



Florida Department of Transportation

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SECRETARY

July 22, 2005

TO: District Directors of Operations, District Directors of Production,
District Design Engineers, District Structures and Facilities Engineers,
District Maintenance Engineers, District Construction Engineers, District
Structures Design Engineers

FROM: William N. Nickas, State Structures Design Engineer *W. Nickas*
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SUBJECT: Structures Temporary Design Bulletin C05-07
Roadway Design Bulletin 05-03
DCE Memorandum 15-05
Policy for Existing Roadway and Traffic Design Standards Index No.
401 Bridge Railing Retrofits

REQUIREMENTS

A. **Delete Structures Design Guidelines, Section 6.7.4., A. General, 2.) and add the following:**

2.) For RRR projects, existing bridge traffic railing retrofits constructed in accordance with *1987 through 2000 Roadway and Traffic Design Standards, Index 401, Schemes 1 and 19 "Concrete Safety Barrier" and Scheme 16 "Guardrail Continuous Across Bridge"* and their accompanying approach and trailing end guardrail treatments may be left in place provided they meet the criteria set forth in the *Plans Preparation Manual, Volume I, Sections 25.4.25.3 and 25.4.26.2.*

3.) When rehabilitation or renovation work is proposed on an existing structure with traffic railings that do not meet the criteria for new or existing railings as provided above, replace or retrofit the existing traffic railings to meet the crash-worthy criteria unless an exception is approved. Refer to Chapter 23 of the *Plans Preparation Manual, Volume I*, for information about exceptions.

B. Add the following to the Plans Preparation Manual, Vol. I, Section 25.4.25.3 after the third paragraph:

Existing bridge traffic railing retrofits constructed in accordance with *1987 through 2000 Roadway and Traffic Design Standards, Index 401, Scheme 16, "Guardrail Continuous Across Bridge"* may be left in place provided the following four criteria are met:

1. The retrofit railing is in good condition.
2. There is not a history of severe crashes at the site.
3. The bridge is not on an Interstate or a high-speed-limited-access facility.
4. The dimension from the center of the w-beam guardrail to the roadway surface is at least 1'-9" (1" tolerance acceptable).

Existing bridge traffic railing retrofits constructed in accordance with *1987 through 2000 Roadway and Traffic Design Standards, Index 401, Schemes 1 and 19 "Concrete Safety Barrier"* may be left in place provided the height of the railing is at least 2'-5" measured from the roadway surface.

C. Delete Section 25.4.26.2 of the Plans Preparation Manual, Vol. I, and add the following new Section 25.4.26.2:

25.4.26.2 Guardrail to Bridge Rail Transitions

Existing guardrail to bridge traffic railing approach and trailing end transitions must be upgraded or replaced unless they conform to one of the following systems.

A. For approach ends of existing standard New Jersey Shape and F Shape bridge traffic railings:

1. The nested thrie beam approach transition shown as *Detail J* in the current *Design Standards, Index 400*.
2. For retrofitted installations, the appropriate nested thrie beam transition shown in the current *Design Standards, Index 402*.
3. The nested w-beam approach transition shown as *Detail J* in the 1998 edition of the *Roadway and Traffic Design Standards, Index 400*, Sheet 7 of 21. This detail is also shown in the 2000 edition of the *Roadway and Traffic Design Standards, Index 401*, Sheet 1 of 9.

All guardrail replacements and new installations connecting to standard New Jersey Shape and F Shape bridge traffic railings shall conform to the current *Design Standards, Index 400*. For guardrail retrofits connecting to existing bridge traffic

railings, see *Design Standards, Index 402* and *Structures Standard Drawings, Indexes I-790, I-795 and I-799*.

B. For approach ends of existing bridge traffic railing retrofits constructed in accordance with the *1987 through 2000 Roadway and Traffic Design Standards, Index 401, Scheme 16, "Guardrail Continuous Across Bridge"*:

1. The w-beam approach transition shown as *Detail J* in the 1987 edition of the *Roadway and Traffic Design Standards, Index 400*, Sheet 9 of 13, upgraded as shown in *Interim Design Standards, Index 403* by the installation of a nested section of w-beam guardrail, additional guardrail posts and offset blocks and a transition block if a curb is not present beyond the bridge end.
2. The nested w-beam approach transition shown as *Detail J* in the 1998 edition of the *Roadway and Traffic Design Standards, Index 400*, Sheet 7 of 21, upgraded as shown in *Interim Design Standards, Index 403* by the installation of a transition block if a curb is not present beyond the bridge end. A transition block is not required if a curb is present.

C. For trailing ends of existing bridge traffic railing retrofits constructed in accordance with the *1987 through 2000 Roadway and Traffic Design Standards, Index 401, Scheme 16, "Guardrail Continuous Across Bridge"*:

1. In the absence of continuing guardrail, two panels of w-beam guardrail and a Type II End Anchorage as shown in *Design Standards, Index 400* or another approved end anchorage.
2. A continuous w-beam guardrail system.

D. For approach ends of existing bridge traffic railing retrofits constructed in accordance with the *1987 through 2000 Roadway and Traffic Design Standards, Index 401, Schemes 1 and 19, "Concrete Safety Barrier"*:

1. The appropriate nested three beam transition shown in *Design Standards, Index 402*.
2. The w-beam approach transition shown as *Detail J* in the 1987 edition of the *Roadway and Traffic Design Standards, Index 400*, Sheet 9 of 13, upgraded as shown in *Interim Design Standards, Index 403* by the installation of a nested section of w-beam guardrail, additional guardrail posts and offset blocks and a transition block if a curb is not present beyond the bridge end.

3. The nested w-beam approach transition shown as *Detail J* in the 1998 edition of the *Roadway and Traffic Design Standards, Index 400*, Sheet 7 of 21, upgraded as shown in *Interim Design Standards, Index 403* by the installation of a transition block if a curb is not present beyond the bridge end.
- E. For trailing ends of existing bridge traffic railing retrofits constructed in accordance with the *1987 through 2000 Roadway and Traffic Design Standards, Index 401, Schemes 1 and 19, "Concrete Safety Barrier"*:
1. In the absence of additional downstream hazards, no end treatment is required.
 2. When additional downstream hazards are present, an approved w-beam trailing end treatment similar to those shown in *Design Standards, Index 400*.

See *Section 25.4.25.3* for bridge traffic railing requirements.

COMMENTARY

Add the following commentary to the *Structures Design Guidelines, Section 6.7.4, A. General, 2.)*:

The obsolete standard entitled "Guardrail Anchorage and Continuous Barrier for Existing Bridges", Index No. 401, was included in the Roadway and Traffic Design Standards from 1987 until 2000. Schemes 1 and 19 of this standard entitled "Concrete Safety Barrier" are based on a design that has been crash tested as documented in Transportation Research Report TRP-03-19-90 and accepted by FHWA at NCHRP Report 350 Test Level 4. Scheme 16 of this standard entitled "Guardrail Continuous Across Bridge" has been structurally evaluated and has been determined to be acceptable to FDOT and FHWA to leave in place on RRR projects provided the installation meets the criteria given herein.

Specify in the Plans the necessary upgrades to the existing guardrail transitions as follows.

For the w-beam approach transition shown as *Detail J* in the 1987 edition of the *Roadway and Traffic Design Standards, Index 400* without a continuation of curb beyond the bridge or approach slab, use the following Plan Sheet note placed adjacent to bridge ends:

Construct Transition Block, nested W Beam Guardrail and additional Guardrail

Posts and Offset Blocks as shown in Interim Design Standards Index 403.

For the w-beam approach transition shown as *Detail J* in the 1987 edition of the *Roadway and Traffic Design Standards, Index 400* with a continuation of curb beyond the bridge or approach slab, use the following Plan Sheet note placed adjacent to bridge ends:

Construct nested W Beam Guardrail and additional Guardrail Posts and Offset Blocks as shown in Interim Design Standards Index 403.

For the nested w-beam approach transition shown as *Detail J* in the 1998 edition of the *Roadway and Traffic Design Standards, Index 400* without a continuation of curb beyond the bridge or approach slab, use the following Plan Sheet note placed adjacent to bridge ends:

Construct Transition Block as shown in Interim Design Standards Index 403.

For all trailing end treatments, specify the necessary guardrail upgrades as appropriate.

BACKGROUND

There are many existing installations of *Roadway and Traffic Design Standards Index 401 Schemes 1, 16 and 19* in place statewide. Schemes 1, 16 and 19 of this obsolete index addressed retrofits of existing bridge railings only. Schemes 1 and 19 are based on a design that has been successfully crash tested and accepted at NCHRP Report 350 Test Level 4. Although Scheme 16 has not been crash tested, it is similar to designs that have been. Scheme 16 has also proven itself by providing overall satisfactory performance for many years. Except as noted above, the removal of an existing Scheme 16 retrofit and replacement with a new traffic railing retrofit is not warranted.

Approach and trailing end guardrail treatments must be evaluated and upgraded or replaced as described. End treatments to all three schemes must be evaluated because the lack of a proper approach and or trailing end treatment may compromise the crashworthiness of the entire retrofit installation. If the approach end of the existing bridge or approach slab curb or sidewalk is not shielded by a continuation of curb beyond the bridge or approach slab, a potential snag point likely exists. The transition block shown in *Interim Design Standards, Index 403* is suitable for reducing the snagging potential at this location.

IMPLEMENTATION

Design: The requirements contained herein reference Interim 2004 Design Standard Index 403 which is attached below for reference. Interim 2006 Design Standard Index 403 will contain the same information and will be issued with the January 2006 interims for the 2006 Design Standards.

All projects let beginning in January 2006 shall use Index 403 if applicable. Projects let between August 2005 and December 2005 should include Index 403 if applicable. If applicable, projects not changed during design shall be addressed during construction as follows.

Construction: Review the bridges on all on-going RRR projects and for those projects that have bridges meeting these conditions contained herein, consult your Design Office and consider adding this work to the existing contract.

CONTACT

For bridge related questions:

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For Design Standards Index related questions:

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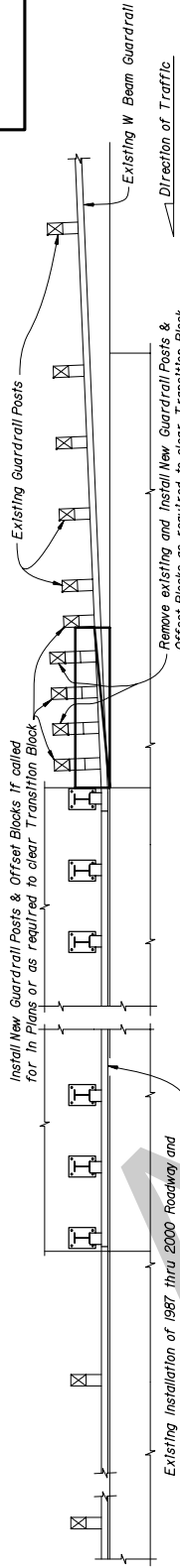
Roadway Design Engineer

(850) 414-4318

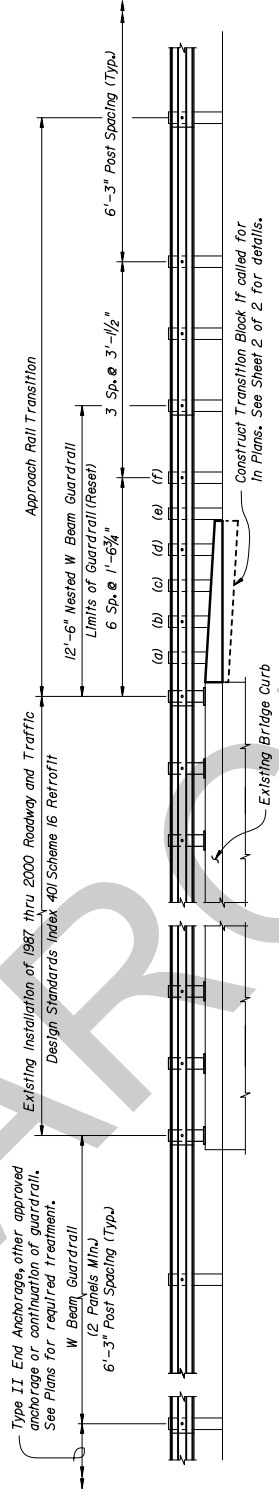
jim.mills@dot.state.fl.us

WNN/BAB/AP/CEB

Attachments



PARTIAL PLAN

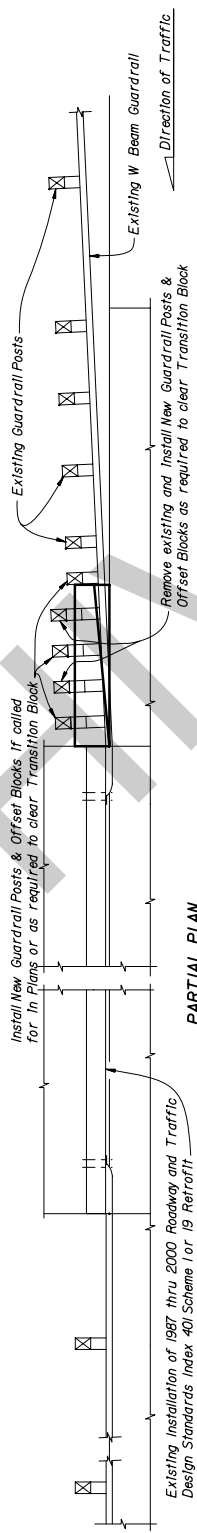


PARTIAL ELEVATION

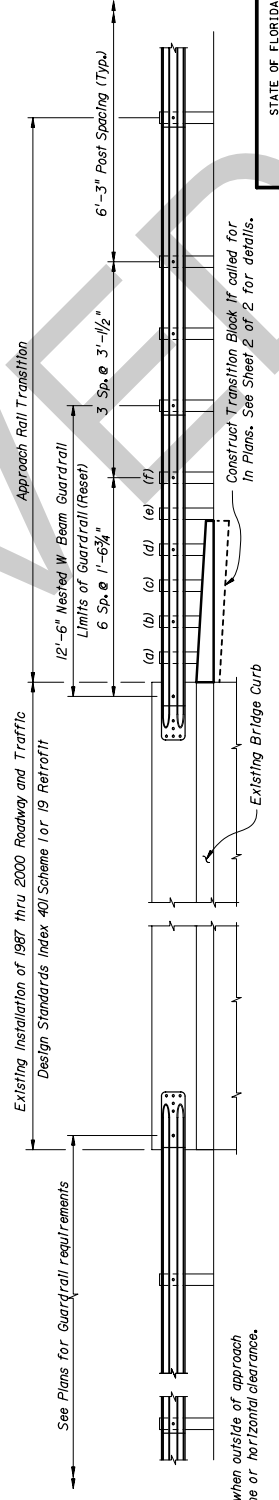
W-BEAM BRIDGE TRAFFIC RAILING RETROFITS

TRAILING END *

APPROACH END



PARTIAL PLAN



PARTIAL ELEVATION

VERTICAL FACE BRIDGE TRAFFIC RAILING RETROFITS

TRAILING END *

APPROACH END

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

GUARDRAIL TRANSITIONS FOR EXISTING BRIDGE TRAFFIC RAILING RETROFITS

INTERIM STANDARD

APPROVED BY: *[Signature]*

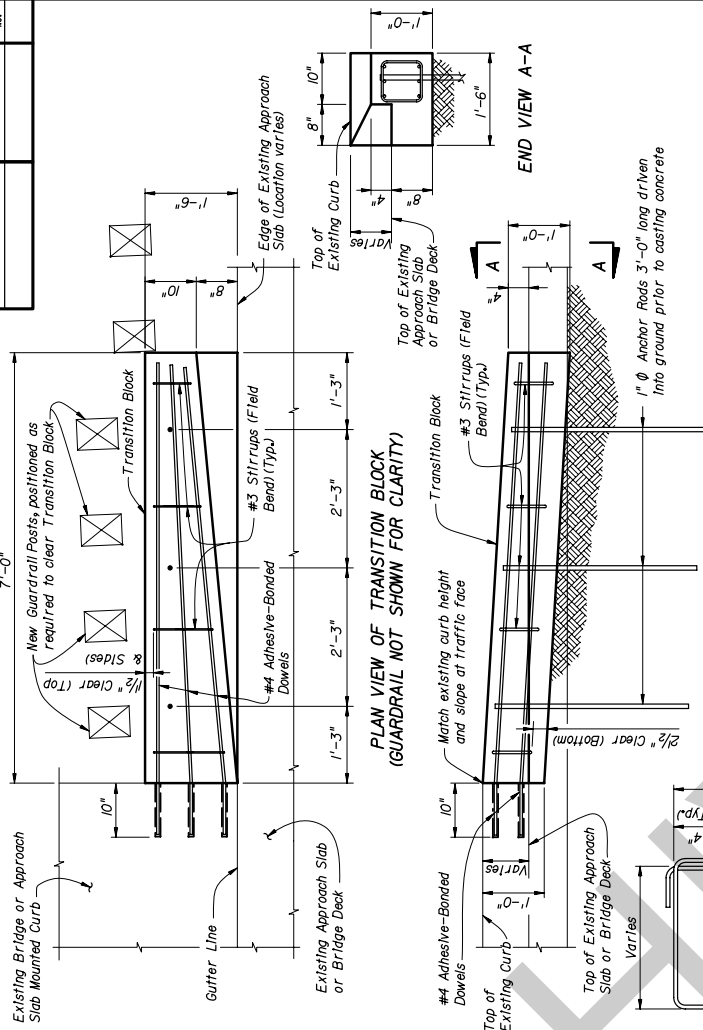
THIS INDEX IS A SUPPLEMENT TO THE DESIGN STANDARDS BOOKLET DATED JANUARY 2004.

REVISION NO. SHEET NO. DATE

2005 1 OF 2 403

INTERIM STANDARD IN ENGLISH UNITS
 THIS INDEX IS A SUPPLEMENT TO THE DESIGN STANDARDS BOOKLET PUBLISHED IN ENGLISH UNITS.

Date: 07-01-05



PLAN VIEW OF TRANSITION BLOCK (GUARDRAIL NOT SHOWN FOR CLARITY)

ELEVATION OF TRANSITION BLOCK (GUARDRAIL AND POSTS NOT SHOWN FOR CLARITY)

#3 STIRRUP (FIELD BEND)

ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Concrete Class II (Miscellaneous)	CU.	0.4
Reinforcing Steel (Roadway)	LB.	61
Guardrail (Reset)	LF.	12.5

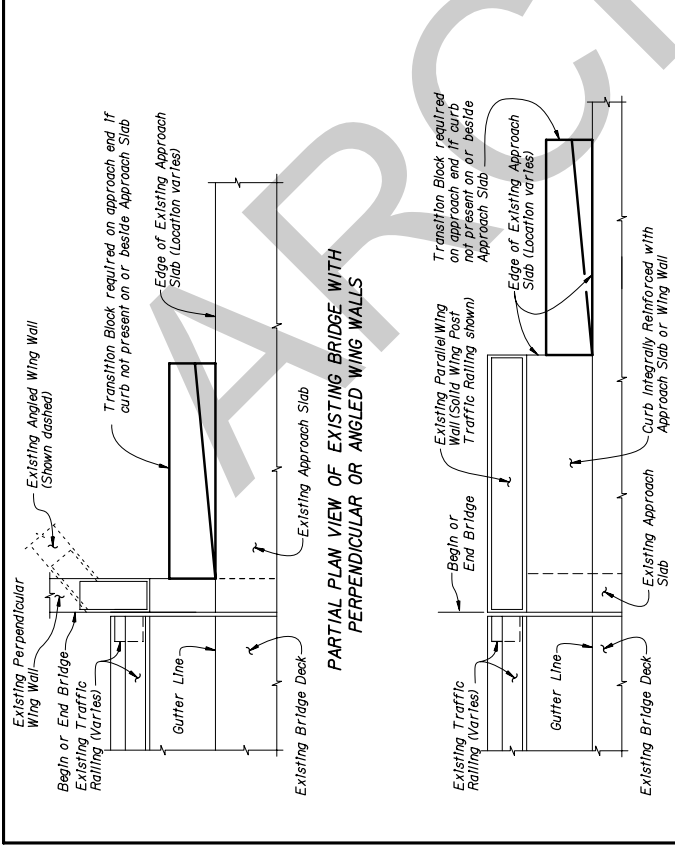
NOTES:
CONCRETE: Concrete for Transition Blocks shall be Class II (Miscellaneous).
REINFORCING STEEL: Reinforcing steel shall be ASTM A615, Grade 60.
ANCHOR RODS: Steel Anchor Rods shall be ASTM A36, ASTM A709 Grade 36 or ASTM A615 Grade 60 hot dip galvanized in accordance with Specification Section 962.
W BEAM GUARDRAIL: Guardrail components and installation shall be in accordance with Design Standards Index 400.
ADHESIVE-BONDED DOWELS: Adhesive Bonding Material Systems for Dowels shall comply with Specification Section 957 and be installed in accordance with Specification Section 46.
 Adhesive Bonded Dowels are shown installed in an existing curb or sidewalk integrally reinforced with Approach Slab, Wingwall or Bridge Deck. For installations in existing detached curbs or sidewalks, install dowels in available sound concrete.
PAYMENT: Payment for Guardrail work will be made under Pay Item Guardrail (Reset) (LF). Payment for Transition Block will be made under Pay Items Concrete Class II (Miscellaneous) (CU) and Reinforcing Steel (Roadway) (LB).

INTERIM STANDARD IN ENGLISH UNITS
 A SUPPLEMENT TO THE DESIGN
 AND CONSTRUCTION MANUAL FOR
 BRIDGE TRAFFIC RAILING RETROFITS
 BOOKLET PUBLISHED IN ENGLISH UNITS.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
**GUARDRAIL TRANSITIONS FOR EXISTING
 BRIDGE TRAFFIC RAILING RETROFITS**

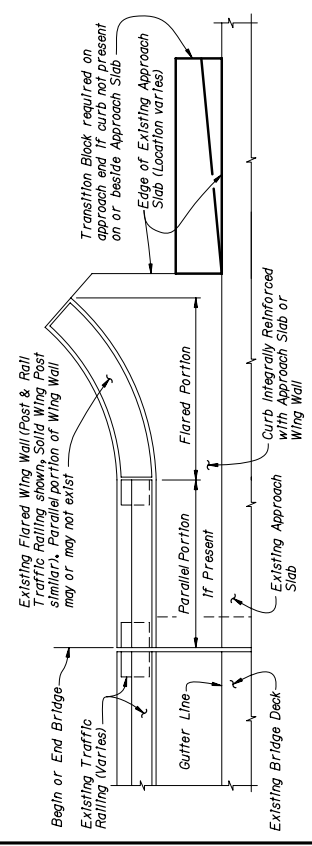
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 DATE: 2/2/2005
 SHEET NO.: 2 OF 2
 PROJECT NO.: 403

Date: 07-01-05



PARTIAL PLAN VIEW OF EXISTING BRIDGE WITH PERPENDICULAR OR ANGLED WING WALLS

PARTIAL PLAN VIEW OF EXISTING BRIDGE WITH PARALLEL WING WALLS AND INTEGRALLY REINFORCED APPROACH SLAB CURBS (APPROACH SLAB WITH DETACHED CURBS OR SIDEWALK SIMILAR)



PARTIAL PLAN VIEW OF EXISTING BRIDGE WITH FLARED WING WALLS AND PARALLEL INTEGRALLY REINFORCED APPROACH SLAB CURBS (APPROACH SLAB WITH DETACHED CURBS OR SIDEWALK SIMILAR)