AASHTO/NSBA Steel Bridge Collaboration

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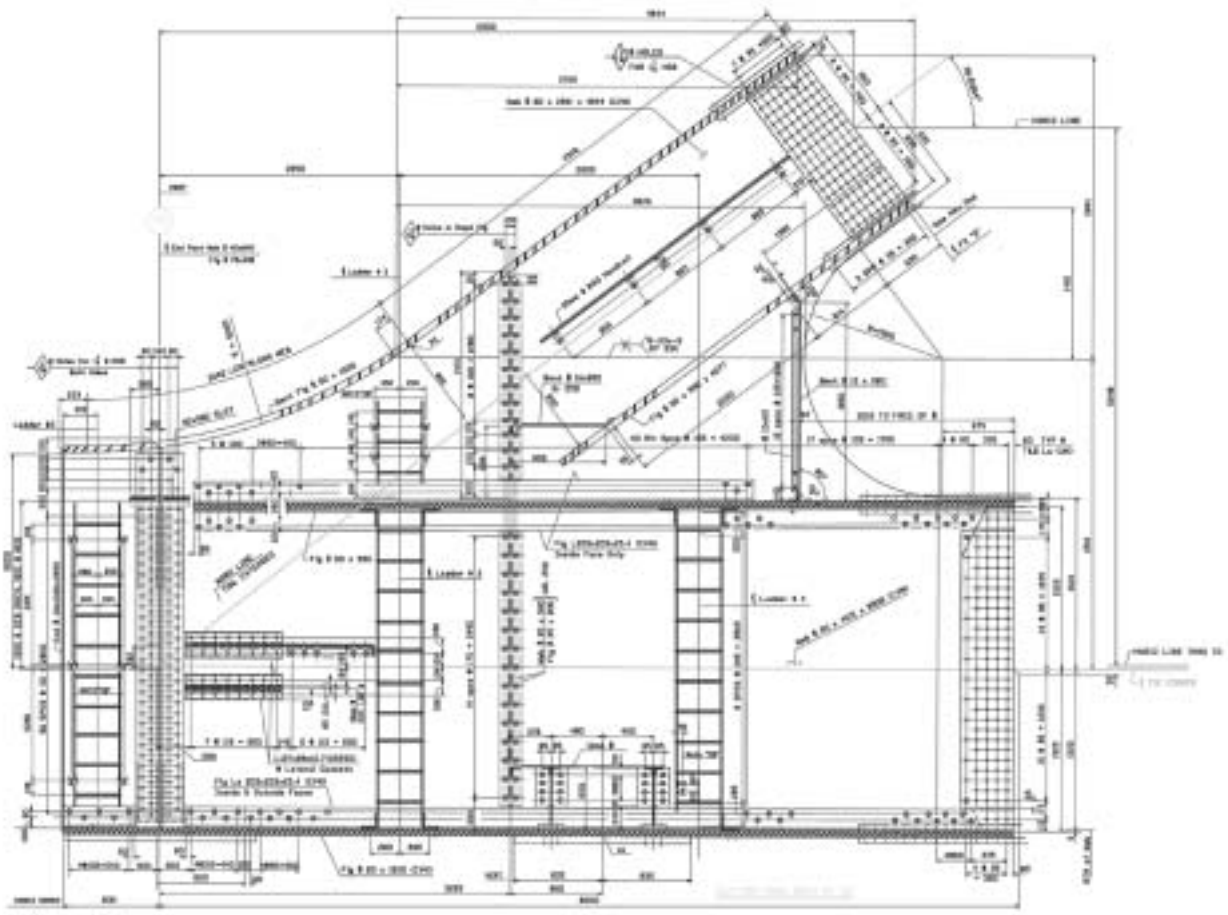

Shop Detail Drawing Presentation Guidelines

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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Table of Contents

Introduction 1

Standard Abbreviations 2

Section 1: Preferred Uniform Procedures 3
- 1.1 Shop Drawing Format 3
- 1.2 Shop Drawing Numbering System 3
- 1.3 Shop Detail Drawing Numbering Sequence 4
- 1.4 Marking System for Shipping Pieces 5

Section 2: Calculation Plan 6

Section 3: Typical Layouts 8

Section 4: General Shop Notes 10
- 4.1 Specifications 10
- 4.2 Material 10
- 4.3 Fabrication and Workmanship 10
- 4.4 Shop Welding and Testing Notes 10
- 4.5 Shop Cleaning and Painting Notes 10
- 4.6 Optional Details Which May Appear on GN1 11

Section 5: Web Camber 13

Section 6: Flange Splicing Diagram 18
- 6.1 Straight Girders 18
- 6.2 Curved Girders 18

Section 7: Horizontal Curve Diagram 20

Section 8: Girder Standards 22
- 8.1 Stiffeners and Connection Plates 22
- 8.2 Field Splices - Option 1 22
- 8.3 Field Splices – Option 2 23

Section 9: Crossframe Standards 27

Section 10: Erection Framing Plan 29
- 10.1 General 29
- 10.2 Field Bolt List 29
- 10.3 Field Bolt Summary 29

Section 11: Shop Assembly Diagram 32
- 11.1 Shop Assembly Diagram 32
- 11.2 Vertical Blocking Diagram 32
- 11.3 Plan View Blocking Diagram 32

Section 12: Girder Details 34

Section 13: Crossframe Details 40

Commentary 45

Introduction

The presentations shown in these Guidelines are based on a general consensus and are not intended to be binding on any Fabricator. Since fabrication drawings have information on them based on each Fabricator's equipment and fabrication processes, they may vary from the drawings shown.

At this time, for the purpose of presentation, metric dimensions have been used on all of the shop detail drawings. English dimensions shall be used if specified in the contract documents. Regardless of the system used, the presentation shown would apply to either metric or English units.

Standard Abbreviations

BRG	Bearing
BTS	Bolt To Ship
CL	Centerline
CVN	Charpy V-Notch Testing
DA	Drill Assembled
DEV	Developed
DT	Drilling Template
DOR	Direction Of Rolling
DWG	Drawing
FCM	Fracture Critical Member Or Fracture Critical Material
FCW	Fracture Critical Weld
FLG	Flange
FS	Far Side Or Field Splice
FWS	Field Weld Shrinkage
HCL	Horizontal Control Line
MK	Mark
MATL	Material
MT	Magnetic Particle Ndt
NC	Numerical Control
NDT	Nondestructive Testing
NS	Near Side
N.T.S.	Not To Scale
OBG	Orthotropic Box Girder
OPP.	Opposite
PC	Point Of Curvature
PCC	Point Of Compound Curve
PT	Point Of Tangency
R	Radius
RA	Ream Assembled
RT	Radiographic Ndt
SECT.	Section
STIFF.	Stiffener
U.N.	Unless Noted
UT	Ultrasonic Ndt
WP	Work Point
WS	Weld Shrinkage
WT	Wrench Tight Bolts (Snug Tight)

Section 1
Preferred Uniform Procedures

1.1 Shop Drawing Format

1.1.1 Sheet Size and Layout

- The sheet size should be 610 mm x 915 mm (24" x 36") with a 38 to 50 mm (11/2" to 2") border on left edge and a 12 mm (1/2") border on the other 3 sides.
- Title block to be as required by Fabricator, contain all the required information as specified by the Owner and located in the lower right of drawing.
- Allow ample open space near the title block for approval review stamps. Normal size should be 50 mm x 25 mm (2" x 1") for full size sheets and an appropriate size for reduced size sets.

1.1.2 Line Weights and Text

- Object lines to be shown with approximately 0.70 mm width lines and dimensional lines shown with approximately 0.30 mm width lines.
- Text to be a minimum of 2.8 mm in height and be in block form with a line weight of 0.35 mm. Text must be legible when reduced to half size prints. (Detailing reference information may be shown smaller.)
- Upper case is generally used for all text except shop assembly piece marks, which are usually shown in lower case.

1.1.3 Drawing Medium

- Electronic files for approval and final distribution to be in either TIFF or PDF format based on prior agreement with Reviewer and Owner.
- Hard copy approval to be half size paper prints. Full size if required by specification. (half size preferred)
- Final hard copy distribution to be per specification: paper, vellum, film or microfilm. Electronic files on a CD is preferred and may be utilized upon mutual agreement.

1.2 Shop Drawing Numbering System

For Type of Drawing

Prefix	Contents Description
WS	Worksheets (calculation and layouts used to prepare shop drawings; not to be reviewed as shop fabrication drawings)
TD	Typical details and layouts (details and layouts to prepare shop drawings; not to be reviewed as shop fabrication drawings)
GN	General shop notes and typical details (lists appropriate notes for welding, paint, etc.)
BG	Basic girder diagrams (web and flange cutting diagrams)
WC	Web camber details (camber cutting and splicing of webs)
FS	Flange splicing details (assembly and splicing of flanges). Web to flange welds may be shown here, on WC drawing, or on girder detail drawing
FW	Field work sheets (used to obtain field dimensions and/or show required fieldwork, including field reaming and drilling)
HC	Horizontal curve diagrams (final line curve diagrams per piece with horizontal ordinates shown)

Prefix	Contents Description
X	Girder job standards (parts details for I girders, box girders and tub girders)
Z	Stringer job standards
M	Miscellaneous job standards (parts details, rolled beams, cross frames, diaphragms, etc.)
SB or SD	Sub-assemblies (parts, shop or field assembled, as units prior to incorporating into a shipping piece or the structure)
E	Anchor bolt plans, field bolt and erection framing plans (location of shipping piece marks). Note: these are not erection procedure plans.
SA	Shop assembly diagrams (line assembly reaming, unit assembly, etc.)
1 thru...	Details of girders, cross frames, stringers, diaphragms, etc.
SP	Shipping procedures (detailed procedure to ship unique pieces)
WP	Welding procedures (used to show required welding procedures; to be submitted and approved separately from shop detail drawings)

Note: Prefix typically followed by numerical identification 1,2,3**,** etc.

1.3 Shop Detail Drawing Numbering Sequence

There should be a logical sequence in shop detail drawings that will aid the reviewer and shop personnel. The approval review process will be expedited if all structure drawings are organized in a common sequence. The prefixed drawings should be located within sets in the order shown in Section 1.2.

Numbered drawings should be sequenced similarly to the following example:

Description	Drawing No.
Bearing Details	1
Girders 2G1A	2AC, 2BC, 2C*
3G2A	3
4G3A	4
5G4A	5
6G1B	6
7G2B	7
8G3B	8
9G4B	9
Cross Frames, Diaphragms & other Misc.	10

*Use letters as suffix when details require more than one drawing.

NOTE: Certain projects may require deviation from the Shop Detail Drawing Numbering System Sequence, dependent upon the Fabricator's requirements. Also, WS, TD, GN, WC & FS drawings may be prepared and submitted [with other necessary sheets/information (E & WP)] prior to balance of detail drawings on large projects in order to begin with fabrication of these pieces. Partial submittals must be complete enough to allow checkers to adequately cross-reference information and avoid requiring later re-checking.

1.4 Marking System for Shipping Pieces

Identifier	Description
G	Girder (member built up of plates for flanges & web)
BG	Box Girder (closed box member)
TG	Tub Girder (open box member)
S	Stringer (rolled beam member)
D	Diaphragm (single rolled shape between main members or built up plate type)
CF, K, X	Cross Frame (built-up member between main members made up of rolled shapes such as wide flange sections, channels or angles)
L or LB	Lateral Bracing (all horizontal plane, diagonal bracing)
MS	Miscellaneous (shipping pieces not in any other group)
DU	Deck Units (usually railroad bridge floor beams with plates attached)
AB	Anchor Bolts
BP	Bronze Plate
BR	Brackets (cantilever type)
EB	Elastomeric Bearing
FB or B	Floorbeams (rolled beam or built-up I-girder)
PP	Preformed Pad
LP	Leveling Plate
MP	Masonry Plate
P	Pin
RP	Rocker Plate
SP	Sole Plate
W	Washer
WD	Weld Detail Drawing (for use on complex structures with many weld details)

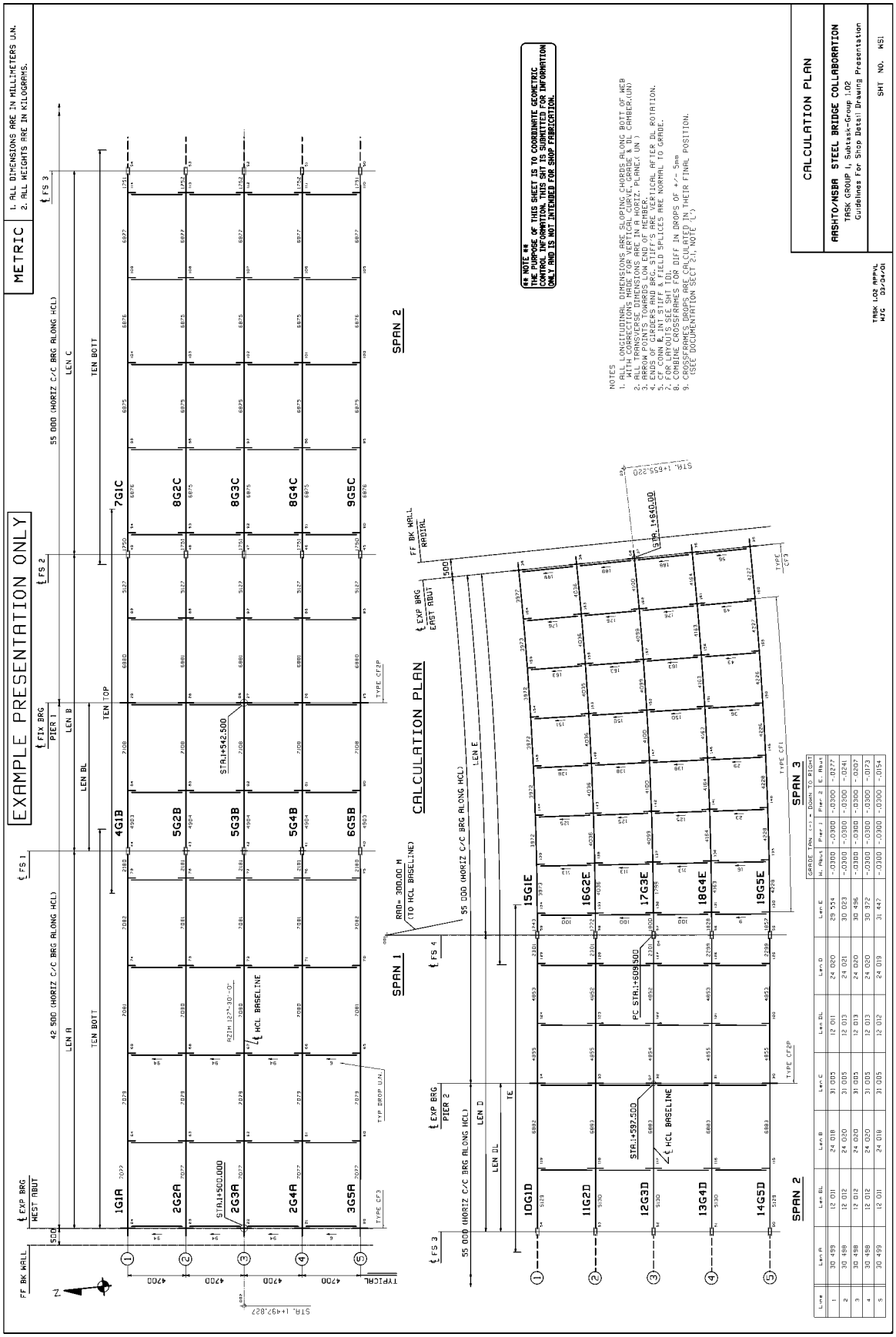
Fracture critical pieces may be prefixed ‘F’, such as FG, FBG, FTG, etc. This is optional and may be used by a Fabricator to differentiate this material. The above letters may be prefixed with the sheet number on which the piece is detailed, serving as a self-indexing system, and suffixed with a numerical identification. Longitudinal main members shall be suffixed A, B, C, etc. in addition to their numerical suffix. See sheets WS1 and E1 for reference.

Section 2
Calculation Plan

(SHT No. WS1, page 7)

- Show the horizontal/geometric control line (HCL) with all defining points (e.g., PT, PC, PCC), azimuths and radii as applicable along with skew angle to bearing line.
- Indicate the stations for the intersections of the centerlines of bearings and the HCL.
- Show dimensions for center to center of bearing along the HCL in a horizontal plane.
- Dimension the sloping length (along centerline of member) from field splice to field splice and crossframe to crossframe with corrections made for geometric camber. Note if correction for dead load camber has been made to the dimensions.
- Show transverse dimensions for center to center of girders in a horizontal plane.
- Indicate the direction of NORTH relative to the structure.
- Show value and direction of crossframe drops with arrow pointing towards low end of member. Label designation of crossframe as per contract drawings.
- Indicate the type of bearing at each support (i.e., fixed, expansion).
- Label field splices (e.g., FS1, FS2), piers, abutments and span numbers.
- Show grade of member at bearings and direction of grade (positive numbers for uphill grades left to right and negative numbers for downhill grades).
- Show elevation view of girders when required to fully define dimensions.
- Crossframe drops (difference in elevations) can be either given in their final (fully deflected) position or in a cambered (or erected) position. The camber position could be with all of the camber included or partial dead load camber after steel deadload deflection occurs. The Engineer should specify this value. This is extremely important on skewed or curved bridges where a different camber and deadload deflections exists between adjacent girders.

Shop Detail Drawing Presentation Guidelines



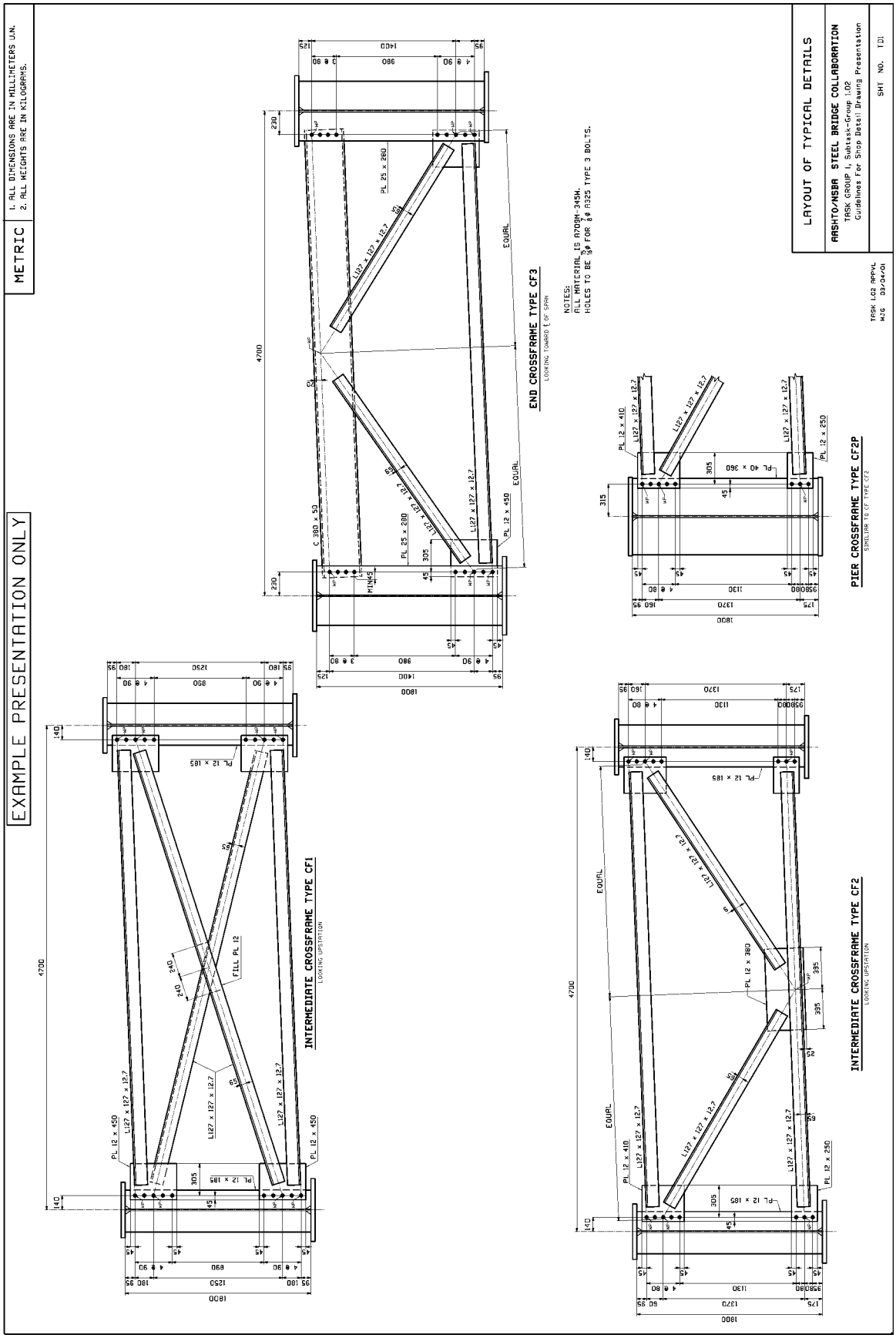
Line	Len R	Len BL	Len B	Len C	Len BL	Len D	Len E	GRADE TRN (+) = DOWN TO RIGHT			
								N. Abut	Pier 1	Pier 2	E. Abut
1	30 489	12 011	24 018	31 005	12 011	24 020	29 534	-.0300	-.0300	-.0300	-.0277
2	30 498	12 012	24 020	31 005	12 013	24 021	30 023	-.0300	-.0300	-.0300	-.0241
3	30 498	12 012	24 020	31 005	12 013	24 020	30 496	-.0300	-.0300	-.0300	-.0207
4	30 498	12 012	24 020	31 005	12 013	24 020	30 972	-.0300	-.0300	-.0300	-.0173
5	30 499	12 011	24 018	31 005	12 012	24 019	31 447	-.0300	-.0300	-.0300	-.0154

Section 3
Typical Layouts

(SHT No. TD1, page 9)

- Typical layouts are used to coordinate the geometry of connections that appear throughout the structure. Field splices are not generally shown on these sheets.
- Illustrate crossframes with the side that requires the most welding as the near side. Indicate whether this is up or down station or the direction looking (such as "Looking East"). Welds are not required to be shown here. (See crossframe details)
- Assign and label location of work points (WP) controlling the geometry of the crossframe. Crossframe WPs should be kept on the crossframe. Establish new fabrication WPs that are on the crossframe if the design drawings specifically indicate WPs not located on the crossframe.
- Dimension horizontal distance from center to center of girders.
- Show the horizontal distance from centerline of girder to the first vertical row of holes in the connection plate, and horizontal spacing of the rows of holes in the connection plate.
- Indicate depths of girder webs.
- Show the vertical dimensions along the centerline of girder web for crossframe: WP to WP and connection plate hole spacing.
- Indicate thickness and width of crossframe connection plates, gussets and fill plates, along with the size of all rolled shapes.
- Provide the AASHTO and/or ASTM specification for the material.
- Note bolt and hole diameters.
- Show edge distances on crossframe components.

Shop Detail Drawing Presentation Guidelines



Section 4
General Shop Notes

(SHT No. GN1, page 12)

A general note sheet must be made for all bridge contracts. It lists the specifications and requirements for fabrication, material, shop procedure, inspection, cleaning and painting, and shows standard details required for the particular structure. Notes are not intended to be all-inclusive, and compliance with relevant specifications remains a requirement.

4.1 Specifications

List the appropriate documents that pertain to the structure and any provisions that may modify them. These typically include AASHTO, state and AWS specifications. If there are multiple edition dates for a particular specification or code stipulate the relevant version used in preparing shop drawings.

4.2 Material

- Identify the ASTM/AASHTO material specifications for the main and secondary members, bolts and shear studs. If thin fills are required and when A709M/M270 bridge steel is not available, alternate equivalent materials may need to be proposed for the Owners acceptance (e.g., ASTM A606).
- For CVN or FCM testing provide the zone, energy and frequency that corresponds to the grade and thickness of the material to be used.
- Specify whether the shear studs are to be shop or field applied.
- Note if the bolts are to be rotational capacity tested in shop, field and/or before delivery.

4.3 Fabrication and Workmanship

- Provide requirements for making re-entrant cuts.
- Indicate reaming or drilling procedures.
- Define Fabricator terms or identifiers (i.e., “DA”, “DT”, ”RA”, etc.).
- The remainder of this section is Fabricator/Owner dependant. Additional information shall be provided as necessary to eliminate repetitive notes or procedures on the actual detail drawings. In the example, the shop has provided a note prohibiting or taking exception to the use of the weights shown on the detail drawings for lifting or shipping purposes.
- A field splice plate match-marking scheme is necessary if the splice plates are reamed or drilled assembled. An additional match-marking scheme is shown on the shop assembly drawings addressing like-marking of plates when CNC drilled holes are used.

4.4 Shop Welding and Testing Notes

- Indicate the welding processes that may be utilized during fabrication of the structure.
- Define the specifications that control the welding procedures.
- Identify the type and extent of non-destructive testing and specifications required. Define the location and terms for each test (e.g., radiograph tension flange plate splices 100% and compression flange plate splices 25%)

4.5 Shop Cleaning and Painting Notes

- Identify the specifications for performing blast cleaning and any applicable profile requirements or time limits between blasting and priming.

- For structures that are to be completely or partially painted, the specifications should be given (e.g., State DOT supplemental provision 123). Indicate the type of paint, paint system, areas of no paint/mist coats and color for painted structures.
- For structures with complicated painting requirements, painting details and notes may be shown on a separate paint sheet (P1).

4.6 Optional Details Which May Appear on GN1

- For web or flange shop splices, the appropriate ANSI/AASHTO/AWS weld designation should be shown. When consumables must match weathering characteristics of unpainted steel, they shall be noted. Special weld details may be shown on this drawing on complex structures with special weld details. If there are many special details a 'WD' drawing may be provided.
- Weld termination details for stiffener/crossframe connection plates and other typical welds are to be given.
- Identify the spacing, size, method and testing required for shop installed shear studs.

EXAMPLE PRESENTATION ONLY

GENERAL SHOP NOTES

METRIC	1. ALL DIMENSIONS ARE IN MILLIMETERS U.N. 2. ALL WEIGHTS ARE IN KILOGRAMS.

SPECIFICATIONS:

1. CONSTRUCTION OF THIS STRUCTURE SHALL CONFORM TO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" ADOPTED BY AASHTO, THE STATE DOT SPECIFICATIONS AND THE SPECIAL PROVISIONS.
2. ANSI/AASHTO/AWS "BRIDGE WELDING CODE, D1.5."
3. MATERIAL, WORKMANSHIP, AND FABRICATION SHALL BE PERFORMED IN ACCORDANCE WITH THE STATE DOT SPECIFICATION, SUPPLEMENTAL AND SPECIAL PROVISIONS.

MATERIAL:

1. ALL STRUCTURAL STEEL SHALL BE ASTM A709M-345W.
2. ALL MATERIAL NOTED ON THE DETAILS AS "CVN" SHALL REQUIRE CHARPY V-NOTCH IMPACT TESTING AS FOLLOWS:
   -MATERIAL 50mm THICK AND UNDER: 20J @ 4° C (H-FREQ).
   -WELDED MATERIAL OVER 50mm THICK: 27J @ 4° C (H-FREQ).
3. ALL H.S. BOLTS SHALL MEET THE REQUIREMENTS OF ASTM A325M-3.
   ALL NUTS SHALL MEET THE REQUIREMENTS OF ASTM A 563M GR 8S3.
   ALL WASHERS SHALL MEET THE REQUIREMENTS OF ASTM F436MW (TYPE 3).
   DO NOT MIX NUTS AND BOLTS FROM DIFFERENT LOTS.
   RC TESTING IS REQUIRED FOR ALL BOLTS BEFORE INSTALLATION.
4. STUDS SHALL BE ASTM A108.

FABRICATION & WORKMANSHIP:

1. CLIP CORNERS OF ALL BEARING STIFFENERS, CROSSFRAME CONNECTION PLATES AND INTERMEDIATE STIFFENERS AS NOTED ON DETAIL SHEETS AND TERMINATE WELD AS SHOWN IN THE WELD TERMINATION DETAIL ON THIS SHEET.
2. ALL RE-ENTRANT CUTS SHALL HAVE A MINIMUM RADIUS OF 25mm UNLESS NOTED.
3. HOLES NOTED "DA" ON THE DETAIL SHEETS SHALL BE EITHER SUB-PUNCHED OR SUB-DRILLED 5mm UNDERSIZED AND REAMED FULL SIZE. HOLES NOTED 'NC' ON DETAIL SHEETS SHALL BE DRILLED FULL SIZE USING A NUMERICALLY CONTROLLED DRILL.
4. THE WEIGHTS SHOWN ON DETAIL SHEETS ARE GROSS WEIGHTS. DO NOT USE THESE WEIGHTS FOR LIFTING OR SHIPPING PURPOSES.
5. ALL FIELD SPLICE MATERIAL SHALL BE MATCH MARKED AND BOLTED FOR SHIPMENT. SEE MATCH MARKING SCHEME ON THIS SHEET.

SHOP WELDING AND TESTING NOTES:

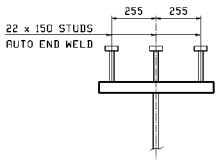
1. WELDING SHALL BE IN ACCORDANCE WITH ANSI/AASHTO/AWS BRIDGE WELDING CODE, D1.5. EXCEPT AS MODIFIED BY THE CONTRACT DOCUMENTS & APPLIED SHOP WELDING PROCEDURES (SEE DOCUMENTATION) SEC 4.1, NOTE 'n')
2. NONDESTRUCTIVE TESTING SHALL BE IN ACCORDANCE WITH ANSI/AASHTO/AWS BRIDGE WELDING CODE D1.5, AND SECTION XXXX.XX OF THE STATE DOT SPECIFICATIONS, AS SHOWN ON THE DETAIL DWGS.
3. ALL WELDS SHALL BE 100% VISUALLY INSPECTED. VISUAL INSPECTION SHALL BE PERFORMED BEFORE, DURING AND AFTER THE COMPLETION OF WELDING.
4. FLANGE SPLICES IN TENSION ARE NOTED "t" ON THE WC & FS SHEETS.
   FLANGE SPLICES IN COMPRESSION ARE NOTED "c" ON THE WC & FS SHEETS.

SHOP CLEANING NOTES:

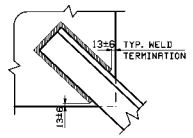
ALL MATERIAL IS TO BE BLAST CLEANED PER SSPC-SP6, EXCEPT AREAS TO BE PAINTED SHALL BE CLEANED PER SSPC-SP10 AND HAVE A SURFACE PROFILE OF 25 TO 65µm.

SHOP PAINTING NOTES:

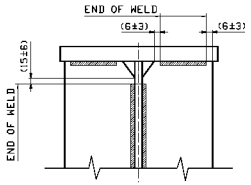
STEEL SHALL BE UNPAINTED EXCEPT STEEL WITHIN 3 M (10 FEET) OF ABUTMENT EXPANSION JOINTS SHALL BE SHOP PRIMED WITH ONE COAT OF INORGANIC, ZINC-RICH PRIMER AT A DRY FILM THICKNESS OF 75 TO 150 um (3.0 TO 6.0 mils)



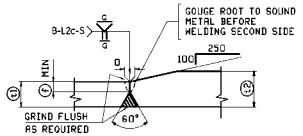
SHEAR CONNECTOR DETAIL



CROSSFRAME WELD TERMINATION
(OPTIONAL WELD WRAPPING)



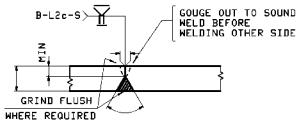
WELD TERMINATION DETAIL



DIRECTION OF GRINDING

FLANGE PLATE SPLICE DETAIL "FA"

①	②	ⓕ
20	30	6
25	35	6
40	60	12



DIRECTION OF GRINDING

WEB PLATE SPLICE DETAIL "WA"

SHEET REFERENCE:

CALCULATION PLAN	PREFIXED "WS"
TYPICAL LAYOUTS	PREFIXED "TD"
GENERAL SHOP NOTES	PREFIXED "GN"
ERECTION FRAMING PLAN	PREFIXED "E"
WEB CAMBER & FLANGE DIAGRAMS	PREFIXED "WC"
FLANGE SPLICING DIAGRAMS	PREFIXED "FS"
HORIZONTAL CURVING DIAGRAMS	PREFIXED "HC"
SHOP ASSEMBLY DIAGRAM	PREFIXED "SA"
GIRDER STANDARDS	PREFIXED "X"
CROSSFRAME STANDARDS	PREFIXED "M"
DETAIL SHEET	1-22

NOTE TO ENGINEER:
THESE NOTES ARE NOT INTENDED TO BE ALL INCLUSIVE AND COMPLIANCE WITH RELEVANT SPECIFICATIONS REMAIN UNCHANGED.

TASK 1.02 APPVL
WJG 03/04/01

GENERAL SHOP NOTES

AASHTO/NSBA STEEL BRIDGE COLLABORATION
TASK GROUP 1, Subtask-Group 1.02
Guidelines For Shop Detail Drawing Presentation

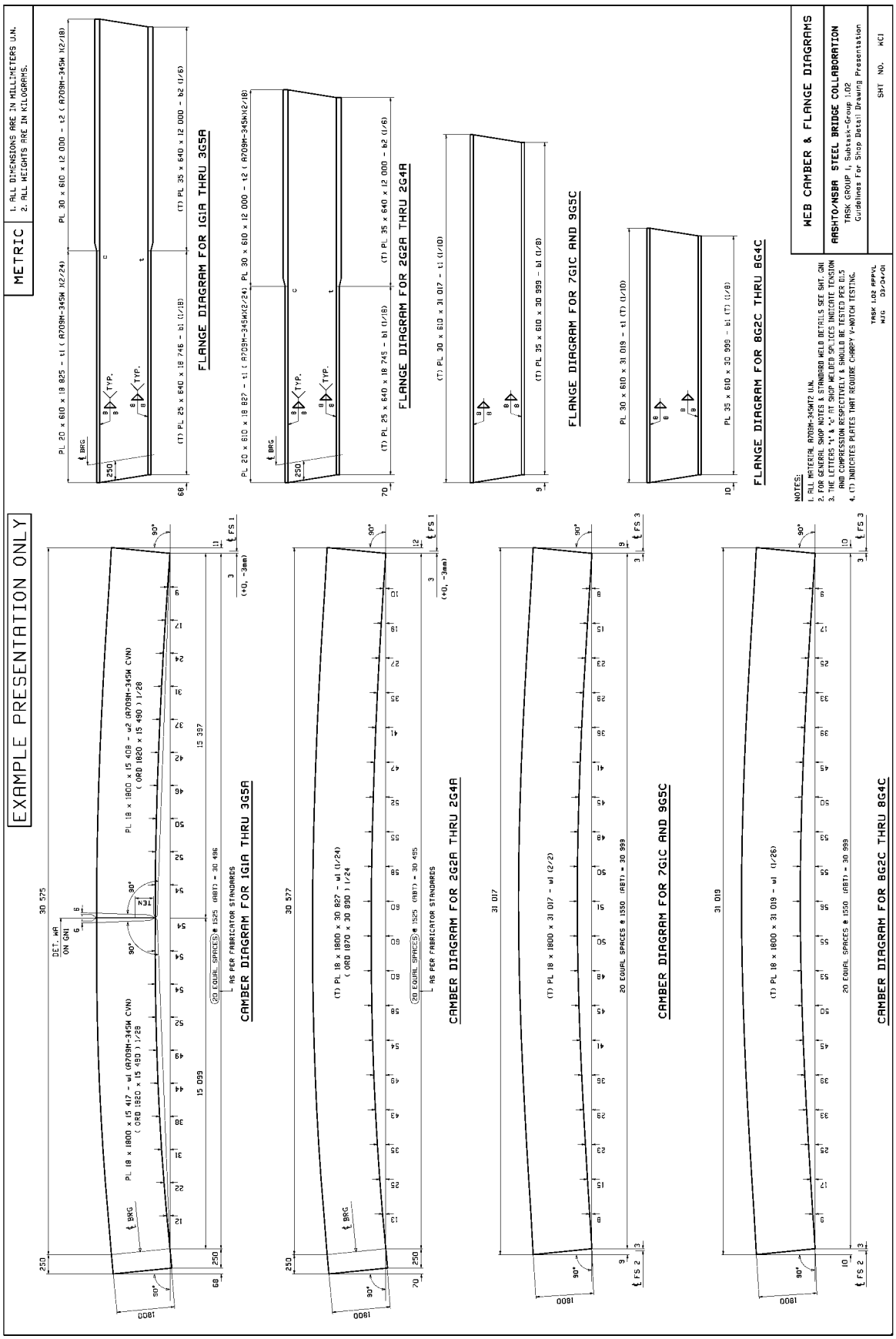
SHT NO. GN1

Section 5
Web Camber

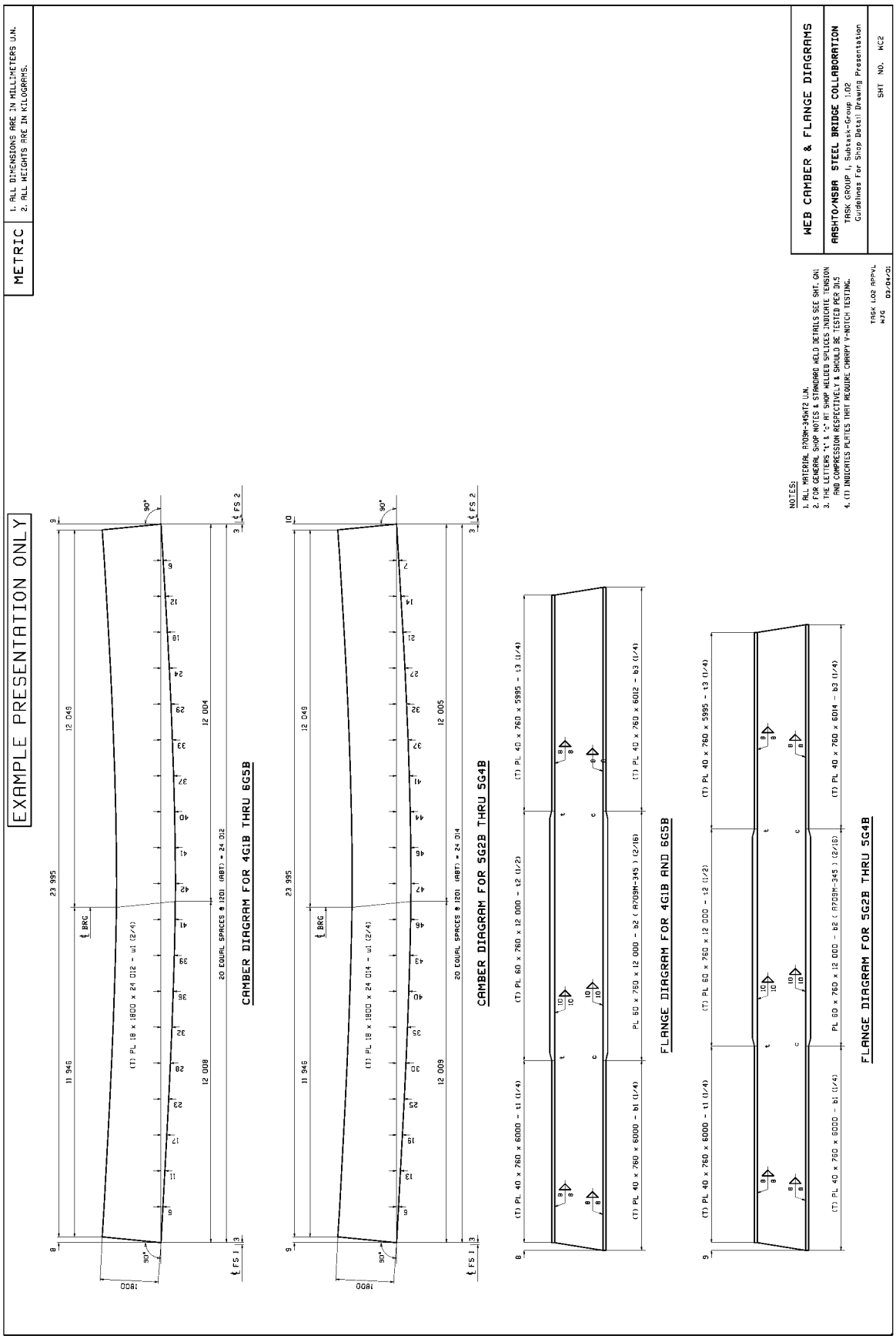
(SHT No. WC1 – WC4, pages 14 - 17)

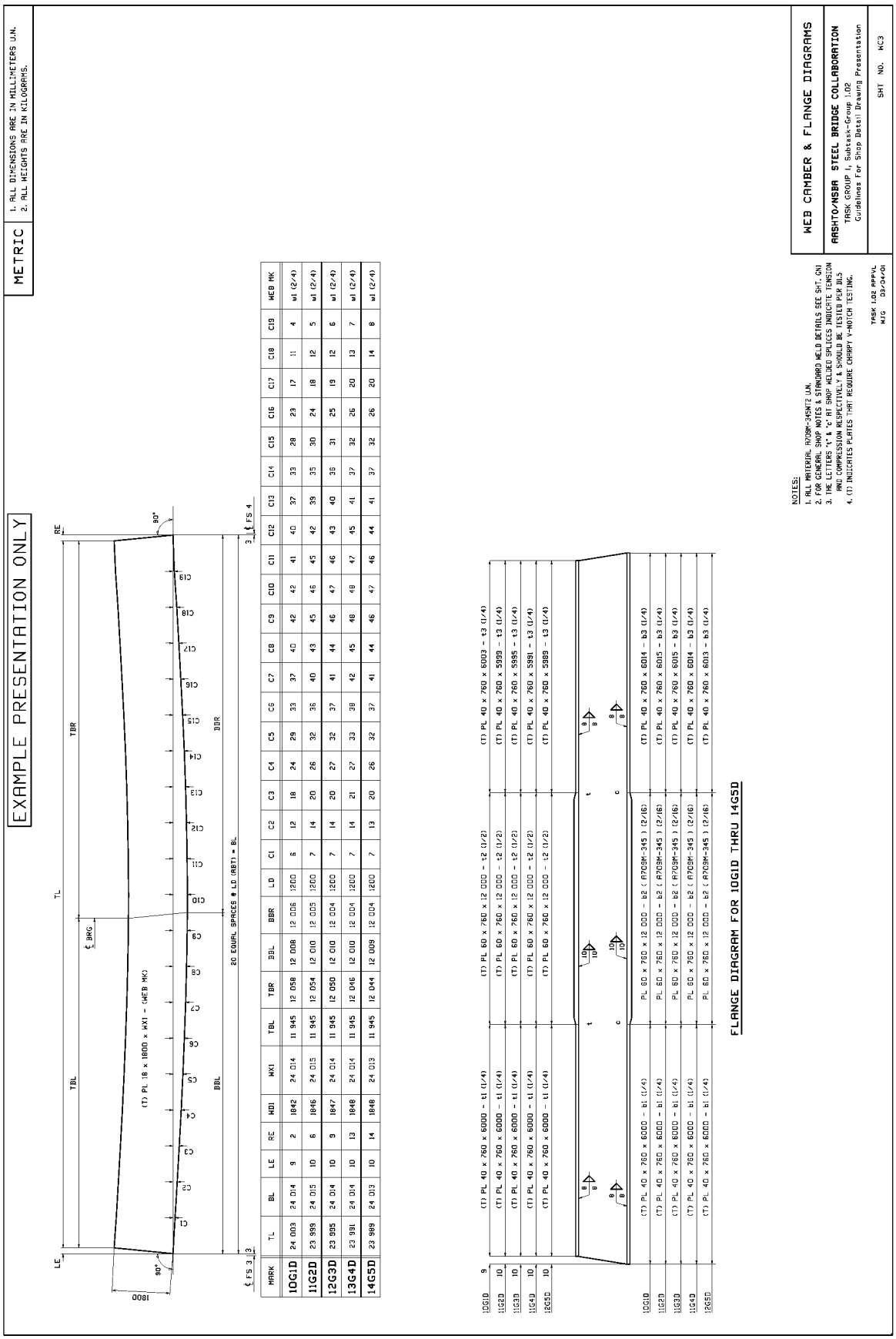
Note: These drawings may illustrate webs and flanges, as shown, or just webs

- Show camber ordinates at equal spaces or spaces per Fabricator request relative to a baseline. The baseline should go through the end points of the web plate at the bottom, unless the web plate is haunched or tapered, then take the baseline through the top end points
- On web camber diagrams with an end overhang or simple span web cambers, baseline should go through the centerline of bearing(s).
- Show end overhang and centerlines of bearing (if applicable).
- Show top and bottom dimensions and end cuts relative to the baseline.
- Show dimension from end of web plate to centerline of bearing along baseline at both top and bottom of the web plate for web plates that go over a pier bearing. Or, as an option, baseline could be shown from end to end of the girder.
- Show camber ordinates perpendicular to the baseline. If required for final dimensional accuracy, camber ordinates are to be adjusted for anticipated weld shrinkage.
- Give web plate thickness, width, length and mark. Width of web plate is usually billed as nominal width. A camber cutting allowance is to be added to the width when material is ordered. Some Fabricators might bill the ordered size in lieu of the nominal.
- Show location of shop web splices (if any).
- Note web plate material to be Charpy V-Notch tested.
- Give the corresponding girder mark for which the web plate is detailed in title for the web plate (optional as per Fabricator's standards).
- Note FMC and FCW for fracture critical material and associated welds when applicable.
- Give the page and line number of the advance bill of materials where the material is ordered.
- A correction for dead load deflection may be included to aid in setting bearing at time of erection.



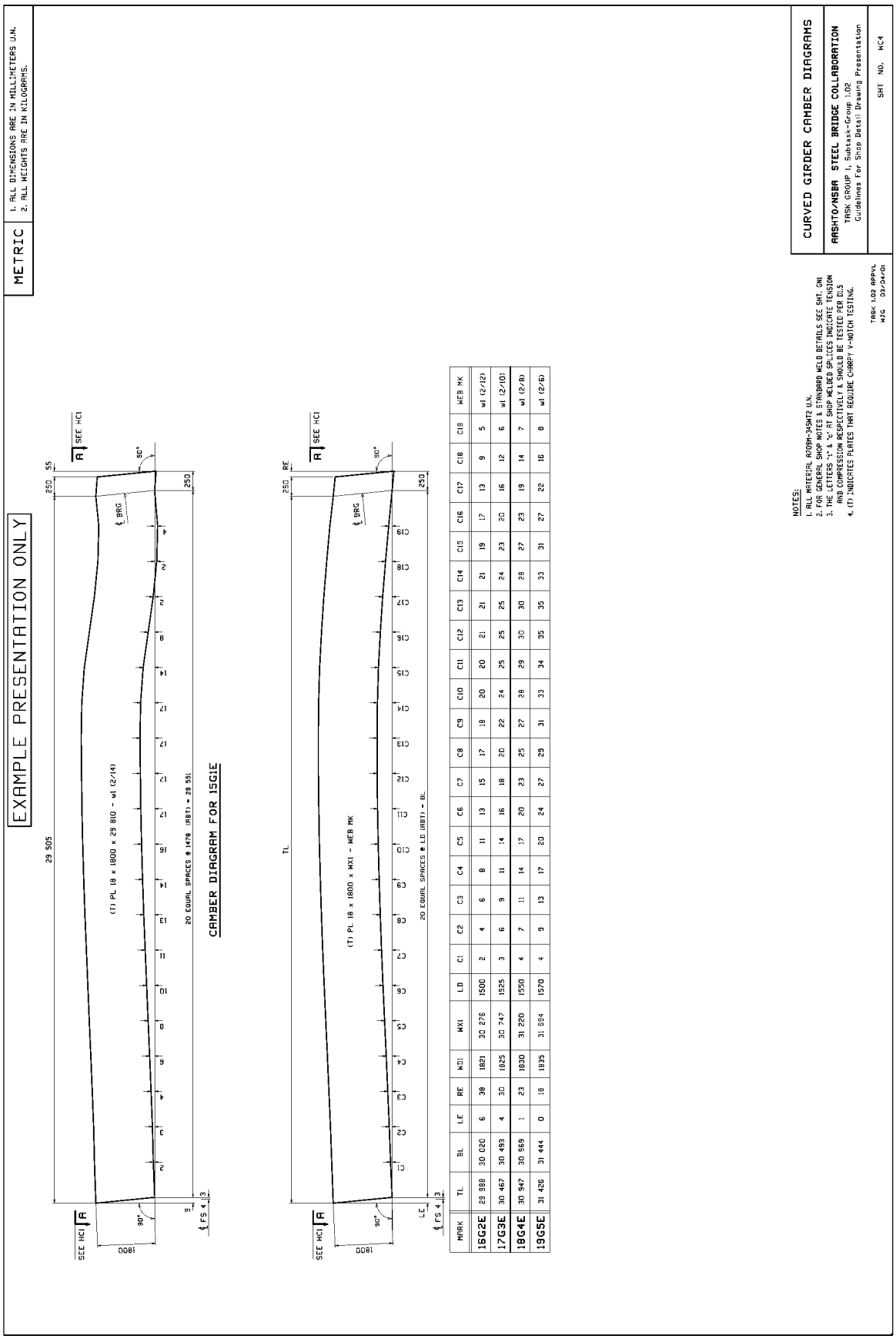
Shop Detail Drawing Presentation Guidelines





MARK	TL	BL	LE	RE	WD1	WX1	TBL	TBR	BBL	BBR	LD	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	WEB MK
10G1D	24 003	24 014	9	2	1842	24 014	11 945	12 058	12 008	12 058	1200	6	12	18	24	29	33	37	40	42	42	41	40	37	33	28	23	17	11	4	w1 (2/4)
11G2D	23 999	24 015	10	6	1846	24 015	11 945	12 054	12 010	12 055	1200	7	14	20	26	32	36	40	43	45	46	45	42	39	35	30	24	18	12	5	w1 (2/4)
12G3D	23 995	24 014	10	9	1847	24 014	11 945	12 050	12 010	12 054	1200	7	14	20	27	32	37	41	44	46	47	46	43	40	36	31	25	19	12	6	w1 (2/4)
13G4D	23 991	24 014	10	13	1848	24 014	11 945	12 046	12 010	12 054	1200	7	14	21	27	33	38	42	45	48	48	47	45	41	37	32	26	20	13	7	w1 (2/4)
14G5D	23 989	24 013	10	14	1848	24 013	11 945	12 044	12 009	12 054	1200	7	13	20	26	32	37	41	44	46	47	46	44	41	37	32	26	20	14	8	w1 (2/4)

Shop Detail Drawing Presentation Guidelines



MARK	TL	BL	LE	RE	WD1	WX1	LD	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	WEB MK
16G2E	29 988	30 020	6	38	1821	30 276	1500	2	4	6	8	11	13	15	17	18	20	20	21	21	21	19	17	13	9	wl (2/12)
17G3E	30 467	30 493	4	30	1825	30 747	1525	3	6	9	11	14	16	18	20	22	24	25	25	25	25	23	20	16	12	wl (2/10)
18G4E	30 947	30 969	1	23	1830	31 220	1550	4	7	11	14	17	20	23	25	27	28	29	30	30	28	27	23	19	14	wl (2/8)
19G5E	31 426	31 444	0	18	1835	31 694	1570	4	9	13	17	20	24	27	29	31	33	34	35	35	33	31	27	22	16	wl (2/6)

Section 6
Flange Splicing Diagram

(SHT No. FS1, page 19)

Note: These drawings are included when flanges are not shown on WC drawings.

6.1 Straight Girders

Similar to flanges shown on WC1 - WC3, pages 14 - 16)

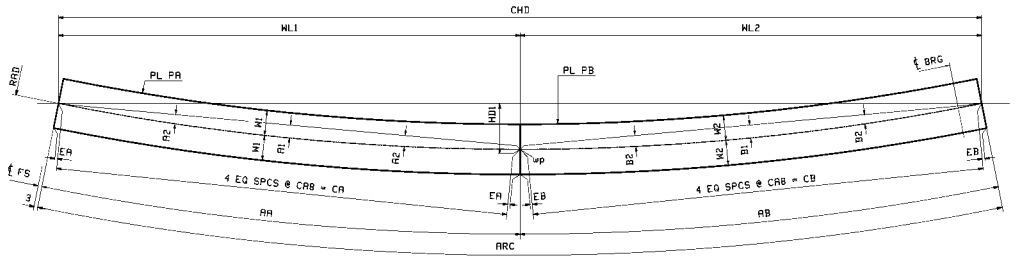
- Show elevation of web plate and flanges
- Identify and locate centerline of bearings.
- Locate shop splices.
- Show the overhang and end cut dimensions.
- Identify whether flange splices are in tension or compression.
- Give the thickness, width and length of each flange plate.
- Identify plate requirements (Charpy V-Notch testing).
- Give the size and location of fillet welds for flange to web connections.
- Note the procedure for making flange splice connections or reference the general note sheet if it is located there.
- Note the ASTM and/or AASHTO designation for the material.
- Show any bevels for flange width and/or thickness transitions.
- Note FCW for fracture critical welding if applicable.
- For curved girders see sections 6.2 and 7.
- Give the page and line number of the advance bill of materials where the material is ordered.

6.2 Curved Girders

- Define centerline of flange plate and a baseline through the end points.
- Show chord lines between ends of steel segments to center line of shop butt splices along centerline of flange plate. Space ordinates along each chord in accordance with Fabricator's standards.
- Identify centerline of field splices and the set-back dimension.
- Locate work points.
- Show offsets of shop splice relative to baseline chord to the centerline of flange plate.
- Along the baseline, show the overall length and lengths from ends to center of splice.
- Assign flange plate marks.
- Give overall arc length along centerline of spliced flange plate and arc length of individual flange plates.
- Show plate offset dimensions along and perpendicular to baseline and along and perpendicular to the plate chord lines.
- Provide flange plate thickness and width.
- Identify plates requiring Charpy V-Notch testing.
- Note the ASTM and/or AASHTO designation of the material.
- Show flange plate assembly diagram with flange to web welding, plate marks, and direction of ends (East, West). Identify and label centerline of bearing and reference camber diagram for web plate
- Give the page and line number of the advance bill of materials where the material is ordered.

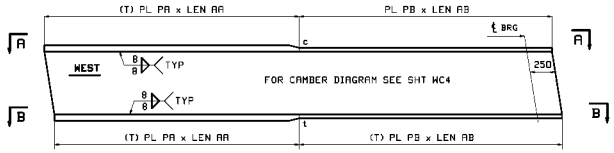
EXAMPLE PRESENTATION ONLY

METRIC	1. ALL DIMENSIONS ARE IN MILLIMETERS U.N. 2. ALL WEIGHTS ARE IN KILOGRAMS.



VIEW A-A TOP FLG
SECTION B-B BTM FLG

LOCATION	RAD	ARC	CHD	AA	AB	EA	A1	A2	A4	CA	EB	B1	B2	B4	CB	WL1	WL2	HD1	W1	W2	PL PA	PL PB
15G1E TOP FLG	280 600	29 755	29 742	12 004	17 751	6	62	46	3001	12 003	9	136	102	4437	17 748	11 997	17 745	366	305	305	PL 30 x 610 -t1 (1/12)	PL 20 x 610 -t2 (3/2)
15G1E BTM FLG	280 600	29 801	29 788	12 004	17 797	7	62	46	3001	12 003	10	136	102	4449	17 794	11 997	17 791	367	320	320	PL 35 x 640 -b1 (1/6)	PL 25 x 640 -b2 (1/22)
16G2E TOP FLG	295 300	30 238	30 225	12 001	18 236	6	61	46	3000	12 002	9	141	106	4558	18 233	11 996	18 229	370	305	305	PL 30 x 610 -t1 (1/12)	PL 20 x 610 -t2 (2/28)
16G2E BTM FLG	295 300	30 270	30 257	12 002	18 268	6	61	46	3000	12 002	10	141	106	4566	18 265	11 996	18 261	371	320	320	PL 35 x 640 -b1 (1/6)	PL 25 x 640 -b2 (1/20)
17G3E TOP FLG	300 000	30 717	30 704	12 001	18 716	6	60	45	3000	12 000	10	146	109	4678	18 713	11 995	18 709	374	305	305	PL 30 x 610 -t1 (1/12)	PL 20 x 610 -t2 (2/26)
17G3E BTM FLG	300 000	30 743	30 730	12 001	18 742	6	60	45	3000	12 000	10	146	110	4685	18 739	11 995	18 735	374	320	320	PL 35 x 640 -b1 (1/6)	PL 25 x 640 -b2 (1/18)
18G4E TOP FLG	304 700	31 197	31 183	12 000	19 197	6	59	44	3000	12 000	10	151	113	4798	19 194	11 993	19 190	378	305	305	PL 30 x 610 -t1 (1/12)	PL 20 x 610 -t2 (2/22)
18G4E BTM FLG	304 700	31 219	31 205	12 000	19 219	6	59	44	3000	12 000	10	152	114	4804	19 216	11 994	19 211	378	320	320	PL 35 x 640 -b1 (1/6)	PL 25 x 640 -b2 (1/16)
19G5E TOP FLG	309 400	31 676	31 662	12 000	19 676	6	58	44	3000	11 999	10	156	117	4918	19 673	11 993	19 669	382	305	305	PL 30 x 610 -t1 (1/12)	PL 20 x 610 -t2 (2/20)
19G5E BTM FLG	309 400	31 694	31 680	12 000	19 694	6	58	44	3000	11 999	10	157	118	4923	19 691	11 993	19 687	382	320	320	PL 35 x 640 -b1 (1/6)	PL 25 x 640 -b2 (1/14)



FLANGE DIAGRAM FOR 15G1E THRU 19G5E

NOTES:
1. ALL MATERIAL A709M-345WT2 U.N.
2. FOR GENERAL SHOP NOTES & STANDARD WELD DETAILS SEE SHT. GN1
3. THE LETTERS 't' & 'c' AT SHOP WELDED SPLICES INDICATE TENSION AND COMPRESSION RESPECTIVELY & SHOULD BE TESTED PER DL5
4. (T) INDICATES PLATES THAT REQUIRE CHARPY V-NOTCH TESTING.

TASK 1.02 APPVL
HJG 03/04/01

FLANGE SPLICING DIAGRAM

AASHTO/NSBA STEEL BRIDGE COLLABORATION
TASK GROUP 1, Subtask-Group 1.02
Guidelines For Shop Detail Drawing Presentation

SHT NO. FS1

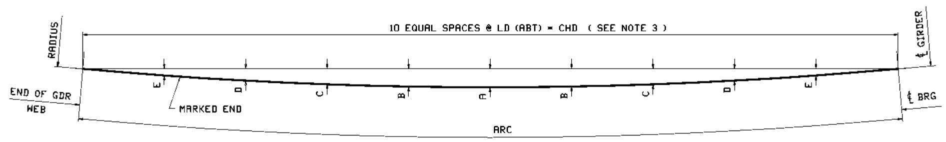
Section 7
Horizontal Curve Diagram

(SHT No. HC1, page 21)

- Show curving with baseline through end points. On girders with end bearing overhangs, show the baseline through the bearing points, not to the end of girder.
- Identify and label centerline of bearings.
- Space curve ordinates at equal spaces relative to the baseline.
- Show dimensions for the radius, chord and arc length along the centerline of each girder.
- Show offsets and dimensions to baseline at centerline PC, PT, or PCC points.

EXAMPLE PRESENTATION ONLY

METRIC
1. ALL DIMENSIONS ARE IN MILLIMETERS U.N.
2. ALL WEIGHTS ARE IN KILOGRAMS.



SECTION A-A

HORIZONTAL CURVE DIAGRAM

(OPTIONAL)

MARK	ARC	CHD	LD	A	B	C	D	E	RADIUS
15G1E	29 551	29 538	2954	375	360	316	240	135	290 600
16G2E	30 020	30 007	3002	381	367	321	244	137	295 300
17G3E	30 493	30 480	3049	387	371	325	248	140	300 000
18G4E	30 969	30 956	3097	394	378	330	252	141	304 700
19G5E	31 444	31 430	3144	400	384	335	256	144	309 400

NOTES:
1. ALL DIMENSIONS ARE GIVEN ALONG BOTTOM OF WEBPLATE
2. FOR GENERAL SHOP NOTES & STANDARD WELD DETAILS SEE SHT. GN1
3. SPACING WILL BE BASED ON FABRICATORS STANDARDS

TASK 1.02 APPVL
WJG 03/04/01

HORIZONTAL CURVE DIAGRAM

AASHTO/NSBA STEEL BRIDGE COLLABORATION
TASK GROUP 1, Subtask-Group 1.02
Guidelines For Shop Detail Drawing Presentation

SHT NO. HC1

Section 8
Girder Standards

8.1 Stiffeners and Connection Plates

(SHT No. X1, page 24)

- Show length, width and thickness for each stiffener.
- Dimension hole spacing from the top of the stiffener and from the edge that is to connect to the web. Do not dimension holes to the bottom of the stiffener or to the edge of the stiffener not in contact with the girder web.
- Show skewed and/or vertical bearing stiffeners to provide a "finish to bear" at bearing flange (usually bottom) and tight fit at other flange, unless contract drawings otherwise dictate.
- Check theoretical gap to web at corner of skewed stiffeners and connecting plates. If gap exceeds 2 mm (1/16"), bevel the edge of the stiffener to be in align with the girder web. Adjust fillet weld size when and as required by AWS D1.5.
- Dimension skewed connection plates and stiffeners to the web face; do not dimension to the centerline of web plate. Detail edges that must be beveled for proper fit to webs and flanges.
- Identify the type of stiffener (i.e., bearing, intermediate, etc).
- Indicate whether the ends of each stiffener are tight fit or finished to bear.
- Identify plates requiring Charpy V-Notch testing.
- Indicate the ASTM and/or AASHTO material designation.
- Fracture critical material must be identified as FCM.
- Note clip, snipe, and chip dimensions.
- Indicate hole and/or slot size(s).
- Note material that is to be plain.
- Give the page and line number of the advance bill of materials where the material is ordered.

8.2 Field Splices - Option 1

(SHT No. X2, option 1, page 25)

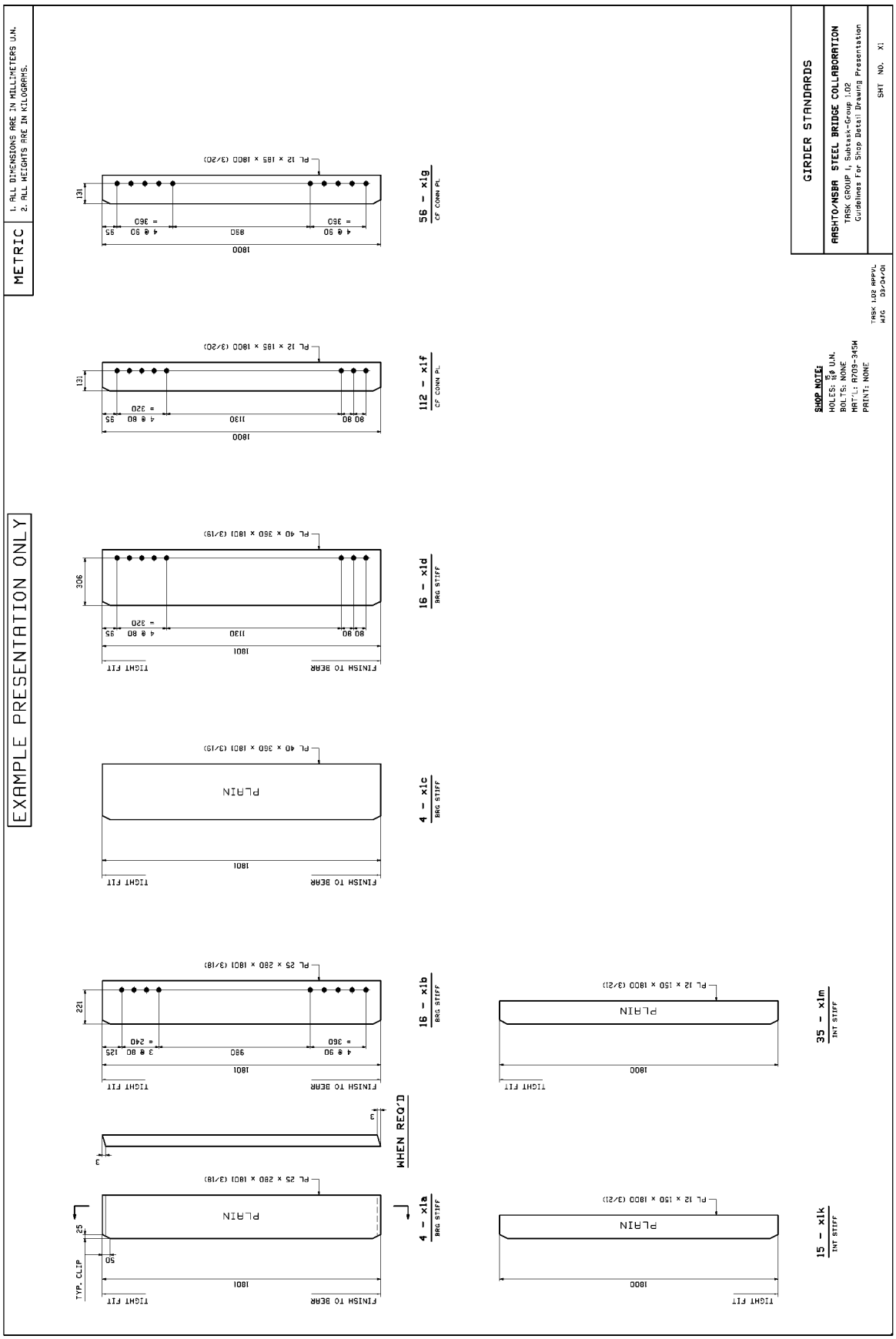
- Identify thickness, width and length of splice material.
- Show vertical and horizontal bolt spacing with edge distances.
- If the designs use minimum edge distances for the splice plates, request that the designer permit an increase in the edge distance according to shop preference.
- Indicate direction of mill rolling (DOR), typically longitudinal.
- Identify plates requiring Charpy V-Notch testing.
- Indicate the ASTM and/or AASHTO designation for field splice material.
- To simplify detailing show field splice plates stacked on top of one another. Show an elevation of how the plates are stacked.
- Give the advance bill order page and line number for all material.
- Note if the holes are to be drilled or reamed in assembly or by CNC.
- Determine if there is sufficient bolting clearances at field splice plates, and if spacing and clearances of splice holes meet minimum AASHTO requirements. If clearances are inadequate, contact the Engineer or designer and propose desired alterations.

8.3 Field Splices – Option 2

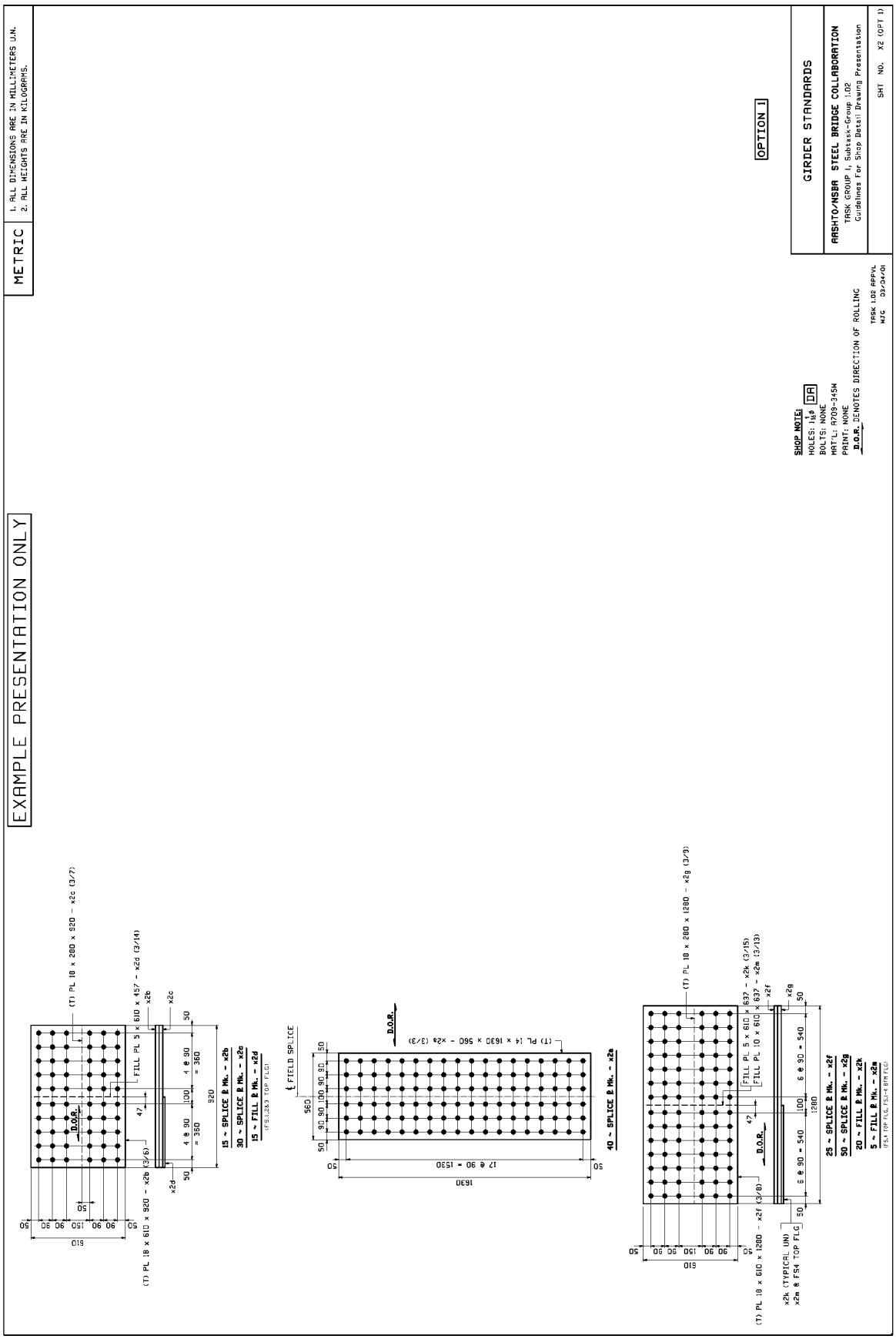
(SHT No. X2, Option 2, page 26)

- Show the field splice as an assembly and assign a sub-assembly mark that correlates to the field splice number on the worksheet.
- Identify thickness, width and length of splice material.
- Show vertical and horizontal bolt spacing with edge distances.
- If the designs use minimum edge distances for the splice plates, request that the designer permit an increase in the edge distance according to shop preference.
- Determine if there is sufficient bolting clearances at field splice plates, and if spacing and clearances of splice holes meet minimum AASHTO requirements. If clearances are inadequate, contact the Engineer or designer and propose desired alterations.
- Indicate gap between girders at centerline of field splice.
- Indicate direction of mill rolling (DOR), typically longitudinal.
- Indicate the ASTM and/or AASHTO designation for the field splice material.
- Detail field splices showing top flange, web and bottom flange connections.
- Note if the holes are to be drilled or reamed in assembly.
- Show bevels or cuts for transitions in bottom flange width
- Give the advanced bill order page and line number for all material.

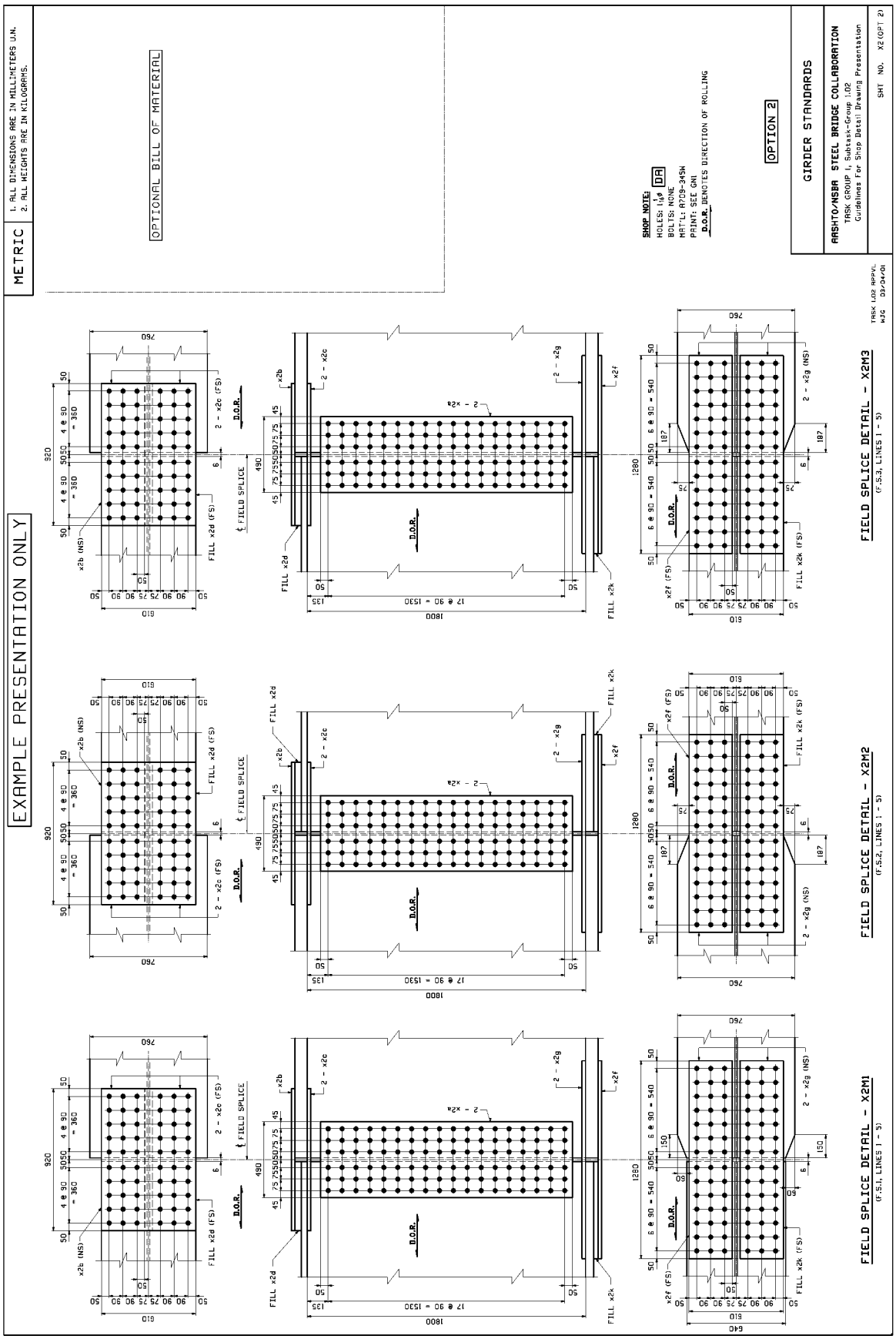
Shop Detail Drawing Presentation Guidelines



Shop Detail Drawing Presentation Guidelines



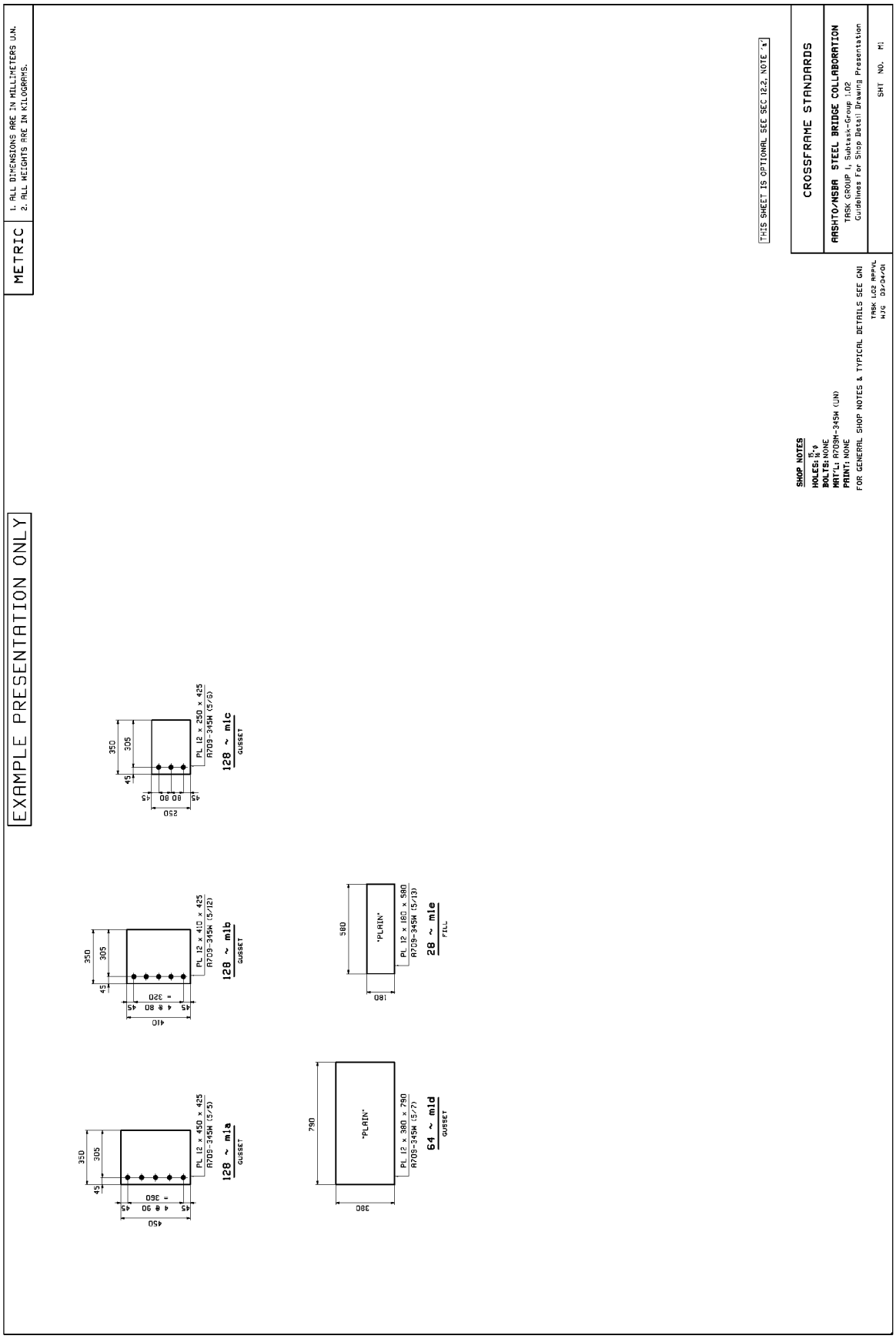
Shop Detail Drawing Presentation Guidelines



Section 9
Crossframe Standards

(SHT No. M1, page 28)

- The crossframe standards sheet should be used for crossframe gusset plate material. Gussets and fill plates are typically repeated and may be shown on this sheet or detailed once on the crossframe detail sheet.
- All pieces should be given a piece mark. Labeling varies by Fabricator, but most use a similar method to that shown for recurring material: the piece mark may be the drawing number followed by a letter.
- Identify type of piece (i.e., gusset, fill, etc.).
- Detail gusset plates approximately to scale with the following applicable information: length, width, and thickness, edge distances and hole to hole, dimension of clips, material specification, testing that is to be done to the material, quantity and piece mark.
- Indicate hole and/or slot sizes.
- Note material that is to be plain.
- Consult the Fabricator for additional detailing information.
- Give the page and line number of the advance bill of materials where the material is ordered.



Section 10
Erection Framing Plan

(SHT No. E1, page 31)

10.1 General

- The framing plan must clearly show the location of all the items provided by the Fabricator.
- Show horizontal span lengths and girder spacing along the bearings. Do not attempt to dimension the entire structure; general shape and size is the intent.
- Show stationing at supports shown on WS1.
- Label all supports, field splices and spans.
- Indicate the shipping mark in the same relative position as it will be when the steel is erected.
- Field welded items, if any, must be accurately located and weld symbols must be properly shown.
- Items related to the structural steel but provided by other sources should be identified by the use of phantom lines and notes.
- Show additional details as required to facilitate proper field placement of pieces.10.2 Field Bolts

10.2 Field Bolt List

- Include all field bolted connections.
- Describe each field connection so the erector can correctly locate it. On complicated connections with multiple plies and pieces, special sketches may be required.
- List the thickness of each plate to be fastened, the total grip, the number of bolts required, the number of times the connection occurs, and the diameter and length of bolt for each connection.
- Indicate the type and quantity of washers per bolt for each connection.
- Use the AISC bolt length chart for determining the length of bolts. Bolts less than 5 inches are in ¼ inch increments; bolts that are to be over 5 inches may be in ¼ or ½ inch increments. Contact the Fabricator to verify preferences. (Domestically produced metric bolts are not currently available except by special order. For "metric" projects, contact Owner to verify how U.S. Customary dimensioned bolts and hole sizes are to be detailed. Bolt lists should show material actually furnished, not a "metric conversion" of inch-dimension bolts.)

10.3 Field Bolt Summary

- Provide the material specification for each fastener assembly (bolt, nut, washer, etc.).
- Show the actual count for each bolt length/diameter.
- Give the percentage of extra bolts to be added to the actual count and the number of bolts to be added for testing and possible field losses. The percentage and number for testing vary with quantity and contract requirements. Verify with Fabricator and Contractor, based on anticipated erection sequence and duration.
- Calculate the total count of each bolt length/diameter = Actual Count + % extra + Testing.
- Provide the total number of washers.

- Indicate if the bolts are to be rotational capacity tested by the manufacturing or Owner's representative prior to delivery and if additional testing is required before shop and/or field installation

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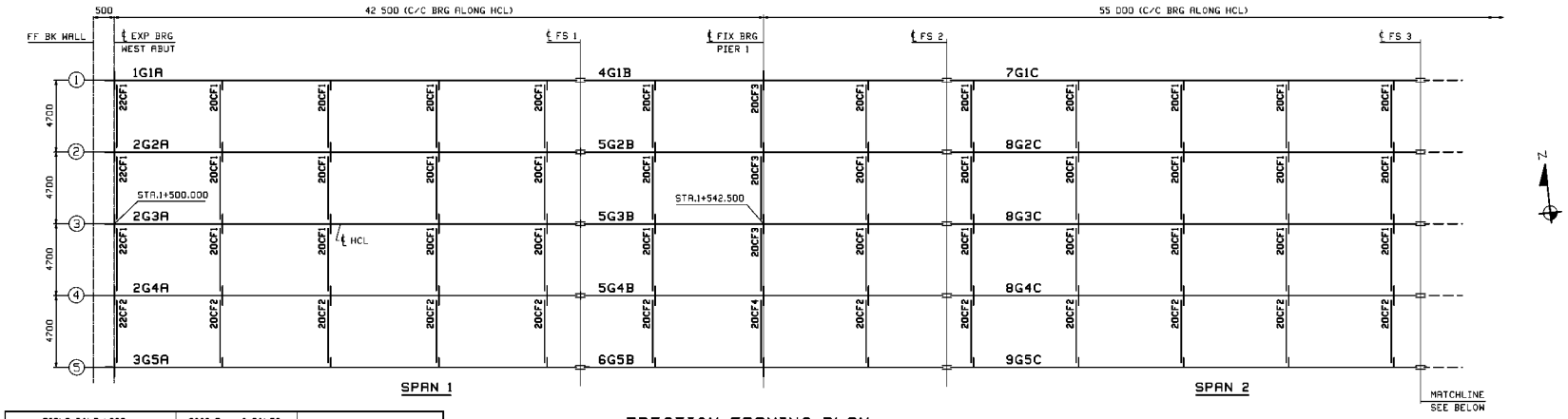
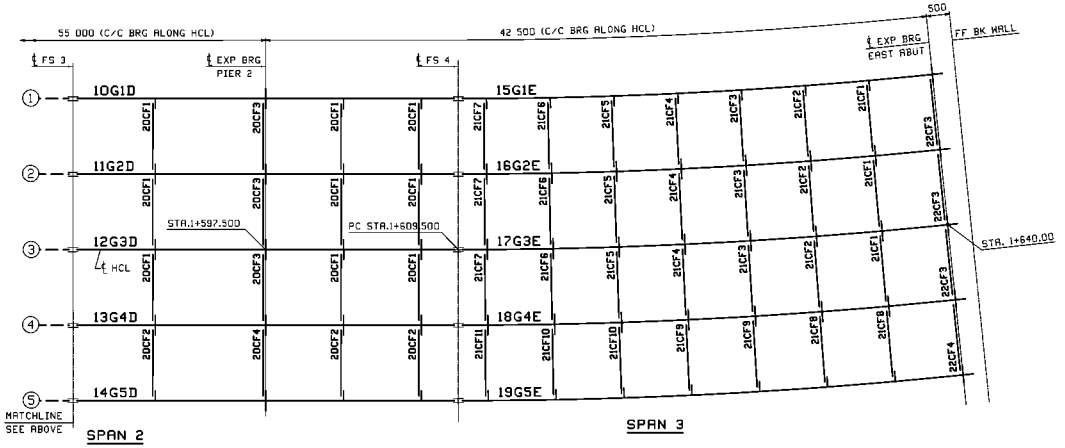
EXAMPLE PRESENTATION ONLY

METRIC	1. ALL DIMENSIONS ARE IN MILLIMETERS U.N. 2. ALL WEIGHTS ARE IN KILOGRAMS.



ERECTION FRAMING PLAN



FIELD BOLT LIST							A325 Type 3 BOLTS					
LINE	NO REQ'D.	BOLT DIAM.	BOLT LEN.	BOLTS / CONN.	# OF CONN.	GRIP	THICKNESS OF PCS. CONNECTED				WASH CODE	PIECES CONNECTED AND REMARKS
1												**FIELD SPLICES**
2												TOP FLANGE
3	900	1	6 1/4	60	15	4 3/4	1 1/8	2 1/2	1 1/8		1	F.S. 1, 2 & 3
4	420	1	6 1/4	84	5	4 3/4	1 1/8	2 1/2	1 1/8		1	F.S. 4
5	2160	1	4 1/2	108	20	2 7/8	7/8	1 1/8	7/8		1	WEB
6	1680	1	6 1/4	84	20	4 3/4	1 1/8	2 1/2	1 1/8		1	BOTTOM FLANGE
7												
8												**CROSSFRAMES**
9	1792	7/8	3	32	56	1 1/2	3/4	3/4			1	TYPE CF2
10	256	7/8	4 1/2	32	8	3 1/4	3/4	2 1/2			1	TYPE CF2P
11	1120	7/8	3	40	28	1 1/2	3/4	3/4			1	TYPE CF1
12	128	7/8	3 1/2	16	8	2 3/16	5/8	1 9/16			1	TYPE CF3 (TOP STRUT)
13	160	7/8	3 3/4	20	8	2 5/16	3/4	1 9/16			1	TYPE CF3 (BTM GUSSET)

WASHER CODES

1: 1 Hard Flat Washer

FIELD BOLT SUMMARY - ACTUAL COUNT +3% SHOWN SEE DOCUMENTATION						
LINE	NO. OF BOLTS	BOLT DIAM.	TYPE	BOLT LEN	ACTUAL COUNT	REMARKS
1	3000	7/8	A325 Type 3	3	2912	SPECIFY ROTATIONAL
2	132	7/8	↑	3 1/2	128	CAPACITY TESTING IF
3	165	7/8	↓	3 3/4	160	REQUIRED OR ANY SPECIAL
4	264	7/8	A325 Type 3	4 3/4	256	WASHER, NUT OR BOLT
5						REQUIREMENTS
6	3561	Hard Flat Washers	for 7/8 ø BOLT			
7						
8	2225	1	A325 Type 3	4 1/2	2160	
9	3090	1	A325 Type 3	6 1/4	3000	
10						
11	5315	Hard Flat Washers	for 1 ø BOLT			
12						

└ NO. OF BOLTS = ACTUAL COUNT + 3%

TASK 1.02 APPVL
WJG 03/04/01

ERECTION FRAMING PLAN/FIELD BOLTS

AASHTO/NSBA STEEL BRIDGE COLLABORATION
TASK GROUP 1, Subtask-Group 1.02
Guidelines For Shop Detail Drawing Presentation

SHT NO. E1

Section 11
Shop Assembly Diagram

(SHT No. SA1, page 33)

11.1 Shop Assembly Diagram

[Dependent upon the shop fabrication process this diagram may be simplified if used only for a reaming diagram or check assembly diagram.]

11.2 Vertical Blocking Diagram

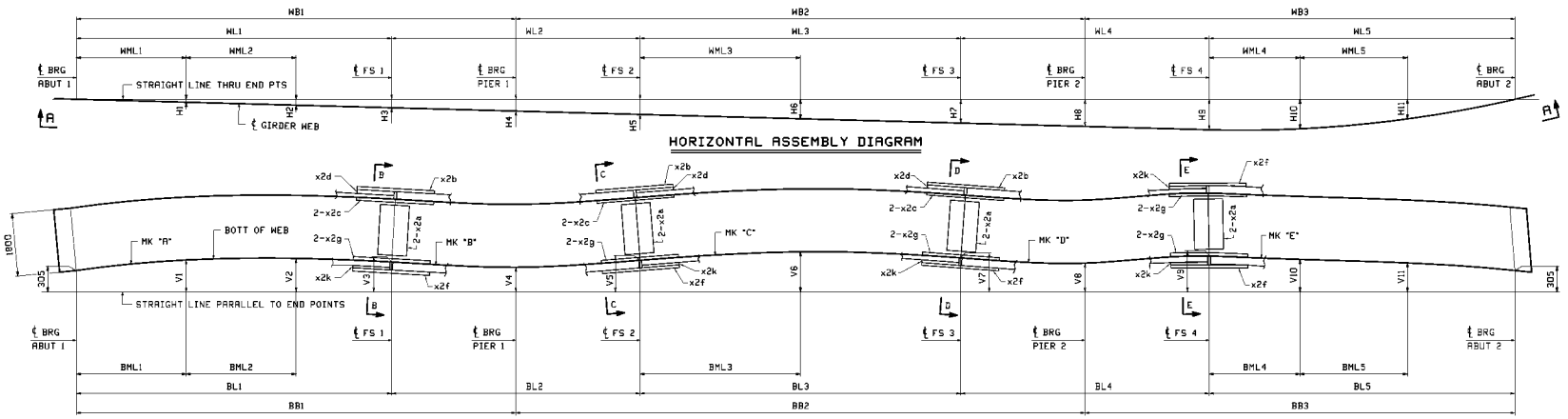
- Define baseline with equal offsets (305 mm shown in example; U.S. customary equivalent is 12 inches.) to the bottom of the web plate, from centerline of first bearing to centerline of last bearing for each line on the bridge. Offsets should be sufficient to keep all intermediate points above the baseline (positive).
- Show dimensions along and perpendicular to the baseline at all field splices, and bearing points unless otherwise required by the contract.
- Show all girder shipping marks.
- At each field splice, show the splice plates and their piece marks.
- For splice plates that are drilled or reamed in assembly (DA or RA) use the match-marking scheme shown on the example diagram or the one shown on the General Notes.

11.3 Plan View Blocking Diagram

- Define baseline from left end of steel or the left-most centerline of bearing to the right end of steel or the right centerline of bearing.
- Dimension all bearings and field splice points along and perpendicular to the baseline.
- Keep longitudinal presentation approximately to scale. Lateral offsets may be exaggerated for large radii or small-angle diverging flares.

EXAMPLE PRESENTATION ONLY

METRIC	1. ALL DIMENSIONS ARE IN MILLIMETERS U.N. 2. ALL WEIGHTS ARE IN KILOGRAMS.



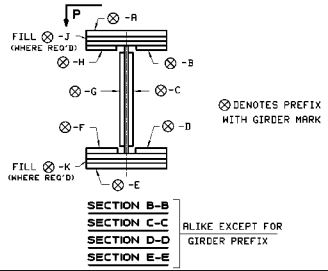
DEVELOPED SECTION A-A

VERTICAL ASSEMBLY DIAGRAM

DIMENSIONS GIVEN ALONG ℄ WEB

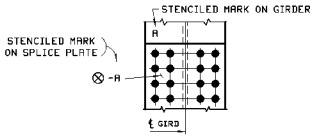
LINE	WL1	WL2	WL3	WL4	WL5	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	WB1	WB2	WB3	BL1	BL2	BL3	BL4	BL5	WML1	WML2	WML3	WML4	WML5
1	30 497	24 019	31 002	24 019	29 518	115	229	329	459	588	755	923	1052	1182	1144	757	42 508	55 021	41 525	30 499	24 018	31 005	24 020	29 552	10 625	10 627	13 754	10 390	10 383
2	30 496	24 020	31 001	24 019	29 986	116	232	333	484	595	765	934	1065	1196	1158	765	42 507	55 021	41 995	30 498	24 020	31 005	24 021	30 023	10 625	10 627	13 754	10 507	10 500
3	30 496	24 019	31 002	24 019	30 461	118	235	337	470	603	774	946	1079	1211	1171	773	42 507	55 021	42 468	30 498	24 020	31 003	24 020	30 496	10 625	10 627	13 754	10 625	10 618
4	30 496	24 019	31 002	24 019	30 934	119	238	341	476	610	784	957	1092	1226	1185	781	42 507	55 021	42 942	30 498	24 020	31 003	24 020	30 972	10 625	10 627	13 754	10 744	10 736
5	30 497	24 019	31 002	24 019	31 409	120	241	345	481	618	793	969	1105	1241	1198	789	42 508	55 021	43 416	30 499	24 018	31 005	24 019	31 446	10 625	10 627	13 754	10 862	10 855

LINE	BML1	BML2	BML3	BML4	BML5	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	BB1	BB2	BB3	"A"	"B"	"C"	"D"	"E"
1	10 617	10 628	13 755	10 391	10 391	377	388	363	327	375	434	391	356	404	385	358	42 510	55 023	41 563	1G1A	4G1B	7G1C	10G1D	15G1E
2	10 625	10 627	13 755	10 508	10 508	376	379	344	316	337	390	329	330	322	330	332	42 510	55 026	42 031	2G2A	5G2B	8G2C	11G2D	16G2E
3	10 615	10 627	13 755	10 626	10 626	368	363	321	349	315	336	347	406	371	276	308	42 510	55 026	42 503	3G3A	5G3B	8G3C	12G3D	17G3E
4	10 616	10 627	13 755	10 744	10 744	360	347	313	381	357	282	412	480	452	224	284	42 510	55 026	42 979	2G4A	5G4B	8G4C	13G4D	18G4E
5	10 617	10 627	13 755	10 863	10 683	348	392	331	401	386	240	455	524	498	196	273	42 510	55 024	43 454	3G5A	6G5B	9G5C	14G5D	19G5E



⊗ DENOTES PREFIX WITH GIRDER MARK

SECTION B-B
SECTION C-C
SECTION D-D
SECTION E-E
ALIKE EXCEPT FOR GIRDER PREFIX



VIEW P
(ROTATE 180° WHERE REQ'D)

NOTES
1) ALL SPLICE PLATES ARE MATCH MARKED AFTER REAMING AS SHOWN IN SECTION B-B THRU SECTION E-E
2) THE MATCH MARKS ON THE SPLICE PLATES CONSIST OF THE MARK OF THE GIRDER THEY ARE SHIPPED WITH AND A SUFFIX. THE MARKINGS ARE STENCILED PERMANENTLY ONTO THE STEEL AT THE END OF THE SPLICE PLATE WHICH IS ON THE GIRDER IT IS SHIPPED WITH. THE CORRESPONDING SUFFIX (A, B, C, ETC.,) IS STENCILED NEAR THE SPLICE PLATE ONTO THE GIRDER (SEE VIEW F)
3) FOR GIRDER MARKS, SEE THE ERECTION PLAN SHEET E1.
4) HOLES MARKED [DA] ARE TO BE SUB-PUNCHED/SUB-DRILLED 1/4"ø UNDER SIZE AND REAMED TO FULL SIZE OR DRILLED FROM SOLID WITH CONNECTING PARTS ASSEMBLED AND MATCH MARKED. BOLTS FOR FIELD SPLICES (WEB AND FLANGES) ARE 1"ø (25mmø) HIGH STRENGTH BOLTS. FINISHED HOLES ARE TO BE 1 1/16"ø (27mmø).
5) FOR GENERAL NOTES SEE SHT. GN1.

TASK 1.02 APPVL
WJG 03/04/01

SHOP ASSEMBLY DIAGRAM

AASHTO/NSBA STEEL BRIDGE COLLABORATION
TASK GROUP 1, Subtask-Group 1.02
Guidelines For Shop Detail Drawing Presentation

SHT NO. SA1

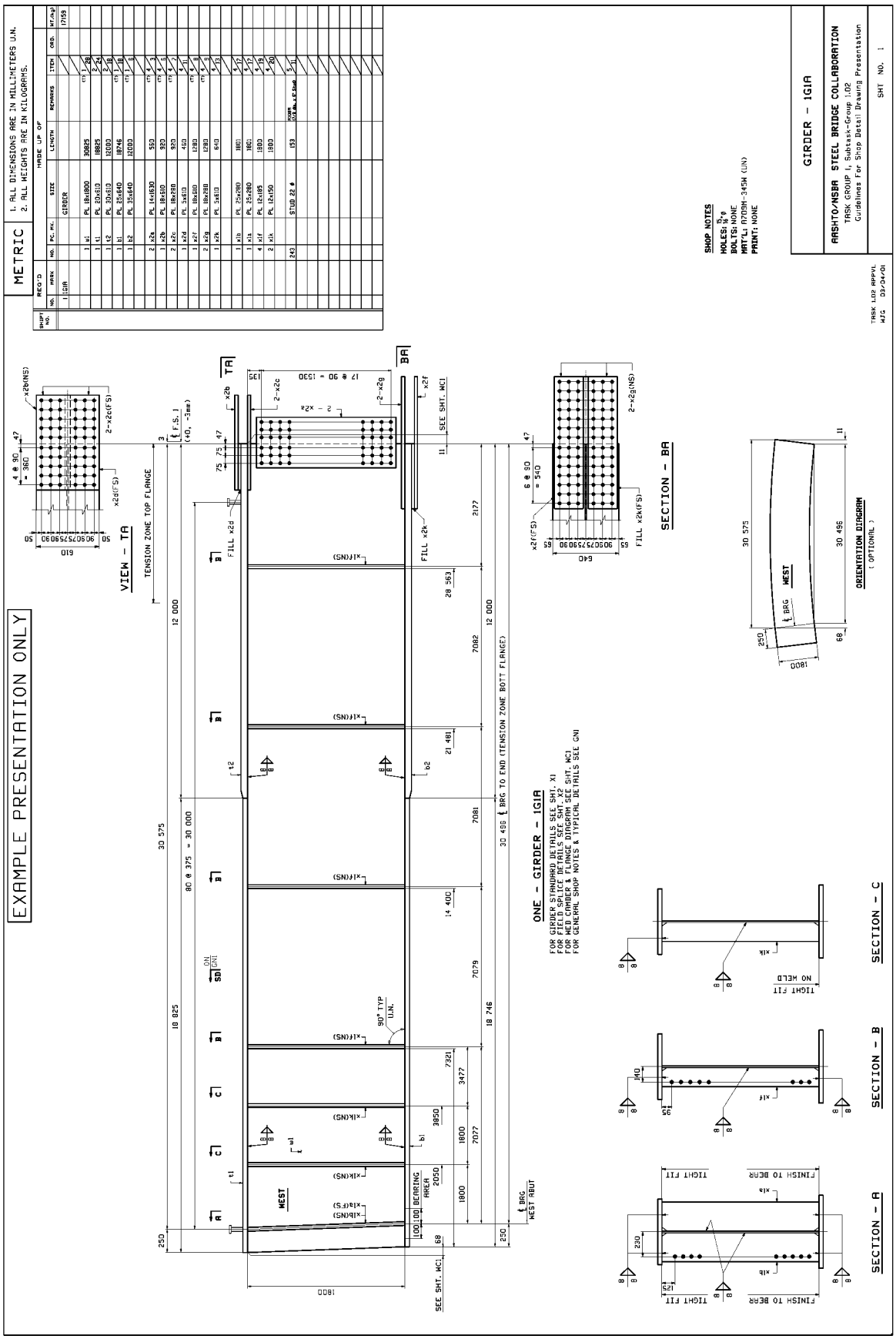
Section 12
Girder Details

(SHT No. 1, 5, 9, 16, pages 36 - 39)

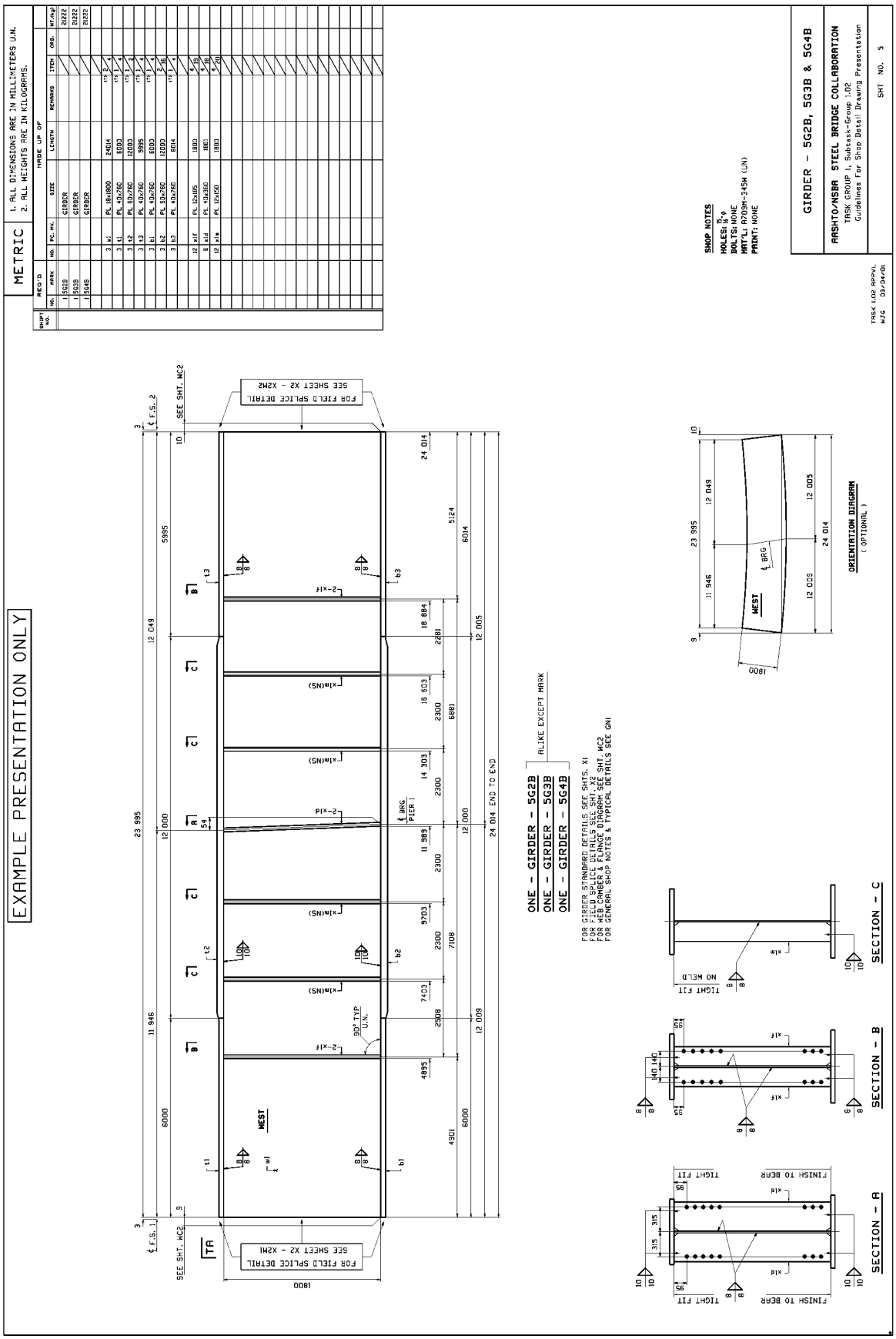
- Provide elevation of girder web and flanges. If flange or web is shop butt spliced, show location of splice(s).
- Show web to flange welding on both top and bottom flanges. (Optional if shown on camber and flange diagrams; see sections 5 & 6).
- Show web and flange plate marks.
- Show stiffener and crossframe connection plates on the elevation. Note plates as near side (NS) or far side (FS). When the same plate is on both side of the web, note thus: 2 – xlf. Do not use (BS) for both sides.
- Label elevation with the corresponding girder mark from the calculation plan.
- At the left end of the girder elevation, note the approximate compass direction the end is oriented (i.e., East, West, North or South).
- Label centerline of bearings.
- Label centerline of field splice showing the set-back distance from end of girder.
- Show bearing overhang on end girders.
- Develop all longitudinal dimensions with lengths in the cambered position. (This is usually along the chord line from end to end but may vary based on Fabricator's preferences.)
- Show full length of curved girders in a developed view.
- Show end cut dimensions and provide reference to the corresponding camber diagram sheet.
- Dimension from left end of girder to centerline of bearing and to the right end of steel for both top and bottom flanges, along baseline.
- Dimension top and bottom flange plate lengths from left end of steel or centerline of bearing to flange splice(s) and on to the right to end of steel or centerline of bearing along baseline.
- Show the center-to-center dimension of all connection plates and stiffeners.
- Give the dimension from each end of steel to the centerline of the nearest stiffener or connection plate along baseline.Locate intermediate web stiffeners as per designs and dimension accordingly.
- Start extension dimensions from the left end of steel, NOT centerline of bearing, to the left face or centerline of the first connection stiffener and to the same location on each of the remaining connection stiffeners. Some Fabricators may indicate intermediate plain stiffeners as a single line.
- Provide a section looking toward the left end of the girder at each type of connection plate or stiffener location.

- In each section, show the corresponding stiffener or connection plate with hole pattern, if applicable. Dimension laterally from the centerline of web and vertically from the top of the web to the first hole. Show whether fit-up of stiffener is tight fit or finished to bear, and show required welds to web and/or flange).
- Show a camber diagram with top and bottom flange lengths along baseline, depth, overhang and actual camber mid-ordinate dimensions before any dead load deflection occurs. Identify the centerline of bearing, where applicable, and when girder has an intermediate bearing, dimension from ends of bottom flange at field splices or end bearings to centerline of intermediate bearing. Show offset dimension from top of web to bottom of web relative to a chord taken through the top of the web plate between field splices or from field splice to end bearing.
- Identify which cross-frame connection plates and/or stiffeners are perpendicular to the bottom flange and which are vertical (plumb) after erection.
- Studs may or may not be shop installed, based on contract requirements. If shop installed, show stud spacing and a section looking toward the left end of girder, and reference the typical section on the General Shop Notes sheet. Check clearance from edge of splice plates to studs. If shop installed studs fall on splice plates, request an increase in the number of studs adjacent to the splice. Omit shop primer in those areas when required.
- At field splices, refer to the splice detail sheet and the assembly piecemark for the field splice (8.2 Field Splices - Option 1and sheet no. X2, option 1, page 25). Alternatively, show splice plates in position and piece marks along with flange transition when required (8.3 Field Splices – Option 2 and sheet no. X2, option 2 page 26).
- Bill all pieces for the girder assembly in the bill of materials starting with the assembly mark label, web and flange plates, splice plates, connection plates, stiffeners and shop installed studs.

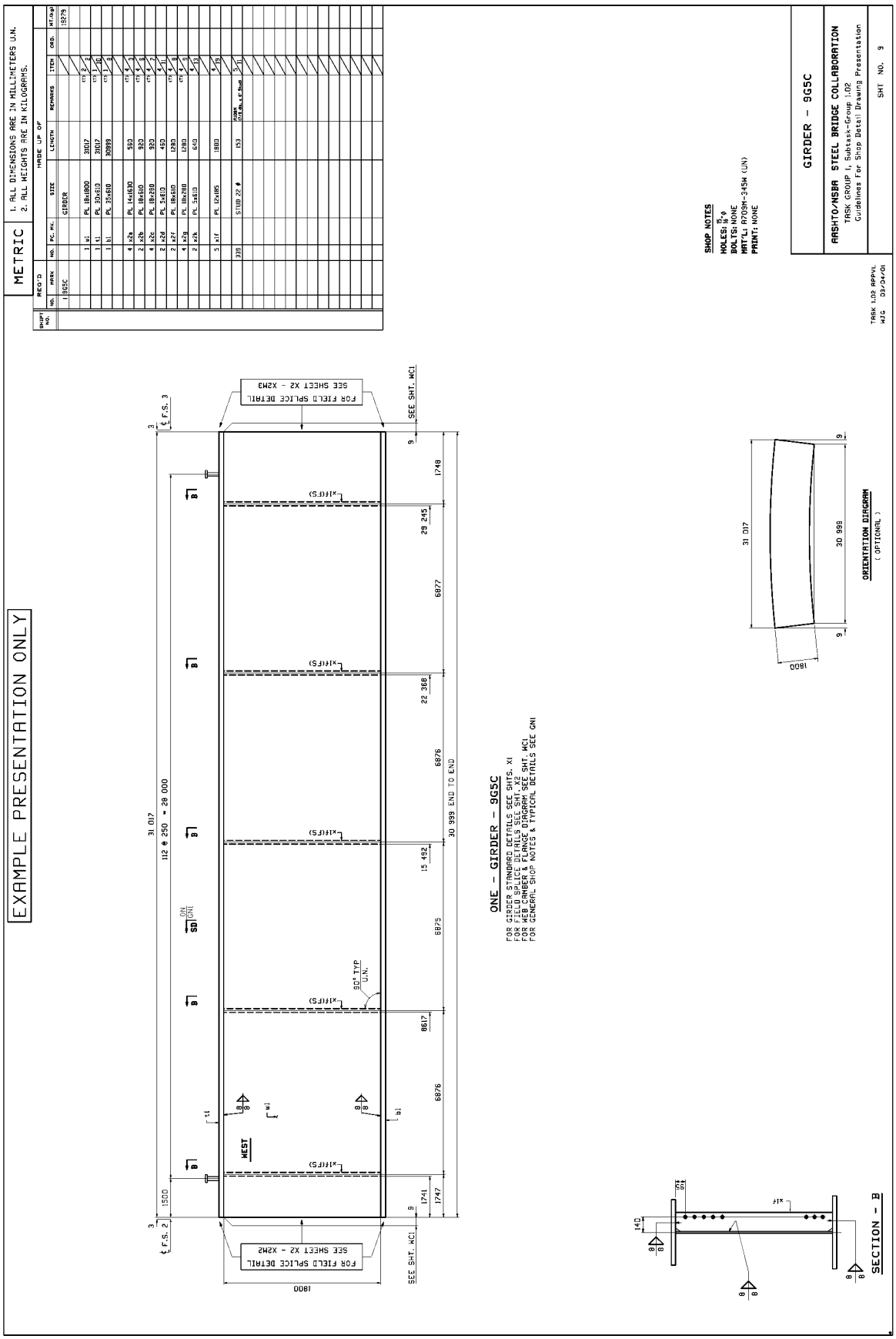
Shop Detail Drawing Presentation Guidelines



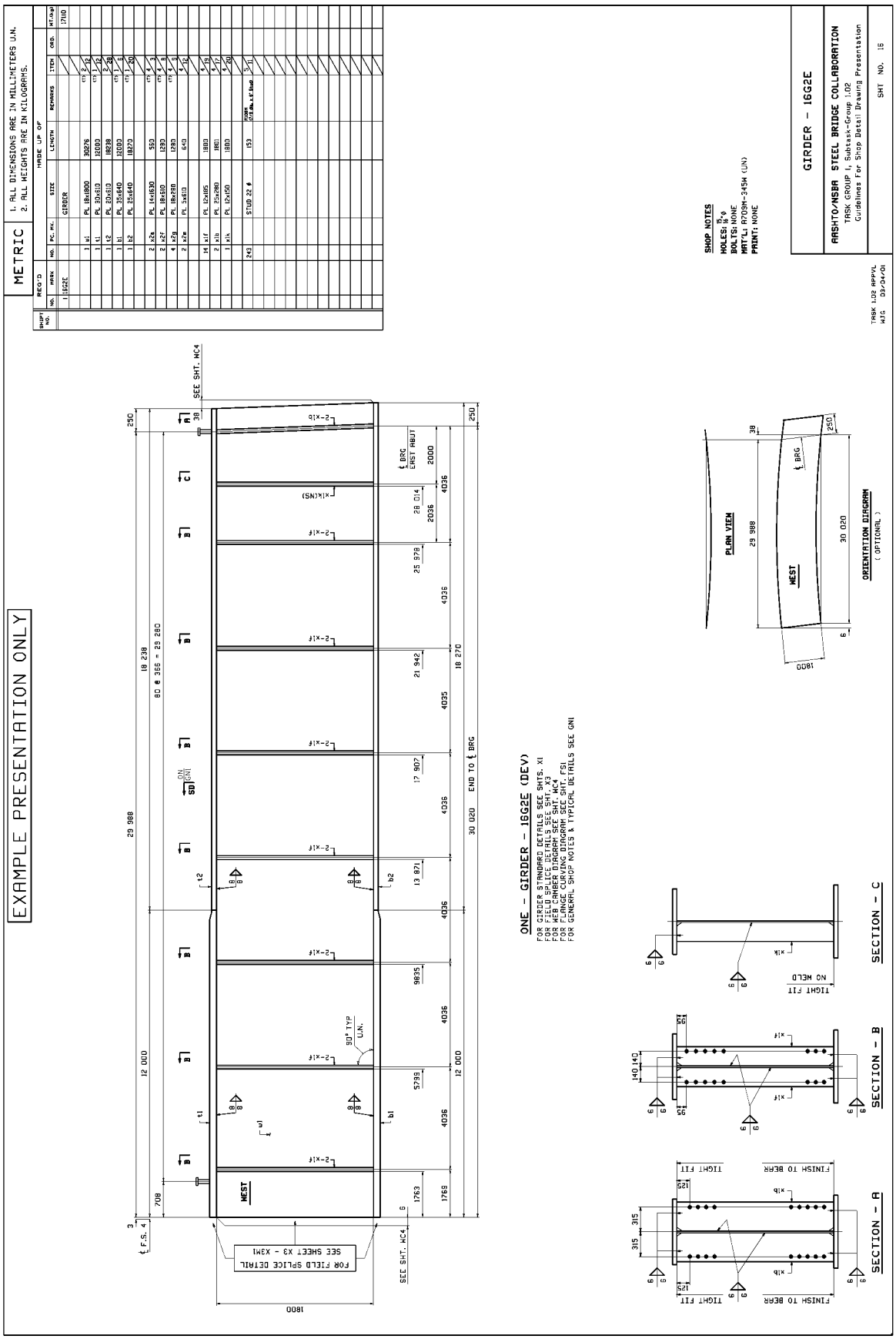
Shop Detail Drawing Presentation Guidelines



Shop Detail Drawing Presentation Guidelines



Shop Detail Drawing Presentation Guidelines



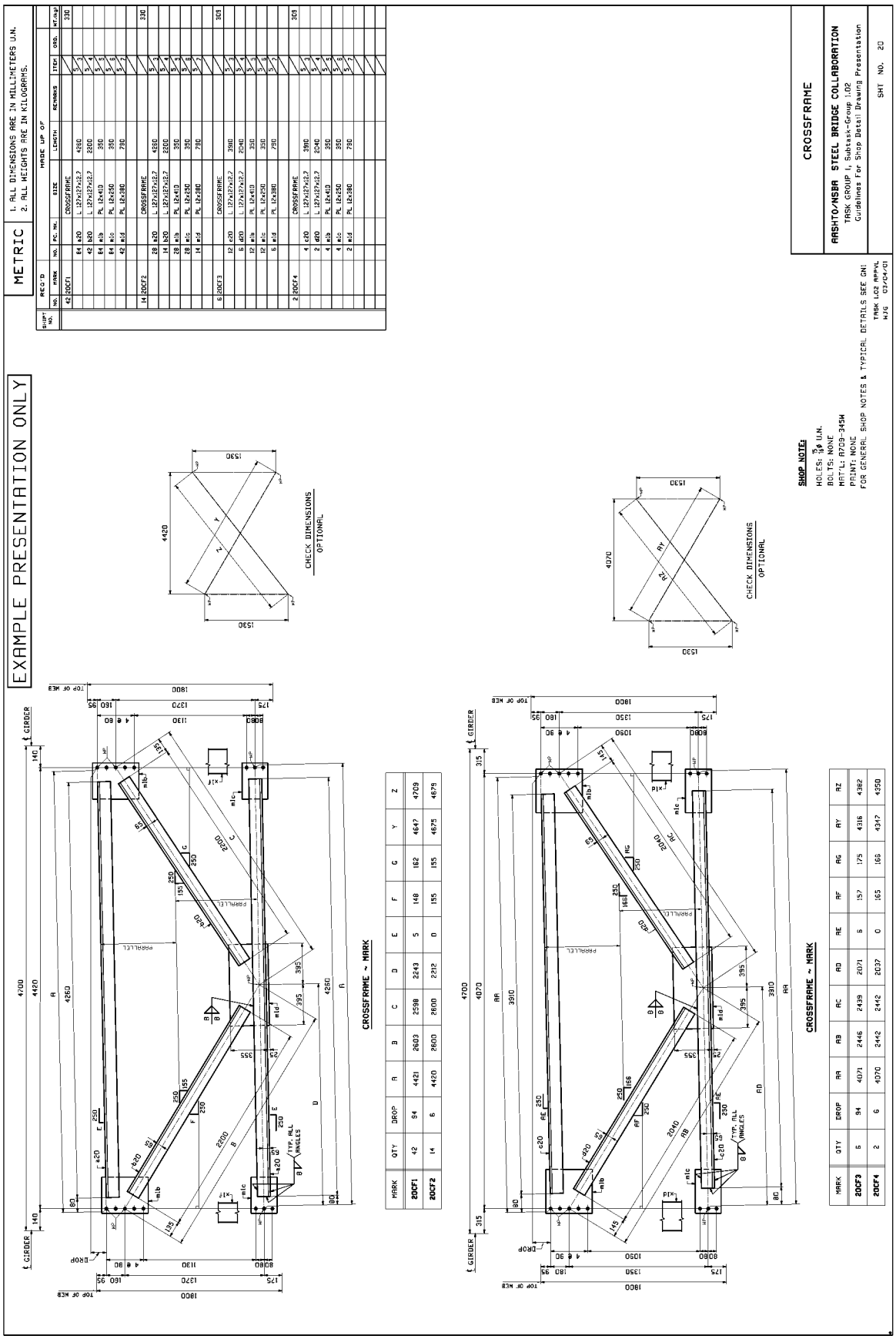
Section 13
Crossframe Details

(SHT No. 20 - 22, pages 42 - 44)

- Detail crossframe with the side that requires the most welding on the near side.
- Charting or scheduling of crossframes is acceptable. However, keep the number of variables to a minimum and do not expand the numbers in the table to a point where the crossframe no longer resembles the picture.
- When charting or scheduling crossframes, sequence items according to depth first, length second, and drop third. (Optional)
- Consecutive shipping marks within the chart and drawings are preferred.
- Shipping marks are generally a combination of sheet number, shipping type designation (e.g., CF for crossframe or D for diaphragm), and a number. This varies with Fabricator. See 1.4 for the preferred marking system.
- Crossframe drops should be combined as stated on the calculation plan. Preferably show drops from top to top hole.
- Crossframe work points (WP) must be kept on the crossframe. If the design drawings specifically indicate WPs not located on the crossframe, then new fabrication WPs shall be established that are on the crossframe.
- Dimension crossframes from WP to WP horizontally, vertically and along slope.
- Dimension horizontal and vertical hole spacing.
- Locate crossframe members with set-back dimensions from only one end.
- All pieces should be rounded to a standard increment (e.g., 5mm, 10mm or 25mm; ¼", ½" or 1").
- Slopes shown are for reference. They are used to calculate angle to angle or hole to hole clearances, and lengths of welds.
- Show location and size of all welds. "TYPICAL" or "typ" may be used for common details.
- Provide all hole sizes.
- Indicate painting requirements when applicable. Do not detail crossframes as "Opposite Hand"; most Fabricators require a new picture. Check with Fabricator before using negative drops.
- If an identical assembly piecemark repeats on other sheets and is not on a standard sheet, use the same mark and bill the piece on each sheet.
- All gusset plates should be the same size and have the same hole spacing whenever possible. Contact the Fabricator if varying sizes are required by the contract so Fabricator may request appropriate changes.
- For K-type cross frames the check dimensions are for squaring up the crossframe jig and are optional.

- Showing the piece mark of the crossframe connection plate/bearing stiffener is a reference item for checking and is optional.
- Dimensions from centerline of girder or to top or bottom web are reference dimensions that can be found on the TD sheet and are not required by all shops.
- The shop bill should include the quantity, weight and mark for each assembly. Following each shipping mark, all pieces used to create the crossframe assembly should be listed.
- In the bill, provide the quantity, piece mark, shape, dimensions, page and line number and material specification for each piece detailed on the sheet. If all the material is of the same specification, provide one common note below the bill.
- Specify ASTM and/or AASHTO material type and any element requiring CVN testing. CVN testing may be required for bracing on curved or heavily skewed structures, cross-members supporting terminating main members, or elements subject to wind loads or traffic-induced vibration
- Some Fabricators may not require unique marks for crossframe component material such as angles, channels, etc.
- When applicable, clearly show and note "Painting" requirements on detail.

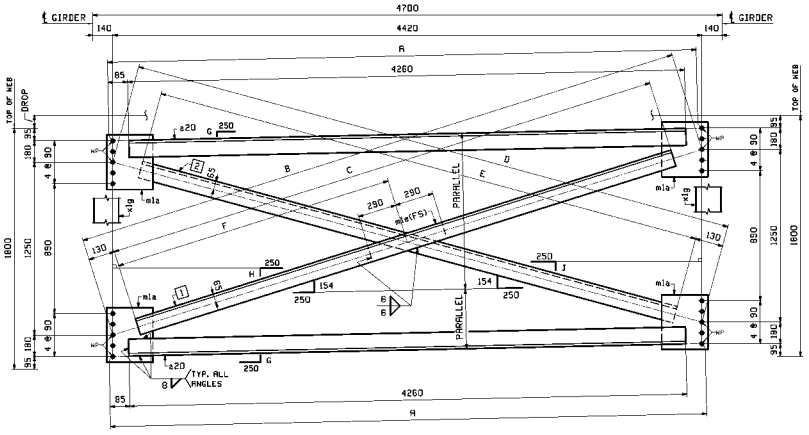
Shop Detail Drawing Presentation Guidelines



EXAMPLE PRESENTATION ONLY

METRIC

1. ALL DIMENSIONS ARE IN MILLIMETERS U.N.
2. ALL WEIGHTS ARE IN KILOGRAMS.

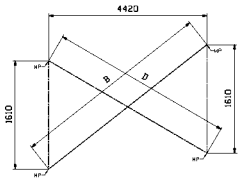


CROSSFRAME ~ MARK

MARK	QTY	DROP	A	B	C	D	E	F	G	H	J	Y	Z	1	2
21CF1	3	176	4424	4644	4385	4549	4290	2192	10	61	81	4647	4767	a21	k21
21CF2	3	163	4423	4640	4380	4552	4290	2190	9	61	80	4651	4762	b21	k21
21CF3	3	150	4423	4636	4375	4555	4295	2188	8	62	79	4655	4758	c21	m21
21CF4	3	138	4422	4633	4370	4558	4295	2186	8	63	79	4659	4753	d21	m21
21CF5	3	125	4422	4629	4370	4561	4300	2184	7	64	78	4663	4748	d21	n21
21CF6	3	113	4421	4625	4365	4564	4305	2183	6	64	77	4667	4744	e21	p21
21CF7	3	100	4421	4622	4360	4567	4305	2181	6	65	76	4671	4739	f21	p21
21CF8	2	46	4420	4606	4345	4581	4320	2173	3	68	73	4689	4720	g21	s21
21CF9	2	32	4420	4602	4340	4585	4325	2171	2	69	73	4693	4715	h21	t21
21CF10	2	19	4420	4599	4340	4588	4325	2169	1	70	72	4698	4711	h21	t21
21CF11	1	9	4420	4596	4335	4591	4330	2168	1	70	71	4701	4707	j21	v21

SHIPT NO.	REQ'D NO.	REQ'D MARK	MADE UP OF NO.	PC. MK.	SIZE	LENGTH	REMARKS	ITEM	ORD.	WT./kg
	3	21CF6			CROSSFRAME					490
			6	a20	L 127x127x12.7	4260		5 10		
			3	a21	L 127x127x12.7	4365		5 11		
			3	p21	L 127x127x12.7	4305		5 11		
			12	mla	PL 12x410	425		5 12		
			3	mle	PL 12x180	580		5 13		
	3	21CF7			CROSSFRAME					490
			6	a20	L 127x127x12.7	4260		5 10		
			3	f21	L 127x127x12.7	4360		5 11		
			3	p21	L 127x127x12.7	4305		5 11		
			12	mla	PL 12x410	425		5 12		
			3	mle	PL 12x180	580		5 13		
	2	21CF8			CROSSFRAME					490
			4	a20	L 127x127x12.7	4260		5 10		
			2	g21	L 127x127x12.7	4345		5 11		
			2	s21	L 127x127x12.7	4320		5 11		
			8	mla	PL 12x410	425		5 12		
			2	mle	PL 12x180	580		5 13		
	2	21CF9			CROSSFRAME					490
			4	a20	L 127x127x12.7	4260		5 10		
			2	h21	L 127x127x12.7	4340		5 11		
			2	t21	L 127x127x12.7	4325		5 11		
			8	mla	PL 12x410	425		5 12		
			2	mle	PL 12x180	580		5 13		
	2	21CF10			CROSSFRAME					490
			4	a20	L 127x127x12.7	4260		5 10		
			2	h21	L 127x127x12.7	4340		5 11		
			2	t21	L 127x127x12.7	4325		5 11		
			8	mla	PL 12x410	425		5 12		
			2	mle	PL 12x180	580		5 13		
	1	21CF11			CROSSFRAME					490
			2	a20	L 127x127x12.7	4260		5 10		
			1	j21	L 127x127x12.7	4335		5 11		
			1	v21	L 127x127x12.7	4330		5 11		
			4	mla	PL 12x410	425		5 12		
			1	mle	PL 12x180	580		5 13		

SHIPT NO.	REQ'D NO.	REQ'D MARK	MADE UP OF NO.	PC. MK.	SIZE	LENGTH	REMARKS	ITEM	ORD.	WT./kg
	3	21CF1			CROSSFRAME					490
			6	a20	L 127x127x12.7	4260		5 10		
			3	a21	L 127x127x12.7	4385		5 11		
			3	k21	L 127x127x12.7	4290		5 11		
			12	mla	PL 12x410	425		5 12		
			3	mle	PL 12x180	580		5 13		
	3	21CF2			CROSSFRAME					490
			6	a20	L 127x127x12.7	4260		5 10		
			3	b21	L 127x127x12.7	4380		5 11		
			3	k21	L 127x127x12.7	4290		5 11		
			12	mla	PL 12x410	425		5 12		
			3	mle	PL 12x180	580		5 13		
	3	21CF3			CROSSFRAME					490
			6	a20	L 127x127x12.7	4260		5 10		
			3	c21	L 127x127x12.7	4375		5 11		
			3	m21	L 127x127x12.7	4295		5 11		
			12	mla	PL 12x410	425		5 12		
			3	mle	PL 12x180	580		5 13		
	3	21CF4			CROSSFRAME					490
			6	a20	L 127x127x12.7	4260		5 10		
			3	d21	L 127x127x12.7	4370		5 11		
			3	m21	L 127x127x12.7	4295		5 11		
			12	mla	PL 12x410	425		5 12		
			3	mle	PL 12x180	580		5 13		
	3	21CF5			CROSSFRAME					490
			6	a20	L 127x127x12.7	4260		5 10		
			3	d21	L 127x127x12.7	4370		5 11		
			3	n21	L 127x127x12.7	4300		5 11		
			12	mla	PL 12x410	425		5 12		
			3	mle	PL 12x180	580		5 13		



CHECK DIMENSIONS
OPTIONAL

SHOP NOTE:

HOLES: $\frac{15}{16}\phi$ U.N.
BOLTS: NONE
MAT'L: A709-345W
PRINT: NONE
FOR GENERAL SHOP NOTES & TYPICAL DETAILS SEE GN1

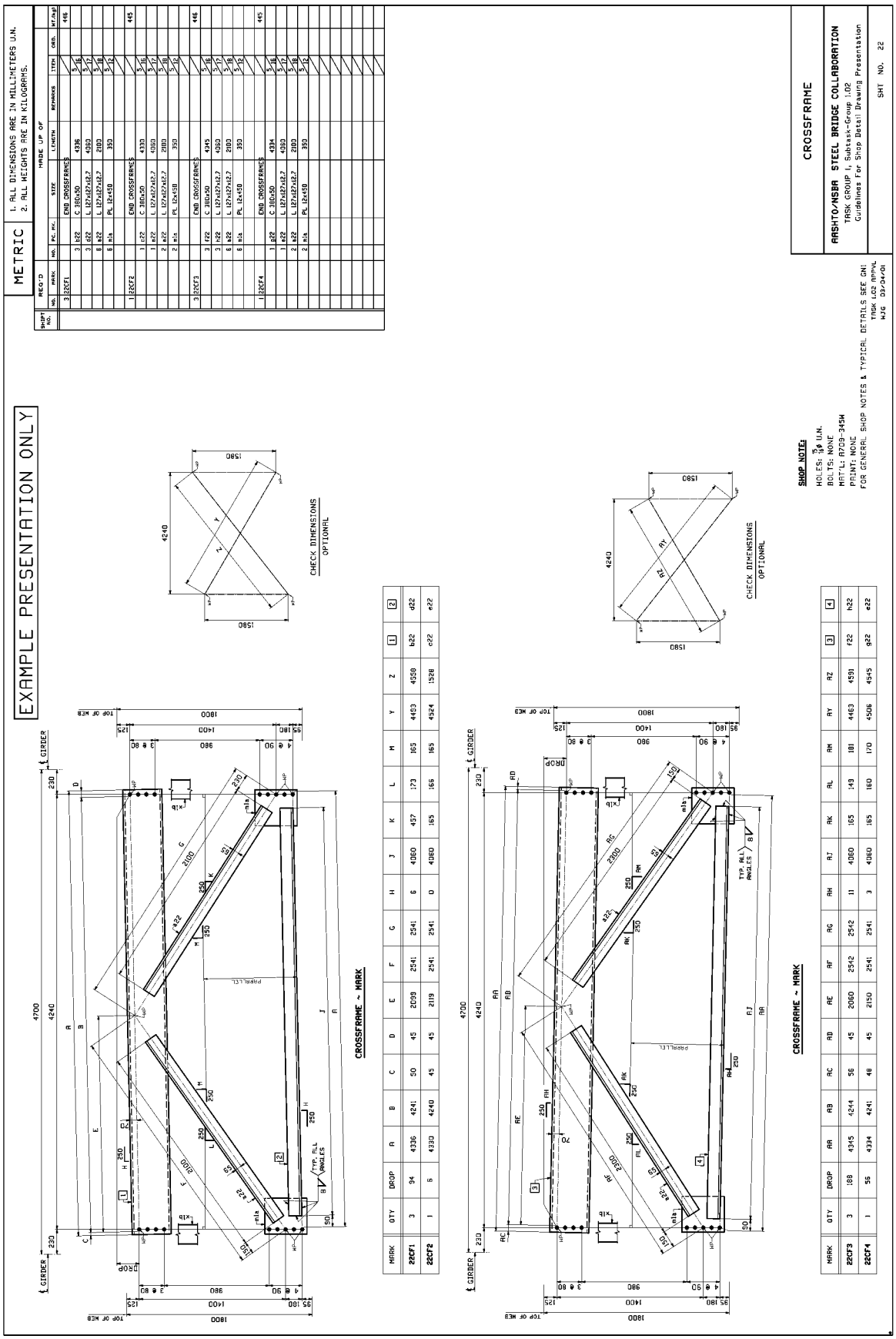
TASK LO2 APPVL HJG 03/04/01

CROSSFRAME

AASHTO/NSBA STEEL BRIDGE COLLABORATION
TASK GROUP 1, Subtask-Group 1.02
Guidelines For Shop Detail Drawing Presentation

SHT NO. 21

Shop Detail Drawing Presentation Guidelines



Commentary

C4.6 Designate all fracture critical welds FC and governed by AWS bridge welding codes.

C6.1 & 6.2 Show, when applicable, flange width transitions at shop welded splices (radius or straight temper) as preferred by Fabricator.

C12 Locate skewed stiffeners to edge in contact with web and not to center line of stiffener. Show section for clarity.