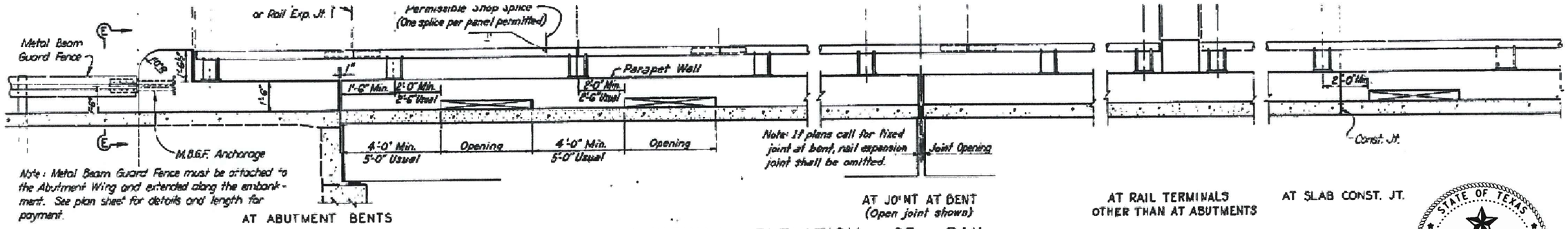
HIGHWAY FACTORS GROUP CHAIRMAN'S
FACTUAL REPORT

Highway Attachment 6 – Contract Plans for the New Single-Sloped Concrete Traffic Rail

Houston, TX

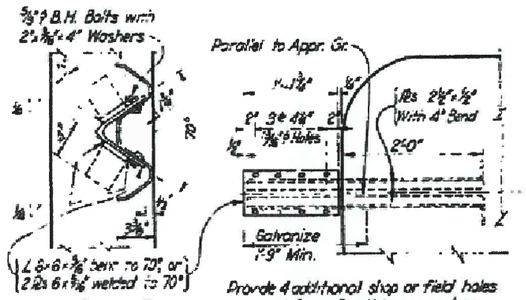
HWY15FH010

(4 pages)

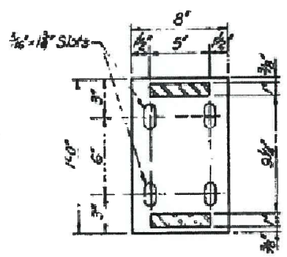


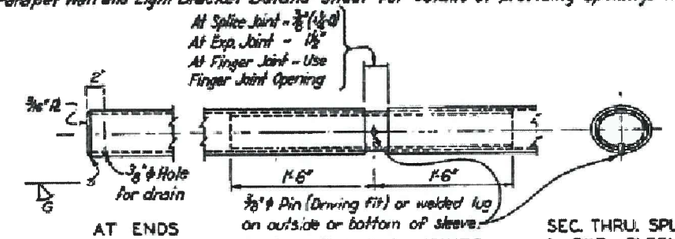
ROADWAY ELEVATION OF RAIL

(Refer to "Typical Parapet Wall and Light Bracket Details" sheet for details of providing openings in parapet wall.)



METAL BM GUARD FENCE ANCHORAGE



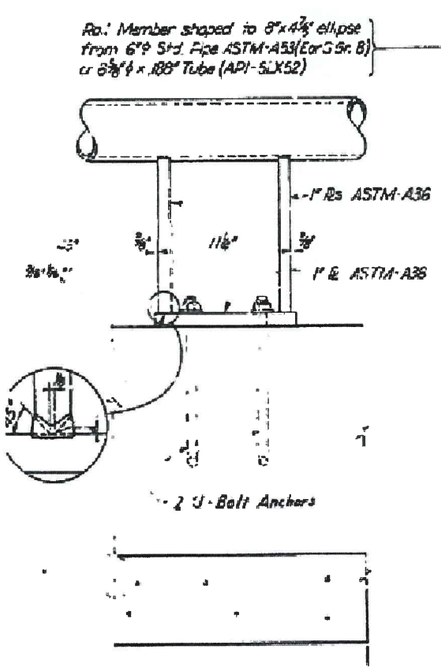


Note: The difference between the outside dimensions of the sleeve and the inside dimensions of the rail shall not exceed .125" along either axis.

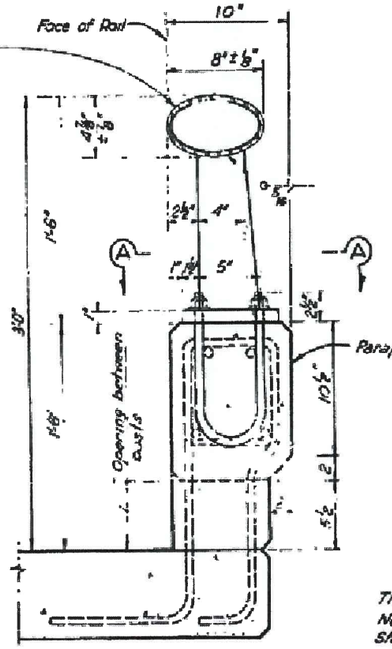
MIN. WALL THICKNESS FOR SLEEVES		
Rail Member →	○	○
Splice Mat'l ↓	A53	5LX52
ASTM-A53-B	.353"	.339"
" A500 GrB	.339"	.325"
" A441	.239"	.231"
API-5LX52	.224"	.216"

Note: Other sections of equal or greater strength are acceptable.

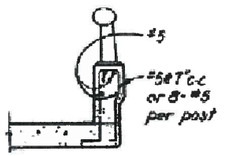
RAIL MEMBER DETAILS



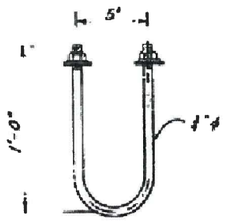
RDWY. ELEV. OF RAIL



SEC. THRU. RAIL



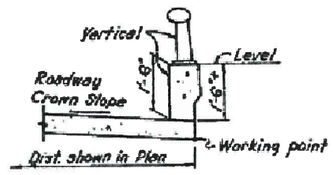
MINIMUM DESIGN REQUIREMENTS



Threaded Anchors ASTM-A321 with Hex Nuts (A325) 1" ø Washers. (2-2" O.D. x 9 ga. Steel Washers & 2-Hardened Washers).

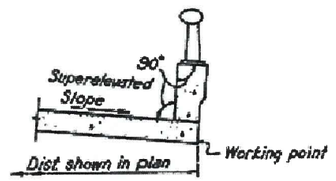
U BOLT ANCHORS

Note. Bolts may have extra length threads for use with nuts or sheet metal fasteners for securing bolts to template.



NORMAL CROWN SECTION *

*Normal crown is used on tangent alignment and on flat horizontal curves as shown in plans.



SUPERELEVATED SECTION ON HORIZONTAL CURVE

Note: Where roadway surface transitions from normal crown to full superelevation, the angle formed by the face of the parapet and the roadway surface shall vary uniformly between the limits shown above.

PARAPET & RAIL POST SETTING DETAIL

This Asbuilt Sheet Is Provided for Contractor's Information Only. It Is The Contractor's Responsability to Verify All Dimensions In the Field Prior to Ordering Materials.

STATE OF TEXAS
ROGER J. LOPEZ
100002
LICENSED PROFESSIONAL ENGINEER
[redacted]
10-06-15

GENERAL NOTES:

Design: AASHO 1964 Interim Specifications.

All open ends of the rail shall be capped.

Rail posts shall be seated on elastomeric pads the same dimensions as post base & ist thick. Additic or half pads may be used in shimming for alignment heights shown will increase by the thickness of the p

Elastomeric pads may be neoprene, rubber-ass rubber fabric, or any other elastomeric product havin meter hardness between 70 & 100 as certified by the manu to the Engineer. The testing specified in Item 438 will not be

Panel lengths of rail member shall be attache minimum of one post and a maximum of four.

For horizontal curves of radius greater than 6 the rail members may be fabricated in straight panels

For curves of radius 800 Ft. and less, panels fabricated to the required radius or in chord length exceed 15 Ft. by beveled shop splices in the rail membe

Rail posts shall be set perpendicular to top of wall.

All bolts, nuts, washers, elastomeric pads, and I Anchorage are considered as parts of the C4 Rail R

Concrete Parapet Wall to be included in Slab ...ment quantities.

All metallic parts of the rail shall be galvanized.

SHEET 1 OF 1

Texas Department of Transportation
Houston District

RETROFIT GUIDE FOR CONCRETE RAIL

SSTR

EXISTING TYPE C4 RAIL DETAILS

FILE: STDD5.DGN	DN: RJL	CK: TxDOT	DW: RJL	CK: TxDOT	STD:	
© TxDOT 2014	DIST	FED REG	PROJECT NO.			SHEET
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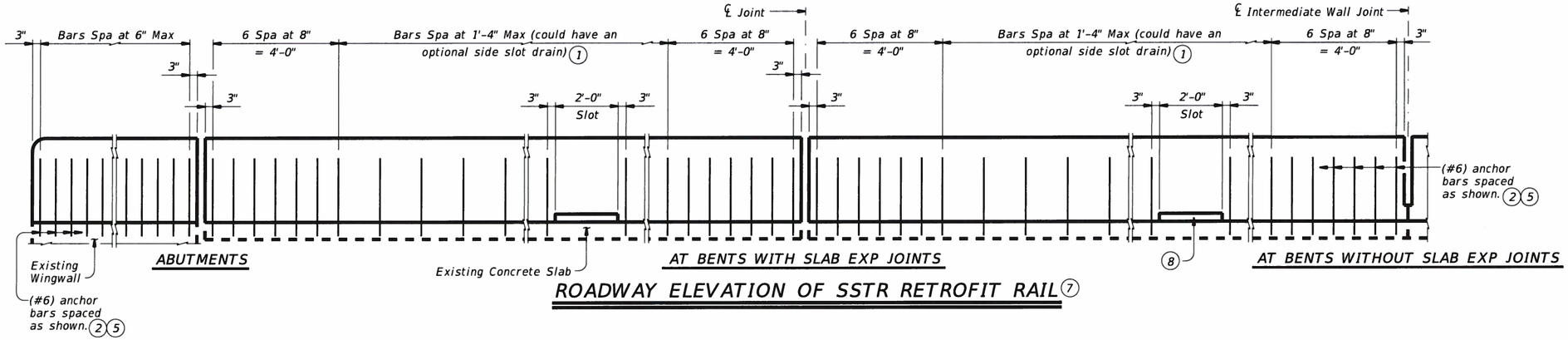
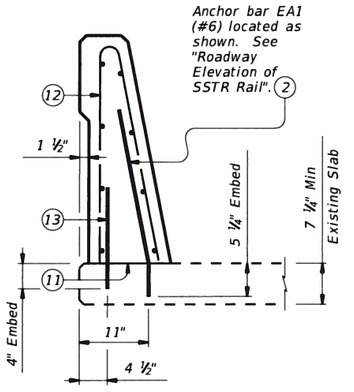
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HARRIS		0912	70	094	IH610

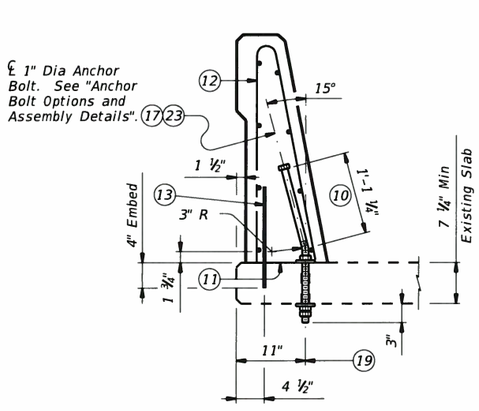


ROADWAY ELEVATION OF SSTR RETROFIT RAIL (7)



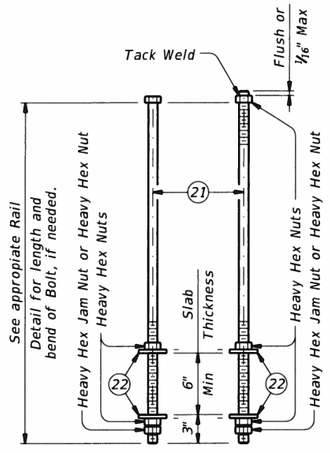
SSTR RAIL

(9) RETROFIT RAIL SECTIONS ON CONCRETE SLABS USING EPOXY ANCHOR BARS

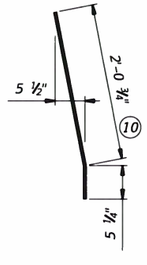


SSTR RAIL

RETROFIT RAIL SECTIONS ON SLABS USING ANCHOR BOLTS (20)



ANCHOR BOLT OPTIONS AND ASSEMBLY DETAILS (23)



ANCHOR BAR EA1 (#6)

(20) Showing location of anchor bars and anchor bolts in a retrofitted rail condition. See appropriate rail standard for details and notes not shown.

(21) ℄ 1" Dia ASTM-F1554 Grade 55 Anchor Bolt or Threaded Rod.

(22) Plate Washer ⅜ x 3 x 3 ASTM-A36 with 1 1/16" Dia Hole centered.

(23) Galvanize anchor bolts, nuts and plate washers.

(1) When side slot drains are used, provide 8'-0" Min clear spacing between drain slots.

(2) Embed (#6) anchor bars 5 ¼" with Hilti HIT RE500 epoxy adhesive. Other Type III Class C epoxy adhesives meeting the requirements of DMS-6100, "Epoxies and Adhesives", may be used if it can be demonstrated that they meet or exceed the strength of Hilti HIT RE500 with the same embedment depth and anchor bar size and spacing. Follow Manufacturer's directions for installing the epoxied anchor bars.

(5) See SSTR Rail Sections in "Retrofit Rail Section on Wingwalls using Epoxy Anchor Bars" and/or "Retrofit Rail Section on Concrete Slabs using Epoxy Anchor Bars".

(7) Showing spacing of (#6) anchor bar epoxy anchored in a retrofitted rail condition. Secondary (#4) anchor bar epoxy anchored in retrofitted rail not shown for clarity. Reinforcing steel and terminal connections not shown for clarity. See appropriate rail standard for details and notes not shown.

(8) Place side slot drains as shown. See appropriate rail standard for side slot drains, except as noted.

(9) Showing location or locations of anchor bars in a retrofitted rail condition. See appropriate rail standard for details and notes not shown.

(10) Increase by amount of existing overlay/seal coat thickness, not to exceed 2". If thickness of existing overlay/seal coat is greater than 2" 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.

(11) Do not cast rails or parapet walls on top of overlays/seal coats.

(12) See appropriate rail standard for reinforcing steel. Modify length of vertical reinforcing bars as required to fit existing structure. Longitudinal reinforcing bars may be removed only if their position puts them in conflict with un-removed portions of existing structure.

(13) Secondary (#4) anchor bars 1'-4" in length are embedded 4" with a Type III Class C epoxy anchorage system. Follow Manufacturer's directions for installing the epoxied anchor bars. (#4) anchor bars spaced longitudinally along rail at 4 ft Max (Spaced 3" longitudinally from outside edge and edge of side slot drains).

(17) ℄ 1" Dia Anchor Bolt Spaced longitudinally along rail at 18" Max (Spaced 6" longitudinally from outside edge and edge of optional side slot drains, if required).

(19) ℄ 1 1/16" to 1 ¼" Dia holes. Core drill holes through existing deck (percussion drilling not permitted). Concrete spalls in the bottom of the deck exceeding ½" from edge of holes will be patched in accordance with Item 429, "Concrete Structure Repair" at the contractor's expense.

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10-06-15

SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

RETROFIT GUIDE FOR CONCRETE RAIL SSTR

(FOR ONE TIME USE)

C-RAIL-R(MOD)

FILE: rlstds22.dgn	DN: RJL	CK: RJL	DW: RJL	CK: NH
©TxDOT July 2014 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0912	70	094	IH 610
	DIST	COUNTY		SHEET NO.
	12	HARRIS		

DATE: 10/6/2015
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DATE: 11/10/2015
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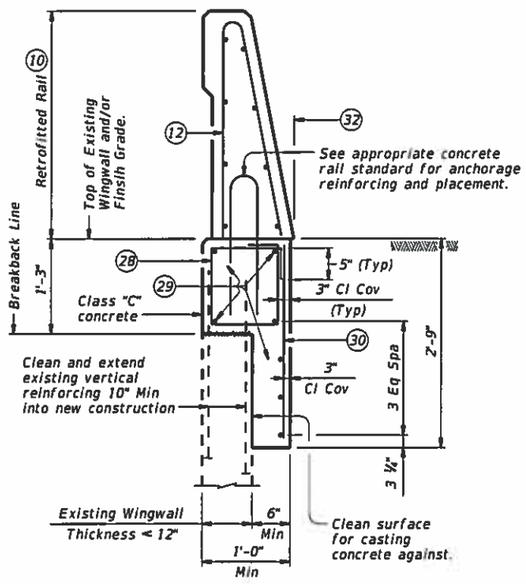


SSTR RAIL

SECTION OF EXISTING PARALLEL WINGWALLS LESS THAN 12" THICK

(10) Increase by amount of existing overlay/seal coat thickness, not to exceed 2". If thickness of existing overlay/seal coat is greater than 2" 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.

(12) See appropriate rail standard for reinforcing steel. Modify length of vertical reinforcing bars as required to fit existing structure. Longitudinal reinforcing bars may be removed only if their position puts them in conflict with un-removed portions of existing structure.

(28) Space (#4) stirrups at 8" Max. (Spaced 3 ¼" longitudinally from retrofitted ends of wingwall).

(29) 7 – (#5) bars with 3" end cover.

(30) Space (#4) bars at 8" Max with 3" end cover, spaced with (#4) stirrups.

(32) Face of rail and/or toe of rail. Location or placement of retrofitted rail must match face of rail and/or toe of rail on bridge.

CONSTRUCTION NOTES:

By adding additional anchorage, welding can be performed at a minimum spacing of 3 ft between the cage and additional anchorage. By satisfying additional anchorage requirements slip forming is allowed. Do not weld to the required anchorage.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

(#6) and (#4) anchor bars used for the epoxied anchorage system must not be epoxy coated within the required embedment.

GENERAL NOTES:

This Retrofit Sheet is to be used in conjunction with th SSTR rail Standard Sheet.

Use of these retrofit details will result in a railing acceptable for Test Level 3 regardless of the higher ratings that may be indicated on the rail standard.

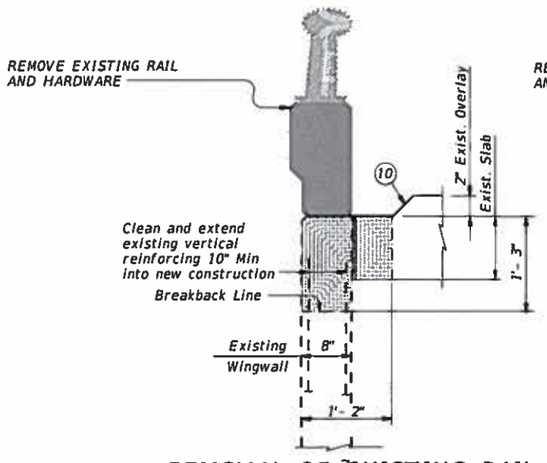
Rail strength tests have been performed on the epoxied (#6) anchor bar system which have demonstrated that the ultimate strength can be developed in the anchorage system.

Rail anchorage details shown on this guide may require modification for select structure types. See appropriate details elsewhere in plans for these modifications. Not all possible combinations of existing railing, curbs, parapets etc. have been shown on this sheet. Other combinations and reinforcement arrangements are permissible if they meet the same strength requirements as indicated on this guide.

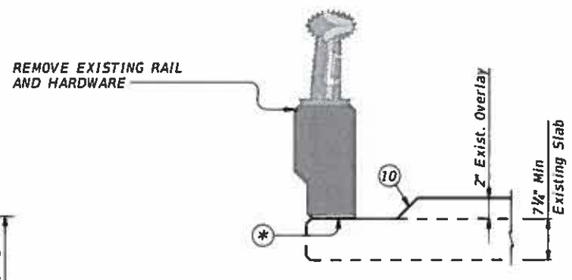
Do not remove any part of a curb until it has been evaluated to not be a load-carrying structural component.

Payment for a retrofit rail will be as per Item 451, "Retrofit Rail (Ty SSTR)".

Reinforcing bar dimensions shown are out-to-out of bar.



REMOVAL OF EXISTING RAIL (AT EXISTING WINGWALL)



REMOVAL OF EXISTING RAIL (AT CONCRETE SLAB)

△(*) Saw cut existing concrete parapet, grind reinforcing steel and paint ends with two coats of zinc rich paint conforming to Item 445 "Galvanizing".
Concrete parapet and metal hardware should be removed in such a manner that can be stored and salvaged by TxDOT personnel.
Existing concrete parapet may be cut 2" above the bridge deck elevation to accomodate the saw machine and clear conflict with existing overlay.
Three (3) sections of 12' length each shall be removed and relocated to the final storage location located at the South Harris Maintenance Office 702 FM 1959 Houston TX, 77034.
Exact locations of the aforementioned existing three sections will be determined by the Engineer.
Contractor shall chip down the remaining 2" stub to ensure a good bond between the new rail and the existing deck as well as to accommodate the retrofit anchor dowels.

See Retrofit Rail Sections for Proposed Retrofit Rail Details.

Install SSTR With Additional 2" Height Allowance (3'-2" Total Height) as Indicated on Type SSTR Rail Standard Sheet.

△ Revised existing rail removal notes. 11/10/15

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SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

RETROFIT GUIDE FOR CONCRETE RAIL SSTR

(FOR ONE TIME USE)

C-RAIL-R(MOD)

FILE: rlstds22.dgn	DW: RJL	CK: RJL	DW: RJL	CK: NH
©TxDOT July 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0912	70	094	IH 610
△ 11/10/15	DIST	COUNTY		SHEET NO.
	12	HARRIS		