**T221, T222 & C221 RAIL**

**RAIL RETROFIT SECTIONS ON SLABS USING ANCHOR BOLTS**

1. **Increase** by amount of existing overlapped/cover thickness, not to exceed 2". If thickness of existing overlapped/cover is greater than 2" at toe of rail, place overlay at a 1:10 or flatter slope over shoulder width to a thickness of 2" or less at toe of rail.

2. **Do not** cast rail or parapet walls on top of overlapped/cover coats.

3. **See appropriate rail standard for reinforcing steel.** Width of vertical reinforcing bars as required to fit existing structure.

4. **Embed** secondary (#4) anchor bars 1'-4" in length with Type III Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedded depth is 8". Anchor bar connections must be able to achieve a basic bond strength in tension, Nba, of 10 kips.

5. **Submit** signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

6. **Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 10 kips.**

7. **Longitudinal reinforcing bars may be removed only if their position puts them in conflict with un-removed portions of existing structure.**

8. **Increase** by amount of existing overlay/seal coat thickness, not to exceed 2". If thickness of existing overlay/seal coat is greater than 2" apply asphaltic 100" max. from outside edge and edge of optional side slot drains, spaced 20" max. from each joint locations with 1-1/2" PVC pipe 5/8" RD (NOT TO BE USED AS A STANDARD).

9. **Joint Opening**

10. **Side Slot Drain**

11. **2 Bars #8/8B placed as shown at each joint.**

12. **T551 RAIL**

13. **T552 RAIL**

14. **RAIL RETROFIT SECTIONS ON CG (PAN FORM) SPANS**

Only SSTR and T551 Rails can be retrofitted to Pan Form overlaps as shown.

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**BAR RD(#8) ASSEMBLY DETAIL**

**ANCHOR BOLT OPTIONS AND ASSEMBLY DETAILS**

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**RETROFIT GUIDE FOR CONCRETE RAILS**

(T221, T222, C221, T402, C402, T551, SSTR, & T552)

(STRONGER THAN STANDARD)
T221 RAIL RETROFIT EXAMPLES

CASE (A)
- Permitted only with Type 1221, 1222, 1222, and 1231 rails. Do not use this detail unless existing curb is at least 10" high and the face is at least 10.5" high per foot. With no strength reduction factor applied.
- Location or placement of rail retrofit must match face of rail and/or toe of rail on bridge.
- Remove existing rail, cut and grind anchor bolts flush, and paint ends with two coats of zinc-rich paint conforming to the Item "Galvanizing".
- Bars spaced longitudinally along rail at 4 ft Max (Spaced 3" longitudinally from outside edge and edge of side slot drains).
- Clean and extend existing vertical reinforcing 10 Min into new construction.
- Clean surface for casting concrete against.

CASE (B)
- Locate anchor bar 2" from toe of rail.
- Increase by amount of existing overlay/Seal coat thickness, not to exceed 2". If thickness of existing overlay/Seal coat is greater than 2" remove any part of rail if not in structure.
- For flashback of seal coat, severe coated with #6 anchor bar spaced at 6" Max (Spaced 3" longitudinally from outside edge). Locate anchor bar 2" from toe of rail.
- Locating face of rail within 2'-0" of face of curb. Location or placement of rail retrofit must match face of rail and/or toe of rail on bridge.

CASE (C)
- Locate anchor bar 2" from toe of rail. The flare at toe of rail, taper overlay at a 1:10 or flatter slope over shoulder width to a thickness of 2" or less at toe of rail.
- Remove existing rail, cut and grind anchor bolts flush, and paint ends with two coats of zinc-rich paint conforming to the Item "Galvanizing".
- Bars spaced longitudinally along rail at 4 ft Max (Spaced 3" longitudinally from retrofitted ends of wingwall).

CASE (D)
- Permitted only with Type 1221, 1222, 1222, and 1231 rails. Do not use this detail unless existing curb is at least 10" high and the face is at least 10.5" high per foot. With no strength reduction factor applied.
- Location or placement of rail retrofit must match face of rail and/or toe of rail on bridge.
- Remove existing rail, cut and grind anchor bolts flush, and paint ends with two coats of zinc-rich paint conforming to the Item "Galvanizing".
- Bars spaced longitudinally along rail at 4 ft Max (Spaced 3" longitudinally from outside edge and edge of side slot drains).

SECTION OF EXISTING PARALLEL WINGWALLS LESS THAN 12" THICK

SECTION OF EXISTING PARALLEL OR FLARED WINGWALLS WITH APPROACH SLAB

CONSTRUCTION NOTES:
- Field verify dimensions before connecting work and ordering materials.
- Connect reinforcement as required to avoid stress concentration at connections. Perform field adhesion tests as required. Minimum adhesion strength at the MASH Test Level required for the MASH Test Level indicated on the applicable rail standard. Rail anchorage details shown on this guide may require modification for select structure types. See appropriate rail standard for details and notes on sheet.
- Clean and extend existing vertical reinforcing 10 Min into new construction. See appropriate rail standard for reinforcing and placement.
- Clean surface for casting concrete against.

MATERIAL NOTES:
- Provide grade 40 reinforcing steel. Ensure code or standards are met. Provide all reinforcing steel listed in the details shown on this guide. Other combinations and reinforcement details shown on this guide. Other combinations and reinforcement details may be acceptable if they meet the same strength requirements as shown on this guide.

GENERAL NOTES:
- Case (A) and (B) anchor bars used for the adhesive anchorage system must not be load-carrying structural component. Require additional anchorage strengths, if specified.
- For flashback of seal coat, severe coated with #6 anchor bar spaced at 6" Max (Spaced 3" longitudinally from outside edge). Locate anchor bar 2" from toe of rail.

This sheet is to be used as a guide for retrofitting existing parallel or flared wingwalls less than 12" thick. General notes and appropriate notes from this guide should be prepared for the job and used in lieu of the detail shown. All modifications of existing or new structures should be designed by a registered professional engineer. All steel and other materials should be set in accordance with the MASH Test Level note. All connection details should be consistent with the applicable rail standard. This sheet is to be used as a guide for retrofitting existing parallel or flared wingwalls less than 12" thick. General notes and appropriate notes from this guide should be prepared for the job and used in lieu of the detail shown. All modifications of existing or new structures should be designed by a registered professional engineer. All steel and other materials should be set in accordance with the MASH Test Level note. All connection details should be consistent with the applicable rail standard.