Midwest States Pooled Fund Program Consulting Quarterly Summary

Midwest Roadside Safety Facility

07-01-2011 to 10-01-2011

Bolt Specifications for Attachment of Thrie Beam to Concrete Parapet

Question

State: WI
Date: 07-01-2011

I have put some responses below in red.
What are the standard bolt lengths for A325 and A449? Or what source should I get to verify standard bolt lengths?
I don't know of standard bolt lengths for A325 and A449. A325 is a structural bolt standard that generally uses shorter thread lengths to increase the shear strength of bolts used in structural connections. It also uses a heavy hex head standard. On many websites, such as Portland Bolt and Fastenal, they recommend that if you cannot find an A325 bolt that meets your need, then you can switch to A449. In fact, in Section 1.5 of the A325 specification it states "for bolts of other configurations and thread lengths with similar mechanical properties (to A325), see Specification A449."
From past experience, we have custom ordered variable length A325 bolts from various manufacturers. As such, you should be able to obtain quotes for most reasonable lengths for 1-in. increments. Second, if thread length is an issue, you could use several ¼"Â¢Ã¢â€šÂ¬Ã...â€œin. thick plate washers on the back side of the parapet to allow for the nut to be tightened on the threads. It may also be possible to epoxy longer female inserts into the concrete parapet for use with the bolts, although further investigation would be required. Can you let us know what bolt lengths would typically be required to pass through the concrete parapets? With this information, we could assist with obtaining quotes for your required lengths.
That said, I cannot find much on standard lengths for A325 bolts. The longest lengths I could find were 14" and 10.5". There were no in between sizes. Thus, I would try contacting Fastenal, Portland Bolt, and Bennett Bolt to see what options are available.
Are there other standards of bolts that we could use?
If you are looking for a substitute for A325, then A449 is the best replacement grade available as the A325 spec noted above. SAE Grade 5 also has similar mechanical properties, but like A449 may not have the exact same bolt head specification.
If you want to stick with A325 bolts, Portland Bolt's website notes that they can custom build A325 bolts. I am guessing that will cost more, but you will likely be able to spec a length and thread length.
Would it be possible to specify a galvanized threaded rod?
In terms of capacity, there are several threaded rod material grades that would work. However, I have concerns that the extra threaded rod that would protrude on the traffic side face of the connection would become a vehicle snag hazard. Thus I would not recommend the use of the threaded rods. SAE Grade 5 and ASTM A193 B7 would be sufficiently strong.
Could we use some of the research on epoxy into bridge deck research to connect thrie beam to a bridge parapet.
There is some potential to use the epoxy anchor research or other inserts to anchor the thrie beam. We did just that with the TCB transition to anchor the thrie beam to the single slope barrier. However, we have not done this

to date with approach guardrail transitions. In order to do so, we would need to look at the type of attachment (epoxied threaded rod, epoxied threaded insert with a bolt, or a mechanical anchor), the depth of the section, and the effect of edge distance and anchor spacing. Thus, I believe that there is a potential to do this kind of attachment, but we would need to do some additional analysis.

Response

Date: 07-01-2011

I'm working on updating our standards on attaching thrie beam to rigid barriers. I understand that A325 bolts and A449 bolts are acceptable alternatives.

We have situations where we will need to drill through parapets and bolt on the back side. In general, we would need a bolt about 14.5 inches long. In some of these situations, a standard A325 bolt may not have enough threading to allow for a tight connection between the thrie beam and concrete barrier.

I know that we could specify the following to solve these situations:

Use a shorter A325 bolt.
Specify an A449 bolt that is fully threaded.

I did some searching around on the web. I had some difficulties finding standard sizes of A325 or A449 bolts. Many of the bolts I found where too short to be used (9 inches or shorter) or where a different standard (SAE...)

The questions I have are:

What are the standard bolt lengths for A325 and A449? Or what source should I get to verify standard bolt lengths?
Are there other standards of bolts that we could use?
Would it be possible to specify a galvanized threaded rod?
Could we use some of the research on epoxy into bridge deck research to connect thrie beam to a bridge parapet.

From my brief look on the web, if galvanized threaded rods are common. If a galvanized rod could be used instead of a specially ordered A449 or A325 bolt, the department could save some costs.

Response

Date: 07-02-2011

As a follow on question, WiSDOT had a question regarding the use of fully threaded A325T bolts versus partially threaded A325 bolts for connection of thrie beam and W-beam to concrete parapets.

Response

Date: 07-02-2011

There was a question regarding the use of fully threaded A325T bolts versus partially threaded A325 bolts for connection of thrie beam and W-beam to concrete parapets.
The only concern that I had was that a fully threaded section would have reduced shear capacity as compared to a partially threaded one.

In order to check this concern I calculated the capacity of the end shoe versus the capacity of the 7/8" A325T bolts. I examined the tensile capacity of the thrie beam end shoe versus as well as the bearing failure of the end shoe anchor holes. It turns out that the bearing failure of the end shoe holes is the limiting value (i.e. the end shoe will fail under bearing failure at the anchor holes long before its tensile capacity is exceeded). As such, the A325T bolts should be acceptable as long as the shear capacity of the 7/8" A325T bolts is greater than the bearing capacity of the end shoe anchor holes.
The shear capacity of the 7/8" A325T bolts is several times greater than the bearing capacity of the thrie beam end shoe bearing capacity, thus the use of the 7/8" A325T bolts should be acceptable.

Curbs Under Transitions

Question

State: WI
Date: 06-30-2011

We are using the thrie beam transition to rigid barrier developed in TRP-03-210-10. This transition was crash tested without a curb under it. Some other thrie beam transitions that MwRSF has crash tested used a sloped 4-inch curb. Is it possible to use a 4" sloped curb similar to the previous crash tests with the transition in TRP-03-210-10?

Response

Date: 07-05-2011

I am assuming that you are referring to the curb detailed in TRP-03-69-98. If so, I do not believe that the addition of the 4" sloped curb would cause any adverse effects. However, be sure to use the same geometry for the curb, i.e., the height, slope, and length of the curb should not exceed that dimensions illustrated in the noted report. Note, this will keep your curb downstream of the asymmetrical transition piece and within the thrie beam rail sections for the newer transition. Further, the lateral placement of the curb must be as detailed in the original report (with the back of the curb adjacent to the face of the post).

Cable Hanger Post Tab Issue

Question

State: NE
Date: 06-30-2011

Another change requested to the Cable Guardrail:
The slot cut to hold the cable on the end post breaks off "every time" in the field.
If we allow a hole in the cable bracket & a light weight clip placed in the hole, is this still a system which will meet NCHRP 350? (See Figur 1.jpg)
Would a 3/16" - 4" brass rod bent in a U and bent over on the back side after installation work as a light weight holding device?

Attachment: http://mwrsf-qa.unl.edu/attachments/625863b110f3d96cd48c1e072eacbbfa.jpg

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Response

Date: 07-07-2011
It would appear that the original FHWA approval letter used 5 mm brass rods to hold each cable within the slot. Thus, a similar pin design would be acceptable.

Termination of the Texas HT steel bridge railing

Question
State: IA
Date: 07-18-2011

Scott and I like the options which flare back onto the parapet at the same elevation. Option 5 may be easier to deal with considering it may use a smaller anchor plate on the back wall. To mitigate concerns for snag increased snag on the posts, it may be necessary to use a minimum tangent length of the tube prior to bending it back to the parapet. Let me know if you have additional questions regarding this matter. Thanks!

Attachment: http://mwrsf-qa.unl.edu/attachments/21c438bcafa06ef856b8e038d0aecc16.pdf

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Response
Date: 07-19-2011

Thanks, Ron. Just one point of clarification: the termination of the elliptical tube is a free end; it is not attached to the concrete. Does this have any impact on your recommendation?

Do you know if the end that TXDOT uses was ever crash tested? (it's a free end as well)

Response
Date: 07-25-2011

I am not aware of any passenger vehicle crash tests being performed on the Texas HT bridge rail. I have contacted my colleagues at TTI to also inquire about any passenger vehicle crash tests on the original system as well as a similar rail on a vertical parapet where a lower rail was added. Based on this inquiry, both TTI and TxDOT have stated that no passenger vehicle crash tests were performed.

Attachment: http://mwrsf-qa.unl.edu/attachments/0f63009ff7a0e10de41554f3fa7aa31f.pdf

Attachment: http://mwrsf-qa.unl.edu/attachments/f909276a25c7d6fd1516a51c09fdbdf8.pdf

Attachment: http://mwrsf-qa.unl.edu/attachments/c6b07abd72d3265acc8986204a819c82.pdf

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Response
Date: 01-29-2013
Could you share your opinion on the preferred treatment at the trailing end of a BR-27C bridge railing? See both pages of the attachment. Note that in some cases, the trailing end could lie within the clear zone of opposing traffic.

My personal preference is the non-flared version. With this version, would it be further advisable to attach the end of the rail to the concrete with a plated connection? Or perhaps to use a reduced post spacing near the end

Attachment: http://mwrsf-qa.unl.edu/attachments/200e97b1ace0861a96b95b25297af70c.pdf

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Response
Date: 01-30-2013
To begin with, I will assume that both the combination bridge rail and the concrete parapet are crashworthy. The tapered/flared concrete end (proposed) is more desirable for downstream end impacts as the non-flared end (original) could potentially cause snag issues during vehicle redirection. However, the flared end (proposed) is drawn such that it leaves the end of the rail open for potential snag issues for reverse direction hits. As such, we recommend using the flared concrete end, but extending the rail to flared concrete end. Thus, snag potential will be minimized for both directions of travel.

A few notes on the design:

(1) The concrete taper/flare should begin on the same plane as the face of the posts (or further back for a more conservative design.) This flare depth will best minimize snag potential.
(2) The flare/taper angle should be gradual / shallow enough to minimized snag. (i.e., 3:1 – 4:1)
(3) There are benefits to bolting the rail to the concrete parapet to ensure stiffness and full lateral capacity. However, if the concrete end is flared and the rail is extended to the flared and cut to match the slope of the flare, the free end of the rail would be supported laterally by the sloped face of the concrete parapet. Thus, attaching the rail to the concrete is not necessary and the rail can remain free.

Response
Date: 04-09-2013
I realize I'm reviving an older question, but could you take a minute and review page 2 of the attached drawing? Specifically, I'm curious if you would consider this design acceptable for both directions of travel (forward- and reverse-direction impacts). The tube railing is cut to match the flare of the concrete with an approximate 1-inch gap between the two.

Please feel free to suggest any enhancements as well.
Attachment: http://mwrsf-qa.unl.edu/attachments/beb5830cb30a14ff9087f12058235e90.pdf

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Response
Date: 04-10-2013
Here's another option for you to consider.

Attachment: http://mwrsf-qa.unl.edu/attachments/9705e5670d307c41dd465f6e162a2bad.pdf

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Response
Date: 04-26-2013

Both rail termination details you have included should perform well during impacts from either direction. Having the free end of the rail cut with a flare to match the taper of the concrete parapet should minimize vehicle snag during impacts. Also, the flared cut allows the rail to utilize the tapered concrete parapet as a lateral support to insure rail strength at this termination location (after a small lateral deflection the rail would be pressing against the concrete wall). The short distance between the free end of the rail and the first post also helps insure strength at the end of the rail.

If I was to pick one design over the other, I would go with the straight rail section. Thus, end section rail fabrication would be simple as a standard rail segment would just have to be cut to correct flare. Also, the straight rail design forms a more continuous barrier face near the top of the bridge rail. Although the change in barrier profile is rather minimal for the second design you sent me (with the rail bent backward away from traffic), continuity always helps create a smooth, stable redirection.

Response

Date: 04-29-2013

I wanted to get your opinions regarding the termination of the metal tube portion of the Texas HT railing (TXDOT drawing attached). We have a project where we will be using the HT railing on a bridge and using a 44" tall F-shape concrete barrier off both ends of the bridge, and we are developing ideas on how to transition between the two.

Please see the attached PDF. It presents 5 different options for transitioning from the Texas HT barrier (on the bridge) to Iowa's 44-inch concrete barrier (off the bridge). Please provide your comments and/or recommendations regarding the use of each of the 5 options. Note that the top width of our 44-inch barrier is 8-1/2 inches.

Attachment: http://mwrsf-qa.unl.edu/attachments/21c438bcafa06ef856b8e038d0aecc16.pdf

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Guardrail on Short Bridge

Question

State: IA
Date: 07-27-2011

We've got a situation where we will be updating the guardrail at a very short bridge (34 feet " see attached pics) and we'd like to carry the thrie-beam across it. Do you guys have a preferred method of attaching guardrail to a vertical parapet like this, and what would be your recommended blockout depth? Note that we will not be modifying the parapet ends in any way.
In the alternative, do you have any other suggestions on how to treat this bridge? Potential candidate for the MGS bridge rail? What about using guardrail with base-plated posts?

Attachment: http://mwrsf-qa.unl.edu/attachments/6b17e4e858cdfd865435f01172cd2cc7.pdf

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Response

Date: 08-11-2011
There have been a few retrofit bridge rails that have included the placement of blocked-out thrie beam on the front face of decorative concrete parapets with some type of curbing. In your situation and depending on test level, you may be able to utilize blocked-out W-beam or thrie beam across the bridge. I assume that you are upgrading the approach guardrail transitions as well. If the parapet stays, there is no reason to use posts with base plates on the deck surface nor the MGS bridge rail. At this time, we have not retrofitted existing deck edges with the new system. However, I would not be too concerned with post placement sufficiently away from deck edge by using cored hole within interior deck region.
If the parapet is sufficiently strong, then it may be most cost-effective to retrofit rail across front face.
If you desire options for this method, , I am enclosing a small pdf file which contains the cover pages for the noted reports as well as general design details for the retrofits bridge rails. Please let us know if you need any other information. The references are listed below.
Crash Tests of R4 Retrofit and Open Parapet Bridge Rails - Final Report, Report No. FHWA-MI-RD-92-01, ENSCO, Inc., Springfield, VA, February, 1992.
Gripne, D.J., "Washington State Department of Transportation Development of a Bridgerail Retrofit Program", Transportation Research Record 1198, Transportation Research Board, Washington, D.C., 1988, pp. 45-54.
Buth, C.E., and Menges, W.L., Crash Testing and Evaluation of Retrofit Bridge Railings and Transition, Report No. FHWA-RD-96-032, Texas Transportation Institute, Texas A&M University, College Station, TX, January, 1997.

Response

Date: 08-23-2011
Thanks for the info, Ron. Our situation is a little different than what the research has covered, so I'd like your opinion on something. Notice in the photos that our parapet is essentially vertical throughout the length of the bridge, with a 1- to 2-inch lip curb near the bottom.
We would like to install a blocked-out thrie beam across the bridge, using our standard guardrail transition (http://www.iowadot.gov/design/SRP/IndividualStandards/eba201.pdf) at each end. My concern with this is the possibility of vehicle snagging at the parapet ends. What depth of blockout would you recommend using on the bridge in order to minimize the snagging potential?

Response

Date: 08-23-2011
Based on the prior approved Iowa AGT attached to a safety-shape parapet (B-47 and B-47A) and a vertical parapet (B-47B), I would utilize a minimum blockout depth of 4 in. on the face of the concrete parapet. This recommendation is based on previously provided a chamfer corner and/or tapered end of 1 to 2 in. behind the parapet face. Thus, if the toe extends up to 2 in. in front of parapet, one would need at least 4 in. of blockout on parapet face. In order to provide some factor of safety, you may consider using a 5-in. blockout depth on the parapet face. Once you traverse past the ends, would you be either (1) anchoring thrie beam to face with end shoe flush or (2) carrying thrie beam across entire bridge?

Response

Date: 09-01-2011
We will be carrying 10-gauge thrie-beam across the length of the bridge using 4-inch blockouts. One of the reports you sent showed 10-foot spacing between blockouts, while another showed 6'-3" spacing. Do you see any problem with reducing the spacing to 3'-1½", or should I just stick with 6'-3"?

Response

Date: 09-01-2011
I am fine with using a 3'-1½" blockout spacing on the bridge.

Response

Date: 09-01-2011
We are actually considering removing the vertical parapet on one of our slab bridges and replacing it with a version of the MGS bridge rail. This particular slab bridge has a deck thickness of approximately 24 inches, so we are looking into the feasibility of side-mounting the tubes that hold the posts. Are you aware of any other states that have tried this yet? If not, do you have any suggestions beyond those that were published in the report?

Response

Date: 09-01-2011
At this time, I am not aware of any states which have adapted the MGS bridge rail for use on existing bridge decks with substantial thickness, such as 24 in.

With such a thick deck, one would think that two transverse epoxied rods could be designed to rigidly attach the tube to the outer vertical surface without causing excessive concrete fracture given sufficient deck reinforcement, anchor depth, and upper concrete cover. The lower end of the tube certainly could be side-mounted on the deck edge.

Alternatively, one could likely drill/core concrete holes in the upper deck surface which are sufficiently away from deck edge. Post could be placed cored holes on new steel hardware to receive bridge post ends. New steel hardware may consist of steel pipe with welded lower end plate to fill bottom and an upper welded ring at top to set sleeve depth. The galvanized hardware would be epoxied into thick depth to prevent washer penetration into concrete edges around pipe. Water could sit in closed pipe without concern. If concerned, then fill pipe with grout around post. Grout could be replaced after impacts.

Backing Plate for Thrie Beam Attachment to Concrete Parapet

Question

State: WI
Date: 08-08-2011

These plates have been used in the past to act as a washer and distribute load over areas that may have spalled out on the backside of the parapet. We believe that it is perfectly appropriate to use plate washers for the same application rather than the plate. We have recommended similar washer plates to Iowa. A 2.5"x2.5"x0.375" or 3"x3"x/375" washer plate should work fine
Attachment: http://mwrsf-qa.unl.edu/attachments/ffac05a17edc9d00dea3e6593833b1d3.pdf

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Response

Date: 08-08-2011
WisDOT would like to know if we are required to have a backing plate on the backside of our parapet for our thrie beam transitions. The plate is 12"x18"x3/8" thick and has hols for the bolts used to connect the thrie beam end shoe.
Attachment: http://mwrsf-qa.unl.edu/attachments/ffac05a17edc9d00dea3e6593833b1d3.pdf

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PCB Overlap Offset

Question

State: OH
Date: 08-22-2011

ODOT rates the deflection of our unanchored 32" portable concrete barrier at 5.5' from the face of barrier. We know it is not a good idea to install unanchored PCB against rigid concrete Jersey or SS barrier. Our direction has been to leave 3.5' of space between the PCB and the rigid barrier to allow for deflection and to prevent the PCB from rotating. My understanding is, if unanchored PBC is placed against rigid concrete wall it is like pinning only the back side of PCB. What if we install PCB against guardrail? Since guardrail is semi-rigid will it deflect and not allow the PCB to rotate. Another scenario would be when one run of unanchored PCB is installed against another run of unanchored PCB. Let me know if these scenario's have been tested, if not your opinions would be helpful.

Response

Date: 08-23-2011

In the past, we have generally recommended using a 2' offset between overlapping barriers when using PCB in front of another barrier system. Historically, we have recommended the overlapping method in situations where TCBs are to be placed in front of a rigid end of a concrete parapet. This recommendation was given prior to the development of several in-line attachments between freestanding and permanent concrete barriers. For the overlapped option, we stated to use 8 barrier sections beyond the end of the permanent barrier with a 2-ft gap between the freestanding and permanent barriers in order to reduce the propensity for vehicle pocketing and snag on the upstream barrier end. For overlapping TCBs, it would seem reasonable to use an overlap of at least 8 or 9 barrier segments for each run " front and back. However, I believe that the gap between both barrier runs could be reduced to 6 to 12 in. or so due to both barrier systems being freestanding, thus reducing the propensity for vehicle snag/pocketing. If limited space exists at the roadside edge for the overlapped option, one may consider the slight flaring of the rearward (shielded) TCB system in order to save space near the shoulder.

I don't believe that we have ever given recommendations regarding TCB placed directly in front of guardrail. Based on the rail geometry, the guardrail would act to resist the rotation of the barrier on the sloped face of the section prior to the toe of the barrier butting up against the base of the post. This would suggest that it is allowable to place the PCB directly against the guardrail. However, doing so will stiffen the deflection of the PCB significantly. Thus, if the PCB mounted in from of the guardrail has free-standing PCB on the upstream end, you will need to use an approach stiffness transition to prevent pocketing and instability.

TCB Anchorage Transitions

Question

State: IA
Date: 08-30-2011

Does MwRSF have any recommendations regarding TCB anchorage transitions for the following situations?

1. Transition from free-standing TCB to TCB using the strap anchorage
2. Transition from TCB using the strap anchorage to TCB using the stake anchorage

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Response

Date: 09-02-2011

1. Transition from free-standing TCB to TCB using the strap anchorage

   In the past, we have recommended that an approach transition does not need to be applied when freestanding barriers are attached to the steel strap tie-down system designed for use on concrete roadways and bridge decks.

2. Transition from TCB using the strap anchorage to TCB using the stake anchorage

   Our best recommendation here would be to use the transition from free-standing to rigid barrier. The strap tie-down still has approximately 33" of deflection, so the transition is still needed. The transition should work better because the upstream end will have lower deflections.

Overlays and Transitions to Rigid Barriers

Question

State: WI
Date: 08-31-2011

Lately, I have had string of overlay projects where an overlay is matching into an existing bridge. The existing bridge rail is at the correct height above the existing deck. If we match into the existing bridge rail at least part of the thrie beam would have to be installed at a lower level to match into the existing bridge rail and transition to the correct height.

Has a thrie beam transition been crash tested at a lower height than 31-inch and passed TL-3 or TL-2 crash testing?

Do you know of any options to matching thrie beam into an existing barrier when the roadway is getting an overall and the bridge is not?

Response

Date: 08-31-2011
See below for my quick thoughts!
Has a thrie beam transition been crash tested at a lower height than 31-inch and passed TL-3 or TL-2 crash testing?
**I am not aware of crash testing on reduced-height thrie beam AGTs at either TL-2 or TL-3. At TL-2, I would expect that a 2-in. overlay could possibly be accommodated in the transition region. Since the bridge rail and deck are at the appropriate elevations, it would seem reasonable to consider milling down the road surface prior to adding new surface overlay.
Do you know of any options to matching thrie beam into an existing barrier when the roadway is getting an overall and the bridge is not?
**Consider shifting guardrail and AGT blockouts upward on posts and capping bridge rail with similar height adjustment for at least 150-200 lineal ft beyond roadway overlay and onto bridge. Then, the height adjustment for bridge rail could be gradually ended.

Clipping thrie beam on the approach transition

Question

State: WI
Date: 09-14-2011

Our approach guardrail transition thrie beam is mounted slighty higher than the concrete rail it is attached to. I believe that the attached PDF shows the field situation correctly. Do you have concerns with clipping the top corner of the thrie beam to prevent snag for reverse direction impacts?
Attachment: http://mwrsf-qa.unl.edu/attachments/c04188b307688b358e3e296afa4257c2.pdf

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Response

Date: 09-14-2011
The noted clipping would not be a problem. However, a small rise of 5/8" does not appear to provide a major snag concern for reverse direction traffic. In any event, the snag concern would be eliminated with the small cut section removed from the end shoe.

Attachment: http://mwrsf-qa.unl.edu/attachments/57c40c12e3a4fcd95160b9a0b97e7617.pdf

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Construction Note: Thrie Beam Bolt Specification

Question

State: WI
Date: 09-19-2011

A contractor is stating that the nut and bolt that we are requiring is not to be spec. together. Please review page 20 of the attached link.
http://roadwaystandards.dot.wi.gov/standards/cmm/110.pdf>

Response

Date: 09-19-2011

I am not sure why someone would claim that the combination in your plans is not to be spec together. You have listed:

"Post bolts are 5/8" diameter x 1'6" long ASTM A307 button head bolt. A post bolt requires a 5/8" diameter A563 DH heavy hex nut and a 5/8" diameter F436 flat washer."

This lists an A563 DH nut and a F436 flat washer. Technically, these are the nut and washer spec for A325 bolts. This is what we typically have listed on our details.

Because the A307 bolt is less strong than an A325, it is allowed to use lower strength nuts and washers. These are the A563A Heavy Hex and the F844 washer. Thus, this is the standard nut and bolt combo. What we typically use is stronger.

http://www.portlandbolt.com/technicalinformation/astm/ASTM_A307.html

Use of the A563A Heavy Hex and the F844 washer is perfectly ok and meets the AASHTO Hardware guide listing for the bolts.

MGS Approach Guardrail Transition

Question

State: IL
Date: 09-29-2011

We are considering adopting this transition (MwRSF Report TRP-03-210-10, December 21, 2010), and have a question about transition to a concrete parapet.

Our current design uses a curb under the thrie beam transition to minimize wheel snagging on the end of the concrete parapet. The new design was developed with a thrie beam version of the bridge rail. Various adaptations are shown in Chapter 14 of the report, but these do not address the issue of the curb. As it is not addressed, we are thinking that the curb would probably still be needed for cases where it is currently used. If it could be deleted, or could be applied as needed for drainage that would provide considerable options for our bridge and roadway designers.

What is the recommendation for use of curbs when adapting the new stiffness transition to current designs attached to concrete parapets?

(Our Type 6 Standard is at:
http://www.dot.il.gov/desenv/hwystds/Rev213/Revision%20213%20pdfs/213-631031-10_TrafBarTermType6.pdf

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Response

Date: 09-29-2011
We have answered a similar question to this before. From the 3rd Quarter 2011 consulting summary:
Problem # 6 " Curbs Under Transitions
State Question:
Dear MwRSF,
We are using the thrie beam transition to rigid barrier developed in TRP-03-210-10. This transition was crash tested without a curb under it. Some other thrie beam transitions that MwRSF has crash tested used a sloped 4-inch curb. Is it possible to use a 4" sloped curb similar to the previous crash tests with the transition in TRP-03-210-10?
MwRSF Response:
I am assuming that you are referring to the curb detailed in TRP-03-69-98. If so, I do not believe that the addition of the 4" sloped curb would cause any adverse effects. However, be sure to use the same geometry for the curb, i.e., the height, slope, and length of the curb should not exceed that dimensions illustrated in the noted report. Note, this will keep your curb downstream of the asymmetrical transition piece and within the thrie beam rail sections for the newer transition. Further, the lateral placement of the curb must be as detailed in the original report (with the back of the curb adjacent to the face of the post).
Although not specifically detailed in the consulting summary, what we had concluded was that any curbs that accompany a given thrie beam transition design should remain part of the "new" system. However, the curb should be terminated (via sloped or flared end) without extending into the w-to-thrie transition element. Our concerns were that the addition of a curb could (1) lead to further snagging of small cars between the curb and the downward slope of the bottom of the w-to-thrie transition element, and (2) cause vehicle instabilities due compressing the suspension and creating vehicle climb. If the curb used in your existing system already terminates prior to the downstream end of the w-to-thrie-transition piece, then use it as previously designed. If not, the upstream end of the curb should be altered to meet this specification.