

DESIGN DATA

GENERAL

- THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE CONTRACT SPECIFICATIONS.
- THE GEOMETRY, LAYOUT, AND ANY DETAILS DEPICTING THE EXISTING STRUCTURE ARE BASED ON EXISTING DRAWINGS AND LIMITED FIELD SURVEY DATA. THE CONTRACTOR SHALL REFER TO THE 1952, 1969 AND 1984 RECORD DRAWINGS FOR ADDITIONAL INFORMATION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY ALL NECESSARY DIMENSIONS SUCH THAT THE WORK CAN BE CONSTRUCTED AS SHOWN ON THESE DRAWINGS. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE CONTRACT ADMINISTRATOR PRIOR TO CONSTRUCTION.
- WHOLE DIMENSIONS SHOWN ON THESE DRAWINGS ARE IN MILLIMETERS. DECIMAL DIMENSIONS ARE IN METRES. THE ORIGINAL BRIDGE STRUCTURE (1952) AND WIDENING (1969) WERE CONSTRUCTED WITH IMPERIAL UNITS OF MEASURE. HARD UNIT CONVERSIONS WERE USED WHERE APPLICABLE.
- THE SCALES SHOWN ON THESE DRAWINGS ARE CORRECT FOR A1 SIZED DRAWING SHEETS. DO NOT DETERMINE DIMENSIONS BY SCALING OFF DRAWINGS.
- THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE EXACT LOCATIONS OF ALL EXISTING ABOVE GROUND AND BELOW GROUND UTILITIES AND REPORTING ANY DISCREPANCIES OR CONFLICTS TO THE CONTRACT ADMINISTRATOR PRIOR TO CONSTRUCTION.
- EXCEPT WHERE INDICATED OTHERWISE, THESE DRAWINGS SHOW DETAILS FOR THE COMPLETED STRUCTURE. THE CONTRACTOR IS RESPONSIBLE FOR THE SAFETY OF WORKERS AND THE DESIGN AND STABILITY OF ANY TEMPORARY WORKS DURING CONSTRUCTION. CONSTRUCTION METHODS REQUIRING THE TEMPORARY INSTALLATION OF SHORING, SCAFFOLDING, BRACING, ETC. SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR FOR REVIEW AND ACCEPTANCE PRIOR TO PROCEEDING WITH THE WORK IN ACCORDANCE WITH THE SPECIFICATIONS. THE CONTRACTOR SHALL RETAIN A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF MANITOBA TO PERFORM AND TAKE PROFESSIONAL RESPONSIBILITY FOR ANY SUCH DESIGNS NECESSARY TO COMPLETE CONSTRUCTION AND AS REQUIRED BY THE CONTRACT DOCUMENTS.

STRUCTURAL DESIGN DATA

DESIGN CODES:

- CAN/CSA-S6-14 CANADIAN HIGHWAY BRIDGE DESIGN CODE (CHBDC) (PRIMARY)
- AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH EDITION, 2016 INTERIMS (SUPPLEMENTARY)
- TAC GUIDE TO BRIDGE TRAFFIC AND COMBINATION BARRIERS, 1ST EDITION, 2010

DESIGN LIFE:

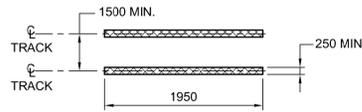
- DESIGN SERVICE LIFE FOR BRIDGE WORKS: 40 YEARS
- DESIGN SERVICE LIFE FOR CATHODIC PROTECTION FOR ABUTMENTS: 40 YEARS
- DESIGN SERVICE LIFE FOR UNDERPASS WORKS: 75 YEARS

LIVE LOAD:

- DESIGN**
 - CAN/CSA-S6-14 CL-625 TRUCK & LANE
 - CAN/CSA-S6-16 PEDESTRIAN LOADING (SIDEWALK AND UNDERPASS)
 - CAN/CSA-S6-16 MAINTENANCE VEHICLE (SIDEWALK AND UNDERPASS)
 - DYNAMIC LOAD ALLOWANCE = 25% (BRIDGE) AS PER CAN/CSA-S6-14 = 21% (PEDESTRIAN-CYCLIST UNDERPASS) AS PER CAN/CSA-S6-14
 - ALL BRIDGE AND PEDESTRIAN-CYCLIST UNDERPASS WORKS WERE LOAD RATED FOR THE FOLLOWING VEHICLES IN ACCORDANCE WITH SECTION 14 OF CAN/CSA-S6-14:
- LOAD RATING**
 - OVERLOAD NO. 1 (63.5 TONNE GVW) TRUCK & LANE ($\alpha_{LL} = 1.63$)
 - OVERLOAD NO. 2 (68.0 TONNE GVW) TRUCK & LANE - PERMIT ($\alpha_{LL} = 1.53$)
 - OVERLOAD NO. 3 (119.0 TONNE GVW) TRUCK & LANE - PERMIT & CONTROLLED MOVEMENT ($\alpha_{LL} = 1.50$)

CONSTRUCTION LOADING FOR DECK REMOVALS:

- DESIGN**
 - TRACKED HYDRO-DEMOLITION ROBOT (MAXIMUM GVW = 2500 KG)



PLAN OF HYDRO-DEMOLITION ROBOT LOADING

- DYNAMIC LOAD ALLOWANCE FOR HYDRO-DEMOLITION ROBOT = 40%
- CONSTRUCTION LIVE LOAD = 2.4 kPa
- CONSTRUCTION LIVE LOAD FACTOR = 1.2

PEDESTRIAN/CYCLIST AND TRAFFIC BARRIERS:

- DESIGN BARRIER EXPOSURE INDEX, $B_e = 28$
- DESIGN BARRIER TEST LEVEL = TL-4

DESIGN ASSUMPTIONS:

- NO LIVE LOAD DISTRIBUTION THROUGH FILL ASSUMED FOR PEDESTRIAN-CYCLIST UNDERPASS
- PROVISION OF FUTURE 150 mm ASPHALTIC WEARING SURFACE OVER PEDESTRIAN-CYCLIST UNDERPASS

TRANSPORTATION DESIGN DATA

DESIGN CODES:

- CITY OF WINNIPEG TRANSPORTATION STANDARDS (2012 UPDATE)
- TAC GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS, 2017

GEOTECHNICAL DESIGN DATA

GEOTECHNICAL REPORT:

- DATA IS FROM TREK GEOTECHNICAL INC.'S PRELIMINARY DESIGN GEOTECHNICAL REPORT (FILE NO. 0022-033-00, SEPTEMBER 14, 2016) AND DETAILED DESIGN GEOTECHNICAL LETTER REV 1 (FILE NO. 0022-033-00, SEPTEMBER 22, 2017). REFER TO GEOTECHNICAL DOCUMENTS FOR DETAILED DESIGN DATA AND RECOMMENDATIONS.
- THE CONTRACTOR SHALL READ AND UNDERSTAND THE REQUIREMENTS OUTLINED IN THESE REPORTS PRIOR TO COMMENCING THE WORKS.

LOADING:

EARTH LOAD FOR UNDERPASS:

- STANDARD INSTALLATION FOR CONCRETE BOX SECTIONS IN TRENCHES AS PER CAN/CSA-S6-14
- B1 INSTALLATION TYPE
- VERTICAL ARCHING FACTOR, $\lambda_v = 1.20$
- MINIMUM HORIZONTAL ARCHING FACTOR, $\lambda_h = 0.30$
- MAXIMUM HORIZONTAL ARCHING FACTOR, $\lambda_h = 0.50$
- SOIL DENSITY ASSUMED $\gamma_{soil} = 22 \text{ kN/m}^3$

BEARING CAPACITIES:

- ULS = 120 kPa
- SLS = 80 kPa

HYDRAULIC DATA:

HYDRAULIC REPORT:

- DATA IS FROM BRUCE HARDING'S HYDROLOGIC & HYDRAULIC ASSESSMENT (MAY 26, 2016)

HYDRAULIC DETAILS FOR EXISTING BRIDGE:

- LOW RED RIVER LEVELS (NO BACKWATER EFFECTS)**
 - Q50% DISCHARGE = 10.8 m³/s
 - 1:2 (Q50%) H.W.L. ELEVATION = 227.01 m
 - Q1% DISCHARGE = 21.2 m³/s
 - 1:100 (Q1%) H.W.L. ELEVATION = 227.57 m
- ELEVATED RED RIVER LEVELS (BACKWATERED WITH RED RIVER AT FLOOD PROTECTION LEVEL = 230.0 M)**
 - Q50% DISCHARGE = 10.8 m³/s
 - 1:2 (Q50%) H.W.L. ELEVATION = 230.03 m
 - Q1% DISCHARGE = 21.2 m³/s
 - 1:100 (Q1%) H.W.L. ELEVATION = 230.09 m

MATERIAL NOTES

CONCRETE:

- CONCRETE SHALL CONFORM TO THE LATEST EDITION OF CAN/CSA 23.1 AND SHALL MEET THE FOLLOWING:

CONCRETE TYPE	EXPOSURE CLASS	NOMINAL COMPRESSIVE STRENGTH	MAXIMUM AGGREGATE SIZE	AIR CONTENT CATEGORY	SPECIAL REQUIREMENTS
1	S-1	35 MPa @ 56 DAYS	20 mm	2	N/A
2	C-1	35 MPa @ 28 DAYS	10 mm	1	SCC SLUMP FLOW 550-600 mm CSA A23.1 Cl. 8.9.2 LOW SHRINKAGE
3	C-1	35 MPa @ 28 DAYS	20 mm	1	SYNTHETIC FIBRES $R_i = 0.15$

- TYPE 1: OVERHEAD SIGN STRUCTURE (OHSS) FOUNDATIONS.
- TYPE 2: ABUTMENT SEAT REFACING.
- TYPE 3: ALL OTHER CONCRETE
- NOTE: SCC FOR ABUTMENT CAP REFACING TO HAVE AN ELECTRICAL RESISTIVITY <15,000 ohm-cm
- CEMENTITIOUS MATERIALS SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF CAN/CSA A3001. SILICA FUME SHALL NOT EXCEED 8% BY MASS OF CEMENT. FLY ASH SHALL BE CLASS C1 OR F AND SHALL NOT EXCEED 30% BY MASS OF CEMENT.
- ALL NEW EXPOSED CONCRETE SURFACES OF THE BRIDGE SUPERSTRUCTURE SHALL RECEIVED AN APPROVED SILANE SEAL COAT.
- ALL EXPOSED EDGES OF CONCRETE TO BE CHAMFERED SHALL BE 20 mm UNO.

REINFORCING STEEL:

REINFORCING STEEL DESIGN STANDARDS SHALL BE AS FOLLOWS:

- LOW-CARBON, CHROMIUM REINFORCEMENT SHALL CONFORM TO THE REQUIREMENTS OF ASTM A1035 CM GRADE 100. MMFX CHROMX 4000 SERIES IS AN APPROVED PRODUCT.
- STAINLESS STEEL REINFORCING SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF ASTM A655, 300 SERIES. MINIMUM GRADE 420. STAINLESS STEEL REINFORCING SHALL BE ONE OF THE FOLLOWING:

TYPE OF STAINLESS STEEL REINFORCING		
COMMON OR TRADE NAME	AIISI TYPE	UNS DESIGNATION
TYPE 316LN	316LN	S31653
TYPE 2205 DUPLEX	2205	S32205
TYPE 2304 DUPLEX	2304	S32304

REINFORCING TYPES SHALL BE AS FOLLOWS:

COMPONENT	TYPE OF STEEL REINFORCING
BRIDGE DECK, DIAPHRAGMS BRIDGE APPROACH SLABS BRIDGE SHOULDER BARRIERS BRIDGE MEDIAN BARRIERS	ASTM A955, 300 SERIES STAINLESS STEEL
BRIDGE ABUTMENT BRIDGE WINGWALLS UNDERPASS STRUCTURE UNDERPASS APPROACH SLABS RETAINING WALL COPING RETAINING WALL CLADDING FERMOR ROADSIDE BARRIERS FERMOR MEDIAN BARRIERS	ASTM A1035 CM GRADE 100 LOW-CARBON CHROMIUM STEEL

MINIMUM LAP LENGTHS SHALL BE AS FOLLOWS:

STAINLESS STEEL & MMFX REINFORCING						
BARS	16	19	22	25	30	35
STANDARD BAR LAPS (mm)	600	800	NA	1100	1600	2200
TOP BAR * LAPS (mm)	850	1100	NA	1550	2150	3050

* HORIZONTAL REINFORCEMENT WITH MORE THAN 300mm CONCRETE BELOW BARS.

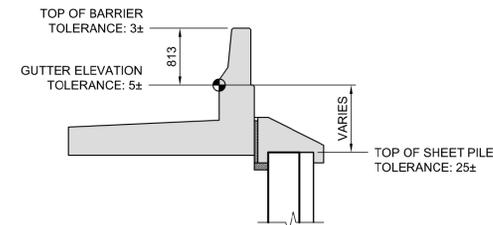
- CONCRETE COVER SHALL BE 60 mm U/N.
- REINFORCING STEEL SHALL BE DENOTED BY THE FOLLOWING SUFFIX AFTER THE DESIGNATED BAR MARK NUMBER:
STAINLESS STEEL - S
LOW-CARBON, CHROMIUM-X

MISCELLANEOUS METAL:

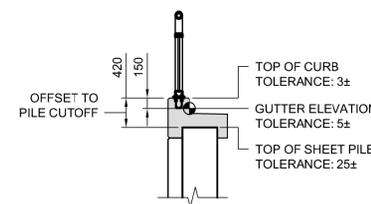
- MISCELLANEOUS METALS SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF CAN/CSA G40.21, MINIMUM GRADE 300W.
- WELDING OF MISCELLANEOUS METALS SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF CAN/CSA W59.
- ALL HOT-DIP GALVANIZING SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF CAN/CSA G164 AND ASTM A123, TO A RETENTION OF 610 g/m².
- ALL STAINLESS STEEL SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF ASTM A167, TYPES 304 OR 316.

SHEET PILING:

- PROFILE: PZC-26
- SECTION DEPTH (HEIGHT) = 450 mm
- NOMINAL WIDTH = 708 mm
- WEB THICKNESS = 13.3 mm
- FLANGE THICKNESS = 15.2 mm
- SECTION X-SECTIONAL AREA = 140.1 cm²
- SECTION MODULUS PER SINGLE SECTION = 1,840 cm³
- MOMENT OF INERTIA PER SINGLE SECTION = 41,390 cm⁴
- ALL SHEET PILES SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF CAN/CSA G40.21, MINIMUM GRADE 350W.
- PILES SHALL BE CONTINUOUS LENGTHS TO THE ELEVATIONS SHOWN. SPLICING OF SHEET PILES IS NOT PERMITTED.
- DRIVING TOLERANCES AS SHOWN ON DETAILS BELOW.
- PILES SHALL NOT BE MORE THAN 1% OF LENGTH OUT OF VERTICAL ALIGNMENT.
- PRIOR TO CONSTRUCTION OF THE CONCRETE CLADDING, THE SURFACE OF THE SHEET SHALL BE PREPARED TO SSDC-SP7 BRUSH-OFF BLAST.



AT ROADSIDE BARRIERS



AT SIDEWALK CURB

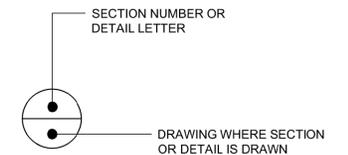
PROFILE ELEVATIONS AND PERMISSIBLE TOLERANCES FOR SHEET PILES

1:50

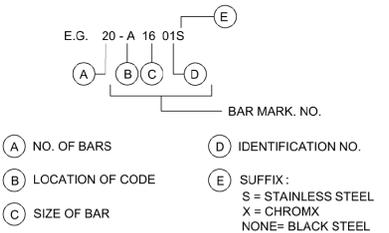
ABBREVIATIONS

ABUT.	- ABUTMENT	LONGIT.	- LONGITUDINAL
ALT.	- ALTERNATING	LVC	- LENGTH OF VERTICAL CURVE
ALUM.	- ALUMINUM	MAX.	- MAXIMUM
APPROX.	- APPROXIMATE	MIN.	- MINIMUM
BVCS	- BEGIN VERTICAL CURVE STATION	Mk.	- MARK
BVCE	- BEGIN VERTICAL CURVE ELEVATION	M.U.P.	- MULTI USE PATH
BRG.	- BEARING	NB	- NORTHBOUND
BOT.	- BOTTOM	N.F.	- NORTH FACE
B.S.	- BOTH SIDES	NO.	- NUMBER
C/C	- CENTRE TO CENTRE	N.T.S.	- NOT TO SCALE
CL	- CLEAR	O.C.	- ON CENTER
CL	- CENTER LINE	O.D.	- OUTSIDE DIAMETER
CONC.	- CONCRETE	O.F.	- OUTSIDE FACE
CONT.	- CONTINUOUS	O/O	- OUT TO OUT
C/W	- COMPLETE WITH	OPP.	- OPPOSITE
DIA.	- DIAMETER	PL	- PLATE
DIAG.	- DIAGONAL	PROP.	- PROPOSED
DL	- DEAD LOAD	PT.	- POINT
DWL	- DOWEL	PVI	- POINT OF VERTICAL INTERSECTION
EA.	- EACH	REINF.	- REINFORCING
EB	- EASTBOUND	RET.	- RETAINING
E.F.	- EAST FACE	REQ'D	- REQUIRED
EL.	- ELEVATION	R.O.W.	- RIGHT OF WAY
EVCS	- END VERTICAL CURVE STATION	SB	- SOUTHBOUND
EVCE	- END VERTICAL CURVE ELEVATION	SHLDR.	- SHOULDER
EXIST.	- EXISTING	SK	- SKEWED
EXP. JT.	- EXPANSION JOINT	SP.	- SPACES
EXT.	- EXTERIOR	SQ.	- SQUARE
EQ. SP.	- EQUALLY SPACED	S.S.	- STAINLESS STEEL
FBCC/FOC	- FIBRE OPTIC CABLE	STA	- STATION
FCM	- FRACTURE CRITICAL MEMBER	SU.	- SUBSTRUCTURE UNIT
F.F.	- FRONT FACE	THK.	- THICK
FIX.	- FIXED	T.O.	- TOP OF
GALV.	- GALVANIZED	TYP.	- TYPICAL
HORZ.	- HORIZONTAL	U/N	- UNLESS NOTED OTHERWISE
HT.	- HEIGHT	U/S	- UNDERSIDE
I.D.	- INSIDE DIAMETER	VERT.	- VERTICAL
I.F.	- INSIDE FACE	WB	- WESTBOUND
K	- K VALUE	W.P.	- WORKING POINT
LDS	- LAND DRAINAGE SEWER		

SECTION AND DETAILS



CODE FOR REINFORCING STEEL



DESIGNED BY	DRA	CHECKED BY	SSR
DRAWN BY	NBG	APPROVED BY	MBL
HOR. SCALE	AS SHOWN	RELEASED FOR CONSTRUCTION	
VERTICAL	AS SHOWN		
ISSUED FOR TENDER	18/02/09	DRA	
NO. REVISIONS	DATE	BY	DATE
0	2018/02/09	DRA	

ENGINEER'S SEAL	PROVINCE OF MANITOBA	D.R.C. AMORIM	Member 33215
CONSULTANT PROJECT NUMBER			
17-5932			

		THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT	
FERMOR AVENUE BRIDGE OVER SEINE RIVER BRIDGE RE-ABILITATION, PEDESTRIAN-CYCLIST UNDERPASS STRUCTURE AND ROADWORKS FROM ST. ANNE'S ROAD TO ARCHIBALD STREET		CITY DRAWING NUMBER B-118-2017-CS-001	
SHEET 001 OF 100		CONSULTANT DRAWING NUMBER CS-001	
GENERAL NOTES			