

RIVET INSPECTION AND REPLACEMENT NOTES

- EXISTING RIVETS TO REMAIN ON MEMBERS AND/OR GUSSETS BEING PAINTED SHALL BE EVALUATED AFTER FIELD PREPARATION FOR PAINTING IS COMPLETED AND SHALL BE REMOVED AND REPLACED IN ACCORDANCE WITH THE RIVET EVALUATION CRITERIA SHOWN ON THIS SHEET. NEW H.S. BOLTS SHALL BE INSTALLED AND TENSIONED IN ACCORDANCE WITH SECTION 6-03.3(33), AND PREPARED FOR PAINT IN ACCORDANCE WITH SECTION 6-07.3(9)F.
- BOLTS SHALL CONFORM TO ASTM F3125 GR A325. BOLTS REPLACING RIVETS SHALL HAVE A DIAMETER MATCHING THE DIAMETER OF THE RIVET THEY REPLACE. EXISTING HOLES MAY BE REAMED TO THE RIVET DIAMETER PLUS 1/8" MAXIMUM TO FACILITATE BOLT INSTALLATION IF NEEDED.
- UNLESS OTHERWISE SHOWN IN THE PLANS OR APPROVED BY THE ENGINEER, ONLY ONE RIVET MAY BE REMOVED AND REPLACED AT A TIME AT ANY CONNECTION. THE REPLACEMENT BOLT SHALL BE FULLY INSTALLED AND TENSIONED BEFORE THE NEXT RIVET MAY BE REMOVED.
- PRIOR TO STARTING ANY RIVET REMOVAL, THE CONTRACTOR SHALL SUBMIT AT TYPE 2 WORKING DRAWING DETAILING PROPOSED RIVET REMOVAL METHODS TO THE ENGINEER. ACCEPTANCE WILL REQUIRE DEMONSTRATION BY THE CONTRACTOR TO ENSURE NO DAMAGE WILL OCCUR TO THE EXISTING MEMBER TO REMAIN. NO FLAME CUTTING METHODS WILL BE PERMITTED.

NOTES TO DESIGNERS:

- These details should be included in all steel painting and rehab projects where the existing structure was originally constructed with rivets.
- The inspection of the rivet condition is intended to be primarily visual. On painting projects, the inspection should happen after surfaces are prepared for painting. In most cases deteriorated rivets are exposed after sand blasting. The intent is not to sound every rivet with the 40 OZ hammer but it can be used as a tool for rivets suspect of being loose.
- The rivet section loss criteria is broken into loading categories. For rivets in pure or nearly pure shear, a significant amount of section loss can be tolerated and the rivet will still function as designed. It is important the rivet head overlaps the hole a nominal amount but the section loss has been allowed up to approximately 60%. For rivets in tension or tension & shear, less section loss can be tolerated and is allowed up to approximately 35%. The two rivet section loss details are drawn to scale for a 7/8" diameter rivet for illustration of the difference between 35% and 60% section loss.
- There may be cases where portions of the rivet head are deteriorated but are not uniform as drawn in the example details. The engineer will need to make a judgement call on replacement or not and can use the general % criteria discussed in Note 3 as a guide.
- For estimating quantities, the engineer shall use existing inspection reports, site visits, and the overall condition of the bridge to determine a quantity of rivets to be removed and replaced. If no or limited information is available, discuss with the WSDOT Steel Specialist or make a best estimate. Payment for removal and replacement of rivets shall be per EACH with the estimated quantity provided in the Contract.

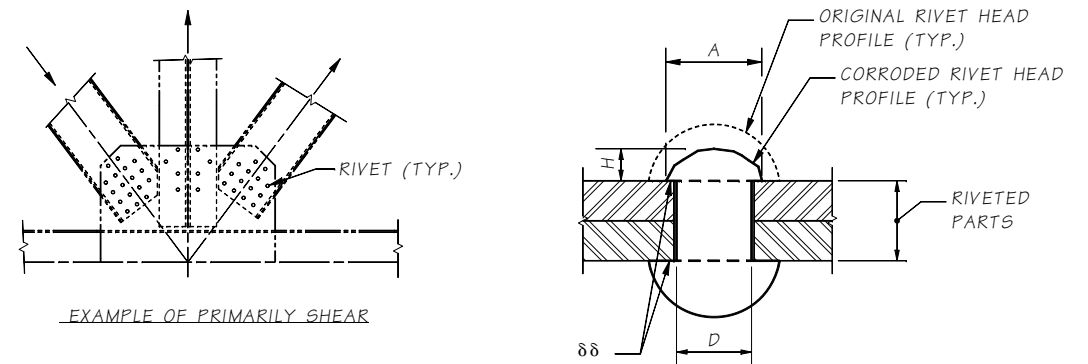
The specified criteria in the detail is based on the following references and previous WSDOT field experience:

- US Army Corps of Engineers Tech Repopr ITL-99-5, December 1999 Rivet Replacement Analysis by Erich Edward Reichle
- Transportation Research Record 950 Rivet Replacement Criteria by R.N. Fazio and A.E. Fazio

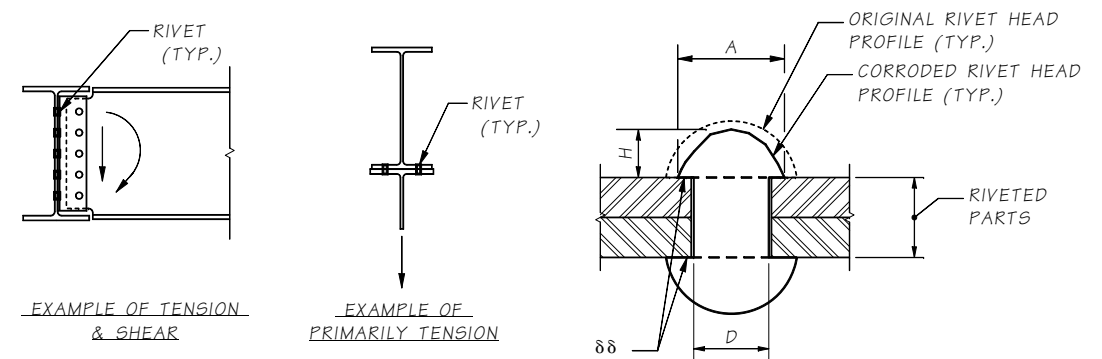
RIVET EVALUATION CRITERIA

RIVETS SHALL BE REPLACED IF THEY FAIL TO MEET ANY ONE OF THESE CRITERIA.

- REPLACE RIVET IF THERE IS SEPARATION BETWEEN THE SOUND METAL SURFACES OF EITHER RIVET HEAD AND THE RIVETED PARTS. (SEE SYMBOL $\delta\delta$)
- REPLACE RIVET IF THE RIVET VISUALLY APPEARS TO BE LOOSE FOR ANY REASON. RIVETS VISUALLY SUSPECT OF BEING LOOSE SHALL BE CONFIRMED LOOSE IF IT CAN BE FELT TO MOVE AFTER BEING STRUCK ON THE SIDE OF THE HEAD IN A DIRECTION APPROXIMATELY PERPENDICULAR TO ITS SHANK WITH A 40 OZ HAMMER.
- REPLACE RIVET IF SECTION LOSS IS EQUAL TO OR GREATER THAN THE DIAGRAM SHOWN BELOW. THE ENGINEER SHALL BE CONSULTED IF UNCLEAR AS TO THE RIVET LOADING CONDITION OR USE THE SECTION LOSS CRITERIA FOR "UNKNOWN" LOADING CONDITION. FOR RIVETS WITH IRREGULAR SECTION LOSS, CONTACT THE ENGINEER FOR DIRECTION.



RIVET LOADING CONDITION - PRIMARILY SHEAR



RIVET LOADING CONDITION PRIMARILY TENSION, TENSION & SHEAR, OR UNKNOWN

MINIMUM RIVET DIMENSIONS				
RIVET SHANK DIAMETER "D"	LOADING: PRIMARILY SHEAR		LOADING: TENSION & SHEAR, TENSION OR UNKNOWN	
	MINIMUM HEAD DIAMETER "A"	MINIMUM HEAD HEIGHT "H"	MINIMUM HEAD DIAMETER "A"	MINIMUM HEAD HEIGHT "H"
5/8"	7/8"	3/16"	1"	3/8"
3/4"	1"	1/4"	1 1/8"	7/16"
7/8"	1 1/8"	3/8"	1 1/4"	9/16"

LAST REVISED 1-4-2019

SHEET

JOB NO. SR

6.4-A16

Bridge Design Engr.								
Supervisor				REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
Designed By				10	WASH.			
Checked By				JOB NUMBER				
Detailed By								
Bridge Projects Engr.								
Prelim. Plan By								
Architect/Specialist	DATE	REVISION	BY	APP'D				

BRIDGE AND STRUCTURES OFFICE



RIVET EVALUATION CRITERIA

BRIDGE SHEET NO.
SHEET
OF
SHEETS