

Appendix B – Niagara Region Standard Detailed Drawings

Updated: April 22, 2026

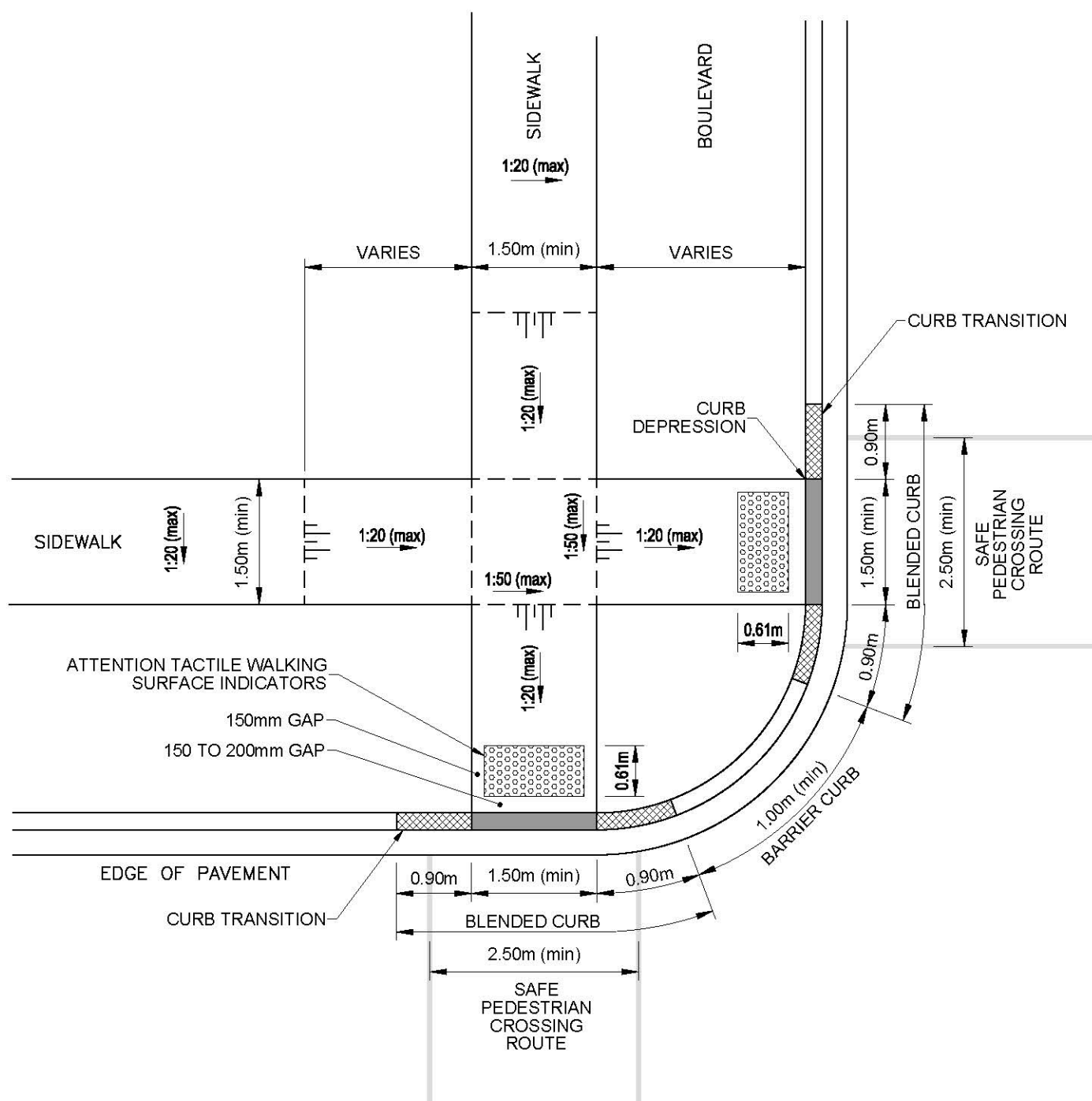
List of Drawings

Drawing Number	Detail	Revision Date
ROADS		
NRS 3001	Tactile Surface Indicators – Blended Curbs Used at 4-Way Intersection with Standard Sidewalk	Apr 2014
NRS 3002	Tactile Surface Indicators – Wraparound Blended Curb with Curb Face Sidewalk	Apr 2014
NRS 3002.5	Tactile Surface Indicators – Curb with Curb Face Sidewalk and Cross Walk at Intersection with Side Street Stop Control	Apr 2014
NRS 3003	Tactile Surface Indicators – Blended Curbs that are Aligned on the Same Axis	Apr 2014
NRS 3004	Tactile Surface Indicators – Blended Curbs to Facilitate Access to an Island	Apr 2014
NRS 3005	Tactile Surface Indicators – Walkway Through an Island that is at Level Road Surface	Apr 2014
NRS 3006	Tactile Surface Indicators – Blended Curbs Used at 4-way Intersection with Standard Sidewalk and Larger Curb Radius	Feb 2015
NRS 3007	Tactile Surface Indicators – Blended Curbs Used at 4-way Intersection with Sidewalk Apron and Larger Curb Radius	Mar 2018
NRS 4001	Guiderail Installation Standards for Roadside Hazards within Clear Zone	Nov 2024
NRS 400	Asphalt Apron for Maintenance Holes in Shoulders	Nov 2017
NRS 501	Bus Bays - Draft	Aug 2017
NRS 600	Rural, Industrial and Commercial Driveway on Existing Road	Jan 2022
NRS 700	Permanent Road Reinstatement Requirements	Nov 2025
NRS 701	Temporary Road Reinstatement Requirements	Nov 2025

Drawing Number	Detail	Revision Date
NRS 702	Typical Trench Reinstatement for Grass Boulevards	Nov 2025
NRS 703	Concrete Pavement Restoration Close to Monolithic Curb	Nov 2025
NRS 704	Concrete Pavement Restoration Close to Monolithic Curb	Nov 2025
NRS 705	Typical Cross Section Ditch Regrade	Nov 2025
NRS 706	Telspar Installation in Soft Surfaces (Direct)	Nov 2025
NRS 707	Telspar Installation in Concrete	Nov 2025
ROADS RESURFACING		
HM-100	Shoulder Construction	Mar 2020
HM-200	Shoulder Construction Strip Vegetation Full Depth	Mar 2020
HM-300	Shoulder Construction Strip Vegetation	Mar 2020
HM-400	Road Widening	Mar 2020
HM-500	Paved Shoulder with Resurface	Mar 2020
HM-600	Paved Shoulder With Rehabilitation	Mar 2020
HM-700	Strip Vegetation at Guiderail	Mar 2020
HM-800	Resurfacing Program Typical Cross Section	Mar 2020
HM-900	Typical Cross Section Reprocessed Pavement	Mar 2020
HM-1000	Road Cross Section – RAP Shoulder	Mar 2020
HM-2001	Type 'A' Patch Repair	Feb 2021
HM-3001	Geotextile Cross Section	Feb 2021
HM-3100	Erosion Control at Box Culverts	Feb 2021
ELECTRICAL		
NRS 0000	Direct Buried Sectional Steel Pole	Nov 2021
NRS 2001	Pole Anchorage Assembly	Dec 2021
NRS 2002	Concrete Foundation for Traffic Poles	Dec 2021

Drawing Number	Detail	Revision Date
NRS 2003-M	Type P44 Controller Cabinet Foundation	Jan 2016
NRS 2020	Junction Box and Duct Application	Jan 2021
NRS 2130	Supply Control Cabinet Installation (Direct Buried Pole)	Jun 2011
NRS 2131	Supply Control Cabinet Installation (Base Mounted Pole)	Jun 2011
NRS 2440	Supply Control Cabinet Assembly Type 1	Oct 2022
NRS 2441	Supply Control Cabinet Assembly Type 3S	Jan 2016
NRS 2520	Loop Detector Installation Details	Feb 2011
NRS 2521	Loop Detector Installation Details 2	Feb 2011
NRS 2522	Decorative Accessories on Roadway Lighting Pole	Feb 2016
NRS 2600	PXO Crossing – Level 2 Type B Sign Layout and Dimensional Detail	Oct 2022
NRS 2610	PXO Crossing – Level 2 Type C Sign Layout and Dimension Detail	Oct 2022
NRS 2620	PXO Crossing – Level 2 Type D Sign Layout and Dimension Detail	Oct 2022
NRS 2710	Signal Cable Colour Identification	Feb 2014
NRS 2800	PVC Conduit Installation Concrete Pole	Apr 2015
NRS 2810	PVC Conduit Installation Wood Pole	Apr 2015
NRS 2820	Duct Termination Concrete Pole	Apr 2015
	Road Cut Open Trench or Patch Reinstatement	
	Roadway Lighting Example	
Detail A	Typical Wiring Detail	Feb 2023
Detail B	Typical Duct and Handwell Layout	Feb 2023

ROADS



BLENDED CURBS USED AT 4-WAY INTERSECTION WITH STANDARD SIDEWALK

ATTENTION TACTILE WALKING
SURFACE INDICATORS

DATE: **APRIL 17 2014**

SCALE: **NTS**

APPROVED BY: **FT**

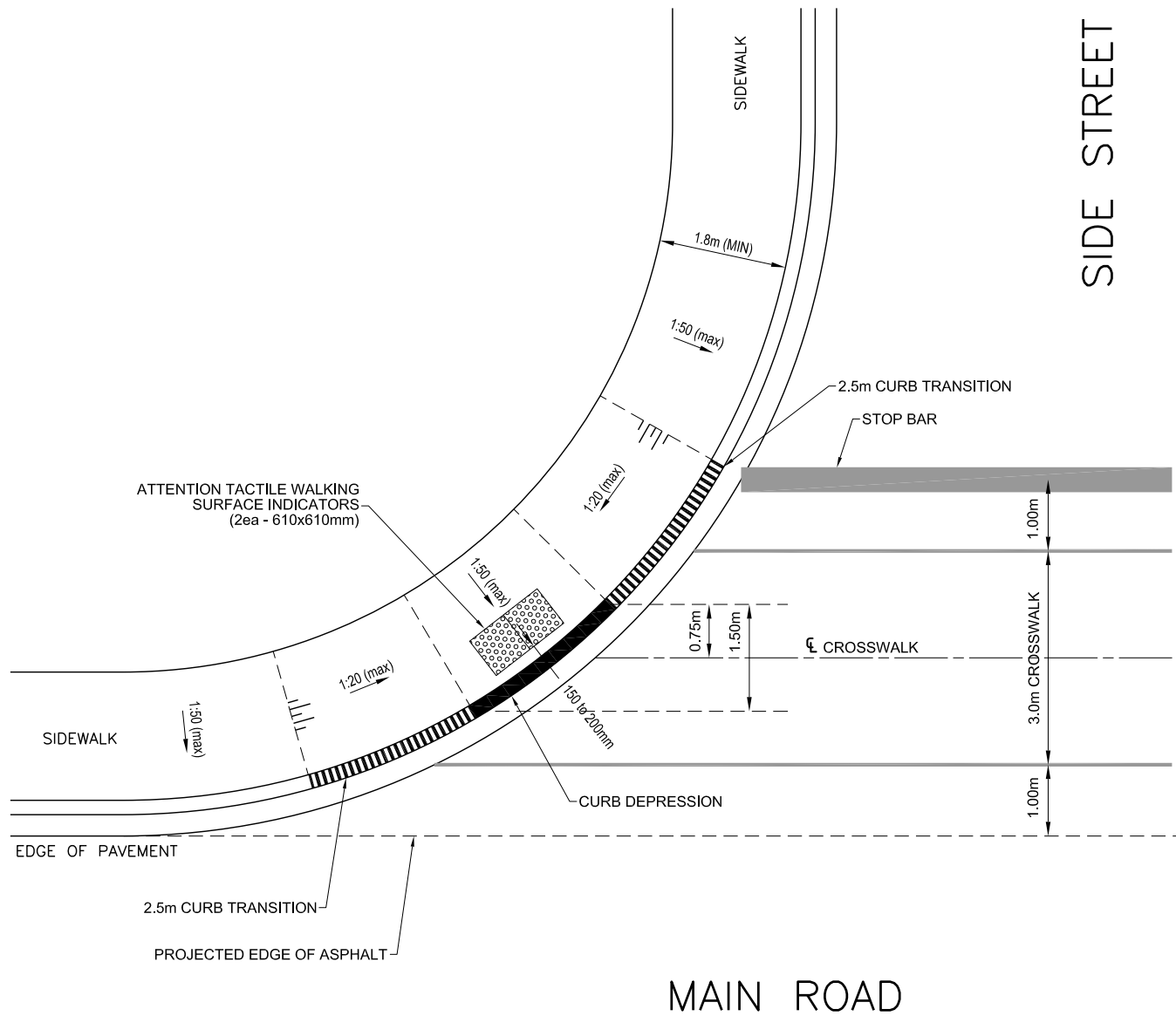
DRAWN BY: **MTK**

**NIAGARA PENINSULA STANDARD
CONTRACT DOCUMENTS**

NRS 3001



NRS 3002



CURB FACED SIDEWALK AND CROSS WALK AT INTERSECTION WITH SIDE STREET STOP CONTROL

ATTENTION TACTILE WALKING SURFACE INDICATORS

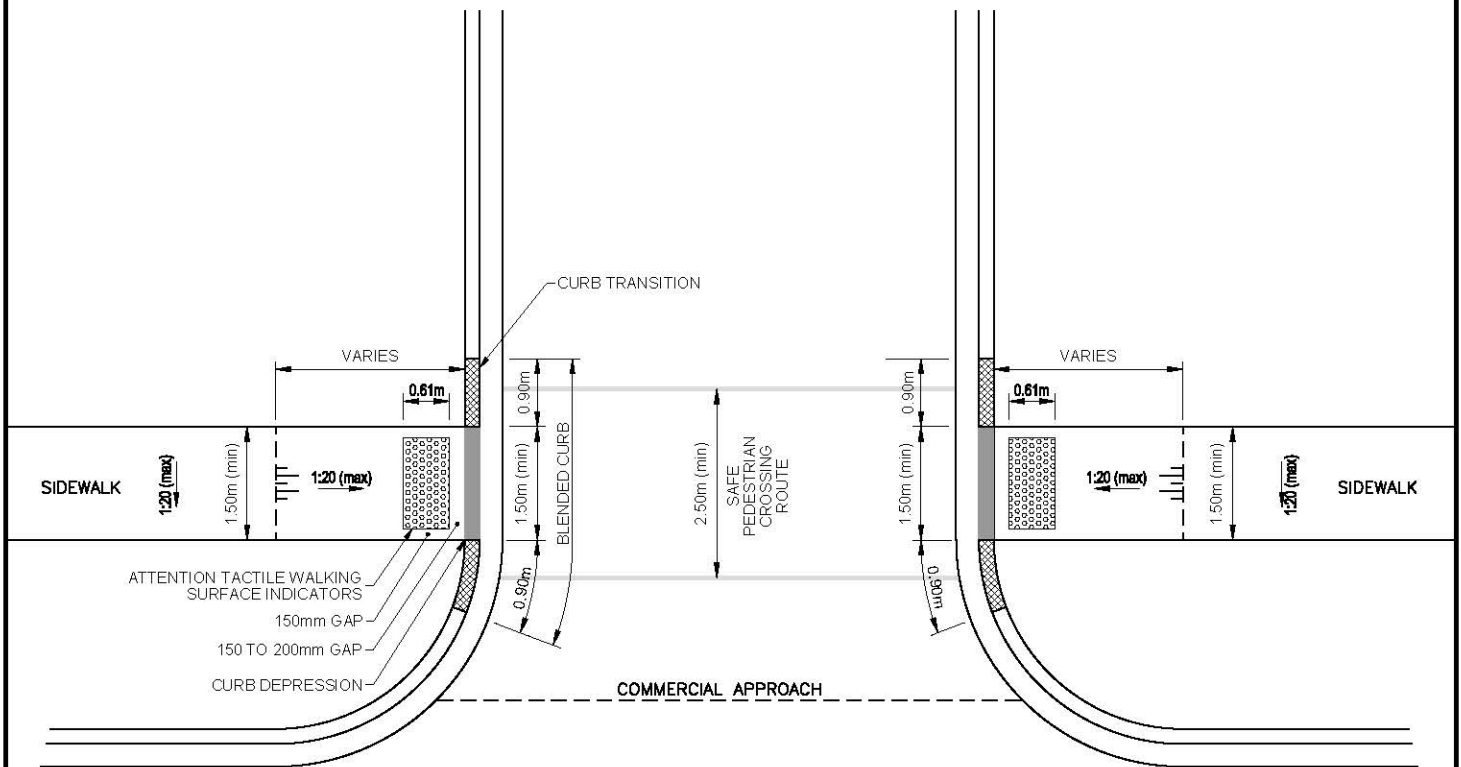
DATE: MAR 06 2018

SCALE: NTS

APPROVED BY: FT

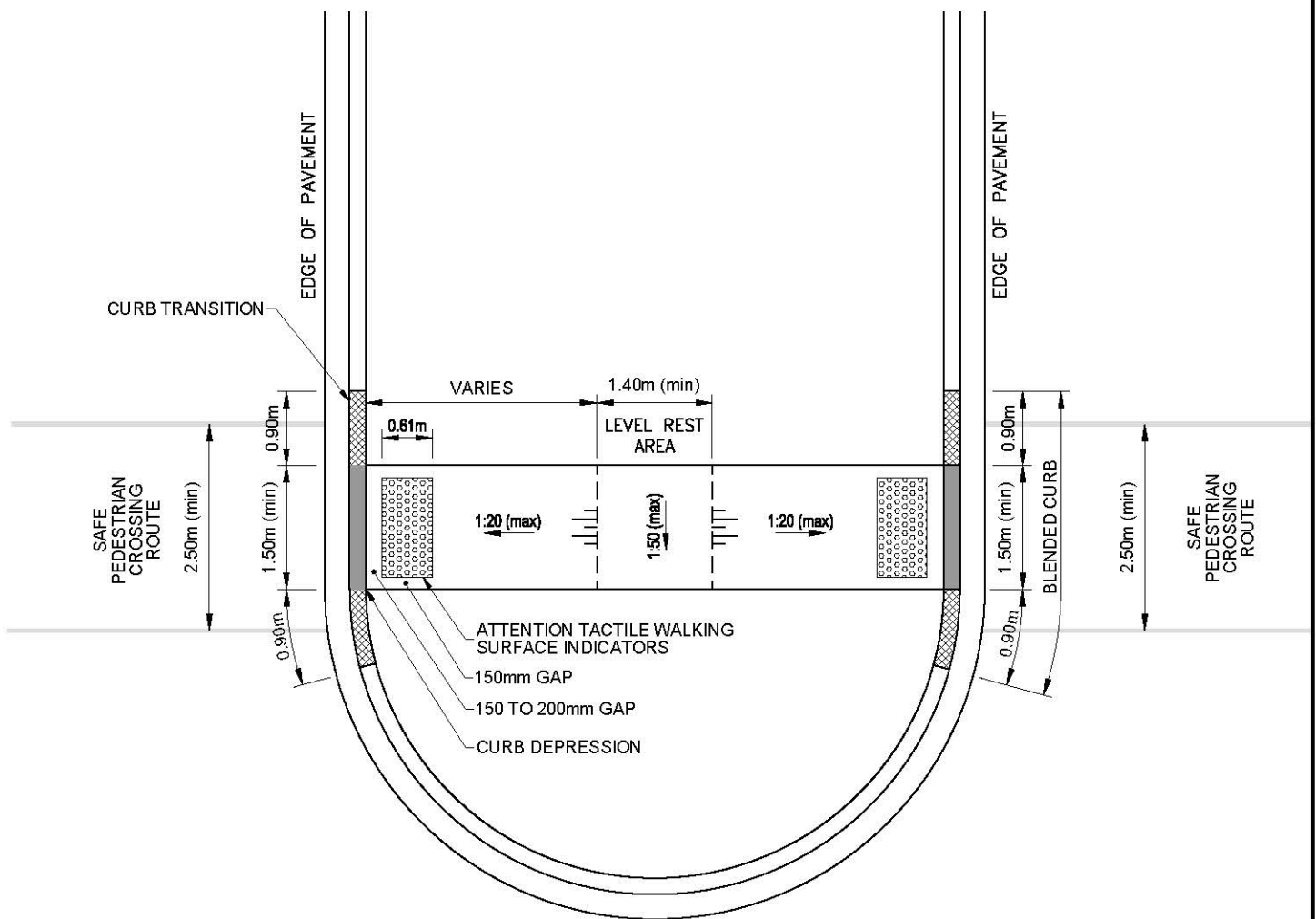
DRAWN BY: MTK

NRS 3002.5



**BLENDED CURBS THAT ARE
ALIGNED ON THE SAME AXIS**

ATTENTION TACTILE WALKING SURFACE INDICATORS		NIAGARA PENINSULA STANDARD CONTRACT DOCUMENTS	
DATE: APRIL 17 2014	SCALE: NTS		
APPROVED BY: FT	DRAWN BY: MTK	NRS 3003	



BLENDED CURBS TO FACILITATE ACCESS TO AN ISLAND

ATTENTION TACTILE WALKING
SURFACE INDICATORS

DATE: **APRIL 17 2014**

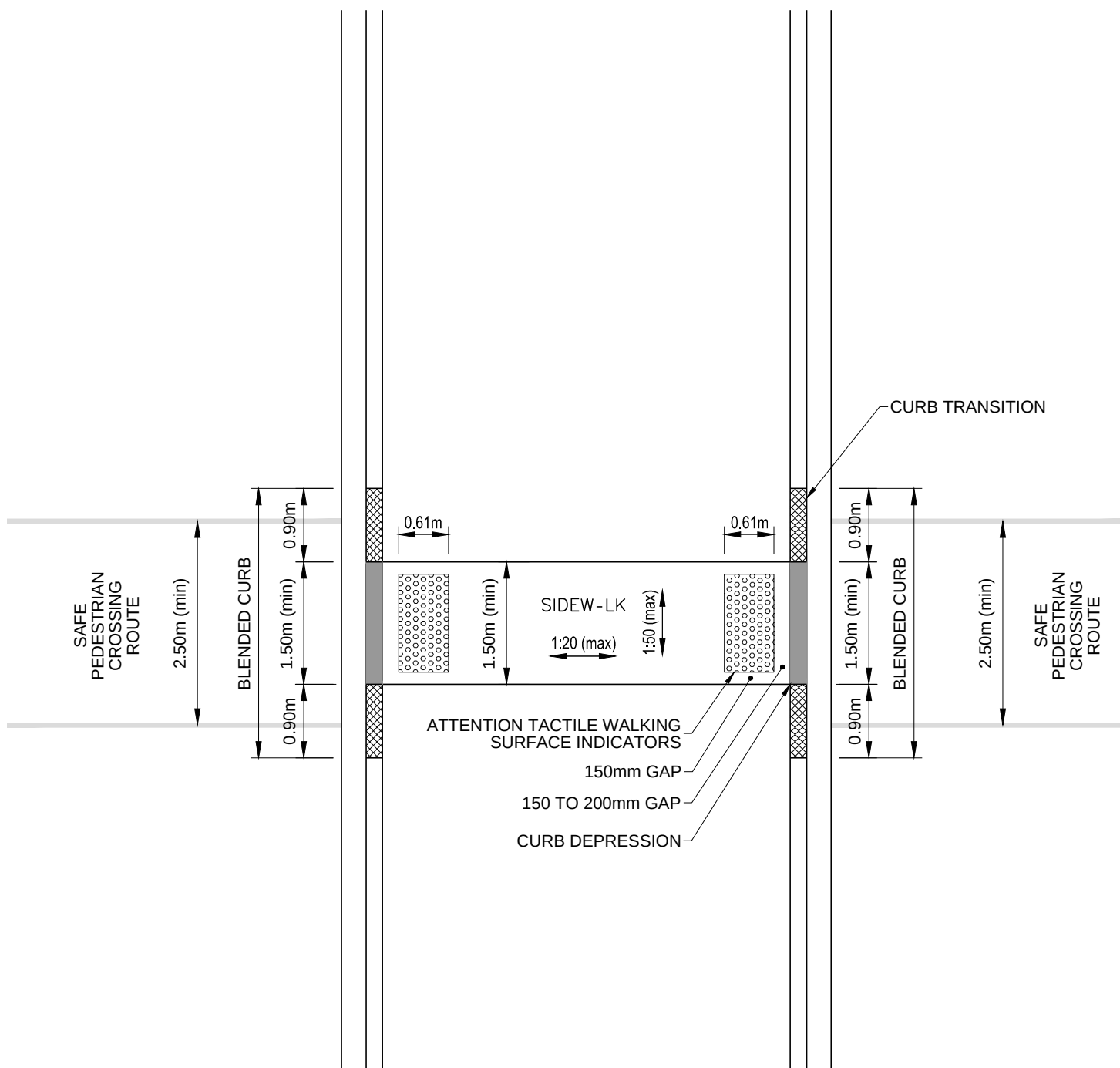
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APPROVED BY: **FT**

DRAWN BY: **MTK**

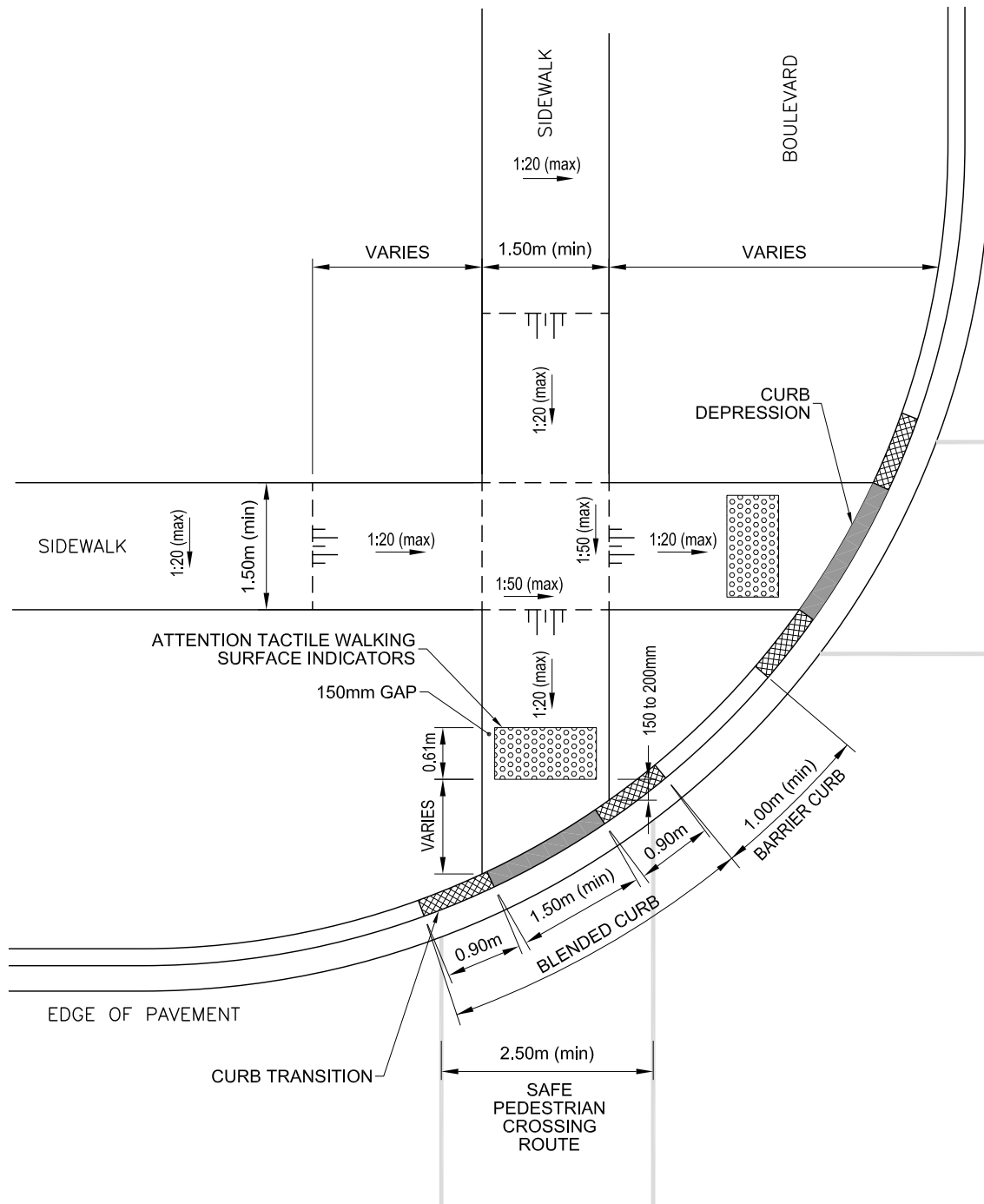
**NIAGARA PENINSULA STANDARD
CONTRACT DOCUMENTS**

NRS 3004



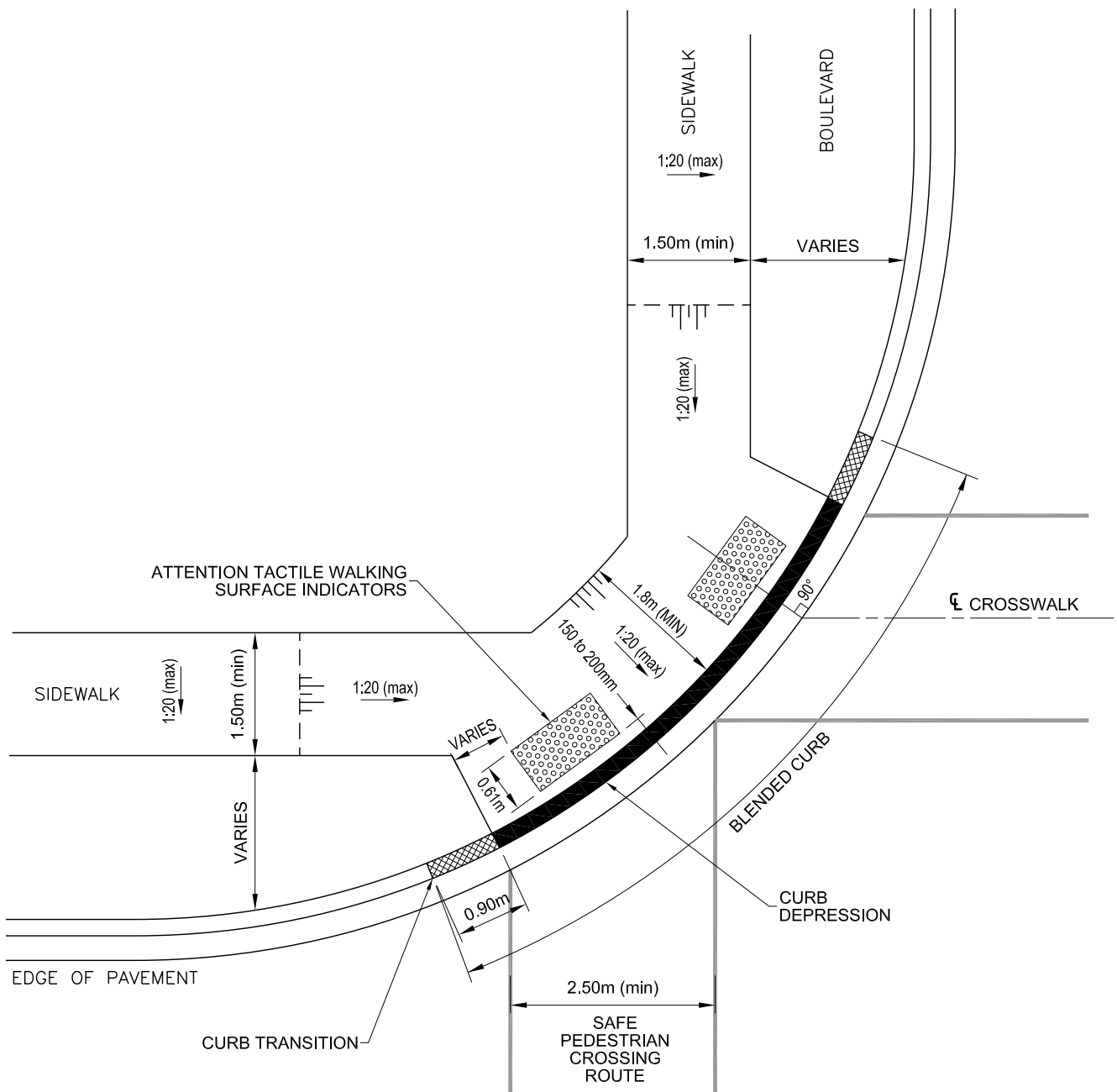
WALKWAY THROUGH AN ISLAND THAT IS LEVEL WITH ROAD SURFACE

ATTENTION TACTILE WALKING SURFACE INDICATORS		NIAGARA PENINSULA STANDARD CONTRACT DOCUMENTS	
DATE: APRIL 17 2014	SCALE: NTS		
APPROVED BY: FT	DRAWN BY: MTK		NRS 3005



**BLENDED CURBS USED AT 4-WAY
INTERSECTION WITH STANDARD SIDEWALK
AND LARGER CURB RADIUS**

ATTENTION TACTILE WALKING SURFACE INDICATORS		NIAGARA PENINSULA STANDARD CONTRACT DOCUMENTS	
DATE: FEB 19 2015	SCALE: NTS		
APPROVED BY: FT	DRAWN BY: MTK		NRS 3006



**BLENDED CURBS USED AT 4-WAY
INTERSECTION WITH SIDEWALK APRON
AND LARGER CURB RADIUS**

ATTENTION TACTILE WALKING SURFACE INDICATORS		NIAGARA PENINSULA STANDARD CONTRACT DOCUMENTS	
DATE: MAR 06 2018	SCALE: NTS		
APPROVED BY: FT	DRAWN BY: MTK		NRS 3007

SEE NOTE 6 FOR
URBAN APPLICATIONS

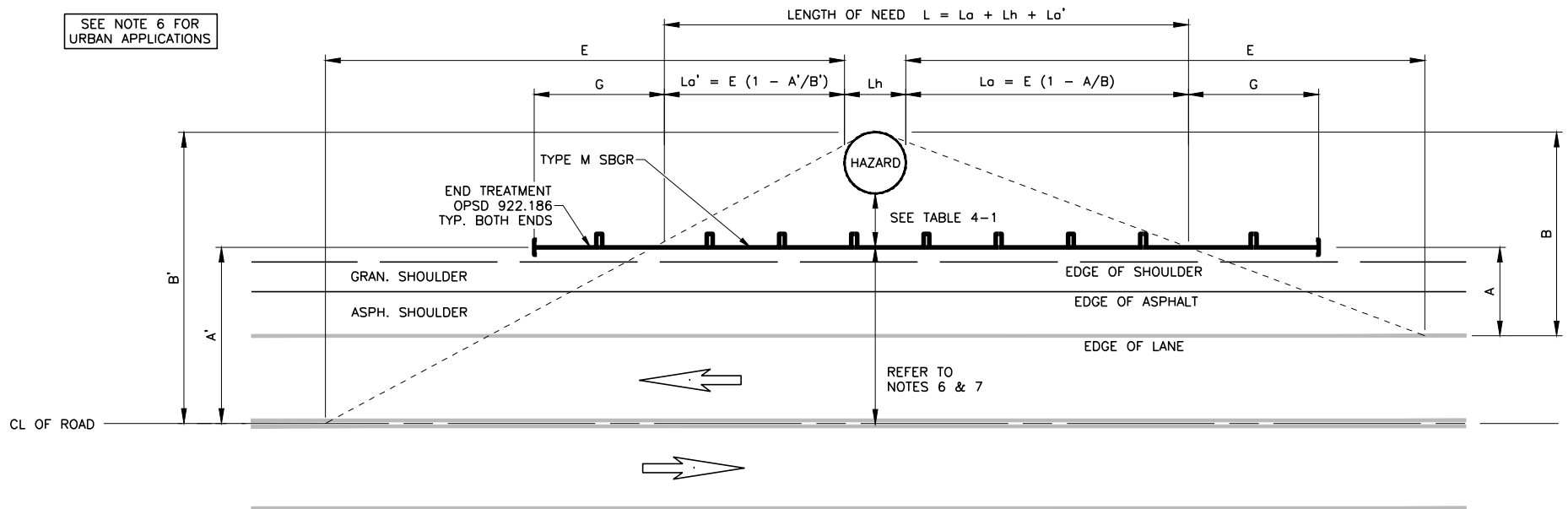


TABLE 4-1 - WORKING WIDTHS FOR TYPE M SBGR INSTALLATIONS

INSTALLATION CONFIGURATION	POST SPACING (m)	POST LENGTH (m)	WORKING WIDTH MASH-09 (m)	
			TL-3	TL-2
TYPE M20	1.905	1.829	1.4	1.2
TYPE M20 ADJACENT TO 2H:1V SLOPE	1.905	2.438	1.4	NOTE 1
TYPE M30 ADJACENT TO BARRIER CURB	1.905	1.829	1.3 NOTE 2	1.0
TYPE M30 OFFSET 1.8m FROM FACE OF BARRIER CURB	1.905	1.829	NOTE 3	1.2
TYPE M20 WITH $\frac{1}{2}$ POST SPACING	0.953	1.829	1.2	NOTE 1
TYPE M20 WITH $\frac{1}{4}$ POST SPACING	0.476	1.829	0.9	NOTE 1
TYPE M LONG SPAN	7.62	1.829	2.4	NOTE 1
TYPE M20 BASE PLATED	1.905	VARIABLE	1.3	NOTE 1

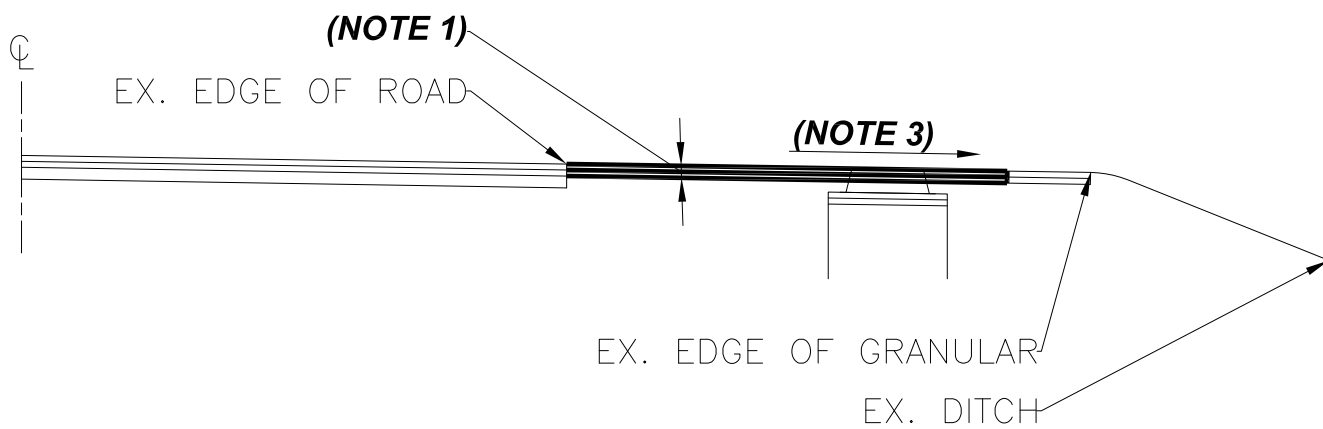
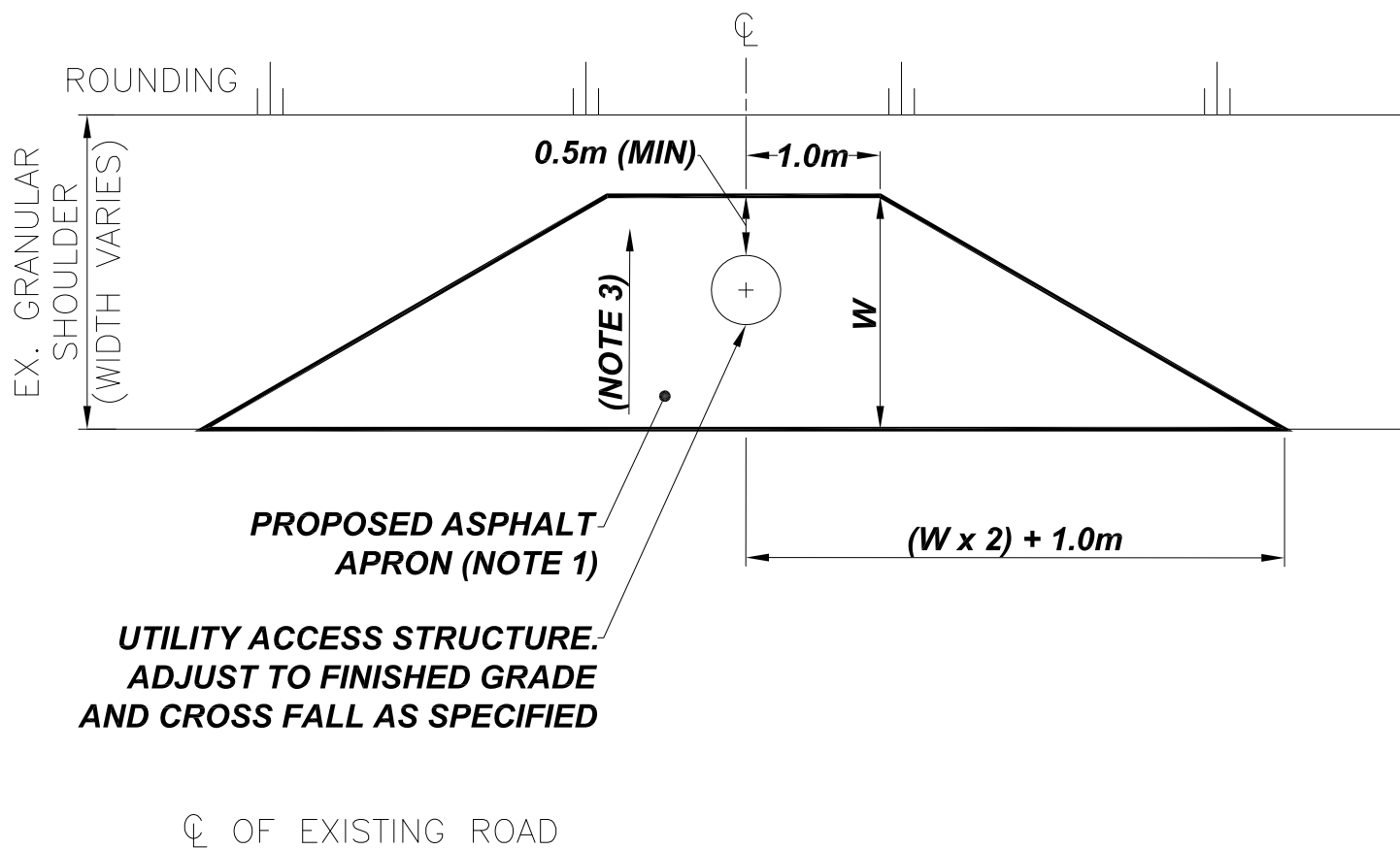
TABLE 2-15 - RUNOUT LENGTHS (ROADSIDE SAFETY MANUAL)

DESIGN SPEED (Km/h)	TRAFFIC VOLUME - DESIGN YEAR AADT			
	>10,000	5,000 TO 10,000	1,000 TO 5,000	<1,000
	E(m)	E(m)	E(m)	E(m)
120	127	116	102	89
110	110	101	88	76
100	91	76	64	61
90	81	67	57	54
80	70	58	49	46
70	60	49	42	38
60	49	40	34	30
≤50	34	27	24	21

NOTES:

1. WORKING WIDTHS VALUES FOR THIS CONFIGURATION AND TEST LEVEL CURRENTLY NOT AVAILABLE.
2. WORKING WIDTH BASED ON NCHRP REPORT 350 CRASH TEST 3-11.
3. CONFIGURATION NOT RECOMMENDED FOR HIGH SPEED ROADWAYS WITH POSTED SPEEDS OF 70km/h AND GREATER. CONFIGURATION MET THE CRASH TEST ACCEPTANCE REQUIREMENTS OF NCHRP REPORT 350 TL-2.
4. REFERENCE MTO ROADSIDE SAFETY MANUAL SECTION 2.3.1 AND 3.1.2 - DESIRABLE CLEAR ZONE
5. WHERE THE DISTANCE BETWEEN THE END OF ONE GUIDE RAIL INSTALLATION AND THE BEGINNING OF ANOTHER IS 50m OR LESS, A CONTINUOUS GUIDE RAIL SHOULD BE PLACED. (SECTION 3.2.3 OF ROADSIDE SAFETY MANUAL)
6. IN URBAN APPLICATIONS WHERE CURB EXISTS, TYPE M30 SBGR TO BE INSTALLED 125mm MAX BEHIND BARRIER CURB FOR TL-3 INSTALLATIONS AND 1.8m MINIMUM BEHIND BARRIER CURB WITH BOULEVARD OR SIDEWALK FOR TL-2 INSTALLATIONS.
7. IN RURAL APPLICATIONS FACE OF GUIDE RAIL SHALL BE A MINIMUM DISTANCE OF 6.25m FROM CENTERLINE OF ROAD TO ALLOW FOR FUTURE ROAD RECONSTRUCTION.
8. CONSIDERATION SHALL BE GIVEN TO DITCH LOCATIONS.
9. DIMENSIONS ARE TO FACE OF GUIDE RAIL.

EX. DITCH



NOTES:

1. PAVE MONOLITHICALLY FOR NEW ROAD CONSTRUCTION - ASPHALT LIFT THICKNESS TO MATCH TOP 2 LIFTS OF ROAD DESIGN OR MIN. 100mm (50mm HL3HS, AND 50mm HL8HS).
2. APPLY TACK COAT TO ALL VERTICAL FACES (ROAD AND STRUCTURE).
3. CROSSFALL SHALL BE AS SPECIFIED.
4. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

NIAGARA REGION STANDARD DRAWING

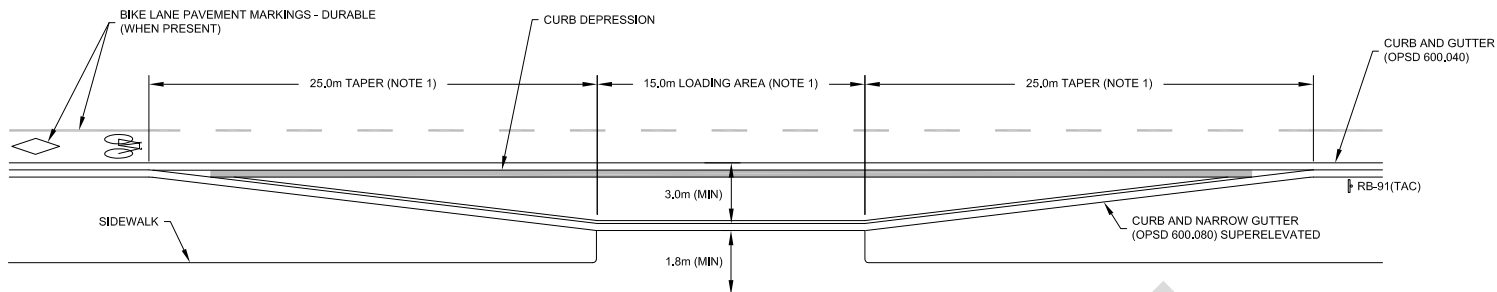
NOV 2017

REV

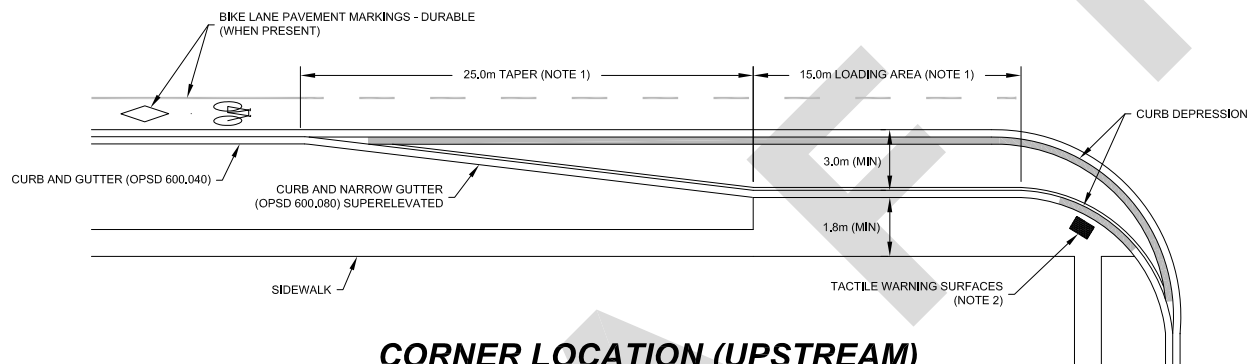
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ASPHALT APRON FOR MAINTENANCE
HOLES IN SHOULDERS

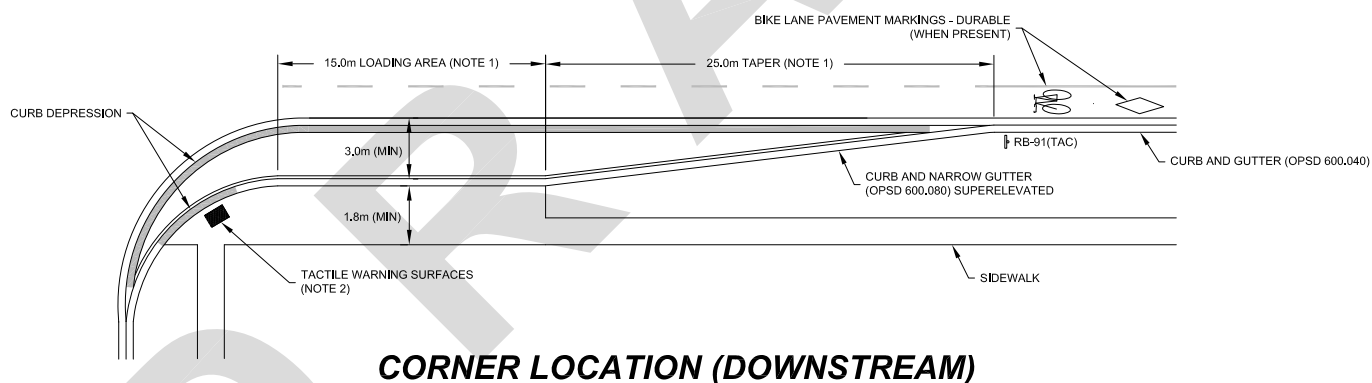
NRS 400



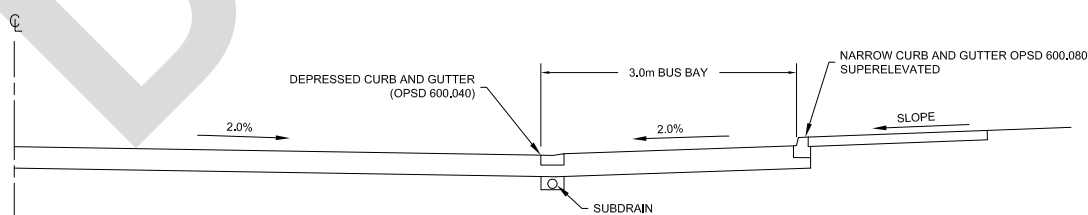
MID BLOCK



CORNER LOCATION (UPSTREAM)



CORNER LOCATION (DOWNSTREAM)



TYPICAL CROSS SECTION

NOTES:

- WHERE THE USE OF ARTICULATED BUSES IS ANTICIPATED, THE BUS BAY DIMENSIONS SHALL BE INCREASED TO PROVIDE A 25.0m LOADING AREA AND A 35.0m TAPERS.
- TACTILE WARNING SURFACES AS REQUIRED BY AODA. REFER TO NRS 3000-3007.
- ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.
- REFER TO NIAGARA REGION CONCRETE BUS BAY DETAIL.

ASPHALT STRUCTURE
-50mm HL3HS (or SP12.5)
-100MM HL8HS (or SP19)
-525mm Gran "A" (min)

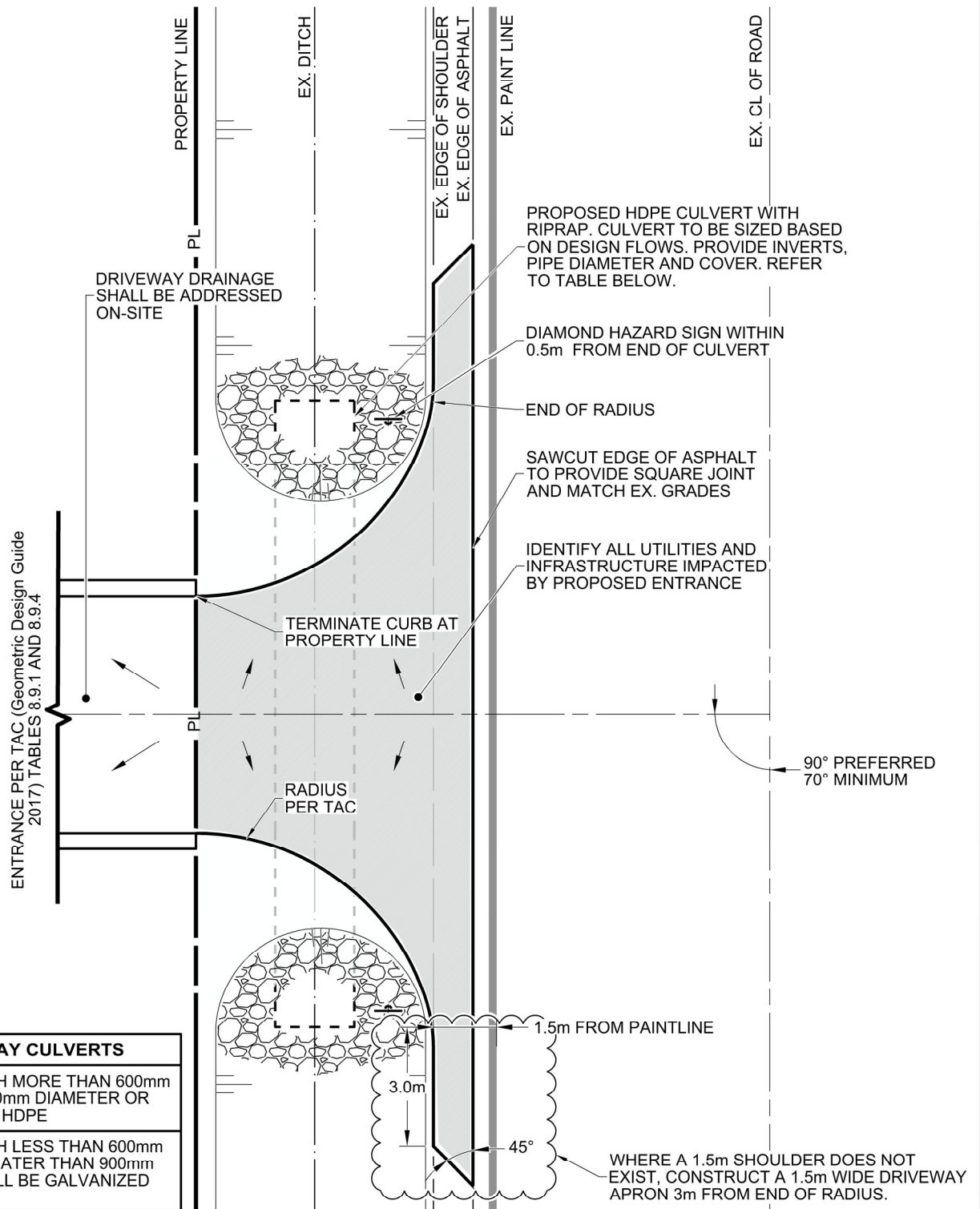
CONCRETE STRUCTURE
-225mm Concrete
-450mm Gran "A" (min)
-(NOTE 4)

ONTARIO PROVINCIAL STANDARD DRAWING

JULY 2017 REV 1

BUS BAYS

NRS 501.010-M



*NOTES TYPICAL TO BOTH SIDES OF ENTRANCE

RURAL INDUSTRIAL AND COMMERCIAL DRIVEWAY ON EXISTING ROAD

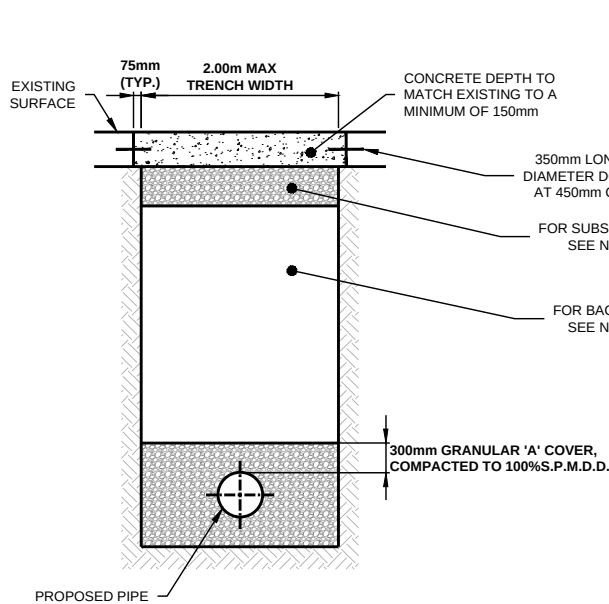
DATE: JAN 13, 2022 SCALE: NTS

APPROVED BY: MTK DRAWN BY: AV

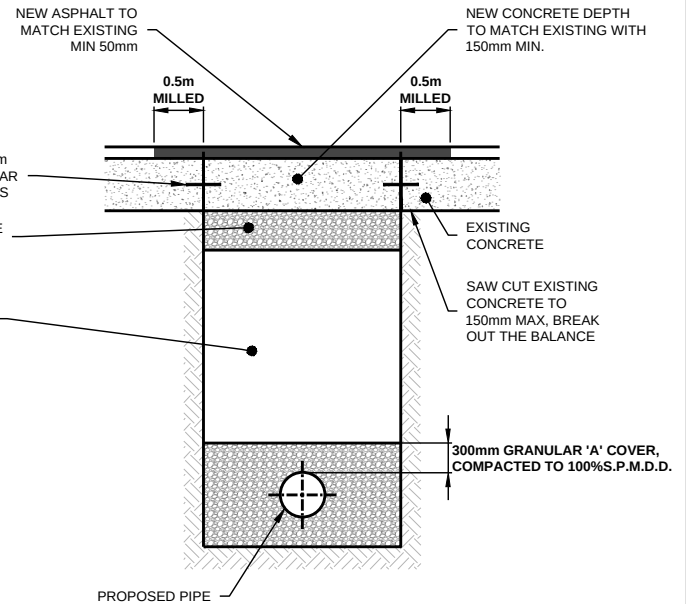
NIAGARA REGION STANDARD DRAWING

NRS 600

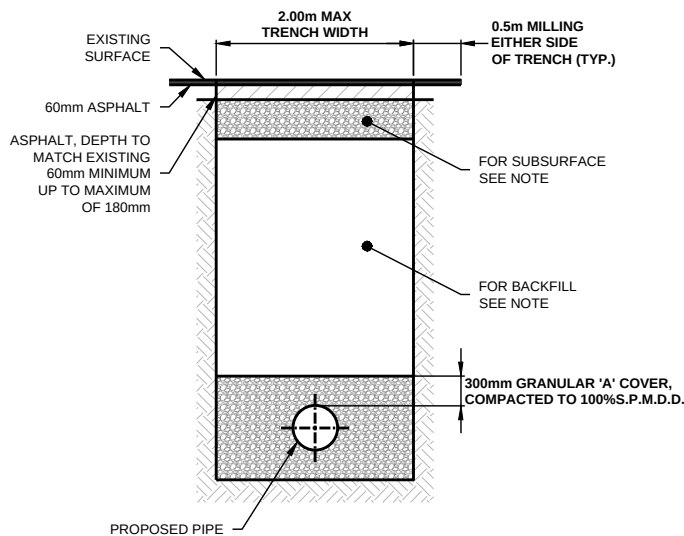
(A) REINSTATEMENT FOR CONCRETE ROADS



(B) REINSTATEMENT FOR COMPOSITE ROADS



(C) REINSTATEMENT FOR ASPHALT PAVEMENT



NOTES

- 1 - ALL PAVEMENTS SHALL BE SAWCUT FOR THE REQUIRED TRENCH WIDTH. FOR CONCRETE SURFACE PAVEMENTS, SAWCUTS SHALL BE MADE 75mm OUTSIDE THE TRENCH WIDTH.
- 2 - PRIOR TO HOT MIX ASPHALT APPLICATION, THE SIDES OF THE CUT PAVEMENT SHALL BE PAINTED WITH AN APPROVED ASPHALT EMULSION.
- 3 - NEW CONCRETE IS TO BE 30 MPa WITH MINIMUM CEMENT CONTENT OF 325 Kg / m³ MIN.
- 4 - MIN FOR ROADWAYS: 60mm HL3HS OR SUPERPAVE 12.5 (SURFACE) 120mm HL8HS OR SUPERPAVE 19 (BASE). CONTRACTOR TO CONFIRM WHAT CURRENT SURFACE IS AND MATCH ACCORDINGLY.
- 5 - MIN FOR SUBSURFACE FOR ROADWAYS/DRIVEWAYS: 525mm GRANULAR 'A', COMPACTED TO 100% S.P.M.D.D.
- 6 - BACKFILL SHALL BE AS SPECIFIED, OR:
- 7 - FOR EXISTING ROADWAYS/DRIVEWAYS: GRANULAR 'A' BACKFILL, COMPACTED TO 100% S.P.M.D.D.
- 8 - NATIVE BACKFILL WILL BE PERMITTED IF THE MATERIAL IS SUITABLE FOR BACKFILL, COMPACTED TO 95% S.P.M.D.D. (MIN.) USING A SHEEP'S FOOT FOR COMPACTION.

PERMANENT ROAD REINSTATEMENT REQUIREMENTS

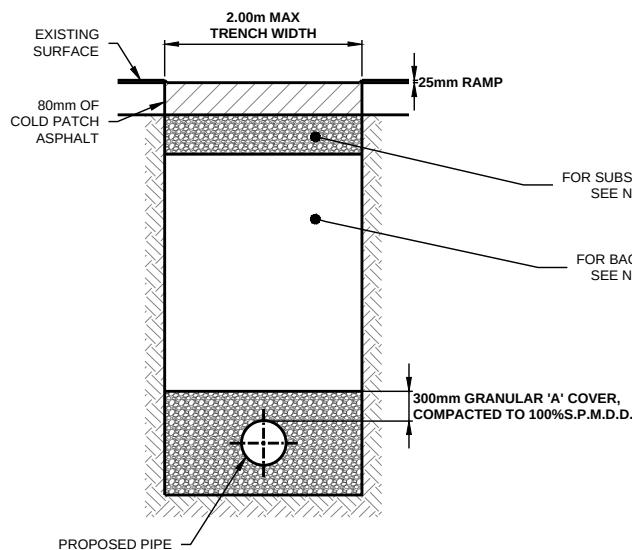
DATE: NOV 05, 2025 SCALE: NTS

APPROVED BY: --- DRAWN BY: RRL

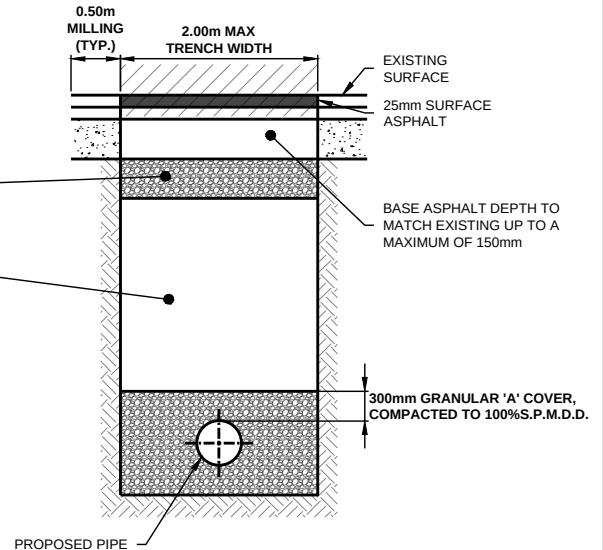
NIAGARA REGION STANDARD DRAWING

NRS 700

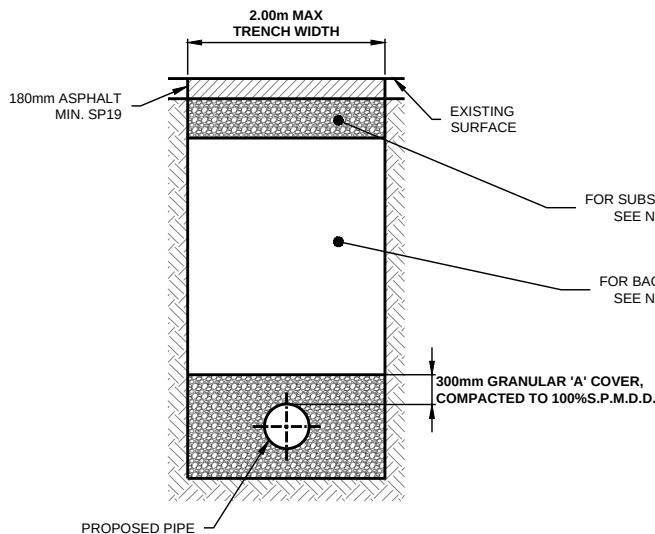
(A) TEMPORARY REINSTATEMENT
WITH COLD MIX (WHERE TEMPORARY
CONDITION EXCEEDS 60 DAYS) AND
THE CONTRACTOR IS TO RETURN TO
COMPLETE THE WORKS.



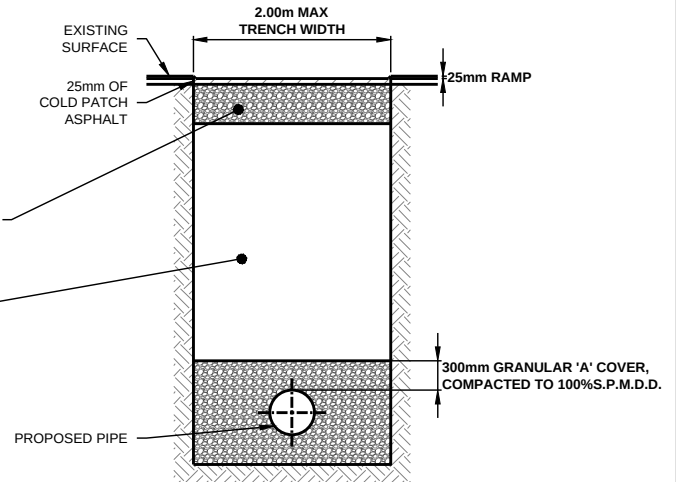
(B) TEMPORARY REINSTATEMENT
FOR ASPHALT PAVEMENT
ON CONCRETE BASE OR
CONCRETE ROADS



(C) PERMANENT REINSTATEMENT
MUST BE WITH BASE
ASPHALT (APPROVED BY NR)



(D) TEMPORARY REINSTATEMENT WITH COLD
MIX (WHERE TEMPORARY CONDITION
DOES NOT EXCEED 60 DAYS)



NOTES

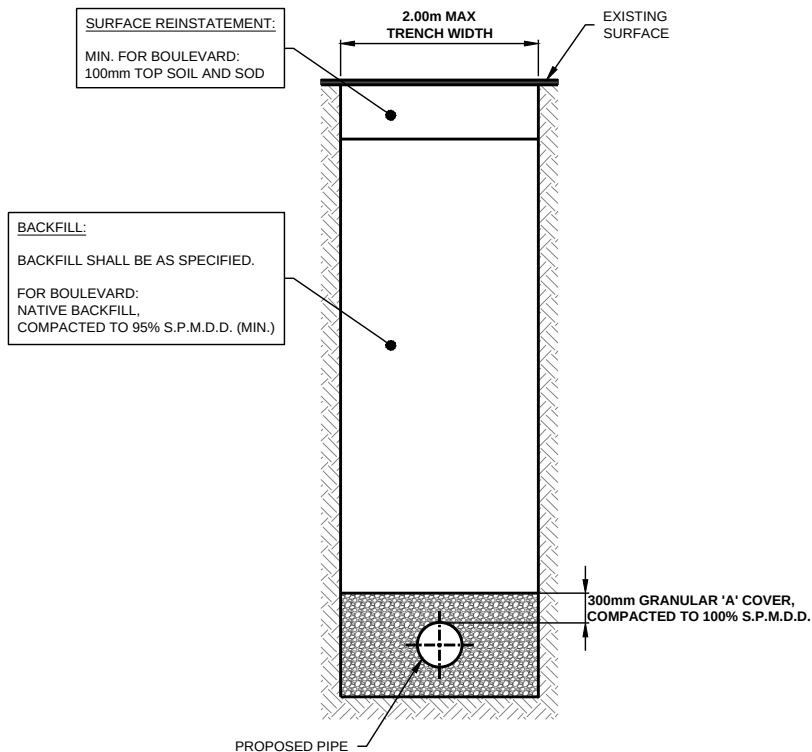
- 1 - ALL PAVEMENTS SHALL BE SAWCUT FOR THE REQUIRED TRENCH WIDTH. FOR CONCRETE SURFACE PAVEMENTS, SAWCUTS SHALL BE MADE 75mm OUTSIDE THE TRENCH WIDTH.
- 2 - PRIOR TO HOT MIX ASPHALT APPLICATION, THE SIDES OF THE CUT PAVEMENT SHALL BE PAINTED WITH AN APPROVED ASPHALT EMULSION.
- 3 - NEW CONCRETE IS TO BE 30 MPa WITH MINIMUM CEMENT CONTENT OF 325 Kg / m³ MIN.
- 4 - MIN FOR ROADWAYS: 60mm HL3HS OR SUPERPAVE 12.5 (SURFACE) 120mm HL8HS OR SUPERPAVE 19 (BASE). CONTRACTOR TO CONFIRM WHAT CURRENT SURFACE IS AND MATCH ACCORDINGLY.
- 5 - MIN FOR SUBSURFACE FOR ROADWAYS/DRIVEWAYS: 525mm GRANULAR 'A', COMPACTED TO 100% S.P.M.D.D.
- 6 - BACKFILL SHALL BE AS SPECIFIED, OR:
- 7 - FOR EXISTING ROADWAYS/DRIVEWAYS: GRANULAR 'A' BACKFILL, COMPACTED TO 100% S.P.M.D.D.
- 8 - NATIVE BACKFILL WILL BE PERMITTED IF THE MATERIAL IS SUITABLE FOR BACKFILL, COMPACTED TO 95% S.P.M.D.D. (MIN.) USING A SHEEP'S FOOT FOR COMPACTION.

TEMPORARY ROAD REINSTATEMENT
REQUIREMENTS

DATE: NOV 05, 2025 SCALE: NTS
APPROVED BY: --- DRAWN BY: RRL

NIAGARA REGION STANDARD
DRAWING

NRS 701



NOTES

- 1 - ALL PAVEMENTS SHALL BE SAWCUT FOR THE REQUIRED TRENCH WIDTH. FOR CONCRETE SURFACES, PAVEMENT SAWCUTS SHALL BE MADE 75mm OUTSIDE THE TRENCH WIDTH.
- 2 - PRIOR TO HOT MIX ASPHALT APPLICATION, THE SIDES OF THE CUT PAVEMENT SHALL BE PAINTED WITH AN APPROVED ASPHALT EMULSION.
- 3 - NEW CONCRETE IS TO BE 32 MPa WITH MINIMUM CEMENT CONTENT OF 325 Kg / m³ MIN.
- 4 - WHERE COLD PATCH ASPHALT IS USED FOR TEMPORARY REINSTATEMENT, AT THE END OF EACH WORKING DAY, AREAS ARE TO BE REVIEWED AND COLD PATCH SHALL BE APPLIED ACCORDINGLY, TO PROVIDE AN APPROPRIATE LEVEL SURFACE.
- 5 - FULL GRANULAR 'A' BACKFILL, COMPACTED TO 100% S.P.M.D.D. IS REQUIRED FOR INSTALLATIONS UNDER EXISTING DRIVEWAYS.

TYPICAL TRENCH REINSTATEMENT FOR GRASS BOULEVARDS

DATE: NOV 05, 2025

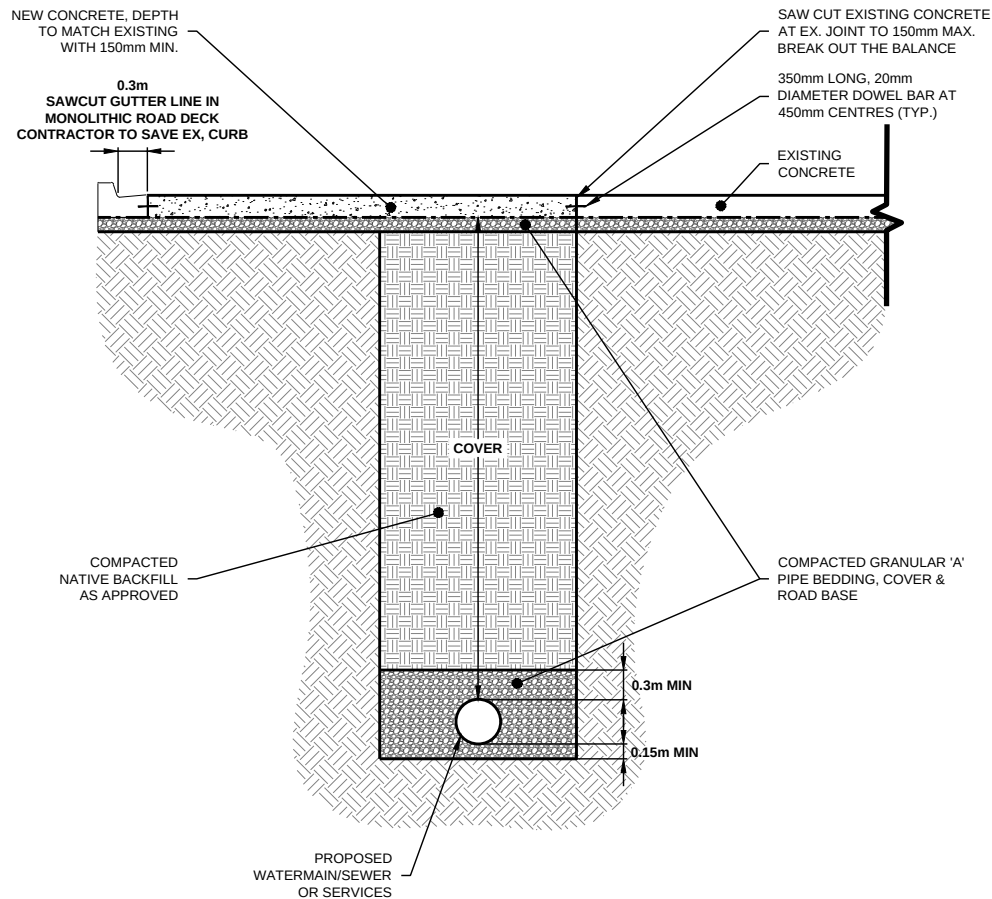
SCALE: NTS

APPROVED BY: ---

DRAWN BY: RRL

NIAGARA REGION STANDARD DRAWING

NRS 702



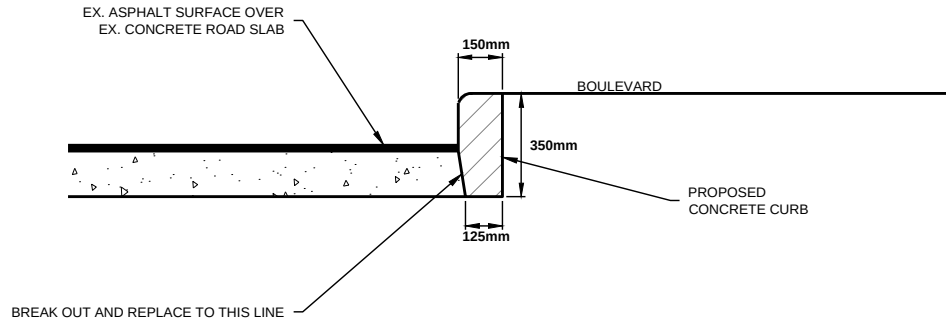
CONCRETE PAVEMENT RESTORATION CLOSE TO MONOLITHIC CURB

DATE: NOV 05, 2025	SCALE: NTS
APPROVED BY: ---	DRAWN BY: RRL

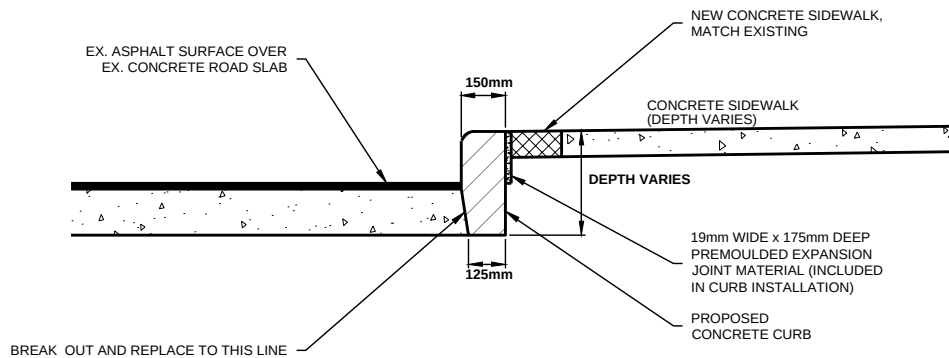
NIAGARA REGION STANDARD DRAWING

NRS 703

DET-IL OF CURB REMOV-L -ND REPL-CEMENT -DJ-CENT TO BOULEV-RD



DET-IL OF CURB REMOV-L -ND REPL-CEMENT -DJ-CENT TO SIDEW-LK



NOTE: DOWEL INTO EXISTING AT EITHER END OF THE REPAIR.

CONCRETE PAVEMENT RESTORATION CLOSE TO MONOLITHIC CURB

DATE: NOV 05, 2025 SCALE: NTS
APPROVED BY: --- DRAWN BY: RRL

NIAGARA REGION STANDARD DRAWING

NRS 704

C/L ROAD

C/L DITCH

EXISTING
PAVEMENT
REGRADE SHOULDER AS
REQUIRED TO PROVIDE
POSITIVE DRAINAGE OFF
OF PAVEMENT

6%

1.0mR

EXISTING
GROUND

MATCH
EXISTING
AS DIRECTED

100mm TOPSOIL AND
SOD OR SEED AS
(AND IF) DIRECTED

CULVERT TO REMAIN
UNLESS OTHERWISE
DIRECTED

* DITCH SIDE SLOPES
3:1 DESIRABLE
2:1 MAXIMUM

TYPICAL CROSS SECTION DITCH REGRADE

DATE: NOV 05, 2025

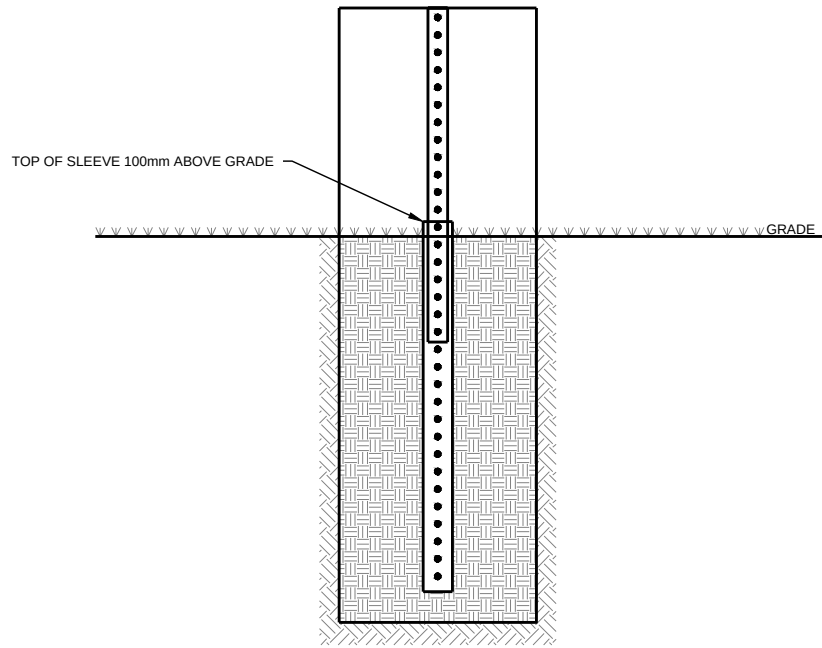
SCALE: NTS

APPROVED BY: ---

DRAWN BY: RRL

NIAGARA REGION STANDARD DRAWING

NRS 705



TELESPAR INSTALLATION IN SOFT SURFACES (DIRECT)

DATE: NOV 05, 2025

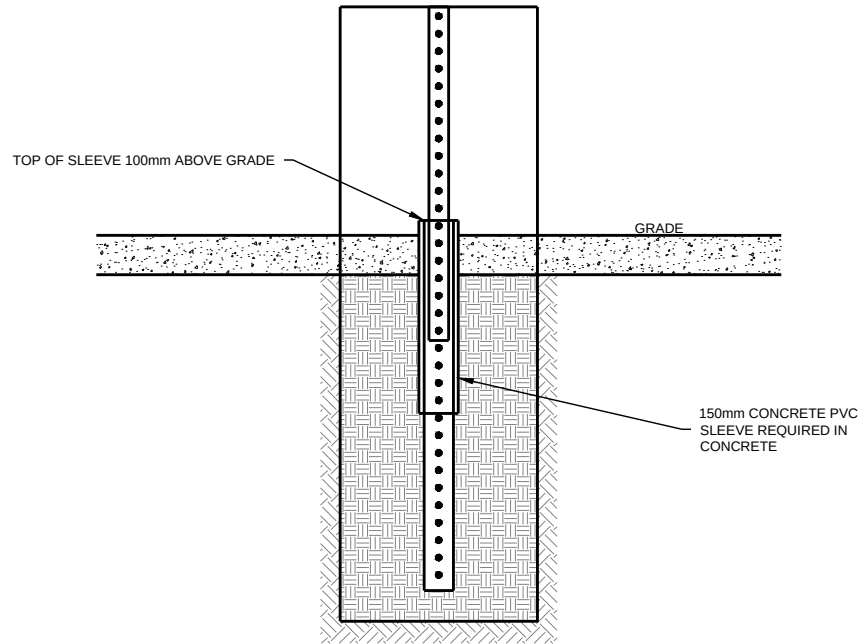
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APPROVED BY: ---

DRAWN BY: RRL

NIAGARA REGION STANDARD DRAWING

NRS 706



TELESPAR INSTALLATION IN CONCRETE

DATE: NOV 05, 2025

SCALE: NTS

APPROVED BY: ---

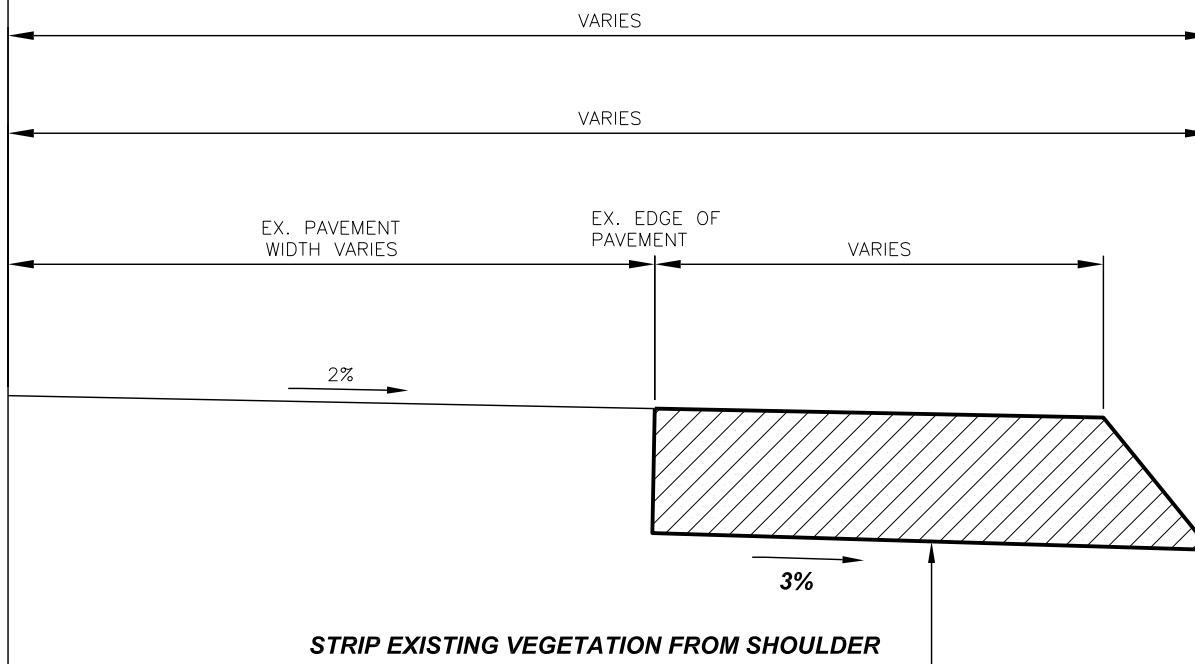
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NIAGARA REGION STANDARD DRAWING

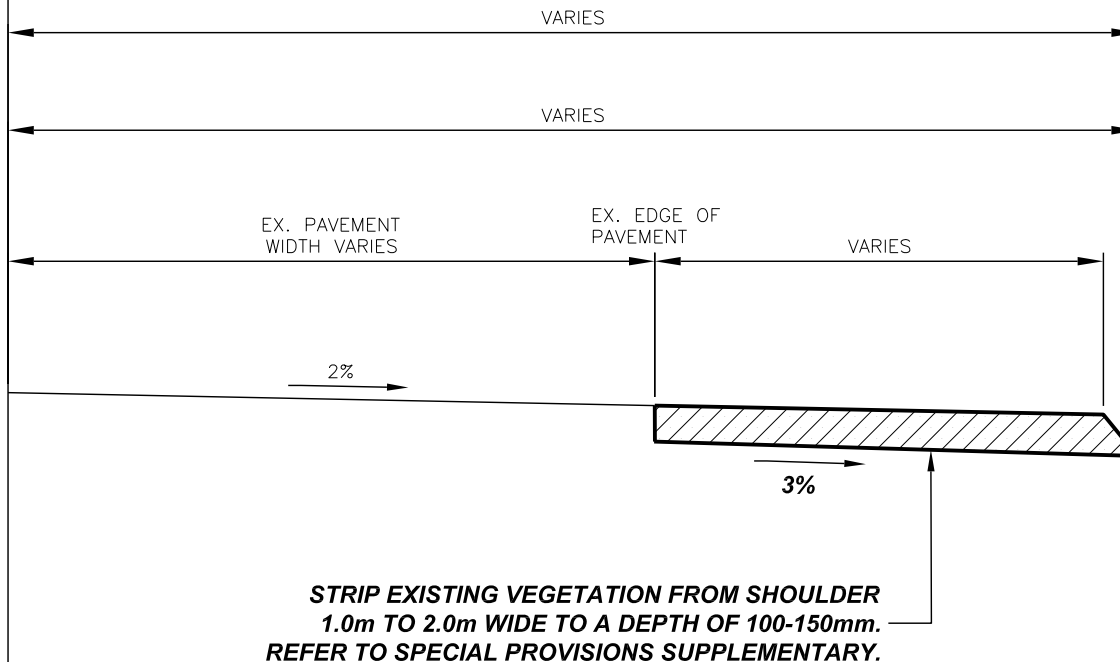
NRS 707

ROADS RESURFACING

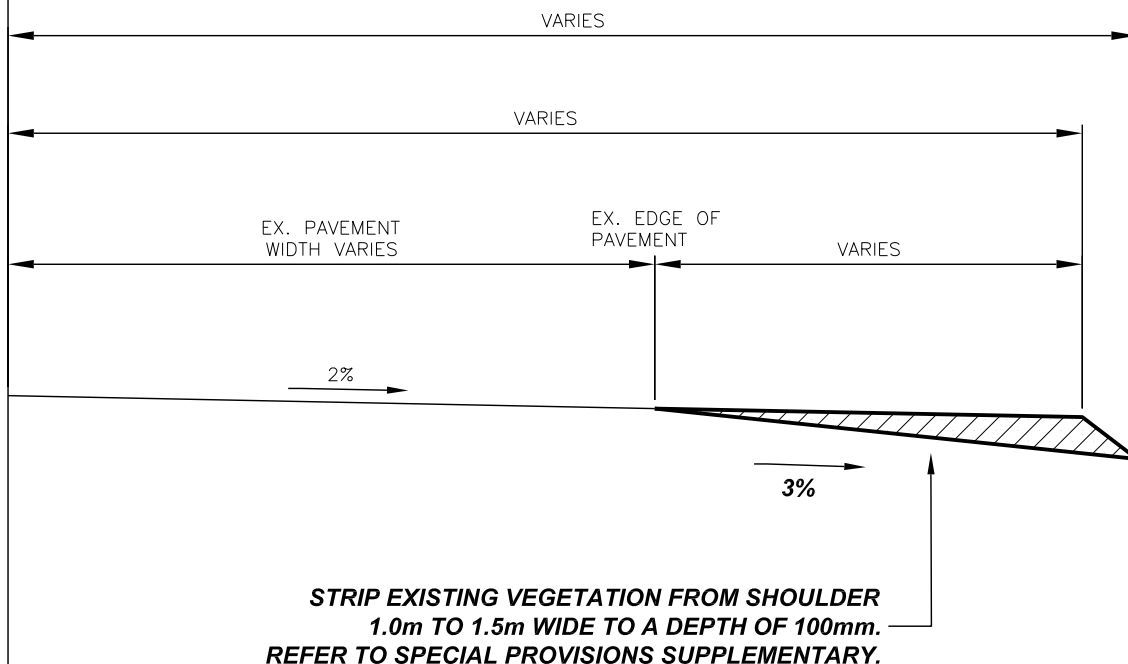
C/L



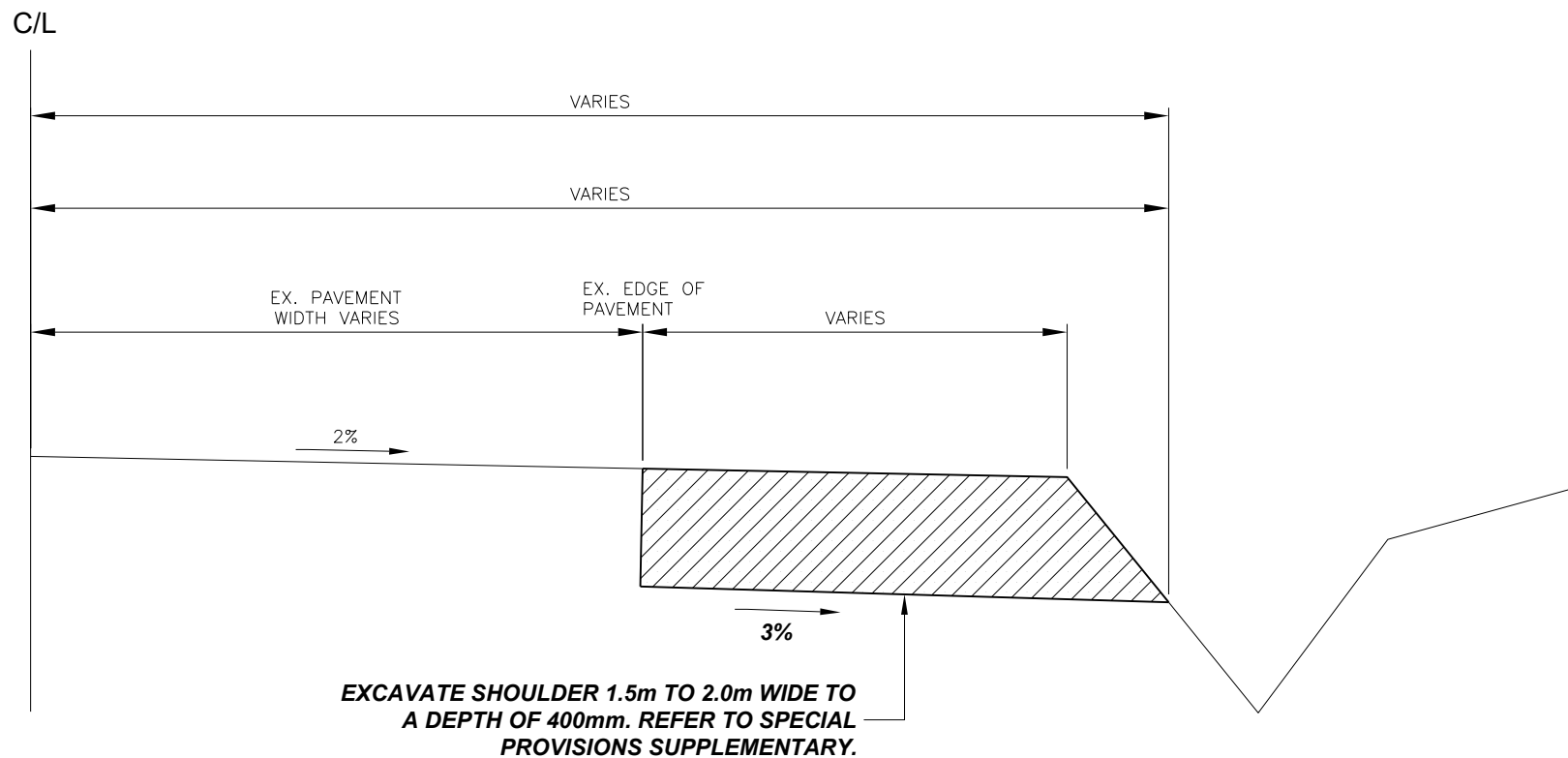
C/L

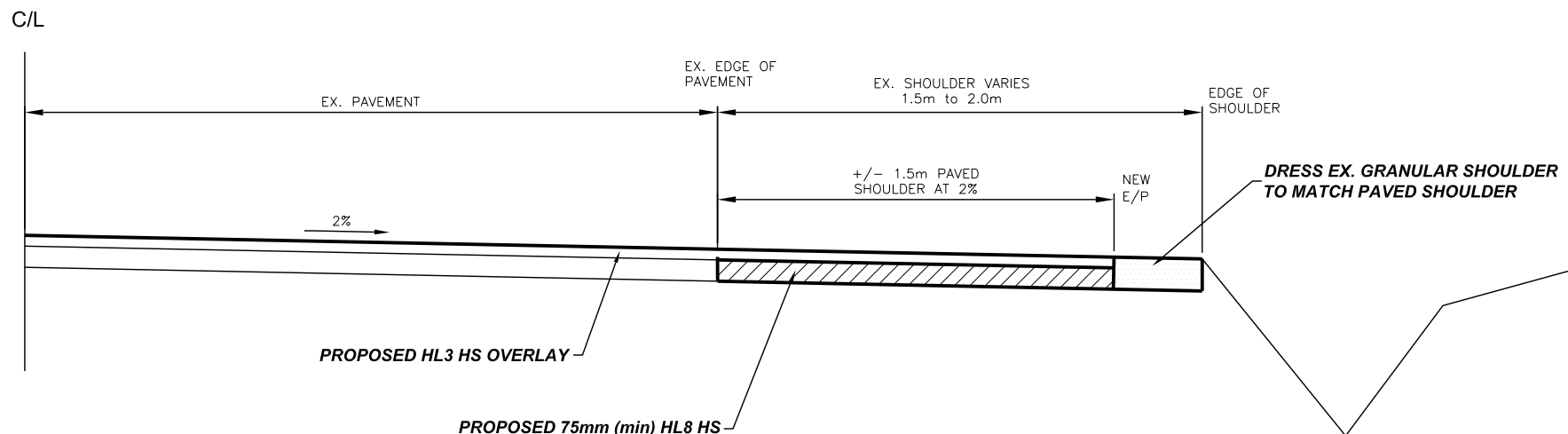


C/L



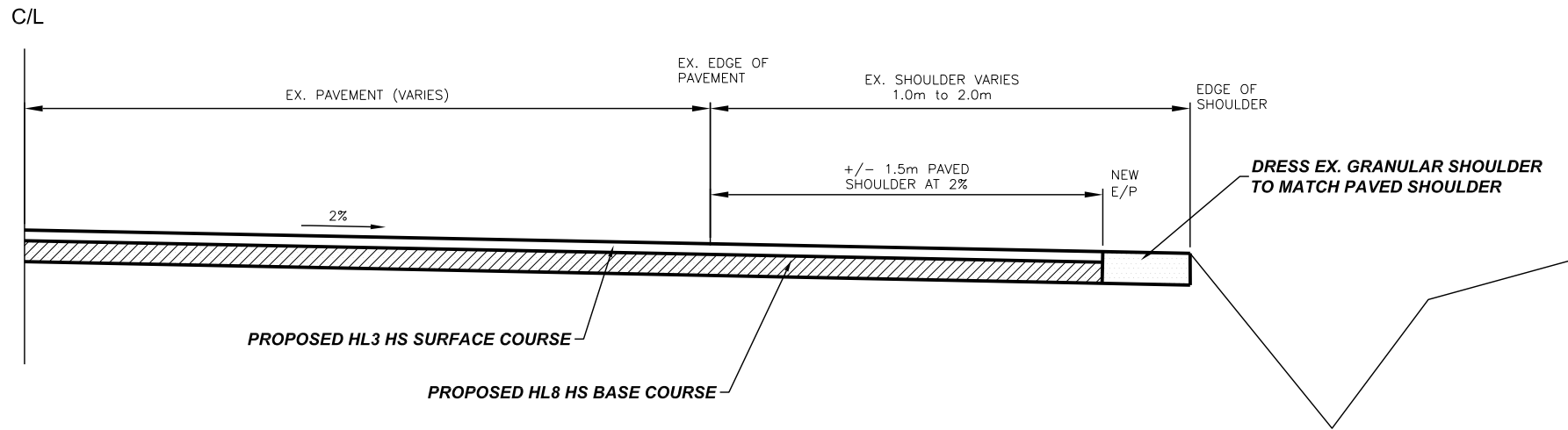
**STRIP EXISTING VEGETATION FROM SHOULDER
1.0m TO 1.5m WIDE TO A DEPTH OF 100mm.
REFER TO SPECIAL PROVISIONS SUPPLEMENTARY.**





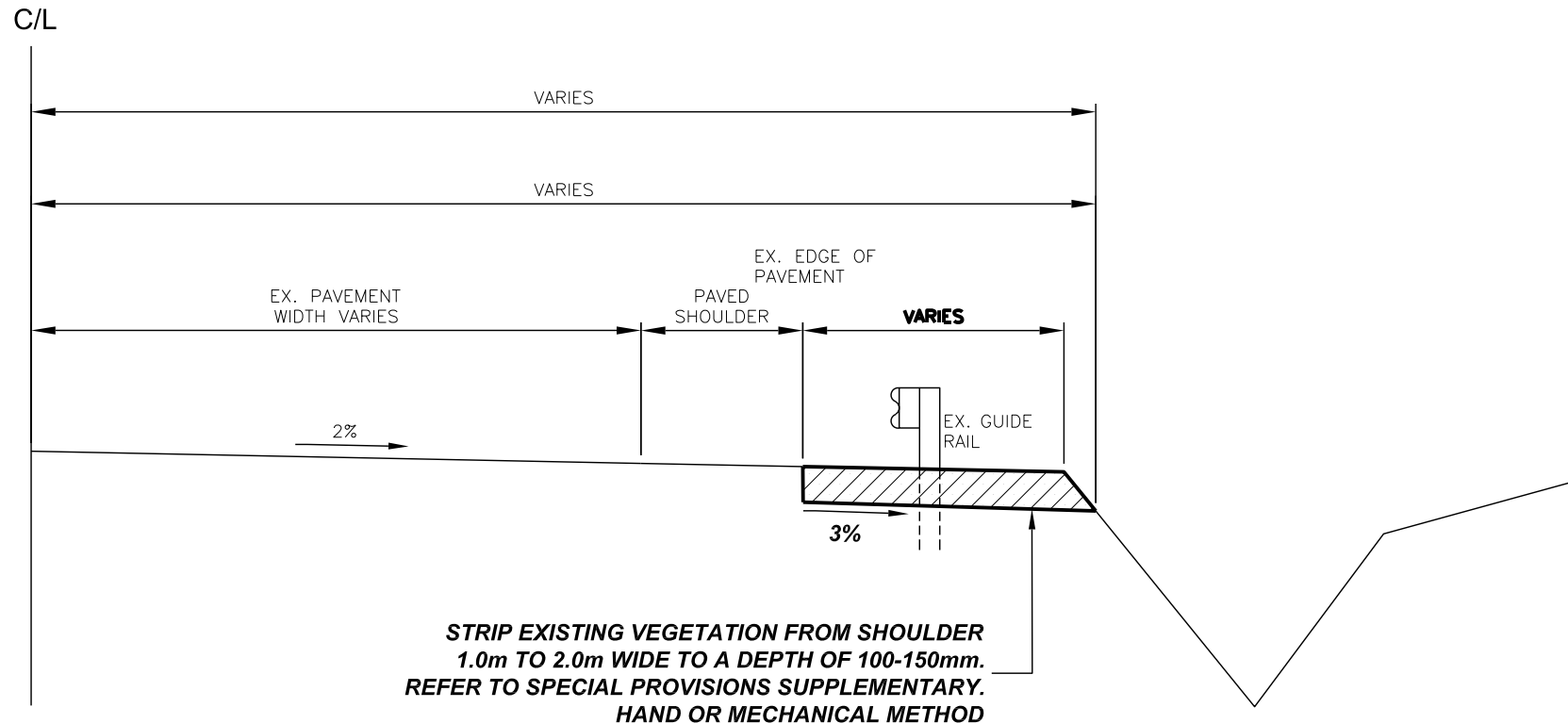
NOTES:

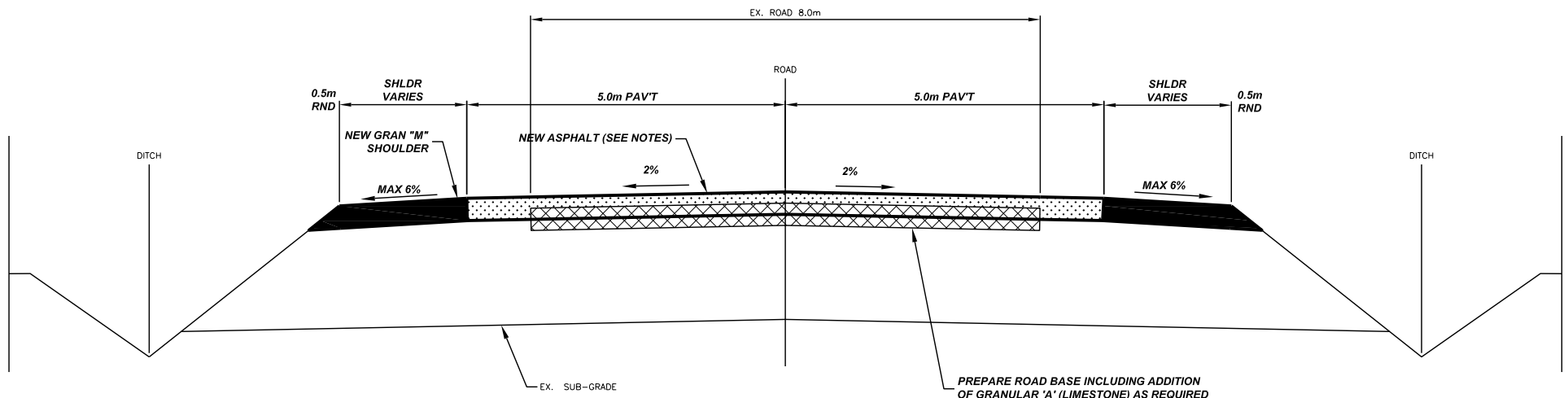
1. CONTRACTOR SHALL EXCAVATE AND GRADE EXISTING SHOULDER TO ACCOMODATE PROPOSED BASE ASPHALT (HL8 HS) THICKNESS FOR PAVED SHOULDER.
2. CONTRACTOR SHALL REUSE EXCAVATED SHOULDER MATERIAL (GRANULAR) TO DRESS EXISTING GRANULAR SHOULDER



NOTES:

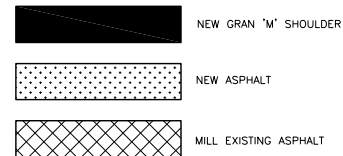
1. CONTRACTOR SHALL EXCAVATE AND GRADE EXISTING SHOULDER TO ACCOMODATE PROPOSED BASE ASPHALT (HL8 HS) THICKNESS FOR PAVED SHOULDER.
2. CONTRACTOR SHALL REUSE EXCAVATED SHOULDER MATERIAL (GRANULAR) TO DRESS EXISTING GRANULAR SHOULDER

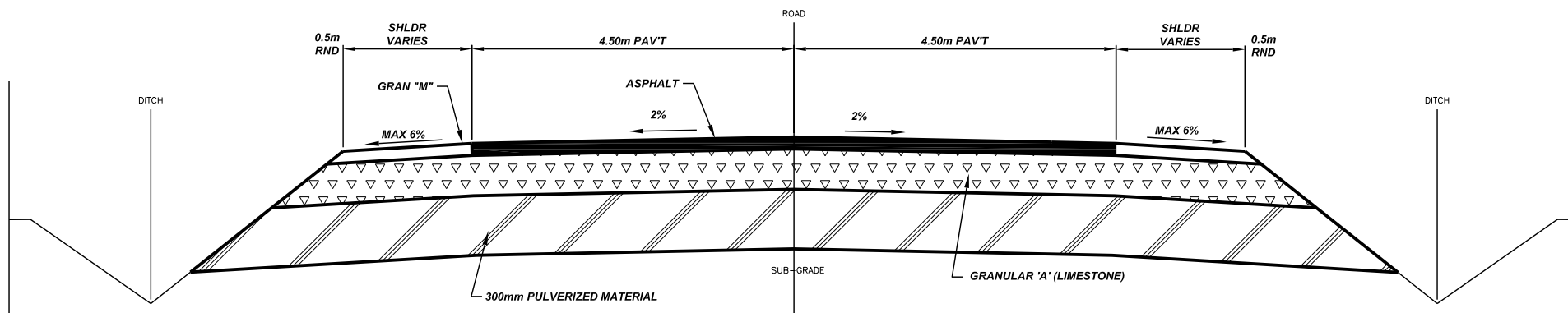




NOTES:

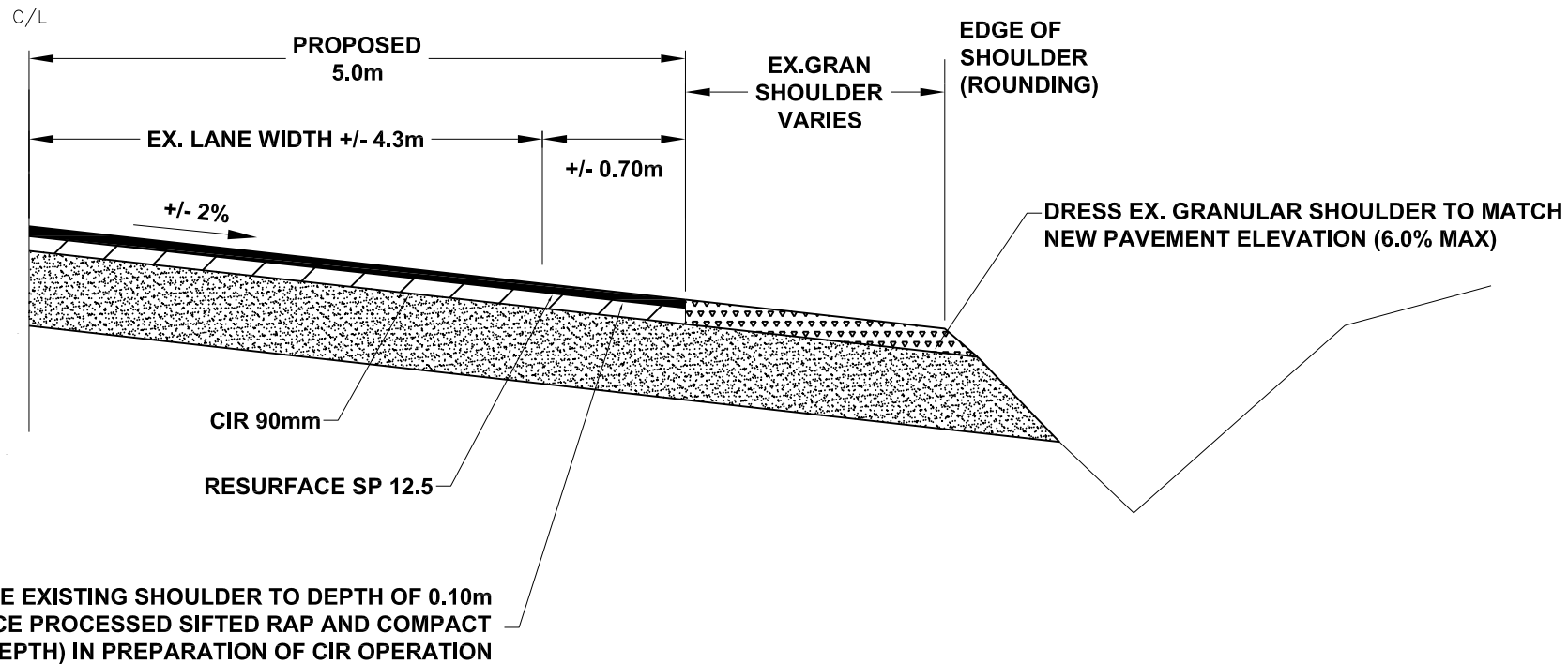
1. MILL EXISTING PAVEMENT WIDTH TO GRANULAR ROAD BASE ($\pm 110\text{mm}$)
2. CONTRACTOR SHALL PREPARE (DRESS) EXISTING GRANULAR BASE FOR PAVING INCLUDING COMPACTION (OPSS 310)
3. PLACE 50mm SP19.0 AT 8.0m WIDE
4. CONTRACTOR SHALL PREPARE GRANULAR SHOULDER (2% CROSSFALL) IN ADVANCE OF PLACING SECOND LIFT OF BASE COURSE
5. PLACE 50mm SP19.0 AT 10.0m WIDE
6. PLACE 40mm SP12.5 AT 10.0m WIDE

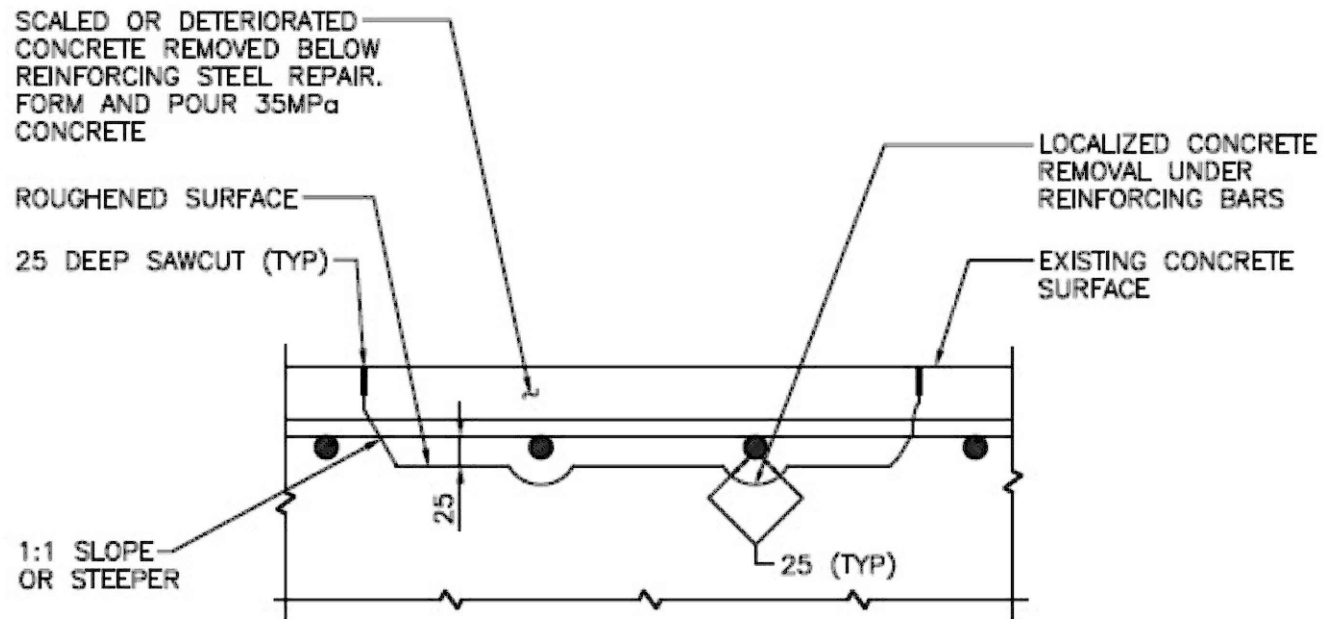


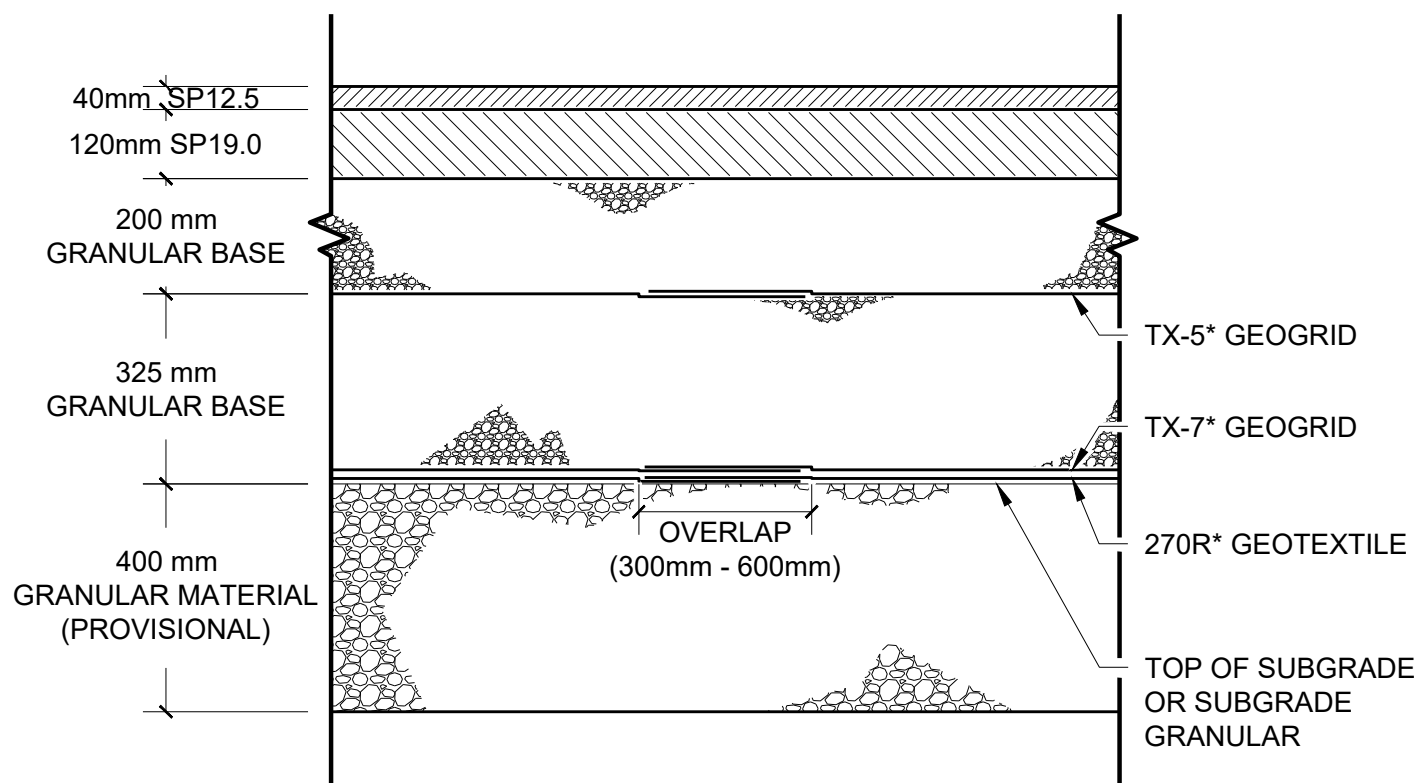


NOTES:

1. REPROCESS PAVEMENT TO A DEPTH OF 300mm.
2. PLACE +/- 150mm OF GRANULAR 'A' (LIMESTONE)
3. EXISTING PAVEMENT STRUCTURE VARIES REFER TO SCHEDULE OF WORK AND BOREHOLES.
4. ASPHALT OVERLAY THICKNESS REFER TO SCHEDULE OF WORK.







NOTES:

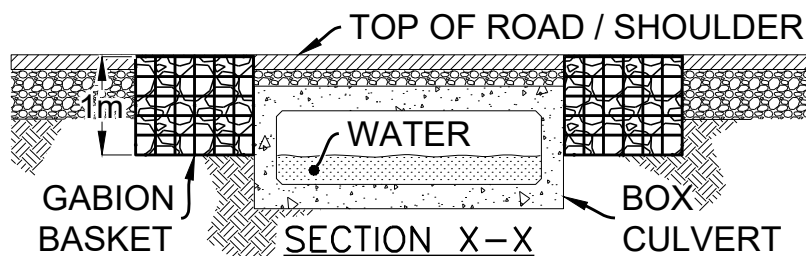
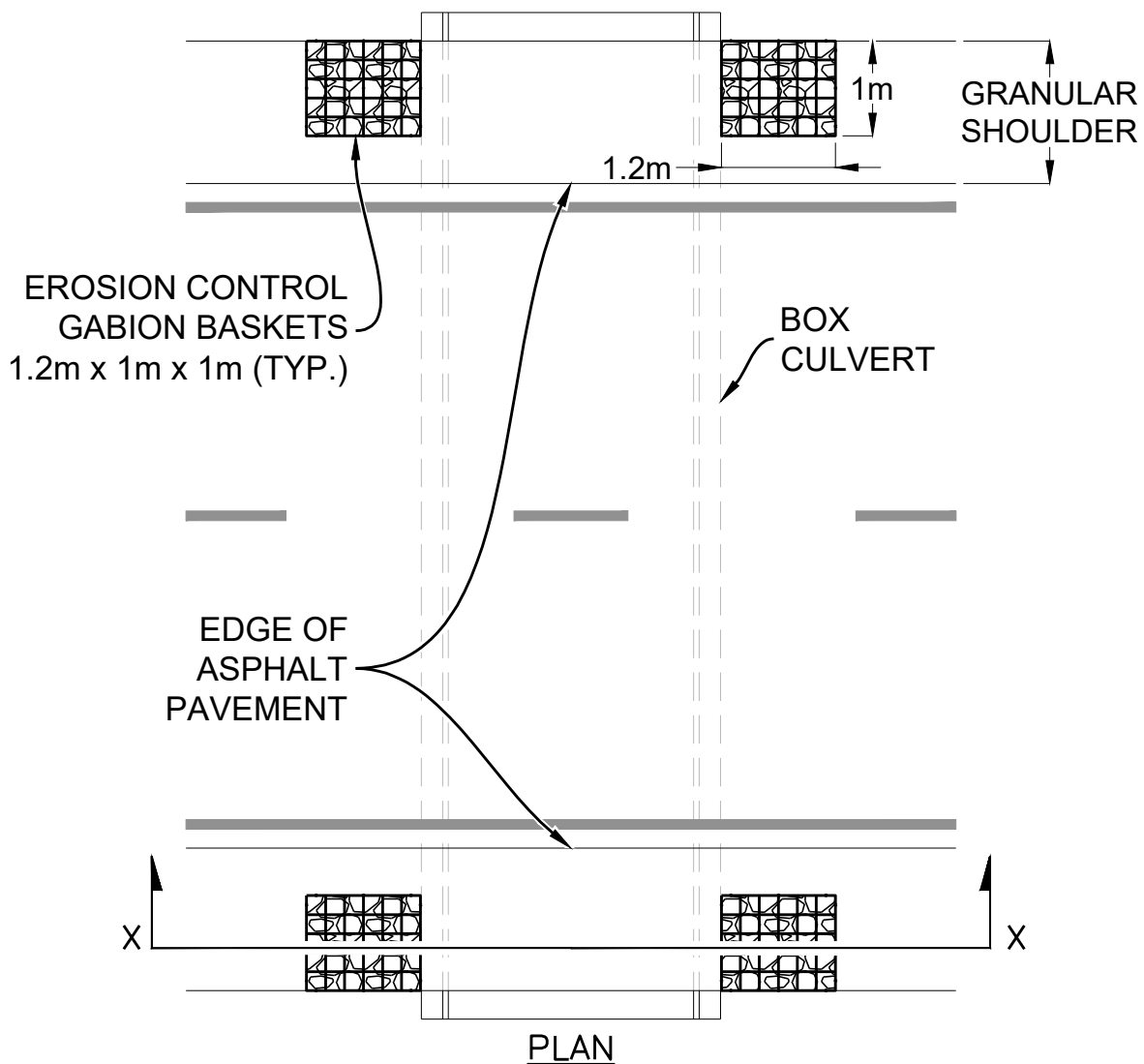
1. PLACE 270R* ON TOP OF SUBGRADE (NATIVE) OR SUBGRADE GRANULAR
2. PLACE TX-7* ON TOP OF 270R*
3. SUBGRADE GRANULAR TO BE BROUGHT UP TO SUBGRADE ELEVATION
4. DO NOT PLACE NATIVE ON TOP OF SUBGRADE GRANULAR
5. DO NOT DRIVE ON TOP OF GEOTEXTILE OR GEOGRID (DIRECTLY ON TOP)
6. GEOTEXTILE AND GEOGRID ARE TO BE INSTALLED PER THE MANUFACTURERS SPECIFICATIONS
7. PRIOR TO GEOTEXTILE PLACEMENT, RUN SMOOTH DRUM ROLLER OVER THE AREA

* OR APPROVED EQUIVALENT

Niagara Region
PUBLIC WORKS

RESURFACING PROGRAM GEOTEXTILE CROSS SECTION

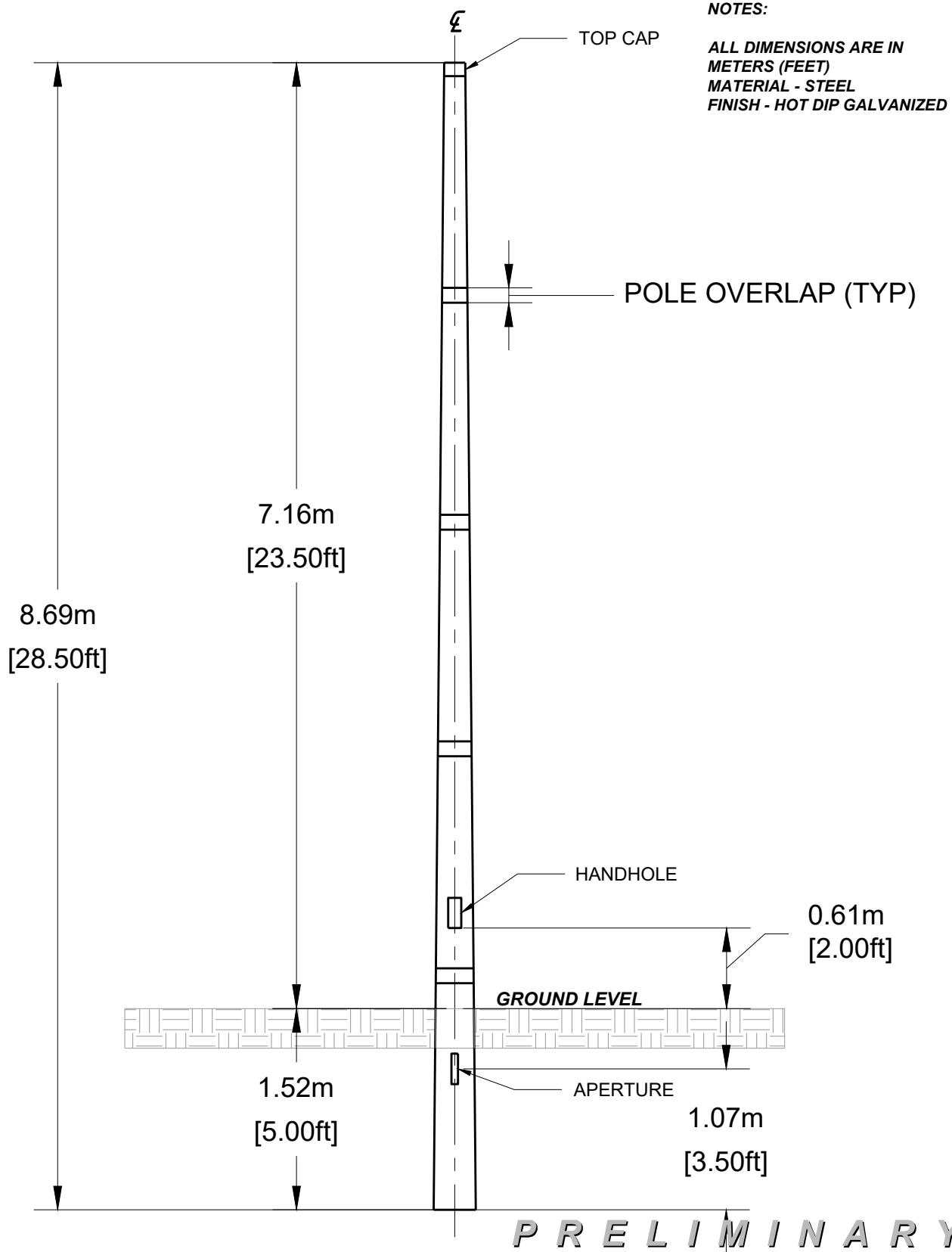
DATE	2021-02-19
SCALE	NTS
REF. No.	
DWG No.	HM-3001



NOTES:

1. GABION BASKETS TO BE PLACED AT THE 4 CORNERS OF THE CULVERT(S) TO PREVENT EROSION OF SHOULDER/ROADWAY.

ELECTRICAL



**DIRECT BURIED SECTIONAL
STEEL POLE**

Niagara Region

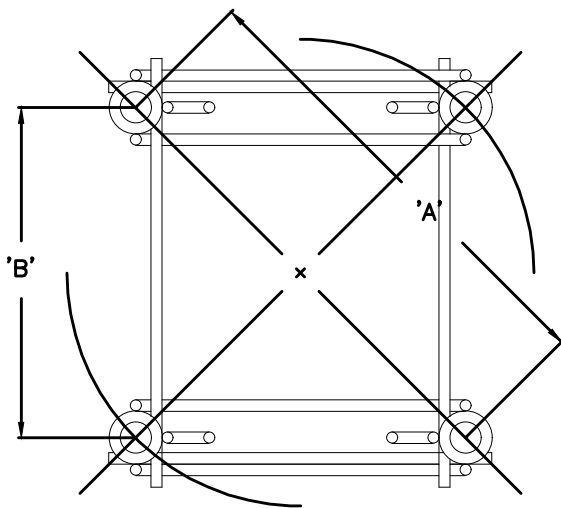
DATE: November 2, 2021 SCALE: NTS

PUBLIC WORKS

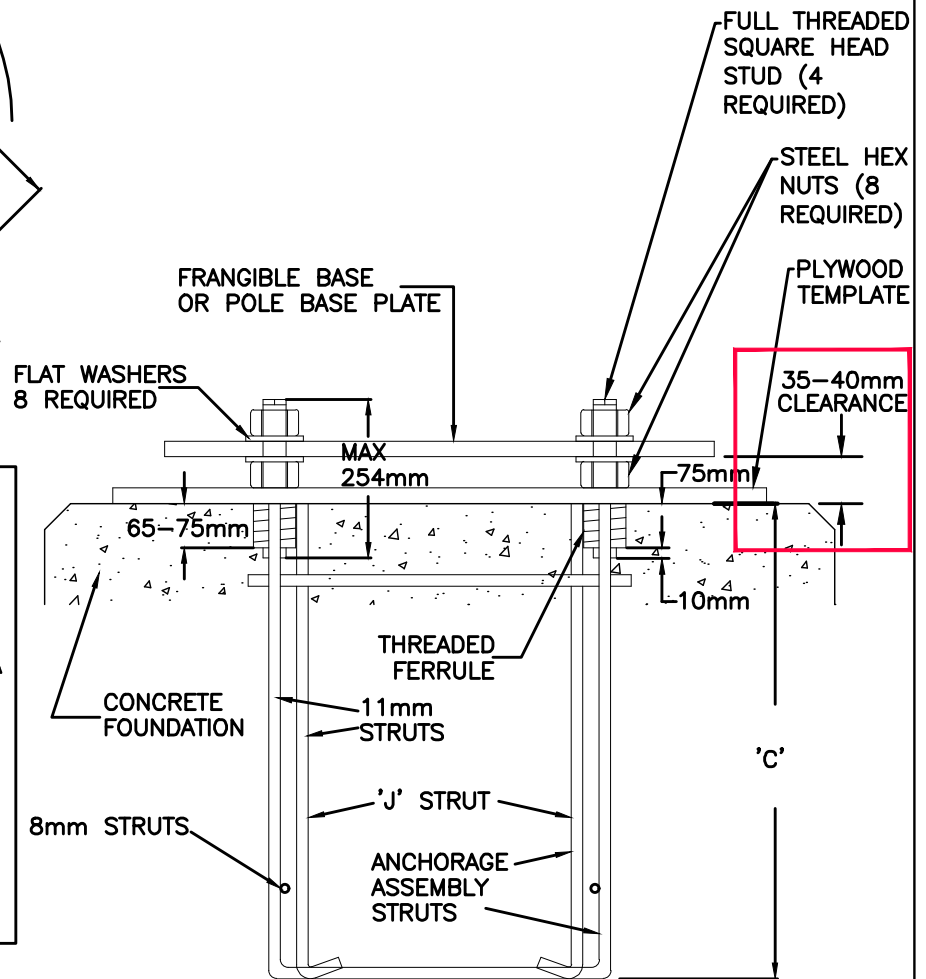
UPDATED BY: A.S. DRAWN BY: T.C.

MODIFIED OPSD - N/A

NRS 0000



PLAN



PROFILE

INSTRUCTIONS:

1. DO NOT REMOVE STUDS FROM THREADED FERRULES.
2. PLACE ANCHORAGE IN FOOTING WITH WOOD TEMPLATE OVER FORMWORK.
3. TIE ANCHORAGE TO STEEL IN FOOTING.
4. TIE DUCTS TO ANCHORAGE.
5. LEVEL ANCHORAGE IN ALL DIRECTIONS WITH A CARPENTER'S LEVEL AND SECURE IN THE LEVEL POSITION PRIOR TO POURING CONCRETE TO THE TOP OF THE FORMWORK.
6. WHEN CONCRETE HAS ACHIEVED INITIAL SET REMOVE NUTS, WASHERS, AND WOOD TEMPLATE AND FINISH TOP OF CONCRETE.
7. REPLACE NUTS AND WASHERS AND HAND TIGHTEN.
8. SEAT STUDS 130mm ABOVE FINISHED CONCRETE FOUNDATION.

NOTES:

1. ASSEMBLY TO BE GALVANIZED ACCORDING TO CAN/CSA -G164-M92
2. STUDS TO BE HI-TENSILE MATERIAL
3. STUDS TO BE IMPERIAL THREAD

ASSEMBLY FOR BASE:	BOLT DIA.	BOLT CIRCLE 'A'		BOLT SPACING 'B'		ANCHORAGE DEPTH 'C'	
	INCHES	MM	INCHES	MM	INCHES	MM	INCHES
TYPE 1PB	3/4	190	7 1/2	140	5 1/2	305	12
TYPE 3	1	323	12 3/4	229	9	457	18
TYPE 5X (TC)	3/4	406	16	280	11	305	12
TYPE 5	1 1/4	395	15 1/2	280	11	457	18
TYPE 6	1 1/4	449	17 5/8	318	12 1/2	457	18
TYPE 8 (JUMBO)	1 1/4	592	23 11/32	419	16 1/2	760	30

ANCHORAGE ASSEMBLY

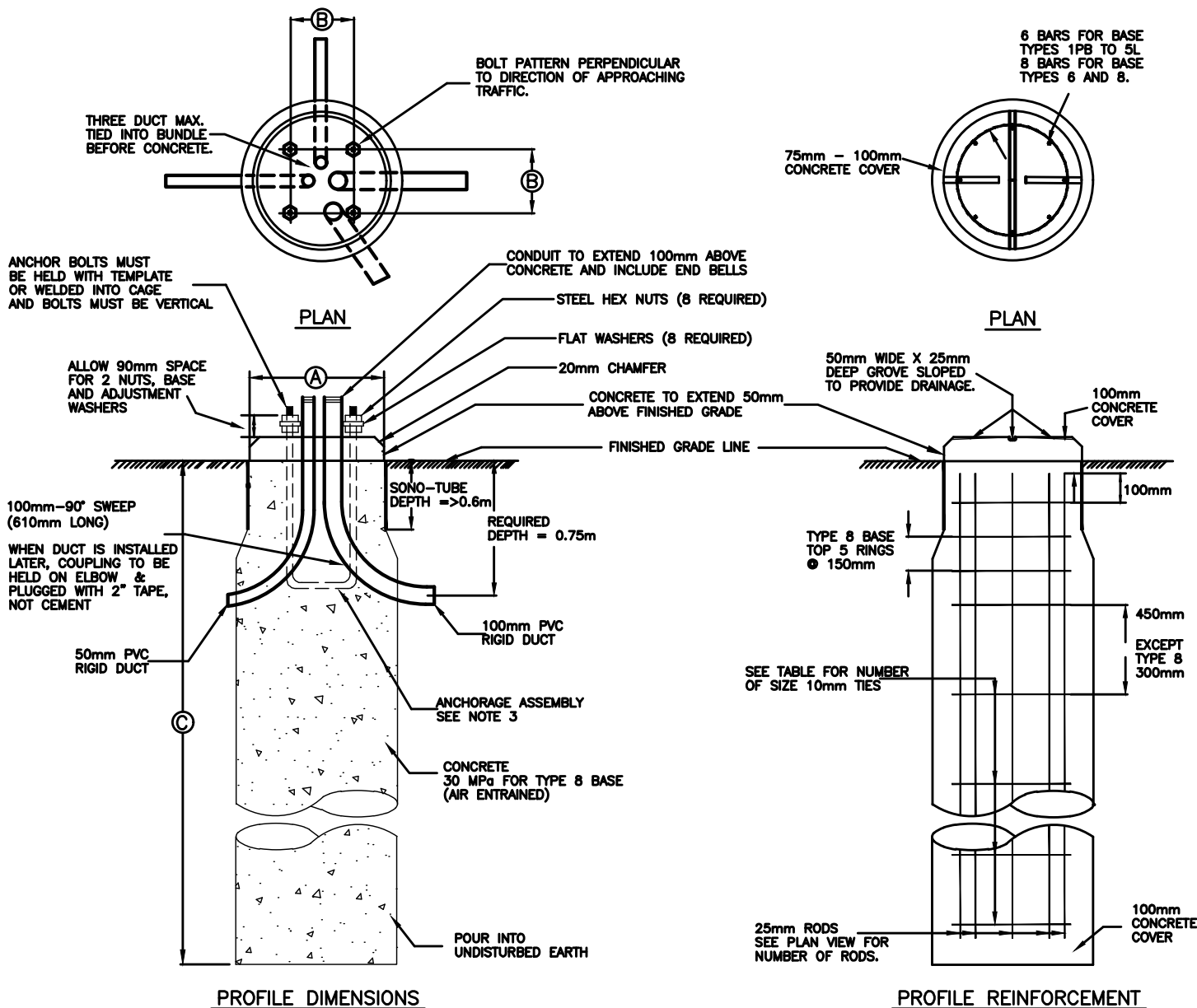
DATE: December 03, 2021 SCALE: NTS

UPDATED BY: A.S. DRAWN BY: T.C.

Niagara Region
PUBLIC WORKS

MODIFIED OPSD - 2215.02

NRS 2001



NOTES:

1. FOR DUCT SIZE SEE CONTRACT DRAWINGS.
2. FOR ANCHORAGE ASSEMBLY SEE NRS 2001.
3. ALL REINFORCING STEEL SHALL CONFORM TO C.S.A. G30.12M GRADE 400 MPa.
4. STUDS/BOLTS SHALL HAVE THE EXPOSED THREADS ABOVE THE FERRULE AND BE COATED WITH SILVER GRADE NEVERSEIZE.

POLE HEIGHT	BASE TYPE	DIAMETER Ⓐ	BOLT SPACING Ⓑ	DEPTH Ⓒ MIN	ROD LENGTH	NO. OF TIES
1.83m	1	305mm	140mm	1.22m	N/A	N/A
N/A	5X	610mm	280mm	1.22m	N/A	N/A
5.56m	3	610mm	230mm	2.15m	1.90m	4
8.92m	5	610mm	280mm	2.45m	2.20m	5
10.52m	6	760mm	318mm	2.60m	2.40m	5
6.93m	8	900mm	420mm	3.10m	2.90m	13

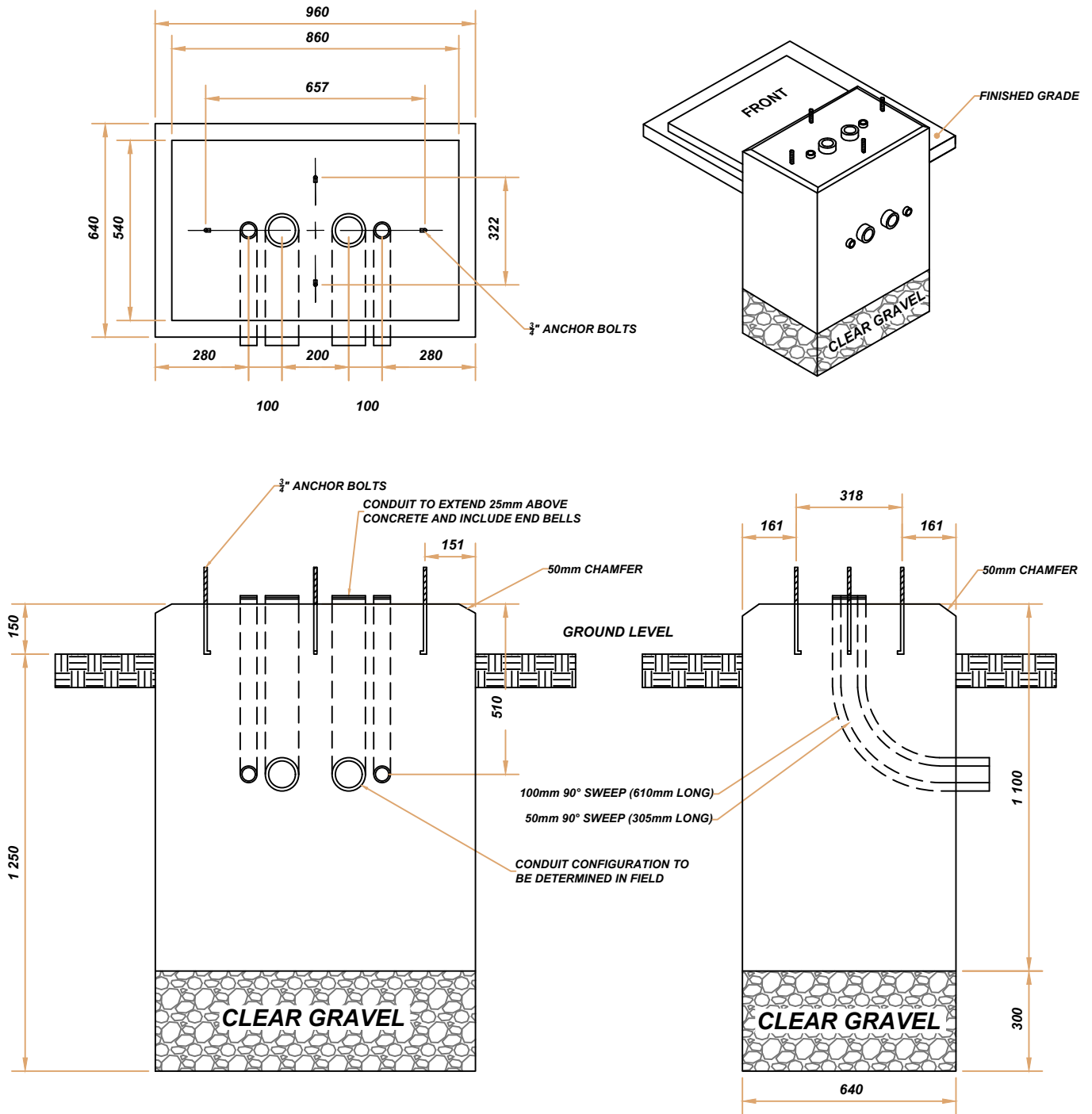
CONCRETE FOUNDATION FOR TRAFFIC POLES (TYPICAL)

DATE: December 03, 2021 SCALE: NTS

UPDATED BY: A.S. DRAWN BY: T.C

Niagara Region
PUBLIC WORKS

NRS 2002



NOTES:

1. CONCRETE BASE TO PROJECT 150mm (6") ABOVE ADJACENT GROUND LEVEL ON 300mm (12") OF CLEAR STONE.
2. CONCRETE BASE TO BE 30 MPa.
3. WHERE DUCT TO BE INSTALLED AT A LATER TIME, COUPLINGS TO BE HELD ON ELBOW AND PLUGGED WITH 50mm TAPE, NOT CEMENT.
4. 1.0m X 1.0m X 150mm (6") CONCRETE PAD TOP BE POURED AT GRADE LEVEL IN FRONT OF CABINET DOOR FOR SERVICING.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

**TYPE M, MSX & MXX CONTROLLER
CABINET FOUNDATION**

DATE: JANUARY 19TH, 2016

SCALE: NTS

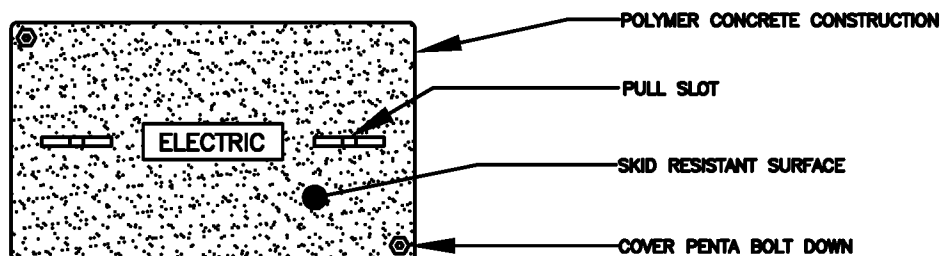
UPDATED BY: AS

DRAWN BY: TC

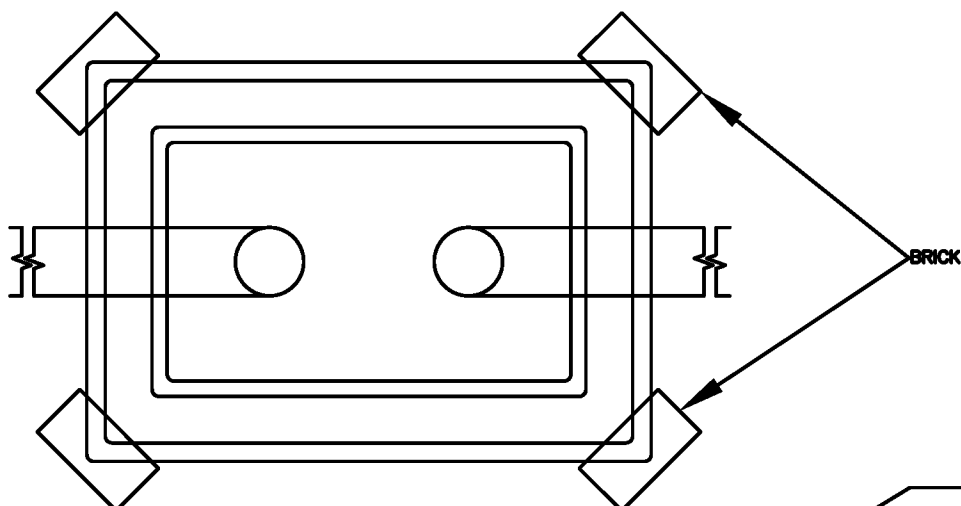
Niagara Region
PUBLIC WORKS

NRS 2003-M

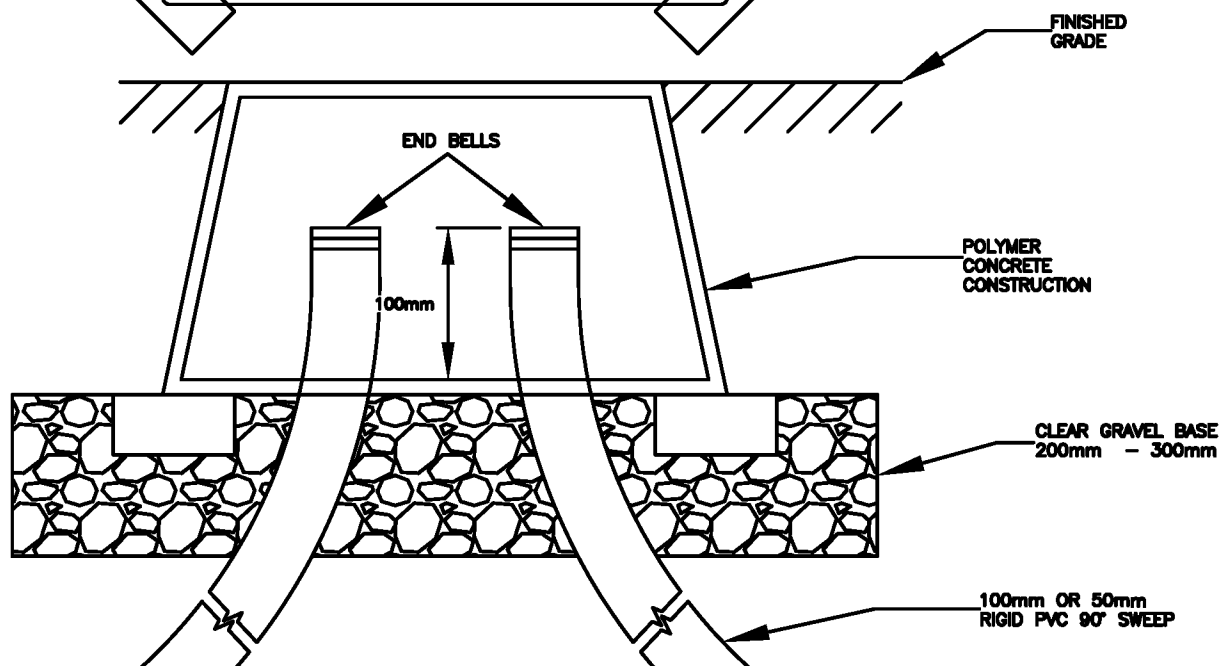
BOX COVER



PLAN



PROFILE



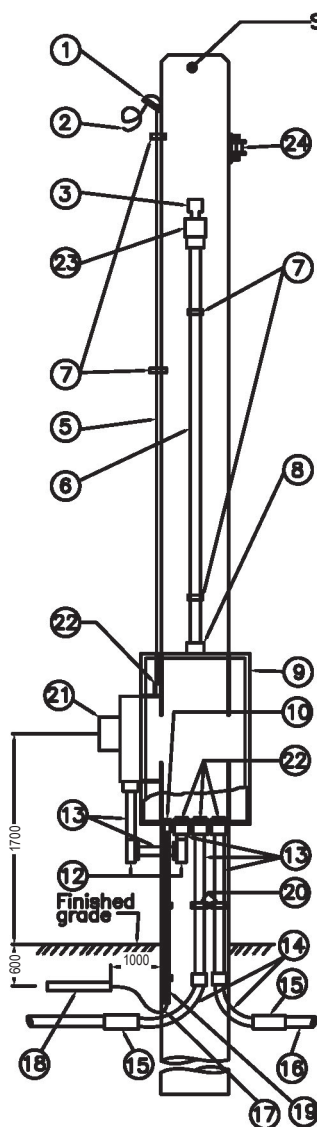
NOTE: ALL DIMENSIONS ARE APPROXIMATE.
JUNCTION BOX NOT TO BE CUT OR ALTERED IN ANY WAY.

TYPICAL JUNCTION BOX AND DUCT APPLICATION

DATE: January 28, 2021	SCALE: NTS
UPDATED BY: T.C	DRAWN BY: T.C

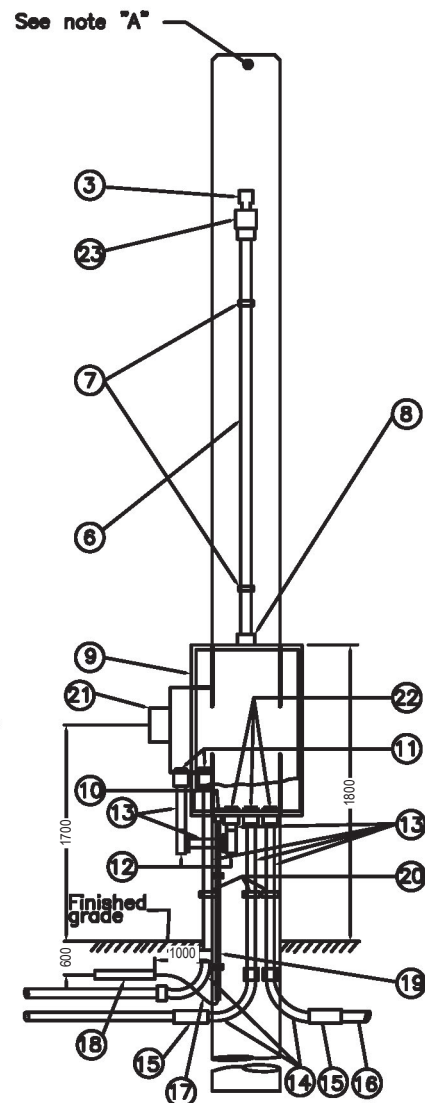
Niagara Region
PUBLIC WORKS

NRS 2020



OVERHEAD SUPPLY
INSTALLATION

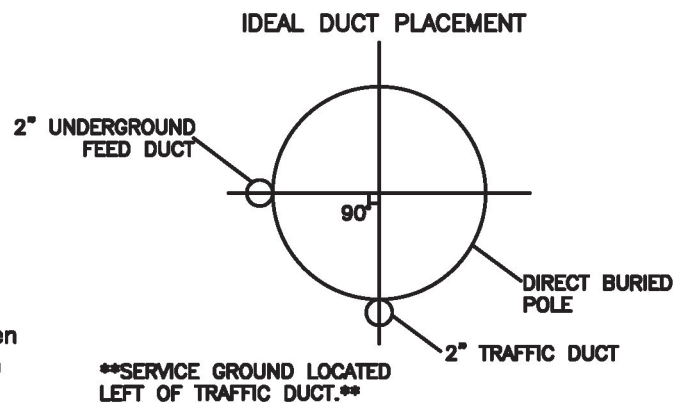
- See note "A"
- ① Service entrance fitting, 50mm, rigid PVC
 - ② #2 B/W (2 Black & 1 White) cable for connection to incoming supply
 - ③ Photoelectric controller with socket
 - ④ 3 #12 AWG, low voltage cable
 - ⑤ Conduit, 50mm, rigid PVC
 - ⑥ Conduit, 32mm, rigid PVC
 - ⑦ 20mm Stainless Steel Band
 - ⑧ Meter hub, 32mm, rigid PVC
 - ⑨ Supply control cabinet
 - ⑩ Terminal adapter and locknut, 19mm rigid PVC
 - ⑪ Terminal offset and locknut, 50mm, rigid PVC
 - ⑫ LB, 50mm, rigid PVC
 - ⑬ 50mm rigid PVC
 - ⑭ 90° elbow, 50mm, rigid PVC
 - ⑮ Adapter coupling, 50mm, rigid PVC to polyethylene pipe
 - ⑯ Polyethylene pipe, 50mm
 - ⑰ #6 AWG green ground copper wire
 - ⑱ 1 Ground Plate
 - ⑲ 20mm rigid PVC
 - ⑳ 50mm Expansion Joint Coupling
 - ㉑ Hydro meter base
 - ㉒ Meter hub, 50mm, Rigid PVC
 - ㉓ 4X4X4 PVC
 - ㉔ SINGLE POINT RACK C/W INSULATOR



UNDERGROUND SUPPLY
INSTALLATION

NOTES:

- A Supply control cabinet shall be mounted to a type 6 direct buried pole.
- B Incoming and out going cable sizes and orientation of cabinet are shown elsewhere in the contract.
- C For supply control cabinet schematic wiring diagram refer to NRS 2440.
- D Mount the supply cabinet to the pole by using applicable mounting brackets and stainless steel strapping.
- E All dimensions are in millimetres or metres unless otherwise shown.
- F Pole Handhole shall be placed 180° to 2" traffic duct. Then 2" underground supply duct shall be placed 90° CCW from center of 2" traffic duct.
- G All conduits shall be continuous except at expansion coupling location. All bends shall be made in the field unless otherwise approved.



SUPPLY CONTROL CABINET INSTALLATION OVERHEAD AND UNDERGROUND SERVICES FOR DIRECT BURIED POLE

DATE: June 29, 2011

SCALE: NTS

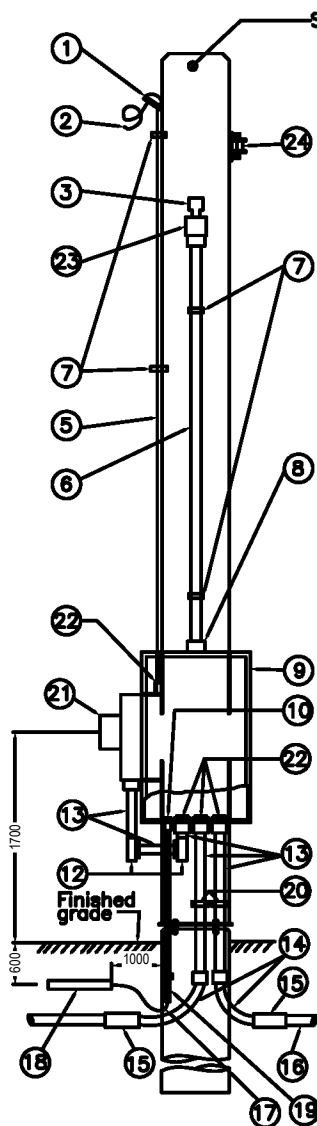
UPDATED BY: H.D.M.

DRAWN BY: T.C

Niagara Region

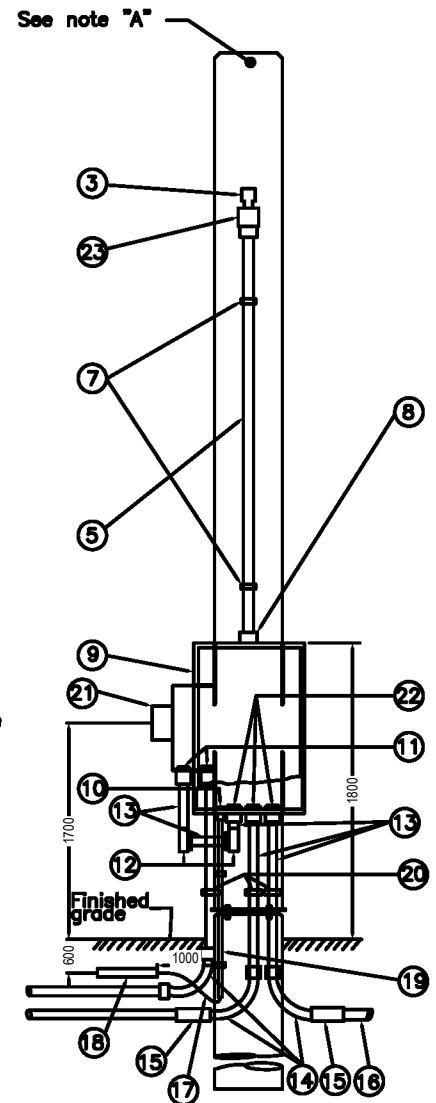
PUBLIC WORKS

NRS 2130



OVERHEAD SUPPLY
INSTALLATION

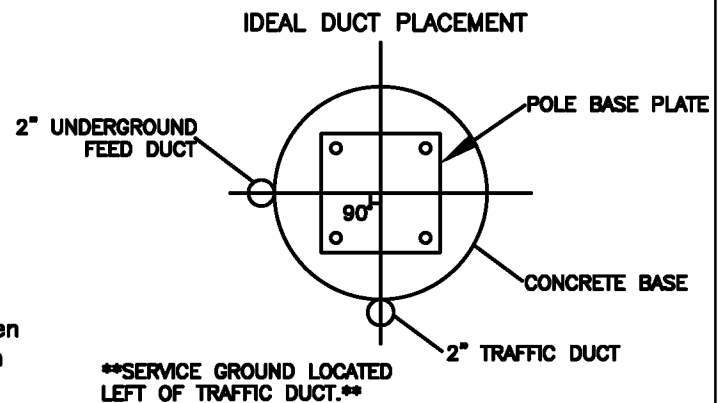
- See note "A"
- ① Service entrance fitting, 50mm, rigid PVC
 - ② #2 B/W (2 Black & 1 White) cable for connection to incoming supply
 - ③ Photoelectric controller with socket
 - ④ 3 #12 AWG, low voltage cable
 - ⑤ Conduit, 50mm, rigid PVC
 - ⑥ Conduit, 32mm, rigid PVC
 - ⑦ 20mm Stainless Steel Band
 - ⑧ Meter hub, 32mm, rigid PVC
 - ⑨ Supply control cabinet
 - ⑩ Terminal adapter and locknut, 19mm rigid PVC
 - ⑪ Terminal offset and locknut, 50mm, rigid PVC
 - ⑫ LB, 50mm, rigid PVC
 - ⑬ 50mm rigid PVC
 - ⑭ 90° elbow, 50mm, rigid PVC
 - ⑮ Adapter coupling, 50mm, rigid PVC to polyethylene pipe
 - ⑯ Polyethylene pipe, 50mm
 - ⑰ #6 AWG green ground copper wire
 - ⑱ 1 Ground Plate
 - ⑲ 20mm rigid PVC
 - ⑳ 50mm Expansion Joint Coupling
 - ㉑ Hydro meter base
 - ㉒ Meter hub, 50mm, Rigid PVC
 - ㉓ 4X4X4 PVC
 - ㉔ SINGLE POINT RACK C/W INSULATOR



UNDERGROUND SUPPLY
INSTALLATION

NOTES:

- A Supply control cabinet shall be mounted to a base mounted pole.
- B Incoming and out going cable sizes and orientation of cabinet are shown elsewhere in the contract.
- C For supply control cabinet schematic wiring diagram refer to NRS 2440.
- D Mount the supply cabinet to the pole by using applicable mounting brackets and stainless steel strapping.
- E All dimensions are in millimetres or metres unless otherwise shown.
- F Pole Handhole shall be placed 180° to 2" traffic duct. Then 2" underground supply duct shall be placed 90° CCW from center of 2" traffic duct.
- G All conduits shall be continuous except at expansion coupling location. All bends shall be made in the field unless otherwise approved.



SUPPLY CONTROL CABINET INSTALLATION OVERHEAD AND UNDERGROUND SERVICES FOR BASE MOUNTED POLE

DATE: June 29, 2011

SCALE: NTS

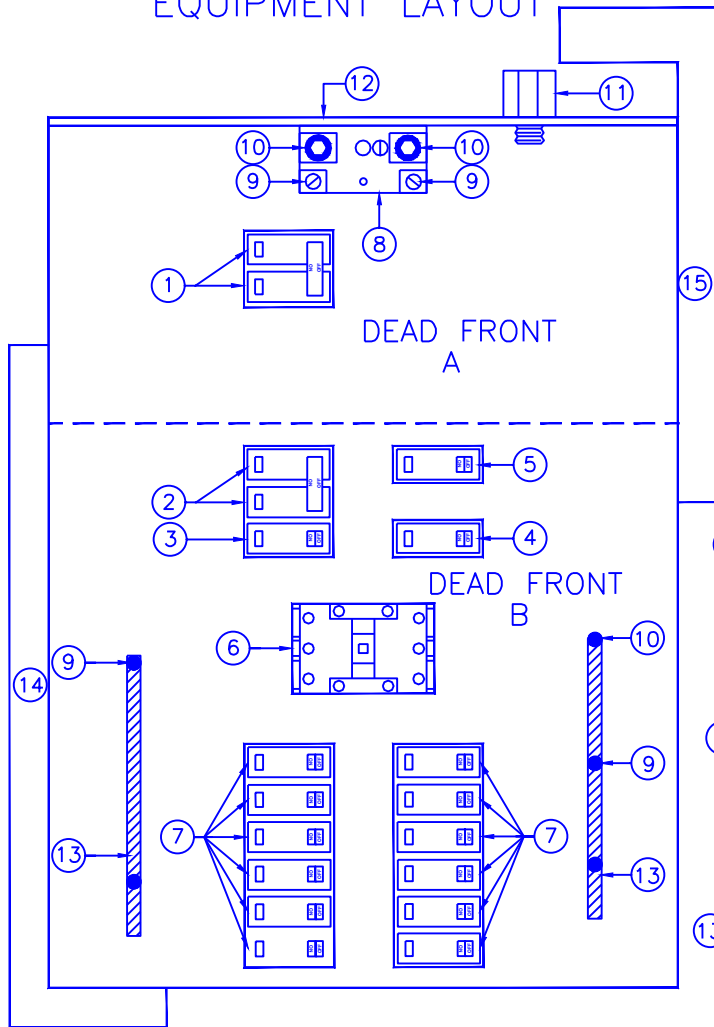
UPDATED BY: H.D.M.

DRAWN BY: T.C

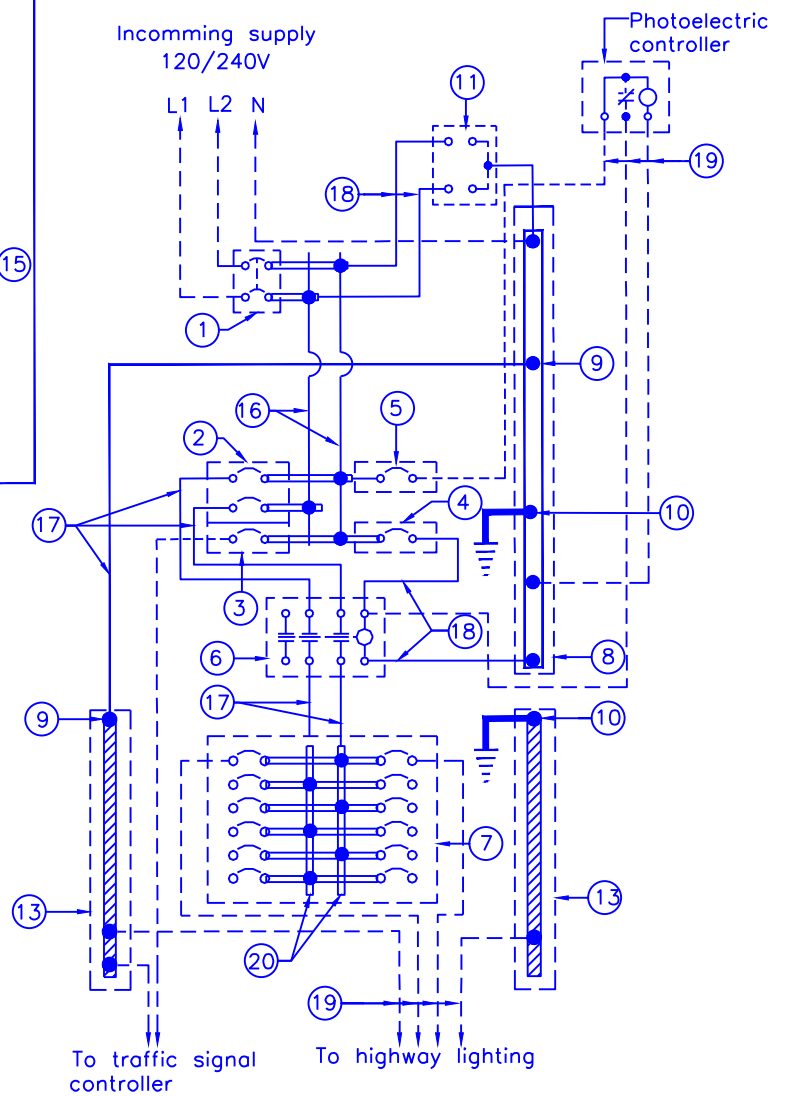
Niagara Region
PUBLIC WORKS

NRS 2131

EQUIPMENT LAYOUT



SCHEMATIC WIRING DIAGRAM



ELECTRICAL EQUIPMENT LIST

- | | |
|---|---|
| <ul style="list-style-type: none"> ① Main circuit breaker – 100A, 2–pole. ② Lighting circuit breaker – 60A, 2–pole. ③ Traffic signal circuit breaker – 1–pole, ampacity as specified ④ Circuit breaker used for relamping – 15A, 1–pole. ⑤ Circuit breaker for photoelectric controller – 15A, 1–pole. ⑥ Lighting contactor – 60A, 2–pole, 120V coil ⑦ Branch circuit breakers – 30A, 1–pole. number of breakers as specified ⑧ Solid neutral assembly – 100 A minimum, copper ⑨ Ground lug for NO. 6 AWG stranded copper ground wire. | <ul style="list-style-type: none"> ⑩ Ground lug for No. 2/0 AWG stranded copper ground wire ⑪ Secondary lightning arrester, 650V, 2–pole. ⑫ Drip shield. ⑬ Secondary neutral and ground bus according to CSA, and as specified ⑭ Primary barrier. ⑮ Secondary barrier. ⑯ No. 3 AWG RWU90 wire or copper bus bar ⑰ No. 6 AWG RWU90 wire ⑱ No. 12 AWG RWU90 wire ⑲ Field wiring ⑳ Copper bus bar |
|---|---|

NOTE:

This NRS shall be read in conjunction with OPSD 2440.040, 2440.050, and 2440.060.

SUPPLY CONTROL CABINET
ASSEMBLY TYPE 1 120/240, 100A,
 1–PHASE, 3–WIRE

DATE: October 11, 2022

SCALE: NTS

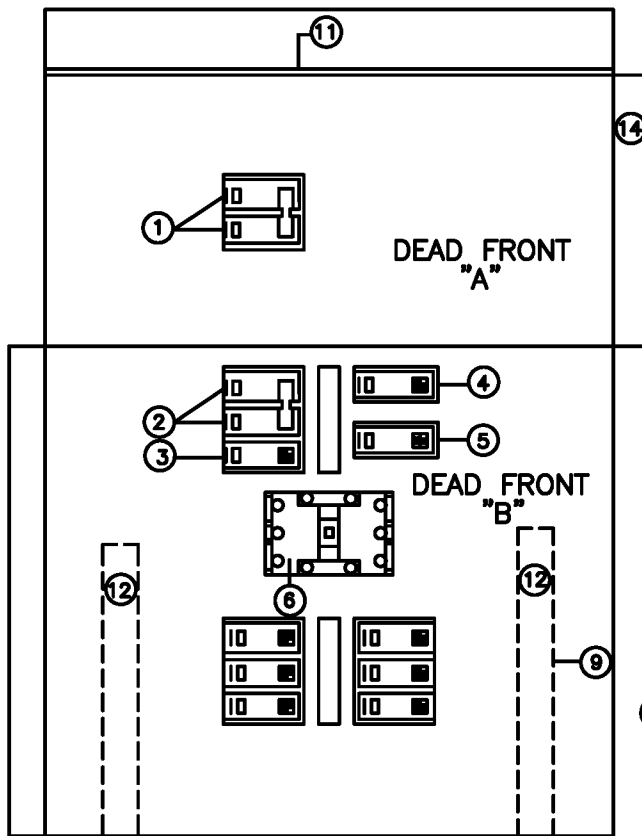
UPDATED BY: N.R.L

DRAWN BY: T.C

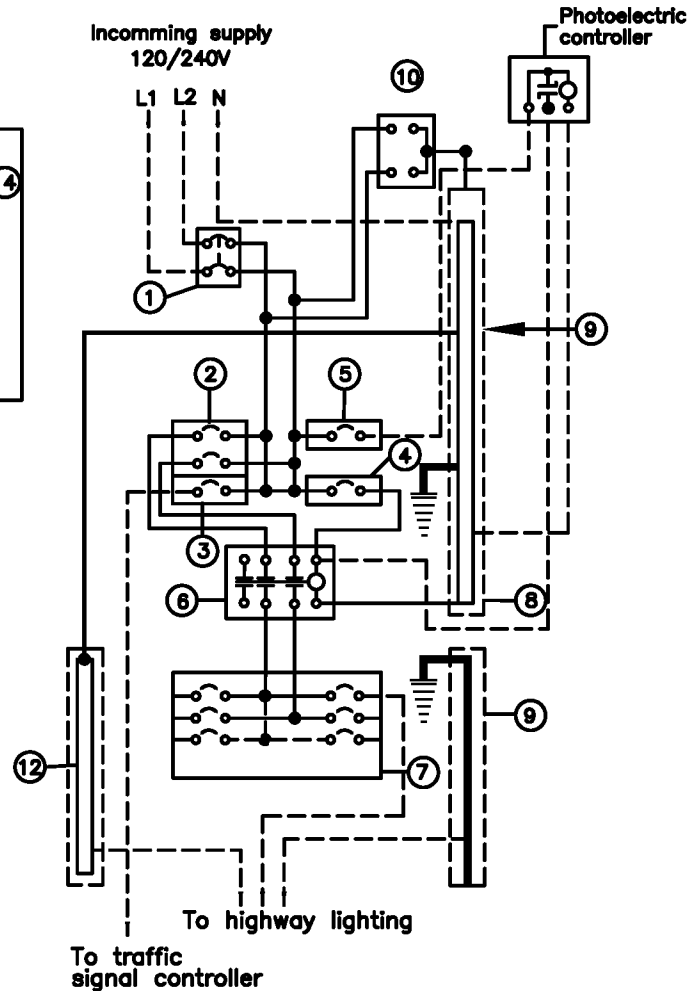
Niagara Region
PUBLIC WORKS

NRS 2440

EQUIPMENT LAYOUT



SCHEMATIC WIRING DIAGRAM



ELECTRICAL EQUIPMENT LIST

- ① Main circuit breaker - 240V, 60A, 2-pole.
- ② Lighting circuit breaker - 240V, 60A, 2-pole.
- ③ Traffic signal circuit breaker - 120V, 40A, 1-pole.
- ④ Circuit breaker used for relamping - 120V, 15A, 1-pole.
- ⑤ Circuit breaker for photoelectric controller - 120V, 15A, 1-pole.
- ⑥ Lighting contactor - 240V, 60A, 3-pole, 120V coil.
- ⑦ Branch circuit breakers - 120V, 30A 1-pole, 120V, 20A 1-pole and 1 120V, 15A 1-pole.
- ⑧ Solid neutral assembly - 100 A minimum
- ⑨ Ground lug for #6 AWG stranded copper ground wire.
- ⑩ Secondary lightning arrester, 650V, 2-pole.
- ⑪ Drip shield.
- ⑫ Secondary neutral and ground bus according to CSA, ESA and project requirements.
- ⑬ Primary barrier.
- ⑭ Secondary barrier.

LEGEND:

- ◆— Denotes terminal connection.
- Denotes #4 AWG RWU90 wire.
- Denotes #12 AWG RWU90 wire.
- Denotes field wiring (sizes as indicated elsewhere on the contract drawings).
- Denotes Ground bus.

SUPPLY CONTROL CABINET
ASSEMBLY TYPE 3S 120/240, 100A,
 1-PHASE, 3-WIRE

DATE: January 29, 2016

SCALE: NTS

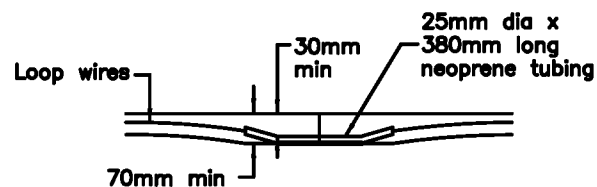
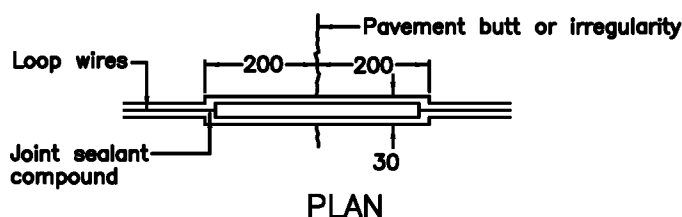
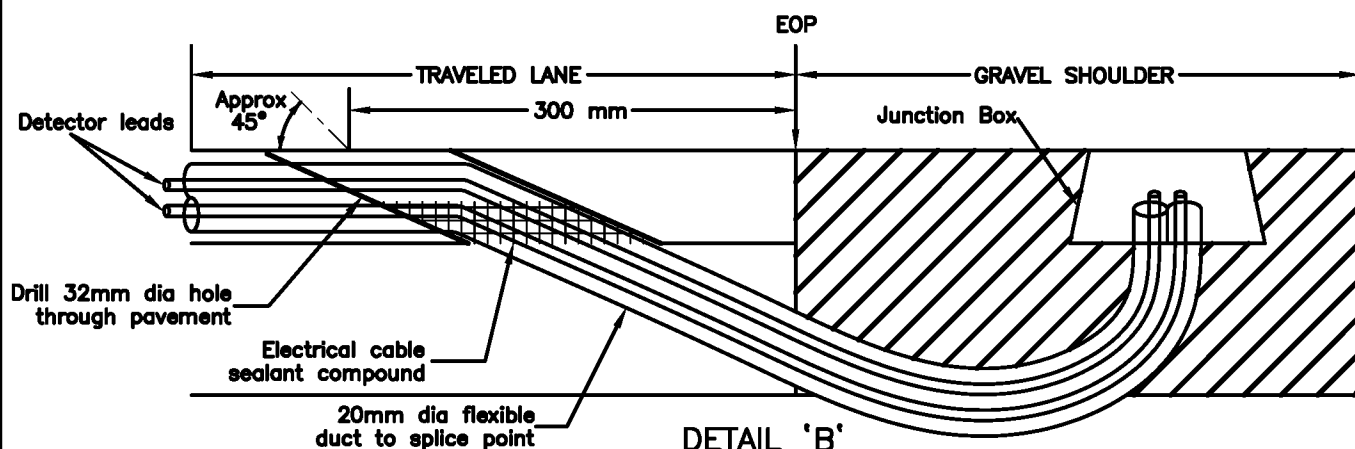
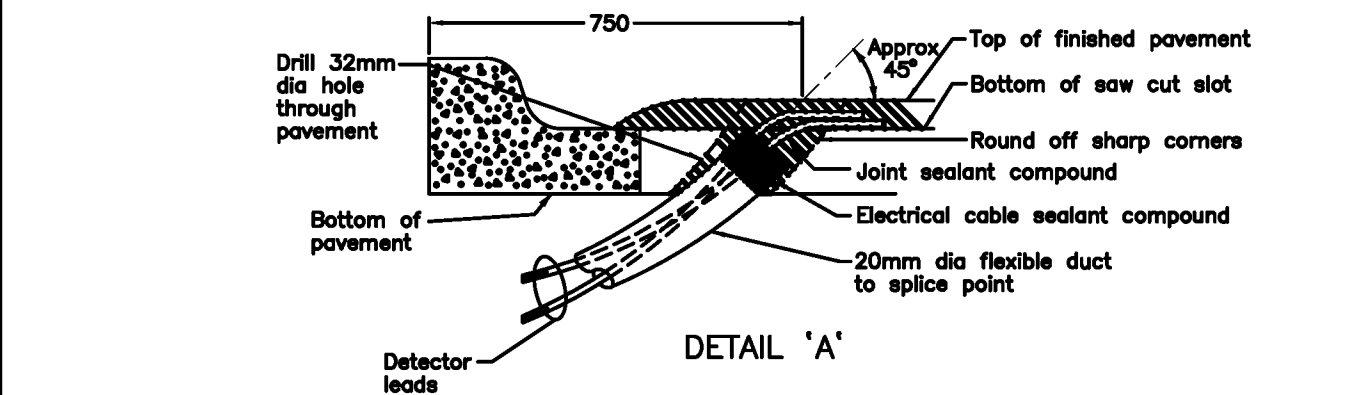
UPDATED BY: A.S

DRAWN BY: T.C

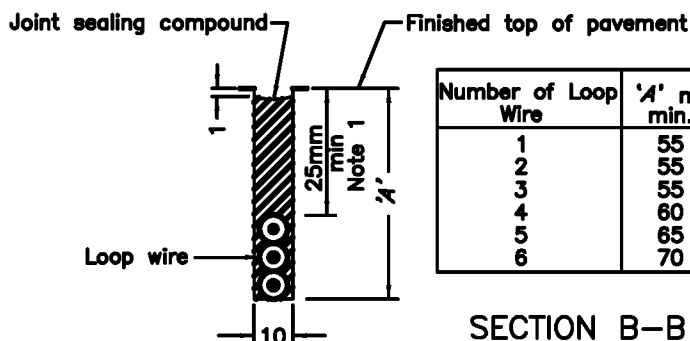
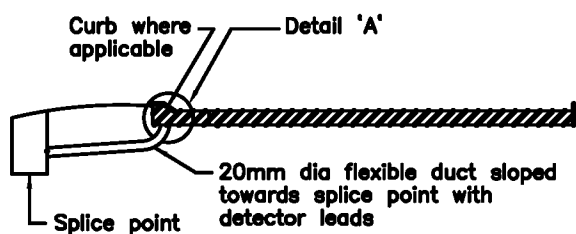
Niagara Region

PUBLIC WORKS

NRS 2441



DETAIL-PAVEMENT BUTT OR IRREGULARITY



Number of Loop Wire	'A' mm min.
1	55
2	55
3	55
4	60
5	65
6	70

NOTES:

- 1 Where cable is installed prior to the finished top course paving, the maximum depth of cover shall be 100mm.
- 2 This drawing shall be read in conjunction with OPSD-2520.01.
- 3 All dimensions are in millimetres or metres unless otherwise shown.
- 4 All loops shall be tested and tagged with impedance reading.
- 5 Loop leads shall be twisted together a minimum of 5 turns per foot exiting the loop.

LOOP DETECTOR INSTALLATION DETAILS

DATE: February 11, 2011 SCALE: NTS

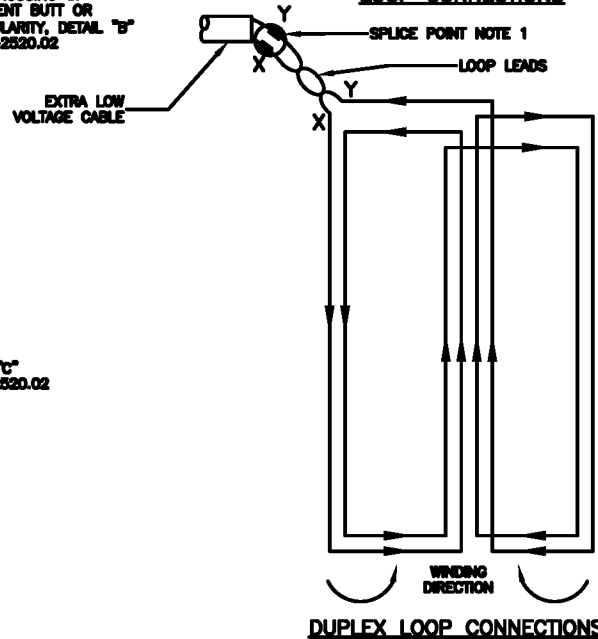
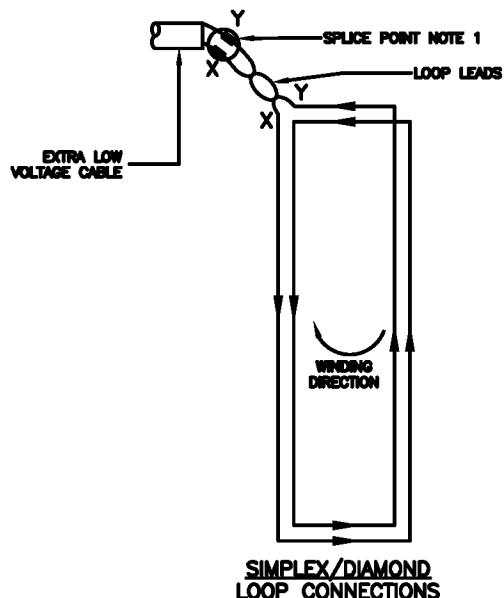
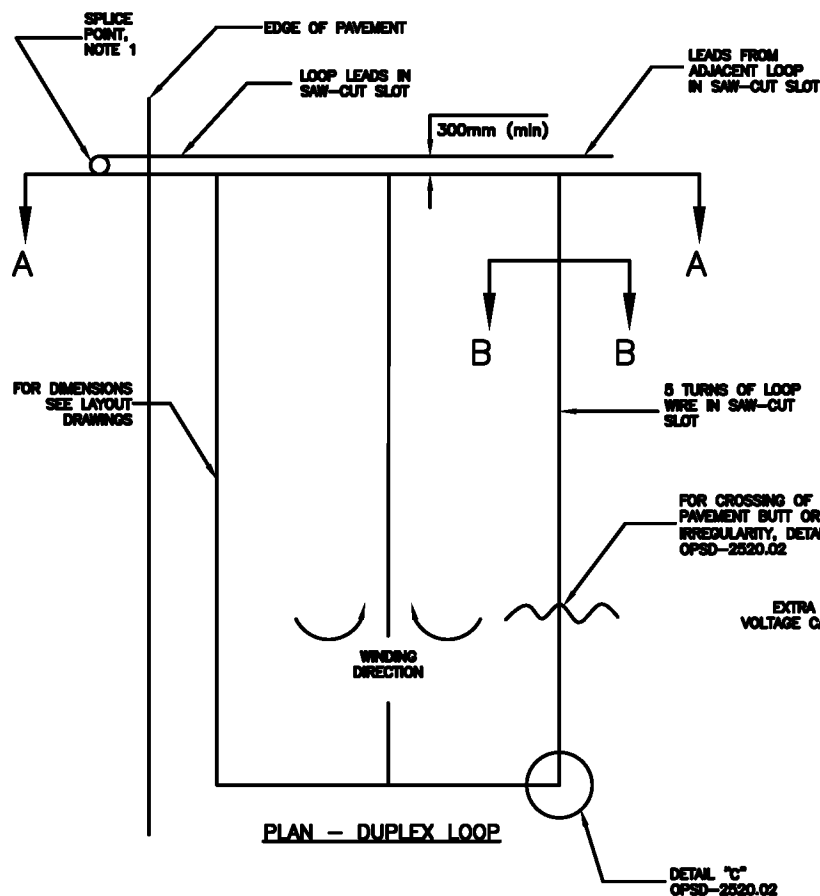
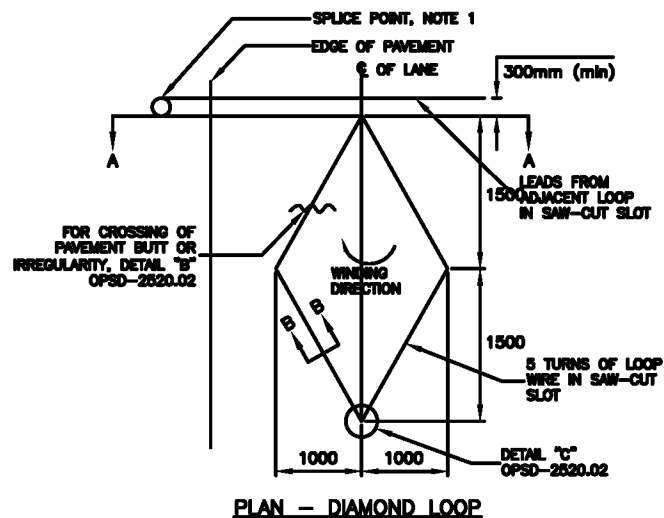
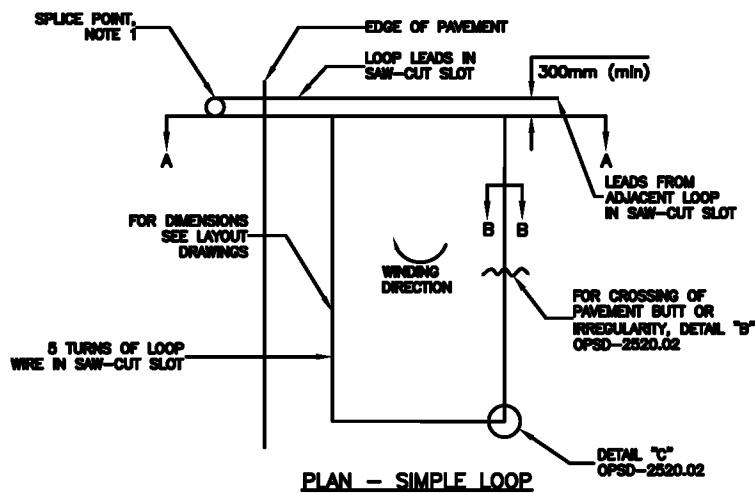
UPDATED BY: H.D.M. DRAWN BY: T.C

MODIFIED OPSD - 2520.02

Niagara Region

PUBLIC WORKS

NRS 2520



NOTES:

- 1 FOR LOCATION OF JUNCTION BOX OR POLE SPICE REFER TO LAYOUT DRAWINGS.
- A FOR SECTIONS A-A & B-B, REFER TO OPSD-2520.02.
- B FOR SPlice TO EXTRA LOW VOLTAGE CABLE, REFER TO OPSD-2530.01.
- C ALL DIMENSIONS ARE IN MILLIMETERS OR METERS UNLESS OTHERWISE SHOWN.

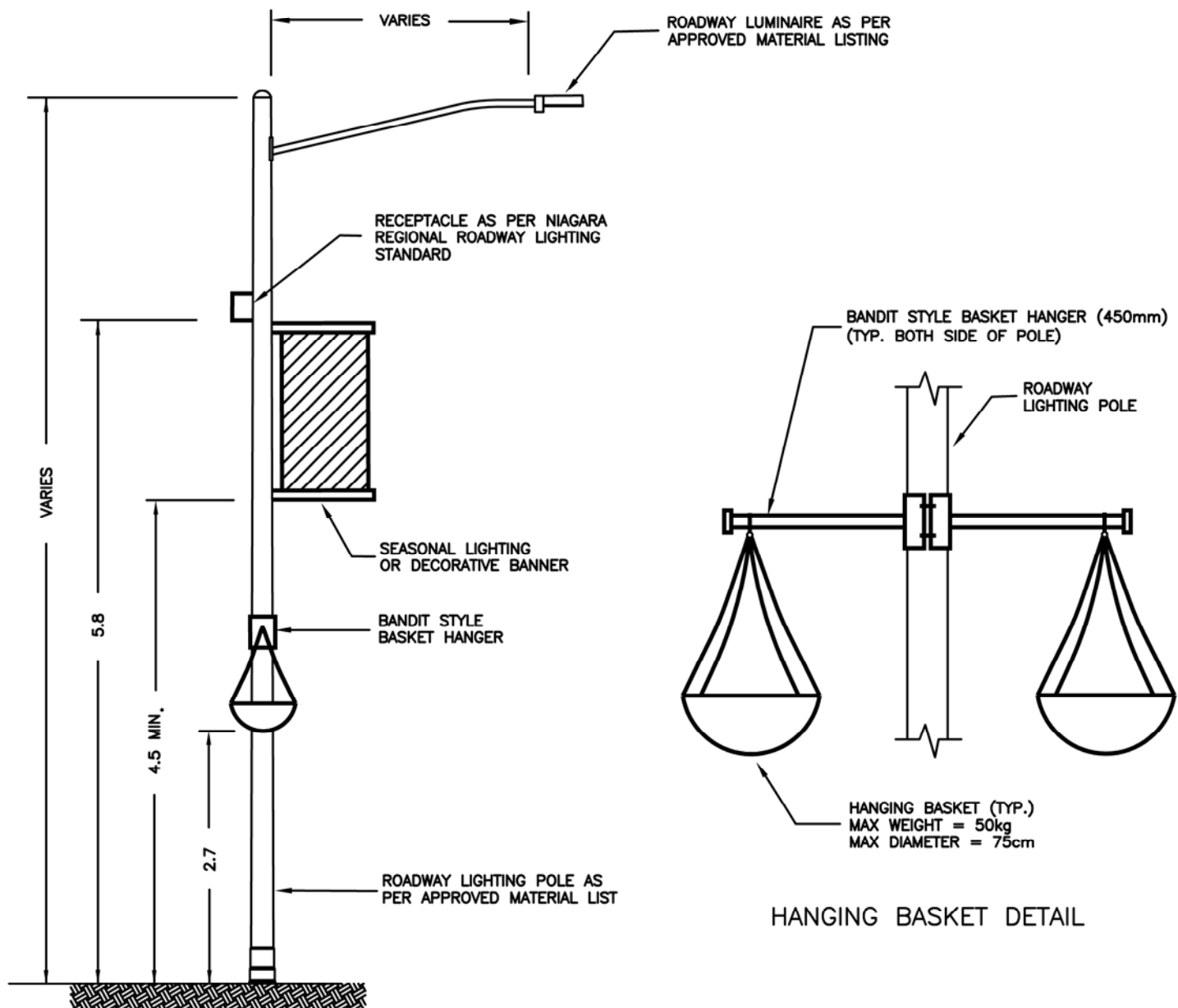
**LOOP DETECTOR INSTALLATION
DETAILS 2**

DATE: February 11, 2011	SCALE: NTS
UPDATED BY: H.D.M.	DRAWN BY: T.C

MODIFIED OPSD - 2520.01

Niagara Region
PUBLIC WORKS

NRS 2521



HANGING BASKET DETAIL

NOTES:

- A. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN
- B. POLES ARE TO BE PRE-DRILLED FROM THE MANUFACTURER FOR ALL WIRING APERTURES, BRACKETS AND BANNER ARMS
- C. ALL CONNECTION HARDWARE AND APPURTENANCES MUST BE APPROVED BY NIAGARA REGION

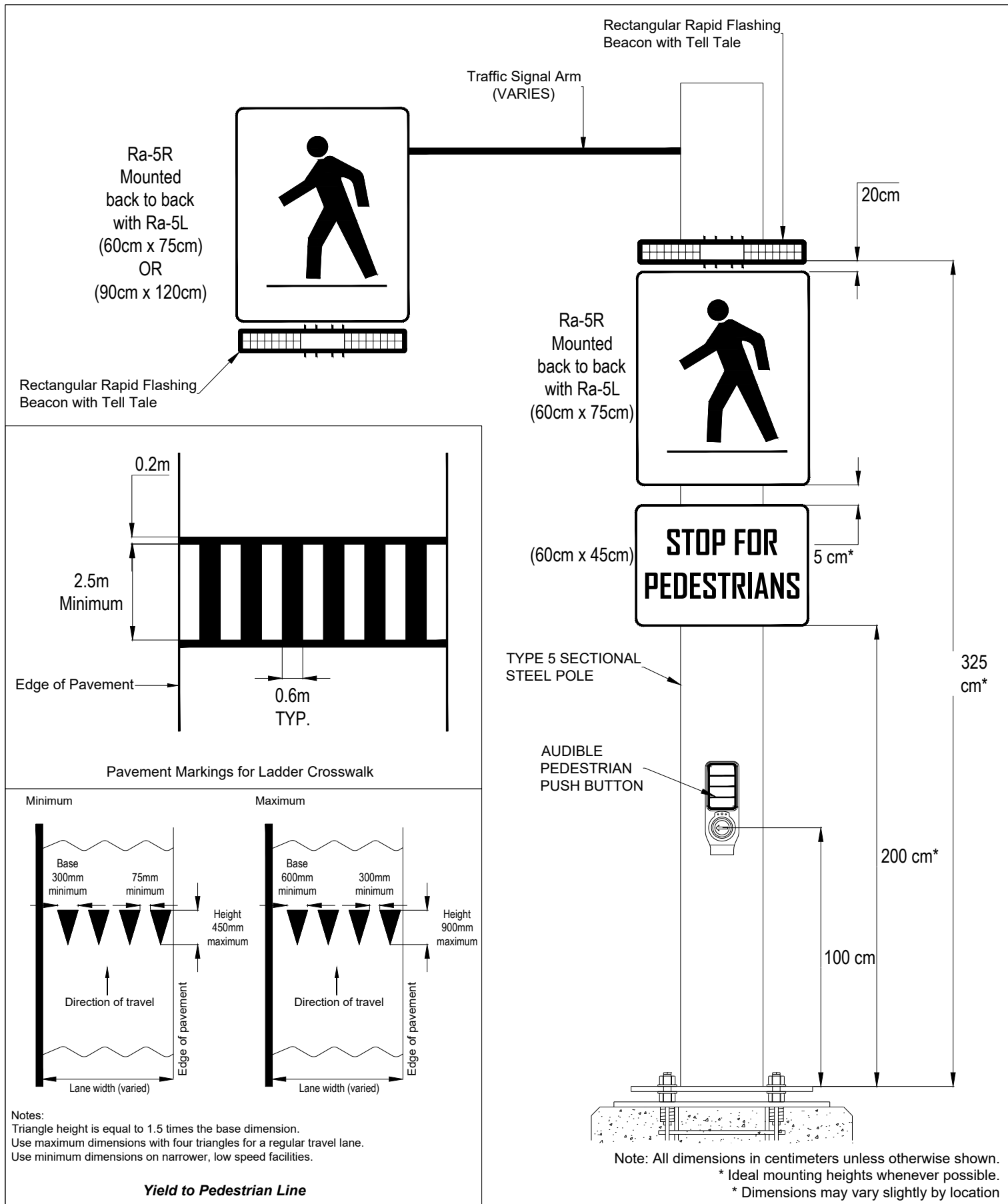
DECORATIVE ACCESSORIES ON
ROADWAY LIGHTING POLE

DATE: FEBRUARY 26, 2016 SCALE: N.T.S.
UPDATED BY: B.D.C. DRAWN BY: B.D.C.

Niagara  Region

PUBLIC WORKS

NRS 2522



PXO CROSSING – LEVEL 2 TYPE B SIGN LAYOUT AND DIMENSION DETAIL

DATE: October 4, 2022

SCALE: NTS

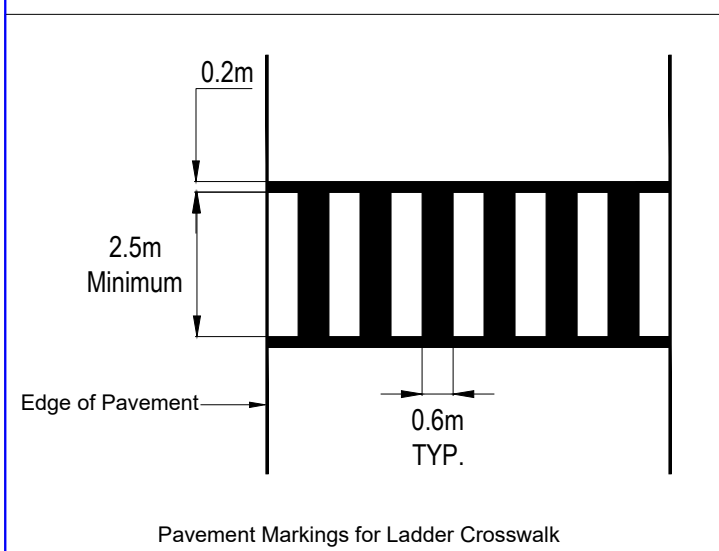
UPDATED BY: TC

DRAWN BY: TC

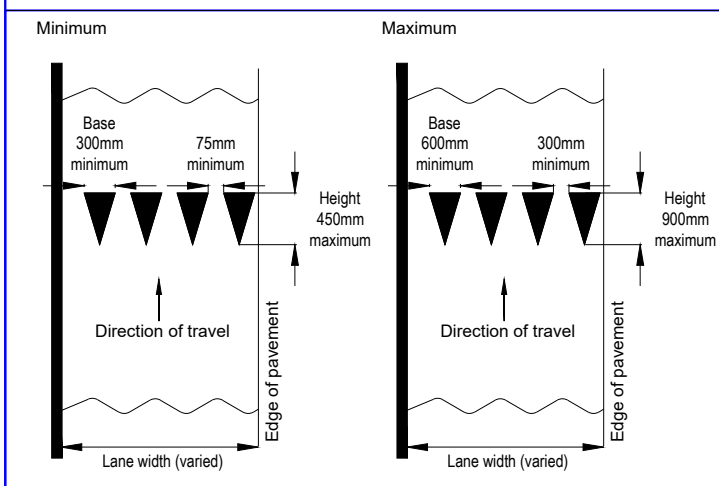
MODIFIED OPSD – N/A

Niagara Region
PUBLIC WORKS

NRS 2600

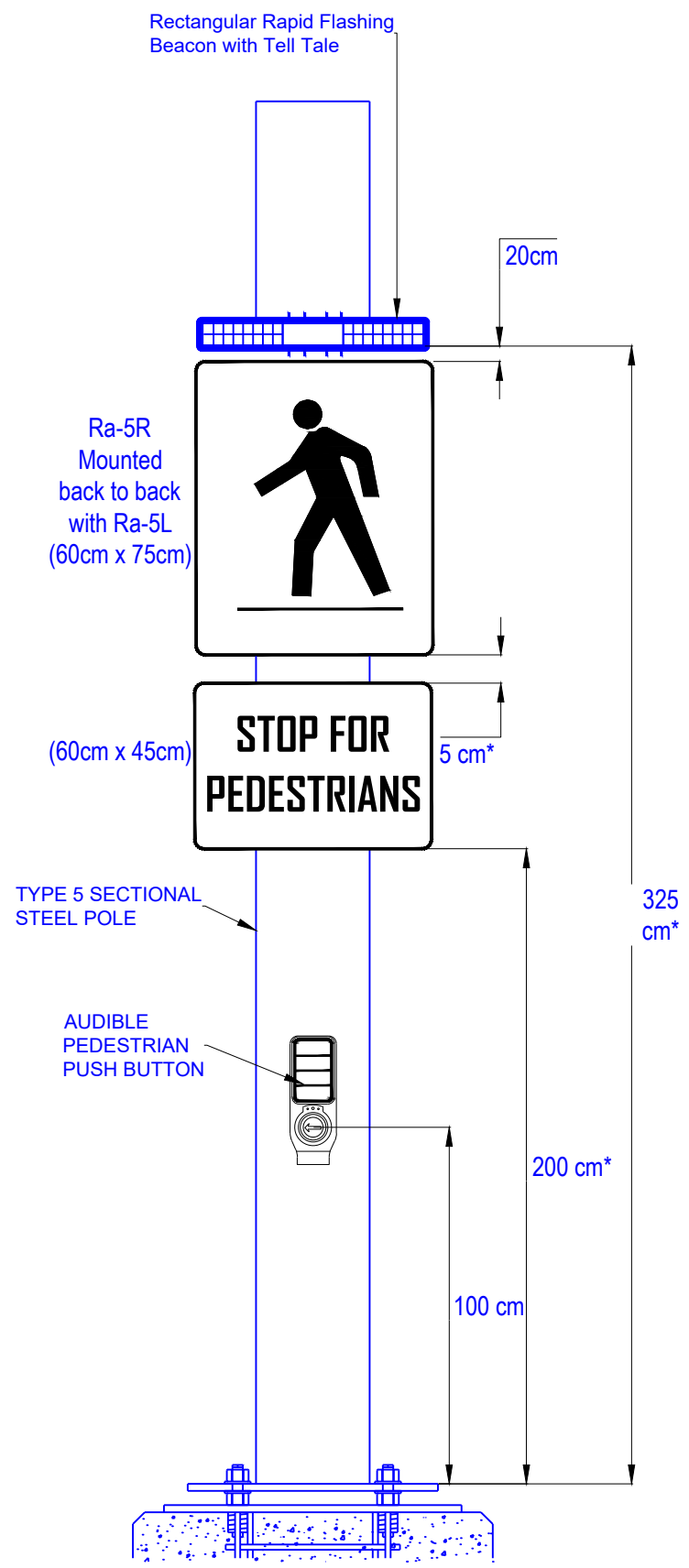


Pavement Markings for Ladder Crosswalk



Notes:
 Triangle height is equal to 1.5 times the base dimension.
 Use maximum dimensions with four triangles for a regular travel lane.
 Use minimum dimensions on narrower, low speed facilities.

Yield to Pedestrian Line

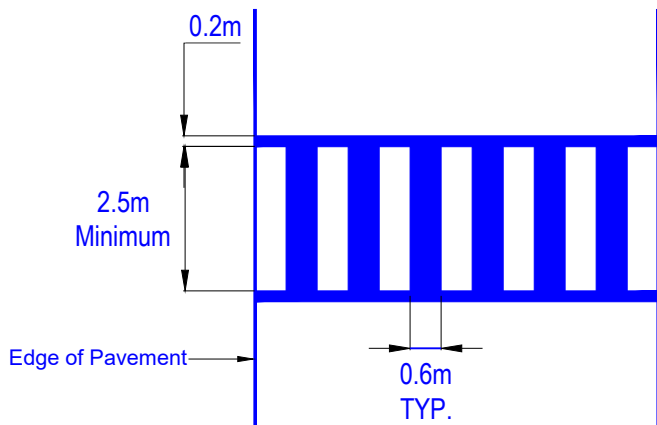


Note: All dimensions in centimeters unless otherwise shown.
 * Ideal mounting heights whenever possible.
 * Dimensions may vary slightly by location

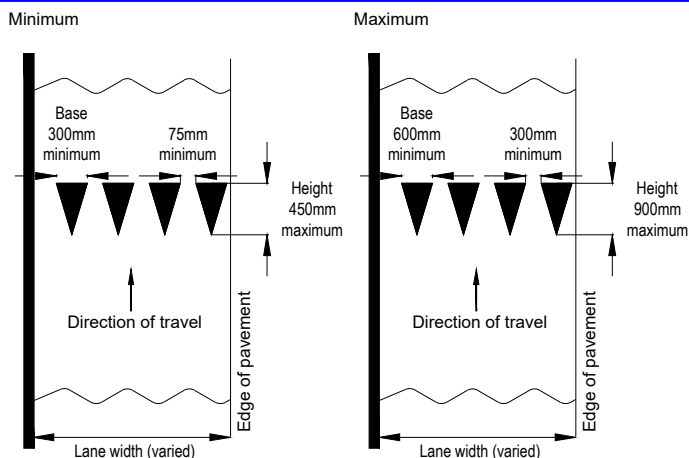
PXO CROSSING – LEVEL 2 TYPE C SIGN LAYOUT AND DIMENSION DETAIL

DATE: October 4, 2022	SCALE: NTS
UPDATED BY: ---	DRAWN BY: N.R.L

MODIFIED OPSD – N/A

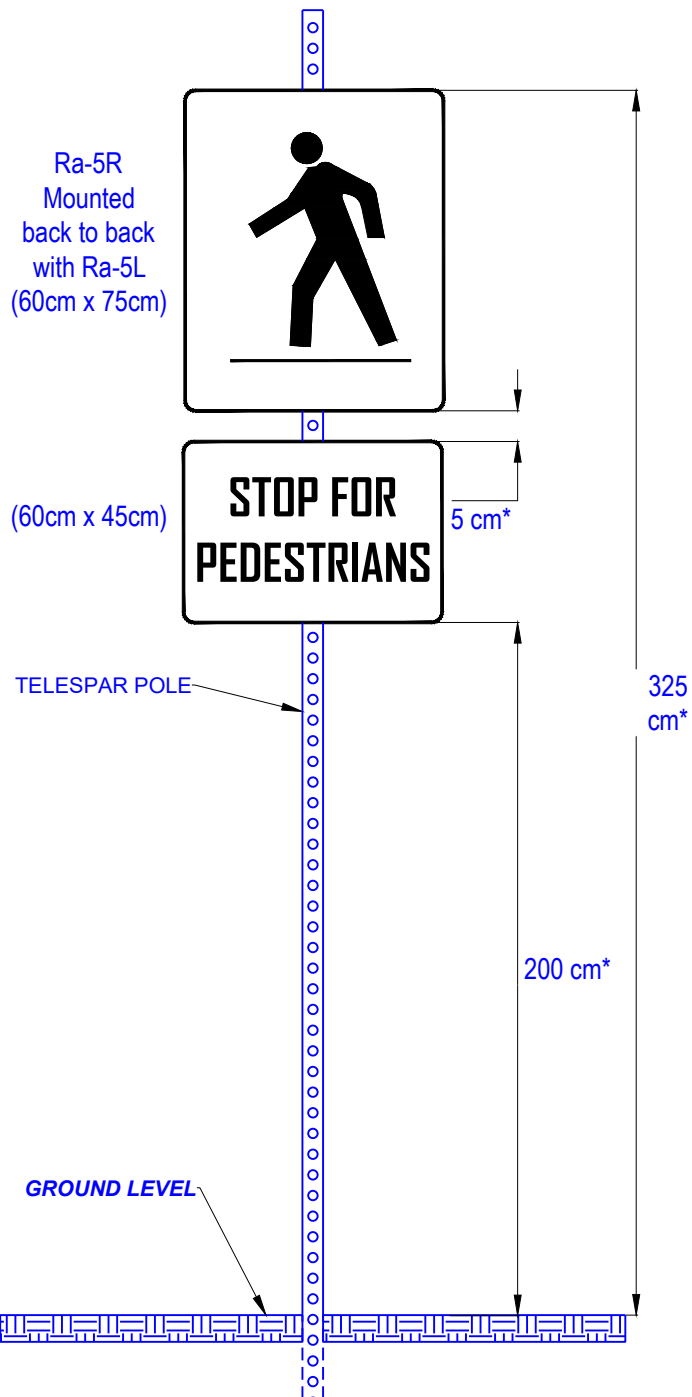


Pavement Markings for Ladder Crosswalk



Notes:
Triangle height is equal to 1.5 times the base dimension.
Use maximum dimensions with four triangles for a regular travel lane.
Use minimum dimensions on narrower, low speed facilities.

Yield to Pedestrian Line



Note: All dimensions in centimeters unless otherwise shown.

* Ideal mounting heights in vertical poles.
* Dimensions may vary slightly by location.

PXO CROSSING – LEVEL 2 TYPE D SIGN LAYOUT AND DIMENSION DETAIL

DATE: October 4, 2022

SCALE: NTS

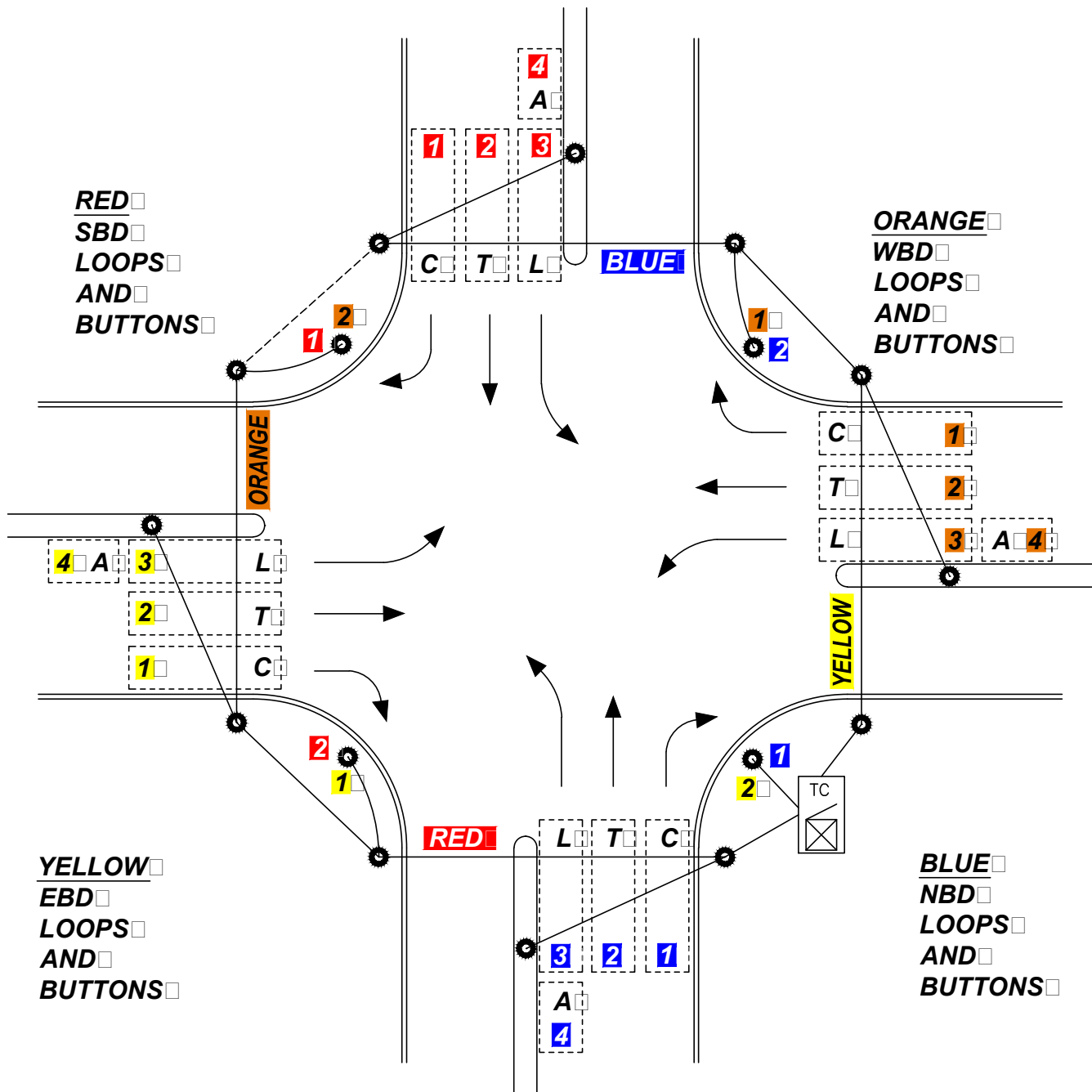
UPDATED BY: ---

DRAWN BY: TC

MODIFIED OPSD – N/A

Niagara Region
PUBLIC WORKS

NRS 2620



**SIGNAL CABLE
COLOUR IDENTIFICATION**

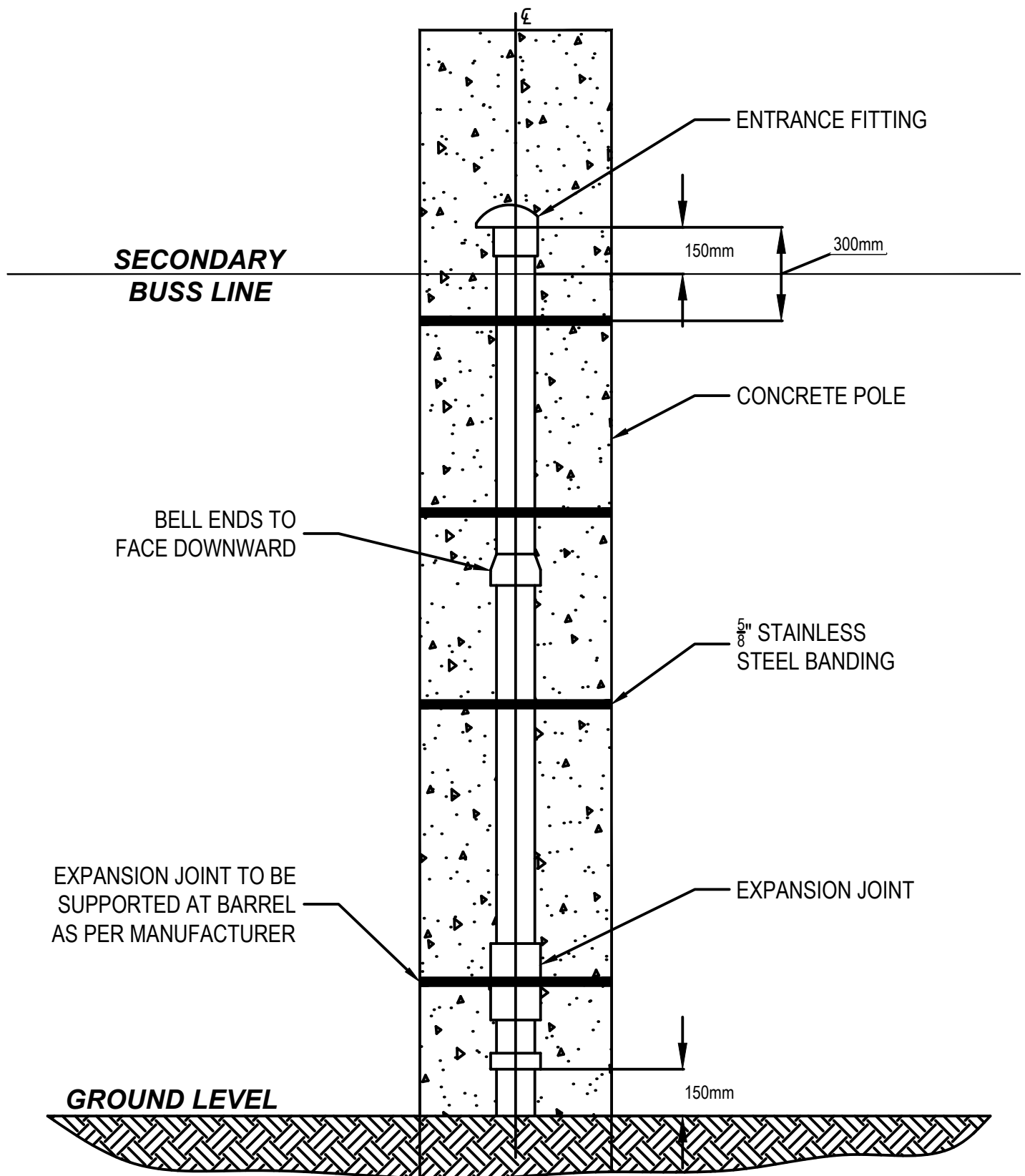
DATE: February 25, 2014	SCALE: NTS
UPDATED BY: A.S.	DRAWN BY: M.K

Niagara Region

PUBLIC WORKS

MODIFIED OPSD - N/A

NRS 2710



NOTES:

1. CONDUIT TO BE INSTALLED ON OPPOSITE SIDE OF TRAFFIC FLOW (WHERE POSSIBLE).
2. CONDUIT TO BE SUPPORTED AS PER OEC 12 (1114).

**PVC CONDUIT INSTALLATION
CONCRETE POLE**

DATE: APRIL 28, 2015

SCALE: NTS

UPDATED BY: GW

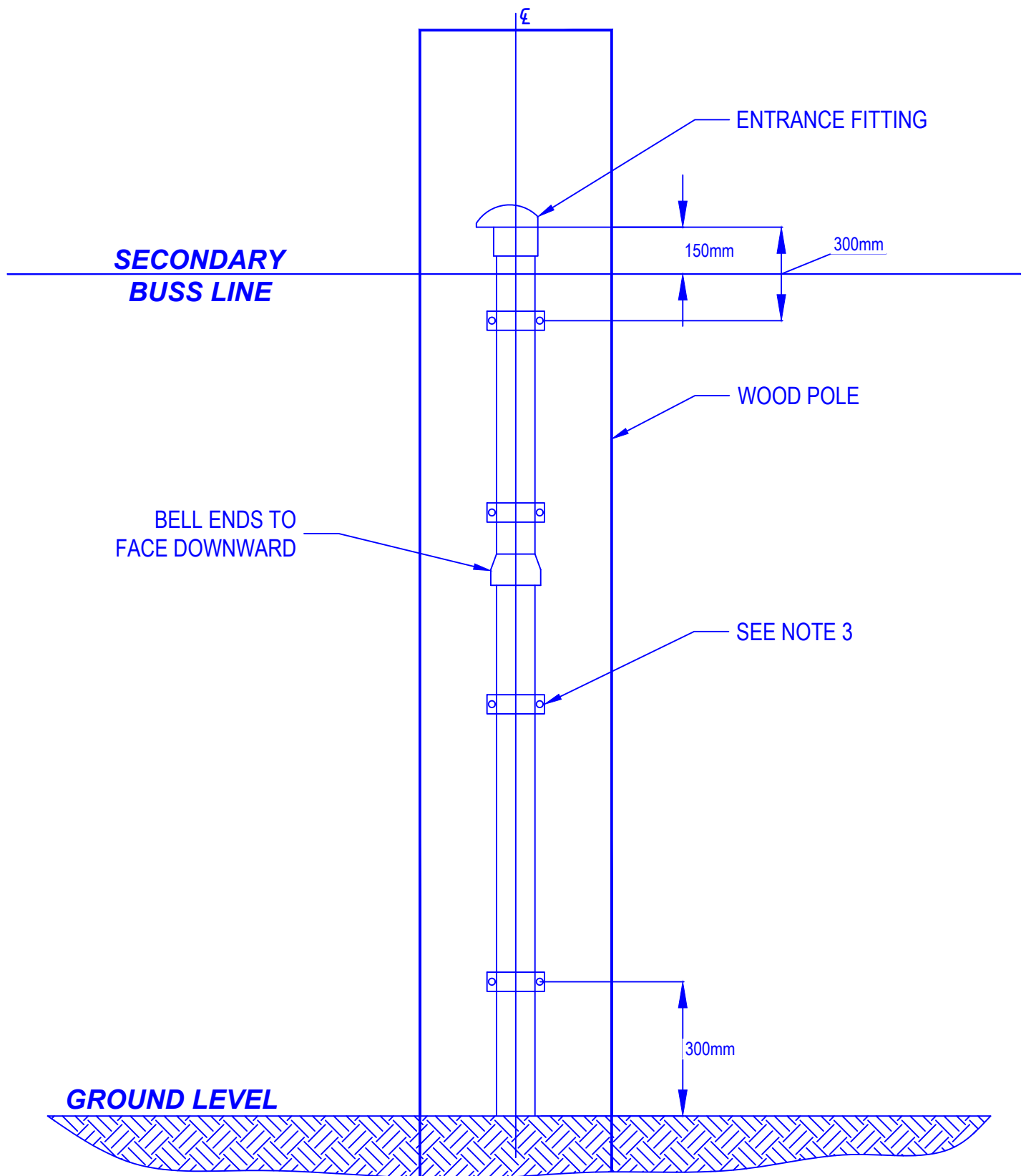
DRAWN BY: TC

MODIFIED OPSD - N/A

Niagara Region

PUBLIC WORKS

NRS 2800



NOTES:

1. CONDUIT TO BE INSTALLED ON OPPOSITE SIDE OF TRAFFIC FLOW (WHERE POSSIBLE).
2. CONDUIT TO BE SUPPORTED AS PER OEC 12 (1114).
3. PVC COATED METAL TWO HOLE STRAPS, ONE TRADE SIZE LARGER THAN CONDUIT USING $\frac{1}{4}$ " X 3" GALVANIZED LAG SCREWS.

**PVC CONDUIT INSTALLATION
WOOD POLE**

DATE: APRIL 28, 2015

SCALE: NTS

UPDATED BY: GW

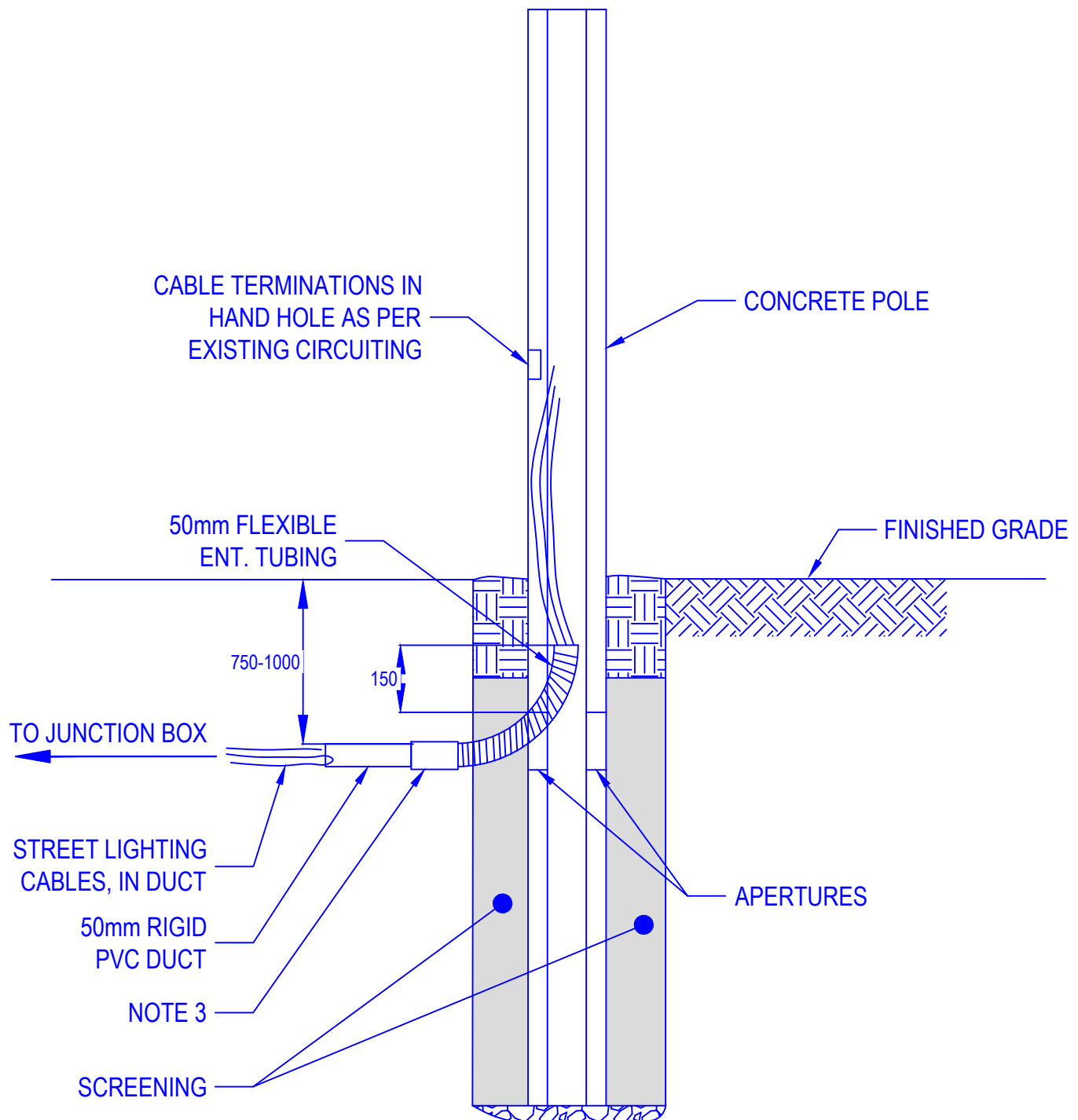
DRAWN BY: TC

MODIFIED OPSD - N/A

Niagara Region

PUBLIC WORKS

NRS 2810



NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE INDICATED.
2. AREAS DISTURBED BY POLE INSTALLATION SHALL BE REINSTATED TO MATCH SURROUNDING EXISTING CONDITIONS.
3. RIGID PVC DUCT SHALL BE CONNECTED TO FLEXIBLE TUBING WITH IPEX ARIG-20 (OR APPROVED EQUAL) ADAPTER BY SOLVENT WELD.
4. SCREENING TO BE USED AS BACKFILL.

**DUCT TERMINATION
CONCRETE POLE**



MATCHLINE 'A'

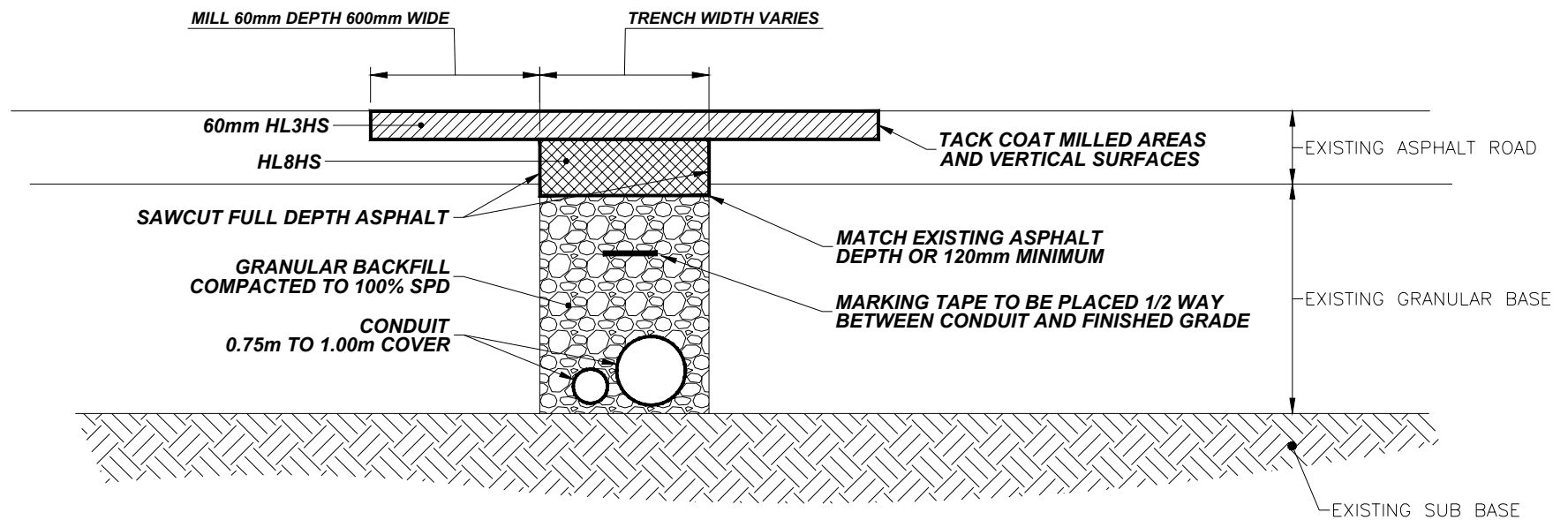


**DOMINION ROAD
EAST LEG**

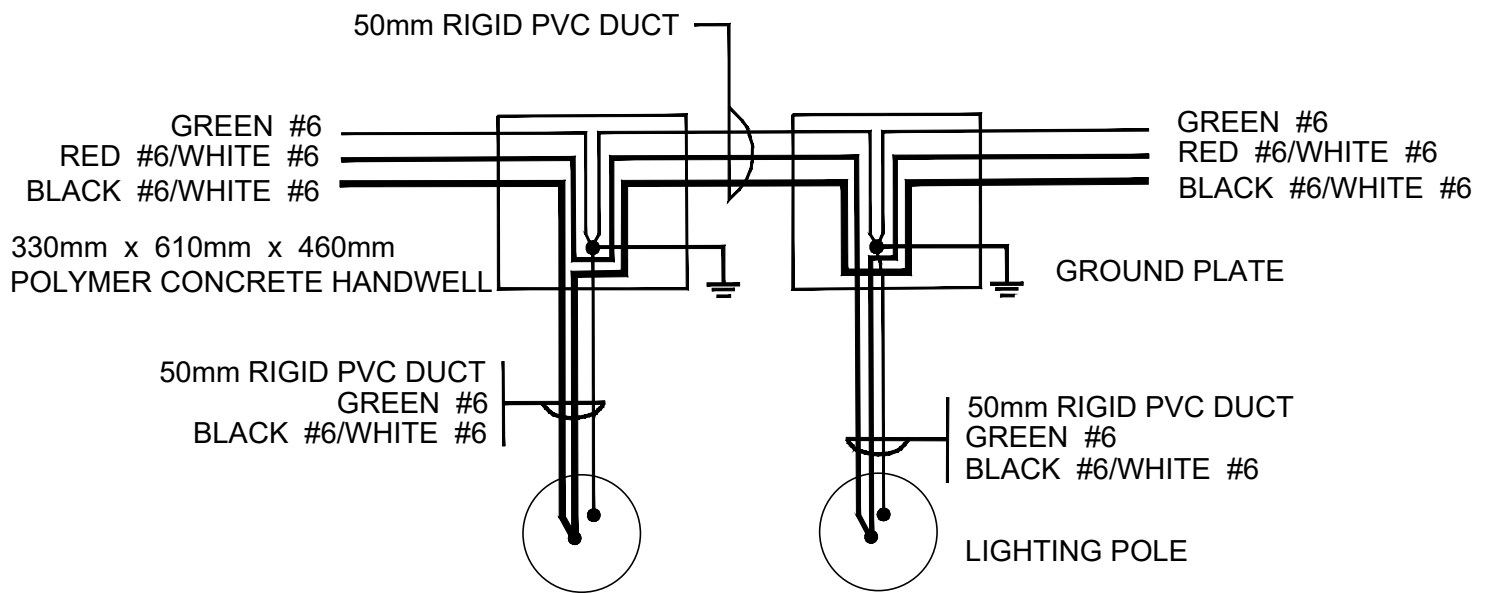
LOADING TABLE HYDRO SUPPLY				
MAIN BREAKER = N/A				
* CIRCUIT LOAD (W)	WATTAGE (W)	LOAD DESCRIPTION	CIRCUIT No	DREAK SIZE
4320	27 x 100	1IP1, 1IP2, 1IP3....., 1IP27	N/A	N/A
			RFD =	N/A
			BLACK =	N/A
			TOTAL LOAD =	4,320

CONSISTANT FILE No. A0641657	
DATE	2017-08-25
SCALE	1:100
REF. No.	2016-T-116
DWG No.	E07
REV	0

ON EXISTING ROADS



REFER TO TRAFFIC SIGNAL SUPPLEMENTARY SPECIAL PROVISIONS



DETAIL 'A'
TYPICAL WIRING DETAIL

N.T.S.

TYPICAL WIRING DETAIL

DATE: FEBRUARY 1, 2023 SCALE: NTS

UPDATED BY: MC DRAWN BY: MC

Niagara Region

PUBLIC WORKS

DETAIL A

BACK OF CURB

VARIES

50mm RIGID
PVC DUCT

310x610x460
POLYMER CONCRETE HANDWELL

50mm RIGID
PVC DUCT

50mm RIGID
PVC DUCT
TO LIGHTING POLE

DETAIL 'B'
TYPICAL DUCT AND HANDWELL LAYOUT

N.T.S.

TYPICAL DUCT AND HANDWELL LAYOUT

DATE: FEBRUARY 1, 2023

SCALE: NTS

UPDATED BY: MC

DRAWN BY: MC

Niagara  **Region**

PUBLIC WORKS

DETAIL B