STATE OF NEW HAMPSHIRE
INTRA-DEPARTMENT COMMUNICATION

DATE: June 12, 2023

FROM: Kirk Mudgett KOM
Chief of Specialty Section

AT (OFFICE): Department of Transportation
Bureau of Highway Design

SUBJECT: Reduced Beam Guardrail Post Spacing Layout - Pay Items and Use

TO: All Project Development Bureaus and Design Consultants

MEMORANDUM

The purpose of this memo is to provide designers guidance for the intended use of reduced w-beam guardrail post spacing and the associated pay items for locations on non-NHS roads. (Applicable on NHS with Assistant Commissioner approval as a MASH design exception)

Recently there has been confusion related to the proper use of some pay items. In 2004, Item 606.184 – 31" W-Beam Guardrail (Reduced Post Spacing) was created for use when a section of guardrail would need to be stiffened as it passed closely in front of a utility pole or other hazard. However, the intention for use of this item has been lost over time, and it appears the result has been unclear direction for designers and contractors. Therefore, this item has been removed from use.

If reduced w-beam guardrail post spacing is needed, the following guidance showing different applications shall be used:

1) Stiffening for a Utility Pole with Offset Between 4 and 6 Feet:

Stiffening, or reduced post spacing, for a utility pole or other tall hazard, is still based on the original NCHRP-350 testing of mid-splice rail (or the MGS system). The detail, "*Mid-Splice Guardrail Stiffening Detail*" is shown on the Highway Design's external website. This detail shows 8 posts spaced at 3'-1½" on the approach, and 4 posts spaced at 3'-1½" on the departure (if outside clear zone of opposite direction). **See Figure 1 below & attachment.**

As noted on the detail, use Item 606.012 – W6x9 Steel Post Replacement for Beam Guardrail and Item 606.0122 - Steel Post Assemblies for Beam Guardrail Posts. These items account for extra posts used beyond the standard 6'-3" spacing of Item 606.18001 - 31" W-Beam Guardrail. When this layout is used, this detail shall be provided in the contract plan set with the appropriate number of posts and post assemblies included in the estimate.

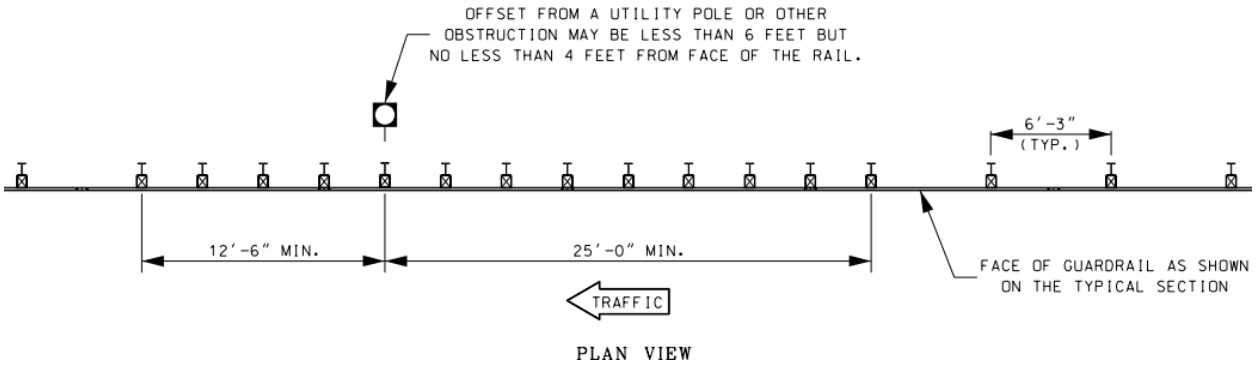


Figure 1 – Utility Pole Stiffening Detail

2) W-Beam Transitions:

On maintenance rehabilitation projects (e.g., resurfacing, guardrail improvements, bridge rehabilitation), existing bridges with non-compliant bridge railing (w-beam) may contain attached highway guardrail that requires updating or replacement. **See Figure 2 examples below.**

Figure 2 – Examples of W-Beam Bridge Rail in Need of Transition

The proposed replacement for this bridge railing is usually still some kind of w-beam railing due to the limitation of the designed structure. See a) through c) below for three typical encountered types of w-beam bridge railing and their approach transition rehab pay items.

Note: Proposed options shown below do not meet the current guidelines of MASH. However, if there is confined space due to a side road or driveway on a limited scope project, guardrail improvements noted below are a significant safety improvement to the existing condition.

a). T-101 With Reduced Approach Transition Length:

If the existing or proposed bridge railing is T-101 (w-beam backed with a steel tube) and is constrained by a nearby driveway or side road such that standard T-101 approach railing will not fit, a reduced transition can may be proposed. **See Figure 3 below & attachment of guardrail note example.**

Use Item 606.012 - W6x9 Steel Post Replacement for Beam Guardrail and Item 606.0122 - Steel Post Assemblies for Beam Guardrail Posts, along with Item 606.18001 - 31" W-Beam Guardrail (standard layout). Item 606.012 and 606.0122 shall be used to account for the additional posts beyond the standard 6'-3" layout of Item 606.18001. A detail shall be provided in the contract plan set showing the intended transition and the appropriate number of extra posts and extra post assemblies shall be included in the estimate.

Figure 3 – Existing Bridge Steel Rail and Reduced Length W-Beam Transition Example

b). Double Nested W-Beam Approach Transition, Reduced Length:

If the existing or proposed bridge railing is double nested w-beam that is in a constrained location, a shortened transition may be needed. **See an example of shortened w-beam transition in Figure 4 below.**

Include separate post and post assemblies items in the contract. Item 606.012 - W6x9 Steel Post Replacement for Beam Guardrail and Item 606.0122 - Steel Post Assemblies for Beam Guardrail Posts shall be used, along with Item 606.18001, 31" W-Beam Guardrail (standard layout). Item 606.012 and 606.0122 shall be used to account for the additional posts beyond the standard 6'-3" layout. A detail shall be provided in the contract plan set showing the intended transition and the appropriate number of extra posts and extra post assemblies shall be included in the estimate.

Figure 4 – Existing Bridge W-Beam Rail and Reduced Length W-Beam Transition Example

c). Double Nested W-Beam Approach Transition, Full Length:

If the existing or proposed bridge railing is double nested w-beam, and is *not* constrained, there is no standard MASH transition developed to apply. However, there is a similar application of MASH tested transition that could serve in the meantime. This transition is 25 feet long and has rub-rail to reduce snagging the vertical face of concrete barrier in the tested case. **See Figure 5 below.** The applied layout for steel post bridge rail would not require the rub-rail. The steel bridge post layout would have 7 spaces at 1'-6¾", followed by 4 spaces at 3'-1½", equaling 25 ft long. The nested rail would extend a distance from the bridge rail, depending on the layout of posts, but at least 6'-3". **See Figure 6 below.** Perhaps a steel post future test would lead to a shorter length, but for now the concrete barrier MASH test length will be used.

If at some point a detail is accepted, a separate unit item may be created for the w-beam transition. Until then, separate post and post assemblies items shall be included. Item 606.012 – W6x9 Steel Post Replacement for Beam Guardrail and Item 606.0122 – Steel Post Assemblies for Beam Guardrail Posts shall be used along with Item 606.18001 - 31" W-Beam Guardrail (standard layout). Item 606.012 and 606.0122 shall be used to account for the additional posts beyond the standard 6'-3" layout. A detail shall be provided in the contract plan set showing the intended transition and the appropriate number of extra posts and extra post assemblies included in the estimate.

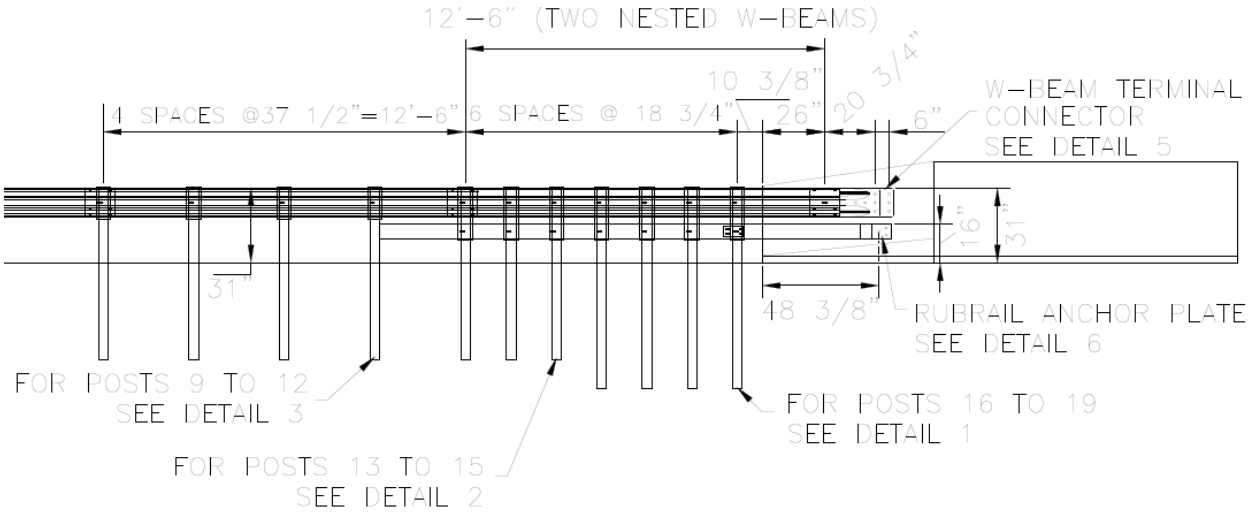


Figure 5 – MASH W-Beam Transition to Concrete Barrier

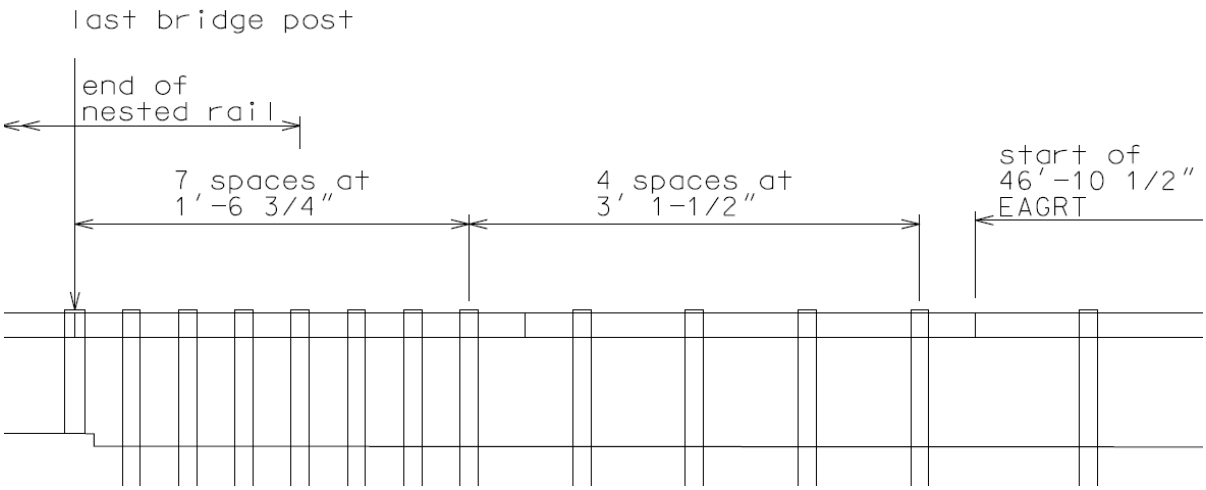
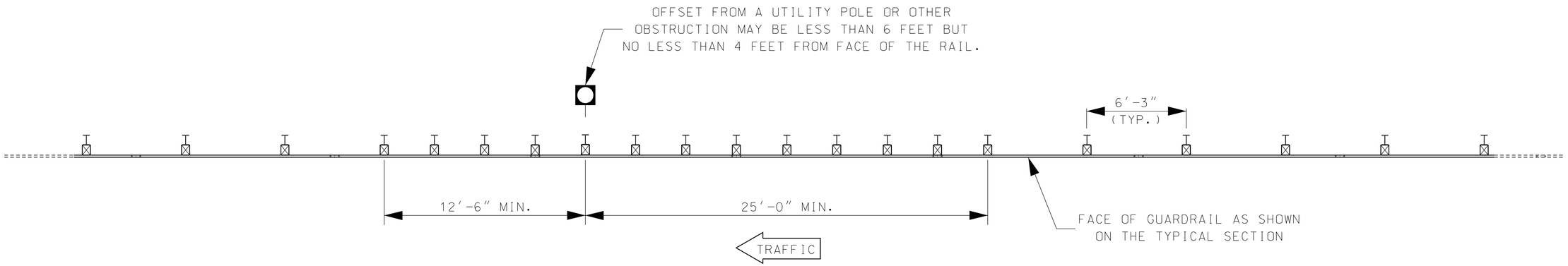


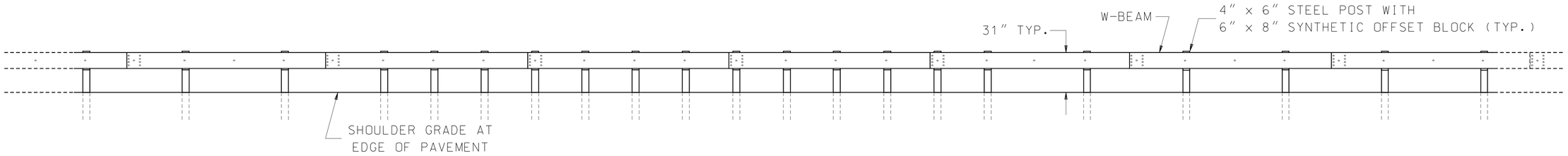
Figure 6 – Draft Steel Rail Full Length W-Beam Transition

Attachments: Mid-Splice Guardrail Stiffening Detail, Reduced Post Notes Example

Noted by: ABH & LRBC



PLAN VIEW



ELEVATION

STANDARD SECTION

GENERAL NOTES

1) THIS TREATMENT IS ONLY TO BE USED WHEN THE OBSTRUCTION CANNOT PRACTICALLY BE MOVED OR OTHERWISE BE MADE SAFE WITHIN THE ZONE OF INTRUSION AS NORMALLY REQUIRED.
   ADDITIONAL ITEMS NEEDED TO CONSTRUCT THIS DETAIL WILL BE PAID FOR UNDER:
2) ITEM 606.012 - W6x9 STEEL POST REPLACEMENT FOR BEAM GUARDRAIL.
   ITEM 606.0122 - STEEL POST ASSEMBLIES FOR BEAM GUARDRAIL POSTS.
3) DETAIL ABOVE REFLECTS USE OF GUARDRAIL BEAM PANELS WITH HOLES FOR ATTACHING POSTS AT 3′-1 1/2″ C.C. SPACING.
4) 12′-6″ W-BEAM PANELS SHOWN, 25′-0″ ALLOWED.

STATE OF NEW HAMPSHIRE
SPECIAL DETAILS
DEPARTMENT OF TRANSPORTATION ∘ BUREAU OF HIGHWAY DESIGN

MID-SPLICE W-BEAM GUARDRAIL STIFFENING DETAIL

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
2-25-2015	gr-stiff-detail	_	6	12

MM
xx.x

NH 120-11

REMOVE 62.5' OF BEAM GUARDRAIL (AND BLUNT ENDS)
INSTALL 12.5' BGR (WITH R=20') ON THE APPROACH, AT 28" IF POSSIBLE
6' AHEAD FROM EXISTING FIRST POST
INSTALL 12.5' OF BGR (8'4" DOUBLE NESTED) AT 3' OFFSET
FROM EP AT DEPARTURE/BRIDGE (FROM LAST BRIDGE POST,
USE 2.08' SPACING FOR THE FIRST FOUR POSTS, USE 4.167' TO FIFTH POST)
INSTALL 12.5' OF BGR AT 31" HEIGHT WITH STRUCTURAL TUBE
ON NEW OFFSET BLOCKS ON EXISTING STEEL POSTS
PER ITEM 563.307 - BRIDGE RAIL T101 (RETROFIT) -
USE EXISTING BRIDGE ANCHORAGES - CENTER ON BRIDGE
CONSTRUCT PARALLEL TL-3 EAGRT UNIT WITH PREFERRED
PLATFORM PER DETAIL (FROM LAST BRIDGE POST
AT DEPARTURE/BRIDGE - USE 2.08' SPACING FOR THE FIRST FOUR POSTS,
USE 4.167' TO FIFTH POST) - AS PART OF THE 62.5' PAY UNIT LENGTH)

MM
xx.x

GRID N

2
268-1
net&t
1001
9
?' from ep

gravel road

gravel drive

stop

MILL BROOK

OW

gravel field access

NH ROUTE 120
43.479855, -72.293299

gravel road

stop

NH 120-10

br#
156/119

gravel field access

CLARK CAMP ROAD

REMOVE 62' OF BEAM GUARDRAIL (AND BLUNT ENDS)
CONSTRUCT TL-3 EAGRT UNIT WITH PREFERRED
PLATFORM PER DETAIL 81.5' BACK FROM EXISTING FIRST POST
INSTALL 25' OF BGR AT 2' OFFSET FROM EP AT APPROACH
INSTALL 25' T101 BRIDGE APPROACH UNIT (ITEM 606.1285)
INSTALL 12.5' OF BGR AT 31" HEIGHT WITH STRUCTURAL TUBE
ON NEW OFFSET BLOCKS ON EXISTING STEEL POSTS
PER ITEM 563.307 - BRIDGE RAIL T101 (RETROFIT) -
USE EXISTING BRIDGE ANCHORAGES - CENTER ON BRIDGE
INSTALL 12.5' OF BGR (8'4" DOUBLE NESTED) AT 3.5' OFFSET FROM EP AT DEPARTURE/BRIDGE
(FROM LAST BRIDGE POST, USE 2.08' SPACING FOR THE FIRST FOUR POSTS)
USE 4.167' TO FIFTH POST)
INSTALL 12.5' BGR (WITH R=20') ON THE DEPARTURE, AT 28" IF POSSIBLE

POSTED SPEED: 55 MPH ADT: 2,600 NOT TO SCALE

TOWN OF
CORNISH

STATE OF NEW HAMPSHIRE
STATEWIDE
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

GENERAL PLANS

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
GEN16	43131genplans	43131	478	65