INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

Design Memorandum No. 12-09
Technical Advisory

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TO: **All Design, Operations, and District Personnel, and Consultants**

FROM: ***/s/ Anthony L. Uremovich***
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SUBJECT: **Bridge Railings**

REVISES: ***Indiana Design Manual*** **Figures 404-4B and 404-4C**

EFFECTIVE: **September 12, 2012, Letting**

A. Standard Documents

Standard information regarding bridge railing and transitions has been revised. The INDOT *Standard Drawings* in series 706, unless identified otherwise, have been revised as listed below.

Proposed designations listed first, alphabetically

Proposed Designation	Current Designation	Proposed Meaning	Device Designation
BRPP	[same]	Bridge Railing Pedestrian Parapet	PF-1, PF-2, PS-1, PS-2
BRSF	BCBR	Bridge Railing Shape F	FC, FT
BRTF	[same]	Bridge Railing Truck-ht. Flush, 2 rails	TF-2
BRTR	TBRC, -E, -F	Bridge Railing Thrie Retrofit	TR
BRTX	[same]	Bridge Railing TeXas	TX
CBRT	[same]	Concrete Bridge Railing Transition	[same]
731-MSRW	731-BRRW	Moment Slab at Retaining Wall	[same]
TTFC	TTBC	Transition Thrie shape F Common ht.	TFC, was TBC
TTFT	TTBT	Transition Thrie shape F Truck ht.	TFT, was TBT

TTPP	TTBP	Transition Thrie Pedestrian Parapet	TPF-1, TPF-2, TPS-1, TPS-2
TTTF	TPBT	Transition Thrie Truck ht. Flush, 2 rails	TTF-2, was TPBT
TTTX	[same]	Transition Thrie TeXas	TTX
TWFC	TWBC	Transition W-bm. shape F Common ht.	WFC, was WBC
[delete]	BRTM	[Bridge Railing CF-1]	[delete]

Device	Designation Meaning
FC	concrete shape F, Common height
FT	concrete shape F, Truck height
PF-1	concrete Parapet, Flush with deck, 1 steel rail
PF-2	concrete Parapet, Flush with deck, 2 steel rails
PS-1	concrete Parapet, atop Sidewalk, 1 steel rail
PS-2	concrete Parapet, atop Sidewalk, 2 steel rails
TF-2	concrete Truck height, Flush with deck, 2 steel rails
TR	steel Thrie-section, Retrofit
TX	concrete, first used in TeXas

Bridge-railing type CF-1 and its transition have been deleted as standard devices.

All related revised and new *Standard Drawings* appear on the Department website, at http://www.in.gov/dot/div/contracts/standards/drawings/sep12/e/sep700.htm.

Recurring Special Provision 706-B-197, attached herewith, should be called for beginning with the September 12, 2012, letting, if the project includes INDOT *Standard Specifications* Section 706 pay items.

Indiana Design Manual Figures 404-4B and 404-4C have been revised online to show these changes. They are attached herewith.

B. Compatibility of Bridge Positive-Protection Devices

Alphabetical order by bridge-railing designation

Bridge Railing	Bridge-Railing Transition	RCBA Extension	Guardrail Transition
FC	TFC, was TBC	16’-5"	TGB
FC	WFC, was WBC	18’-0”	WGB
FT	TFT, was TBT	20’-6”	TGB
PF-1	TPF-1	16’-5"	TGB
PF-2	TPF-2	16’-5"	TGB
PS-1	TPS-1	16’-5"	TGB
PS-2	TPS-2	16’-5"	TGB

TF-2	TTF-2, was TPBT	20'-6"	TGB
TR	[none]	[none]	TGR
TX	TTX	20'-6"	TGB

The pay-item code numbers for bridge-railing transitions now designated as TFC, TFT, TTF-2, and WFC have not been changed. Calling for the code number for inclusion in an estimate of quantities or cost estimate for a project on Sept. 12, 2012, letting or later, will provide the new pay-item designation shown above.

C. Bridge-Railing Pay Items

Alphabetical order by device type. X = required

Device Type	Railing, Concrete, _____ type	Pay Unit *	Railing, Steel, _____ type	Pay Unit	Reinfor-cing Bars	Pay Unit
FC	X	CYS			X	LBS
FT	X	CYS			X	LBS
PF-1	X	CYS	X	LFT	X	LBS
PF-2	X	CYS	X	LFT	X	LBS
PS-1	X	CYS	X	LFT	X	LBS
PS-2	X	CYS	X	LFT	X	LBS
TF-2	X	CYS	X	LFT	X	LBS
TR			X	LFT		
TS-1			X	LFT		
TX	X	CYS			X	LBS

* Pay unit of LFT instead of CYS should be used only for a bridge rehabilitation, with the permission of the Office of Bridge Rehabilitation.

D. Bridge-Railing-Transition Pay Items

Alphabetical order by bridge-railing device type. X = required

Bridge-Railing Device Type	Transition Device Type	Concrete Bridge Railing Transition, _____ type	Reinfor-cing Bars
FC	TFC	X	X
FC	WFC	X	X
FT	TFT	X	X
PF-1	TPF-1	X	X
PF-2	TPF-2	X	X
PS-1	TPS-1	X	X
PS-2	TPS-2	X	X
TF-2	TTF-2	X	X
TR	[none]		
TS-1	[none]		
TX	TTX	X	X

The pay unit for all transitions is EACH. The pay unit for all reinforcing bars is LBS.

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Attachments

[P:\Structural Services\Design Memos\Signed\2011\1209-ta.doc]

706-B-197 BRIDGE RAILING

(Adopted 02-16-12)

The Standard Specifications are revised as follows:

SECTION 706, AFTER LINE 42, INSERT AS FOLLOWS:

Concrete bridge railing shall be built monolithically and continuous from support to support. A joint shall be provided at the end of the bridge between the bridge railing and the railing transition as shown on the plans.

SECTION 910, BEGIN LINE 1400, DELETE AND INSERT AS FOLLOWS:

910.20 Steel Bridge Railing Components

Materials for steel bridge railing components shall be in accordance with the following~~.~~*:*

(a) Railing *and posts* tubing shall be in accordance with ASTM A 500, Grade B.

(b) Posts, connection plates, splice bars, base plates, and anchor channel bars shall be in accordance with ASTM A *709, Grade* 36 ~~(A 36M)~~. *High strength steel posts and connection plates shall be in accordance with ASTM A 709, Grade 50.*

SECTION 910, BEGIN LINE 1424, DELETE AND INSERT AS FOLLOWS:

(h) Anchor bolts shall be ~~stainless steel~~ *galvanized and* in accordance with ~~ASTM A 276, type 305 or 430. However, they shall have a minimum ultimate strength~~ ~~of 100 ksi (690 MPa)~~ *910.02(g)1*. Threads may be cut or rolled.

Railing Designation	TS-1 *	PF-2	PS-2	TX **
Height Designation	Common	Pedestrian	Pedestrian	Pedestrian
Mounting Location	On bridge coping	Flush with bridge deck	Atop sidewalk of minimum 5 ft width	Either atop sdwk. of 5 ft min. width, or flush with bridge deck
Railing Elements	Thrie-beam with steel posts	2 steel tubes with steel posts on concrete parapet	2 steel tubes with steel posts on concrete parapet	Concrete
Total Height	2'-9"	3'-6"	3'-6"	3'-6"
Bridge-Railing Standard Drawings	n/a	706-BRPP-02, and -05, -06	706-BRPP-04, and -05, -06	706-BRTX-01 through -04
Bridge-Railing Transition	none	TPF-2	TPS-2	TTX
Br.-Rlg.-Trans. Standard Drawings	n/a	706-TTPP-03, and -04	706-TTPP-07 and -08	706-TTTX-01 and -02
Guardrail Transition	TGS-1	TGB	TGB	TGB
Gdrl.-Trans. Standard Drawings	n/a	601-TTGB-01 through -05	601-TTGB-01 through -05	601-TTGB-01 through -05

* Bridge railing type TS-1 may be used only on a local-public-agency collector or local road. Details for the bridge railing and transition are shown in INDOT Recurring Plan Detail 706-B-140d.

** Bridge railing type TX should be considered for an aesthetically-sensitive area.

BRIDGE-RAILING TYPES
TEST LEVEL 2

Figure 404-4B
(Page 1 of 3)

Railing Designation	FC	TR ***	PS-1	PF-1
Height Designation	Common	Common	Pedestrian	Pedestrian
Mounting Location	Flush with bridge deck	On existing concrete parapet	Atop sidewalk of minimum 5 ft width	Flush with bridge deck
Railing Elements	Concrete, shape F	Thrie beam with steel posts	1 steel tube with steel posts on concrete parapet	1 steel tube with steel posts on concrete parapet
Total Height	2'-9"	2'-10"	3'-6"	3'-6"
Bridge-Railing Standard Drawings	706-BRSF-01, and -03	706-BRTR-01, through -04	706-BRPP-03, and -05, -06	706-BRPP-01, and -05, -06
Bridge-Railing Transition	TFC	none	TPS-1	TPF-1
Br.-Rlg.-Trans. Standard Drawings	706-TTFC-01 through -03	n/a	706-TTPP-05 and -06	706-TTPP-01 and -02
Guardrail Transition	TGB	TGR	TGB	TGB
Gdrl.-Trans. Standard Drawings	601-TTGB-01 through -05	706-BRTR-05 and -06	601-TTGB-01 through -05	601-TTGB-01 through -05

*** Bridge-railing type TR should be used only to replace existing aluminum bridge railing where no other modifications to a bridge are to be made, either as a spot improvement or within the limits of a 3R or 4R project.

BRIDGE-RAILING TYPES
TEST LEVEL 4

Figure 404-4B
(Page 2 of 3)

Railing Designation	FT	TF-2
Height Designation	Truck	Truck
Mounting Location	Flush with bridge deck	Flush with bridge deck
Railing Element	Concrete, shape F	2 steel tubes with steel posts on concrete parapet
Total Height	3’-9”	4’-2”
Bridge-Railing Standard Drawings	706-BRSF-02, and -03	706-BRTF-01 through -04
Bridge-Railing Transition	TFT	TTF-2
Br.-Rlg.-Trans. Standard Drawings	706-TTFT-01 through -03	706-TTTF-01 through -04
Guardrail Transition	TGB	TGB
Gdrl.-Trans. Standard Drawings	601-TTGB-01 through -05	601-TTGB-01 through -05

BRIDGE-RAILING TYPES
TEST LEVEL 5

Figure 404-4B
(Page 3 of 3)

Railing Desig-nation	Railing		Bridge-Railing Transition		Guardrail Transition	
	Pay Items	Pay Units	Pay Items	Pay Units	Pay Items	Pay Units
TS-1	Railing, Steel, TS-1	LFT	none	n/a	Guardrail Transition, TGS-1	EACH
PF-2	Railing, Concrete, PF-2 Railing, Steel, PF-2 Reinforcing Steel, Epoxy Coated	CYS LFT LBS	Concrete Bridge Railing Transition, TPF-2 Reinforcing Steel, Epoxy Coated	EACH LBS	Guardrail Transition, TGB	EACH
PS-2	Railing, Concrete, PS-2 Railing, Steel, PS-2 Reinforcing Steel, Epoxy Coated	CYS LFT LBS	Concrete Bridge Railing Transition, TPS-2 Reinforcing Steel, Epoxy Coated	EACH LBS	Guardrail Transition, TGB	EACH
TX	Railing, Concrete, TX Reinforcing Steel, Epoxy Coated	CYS LBS	Concrete Bridge Railing Transition, TTX Reinforcing Steel, Epoxy Coated	EACH LBS	Guardrail Transition, TGB	EACH

Test Level 2 Railings

FC	Railing, Concrete, FC Reinforcing Steel, Epoxy Coated	CYS LBS	Concrete Bridge Railing Transition, TFC * Reinforcing Steel, Epoxy Coated	EACH LBS	Guardrail Transition, TGB *	EACH
TR	Railing, Steel, TR	LFT	none	n/a	Guardrail Transition, TGR	EACH
PF-1	Railing, Concrete, PF-1 Railing, Steel, PF-1 Reinforcing Steel, Epoxy Coated	CYS LFT LBS	Concrete Bridge Railing Transition, TPF-1 Reinforcing Steel, Epoxy Coated	EACH LBS	Guardrail Transition, TGB	EACH
PS-1	Railing, Concrete, PS-1 Railing, Steel, PS-1 Reinforcing Steel, Epoxy Coated	CYS LFT LBS	Concrete Bridge Railing Transition, TPS-1 Reinforcing Steel, Epoxy Coated	EACH LBS	Guardrail Transition, TGB	EACH

Test Level 4 Railings

FT	Railing, Concrete, FT Reinforcing Steel, Epoxy Coated	CYS LBS	Concrete Bridge Railing Transition, TFT Reinforcing Steel, Epoxy Coated	EACH LBS	Guardrail Transition, TGB	EACH
TF-2	Railing, Concrete, TF-2 Railing, Steel, TF-2 Reinforcing Steel, Epoxy Coated	CYS LFT LBS	Concrete Bridge Railing Transition, TTF-2 Reinforcing Steel, Epoxy Coated	EACH LBS	Guardrail Transition, TGB	EACH

Test Level 5 Railings

* May be WFC where appropriate. If bridge-railing transition is WFC, guardrail transition is WGB.

BRIDGE-RAILING PAY ITEMS

Figure 404-4C