

GUIDELINES FOR SUPERSTRUCTURE PLAN REVIEW FOR PRE-FABRICATED PEDESTRIAN/BICYCLE BRIDGES

- The pre-fabricated superstructure plan, as prepared by the pedestrian/bicycle bridge manufacturer, shall include, at a minimum, the following sheets:
 - General Plan and Elevation (GP & E) sheet
 - Bridge Layout sheet
 - Superstructure detail sheets
 - Bearing detail sheets for abutments and/or piers

- General Plan and Elevation
 - Verify that the General Plan and Elevation sheet is consistent with the pre-letting GP & E sheet. Verify that any changes made do not significantly alter the original intent of the contract documents.
 - Verify that all plan sheets, including the GP & E sheet, are signed by a Professional Engineer licensed in the State of Minnesota and experienced in bridge design.

- Bridge Layout sheet
 - Verify all top of deck elevations along survey line at centerline of substructures.
 - Verify dimensions between centerlines of substructures.
 - Verify all abutment bearing seat dimensions and elevations against the pre-letting Bridge Layout sheet to assure the new pedestrian bridge superstructure fits properly. (i.e.: Top of Roadway to Bridge Seat table, Bridge Seat Elevations, Abutment Corner Detail dimensions, etc.) Any changes from the pre-letting plan must be communicated with the owner/owner's consultant.

- Superstructure detail sheets
 - Review of Pedestrian bridge design.
 - Review the fabricators Design Calculations for the pedestrian bridge.
 - Verify that all members, connections and splices have been designed per the latest AASHTO LRFD Guide Specifications for Design of Pedestrian Bridges, in conjunction with AASHTO LRFD Bridge Design Specifications and the MnDOT LRFD Bridge Design Manual.
 - Verify design adequacy of safety rails. Verify that adequate lateral support of safety rails is provided for bridges with large bay spacings.
 - Check U-frame stiffness as outlined in the Pedestrian Guide Specifications.

- Review of Pedestrian bridge plans.
 - General Plan and Elevation
 - Verify that all member sizes called for in the design calculations are used in the design plans and are shown in a “Schedule of Member Sizes” table.
 - Verify that the minimum wall thickness for all structural tubular members is $\frac{1}{4}$ ”, the minimum web thickness for channels and w-shapes is $\frac{1}{4}$ ” and the minimum flange thickness is $\frac{5}{16}$ ”.
 - Verify that bay spacing, truss height, stringer spacing, etc. is as called for in the calculations.
 - Check bridge length and deck clear width against design plans.
 - Verify the type of connection used to attach the floor beams to the vertical trusses. Connections in which the floor beams are welded directly into the side face of the bottom chords are not allowed in pony trusses without stiffening of the bottom chord at all floor beams.
 - Check bridge camber diagram to verify that total camber includes both dead load deflection and adequate residual camber for deck to follow the vertical profile of the path called for in the design plans. If bridge is located on a flat grade, a minimum amount of residual camber should be maintained to avoid the appearance of a sag in the span (2” - 3” minimum for 100’ span recommended).
 - Check maximum expansion gap at ends of bridge – if gap is greater than $\frac{1}{2}$ ”, a $\frac{1}{4}$ ” to $\frac{3}{8}$ ” cover plate should be used.
 - If cover plate is used, edges should be beveled at a 4H to 1V with a $\frac{1}{8}$ ” minimum thickness at the edge of plate. Verify whether or not cover plate is recessed into abutment backwall and that it is properly placed on the bridge ends to allow for proper fit and smooth movement across the top of backwall. Check that all bridge safety railings, handrails, rubrails, toerails, etc. match what is called for in the design plan and Special Provisions.
 - Verify that maximum safety rail opening requirements are met. (railings shall not permit a 4” sphere to pass through the lower 27” of railing, and a 6” sphere to pass through any opening above 27” above the deck)
 - All members shall be labeled and dimensioned so that their orientation is clear.
 - All connections shall be adequately detailed, and all weld details shown.
 - All attachment details for wood decking, rubrail, etc. shall be shown. Attachment hardware shall be as specified in the design plans and Special Provisions.
 - The bridge plan should contain a load table giving all the dead, live, wind and thermal service load reactions at the bearing locations.

- If the bridge has an elevation difference between the bearings at each end, this should be adequately detailed and dimensioned, and the bridge marked for shipping such that the high end of the bridge can be easily identified for erection.

- General Notes
 - Design shall be per the current edition of MnDOT Standard Specifications for Construction.
 - Material to be used shall be clearly specified on plan and shall agree with that called for in the Special Provisions.
 - Wood species and grade used for decking and rub rails shall be specified.
 - Preservative Treatment for all wood used on the bridge shall be as approved by the Office of Environmental services (OES).
<http://www.dot.state.mn.us/products/walls/treatedwood.html>
 - Exceptions have been allowed in cases where the local agency/owner understands and is willing to assume the responsibility and associated potential negative effects on local aquatic life.
 - Check with the Office of Environmental Services (OES) to verify that the wood treatment chosen for the timber components is suitable for contact with human skin.
 - Ipe wood is a non-domestic wood product and its use is **not** allowed.
 - Weld testing notes. Weld testing shall be provided per MnDOT Spec. 2471.3M on all State or Federally funded projects. At minimum, some typical notes are as follows:
 - All welds shall be visually inspected and conform to AWS D1.1.
 - Ten Percent of all welds shall be magnetic particle tested.
 - All full penetration welds in the tension chord (bottom chord for simple span) and 25% of full penetration welds in the compression chord (top chord for simple span) to be ultrasonically tested.
 - Painting requirements and instructions shall be given for all painted bridges. They shall be in adherence to the Special Provisions and MnDOT specifications. See the following link for approved paint systems.
<http://www.dot.state.mn.us/products/paint/bridgestructuralsteelcoating.html>
 - Blast cleaning
 - For self-weathering steel bridges, the following note should be included on the plan.
 - All uncoated surfaces of steel, including contact surfaces of bolted structural connections, shall be sand blasted in accordance with the Steel Structures Painting Council

Surface Preparation Specification No. 6 Commercial Blast Cleaning (SSPC – SP6) latest edition.

- For painted bridges, the following note should be included on the plan.
 - All surfaces of steel, including contact surfaces of bolted structural connections, shall be sand blasted in accordance with the Steel Structures Painting Council Surface Preparation Specification No. 10 Near White Blast Cleaning (SSPC – SP10) latest edition.

- Design Data Box
 - Specs used for the bridge design (as mentioned above) shall be listed.
 - All design loads shall be listed, including uniform live loads, vehicle loads and wind loads. They should coincide with the original design plan and Special Provisions.
 - Per the AASHTO Guide Specifications for Design of Pedestrian Bridges, bridges from 6 to 10 foot in clear width shall be designed for a 10,000 lb (H-5) vehicle and bridges over 10 feet in clear width shall be designed for a 20,000 lb (H-10) vehicle. Any deviation from this shall require a letter from the owner verifying the smaller vehicle usage of the bridge and taking responsibility in the event that heavier vehicles do cross the bridge. Bollards may be necessary in these instances to help prevent larger vehicles from accessing the bridge. In any event, the bridge shall have the vehicle load limit posted at each end of the bridge.

- Bearing detail sheets for abutments and/or piers
 - Verify that all dimensions and details from the pre-letting substructure plans have been modified as necessary to accommodate the bridge.
 - Verify step dimensions.
 - If step dimension changes, verify that any affects that this change has on the slope paving or vertical clearance have been accounted for.
 - Verify the width of the abutment/pier to assure that bridge will have adequate room to rest on the bearing seats or pedestals. Adequate concrete edge distance should be provided for proper anchor rod placement (typically 6" minimum).
 - If abutment/pier dimensions must be changed from pre-letting plan, verify that rebar lengths and quantities are changed accordingly.
 - Anchor bolt spacing. If drilled-in anchors are called for, check for interference with rebar (2" minimum clear distance between anchor rods and rebar).

- Check Pile Load Chart against actual dead loads provided by the pedestrian bridge manufacturer.
- Compare front face of backwall to front face of backwall dimension to length of pedestrian bridge – is the intended expansion opening at the ends of the bridge provided?
- If a cover plate is used, and it is recessed into the abutment backwall, verify that the abutment details properly detail and dimension the recess.
- Verify that the type of bearing device called for in the plans and Special Provisions was used on the bridge.
- Check that bearings are designed properly to accommodate the full expansion and contraction movement of the bridge along with any rotational movement of the bearings.
- Verify that the slots in the bearing plates are adequate to accommodate the full range of bridge movement.
- Make sure that it is clarified who is to be supplying the anchor rods, bearing pads and other attachment hardware – contractor or fabricator?
- The bridge should have a fixed and an expansion bearing.

- Misc. checks
 - Verify that bridge fabricator is on the list of Approved Suppliers for Fabricated Structural Metals Products.
 - The MnDOT bridge number and State Project number (SP #) shall be placed on every sheet.
 - If bridge members are open-ended, such as those containing a field splice, verify that weep holes (3/8" to 1/2" dia. typ) are called for on the underside of each end of the member for drainage and their locations detailed on the plan. (Often bridges are built by shops other than that which did the design drawings, therefore weep hole locations should be shown, as opposed to covered in a note to 'put weep holes in the low points of all open-ended members'.) Weep holes should not be placed within the corner radius region of the tube.
 - On painted bridges, all members are to be sealed to prevent moisture from getting trapped inside. All members that are not completely sealed shall have a 3/8" to 1/2" diameter weep hole placed on the underside of the low end of the member for drainage.
 - Verify that lead-in railing, if required, is adequately detailed, and matches requirements called for in the plans and Special Provisions.
 - The bridge shall have name plates at each end of bridge containing vehicle load limit and MnDOT bridge number.
 - All sheets shall contain the initials of the designer, drafter and checkers.
 - If ornamental railing or fencing is required on the bridge, it is highly preferred from a product quality and fit-up standpoint, that they be fabricated and installed by the pedestrian bridge manufacturer. If the contractor chooses to have the railing or fence provided by others, then attachment locations, details and hardware required shall be provided on

the superstructure plan. Contractor shall also provide detailed plans of the ornamental railing or fencing system for review. Verify that the fabricator of the ornamental railing or fence support rails is on the MnDOT Approved Supplier list.

- Splice Sheets
 - All field splices shall be fully detailed on the plans.
 - All structural bolts on unpainted, self-weathering steel bridges shall be A325 Type 3 with high strength nuts and washers (Type 3).
 - All structural bolts on painted steel bridges shall be A325 with high strength nuts and washers and be mechanically galvanized.
 - It is recommended that Direct Tension Indicator (DTI) washers are used for all splice connections to assure that the proper tension is achieved in the bolts.
 - Tack welding of nuts is not allowed.
 - If splices are bolting through entire tube, stiffener plates shall be used to prevent the crushing of the tube face when bolts are tightened. Stiffener plates shall be adequately sized and supported to take the minimum fastener tension required for the bolts in the connection.
 - Oversize holes are not allowed in structural splice connections.