

**ANCHORAGE DETAILS**

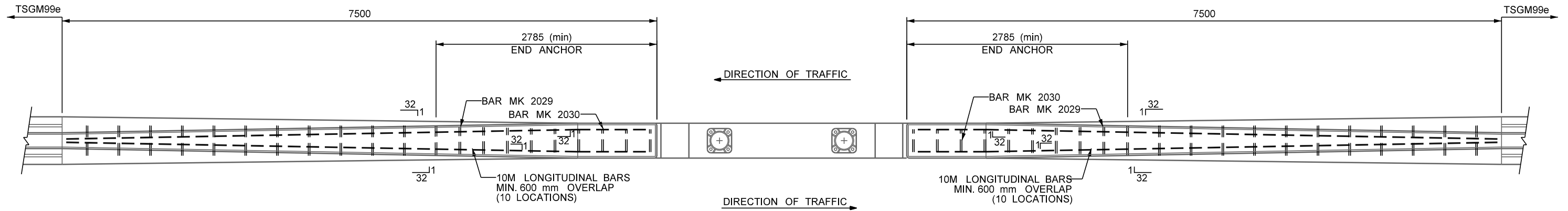
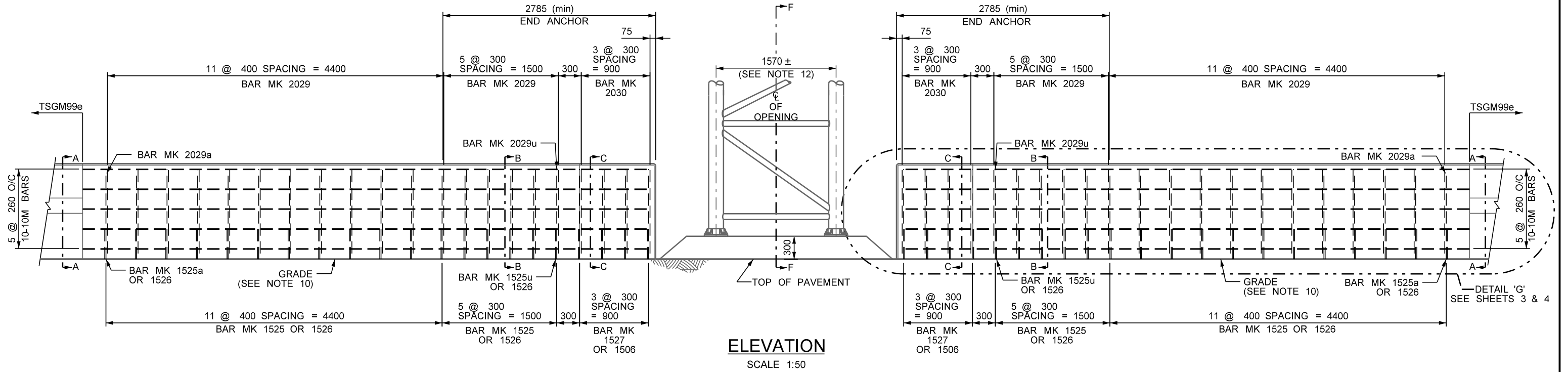
- NOTES:**
1. ALL SCALES ARE APPROXIMATE.
  2. LONGITUDINAL REINFORCING NOT SHOWN FOR CLARITY.
  3. FORMED OR CUT CONTRACTION JOINTS SHALL BE CREATED AT EACH PLACE WHERE THE BARRIER SHAPE CHANGES, TO MATCH ADJACENT PAVEMENT JOINT SPACING, OR AT A MAXIMUM 6000 mm.
  4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.
  5. THE ORIGINAL SEALED AND SIGNED DRAWING IS IN TRAFFIC ENGINEERING.
  6. ALL REINFORCING SHALL HAVE MINIMUM 75 mm COVER, UNLESS OTHERWISE NOTED.
  7. CONCRETE: CSA A23.1, EXPOSURE CLASS C-1, AIR CONTENT CATEGORY 1, COMPRESSIVE STRENGTH: BARRIER ≥ 45 MPa AND FOOTING ≥ 35 MPa @ 28 DAYS.
  8. SEE SHEETS 8 & 9 FOR REINFORCING DETAILS.
  9. TRANSVERSE REINFORCING NOT SHOWN FOR CLARITY.
  10. SEE SHEET 7 FOR BELOW GRADE DESIGN OPTIONS.
  11. GUARDRAIL TO BE OVERLAPPED FOR DIRECTION OF TRAFFIC.
  12. DIMENSIONS SHOWN ARE FOR ILLUSTRATIVE PURPOSES. THE FINAL DIMENSIONS SHALL BE DETERMINED IN THE FIELD AS CENTERED ON THE OVERHEAD SIGN STRUCTURE OPENING.

REVISIONS		
DATE	DESCRIPTION	BY



**MANITOBA CONSTRAINED WIDTH CONSTANT SLOPE BARRIER - MEDIUM NESTED THRIE BEAM AT OVERHEAD SIGN STRUCTURE OPENING**

SHEET NO: 1 OF 9	DATE: 2020 - 08
DESIGNED BY: H. LARSEN	
DRAWN BY: L. LIEBRECHT	
REVIEWED BY: N. JOYAL	
<b>TSTM93e</b>	



**ANCHORAGE DETAILS**

**NOTES:**

1. ALL SCALES ARE APPROXIMATE.
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7. CONCRETE: CSA A23.1, EXPOSURE CLASS C-1, AIR CONTENT CATEGORY 1, COMPRESSIVE STRENGTH: BARRIER ≥ 45 MPa AND FOOTING ≥ 35 MPa @ 28 DAYS.
8. SEE SHEETS 8 & 9 FOR REINFORCING DETAILS.
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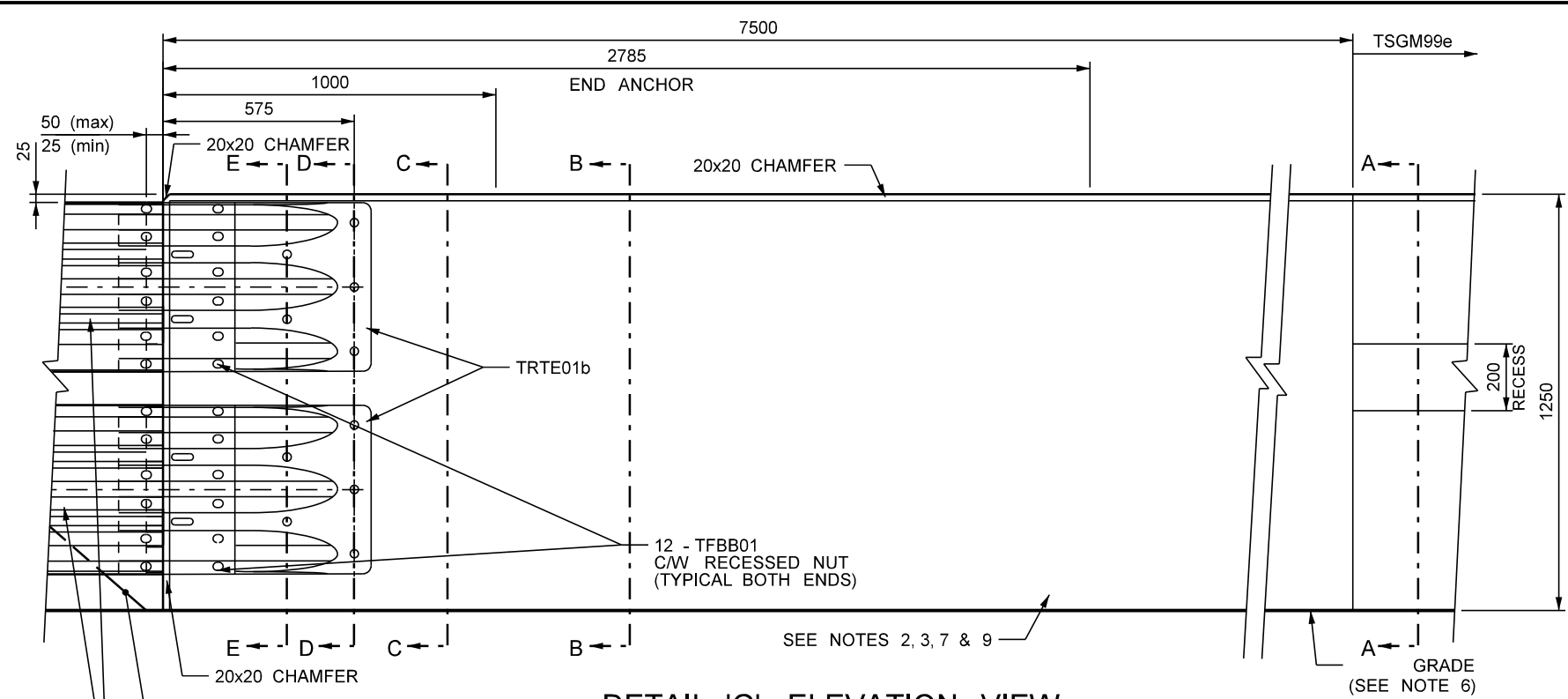
REVISIONS		
DATE	DESCRIPTION	BY



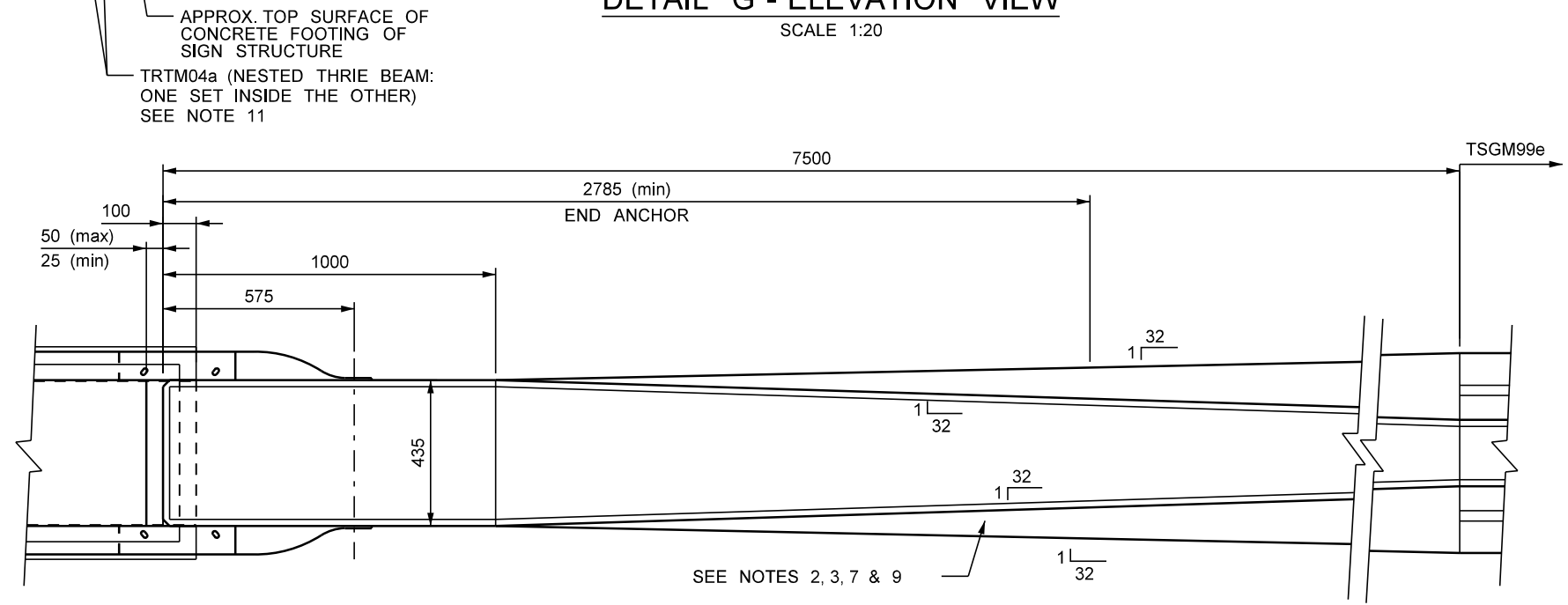
**MANITOBA CONSTRAINED  
WIDTH CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM AT  
OVERHEAD SIGN  
STRUCTURE OPENING**

SHEET NO: 2 OF 9	DATE: 2020 - 08
DESIGNED BY:	H. LARSEN
DRAWN BY:	L. LIEBRECHT
REVIEWED BY:	N. JOYAL

**TSTM93e**



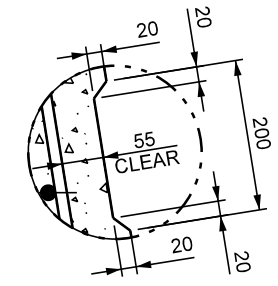
**DETAIL 'G' - ELEVATION VIEW**  
SCALE 1:20



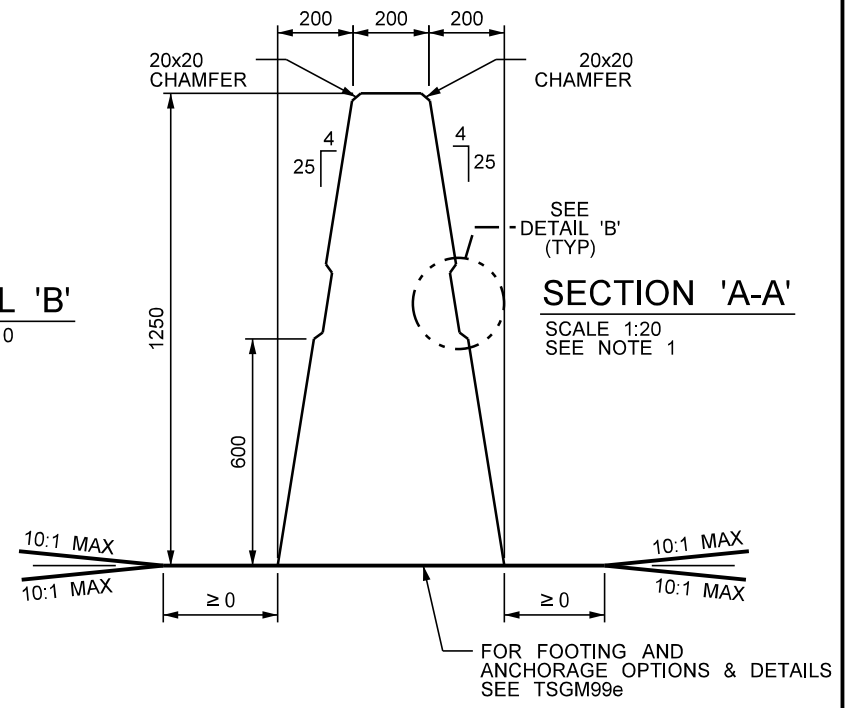
**DETAIL 'G' - PLAN VIEW**  
SCALE 1:20

**NOTES:**

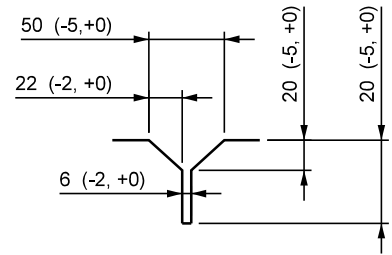
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7. CONCRETE: CSA A23.1, EXPOSURE CLASS C-1, AIR CONTENT CATEGORY 1, COMPRESSIVE STRENGTH: BARRIER ≥ 45 MPa AND FOOTING ≥ 35 MPa @ 28 DAYS.
8. SEE SHEETS 8 & 9 FOR REINFORCING DETAILS.
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10. SEE SHEET 7 FOR BELOW GRADE DESIGN OPTIONS.
11. GUARDRAIL TO BE OVERLAPPED FOR DIRECTION OF TRAFFIC.



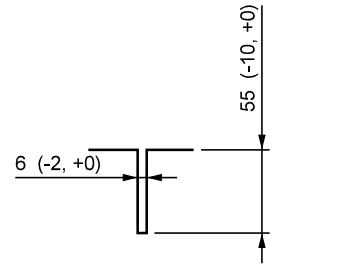
**DETAIL 'B'**  
SCALE 1:10



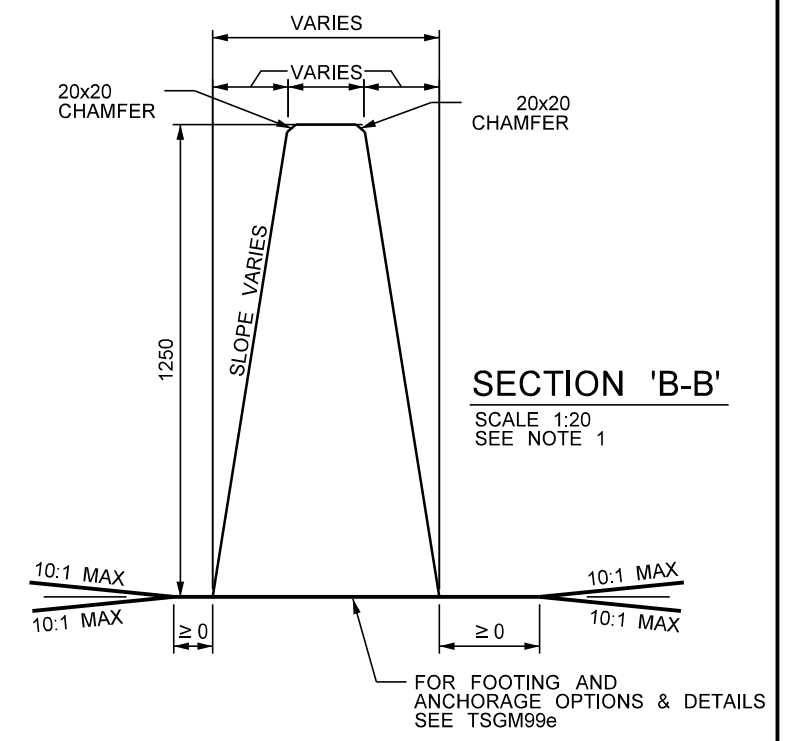
**SECTION 'A-A'**  
SCALE 1:20  
SEE NOTE 1



**HAND FORMED BARRIER**  
SCALE 1:10



**SLIP FORMED BARRIER (SAW CUT)**  
SCALE 1:10



**SECTION 'B-B'**  
SCALE 1:20  
SEE NOTE 1

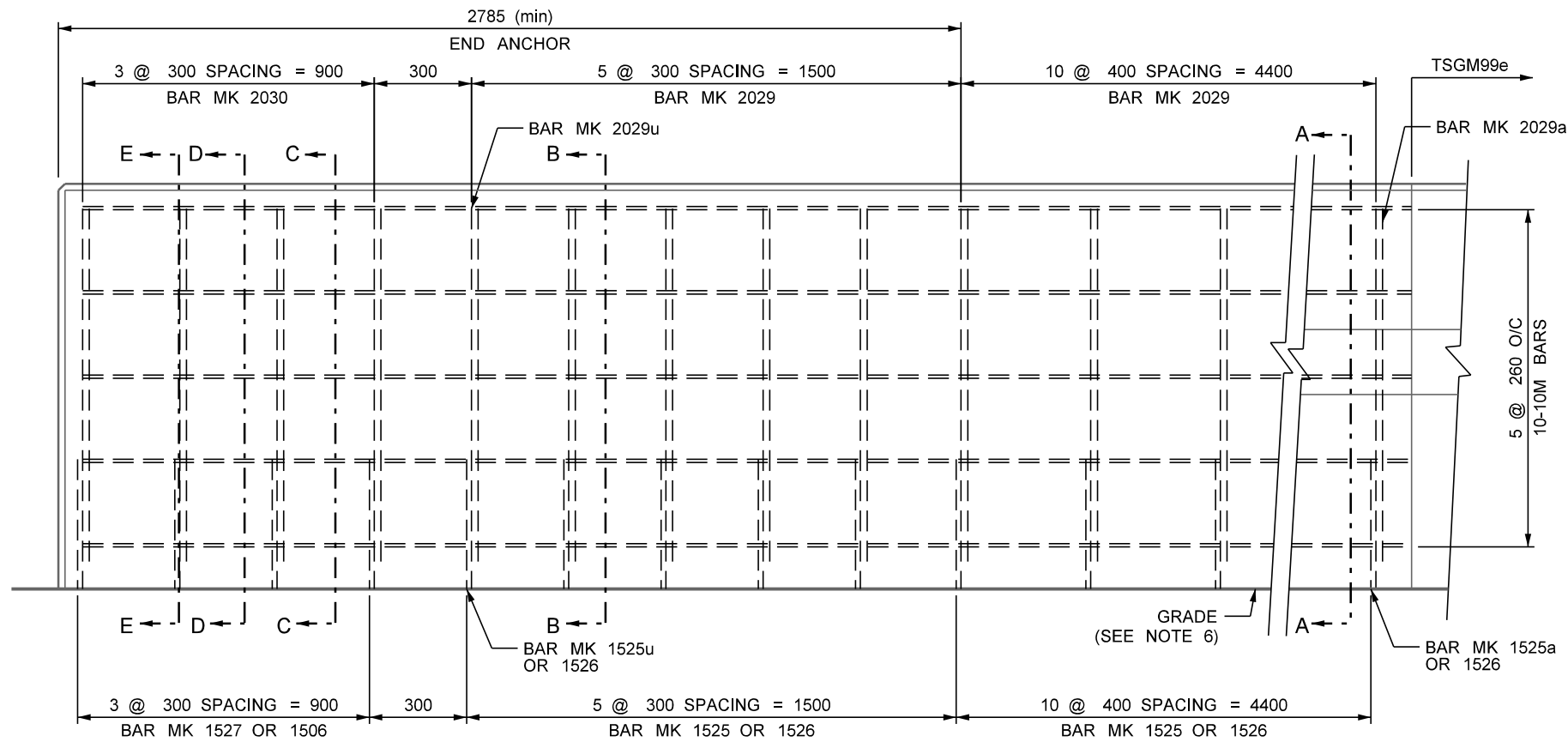
**CONTRACTION JOINT DETAILS**

REVISIONS		
DATE	DESCRIPTION	BY

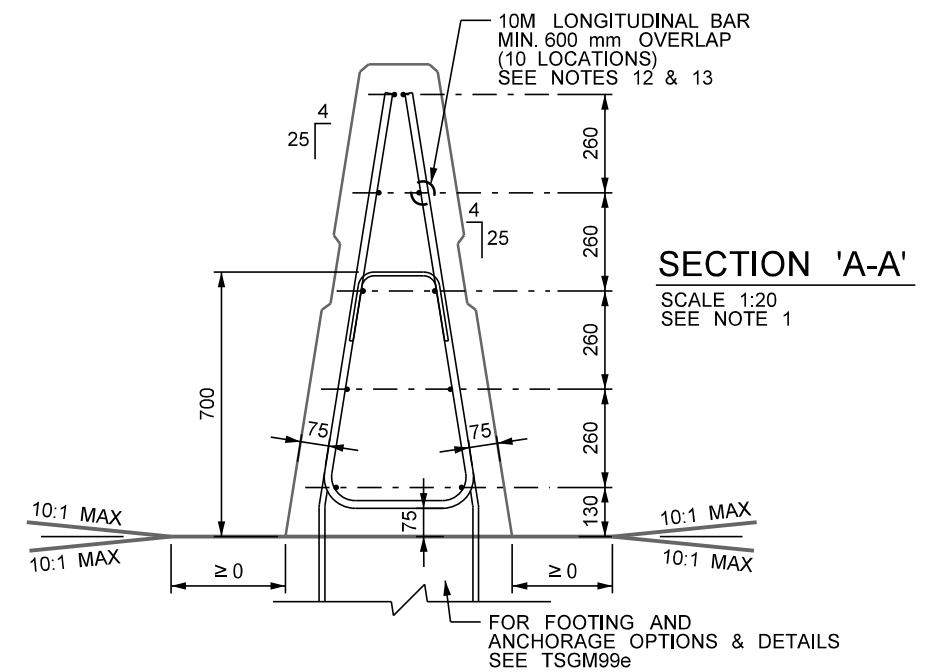


**MANITOBA CONSTRAINED WIDTH CONSTANT SLOPE BARRIER - MEDIAN NESTED THRIE BEAM AT OVERHEAD SIGN STRUCTURE OPENING**

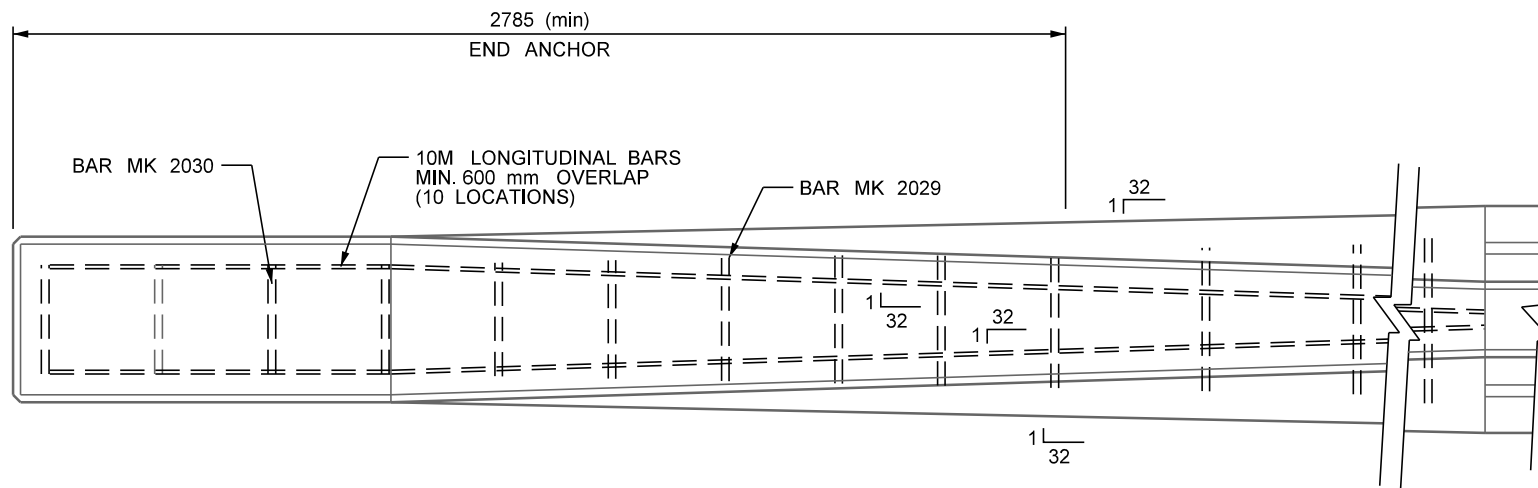
SHEET NO: 3 OF 9	DATE: 2020 - 08
DESIGNED BY: H. LARSEN	
DRAWN BY: L. LIEBRECHT	
REVIEWED BY: N. JOYAL	
<b>TSTM93e</b>	



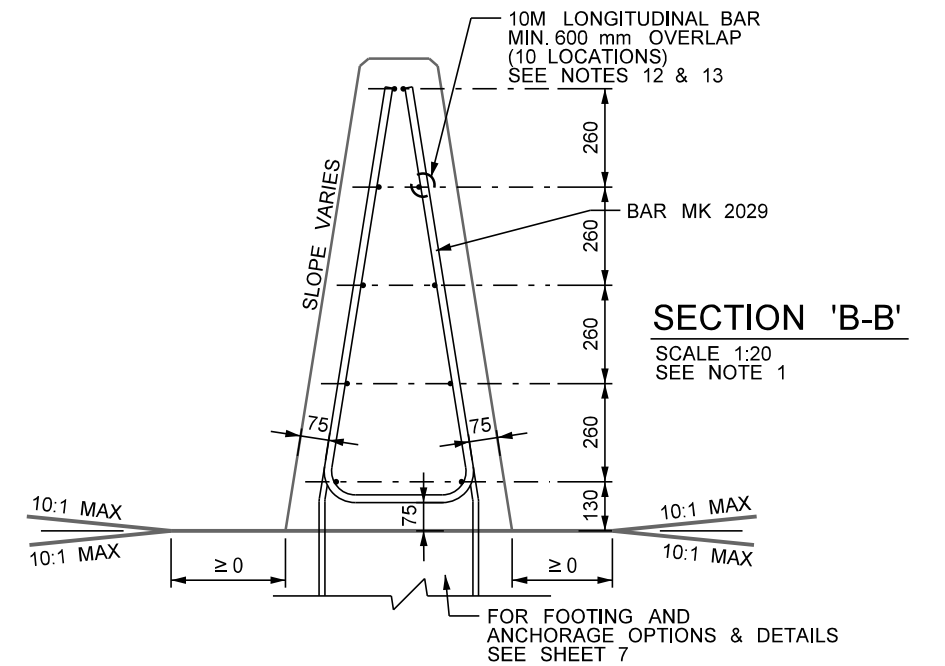
**DETAIL 'G' - ELEVATION VIEW**  
SCALE 1:20



**SECTION 'A-A'**  
SCALE 1:20  
SEE NOTE 1



**DETAIL 'G' - PLAN VIEW**  
SCALE 1:20



**SECTION 'B-B'**  
SCALE 1:20  
SEE NOTE 1

**NOTES:**

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8. SEE SHEETS 8 & 9 FOR REINFORCING DETAILS.
9. TRANSVERSE REINFORCING NOT SHOWN FOR CLARITY.
10. SEE SHEET 7 FOR BELOW GRADE DESIGN OPTIONS.
11. GUARDRAIL TO BE OVERLAPPED FOR DIRECTION OF TRAFFIC.
12. ALTERNATE LONGITUDINAL REINFORCEMENT OF TOP TWO BARS MAY BE ONE (1) SINGLE 15M BAR.
13. LONGITUDINAL BARS SHALL BE SEPARATED FROM EACH OTHER MINIMUM DISTANCE OF 15 TIMES THE MAXIMUM AGGREGATE SIZE; ADJUST PLACEMENT AS REQUIRED.

REVISIONS		
DATE	DESCRIPTION	BY

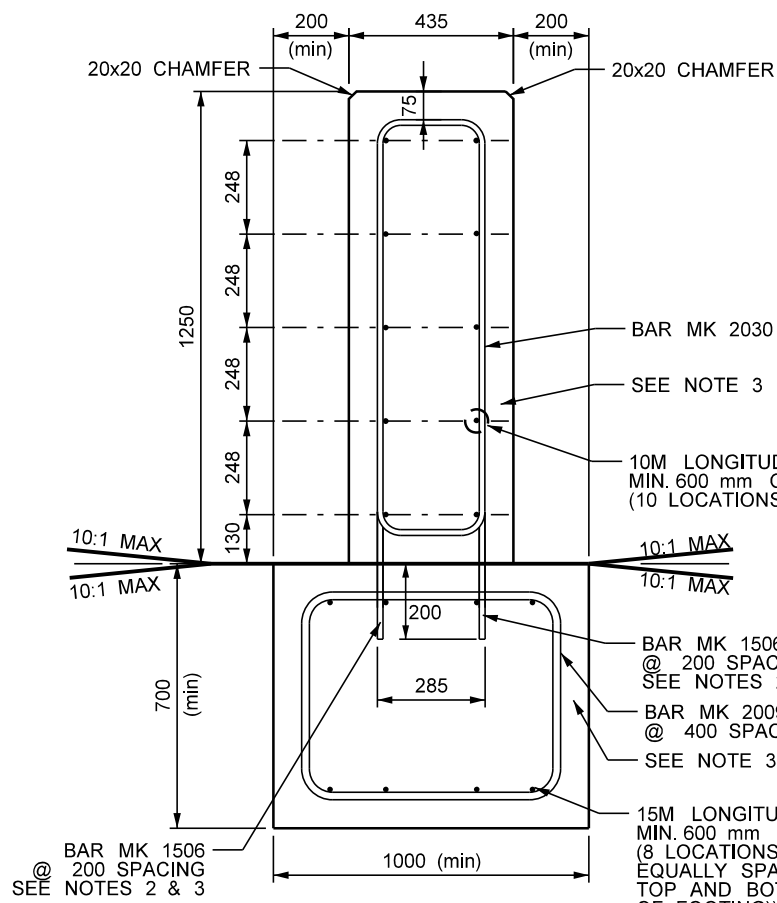
**Manitoba**  
Infrastructure  
Traffic Engineering



**MANITOBA CONSTRAINED  
WIDTH CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM AT  
OVERHEAD SIGN  
STRUCTURE OPENING**

SHEET NO: 4 OF 9	DATE: 2020 - 08
DESIGNED BY: H. LARSEN	
DRAWN BY: L. LIEBRECHT	
REVIEWED BY: N. JOYAL	

**TSTM93e**



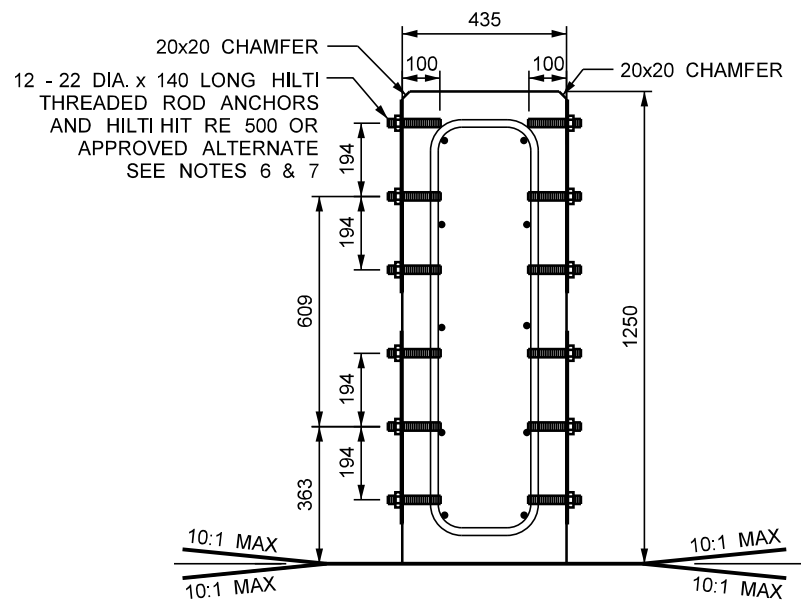
**VIEW 'C-C'**  
OPTION 1  
SCALE 1:20

BAR MK 1506 @ 200 SPACING SEE NOTES 2 & 3

BAR MK 2030  
SEE NOTE 3  
10M LONGITUDINAL BARS MIN. 600 mm OVERLAP (10 LOCATIONS)

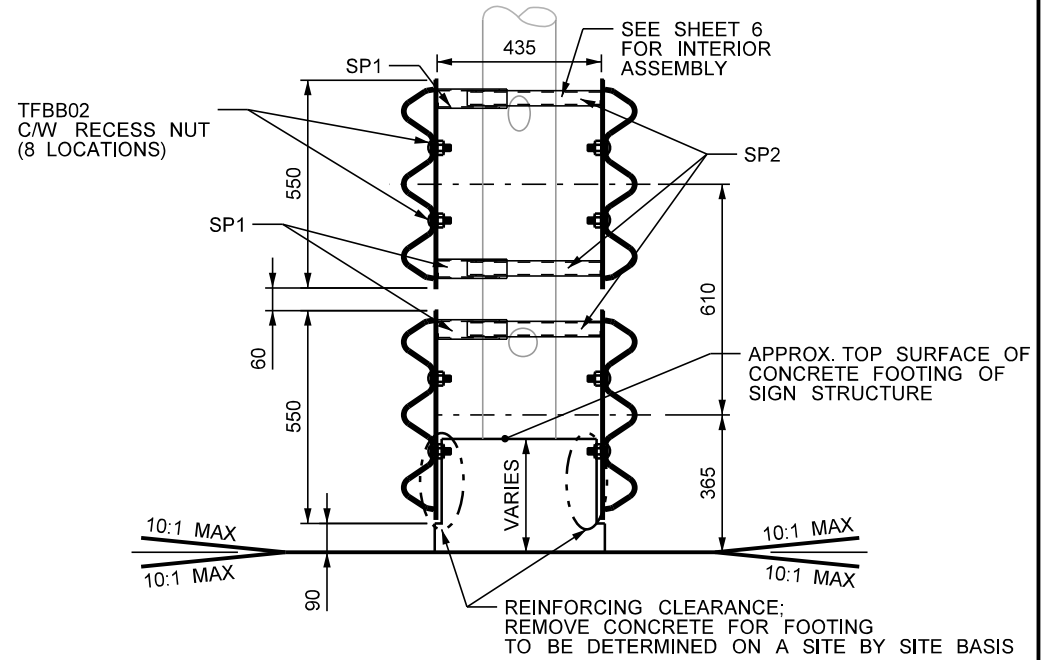
BAR MK 1506 @ 200 SPACING SEE NOTES 2 & 3  
BAR MK 2009 @ 400 SPACING SEE NOTE 3

15M LONGITUDINAL BARS MIN. 600 mm OVERLAP (8 LOCATIONS; 4 BARS EQUALLY SPACED IN TOP AND BOTTOM OF FOOTING)



**VIEW 'D-D'**  
SCALE 1:20

20x20 CHAMFER  
12 - 22 DIA. x 140 LONG HILTI THREADED ROD ANCHORS AND HILTI HIT RE 500 OR APPROVED ALTERNATE SEE NOTES 6 & 7  
20x20 CHAMFER



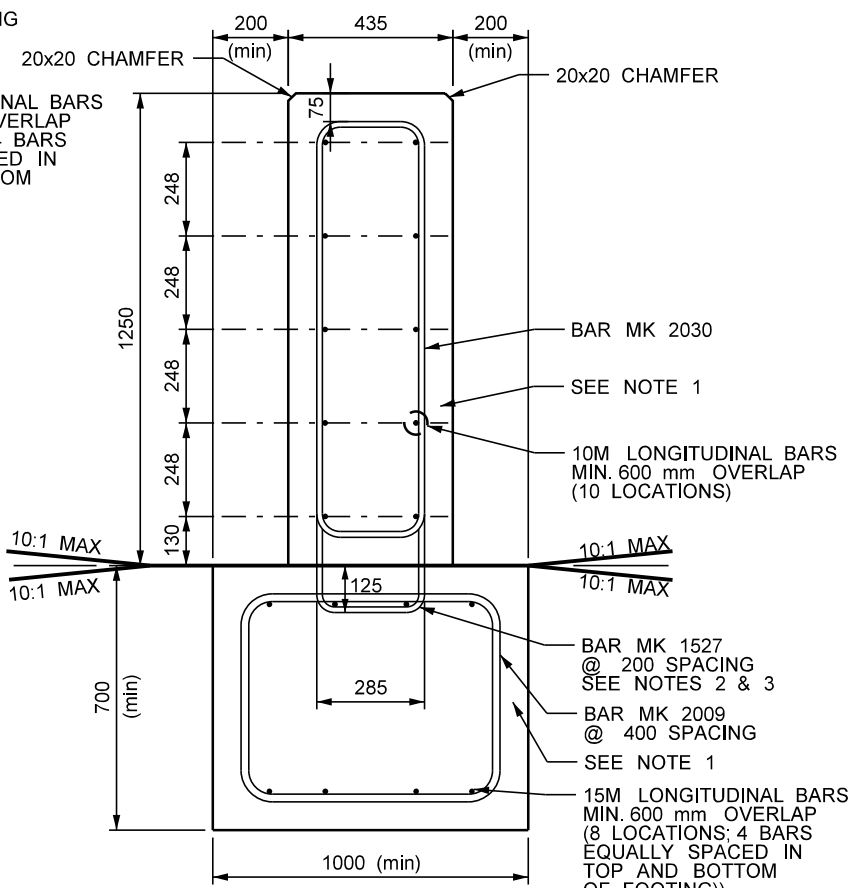
**SECTION 'F-F'**  
SCALE 1:20

TFBB02 C/W RECESS NUT (8 LOCATIONS)

SEE SHEET 6 FOR INTERIOR ASSEMBLY

APPROX. TOP SURFACE OF CONCRETE FOOTING OF SIGN STRUCTURE

REINFORCING CLEARANCE; REMOVE CONCRETE FOR FOOTING TO BE DETERMINED ON A SITE BY SITE BASIS

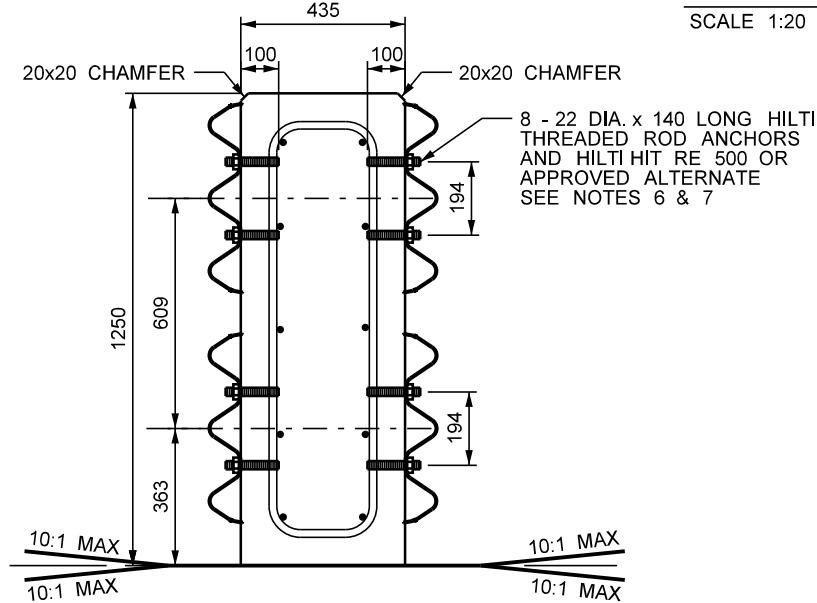


**VIEW 'C-C'**  
OPTION 2  
SCALE 1:20

BAR MK 2030  
SEE NOTE 1  
10M LONGITUDINAL BARS MIN. 600 mm OVERLAP (10 LOCATIONS)

BAR MK 1527 @ 200 SPACING SEE NOTES 2 & 3  
BAR MK 2009 @ 400 SPACING SEE NOTE 1

15M LONGITUDINAL BARS MIN. 600 mm OVERLAP (8 LOCATIONS; 4 BARS EQUALLY SPACED IN TOP AND BOTTOM OF FOOTING)



**VIEW 'E-E'**  
SCALE 1:20

8 - 22 DIA. x 140 LONG HILTI THREADED ROD ANCHORS AND HILTI HIT RE 500 OR APPROVED ALTERNATE SEE NOTES 6 & 7

**NOTES:**

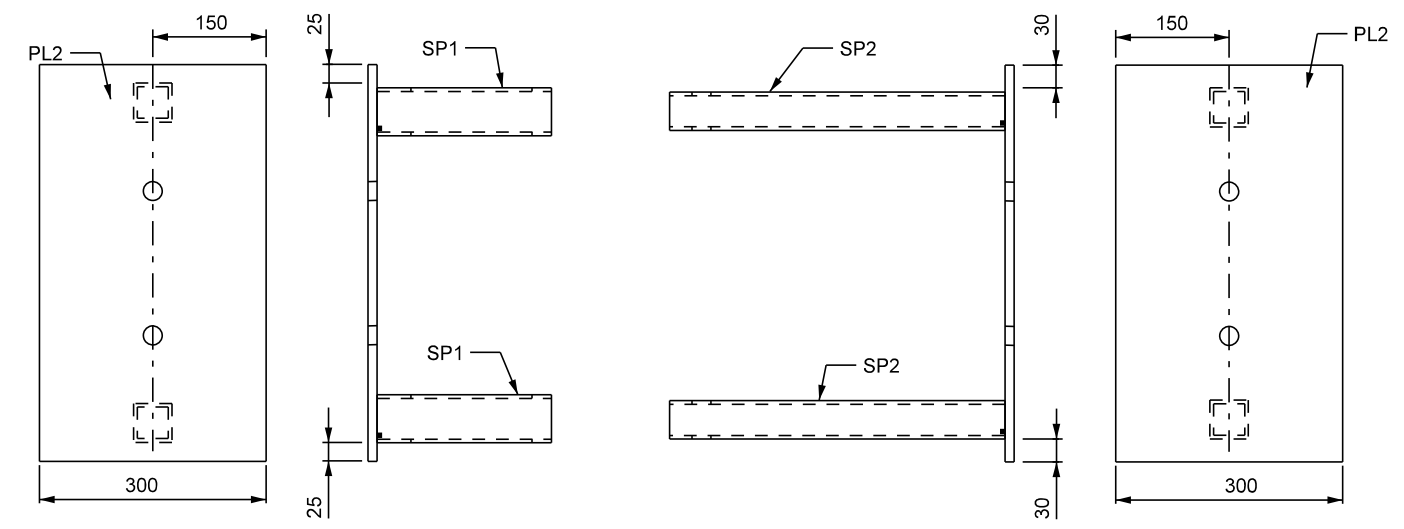
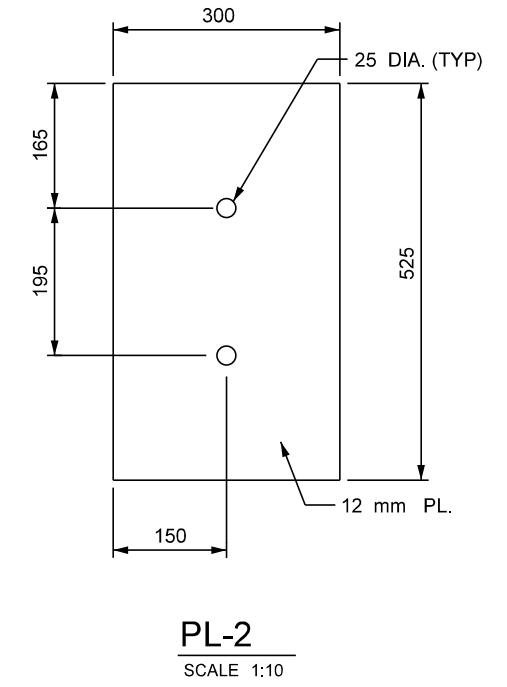
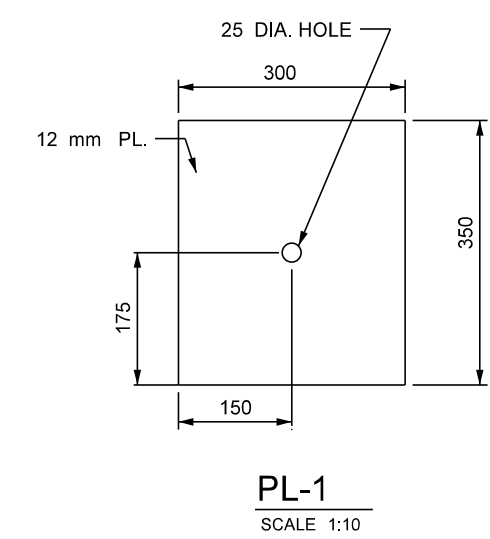
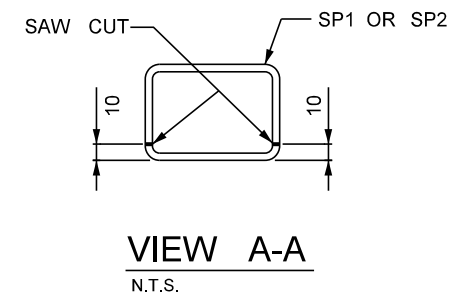
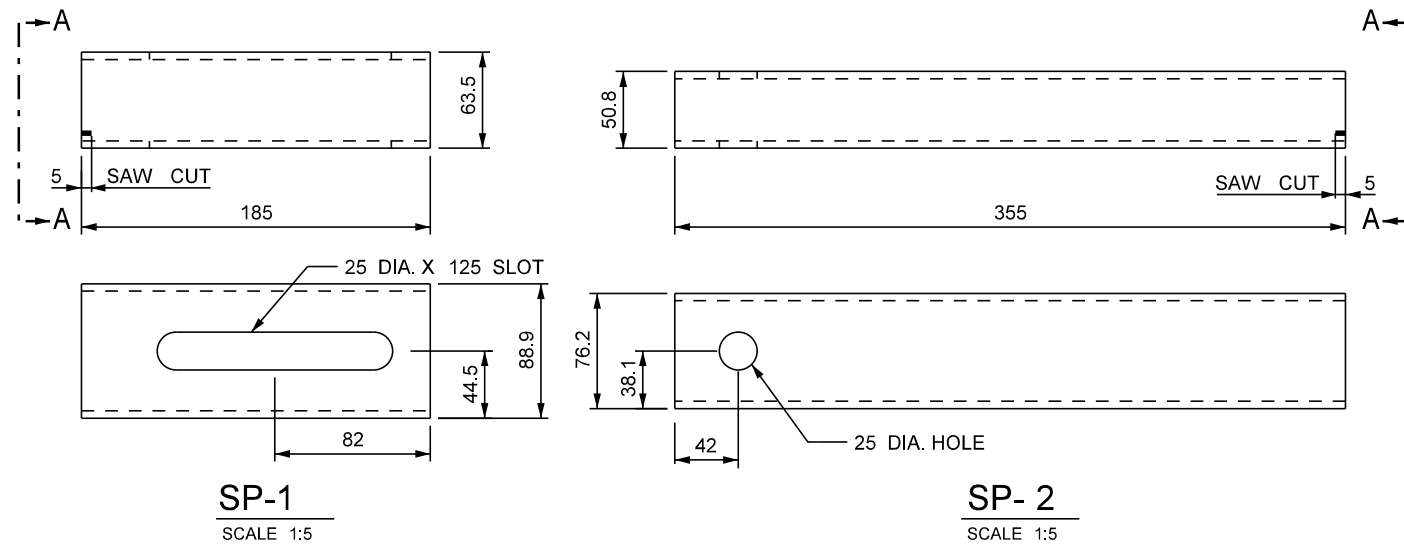
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE INDICATED.
2. SEE SHEETS 8 & 9 FOR REINFORCEMENT DETAILS.
3. CONCRETE: CSA A23.1, EXPOSURE CLASS C-1, AIR CONTENT CATEGORY 1, COMPRESSIVE STRENGTH: BARRIER ≥ 45 MPa AND FOOTING ≥ 35 MPa @ 28 DAYS.
4. GUARDRAIL TO BE OVERLAPPED FOR DIRECTION OF TRAFFIC.
5. SEE SHEET 7 FOR BELOW GRADE DESIGN OPTIONS.
6. HOLES FOR THREADED RODS SHALL BE DRILLED HORIZONTAL A 2 mm LARGER THAN DIAMETER OF THREADED ROD.
7. STEEL (REBAR) LOCATOR TO BE USED PRIOR TO DRILLING HOLES.
8. ALL REINFORCING SHALL HAVE MINIMUM 75 mm COVER, UNLESS OTHERWISE NOTED.

REVISIONS		
DATE	DESCRIPTION	BY



**MANITOBA CONSTRAINED WIDTH CONSTANT SLOPE BARRIER - MEDIUM NESTED THREE BEAM AT OVERHEAD SIGN STRUCTURE OPENING**

SHEET NO: 5 OF 9	DATE: 2020 - 08
DESIGNED BY: H. LARSEN	
DRAWN BY: L. LIEBRECHT	
REVIEWED BY: N. JOYAL	
<b>TSTM93e</b>	



**INTERIOR STIFFENER ASSEMBLIES**  
SCALE 1:10

BILL OF MISCELLANEOUS METAL					
MARK	No.	DESCRIPTION	SIZE	MASS PER /UNIT	TOTAL MASS
T1	40	Threaded Rod	22 dia x 140 Threaded rod c/w lock nut		N/A
SP-1		Spacer	HSS 88.9 x 63.5 x 4.8 x 210		N/A
SP-2		Spacer	HSS 76.2 x 50.8 x 4.8 x 216		N/A
PL-1		PLATE	300 x 350 x 12		N/A
PL-2		PLATE	300 x 525 x 12		N/A

**NOTES:**

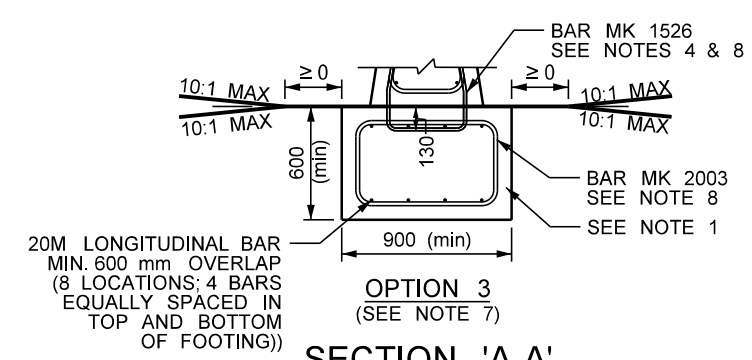
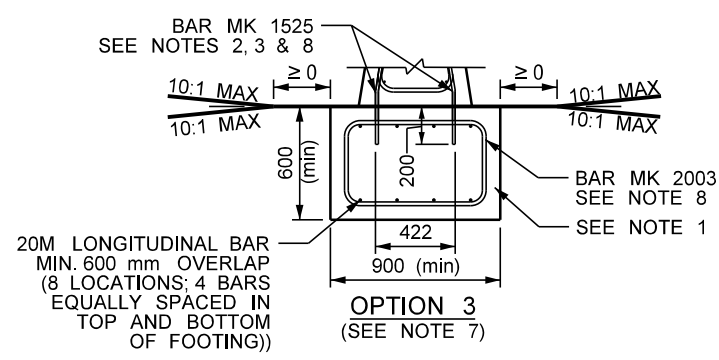
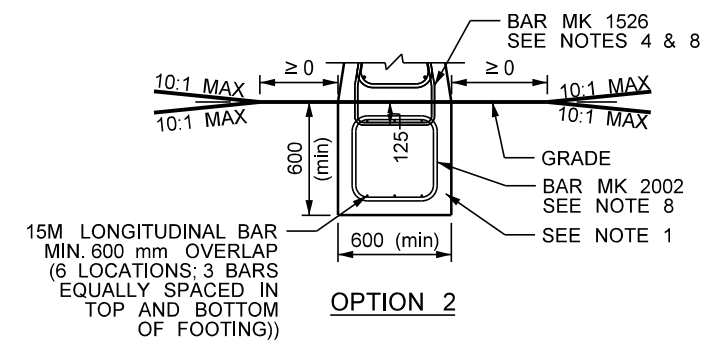
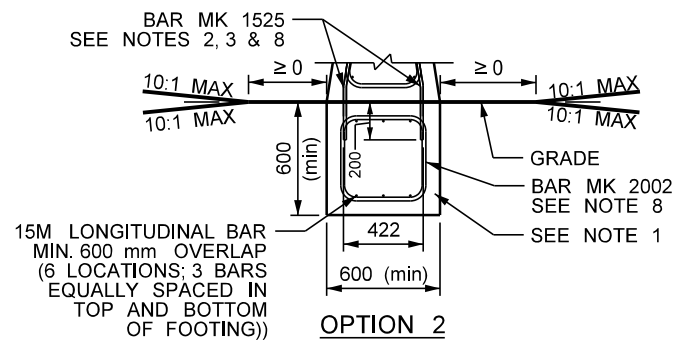
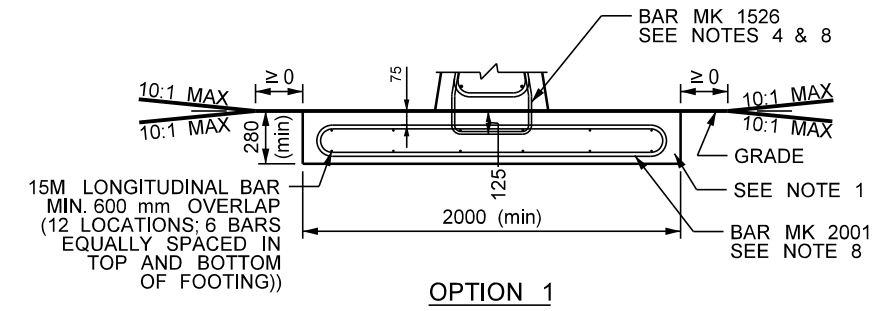
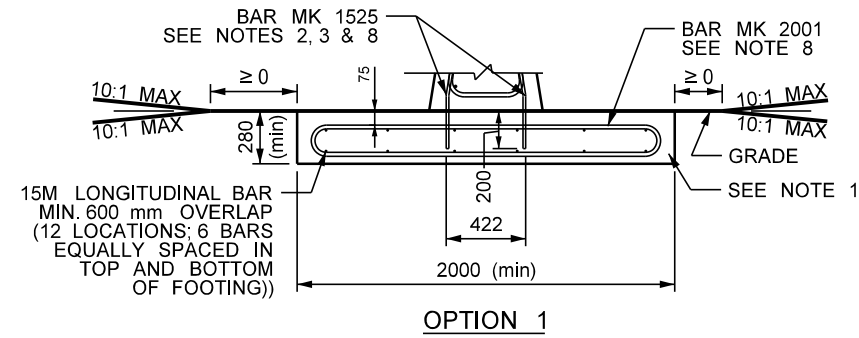
- ALL SCALES ARE APPROXIMATE.
- OVERLOAD SIGN STRUCTURE OMITTED FOR CLARITY.
- INTERNAL STIFFENERS TO BE DEVELOPED ON A SITE BY SITE BASIS.
- INTERNAL STIFFENERS SHALL BE SUCH THAT IMPACT LOADS FROM VEHICLE ARE TRANSFERRED FROM ONE SET OF NESTED RAILS TO OPPOSITE SET OF NESTED RAILS.
- MAXIMUM SPACING OF INTERNAL STIFFENERS SHALL NOT EXCEED 1905 mm ON ANY SINGLE NESTED THRIE BEAM.
- DETAILS SHOWN ARE FOR ILLUSTRATIVE PURPOSES. THE FINAL DESIGN SHALL BE DETERMINED BASED ON THE SPECIFIC SITE.

REVISIONS		
DATE	DESCRIPTION	BY



**MANITOBA CONSTRAINED  
WIDTH CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM AT  
OVERHEAD SIGN  
STRUCTURE OPENING**

SHEET NO: 6 OF 9	DATE: 2020 - 08
DESIGNED BY: H. LARSEN	
DRAWN BY: L. LIEBRECHT	
REVIEWED BY: N. JOYAL	
<b>TSTM93e</b>	



SECTION 'A-A'  
EXISTING FOOTING  
SCALE 1:40

SECTION 'A-A'  
NEW FOOTING  
SCALE 1:40

NOTES:

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7. SEE SHEETS 8 & 9 FOR REINFORCING DETAILS.
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REVISIONS		
DATE	DESCRIPTION	BY



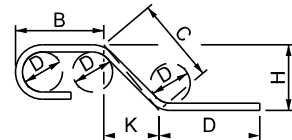
MANITOBA CONSTRAINED  
WIDTH CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM AT  
OVERHEAD SIGN  
STRUCTURE OPENING

SHEET NO: 7 OF 9	DATE: 2020 - 08
DESIGNED BY:	H. LARSEN
DRAWN BY:	L. LIEBRECHT
REVIEWED BY:	N. JOYAL
TSTM93e	

MARK	TYPE	PIN DIAMETER (mm)	TOTAL LENGTH (mm)	MASS			BENDING DIAGRAM		
				kg	kg/m				
					INTERIOR SEC.	END SEC.			
1506	STR	0	600	0.94	2.82	3.76			
							DIMENSION		
							A	B	
1525a	BENT	65	604	0.95	0.95	0.95	318	49	
1525b	BENT	65	603	0.95	0.95	0.95	318	47	
1525c	BENT	65	603	0.95	0.95	0.95	318	44	
1525d	BENT	65	603	0.95	0.95	0.95	318	42	
1525e	BENT	65	602	0.95	0.95	0.95	319	40	
1525f	BENT	65	602	0.95	0.95	0.95	319	38	
1525g	BENT	65	602	0.95	0.95	0.95	319	35	
1525h	BENT	65	602	0.95	0.95	0.95	319	33	
1525i	BENT	65	602	0.95	0.95	0.95	319	31	
1525j	BENT	65	601	0.94	0.94	0.94	319	28	
1525k	BENT	65	601	0.94	0.94	0.94	319	26	
1525l	BENT	65	601	0.94	0.94	0.94	319	23	
1525m	BENT	65	601	0.94	0.94	0.94	320	21	
1525n	BENT	65	601	0.94	0.94	0.94	320	19	
1525o	BENT	65	600	0.94	0.94	0.94	320	16	
1525p	BENT	65	600	0.94	0.94	0.94	320	14	
1525q	BENT	65	600	0.94	0.94	0.94	321	12	
1525r	BENT	65	600	0.94	0.94	0.94	321	9	
1525s	BENT	65	600	0.94	0.94	0.94	321	7	
1525t	BENT	65	600	0.94	0.94	0.94	321	5	
1525u	BENT	65	600	0.94	0.94	0.94	321	2	
							DIMENSION		
							A	B	C
1526a	BENT	65	1435	2.25	2.25	2.25	318	49	319
1526b	BENT	65	1427	2.24	2.24	2.24	318	47	318
1526c	BENT	65	1420	2.23	2.23	2.23	318	44	316
1526d	BENT	65	1414	2.22	2.22	2.22	318	42	314
1526e	BENT	65	1407	2.21	2.21	2.21	319	40	313
1526f	BENT	65	1400	2.20	2.20	2.20	319	38	311
1526g	BENT	65	1393	2.19	2.19	2.19	319	35	310
1526h	BENT	65	1385	2.17	2.17	2.17	319	33	308
1526i	BENT	65	1380	2.17	2.17	2.17	319	31	307
1526j	BENT	65	1371	2.15	2.15	2.15	319	28	304
1526k	BENT	65	1366	2.14	2.14	2.14	319	26	303
1526l	BENT	65	1360	2.14	2.14	2.14	319	23	302
1526m	BENT	65	1353	2.12	2.12	2.12	320	21	300
1526n	BENT	65	1347	2.11	2.11	2.11	320	19	229
1526o	BENT	65	1340	2.10	2.10	2.10	320	16	297
1526p	BENT	65	1333	2.09	2.09	2.09	320	14	295
1526q	BENT	65	1327	2.08	2.08	2.08	321	12	293
1526r	BENT	65	1320	2.07	2.07	2.07	321	9	292
1526s	BENT	65	1313	2.06	2.06	2.06	321	7	290
1526t	BENT	65	1307	2.05	2.05	2.05	321	5	288
1526u	BENT	65	1300	2.04	2.04	2.04	321	2	287
1527	BENT	65	1294	2.03	6.09	8.12			
2001	BENT	125	4173	9.83	29.49	39.32			
2002	BENT	125	2285	5.38	16.14	21.52			

**NOTES:**

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- ALL REINFORCING STEEL SHALL BE DEFORMED STEEL UNLESS NOTED OTHERWISE IN THE BILL OF REINFORCING STEEL.
- ALL REINFORCING STEEL SHALL CONFORM TO CSA G30.18-M92 "BILLET STEEL BARS FOR CONCRETE REINFORCEMENT" GRADE 400W, UNLESS NOTED OTHERWISE IN THE BILL OF REINFORCING STEEL.
- LIKE BARS SHALL BE BUNDLED, SECURELY TIED, AND IDENTIFIED AS TO MARK No. BY APPROPRIATE MEANS. ALL OTHER ITEMS TO BE IDENTIFIED IN A SIMILAR FASHION.
- BARS MARKED WITH THE SUFFIX "P" SHALL BE PLAIN UNDEFORMED BARS IN ACCORDANCE WITH CAN/CSA G40.21-M92 GRADE 300W.
- ALL BARS SHALL BE BENT IN ACCORDANCE WITH THE FOLLOWING DETAIL:



REVISIONS		
DATE	DESCRIPTION	BY



**MANITOBA CONSTRAINED WIDTH CONSTANT SLOPE BARRIER - MEDIAN NESTED THRIE BEAM AT OVERHEAD SIGN STRUCTURE OPENING**

SHEET NO: 8 OF 9	DATE: 2020 - 08
DESIGNED BY: H. LARSEN	
DRAWN BY: L. LIEBRECHT	
REVIEWED BY: N. JOYAL	

**TSTM93e**



MARK	TYPE	PIN DIAMETER (mm)	TOTAL LENGTH (mm)	MASS			BENDING DIAGRAM
				kg	kg/m		
					INTERIOR SEC.	END SEC.	
2003	BENT	125	2883	6.79	20.37	27.16	

2009	BENT	125	3283	7.73	23.19	30.92	
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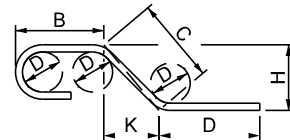
							DIMENSION			
							A	B	C	
2029a	BENT	65	2546	6.00	6.00	6.00	1113	170	79	
2029b	BENT	65	2538	5.98	5.98	5.98	1112	162	89	
2029c	BENT	65	2531	5.96	5.96	5.96	1111	154	99	
2029d	BENT	65	2524	5.94	5.94	5.94	1110	146	109	
2029e	BENT	65	2517	5.93	5.93	5.93	1109	138	119	
2029f	BENT	65	2510	5.91	5.91	5.91	1108	129	129	
2029g	BENT	65	2504	5.90	5.90	5.90	1107	121	139	
2029h	BENT	65	2497	5.88	5.88	5.88	1106	113	149	
2029i	BENT	65	2491	5.87	5.87	5.87	1105	105	159	
2029j	BENT	65	2482	5.85	5.85	5.85	1104	96	168	
2029k	BENT	65	2477	2.83	2.83	2.83	1104	89	178	
2029l	BENT	65	2472	5.82	5.82	5.82	1103	81	188	
2029m	BENT	65	2465	5.81	5.81	5.81	1102	73	198	
2029n	BENT	65	2460	5.79	5.79	5.79	1102	65	208	
2029o	BENT	65	2453	5.78	5.78	5.78	1101	56	217	
2029p	BENT	65	2447	5.76	5.76	5.76	1101	48	226	
2029q	BENT	65	2442	5.75	5.75	5.75	1100	40	236	
2029r	BENT	65	2436	5.74	5.74	5.74	1100	32	246	
2029s	BENT	65	2430	5.72	5.72	5.72	1100	24	256	
2029t	BENT	65	2425	5.71	5.71	5.71	1100	16	266	
2029u	BENT	65	2419	5.70	5.70	5.70	1100	7	276	

2030	BENT	125	2913	6.86	20.58	27.44	
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LONGITUDINAL REINFORCING - MASS (kg/m)									
BAR	INTERIOR SECTION	END SECTION	FOOTING						
			OPTION 1	OPTION 2	OPTION 3				
10M	9.36	9.36	---	---	---				
15M	---	---	22.61	11.30	---				
20M	---	---	---	---	22.61				

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SHEET NO: 9 OF 9	DATE: 2020 - 08
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DRAWN BY: L. LIEBRECHT	
REVIEWED BY: N. JOYAL	
<b>TSTM93e</b>	