



ALECTRA UTILITIES

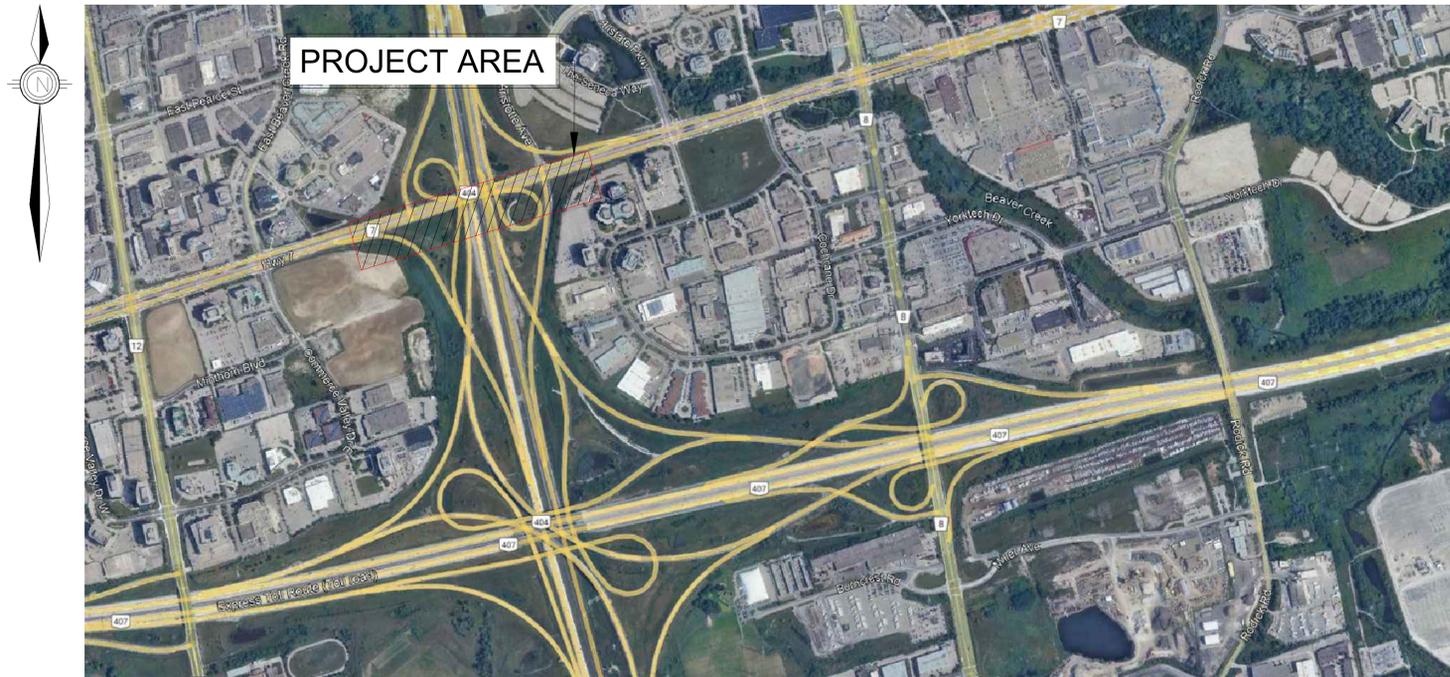
VAUGHAN OFFICE:  
161 Cityview Blvd.  
Vaughan, ON

BARRIE OFFICE:  
55 Patterson Rd.  
Barrie, ON

TEL: (905) 417-6900

TEL: (705) 722-7222

## City of Markham Rainbow Site 2 - Hwy 7 from E. Valhalla Dr to Commerce Valley Dr E MTO Crossing



DRAWING NO.	DESCRIPTION	DATE	REV.	RESP.	NOTE
101	TITLE PAGE/KEY MAP	2024-10-24	B	AM	
401	HDD PLAN AND PROFILE	2024-10-24	E	AM	
402	HDD DRILLING CHART A	2024-10-24	E	AM	
403	HDD GENERAL & CONSTRUCTION NOTES	2024-10-24	E	AM	
404	SETTLEMENT MONITORING PLAN	2024-10-24	B	AM	

Revisions				
No.	Revision	Date	By	Checked By
B	RE-ISSUED FOR MTO	10/24/24	M.Day	A.Michial
A	ISSUED FOR MTO	07/29/24	M.Day	A.Michial

DRAWING NAME	DRAWING NUMBER - SHEET NUMBER
TITLE PAGE/KEY MAP	101
HDD PLAN AND PROFILE	401
HDD DRILLING CHART A	402
HDD GENERAL & CONSTRUCTION NOTES	403
SETTLEMENT MONITORING PLAN	404

PLAN CERTIFICATE OF APPROVAL	FINAL CIVIL CONSTRUCTION CERTIFICATE	LINES CONSTRUCTION CERTIFICATE
This plan has been assembled by utilizing certified construction standards, certified specifications, approved equipment and it meets the safety requirements of Section 4 of Ontario Regulation 22/04.	The construction as recorded in this drawing is consistent with the approved plan, certified construction standards and/or work instruction and that approved equipment has been used.	The construction as recorded in this drawing is consistent with the approved plan, certified construction standards and/or work instruction and that approved equipment has been used.
Name: <b>ADEL MICHIAL</b> Date: <b>10/24/2024</b> Signature of P.Eng. Licensed in the Province of Ontario	Name: _____ Date: _____ Signature: _____ Position: _____	Name: _____ Date: _____ Signature: _____ Position: _____

CALL LOCATES BEFORE DIGGING  
ONTARIO ONE CALL LTD  
1-800-400-2255

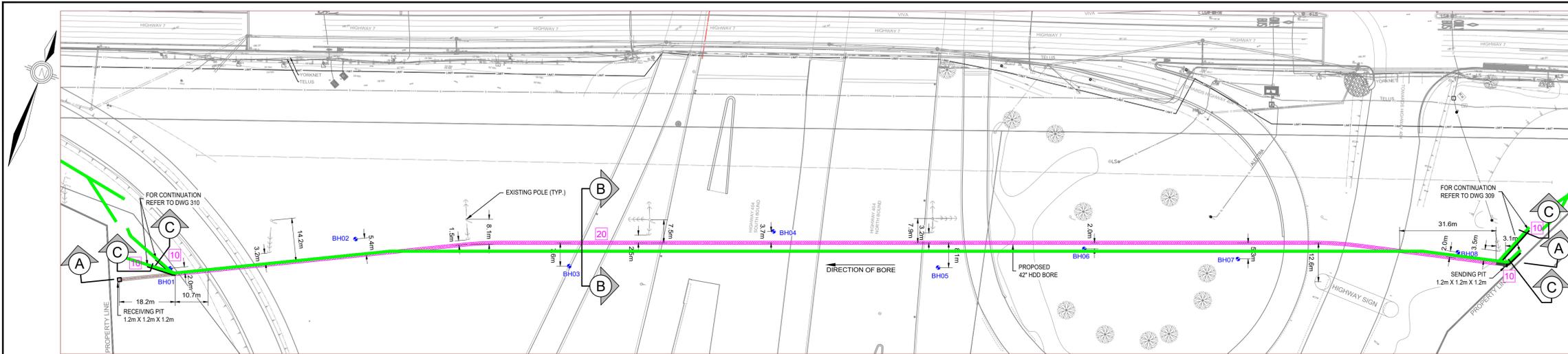


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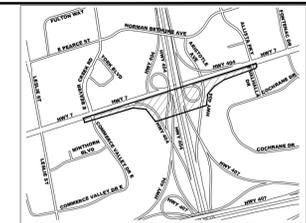
DRAWING SHOWING:  
**Project Rainbow Site 2 - Hwy 7 from E. Valhalla Dr to Commerce Valley Dr E  
MTO Crossing  
TITLE PAGE/KEY MAP**

WORK ORDER No.'s	CAPITAL: -	MUNICIPALITY: CITY OF MARKHAM
DESIGNED BY: A. MICHIAL	SCALE: N.T.S.	DRAWING NO. -
DRAWN BY: G. AVILES	DESIGN DATE: 05/16/2024	SHEET NO. C-101



THE PROPOSED TRENCHLESS METHOD OF INSTALLATION WITHIN THE MTO RIGHT OF WAY IS HORIZONTAL DIRECTIONAL DRILLING (HDD)

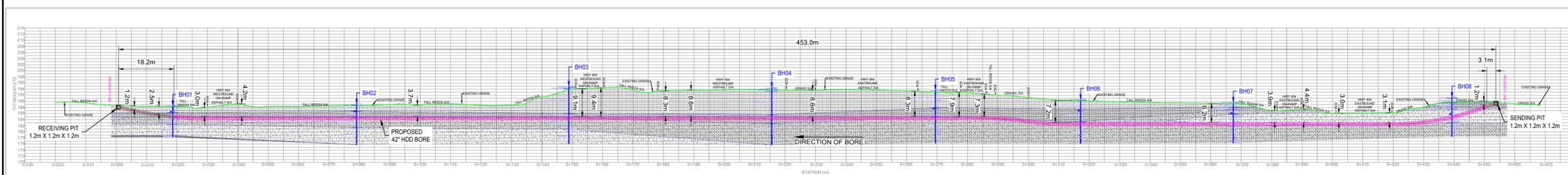
PLAN VIEW  
SCALE 1:750



KEY PLAN  
(City of Markham)

LEGEND:

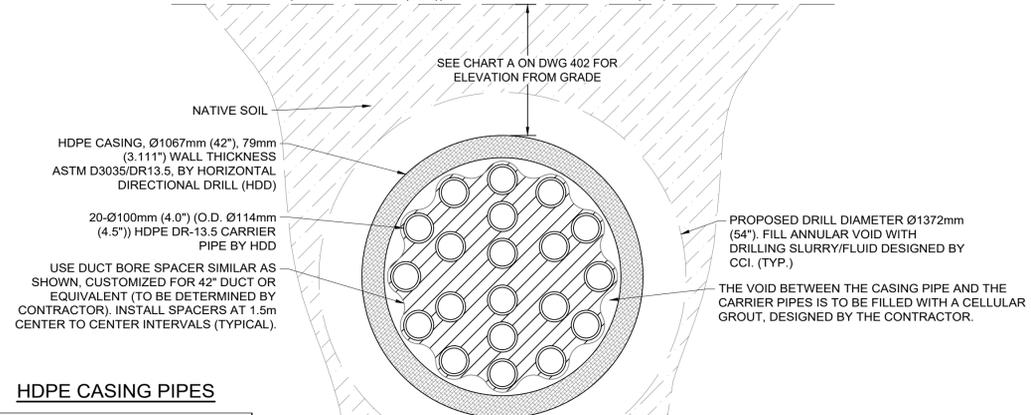
- PROPOSED U/G 36\"/>
- 36\"/>
- PROPOSED CONCRETE ENCASED DUCTBANK
- INDICATES QUANTITY OF CARRIER DUCTS
- EXISTING POLE
- EXISTING GUY



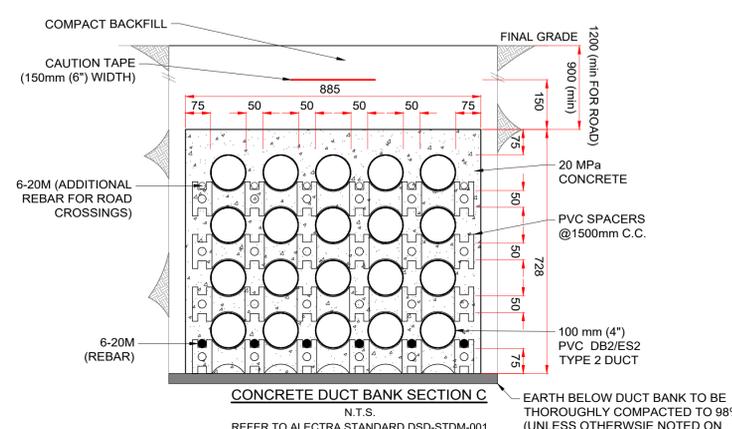
PROPOSED HDD CROSS SECTION A-A  
SCALE 1:750

HORIZONTAL DIRECTIONAL DRILLING

20X100mm (O.D. Ø114.3mm (4.5\"/>



HDPE CASING SECTION B  
N.T.S.



CONCRETE DUCT BANK SECTION C  
N.T.S.

HDPE CASING PIPES

Pipe Specifications	ASTM D3035 (128 PSI)		DR 13.5	
	Imperial	Metric	Imperial	Metric
Nominal, Outside Diameter	42.000	1067	42.000	1067
# of 4 inch Pipes inside	20,000			
Nominal, Inner Diameter	35.40	899	35.40	899
Min. Wall Thickness	3.113	79	3.113	79
Nominal Weight	166.06	247.1	166.06	247.1
Tensile Strength	1,150	7.9	1,150	7.9
Pulled Tensile Safe	437,284	1945	437,284	1945

HDPE CARRIER DUCT

Pipe Specifications	ASTM D3035 (128 PSI)		DR 13.5	
	Imperial	Metric	Imperial	Metric
Nominal Diameter	4.000	100	4.000	100
Outside Diameter	4.500	114	4.500	114
Inner Diameter	3.750	96	3.750	96
Min. Wall Thickness	0.333	8	0.333	8
Nominal Weight	1.91	2.8	1.91	2.8
Tensile Strength	1,150	7.9	1,150	7.9
Pulled Tensile Safe	5,020	22	5,020	22

THE PROPOSED DESIGN DRILL PLAN IS PROVIDED AS REFERENCE AND GUIDANCE ONLY. IT IS REQUIRED THAT THE DRILL CONTRACTOR SUBMIT A DETAILED HDD DRILL PLAN TO ALECTRA UTILITIES AND THE MTO FOR REVIEW AND APPROVAL PRIOR TO THE COMMENCEMENT OF DRILLING.

THE CONTRACTOR/CONTRACTOR'S ENGINEER WILL DO THEIR DUE DILIGENCE IN CASE THEY ENCOUNTER ADDITIONAL EXISTING UTILITIES AND MTO INFRASTRUCTURE OR THE DIMENSIONS ON FIELD ARE DIFFERENT THAN THAT SHOWN ON DRAWINGS. BE ADVISED SEPARATION REQUIREMENTS SHALL BE MET AS PER APPLICABLE UTILITY STANDARDS UNDER ANY CIRCUMSTANCE.

THE CONTRACTOR HAS TO MAINTAIN EXISTING CONDITION WITHIN THE MTO RIGHT-OF-WAY AND THE CONTRACTOR HAS TO MAKE SURE THAT EXISTING HYDRO POLES/UTILITIES ARE SUPPORTED/PROTECTED.

BEFORE DIGGING CALL: ONTARIO ONE-CALL, OIL PIPELINE, COMM UTILITIES, ENBRIDGE GAS, REGIONAL WATER, SEWER, ALECTRA UTILITIES, AND ALL OTHER APPLICABLE UTILITIES/SOURCES FOR UNDERGROUND LOCATES.

EXISTING UNDERGROUND UTILITIES AND INFRASTRUCTURE SHALL NOT BE IMPACTED OR COMPROMISED WHILE TUNNELING FOR THE PROPOSED INSTALLATION.

- CONSTRUCTION NOTES:
- CONTRACTOR TO DETERMINE/CONFIRM SIZE AND LOCATION OF ALL LOCATES PRIOR TO CONSTRUCTION.
  - ALL HORIZONTAL CURVES IN THE HDD BORE ALIGNMENT ARE TO HAVE A MINIMUM RADIUS OF CURVATURE OF 107m.
  - ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.

DRAWING NAME	DRAWING NUMBER - SHEET NUMBER
TITLE PAGE/KEY MAP	101
HDD PLAN AND PROFILE	401
HDD DRILLING CHART A	402
HDD GENERAL & CONSTRUCTION NOTES	403
SETTLEMENT MONITORING PLAN	404

PLAN CERTIFICATE OF APPROVAL

This plan has been assembled by utilizing certified construction standards, certified specifications, approved equipment and it meets the safety requirements of Section 4 of Ontario Regulation 22/04.

Adel Michal, 10/24/2024  
Name Date  
Signature Position

FINAL CIVIL CONSTRUCTION CERTIFICATE

The construction as recorded in this drawing is consistent with the approved plan, certified construction standards and/or work instruction and that approved equipment has been used.

Name Date  
Signature Position

LINES CONSTRUCTION CERTIFICATE

The construction as recorded in this drawing is consistent with the approved plan, certified construction standards and/or work instruction and that approved equipment has been used.

FINAL ENERGIZATION (Applies to Complete Drawing)

Name Date  
Signature Position

CALL LOCATES BEFORE DIGGING  
ONTARIO ONE CALL LTD  
1-800-400-2255

Revisions

No.	Revision	Date	By	Checked By
E	RE-ISSUED FOR MTO	10/24/24	M.Day	A.Michal
D	ISSUED FOR MTO	07/29/24	M.Day	A.Michal
C	RE-ISSUED FOR GEOTECH	06/24/24	M.Day	A.Michal

Power Stream alectra utilities

ALECTRA UTILITIES  
VAUGHAN OFFICE: 161 Clippewick Blvd. Vaughan, ON  
BARRIE OFFICE: 55 Pallisades Rd. Barrie, ON  
TEL: (905) 417-6900 TEL: (705) 722-7222

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DRAWING SHOWING: Project Rainbow Site 2 - Hwy 7 from E. Valhalla Dr to Commerce Valley Dr E MTO Crossing HDD Plan and Profile

WORK ORDER No.: CAPITAL: xxxxxx MUNICIPALITY: CITY OF MARKHAM  
CR: xxxxxx SCALE: AS SHOWN

DESIGNED BY: A.MICHAL DRAWING NO. xxxxxx  
DRAWN BY: M.DAY DESIGN DATE: 09/15/2023 SHEET NO. 401

### HORIZONTAL DIRECTIONAL DRILLING (H.D.D.) CHART A

HDD Ground Finishes	Station	Drill					Bore Plan	Depth Below Ground Surface	Angle	Lateral Deviation from Direct Line Between Pits (m)
		Length	Chalange	Elevation	Flow	Ground Surface				
Tall Reeds Area	0+0.00	0.0	433.0	188.71	188.71	0.00	13°3'48"	0.00		
Tall Reeds Area	0+1.00	1.0	432.0	188.71	188.71	0.00				
Tall Reeds Area	0+2.00	2.0	431.0	188.70	188.71	0.01				
Tall Reeds Area	0+3.00	3.0	430.0	188.67	188.70	0.03	12°1'29"			
Tall Reeds Area	0+4.00	4.0	429.0	188.64	188.70	0.06				
Tall Reeds Area	0+5.00	5.0	428.0	188.54	188.72	0.18	10°42'27"	0.53		
Tall Reeds Area	0+6.00	6.0	427.0	188.50	188.71	0.21				
Tall Reeds Area	0+7.00	7.0	426.0	188.46	188.72	0.26				
Tall Reeds Area	0+8.00	8.0	425.0	188.45	188.91	0.46	9°0'48"			
Tall Reeds Area	0+9.00	9.0	424.0	188.45	188.91	0.46				
Tall Reeds Area	0+10.00	10.0	423.0	188.45	188.91	0.46				
Tall Reeds Area	0+11.00	11.0	422.0	188.44	188.92	0.48				
Tall Reeds Area	0+12.00	12.0	421.0	188.44	188.92	0.48				
Tall Reeds Area	0+13.00	13.0	420.0	188.44	188.92	0.48				
Tall Reeds Area	0+14.00	14.0	419.0	188.46	188.92	0.46				
Tall Reeds Area	0+15.00	15.0	418.0	188.45	188.92	0.47	5°58'37"			
Tall Reeds Area	0+16.00	16.0	417.0	188.44	188.93	0.49				
Tall Reeds Area	0+17.00	17.0	416.0	188.44	188.93	0.49				
Tall Reeds Area	0+18.00	18.0	415.0	188.42	188.93	0.51	4°25'26"	1.63		
Tall Reeds Area	0+19.00	19.0	414.0	188.38	188.92	0.54				
Tall Reeds Area	0+20.00	20.0	413.0	188.34	188.92	0.58				
Tall Reeds Area	0+21.00	21.0	412.0	188.31	188.92	0.61	2°51'20"			
Tall Reeds Area	0+22.00	22.0	411.0	188.27	188.92	0.65				
Tall Reeds Area	0+23.00	23.0	410.0	188.20	188.92	0.70				
Tall Reeds Area	0+24.00	24.0	409.0	188.18	188.92	0.72	1°17'34"	2.17		
Tall Reeds Area	0+25.00	25.0	408.0	188.17	188.92	0.73				
Tall Reeds Area	0+26.00	26.0	407.0	188.17	188.92	0.73				
Tall Reeds Area	0+27.00	27.0	406.0	188.17	188.92	0.73	0°55'12"			
Tall Reeds Area	0+28.00	28.0	405.0	188.17	188.92	0.73				
Tall Reeds Area	0+29.00	29.0	404.0	188.17	188.92	0.73				
Tall Reeds Area	0+30.00	30.0	403.0	188.19	188.92	0.73	0°00'00"	2.71		
Tall Reeds Area	0+31.00	31.0	402.0	188.19	188.92	0.73				
Tall Reeds Area	0+32.00	32.0	401.0	188.19	188.92	0.73				
Tall Reeds Area	0+33.00	33.0	400.0	188.19	188.92	0.73	0°00'00"			
Tall Reeds Area	0+34.00	34.0	399.0	188.19	188.92	0.73				
Tall Reeds Area	0+35.00	35.0	398.0	188.19	188.92	0.73				
Tall Reeds Area	0+36.00	36.0	397.0	188.19	188.92	0.73	0°00'00"	3.25		
Tall Reeds Area	0+37.00	37.0	396.0	188.19	188.92	0.73				
Tall Reeds Area	0+38.00	38.0	395.0	188.19	188.92	0.73				
Tall Reeds Area	0+39.00	39.0	394.0	188.19	188.92	0.73	0°00'41"			
Tall Reeds Area	0+40.00	40.0	393.0	188.14	188.92	0.78				
Tall Reeds Area	0+41.00	41.0	392.0	188.14	188.92	0.78				
Tall Reeds Area	0+42.00	42.0	391.0	188.14	188.92	0.78	0°00'00"	3.78		
Tall Reeds Area	0+43.00	43.0	390.0	188.14	188.92	0.78				
Tall Reeds Area	0+44.00	44.0	389.0	188.14	188.92	0.78				
Tall Reeds Area	0+45.00	45.0	388.0	188.14	188.92	0.78	0°00'00"			
Tall Reeds Area	0+46.00	46.0	387.0	188.19	188.92	0.73				
Tall Reeds Area	0+47.00	47.0	386.0	188.19	188.92	0.73				
Tall Reeds Area	0+48.00	48.0	385.0	188.19	188.92	0.73	0°00'00"	4.33		
Tall Reeds Area	0+49.00	49.0	384.0	188.19	188.92	0.73				
Tall Reeds Area	0+50.00	50.0	383.0	188.19	188.92	0.73				
Tall Reeds Area	0+51.00	51.0	382.0	188.19	188.92	0.73	0°00'00"	5.35		
Tall Reeds Area	0+52.00	52.0	381.0	188.19	188.92	0.73				
Tall Reeds Area	0+53.00	53.0	380.0	188.19	188.92	0.73				
Tall Reeds Area	0+54.00	54.0	379.0	188.19	188.92	0.73	0°00'00"	6.48		
Tall Reeds Area	0+55.00	55.0	378.0	188.19	188.92	0.73				
Tall Reeds Area	0+56.00	56.0	377.0	188.19	188.92	0.73				
Tall Reeds Area	0+57.00	57.0	376.0	188.19	188.92	0.73	0°00'00"	7.64		
Tall Reeds Area	0+58.00	58.0	375.0	188.19	188.92	0.73				
Tall Reeds Area	0+59.00	59.0	374.0	188.19	188.92	0.73				
Tall Reeds Area	0+60.00	60.0	373.0	188.19	188.92	0.73	0°00'00"	8.82		
Tall Reeds Area	0+61.00	61.0	372.0	188.19	188.92	0.73				
Tall Reeds Area	0+62.00	62.0	371.0	188.19	188.92	0.73				
Tall Reeds Area	0+63.00	63.0	370.0	188.19	188.92	0.73	0°00'00"	10.03		
Tall Reeds Area	0+64.00	64.0	369.0	188.19	188.92	0.73				
Tall Reeds Area	0+65.00	65.0	368.0	188.19	188.92	0.73				
Tall Reeds Area	0+66.00	66.0	367.0	188.19	188.92	0.73	0°00'00"	11.28		
Tall Reeds Area	0+67.00	67.0	366.0	188.19	188.92	0.73				
Tall Reeds Area	0+68.00	68.0	365.0	188.19	188.92	0.73				
Tall Reeds Area	0+69.00	69.0	364.0	188.19	188.92	0.73	0°00'00"	12.58		
Tall Reeds Area	0+70.00	70.0	363.0	188.19	188.92	0.73				
Tall Reeds Area	0+71.00	71.0	362.0	188.19	188.92	0.73				
Tall Reeds Area	0+72.00	72.0	361.0	188.19	188.92	0.73	0°00'00"	13.93		
Tall Reeds Area	0+73.00	73.0	360.0	188.19	188.92	0.73				
Tall Reeds Area	0+74.00	74.0	359.0	188.19	188.92	0.73				
Tall Reeds Area	0+75.00	75.0	358.0	188.19	188.92	0.73	0°00'00"	15.34		
Tall Reeds Area	0+76.00	76.0	357.0	188.19	188.92	0.73				
Tall Reeds Area	0+77.00	77.0	356.0	188.19	188.92	0.73				
Tall Reeds Area	0+78.00	78.0	355.0	188.19	188.92	0.73	0°00'00"	16.81		
Tall Reeds Area	0+79.00	79.0	354.0	188.19	188.92	0.73				
Tall Reeds Area	0+80.00	80.0	353.0	188.19	188.92	0.73				
Tall Reeds Area	0+81.00	81.0	352.0	188.19	188.92	0.73	0°00'00"	18.34		
Tall Reeds Area	0+82.00	82.0	351.0	188.19	188.92	0.73				
Tall Reeds Area	0+83.00	83.0	350.0	188.19	188.92	0.73				
Tall Reeds Area	0+84.00	84.0	349.0	188.19	188.92	0.73	0°00'00"	19.94		
Tall Reeds Area	0+85.00	85.0	348.0	188.19	188.92	0.73				
Tall Reeds Area	0+86.00	86.0	347.0	188.19	188.92	0.73				
Tall Reeds Area	0+87.00	87.0	346.0	188.19	188.92	0.73	0°00'00"	21.60		
Tall Reeds Area	0+88.00	88.0	345.0	188.19	188.92	0.73				
Tall Reeds Area	0+89.00	89.0	344.0	188.19	188.92	0.73				
Tall Reeds Area	0+90.00	90.0	343.0	188.19	188.92	0.73	0°00'00"	23.33		
Tall Reeds Area	0+91.00	91.0	342.0	188.19	188.92	0.73				
Tall Reeds Area	0+92.00	92.0	341.0	188.19	188.92	0.73				
Tall Reeds Area	0+93.00	93.0	340.0	188.19	188.92	0.73	0°00'00"	25.13		
Tall Reeds Area	0+94.00	94.0	339.0	188.19	188.92	0.73				
Tall Reeds Area	0+95.00	95.0	338.0	188.19	188.92	0.73				
Tall Reeds Area	0+96.00	96.0	337.0	188.19	188.92	0.73	0°00'00"	27.00		
Tall Reeds Area	0+97.00	97.0	336.0	188.19	188.92	0.73				
Tall Reeds Area	0+98.00	98.0	335.0	188.19	188.92	0.73				
Tall Reeds Area	0+99.00	99.0	334.0	188.19	188.92	0.73	0°00'00"	28.95		
Tall Reeds Area	0+100.00	100.0	333.0	188.19	188.92	0.73				
Tall Reeds Area	0+101.00	101.0	332.0	188.19	188.92	0.73				
Tall Reeds Area	0+102.00	102.0	331.0	188.19	188.92	0.73	0°00'00"	31.00		
Tall Reeds Area	0+103.00	103.0	330.0	188.19	188.92	0.73				
Tall Reeds Area	0+104.00	104.0	329.0	188.19	188.92	0.73				
Tall Reeds Area	0+105.00	105.0	328.0	188.19	188.92	0.73	0°00'00"	33.15		
Tall Reeds Area	0+106.00	106.0	327.0	188.19	188.92	0.73				
Tall Reeds Area	0+107.00	107.0	326.0	188.19	188.92	0.73				
Tall Reeds Area	0+108.00	108.0	325.0	188.19	188.92	0.73	0°00'00"	35.40		
Tall Reeds Area	0+109.00	109.0	324.0	188.19	188.92	0.73				
Tall Reeds Area	0+110.00	110.0	323.0	188.19	188.92	0.73				
Tall Reeds Area	0+111.00	111.0	322.0	188.19	188.92	0.73	0°00'00"	37.75		
Tall Reeds Area	0+112.00	112.0	321.0	188.19	188.92	0.73				
Tall Reeds Area	0+113.00	113.0	320.0	188.19	188.92	0.73				
Tall Reeds Area	0+114.00	114.0	319.0	188.19	188.92	0.73	0°00'00"	40.20		

HDD Ground Finishes	Station	Drill					Bore Plan	Depth Below Ground Surface	Angle	Lateral Deviation from Direct Line Between Pits (m)
		Length	Chalange							

**HORIZONTAL DIRECTIONAL DRILL GENERAL NOTES:**

- IN CASE OF CONFLICT BETWEEN THE DRAWING NOTES AND THE CIVIL TENDER DOCUMENTS THE STRICTER CASE WILL GOVERN.
- ALL WORK OUTSIDE OF MTO ROW SHALL BE PERFORMED IN ACCORDANCE WITH ALECTRA UTILITIES(ALECTRA) STANDARDS AND SPECIFICATIONS WHILE ALL WORK WITHIN THE MTO ROW SHALL BE AS PER MTO STANDARDS AND SPECIFICATIONS. ALL WORK, BOTH WITHIN AND OUTSIDE OF THE MTO ROW, SHALL MEET SECTION 4 OF ONTARIO REGULATION 22/04, UNLESS NOTED OTHERWISE.
- ALL CHANGES OR ALTERATIONS TO THIS DESIGN MUST BE REVIEWED AND APPROVED IN WRITING BY THE MTO/ALECTRA'S ENGINEERING DEPARTMENT/NBM ENGINEERING PRIOR TO COMMENCEMENT OF CONSTRUCTION AND/OR INSTALLATION.
- WORK TO DIMENSIONS AND DON'T SCALE DRAWINGS. ALL DIMENSIONS MUST BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION AND/OR INSTALLATION.
- NO WORK SHALL PROCEED WITHOUT NOTIFYING ALECTRA AND THE MTO 48 HOURS PRIOR TO CONSTRUCTION AND/OR INSTALLATION.
- ALECTRA MUST NOTIFY THE LOCAL MUNICIPALITY WITHIN 48 HOURS PRIOR TO CONSTRUCTION AND/OR INSTALLATION.
- THE CONTRACTOR SHALL OBTAIN ALL NECESSARY ROAD OCCUPANCY PERMITS PRIOR TO CONSTRUCTION AND/OR INSTALLATION.
- THE ENCROACHMENT PERMIT C/W UTILITY CROSSING AND CONSTRUCTION SHALL BE OBTAINED PRIOR TO CONSTRUCTION AND/OR INSTALLATION.
- NO WORK IS TO PROCEED UNTIL AN MTO PERMIT HAS BEEN ISSUED AND THE DETAILED WORK PLAN METHODOLOGY HAS BEEN APPROVED BY THE MTO.
- PRIOR TO CONSTRUCTION, THE CONTRACTOR MUST CONTACT REGIONAL MUNICIPALITY OF YORK, THE CITY OF MARKHAM, ONTARIO ONE-CALL PRE-ENGINEERING SERVICES, AND OTHER APPLICABLE SOURCES, TO LOCATE ALL EXISTING WATER SERVICES (W/S) AND WATERMANS, AND ALL OTHER UTILITIES RELEVANT TO THE AREA OF THIS PROJECT.
- PRIOR TO CONSTRUCTION, THE LOCATIONS AND DEPTH OF ALL THE EXISTING UTILITIES, INCLUDING WATERMANS, STORM/SANITARY SEWERS AND GAS LINES, MUST BE CONFIRMED. THE MINIMUM VERTICAL CLEARANCE (POST CONSTRUCTION) SHALL BE SET BY EACH UTILITY BUT SHALL NOT BE LESS THAN 0.3 M FOR OPEN TRENCH AND 1.0 M FOR TRENCHLESS TECHNOLOGY.
- PRIOR TO TRENCHLESS INSTALLATION, THE CONTRACTOR SHALL DAYLIGHT TO IDENTIFY THE PRECISE LOCATIONS OF EXISTING MTO INFRASTRUCTURE (I.E. CULVERTS) AND OTHER UTILITIES AS NEEDED; AND SUBMIT DAYLIGHTING PLANS TO DEMONSTRATE THAT THE PROPOSED WORK WILL NOT BE IN CONFLICT WITH ANY MTO INFRASTRUCTURE, UNDERGROUND UTILITIES, ETC.
- WHEN TRENCHING WITHIN THE VICINITY OF A DITCH, MAINTAIN A TRENCH DEPTH OF 1.2 M (4.0 FT.) FROM THE LOWEST POINT OF THE DITCH AND MAINTAIN A MINIMUM OF 2.0 M (6'-7") SEPARATION FROM DITCH AREAS AND WATERMANS (WHERE POSSIBLE).
- WHEN HAND TRENCHING, MAINTAIN 0.6 M (2 FT.) HORIZONTAL AND 0.3 M (1.0 FT.) VERTICAL CLEARANCE FROM ALL OTHER UTILITIES AND MUNICIPAL SERVICES.
- NO OPEN EXCAVATIONS/TRENCHING WITHIN 2.4 M (8.0 FT.) OF THE CITY-OWNED TREES. MICRO TUNNEL OR BORE ONLY AT A DEPTH OF 1.60 M (5'-3"). THE DEPTH OF 1.2 M (4.0 FT.) MAY BE USED IF 1.60 M (5'-3") CONFLICTS WITH EXISTING PLANT.
- THE POSITION OF POLE LINES, CONDUITS, WATER MAINS, SEWERS, GAS PIPES, AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN AS EXACT. THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED BEFORE STARTING WORK. THE CONTRACTOR SHALL CONFIRM THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR THEIR DAMAGE.
- DUE TO THE PRESENCE OF EXISTING UTILITIES, THE CONTRACTOR IS TO EXERCISE EXTREME CAUTION WHEN WORKING IN THE AREA. THE CONTRACTOR SHALL TAKE FULL RESPONSIBILITY WITH THE IMPLEMENTATION OF THE WORK AND SHALL BE RESPONSIBLE FOR ANY DAMAGES CAUSED BY THE CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR THE RESTORATION, BOTH DURING AND AFTER COMPLETION OF PIPE INSTALLATION, IN CASE THERE ARE ANY ISSUES OR CONCERNS RELATING TO THE WORK COMPLETED BY THE CONTRACTOR. DURING THE INSTALLATION, THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASUREMENTS AND PROPER WORK METHODS TO ENSURE A SAFE AND PROPER INSTALLATION.
- THE EFFECTED AREA SHALL BE RESTORED TO ORIGINAL, OR BETTER, CONDITIONS AND WILL BE IN CONFORMANCE WITH MUNICIPAL STANDARDS.
- THE CONTRACTOR IS TO ARRANGE MTO LOCATES AND FLAGGING PRIOR TO CONSTRUCTION.
- THE CONTRACTOR IS TO OBTAIN CLEARANCE FROM THE MTO FOR THE PROPOSED INSTALLATION.
- ALL PARTIES INVOLVED IN THE CONSTRUCTION OF THIS PROJECT WILL RECEIVE A JOB BRIEFING FROM THE SITE SAFETY REPRESENTATIVE PRIOR TO ENTERING THE MTO RIGHT-OF-WAY. THE JOB BRIEFING ALLOWS FOR A CONFIRMATION OF IMPORTANT SAFETY REQUIREMENTS; FURTHER INFORMATION REGARDING THIS WILL BE PROVIDED IN THE SUBSEQUENT WORK PLAN METHODOLOGY.
- TEST HOLE EXCAVATION MAY BE REQUIRED FOR LOCATION VERIFICATION OF EXISTING UTILITIES AND STRUCTURES RELEVANT TO THIS CONSTRUCTION.
- ALECTRA IS TO VERIFY EASEMENT EXISTENCE FOR ALL AREAS OUTSIDE OF R.O.W.
- PRIMARY CIRCUIT VOLTAGE(S) IS 28 KV.
- THE CONTRACTOR/CONTRACTOR'S ENGINEER WILL DO THEIR DUE DILIGENCE IN CASE THEY ENCOUNTER ADDITIONAL EXISTING UTILITIES OR THE DIMENSIONS IN THE FIELD ARE DIFFERENT THAN THAT SHOWN-ON DRAWINGS. BE ADVISED, SEPARATION REQUIREMENTS SHALL BE MET AS PER APPLICABLE UTILITY/MUNICIPAL STANDARDS UNDER ANY CIRCUMSTANCE.

**HORIZONTAL DIRECTIONAL DRILL CONSTRUCTION NOTES:**

- THE DESIGN SHOWN IN THE DRAWING PACKAGE IS INTENDED TO BE USED FOR THIS PROJECT ONLY. ANY ERRORS OR OMISSIONS MUST BE REPORTED BACK TO ALECTRA AND NBM ENGINEERING REPRESENTATIVE IMMEDIATELY.
- THE HDPE CASING PIPE MUST HAVE A MINIMUM YIELD STRENGTH OF 22 MPA AND BE RATED FOR A DESIGN LIFE OF AT LEAST 100 YEARS.
- THE PROPOSED DESIGN IS BASED ON A GEOTECHNICAL REPORT PREPARED BY GEOTECHNICAL ENGINEERING FIRM NAME, REPORT # 121625347, AND MTO APPROVAL.
- PROJECT DRAWING(S) HAS BEEN ASSEMBLED UTILIZING ONLY CERTIFIED CONSTRUCTION STANDARDS, SPECIFICATIONS AND APPROVED EQUIPMENT AND MEET THE SAFETY REQUIREMENTS OF SECTION 4 OF ONTARIO REGULATION 22/04.
- BARRICADES, WARNING SIGNS AND FLAGMAN, WHEN NECESSARY AND SPECIFIED, SHALL BE PROVIDED BY THE CONTRACTOR.
- THE CONTRACTOR SHALL PROVIDE THE FOLLOWING TO THE MTO AND ALECTRA FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION:
  - IDENTIFY IN THE WORK PLAN DETAILS/METHODOLOGY OF THE HORIZONTAL DIRECTIONAL DRILLING (HDD) CONSTRUCTION WITH A SIGNED ONTARIO PROFESSIONAL ENGINEER'S STAMP. THE DETAILS ARE TO INCLUDE, BUT ARE NOT LIMITED TO, THE SEQUENCE OF OPERATIONS TO BE PERFORMED DURING CONSTRUCTION AND A DETAILED SCHEDULE OF CONSTRUCTION;
  - METHODOLOGY FOR ANY TEMPORARY EXCAVATIONS MUST BE SUBMITTED FOR REVIEW (IF REQUIRED);
  - METHOD OF DE-WATERING AND DISPOSAL ON OR ADJACENT TO THE MTO RIGHT-OF-WAY (IF REQUIRED FOR SENDING/RECEIVING PITS AND/OR DUCT BANK AND MANHOLE INSTALLATION). THE METHOD OF DE-WATERING MUST DIRECT THE DRAINAGE WATER AWAY FROM THE HIGHWAY AND OFF THE MTO ROW;
  - BORE EQUIPMENT SPECIFICATIONS, INCLUDING, BUT NOT LIMITED TO, SIZE AND TYPE OF CUTTING HEAD(S), SIZE AND TYPE OF BORING MACHINE, AND SIZE AND TYPE OF DRILLING SLURRY/FLUID STORAGE/RECOVERY FACILITIES. IF USING MULTIPLE PASSES INCLUDE ALL HEADS FROM PILOT BORE TO FINAL PASS;
  - METHODOLOGY OF HDPE PIPE FUSION, INCLUDING SEGMENT LENGTH AND TYPE OF EQUIPMENT;
  - CASING PIPE SHOP DRAWINGS INCLUDING, BUT NOT LIMITED TO, THE PIPE MATERIAL & THICKNESS;
  - TYPE, LOCATION AND METHOD OF INSTALLING LOCATOR STATION;
  - METHOD OF CONTROLLING LINE AND GRADE;
  - METHOD OF SPOIL REMOVAL, INCLUDING SURFACE STORAGE AND DISPOSAL;
  - GROUTING TECHNIQUES TO BE USED FOR FILLING ANNULAR VOIDS CAUSED BY OVER EXCAVATION (IF ANY), INCLUDING EQUIPMENT, PUMPING AND INJECTION PROCEDURES, PRESSURE GROUT TYPES AND MIXTURES. THE GROUTING PRESSURE IS TO BE SUFFICIENT TO SUPPORT THE ANNULAR VOID DURING ALL LOADING CONDITIONS INCLUDING HIGHWAY LOADING;
  - METHODOLOGY FOR SUPPORT OF BORE TUNNEL DURING CONSTRUCTION. THIS METHODOLOGY IS TO INCLUDE, BUT IS NOT LIMITED TO, A SPECIFIED MAXIMUM TIMEFRAME DURING WHICH THE BORE TUNNEL IS SUPPORTED ONLY BY DRILLING SLURRY/FLUID; CALCULATIONS INDICATING THAT THE SUPPORT DURING CONSTRUCTION, BUT BEFORE CASING PIPE INSTALLATION, IS ADEQUATE TO SUPPORT ALL LOADS ALONG THE TUNNEL, INCLUDING THE LIVE LOADS UNDER THE HIGHWAY; AND CALCULATIONS INDICATING THE TOTAL AMOUNT OF SETTLEMENT;
  - DETAILS OF CASING SPACERS AND CASING END SEALS. THE ENDS OF THE HDD PIPE ARE TO BE SEALED WITH STRUCTURAL GROUT/RUBBER GASKET;
  - METHODOLOGY/CALCULATIONS FOR THE DESIGN AND INSTALLATION OF CELLULAR GROUT IN THE INTERIOR VOIDS OF THE CASING PIPE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE INSTALLATION AND CURING OF THE GROUT MATERIAL WILL NOT DAMAGE THE CASING OR CARRIER PIPES. WARNING: HEAT GENERATED DURING CURING PERIOD CAN DAMAGE HOPE PIPES.
  - MANAGEMENT OF OBSTRUCTIONS (BOULDERS, COBBLES OR OTHER OBSTRUCTIONS) INCLUDING CONTINGENCY PLAN IF OBSTRUCTIONS ARE ENCOUNTERED, AND PROGRESS IS IMPEDED.
  - A CONTINGENCY PLAN FOR DEALING WITH FRAC OUT. THE FRAC OUT PLAN IS TO INCLUDE, BUT IS NOT LIMITED TO:
    - PROCEDURE/METHOD TO CONTAIN AND CLEAN UP DRILLING SLURRY FROM FRAC OUT, AND
    - PROCEDURE/METHOD TO PREVENT FURTHER FRAC OUT FROM OCCURRING.
  - EMERGENCY SAFETY AND REPAIR PLAN FOR ACCIDENTAL DAMAGE CAUSED TO EXISTING UTILITIES, ROADWAY SURFACE, OR OTHER FEATURES RESULTING FROM CONSTRUCTION OPERATIONS;
  - TRANSITION FROM TRENCHLESS PIPE(S) TO CONCRETE ENCASED DUCT BANK (PROVIDED DESIGN TO BE USED AS A REFERENCE ONLY);
  - A TRAFFIC CONTROL PLAN (IF REQUIRED);
  - A GROUND AND TRACK MONITORING PLAN IS REQUIRED TO BE SUBMITTED BY A COMPETENT "THIRD PARTY". REFER TO SETTLEMENT MONITORING NOTES FOR MORE DETAILS.
  - CONFIRM AVAILABILITY OF TEMPORARY WORKSPACES AND MARK THE WORKSPACES ON THE DRAWINGS;
  - QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES;
- THE CONTRACTOR MAY BEGIN CONSTRUCTION ONCE THEY HAVE RECEIVED APPROVAL FROM THE MTO AND ALECTRA REGARDING ALL CONTRACTOR SUBMITTALS LISTED IN NOTE 6 ABOVE AND ALL OTHER NECESSARY APPROVALS FROM ALL RELEVANT AUTHORITIES.
- THE CONTRACTOR SHALL MONITOR SPOIL REMOVAL TO DETECT EXCESSIVE GROUND LOSS. REGULAR TESTS ARE TO BE CONDUCTED EVERY 4 HOURS TO DETERMINE SAND CONTENT AND VISCOSITY WHILE MONITORING SOLIDS CONTENT AND ENSURE THE PERFORMANCE OF THE DRILLING FLUID. THE RESULTS OF THE TESTING ARE TO BE REPORTED TO THE MTO REPRESENTATIVE IMMEDIATELY IF AN ISSUE IS FOUND. IF NO ISSUES ARE FOUND THEN THE DATA IS TO BE SENT TO THE MTO AND ALECTRA AT THE END OF EACH WORK DAY.
- THE TUNNEL SHALL BE SUPPORTED WITH DRILLING SLURRY/FLUID DURING CONSTRUCTION, UNTIL THE PIPE CASING CAN BE INSTALLED. UPON PIPE INSTALLATION, THE ANNULAR SPACE SHALL BE FILLED WITH DRILLING SLURRY/FLUID DESIGNED BY THE CONTRACTOR. NOTE THAT IN THE EVENT OF A BORE BEING ABANDONED A MIXTURE OF BENTONITE AND CEMENT IS TO BE USED FOR BACKFILLING OF THE TUNNEL.
- THE PROPOSED DESIGN DRILL PLAN IS PROVIDED AS GUIDANCE ONLY. IT IS REQUIRED THAT THE DRILL CONTRACTOR SUBMIT A DETAILED HDD DRILL PLAN TO ALECTRA AND THE MTO FOR REVIEW AND APPROVAL PRIOR TO THE COMMENCEMENT OF DRILLING.
- AFTER DUCT BANK INSTALLATION IS COMPLETE, FILL THE CASING PIPE WITH CELLULAR GROUT, DESIGNED BY THE CONTRACTOR. TERMINATE THE CASING PIPE AT BOTH ENDS BY SEALING WITH STRUCTURAL GROUT/RUBBER GASKET.
- THE SIZE & TYPE OF THE DRILL EQUIPMENT AND DRILL FLUID ADDITIVES MUST BE CAREFULLY SELECTED BY THE CONTRACTOR TO ENSURE THE REMOVAL OF CUTTINGS FROM THE BORE AND TO MAINTAIN BORE AND PIPE SUPPORT DURING AND AFTER PIPE INSTALLATION. THE PROPOSED DRILL EQUIPMENT SIZE, TYPE AND DRILL FLUID MIXTURE IS REQUIRED TO BE INCLUDED IN THE DRILL PLAN.
- PRIOR TO DURING DAYLIGHTING THE CONTRACTOR IS TO COMPLETE/FOLLOW THE FOLLOWING:
  - ALL UTILITY LOCATIONS SHOULD BE VERIFIED USING DAYLIGHTING TECHNIQUES PRIOR TO THE COMMENCEMENT OF DRILLING. IN ADDITION, IT IS REQUIRED THAT THE DRILLING CONTRACTOR PERFORMS A SITE AND SUBSURFACE SURVEY PRIOR TO DRILLING TO CONFIRM THAT NO UNKNOWN OR UNMARKED UTILITIES ARE PRESENT. ESTABLISH A PATH FOR THE CASING INSTALLATION THAT WILL MEET MINIMUM CLEARANCES REQUIRED BY ADJACENT UTILITIES WHILE FOLLOWING THE PLANS.
  - DAYLIGHTING ACTIVITY WITHIN THE MTO ROW SHALL BE BACKFILLED WITH HIGH-PERFORMANCE BEDDING 300mm ABOVE THE UTILITY AS A COVER FOR CABLES AND CAN BACKFILL THE REMAINING DEPTH WITH U-FILL (0.4MPA MINIMUM). DAYLIGHTING WITHIN THE MTO ROW IS NOT PERMITTED WITHOUT AN APPROVED MTO WORK PERMIT.
- PROVIDE HORIZONTAL AND VERTICAL ALIGNMENT DATA, IN LATITUDE AND LONGITUDE COORDINATES AND ELEVATION IN METERS, PERTAINING TO THE ENDS OF THE HDD INSTALLATION, INCLUDING BUT NOT LIMITED TO THE BEGINNING AND END POINTS AND ALL INTERMEDIATE BOXES.
- WELDING OF THE PIPE SECTIONS IS TO COMPLY WITH THE FOLLOWING:
  - CONNECT EACH SECTION OF THE CASING USING FUSION BUTT WELDING AROUND THE ENTIRE CIRCUMFERENCE OF THE JOINT. THE QUALITY OF THE WELD WILL CONFORM TO CSA B137.1, AND WILL DEVELOP THE FULL STRENGTH OF THE CASING WALL. ENSURE PROPER WELDING PROCEDURES/CHECKS ARE FOLLOWED AND ONLY CERTIFIED WELDERS CAN BE USED.
  - WELDING NEEDS TO BE INSPECTED BY A CERTIFIED 3RD PARTY INSPECTOR WITH CWB LEVEL 2 QUALIFICATION.
  - THE 3RD PARTY WELDING CAN BE PART OF THE CONTRACTOR'S TEAM; HOWEVER, IT CANNOT BE THE SAME PERSON CARRYING OUT THE WELDING AND IS NOT TO BE REPORTING TO THE PROJECT MANAGER ON SITE. THEY SHOULD BE REPORTING TO QA/QC MANAGER IN THE COMPANY;
  - THE WELDING REPORT SUBMITTED BY THE WELDING INSPECTOR SHALL BE SUBMITTED TO THE CONTRACTOR, THE MTO, ALECTRA, AND NBM ENGINEERING AND SHALL INCLUDE, BUT IS NOT LIMITED TO, THE FOLLOWING:
    - CONFIRMATION OF PIPE MATERIAL
    - WELDER QUALIFICATION AND NAME
    - PIPELINE PREPARATION FOR WELDING
    - CONFIRM WELDED JOINT IS ACCEPTABLE
    - NUMBER OF WELDS AND LENGTH OF THE SLEEVES (INCLUDING A COPY OF THE REFERENCE DRAWING)
    - PROVIDE ACCEPTANCE OF THE ABOVE
- THE CONTRACTOR IS TO COMPLETE THE FOLLOWING INSTALLATION REQUIREMENTS:
  - INSTALL THE PIPE(S) CASING SPECIFIED IN THE CONTRACT DOCUMENTS TO THE ALIGNMENT AND PROFILE SHOWN ON THE PLANS.
  - CONTINUOUSLY MONITOR THE LOCATION AND ALIGNMENT OF THE PILOT BORE PROGRESS TO ENSURE COMPLIANCE WITH THE PROPOSED INSTALLATION ALIGNMENT AND TO VERIFY DEPTH OF THE BORE.
  - THE CONTRACTOR IS TO PROVIDE THE MAKE AND MODEL OF THE EQUIPMENT USED TO DETERMINE THE BORE HEAD LOCATION AND DEPTH TO ALECTRA AND NBM ENGINEERING. THE CONTRACTOR IS ALSO TO PROVIDE THE EXPECTED LEVEL OF ACCURACY FOR THE READINGS TAKEN FOR THIS EQUIPMENT.
    - PROVIDE AS-BUILT DRAWINGS AND AN ACCURATE LOG OF THE UTILITY BORING UPON COMPLETION OF THE BORE TO THE MTO, ALECTRA, AND NBM ENGINEERING.
  - MONITOR WORKSITE FOR INDICATIONS OF DISPLACEMENT OF THE MTO HIGHWAY.
  - CONTAIN EXCESS BORING FLUIDS AT THE ENTRY AND EXIT POINTS UNTIL RECYCLED OR REMOVED FROM THE SITE.
  - LEAVE NO EXTERIOR VOIDS BETWEEN THE OUTSIDE OF THE CASING PIPE AND THE EXCAVATION.
  - IF THE CONTRACTOR ENCOUNTERS DIFFICULTIES IN PROCEEDING WITH THE PROPOSED TRENCHLESS METHOD AS PER THE GEOTECHNICAL RECOMMENDATION AND REQUIRE TO SWITCH OR CHANGE THE METHOD, THE CONTRACTOR SHALL SUBMIT A REQUEST TO THE MTO, ALECTRA, AND NBM ENGINEERING WITH A JUSTIFICATION LETTER SIGNED AND STAMPED BY A GEOTECHNICAL ENGINEER LICENSED IN THE PROVINCE OF ONTARIO ALONG WITH SUPPORTING DOCUMENTS.
  - IF THE CONTRACTOR ENCOUNTERS VARYING GROUND CONDITIONS, THE CONTRACTOR SHALL NOTIFY THE MTO, ALECTRA, AND NBM ENGINEERING IMMEDIATELY AND REQUEST A SITE MEETING TO DISCUSS WITH THE MTO TECHNICAL ADVISOR, THE CONTRACTOR'S GEOTECHNICAL ENGINEER, AND REPRESENTATIVES FROM ALECTRA AND NBM ENGINEERING. FURTHER TO THE SITE MEETING, THE CONTRACTOR SHALL PROPOSE THE NEXT STEPS TO THE MTO, ALECTRA, AND NBM ENGINEERING FOR REVIEW AND CONSIDERATION.
  - FILL ALL VOIDS WITH A DRILLING SLURRY/FLUID MATERIAL. IF THE VOIDS EXCEED 25MM FROM THE PROPOSED BORE DIAMETER, THEN THE ADDITIONAL VOID SPACE IS TO BE FILLED AT NO ADDITIONAL COST TO ALECTRA.
  - FILL THE VOID IMMEDIATELY WITH FLOWABLE FILL, CONSISTING OF BENTONITE AND CEMENT, IF AN OBSTRUCTION IS HIT DURING CONSTRUCTION AND THE BORE PATH IS TO BE ABANDONED.
  - DO NOT ALLOW THE USE OF WATER UNDER PRESSURE (JETTING) OR PUDDLING TO FACILITATE BORING OPERATIONS.
- DESIGN DATA:
  - HDPE PIPE CASING SHALL HAVE A MINIMUM YIELD STRENGTH OF 3,200 PSI (22 MPA).
  - HDPE CASING PIPE SHALL MEET ASTM D3035/D1313 S OR APPROVED EQUAL.
  - HDPE PIPE JOINT IS FUSION WELDED. UNLESS OTHERWISE SPECIFIED, THE MINIMUM WALL THICKNESS OF THE 42 INCH (1067 mm) HDPE CASING PIPE SHALL BE 3.111 INCH (79 mm).



**LEGEND:**

Revisions				
No.	Revision	Date	By	Checked By
E	RE-ISSUED FOR MTO	10/24/24	M.Day	A.Michial
D	ISSUED FOR MTO	07/29/24	M.Day	A.Michial
C	RE-ISSUED FOR GEOTECH	06/24/24	M.Day	A.Michial

DRAWING NAME	DRAWING NUMBER - SHEET NUMBER
TITLE PAGE/KEY MAP	101
HDD PLAN AND PROFILE	401
HDD DRILLING CHART A	402
HDD GENERAL & CONSTRUCTION NOTES	403
SETTLEMENT MONITORING PLAN	404

**PLAN CERTIFICATE OF APPROVAL**  
 This plan has been assembled by utilizing certified construction standards, certified specifications, approved equipment and it meets the safety requirements of Section 4 of Ontario Regulation 22/04.

ADIEL MICHAL, 10/24/2024  
 Name Date  
 Signature of P.Eng. Licensed in the Province of Ontario

**FINAL CIVIL CONSTRUCTION CERTIFICATE**  
 The construction as recorded in this drawing is consistent with the approved plan, certified construction standards and/or work instruction and that approved equipment has been used.

Name Date  
 Signature Position

**LINES CONSTRUCTION CERTIFICATE**  
 The construction as recorded in this drawing is consistent with the approved plan, certified construction standards and/or work instruction and that approved equipment has been used.

FINAL ENERGIZATION (Applies to Complete Drawing)

Name Date  
 Signature Position

CALL LOCATES BEFORE DIGGING  
 ONTARIO ONE CALL LTD  
 1-800-400-2255

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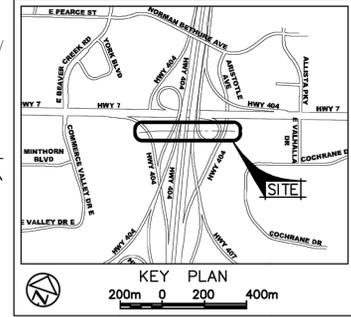


DRAWING SHOWING:  
**Project Rainbow Site 2 - Hwy 7 from E. Valhalla Dr to Commerce Valley Dr E**  
**MTO Crossing**  
**HDD General & Construction Notes**

WORK ORDER No.'s: CAPITAL: xxxxxx MUNICIPALITY: CITY OF MARKHAM  
 CR: xxxxxx SCALE: AS SHOWN  
 DESIGNED BY: A.MICHIAL ALECTRA TECH: xxxxxx DRAWING NO. xxxxxx  
 DRAWN BY: M.DAY DESIGN DATE: 09/15/2023 SHEET NO. 403



Highway 404  
PROJECT RAINBOW SITE 2  
MONITORING & INSTRUMENTATION PLAN



LEGEND

- Borehole
- Surface Monitoring Point
- In-ground Monitoring Point

No	ELEVATION	MTM_ZONE 10 NORTH	COORDINATES EAST
BH01	188.4	4 856 195.3	315 004.4
BH02	188.9	4 856 223.7	315 056.6
BH03	194.7	4 856 237.7	315 127.6
BH04	194.3	4 856 269.8	315 187.2
BH05	193.5	4 856 275.8	315 241.9
BH06	190.4	4 856 296.9	315 285.2
BH07	189.5	4 856 309.9	315 333.9
BH08	191.1	4 856 335.0	315 401.3

NOTES

The proposed structure detail/works if shown are for illustration purposes only and may not be consistent with final design configuration as shown elsewhere in the contract document

REVISIONS	DATE	BY	DESCRIPTION

GEORES No 30M14-660

HWY No 404	SUBM'D GZ	CHECKED	DATE 2024-06-27	DIST	CENTRAL	SITE

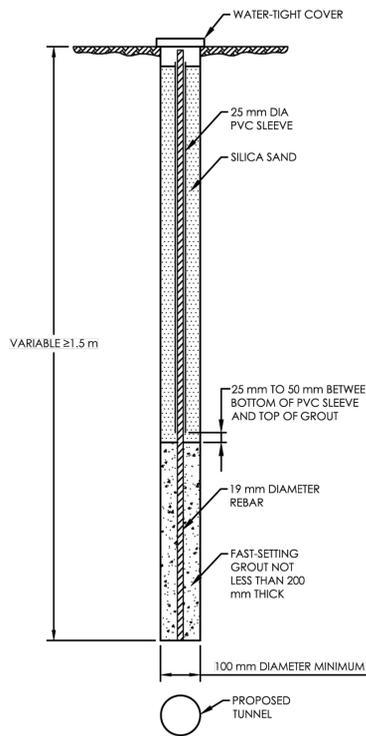
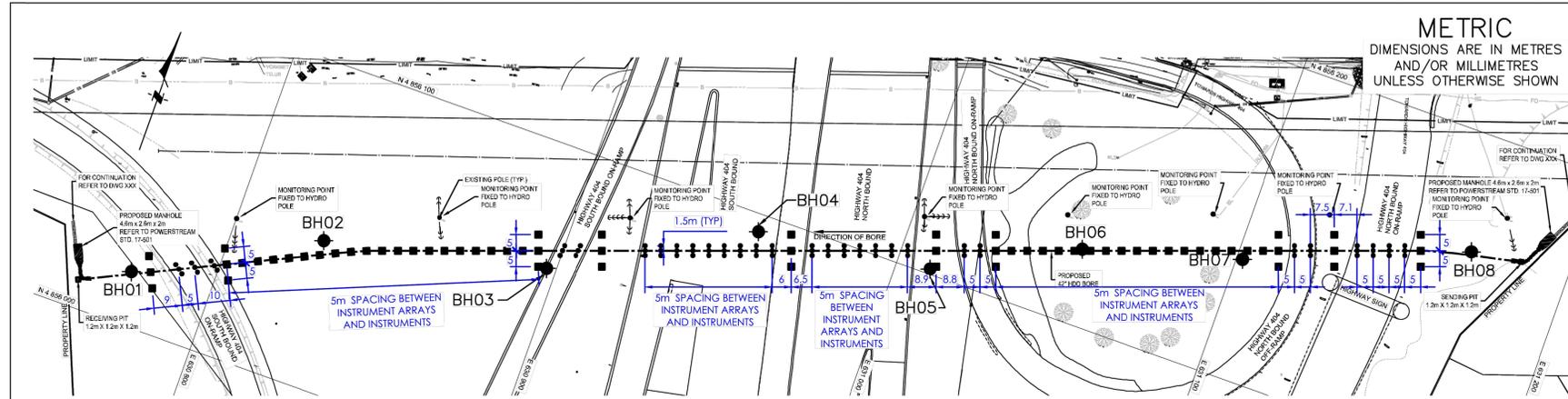
Power Stream | alectra utilities | ALECTRA UTILITIES VAUGHAN OFFICE: 161 Clive Ave. | BARRIE OFFICE: 55 Patterson Rd. | Vaughan, ON | Barrie, ON | TEL: (905) 417-6900 | TEL: (705) 722-7229

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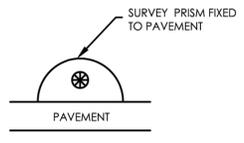


DRAWING SHOWING:  
Project Rainbow Site 2 - Hwy 7 from E. Valhalla Dr to Commerce Valley Dr E  
MTO Crossing  
Settlement Monitoring Plan

WORK ORDER No. 3	CAPITAL: xxxxxx	MUNICIPALITY: CITY OF MARKHAM
DESIGNED BY: A.MICHIAL	CR: xxxxxx	SCALE: AS SHOWN
DRAWN BY: M.DAY	ALECTRA TECH: xxxxxx	DRAWING NO. xxxxxx
	DESIGN DATE: 09/15/2023	SHEET NO. 404



DEEP (IN-GROUND) MONITORING POINT  
NOT TO SCALE



SURFACE MONITORING POINT  
NOT TO SCALE

- GENERAL NOTES
- BASE PLAN PROVIDED BY ALECTRA UTILITIES. FILENAME: NBM-H23-0163-AUC - Project Rainbow Site 2 - MTO Crossing Rev 8.08-For Geotech.DWG, SHEET 401, ISSUED FOR GEOTECH 05/29/2024.
  - ALL DIMENSIONS IN METERS UNLESS OTHERWISE SPECIFIED.
  - THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH STANTEC FOUNDATION INVESTIGATION AND DESIGN REPORT - ALECTRA UTILITIES INSTALLATION BELOW HIGHWAY 404 AND HIGHWAY 7 INTERCHANGE, NBM-H23-0163-AUC PROJECT RAINBOW SITE 2, MARKHAM, ONTARIO, DATED JUNE 2024.
  - ALL MONITORING LOCATIONS SHOULD BE CONSIDERED APPROXIMATE AND MUST BE CONFIRMED BY THE CONTRACTOR IN CONSULTATION WITH THE CONTRACT ADMINISTRATOR, GEOTECHNICAL ENGINEER, MTO, PRIOR TO INSTALLATION/CONSTRUCTION AND MAY HAVE TO BE ADJUSTED IN THE FIELD TO SUIT LOCAL CONDITIONS/CONSTRAINTS.
  - THE CONSULTANT SHALL RETAIN A SURVEYOR REGISTERED IN ONTARIO AND MTO RAGS FOR ESTABLISHING AND SURVEYING THE MONITORING POINTS FOR THE DURATION OF CONSTRUCTION.
  - ALL MONITORING INSTRUMENTS SHALL BE INSTALLED AT LEAST 14 DAYS PRIOR TO ANY EXCAVATION OR TUNNELING TAKING PLACE.
  - SHALLOW IN-GROUND MONITORING POINTS SHALL BE FOUNDED AT DEPTH 1.5 m BELOW EXISTING GRADE. TIP ELEVATION OF IN-GROUND MONITOR POINT SHALL BE ADJUSTED BASE ON HDD CONTRACTORS DRILL FLUID PRESSURE TO MITIGATE THE POSSIBILITY OF TRAC OUT. PAVEMENT MONITORING POINTS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
  - THE CONTRACTOR SHALL ESTABLISH TWO TEMPORARY BENCHMARKS OUTSIDE THE AREA OF CONSTRUCTION. THE CONTRACTOR SHALL SUBMIT THE PROPOSED BENCHMARK LOCATIONS TO THE CONTRACT ADMINISTRATOR FOR APPROVAL. PRIOR TO CONSTRUCTION ALL MONITORING POINTS SHALL BE SURVEYED FOR ELEVATION AND LOCATION TO A TOLERANCE OF NOT MORE THAN ±2 mm IN THE VERTICAL AND HORIZONTAL DIRECTION.
  - THE SPECIFIED SETTLEMENT REVIEW LEVEL BELOW HWY 404 IS 10 mm AND THE SPECIFIED SETTLEMENT ALERT LEVEL IS 15 mm RELATIVE TO THE BASELINE READING. THE REQUIRED ACTIONS TO BE TAKEN IF THE REVIEW AND ALERT LEVELS ARE REACHED OR EXCEEDED ARE SPECIFIED IN THE STANTEC REPORT.
  - THE FREQUENCY AT WHICH THE CONTRACTOR IS REQUIRED TO SURVEY THE MONITORING POINTS ARE SPECIFIED IN THE STANTEC REPORT.
  - WITHIN 24 HOURS OF COMPLETION OF ANY MEASUREMENT A COPY OF THE RESULTS SHALL BE MADE AVAILABLE TO THE CONTRACT ADMINISTRATOR, GEOTECHNICAL ENGINEER AND MTO.
  - THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR TRAFFIC CONTROL IN ACCORDANCE WITH ONTARIO TRAFFIC MANUAL BOOK 7.
  - REMOVE ALL MONITORING POINTS ON COMPLETION OF SURVEY, SUBJECT TO APPROVAL FROM THE CONTRACT ADMINISTRATOR, GEOTECHNICAL ENGINEER AND MTO.

- DESIGN NOTES:
- THE PROVIDED SETTLEMENT MONITORING DESIGN WAS PROVIDED IN STANTEC GEOTECHNICAL REPORT NO. 121625347, DATED JUNE 28, 2024.
  - PRIOR TO CONSTRUCTION THE FINAL LOCATION OF THE SETTLEMENT MONITORING POINTS, AND THE MONITORING PLAN, WILL BE DISCUSSED WITH THE MTO, ALECTRA, NBM, THE GENERAL CONTRACTOR, AND THE SETTLEMENT MONITORING SUB-CONTRACTOR.

Revisions

No.	Revision	Date	By	Checked By
B	RE-ISSUED FOR MTO	10/24/24	M.Day	A.Michial
A	ISSUED FOR MTO	07/29/24	M.Day	A.Michial

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<p>PLAN CERTIFICATE OF APPROVAL</p> <p>This plan has been assembled by utilizing certified construction standards, certified specifications, approved equipment and it meets the safety requirements of Section 4 of Ontario Regulation 22/04.</p> <p>ADEL MICHIAL 10/24/2024 Name Date Signature P. ENG Signature of P. Eng. Licensed in the Province of Ontario</p>	<p>FINAL CIVIL CONSTRUCTION CERTIFICATE</p> <p>The construction as recorded in this drawing is consistent with the approved plan, certified construction standards and/or work instruction and that approved equipment has been used.</p> <p>Name Date Signature Position</p>	<p>LINES CONSTRUCTION CERTIFICATE</p> <p>The construction as recorded in this drawing is consistent with the approved plan, certified construction standards and/or work instruction and that approved equipment has been used.</p> <p>FINAL ENERGIZATION (Applies to Complete Drawing)</p> <p>Name Date Signature Position</p>
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