

APPENDIX 'B'

HYDRAULIC REPORT

MEMORANDUM

TO: Craig Rowbotham, P. Eng.
CC: Andrée Kirouac, P. Eng.

FROM: Dave White, E.I.T.

DATE: January 22, 2013

PROJECT NO: 12-0107-005

RE: New Navin Drain Culvert Crossing – Hydraulic Assessment
Bishop Grandin Blvd / Shorehill Dr to Beaverhill Blvd Multi-Use Path – REV1

1.0 BACKGROUND

KGS Group carried out a hydraulic assessment for a proposed culvert crossing along the Navin Drain, which is required as part of the design of the multi-use path from Shorehill Dr. to Beaverhill Blvd. for the City of Winnipeg. The Navin Drain is a third order drain that runs west from a point near the Red River Floodway Channel along Bishop Grandin Blvd. to the Seine River (see Figure 1). In 2011, a similar culvert crossing was constructed along the Navin Drain immediately east of Lagimodiere Blvd. for a different multi-use path. The hydraulic assessment report for this crossing was prepared by Bruce Harding Consulting Ltd. in November 2010 and is included in Appendix A.

The drainage area associated with the Navin Drain is shown in Figure 1 and primarily consists of an area east of Lagimodiere Blvd. The residential communities along the north and south side of Bishop Grandin Blvd as well as the new Sage Creek development have their own separated land drainage systems and do not flow to the Navin Drain. Furthermore, the Southland Park residential area, highlighted in yellow in Figure 1, drains to Storm Retention Basin (SRB) 5-21 which gradually releases flow to a ditch downstream and eventually to the Navin Drain. As such, this area does not contribute to peak flows in the Navin Drain and has therefore been excluded from the total contributing drainage area. The total drainage area contributing to peak flows in the Navin Drain is approximately 1805 ha.

Based on information provided in the 2010 report, Fisheries and Oceans Canada has classified the drain as Class E. Therefore, fish passage guidelines including maximum permissible velocity and pipe embedment have not been considered as part of the design of the proposed crossing. Similarly, because it is assumed that the Navin Drain is not navigable, the proposed culvert design does not consider any requirements based on the Transport Canada Navigable Waters Act.

2.0 HYDROLOGY

As part of the KGS Group hydraulic assessment, a cursory review of the hydrologic analysis carried out by Bruce Harding Consulting Ltd. was undertaken. The analysis was included as part of Bid Opportunity 538-2011. It is our understanding that the report was reviewed and approved by the City of Winnipeg Water and Waste Department, and was therefore used as the basis for the hydraulic assessment for the new Navin Drain crossing.

The flows referenced in the report were determined based on a combination of the Rational Method (for small rural drainage areas up to 1300 ha) and the Regional Flood Curves (for drainage areas greater than 3900 ha). For drainage areas between these two limits, interpolation between the two methods is used. The 2010 Bruce Harding report identified the contributing drainage area as 1840 ha which included Sage Creek prior to its development. Since this area no longer contributes to Navin Drain, the existing drainage area has been reduced to approximately 1805 ha. However, the 3% discharge of 7.1 m³/s from the 2010 Bruce Harding report was still utilized for the design of the proposed culvert crossing since it had previously been accepted by the City, acknowledging that it was considered to be somewhat conservative.

3.0 HYDRAULIC ASSESSMENT

The preliminary design drawings of the proposed crossing are included in Appendix B. The proposed culvert design, as shown on the KGS Group preliminary design drawing C380-12-01, consists of a cast-in-place concrete box culvert that is approximately 23.2 m in length. The approach apron of the channel will be 5.93 m with 4:1 side slopes and flared wingwalls. Minor changes to the preliminary design may occur, but should not affect the overall performance of the culvert.

A HEC-RAS model of the Navin Drain, extending from the Seine River to downstream of the Lagimodiere crossing was provided by the City of Winnipeg and used for the hydraulic analysis of the proposed crossing. Two additional cross sections were input into the model to represent upstream and downstream design sections as well as the proposed culvert.

The design standards used for the proposed culvert crossing are consistent with the standards outlined in the 2010 report by Bruce Harding Consulting Ltd. Grant Mohr, Branch Head - Land Drainage and Flood Protection (City of Winnipeg Water and Waste Department) also confirmed that these standards are appropriate for the proposed new Navin Drain crossing and are summarized as follows:

- Design discharge – 3% Flood;
- Maximum headloss – 0.3 m;
- Minimum soffit clearance – 0.2 m.

As part of the HEC-RAS model, assumptions need to be made with respect to the downstream boundary condition, which can be in the form of a typical tailwater level or rating curve as examples. Because the downstream water level on the drain is not known, a sensitivity analysis was carried out to assess the effect of various tailwater levels on the model results. A total of three downstream water levels were modeled:

1. Critical depth (EL 227.81 m, as determined by HEC-RAS)
2. Normal depth (EL 228.10 m, as determined by HEC-RAS)
3. Flood Protection Level (FPL) water level for the adjacent community. The City of Winnipeg

Flood Activity / Emergency Manual states that the FPL water level of the Royalwood – Island Lakes sector located immediately south of the drain is EL 229.45 m.

The resulting water surface profiles for the three tailwater levels are shown in Figure 2. As shown in the figure, the tailwater condition does not impact the hydraulic grade line at the proposed crossing.

To satisfy the above design conditions, a single box culvert, 3.0 m (width) by 2.0 m (height), results in a maximum headloss through the culvert of 0.23 m, while the soffits remain clear of the water surface by 0.49 m. Additional details of the proposed design are summarized as follows:

- Upstream invert = EL 228.81 m;
- Downstream invert = EL 228.70 m (based on existing channel grade);
- No culvert embedment or skew;
- Angled approach channel wingwalls.

4.0 CONSTRUCTION MANAGEMENT

Best management practices for working near waterways should be implemented for the construction of the proposed crossing, including seeding or applying riprap to exposed slopes and the use of erosion control blankets as required. Construction would also be best suited for the fall or winter to reduce the potential for runoff and to minimize water management requirements.

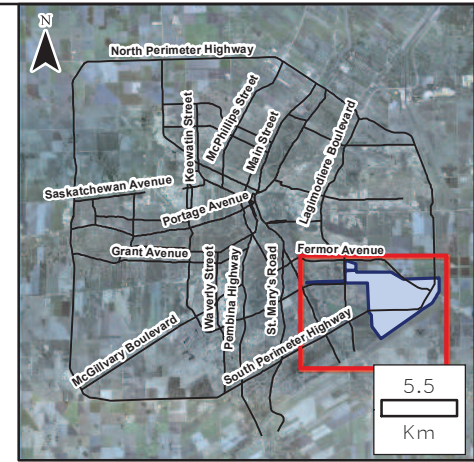
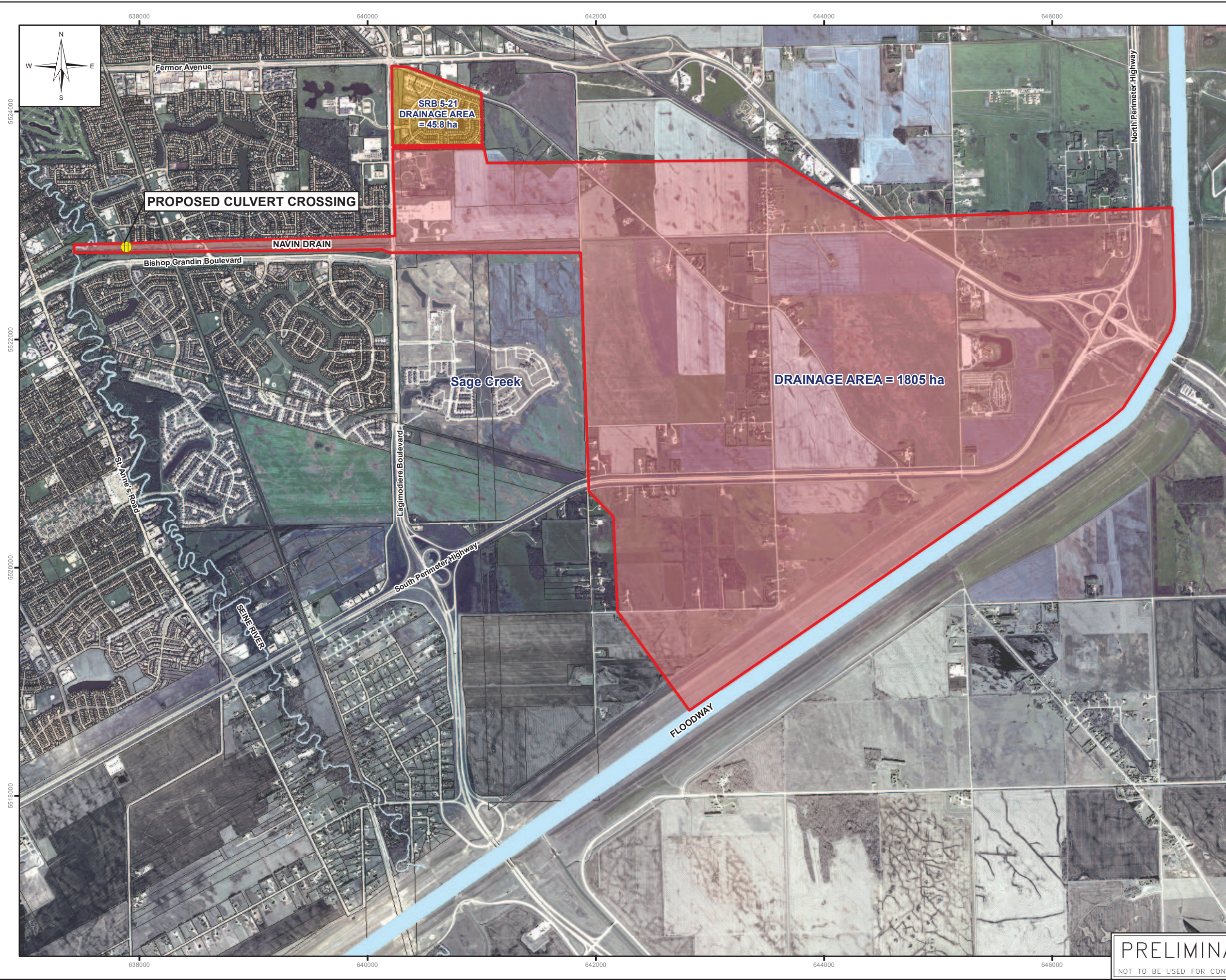
Prepared by:

Reviewed by:

Dave White, E.I.T.
Water Resources Engineer

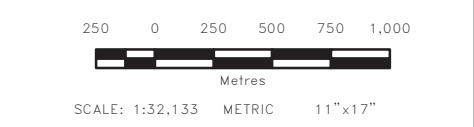
Andrée Kirouac, P. Eng,
Senior Water Resources Engineer

FIGURES



- LEGEND:**
- Navin Drain Catchment
 - SRB 5-21 Catchment
 - River or Stream
 - City of Winnipeg Lot

NOTE
1. Drainage area associated with SBR 5-21 does not contribute to peak flows in Navin Drain.



All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 14
Elevations are in metres above sea level (MSL)

NO.	YY/MM/DD	DESCRIPTION	BY
0	13/01/22	ISSUED FOR INFORMATION	DW

REVISIONS / ISSUE

KGS
GROUP
CONSULTING
ENGINEERS

PROPOSED SHOREHILL BLVD.
MULTI-USE PATH
NAVIN DRAIN CATCHMENT

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

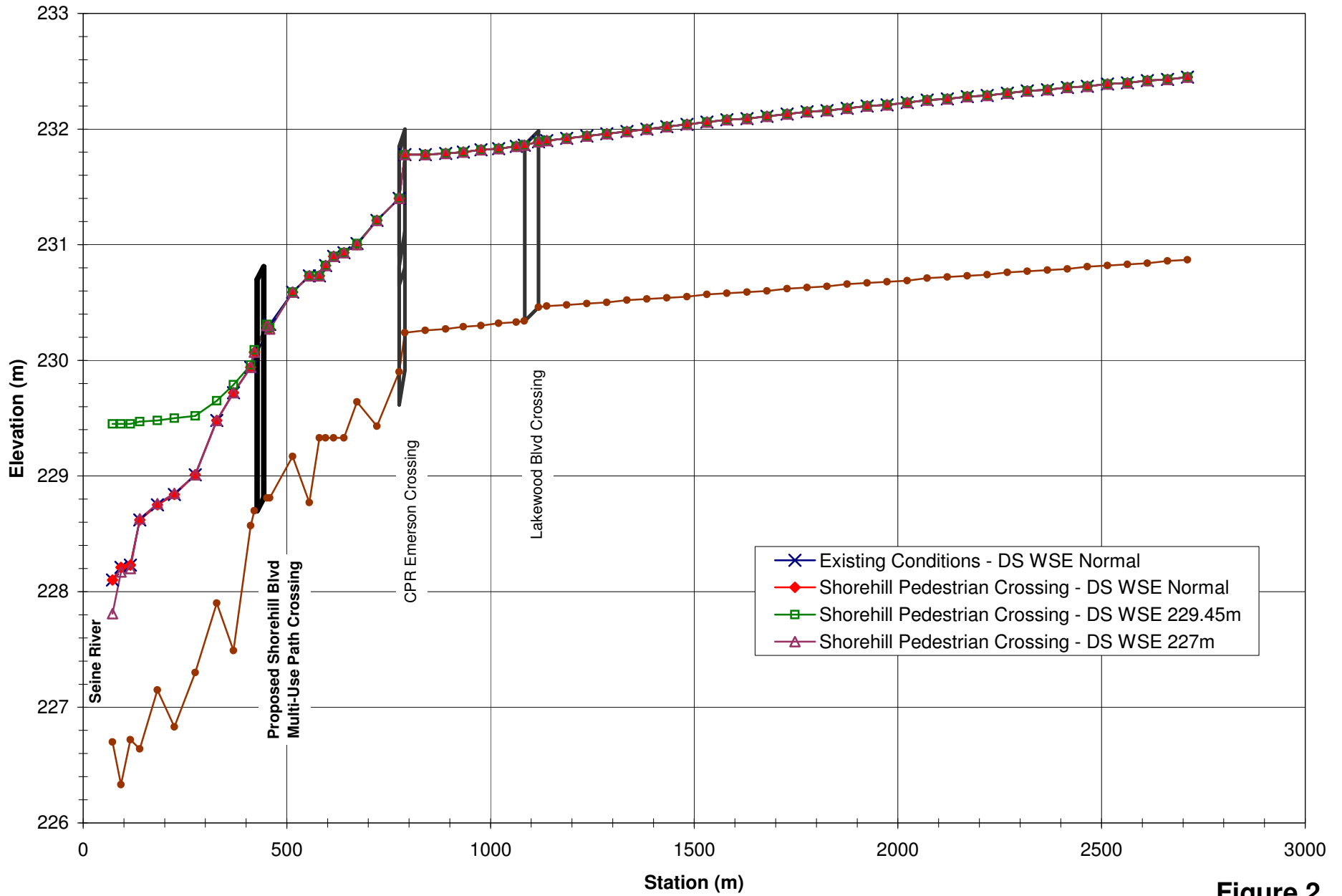


Figure 2
Water Surface Profiles
Proposed Shorehill Blvd Multi-Use Path

**APPENDIX A
NAVIN DRAIN PEDESTRIAN TRAIL CROSSING
HYDRAULIC ASSESSMENT FOR PROPOSED CROSSING
BRUCE HARDING CONSULTING LTD., NOVEMBER 2010**

Bruce Harding Consulting Ltd

To Scott Minty, P.Eng.
Manager – Transportation Group

Date November 30, 2010

From Bruce Harding, P.Eng.

File GR2

Subject Navin Drain Pedestrian Trail Crossing
Hydraulic Assessment for Proposed Crossing
Rev 2

This memorandum summarizes the results of our hydrologic analysis and hydraulic assessment for a proposed pedestrian trail crossing of Navin Drain immediately east of Lagimodiere Boulevard. The location of the site is indicated on Figure 1. Photos of the crossing and drain are appended for reference. The total contributing drainage area to the crossing has been estimated to be 18.4 km² with a corresponding 10% and 3% discharge of 4.7 m³/s and 7.1 m³/s respectively.

Other pertinent features of the site are as follows:

- Municipality - City of Winnipeg
- Watercourse - Navin Drain
- Stream Order - 3rd order drain
- Flow Direction - west
- Designation of Drain Map - No. 9
- Total Drainage Area - 18.4 km²
- UTM Coordinates - 640310E, 5522830N (Zone 14)

This reach of the Navin Drain has been classified by Fisheries and Oceans Canada¹ as Type E – ephemeral with indirect simple habitat. The typical fish passage requirements, as per the Manitoba Stream Crossing Guidelines² including maximum permissible velocity and embedment, will not be required for the proposed crossing.

An assessment on whether the Navin Drain is considered navigable has not been undertaken by Transport Canada; however it is unlikely that the waterway would be deemed navigable. On that basis it has been assumed that no provisions under the Navigable Waters Act are required for this proposed crossing.

1 "Fish Habitat Classification for Manitoba Agricultural Watersheds", Map 062H14, March 2008, Fisheries and Oceans Canada.

2 "Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat", Manitoba Natural Resources - Fisheries Department and the Canadian Department of Fisheries and Oceans, May 1996.

The proposed replacement crossing would consist of a single 1.8m high by 2.4m wide by 5 m long reinforced concrete box culvert complete with headwalls. Additional details with respect to the hydrologic assessment, the hydraulic sizing and layout of the crossing are summarized in the following sections.

1 Flood Hydrology

The total contributing drainage area to the crossing has been estimated to be 18.4 km² as delineated on Figure 1. The hydrology for Navin Drain at the proposed crossing site was developed using transitional techniques, utilizing rational and regional discharge coefficients. The transitional approach utilizes direct interpolation on the basis of drainage area between the rational method estimate for a 13 km² drainage area and the regional method estimate for a 39 km² drainage area.

Rational Estimates

Runoff events, and not snowmelt typically govern flood hydrology for watersheds with small drainage areas. Manitoba Stewardship, Water Branch has developed standards³, based on the application of rational analysis techniques, for estimating discharge for small rural watersheds. Unit area runoff values applicable to a specific frequency of occurrence are given, with correction factors to account for land use, soil type, slope and rainfall intensity. The drainage area is predominantly cropped, flat with tight clay. The following table summarizes the rational estimates for this site.

Table 1
Navin Drain Flood Hydrology
Rational Discharge Coefficients

Event	Mean Daily Discharge Coefficient (m ³ /s/km ²)	Correction Factor for Land Use, Slope and Soil Type *	Correction Factor for Rainfall Intensity	Kelln Runoff Adjustment Factor	Adjusted Mean Daily Discharge Coefficient (m ³ /s/km ²)
50% Flood	0.29	0.75	1.0	0.57	0.12
20% Flood	0.42	0.90	1.0	0.61	0.23
10% Flood	0.51	1.0	1.0	0.64	0.33
3% Flood	0.66	1.0	1.0	0.71	0.47

* - flat, cropped with tight clay soils

3 "Runoff from Small Rural Watersheds", Province of Manitoba, Water Stewardship

Regional Estimates

A streamflow gauge had been operated by Water Survey of Canada on Omand's Creek (Omand's Creek near Metro Route 90 – WSC 05MJ007) for the period from 1978 to 1993. The flood hydrology derived for the Omand's Creek streamflow gauge was selected as the index gauge for Navin Drain. The flood hydrology for the Omand's Creek gauge 05MJ007 was developed by Manitoba Water Stewardship (MWS) utilizing recorded and correlated data for Omand's Creek. The flood hydrology and computed regional discharge coefficients for the Omand's Creek gauge are summarized in Table 2.

Table 2
Omand's Creek at Metro Route 90 – WSC Gauge 05MJ007
Flood Hydrology – Regional Coefficients and Flood Estimates

Flood Event	Flood Estimate Omand's Creek near Metro Route 90 Gauge 05MJ007 Drainage Area = 72.3 km ² (m ³ /s)	Regional Discharge Coefficient
50% Flood	2.7	0.102
20% Flood	6.8	0.257
10% Flood	10.4	0.393
3% Flood	17.8	0.673
Q3D10	7.2	0.273

* - from Regional Flood Formulae Tables, Zone 3, Manitoba Water Stewardship, August 21, 2009, n=0.765

Flood Estimates

Table 3 summarizes the transitional estimates for Navin Drain at the proposed pedestrian trail crossing.

Table 3
Navin Drain Pedestrian Trail Crossing
Flood Hydrology Estimates

Flood Event	Flood Estimate Navin Drain - Drainage Area = 18.4 km ² (m ³ /s)
50% Flood	1.6
20% Flood	3.3
10% Flood	4.7
3% Flood	7.1
Q3D10	3.3

A 3% discharge will be selected as the proposed design discharge for the pedestrian trail crossing. It was noted that the downstream Lakewood Boulevard box culvert crossing of Navin Drain was designed for a discharge of 7.1 m³/s, which is equivalent to the design discharge proposed for the pedestrian trail crossing.

3 Hydraulic Sizing of Replacement Crossing

A steady-state backwater model of the Navin Drain within the study reach was developed using the US Army Corps of Engineers River Analysis System HEC-RAS model. The HEC-RAS model is a one-dimensional backwater model, which is considered to be the universal standard for computing steady-state water surface profiles. The backwater model was assembled from cross-sections, channel profiles and details of the crossings surveyed by Genivar, the City of Winnipeg and the R.M. of Springfield.

The backwater model has been developed to the level of detail required to estimate the relative effect of the proposed crossing. The model has not been calibrated to observed water levels during periods of high flow, and hydraulic parameters such as channel roughness have been selected based on observations, judgement and experience gained from similar projects.

The hydraulic design criterion selected for the replacement crossing is as follows:

- Design discharge – 3% Flood
- Maximum headloss of 0.3 m during the passage of the design discharge
- Culvert soffit to remain free of water surface by a minimum of 0.2 m during passage of design discharge.

The crossing would not be subject to the specific velocity requirements due to the habitat classification; but the assessment will be presented. The culvert length as proposed is less than 25 m; therefore a maximum permissible fish passage velocity of 1.0 m/s during the passage of the 3 day delay –10% fish passage discharge (Q3D10) would typically be required.

The details of the proposed crossing are summarized as follows:

- Single 1.8m high by 2.4m wide by 5 m long reinforced concrete box culvert complete with headwalls.

- Culvert set level with no embedment and not backfilled with rock. Upstream and downstream culvert inverts set at elevation 231.10.
- Culvert set with no skew.
- Refer to appended sketches of the proposed crossing for additional details.

The upstream and downstream aprons should be armoured to minimize erosion and to ensure long term function. The crossing aprons would have the following geometry:

- Base width = 3.0 m
- Armoured apron length at proposed base width = 3.0 m upstream and downstream of culvert ends
- Channel invert at upstream and downstream ends of culverts = 231.10
- Rock armouring to be Class 450 rock 0.65 m thick. Rock armouring to extend to elevation 233.0
- Channel side slopes at 3H:1V
- A transition from the upstream apron to the existing channel is required due to the discontinuity in the channel grade. The transition should be over a 4 m length using Class 450 rock.
- The base of the drainage channel should be excavated to elevation 231.10 between the proposed pedestrian crossing and the Lagimodiere box culvert crossing.

The estimated water surface profiles with the proposed crossing are shown on Figure 2. Table 4 summarizes the hydraulic assessment for the proposed crossing.

Table 4
Navin Drain Pedestrian Trail Crossing
Hydraulic Summary for Proposed Crossing
Proposed 1.8 m high by 2.4 m wide by 5 m long Reinforced Concrete Box Culvert

Flood Event	Discharge (m ³ /s)	Water Level Downstream of Crossing (m)	Headloss (m)	Soffit Clearance (m)	Average Culvert Velocity (m/s)
50% Flood	1.6	231.82	<0.05	1.1 clear	0.95
20% Flood	3.3	232.12	0.07	0.8 clear	1.4
10% Flood	4.7	232.32	0.10	0.6 clear	1.7
3% Flood	7.1	232.62	0.14	0.35 clear	2.1
Q3D10	3.3	232.12	0.07	0.8 clear	1.4

It was noted that the upstream Navin Drain culvert crossings located at Plessis, Dawson and

Symington Roads are two 1500mm diameter corrugated steel culverts, which would be consistent with what is proposed at the pedestrian crossing when the additional drainage area is taken into consideration.

5 Other Considerations

Best Management Practices for working near waterways including the appropriate implementation of sediment and erosion control measures should be followed. Exposed slopes not covered with riprap should be seeded with native flood resistant species and covered with erosion control blanket. Construction activities within the drain shall not take place between April 1 and June 15 of any given year.

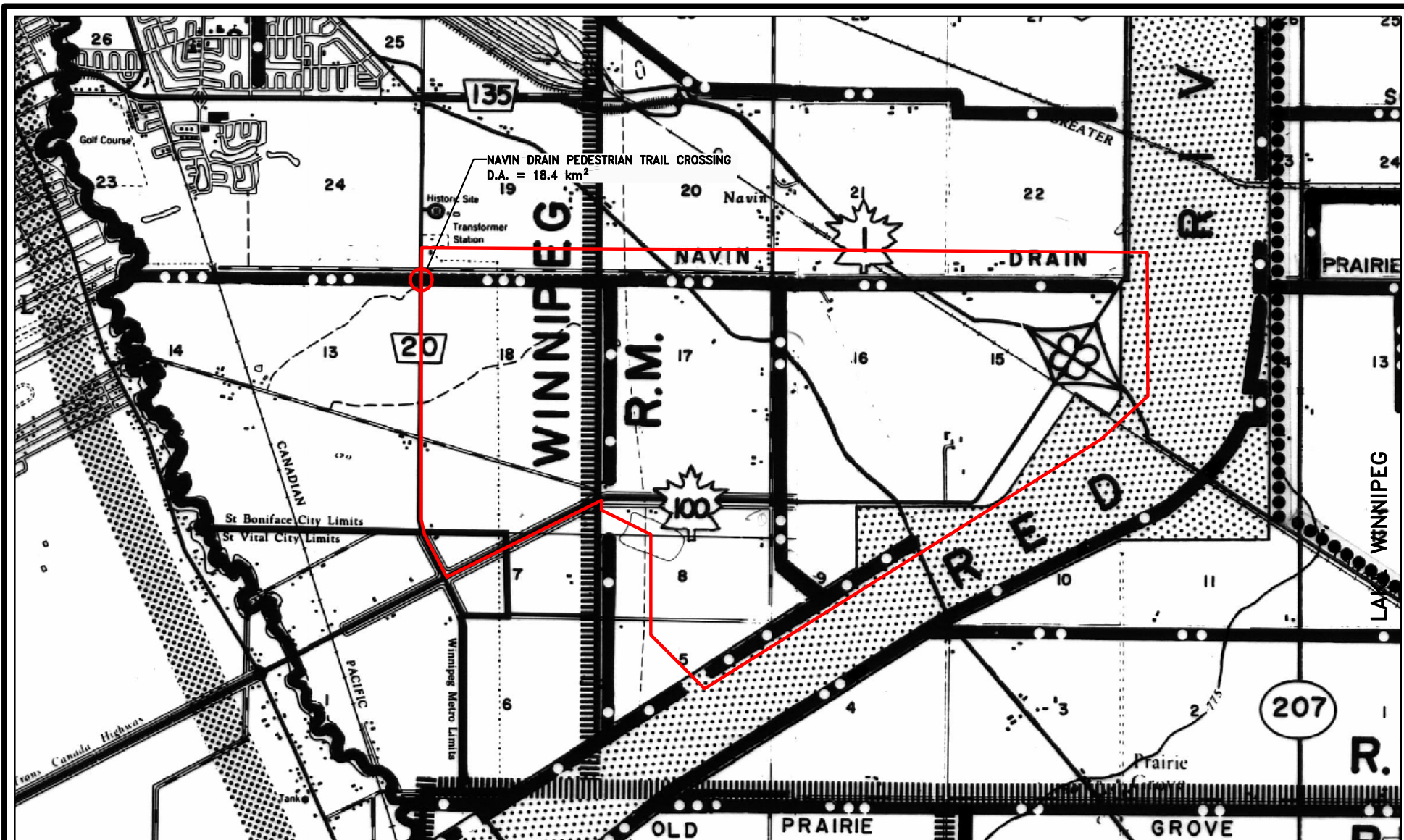
Water management during construction can be an important aspect of any project and may influence the cost and scheduling for crossing replacement. The largest flows within the drain are expected to occur during the spring runoff period and following a heavy summer rainfall event. Construction should take place in the fall and winter period when the potential for runoff is reduced thereby minimizing water management requirements. It is anticipated that the drain would not be flowing throughout the fall and winter.

Habitat compensation shouldn't be required to offset the loss of aquatic habitat due to the proposed crossing, as this reach is classified as Type E habitat.



A handwritten signature in black ink, appearing to read "B. A.", positioned to the right of the professional seal.

Bruce Harding, P.Eng.
Senior Hydraulic Engineer



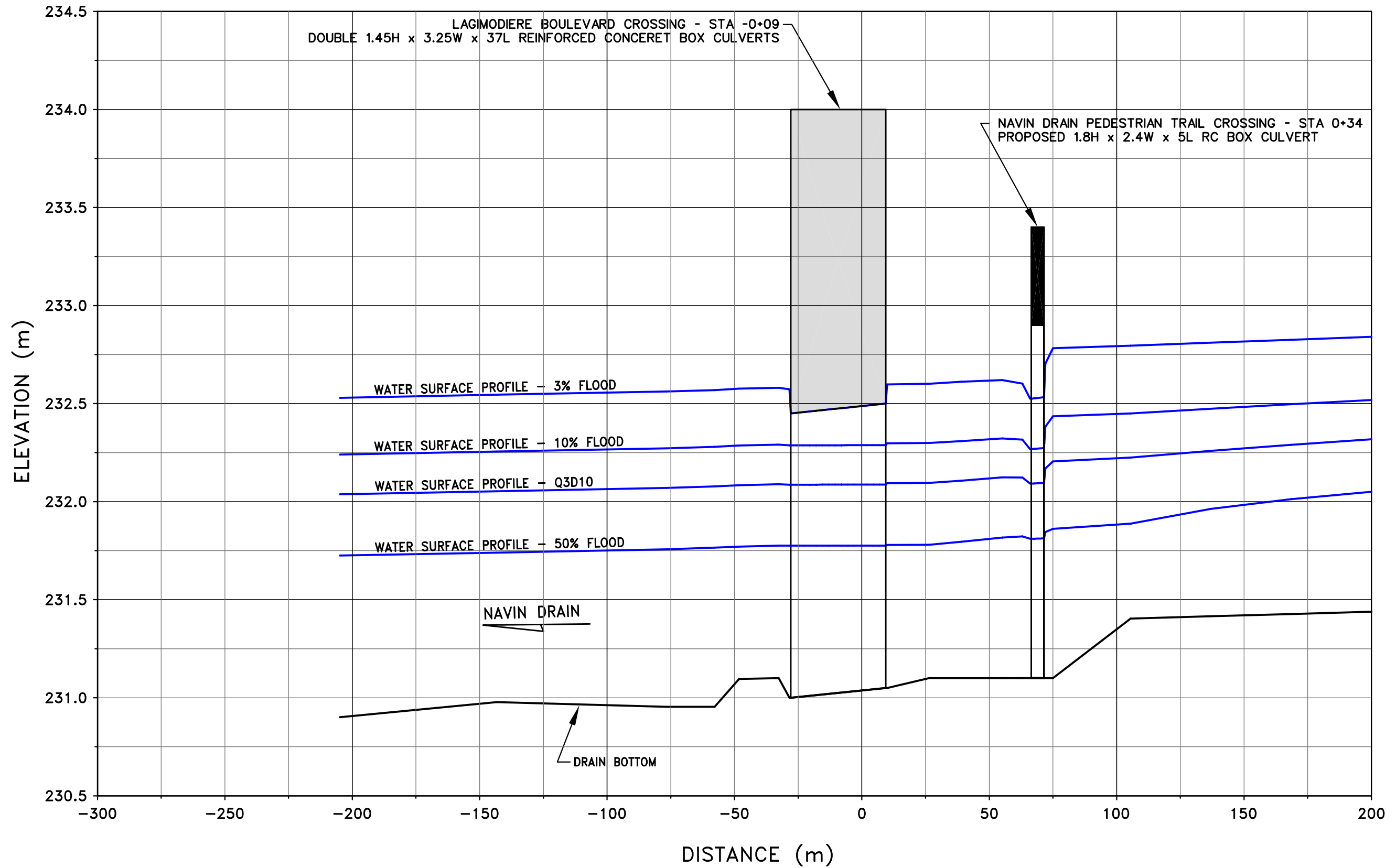
WATERSHED MAP 9

NAVIN DRAIN PEDESTRIAN TRAIL CROSSING
LOCATION PLAN

FIGURE 1

SCALE 1:50000 (METRES)





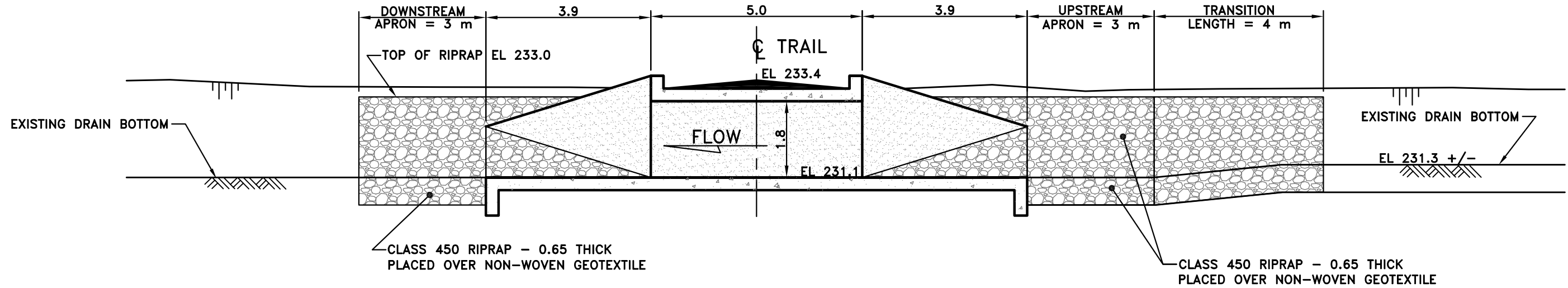
NOTES:

- 1) WATER SURFACE PROFILES REFLECT HYDRAULIC CONDITIONS WITH PROPOSED 1.8 W x 2.4 H x 5 L RC BOX CULVERT CROSSING AT THE PEDESTRIAN TRAIL
- 2) DOWNSTREAM BOUNDARY CONDITION FOR HEC-RAS MODEL ASSUMES NORMAL DEPTH AT 0.026% SLOPE

NAVIN DRAIN PEDESTRIAN TRAIL CROSSING
WATER SURFACE PROFILES WITH PROPOSED CULVERT CROSSING
FIGURE 2

WEST

EAST



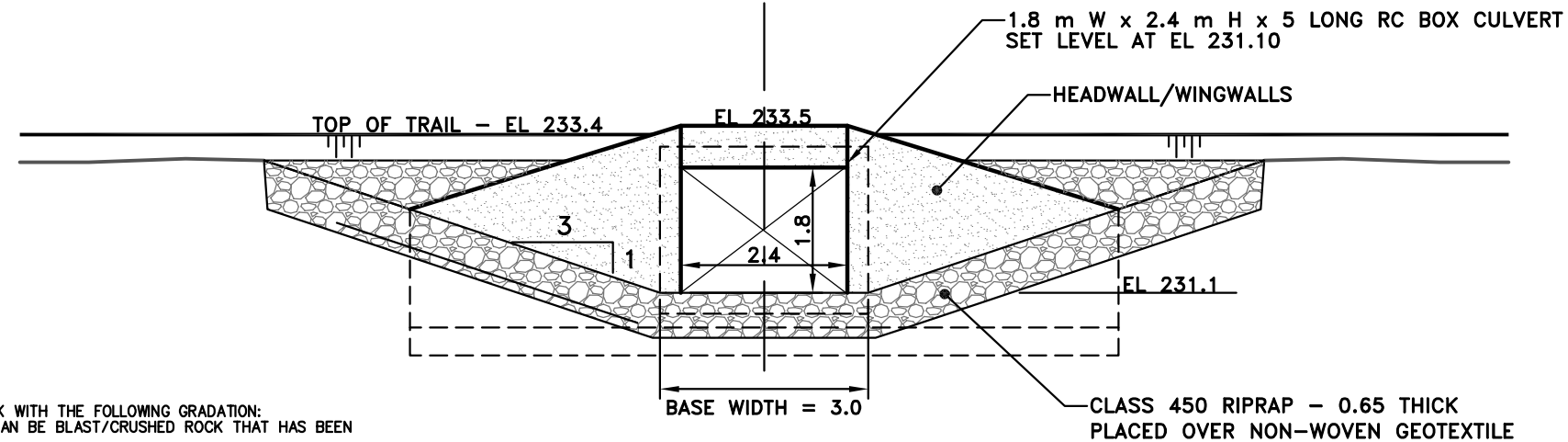
PROFILE THROUGH CULVERT CROSSING

SCALE 1:100

SOUTH

CROSSING

NORTH



UPSTREAM ELEVATION

SCALE 1:100

NOTES

- 1) CLASS 450 RIPRAP TO BE WELL GRADED, ROUNDED, CLEAN, SOUND ROCK WITH THE FOLLOWING GRADATION: 100% < 450 mm, 15-50% < 350 mm AND 0-15% < 100 mm. THE ROCK CAN BE BLAST/CRUSHED ROCK THAT HAS BEEN PROCESSED TO THE SPECIFIED GRADATION.
- 2) ALL EXPOSED EARTH SLOPES NOT COVERED WITH RIPRAP WILL BE SEEDED AND COVERED WITH EROSION CONTROL BLANKET.
- 3) CULVERT INSTALLATION TO FOLLOW STANDARD PRACTICES FOR BEDDING AND BACKFILL.



NAVIN DRAIN PEDESTRIAN TRAIL CROSSING
PROPOSED CROSSING DETAILS

Navin Drain Pedestrian Trail Crossing



Photo No. 1 Navin Drain west of Lagimodiere Boulevard (May 2005)



Photo No. 2 West side of Lagimodiere Boulevard Crossing (May 2005)

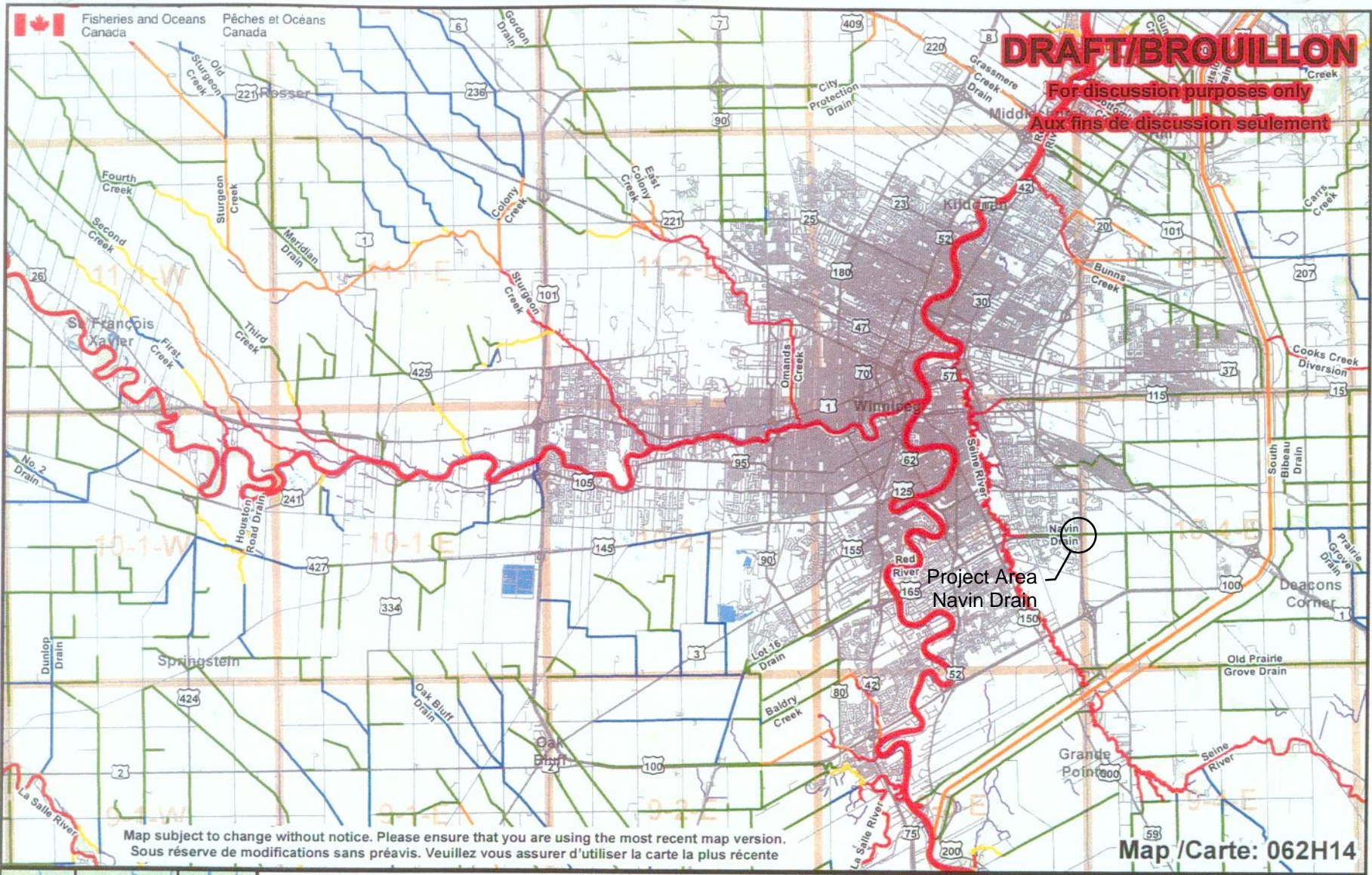
Navin Drain Pedestrian Trail Crossing



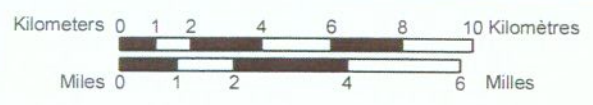
Photo No. 3 East side of Lagimodiere Boulevard Crossing (May 2005)



Photo No. 4 Navin Drain east of Lagimodiere Boulevard near proposed crossing (May 2005)



062I04	062I03	062I02
062H13	062H14	062H15
062H12	062H11	062H10



Map not to be used for navigation/
Ne pas utiliser pour la navigation

©Her Majesty the Queen in Right of Canada 2007
©Sa majesté la Reine du Chef du Canada 2007

Habitat Type/ Type d'habitat	Color/ Couleur
A	Red
B	Orange
C	Yellow
D	Blue
E	Green
Unclassified/ Non classifié	Purple

**Fish Habitat Classification for
Manitoba Agricultural Watersheds/
Classification de l'habitat du poisson
par rapport aux bassins hydrographiques
agricoles au Manitoba**

Version 1.0
Valid until March 31, 2008
Valide jusqu'au 31 mars 2008

**APPENDIX B
PROPOSED NAVIN DRAIN CULVERT CROSSING
BISHOP GRANDIN BLVD / SHOREHILL DR TO BEAVERHILL BLVD MULTI-USE PATH
DESIGN DRAWINGS**



THE CITY OF WINNIPEG

**PUBLIC WORKS DEPARTMENT
TRANSPORTATION ENGINEERING DIVISION**

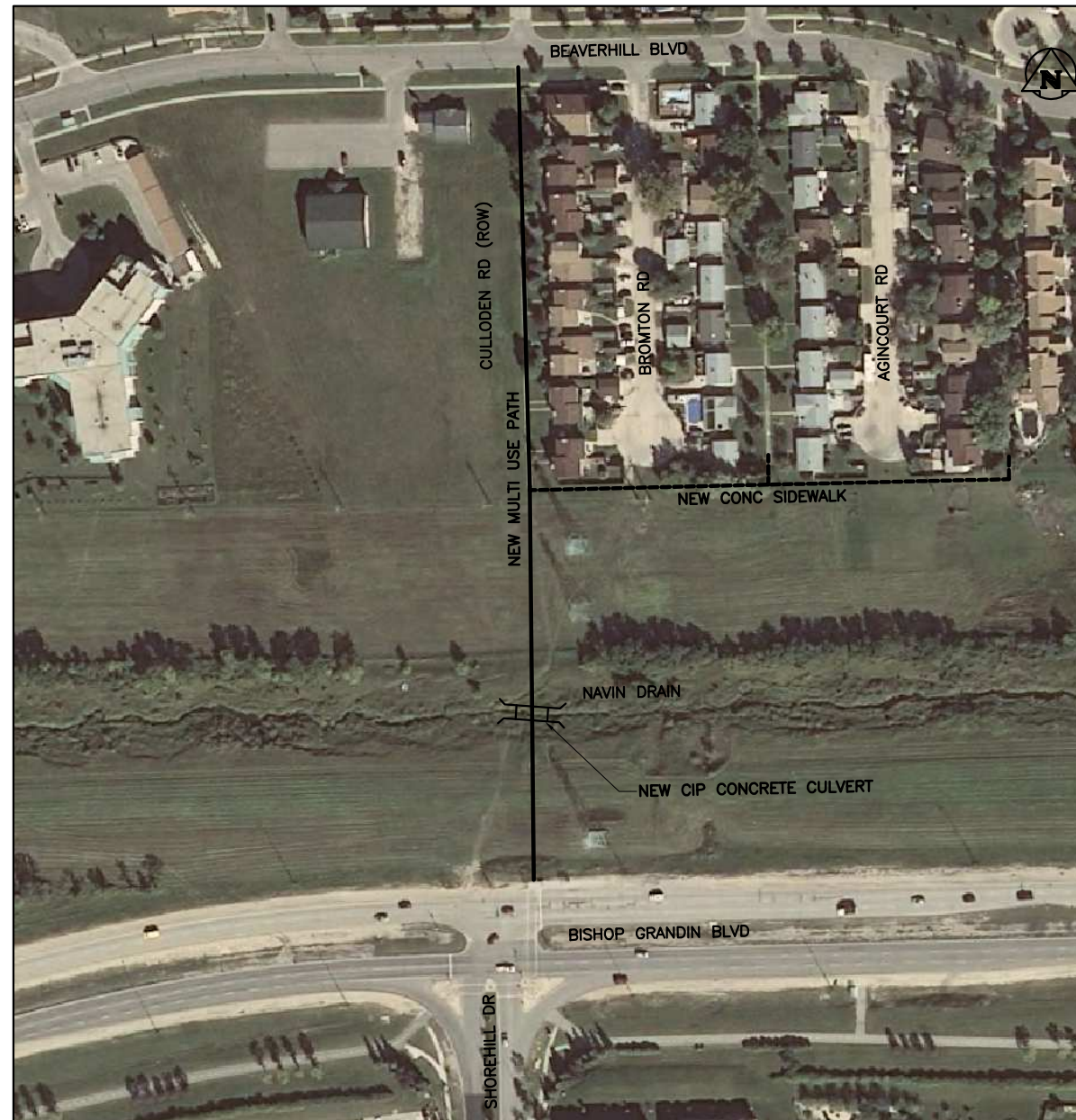


BID OPPORTUNITY NO. XXX-2012

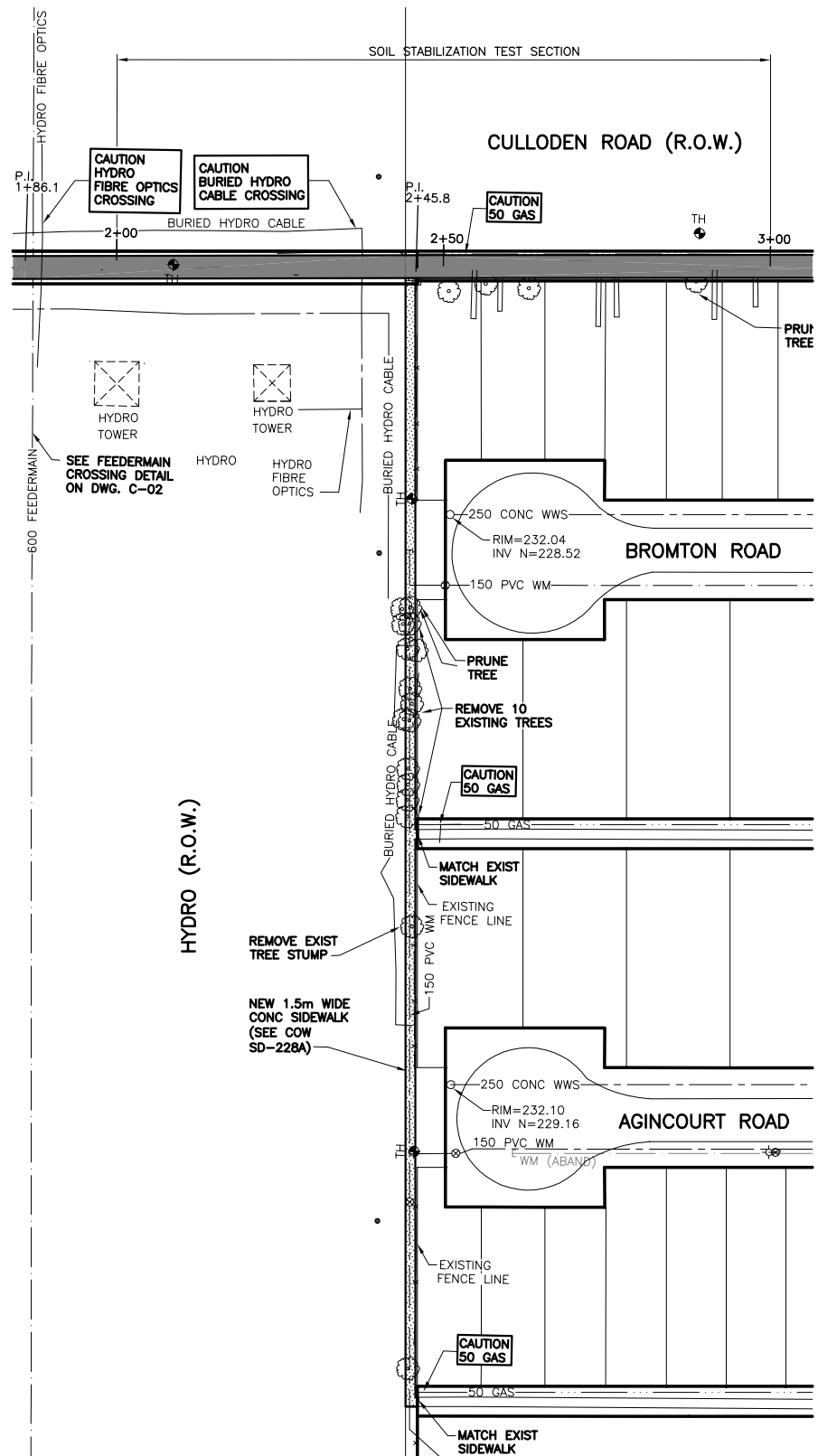
MULTI-USE PATH AND NAVIN DRAIN C.I.P. CONCRETE CULVERT - BISHOP GRANDIN BLVD/ SHOREHILL DR TO BEAVERHILL BLVD

SHEET INDEX

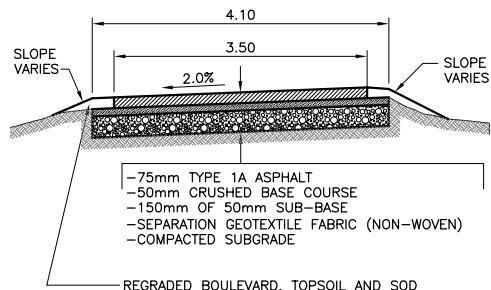
DRAWING NO.	TITLE
-	COVER SHEET
C-01	BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD PLAN AND PROFILE
C-02	BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD MISCELLANEOUS DETAILS
C380-12-01	BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD BOX CULVERT PLAN
C380-12-02	BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD BOX CULVERT ELEVATION AND DATE DETAIL
C380-12-03	BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD BOX CULVERT SECTION
C380-12-04	BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD BOX CULVERT AND CHAIN LINK FENCE PLAN
C380-12-05	BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD BOX CULVERT SECTIONS AND DETAIL
G-01	BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD BANK STABILIZATION PLAN
G-02	BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD BANK STABILIZATION SECTIONS



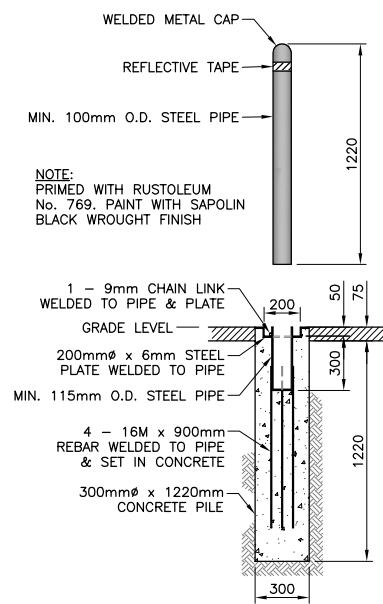
LOCATION PLAN



CONCRETE SIDEWALK PLAN
SCALE: 1:500



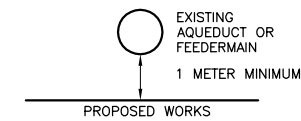
TYPICAL PATH SECTION
SCALE: NTS



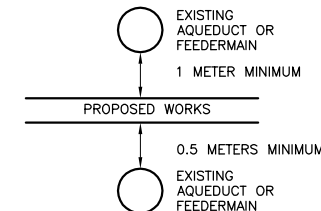
REMOVABLE BOLLARD DETAIL
SCALE: 1:20

- CONTACT THE WATER AND WASTE DEPARTMENT'S CONSTRUCTION SERVICES COORDINATOR AT 204-986-4289, 7 DAYS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR AN INSPECTION.
- PRIOR TO ANY CONSTRUCTION, THE AQUEDUCT OR FEEDERMAIN MUST BE EXPOSED BY A SOFT DIG METHOD SO AS TO CONFIRM DEPTH AND LOCATION.
- A MINIMUM CLEARANCE OF 1.0 METER MUST BE PROVIDED BETWEEN THE UNDERSIDE OF ANY EXISTING AQUEDUCT OR FEEDERMAIN AND THE TOP OF THE PROPOSED WORKS. THIS INSTALLATION BY TRENCHLESS METHOD ONLY.

A MINIMUM CLEARANCE OF 1.0 METER MUST BE PROVIDED BETWEEN THE UNDERSIDE OF ANY EXISTING AQUEDUCT OR FEEDERMAIN AND THE TOP OF THE PROPOSED WORKS. THIS INSTALLATION BY TRENCHLESS METHOD ONLY.



A MINIMUM CLEARANCE OF 0.5 METERS MUST BE PROVIDED BETWEEN THE UNDERSIDE OF THE PROPOSED WORKS AND THE TOP OF ANY EXISTING AQUEDUCT OR FEEDERMAIN BY TRENCHLESS OR OPEN TRENCH.



- A SHAFT MUST BE EXCAVATED BY SOFT DIG METHODS 4.0 METERS FROM THE CENTRELINE OF THE AQUEDUCT AND/OR FEEDERMAIN TO CONFIRM THE ALIGNMENT AND ELEVATION OF THE DRILLING ROD BEFORE IT CROSSES OVER OR UNDER THE AQUEDUCT AND/OR FEEDERMAIN. THIS CONFIRMATION MUST BE WITNESSED BY A CITY REPRESENTATIVE.

AQUEDUCT & FEEDERMAIN CROSSING DETAIL
SCALE: NTS

NOTES:

- ALL WORK AND MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS.
- CONTRACTOR TO VERIFY DEPTH OF UTILITIES PRIOR TO CONSTRUCTION.
- LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE, BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.
- THE CONTRACTOR IS RESPONSIBLE FOR COSTS ACQUIRED BY HYDRO SAFETY WATCH.
- EXCAVATED MATERIAL TO BE USED AS BACKFILL WHERE REQUIRED.
- ALL SURFACES TO BE MAINTAINED OR RESTORED TO PREVIOUS CONDITION OR BETTER.
- REFER TO CITY OF WINNIPEG E-SPEC FOR INSTALLATION OF DETECTABLE WARNING SURFACE TILES

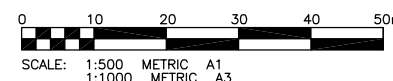
METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMAL NUMBERS INDICATE METRES



PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG, NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.



EXISTING	LEGEND-PLAN	PROPOSED	EXISTING	LEGEND-PLAN	PROPOSED	EXISTING	LEGEND-PROFILE	PROPOSED
150 WM	WATERMAIN	150 WM	HYDRO	150 WM	WATERMAIN	150 WM	WATERMAIN	150 WM
Hydrant symbol	HYDRANT	Hydrant symbol	M.T.S.	Hydrant symbol	HYDRANT, VALVE	Hydrant symbol	HYDRANT, VALVE	Hydrant symbol
Valve symbol	VALVE	Valve symbol	CONCRETE	Valve symbol	LAND DRAINAGE SEWER	Valve symbol	LAND DRAINAGE SEWER	Valve symbol
300 LDS	LAND DRAINAGE SEWER	300 LDS	ASPHALT	300 LDS	WASTE WATER SEWER	300 LDS	WASTE WATER SEWER	300 LDS
250 WWS	WASTE WATER SEWER	250 WWS	SIDEWALK	250 WWS	Q PROFILE	250 WWS	Q PROFILE	250 WWS
Manhole symbol	MANHOLE	Manhole symbol	KGS TEST HOLE	Manhole symbol	NORTH/WEST GUTTER	Manhole symbol	NORTH/WEST GUTTER	Manhole symbol
Catch basin symbol	CATCH BASIN	Catch basin symbol	PROPERTY LINE	Catch basin symbol	SOUTH/EAST GUTTER	Catch basin symbol	SOUTH/EAST GUTTER	Catch basin symbol
Curb inlet symbol	CURB INLET	Curb inlet symbol	SURVEY BAR	Curb inlet symbol	N/W, S/E R'S	Curb inlet symbol	N/W, S/E R'S	Curb inlet symbol
Junction symbol	JUNCTIONS	Junction symbol	DITCH	Junction symbol	N/W, S/E TOP/CURB	Junction symbol	N/W, S/E TOP/CURB	Junction symbol
Culvert symbol	CULVERT	Culvert symbol	ELEVATION	Culvert symbol	NORTH/WEST DITCH	Culvert symbol	NORTH/WEST DITCH	Culvert symbol
Gas symbol	GAS	Gas symbol	231.334	Gas symbol	SOUTH/EAST DITCH	Gas symbol	SOUTH/EAST DITCH	Gas symbol

LOCATION APPROVED UNDERGROUND STRUCTURES

SUPPLY U/G STRUCTURES DATE

NOTE: LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

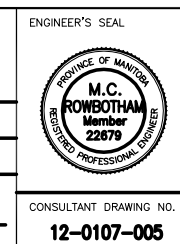
NO.	REVISIONS	DATE	BY
0	ISSUED FOR TENDER	12/09/04	

KGS GROUP CONSULTING ENGINEERS

DESIGNED BY: AW
CHECKED BY: CR
DRAWN BY: DMW
APPROVED BY: RJH

HOR. SCALE: 1:500
VERTICAL: 1:20

RELEASED FOR CONSTRUCTION: 12/06/11



THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT

PROJECT TITLE: **MULTI-USE PATH AND NAVIN DRAIN C.I.P. CONCRETE CULVERT**

BISHOP GRADIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD
MISCELLANEOUS DETAILS

SHEET OF: **02 09**

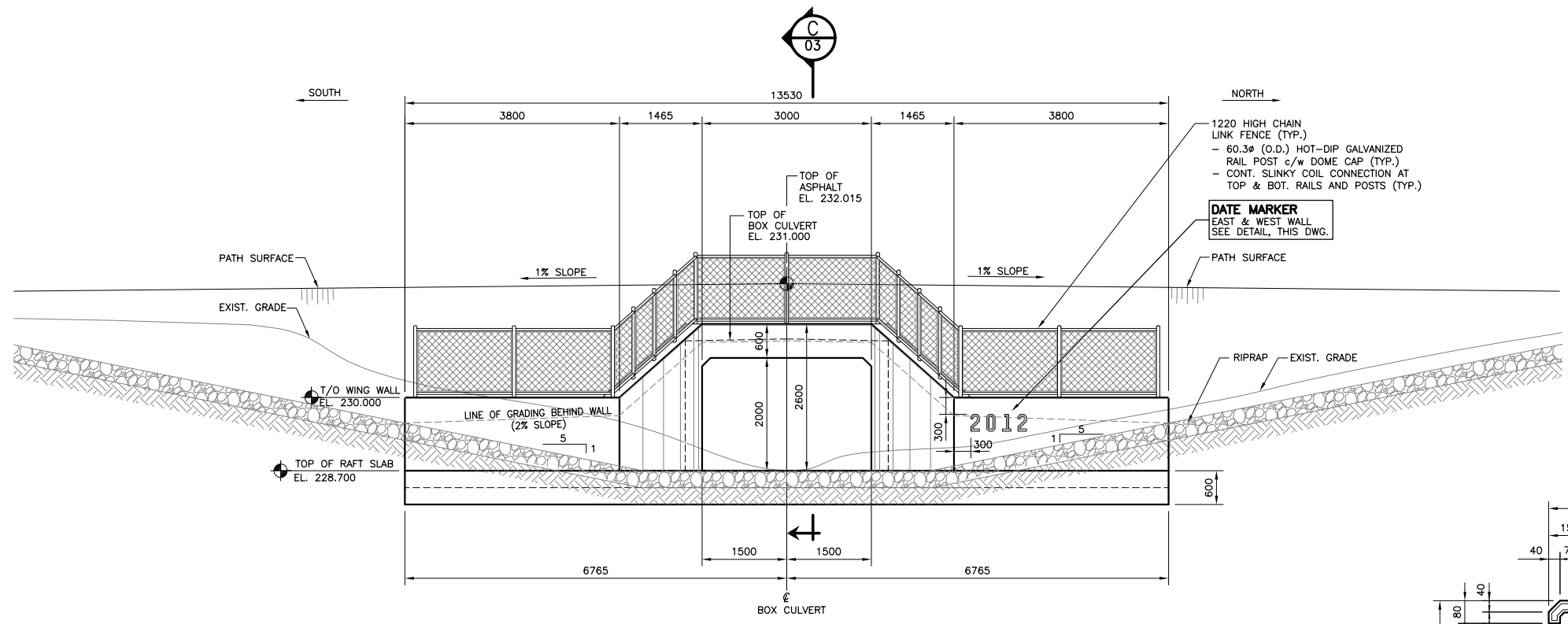
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CITY DRAWING NUMBER: **C-02**

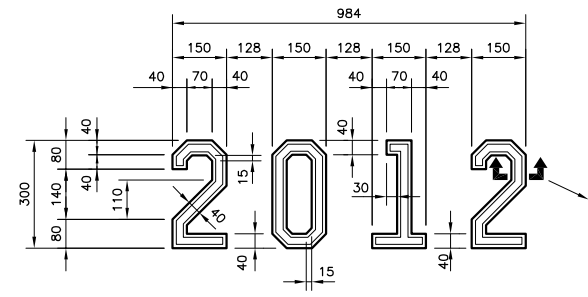
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CULVERT DESIGN DATA

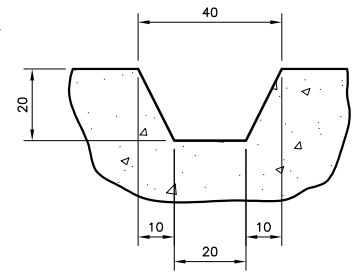
SPECIFICATIONS:
 CAN/CSA S6-06
 DESIGN VEHICULAR LOAD:
 MAINTENANCE VEHICLE, CLAUSE 3.8.11
 GROSS VEHICLE WEIGHT = 80kN
 DESIGN SOIL PARAMETERS:
 $\gamma = 19.0 \text{ kN/M}^3$
 $\lambda_v = 1.35$, CLAUSE 7.8.4.2.3
 $\lambda_h = 0.50$, CLAUSE 7.8.4.2.3
 CONCRETE:
 $f_c = 32 \text{ MPa}$; EXPOSURE CLASS S-2
 REINFORCING STEEL:
 CSA G30.18 (LATEST), GRADE 400 MPa



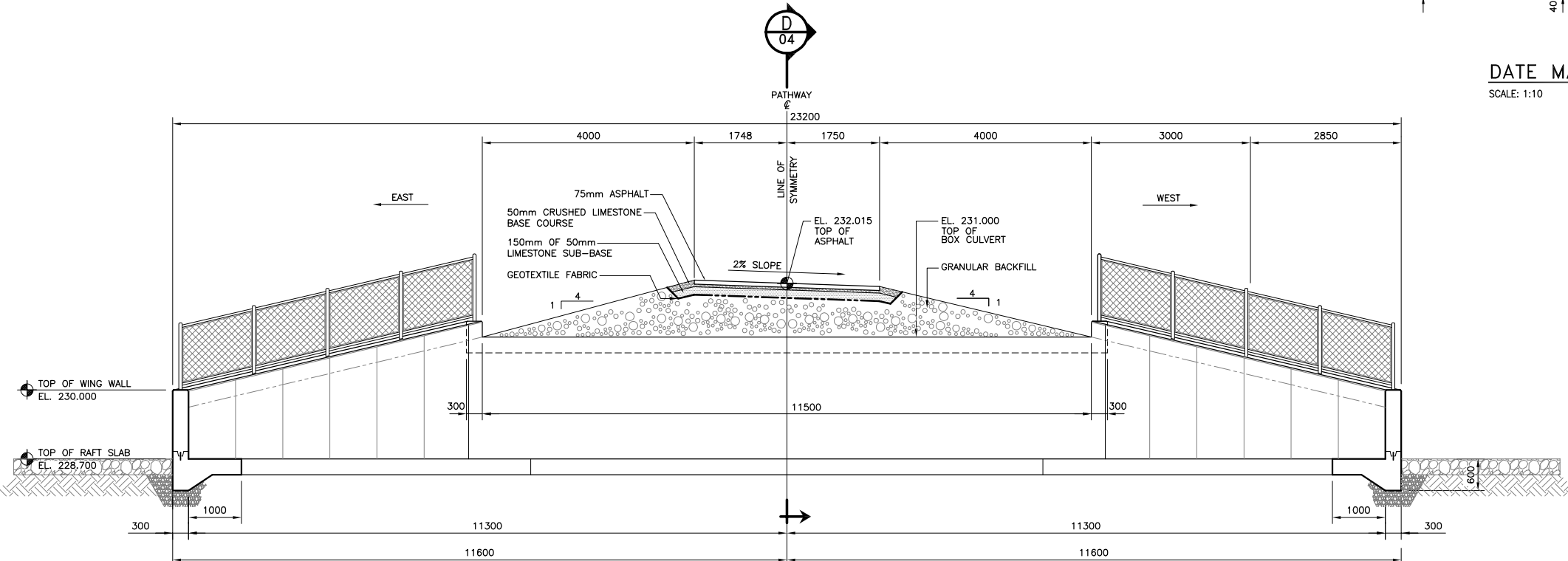
A
01
EAST ELEVATION
SCALE: 1:50



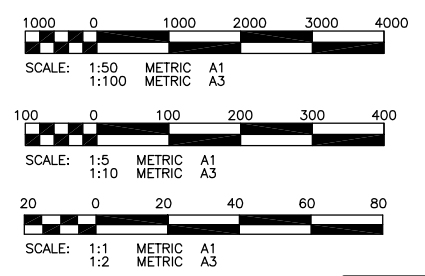
DATE MARKER DETAIL
SCALE: 1:10



INSERT DETAIL
SCALE: 1:1



B
01
NORTH ELEVATION
SCALE: 1:50



METRIC
 WHOLE NUMBERS INDICATE MILLIMETRES
 DECIMALIZED NUMBERS INDICATE METRES



P:\Projects\2012\12-0107-005\Drawings\Struct\Rev 0 - Tender\12-0107-005-C380-12-02-Rev.0.dwg - Tab: 02 Plotted By: GLoewen 01/22/2013 [Tue 10:45am]
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EXISTING	LEGEND-PLAN	PROPOSED	EXISTING	LEGEND-PLAN	PROPOSED	EXISTING	LEGEND-PROFILE	PROPOSED
150 WM	WATERMAIN	150 WM	---	HYDRO	---	150 WM	WATERMAIN	150 WM
+	HYDRANT	+	---	M.T.S.	---	+	HYDRANT, VALVE	+
+	VALVE	+	---	CONCRETE	---	+	LAND DRAINAGE SEWER	+
300 LDS	LAND DRAINAGE SEWER	300 LDS	---	ASPHALT	---	300 LDS	WASTE WATER SEWER	300 LDS
250 WWS	WASTE WATER SEWER	250 WWS	---	SIDEWALK	---	250 WWS	WASTE WATER SEWER	250 WWS
o	MANHOLE	o	o	KGS TEST HOLE	o	o	NORTH/WEST GUTTER	o
o	CATCH BASIN	o	o	PROPERTY LINE	o	o	SOUTH/EAST GUTTER	o
o	CURB INLET	o	o	SURVEY BAR	o	o	N/W, S/E R'S	o
o	JUNCTIONS	o	o	DITCH	o	o	N/W, S/E TOP/CURB	o
o	CULVERT	o	o	ELEVATION	o	o	NORTH/WEST DITCH	o
o	GAS	o	o		o	o	SOUTH/EAST DITCH	o

LOCATION APPROVED UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE DATE

NOTE:
 LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

KGS GROUP CONSULTING ENGINEERS

DESIGNED BY: R.J.L. CHECKED BY: []
 DRAWN BY: J.F./EDC APPROVED BY: []
 SCALE: AS NOTED RELEASED FOR CONSTRUCTION: []

DATE: 12/06/29

ENGINEER'S SEAL

R.J. LONG
 REGISTERED PROFESSIONAL ENGINEER

CONSULTANT DRAWING NO. 12-0107-005-02

THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT

PROJECT TITLE: MULTI-USE PATH AND NAVIN DRAIN C.I.P. CONCRETE CULVERT
 BISHOP GRADIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD
 BOX CULVERT ELEVATION & DATE DETAIL

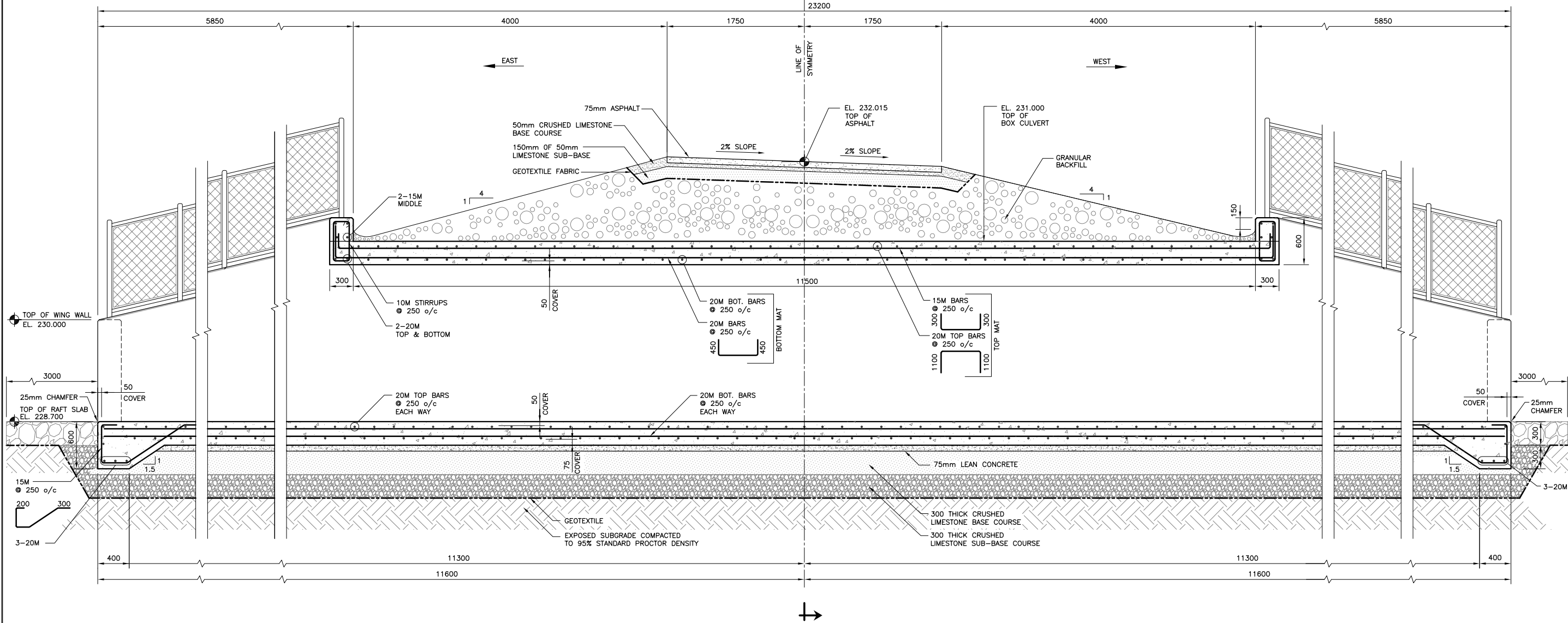
SHEET 04 OF 09
 COMPUTER FILE NAME: 12-0107-005
 CITY DRAWING NUMBER: C380-12-02

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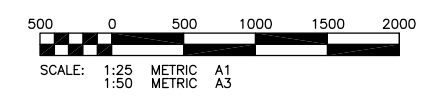


PATHWAY
23200

LINE OF SYMMETRY



C BOX-CULVERT SECTION
SCALE: 1:25
1:50



METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



150 WM	WATERMAIN	150 WM	HYDRO	150 WM	WATERMAIN	150 WM	WATERMAIN
+	HYDRANT	+	M.T.S.	+	HYDRANT, VALVE	+	HYDRANT, VALVE
+	VALVE	+	CONCRETE	+	LAND DRAINAGE SEWER	+	LAND DRAINAGE SEWER
---	LAND DRAINAGE SEWER	---	ASPHALT	---	WASTE WATER SEWER	---	WASTE WATER SEWER
---	WASTE WATER SEWER	---	SIDEWALK	---	Q PROFILE	---	Q PROFILE
o	MANHOLE	o	KGS TEST HOLE	o	NORTH/WEST GUTTER	o	NORTH/WEST GUTTER
o	CATCH BASIN	o	PROPERTY LINE	o	SOUTH/EAST GUTTER	o	SOUTH/EAST GUTTER
o	CURB INLET	o	SURVEY BAR	o	N/W, S/E R'S	o	N/W, S/E R'S
+	JUNCTIONS	+	DITCH	+	N/W, S/E TOP/CURB	+	N/W, S/E TOP/CURB
---	CULVERT	---	ELEVATION	---	NORTH/WEST DITCH	---	NORTH/WEST DITCH
---	GAS	---		---	SOUTH/EAST DITCH	---	SOUTH/EAST DITCH
---	EXISTING	---	LEGEND-PLAN	---	LEGEND-PROFILE	---	LEGEND-PROFILE
---	PROPOSED	---		---		---	

LOCATION APPROVED UNDERGROUND STRUCTURES
 SUPV. U/G STRUCTURES COMMITTEE DATE
 NOTE:
 LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

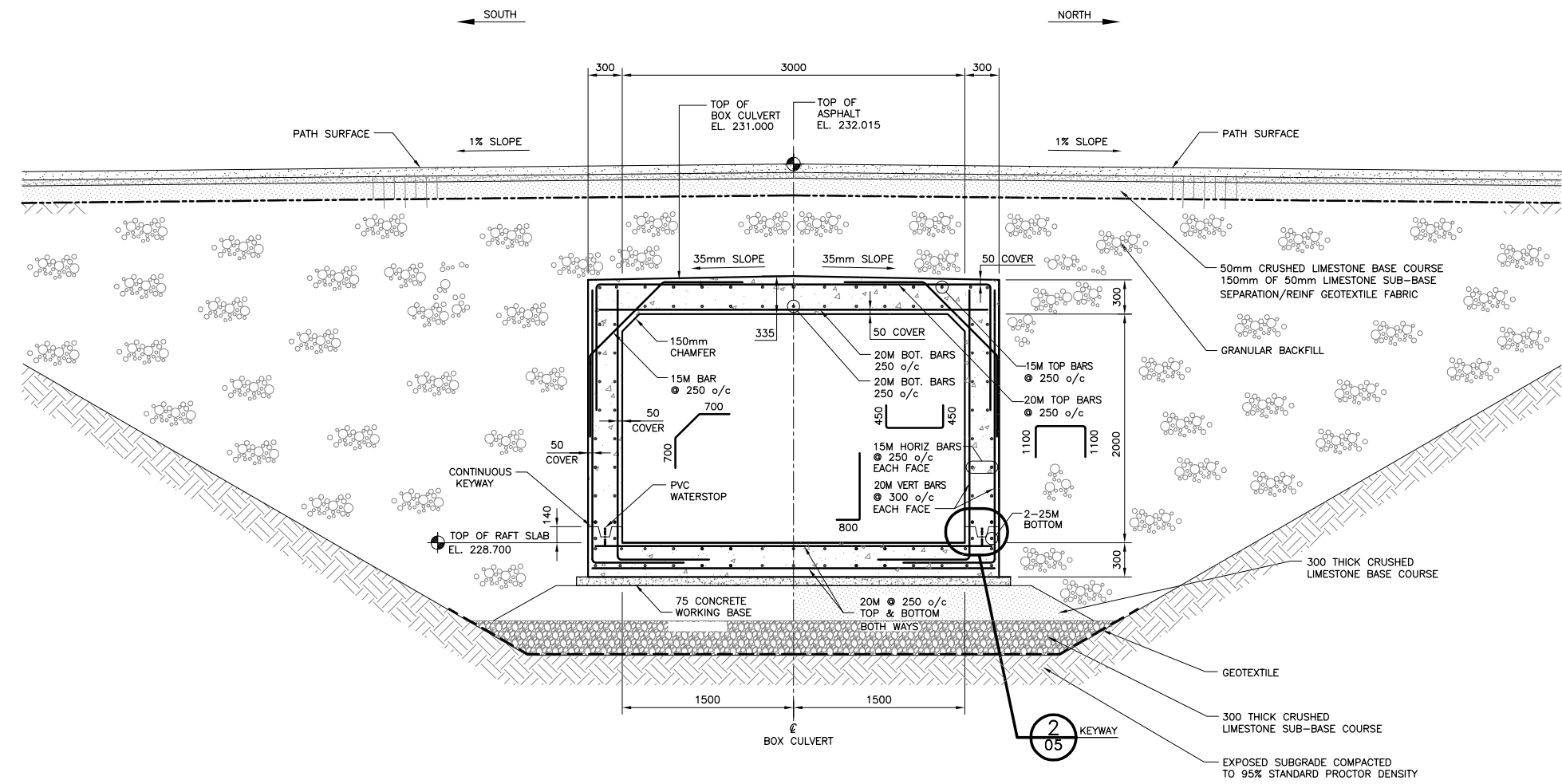
NO.	REVISIONS	DATE	BY
0	ISSUED FOR TENDER	12/11/11	RJL

KGS GROUP CONSULTING ENGINEERS
 SCATLIFF+MILLER+MURRAY INC.
 DESIGNED BY: RJL
 DRAWN BY: JF/EDC
 SCALE: 1:25
 CHECKED BY:
 APPROVED BY:
 RELEASED FOR CONSTRUCTION:
 DATE: 12/06/29

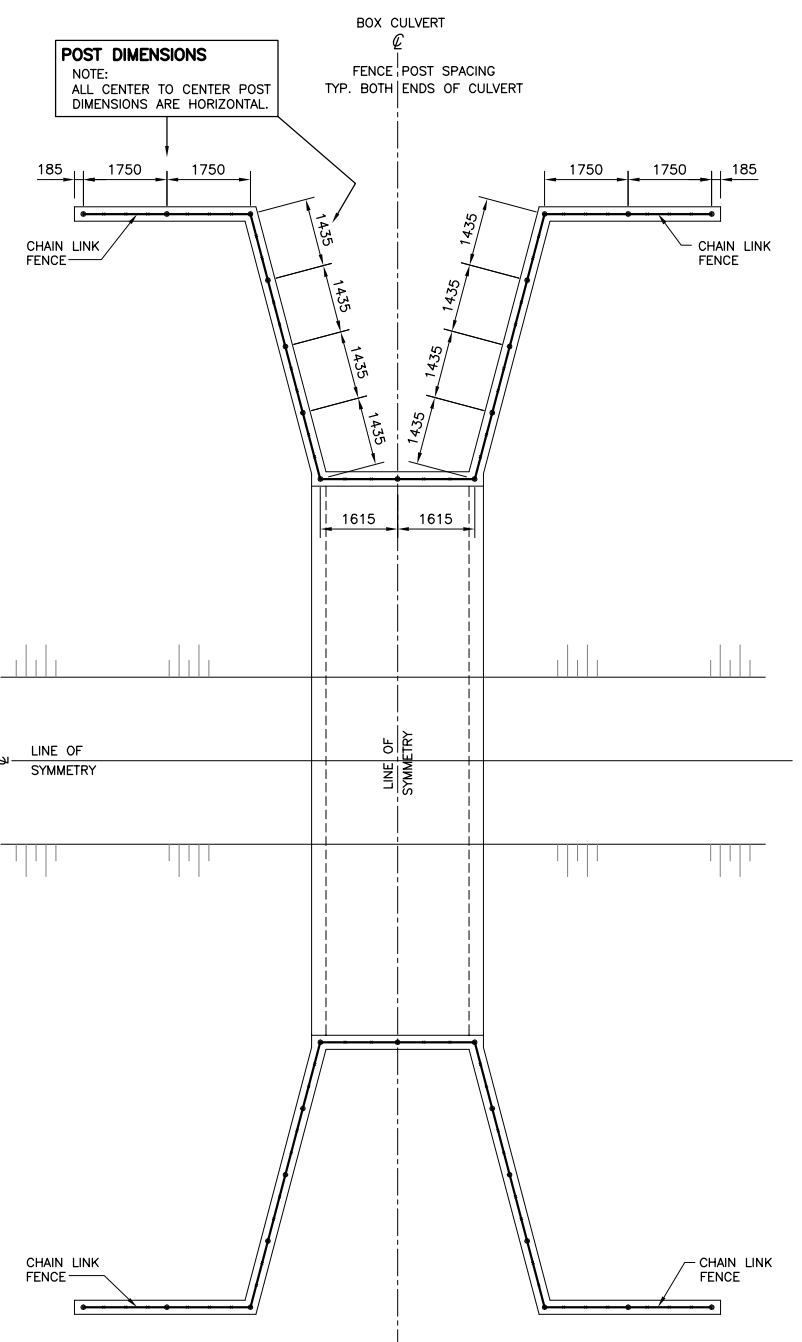
ENGINEER'S SEAL
R.J. LONG
 REGISTERED PROFESSIONAL ENGINEER
 CONSULTANT DRAWING NO. **12-0107-005-03**

THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT
 PROJECT TITLE: **MULTI-USE PATH AND NAVIN DRAIN C.I.P. CONCRETE CULVERT**
 BISHOP GRADIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD
 BOX CULVERT SECTION
 SHEET OF **05** OF **09**
 COMPUTER FILE NAME: **12-0107-005**
 CITY DRAWING NUMBER: **C380-12-03**

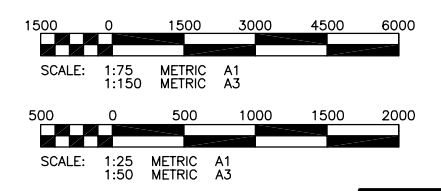
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 COWLEGGEND



D 01 BOX-CULVERT SECTION
SCALE: 1:25



CHAIN LINK FENCE PLAN SHOWING POST LOCATIONS
SCALE: 1:75



METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



150 WM	WATERMAIN	150 WM	HYDRO	150 WM	WATERMAIN	150 WM	WATERMAIN
⊕	HYDRANT	⊕	M.T.S.	⊕	HYDRANT, VALVE	⊕	HYDRANT, VALVE
⊙	VALVE	⊙	CONCRETE	⊙	LAND DRAINAGE SEWER	⊙	LAND DRAINAGE SEWER
300 LDS	LAND DRAINAGE SEWER	300 LDS	ASPHALT	250 WWS	WASTE WATER SEWER	250 WWS	WASTE WATER SEWER
250 WWS	WASTE WATER SEWER	250 WWS	SIDEWALK	□	PROFILE	□	PROFILE
○	MANHOLE	○	KGS TEST HOLE	○	NORTH/WEST GUTTER	○	NORTH/WEST GUTTER
□	CATCH BASIN	□	PROPERTY LINE	○	SOUTH/EAST GUTTER	○	SOUTH/EAST GUTTER
▽	CURB INLET	▽	SURVEY BAR	◇, ○	N/W, S/E P'S	◇, ○	N/W, S/E P'S
+	JUNCTIONS	+	DITCH	△	N/W, S/E TOP/CURB	△	N/W, S/E TOP/CURB
▬	CULVERT	▬	ELEVATION	△	NORTH/WEST DITCH	△	NORTH/WEST DITCH
⋯	GAS	⋯		▽	SOUTH/EAST DITCH	▽	SOUTH/EAST DITCH
---	EXISTING	---	LEGEND-PLAN	---	EXISTING	---	LEGEND-PROFILE
---	PROPOSED	---	EXISTING	---	PROPOSED	---	EXISTING

LOCATION APPROVED UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES DATE COMMITTEE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

0	ISSUED FOR TENDER	12/7/77	RJL
NO.	REVISIONS	DATE	BY

KGS GROUP CONSULTING ENGINEERS

SCATLIFF+MILLER+MURRAY Inc.

DESIGNED BY: RJL
DRAWN BY: JF/EDC
SCALE: AS NOTED

CHECKED BY:
APPROVED BY:
RELEASED FOR CONSTRUCTION:

DATE: 12/06/29

ENGINEER'S SEAL

R.J. LONG

CONSULTANT DRAWING NO. 12-0107-005-04

THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT

PROJECT TITLE: MULTI-USE PATH AND NAVIN DRAIN C.I.P. CONCRETE CULVERT

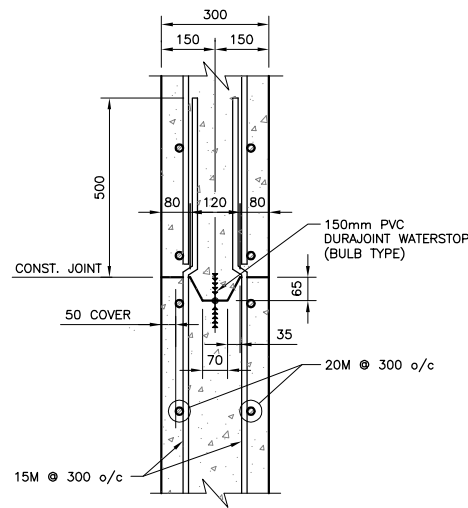
BISHOP GRADIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD

BOX CULVERT & CHAIN LINK FENCE PLAN

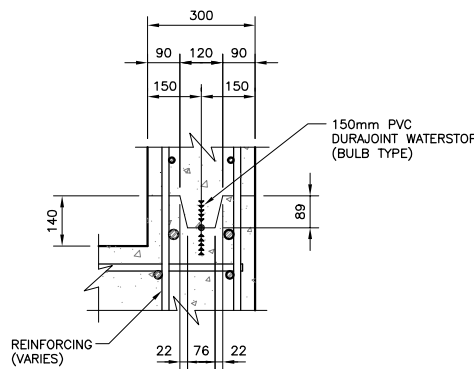
SHEET 06 OF 09

COMPUTER FILE NAME: 12-0107-005

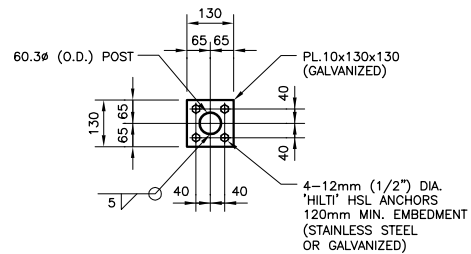
CITY DRAWING NUMBER: C380-12-04



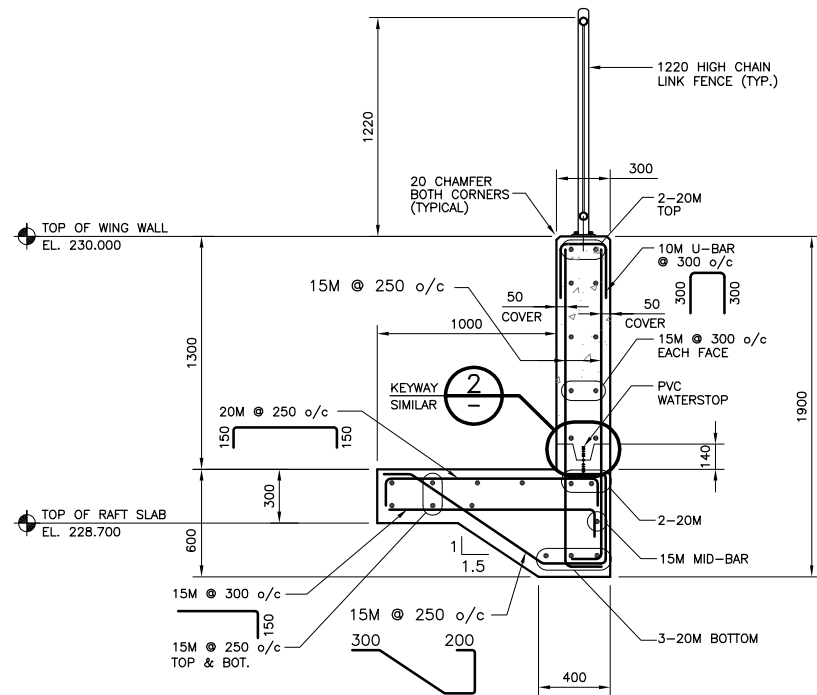
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01 VERTICAL CONST. JOINT DETAIL
SCALE: 1:10 (24x36)
1:20 (11x17)



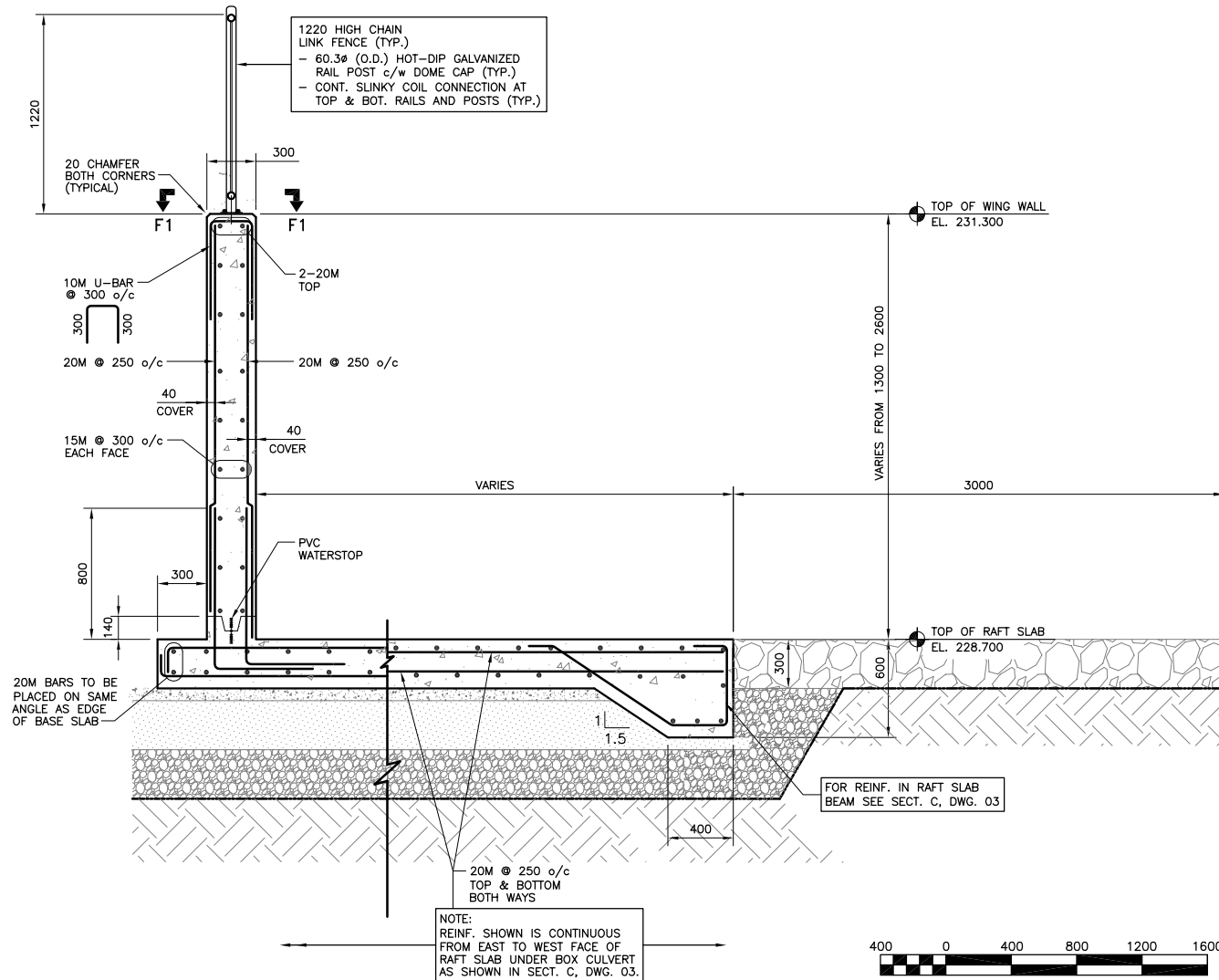
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04 KEYWAY DETAIL
SCALE: 1:10 (24x36)
1:20 (11x17)



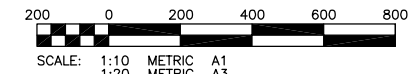
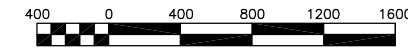
SECTION F1-F1
SCALE: 1:10 (24x36)
1:20 (11x17)



E
01 RETURN WALL - SECTION
SCALE: 1:20 (24x36)
1:40 (11x17)



F
01 WINGWALL - SECTION
SCALE: 1:20 (24x36)
1:40 (11x17)



METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



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EXISTING	LEGEND-PLAN	PROPOSED	EXISTING	LEGEND-PLAN	PROPOSED	EXISTING	LEGEND-PROFILE	PROPOSED
150 WM	WATERMAIN	150 WM	HYDRO	---	150 WM	WATERMAIN	150 WM	---
+	HYDRANT	+	M.T.S.	+	+	HYDRANT, VALVE	+	+
○	VALVE	○	CONCRETE	▒	300 LDS	LAND DRAINAGE SEWER	300 LDS	---
300 LDS	LAND DRAINAGE SEWER	300 LDS	ASPHALT	▒	250 WWS	WASTE WATER SEWER	250 WWS	---
250 WWS	WASTE WATER SEWER	250 WWS	SIDEWALK	▒	---	---	---	---
○	MANHOLE	○	KGS TEST HOLE	+	---	---	---	---
▽	CATCH BASIN	▽	PROPERTY LINE	---	---	---	---	---
▽	CURB INLET	▽	SURVEY BAR	+	---	---	---	---
+	JUNCTIONS	+	DITCH	---	---	---	---	---
---	CULVERT	---	ELEVATION	---	---	---	---	---
---	GAS	---						

LOCATION APPROVED UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

0	ISSUED FOR TENDER	12/??/??	RJL
NO.	REVISIONS	DATE	BY

KGS GROUP CONSULTING ENGINEERS

DESIGNED BY: RJL
DRAWN BY: JF/EDC
SCALE: AS NOTED

CHECKED BY: []
APPROVED BY: []
RELEASED FOR CONSTRUCTION: []

DATE: 12/06/29

ENGINEER'S SEAL

R.J. LONG
PROFESSIONAL ENGINEER

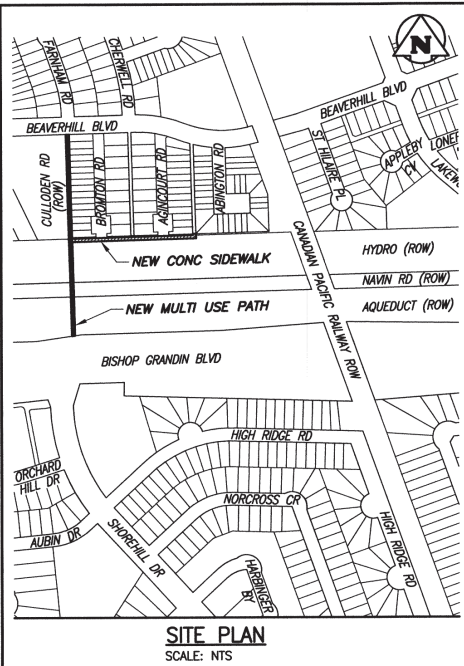
CONSULTANT DRAWING NO. 12-0107-005-05

THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT

PROJECT TITLE: MULTI-USE PATH AND NAVIN DRAIN C.I.P. CONCRETE CULVERT

BISHOP GRADIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD
BOX CULVERT SECTIONS & DETAIL

SHEET OF	07 OF 09
COMPUTER FILE NAME	12-0107-005
CITY DRAWING NUMBER	C380-12-05

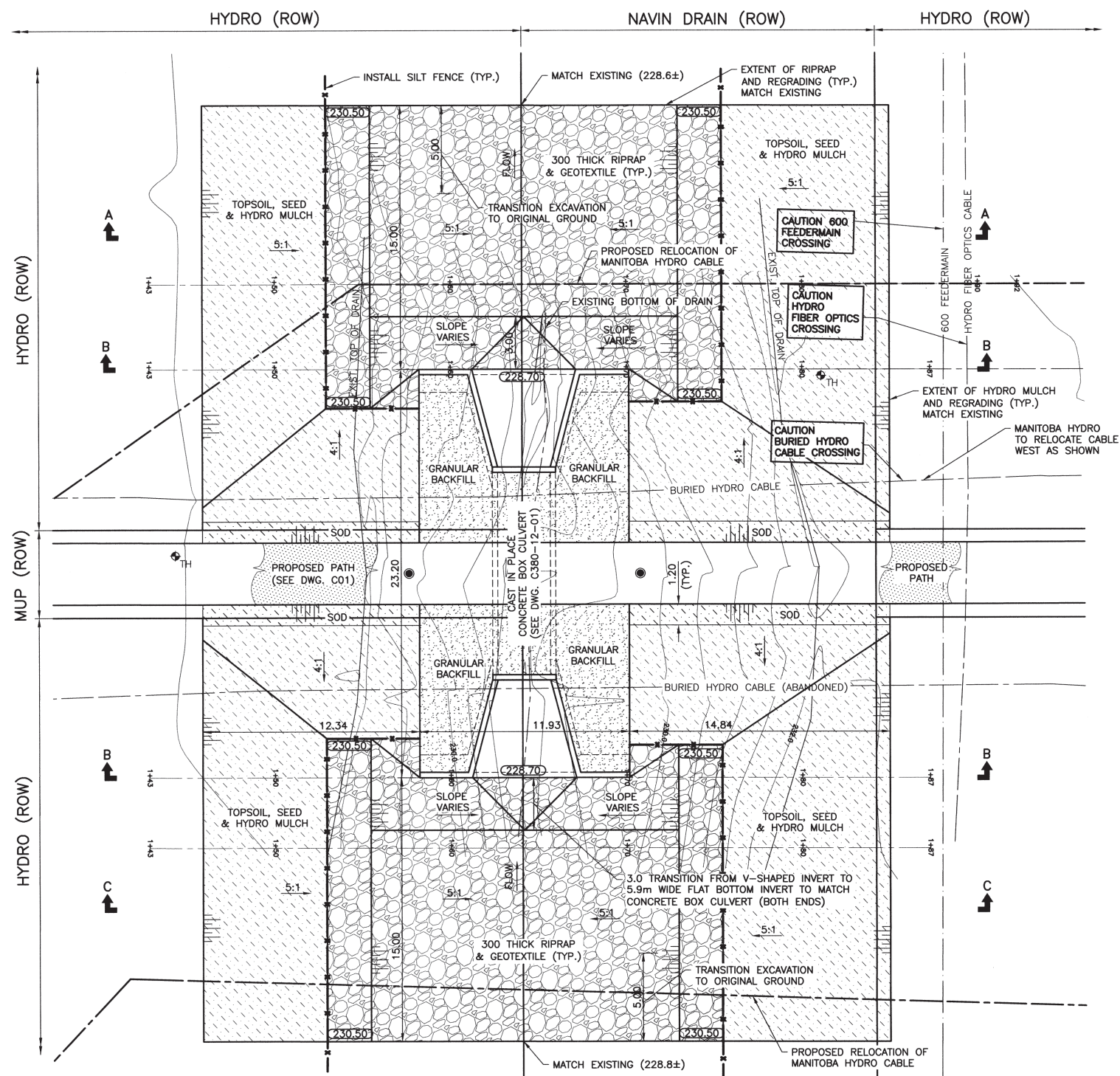


SITE PLAN
SCALE: NTS



NOTES:

1. ALL WORK AND MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISIONS OF THE CITY OF WINNIPEG STANDARD CONSTRUCTION SPECIFICATIONS.
2. CONTRACTOR TO VERIFY DEPTH OF UTILITIES PRIOR TO CONSTRUCTION.
3. LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE, BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR SAFETY WATCH COSTS.
5. SUITABLE EXCAVATED MATERIAL TO BE USED AS BACKFILL WHERE REQUIRED.
6. ALL SURFACES INCIDENTALLY DAMAGED OR DISTURBED TO ACCOMMODATE CONSTRUCTION SHALL BE MAINTAINED OR RESTORED TO PREVIOUS CONDITION OR BETTER.
7. REFER TO CITY OF WINNIPEG E-SPEC FOR INSTALLATION OF DETECTABLE WARNING SURFACE TILES.
8. NEW DRAIN INVERT SHALL BE CONSTRUCTED IN A SMOOTH AND UNIFORM PROFILE BETWEEN THE DESIGN GRADES SHOWN.
9. MUP (ROW) IS MULTI-USE PATH RIGHT-OF-WAY.



PLAN
SCALE 1:150

WARNING

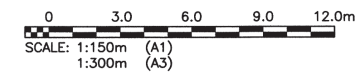
1. NOTIFY THE GAS COMPANY OF THE PROPOSED LOCATION OF EXCAVATION.
2. TAKE PRECAUTION TO AVOID DAMAGE TO GAS COMPANY INSTALLATIONS.
3. SEE PROVINCIAL REGULATION 210/72 FOR DETAILS.

PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG. NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



150 WM	WATERMAIN	150 WM	HYDRO	150 WM	WATERMAIN	150 WM	WATERMAIN
+	HYDRANT	+	M.T.S.	+	HYDRANT, VALVE	+	HYDRANT, VALVE
○	VALVE	○	ASPHALT	○	LAND DRAINAGE SEWER	○	LAND DRAINAGE SEWER
300 LDS	LAND DRAINAGE SEWER	300 LDS	RIPRAP	250 WWS	WASTE WATER SEWER	250 WWS	WASTE WATER SEWER
250 WWS	WASTE WATER SEWER	250 WWS	GRAVEL	□	Q PROFILE	□	Q PROFILE
○	MANHOLE	○	SOD	□	NORTH/WEST GUTTER	□	NORTH/WEST GUTTER
□	CATCH BASIN	□	SEED	○	SOUTH/EAST GUTTER	○	SOUTH/EAST GUTTER
▽	CURB INLET	▽	KGS TEST HOLE	◇, ○	N/W, S/E P'S	◇, ○	N/W, S/E P'S
□	BOLLARD	□	PROPERTY LINE	□, ○	N/W, S/E TOP/CURB	□, ○	N/W, S/E TOP/CURB
□	CULVERT	□	DITCH	△	NORTH/WEST DITCH	△	NORTH/WEST DITCH
□	GAS	□	ELEVATION	▽	SOUTH/EAST DITCH	▽	SOUTH/EAST DITCH
---	EXISTING	---	LEGEND-PLAN	---	LEGEND-PROFILE	---	LEGEND-PROFILE
---	PROPOSED	---	EXISTING	---	PROPOSED	---	EXISTING

LOCATION APPROVED UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. 55-056
ELEV. 232.913m

STURGEON - N.W. COR. BEAVERHILL BLVD. & C.P.P. EMERSON LINE, TR-11 ON TOP OF 0.05m DIA. x 2.4m IRON PIPE, 10.65m W. OF W. RAIL OF RAILWAY TRACKS & 6.78m N. OF C.L. CONC. PAVT. BEAVERHILL BLVD. OR 3.8m E. OF N.L. OF C.P.P. EMERSON R.O.W. & 6.4m S. OF N.L. OF BEAVERHILL BLVD.

KGS GROUP CONSULTING ENGINEERS

DESIGNED BY AKW
DRAWN BY DMW

CHECKED BY
APPROVED BY

HOR. SCALE: AS SHOWN
VERTICAL:

DATE 12/06/11

ENGINEER'S SEAL

PROF. P. PRIESEN
Member
23875

CONSULTANT DRAWING NO. 12-0107-005

THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT

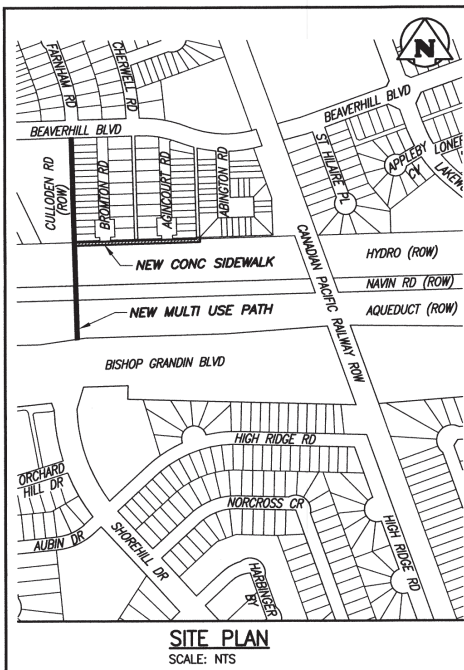
PROJECT TITLE: MULTI-USE PATH AND NAVIN DRAIN C.I.P. CONCRETE CULVERT

SHEET 08 OF 10

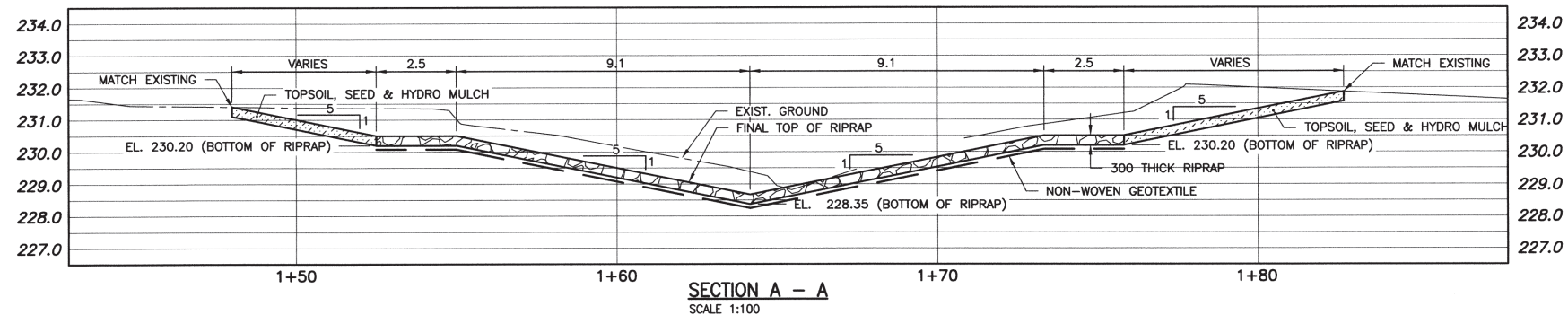
COMPUTER FILE NAME: 12-0107-005

CITY DRAWING NUMBER: G-01

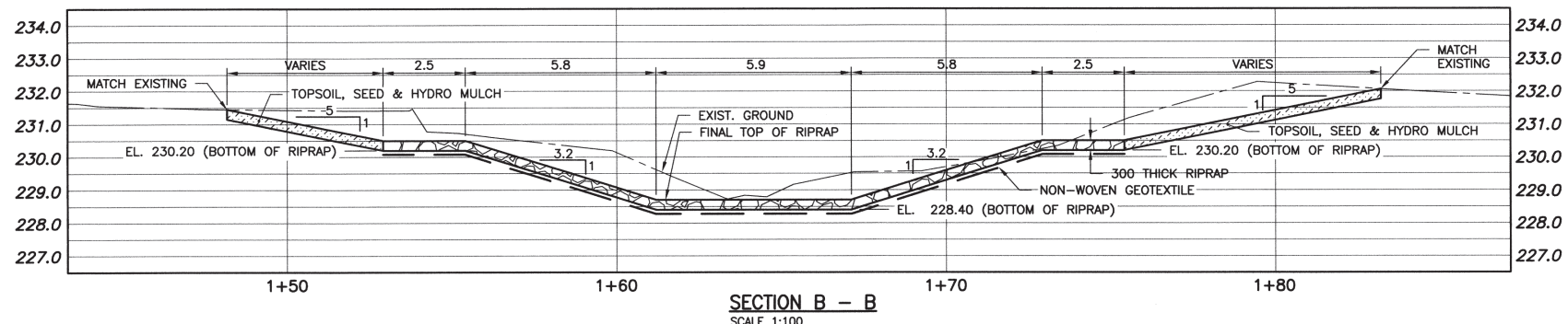
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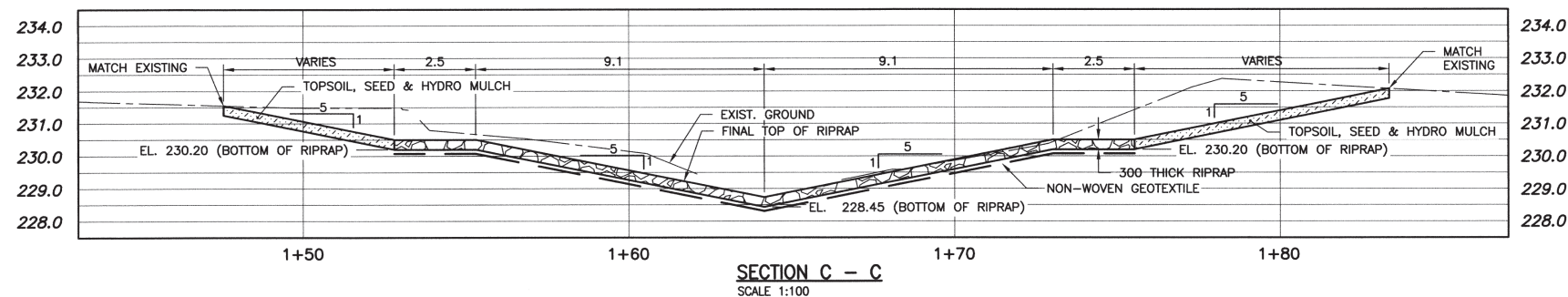
SITE PLAN
SCALE: NTS



SECTION A - A
SCALE 1:100



SECTION B - B
SCALE 1:100



SECTION C - C
SCALE 1:100

WARNING

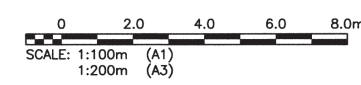
1. NOTIFY THE GAS COMPANY OF THE PROPOSED LOCATION OF EXCAVATION.
2. TAKE PRECAUTION TO AVOID DAMAGE TO GAS COMPANY INSTALLATIONS.
3. SEE PROVINCIAL REGULATION 210/72 FOR DETAILS.

PROPERTY LIMITS DELINEATION

DELINEATION OF PROPERTY LIMITS AS SHOWN ON THIS DWG DOES NOT REPRESENT A "LEGAL SURVEY". KGS GROUP MAKES NO REPRESENTATION OR WARRANTY AS TO THE ACCURACY OF PROPERTY LIMITS DELINEATED ON THIS DWG, NOR ON THE DIMENSIONAL ACCURACY OF DWG FEATURES RELATIVE TO THOSE PROPERTY LIMITS.

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES



P:\Projects\2012\12-0107-005\DocControl\Tobias\DWG\12-0107-005_G02-Rev. 0.dwg - Tab: 002 Plotted By: Diercoche 01/18/2013 [Fr. 11:48am] C:\LEGEND

150 WM	WATERMAIN	150 WM	HYDRO	150 WM	WATERMAIN	150 WM	WATERMAIN
+	HYDRANT	+	M.T.S.	+	HYDRANT, VALVE	+	HYDRANT, VALVE
○	VALVE	○	ASPHALT	○	LAND DRAINAGE SEWER	○	LAND DRAINAGE SEWER
300 LDS	LAND DRAINAGE SEWER	300 LDS	RIPRAP	250 WWS	WASTE WATER SEWER	250 WWS	WASTE WATER SEWER
250 WWS	WASTE WATER SEWER	250 WWS	GRAVEL	X	Q PROFILE	X	Q PROFILE
○	MANHOLE	○	SOD	□	NORTH/WEST GUTTER	□	NORTH/WEST GUTTER
□	CATCH BASIN	□	SEED	○	SOUTH/EAST GUTTER	○	SOUTH/EAST GUTTER
▽	CURB INLET	▽	KGS TEST HOLE	◇, ○	N/W, S/E P'S	◇, ○	N/W, S/E P'S
□	BOLLARD	□	PROPERTY LINE	□, ○	N/W, S/E TOP/CURB	□, ○	N/W, S/E TOP/CURB
□	CULVERT	□	DITCH	△	NORTH/WEST DITCH	△	NORTH/WEST DITCH
□	GAS	□	ELEVATION	▽	SOUTH/EAST DITCH	▽	SOUTH/EAST DITCH
---	EXISTING	---	LEGEND-PLAN	---	EXISTING	---	LEGEND-PROFILE
---	PROPOSED	---	EXISTING	---	PROPOSED	---	EXISTING

LOCATION APPROVED UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES DATE COMMITTEE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. 55-056	81804 - N.W. COR. BEAVERHILL BLVD. @ C.P.R. EMERSON LINE, TRT. ON TOP OF 0.025m DIA. x 2.4m IRON PIPE, 10.68m W. OF W. RAIL OF RAILWAY TRACKS @ 6.76m W. OF C.L. CONC. PAVT. BEAVERHILL BLVD. OR 3.8m E. OF W.L. OF C.P.R. EMERSON R.O.W. @ 8.4m S. OF N.L. OF BEAVERHILL BLVD.
ELEV. 232.913m	
0	ISSUED FOR TENDER
NO.	REVISIONS
	DATE

KGS GROUP CONSULTING ENGINEERS

SCATLIFF+MILLER+MURRAY Inc.

DESIGNED BY: AKW
CHECKED BY: [Signature]
DRAWN BY: GEL
APPROVED BY: [Signature]

HOR. SCALE: AS SHOWN
VERTICAL: [Signature]

RELEASED FOR CONSTRUCTION: 12/06/11

ENGINEER'S SEAL

AD. PRIESEN
Member 23875

CONSULTANT DRAWING NO. 12-0107-005

THE CITY OF WINNIPEG PUBLIC WORKS DEPARTMENT

PROJECT TITLE: MULTI-USE PATH AND NAVIN DRAIN C.I.P. CONCRETE CULVERT

BISHOP GRADIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD BANK STABILIZATION SECTIONS

SHEET	09	OF	10
COMPUTER FILE NAME	12-0107-005		
CITY DRAWING NUMBER	G-02		