A1010 Workshop
InTrans Conference Room
March 18, 2015 8:30 am

Steve Fugate
Comments on weldability:

- nothing special for procedures, right in “sweet spot” of process
- allow for distortion
- some cracking could occur if correct contours are not used at weld prep locations. (pre-kick to allow for distortion, avoid restraint, gouging, edge preparation)
- fabrication process not really changed
- they have some NDT procedures established.

Steve Williams

- Some inconsistencies in testing at weld-affected zones
- Toughness-exceeds CVN zone 2
- “sweet spot” for plate production: L=240” – 480”, W = 84” – 99”, 2” max thickness
- A193 B8*, Class 2 Bolts
  *A, M, MA, M2, M3, N, NA, MN, MNA
- Nuts A194 Gr8
- Washer AISI 304
- Regular carbon steel headed studs – no known issues
- Special electrodes for welding

Special Provisions

- CVN A709 HPS Gr 50W, Zone 2
- Fy=50 ksi
- Tensile=70 ksi
- Procedure Qualification Record (PQR)
- Welder prequalification
- Ultrasonic inspection, magnetic particle testing (A1010 is magnetic)
- New tools?
- Weld consumables - process
  - flux
  - electrode
- Cut on water table to absorb smoke (this also limits plate size availability)
- Weld fabrication mock-up

Past experience:

- Below 1”, met CVN requirements
- Above 1”, did not meet CVN req. – cracks observed in tension flanges

⇨ New material is improved

- Previous contract that used A1010 was divided into 2 contracts to allow in-shop fabrication

- Full patina development period – way behind A709 50W.
- Misting/drying requirements needed for spec? Most uniform is to use as-is from mill. Blasting results in non-uniform development of patina.

Modulus of elasticity?
It was discussed that test results have not produced a consistent value. This could be an issue of sample preparation. Further study is needed.

An incorrect value of "E" could affect the calculated values of beam deflections, and values of beam camber used for plan detailing and setting girder seat elevations.

It was noted that on previous projects that used E = 29,000 ksi, camber issues were not experienced. Those were short span bridges.

It was noted that perhaps slightly larger tolerances for field haunch should be incorporated into the plans to accommodate unexpected amounts of beam deflection. The concrete deflection would still be an unknown amount if the actual value of "E" is not known.

Field-welding of shear studs would allow for stud length changes to be made if necessary at the time of construction. Otherwise, accommodations for larger haunches could be made with reinforcing steel.

Arcelormittal presentation
- largest steel co in world
- includes Bethlehem, LTV, Mittal, USS Gary

- A1010=12% CR Steel. It is a high grade carbon steel, but it is commonly called stainless steel because it has more than 10% chromium

- Available from 3/16" to 2"
- Plate lengths up to 540 inches, 45 feet
- Plate widths from 72" to 120"

- DOT / SBI could get feedback from him regarding proposed plate sizes/lengths

- Cost premium for A1010 is approximately 2.5x price for A709 (material only)

- Fabricated and installed cost will be less than 2.5x price for A709

- Available plate length (45' max) is due to having to cut on a water table.

- 14-16 week lead time for A1010 material
- Typical carbon steel is 8 to 10 weeks lead
- 10,000 lb minimum order (single plate)

Miscellaneous discussion:

- Fatigue design values for A709 Grade 50W should be appropriate for A1010 design
- Public interest finding required since sole source
- Thermal expansion coefficient was not known to match steel value of 0.0000065. It was noted that some recommendations have been made to not use A1010 girders parallel to A709 girders due to varying values of coefficient. However, there is not extensive test data available.
- There was some discussion of using A1010 for half the length of the bridge and A709 for the other half.
- For design of the current project, the following was suggested:
    - Splice plates should be A1010 for A1010 girders.
    - Bolts should be galvanized A325 for A1010 girders.
    - Splice plate thickness should match girder plate thicknesses if possible, to reduce the number of plate thicknesses required for the project.
    - Stiffener plates for bearing stiffeners and cross frame attachment locations should be A1010, and match girder / splice plate thicknesses if possible.
    - Sole plate material should be A1010.
    - Headed studs for composite design should be standard carbon steel, but proper electrodes should be used (E309?).
    - South exterior girder and first adjacent interior girder should be A1010.
    - Strength, service, and fatigue limit state design values of A709 should be used for A1010.