

Standards and Guidelines for the Construction of OHV Trail Bridges on Crown land

Part 2- Drawings and Tables

Report PKS 2013-001 (Part 2)



Disclaimer

This document is distributed by the Department of Natural Resources with the sponsorship of the Department of Health and Wellness in the interest of information exchange. It is only to be used to aid in the construction of the superstructure of trail bridges on Nova Scotia Crown lands. It shall be used by persons with practical experience and technical training in trail and trail bridge construction.

It is important that the bridge proponent work closely with the Department of Natural Resources regional staff so they are familiar with the standards, plans and tables and their appropriate uses.

The documents are subject to review and may change without notice. The website should be checked to ensure the most current versions of the documents are being used.

This document is not designed to provide precise instructions for every construction scenario. While this document reflects standards and specifications including CSA-S6-06, Canadian Highway Bridge Design Code, the contents are not meant to be applied to projects outside the scope of this document. Users of this document are solely responsible for the appropriate interpretation of the content provided and shall seek specific legal, engineering, and design expertise to suit individual conditions and projects.

Any use of trade names is for the information and convenience of the reader and does not constitute endorsement by the Province of Nova Scotia

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Comments and suggestions regarding content and format of the document are of great interest to DNR and will assist the Department in updating and improving future editions. Please send comments and suggestions to:

Nova Scotia Department of Natural Resources
Parks and Recreation Div
11881 Hwy 2, RR1 Belmont, NS
B0M1C0

Drawing Name

Revision

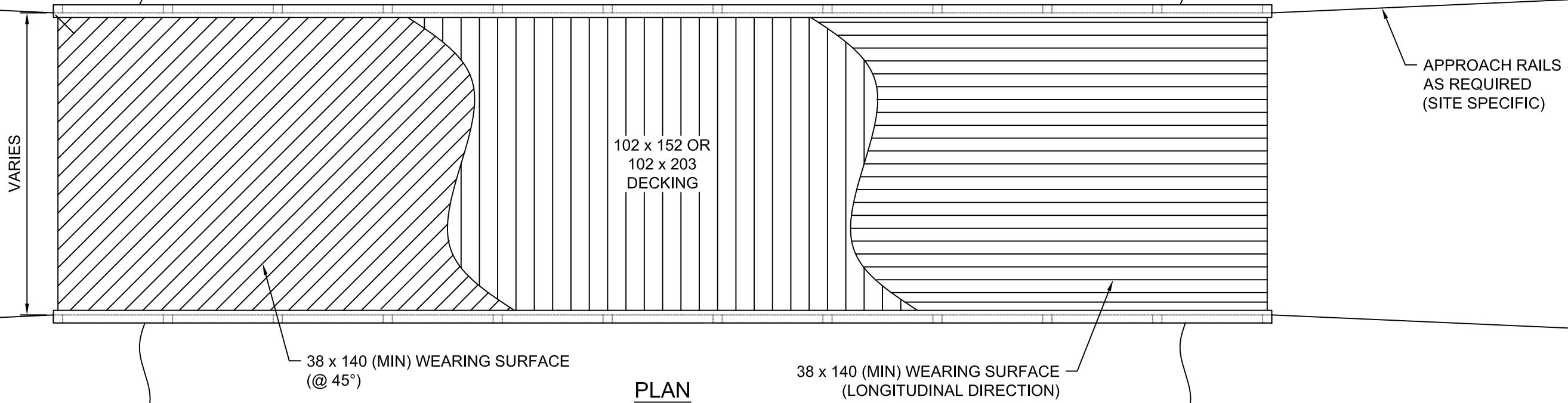
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02	Timber Stringer Cross Sections	0
03	Steel Stringer Cross Sections	0
04	Loading Tables & Notes	2
05	Typical Details	1
06	Timber Stringer Details	1
07	Steel Stringer Details	1
08	Timber Sill Abutment	3
09	Timber Crib Abutment - Elevation	3
10	Timber Crib Abutment - Plan & Section	3
11	Gabion Abutment	3
12	Notes	0
13	Notes	0

BUCHANAN DESIGN GROUP

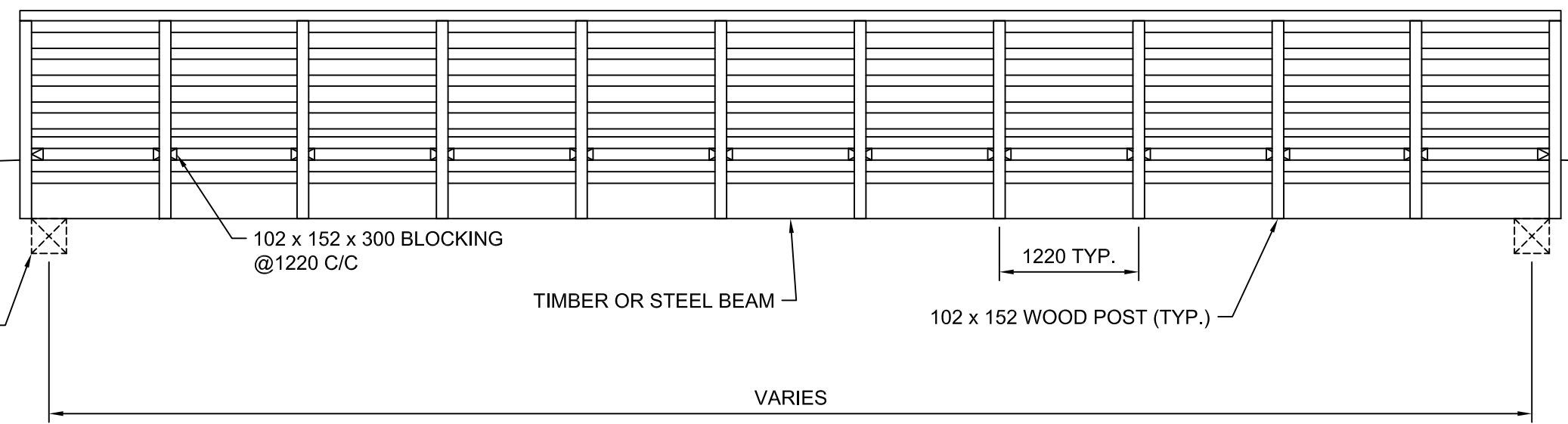
CONSULTING PROFESSIONAL ENGINEERS

P.O. BOX 1013 LANTZ, NS B2S 3G6
Ph: 902-478-3255 Fax: 902-883-8889
buchanan.glen@gmail.com

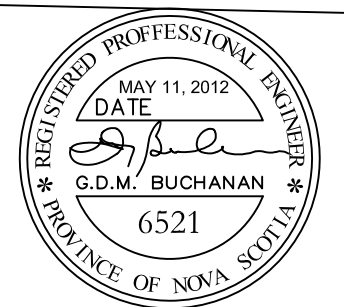
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PLAN

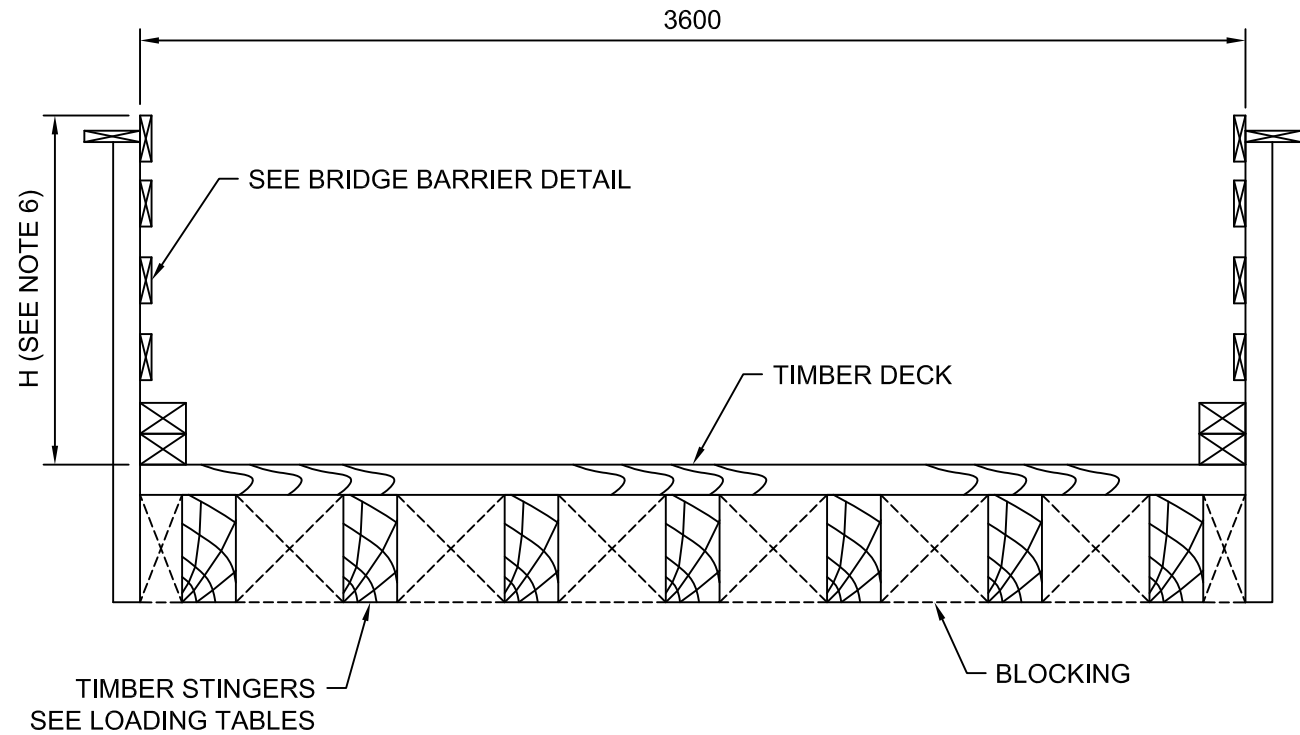


ELEVATION

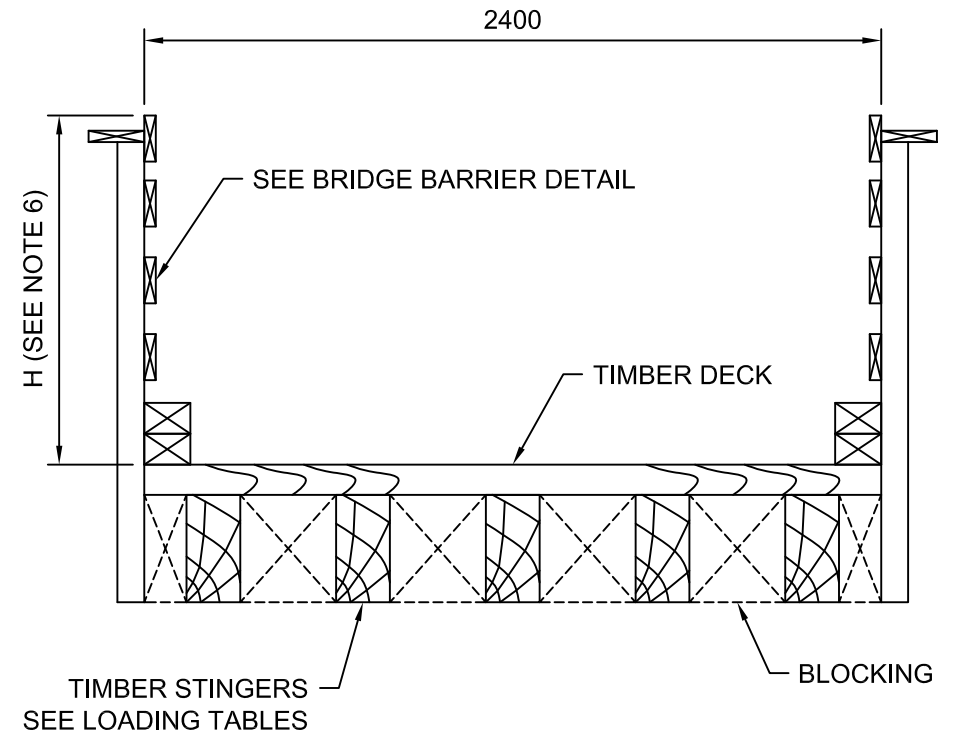


FOR STRUCTURAL SIZES ONLY

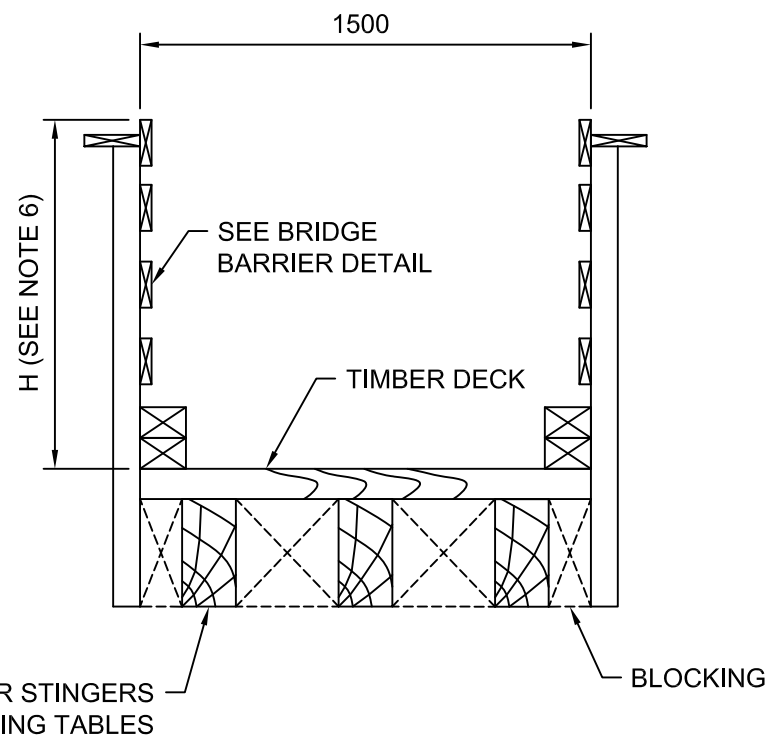
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DRAWN BY JEM	CHECKED BY GB
DATE JUNE, 2010	SHEET 01
SCALE AS SHOWN	



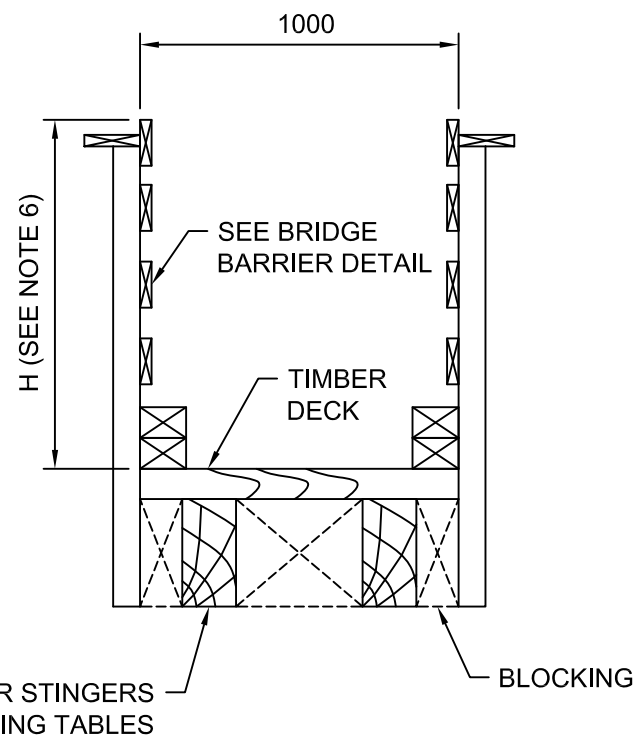
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CROSS SECTION 2400 WIDE BRIDGE
SCALE: NTS



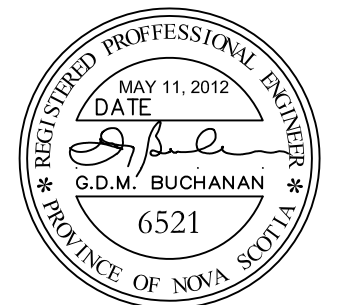
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CROSS SECTION 1000 WIDE BRIDGE
SCALE: NTS

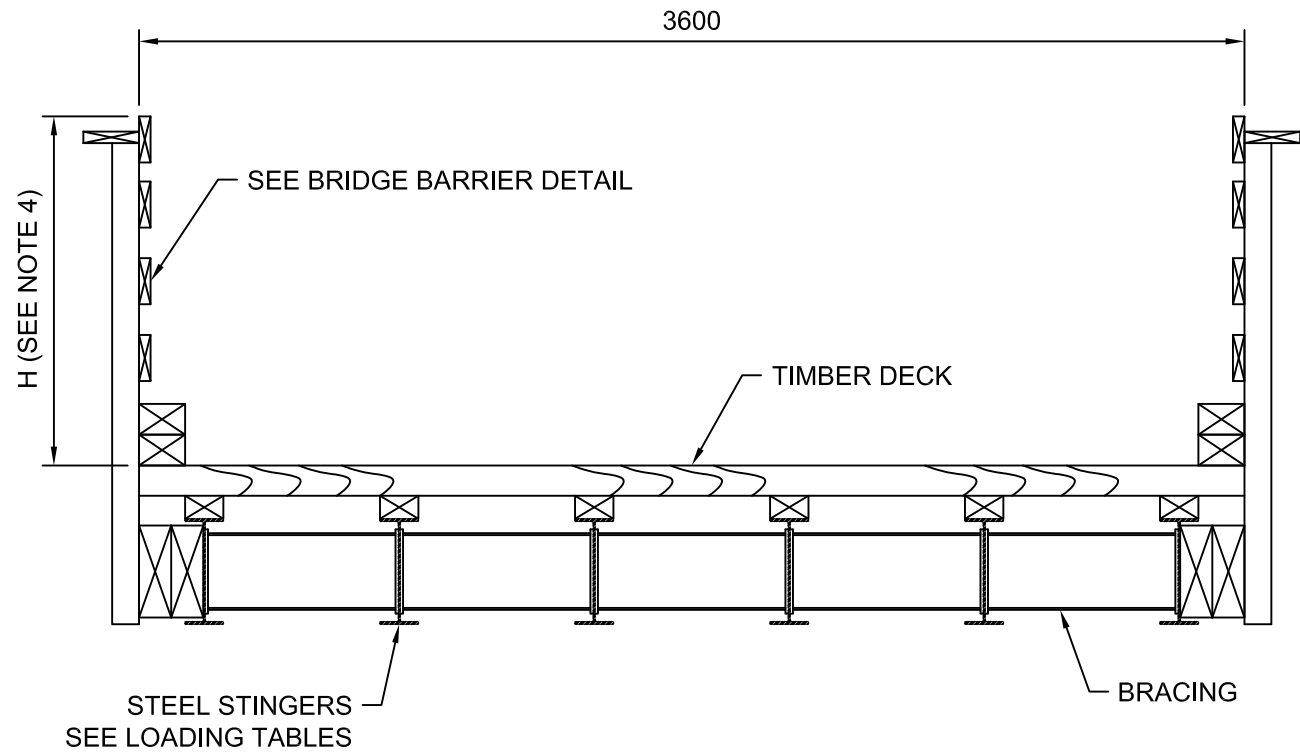
NOTES:

1. BLOCKING REQUIRED AT ENDS AND QUARTER POINTS ALONG LENGTH.
2. BLOCKING SIZE TO MATCH SIZE OF STRINGERS.
3. IF DRESSED LUMBER USED FOR STRINGERS, BLOCKING TO BE THREE PIECES OF DRESSED LUMBER NAIL LAMINATED.
4. WEARING SURFACE NOT SHOWN FOR CLARITY.
5. HEIGHT TO TOP OF TOP RAIL TO BE MEASURED FROM TOP OF WEARING SURFACE, IF PRESENT.
6. H = 1067 EXCEPT IF ONE OF THE AUTHORIZED USES IS CYCLING OR EQUESTRIAN, THEN H = 1372.

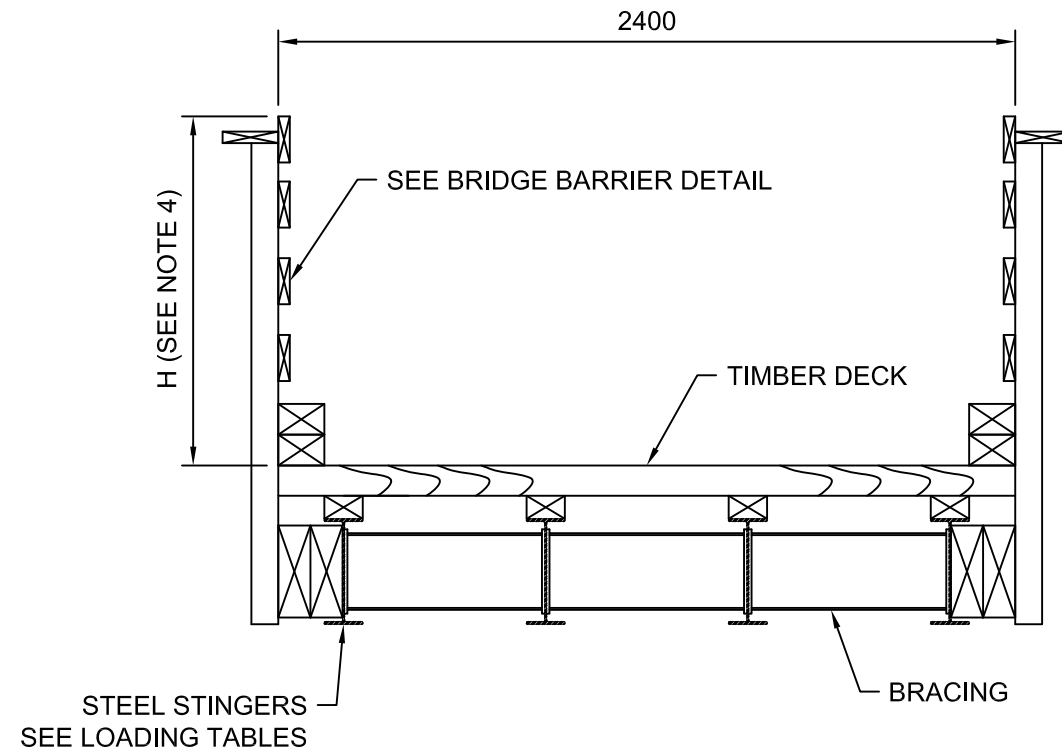


FOR STRUCTURAL SIZES ONLY

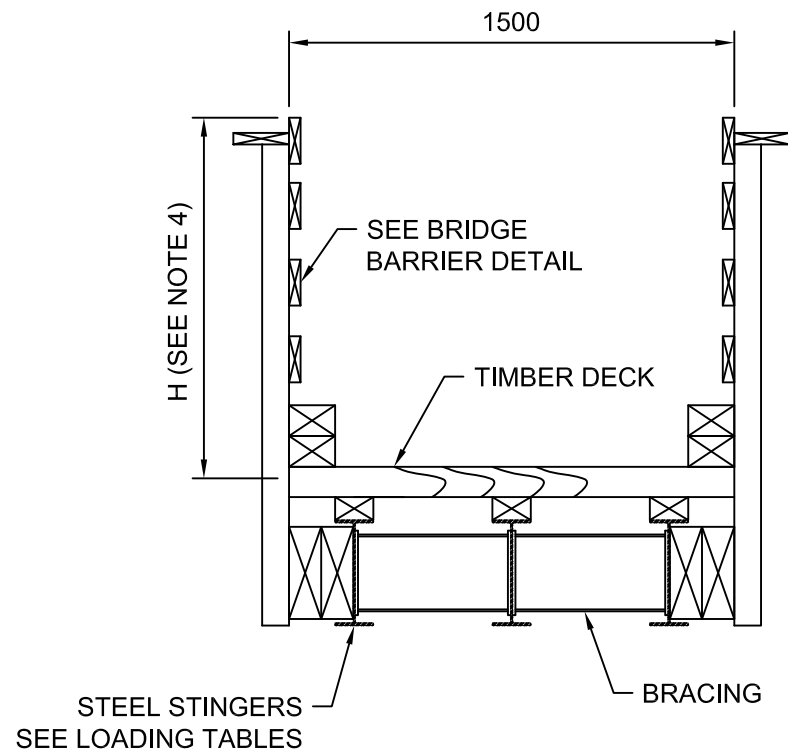
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DATE JUNE, 2010	SHEET
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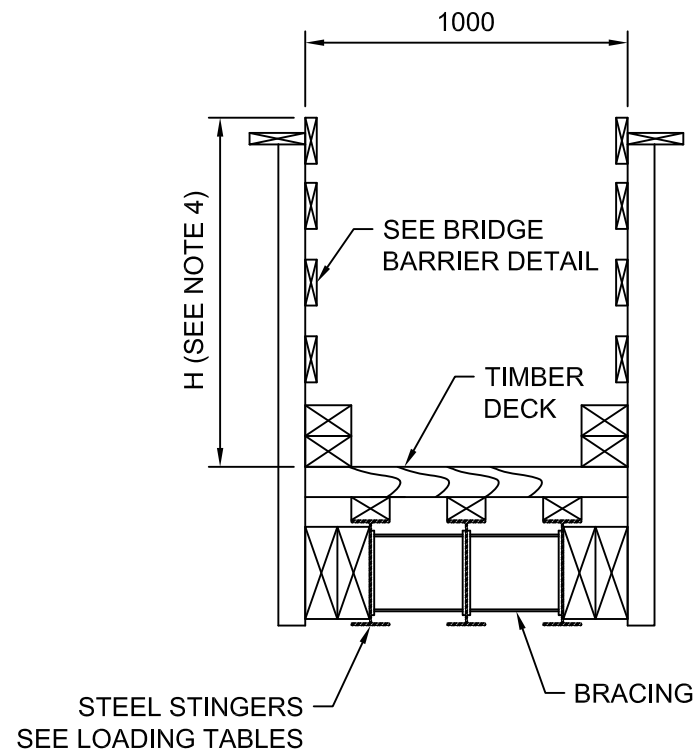
CROSS SECTION 3600 WIDE BRIDGE
SCALE: NTS



CROSS SECTION 2400 WIDE BRIDGE
SCALE: NTS



CROSS SECTION 1500 WIDE BRIDGE
SCALE: NTS



CROSS SECTION 1000 WIDE BRIDGE
SCALE: NTS

NOTES:

1. BRACING REQUIRED AT ENDS AND QUARTER POINTS ALONG LENGTH.
2. WEARING SURFACE NOT SHOWN FOR CLARITY.
3. HEIGHT TO TOP OF TOP RAIL TO BE MEASURED FROM TOP OF WEARING SURFACE, IF PRESENT.
4. $H = 1067$ EXCEPT IF ONE OF THE AUTHORIZED USES IS CYCLING OR EQUESTRIAN, THEN $H = 1372$.



FOR STRUCTURAL SIZES ONLY

TITLE STEEL STRINGER CROSS SECTIONS	
DRAWN BY JEM	CHECKED BY GB
DATE JUNE, 2010	SHEET
SCALE AS SHOWN	03

TABLE 1 - OHV USE ONLY (WITH GROOMER)

MAXIMUM SPAN	WIDTH			MATERIAL	
	1.5m	2.4m	3.6m	STRINGERS	DECK
3m	4-178x356	5-178x356	6-178x356	SOLID SAWN	SOLID SAWN
	3-203x406	4-203x406	5-203x406		
4.8m	4-W200x19	6-W200x19	8-W200x19	STEEL	SOLID SAWN
	3-W310x21	4-W310x21	6-W310x21		
7.3m	3-W360x33	4-W410x39	4-W410x46	STEEL	SOLID SAWN
	3-W410x39	5-W360x33	5-W410x39		
9.1m	3-W410x39	5-W410x39	6-W410x39	STEEL	SOLID SAWN
	3-W410x46	4-W410x46	5-W410x46		
15.2m	4-W360x45	5-W360x45	7-W360x45	STEEL	SOLID SAWN
	3-W460x52	4-W460x52	5-W460x52		

TABLE 2 - OHV USE ONLY (WITHOUT GROOMER)

MAXIMUM SPAN	WIDTH			MATERIAL	
	1.5m	2.4m	3.6m	STRINGERS	DECK
3m	6-38x184	9-38x184	13-38x184	DRESSED LUMBER	DRESSED LUMBER
	4-38x235	6-38x235	9-38x235		
4.8m	4-152x254	6-152x254	7-152x254	SOLID SAWN	SOLID SAWN
	3-178x356	4-178x356	5-178x356		
7.3m	4-178x356	6-178x356	8-178x356	SOLID SAWN	SOLID SAWN
	3-203x406	4-203x406	6-203x406		
9.1m	3-W310x28	5-W310x28	7-W310x28	STEEL	SOLID SAWN
	3-W360x33	4-W360x33	6-W360x33		
15.2m	3-W410x39	5-W410x39	7-W410x39	STEEL	SOLID SAWN
	3-W410x46	4-W410x46	6-W410x46		

TABLE 3 - MULTIUSE TRAILS *

MAXIMUM SPAN	WIDTH		MATERIAL	
	1m	1.5m	STRINGERS	DECK
3m	5-38x184	7-38x184	DRESSED LUMBER	SEE NOTE 7
	4-38x235	5-38x235		
4.8m	8-38x286	11-38x286	DRESSED	SEE NOTE 7
	3-152x254	5-152x254	SOLID SAWN	SOLID SAWN
7.3m	4-178x356	5-178x356	SOLID SAWN	SOLID SAWN
	3-203x406	4-203x406		
9.1m	5-178x356	7-178x356	SOLID SAWN	SOLID SAWN
	4-203x406	5-203x406		
15.2m	3-W360x33	4-W360x33	STEEL	SOLID SAWN
	2-W410x39	4-W410x39		

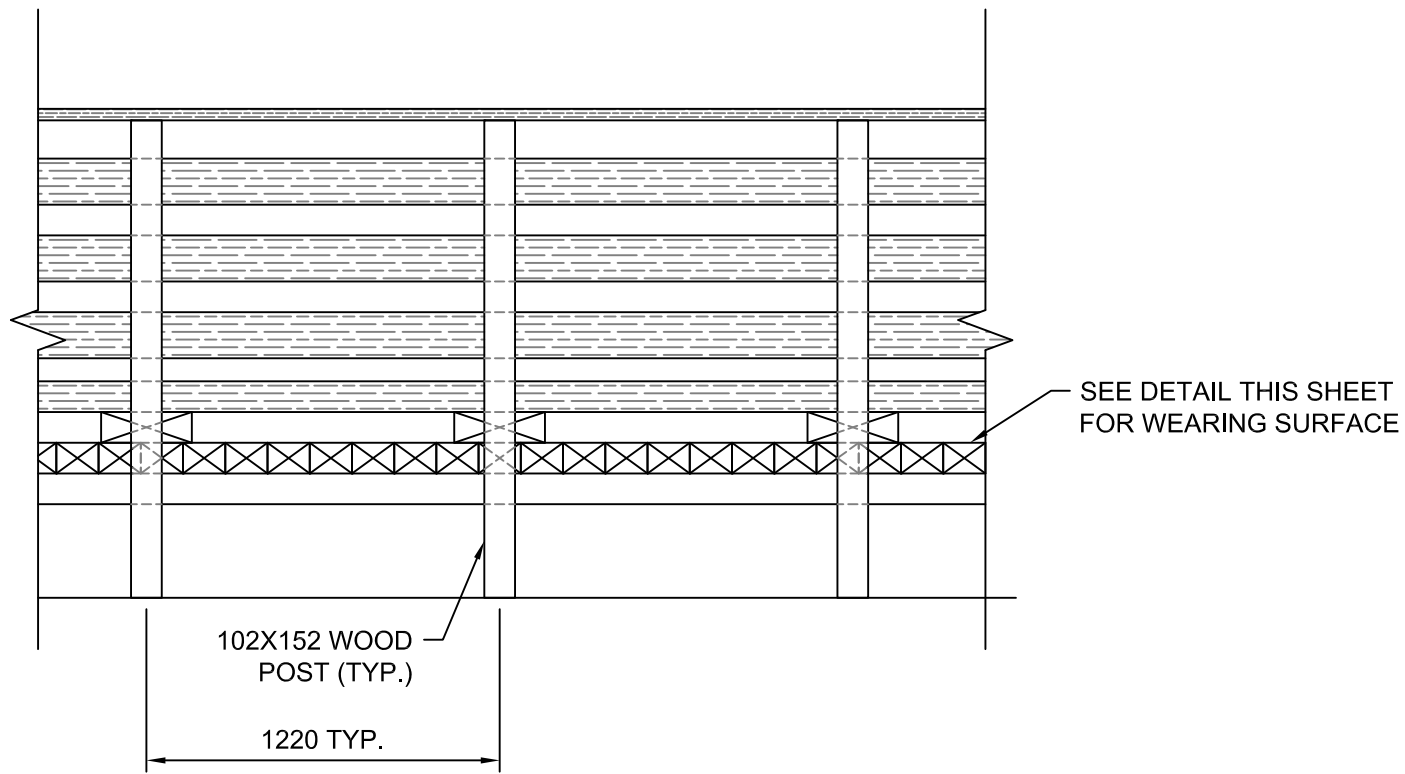
NOTES:

- IT IS THE RESPONSIBILITY OF THE INDIVIDUAL GROUPS TO DETERMINE THE INTENDED USE OF THE STRUCTURE AND SELECT THE DESIGN LOADING ACCORDINGLY.
- GROOMER LOADING IS A TWO AXLE TRACTOR PLUS GROOMER WITH A MAXIMUM GROSS VEHICLE WEIGHT FOR TRACTOR OF 6,620kg WITH A MAXIMUM AXLE LOAD OF 4,630kg AND AXLE SPACING OF 2685mm.
- THESE LOADING TABLES DO NOT APPLY TO BRIDGES OF DIFFERING WIDTHS LISTED OR GROOMER LOADS WITH LOAD EFFECTS GREATER THAN THE GROOMER LOADING ABOVE.
- EXAMPLE BEAM DEFINITION: W 310x28
310 DENOTES THE NOMINAL OR APPROXIMATE BEAM DEPTH
28 DENOTES THE UNIT WEIGHT IN kg PER m.
- * FOR THE PURPOSES OF THIS DOCUMENT "MULTIUSE" IS DEFINED AS ANY TRAIL DESIGNED TO ACCOMMODATE A MIX OF HUMAN POWERED OR PEDESTRIAN TRAFFIC (E.G. WALKING, HIKING, BICYCLING, SKIING, ETC), EQUESTRIAN AND OHVS.
- THESE TABLES DO NOT APPLY TO STRUCTURES ON THE PROVINCIALLY-OWNED ABANDONED RAIL CORRIDOR AND OTHER MULTIUSE TRAILS WHERE SERVICE VEHICLES AND TRAIL GROOMERS ARE USED. PLEASE CONTACT DNR FOR MORE INFORMATION.
- 2 LAYERS OF 38mm DRESSED LUMBER. LOWER LAYER PERPENDICULAR TO STRINGERS. UPPER LAYER AT 45° ANGLE TO STRINGERS

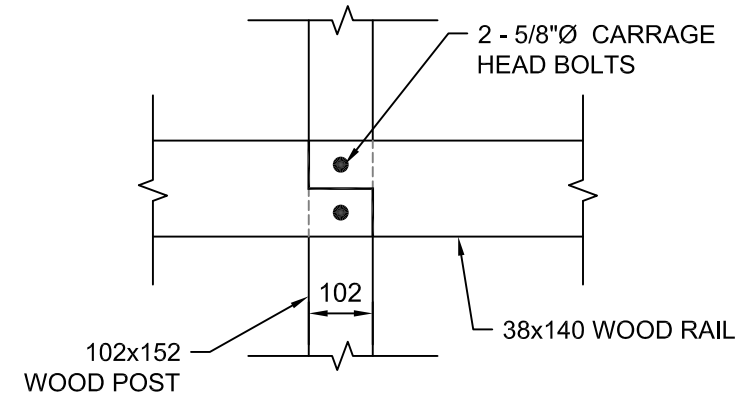


FOR STRUCTURAL SIZES ONLY

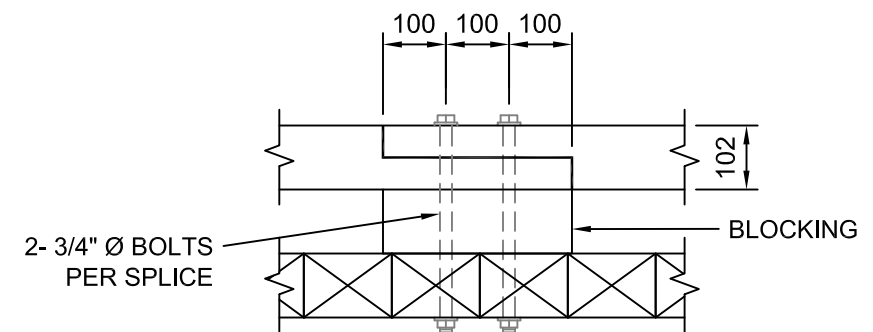
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REV	DATE	DESCRIPTION
TITLE LOADING TABLES & NOTES		
DRAWN BY JEM	CHECKED BY GB	
DATE JUNE, 2010	SHEET	04
SCALE AS SHOWN		



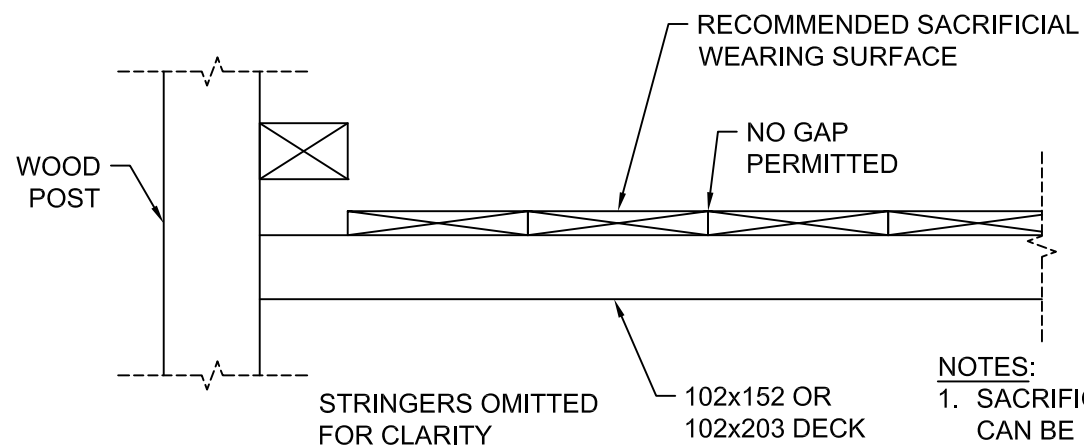
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SCALE: NTS



RAIL SPLICE
SCALE: NTS

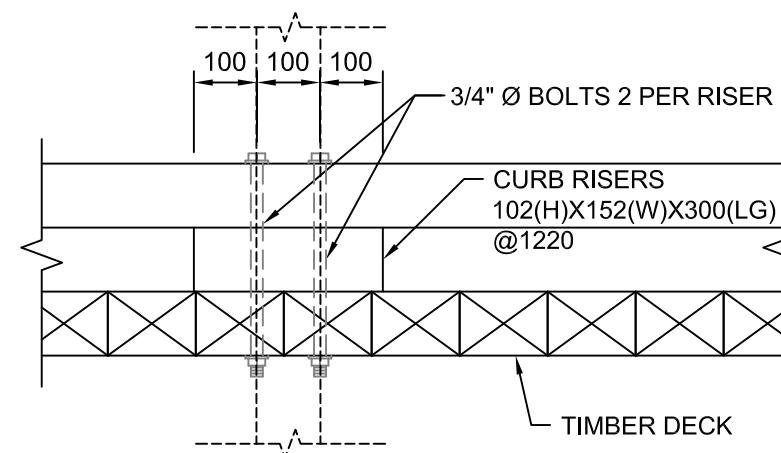


CURB SPLICE
SCALE: NTS



SACRIFICIAL WEARING SURFACE DETAIL
SCALE: NTS

- NOTES:**
1. SACRIFICIAL WEARING SURFACE CAN BE PLACED PARALLEL TO OR AT 45° TO TRAVEL DIRECTION.
 2. SEE LOADING TABLES FOR MATERIAL TYPE.



CURB ELEVATION
SCALE: NTS

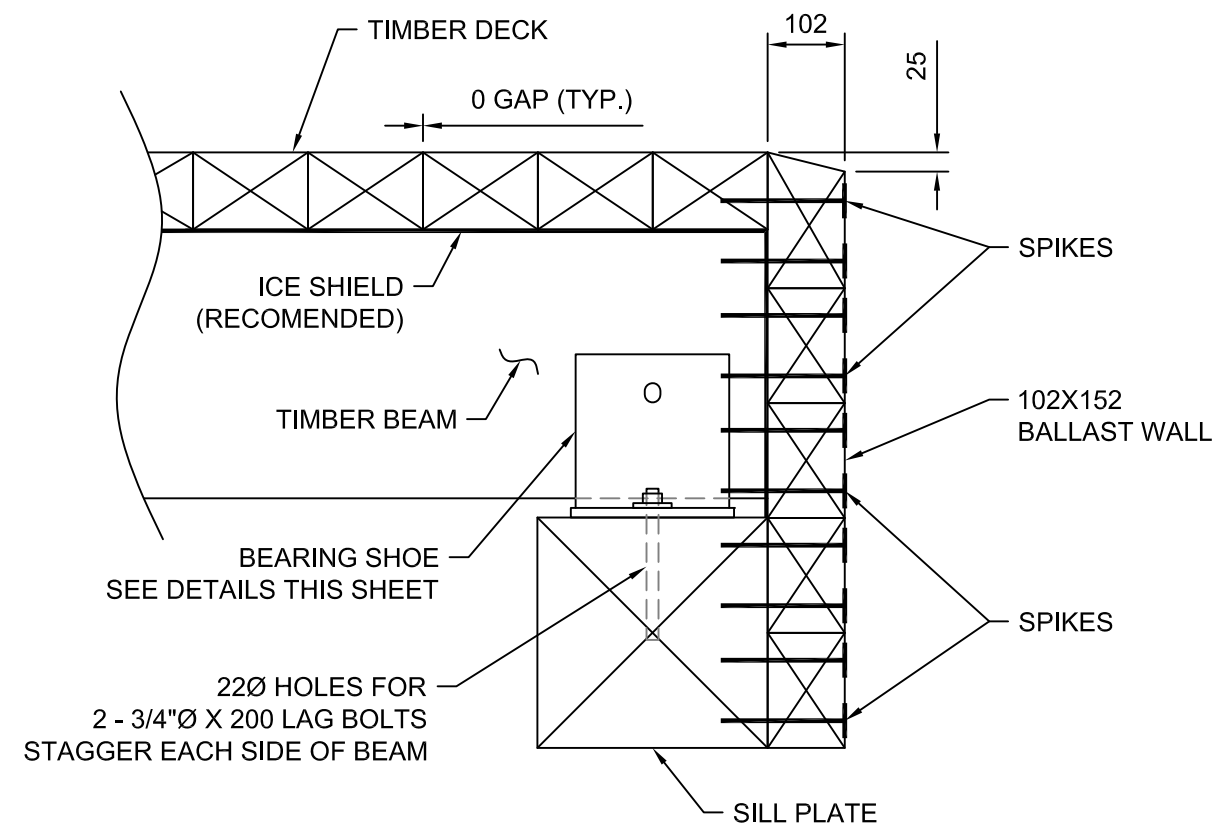
NOTE: CURB RISERS TO BE LOCATED AT WOOD POST LOCATIONS ONLY.



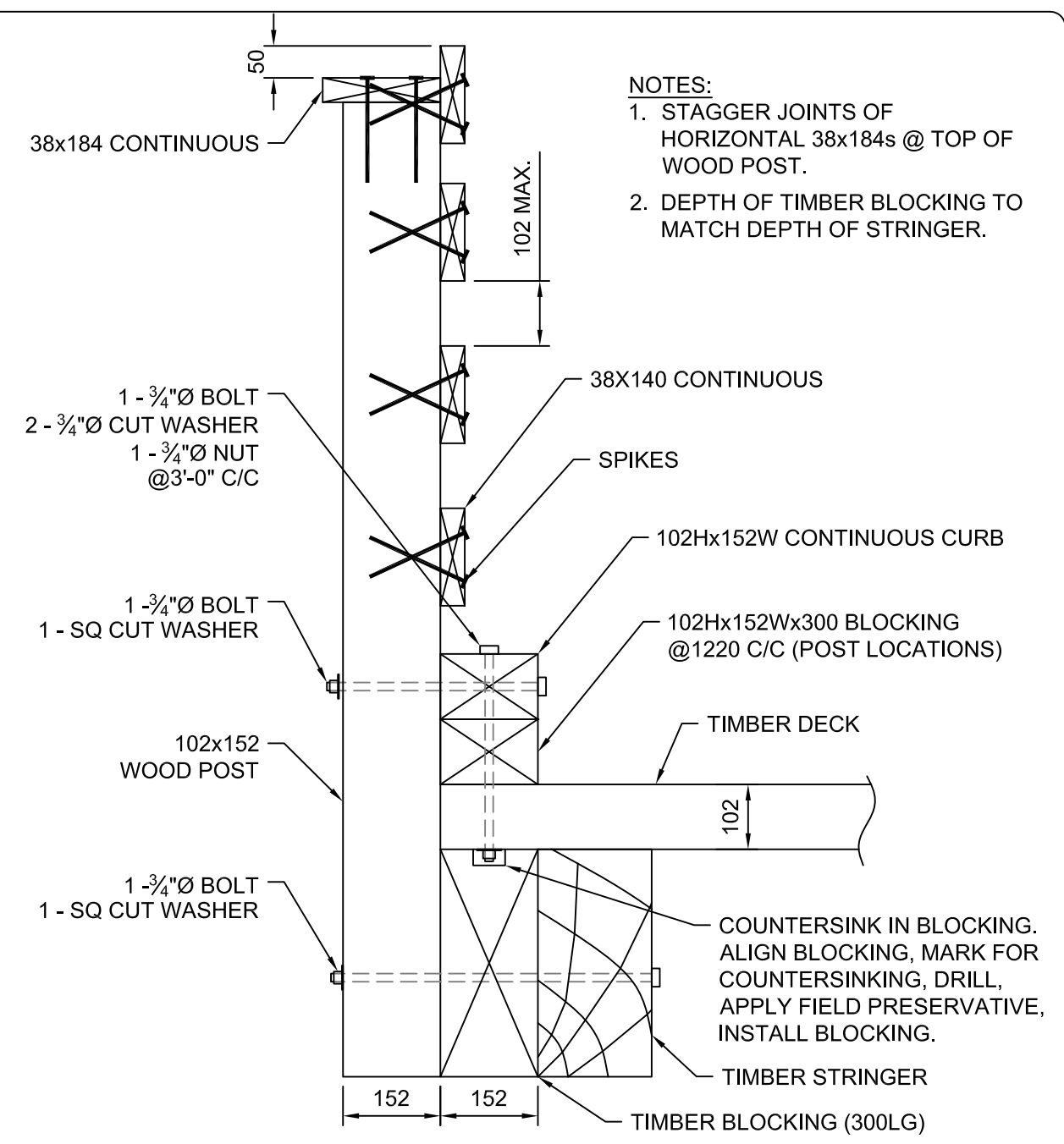
FOR STRUCTURAL SIZES ONLY

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REV	DATE	DESCRIPTION
TYPICAL DETAILS		
DRAWN BY	CHECKED BY	
JEM	GB	
DATE	SHEET	
JUNE, 2010	05	
SCALE		
AS SHOWN		

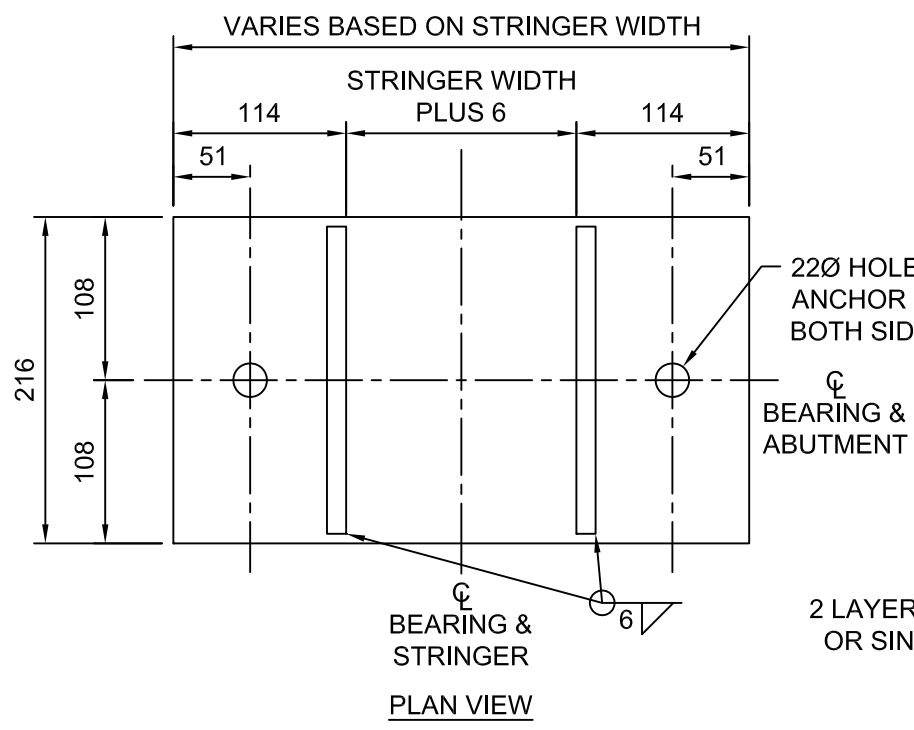
- NOTES:**
1. STAGGER JOINTS OF HORIZONTAL 38x184s @ TOP OF WOOD POST.
 2. DEPTH OF TIMBER BLOCKING TO MATCH DEPTH OF STRINGER.



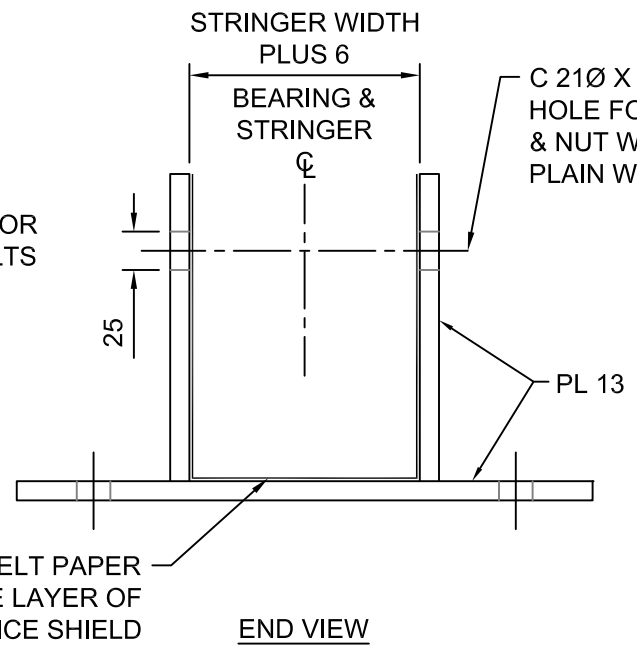
END DETAIL
SCALE: 1:10



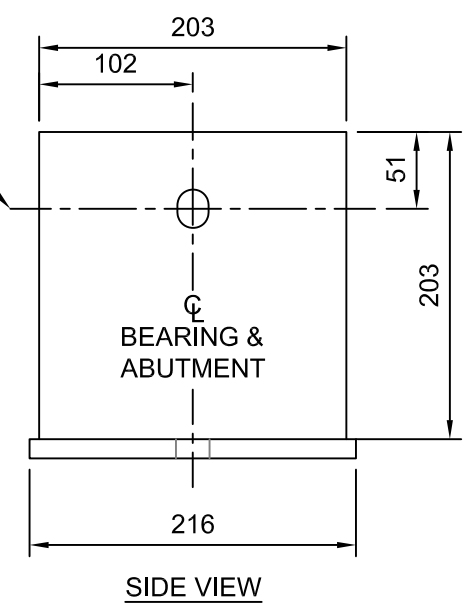
RAILING DETAIL
SCALE: 1:10



PLAN VIEW



END VIEW
BEARING SHOE DETAILS
SCALE: 1:5

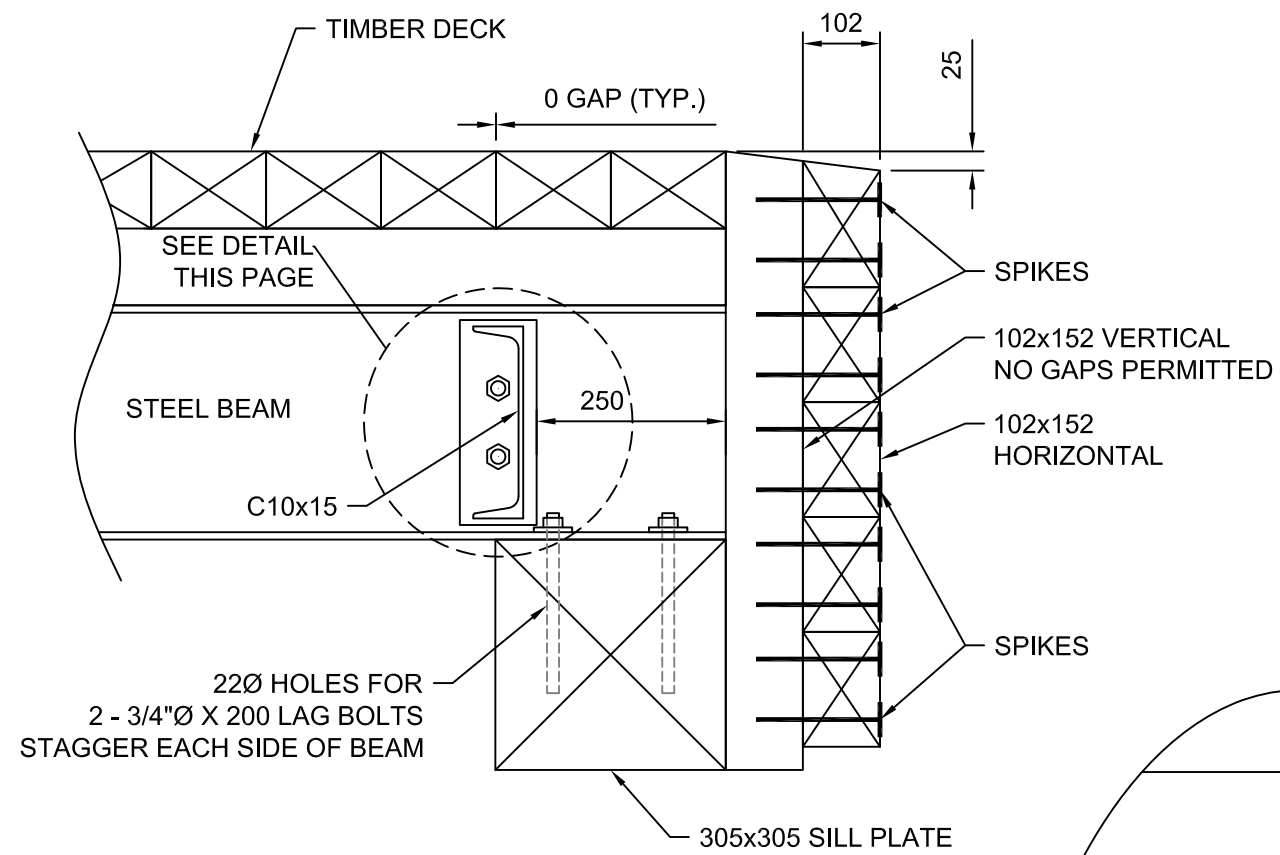


SIDE VIEW

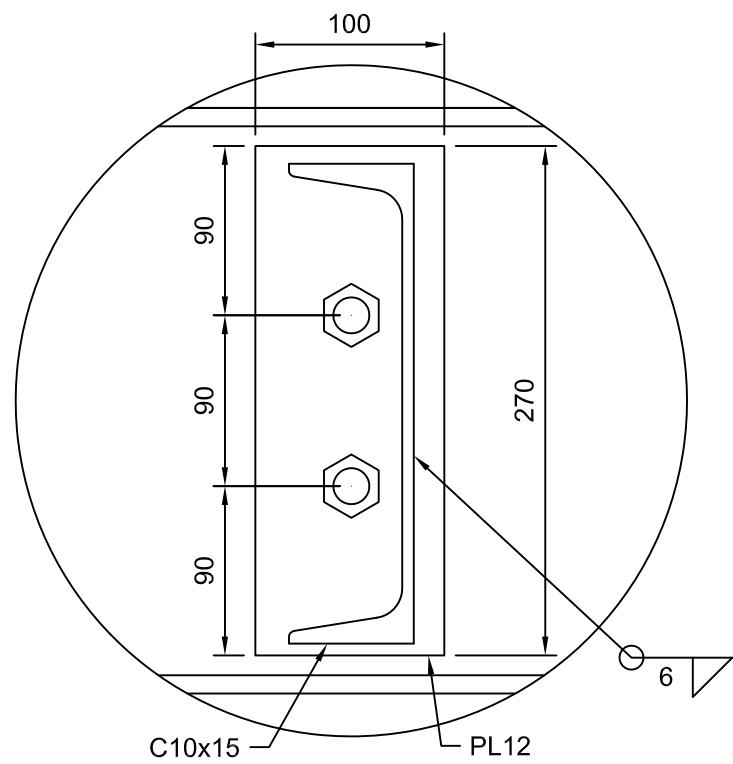


FOR STRUCTURAL SIZES ONLY

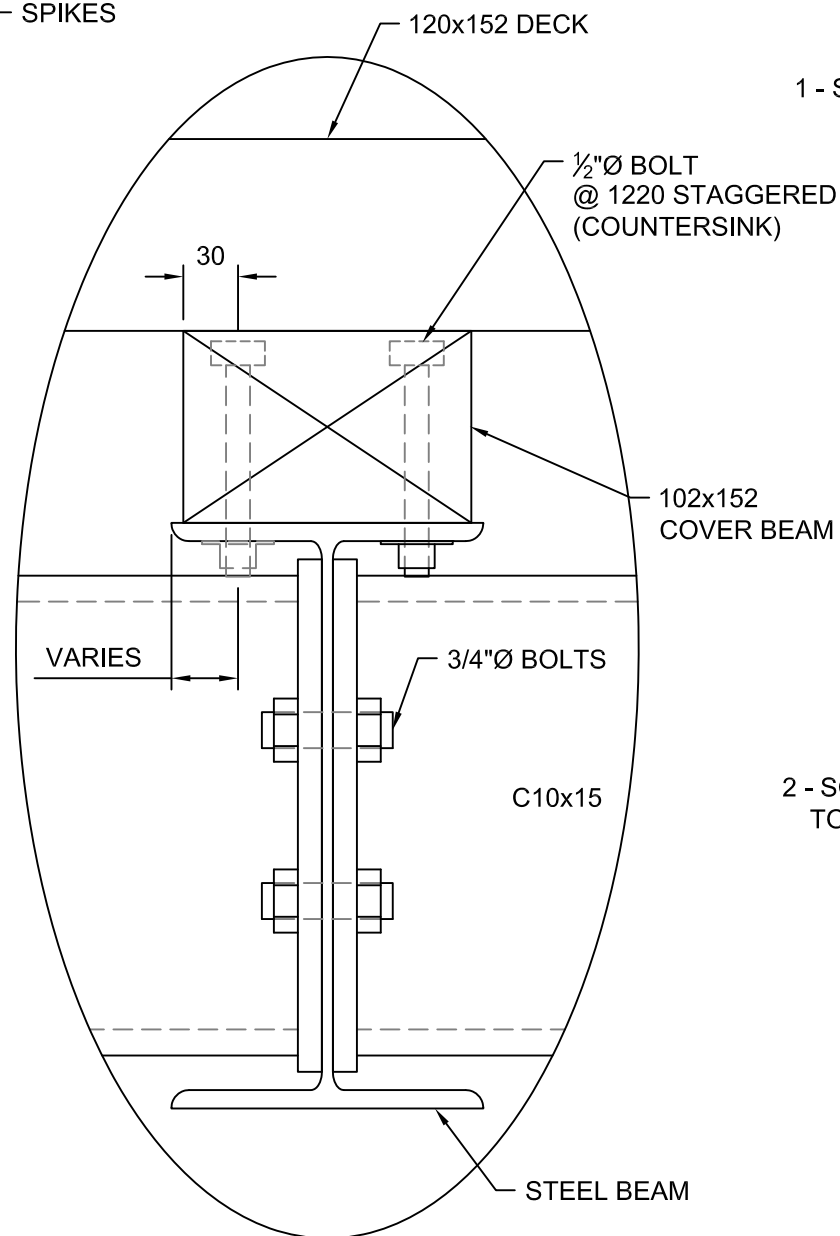
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JEM		
DATE	SHEET	
JUNE, 2010	06	
SCALE		
AS SHOWN		



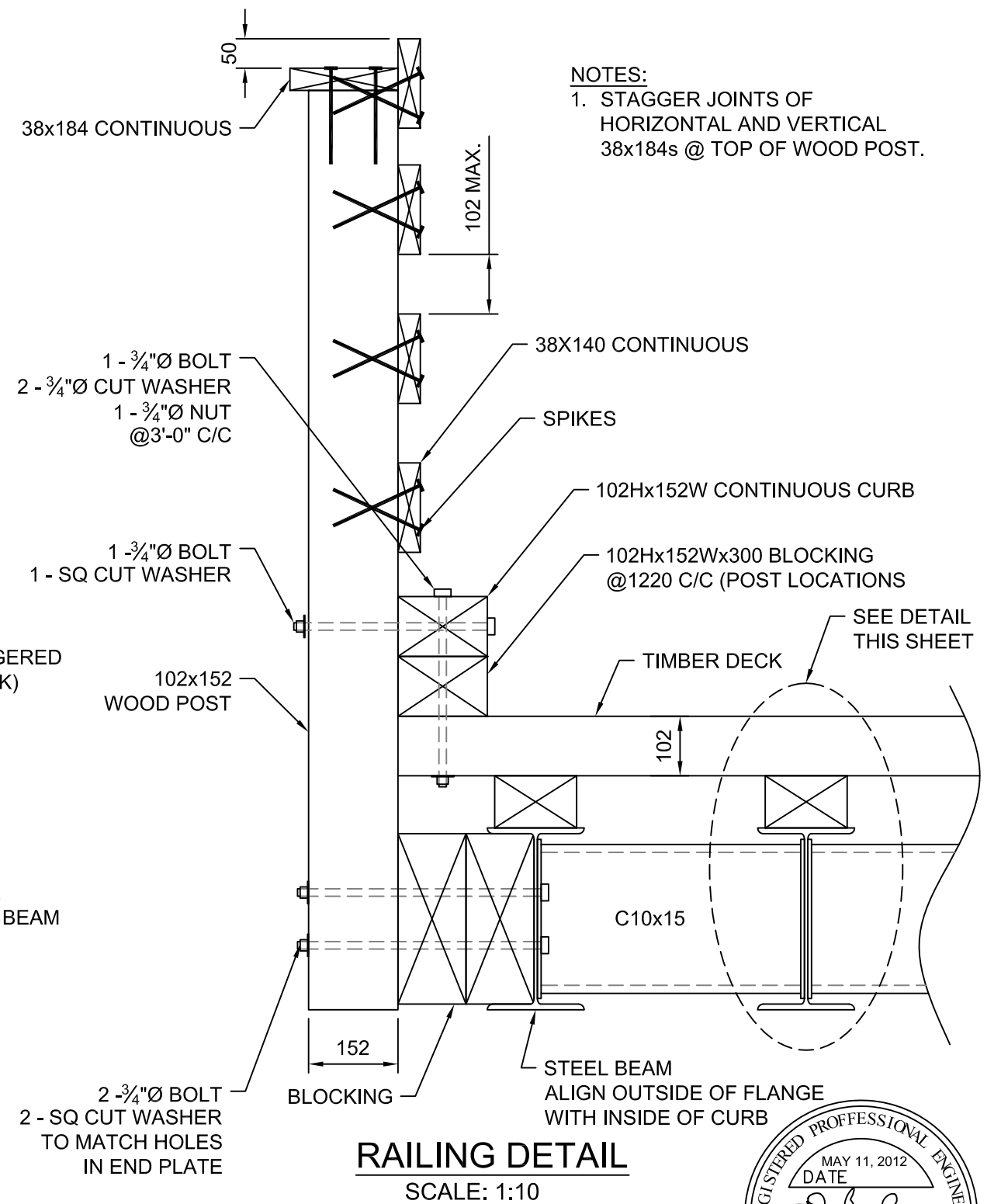
END DETAIL
SCALE: 1:10



CHANNEL DETAIL @ BEAM
SCALE: 1:4

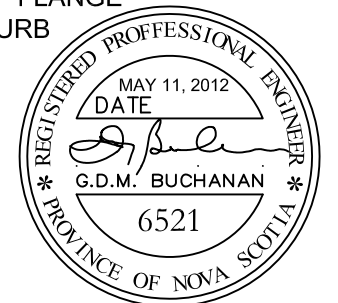


BEAM DETAIL
SCALE: 1:4



RAILING DETAIL
SCALE: 1:10

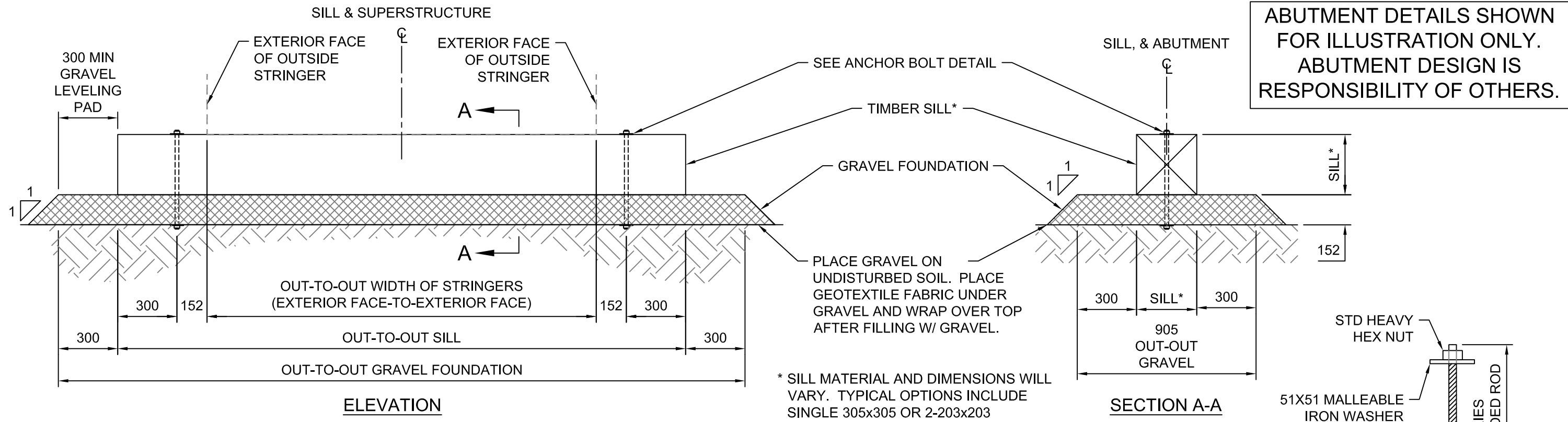
NOTES:
1. STAGGER JOINTS OF HORIZONTAL AND VERTICAL 38x184s @ TOP OF WOOD POST.



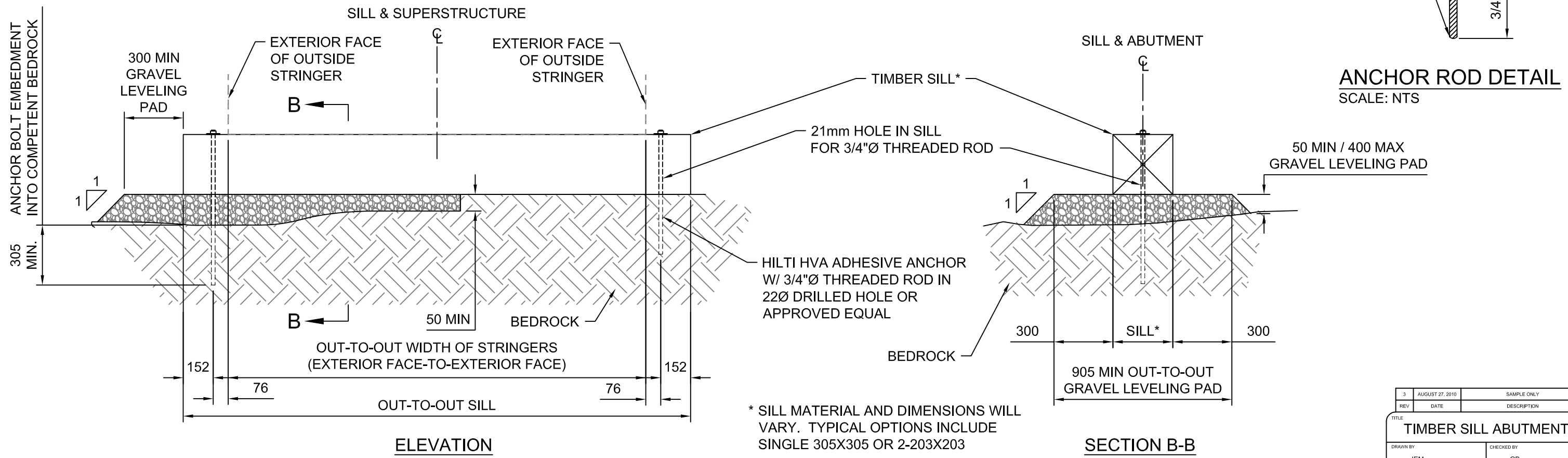
FOR STRUCTURAL SIZES ONLY

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TITLE STEEL STRINGER DETAILS	
DRAWN BY JEM	CHECKED BY GB
DATE JUNE, 2010	SHEET 07
SCALE AS SHOWN	



GRAVEL LEVELING PAD ON EXISTING GRADE
SCALE: 1:20



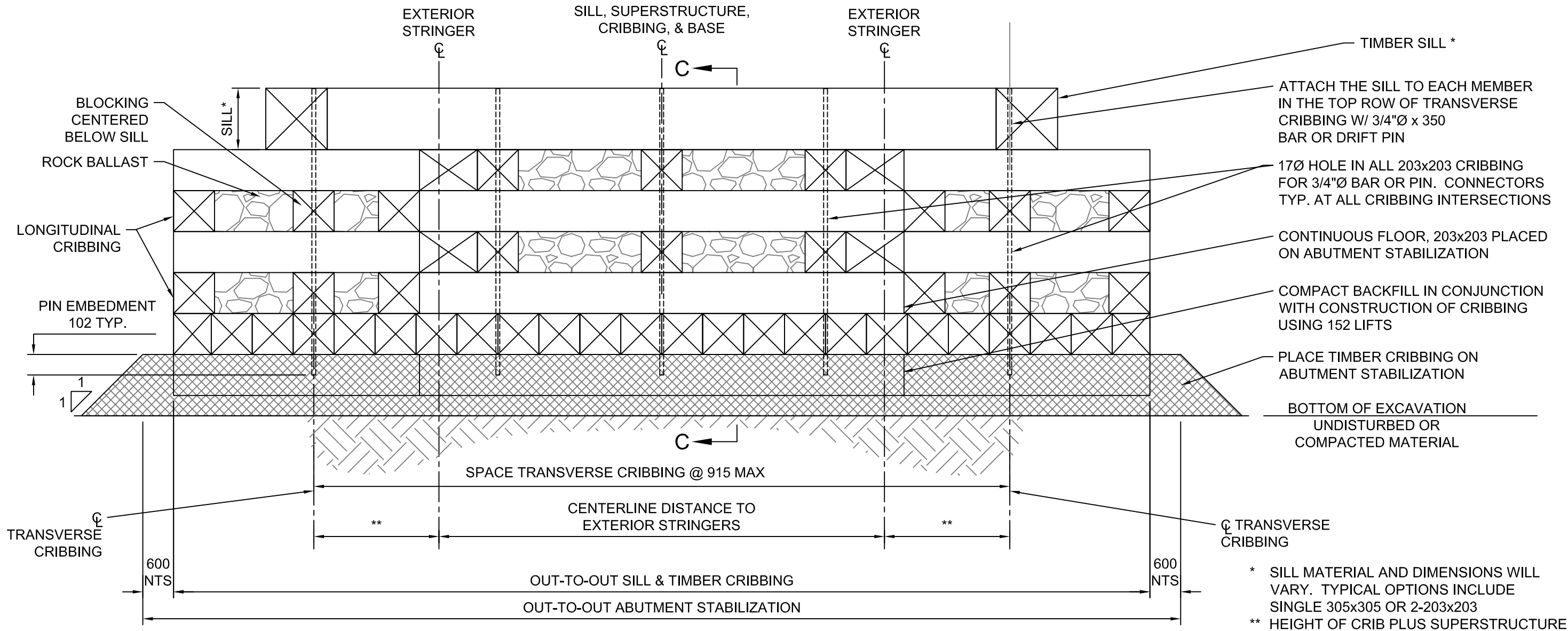
GRAVEL LEVELING PAD ON BEDROCK FOUNDATION
SCALE: 1:20

ANCHOR ROD DETAIL
SCALE: NTS

3	AUGUST 27, 2010	SAMPLE ONLY
REV	DATE	DESCRIPTION
TITLE		
TIMBER SILL ABUTMENT		
DRAWN BY	CHECKED BY	
JEM	GB	
DATE	SHEET	
JUNE, 2010	08	
SCALE		
AS SHOWN		

ABUTMENT DETAILS SHOWN FOR ILLUSTRATION ONLY. ABUTMENT DESIGN IS RESPONSIBILITY OF OTHERS.

- NOTES:**
1. CONSTRUCT CRIBBING WITH 203x203 ROUGH SAWN TREATED TIMBERS. FIELD DRILLED HOLES SHALL BE TREATED PER GENERAL NOTES.
 2. ABUTMENT STABILIZATION TO BE TYPE 1 GRAVEL
 3. ROCK BALLAST TO BE 100mm LARGER IN SIZE THEN OPENING IN CRIB OR CRIB TO BE CLOSE FACED.

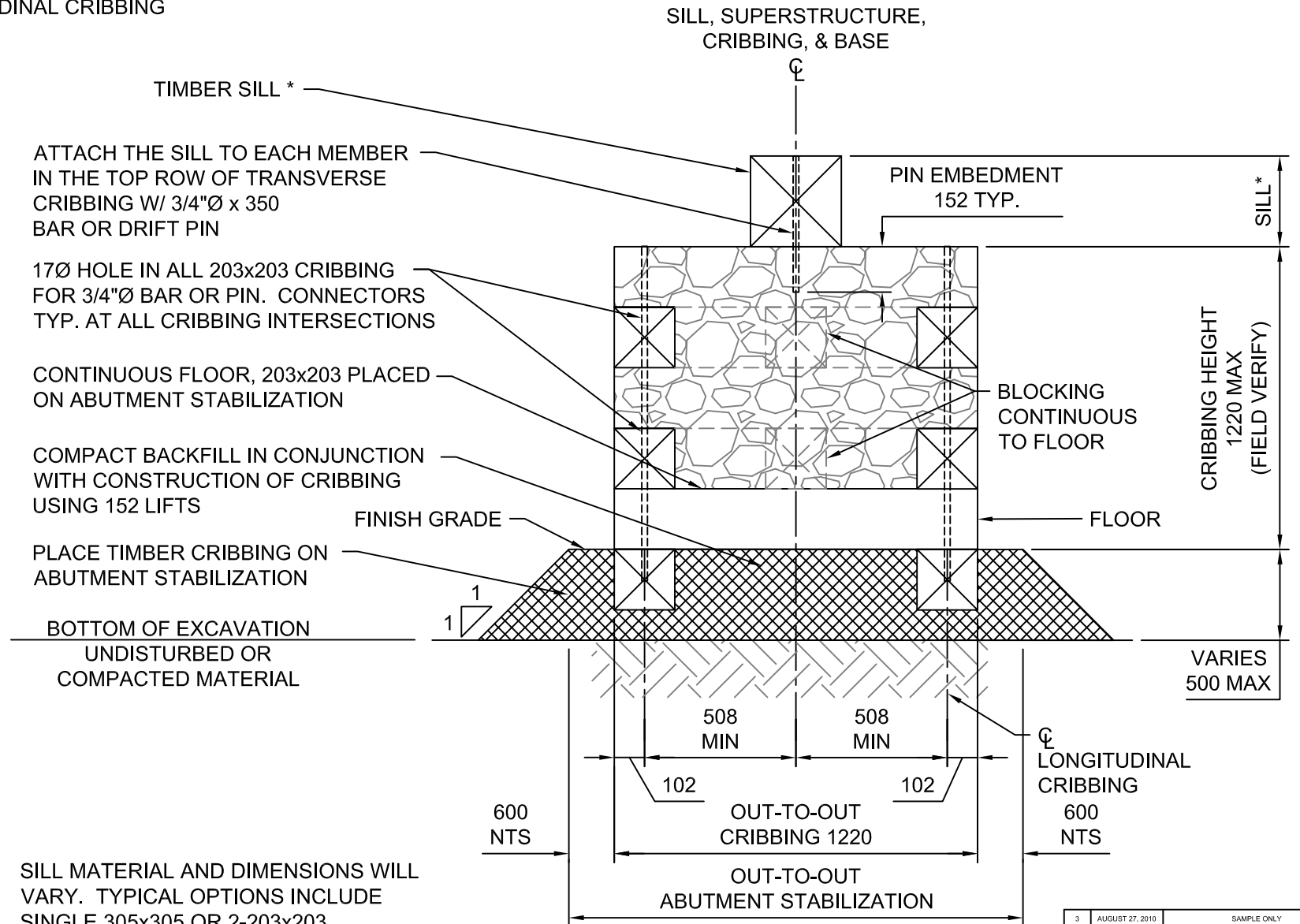
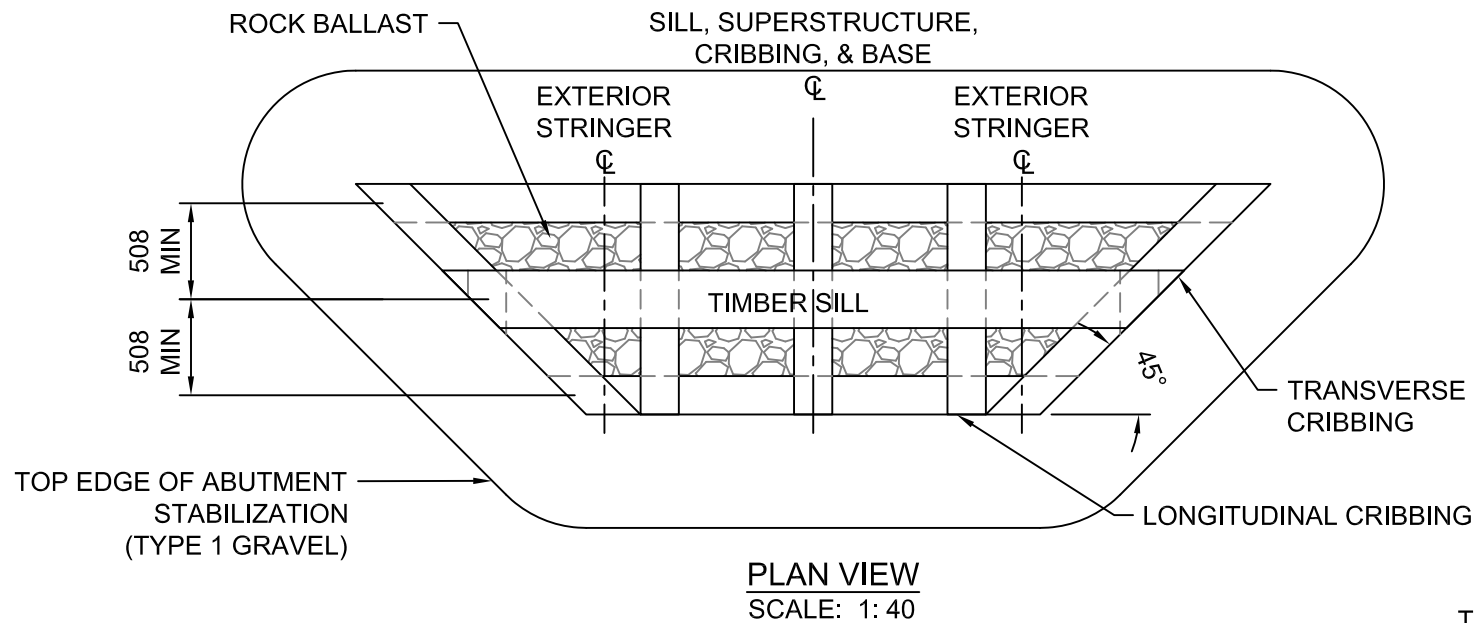


TIMBER CRIBBING ABUTMENT - ELEVATION
SCALE: 1:20

3	AUGUST 27, 2010	SAMPLE ONLY
REV	DATE	DESCRIPTION
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DRAWN BY JEM	CHECKED BY GB	
DATE JUNE, 2010	SHEET	09
SCALE AS SHOWN		

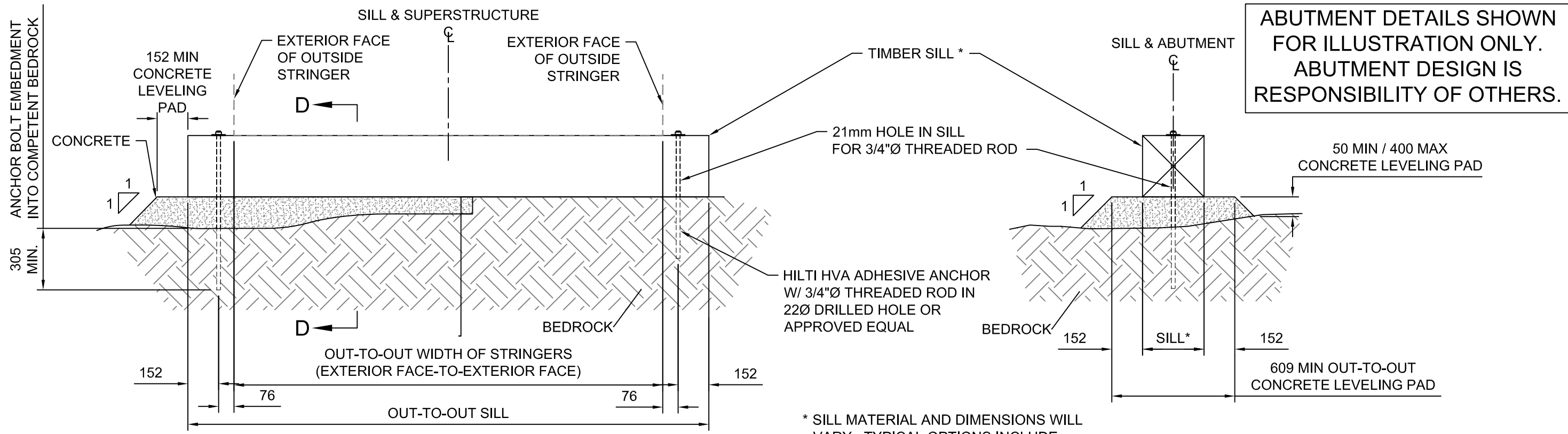
ABUTMENT DETAILS SHOWN FOR ILLUSTRATION ONLY. ABUTMENT DESIGN IS RESPONSIBILITY OF OTHERS.

- NOTES:**
1. CONSTRUCT CRIBBING WITH 203x203 ROUGH SAWN TREATED TIMBERS. FIELD DRILLED HOLES SHALL BE TREATED PER GENERAL NOTES.
 2. ABUTMENT STABILIZATION TO BE TYPE 1 GRAVEL
 3. ROCK BALLAST TO BE 100mm LARGER IN SIZE THEN OPENING IN CRIB OR CRIB TO BE CLOSE FACED.



* SILL MATERIAL AND DIMENSIONS WILL VARY. TYPICAL OPTIONS INCLUDE SINGLE 305x305 OR 2-203x203
 ** HEIGHT OF CRIB PLUS SUPERSTRUCTURE

3	AUGUST 27, 2010	SAMPLE ONLY
REV	DATE	DESCRIPTION
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DRAWN BY	JEM	CHECKED BY
		GB
DATE	JUNE, 2010	SHEET
SCALE	AS SHOWN	10



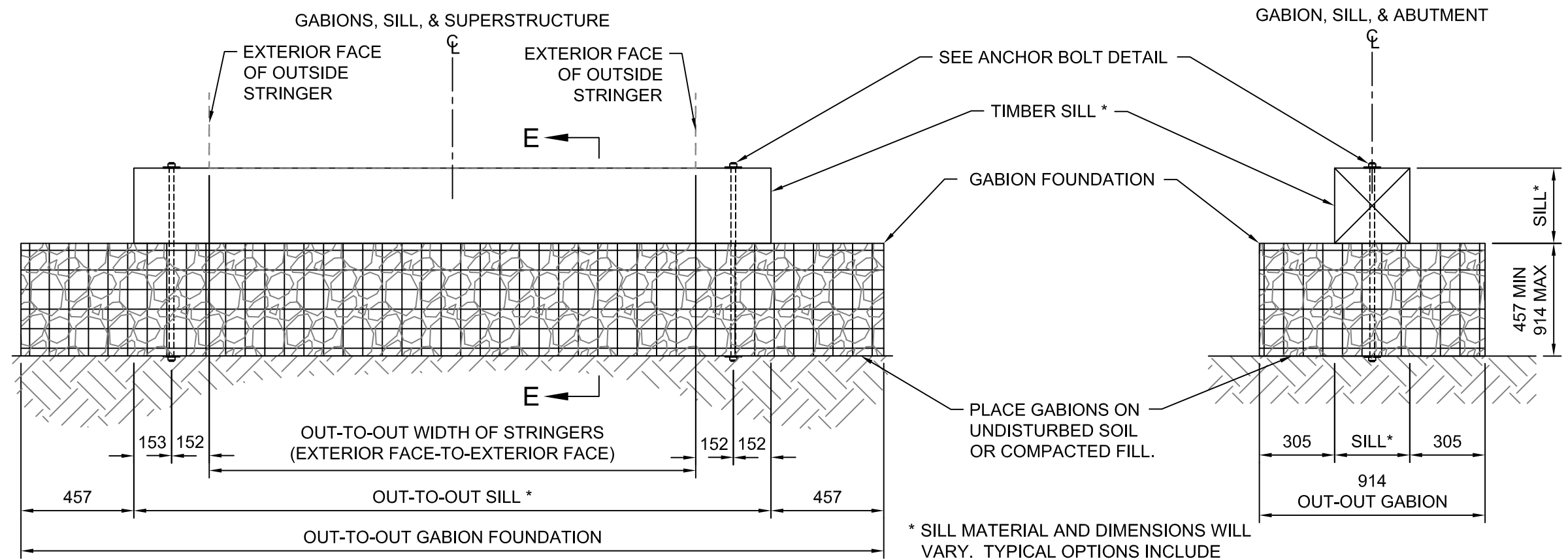
ABUTMENT DETAILS SHOWN FOR ILLUSTRATION ONLY. ABUTMENT DESIGN IS RESPONSIBILITY OF OTHERS.

REINFORCE WITH 15M @ 300 E/W FOR CONCRETE BETWEEN 250 AND 400 THICK. ENGINEER DESIGN REQUIRED OVER 400.

ELEVATION

SECTION D-D

CONCRETE LEVELING PAD ON BEDROCK FOUNDATION
SCALE: 1:20



ELEVATION

SECTION E-E

GABION FOUNDATION
SCALE: 1:20

3	AUGUST 27, 2010	SAMPLE ONLY
REV	DATE	DESCRIPTION
TITLE		
GABION ABUTMENT		
DRAWN BY	CHECKED BY	
JEM	GB	
DATE	SHEET	
JUNE, 2010	11	
SCALE		
AS SHOWN		

CONSTRUCTION NOTES

GENERAL:

DRAWINGS AND NOTES ARE TO BE READ IN CONJUNCTION WITH THE LATEST EDITION OF "CONSTRUCTION STANDARDS FOR TRAIL BRIDGES ON CROWN LAND" MANUAL, NOVA SCOTIA.

COMPLY WITH LOCAL BY-LAWS, CANADIAN CONSTRUCTION SAFETY CODE AND ALL REGULATIONS SET BY AUTHORITIES HAVING JURISDICTION. IN CASE OF CONFLICT OR DISCREPANCY, THE MORE STRINGENT REQUIREMENTS SHALL APPLY.

ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE NOVA SCOTIA OCCUPATIONAL HEALTH & SAFETY ACT AND REGULATIONS.

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE TO EXAMINE ALL DRAWINGS, CHECK ALL DIMENSIONS, ELEVATIONS AND CONDITIONS ON SITE AND COMPARE THESE DIMENSIONS AND CONDITIONS WITH THESE DRAWINGS AND REPORT ANY DISCREPANCIES OR CONFLICTS TO THE ENGINEER IN WRITING BEFORE PROCEEDING WITH ANY WORK.

PRIOR TO STARTING WORK ON SITE, THE CONTRACTOR SHALL ADVISE THE ENGINEER IN WRITING OF ANY ABNORMALITIES THAT HE HAS OBSERVED ON THE EXISTING SITE THAT ARE NOT INDICATED ON THE DRAWINGS. ALL OTHER ABNORMALITIES BROUGHT TO LIGHT AFTER THE START OF THE WORK SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE AND TO THE SATISFACTION OF THE ENGINEER.

DETAILS OF CONSTRUCTION NOT FULLY SHOWN SHALL BE OF SAME CHARACTER AS THOSE NOTED FOR SIMILAR CONDITIONS.

DRAWINGS ARE NOT TO BE SCALED.

FOUNDATIONS ARE THE RESPONSIBILITY OF OTHERS AND SHOWN FOR ILLUSTRATION ONLY.

STRUCTURAL STEEL SPECIFICATIONS:

GENERAL:

ALL MATERIALS, CONNECTION DESIGN, FABRICATION, ERECTION AND WORKMANSHIP SHALL BE NEW AND TO CAN/CSA S16.

DETAILS OF CONSTRUCTION NOT FULLY SHOWN SHALL BE OF SAME CHARACTER AS THOSE NOTED FOR SIMILAR CONDITIONS.

THE CONTRACTOR IS RESPONSIBLE FOR SEQUENCE OF ERECTION, TEMPORARY RIGGING, FALL PROTECTION AND ALL RELATED SAFETY PROCEDURES.

INSPECTION:

EXAMINE THE WORK OF OTHER TRADES UPON WHICH THE WORK OF THIS TRADE DEPENDS AND REPORT ANY DISCREPANCIES TO THE ENGINEER.

VERIFY THAT SURFACES AND CONDITIONS ARE READY TO ACCEPT THE WORK OF THIS SECTION.

BEGINNING OF INSTALLATION MEANS ACCEPTANCE OF EXISTING CONDITIONS.

QUALITY CONTROL AND QUALITY ASSURANCE:

THE CONTRACTOR IS TO PROVIDE WRITTEN DOCUMENTATION FROM THE CANADIAN WELDING BUREAU CERTIFYING THAT THE STEEL SUBCONTRACTOR IS QUALIFIED TO REQUIREMENTS OF CSA-W47.1, DIVISION 1 OR 2.1.

MATERIALS:

STRUCTURAL STEEL: TO CSA-G40.21 GRADE 350W, OR ASTM A572, GRADE 50 FOR BEAMS. TO CSA-G40.21, GRADE 300W FOR ANGLES, PLATES AND CHANNELS.

ANCHOR RODS: TO CSA-G40.21, GRADE 300W.

BOLTS, NUTS AND WASHERS: TO ASTM A325, TYPE 1.

WELDING MATERIALS: TO CSA-W59 AND CERTIFIED BY CANADIAN WELDING BUREAU.

FABRICATION:

FABRICATE STRUCTURAL STEEL, AS INDICATED, IN ACCORDANCE WITH CAN/CSA-S16 AND IN ACCORDANCE WITH REVIEWED SHOP DRAWINGS.

SPLICING OF MEMBERS WILL NOT BE PERMITTED.

ALL HOLES IN STRUCTURAL STEEL SHALL BE DRILLED.

STRUCTURAL STEEL SECTIONS SHALL BE PRECISION CUT.

NO CUTTING OR CREATION OF HOLES IN STRUCTURAL STEEL USING A TORCH IS PERMITTED.

STRUCTURAL STEEL SHOP DRAWINGS SHALL BE STAMPED BY A PROFESSIONAL ENGINEER REGISTERED TO PRACTICE IN THE PROVINCE OF NOVA SCOTIA, WHO WILL BE RESPONSIBLE FOR THE DESIGN OF CONNECTIONS.

ALL WELDING SHALL CONFORM TO THE REQUIREMENTS OF CSA W59 WELDED STEEL CONSTRUCTION WITH ALL SUBSEQUENT REVISIONS.

WELDING ELECTRODES SHALL CONFORM TO THE REQUIREMENTS OF CSA W48.1.

ALL WELDS SHALL BE IN ACCORDANCE WITH PROCEDURES APPROVED BY THE CWB.

GALVANIZING

HOT DIP GALVANIZE ALL COMPONENTS IN ACCORDANCE WITH CSA G164 AFTER FABRICATION AND PRIOR TO ASSEMBLY.

ALL STRUCTURAL STEEL COMPONENTS ARE TO EITHER BE HOT DIP GALVANIZED TO 600 G/M2 OR BE PAINTED WITH A THREE COAT SYSTEM TO INCLUDE ONE PRIME COAT AND TWO TOP COATS. IN LOCATIONS ALONG OR CLOSE TO THE COAST, THE COATING PROCESS WILL HAVE TO BE UPGRADED TO WITHSTAND THE HARSHER ENVIRONMENT.



FOR STRUCTURAL SIZES ONLY

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ERECTION:

ERECT STRUCTURAL STEEL AS INDICATED AND IN ACCORDANCE WITH CAN/CSA-S16, AND REVIEWED ERECTION DRAWINGS.

THE STEEL ERECTOR SHALL DESIGN AND PROVIDE TEMPORARY BRACING WHEREVER NECESSARY TO WITHSTAND ALL LOADS WHICH THE STRUCTURE MAY BE SUBJECT TO DURING CONSTRUCTION. TEMPORARY BRACING SHALL REMAIN IN PLACE UNTIL BRIDGE'S PERMANENT BRACING SYSTEM IS INSTALLED.

PRIOR TO ERECTION, THE STEEL CONTRACTOR SHALL REVIEW SITE CONDITIONS, DIMENSIONS, AND ELEVATIONS FOR FOUNDATION AND LOCATION OF ANCHOR RODS. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.

OBTAIN WRITTEN APPROVAL OF ENGINEER PRIOR TO FIELD CUTTING OR ALTERING OF STRUCTURAL MEMBERS.

THE ERECTABILITY OF THE STEEL IS THE CONTRACTOR'S RESPONSIBILITY, REGARDLESS OF THE ENGINEER-REVIEWED SHOP DRAWINGS.

TIMBER FRAMING NOTES

ALL COMPONENTS OF ALL TIMBER FRAMING SHALL BE NEW AND FABRICATED AND INSTALLED IN ACCORDANCE WITH CSA-086-01.

TIMBER FRAMING FOR STRINGERS, DECK AND WEARING SURFACE SHALL BE NO. 1 GRADE SPRUCE PINE FIR OR BETTER IN ACCORDANCE WITH CSA-086.

TIMBER FRAMING FOR RAILING SYSTEM SHALL BE NO. 1 GRADE SPRUCE PINE FIR OR BETTER IN ACCORDANCE WITH CSA-086.

ALL TIMBER EXCEPT WEARING SURFACE SHALL BE PRESERVATIVE TREATED IN ACCORDANCE WITH THE USE CATEGORIES SET OUT IN CSA-080.1, SPECIFICATION OF TREATED WOOD:

COMPONENT	EXPOSURE
STRINGERS	GROUND CONTACT
DECKING	ABOVE GROUND
RAIL SYSTEM	ABOVE GROUND SILL

FOUNDATION	GROUND CONTACT
CRIB FOUNDATION NO	
GROUNDWATER CONTACT	GROUND CONTACT
CRIB FOUNDATION	
FRESH WATER CONTACT	FRESHWATER
CRIB FOUNDATION	
BRACKISH OR SALT WATER	MARINE

TIMBER FOR WEARING SURFACE DOES NOT REQUIRE PRESERVATIVE TREATMENT.

PRE-DRILL ALL BOLT AND LAG BOLT HOLES PRIOR TO INSTALLING BOLTS.

BOREHOLES FOR MACHINE BOLTS TO BE SAME DIAMETER AS BOLTS.

BOREHOLES FOR LAG BOLTS TO BE SAME DIAMETER AS SHANK FOR UNTHREADED PORTION AND 0.70 TIMES THE SHANK DIAMETER FOR THE THREADED PORTION. THREADED PORTION OF LAG BOLTS WILL BE INSTALLED USING A WRENCH, NOT BY DRIVING.

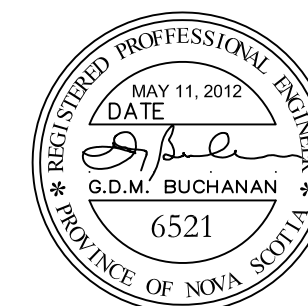
TIMBER WILL BE PROTECTED DURING HANDLING, SHIPPING, OFFLOADING AND FIELD HANDLING BY USE OF SUITABLE EQUIPMENT AND PROCEDURES. USE ROPE OR FABRIC STRAP SLINGS FOR MOVING BUNDLES OR INDIVIDUAL TIMBERS, RATHER THAN METAL GRABS, CHAINS OR CABLES.

TREAT IN FIELD SPIKE HOLES, BOREHOLES, PLUGGED HOLES, CUTS AND ANY DAMAGE TO TREATED MATERIAL USING AN APPROVED WATERBORNE PRESERVATIVE. FILL ALL UNUSED BORED HOLES AND ANY OTHER HOLES WITH TIGHT FITTING TREATED WOODEN PLUGS PRIOR TO ANY EXPOSURE TO WATER.

ENSURE NO SPILLAGE OR EXCESS APPLICATION OF FIELD PRESERVATIVE. WORKERS TO HAVE SUFFICIENT TRAINING AND PROTECTIVE GEAR TO PROPERLY AND SAFELY HANDLE THE TREATED MATERIALS AND TO APPLY FIELD TREATMENT SO AS TO PREVENT UNDUE HAZARD TO THEMSELVES, OTHERS OR THE ENVIRONMENT.

ALL HARDWARE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

- MACHINE BOLTS, LAG BOLTS, NUTS AND ROUND PLATE WASHERS TO ASTM A307.
- SPIKES TO CSA B111.
- ALL HARDWARE WILL BE GALVANIZED.
- HOT DIP GALVANIZED HARDWARE, BOLTS, NUTS, WASHERS AND SPIKES TO CSA G164,
- MINIMUM COATING OF 600 G/M2.



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