



Guidelines for Design Details

AASHTO/NSBA Steel Bridge Collaboration

Preface

This document is a standard developed by the AASHTO/NSBA Steel Bridge Collaboration. The primary goal of the Collaboration is to achieve steel bridge design and construction of the highest quality and value through standardization of the design, fabrication, and erection processes. Each standard represents the consensus of a diverse group of professionals

It is intended that Owners adopt and implement Collaboration standards in their entirety to facilitate the achievement of standardization. It is understood, however, that local statutes or preferences may prevent full adoption of the document. In such cases Owners should adopt these documents with the exceptions they feel are necessary.

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NOTES:

NUMBER AND DIAMETER OF BOLTS, WELD SIZES AND TYPES , LINES ,ROWS, COLUMNS OF HOLES, AND MATERIAL DIMENSIONS SHOWN ON ALL THESE SHEETS ARE FOR PRESENTATION PURPOSES ONLY. IT IS THE RESPONSIBILITY OF THE DESIGNER TO DETERMINE THE NUMBER AND DIAMETER OF BOLTS, WELD SIZES AND TYPES , AS WELL AS THE SIZES OF MEMBERS AND CONNECTION PLATE SIZES.

DISCLAIMER NOTE

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STRUCTURAL STEEL INDEX OF SHEETS

AASHTO/NSBA STEEL BRIDGE COLLABORATION

TASK GROUP 1, SUBTASK - GROUP 1.4
GUIDELINES FOR DESIGN DETAILS

MATERIAL : (UNLESS NOTED OTHERWISE)

ALL STRUCTURAL STEEL, FOR PAINTED PROJECTS, SHALL BE ASTM A709, GRADE 50. EXCEPT THAT STIFFENERS, INTERMEDIATE AND END CROSSFRAMES AND LATERAL BRACING MAY BE GRADE 36.
USE ASTM A709-50W FOR ALL MATERIAL ON UNPAINTED JOBS.
ALL BOLTS FOR PAINTED STEEL SHALL BE A325-TYPE 1 (MECH GALV) ROTATIONAL CAPACITY TESTED (RCT)
ALL BOLTS FOR UN-PAINTED STEEL SHALL BE A325-TYPE 3 ROTATIONAL CAPACITY TESTED (RCT)
ALL STRUCTURAL STEEL SHALL BE OF PRODUCED DOMESTICALLY ON FEDERAL AID PROJECTS.

FRACTURE CRITICAL MEMBERS:

DESIGN PLANS SHALL DESIGNATE EACH MEMBER OR COMPONENT THAT MUST MEET THE AASHTO REQUIREMENTS FOR FRACTURE CRITICAL MEMBERS. THE SPECIAL PROVISIONS FOR "FRACTURE CRITICAL" SHALL CONFORM TO THE PROVISIONS OF THE CURRENT AASHTO FRACTURE CONTROL PLAN. THE FABRICATOR MUST HAVE THE AISC FRACTURE CRITICAL ENDORSEMENT.

CHARPY V-NOTCH:

DESIGN DRAWINGS SHALL IDENTIFY ALL MAIN LOAD CARRYING MEMBERS.
ALL STRUCTURAL STEEL AS DESIGNATED ON THE PLANS SHALL RECEIVE CHARPY V-NOTCH TESTING IN ACCORDANCE WITH ASTM A709 AND SUPPLEMENTAL REQUIREMENT S83 OR S84 AS NOTED BELOW.

1. TENSION COMPONENTS OF REDUNDANT MEMBERS, DESIGNATED "T" ON THE PLANS, SHALL BE TESTED IN ACCORDANCE WITH TABLE S1.2 OF ASTM A709 (S83)
2. TENSION COMPONENTS OF FRACTURE CRITICAL MEMBERS, DESIGNATED "F" ON THE PLANS, SHALL BE TESTED IN ACCORDANCE WITH TABLE S1.3 OF ASTM A709 (S84)

STEEL FABRICATION:

FABRICATION SHALL BE PERFORMED IN ACCORDANCE WITH THE NSBA/AASHTO COLLABORATION DOC S2.1-2002 "STEEL BRIDGE FABRICATION GUIDE SPEC."
FABRICATORS OF STRUCTURAL STEEL SHALL HAVE THE APPROPRIATE AISC QUALITY CERTIFICATION.

WELDING:

1. WELDING DETAILS AND THE WELDING OPERATIONS SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF THE AASHTO/AWS D1.5 BRIDGE WELDING CODE. WELDING PROCEDURES SHALL BE SUBMITTED AND APPROVED PRIOR TO WELDING ON PROJECT. NON-DESTRUCTIVE TESTING SHALL BE PERFORMED AS REQUIRED BY THE CURRENT EDITION OF THE ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE.
2. THE FOLLOWING MEMBERS ARE CLASSIFIED AS ANCILLARY MEMBERS IN ACCORDANCE WITH THE CURRENT EDITION OF THE ANSI/AWS D1.5 BRIDGE WELDING CODE:

A. EXPANSION JOINT

B. DRAINAGE SYSTEM

C. OTHER MISCELLANEOUS MATERIAL

FIELD CONNECTIONS:

ALL BOLTED CONNECTIONS SHALL USE 7/8 " DIAMETER ASTM A325 BOLTS UNLESS OTHERWISE NOTED, INSTALLED PER THE RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC). BOLTS FOR SLIP CRITICAL CONNECTIONS (SPLICES, CURVED BEAM/GIRDER BRACING) SHALL HAVE ROTATIONAL CAPACITY TESTING (RCT).

PAINTING IF REQUIRED:

STRUCTURAL STEEL SHALL BE PAINTED WITH A COATING SYSTEM IN ACCORDANCE WITH THE APPROPRIATE SECTION OF THE OWNERS SPECIFICATIONS, AND THE AASHTO/NSBA DOCUMENT ON PAINTING (TG8). S8.1-2002,"GUIDE SPECIFICATIONS FOR INORGANIC ZINC-RICH PRIMER BASED COATING SYSTEMS" AND S2.1-2002,"STEEL BRIDGE FABRICATION GUIDE SPEC."

DRAWING PRESENTATION AND APPROVAL GUIDELINES:

DESIGN DRAWINGS SHOULD BE PREPARED IN ACCORDANCE WITH THE AASHTO/NSBA "DESIGN PLAN PRESENTATION GUIDELINES" G1.2
DETAIL DRAWINGS SHOULD BE PREPARED IN ACCORDANCE WITH THE AASHTO/NSBA "SHOP DETAIL DRAWINGS PRESENTATION GUIDELINES" G1.3
SHOP DETAIL DRAWINGS SHOULD BE REVIEWED IN ACCORDANCE WITH THE AASHTO/NSBA "SHOP DETAIL DRAWING REVIEW/APPROVAL GUIDELINES" G1.1

NOTES TO DESIGNERS:

A... 1" DIAMETER HSB CAN BE USED TO REDUCE THE NUMBER OF BOLTS REQUIRED IN LARGE SPLICES OR CONNECTIONS BASED ON A RE-DESIGN BY A LICENSED ENGINEER AT THE CONTRACTOR’S EXPENSE.

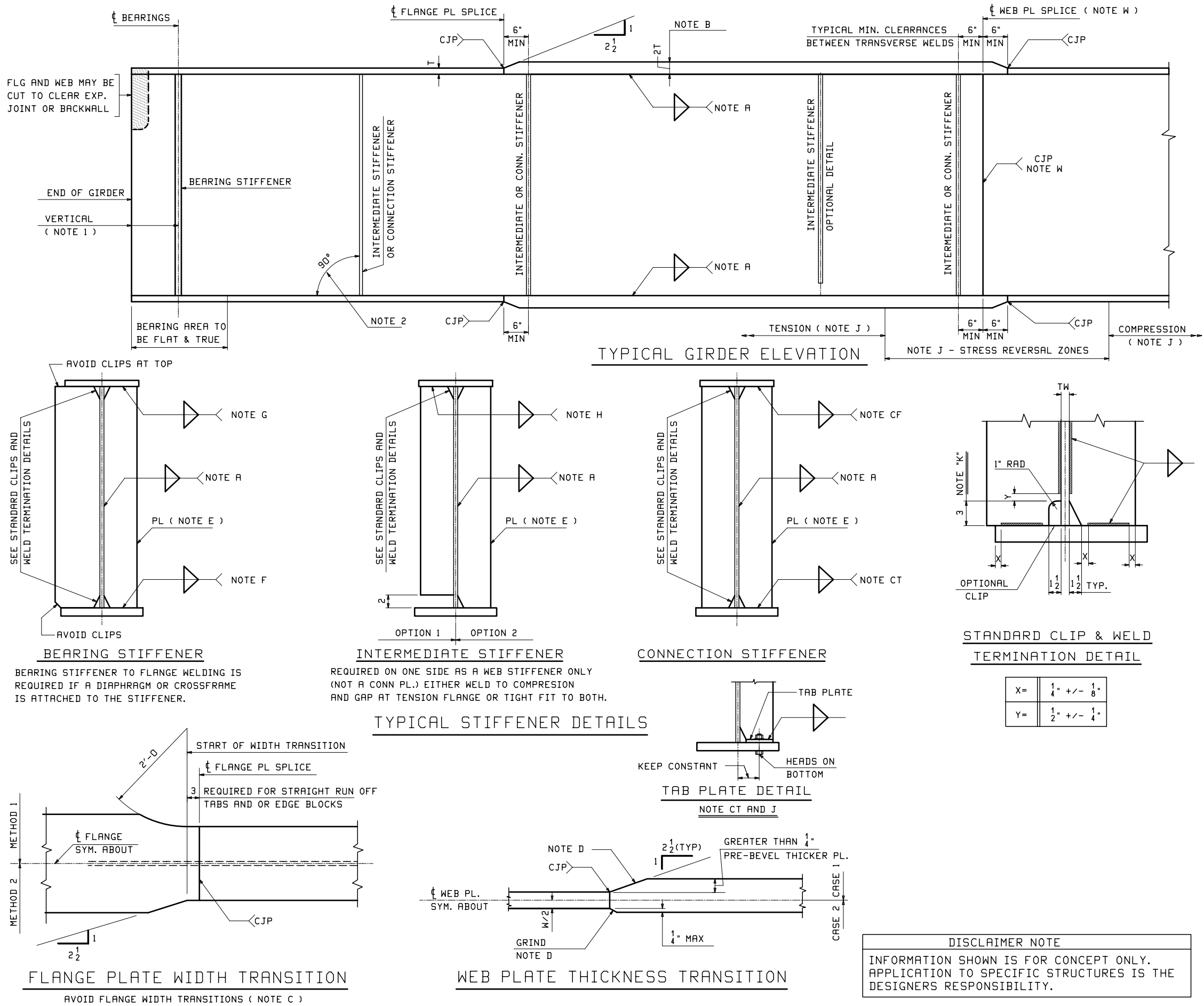
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GENERAL NOTES STRUCTURAL STEEL

AASHTO/NSBA STEEL BRIDGE COLLABORATION

TASK GROUP 1, SUBTASK – GROUP 1.4
GUIDELINES FOR DESIGN DETAILS

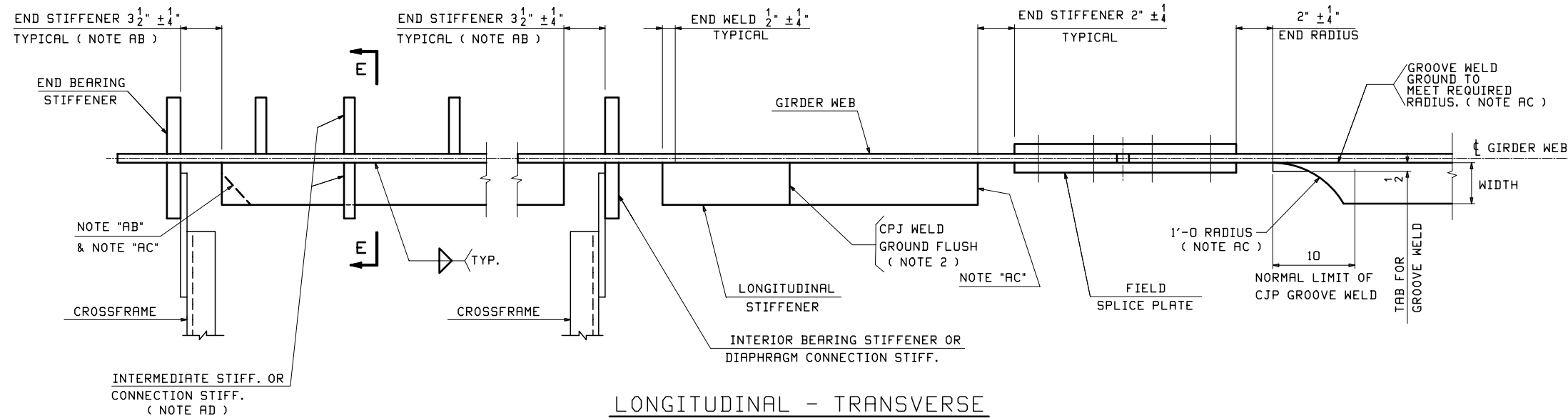


- NOTES FOR DESIGN DRAWINGS:
- 1 ... ENGINEER SHOULD SPECIFY THAT UNDER FULL DEAD LOAD, GIRDER ENDS AND ALL BEARING STIFFENERS, INCLUDING BEARING STIFFENERS AT PIERS, ARE VERTICAL OR NORMAL TO GRADE LONGITUDINALLY.
 - 2 ... INTERMEDIATE STIFFENERS AND CONNECTION STIFFENERS SHOULD BE NORMAL TO THE FLANGE UNLESS OTHERWISE REQUIRED BY DESIGNER OR REQUESTED BY THE FABRICATOR, SUCH AS A CONNECTION STIFFENER IN AN AREA OF COMPLEX FRAMING. PLACE INTERMEDIATE STIFFENERS ON THE INTERIOR SIDE OF FASCIA GIRDERS.
- NOTES TO DESIGNERS:
- A ... FILLET WELD SIZES SHALL BE SHOWN ON THE DESIGN DRAWINGS OR A NOTE STATING THAT MINIMUM AASHTO/AWS WELDS SHALL BE USED. WHERE EVER POSSIBLE AVOID FILLET WELDS OVER 5/16. AVOID CJP WELDS, FOR OTHER THAN WEB AND FLANGE SPLICES.
- B ... THICKER PLATE PREFERABLY SHOULD NOT BE MORE THAN 2X THE THICKNESS OF THINNER PLATE AT CJP WELDS.
- C ... AVOID SHOP SPLICE FLANGE WIDTH TRANSITIONS WITHIN A GIRDER SHIPPING UNIT, CHANGES IN THE THICKNESS OF FLANGE PLATES ARE PREFERRED.
- D ... WHERE DIFFERENCES IN WEB PLATE THICKNESS ARE LESS THAN 1/4" TRANSITIONS MAYBE ACCOMPLISHED BY GRINDING AFTER WELDING.
- E ... DESCRIBE STIFFENER PLATE SIZES HERE OR ON GIRDER ELEVATIONS. USE 7 1/2" MINIMUM WIDTH FOR CONNECTION STIFFENERS WITH 2 VERTICAL ROWS OF BOLTS. USE 5" MINIMUM WIDTH CONNECTION PL'S FOR ONE ROW OF BOLTS.
- F ... FINISH TO BEAR (TYP) AND FILLET WELD IF A DIAPHRAGM OR CROSSFRAME ATTACHES TO STIFFENER. INSURE CLEARANCE TO BRG. ATTACHMENT BOLTS. INVESTIGATE LOAD FOR REQUIREMENT OF CJP WELDS.
- G ... USE FILLET WELD IN LIEU OF TIGHT FIT WHEN A DIAPHRAGM OR CROSSFRAME ATTACHES TO STIFFENER. TIGHT FIT ONLY WITHOUT A DIAPHRAGM OR CROSSFRAME ATTACHED.
- H ... USE FILLET WELD TO COMPRESSION FLANGE AND GAP AT TENSION FLANGE OR TIGHT FIT TO BOTH FLANGES.
- J ... SHOW LIMITS WITH DIMENSIONS OF TENSION ZONES AND STRESS REVERSAL ZONES. THESE ARE NEEDED FOR WELD TESTING AND FIT OF STIFFENERS.
- K ... KEEP THE SIZE OF CLIPS THE SAME FOR ANY ONE PROJECT. 3" SHOULD WORK FOR ALMOST ALL STRUCTURES.
- W ... DO NOT SHOW A CJP DETAIL FOR A WEB SPLICE UNLESS THE THICKNESS CHANGES. SPECIFY WHERE GRINDING IS REQUIRED.
- X ... THESE DETAILS & MATERIAL SIZES ARE SUGGESTED AND ARE FOR A GUIDE ONLY. ENGINEER SHOULD CHECK WITH OWNER FOR POSSIBLE PREFERRED STANDARDS.
- CF .. FILLET WELD TO COMPRESSION FLANGE.
- CT .. FILLET WELDING TO TENSION FLANGE IS PREFERRED. DESIGNER MUST CHECK STRESS RANGE FOR CATEGORY C . INVESTIGATE THICKENING FLANGE PLATE IN LIEU OF USING A BOLTED TAB PLATE. THEN USE TAB PLATES ONLY AT LOCATIONS WHERE REQUIRED. TAB PLATES COST ABOUT 150 DOLLARS EACH BASED ON 2003 COSTS.

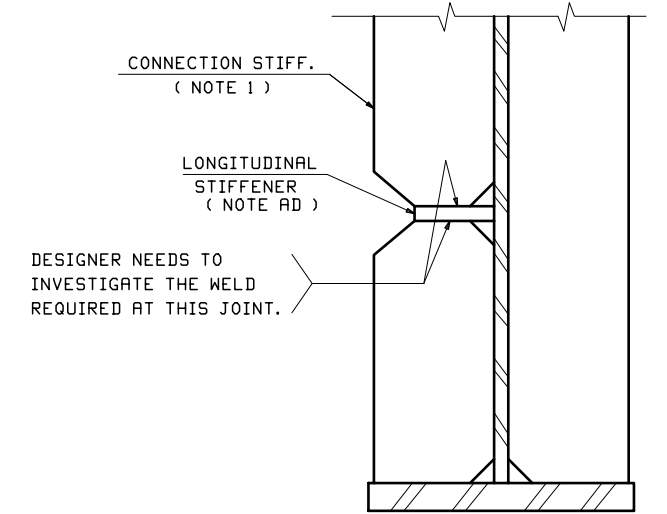
TYPICAL GIRDER DETAILS - I

AASHTO/NSBA STEEL BRIDGE COLLABORATION

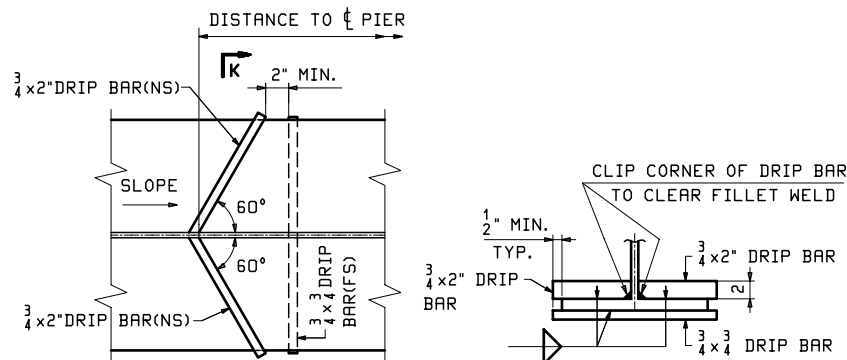
TASK GROUP 1, SUBTASK - GROUP 1.4
GUIDELINES FOR DESIGN DETAILS



LONGITUDINAL - TRANSVERSE
STIFFENER INTERSECTION DETAIL



SECTION E-E
(IN TENSION OR REVERSAL ZONE ONLY)
(AT INT. STIFF. OR CONN. PL.)

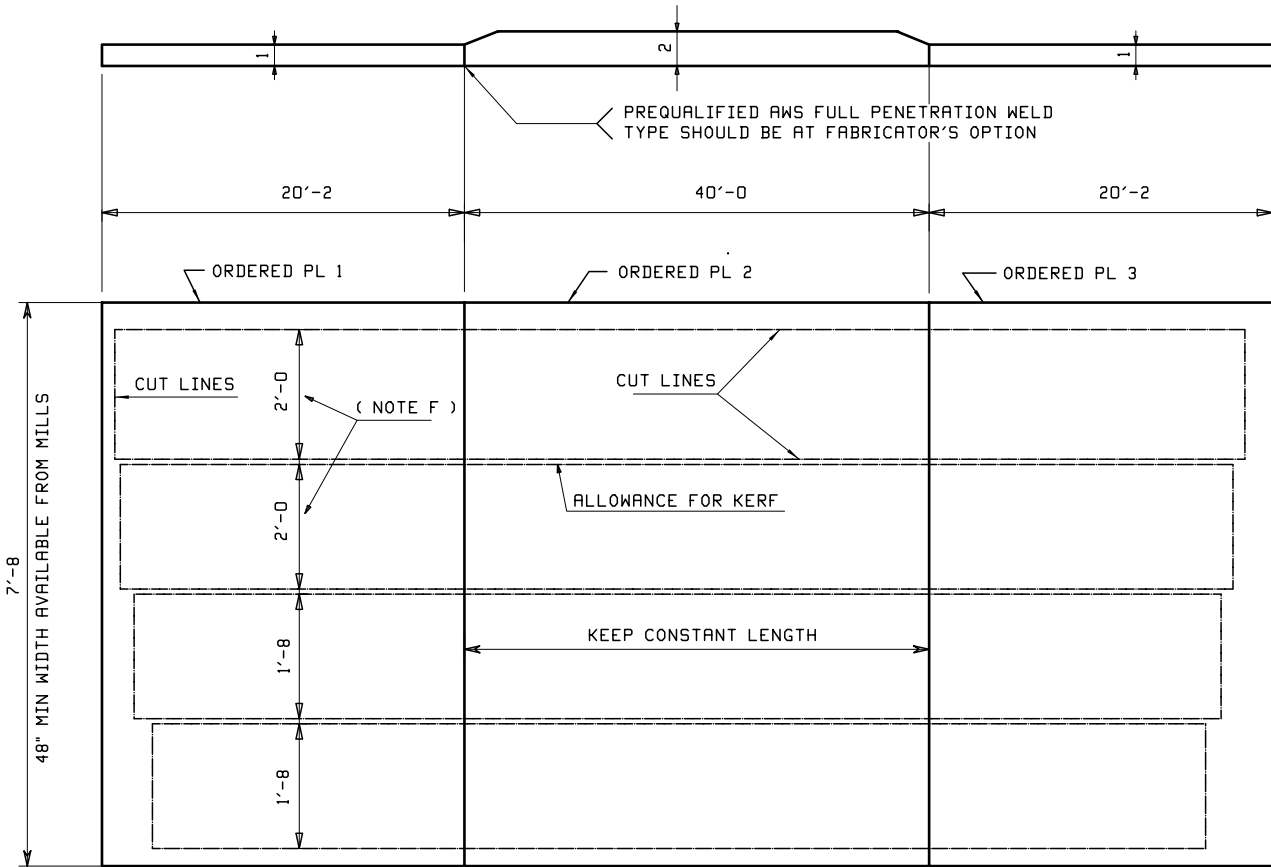


DRIP BAR DETAIL

NOTE:
DRIP BAR ON TOP OF BOTTOM FLANGE SHALL BE CAULKED AGAINST FLANGE, WEB & FILLET WELD SUBJECT TO APPROVAL OF THE ENGINEER.

SECTION K

FOR INFORMATION ONLY - NOT PART OF DESIGN PLANS



ALLOWANCE FOR SQUARING
AND CUTTING BOTH SIDES TO
AVOID INDUCING SWEEP.

SLABBING AND STRIPPING

LONGITUDINAL & TRANSVERSE STIFFENER

NOTES FOR DESIGN DRAWINGS:

- 1...LOCATE ALL INTERMEDIATE STIFFENERS ON OPPOSITE SIDE OF WEB FROM LONGITUDINAL STIFFENERS WHEN POSSIBLE. LOCATE LONGITUDINAL STIFFENER ON EXTERIOR FACE OF FASCIA GIRDERS.
- 2...PERFORM NON-DESTRUCTIVE TESTING ON LONGITUDINAL STIFFENER BUTT WELDS PRIOR TO ATTACHMENT TO GIRDER WEB. WELD NOT DETAILED ON DESIGN PLANS.
- 3...SEE SECTION E-E FOR STRESS REVERSAL ZONE AT STIFFENERS.

NOTES TO DESIGNERS:

- AA...AVOID THE USE OF LONGITUDINAL STIFFENERS WHEREVER THICKENING THE WEB PLATE MIGHT BE MORE ECONOMICAL.
- AB...CROSSFRAME MAY INTERFERE WITH LONGITUDINAL STIFFENER DURING ERECTION, IF SO CLIP STIFFENER AS REQUIRED.
- AC...USE GROOVE WELD TERMINATION AND RADIUS CUT ONLY WHEN REQUIRED BY DESIGN.
- AD...AVOID INTERSECTING TRANSVERSE AND LONGITUDINAL STIFFENERS BY LIMITING LENGTH OF THE LONGITUDINAL STIFFENER OR THICKENING THE WEB PLATE..

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SLABBING & STRIPPING DETAIL

NOTES TO DESIGNERS

- A...STEEL MILLS NO LONGER ROLL PLATES IN WIDTHS LESS THAN 48 INCHES. THE FABRICATOR'S ARE REQUIRED TO COMBINE PLATES AND NEST THEM IN ORDER TO ECONOMIZE AND REDUCE SCRAP.
- B...THE ENDS OF ORDERED PLATES ARE PREPARED AND THEN WELDED TOGETHER AS SHOWN. THE INDIVIDUAL FLANGE PLATE ASSEMBLIES ARE THEN FLAME CUT TO THEIR FINISHED WIDTHS BY MULTIPLE TORCHES. NON-DESTRUCTIVE TESTING MAYBE PERFORMED PRIOR TO OR AFTER STRIPPING BUT BEFORE WELDING THE FLANGE PLATE ASSEMBLIES TO THE WEB PLATES.
- C...THE COST OF SPLICING THE SLAB WHICH INCLUDES HANDLING, BEVELING, GRINDING AND TESTING, WOULD BE SUBSTANTIALLY LESS THAN FABRICATING EACH FLANGE PLATE ASSEMBLY INDIVIDUALLY.
- D...AVOID TRANSITIONS IN FLANGE WIDTH IN ANY ONE GIRDER SHIPPING LENGTH (VARY THICKNESS INSTEAD) THIS WILL ELIMINATE EXTENSION TABS AND RUN-OFF BARS.
- E...MINIMIZE CHANGES IN FLANGE PLATE THICKNESS. IT MAY BE MORE ECONOMICAL TO ELIMINATE A FLANGE SPLICE AND EXTEND THE THICKER FLANGE. THE COST OF A SPLICE MAY EXCEED THE MATERIAL COSTS.
- F...IF DIFFERENT FLANGE AREAS ARE NEEDED FOR ADJACENT CURVED GIRDERS, VARY WIDTHS INSTEAD IF THICKNESS.

TYPICAL GIRDER DETAILS - II
& FLANGE SLABBING AND STRIPPING DETAILS

AASHTO/NSBA STEEL BRIDGE COLLABORATION

TASK GROUP 1, SUBTASK - GROUP 1.4
GUIDELINES FOR DESIGN DETAILS