



NEW YORK
STATE OF
OPPORTUNITY.

Department of Transportation

ENGINEERING
INSTRUCTION

EI
24-010

Title: **GUIDANCE ON AND SPECIFICATIONS FOR THE USE OF STEEL-BACKED TIMBER GUIDE RAIL AND MEDIAN BARRIER**

**SUPERSEDED BY EB 26-015
EFFECTIVE 12/31/26**

Approved:

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5/7/2024

Date

ADMINISTRATIVE INFORMATION:

- Effective Date: This Engineering Instruction (EI) is effective upon signature.
- Superseded Issuances: None
- Superseded Shelf Notes/Special Notes: None
- Disposition of Issued Materials: This guidance will be incorporated into a future revision of Chapter 10 of the Highway Design Manual. The new special specifications will reside in the Special Specification Repository located at: <https://www.dot.ny.gov/spec-repository-us>, and will also be found in the Electronic Pay Item Catalog (e-PIC) at <https://www.dot.ny.gov/pic>.
- This EI is issued in conjunction with EI 24-009, "New Standard Sheet 606-50 Steel-Backed Timber Guide Rail and 606-51 Steel-Backed Timber Median Barrier".

PURPOSE: To issue guidance on and specifications for the use of Steel-Backed Timber Guide Rail (SBTGR) and Median Barrier (SBTMB).

TECHNICAL INFORMATION:

- The Department has approved a new design for steel-backed timber barrier systems, including guide rail, median barrier, set-back anchorage units, and transitions to walls.
- The new designs require inclusion of a secondary rub rail. MASH testing (Manual for Assessing Safety Hardware, 2016) was sponsored by the Federal Highway Administration (FHWA) and showed the system to be suitable at TL-3 conditions (62 mph impacts).
- Use: Due to the increased cost of steel-backed timber rail, its use should be limited to places of scenic or environmental significance such as historic parkways, rest areas, parking areas, scenic overlooks, or other similar locations. Where the posted speed exceeds 30 mph, any new or replacement installations of SBTGR should include the rub rail(s).
- Terminal Selection - Medians: A run of SBTMB will generally need to be terminated with a concrete wall which will need to be shielded from approaching traffic with a MASH-compliant attenuator. In rare cases, a median may be wide enough and operating speeds low enough that the use of a ramped median terminal may be acceptable. Due to the infrequency with which this situation exists, a standard detail has not been developed.
- Terminal Selection – Roadsides: A run of SBTGR will need to be terminated with either a connection to a wall or with a flared-back anchorage unit. In general, the flared-back anchorage on approach ends should only be used if the ramped end can be placed close, at, or beyond to the limit of the clear zone. Use of the flare has the advantage of cutting off access to the area behind the run. It will usually be the less expensive option and will be the

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less complex design option. If the ramped end cannot be set back at a desirable offset, connection to a wall and an attenuator is preferred. On downstream ends not exposed to approaching traffic, the anchorage unit does not need to be widely offset and the Flared Terminal post, "FT", may be placed as close to the shoulder as at Post Position F3 or F4. (See Standard Sheet 606-50, Sheet 6.)

- Information in Contract Documents:
 - Walls: Where connections to walls are selected, any architectural treatments of the concrete surfaces should be specified. If appropriate, the class of attenuator (reusable or expendable) for the approach end of the wall should be stated.
 - Flared Terminals (FT): Where a flared-back terminal is selected, the station for the point of tangency should be shown on the plans. Additionally, the Standard Sheets identify possible post positions relative to that point of tangency. The plans should identify, for each site, where the "FT" post of the ramped end should be positioned. This position selection will determine how far back from the traveled way the flared terminal will be located.
- Cost Impact: Based on limited bid histories, the costs of steel-backed runs are anticipated to be around three times the cost of equivalent HPBO runs. The use of the rub rails is expected to cause a cost increase of around 15% compared to the former steel-backed systems without rub rails.
- Existing Installations Without Rub Rails:
 - Repair: Short sections of damage may be repaired in-kind as part of typical maintenance operations. For purposes of this allowance, a short section may exceed neither 300 feet nor 50% of the length of the run.
 - Replacement: Deteriorated steel-backed timber guide rail or median barrier shall be programmed to be replaced to meet current standards. Where posted speed exceeds 30 mph, significant segments of damaged or deteriorated guide rail or median barrier (more than 50% of an existing run) shall be programmed to be replaced to meet current standards. While existing runs of SBT without rub rails are expected to perform satisfactorily on lower-speed facilities, the desire for conservative treatments has led to the decision to replace or upgrade them on 3R projects with posted speeds over 30 mph.
 - Upgrade: When existing installations without rub rail(s) are in good condition, the addition of rub rails may be an acceptable means of making them MASH-compliant. This option will require the professional engineering judgment of the designer and the concurrence of the Main Office's subject matter expert that the existing barrier's configuration is sufficiently similar to the approved design shown on the Standard Sheets. New or appropriately modified terminations will be required.

NEW/MODIFIED ITEMS: The following PIN-Approved special specification items have been created for the installation of the new system with rub rails.

- 606.47851010 – Steel-Backed Timber Guide Rail with Rub Rail and Timber Posts
- 606.47861010 – Anchorage Unit for Steel-Backed Timber Guide Rail with Rub Rail
- 606.47871010 – Steel-Backed Timber Guide Rail with Rub Rail - Transition to Wall
- 606.47941010 – Steel-Backed Timber Median Barrier with Rub Rails and Timber Posts
- 606.47951010 – Anchorage Unit for Steel-Backed Timber Median Barrier with Rub Rails
- 606.47961010 – Steel-Backed Timber Median Barrier with Rub Rails - Transition to Wall

The following special specification items have been created for use on projects where it is desired to add rub rails to a previously constructed SBTGR or SBTMB.

- 606.47852010 – Addition of Rub Rail to Existing Steel-Backed Timber Guide Rail

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- 606.47942010 – Addition of Rub Rails to Existing Steel-Backed Timber Median Barrier

DISAPPROVED ITEMS: None.

TRANSMITTED MATERIALS: The listed new specification items are appended to this EI.

BACKGROUND: A TL-3 crash test performed on an SBTGR system used on the Merritt Parkway in Connecticut and similar to NYSDOT's design, resulted in a failed test for that guide rail design. The pickup penetrated into the system causing an abrupt deceleration. This failure resulted in the issuance of EB 23-009, discontinuing installation of NYSDOT's traditional SBTGR at TL-3 locations (greater than 45 mph posted speed). A subsequent and recent TL-3 test performed on behalf of the FHWA in May 2022, on a guide rail design which included a rub rail, produced satisfactory results. The new rail design includes this secondary rub rail just below the main rail. Based on the test results of this rail's configuration, this system design may be used at TL-3 locations.

CONTACT: For questions or further information on this EI, please contact Terry.Hale@dot.ny.gov via e-mail or by telephone at (518) 485-7009.

**ITEM 606.47851010 - STEEL-BACKED TIMBER GUIDE RAIL WITH RUB RAIL AND
TIMBER POSTS**

**ITEM 606.47861010 - ANCHORAGE UNIT FOR STEEL-BACKED TIMBER GUIDE
RAIL WITH RUB RAIL**

**ITEM 606.47871010 - STEEL-BACKED TIMBER GUIDE RAIL WITH RUB RAIL -
TRANSITION TO WALL**

DESCRIPTION

The Contractor shall furnish and install steel-backed timber guide rail system, anchorage units, and transitions that include connections to walls, in accordance with details provided in the plans, at locations shown on the plans, and where directed by the Engineer.

MATERIALS

General.

1. *Steel Rails and Hardware.* Steel rails, steel back-up plates, splice plates, and all accessory components and hardware shall be fabricated as shown on the plans. Bolt holes, as necessary, may be enlarged or slotted to permit expansion and contraction and to facilitate erection. The steel rails and steel plates shall be straight and of uniform section.

The steel rails and splice plates shall meet the requirements of ASTM A36 and shall be galvanized. No punching, drilling, cutting or welding will be permitted after galvanizing.

Bolts, nuts, J hooks, washers and other miscellaneous fasteners and hardware shall be galvanized. All bolts and fasteners used to fasten steel back plates and splices shall conform to ASTM A449. All other hardware shall conform to ASTM A307.

Certified copies of the test results conducted by the manufacturer of the base metal for the physical and chemical requirements shall be furnished for all steel in the manner and form requested by the Department.

2. *Timber Rail, Rub Rail, Timber Blocks, Block-outs, and Posts.* All wood/timber elements shall conform to AASHTO M168. The timber elements shall be fabricated from dry, well-seasoned, and rough-sawn Douglas Fir, Southern Pine, or other species having a stress grade of at least 1500 psi. After boring bolt holes and cutting to final dimensions, treat the rail, post, and block-out elements with either Chromated Copper Arsenate Type C (CCA-C) or Ammoniacal Copper Zinc Arsenate (ACZA) in accordance with American Wood Protection Association (AWPA) Category 4A (UC4A). Minimum net retention shall be as required for material supplied. Any subsequent field cutting or boring for bolts shall be treated with fresh preservatives in accordance with AWPA M4-15.

A timber post that has a through-check, shake, or end split in the same plane as, or a plane parallel to the bolt hole and extending from the top of the post to within 3" of the bolt hole will be rejected.

3. *Concrete.* Cast-in-place concrete shall meet the requirements specified for Class A

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Concrete in Section 501 "Portland Cement Concrete – General." Precast concrete units shall meet the requirements of Subsection 704-03 Precast Concrete – General. The requirement for a Department-approved automated concrete batch plant does not apply.

4. *Welding.* Fabrication welding shall comply with the subsection "Welding" in the New York State Steel Construction Manual, except that radiographic inspection will not be required.
5. *Galvanizing.* Galvanizing shall conform to Subsection 719-01. Galvanizing shall be Type 1, except for hardware which shall be Type 2.

Anchorage Units. Back-up plates shall be galvanized and shall conform to ASTM A36. Reinforcement for the anchor shall conform to Subsection 709-01, "Bar Reinforcement, Grade 60". Timber blocks shall conform to AASHTO M168.

Basis of Acceptance. The Contractor shall supply manufacturer certification that all materials are of the type, quality, and treatment level specified.

CONSTRUCTION DETAILS

General. Guide rail shall be installed as indicated in the Contract Documents.

Wood posts shall be placed by excavating or by using vibratory driving or impact driving equipment approved by the Engineer. Post driving will be permitted only if alignment and grade tolerances are met and providing no damage is done to the posts during installation. Damaged or misaligned posts shall be removed and replaced by the Contractor as directed by the Engineer, at no additional cost to the State. To facilitate driving, the base of the wood posts may be tapered.

Post and anchor excavations shall be backfilled in accordance with Subsection 203-3.13 of NYSDOT Standard Specifications.

All posts shall be aligned to a tolerance of 1/4" for plumb and grade line.

The timber rails shall be field cut to produce a fit at the joints as indicated on the plans or working drawings. Treat field cuts with 2 coats of Waterborne Wood Preservative in accordance with AWWA Standards.

Upon completion of the installation of the guide rail components, the Contractor shall restore the area to its original state to the satisfaction of the Engineer.

Connection to Walls:

Holes for any thru bolts shall be carefully drilled. Damage caused to the wall shall be repaired by the Contractor to the satisfaction of the Engineer, at no cost to the State.

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TRANSITION TO WALL**

METHOD OF MEASUREMENT

The guide rail will be measured by the number of feet, measured along the axis of the guide rail, furnished and installed.

Anchorage units will be measured by the number furnished and installed.

Connections to walls will be measured by the number furnished and installed.

BASIS OF PAYMENT

The unit price bid for each item shall include the cost of all labor, materials, and equipment necessary to complete the work, including paint, concrete, reinforcement, excavation, backfill, and removal and replacement of damaged or misaligned posts.

Payment for Steel-Backed Timber Guide Rail with Rub Rail, Timber Blocks, Timber Posts and Block Outs shall include the unit price bid and the measured quantity multiplied by the payment factor for post spacing listed in the following table:

PAYMENT FACTORS FOR STEEL-BACKED TIMBER GUIDE RAIL	
Post Spacing Center to Center	Payment Factor
10 feet	1.0
5 feet	1.5

Unless otherwise indicated on the plans, the cost of restoring any disturbed areas, including paving, sodding, seeding, and mulching, shall be included in the unit price bid.

Progress payments will be made for linear foot items for Steel-Backed Timber Guide Rail with Rub Rail, Timber Posts, Timber Blocks, and Block Outs, when the guide rail is erected in the position and manner indicated on the plans and in a manner approved by the Engineer, exclusive of restoration of disturbed areas and final alignment. Payment will be made, at the unit price bid, for 90% of the quantity erected. The balance of the quantity erected will be paid for upon proper repair of the disturbed areas and alignment of the guide rail to the specified tolerance.

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ITEM 606.47951010 - ANCHORAGE UNIT FOR STEEL-BACKED TIMBER MEDIAN BARRIER WITH RUB RAILS

ITEM 606.47961010 - STEEL-BACKED TIMBER MEDIAN BARRIER WITH RUB RAILS - TRANSITION TO WALL

DESCRIPTION

The Contractor shall furnish and install steel-backed timber median barrier system, anchorage units, and transitions that include connections to walls, in accordance with details provided in the plans, at locations shown on the plans, and where directed by the Engineer.

MATERIALS

General.

1. *Steel Rails and Hardware.* Steel rails, steel back-up plates, splice plates, and all accessory components and hardware shall be fabricated as shown on the plans. Bolt holes, as necessary, may be enlarged or slotted to permit expansion and contraction and to facilitate erection. The steel rails and steel plates shall be straight and of uniform section.

The steel rails and splice plates shall meet the requirements of ASTM A36 and shall be galvanized. No punching, drilling, cutting, or welding will be permitted after galvanizing.

Bolts, nuts, J hooks, washers, lag screws, and other miscellaneous fasteners and hardware shall be galvanized. All bolts and fasteners used to fasten steel back plates and splices shall conform to ASTM A449. All other hardware shall conform to ASTM A307.

Certified copies of the test results conducted by the manufacturer of the base metal for the physical and chemical requirements shall be furnished for all steel in the manner and form requested by the Department.

2. *Timber Rail, Rub Rail, Timber Blocks, Block-outs, and Posts.* All wood/timber elements shall conform to AASHTO M168. The timber elements shall be fabricated from dry, well-seasoned, rough-sawn Douglas Fir, Southern Pine, or other species having a stress grade of at least 1500 psi. Treat the rail and block-out elements with either Chromated Copper Arsenate Type C (CCA-C) or Ammoniacal Copper Zinc Arsenate (ACZA) in accordance with American Wood Protection Association (AWPA) Category 4A (UC4A). Minimum net retention shall be as required for material supplied. Any subsequent field cutting or boring for bolts shall be treated with fresh preservatives in accordance with AWPA M4-15.

A timber post that has a through-check, shake, or end split in the same plane as, or a plane parallel to the bolt hole and extending from the top of the post to within 3” of the

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bolt hole will be rejected.

3. *Concrete.* Cast-in-place concrete shall meet the requirements specified for Class A Concrete in Section 501 “Portland Cement Concrete – General.” Precast concrete units shall meet the requirements of Subsection 704-03 Precast Concrete – General. The requirement for a Department-approved automated concrete batch plant does not apply.
4. *Welding.* Fabrication welding shall comply with the subsection “Welding” in the New York State Steel Construction Manual, except that radiographic inspection will not be required.
5. *Galvanizing.* Galvanizing shall conform to Subsection 719-01. Galvanizing shall be Type 1, except for hardware which shall be Type 2.

Anchorage Units. Back-up plates shall be galvanized and shall conform to ASTM A36. Reinforcement for the anchor shall conform to Subsection 709-01, “Bar Reinforcement, Grade 60”. Timber blocks shall conform to AASHTO M168.

Basis of Acceptance. The Contractor shall supply manufacturer certification that all materials are of the type, quality and treatment level specified.

CONSTRUCTION DETAILS

General. Median barrier shall be installed as indicated in the Contract Documents.

Wood posts shall be placed by excavating or by using vibratory driving or impact driving equipment approved by the Engineer. Post driving will be permitted only if alignment and grade tolerances are met and providing no damage is done to the posts during installation. Damaged or misaligned posts shall be removed and replaced by the Contractor as directed by the Engineer, at no additional cost to the State. To facilitate driving, the base of the wood posts may be tapered.

Post and anchor excavations shall be backfilled in accordance with Subsection 203-3.13 of the NYSDOT Standard Specifications.

All posts shall be aligned to a tolerance of ¼” for plumb and grade line.

The timber rails shall be field cut where necessary to produce a fit at the joints as indicated on the plans or working drawings. Treat field cuts with 2 coats of Waterborne Wood Preservative in accordance with AWWPA Standards.

Upon completion of the installation of the median barrier components, the Contractor shall

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restore the area to its original state to the satisfaction of the Engineer.

Connection to Walls:

Holes for any thru bolts shall be carefully drilled. Damage caused to the wall shall be repaired by the Contractor to the satisfaction of the Engineer, at no cost to the State.

METHOD OF MEASUREMENT

The median barrier will be measured by the number of feet, measured along the axis of the median barrier, furnished and installed.

Anchorage units will be measured by the number furnished and installed.

Connections to walls will be measured by the number furnished and installed.

BASIS OF PAYMENT

The unit price bid for each item shall include the cost of all labor, materials, and equipment necessary to complete the work, including paint, concrete, reinforcement, excavation, backfill, and removal and replacement of damaged or misaligned posts.

Payment for Steel-Backed Timber Median Barrier with Rub Rail, Timber Blocks, Timber Posts and Block Outs shall include the unit price bid and the measured quantity multiplied by the payment factor for post spacing listed in the following table:

PAYMENT FACTORS FOR STEEL-BACKED TIMBER GUIDE RAIL	
Post Spacing Center to Center	Payment Factor
10 feet	1.0
5 feet	1.5

Unless otherwise indicated on the plans, the cost of restoring any disturbed areas, including paving, sodding, seeding, and mulching, shall be included in the unit price bid.

Progress payments will be made for linear foot items for Steel-Backed Timber Median Barrier with Rub Rails, Timber Posts, Timber Blocks, and Block Outs, when the barrier is erected in the position and manner indicated on the plans and in a manner approved by the Engineer, exclusive of restoration of disturbed areas and final alignment. Payment will be made, at the unit price bid, for 90% of the quantity erected. The balance of the quantity erected will be paid for upon proper repair of the disturbed areas and alignment of the median barrier to the specified tolerance.

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TIMBER GUIDE RAIL**

**ITEM 606.47942010 – ADDITION OF RUB RAILS TO EXISTING STEEL-BACKED
TIMBER MEDIAN BARRIER**

DESCRIPTION

The Contractor shall furnish and install rub rails on existing runs of steel-backed timber guide rail (one rub rail) and steel-backed timber median barrier (two rub rails) in accordance with the 606-50 and 606-51 Standard Sheets.

MATERIALS

1. *Timber Rub Rail.* The timber rail shall conform to AASHTO M168 and shall be fabricated from dry, well-seasoned and dressed rough-sawn Douglas Fir, Southern Pine, or other species having a stress grade of at least 1500 psi. Treat the rail and block-out elements with either Chromated Copper Arsenate Type C (CCA-C) or Ammoniacal Copper Zinc Arsenate (ACZA) in accordance with American Wood Protection Association (AWPA) Category 4A (UC4A). Minimum net retention shall be as required for material supplied. Bolt holes bored through posts shall be treated with preservatives in accordance with AWPA M4-15.

A timber rub rail that has a through-check, shake, or end split in the same plane as, or a plane parallel to the bolt hole and extending to within 3” of the bolt hole will be rejected.

2. *Steel Rails and Plates.* The steel rails, back plates, and splice plates shall meet the requirements of ASTM A36 and shall be galvanized. No punching, drilling, cutting, or welding will be permitted after galvanizing.
3. *Hardware.* Bolts, nuts, lag bolts, washers and other miscellaneous fasteners and hardware shall be galvanized. All bolts and fasteners used to fasten steel back-plates and splices shall conform to ASTM A449. All other hardware shall conform to ASTM A307.

CONSTRUCTION DETAILS

The Contractor shall drill holes through the existing posts at the locations and to the diameters and depths indicated in the contract plans. Before bolts are inserted, the ends of each drilled hole shall be liberally “painted” with two coats of waterborne wood preservative and allowed to dry between applications.

If connections to existing concrete walls require the installation of anchor bolts, holes for the bolts shall either be drilled through the concrete for through-bolts or a minimum of 7 inches into the concrete for the installation of grouted anchor bolts with a minimum embedment of 6 inches.

Before erecting the rub rails, the appropriate steel rub-rail plate shall be lag bolted in pre-drilled holes to the back side of the corresponding timber rub rail. Before permanently fastening the

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assembled rub rails to the splice plates, the fit of the timbers shall be checked. As needed, the timber rub rails shall be field cut to produce a fit at the joints as indicated on the Standard Sheets or plans. Treat field cuts with 2 coats of Waterborne Wood Preservative in accordance with AWWPA Standards.

METHOD OF MEASUREMENT

In the case of rub rail added to steel-backed timber guide rail, measurement will be made along the added rub rail for the number of feet furnished and installed.

In the case of addition to steel-backed timber median barrier, measurement will be of the length in feet of the installed pair of rub rails measured along the axis of the median barrier. They will not be individually measured.

No extra measurement or payment will be made for any reduced post spacing.

BASIS OF PAYMENT

The unit price bid for each item shall include the cost of all labor, materials, and equipment necessary to complete the work.