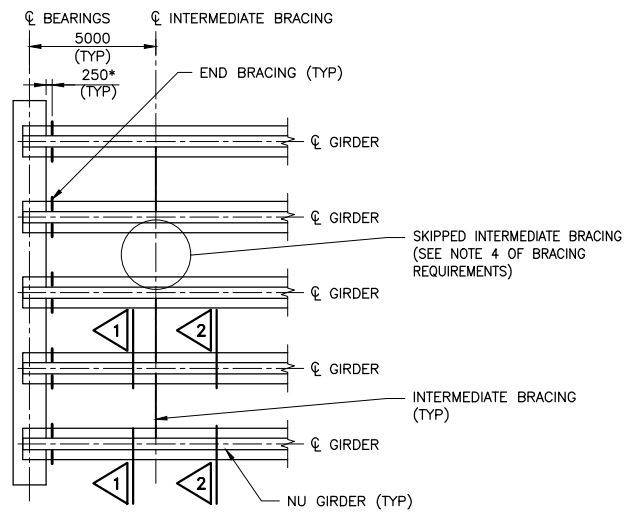


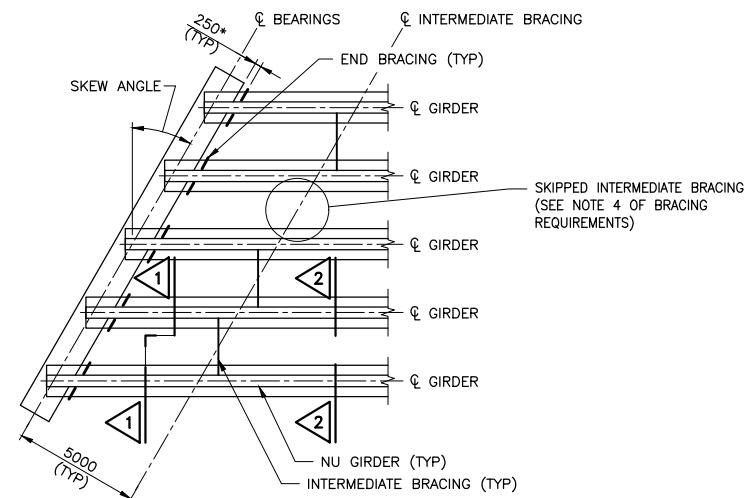
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 MODIFIED: 2022-08-03 12:05  
 MINISTRY OF TRANSPORTATION OF ONTARIO STRUCTURAL ANS1 D FRAME 2020-05

**Ontario** Ministry of Transportation  
 CONT WP  
 SHEET  
**MINIMUM BRACING REQUIREMENTS FOR NU GIRDERS INSTALLATION**

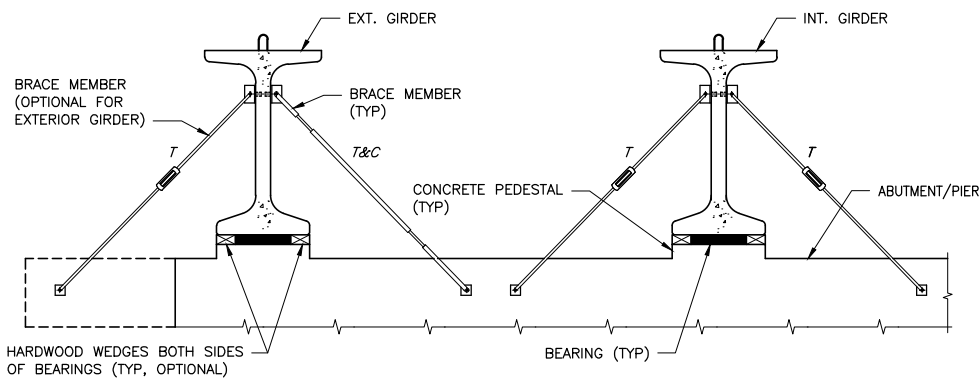
**METRIC**  
 DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN  
 DRAWING NOT TO BE SCALED  
 100mm ON ORIGINAL DRAWING



**BRIDGES WITHOUT SKEW**



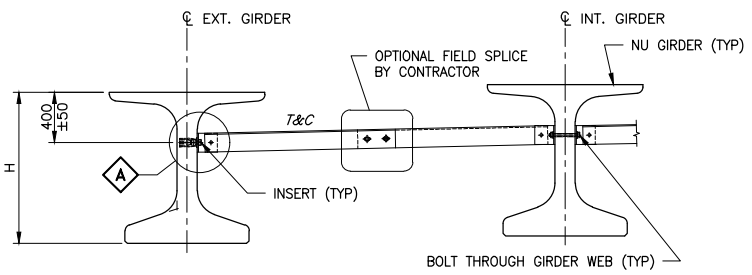
**SKEWED BRIDGES**



**TYPICAL END BRACINGS AT SUPPORT**

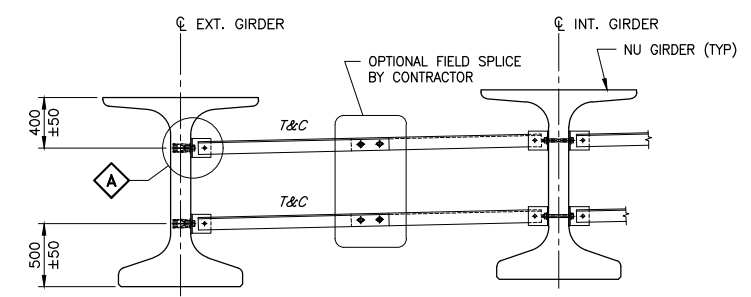
**BRACING LAYOUT**

(ONE END OF THE SPAN SHOWN ONLY, OTHER END IS SIMILAR)  
 \* END BRACINGS SHALL BE INSTALLED WITH MAXIMUM DISTANCE OF 250mm AWAY FROM THE ABUTMENT OR PIER DIAPHRAGM FACE.



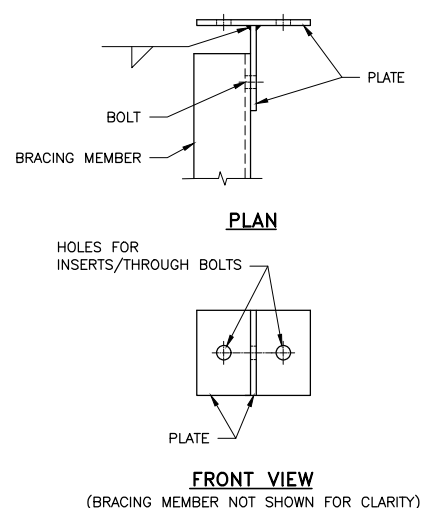
**INTERMEDIATE BRACING FOR NU900 AND NU1200 GIRDERS**

INTERMEDIATE BRACINGS ARE REQUIRED FOR SPANS OVER TRAFFIC OR NAVIGABLE WATERWAYS. FOR OTHER CASES INTERMEDIATE BRACING IS OPTIONAL.



**INTERMEDIATE BRACING FOR NU1400 TO NU2400 GIRDERS**

INTERMEDIATE BRACINGS ARE ALWAYS REQUIRED.



**DETAIL**

**NOTE:**

DETAIL 'A' IS AN OPTION FOR ATTACHMENT OF INTERMEDIATE BRACING MEMBER TO THE NU GIRDER. THE CONTRACTOR SHALL DESIGN THE BRACING MEMBERS AND THEIR ATTACHMENTS TO THE NU GIRDER USING THE DESIGN FORCES PROVIDED IN THE TABLE 1.

**GENERAL NOTES:**

1. THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE GIRDERS AT ALL TIMES.
2. THIS DRAWING ADDRESSES STABILITY OF THE GIRDERS PRIOR TO FORMWORK INSTALLATION.

**BRACING REQUIREMENTS:**

1. THESE MINIMUM BRACING REQUIREMENTS CONSIST OF BRACINGS AT THE END OF EACH GIRDER AT SUPPORTS AND INTERMEDIATE POINTS.
2. THE CONTRACTOR IS RESPONSIBLE TO DESIGN AND INSTALL GIRDER'S END BRACINGS AS SPECIFIED IN OPSS 909 FOR THE STABILITY OF THE GIRDERS FOR APPLICABLE LOADS, AND ACCOUNTING FOR CONSTRUCTION TOLERANCES, THROUGHOUT VARIOUS CONSTRUCTION STAGES i.e. FROM THE TIME THEY ARE INSTALLED UP TO THE TIME THE GIRDERS ARE MADE COMPOSITE WITH THE DECK SLAB.
3. SIZE OF EACH INTERMEDIATE BRACING AND ATTACHMENT SHALL BE ACCORDING TO THE FORCES IN TABLE 1.
4. WHEN GIRDER INSTALLATIONS ARE IN A CONTINUOUS OPERATION, GIRDERS SHALL BE IN SETS OF TWO (2) OR MORE, INSTALL INTERMEDIATE BRACING BETWEEN ALL GIRDERS WITHIN A SET, INTERMEDIATE BRACING BETWEEN SETS ARE OPTIONAL.
5. THE BRACING MEMBER SHALL BE ATTACHED THROUGH THE WEB OF THE GIRDER. NO ATTACHMENT TO THE GIRDER FLANGES IS PERMITTED.
6. THESE MINIMUM BRACING REQUIREMENTS ARE APPLICABLE WHEN THE GIRDERS ARE MADE COMPOSITE WITH THE DECK SLAB WITHIN THE SAME CONSTRUCTION SEASON. IF THE DECK CONSTRUCTION IS DELAYED UNTIL NEXT SEASON, THE CONTRACTOR SHALL DESIGN ALL PARTS OF THE BRACING SYSTEM FOR MULTI-YEAR CONSTRUCTION TO MEET THE MINIMUM REQUIREMENTS.

**CONSTRUCTION NOTES:**

1. ALL THE BOLT HOLES IN THE GIRDERS FOR CONNECTING THE BRACINGS SHALL BE PRE-FORMED AT THE TIME OF GIRDER FABRICATION. NO FIELD DRILLED HOLES ARE PERMITTED.
2. END BRACING SHALL BE INSTALLED IMMEDIATELY AFTER GIRDER PLACEMENT AND BEFORE ANY RIGGING IS DISCONNECTED FROM THE GIRDER OR CRANE.
3. INTERMEDIATE BRACING SHALL BE INSTALLED IMMEDIATELY AFTER ADJACENT GIRDER INSTALLATION.
4. THIS BRACING SYSTEM AND ITS COMPONENTS SHALL NOT BE REMOVED UNTIL THE GIRDERS ARE MADE COMPOSITE WITH THE DECK SLAB.
5. WHEN THE SYSTEM IS REMOVED, THE PRE-FORMED GIRDER HOLES SHALL BE FILLED WITH NON-SHRINK GROUT IMMEDIATELY AFTER REMOVAL OF THE BRACING CONNECTIONS.

**LEGEND:**

- T - TENSION
- C - COMPRESSION
- INT. - INTERIOR
- EXT. - EXTERIOR

**TABLE 1 - DESIGN FORCES\*\* FOR EACH INTERMEDIATE BRACING MEMBER**

GIRDER SIZE	AXIAL COMPRESSION (kN)	
	UNFACTORED FORCE	FACTORED FORCE (ULS 4)
NU900, NU1200	18	25
NU1400, NU1500, NU1600	30	42
NU1800, NU1900, NU2000	52	72
NU2400	85	115

\*\* DESIGN FORCES ARE BASED ON LATERAL WIND PRESSURE OF 395 Pa.  
 NOTE:  
 DESIGN AXIAL TENSION = 0.5 x AXIAL COMPRESSION

STANDARD DRAWING AUGUST 3, 2022 SS107-9  
**MINIMUM BRACING REQUIREMENTS FOR NU GIRDERS INSTALLATION**

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	CHK	CODE	CSA S6-19/LOAD
DRAWN	CHK	SITE	DATE DWG