GENERAL NOTES

1. THE METRIC SYSTEM OF MEASUREMENT IS USED ON ALL DRAWINGS. ELEVATIONS AND STATIONS ARE SHOWN IN METERS AND ALL OTHER DIMENSIONS ARE SHOWN IN MILLIMETERS.
2. CONTRACTOR MUST VERIFY ALL EXISTING GEOMETRY AS WELL AS PROPOSED DIMENSION AND LAYOUT IN THE FIELD PRIOR TO FABRICATION AND CONSTRUCTION AND NOTIFY THE CONTRACT ADMINISTRATOR OF ANY CHANGES.
3. CONTRACTOR MUST VERIFY ALL EXISTING UTILITIES PRIOR TO EXCAVATION OR CONSTRUCTION.
4. ANY DAMAGE TO EXISTING STRUCTURES AND UTILITIES BY THE CONTRACTOR'S OPERATIONS MUST BE REPAIRED BY THE CONTRACTOR AT HIS OWN COST.
5. ALL REFERENCES TO CODES, STANDARDS, SPECIFICATIONS, GUIDELINES, ETC., SHALL MEAN THE LATEST EDITION.

BRIDGE DESIGN DATA

1. DESIGN CODES:
   - AREMA, 2016 UNLESS NOTED OTHERWISE
   - CN GUIDELINES FOR DESIGN OF RAILWAY STRUCTURES, JAN 2006
2. DESIGN LIVE LOAD:
   COOPER E90: VERTICAL LOAD
   TRACTION & BRAKING
   ALTERNATIVE LIVE LOAD AS PER AREMA
3. LIVE LOAD IMPACT FACTOR: 35.39% 21.7 m SPAN
   38.32% 17.6 m SPAN
4. BALLAST DEPTH: 405 mm PRESENT (MINIMUM) AND 305 mm ADDITIONAL IN FUTURE
5. STRUCTURAL STEEL ALLOWABLE STRESSES:
   TENSION CSA GRADE 350W/WT 192.5 MPa

FOUNDATION NOTES

1. STEEL H-PILES SHALL CONFORM TO CSA G40.20/G40.21, GRADE 350W.
   PILE TIP REINFORCING PLATES SHALL CONFORM TO CSA G40.20/G40.21, GRADE 300W.
2. PERMANENT STEEL CASING SHALL CONFORM TO ASTM A252, GRADE 3 (Fy = 310 MPa).
3. FOR GEOTECHNICAL DESIGN SEE PRELIMINARY DESIGN GEOTECHNICAL REPORT BY AECOM CANADA LTD. DATED JANUARY 2015.
4. THE CONTRACTOR SHALL NOTIFY THE CONTRACT ADMINISTRATOR, WHO WILL NOTIFY THE GEOTECHNICAL ENGINEER FOR INSPECTION ONCE EXCAVATION HAS BEEN CARRIED OUT TO DESIGN ELEVATIONS.
5. BACKFILL SHALL NOT BE PLACED AGAINST THE ABUTMENTS UNTIL THE CONCRETE HAS ACHIEVED THE FULL 28 DAY STRENGTH.
6. HEAVY EARTH COMPACTING EQUIPMENT, OR OTHER HEAVY CONSTRUCTION EQUIPMENT SHALL NOT BE USED WITHIN 3.0 m OF THE ABUTMENTS, WING WALLS AND PIERS. SMALL PLATE PACKERS MUST BE USED IN THESE AREAS.

CONCRETE NOTES

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH CSA-A23.1.
2. CEMENT SHALL CONFORM TO THE REQUIREMENTS OF CSA STANDARD LATEST EDITION.
3. ALL CAST-IN-PLACE CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS, CEMENT TYPE, EXPOSURE CLASS, AND WATER/CEMENT RATIO AS FOLLOWS:

	STRENGTH	CEMENT TYPE	CLASS	AIR CONTENT
TYPE 1 - FOUNDATIONS	35 MPa	TYPE HS	CLASS S1	5 - 8%
TYPE 2 - CAISSONS	35 MPa	TYPE HS	CLASS S1, C1	5 - 8%
TYPE 3 - ABUTMENTS	35 MPa	TYPE GU	CLASS S1	5 - 8%
TYPE 4 PIER CAP, DECK, TRAINMAN'S WALKWAY	35 MPa	TYPE GU	CLASS C1	5 - 8%
TYPE 5 TRAFFIC BARRIERS C/W FOOTINGS AND CAPS, SLOPE PAVING	35 MPa	TYPE GU	CLASS C1 (WITH FIBRES)	5 - 8%

4. CONCRETE CLEAR COVER TO REINFORCEMENT UNLESS NOTED OTHERWISE:

CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	100 ± 25
FOOTING, PIER, ABUTMENT EXPOSED TO EARTH	60 ± 10
ABUTMENT NOT EXPOSED TO EARTH, PIER CAP	60 ± 10
TRAFFIC BARRIERS, SLOPE PAVING	60 + 10, -0
DECK AND TRAINMAN'S WALKWAY	50 + 10, -0

5. ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 20 mm UNLESS NOTED OTHERWISE.
6. PRIOR TO POURING CONCRETE THE CONTRACTOR SHALL CHECK FOR ALL OPENINGS, ANCHOR BOLTS, INSERTS AND EMBEDDED ITEMS REQUIRED FOR MECHANICAL, ELECTRICAL OR UTILITY SUPPORT PURPOSES AS SHOWN ON THE DRAWINGS. ANY DISCREPANCIES NOT REPORTED TO THE CONTRACT ADMINISTRATOR FOR CLARIFICATION WILL BECOME THE RESPONSIBILITY OF THE CONTRACTOR.
7. GROUT SHALL BE OF THE NON-SHRINK, NON-METALLIC TYPE. MINIMUM 28 DAYS COMPRESSIVE STRENGTH SHALL BE 40 MPa.
8. BONDING SURFACE BETWEEN NEW AND PREVIOUSLY POURED CONCRETE SHALL BE SATURATED SURFACE DRY. ROUGHENED CONCRETE SURFACES SHALL BE WET ABRASIVE BLAST CLEANED TO SOUND CONCRETE IN ACCORDANCE WITH ASTM STANDARD D 4259. OBTAINED SURFACE PROFILE SHALL BE EQUIVALENT TO ICRI CSP 10 OR APPROXIMATELY 6 mm AMPLITUDE SURFACE ROUGHNESS.
9. BEARING SEATS SHALL BE FINISHED SMOOTH AND LEVELED TO EXACT ELEVATION SHOWN.

REINFORCING STEEL NOTES

1. FOR PIERS AND ABUTMENTS: REINFORCING STEEL CONFORMING TO CAN/CSA-G30.18 GRADE 400W, UNLESS NOTED OTHERWISE.
2. FOR DECK AND TRAINMAN'S WALKWAY: MICRO COMPOSITE REINFORCING STEEL CHROMX 9000 (MMFX2) CONFORMING TO A1035 CS AASHTO M31, GRADE 100 (690 MPa).
3. FOR TRAFFIC BARRIERS: STAINLESS STEEL CONFORMING TO ASTM A955M, GRADE 60 (420), TYPE 2205 DUPLEX (UNS S30803), TYPE 316 LN (UNS S31653, TYPE XM-28 (S24100), TYPE 2304 (UNS S32304).
4. FOR PIER CAISSONS, PIER CAPS, AND SLOPE PAVING: GALVANIZED REINFORCEMENT SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM A767M-16 TO A MINIMUM ZINC THICKNESS OF 610 g/m^2.
5. ALL LAPS OF REINFORCING BARS FOR SPLICES SHALL BE AS FOLLOWS:

BLACK/ GALVANIZED	EQUIVALENT STAINLESS STEEL DIA. / CHROMX	REBAR	TOP BARS *
10M	10	400	550
15M	16	600	850
20M	19	800	1100
25M	25	1100	1550
30M	29	1600	2150
35M	36	2200	3050

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

6. REINFORCEMENT LAPS TO BE STAGGERED UNLESS NOTED OTHERWISE.

STRUCTURAL STEEL

1. STEEL DESIGN IN ACCORDANCE WITH LISTED DESIGN CODES.
2. WORKMANSHIP, MATERIALS AND STEEL FABRICATION SHALL BE IN ACCORDANCE WITH THE AREMA AND CN RAILWAY SPECIFICATIONS.
3. WELDING SHALL BE IN ACCORDANCE WITH CSA-W59.
4. ALL STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:

   STRUCTURAL STEEL: CSA G40.21
   GRADE 350WT, CATEGORY 5: IN GIRDER WEBS, FLANGES, BEARING STIFFENER PLATES
   GRADE 350W: TEMPORARY BRACING, INTERMEDIATE STIFFENER ANGLES AND ALL REMAINING MEMBERS.
   GRADE 300W: FOR BEARING PLATES.
5. STRUCTURAL STEEL CONFORMING TO CAN CSA G40.21, CHARPY V-NOTCH IMPACT TESTING, IMPACT TEST REQUIREMENTS WILL BE AS PER ZONE 3 SERVICE TEMPERATURES OF TABLE 15-1-14 OF AREMA CHAPTER 15 FOR FRACTURE CRITICAL MEMBERS, AND WILL BE AS PER ZONE 3 SERVICE TEMPERATURES OF TABLE 15-1-2 FOR NONFRACTURE CRITICAL ELEMENTS.
6. ALL SHOP AND FIELD CONNECTIONS SHALL BE BOLTED WITH HIGH-STRENGTH BOLTS EXCEPT WHERE OTHERWISE SHOWN OR NOTED IN THE DRAWINGS TO BE BOLTED WITH MACHINE BOLTS OR WELDED.
7. ALL HIGH-STRENGTH BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A325, TYPE 1, AND HAVE A HARDENED WASHER UNDER THE ELEMENT TURNED IN TIGHTENING.
8. BOLTS SHALL BE 22 mm DIAMETER UNLESS NOTED OTHERWISE.
9. HOLES SHALL BE 2 mm LARGER THAN BOLT SIZE UNLESS OTHERWISE NOTED FOR SHOP FASTENERS AND 3 mm LARGER THAN BOLT SIZE UNLESS OTHERWISE NOTED FOR FIELD FASTENERS. HOLES FOR SHOP FASTENERS SHALL BE SUBPUNCHED OR SUBDRILLED AND REAMED THROUGH A TEMPLATE IN ACCORDANCE WITH AREMA SPECIFICATIONS.
10. BOLT HEADS SHALL BE INSTALLED ON THE EXPOSED SURFACES OF THE GIRDER UNLESS NOTED OTHERWISE.
11. TIGHTENING OF BOLT SHALL BE DONE BY THE TURN-OF-NUT METHOD AS PER AREMA AND SPECIFICATIONS FOR STRUCTURAL JOINTS USING A325 BOLTS.
12. SHOP ASSEMBLY AND MATCH MARKING OF ALL STRUCTURAL STEEL IS REQUIRED TO ENSURE PROPER FIT.
13. IN ADDITION TO THE REQUIREMENTS OF AREMA CHAPTER 15, SECTION 1.14 AND 3.5, NON-DESTRUCTIVE TESTING OF WELDS SHALL BE PERFORMED IN ACCORDANCE WITH CN GUIDELINES FOR DESIGN OF RAILWAY STRUCTURES AND SPECIFICATION HC05121 "STRUCTURAL STEEL FABRICATION FOR RAILWAY BRIDGES" AS FOLLOWS:
    a. VISUAL EXAMINATION - 100% OF ALL WELDS
    b. RADIOGRAPH TEST METHOD
       100% OF BUTT JOINT GROOVE WELDS IN FLANGE SPLICES ON TENSION ZONES INSPECTED AFTER STRESS RELIEVING.
       100% OF BUTT JOINT GROOVE WELDS IN FLANGE AND WEB SPLICES .
    c. ULTRASONIC TEST METHOD
       100% OF ALL BEARING STIFFENER TO FLANGE WELDS OF GIRDERS AND BEAMS.
    d. MAGNETIC PARTICLE TEST METHOD
       ALL FLANGE TO WEB FILLET WELDS 50% CONCENTRATED AT THE CENTER OF THE GIRDERS, AT EVERY STOP AND START LOCATION AND REPAIR LOCATION.
14. NONDESTRUCTIVE TESTING OF THE FRACTURE CRITICAL MEMBERS TO BE PERFORMED BY AN INDEPENDENT TESTING COMPANY APPROVED BY THE CONTRACT ADMINISTRATOR , THE CITY, AND CN AND CONTRACTED FOR BY THE CONTRACT ADMINISTRATOR. PERSONNEL QUALIFICATION AND CERTIFICATION IS TO BE IN ACCORDANCE WITH CURRENT AREMA CHAPTER 15 SPECIFICATIONS FOR FRACTURE CRITICAL MEMBERS, COPIES OF THE TEST REPORTS SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR.
15. CERTIFIED COPIES OF THE MILL REPORTS FOR THE MATERIALS SHALL BE SUBMITTED IN ACCORDANCE WITH THE SPECIFICATIONS, CONTRACT ADMINISTRATOR'S APPROVAL MUST BE OBTAINED PRIOR TO FABRICATION.
16. THE STRUCTURAL STEEL SHALL BE CLEANED AND LEFT UNPAINTED EXCEPT WHERE SPECIFIED ON DRAWINGS.

MISCELLANEOUS METAL NOTES

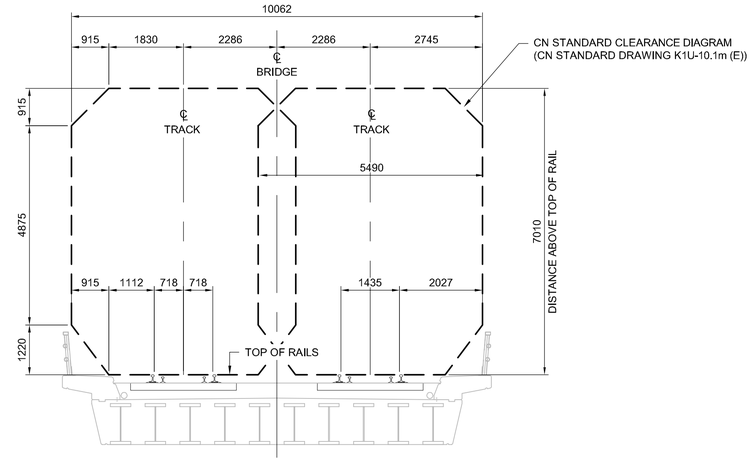
17. ALL MISCELLANEOUS METAL SHALL CONFORM TO CAN/CSA-G40.21 GRADE 350W.
18. ALL HOLLOW STRUCTURAL SECTIONS FOR RAILING SHALL CONFORM TO G40.20/G40.21, GRADE 350W CLASS C OR ASTM A500 GRADE C.
19. BOLTS SHALL CONFORM TO ASTM STANDARD A325 UNLESS NOTED OTHERWISE.
20. ALL EXPOSED OR PARTIALLY EXPOSED MISCELLANEOUS METAL WORKS, INCLUDING BOLTS, NUTS AND WASHERS SHALL BE HOT DIP GALVANIZED, GALVANIZING SHALL CONFORM TO ASTM A123 TO A NET RETENTION OF 610 g/m² UNLESS NOTED OTHERWISE.
21. WHERE GALVANIZING IS DAMAGED, REPAIR WITH TWO COATS OF ONE COMPONENT ZINC-RICH COATING CONTAINING 96% NON-TOXIC ELECTROLYTIC ZINC POWDER (PURE TO 99.995%) AND NON-TOXIC SOLVENT.

TEMPORARY SHORING NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND IMPLEMENTATION OF TEMPORARY SHORING WALLS AS SHOWN ON THE DRAWINGS.
2. DESIGN OF THE TEMPORARY SHORING WALLS SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF CN DESIGN CRITERIA FOR THE SHORING WALLS, CONSTRUCTION AND MONITORING GUIDELINE AND AREMA REQUIREMENTS.
3. THE TEMPORARY SHORING WALLS SHALL BE DESIGNED TO RESIST LATERAL EARTH PRESSURE AND LATERAL FORCES FROM LIVE LOAD SURCHARGES INCLUDING RAILWAY LOADING AND ANTICIPATED CONSTRUCTION ACTIVITIES.
4. LATERAL PRESSURE FROM RAILWAY LOADING SHALL BE DETERMINED FROM THE LATEST CN GUIDELINES AND AREMA MANUAL USING COOPER E90 LOADING.

ABBREVIATIONS

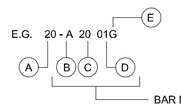
ABUT.	- ABUTMENT	EXP. JT.	- EXPANSION JOINT	OPP.	- OPPOSITE
ALT.	- ALTERNATING	EXT.	- EXTERIOR	PL	- PLATE
APPROX.	- APPROXIMATE	EXIST.	- EXISTING	PT.	- POINT
BVCS	- BEGIN VERTICAL CURVE STATION	E.S.	- EQUALLY SPACED	PVI	- POINT OF VERTICAL INTERSECTION
BVCE	- BEGIN VERTICAL CURVE ELEVATION	FBOC/FOC	-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



STANDARD CLEARANCE DIAGRAM

SCALE 1:75

CODE FOR REINFORCING STEEL



- (A) NO. OF BARS
- (B) LOCATION OF CODE
- (C) SIZE OF BAR
- (D) IDENTIFICATION NO.
- (E) SUFFIX :
  G = GALVANIZED
  S = STAINLESS STEEL
  X = CHROMX 9000
  NONE= BLACK STEEL

APEGM
Certificate of Authorization
Dillon Consulting Limited (MB)
No. 1789 Date: 2017/01/09

NO.	REVISIONS	DATE	BY
0	ISSUED FOR TENDER	17/01/09	RE

DILLON CONSULTING

DESIGNED BY	RE	CHECKED BY	SSR
DRAWN BY	CGC	APPROVED BY	DBW
HOR. SCALE	AS SHOWN	RELEASED FOR CONSTRUCTION	
VERTICAL	AS SHOWN		
DATE		DATE	

ENGINEER'S SEAL
PROVINCE OF MANITOBA
R.B. ERIC
Member 22665
REGISTERED PROFESSIONAL ENGINEER

CONSULTANT PROJECT NUMBER
16-3353

Winnipeg

THE CITY OF WINNIPEG
PUBLIC WORKS DEPARTMENT

WAVERLEY STREET UNDERPASS AT CN MILE 3.89 RIVERS SUB
CONTRACT 2: UNDERPASS STRUCTURE, RAILWORKS, ROADWORKS, LAND DRAINAGE SEWER, PUMPING STATION AND LANDSCAPING WORKS

GENERAL NOTES AND CLEARANCE DIAGRAM

CITY DRAWING NUMBER: U-239-2016-C2-CS-001
SHEET 001 OF 085
CONSULTANT DRAWING NUMBER: C2-CS-001

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