

CN Tunnel - Winnipeg SWBRT Project Pre-Tender Meeting Structural Notes

PREPARED FOR: The City of Winnipeg
 PREPARED BY: Kevin Willis
 DATE: Last Saved October 16, 2009
 PROJECT NUMBER: 08-8813
 VERSION: 1

This memo briefly outlines items discussed at the contractor's pre-tender meeting on October 16th, 2009. This memo accompanies a partial set of drawings that include highlight and markups of specific areas of interest.

Ref No.	Sheet	Comment
1	03	Two separate geotechnical reports are available, and as the other presentations have made clear - geotechnical issues are a big part of this project.
2	03	All reinforcement and embedded structural steel is to be hot-dip galvanized. Shoring in general does not have to be galvanized but we will consider further how to handle those parts of the shoring that remain permanently embedded in the tunnel structure.
	05	Just pointed out the tunnel, retaining walls at each end and the staging joint running through the middle of the tunnel.
	06	Segment layout is essentially for detailing convenience only - contractor may elect to put in longer lengths of up to 30 meters. There is no requirement for tunnel segments to be poured in an alternating sequence (i.e. "checkerboard") although there is a requirement for this at the retaining walls. Contractor can essentially pour the tunnel in segments of whatever length he chooses from 10 meters up to 30 meters but he must submit his proposed layout for review and must coordinate that layout with the layout of joints in the tiling that goes on the tunnel walls.
	06	Camber is required for the roof slab as shown.
	07	Underside of foundation slab is shown sloped but may be poured level as shown by increasing the thickness at the outside edges (i.e. NOT by reducing the thickness at the center). If the underside is placed level, the reinforcing cage must be adjusted to match the lower elevation.
	07	Waterproofing is required on the top of the roof slab and down the walls. The roof slab has protection board on top of the membrane and the walls have wall drain outside the membrane. Waterproofing membrane and protection board is also required inside the tunnel on top of the foundation slab.
	07	Because of the staging of backfill and shoring removal, splices may be required in the waterproofing membrane on the walls. A detail for this splice is given here.
	07	Walls have been designed to be backfilled to the elevation shown prior to the roof slab

		being in place.
	08	Underside of foundation slab is shown sloped but may be poured level as shown by increasing the thickness at the outside edges (i.e. NOT by reducing the thickness at the center). If the underside is placed level, the reinforcing cage must be adjusted to match the lower elevation.
	23	Underside of foundation slab is shown sloped but may be poured level as shown by increasing the thickness at the outside edges (i.e. NOT by reducing the thickness at the center). If the underside is placed level, the reinforcing cage must be adjusted to match the lower elevation.
	23	Mechanical couplers are generally not shown in the main typical foundation reinforcement but the contractor may propose to use them if it helps with the rebar placement.
	24	Stirrups are shown as closed stirrups but open stirrups (i.e. u-shape with 2 - 135° hooks at top or bottom) may also be used. Pairs of overlapping U-bars are not acceptable in the foundation or roof slabs, but are acceptable (for the most part) in the walls. More on this below.
	28	Noted headwall constructed on top of Stage 1 of the tunnel to act as shoring during Stage 2.
	29	Noted single line of reinforcement extending from wall into roof slab, roof slab designed as simple span member. Noted generous use of "expanding sealant" throughout. Noted that no center wall was provided as this was part of the requirements put forth by Transit.
	30	Noted single line of reinforcement extending from wall into roof slab, roof slab designed as simple span member. Noted generous use of "expanding sealant" throughout. Noted that no center wall was provided as this was part of the requirements put forth by Transit.
	31	Stirrups are shown as closed stirrups but open stirrups (i.e. u-shape with 2 - 135° hooks at top or bottom) may also be used. Pairs of overlapping U-bars are not acceptable in the foundation or roof slabs, but are acceptable (for the most part) in the walls. More on this below.
	31	At locations where the roof slab thickness changes, we want to avoid ponding of water against that step. This sheet contains a detail showing modifications to slab elevations in those areas in order to avoid this happening.
	32	Noted reinforcement extending into roof slab and liberal use of expanding sealant throughout the tunnel.
	33	Stirrups are shown as closed stirrups but except for the 5 ties at the very top of the wall, open stirrups (i.e. U-shape with 2 - 135° hooks at top or bottom) or pairs of opposing U-bars may also be used.
	35	Noted walls cantilevering from the tunnel on each side to engage with the sheet piling and form part of the shoring system during Stage 2 construction.
	36	More headwall details - nothing special to note.
	37	Noted embedded structural steel used in the joint area in place of either spliced or coupled conventional reinforcement. This is the steel that is covered by the 'Structural Steel' section of the specifications.
	43	Noted three different types of retaining wall in use: U-shaped channel (i.e. tunnel without a roof), conventional spread footing gravity walls and conventional pile-supported gravity walls.
	44	Only two types of retaining wall are in use at the south end - U-shaped channel (i.e. tunnel without a roof) and conventional spread footing gravity walls.
	45	Noted tall concrete wall at the NW wall, where the top of concrete steps up to match top of fencing.
	46	No special notes.
	47	Sections taken through the U-channel wall area, with counterfort option shown.
	49	Two alternative designs shown for the U-channel area: counterfort design on the left and tapered wall on the right. Either design may be used at the discretion of the Contractor.

STRUCTURE DESIGN NOTES:

- 1. DESIGN BASED ON AREMA "MANUAL FOR RAILWAY ENGINEERING", 2008 EDITION AND ON CNR "GUIDELINES FOR DESIGN OF RAILWAY STRUCTURES", DATED JANUARY 2006.
2. THESE DRAWINGS TO BE READ IN CONJUNCTION WITH THE CONTRACT SPECIFICATIONS.
3. EXISTING DIMENSIONS ARE APPROXIMATE ONLY. CONTRACTOR SHALL SITE VERIFY ALL DIMENSIONS.
4. ALL STATIONS AND COORDINATES ARE NAD 83 UTM GRID COORDINATES. ALL DIMENSIONS ARE GIVEN IN GROUND COORDINATES. GROUND = GRID/0,9997688

DESIGN LOADS

- 1. COOPER E90 PLUS IMPACT.

FOUNDATIONS

- 1. FOUNDATION DESIGN IS BASED ON THE FOLLOWING REPORTS:
- "THE CITY OF WINNIPEG BUS RAPID TRANSIT SYSTEM - SOUTHWEST CORRIDOR GEOTECHNICAL INVESTIGATION AND PRELIMINARY RECOMMENDATIONS", PREPARED BY KLOHN CRIPPEAN AND DATED MAY 2004.
- "CITY OF WINNIPEG - BUS RAPID TRANSIT PROJECT SUMMARY OF ADDITIONAL GEOTECHNICAL ASSESSMENT" DATE JULY 03, 2009.

- ENSURE THAT THE REQUIREMENTS OUTLINED IN THESE REPORTS ARE READ AND UNDERSTOOD PRIOR TO COMMENCING WITH FOUNDATION WORK. FOR TEST HOLE LOCATIONS REFER TO THE GEOTECHNICAL REPORT OR BORE HOLE LOG DRAWINGS 9 & 10.
2. PROTECT EXCAVATION FOR FOOTINGS FROM RAIN, SNOW, FREEZING TEMPERATURES AND STANDING WATER.
3. PLACE A MAT OF LEAN MIX CONCRETE 10 MPa ON THE SPECIFIED WORKING BASE IMMEDIATELY UPON COMPLETION OF AN EXCAVATION TO MINIMIZE LOSS OF MOISTURE OR DEGRADATION OF THE BASE.
4. REMOVE GROUND WATER ENTERING EXCAVATION BY AN APPROVED DEWATERING METHOD.
5. DO NOT PLACE CONCRETE AGAINST FROZEN GROUND, THAW BY AN APPROVED METHOD, THEN PROTECT EXCAVATION FROM FREEZING PRIOR TO PLACING CONCRETE.

CAST IN PLACE CONCRETE

- 1. CONCRETE MATERIAL, QUALITY, MIXING, PLACING, FORM WORK AND OTHER CONSTRUCTION PRACTICES TO CONFORM TO CSA-A23.1.
2. SEE SPECIFICATIONS FOR CONCRETE MIX DESIGN REQUIREMENTS.
3. MINIMUM REQUIRED CONCRETE STRENGTH AT 28 DAYS IS 35 MPa.

REINFORCING STEEL

- 1. REINFORCING STEEL SHALL CONFORM TO CSA G30.18 GRADE 400.
2. REINFORCEMENT SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH CSA G164 TO A MINIMUM ZINC RETENTION OF 610 g/m².
3. CONCRETE CLEAR COVER TO REINFORCEMENT UNLESS NOTED OTHERWISE:
EXPOSED TO EARTH 75 mm TO 90 mm
ALL OTHER LOCATIONS 60 mm TO 80 mm
NO ADDITIONAL CONSTRUCTION TOLERANCES SHALL BE APPLIED TO THESE VALUES.
4. PROVIDE MINIMUM 30 CLEAR BETWEEN REINFORCEMENT AND OTHER EMBEDDED ITEMS SUCH AS SHORING.
5. SUPPLY SUPPORT BARS TO SUPPORT MAIN REINFORCING AS REQUIRED.

REINFORCING LAP SPLICES/PROJECTION LENGTH

Table with columns: BAR SIZE, PROJECTION OR LAP. Rows include 10M, 15M, 20M, 25M, 30M, 35M with corresponding values.

- 1. LAP SPLICE SCHEDULE IS FOR CLASS B SPLICES OF TOP BARS AND APPLIES TO REINFORCING SPLICES NOT OTHERWISE DETAILED.
2. LOCATE REINFORCING SPLICES NOT INDICATED ON THE DRAWINGS AT POINTS OF MINIMUM STRESS. LOCATION OF SPLICES TO BE APPROVED BY THE CONTRACT ADMINISTRATOR.
3. BEFORE PLACING REBAR, ENSURE IT IS CLEAN, FREE OF LOOSE SCALE, DIRT, OR OTHER FOREIGN COATING WHICH WOULD REDUCE THE BOND TO CONCRETE.
4. ALL LONGITUDINAL BARS IN MAT FOUNDATION, WALLS AND ROOF TO BE SPLICED CONTINUOUS FOR THE FULL STRUCTURE LENGTH (EXCEPT AT STAGE 1/2 JOINT WHERE OTHER DETAILS APPLY).
5. PROJECTION SHOWN SHALL BE PROVIDED AT CONSTRUCTION JOINTS UNLESS NOTED OTHERWISE.

MISCELLANEOUS METAL/STRUCTURAL STEEL

- 1. STEEL SHALL CONFORM TO CSA G40.21 GRADE 350W.
2. STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH CSA G164 TO A MINIMUM ZINC RETENTION OF 610 g/m².

WELDING

- 1. WELDING SHALL BE UNDERTAKEN BY A COMPANY WITH PROVEN CAPABILITIES IN THIS TYPE OF WORK AND SHALL HAVE APPROVAL FROM THE CANADIAN WELDING BUREAU TO THE REQUIREMENTS OF CSA W47.1.
2. WELDING SHALL CONFORM TO CSA W59.

TEMPORARY DRAINAGE/TEMPORARY SHORING

- 1. SEE SPECIFICATIONS FOR REQUIREMENTS.

WATERPROOFING

- 1. WATERSTOP SHALL BE DURAJOINT BASEAL TYPE 61 OR APPROVED EQUAL ONLY.
2. EXPANDING SEALANT SHALL BE VOLCLAY RX101, SIKKA SWELL S-2 OR APPROVED EQUAL ONLY.
3. WALL DRAIN SHALL BE NILEX NUDRAIN DN50 OR APPROVED EQUAL ONLY.
4. SEE SPECIFICATIONS FOR APPROVED WATERPROOFING MEMBRANE TYPES. IF ANY DETAILS SHOWN ARE INCOMPATIBLE WITH THE SELECTED PRODUCT OR DO NOT CONFORM TO THE MEMBRANE MANUFACTURER'S RECOMMENDATIONS, SUBMIT ALTERNATIVE DETAILS TO THE CONTRACT ADMINISTRATOR FOR REVIEW.

PLAN LEGEND

Table mapping existing, proposed, to be removed/abandoned, and to be adjusted symbols to infrastructure types like Combined Sewer, Waste Water Sewer, Storm Relief Sewer, etc.

ROADWAY ABBREVIATIONS

Table mapping abbreviations to roadway features like ABAN (ABANDON (ED)), ABUT (ABUTMENT), ANGLE, APPROX (APPROXIMATE), etc.

STRUCTURE ABBREVIATIONS

Table mapping abbreviations to structure types like ACP (ASPHALT CONCRETE PAVEMENT), AF (ACROSS FLATS), ALT (ALTERNATING), etc.

PROFILE LEGEND

Table mapping existing and proposed profile symbols to features like PROFILE CENTER LINE/CTL, PROFILE SOUTHEAST GUTTER/CTL, etc.

HATCH LEGEND

Table mapping hatch patterns to materials like CONCRETE PAVEMENT/CONCRETE PAVEMENT (WITH ASPHALT OVERLAY), ASPHALT PAVEMENT, etc.

SECTIONS AND DETAILS

- A SECTION NUMBER OR DETAIL LETTER
B DRAWING WHERE SECTION OR DETAILS IS TAKEN
C DRAWING WHERE SECTION OR DETAIL IS DRAWN



Approval and revision table with columns for Location, Date, and Description. Includes 'APPROVED UNDERGROUND STRUCTURES' and 'ISSUED FOR TENDER'.

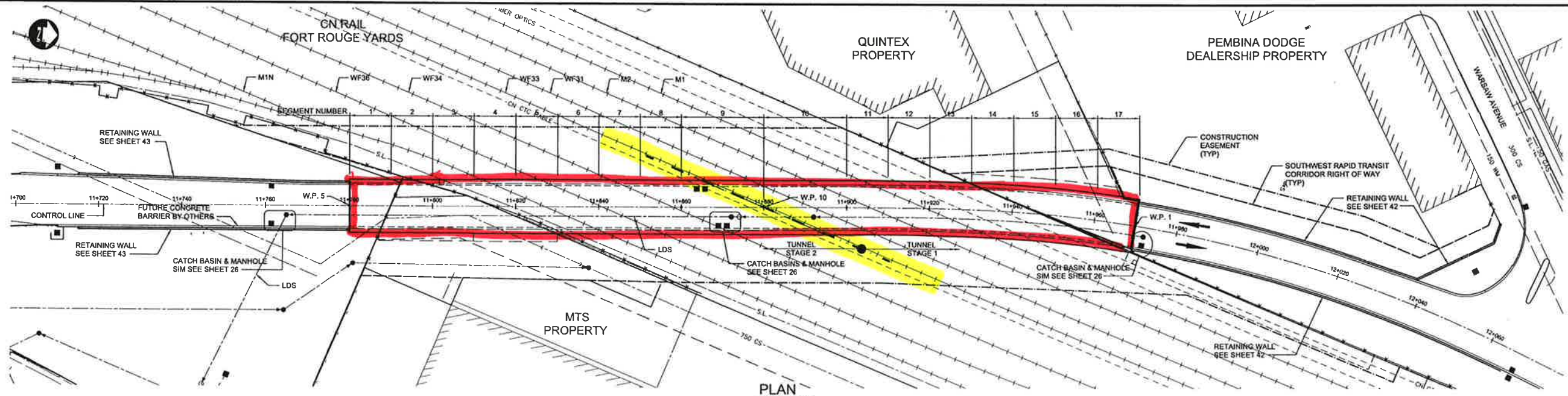
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Release for construction table with columns for Released for construction and Date. Includes Dillon Consulting logo.

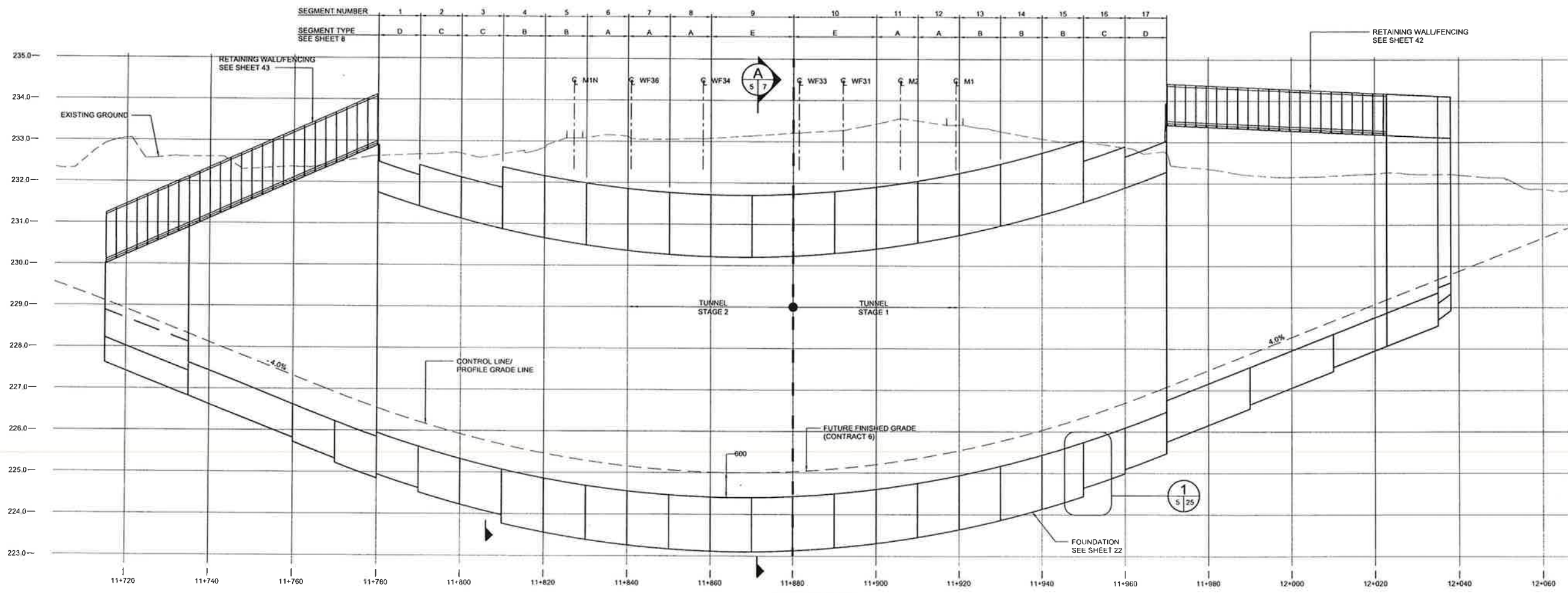


Project information block including City of Winnipeg Transit Department logo, project name 'SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1 TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION', drawing number 'U237-09-03', and sheet '03 OF 73'.

Vertical text on the left margin: C:\proj\088813\Contract\Contract - 1\Current\C4-G102-P-Rev



PLAN
SCALE 1:500



ELEVATION
SCALE HORZ 1:500
VERT 1:50

- NOTES:
- TRACKS ARE SHOWN IN ORIGINAL LOCATION. SEE TRACK DETOUR DRAWINGS FOR TEMPORARY LOCATIONS DURING CONSTRUCTION.
 - SECTION TAKEN ALONG WEST ELEVATION.



LOCATION UNDERGROUND	APPROVED STRUCTURES	B.M. ELEV.	DESIGNED BY: KGW
SUPV. U/G STRUCTURES COMMITTEE	DATE:		DRAWN BY: RCB
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.			CHECKED BY: KGW
			APPROVED BY: DPK
			HOR. SCALE: AS SHOWN
			VERTICAL: AS SHOWN
			ISSUED FOR TENDER: 10/13/2009 RCB
			NO. REVISIONS: DATE: BY: DATE: 2009/06/24

DILLON CONSULTING

ENGINEER'S SEAL
PROFESSIONAL ENGINEER
ORIGINAL SIGNED BY: K.G. WALLIS 10/13/2009
REGISTERED PROFESSIONAL ENGINEER

CONSULTANT PROJECT NO. 088813

THE CITY OF WINNIPEG TRANSIT DEPARTMENT

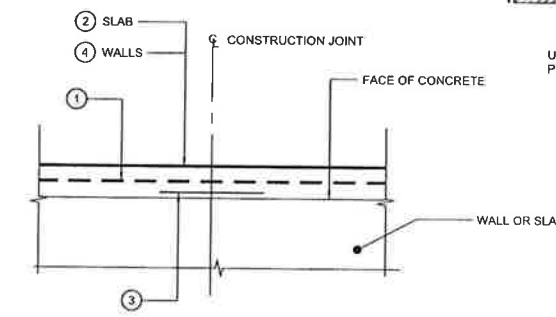
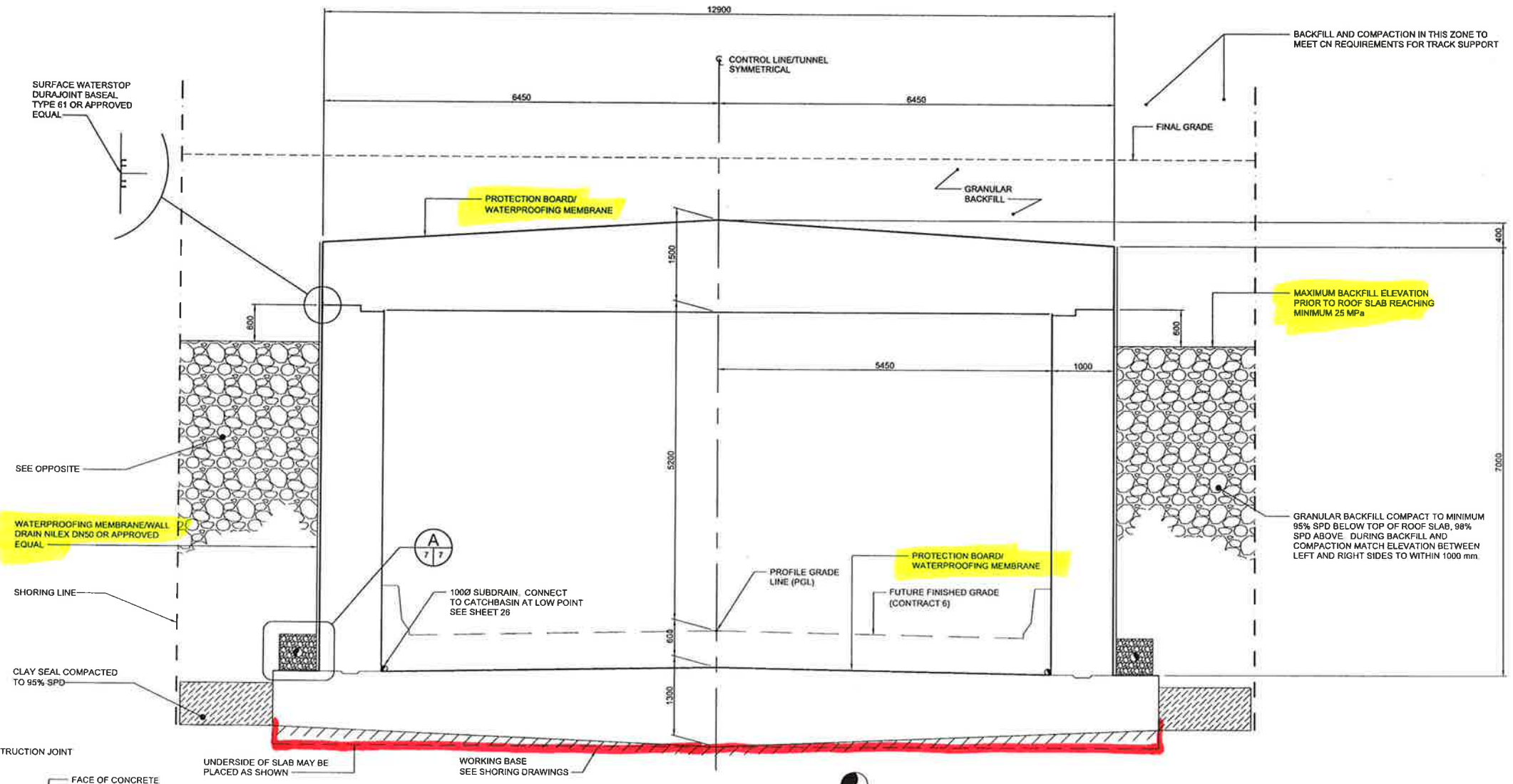
Winnipeg

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

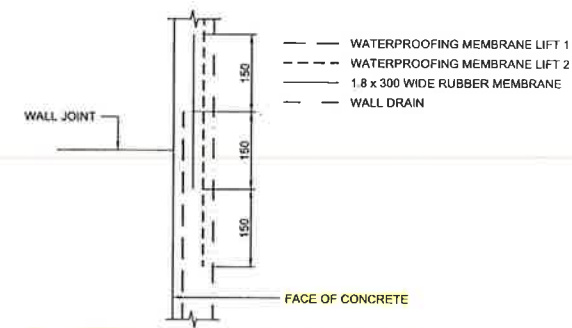
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SHEET 05 OF 73
CONSULTANT DRAWING NUMBER: C4-G104-T

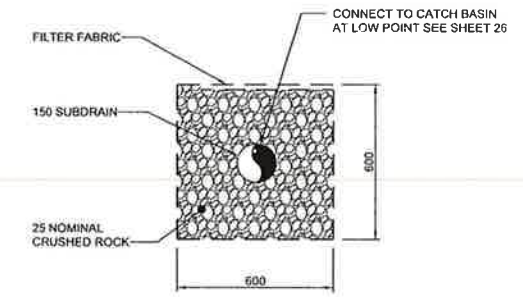
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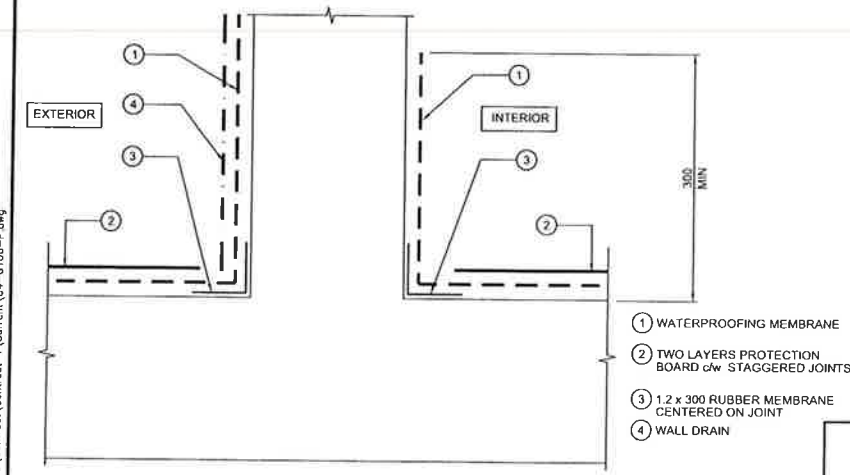
TYPICAL INTERIOR TUNNEL SECTION
SCALE 1:40



MEMBRANE SPLICE DETAIL
SCALE 1:20



TYPICAL SUBDRAIN DETAIL
SCALE N.T.S.



TYPICAL WATERPROOFING MEMBRANE DETAILS
SCALE N.T.S.

APEGM
Certificate of Authorization
Dillon Consulting Limited (MB)
No. 1789 Date: OCTOBER 13, 2009

LOCATION	APPROVED	B.M.	DESIGNED	ENGINEER'S SEAL
UNDERGROUND	STRUCTURES	ELEV.	BY	
SUPP. U/G STRUCTURES COMMITTEE	DATE		KGW	
			RCB	
			KGW	
			DPK	
			HOR SCALE AS SHOWN	RELEASED FOR CONSTRUCTION
			VERTICAL AS SHOWN	DATE
0	ISSUED FOR TENDER	10/13/2009	RCB	2009/06/24
NO.	REVISIONS	DATE	BY	DATE

DILLON CONSULTING

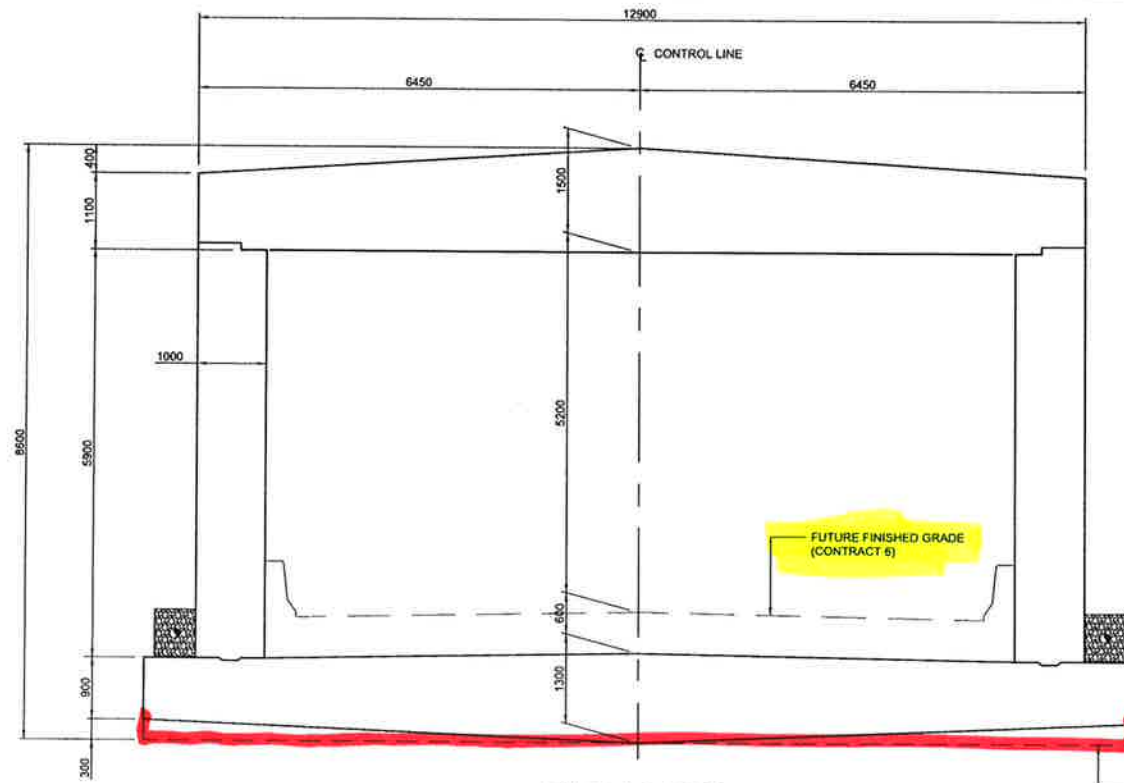
CONSULTANT PROJECT NO: 088813

THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

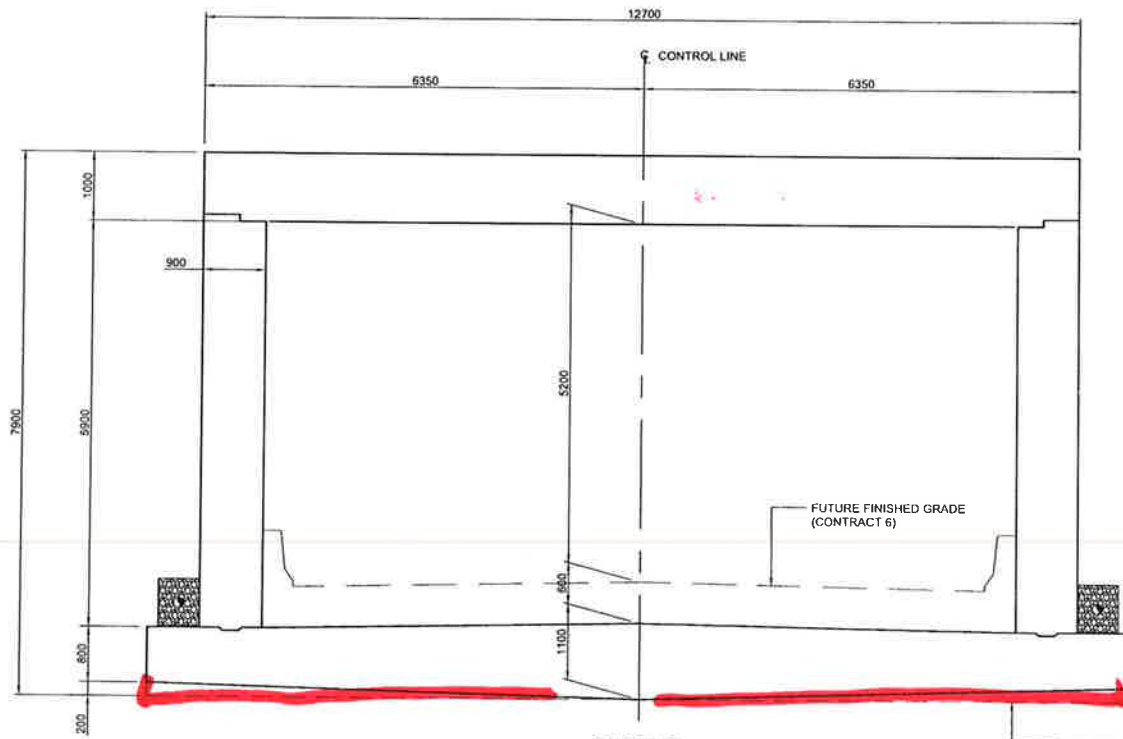
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SHEET 07 OF 73
CONSULTANT DRAWING NUMBER: C4-G106-T

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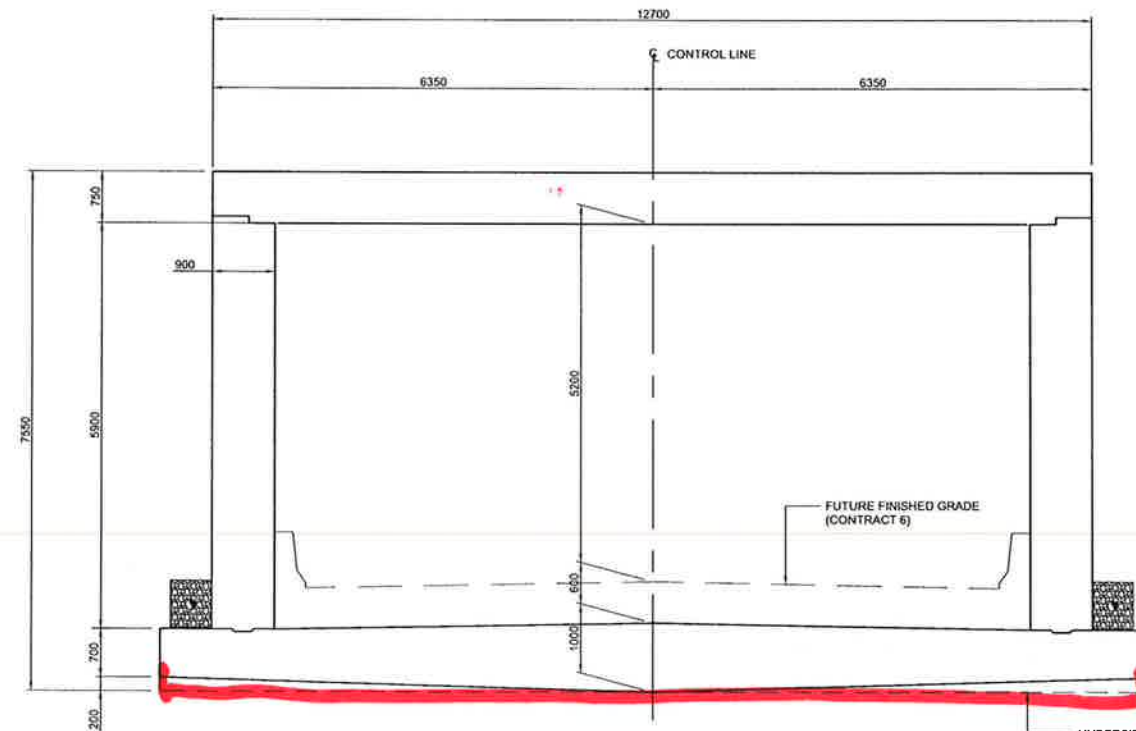
TYPE A & B & E
SCALE 1:50

UNDERSIDE OF SLAB MAY BE PLACED LEVEL AS SHOWN



TYPE C
SCALE 1:50

UNDERSIDE OF SLAB MAY BE PLACED LEVEL AS SHOWN



TYPE D
SCALE 1:50

UNDERSIDE OF SLAB MAY BE PLACED LEVEL AS SHOWN

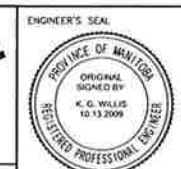
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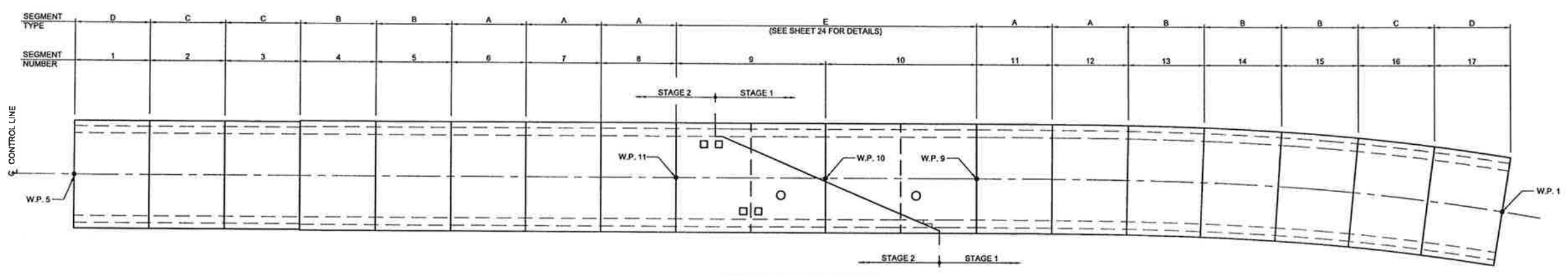
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0	ISSUED FOR TENDER	2013/2009	RCB

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UNDERGROUND	STRUCTURES	ELEV.
SUPV. U/G STRUCTURES COMMITTEE	DATE:	

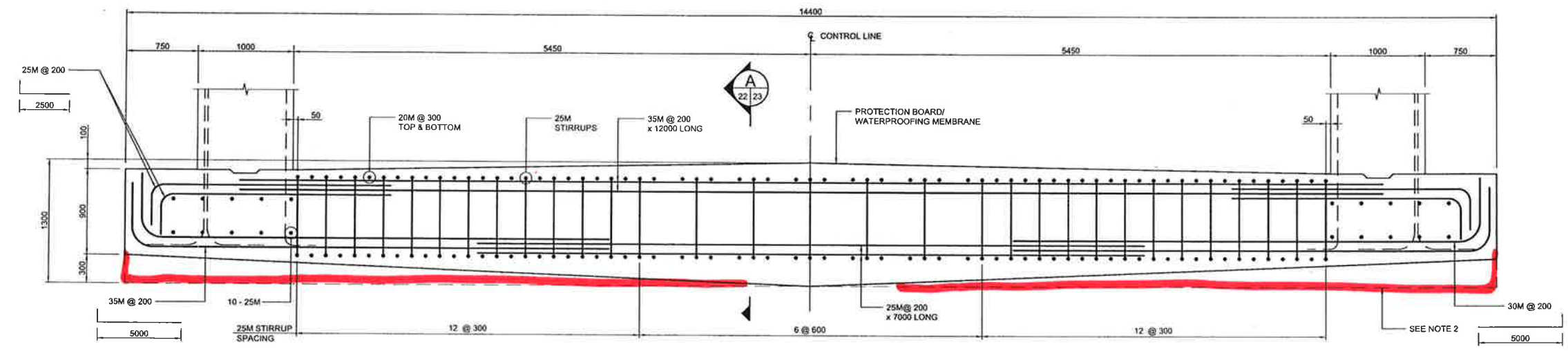
DESIGNED BY	KGW
DRAWN BY	RCB
CHECKED BY	KGW
APPROVED BY	DPK
HOR. SCALE	AS SHOWN
VERTICAL	AS SHOWN
DATE	2009/06/24



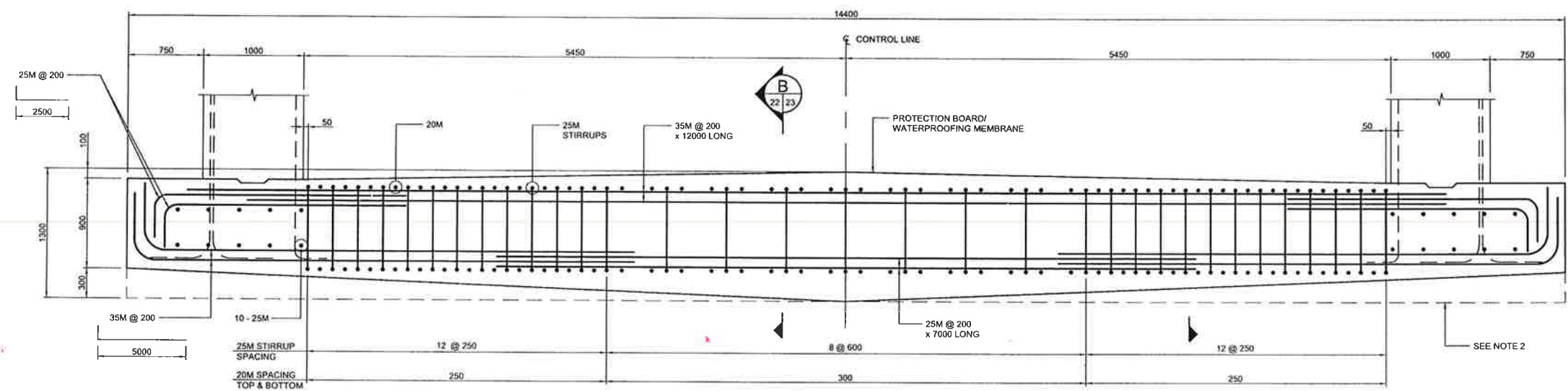
SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1 TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION MILEAGE 1.38 & ASSOCIATED WORKS	
CITY DRAWING NUMBER U237-09-08	SHEET OF 08 73
CONSULTANT PROJECT NO. 088813	CONSULTANT DRAWING NUMBER C4-G107-T



FOUNDATION LAYOUT
SCALE 1:300



SEGMENT TYPE A
SCALE 1:25



SEGMENT TYPE B
SCALE 1:25

- NOTES**
1. STAGGERED MECHANICAL COUPLERS OR LAP SPLICES MAY BE ADDED TO FACILITATE BAR PLACEMENT AROUND SHORING. SUBMIT PROPOSED SPLICE AND COUPLER LAYOUT FOR REVIEW BEFORE DETAILING REINFORCEMENT.
 2. CONTRACTOR MAY ELECT TO PLACE UNDERSIDE OF SLAB LEVEL AS SHOWN. BOTTOM REINFORCEMENT LOCATION AND STIRRUP DEPTH SHALL BE ADJUSTED TO SUIT THE RESULTING MINIMUM SLAB THICKNESS.



LOCATION OF UNDERGROUND STRUCTURES	APPROVED DATE	B.M. ELEV.	DESIGNED BY	KGW
SUPV. U/G STRUCTURES COMMITTEE			DRAWN BY	RCB
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.			CHECKED BY	KGW
			APPROVED BY	DPK
			HOR. SCALE	AS SHOWN
			VERTICAL SCALE	AS SHOWN
			RELEASED FOR CONSTRUCTION	
			DATE	2009/06/24

DILLON CONSULTING

ENGINEER'S SEAL
PROVINCE OF MANITOBA
ORIGINAL SIGNED BY
K. G. WELLS
10.13.2009
REGISTERED PROFESSIONAL ENGINEER

CONSULTANT PROJECT NO:
088813

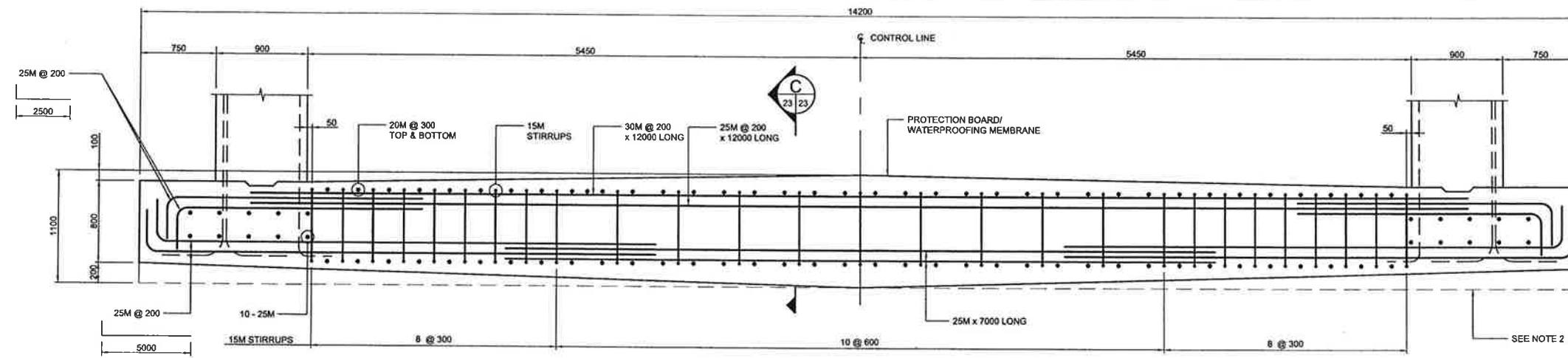
THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

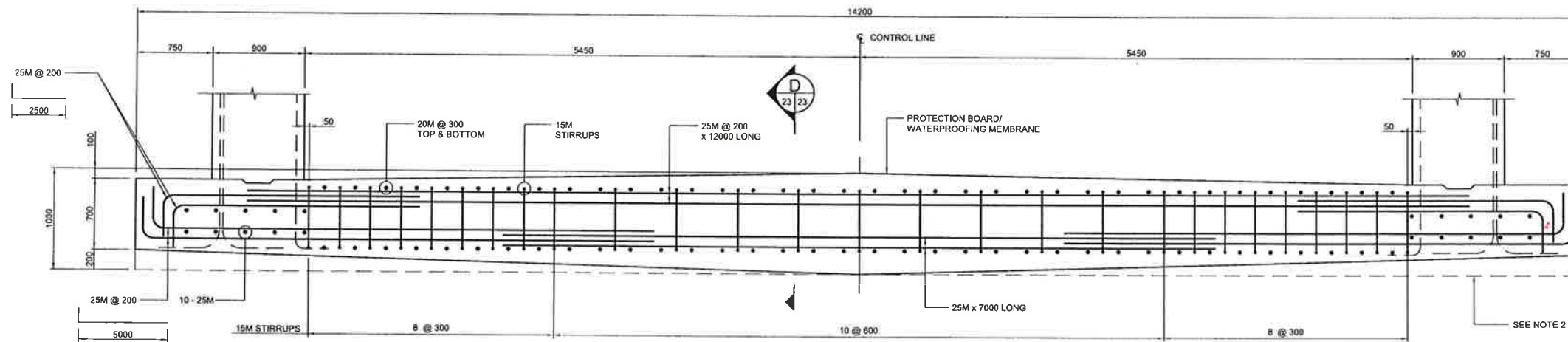
FOUNDATION PLAN AND DETAILS

CITY DRAWING NUMBER: U237-09-23
SHEET 23 OF 73
CONSULTANT DRAWING NUMBER: C4-S1100-T

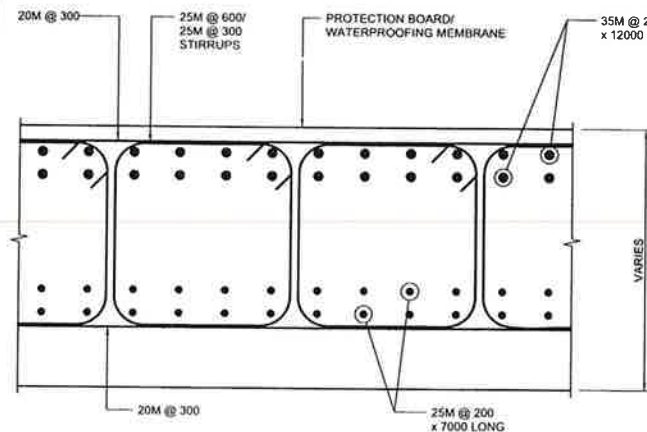
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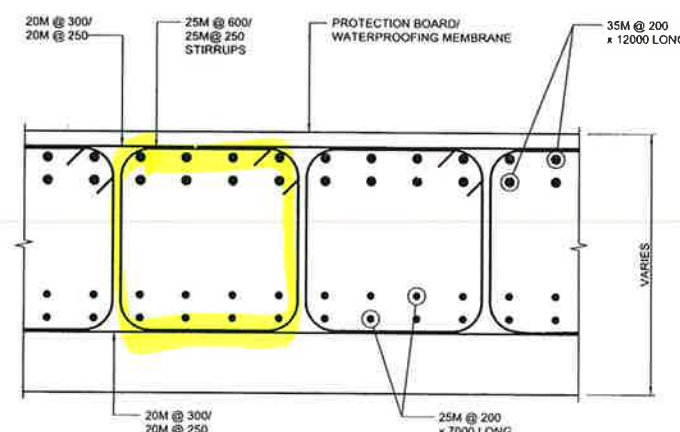
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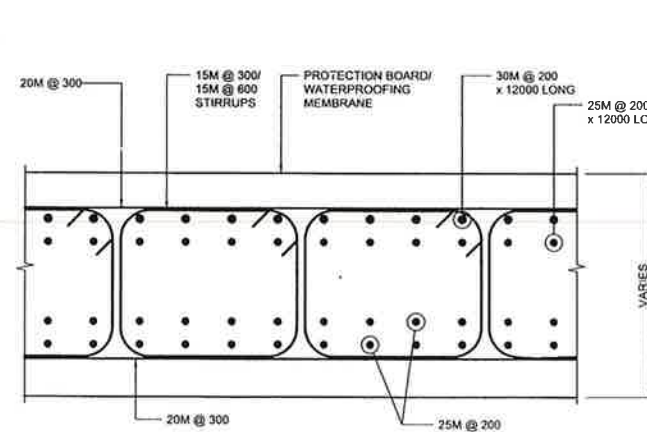
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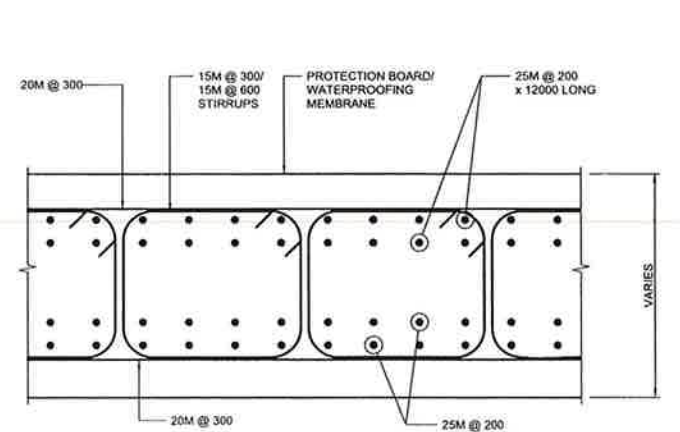
SECTION A
SCALE 1:15



SECTION B
SCALE 1:15



SECTION C
SCALE 1:15



SECTION D
SCALE 1:15

NOTES:

1. STAGGERED MECHANICAL COUPLERS OR LAP SPLICES MAY BE ADDED TO FACILITATE BAR PLACEMENT AROUND SHORING. SUBMIT PROPOSED SPLICE AND COUPLER LAYOUT FOR REVIEW BEFORE DETAILING REINFORCEMENT.
2. CONTRACTOR MAY ELECT TO PLACE UNDERSIDE OF SLAB LEVEL AS SHOWN. BOTTOM REINFORCEMENT LOCATION AND STIRRUP DEPTH SHALL BE ADJUSTED TO SUIT THE RESULTING MINIMUM SLAB THICKNESS.
3. CONTRACTOR MAY ELECT TO REPLACE THE CLOSED STIRRUPS SHOWN WITH CONVENTIONAL OPEN STIRRUPS *c/w* 2-135 DEGREE HOOKS. HOOKS MAY BE PLACED AT TOP OR BOTTOM OF SLAB.



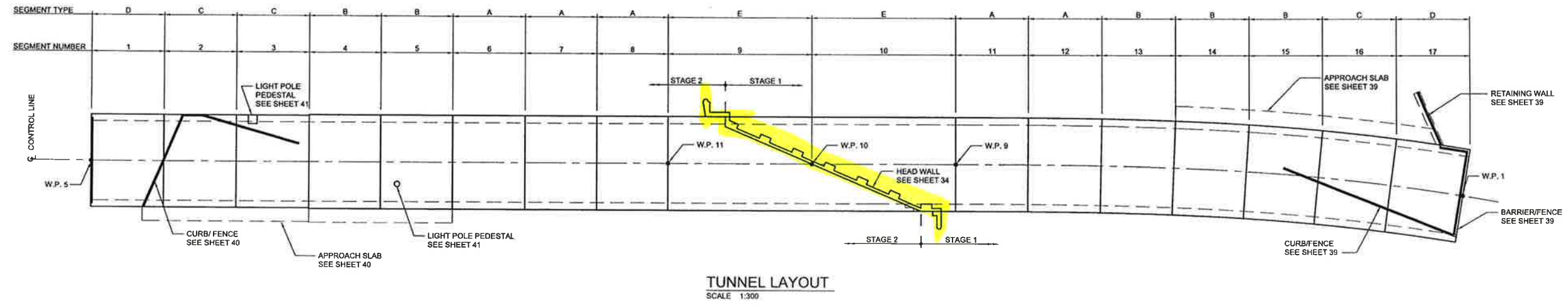
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SUPV. U/G STRUCTURES COMMITTEE	DATE:		RCB	
			KGW	
			DPK	
			HOR. SCALE AS SHOWN	RELEASED FOR CONSTRUCTION
			VERTICAL AS SHOWN	DATE
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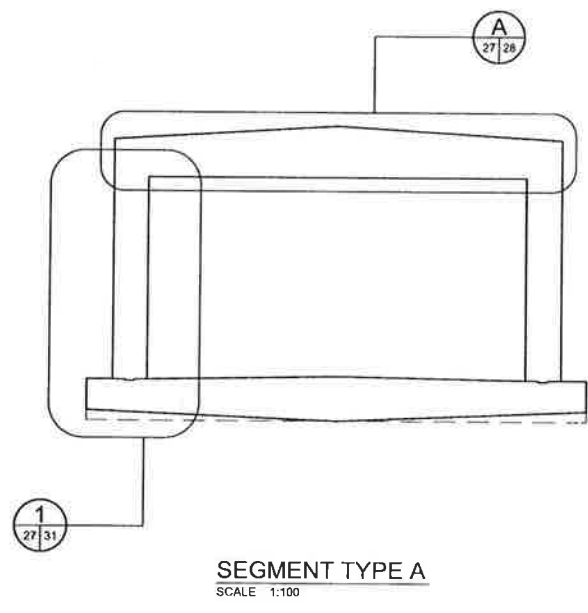
CONSULTANT PROJECT NO.	088813
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THE CITY OF WINNIPEG
 TRANSIT DEPARTMENT
 SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
 TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
 MILEAGE 1.38 & ASSOCIATED WORKS
 FOUNDATION DETAILS

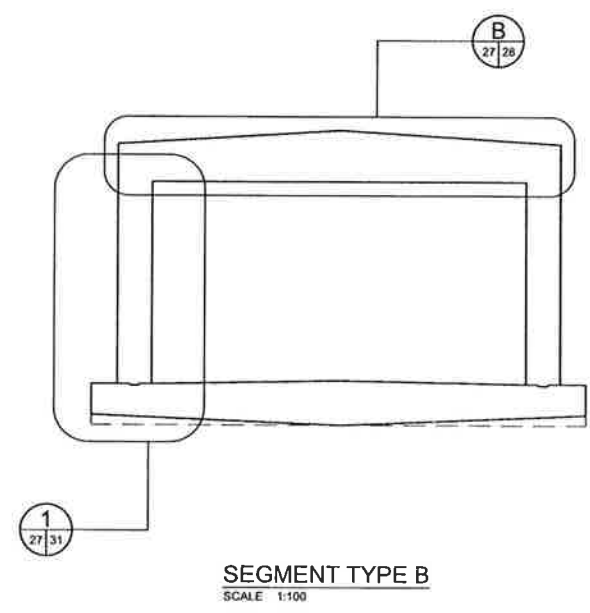
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SHEET	24 OF 73
CONSULTANT DRAWING NUMBER	C4-S1101-T



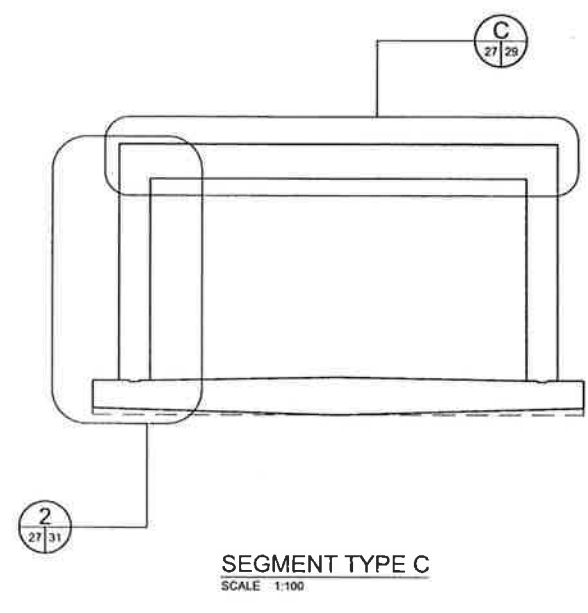
TUNNEL LAYOUT
SCALE 1:300



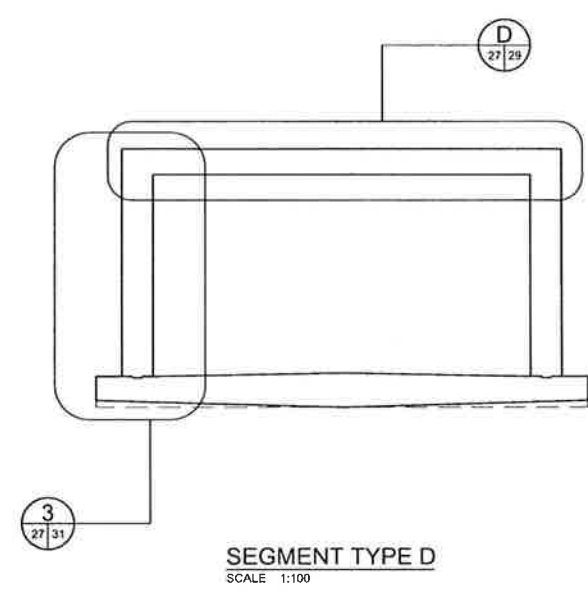
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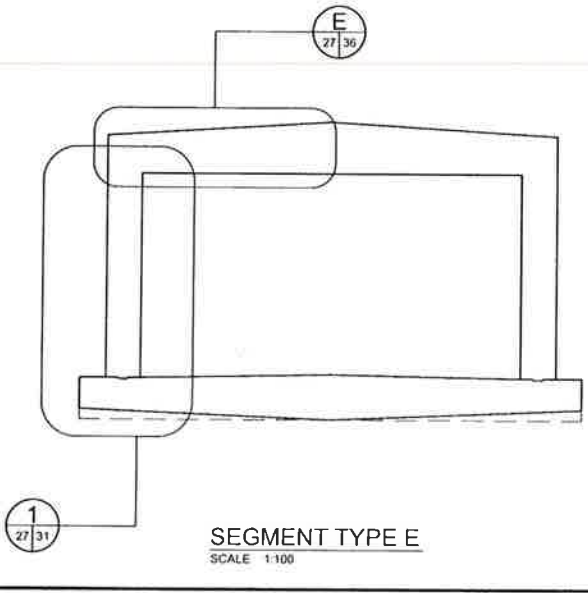
SEGMENT TYPE B
SCALE 1:100



SEGMENT TYPE C
SCALE 1:100



SEGMENT TYPE D
SCALE 1:100



SEGMENT TYPE E
SCALE 1:100



LOCATION UNDERGROUND STRUCTURES	APPROVED STRUCTURES	B.M. ELEV.	DESIGNED BY KGW
SUPV. U/G STRUCTURES COMMITTEE	DATE		DRAWN BY RCB
NOTE:			CHECKED BY KGW
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.			APPROVED BY DPK
			HOR. SCALE AS SHOWN
			VERTICAL AS SHOWN
			RELEASED FOR CONSTRUCTION DATE
NO. REVISIONS	DATE	BY	DATE 2009/06/24

DILLON CONSULTING

ENGINEER'S SEAL
PROVINCE OF MANITOBA
ORIGINAL SIGNED BY
K. G. WILLIS
10.13.2009
REGISTERED PROFESSIONAL ENGINEER

THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

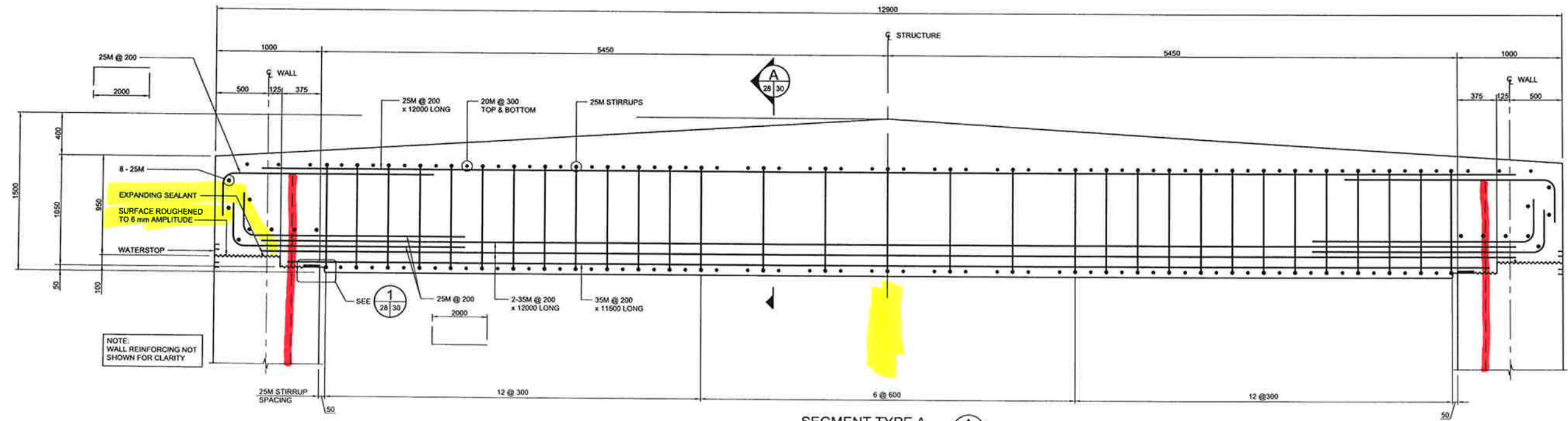
SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

TUNNEL LAYOUT AND SECTIONS

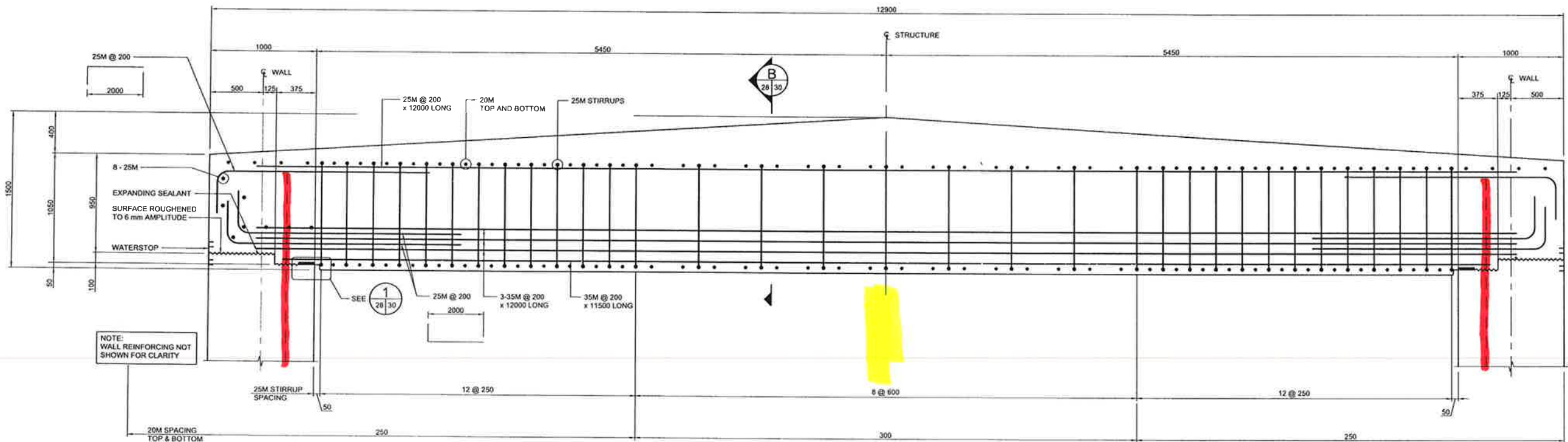
CITY DRAWING NUMBER U237-09-28
SHEET 28 OF 73
CONSULTANT DRAWING NUMBER C4-S1105-T

CONSULTANT PROJECT NO. 088813

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SEGMENT TYPE A
SCALE 1:20



SEGMENT TYPE B
SCALE 1:20

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NO.	REVISIONS	DATE	BY
0	ISSUED FOR TENDER	09/13/2009	RCB
1			
2			
3			
4			
5			
6			
7			
8			
9			

DESIGNED BY	KGW
DRAWN BY	RCB
CHECKED BY	KGW
APPROVED BY	DPK
HOR. SCALE	AS SHOWN
VERTICAL	AS SHOWN
DATE	2009/06/24



THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

Winnipeg

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

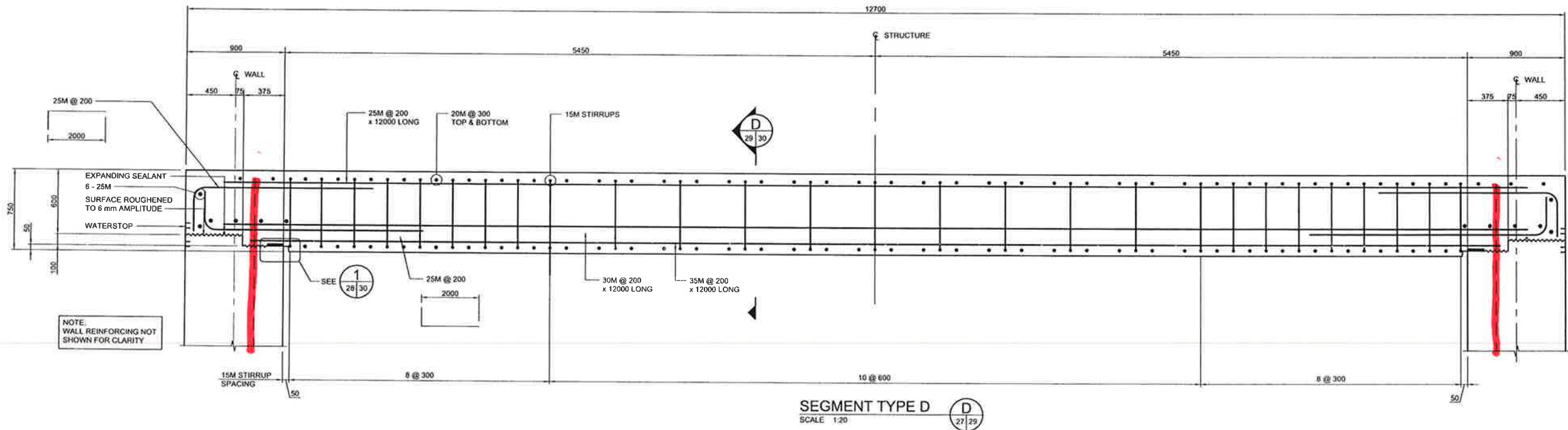
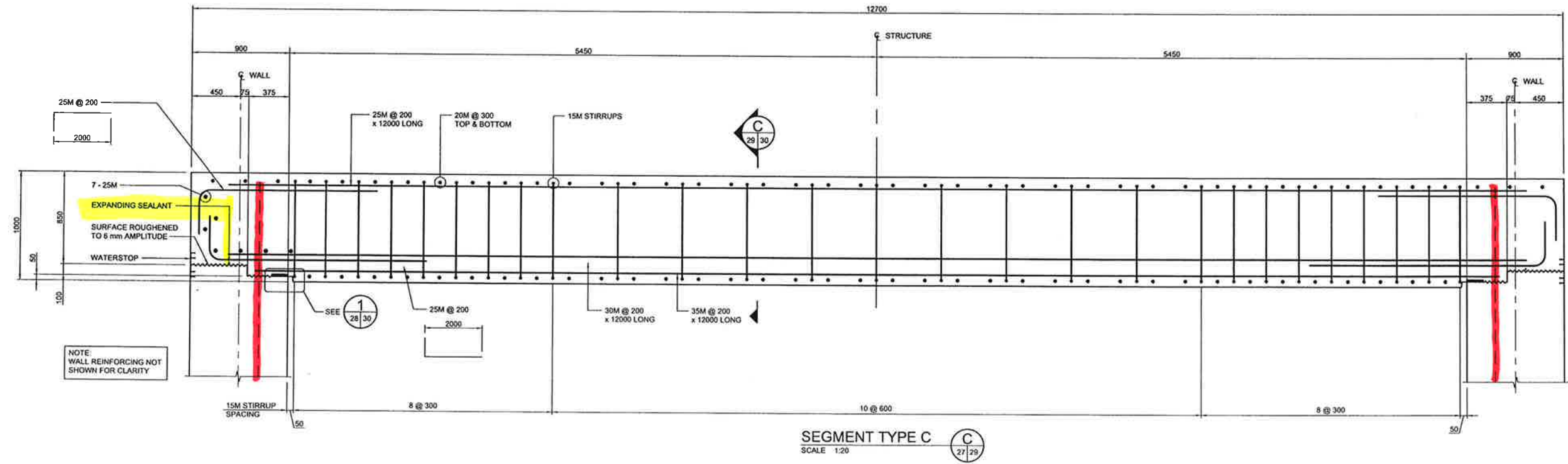
ROOF SLAB DETAILS SHEET 1 OF 2

CITY DRAWING NUMBER: U237-09-29
SHEET 29 OF 73
CONSULTANT DRAWING NUMBER: C4-S1106-T

CONSULTANT PROJECT NO. 088813

LOCATION	APPROVED	B.M.	DATE
UNDERGROUND	STRUCTURES	ELEV.	
SUPPLY U/G STRUCTURES 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.



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APEGM
Certificate of Authorization
Dillon Consulting Limited (MB)
No. 1789 Date: OCTOBER 13, 2009

LOCATION UNDERGROUND	APPROVED STRUCTURES	DATE
SUPPLY U/G STRUCTURES		
COMMITTEE		

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. BEST AND GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN ON 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	20/12/2009	RCB

DESIGNED BY	KGW
DRAWN BY	RCB
CHECKED BY	KGW
APPROVED BY	DPK
HOR. SCALE	AS SHOWN
VERTICAL	AS SHOWN
DATE	2009/06/24

DILLON CONSULTING

RELEASED FOR CONSTRUCTION

ENGINEER'S SEAL
PROVINCE OF MANITOBA
ORIGINAL SIGNED BY
K. G. WELLS
10.13.2009
REGISTERED PROFESSIONAL ENGINEER
CONSULTANT PROJECT NO.
088813

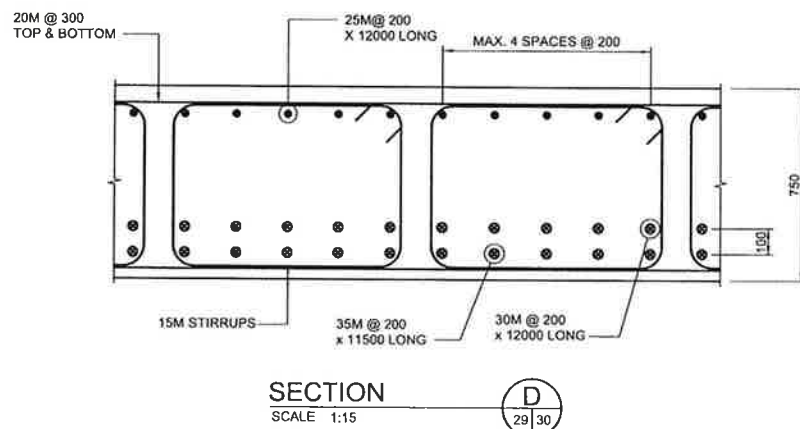
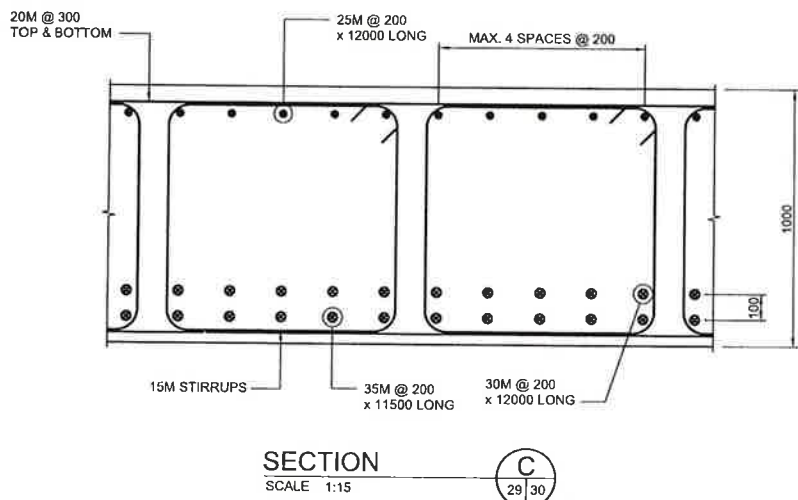
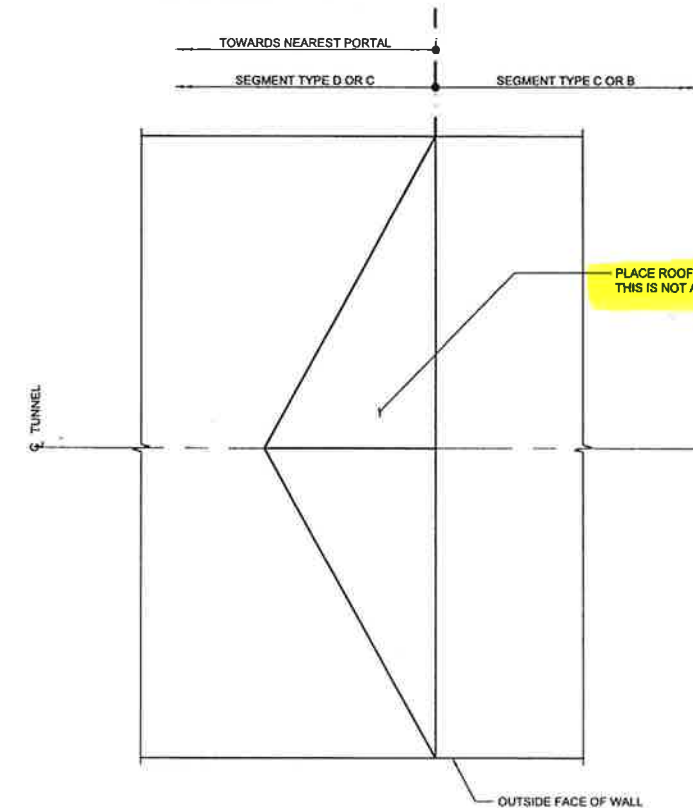
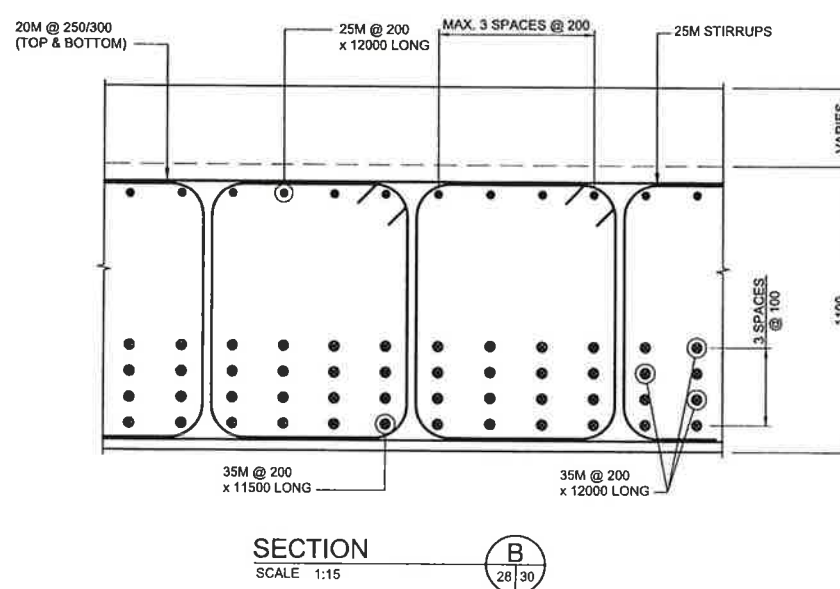
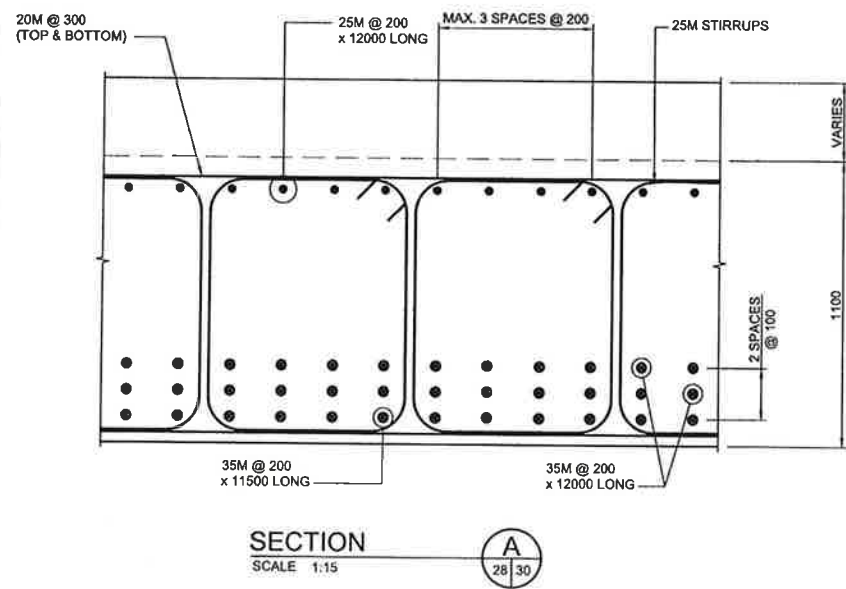
THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

Winnipeg

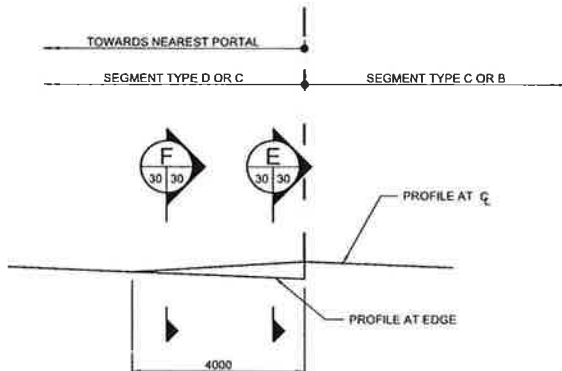
SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

ROOF SLAB DETAILS SHEET 2 OF 2

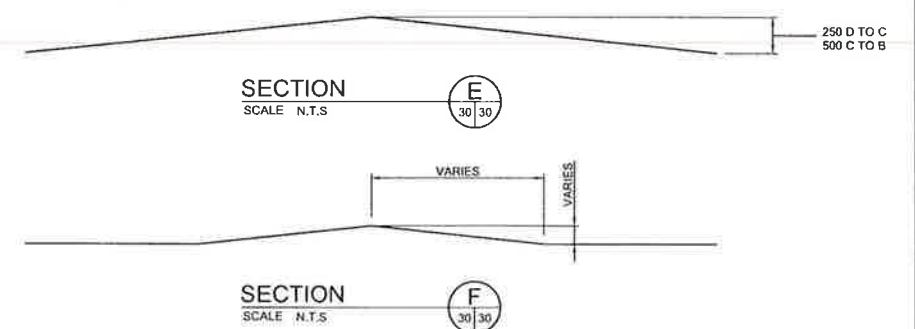
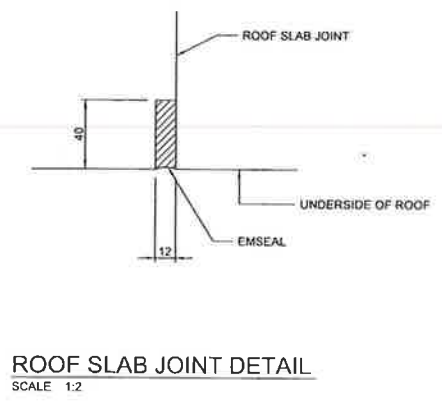
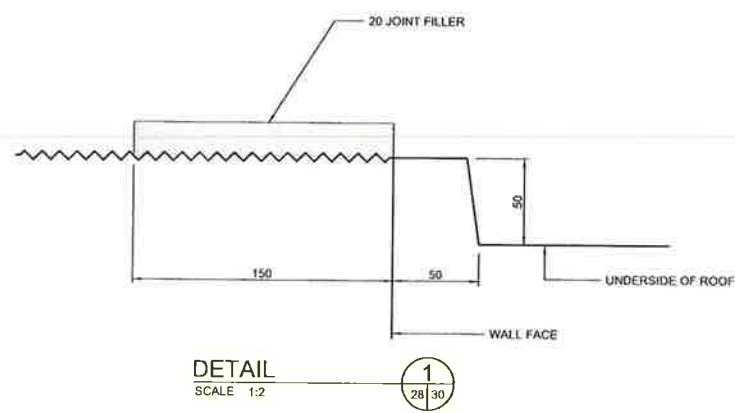
CITY DRAWING NUMBER	U237-09-30
SHEET	30 OF 73
CONSULTANT DRAWING NUMBER	C4-S1107-T



DRAINAGE AT ROOF STEPS - PLAN
SCALE N.T.S.



DRAINAGE AT ROOF STEPS - ELEVATION
SCALE N.T.S.



NOTES:

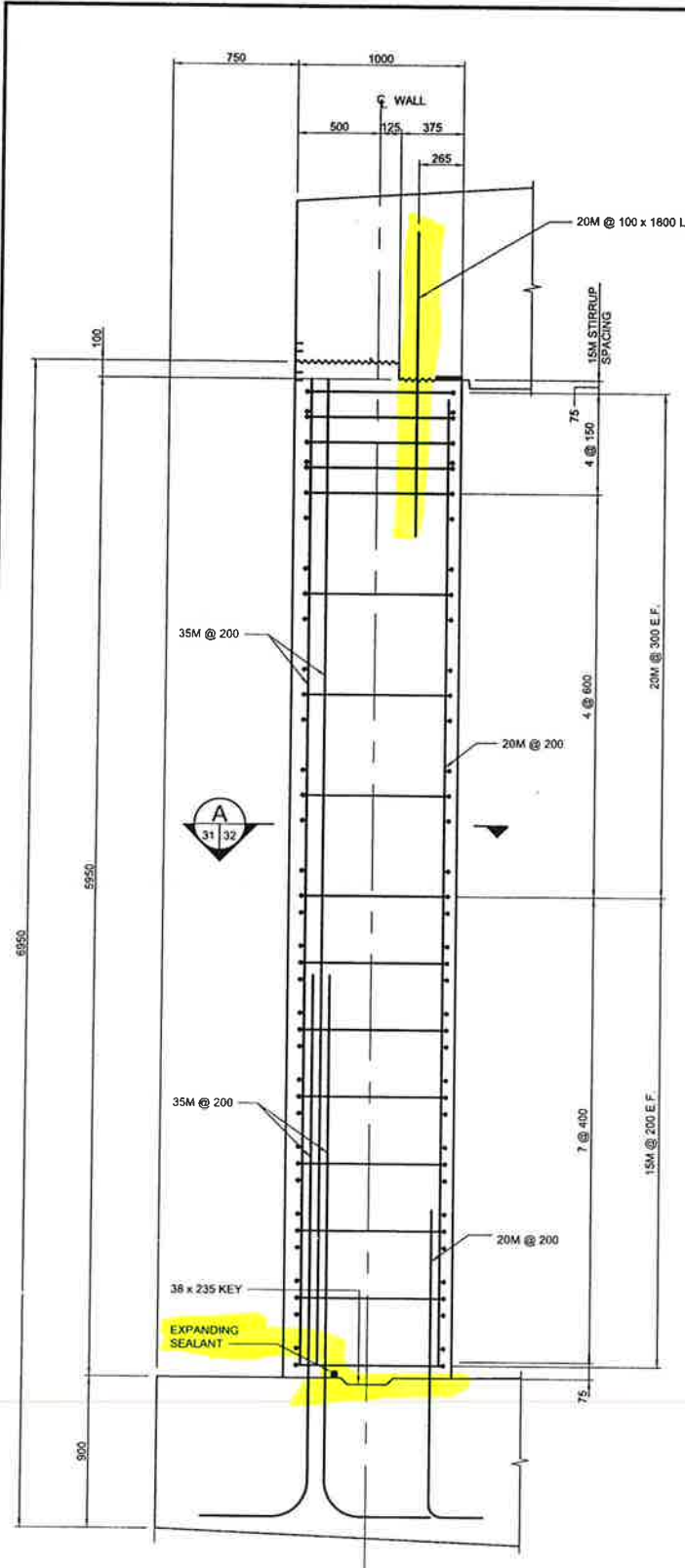
1. CLOSED STIRRUPS SHOWN MAY BE REPLACED WITH CONVENTIONAL OPEN STIRRUPS dw 2 - 135 DEGREE HOOKS. HOOKS MAY BE PLACED AT TOP OR BOTTOM OF SLAB.



LOCATION APPROVED UNDERGROUND STRUCTURES		D.M. ELEV.		DESIGNED BY		ENGINEER'S SEAL	
SUPV. U/G STRUCTURES COMMITTEE	DATE			KGW			THE CITY OF WINNIPEG TRANSIT DEPARTMENT
				RCB			
				KGW			
				DPK			
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 UTILITIES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.		ISSUED FOR TENDER	2013/2009	RCB		CONSULTANT PROJECT NO.	088813
		NO. REVISIONS	DATE	BY	DATE	2009/06/24	

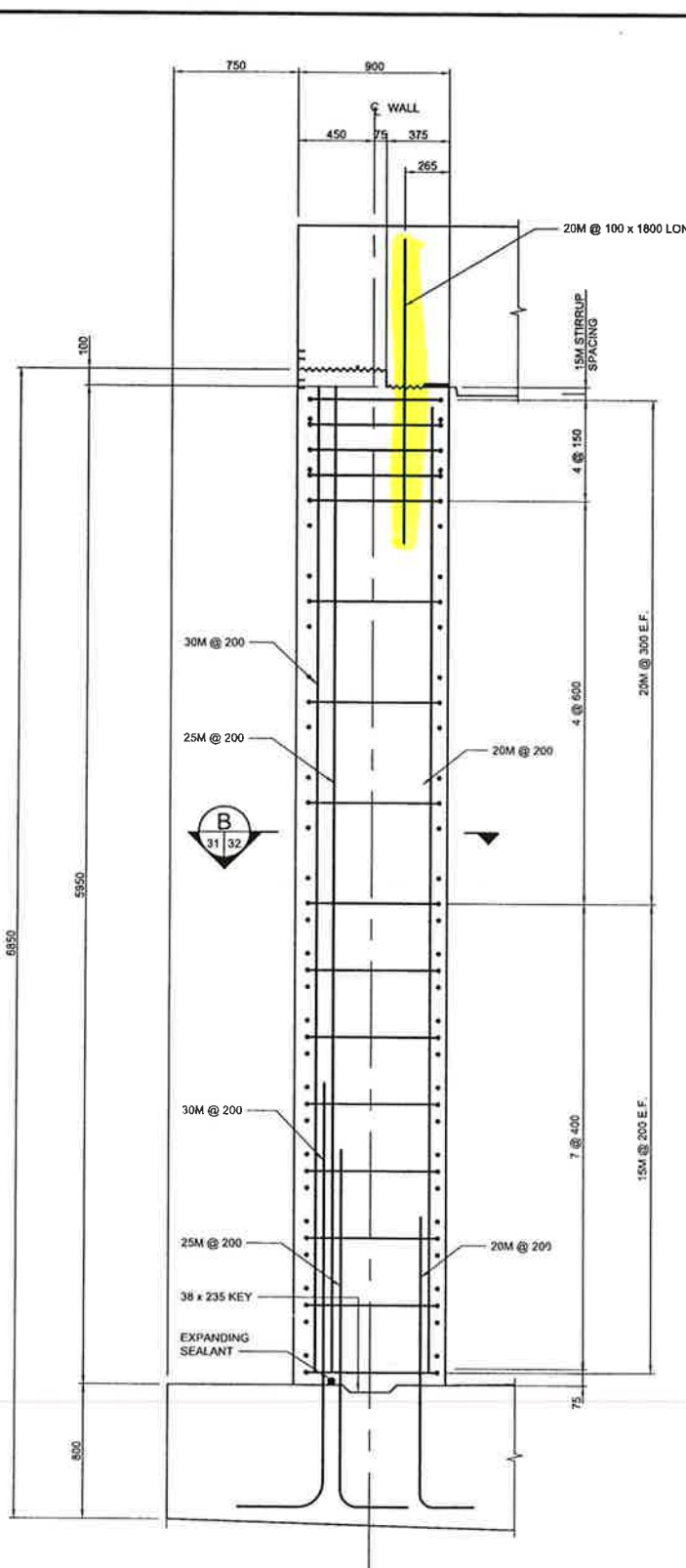
	SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1 TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION MILEAGE 1.38 & ASSOCIATED WORKS		CITY DRAWING NUMBER U237-09-31
	ROOF SLAB SECTIONS		SHEET 31 OF 73
RELEASED FOR CONSTRUCTION		CONSULTANT DRAWING NUMBER C4-S1108-T	

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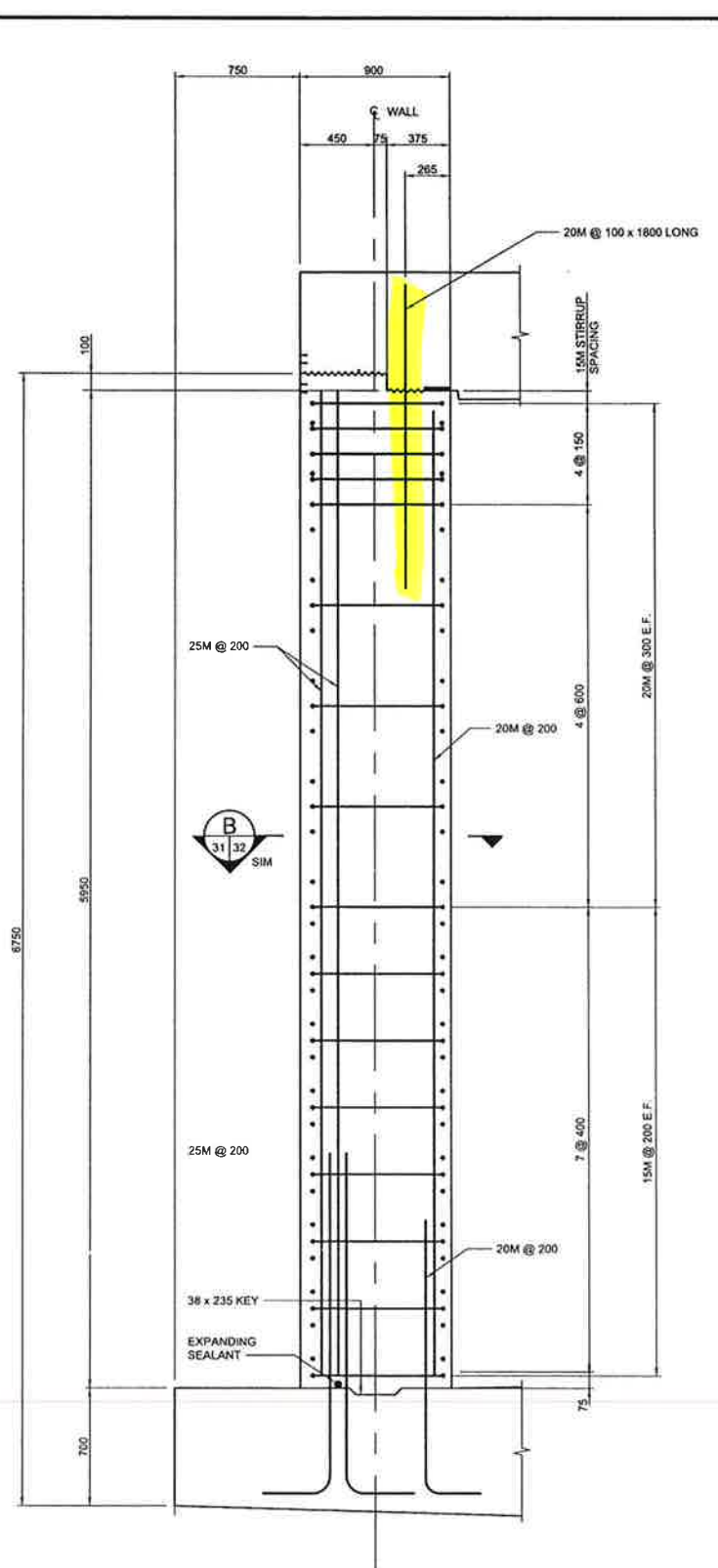
SEGMENT TYPE A/B
SCALE 1:20

1
27/31



SEGMENT TYPE C
SCALE 1:20

2
27/31



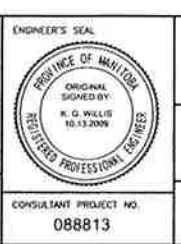
SEGMENT TYPE D
SCALE 1:20

3
27/31

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LOCATION UNDERGROUND	APPROVED STRUCTURES	B.M. ELEV.	DESIGNED BY KGW
SUPV. U/G STRUCTURES COMMITTEE	DATE		DRAWN BY RCB
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.			CHECKED BY KGW
			APPROVED BY DPK
			HOR. SCALE AS SHOWN
			VERTICAL AS SHOWN
0 ISSUED FOR TENDER	10/13/2009	RCB	RELEASED FOR CONSTRUCTION
NO. REVISIONS	DATE	BY	DATE 2009/09/24



THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

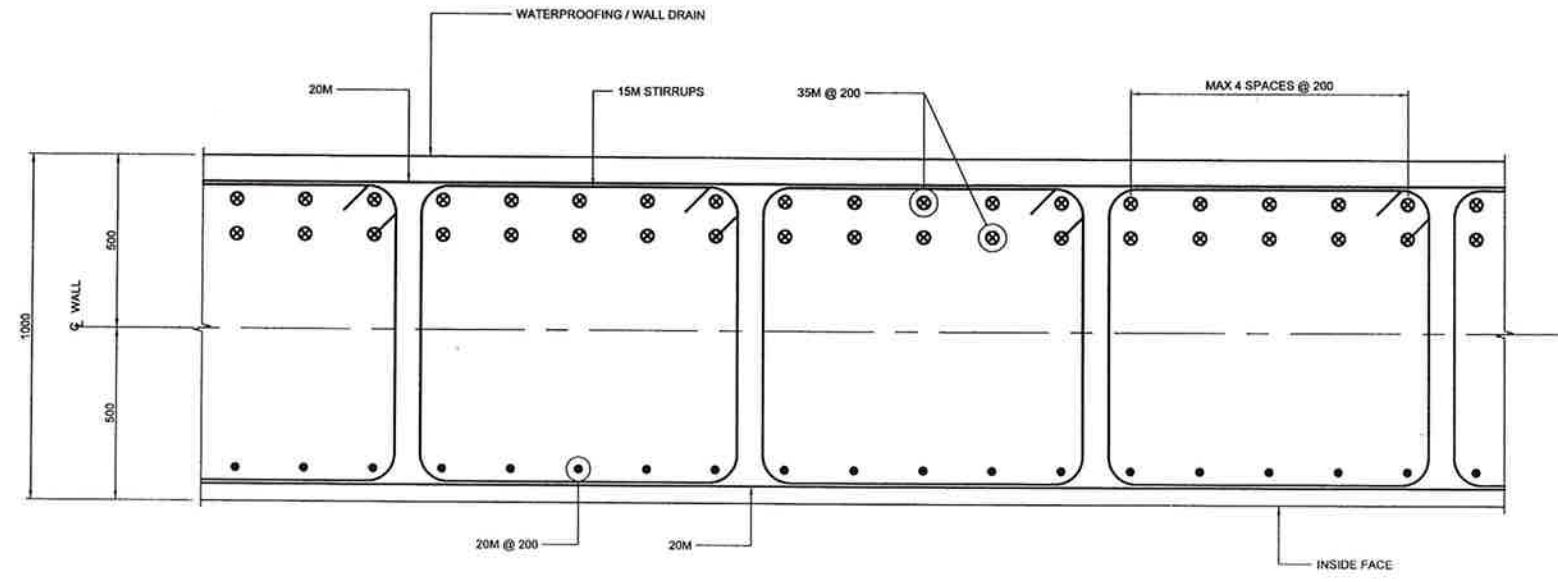
Winnipeg

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

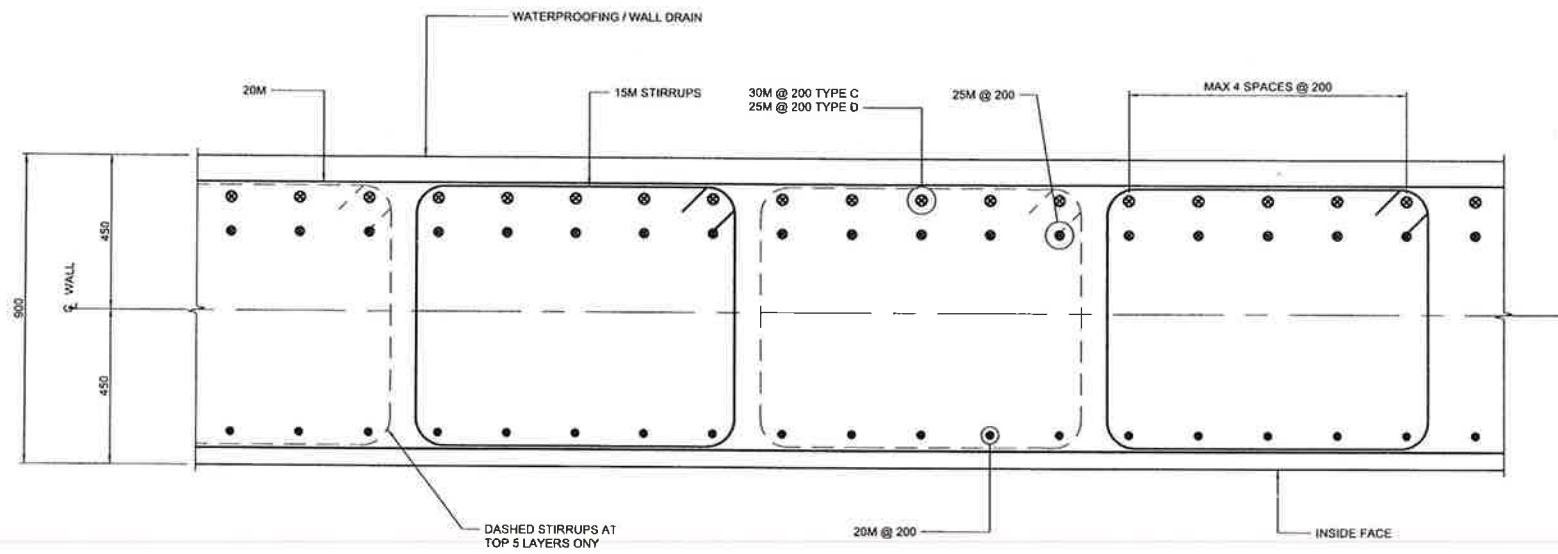
CITY DRAWING NUMBER U237-09-32
SHEET 32 OF 73
CONSULTANT DRAWING NUMBER C4-S1109-T

CONSULTANT PROJECT NO. 088813

WALL DETAILS



SECTION A
SCALE 1:10



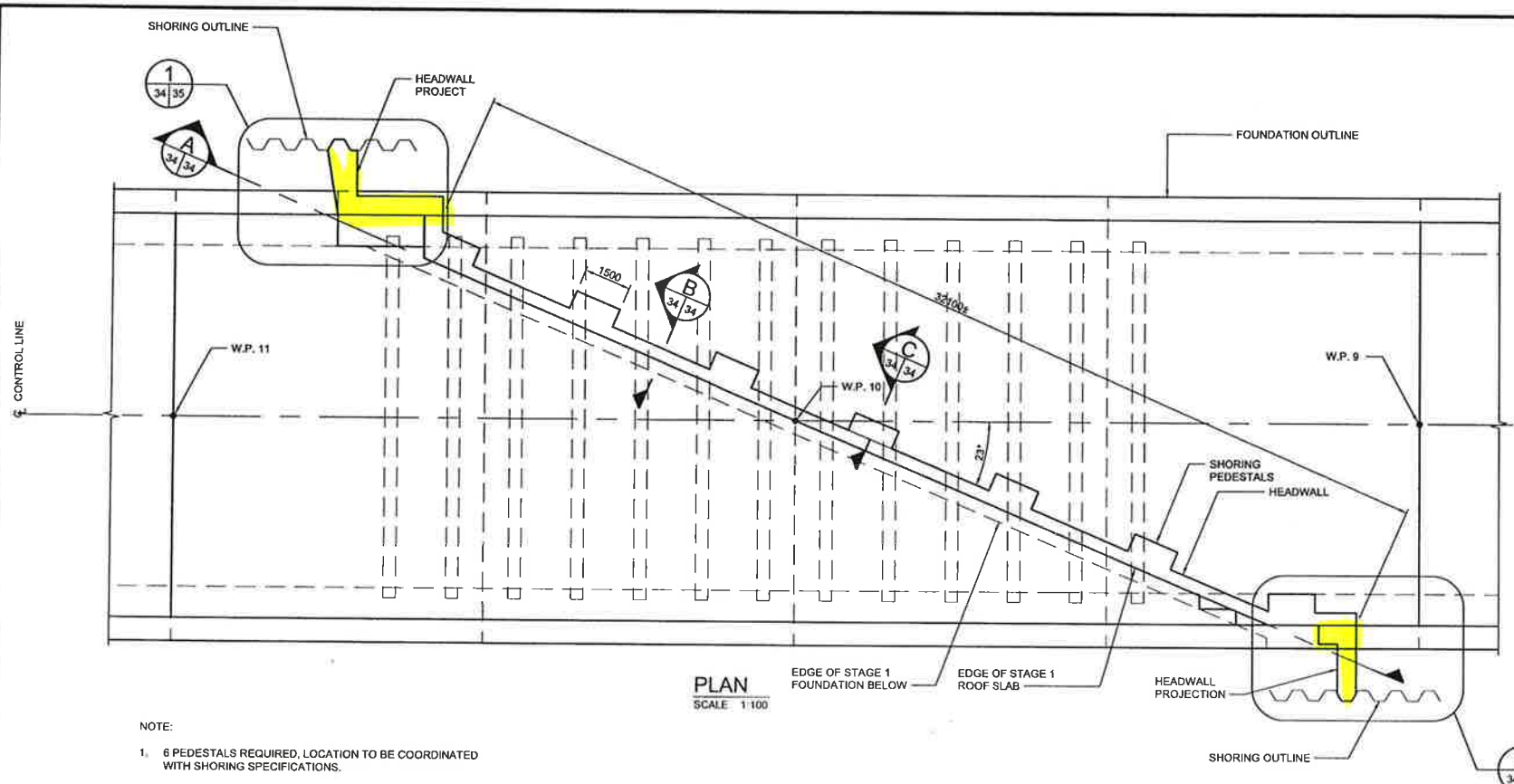
SECTION B
SCALE 1:10

NOTES:
1 FIVE (5) LAYERS AT TOP OF WALL TO BE CLOSED STIRRUPS AS SHOWN. BELOW THIS, CLOSED STIRRUPS MAY BE REPLACED WITH CONVENTIONAL OPEN STIRRUPS w/ 2-135 DEGREE HOOKS OR BY PAIRS OF U-BARS WITH MINIMUM 550 LAP.



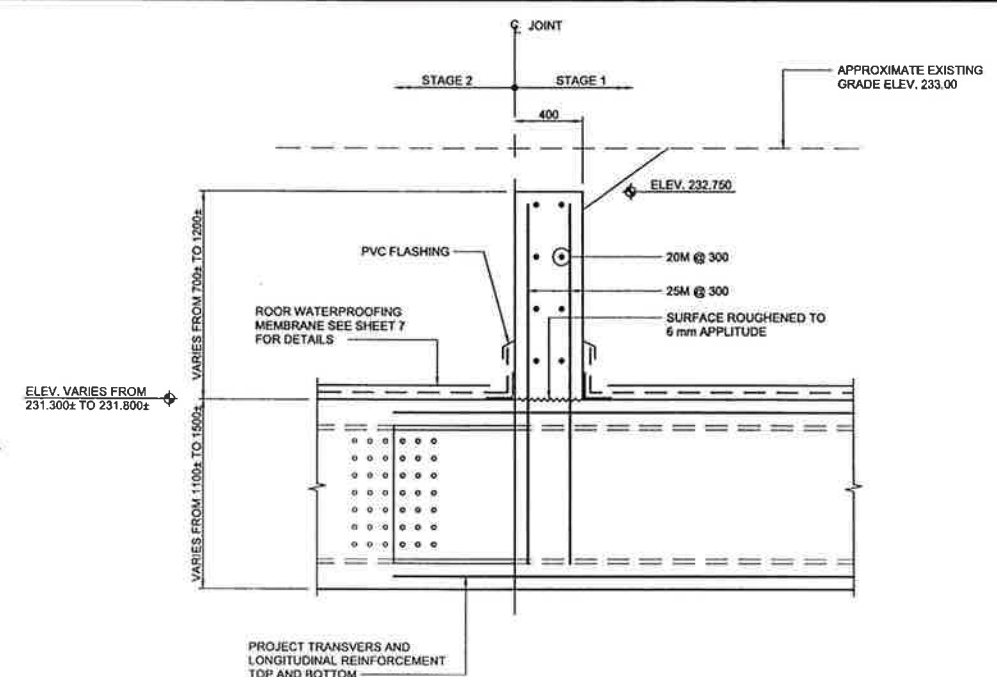
LOCATION UNDERGROUND STRUCTURES SUPV. U/G STRUCTURES COMMITTEE DATE:	APPROVED STRUCTURES DATE:	B.M. ELEV.	DESIGNED BY: KGW DRAWN BY: RCB CHECKED BY: KGW APPROVED BY: DJPK HOR. SCALE: AS SHOWN VERTICAL: AS SHOWN		ENGINEER'S SEAL 		SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1 TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION MILEAGE 1.38 & ASSOCIATED WORKS	CITY DRAWING NUMBER: U237-09-33 SHEET: 33 OF 73	
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.						CONSULTANT PROJECT NO.: 088813	WALL SECTIONS	CONSULTANT DRAWING NUMBER: C4-S1110-T	
NO. REVISIONS: 0 ISSUED FOR TENDER: 10/13/2009 DATE: 2009/06/24		RELEASED FOR CONSTRUCTION DATE:							

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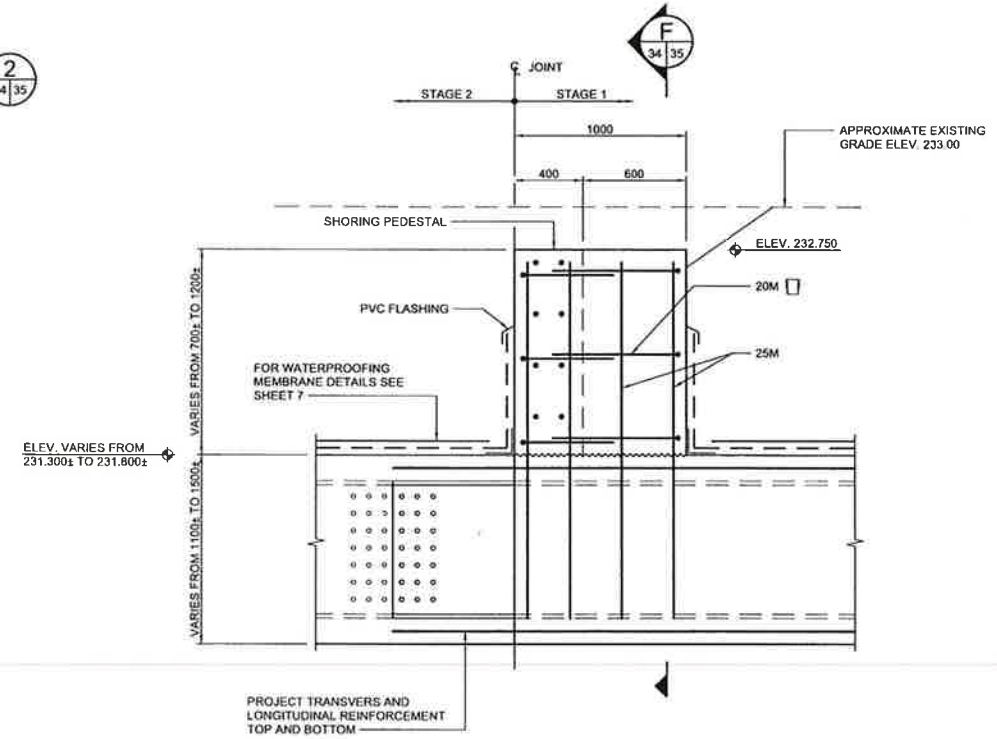


PLAN
SCALE 1:100

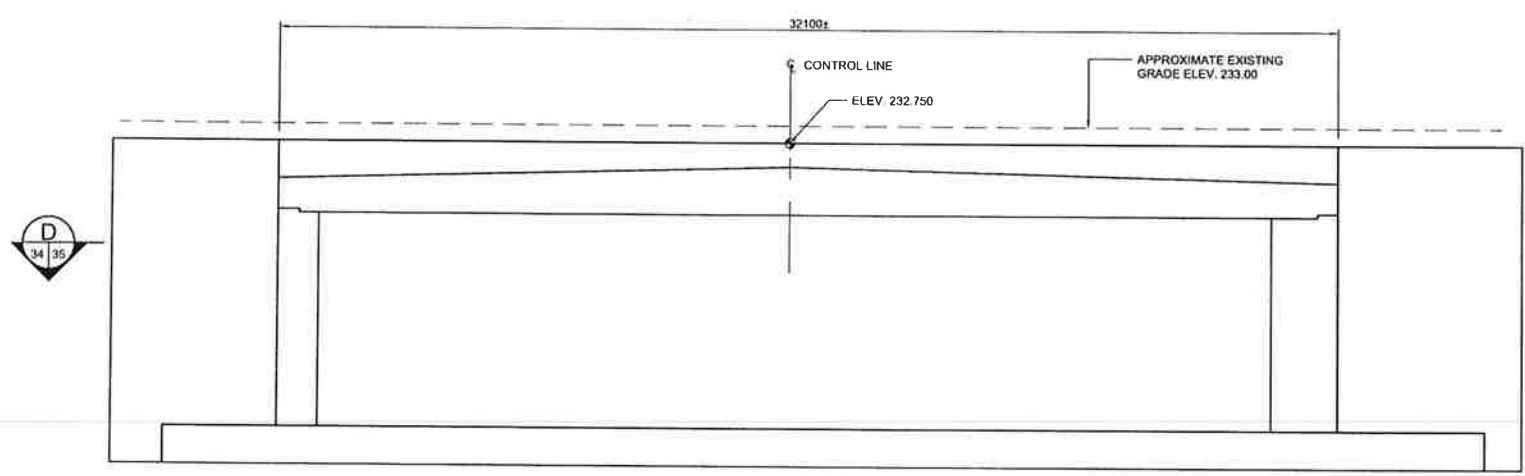
NOTE:
1. 6 PEDESTALS REQUIRED, LOCATION TO BE COORDINATED WITH SHORING SPECIFICATIONS.



SECTION
SCALE 1:20



SECTION
SCALE 1:20



SECTION SCHEMATIC
SCALE N.T.S.

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LOCATION APPROVED UNDERGROUND STRUCTURES		B.M. ELEV.	DESIGNED BY	ENGINEER'S SEAL	
SUPPLY	DATE		KGW		
W/D			RCB		
STRUCTURES			KGW		
COMMITTEE			DPK		
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 UTILITY BEFORE PROCEEDING WITH CONSTRUCTION.		0	ISSUED FOR TENDER	10/13/2009	RCB
NO.	REVISIONS	DATE	BY	DATE	2009/06/24

DILLON CONSULTING

RELEASED FOR CONSTRUCTION

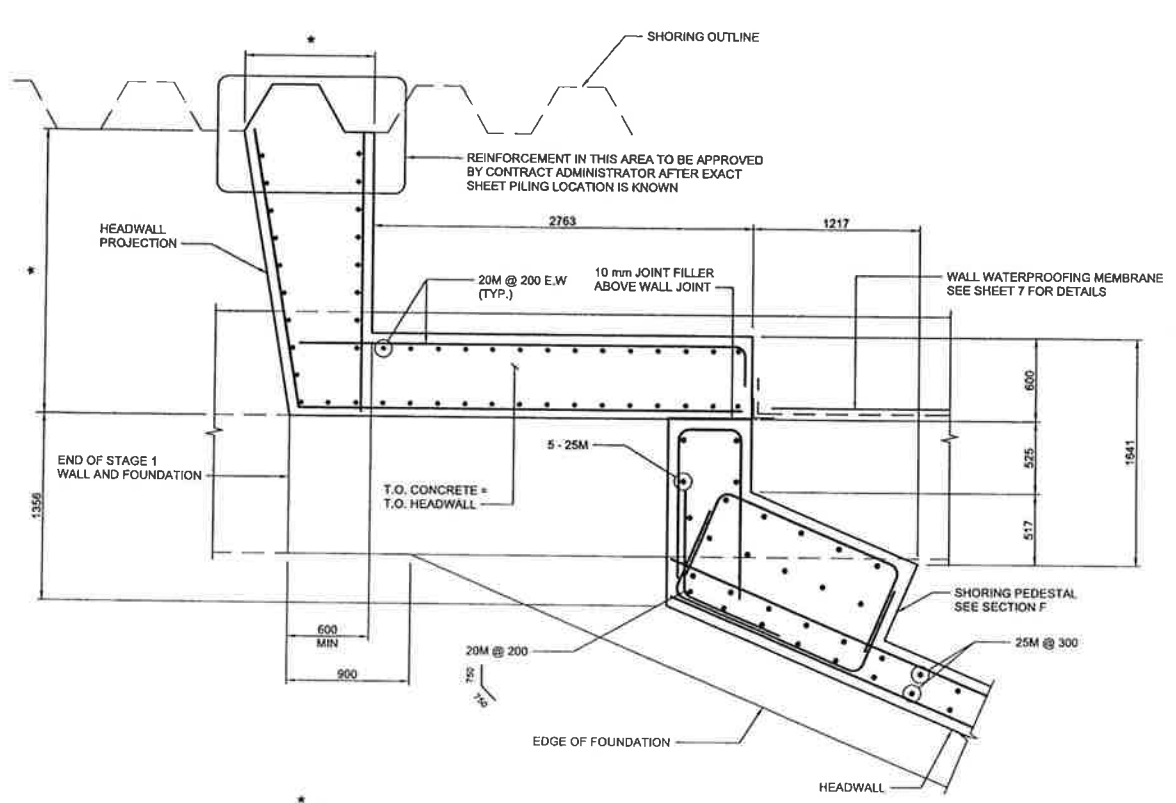
CONSULTANT PROJECT NO. 088813

THE CITY OF WINNIPEG TRANSIT DEPARTMENT

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

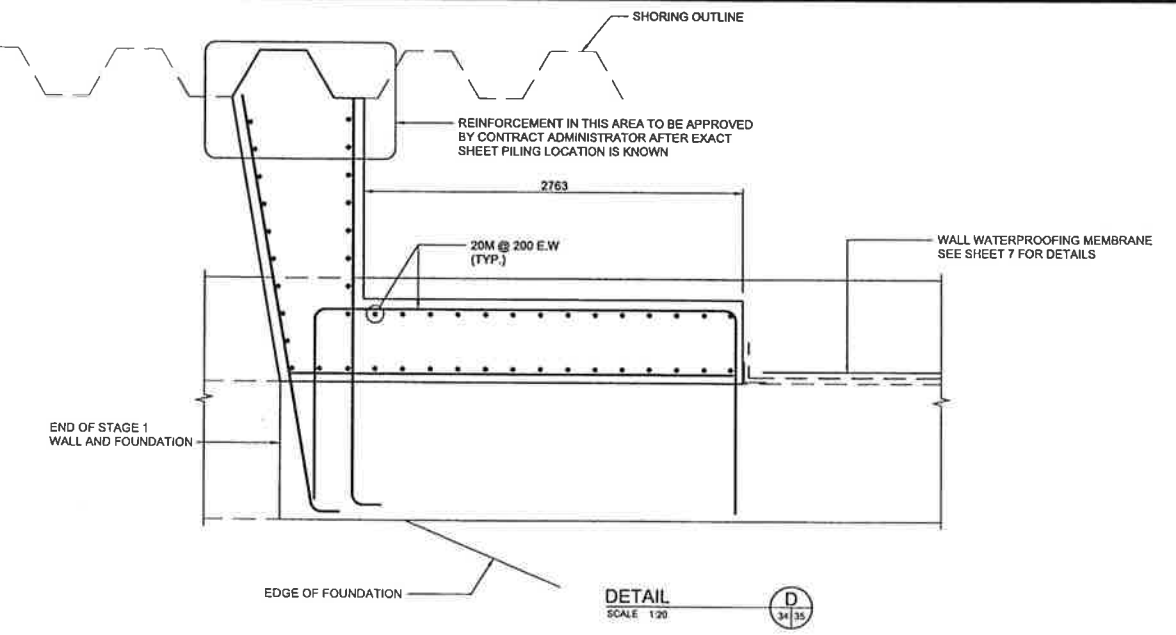
HEADWALL DETAILS SHEET 1 OF 2

CITY DRAWING NUMBER: U237-09-35
SHEET 35 OF 73
CONSULTANT DRAWING NUMBER: C4-S1112-T

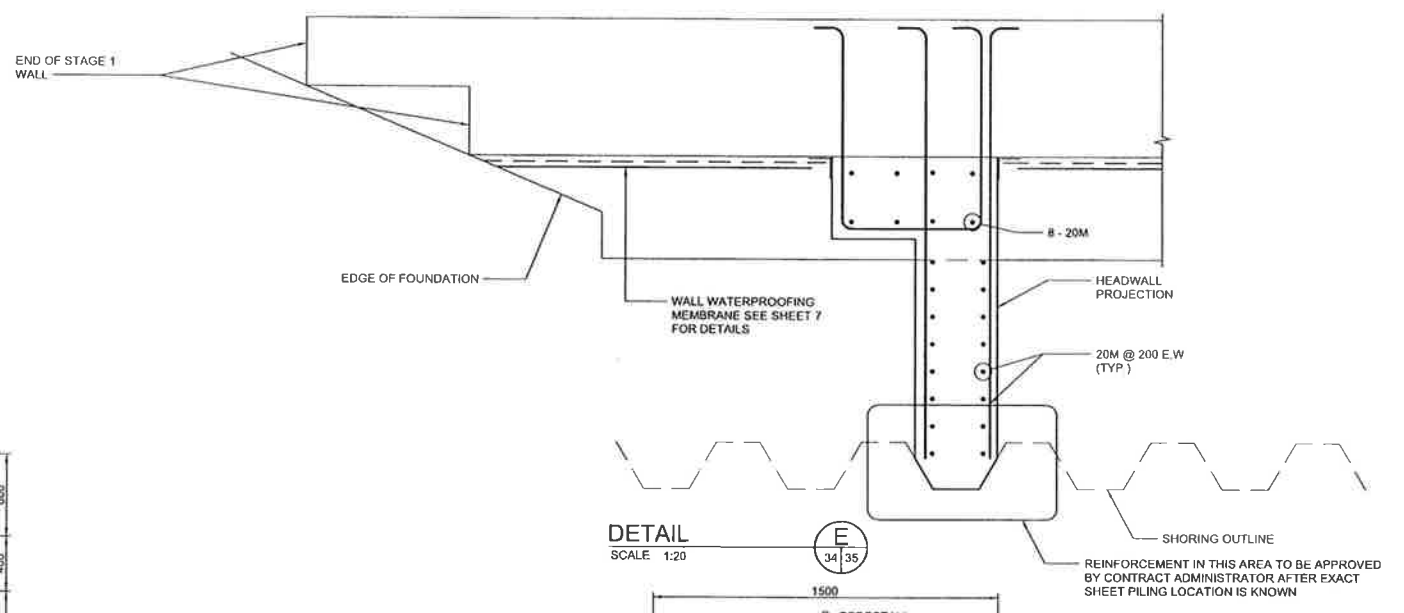


DETAIL
SCALE 1:20
1
34 35

* LOCATION AND SIZE TO BE DETERMINED IN THE FIELD

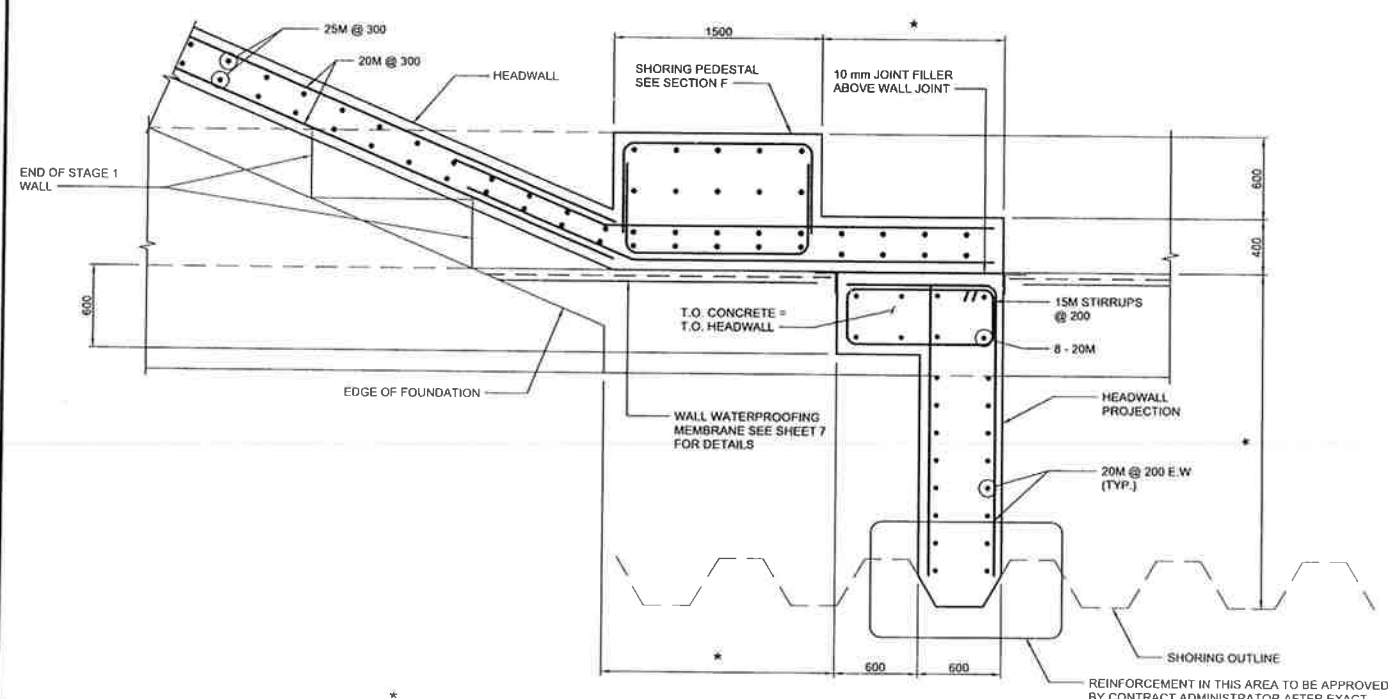


DETAIL
SCALE 1:20
D
34 35



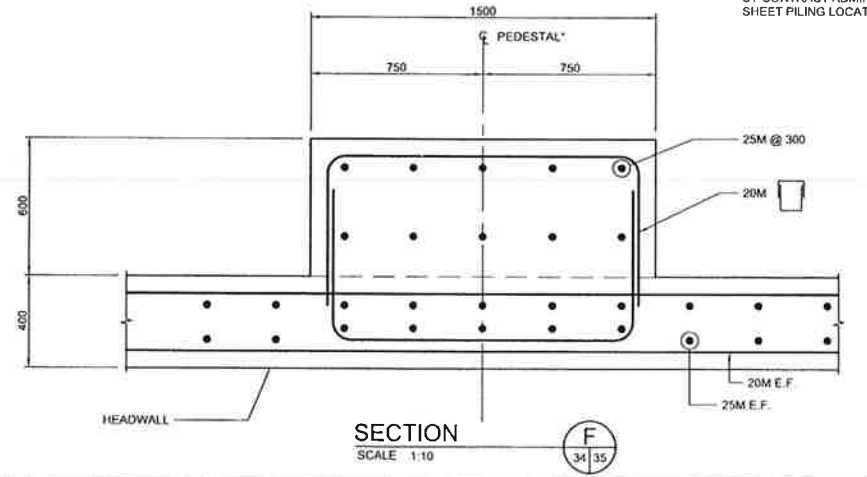
DETAIL
SCALE 1:20
E
34 35

* 6 SHORING PEDESTALS REQUIRED, LOCATION TO BE COORDINATED WITH SHORING SPECIFICATIONS.



DETAIL
SCALE 1:20
2
34 35

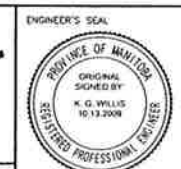
* LOCATION AND SIZE TO BE DETERMINED IN THE FIELD



SECTION
SCALE 1:10
F
34 35



LOCATION UNDERGROUND STRUCTURES	APPROVED	B.M. ELEV.	DESIGNED BY	KGW
SUB: U/G STRUCTURES COMMITTEE	DATE:		DRAWN BY	RCB
NOTE: LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES AND SYSTEMS OF THAT AREA LOCATION AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.			CHECKED BY	KGW
			APPROVED BY	DPK
			HOR. SCALE	AS SHOWN
			VERTICAL SCALE	AS SHOWN
0	ISSUED FOR TENDER	10/13/2009	RELEASED FOR CONSTRUCTION	
NO REVISIONS	DATE	BY	DATE	2009/06/24



THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

Winnipeg

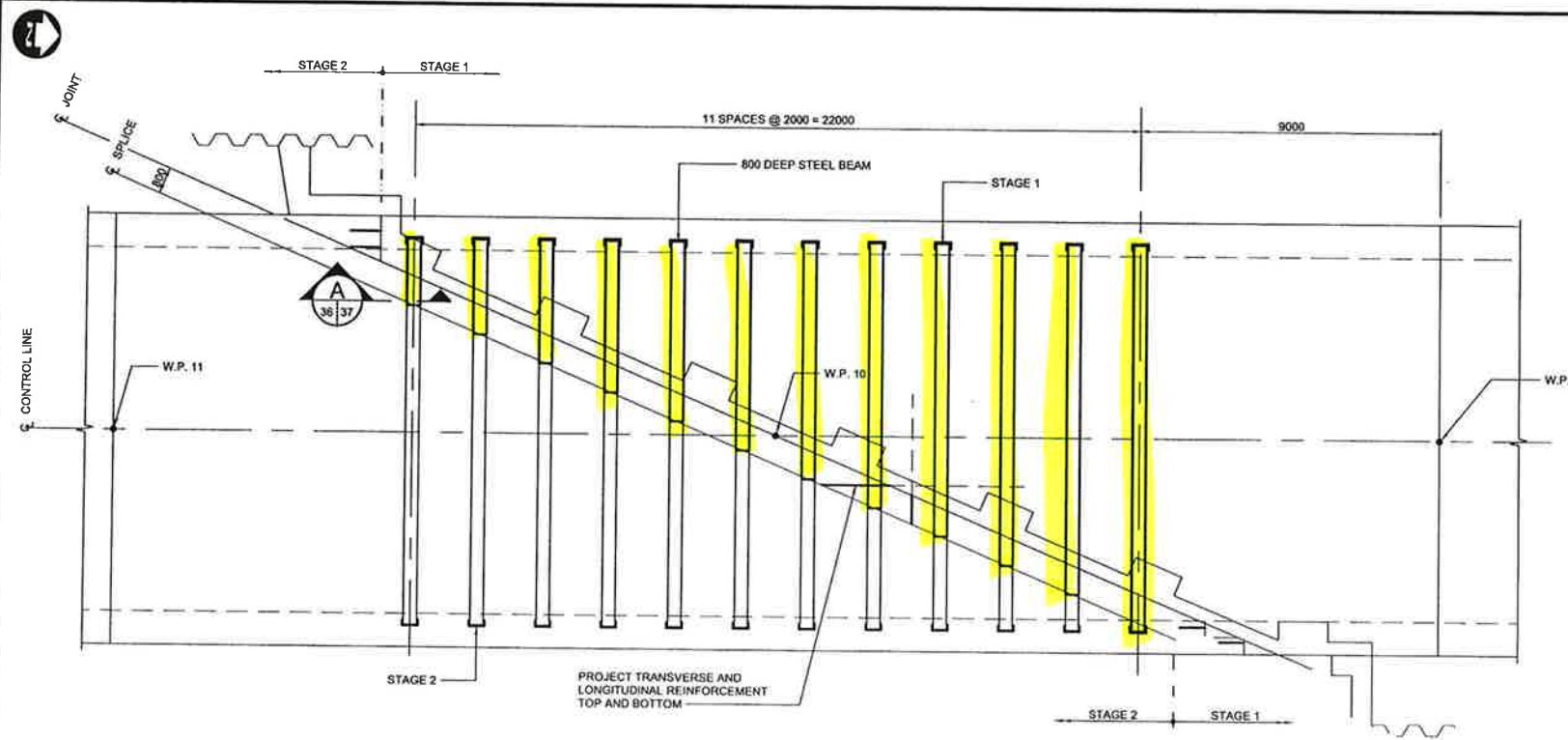
SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

HEADWALL DETAILS SHEET 2 OF 2

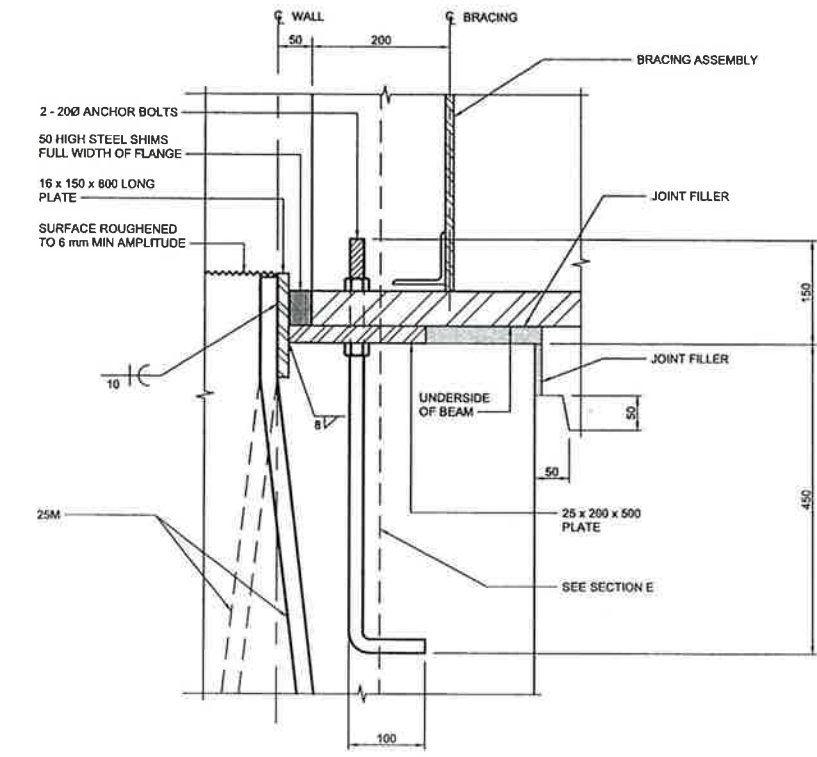
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SHEET 36 OF 73
CONSULTANT DRAWING NUMBER: C4-S1113-T

CONSULTANT PROJECT NO. 088813

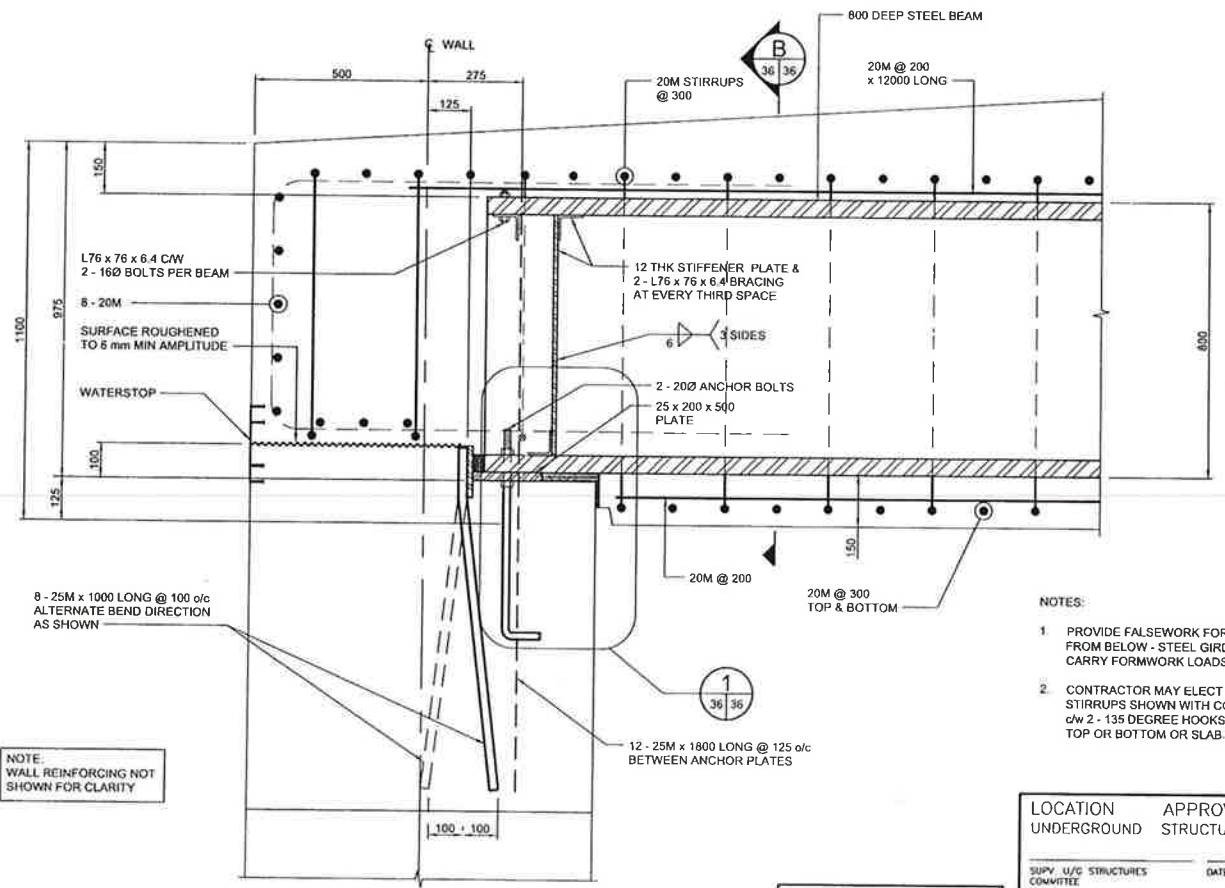
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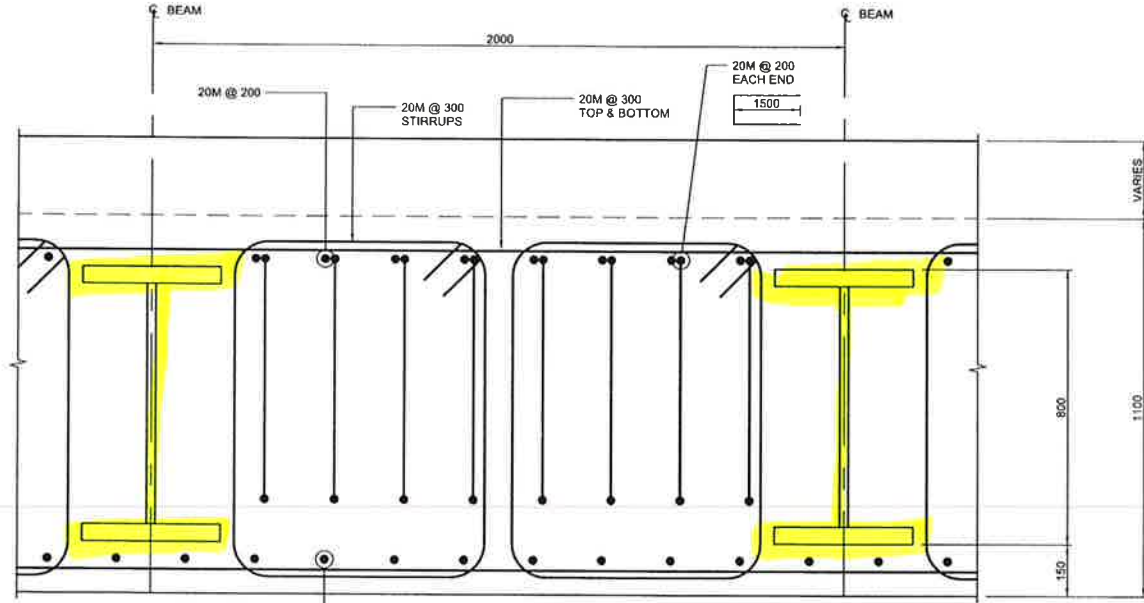
STRUCTURAL STEEL LAYOUT
SCALE 1:100



DETAIL
SCALE 1:5



SECTION
SCALE 1:10



SECTION
SCALE 1:10

- NOTES:
1. PROVIDE FALSEWORK FOR ROOF SLAB SUPPORTED FROM BELOW - STEEL GIRDERS ARE NOT DESIGNED TO CARRY FORMWORK LOADS.
 2. CONTRACTOR MAY ELECT TO REPLACE THE CLOSED STIRRUPS SHOWN WITH CONVENTIONAL OPEN STIRRUPS ϕ 2 - 135 DEGREE HOOKS. HOOKS TO BE PLACED AT TOP OR BOTTOM OR SLAB.

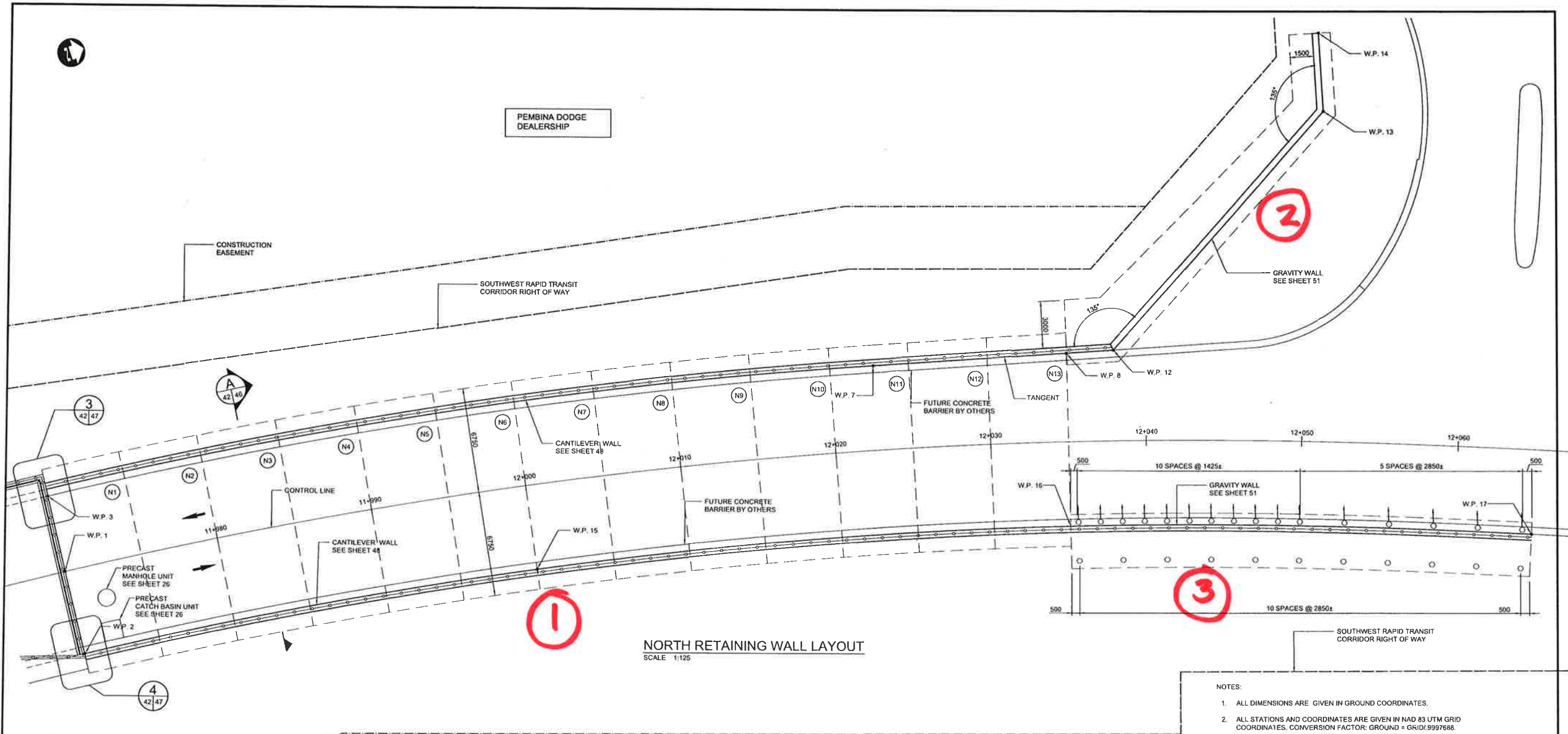
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NOTE: WALL REINFORCING NOT SHOWN FOR CLARITY



LOCATION UNDERGROUND APPROVED STRUCTURES SUPV. U/G STRUCTURES COMMITTEE DATE:	B.M. ELEV.	DESIGNED BY: KGW DRAWN BY: RCB CHECKED BY: KGW APPROVED BY: DPK		ENGINEER'S SEAL 	
NOTE: LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE, BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES AND SPACES OR CONTINUATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITY BEFORE PROCEEDING WITH CONSTRUCTION.	NO. REVISIONS: 0 ISSUED FOR TENDER: 10/13/2009 DATE: 2009/06/24	RELEASED FOR CONSTRUCTION DATE:	CONSULTANT PROJECT NO. 088813	SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1 TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION MILEAGE 1.38 & ASSOCIATED WORKS	CITY DRAWING NUMBER U237-09-37 SHEET 37 OF 73 CONSULTANT DRAWING NUMBER C4-S1114-T

STAGING JOINT DETAILS SHEET 1 OF 2



NORTH RETAINING WALL LAYOUT
SCALE 1:125

- NOTES:**
1. ALL DIMENSIONS ARE GIVEN IN GROUND COORDINATES.
 2. ALL STATIONS AND COORDINATES ARE GIVEN IN NAD 83 UTM GRID COORDINATES. CONVERSION FACTOR: GROUND = GRID/999768.
 3. DIMENSIONS AND WORK POINTS ARE GIVEN AT FRONT FACE OF WALLS U.N.O.
- PILE GENERAL NOTES:**
1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 30 MPa AT TIME OF PRESTRESSING AND 50 MPa AT 28 DAYS. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
 2. SPACING OF PILES FOR ALL FOOTINGS AS SHOWN ARE AT THE BOTTOM OF THE FOOTING.
 3. PREBORE PILES MINIMUM 5 m AS SPECIFIED IN THE GEOTECHNICAL REPORT.
 4. ALL PILES ARE 360 HEXAGONAL PRECAST CONCRETE.
 5. PRECAST PRESTRESSED CONCRETE PILES SHALL BE DRIVEN TO REFUSAL WITH A HAMMER WITH A RATED ENERGY OF AT LEAST 40 kJ PER BLOW.
 6. REFUSAL OF PRECAST PILES SHALL BE TAKEN AS 10 BLOWS PER 25 mm FOR 3 CONSECUTIVE SETS.
 7. UNRAVEL AND SPLAY PILE STRANDS 600 mm LONG AFTER CUT OFF.
 8. ESTIMATED PILE TIP ELEVATION = 218.000
 9. ALL PILES SHOWN BATTERED ARE AT A SLOPE OF 1H:4V

WORK POINT COORDINATES						
POINT NO.	STATION	OFFSET	GRID COORDINATES			REMARKS
			NORTHING	EASTING	ELEV _N	
W.P. 1	11+970.000		5526019.423	633511.225	227.080	NORTH PORTAL AT CONTROL LINE
W.P. 2	11+970.000	5.450	5526016.890	633516.644	233.130	NORTH PORTAL AT FACE OF NE WALL
W.P. 3	11+970.000	-5.450	5526019.956	633505.805	233.413	NORTH PORTAL AT FACE OF NW WALL
W.P. 4	11+780.000		5525829.736	633518.657	226.549	SOUTH PORTAL AT CONTROL LINE
W.P. 5	11+780.000	-5.450	5525829.398	633513.219	232.900	SOUTH PORTAL AT FACE OF SW WALL
W.P. 6	11+780.000	5.450	5525830.067	633524.096	232.900	SOUTH PORTAL AT FACE OF SE WALL
W.P. 7	12+022.767	-5.450	5526072.671	633515.807	233.172	NW WALL ALIGNMENT CHANGE
W.P. 8	12+035.000	-5.700	5526084.663	633519.197	233.117	NW WALL TYPE CHANGE
W.P. 9	11+900.000		5525949.510	633511.289	225.205	CONTROL LINE
W.P. 10	11+880.000		5525929.548	633512.517	225.029	CONTROL LINE
W.P. 11	11+860.000		5525909.585	633513.745	225.013	CONTROL LINE
W.P. 12A	12+037.974	-5.840	5526087.583	633520.022	233.103	NW WALL ALIGNMENT CHANGE
W.P. 12B					234.303	
W.P. 13	12+050.836	-21.280	5526105.420	633510.046	234.303	NW WALL ALIGNMENT CHANGE
W.P. 14	12+050.418	-26.240	5526106.775	633505.252	234.303	END OF NW WALL
W.P. 15	12+000.000	5.450	5526048.005	633521.033	233.130	NE WALL ELEVATION POINT
W.P. 16	12+035.000	5.450	5526081.213	633529.795	232.360	NE WALL TYPE CHANGE
W.P. 17	12+065.000	5.450	5526108.874	633540.225	231.700	END OF NE WALL
W.P. 18	11+725.000	-6.720	5525774.422	633515.332	230.446	SW WALL TYPE CHANGE
W.P. 19	11+715.000	-7.000	5525784.424	633515.662	230.000	END OF SW WALL
W.P. 20	11+725.000	5.450	5525775.171	633527.474	230.446	SE WALL TYPE CHANGE
W.P. 21	11+715.000	5.450	5525765.191	633528.088	230.000	END OF SE WALL
W.P. 22	11+769.328	-5.450	5525818.746	633513.874	232.424	SW WALL ALIGNMENT CHANGE



LOCATION APPROVED UNDERGROUND 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 COORDINATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

DESIGNED BY	KGW
DRAWN BY	RCB
CHECKED BY	KGW
APPROVED BY	DPK
HOR. SCALE	AS SHOWN
VERTICAL	AS SHOWN
ISSUED FOR TENDER	10/13/09 RCB
NO. REVISIONS	DATE BY

DILLON CONSULTING

ENGINEER'S SEAL

PROFESSIONAL ENGINEER

K. G. WILLS

10-13-2008

CONSULTANT PROJECT NO. 088813

THE CITY OF WINNIPEG TRANSIT DEPARTMENT

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1 TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION MILEAGE 1.38 & ASSOCIATED WORKS

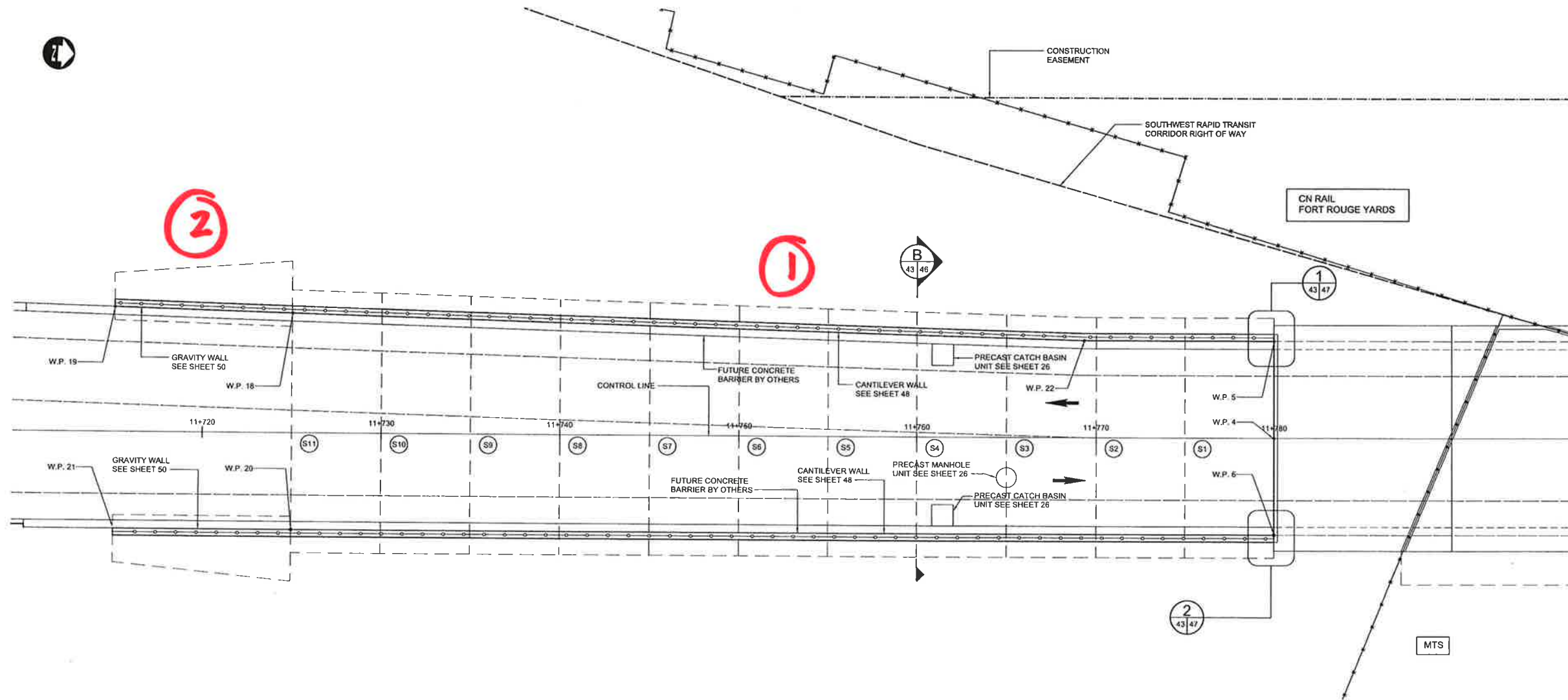
CITY DRAWING NUMBER U237-09-43

SHEET 43 OF 73

CONSULTANT DRAWING NUMBER C4-S1120-T

NORTH RETAINING WALLS

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SOUTH RETAINING WALL LAYOUT
SCALE 1:125

NOTES:

1. ALL DIMENSIONS ARE GIVEN IN GROUND COORDINATES
2. ALL STATIONS AND COORDINATES ARE GIVEN IN GRID COORDINATES.
3. DIMENSIONS AND WORKS POINTS ARE GIVEN AT THE FRONT FACE OF THE WALLS U.N.O.
4. SEE SHEET 27/42 FOR WORK POINT INFORMATION
5. SEE SHEET 42 FOR PILING NOTES.



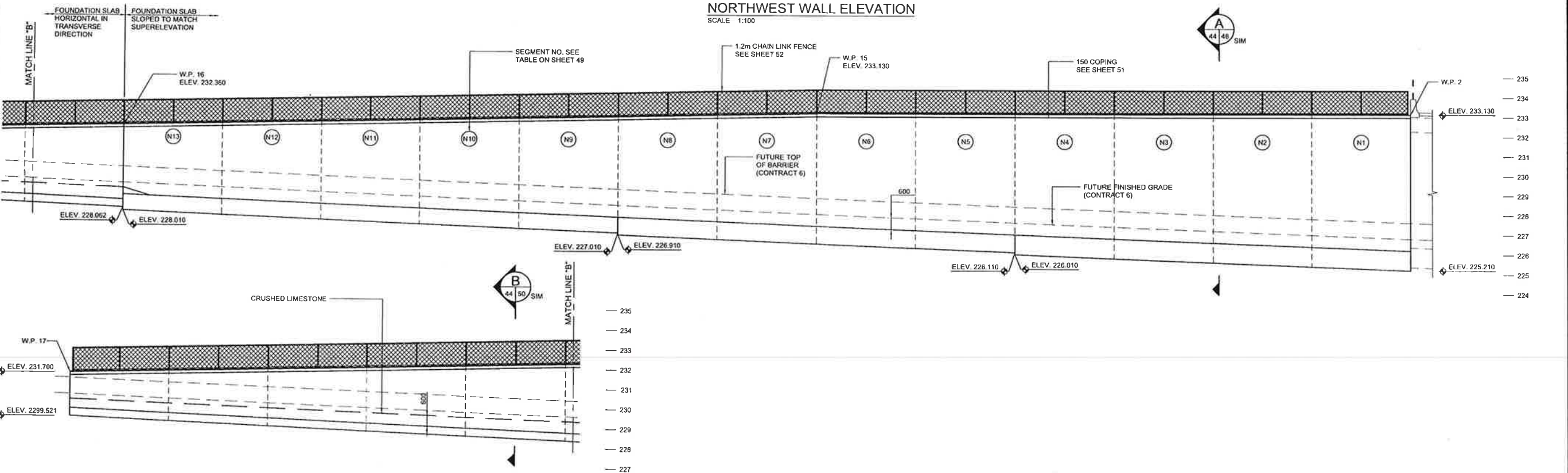
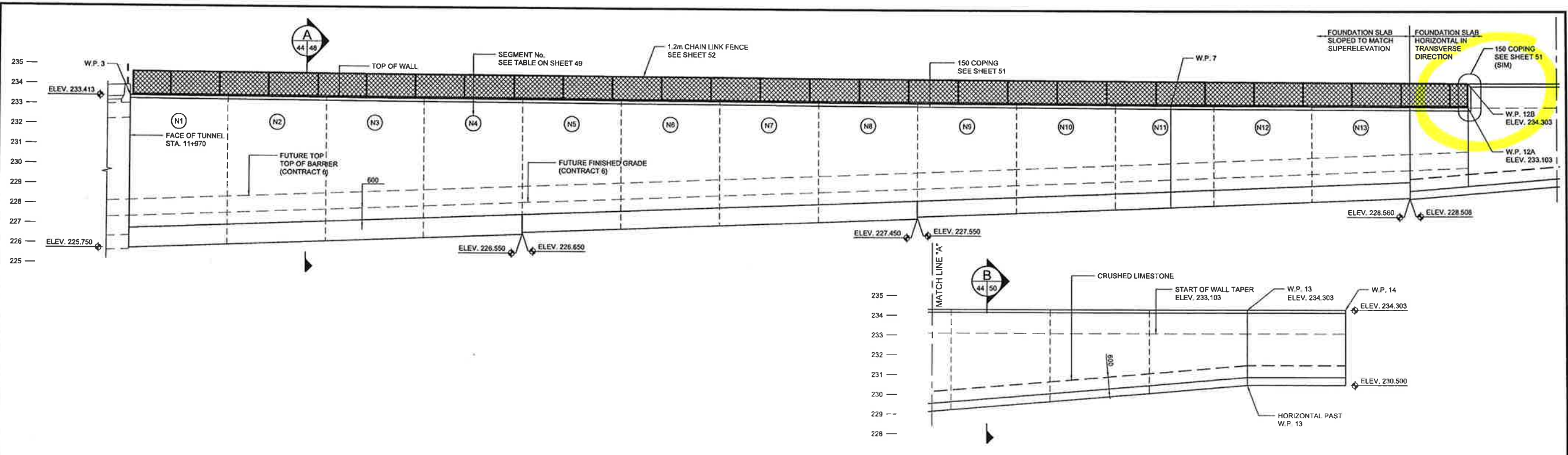
NO.	REVISIONS	DATE	BY
0	ISSUED FOR TENDER	10/13/2009	RCB

DESIGNED BY	KGW
DRAWN BY	RCB
CHECKED BY	KGW
APPROVED BY	DPK
HOR. SCALE	AS SHOWN
VERTICAL SCALE	AS SHOWN
DATE	2009/06/24



THE CITY OF WINNIPEG TRANSIT DEPARTMENT	
SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1 TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION MILEAGE 1.38 & ASSOCIATED WORKS	
CITY DRAWING NUMBER U237-09-44	CONSULTANT PROJECT NO. 088813
SHEET 44 OF 73	CONSULTANT DRAWING NUMBER C4-S1121-T
SOUTH RETAINING WALLS	

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- NOTES:
1. FINISHED GRADE SHOWN WILL BE COMPLETED BY OTHERS IN FUTURE CONSTRUCTION AND IS SHOWN FOR INFORMATION ONLY.
 2. FENCE POST LAYOUT TO BE PROVIDED BY FENCING SUPPLIER. MAXIMUM SPACING 2500.
 3. FOUNDATION ELEVATIONS GIVEN AT EDGE OF FOOTING.



NO.	REVISIONS	DATE	BY
0	ISSUED FOR TENDER	10/13/2009	RCB

DESIGNED BY	KGW
DRAWN BY	RCB
CHECKED BY	KGW
APPROVED BY	DPK
HOR. SCALE	AS SHOWN
VERTICAL SCALE	AS SHOWN
DATE	2009/06/24

THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

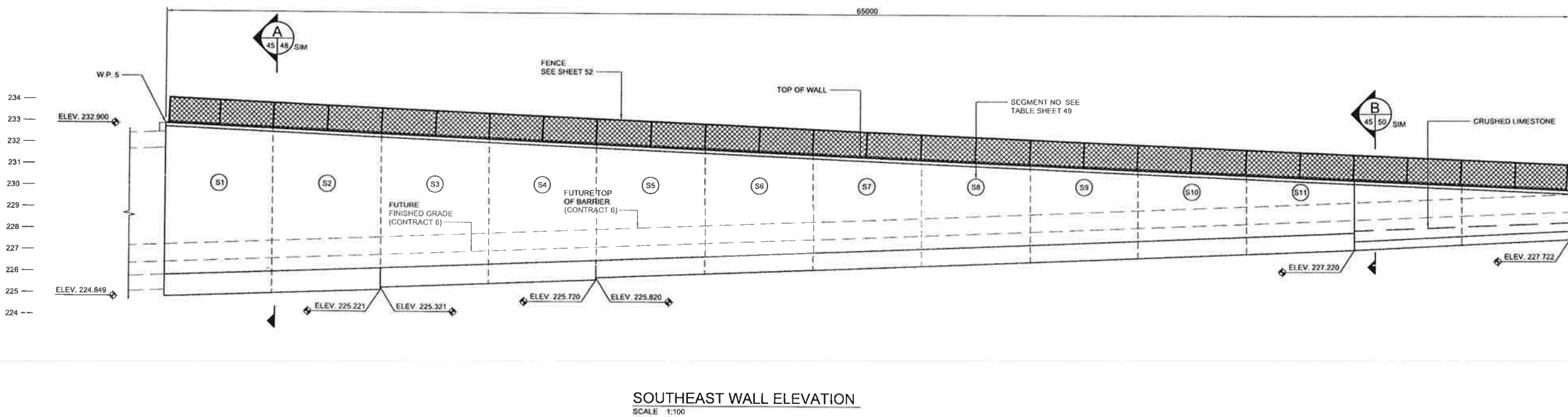
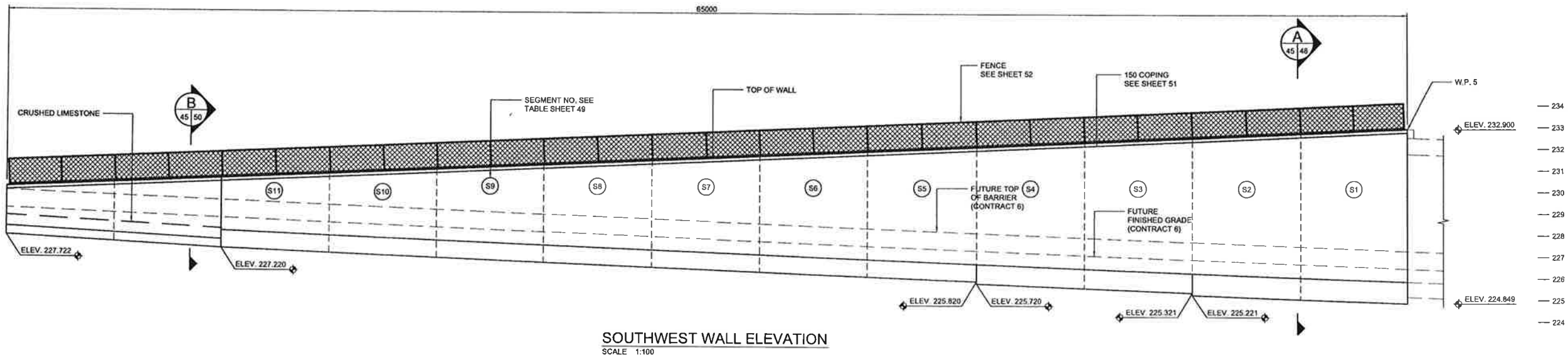
Winnipeg

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

CITY DRAWING NUMBER: U237-09-45
SHEET: 45 OF 73
CONSULTANT DRAWING NUMBER: C4-S1122-T

ENGINEER'S SEAL: ORIGINAL SIGNED BY K.G. WILIS 10/13/2009 REGISTERED PROFESSIONAL ENGINEER
CONSULTANT PROJECT NO.: 088813

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NOTES:

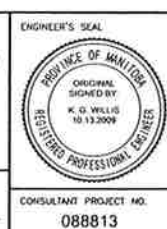
1. FINISHED GRADE SHOWN WILL BE COMPLETED BY OTHERS CONTRACT 6 CONSTRUCTION AND IS SHOWN FOR INFORMATION ONLY.
2. FENCE POST LAYOUT TO BE PROVIDED BY FENCING SUPPLIER. MAXIMUM SPACING 2500.
3. FOUNDATION ELEVATIONS GIVEN AT EDGE OF FOOTING.



LOCATION APPROVED UNDERGROUND STRUCTURES		DATE	
NO	REVISIONS	DATE	BY

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 LOCATION OF ALL UTILITIES. MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

DESIGNED BY	KGW
DRAWN BY	RCB
CHECKED BY	KGW
APPROVED BY	DPK
HOR. SCALE	AS SHOWN
VERTICAL	AS SHOWN
DATE	2009/05/24



THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

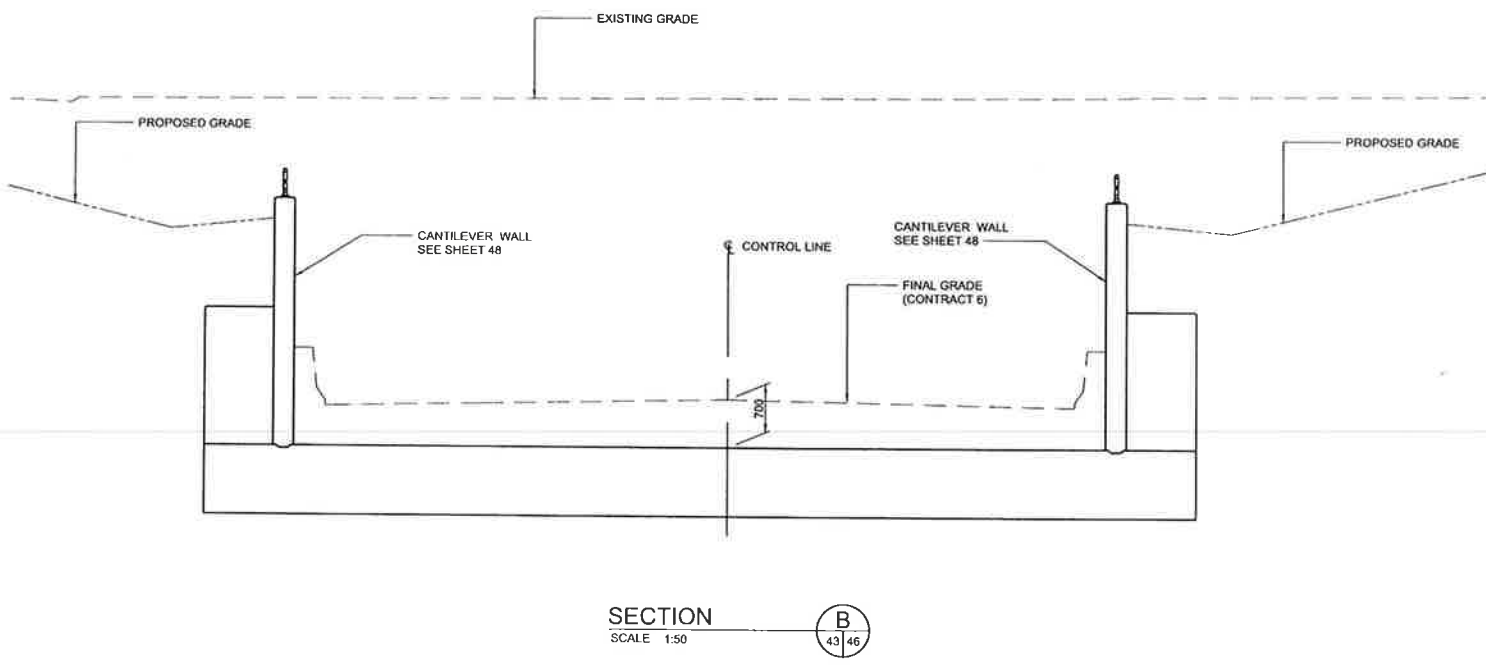
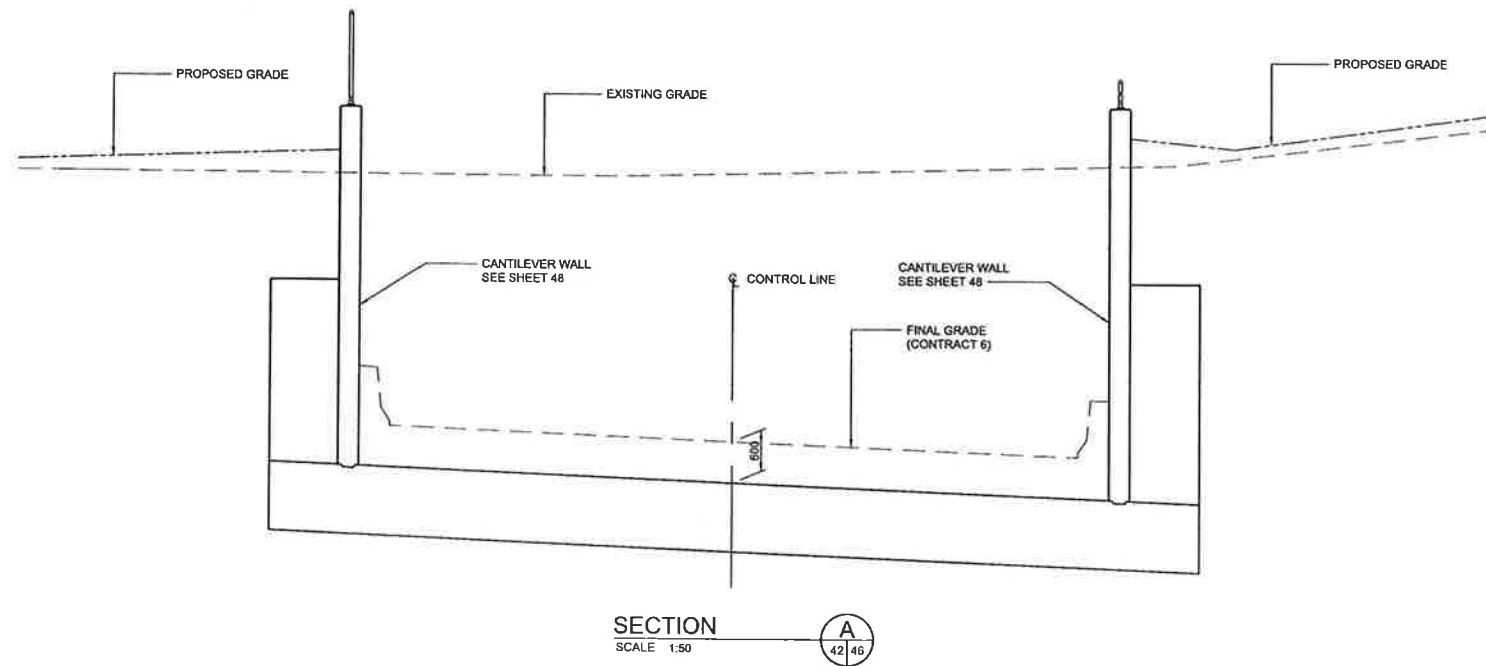
Winnipeg

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

CONSULTANT PROJECT NO. 088813

CITY DRAWING NUMBER U237-09-46
SHEET 46 OF 73
CONSULTANT DRAWING NUMBER C4-S1123-T

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LOCATION UNDERGROUND STRUCTURES	APPROVED STRUCTURES	B.M. ELEV.	DESIGNED BY
SUPR. U/G STRUCTURES COMMITTEE <td>DATE</td> <td></td> <td>KGW</td>	DATE		KGW
			RCB
			KGW
			DPK
			AS SHOWN
			AS SHOWN
0	ISSUED FOR TENDER	30/12/2009	RCB
NO. REVISIONS	DATE	BY	DATE
			2009/06/24

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 INDIVIDUALS WHOSE BEFORE PROCEEDING WITH CONSTRUCTION.

DESIGNED BY: KGW
 DRAWN BY: RCB
 CHECKED BY: KGW
 APPROVED BY: DPK
 HOR. SCALE: AS SHOWN
 VERTICAL: AS SHOWN
 RELEASED FOR CONSTRUCTION: _____
 DATE: _____

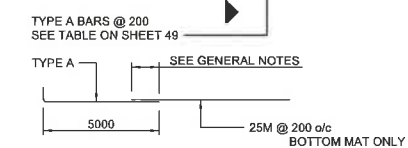
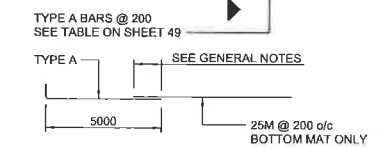
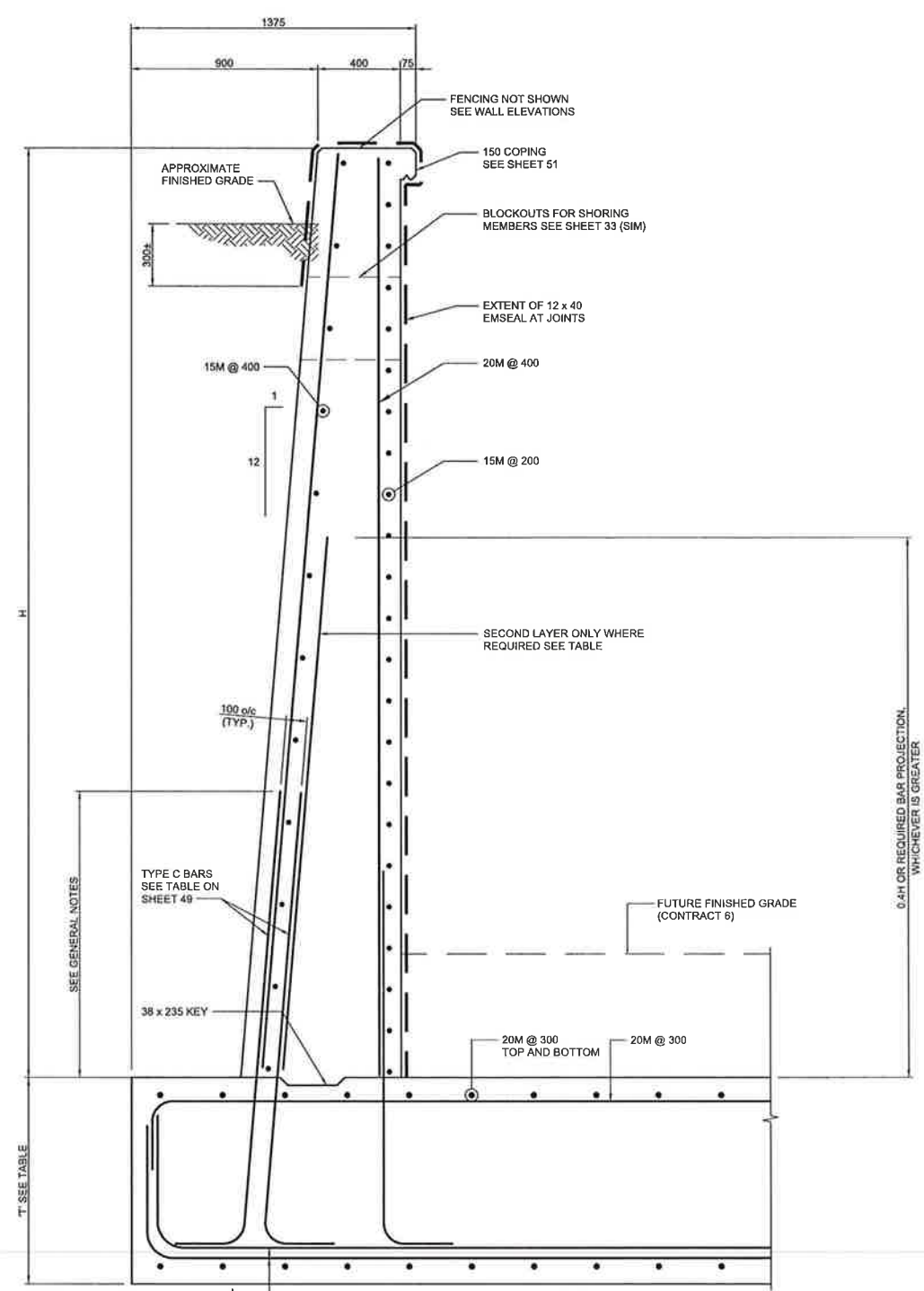
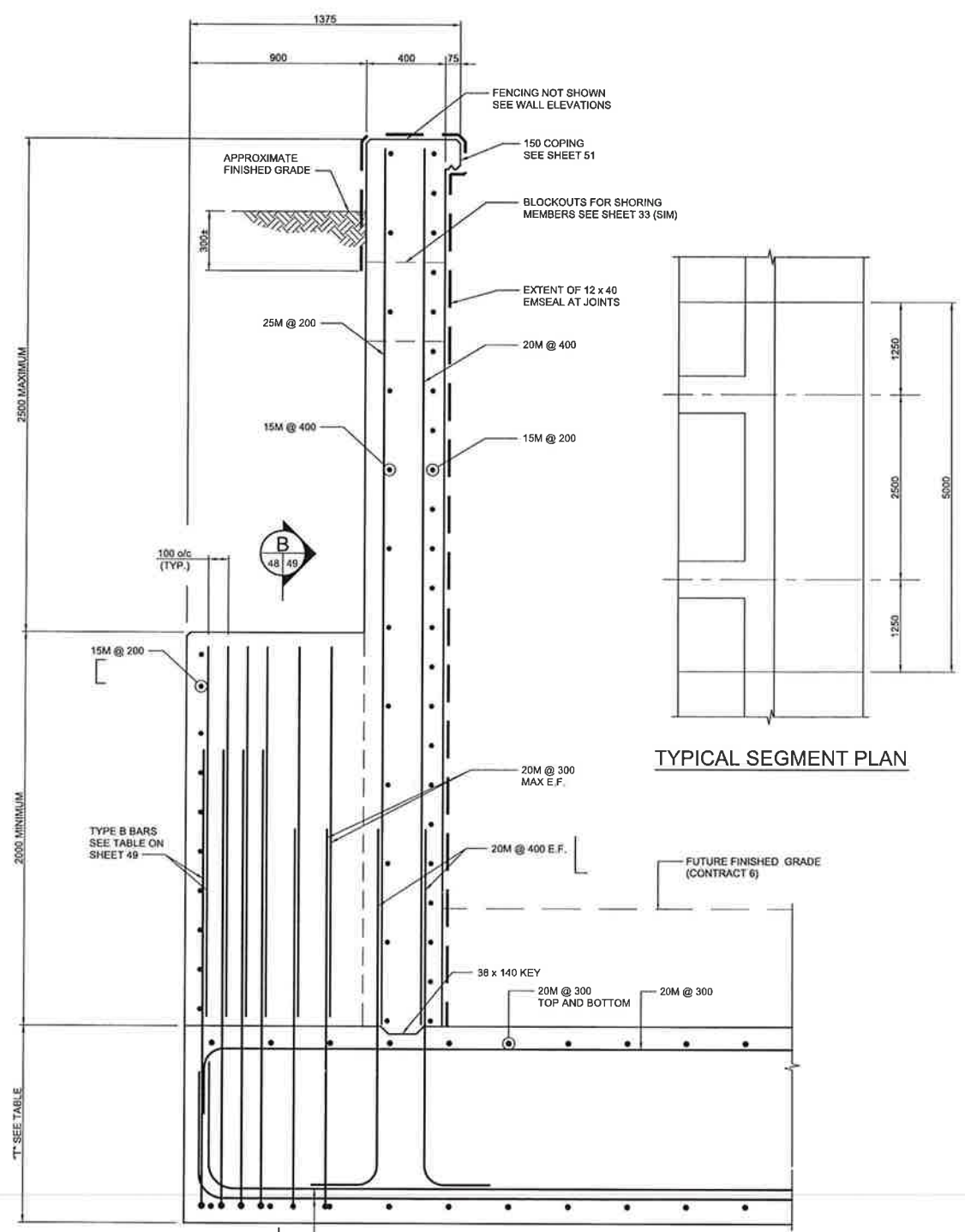
ENGINEER'S SEAL

 CONSULTANT PROJECT NO: 088813

THE CITY OF WINNIPEG
 TRANSIT DEPARTMENT
 SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
 TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
 MILEAGE 1.38 & ASSOCIATED WORKS
 RETAINING WALL CROSS-SECTIONS

CITY DRAWING NUMBER	U237-09-47
SHEET	47 OF 73
CONSULTANT DRAWING NUMBER	C4-S1124-T

- NOTES:
1. RETAINING WALLS ARE DIVIDED INTO 5 m SEGMENTS FOR DETAILING PURPOSES.
 2. EACH SEGMENT MAY BE CONSTRUCTED USING EITHER THE COUNTERFORT OPTION OR THE TAPERED WALL OPTION. DIFFERENT OPTIONS MAY BE USED AT EAST AND WEST ENDS OF THE SAME SEGMENT.
 3. WALL JOINTS TO BE SPACED AT 5m o/c MAXIMUM
 4. FOUR ALTERNATE WALL SEGMENTS WITH A MINIMUM OF 7 DAYS BETWEEN ADJACENT POURS.



COUNTERFORT OPTION

TAPERED OPTION

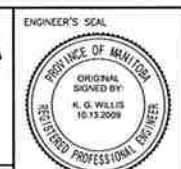


SECTION SCALE 1:15



NO.	REVISIONS	DATE	BY
0	ISSUED FOR TENDER	10/13/2009	RCB

DESIGNED BY	KGW
DRAWN BY	RCB
CHECKED BY	KGW
APPROVED BY	DPK
HOR. SCALE	AS SHOWN
VERTICAL SCALE	AS SHOWN
DATE	2009/10/24



THE CITY OF WINNIPEG
TRANSIT DEPARTMENT

SOUTHWEST RAPID TRANSIT CORRIDOR - STAGE 1
TRANSITWAY TUNNEL AT CN RIVERS SUBDIVISION
MILEAGE 1.38 & ASSOCIATED WORKS

CITY DRAWING NUMBER: U237-09-49
SHEET 49 OF 73
CONSULTANT DRAWING NUMBER: C4-S1126-T

CONSULTANT PROJECT NO.: 088813

RELEASING FOR CONSTRUCTION DATE: _____

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