

INDIANA DEPARTMENT OF TRANSPORTATION



INTER-DEPARTMENT COMMUNICATION
Standards Section C Room N642



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DESIGN MEMORANDUM No. 01-01 TECHNICAL ADVISORY

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

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SUBJECT: Concrete Barrier Walls

EFFECTIVE: September 11, 2001, Letting

INTRODUCTION

The Department utilizes two heights of concrete barrier walls which are usually located in the median of multi-lane divided highways or streets to protect motorists, primarily, from crossover-type crashes. Concrete barriers are used also along the outside shoulders or edges of roadways near or on bridge structures, along high embankments in restrictive areas or other situations where a truck could crash through a standard guardrail and reach another roadway or populated development below.

The heights of the concrete barrier walls currently used by the Department are 840 mm (33 in.), referred to herein as the common-height wall, and 1170 mm (46 in.), referred to herein as the truck-height wall. The truck-height barrier wall is used primarily where larger vehicles such as semi-trailer trucks, etc. comprise a significant portion of the vehicular traffic using the roadway. See Chapter 49 of the Indiana Design Manual for design information. Both of the concrete barrier walls are the "F" shape which is the most effective shape for redirecting errant vehicles with minimal adverse effects on both the vehicle and its occupants.

THE INDOT CONCRETE BARRIER WALLS AND THE NCHRP 350 CRASH TEST CRITERIA

Vehicles using the roadways today are larger and travel at higher speeds than in the past. The new NCHRP 350 crash test criteria, which highway hardware must meet, addresses the size and travel speed characteristics of modern vehicles using our roads.

A wall similar in size and shape to the INDOT's truck-height wall, developed by the Ontario Ministry of Transportation, was successfully crash tested by the Texas Transportation Institute. However, the thickness of the Ontario wall was greater than the INDOT wall where the 75 mm (3 in.) sawed contraction joints are located. Therefore, the INDOT truck-height wall does not closely match the tested wall in the thickness aspect.

INDOT BARRIER WALL MODIFICATIONS

We are adding thickness to our two concrete barrier wall sections in order to more nearly conform to the dimensional characteristics of the Ontario wall. The thickness at the top of the common-height barrier wall will be 410 mm (16 in.). The thickness at the top of the truck-height barrier wall will be 360 mm (14 in.). Sawcuts in the barrier walls to control the location, path, and aesthetics of contraction cracking have been reduced to 40 mm (1.5 in.) in depth to provide a larger frictional surface, to provide increased strength within the walls and to more nearly match the thickness of the Ontario wall.

In order to assume the true "F" shape, the vertical faces, or reveals, at the base of each concrete median barrier wall section, "F" shape concrete bridge railing, and related concrete bridge railing transitions, have been reduced to 75 mm (3 in.) in height. The upper sloped portion of the common-height barrier wall has been extended upward 25 mm (1 in.) to retain the overall 840 mm (33 in.) height, while the truck-height barrier wall has been reduced in height to 1145 mm (45 in.).

These barrier wall modifications are also reflected in sign foundations where their faces are similar to the concrete barrier wall faces and where such sign foundations tie into or are adjacent to the walls.

DESIGN AND CONSTRUCTION CONSIDERATIONS

In order to facilitate design considerations for designers and construction operations for contractors, the widths of the two barrier walls at their bases are now the same, 760 mm (30 in.). This uniform base width allows uniform shoulder widths next to the walls and uniform trench widths for forming the wall irrespective of the wall height dictated by design criteria.

Since the basic shapes of both wall sections are similar, the uniform base width allows the contractor to use the same wall form, also known as the "mule" or "shoe," to slipform both sections. A "plug" or blockout is placed at the top of the form, to slipform the common-height section. The use of the truck-height wall form to construct both sections minimizes the number of forms needed, the changeover time and effort necessary when changing the barrier wall height, and the associated wall form costs.

DESIGN POLICY

The design policy concerning when and where either of the barrier wall heights should be used remains unchanged.

CONTRACT DOCUMENT REQUIREMENTS

Inclusion of concrete barrier walls into a contract affects the contract documents as follows:

- 1. Plans.** The location of the concrete barrier walls should be shown on all applicable typical cross sections, plan and profile, and construction details sheets by means of appropriate line diagrams, symbols, or tables to inform the contractor where the barrier walls included in the Schedule of Pay Items are to be installed. Impact attenuators to shield motorists from the blunt ends of the barrier walls and barrier wall transitions should be shown on the applicable plan and profile sheets and construction detail sheets.
- 2. Standard Drawings.** The designer should review all standard drawings pertaining to concrete barrier walls to determine which drawings are to be included in the contract. All such drawings should be included in the standard drawing index for the contract. The revised standard drawings are as follows:

602-CCMB-01, -02, -04, -05, -06: Concrete barrier
706-BCBR-01 through -04: "F" shape concrete bridge railing
706-TTBC-01, -02, -03: Concrete railing transition TBC
706-TTBT-01, -02, -03: Concrete railing transition TBT
706-TTWC-01, -02: Concrete railing transition WBC
720-ICCA-01, 02, 03: Casting type 5
720-INST-05A: Inlet type H
802-SNBF-01, -02, -03: Box truss traffic sign support foundations
802-SNFT-01, -02, -03: Sign structure foundation
802-SNOH-15, -16: Box truss foundation median installation

- 3. Specifications / Special Provisions.** The Supplemental Specifications, beginning with the September 2001 edition, have incorporated the corresponding aspects of the barrier wall revisions. For typical situations the Supplemental Specifications should be sufficient to use the revised barrier walls in contracts. However, contract-specific requirements may require writing unique special provisions.
- 4. Pay Items.** The new code numbers, pay item descriptions, and pay units are as follows:

| | | |
|-----------|---------------------------------|-----|
| 602-06944 | Barrier, Concrete, 840 mm..... | m |
| 602-06944 | Barrier, Concrete, 33 in. | LFT |
| 602-06945 | Barrier, Concrete, 1145 mm..... | m |
| 602-06945 | Barrier, Concrete, 45 in. | LFT |

The code numbers, pay item descriptions, and pay units for concrete bridge railings and their corresponding railing transitions, and sign structure foundations are unchanged.

EXISTING ROADWAY BARRIER WALL REPAIR / REPLACEMENT / CONTINUATION APPLICATIONS

Where existing concrete barrier walls constructed to the old barrier wall standards must be repaired, replaced, or continued, the designer should refer to Recurring Plan Details 602-R-388d, pages 1 through 5, attached herewith.

Pay item code numbers, descriptions, and pay units for the old concrete barrier walls are as follows. These should be used for both median and shoulder installations.

| | | |
|-----------|--|-----|
| 602-06977 | Barrier, Concrete, 840 mm, Modified | m |
| 602-06977 | Barrier, Concrete, 33 in., Modified..... | LFT |
| 602-06976 | Barrier, Concrete, 1145 mm, Modified | m |
| 602-06976 | Barrier, Concrete, 45 in., Modified..... | LFT |

The following pay items have therefore been obsolete.

| | | |
|-----------|--|---------|
| 602-06032 | Barrier, Median, Concrete | m (LFT) |
| 602-01598 | Barrier, Median, Concrete, 1170 mm | m |
| 602-01598 | Barrier, Median, Concrete, 46 in. | LFT |

IMPLEMENTATION OF THE NEW CONCRETE BARRIER WALL STANDARDS IN NEW-CONSTRUCTION OR RECONSTRUCTION CONTRACTS

Plans should be developed or revised to accommodate the new barrier wall section. For projects with plans that have not been developed to the preliminary field check stage, the recommended widths of the median barrier offsets and median shoulders shown in the Design Manual should be used with the new concrete barrier wall width. For projects with plans that have been developed to or beyond the preliminary field check stage, the median barrier offsets or median shoulders should be narrowed as required, and the lateral locations of the median edges of travelways should be retained. Narrowing the offsets or shoulders may reduce the revised widths to 25 to 75 mm (1 to 3 in.) below those recommended in the Design Manual. A design exception will not be required for use of such narrower widths.

RVC:alu
Attachment

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