

**STRUCTURAL STEEL NOTES:**

**DESIGN STRESSES:**

Design stresses for the following materials are in accordance with AREMA.

Structural Steel: ASTM A709, 50W Fy = 50,000 psi  
 Structural Steel: ASTM A709, Grade 36 Fy = 36,000 psi

**DESIGN LOADING:**

- \* Live Load, Longitudinal Beams = Cooper E-80 or Alternative Live Load Chapter 1b
- Impact = 2011 AREMA Chapter 15
- Longitudinal Load = 2011 AREMA Chapter 15
- Other Loads = 2011 AREMA Chapter 15
- Ballast = 30" deep (accounts for future raises) Chapter 15

\* Beams were analyzed and designed to satisfy deflection criteria under E-80 or Alternate Loading, Impact and Dead Loads without any composite action.

**STRUCTURAL STEEL:**

1. Fabrication and shop assembly shall comply with 2011 AREMA Chapter 1b, Part 3: "Fabrication".
2. Fabrication of structural steel shall be performed by a fabricator certified under AISC Certification Program, Category CBR, Major Steel Bridges, Fracture Critical Endorsement.
3. Structural steel shall conform to the following requirements:

<b>Permanent Bridge:</b>	
Beams	ASTM A709, Grade 50WT2
Ballast curbs, diaphragms, diaphragm connectors, deck support brackets and sole plates	ASTM A588
Deck plates, cover plates, backwall plates and flashing plates	ASTM A709, Grade 36
Fence posts	ASTM A500 Grade B
Anchor rods (anchor bolts, wedge bolts)	ASTM F1554, Grade 36
Embedded structural steel and sole plates (Fascia Beam)	ASTM A588
Anchor Bolts (Fascia Beam)	ASTM F1554, Grade 105
<b>Temporary Bridge:</b>	
Beams, diaphragms, stiffeners and sole plates	ASTM A709, Grade 36
Handrail	ASTM A709, Grade 36
Anchor Bolts	ASTM F1554, Grade 36
Pile Plates	ASTM A36

4. Calculated weight of Structural Steel =

<b>Permanent Bridge:</b>	
ASTM A709, Grade 50WT2	336,000 lbs.
ASTM A588	70,035 lbs.
ASTM A36	93,456 lbs.
ASTM F1554 Grade 36	273 lbs.
Misc. Steel (Drain Pipe)	76 lbs.
Total = 499,840 lbs.	
<b>Temporary Bridge:</b>	
ASTM A709, Grade 36	114,720 lbs.
ASTM F1554 Grade 36	195 lbs.
ASTM A709, Grade 36 (Handrail)	1,065 lbs.
ASTM A709, Grade 36 (Pile Plates)	9,170 lbs.
ASTM A709, Grade 36 (Bent bracing)	2,892 lbs.
ASTM A709, Grade 36 (Misc. Steel)	364 lbs.
Total = 128,406 lbs.	

5. Structural steel shall be of the type and quality as designated on the plans. Material supplied shall meet the longitudinal Charpy V-notch requirements as specified in the AREMA provisions.
6. The wide flange beams for the permanent and temporary structures are noted as conforming to the supplemental requirements for non-fracture critical impact test requirements noted in Table 1-2, Section 1.2.1, Chapter 15 of the AREMA specifications for Zone 2 service temperature. These components are noted on the plans as notch toughness requirements (N.T.R.).
7. All shop and field bolted connections shall use high strength bolts (including nuts and washers) conforming to ASTM A325 Type 3. All bolts shall be 3/4" diameter unless otherwise noted. Holes for bolts shall be 1/8" diameter larger than nominal bolt diameter unless otherwise noted. All high strength steel bolts shall have one hardened steel washer per bolt under the element to be turned and shall be installed using the "turn of the nut method". Alternative bolt fastening methods are subject to approval of the Engineer.

**STRUCTURAL STEEL NOTES:**

8. Bolts shall be placed so that the bolt heads are on the outside (exposed) surface of member unless shown otherwise on the plans. Threads shall be excluded from the shear plane in all connections.
9. Center to center dimensions for all bolts shall be as noted.
10. Machine bolts for shipment shall be ASTM A307.
11. Welding: All welding shall be in accordance with the current edition of the Bridge Welding Code, AWS D1.5 and shall also conform to the applicable provisions of AREMA, Chapter 15. Welding to be allowed only as shown on design drawings and approved shop drawings.
12. Welded joints are to be AWS prequalified. All welding shall be done to minimize distortion. The welding sequence and procedures to be used shall be submitted for approval to the Engineer.
13. Fully automatic submerged arc welding shall be required for this project. Manual shielded arc welding or semi-automatic submerged arc welding will be allowed only if fully automatic submerged arc welding is not practical.
14. The fabricator shall submit copies of welder's certificates for semi-automatic welding process. If overhead welding is planned during fabrication, certificates for overhead semi-automatic welding process shall also be submitted to the Engineer.
15. In addition to the requirements of AREMA Chapter 15, Sections 1.14 and 3.5, nondestructive testing of welds shall be performed in accordance with the detailed specifications.
16. Grinding shall be in the longitudinal direction.
17. The fabricator shall submit three (3) copies of detailed shop drawings prior to beginning fabrication. Fabrication shall not begin until shop drawings are approved.
18. The fabricator shall shop assemble the beam span prior to shipping. During assembly and reaming all bolts shall be placed in holes as the work progresses to assure proper fit.
19. Shop assembled span shall be inspected by the Engineer before the steel is disassembled and shipped to the erection site.
20. All steel components shall be inspected by the Engineer before shipment.

**WATERPROOFING:**

1. Waterproofing and protective asphalt panels shall comply with the recommendations of Chapter 8, Part 29 of AREMA. The waterproofing shall consist of one layer of 3/32" Butyl Rubber Membrane waterproofing system. Protective asphalt panels shall be placed in two - 1/2" layers with total thickness not less than 1" and shall be laid with joints staggered. Protective asphalt panels shall be bonded to the membrane and each other.
2. Four inches of ballast shall be placed over waterproofing and protective asphalt panels immediately upon acceptance by the Engineer. No construction traffic is allowed on waterproofing until the ballast covering is in place. Waterproofing installation shall be observed and approved by the manufacturer's representative.

**PILE DRIVING**

1. All piles shall be driven to the capacity shown on the plans. If any numbered pile cannot be driven to the capacity shown, the Engineer must be notified.
2. Estimated capacity of driven piles shall be calculated using the Modified ENR Formula, with F.S. = 5 unless otherwise noted. Qualified Contractor QC personnel to verify nominal bearing capacity of piles and submit to the Engineer. Direct questions to the Engineer.
3. In lieu of the hammer selection criteria and use of the Modified ENR Formula, with F.S. = 5 specified in Section 02455 of the Specifications, the contractor shall conduct a wave equation analysis to establish the driving criteria at all pile foundations which specify a nominal required bearing above 600 kips. The analysis and calculations shall be submitted to the Engineer for approval.
4. The contractor shall drive test piles to 110% of the nominal required bearing specified in production locations at the substructures specified or approved by the Engineer before ordering the remainder of piles.
5. Mark every pile with a dimension indicating the pile depth from cut-off to point of the pile. The dimension should be rounded to the nearest foot.
6. The mark shall be welded on to outside face, low mile post side on the pile face, approximately 1' below the bottom of the cap, and in numbers of approximately 3" in height. If pile is not exposed, no mark is required.
7. All steel H-piles shall conform to ASTM A572, Grade 50.

**FIELD WELDING**

1. Welding must be accomplished with the SMAW or FCAW process. Welding must be in compliance with the requirements specified in AWS D1.5, except 5/16" fillet welds may be made with a single pass. Welding electrodes must be E7018 for SMAW or E70T-1 or E70T-5 for FCAW.
2. Welders must possess valid certification. Welding must be performed by operators who have been qualified previously by tests as prescribed by the American Welding Society's standard qualification procedure to perform the work required. The qualifications of the personnel must be submitted to the Engineer in advance of the work.

**MISCELLANEOUS STEEL SPECIFICATIONS:**

1. Design and Workmanship - Per 2011 AREMA Manual for Railway Engineering.
2. Miscellaneous Steel - Per current ASTM A588 specifications unless otherwise noted.
3. Steel Coating - None.
4. Welding - Arc process per 2011 AREMA Manual for Railway Engineering and AWS D1.1 Structural Welding Code.

**MISCELLANEOUS MATERIAL NOTES:**

1. Bearing pads for beam spans shall be polyurethane pads (80 Durometer).
2. Bearing pads shall be shipped flat.
3. Bearing pads shall meet the requirements of Table 15-10.2 of the AREMA Manual for Railway Engineering.



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PLT SCALE: -	DRAWN: RMG	REVISED: -	CONTRACT NO. 63598		
PLT DATE: 12/13/2012	CHECKED: LRB	REVISED: -	ILLINOIS FUEL AID PROJECT		

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