILE REPAIR TOOLS LONGITUDINAL JOINT.

**CONCRETE PAVEMENT JOINT REPAIR**

FULL DEPTH OF THE EXISTING CONCRETE APPROXIMATELY \( \frac{1}{4} \)" WIDE FOR THE CLOSED CELL STRUCTURE OR STYROFOAM. THERMO-SETTING POLYURETHANE OF BOND BREAKER MATERIAL SHALL BE APPLIED AS FULL LONGITUDINAL JOINT BOND REMOVED AND POLYURETHANE OF CLOSED CELL STRUCTURE OR STYROFOAM. THE JOINT REPAIR. SHALL NOT BE RE-ESTABLISHED IN THE EXISTING TRANSVERSE JOINT OF REPAIR IS GREATER THAN 6'-0", CONSTRUCT A TOOLED JOINT AT THE MIDPOINT OF THE REPAIR (\( W/2 \)).

**NOTES:**

1. IF THE LENGTH OF REPAIR IS 4'-0" TO 8'-0" OR LESS AND WIDTH OF REPAIR IS GREATER THAN 4'-0", CONSTRUCT A TOOLED LONGITUDINAL JOINT AT THE MIDPOINT OF THE REPAIR PANEL.
2. IF THE LENGTH OF REPAIR IS GREATER THAN 8'-0", CONSTRUCT A TOOLED TRANSVERSE JOINT EXTENDING TO THE NEXT CURB. IF THE PAVER REPAIR SHOULD EXTEND THROUGH INTEGRAL CURB, THE NEW CURB SHALL BE CONSTRUCTED TO THE SAME DIMENSIONS AS THE EXISTING CURB.

**LEGEND**

- \( T \)" THICKNESS OF CONCRETE
- \( W \)" WIDTH OF PANEL
- \( L \)" LENGTH OF PANEL
- \( D \)" DEPTH OF PANEL
- \( * \) FOR JOINT REPAIR LOCATIONS, SEE SHEET C

**SEE DETAIL A**
**TYPICAL CROSS SECTIONS**

**Figure A**

- **Legend**
  - "T": Thickness of concrete
  - "L": Length of panel
  - "W": Width of panel
  - "E": Existing transverse joint

**Figure B**

- **Detail A**
  - See Figure A
  - See Figure B

**Figure C**

- **Repair Section**
  - Transverse joint
  - Longitudinal joint

**NOTE:**

- For pavement repair locations, see Sheet C.
NO OVERLAY DOWELED CONCRETE PAVEMENT REPAIR

**NOTE:** THE EXISTING TRANSVERSE JOINT MAY BE SUBSTITUTED AT FULL DEPTH DIAMOND SAW CUT.

- **Dowel Bars:** 2'-0" from the edge of the pavement
- **Transverse Joint Sealant:** Hot poured joint location
- **Concrete:** In plastic form while repair
- **Hole:** 1" to 1½" dia.
- **Bonds:** 18" dowel bars

**Longitudinal Joint Bond Breaker:**
- **Bonds:** 2'-0" from the edge of the pavement
- **Transverse Joint Sealant:** Hot poured joint location
- **Concrete:** In plastic form while repair
- **Hole:** 1" to 1½" dia.
- **Bonds:** 18" dowel bars

**Legend:***
- **Full Depth Diamond Saw Cut:** Full depth
- **Partial Depth Diamond Saw Cut:** Partial depth
- **Concrete Removal (Full Lane Width):** Full lane width
- **Concrete Removal (Partial Lane Width):** Partial lane width
- **Existing Transverse Joint:** Existing transverse joint
- **Existing Doweled Joint:** Existing doweled joint
- **Concrete Thickness:** Thickness of concrete
- **Panel Dimensions:** Length and width of panel
- **Contractor's Option:** Saw or tool longitudinal joint

**Notes:**
- **Pavement Repair:** Should extend with integral curb and shall be even with the same adjoining lane.
- **Joint Sealant:** Hot poured joint location
- **Concrete:** In plastic form while repair
- **Hole:** 1" to 1½" dia.
- **Bonds:** 18" dowel bars
- **Joint Bond Breaker:** 2'-0" from the edge of the pavement
- **Transverse Joint Sealant:** Hot poured joint location
- **Concrete:** In plastic form while repair
- **Hole:** 1" to 1½" dia.
- **Bonds:** 18" dowel bars

**Sections:**
- **Figure A:** Transverse Joint
- **Figure B:** Longitudinal Joint

**For Actual Repair Dimensions:** See Repair Tables (Full Depth)
TYPICAL CROSS SECTIONS

OVERLAY ONLY JOINT REPAIR

FULL DEPTH DIAMOND SAW CUT WILL BE PERMITTED FOR JOINT REPAIR.

INSTALL TIE BARS AT NEW TRANSVERSE JOINT NEAREST TO EXISTING TRANSVERSE JOINT.

INSTALL DOWEL BARS AT NEW TRANSVERSE JOINT NEAREST TO EXISTING TRANSVERSE JOINT.

LONGITUDINAL JOINT BOND BREAKER COMPOSED OF A THERMO-SETTING POLYURETHANE OF CLOSED CELL STRUCTURE OR STYROFOAM.

BOND BREAKER WILL BE INSTALLED ON THE LONGITUDINAL JOINT BETWEEN THE NEW DOWELED TRANSVERSE JOINT AND THE EXISTING TRANSVERSE JOINT.

NOTES:

1. ALL DOWEL BARS AND TIE BARS WILL BE EPOXY COATED.
2. THE EXISTING TRANSVERSE JOINT SHALL NOT BE REPLACED IN THE JOINT REPAIR.
3. TIE BARS REQUIRED.
4. INSTALL TIE BARS AT NEW TRANSVERSE JOINT OPPOSITE OF DOWEL BARS.
5. LONGITUDINAL JOINT BOND BREAKER COMPOSED OF A THERMO-SETTING POLYURETHANE OF CLOSED CELL STRUCTURE OR STYROFOAM.

RE-ESTABLISHED IN THE JOINT REPAIR.

THE EXISTING TRANSVERSE JOINT SHALL NOT BE SUBSTITUTED AT FULL DEPTH LONGITUDINAL STRUCTURE OR STYROFOAM.

NOTE: FOR JOINT REPAIR LOCATIONS, SEE SHEET C

THESE DETAILS ARE CREATED FOR OVERLAY PROJECTS
THESE DETAILS ARE CREATED FOR OVERLAY PROJECTS
**TYPICAL CROSS SECTIONS**

**TRANSVERSE JOINT DETAILS**

- Bond Breaker
- Tie Bars
- Variable Width

**SKEWED TRANSVERSE JOINT DETAILS**

- Bond Breaker
- Tie Bars
- Variable Width

**LONGITUDINAL JOINT**

- Bond Breaker
- Tie Bars
- Variable Width

**DETAIL A**

- Cut off the tie bars from the existing pavement up to the joint.
- Bond breakers will be installed on the longitundinal joint between the new concrete and the existing concrete.

**DOgew BAR SPACING**

- Dowel bars are to be installed at 18" on center into existing pavement.

**NOTE:** All tie bars will be epoxy coated.

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**TEXT:**

- Dowel bars are to be installed at 18" on center into existing pavement.
- Bond breakers will be installed on the longitudinal joint between the new concrete and the existing concrete.
- Tie bars are to be installed at 18" on center into existing pavement.
- All tie bars will be epoxy coated.

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**THESE DETAILS ARE CREATED FOR OVERLAY PROJECTS**
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THESE DETAILS ARE CREATED FOR OVERLAY PROJECTS
Typical Cross Sections

3851-2-E-18
Sheet 6 of 10

Roadway Design Division

Computer: NDOT Design 134
Date: 06-JUL-2021 09:29
File: 38512e18.dgn

Stage
Concrete is in plastic form joint while repair

Repair Section
TOOLED LONGITUDINAL JOINT

Joint repair
OVERLAY ONLY 6" AND 7"
FULL DEPTH OF THE EXISTING CONCRETE APPROXIMATELY 1" WIDE FOR THE A CLOSED CELL STRUCTURE THERMO-SETTING POLYURETHANE OF BOND BREAKER MATERIAL SHALL BE 1" T POLYURETHANE BOND BREAKER THERMO-SETTING

Pavement
EXISTING REPAIR SECTION

THESE DETAILS ARE CREATED FOR OVERLAY PROJECTS

NOTE: FOR JOINT REPAIR LOCATIONS, SEE SHEET C
THICKNESS OF CONCRETE T
LENGTH OF PANEL L
WIDTH OF PANEL W

* THE SAME DIMENSIONS AS THE EXISTING CURB.
IF THE PAVEMENT REPAIR SHOULD EXTEND THROUGH THE EXISTING TRANSVERSE JOINT (W/2). OF REPAIR IS GREATER THAN 6'-0", CONSTRUCT A TOOLED LONGITUDINAL JOINT AT THE MIDPOINT OF THE REPAIR (W/2). IF THE LENGTH OF REPAIR IS 9'-0" OR LESS AND WIDTH
NOTE: TO CONSTRUCT THE CHIPPED FACE. CHIPPING HAMMER SHALL BE USED TO BE REMOVED. A MAXIMUM 15# SAW CUT ON EACH SIDE OF SECTION APPROX. 4" WHEEL CUTTER SAW CUT.
CONTRACTOR MAY USE FULL DEPTH DIAMOND SAW CUT IN PLACE OF 4" WHEEL CUTTER SAW CUT.
2" + 1" INBOARD FROM DIAMOND WHEEL CUTTER SAW CUT.
NOTE: CONSTRUCTION MAY USE FULL DEPTH SAW CUT IN PLACE OF 4" WHEEL CUTTER SAW CUT.
NOTE: DIAMOND SAW CUT

NOTES:
THE EXISTING TRANSVERSE JOINT SHALL NOT BE RE-EVOLUTIONED IN THE JOINT REPAIR.

Legend
T Panel
L Length of Panel
W Width of Concrete
NOTE: FOR JOINT REPAIR LOCATIONS, SEE SHEET C

These details are created for overlay projects.
Typical Cross Sections

Legend:
- "H" - Height of Panel
- "L" - Length of Panel
- "T" - Thickness of Concrete
- "E" - Existing Transverse Joint
- "C" - Concrete Removal Partial Line Width
- "R" - Concrete Removal Full Line Width

Note: For actual repair dimensions, see repair tables (full depth).

These details are created for overlay projects.
THESE DETAILS ARE CREATED FOR OVERLAY PROJECTS
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