Ontario Provincial Standards for Roads and Public Works

- Volume 4 -

MUNICIPAL AND PROVINCIAL COMMON

DRAWINGS FOR ELECTRICAL WORK

Ontario

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Municipal
Engineers
Association

MANUAL REVISION RECORD

Volume 4 – Drawings for Electrical

This record should remain in the manual at all times. Revisions are numbered sequentially. This sheet should be filled in after each revision has been placed into the manual. It will quickly indicate to users whether the contents of the manual are up-to-date.

REVISION NUMBER	REVISION DATE	ENTERED BY	REVISION NUMBER	DATE	ENTERED BY
19	Nov 2004	Included in new manuals	44		
20	Nov 2005	Included in new manuals	45		
21	Nov 2006	Included in new manuals	46		
22	April 2007	Included in new manuals	47		
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32	Nov 2014	Included in new manuals	57		
33	Nov 2015	Included in new manuals	58		
34	Nov 2016	Included in new manuals	59		
35	April 2017	Included in new manuals	60		
36	Nov 2017	Included in new manuals	61		
37	Nov 2018	Included in new manuals	62		
38	April 2019	Included in new manuals	63		
39	Nov 2019	Included in new manuals	64		
40	Nov 2020	Included in new manuals	65		
41			66		
42			67		
43			68		

ONTARIO PROVINCIAL STANDARD SPECIFICATION

VOLUME 4 INDEX

MUNICIPAL AND PROVINCIAL DRAWINGS FOR ELECTRICAL WORK

DATE	OPSD	REV.	TITLE
DIVISION 2000 - ABBREVIATIONS			
2018 11	2000.001	1	Abbreviations, General
2018 11	2011.101	1	General Symbols, Ducts and Cables
2018 11	2011.201	1	General Symbols, Maintenance Holes, Junction Boxes, Pads, and Footings
2018 11	2011.401	1	General Symbols, Poles and Guying
2018 11	2011.501	1	General Symbols, Power Supply Equipment
2018 11	2011.601	2	General Symbols, Control Equipment
2018 11	2011.701	4	General Symbols, Traffic Actuation Devices
2018 11	2012.101	1	Highway Lighting Symbols, Luminaires
2018 11	2013.101	1	Electrical Traffic Control Symbols, Traffic Control Devices
2018 11	2013.201	1	Electrical Traffic Control Symbols, Traffic Signal Displays
2018 11	2014.101	1	Wiring Symbols, Wiring Diagrams 1
2018 11	2014.102	1	Wiring Symbols, Wiring Diagrams 2
2018 11	2015.201	1	Advanced Traffic Management System, Equipment Identifier 1
2018 11	2015.202	1	Advanced Traffic Management System, Equipment Identifier 2
2018 11	2015.301	1	Advanced Traffic Management System, Layout Drawings
2018 11	2015.302	1	Advanced Traffic Management System, Wiring Diagrams
2018 11	2016.301	1	Communications Symbols, Fibre Optic Communications Schematic 1
2018 11	2016.302	1	Communications Symbols, Fibre Optic Communications Schematic 2
DIVISION 2100 - UNDERGROUND WORK, ETC.			
2013 11	2100.010	0	Cable Installation in Trenches
2013 11	2100.050	0	Cable and Duct Protection and Marking
2015 11	2100.06	2	Rigid Ducts Encased in Concrete
2013 11	2101.01	1	Duct Installation in Trenches
2013 11	2101.020	0	Extension of Existing Rigid Ducts Encased in Concrete
2013 11	2102.01	1	Underground Rigid Duct Connection at Concrete Structure
2015 11	2102.020	0	Underground Rigid Duct Connection at Concrete Structure Without Expansion Joint
2015 11	2103.010	0	Rigid Duct Termination for High Voltage Cables at Utility Poles
2015 11	2103.02	1	Duct Installation Profiles

DATE	OPSD	REV.	TITLE
2015 11	2103.030	1	Rigid Duct Installation in Existing Paved Area, Unshrinkable Backfill Method
2015 11	2103.040	0	Rigid Duct Installation in Existing Paved Area - Granular Backfill Method
2015 11	2103.050	0	Duct Installation at Utility Crossings
2015 11	2103.060	0	Augering Pits for Subsurface Installation of Ducts and Encasements
2020 11	2104.010	1	Ducts Surface Mounted on Structures
2015 11	2111.020	1	Electrical Maintenance Hole - Precast Concrete - 600 x 1450 mm
2015 11	2111.030	1	Electrical Maintenance Hole - Precast Concrete - 1200 mm Dia.
2015 11	2111.040	1	Electrical Maintenance Hole - Precast Concrete - 1200 x 1650 mm
2015 11	2111.050	1	Electrical Maintenance Hole - Precast Concrete - 1800 x 2400 mm
2017 11	2112.010	0	Electrical Handhole, Precast Concrete with Cover, 300 mm Dia.
2017 11	2112.020	0	Electrical Handhole, Precast Concrete with Cover, 460 mm Dia.
2017 11	2112.030	1	Electrical Handhole Precast Concrete - 675 mm Dia.
2017 11	2112.040	1	Electrical Handhole Precast Concrete - 600 x 600 mm
2017 11	2112.050	0	Electrical Handhole, Precast Concrete with Cover, 300 x 500 mm
2017 11	2113.010	1	Electrical Handhole, Non and Semi-Concrete, General Requirements
2013 11	2116.01	1	Drainage Facilities for Electrical Maintenance Holes
2013 11	2116.02	1	Electrical Maintenance Hole, Drains to Drainage Pockets, Embankment Outlets, and Ditches
2013 11	2116.03	1	Electrical Maintenance Hole, Drains to Storm Sewer Systems
2019 04	2117.010	1	Electrical Maintenance Holes, General Installation Requirements
2017 11	2117.020	0	Electrical Handholes, General Installation Requirements
2017 11	2118.010	1	Electrical Chamber Installation in Median
2017 11	2118.020	1	Electrical Chamber Installation in Slope
2013 11	2123.01	1	Electrical Maintenance Holes, Entry of Direct Buried Ducts
2013 11	2123.02	1	Electrical Maintenance Holes, Entry of Encased Ducts
2017 11	2123.030	0	Electrical Handholes, Entry of Direct Buried and Encased Ducts
2018 11	2126.010	3	Distribution Assembly, Concrete Pad and Ducts, Plan and Section A-A
2018 11	2126.020	3	Distribution Assembly, Concrete Pad and Ducts, Section B-B

DATE	OPSD	REV.	TITLE
2016 11	2130.010	1	Supply Control Cabinet Installation Overhead Services, Top Entry Metering
2016 11	2130.011	1	Supply Control Cabinet Installation, Underground Services, Bottom Entry Metering
2016 11	2130.012	1	Supply Control Cabinet Installation, Overhead Services, Bottom Entry Metering
2016 11	2130.013	0	Supply Control Cabinet Installation, Underground Services, Bottom Entry Metering
2019 11	2135.010	0	Service Supply Pedestal for Traffic Signal And Street Lighting
2019 11	2140.010	0	Service Box Installation, Overhead Services
DIVISION 2200 - FOUNDATIONS, ETC.			
2012 11 (R2019)	2200.01	2	Concrete Footing for Base Mounted Lighting and Signal Poles
2010 11 (R2019)	2200.011	0	Raised Concrete Footing for Base Mounted Lighting Poles
2013 11	2200.02	1	Concrete Foundation for Direct Buried Lighting Poles Where Rock is Encountered
2012 11	2200.03	2	Concrete Foundation for Base Mounted Lighting Poles Where Rock is Encountered
2014 11	2200.04	2	Concrete Footing and Anchorage Assembly for 3.3 m Base Mounted Metal Pole
2014 11	2200.041	0	Concrete Footing for 1.5 m Base Mounted Pedestrian Push Button Pole
2019 11	2200.050	0	Precast Pedestal Foundation for Metering Or Street Lighting
2016 11	2200.070	1	Pole Footing in Earth for Cast-In-Place Concrete Barrier
2016 11	2200.080	1	Pole Footing in Rock for Cast-In-Place Concrete Barrier
2013 11	2210.010	0	Local Grading at Pole Foundations
2016 11	2210.030	1	High Mast Lighting Pole, Apron
2015 11	2215.02	4	Anchorage Assembly for Lighting and Signal Poles
2015 11	2215.025	0	Anchorage Assembly for Heavy Class Steel Pole and Sectional Steel Pole
2014 11	2215.03	4	Pole Mounting Details for Base Mounted Metal Pole
2015 11	2216.010	2	Anchorage Assembly for Pole Footing in Concrete Barrier
2016 11	2218.010	1	High Mast Lighting Pole Anchorage Assembly Placement
2010 11 (R2019)	2220.01	1	Pole Handhole Locations
2016 11	2225.010	1	Concrete Lighting Pole, Direct Buried
2016 11	2228.010	1	Metal Lighting Pole, Base Mounted

DATE	OPSD	REV.	TITLE
2016 11	2232.010	1	Sectional Steel Pole with Brackets, Luminaire, and Traffic Signal Head
2012 11	2235.01	2	Pole Guying Details
2013 11	2236.010	0	Wooden Pole and Anchorage Settings in Solid Rock 1
2013 11	2236.020	0	Wooden Pole and Anchorage Settings in Solid Rock 2
2010 11 (R2019)	2238.01	1	Wooden Pole in Earth
2013 11	2239.010	0	Cribbing for Wood Poles in Muskeg
2013 11	2239.020	0	Log Anchor for Guy in Muskeg
2017 11	2240.010	0	Wooden Pole with Elliptical Bracket, Overhead and Underground Circuits
2013 11	2242.01	1	Wooden Pole with Neutral Supported Cable
2013 11	2242.02	2	Wooden Poles with Aerial Signal Cables Lashed on Messenger
2017 11	2245.010	0	Installation of Aerial Cable Systems
2017 11	2245.020	2	Minimum Vertical Clearances for Aerial Cable Systems
2016 11	2250.010	0	Aluminum Tapered Elliptical Brackets on Metal and Concrete Poles, Mounting Details
2013 11	2255.010	1	Pole Wiring Diagram - 120V System
2013 11	2255.020	1	Pole Wiring Diagram - 120/240V System
2013 11	2255.030	1	Pole Wiring Diagram - 347/600V System
2013 11	2255.040	1	Pole Wiring Diagram, Lighting Pole on Bridge Structure
DIVISION 2300 - WORK ON STRUCTURE			
2013 11	2300.010	1	Rigid PVC Junction Box, Type P1
2013 11	2300.020	1	Rigid PVC Junction Box, Type P2
2013 11	2300.030	1	Rigid PVC Junction Box, Type P4
2010 11	2302.010	1	Embedded Work Detail for Rigid PVC Junction Box, Type P3-1, for Use in Concrete Barrier Wall
2013 11	2302.020	0	Expansion and Deflection Fitting Assembly for 50 and 75 mm Rigid Ducts
2013 11	2302.040	1	Embedded Work in Structure, New Jersey Type Concrete Barrier Wall
2014 11	2302.045	0	Embedded Work in Structure, Parapet Wall
2016 11	2305.020	2	Underpass Luminaires Wall Mounted Installation
2016 11	2310.010	1	Underpass Luminaire Ceiling Mounted Installation with Tee Bracket
2016 11	2310.020	2	Tee Bracket for Ceiling Mounted Underpass Luminaire

DATE	OPSD	REV.	TITLE
2016 11	2310.030	1	Wedge Mounting Bracket for Underpass Luminaire
2016 11	2310.040	1	Support Bracket for Column Mounted Underpass Luminaire
2016 11	2315.010	1	Underpass Luminaire, Wiring Detail
DIVISION 2400 - PURCHASING STANDARDS			
2018 11	2400.000	3	Distribution Assembly Legend
2018 11	2400.010	3	Distribution Assembly, Cabinet
2018 11	2400.020	2	Distribution Assembly, Equipment Layout
2018 11	2400.030	3	Distribution Assembly Wiring Schematic
2018 11	2400.100	1	Warning Signs for Electrical Equipment
2018 11	2400.101	1	Warning Signs Outside Electrical Equipment
2012 11 (R2020)	2410.01	3	Spun Concrete Pole
2012 11 (R2020)	2410.020	0	18.3 m Spun Concrete Pole for TV Camera Mounting
2015 11	2414.010	0	3.3m Aluminum and Sectional Steel Poles, Base Mounted
2017 04	2415.011	1	Steel Pole, Base Mounted
2017 04	2416.011	1	Steel Pole, Concrete Barrier Base Mounted
2016 11	2418.010	2	1.8 m and 2.7 m Steel Truss Bracket for Steel Poles
2017 11	2420.010	0	Aluminum Tapered Elliptical Bracket
2016 11	2421.010	1	Lamp Wattage Label for Luminaire
2020 11	2428.010	4	Frangible Bases
2020 11	2432.010	2	Aluminum Pole - Base Mounted
2014 11	2440.010	1	Supply Control Cabinet Assembly Type 1, 120/240V, 100A, 1-Phase, 3-Wire
2014 11	2440.020	1	Supply Control Cabinet Assembly Type 2, 120/208V, 100A, 3-Phase, 4-Wire
2014 11	2440.021	0	Supply Control Cabinet Assembly Type 2, 347/600V, 100A, 3-Phase, 4-Wire
2014 11	2440.030	1	Supply Control Cabinet Assembly Type 1 and 2, Enclosure
2014 11	2440.040	1	Pole Mounting Bracket for Supply Control Cabinet Assembly
2014 11	2440.050	1	Supply Control Cabinet Assembly Type 1 and 2, Dead Front Panels
2016 11	2440.051	0	Supply Control Cabinet Assembly Type 1 and 2, Barrier Details
2014 11	2440.060	1	Supply Control Cabinet Assembly Type 1 and 2, 3-Point Door Latch

DATE	OPSD	REV.	TITLE
2014 11	2440.061	0	Supply control Cabinet Assembly Type 1, 2, and 3, 3-Point Stainless Steel Door Handle
2014 11	2441.000	1	Supply Control Cabinet Assembly Type 3, 120/240V, 100A, 1-Phase, 3-Wire
2014 11	2441.010	1	Supply Control Cabinet Assembly Type 3, Enclosure
2014 11	2441.020	1	Supply Control Cabinet Assembly Type 3, Dead Front Panels
2014 11	2441.030	0	Supply Control Cabinet Assembly Type 3, 3-Point Door Latch
2015 11	2442.010	0	Duct Hanger
2019 11	2443.010	0	Service Supply Pedestal for Traffic Signal And Street Lighting, Layout And Wiring Schematic, 120/240V, 100A, 1-Phase, 3-Wire
2016 11	2450.011	1	High Mast Lighting Pole, 25, 30, and 35 m 8-Sided Pole
2016 11	2450.021	1	High Mast Lighting Pole, 40 and 45 m 12-Sided Pole
2016 11	2453.000	1	High Mast Lighting Pole, Luminaire and Handhole Orientation
2016 11	2453.001	0	High Mast Lighting Pole, Luminaire and Handhole Orientation for Median Mounted Poles
2016 11	2453.010	1	High Mast Lighting Pole, Cable Holder, and Storage Hook Details
2016 11	2453.020	1	High Mast Lighting Pole, Handhole Cover Hinges, Latches, and Padlock
2016 11	2453.050	1	High Mast Lighting Pole, Nameplate Details
2016 11	2453.060	1	High Mast Lighting Pole, Flood Light Luminaire Mounting Details
2016 11	2453.070	2	High Mast Lighting Pole, Luminaire Support Ring
2016 11	2453.080	2	High Mast Lighting Pole, Head Frame and Ring Assembly
2016 11	2453.090	1	High Mast Lighting Pole, Luminaire Shroud
2016 11	2453.091	1	High Mast Lighting Pole, Luminaire Shroud Details
2016 11	2453.140	1	High Mast Lighting Pole, Internal Drive Raising and Lowering Equipment - List of Components
2016 11	2453.150	1	High Mast Lighting Pole, Internal Drive Raising and Lowering Equipment - Layout
2016 11	2453.170	1	High Mast Lighting Pole, Internal Drive Raising and Lowering Equipment, 347/600V, 3-Phase, Wiring Diagram
2016 11	2453.180	1	High Mast Lighting Pole, Internal Drive Raising and Lowering Equipment, 120/240V, 1-Phase, Wiring Diagram
2016 11	2453.190	1	High Mast Lighting Pole, External Drive Raising and Lowering Equipment - List of Components
2016 11	2453.200	1	High Mast Lighting Pole, External Drive Raising and Lowering Equipment - Layout

DATE	OPSD	REV.	TITLE
2016 11	2453.210	1	High Mast Lighting Pole, External Drive Raising and Lowering Equipment, 347/600V, 3-Phase, Wiring Diagram
2016 11	2453.220	1	High Mast Lighting Pole, External Drive Raising and Lowering Equipment, 120/240V, 1-Phase, Wiring Diagram
2016 11	2456.011	1	High Mast Lighting Pole Anchorage Assembly Details
DIVISION 2500 - TRAFFIC SIGNALS			
2017 11	2500.010	2	600 mm Signal Arm and Signal Head
2017 11	2500.020	2	600 mm Signal Arm Attachment to Poles
2017 11	2501.010	0	Single Member Arm and Signal Head
2017 11	2501.020	0	Aluminum Single Member Arm Attachment Details
2017 11	2502.010	1	Traffic Signal, Adjustable Mid-Section Hanger
2017 11	2502.011	1	Traffic Signal, Dual-End Hanger
2014 11 (R2019)	2505.010	1	Traffic Signal, Pedestrian Head and Push Button Mounted on Pole
2019 11	2508.010	1	Traffic Signal, Sectional Steel Poles with Primary and Secondary Signal Heads for Ramp Metering
2012 11 (R2019)	2510.010	0	Pole Mounted Controller Cabinet
2011 11 (R2019)	2510.020	0	Mounting Bracket for Pole Mounted Controller Cabinet
2012 11 (R2020)	2514.010	0	Controller Cabinet on Pad
2012 11 (R2020)	2514.020	0	Concrete Pad for Controller Cabinet
2012 11 (R2020)	2516.102	0	Traffic Data Collection, Data Station, Traffic Counting Station Type 2
2012 11 (R2020)	2518.101	0	Prefabricated Detector Loop
2020 11	2518.102	1	Traffic Data Collection, Detector Loops, Heavy Duty Rubber
2012 11 (R2020)	2520.010	0	Loop Detector Installation Details I
2012 11 (R2020)	2520.02	4	Loop Detector Installation Details II
2017 11	2522.010	1	Traffic Signal, Cushion Hanger
2018 11	2524.010	0	Traffic Signal, Double Arm Bracket
2012 11 (R2020)	2526.01	1	Traffic Signal Bracket for Mounting Pedestrian Instruction Sign on Pole
2017 11	2528.010	0	Traffic Signal Equipment, Pole Wiring Diagram
2015 11	2529.010	1	Signal Wiring for Pedestrian Facilities
2012 11	2529.020	0	Signal Wiring Using 4/C Cable Connected Radially, 2 Phase
2012 11	2529.030	0	Signal Wiring Using 12/C Cable Tapped, 2 to 8 Phase

DATE	OPSD	REV.	TITLE
2012 11	2529.040	0	Signal Wiring Using 4/C and 12/C Cable Tapped, 2 to 8 Phase
2012 11	2529.050	0	Signal Wiring Using 4/C Cable Connected Radially, 2 to 8 Phase
2012 11	2529.060	0	Signal Wiring Using 4/C Cable Connected Radially, and 12/C Cable Tapped, 2 to 8 Phase
2012 11	2529.070	0	Signal Wiring Using 19/C Cable Tapped, 2 to 8 Phase
2012 11	2529.080	0	Signal Wiring Using 7/C Cable Connected Radially T-Intersection, 2 to 3 Phase
2012 11	2529.090	0	Signal Wiring Using 4/C Cable Connected Radially T-Intersection, 2 Phase
2013 11	2530.01	1	Splices for Traffic Signal Cable and Extra Low Voltage Cable
2015 11	2536.010	2	Flasher Beacons for Roadway Sign and Downlight and Wiring Diagram
2015 11	2536.030	0	Solar Powered LED Flasher Beacon and Wiring Diagram for Roadway Sign, Base Mounted Pole
2015 11	2536.032	0	Solar Powered LED Flasher Beacon and Wiring Diagram for Roadway Sign, Direct Buried Pole
2013 11	2540.01	4	Aerial Traffic Signal Installation
2013 11	2540.02	2	Aerial Flasher Beacon Installation
2013 11	2540.030	0	Aerial Suspension Mounting Bracket, Signal Heads and Flashing Beacons
2018 11	2540.100	1	Aerial Suspension Mounting Bracket, Pre-Emption Unit
2012 11	2545.01	1	PVC Junction Box for Signal Cable Splicing
2014 11	2547.010	1	Traffic Signal and Illumination Grounding System
2019 11	2552.010	3	Traffic Signal System Equipment on Wooden or Concrete Poles, Overhead Wiring Installation
2019 11	2554.010	1	Traffic Signal System Equipment on Wooden or Concrete Poles, Underground Wiring Installation
2016 11	2555.010	0	Flexible Utility Markers
2018 11	2558.000	1	Pole for Accessible Pedestrian Signal Push Button

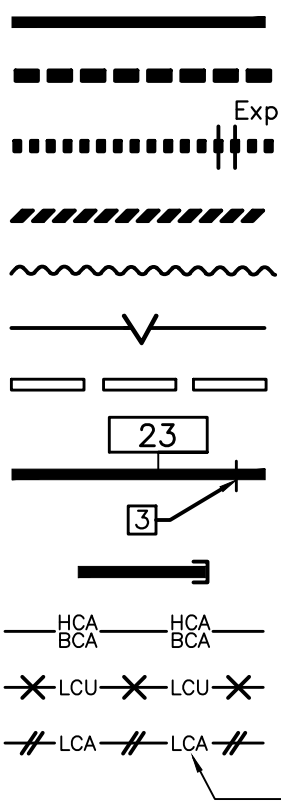
DIVISION 26 - SIGN LIGHTING

Currently No Drawings

DIVISION 29 - ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS)

2015 11	2902.322	0	Advanced Traffic Management System, Supply Control Cabinet, 120V, 100A, 1-Phase, 3 Wire

A	ampere
AC	alternating current
Al	aluminum
AMB	amber
APS	accessible pedestrian signal
ATMS	Advanced Traffic Management System
AWG	American Wire Gauge
BGRD	bare ground
BLK	black
BLU	blue
CCT	circuit
CCTV	closed–circuit television
CDT	conduit
CEC	Canadian Electrical Code
COMM	communication
COND	conductor
CONT	control
C/W	complete with
Cu	copper
DB	direct buried
DC	direct current
DET	detector
EC	electrical chamber
EL	electrical
ELV	extra–low voltage
EMI	electromagnetic interference
EQPT	equipment
EXP	expansion joint
F	farad
GRD	ground
GRN	green
µH	micro henry
HAR	highway advisory radio
HEC	hydro electric commission
HH	electrical handhole
HV	high voltage
Hz	hertz
IGRD	insulated ground, green
IMPD	impedance
IND	inductance
IPS	iron pipe size
ITS	Intelligent Transportation Systems
JB	junction box
LAN	local area network
LCS	lane control sign
LD	loop detector
LED	light emitting diode
LS	light standard
LV	low voltage
MH	electrical maintenance hole
NEUT	neutral
NIC	not included in contract
OESC	Ontario Electrical Safety Code
Ω	ohm
PB	pedestrian push button
PCS	permanent counting station
PUC	public utilities commission
PVC	polyvinyl chloride
PVMS	portable variable message sign
PWR	power
PXO	pedestrian crossover
QWS	queue warning sign
RF	radio frequency
RFI	radio frequency interference
RLC	red light camera
RMS	ramp metering station
TC	traffic signal controller cabinet
TD	transit detector
TS	traffic signal
XFMR	transformer
UPC	underpavement crossing
UPS	uninterruptible power supply
V	volt
VA	volt ampere
VD	video detector
VDS	vehicle detector station
VMS	variable message sign
W	watt
Wh	watt hour
WHT	white
WWR	welded wire reinforcement
YEL	yellow



ducts and/or cables, underground

ducts and/or cables, surface mounted

ducts and/or cables embedded, Exp indicates expansion joint

cables, installed in existing ducts

cables, aerial

cables, in pavement slot

ducts and/or cables, future by others

underpavement crossing identification code, Note 1

reference point with identification code, Note 1

duct stub with plug

existing cables and/or ducts to remain in place

existing cables and/or ducts to be removed

existing cables and/or ducts to be abandoned

identification codes

identification codes for existing duct or cable usage, Note 2

BC	Bell cable
CC	communications cable
DC	extra–low voltage detector cable
FO	fiber optic cable
GC	guy cable
HC	hydro cable
LC	lighting cable
PC	power cable
TS	traffic signal cable
TV	television cable

ground electrodes

cable protection bricks, concrete cap, or marker tape in trench

identification code for removal equipment

NOTES:

1 Identification codes may be used with any duct or cable symbol.

2 Add suffix U for underground or suffix A for aerial.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
GENERAL SYMBOLS DUCTS AND CABLES			

OPSD 2011.101

	MH32	electrical maintenance hole with identification code
	JB36	junction box, embedded or surface mounted with identification code
	HH21	electrical handhole, underground with identification code
	CP33	concrete pad with identification code
	F43	footing in earth or rock with identification code
	F44	footing on structure with identification code
	SF3	sign footing with identification code

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2018 | Rev 1

GENERAL SYMBOLS

MAINTENANCE HOLES, JUNCTION BOXES, PADS, AND FOOTINGS

OPSD 2011.201



pole with identification code



LS

existing pole to remain with identification code



LS

existing pole to be removed with identification code

identification codes for existing pole usage:

A	authority owned pole
B	Bell pole
C	communications pole
GP	guy pole
H	hydro pole
HM	high mast lighting pole
LS	lighting pole
TS	traffic signal pole
TV	television pole



single guy with single anchor



double guy with single anchor



double guy with double anchor



single guy with sidewalk strut and single anchor

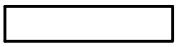
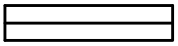
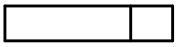
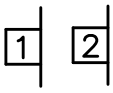
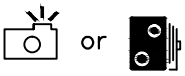
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
GENERAL SYMBOLS POLES AND GUYING			
			OPSD 2011.401

	electric vehicle charging station
	solar power
	power supply equipment, pole mounted
	transformer
	generator
	power supply equipment, pad and/or footing mounted
SUPPLY 'A' 120/240V, 1ø 3W METERED	power supply equipment identification code, other applicable description may be used for transformer, generator, etc.
	photoelectric controller

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev 1	
GENERAL SYMBOLS POWER SUPPLY EQUIPMENT			
	OPSD 2011.501		

	controller cabinet, front door opens on side indicated
	controller cabinet with adjacent power supply cabinet on side indicated, front door opens on side indicated
	controller cabinet with attached external communications interface box on side indicated, front door opens on side indicated
	controller cabinet, pad and/or footing mounted
	two controller cabinets, pad and/or footing mounted, side by side type
	two controller cabinets, pad and/or footing mounted, in–line type
	identification code for traffic signal controller cabinet
	uninterruptible power supply cabinet
	controller cabinet with uninterruptible power supply cabinet
	controller cabinet, pad and/or footing mounted complete with internal uninterruptible power supply

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018 Rev 2	
GENERAL SYMBOLS CONTROL EQUIPMENT	- - - - - - - - - - - - - - - - - - - -	**OPSD 2011.601**

	LD2	simple loop detector with identification code
	LD3	duplex loop detector with identification code
	LD4	powerhead loop detector with identification code
	NID1	non–intrusive detection zone with identification code
	NLP2	non–loop in–pavement detector with identification code
	LD5	diamond loop detector with identification code
		numbers shown within loops indicate loop numbers in a set
	VP1	vehicle pre–emption with identification code
	MD1	non–intrusive sensor with identification code
		micro loop detector, number shown inside loop indicates loop number in a set
	PB1	accessible pedestrian push button and direction arrow with identification code
	VD1	video camera or video camera detector with identification code
		multi–leg detection camera
		red light camera
		radio antenna
		Bluetooth reader station

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev 4	
GENERAL SYMBOLS TRAFFIC ACTUATION DEVICES	- - - - - - - - - - - - - - - - - - - -		ONTARIO STANDARDS • MUNICIPAL – PROVINCIAL •
	OPSD 2011.701		



luminaire



luminaire with photoelectric controller



luminaire with shield



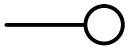
floodlighting luminaire



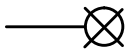
underpass or surface mounted luminaire



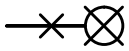
luminaire, number shown indicates luminaire location on high mast ring with respect to pole handhole



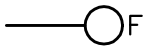
luminaire with bracket



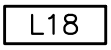
existing luminaire to be removed, bracket to remain



existing luminaire and bracket to be removed

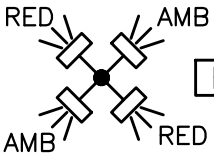
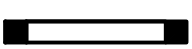


future luminaire and bracket



luminaire identification code

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
HIGHWAY LIGHTING SYMBOLS LUMINAIRES			
	OPSD 2012.101		

	TS4	illuminated traffic sign, single side with identification code
	TS5	illuminated traffic sign, double side with identification code
	FB3	illuminated traffic sign with flashing beacon with identification code
	FB4	flashing beacon with identification code
	FB5	flashing beacons, 4–way, with identification code
	FM2	flasher mechanism with identification code
	PX03	pedestrian crossover with identification code
	TS8	traffic sign, overhead sign support with static sign and identification code
	TS9	traffic sign, overhead sign support with variable message sign and identification code
	TS10	traffic sign, overhead sign support with lane control signs and identification code; may be used in combination with static or variable message sign

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
ELECTRICAL TRAFFIC CONTROL SYMBOLS TRAFFIC CONTROL DEVICES			
	OPSD 2013.101		



highway signal head, 300mm red, 200mm amber and green lenses, with backboard



highway signal head, all 300mm lenses, with backboard



standard signal head, all 200mm lenses



standard signal head, all 200mm lenses, with backboard

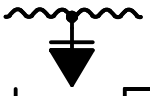


special signal head with backboard, lens sizes as per Table 1; number indicates type of signal head as per Table 1



pedestrian signal head, two section or bimodal type

pedestrian signal head, two section type c/w pedestrian countdown



span wire mounting, highway signal head with backboard, Note 1



mast arm mounting, highway signal head with backboard shown, Note 1



double arm bracket mounting, highway signal head with backboard shown, Note 1

TABLE 1 – SPECIAL SIGNAL HEAD CONFIGURATIONS

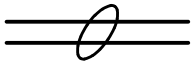
Type	No. of Sections	Lens Size in mm and Arrow Indication						
		Transit Bar	Red	Amber	Green	Arrow	Arrow	Arrow
1	3		300	300	–	300 ↑ GRN	–	–
2	3		300	300	–	300 ← GRN	–	–
3	3		300	300	–	300 → GRN	–	–
4	4		300	300	–	300 ↑ GRN	300 ← GRN	–
5	4		300	300	–	300 ↑ GRN	300 → GRN	–
6	4		300	300	–	300 ← GRN	300 → GRN	–
7	5		300	300	–	300 ↑ GRN	300 ← GRN	300 → GRN
8	5		300	200	200	300 ← AMB	300 ← GRN	–
8A	5		300	300	300	300 ← AMB	300 ← GRN	–
9	4		300	200	200	300 ← AMB/GRN	–	–
9A	4		300	300	300	300 ← AMB/GRN	–	–
10	4		300	200	200	300 ← GRN	–	
10A	4		300	300	300	300 ← GRN	–	–
11	4		300	200	200	300 → GRN	–	–
11A	4		300	300	300	300 → GRN	–	–
12	4	200	300	200	200	–	–	–
12A	4	300	300	300	300	–	–	–

AMB–Amber GRN–Green AMB/GRN– Amber and Green

NOTE:

1 Highway signal head symbol shown is for illustration only, other signal head symbols may be used.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
ELECTRICAL TRAFFIC CONTROL SYMBOLS TRAFFIC SIGNAL DISPLAYS			
	OPSD 2013.201		



cables to be installed in the same duct

spare duct for future use

conductors, single or multiple, identified by note

2–19/C #14 TS–75mm — wiring identification note

- TS–75mm: duct size, aerial or direct buried
- TS: type of cable:
  - TS traffic signal
  - HV high voltage
  - LV low voltage
  - ELV extra–low voltage
  - CONT control
  - BGRD bare ground
  - IGRD insulated ground (green)
- #14: AWG size of conductor
- 19/C: number of conductors in cable, not required for single conductor
- 2: number of cables

8SM, 16MM

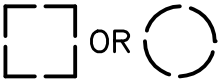
- 16MM: fiber optic cable, number of multi–mode fibres
- 8SM: number of single mode fibres



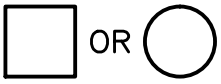
in–line cable splice, number denotes number of cables



tap cable splice, number denotes number of cables



wiring enclosure and electrical chambers
identification code matches layout drawings



equipment item, (e.g., poles and cabinets)
identification code matches layout drawings

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev 1

WIRING SYMBOLS

WIRING DIAGRAMS 1

OPSD 2014.101

single phase 2 wire system:

BLK	black, line
WHT	white, neutral
GRN	green, ground

single phase 3 wire system:

RED	red, line 1
BLK	black, line 2
WHT	white, neutral
GRN	green, ground

three phase 4 wire system:

RED	red, line 1, phase a
BLK	black, line 2, phase b
BLU	blue, line 3, phase c
WHT	white, neutral
GRN	green, ground

A RED 7	circuit identification code: A denotes supply location A RED denotes red, line 1 7 denotes breaker or switching device no. 7

NOTES:

A Wiring diagrams use electrical and electronic symbols common to industry practice.

B Symbols for existing and future items are included only for widely used items. In general, existing features are shown in screened or light lines and/or shown with a letter E, new construction is shown in bold or heavy lines, and future work by others is shown in light dashed lines and/or shown with a letter F. Prefix E or F in identification code indicates existing or future respectively

C Where quantity sheets are not used, location, size, quantity, and type of equipment to be installed may be indicated by notation on the layout drawings.

D Symbols crossed out with an X indicates removal. Symbols crossed out with a double stroke // indicates abandoned.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
WIRING SYMBOLS WIRING DIAGRAMS 2	- - - - - - - - - - - - - - - - - - - -		
	OPSD 2014.102		

XXXLLNNNNMLL

Freeway Identification

(e.g., QEW, 401, and 400)

Equipment (station) Type

C = cabinet site
D = vehicle detection station
I = Bluetooth reader station
L = LCS/QWS station
M = central equipment
R = ramp metering station
T = CCTV station
V = VMS station

Direction From Reference Point

E = east
W = west
N = north
S = south
T = Toronto bound
B = border bound
X = for central equipment

Equipment (station) Number, Note 1

143 = station number 143
007 = station number 7

Interspace (station) Number, Note 3

0 = no interspaced devices (original design)
5 = first interspace number
1 to 4 = station interspaced between station 0 and 5 (future use)
6 to 9 = station interspaced between station 5 and next station

Type Of Roadway

A = connecting arterial
C = collector lanes
E = express lanes
F = connecting freeway
M = managed lanes
R = ramp
S = standard freeway
T = transfer roadway
X = for central equipment

Direction Of Traffic

E = eastbound
W = westbound
N = northbound
S = southbound
T = Toronto bound
B = border bound
X = for central equipment

Type Of Devices Or Element Number Note 2

C = comm
D = VDS type (loops, NITS, other)
E = VDS, VMS
G = VDS, CCTV
H = VDS, RMS, VMS
I = Bluetooth reader
J = VDS, RMS, CCTV
K = VDS, VMS, CCTV
L = LCS/QWS type
M = TPR type
N = RMS, VMS
O = VDS, CCTV, QWS
P = power (UPS station)
Q = RMS, VMS, CCTV
R = RMS and VDS type
S = LCS/QWS and VDS type
T = CCTV type
U = lift bridge
V = VMS type
W = CCTV and VMS type
X = RMS, LCS/QWS, and VDS type
Y = CCTV and LCS/QWS type
Z = VMS and LCS/QWS type

1 to 0 = VDS element number of the first 5 lanes
A and B = VDS element number of the 6th lane

NOTES:

1 Devices related to roadway usage are numbered sequentially in the same set of lanes (applies to D, L, and V Stations). With transitions between a single roadway and an express – collector type freeway, the count is increased by 100 from last similar situation. Devices not related to lanes are numbered sequentially along the roadway (applies to T, R, and C Stations). Numbering begins at the reference points.

2 The element number applies to lane usage for detector stations; individual loops are numbered starting in the upstream passing lane.

3 The interspace number is normally 0. This number may be used in future if it is found necessary to interspace any equipment.

A This OPSD shall be read in conjunction with OPSD 2015.202.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
ADVANCED TRAFFIC MANAGEMENT SYSTEM EQUIPMENT IDENTIFIER I			
			OPSD 2015.201

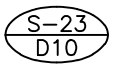
	HIGHWAY	REFERENCE POINT	DIRECTION FROM REFERENCE POINT
CENTRAL REGION	400	Highway 401	north and south
	401	Keele Street	east and west
	403 – Burlington 403 – Hamilton to Oakville	Northshore Blvd.	east and west
	403 – Mississauga	Highway 401	west
	404	Highway 401	north and south
	405	QEW	east
	406	QEW	south
	407 – ETR	Highway 401	east and west
	407 – Extension to Hwy 35/115	Brock Road	east
	409	Highway 401	west
	410	Highway 401	north
	412	Highway 401	north
	418	Highway 401	north
	420	QEW	east
	427	Highway 401	north and south
	QEW – Mississauga/Burlington	Freeman Interchange	Toronto bound (E) border bound (S)
	QEW – Niagara Region	Freeman Interchange	south
	58 – Thorold Tunnel	QEW	south
EAST REGION	401	Sir John A Macdonald	east and west
	416	Highway 417	south
	417	Preston Steet	east and west
	137	Highway 401	south
WEST REGION	401	Wellington Road	east and west
	401 – Windsor	Huron Church Road	west and east
	402	Blue Water Bridge	east
	403	Highway 401	east
NORTHEAST REGION	400/69	Sudbury	south
	11	North Bay	north and south
	17	Sudbury	east and west
NORTHWEST REGION	11	Thunder Bay	east and west
	17	Thunder Bay	north

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2018 | Rev 1

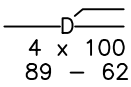
ADVANCED TRAFFIC MANAGEMENT SYSTEM

EQUIPMENT IDENTIFIER 2

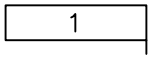
OPSD 2015.202



detail cross – reference:
upper number indicates detail number
lower number indicates ATMS drawing number



identification code for duct usage: underground ducts, existing number and size of existing ducts contract number of duct installation



simple loop detector, number shown inside loop indicates loop number in a station



simple loop detector, number shown inside loop indicates loop number in a station



camera, fixed position, aiming direction indicated by arrow



camera



camera with lowering device

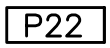


portable variable message sign



pole–mounted variable message sign





communications pedestal with identification code



managed lane receiver sensor

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
ADVANCED TRAFFIC MANAGEMENT SYSTEM LAYOUT DRAWINGS	- - - - - - - - - - - - - - - - - - - -		
	OPSD 2015.301		

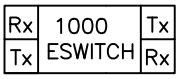
Identification codes:

C – communications
S – spare
M – other agency (name)
G – Government of Ontario (spare)
D – detector
V – VMS/PVMS
L – LCS/QWS
R – RMS
P – power
TS – traffic signals
T – CCTV
H – HAR

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
ADVANCED TRAFFIC MANAGEMENT SYSTEM WIRING DIAGRAMS	- - - - - - - - - -		
	- - - - - - - - - -		
	OPSD 2015.302		



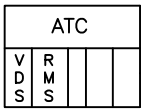
modem with identification codes
M_S fibre optic serial modem
M_B telco modem
M_E fibre optic Ethernet modem



Ethernet switch
numerical value denotes device bandwidth



port server/protocol converter



advanced traffic controller
RMS – ramp metering system
VDS – vehicle detection station
EXT – external devices
QWS – queue warning sign
NITS – non–intrusive traffic sensor



port sharing device



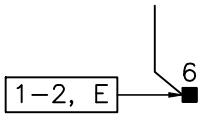
drop cable for future connection
label denotes subsystem type

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1

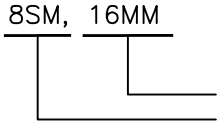
COMMUNICATIONS SYMBOLS

FIBRE OPTIC COMMUNICATIONS SCHEMATIC 1

OPSD 2016.301



fibre splices, number denotes quantity (1–2, E)
indicates fibres 1 and 2 from the east



fibre optic cable

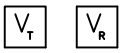
number of multi–mode fibres
number of single–mode fibres



video encoder/decoder

V_E video encoder

V_D video decoder



video transmitter/receiver

V_R video receiver

V_T video transmitter

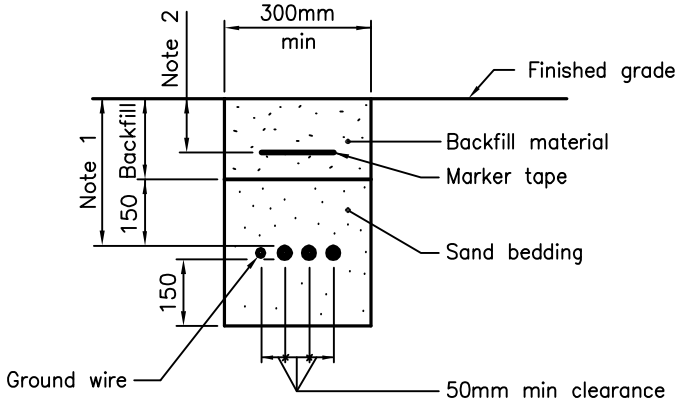


wireless transmitter/receiver

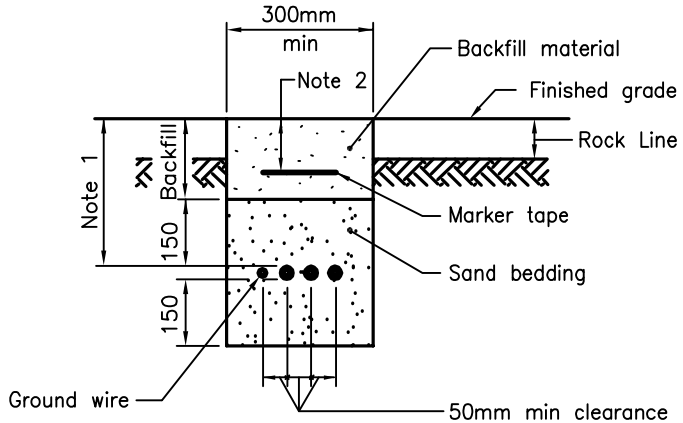
W_r receiver

W_t transmitter

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
COMMUNICATIONS SYMBOLS FIBRE OPTIC COMMUNICATIONS SCHEMATIC 2			
	OPSD 2016.302		



IN EARTH



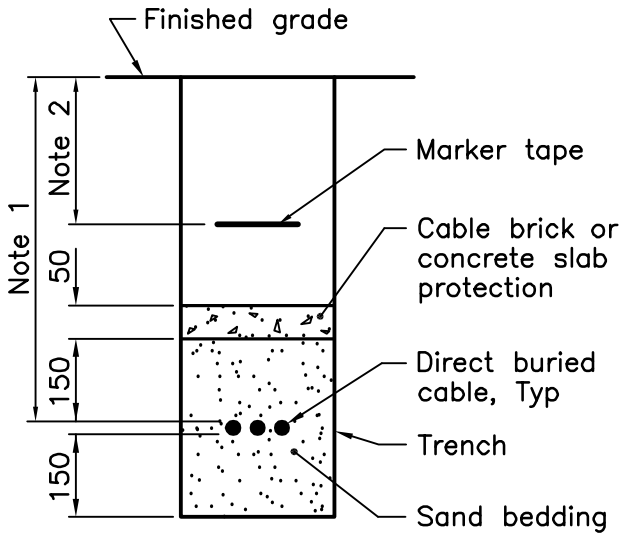
IN ROCK

NOTES:

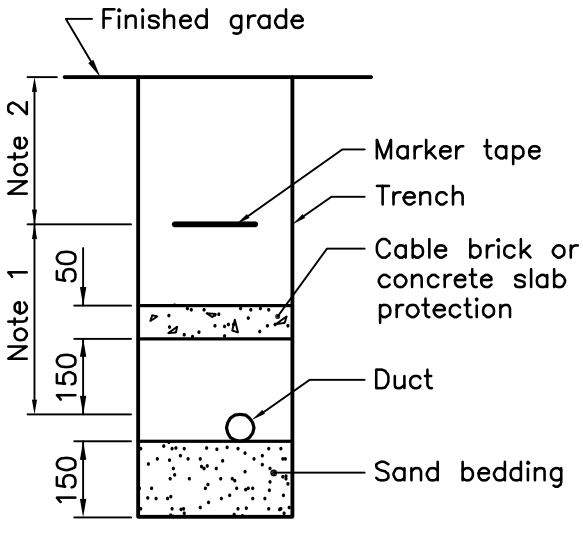
1 Depth of cable shall be as specified in the Ontario Electrical Safety Code.
2 Depth of marker tape shall be as specified in the Ontario Electrical Safety Code.

A Ground wire shall be installed as specified in the Contract Documents.
B Cable brick or concrete slab shall be installed where specified in the Contract Documents. See OPSD 2100.050.
C All dimensions are in millimetres unless otherwise shown.

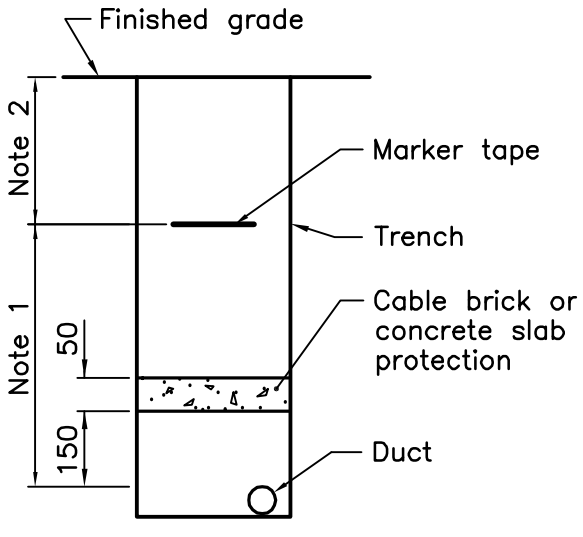
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	0
CABLE INSTALLATION IN TRENCHES			
	OPSD 2100.010		



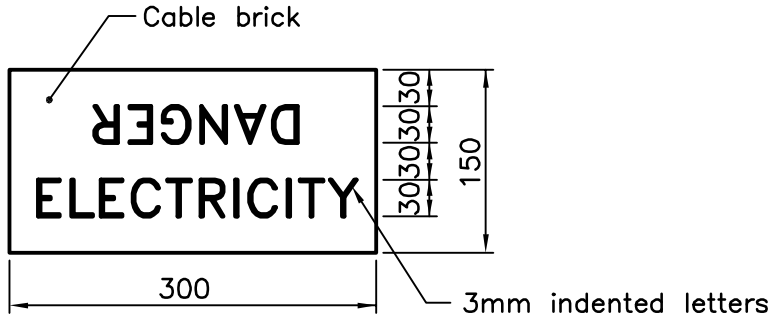
DIRECT BURIED CABLE IN ROCK OR IN EARTH



DUCT IN ROCK



DUCT IN EARTH



CABLE BRICK

NOTES:

1 Depth of cable or duct shall be as specified in the Ontario Electrical Safety Code.
2 Depth of marker tape shall be as specified in the Ontario Electrical Safety Code.

A This OPSD shall be read in conjunction with OPSD 2100.010 and 2101.01.
B All dimensions are in millimetres unless otherwise shown.

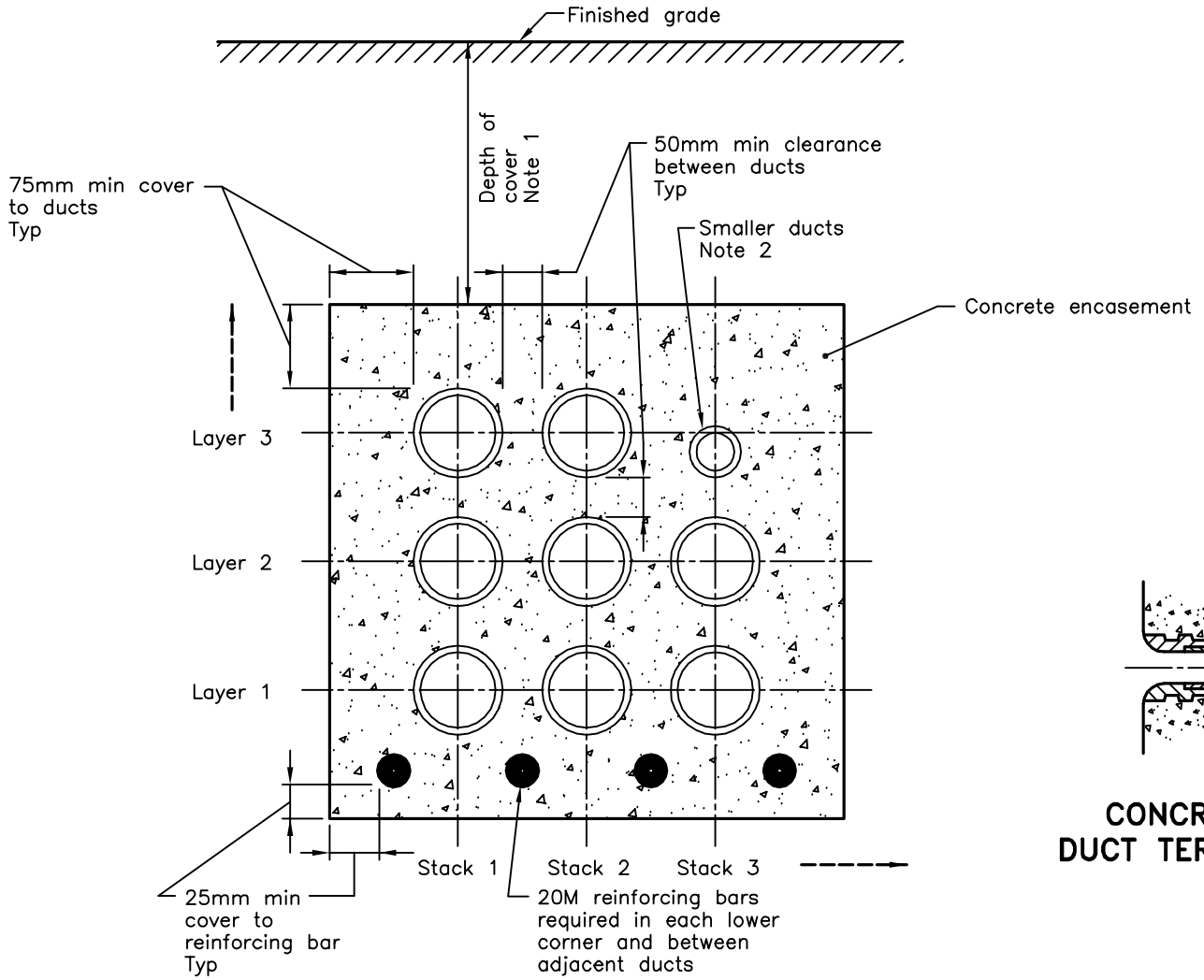
ONTARIO PROVINCIAL STANDARD DRAWING

CABLE AND DUCT PROTECTION AND MARKING

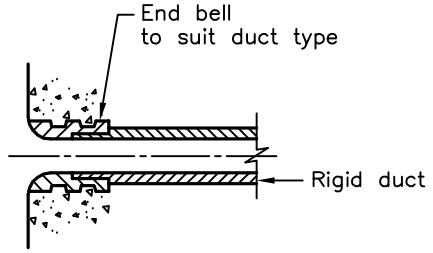
Nov 2013	Rev	0

ONTARIO STANDARDS MUNICIPAL – PROVINCIAL

OPSD 2100.050



SECTION



CONCRETE ENCASED DUCT TERMINATION DETAIL

NOTES:

1 For depth of cover see OPSD 2103.02.

2 Smaller ducts shall be installed in uppermost layers.

A Maximum number of layers shall be 4, maximum number of stacks shall be 4.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

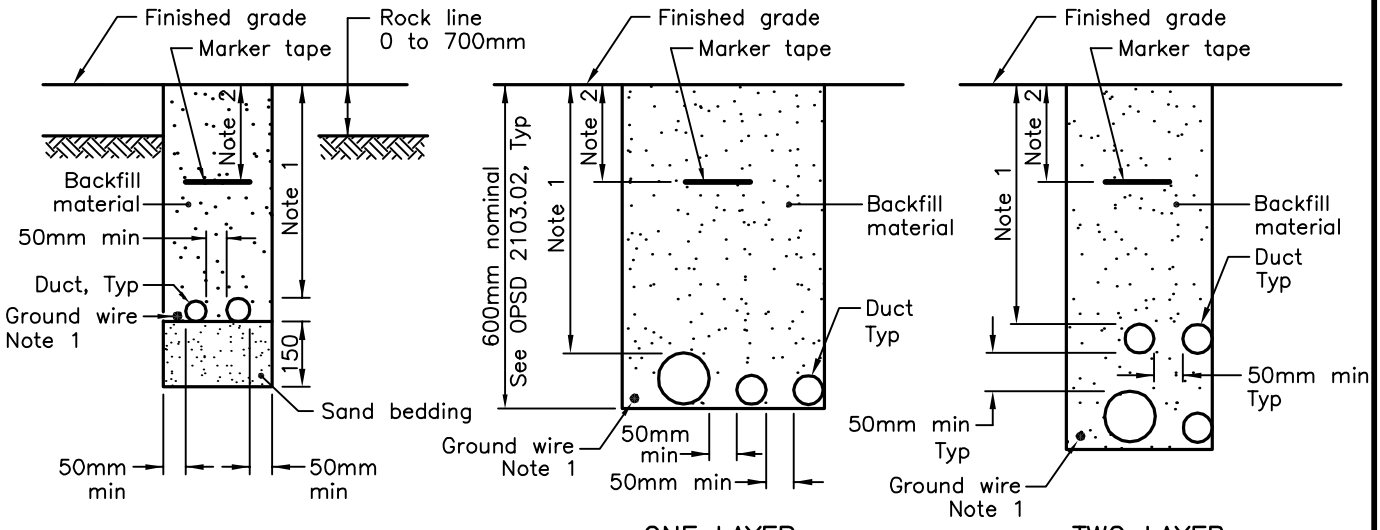
RIGID DUCTS ENCASED IN CONCRETE

Nov 2015 | Rev 2

OPSD 2100.06

MINIMUM TRENCH WIDTH FOR ONE LAYER AND TWO LAYER DUCT ARRANGEMENT

No. OF 100 mm DUCTS	No. OF LAYERS	NUMBER OF 50 mm DUCTS										
		0	1	2	3	4	5	6	7	8	9	10
0	1	N/A	150	205	300	460	610	N/A	N/A	N/A	N/A	N/A
	2	N/A	N/A	N/A	N/A	205	300	350	460	460	610	610
1	1	150	255	460	610	610	N/A	N/A	N/A	N/A	N/A	N/A
	2	N/A	N/A	205	255	300	460	460	610	610	610	N/A
2	1	300	460	610	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	150	255	255	460	460	610	610	610	N/A	N/A	N/A
3	1	460	610	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	300	300	460	460	610	610	610	N/A	N/A	N/A	N/A
4	1	610	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2	300	460	460	610	610	N/A	N/A	N/A	N/A	N/A	N/A



IN ROCK

ONE LAYER ARRANGEMENT **IN EARTH**

TWO LAYER ARRANGEMENT **IN EARTH**

NOTES:

1 Ground wire shall be installed in the duct or trench as specified in the Contract Documents.
2 Depth of marker tape shall be as specified in the Ontario Electrical Safety Code.

A Cable brick or concrete slab shall be installed where specified in the Contract Documents. See OPSD 2100.050.

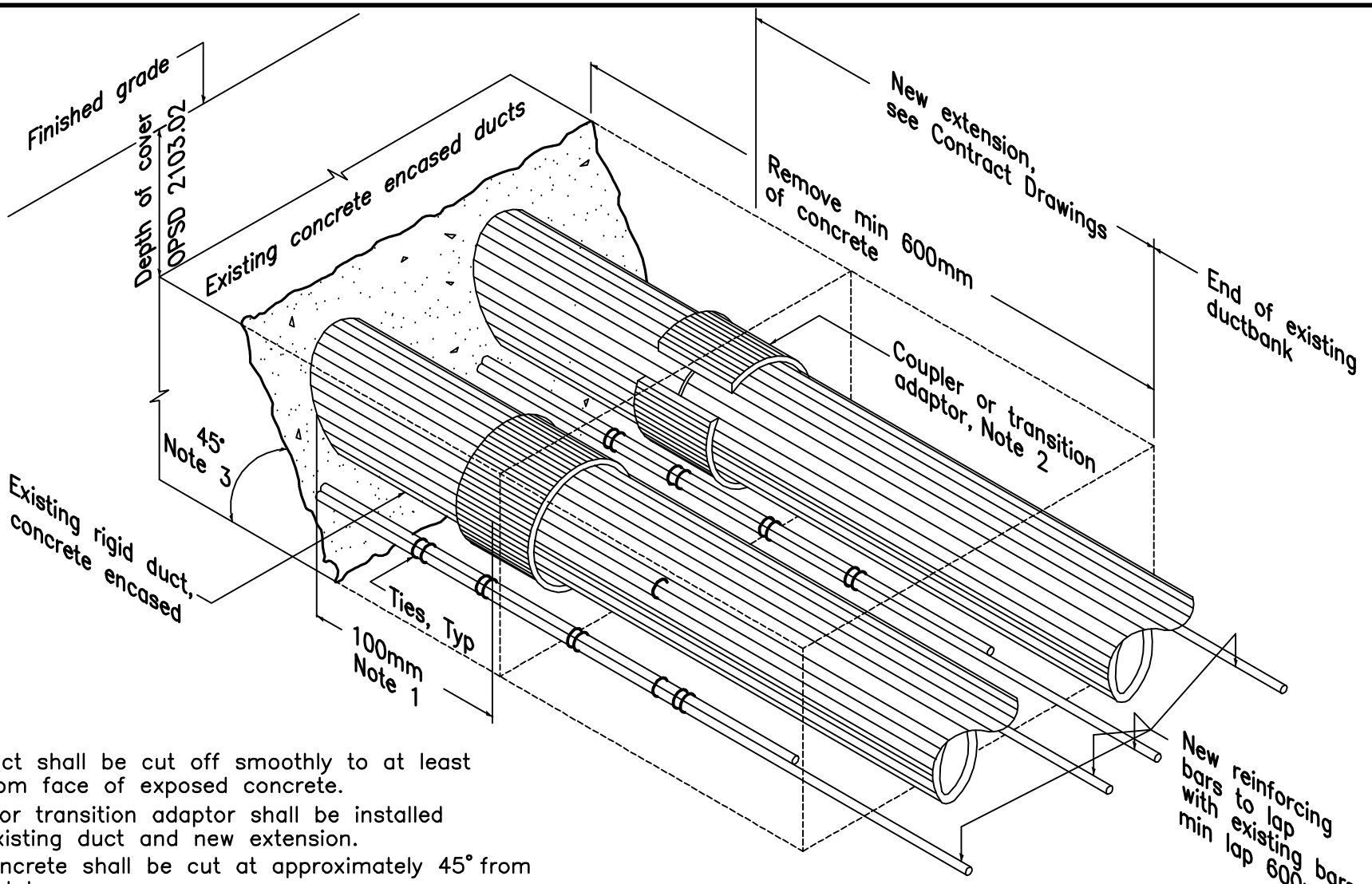
B This OPSD shall be read in conjunction with OPSD 2103.02.

C Contractor has the option of installing one or two layer duct arrangement.

D N/A – Not Applicable, undesirable or exceeding equipment limits.

E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1
DUCT INSTALLATION IN TRENCHES			
			OPSD 2101.01



NOTES:

1 Existing duct shall be cut off smoothly to at least 100mm from face of exposed concrete.

2 A coupler or transition adaptor shall be installed between existing duct and new extension.

3 Existing concrete shall be cut at approximately 45° from the horizontal.

A When existing direct buried ducts are encased in concrete and are connected to existing duct bank, Note 1 shall be applied and split duct shall be used as a coupler. Split duct shall be taped.

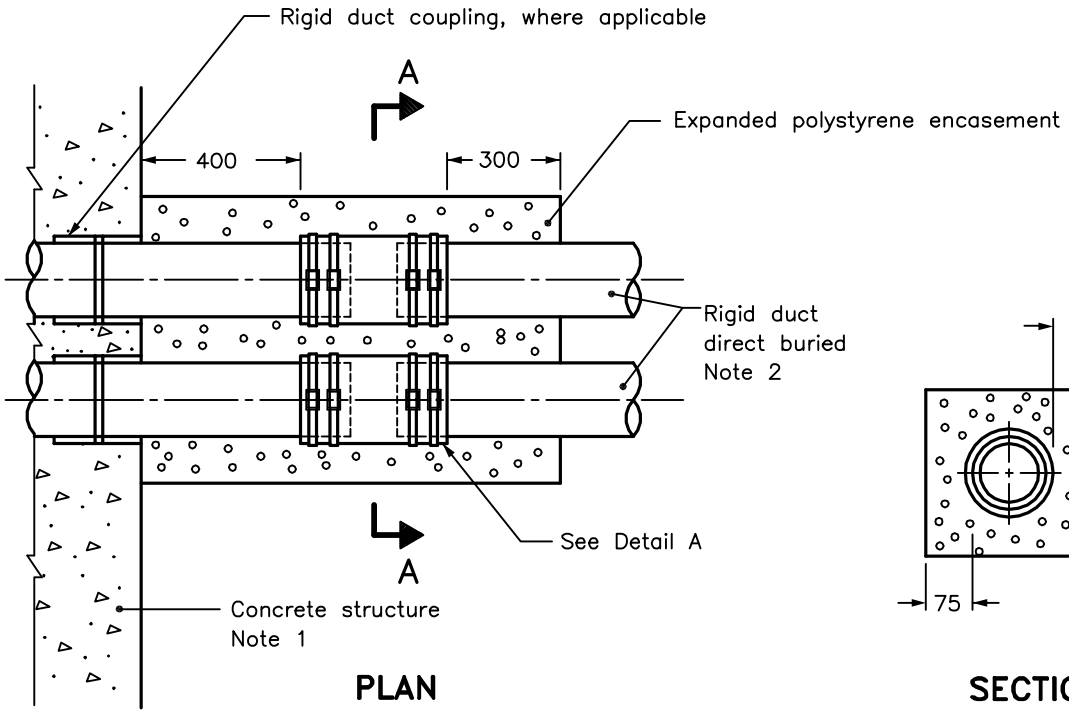
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

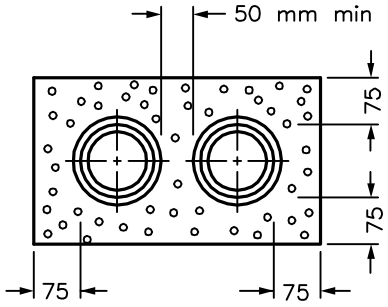
EXTENSION OF EXISTING RIGID DUCTS ENCASED IN CONCRETE

Nov 2013	Rev	0

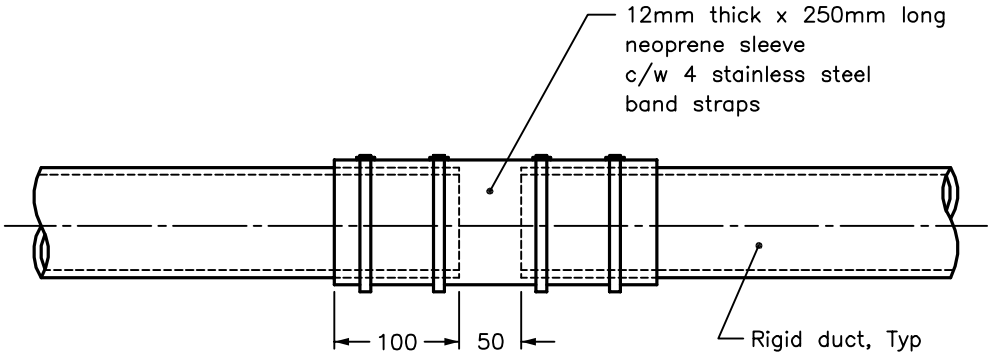
OPSD 2101.020



PLAN



SECTION A–A



DETAIL A
WOBBLE JOINT

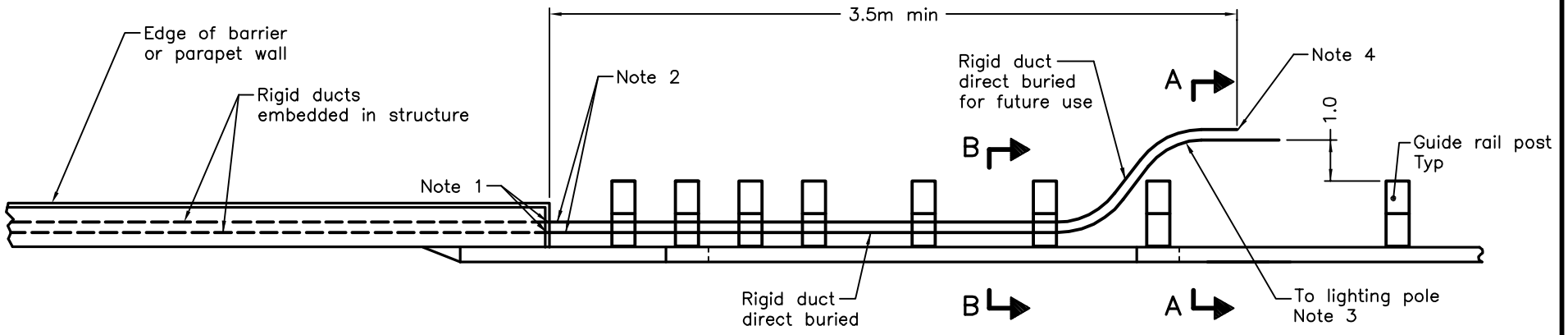
NOTES:

1 Concrete structures include bridge structure, concrete footing, electrical chamber, concrete duct bank, etc.

2 For number, sizes, and orientation of ducts, refer to Contract Drawings.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1
UNDERGROUND RIGID DUCT CONNECTION AT CONCRETE STRUCTURE			
	OPSD 2102.01		



PLAN
DUCT EXTENSION AT END OF STRUCTURE

NOTES:

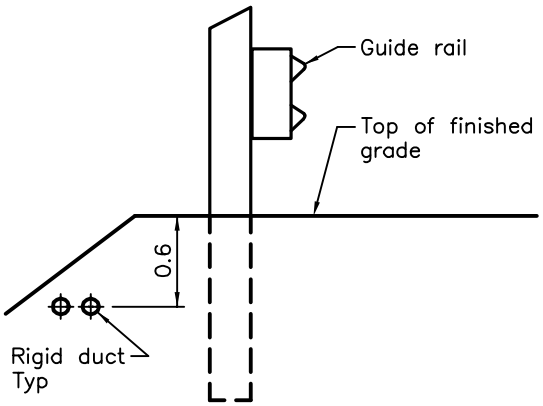
1 Buried ducts shall be connected to the embedded ducts at end of structure. Refer to Contract Documents for the termination detail of the embedded ducts. Hand dig or hydrovac to expose termination of embedded ducts.

2 Expansion and deflection fitting assemblies shall be installed along straight section of buried ducts within 0.3m of structure. Provide local loose expanded polystyrene foam fill bedding for the fitting assembly.

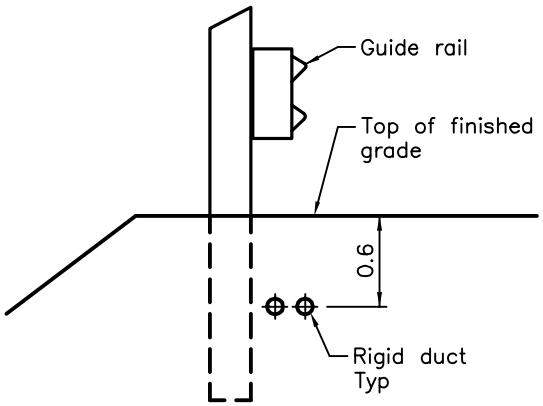
3 Extend the fish wire and trace wire through the duct to the pole handhole.

4 Terminate the rigid duct direct buried behind the guide rail, 600mm below grade. Extend the fish wire and trace wire through and plug the end of the duct.

A All dimensions are in metres unless otherwise shown.

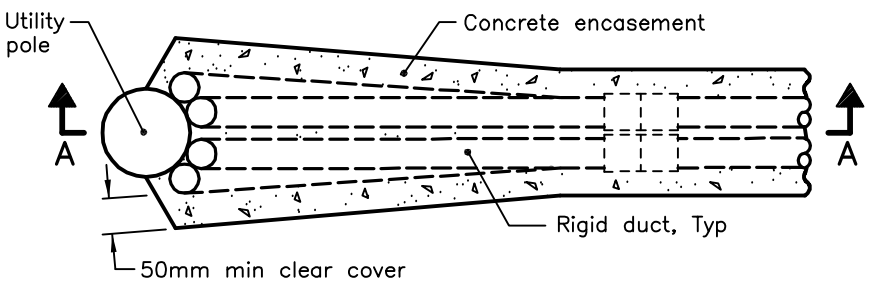


SECTION A–A

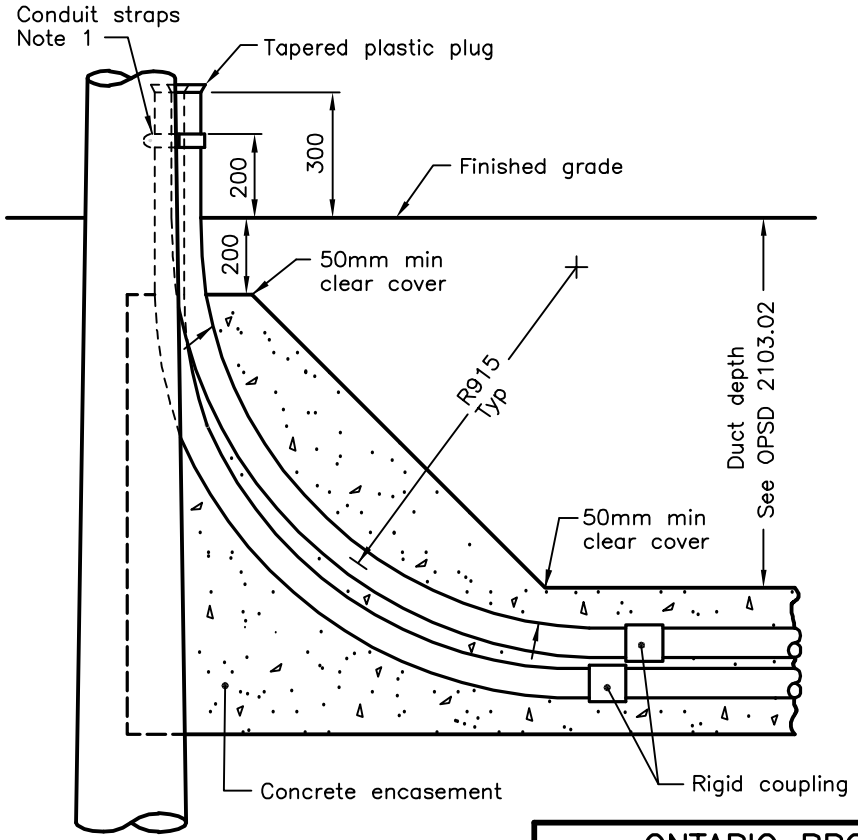


SECTION B–B

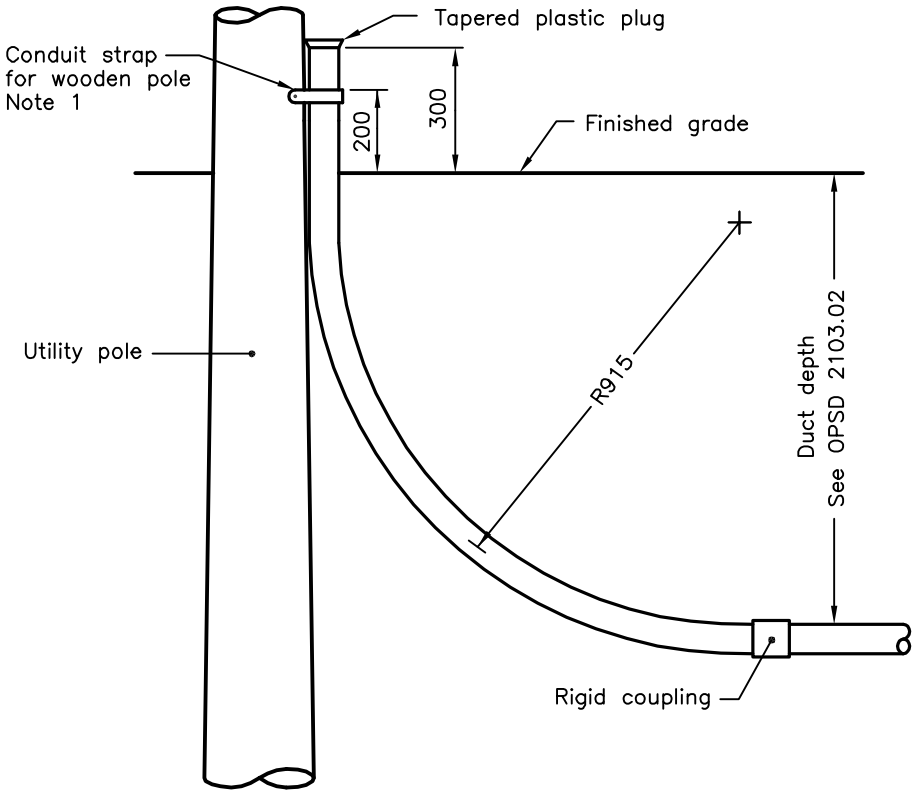
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	0
UNDERGROUND RIGID DUCT CONNECTION AT CONCRETE STRUCTURE WITHOUT EXPANSION JOINT			
	OPSD 2102.020		



PLAN



SECTION A–A
CONCRETE ENCASED DUCT



DIRECT BURIED DUCT

NOTES:

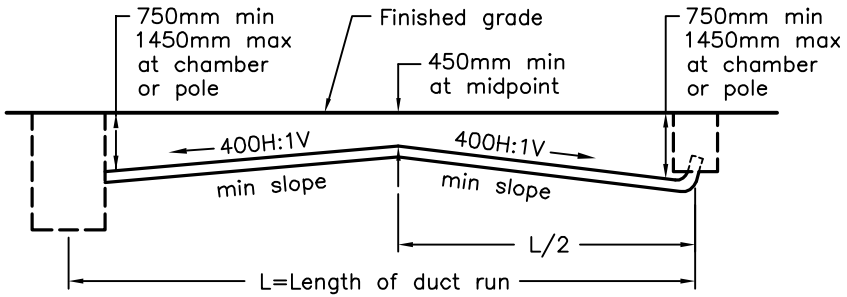
1 For other than wooden poles, stainless steel banding shall be used.

A Size and number of ducts shall be as specified.

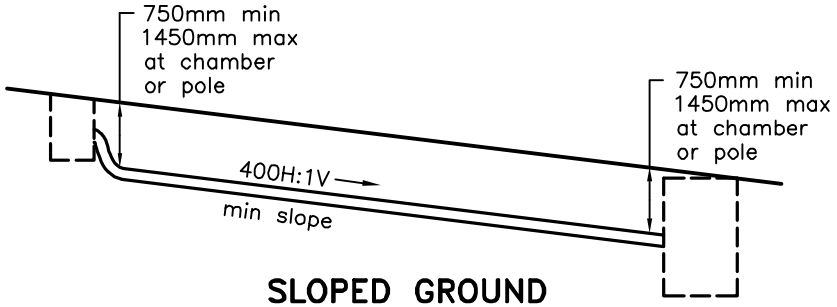
B This OPSD shall be read in conjunction with OPSD 2100.06 and 2101.01.

C All dimensions are in millimetres unless otherwise shown.

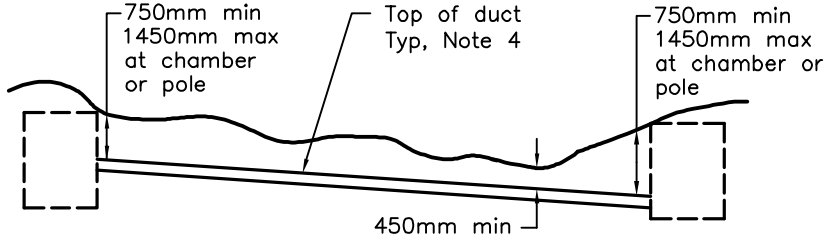
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	0
RIGID DUCT TERMINATION FOR HIGH VOLTAGE CABLES AT UTILITY POLES			
	OPSD 2103.010		



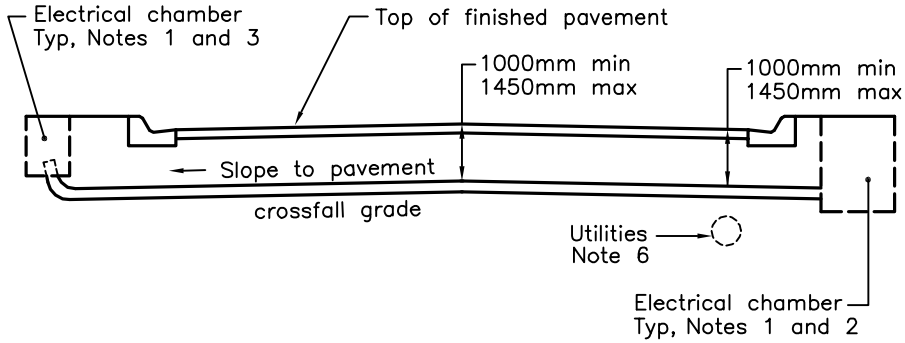
FLAT GROUND



SLOPED GROUND



UNEVEN GROUND



OPEN TRENCH METHOD ACROSS ROADWAYS
NOTE 5

NOTES:

1 Type and size of electrical chambers shall be as specified.

2 For duct connection to electrical maintenance hole see OPSD 2123.01 and 2123.02.

3 For duct connection to electrical handholes see OPSD 2123.03.

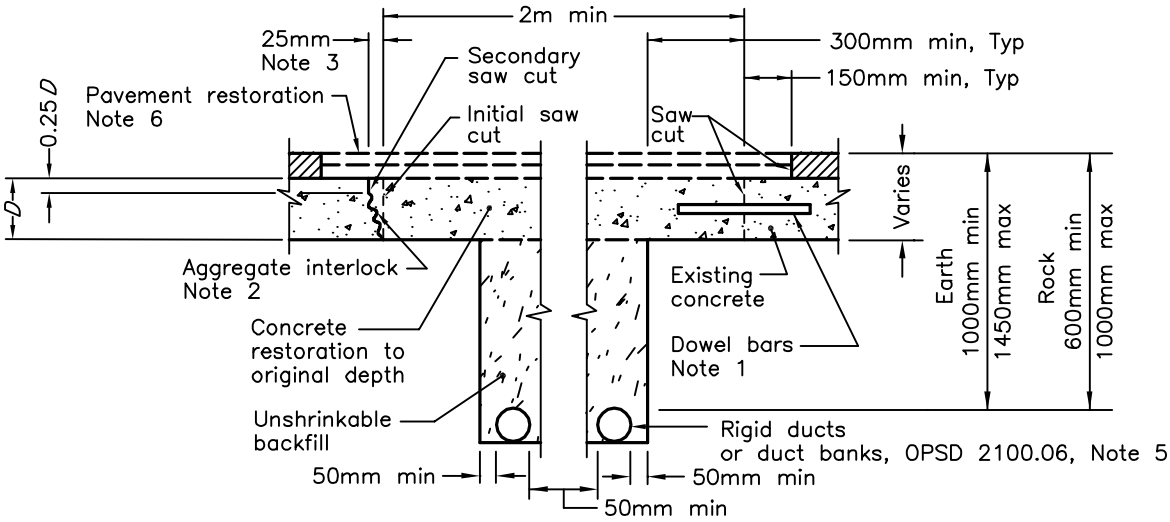
4 Depth of cover specified shall be to top of direct buried ducts or to top of concrete encasement.

5 For subsurface and underpavement installation, the cover shall be 1000mm minimum and 1450mm maximum measured from the top of steel encasement or duct to the finished grade.

6 For treatment at utility crossings see OPSD 2103.050.

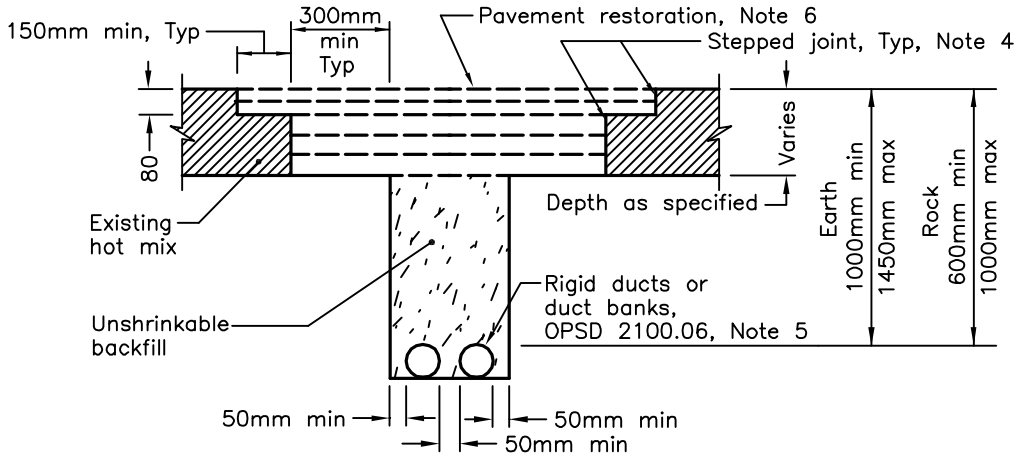
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	1
DUCT INSTALLATION PROFILES			
		OPSD 2103.02	



UNDOWELLED TREATMENT, NOTE 2 **DOWELLED TREATMENT, NOTE 1**

COMPOSITE OR CONCRETE PAVEMENT



BITUMINOUS PAVEMENT

NOTES:

1 Dowelled treatment is only required in existing concrete pavement or concrete base that contains load transfer devices. Dowels shall be 32mm diameter, 450mm long, epoxy coated, installed at 300mm intervals at mid depth of the concrete slab, in plane to the pavement surface, parallel to the centre line of the road, and set 225mm in 35mm holes with epoxy grout.

2 Undowelled treatment is only required in existing concrete pavement or concrete base that is constructed without load transfer devices at joints. Aggregate interlock is created by chipping the vertical concrete face with a light 15kg maximum pneumatic hammer.

3 The initial saw cut shall be full depth. The secondary saw cut shall be 1/4 of existing pavement depth with 25mm of chipping for aggregate interlock.

4 Where existing pavement depth is between 80 and 120mm, the 150mm wide stepped joint shall be 40mm deep.

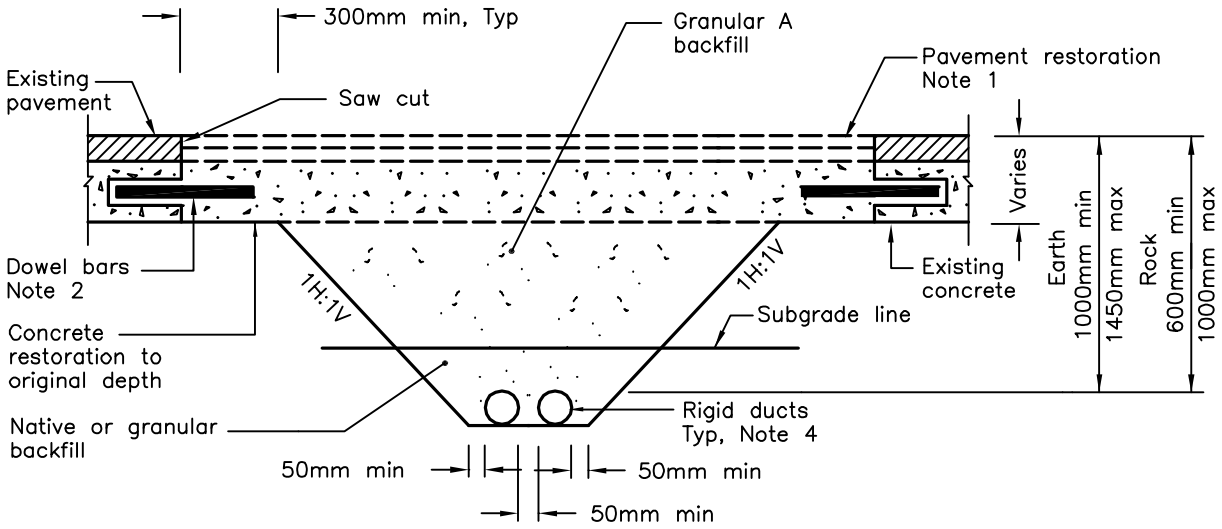
5 In rock, the ducts shall be placed on 150mm sand bedding.

6 Bituminous pavement restoration shall match existing type unless otherwise specified. The surface and top binder courses shall be placed in 40mm lifts with other lifts placed at 80mm maximum.

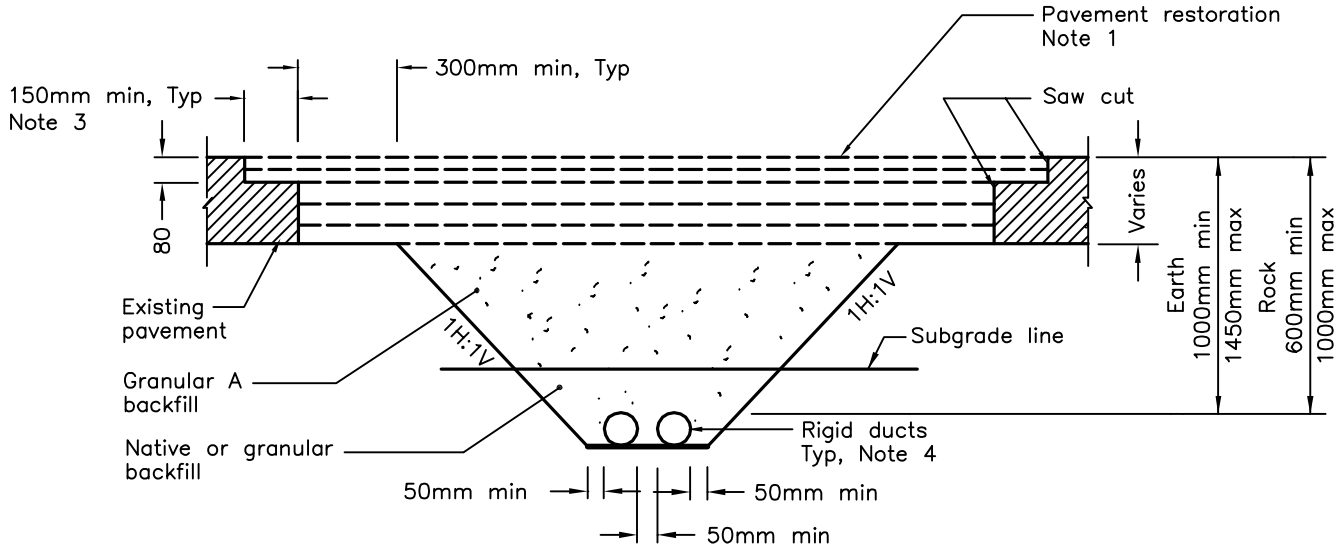
A All voids below the pavement shall be filled with unshrinkable backfill.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	1
RIGID DUCT INSTALLATION IN EXISTING PAVED AREA UNSHRINKABLE BACKFILL METHOD			
	OPSD 2103.030		



COMPOSITE OR CONCRETE PAVEMENT



BITUMINOUS PAVEMENT

NOTES:

1 Bituminous pavement restoration shall match existing type unless otherwise specified. The surface and top binder courses shall be placed in 40mm lifts with other lifts placed at 80mm maximum.

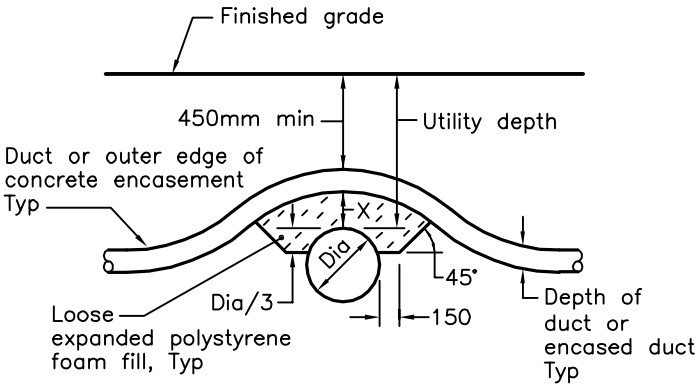
2 Dowel bars are required only in concrete base or pavement with load transfer devices at joints. Dowels shall be 32mm diameter, 450mm long, epoxy coated, installed at 300mm intervals, centred vertically in concrete base, and set 225mm in 35mm holes with epoxy grout. Dowels shall be aligned parallel to the longitudinal axis of the pavement.

3 Where existing pavement depth is between 80 and 120mm, the 150mm wide step joint shall be 40mm deep.

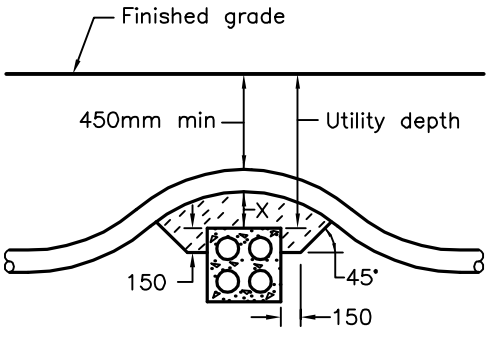
4 In rock, the ducts shall be placed on 150mm sand bedding.

A All dimensions are in millimetres unless otherwise shown.

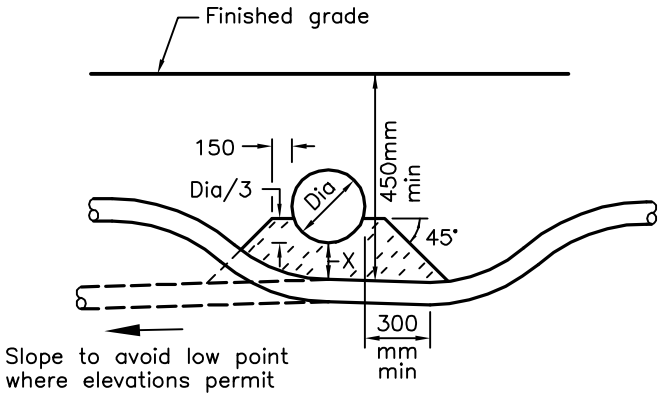
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	0
RIGID DUCT INSTALLATION IN EXISTING PAVED AREA GRANULAR BACKFILL METHOD			
	OPSD 2103.040		



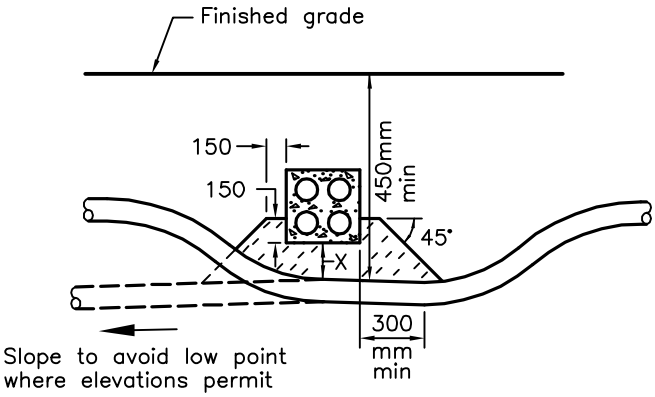
CROSSING OVER UTILITY



CROSSING OVER CONCRETE ENCASED UTILITY



CROSSING UNDER UTILITY



CROSSING UNDER CONCRETE ENCASED UTILITY

NOTES:

A The required clearance between the utility and the ducts or concrete encasement shall be as follows:

UTILITY	X mm min
Ducts, direct buried or encased	100
All other pipes	300
High voltage cables	300
All other cables	300

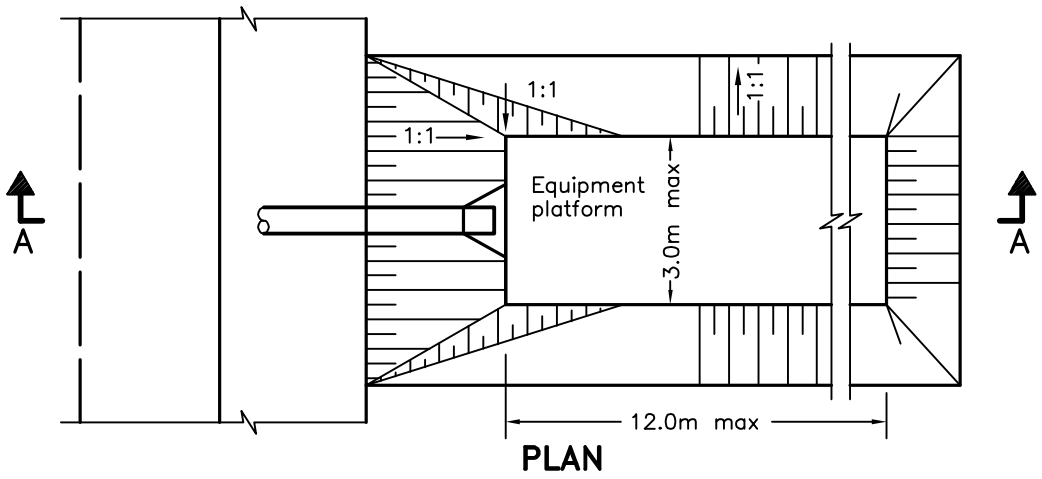
B Trench widths shall be kept to the minimum required for working space. Manual excavation and backfill methods shall be used with the utility supported in place, when required, when crossing under a utility is necessary.

C All dimensions are in millimetres unless otherwise shown.

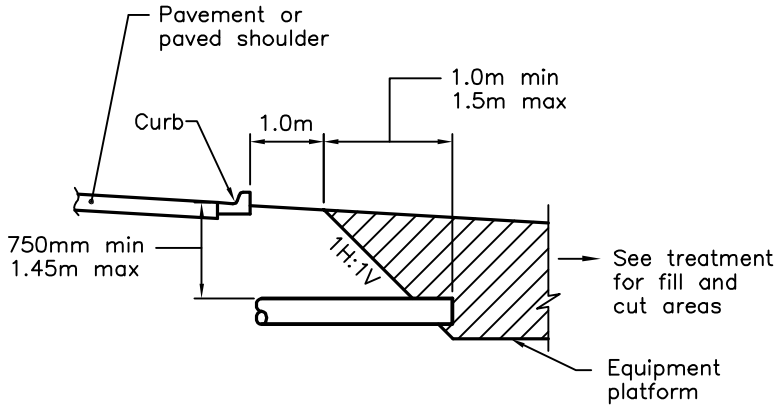
ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2015 | Rev 0

DUCT INSTALLATION AT UTILITY CROSSINGS

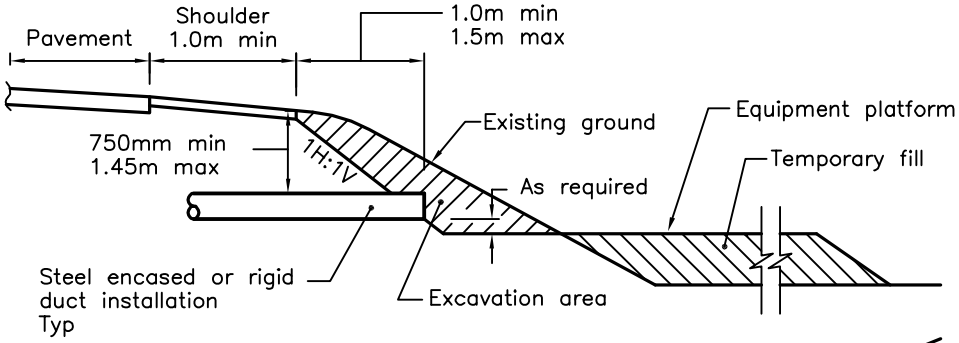
OPSD 2103.050



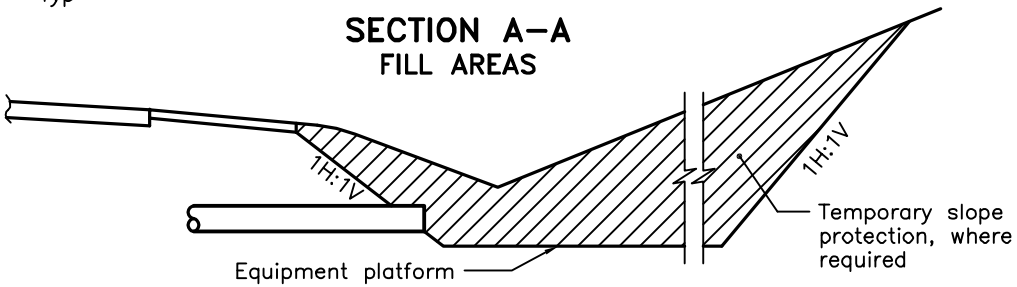
PLAN



SECTION A–A
VARIATION AT CURBED SITE



SECTION A–A
FILL AREAS



SECTION A–A
CUT AREAS

NOTES:

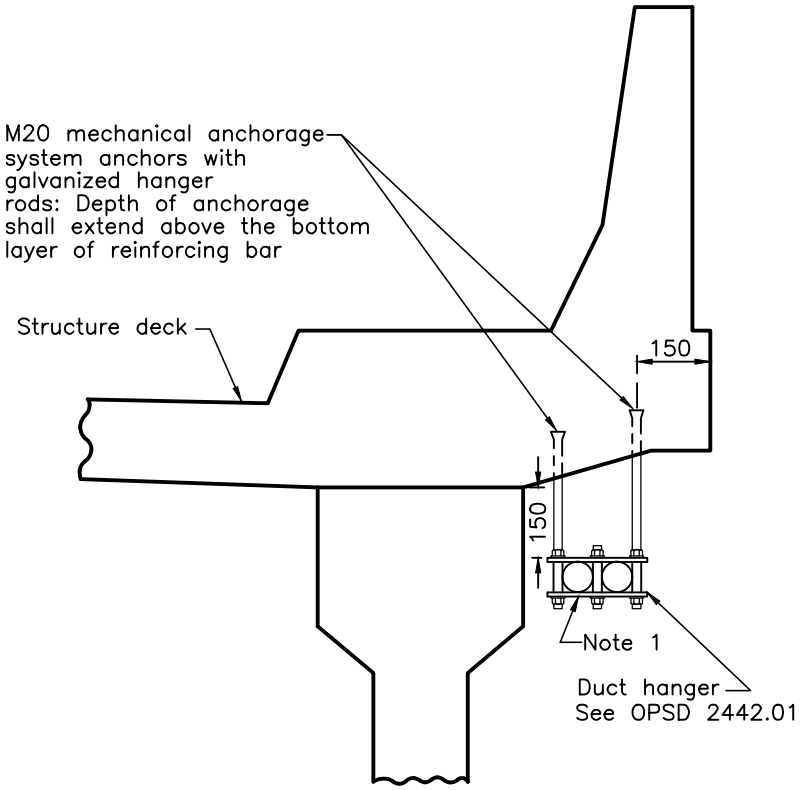
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

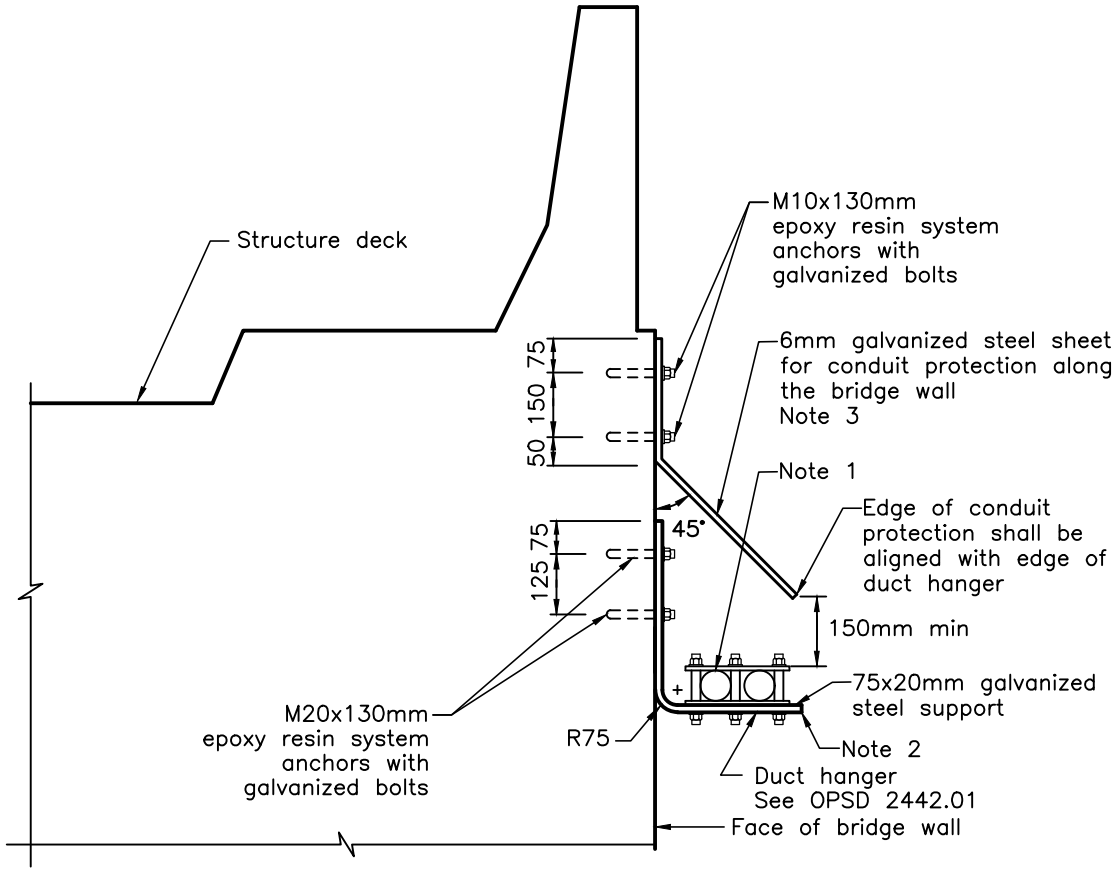
Nov 2015 | Rev 0

AUGERING PITS FOR SUBSURFACE INSTALLATION OF DUCTS AND ENCASEMENTS

OPSD 2103.060



UNDER BRIDGE DECK



SECTION VIEW

NOTES:

1 Where required, conduit bends shall not exceed 22.5°.
2 The maximum spacing of the support system shall be according to the Ontario Electrical Safety Code.
3 When specified, a conduit protection shall be installed along the span of the bridge and wing walls, where surface mounted ducts are mounted on the face of the structure. The maximum horizontal length of each conduit protection section shall be 1500mm. Each conduit protection section shall be attached with 8 – M10 bolts, uniformly spaced. The protection shall not span expansion joints.

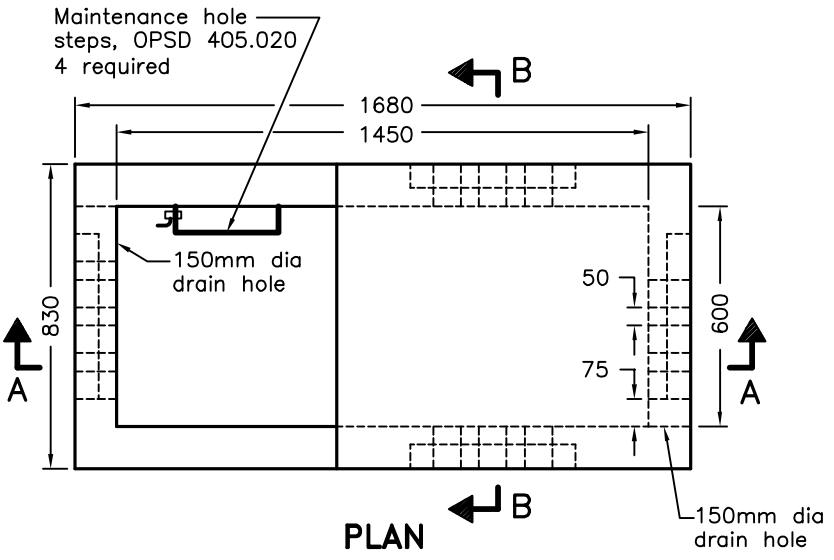
A The number and size of ducts are as indicated in the contract.
B Split stop rings shall be installed midway between expansion joints at support bracket.
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

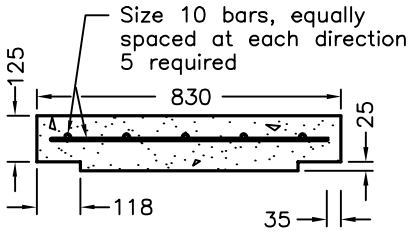
DUCTS SURFACE MOUNTED ON STRUCTURES

Nov 2020 | Rev 1

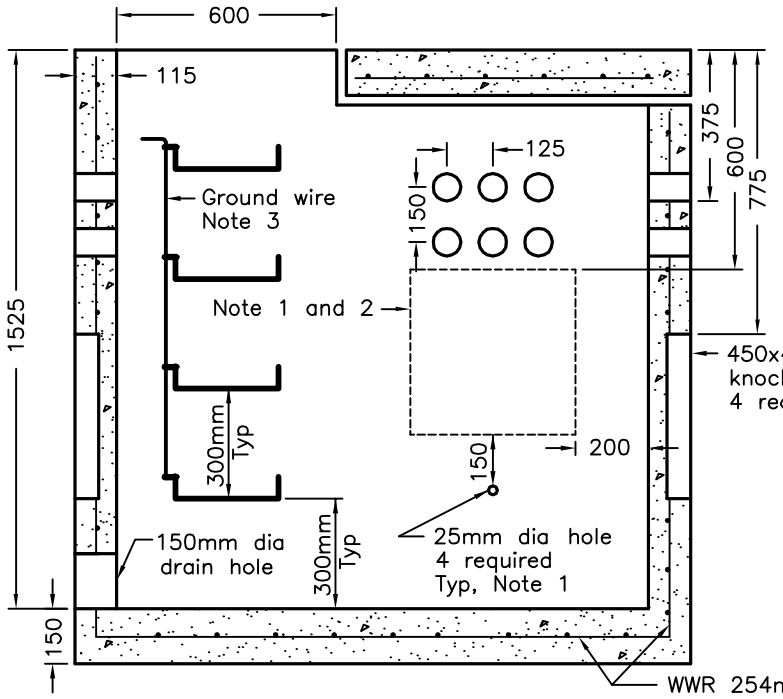
OPSD 2104.010



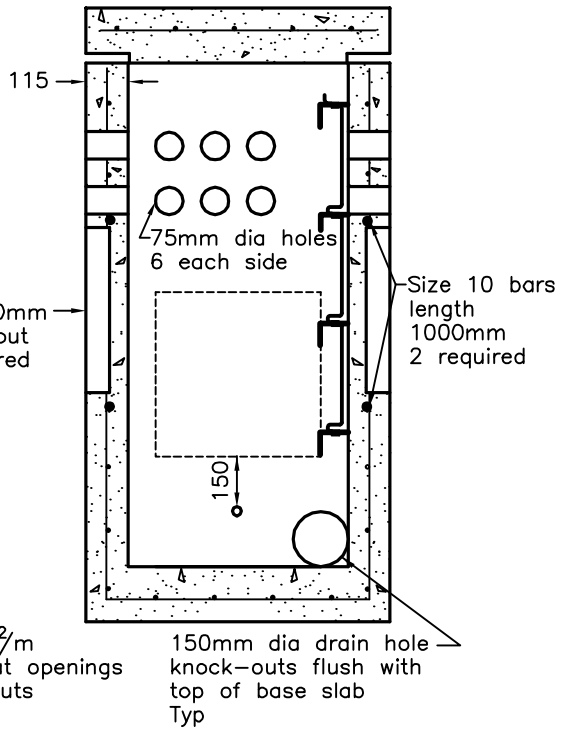
PLAN



CAP DETAIL



SECTION A–A



SECTION B–B

NOTES:

1 For general installation details see OPSD 2117.01.

2 For duct installation profiles see OPSD 2103.02.

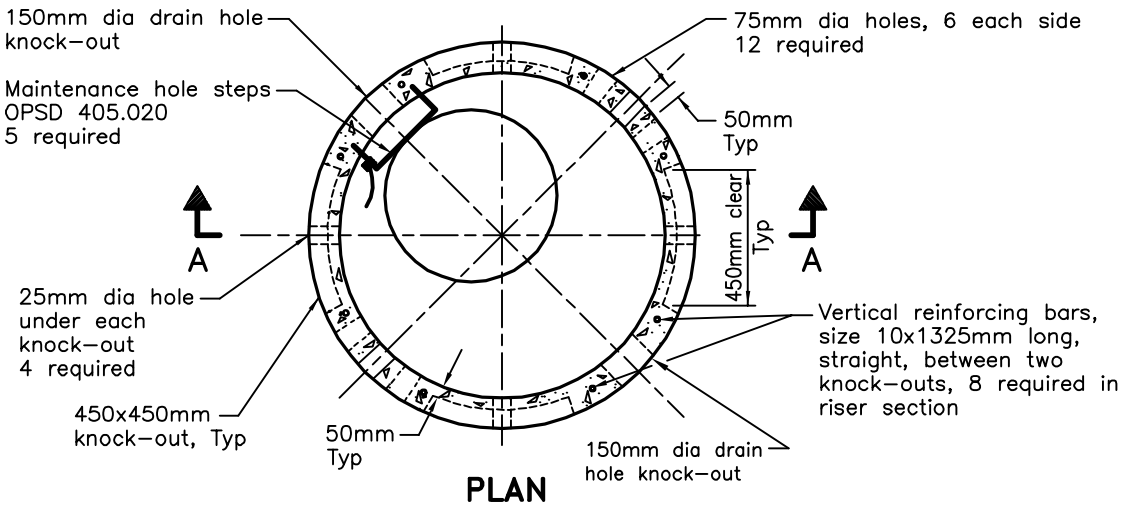
3 1/0 AWG stranded copper bare wire shall be fastened to steps using aluminum parallel groove clamps and anti–oxidant component.

A Minimum cover for reinforcing steel shall be 35mm external surface, 25mm internal surface.

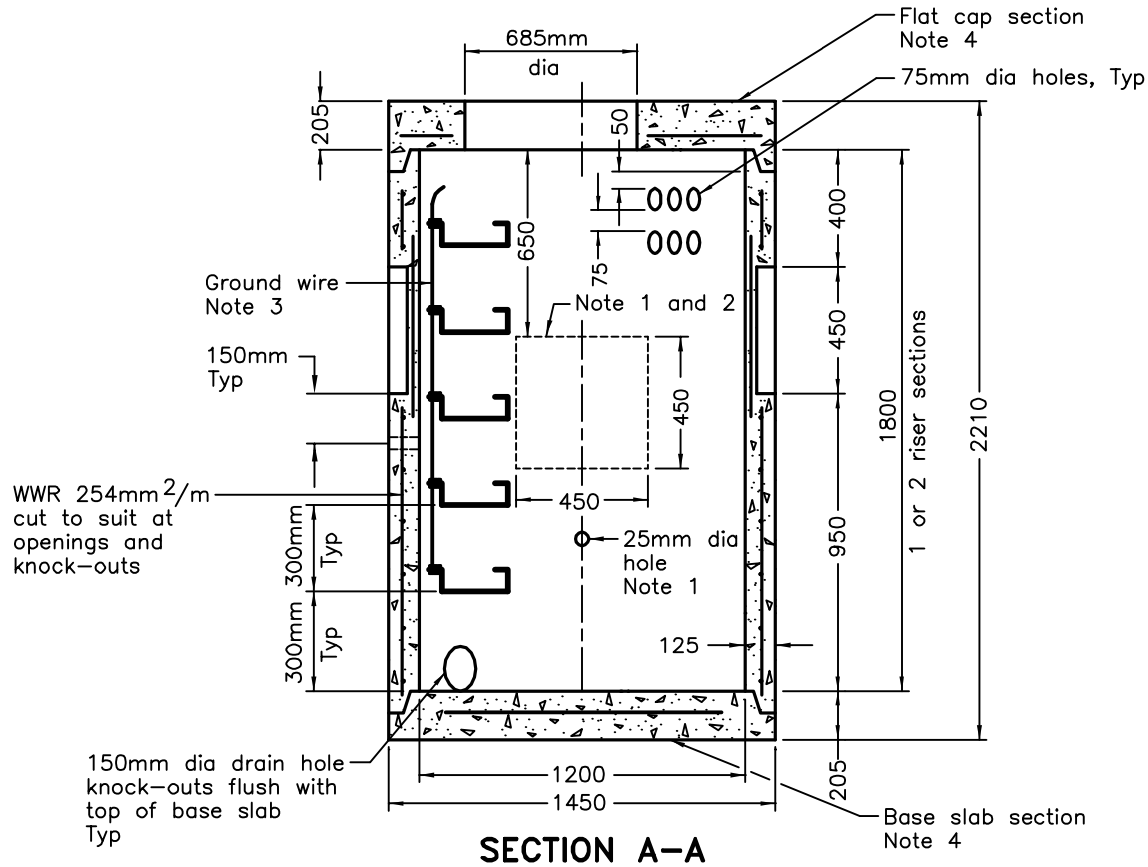
B All reinforcing bars shall be cut to suit openings.

C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	1
ELECTRICAL MAINTENANCE HOLE PRECAST CONCRETE 600 x 1450mm			
	OPSD 2111.020		



PLAN



SECTION A–A

NOTES:

1 For general installation details see OPSD 2117.01.

2 For duct installation profiles see OPSD 2103.02.

3 1/0 AWG stranded copper bare wire shall be fastened to steps using aluminum parallel groove clamps and anti–oxidant component.

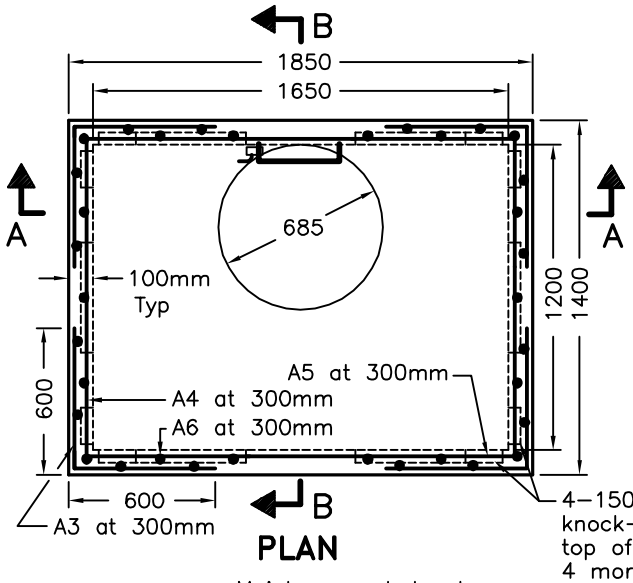
4 For details and reinforcing of flat cap section and base slab section see OPSD 701.030.

A Minimum cover for reinforcing steel shall be 35mm external surface, 25mm internal surface.

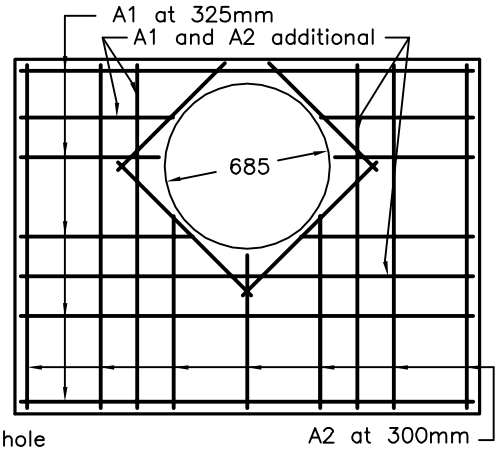
B All reinforcing bars shall be cut to suit openings.

C All dimensions are in millimetres unless otherwise shown.

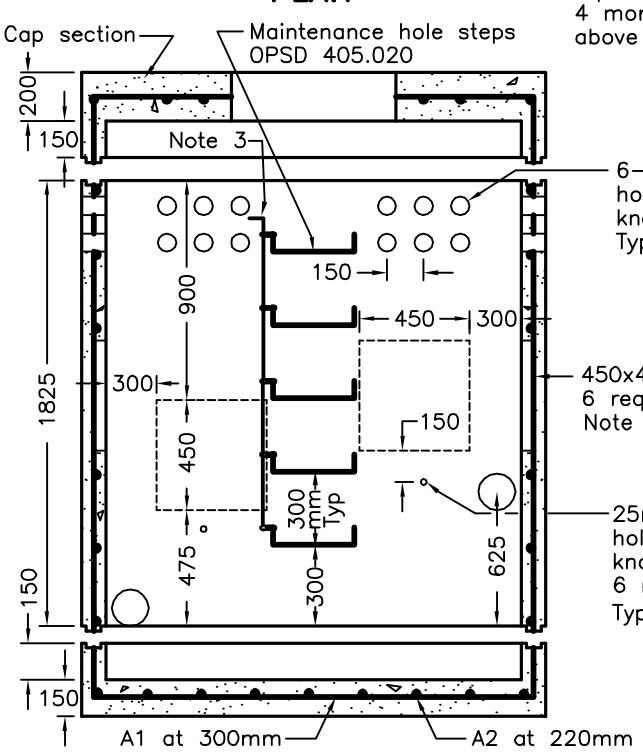
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	1
ELECTRICAL MAINTENANCE HOLE PRECAST CONCRETE 1200mm DIA			
	OPSD 2111.030		



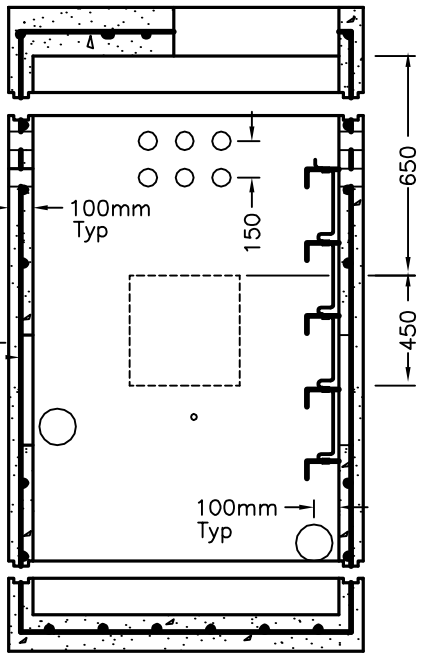
PLAN



PLAN
CAP SECTION



SECTION A–A



SECTION B–B

NOTES:

1 For general installation details see OPSD 2117.01.

2 For duct installation profiles see OPSD 2103.02.

3 1/0 AWG stranded copper bare wire shall be fastened to steps using aluminum parallel groove clamps and anti–oxidant component.

A Minimum cover for reinforcing steel shall be 35mm external surface, 25mm internal surface.

B All reinforcing bars shall be cut to suit openings.

C All dimensions are in millimetres unless otherwise shown.

REINFORCING TABLE

Mark	Quant	Size	Length m	Mass kg	Detail
A1	13	10	2.15	21.94	0.2 1.75
A2	18	10	1.68	23.74	0.19 1.3
A3	24	15	1.2	45.21	0.6 10.6
A4	12	10	1.83	17.24	0.28 1.27
A5	12	15	1.72	32.40	Straight
A6	34	10	1.77	47.24	Straight

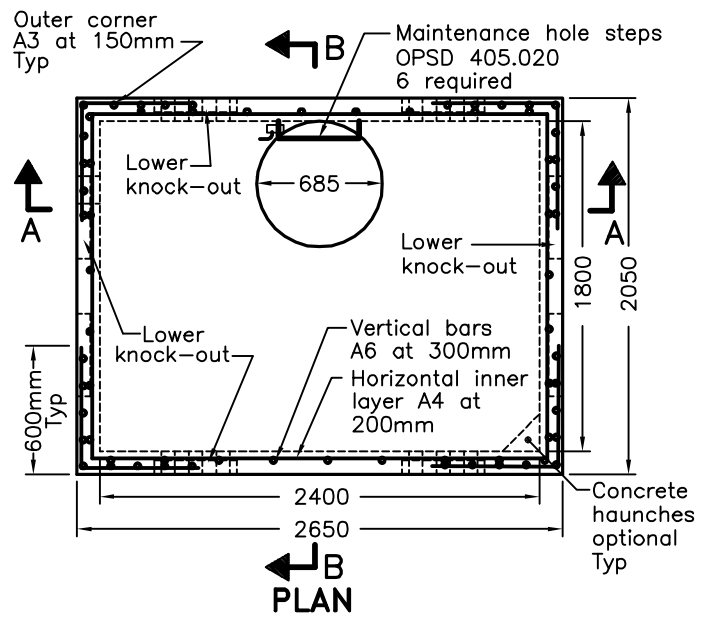
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 | Rev 1

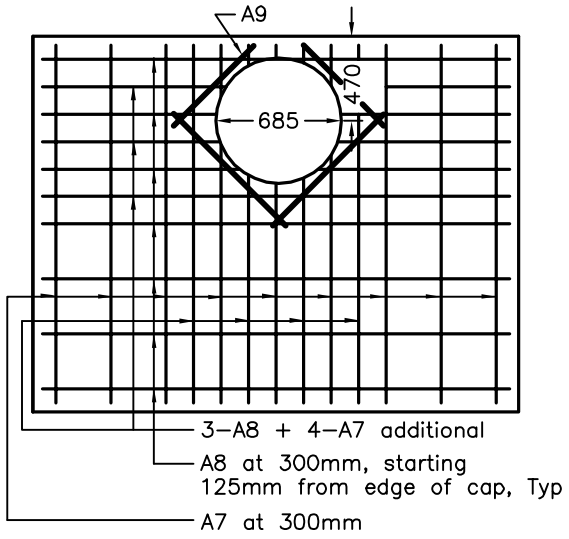
ELECTRICAL MAINTENANCE HOLE PRECAST CONCRETE 1200 x 1650mm

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL · OPSS

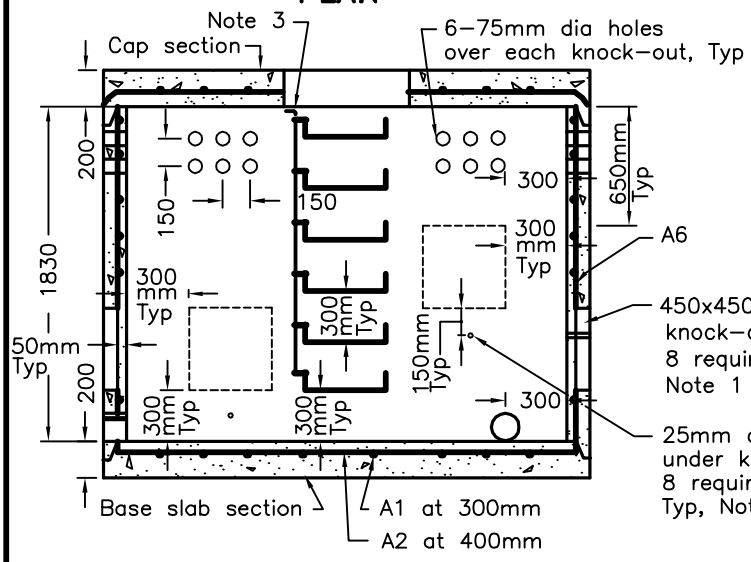
OPSD 2111.040



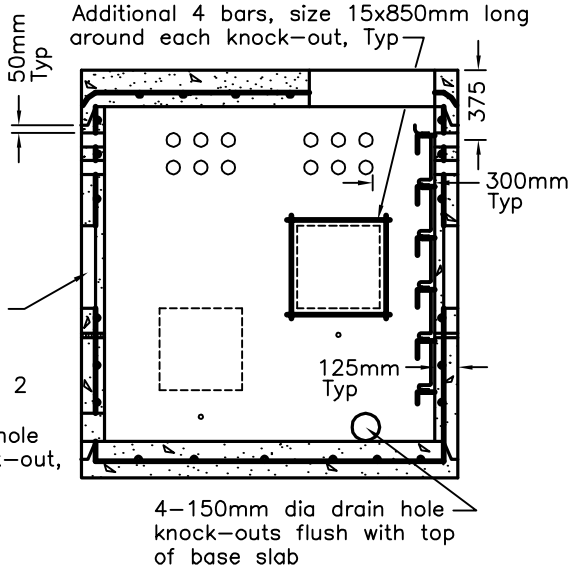
PLAN



PLAN
CAP SECTION



SECTION A–A



SECTION B–B

REINFORCING TABLE					
Mark	Quant	Size	Length (m)	Mass (kg)	Detail
A1	10	15	2.48	38.62	Straight
A2	6	15	1.86	17.52	Straight
A3	52	15	1.2	17.97	0.6 / 0.6
A4	20	20	2.45	115.4	Straight
A5	20	20	2.51	118.22	0.31 / 1.89
A6	36	10	1.78	50.3	Straight
A7	13	15	2.82	57.55	0.12 / 2.58
A8	10	15	2.22	34.85	0.12 / 1.98
A9	4	15	1.0	6.28	Straight

NOTES:

1 For general installation details see OPSD 2117.01.

2 For duct installation profiles see OPSD 2103.02.

3 1/0 AWG stranded copper bare wire shall be fastened to steps using aluminum parallel groove clamps and anti–oxidant component.

A Minimum cover for reinforcing steel shall be 35mm external surface, 25mm internal surface.

B All reinforcing bars shall be cut to suit openings.

C All dimensions are in millimetres unless otherwise shown.

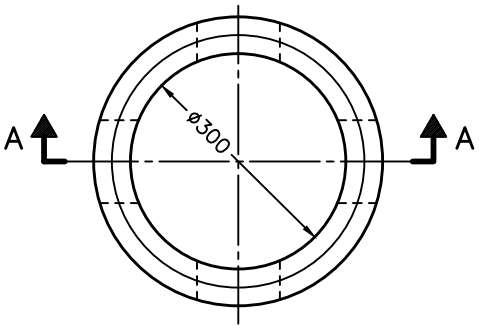
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 | Rev 1

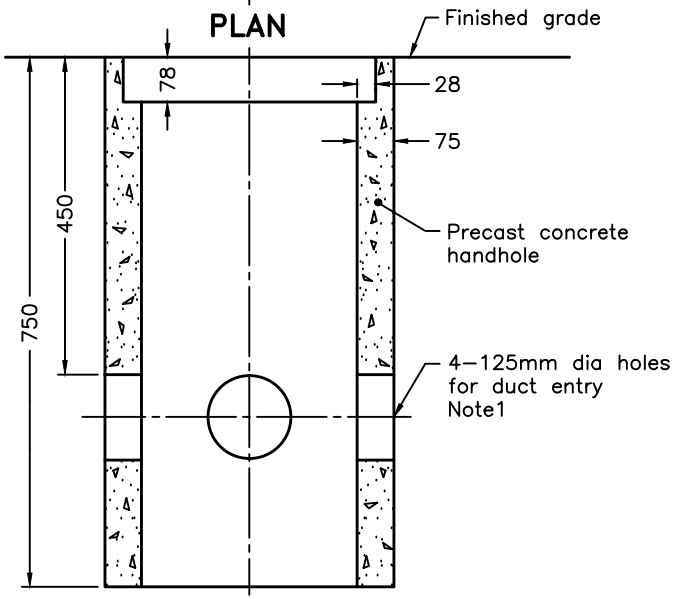
ELECTRICAL MAINTENANCE HOLE
PRECAST CONCRETE
1800 x 2400mm

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL · OPSS

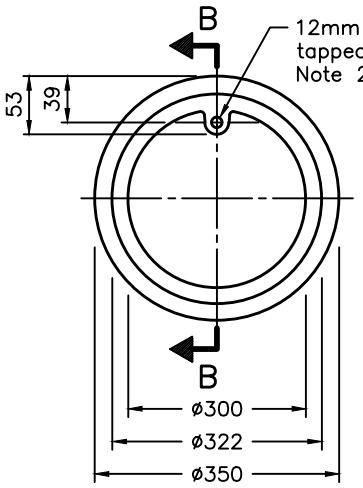
OPSD 2111.050



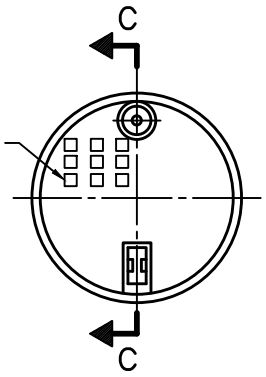
PLAN



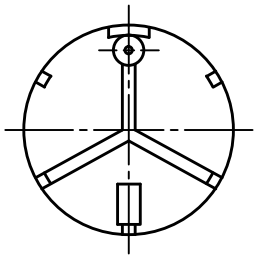
SECTION A–A



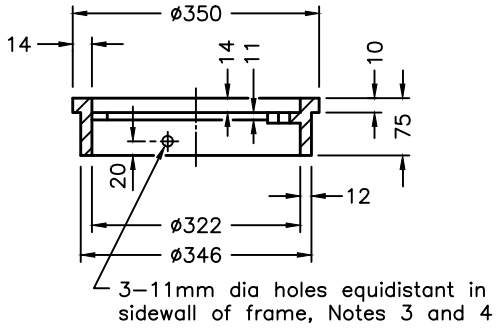
PLAN FRAME



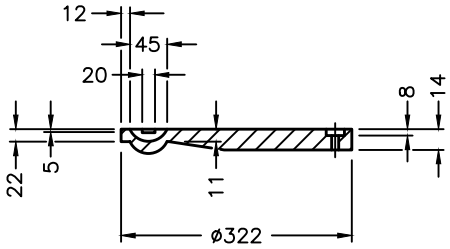
PLAN COVER



UNDERSIDE OF COVER



SECTION B–B



SECTION C–C

NOTES:

1 For installation of ducts see OPSD 2123.030.
2 Cover shall be retained with 12mm dia x 20mm long stainless steel hex head machine bolt that shall be flush with top of cover when fastened.
3 Frame shall be attached using 3–10mm dia x 38mm long machine bolts anchored in concrete wall.
4 One ground lug for #6 AWG stranded copper shall be attached to one frame bolt.
A For general installation see OPSD 2117.020.
B All dimensions are in millimetres unless otherwise shown.

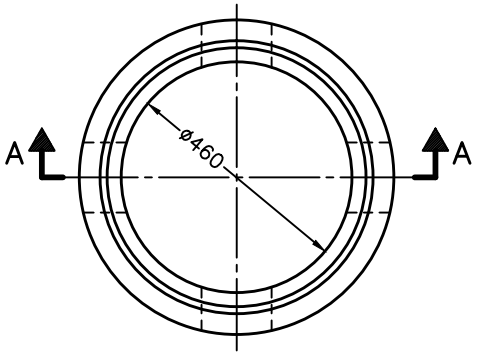
ONTARIO PROVINCIAL STANDARD DRAWING

ELECTRICAL HANDHOLE PRECAST CONCRETE WITH COVER 300mm DIAMETER

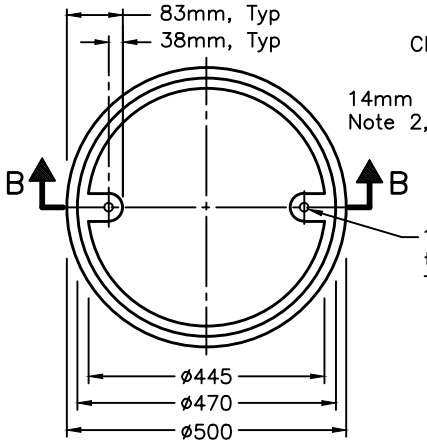
Nov 2017 | Rev 0

ONTARIO STANDARDS • MUNICIPAL – PROVINCIAL •

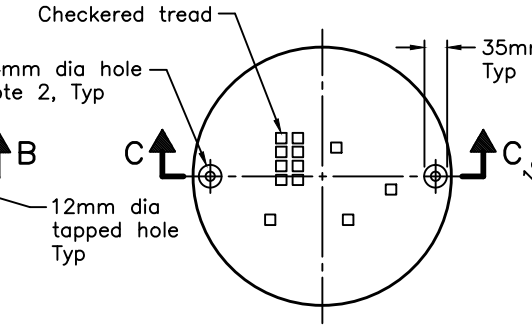
OPSD 2112.010



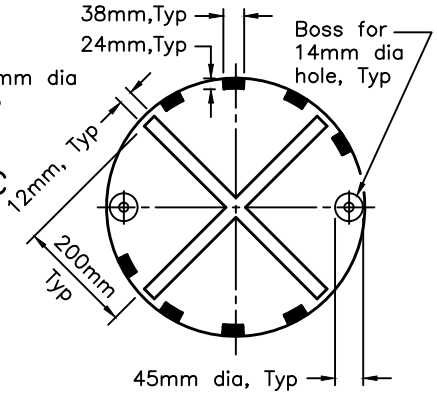
PLAN
HANDHOLE



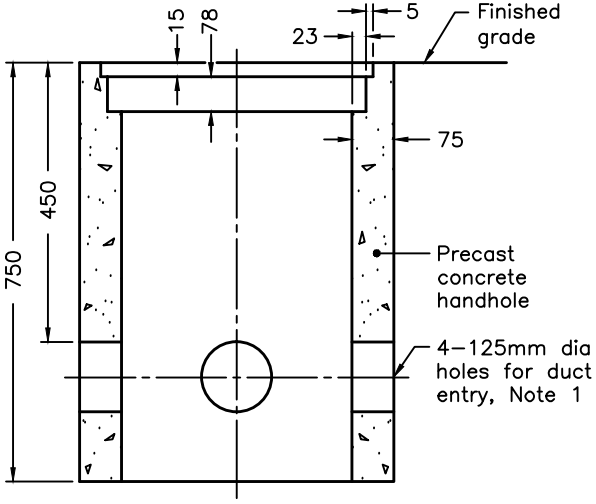
PLAN
FRAME



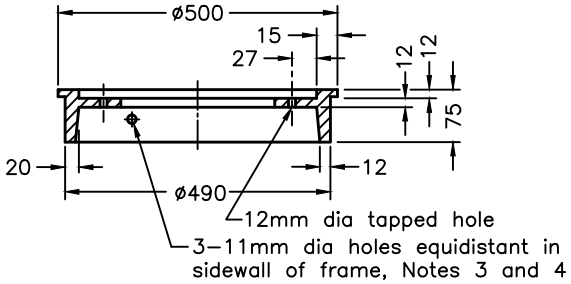
PLAN
COVER



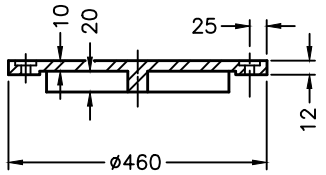
UNDERSIDE OF COVER



SECTION A–A



SECTION B–B



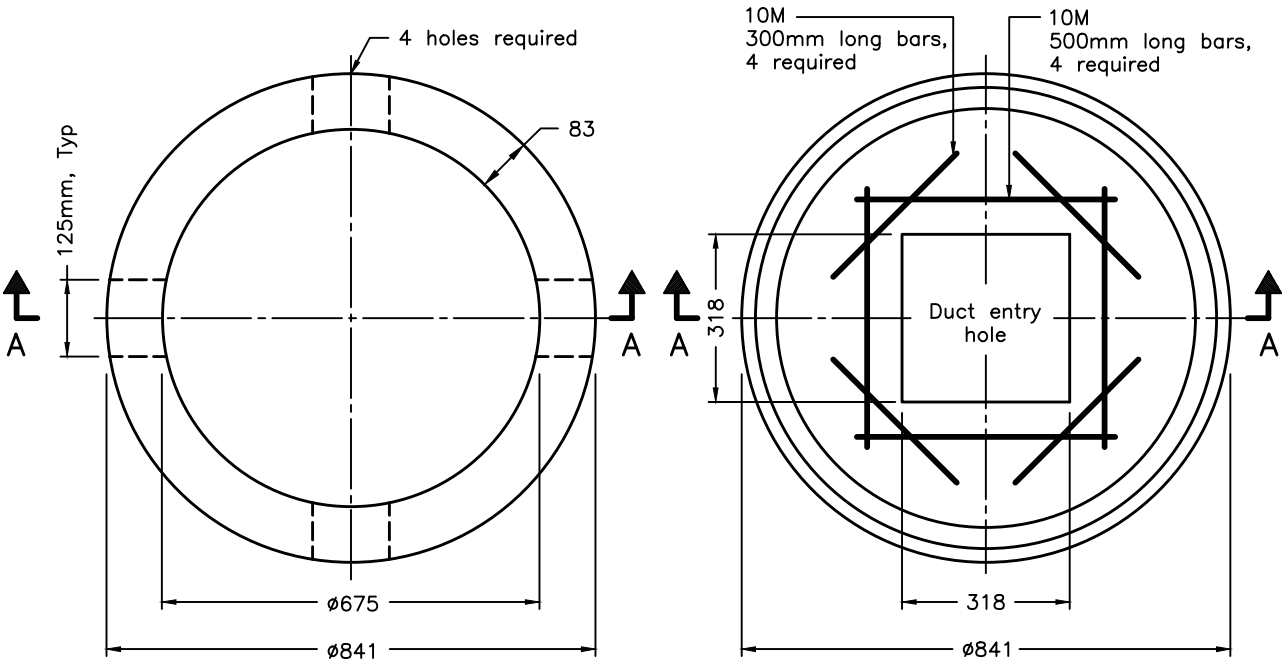
SECTION C–C

NOTES:

1 For installation of ducts see OPSD 2123.030.
2 Cover shall be retained with 2–12mm dia x 20mm long stainless steel hex head machine bolts that shall be flush with top of cover when fastened.
3 Frame shall be attached using 3–10mm dia x 38mm long machine bolts anchored in concrete wall.
4 One ground lug for #6 AWG stranded copper shall be attached to one frame bolt.

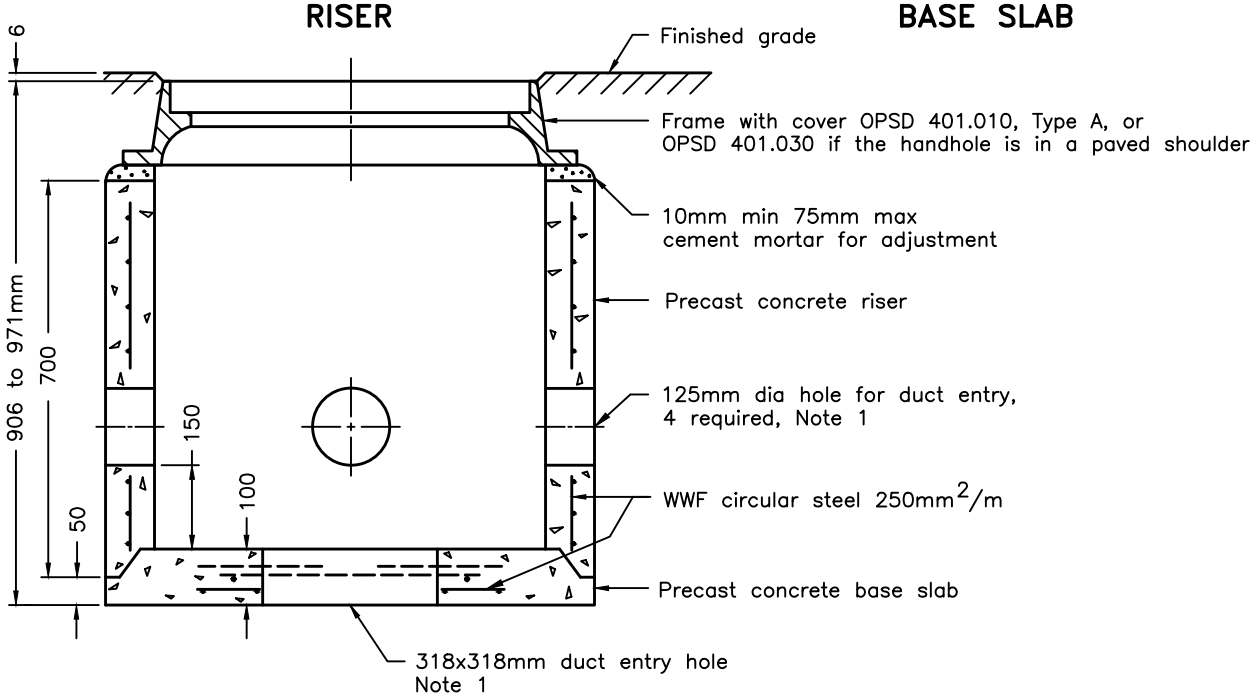
A For general installation see OPSD 2117.020.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	0
ELECTRICAL HANDHOLE PRECAST CONCRETE WITH COVER 460mm DIAMETER			
	OPSD 2112.020		



PLAN
RISER

PLAN
BASE SLAB



SECTION A–A

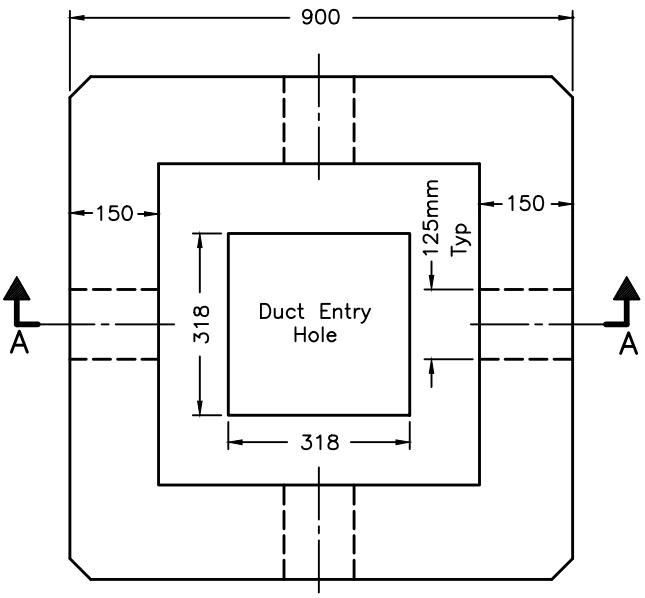
NOTES:

1 For duct installation details see OPSD 2123.030.

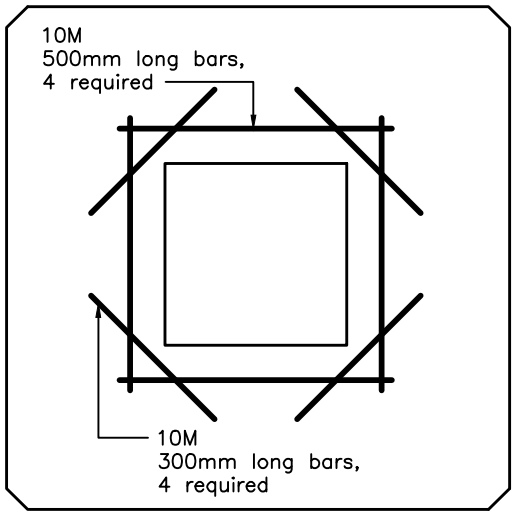
A For general installation details see OPSD 2117.020.

B All dimensions are in millimetres unless otherwise shown.

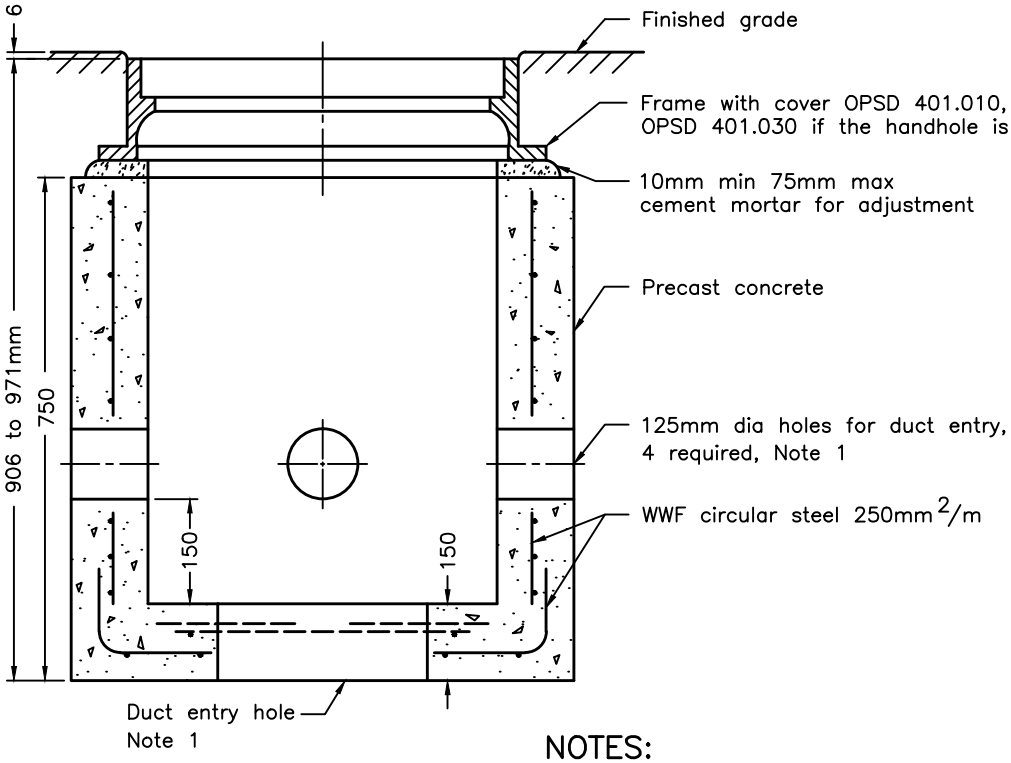
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	1
ELECTRICAL HANDHOLE **PRECAST CONCRETE** **675mm DIAMETER**			
	OPSD 2112.030		



PLAN



BOTTOM–DUCT ENTRY REINFORCING



SECTION A–A

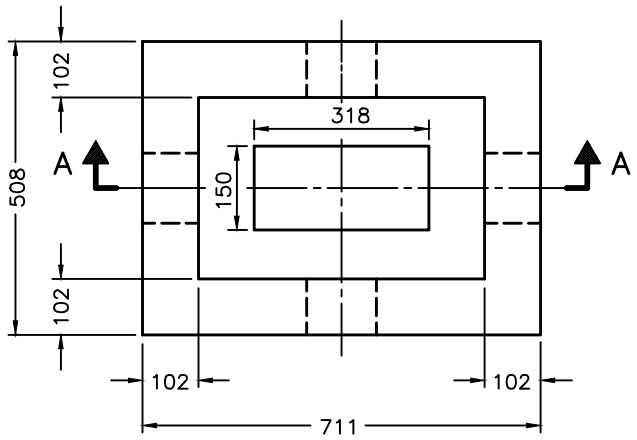
NOTES:

1 For duct installation details see OPSD 2123.030.

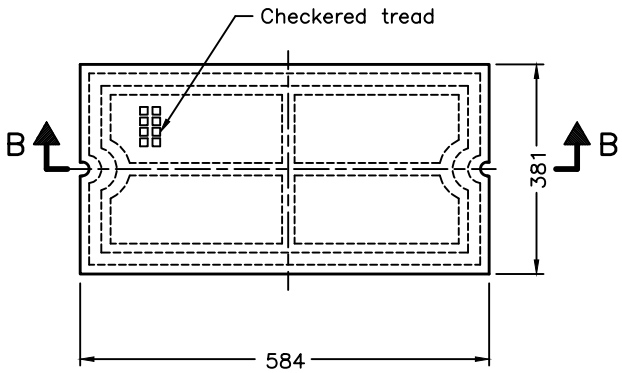
A For general installation details see OPSD 2117.020.

B All dimensions are in millimetres unless otherwise shown.

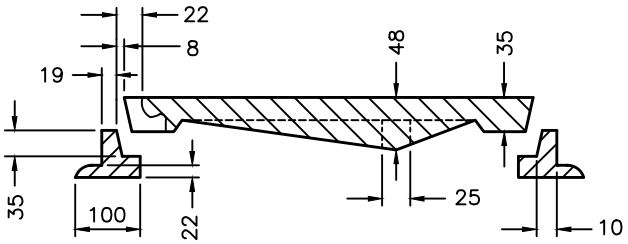
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	1
ELECTRICAL HANDHOLE PRECAST CONCRETE 600 x 600mm			
			OPSD 2112.040



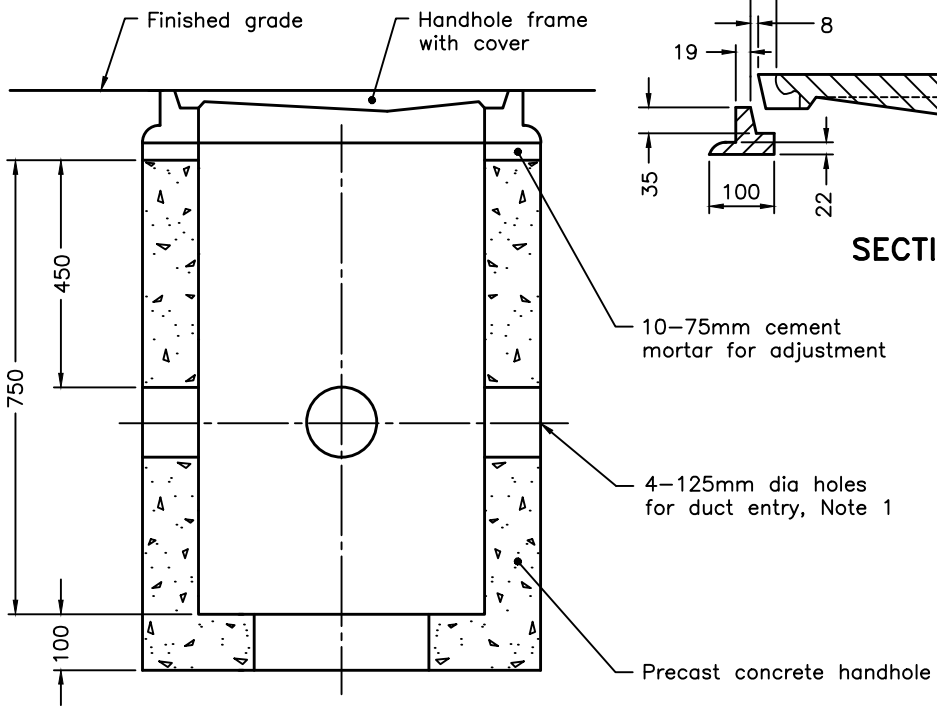
PLAN



PLAN
COVER



SECTION B–B



SECTION A–A

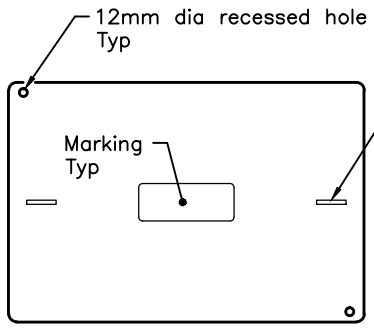
NOTES:

1 For installation of ducts see OPSD 2123.030.

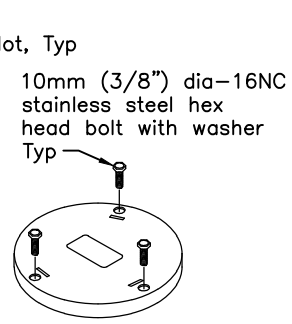
A For general installation details see OPSD 2117.020.

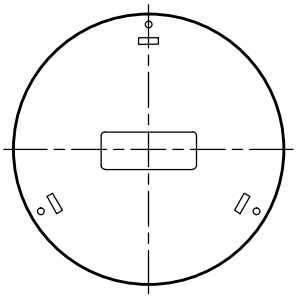
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	0
ELECTRICAL HANDHOLE PRECAST CONCRETE WITH COVER 300 x 500mm			
	OPSD 2112.050		

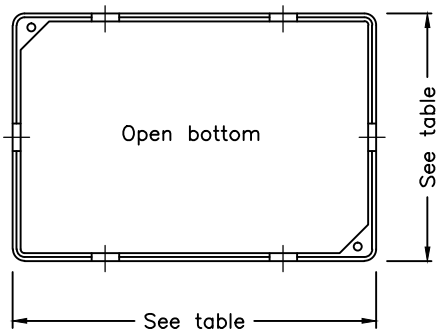


COVER VIEW

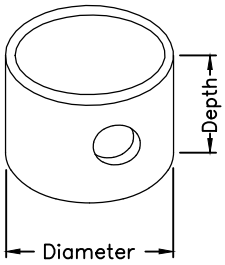




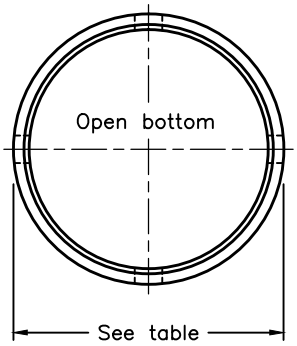
COVER VIEW



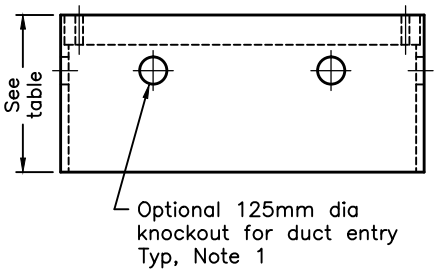
PLAN VIEW



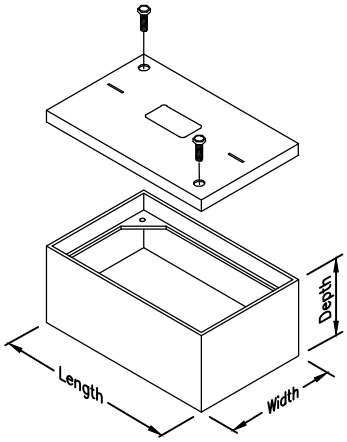
ROUND HANDHOLE



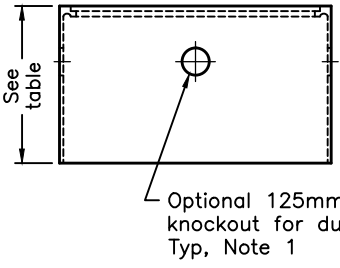
PLAN VIEW



FRONT VIEW



RECTANGULAR HANDHOLE



FRONT VIEW

HANDHOLE	RECTANGULAR HANDHOLE						ROUND HANDHOLE			
	Length		Width		Depth		Diameter		Depth	
	min	max	min	max	min	max	min	max	min	max
TYPE I–small	500	<600	300	<350	300	<350	437	<517	300	<350
TYPE II–medium	600	<850	350	<550	350	<450	517	<771	350	<450
TYPE III–large	850	<1500	550	<1000	450	<660	771	<1382	450	<660

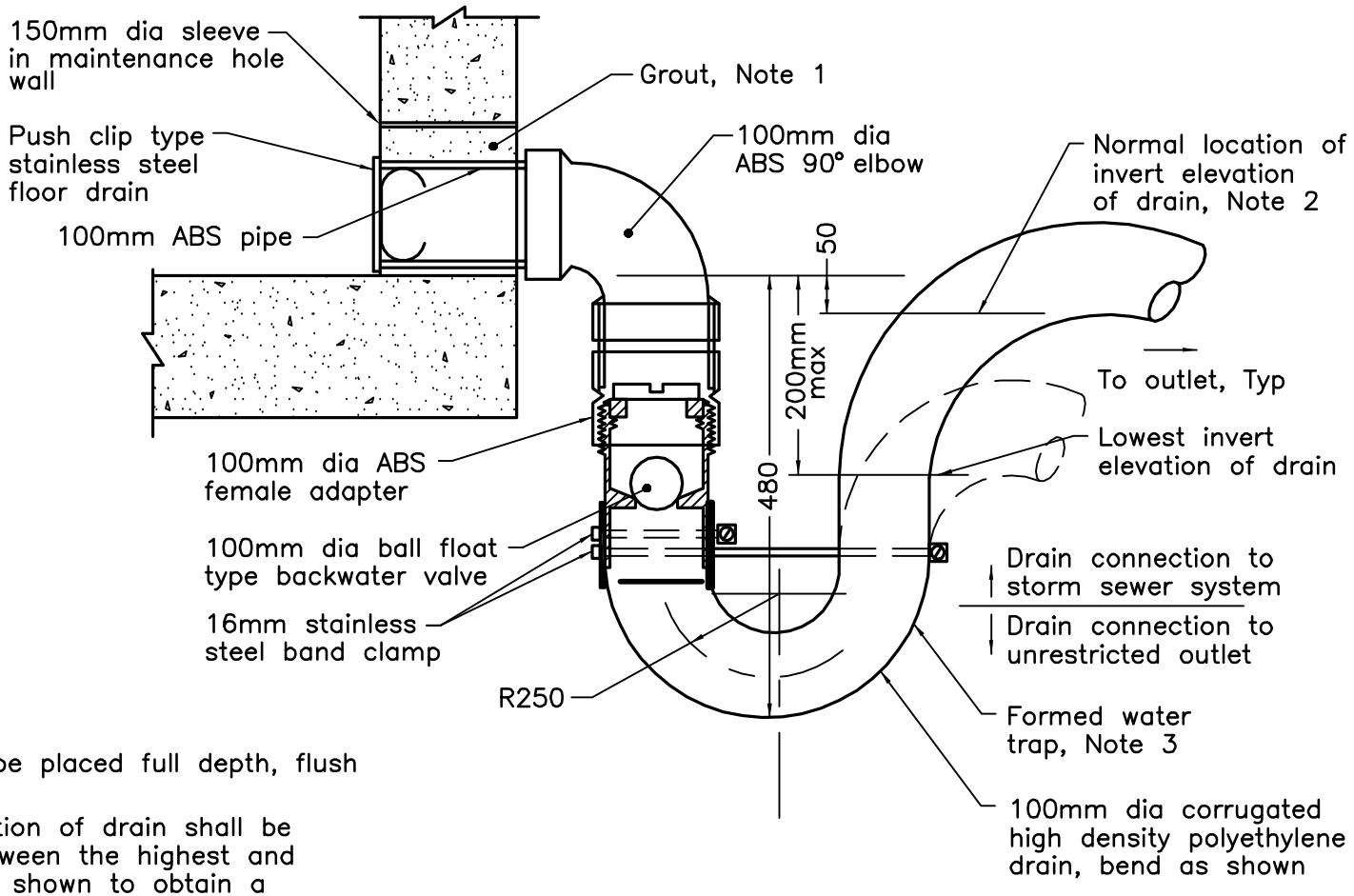
NOTES:

1 For duct installation details see OPSD 2123.030.

A For general installation details see OPSD 2117.020.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	1
ELECTRICAL HANDHOLE NON AND SEMI–CONCRETE GENERAL REQUIREMENTS	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _		
	OPSD 2113.010		



NOTES:

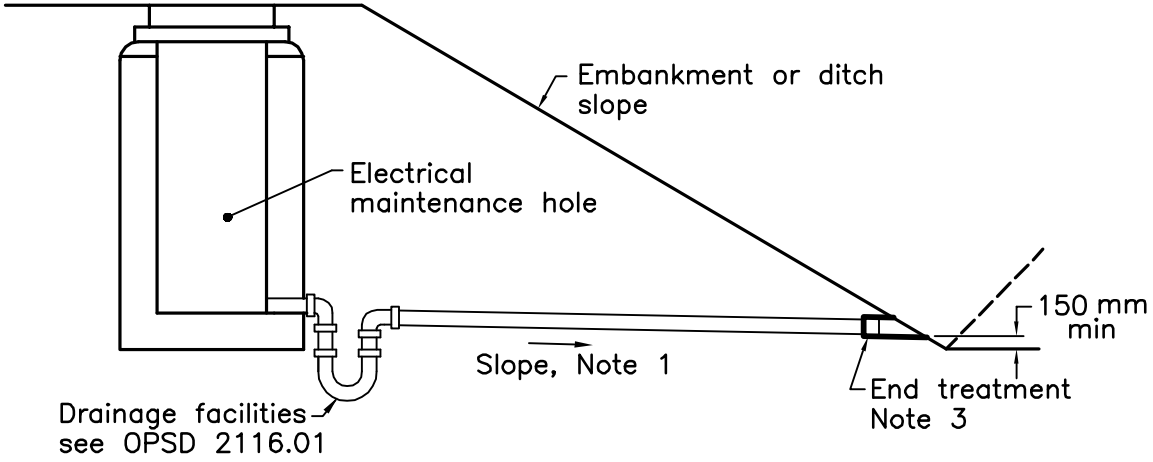
1 Grout shall be placed full depth, flush both walls.

2 Vertical location of drain shall be adjusted between the highest and lowest limits shown to obtain a minimum grade on the drain as set by the outlet elevation.

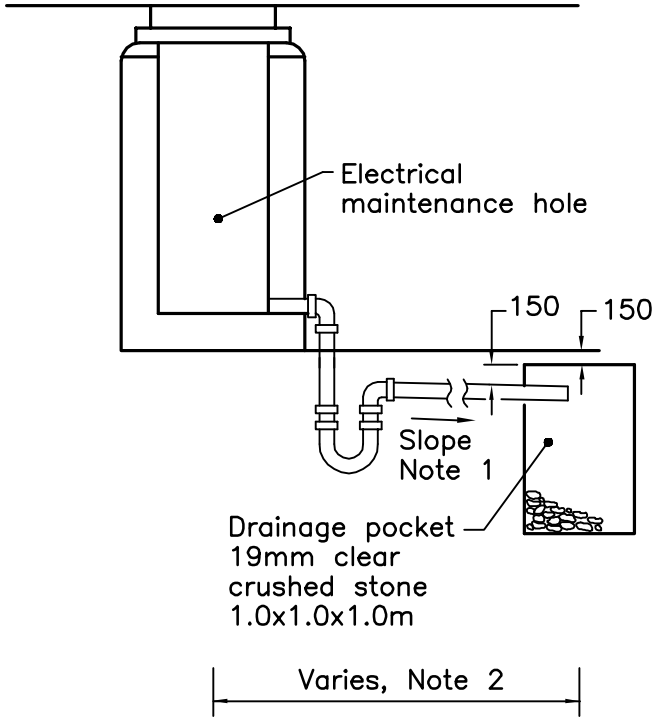
3 Water trap shall be formed in all cases when the outlet is part of the storm sewer system.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1
DRAINAGE FACILITIES FOR ELECTRICAL MAINTENANCE HOLES			
	OPSD 2116.01		



DRAIN TO EMBANKMENT SLOPE OR DITCH OUTLET



DRAIN TO DRAINAGE POCKET

NOTES:

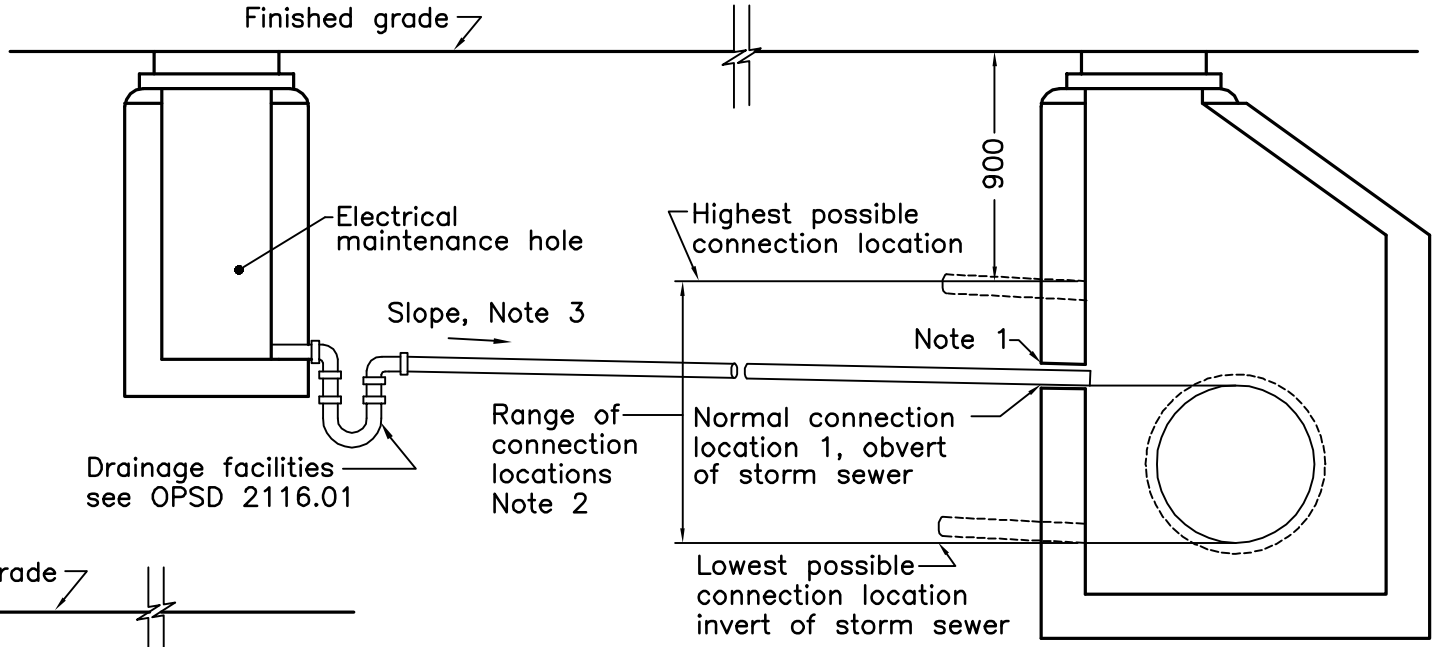
1 Drain to slope shall be a minimum of 0.25% (400H:1V) to outlet.

2 Drainage pocket shall be located 1.5m from centreline of maintenance hole in paved or restricted areas and 3.0m from centreline of maintenance hole in grass or unrestricted areas.

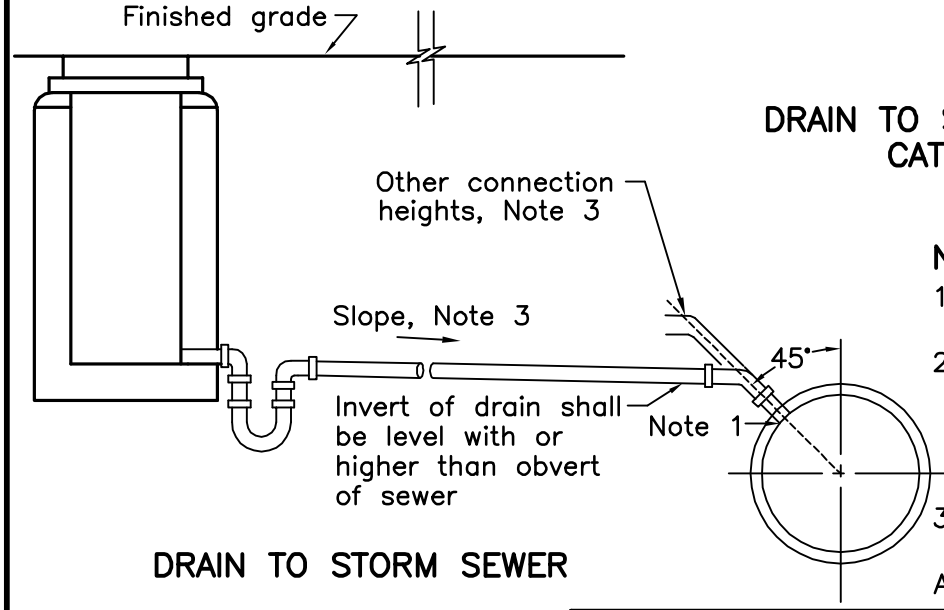
3 A 2.5m length of 150mm diameter corrugated steel pipe with galvanized rodent gate shall be installed with drain pipe with 0.3m overlap.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1
ELECTRICAL MAINTENANCE HOLE DRAINS TO DRAINAGE POCKETS, EMBANKMENT OUTLETS, AND DITCHES			
	OPSD 2116.02		



DRAIN TO STORM SEWER MAINTENANCE HOLE, CATCHBASIN, OR DITCH INLET



DRAIN TO STORM SEWER

NOTES:

1 Break–in shall be performed using 150mm core drill. Grout shall be placed to fill cavity.

2 The normal connection location shall be used when elevations allow, using the range of drain heights at the maintenance hole as shown on OPSD 2116.01 and the minimum slope of drain. Other locations may be used when elevations do not allow the use at the normal connection point.

3 Drain to slope shall be a minimum of 0.25% (400H:1V) to outlet connection point.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1
ELECTRICAL MAINTENANCE HOLE DRAINS TO STORM SEWER SYSTEMS	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _		
	OPSD 2116.03		

NOTES:

1 #6 AWG stranded copper bare wire shall be fastened to steps using single cable to pipe copper ground connectors. The ground connector shall be a copper or copper–alloy saddle. The connector shall be attached to each step in such a way that the ground wire runs perpendicularly to the steps.

2 When specified, a precast concrete cap shall be used to replace the frame with cover and adjustment units.

3 Space surrounding ducts in used openings shall be filled with grout.

4 For maintenance holes with metal frames, ground wire shall be attached to frame using a ground lug suitable for #6 AWG stranded copper wire.

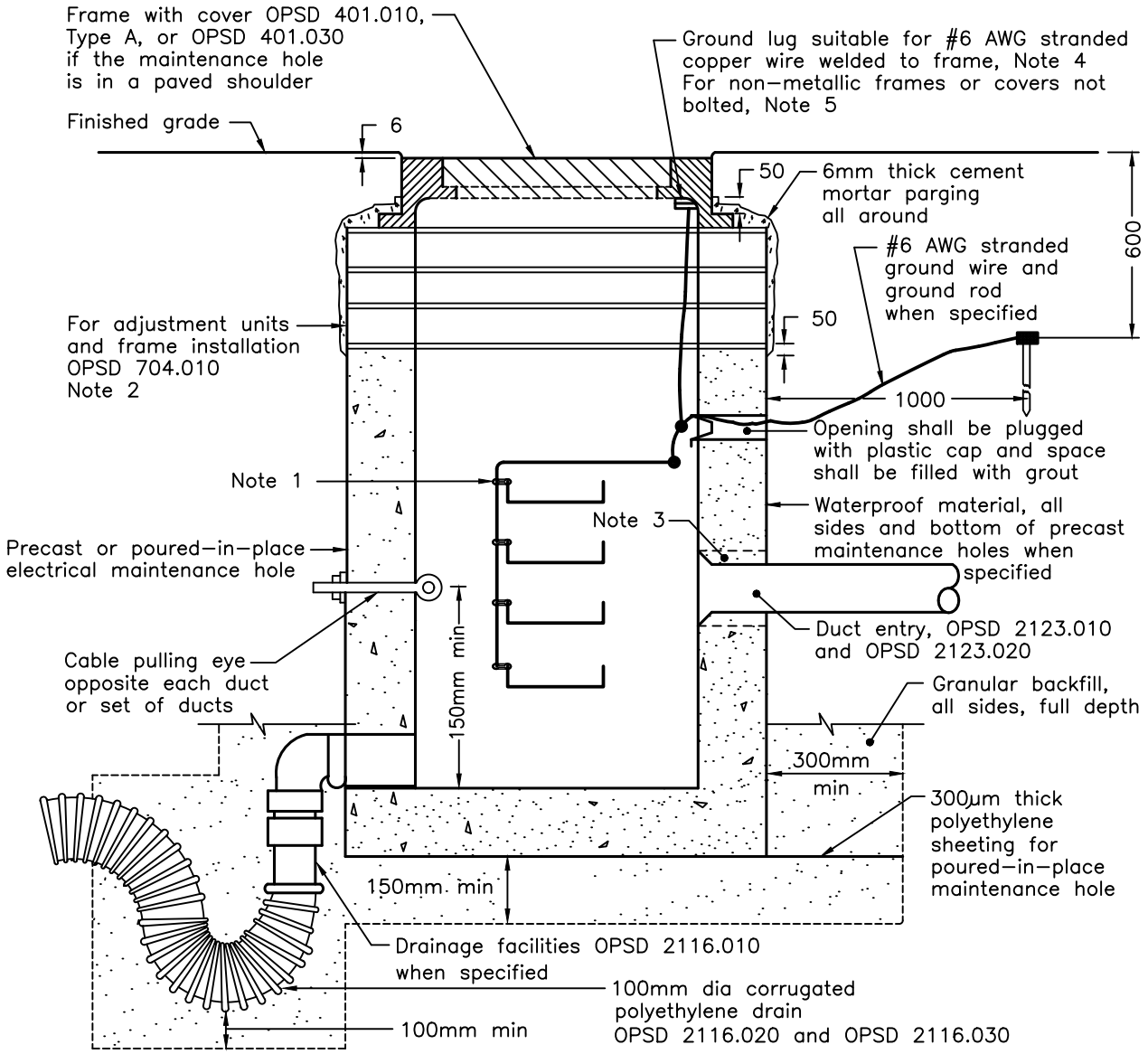
5 For maintenance holes with metal covers and non–metallic frames or maintenance holes with metal covers not bolted to the metal frame, the ground wire shall be attached to the maintenance hole cover using a ground lug suitable for #6 AWG flat braided copper wire with 1m of slack above finished grade.

A This OPSD shows general equipment only. Refer to other drawings for particular applications.

B Orient maintenance hole such that the wall with maintenance hole steps is nearest to the travelled roadway, where practical. Orient maintenance hole to accommodate existing ducts both in line and grade. Maintain a maximum 45° skew to existing ducts in line. Where required, cut back duct encasement to 3.0m maximum beyond the maintenance hole and refit duct to proper location.

C Unused openings shall be filled with grout.

D All dimensions are in millimetres unless otherwise shown.



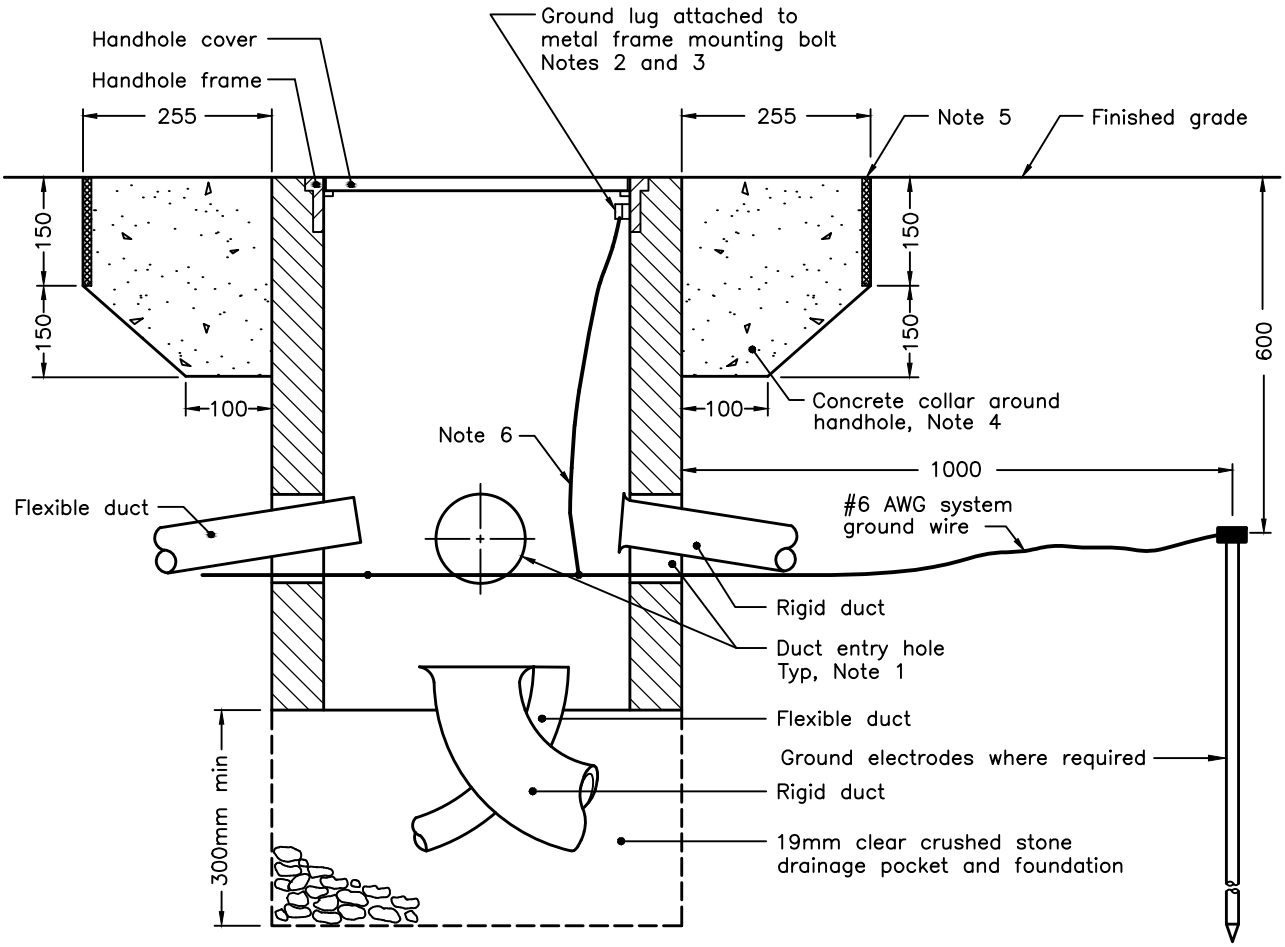
ONTARIO PROVINCIAL STANDARD DRAWING

ELECTRICAL MAINTENANCE HOLES

GENERAL INSTALLATION REQUIREMENTS

Apr 2019 | Rev 1

OPSD 2117.010



NOTES:

1 For duct entry details see OPSD 2123.030.

2 For handholes with metal frames, ground wire shall be attached to frame using a ground lug suitable for #6 AWG stranded copper wire.

3 For handholes with metal covers and non–metallic frames or handholes with metal covers not bolted to the metal frame, the ground wire shall be attached to the handhole cover using a ground lug suitable for #6 AWG flat braided copper wire with 1m of slack above finished grade.

4 Concrete collar is required around the complete perimeter of all electrical handholes except:
   a) concrete electrical handholes, or
   b) handholes installed in concrete pavement or sidewalk.

5 In raised traffic islands, install 12mm expansion board at back of curb and install concrete collar to suit.

6 For handholes with only extra low–voltage cables with metal frames and covers, grounding and bonding is not required.

A For specific handhole details see OPSD 2112.010, 2112.020, 2112.030, 2112.040, 2112.050, and 2113.010.

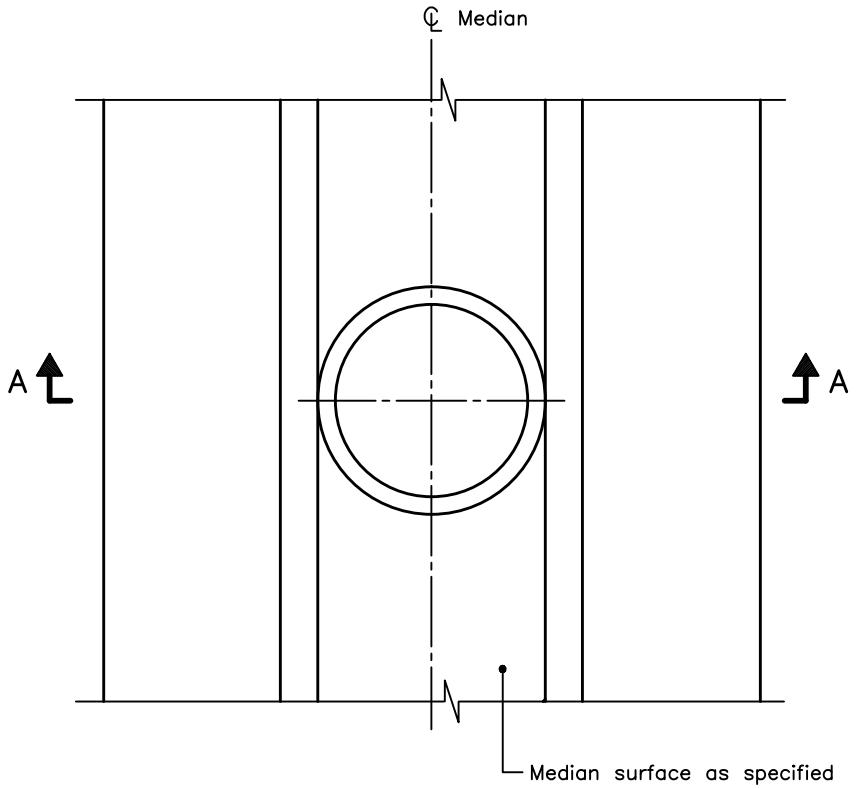
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	0

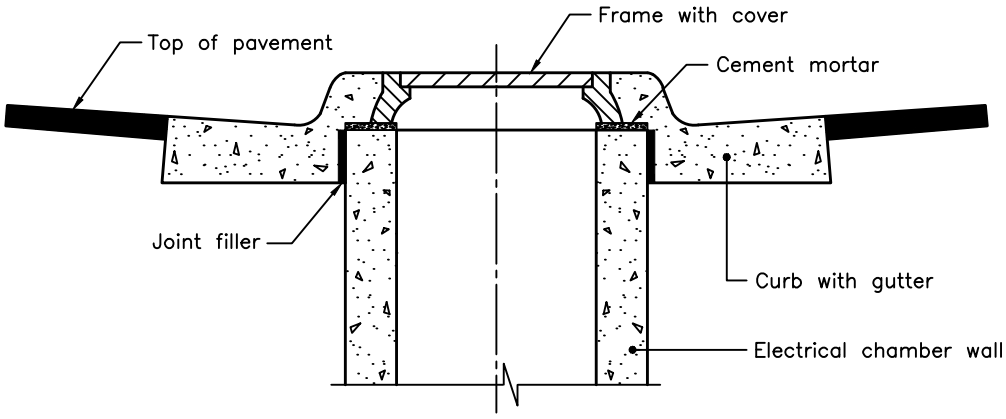
ELECTRICAL HANDHOLES

GENERAL INSTALLATION REQUIREMENTS

OPSD 2117.020

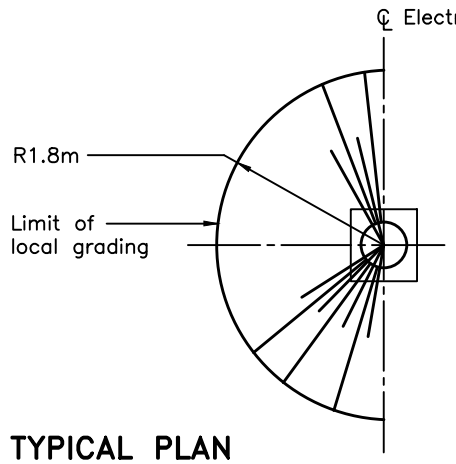


PLAN

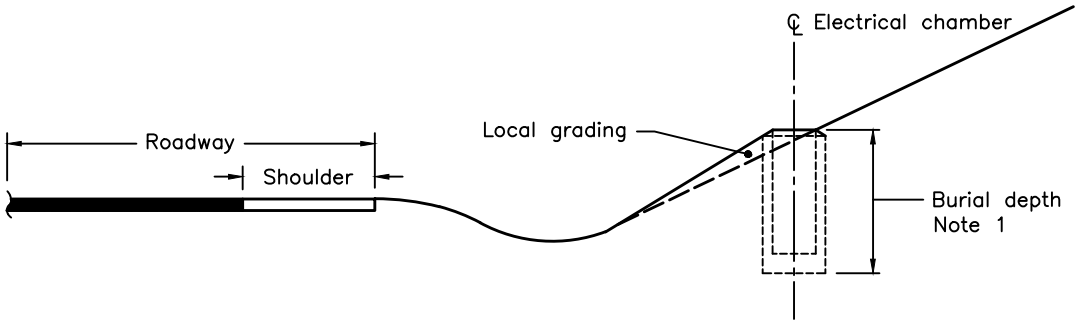


SECTION A–A

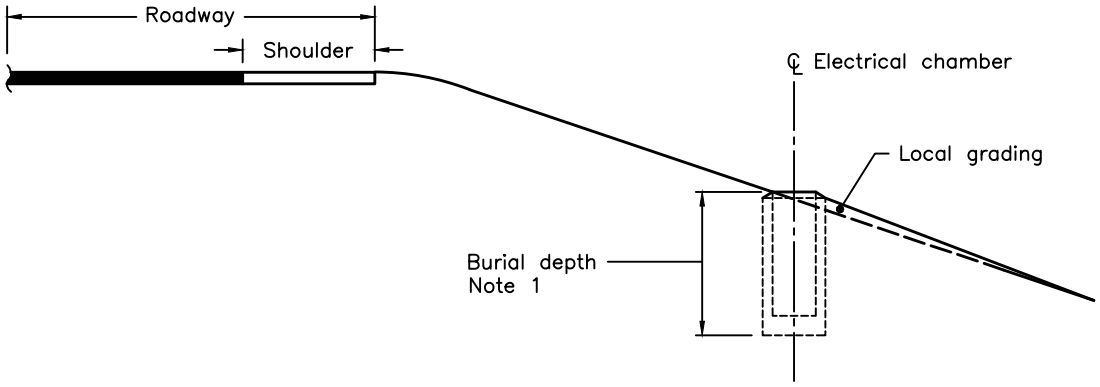
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	1
ELECTRICAL CHAMBER INSTALLATION IN MEDIAN			
	OPSD 2118.010		



TYPICAL PLAN



ELECTRICAL CHAMBER IN CUT



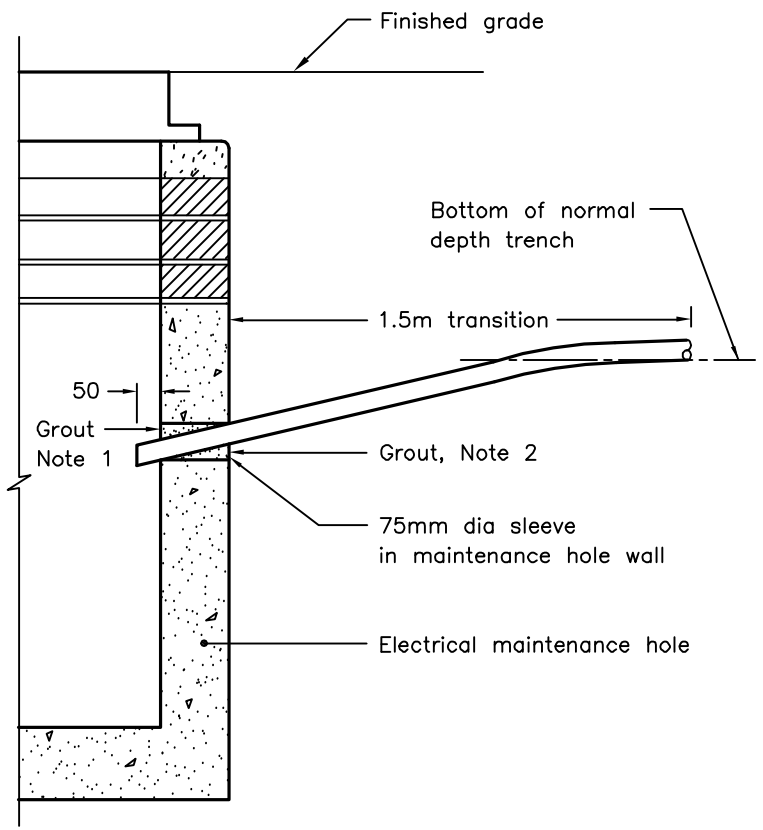
ELECTRICAL CHAMBER IN FILL

NOTES:

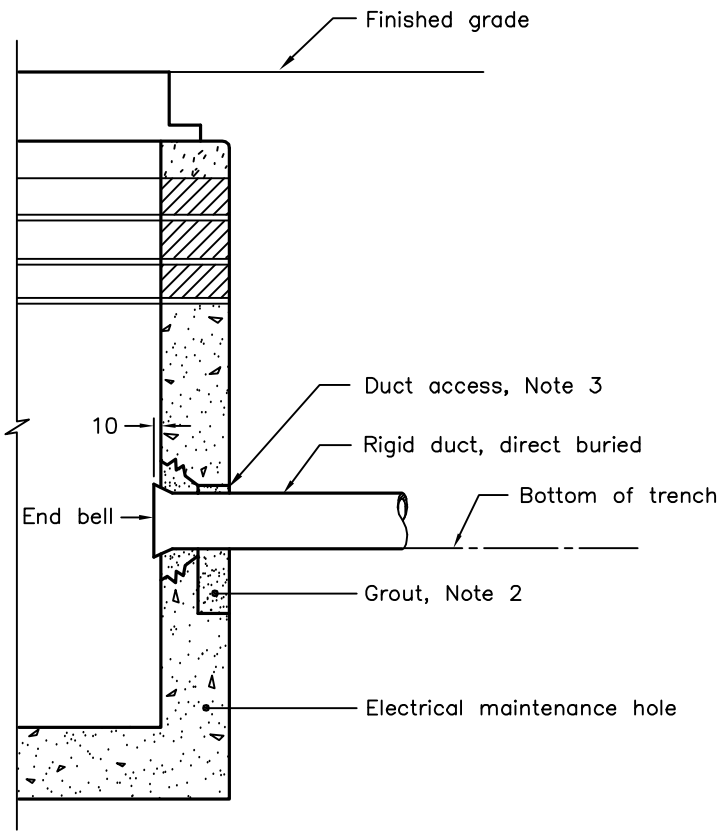
1 Burial depth shall be measured from the highest grade elevation of the chamber frame with cover.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	1
ELECTRICAL CHAMBER INSTALLATION IN SLOPE			
	OPSD 2118.020		



FLEXIBLE DUCTS, DIRECT BURIED

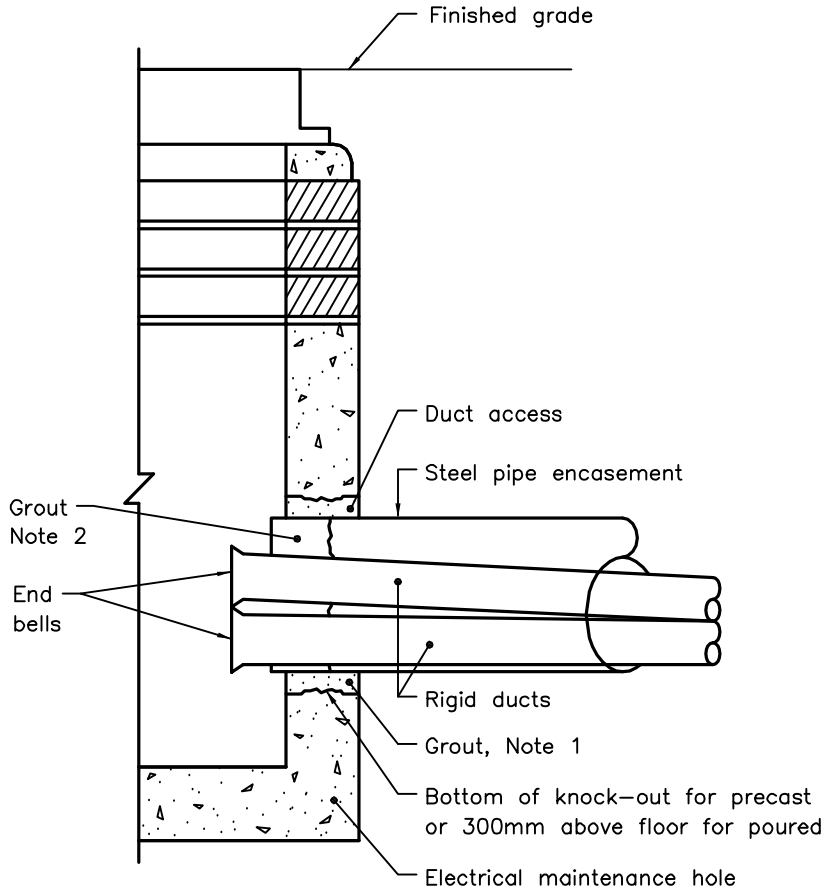


RIGID DUCTS, DIRECT BURIED
OR BY SUB–SURFACE INSTALLATION

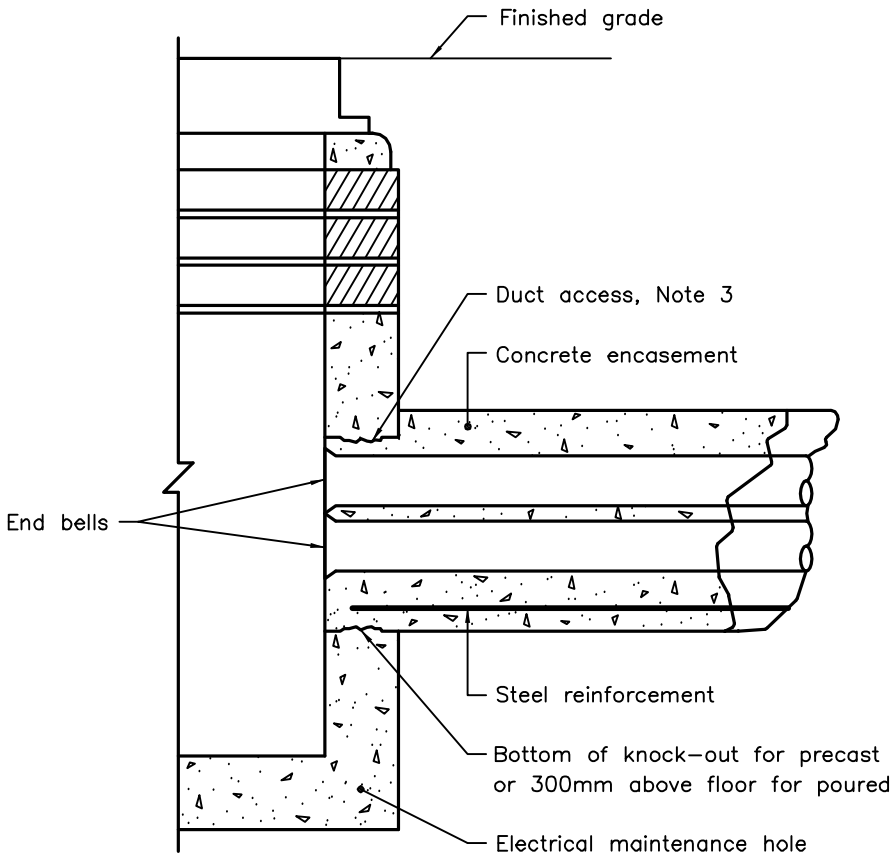
NOTES:

1 Grout shall be placed flush with inside wall to a minimum thickness of 75mm.
2 Grout shall be placed flush with outside wall and full depth, including knock–out cavity in precast maintenance holes.
3 For precast maintenance holes, knock–out holes shall be the minimum size required.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1
ELECTRICAL MAINTENANCE HOLES ENTRY OF DIRECT BURIED DUCTS			
	OPSD 2123.01		



RIGID DUCTS, STEEL ENCASED



RIGID DUCTS, CONCRETE ENCASED

NOTES:

1 Grout shall be placed full depth and flush with both walls.

2 Grout shall be placed within steel pipe, around all ducts, to a minimum depth of 75mm.

3 Concrete shall be placed flush with inside wall.

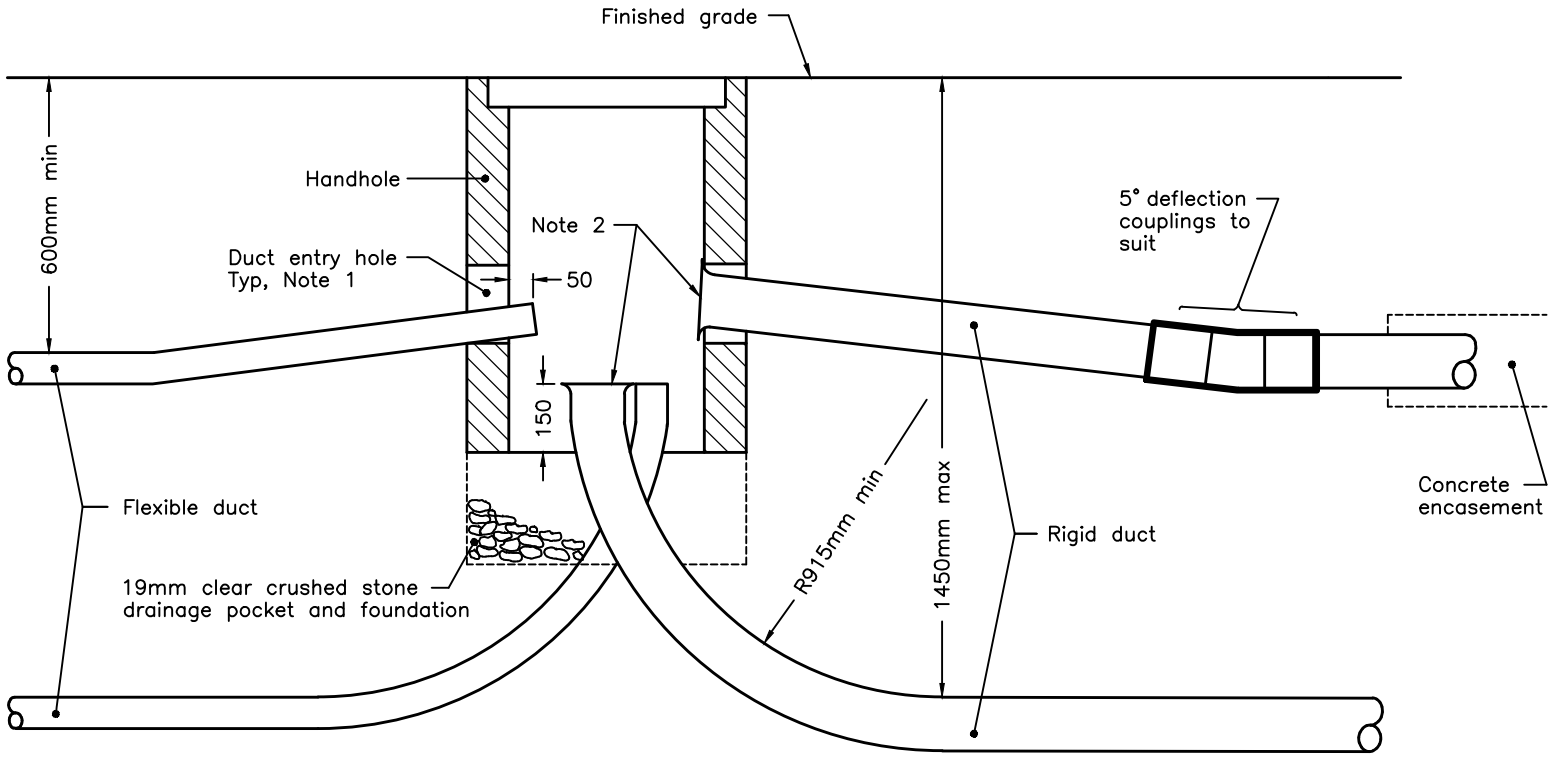
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

ELECTRICAL MAINTENANCE HOLES ENTRY OF ENCASED DUCTS

Nov 2013 | Rev 1

OPSD 2123.02



NOTES:

1 Duct entry holes shall be filled with expandable foam.

2 Rigid ducts terminating in maintenance holes, handholes, or other permanent openings of underground systems shall be provided with an end bell.

A For installation details see OPSD 2117.020.

B All dimensions are in millimetres unless otherwise shown.

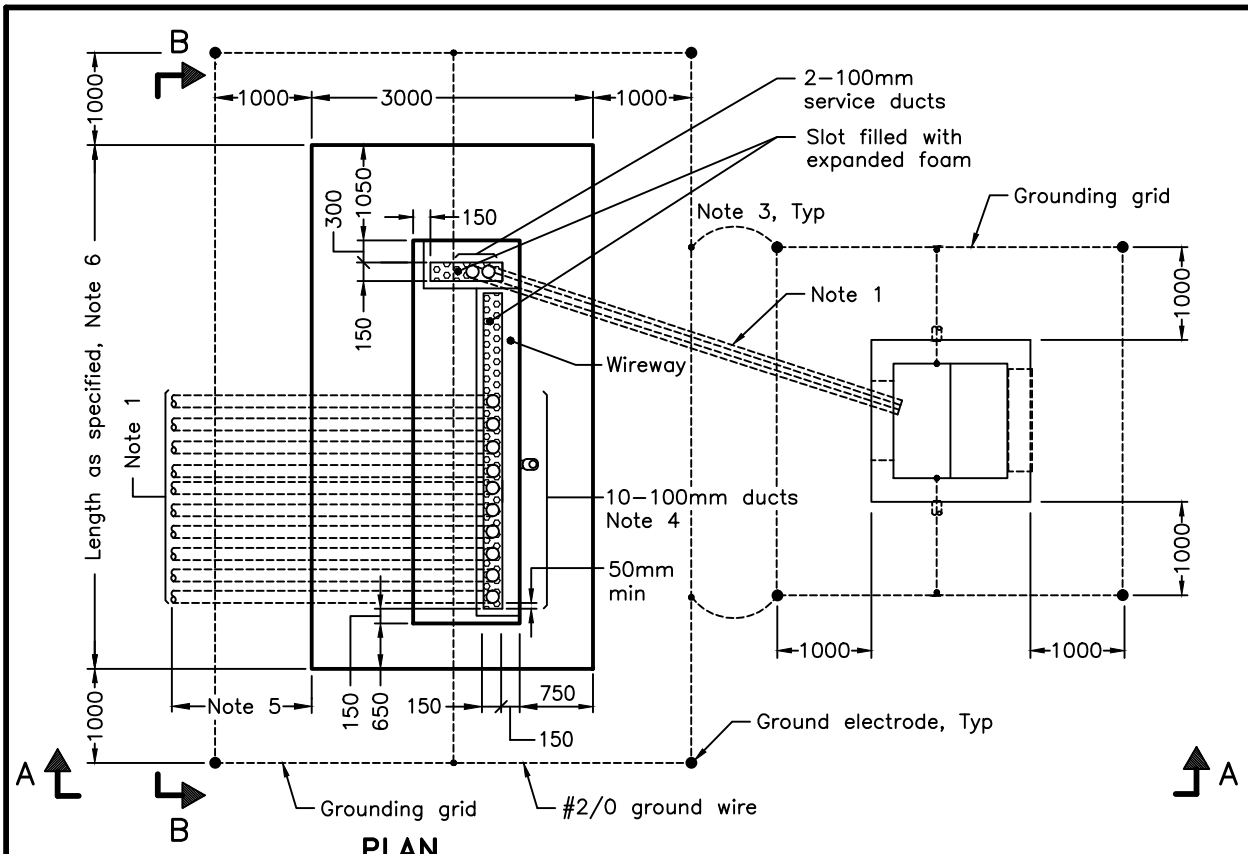
ONTARIO PROVINCIAL STANDARD DRAWING

ELECTRICAL HANDHOLES

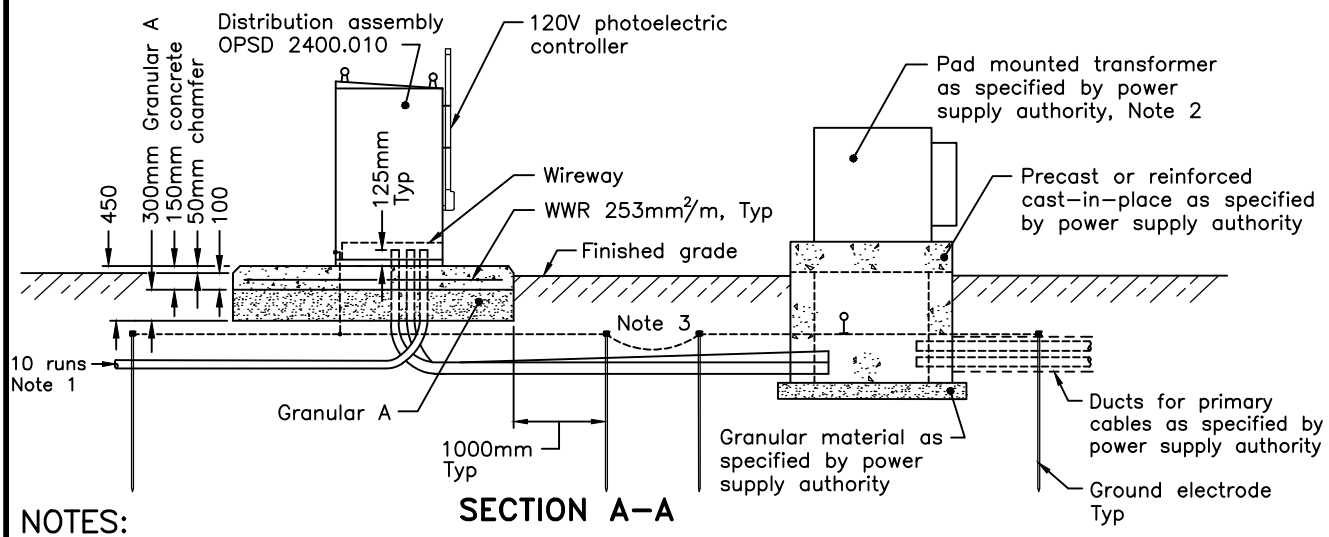
ENTRY OF DIRECT BURIED AND ENCASED DUCTS

Nov 2017	Rev	0

OPSD 2123.030



PLAN



SECTION A–A

NOTES:

1 Orientation of ducts as specified.
2 Installation and grounding details shall be as specified by power supply authority.
3 Transformer pads located within 15m from the distribution assembly shall have grounding system bonded to the grounding grid of the distribution assembly.
4 Space between ducts shall be 50mm minimum.
5 All spare ducts shall be extended 1500mm and capped.
6 Dimension of concrete pad to suit distribution assembly enclosure.

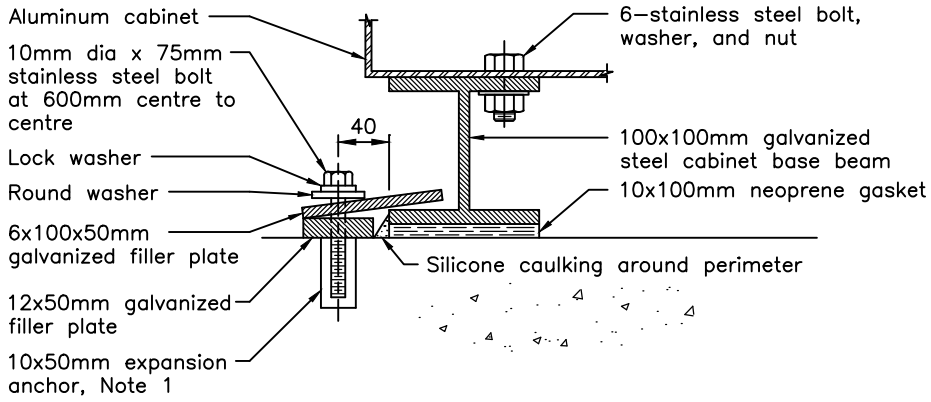
A This OPSD shall be read in conjunction with OPSD 2126.020 and 2400.030.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	3

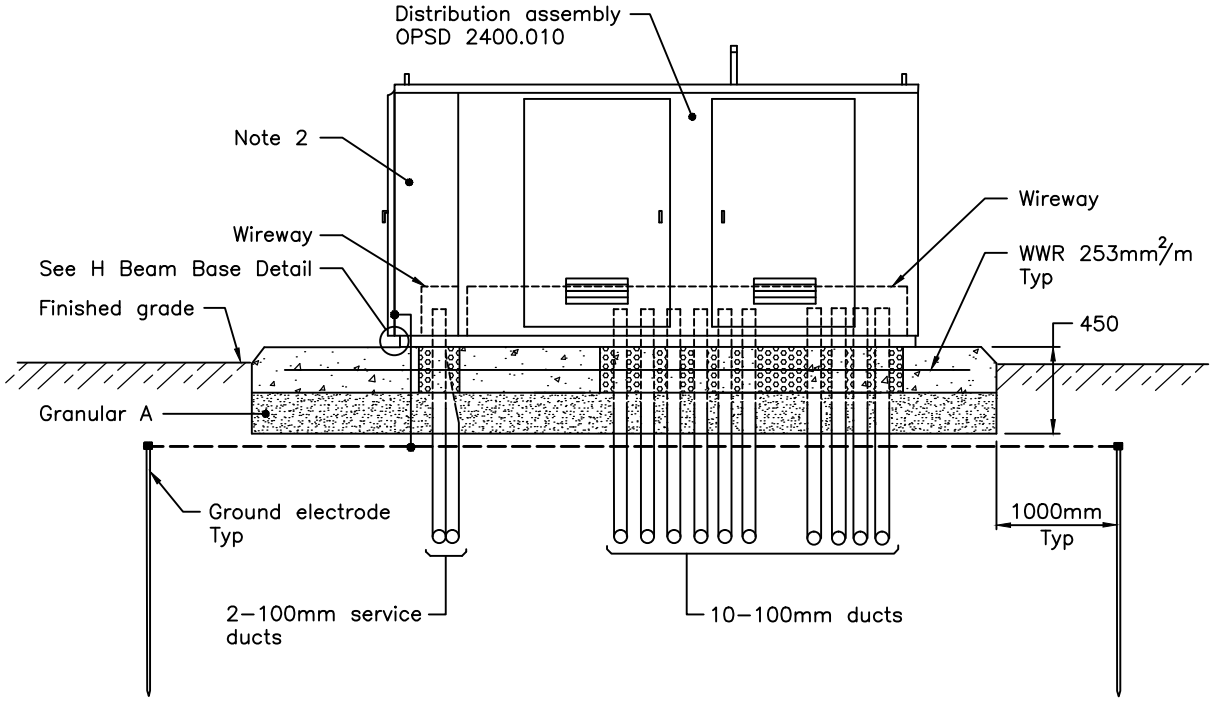
DISTRIBUTION ASSEMBLY

CONCRETE PAD AND DUCTS
PLAN AND SECTION A–A

OPSD 2126.010



H BEAM BASE DETAIL



SECTION B–B

NOTES:

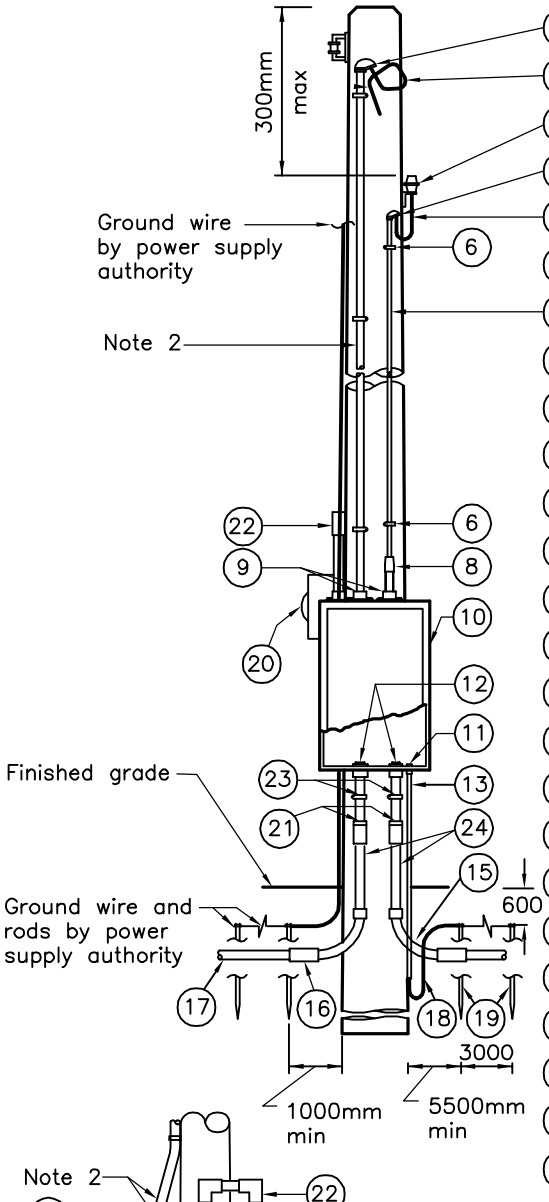
1 Anchor bolts shall be installed on exterior face of base beam.

2 Metering compartment as specified by power supply authority. Metering compartment may be a separate stand–alone enclosure.

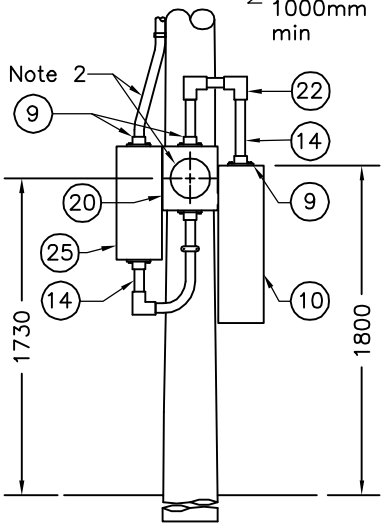
A For plan view see OPSD 2126.010.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	3
DISTRIBUTION ASSEMBLY CONCRETE PAD AND DUCTS SECTION B–B			
	OPSD 2126.020		



1 Service entrance fitting, Note 2
2 1.0m coil of cable for connection to incoming supply
3 Photoelectric controller with bracket
4 Service entrance fitting, 25mm, rigid PVC
5 3 No.12 AWG, low voltage cable
6 Clamp for 25mm, rigid PVC
7 Conduit, 25mm, rigid PVC
8 Reducing adapter, 50mm to 25mm, rigid PVC
9 Meter hub, 50mm, rigid PVC
10 Supply control cabinet
11 Terminal or box adapter and locknut, 20mm, rigid PVC
12 Terminal or box adapter and locknut, rigid PVC, size as required
13 Conduit, 20mm, rigid PVC
14 Conduit, 50mm, rigid PVC
15 Standard 90° elbow, rigid PVC, size as required
16 Adapter coupling, size as required
17 Conduit, polyethylene or steel, size as required
18 Ground wire, Note 1
19 Ground rod, Note 1
20 Meter base, 100A, 600V
21 Expansion coupling, size as required
22 Access fitting Type LB, 50mm rigid PVC
23 Clamp for rigid PVC, size as required
24 Conduit, rigid PVC, size as required
25 Disconnect, size as required, Note 3



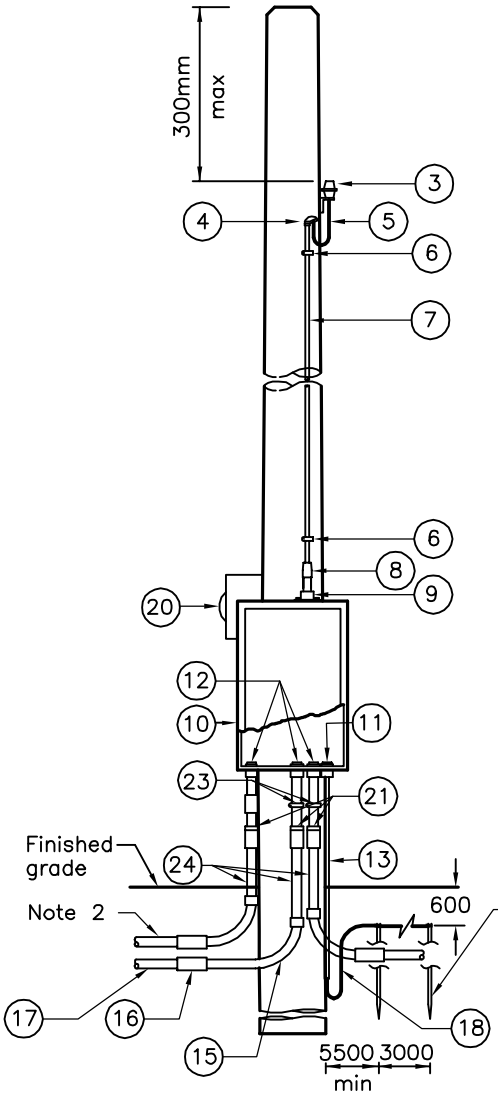
DETAIL OF METER BASE

OVERHEAD SERVICES

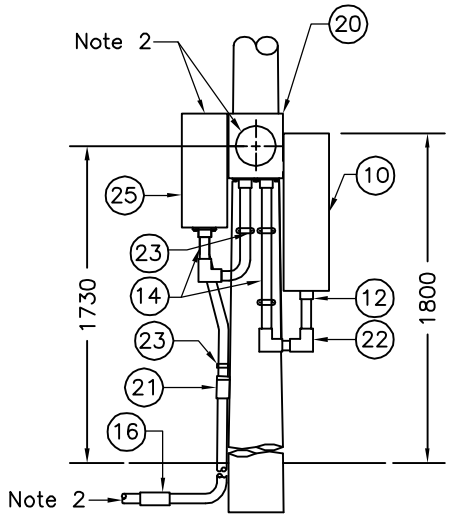
NOTES:

1 Number of ground rods and size of ground wire shall be as specified in the Contract Documents.
2 The installation shall be according to the requirements of the power supply authority.
3 Disconnect required only for 347/600V power supply cabinet.
A If required, the meter base shall be bonded in accordance to the requirements of the Electrical Safety Authority. Meter base shall be placed on the side of the pole that is most accessible to the power supply authority.
B For supply control cabinet schematics wiring diagram see OPSD 2440.010 and 2440.020.
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
SUPPLY CONTROL CABINET INSTALLATION OVERHEAD SERVICES TOP ENTRY METERING			
	OPSD 2130.010		



1. Service entrance fitting, Note 2 (Not Used)
2. 1.0m coil of cable for connection to incoming supply (Not Used)
3. Photoelectric controller with bracket
4. Service entrance fitting, 25mm, rigid PVC
5. 3 No.12 AWG, low voltage cable
6. Clamp for 25mm, rigid PVC
7. Conduit, 25mm, rigid PVC
8. Reducing adapter, 50mm to 25mm, rigid PVC
9. Meter hub, 50mm, rigid PVC
10. Supply control cabinet
11. Terminal or box adapter and locknut, 20mm, rigid PVC
12. Terminal or box adapter and locknut, rigid PVC, size as required
13. Conduit, 20mm, rigid PVC
14. Conduit, 50mm, rigid PVC
15. Standard 90° elbow, rigid PVC, size as required
16. Adapter coupling, size as required
17. Conduit polyethylene or steel, size as required
18. Ground wire, Note 1
19. Ground rod, Note 1
20. Meter base, 100A, 600V
21. Expansion coupling, size as required
22. Access fitting Type LB, 50mm rigid PVC
23. Clamp for 50mm, rigid PVC
24. Conduit, rigid PVC, size as required
25. Disconnect, size as required, Note 3



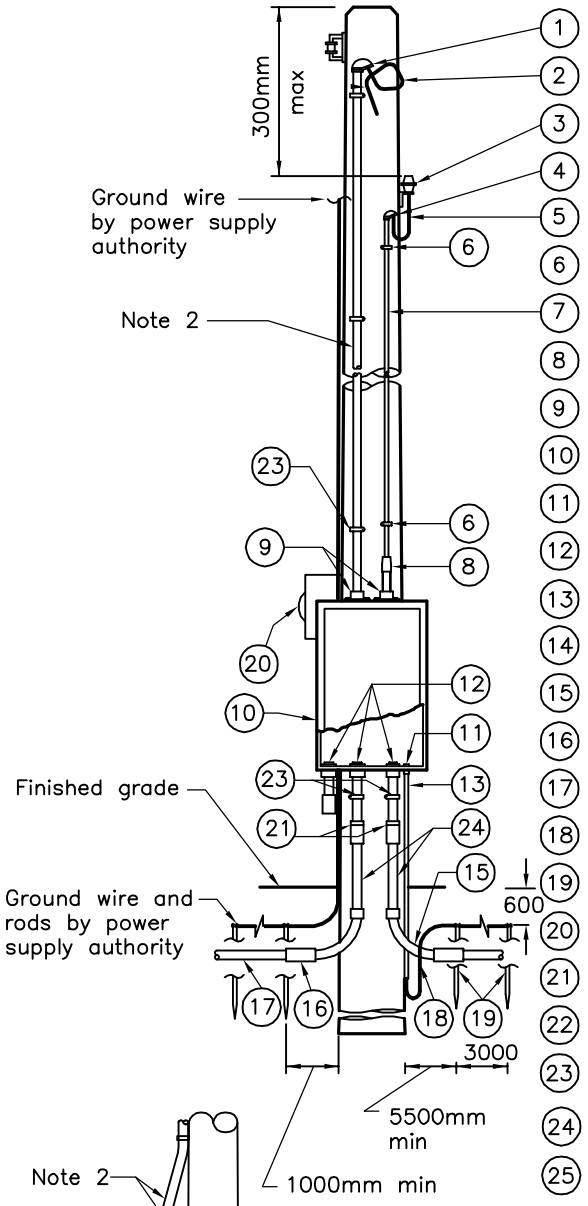
DETAIL OF METER BASE

UNDERGROUND SERVICES

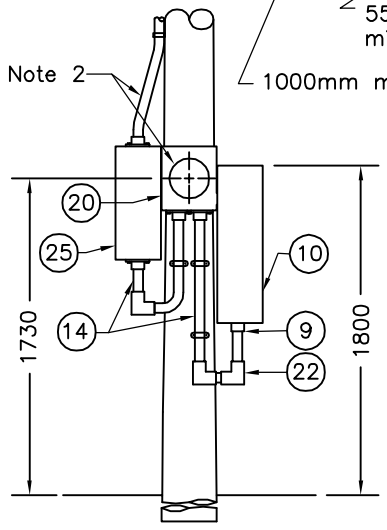
NOTES:

1 Number of ground rods and size of ground wire shall be as specified in the Contract Documents.
2 The installation shall be according to the requirements of the power supply authority.
3 Disconnect required only for 347/600V power supply cabinet.
A If required, the meter base shall be bonded in accordance to the requirements of the Electrical Safety Authority. Meter base shall be placed on the side of the pole that is most accessible to the power supply authority.
B For supply control cabinet schematics wiring diagram see OPSD 2440.010 and 2440.020.
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
SUPPLY CONTROL CABINET INSTALLATION UNDERGROUND SERVICES BOTTOM ENTRY METERING			
	OPSD 2130.011		



1. Service entrance fitting, Note 2
2. 1.0m coil of cable for connection to incoming supply
3. Photoelectric controller with bracket
4. Service entrance fitting, 25mm, rigid PVC
5. 3 No.12 AWG, low voltage cable
6. Clamp for 25mm, rigid PVC
7. Conduit, 25mm, rigid PVC
8. Reducing adapter, 50mm to 25mm, rigid PVC
9. Meter hub, 50mm, rigid PVC
10. Supply control cabinet
11. Terminal or box adapter and locknut, 20mm, rigid PVC
12. Terminal or box adapter and locknut, rigid PVC, size as required
13. Conduit, 20mm, rigid PVC
14. Conduit, 50mm, rigid PVC
15. Standard 90° elbow, rigid PVC, size as required
16. Adapter coupling, size as required
17. Conduit polyethylene or steel, size as required
18. Ground wire, Note 1
19. Ground rod, Note 1
20. Meter base, 100A, 600V
21. Expansion coupling, size as required
22. Access fitting Type LB, 50mm rigid PVC
23. Clamp for rigid PVC, size as required
24. Conduit, rigid PVC, size as required
25. Disconnect, size as required, Note 3



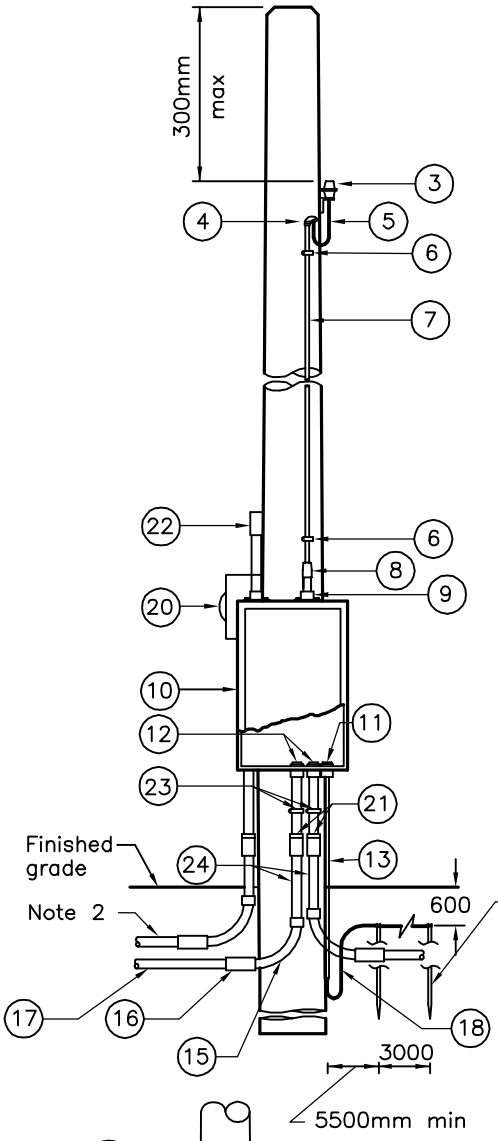
DETAIL OF METER BASE

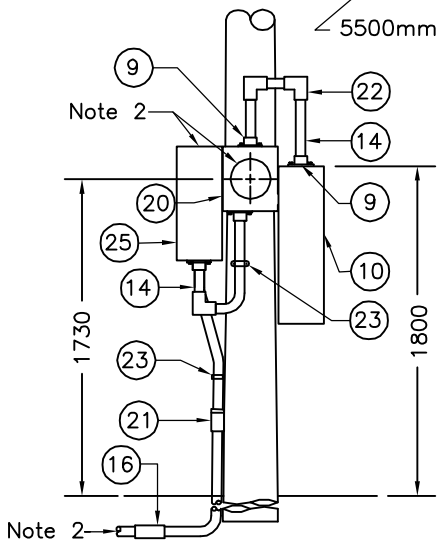
OVERHEAD SERVICES

NOTES:

1 Number of ground rods and size of ground wire shall be as specified in the Contract Documents.
2 The installation shall be according to the requirements of the power supply authority.
3 Disconnect required only for 347/600V power supply cabinet.
A If required, the meter base shall be bonded in accordance to the requirements of the Electrical Safety Authority. Meter base shall be placed on the side of the pole that is most accessible to the power supply authority.
B For supply control cabinet schematics wiring diagram see OPSD 2440.010 and 2440.020.
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
SUPPLY CONTROL CABINET INSTALLATION OVERHEAD SERVICES BOTTOM ENTRY METERING			
	OPSD 2130.012		





DETAIL OF METER BASE

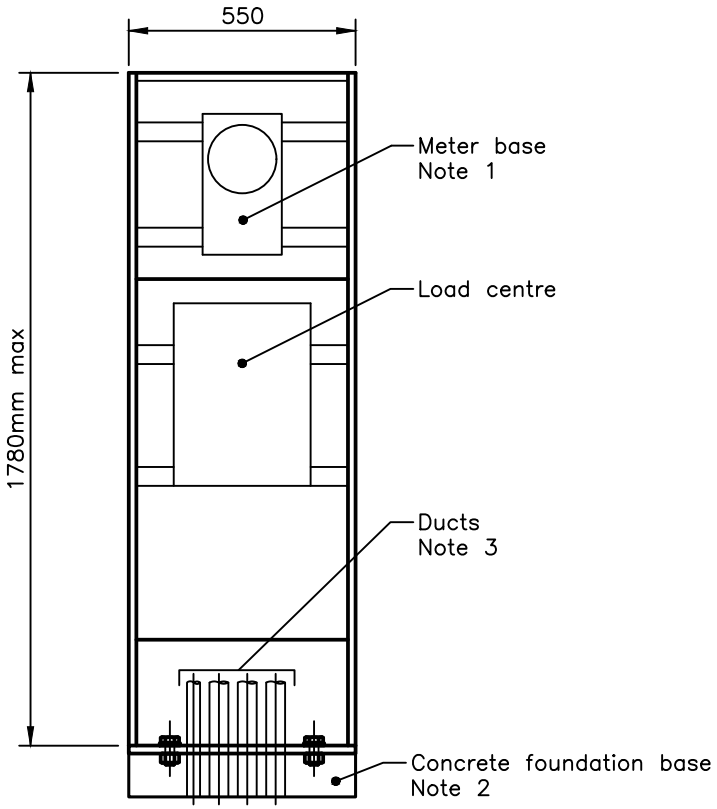
1. Service entrance fitting, Note 2 (Not Used)
2. 1.0m coil of cable for connection to incoming supply (Not Used)
3. Photoelectric controller with bracket
4. Service entrance fitting, 25mm, rigid PVC
5. 3 No.12 AWG, low voltage cable
6. Clamp for 25mm, rigid PVC
7. Conduit, 25mm, rigid PVC
8. Reducing adapter, 50mm to 25mm, rigid PVC
9. Meter hub, 50mm, rigid PVC
10. Supply control cabinet
11. Terminal or box adapter and locknut, 20mm, rigid PVC
12. Terminal or box adapter and locknut, rigid PVC, size as required
13. Conduit, 20mm, rigid PVC
14. Conduit, 50mm, rigid PVC
15. Standard 90° elbow, rigid PVC, size as required
16. Adapter coupling, size as required
17. Conduit polyethylene or steel, size as required
18. Ground wire, Note 1
19. Ground rod, Note 1
20. Meter base, 100A, 600V
21. Expansion coupling, size as required
22. Access fitting Type LB, 50mm rigid PVC
23. Clamp for 50mm, rigid PVC
24. Conduit, rigid PVC, size as required
25. Disconnect, size as required, Note 3

UNDERGROUND SERVICES

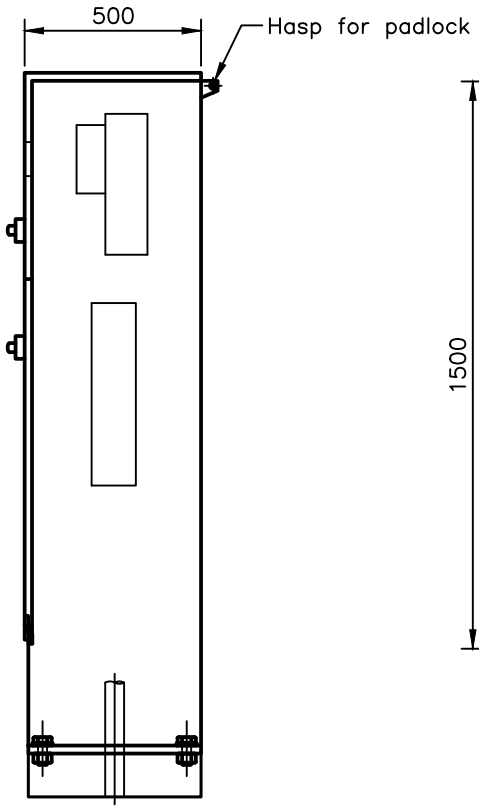
NOTES:

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3 Disconnect required only for 347/600V power supply cabinet.
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C All dimensions are in millimetres unless otherwise shown.

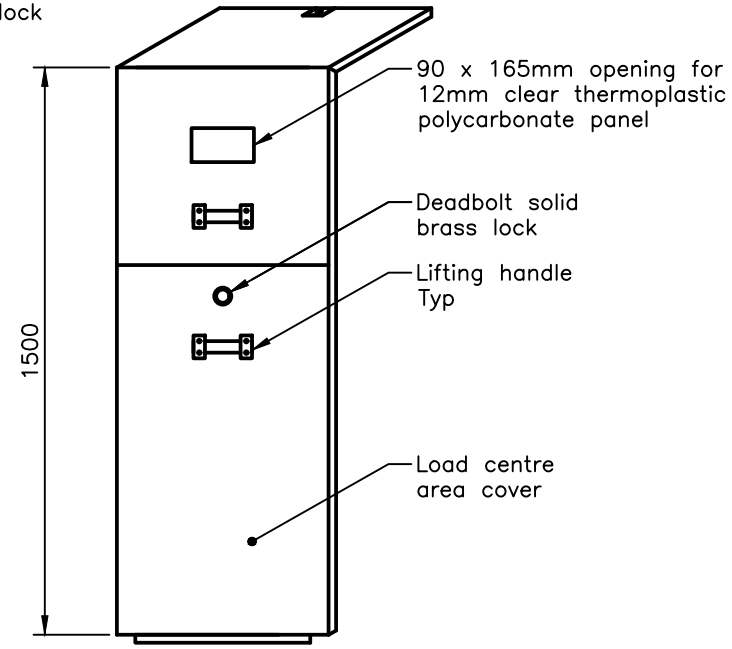
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	0
SUPPLY CONTROL CABINET INSTALLATION UNDERGROUND SERVICES TOP ENTRY METERING			
			OPSD 2130.013



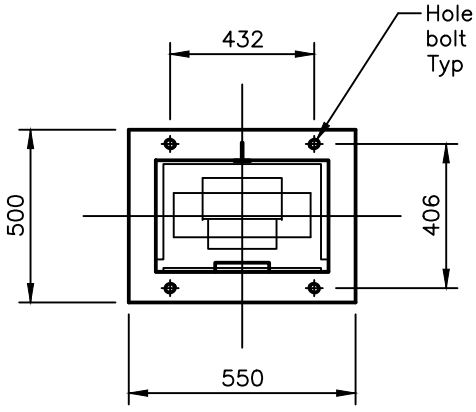
FRONT VIEW



SIDE VIEW



DOOR PANEL

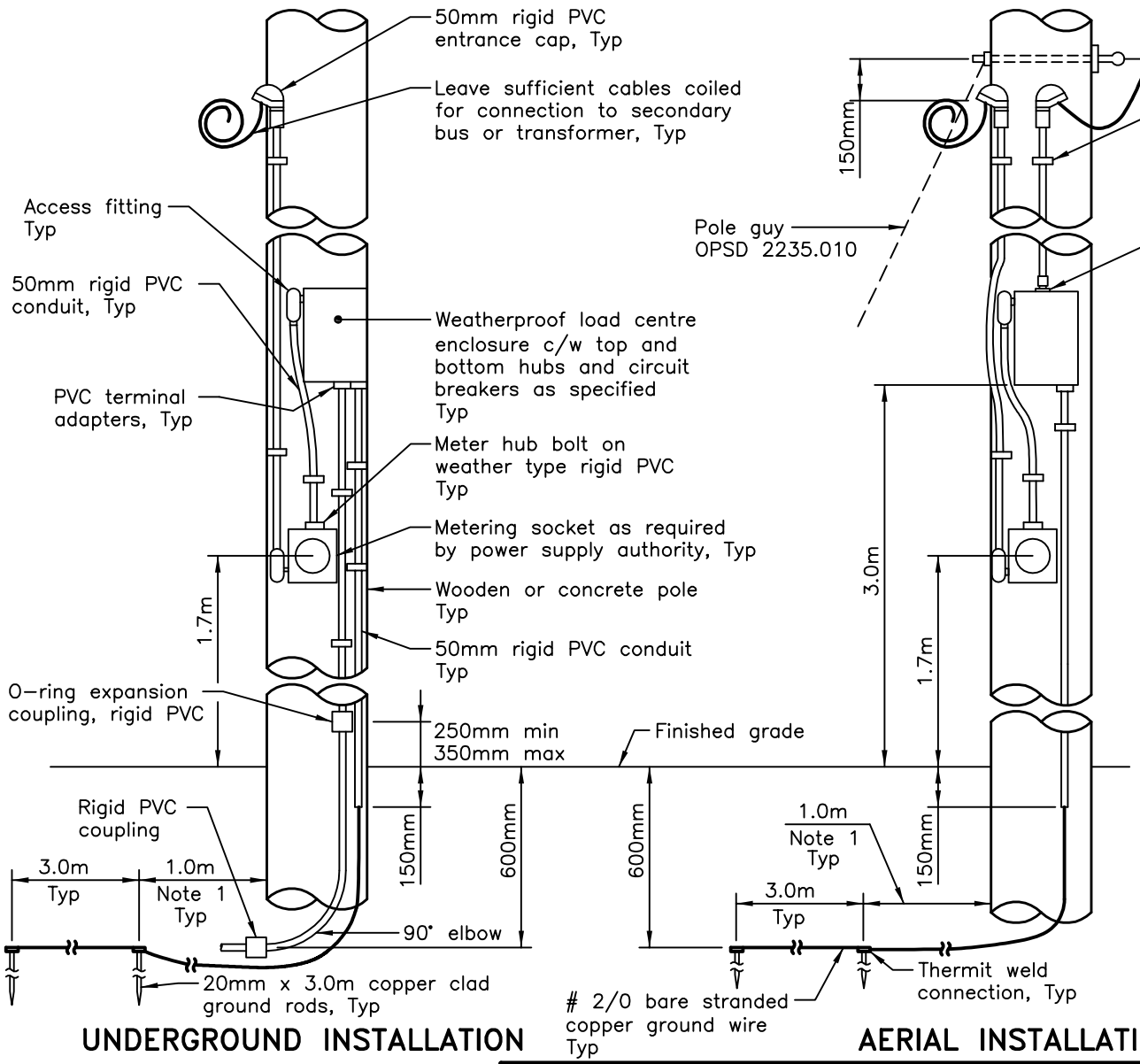


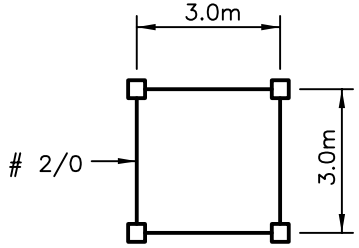
PLAN

NOTES:

1 Meter base as specified.
2 Pedestal shall be mounted on concrete foundation as specified.
3 Size and number of ducts as specified.
A For service supply pedestal layout and wiring schematic diagram see OPSD 2443.010.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev	0
SERVICE SUPPLY PEDESTAL FOR TRAFFIC SIGNAL AND STREET LIGHTING			
	OPSD 2135.010		





TYPICAL GROUND ROD LAYOUT

NOTES:

1 Ground grid shall be 5.5m away from traffic signal controller cabinet.

A Work on hydro poles shall be done only in the presence of or with the permission of the power supply authority.

B Mounting details shown are typical only and shall be adapted to suit site conditions and power supply authority.

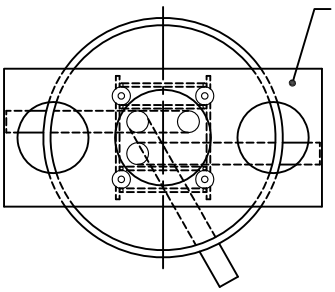
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

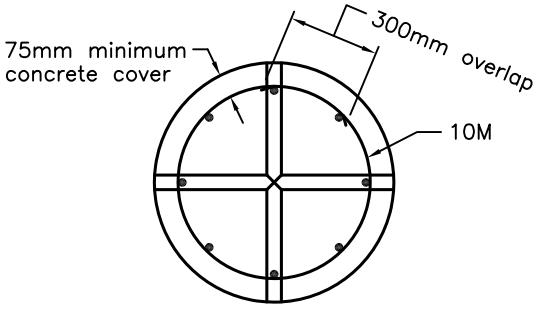
SERVICE BOX INSTALLATION OVERHEAD SERVICES

Nov 2019 | Rev 0

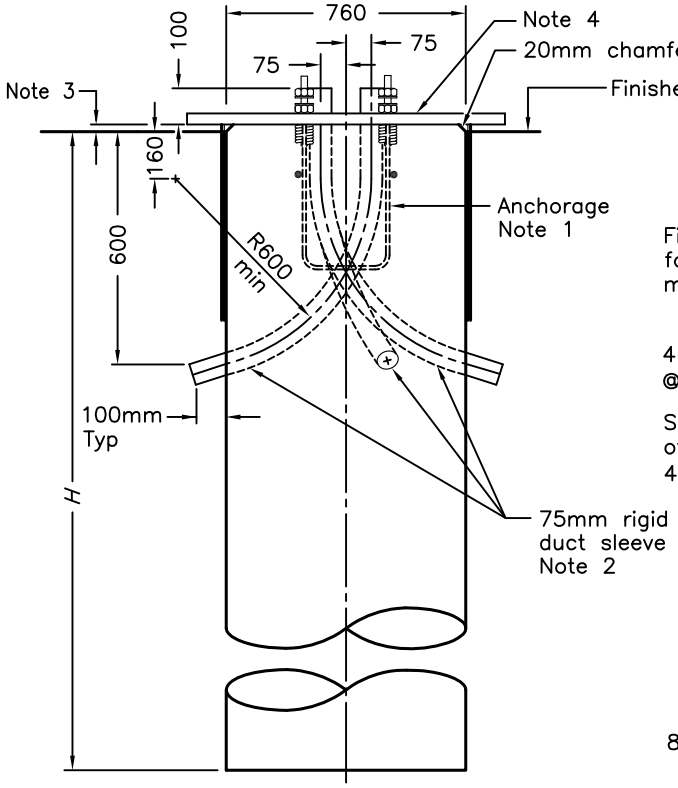
OPSD 2140.010



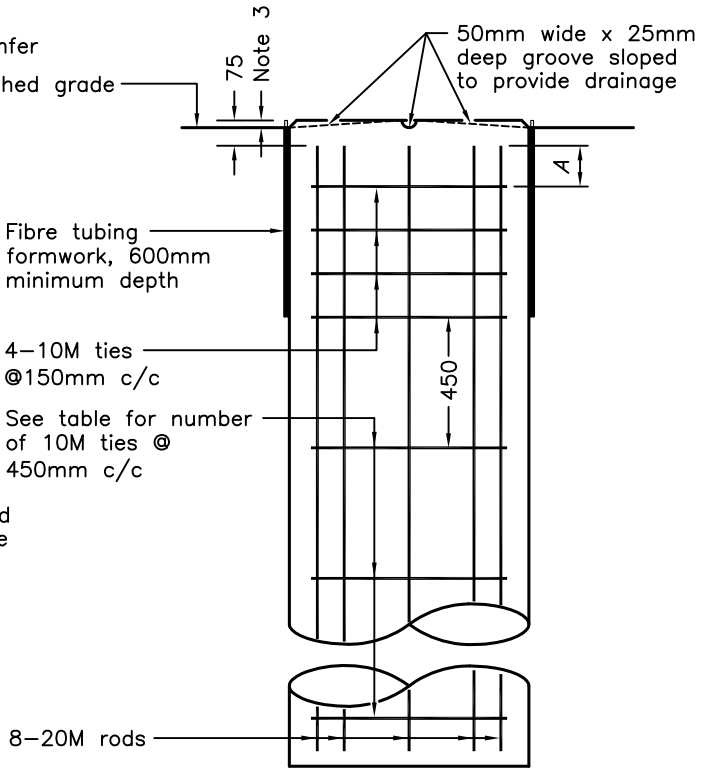
PLAN



PLAN



ELEVATION
LAYOUT



ELEVATION
REINFORCEMENT

NOTES:

1 For anchorage assembly see OPSD 2215.02.
2 Minimum of two sleeves required for each concrete footing. Three sleeves as specified.
3 Top of footing shall be installed at 40mm ±15mm above finished grade in paved or concrete areas and 75mm ±25mm above finished grade in earth or granular areas.
4 Plywood template set level. Remove to finish concrete after initial set.

A For pole mounting details see OPSD 2215.03.
B All dimensions are in millimetres unless otherwise shown.

POLE LENGTH m	BURIAL DEPTH *H* m	ROD LENGTH m	*A* mm	NO. OF 10M TIES @ 450 c/c	BOLT CIRCLE DIA FOR METAL POLES		
					Aluminum	Steel	Sectional Steel
5.6	2.15	2.00	100	3	N/A	N/A	449
7.0	2.15	2.00	100	3	N/A	N/A	449
7.5	2.15	2.00	100	3	406	406	N/A
8.7	2.45	2.30	250	3	N/A	N/A	449
9.0	2.45	2.30	0	4	406	406	N/A
10.5	2.60	2.45	100	4	406	406	449
12.0	2.75	2.60	150	4	406	406	N/A
13.6	2.90	2.75	0	5	406	406	N/A
15.1	3.05	2.90	100	5	406	406	N/A

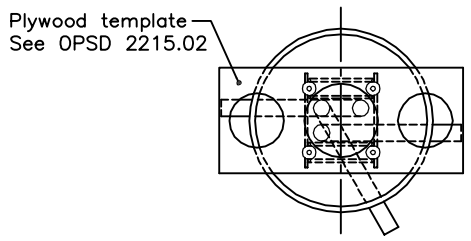
N/A – Not applicable

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2012 | Rev 2

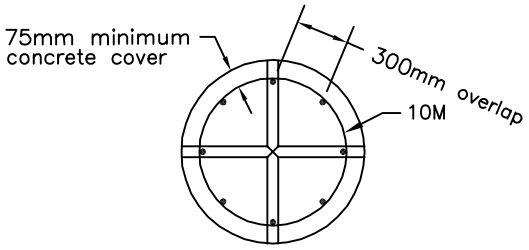
CONCRETE FOOTING FOR BASE MOUNTED LIGHTING AND SIGNAL POLES

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL ·

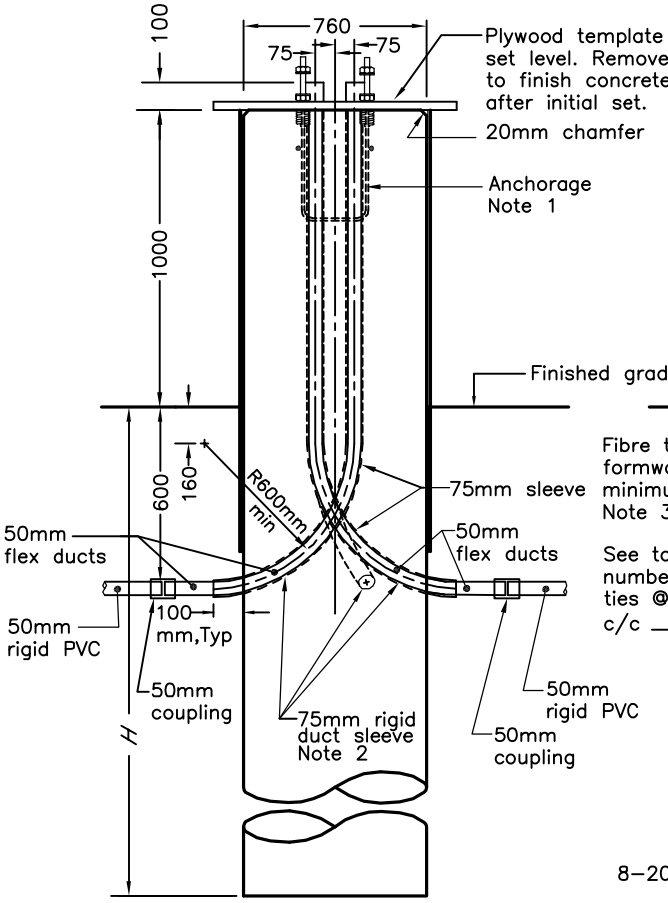
OPSD 2200.01



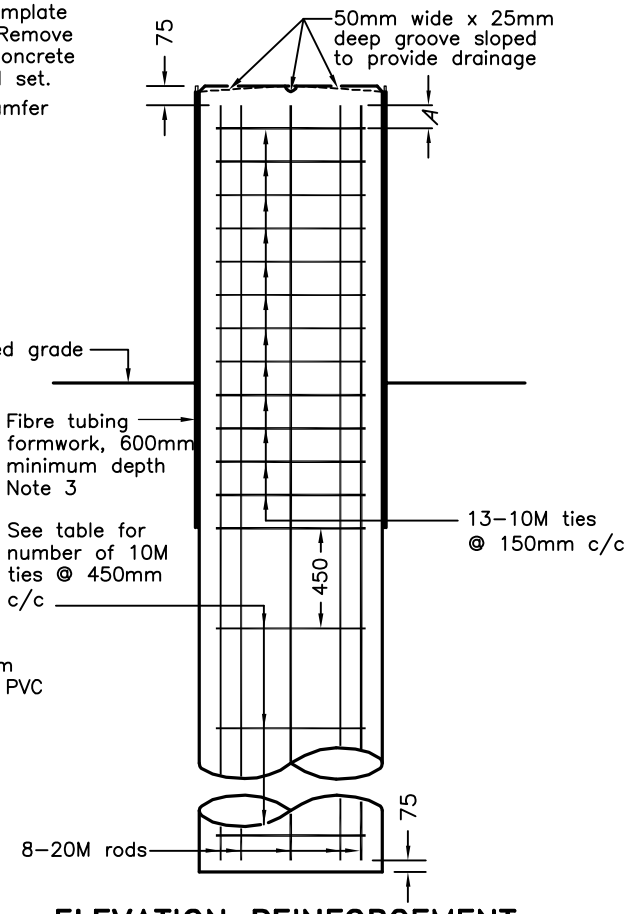
PLAN



PLAN



ELEVATION LAYOUT



ELEVATION REINFORCEMENT

POLE LENGTH m	BURIAL DEPTH H m	ROD LENGTH m	A mm	NO. OF 10M TIES @ 450 c/c	BOLT CIRCLE DIA FOR METAL POLES		
					Aluminum	Steel	Sectional Steel
5.6	2.15	3.00	100	3	N/A	N/A	449
7.0	2.15	3.00	100	3	N/A	N/A	449
7.5	2.15	3.00	100	3	406	406	N/A
8.7	2.45	3.30	250	3	N/A	N/A	449
9.0	2.45	3.30	0	4	406	406	N/A
10.5	2.60	3.45	100	4	406	406	449
12.0	2.75	3.60	150	4	406	406	N/A
13.6	2.90	3.75	0	5	406	406	N/A
15.1	3.05	3.90	100	5	406	406	N/A

N/A – Not applicable

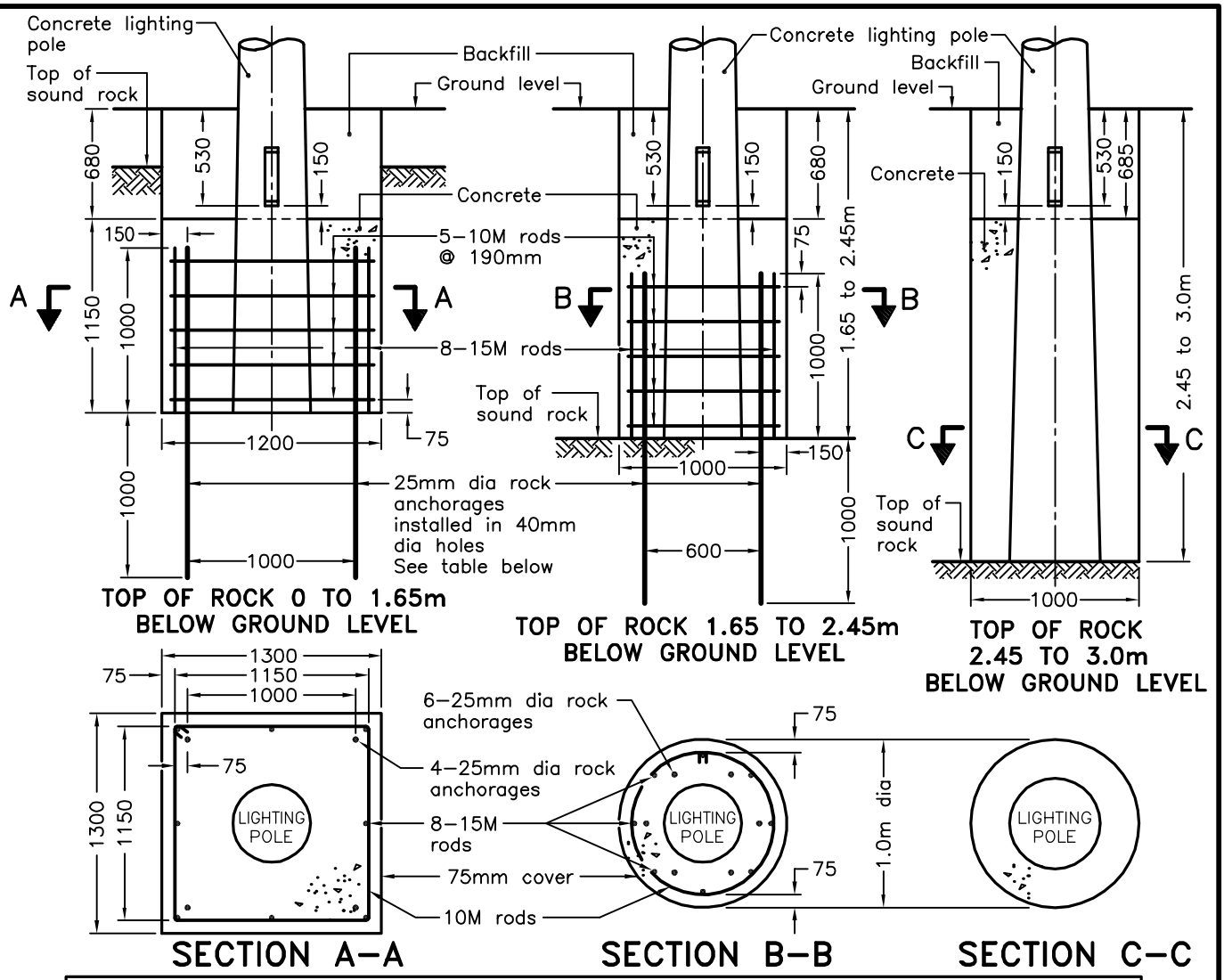
NOTES:

1 For anchorage assembly see OPSD 2215.02.
2 Minimum of two sleeves required for each concrete footing. Three sleeves as specified.
3 Remove formwork above finished grade after initial set.
A For pole mounting details see OPSD 2215.03.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2010 | Rev 0

RAISED CONCRETE FOOTING FOR BASE MOUNTED LIGHTING POLES

OPSD 2200.011



CONCRETE POLE SETTING WHERE ROCK IS ENCOUNTERED												
POLE LENGTH m	NORMAL BURIAL DEPTH IN EARTH m	BELOW GROUND DEPTH TO TOP OF ROCK, m										
		0	0.30	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70	3.00
		DEPTH OF ROCK EXCAVATION REQUIRED, m										
9.0	1.65	1.65 *	1.35 *	1.05 *	0.75 *	0.45 *	0.15 *					
10.2	1.65	1.65 *	1.35 *	1.05 *	0.75 *	0.45 *	0.15 *					
10.7	1.65	1.65 *	1.35 *	1.05 *	0.75 *	0.45 *	0.15 *					
12.1	1.65	1.65 *	1.35 *	1.05 *	0.75 *	0.45 *	0.15 *					
12.5	2.00	1.65 (0.30) *	1.35 (0.30)	1.05 (0.30)	0.75 (0.30)	0.45 (0.30)	0.15 (0.30) *	0 (0.15) *				
14.0	2.00	1.65 (0.30) *	1.35 (0.30)	1.05 (0.30)	0.75 (0.30)	0.45 (0.30)	0.15 (0.30)	0 (0.15) *				
15.8	2.30	1.65 (0.60)	1.35 (0.60)	1.05 (0.60)	0.75 (0.60)	0.45 (0.60)	0.15 (0.75)	0 (0.45)	0 (0.15) *			
18.3	3.20	1.65 (1.50)	1.35 (1.50)	1.05 (1.50)	0.75 (1.50)	0.45 (1.50)	0.15 (1.50)	0 (1.35)	0 (1.05)	0 (0.75) *	0 (0.45) *	0 (0.15) *
21.3	3.20	1.65 (1.50)	1.35 (1.50)	1.05 (1.50)	0.75 (1.50)	0.45 (1.50)	0.15 (1.50)	0 (1.35)	0 (1.05)	0 (0.75) *	0 (0.45) *	0 (0.15) *

* Rock anchorages and steel reinforcing not required.

( ) Dimensions shown in brackets indicate the length to be cut off from the bottom of the pole.

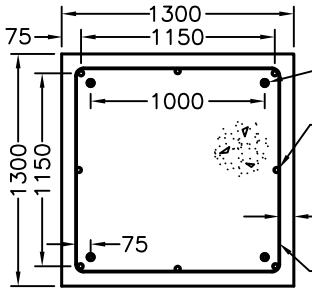
NOTE:

A All dimensions are in millimetres unless otherwise shown.

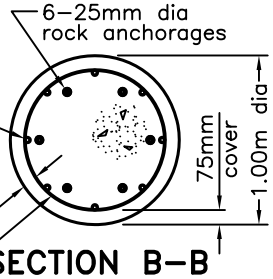
ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2013 | Rev 1

CONCRETE FOUNDATION FOR DIRECT BURIED LIGHTING POLES WHERE ROCK IS ENCOUNTERED

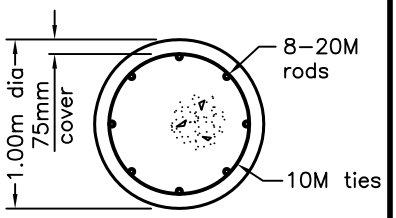
OPSD 2200.02



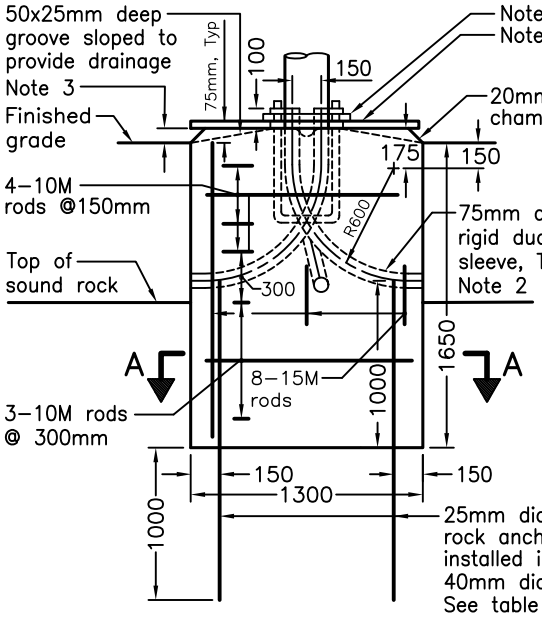
SECTION A–A



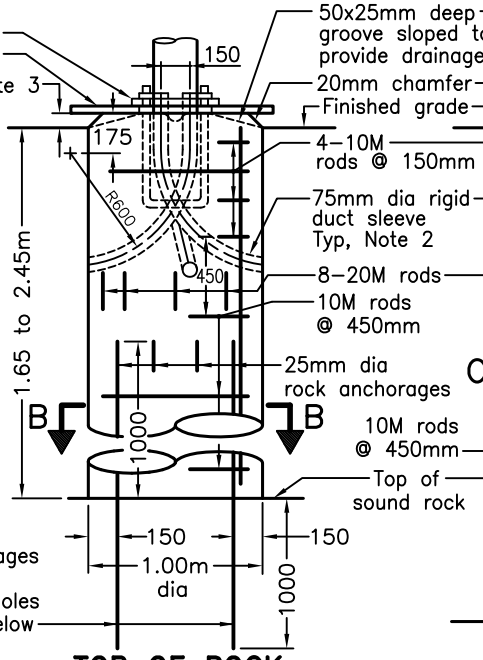
SECTION B–B



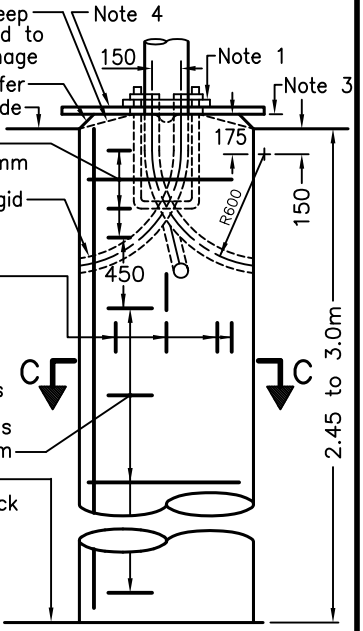
SECTION C–C



TOP OF ROCK 0 TO 1.65m
BELOW GROUND LEVEL



TOP OF ROCK
1.65 TO 2.45m
BELOW GROUND LEVEL



TOP OF ROCK
2.45 TO 3.0m
BELOW GROUND LEVEL

FOOTINGS FOR BASE MOUNTED POLES WHERE ROCK IS ENCOUNTERED										
POLE LENGTH m	NORMAL BURIAL DEPTH IN EARTH m	BELOW GROUND DEPTH TO TOP OF ROCK, m								
		0.0	0.30	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70
		DEPTH OF ROCK EXCAVATION REQUIRED, m								
7.0	2.15	1.65*	1.35*	1.05*	0.75*	0.45*	0.15*				
7.5	2.15	1.65*	1.35*	1.05*	0.75*	0.45*	0.15*				
8.7	2.45	1.65*	1.35*	1.05*	0.75*	0.45*	0.15*				
9.0	2.45	1.65*	1.35*	1.05*	0.75*	0.45	0.15*				
10.5	2.60	1.65*	1.35	1.05	0.75	0.45	0.15*	0*			
12.0	2.75	1.65*	1.35	1.05	0.75	0.45	0.15	0*			
13.6	2.90	1.65	1.35	1.05	0.75	0.45	0.15	0	0*		
15.1	3.05	1.65	1.35	1.05	0.75	0.45	0.15	0	0	0*	0*

* Rock anchorages not required

NOTES:

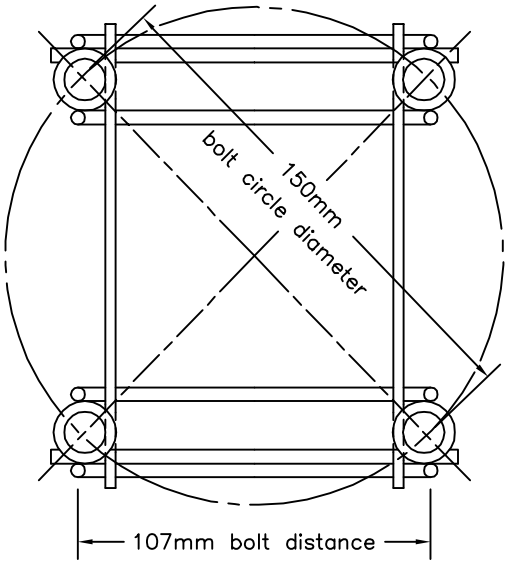
1 For anchorage assembly see OPSD 2215.02. For pole mounting details see OPSD 2215.03.
2 Minimum of two sleeves required for concrete foundation. Three sleeves as specified.
3 Top of footing shall be installed at 40mm ±15mm above finished grade in paved or concrete areas and 75mm ±25mm above finished grade in earth or granular areas.
4 Plywood template set level. Remove to finish concrete after initial set.

A All dimensions are in millimetres unless otherwise shown.

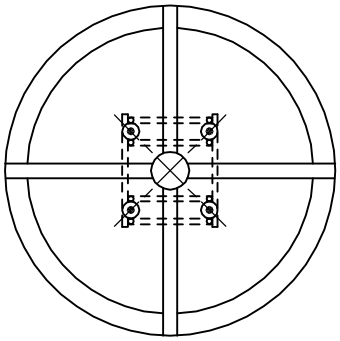
ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2012 | Rev 2

CONCRETE FOUNDATION FOR BASE MOUNTED LIGHTING POLES WHERE ROCK IS ENCOUNTERED

OPSD 2200.03

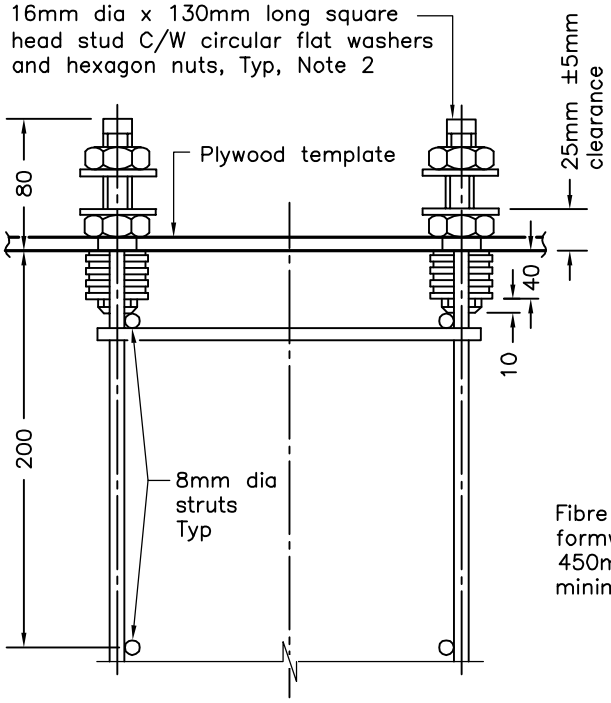


PLAN

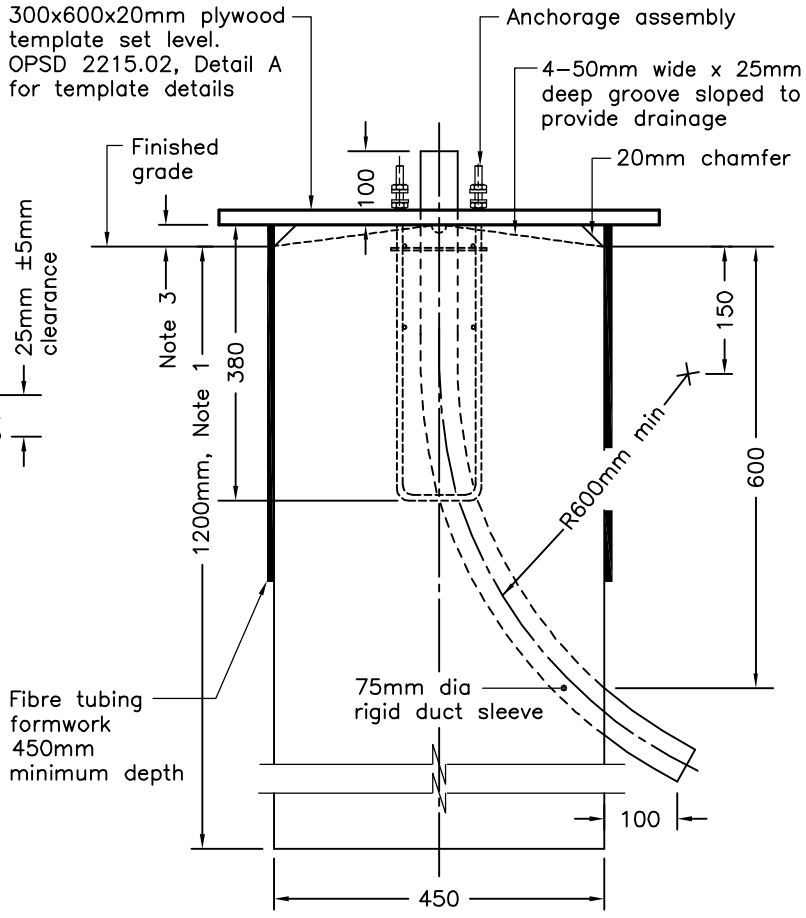


PLAN

Plywood template not shown for clarity



ELEVATION
ANCHORAGE ASSEMBLY



ELEVATION
CONCRETE FOOTING

NOTES:

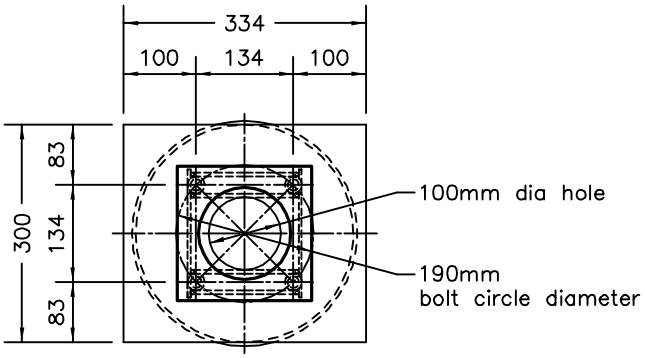
1 When rock is encountered at 600mm or less below ground level, the depth of the concrete footing shall be a minimum of 900mm.

2 Studs shall be factory set with preapplied thread locking compound and shall remain in place during footing and pole installation.

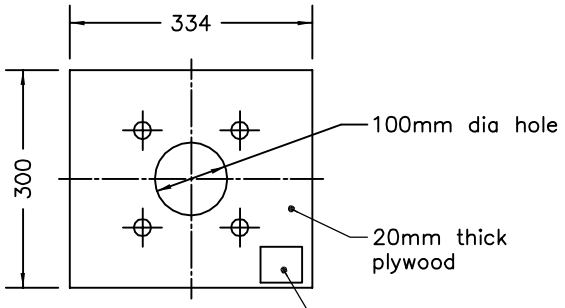
3 Top of footing shall be installed at 40mm ±15mm above finished grade in paved or concrete areas and 75mm ±25mm above finished grade in earth or granular areas.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	2
CONCRETE FOOTING AND ANCHORAGE ASSEMBLY FOR 3.3m BASE MOUNTED METAL POLE			
	OPSD 2200.04		



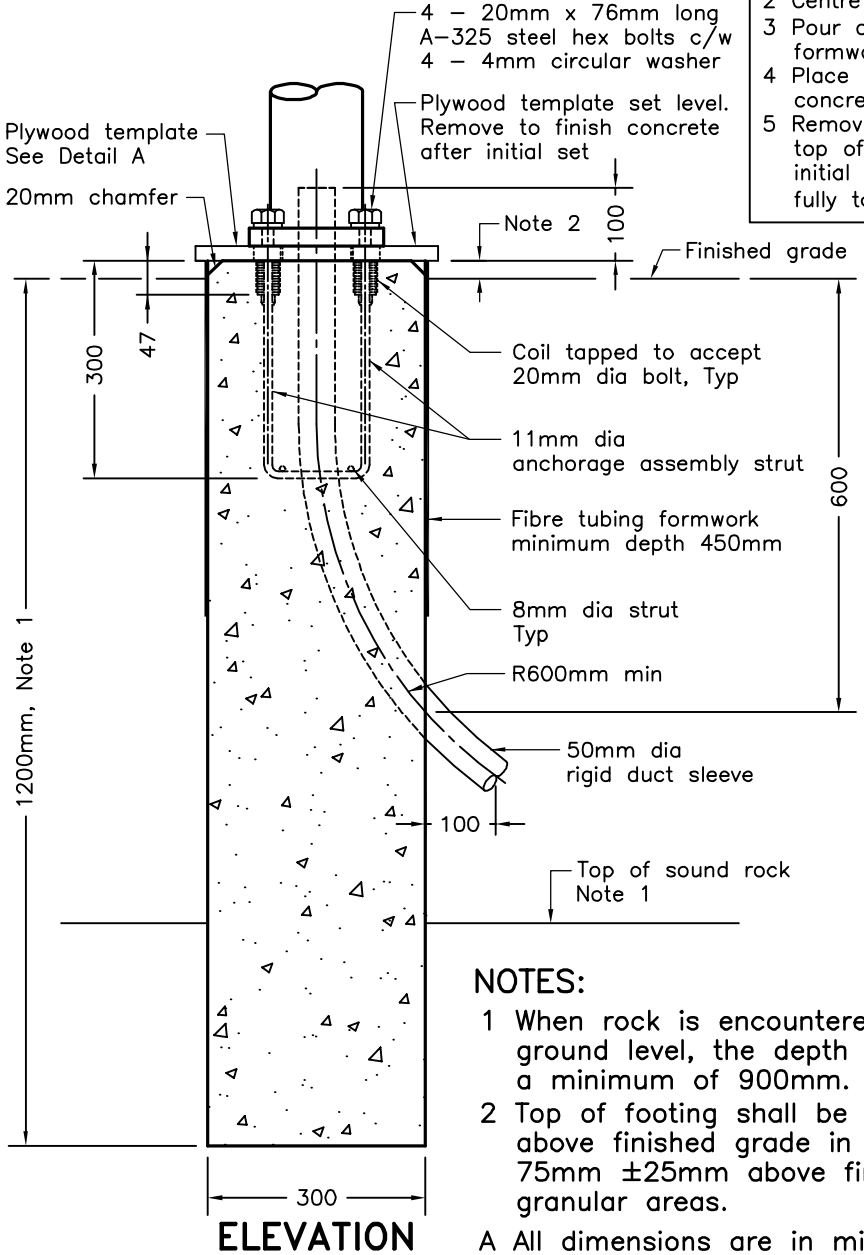
PLAN



DETAIL A

INSTRUCTIONS:

1 Position and level fibre tubing formwork.
2 Centre duct within fibre tubing formwork.
3 Pour concrete to the top of the fibre tubing formwork.
4 Place and centre anchorage assembly within concrete footing.
5 Remove wood template and finish concrete on top of footing as soon as concrete has an initial set. Replace template and place bolts fully to threaded ferrules, hand tight.



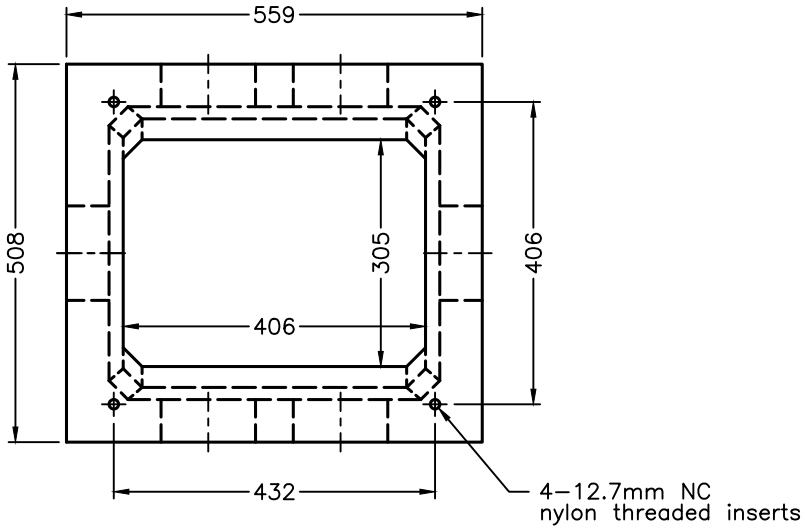
ELEVATION

NOTES:

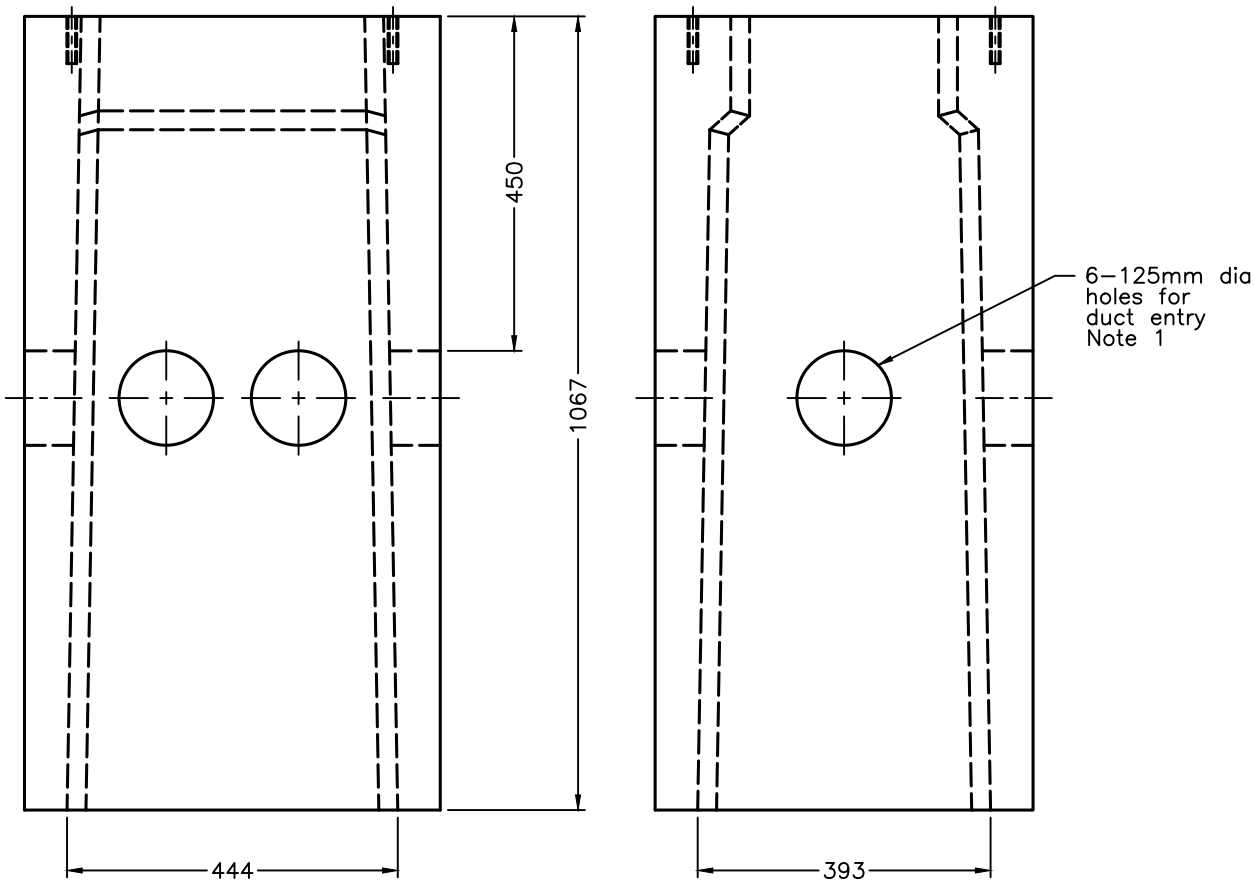
1 When rock is encountered at 600mm or less below ground level, the depth of the concrete footing shall be a minimum of 900mm.
2 Top of footing shall be installed at 40mm ±15mm above finished grade in paved or concrete areas and 75mm ±25mm above finished grade in earth or granular areas.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	0
CONCRETE FOOTING FOR 1.5m BASE MOUNTED PEDESTRIAN PUSH BUTTON POLE			
	OPSD 2200.041		



PLAN



ELEVATION

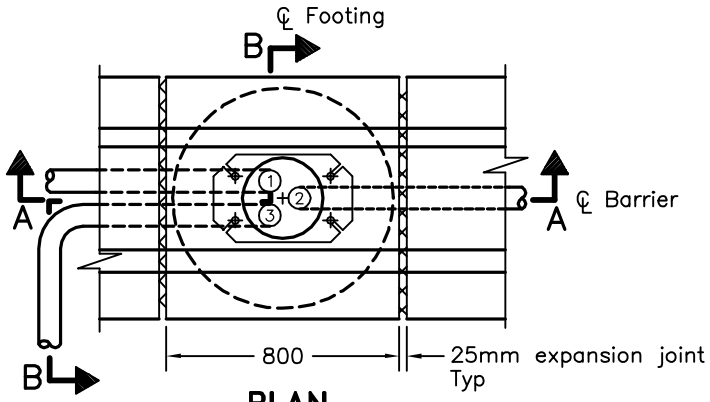
NOTES:

1 For installation of ducts see OPSD 2123.030.

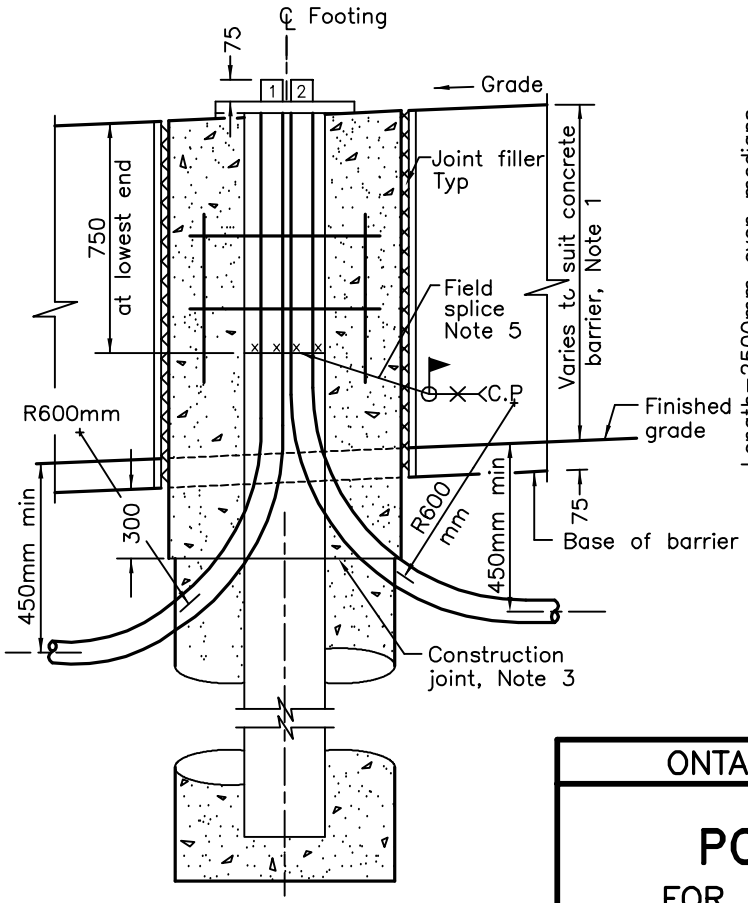
A Concrete shall be according to OPSS 1350 with a nominal minimum 28–Day compressive strength of 32 MPa.

B All dimensions are in millimetres unless otherwise shown.

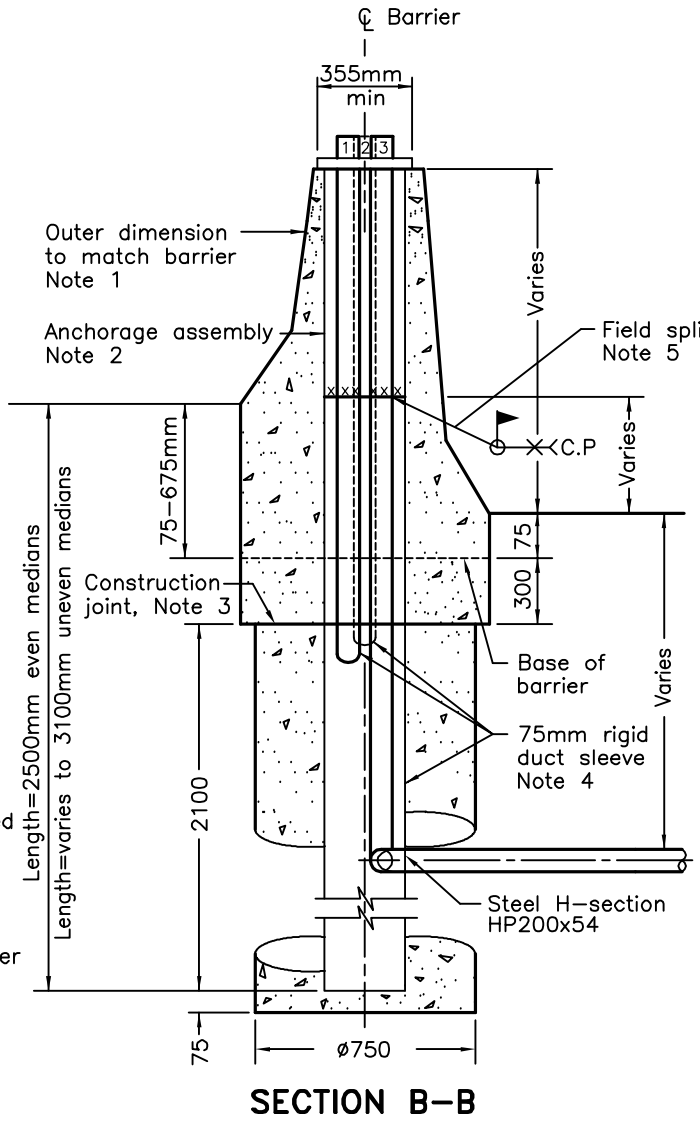
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev	0
PRECAST PEDESTAL FOUNDATION FOR METERING OR STREET LIGHTING			
		OPSD 2200.050	



PLAN



SECTION A–A



SECTION B–B

NOTES:

1 Concrete barrier shall be according to OPSD 911.131.

2 Anchorage assembly shall be according to OPSD 2216.010.

3 The upper portion of the footing may be poured with the barrier using a suitable box–out for the top opening.

4 Minimum of two sleeves required for each concrete footing. Three sleeves as specified.

5 The field splice is optional. Welding shall be according to CSA W59. Where construction staging allows the H–section should be supplied continuous with the H–section of the anchorage assembly.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

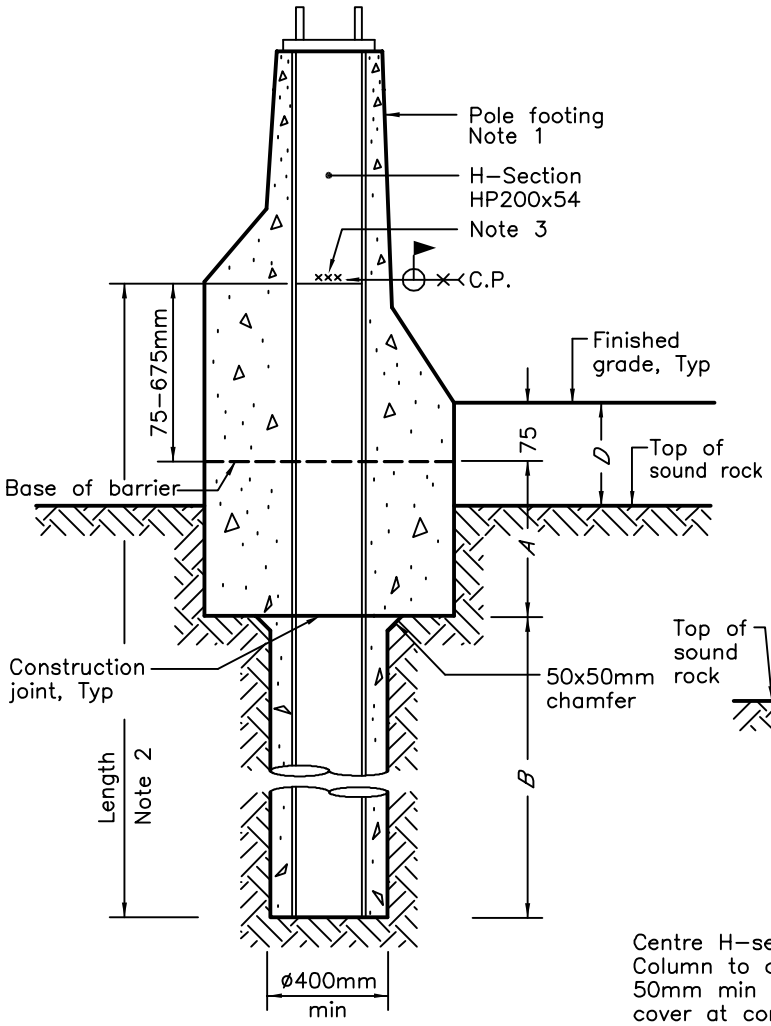
Nov 2016 | Rev 1

POLE FOOTING IN EARTH

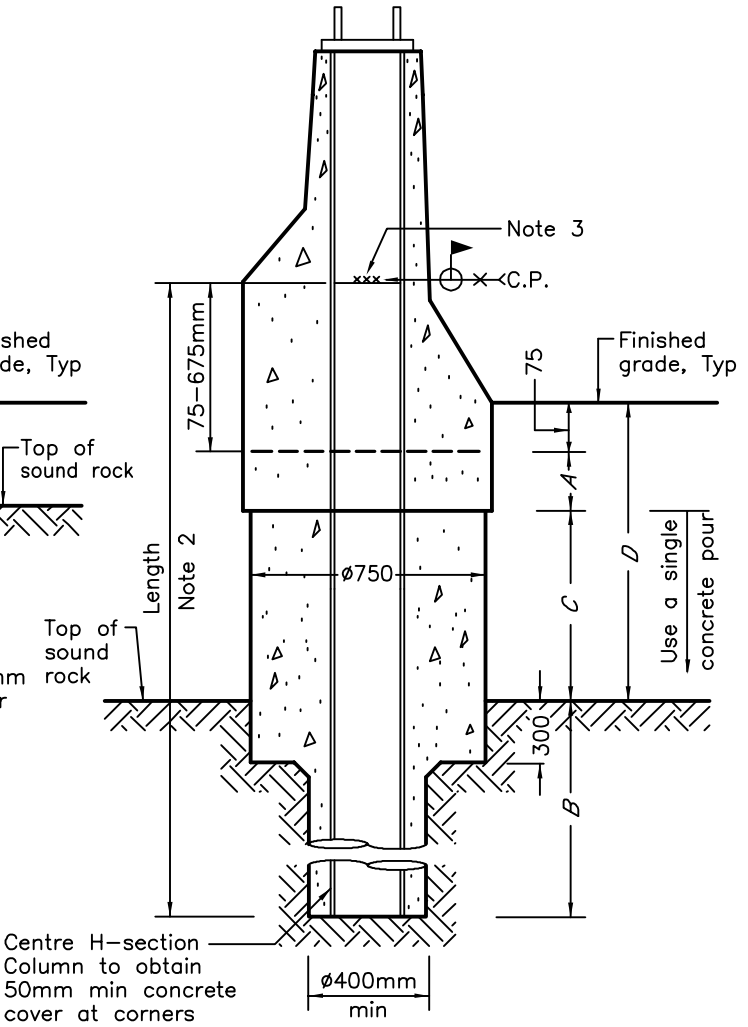
FOR CAST–IN–PLACE CONCRETE BARRIER

ONTARIO STANDARDS · MUNICIPAL–PROVINCIAL · OPSS

OPSD 2200.070



DEPTH TO SOUND ROCK = 0 TO 1199mm



DEPTH TO SOUND ROCK = 1200 TO 2100mm

DIMENSION		DEPTH TO SOUND ROCK *D* mm							
		0	300	600	900	1200	1500	1800	2100
Depth *A*		300	600	900	1100	300	300	200	200
Depth *B*	C	1400	1100	800	600	600	900	600	300
	C–1	2000	1700	1400	1200	1200	1500	1200	900
Depth *C*		n/a	n/a	n/a	n/a	800	1100	1500	1800
Length	C	1875	1875	1875	1875	1875	2475	2475	2475
	C–1	2475	2475	2475	2475	2475	3075	3075	3075

NOTES:

1 Details shown are for modifications required to the normal footing for installation in rock. For all other details, refer to OPSD 2200.070.

2 Lengths are indicated for C or C–1 barriers. Rock excavation depth *B* shall correspond to the H–section lengths as shown.

3 The field splice is optional. Welding shall be according to CSA W59. Where construction staging allows, the H–section should be supplied continuous with the H–section of the anchorage assembly.

A C and C–1 are barrier types. Refer to OPSD 911.131.

B All dimensions are in milimetres unless otherwise shown.

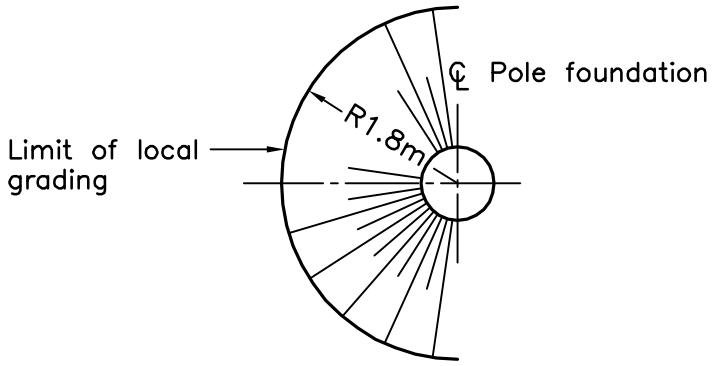
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2016 | Rev 1

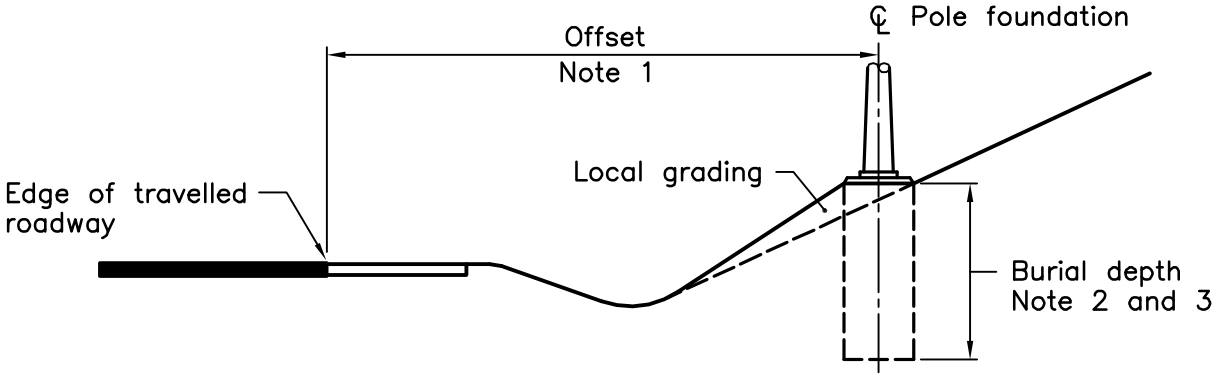
POLE FOOTING IN ROCK

FOR CAST–IN–PLACE CONCRETE BARRIER

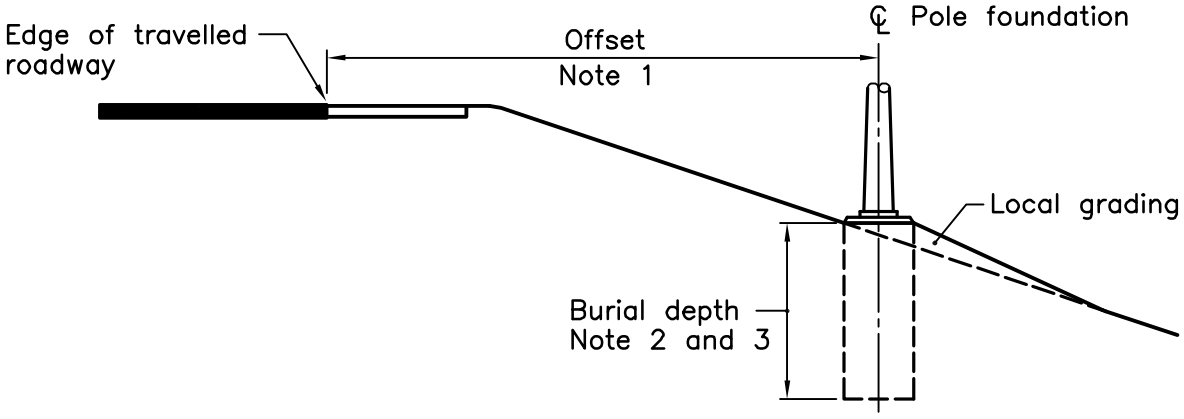
OPSD 2200.080



TYPICAL PLAN



POLE FOUNDATION IN CUT



POLE FOUNDATION IN FILL

NOTES:

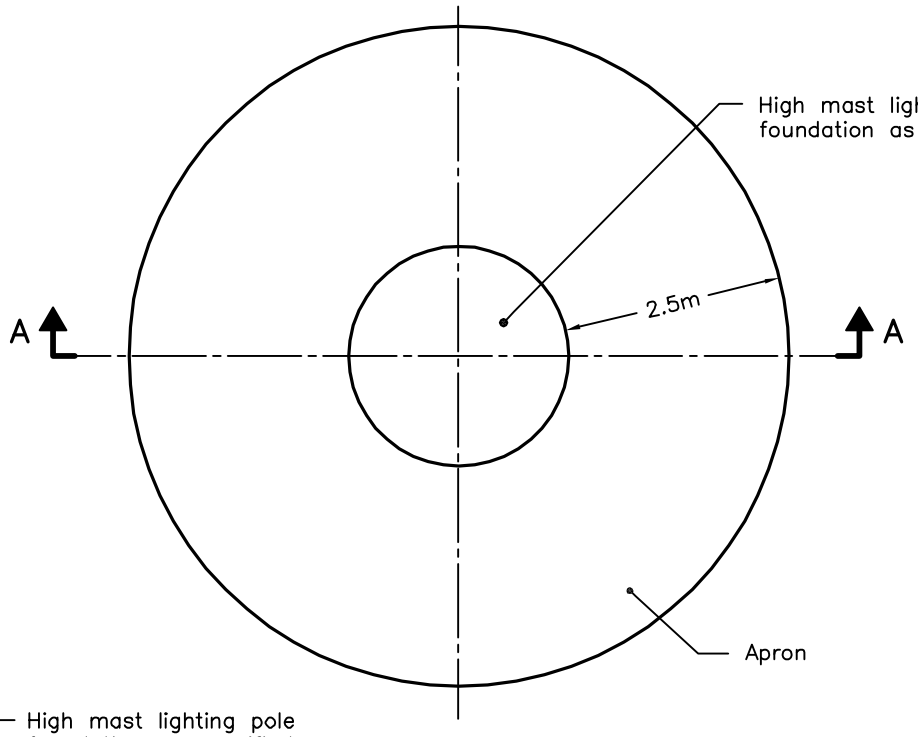
1 Offset dimension as specified in the Contract Documents.

2 Burial depth shall be measured from the highest grade elevation at pole foundation.

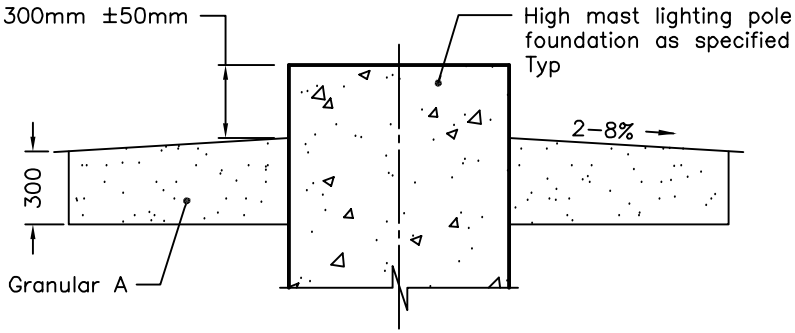
3 For burial depths see OPSD 2200.01.

A All dimensions are in millimetres unless otherwise shown.

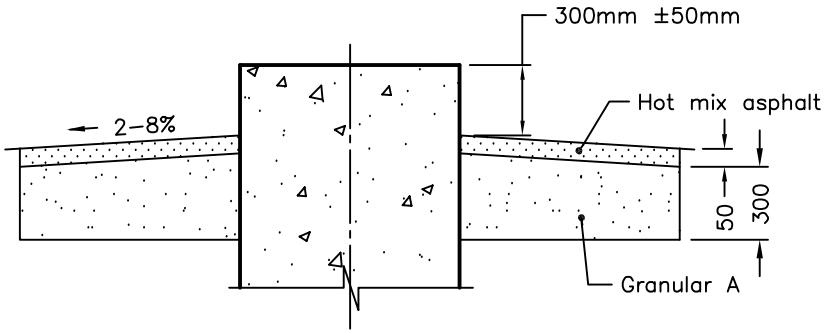
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	0
LOCAL GRADING AT POLE FOUNDATIONS			
	OPSD 2210.010		



PLAN



SECTION A–A
GRANULAR APRON



SECTION A–A
ASPHALT APRON
WHEN SPECIFIED

NOTE:
A All dimensions are in millimetres unless otherwise shown.

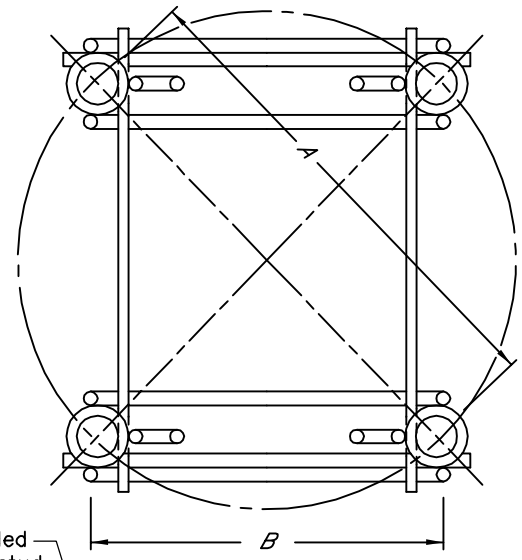
ONTARIO PROVINCIAL STANDARD DRAWING

HIGH MAST LIGHTING POLE

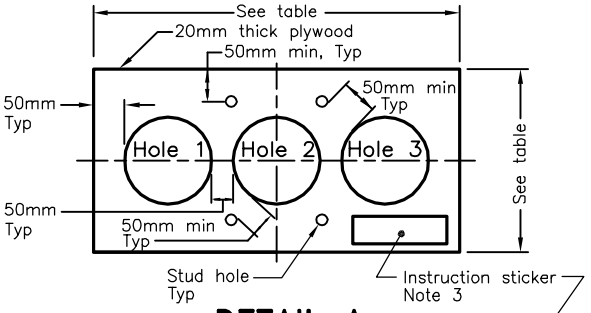
APRON

Nov 2016 | Rev 1

OPSD 2210.030



PLAN



DETAIL A

INSTRUCTIONS:

1 Do not remove studs from threaded ferrules.

2 Place anchorage in footing with wood template over formwork.

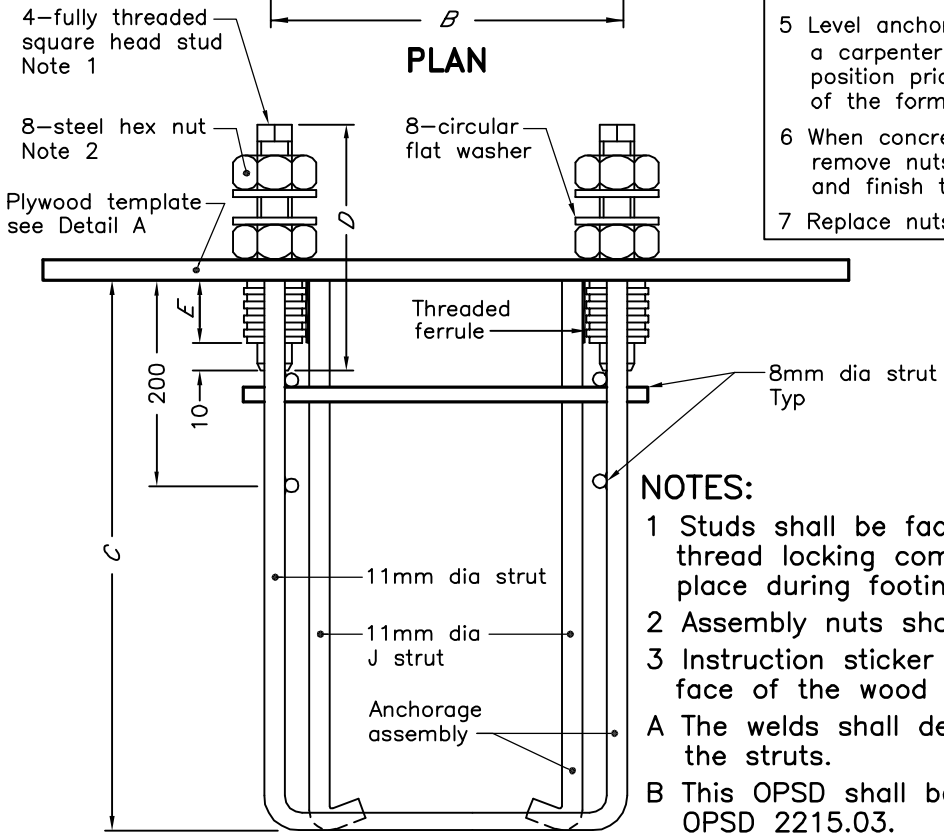
3 Tie anchorage to steel in footing.

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.



ELEVATION

NOTES:

1 Studs shall be factory set with preapplied thread locking compound and shall remain in place during footing and pole installation.

2 Assembly nuts shall be shipped hand tight only.

3 Instruction sticker shall be attached on top face of the wood template.

A The welds shall develop the strength of the struts.

B This OPSD shall be read in conjunction with OPSD 2215.03.

C All dimensions are in millimetres unless otherwise shown.

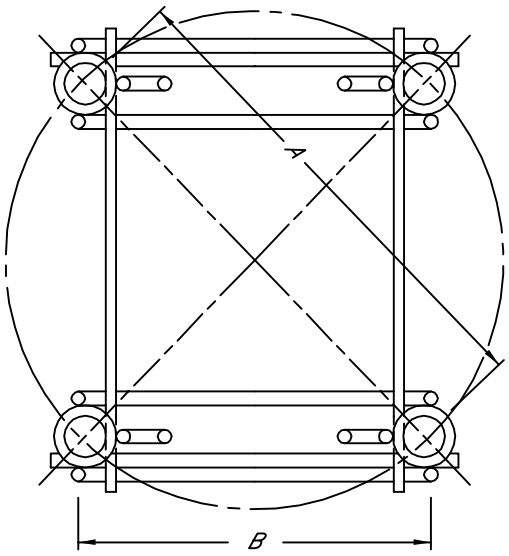
ASSEMBLY DIMENSIONS						WOOD TEMPLATE DIMENSIONS			
STUD DIA	STUD LENGTH *D*	BOLT CIRCLE DIA *A*	STUD DISTANCE *B*	FERRULE LENGTH *E*	ANCHORAGE DEPTH *C*	LENGTH	WIDTH	HOLE DIA 1 and 3	HOLE DIA 2
32mm (1–1/4")	230	406	287	75	250mm FOR STRUCTURES	1000	400	247	306
					457	1000	400	247	306
		449	318		457	1000	418	225	349
19mm (3/4")	180	190	135	38	305	600	300	155	90

ONTARIO PROVINCIAL STANDARD DRAWING

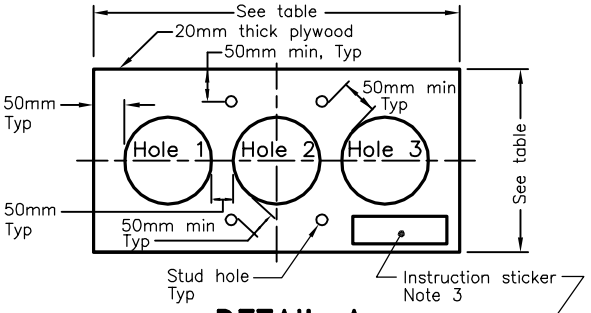
Nov 2015 | Rev 4

ANCHORAGE ASSEMBLY FOR LIGHTING AND SIGNAL POLES

OPSD 2215.02



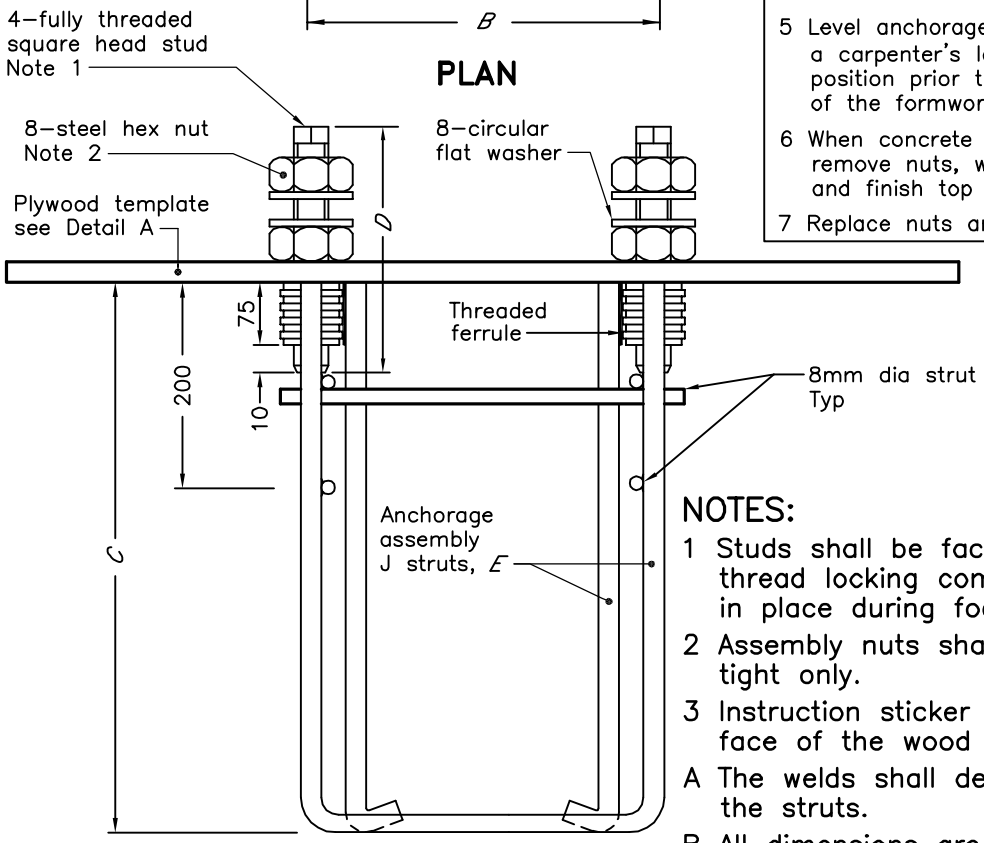
PLAN



DETAIL A

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.



ELEVATION

NOTES:

1 Studs shall be factory set with preapplied thread locking compound and shall remain in place during footing and pole installation.
2 Assembly nuts shall be shipped hand tight only.
3 Instruction sticker shall be attached on top face of the wood template.
A The welds shall develop the strength of the struts.
B All dimensions are in millimetres unless otherwise shown.

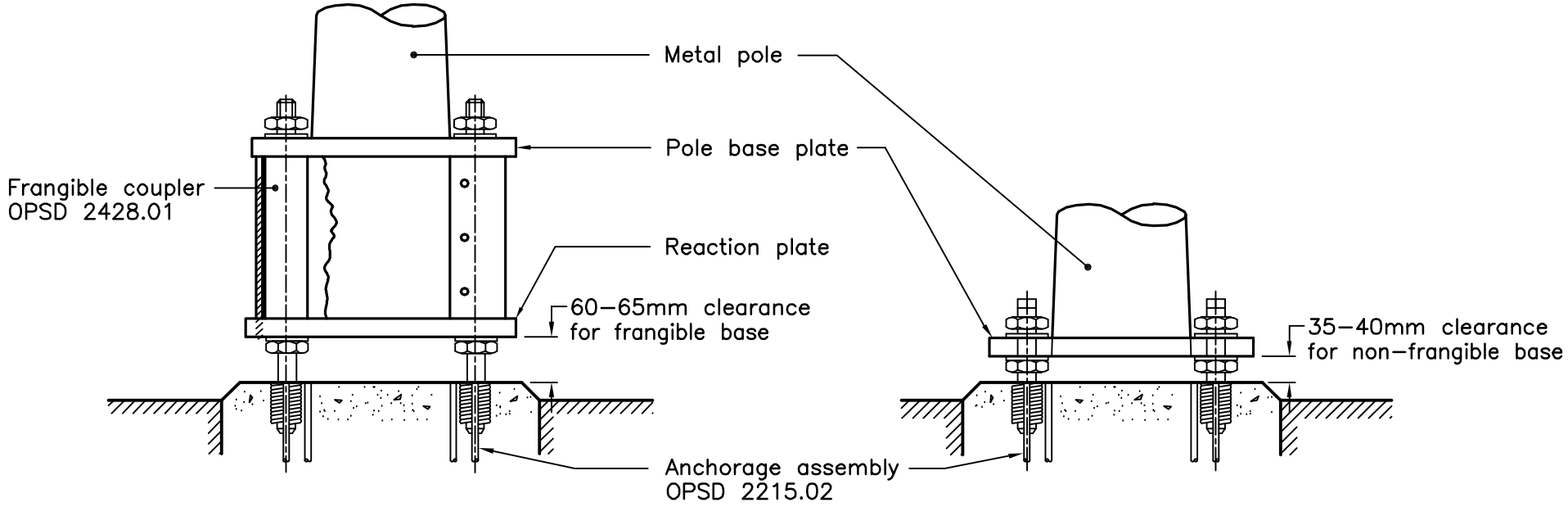
POLE	ASSEMBLY DIMENSIONS						WOOD TEMPLATE DIMENSIONS			
LENGTH m	STUD DIA	BOLT CIRCLE DIA A	STUD DISTANCE B	ANCHORAGE DEPTH C	STUD LENGTH D	J STRUT DIA E	LENGTH	WIDTH	HOLE DIA 1 and 3	HOLE DIA 2
10.5	38mm (1–1/2")	449	318	457	285	12.7	1000	418	225	349
9.0										
7.5	32mm (1–1/4")	449	318	457	265	11	1000	418	225	349
6.0										

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 | Rev 0

ANCHORAGE ASSEMBLY FOR HEAVY CLASS STEEL POLE AND SECTIONAL STEEL POLE

OPSD 2215.025



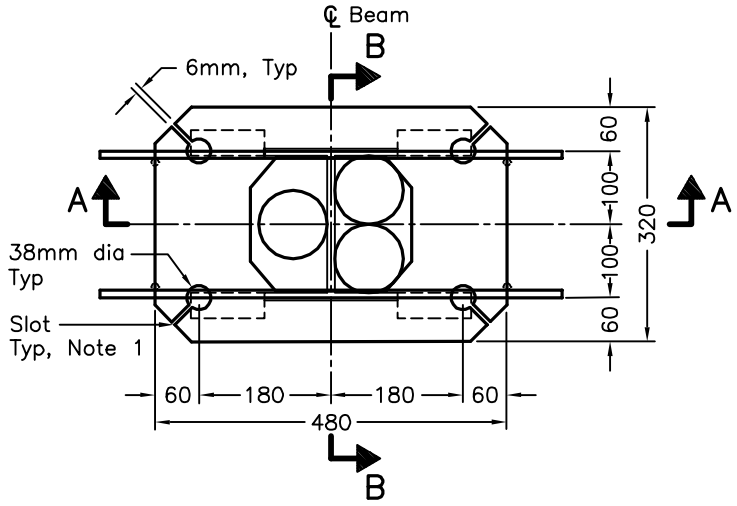
FRANGIBLE BASE – FRANGIBLE COUPLER

NON–FRANGIBLE BASE

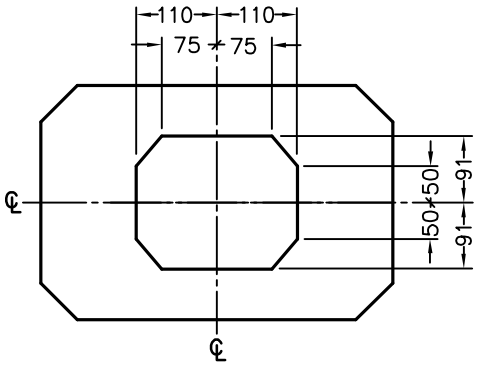
NOTE:

A All dimensions are in millimetres unless otherwise shown.

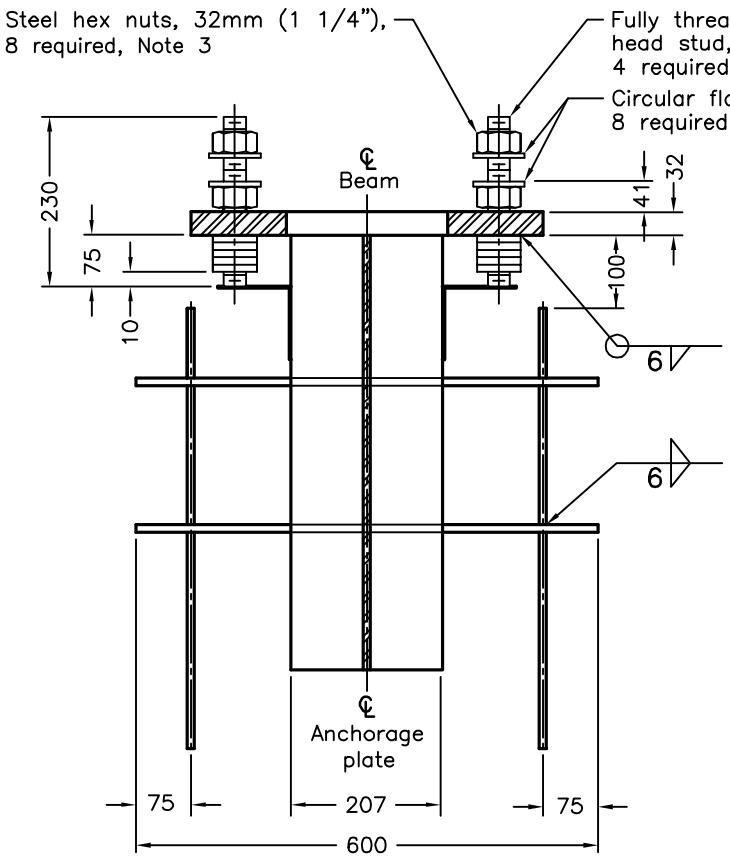
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	4
POLE MOUNTING DETAILS FOR BASE MOUNTED METAL POLE			
	OPSD 2215.03		



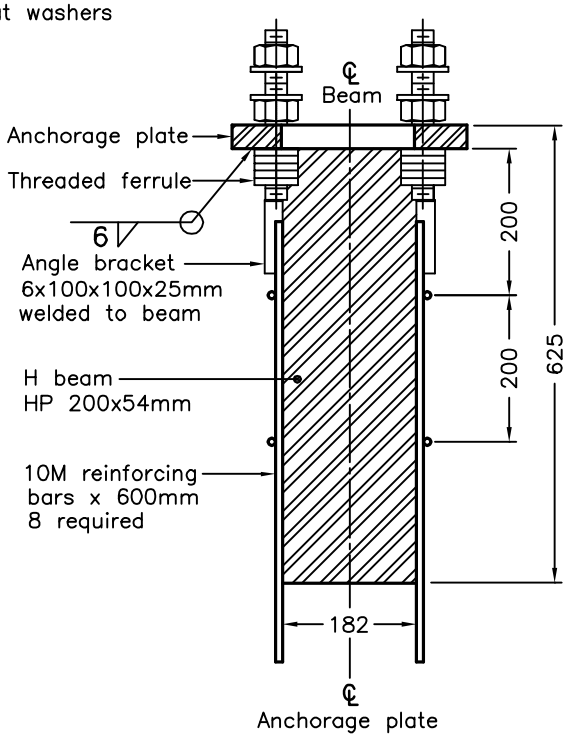
PLAN



DETAIL OF
DUCT ENTRY HOLE



SECTION A–A



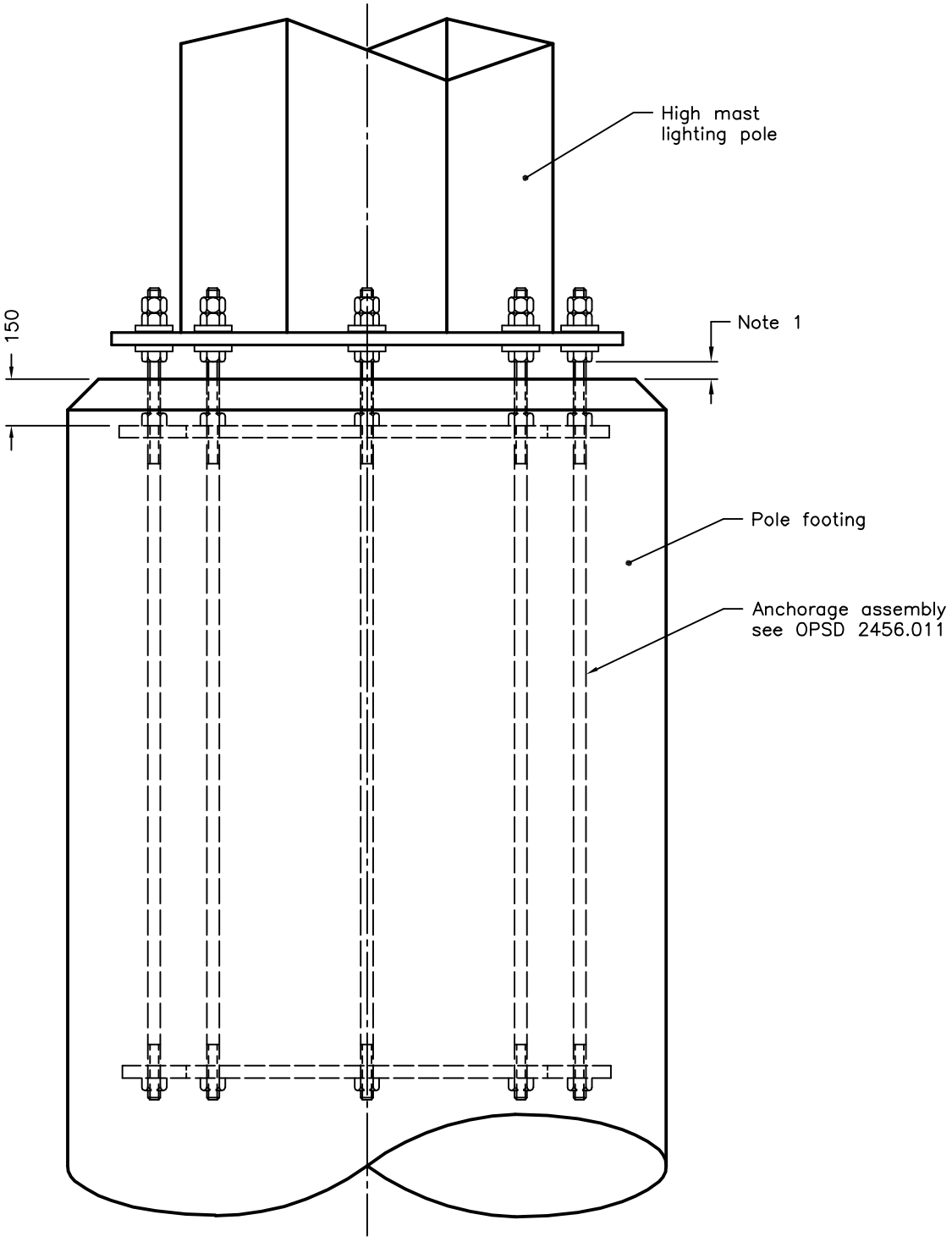
SECTION B–B

NOTES:

1 6mm slots to bolt holes, when required, for steel cutting purposes only.
2 Studs shall be factory set in ferrule with preapplied thread locking compound.
3 Assembly nuts shall be shipped hand tightened only.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	2
ANCHORAGE ASSEMBLY FOR POLE FOOTING IN CONCRETE BARRIER			
	OPSD 2216.010		



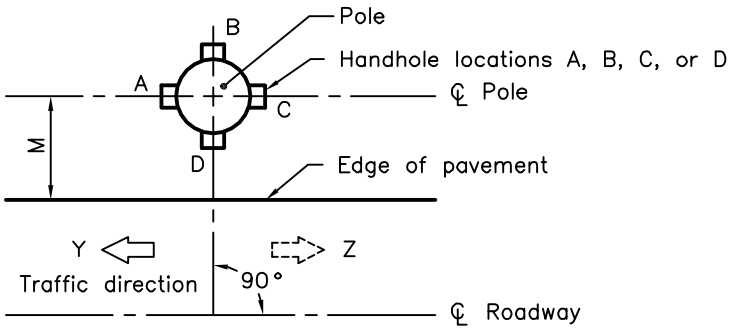
ELEVATION

NOTES:

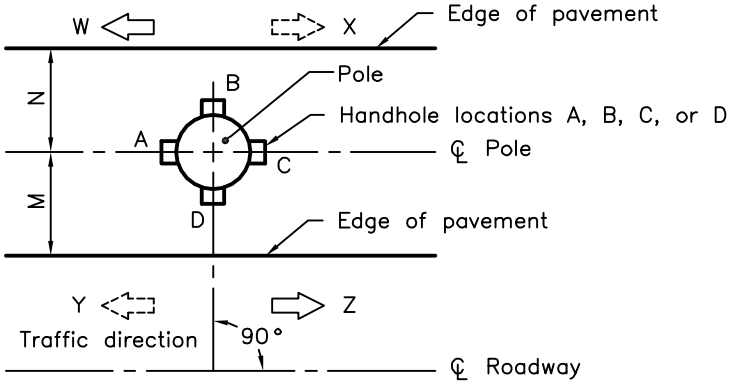
1 Distance from the underside of the nut to the top of the pole footing shall be 50mm ±10mm.

A All dimensions are in millimetres unless otherwise shown.

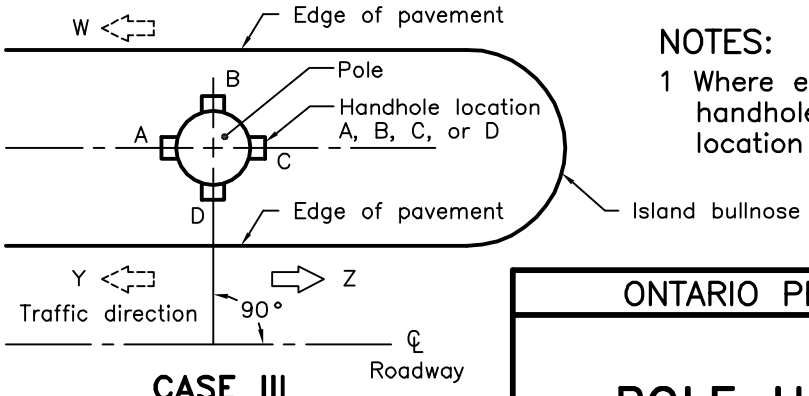
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
# HIGH MAST LIGHTING POLE ANCHORAGE ASSEMBLY PLACEMENT			
	OPSD 2218.010		



CASE I
ALONG ROADWAYS



CASE II
CONTINUOUS MEDIANS



CASE III
ISLANDS AND BULLNOSES

TYPE OF POLE	POLE USE	CASE	TRAFFIC DIRECTION	HANDHOLE LOCATION
Concrete	Lighting	I	Y	A
		I	Z	C
		II	X and Y or W and Z	A or C
		II	W and Y	A
		II	X and Z	C
Steel or aluminum	Lighting (along roadway)	I	Y	B
		I	Z	B
		II	X and Y or W and Z W and Y or X and Z	B or D for M=N B for N > M D for M > N
	Lighting (on structures)	I	Y	D
		I	Z	D
		II	X and Y or W and Z W and Y or X and Z	B or D for M=N B for N > M D for M > N
Sectional steel, heavy class sectional steel, or heavy class steel	Lighting and traffic signals	I	Y	A or (B Note 1)
		I	Z	C or (B Note 1)
		II	W and Z or X and Y	A or C
		II	W and Y	A
		II	X and Z	C
		III	W and Z	A
		III	W and Y	A

NOTES:

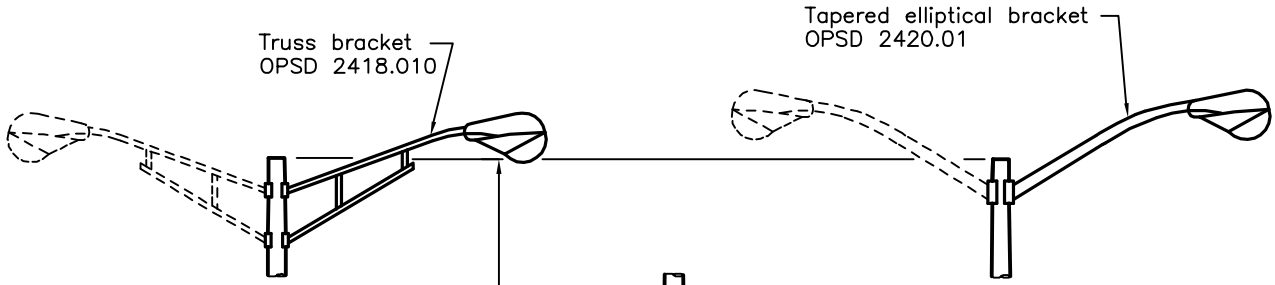
1 Where externally mounted traffic signal equipment interferes with the preferred handhole location, the pole shall be rotated 90° to give the alternative handhole location as indicated.

ONTARIO PROVINCIAL STANDARD DRAWING

POLE HANDHOLE LOCATIONS

Nov 2010 | Rev 1

OPSD 2220.01

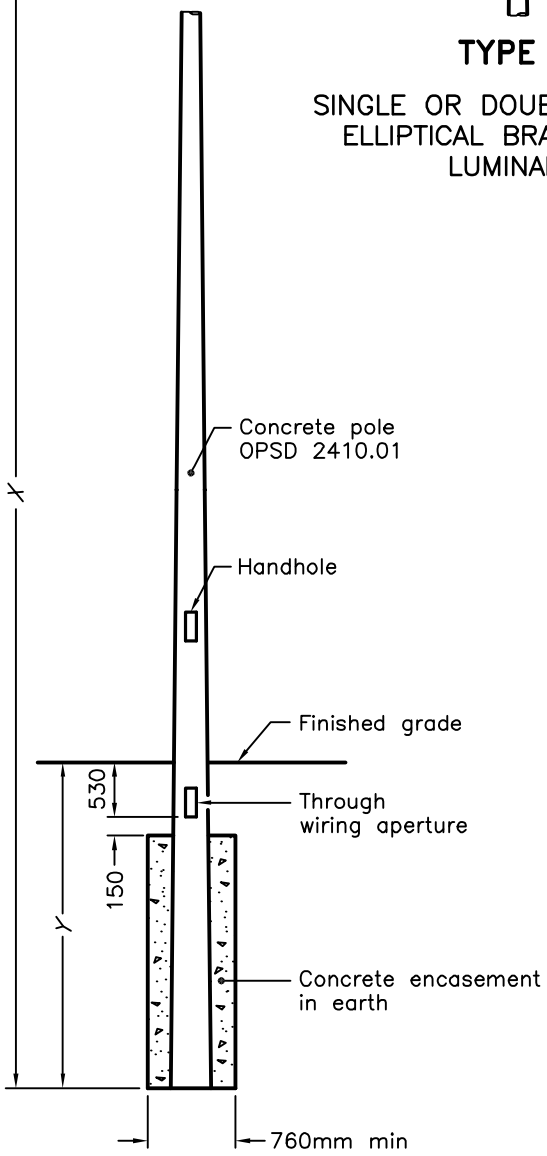


TYPE A

SINGLE OR DOUBLE TRUSS BRACKET AND LUMINAIRE

TYPE B

SINGLE OR DOUBLE TAPERED ELLIPTICAL BRACKET AND LUMINAIRE



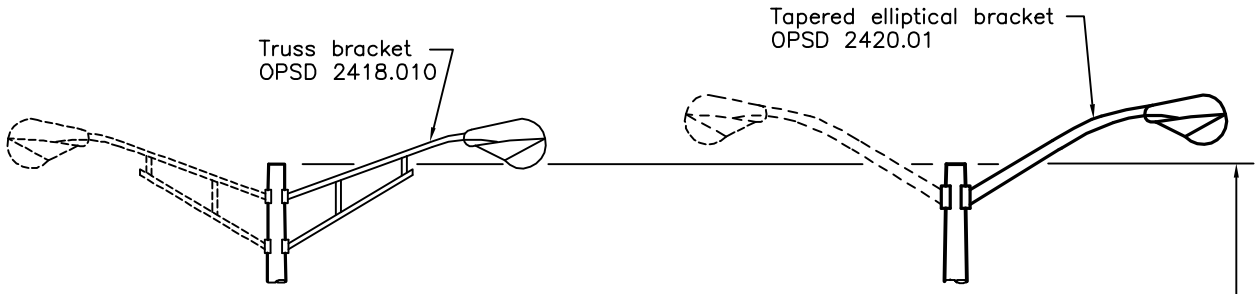
CONCRETE LIGHTING POLE Installation Data	
X Pole Length m	Y Burial Depth m
9.0	1.65
10.7	1.65
12.5	2.00
14.0	2.00
15.8	2.30
18.3	3.20
21.3	3.20

NOTES:

A For installation in rock, this OPSD shall be read in conjunction with OPSD 2200.02.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
CONCRETE LIGHTING POLE DIRECT BURIED			
	OPSD 2225.010		

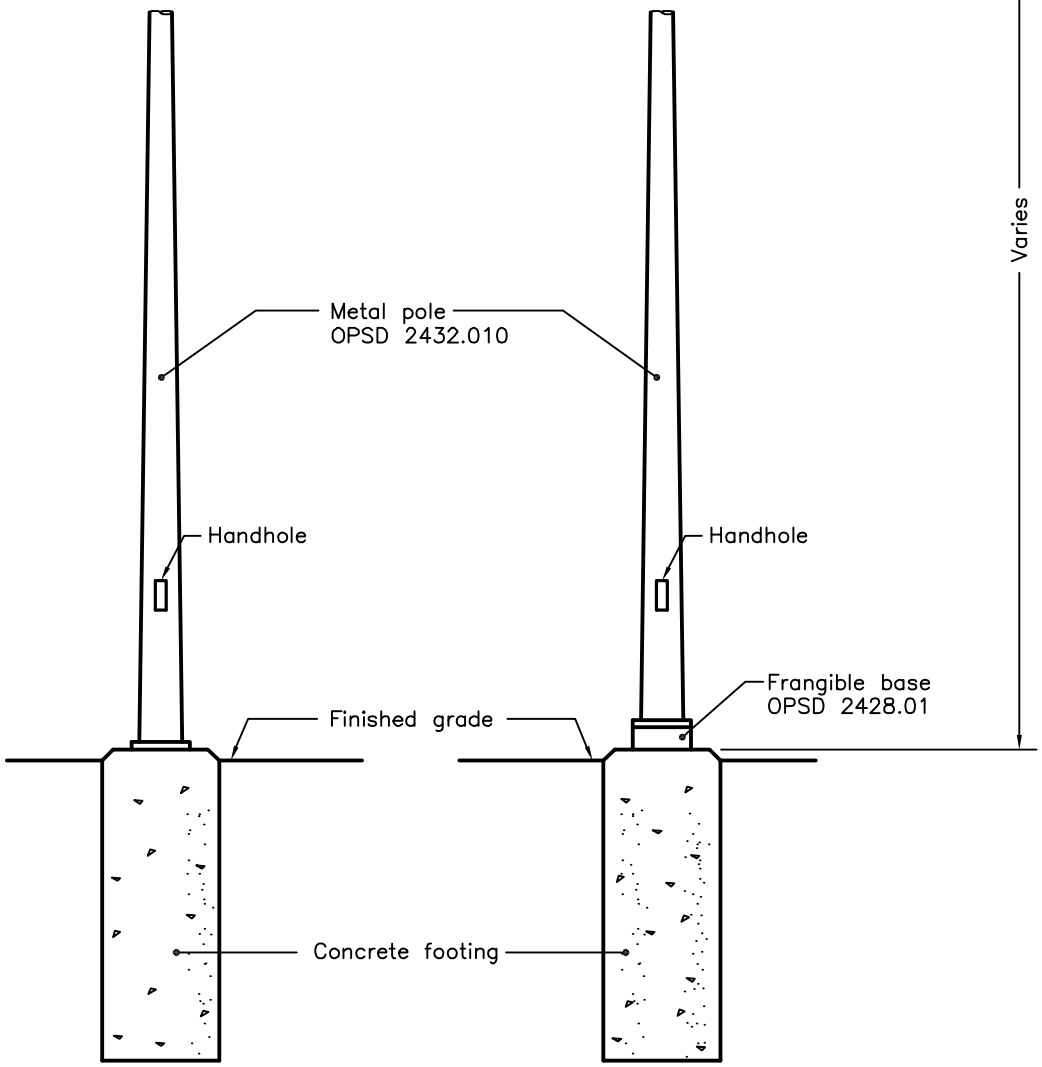


TYPE A

SINGLE OR DOUBLE TRUSS BRACKET AND LUMINAIRE

TYPE B

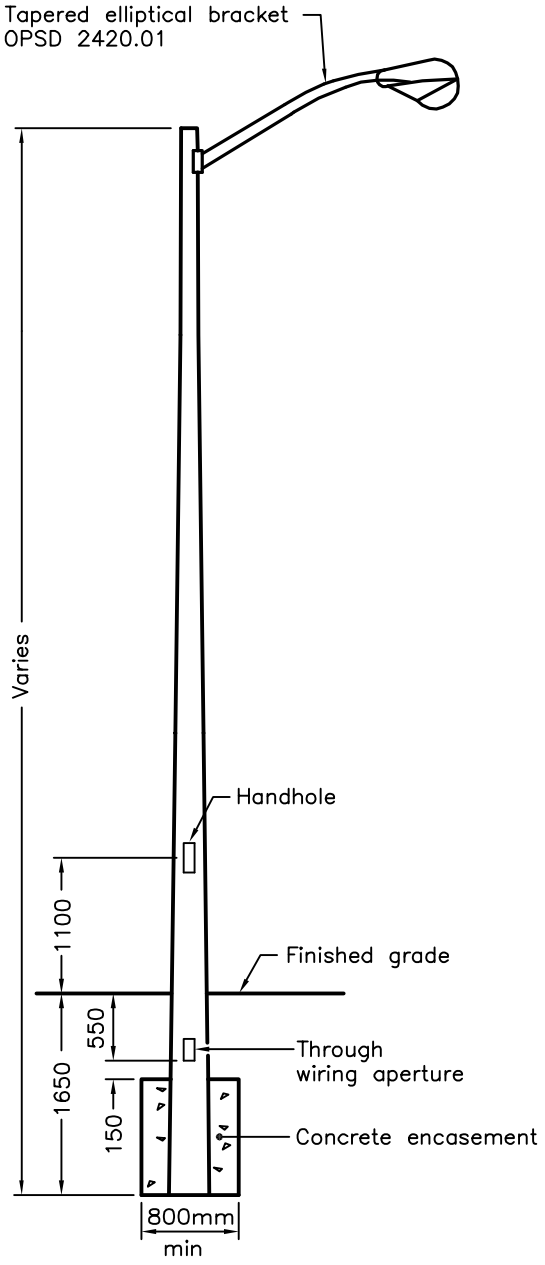
SINGLE OR DOUBLE TAPERED ELLIPTICAL BRACKET AND LUMINAIRE



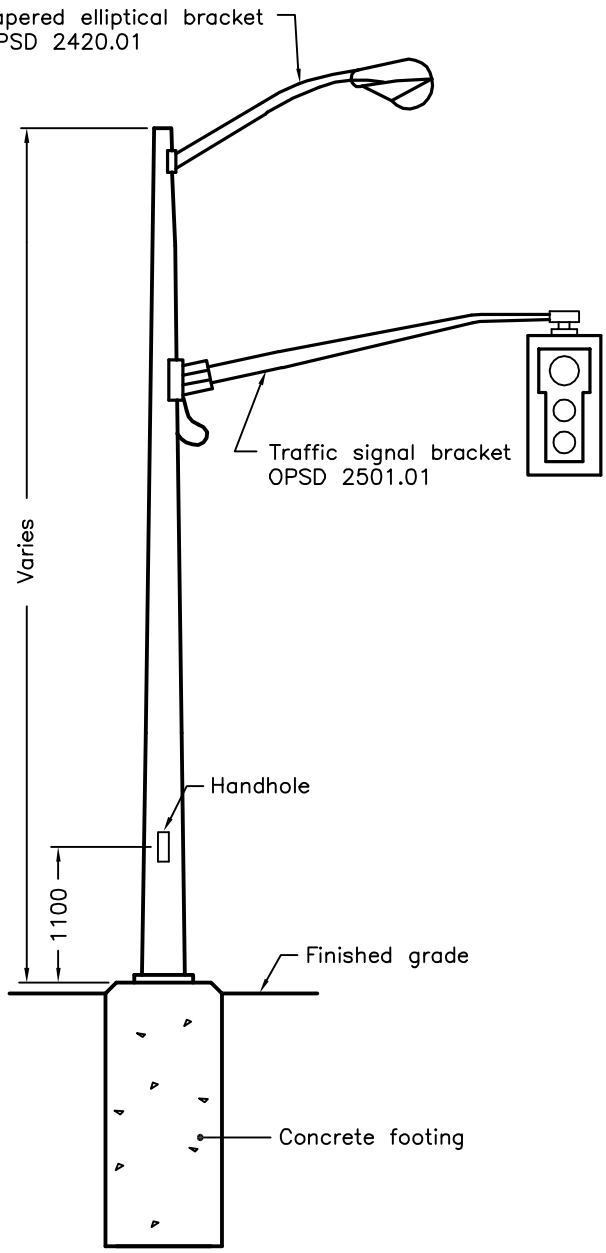
BASE MOUNTED

FRANGIBLE BASE MOUNTED

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
METAL LIGHTING POLE **BASE MOUNTED**			
	OPSD 2228.010		



DIRECT BURIED

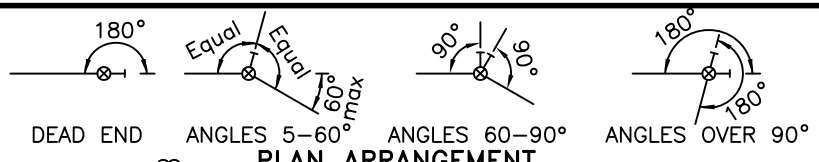


BASE MOUNTED

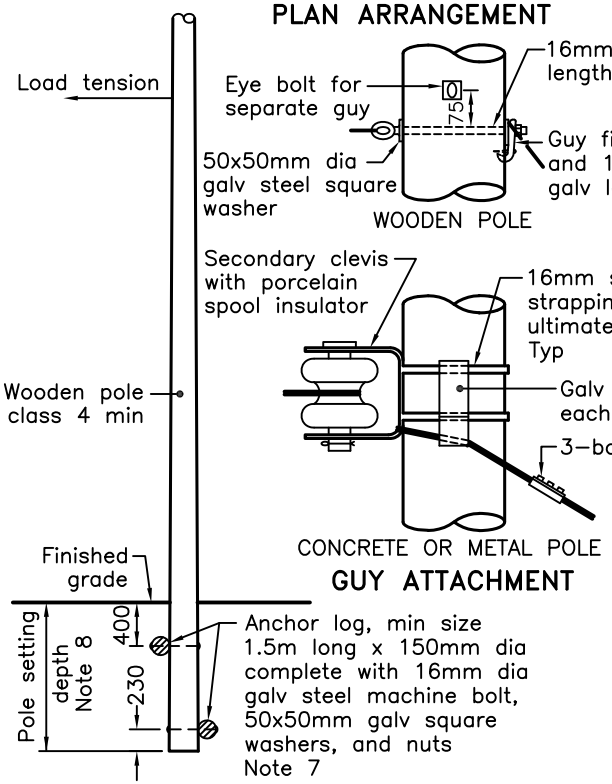
NOTES:

A All dimensions are in millimetres unless otherwise shown.

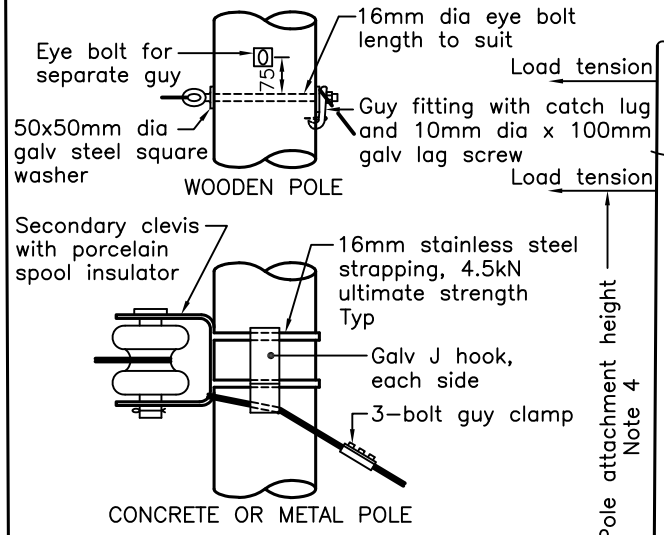
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
SECTIONAL STEEL POLE WITH BRACKETS, LUMINAIRE, AND TRAFFIC SIGNAL HEAD			
			OPSD 2232.010



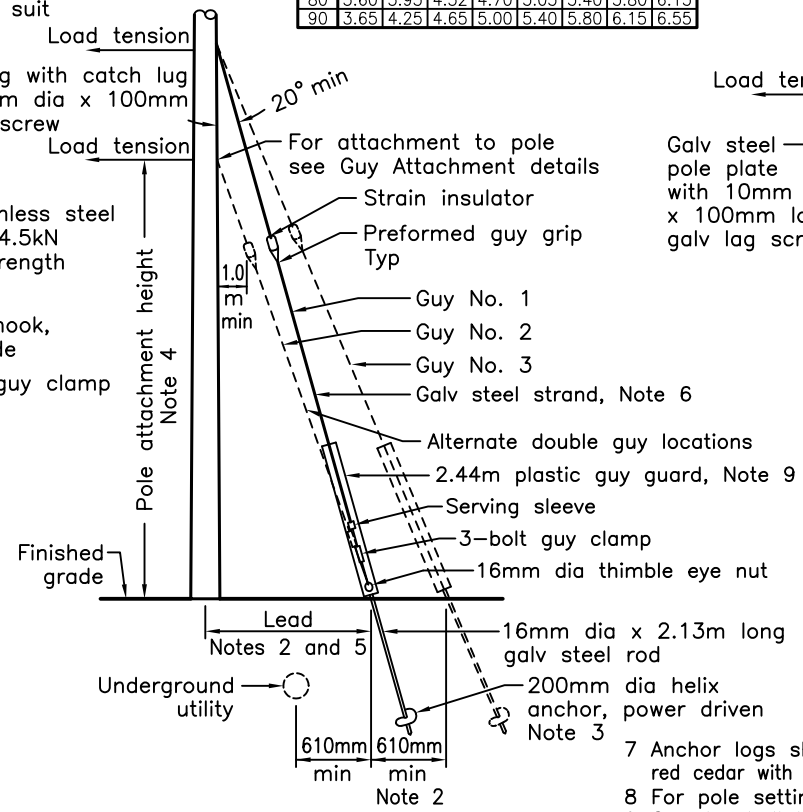
PLAN ARRANGEMENT



SELF–SUPPORTING POLE



GUY ATTACHMENT



NORMAL GUYING REQUIREMENTS

TABLE 1 MINIMUM LEAD SETTINGS

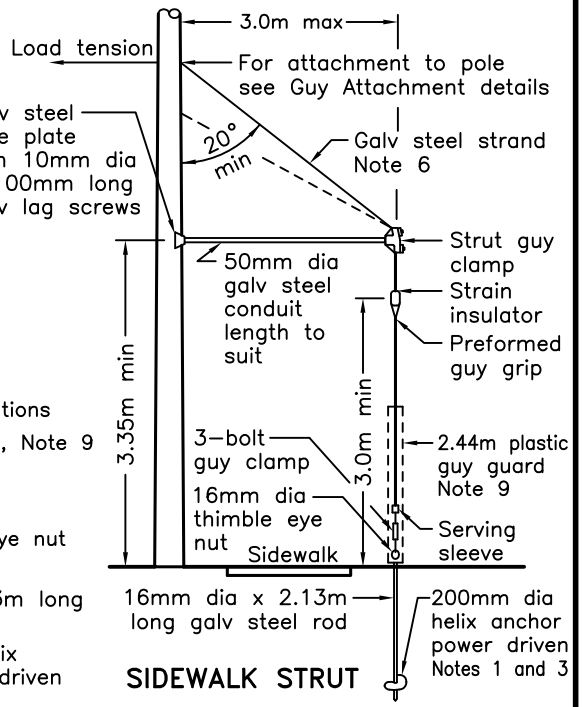
SINGLE GUY ANCHORS FOR GUY No. 1

Span m	Pole attachment height, m							
	6.00	6.60	7.20	7.80	8.40	9.00	9.60	10.20
30	2.80	3.10	3.40	3.70	3.95	4.25	4.50	4.80
40	3.20	3.50	3.85	4.15	4.45	4.80	4.05	4.30
50	3.50	3.85	4.20	4.55	4.90	4.15	4.45	4.70
60	4.00	4.35	4.75	4.00	4.30	4.60	4.90	5.20
70	4.20	4.65	3.90	4.25	4.55	4.90	5.20	5.55
80	3.60	3.95	4.32	4.70	5.05	5.40	5.80	6.15
90	3.65	4.25	4.65	5.00	5.40	5.80	6.15	6.55

TABLE 2 MINIMUM LEAD SETTINGS

DOUBLE GUY ANCHORS FOR GUY No. 1

Span m	Pole attachment height, m							
	6.00	6.60	7.20	7.80	8.40	9.00	9.60	10.20
30	2.25	2.50	2.75	3.00	3.20	3.40	3.60	3.85
40	2.55	2.80	3.10	3.35	3.60	3.85	3.25	3.45
50	2.80	3.10	3.40	3.65	3.95	3.35	3.60	3.80
60	3.20	3.50	3.80	3.20	3.45	3.70	3.95	4.20
70	3.36	3.75	3.12	3.40	3.65	3.95	4.20	4.45
80	2.90	3.20	3.50	3.80	4.05	4.35	4.65	4.95
90	3.10	3.40	3.75	4.00	4.35	4.65	4.95	5.25



SIDEWALK STRUT

NOTES:

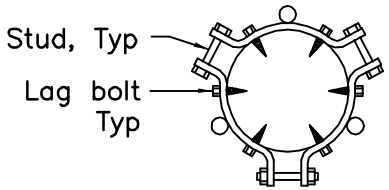
1 Clearances to underground utilities and other guy anchors as shown on Normal Guying Requirements apply to Sidewalk Strut detail.
2 A minimum separation of 610mm shall be obtained between double anchors or anchors owned by others.
3 When it is impractical to install power driven anchors, 250mm diameter expandable type anchors shall be installed and native backfill shall be compacted.
4 Pole attachment height shall be set using applicable drawings OPSD 2245.01, 2540.01, or 2540.02.
5 For minimum lead settings refer to Table 1 or Table 2.
6 Guy steel strand shall be according to CAN/CSA G12 and shall be 7mm diameter Grade 110 for values above the heavy line in Table 1 and Table 2 and 9mm diameter Grade 160 for values below the line.
7 Anchor logs shall be pressure treated pine or western red cedar with preservative treatment according to CSA 080.
8 For pole setting depths see OPSD 2238.01.
9 Guards shall be complete with 3–50mm wide retroreflective bands according to ASTM D 4956, Type I, spaced equally apart.
A This OPSD applies to low voltage and traffic signal installations only.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

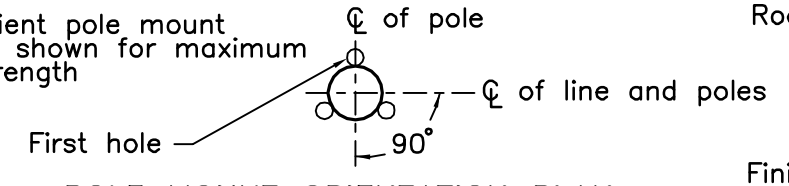
POLE GUYING DETAILS

Nov 2012 | Rev 2

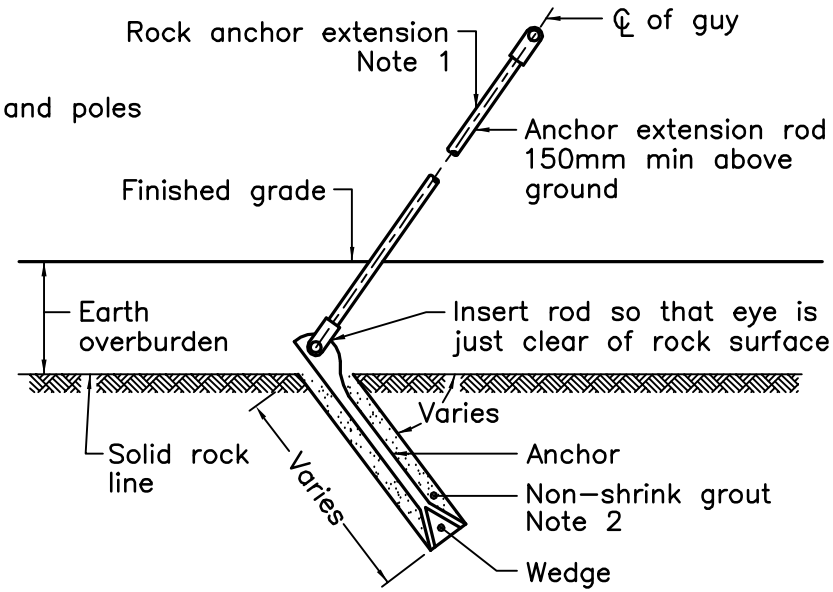
OPSD 2235.01



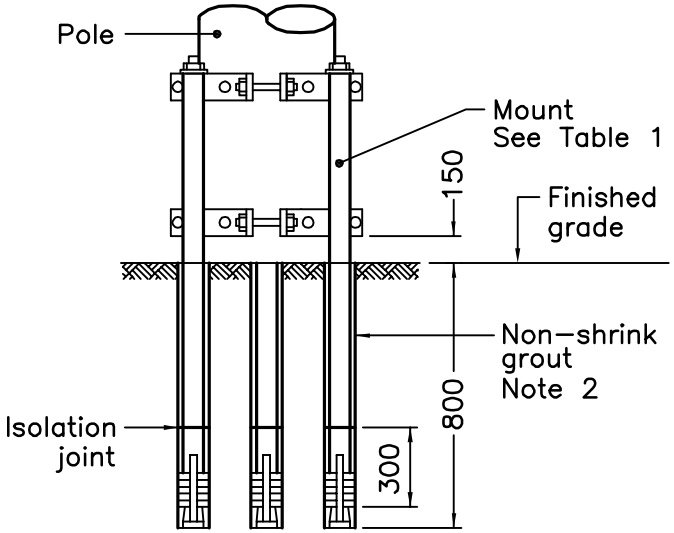
PLAN



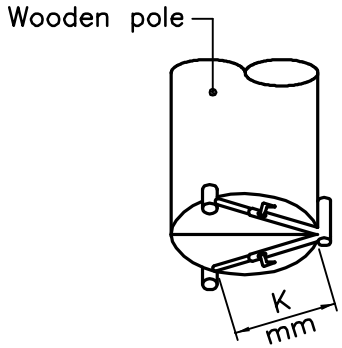
POLE MOUNT ORIENTATION PLAN



GUY ANCHORAGE SETTING



ELEVATION
POLE ANCHORAGE SETTING



DRILLING TEMPLATE APPLICATION

TABLE 1

	DIMENSION		
ROCK DRILL DIAMETER	54	64	64
DRILLING TEMPLATE, (K min)	280	380	480
MOUNT DIAMETER	32	38	38
POLE BUTT DIAMETER	280 – 380	380 – 480	480 – 580

NOTES:

1 Rock anchor extension is not required if there is no earth overburden on top of rock.

2 Hole shall be grouted to prevent water entry.

A All anchors shall be installed according to manufacturer's specifications.

B Pole anchorage shall be suitable for the class of pole installed.

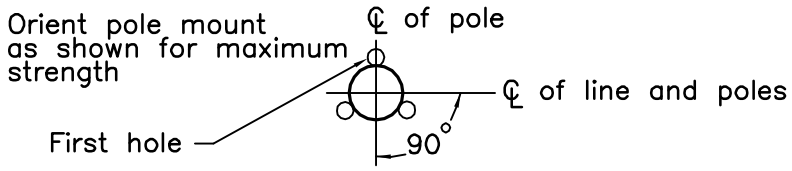
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

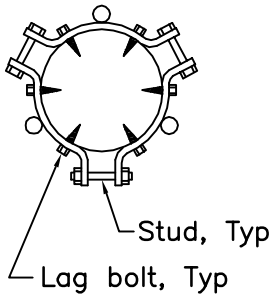
WOODEN POLE AND ANCHORAGE SETTINGS IN SOLID ROCK 1

Nov 2013 | Rev 0

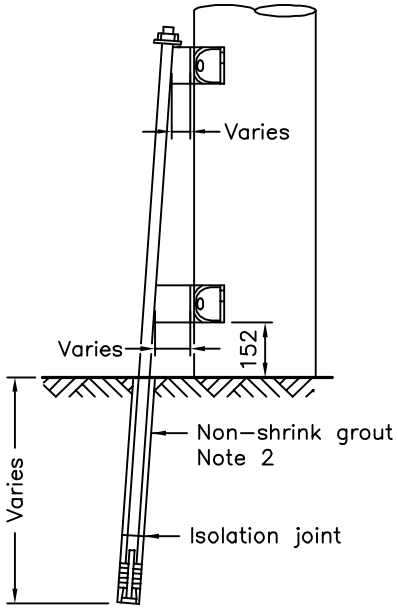
OPSD 2236.010



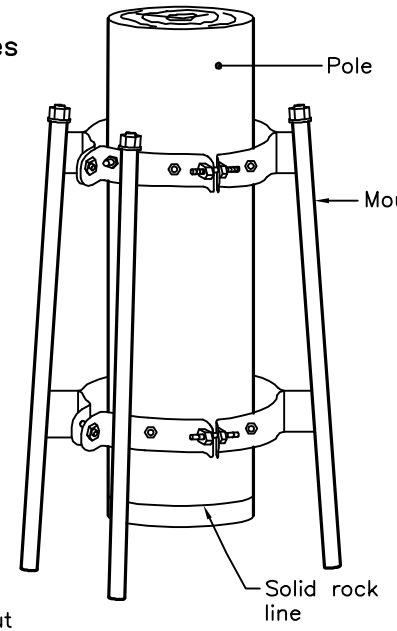
POLE MOUNT ORIENTATION PLAN



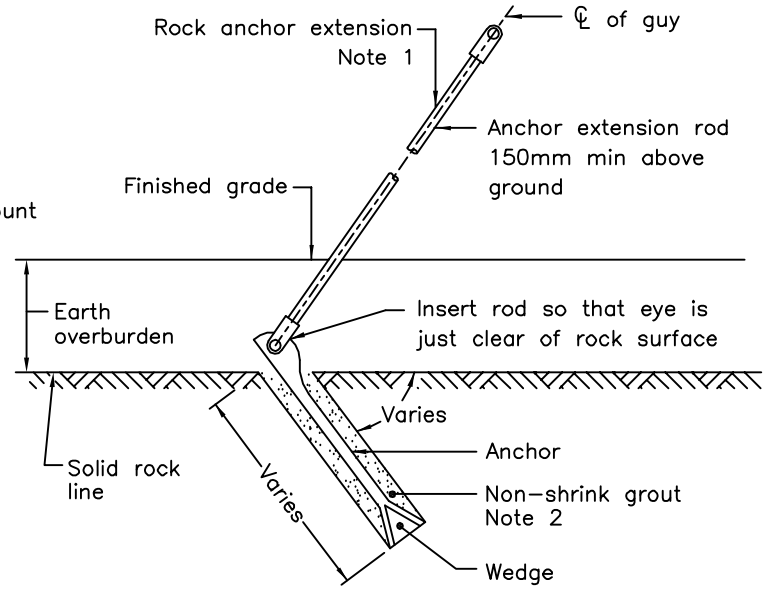
PLAN



ELEVATION
POLE ANCHORAGE SETTING

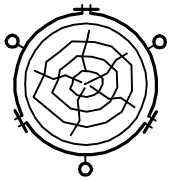
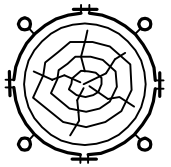
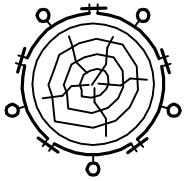


ISOMETRIC VIEW



GUY ANCHORAGE SETTING

SELECTION CHART

3 Anchor Configuration	4 Anchor Configuration	5 Anchor Configuration
		

NOTES:

1 Rock anchor extension is not required if there is no earth overburden on top of rock.

2 Hole shall be grouted to prevent water entry.

A All anchors shall be installed according to manufacturer's specifications.

B Pole anchorage shall be suitable for the class of pole installed.

C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

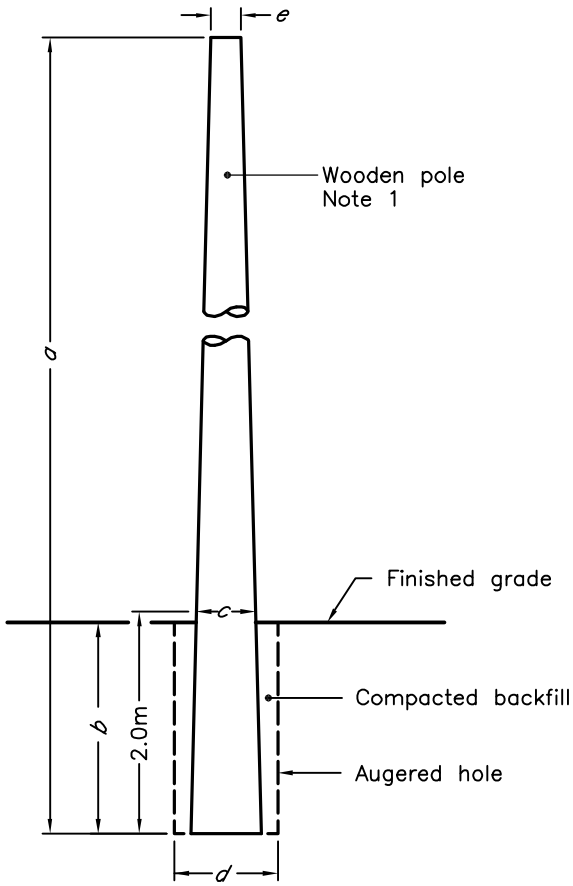
WOODEN POLE AND ANCHORAGE SETTINGS IN SOLID ROCK 2

Nov 2013 | Rev 0

ONTARIO STANDARDS · MUNICIPAL–PROVINCIAL · O P S

OPSD 2236.020

Class of pole	Approximate breaking strength N	Pole length *a* m	Pole setting depth *b* m	Minimum diameter at *c*	Minimum augering diameter *d*	Minimum pole top diameter *e*
1	20,200	8.0	1.50	310	610	215
		9.5	1.65	330	685	
		11.0	1.80	350	685	
		12.5	1.95	370	685	
		14.0	2.10	390	760	
		15.5	2.25	410	760	
		17.0	2.40	430	760	
		18.5	2.55	440	760	
2	16,600	8.0	1.50	290	610	200
		9.5	1.65	310	610	
		11.0	1.80	330	685	
		12.5	1.95	350	685	
		14.0	2.10	370	685	
		15.5	2.25	390	710	
		17.0	2.40	400	710	
		18.5	2.55	420	710	
3	13,500	8.0	1.50	265	610	185
		9.5	1.65	290	610	
		11.0	1.80	310	610	
		12.5	1.95	330	685	
		14.0	2.10	350	685	
		15.5	2.25	370	685	
		17.0	2.40	390	710	
		18.5	2.55	400	710	
4	10,700	8.0	1.50	245	560	170
		9.5	1.65	265	610	
		11.0	1.80	290	610	
		12.5	1.95	310	610	
		14.0	2.10	330	685	
		15.5	2.25	340	685	
		17.0	2.40	350	685	
		18.5	2.55	360	685	
5	8,500	8.0	1.50	230	560	155
		9.5	1.65	245	560	
		11.0	1.80	265	610	
		12.5	1.95	290	610	
		14.0	2.10	310	610	
		15.5	2.25	330	685	
		17.0	2.40	350	685	



NOTES:

1 Length and class of pole as specified.

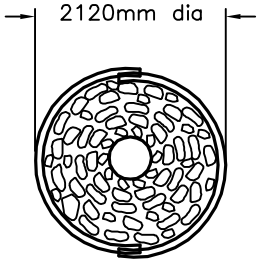
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

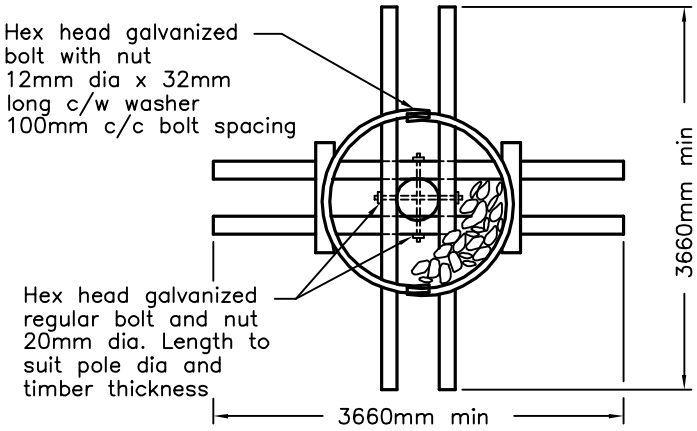
Nov 2010 | Rev 1

WOODEN POLE IN EARTH

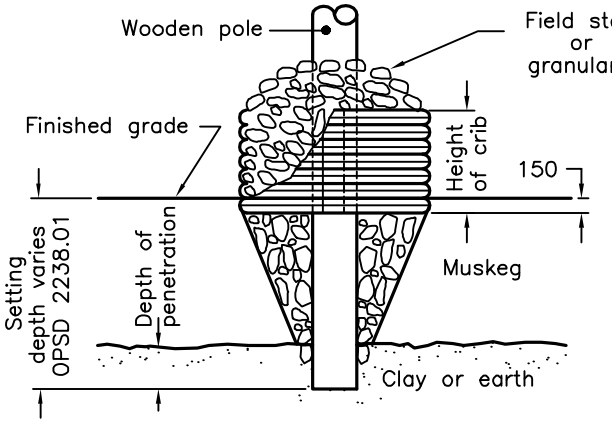
OPSD 2238.01



PLAN

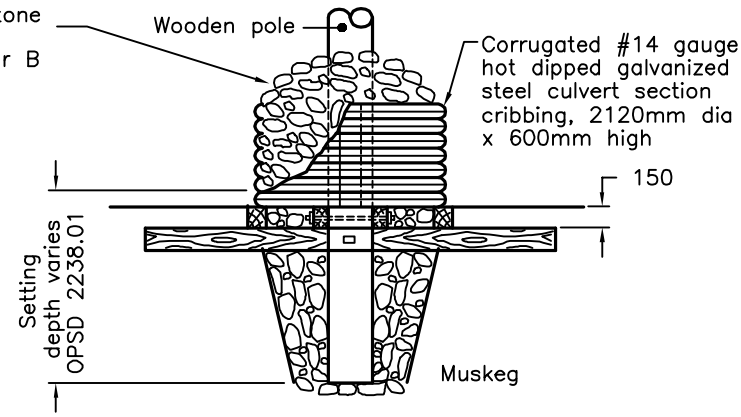


PLAN



SETTING A

SETTING WITH BUTT OF POLE RESTING ON OR PENETRATING SOLID EARTH AT SETTING DEPTH



SETTING B

SETTING WITH BUTT OF POLE NOT REACHING SOLID EARTH AT SETTING DEPTH

TABULATION OF CRIB HEIGHTS

POLE LENGTH	SETTING A						SETTING B
	DEPTH OF PENETRATION						
	300	600	900	1200	1500	1800	
	HEIGHT OF CRIB						
9500	1000	600	600				1000
11000	1150	750	600				1150
12500	1300	1000	600	600			1300
14000	1300	1000	600	600			1300
15500	1500	1150	750	600	600		1500
17000	1500	1300	1000	600	600		1500
18500	1650	1500	1150	750	600		1650

NOTES:

A Timbers shall be cedar or hardwood, treated according to OPSS 1601, and not less than 150mm diameter or 100mm square.

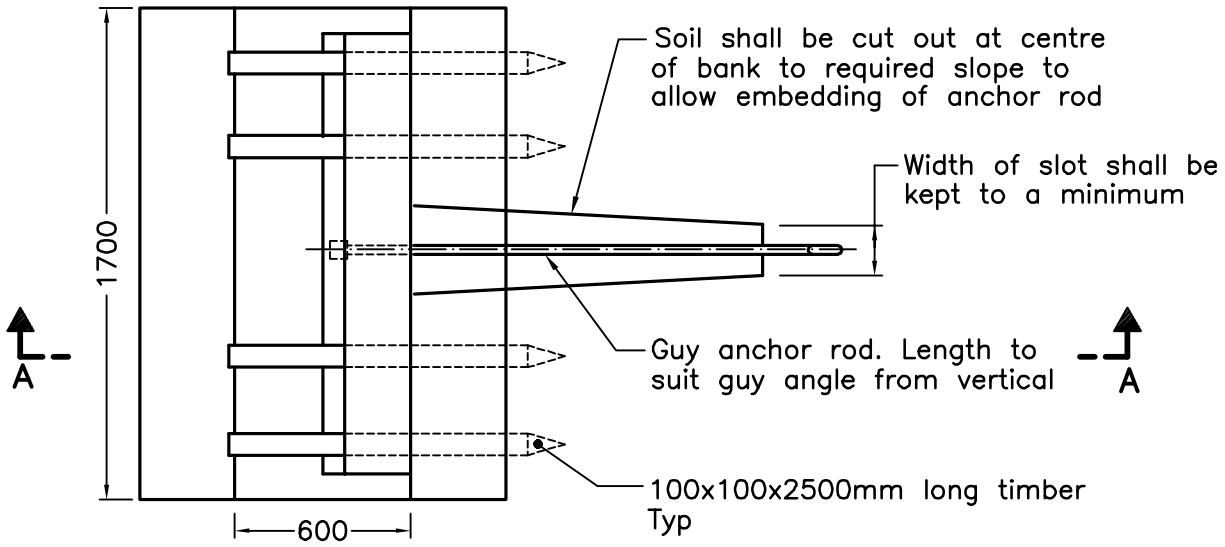
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2013 | Rev 0

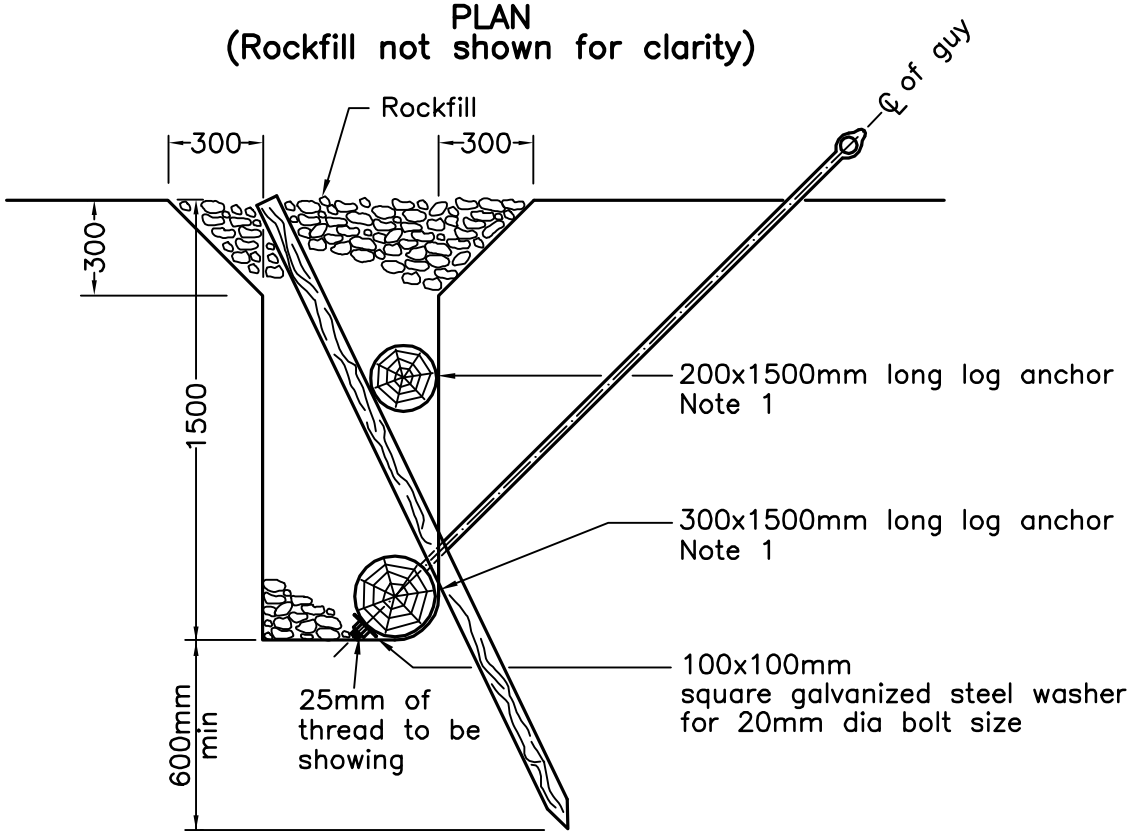
CRIBBING

FOR WOODEN POLES IN MUSKEG

OPSD 2239.010



PLAN
(Rockfill not shown for clarity)



SECTION A–A

NOTES:

1 Log anchor shall be cedar or hardwood and treated according to OPSS 1601.

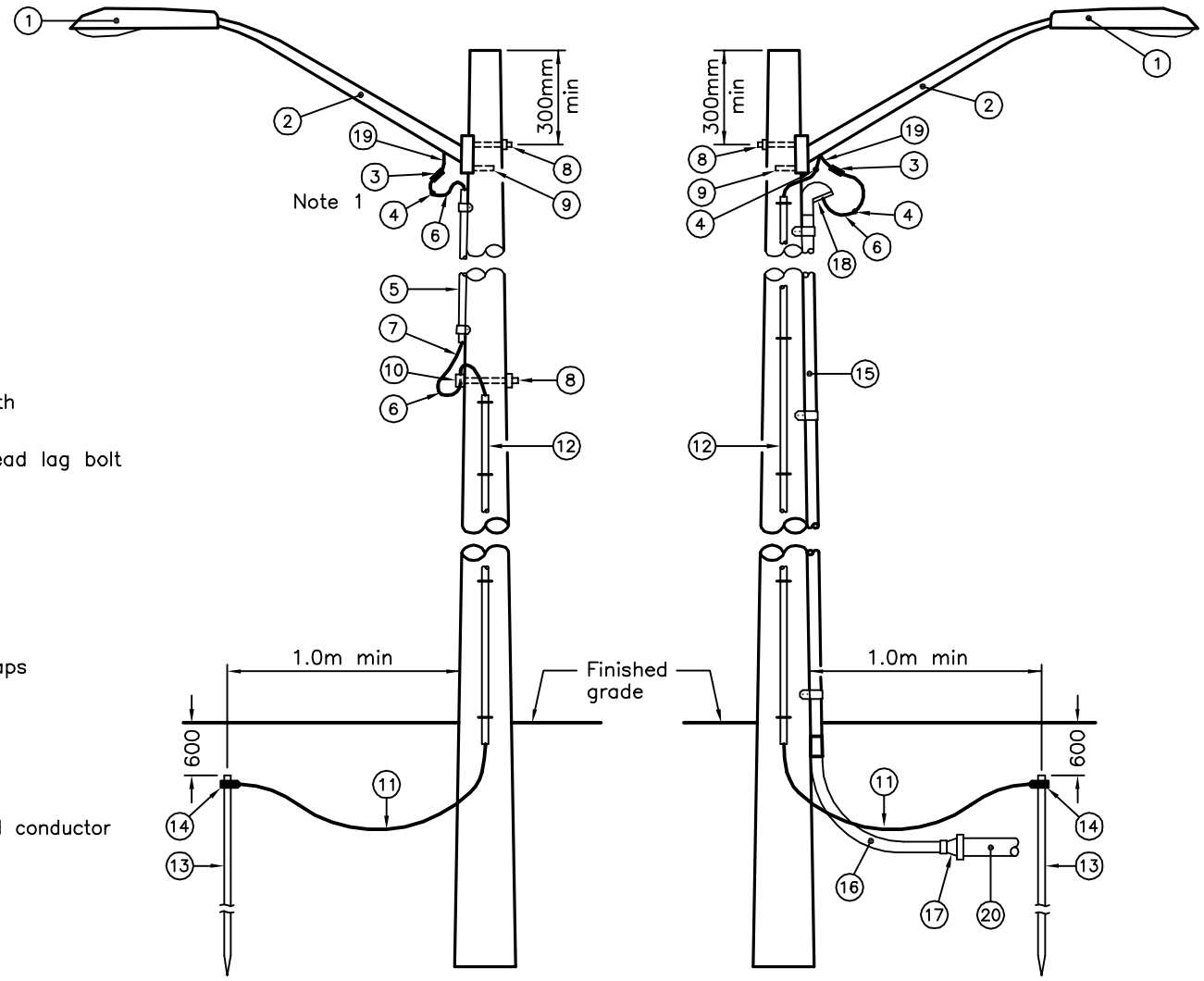
A To locate the position of the anchor see OPSD 2235.01.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	0
LOG ANCHOR FOR GUY IN MUSKEG			
	OPSD 2239.020		

MATERIALS:

1. Luminaire
2. Single or double elliptical bracket
3. 600V, 15A in line type fuse holder, complete with 10A fuse and insulating boots
4. Compression connectors with insulating covers
5. 25mm rigid PVC conduit with PVC pipe straps
6. 150mm drip loop
7. Secondary aerial bus, 2–#12 AWG low voltage cables and #12 AWG ground conductor
8. 16mm dia galvanized through bolt, complete with 50x50mm square washer, lock washer, and nut
9. 12mm dia x 150mm long galvanized square head lag bolt
10. Spool and clevis with secondary aerial cable
11. #6 AWG ground conductor
12. Protective moulding stapled to pole
13. Ground rod
14. Ground rod connection
15. 32mm dia rigid PVC conduit with PVC pipe straps
16. 32mm dia rigid PVC 90° bend
17. Coupling from 32mm dia rigid PVC conduit to 50mm dia duct
18. Entrance fitting
19. #12 AWG low voltage cables and #12 AWG ground conductor
20. 50mm dia duct



OVERHEAD CIRCUIT **UNDERGROUND CIRCUIT**

NOTE:

1 For overhead circuit connection, see OPSD 2242.010 and OPSD 2242.020.

A Connect #12 AWG ground conductor to luminaire ground stud and secondary aerial bus.

B Length of wooden pole and pole setting depth as specified.

C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

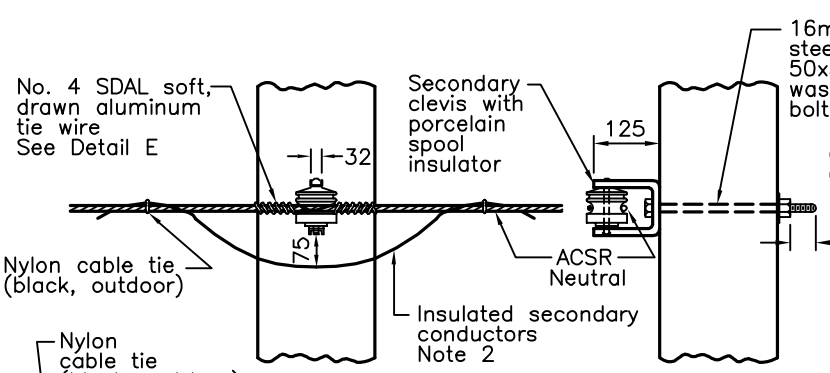
Nov 2017 | Rev | 0

WOODEN POLE WITH ELLIPTICAL BRACKET

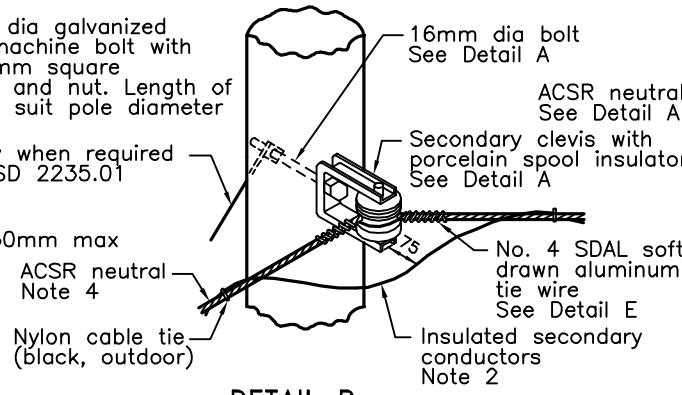
OVERHEAD AND UNDERGROUND CIRCUITS

ONTARIO STANDARDS MUNICIPAL – PROVINCIAL

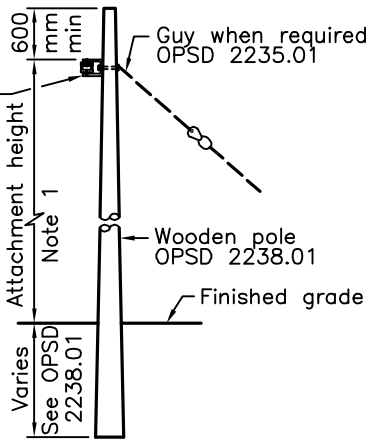
OPSD 2240.010



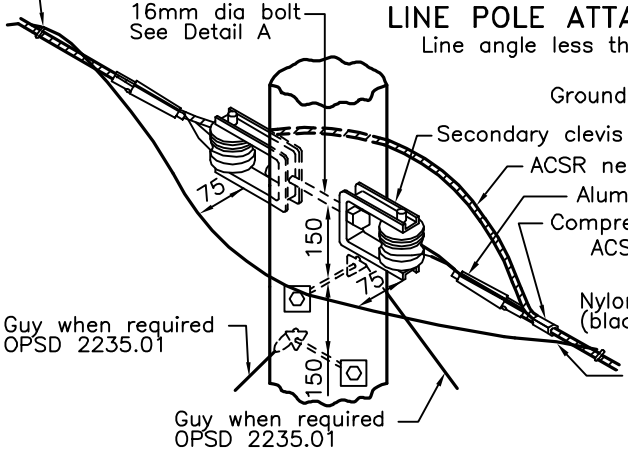
DETAIL A
LINE POLE ATTACHMENT
Line angle less than 5°



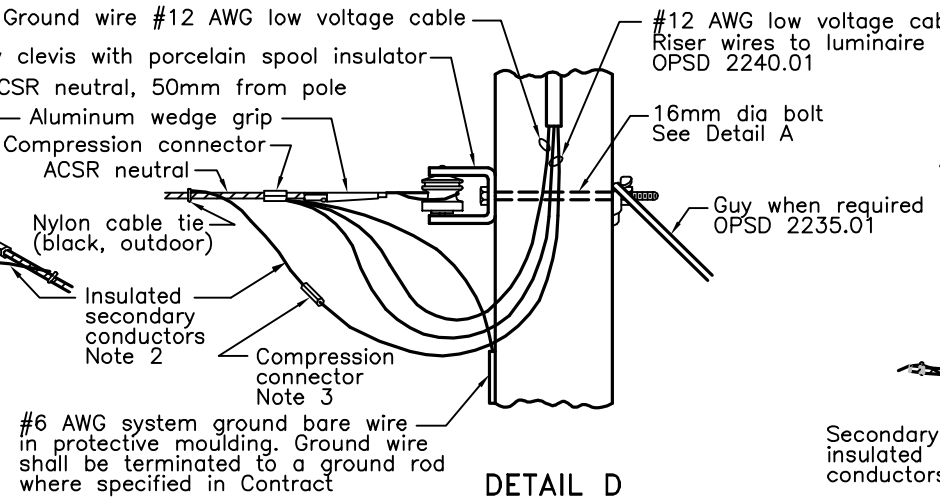
DETAIL B
ANGLE POLE ATTACHMENT
Line angle 5° to 60°



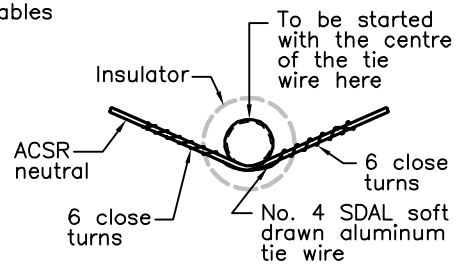
SIDE ELEVATION



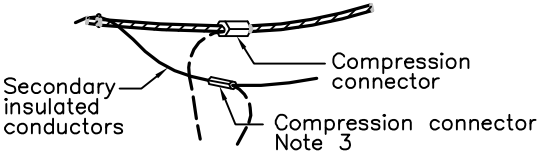
DETAIL C
ANGLE POLE ATTACHMENT
Line angle greater than 60°



DETAIL D
DEAD END ATTACHMENT



DETAIL E
CABLE TIE



TYPICAL CONNECTION FOR TAP RUN

NOTES:

1 Pole attachment height shall be as high as possible. For minimum attachment heights see OPSD 2245.01.
2 This drawing applies to neutral supported cable types NS75 and NS90 with one, two, or three secondary insulated conductors.
3 Compression connectors shall be insulated.
4 ACSR neutral shall be installed on the bearing face of the insulator

A Maximum span for neutral supported cable shall be 38m.
B Splices in cable shall be done at pole locations only, using aluminum wedge grips to dead end the ACSR neutral and connecting cables similar to Detail C.
C For location and types of poles and cables see layout drawings.
D All dimensions are in millimetres unless otherwise shown.

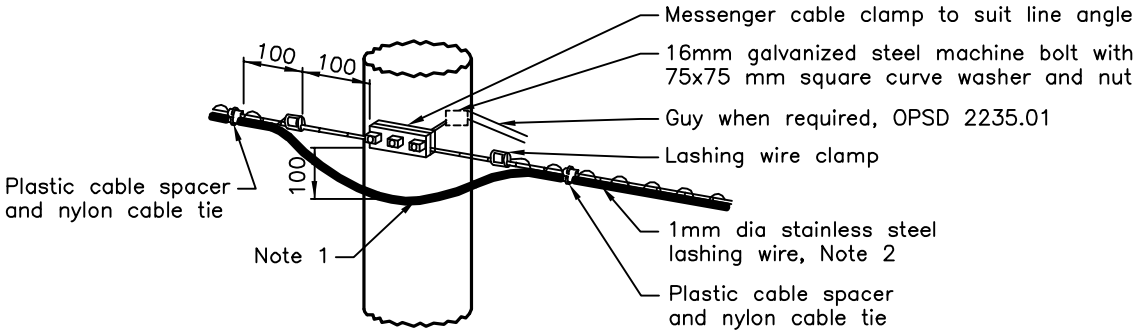
ONTARIO PROVINCIAL STANDARD DRAWING

WOODEN POLE WITH NEUTRAL SUPPORTED CABLE

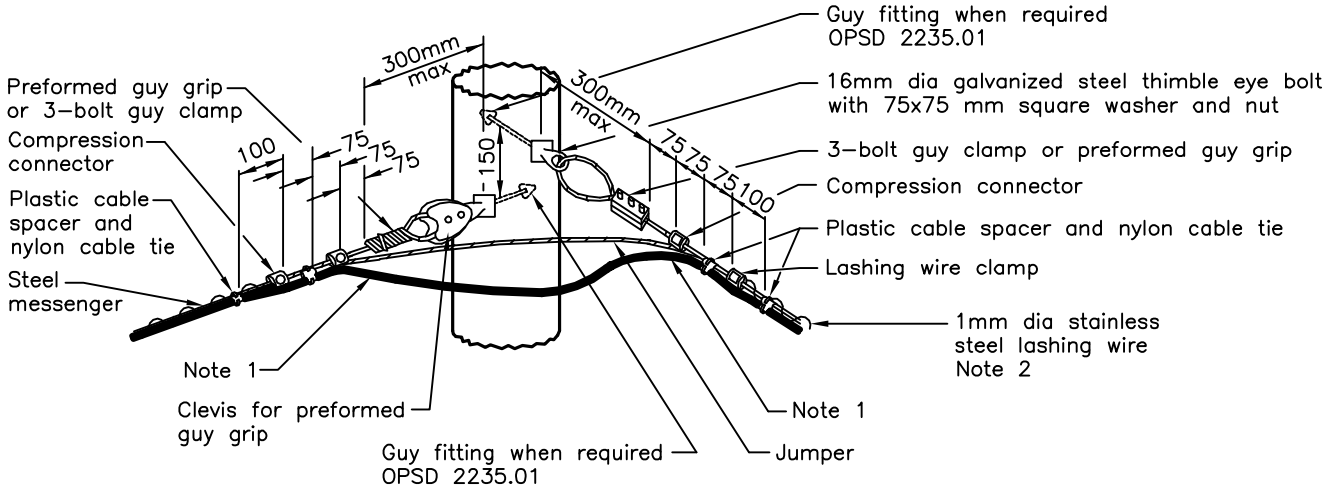
Nov 2013 | Rev 1

ONTARIO STANDARDS MUNICIPAL-PROVINCIAL

OPSD 2242.01



LINE POLE ATTACHMENT
Line Angle Less Than 30°



ANGLE POLE ATTACHMENT
Line Angle Greater Than 30°

NOTES:

1 For number and type of cable, refer to layout drawings and wiring diagrams. For cable arrangement, riser conduit, and junction box requirements, refer to OPSD 2240.01, 2540.01, 2552.01, layout or detail drawings.

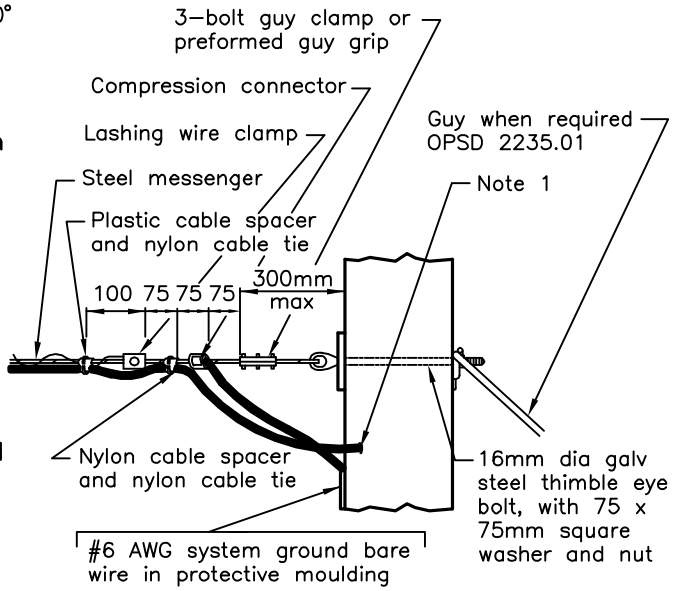
2 Lashing wire shall be installed in a one wire spiral lay using a mechanical cable lasher.

A Pole attachment height shall be at 600mm minimum from pole top and as high as possible. For minimum attachment heights see OPSD 2245.01

B Steel messenger cable shall be installed to tension as shown on OPSD 2245.01, size and grade as specified in the Contract.

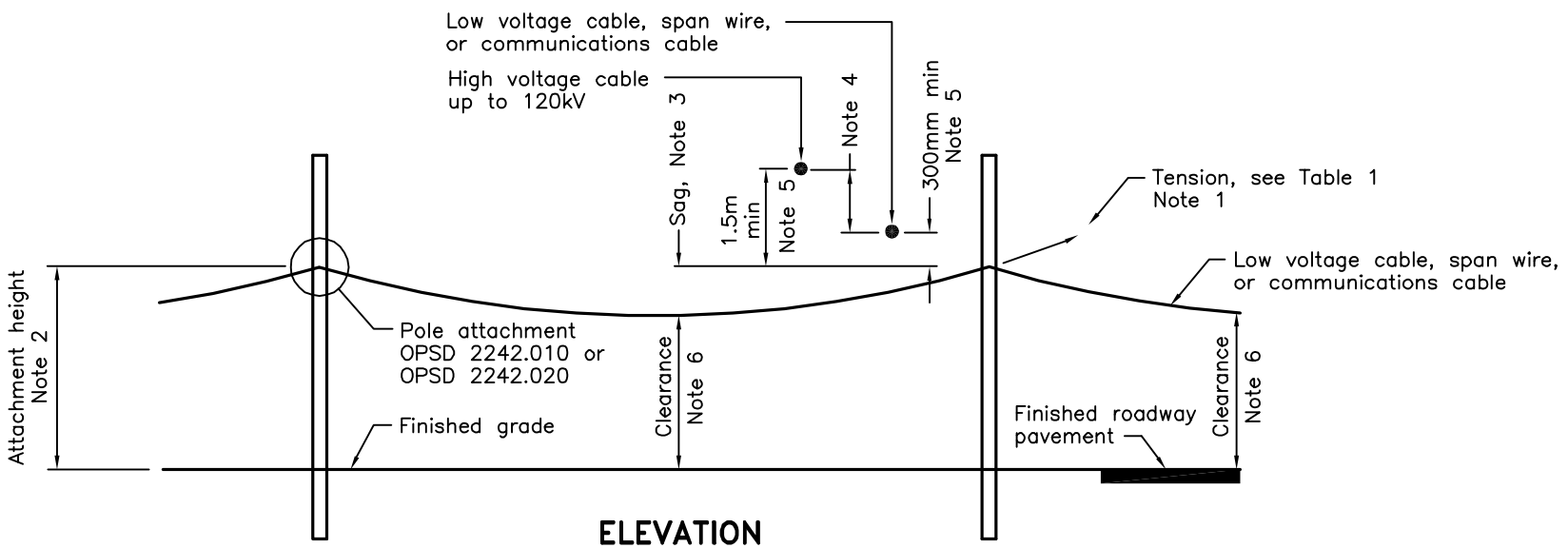
C For non–permanent installations of 70m span or shorter, nylon cable ties at 450mm c/c may be used in lieu of lashing wire for cable support.

D All dimensions are in millimetres unless otherwise shown.



DEAD END ATTACHMENT

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	2
WOODEN POLES WITH AERIAL CABLES LASHED ON MESSENGER			
	OPSD 2242.02		



ELEVATION

NOTES:

1 Cables shall be installed at the tension shown in Table 1 to the sag specified by the cable manufacturer and the Ontario Electrical Safety Code sag tables. Where cables are parallel to an existing cable line on the same poles, the tension shall be adjusted to maintain a consistent vertical spacing.

2 Minimum attachment height shall be determined by addition of the clearance height to the maximum sag.

3 Maximum sag shall be based on the heavy loading or thermal loading conditions specified in CSA C22.3 No.1–15. For maximum sag, refer to cable manufacturer and the Ontario Electrical Safety Code sag tables.

4 For minimum vertical clearances between the high voltage cables over 120kV and other cables, refer to CSA C22.3 No.1–15.

5 Vertical clearance between wires shall be measured with the upper wire in its maximum sag position and the lower wire is assumed to form a straight line between its points of support.

6 Minimum vertical clearance shall be according to OPSD 2245.020.

A All dimensions are in millimetres unless otherwise shown.

TABLE 1

TENSIONS FOR INSTALLATION OF AERIAL CABLES					
Installation Temp. °C	ACSR Tension For Types NS–1, NSF–2 Cables N			Steel Strand Tension N	
	#2	#1/0	#3/0	7mm Gr.110	9mm Gr.160
–29	1480	1320	1500	7600	13500
–18	1300	1280	1460	6950	12300
0	1120	1210	1410	5900	10500
16	990	1170	1370	4900	8700
32	900	1120	1350	3900	6900
38	860	1070	1330	3700	6600

ONTARIO PROVINCIAL STANDARD DRAWING

INSTALLATION OF AERIAL CABLE SYSTEMS

Nov 2017 | Rev 0

OPSD 2245.010

MINIMUM VERTICAL CLEARANCES

	LOCATION OF WIRES OR CABLES	MINIMUM VERTICAL CLEARANCES ABOVE FINISHED GRADE									
		COMMUNICATIONS CABLE AND SPAN WIRE	LOW VOLTAGE CABLE 0–750V	HIGH VOLTAGE CABLE							
				>750V ≤22kV	>22kV ≤50kV	>50kV ≤90kV	>90kV ≤120kV	>120kV ≤150kV	>150kV ≤200kV	220kV (360kV)	318kV (500kV)	442kV (735kV)
1	OVER FREEWAYS, EXPRESSWAYS, AND RAMPS	6.0	6.0	6.0	6.0	6.0	6.1	6.4	6.9	10.5	15.7	20.7
2	OVER KING'S HIGHWAYS AND OTHER ROADWAYS	4.7	4.7	5.1	5.5	5.8	6.1	6.4	6.9	10.5	15.7	20.7
3	OVER AREAS LIKELY TO BE TRAVELLED BY VEHICLES (OTHER THAN RESIDENTIAL DRIVEWAYS)	4.7	4.7	5.1	5.5	5.8	6.1	6.4	6.9	10.5	15.7	20.7
4	ALONGSIDE ROADS IN DENSELY POPULATED AREAS	4.7	4.7	5.1	5.5	5.8	6.1	6.4	6.9	10.5	15.7	20.7
5	ALONGSIDE ROADS OR OVER AREAS UNLIKELY TO BE TRAVELLED BY VEHICLES	3.3	3.7	4.5	4.9	5.2	5.5	5.8	6.3	6.5	7.5	8.7
6	OVER RESIDENTIAL DRIVEWAYS	4.0	4.0	5.1	5.5	5.8	6.1	6.4	6.9	10.5	15.7	20.7
7	OVER AREAS ACCESSIBLE TO PEDESTRIANS ONLY	2.8	3.4	3.7	4.0	4.3	4.6	4.9	5.4	5.6	6.6	7.8
8	ABOVE TOP OF RAIL AT RAILWAY CROSSINGS	7.6	7.6	7.9	8.4	8.7	9.0	9.3	9.8	10.0	11.0	12.2

NOTES:

A Clearances shown are under maximum sag conditions as defined in in CSA C22.3 No.1–15.

B Voltages are rms line to ground. Voltages in brackets are phase to phase.

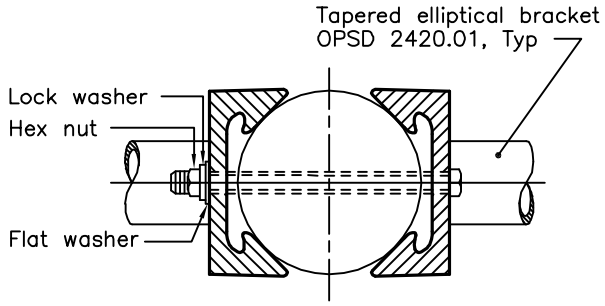
C All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

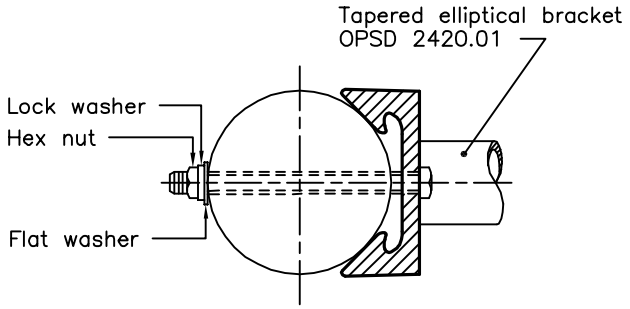
MINIMUM VERTICAL CLEARANCES FOR AERIAL CABLE SYSTEMS

Nov 2017 | Rev 2

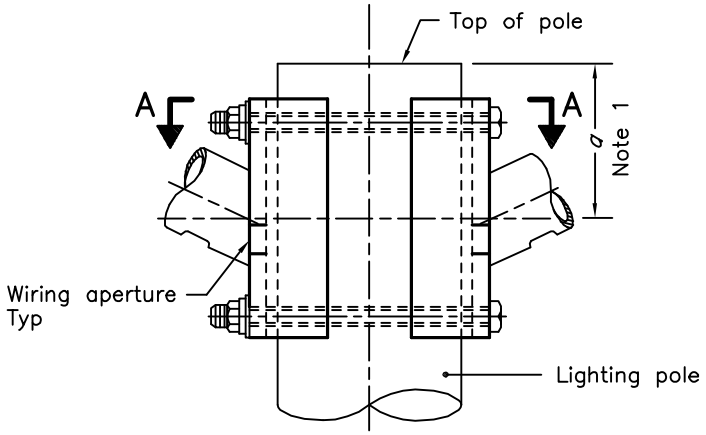
OPSD 2245.020



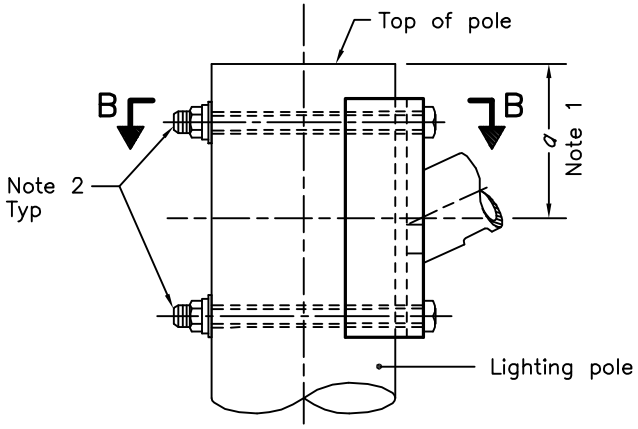
SECTION A–A



SECTION B–B



DOUBLE BRACKET



SINGLE BRACKET

NOTES:

1 For sectional steel poles, dimension σ=300mm.
For all other metal poles and concrete poles, dimension σ=230mm.

2 16mm diameter galvanized steel square head bolt. Bolt length to suit pole.

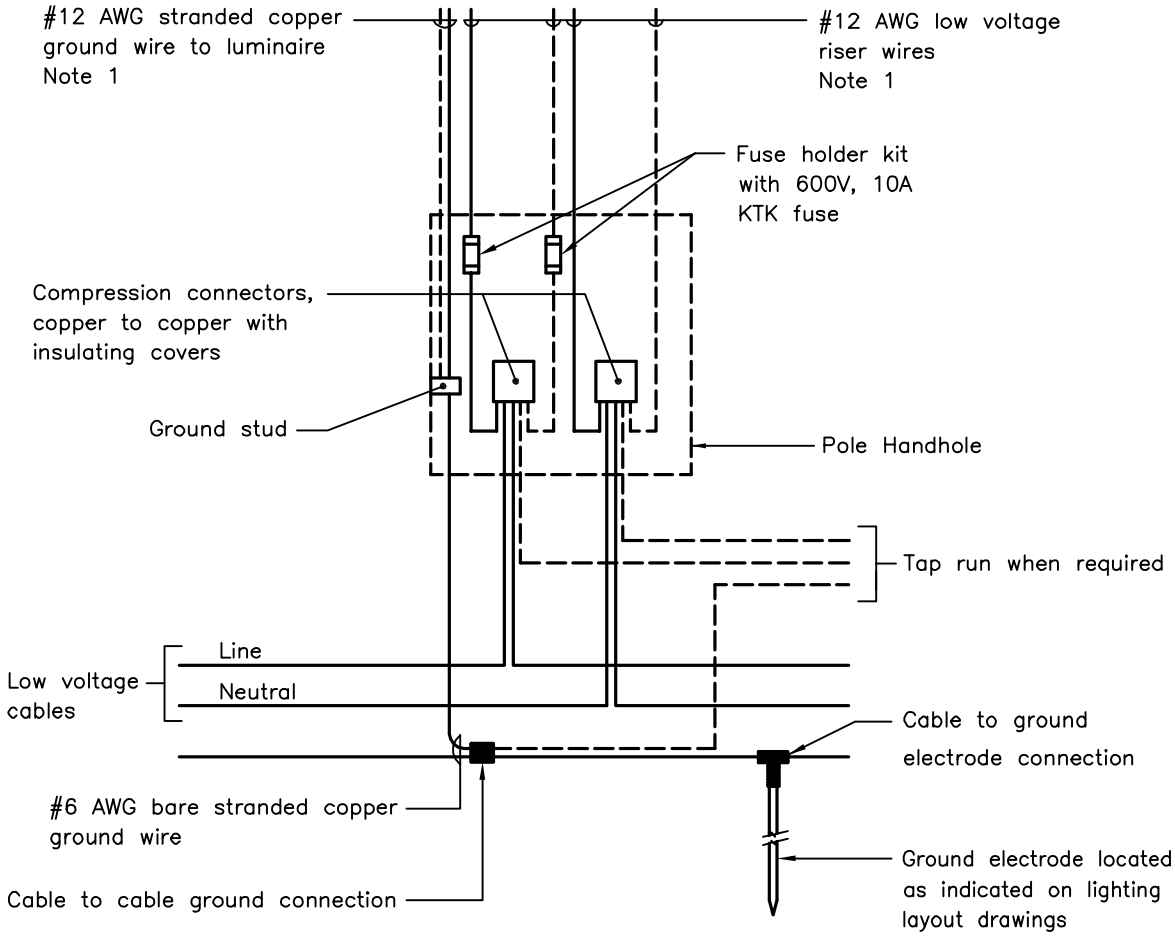
ONTARIO PROVINCIAL STANDARD DRAWING

ALUMINUM TAPERED ELLIPTICAL BRACKETS ON METAL AND CONCRETE POLES

MOUNTING DETAILS

Nov 2016 | Rev 0

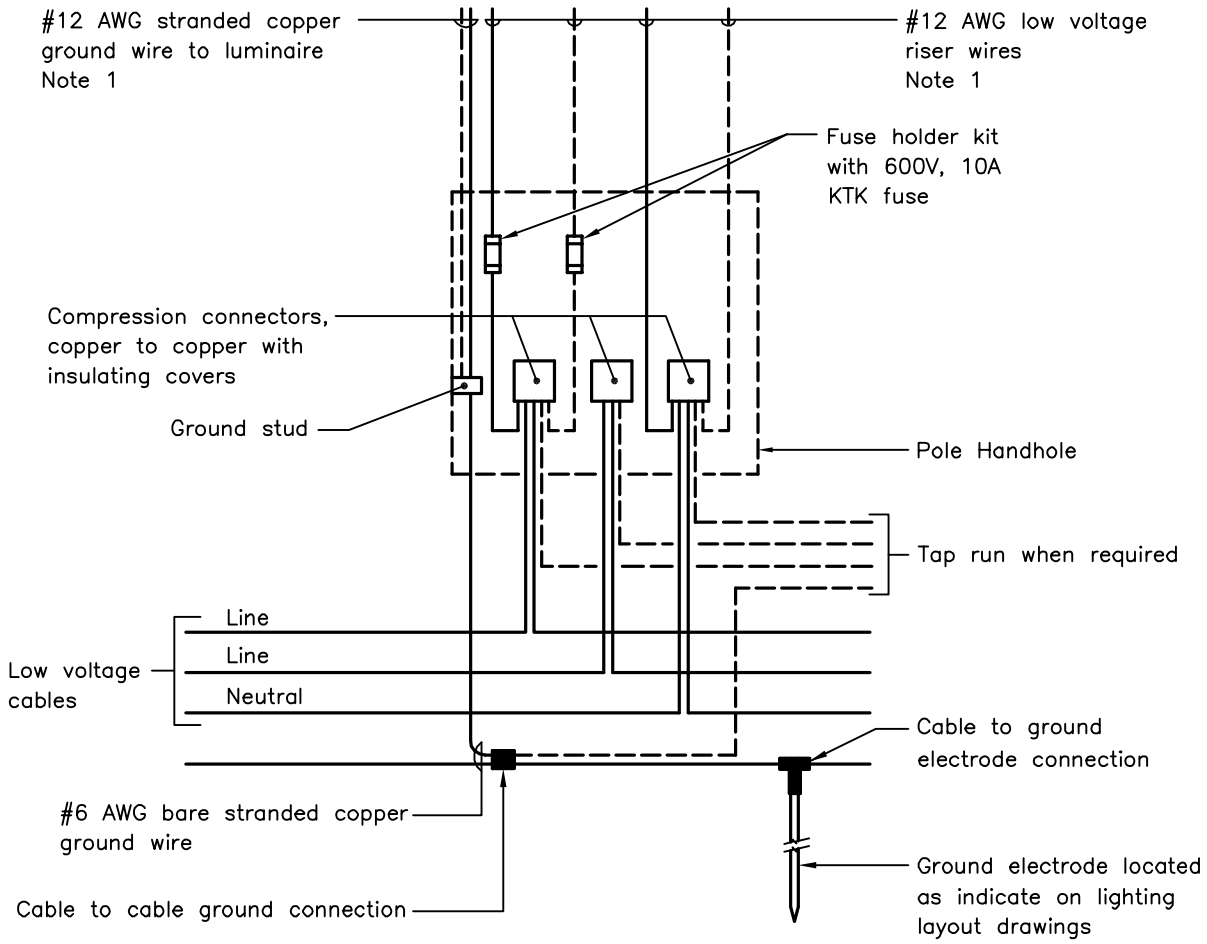
OPSD 2250.010



NOTE:

1 Broken lines indicate additional conductors for double luminaire installation.

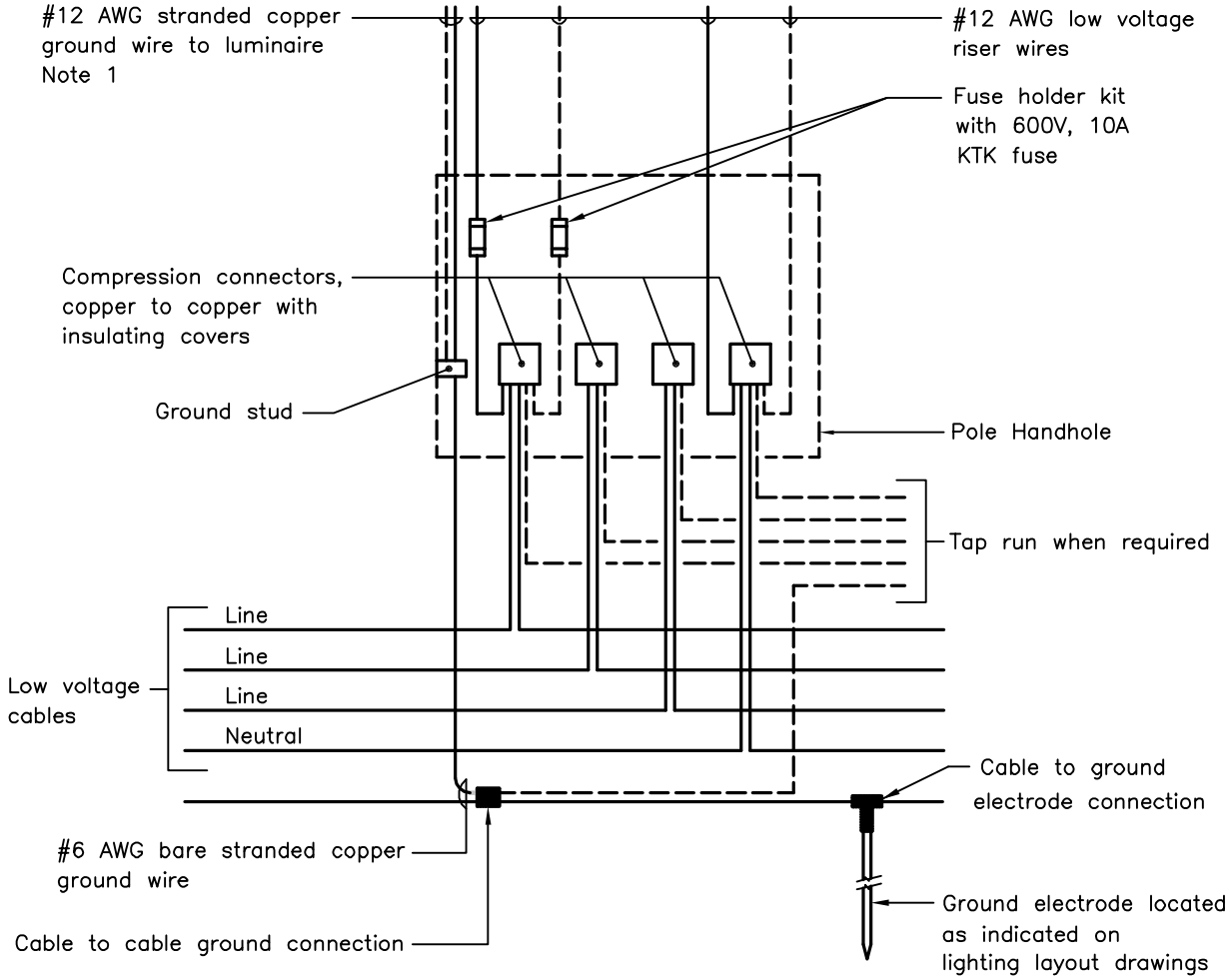
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1
POLE WIRING DIAGRAM 120V SYSTEM			
	OPSD 2255.010		



NOTE:

1 Broken lines indicate additional conductors for double luminaire installation.

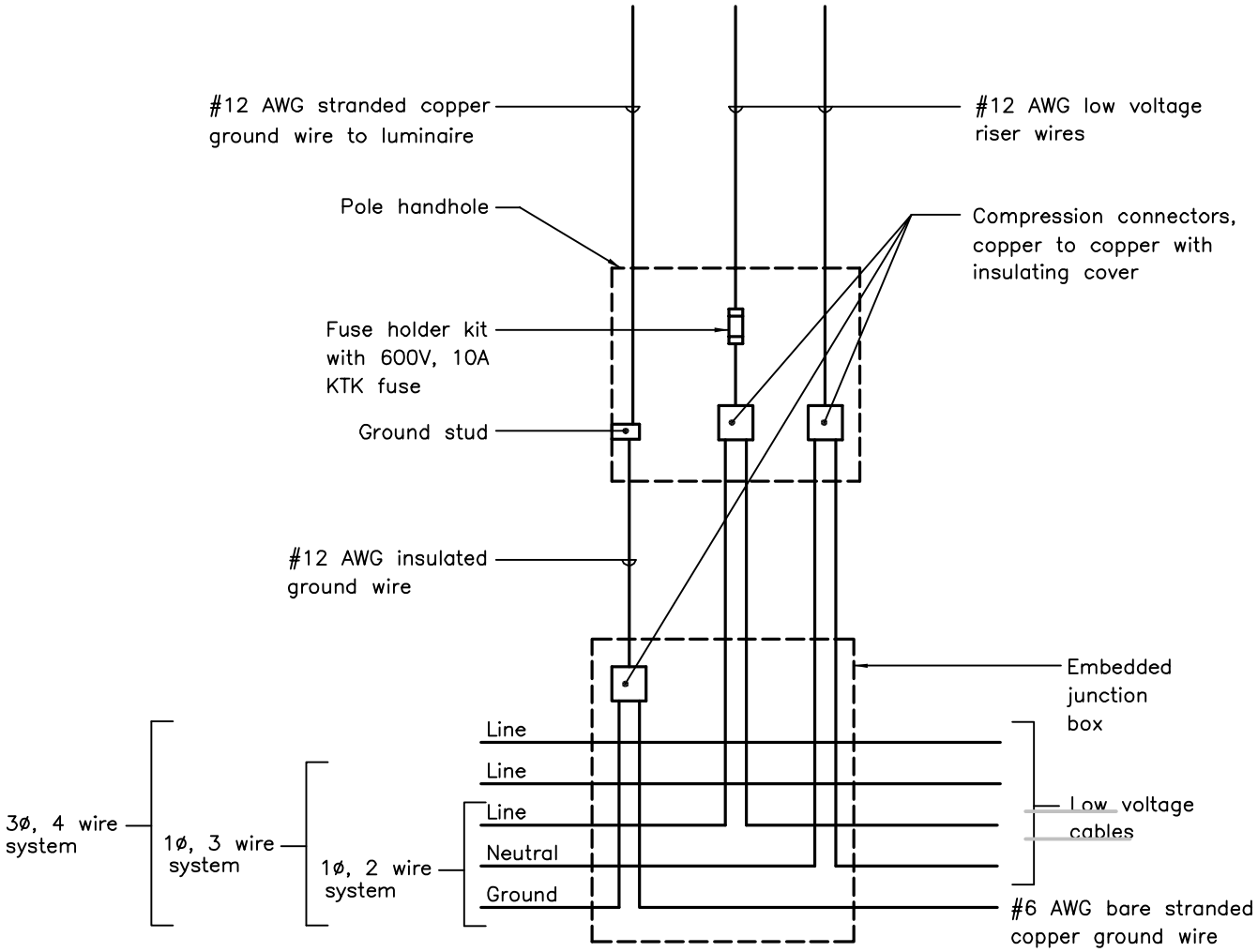
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1
POLE WIRING DIAGRAM 120/240V SYSTEM	- - - - - - - - - - - - - - - - - - - -		
	OPSD 2255.020		



NOTE:

1 Broken lines indicate additional conductors for double luminaire installation.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1
POLE WIRING DIAGRAM 347/600V SYSTEM			
	OPSD 2255.030		



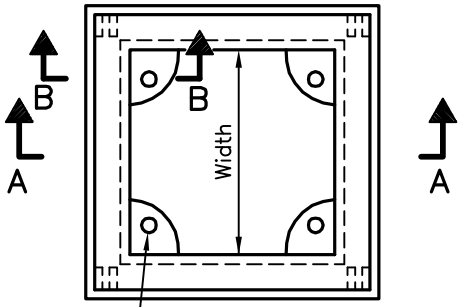
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 | Rev 1

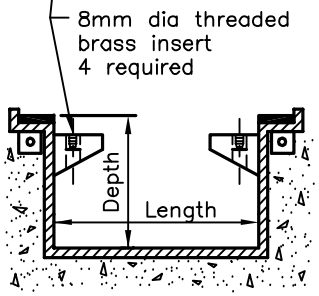
POLE WIRING DIAGRAM

LIGHTING POLE ON BRIDGE STRUCTURE

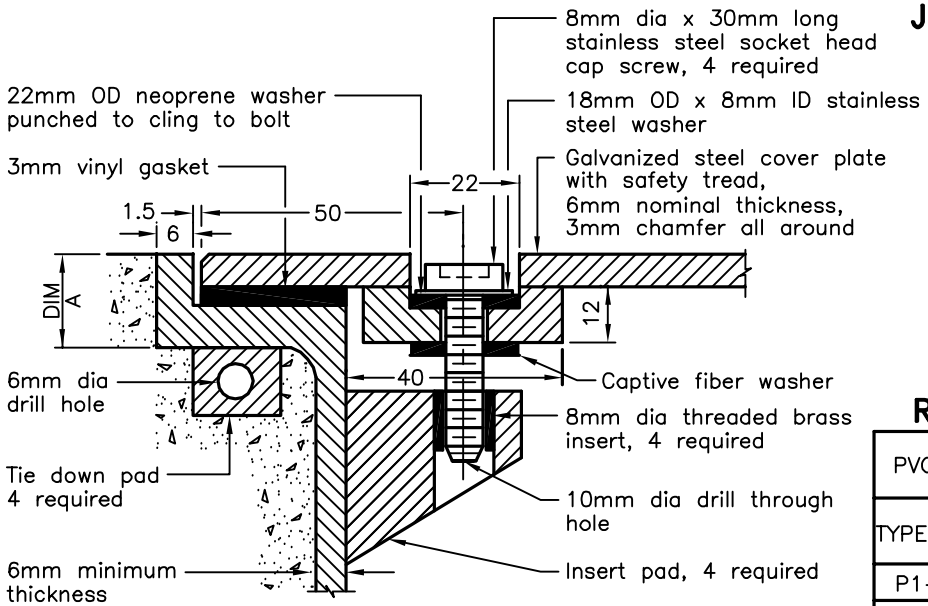
OPSD 2255.040



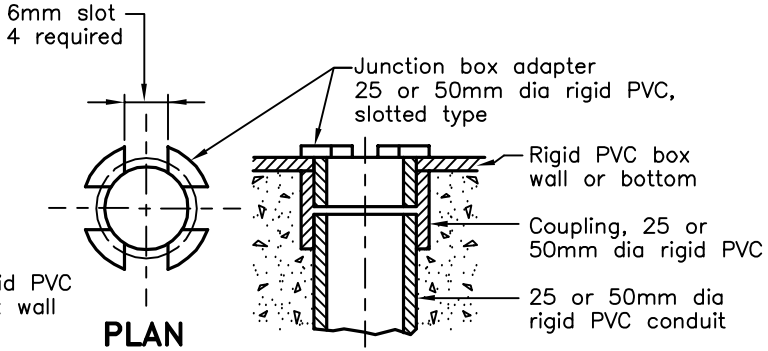
PLAN



SECTION A–A

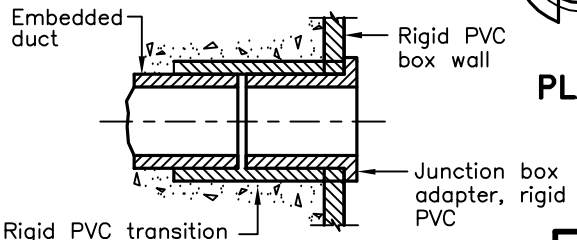


SECTION B–B WITH COVER



PLAN

TYPICAL DETAIL FOR DRAINAGE



TYPICAL CONNECTION FOR RIGID CONDUIT

JUNCTION BOX ADAPTER SIZES

JUNCTION BOX ADAPTER	DRILL HOLE SIZES
25	33
30	42
40	48
50	60
65	73
75	88

DIMENSIONS OF TYPE P1 RIGID PVC JUNCTION BOXES

PVC BOX (INSIDE) DIMENSION				COVER THICK–NESS	DIM A
TYPE No.	LENGTH	WIDTH	DEPTH		
P1–1	150	150	110	6	15
P1–2	150	150	160	6	15
P1–3	200	200	110	9	20
P1–4	200	200	160	9	20
P1–5	200	200	185	9	20
P1–6	250	200	185	9	20
P1–7	300	300	185	9	20
P1–8	400	200	185	9	20
P1–9	400	400	185	9	20

NOTES:

1 Rigid PVC transition coupling shall be suitable for use with embedded ducts.

A For junction box conduit entries, refer to the Contract Drawings.

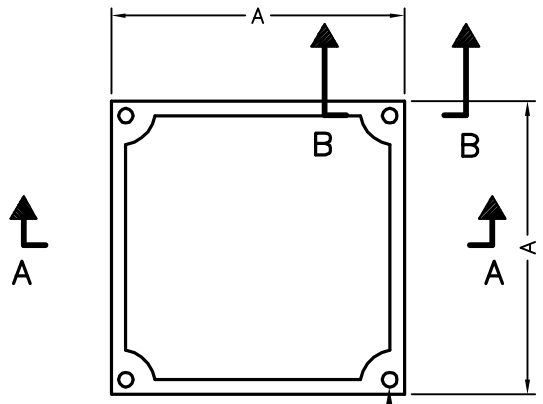
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

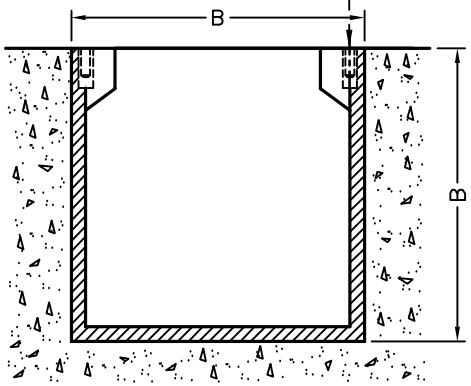
Nov 2013 | Rev 1

RIGID PVC JUNCTION BOX TYPE P1

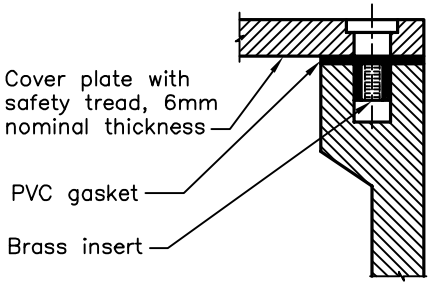
OPSD 2300.010



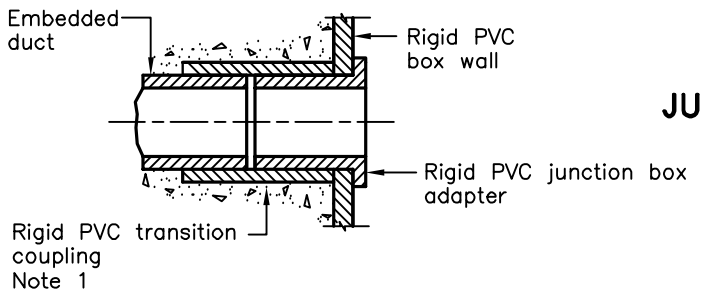
PLAN



SECTION A–A



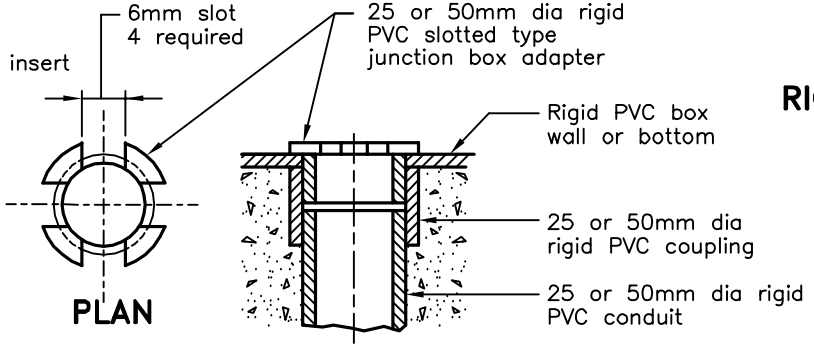
SECTION B–B WITH COVER



TYPICAL CONNECTION FOR RIGID CONDUIT

JUNCTION BOX ADAPTER SIZES

JUNCTION BOX ADAPTER	DRILL HOLE SIZES
25	33
32	42
38	48
50	60
65	73
75	88



PLAN

TYPICAL DETAIL FOR DRAINAGE

DIMENSIONS OF TYPE P2 RIGID PVC JUNCTION BOXES

PVC BOX (INSIDE) DIMENSION WITH COVER		
TYPE No.	A	B
P2–1	102	70
P2–2	102	106
P2–3	102	158
P2–4	127	151
P2–5	162	124
P2–6	162	157
P2–7	219	107
P2–8	219	184
P2–9	320	108
P2–10	320	158
P2–11	320	210

NOTES:

1 Rigid PVC transition coupling shall be suitable for use with embedded ducts.

A For junction box conduit entries, refer to the Contract Drawings.

B All dimensions are in millimetres unless otherwise shown.

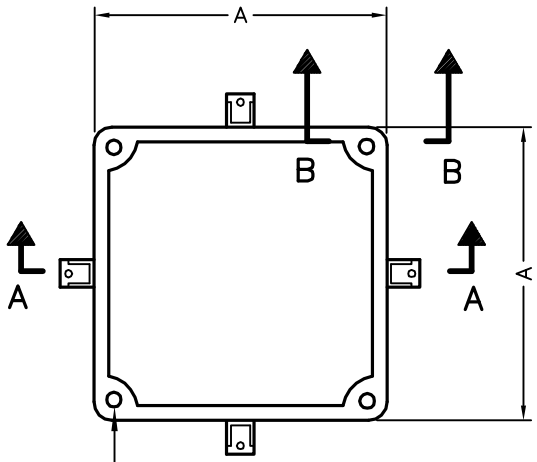
ONTARIO PROVINCIAL STANDARD DRAWING

RIGID PVC JUNCTION BOX TYPE P2

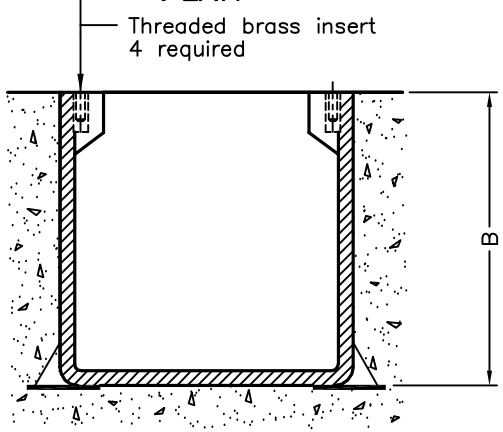
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ONTARIO STANDARDS · MUNICIPAL–PROVINCIAL · O P S

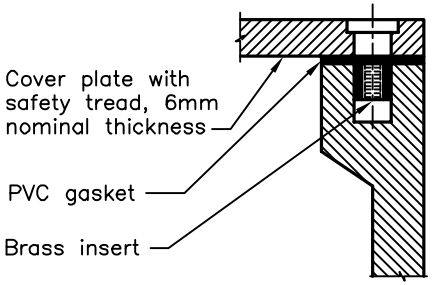
OPSD 2300.020



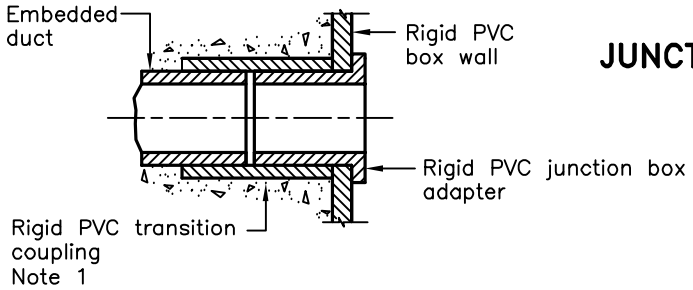
PLAN



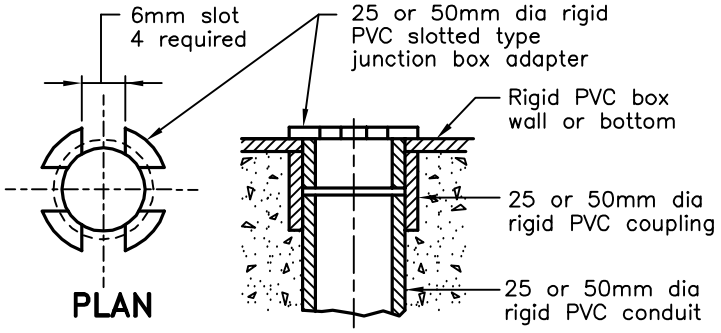
SECTION A–A



SECTION B–B WITH COVER



TYPICAL CONNECTION FOR RIGID CONDUIT



TYPICAL DETAIL FOR DRAINAGE

NOTES:

1 Rigid PVC transition coupling shall be suitable for use with embedded ducts.

A Mounting feet shall be installed to secure the box during installation.

B For junction box conduit entries, refer to the Contract Drawings.

C All dimensions are in millimetres unless otherwise shown.

JUNCTION BOX ADAPTER SIZES

JUNCTION BOX ADAPTER	DRILL HOLE SIZES
25	33
32	42
38	48
50	60
65	73
75	88

DIMENSIONS OF TYPE P4 RIGID PVC JUNCTION BOXES

PVC BOX DIMENSIONS WITH COVER		
TYPE No.	A	B
P4–1	102	70
P4–2	102	106
P4–3	102	158
P4–4	127	51
P4–5	162	124
P4–6	162	157
P4–7	219	107
P4–8	219	184
P4–9	320	108
P4–10	320	158
P4–11	320	210

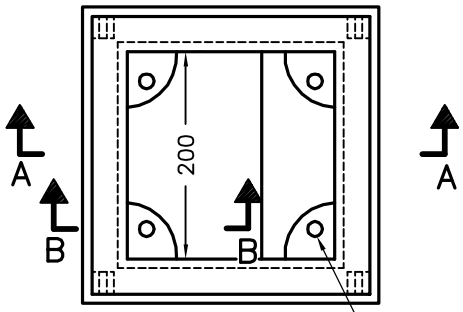
ONTARIO PROVINCIAL STANDARD DRAWING

RIGID PVC JUNCTION BOX TYPE P4

Nov 2013 | Rev 1

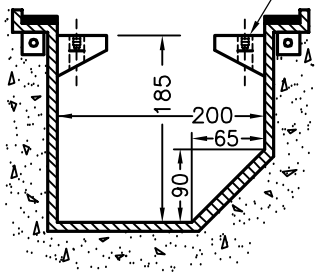
ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL · O P S

OPSD 2300.030

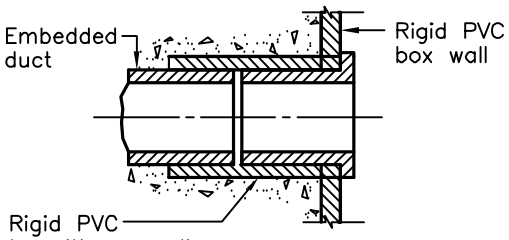


RIGID PVC JUNCTION BOX
PLAN

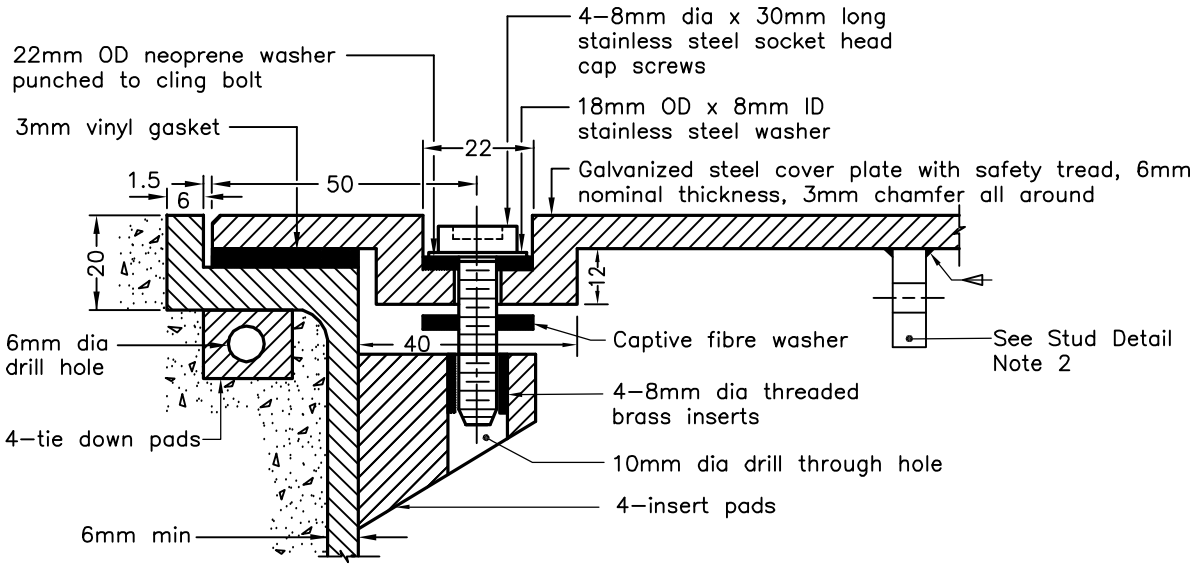
4–insert pads C/W 8mm threaded brass inserts



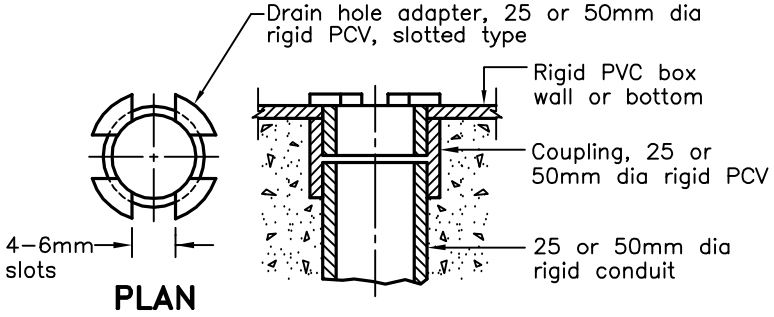
SECTION A–A



TYPICAL CONNECTION FOR RIGID CONDUIT

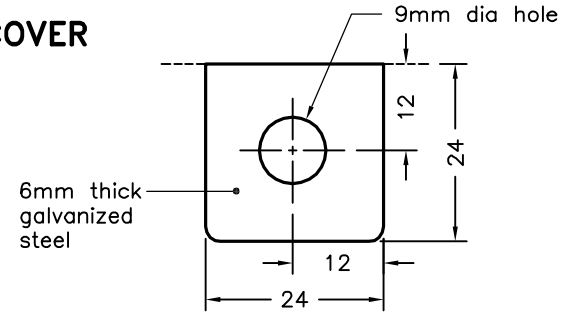


SECTION B–B WITH COVER



PLAN

TYPICAL DETAIL FOR DRAINAGE



STUD DETAIL

NOTES:

1 Rigid PVC transition coupling shall be suitable for use with embedded ducts.
2 Stud for ground connection shall be located at the centre of the cover.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

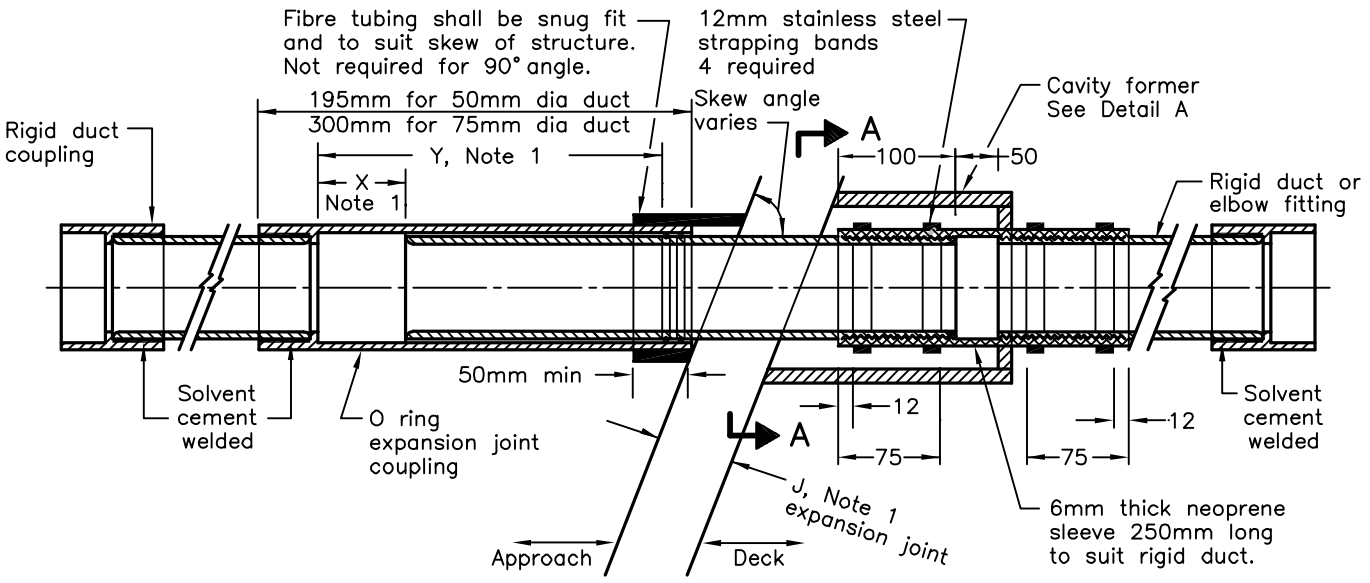
Nov 2010 | Rev 1

EMBEDDED WORK DETAIL

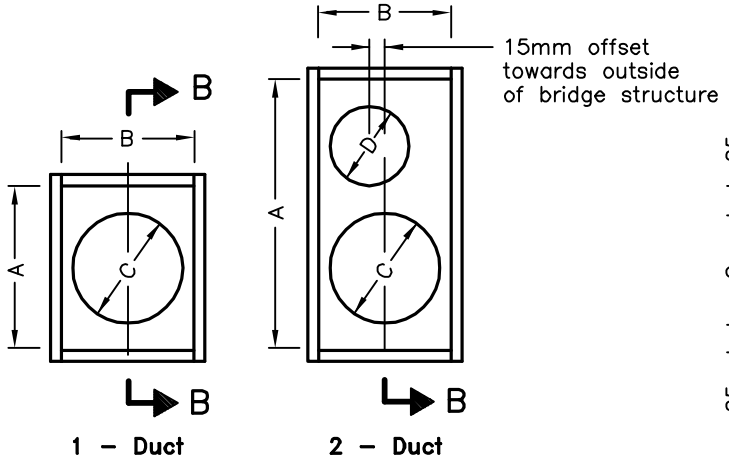
FOR RIGID PVC JUNCTION BOX, TYPE P3–1, FOR USE IN CONCRETE BARRIER WALL

ONTARIO STANDARD · MUNICIPAL – PROVINCIAL · OPS

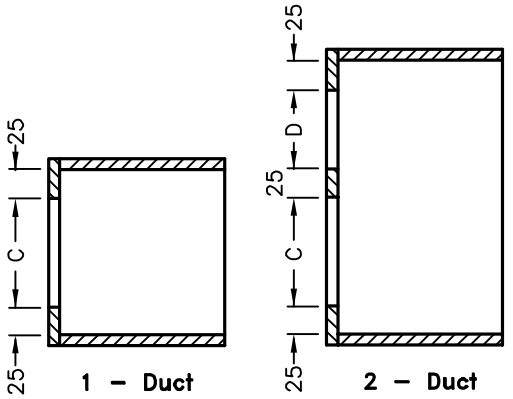
OPSD 2302.010



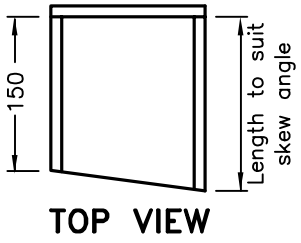
B PLAN – FITTING ASSEMBLY



SECTION A–A



SECTION B–B



TOP VIEW

Number of Duct	Size of Duct	A	B	C	D
1	50	120	90	70	–
1	75	150	120	100	–
2	50	215	90	70	70
1 1	50 75	245	120	100	70

DETAIL A – CAVITY FORMER

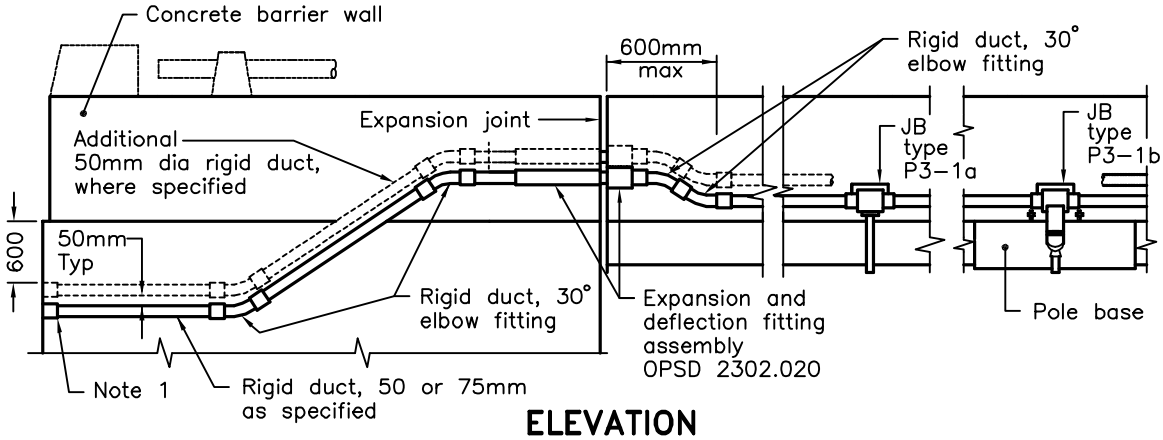
NOTES:

1 Refer to structural expansion joint drawings for J dimensions.
X=J at installation temperature – Min J + 25, mm minimum.
Y=Max J – Min J + 50, mm minimum.

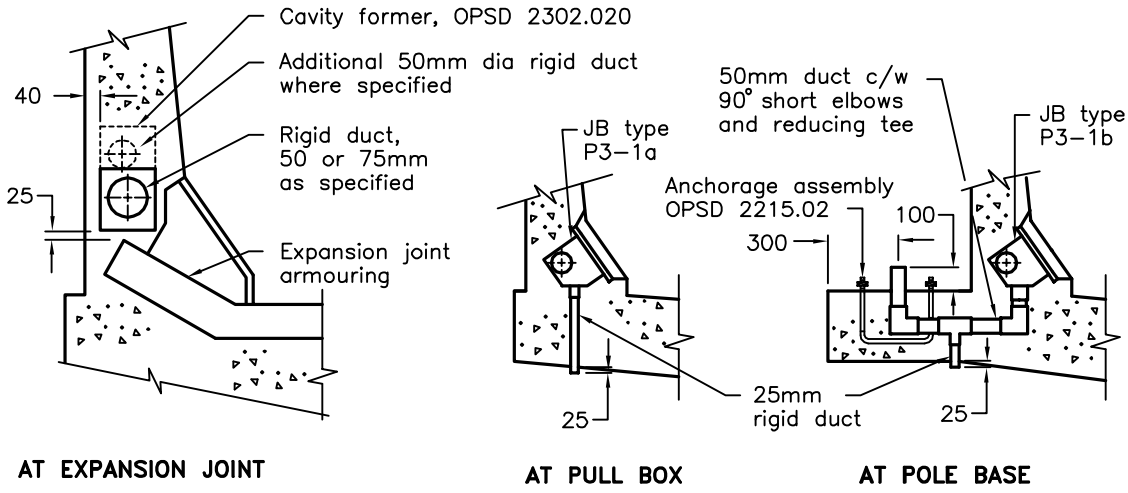
A The cavity former shall be made of 10 mm plywood.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	0
EXPANSION AND DEFLECTION FITTING ASSEMBLY FOR 50 AND 75mm RIGID DUCTS			
	OPSD 2302.020		



ELEVATION

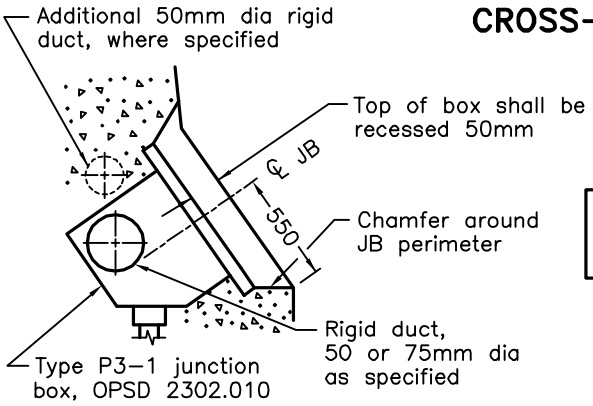


AT EXPANSION JOINT

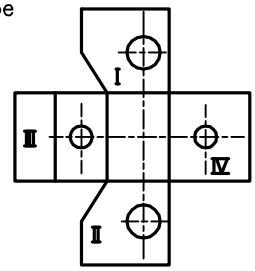
AT PULL BOX

AT POLE BASE

CROSS–SECTION DETAILS



JUNCTION BOX INSTALLATION DETAIL



DRILL–HOLE SIZE AND LOCATION

JUNCTION BOX TYPE	DRILL–HOLE DIA			
	I	II	III	IV
P3–1a	*	*	33	–
P3–1b	*	*	60	–

* For 50mm duct drill–hole dia = 60mm
For 75mm duct drill–hole dia = 88mm

JUNCTION BOX – DUCT ENTRY SIZES AND LOCATIONS

NOTES:

1 Embedded rigid duct shall be terminated at wing wall with O ring expansion joint coupling, 195mm long, for 50mm dia duct and with regular coupling for 75mm dia duct.

2 When the 50mm dia duct is installed in addition to the 75 or 50mm dia duct, junction boxes shall not be installed in the additional 50mm duct.

A For embedded duct and junction box requirements, refer to Contract Drawings.

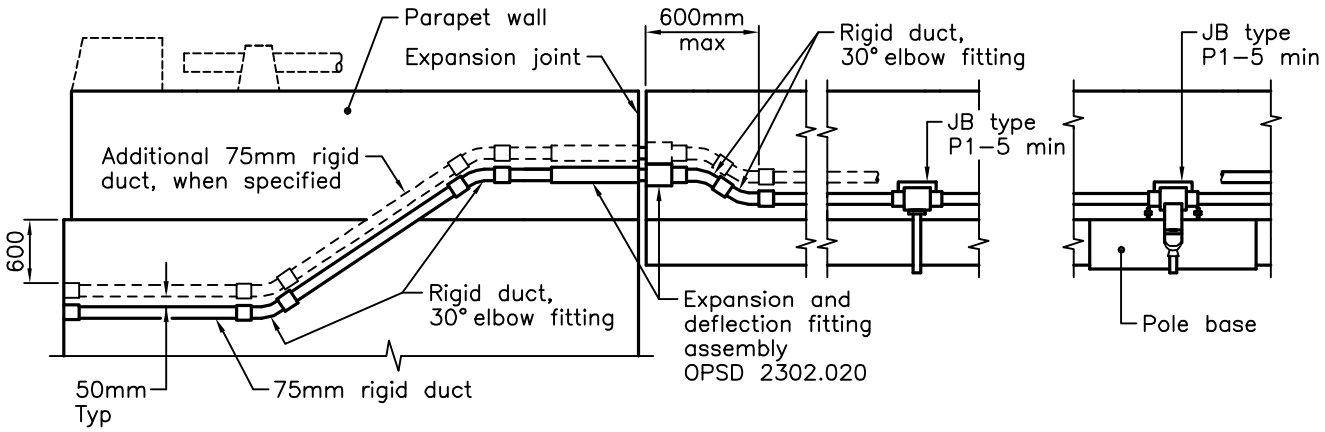
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	1

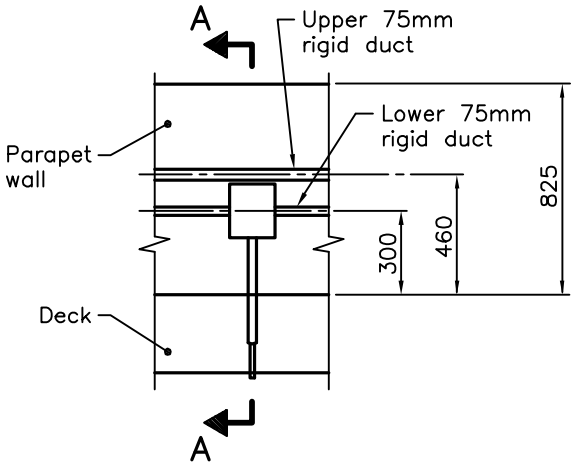
EMBEDDED WORK IN STRUCTURE

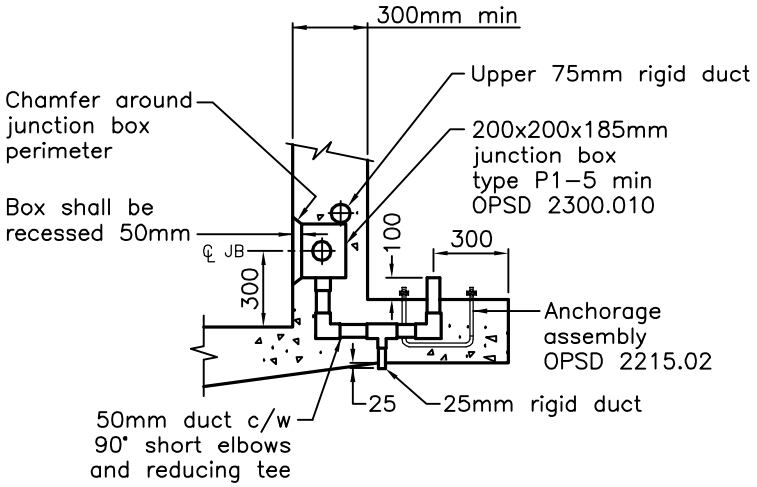
NEW JERSEY TYPE CONCRETE BARRIER WALL

OPSD 2302.040

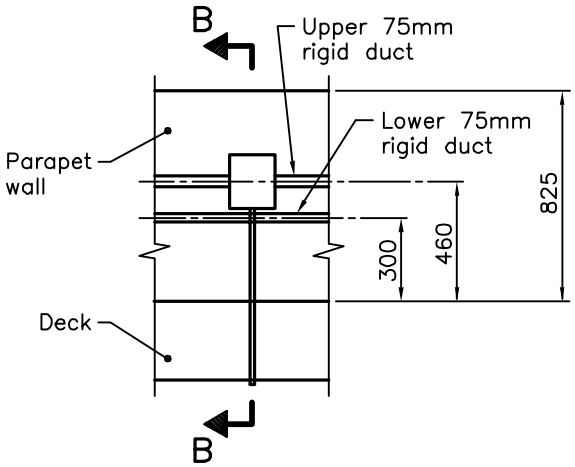


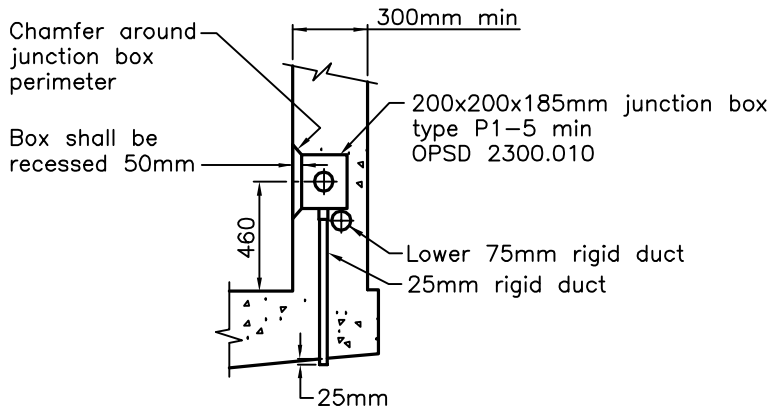
ELEVATION





SECTION A–A AT LIGHTING POLE BASE





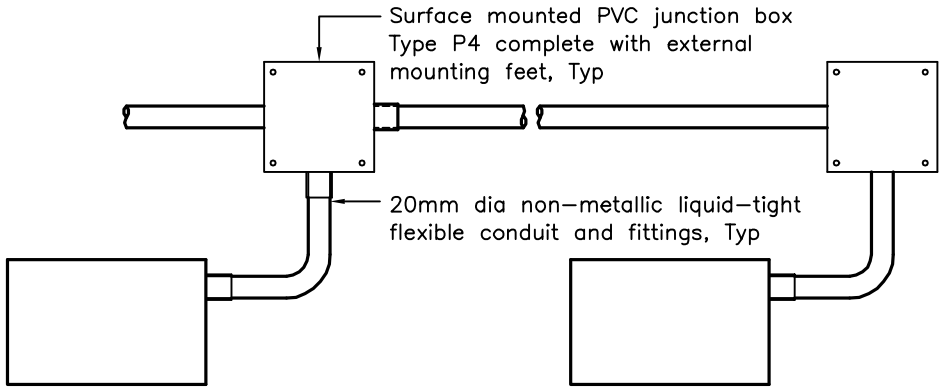
SECTION B–B

NOTES:

A Embedded duct and junction box requirements shall be according to the Contract Documents.

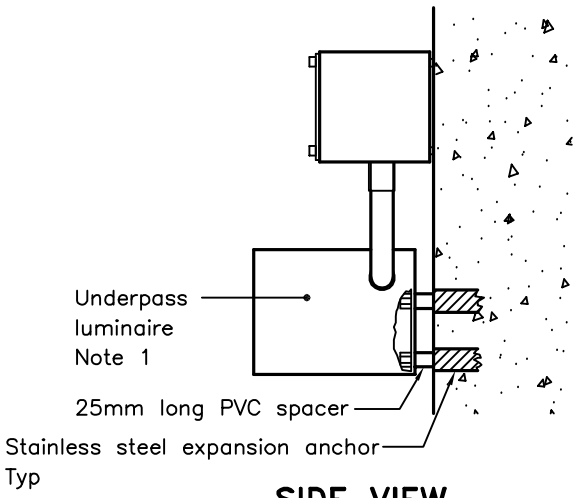
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	0
EMBEDDED WORK IN STRUCTURE PARAPET WALL			
	OPSD 2302.045		

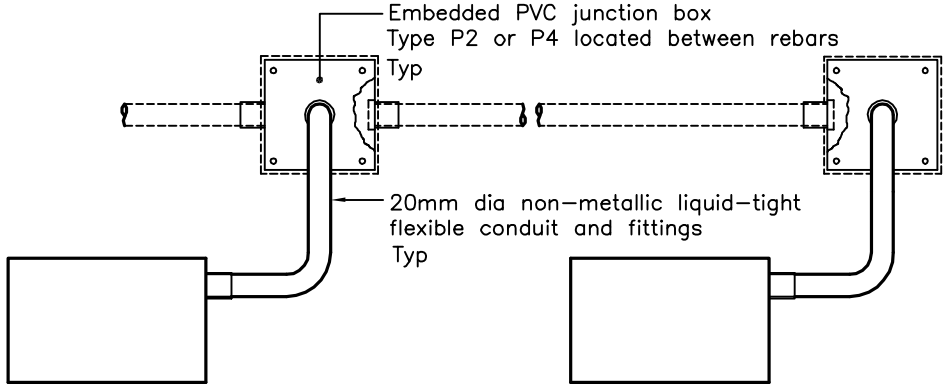


FRONT VIEW

SURFACE MOUNTED DUCTS AND JUNCTION BOXES

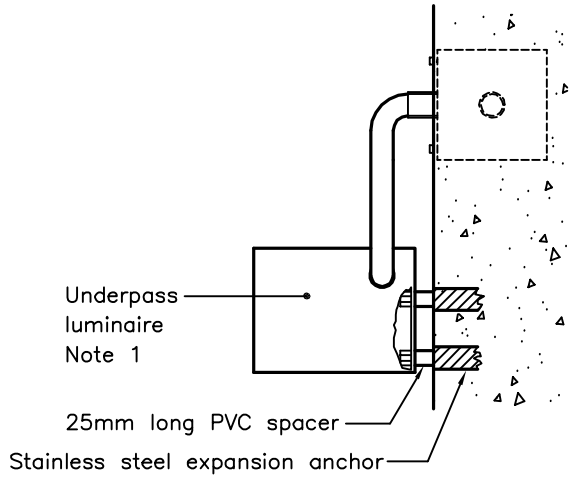


SIDE VIEW



FRONT VIEW

EMBEDDED DUCTS AND JUNCTION BOXES



SIDE VIEW

NOTES:

1 Luminaires shall be mounted on concrete surface by drilling and inserting stainless steel expansion anchors and securing the luminaires with 10mm dia x 65mm long stainless steel hexagonal head machine bolts.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

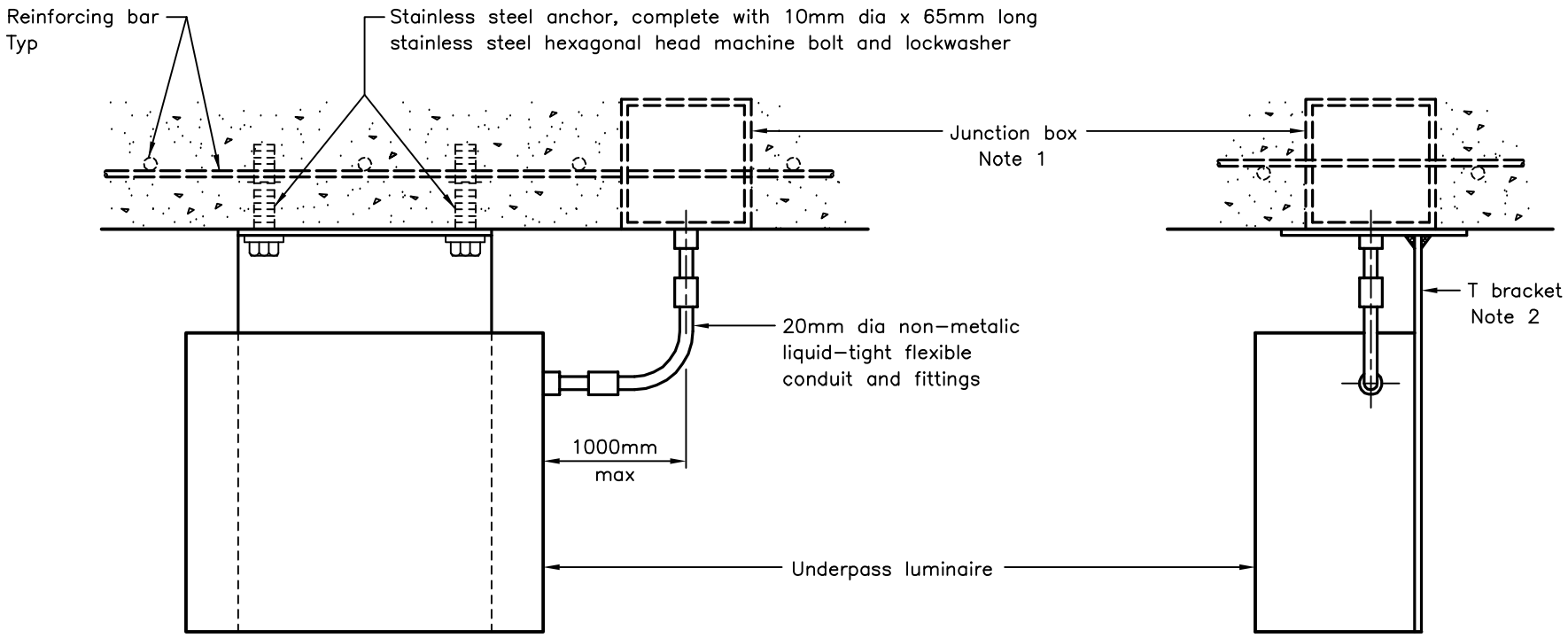
UNDERPASS LUMINAIRES

WALL MOUNTED INSTALLATION

Nov 2016 | Rev 2

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL ·

OPSD 2305.020



FRONT VIEW

SIDE VIEW

NOTES:

1 Junction box may be Type P4, surface mounted, or Type P2 or P4, embedded.

2 If ceiling of structure is not flat, T bracket shall be attached to the ceiling using a wedge mounting bracket as shown in OPSD 2310.030.

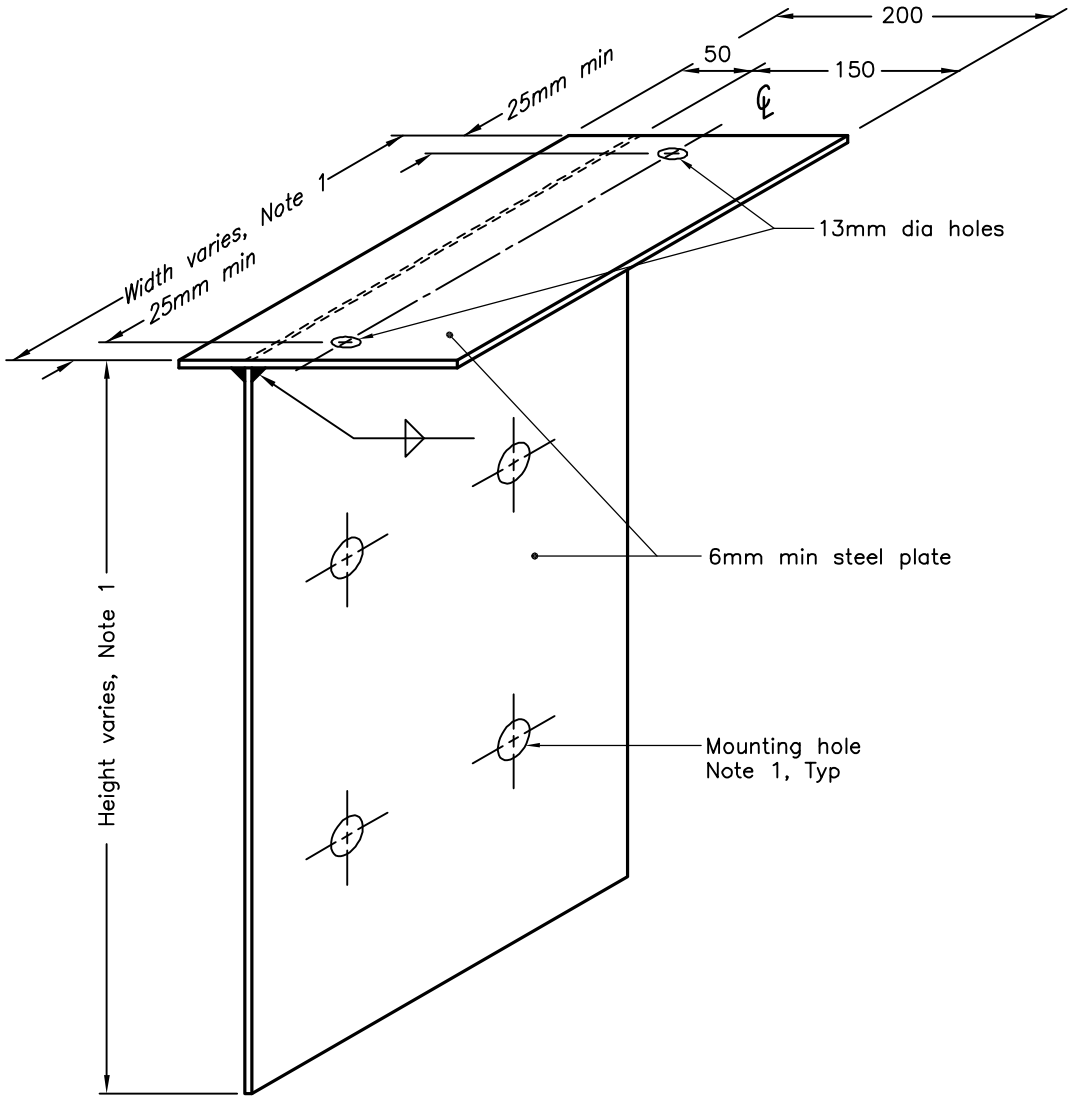
A This OPSD shall be read in conjunction with OPSD 2310.020.

B Stainless steel hexagonal head machine bolts of a size to suit luminaire mounting holes, nuts, and lockwashers shall be used to mount luminaire to bracket.

C Conduit entry into the luminaire may vary.

D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
UNDERPASS LUMINAIRE CEILING MOUNTED INSTALLATION WITH T BRACKET			
	OPSD 2310.010		



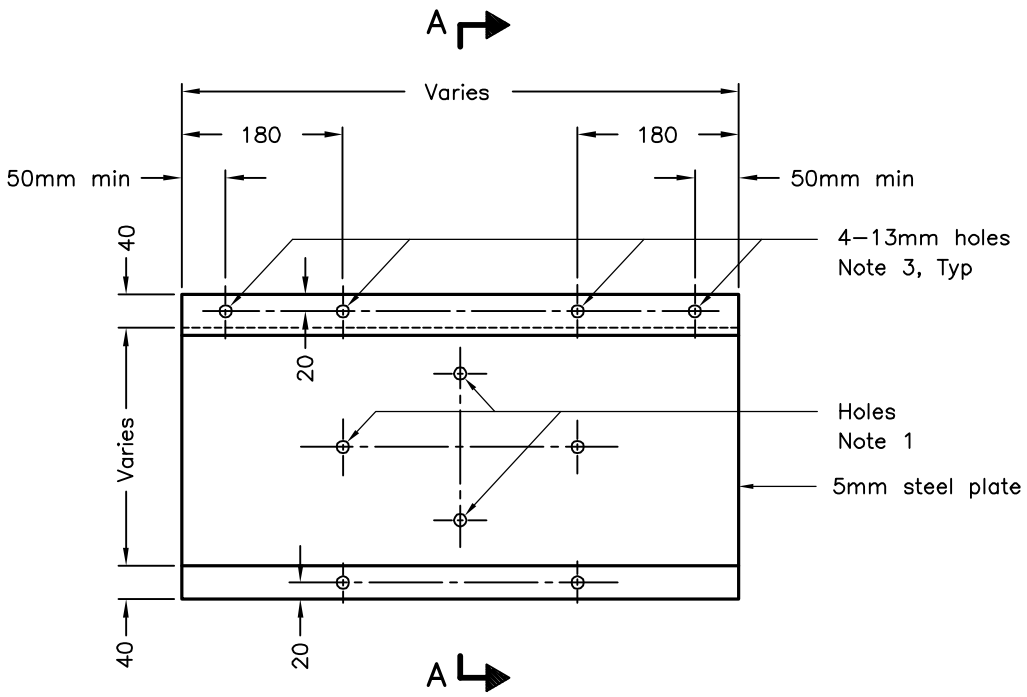
NOTES:

1 The width, height, mounting holes, and wiring aperture of the bracket shall suit the luminaire and fittings for conduit entry and shall be suitable to accommodate the opening of the luminaire door.

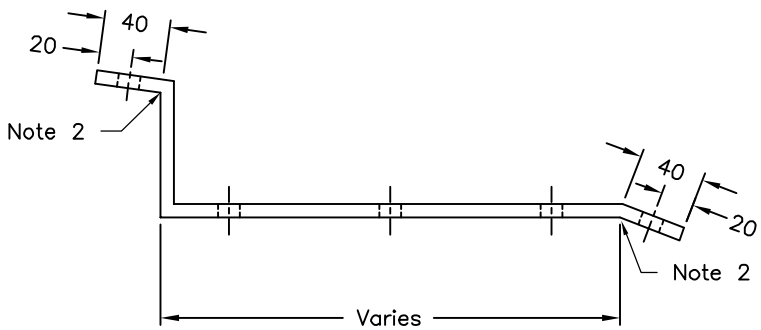
A Bracket shall be stainless steel when attached to atmospheric corrosion resistant structural steel components. For all other applications, brackets shall be stainless steel or hot dip galvanized steel according to ASTM A123.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	2	ONTARIO STANDARDS MUNICIPAL – PROVINCIAL
T BRACKET FOR CEILING MOUNTED UNDERPASS LUMINAIRE				
	OPSD 2310.020			



PLAN



SECTION A–A

NOTES:

1 Holes shall suit mounting holes of the T bracket.

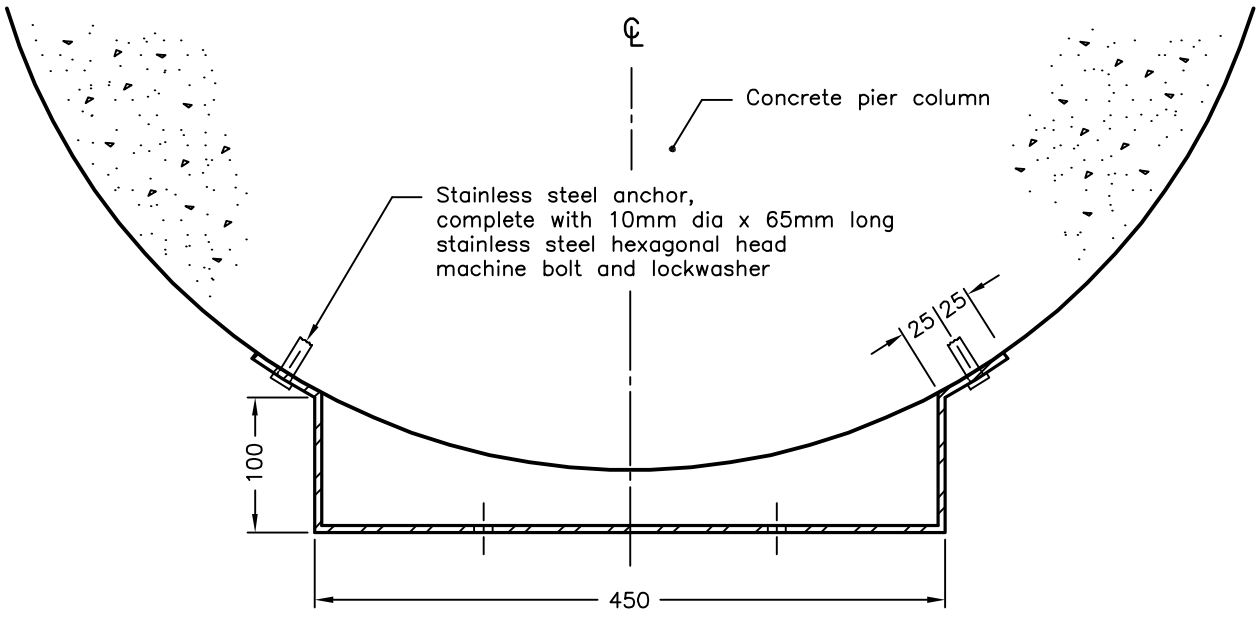
2 Angle of attachment for wedge mounting bracket shall be formed to suit structure.

3 Holes for mounting wedge bracket to structure.

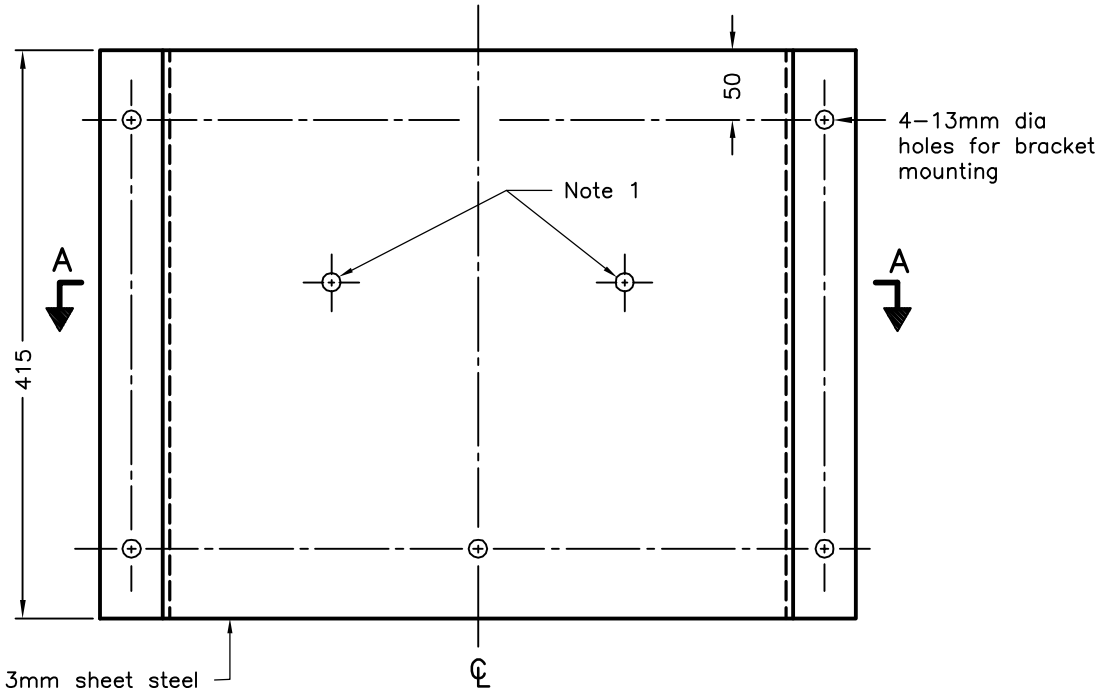
A Bracket shall be hot dip galvanized according to ASTM A123 after fabrication.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
WEDGE MOUNTING BRACKET FOR UNDERPASS LUMINAIRE			
	OPSD 2310.030		



SECTION A–A



FRONT

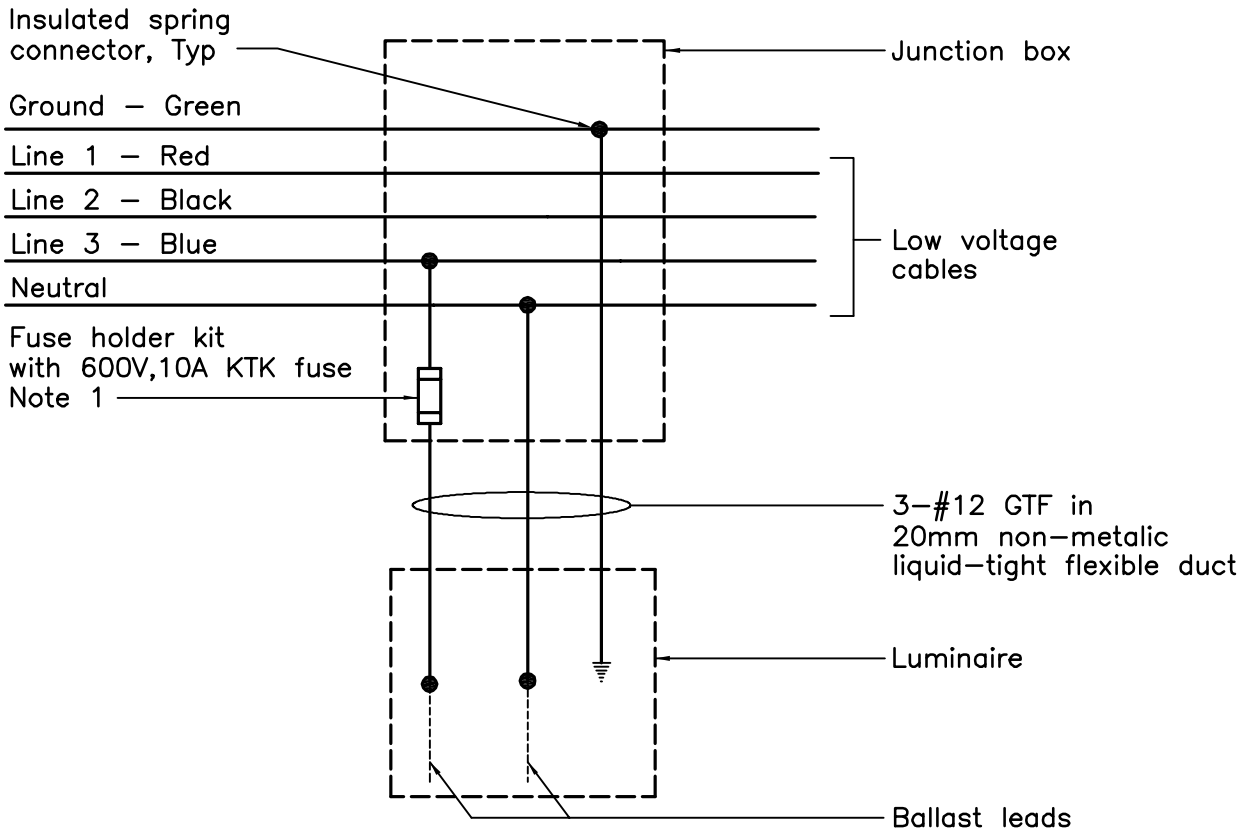
NOTES:

1 Holes in bracket shall suit luminaires mounting holes.

A Bracket shall be hot dip galvanized according to ASTM A123 after fabrication.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
SUPPORT BRACKET FOR COLUMN MOUNTED UNDERPASS LUMINAIRE			
	OPSD 2310.040		



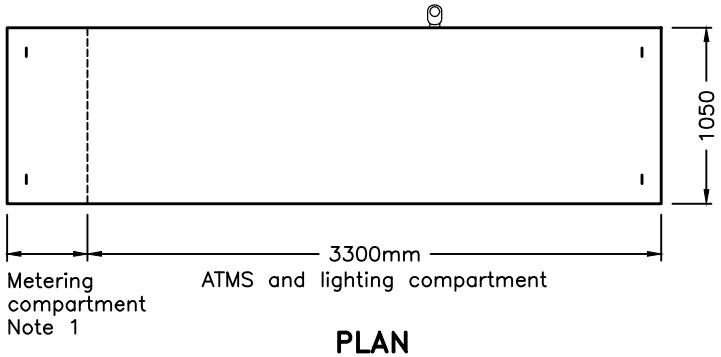
NOTE:

1 Fuse holder kit may be located inside the luminaire.

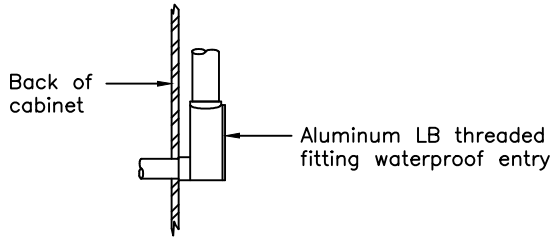
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
UNDERPASS LUMINAIRE WIRING DETAIL			
	OPSD 2315.010		

1. Service entrance disconnect with nameplate: SERVICE ENTRANCE DISCONNECT
2. Metering socket as specified by power supply authority
3. Main feed switch, 400A, with nameplate: MAIN FEED SWITCH
4. Main splitter, 400A
5. Combination panelboard, 347/600V, 225A, for Advanced Traffic Management Systems, with nameplate: 347/600V ATMS PANEL
6. Relamp switch with nameplate: RELAMP SWITCH
7. Lighting system disconnect with nameplate: 347/600V LIGHTING DISCONNECT
8. Lighting contactor with nameplate: LIGHTING CONTACTOR
9. Secondary lightning arrestor, thyrite type, 650V, 3–pole
10. Panelboard, 347/600V, 225A, lighting system, with nameplate: 347/600V LIGHTING PANEL
11. Utility panel, 120/240V service, with nameplate: 120/240V UTILITY PANEL
12. Utility disconnect, 600V, with nameplate: 600V UTILITY DISCONNECT
13. Dry–type transformer, single phase
14. Light switch with nameplate: CABINET LIGHT SWITCH
15. Photoelectric controller
16. Junction box, 150x150x150mm, complete with terminals for photoelectric controller connection. Terminals shall be identified as Neutral, Line, and Load
17. Enclosed and gasketed luminaire with incandescent lamp and clear glass globe
18. GFCI receptacle, 125V, 15A
19. #2/0 AWG ground wire
20. Copper ground bus
21. Field control circuit wiring, min #12AWG
22. ATMS 225A system feed cable
23. Lighting system feed cable
24. Service cable
25. Service transformer primary feeder, #8AWG
26. Circuit wireway
27. Control circuit wiring, min #12AWG

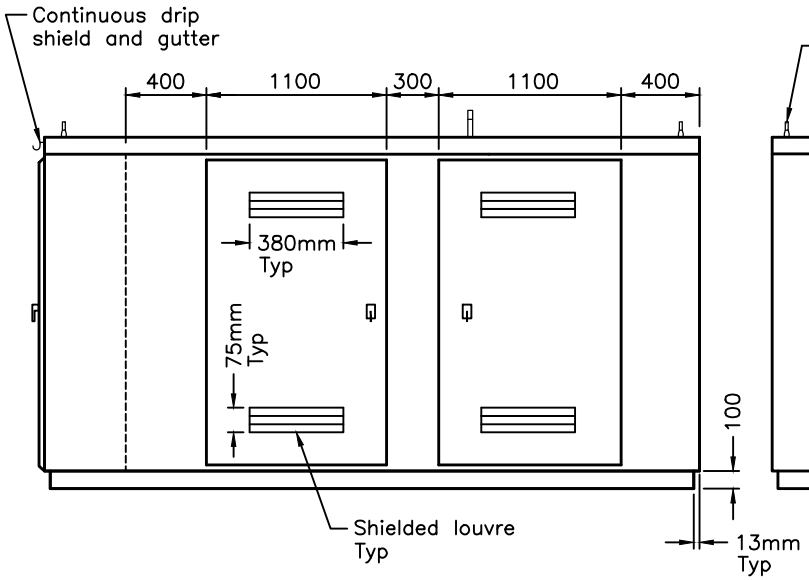
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	3
DISTRIBUTION ASSEMBLY LEGEND			
	OPSD 2400.000		



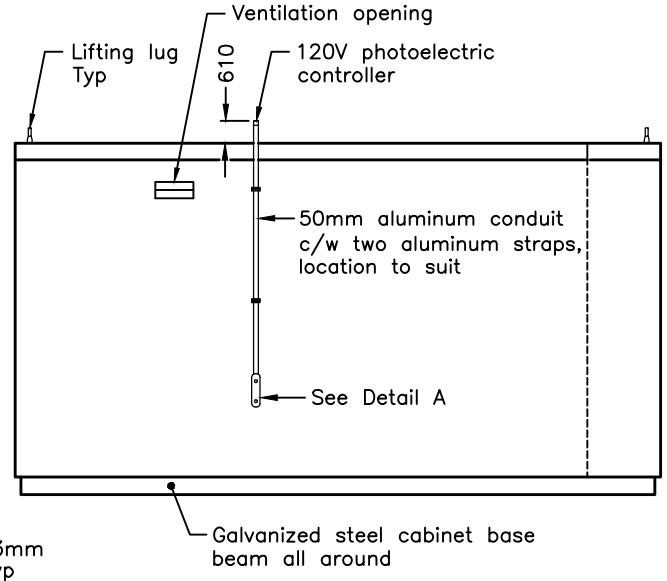
PLAN



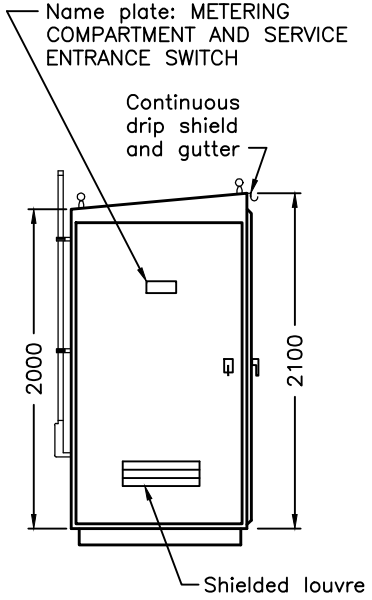
DETAIL A



FRONT ELEVATION



REAR ELEVATION



SIDE ELEVATION

NOTES:

1 Metering compartment as specified by power supply authority. Metering compartment may be a separate stand–alone enclosure.

A This OPSD shall be read in conjunction with OPSD 2400.000 and 2400.020.

B All wiring shall be run in conduit or metal wireway between items of equipment.

C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

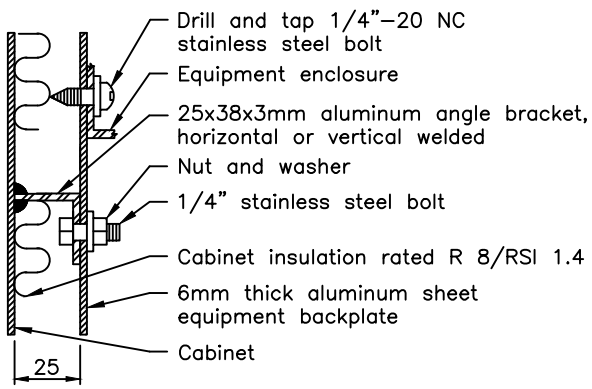
DISTRIBUTION ASSEMBLY

CABINET

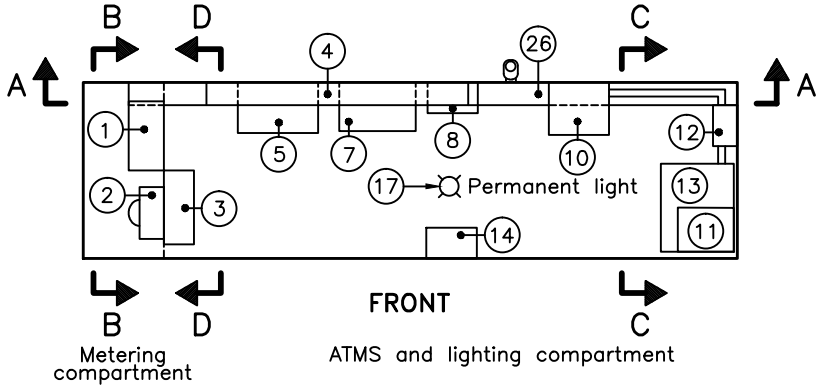
Nov 2018 | Rev 3

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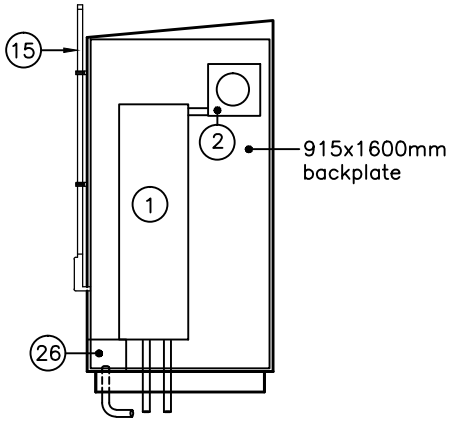
OPSD 2400.010



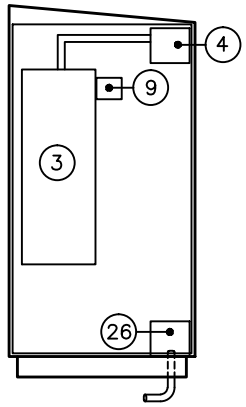
EQUIPMENT MOUNTING DETAIL



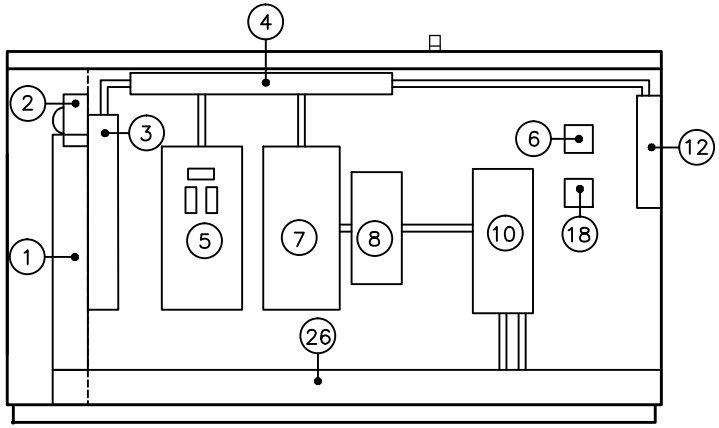
PLAN



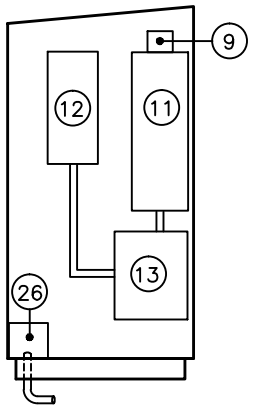
SECTION B–B



SECTION D–D



SECTION A–A



SECTION C–C

NOTES:

A This OPSD shall be read in conjunction with OPSD 2400.000 and 2400.010.

B All dimensions are in millimetres unless otherwise shown.

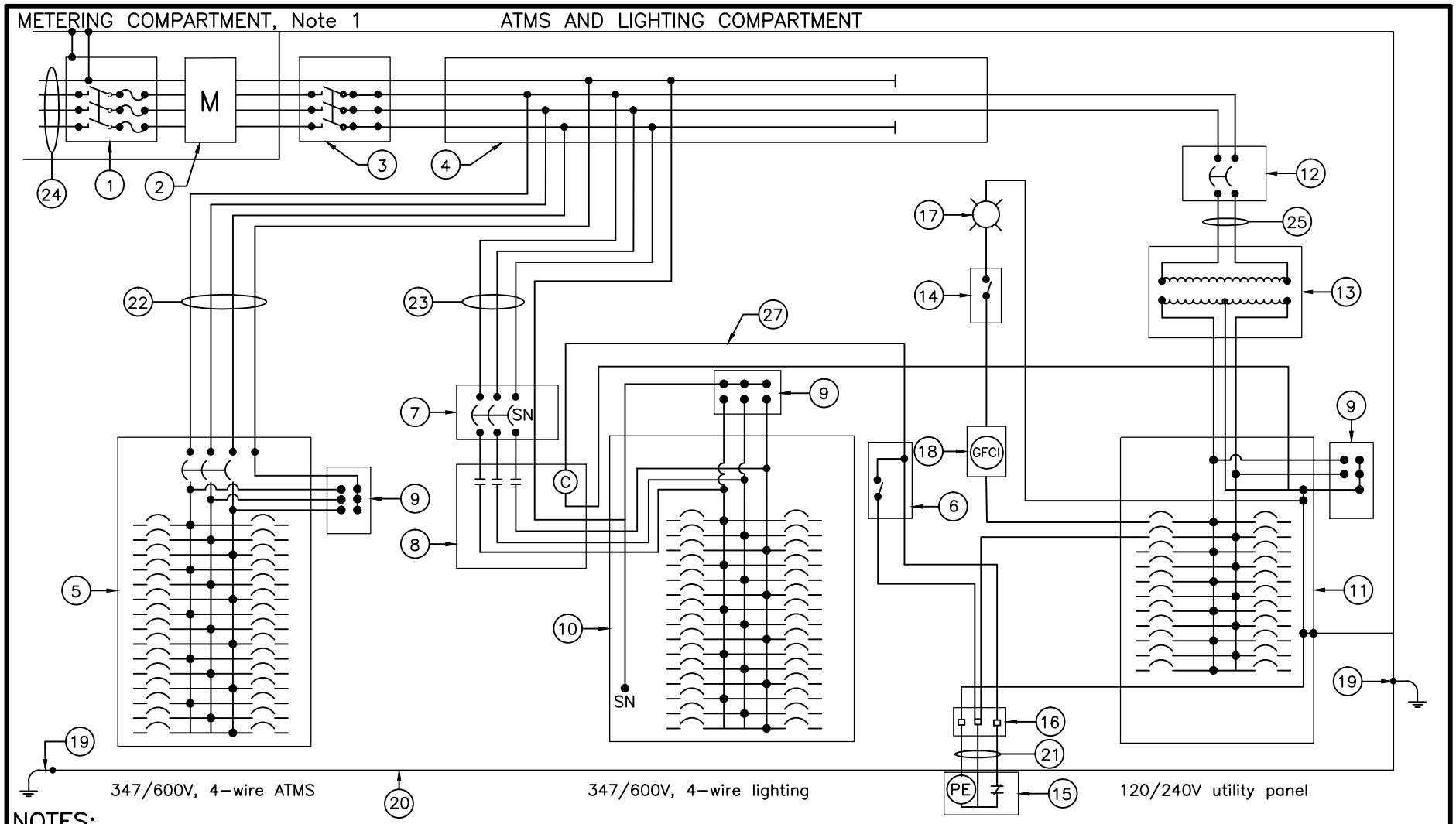
ONTARIO PROVINCIAL STANDARD DRAWING

DISTRIBUTION ASSEMBLY

EQUIPMENT LAYOUT

Nov 2018 | Rev 2

OPSD 2400.020



NOTES:

1 Power supply authority shall provide current taps and voltage transformers for metering during construction.

A Size dependent equipment rating as specified.

B This OPSD shall be read in conjunctionwith OPSD 2400.000.

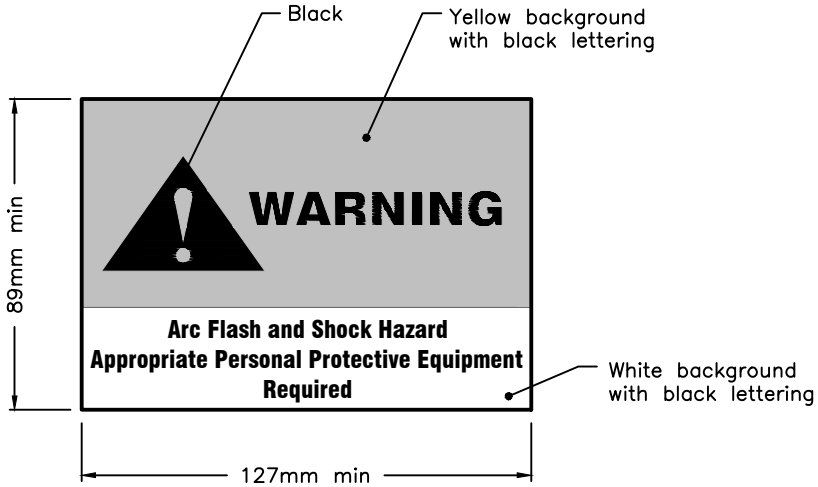
C All dimensions are in millimetres unless otherwise shown.

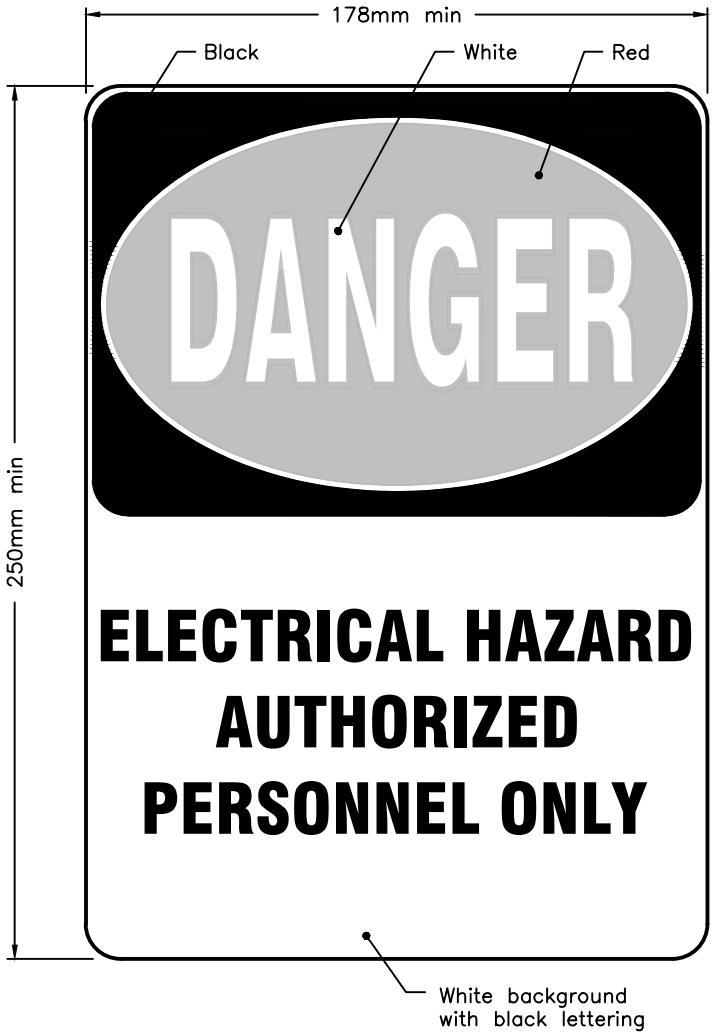
ONTARIO PROVINCIAL STANDARD DRAWING

DISTRIBUTION ASSEMBLY WIRING SCHEMATIC

Nov 2018 | Rev 3

OPSD 2400.030





NOTES:

A Signs shall be fabricated with permanent and weatherproof material.

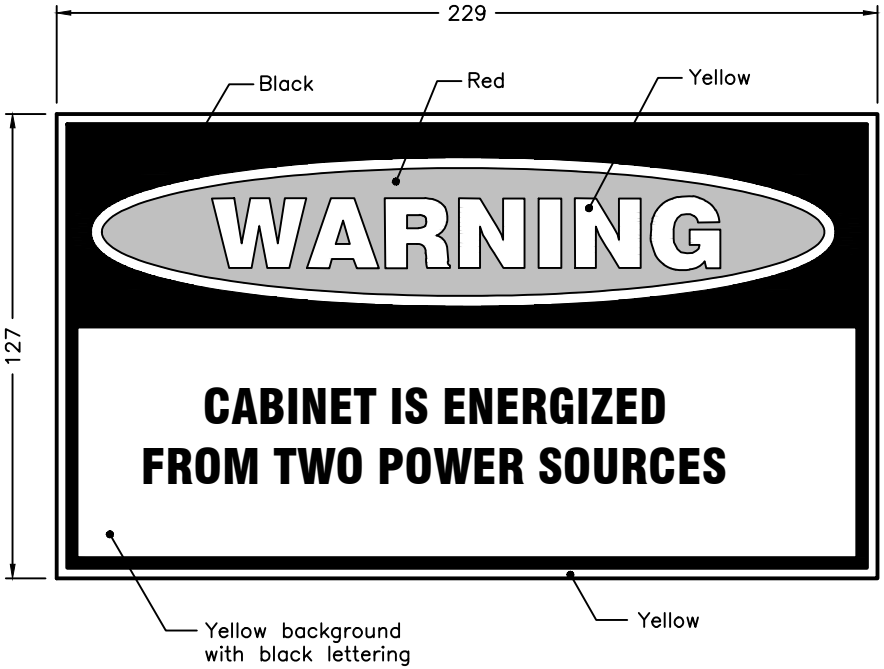
B All dimensions are in millimetres unless otherwise shown.

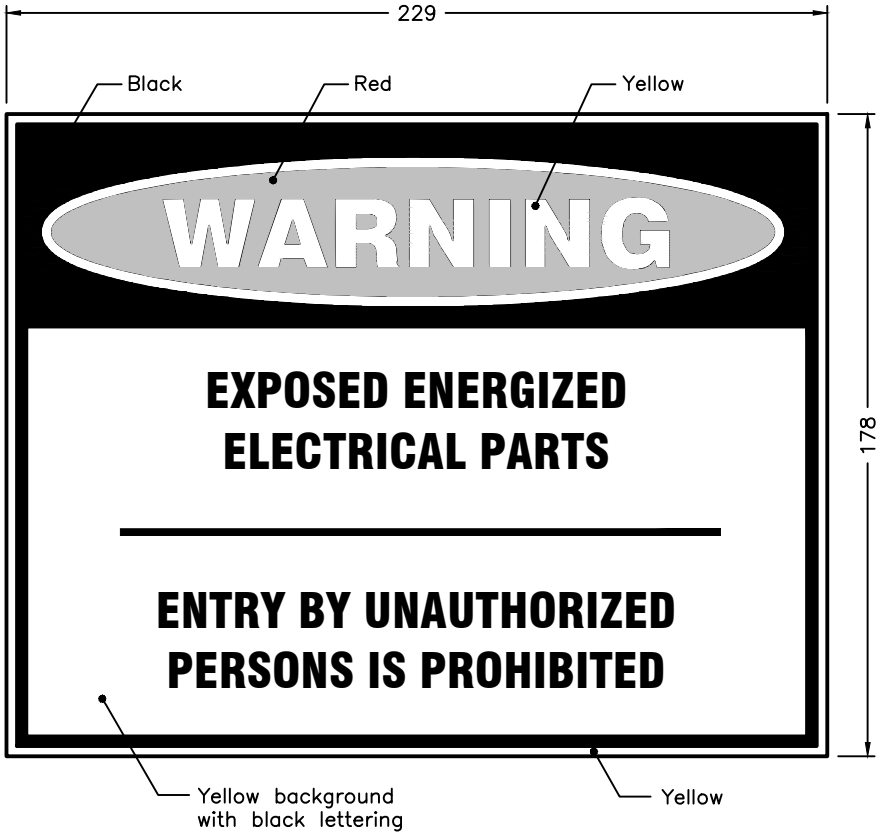
ONTARIO PROVINCIAL STANDARD DRAWING

WARNING SIGNS FOR ELECTRICAL EQUIPMENT

Nov 2018 | Rev 1

OPSD 2400.100





NOTES:

A Signs shall be fabricated with permanent and weatherproof material.

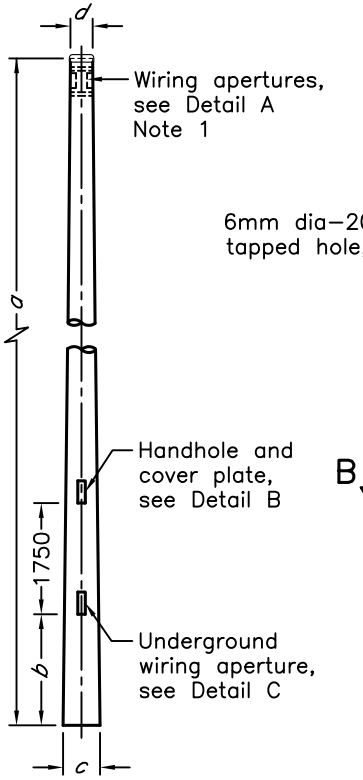
B All dimensions are in millimetres unless otherwise shown.

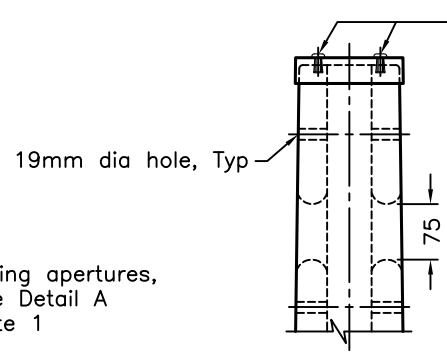
ONTARIO PROVINCIAL STANDARD DRAWING

WARNING SIGNS OUTSIDE ELECTRICAL EQUIPMENT

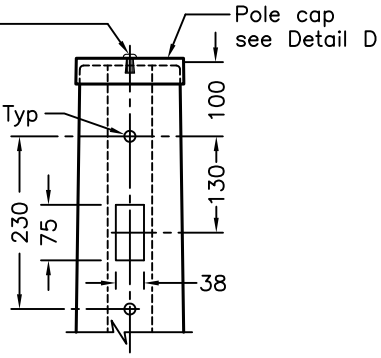
Nov 2018 | Rev 1

OPSD 2400.101



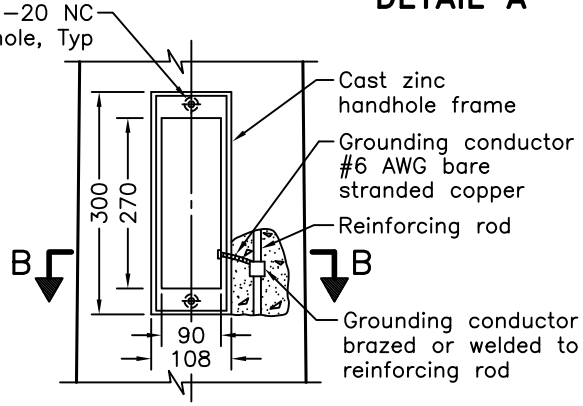


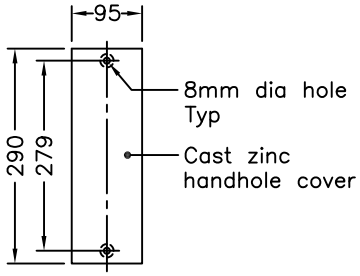
FRONT VIEW



SIDE VIEW

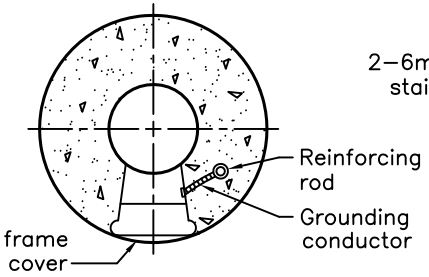
DETAIL A



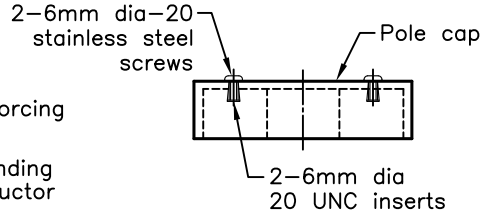


DETAIL B

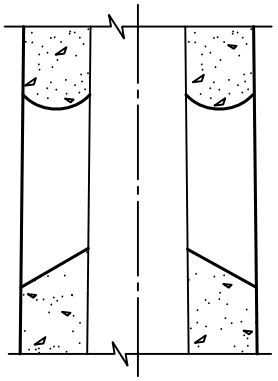
POLE FABRICATION DATA			
Pole Length *a* m	Aperture Location *b* mm	Bottom Diameter *c* mm	Top Diameter *d* mm
9.0	1150	290	165
10.7	1150	312	165
12.5	1500	338	165
14.0	1500	373	165
15.8	1750	401	165
18.3	2670	439	165
21.3	2670	485	165



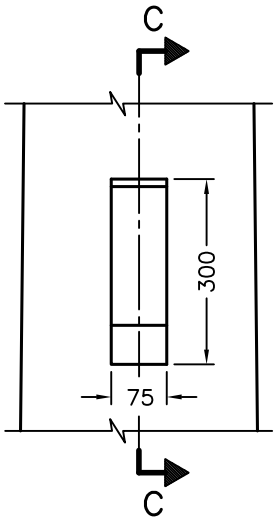
SECTION B–B



DETAIL D



SECTION C–C



DETAIL C

NOTES:

1 Wiring apertures not used shall be covered with a stainless steel or aluminum plate.

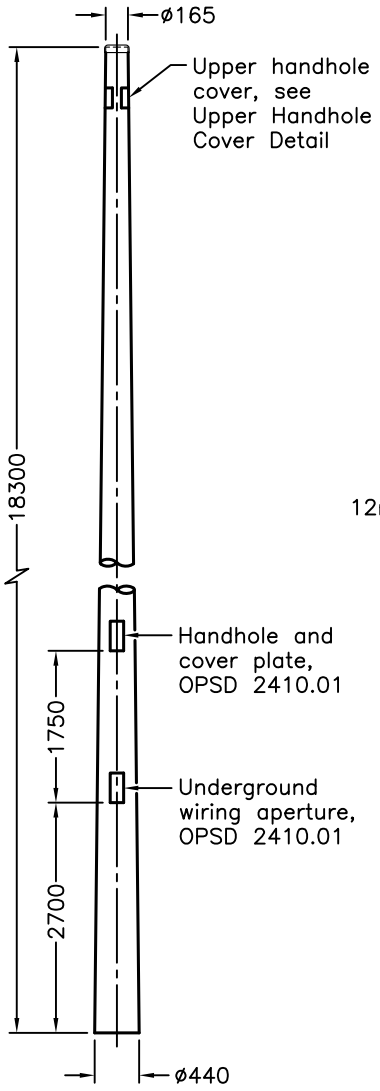
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

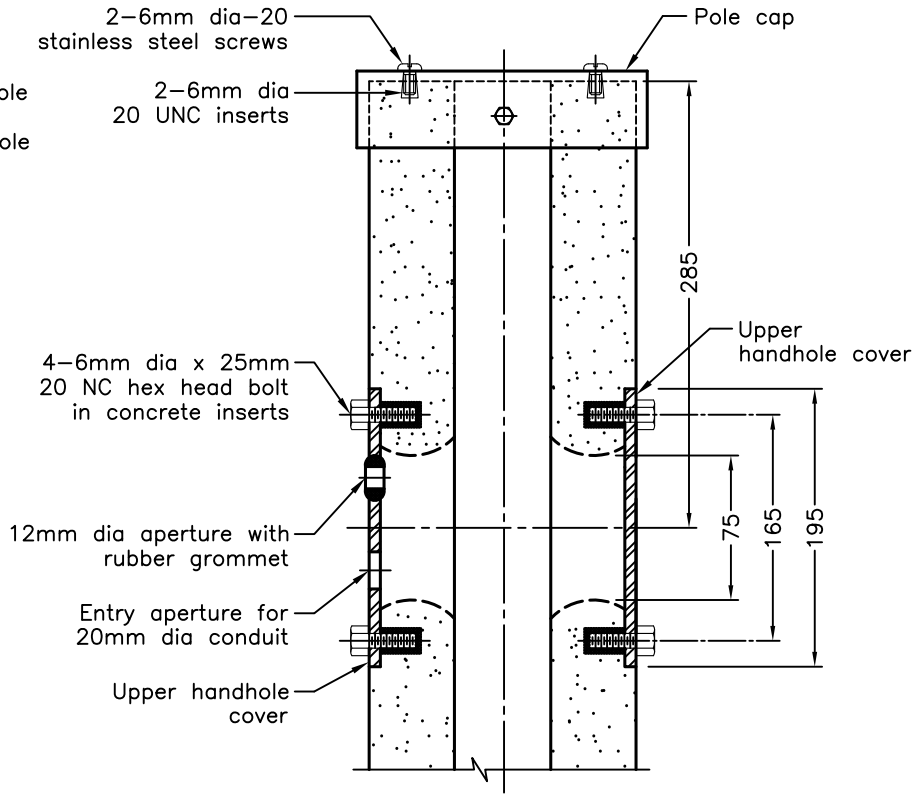
SPUN CONCRETE POLE

Nov 2012 | Rev 3

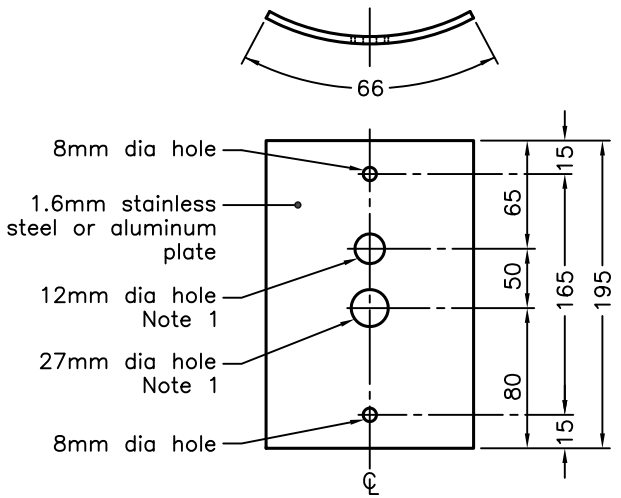
OPSD 2410.01



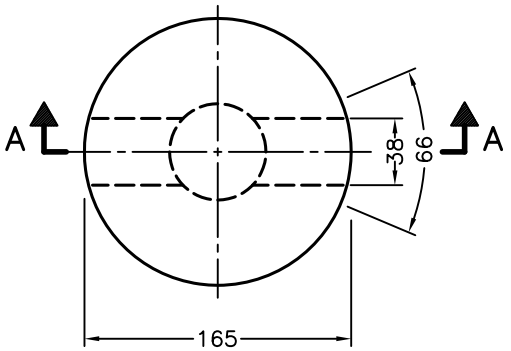
ELEVATION



SECTION A–A
AT UPPER HANDHOLE COVER



UPPER HANDHOLE COVER DETAIL



PLAN
POLE TOP DETAIL

NOTES:

1 Entry holes shall be made in one upper handhole cover only.

A For additional details, refer to OPSD 2410.01.
B All hardware shall be stainless steel.
C All dimensions are in millimetres unless otherwise shown.

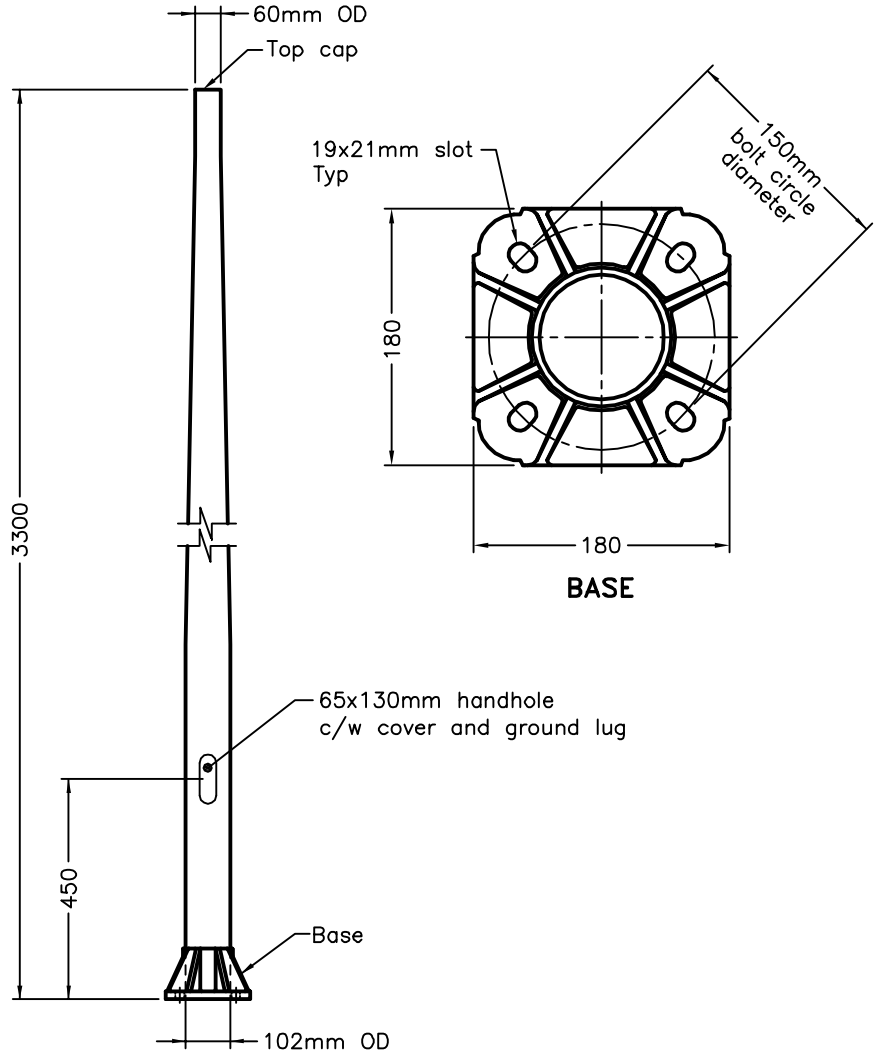
ONTARIO PROVINCIAL STANDARD DRAWING

18.3m SPUN CONCRETE POLE
FOR TV CAMERA MOUNTING

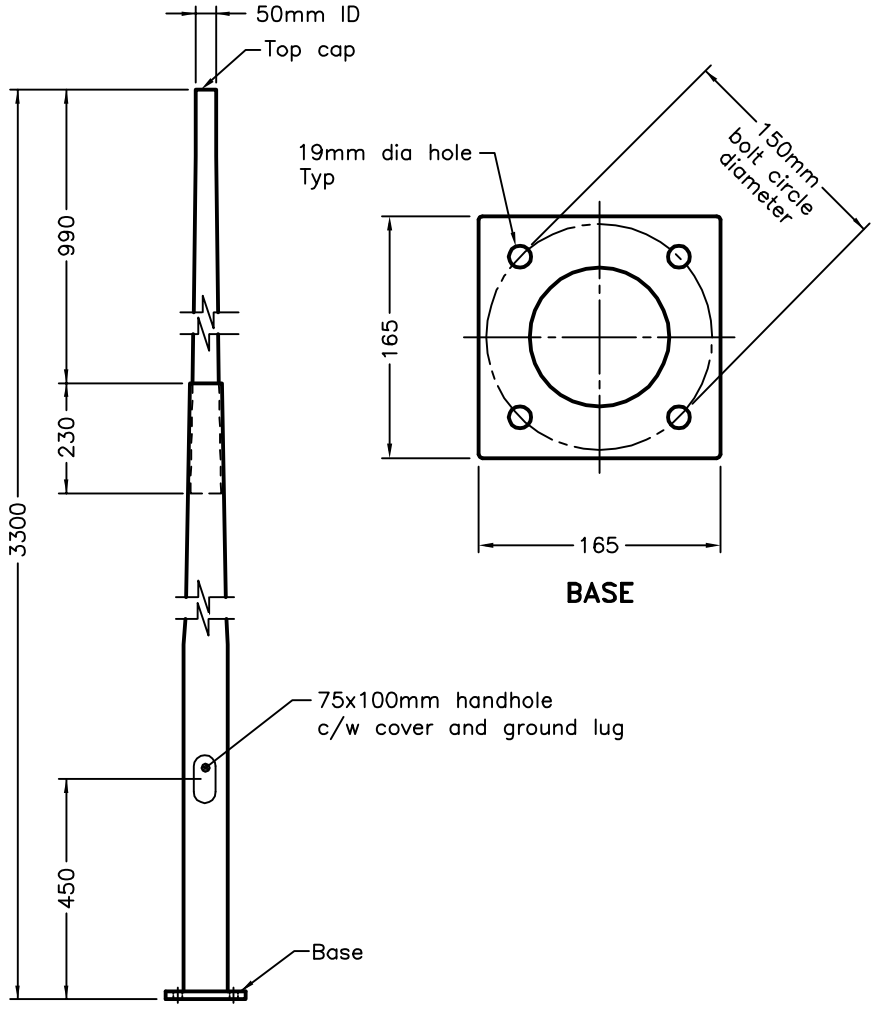
Nov 2012 | Rev 0

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OPSD 2410.020



ALUMINUM POLE



SECTIONAL STEEL POLE

NOTES:

A This OPSD shall be read in conjunction with OPSD 2200.04.

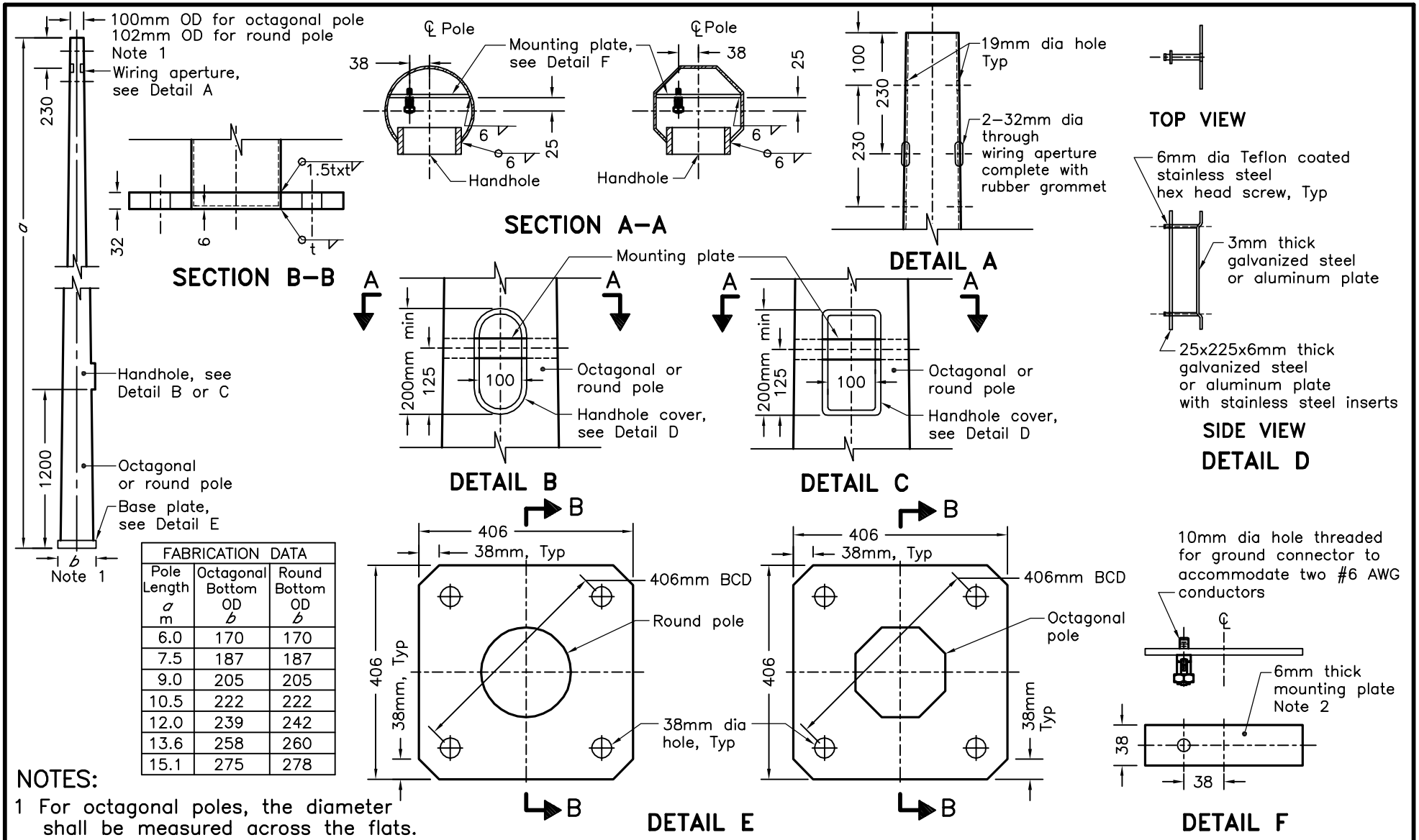
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

3.3m ALUMINUM AND SECTIONAL STEEL POLES, BASE MOUNTED

Nov 2015 | Rev 0

OPSD 2414.010



FABRICATION DATA		
Pole Length *a* m	Octagonal Bottom OD *b*	Round Bottom OD *b*
6.0	170	170
7.5	187	187
9.0	205	205
10.5	222	222
12.0	239	242
13.6	258	260
15.1	275	278

NOTES:

1 For octagonal poles, the diameter shall be measured across the flats.

2 Centreline of mounting plate and ground connector shall be 25mm above centreline of handhole.

A All shafts shall be 4.5mm thick steel.

B All dimensions are in millimetres unless otherwise shown.

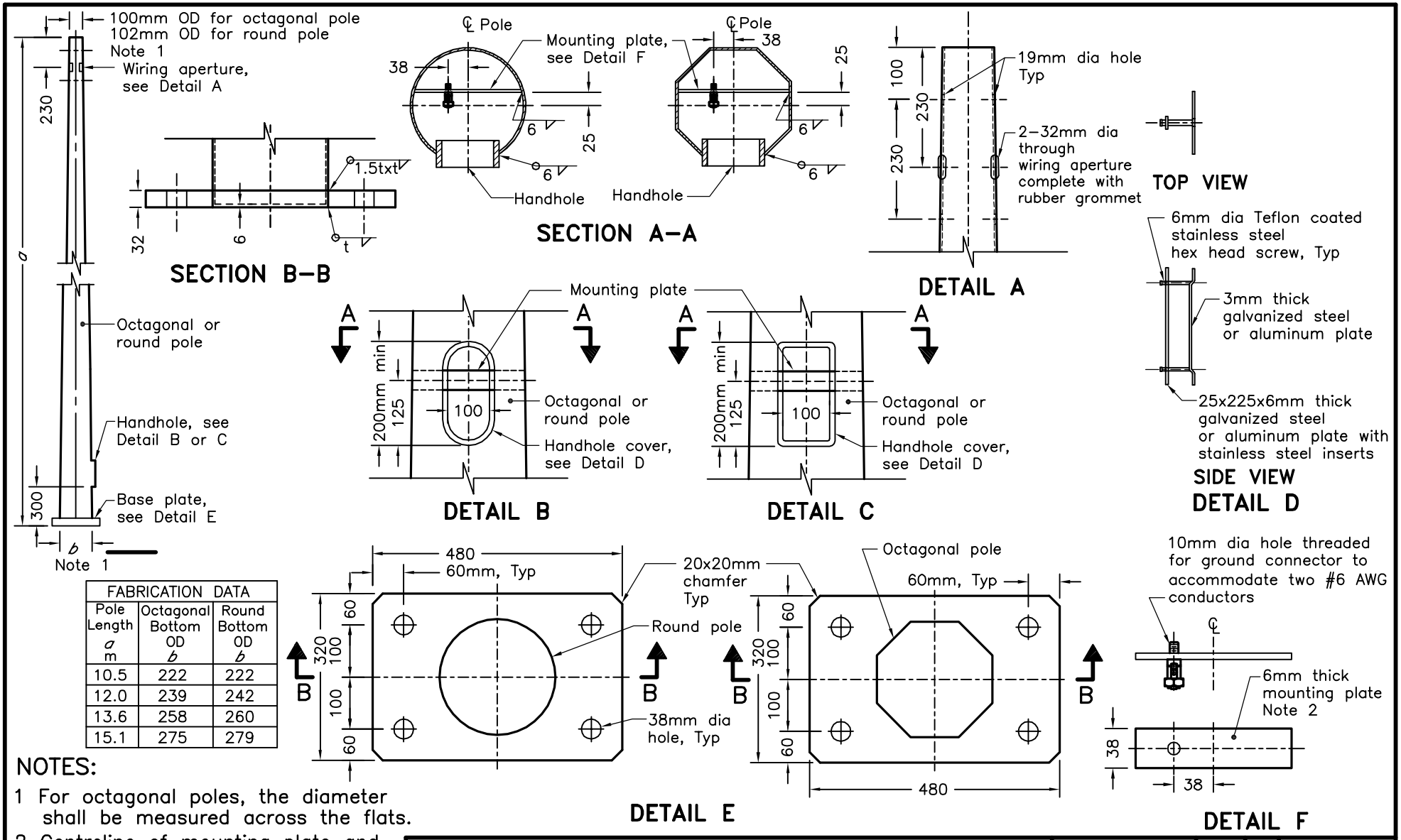
ONTARIO PROVINCIAL STANDARD DRAWING

STEEL POLE

BASE MOUNTED

Apr 2017 | Rev 1

OPSD 2415.011



FABRICATION DATA		
Pole Length a m	Octagonal Bottom OD b	Round Bottom OD b
10.5	222	222
12.0	239	242
13.6	258	260
15.1	275	279

NOTES:

1 For octagonal poles, the diameter shall be measured across the flats.

2 Centreline of mounting plate and ground connector shall be 25mm above centreline of handhole.

A All shafts shall be 4.5mm thick steel.

B All dimensions are in millimetres unless otherwise shown.

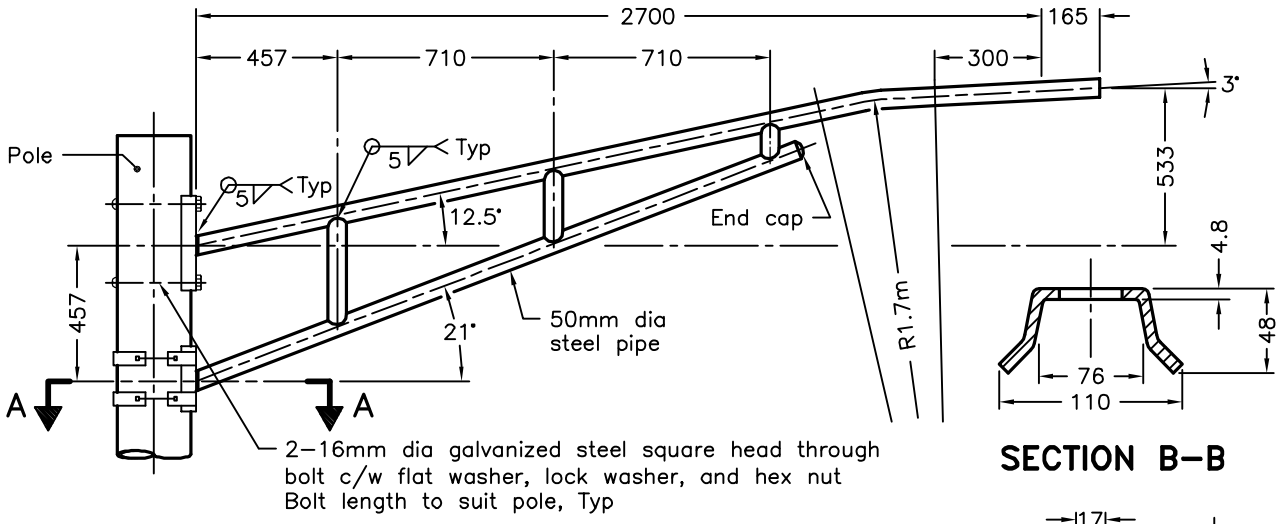
ONTARIO PROVINCIAL STANDARD DRAWING

Apr 2017 | Rev 1

STEEL POLE

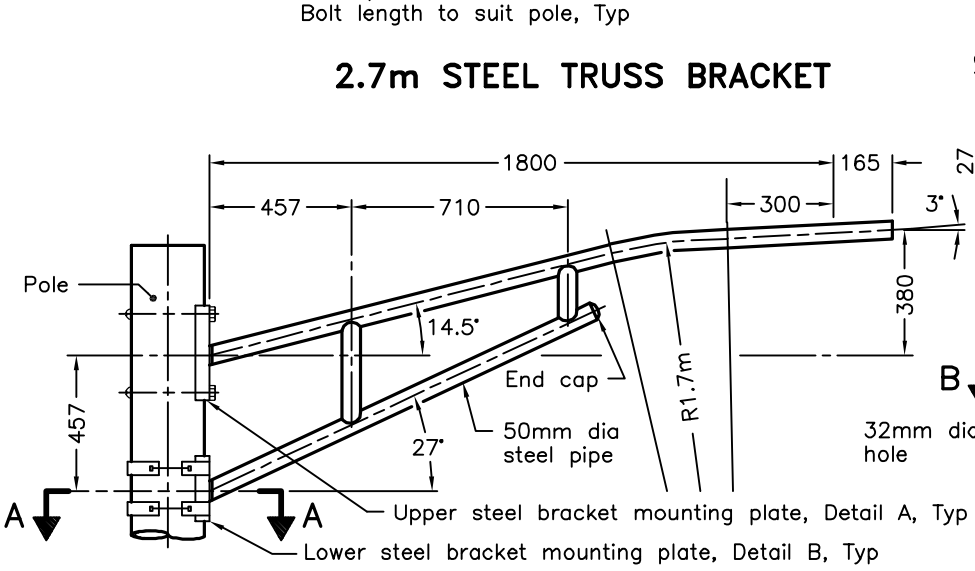
CONCRETE BARRIER BASE MOUNTED

OPSD 2416.011

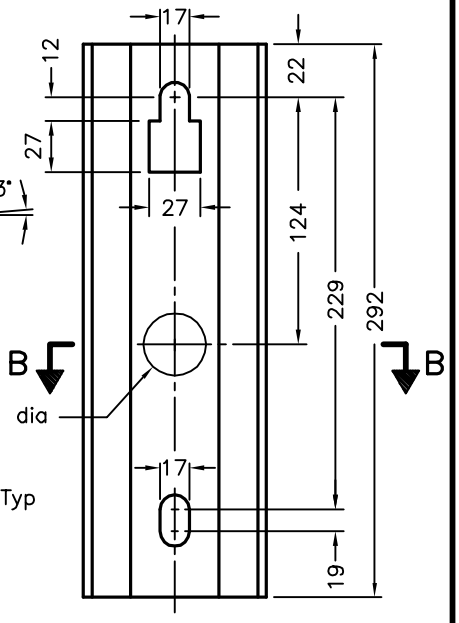


SECTION B–B

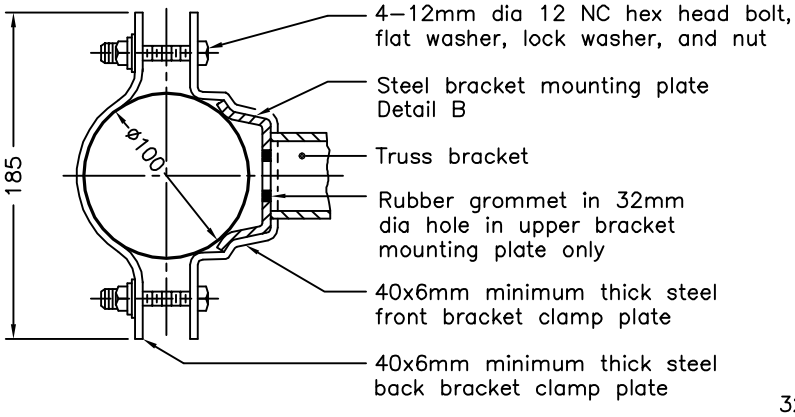
2.7m STEEL TRUSS BRACKET



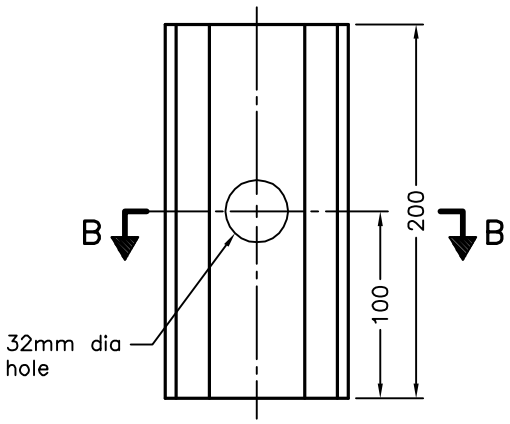
1.8m STEEL TRUSS BRACKET



DETAIL A



SECTION A–A

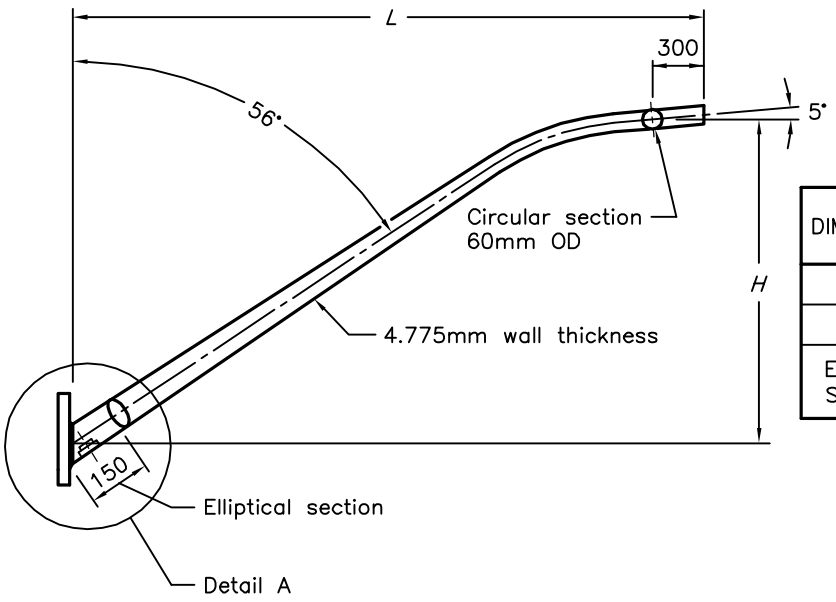


DETAIL B

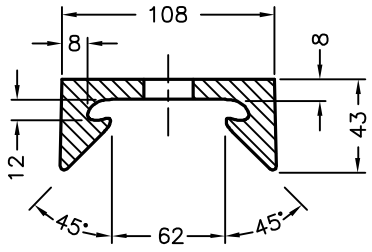
NOTES:

A All dimensions are in millimetres unless otherwise shown.

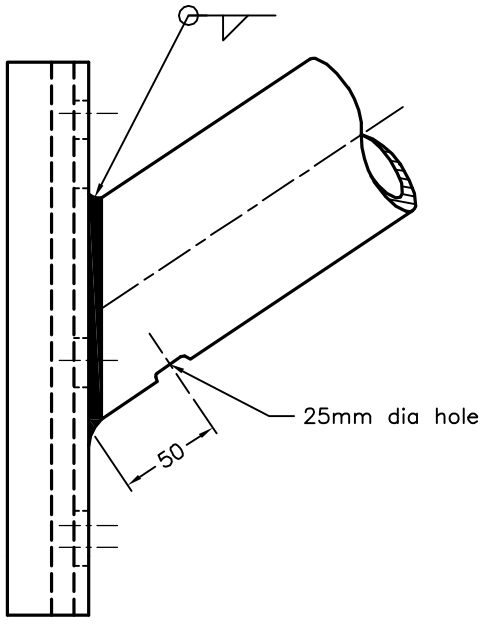
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	2
1.8m AND 2.7m STEEL TRUSS BRACKET FOR STEEL POLES			
			OPSD 2418.010



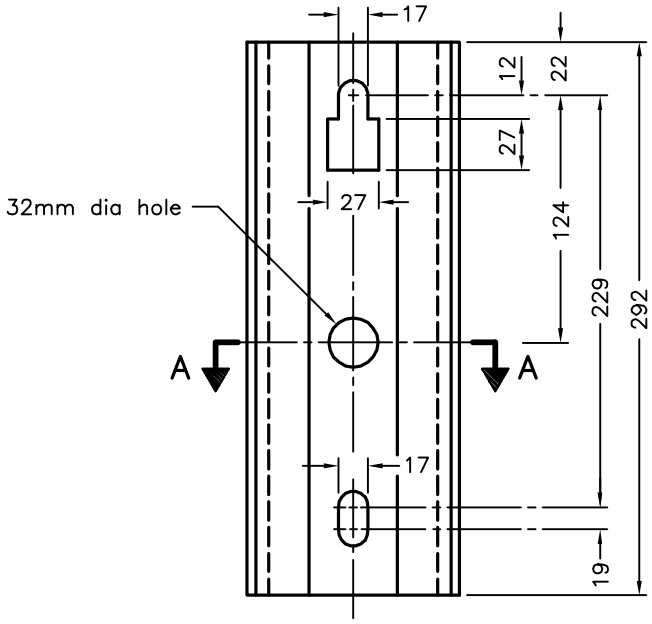
DIMENSION	BRACKET			
	1.8m	2.4m	3.0m	3.0m
L	1.8m	2.4m	3.0m	3.0m
H	0.9m	1.2m	1.2m	2.4m
Elliptical Section	64x108 mm OD	70x125 mm OD	70x125 mm OD	70x125 mm OD



SECTION A–A



DETAIL A



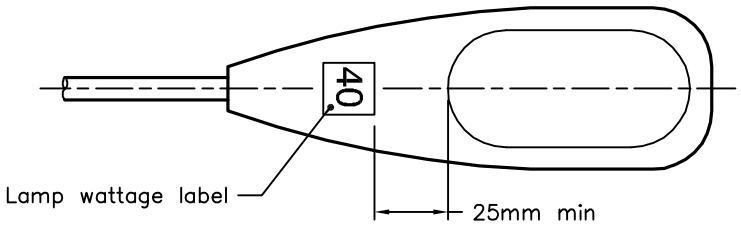
BRACKET BASE PLATE

NOTES:

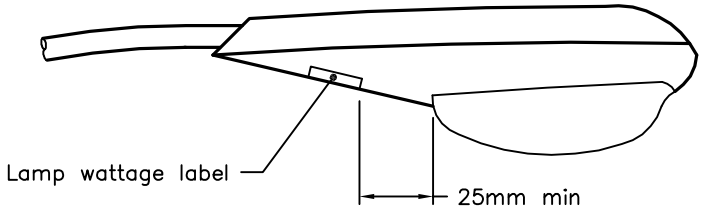
A For mounting details, see OPSD 2250.010.

B All dimensions are in millimetres unless otherwise shown.

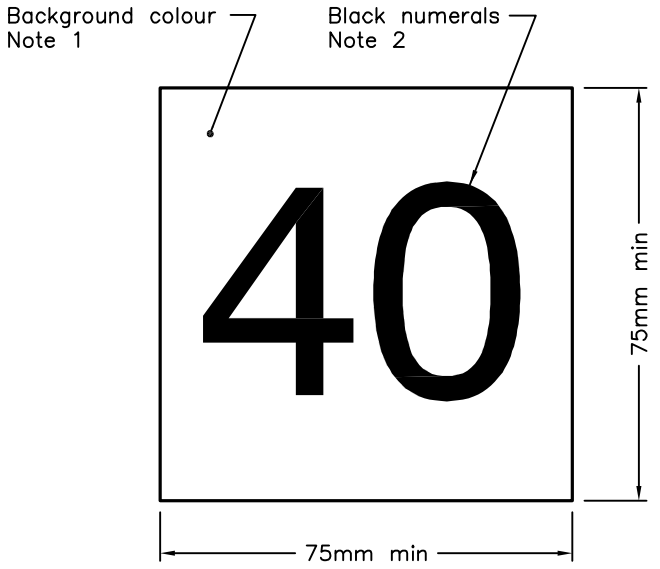
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	0
ALUMINUM TAPERED ELLIPTICAL BRACKET			
	OPSD 2420.010		



BOTTOM VIEW



SIDE VIEW



LABEL DIMENSIONS

TYPICAL LAMP WATTAGE CODES	
IDENTIFYING NUMERAL	LAMP WATTAGE
7	70 W
10	100 W
15	150 W
25	250 W
35	350 W
40	400 W

NOTES:

1 A gold background shall be used for high pressure sodium and fluorescent red background for the metal halide labels. Labels shall be made using high visibility reflective sheeting.

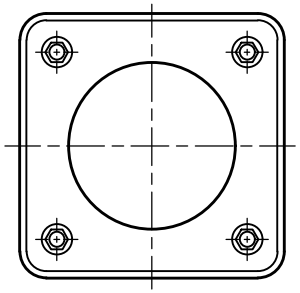
2 All numerals on the labels shall be black and made from 9mm wide line and numerals shall be minimum of 50mm high.

A Do not cover manufacturer's label.

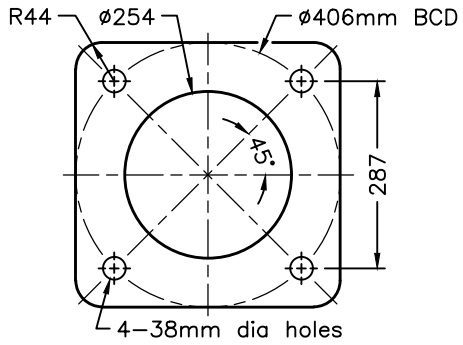
B Labels shall be the peel and stick type.

C All dimensions are in millimetres unless otherwise shown.

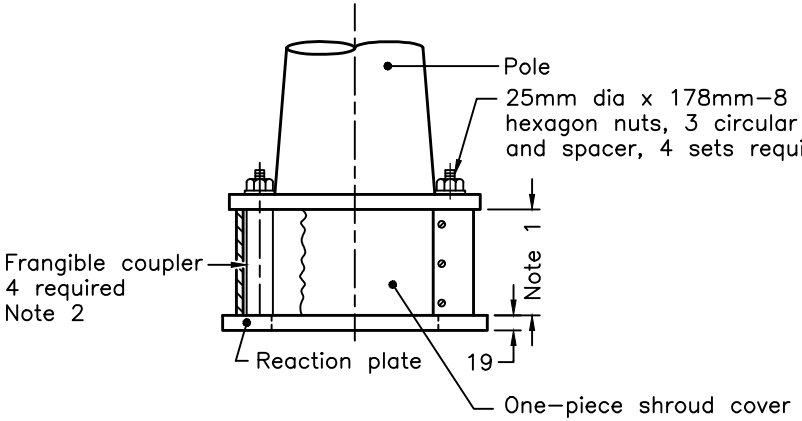
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
LAMP WATTAGE LABEL FOR LUMINAIRE			
	OPSD 2421.010		



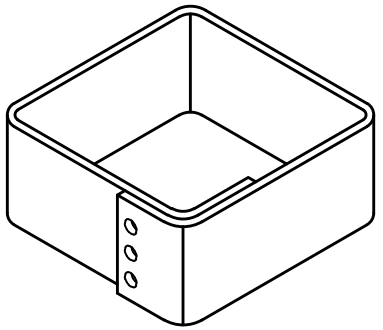
TOP VIEW



REACTION PLATE DETAIL



FRONT VIEW



ONE–PIECE SHROUD COVER

NOTES:

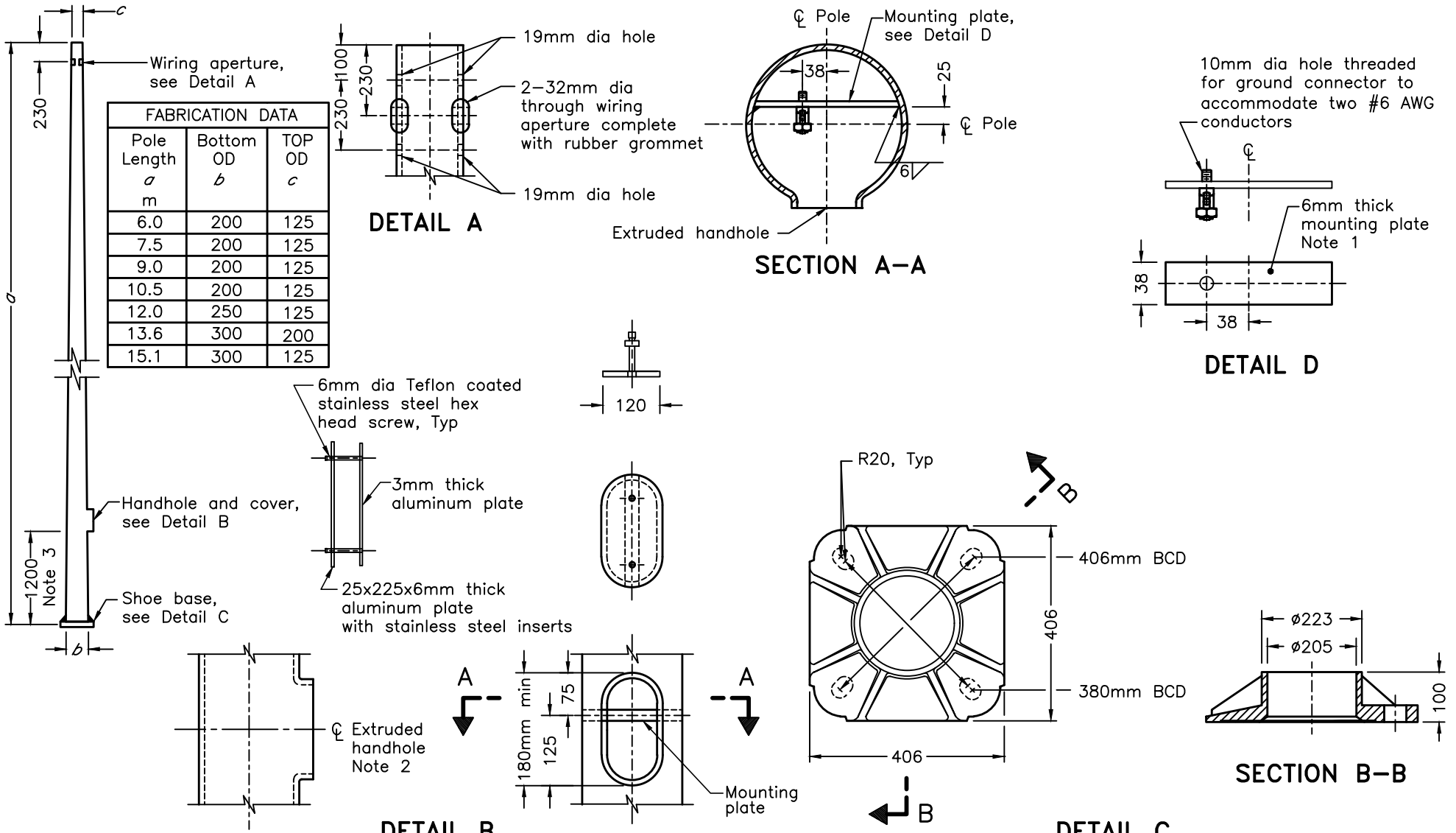
1 Height to suit coupler assembly.
2 Frangible couplers as specified.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

FRANGIBLE BASES

Nov 2020 | Rev 4

OPSD 2428.010



NOTES:

1 Centreline of mounting plate and service post connector shall be 25mm above centreline of handhole.
2 Extruded handhole is shown. Welded cast frame is acceptable.
3 When on bridge, handhole shall be adjusted to suit barrier/railing.
A All dimensions are in millimetres unless otherwise shown.

FABRICATION DATA		
Pole Length *a* m	Bottom OD *b*	TOP OD *c*
6.0	200	125
7.5	200	125
9.0	200	125
10.5	200	125
12.0	250	125
13.6	300	200
15.1	300	125

ONTARIO PROVINCIAL STANDARD DRAWING

ALUMINUM POLE

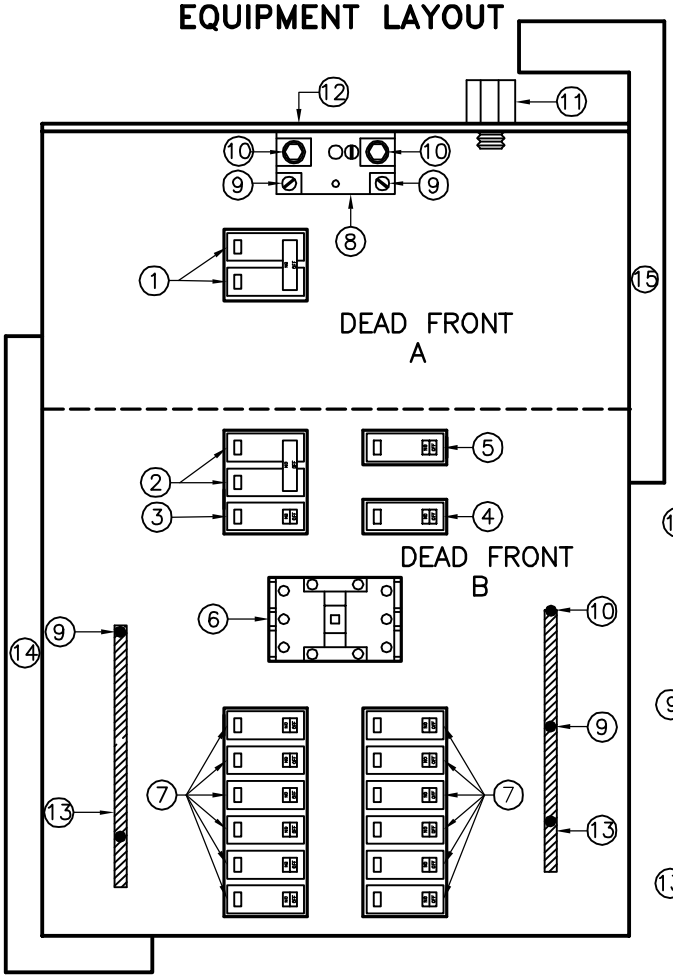
BASE MOUNTED

Nov 2020 | Rev 2

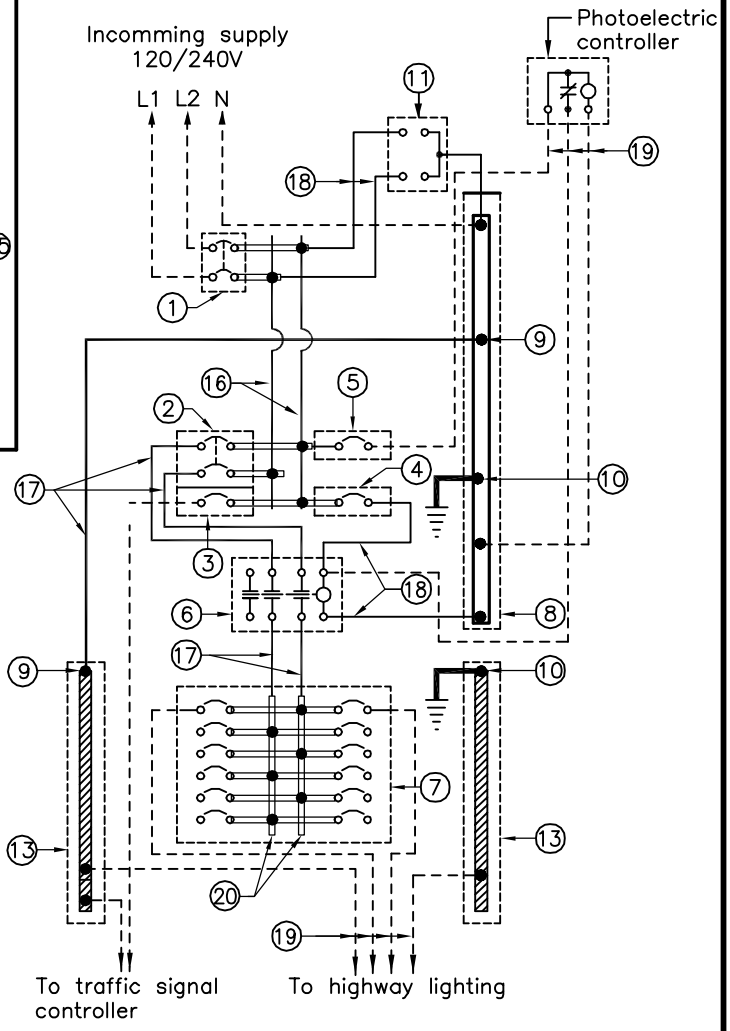
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OPSD 2432.010

EQUIPMENT LAYOUT



SCHEMATIC WIRING DIAGRAM



ELECTRICAL EQUIPMENT LIST

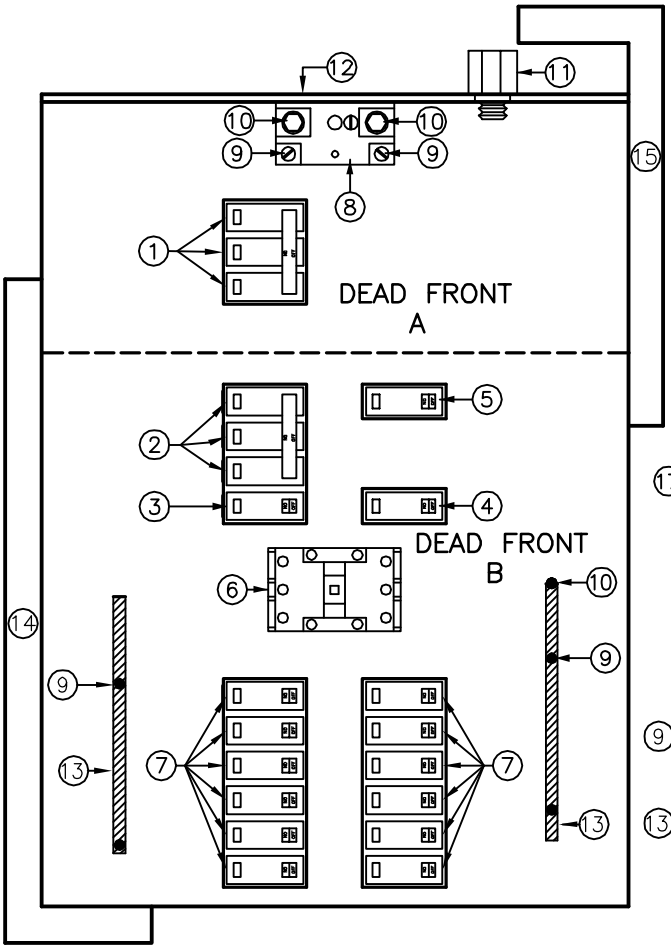
1. Main circuit breaker – 100A, 2–pole
2. Lighting circuit breaker – 60A, 2–pole
3. Traffic signal circuit breaker – 1–pole, ampacity as specified
4. Circuit breaker used for relamping – 15A, 1–pole
5. Circuit breaker for photoelectric controller – 15A, 1–pole
6. Lighting contactor – 60A, 2–pole, 120V coil
7. Branch circuit breakers – 30A, 1–pole, number of breakers as specified
8. Solid neutral assembly – 100A minimum, copper
9. Ground lug for No. 6 AWG stranded copper ground wire
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:

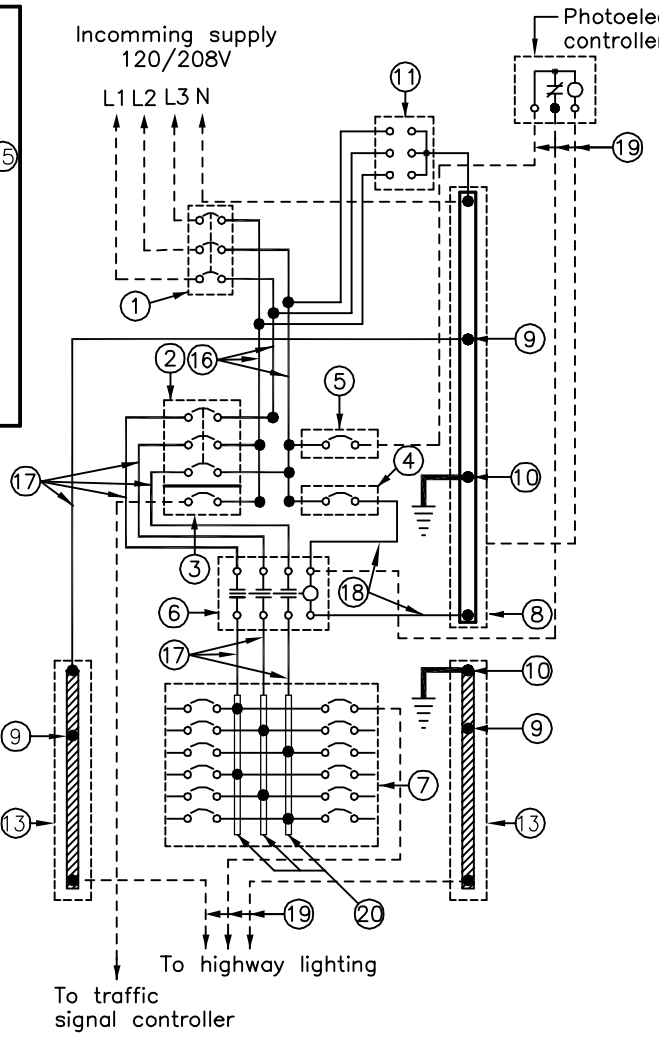
A This OPSD shall be read in conjunction with OPSD 2440.030, 2440.050, and 2440.060.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	1
SUPPLY CONTROL CABINET ASSEMBLY TYPE 1 **120/240V, 100A, 1–PHASE, 3–WIRE**	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _		
	OPSD 2440.010		

EQUIPMENT LAYOUT



SCHEMATIC WIRING DIAGRAM



ELECTRICAL EQUIPMENT LIST

(1) Main circuit breaker – 100A, 3–pole

(2) Lighting circuit breaker – 60A, 3–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, 3–pole, 120V coil

(7) Branch circuit breakers – 30A, 1–pole, number of breakers as specified

(8) Solid neutral assembly – 150A minimum, copper

(9) Ground lug for No. 6 AWG stranded copper ground wire

(10) Ground lug for No. 2/0 AWG stranded copper ground wire

(11) Secondary lightning arrester, 650V, 3–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:

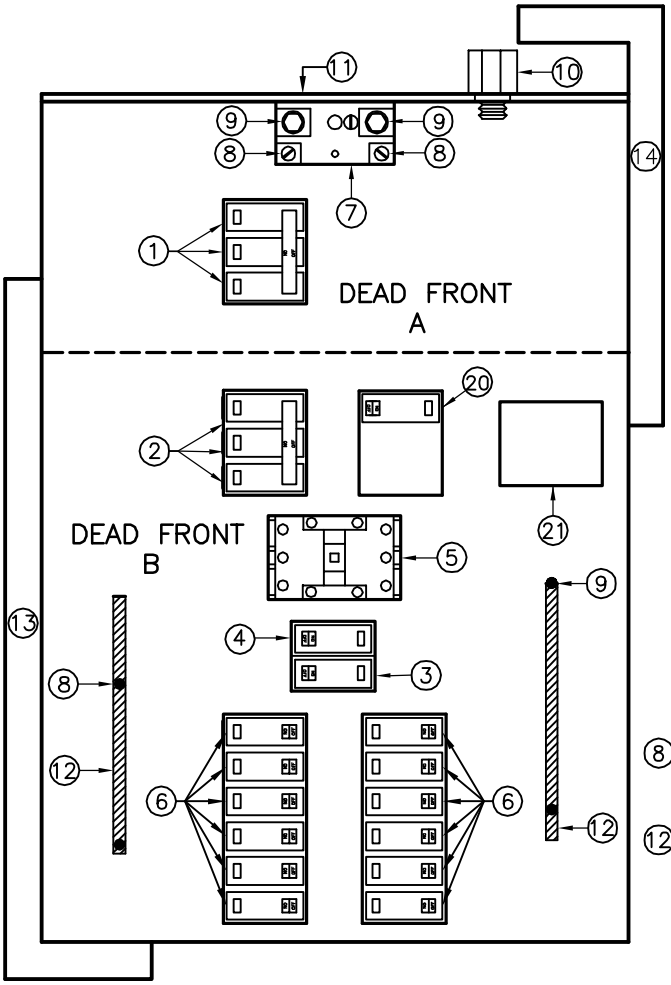
A This OPSD shall be read in conjunction with OPSD 2440.030, 2440.050, and 2440.060.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2014 | Rev 1

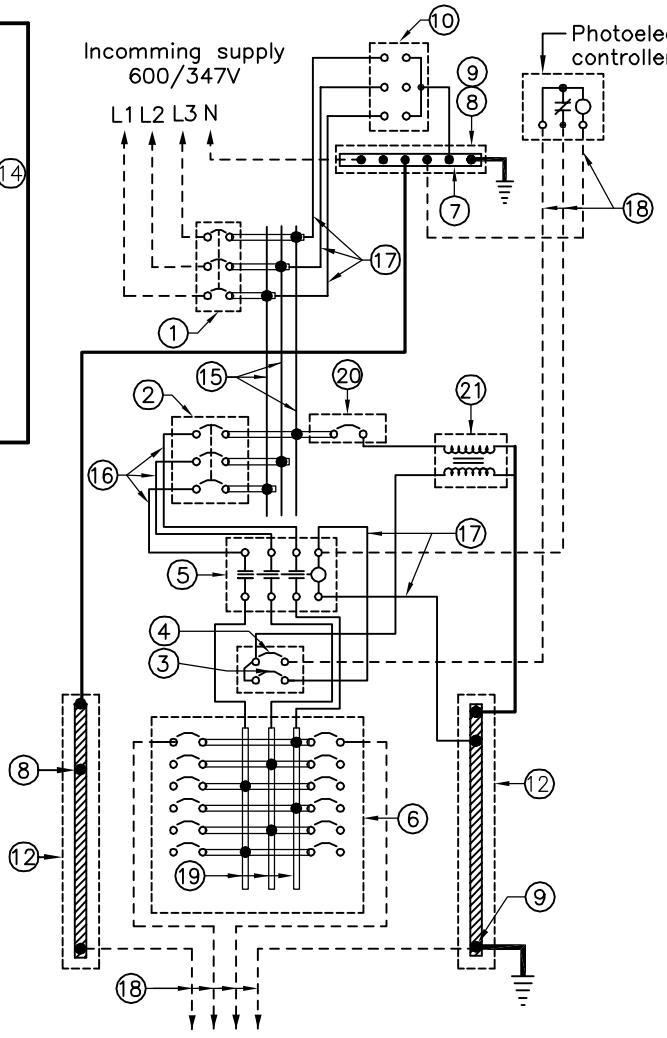
SUPPLY CONTROL CABINET ASSEMBLY TYPE 2
120/208V, 100A, 3–PHASE, 4–WIRE

OPSD 2440.020

EQUIPMENT LAYOUT



SCHEMATIC WIRING DIAGRAM



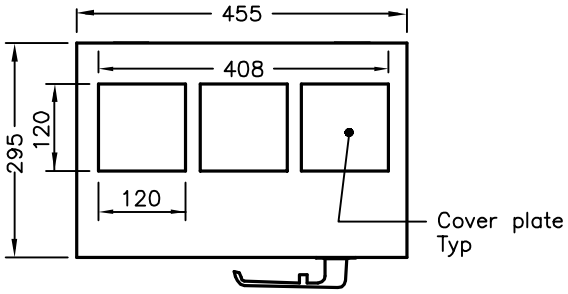
ELECTRICAL EQUIPMENT LIST

1. Main circuit breaker – 600V, 100A, 3–pole
2. Lighting circuit breaker – 600V, 60A, 3–pole
3. Circuit breaker used for relamping – 120/240V, 10A, 1–pole
4. Circuit breaker for photoelectric controller – 120/240V, 10A, 1–pole
5. Lighting contactor – 600V, 100A, 3–pole, 120V coil
6. Branch circuit breakers – 600/347V, 30A, 1–pole, number of breakers as specified
7. Solid neutral assembly – 100A minimum, copper
8. Ground lug for No. 6 AWG stranded copper ground wire
9. Ground lug for No. 2/0 AWG stranded copper ground wire
10. Secondary lightning arrester, 650V, 3–pole
11. Drip shield
12. Secondary neutral and ground bus according to CSA and as specified
13. Primary barrier
14. Secondary barrier
15. No. 3 AWG RWU90 wire or copper bus bar
16. No. 6 AWG RWU90 wire
17. No. 12 AWG RWU90 wire
18. Field wiring
19. Copper bus bar
20. Circuit breaker for transformer, 600V, 15A
21. 347/120V 75VA control transformer

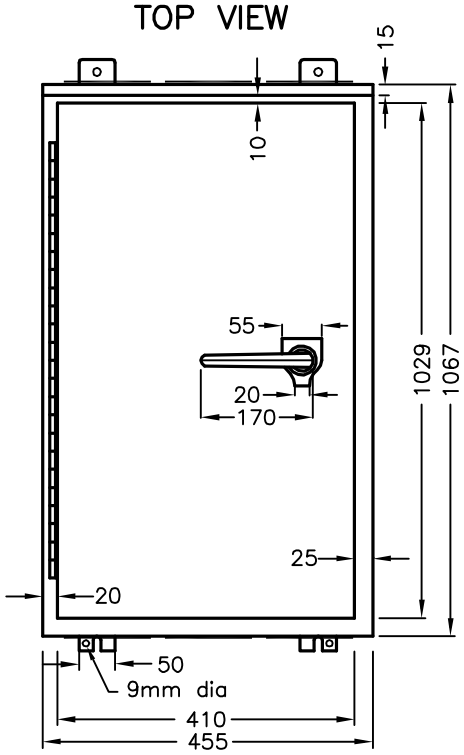
NOTE:

A This OPSD shall be read in conjunction with OPSD 2440.030, 2440.050, and 2440.060.

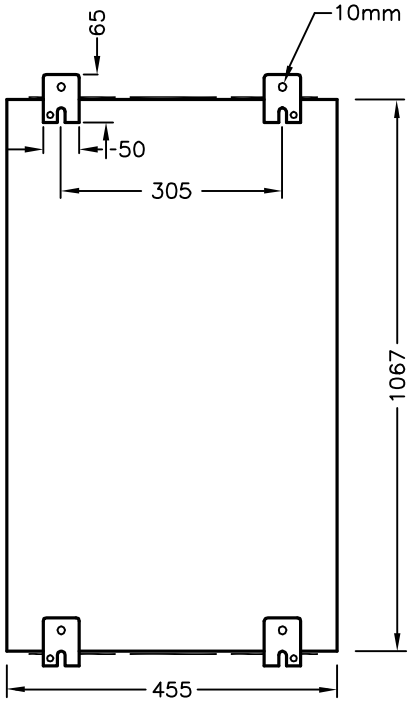
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	0
SUPPLY CONTROL CABINET ASSEMBLY TYPE 2 **600/347V, 100A, 3–PHASE, 4–WIRE**			
			OPSD 2440.021



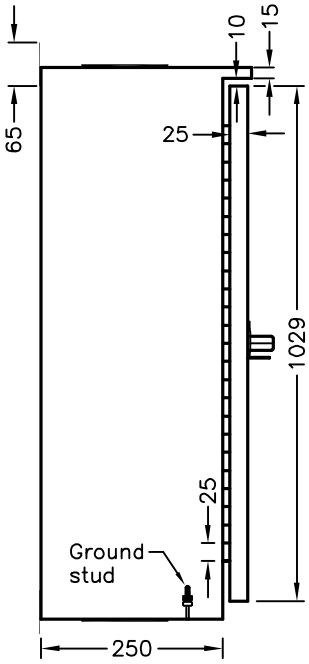
TOP VIEW



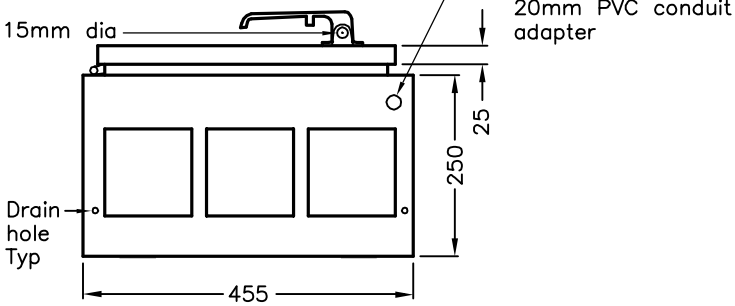
FRONT VIEW



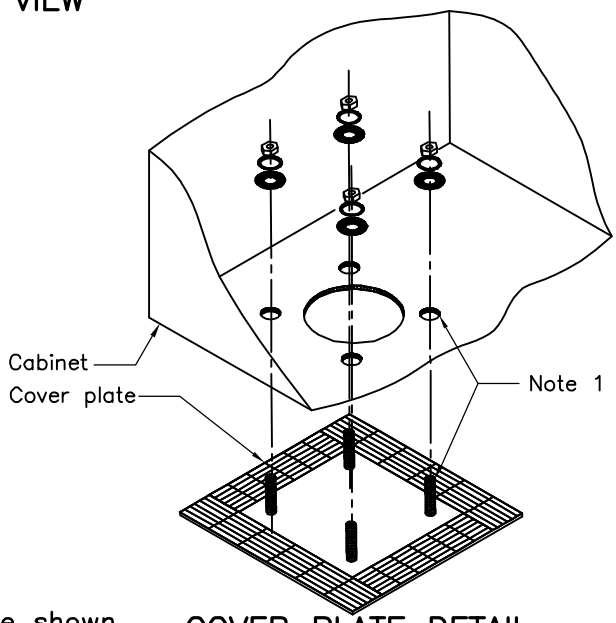
BACK VIEW



SIDE VIEW



BOTTOM VIEW



COVER PLATE DETAIL

NOTES:

1 Bolt and hole pattern shall suit meter hub.

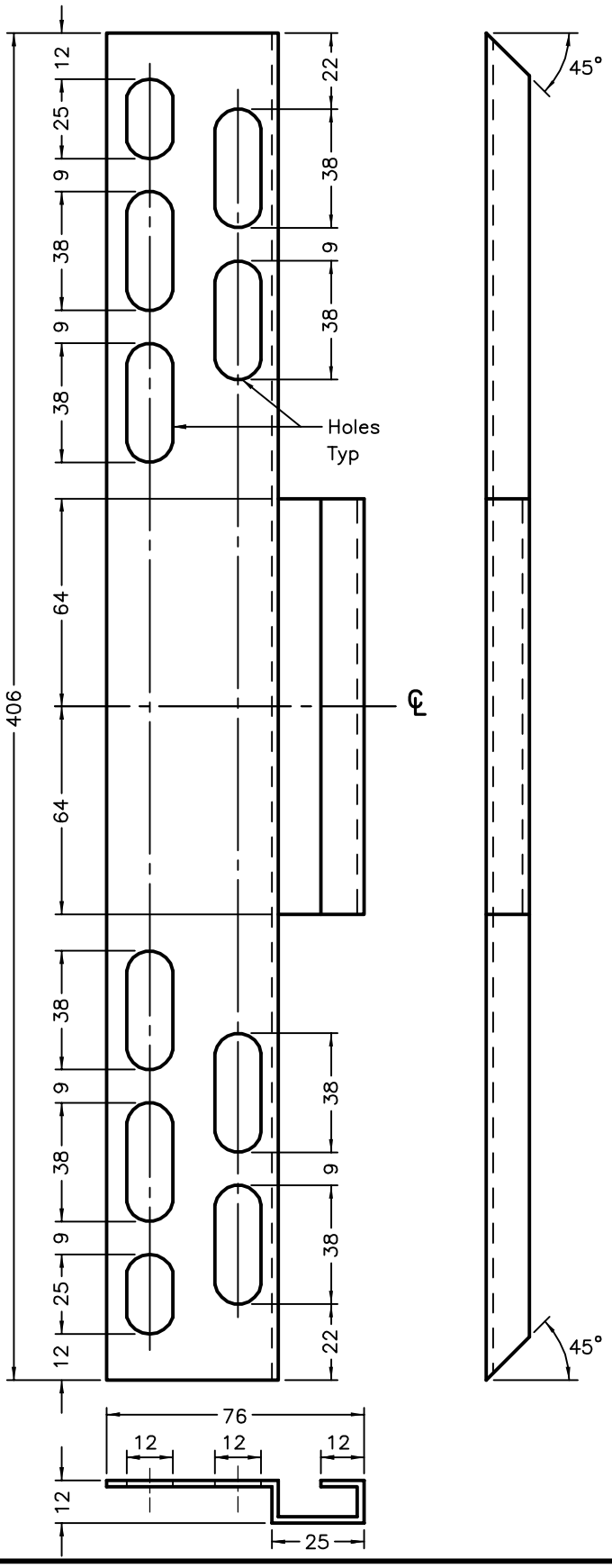
A All dimensions are in millimetres unless otherwise shown.

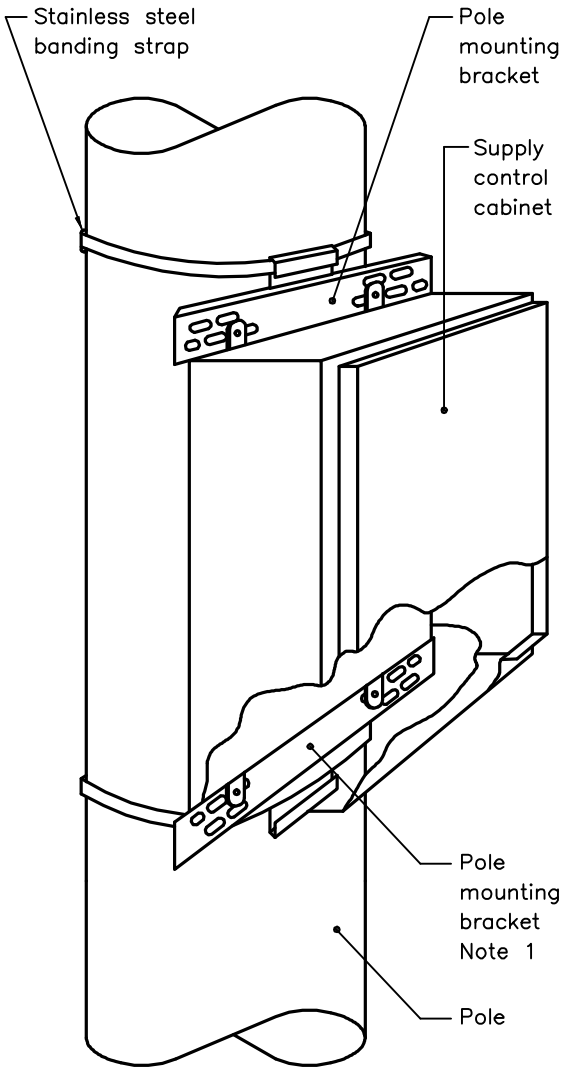
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2014 | Rev 1

SUPPLY CONTROL CABINET ASSEMBLY TYPE 1 AND 2 ENCLOSURE

OPSD 2440.030





NOTES:

1 The pole mounting bracket for supply control cabinet assembly shall be #11 gauge stainless steel.

A All burrs and sharp corners shall be removed.

B Pole mounting bracket is required only when the supply cabinet does not have built–in pole mounting provision.

C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

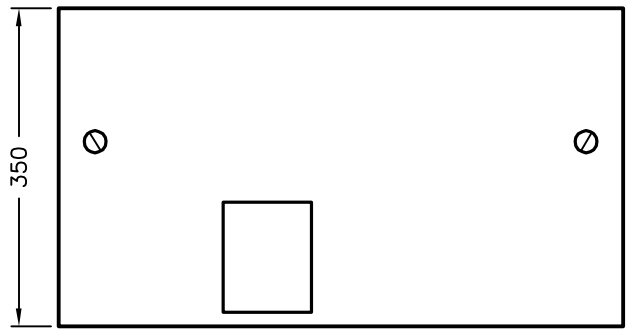
Nov 2014 | Rev 1

POLE MOUNTING BRACKET

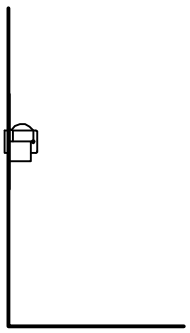
FOR SUPPLY CONTROL CABINET ASSEMBLY

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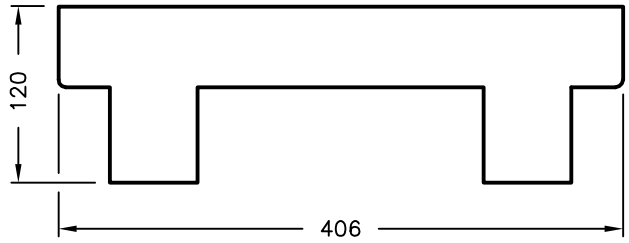
OPSD 2440.04



FRONT VIEW

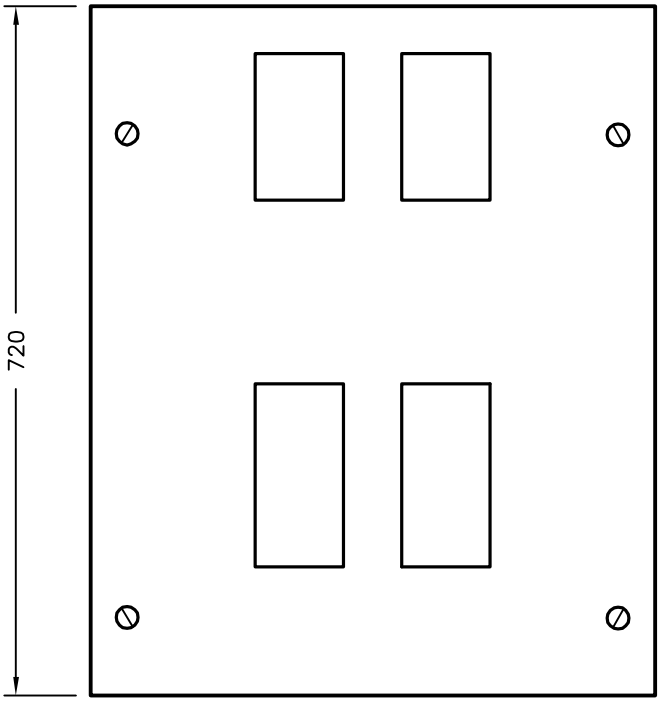


SIDE VIEW

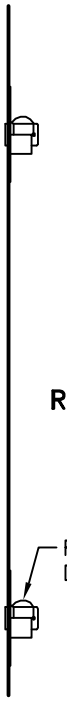


BOTTOM VIEW, Note 1

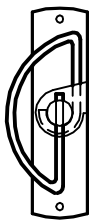
DEAD FRONT A



FRONT VIEW



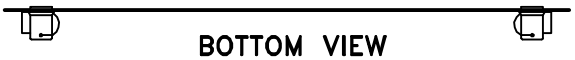
SIDE VIEW



BACK VIEW OF
RETAINING SCREW

DETAIL A

Retaining screw
Detail A



BOTTOM VIEW

DEAD FRONT B

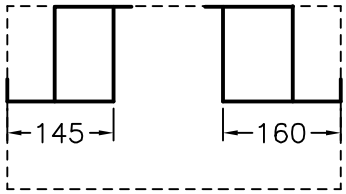
NOTES:

1 Size and position of openings to suit main and branch circuit breakers.

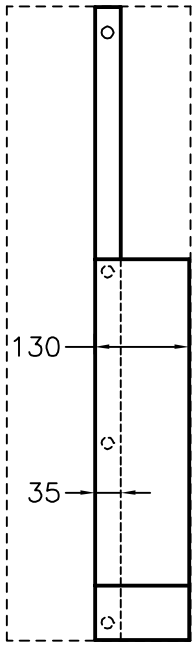
A Tolerances shall be within ±3mm unless otherwise shown.

B All dimensions are in millimetres unless otherwise shown.

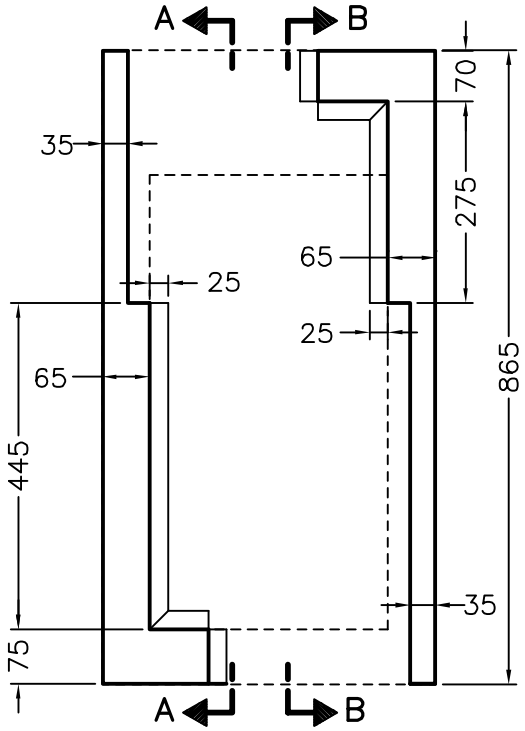
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	1
SUPPLY CONTROL CABINET ASSEMBLY TYPE 1 AND 2 DEAD FRONT PANELS			
	OPSD 2440.050		



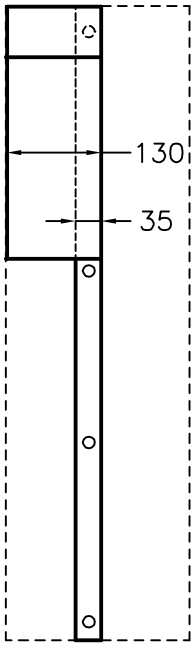
TOP VIEW



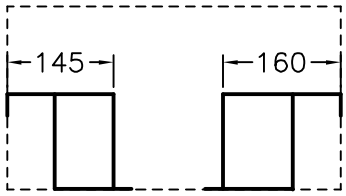
SECTION A–A



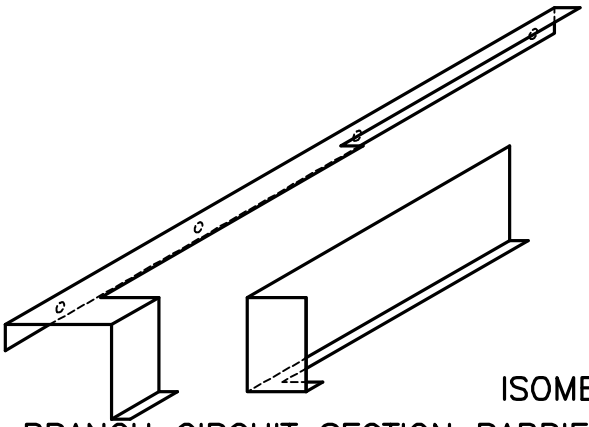
FRONT VIEW



SECTION B–B

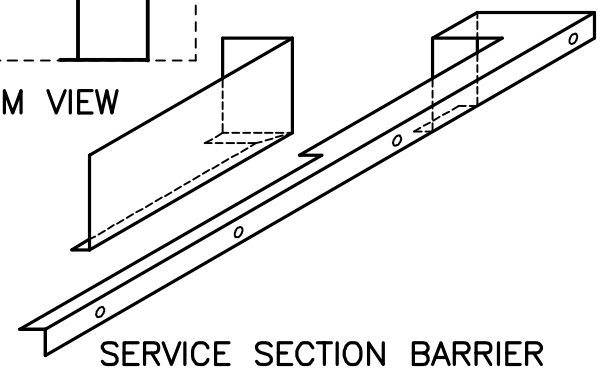


BOTTOM VIEW



ISOMETRIC VIEW

BRANCH CIRCUIT SECTION BARRIER



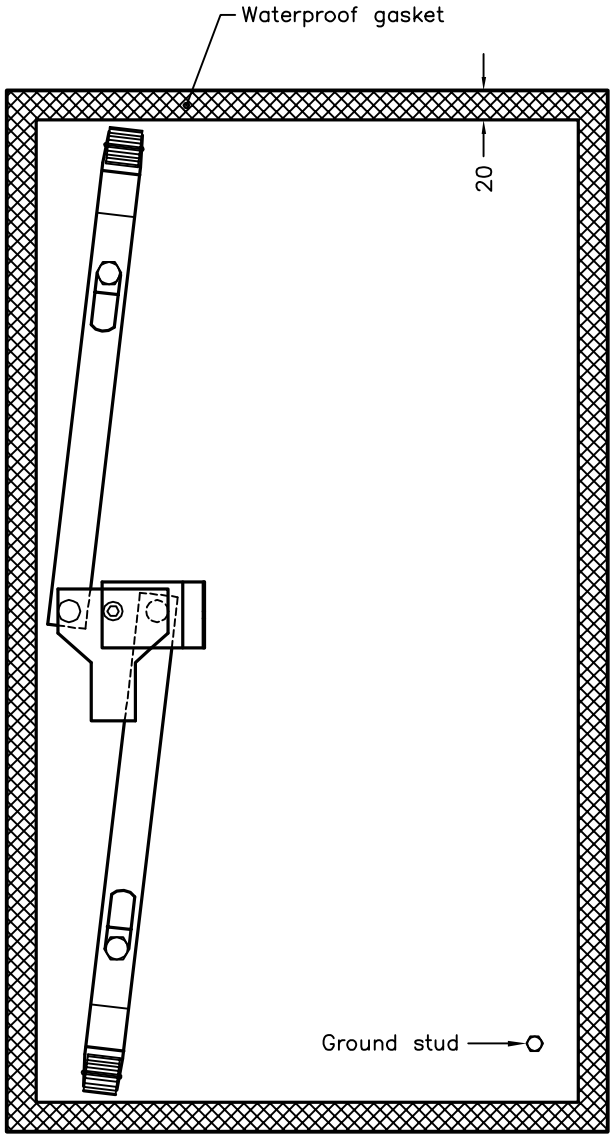
SERVICE SECTION BARRIER

NOTES:

A All dimensions are shown for guidance only. Dimensions shall be modified as nesessary to meet the requirements of the Ontario Electrical Safety Code.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	0
SUPPLY CONTROL CABINET ASSEMBLY TYPE 1 AND 2 BARRIER DETAILS			
	OPSD 2440.051		



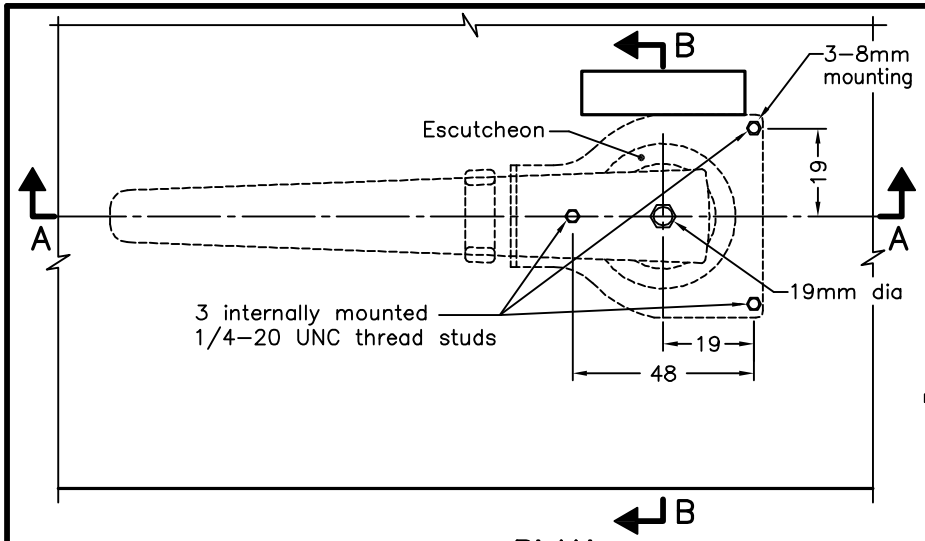
INSIDE DOOR VIEW

NOTES:

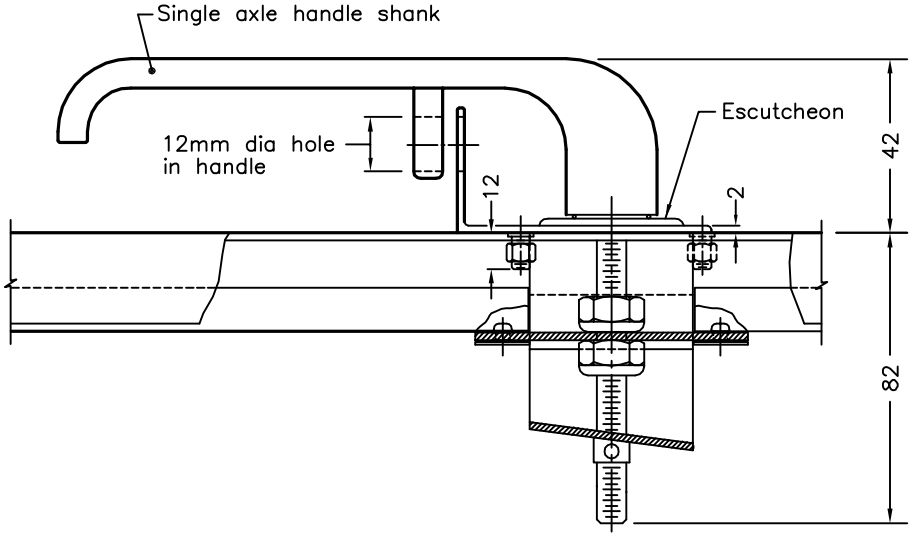
A Tolerances shall be within ±3mm unless otherwise shown.

B All dimensions are in millimetres unless otherwise shown.

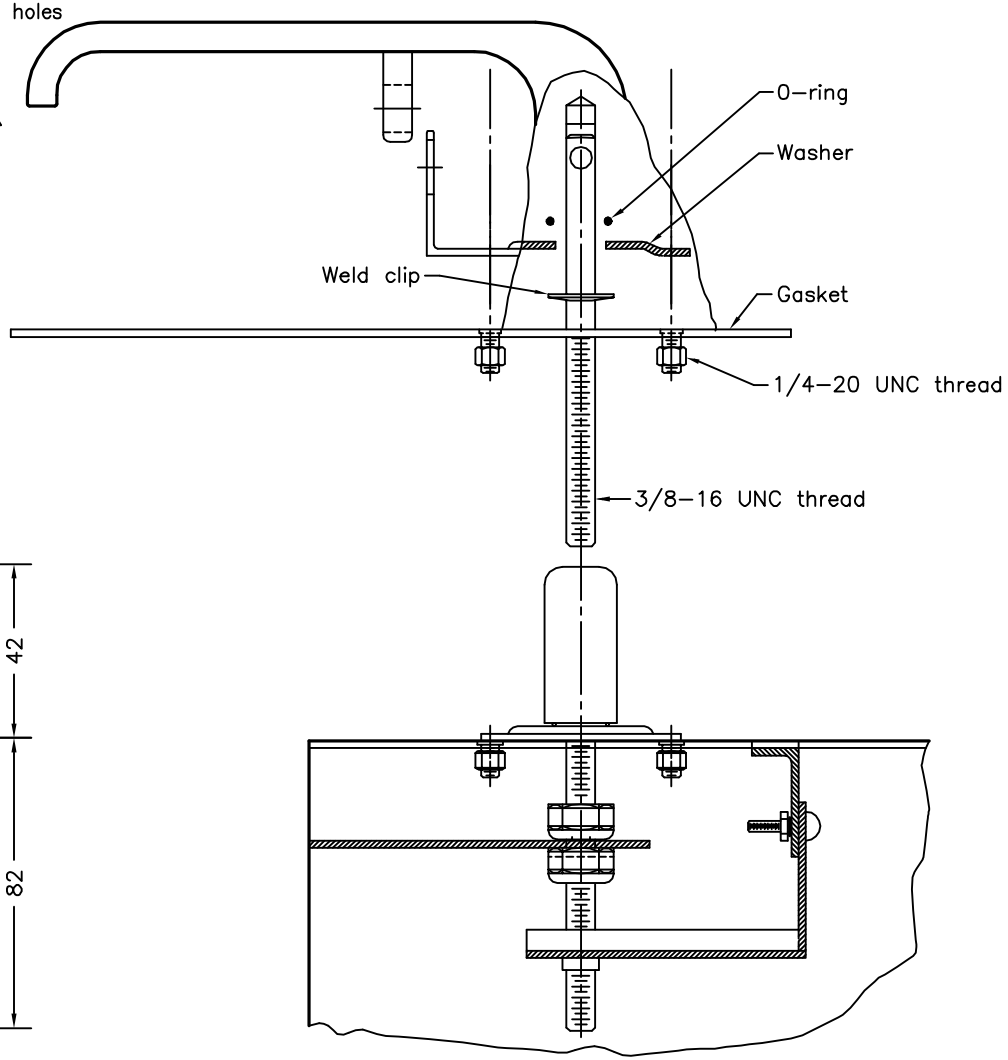
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	1
SUPPLY CONTROL CABINET ASSEMBLY TYPE 1 AND 2 3–POINT DOOR LATCH			
	OPSD 2440.060		



PLAN



SECTION A–A



SECTION B–B

NOTES:

A Door handle shall be stainless steel with threaded shank, blind mount escutcheon, and o–ring and gasket.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

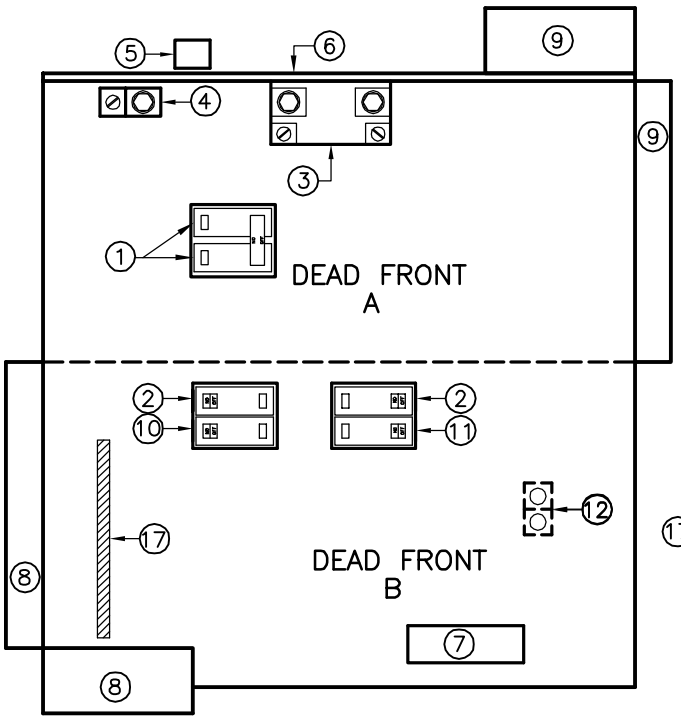
SUPPLY CONTROL CABINET ASSEMBLY TYPE 1, 2, AND 3

3–POINT STAINLESS STEEL DOOR HANDLE

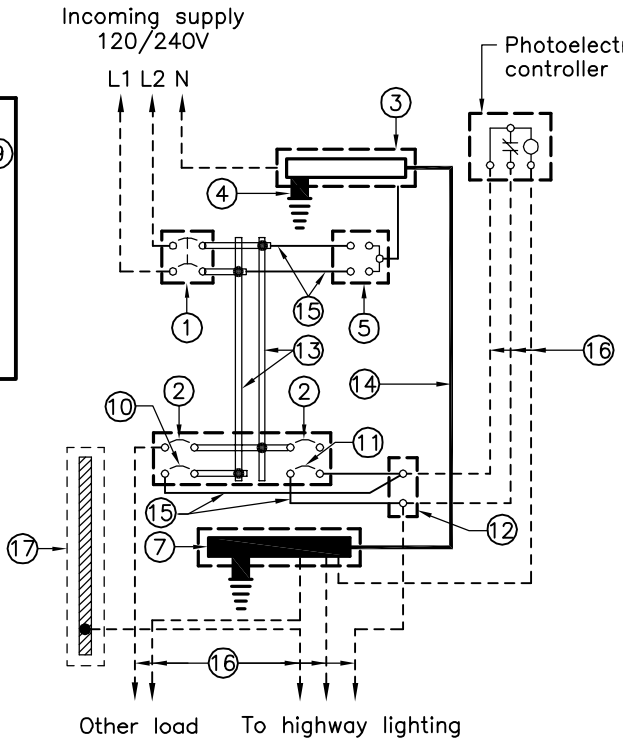
Nov 2014 | Rev | 0

OPSD 2440.061

EQUIPMENT LAYOUT



SCHEMATIC WIRING DIAGRAM



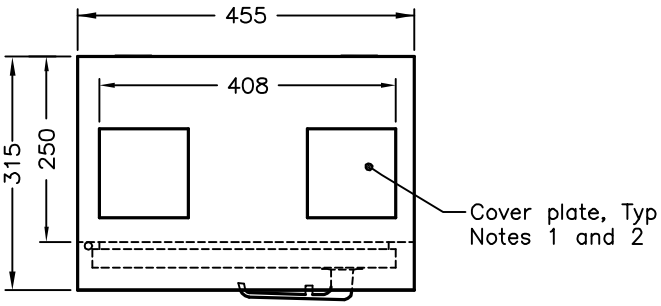
ELECTRICAL EQUIPMENT LIST

1. Main circuit breaker – 100A, 2–pole
2. Branch circuit breakers – 1–pole
3. Solid neutral assembly – 100A minimum
4. Ground lug for No. 2/0 AWG stranded copper ground wire
5. Secondary lightning arrester – 650V, 2–pole
6. Drip shield
7. Secondary neutral
8. Primary barrier
9. Secondary barrier
10. Circuit breaker for photoelectric controller and lighting – 15A, 1–pole
11. Circuit breaker for relamping – 15A, 1–pole
12. Terminal block
13. Copper bus bar
14. No. 6 AWG RWU 90 wire
15. No. 12 AWG RWU 90 wire
16. Field wiring
17. Bond bus

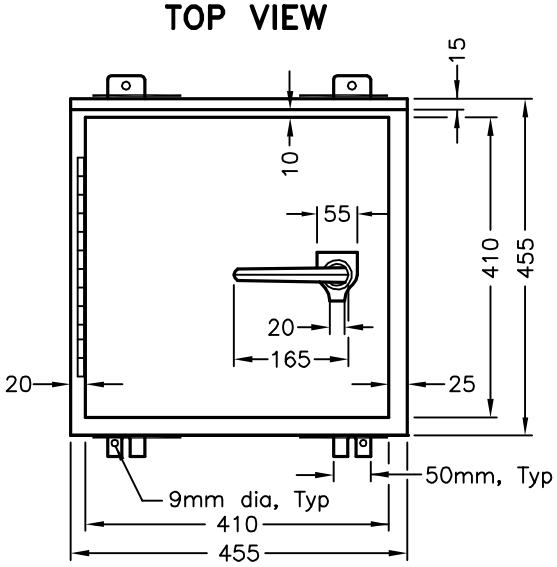
NOTE:

A This OPSD shall be read in conjunction with OPSD 2441.010, 2441.020, and 2441.030.

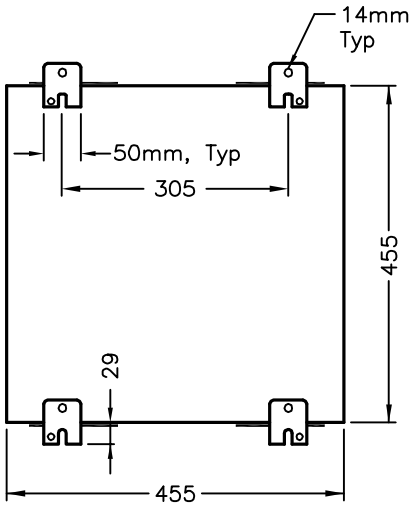
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	1
SUPPLY CONTROL CABINET ASSEMBLY TYPE 3 **120/240V, 100A, 1–PHASE, 3–WIRE**			
			OPSD 2441.000



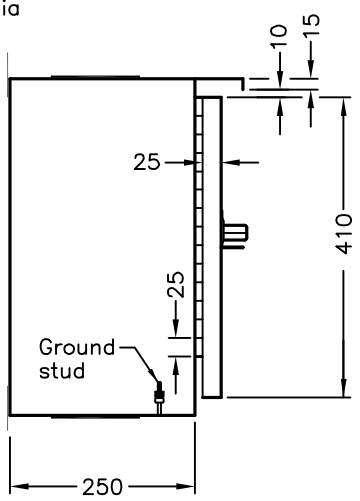
TOP VIEW



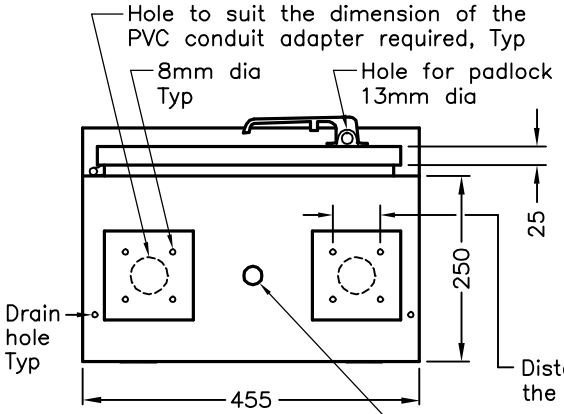
FRONT VIEW



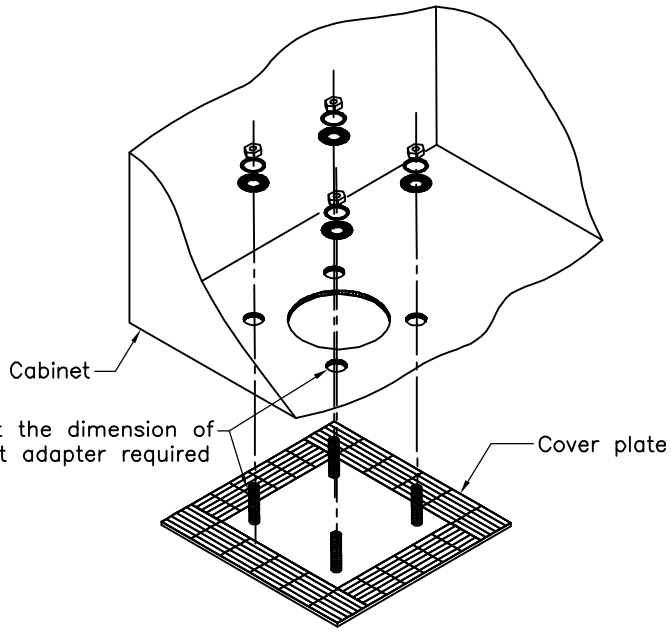
BACK VIEW



SIDE VIEW



BOTTOM VIEW



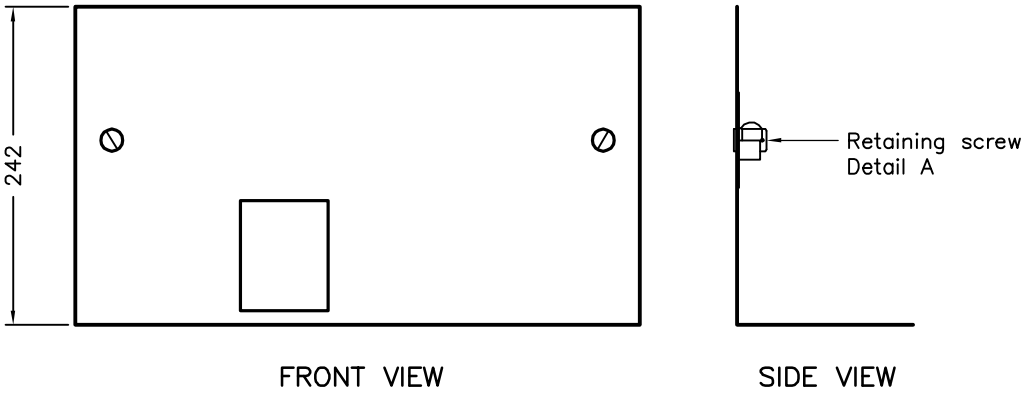
COVER PLATE DETAIL

NOTES:

1 All plates shall suit the dimensions and quantity of the PVC conduit adapter required.
2 Bolt and hole pattern shall suit meter hub.

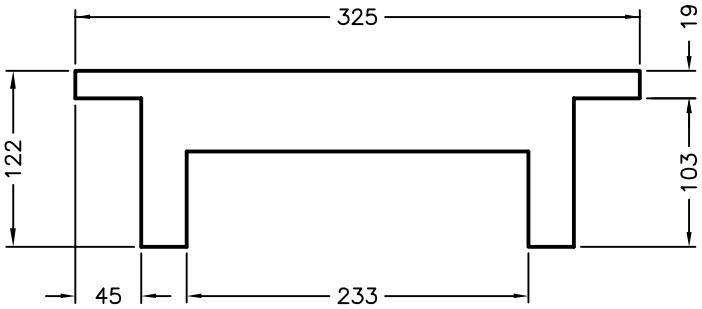
A Tolerances shall be within ±3mm unless otherwise shown.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	1
SUPPLY CONTROL CABINET ASSEMBLY TYPE 3 ENCLOSURE			
	OPSD 2441.010		



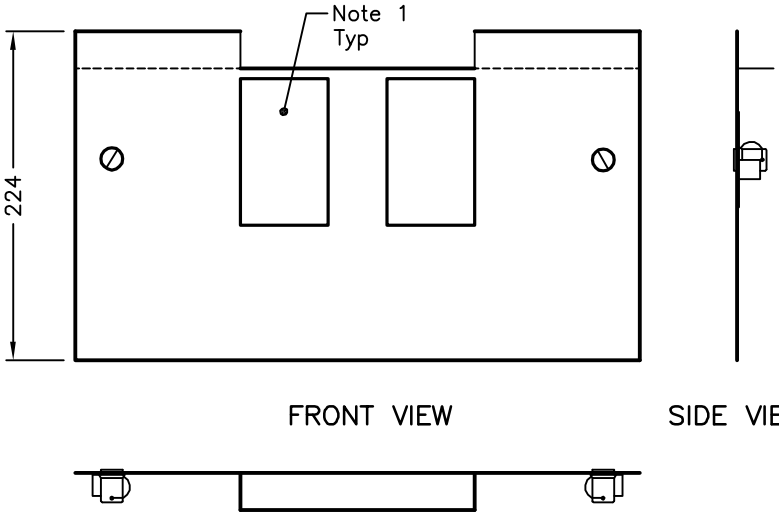
FRONT VIEW

SIDE VIEW



BOTTOM VIEW

DEAD FRONT A

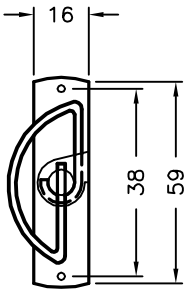


FRONT VIEW

SIDE VIEW

BOTTOM VIEW

DEAD FRONT B



BACK VIEW OF
RETAINING SCREW

DETAIL A

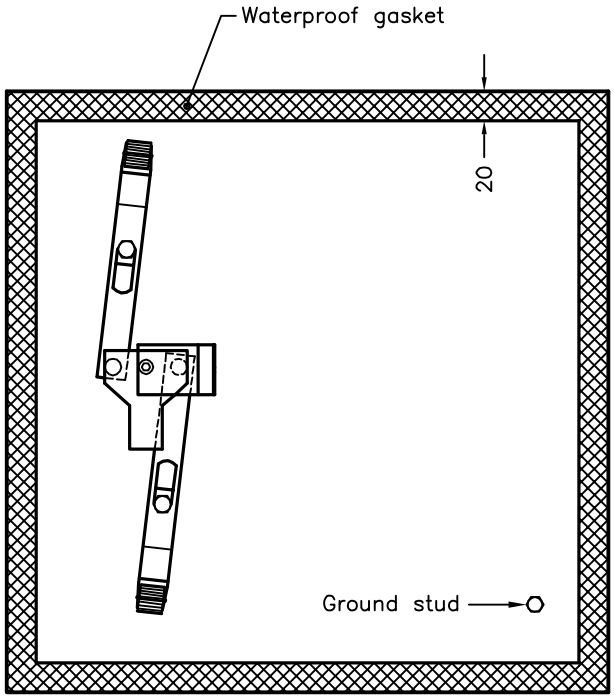
NOTES:

1 Size and position of openings to suit main and branch circuit breakers.

A All dimensions are shown for guidance only. Dimensions shall be modified as necessary to meet the requirements of the Ontario Electrical Safety Code.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	1
SUPPLY CONTROL CABINET ASSEMBLY TYPE 3 DEAD FRONT PANELS			
	OPSD 2441.020		



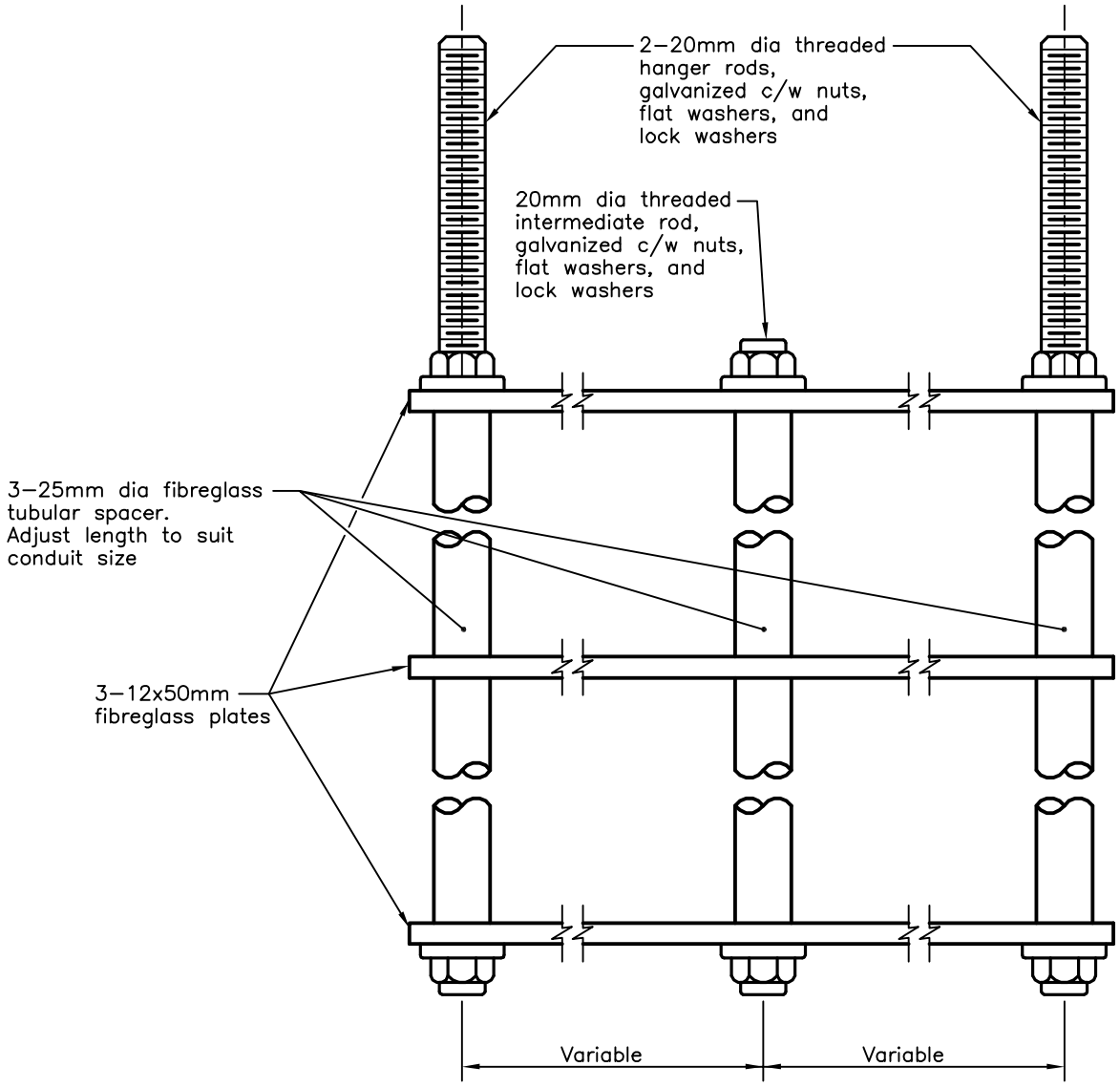
INSIDE DOOR VIEW

NOTES:

A Tolerances shall be within ±3mm unless otherwise shown.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	0
SUPPLY CONTROL CABINET ASSEMBLY TYPE 3 3–POINT DOOR LATCH			
	OPSD 2441.030		



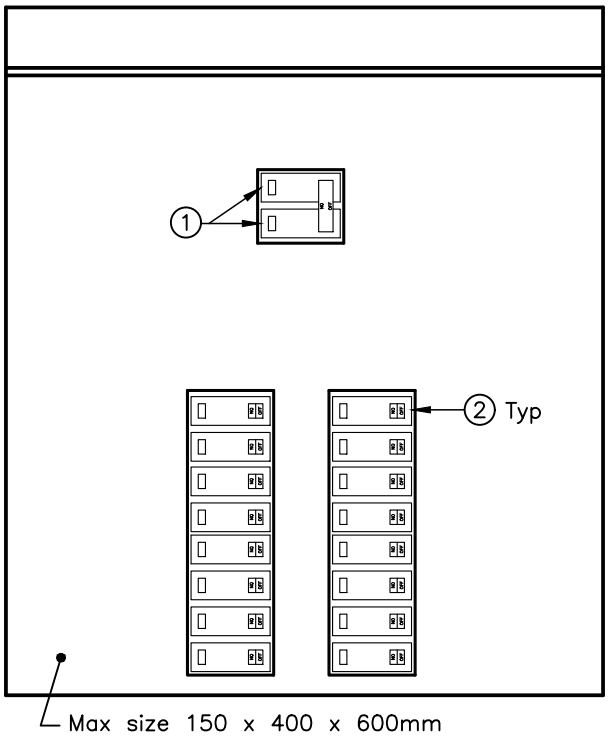
NOTES:

A Arrange hanger system to accommodate duct arrangement in trench.

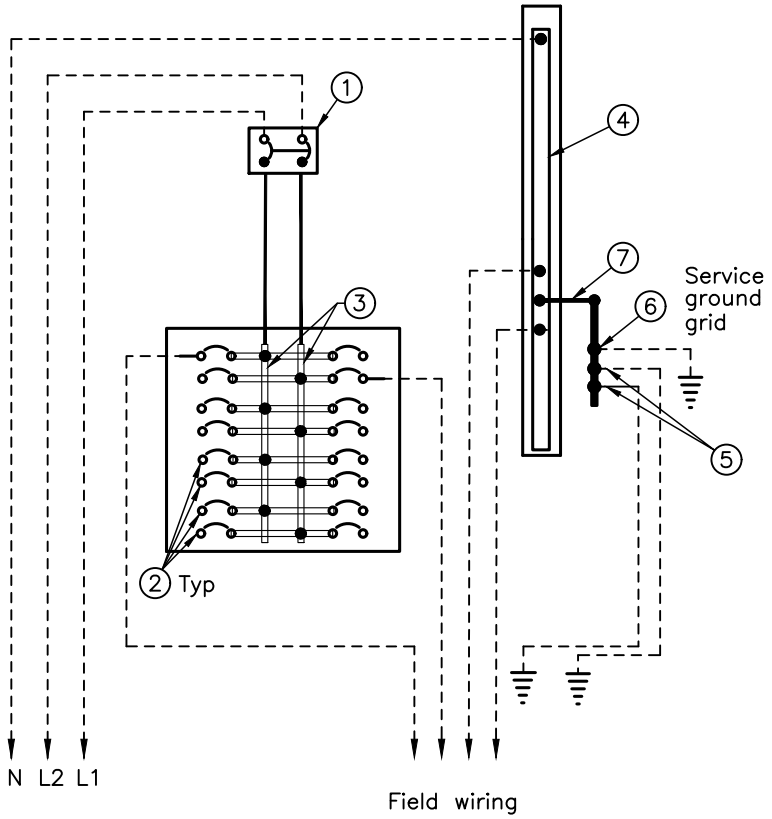
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	0
DUCT HANGER			
	OPSD 2442.010		

EQUIPMENT LAYOUT



SCHEMATIC WIRING DIAGRAM



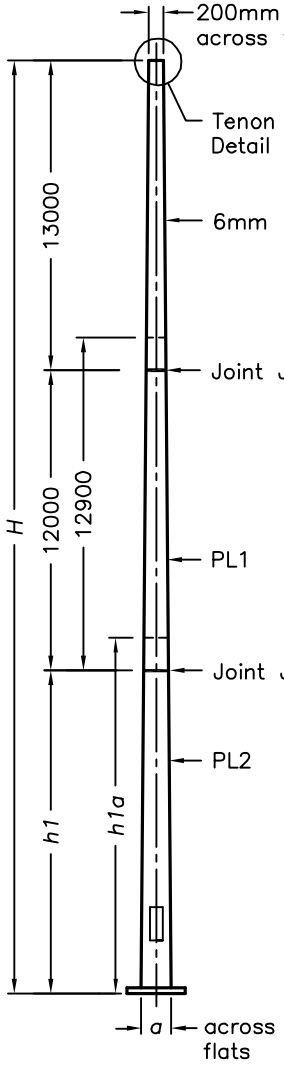
ELECTRICAL EQUIPMENT LIST

1. Main circuit breaker – 120/240V, 100A, 2–pole
2. Branch circuit breakers – 120/240V, size, type, and number of breakers as specified
3. Secondary bus
4. Solid neutral bus – 100A minimum
5. Ground lug for No. 6 AWG stranded copper insulated ground (lighting circuits)
6. Ground lug for No. 2/0 AWG stranded copper (ground grid)
7. Green No. 4 AWG stranded copper

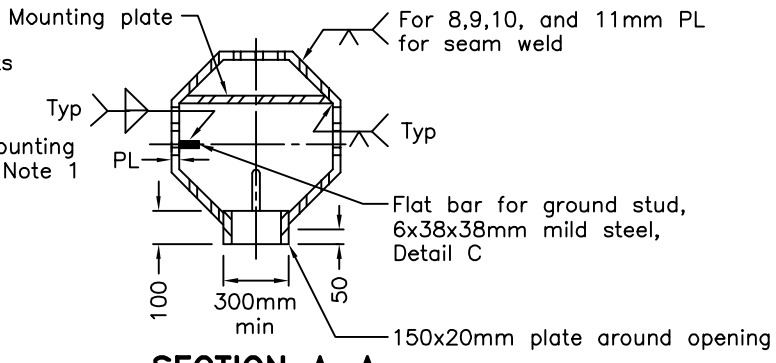
LEGEND:

- Denotes terminal connection
- Denotes No. 2 AWG RWU90 SR Copper
- Denotes field wiring, sizes as specified
- Ground bus

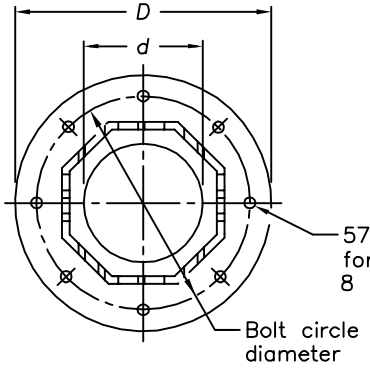
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev	0
SERVICE SUPPLY PEDESTAL FOR TRAFFIC SIGNAL AND STREET LIGHTING LAYOUT AND WIRING SCHEMATIC 120/240V, 100A, 1–PHASE, 3–WIRE			
		OPSD 2443.010	



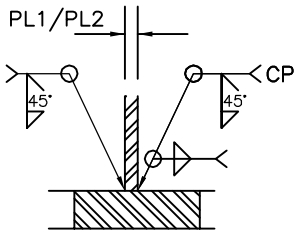
POLE ELEVATION



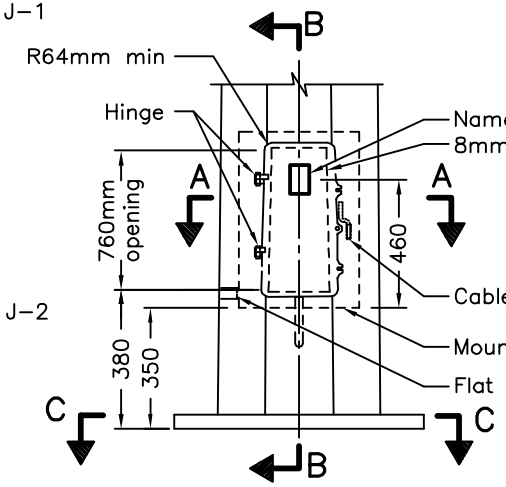
SECTION A–A



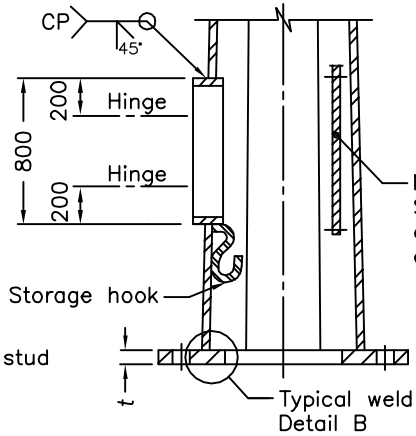
SECTION C–C



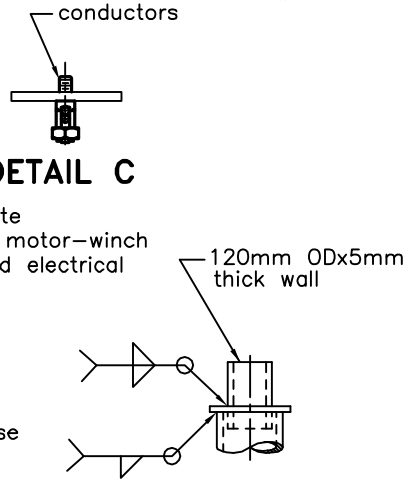
DETAIL B



ELEVATION



SECTION B–B



DETAIL C

DETAIL A

POLE DATA						POLE BASE DATA					
Length *H* m	*h1* m	*h1a* m	PL1 mm	PL2 mm	*a* mm	Unfactored Moment kNm	Unfactored Shear kN	*D* mm	Bolt Circle Diameter mm	*d* mm	*t* mm
25	–	–	9	–	600	380	29	900	750	422	50
30	5	6.35	8	10	700	570	38	1000	850	500	50
35	10	11.35	8	11	800	815	50	1100	950	600	60

NOTES:

1 Detail of tenon mounting shall suit luminaire raising and lowering equipment.

A This OPSD shall be read in conjunction with OPSD 2453.010, 2453.020, and 2453.050.

B All dimensions are in millimetres unless otherwise shown.

JOINT	FINAL FORCE OF ASSEMBLY
J–1	26kN
J–2	46kN

ONTARIO PROVINCIAL STANDARD DRAWING

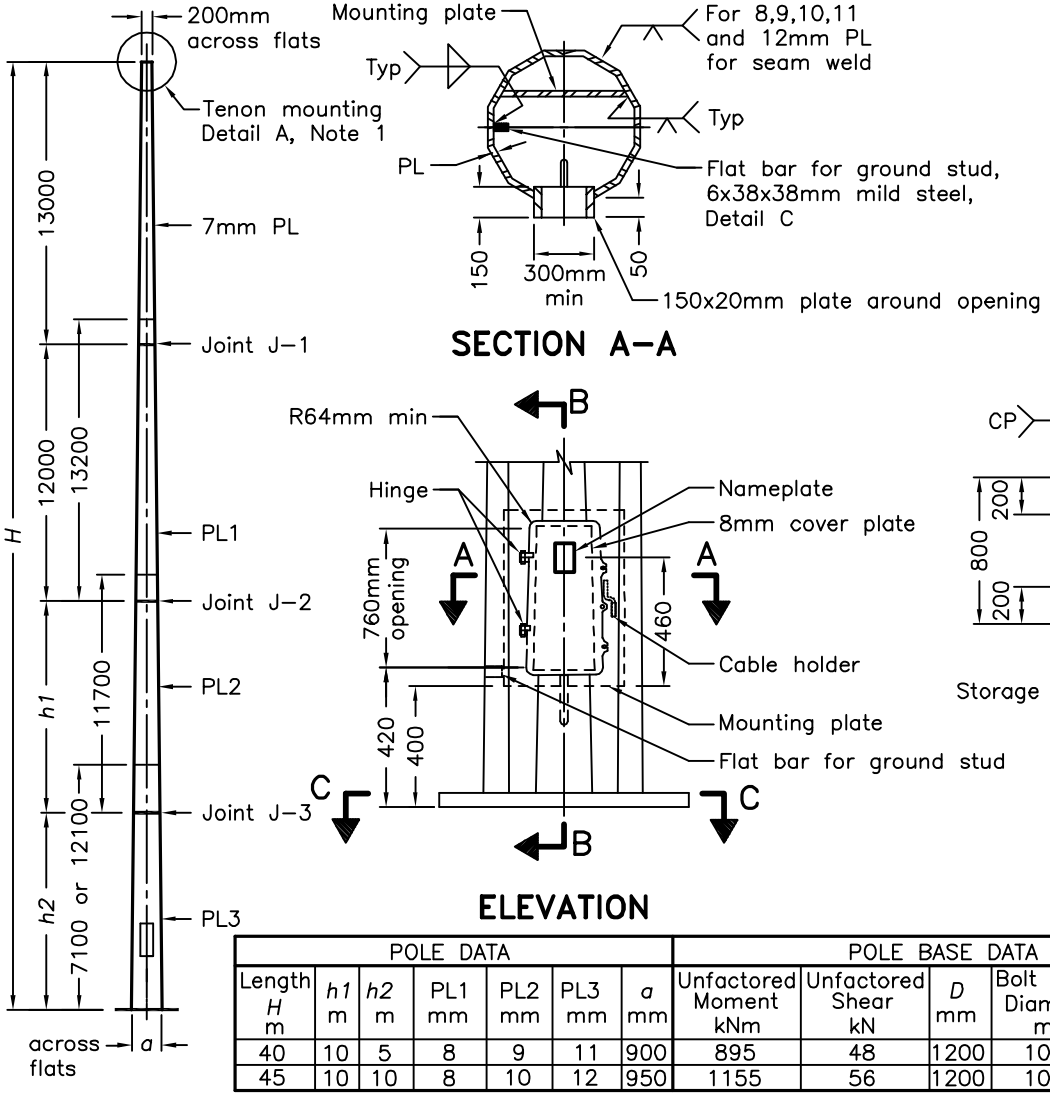
HIGH MAST LIGHTING POLE

25, 30, AND 35m 8–SIDED POLE

Nov 2016 | Rev 1

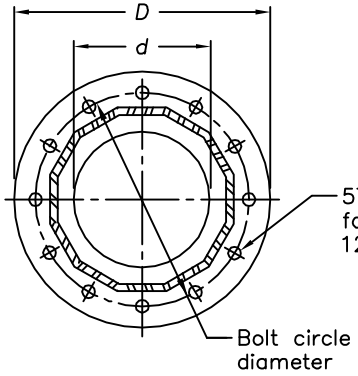
ONTARIO STANDARDS · MUNICIPAL–PROVINCIAL · OPS

OPSD 2450.011

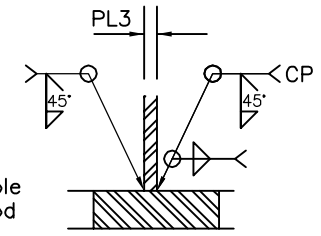


POLE ELEVATION

SECTION A–A

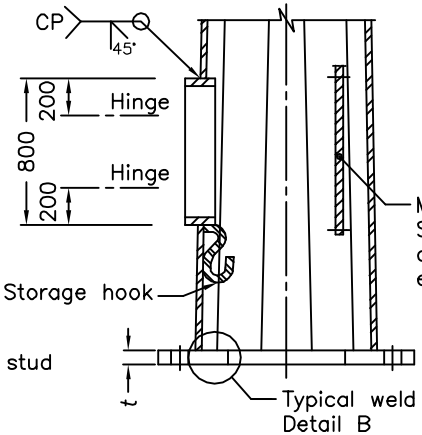


SECTION C–C



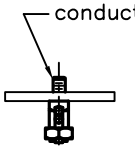
DETAIL B

ELEVATION

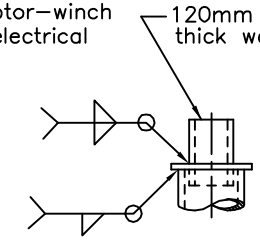


SECTION B–B

10mm dia hole threaded for ground connector to accommodate two #6 AWG conductors



DETAIL C



DETAIL A

POLE DATA							POLE BASE DATA					
Length H m	h1 m	h2 m	PL1 mm	PL2 mm	PL3 mm	a mm	Unfactored Moment kNm	Unfactored Shear kN	D mm	Bolt Circle Diameter mm	d mm	t mm
40	10	5	8	9	11	900	895	48	1200	1075	700	65
45	10	10	8	10	12	950	1155	56	1200	1075	750	70

NOTES:

1 Detail of tenon mounting shall suit luminaire raising and lowering equipment.

A This OPSD shall be read in conjunction with OPSD 2453.010, 2453.020, and 2453.050.

B All dimensions are in millimetres unless otherwise shown.

JOINT	FINAL FORCE OF ASSEMBLY
J–1	41kN
J–2	68kN
J–3	97kN

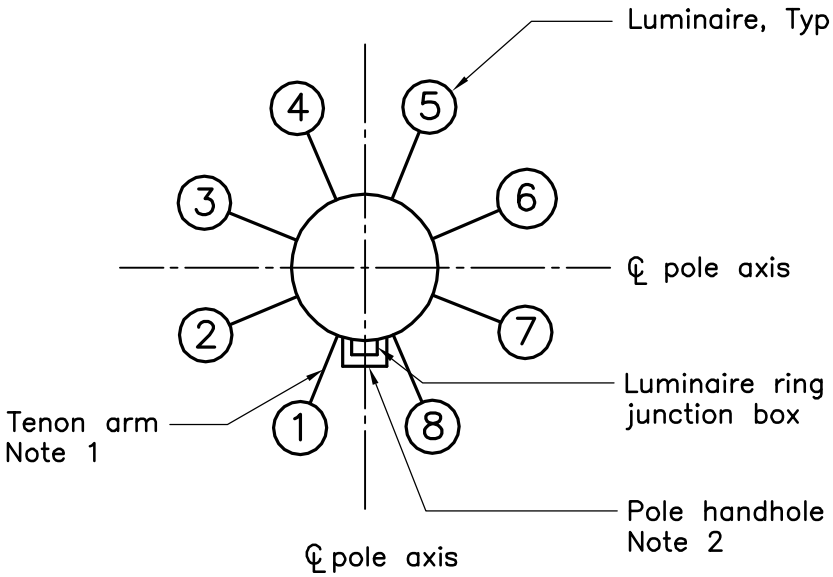
ONTARIO PROVINCIAL STANDARD DRAWING

HIGH MAST LIGHTING POLE

40 AND 45m 12–SIDED POLE

Nov 2016 | Rev 1

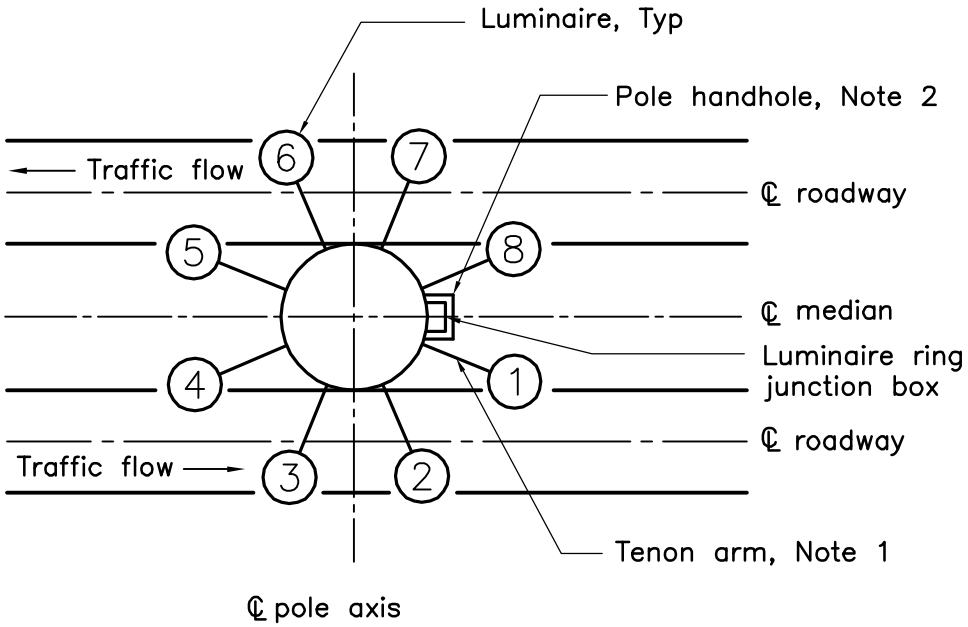
OPSD 2450.021



NOTES:

1 Tenon arm brackets shall be drilled and assembled so that luminaire No. 1 is always located to the left of the pole handhole and luminaire ring junction box.
2 The handhole shall be located such that the operator of the raising and lowering system can safely stand in front of the handhole and be able to look into the pole handhole while standing a minimum of 10 metres away from the pole.
A All luminaire tenon arms shall be spaced equally on the ring.
B Only one luminaire shall be mounted on each tenon arm.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE LUMINAIRE AND HANDHOLE ORIENTATION	- - - - - - - - - - - - - - - - - - - -		
	OPSD 2453.000		



NOTES:

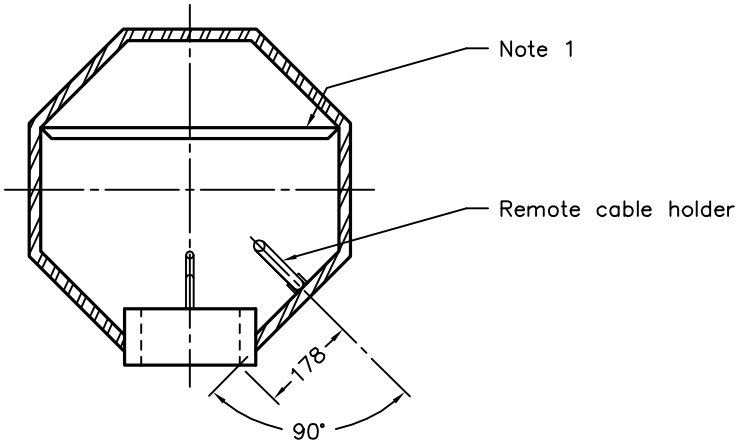
1 Tenon arm brackets shall be drilled and assembled so that luminaire No. 1 is always located to the left of the pole handhole and luminaire ring junction box.

2 The handhole shall be located such that the operator of the raising and lowering system can safely stand in front of the handhole and be able to look into the pole handhole while standing a minimum of 10 metres away from the pole.

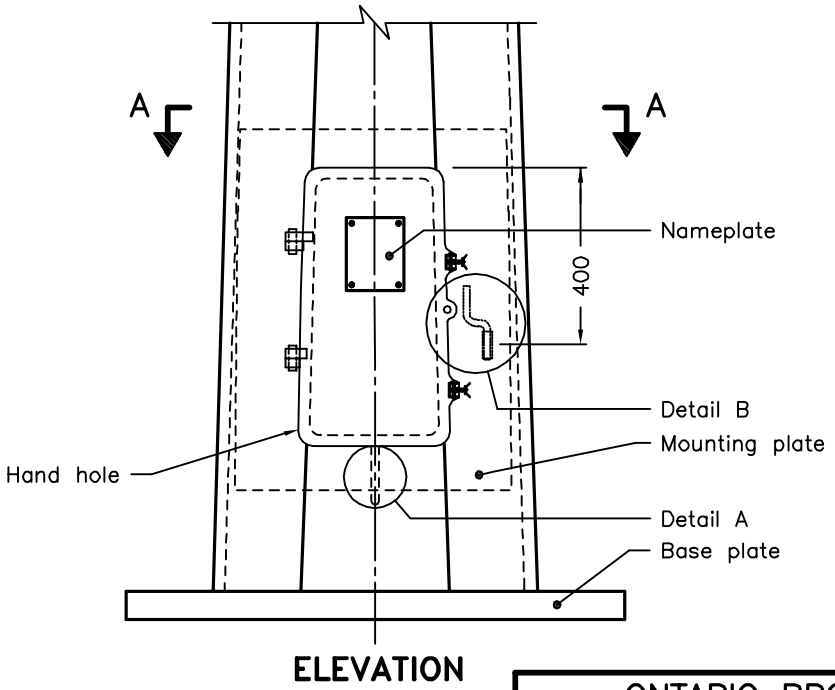
A All luminaire tenon arms shall be spaced equally on the ring.

B Only one luminaire shall be mounted on each tenon arm.

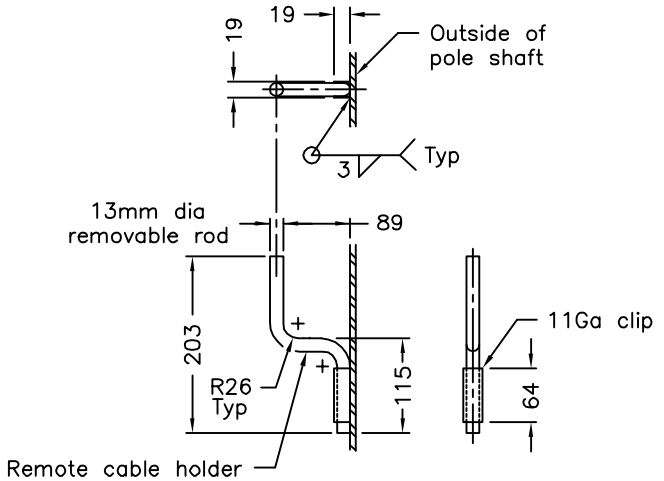
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	0
HIGH MAST LIGHTING POLE **LUMINAIRE AND HANDHOLE ORIENTATION FOR MEDIAN MOUNTED POLES**			
	OPSD 2453.001		



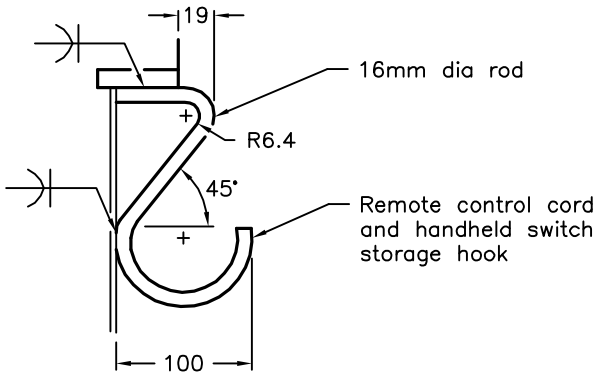
SECTION A–A



ELEVATION



DETAIL B



DETAIL A

NOTES:

1 Mounting plate location varies based on pole length.

A All dimensions are in millimetres unless otherwise shown.

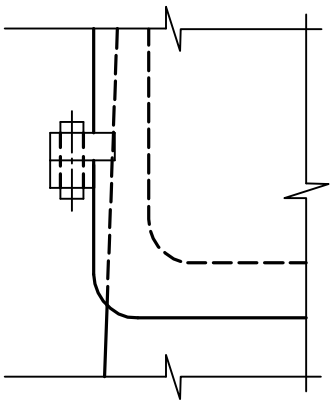
ONTARIO PROVINCIAL STANDARD DRAWING

HIGH MAST LIGHTING POLE

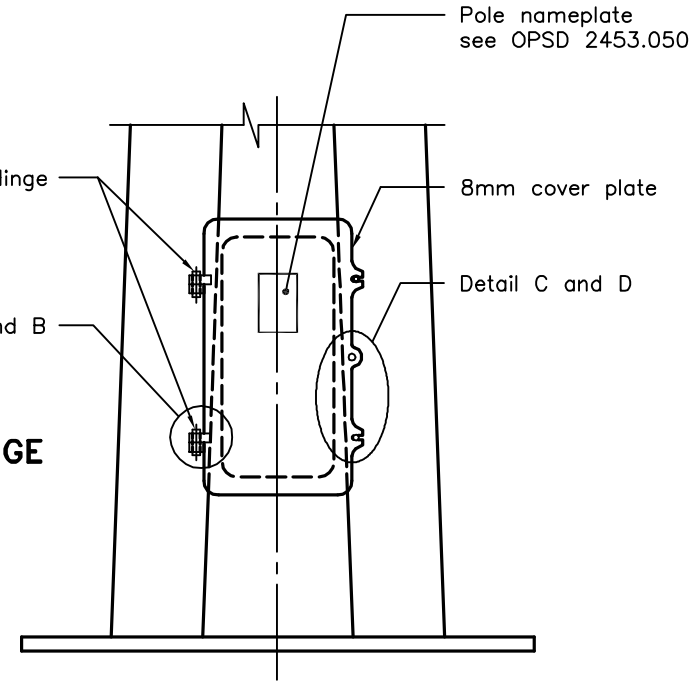
CABLE HOLDER AND STORAGE HOOK DETAILS

Nov 2016 | Rev 1

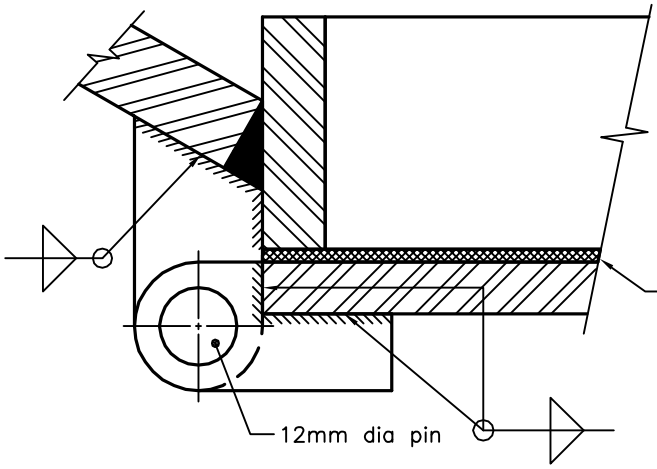
OPSD 2453.010



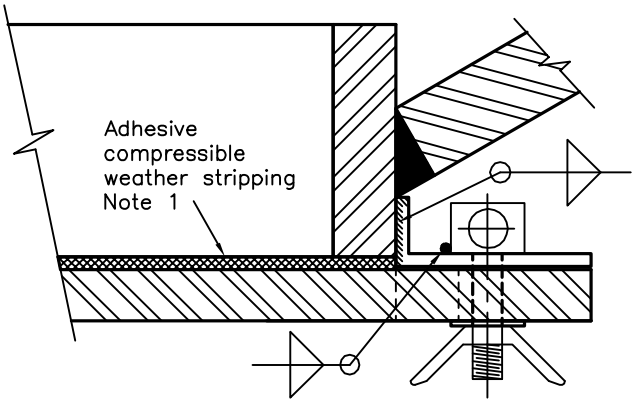
DETAIL A
FRONT VIEW OF HANDHOLE COVER HINGE



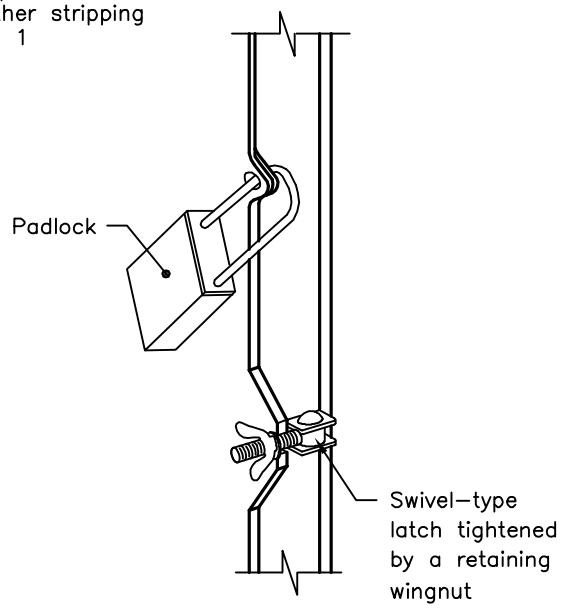
ELEVATION



DETAIL B
TOP VIEW OF HANDHOLE COVER HINGE



DETAIL D
TOP VIEW OF HANDHOLE COVER LATCH



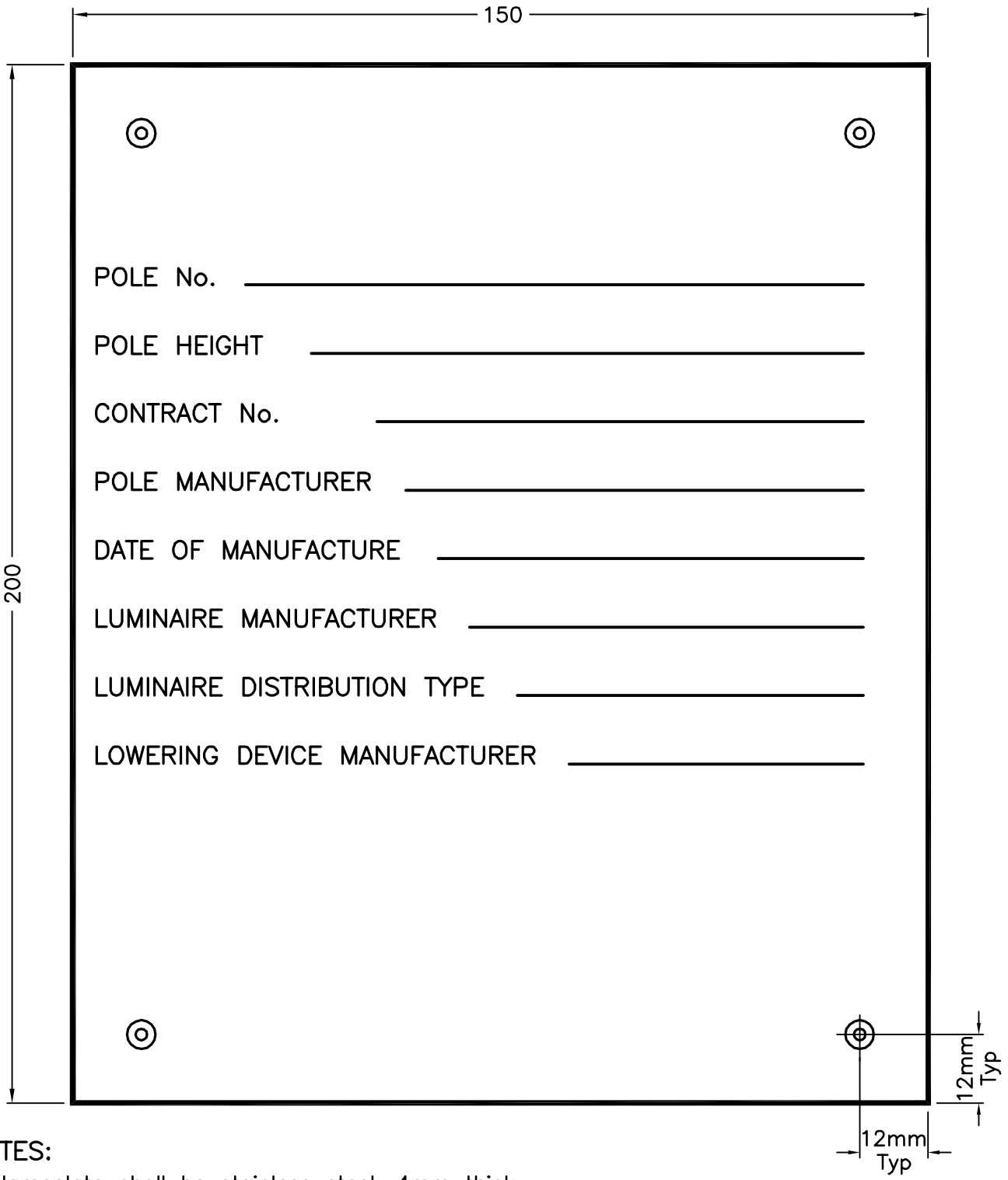
DETAIL C
HANDHOLE COVER LATCH AND PADLOCK

NOTES:

1 Weather stripping shall be 50mm minimum wide and shall be securely attached around the complete edge of the pole handhole opening.

A All dimensions are in millimetres unless otherwise shown.

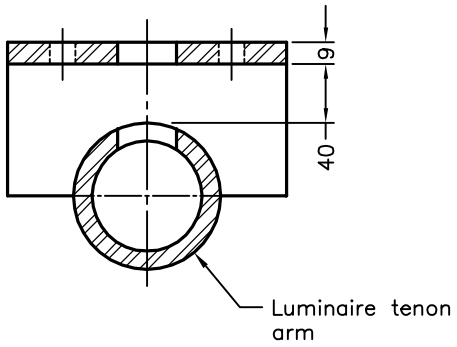
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE HANDHOLE COVER HINGES, LATCHES, AND PADLOCK			
	OPSD 2453.020		



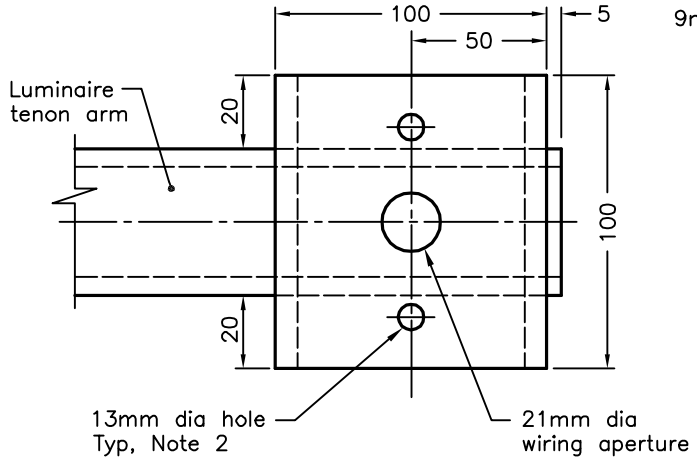
NOTES:

A Nameplate shall be stainless steel, 4mm thick.
B Nameplate shall be supplied with a 4mm neoprane or rubber backing and shall be riveted to the hand hole cover.
C All lettering including fill–in information shall be engraved and painted black. Letter height shall be a minimum of 4mm.
D All dimensions are in millimetres unless otherwise shown.

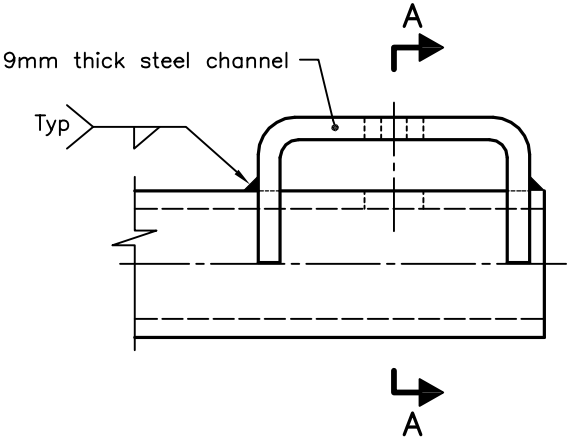
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE NAMEPLATE DETAILS			
	OPSD 2453.050		



SECTION A–A

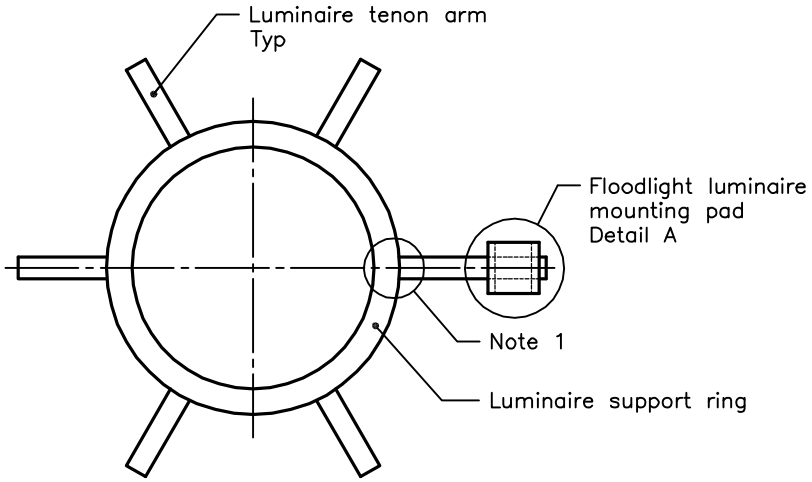


PLAN



ELEVATION

DETAIL A

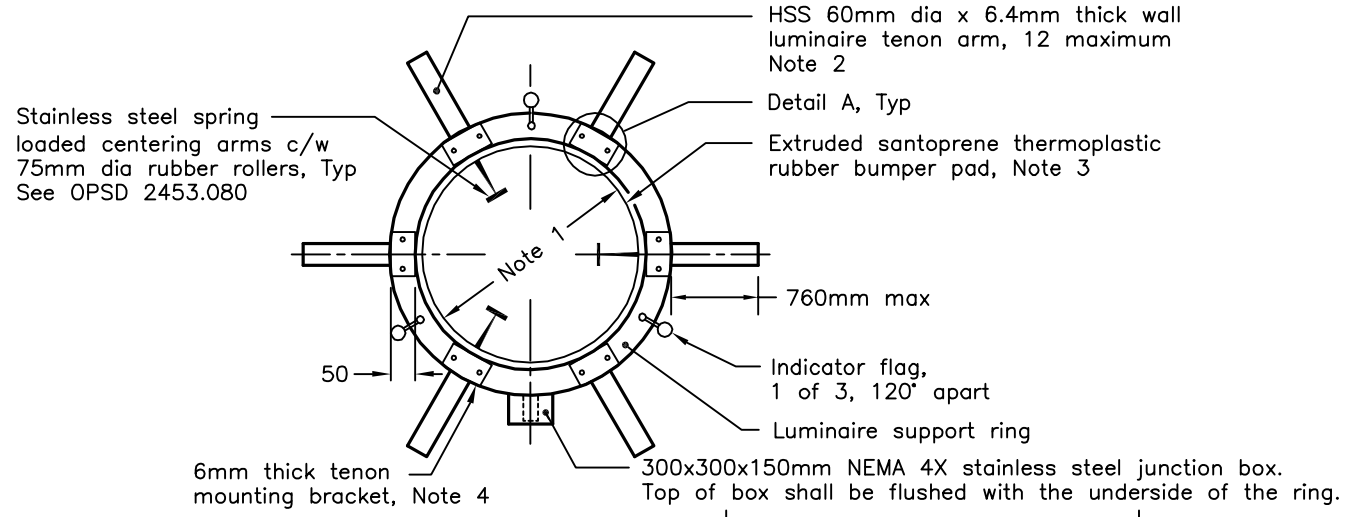


PLAN

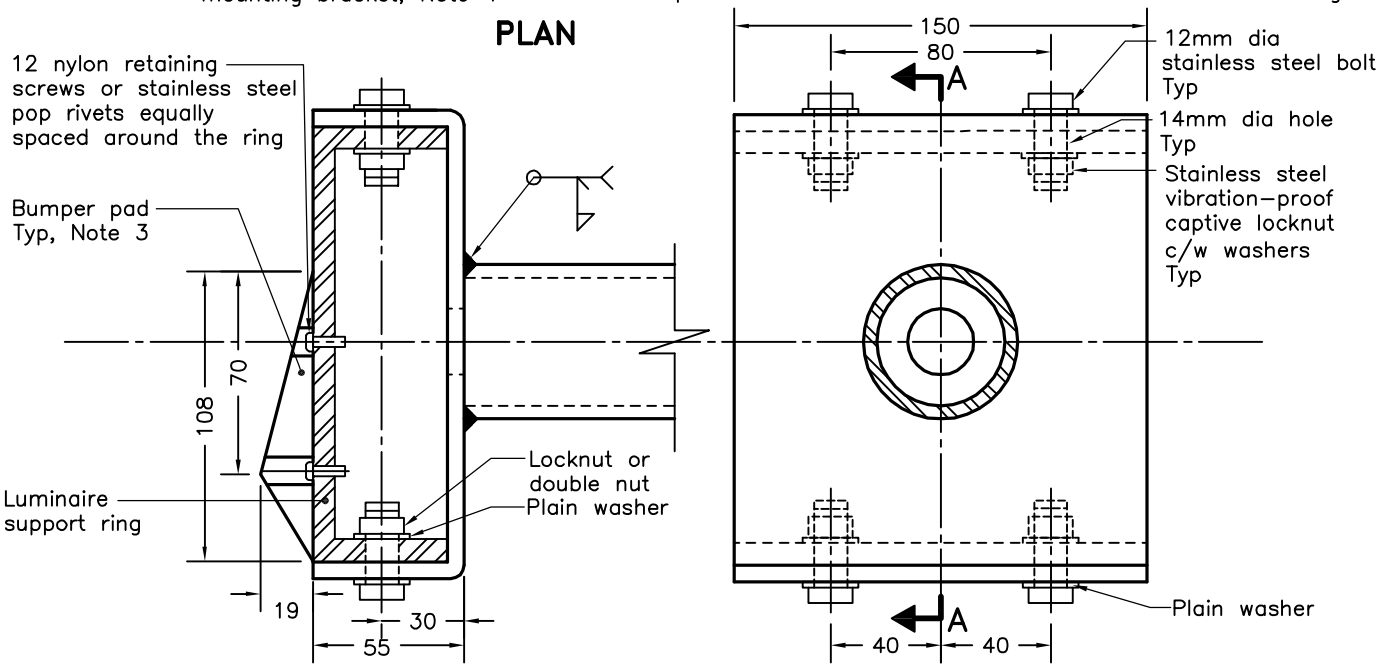
NOTES:

1 For luminaire support ring details see OPSD 2453.070.
2 Hole to be drilled to match floodlight mounting requirements.
A Orientation, number of luminaire tenon arms, and pads required as specified.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE FLOOD LIGHT LUMINAIRE MOUNTING DETAILS			
	OPSD 2453.060		



PLAN



SECTION A–A

DETAIL A

ELEVATION

LEGEND:

HSS – Hollow Structural Section

NEMA – National Equipment Manufacturers Association

NOTES:

1 The inner diameter of the ring shall be suitable for the maximum pole diameter specified. A minimum clearance of 100mm from the bumper pad to the pole surface shall be provided all around the pole when the ring is in the lowest position.

2 Orientation and number of luminaire arms as specified.

3 Dimensions and bumper shape shown are typical. Bumper pads shall be glued and fastened to the ring such that the screws or rivets do not come in contact with the pole surface.

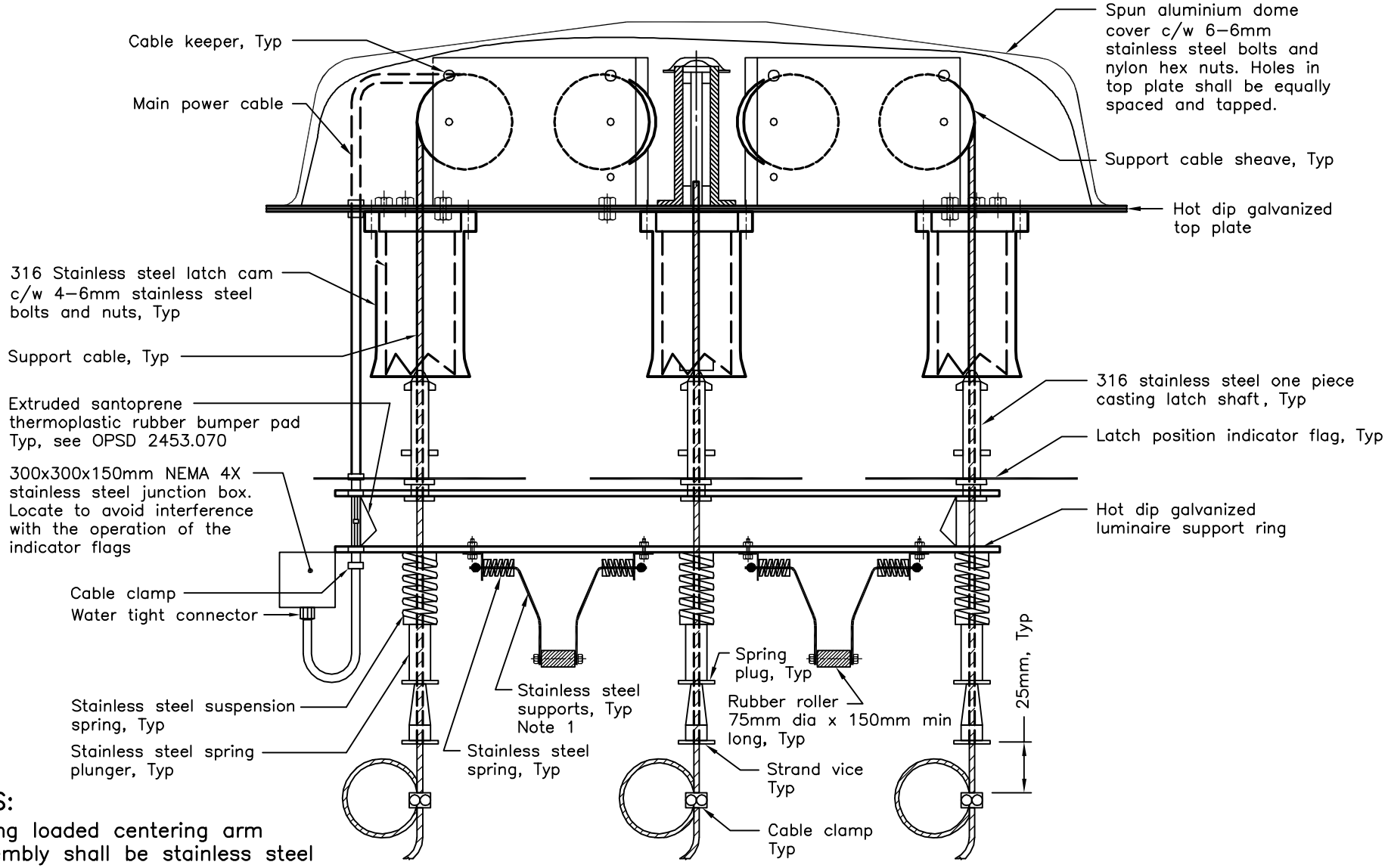
4 Tenon mounting bracket shall be manufactured to fit the exact radius of the lowering ring. The mounting plate shall not be abruptly bent or notched.

A All steel shall be grade 300W or 350W. Assembly shall be hot dip galvanized after fabrication with fraying surfaces subsequently wire brushed.

B All bolts shall be stainless steel ASTM F593 with Fu> 690 MPa.

C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	2
HIGH MAST LIGHTING POLE LUMINAIRE SUPPORT RING			
	OPSD 2453.070		



NOTES:

1 Spring loaded centering arm assembly shall be stainless steel c/w 75mm dia x 150mm long rubber roller. Three equally spaced arms are required per ring.

A All mounting hardware shall be stainless steel.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

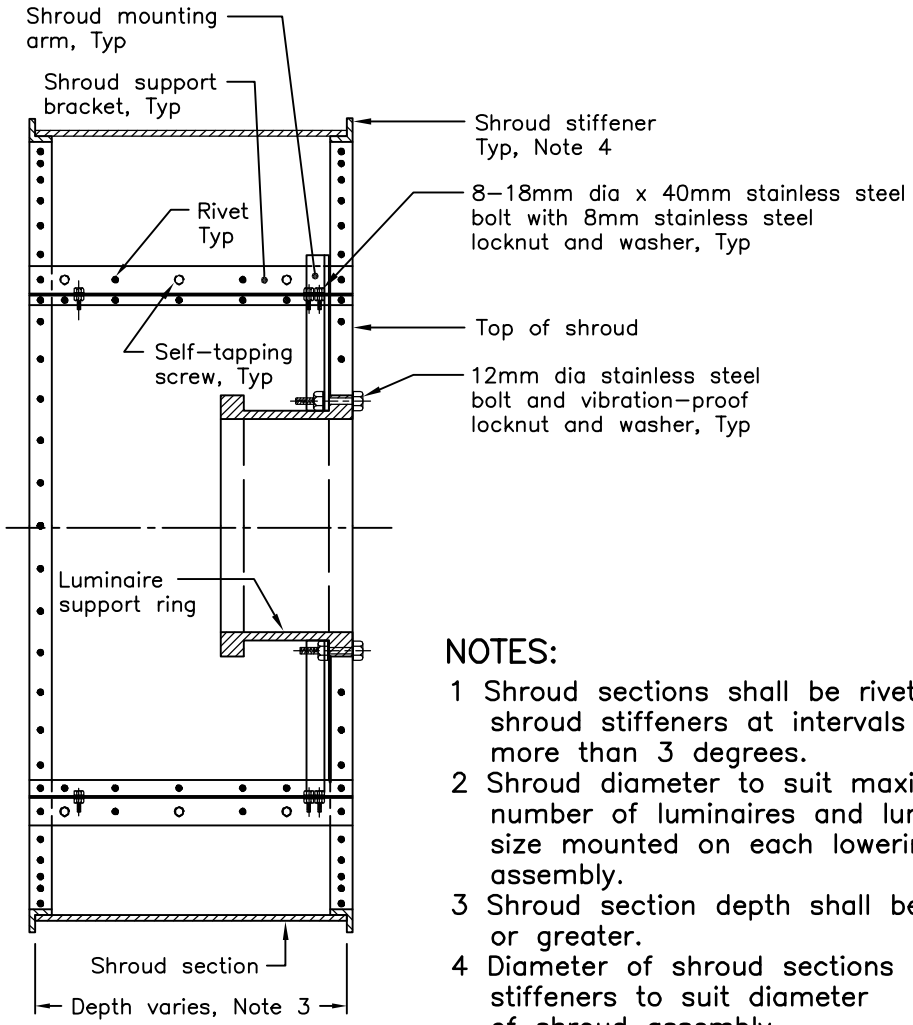
HIGH MAST LIGHTING POLE

HEAD FRAME AND RING ASSEMBLY

Nov 2016 | Rev 2

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL ·

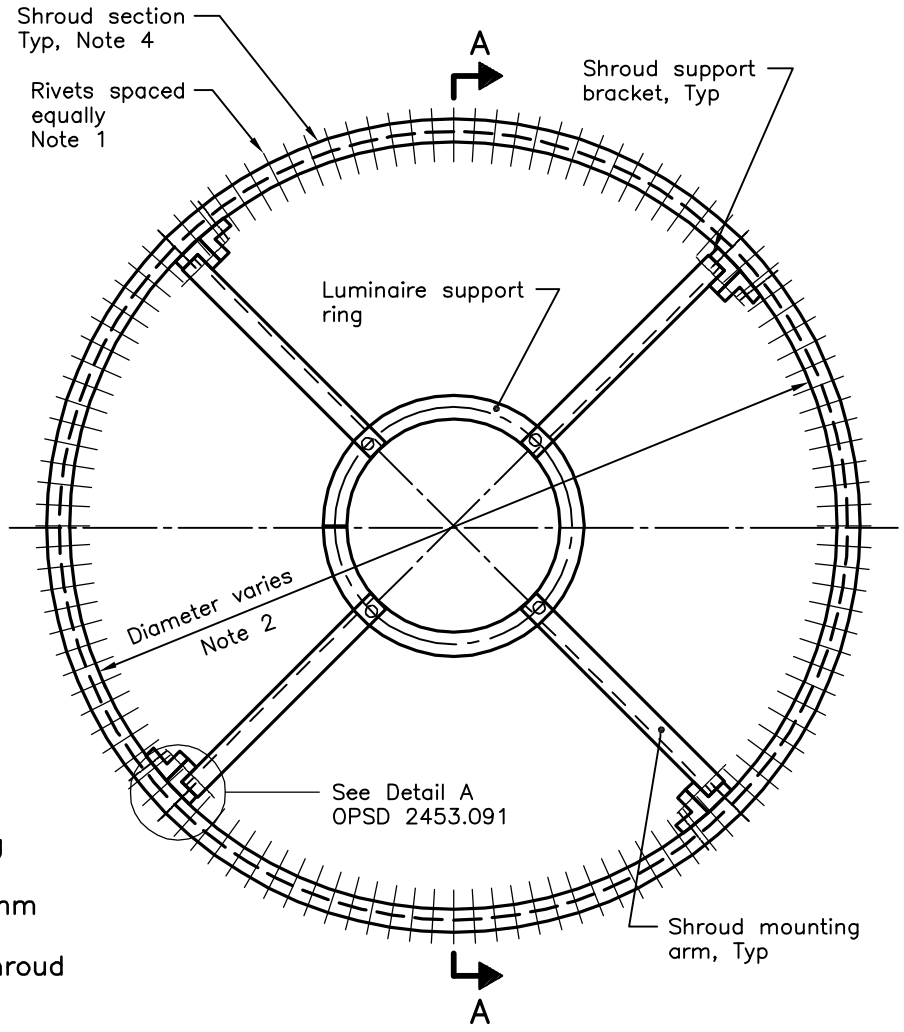
OPSD 2453.080



SECTION A–A

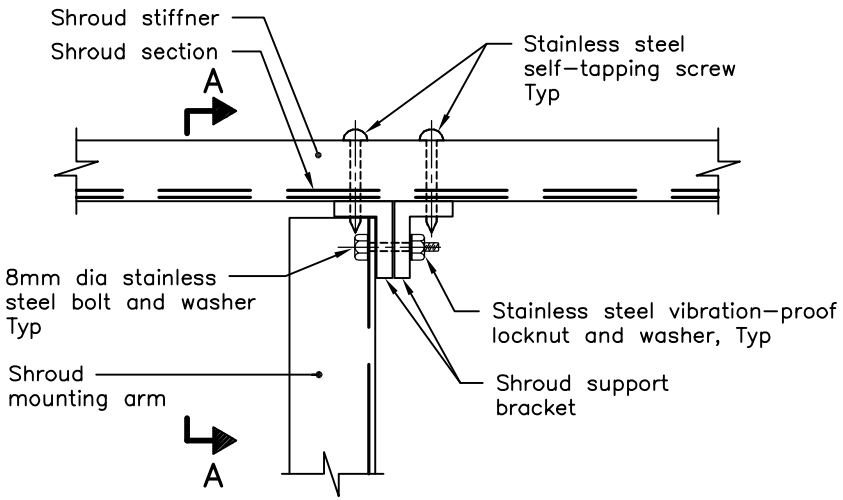
NOTES:

1 Shroud sections shall be riveted to shroud stiffeners at intervals of no more than 3 degrees.
2 Shroud diameter to suit maximum number of luminaires and luminaire size mounted on each lowering ring assembly.
3 Shroud section depth shall be 600mm or greater.
4 Diameter of shroud sections and shroud stiffeners to suit diameter of shroud assembly.
A All dimensions are in millimetres unless otherwise shown.



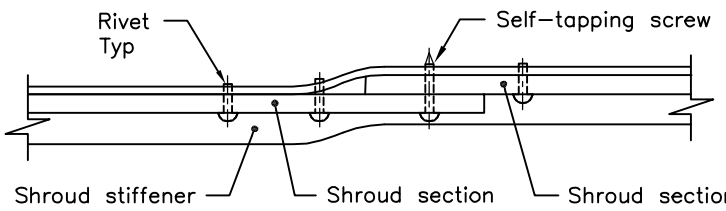
PLAN
SHROUD ASSEMBLY

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
# HIGH MAST LIGHTING POLE SHROUD			
	OPSD 2453.090		

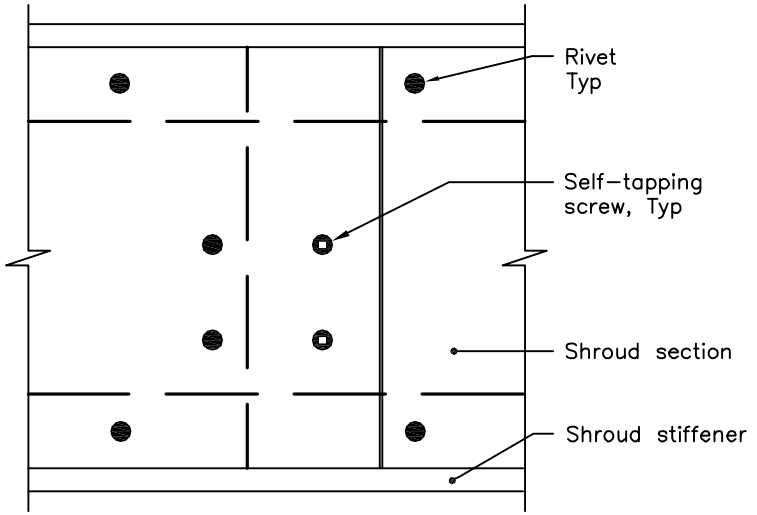


DETAIL A

ATTACHMENT OF SHROUD MOUNTING ARM TO SHROUD SUPPORT BRACKET

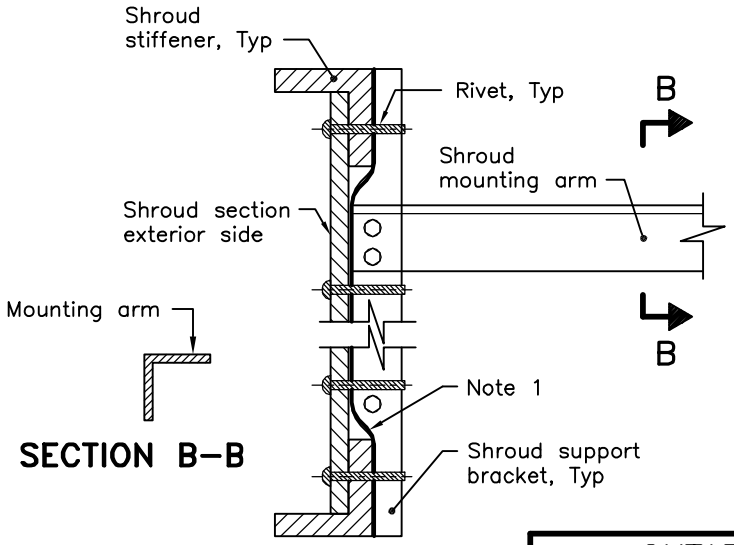


PLAN



ELEVATION

SHROUD SECTION OVERLAP



SECTION B–B

SECTION A–A

NOTES:

1 Bend shroud support bracket at top and bottom shroud stiffener.
A Length of shroud support bracket to suit shroud assembly depth.
B Length of mounting arm to suit diameter of shroud assembly.
C Shroud sections shall be overlapped midway between shroud support brackets and shall be held in place by self–tapping screws.
D This OPSD shall be read in conjunction with OPSD 2453.090.
E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE			
SHROUD DETAILS			
			OPSD 2453.091

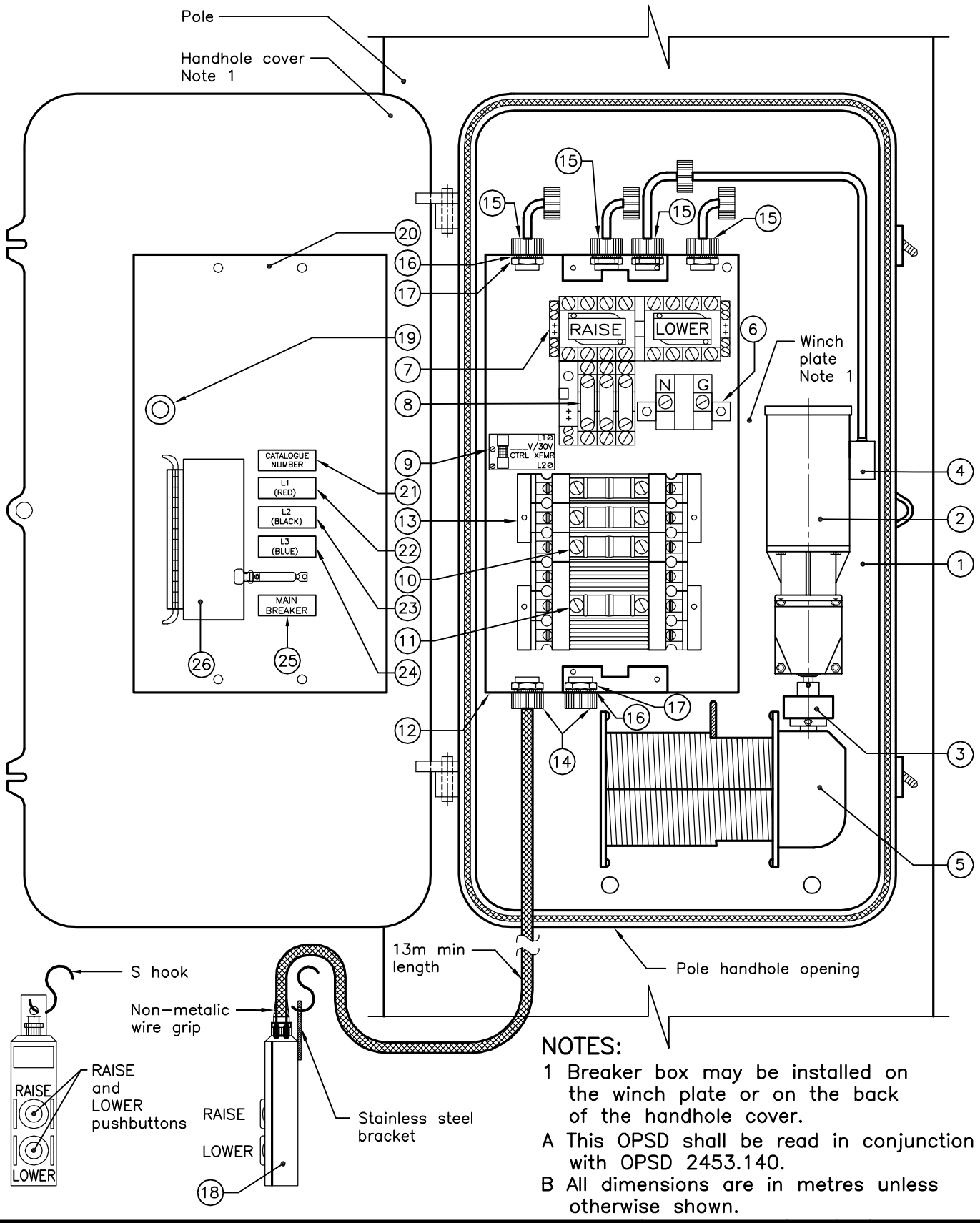
ID No.	QTY	PART DESCRIPTION
①	1	GALVANIZED STEEL WINCH AND EQUIPMENT MOUNTING PLATE
②	1	MOTOR AND GEAR REDUCER ASSEMBLY, VOLTAGE _____, HP _____
③	1	TORQUE LIMITER
④	1	JUNCTION BOX
⑤	1	WINCH WITH DRUM ASSEMBLY
⑥	1	NEUTRAL AND GROUND TERMINAL
⑦	1	MOTOR CONTROLLER
⑧	3	MOTOR STARTER OVERLOAD PROTECTION (HEATER)
⑨	1	___V / 30V MAX CONTROL XFMR
⑩	3	SINGLE POLE BREAKER, _____ A, _____V
⑪	1	THREE POLE BREAKER, _____ A, _____V
⑫	1	BREAKER BOX
⑬	1	BREAKER MOUNTING BRACKET
⑭	2	STRAIN RELIEF CONNECTOR
⑮	4	90° STRAIN RELIEF CONNECTOR
⑯	4	O–RING
⑰	4	LOCKNUT
⑱	1	PUSH BUTTON SWITCH AND PENDANT
⑲	1	OVERLOAD RESET BUTTON
⑳	1	BREAKER BOX COVER PLATE, SHOWN DETACHED
㉑	1	ADHESIVE LABEL: "CATALOGUE NUMBER"
㉒	1	ADHESIVE LABEL: "L1 (RED)"
㉓	1	ADHESIVE LABEL: "L2 (BLACK)"
㉔	1	ADHESIVE LABEL: "L3 (BLUE)"
㉕	1	ADHESIVE LABEL: "MAIN BREAKER"
㉖	1	BREAKER BOX COVER DOOR

NOTES:

A Voltages, amperages, and horsepower ratings as specified.

B This OPSD shall be read in conjunction with OPSD 2453.150.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE INTERNAL DRIVE RAISING AND LOWERING EQUIPMENT–LIST OF COMPONENTS	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _		
	OPSD 2453.140		



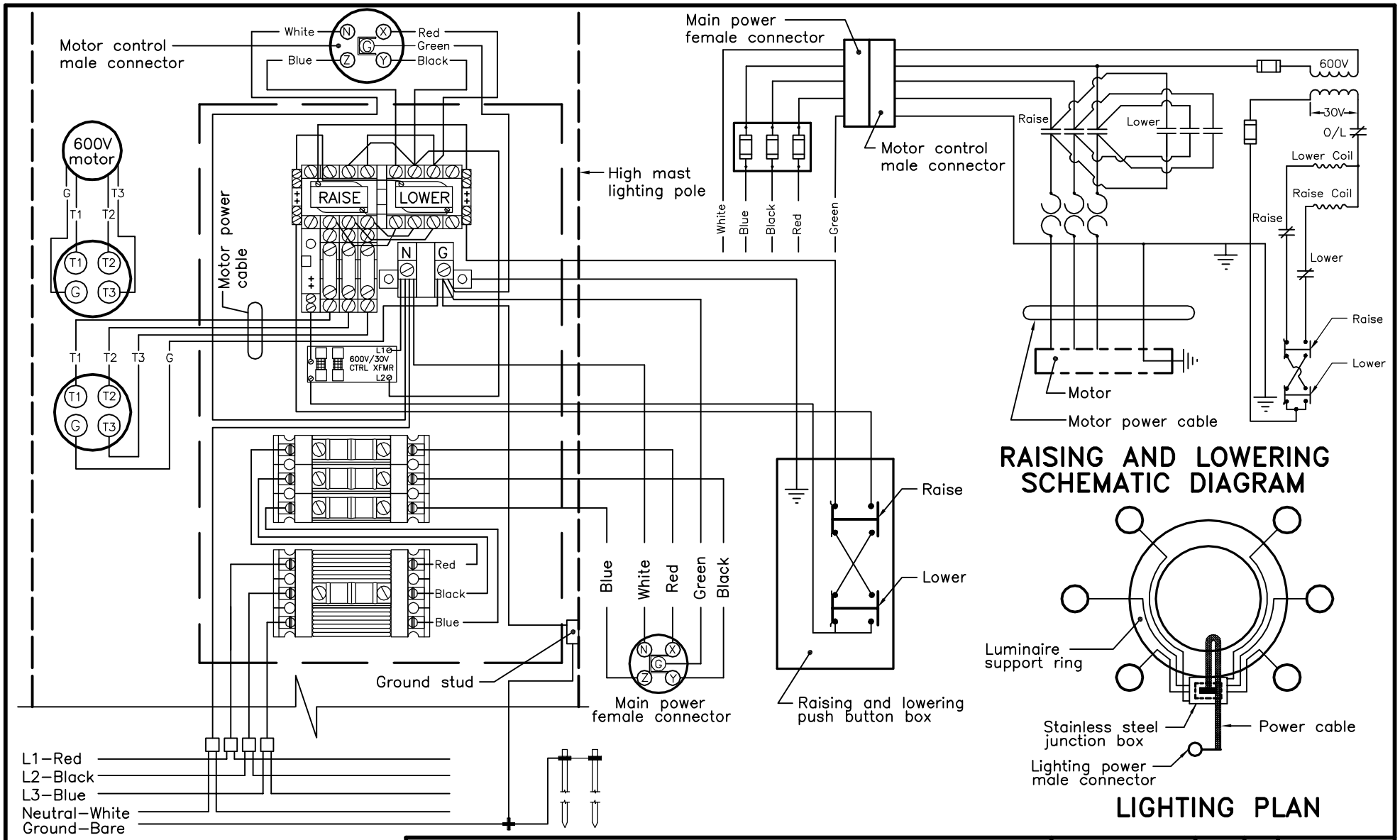
NOTES:

1 Breaker box may be installed on the winch plate or on the back of the handhole cover.

A This OPSD shall be read in conjunction with OPSD 2453.140.

B All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE INTERNAL DRIVE RAISING AND LOWERING EQUIPMENT–LAYOUT			
	OPSD 2453.150		



NOTE:

A Male and female connectors for the motor shall be uniquely keyed to prevent mating with other connectors.

ONTARIO PROVINCIAL STANDARD DRAWING

HIGH MAST LIGHTING POLE

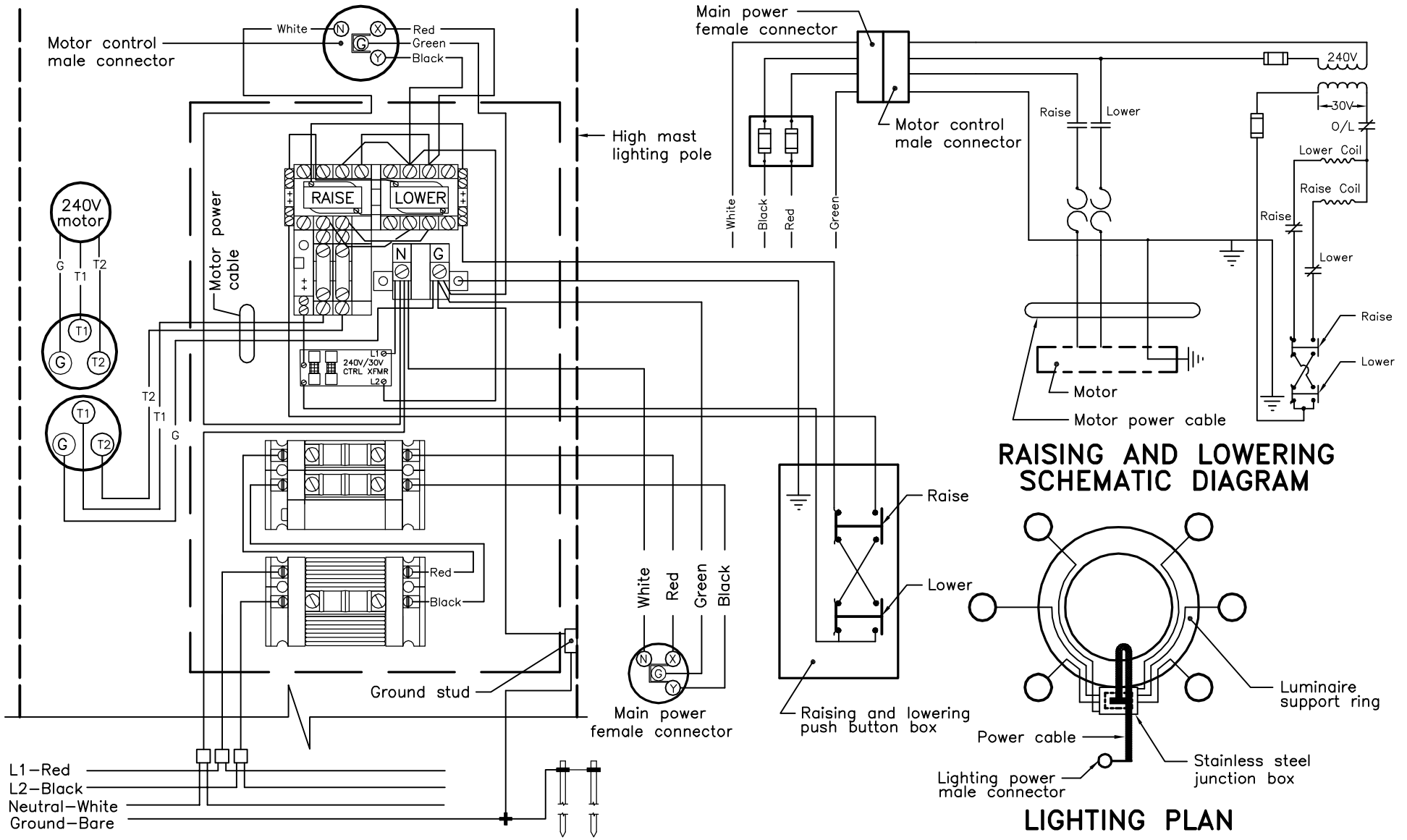
INTERNAL DRIVE WIRING DIAGRAM

347/600V, 3–PHASE

Nov 2016 | Rev 1

ONTARIO STANDARDS · MUNICIPAL–PROVINCIAL · OPS

OPSD 2453.170



NOTE:

A Male and female connectors for the motor shall be uniquely keyed to prevent mating with other connectors.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2016 | Rev 1

HIGH MAST LIGHTING POLE

INTERNAL DRIVE WIRING DIAGRAM

120/240V, 1–PHASE

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL · O P S

OPSD 2453.180

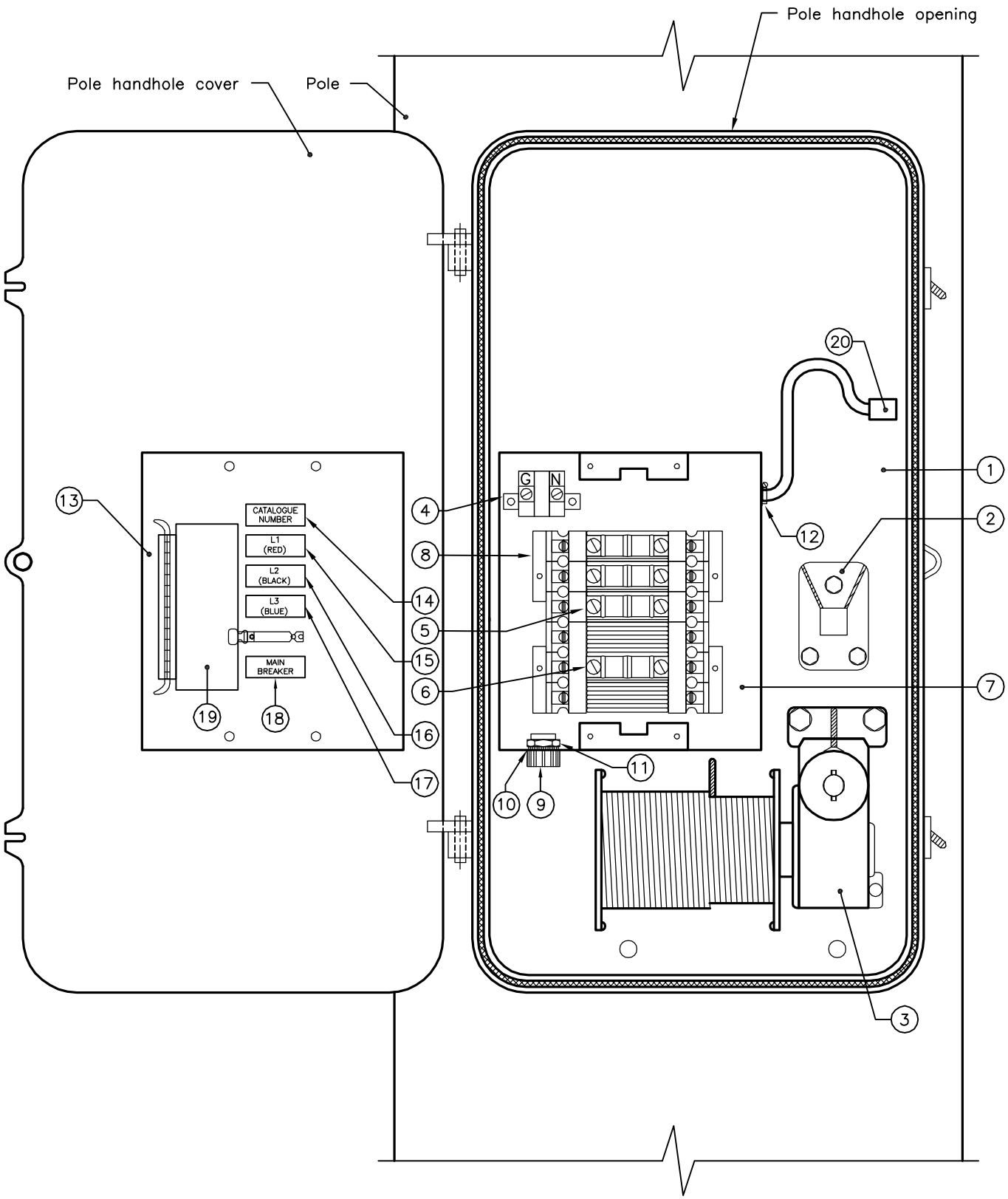
ID No.	QTY	PART DESCRIPTION
(1)	1	GALVANIZED STEEL WINCH AND EQUIPMENT MOUNTING PLATE
(2)	1	ZINC ELECTROPLATED STEEL DRIVE SUPPORT ASSEMBLY
(3)	1	WINCH WITH DRUM ASSEMBLY
(4)	1	NEUTRAL AND GROUND TERMINAL
(5)	3	SINGLE POLE BREAKER, _____ A, _____V
(6)	1	THREE POLE BREAKER, _____ A, _____V
(7)	1	BREAKER BOX
(8)	1	BREAKER MOUNTING BRACKET
(9)	1	STRAIN RELIEF CONNECTOR
(10)	1	O–RING
(11)	1	LOCKNUT
(12)	1	WIRE CONNECTOR
(13)	1	BREAKER BOX COVER PLATE, SHOWN DETACHED
(14)	1	ADHESIVE LABEL: "CATALOGUE NUMBER"
(15)	1	ADHESIVE LABEL: "L1 (RED)"
(16)	1	ADHESIVE LABEL: "L2 (BLACK)"
(17)	1	ADHESIVE LABEL: "L3 (BLUE)"
(18)	1	ADHESIVE LABEL: "MAIN BREAKER"
(19)	1	BREAKER BOX COVER DOOR
(20)	1	CONNECTOR, FEMALE TYPE, BLUE CASING, POLYESTER HOUSING, FIBRE REINFORCED ___V, ___A, ___W, NEMA 3R

NOTES:

A Voltages, amperages, and wattages as specified.

B This OPSD shall be read in conjunction with OPSD 2453.200.

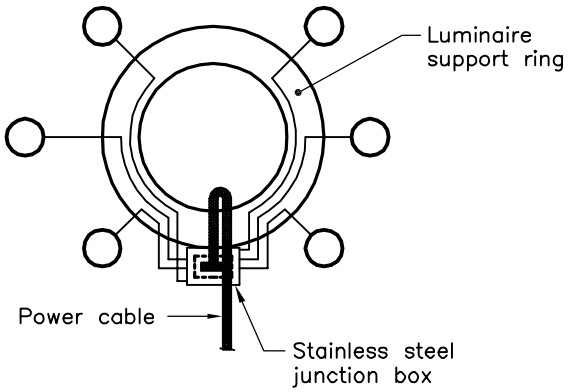
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT–LIST OF COMPONENTS	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _		
OPSD 2453.190			



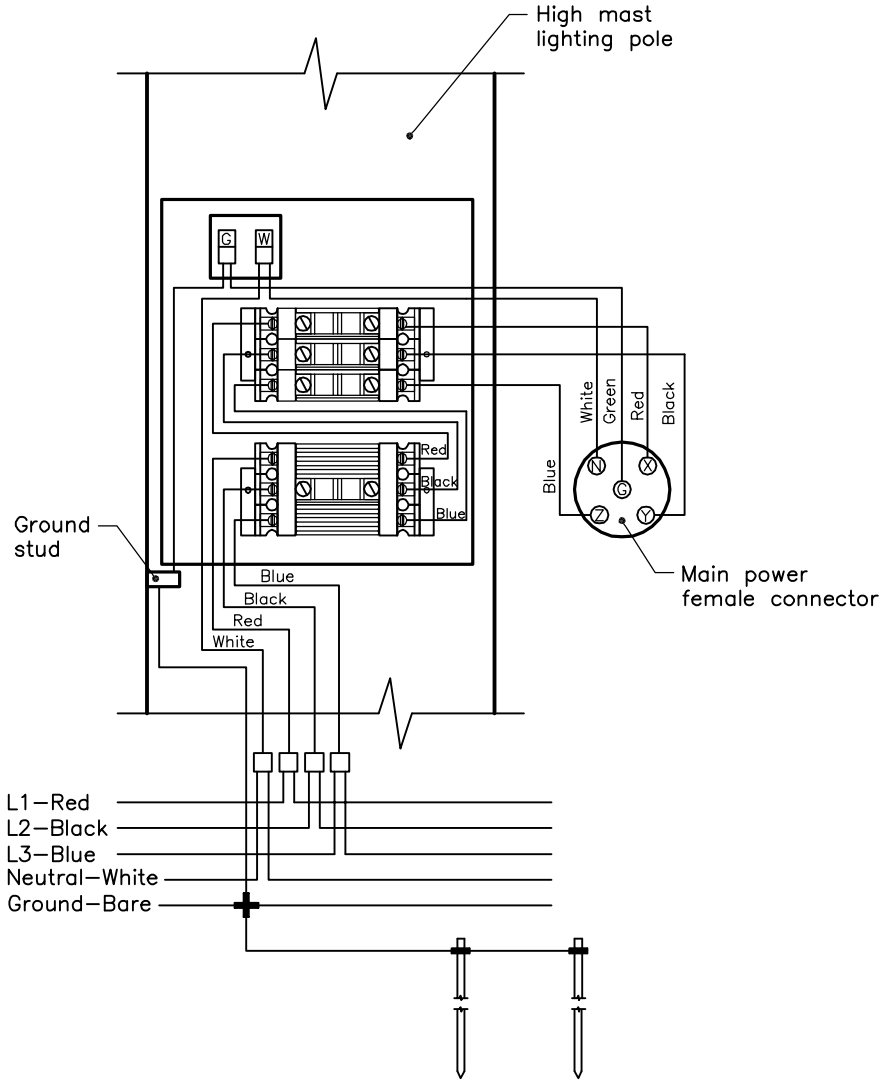
NOTES:

A This OPSD shall be read in conjunction with OPSD 2453.190.

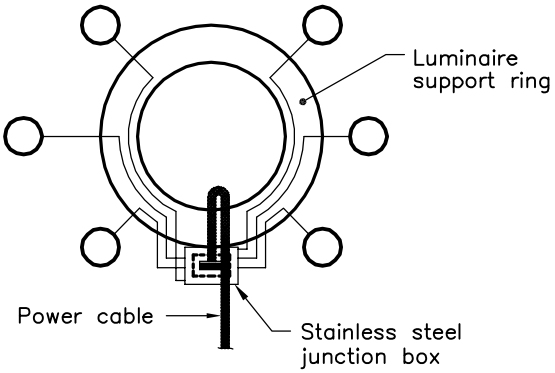
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT–LAYOUT			
	OPSD 2453.200		



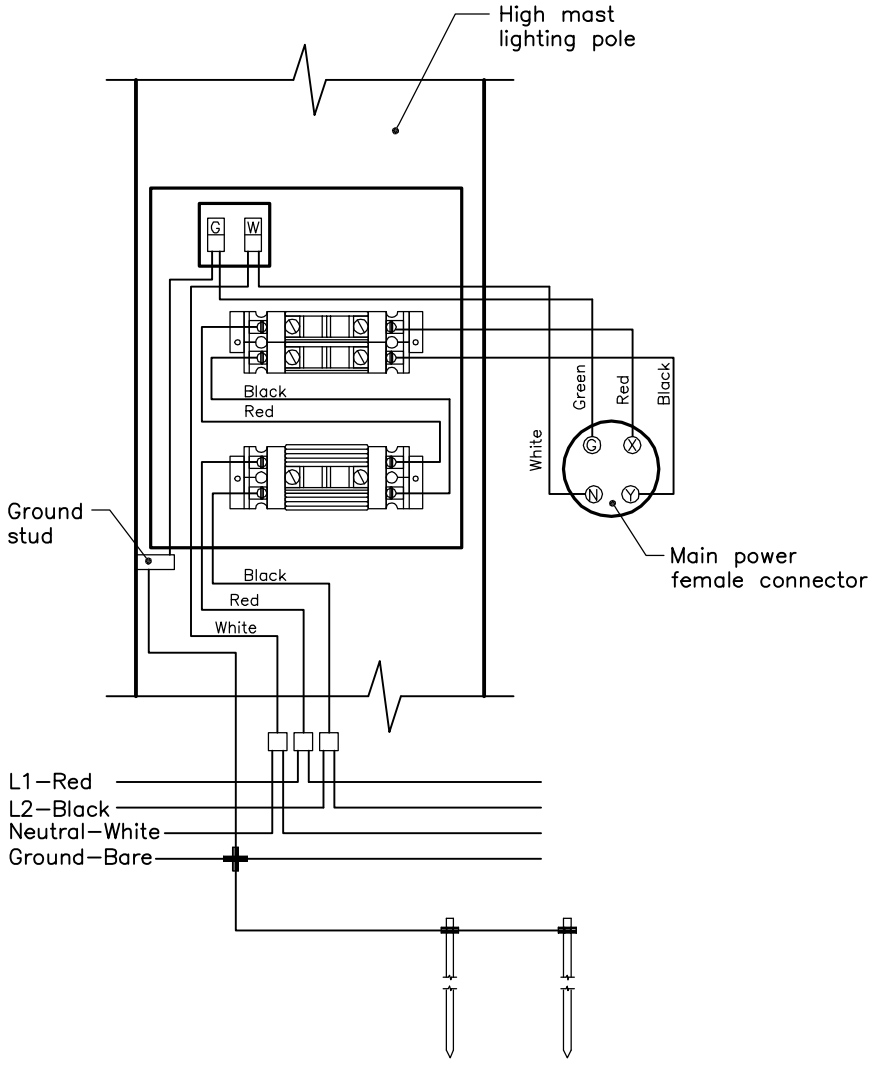
PLAN



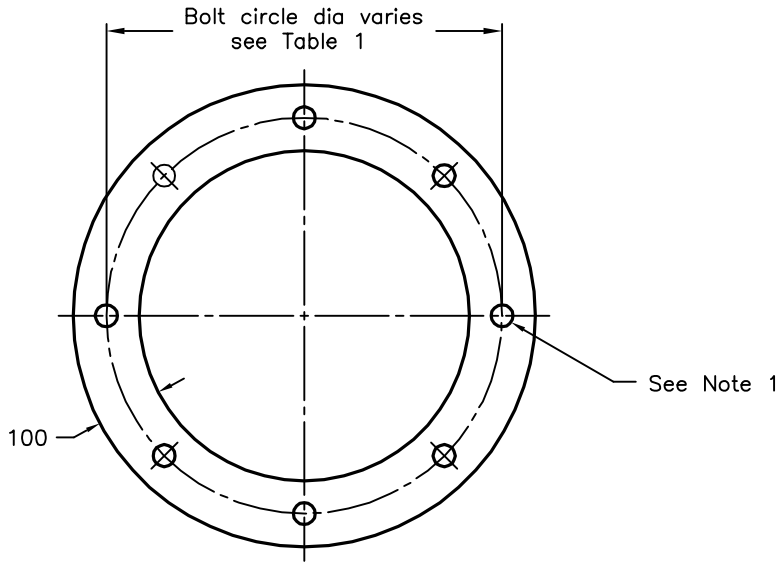
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT 347/600V, 3–PHASE WIRING DIAGRAM			
	OPSD 2453.210		



PLAN



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT 120/240V, 1–PHASE WIRING DIAGRAM			
	OPSD 2453.220		



METAL PLATE DETAIL

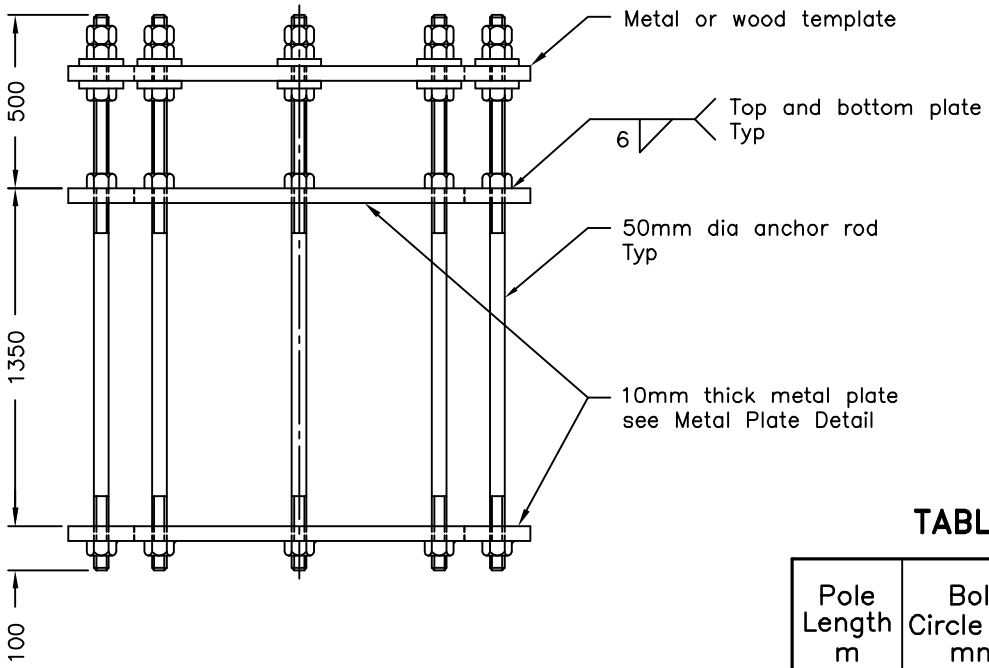


TABLE 1

Pole Length m	Bolt Circle Dia mm	No. of Anchor Rods
25	750	8
30	850	8
35	950	8
40	1075	12
45	1075	12

NOTES:

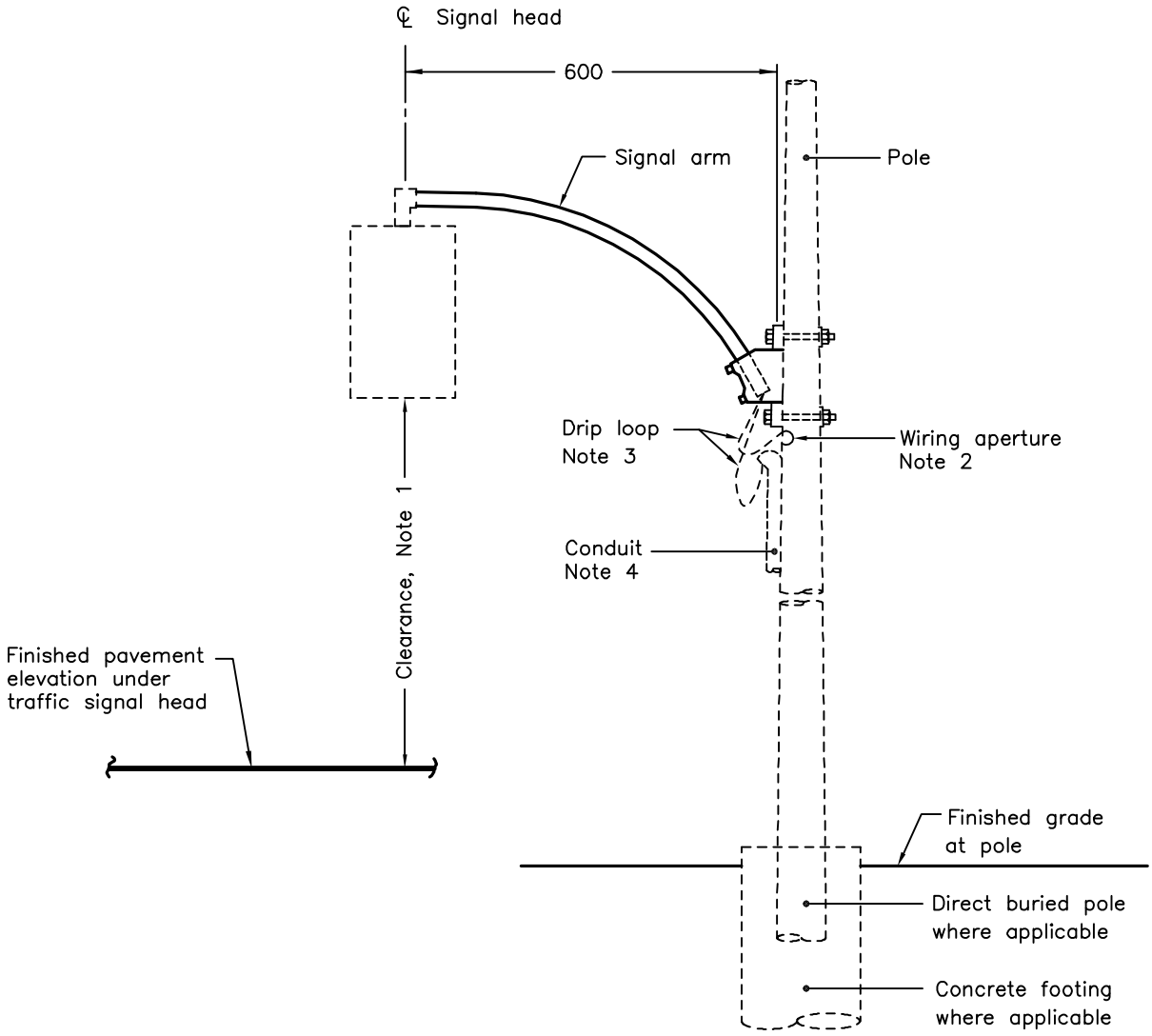
1 Number of anchor rod holes varies, see Table 1.

A Anchor rods shall be equally spaced.

B All nuts, anchor rods, metal plates, and washers of the assembly shall be galvanized.

C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	1
HIGH MAST LIGHTING POLE ANCHORAGE ASSEMBLY DETAILS			
	OPSD 2456.011		



NOTES:

1 The bottom of the signal head shall be a minimum of 5.0m above the highest point on the roadway, regardless of whether the signal head is above the pavement or not.

2 Wiring aperture shall be 25mm diameter field drilled complete with rubber grommet, 25mm below arm attachment or 25mm below overlapping sectional steel joints, deburred, and protected with zinc rich paint.

3 Drip loops shall be provided.

4 For external conduit system on wooden or concrete poles refer to OPSD 2552.010 or OPSD 2554.010.

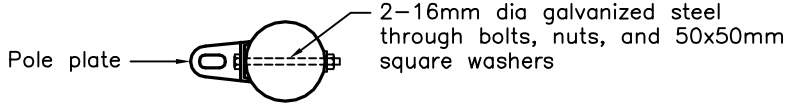
A For arm attachment details refer to OPSD 2500.020.

B For traffic signal head wiring details refer to OPSD 2528.010.

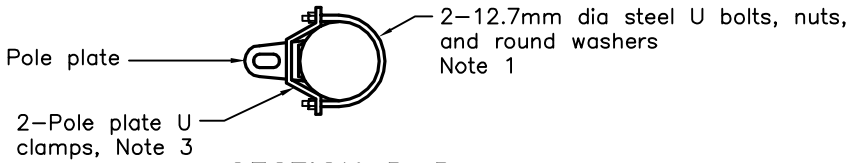
C Traffic signal hanger details shall be as specified.

D All dimensions are in millimetres unless otherwise shown.

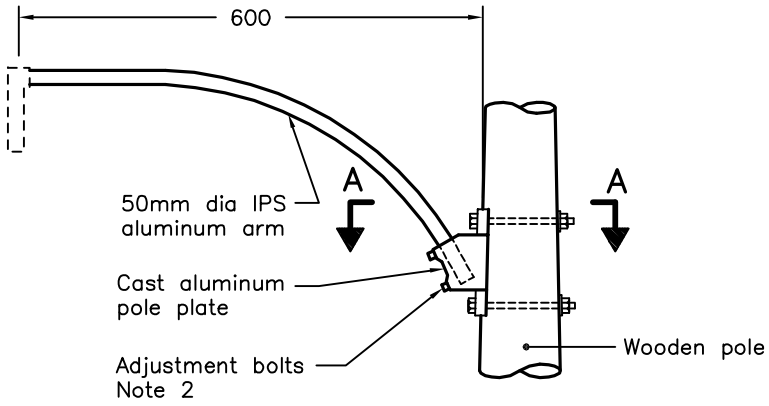
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	2
600mm SIGNAL ARM AND SIGNAL HEAD			
	OPSD 2500.010		



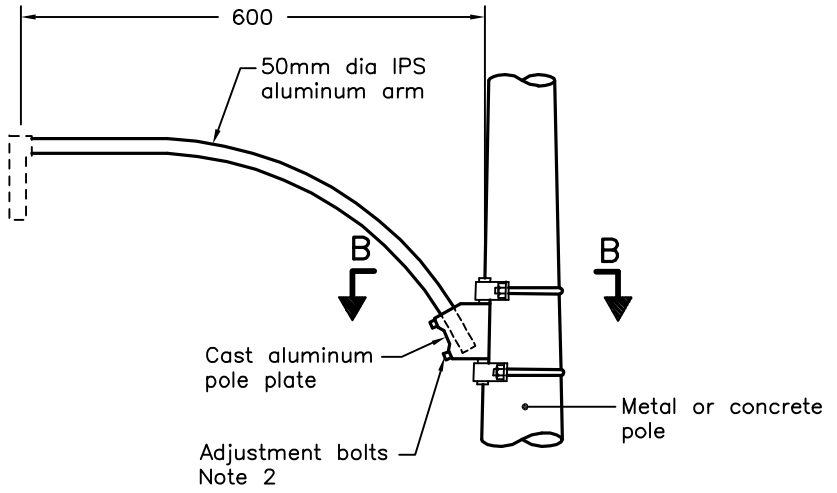
SECTION A–A



SECTION B–B



ATTACHMENT TYPE 2
WOODEN POLE



ATTACHMENT TYPE 1
METAL AND CONCRETE POLE

NOTES:

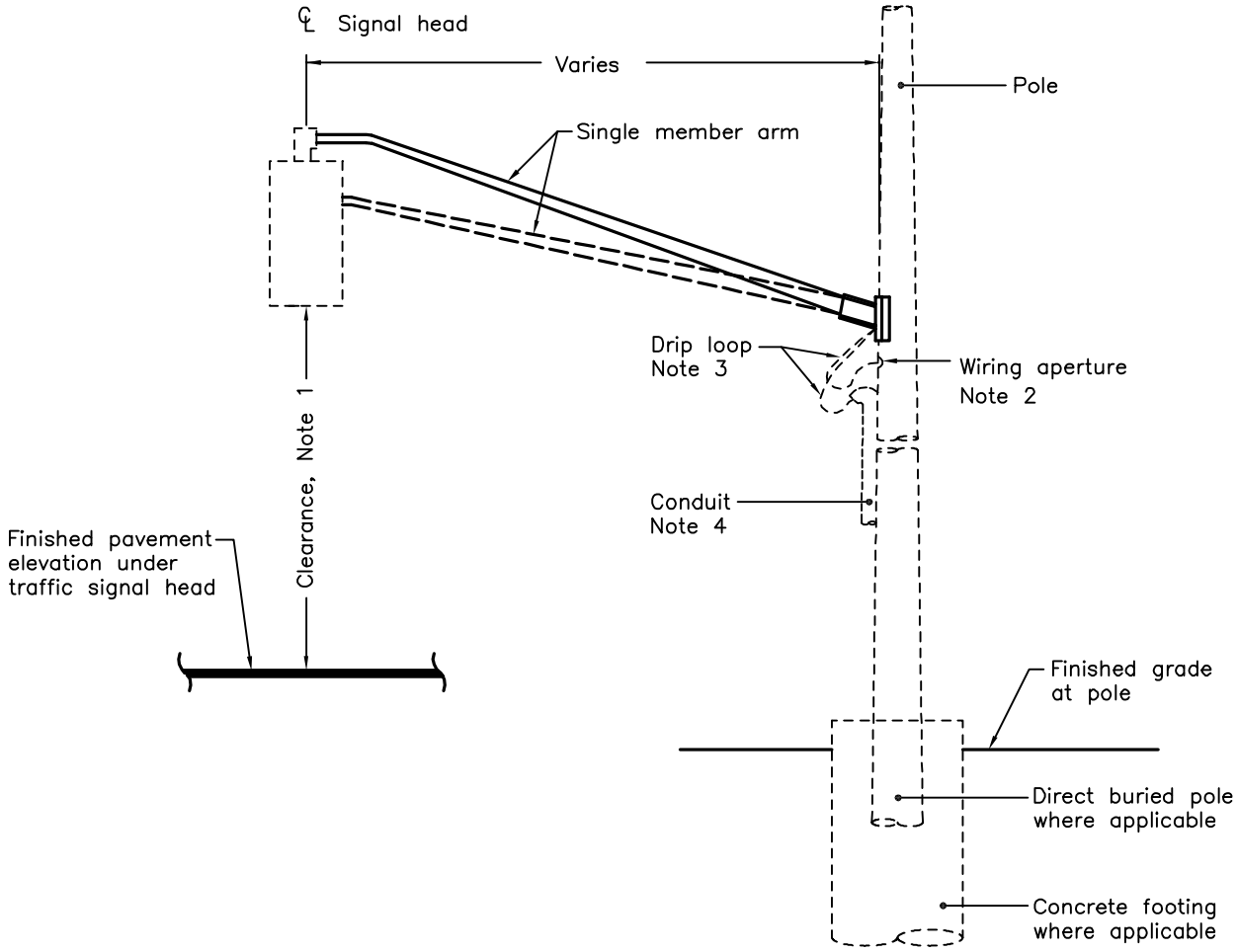
1 12.7mm diameter U bolts shall be no more than 25mm larger in diameter than the diameter of the pole at the point of attachment.
2 Adjustment bolts shall be adjusted so the straight portion of the arm is level.
3 Pole plate U clamps shall be 8mm hot dip galvanized steel plate and suit the pole diameter.
A This OPSD shall be read in conjunction with OPSD 2500.010.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

600mm SIGNAL ARM ATTACHMENT TO POLES

Nov 2017 | Rev 2

OPSD 2500.020



NOTES:

1 The bottom of the signal head shall be a minimum of 5.0m above the highest point on the roadway, regardless of whether the signal head is above the pavement or not.

2 Wiring aperture shall be 25mm diameter field drilled complete with rubber grommet, 25mm below arm attachment or 25mm below overlapping sectional steel joints, deburred, and protected with zinc rich paint.

3 Drip loops shall be provided.

4 For external conduit system on wooden or concrete poles refer to OPSD 2552.010 or OPSD 2554.010.

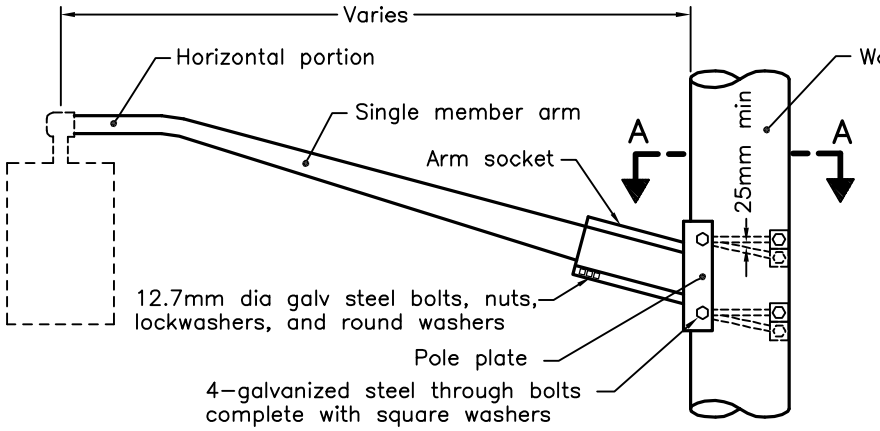
A For arm attachment details refer to OPSD 2500.020.

B For traffic signal head wiring details refer to OPSD 2528.010.

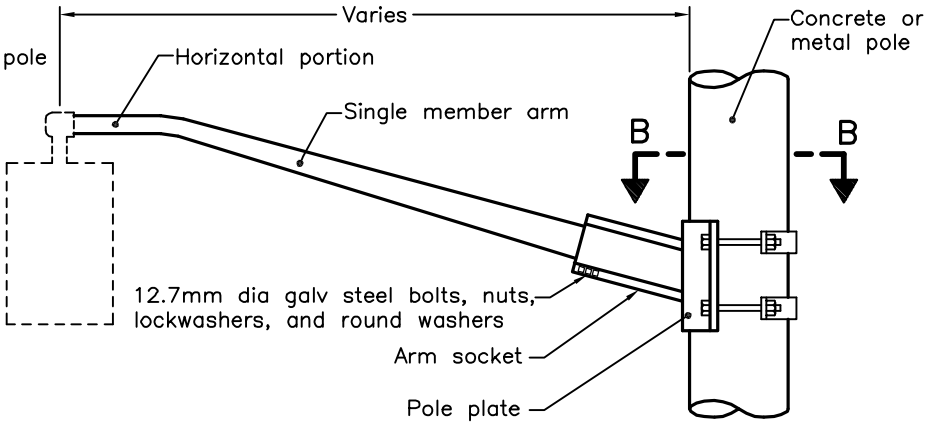
C Traffic signal hanger details shall be as specified.

D All dimensions are in millimetres unless otherwise shown.

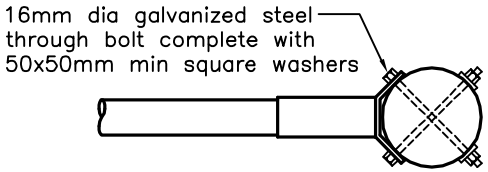
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	0
SINGLE MEMBER ARM AND SIGNAL HEAD			
	OPSD 2501.010		



GENERAL ARRANGEMENT



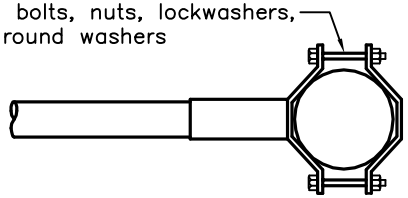
GENERAL ARRANGEMENT



SECTION A–A

WOODEN POLE ATTACHMENT

NOTE1



SECTION B–B

CONCRETE AND METAL POLE ATTACHMENT

NOTE 2

NOTES:

1 For 1.2 to 2.4m arms, use 3.2mm thick arm sockets and 6.3mm thick pole plates.
For 3.0 to 6.7m arms, use 4.7mm thick arm sockets and 9.5mm thick pole plates.

2 For 1.2 to 2.4m arms, use 3.2mm thick arm sockets, 6.3mm thick pole plates, and 15mm dia bolts.
For 3.0 to 6.7m arms, use 4.7mm thick arm sockets, 9.5mm thick pole plates, and 19mm dia bolts.

A For pole attachment locations refer to OPSD 2501.010.

B Traffic signal hanger details as specified.

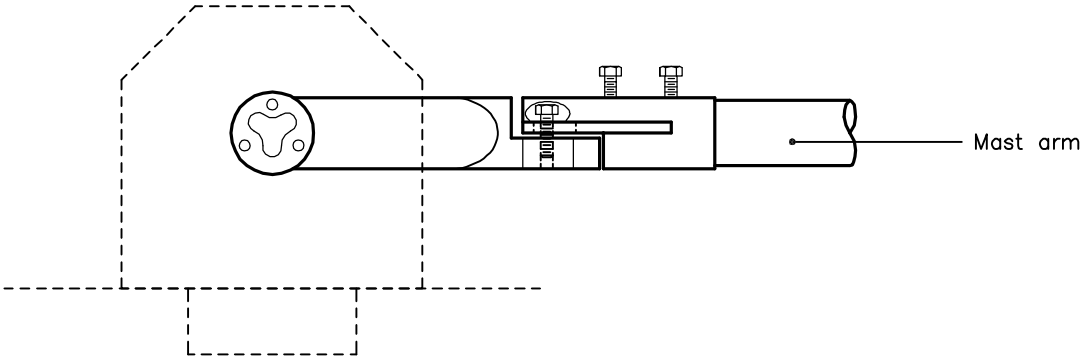
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

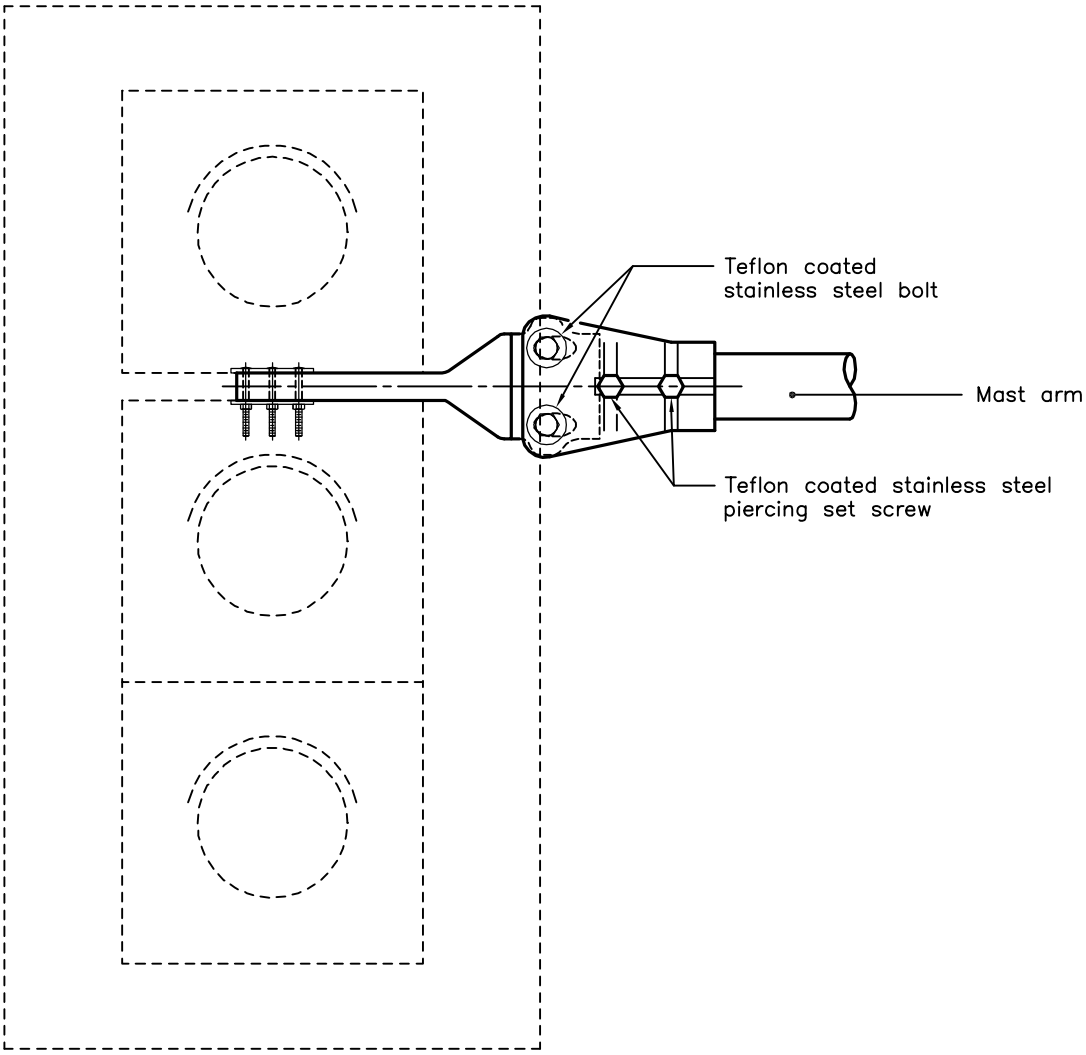
ALUMINUM SINGLE MEMBER ARM ATTACHMENT DETAILS

Nov 2017 | Rev 0

OPSD 2501.020



PLAN

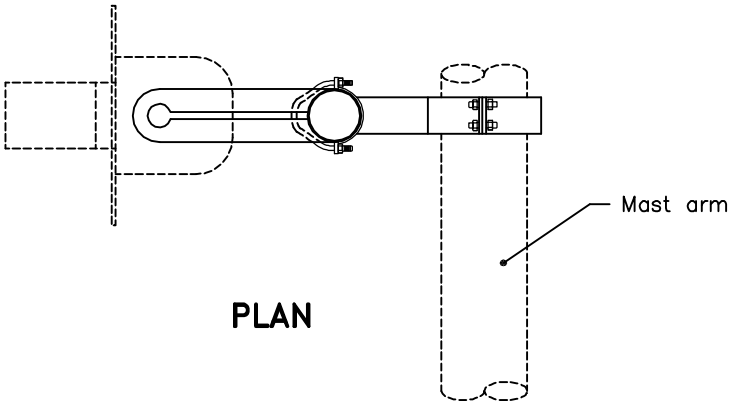


ELEVATION

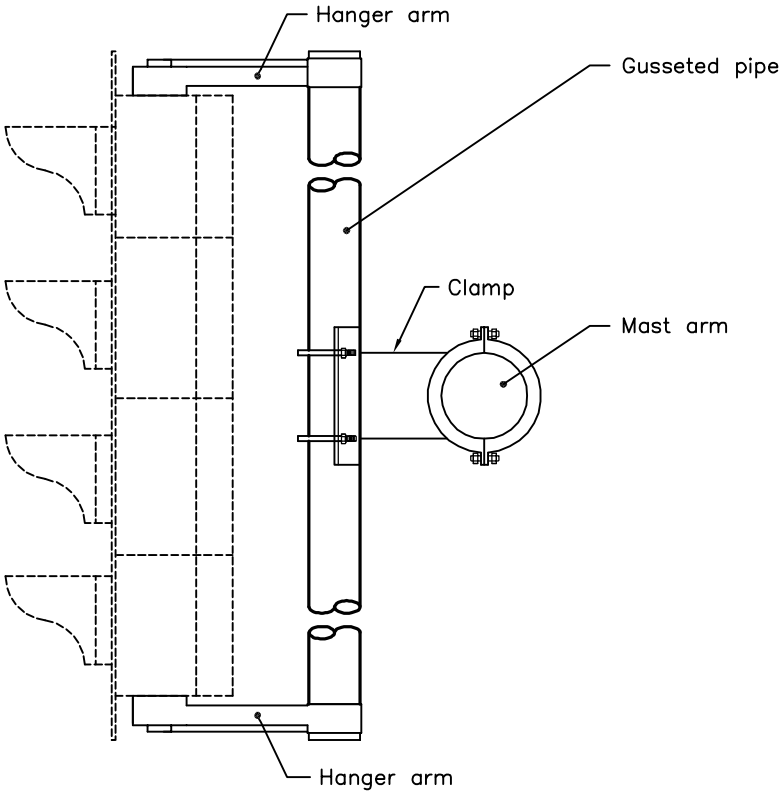
NOTE:

A This OPSD shall be read in conjunction with OPSD 2501.010 and 2501.020.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	1
TRAFFIC SIGNAL ADJUSTABLE MID–SECTION HANGER			
	OPSD 2502.010		



PLAN



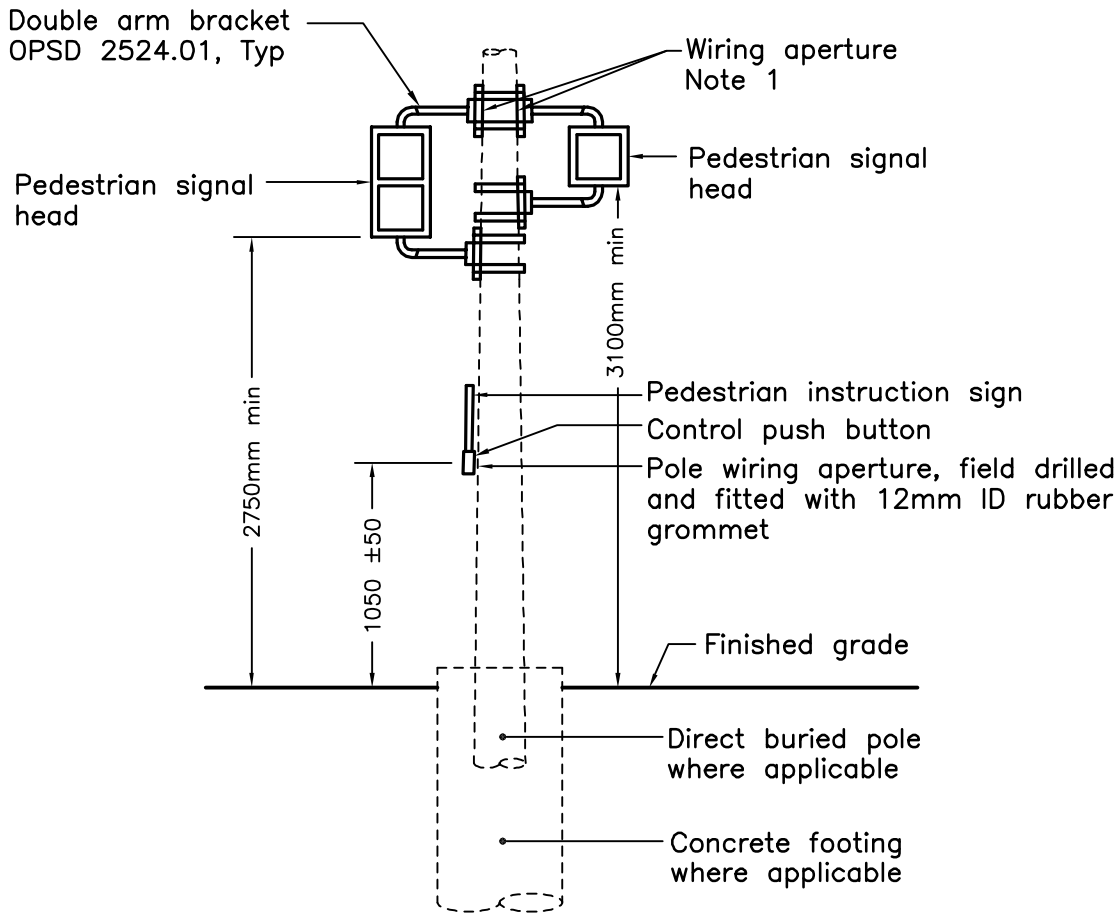
SIDE VIEW

NOTES:

A All fastening hardware shall be stainless steel.

B This OPSD shall be read in conjunction with OPSD 2501.010 and 2501.020.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	1
TRAFFIC SIGNAL DUAL–END HANGER			
	OPSD 2502.011		



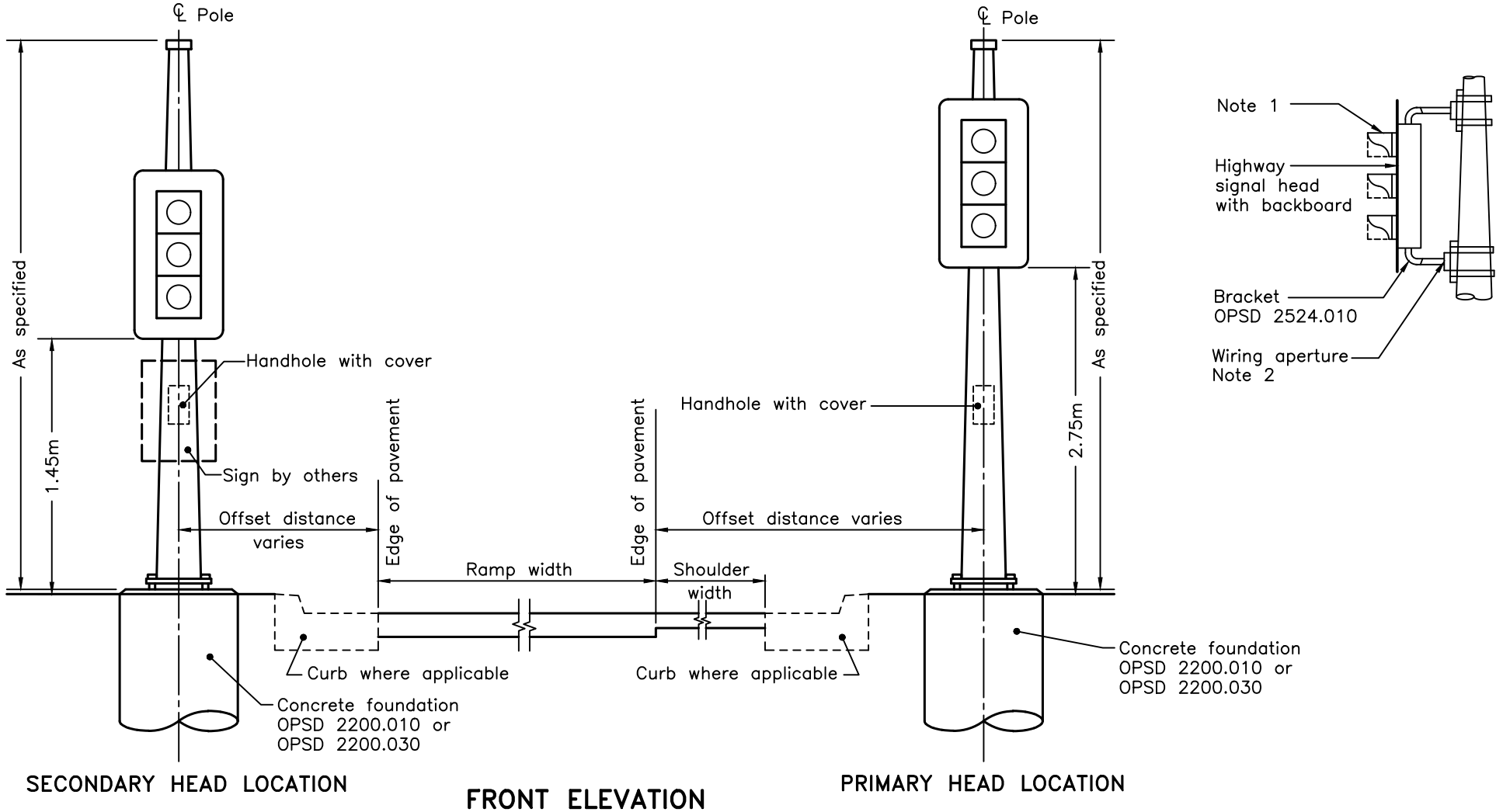
NOTES:

1 Wiring aperture shall be 25mm diameter field drilled complete with rubber grommet, de–burred, and protected with zinc rich paint.

A For external conduit system on wooden or concrete poles refer to OPSD 2552.01 or OPSD 2554.010.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	1
TRAFFIC SIGNAL **PEDESTRIAN HEAD AND** **PUSH BUTTON MOUNTED ON POLE**			
	OPSD 2505.010		



FRONT ELEVATION

NOTES:

1 Where applicable, refer to layout drawings and specifications for aiming requirements.

2 Wiring aperture shall be 25mm diameter field drilled at lower bracket for primary head completed with rubber grommet, de–burred, and protected with zinc rich paint.

A For offset distances and ramp and shoulder widths refer to layout drawings.

B All dimensions are in millimetres unless otherwise shown.

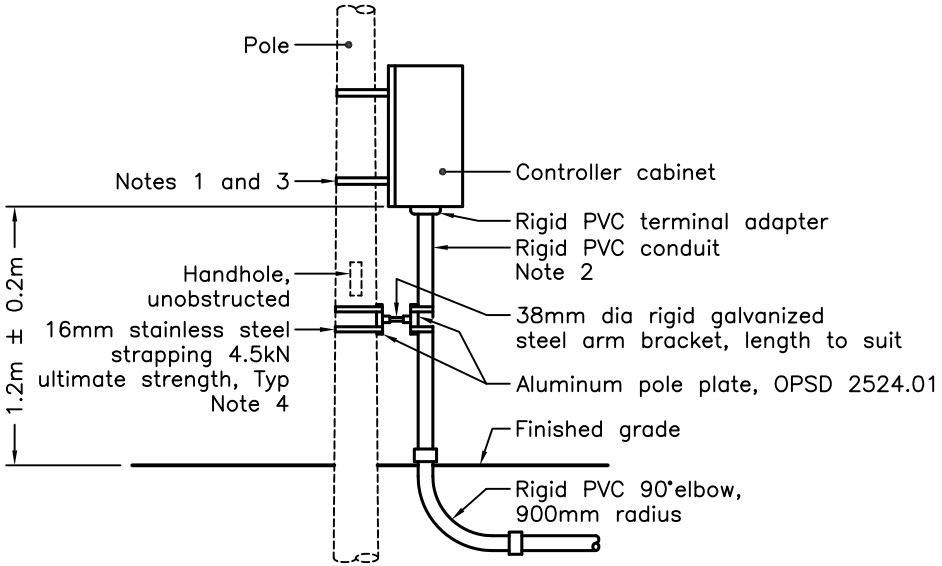
ONTARIO PROVINCIAL STANDARD DRAWING

TRAFFIC SIGNAL
SECTIONAL STEEL POLES WITH PRIMARY AND SECONDARY SIGNAL HEADS FOR RAMP METERING

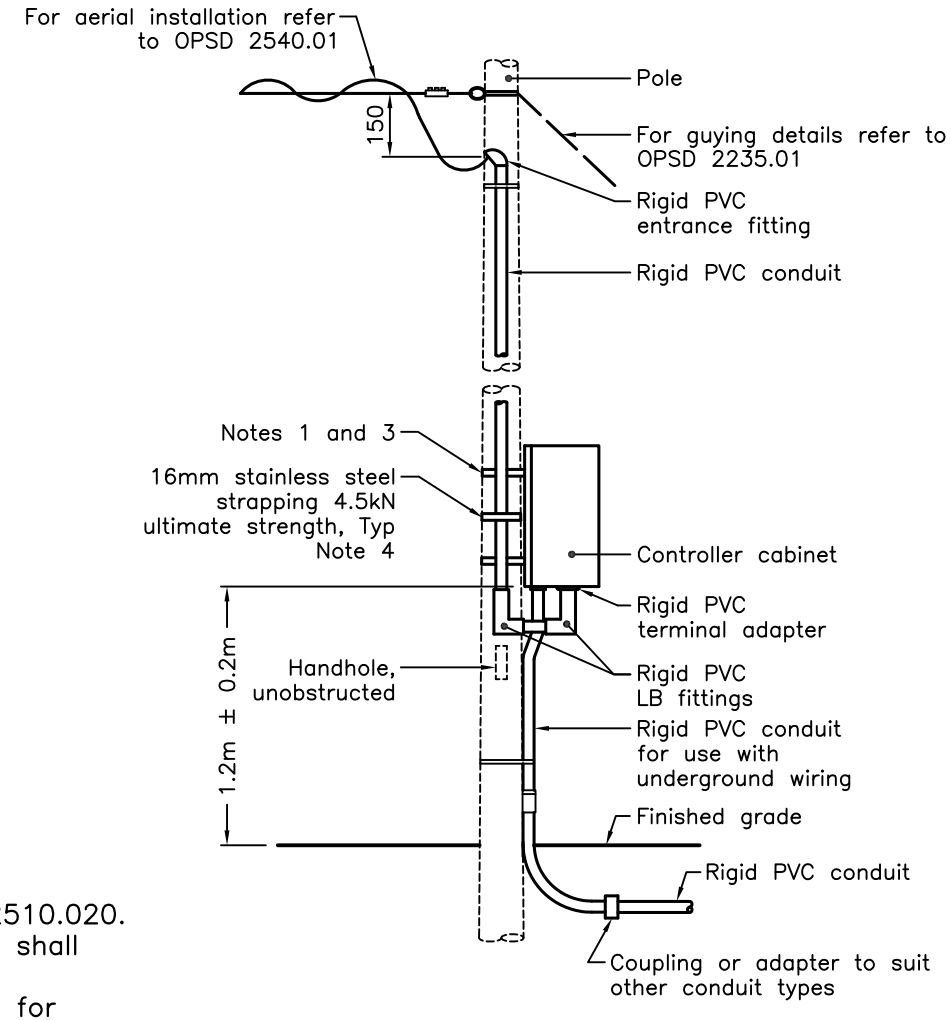
Nov 2019 | Rev | 1

ONTARIO STANDARD • MUNICIPAL – PROVINCIAL •

OPSD 2508.010



UNDERGROUND WIRING INSTALLTIONS



OVERHEAD WIRING INSTALLATIONS

NOTES:

1 For controller cabinet bracket mounting details refer to OPSD 2510.020.
2 When controller cabinet mounted on metal pole, system ground shall not be connected to pole ground terminal.
3 Stainless steel strapping shall not be used as the sole support for electrical equipment installed on wooden poles.
4 Spacing shall be as specified in the Ontario Electrical Safety Code or the manufacturer's instructions.

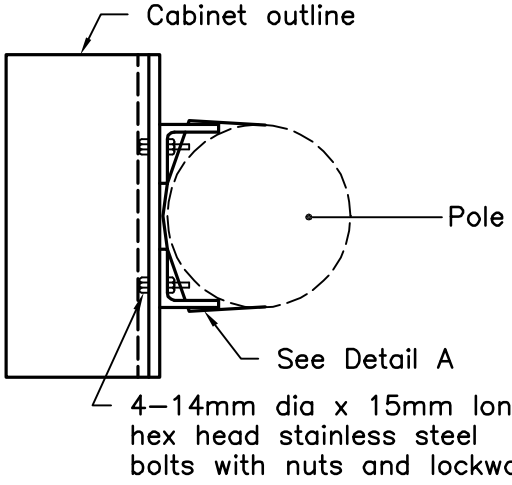
A For location and types of poles and orientation and location of controller cabinet refer to the layout drawings.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

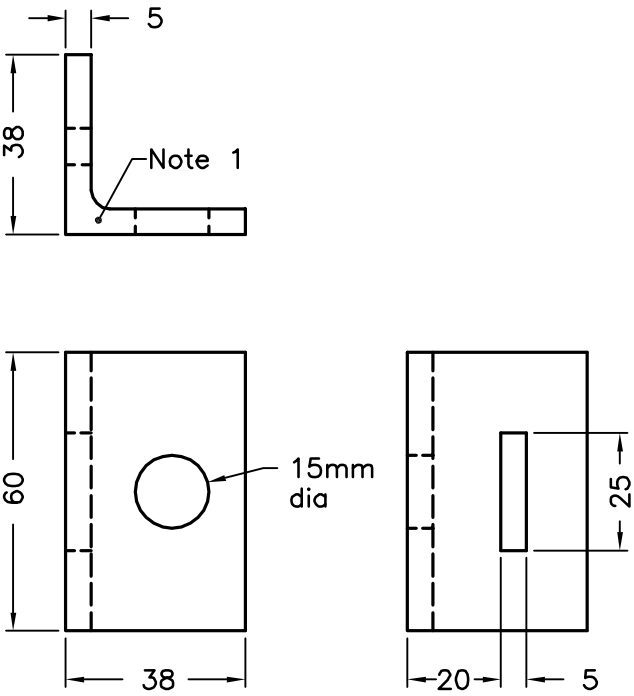
POLE MOUNTED CONTROLLER CABINET

Nov 2012 | Rev 0

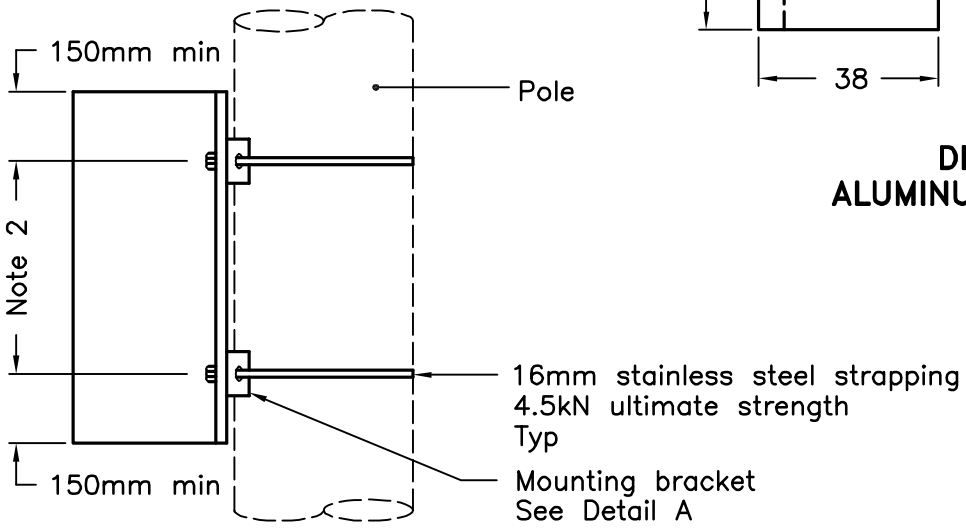
OPSD 2510.010



TOP VIEW



DETAIL A
ALUMINUM POLE PLATE

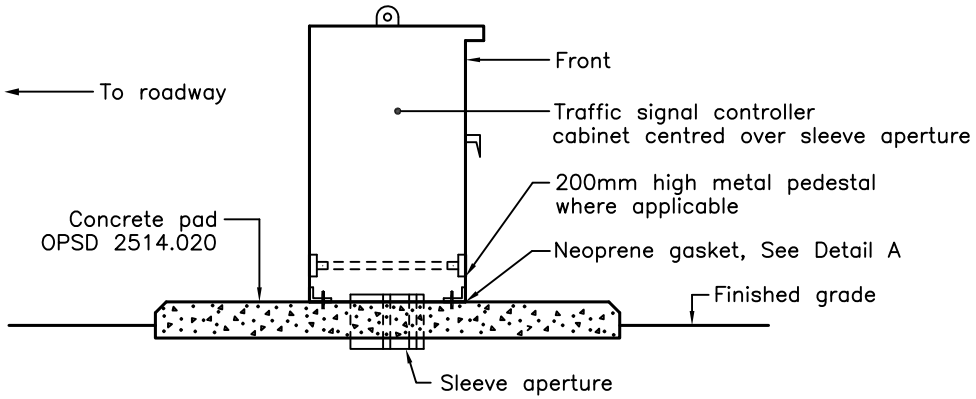


SIDE ELEVATION

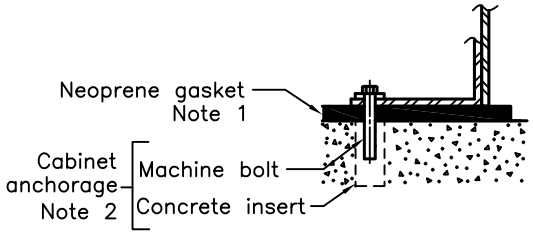
NOTES:

1 Mounting bracket shall be extruded aluminum grade 6061–T6.
2 Adjust mounting location to suit internal cabinet equipment.
A This OPSD to be read in conjunction with OPSD 2510.010.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2011	Rev	0
MOUNTING BRACKET FOR POLE MOUNTED CONTROLLER CABINET			
	OPSD 2510.020		



SIDE VIEW



DETAIL A

NOTES:

1 Cabinet shall be sealed around bottom perimeter with a 10mm thick by 65mm wide neoprene gasket. Gasket shall have a durometer hardness of 45 and shall be provided with adhesive backing for attachment to the cabinet.

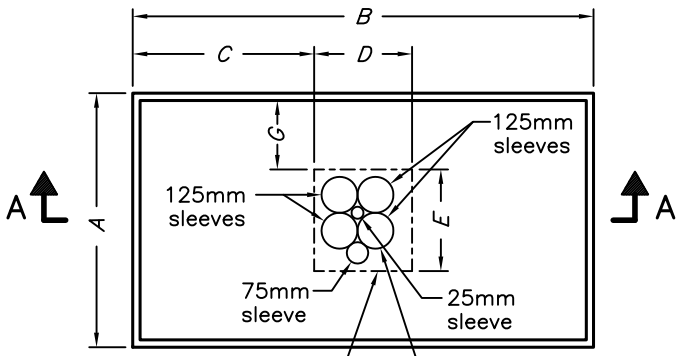
2 Cabinet shall be secured to the pad, accurately aligned, with chuck end concrete anchors and 16mm dia x 38mm long stainless steel hexagonal head machine bolts and lockwashers. Location of anchors shall be according to manufacturer's instructions.

A For numbers, sizes, and orientation of conduits entering sleeves in concrete pad, refer to Contract Drawings.

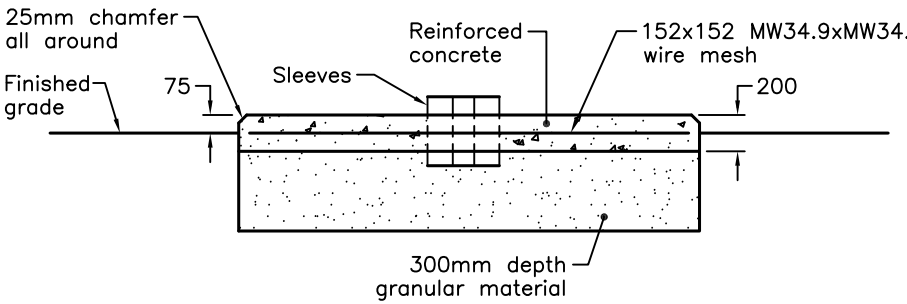
B For location and orientation of cabinet and concrete pad, refer to Contract Drawings.

C All dimensions are in millimetres unless otherwise shown.

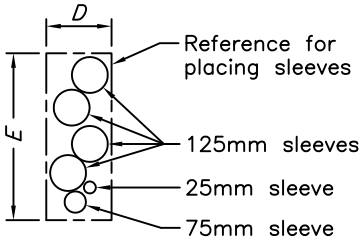
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 0
CONTROLLER CABINET ON PAD		
	OPSD 2514.010	



PLAN



SECTION A–A



DETAIL A

PAD DIMENSIONS						
Cabinet Type	Dimensions mm					
	A	*B*	*C*	*D*	*E*	*G*
332	1000	2000	725	380	380	310
M	1000	1650	400	250	660	170
P	1250	1950	400	250	660	295
R	1500	1950	400	250	660	420

NOTES:

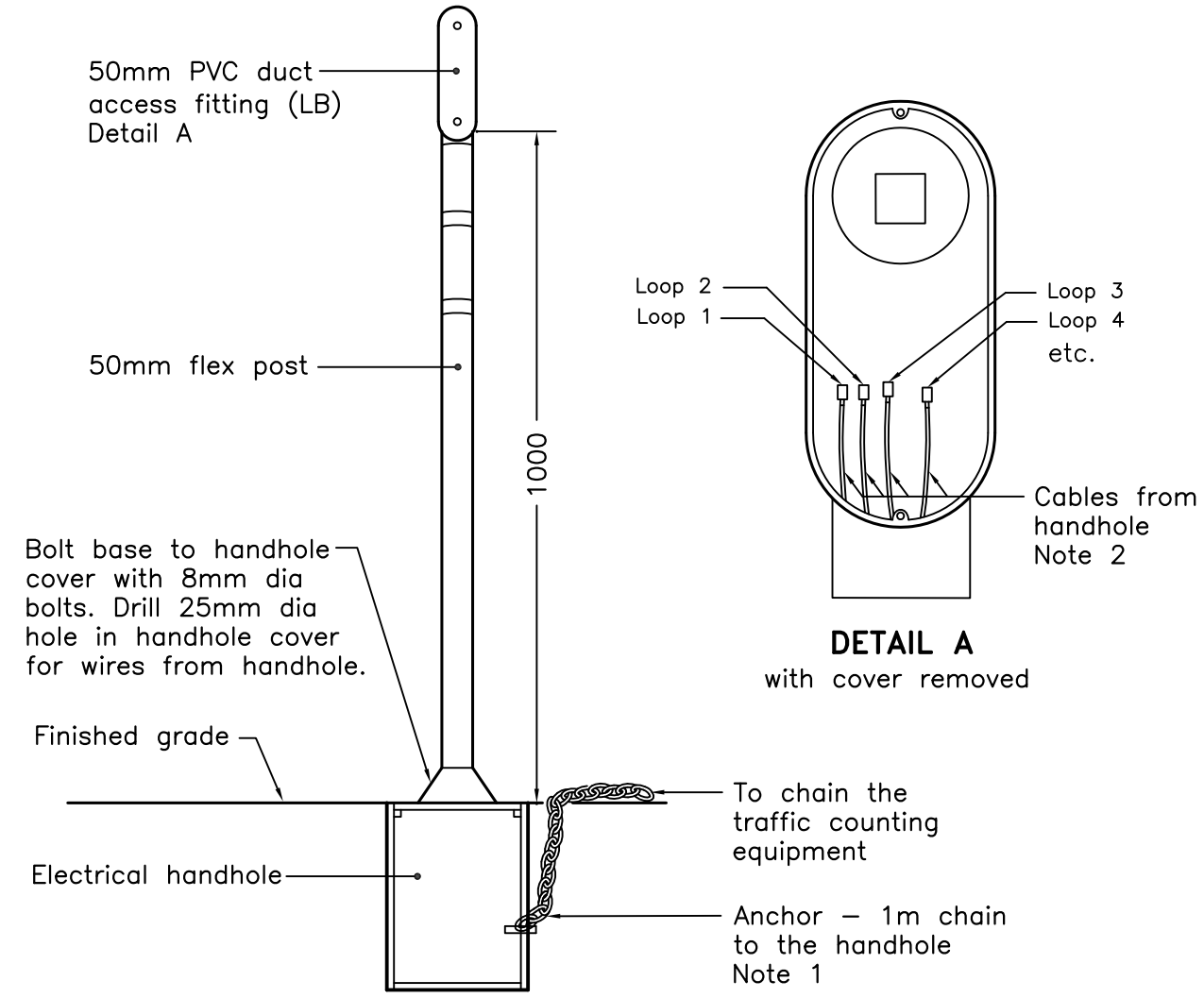
A This OPSD shall be read in conjunction with OPSD 2514.010.
B Maintain 75mm minimum cover over reinforcing steel.
C Aperture for sleeves shall be filled with expandable foam.
D Sleeves in concrete pad shall protrude 50mm above top of pad.
E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2012 | Rev 0

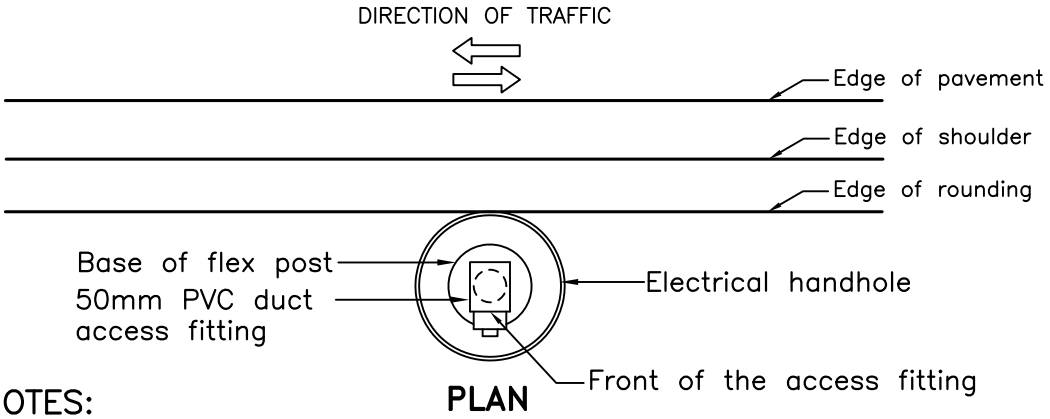
CONCRETE PAD FOR CONTROLLER CABINET

OPSD 2514.020



DETAIL A
with cover removed

ELEVATION

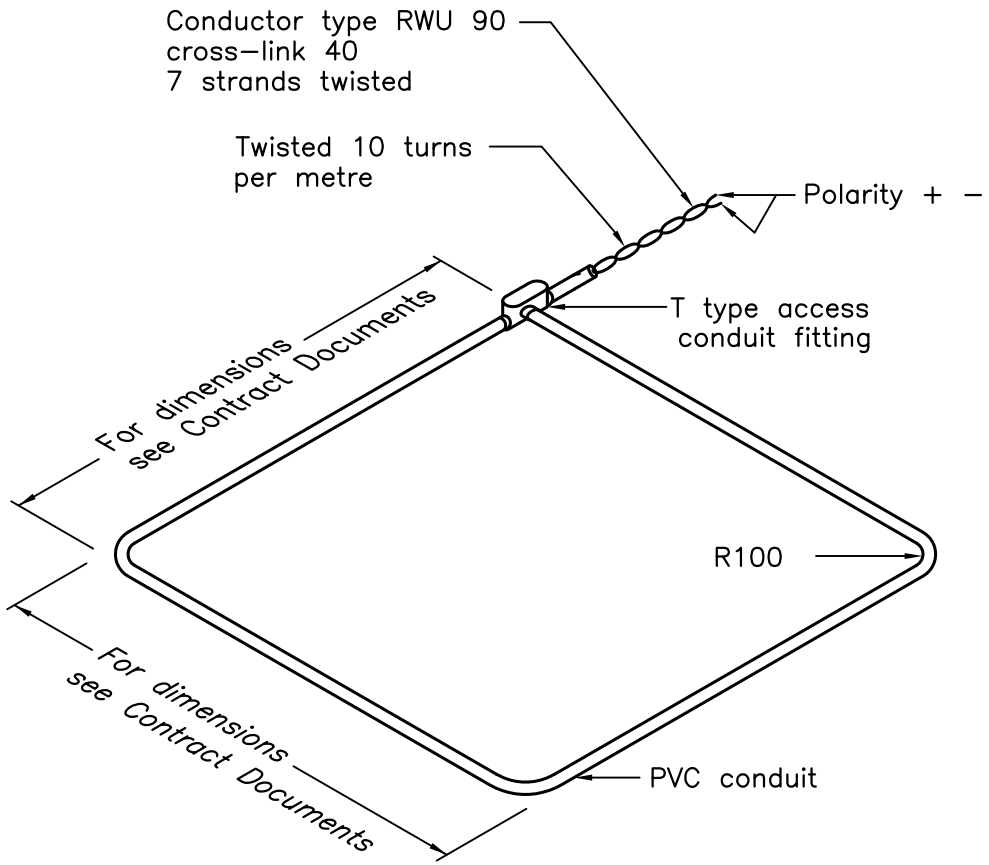


PLAN

NOTES:

1 1.0m long, 7mm diameter galvanized links.
2 Number of cables depends on number of loop detectors. Group and coil the cables to prevent from falling down the post.
A For type of loop detector and station or offset of the handhole, refer to the layout drawings and the quantity sheets.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev	0
TRAFFIC DATA COLLECTION DATA STATION **TRAFFIC COUNTING STATION TYPE 2**			OPSD 2516.102

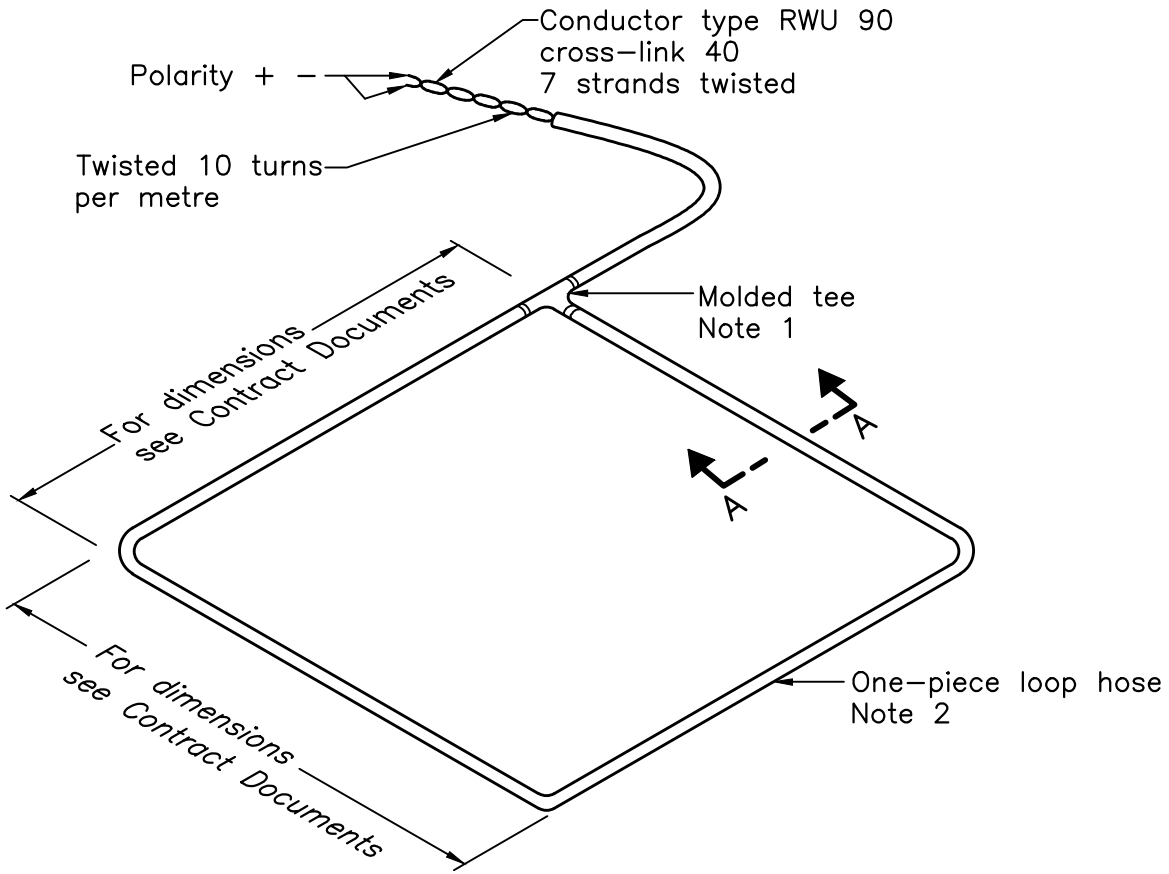


PLAN

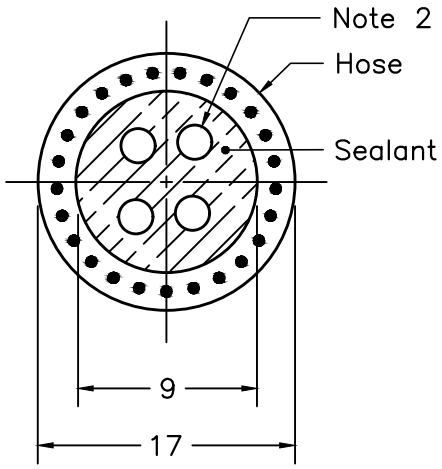
NOTES:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev	0
PREFABRICATED DETECTOR LOOP			
	OPSD 2518.101		



PLAN



SECTION A–A

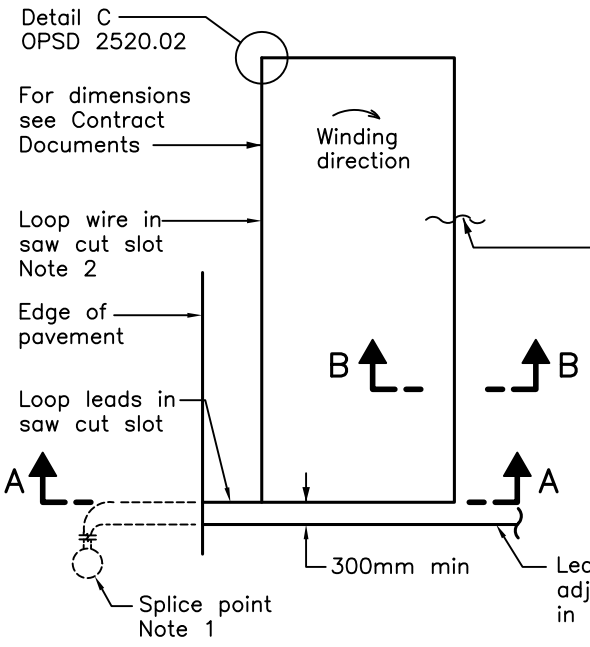
NOTES:

1 Tee shall be constructed of heavy duty high temperature rubber.

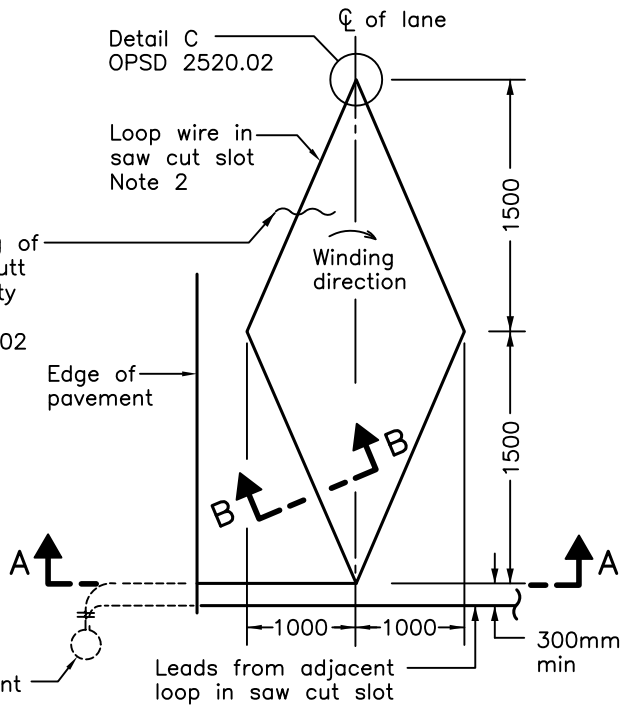
2 Loop and lead–in wires shall be constructed within heavy duty reinforced rubber hose. Number of turns as specified.

A All dimensions are in millimetres unless otherwise shown.

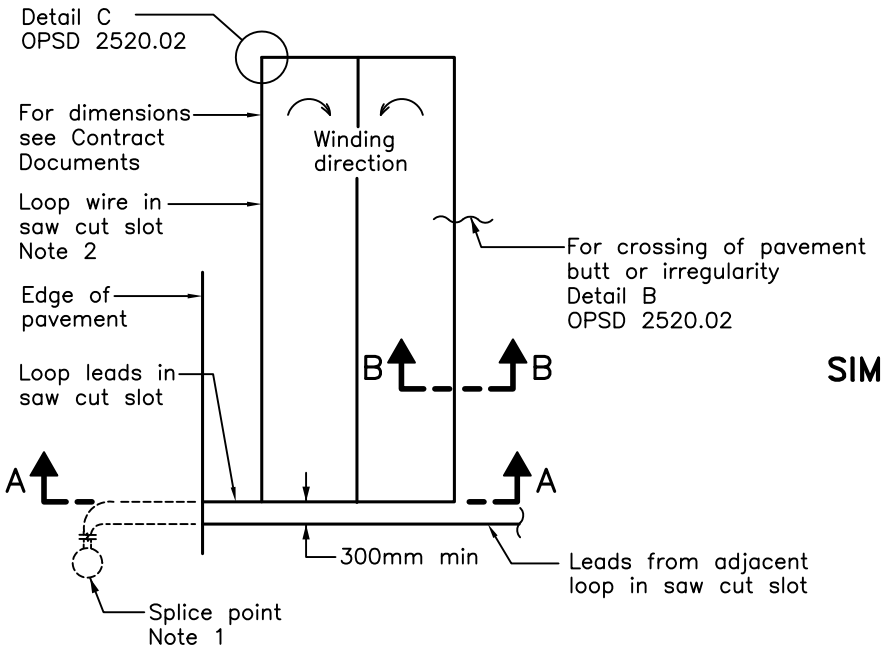
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2020	Rev	1
TRAFFIC DATA COLLECTION DETECTOR LOOPS **HEAVY DUTY RUBBER**			
	OPSD 2518.102		



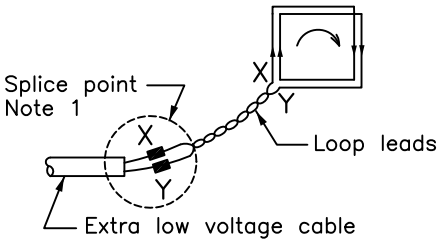
PLAN
SIMPLE LOOP



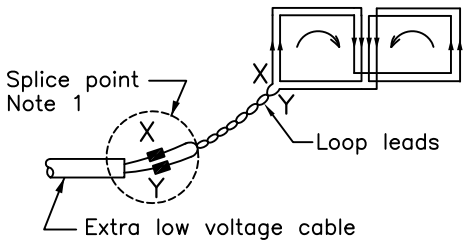
PLAN
DIAMOND LOOP



PLAN
DUPLEX LOOP



SIMPLE AND DIAMOND LOOP CONNECTIONS



DUPLEX LOOP CONNECTIONS

NOTES:

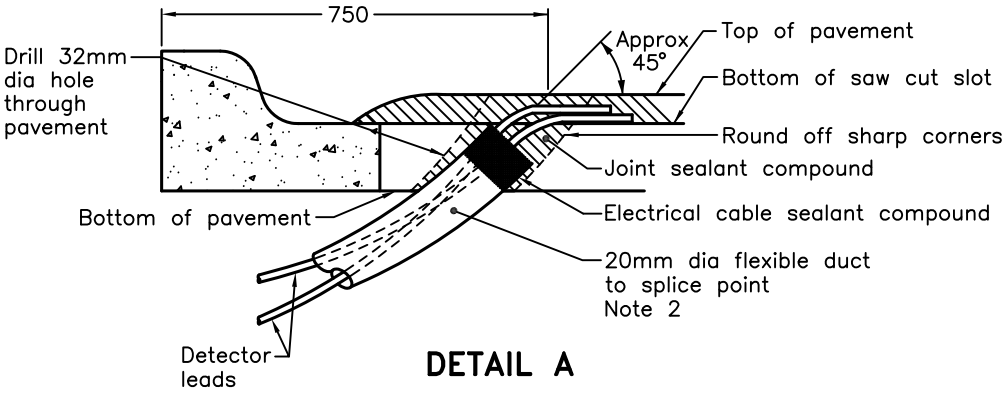
1 Location of electrical chambers or pole splice as specified.
2 Number of turns of loop wire for loop detector as specified.

A For Section A–A and B–B see OPSD 2520.02.
B This OPSD shall be read in conjunction with OPSD 2520.02.
C For splice to extra low voltage cable see OPSD 2530.01.
D All dimensions are in millimetres unless otherwise shown.

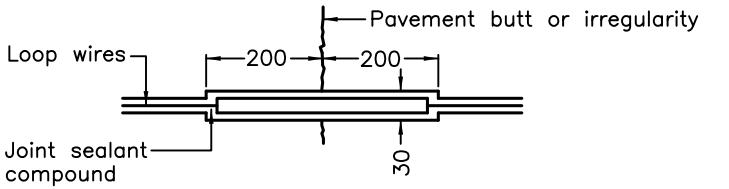
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev	0

LOOP DETECTOR INSTALLATION DETAILS I

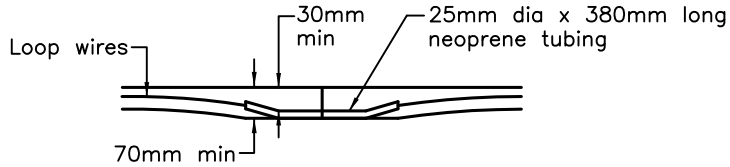
OPSD 2520.010



DETAIL A

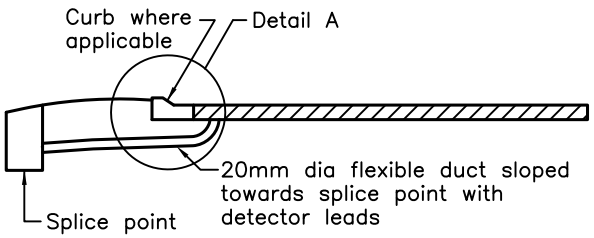


PLAN

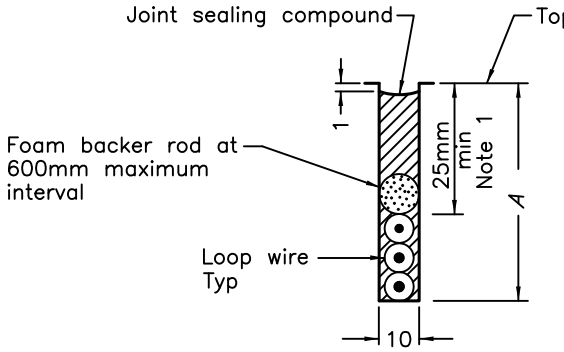


ELEVATION

DETAIL B
PAVEMENT BUTT OR IRREGULARITY

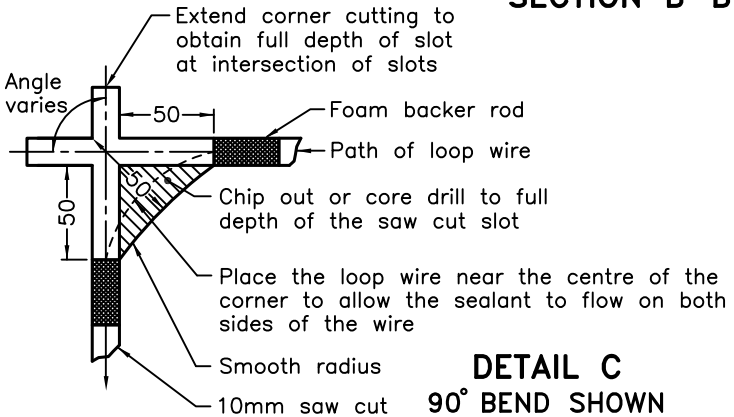


SECTION A–A



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

SECTION B–B



DETAIL C
90° BEND SHOWN

NOTES:

1 When cable is installed prior to the finished top course paving, the maximum depth of cover shall be 100mm.
2 Duct and cable shall be installed a minimum of 300mm below finished grade.

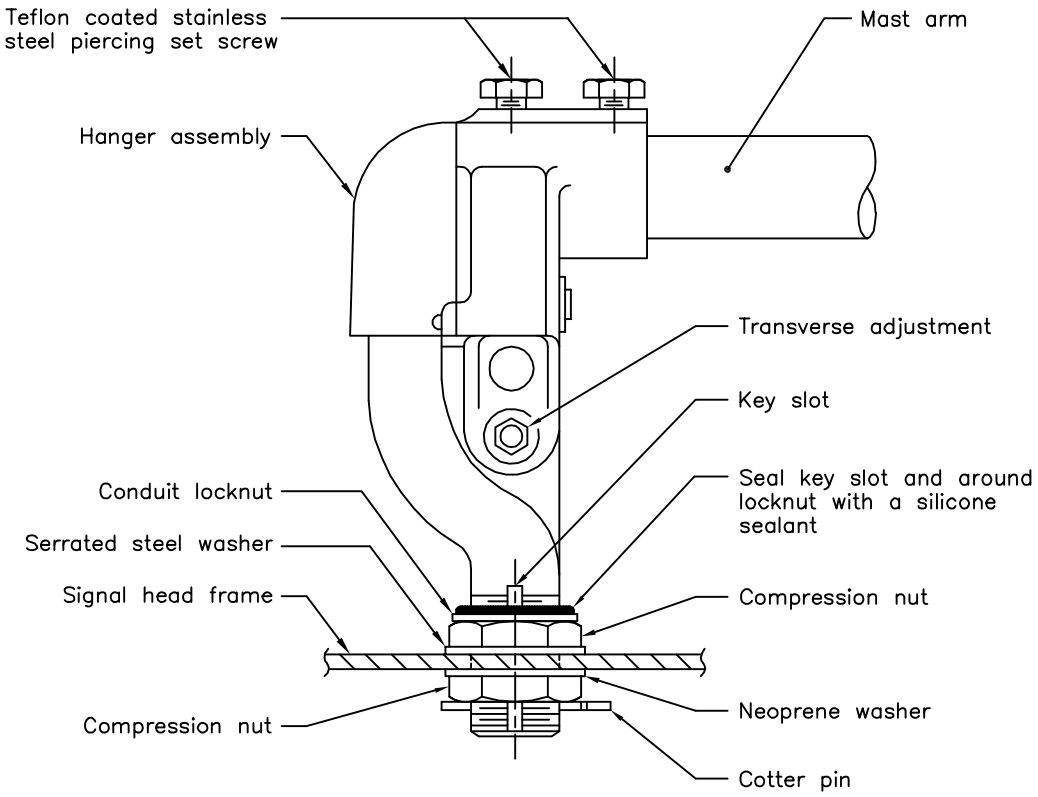
A This OPSD shall be read in conjunction with OPSD 2520.010.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

LOOP DETECTOR INSTALLATION DETAILS II

Nov 2012 | Rev 4

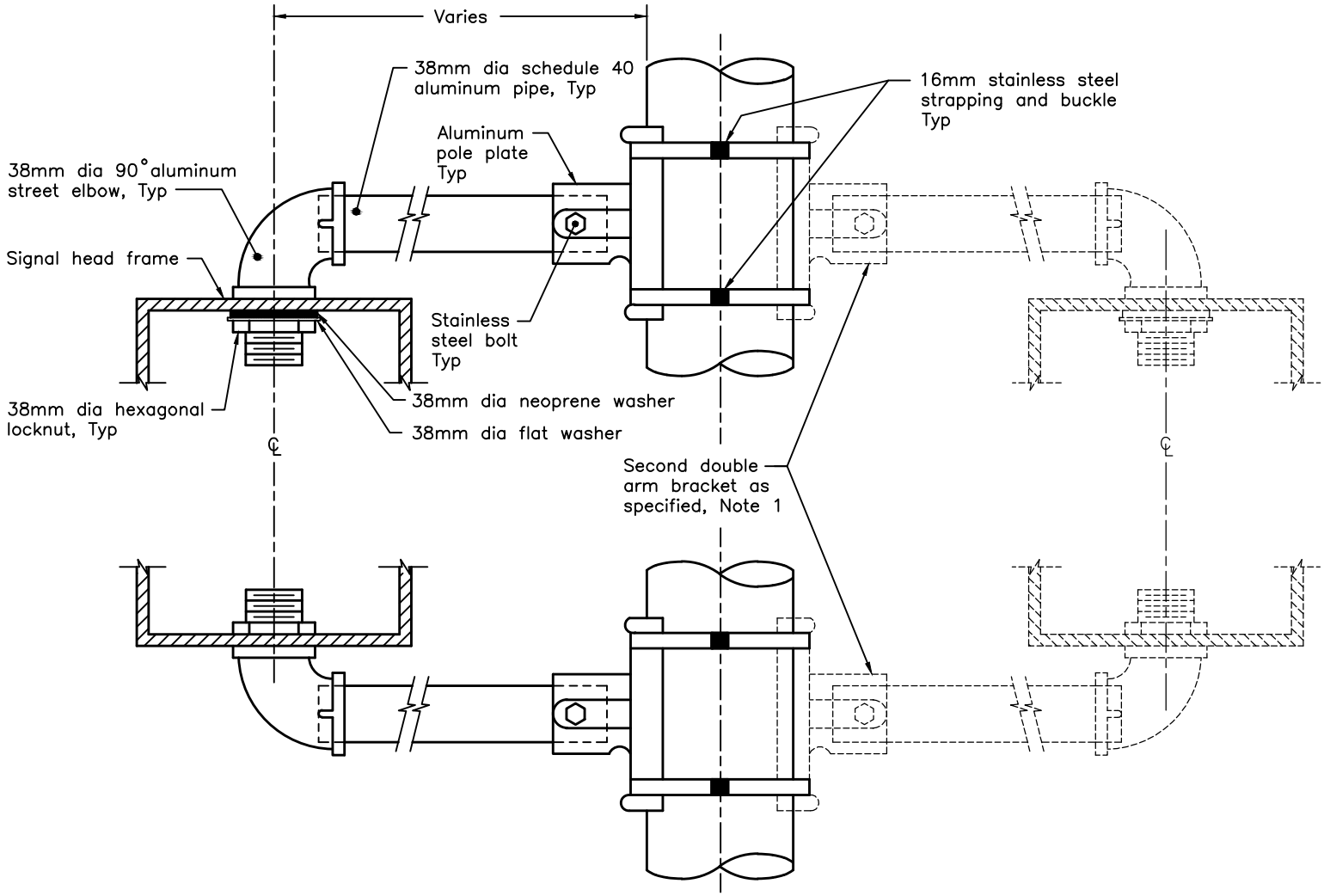
OPSD 2520.02



NOTE:

A This OPSD shall be read in conjunction with OPSD 2501.010 and 2501.020.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2017	Rev	1
TRAFFIC SIGNAL CUSHION HANGER	- - - - - - - - - - - - - - - - - - - -		
	OPSD 2522.010		



NOTES:

1 The orientation of the second double arm bracket varies.

A All dimensions are in millimetres unless otherwise shown.

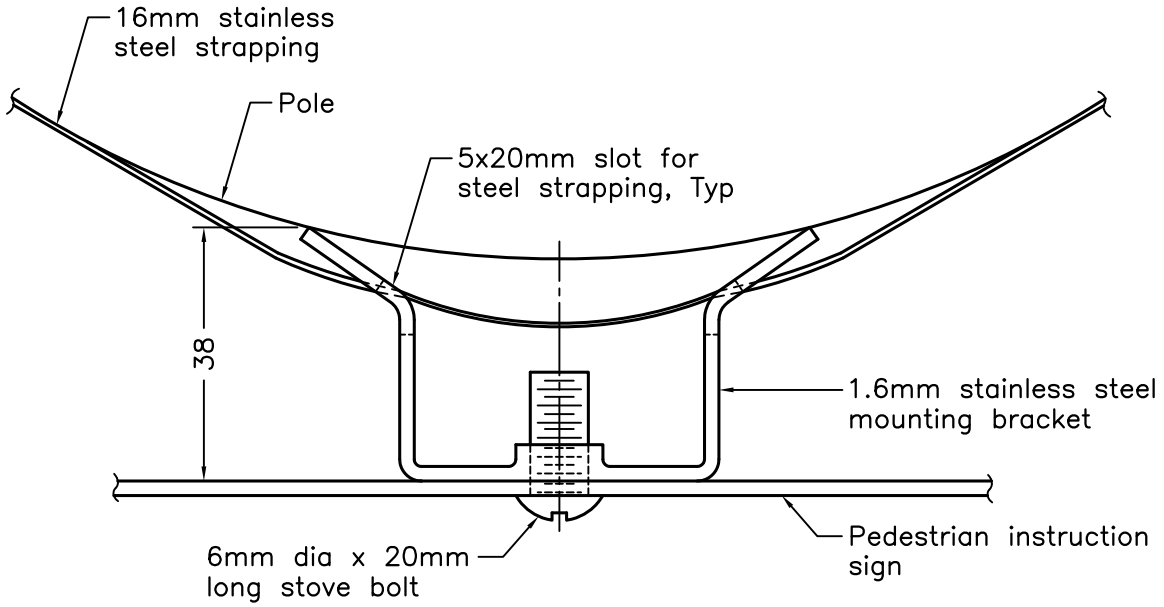
ONTARIO PROVINCIAL STANDARD DRAWING

TRAFFIC SIGNAL

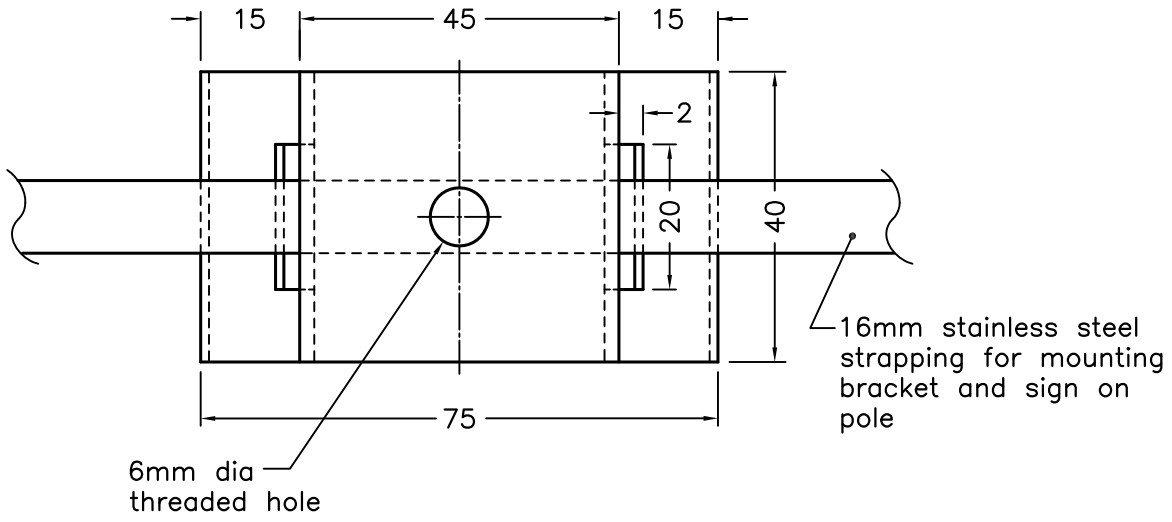
DOUBLE ARM BRACKET

Nov 2018 | Rev 0

OPSD 2524.010



PLAN



ELEVATION

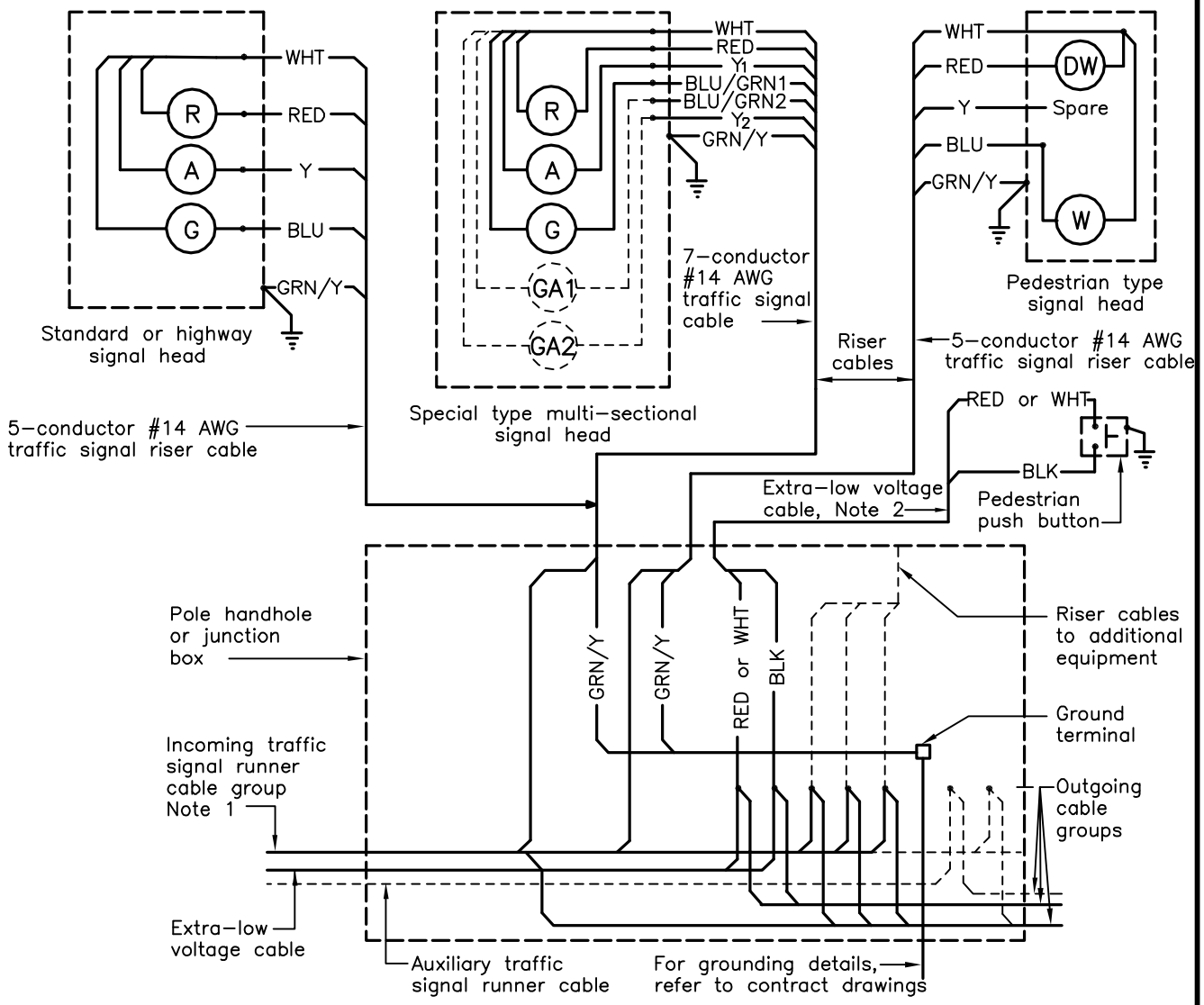
NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev	1
TRAFFIC SIGNAL BRACKET FOR MOUNTING PEDESTRIAN INSTRUCTION SIGN ON POLE			
	OPSD 2526.01		

CABLE COLOUR ABBREVIATIONS
Colour/Marker

ABBREV.	DESCRIPTION
BLU/GRN 1	– Blue with 'green one' marker
BLU/GRN 2	– Blue with 'green two' marker
Y_1	– Yellow with marker – Y_1
Y_2	– Yellow with marker – Y_2
RED	– Red
BLU	– Blue
GRN/Y	– Green with yellow tracer
BLK	– Black
WHT	– White
GRN	– Green



NOTES:

1 Riser cable connection shall be made to the designated conductor in the cable group as specified, together with connection to the outgoing conductor.

2 Number of conductors as specified.

A For traffic signal cable groups, abbreviations and colour coding as specified.

B Details shown are typical only. For multiple equipment installations on the same pole, maintain riser cable type and colour coding and connect to the designated conductors as specified.

C Green conductors with yellow tracer used as ground shall be tagged Ground in the pole handhole or junction box.

ONTARIO PROVINCIAL STANDARD DRAWING

TRAFFIC SIGNAL EQUIPMENT

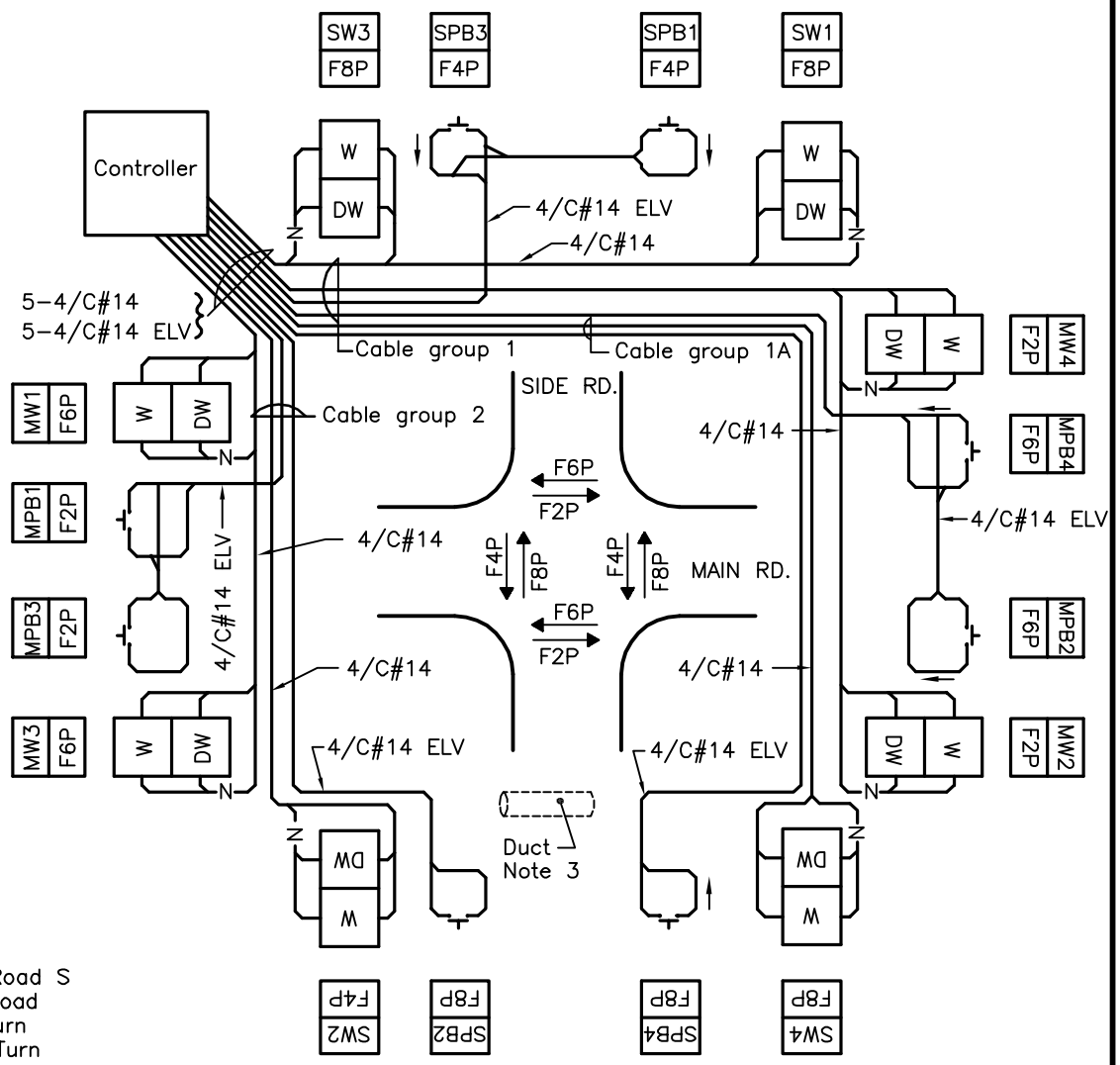
POLE WIRING DIAGRAM

Nov 2017 | Rev 0

ONTARIO STANDARDS – MUNICIPAL – PROVINCIAL

OPSD 2528.010

		Cond #	Colour/Mark	Cable Group 1	Cable Group 2	Cable Group 1A
	4/C#14(M)	1	White	Neutral	Neutral	
		2	Red	DW[MW2,MW4]	DW[MW3,MW1]	
		3	Yellow	Not Used, Note 1	Not Used, Note 1	
		4	Blue	W[MW2,MW4]	W[MW3,MW1]	
	4/C#14(S)	1	White	Neutral	Neutral	Neutral
		2	Red	DW[SW3,SW1]	DW[SW2]	DW[SW4] Note 3
		3	Yellow	Not Used, Note 1	Not Used, Note 1	Not Used, Note 1&3
		4	Blue	W[SW3,SW1]	W[SW2]	W[SW4] Note 3
Extra-Low Voltage Cable ELV	4/C#14(M)	1	White	MPB2,MPB4	MPB1,MPB3	
		2	Black	MPB2,MPB4	MPB1,MPB3	
		3	Red	Spare	Spare	
		4	Green	Spare	Spare	
	4/C#14(S)	1	White	SPB1,SPB3	SPB2	SPB4, Note 3
		2	Black	SPB1,SPB3	SPB2	SPB4, Note 3
		3	Red	Spare	Spare	Spare
		4	Green	Spare	Spare	Spare



NOTES:

1 Conductors shown as 'Not Used' shall be left unconnected and designated as spares.
2 Opposing faze pedestrian movements are normally concurrent and can normally be connected in parallel in the controller cabinet.
3 If ducts are available across the far side road leg, cable group 1A may be eliminated by extension of group 2 cable through the duct to wire SW4 in parallel with SW2 and SPB4 in parallel with SPB2.
A Connections shown are general and typical and shall be adjusted to suit intersection layout.

LEGEND:

DW – 'DON'T WALK' display
W – 'WALK' display
MW# – Main Road pedestrian head No. #
SW# – Side Road pedestrian head No. #
MPB# – Main Road pedestrian push button No. #
SPB# – Side Road pedestrian push button No. #
F#P – Faze # pedestrian movement, Note 2
MP# – Main Road Primary No. #
MS# – Main Road Secondary No. #
MA# – Main Road Auxiliary No. #
SP# – Side Road Primary No. #
SS# – Side Road Secondary No. #
SA# – Side Road Auxiliary No. #

M – Main Road S
S – Side Road
LT – Left Turn
RT – Right Turn
SL – Side Road Left Turn cable
ML – Main Road Left Turn cable

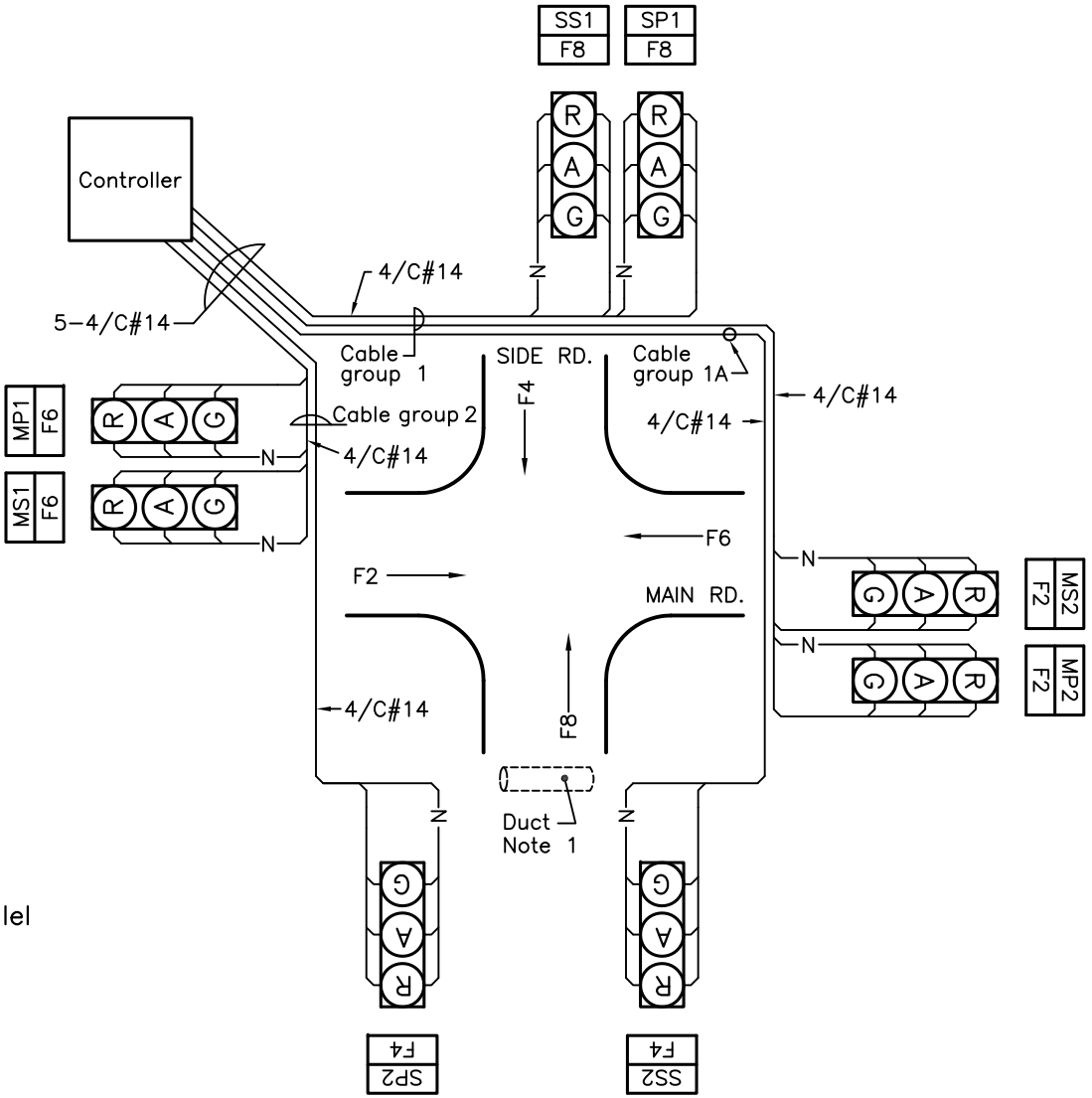
ONTARIO PROVINCIAL STANDARD DRAWING

SIGNAL WIRING FOR PEDESTRIAN FACILITIES

Nov 2015 | Rev 1

OPSD 2529.010

	Cond #	Colour/Mark	Cable Group 1	Cable Group 2	Cable Group 1A Note 1
4/C#14(M)	1	White	Main Rd. Neutral	Main Rd. Neutral	
	2	Red	Main Rd. Red	Main Rd. Red	
	3	Yellow	Main Rd. Amber	Main Rd. Amber	
	4	Blue	Main Rd. Green	Main Rd. Green	
4/C#14(S)	1	White	Side Rd. Neutral	Side Rd. Neutral	Side Rd. Neutral
	2	Red	Side Rd. Red	Side Rd. Red	Side Rd. Red
	3	Yellow	Side Rd. Amber	Side Rd. Amber	Side Rd. Amber
	4	Blue	Side Rd. Green	Side Rd. Green	Side Rd. Green



NOTES:

1 If ducts are available across the far side road leg, cable group 1A may be eliminated by extension of group 2 cable through the duct to wire SS2 in parallel with SP2.

A Connections shown are general and typical and shall be adjusted to suit intersection layout.

B For Legend see OPSD 2529.010.

C For pedestrian facilities see OPSD 2529.010.

D If advance arrow is required use OPSD 2529.030.

ONTARIO PROVINCIAL STANDARD DRAWING

SIGNAL WIRING

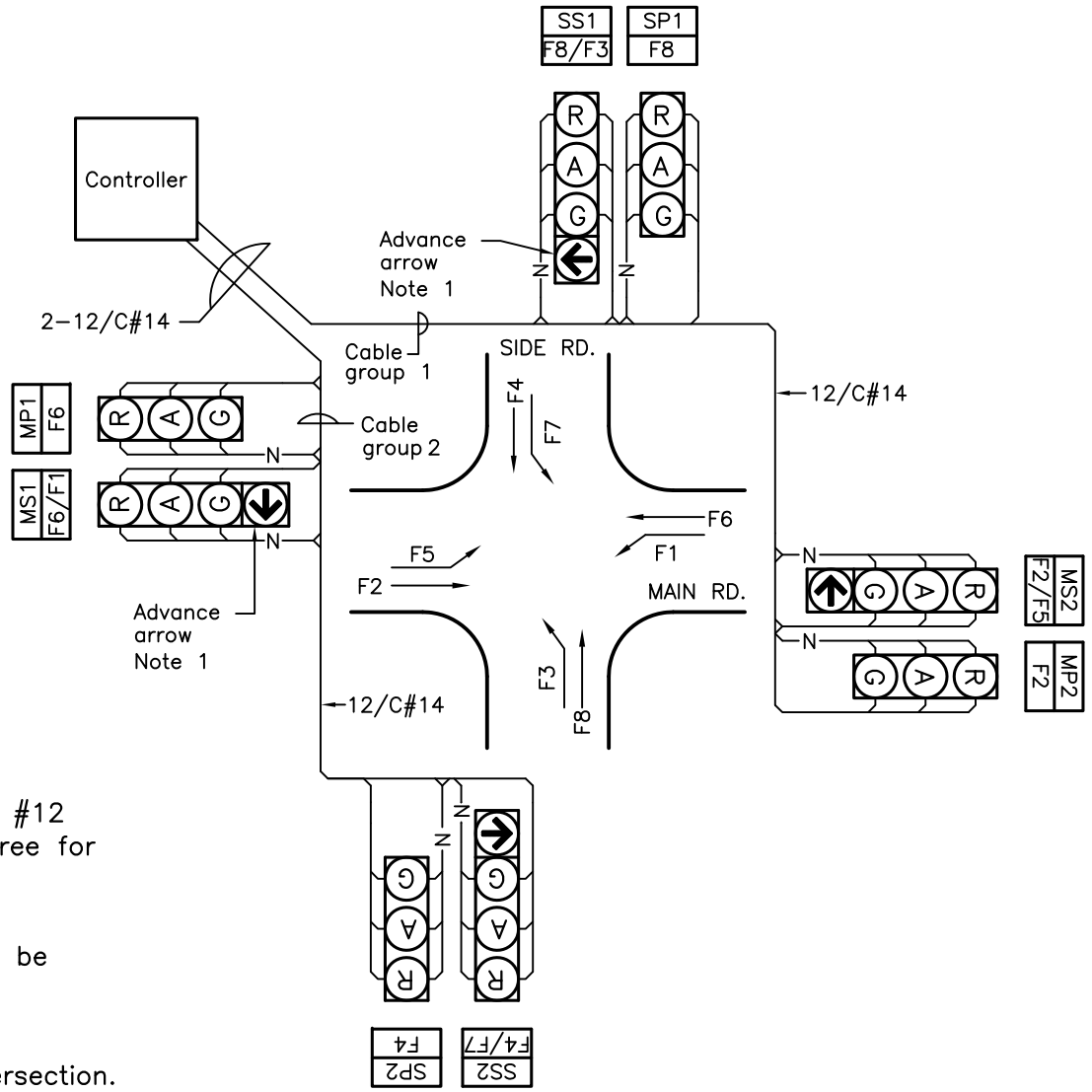
USING 4/C CABLE CONNECTED RADIALLY, 2 PHASE

Nov 2012 | Rev 0

ONTARIO STANDARDS - MUNICIPAL - PROVINCIAL

OPSD 2529.020

	Cond #	Colour/Mark	Cable Group 1	Cable Group 2
12/C#14	1	White	Neutral	Neutral
	2	Black	Note 1	Note 1
	3	Orange	Note 1	Note 1
	4	Red/Red One	Main Rd. Red	Main Rd. Red
	5	Red/Red Two	Side Rd. Red	Side Rd. Red
	6	Red/Red Three	Spare	Spare
	7	Yellow/Amber One	Main Rd. Amber	Main Rd. Amber
	8	Yellow/Amber Two	Side Rd. Amber	Side Rd. Amber
	9	Yellow/Amber Three	Note 1	Note 1
	10	Blue/Green One	Main Rd. Green	Main Rd. Green
	11	Blue/Green Two	Side Rd. Green	Side Rd. Green
	12	Blue/Green Three	Note 1	Note 1



NOTES:

1 When arrow advance greens are used, use conductor #12 Blue/Green Three and conductor #9 Yellow/Amber Three for the Main Road heads; and conductor #2 Black and conductor #3 Orange for the Side Road heads.

A Connections shown are general and typical and shall be adjusted to suit intersection layout.
B For Legend see OPSD 2529.010.
C For pedestrian facilities see OPSD 2529.010.
D The system shown requires ducts all around the intersection.

ONTARIO PROVINCIAL STANDARD DRAWING

SIGNAL WIRING

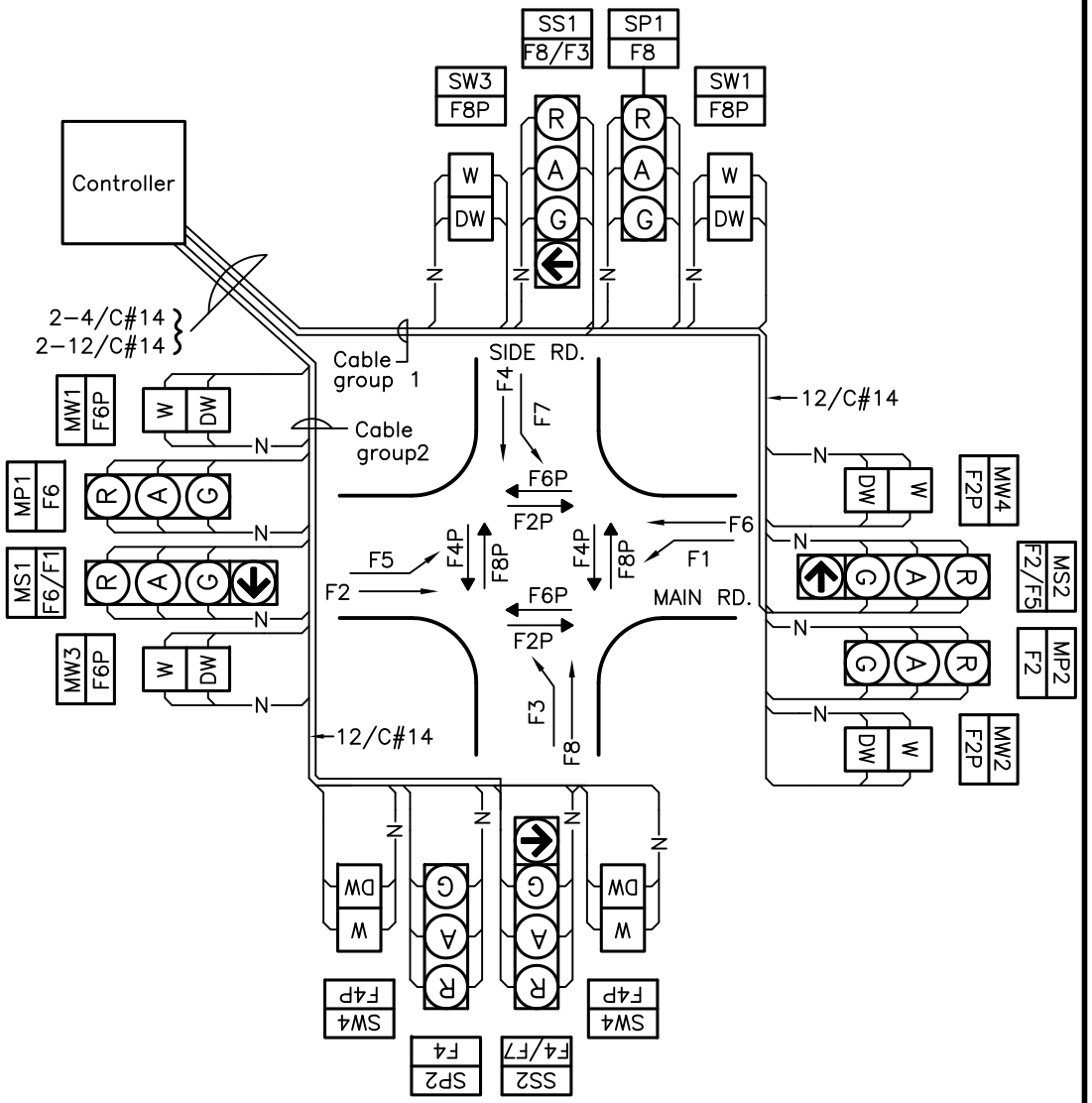
USING 12/C CABLE TAPPED,
2 TO 8 PHASE

Nov 2012 | Rev 0

ONTARIO STANDARDS - MUNICIPAL - PROVINCIAL

OPSD 2529.030

	Cond #	Colour/Mark	Cable Group 1	Cable Group 2
4/C#14	1	White	Main Rd. LT Green	Main Rd. LT Green
	2	Red	Main Rd. LT Amber	Main Rd. LT Amber
	3	Yellow	Side Rd. LT Amber	Side Rd. LT Amber
	4	Blue	Side Rd. LT Green	Side Rd. LT Green
12/C#14	1	White	Neutral	Neutral
	2	Black	Side Rd. Don't Walk	Side Rd. Don't Walk
	3	Orange	Side Rd. Walk	Side Rd. Walk
	4	Red/Red One	Main Rd. Red	Main Rd. Red
	5	Red/Red Two	Side Rd. Red	Side Rd. Red
	6	Red/Red Three	Main Rd. Don't Walk	Main Rd. Don't Walk
	7	Yellow/Amber One	Main Rd. Amber	Main Rd. Amber
	8	Yellow/Amber Two	Side Rd. Amber	Side Rd. Amber
	9	Yellow/Amber Three	Spare	Spare
	10	Blue/Green One	Main Rd. Green	Main Rd. Green
	11	Blue/Green Two	Side Rd. Green	Side Rd. Green
	12	Blue/Green Three	Main Rd. Walk	Main Rd. Walk



NOTES:

A Connections shown are general and shall be adjusted to suit intersection layout.
B Additional cable is required where arrow advance greens are used, see OPSD 2529.060.
C The system shown requires ducts all around the intersection.
D The system includes pedestrian facilities without pedestrian actuation.
E For Legend see OPSD 2529.010.
F For pedestrian facilities see OPSD 2529.010.

ONTARIO PROVINCIAL STANDARD DRAWING

SIGNAL WIRING

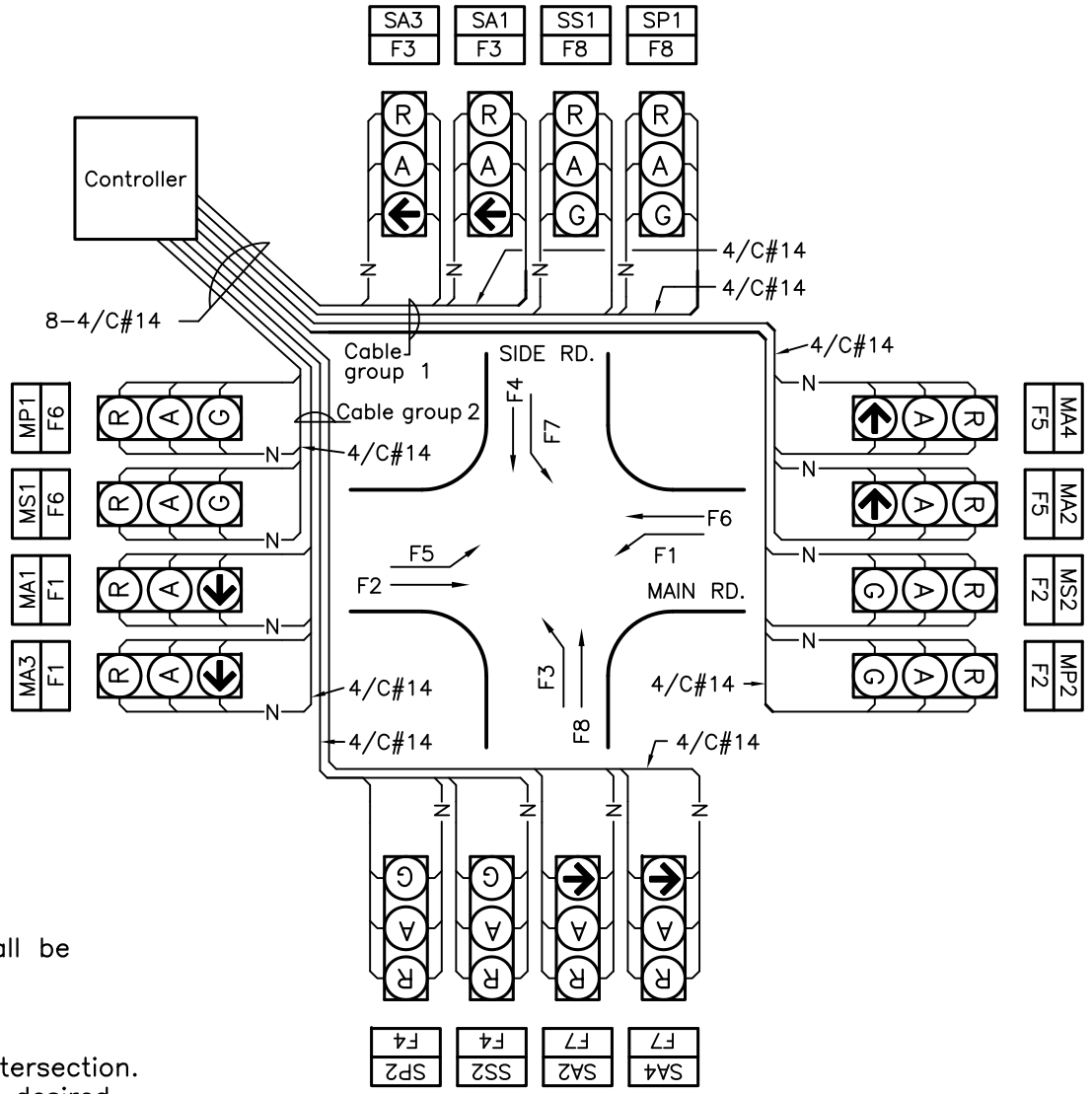
USING 4/C AND 12/C CABLE TAPPED,
2 TO 8 PHASE

Nov 2012 | Rev 0

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL

OPSD 2529.040

	Cond #	Colour/Mark	Cable Group 1	Cable Group 2
4/C#14(S)	1	White	Neutral	Neutral
	2	Red	Side Rd. Red	Side Rd. Red
	4	Blue	Side Rd. Green	Side Rd. Green
	3	Yellow	Side Rd. Amber	Side Rd. Amber
4/C#14(SL)	1	White	Neutral	Neutral
	2	Red	Side Rd. LT Red	Side Rd. LT Red
	4	Blue	Side Rd. LT Green	Side Rd. LT Green
	3	Yellow	Side Rd. LT Amber	Side Rd. LT Amber
4/C#14(M)	1	White	Neutral	Neutral
	2	Red	Main Rd. Red	Main Rd. Red
	4	Blue	Main Rd. Green	Main Rd. Green
	3	Yellow	Main Rd. Amber	Main Rd. Amber
4/C#14(ML)	1	White	Neutral	Neutral
	2	Red	Main Rd. LT Red	Main Rd. LT Red
	4	Blue	Main Rd. LT Green	Main Rd. LT Green
	3	Yellow	Main Rd. LT Amber	Main Rd. LT Amber



NOTES:

A Connections shown are general and typical and shall be adjusted to suit intersection layout.
B For Legend see OPSD 2529.010.
C For pedestrian facilities see OPSD 2529.010.
D The system shown requires ducts all around the intersection. Cable to SA4 and SA2 may follow with group 1, if desired.

ONTARIO PROVINCIAL STANDARD DRAWING

SIGNAL WIRING

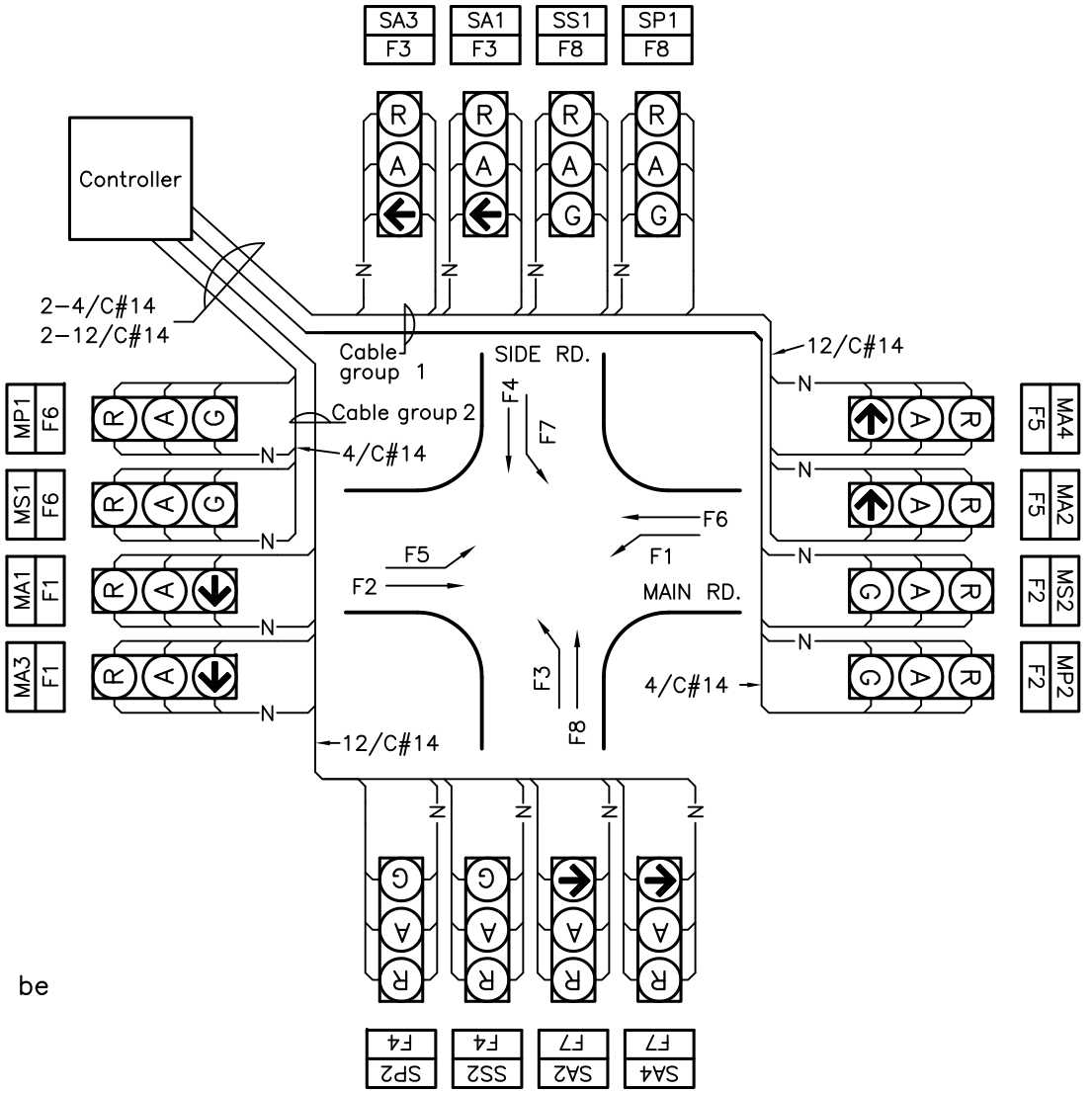
USING 4/C CABLE CONNECTED RADIALLY, 2 TO 8 PHASE

Nov 2012 | Rev 0

ONTARIO STANDARDS - MUNICIPAL - PROVINCIAL

OPSD 2529.050

	Cond #	Colour/Mark	Cable Group 1	Cable Group 2
4/C#14	1	White	Neutral	Neutral
	2	Red	Main Rd. Red	Main Rd. Red
	3	Yellow	Main Rd. Green	Main Rd. Green
	4	Blue	Main Rd. Amber	Main Rd. Amber
12/C#14	1	White	Neutral	Neutral
	2	Black	Spare	Spare
	3	Orange	Spare	Spare
	4	Red/Red One	Main Rd. LT Red	Main Rd. LT Red
	5	Red/Red Two	Side Rd. Red	Side Rd. Red
	6	Red/Red Three	Side Rd. LT Red	Side Rd. LT Red
	7	Yellow/Amber One	Main Rd. LT Amber	Main Rd. LT Amber
	8	Yellow/Amber Two	Side Rd. Amber	Side Rd. Amber
	9	Yellow/Amber Three	Side Rd. LT Amber	Side Rd. LT Amber
	10	Blue/Green One	Main Rd. LT Green	Main Rd. LT Green
	11	Blue/Green Two	Side Rd. Green	Side Rd. Green
	12	Blue/Green Three	Side Rd. LT Green	Side Rd. LT Green



NOTES:

A Connections shown are general and typical and shall be adjusted to suit intersection layout.
B For Legend see OPSD 2529.010.
C For pedestrian facilities see OPSD 2529.010.
D The system shown requires ducts all around the intersection.

ONTARIO PROVINCIAL STANDARD DRAWING

SIGNAL WIRING

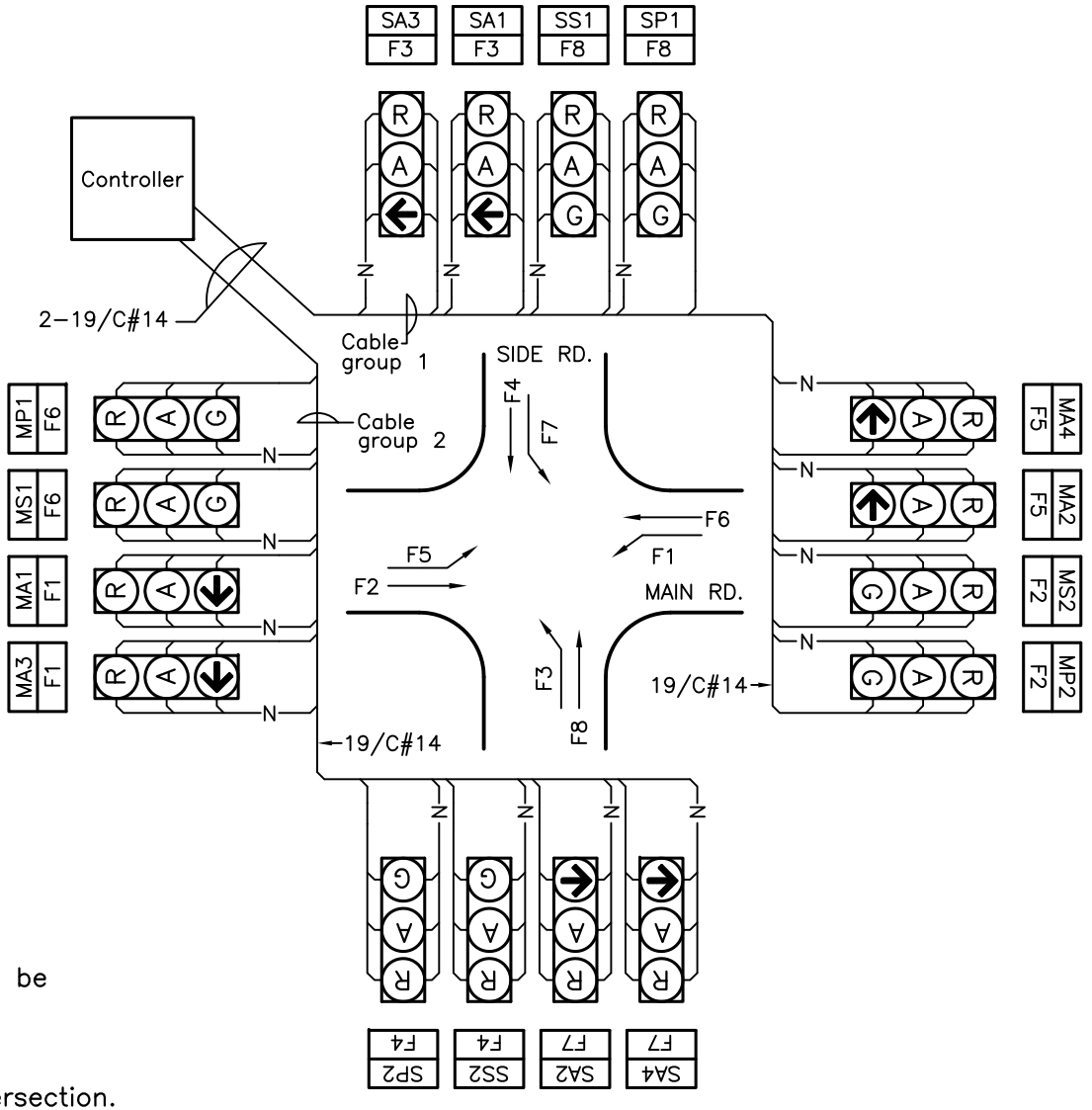
USING 4/C CABLE CONNECTED RADIALLY AND 12/C CABLE TAPPED, 2 TO 8 PHASE

Nov 2012 | Rev 0

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL

OPSD 2529.060

	Cond #	Colour/Mark	Cable Group 1	Cable Group 2
19/C#14	1	White/White One	Main Rd. Neutral	Main Rd. Neutral
	2	White/White Two	Side Rd. Neutral	Side Rd. Neutral
	3	Black	Spare	Spare
	4	Orange	Spare	Spare
	5	Red/Red One	Main Rd. Red–F2	Main Rd. Red–F6
	6	Red/Red Two	Main Rd. LT Red–F5	Main Rd. LT Red–F1
	7	Red/Red Three	Side Rd. Red–F8	Side Rd. Red–F4
	8	Red/Red Four	Side Rd. LT Red–F3	Side Rd. LT Red–F7
	9	Red/Red Five	Spare	Spare
	10	Yellow/Amber One	Main Rd. Amb–F2	Main Rd. Amb–F6
	11	Yellow/Amber Two	Main Rd. LT Amb–F5	Main Rd. LT Amb–F1
	12	Yellow/Amber Three	Side Rd. Amb–F8	Side Rd. Amb–F4
	13	Yellow/Amber Four	Side Rd. LT Amb–F3	Side Rd. LT Amb–F7
	14	Yellow/Amber Five	Spare	Spare
	15	Blue/Green One	Main Rd. Green–F2	Main Rd. Green–F6
	16	Blue/Green Two	Main Rd. LT Gr–F5	Main Rd. LT Gr–F1
	17	Blue/Green Three	Side Rd. Green–F8	Side Rd. Green–F4
	18	Blue/Green Four	Side Rd. LT Gr–F3	Side Rd. LT Gr–F7
	19	Blue/Green Five	Spare	Spare



NOTES:

A Connections shown are general and typical and shall be adjusted to suit intersection layout.
B For Legend see OPSD 2529.010.
C For pedestrian facilities see OPSD 2529.010.
D The system shown requires ducts all around the intersection.

ONTARIO PROVINCIAL STANDARD DRAWING

SIGNAL WIRING

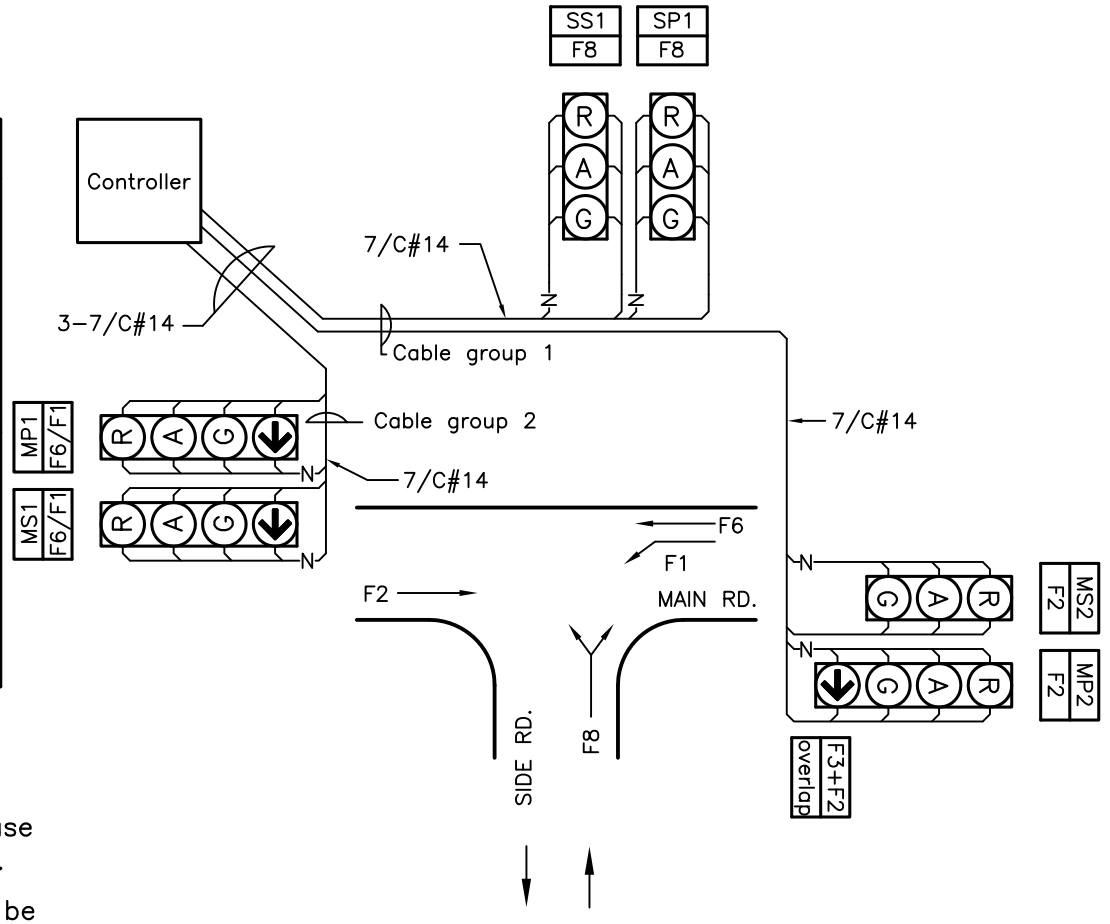
USING 19/C CABLE TAPPED,
2 TO 8 PHASE

Nov 2012 | Rev 0

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL

OPSD 2529.070

	Cond #	Colour/Mark	Cable Group 1	Cable Group 2
7/C#14(M)	1	White	Neutral	Neutral
	2	Red/Red One	Main Rd. Red F2	Main Rd. Red F6
	3	Red/Red Two	Spare	Spare
	4	Yellow/Amber One	Main Rd. Amber	Main Rd. Amber
	5	Yellow/Amber Two	Spare	Spare or Note 1
	6	Blue/Green One	Main Rd. Green	Main Rd. Arrow
	7	Blue/Green Two	Main Rd. RT Arrow	Main Rd. LT Arrow
7/C#14(S)	1	White	Neutral	
	2	Red/Red One	Side Rd. Red	
	3	Red/Red Two	Spare	
	4	Yellow/Amber One	Side Rd. Amber	
	5	Yellow/Amber Two	Spare	
	6	Blue/Green One	Side Rd. LT Green	
	7	Blue/Green Two	Spare	



NOTES:

1 When the left turn arrow is of the fibre optic type, use conductor #5 Yellow/Amber Two for the arrow amber.

A Connections shown are general and typical and shall be adjusted to suit intersection layout.

B For Legend see OPSD 2529.010.

C For pedestrian facilities see OPSD 2529.010.

ONTARIO PROVINCIAL STANDARD DRAWING

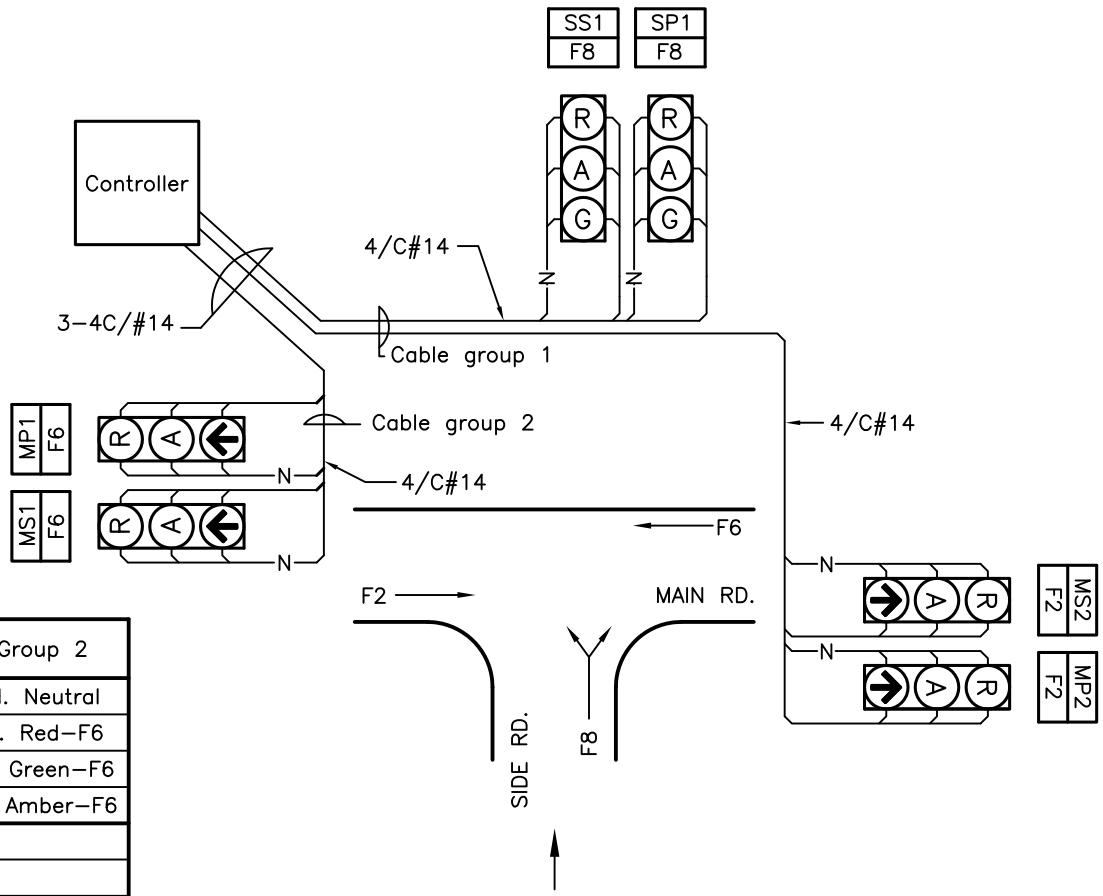
SIGNAL WIRING

USING 7/C CABLE CONNECTED RADIALLY
T-INTERSECTION, 2 TO 3 PHASE

Nov 2012 | Rev 0

ONTARIO STANDARDS · MUNICIPAL - PROVINCIAL

OPSD 2529.080



	Cond #	Colour/Mark	Cable Group 1	Cable Group 2
4/C#14(M)	1	White	Main Rd. Neutral	Main Rd. Neutral
	2	Red	Main Rd. Red–F2	Main Rd. Red–F6
	4	Blue	Main Rd. Green–F2	Main Rd. Green–F6
	3	Yellow	Main Rd. Amber–F2	Main Rd. Amber–F6
4/C#14(S)	1	White	Side Rd. Neutral	
	2	Red	Side Rd. Red–F8	
	4	Blue	Side Rd. Green–F8	
	3	Yellow	Side Rd. Amber–F8	

NOTES:

A Connections shown are general and typical and shall be adjusted to suit intersection layout.
B For Legend see OPSD 2529.010.
C For pedestrian facilities see OPSD 2529.010.

ONTARIO PROVINCIAL STANDARD DRAWING

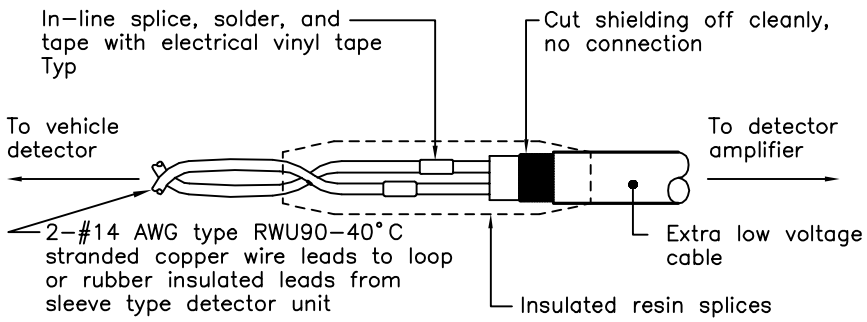
SIGNAL WIRING

USING 4/C CABLE CONNECTED RADIALLY
T–INTERSECTION, 2 PHASE

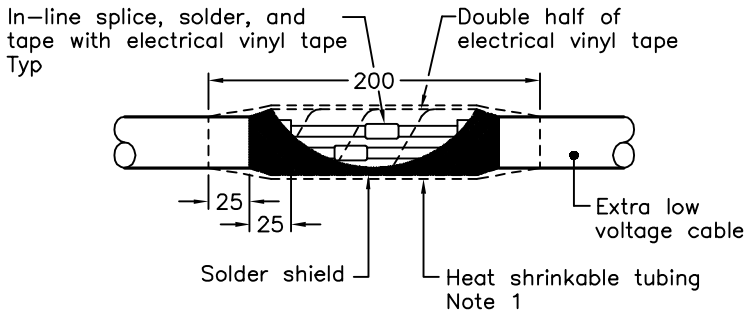
Nov 2012 | Rev 0

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL ·

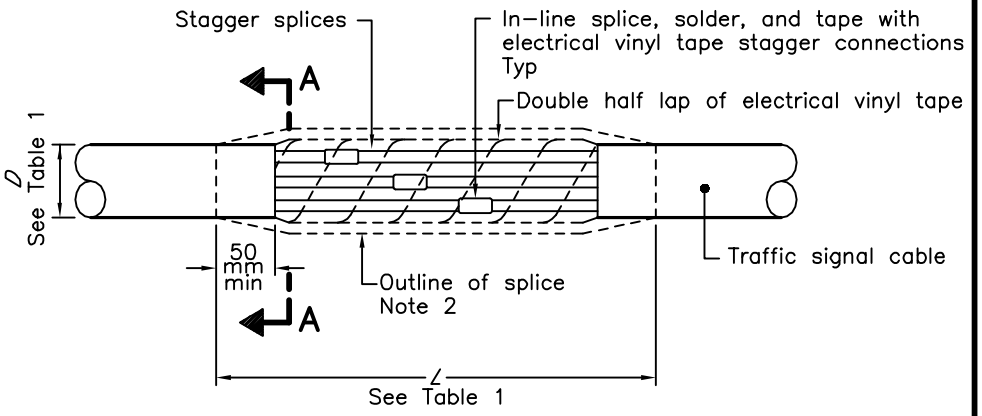
OPSD 2529.090



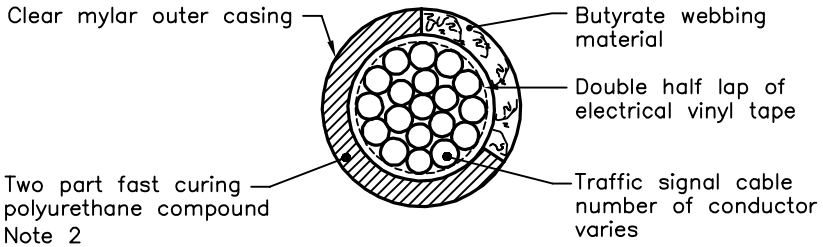
EXTRA LOW VOLTAGE CABLE TO DETECTOR CABLE SPLICING DETAIL



EXTRA LOW VOLTAGE CABLE SPLICING DETAIL



TRAFFIC SIGNAL CABLE SPLICING DETAIL



SECTION A–A

TABLE 1

TRAFFIC SIGNAL CABLE	D	L
4 Conductor	12	300
7 Conductor	16	450
12 Conductor	21	450
19 Conductor	25	500

NOTES:

1 Heat shrinkable tubing shall be 2.4mm wall thickness, 19mm diameter, and 600 volt.

2 Splices shall be of suitable diameter and length as shown in Table 1 and installed according to manufacturer's instructions.

A Splices shall not be used unless shown on the wiring diagrams, quantity sheets, or layout drawings, unless otherwise approved by the Engineer.

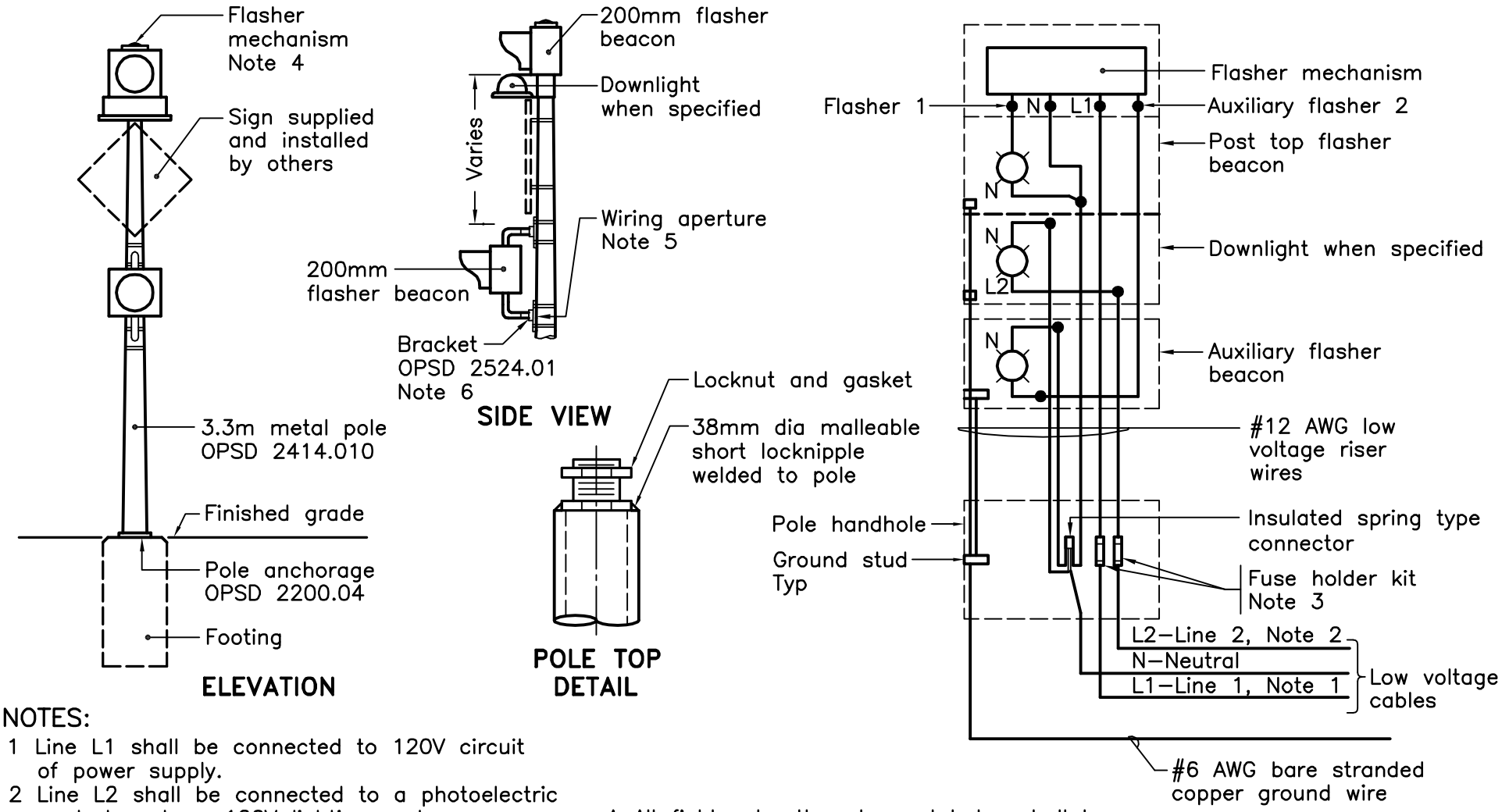
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

SPLICES FOR TRAFFIC SIGNAL CABLE AND EXTRA LOW VOLTAGE CABLE

Nov 2013 | Rev 1

OPSD 2530.01



NOTES:

1 Line L1 shall be connected to 120V circuit of power supply.
2 Line L2 shall be connected to a photoelectric control or to a 120V lighting system.
3 Fuse holder shall be in–line type, 600V, complete with 15A fuse and insulating boots.
4 Flasher mechanism shall be installed into knockout hole on the top of flasher beacon.
5 Drill 25mm diameter aperture at lower bracket location for auxiliary flasher. Install rubber grommet.
6 Bracket shall be 150mm long.

A All field cuts, threads, and holes shall be deburred and coated with zinc rich paint.
B All dimensions are in millimetres unless otherwise shown.

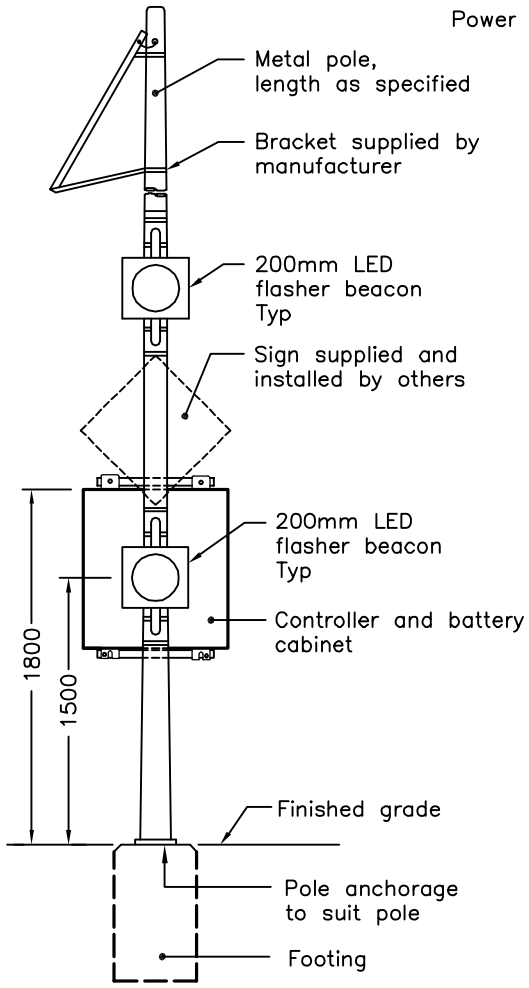
ONTARIO PROVINCIAL STANDARD DRAWING

FLASHER BEACONS FOR ROADWAY SIGN AND DOWNLIGHT AND WIRING DIAGRAM

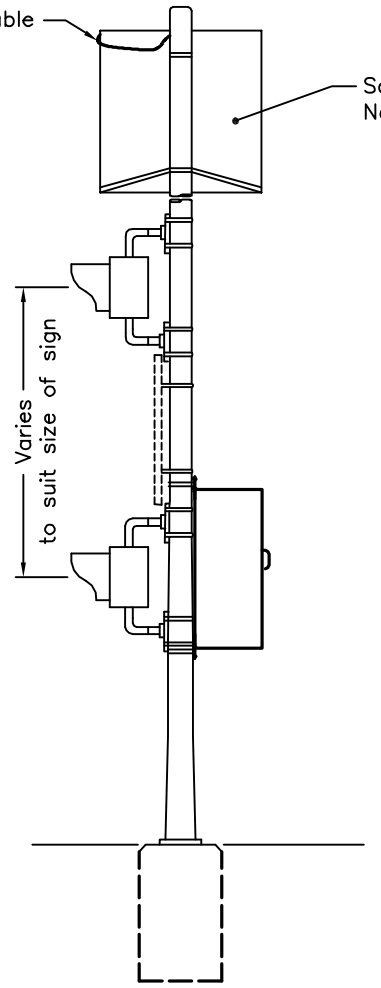
Nov 2015 | Rev 2

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL ·

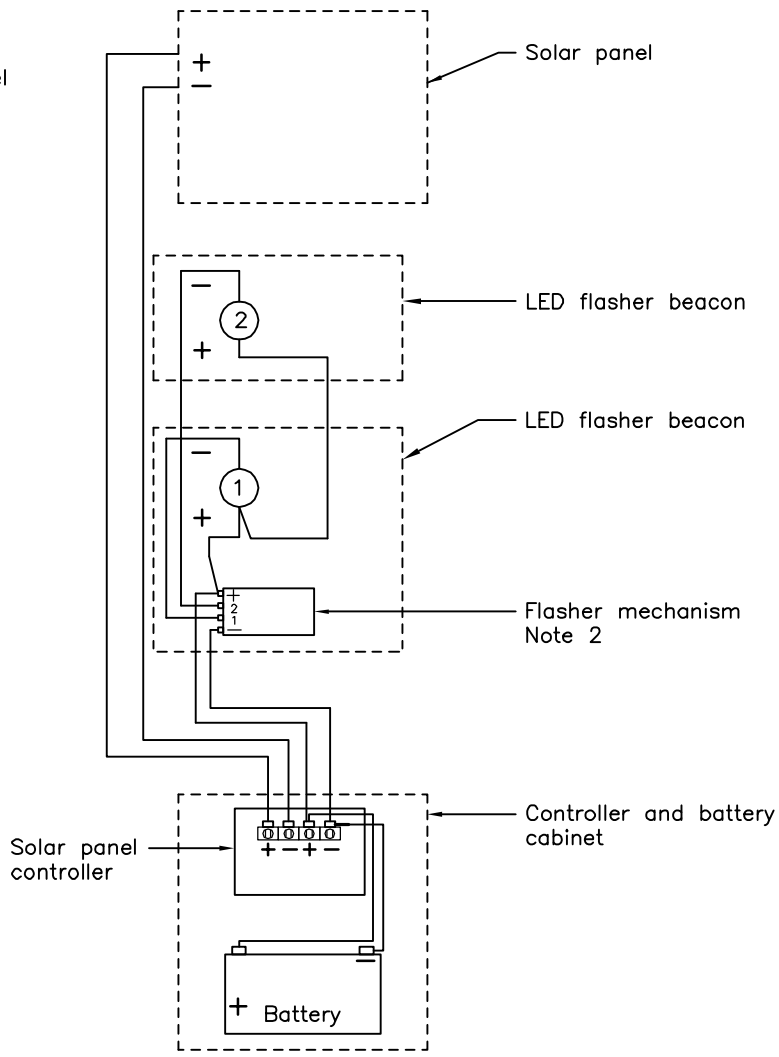
OPSD 2536.010



FRONT VIEW



SIDE VIEW



WIRING DIAGRAM

NOTES:

1 The solar panel and equipment shall be installed and oriented according to manufacturer's recommendations and as specified.

2 The flasher mechanism shall be attached in one of the flasher beacons.

A LED flasher beacons and downlights shall be extra low–voltage DC to suit battery.

B All field cuts, threads, and holes shall be deburred and coated with zinc rich paint.

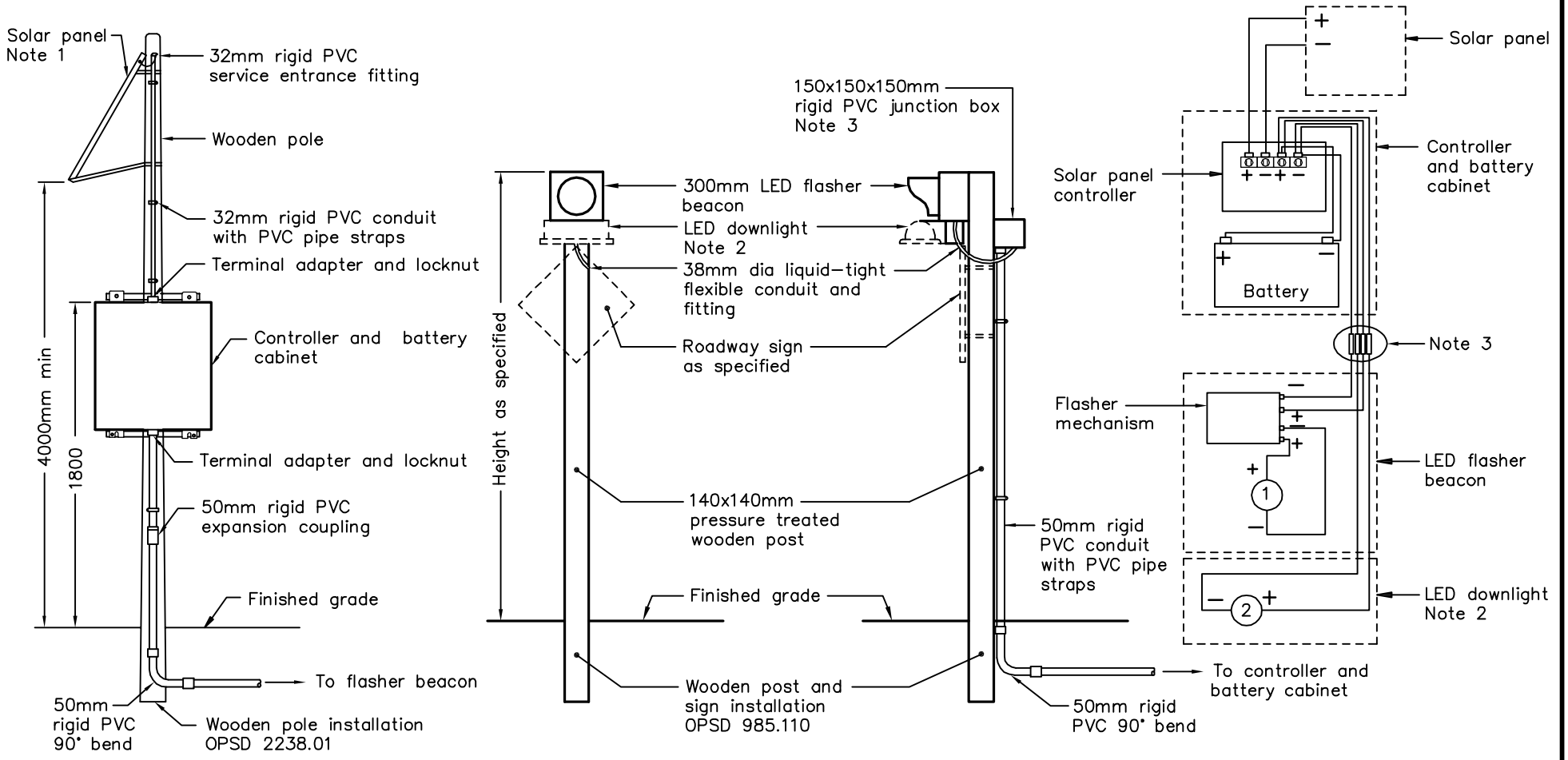
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

SOLAR POWERED LED FLASHER BEACON AND WIRING DIAGRAM FOR ROADWAY SIGN BASE MOUNTED POLE

Nov 2015 | Rev 0

OPSD 2536.030



SOLAR POWER ASSEMBLY **FRONT VIEW** **SIDE VIEW** **WIRING DIAGRAM**

NOTES:

1 The solar panel and equipment shall be installed and oriented according to manufacturer's recommendations and as specified.

2 LED downlight included when specified.

3 A break-away in-line fuse holder shall be installed for each circuit to a flasher beacon and each circuit to a downlight.

A LED flasher beacons and downlights shall be extra low-voltage DC to suit battery.

B All field cuts, threads, and holes shall be deburred and coated with zinc rich paint.

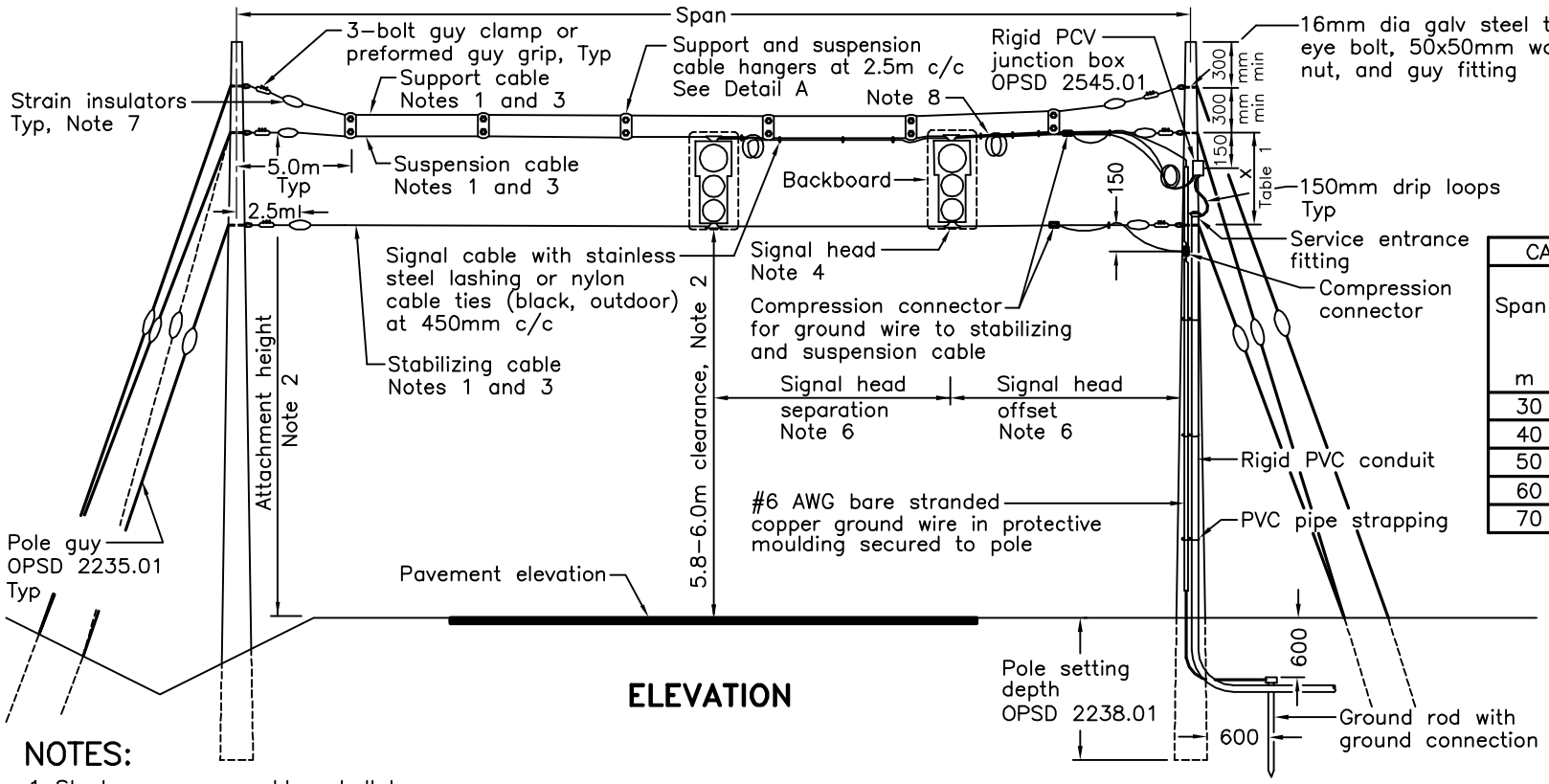
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

SOLAR POWERED LED FLASHER BEACON AND WIRING DIAGRAM FOR ROADWAY SIGN DIRECT BURIED POLE

Nov 2015 | Rev | 0

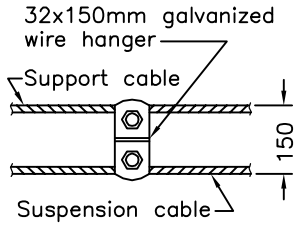
OPSD 2536.032



ELEVATION

TABLE 1
Note 5

CABLE ATTACHMENT HEIGHT		
Span m	Attachment Height Suspension Cable m	x Cable Separation m
30	7.55	1.75
40	7.80	2.00
50	8.10	2.30
60	8.40	2.60
70	8.80	3.00



DETAIL A

NOTES:

1 Steel messenger cables shall be:
  a) 9mm diameter Grade 160 support cable (required only on spans greater than 60m)
  b) 9mm diameter Grade 160 suspension cable
  c) 7mm diameter Grade 110 (minimum) stabilizing cable

2 Attachment height shall be set to obtain the clearance height shown under CSA heavy loading conditions. Install suspension cable attachment height according to Table 1 and allow for deviations between pavement elevation and finished grade elevation at the pole. Install stabilizing cable at cable separation height according to Table 1.

3 Cable shall be installed using the tension corresponding to the installation temperature as shown in OPSD 2245.01.

4 Details shown are for Highway type signal heads, for larger signal heads increase the cable separation and suspension cable attachment height accordingly.

5 Values shown in Table 1 shall be interpolated to obtain intermediate values.

6 For orientation and location of signal heads and poles, refer to layout drawings.

7 Strain insulators shall be used only for attachment to utility poles or poles with live cables installed above the suspension cable.

8 When required, provide sufficient length of cable coils to allow signal head movement to suit construction stages.

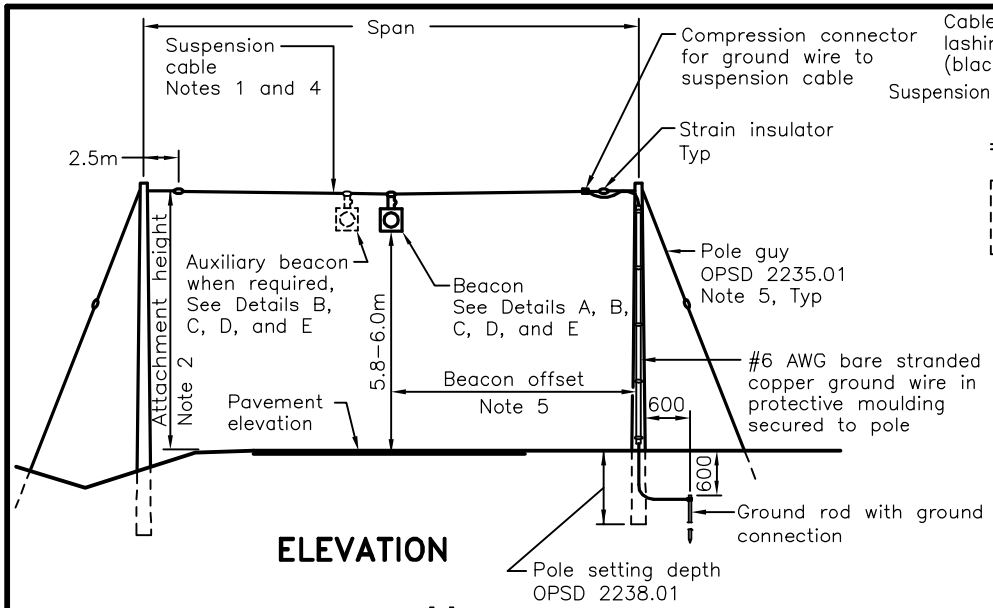
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

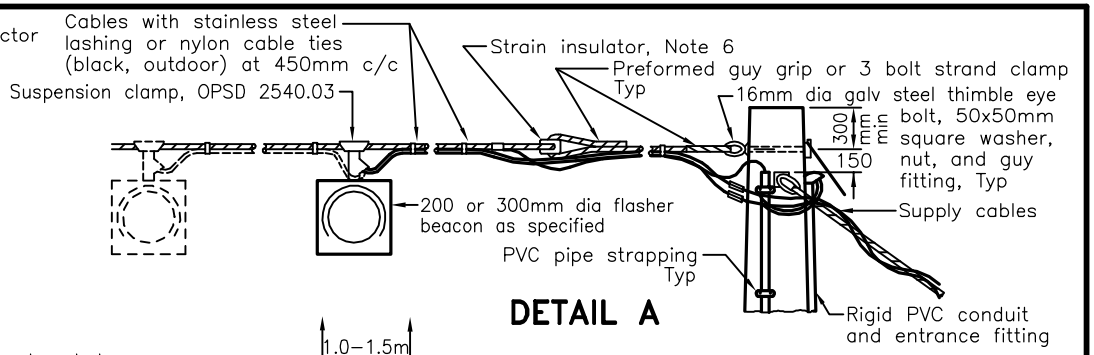
AERIAL TRAFFIC SIGNAL INSTALLATION

Nov 2013 | Rev 4

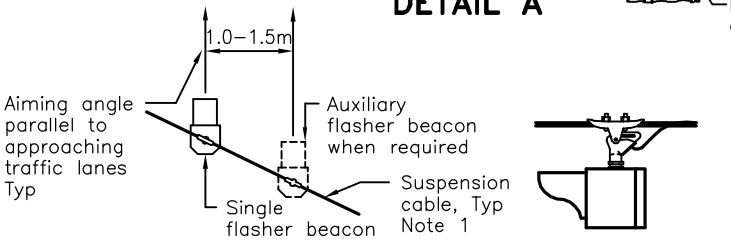
OPSD 2540.01



ELEVATION



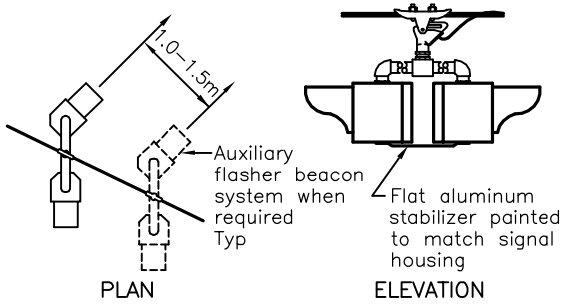
DETAIL A



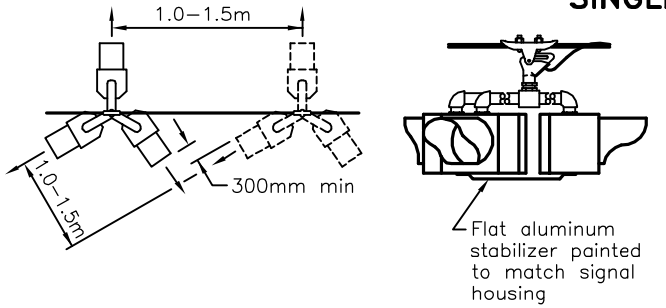
DETAIL B
SINGLE WAY BEACON DETAIL

TABLE 1
Note 3

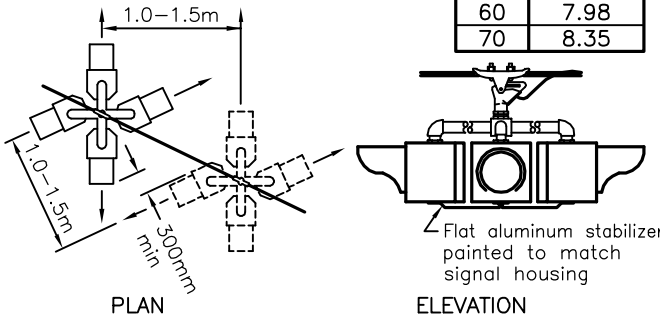
CABLE ATTACHMENT HEIGHT	
Span m	Attachment Height m
30	7.25
40	7.45
50	7.65
60	7.98
70	8.35



DETAIL C
TWO–WAY BEACON DETAIL



DETAIL D
THREE–WAY BEACON DETAIL



DETAIL E
FOUR–WAY BEACON DETAIL

NOTES:

1 Suspension cable shall be 9mm diameter Grade 160 steel strand cable.

2 Attachment height shall be set to obtain the clearance height shown under CSA heavy loading conditions. Install suspension cable attachment height according to Table 1 and allow for deviations between pavement elevation and finished grade elevation at the pole.

3 Values shown in Table 1 shall be interpolated to obtain intermediate values.

4 Cable shall be installed using the tension corresponding to the installation temperature as shown in OPSD 2245.01.

5 For orientation and location of signal heads and poles, refer to layout drawings.

6 Strain insulators shall be used only for attachment to utility poles or poles with live cables installed above the suspension cable.

A All dimensions are in millimetres unless otherwise shown.

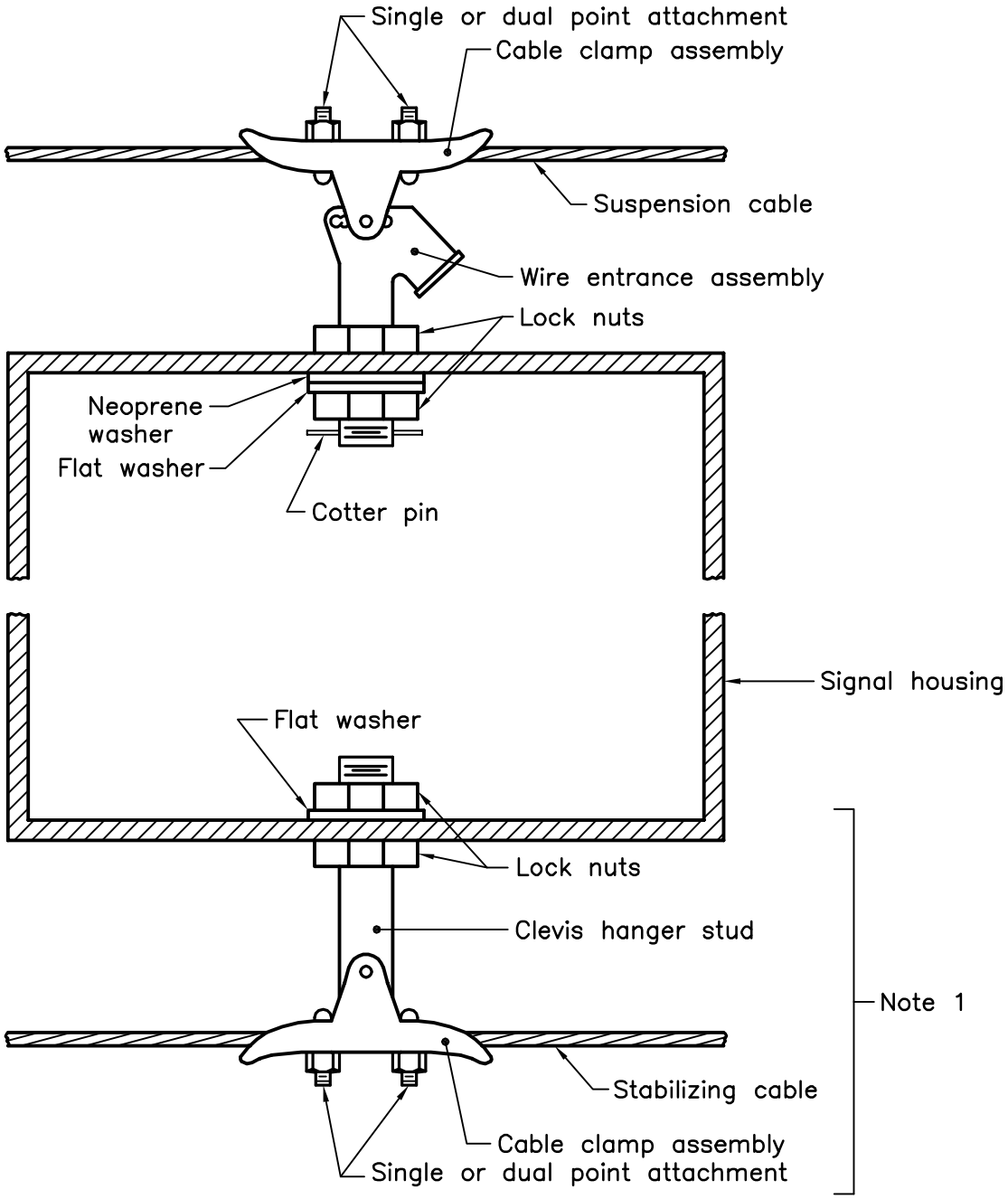
ONTARIO PROVINCIAL STANDARD DRAWING

AERIAL FLASHER BEACON INSTALLATION

Nov 2013 | Rev 2

ONTARIO STANDARDS · MUNICIPAL–PROVINCIAL · O P S

OPSD 2540.02



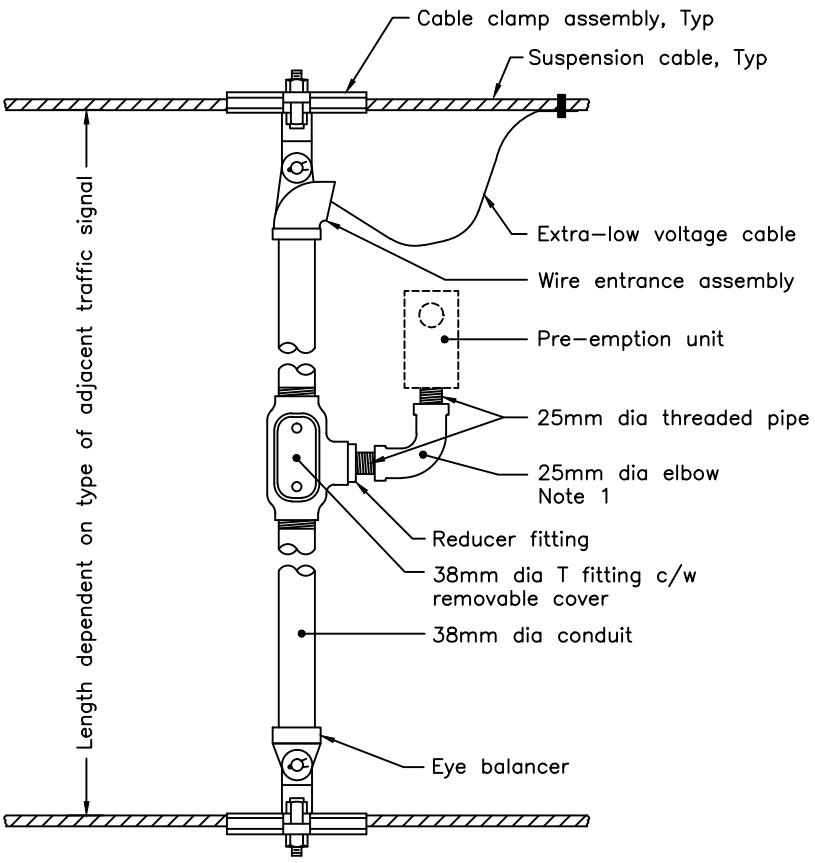
NOTES:

1 Lower assembly applies to signal heads only.

A All hardware fittings shall be cast aluminum with stainless steel mounting hardware.

B This OPSD shall be read in conjunction with OPSD 2540.01 and OPSD 2540.02.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2013	Rev	0
AERIAL SUSPENSION MOUNTING BRACKET SIGNAL HEADS AND FLASHING BEACONS			
	OPSD 2540.030		

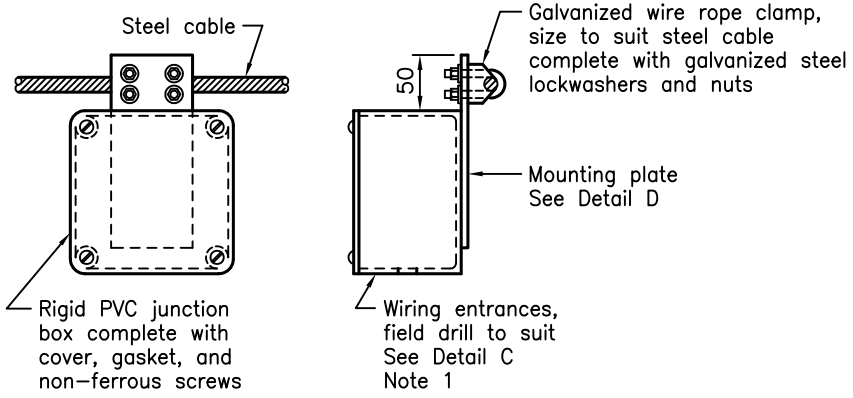


NOTES:

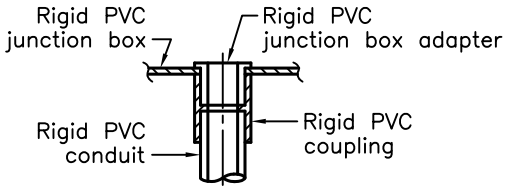
1 Elbow may be eliminated when side mounted pre–emption unit is used.

A Assembly shall be mounted on span cables as specified.
B This OPSD shall be read in conjunction with OPSD 2540.010.
C All hardware fittings shall be cast aluminum with stainless steel mounting hardware.
D All dimensions are in millimetres unless otherwise shown.

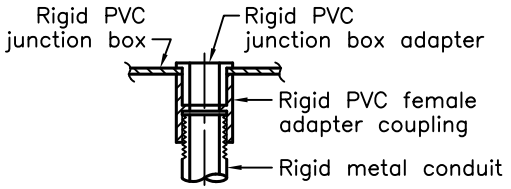
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
AERIAL SUSPENSION MOUNTING BRACKET PRE–EMPTION UNIT			
	OPSD 2540.100		



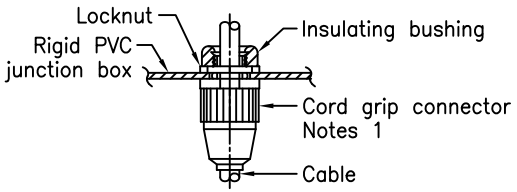
AERIAL SUSPENSION DETAIL



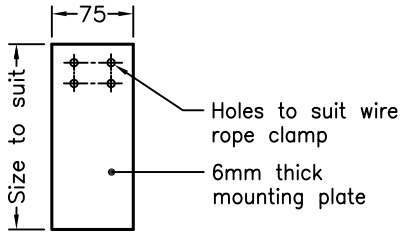
TYPICAL CONNECTION FOR RIGID PVC CONDUIT
DETAIL A



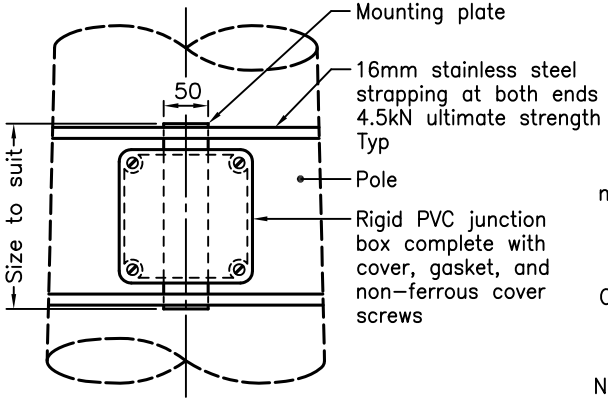
TYPICAL CONNECTION FOR RIGID METAL CONDUIT
DETAIL B

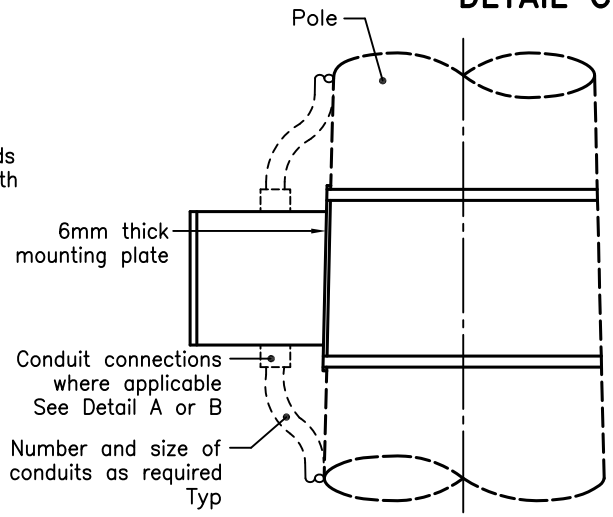


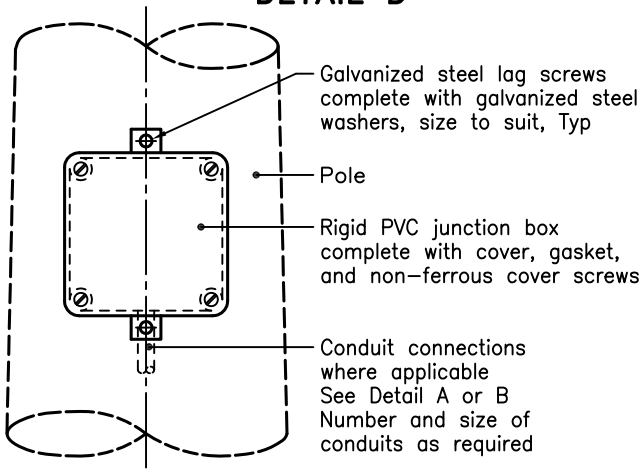
TYPICAL LIQUID TIGHT STRAIN RELIEF CONNECTOR
DETAIL C



MOUNTING PLATE FOR AERIAL SUSPENSION
DETAIL D







MOUNTING ON CONCRETE OR METAL POLE

MOUNTING ON WOODEN POLE

NOTES:

1 For aerial suspension, drill wiring entrances, number as required, to suit size of cable connector. Wiring entrances shall be located in bottom of junction box only.

A All dimensions are in millimetres unless otherwise shown.

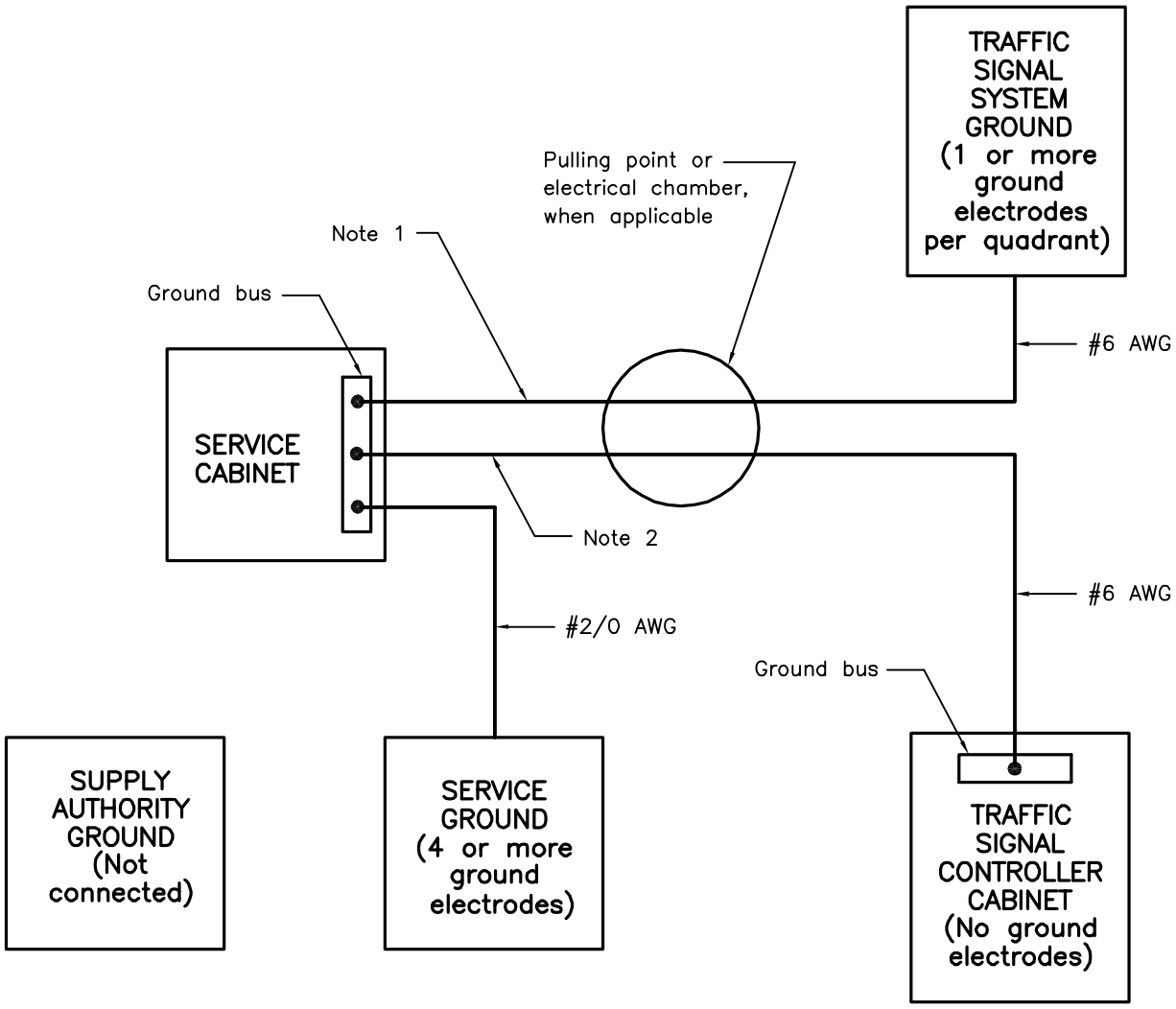
ONTARIO PROVINCIAL STANDARD DRAWING

PVC JUNCTION BOX FOR SIGNAL CABLE SPLICING

Nov 2012 | Rev 1

ONTARIO STANDARDS · MUNICIPAL – PROVINCIAL · O P S

OPSD 2545.01

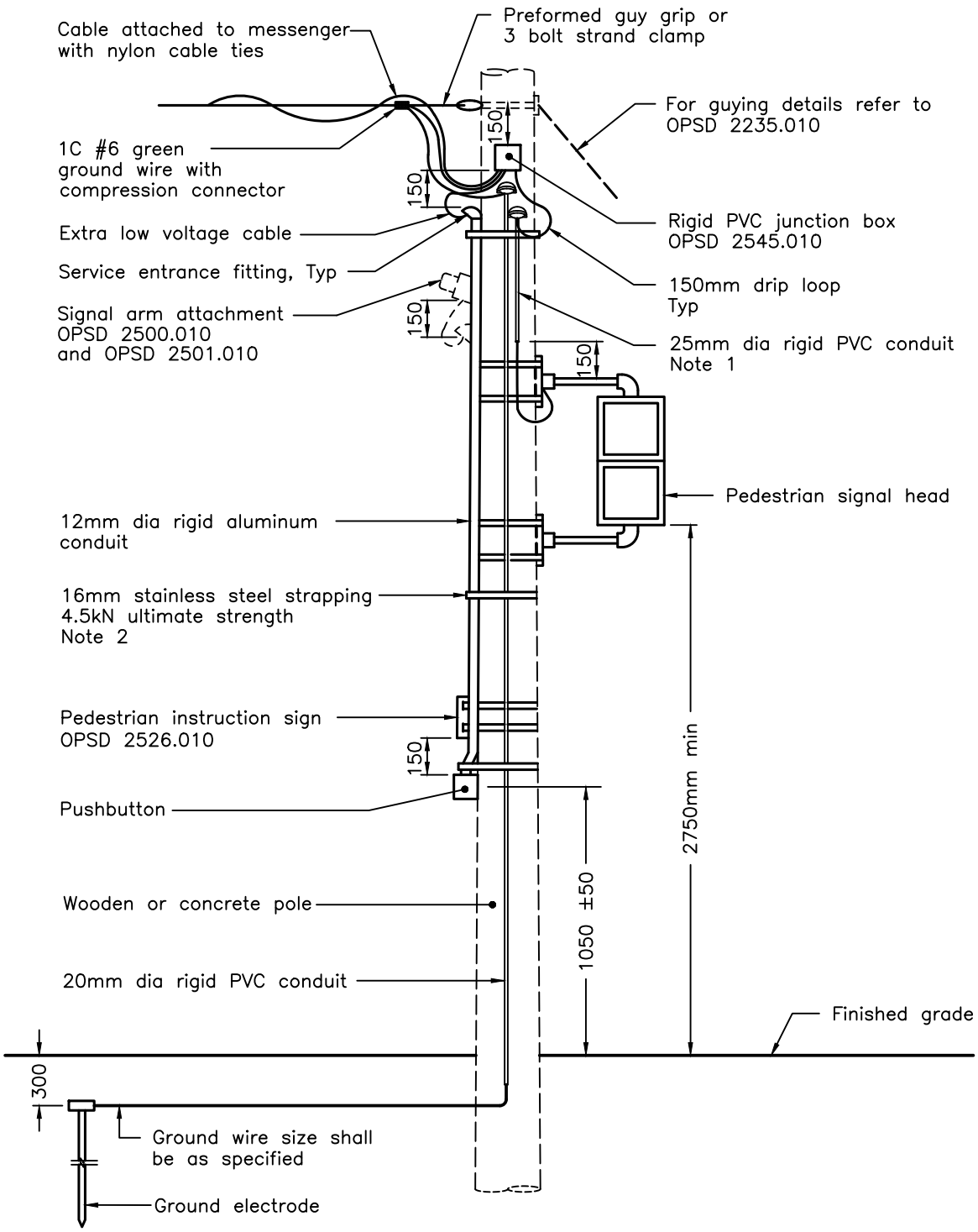


NOTES:

1 The #6 AWG pole system ground, with or without lighting, may connect to the #2/0 grid of the service ground or to the ground bus of the service cabinet.

2 The #6 AWG traffic controller cabinet ground shall not be bonded to any ground system, except at the ground bus of the service cabinet.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev	1
TRAFFIC SIGNAL AND ILLUMINATION GROUNDING SYSTEM			
	OPSD 2547.010		



NOTES:

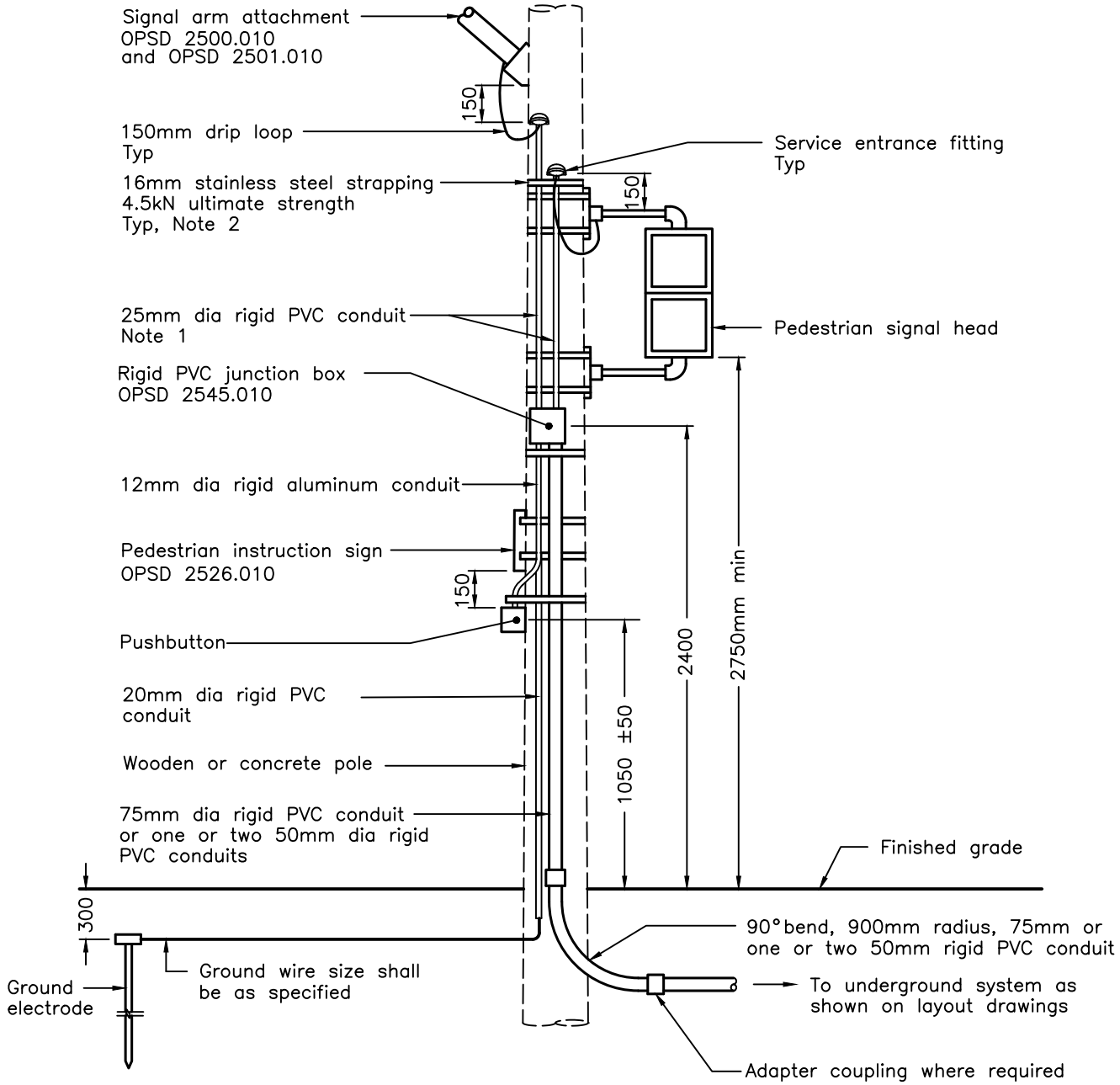
1 One 25mm diameter rigid PVC conduit required for each signal head. Install all signal heads prior to installing conduit. Install conduit system to obtain a neat and straight installation.

2 On concrete poles, mount conduits using 16mm stainless steel strapping and buckles. On wooden poles, mount conduits using PVC coated steel or galvanized pipe straps with 6x38mm lag screws.

A For orientation and location of poles and equipment refer to layout drawings.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev	3
TRAFFIC SIGNAL SYSTEM EQUIPMENT ON WOODEN OR CONCRETE POLES OVERHEAD WIRING INSTALLATION			
	OPSD 2552.010		



NOTES:

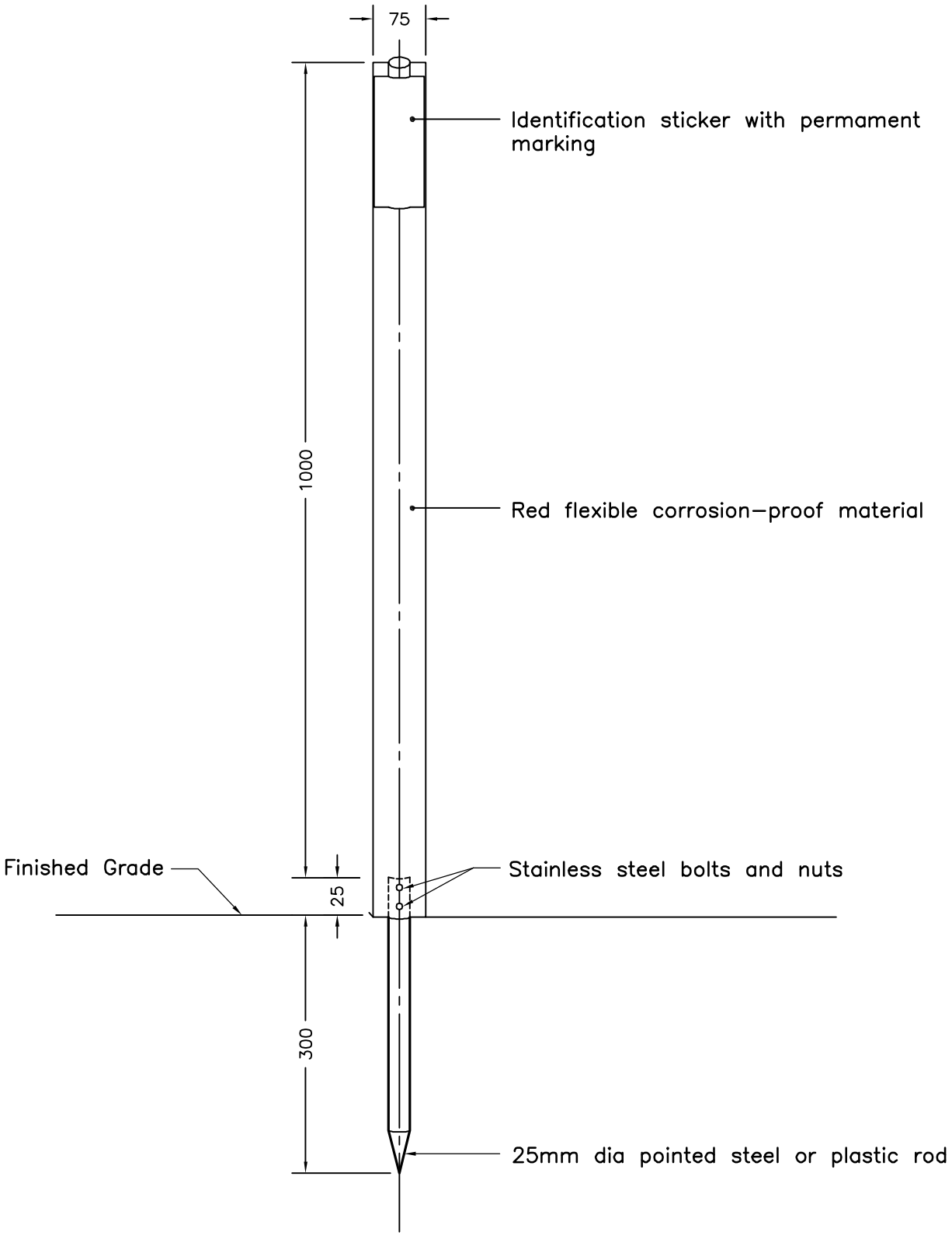
1 One 25mm diameter rigid PVC conduit required for each signal head. Install all signal heads prior to installing conduit. Install conduit system to obtain a neat and straight installation.

2 On concrete poles, mount conduits using 16mm stainless steel strapping and buckles. On wooden poles, mount conduits using PVC coated steel or galvanized pipe straps with 6x38mm lag screws.

A For orientation and location of poles and equipment refer to layout drawings.

B All dimensions are in millimetres unless otherwise shown.

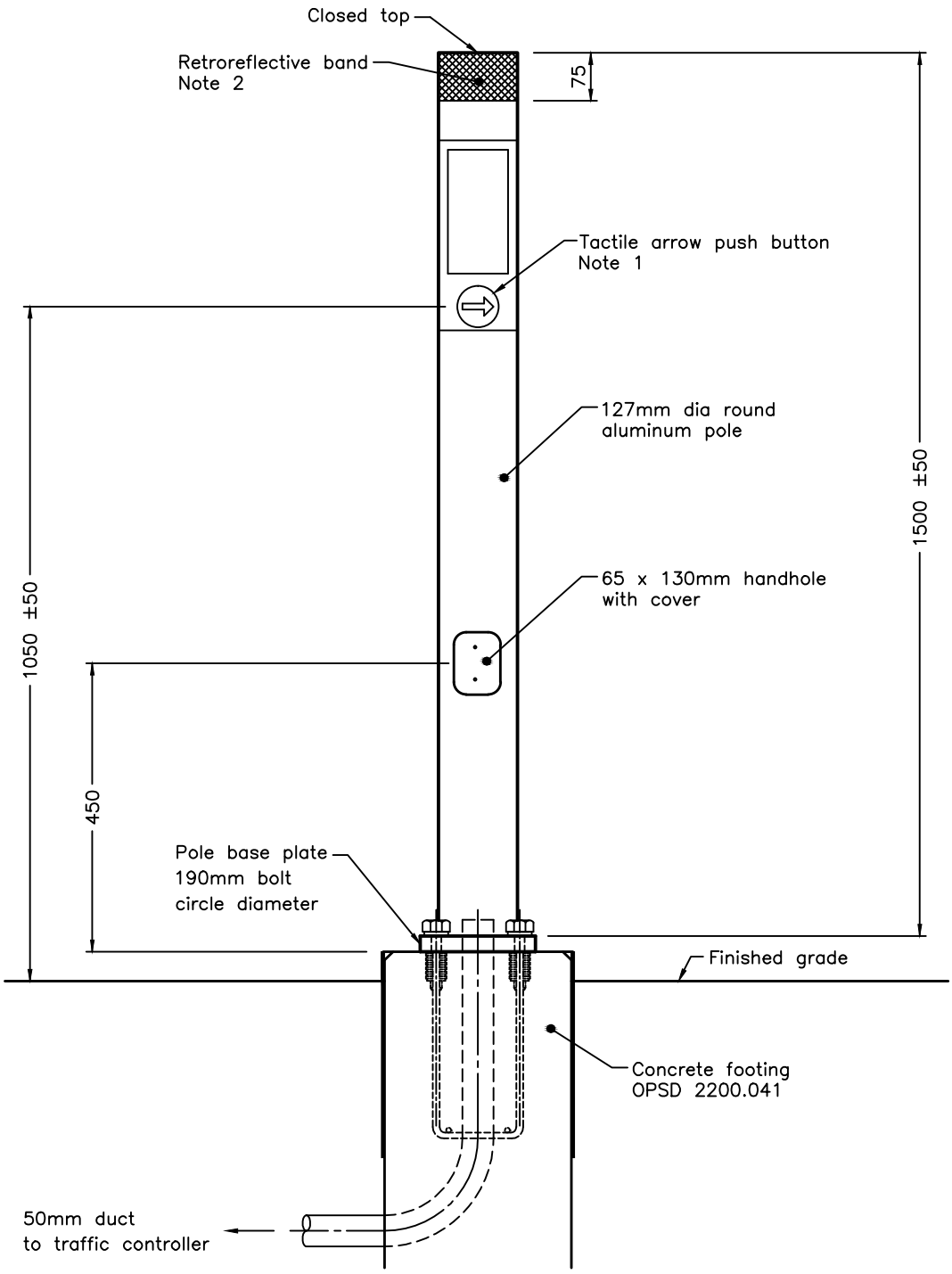
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev	1
TRAFFIC SIGNAL SYSTEM EQUIPMENT ON WOODEN OR CONCRETE POLES UNDERGROUND WIRING INSTALLATION			
			OPSD 2554.010



NOTES:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev	0
FLEXIBLE UTILITY MARKER			
	OPSD 2555.010		



NOTES:

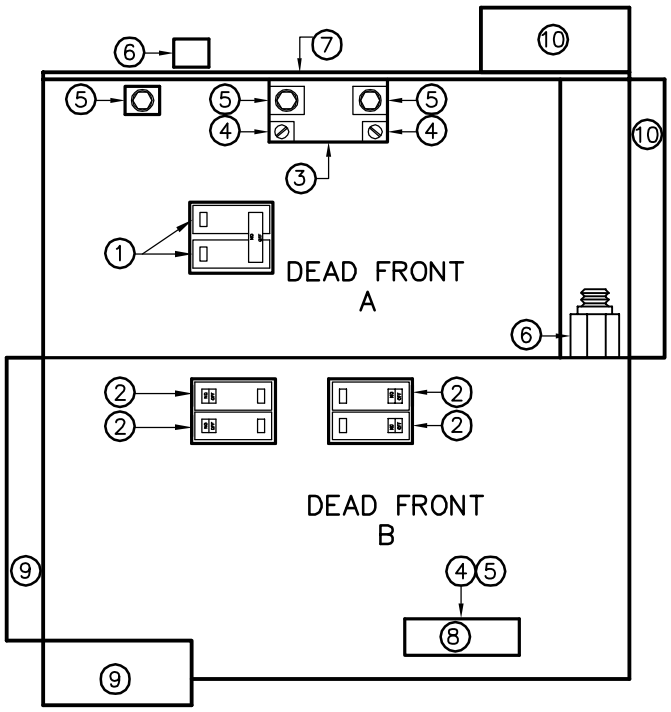
1 Accessible Pedestrian Signal tactile arrow push button shall align with direction of crosswalk.

2 Pole shall be outfitted with a strip of 75mm wide fluorescent yellow prismatic retroreflective sheeting according to ASTM D 4956, Type XI.

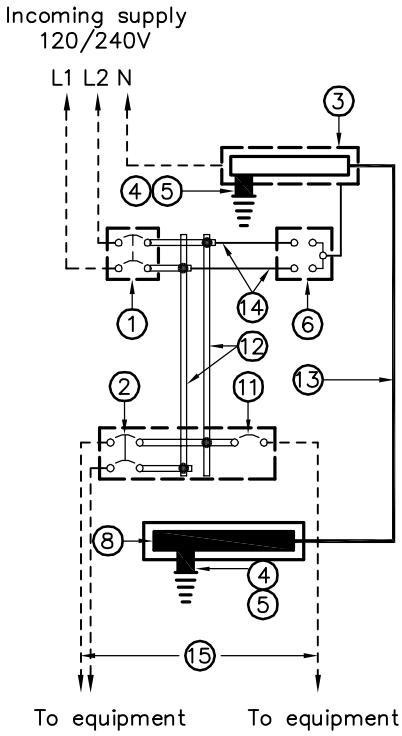
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	1
POLE FOR ACCESSIBLE PEDESTRIAN SIGNAL PUSH BUTTON			
	OPSD 2558.000		

EQUIPMENT LAYOUT



SCHEMATIC WIRING DIAGRAM



ELECTRICAL EQUIPMENT LIST

1. Main circuit breaker – 100A, 2–pole
2. Branch circuit breaker – 2–pole and 1–pole, number of breakers and ampacity as specified
3. Solid neutral assembly – 100A minimum, copper
4. Ground lug for No. 6 AWG stranded copper ground wire
5. Ground lug for No. 2/0 AWG stranded copper ground wire
6. Secondary lightning arrester – 650V, 2–pole
7. Drip shield
8. Secondary neutral and ground bus according to CSA and as specified
9. Primary barrier
10. Secondary barrier
11. Circuit breaker for equipment
12. Copper bus bar
13. No. 6 AWG RWU90 wire
14. No. 12 AWG RWU90 wire
15. Field wiring

NOTE:

A This OPSD shall be read in conjunction with OPSD 2441.010, 2441.020 and 2441.030.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	0
ADVANCED TRAFFIC MANAGEMENT SYSTEM SUPPLY CONTROL CABINET 120/240V, 100A, 1–PHASE, 3–WIRE	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _		
	OPSD 2902.322		