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## PROFESSIONAL RECOMMENDATION MEMORANDUM

**Project Name:** Engineering Support Services and Recommendations for Roadside Safety Issues/Problems for Member States

**Sponsor:** Roadside Safety Pooled Fund

**Task 21-07:** Tube Bridge Rail Retrofit Project Substituting Steel Properties

**DATE:** August 02, 2021

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### Material of Tube Bridge Rail – ASTM A 500 Grad B / ASTM A 1085

This memorandum is comparing the material properties of ASTM A 500 Grad B with ASTM A 1085 to check if ASTM A 1085 can be used instead of ASTM A 500 Grad B for a tube bridge rail that crash tested.

The material specification for ASTM A 1085 was released in April of 2013 for steel tubes used in structural applications. Table 1 compares the material properties of ASTM A 1085 with the commonly used ASTM A 500 Grade B. The strength of ASTM A 1085 is higher than ASTM A 500 Grade B. The dimension of A 1085 rectangular HSS covers the dimensions used for the tubes that crash tested.

Therefore, by keeping the identical sectional dimensions, the ASTM A 1085 HSS sections can be substitute for the ASTM A 500 Grade B tube bridge rail.

**Table 1. Comparison of Material Properties**

	<b>ASTM A500-10 Grade B</b>		<b>ASTM A1085</b>	
<b>Scope</b>	Cold-formed welded & seamless		Cold-formed welded	
<b>Max. Perimeter</b>	88"		88"	
<b>Thickness Ranger</b>	t < 0.875"		0.148 < t < 0.875"	
<b>Yield Stress</b>	Round	42 ksi min	All Shapes	50 ksi min
	Sq/Rect	46 ksi min	All Shapes	70 ksi max
<b>Tensile Stress</b>	Round	58 ksi min	All Shapes	65 ksi min
	Sq/Rect	58 ksi min		
<b>Wall Thickness</b>	-10%		-5%	
<b>Mass Tolerance</b>	N/A		-3.5%	
<b>Corner Radii</b> (Rectangular and Square HSS)	R<3t		t < 0.400"	1.6t to 3.0t
			t > 0.400"	1.8t to 3.0t
<b>CVN</b>	N/A		25 ft-lbs @ 40°F	
<b>Supplemental Requirements</b>	N/A		Optional heat-treating Optional varying CVN	

**Reference**

Steel Tube Institute. "ASTM A1085 Specification for HSS", 2516 Waukegan Road, Suite 172, Glenview, Illinois.