TO:

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ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: BOX BEAM GUIDE RAILING

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Code: EI 89-7

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Supersedes: EI 81-32

We are transmitting the following:

Standard Sheet 606-3R4 Box Beam Guide Rail
Proposal Insert titled "Box Beam Guide Railing"

Standard Sheet 606-3R4 incorporates a new end assembly for restricted areas and also modifies details originally transmitted by EI 81-32 for terminating box beam guide rail in backslopes. The proposal insert adds four new pay items for box beam guide railing terminals and deletes items 606.14 and 606.1450.

This instruction provides guidance on when the various end treatments or end assemblies are appropriate, and a listing of disapproved special item end assemblies previously used by different Regions.

Typical Treatment for Buried Ends. The last paragraph of Section 10.01.04, Guide Rail Installation of the Highway Design Manual as presently written contains the policy for buried ends. It reads as follows:

"Where guide rail terminates near a normal longitudinal drainage ditch in cut, extend the rail into the cut slope and anchor if required for the type of rail.. A sloped terminal section would not be required for this condition."

The detail on standard sheet 606-3R4 titled "Typical Treatment for Buried Ends-Rock or Soil" will cover the case where 6" X 6" box beam guide railing terminates in the backslope of a ditch or in a cut slope. When the end of the box beam is buried, an end assembly is not required.

Please note that no new pay items are required when this treatment is used; the standard pay items for Box Beam Guide Railing, straight or shop curved, being utilized. A pay factor of two (2) for the last 18 LF is used for rock installations to compensate the contractor for the extra cost associated with rock drilling.

Type I End Assembly. The Type I End Assembly is the old standard box beam end assembly that has been used in the past on the end of the 72 foot approach or terminal end and at driveways and other openings. It should continue to be used at the end of the 72 foot approach or terminal end and may also be used without any flare on the downstream end of box beam guide rail runs on one way roadways where it will not receive an impact from approaching traffic. The Type I End Assembly should no longer be used at driveways or at any other break in box beam guiderail runs when the 72 foot flared back end treatment cannot be constructed, except on one-way roadways where it may be utilized on the upstream side of these openings or breaks in the guiderail run. The new Type II End Assembly should be utilized on the down stream side of the break.

Type II End Assembly. This is a new system which is satisfactory for end on impacts at speeds up to 50 mph. Even at speeds over 50 mph the Type II's performance is superior to the Type I assembly for end on impacts. Therefore, the Type II should be the end assembly of choice at driveways and other breaks in the guide railing, except as noted above, and when the 72 foot flared back end treatment cannot be constructed. Even though the Type II End Assembly functions satisfactorily for end on impacts at speeds up to 50 mph, the Department's policy will be to incorporate a flare and set back as detailed on the standard sheets for the followng reason: The flare will minimize a driver's reaction to an apparent hazard near the traveled way. It has been shown that the introduction of an object, such as a guide rail terminal, which appears to be close to the traveled way may cause a driver to shift laterally, slow down, or both. Such reactions are undesirable. When restrictive conditions do not allow the installation of the flare and setback shown on the standard sheet, the flare may be flattened in accordance with Note 8 on the standard sheet.

The Engineering Research and Development Bureau crash tested the Type II End Assembly in accordance with NCHRP Report 230 and the end assembly exhibited the following characteristics during the tests:

1. Satisfactory performance with end-on impacts at speeds up to 51.6 mph for the 1800 pound sedan. However, rollovers did occur with end-on impacts of 60 mph. Both the ramping and vaulting of the 1800 pound test vehicle, at 60 mph, were substantially reduced when compared to another terminal that was tested as part of this project having a 1:2 end slope found on the Type I End Assembly.

2. When impacted with an angular hit at or near the end of the assembly, the test vehicle penetrated the terminal and traveled behind the rail. Therefore a traversable area behind the railing should be provided whenever conditions permit.

3. The full barrier strength was developed 22 feet from the two post anchor. However, the point of need has been established at 27 feet where full rail height is achieved.

For more detailed information on the full scale tests and the conclusions and recommendations of the Engineering Research and Development Bureau you may refer to Research Report 144, which may be obtained from the Engineering Research and Development Bureau.

The new pay items for box beam guide railing terminals and the new standard sheet will become effective with the letting of September 14, 1989.

The following items will be disapproved as of that date:

Item No.	Item	Pay Unit
02606.14	Box Beam Guide Rail End Assembly Double Inverted Post	Ea.
10606.14	Box Beam Guide Rail End Assembly for Restricted Conditions	Ea.
05606.1401	Box Beam Guide Rail End Assembly Type W	Ea.
06606.1401	Box Beam Guide Rail End Assembly Double Posts	Ea.
08606.1401	Box Beam Guide Railing Anchorage Unit	Ea.
09606.1401	Box Beam Guide Railing End Assembly - Type W	Ea.
05606.1402	Box Beam end Assembly for Restricted Conditions	Ea.
08606.1402	Box Beam End Assembly for Restricted Conditions	Ea.
09606.1402	Box Beam Guide Railing End Assembly - Type Z	Ea.
06606.1403	Box Beam Terminal for Restricted Conditions	Ea.
05606.1487	Box Beam Guide Rail End Assembly Type MO	Ea.
05606.1501	Box Beam Guide Railing end Assembly Type A	Ea.
05606.1502	Box Beam Guide Railing End Assembly Type B	Ea.
05606.1601	Box Beam Guide Railing End Assembly Type B	Ea.

Item No.	Item	Pay Unit
08606.1611	Box Beam Guide Rail End Assembly for Restricted Conditions - Type 8 (Controlled Oxidizing)	Ea.
08606.1612	Box Beam Guide Rail End Assembly for Restricted Conditions - Type 10 (Controlled Oxidizing)	Ea.
05606.1701	Box Beam Guide Railing End Assembly Type C	Ea.

BOX BEAM GUIDE RAILING

Make the following changes to the Standard Specifications of January 2, 1985:

Pg. 6-18 of the Standard Specifications.

Under the list of pay items delete Item 606.14 "Box Beam Guide Railing End Assembly".

Pg. 41 of Addenda 1.

Under the list of pay items delete Item 606.1450 "Box Beam Guide Railing End Assembly (Rustic)."

Pg. 6-18 of the Standard Specifications add the following to the list of pay items found on this page:

Item No.	Item	Pay Unit
606.1401	Box Beam Guide Railing End Assembly Type I	Each
606.1402	Box Beam Guide Railing End Assembly Type II	Each
606.1451	Box Beam Guide Railing End Assembly Type I (Rustic)	Each
606.1452	Box Beam Guide Railing End Assembly Type II (Rustic)	Each