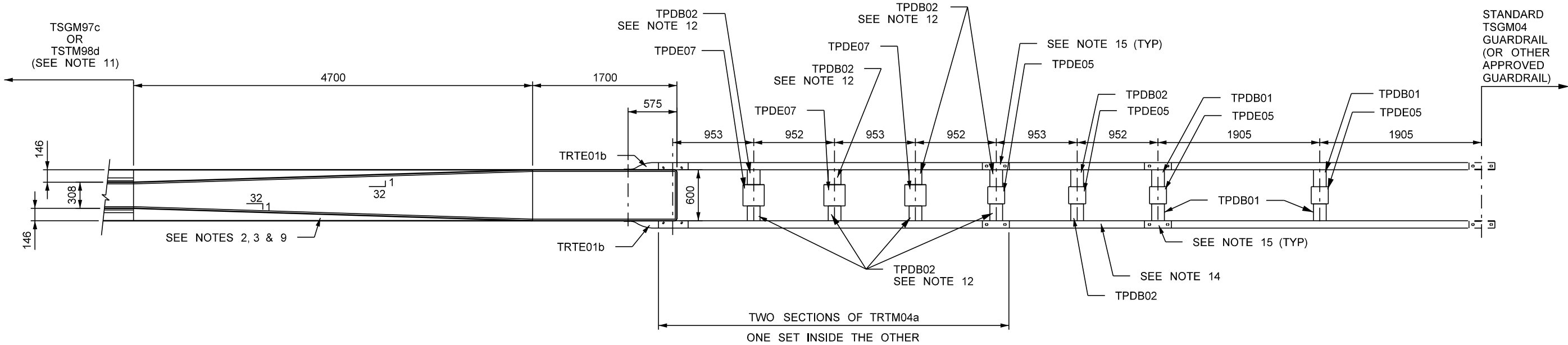


**ELEVATION**  
SCALE 1:50



**PLAN**  
SCALE 1:50

**NOTES:**

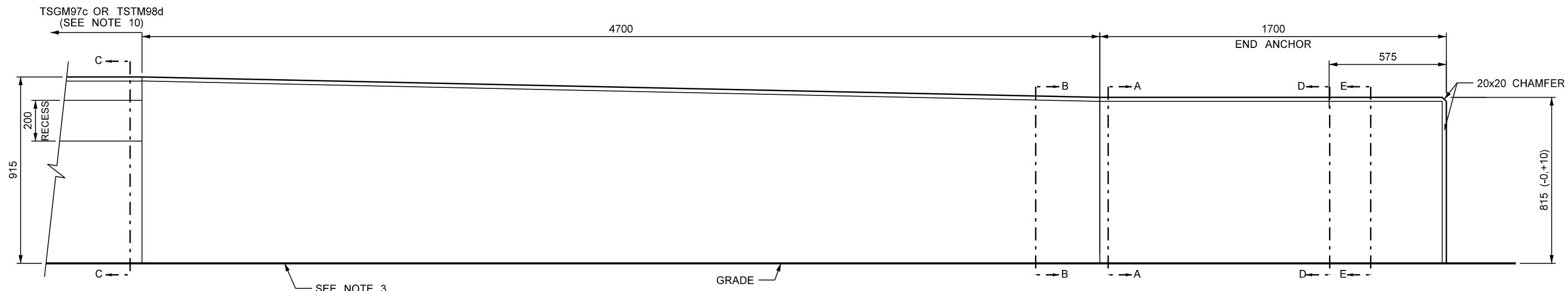
1. ALL SCALES ARE APPROXIMATE.
2. LONGITUDINAL REINFORCING NOT SHOWN FOR CLARITY.
3. FORMED OR CUT CONTRACTION JOINTS SHALL BE CREATED AT EACH PLACE WHERE THE BARRIER SHAPE CHANGES, TO MATCH ADJACENT PAVEMENT JOINT SPACING, OR AT A MAXIMUM SPACING OF 9000 mm.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS 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 AT 28 DAYS.
8. SEE SHEETS 8 & 9 FOR REINFORCING DETAILS.
9. TRANSVERSE REINFORCING NOT SHOWN FOR CLARITY.
10. SEE SECTIONS 'A-A' AND 'B-B' FOR BELOW GRADE DESIGN OPTIONS.
11. TSGM97c SHOWN FOR ILLUSTRATIVE PURPOSES.
12. BLOCK OUT TDPB02 TO BE CUT TO FIT AVAILABLE SPACE; CUT SURFACE TO BE TREATED WITH ACCEPTABLE END CUT PRESERVATIVE.
13. BLOCK OUT TO BE TOE NAILED TO POST TO PREVENT ROTATION USING 90 mm GALVANIZED NAIL.
14. USE 16 DIA. x 700 mm LONG GALVANIZED THREADED ROD C/W RECESS NUT (NO WASHER) IN UPPER HOLES OF RAIL, BLOCK OUT AND POST.
15. GUARDRAIL SHALL BE LAPPED SMOOTH FOR TRAFFIC TRAVELLING IN THE ADJACENT LANE ON BOTH SIDES.

REVISIONS		
DATE	DESCRIPTION	BY

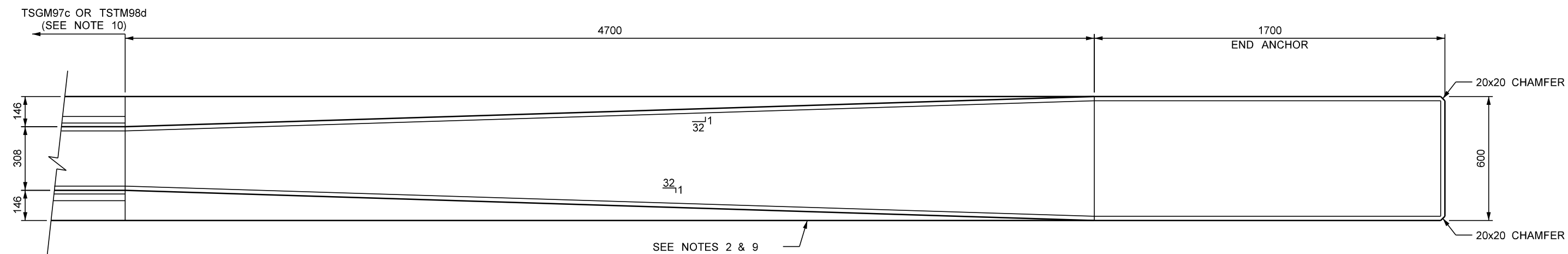


**MANITOBA**  
CONSTRAINED WIDTH  
CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM  
TO TL-4

SHEET NO: 1 OF 9	DATE: 2020 - 08
DESIGNED BY: H. LARSEN	
DRAWN BY: L. LIEBRECHT	
REVIEWED BY: N. JOYAL	
<b>TSTM94c</b>	



DETAIL 'H' - ELEVATION VIEW  
SCALE 1:20



DETAIL 'H' - PLAN VIEW  
SCALE 1:20

NOTES:

1. ALL SCALES ARE APPROXIMATE.
2. LONGITUDINAL REINFORCING OMITTED FOR CLARITY.
3. SEE SECTION 'A-A' AND SHEET 4 FOR BELOW GRADE DESIGN OPTIONS.
4. NEW OR EXISTING REINFORCED CONCRETE: CSA A23.1, EXPOSURE CLASS C-1, AIR CONTENT CATEGORY 1, COMPRESSIVE STRENGTH: BARRIER  $\geq 45$  MPa AND FOOTING  $\geq 35$  MPa @ 28 DAYS.
5. HOLES IN FOOTING SHALL BE DRILLED VERTICALLY 2 mm LARGER THAN REINFORCING.
6. HOLES IN FOOTING SHALL BE PREPARED FOR EPOXY (HILTI HIT RE 500, OR APPROVED ALTERNATIVE) AS DIRECTED BY MANUFACTURER.
7. STIRRUP SHALL BE SECURELY ATTACHED TO REBAR.
8. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE INDICATED.
9. SEE SHEETS 8 & 9 FOR REINFORCEMENT DETAILS.
10. TSGM97c SHOWN FOR ILLUSTRATIVE PURPOSES.
11. ALL REINFORCING SHALL HAVE MINIMUM 75 mm COVER, UNLESS OTHERWISE NOTED.

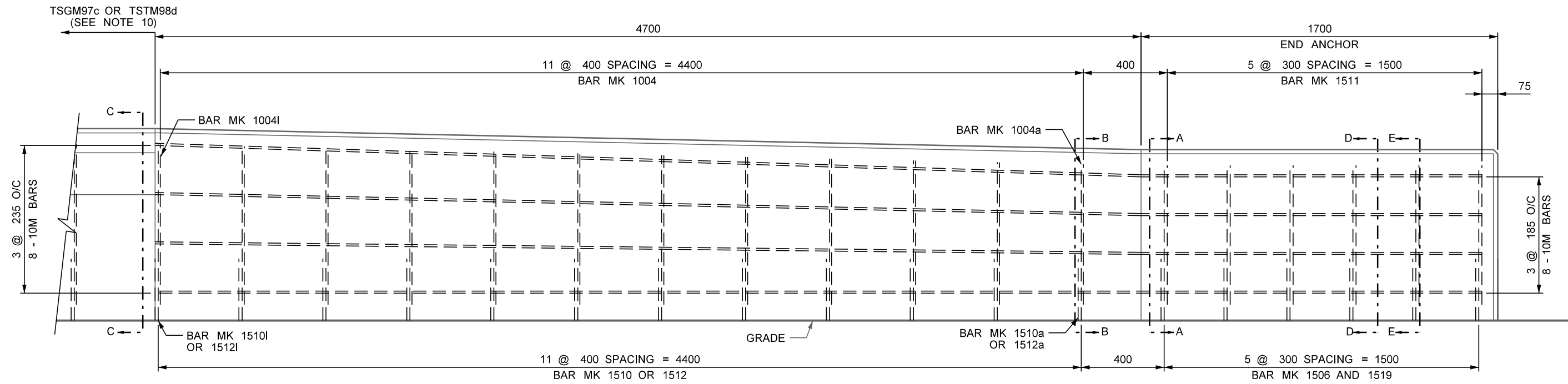
REVISIONS		
DATE	DESCRIPTION	BY



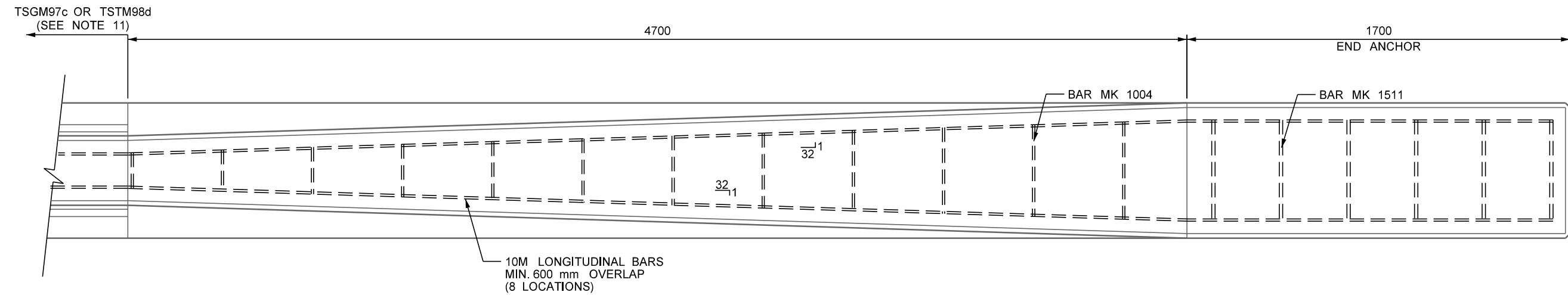
MANITOBA  
CONSTRAINED WIDTH  
CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM  
TO TL-4

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

TSTM94c



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



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

**NOTES:**

1. ALL SCALES ARE APPROXIMATE.
2. LONGITUDINAL REINFORCING OMITTED FOR CLARITY.
3. SEE SECTION 'A-A' AND SHEET 4 FOR BELOW GRADE DESIGN OPTIONS.
4. NEW OR EXISTING REINFORCED CONCRETE: CSA A23.1, EXPOSURE CLASS C-1, AIR CONTENT CATEGORY 1, COMPRESSIVE STRENGTH: BARRIER  $\geq 45$  MPa AND FOOTING  $\geq 35$  MPa @ 28 DAYS.
5. HOLES IN FOOTING SHALL BE DRILLED VERTICALLY 2 mm LARGER THAN REINFORCING.
6. HOLES IN FOOTING SHALL BE PREPARED FOR EPOXY (HILTI HIT RE 500, OR APPROVED ALTERNATIVE) AS DIRECTED BY MANUFACTURER.
7. STIRRUP SHALL BE SECURELY ATTACHED TO REBAR.
8. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE INDICATED.
9. SEE SHEETS 8 & 9 FOR REINFORCEMENT DETAILS.
10. TSGM97c SHOWN FOR ILLUSTRATIVE PURPOSES.
11. ALL REINFORCING SHALL HAVE MINIMUM 75 mm COVER, UNLESS OTHERWISE NOTED.

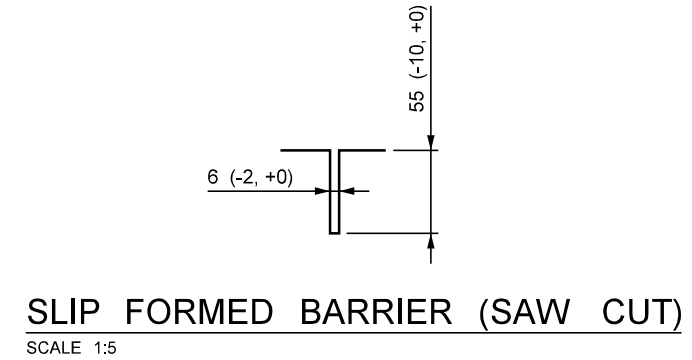
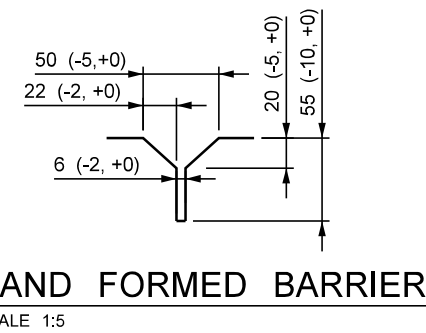
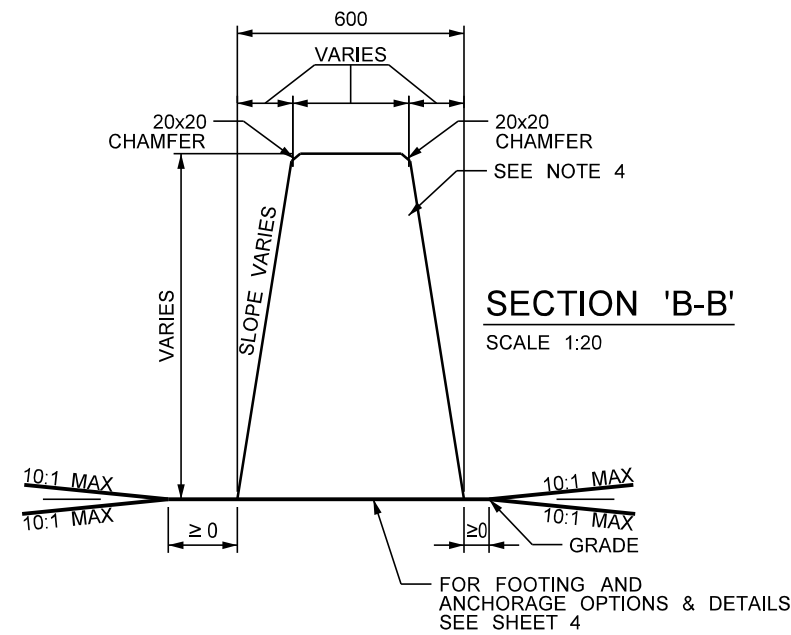
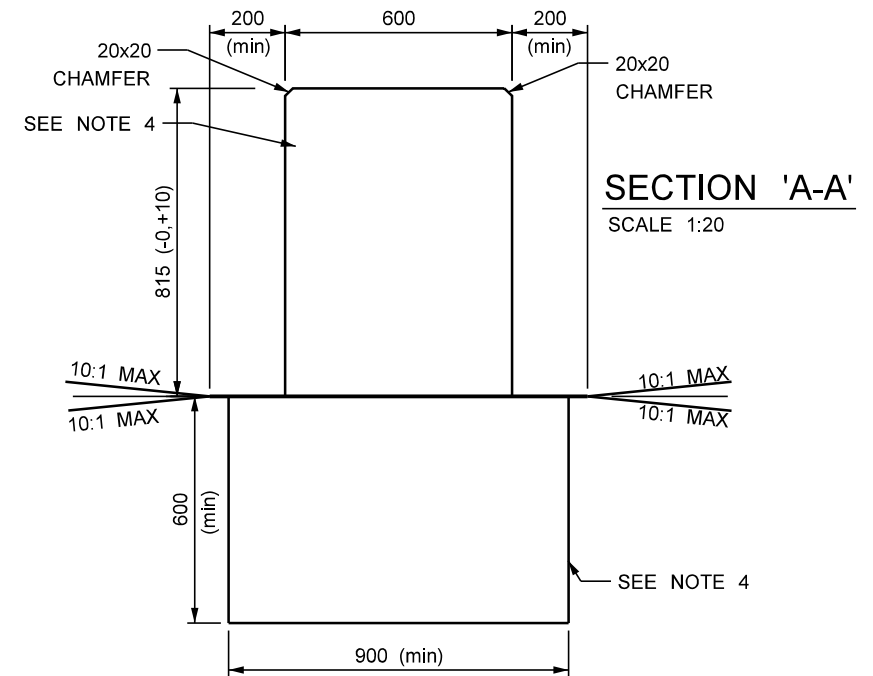
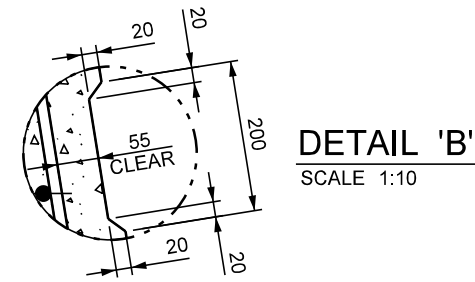
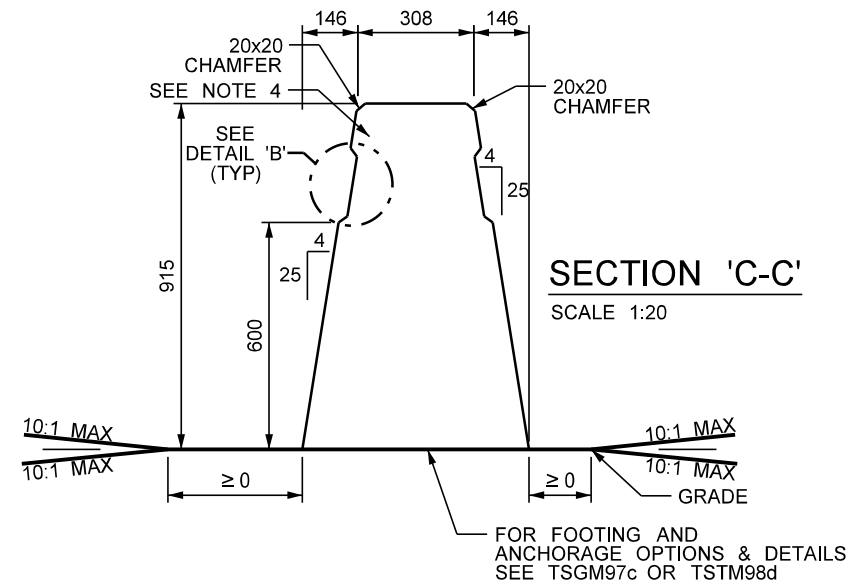
REVISIONS		
DATE	DESCRIPTION	BY



**MANITOBA  
CONSTRAINED WIDTH  
CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM  
TO TL-4**

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

**TSTM94c**



**CONTRACTION JOINT DETAILS**

**NOTES:**

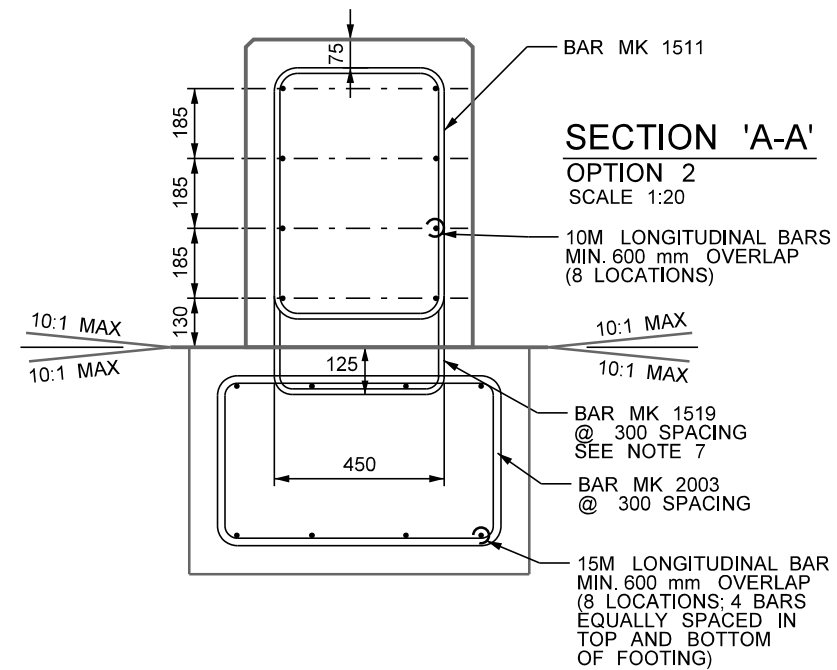
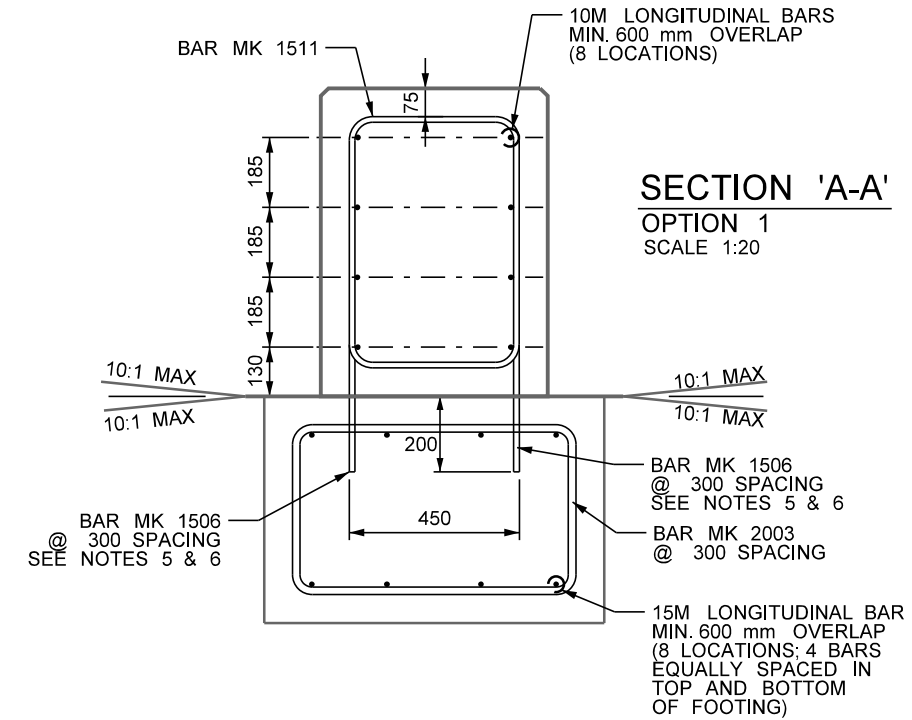
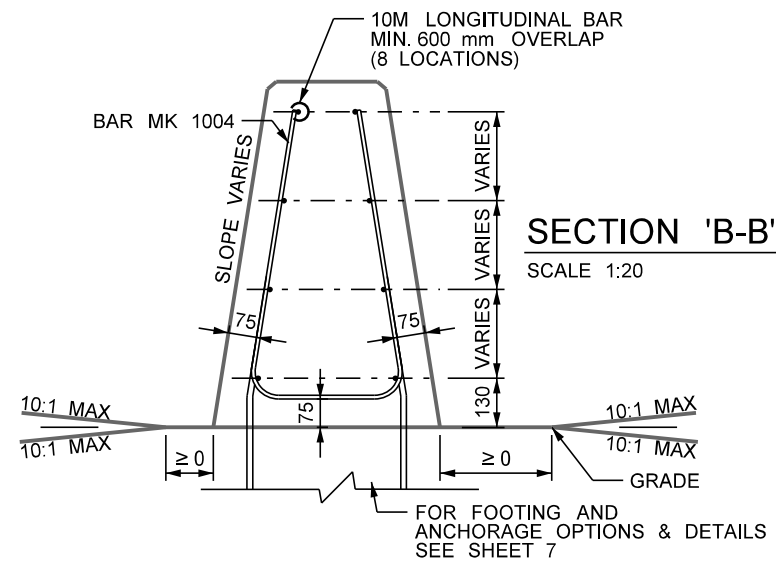
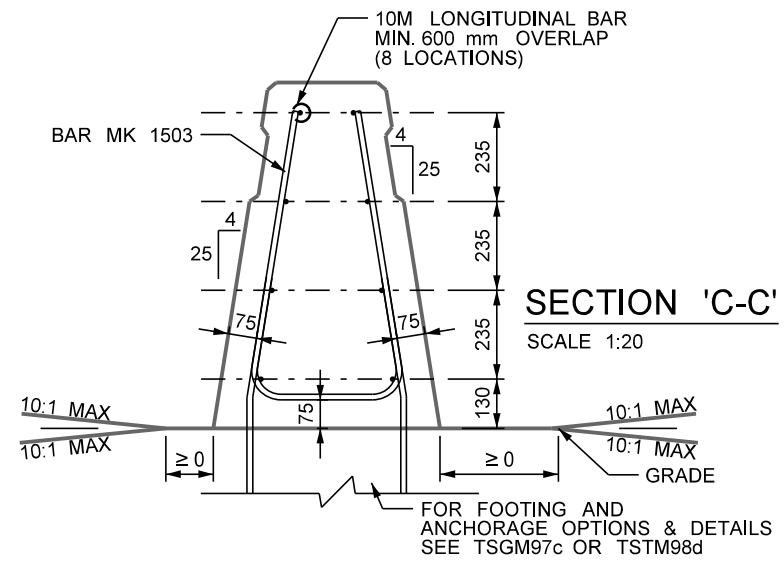
1. ALL SCALES ARE APPROXIMATE.
2. LONGITUDINAL REINFORCING OMITTED FOR CLARITY.
3. SEE SECTION 'A-A' AND SHEET 4 FOR BELOW GRADE DESIGN OPTIONS.
4. NEW OR EXISTING REINFORCED CONCRETE: CSA A23.1, EXPOSURE CLASS C-1, AIR CONTENT CATEGORY 1, COMPRESSIVE STRENGTH: BARRIER  $\geq$  45 MPa AND FOOTING  $\geq$  35 MPa @ 28 DAYS.
5. HOLES IN FOOTING SHALL BE DRILLED VERTICALLY 2 mm LARGER THAN REINFORCING.
6. HOLES IN FOOTING SHALL BE PREPARED FOR EPOXY (HILTI HIT RE 500, OR APPROVED ALTERNATIVE) AS DIRECTED BY MANUFACTURER.
7. STIRRUP SHALL BE SECURELY ATTACHED TO REBAR.
8. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE INDICATED.
9. SEE SHEETS 8 & 9 FOR REINFORCEMENT DETAILS.
10. TSGM97c SHOWN FOR ILLUSTRATIVE PURPOSES.
11. ALL REINFORCING SHALL HAVE MINIMUM 75 mm COVER, UNLESS OTHERWISE NOTED.

REVISIONS		
DATE	DESCRIPTION	BY



**MANITOBA  
CONSTRAINED WIDTH  
CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM  
TO TL-4**

SHEET NO: 4 OF 9	DATE: 2020 - 08
DESIGNED BY:	H. LARSEN
DRAWN BY:	L. LIEBRECHT
REVIEWED BY:	N. JOYAL
<b>TSTM94c</b>	



**NOTES:**

1. ALL SCALES ARE APPROXIMATE.
2. LONGITUDINAL REINFORCING OMITTED FOR CLARITY.
3. SEE SECTION 'A-A' AND SHEET 4 FOR BELOW GRADE DESIGN OPTIONS.
4. NEW OR EXISTING REINFORCED CONCRETE: CSA A23.1, EXPOSURE CLASS C-1, AIR CONTENT CATEGORY 1, COMPRESSIVE STRENGTH: BARRIER  $\geq 45$  MPa AND FOOTING  $\geq 35$  MPa @ 28 DAYS.
5. HOLES IN FOOTING SHALL BE DRILLED VERTICALLY 2 mm LARGER THAN REINFORCING.
6. HOLES IN FOOTING SHALL BE PREPARED FOR EPOXY (HILTI HIT RE 500, OR APPROVED ALTERNATIVE) AS DIRECTED BY MANUFACTURER.
7. STIRRUP SHALL BE SECURELY ATTACHED TO REBAR.
8. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE INDICATED.
9. SEE SHEETS 8 & 9 FOR REINFORCEMENT DETAILS.
10. TSGM97c SHOWN FOR ILLUSTRATIVE PURPOSES.
11. ALL REINFORCING SHALL HAVE MINIMUM 75 mm COVER, UNLESS OTHERWISE NOTED.

REVISIONS		
DATE	DESCRIPTION	BY

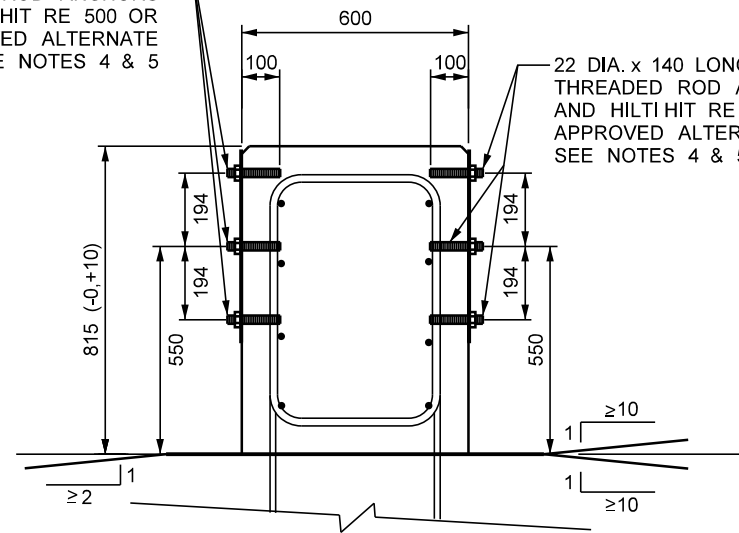


**MANITOBA  
CONSTRAINED WIDTH  
CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM  
TO TL-4**

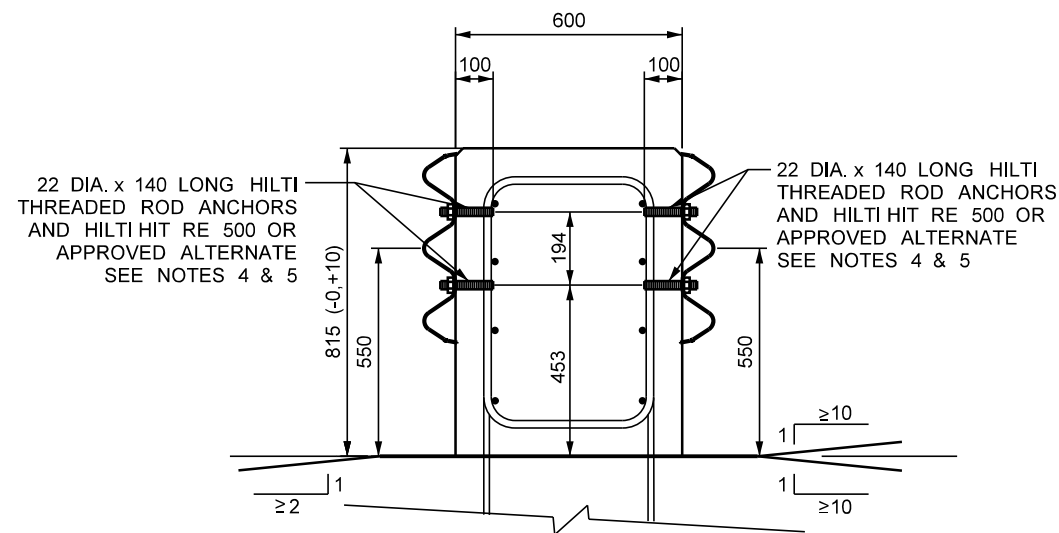
SHEET NO: 5 OF 9	DATE: 2020 - 08
DESIGNED BY:	H. LARSEN
DRAWN BY:	L. LIEBRECHT
REVIEWED BY:	N. JOYAL

**TSTM94c**

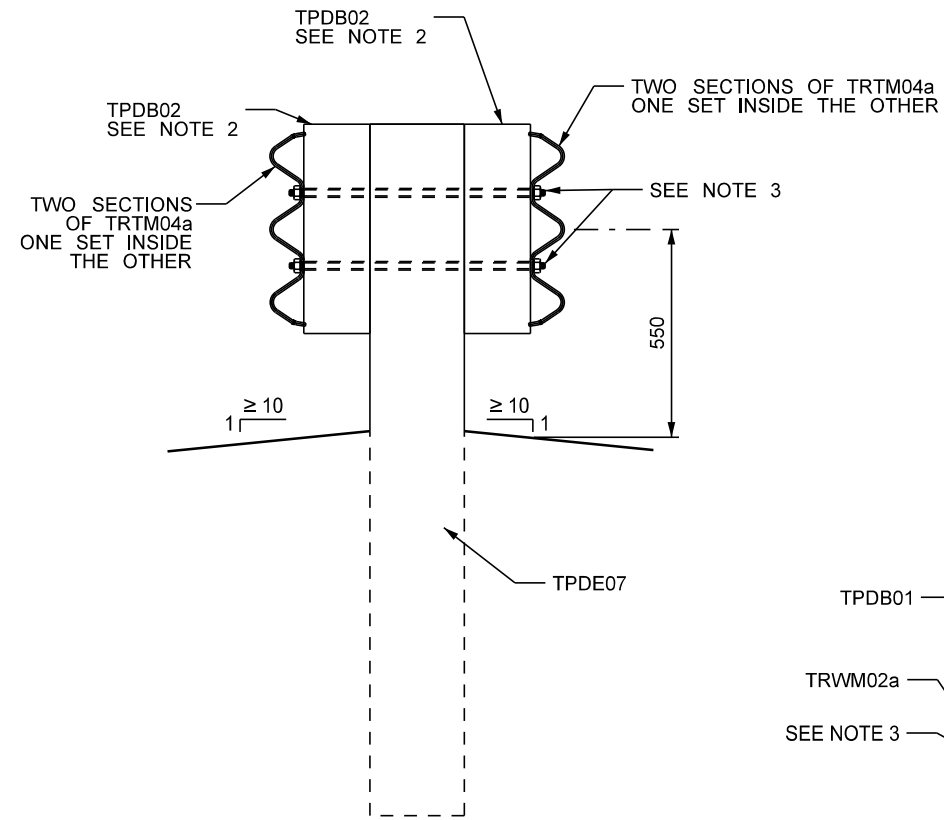
22 DIA. x 140 LONG HILTI  
THREADED ROD ANCHORS  
AND HILTI HIT RE 500 OR  
APPROVED ALTERNATE  
SEE NOTES 4 & 5



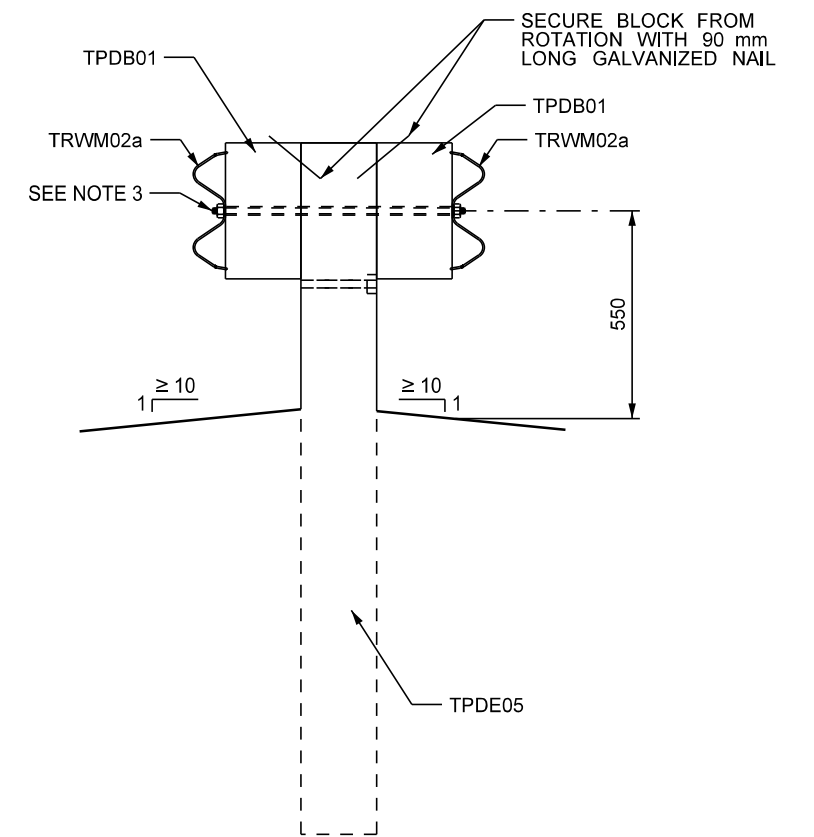
**SECTION 'D-D'**  
SCALE 1:20



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



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



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

**NOTES:**

1. ALL SCALES ARE APPROXIMATE
2. BLOCK OUT TDPB02 TO BE CUT TO FIT AVAILABLE SPACE; CUT SURFACE TO BE TREATED WITH ACCEPTABLE END CUT PRESERVATIVE.
3. 16 DIA. x 700 mm LONG GALVANIZED THREADED ROD C/W 2 RECESS NUTS (NO WASHER).
4. HOLES FOR THREADED RODS SHALL BE DRILLED HORIZONTAL AT 2 mm LARGER THAN DIAMETER OF THREADED ROD.
5. STEEL (REBAR) LOCATOR TO BE USED PRIOR TO DRILLING HOLES.

REVISIONS		
DATE	DESCRIPTION	BY

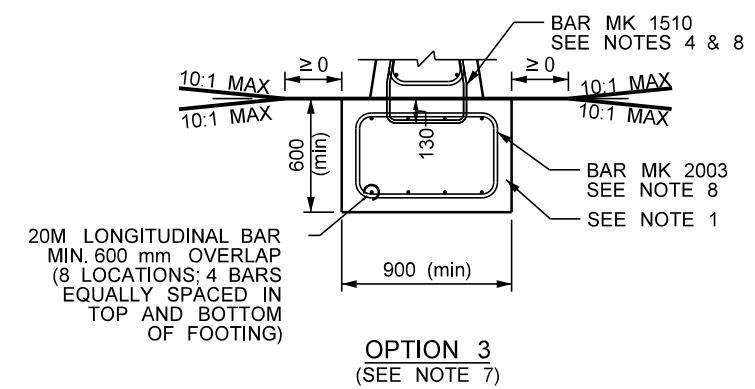
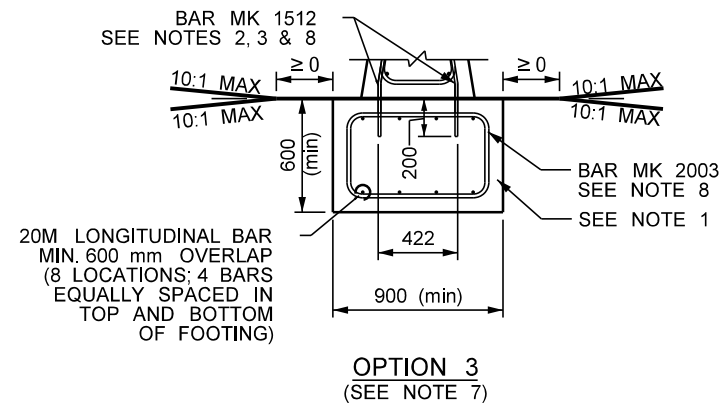
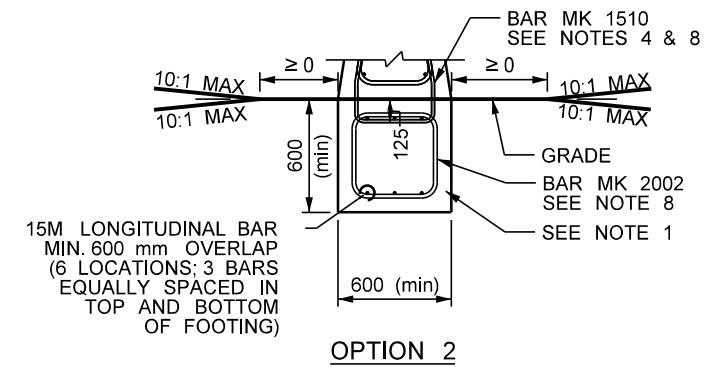
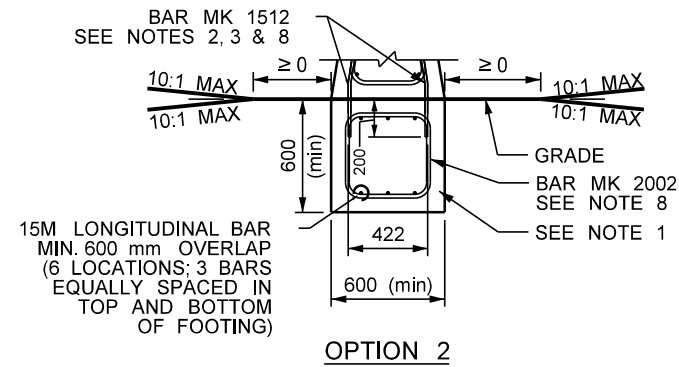
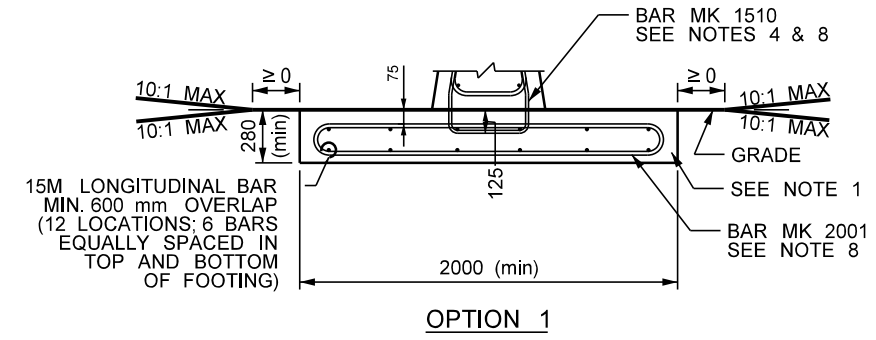
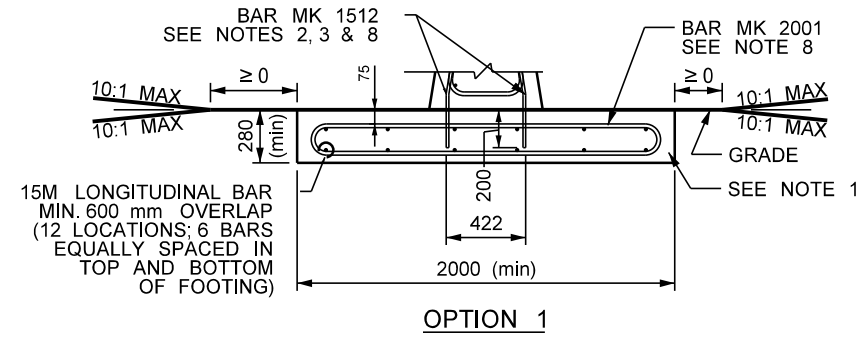
**Manitoba**  
Infrastructure  
Traffic Engineering



**MANITOBA**  
CONSTRAINED WIDTH  
CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM  
TO TL-4

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

**TSTM94c**



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

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

**NOTES:**

1. NEW OR EXISTING REINFORCED CONCRETE: CSA A23.1, EXPOSURE CLASS C-1, AIR CONTENT CATEGORY 1, COMPRESSIVE STRENGTH FOOTING  $\geq 35$  MPa AT 28 DAYS.
2. HOLES IN FOOTING SHALL BE DRILLED VERTICALLY 2 mm LARGER THAN REINFORCING.
3. HOLES IN FOOTING SHALL BE PREPARED FOR EPOXY (HILTI HIT RE 500, OR APPROVED ALTERNATIVE) AS DIRECTED BY MANUFACTURER.
4. STIRRUP SHALL BE SECURELY ATTACHED TO REBAR.
5. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE INDICATED.
6. SEE SHEETS 8 & 9 FOR REINFORCEMENT DETAILS.
7. OPTION 3 MUST BE USED FOR END ANCHOR OF BARRIER.
8. SPACING TO MATCH BAR MK 1004 OR BAR MK 1511.
9. ALL REINFORCING SHALL HAVE MINIMUM 75 mm COVER, UNLESS OTHERWISE NOTED.

REVISIONS		
DATE	DESCRIPTION	BY



**MANITOBA**  
CONSTRAINED WIDTH  
CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM  
TO TL-4

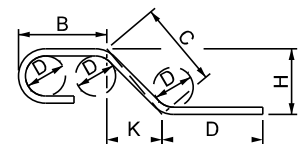
SHEET NO: 7 OF 9	DATE: 2020 - 08
DESIGNED BY:	H. LARSEN
DRAWN BY:	L. LIEBRECHT
REVIEWED BY:	N. JOYAL

**TSTM94c**

MARK	TYPE	PIN DIAMETER (mm)	TOTAL LENGTH (mm)	MASS			BENDING DIAGRAM								
				kg	kg/m										
					INTERIOR SEC.	END SEC.	DIMENSION								
							A	B	C	D					
1004a	BENT	125	1726	1.35	0.21	--	671	671	7	434					
1004b	BENT	125	1739	1.37	0.21	--	680	679	17	412					
1004c	BENT	125	1757	1.38	0.22	--	688	688	28	389					
1004d	BENT	125	1766	1.39	0.22	--	697	696	38	366					
1004e	BENT	125	1779	1.40	0.22	--	706	705	48	343					
1004f	BENT	125	1784	1.40	0.22	--	716	713	58	321					
1004g	BENT	125	1808	1.42	0.22	--	725	722	69	297					
1004h	BENT	125	1822	1.43	0.22	--	734	730	79	274					
1004i	BENT	125	1837	1.44	0.23	--	744	739	90	251					
1004j	BENT	125	1851	1.45	0.23	--	754	747	100	228					
1004k	BENT	125	1868	1.47	0.23	--	764	756	111	204					
1004l	BENT	125	1883	1.48	0.23	--	774	764	121	181					
1503	BENT	125	1878	2.95	N/A SEE TSGM97c	N/A SEE TSGM97c									
1506	STR	0	600	0.94	--	1.76									
							DIMENSION								
1510a	BENT	65	1430	2.24	0.35	--	273	252	3	442	447				
1510b	BENT	65	1426	2.24	0.35	--	274	251	6	430	442				
1510c	BENT	65	1422	2.23	0.35	--	275	250	10	418	438				
1510d	BENT	65	1418	2.23	0.35	--	276	249	13	406	433				
1510e	BENT	65	1413	2.22	0.35	--	277	248	17	395	429				
1510f	BENT	65	1410	2.21	0.35	--	278	247	20	384	424				
1510g	BENT	65	1408	2.21	0.35	--	265	261	25	373	422				
1510h	BENT	65	1409	2.21	0.35	--	250	276	30	362	422				
1510i	BENT	65	1410	2.21	0.35	--	235	292	35	352	422				
1510j	BENT	65	1411	2.22	0.35	--	224	304	40	341	422				
1510k	BENT	65	1412	2.22	0.35	--	215	314	45	331	422				
1510l	BENT	65	1413	2.22	0.35	--	207	322	51	321	422				
1511	BENT	125	2779	6.54	--	6.13									

**NOTES:**

- ALL DIMENSIONS GIVEN IN BENDING DIAGRAM ARE OUT TO OUT, EXCEPT RADII AND EXTENSIONS ON 90°, 135° & 180° HOOKS. EXTENSIONS ON 90°, 135° & 180° HOOKS ARE THE "A" OR "G" DIMENSIONS FOR THE STANDARD 90°, 135° & 180° HOOKS REFERENCED FROM THE RSIC "MANUAL OF STANDARD PRACTICE". RADII ARE INSIDE DIMENSIONS. ALL REINFORCING STEEL BENDS AND HOOKS SHALL CONFORM TO CLAUSE 6.6.2 OF CSA A23.1 UNLESS NOTED OTHERWISE IN THE BILL OF REINFORCING STEEL.
- 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



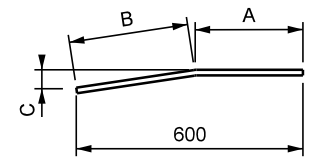
MANITOBA  
CONSTRAINED WIDTH  
CONSTANT SLOPE  
BARRIER - MEDIAN  
NESTED THRIE BEAM  
TO TL-4

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

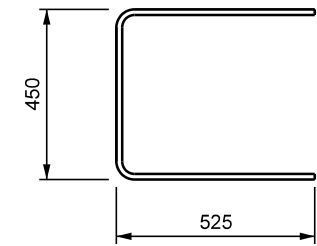
TSTM94c



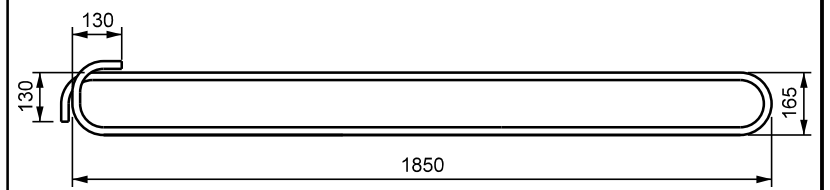
MARK	TYPE	PIN DIAMETER (mm)	TOTAL LENGTH (mm)	MASS			BENDING DIAGRAM		
				kg	kg/m				
					INTERIOR SEC.	END SEC.	DIMENSION		
A	B	C							
1512a	BENT	65	600	0.94	0.29	--	348	252	3
1512b	BENT	65	600	0.94	0.29	--	349	251	6
1512c	BENT	65	600	0.94	0.29	--	350	250	10
1512d	BENT	65	600	0.94	0.29	--	351	249	13
1512e	BENT	65	601	0.94	0.29	--	352	248	17
1512f	BENT	65	601	0.94	0.29	--	353	247	20
1512g	BENT	65	602	0.94	0.29	--	343	258	25
1512h	BENT	65	602	0.94	0.29	--	325	277	30
1512i	BENT	65	602	0.95	0.30	--	310	292	35
1512j	BENT	65	603	0.95	0.30	--	299	304	40
1512k	BENT	65	603	0.95	0.30	--	290	314	45
1512l	BENT	65	604	0.95	0.30	--	282	318	51



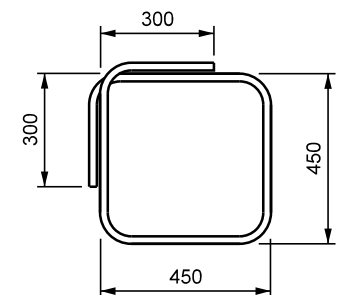
1522	BENT	65	1459	2.29	--	2.15
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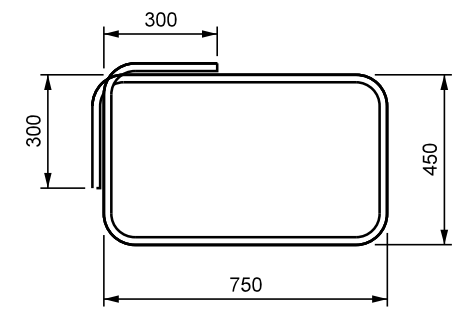
2001	BENT	125	4173	9.83	18.43	9.21
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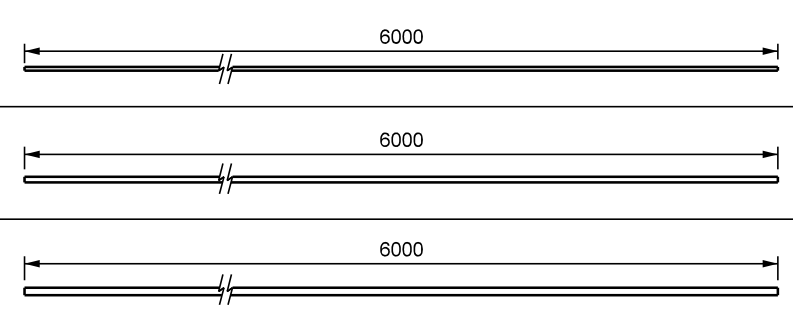
2002	BENT	125	2285	5.38	10.09	--
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2003	BENT	125	2883	6.79	12.73	23.19
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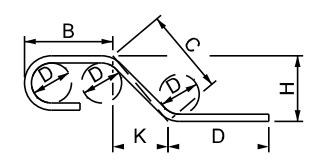


LONGITUDINAL REINFORCING - MASS (kg/m)					
BAR	INTERIOR SECTION	END SECTION	FOOTING		
			OPTION 1	OPTION 2	OPTION 3
10M	8.24	8.24	--	--	--
15M	--	--	19.78	9.89	--
20M	--	--	--	--	19.78



**NOTES:**

- ALL DIMENSIONS GIVEN IN BENDING DIAGRAM ARE OUT TO OUT, EXCEPT RADII AND EXTENSIONS ON 90°, 135° & 180° HOOKS. EXTENSIONS ON 90°, 135° & 180° HOOKS ARE THE "A" OR "G" DIMENSIONS FOR THE STANDARD 90°, 135° & 180° HOOKS REFERENCED FROM THE RSIC "MANUAL OF STANDARD PRACTICE". RADII ARE INSIDE DIMENSIONS. ALL REINFORCING STEEL BENDS AND HOOKS SHALL CONFORM TO CLAUSE 6.6.2 OF CSA A23.1 UNLESS NOTED OTHERWISE IN THE BILL OF REINFORCING STEEL.
- 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 Infrastructure**  
Traffic Engineering

**MANITOBA CONSTRAINED WIDTH CONSTANT SLOPE BARRIER - MEDIAN NESTED THRIE BEAM TO TL-4**

SHEET NO: 9 OF 9	DATE: 2020 - 08
DESIGNED BY: H. LARSEN	
DRAWN BY: L. LIEBRECHT	
REVIEWED BY: N. JOYAL	
<b>TSTM94c</b>	