

SUPERSEDED BY EB 15-031 EFFECTIVE 9/28/15		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 10-026
Title: Standard Specification Changes for New Box Beam End Assembly Type IIA, Disapproval of Type II End Assembly, and A588 Rail Components			
Distribution: ☒ Manufacturers (18) ☒ Local Govt. (31) ☒ Agencies (32)	☐ Surveyors (33) ☒ Consultants (34) ☒ Contractors (39) ☐ _____ ()	Approved:  Daniel D'Angelo, P.E. Deputy Chief Engineer, Design	
		7/2/10 Date	

ADMINISTRATIVE INFORMATION:

- The EI is effective for projects let on or after January 6, 2011.
- Superseded Issuances: No issuances are superseded.
- The information transmitted by this issuance will be incorporated into a future revision to the Standard Specifications.

PURPOSE: The purpose of this EI is to issue changes to Standard Specifications Section 606 Guide Railing.

TECHNICAL INFORMATION:

Design

- This EI is being issued concurrently with EB 10-021 *Highway Design Manual Revision No. 57 - Chapter 10 - Roadside Design, Guide Rail, and Appurtenances* and EB 10-022 *Type IIA End Assembly for Box Beam Guide Railing - Standard Sheets 606-04 and M606-55, M606-56, M606-57, & M606-58.*
- The Box Beam Type II End Assembly is no longer approved for installation on new construction or reconstruction projects, or resetting where it must be dismantled as part of the project work.
- As alternatives to the Type II End Assembly, designers may specify use of a Type 0, a Type I, a Type IIA, or a Type III, depending on the conditions.
- Item 606.1201 *Box Beam Guide Railing End Assembly, Type I* is disapproved and is replaced with 606.120101 *Box Beam End Piece*. This will be used on departure ends of tangent.
- The Type I End Assembly item has been changed to 606.120102 and the pay limits now include the turned down end piece **and** the 72' of curved approach/terminal end.
- For locations where a greater set back is needed to place the end piece within 5' of the edge of the clear zone, a separate item (606.120103) has been created for the Type I End Assembly with an 18 feet extension.
- The Type IIA End Assembly item will be paid for using 606.120201 *Box Beam Guide Railing End Assembly, Type IIA*. Pay limits include the turned down end piece **and** the 18' of curved section.
- The emergency standby contract special specification has been revised to accommodate the Type IIA End Assembly and remove rustic references.
- Until sufficient pay item history is established the following costs should be used for estimating purposes:

○ 606.120101 Box Beam End Piece	\$324.00
○ 606.120102 Box Beam Guide Railing End Assembly, Type I	\$2052.00
○ 606.120103 Box Beam Guide Railing End Assembly, Type I w/ 18' extension	\$2448.00
○ 606.120201 Box Beam Guide Railing End Assembly, Type IIA	\$1057.00

Miscellaneous

- In addition to the above specification changes involving box beam end assemblies, this issuance disapproves pay items numbers for specifications referencing "rustic" items that were overlooked in EI 07-029 *Elimination of A588 Steel for Guide Rail Design Projects*.

IMPLEMENTATION:

- Main Office Design Quality Assurance Bureau will insert the standard specification shelf note into contract proposals beginning with projects submitted for the letting of January 6, 2011.
- The following contract pay items have been **disapproved**:

U.S. Customary

- 606.1201 Box Beam Guide Railing End Assembly, Type I
- 606.10010008 Powder Coating Box Beam Guide Railing
- 606.12010063 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 1
- 606.1202 Box Beam Guide Railing End Assembly, Type II
- 606.12020063 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 2
- 606.12020108 Powder Coating Box Beam Guide Railing Type II End Section
- 606.12020208 Powder Coating Box Beam Guide Railing Type II End Section
- 606.12020308 Powder Coating Box Beam Guide Railing Type II End Section
- 606.12030063 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 3

Metric

- 606.1201 Box Beam Guide Railing End Assembly, Type I
- 606.1001--03 Powder Coating Box Beam Guide Railing
- 606.1201--63 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 1
- 606.1202 Box Beam Guide Railing End Assembly, Type II
- 606.1202--63 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 2
- 606.12020103 Powder Coating Box Beam Guide Railing Type II End Section
- 606.1203--63 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 3

- The following standard and special specifications are **approved**:

U.S. Customary

- 606.120101 Box Beam End Piece
- 606.120102 Box Beam Guide Railing End Assembly, Type I
- 606.120103 Box Beam Guide Railing End Assembly, Type I with 18' extension
- 606.120201 Box Beam Guide Railing End Assembly, Type IIA
- 606.12010163 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Range 1 (1 to 5)
- 606.12020163 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 2 (6 to 10)
- 606.12030163 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 3 (11 to 15)

Metric

- 606.120101 Box Beam End Piece
- 606.120102 Box Beam Guide Railing End Assembly, Type I
- 606.120103 Box Beam Guide Railing End Assembly, Type I with 5.5 m extension
- 606.120201 Box Beam Guide Railing End Assembly, Type IIA
- 606.12010163 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work Range 1 (1 to 5)
- 606.12020163 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work Range 2 (6 to 10)
- 606.12030163 Box Beam Guide Railing End Assembly, Emergency Standby Contract Work Range 3 (11 to 15)

- The following contract pay items have been disapproved because they reference "Rustic" rail. Where use

of any of these items is desired, designers should submit revised special specifications for approval, with the A588 components eliminated.

U.S. Customary

- o 606.10010091 Ironwood Guide Railing with Extra Long Posts (Shop Curve)
- o 606.10500091 Ironwood Guide Railing (Rustic)
- o 606.12000091 End Terminal for Ironwood Guide Rail (Type II)

Metric

- o 606.10---91 Ironwood Guide Railing
- o 606.1001--91 Ironwood Guide Railing with Extra Long Posts (Shop Curve)
- o 606.1003--08 Box Beam Guide Railing End Assembly, Material Only
- o 606.1050--91 Ironwood Guide Railing (Rustic)
- o 606.1051--91 Ironwood Guide Railing with Extra Long Posts (Rustic)
- o 606.11---91 End Terminal For Ironwood Guide Rail (Type I)
- o 606.11020108 Repair Box Beam Median (North)
- o 606.11020208 Repair Box Beam Median (South)
- o 606.12---91 End Terminal for Ironwood Guide Rail (Type II)
- o 606.1250--91 End Terminal for Ironwood Guide Rail (Type II)(Rustic)
- o 606.1801--08 Merritt Parkway Guide Rail
- o 606.1802--08 Merritt Parkway Guide Rail (System 2)
- o 606.1801--08 Merritt Parkway Guide Rail (System 3)
- o 606.1801--08 Merritt Parkway Guide Rail (System 3A)
- o 606.4791--10 Steel Backed Timber Median Barrier with Timber Posts and Block-Outs
- o 606.4792--10 Approach Anchorage Units for Steel Backed Timber Median Barrier with Timber Posts and Block-Outs
- o 606.4794--10 Steel Backed Timber Median Barrier with Timber Posts and Block-Outs Connection to Walls

TRANSMITTED MATERIALS:

Attached are both US Customary and Metric shelf notes, *Section 402 – Hot Mix Asphalt (HMA) Pavements*.

BACKGROUND: In the early 1980s, it was recognized that a box beam terminal was needed for situations where the available space was too restricted for the use of a Type I end assembly. Numerous terminal concepts were tested, but none was found that performed acceptably for high-speed impacts. During the development and testing of what became the Type II, a small vehicle was barely able to remain upright after passing over the terminal at 41.8 mph. Based on the crash test results, the Type II was judged acceptable for speeds of 45 mph or less. However, that test had level ground behind the terminal, a condition that seldom exists for most real installations. When the ramping effect of the terminal is combined with the destabilizing effect of landing on a slope, it is now believed there could be a significant number of cases where even a low-speed small vehicle could end up rolling over after traversing a Type II.

The small car that was used in the original crash testing has become quite rare. This led AASHTO to modify the crash testing protocol from NCHRP 350 to MASH, which increased the weight of the small test vehicle from 1800 lb to 2425 lb. Because the added mass should make the vehicle more stable, the Type II box beam terminal was recently subjected to a crash test to see if the Type II could function adequately for the heavier small vehicle at high speed. The test was for what was believed to be the critical impact condition: the small car straddling the end of the terminal while crossing it at high speed and a relatively low angle. Unfortunately, the test vehicle was tripped and rolled. Based on this unfavorable result, the Type II terminal is deemed undesirable for new or reconstruction use on high-speed highways and remains suspect for lower speeds.

Because a need still exists for an economical, generic terminal that can function adequately in high-speed locations, it was decided to test what has often proven to be a necessary installation, a tightly curved flare ending with a Type I end piece. Through the testing program, it was found that satisfactory results were obtained whe

an 18 foot length of box beam was shop-curved to a 35 foot radius and terminated with a Type I end piece. Posts, some that were extra length, were placed at three foot post spacing. Details are shown on the Standard Sheets 606-04 issued via EB 10-022.

As part of the crash testing effort, the Department elected to run two special crash tests that are not required as part of the standard suite of tests. Both of these tests involved testing the terminal with a ditch in close proximity behind the rail and under the terminal, a condition not uncommon on our secondary highways. In the first of these special tests, a small car was run at a relatively low speed down the slope at a shallow angle, giving it the opportunity to follow the grade down before arriving at the flared back terminal. In this test, the box beam separated from the posts, came over the hood, and smashed sideways through the passenger's side of the windshield. This test underscored the critical importance of trying to avoid placement geometries (combination of rail profile and approach slopes) that could lead to "clotheslining" type crashes.

In the second special test with a ditch, a heavy pickup truck (5000#) was run at a 25 degree angle and a speed of 62 mph into the flared-back portion of the guide rail. The purposes of this test were, first, to determine the extent to which the terminal could help slow the vehicle before its impact with the back slope of the ditch and, second, to determine whether striking the rail might somehow make the ditch crash worse. It was found that the terminal made the crash into the ditch much more survivable. The end assembly turned and slowed the pickup from 62 mph to 40 mph just before the rear end of the truck struck the back slope. The decelerations were actually determined to be within the limits required for the test suite, but the rollover that followed, though not as severe as would otherwise have occurred without the terminal, was more than the limit for a passing test.

CONTACT: Questions may be directed to Terry Hale by calling (518) 485-7009 or by e-mailing thale@dot.state.ny.us.

Section 606 – Box Beam Guide Railing End Assembly, Type IIA

Make the following changes to the Standard Specifications of May 1, 2008:

Page 515, in §606-5, **delete** the pay items “606.1201 Box Beam Guide Railing End Assembly Type I” and “606.1202 Box Beam Guide Railing End Assembly Type II” and **add** the following:

“606.120101 Box Beam End Piece
606.120102 Box Beam Guide Railing End Assembly Type I
606.120103 Box Beam Guide Railing End Assembly Type I with 18 ft Extension
606.120201 Box Beam Guide Railing End Assembly Type IIA”

Page 858, in **710-20 CORRUGATED BEAM GUIDE RAILING AND MEDIAN BARRIER**, under MATERIAL AND FABRICATION REQUIREMENTS **add** the following paragraph:

General: For new installations all components shall be new.”

Page 859, in **710-21 BOX BEAM GUIDE RAILING AND MEDIAN BARRIER**, under MATERIAL REQUIREMENTS **add** the following paragraph:

General: For new installations all components shall be new.”

Page 860, in **710-22 CABLE GUIDE RAILING**, under MATERIAL REQUIREMENTS **add** the following paragraph:

General: For new installations all components shall be new.”

Section 606 – Box Beam Guide Railing End Assembly, Type IIA

Make the following changes to the Standard Specifications of May 4, 2006:

Page 515, in §606-5, **delete** the pay items “606.1201 Box Beam Guide Railing End Assembly Type I” and “606.1202 Box Beam Guide Railing End Assembly Type II” and **add** the following:

“606.120101 Box Beam End Piece
606.120102 Box Beam Guide Railing End Assembly Type I
606.120103 Box Beam Guide Railing End Assembly Type I with 18 ft Extension
606.120201 Box Beam Guide Railing End Assembly Type IIA”

Page 817, in **710-20 CORRUGATED BEAM GUIDE RAILING AND MEDIAN BARRIER**, under MATERIAL AND FABRICATION REQUIREMENTS **add** the following paragraph:

“General: For new installations all components shall be new.”

Page 818, in **710-21 BOX BEAM GUIDE RAILING AND MEDIAN BARRIER**, under MATERIAL REQUIREMENTS **add** the following paragraph:

“General: For new installations all components shall be new.”

Page 819, in **710-22 CABLE GUIDE RAILING**, under MATERIAL REQUIREMENTS **add** the following paragraph:

“General: For new installations all components shall be new.”

ITEM 606.12XX0063 - BOX BEAM GUIDE RAIL END ASSEMBLY, EMERGENCY STANDBY
CONTRACT WORK

All the provisions of Section 606 with respect to Box Beam Guide Rail End Assembly apply except:

1. Supply End Assembly Type I, or End Assembly Type IIA, or End Assembly Type III for box beam guide railing as stated in the initial order or as directed by the Engineer.
2. Payment for box beam guide rail end assemblies under this item shall include the unit price bid and the quantity multiplied by the appropriate payment factor for the different types of box beam guide rail end assemblies listed in the table below.

PAYMENT FACTORS FOR DIFFERENT TYPES OF BOX BEAM END ASSEMBLIES

TYPE OF END ASSEMBLY	PAYMENT FACTOR
Box Beam End Piece	1.00
Box Beam End Assembly, Type I	6.33
Box Beam End Assembly, Type I with 18 ft extension	7.55
Box Beam End Assembly, Type IIA	3.26
Box Beam End Assembly, Type III	15.50

Payment = (Bid Price) x (Quantity) x (Factor from Table 606-2) x (Factor from Table above).

Payment will be made under:

<u>ITEM NO.</u>	<u>ITEM DESCRIPTION</u>	<u>PAY UNIT</u>
606.12110063	Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 1 (1 to 5)	Each
606.12120063	Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 2 (6 to 10)	Each
606.12130063	Box Beam Guide Railing End Assembly, Emergency Standby Contract Work, Quantity Range 3 (11 to 15)	Each