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ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

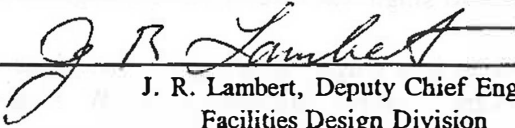
**SUBJECT: SINGLE-SLOPE CONCRETE MEDIAN BARRIER
(ISTEA-INNOVATIVE SAFETY BARRIER)**

Subject Code: 7.27-1-606; 7.27-2-606

Distribution: 30 Main Office 32 Regions 34 Consultants

Code: EI 93-023

APPROVED:


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Facilities Design Division

Date: August 4, 1993

Supersedes:

EI 93-009, dated May 12, 1993, stated that formalized drawings, details, and specifications for the various innovative barriers would be issued by Engineering Instruction as they were prepared.

Therefore, we are transmitting the following herewith:

Item 93606.30XX Single-Slope Concrete Median Barrier
Item 15606.30XX Single-Slope Concrete Barrier For Use To The Right of Traffic
CADD detail sheets for the Single-Slope Concrete Median Barrier, Single-Slope Concrete Half Section Barrier, and Single-Slope Concrete Median Barrier Terminals.

Purpose: To provide specifications and detail drawings for single sloped barriers. The single-slope concrete median barrier is an innovative safety barrier that is being implemented by NYSDOT to satisfy the requirements of Section 1058 of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA).

General Information: Single-slope concrete median barrier used as a median barrier (a barrier used to separate flows of traffic) will use item 93606.30XX, regardless of highway classification or funding source. Any other usage of this item such as a barrier on the right side of traffic with no traffic on the other side will use Item 15606.30XX. The 93 prefix on the item number indicates that this item is an innovative safety barrier and the use of this prefix will help us track the use of the innovative safety barriers used as median barriers. This is necessary as the Department must certify annually to FHWA that at least 2.5% of new or replacement permanent median barrier placed on Federal-aid projects on the National Highway System (NHS) is innovative safety barrier. The Single-Slope Barrier For Use To The Right of Traffic has not been assigned a 93 prefix because it is not known under what conditions, if any, it would be considered an innovative safety barrier. Engineering Instruction 93-009, which was recently issued, contains the details for complying with Section 1058 of ISTEA.

The attached detail sheets are on Micro Station CADD and may be obtained on computer disk or down loaded to your system by contacting the draftsman at (518)457-6449. The designer should note that the drawing is a detail sheet, not a standard sheet, and that he/she may have to add some notes or minor details to it so that it may be used as a plan sheet in the project utilizing the single-slope barrier.

We are also developing the following transitions for the single-slope concrete median barrier:

1. Single-slope concrete median barrier to the Department's standard median barrier (N J Shape).

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2. Single-slope-concrete-median-barrier-to-box-beam-median-barrier.
3. Half section single-slope concrete median barrier to vertical walls.
4. Half section single-slope concrete median barrier to single and double box beam guide rail.

As the approval process for newly developed transitions is a lengthy process the transitions are not included with this Engineering Instruction. However, in the event you need a transition, Mr. W. E. Hopkins at (518) 457-6399 will assist you in developing a design for your project.

Warrants and Guidelines for Usage. The warrants for Single-Slope Concrete Median Barrier and the Single-Slope Concrete Barrier For Use To The Right Of Traffic will be the same as the Department's standard median barrier (N J Shape).

Item 15606.30XX Single-Slope Concrete Barrier For Use To The Right of Traffic has a full section concrete barrier as one of the pay items. The full section barrier has the same shape as the single-slope concrete median barrier and the detail sheet for the median barrier should be used. We included the full section concrete median barrier as it is only two (2) inches wider than the half section with backup posts. The Single-Slope Concrete Median Barrier and the Single-Slope Barrier For Use To The Right Of Traffic have some distinct advantages over the standard N J shape.

The following is a list of these advantages:

1. Increased safety because of lower roll angles, especially for the small car, is a principal advantage of these barriers.
2. The extra height and thickness of the barrier will increase its strength and mass. Therefore, it will better contain a large vehicle.
3. The extra height will lessen headlight glare without the use of glare screens.
4. Resurfacing of the roadway adjacent to the barrier that changes the grade by more than 3" may be made as long as the resurfacing does not reduce the height of the barrier to less than 32".
5. The grade from one side of the barrier to the other can differ without the necessity of a complex asymmetrical barrier provided the height of the barrier on the high side is not less than 32".
6. The single slope barrier is easier to construct because of its simple shape.

It should be noted that our review of the research on the single-slope barrier revealed that computer simulations indicate that the occupant impact velocity is slightly higher than the New Jersey barrier. However, the crash tests indicated that the occupant risk was within the limits of NCHRP Report 230.

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Single-slope barriers should be terminated by one of the following methods:

1. Shielding it with a properly designed impact attenuator.
2. Flaring the end away from approaching traffic and fitting it with a single-slope concrete median barrier terminal (end section). When the terminal is flared the turn down should be outside the clear zone. Single-slope concrete median barrier for use to the right of traffic and single-slope concrete half section barrier may be terminated with a single-slope concrete median barrier terminal (end section), provided the above on set back and flare are met.
3. Burying the end in a side slope or earth berm.

If you have any questions regarding this instruction, the attached specifications, detail drawings, or guidelines you may contact W. E. Hopkins at (518) 457-6399.

ITEM 93606.30XX SINGLE-SLOPE CONCRETE MEDIAN BARRIER

Description. Under this work the Contractor shall construct Single-Slope Concrete median barrier of the type specified in the contract documents. The barrier shall be constructed in accordance with these specifications, the details shown in the contract documents, and to the lines and grades shown in the contract documents or as established by the Engineer.

Materials. The materials for Single-Slope Concrete median barrier shall conform to the requirements of the following:

- A. Precast Single-Slope Concrete Median Barrier. The requirements of 704-05 of the Standard Specifications shall apply except that the minimum cover for the reinforcing specified under "Frabrication" shall be two (2) inches.
- B. Cast-in-Place Single-Slope Concrete Median Barrier. The concrete shall conform to the requirements for Class A Concrete in 501, Portland Cement Concrete - General, and the requirements of the following subsections of §700 - Materials.

Premoulded Resilient Joint Filler	705-07
Wire Fabric for Concrete Reinforcement	709-02
Epoxy Coated Bar Reinforcement, Grade 60	709-04

- C. Machine Formed Single-Slope Concrete Median Barrier. The concrete shall conform to the requirements for Class I Concrete in 501, Portland Cement Concrete - General, and the requirements of the following subsections of §700 - Materials.

Premoulded Resilient Joint Filler	705-07
Epoxy Coated Bar Reinforcement, Grade 60	709-04

Construction Details. Single-Slope Concrete median barrier of the type specified shall be erected in accordance with the plans and these specifications. If optional Single-Slope Concrete median barrier is specified the Contractor shall provide precast, cast-in-place, or machine formed barriers. However, no intermixing in any run of barrier will be permitted unless shown otherwise in the contract documents.

- A. Precast Single-Slope Concrete Median Barrier. The requirements of 606-3.05A Precast Concrete Median Barrier shall apply.
- B. Cast-in-Place Single-Slope Concrete Median Barrier. The requirements of 606-3.05B Cast-in-Place Concrete Median Barrier shall apply.
- C. Machine Formed Single-Slope Concrete Median Barrier. The requirements of 606-3.05C Machine Formed Concrete Median Barrier shall apply.

Method of Measurement. Single-Slope Concrete median barrier will be measured by the number of linear feet of barrier constructed in accordance with the plans, specifications, and as directed by the Engineer. The measurement will be taken along the axis of the barrier between its extreme outer limits, unless otherwise indicated in the contract documents.

SINGLE-SLOPE CONCRETE MEDIAN BARRIER (CONTINUED)

Basis of Payment. The unit price per linear foot of single-sloped concrete median barrier shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work.

Payment will be made under:

<u>Item No.</u>	<u>Item</u>	<u>Pay Unit</u>
93606.3041	Single-Slope Concrete Median Barrier (Optional)	Linear Foot
93606.3042	Single-Slope Concrete Median Barrier (Precast)	Linear Foot
93606.3043	Single-Slope Concrete Median Barrier (Cast-in-Place)	Linear Foot
93606.3044	Single-Slope Concrete Median Barrier (Machine Formed)	Linear Foot
93606.3045	Single-Slope Concrete Median Barrier (Optional) (Wide Barrier)	Linear Foot
93606.3046	Single-Slope Concrete Median Barrier (Precast) (Wide Barrier)	Linear Foot
93606.3047	Single-Slope Concrete Median Barrier (Cast-in-Place) (Wide Barrier)	Linear Foot
93606.3048	Single-Slope Concrete Median Barrier (Machine Formed) (Wide Barrier)	Linear Foot

**ITEM 15606.30XX SINGLE-SLOPE CONCRETE BARRIER
FOR USE TO THE RIGHT OF TRAFFIC**

Description. Under this work the Contractor shall construct a single-slope concrete barrier of the type specified in the contract documents. The barrier shall be constructed in accordance with these specifications, the details shown in the contract documents, and to the lines and grades shown in the contract documents or-as-established by the Engineer.

Materials. The materials for Single-Slope Concrete Barrier For Use To The Right Of Traffic shall conform to the requirements of the following:

- A. Precast Single-Slope Concrete Barrier For Use To The Right Of Traffic. The requirements of 704-05 of the Standard Specifications shall apply except that the minimum cover for the reinforcing specified under "Fabrication" shall be two (2) inches.
- B. Cast-in-Place Single-Slope Concrete Barrier For Use To The Right Of Traffic. The concrete shall conform to the requirements for Class A Concrete in 501, Portland Cement Concrete - General, and the requirements of the following subsections of §700 - Materials:

Premoulded Resilient Joint Filler	705-07
Wire Fabric for Concrete Reinforcement	709-02
Epoxy Coated Bar Reinforcement, Grade 60	709-04

- C. Machine Formed Single-Slope Concrete Barrier For Use To The Right Of Traffic. The concrete shall conform to the requirements for Class I Concrete in 501, Portland Cement Concrete - General, and the requirements of the following subsections of §700 - Materials:

Premoulded Resilient Joint Filler	705-07
Epoxy Coated Bar Reinforcement, Grade 60	709-04

Construction Details. Single-Slope Concrete Barrier For Use To The Right Of Traffic of the type specified shall be erected in accordance with the plans and these specifications. If optional Single-Slope Concrete barrier is specified the Contractor shall provide precast, cast-in-place, or machine formed barriers. However, no intermixing in any run of barrier will be permitted unless shown otherwise in the contract documents.

- A. Precast Single-Slope Concrete Barrier For Use To The Right Of Traffic. The requirements of 606-3.05A "Precast Concrete Median Barrier" shall apply.
- B. Cast-in-Place Single-Slope Concrete Barrier For Use To The Right Of Traffic. The requirements of 606-3.05B "Cast-in-Place Concrete Median Barrier" shall apply.
- C. Machine Formed Single-Slope Concrete Barrier For Use To The Right Of Traffic. The requirements of 606-3.05C "Machine Formed Concrete Median Barrier" shall apply.

**ITEM 15606.XYYY SINGLE-SLOPE CONCRETE BARRIER
FOR USE TO THE RIGHT OF TRAFFIC (CONTINUED)**

Method of Measurement. Single-Slope Concrete Barrier For Use To The Right Of Traffic will be measured by the number of linear feet of barrier constructed in accordance with the plans, specifications, and as directed by the Engineer. The measurement will be taken along the axis of the barrier between its extreme outer limits, unless otherwise indicated in the contract documents.

Basis of Payment. The unit price per linear foot of Single-Slope Concrete Barrier For Use To The Right Of Traffic shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work.

Payment will be made under:

<u>Item No.</u>	<u>Item</u>	<u>Pay Unit</u>
15606.3041	Single-Slope Concrete Half Section Barrier (Optional)	Linear Foot
15606.3042	Single-Slope Concrete Half Section Barrier (Precast)	Linear Foot
15606.3043	Single-Slope Concrete Half Section Barrier (Cast-in-Place)	Linear Foot
15606.3044	Single-Slope Concrete Half Section Barrier (Machine Formed)	Linear Foot
15606.3045	Full Section Concrete Barrier For Use To The Right Of Traffic (Optional)	Linear Foot
15606.3046	Full Section Concrete Barrier For Use To The Right Of Traffic (Precast)	Linear Foot
15606.3047	Full Section Concrete Barrier For Use To The Right Of Traffic (Cast-in-Place)	Linear Foot
15606.3048	Full Section Concrete Barrier For Use To The Right Of Traffic (Machine Formed)	Linear Foot