Index 477 Thrie-Beam Panel Retrofit (Concrete Handrail) (Rev. 07/13)

Design Criteria

AASHTO LRFD Bridge Design Specifications, 6th Edition, Section 13; ***Structures Design Guidelines (SDG)***

Design Assumptions and Limitations

This Design Standard is applicable for use along bridges or roadways with design speeds of 45 mph or less and where the existing traffic railing is structurally sound and free of major cracks or spalls. Contact the Structures Design Office regarding potential applications on bridges with higher design speeds.

This Design Standard is applicable for retrofitting a specific type of existing bridge mounted traffic railing (concrete handrail) which is not based on a crash tested design. This Design Standard differs from Design Standards Indexes 470-476 in that the existing traffic railing stays in place and the retrofit 10 Gauge Thrie-Beam Guardrail panels are bolted directly to the existing railing.

In the event that the designs and details presented in this Design Standard do not closely match the existing conditions, and if this Design Standard is ultimately determined to be appropriate for use, the Structures and/or Roadway Engineer(s) may prepare a customized project specific retrofit design based on the bridge railing and guardrail transition designs presented in this Design Standard as a guide. Contact the Structures Design Office for guidance in this event.

This Design Standard is intended for retrofitting existing Post and Beam Concrete Handrails (traffic railings) as shown on these and other similar obsolete Indexes with geometry and reinforcing as shown:

Index 10257 Concrete Handrail (1969 and 1970 with 1975 Revision)

Index 10257-MOD Concrete Handrail (1970 with 1971 and 1973 Revisions)

Index 10266 Concrete Handrail (1969 with 1973, 1974 and 1975 Revisions)

Index 10276 Concrete Handrail and Light Standard Pilaster Details (1969 with 1973 Revisions)

Determine the applicability of this Design Standard to a particular bridge based on a review of the Load Rating of the existing bridge and a comparison of the existing railing geometry to that shown for this. The average weight per linear foot of the retrofit is 20 lb/ft.

The Thrie-Beam Trailing End Transition is for use only when a line of guardrail is located outside of the Clear Zone of any opposing Travel Way. In all other cases, use the Thrie-Beam Approach Transition on each end of each line of guardrail.

The treatment of the approach and trailing ends of the retrofit shall consist of the Thrie Beam Approach Transition and Trailing End Transition, respectively, as shown on the Design Standard. The appropriate guardrail treatments beyond the Approach and Trailing End Transitions shall be determined by the Roadway Engineer. As a minimum, if no other hazards are present, an End Anchorage Assembly Type II shall be provided on the trailing end of the retrofit. On approach ends, a Transition Block or Curb is required at the end of the bridge/wingwall if the existing Approach Slab does not have a curb. A Transition Block is not required on trailing ends of bridges having no opposing traffic; however, a Curb may be required due to drainage needs. An Index 300, Type D Concrete Curb is generally suitable for this application.

The Structures Engineer shall identify the locations in the Plans (if any are required) where a Thrie-Beam Expansion Section is to be included in the guardrail. Evaluate the thermal movements of the existing bridge using the following criteria: If the total thermal movement at an individual bridge deck expansion joint is 1½" (¾" in each direction) or less, the Thrie-Beam Guardrail shall span the joint without the use of an expansion section. If the total thermal movement at an individual bridge deck expansion joint exceeds 1½", a Thrie-Beam Expansion Section must be installed at that location. The total amount of thermal movement at bridge deck expansion joints shall be determined by theoretical calculation and confirmed by field measurements where possible. It should be noted that the actual in-service movement due to thermal effects may be less than the value determined by theoretical calculation.

This Design Standard does not address retrofitting of the existing traffic railings, curbs or sidewalks for pedestrian use. The potential need to retrofit the existing bridge for pedestrian use shall be evaluated on a project by project basis and the necessary Plans developed accordingly.

Plan Content Requirements

Generally, this Design Standard can be used without any modifications being made to it. A separate Plan and Elevation sheet of the type used in Structures Plans is recommended. If project specific details are required, use this Design Standard as a guide for developing general notes and details to be included in the plans.

Supplement this Design Standard as required with project specific details that may be deemed necessary to complete the installation of the retrofit. These details may include locations and details of any existing utilities, conduits, drainage structures, sign structures and luminaire supports, and any other needed information not included in this Design Standard.

Include a reference note in the Roadway Plans for each bridge along with the limiting stations of the retrofit. Show the limiting stations or overall length of the retrofit for each bridge. An example of a note containing the required information as it would appear on a Plan or Plan-Profile sheet is as follows:

"Construct Thrie-Beam Panel Retrofit (Concrete Handrail), Index No. 477, from Sta. XX+XX.XX (at or near Begin Bridge) to Sta. XX+XX.XX (at or near End Bridge)."

For projects with multiple bridges, a tabular format may be used to convey the necessary information.

Also show the appropriate site specific approach and trailing end treatments in the Plans.

The Utility Adjustment Plans, if required, shall contain all necessary utility adjustment information required for the construction of the retrofit. Utilities and/or conduits may exist in or adjacent to the existing traffic railings and will vary in size, number and location. The presence, size, number and locations of existing utilities and/or conduits shall be determined by a review of existing Plans and confirmed by field verification. It should be noted that utility and/or conduit installations may vary by location on a single bridge. Thus, a field verification shall be conducted for each individual installation of the retrofit. Existing utilities and/or conduits that conflict with the retrofit shall be relocated if possible or placed out of service. The required field verification work should be completed as early in the evaluation phase as possible.

The Traffic Control Plans for the construction of the retrofit shall be prepared in accordance with Index 600 Series. The Plans shall address all aspects of the construction of the retrofit. Generally, the use of this Design Standard may require traffic control consisting of shifting, narrowing and/or closing of travel lanes and/or shoulders.

The existing guardrail end transitions may have been previously retrofitted utilizing a scheme presented in Roadway and Traffic Design Standards Index 401 (2000 and earlier Editions). In this event, the requirements for removal or replacement of the prior retrofit shall be evaluated and addressed in the Plans as required. Include a Pay Item note in the plans stating that removal of the prior retrofit is considered incidental work with no separate payment made.

Payment

Item number	Item description	Unit Measure
460-72-1	Thrie-Beam Panel Retrofit (Concrete Handrail)	LF