



Appendix 'K' – Stormwater Management Report





Date: 5/14/2021 File: 119104
To: Gagan Batra, City of Brantford
From: Jack Turner, P. Eng., GM BluePlan Engineering Ltd.
Project: Three Grand River Crossings, City of Brantford
Subject: Stormwater Management Review

TECHNICAL MEMO

INTRODUCTION

The City of Brantford (City) retained GM BluePlan Engineering Limited (GM BluePlan) to provide consulting services related to a Schedule 'B' Municipal Class Environmental Assessment (MCEA) to review alternatives for three bridges over the Grand River. These are collectively referred to as the Three Grand River Crossings and include the Lorne Bridge, the Brant's Crossing Bridge and the TH&B Crossing Bridge, as well as lands in the vicinity of the bridges, hereafter referred to as the Study Area for the purpose of this Stormwater Management Review. The purpose of this technical memo is to provide a high-level review of stormwater runoff at each bridge location based on the background information provided by the City at the onset of the MCEA. For the purposes of this report, all three bridges are considered to span from east to west.

EXISTING CONDITIONS

Lorne Bridge

The Lorne Bridge predominantly directs water from east to west, with the deck above the peak of the easterly arch as the high point. East of the peak of the east arch, stormwater is directed towards the Brant Avenue intersection. As detailed in the 1980 superstructure replacement drawings completed by JD Lee, the deck is designed to have 2% crossfall, draining runoff towards the curbs on each side of the bridge. At the midspan of the center and western arches there are inlets to deck drains which outlet beneath the bridge as can be seen in Figures 1 and 2 below. It is noted that the deck drains are plugged with debris and likely not functioning as intended. There are also catch basins on each side of the arch bridge, at the western end.

East of the peak of the east arch, stormwater drains from west to east along the deck towards catch basins near the Brant Avenue intersection, east of the bridge structure. Refer to the photos below.



Figure 1: Southern deck drain inlet at center arch, clogged with debris



Figure 2: Deck deck drain outlets at center arch



Figure 3: South catch basin at west end of Lorne Bridge



Figure 4: North catch basin at east end of Lorne Bridge

There is also a 33 inch diameter concrete pipe that extends from the Brant Avenue intersection storm sewer system towards a stormwater outfall south of the abutment of the Lorne Bridge east arch span. It is assumed that catch basins at the east end of the bridge connect into the 33 inch concrete storm pipe; however, the background information provided by the City does not explicitly show a connection. Refer to Figure 5 below for summary of the storm sewer network and outlet adjacent to the east approach of the bridge.

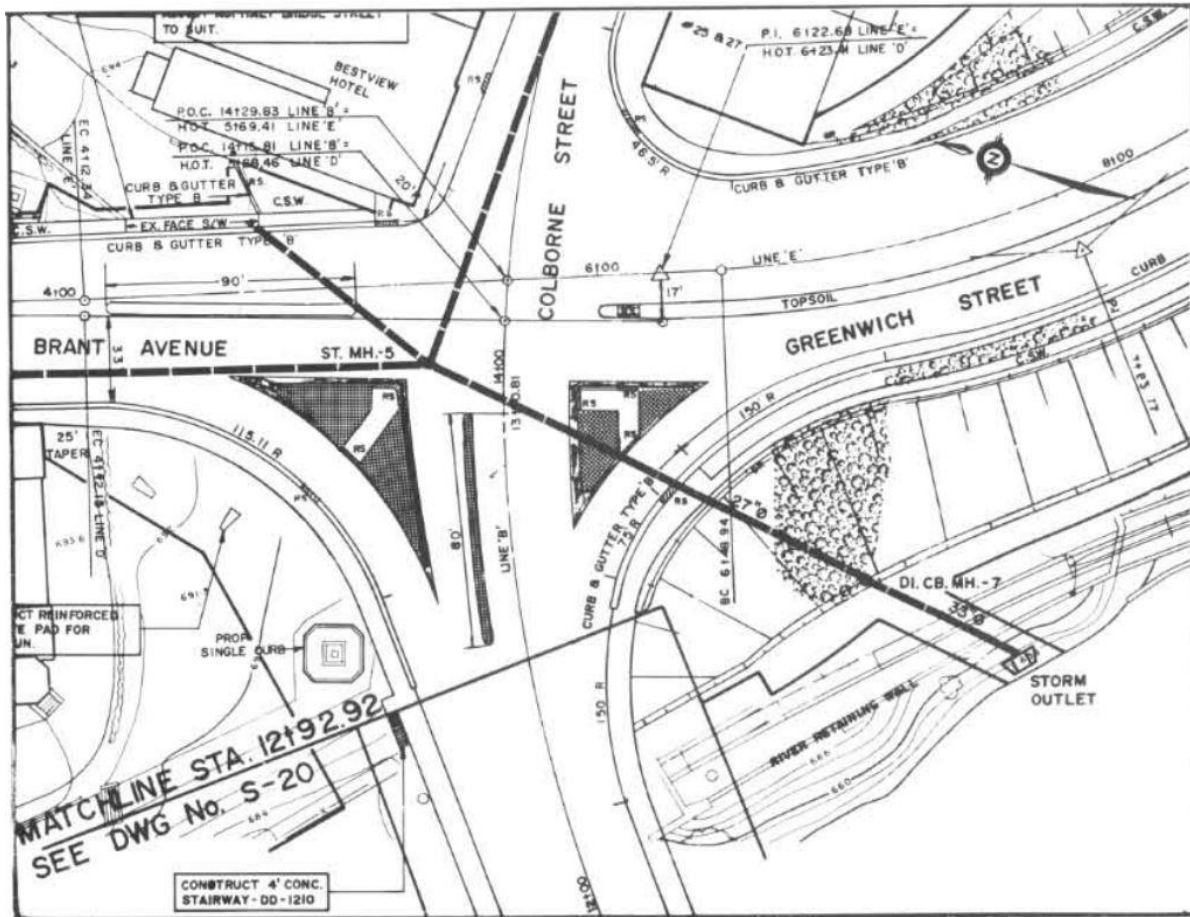


Figure 5: Key Plan, Drawing M-28, Storm Outlet - East Approach, June 5, 1979, By J.D. Lee Engineering Limited

In 2020 GMBP provided consulting services to the City of Brantford for the development of the City's Master Servicing Plan. **Figure 6** below details the locations of existing catch basins, manholes and stormwater gravity mains within the Study Area, based on data collected as part of the City's Master Servicing Plan. Note that based on this data, the connection details for the catch basins into the stormwater mains remain an unknown. The 1980 Lorne Bridge Reconstruction Drawings indicate that the westerly catch basin leads at Lorne Bridge were to be extended to the location of the current day catch basins; however, no other information is available at the time of this report.

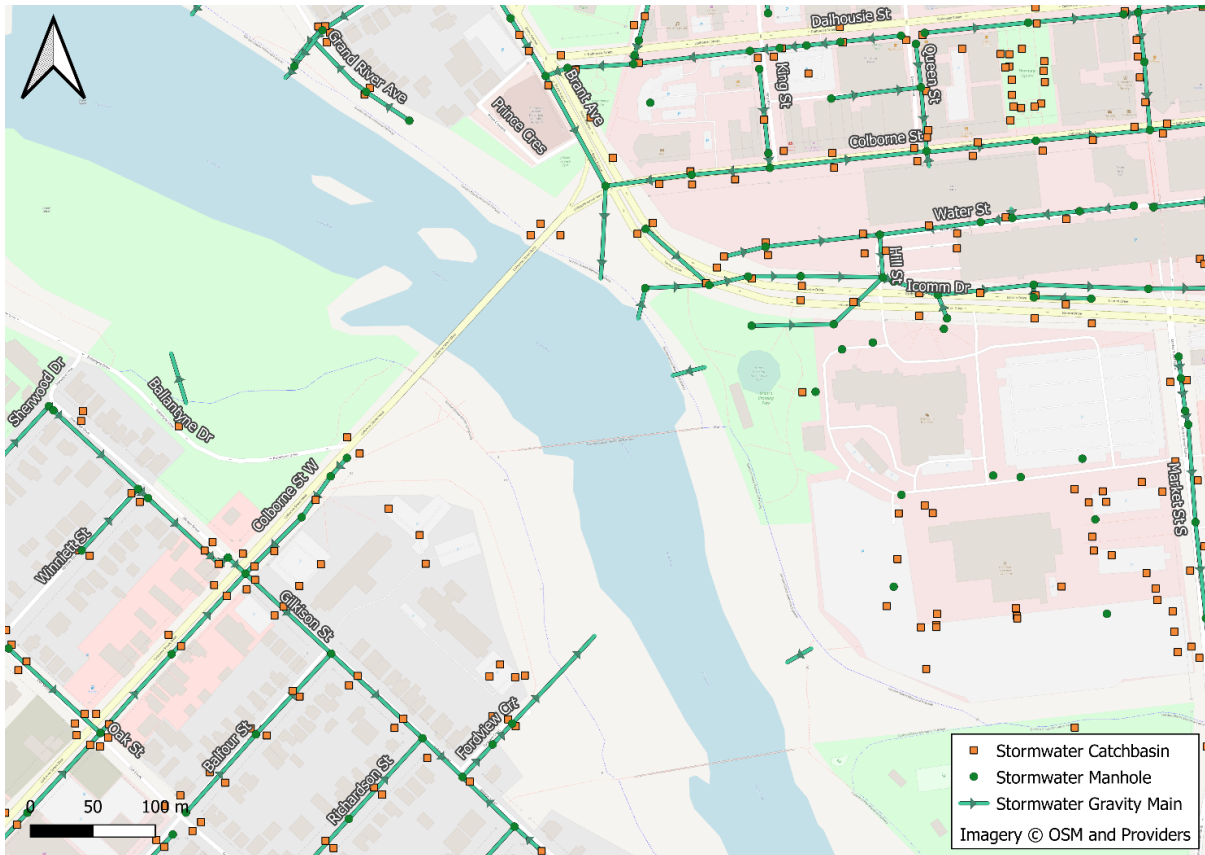


Figure 6: Excerpt from data collected by GMBP as part of the City's Master Servicing Plan

Pedestrian Bridges

Brant's Crossing Bridge and TH&B Crossing Bridge do not have formal drainage systems, with water draining through the wooden deck to the river below. Refer to the photos below.



Figure 7: Brant's Crossing Bridge deck (no deck drains present)



Figure 8: TH&B Crossing Bridge deck top (no deck drains present)

DISCUSSION AND RECOMMENDATIONS

Lorne Bridge

As detailed in the recommended Overall Crossing Strategy, Lorne Bridge has been recommended to be rehabilitated. Repairs to the deck top are recommended to be included as part of this rehabilitation; however, the existing network of deck drains and catch basins are not anticipated to be impacted by the works and should be maintained. It is recommended that the deck drains on Lorne Bridge are cleaned of debris annually to ensure they remain in good working order.

Brant's Crossing Bridge

As detailed in the recommended Overall Crossing Strategy, Brant's Crossing Bridge has been recommended to be raised and replaced. The new superstructure could include a series of deck drains to manage stormwater runoff out to the river banks. However, for a bridge of this length, this is atypical and would only be recommended if the Grand River Conservation Authority required this change. The stormwater management system will ultimately be determined during the detailed design phase.

TH&B Crossing Bridge

As detailed in the recommended Overall Crossing Strategy, Brant's Crossing Bridge has been recommended to undergo a minor rehabilitation and then ultimately be removed at the end of the structure's useful life. As the structure is ultimately scheduled for removal, the addition of deck drains, or other improvements to the structure's stormwater management are not recommended to be included as part of the rehabilitation works.

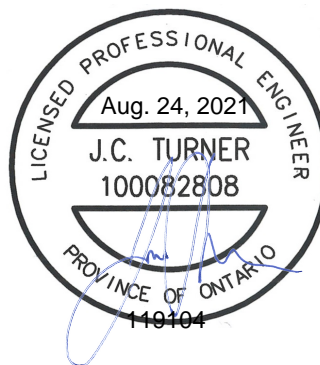
Select drawings from the 1980 Lorne Bridge superstructure replacement have been appended to this report for information.

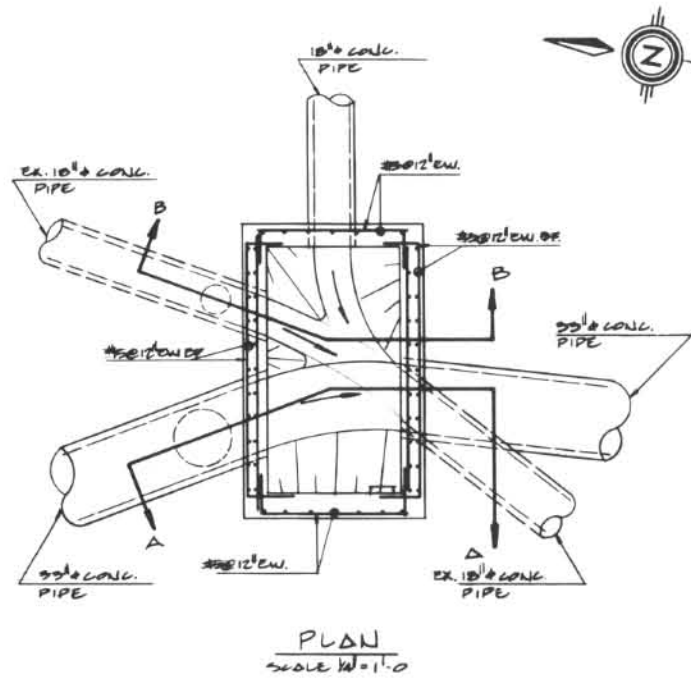
All of which is respectfully submitted.

GM BLUEPLAN ENGINEERING LIMITED

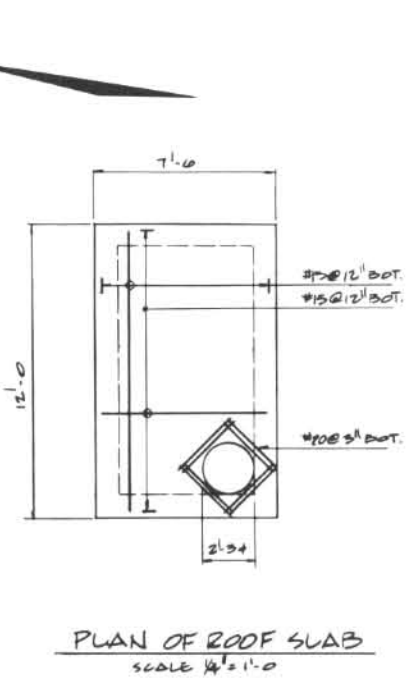
Per:

Jack Turner, P. Eng

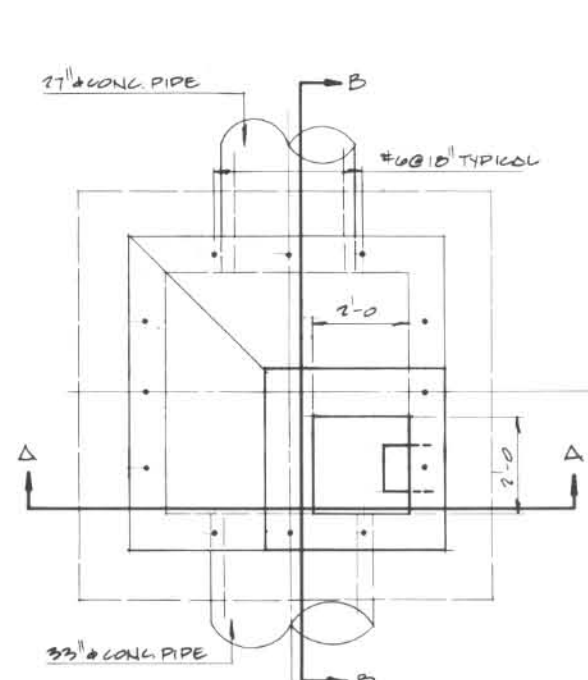




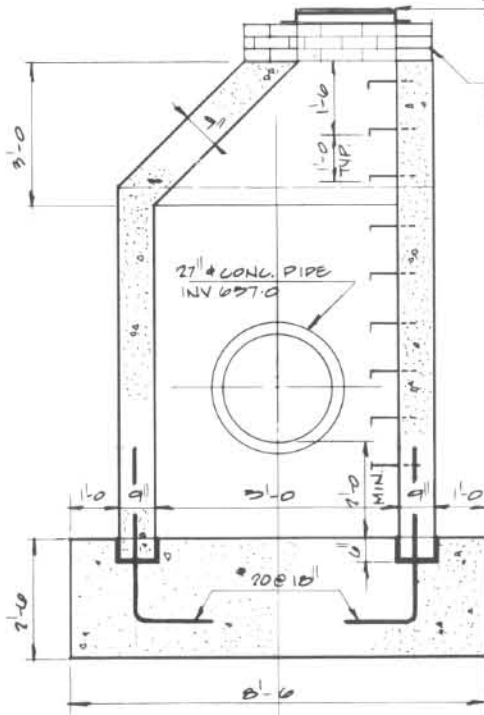
PLAN
SCALE 1/4" = 1'-0"



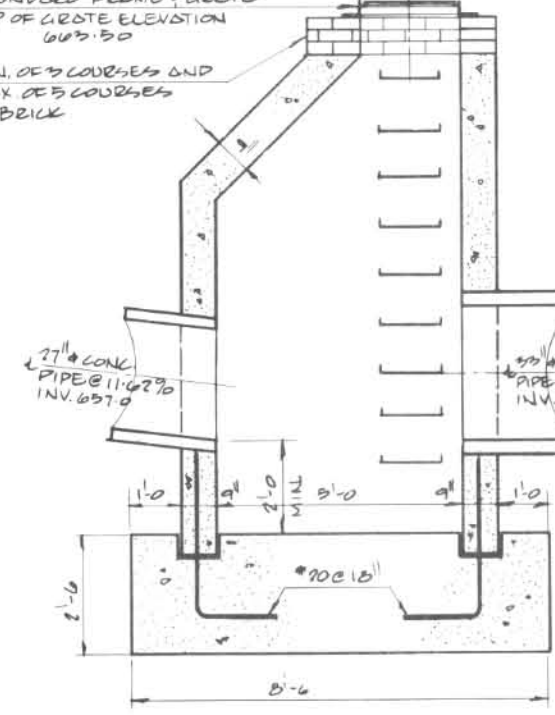
PLAN OF ROOF SLAB
SCALE 1/4" = 1'-0"



PLAN
SCALE 1/4" = 1'-0"

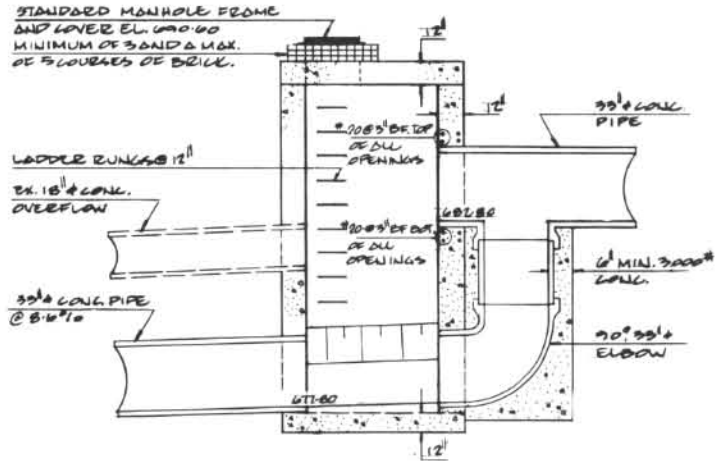


SECTION A-A
SCALE 1/2" = 1'-0"

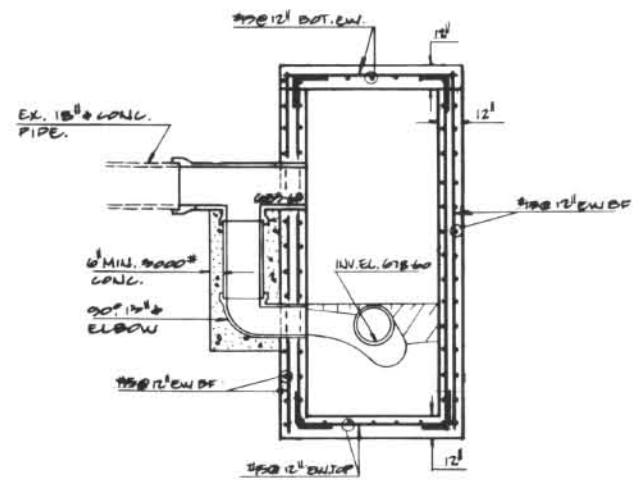


SECTION B-B
SCALE 1/2" = 1'-0"

- NOTES
1. POROUS BACKFILL TO BE PLACED TO MIN. THICKNESS OF 1'-0" ON ALL SIDES.
 2. LADDER RUNGS TO CONFORM TO THE CITY OF BRANTFORD SPECIFICATION.
 3. ALL CONCRETE WORK TO CONFORM TO SECTION 9.04 OF M.T.C. FORM 1. LOSS OF CONCRETE: 3000 PSI.

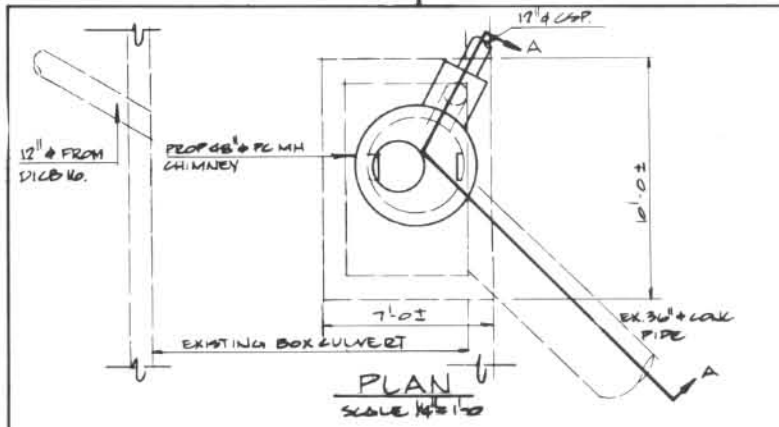


SECTION A-A
SCALE 1/4" = 1'-0"

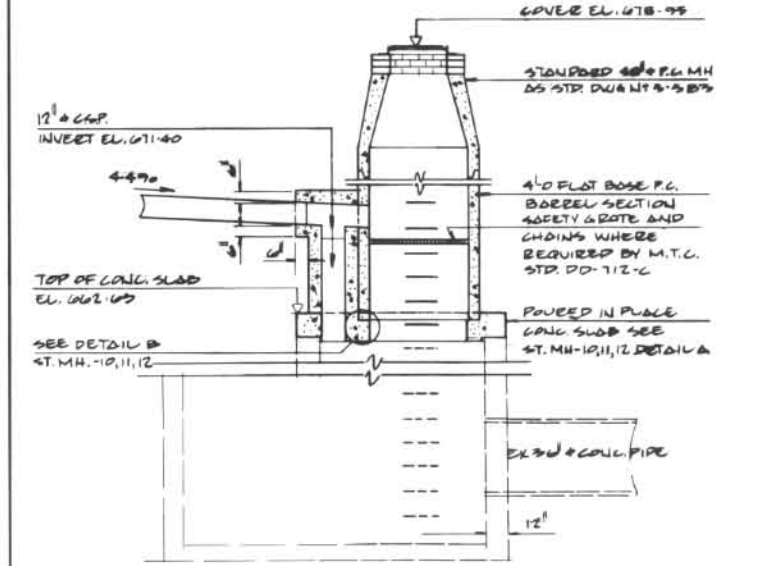


SECTION B-B
SCALE 1/4" = 1'-0"

STORM MANHOLE No. 5

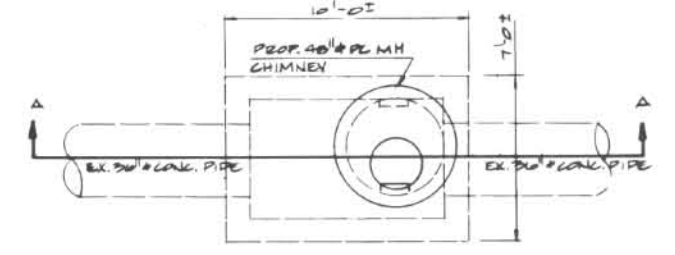


PLAN
SCALE 1/4" = 1'-0"

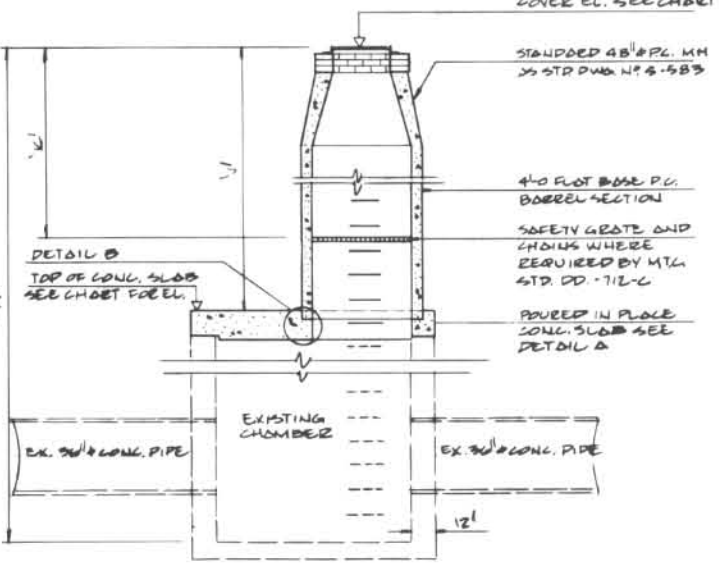


SECTION A-A
SCALE 1/4" = 1'-0"

STORM MANHOLE No. 9

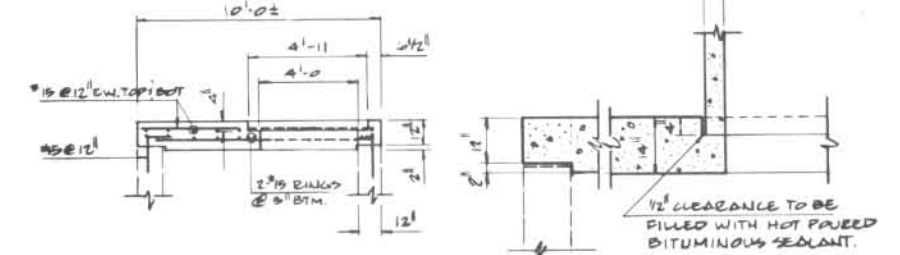


PLAN
SCALE 1/4" = 1'-0"



SECTION A-A
SCALE 1/4" = 1'-0"

ACCESS SHAFTS TO EXISTING 36" STORM SEWER



DETAIL A
SCALE 1/4" = 1'-0"

DETAIL B
SCALE 1/2" = 1'-0"

M.H. NO.	SUMP ELEV.	ELEV. TOP OF SLAB	PROP. LOWER ELEV.	H	V	U
47 MH 10	647.58	648.00	616.71	24.18	14.57	14.71
47 MH 11	647.25	648.00	649.58	18.30	6.99	7.22
47 MH 12	647.13	647.07	649.40	12.02	-	-

NOTE: 47 MH 12 - CONSTRUCT 10' REINFORCED CONG. SLAB PILE REQUIRED C.O. FRAME AND GRATE.

GENERAL NOTES

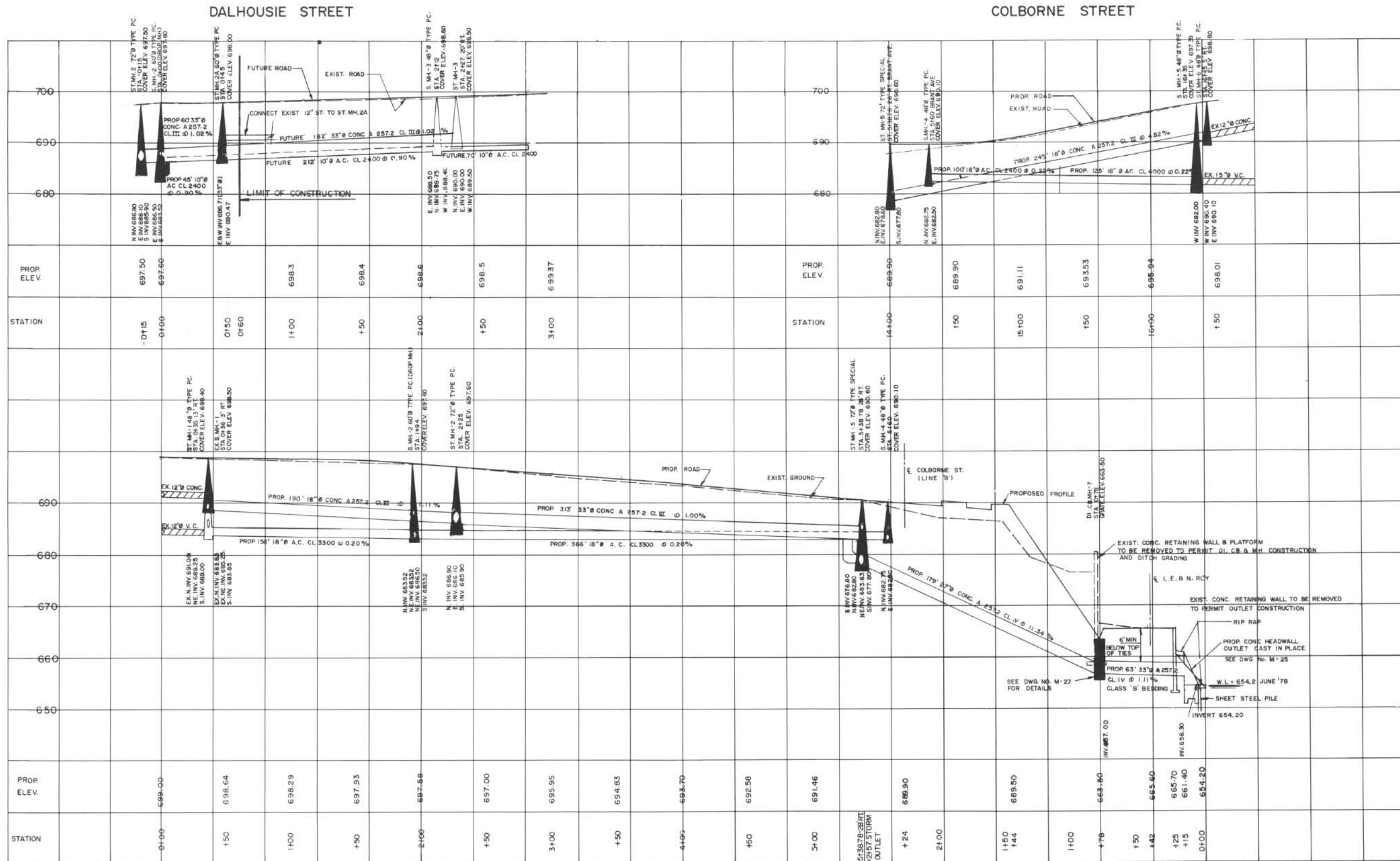
1. ALL CONCRETE WORK TO CONFORM TO CITY OF BRANTFORD SPEC. SECTION 9.02.
2. ALL EXPOSED EDGES TO HAVE 1" CHAMFER.
3. POROUS BACKFILL TO BE PLACED TO MIN. THICKNESS OF 1'-0" ON ALL SIDES.
4. ALL REINFORCING BARS TO HAVE 2" COVER.
5. STRUCTURE TO BE BUILT IN ACCORDANCE WITH CITY OF BRANTFORD SPEC. SECTION 9.01.
6. PAURED CONCRETE CHUTE BLOCKS TO BE LOCATED BY FIELD ENGINEER.
7. LADDER RUNGS TO CONFORM TO CITY OF BRANTFORD PLAN N9.5-580.



CITY OF BRANTFORD
LORNE BRIDGE RECONSTRUCTION
SPECIAL MANHOLES
EAST APPROACH STORM SEWER

J.D. LEE ENGINEERING LIMITED
CONSULTING ENGINEERS - KINGSTON, BRANTFORD, ONT.

DESIGN	JEB	RGR	SCALE	AS SHOWN	JOB NO.	DATE
OWN.	JTF	JEB			1818	MAR 1978
DATE	REVISION	CHK.	QUANT.	DWS. NO.	SHEET	REVISION
				8-87	27	

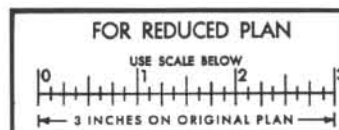


BRANT AVENUE

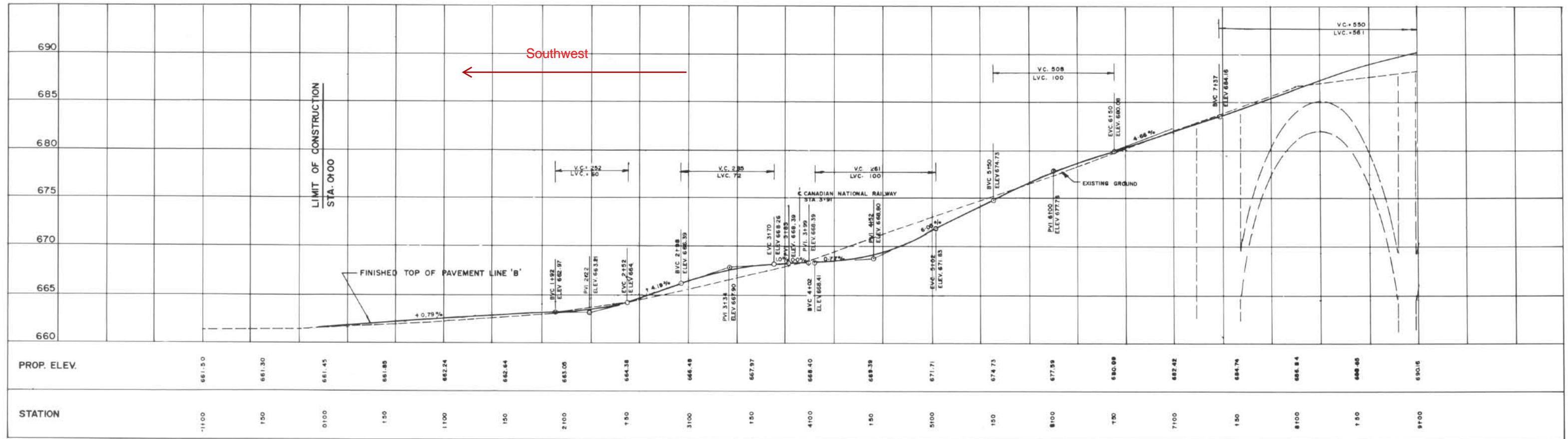
STORM OUTLET

GENERAL NOTES

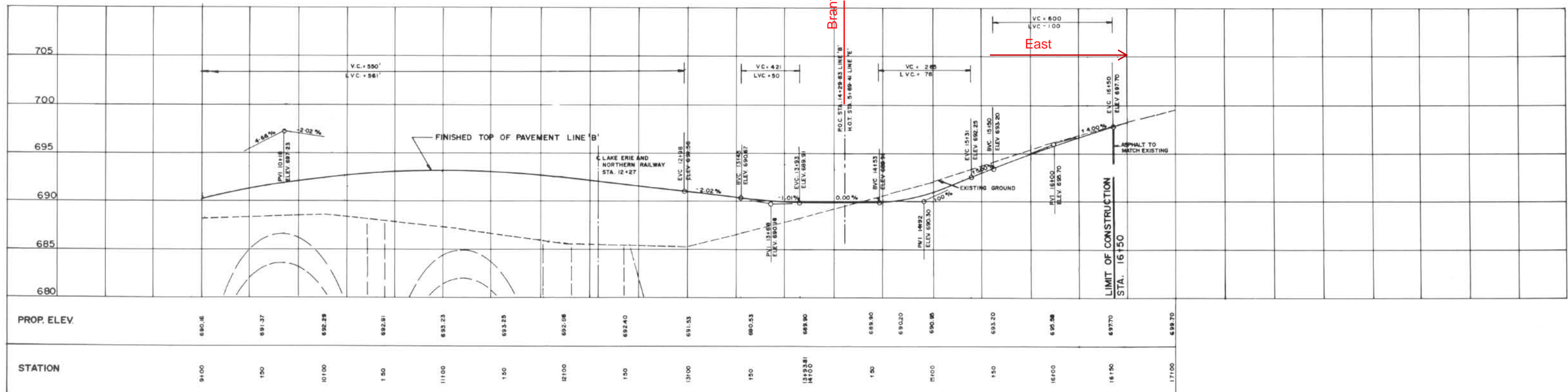
1. ALL BEDDING TO BE CITY OF BRANTFORD CLASS 'B'
2. ALL PRIVATE SANITARY SERVICE CONNECTIONS TO MAINS TO BE MADE BY MEANS OF TEES OR SADDLES
3. ALL PRIVATE STORM SERVICE AND CATCHBASIN LEAD CONNECTIONS TO MAINS TO BE MADE BY MEANS OF TEES OR MORTAR ON SADDLES.



CITY OF BRANTFORD		LORNE BRIDGE RECONSTRUCTION		EAST APPROACH		SEWER PROFILES	
J.D. LEE ENGINEERING LIMITED CONSULTING ENGINEERS - KINGSTON, BRANTFORD, ONT.							
DESIGN	R.R.R.	J.E.B.	SCALE 1/40' HOR.	JOB NO.	DATE		
MAY 14/79	GRADE FROM ST-5-ST-7	1 C.M.	DWN.	1 C.M.	R.G.R.	1/10' VER.	416
DATE	REVISION	CHK.	QUANT.	DWG. NO.	SHEET	REVISION	
				M-10	10		



PAVING PROFILE LINE 'B'

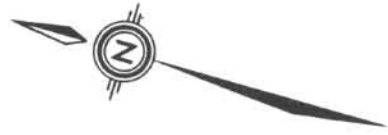


PAVING PROFILE LINE 'B'

GENERAL NOTES
1. ALL ELEVATIONS SHOWN RELATE TO GEODETIC DATUM.



CITY OF BRANTFORD					
LORNE BRIDGE RECONSTRUCTION					
COLBORNE STREET PAVING PROFILE					
J.D. LEE ENGINEERING LIMITED CONSULTING ENGINEERS - KINGSTON, BRANTFORD, ONT.					
DESIGN	R.G.R.	J.E.B.	SCALE 1"=40' HOR. 1"=5' VER.	JOB NO.	DATE
DWN.	I.C.M.	R.G.R.	DWG. NO.	SHEET	REVISION
DATE	REVISION	CHK.	QUANT.	M-18	16



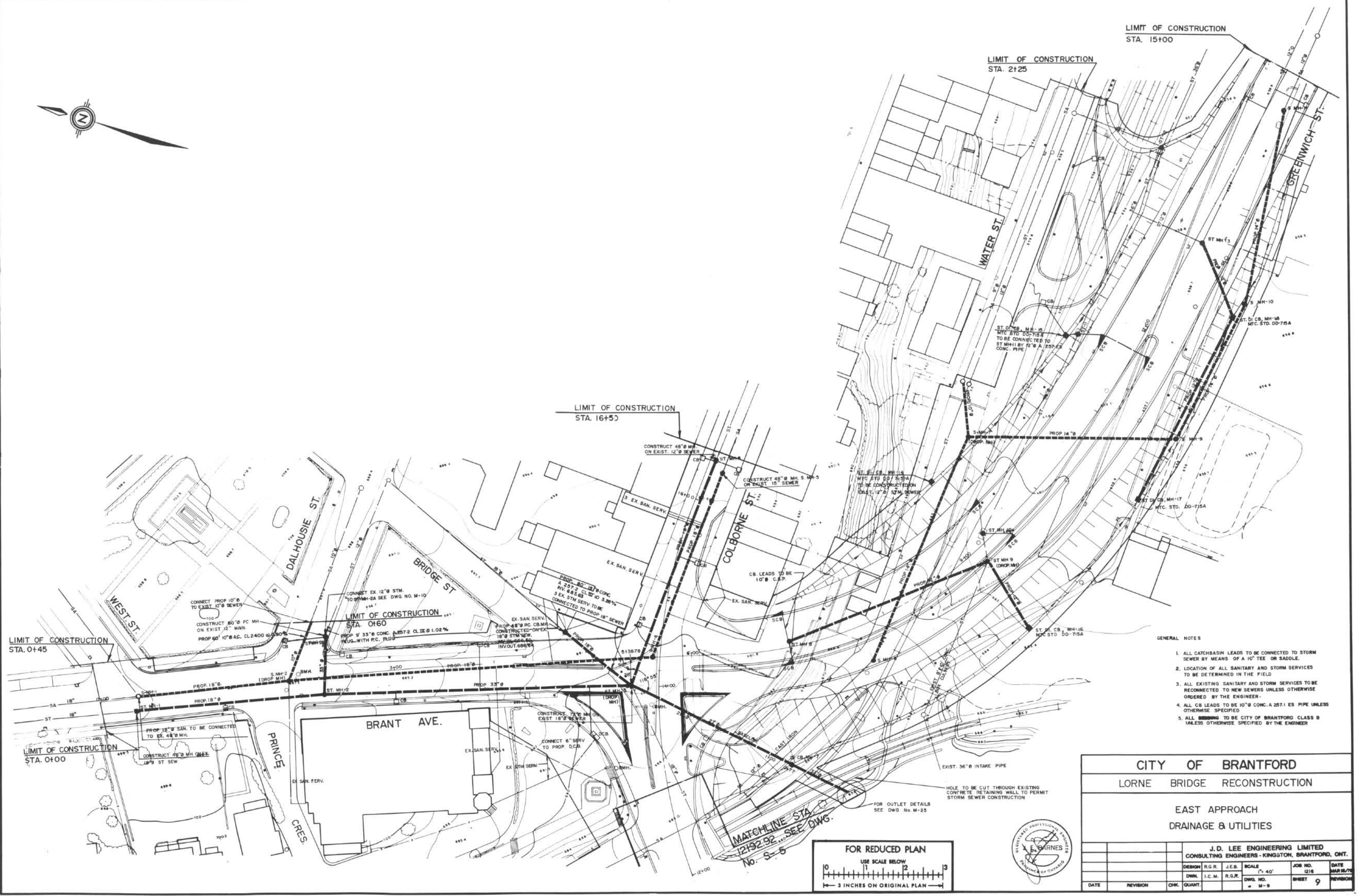
LIMIT OF CONSTRUCTION
STA. 15+00

LIMIT OF CONSTRUCTION
STA. 21+25

LIMIT OF CONSTRUCTION
STA. 16+50

LIMIT OF CONSTRUCTION
STA. 0+45

LIMIT OF CONSTRUCTION
STA. 0+00



GENERAL NOTES

1. ALL CATCHBASIN LEADS TO BE CONNECTED TO STORM SEWER BY MEANS OF A 10" TEE OR SADDLE.
2. LOCATION OF ALL SANITARY AND STORM SERVICES TO BE DETERMINED IN THE FIELD.
3. ALL EXISTING SANITARY AND STORM SERVICES TO BE RECONNECTED TO NEW SEWERS UNLESS OTHERWISE ORDERED BY THE ENGINEER.
4. ALL CB LEADS TO BE 10" CONC. A 257.1 ES PIPE UNLESS OTHERWISE SPECIFIED.
5. ALL BRIDGING TO BE CITY OF BRANTFORD CLASS B UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.

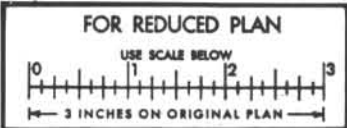
CITY OF BRANTFORD

LORNE BRIDGE RECONSTRUCTION

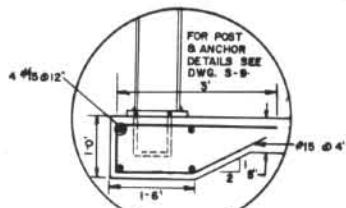
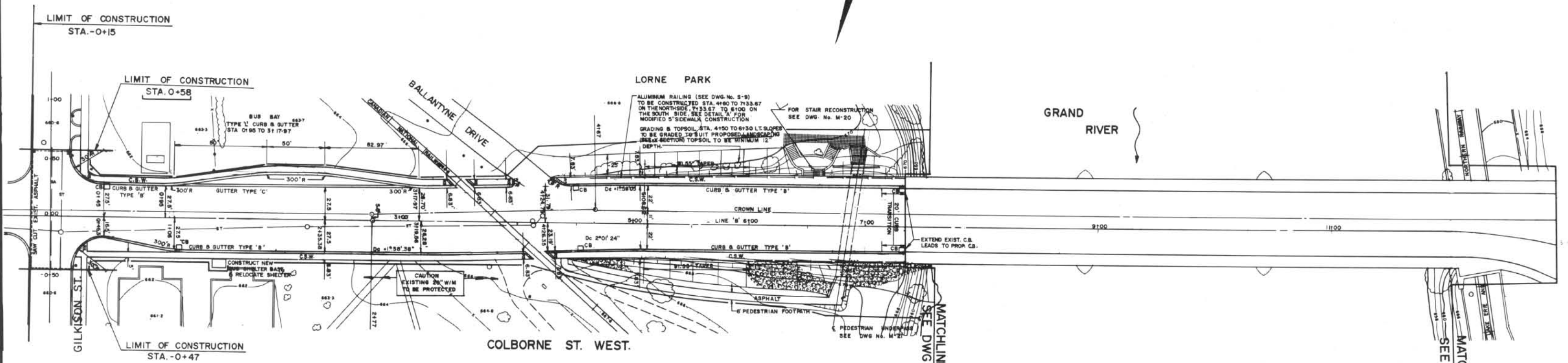
EAST APPROACH
DRAINAGE & UTILITIES

J.D. LEE ENGINEERING LIMITED
CONSULTING ENGINEERS - KINGSTON, BRANTFORD, ONT.

DESIGN	R.G.R.	J.E.B.	SCALE	JOB NO.	DATE
DRAWN	I.C.M.	R.G.R.	1" = 40'	1216	MAR 16, 78
DATE	REVISION	CHK.	QUANT.	DWG. NO.	SHEET
				M-9	9



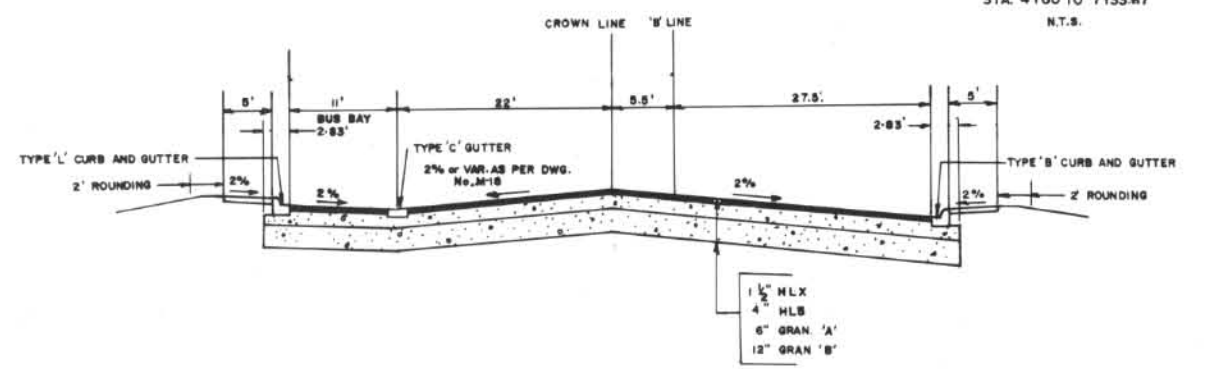
MATCHLINE STA.
12+92.92 SEE DWG.
No. S-5



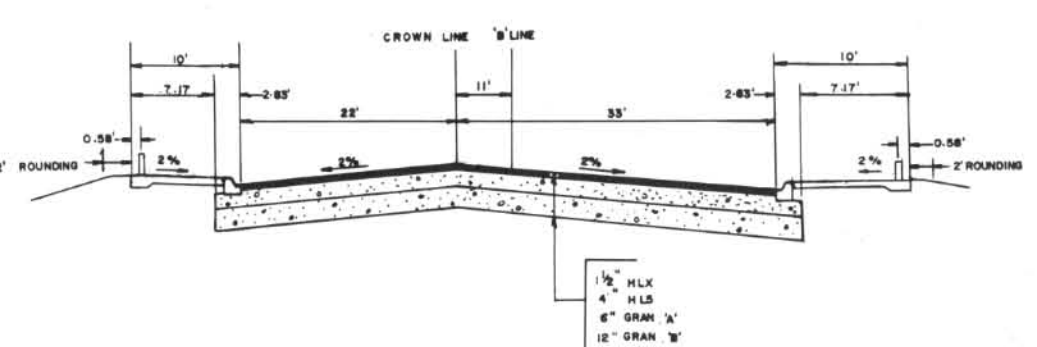
DETAIL 'A' MODIFIED 8" S/W
STA. 4160 TO 7133.67
N.T.S.



TYPICAL X SECTION
PEDESTRIAN FOOTPATH
N.T.S.



TYPICAL X-SECTION THROUGH BUS BAY
N.T.S.



TYPICAL X-SECTION STA. 6+00 TO STA. 7+33.67
N.T.S.

- GENERAL NOTES
1. PROPOSED CATCH BASINS TO BE CONNECTED TO EXISTING STORM SEWERS.
 2. SIDEWALK CONSTRUCTION TO CONFORM TO CITY OF BRANTFORD PLAN NO. 3-1078.
 3. TOPSOIL DEPTH TO BE 6" UNDER SOU.



CITY OF BRANTFORD					
LORNE BRIDGE RECONSTRUCTION					
WEST APPROACH					
PAVEMENT DETAILS AND TYPICAL CROSS SECTIONS					
J.D. LEE ENGINEERING LIMITED CONSULTING ENGINEERS - KINGSTON, BRANTFORD, ONT.					
DESIGN	RGR	JEB	SCALE	JOB NO.	DATE
DRAWN	ICM	R.S.R.	1" = 40'-0"	1218	08/16/22
DATE	REVISION	CHK.	QUANT.	DWG. NO.	SHEET
				M-19	19