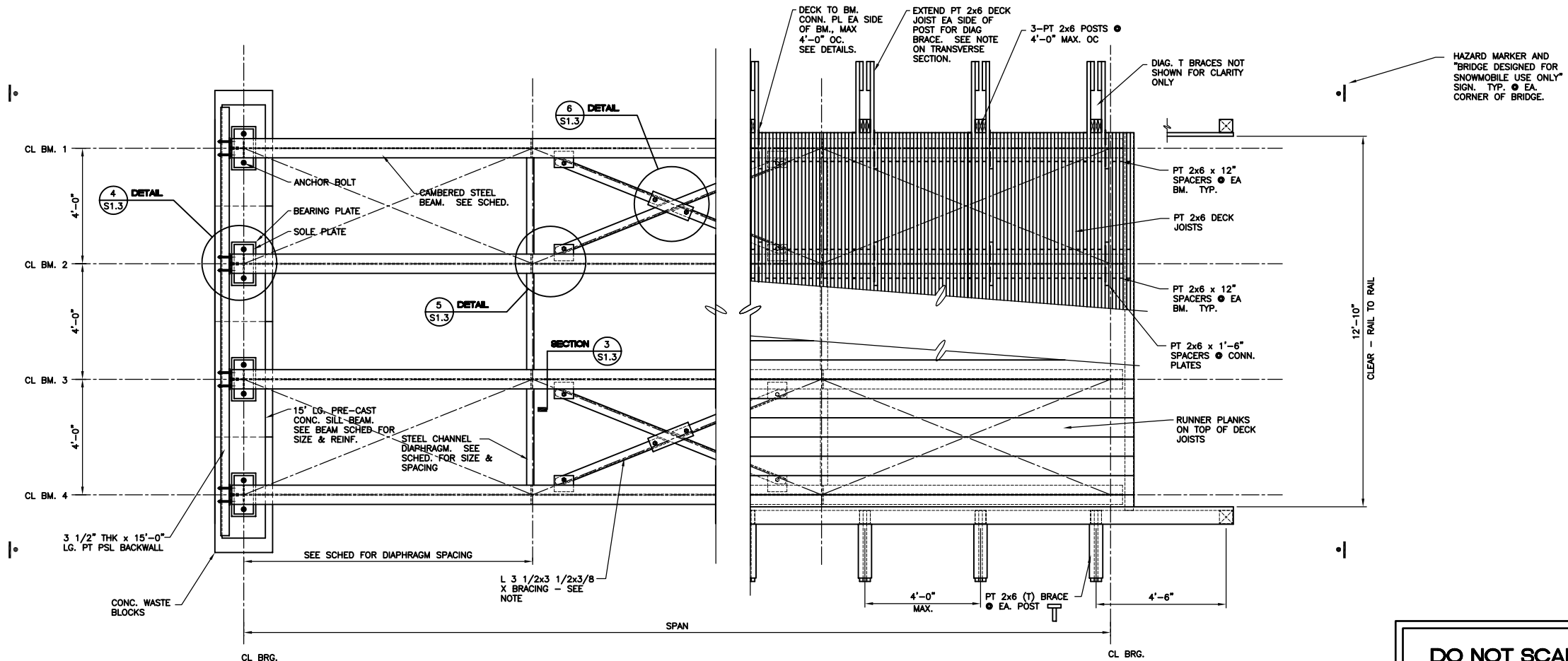






Stewart Structural Engineering, PLLC 9/27/2005 9:05 AM S1.2 & S1.3 STEEL PLANS.dwg



**TYP. PLAN  
STEEL BEAM BRIDGE**  
SCALE: 1/2" = 1'-0"

**X BRACING NOTE**  
X BRACING SHOWN THIS BAY FOR CLARITY ONLY. X BRACING SHALL BE LOCATED BETW EVERY PAIR OF ADJACENT DIAPHRAGMS BETW. BMS 1 & 2 AND BETW BMS 3 & 4.

**DO NOT SCALE  
THIS REDUCED  
SIZE PLAN**

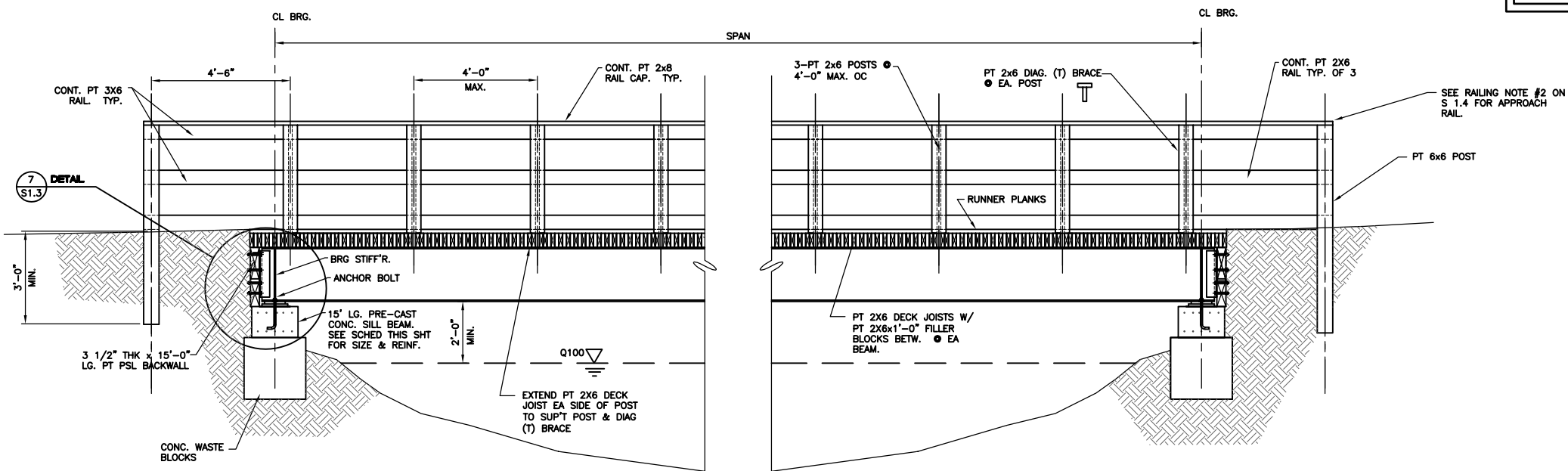
NO.	DATE	REVISION

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VERMONT ASSOCIATION OF  
SNOW TRAVELERS, INC.  
STANDARD SNOWMOBILE BRIDGE PLANS & DETAILS  
STEEL BEAM BRIDGE  
TYPICAL PLAN & ELEVATION

DATE 09/26/05	PROJ. NO. 242004
ENG. BY BDS	DRWN. BY BDS
CHKD. BY BDS	DRWG. NO 242004-S1.2

S 1.2



**TYP. ELEVATION  
STEEL BEAM BRIDGE**  
SCALE: 1/2" = 1'-0"



BEAM, CAMBER, and DIAPHRAGM SCHEDULE				
SPAN C/C BRGS.	DIAPHRAGM SPACING	BEAM SECTION	BEAM CAMBER INCHES	DIAPHRAGM
10'	10'	5 1/4" x 11 7/8" PT PSL		3 1/2" x 11 7/8" PT PSL
		5 1/8"x12 3/8" PT GLU-LAM	1.0	3 1/2" x 11 7/8" PT PSL
		W 16x26	0.1	C 12x20.7
		W 14x22	0.1	C 12x20.7
		W 12x19	0.1	C 10x15.3
		W 10x19	0.2	C 8x11.5
20'	10'	5 1/4" x 18" PT PSL		3 1/2" x 14" PT PSL
		5 1/8"x17 7/8" PT GLU-LAM	1.4	3 1/2" x 14" PT PSL
		W 18x35	0.3	C 12x20.7
		W 16x26	0.5	C 12x20.7
		W 14x30	0.5	C 12x20.7
		W 12x26	0.7	C 10x15.3
30'	10'	6 3/4"x22" PT GLU-LAM	2.0	5 1/4" x 18" PT PSL
		W 21x44	0.8	C 15x33.9
		W 18x40	1.0	C 12x20.7
		W 16x36	1.3	C 12x20.7
		W 14x38	1.6	C 10x15.3
		W 12x40	2.0	C 10x15.3
40'	10'	8 1/2"x26 1/8" PT GLU-LAM	3.0	5 1/4" x 18" PT PSL
		W 24x55	1.3	C 15x33.9
		W 21x50	1.7	C 15x33.9
		W 18x50	2.1	C 12x20.7
		W 16x50	2.6	C 12x20.7
		W 14x53	2.7	C 10x15.3
	13'-4"	8 1/2"x26 1/8" PT GLU-LAM	3.0	5 1/4" x 18" PT PSL
		W 24x62	1.1	C 15x33.9
		W 21x62	1.3	C 15x33.9
		W 18x55	1.9	C 12x20.7
		W 16x67	1.8	C 12x20.7
		W 14x61	2.7	C 10x15.3
50'	12'-6"	W 27x84	1.4	MC 18x42.7
		W 24x68	2.1	C 15x33.9
		W 21x68	2.6	C 15x33.9
		W 18x71	3.3	C 12x20.7
		W 16x67	4.0	C 12x20.7
		W 14x74	4.8	C 10x15.3
	16'-8"	W 27x84	1.4	MC 18x42.7
		W 24x68	2.1	C 15x33.9
		W 21x63	2.1	C 15x33.9
		W 18x76	2.9	C 12x20.7
		W 16x77	3.5	C 12x20.7
		W 14x74	4.8	C 10x15.3
60'	15'	W 30x90	2.1	MC 18x42.7
		W 27x84	2.7	MC 18x42.7
		W 24x84	3.2	C 15x33.9
		W 21x93	3.7	C 15x33.9
		W 18x86	5.0	C 12x20.7
		W 16x89	5.8	C 12x20.7
	20'	W 30x90	2.1	MC 18x42.7
		W 27x94	2.4	MC 18x42.7
		W 24x104	2.5	C 15x33.9
		W 21x101	3.2	C 15x33.9
		W 18x97	4.4	C 12x20.7
		W 16x100	5.2	C 12x20.7
70'	14'	W 30x90	3.7	MC 18x42.7
		W 27x94	4.1	MC 18x42.7
		W 24x104	4.4	C 15x33.9
		W 21x101	5.6	C 15x33.9
		W 18x106	7.2	C 12x20.7
		W 30x99	3.4	MC 18x42.7
	17'-6"	W 27x102	3.8	MC 18x42.7
		W 24x104	4.4	C 15x33.9
		W 21x101	5.6	C 15x33.9
		W 18x106	7.2	C 12x20.7
		W 33x118	3.9	MC 18x42.7
		W 30x116	4.6	MC 18x42.7
80'	16'	W 27x114	5.6	MC 18x42.7
		W 24x117	6.4	C 15x33.9
		W 21x122	7.8	C 15x33.9
		W 33x118	3.9	MC 18x42.7
		W 30x132	4.0	MC 18x42.7
		W 27x146	4.2	MC 18x42.7
	20'	W 24x117	6.4	C 15x33.9
		W 21x122	7.8	C 15x33.9

BEAM, CAMBER, and DIAPHRAGM SCHEDULE (CONT.)				
SPAN C/C BRGS.	DIAPHRAGM SPACING	BEAM SECTION	BEAM CAMBER INCHES	DIAPHRAGM
90'	15'	W 33x118	6.0	MC 18x42.7
		W 30x124	6.7	MC 18x42.7
		W 27x146	6.6	MC 18x42.7
		W 24x146	8.0	C 15x33.9
		W 21x147	10.2	C 15x33.9
		W 33x130	5.4	MC 18x42.7
	18'	W 30x148	5.5	MC 18x42.7
		W 27x146	6.6	MC 18x42.7
		W 24x146	8.1	C 15x33.9
		W 21x166	8.8	C 15x33.9
		W 36x135	7.0	MC 18x42.7
		W 33x141	7.3	MC 18x42.7
100'	16'-8"	W 30x173	6.9	MC 18x42.7
		W 27x146	9.7	MC 18x42.7
		W 24x146	12.0	C 15x33.9
		W 36x150	6.1	MC 18x42.7
		W 33x152	6.8	MC 18x42.7
		W 30x173	6.9	MC 18x42.7
	20'	W 27x161	8.9	MC 18x42.7
		W 24x162	10.8	C 15x33.9

**GENERAL NOTES AND SPECIFICATIONS**

**GENERAL**

- SPANS SHOWN ARE BASED ON 10' INCREMENTS. FOR SPANS BETWEEN THOSE SHOWN, USE NEXT LARGER SPAN.
- DIAPHRAGM SPACINGS SHOWN ARE EVENLY DIVISIBLE INTO SPAN LENGTHS SHOWN. DIAPHRAGMS MAY BE SPACED CLOSER THAN SHOWN FOR A GIVEN BEAM SIZE, BUT NOT FARTHER APART.

**LOADS**

- DECK SNOW LOAD - 100 PSF
- DECK LIVE LOAD - 20,000 LB TRAIL GROOMER ON TWO 2'-0" X 8'-0" TRACKS + 5000 LB DRAG. BRIDGES HAVE NOT BEEN DESIGNED FOR ANY OTHER TYPE OF VEHICLE TRAFFIC.
- POSTS & RAILS - POSTS & RAILS ARE DESIGNED FOR PEDESTRIAN LOADINGS ONLY, PER BUILDING CODE. RAIL IS NOT A GUARD FOR VEHICLE TRAFFIC.

**RAILINGS**

- BRIDGE AND APPROACH RAILS ARE INTENDED TO FUNCTION PRIMARILY AS A PEDESTRIAN HAND RAIL AND TRAFFIC CONTROL GUIDE. BRIDGE AND APPROACH RAILS HAVE BEEN DESIGNED TO ACCOMMODATE FORCES TYPICAL OF A PEDESTRIAN HAND RAIL AND ARE NOT INTENDED OR DESIGNED TO WITHSTAND DIRECT OR ANGULAR IMPACT BY EITHER GROOMING EQUIPMENT OR SNOWMOBILES.
- APPROACH RAIL IS SHOWN EXTENDING ONE POST BEYOND END OF BRIDGE FOR BREVITY OF PRESENTATION ONLY. APPROACH RAIL SHOULD BE EXTENDED AS FAR BEYOND BRIDGE AS NECESSITATED BY SITE CONDITIONS, TO INSURE THAT APPROACHING AND EXITING TRAFFIC IS GUIDED SAFELY ON TO AND OFF OF THE BRIDGE. APPROACH RAILS SHOULD TERMINATE BY FLARING AWAY FROM THE TRAIL AND/OR BY TAPERING DOWNWARDS TOWARDS THE GROUND SURFACE, TO MINIMIZE IMPACT AND SNAG HAZARD TO APPROACHING TRAFFIC.

**WOOD**

- ALL STRUCTURAL LUMBER SHALL CONFORM TO THE LATEST EDITION OF THE N.F.O.P.A. "NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION" AND ITS SUPPLEMENTS.
- ALL SOLID SAWN LUMBER FOR DECKING, RAILS, POSTS, CURBS, AND NAILERS SHALL BE PRESSURE TREATED (PT) #2 SOUTHERN PINE (OR BETTER) UNLESS OTHERWISE NOTED.
- ALL PARALLAM, PARALLEL STRAND LUMBER (PSL) FOR BEAMS, DIAPHRAGMS, BACKWALLS, AND BED BEAMS SHALL BE PRESSURE TREATED (PT) RATED FOR GROUND CONTACT, RATED FOR SERVICE LEVEL 3 EXPOSURE, AND HAVE A MINIMUM ALLOWABLE BENDING STRESS, F<sub>b</sub>, OF 1915 PSI (SINGLE USE, NORMAL DURATION), A MINIMUM ALLOWABLE HORIZONTAL SHEAR STRESS, F<sub>v</sub>, OF 160 PSI, AND A MINIMUM MODULUS OF ELASTICITY, E, OF 1,640,000 PSI UNLESS OTHERWISE NOTED.
- ALL GLUE LAMINATED LUMBER (GLULAM) BEAMS, DIAPHRAGMS, BACKWALLS, AND BED BEAMS SHALL BE PRESSURE TREATED (PT) SOUTHERN PINE, PT BEFORE FABRICATION (LAMINATION), RATED FOR GROUND CONTACT, RATED FOR WET SERVICE EXPOSURE, AND HAVE A MINIMUM ALLOWABLE BENDING STRESS, F<sub>b</sub>, OF 2400 PSI (SINGLE USE, NORMAL DURATION), A MINIMUM ALLOWABLE HORIZONTAL SHEAR STRESS, F<sub>v</sub>, OF 160 PSI, AND A MINIMUM MODULUS OF ELASTICITY, E, OF 1,700,000 PSI UNLESS OTHERWISE NOTED.
- NO WOODEN BEAMS OR OTHER MEMBERS SHALL BE CUT, NOTCHED, OR BORED OTHER THAN FOR BOLTING AS SHOWN ON THESE DRAWINGS.
- ALL SIZES, EXCEPT GLUE LAMINATED LUMBER SIZES, ARE NOMINAL DIMENSIONS UNLESS OTHERWISE NOTED.
- ALL LUMBER SHALL BE PRESSURE TREATED PER APPLICABLE AMERICAN WOOD PRESERVERS' ASSOCIATION (AWPA) STANDARDS, AND RATED FOR GROUND CONTACT. THE SPECIFIC PRESERVATIVE RETENTION LEVEL REQUIRED TO ACHIEVE GROUND CONTACT RATING SHALL BE PER AWPA FOR THE TYPE OF PRESERVATIVE USED.

**CONCRETE**

- CONCRETE FOR SILL BEAMS SHALL BE NORMAL WEIGHT, APPROVED, READY-MIXED CONCRETE HAVING AN ULTIMATE COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS. MAXIMUM WATER CEMENT RATIO SHALL BE 0.50 BY WEIGHT. SLUMP SHALL BE 2-4 INCHES. CONCRETE SHALL BE AIR ENTRAINED WITH 4-6% AIR BY VOLUME.
- TYPICAL REINFORCING SHALL BE DEFORMED BILLET STEEL BARS CONFORMING TO ASTM A615, GRADE 60.
- LAP ALL REINFORCING MINIMUM 40 BAR DIAMETERS.

**ABBREVIATIONS**

AB	ANCHOR BOLT
BETW	BETWEEN
BM	BEAM
B OR BOT	BOTTOM
BP OR BRG PL	BEARING PLATE
BRG	BEARING
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
CTRD	CENTERED
DIM	DIMENSION
DWGS	DRAWINGS
DWLS	DOWELS
EA	EACH
HDG	HOT DIPPED GALVANIZED
MAX	MAXIMUM
MIN	MINIMUM
OC	ON CENTER
PL	PLATE
PSF	POUNDS PER SQUARE FOOT
PC	PRE CAST
PT	PRESSURE TREATED
REINF	REINFORCING
REQ'D	REQUIRED
SECT	SECTION
SHT	SHEET
SIM	SIMILAR
STD	STANDARD
STL	STEEL
STRUCT	STRUCTURE OR STRUCTURAL
T & B	TOP & BOTTOM
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VIF	VERIFY IN FIELD
VERT	VERTICAL
W/	WITH

**STEEL**

- ALL STRUCTURAL STEEL WORK SHALL CONFORM TO "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS - ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN" - AISC, "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES" - AISC, AND "STRUCTURAL WELDING CODE-STEEL" - AWS D1.1.
- STRUCTURAL STEEL SHALL BE FABRICATED BY A SHOP WHICH IS AISC CERTIFIED, A MEMBER OF AISC, OR A MEMBER OF SSFNE (STRUCTURAL STEEL FABRICATORS OF NEW ENGLAND). THIS REQUIREMENT IS INTENDED TO ESTABLISH A LEVEL OF QUALITY FOR BOTH SHOP DRAWINGS AND STRUCTURAL STEEL. SHOPS NOT MEETING THE ABOVE REQUIREMENTS MAY BE CONSIDERED, AFTER SUBMITTAL OF SATISFACTORY EVIDENCE THAT THEY CAN MEET THE SAME LEVEL OF QUALITY IN PRODUCTION OF BOTH SHOP DRAWINGS AND FABRICATED STRUCTURAL STEEL. REFERENCES AND EXAMPLES OF RECENT PROJECTS SHALL BE SUBMITTED TO THE ENGINEER FOR CONSIDERATION.
- STRUCTURAL STEEL ANGLES, CHANNELS, AND PLATES SHALL CONFORM TO ASTM A36. STRUCTURAL STEEL W SHAPES SHALL CONFORM TO ASTM A572 GRADE 50 OR ASTM A992 GRADE 50.
- ANCHOR BOLTS, WOOD TO WOOD CONNECTION BOLTS, WOOD TO STEEL CONNECTION BOLTS, AND STEEL TO STEEL CONNECTION BOLTS SHALL CONFORM TO ASTM A307.
- WELDING ELECTRODES SHALL BE E70XX SERIES.
- ALL STEEL SURFACES NOT ENCASED IN CONCRETE OR SCHEDULED FOR FIELD WELDING SHALL BE SHOP PAINTED WITH AN APPROVED PRIMER OF MIN. 2 MILS DRY THICKNESS. WIRE BRUSH CLEAN ALL FIELD WELDED, SCARRED, OR OTHERWISE DAMAGED AREAS AND TOUCH UP PAINT WITH PRIMER SAME AS SHOP APPLIED. FINISH PAINT PER OWNER.
- SHOP FABRICATE ALL MEMBERS AND CONNECTIONS TO MAXIMUM EXTENT POSSIBLE USING WELDING OR BOLTING. USE BOLTED FIELD CONNECTIONS UNLESS SPECIFICALLY NOTED OTHERWISE. ALL WELDING SHALL BE PERFORMED BY AN AWS CERTIFIED WELDER, CERTIFIED FOR THE TYPE AND POSITION OF WELDS TO BE PERFORMED. SUBMIT COPY OF WELDER'S CERTIFICATION FOR ALL PERSONS PERFORMING FIELD WELDS.

**CAMBER**

- CAMBER IS THE UPWARD CURVATURE OR ARCHING OF A BEAM. CAMBER MUST BE CREATED IN THE FABRICATION PROCESS OF THE BEAM.
- POSITIVE BEAM CAMBER SHOWN IN BEAM SCHEDULE IS INTENDED TO OFFSET THE EXPECTED BRIDGE DEFLECTION (SAG) DUE TO SNOW LOAD PLUS THE GROOMING EQUIPMENT. CAMBER IS NOT NECESSARY STRUCTURALLY, AND ADDS NO STRENGTH TO THE BRIDGE. CAMBER IS RECOMMENDED FOR SPANS EXCEEDING 40', TO AVOID A SAGGING APPEARANCE.

**HARDWARE**

- ALL STEEL CONNECTORS (PLATES, ANGLES, ETC), BOLTS, NAILS, FASTENERS, AND HARDWARE SHALL BE HOT DIP GALVANIZED (HDG) FINISH WITH G90 COATING IN ACCORDANCE WITH ASTM A-123 OR A-153 AS APPLICABLE, AFTER FABRICATION. ALL STEEL SHAPES AND FABRICATIONS SHALL BE COMMERCIAL BLAST CLEANED AFTER FABRICATION AND PRIOR TO GALVANIZING. ALL CUTTING, WELDING, DRILLING, TRIMMING, REAMING, AND HOLES SHALL BE MADE PRIOR TO THE HDG PROCESS. REPAIR ANY AREAS DAMAGED DURING DELIVERY OR FIT UP IN ACCORDANCE WITH ASTM A-780.
- TYPE 304 OR 316 STAINLESS STEEL FASTENERS MAY BE USED FOR WOOD TO WOOD OR WOOD TO STEEL FASTENING IN LIEU OF HDG FASTENERS WHERE FASTENERS ARE NOT IN CONTACT WITH HDG STEEL OR OTHER HDG HARDWARE.
- WHERE NAILS ARE SPECIFIED, SIZES ARE COMMON WIRE NAIL DIAMETER UNLESS NOTED OTHERWISE.

<p><b>STEWART</b> STRUCTURAL ENGINEERING, PLLC 1485 Garland Hill Barnet, VT 05821 Tel: 802 633 3300 Fax: 802 633 4040</p>	<p>VERMONT ASSOCIATION OF SNOW TRAVELERS, INC. STANDARD SNOWMOBILE BRIDGE PLANS &amp; DETAILS BEAM &amp; DIAPHRAGM SCHEDULE</p>												
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>DATE</td><td>09/26/05</td><td>PROJ. NO.</td><td>242004</td></tr> <tr><td>ENG. BY</td><td>BDS</td><td>DRWN. BY</td><td>BDS</td></tr> <tr><td>CHKD. BY</td><td>BDS</td><td>DRWG. NO.</td><td>242004-S1.4</td></tr> </table>	DATE	09/26/05	PROJ. NO.	242004	ENG. BY	BDS	DRWN. BY	BDS	CHKD. BY	BDS	DRWG. NO.	242004-S1.4	<p style="font-size: 2em; font-weight: bold;">S 1.4</p>
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