

Ontario Provincial Standards for Roads and Public Works



- Volume 4 -

MUNICIPAL AND PROVINCIAL COMMON

DRAWINGS FOR ELECTRICAL WORK



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MANUAL REVISION RECORD

Municipal and Provincial Common

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	45		
20	NOV 2005	Included in new manuals	46		
21	NOV 2006	Included in new manuals	47		
22	APRIL 2007	Included in new manuals	48		
23	NOV 2007	Included in new manuals	49		
24	NOV 2008	Included in new manuals	50		
25	APR 2009	Included in new manuals	51		
26	NOV 2009	Included in new manuals	52		
27	APR 2010	Included in new manuals	53		
28	NOV 2010	Included in new manuals	54		
29	NOV 2011	Included in new manuals	55		
30	NOV 2012	Included in new manuals	56		
31	NOV 2013	Included in new manuals	57		
32	NOV 2014	Included in new manuals	58		
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REVISION INFORMATION SHEET

ONTARIO PROVINCIAL STANDARDS FOR ROADS AND PUBLIC WORKS

VOLUME 4 MUNICIPAL AND PROVINCIAL COMMON DRAWINGS FOR ELECTRICAL WORK

MANUAL REVISION #34

NOVEMBER 2016

UPDATING ONTARIO PROVINCIAL STANDARDS FOR YOUR USE

Each roads and public works owner (Owner) is responsible for determining implementation dates and directions for use of Ontario Provincial Standards; therefore, manual holders are cautioned about immediately discarding superseded and cancelled standards.

ACCESSING AND OBTAINING ONTARIO PROVINCIAL STANDARDS

The Ontario Provincial Standards for Roads and Public Works (OPS) manuals and the latest published updates for each of the eight OPS manuals are available as follows:

- Available electronically on the OPS/MTO website. Online access to the current, updated, and archived standards; indexes; OPS User Notes; and publication Revision Information Sheets are available free of charge at the site.
(<http://www.raqs.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>)
- Hard-copy format available from Publications Ontario by telephone at 1-800-668-9938 or online. Updates and OPS manuals are available for a cost-recovery fee.
(www.publications.serviceontario.ca)
- The eight OPS manuals of standards are available on one CD in PDF format. The OPS drawings published in Volumes 3 and 4 are available in AutoCAD format on a separate CD. These CDs are available from Publications Ontario or by telephone at 1-800-668-9938 or online for a cost-recovery fee. The updates are not available on CDs as an update package.
(www.publications.serviceontario.ca)

At the Publications Ontario web page, you can type "Ontario Provincial Standards," "OPS," "OPSS," or "OPSD" in the search box, and all related products for the Ontario Provincial Standards will be listed, click on the item you wish to purchase, add the item to your cart, then follow the instructions to complete your order. If trying to order an OPS product online from Publications Ontario and it is shown as Out of Stock, you can backorder the product by telephone at 1-800-668-9938.

In order to receive the Municipal Engineers Association (MEA) purchase price, MEA members should visit the MEA website (www.municipalengineers.on.ca/) for the MEA Publications Ontario order form for hard-copy manuals and CDs.

MTO employees should contact Simon Leung, Account Representative at Publications Ontario, by email (simon.leung@ontario.ca) to set up an account in order to receive the MTO purchase price for technical publications, including the Ontario Provincial Standards.

Links to Publications Ontario and the Ontario Provincial Standards on the MTO Library website are available on the OPS website (www.ops.on.ca). Also on this site under News and Activities are notices for updates and changes in OPS.

Questions should be directed by email to Ontario.Prov.Standards@ontario.ca.

YOU SHOULD REGISTER YOUR OPS MANUALS AND CDs

Users of OPS do not receive notices of OPS updates as they had in the past. Methods of notification from Publications Ontario for the future are being investigated, and you will be informed of them as they become available. In the interim, an email will be sent to OPS users who have registered their OPS manuals and CDs with OPS.

Owners of OPS manuals, who have not yet done so, are requested to register their OPS hard-copy manuals and CDs with Ontario.Prov.Standards@ontario.ca. The registration form and submission instructions are available on the OPS website (www.ops.on.ca), Miscellaneous Info, OPS Forms.

WAITING TO HEAR FROM YOU

If you have a suggestion to revise a standard or you have a standard that works in your ministry, municipality, or area, send it to the Head, OPS Administration, for review and possible inclusion into the Ontario Provincial Standards.

THIS MANUAL IS REVISED AS FOLLOWS:

Index Pages Volume 4

Please remove the entire index and replace with the attached revised index.

Standard Drawings Volume 4

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
2011.701	2	2011.701	3	“GENERAL SYMBOLS, TRAFFIC ACTUATION DEVICES” See Summary of Revisions.
2130.010	0	2130.010	1	“SUPPLY CONTROL CABINET INSTALLATION, OVERHEAD SERVICES, TOP ENTRY METERING” Meter base and access fitting shown on elevation view.
2130.011	0	2130.011	1	“SUPPLY CONTROL CABINET INSTALLATION, UNDERGROUND SERVICES, BOTTOM ENTRY METERING” Distance from top of pole to photoelectric controller added and meter base shown in elevation view.
2130.012	0	2130.012	1	“SUPPLY CONTROL CABINET INSTALLATION, OVERHEAD SERVICES, BOTTOM ENTRY METERING” Location of photoelectric controller revised and meter base shown in elevation view.
		2130.013	0	“SUPPLY CONTROL CABINET INSTALLATION, UNDERGROUND SERVICES, TOP ENTRY METERING” This is a NEW Drawing. The MTO representative recommended converting MTOD 2130.013 (December 2014) into OPSD 2130.013.
2200.070	0	2200.070	1	“POLE FOOTING IN EARTH FOR CAST-IN-PLACE CONCRETE BARRIER” See Summary of Revisions.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
2200.080	0	2200.080	1	“POLE FOOTING IN ROCK FOR CAST-IN-PLACE CONCRETE BARRIER” Anchorage plate moved to top of concrete barrier.
2210.020	1			“INSTALLATION OF DIRECT BURIED POLES IN SLOPES” OPSD Cancelled. Drawing does not add any useful information.
2210.030	0	2210.030	1	“HIGH MAST LIGHTING POLE, APRON” This drawing has been reaffirmed with no changes to technical information.
2218.010	0	2218.010	1	“HIGH MAST LIGHTING POLE, ANCHORAGE ASSEMBLY PLACEMENT” This drawing has been reaffirmed with no changes to technical information.
2225.010	0	2225.010	1	“CONCRETE LIGHTING POLE, DIRECT BURIED” This drawing has been reaffirmed with no changes to technical information.
2228.010	0	2228.010	1	“METAL LIGHTING POLE, BASE MOUNTED” This drawing has been reaffirmed with no changes to technical information.
2232.010	0	2232.010	1	“SECTIONAL STEEL POLE WITH BRACKETS, LUMINAIRE AND TRAFFIC SIGNAL HEAD” This drawing has been reaffirmed with no changes to technical information.
2250.01	5	2250.010	0	“ALUMINUM TAPERED ELLIPTICAL BRACKETS ON METAL AND CONCRETE POLES, MOUNTING DETAILS” This drawing has been reaffirmed with no changes to technical information. Changed revision number to zero to reflect updating the number of old 2250.01 to 2250.010.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
2305.020	1	2305.020	2	“UNDERPASS LUMINAIRES, WALL MOUNTED INSTALLATION” Note 1 revised to specify stainless steel expansion anchors and hexagonal head machine bolts.
2310.010	0	2310.010	1	“UNDERPASS LUMINAIRE, CEILING MOUNTED INSTALLATION WITH BRACKET” See Summary of Revisions.
2310.020	1	2310.020	2	“T BRACKET FOR CEILING MOUNTED UNDERPASS LUMINAIRE” Note A revised to specify ASTM A123 for galvanizing requirements.
2310.030	0	2310.030	1	“WEDGE MOUNTING BRACKET FOR UNDERPASS LUMINAIRE” See Summary of Revisions.
2310.040	0	2310.040	1	“SUPPORT BRACKET FOR COLUMN MOUNTED UNDERPASS LUMINAIRE” See Summary of Revisions.
2315.010	0	2315.010	1	“UNDERPASS LUMINAIRE, WIRING DETAIL” This drawing has been reaffirmed with no changes to technical information.
2418.010	1	2418.010	2	“1.8M AND 2.7M STEEL TRUSS BRACKET FOR STEEL POLES” This drawing has been reaffirmed with no changes to technical information.
2421.010	0	2421.010	1	“LAMP WATTAGE LABEL FOR LUMINAIRE” This drawing has been reaffirmed with no changes to technical information.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
		2440.051	0	“SUPPLY CONTROL CABINET ASSEMBLY TYPE 1 AND 2, BARRIER DETAILS” This is a New Drawing. The MTO representative recommended converting MTOD 2440.051 (February 2004) into OPSD 2440.051.
2450.010	0			“HIGH MAST LIGHTING 25, 30, AND 35m OCTAGONAL POLE WITH DOUBLE BASE PLATE” OPSD Cancelled. These poles were designed for a specific footing. Going forward, high mast lighting poles should have a single base plate according to the most recent published standards.
2450.011	0	2450.011	1	“HIGH MAST LIGHTING POLE, 25, 30, AND 35m 8-SIDED POLE” See Summary of Revisions.
2450.020	0			“HIGH MAST LIGHTING 40 AND 45m OCTAGONAL POLE WITH DOUBLE BASE PLATE” OPSD Cancelled. These poles were designed for a specific footing. Going forward, high mast lighting poles should have a single base plate according to the most recent published standards.
2450.021	0	2450.021	1	“HIGH MAST LIGHTING POLE, 40 AND 45m 12-SIDED POLE” See Summary of Revisions.
2452.010	0			“HIGH MAST LIGHTING 25, 30, AND 35m ROUND POLE WITH DOUBLE BASE PLATE” OPSD Cancelled. These poles were designed for a specific footing. Going forward, high mast lighting poles should have a single base plate according to the most recent published standards.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
2452.020	0			“HIGH MAST LIGHTING 40 AND 45m ROUND POLE WITH DOUBLE BASE PLATE” OPSD Cancelled. These poles were designed for a specific footing. Going forward, high mast lighting poles should have a single base plate according to the most recent published standards.
2453.000	0	2453.000	1	“HIGH MAST LIGHTING POLE, LUMINAIRE AND HANDHOLE ORIENTATION” See Summary of Revisions.
		2453.001	0	“HIGH MAST LIGHTING POLE, LUMINAIRE AND HANDHOLE ORIENTATION FOR MEDIAN MOUNTED POLES” This is a new drawing. The MTO representative recommended converting MTOD 2453.021 (February 2004) into OPSD 2453.001.
2453.010	0	2453.010	1	“HIGH MAST LIGHTING POLE, CABLE HOLDER AND STORAGE HOOK DETAILS” See Summary of Revisions.
2453.020	0	2453.020	1	“HIGH MAST LIGHTING POLE, HANDHOLE COVER HINGES, LATCHES, AND PADLOCK” Note 1, weather stripping requirements added.
2453.050	0	2453.050	1	“HIGH MAST LIGHTING POLE, NAMEPLATE DETAILS” POLE HEIGHT added to nameplate.
2453.060	0	2453.060	1	“HIGH MAST LIGHTING POLE, FLOOD LIGHT LUMINAIRE MOUNTING DETAILS” This drawing has been reaffirmed with no changes to technical information.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
2453.070	1	2453.070	2	“HIGH MAST LIGHTING POLE, LUMINAIRE SUPPORT RING” See Summary of Revisions.
2453.080	1	2453.080	2	“HIGH MAST LIGHTING POLE, HEAD FRAME AND RING ASSEMBLY” See Summary of Revisions.
2453.090	0	2453.090	1	“HIGH MAST LIGHTING POLE, SHROUD” This drawing has been reaffirmed with no changes to technical information.
2453.091	0	2453.091	1	“HIGH MAST LIGHTING POLE, SHROUD DETAILS” This drawing has been reaffirmed with no changes to technical information.
2453.140	0	2453.140	1	“HIGH MAST LIGHTING POLE, INTERNAL DRIVE RAISING AND LOWERING EQUIPMENT – LIST OF COMPONENTS” ID No. 2, 5, 6, 22, 23, and 24; part descriptions revised.
2453.150	0	2453.150	1	“HIGH MAST LIGHTING POLE, INTERNAL DRIVE RAISING AND LOWERING EQUIPMENT – LAYOUT” See Summary of Revisions.
2453.160	0			“HIGH MAST LIGHTING POLE, INTERNAL MOTOR AND WINCH DETAILS ” OPSD Cancelled. Information on drawing is already shown on OPSD 2453.150.
2453.170	0	2453.170	1	“HIGH MAST LIGHTING POLE, INTERNAL DRIVE WIRING DIAGRAM, 347/600V, 3-PHASE ” See Summary of Revisions.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
2453.180	0	2453.180	1	“HIGH MAST LIGHTING POLE, INTERNAL DRIVE WIRING DIAGRAM ” See Summary of Revisions.
2453.190	0	2453.190	1	“HIGH MAST LIGHTING POLE, EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT – LIST OF COMPONENTS ” See Summary of Revisions.
2453.200	0	2453.200	1	“HIGH MAST LIGHTING POLE, ” EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT – LAYOUT” See Summary of Revisions.
2453.210	0	2453.210	1	“HIGH MAST LIGHTING POLE, EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT, WIRING DIAGRAM” W revised to N for neutral.
2453.220	0	2453.220	1	“HIGH MAST LIGHTING POLE, EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT, 120/240V, 1 PHASE, WIRING DIAGRAM” W revised to N for neutral.
2454.010	0			“HIGH MAST LIGHTING POLE, DOUBLE BASE PLATE DETAILS” OPSD Cancelled. These double base plates were designed for a specific footing. Going forward, high mast lighting poles should have a single base plate according to the most recent published standards.
2456.010	0			“HIGH MAST LIGHTING POLE, ANCHORAGE ASSEMBLY DETAILS FOR DOUBLE BASE PLATE” OPSD Cancelled. These double base plates were designed for a specific footing. Going forward, high mast lighting poles should have a single base plate according to the most recent published standards.

Superseded/Cancelled (Remove)		Revised/New (Insert)		Remarks
OPSD	Revision	OPSD	Revision	
2456.011	0	2456.011	1	“HIGH MAST LIGHTING POLE, ANCHORAGE ASSEMBLY DETAILS” This drawing has been reaffirmed with no changes to technical information.
		2555.010	0	“FLEXIBLE UTILITY MARKER” This is a new drawing. The MTO representative recommended converting MTOD 2555.010 (October 2008) into OPSD 2555.010.

SUMMARY OF REVISIONS TO OPSD 2011.701

GENERAL SYMBOLS, TRAFFIC ACTUATION DEVICES

- Existing description for non-intrusive traffic sensor revised to be generic.
- Non-intrusive detection zone and non-loop in-pavement detector symbols added.

SUMMARY OF REVISIONS TO OPSD 2200.070

POLE FOOTING IN EARTH FOR CAST-IN-PLACE CONCRETE BARRIER

- Anchorage plate moved to top of concrete barrier.
- Section A-A, depth of duct revised from 500 mm to 450 mm min.
- Section B-B, wobble joint and concrete encasement deleted.
- Existing Note 3 deleted. Other notes reordered.
- Existing Note 4 revised.

SUMMARY OF REVISIONS TO OPSD 2310.010

UNDERPASS LUMINAIRE, CEILING MOUNTED INSTALLATION WITH T BRACKET

- Anchors revised from metal to stainless steel.
- Machine bolts revised to be 65 mm long with hexagonal heads.
- Reinforcing bars labelled.

SUMMARY OF REVISIONS TO OPSD 2310.030

WEDGE MOUNTING BRACKET FOR UNDERPASS LUMINAIRE

- Bracket length and width dimensions revised to varies.
- Mounting holes added and size of holes revised.
- Existing Section B-B deleted.
- Note A, galvanizing requirements revised to ASTM A123.

SUMMARY OF REVISIONS TO OPSD 2310.040

SUPPORT BRACKET FOR COLUMN MOUNTED UNDERPASS LUMINAIRE

- Section A-A view, anchors revised from metal to stainless steel and machine bolts revised from 30 to 65 mm long.
- Front view, hole diameter revised from 11 to 13 mm.
- Note A, galvanizing requirements revised to ASTM A123.

SUMMARY OF REVISIONS TO OPSD 2450.011

HIGH MAST LIGHTING POLE, 25, 30, AND 35m 8-SIDED POLE

- Elevation, flat bar specified for ground stud and 42 mm pipe deleted.
- Section A-A, flat bar specified for ground stud.
- Section B-B, welding requirements revised.
- Section C-C, hole diameter revised from 52 to 57 mm.
- Detail B, back up bar deleted and welding requirements revised.
- Detail C added.
- Note A, reference to OPSD 2453.020 added.

SUMMARY OF REVISIONS TO OPSD 2450.021

HIGH MAST LIGHTING POLE, 40 AND 45m 12-SIDED POLE

- Elevation, flat bar specified for ground stud and 42 mm pipe deleted.
- Section A-A, flat bar specified for ground stud.
- Section B-B, welding requirements revised.
- Section C-C, hole diameter revised from 52 to 57 mm.
- Detail B, back up bar deleted and welding requirements revised.
- Detail C added.
- Note A, reference to OPSD 2453.020 added.

SUMMARY OF REVISIONS TO OPSD 2453.000

HIGH MAST LIGHTING POLE, LUMINAIRE AND HANDHOLE ORIENTATION

- New Note 2 added.
- Existing Note A deleted. Order notes reordered.

SUMMARY OF REVISIONS TO OPSD 2453.010

HIGH MAST LIGHTING POLE, CABLE HOLDER AND STORAGE HOOK DETAILS

- Elevation, 42 mm pipe and Teck cable clamp deleted.
- Section A-A, Teck cable clamp deleted.

SUMMARY OF REVISIONS TO OPSD 2453.070

HIGH MAST LIGHTING POLE, LUMINAIRE SUPPORT RING

- Plan view; tenon arm length revised from 710mm max to 760mm max, junction box revised from EEMAC 4X to NEMA 4X stainless steel, and tenon mounting bracket thickness added.
- Section A-A view; installation of retaining screws and pop rivets reversed, width of tenon mounting bracket added, and locknut and double nut with plain washer labelled and dimensioned.
- Elevation view; hole diameter specified and bolt location dimensioned.
- New Notes A and B added. Other note reordered.

SUMMARY OF REVISIONS TO OPSD 2453.080

HIGH MAST LIGHTING POLE, HEAD FRAME AND RING ASSEMBLY

- Junction box revised from EEMAC 4X to NEMA 4X stainless steel.
- Allen head set screws, slip fitter, and galvanized gusset plate deleted.
- Rubber roller length revised from 150mm to 150mm min.

SUMMARY OF REVISIONS TO OPSD 2453.150

HIGH MAST LIGHTING POLE, INTERNAL DRIVE RAISING AND LOWERING EQUIPMENT – LAYOUT

- PHASE A, PHASE B, and PHASE C revised to L1, L2, and L3; respectively.
- ID No. 15, additional strain relief connectors added.
- W revised to N for neutral.
- New Note 1 added.
- Note A, reference to OPSD 2453.160 deleted.

SUMMARY OF REVISIONS TO OPSD 2453.170

HIGH MAST LIGHTING POLE, INTERNAL DRIVE WIRING DIAGRAM, 347/600V, 3-PHASE

- Titles revised.
- W revised to N for neutral.
- Raising and lowering wiring revised.
- Raising and lowering push buttons and box labelled.
- Main power female connector and motor control male connector added.

SUMMARY OF REVISIONS TO OPSD 2453.180

HIGH MAST LIGHTING POLE, INTERNAL DRIVE WIRING DIAGRAM, 120/240V, 1-PHASE

- Titles revised.
- W revised to N for neutral.
- Raising and lowering wiring revised.
- Raising and lowering push buttons and box labelled.
- Main power female connector and motor control male connector added.

SUMMARY OF REVISIONS TO OPSD 2453.190

HIGH MAST LIGHTING POLE, EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT – LIST OF COMPONENTS

- Existing ID No. 4 deleted. Other numbers reordered.
- ID No. 3, 4, 15, 16, and 17; part descriptions revised.

SUMMARY OF REVISIONS TO OPSD 2453.200

HIGH MAST LIGHTING POLE, EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT – LAYOUT

- ID Nos. revised to reflect renumbering in OPSD 2453.190.
- PHASE A, PHASE B, and PHASE C revised to L1, L2, and L3; respectively.
- W revised to N for neutral.



DATE	OPSD NO.	REV.	TITLE
DIVISION 2000 - ABBREVIATIONS			
2009 11	2000.001	0	Abbreviations, General
2009 11	2011.101	0	General Symbols, Ducts and Cables
2009 11	2011.201	0	General Symbols, Maintenance Holes, Junction Boxes, Pads, and Footings
2009 11	2011.401	0	General Symbols, Poles and Guying
2009 11	2011.501	0	General Symbols, Power Supply Equipment
2013 11	2011.601	1	General Symbols, Control Equipment
2016 11	2011.701	3	General Symbols, Traffic Actuation Devices
2009 11	2012.101	0	Highway Lighting Symbols, Luminaires
2009 11	2013.101	0	Electrical Traffic Control Symbols, Traffic Control Devices
2009 11	2013.201	0	Electrical Traffic Control Symbols, Traffic Signal Displays
2009 11	2014.101	0	Wiring Symbols, Wiring Diagrams 1
2009 11	2014.102	0	Wiring Symbols, Wiring Diagrams 2
2009 11	2015.201	0	Advanced Traffic Management Symbols, Universal Traffic Management System, Equipment Identifier 1
2009 11	2015.202	0	Advanced Traffic Management Symbols, Universal Traffic Management System, Equipment Identifier 2
2009 11	2015.301	0	Advanced Traffic Management Symbols, Layout Drawings
2009 11	2015.302	0	Advanced Traffic Management Symbols, Wiring Diagrams
2009 11	2016.301	0	Communications Symbols, Fibre Optic Communications Schematic 1
2009 11	2016.302	0	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



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DATE	OPSD NO.	REV.	TITLE
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
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
92 12 15	2104.01	-	Re 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
2009 11	2112.01	2	Electrical Handhole, Precast Concrete with Cover, 300 mm Dia.
2009 11	2112.02	2	Electrical Handhole, Precast Concrete with Cover, 460 mm Dia.
2004 11	2112.030	0	Electrical Handhole Precast Concrete - 675 mm Dia.
2004 11	2112.040	0	Electrical Handhole Precast Concrete - 600 x 600 mm
2009 11	2112.05	1	Electrical Handhole, Precast Concrete with Cover, 300 x 500 mm
2004 11	2113.010	0	Electrical Handhole, Non and Semi-Concrete, General Requirements



DATE	OPSD NO.	REV.	TITLE
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
2013 11	2117.01	2	Electrical Maintenance Holes, General Installation Requirements
2013 11	2117.02	3	Electrical Handholes, General Installation Requirements
2009 11	2118.010	0	Electrical Chamber Installation in Median
2009 11	2118.020	0	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
2013 11	2123.03	2	Electrical Handholes, Entry of Direct Buried and Encased Ducts
2010 11	2126.010	2	Distribution Assembly, Concrete Pad and Ducts, Plan and Section A-A
2010 11	2126.020	2	Distribution Assembly, Concrete Pad and Ducts, Section B-B
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
DIVISION 2200 - FOUNDATIONS, ETC.			
2012 11	2200.01	2	Concrete Footing for Base Mounted Lighting and Signal Poles
2010 11	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



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DATE	OPSD NO.	REV.	TITLE
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
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	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
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	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
2006 11	2240.01	2	Wood Pole with Elliptical Bracket, Overhead and Underground Circuits



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DATE	OPSD NO.	REV.	TITLE
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
2004 11	2245.01	2	Installation of Aerial Cable Systems
2011 11	2245.020	1	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
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



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DIVISION 2400 - PURCHASING STANDARDS			
2013 11	2400.000	2	Distribution Assembly Legend
2010 11	2400.010	2	Distribution Assembly, Cabinet
2008 11	2400.020	1	Distribution Assembly, Equipment Layout
2013 11	2400.030	2	Distribution Assembly Wiring Schematic
2008 11	2400.100	0	Warning Signs for Electrical Equipment
2010 11	2400.101	0	Warning Signs Outside Electrical Equipment
2012 11	2410.01	3	Spun Concrete Pole
2012 11	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
93 12 15	2415.010	-	Steel Pole - Base Mounting
2010 11	2415.011	0	Steel Pole, Base Mounted Without Gussets
93 12 15	2416.010	-	Steel Pole - Concrete Barrier Mounting
2010 11	2416.011	0	Steel Pole, Concrete Barrier Base Mounted Without Gussets
2016 11	2418.010	2	1.8 m and 2.7 m Steel Truss Bracket for Steel Poles
2007 04	2420.01	4	1.8 m and 2.7 m Aluminum Tapered Elliptical Bracket
2016 11	2421.010	1	Lamp Wattage Label for Luminaire
2010 11	2428.01	3	Frangible Bases
2010 11	2432.010	1	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



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DATE	OPSD NO.	REV.	TITLE
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
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
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



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DATE	OPSD NO.	REV.	TITLE
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
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			
2011 11	2500.010	1	600 mm Signal Arm and Signal Head
2009 11	2500.020	1	600 mm Signal Arm Attachment to Poles
2011 11	2501.01	2	Single Member Arm and Signal Head
2011 11	2501.02	2	Aluminum Single Member Arm Attachment Details
2007 11	2502.010	0	Traffic Signal, Adjustable Mid-Section Hanger



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DATE	OPSD NO.	REV.	TITLE
2007 11	2502.011	0	Traffic Signal, Dual-End Hanger
2014 11	2505.010	1	Traffic Signal, Pedestrian Head and Push Button Mounted on Pole
2011 11	2508.010	0	Traffic Signal, Sectional Steel Poles with Primary and Secondary Signal Heads for Ramp Metering
2012 11	2510.010	0	Pole Mounted Controller Cabinet
2011 11	2510.020	0	Mounting Bracket for Pole Mounted Controller Cabinet
2012 11	2514.010	0	Controller Cabinet on Pad
2012 11	2514.020	0	Concrete Pad for Controller Cabinet
2012 11	2516.102	0	Traffic Data Collection, Data Station, Traffic Counting Station Type 2
2012 11	2518.101	0	Prefabricated Detector Loop
2012 11	2518.102	0	Traffic Data Collection, Detector Loops, Heavy Duty Rubber
2012 11	2520.010	0	Loop Detector Installation Details I
2012 11	2520.02	4	Loop Detector Installation Details II
2007 11	2522.010	0	Traffic Signal, Cushion Hanger
2009 11	2524.01	1	Traffic Signal, Double Arm Bracket
2012 11	2526.01	1	Traffic Signal Bracket for Mounting Pedestrian Instruction Sign on Pole
2010 11	2528.01	2	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
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



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DATE	OPSD NO.	REV.	TITLE
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
2009 11	2540.100	0	Aerial Suspension Mounting Bracket, Emergency 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
2011 11	2552.01	2	Traffic Signal System Equipment on Wooden or Concrete Poles, Overhead Wiring Installation
2011 11	2554.010	0	Traffic Signal System Equipment on Wooden or Concrete Poles, Underground Wiring Installation
2016 11	2555.010	0	Flexible Utility Markers
2014 11	2558.000	0	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	JB	junction box
AC	alternating current	LAN	local area network
Al	aluminum	LCS	lane control sign
AMB	amber	LD	loop detector
APS	accessible pedestrian signal	LED	light emitting diode
ATMS	Advanced Traffic Management System	LS	light standard
AWG	American Wire Gauge	LV	low voltage
BGRD	bare ground	MH	electrical maintenance hole
BLK	black	NEUT	neutral
BLU	blue	NIC	not included in contract
CCT	circuit	OESC	Ontario Electrical Safety Code
CCTV	closed-circuit television	Ω	ohm
CDT	conduit	PB	pedestrian push button
CEC	Canadian Electrical Code	PCS	permanent counting station
COMM	communication	PUC	public utilities commission
COND	conductor	PVC	polyvinyl chloride
CONT	control	PVMS	portable variable message sign
C/W	complete with	PWR	power
Cu	copper	PXO	pedestrian crossover
DB	direct buried	QWS	queue warning sign
DC	direct current	RF	radio frequency
DET	detector	RFI	radio frequency interference
EC	electrical chamber	RLC	red light camera
EL	electrical	RMS	ramp metering station
ELV	extra-low voltage	TC	traffic signal controller cabinet
EMI	electromagnetic interference	TD	transit detector
EQPT	equipment	TS	traffic signal
EXP	expansion joint	XFMR	transformer
F	farad	UPC	underpavement crossing
GRD	ground	UPS	uninterruptible power supply
GRN	green	V	volt
μH	micro henry	VA	volt ampere
HAR	highway advisory radio	VD	video detector
HEC	hydro electric commission	VDS	vehicle detector station
HH	electrical handhole	VMS	variable message sign
HV	high voltage	W	watt
Hz	hertz	Wh	watt hour
IGRD	insulated ground, green	WHT	white
IMPD	impedance	WWR	welded wire reinforcement
IND	inductance	YEL	yellow
IPS	iron pipe size		
ITS	Intelligent Transportation Systems		

ONTARIO PROVINCIAL STANDARD DRAWING

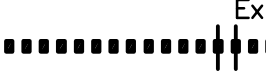
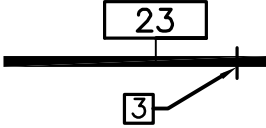
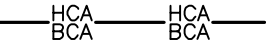
Nov 2009 Rev 0

ABBREVIATIONS

GENERAL



OPSD 2000.001

	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 2009	Rev	0	
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 2009

Rev 0



GENERAL SYMBOLS

MAINTENANCE HOLES, JUNCTION BOXES,
PADS, AND FOOTINGS

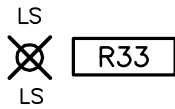
OPSD 2011.201



pole with identification code



existing pole to remain with identification code



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

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GENERAL SYMBOLS

POLES AND GUYING

OPSD 2011.401





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

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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



UPS

uninterruptible power supply cabinet



UPS

controller cabinet with uninterruptible power supply cabinet



UPS

controller cabinet, pad and/or footing mounted complete with internal uninterruptible power supply

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013

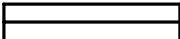
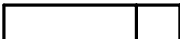
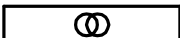
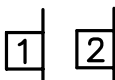
Rev 1

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
	EV1	emergency 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
 or 		red light camera

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2016

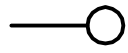
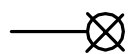
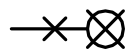
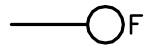
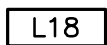
Rev 3

GENERAL SYMBOLS

TRAFFIC ACTUATION DEVICES



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

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Rev 0

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 changeable 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 changeable message sign

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2009	Rev	0	
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		
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
8	5		300	200	200	300 ←	AMB	300 → GRN
8A	5		300	300	300	300 ←	AMB	—
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 2009	Rev	0	
ELECTRICAL TRAFFIC CONTROL SYMBOLS TRAFFIC SIGNAL DISPLAYS	-----			

OPSD 2013.201				



cables to be installed in the same duct



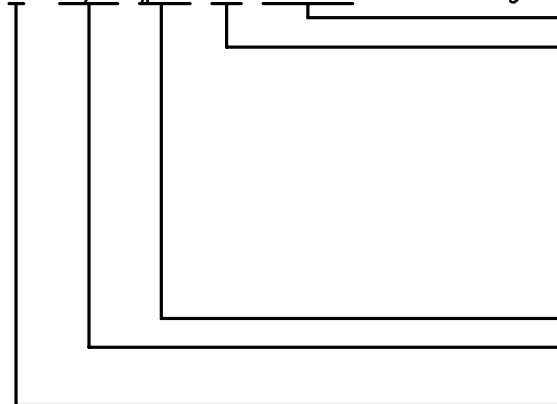
spare duct for future use



conductors, single or multiple, identified by note

2-19/C #14 TS-75mm

wiring identification note



duct size, aerial or direct buried

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)

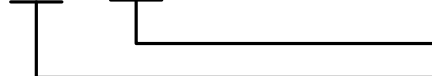
AWG size of conductor

number of conductors in cable,

not required for single conductor

number of cables

8SM, 16MM



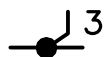
fiber optic cable

number of multi-mode fibres

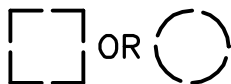
number of single mode fibres



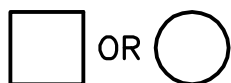
in-line cable splice, number denotes number of cables



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 2009

Rev 0

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. Refer to CSA Z99 for symbols not included in this legend.
- 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 2009

Rev 0

WIRING SYMBOLS

WIRING DIAGRAMS 2

OPSD 2014.102



XXXLLNNNNMLL

freeway identification

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

equipment (station) type

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

direction from reference point

E = east
W = west
N = north
S = south
T = Toronto
B = border
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

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

direction of traffic

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

type of devices or
element number

Note 2

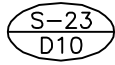
C = comm
D = VDS type
E = VDS, VMS
G = VDS, CCTV
H = VDS, RMS, VMS
I = interface (others)
J = VDS, RMS, CCTV
K = VDS, VMS, CCTV
L = LCS/QWS type
M = TPR type
N = RMS, VMS
O = VDS, CCTV, QWS
P = power (UPS station)
Q = RMS, VMS, CCTV
R = RMS and VDS type
S = LCS/QWS and VDS type
T = CCTV type
U = lift 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:

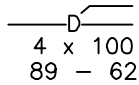
- 1 Numbering begins at the reference points. For D, L, and V stations, devices related to roadway usage are numbered sequentially in the same set of lanes with transitions between a single roadway and an express – collector type freeway, the count is increased by 100 from last similar situation. For T, R, and C stations, devices not related to lanes are numbered sequentially along the roadway.
 - 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 to be read in conjunction with OPSD 2015.202.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2009	Rev	0	
ADVANCED TRAFFIC MANAGEMENT SYMBOLS UNIVERSAL TRAFFIC MANAGEMENT SYSTEM EQUIPMENT IDENTIFIER I	----- -----			
	OPSD 2015.201			

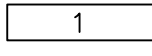
	HIGHWAY	REFERENCE POINT	DIRECTION FROM REFERENCE POINT
CENTRAL REGION	400	Highway 401	north and south
	401	Toronto Traffic Operations Centre	east and west
	403 – Burlington – Hamilton to Oakville	Freeman Interchange	east and west
	403 – Mississauga – Highway 401 to QEW	Highway 401	west
	404	Highway 401	north and south
	409	Highway 401	west
	410	Highway 401	north
	420	QEW	east
	427	Highway 401	north and south
	QEW – Mississauga/Burlington	Burlington Traffic Operations Centre	Toronto bound (T) border bound (B)
NORTH REGION	400/69	Sudbury	south
	11	Sudbury	north and south
	17	Sudbury	east and west
EAST REGION	416	Highway 417	south
	417	Ottawa Traffic Operations Centre	east and west
WEST REGION	401	London Traffic Operations Centre	east and west
	401 – Windsor	Highway 3	east
	402	Blue Water Bridge	east
	403	Highway 401	east
	405	QEW	east
	406	QEW	south
	58 – Thorold Tunnel	QEW	east
	QEW – Niagara Region	Burlington Traffic Operations Centre	Toronto bound (T) border bound (B)



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 set



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



conventional camera with pan and tilt unit



conventional camera, fixed location, aiming direction indicated by arrow



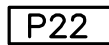
portable variable message sign



dome camera



dome camera with lowering device



communications pedestal with identification code

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2009	Rev	0	
ADVANCED TRAFFIC MANAGEMENT SYMBOLS LAYOUT DRAWINGS		-----			

		OPSD 2015.301			

Identification codes:

C – communications

S – spare

M – municipality (name municipality)

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 2009

Rev 0

ADVANCED TRAFFIC MANAGEMENT SYMBOLS

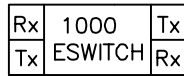
WIRING DIAGRAMS

OPSD 2015.302

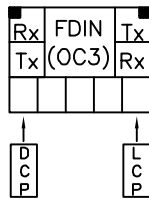




modem with identification codes
M_S fibre optic serial modem
M_B telco modem
M_E fibre optic Ethernet modem



Ethernet switch
numerical value denotes device bandwidth



field drop and insert node

■ indicates primary transmitter (Tx) and receiver (Rx)



data channel port

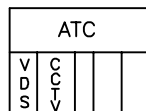
label denotes related subsystem or agency



LAN channel port



port server/protocol converter



advanced traffic controller

RMS – beacon and signal control

VDS – vehicle detection station

CCTV– closed–circuit television camera

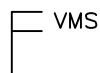
EXT – external devices

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

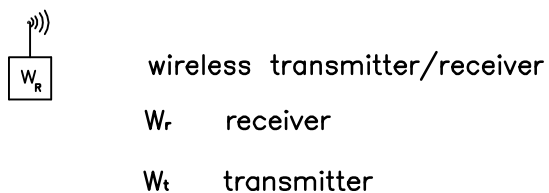
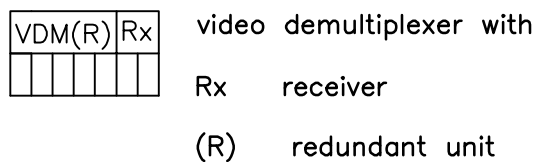
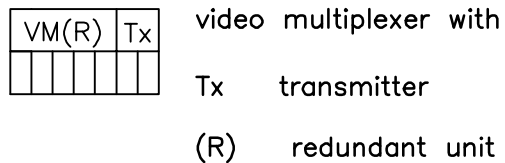
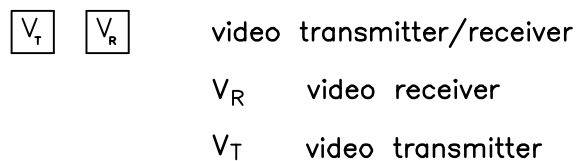
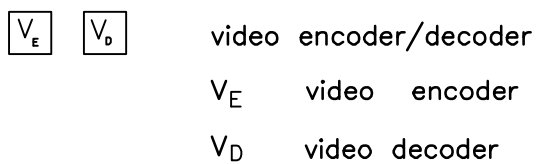
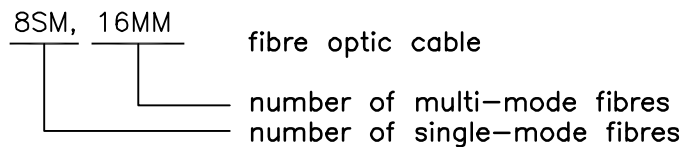
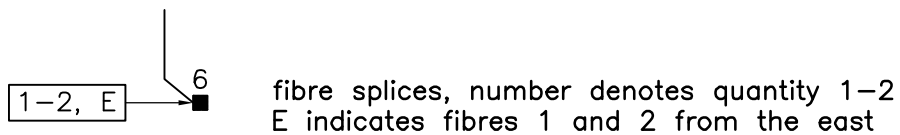
Nov 2009

Rev 0

COMMUNICATIONS SYMBOLS
FIBRE OPTIC COMMUNICATIONS SCHEMATIC 1

OPSD 2016.301





ONTARIO PROVINCIAL STANDARD DRAWING

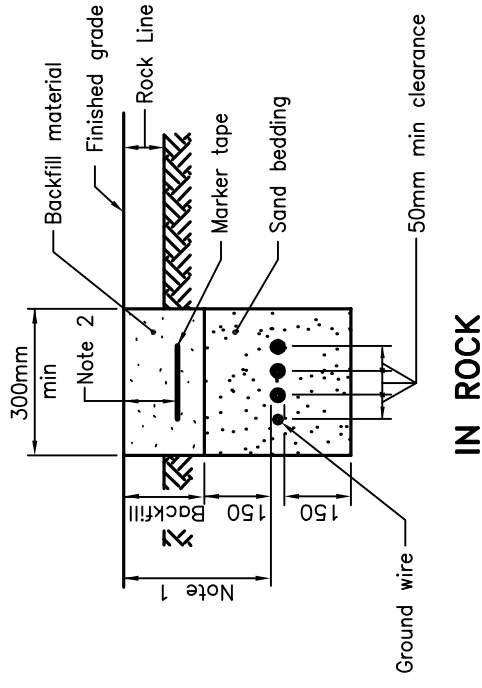
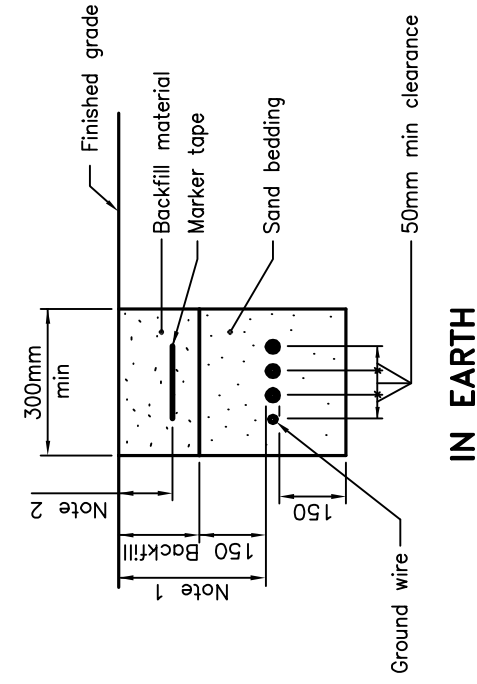
Nov 2009

Rev 0

COMMUNICATIONS SYMBOLS
FIBRE OPTIC COMMUNICATIONS SCHEMATIC 2

OPSD 2016.302





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 OPD 2100.050.
- C All dimensions are in millimetres unless otherwise shown.

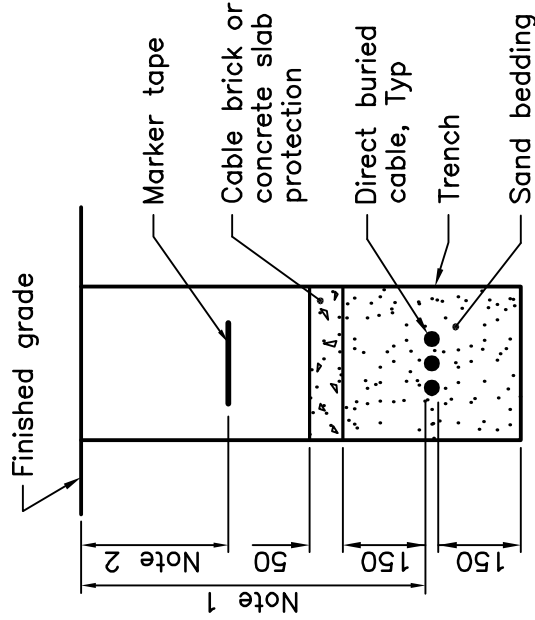
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 Rev 0

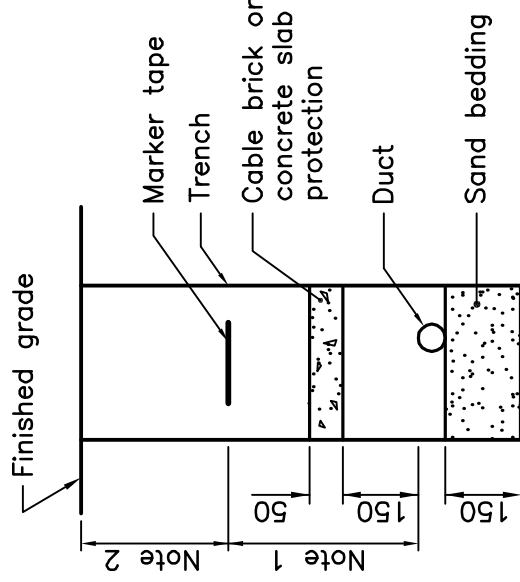


CABLE INSTALLATION IN TRENCHES

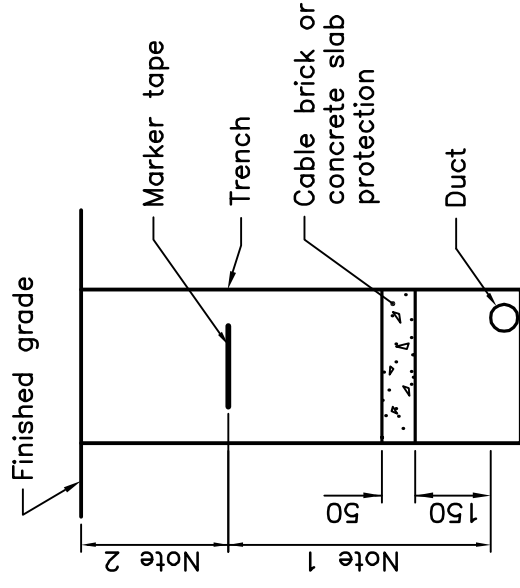
OPSD 2100.010



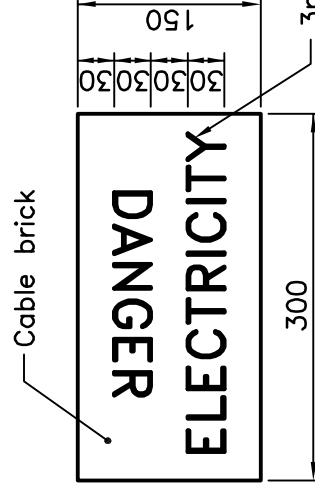
**DIRECT BURIED CABLE
IN ROCK OR IN EARTH**



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.

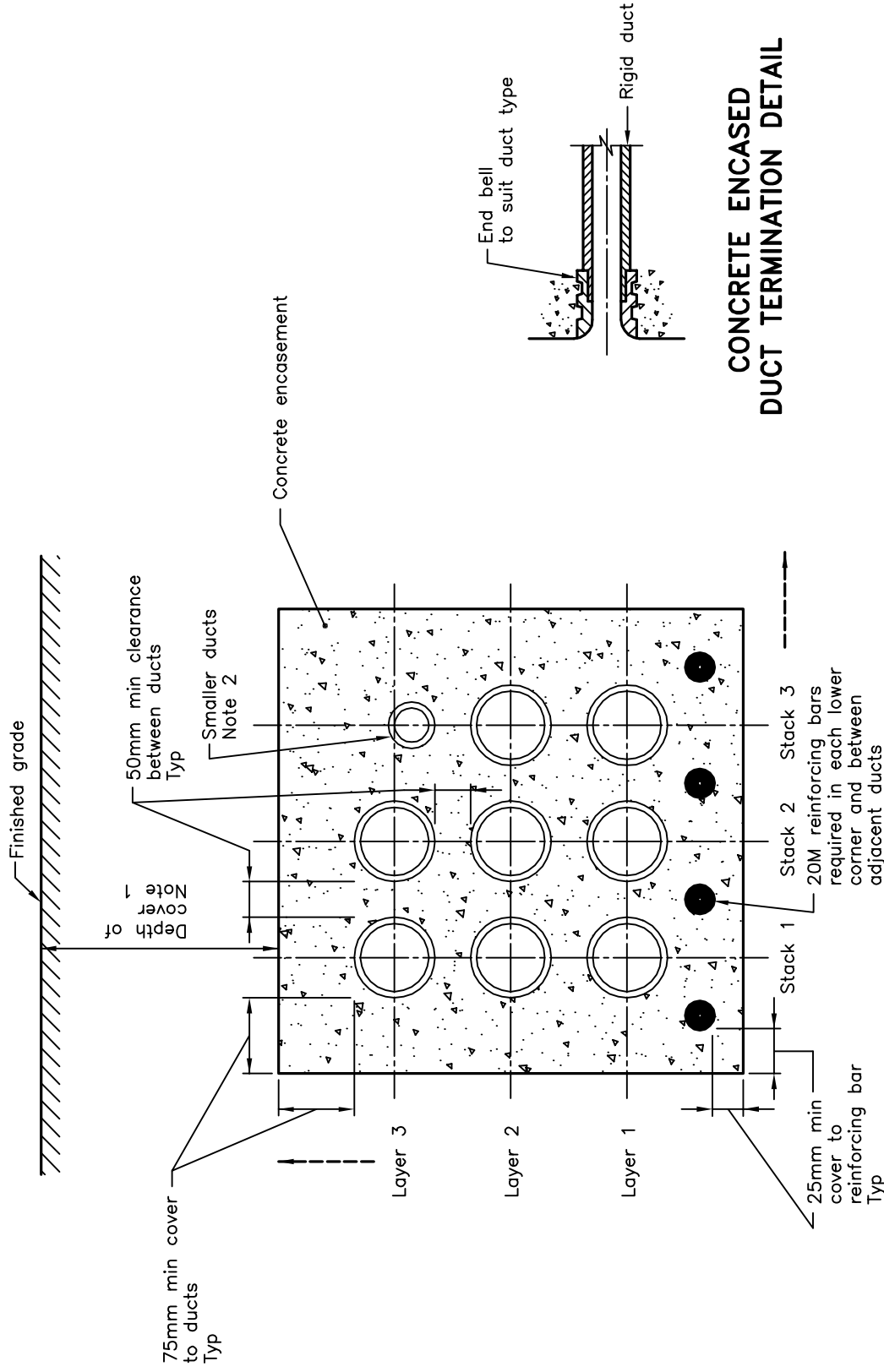
ONTARIO PROVINCIAL STANDARD DRAWING

**CABLE AND DUCT PROTECTION
AND MARKING**

Nov 2013 Rev 0



OPSD 2100.050



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.

SECTION

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 2

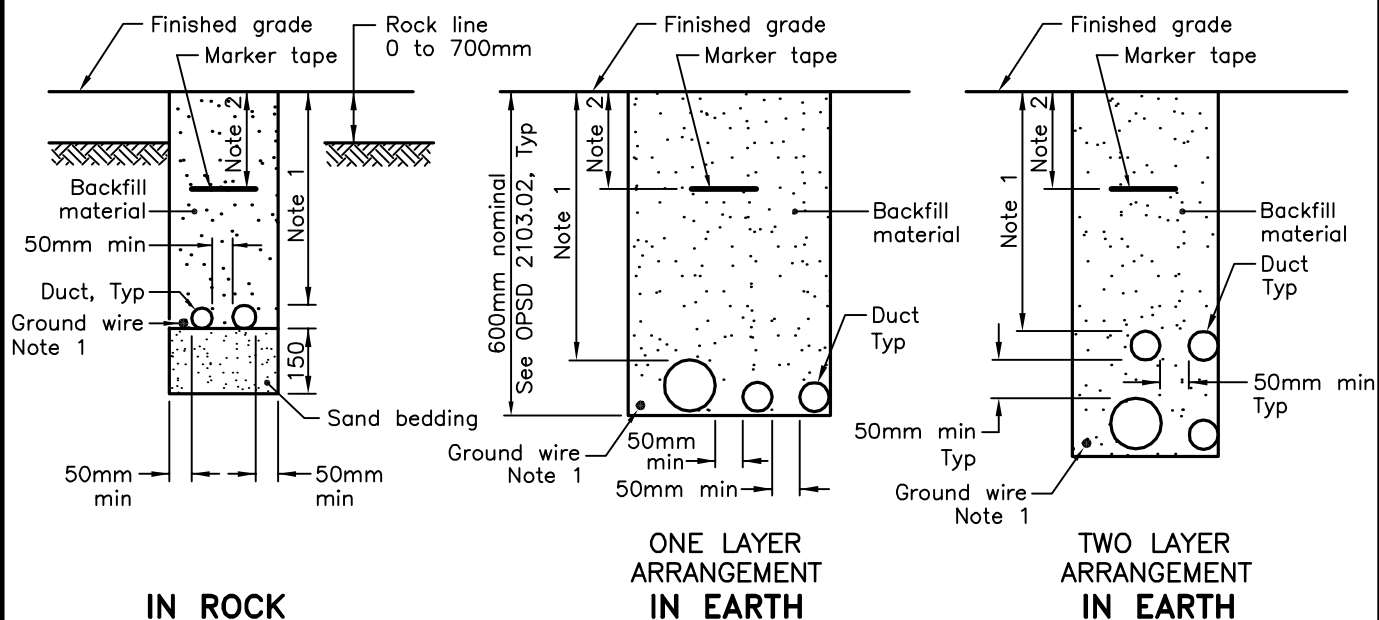


RIGID DUCTS ENCASED IN CONCRETE

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	



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

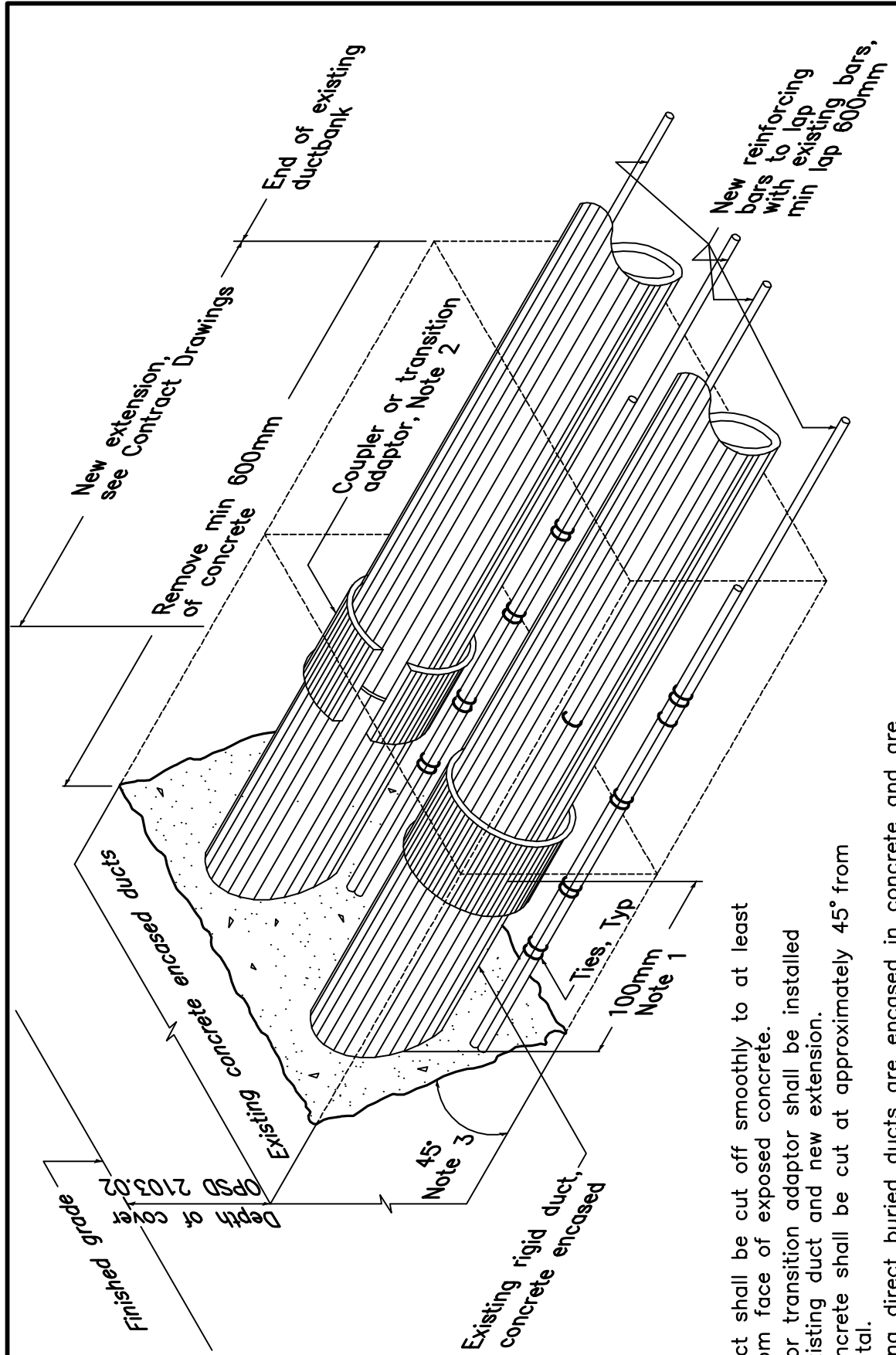
Nov 2013

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.

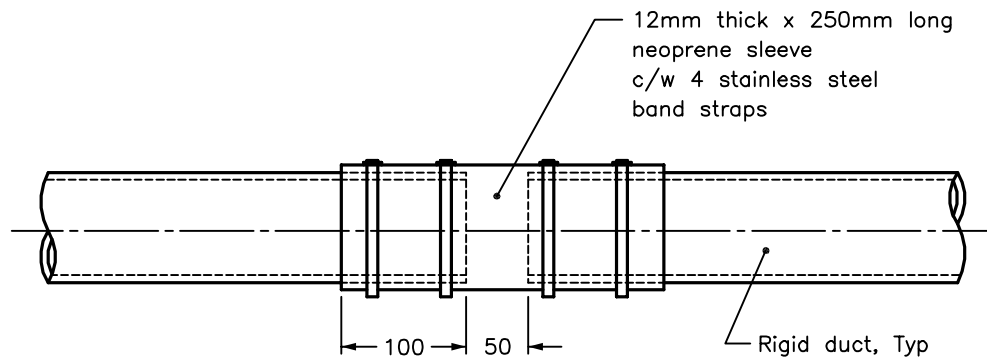
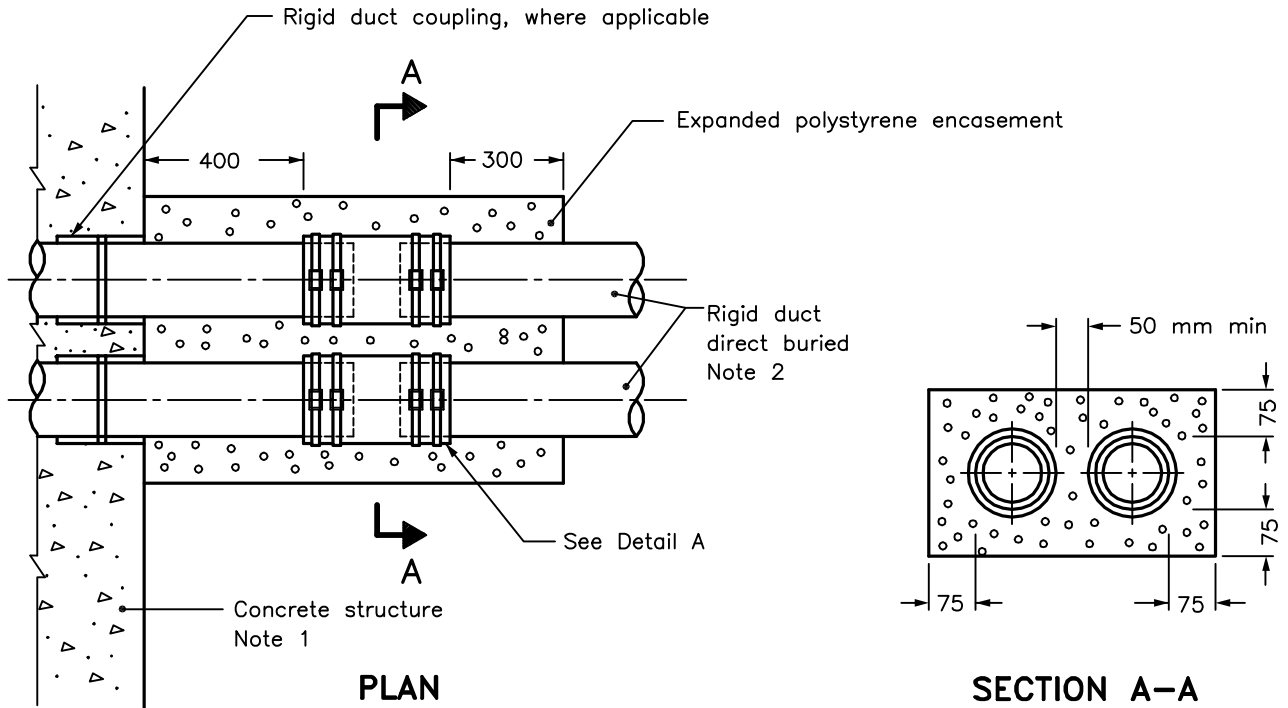
ONTARIO PROVINCIAL STANDARD DRAWING

EXTENSION OF EXISTING RIGID DUCTS ENCASED IN CONCRETE

Nov 2013	Rev 0
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OPSD 2101.020

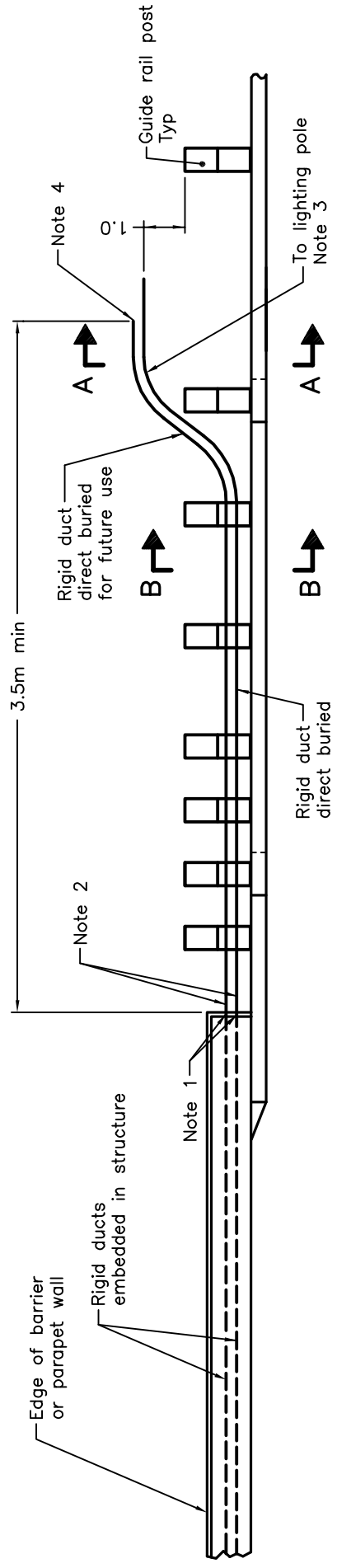


**DETAIL A
WOBBLE JOINT**

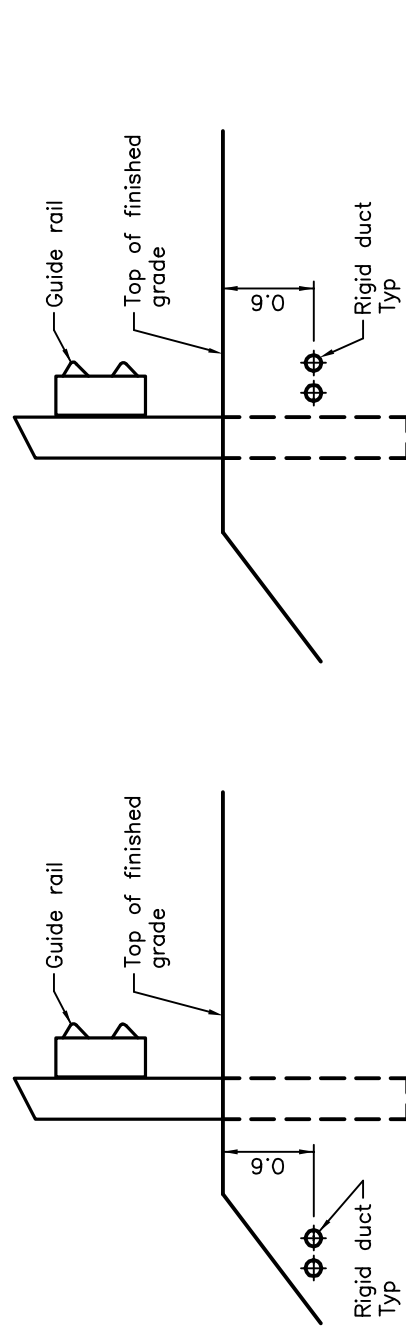
NOTES:

- 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



SECTION A-A

SECTION B-B

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.

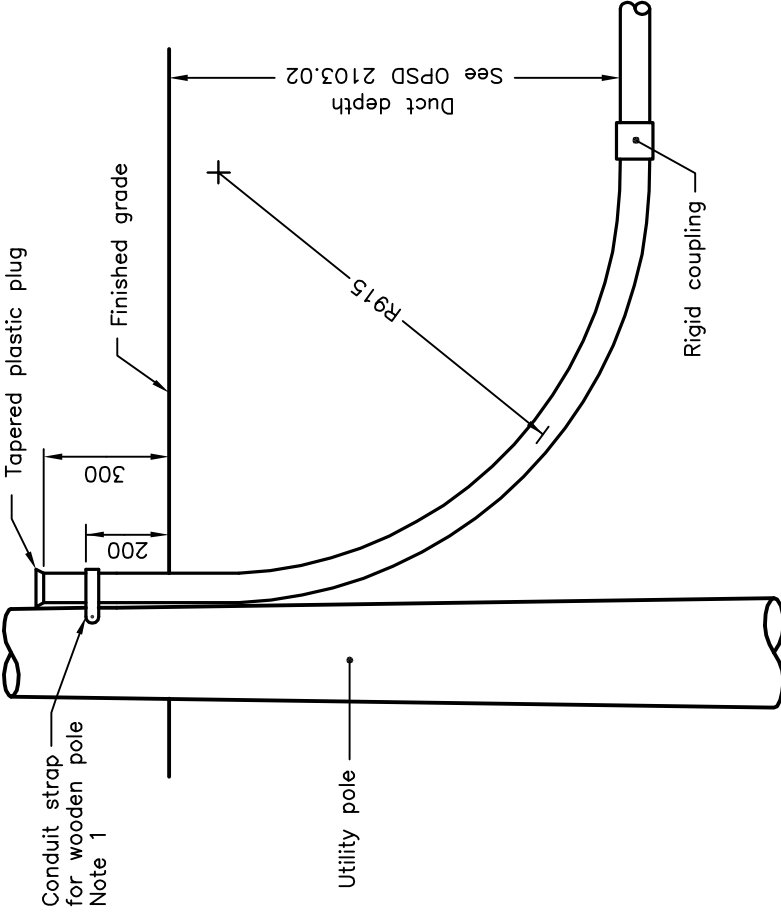
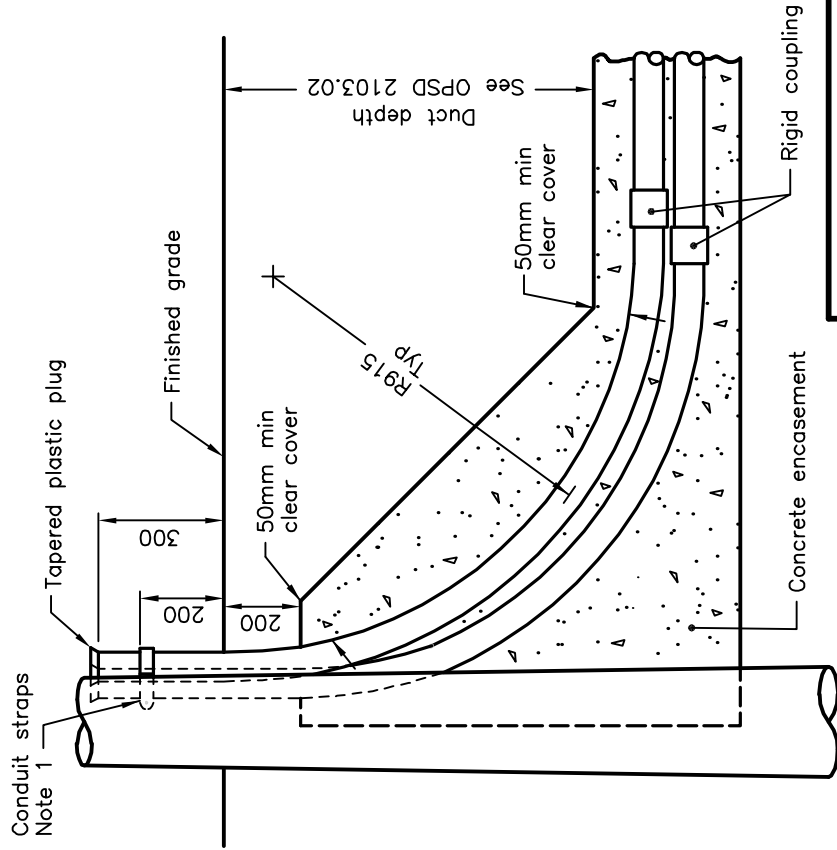
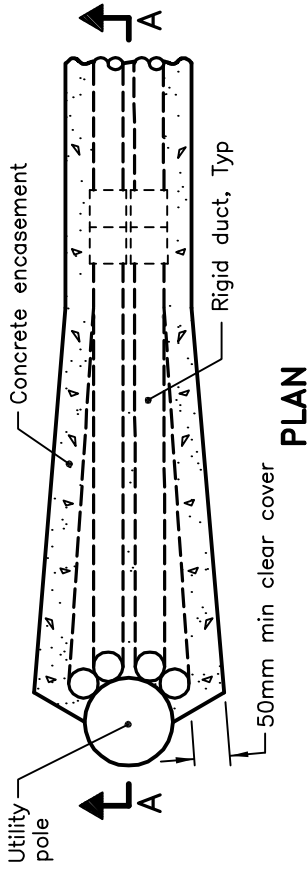
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 0



UNDERGROUND RIGID DUCT CONNECTION
AT CONCRETE STRUCTURE
WITHOUT EXPANSION JOINT

OPSD 2102.020



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 OPSP shall be read in conjunction with OPSP 2100.06 and 2101.01.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

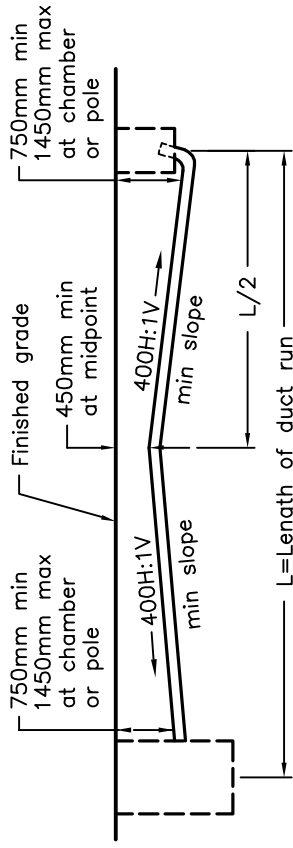
SECTION A-A
CONCRETE ENCASED DUCT

**RIGID DUCT TERMINATION
FOR HIGH VOLTAGE CABLES
AT UTILITY POLES**

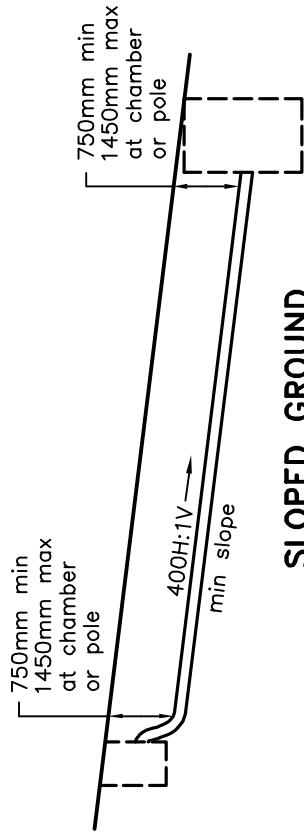
Nov 2015 Rev 0



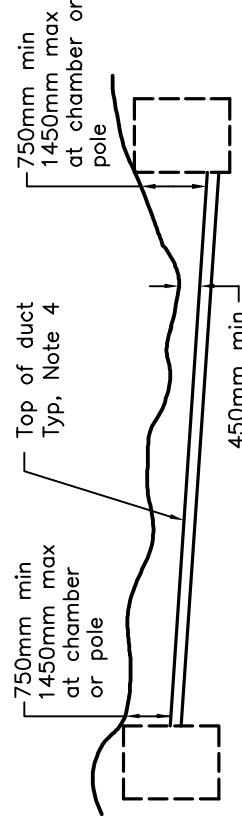
OPSP 2103.010



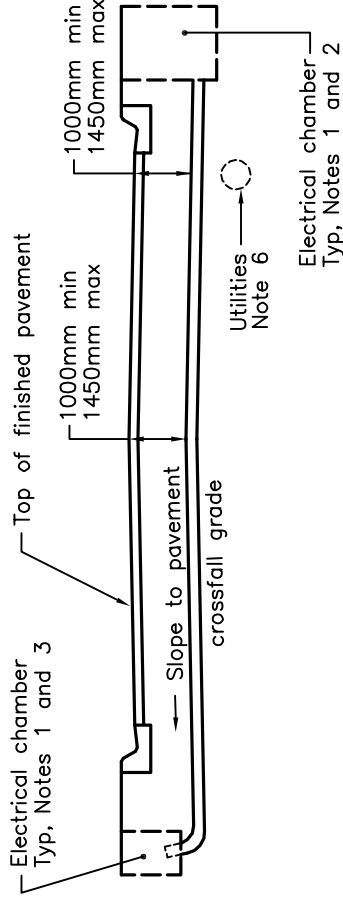
FLAT GROUND



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.

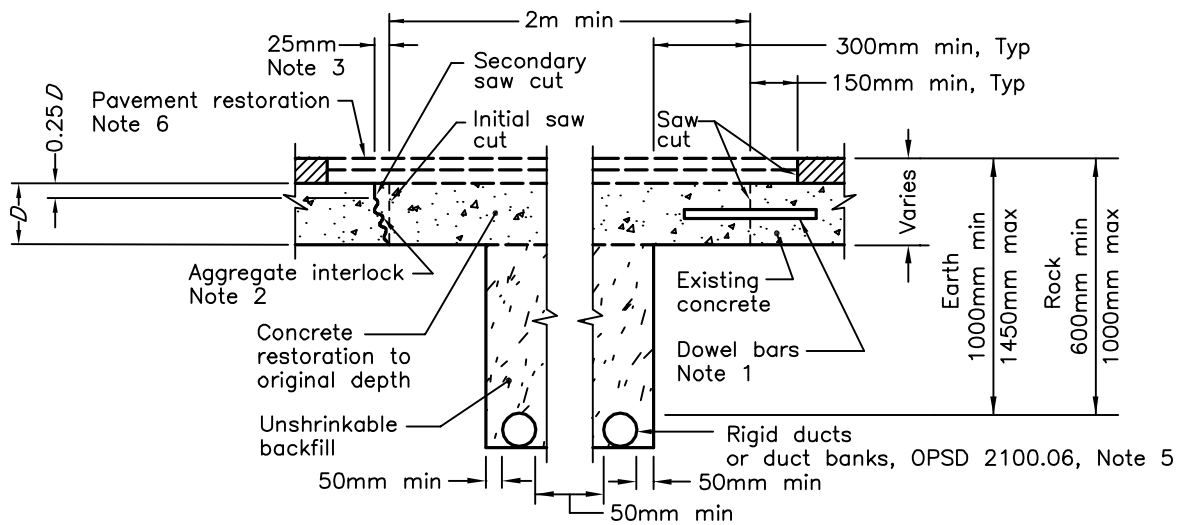
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 1

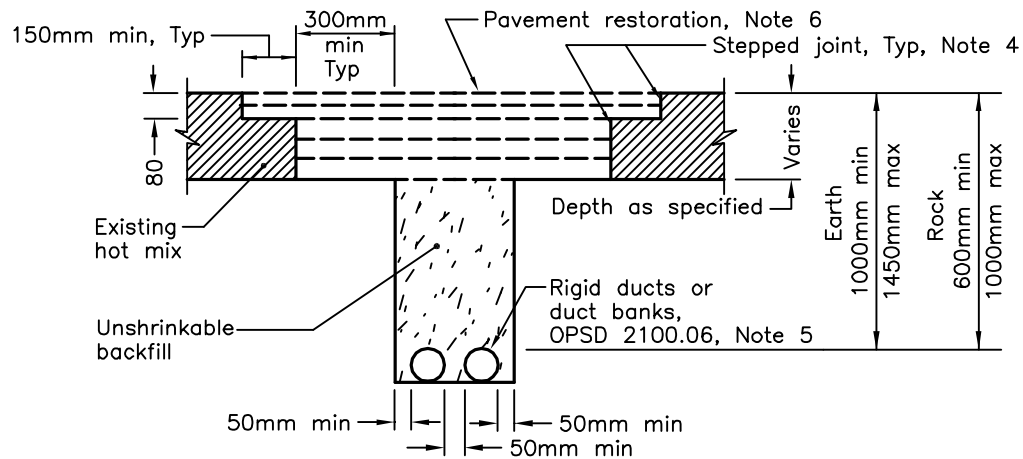
**DUCT INSTALLATION
PROFILES**



OPSD 2103.02



UNDOWELLED TREATMENT, NOTE 2 DOWELLED TREATMENT, NOTE 1
COMPOSITE OR CONCRETE PAVEMENT



NOTES:

BITUMINOUS PAVEMENT

- 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

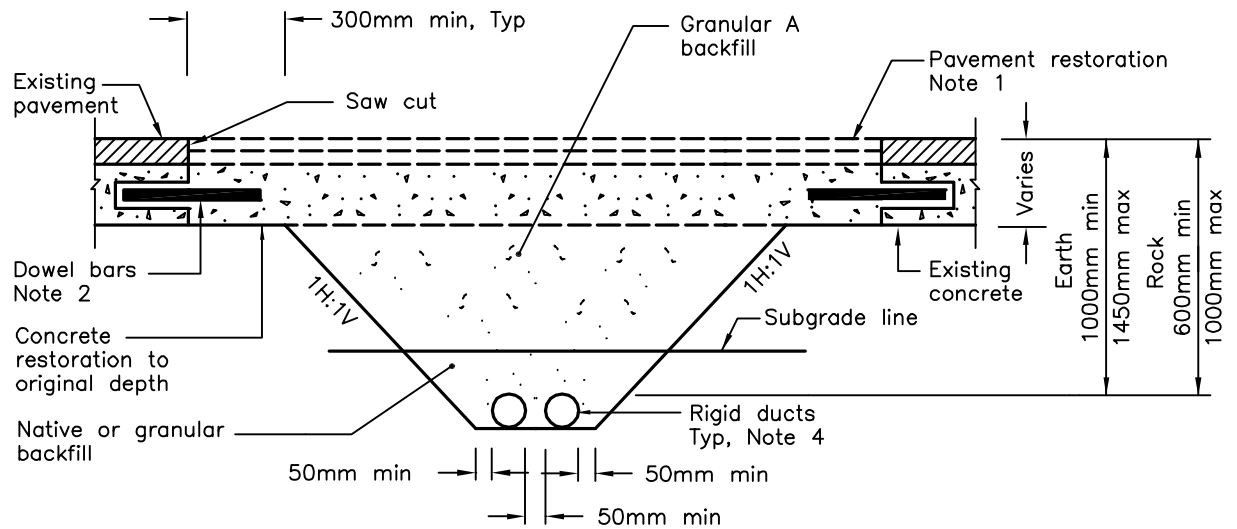
Nov 2015

Rev 1

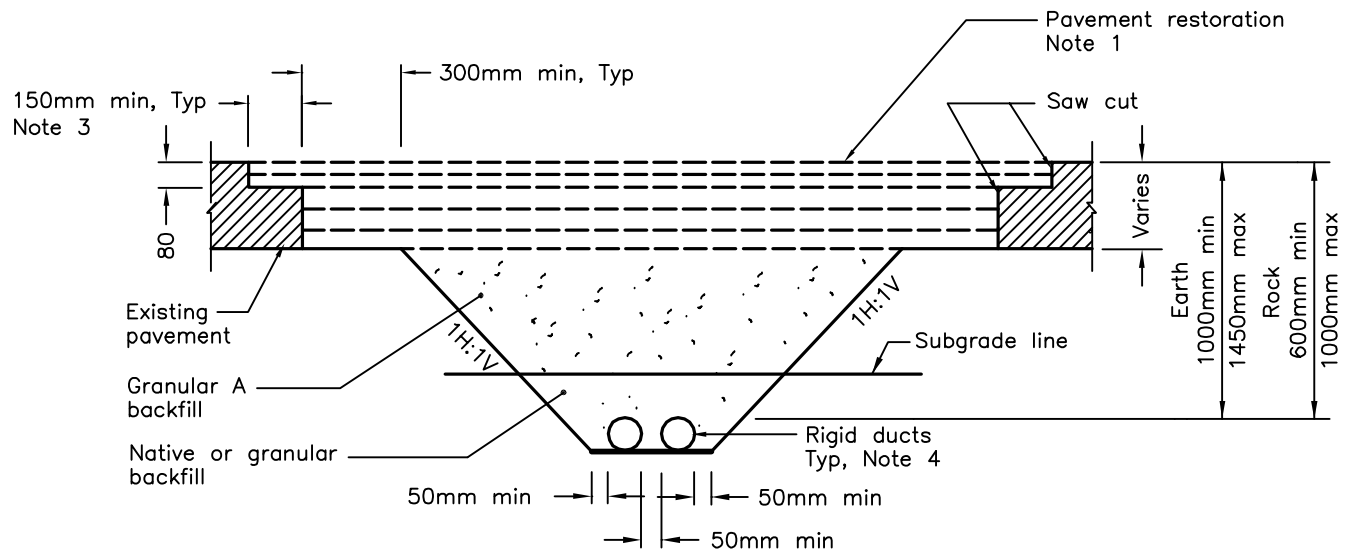
**RIGID DUCT INSTALLATION
IN EXISTING PAVED AREA
UNSHRINKABLE BACKFILL METHOD**

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

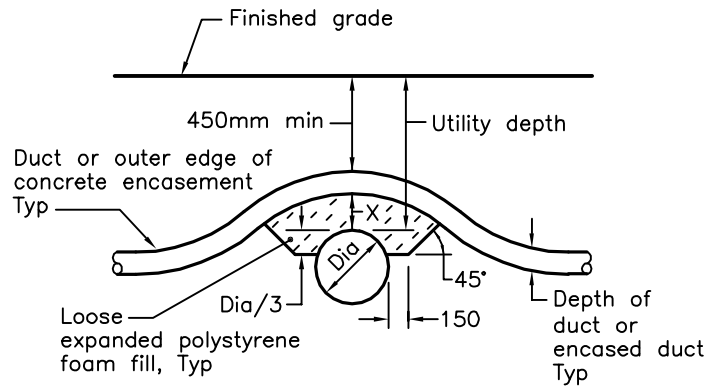
Nov 2015

Rev 0

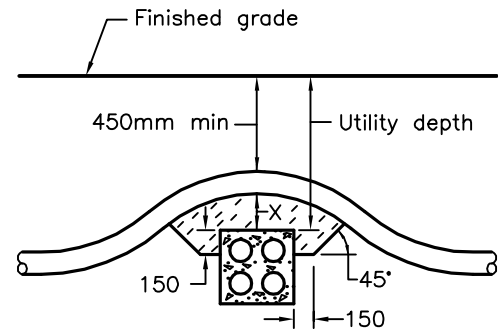
**RIGID DUCT INSTALLATION
IN EXISTING PAVED AREA
GRANULAR BACKFILL METHOD**



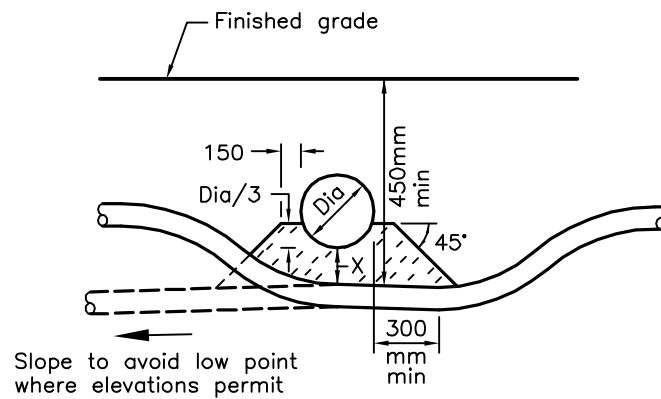
OPSD 2103.040



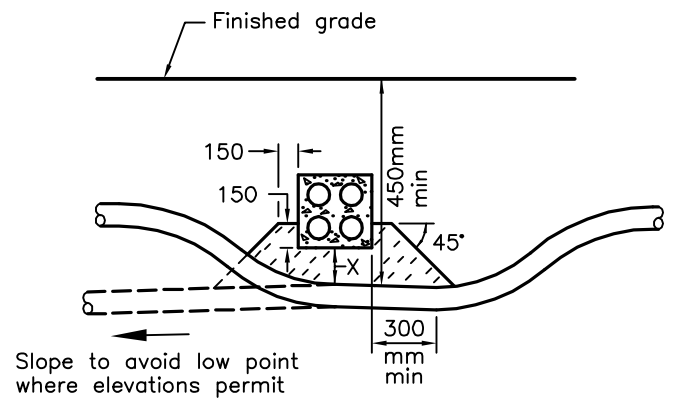
CROSSING OVER UTILITY



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

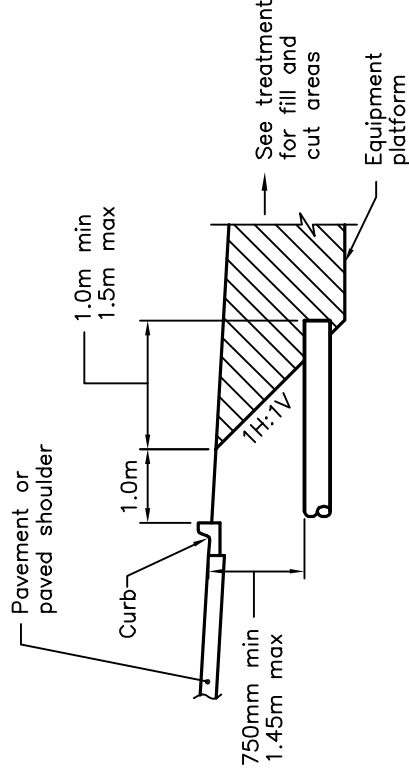
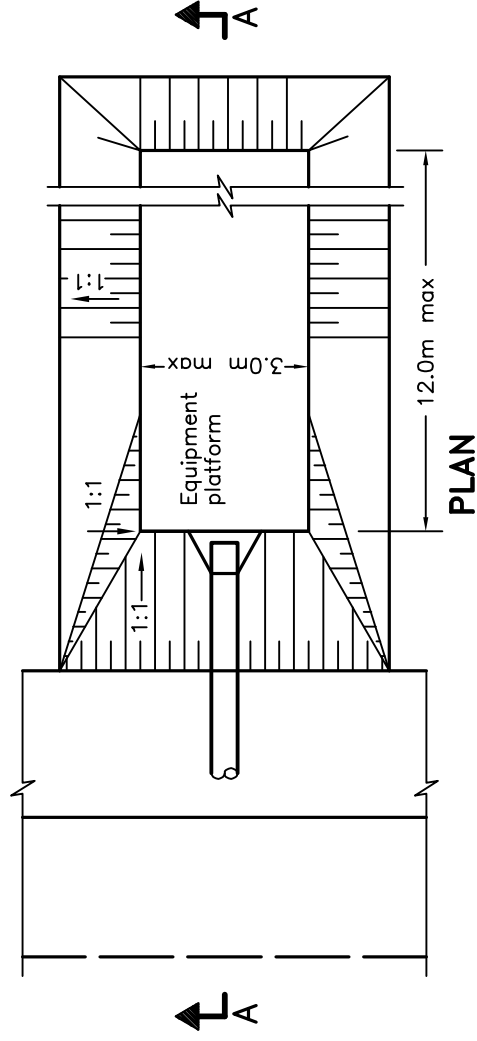
Nov 2015

Rev 0

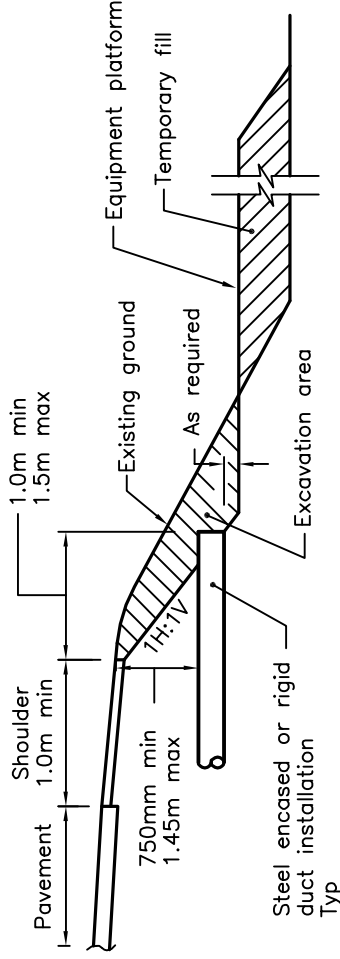
**DUCT INSTALLATION
AT UTILITY CROSSINGS**



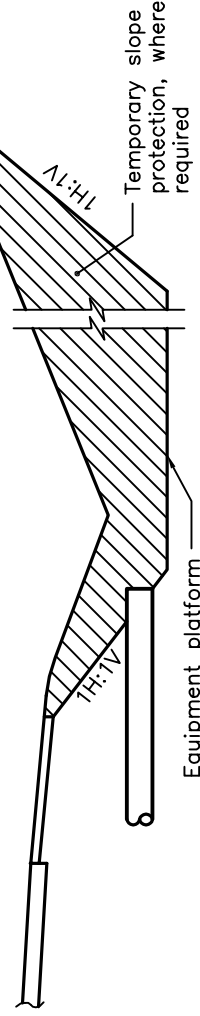
OPSD 2103.050



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.

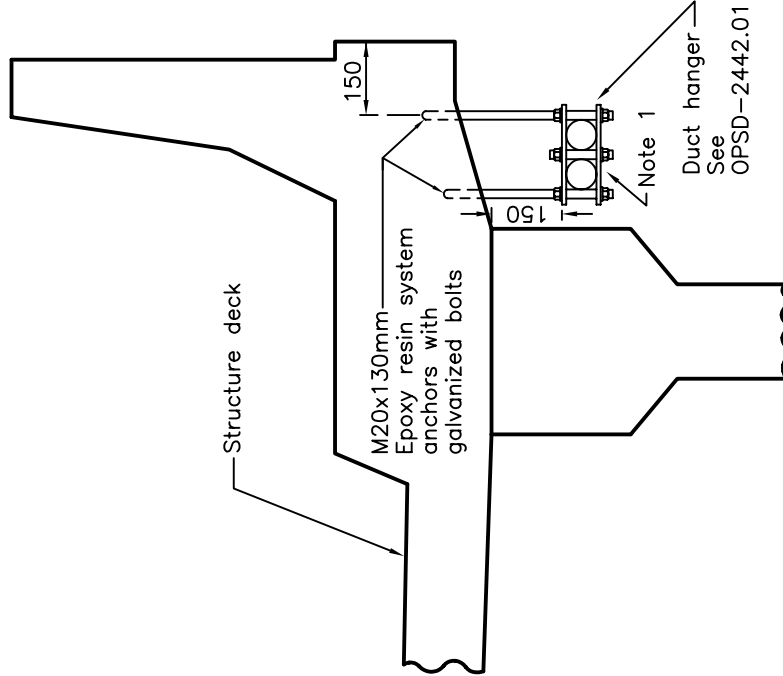
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 0

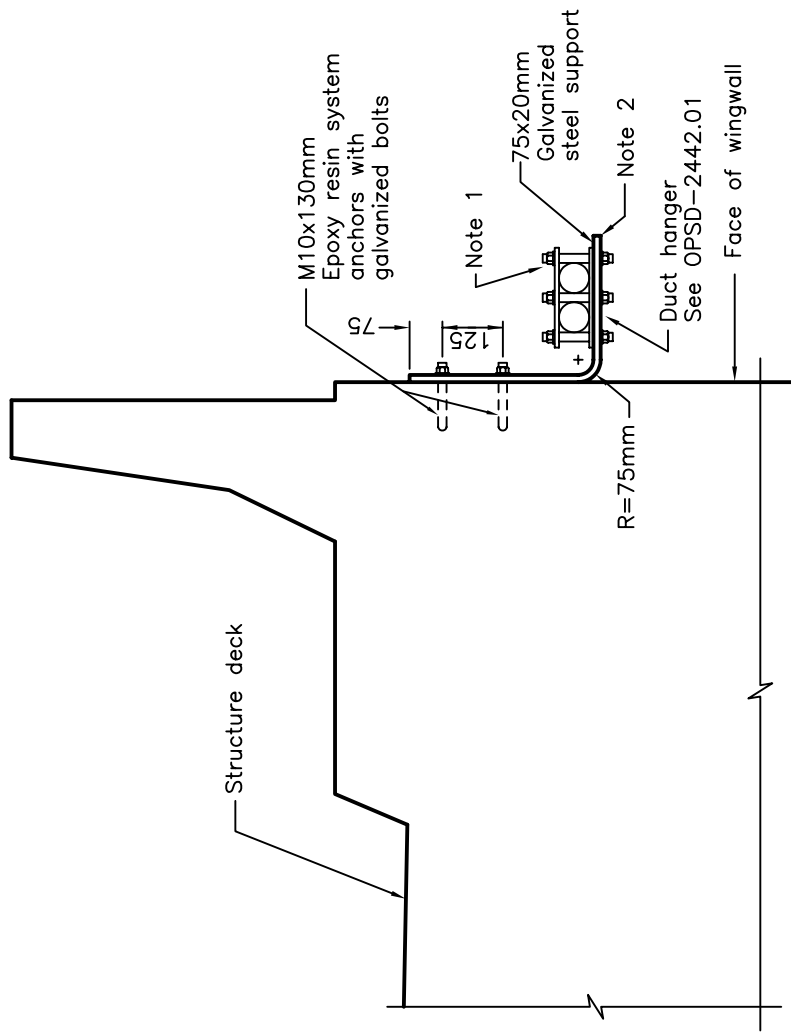


**AUGERING PITS FOR
SUBSURFACE INSTALLATION
OF DUCTS AND ENCASEMENTS**

OPSD 2103.060



UNDER BRIDGE DECK



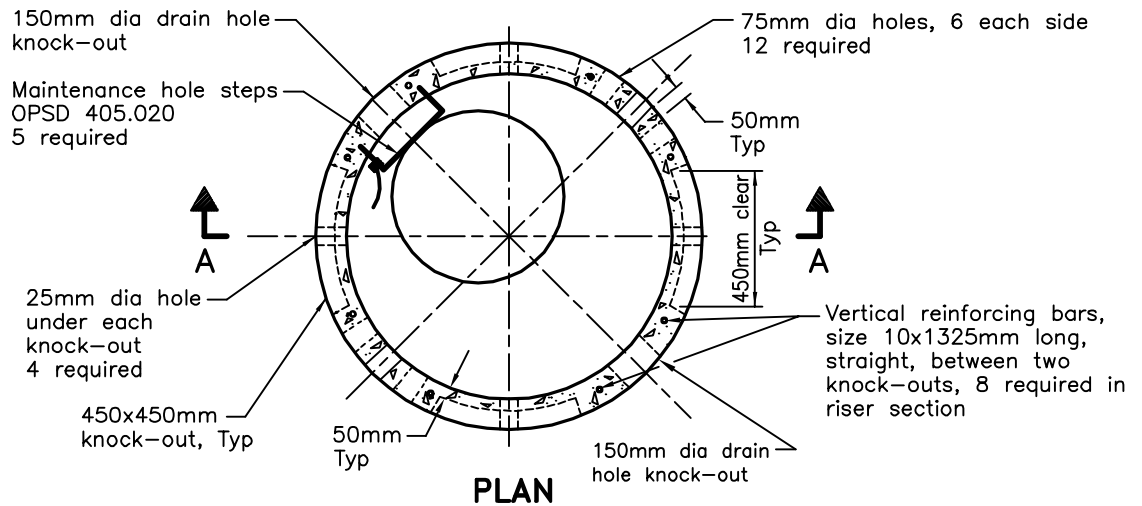
AT WINGWALL

NOTES:

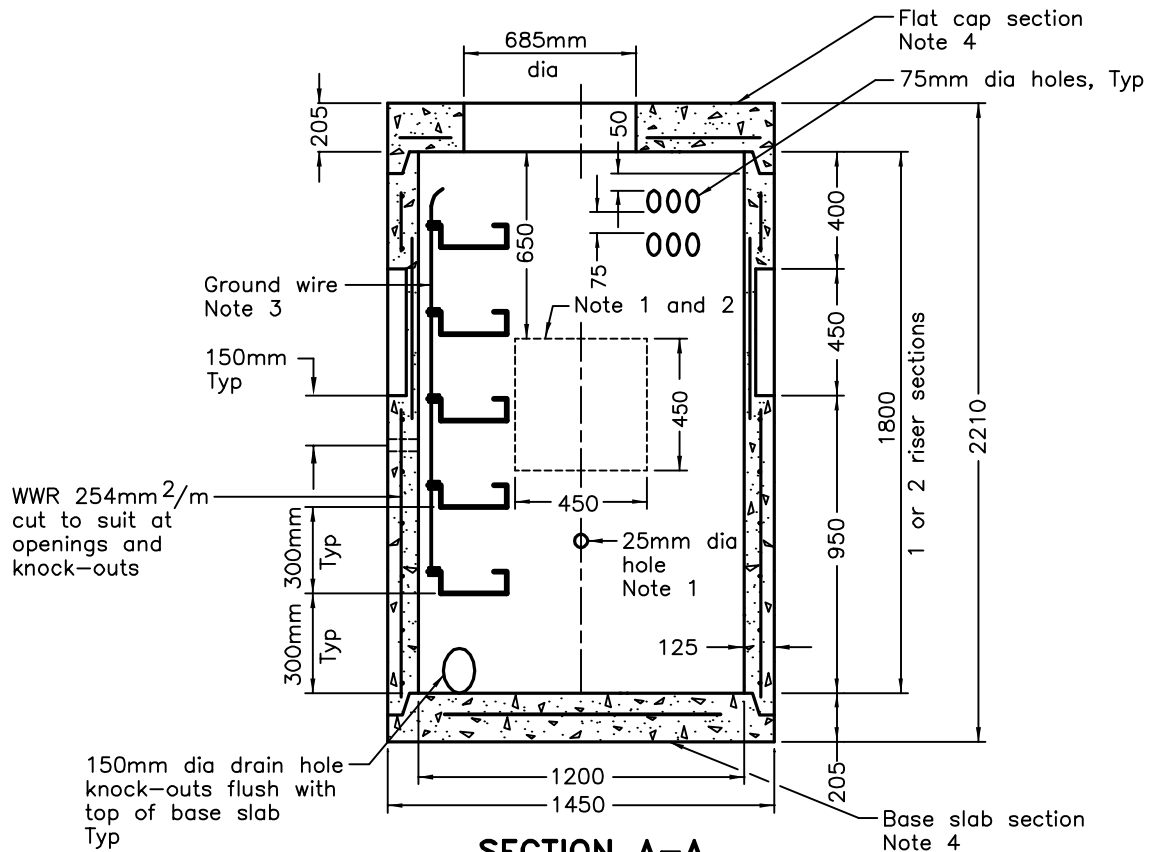
- 1 Where required, attach duct system to underside of structure deck and swing out to outside of wingwall location at abutment wall. Use 22.5° bends maximum.
- 2 Support system shall be installed at a maximum spacing of 3.0m.
- A The number and size of ducts are as indicated in the contract.
- B Split stop rings shall be installed midway between expansion joints at support bracket.
- C All dimensions are in millimetres or metres unless otherwise shown.

OPSD - 2104.01

ONTARIO PROVINCIAL STANDARD DRAWING				
Date	1992	12	15	Rev
Date				
RE DUCTS SURFACE MOUNTED ON STRUCTURES				
OPSD - 2104.01				



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

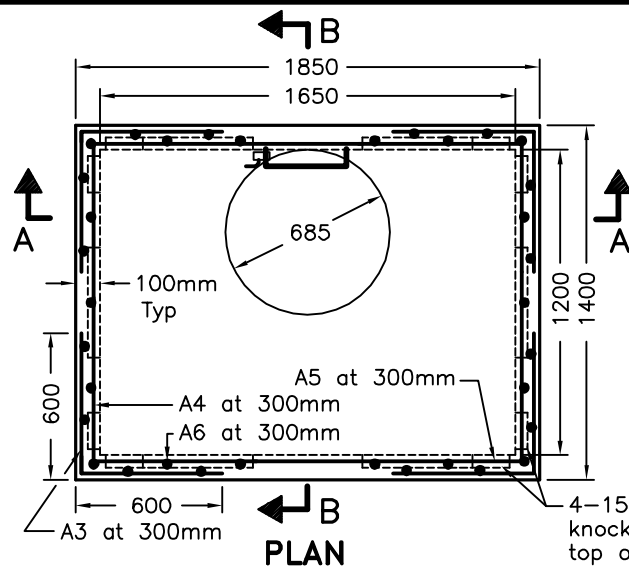
Nov 2015

Rev 1

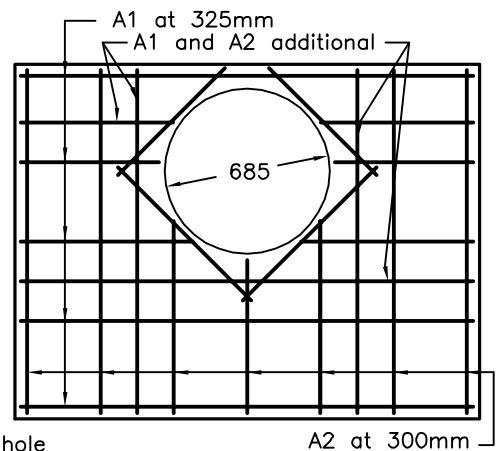
**ELECTRICAL MAINTENANCE HOLE
PRECAST CONCRETE
1200mm DIA**

OPSD 2111.030

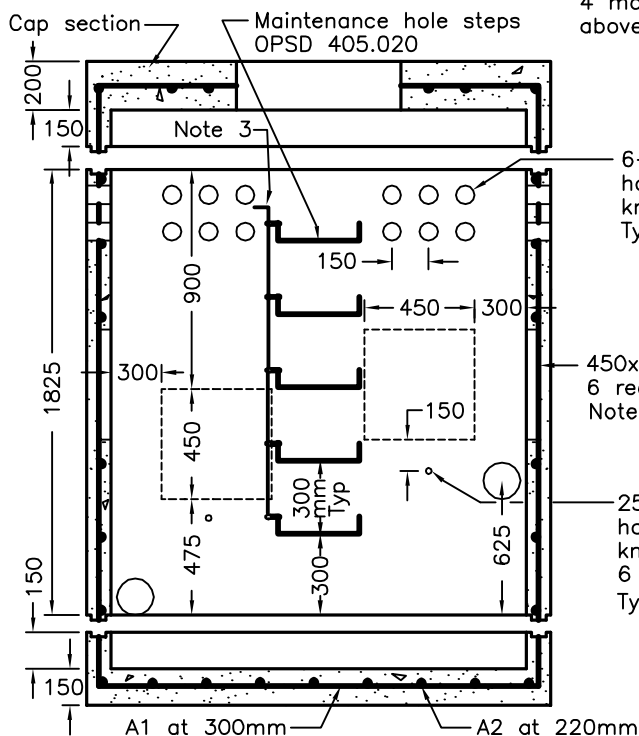




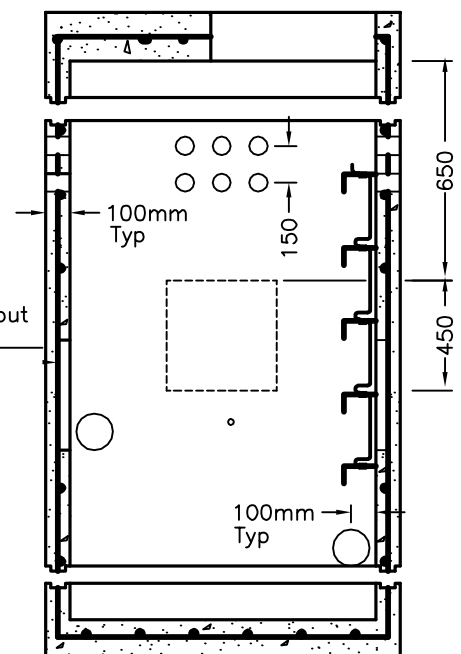
PLAN



**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	
A2	18	10	1.68	23.74	
A3	24	15	1.2	45.21	
A4	12	10	1.83	17.24	
A5	12	15	1.72	32.40	Straight
A6	34	10	1.77	47.24	Straight

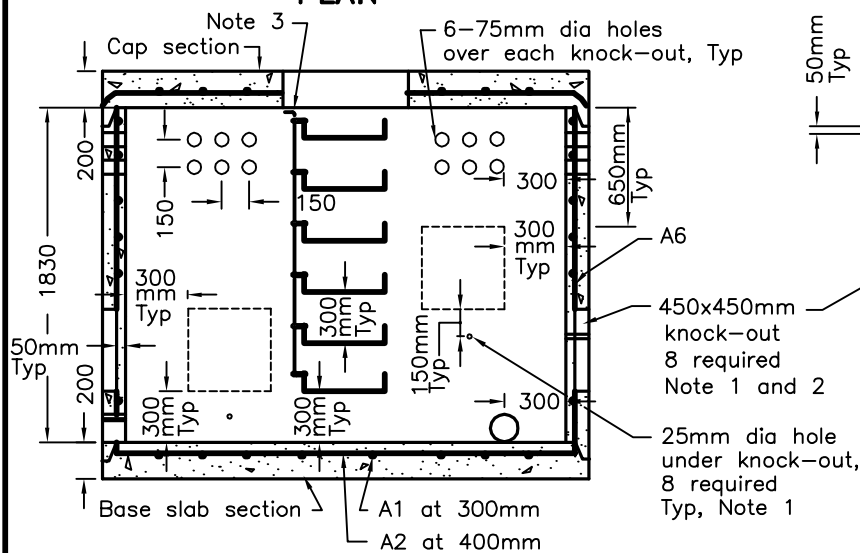
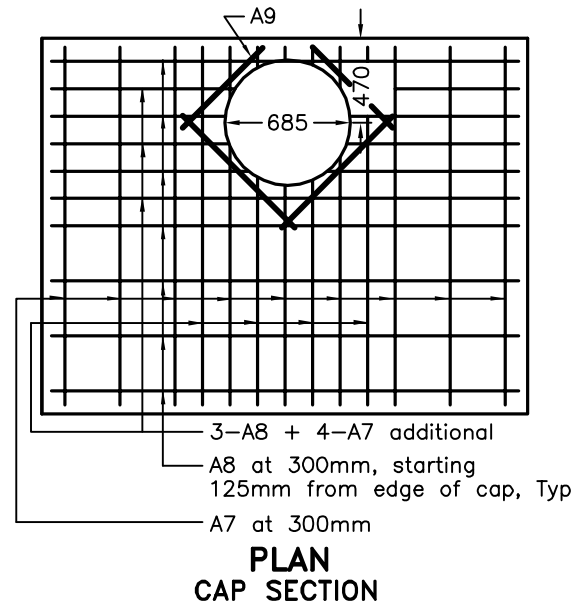
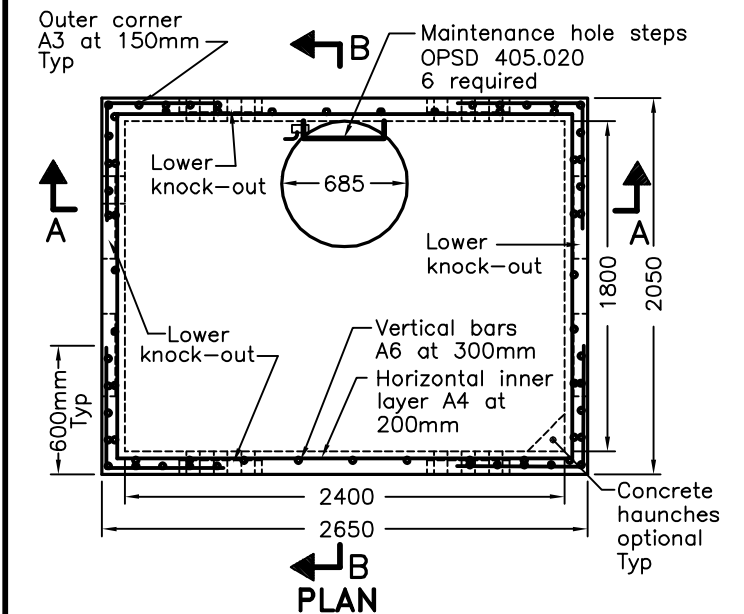
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 1

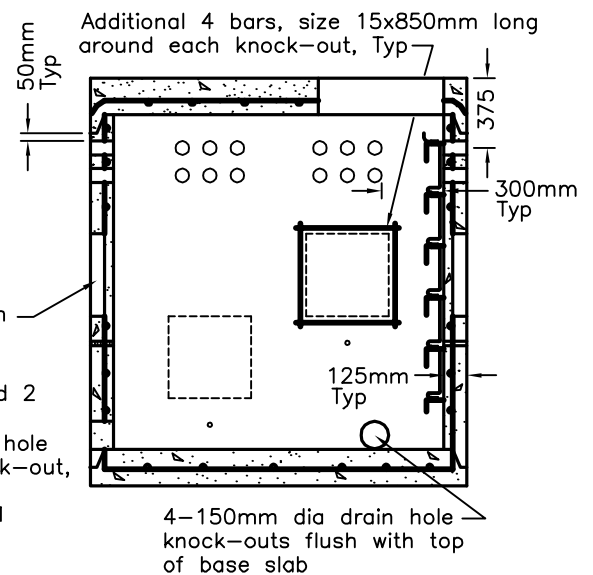
**ELECTRICAL MAINTENANCE HOLE
PRECAST CONCRETE
1200 x 1650mm**

OPSD 2111.040





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	10	15	2.48	38.62	Straight
A2	6	15	1.86	17.52	Straight
A3	52	15	1.2	17.97	
A4	20	20	2.45	115.4	Straight
A5	20	20	2.51	118.22	
A6	36	10	1.78	50.3	Straight
A7	13	15	2.82	57.55	
A8	10	15	2.22	34.85	
A9	4	15	1.0	6.28	Straight

ONTARIO PROVINCIAL STANDARD DRAWING

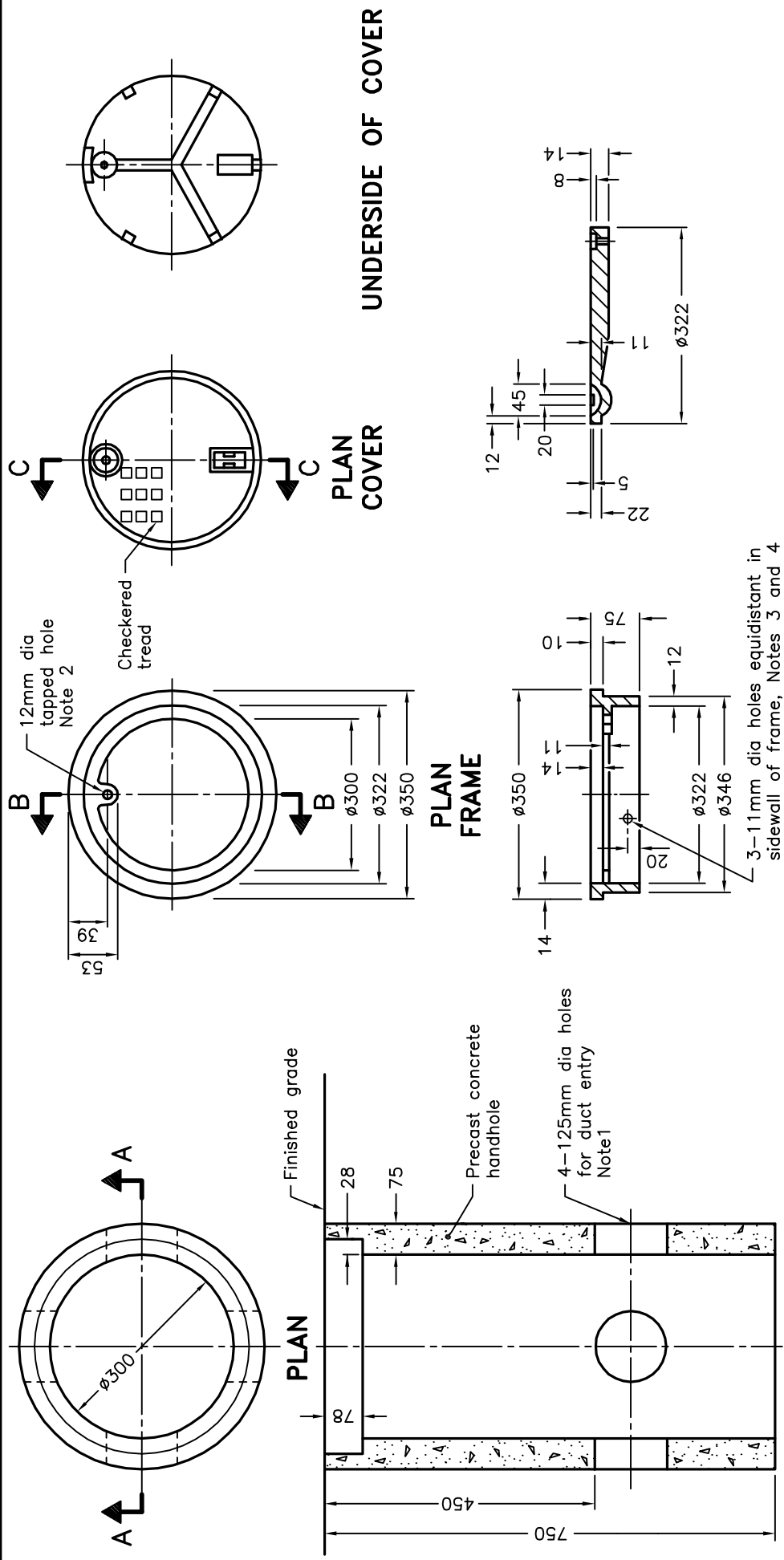
Nov 2015

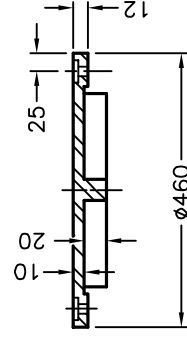
Rev 1

**ELECTRICAL MAINTENANCE HOLE
PRECAST CONCRETE
1800 x 2400mm**



OPSD 2111.050

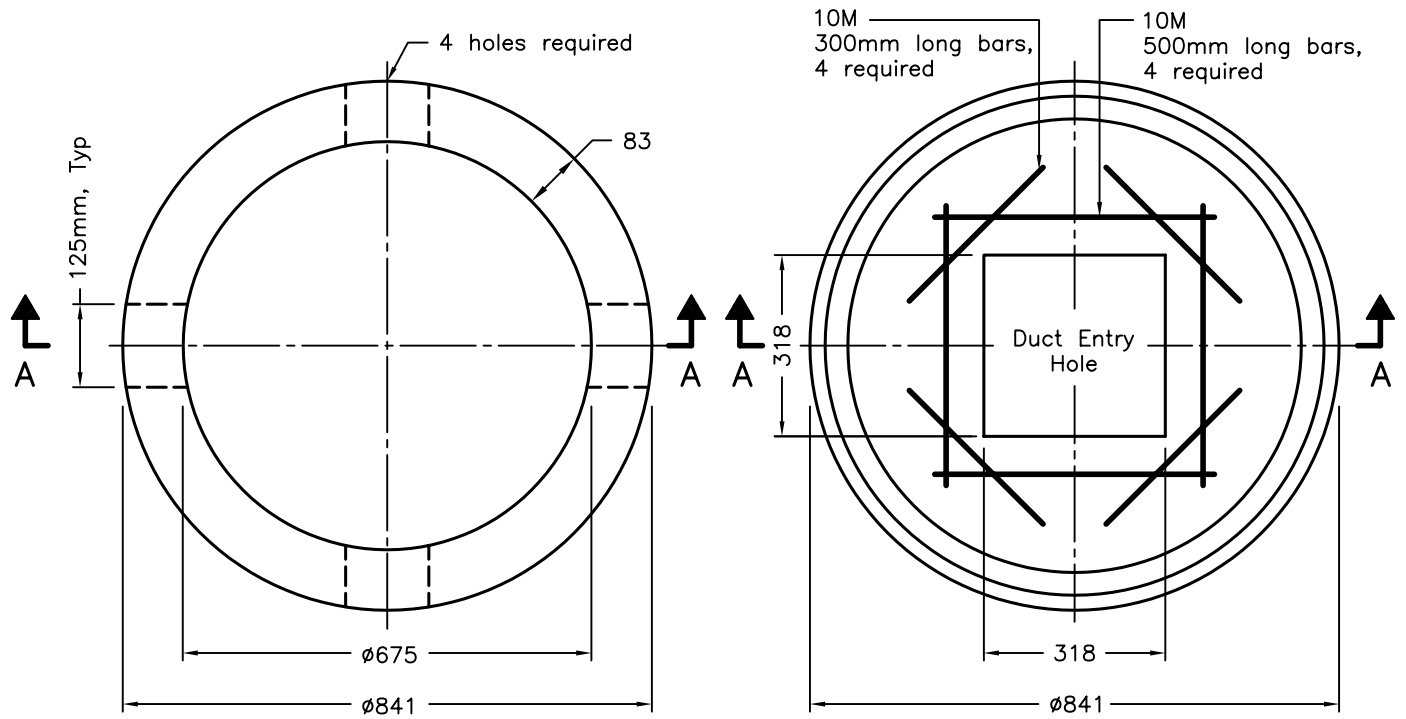




NOTES:

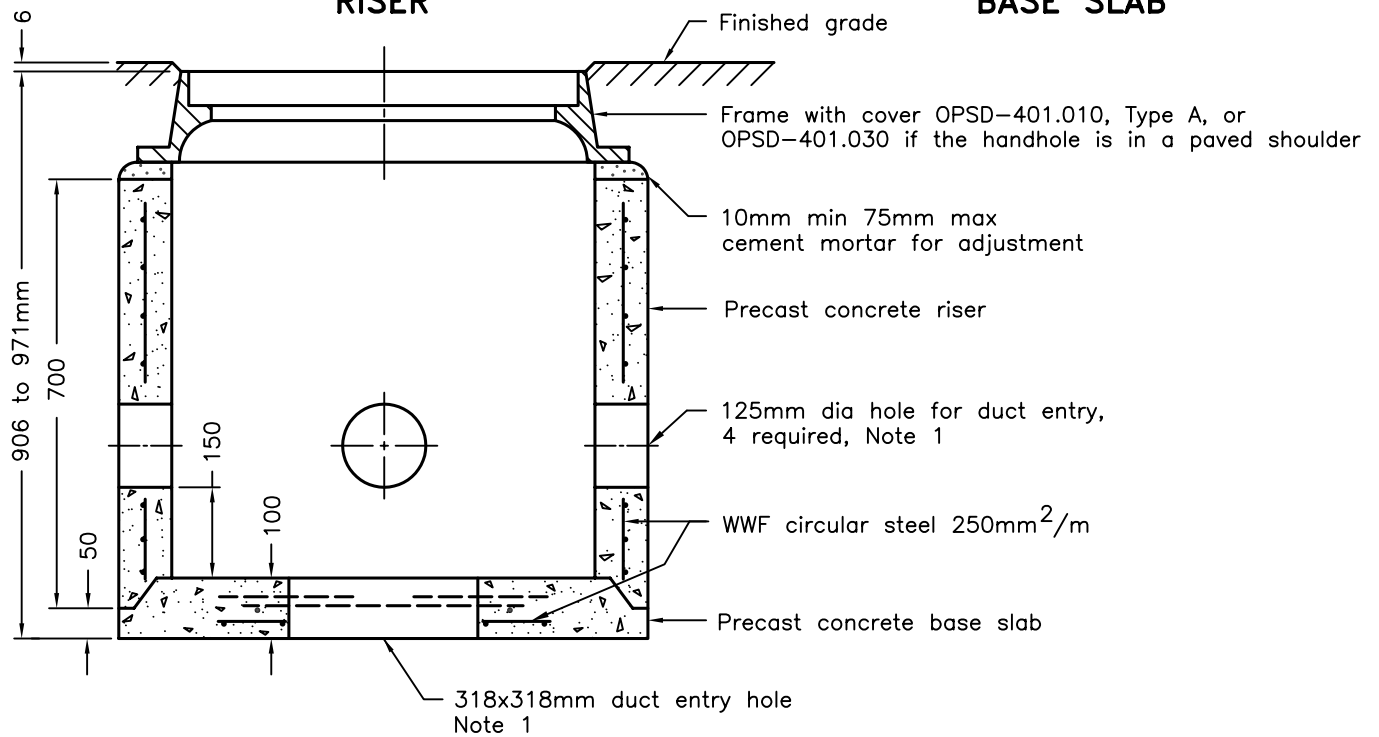
- ## SECTION A-A

OPSD 2112.02



**PLAN
RISER**

**PLAN
BASE SLAB**



SECTION A-A

NOTES:

- 1 For duct installation details see OPSD-2123.03.
- A For general installation details see OPSD-2117.02.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2004

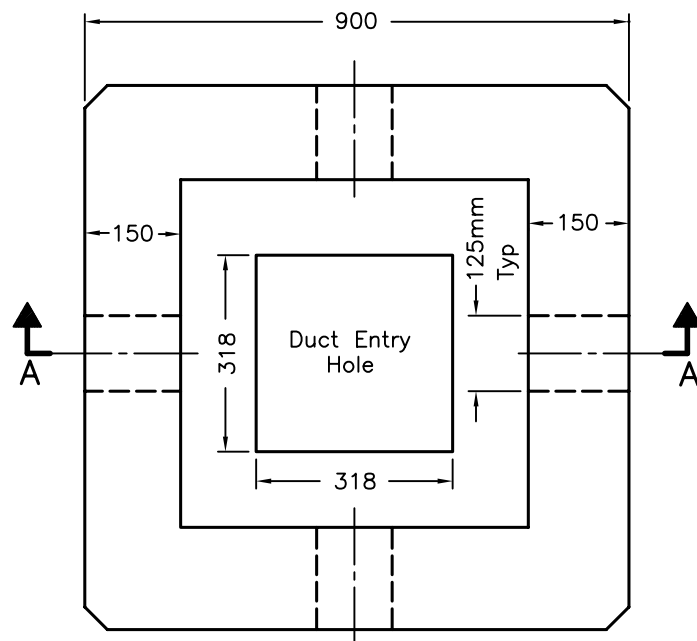
Rev 0

ELECTRICAL HANDHOLE

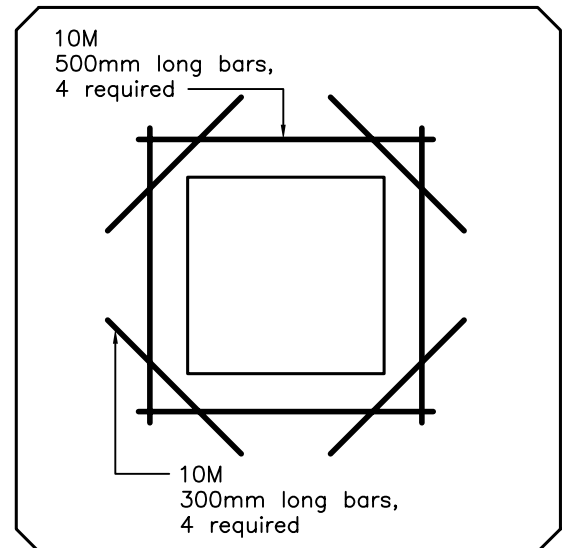
PRECAST CONCRETE – 675mm DIAMETER



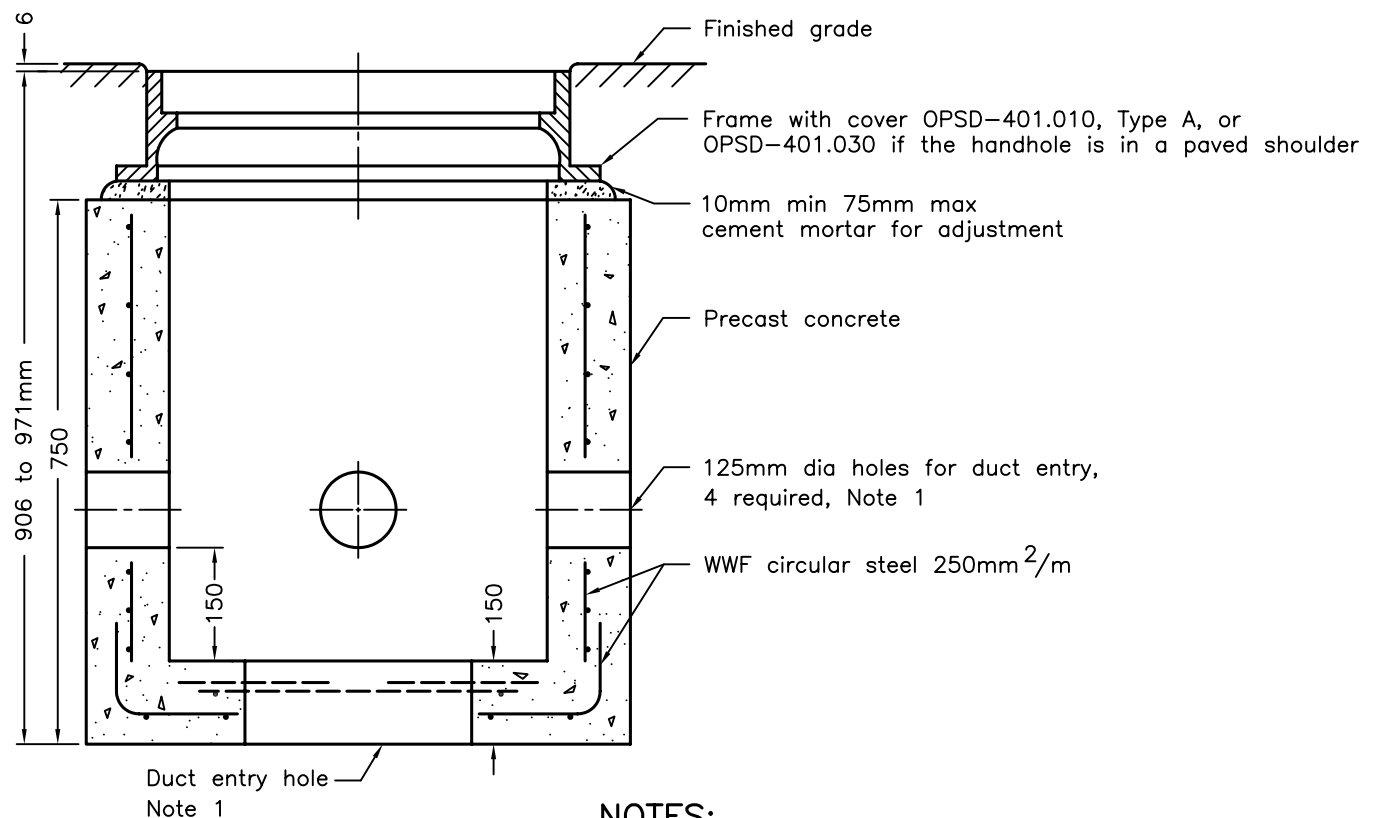
OPSD – 2112.030



PLAN



BOTTOM-DUCT ENTRY REINFORCING



SECTION A-A

NOTES:

- 1 For duct installation details see OPSD-2123.03.
- A For general installation details see OPSD-2117.02.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2004

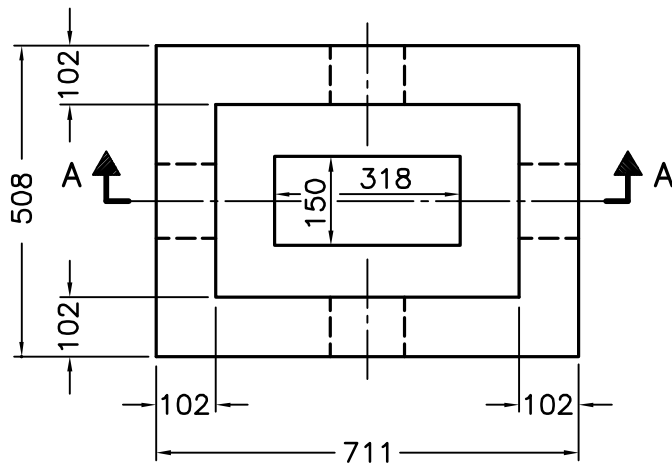
Rev 0

ELECTRICAL HANDHOLE

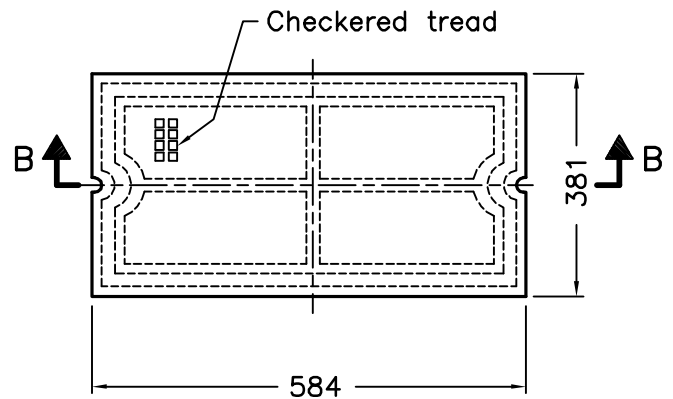
PRECAST CONCRETE - 600 x 600mm



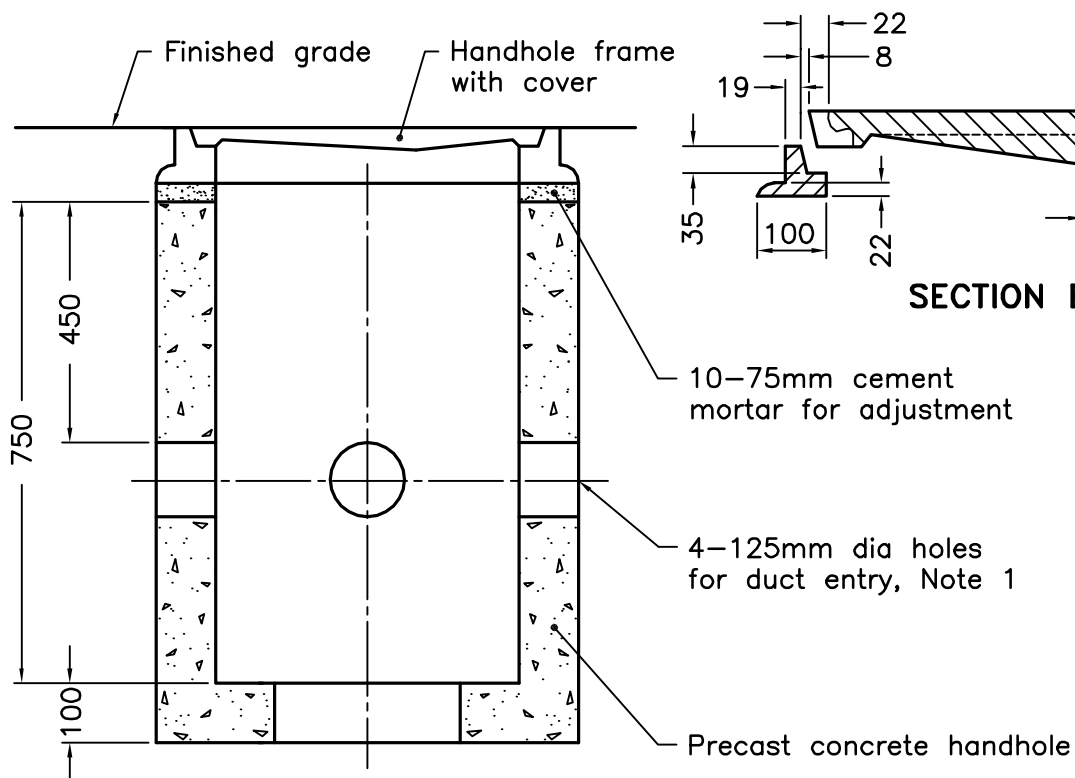
OPSD - 2112.040



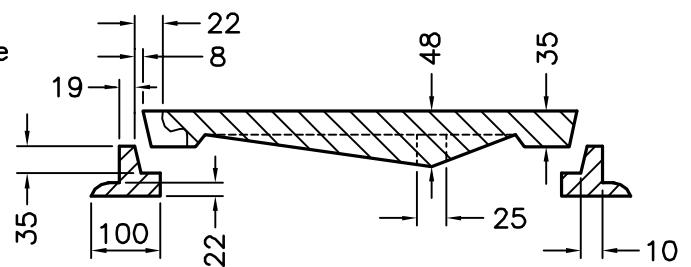
PLAN



**PLAN
COVER**



SECTION A-A



SECTION B-B

NOTES:

- 1 For installation of ducts see OPSD 2123.03.
- A For general installation details see OPSD 2117.02.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

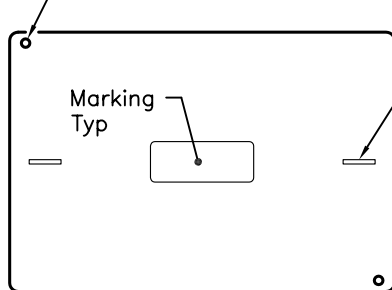
Nov 2009 | Rev | 1

**ELECTRICAL HANDHOLE
PRECAST CONCRETE WITH COVER
300 x 500mm**

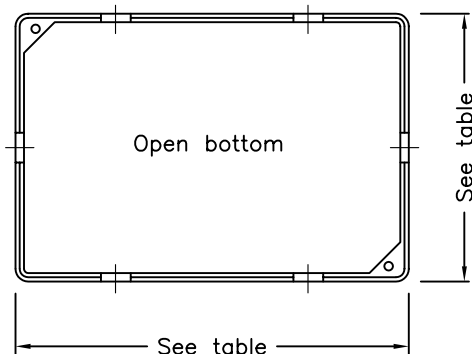


OPSD 2112.05

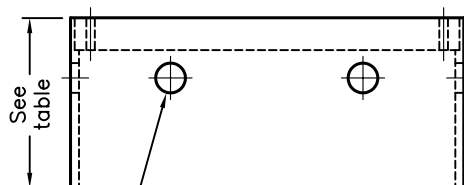
12mm dia recessed hole
Typ



COVER VIEW



PLAN VIEW

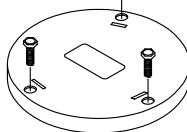


Optional 125mm dia
knockout for duct entry
Typ, Note 1

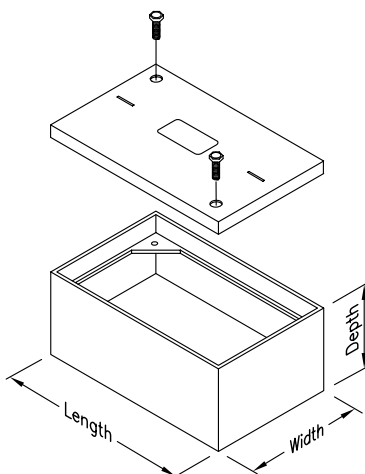
FRONT VIEW

Pull slot, Typ

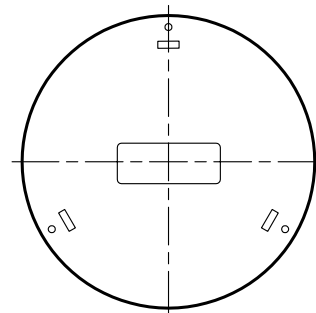
10mm (3/8") dia-16NC
stainless steel hex
head bolt with washer
Typ



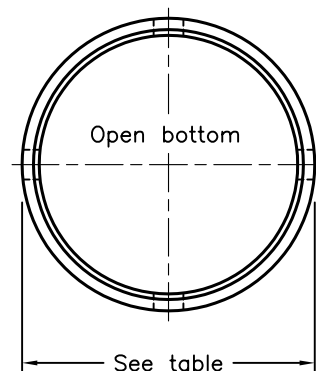
RECTANGULAR HANDHOLE



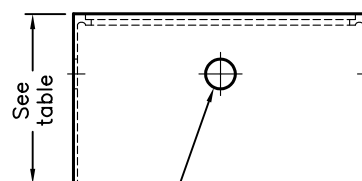
RECTANGULAR HANDHOLE



COVER VIEW



PLAN VIEW



Optional 125mm dia
knockout for duct entry
Typ, Note 1

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-2123.03.

A For general installation details see OPSD-2117.02.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

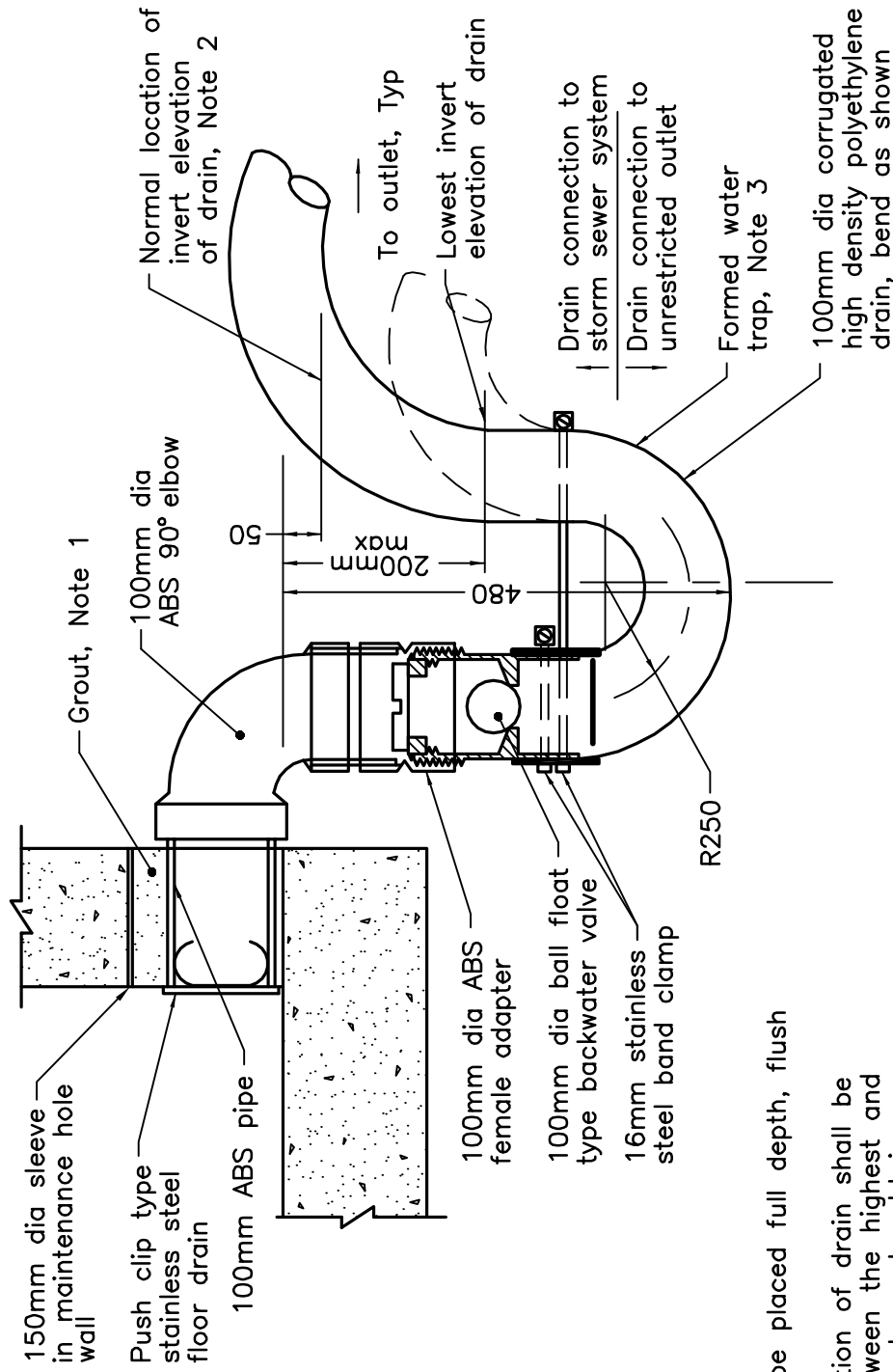
Nov 2004

Rev 0

**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.

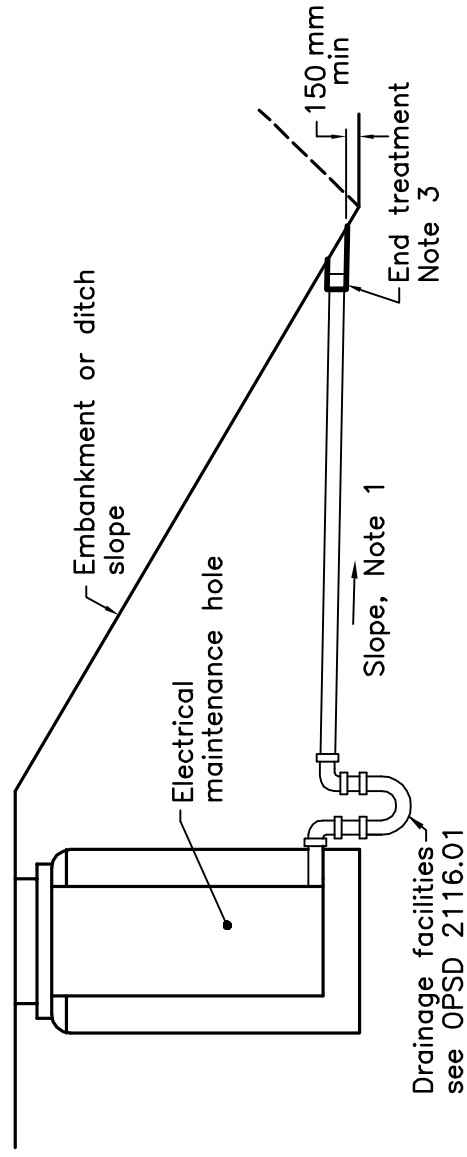
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 Rev 1

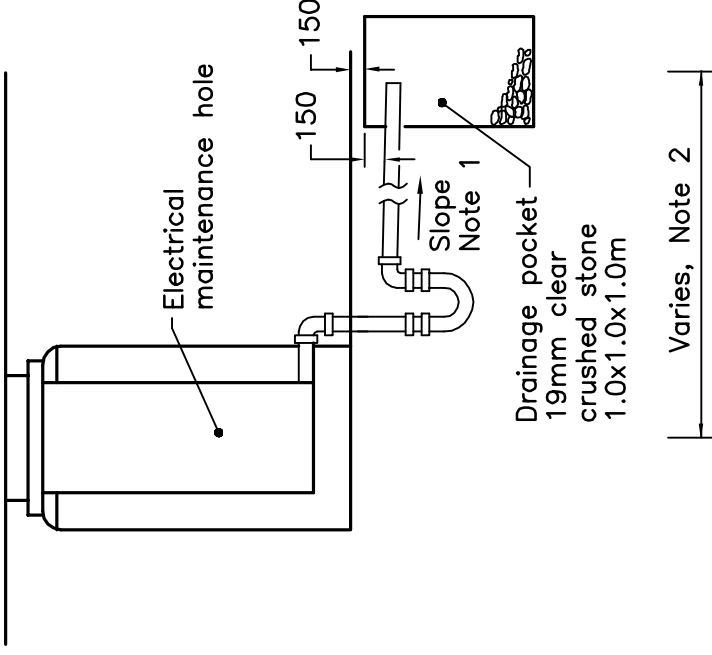


DRAINAGE FACILITIES
FOR ELECTRICAL
MAINTENANCE HOLES

OPSD 2116.01



DRAIN TO EMBANKMENT SLOPE OR DITCH OUTLET



Varies, Note 2

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

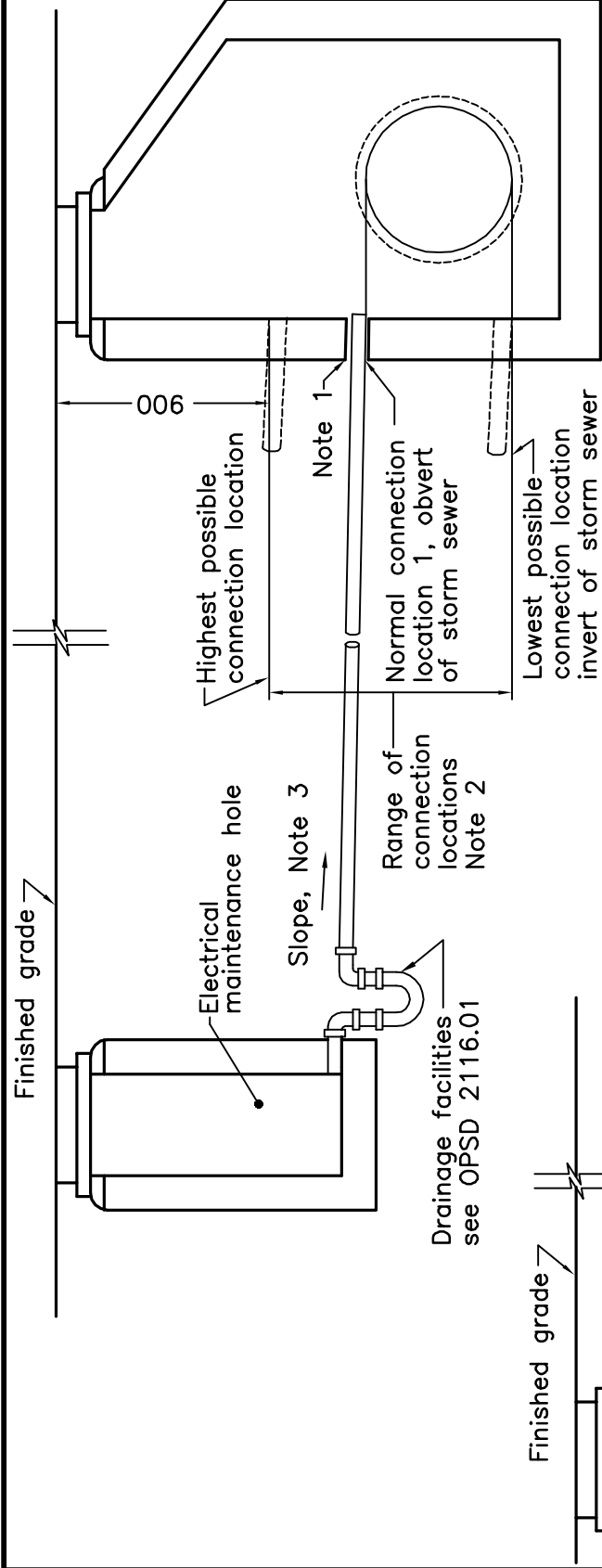
Nov 2013 Rev 1



ELECTRICAL MAINTENANCE HOLE
DRAINS TO DRAINAGE POCKETS,
EMBANKMENT OUTLETS, AND DITCHES

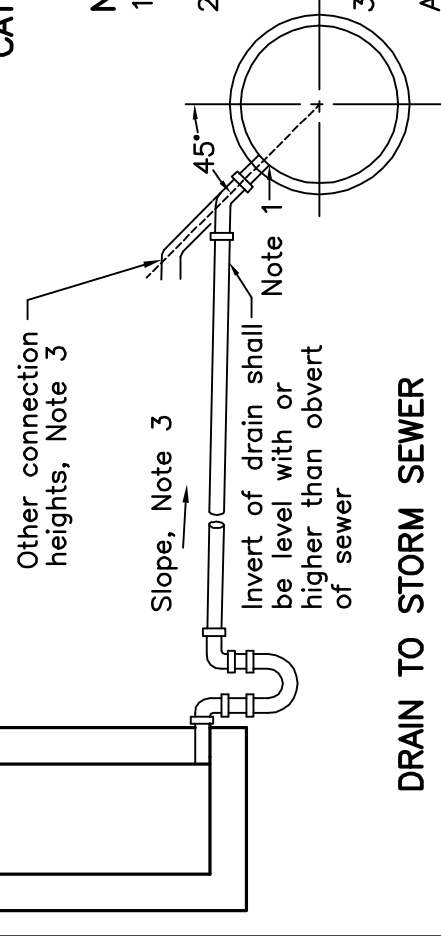
OPSD 2116.02

Finished grade 7



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

Other connection heights, Note 3



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 OPD 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.

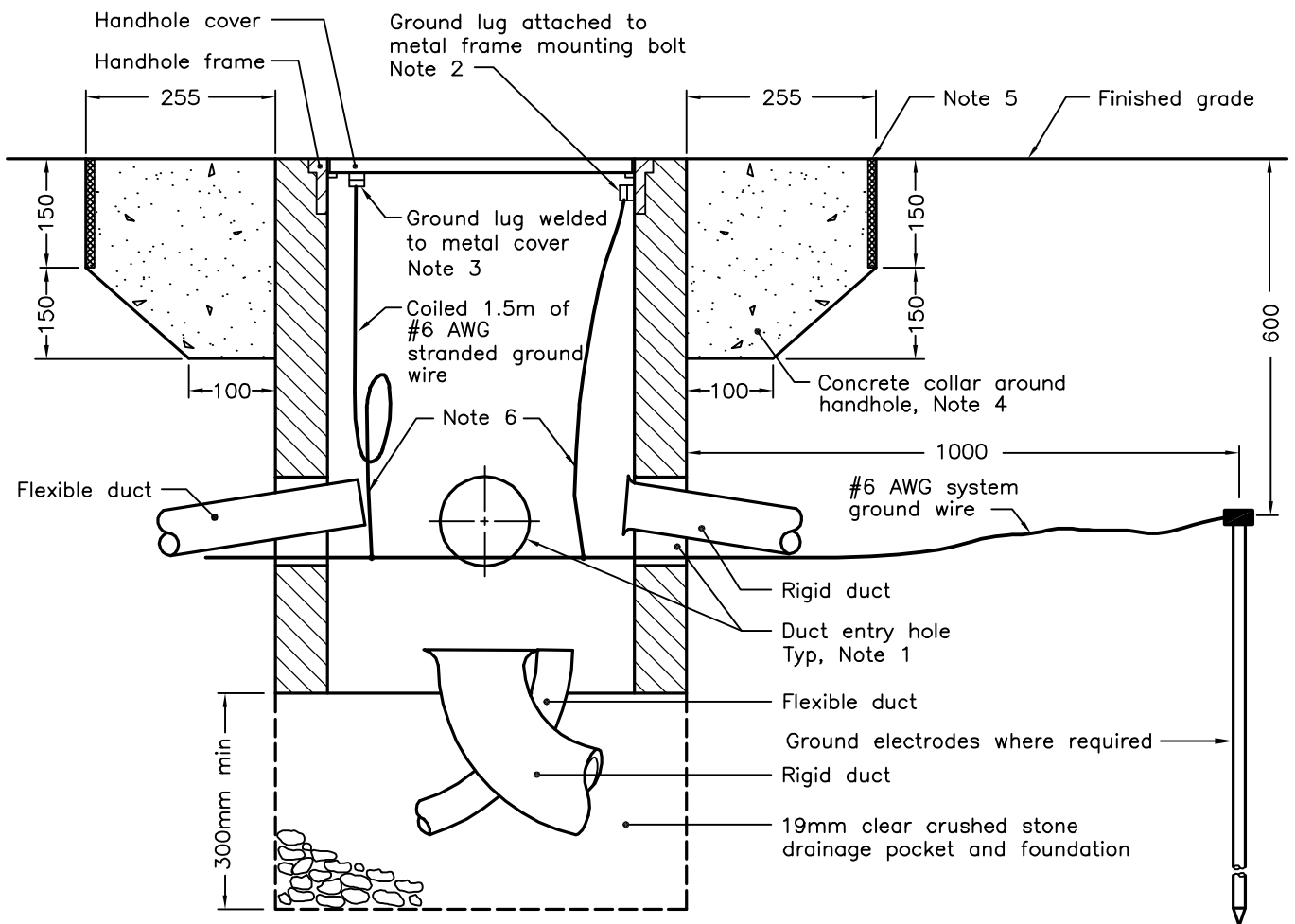
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 Rev 1

ELECTRICAL MAINTENANCE HOLE
DRAINS TO
STORM SEWER SYSTEMS



OPSD 2116.03



NOTES:

- 1 For duct entry details see OPSD 2123.03.
 - 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, the ground wire shall be attached to the handhole cover using a ground lug suitable for #6 AWG copper wire.
 - 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 extra low voltage cables with metal frames and covers, grounding and bonding is not required.
- A For specific handhole details see OPSD 2112.01, 2112.02, 2112.030, 2112.040 2112.05, and 2113.010.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

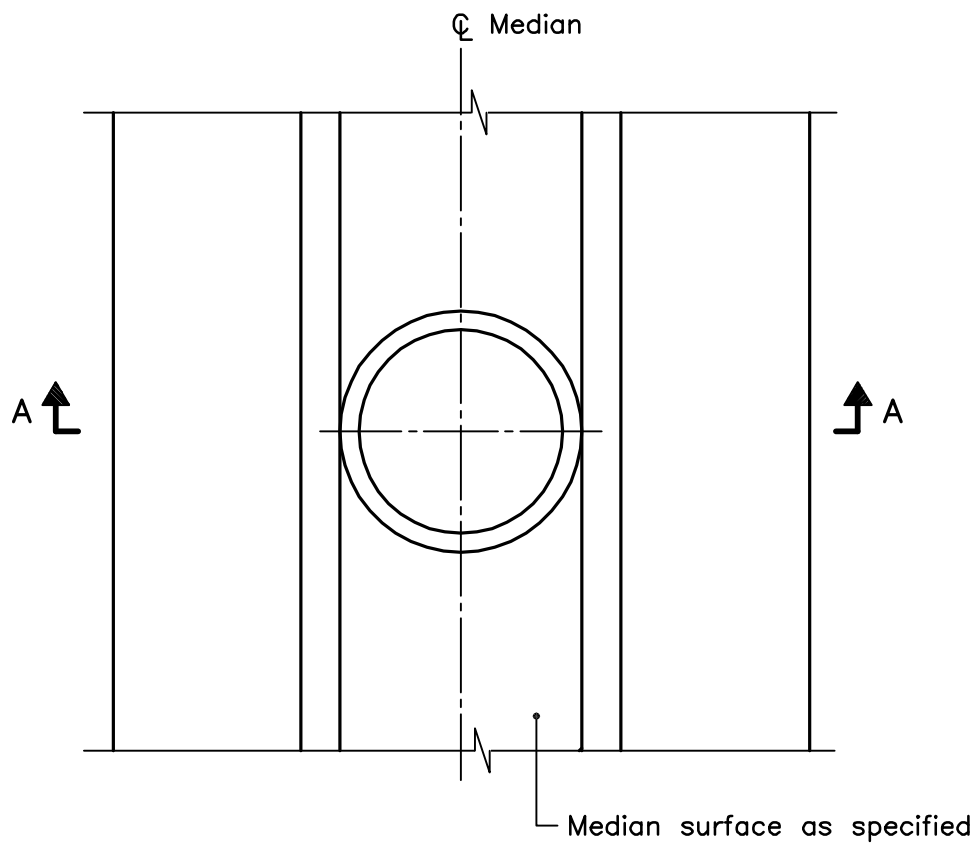
Nov 2013 | Rev | 3

ELECTRICAL HANDHOLES

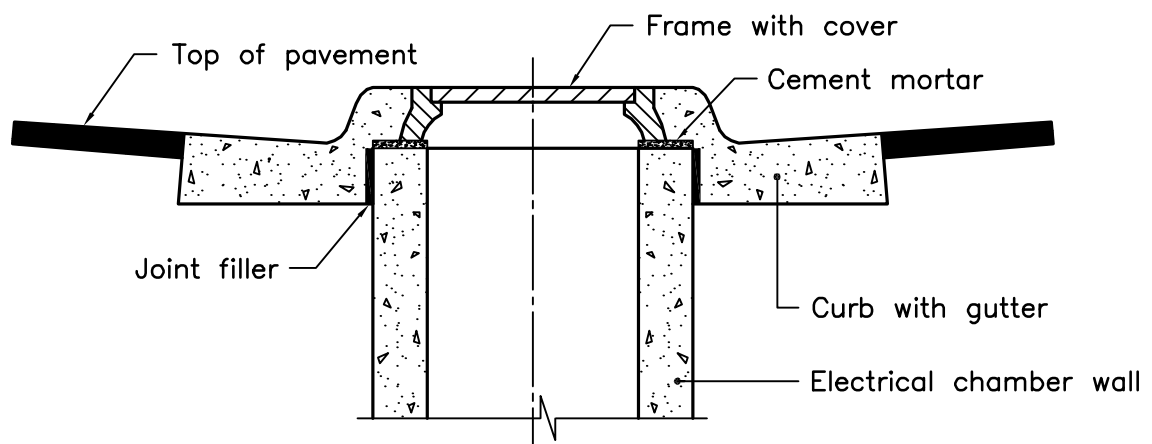
GENERAL INSTALLATION REQUIREMENTS



OPSD 2117.02



PLAN



SECTION A-A

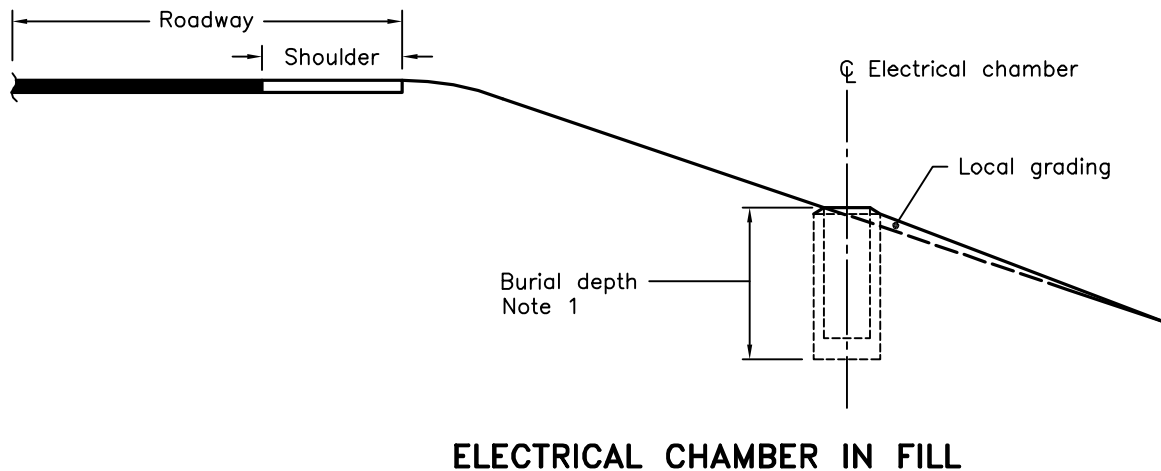
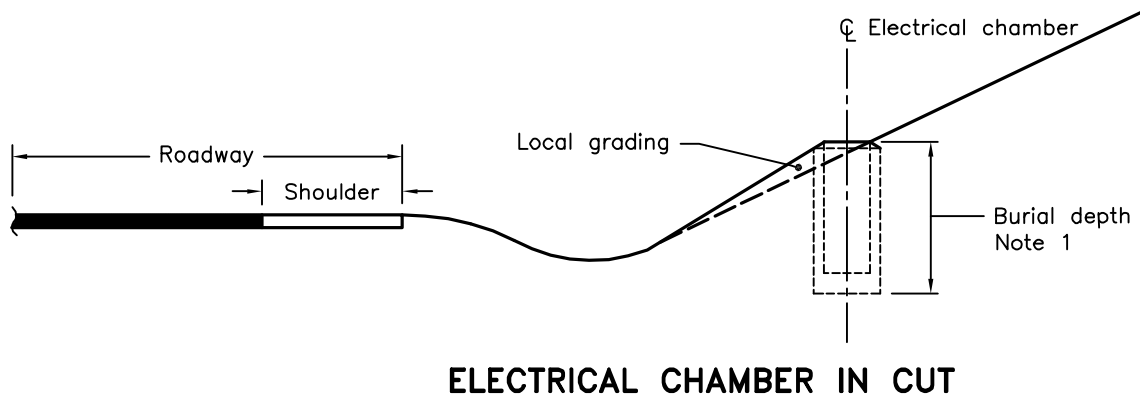
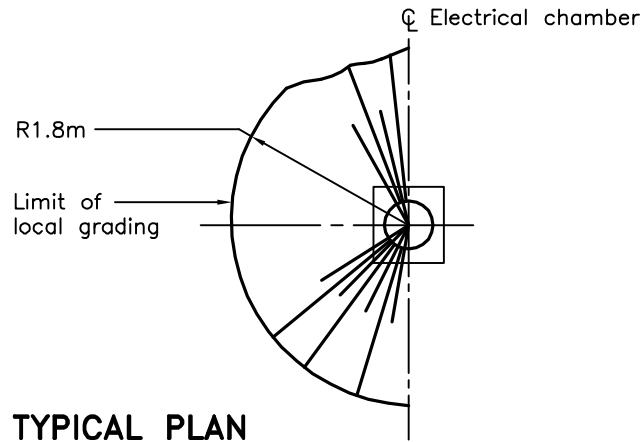
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2009 Rev 0

ELECTRICAL CHAMBER
INSTALLATION IN MEDIAN



OPSD 2118.010



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

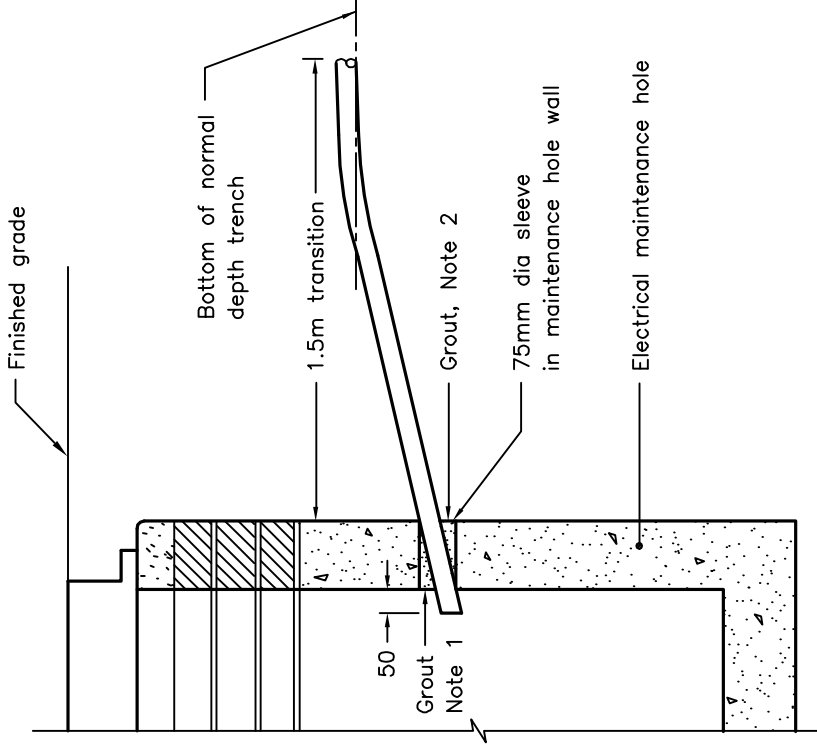
Nov 2009

Rev 0

**ELECTRICAL CHAMBER
INSTALLATION IN SLOPE**



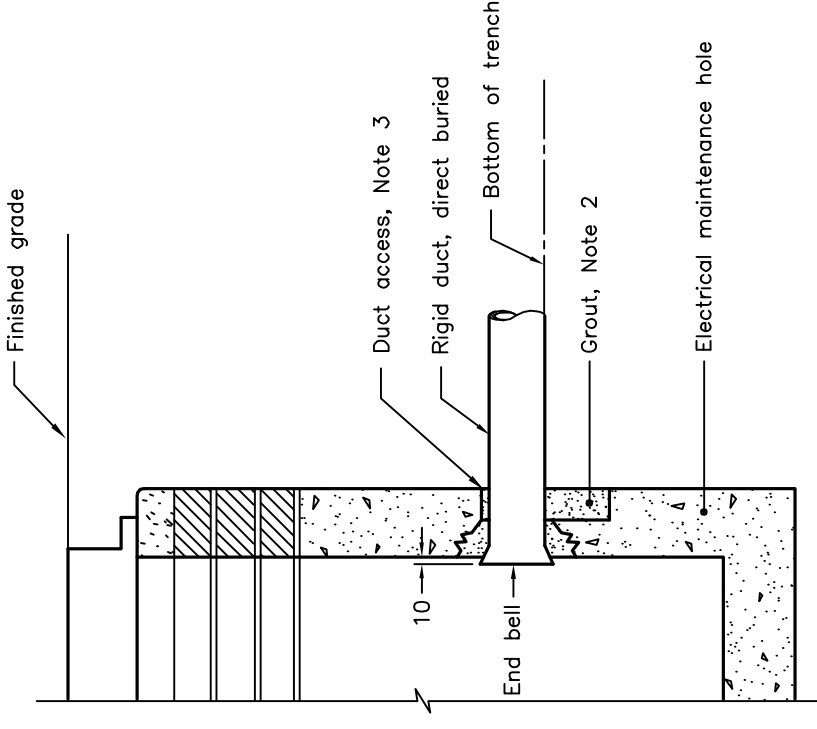
OPSD 2118.020



FLEXIBLE DUCTS, DIRECT BURIED

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.



**RIGID DUCTS, DIRECT BURIED
OR BY SUB-SURFACE INSTALLATION**

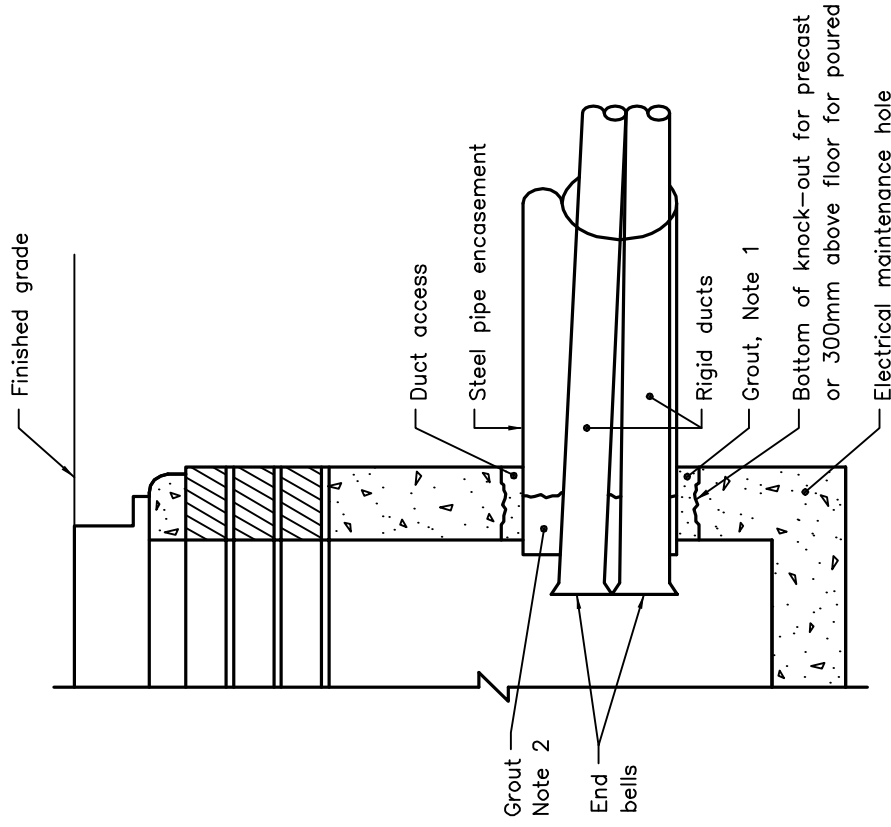
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 Rev 1



**ELECTRICAL MAINTENANCE HOLES
ENTRY OF DIRECT BURIED DUCTS**

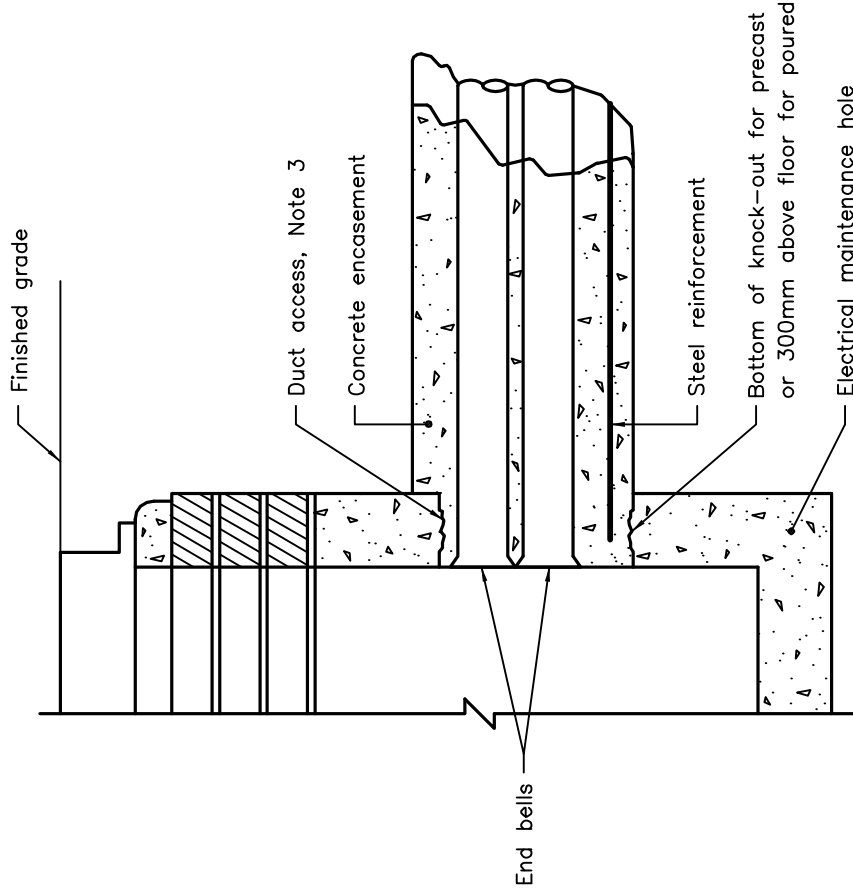
OPSD 2123.01



RIGID DUCTS, STEEL 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.



RIGID DUCTS, CONCRETE ENCASED

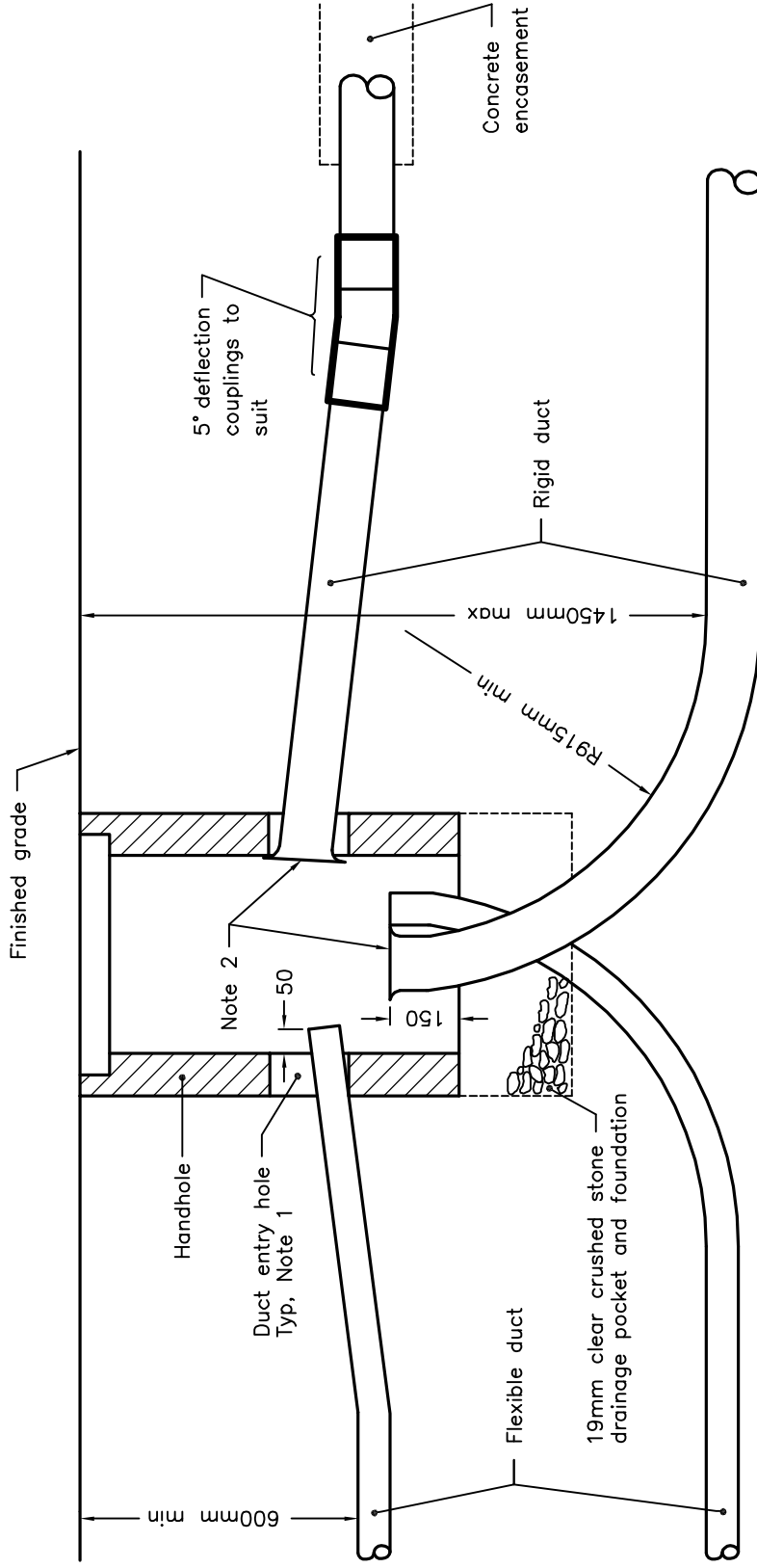
ONTARIO PROVINCIAL STANDARD DRAWING

**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 2117.02.

B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

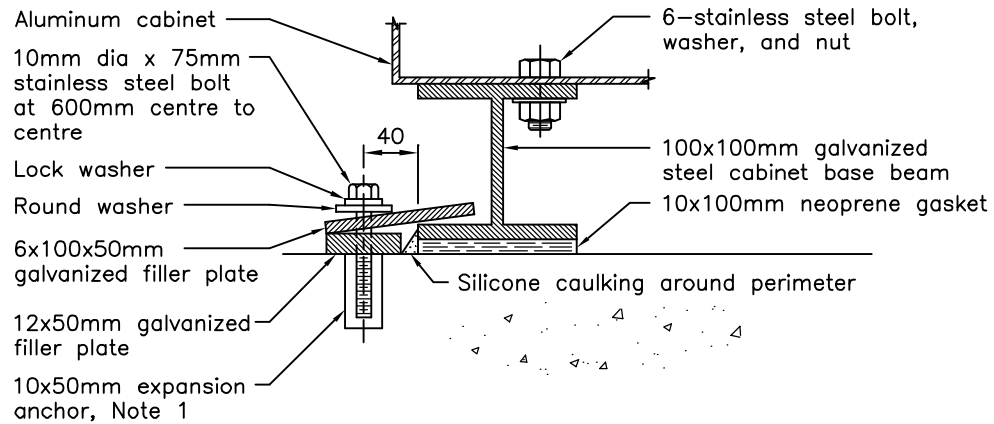
Nov 2013 Rev 2



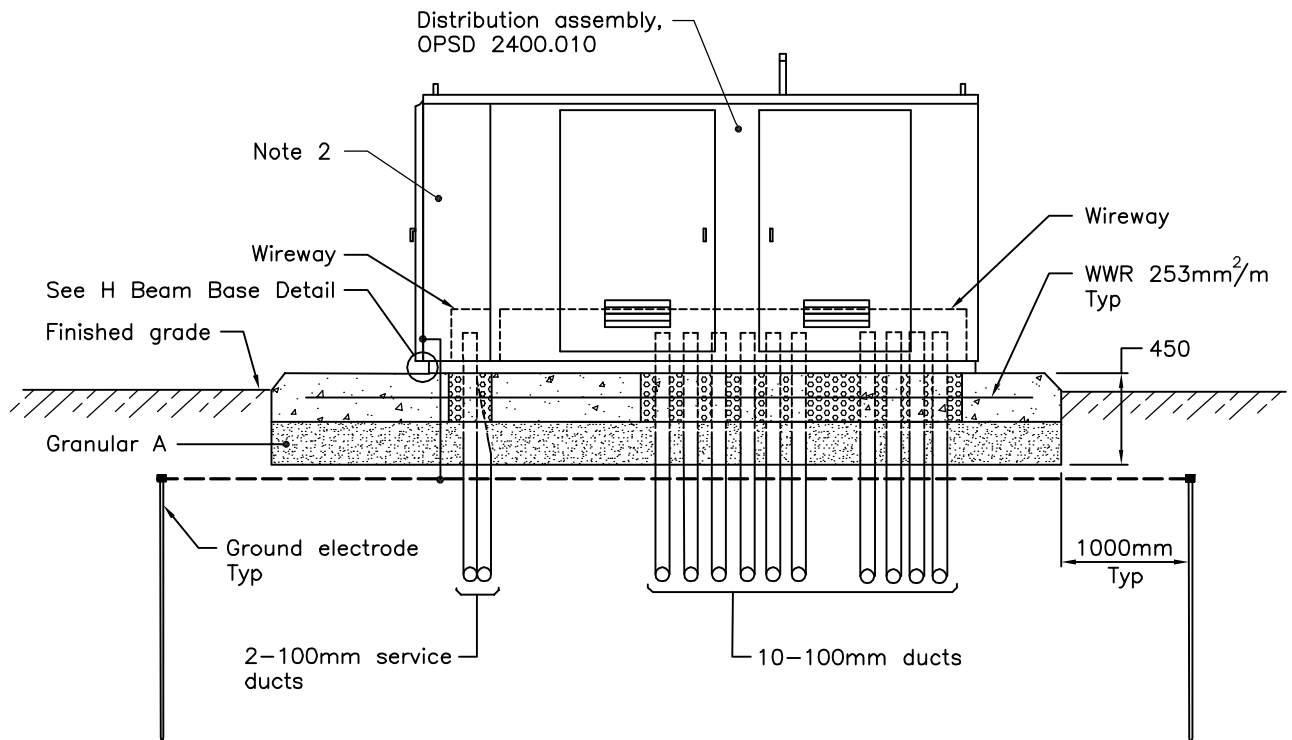
ELECTRICAL HANDHOLES

ENTRY OF DIRECT BURIED AND ENCASED DUCTS

OPSD 2123.03



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 2010

Rev 2

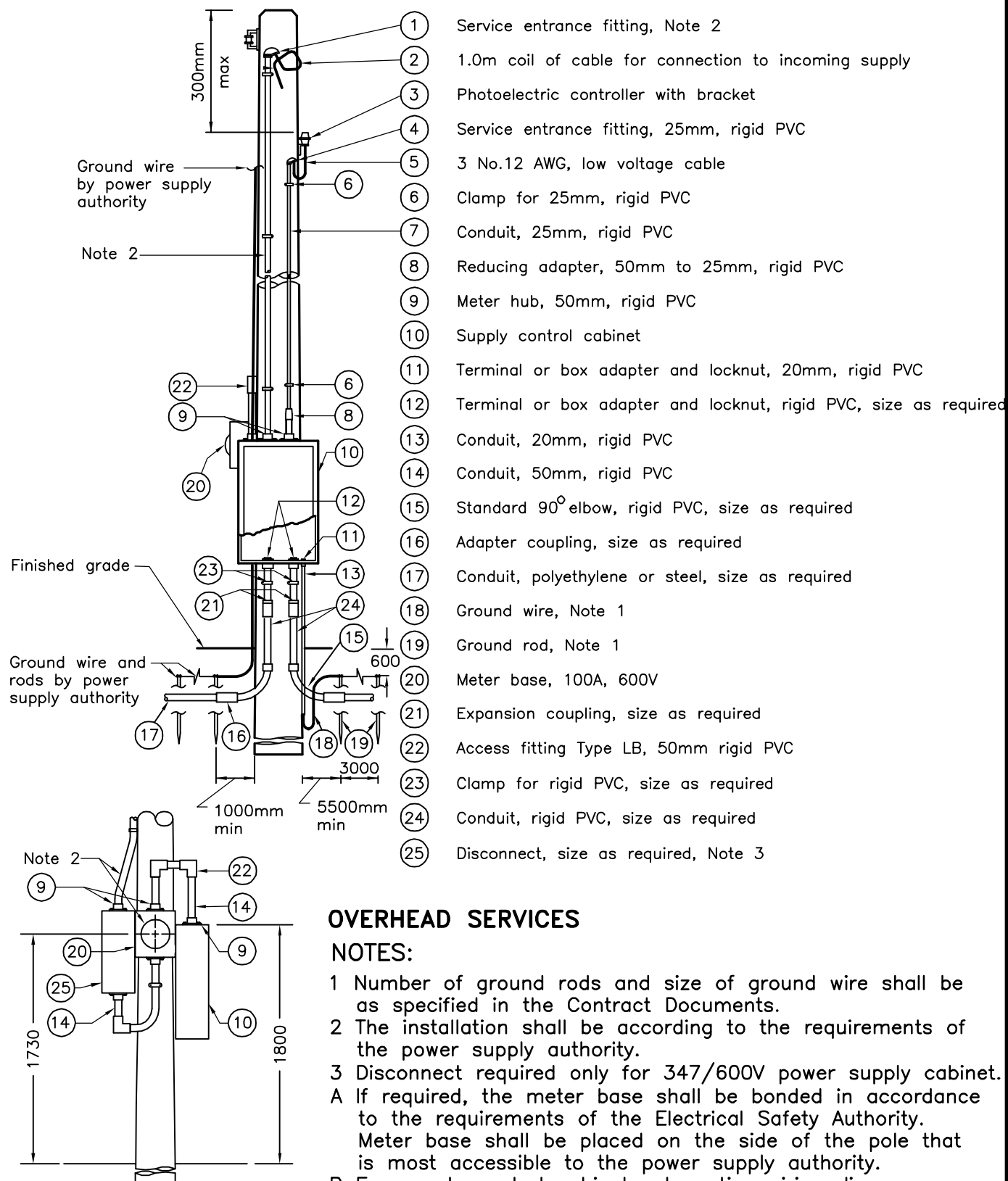
DISTRIBUTION ASSEMBLY

CONCRETE PAD AND DUCTS

SECTION B-B

OPSD 2126.020





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.

DETAIL OF METER BASE

ONTARIO PROVINCIAL STANDARD DRAWING

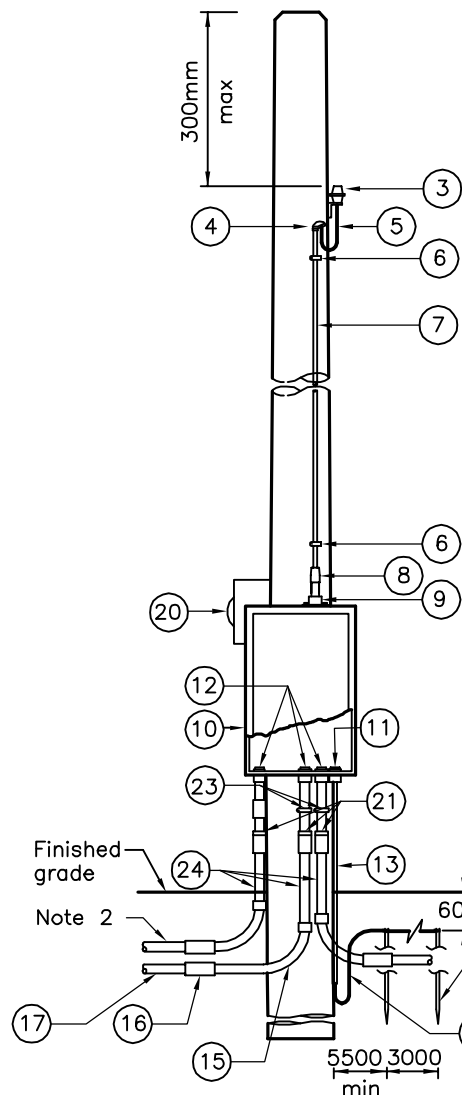
Nov 2016

Rev 1

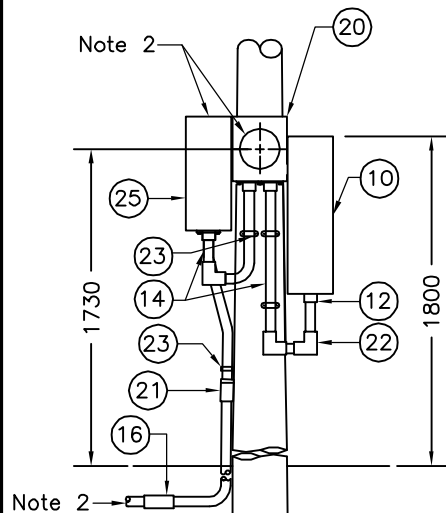
SUPPLY CONTROL CABINET INSTALLATION
OVERHEAD SERVICES
TOP ENTRY METERING

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 OPSP 2440.010 and 2440.020.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

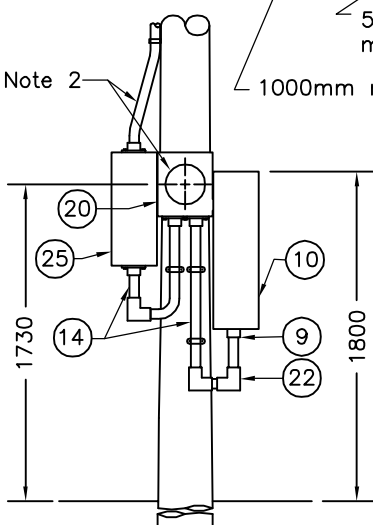
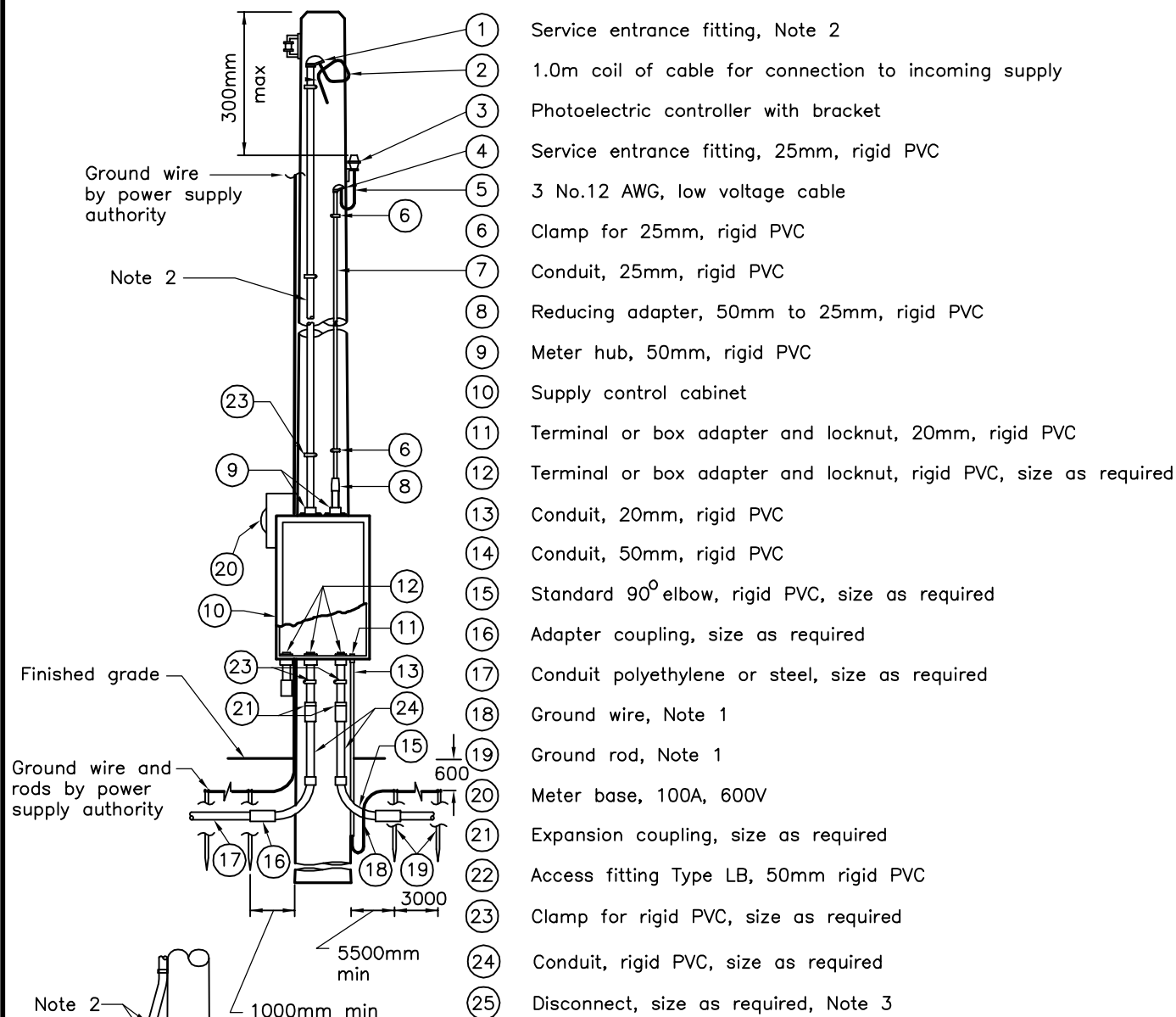
Nov 2016

Rev 1

**SUPPLY CONTROL CABINET INSTALLATION
UNDERGROUND SERVICES
BOTTOM ENTRY METERING**

OPSD 2130.011





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

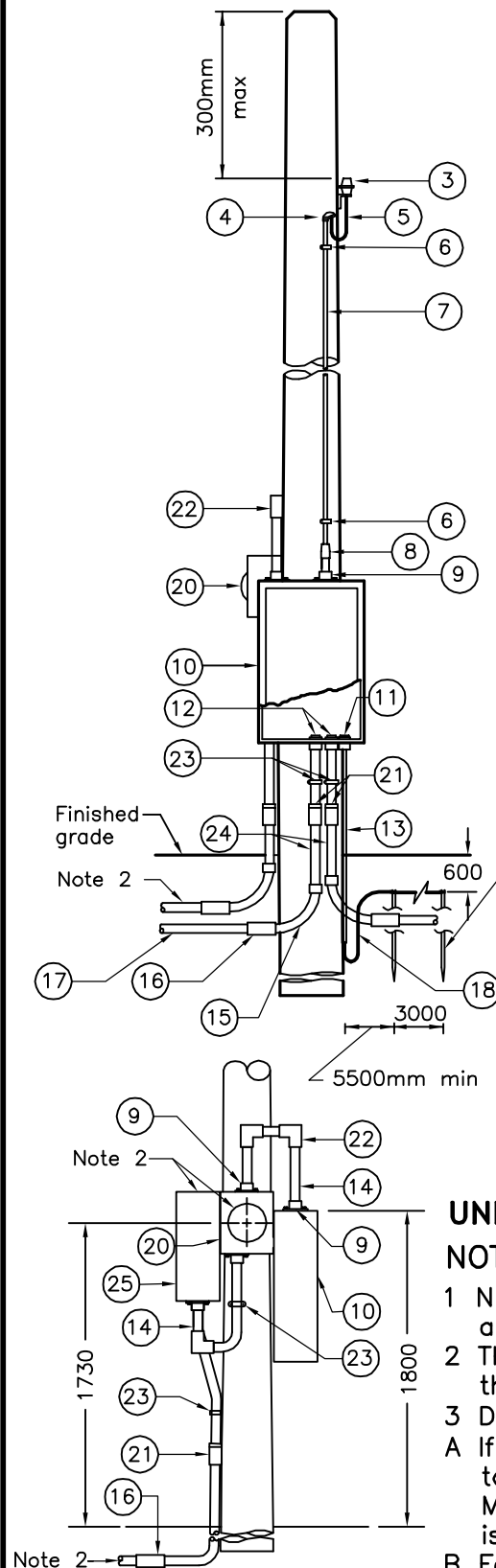
Nov 2016

Rev 1

SUPPLY CONTROL CABINET INSTALLATION
OVERHEAD SERVICES
BOTTOM ENTRY METERING



OPSD 2130.012



- 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:

- 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.

DETAIL OF METER BASE

ONTARIO PROVINCIAL STANDARD DRAWING

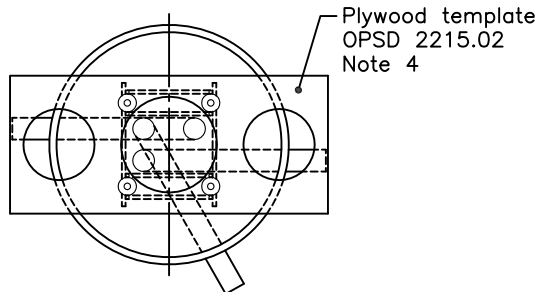
Nov 2016

Rev 0

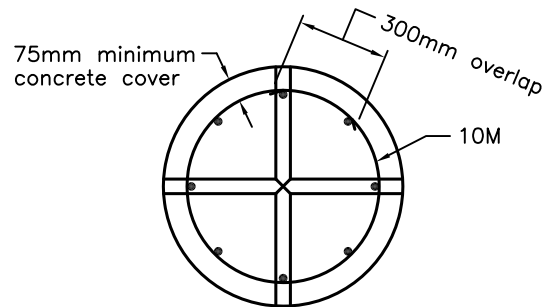
SUPPLY CONTROL CABINET INSTALLATION
UNDERGROUND SERVICES
TOP ENTRY METERING

OPSD 2130.013

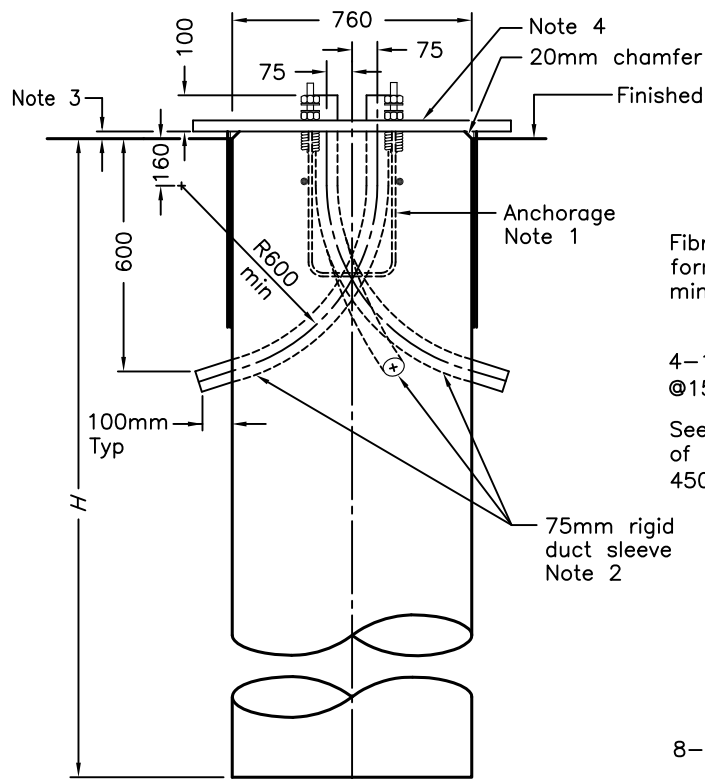




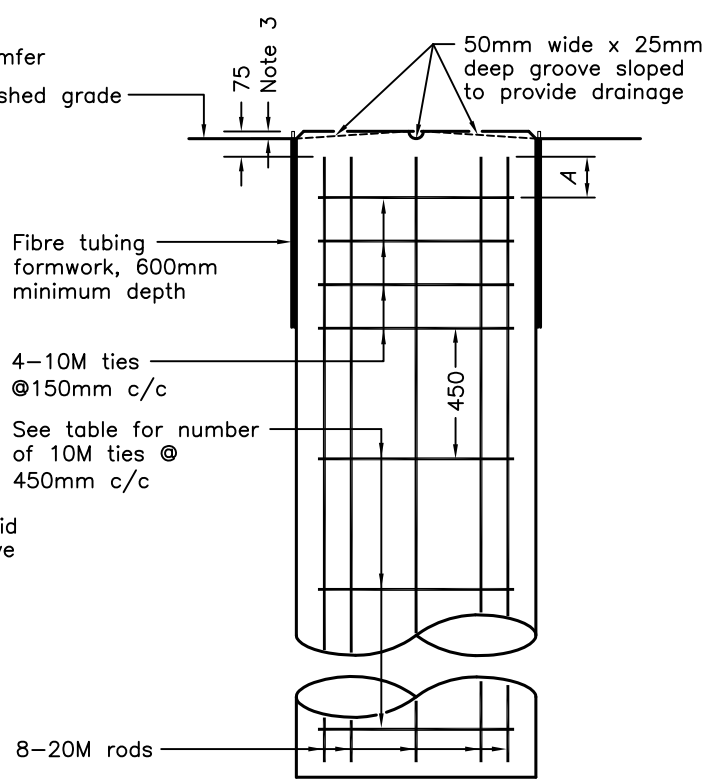
PLAN



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 $\pm$ 15mm above finished grade in paved or concrete areas and 75mm $\pm$ 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

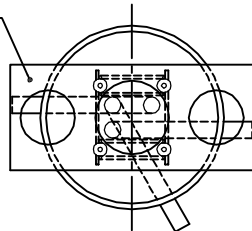
Rev 2

CONCRETE FOOTING
FOR BASE MOUNTED
LIGHTING AND SIGNAL POLES

OPSD 2200.01

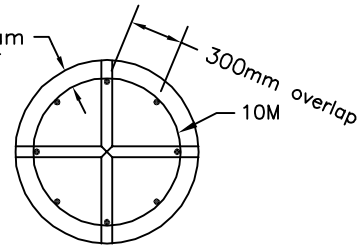


Plywood template
See OPSD 2215.02

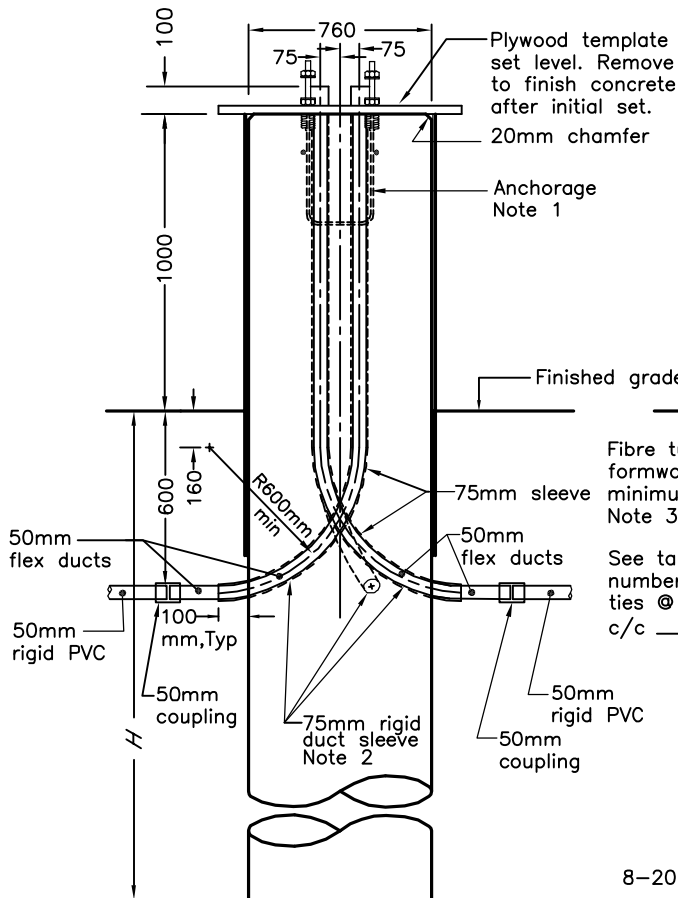


PLAN

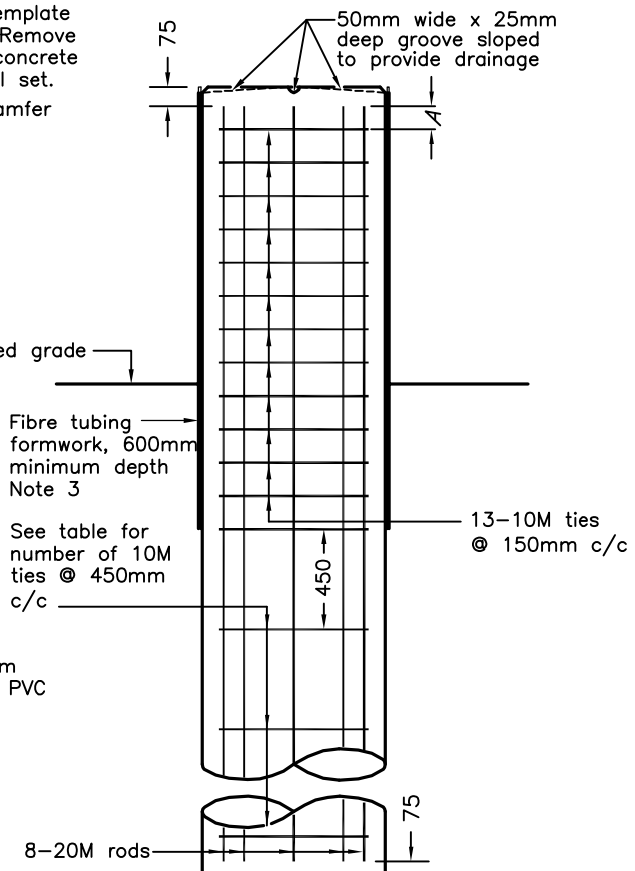
75mm minimum
concrete cover



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 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.

POLE LENGTH m	BURIAL DEPTH H m	ROD LENGTH m	A mm	NO. OF 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

ONTARIO PROVINCIAL STANDARD DRAWING

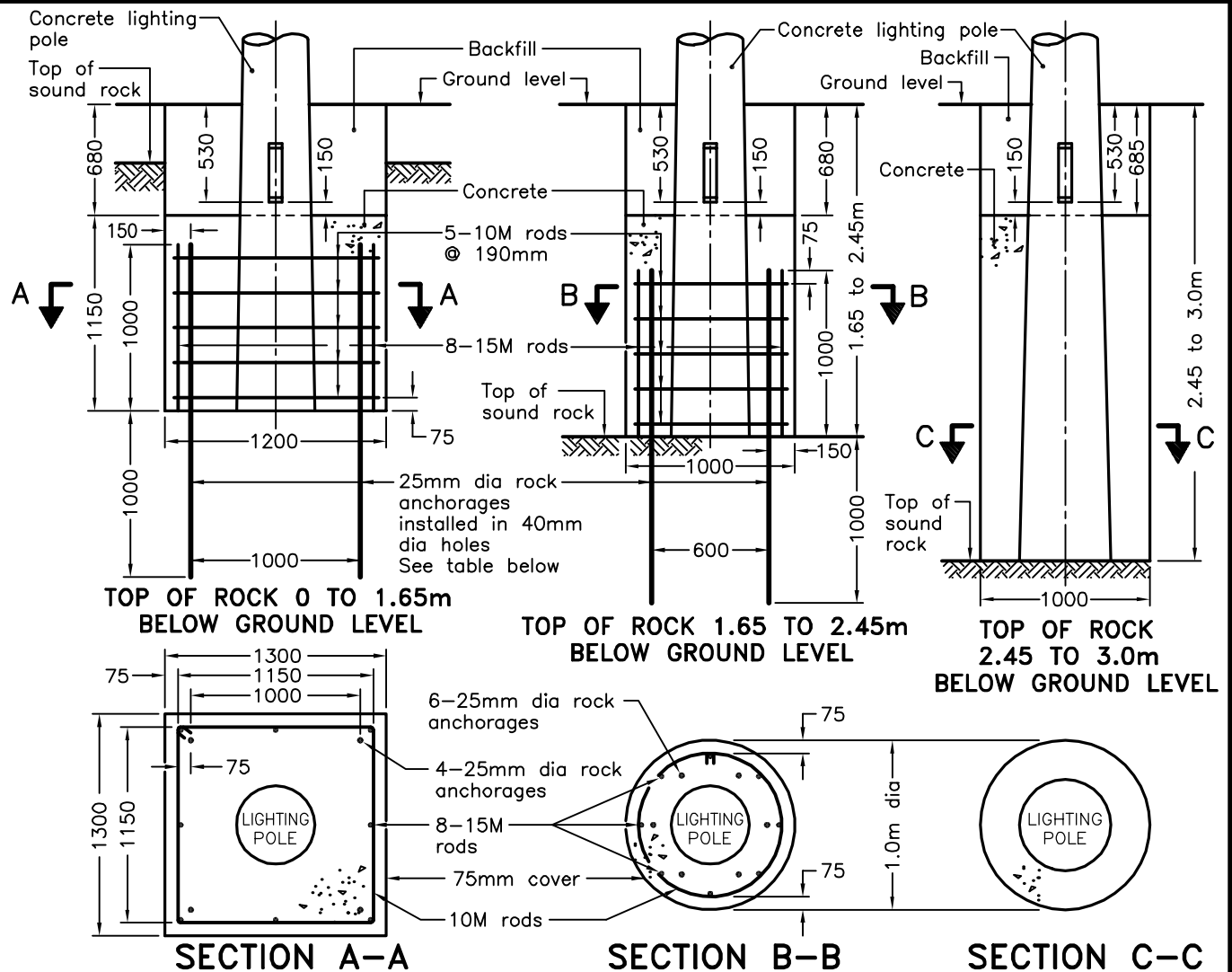
Nov 2010

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) *

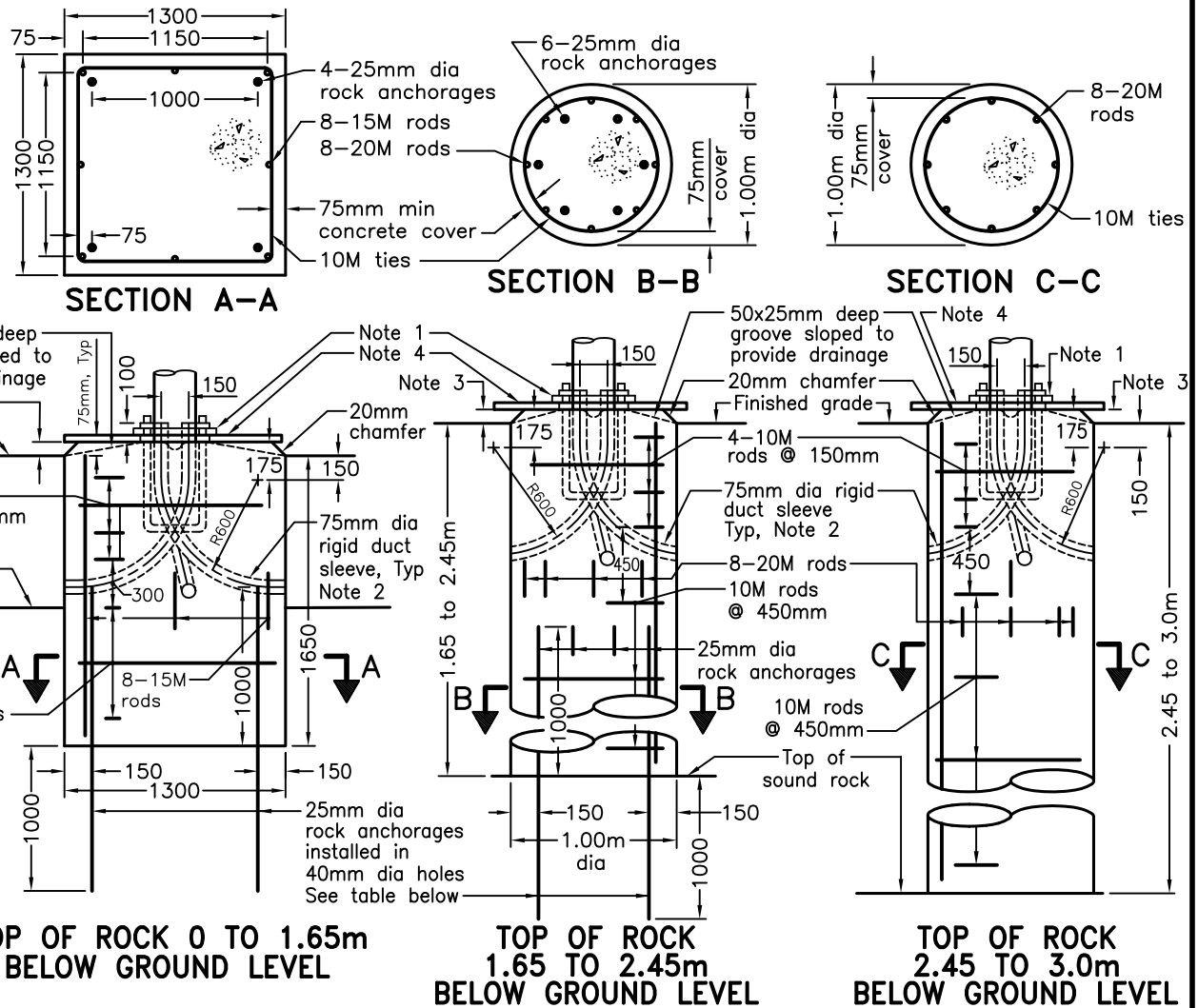
* Rock anchorages and steel reinforcing not required.

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

NOTE:

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



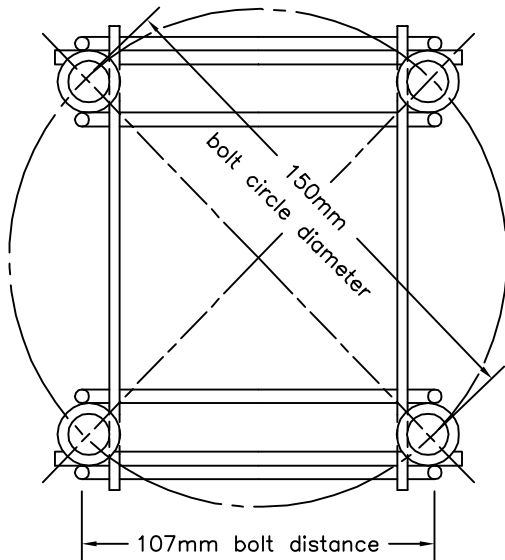
FOOTINGS FOR BASE MOUNTED POLES WHERE ROCK IS ENCOUNTERED											
POLE LENGTH m	NORMAL BURIAL DEPTH IN EARTH m	BELOW GROUND DEPTH TO TOP OF ROCK, m									
		0.0	0.30	0.60	0.90	1.20	1.50	1.80	2.10	2.40	2.70
		DEPTH OF ROCK EXCAVATION REQUIRED, m									
7.0	2.15	1.65*	1.35*	1.05*	0.75*	0.45*	0.15*	* Rock anchorages not required			
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		

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 $\pm$ 15mm above finished grade in paved or concrete areas and 75mm $\pm$ 25mm above finished grade in earth or granular areas.
- 4 Plywood template set level. Remove to finish concrete after initial set.

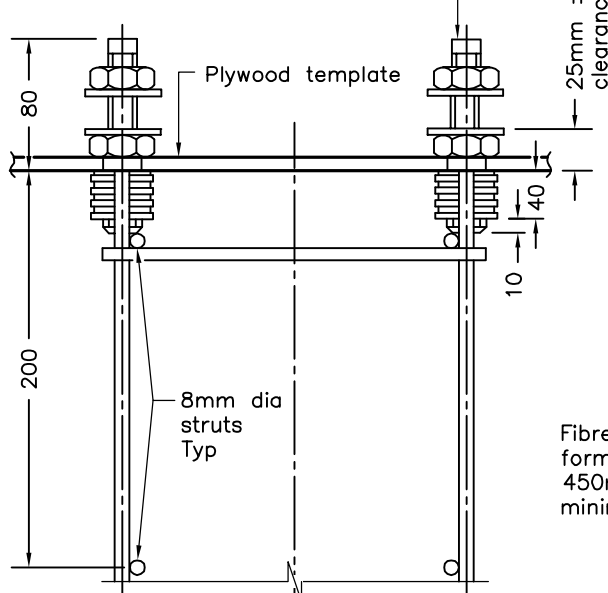
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2012	Rev	2	
CONCRETE FOUNDATION FOR BASE MOUNTED LIGHTING POLES WHERE ROCK IS ENCOUNTERED					
		OPSD 2200.03			

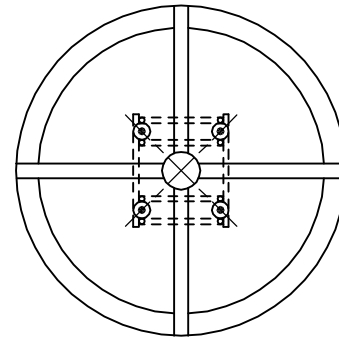


PLAN

16mm dia x 130mm long square head stud C/W circular flat washers and hexagon nuts, Typ, Note 2



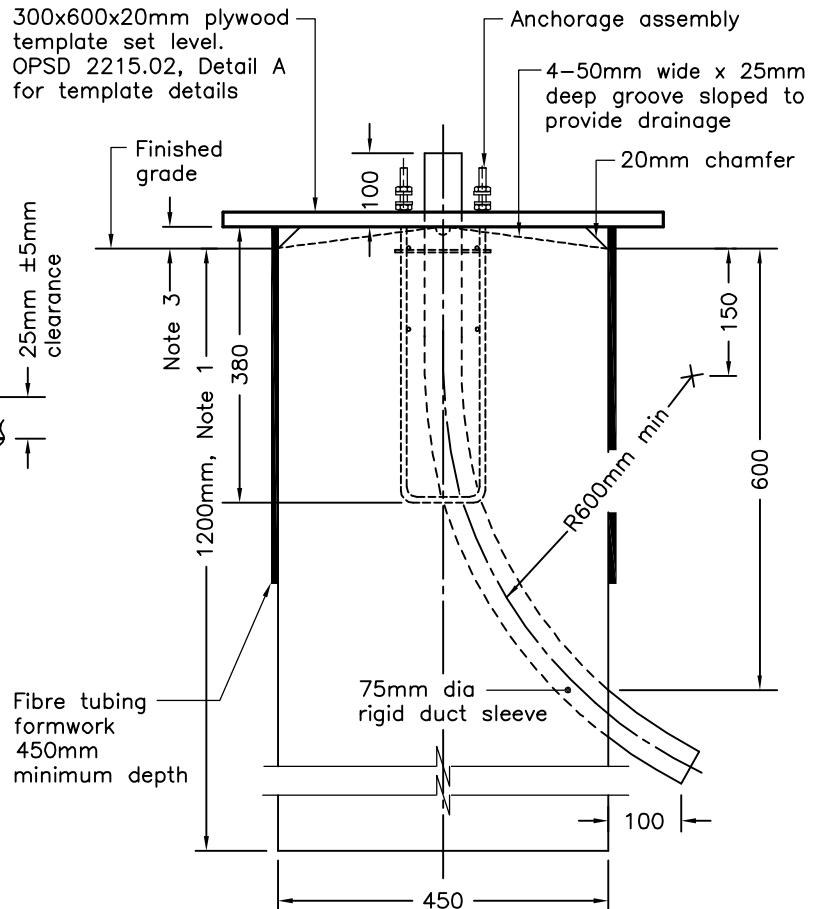
**ELEVATION
ANCHORAGE ASSEMBLY**



PLAN

Plywood template not shown for clarity

300x600x20mm plywood template set level.
OPSD 2215.02, Detail A for template details



**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

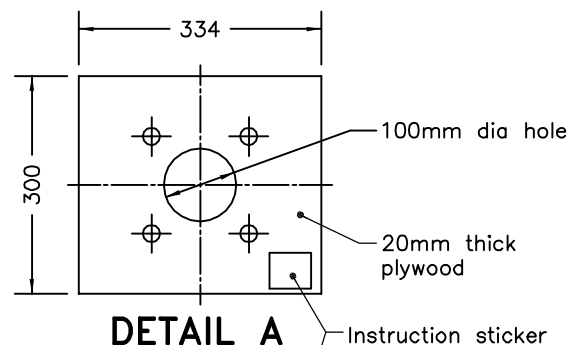
Nov 2014

Rev 2

**CONCRETE FOOTING
AND ANCHORAGE ASSEMBLY FOR
3.3m BASE MOUNTED METAL POLE**

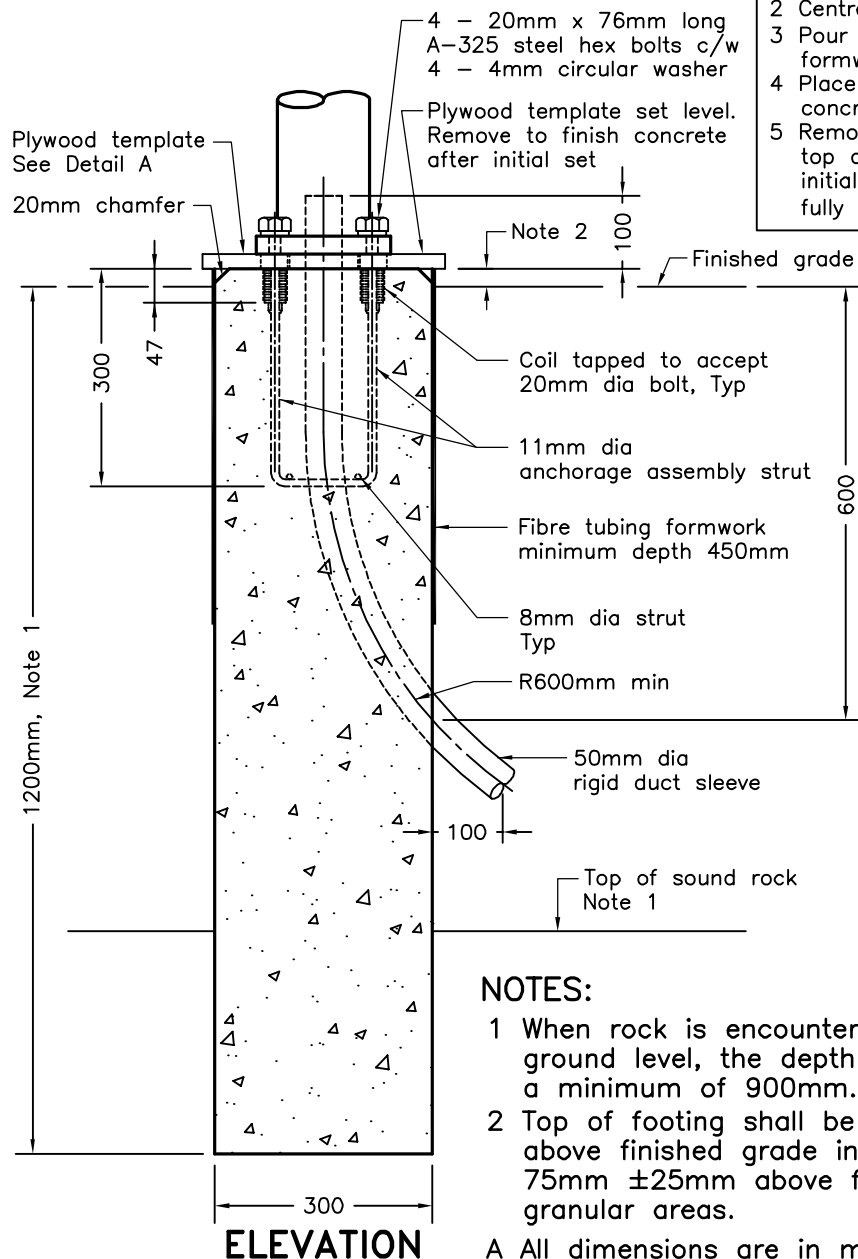


OPSD 2200.04



DETAIL A

- 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.



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 $\pm$ 15mm above finished grade in paved or concrete areas and 75mm $\pm$ 25mm above finished grade in earth or granular areas.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

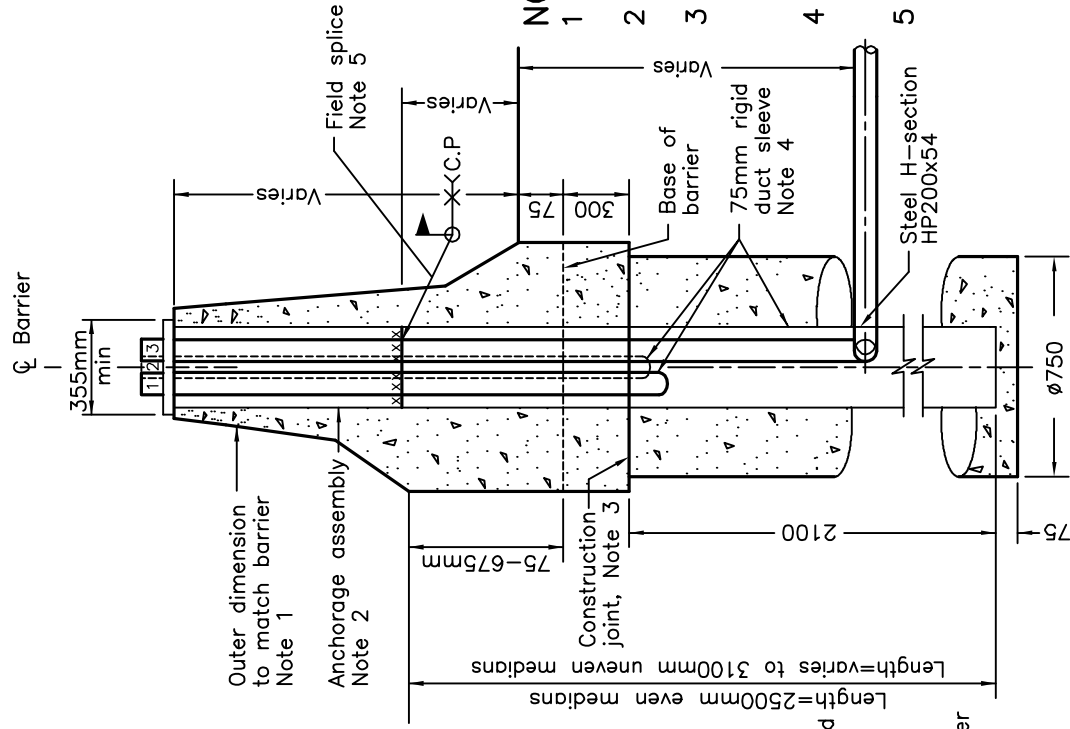
Nov 2014

Rev	0

**CONCRETE FOOTING FOR
1.5m BASE MOUNTED
PEDESTRIAN PUSH BUTTON POLE**



OPSD 2200.041



A All dimensions are in millimetres unless otherwise shown.

- ## 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.

ONTARIO PROVINCIAL STANDARD DRAWING

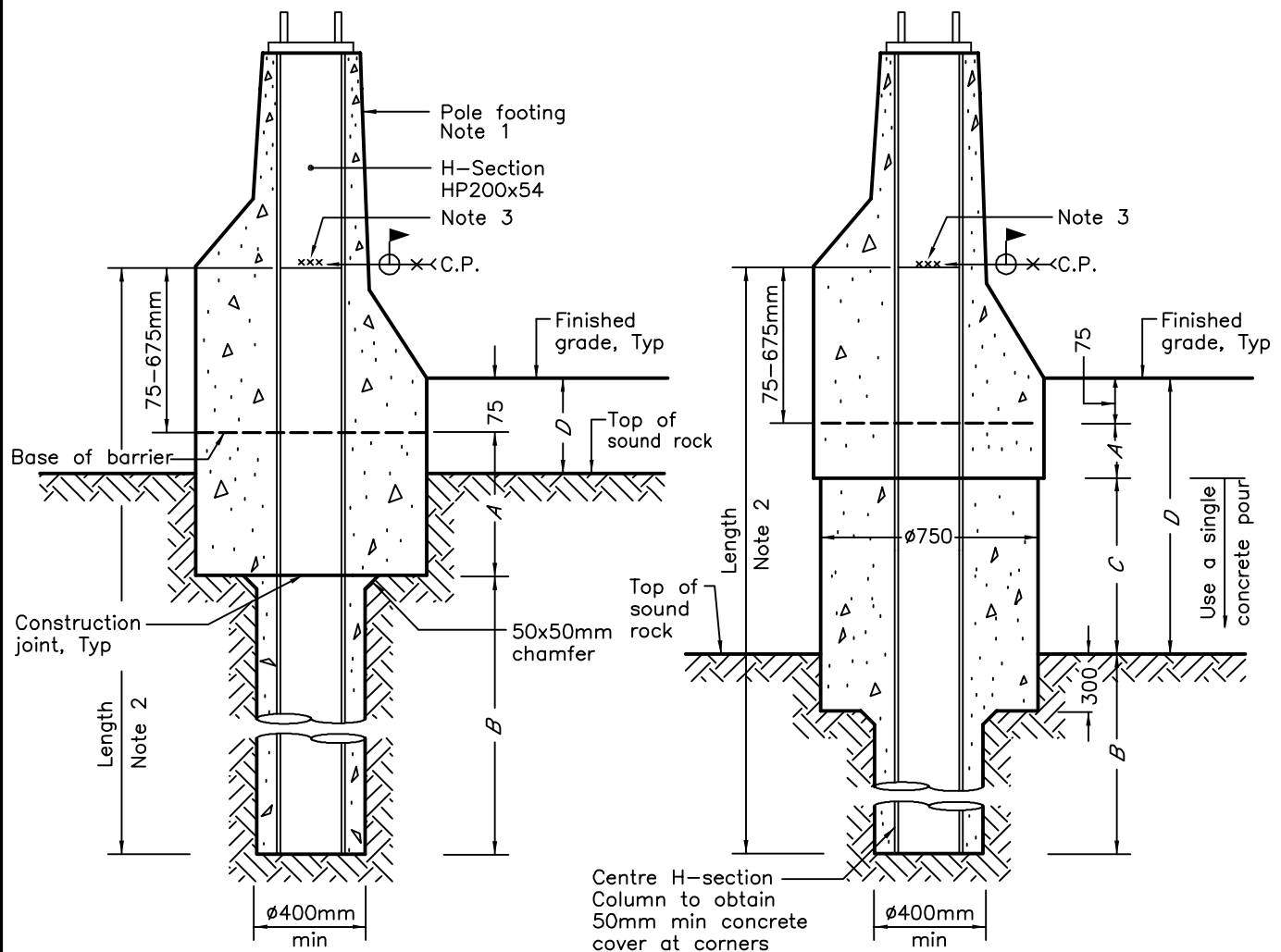


POLE FOOTING IN EARTH

FOR CAST-IN-PLACE CONCRETE BARRIER

SECTION A-A

OPSD 2200.070



DEPTH TO SOUND ROCK = 0 TO 1199mm

DEPTH TO SOUND ROCK = 1200 TO 2100mm

NOTES:

- Details shown are for modifications required to the normal footing for installation in rock. For all other details, refer to OPSD 2200.070.
 - Lengths are indicated for C or C-1 barriers. Rock excavation depth *B* shall correspond to the H-section lengths as shown.
 - 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 millimetres unless otherwise shown.

DIMENSION		DEPTH TO SOUND ROCK <i>D</i> mm							
		0	300	600	900	1200	1500	1800	2100
Depth <i>A</i>		300	600	900	1100	300	300	200	200
Depth <i>B</i>	C	1400	1100	800	600	600	900	600	300
	C-1	2000	1700	1400	1200	1200	1500	1200	900
Depth <i>C</i>		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

ONTARIO PROVINCIAL STANDARD DRAWING

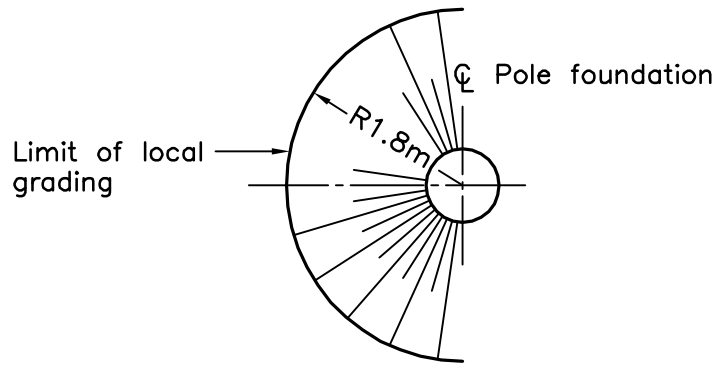
Nov 2016

Rev 1

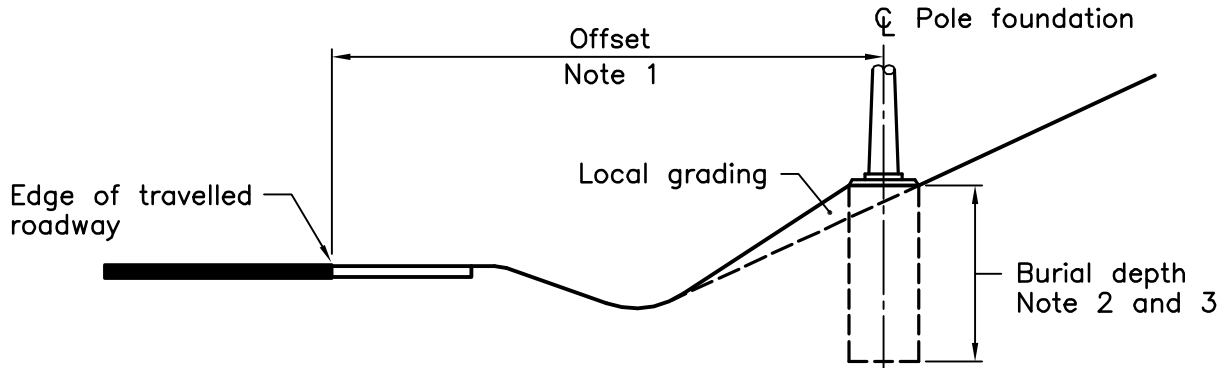
POLE FOOTING IN ROCK
FOR CAST-IN-PLACE CONCRETE BARRIER



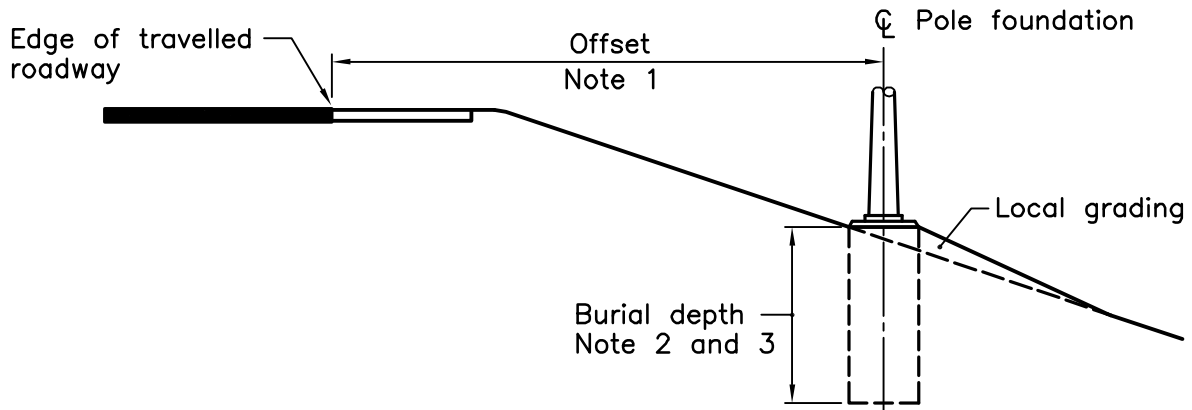
OPSD 2200.080



TYPICAL PLAN



POLE FOUNDATION IN CUT

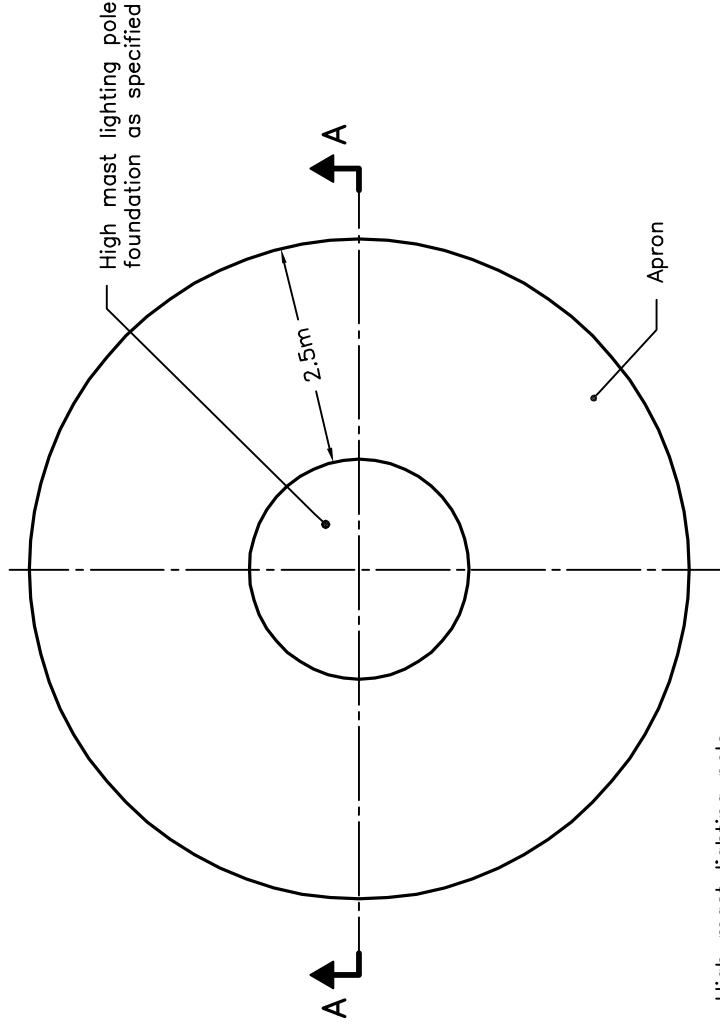


POLE FOUNDATION IN FILL

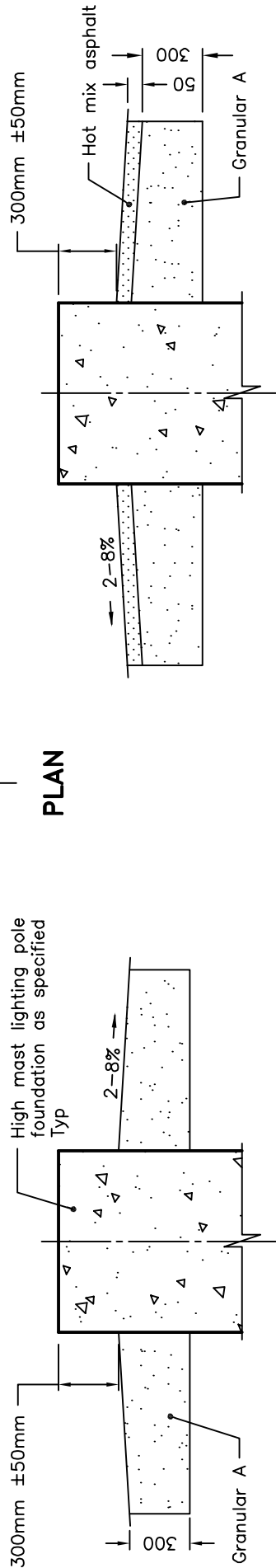
NOTES:

- 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



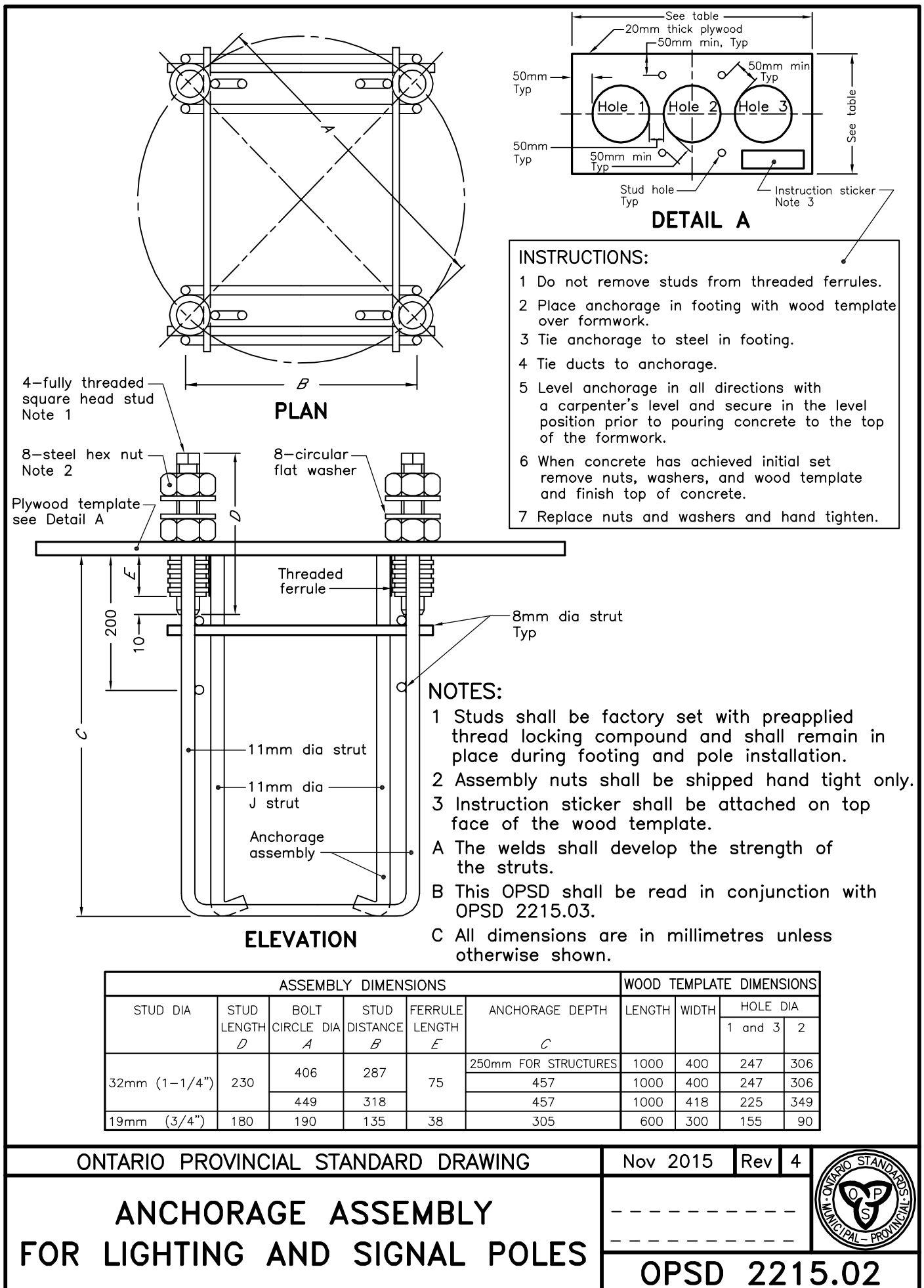
SECTION A-A
ASPHALT APRON
WHEN SPECIFIED

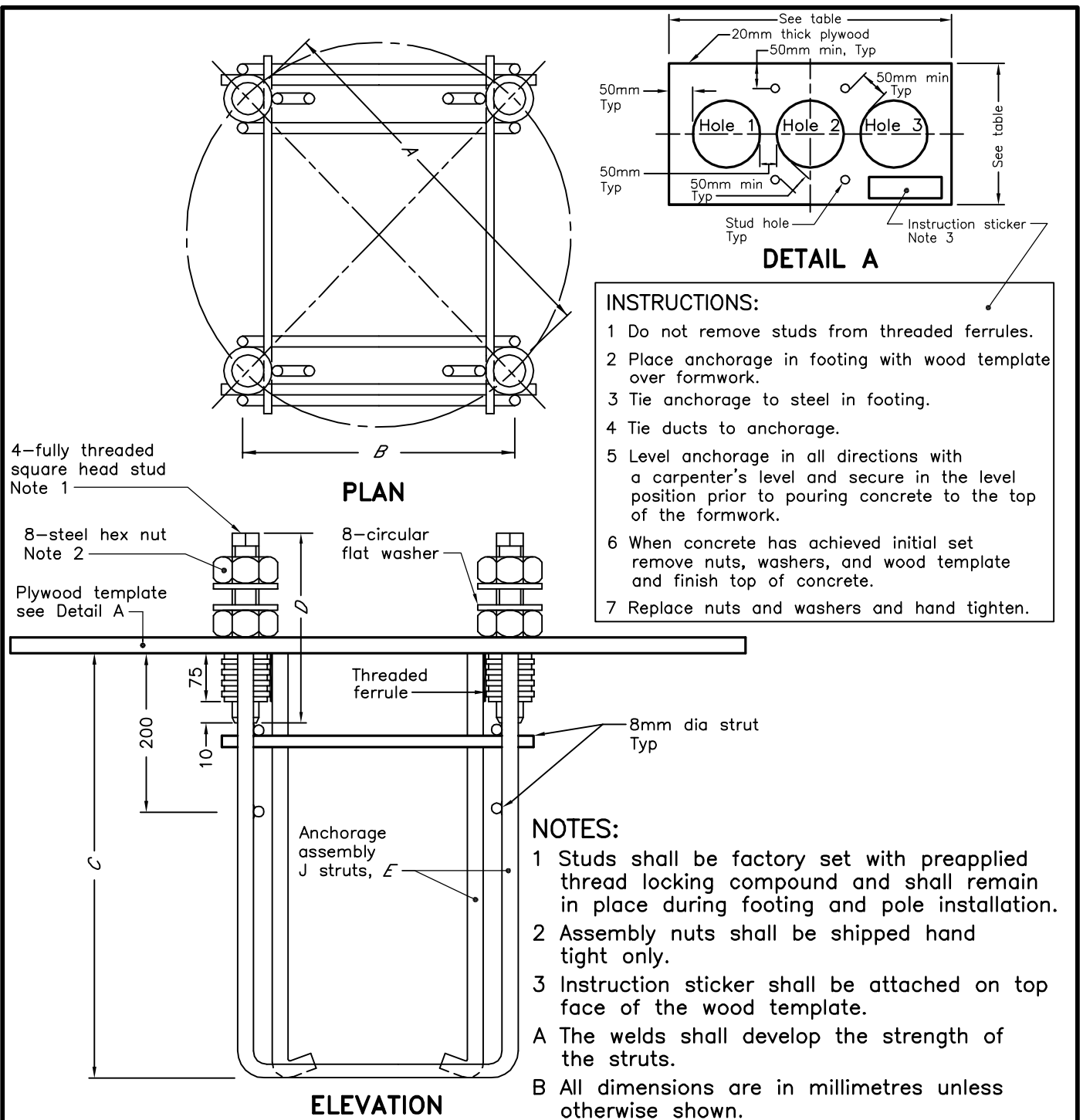
SECTION A-A
GRANULAR APRON

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

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2016	Rev 1
HIGH MAST LIGHTING POLE APRON			
		OPSD 2210.030	







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	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

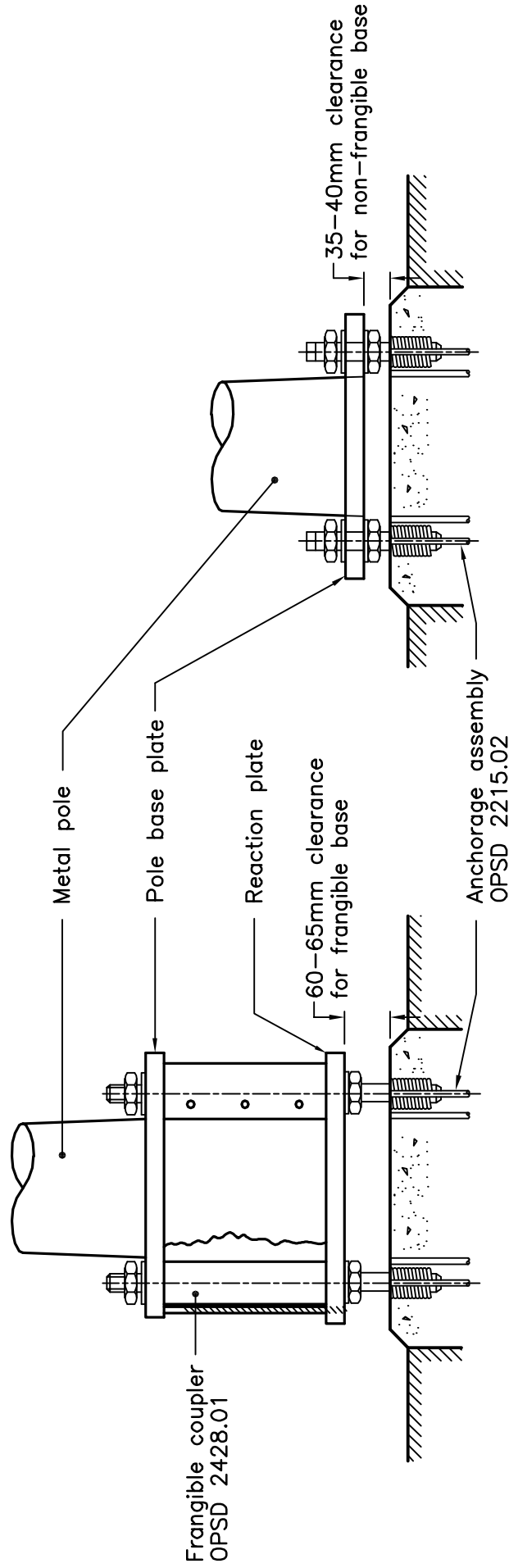
Nov 2015

Rev 0

**ANCHORAGE ASSEMBLY
FOR HEAVY CLASS STEEL POLE AND
SECTIONAL STEEL POLE**



OPSD 2215.025



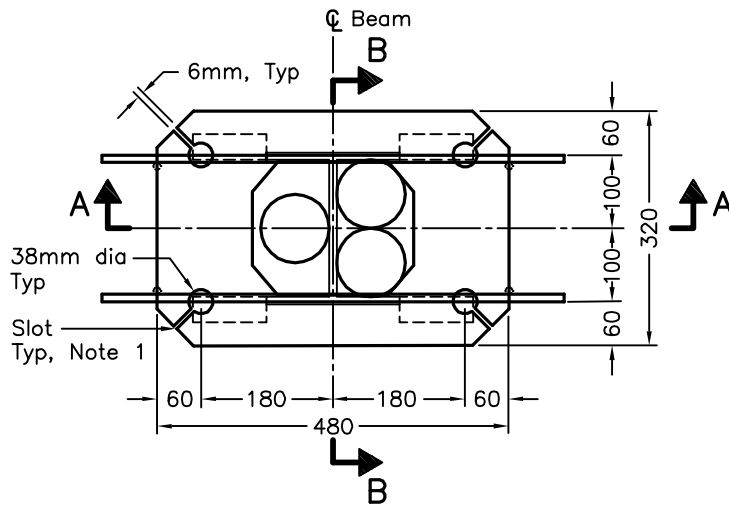
FRANGIBLE BASE - FRANGIBLE COUPLER

NON-FRANGIBLE BASE

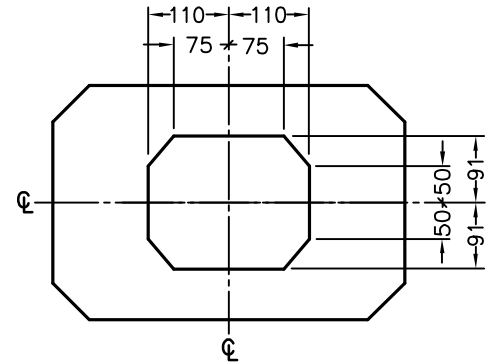
NOTE:

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	

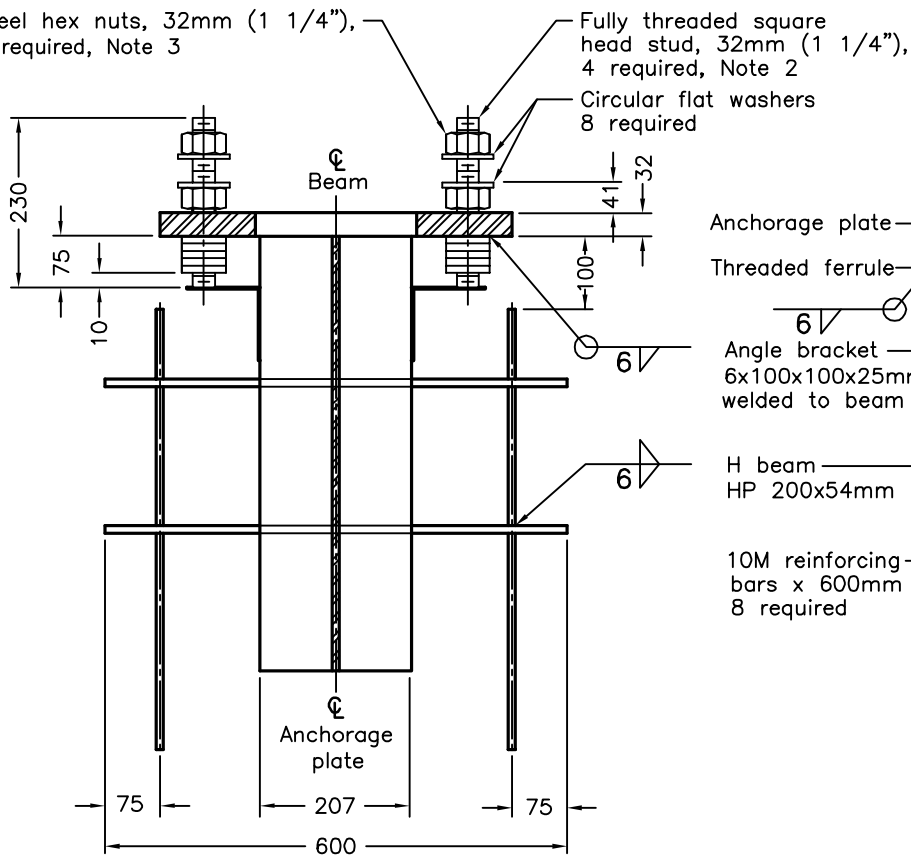


PLAN

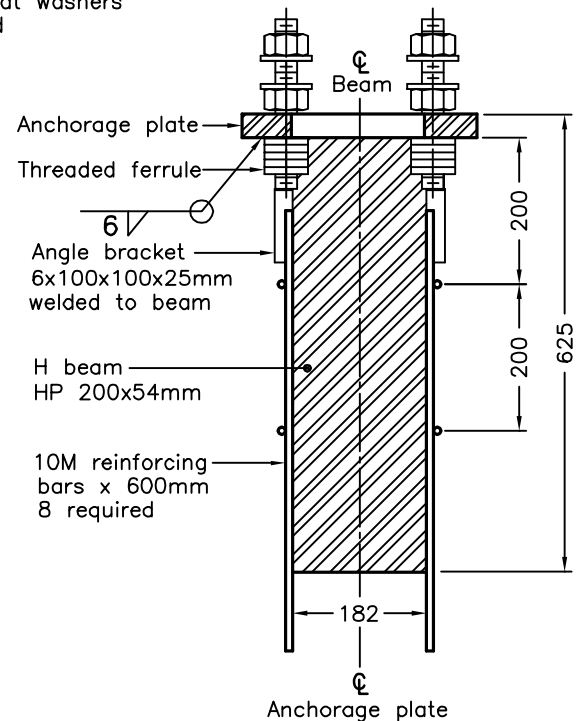


DETAIL OF
DUCT ENTRY HOLE

Steel hex nuts, 32mm (1 1/4"),
8 required, Note 3



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

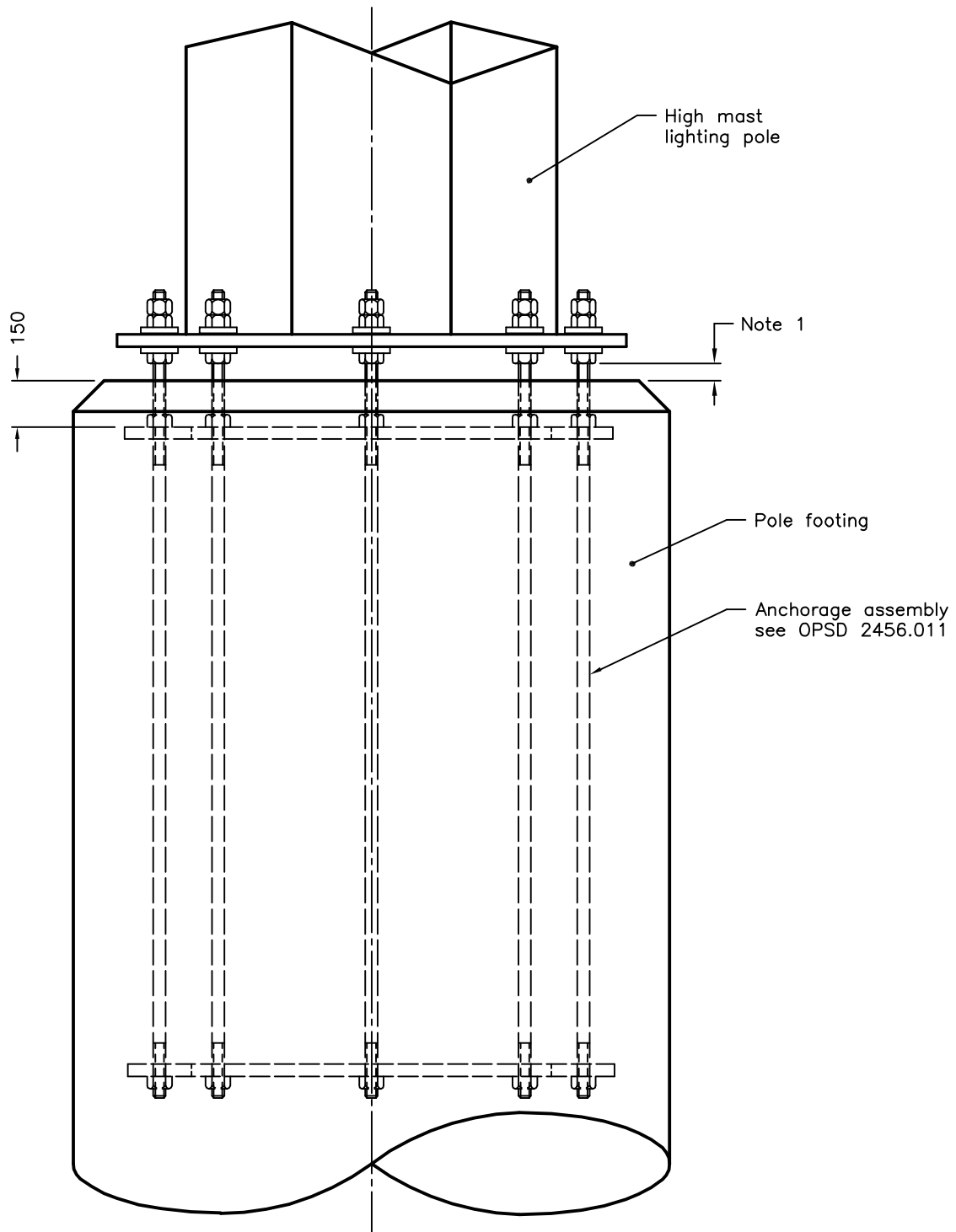
Nov 2015

Rev 2

ANCHORAGE ASSEMBLY
FOR
POLE FOOTING IN CONCRETE BARRIER

OPSD 2216.010





NOTES:

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

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2016

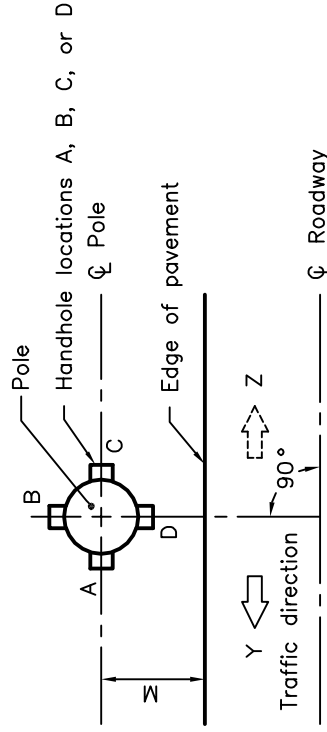
Rev 1

HIGH MAST LIGHTING POLE

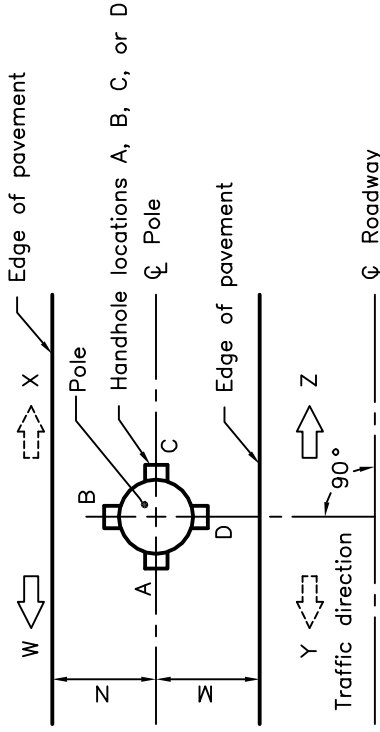
ANCHORAGE ASSEMBLY PLACEMENT



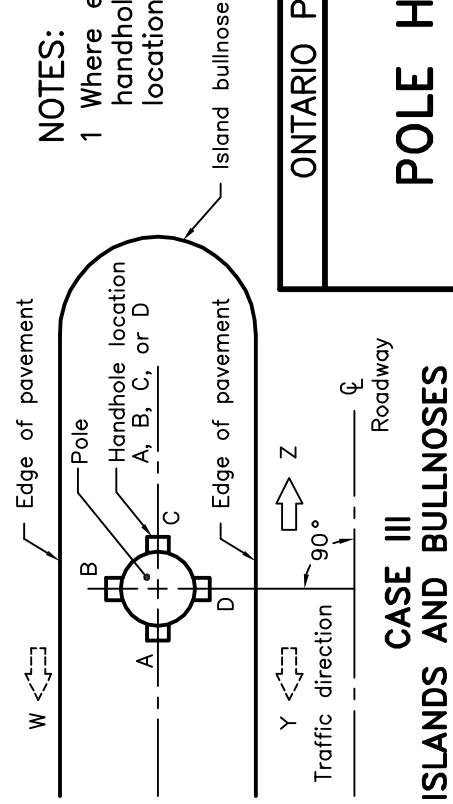
OPSD 2218.010



**CASE I
ALONG ROADWAYS**



**CASE II
CONTINUOUS MEDIANS**



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.

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	B or D for M=N B for N > M D for M > N
		II	W and Y or X and Z	D
		I	Y	D
Sectional steel, heavy class sectional steel, or heavy class steel	Lighting (on structures) Lighting and traffic signals	I	Z	D
		II	X and Y or W and Z	B or D for M=N B for N > M D for M > N
		II	W and Y or X and Z	D for M > N
		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

ONTARIO PROVINCIAL STANDARD DRAWING

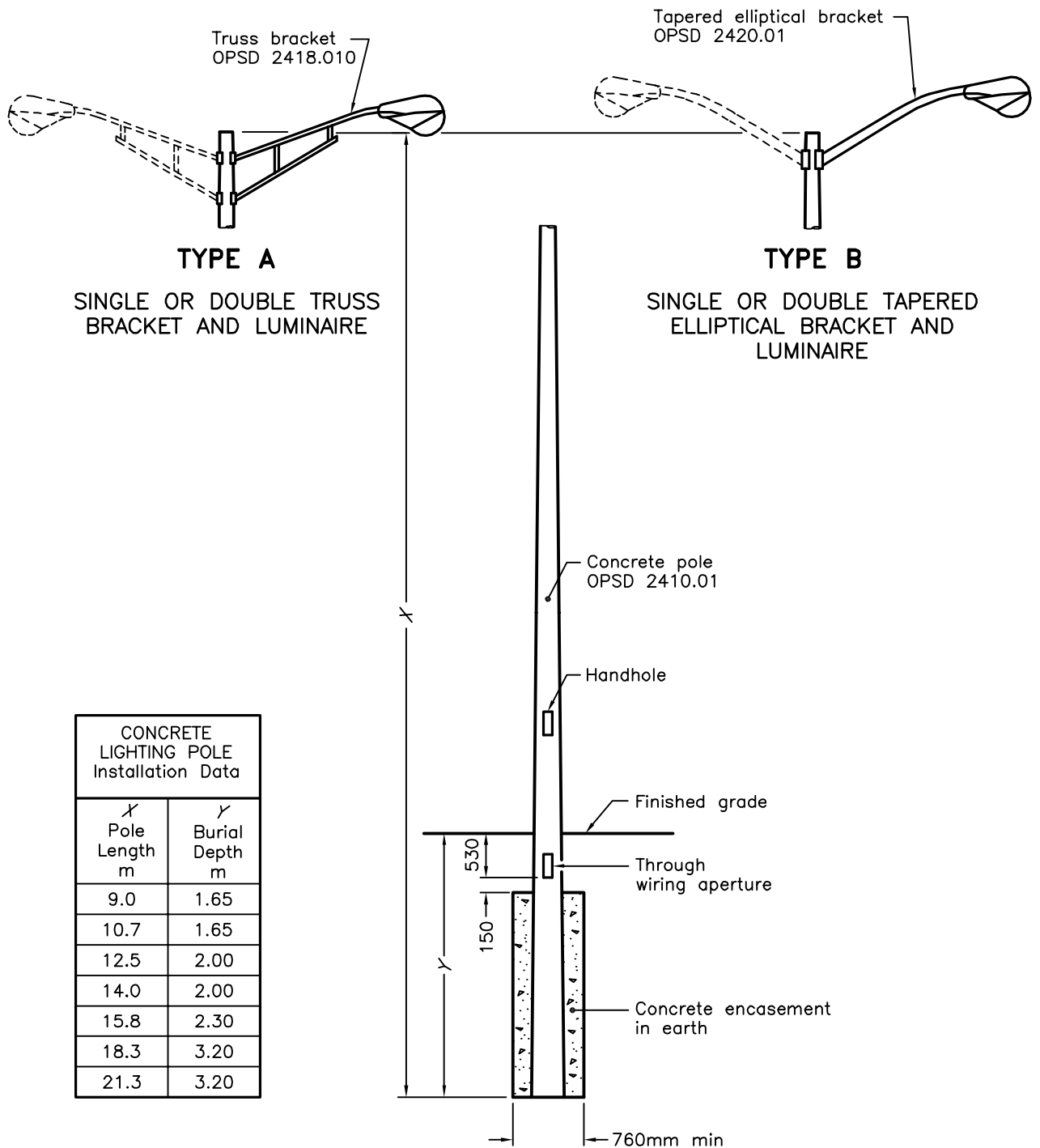
Nov 2010 Rev 1



POLE HANDHOLE LOCATIONS

**CASE III
ISLANDS AND BULLNOSES**

OPSD 2220.01



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

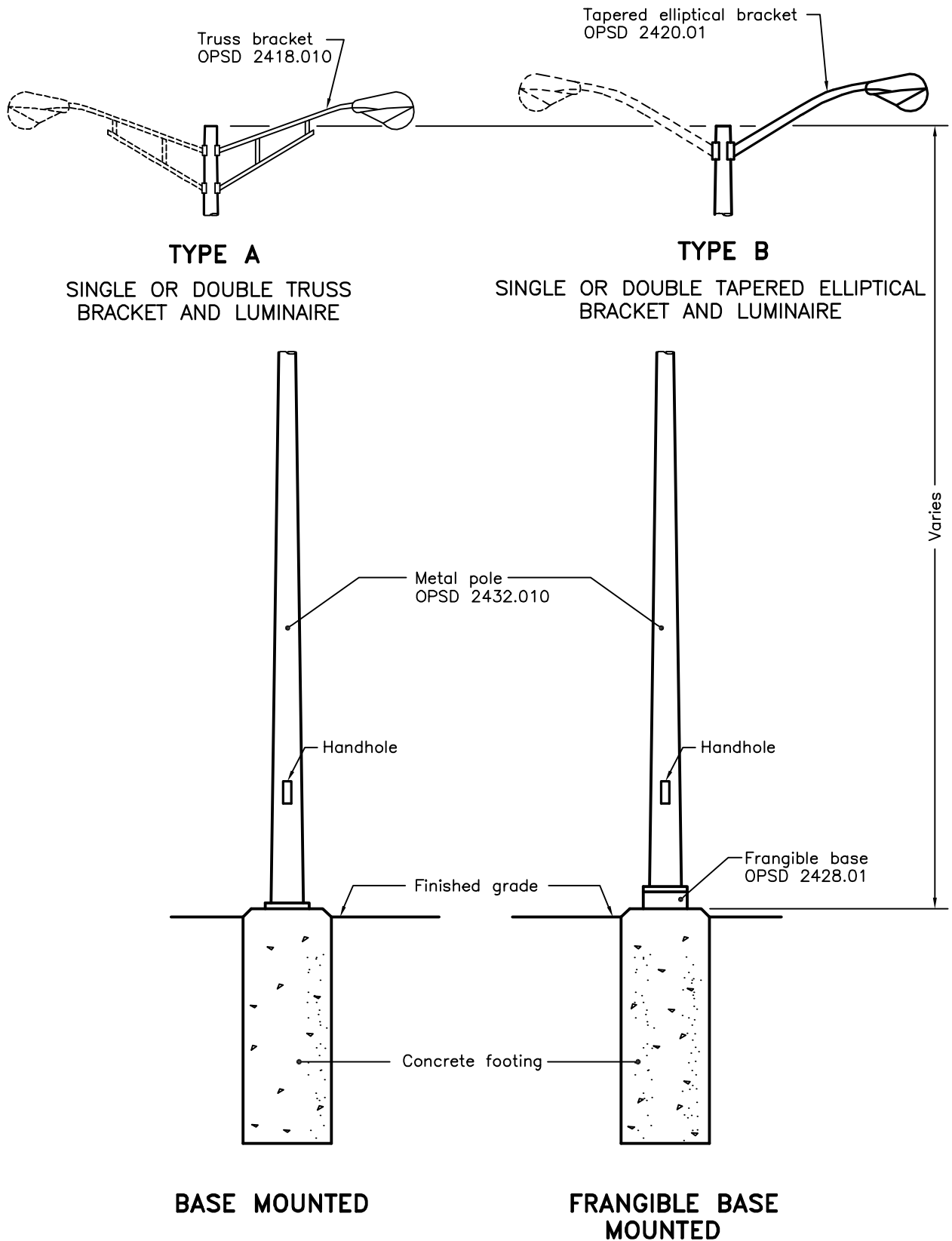
Nov 2016

Rev 1

**CONCRETE LIGHTING POLE
DIRECT BURIED**



OPSD 2225.010



ONTARIO PROVINCIAL STANDARD DRAWING

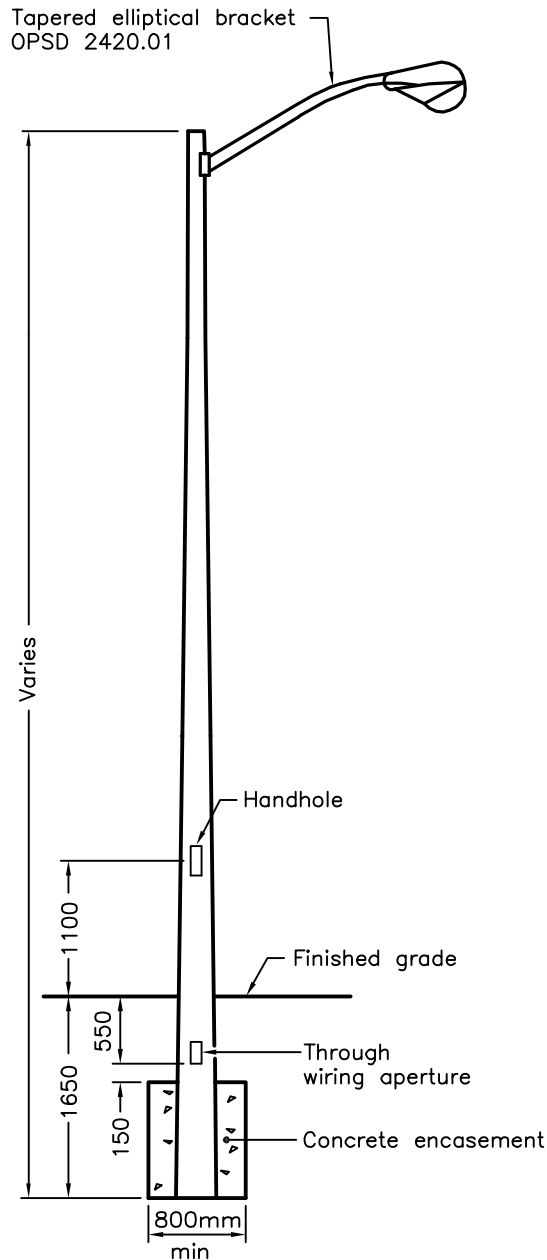
Nov 2016

Rev 1

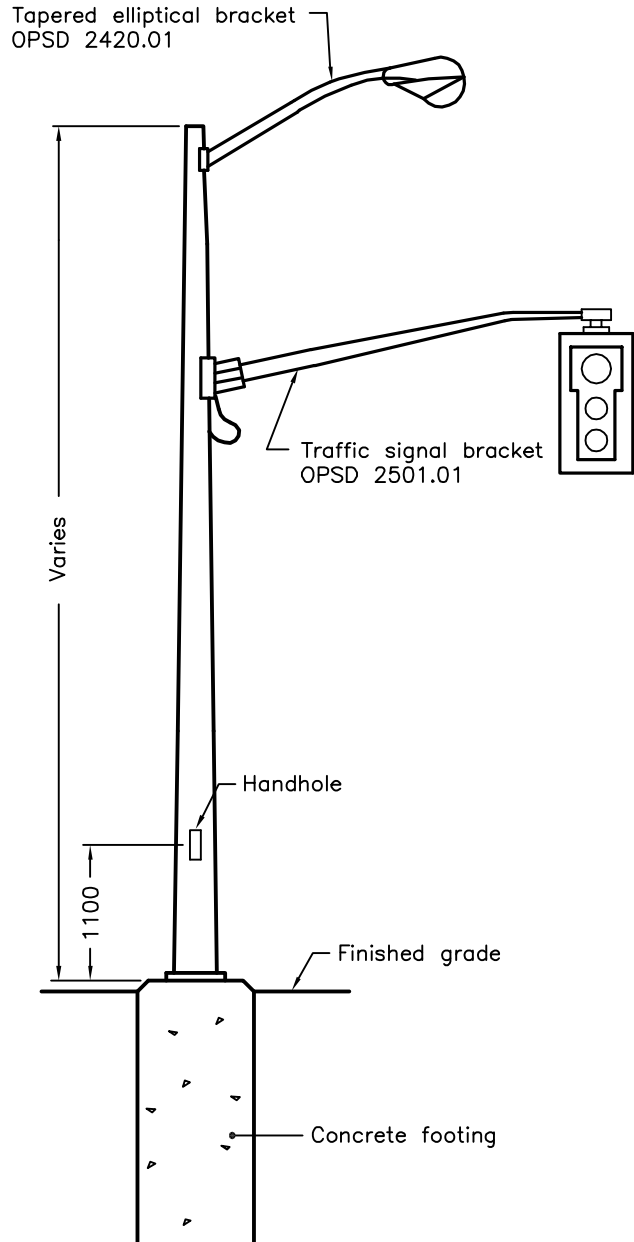
**METAL LIGHTING POLE
BASE MOUNTED**

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			

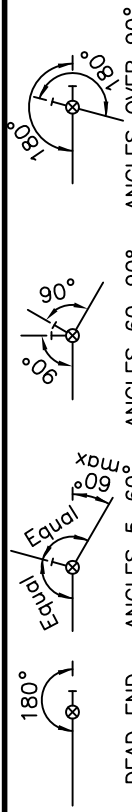
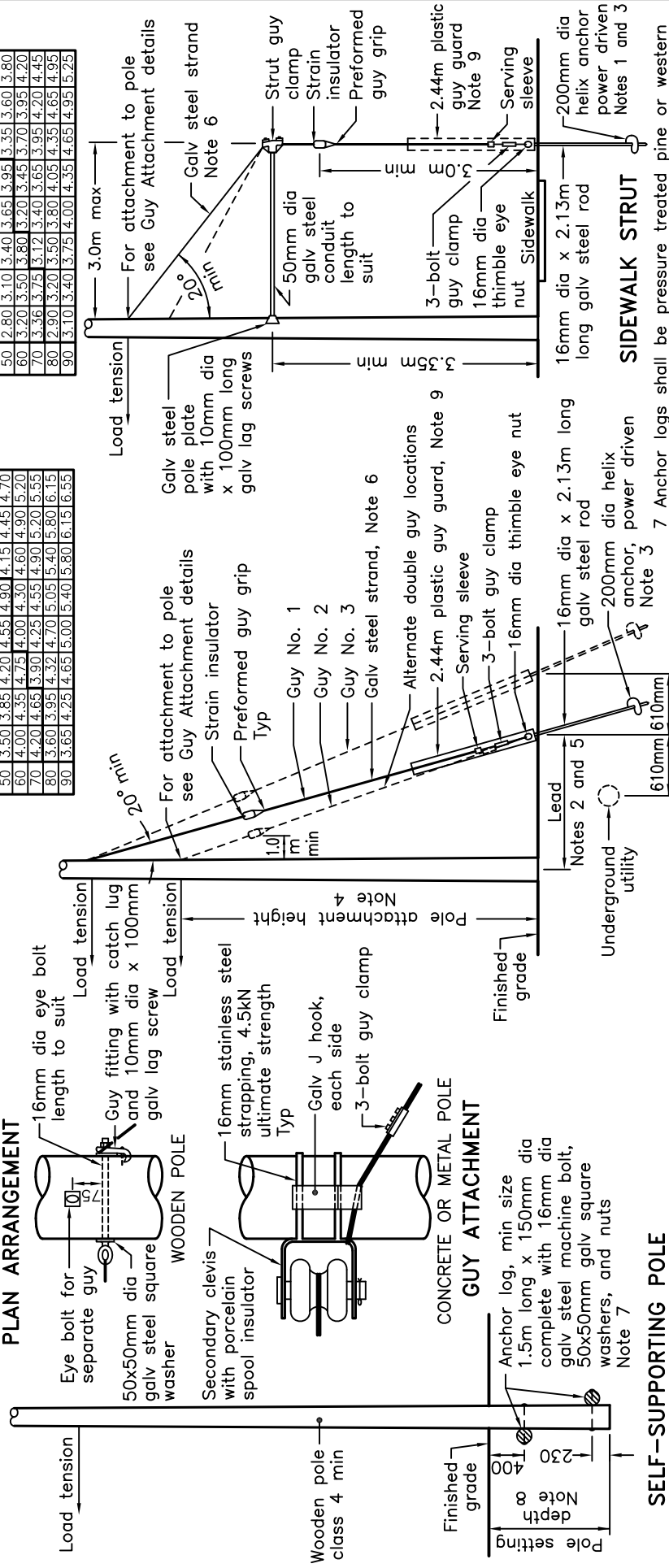


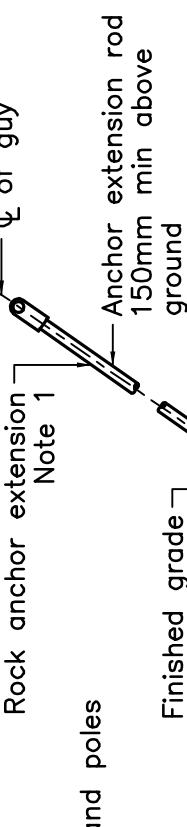
**TABLE 1 MINIMUM LEAD SETTINGS
SINGLE GUY ANCHORS FOR GUY No. 1**

Span	Pole attachment height, m				
m	6.00	6.60	7.20	7.80	8.40
30	2.80	3.10	3.40	3.70	3.95
40	3.20	3.50	3.85	4.15	4.45
50	3.50	3.85	4.20	4.55	4.90
60	4.00	4.35	4.75	4.60	4.90
70	4.20	4.65	3.90	4.25	4.55
80	3.60	3.95	4.32	4.70	5.05
90	3.65	4.25	4.65	5.00	5.40
100	3.65	4.45	4.65	5.00	5.40

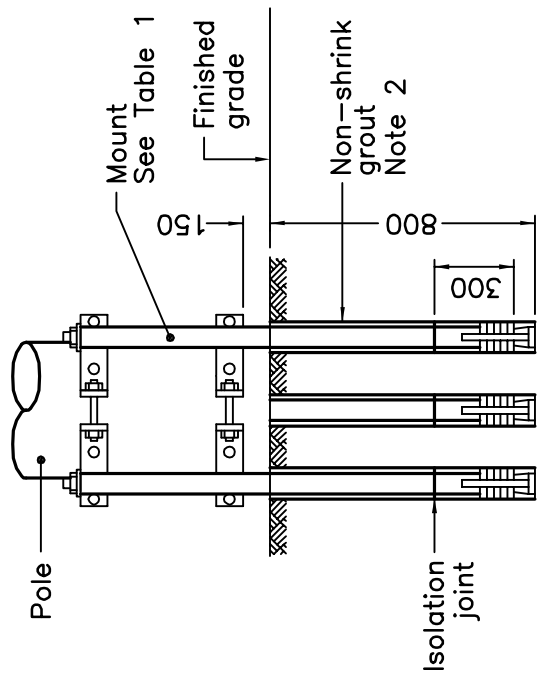
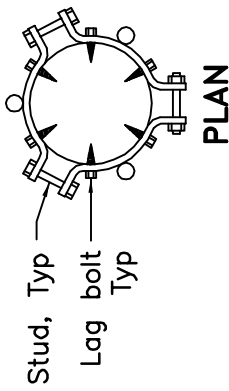
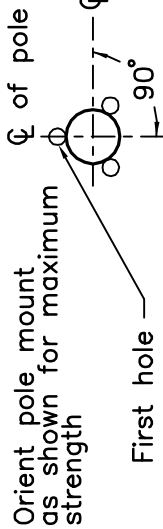
TABLE 2 MINIMUM LEAD SETTINGS
DOUBLE GUY ANCHORS FOR GUY No. 1

Span	Pole attachment height, m						
6.00	16.60	7.20	17.80	18.40	9.00	9.60	10.20
30	2.25	5.20	2.75	3.00	3.20	3.40	3.85
40	2.55	5.20	2.75	3.00	3.20	3.40	3.85
40	2.55	2.80	3.10	3.35	3.60	3.85	3.25
50	2.80	3.10	3.40	3.65	3.95	3.50	3.80
60	3.20	3.50	3.80	3.20	3.45	3.70	3.95
70	3.36	3.75	3.12	3.20	3.65	3.95	4.20
80	2.90	3.20	3.50	3.80	4.05	3.45	4.65
90	3.10	3.40	3.75	4.00	4.35	3.45	4.95
90	3.10	3.40	3.75	4.00	4.35	3.45	4.95





POLE MOUNT ORIENTATION PLAN

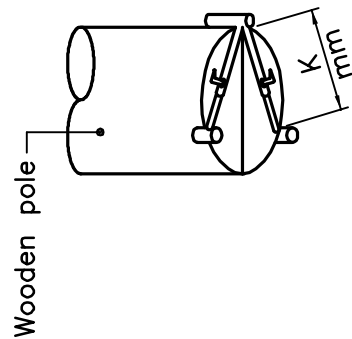


ELEVATION SETTING

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.

DRILLING TEMPLATE APPLICATION



GUY ANCHORAGE SETTING

TABLE 1

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

- B Pole anchorage shall be suitable for the class of pole installed.
- C All dimensions are in millimetres unless otherwise shown.

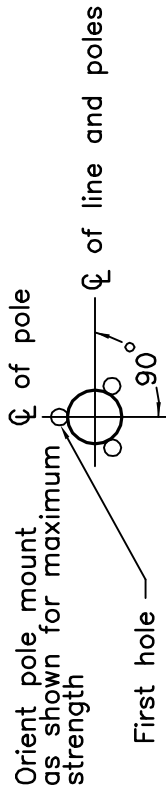
ONTARIO PROVINCIAL STANDARD DRAWING

WOODEN POLE AND ANCHORAGE SETTINGS IN SOLID ROCK 1

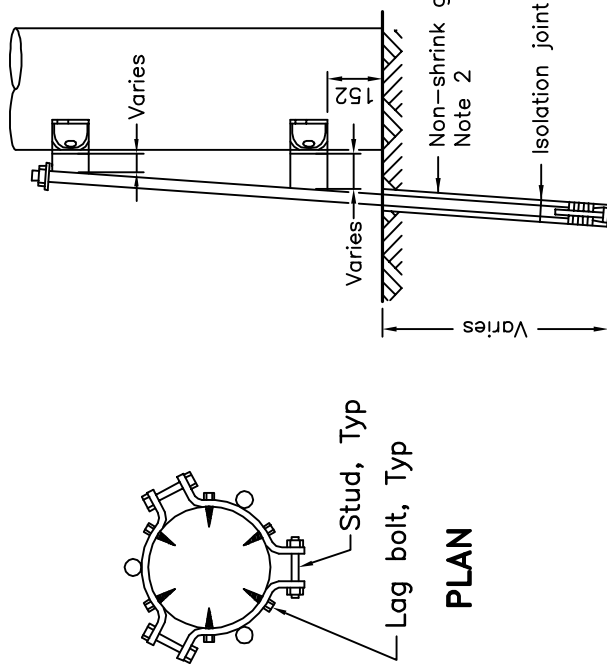


OPSD 2236.010

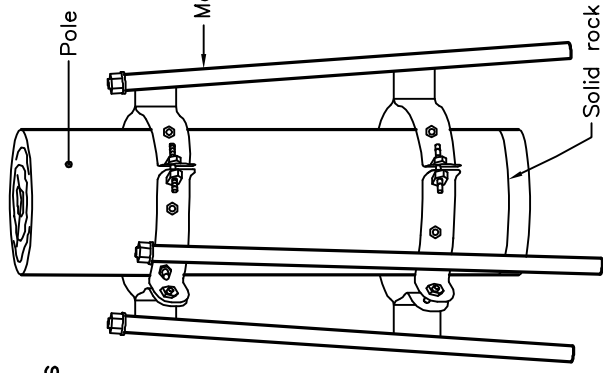
Nov 2013	Rev 0



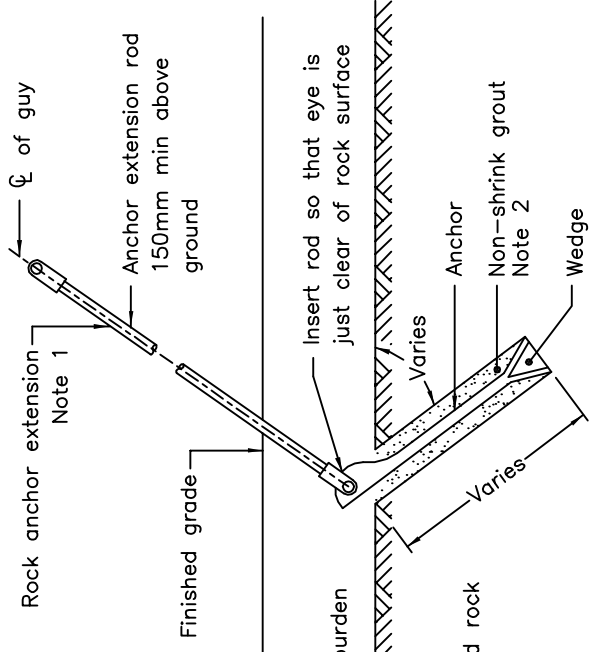
POLE MOUNT ORIENTATION PLAN



PLAN



ISOMETRIC VIEW



GUY ANCHORAGE SETTING

SELECTION CHART

3 Anchor Configuration	4 Anchor Configuration	5 Anchor Configuration

ELEVATION SETTING

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

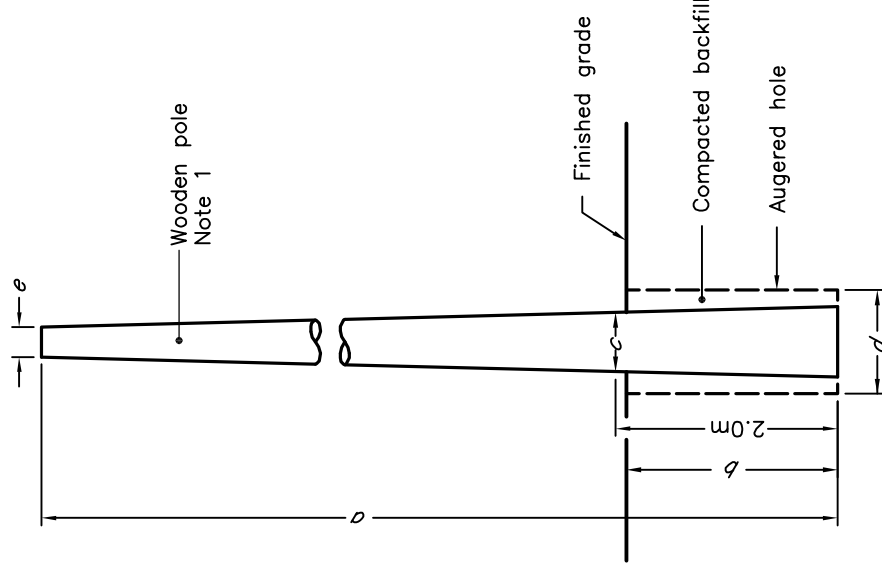
Nov 2013 Rev 0



WOODEN POLE AND ANCHORAGE SETTINGS IN SOLID ROCK 2

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 9.5 11.0 12.5 14.0 15.5 17.0 18.5	1.50 1.65 1.80 1.95 2.10 2.25 2.40 2.55	310 330 350 370 390 410 430 440	610 685 685 685 760 760 760 760	215
2	16,600	8.0 9.5 11.0 12.5 14.0 15.5 17.0 18.5	1.50 1.65 1.80 1.95 2.10 2.25 2.40 2.55	290 310 330 350 370 390 400 420	610 610 685 685 685 710 710 710	200
3	13,500	8.0 9.5 11.0 12.5 14.0 15.5 17.0 18.5	1.50 1.65 1.80 1.95 2.10 2.25 2.40 2.55	265 290 310 330 350 370 390 400	610 610 610 685 685 685 710 710	185
4	10,700	8.0 9.5 11.0 12.5 14.0 15.5 17.0 18.5	1.50 1.65 1.80 1.95 2.10 2.25 2.40 2.55	245 265 290 310 330 340 350 360	560 610 610 610 685 685 685 685	170
5	8,500	8.0 9.5 11.0 12.5 14.0 15.5 17.0	1.50 1.65 1.80 1.95 2.10 2.25 2.40	230 245 265 290 310 330 350	560 560 610 610 610 685 685	155



NOTES:

- 1 Length and class of pole as specified.
- A All dimensions are in millimetres unless otherwise shown.

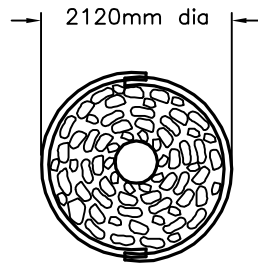
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2010 Rev 1



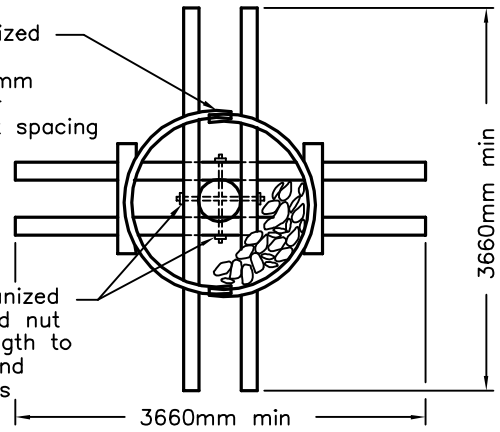
WOODEN POLE IN EARTH

OPSD 2238.01



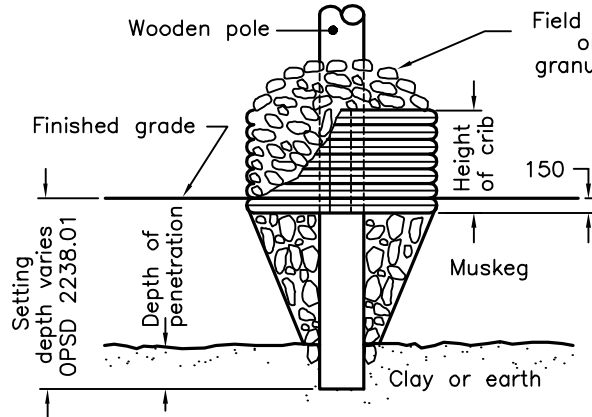
PLAN

Hex head galvanized bolt with nut
12mm dia x 32mm long c/w washer
100mm c/c bolt spacing



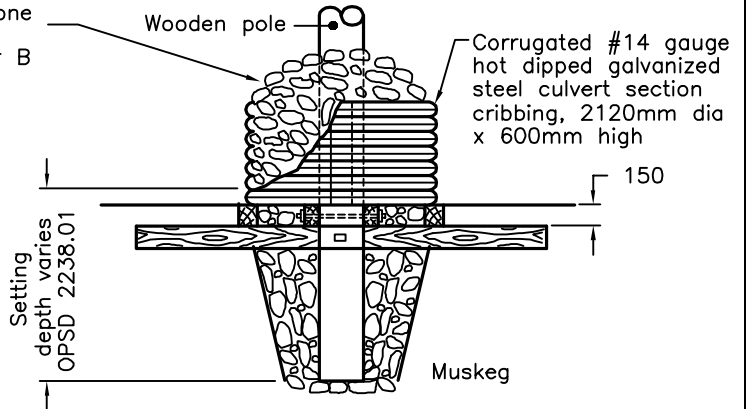
Hex head galvanized regular bolt and nut
20mm dia. Length to suit pole dia and timber thickness

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

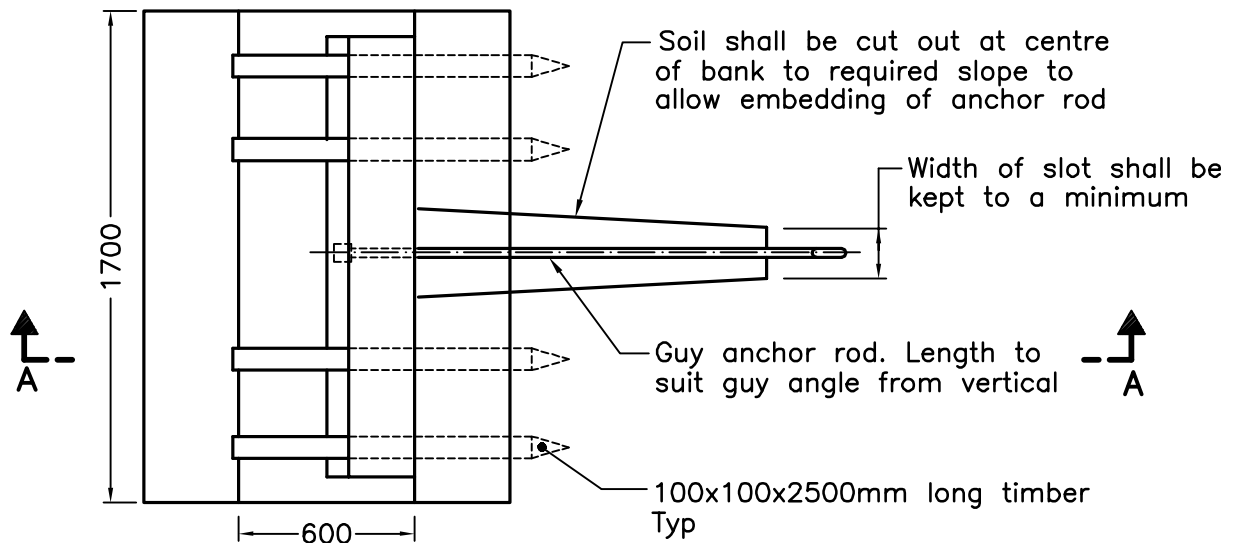
Rev 0

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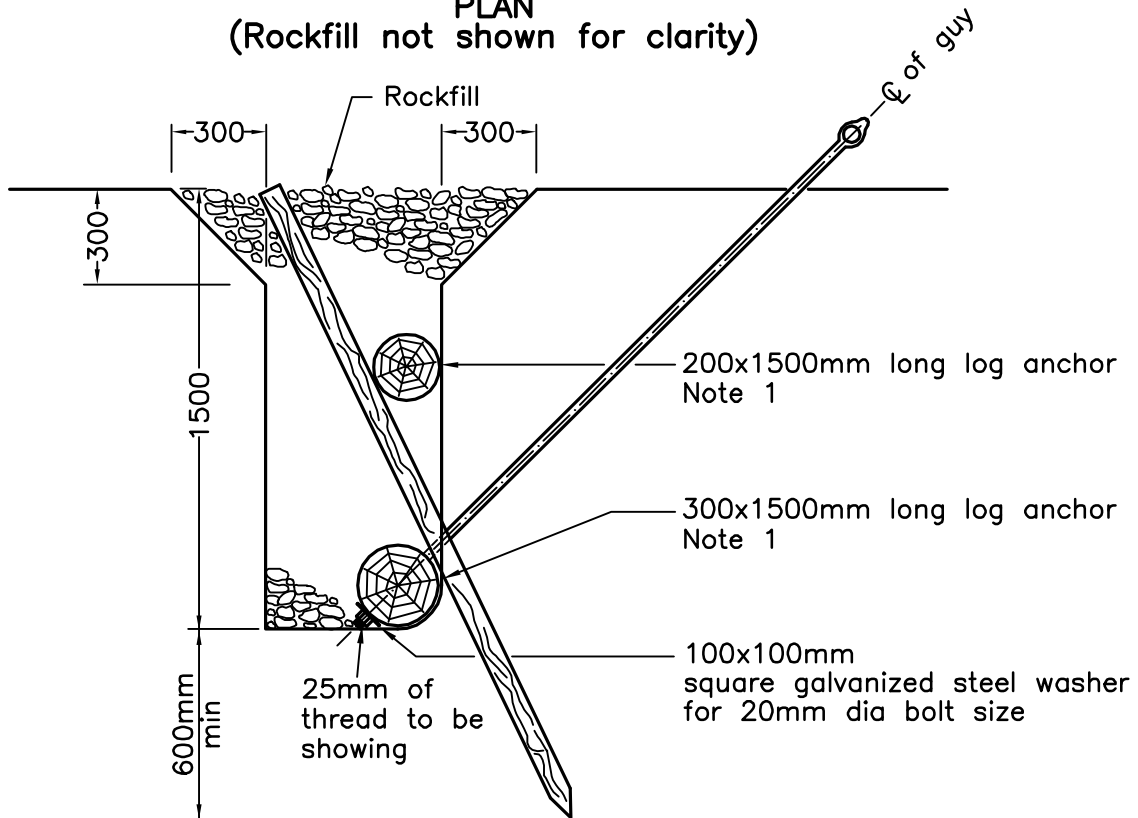
FOR WOODEN POLES IN MUSKEG



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

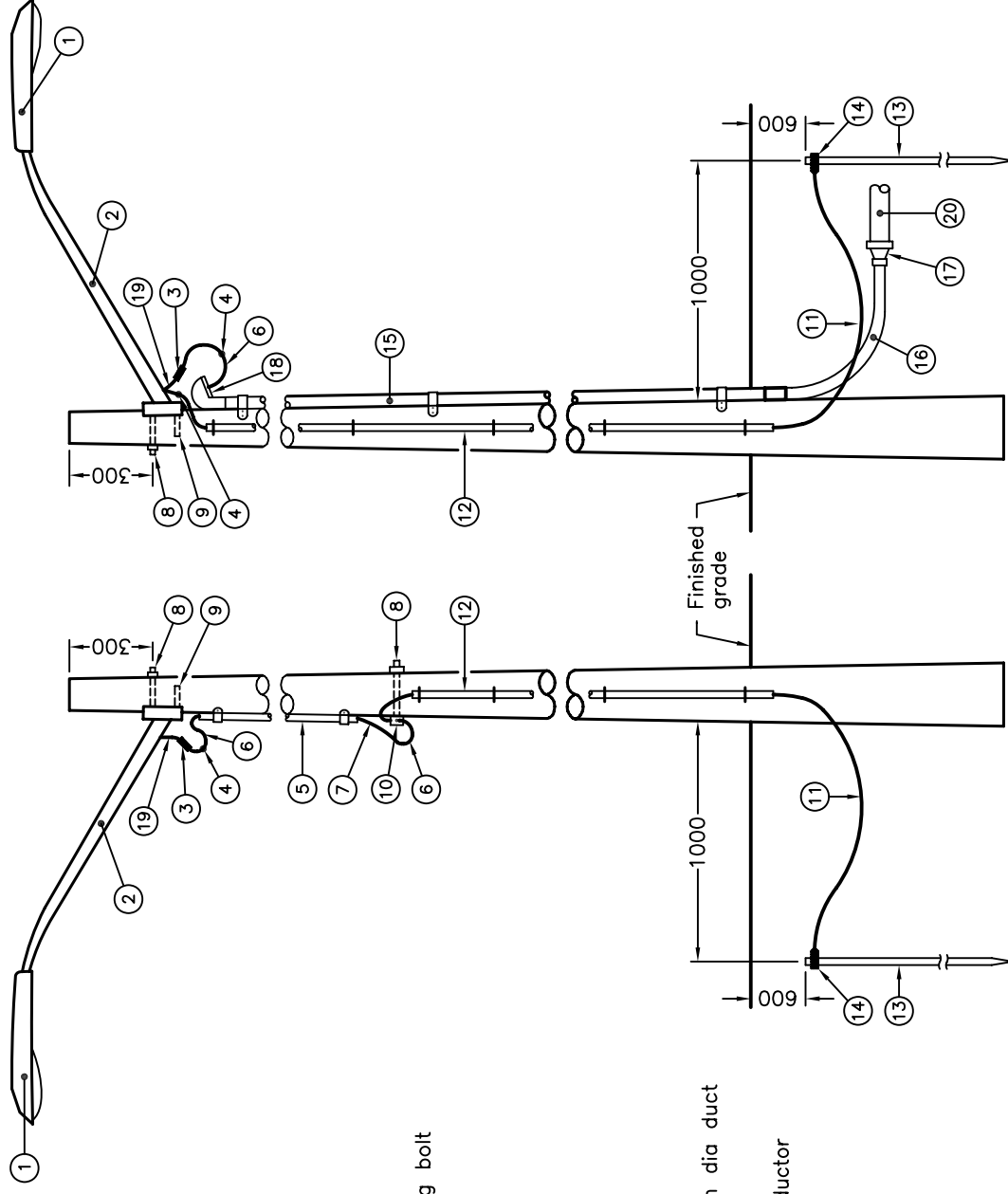


MATERIALS:

- 1 Luminaire
- 2 Single or double elliptical bracket
- 3 600V, 15A in line type fuse holder, complete with 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

NOTES:

- A Connect #12 AWG ground conductor to luminaire ground stud and secondary aerial bus.
- B Length of wood pole and pole setting depth as specified.
- C All dimensions are in millimetres unless otherwise shown.



OVERHEAD CIRCUIT

UNDERGROUND CIRCUIT

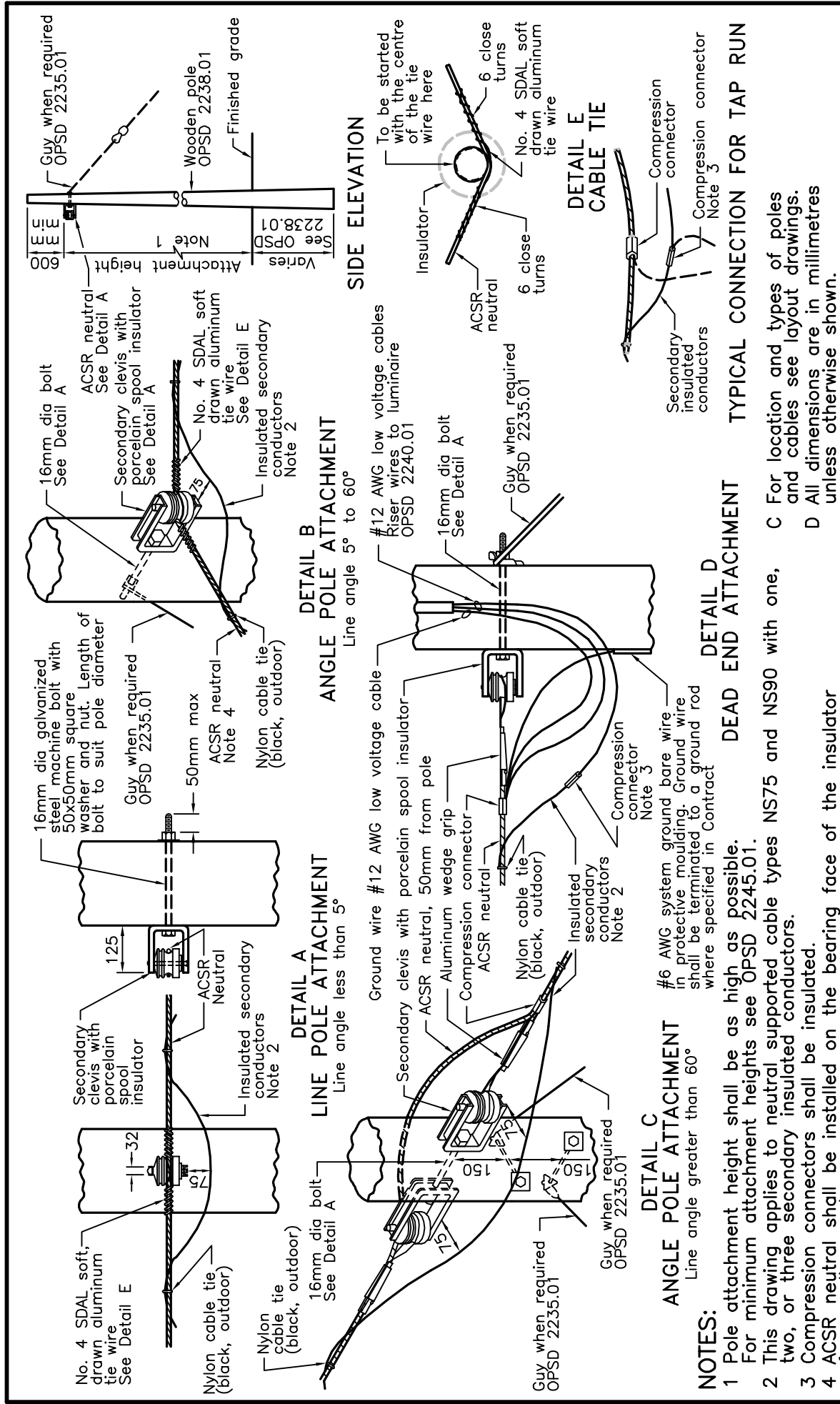
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2006 Rev 2

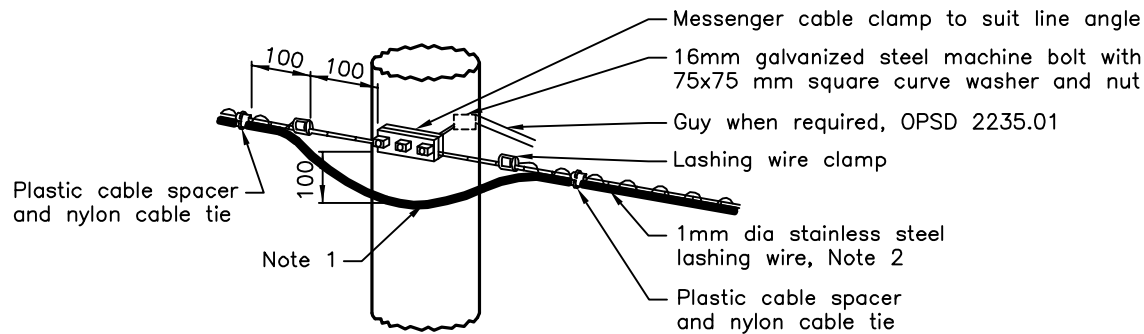


WOOD POLE WITH ELLIPTICAL BRACKET OVERHEAD AND UNDERGROUND CIRCUITS

OPSD 2240.01

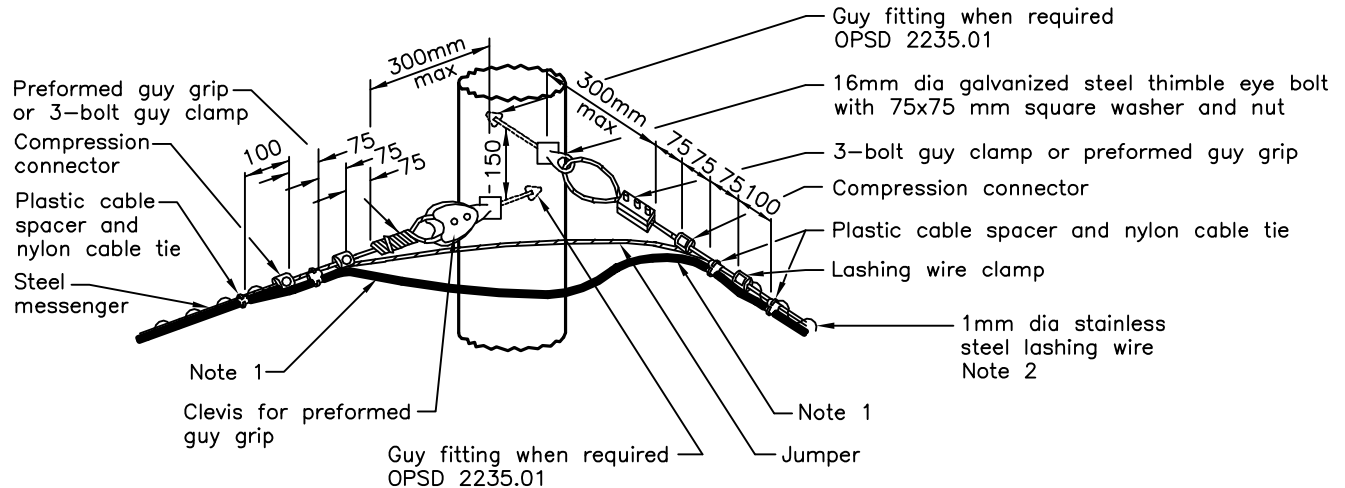


ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2013	Rev 1
WOODEN POLE WITH NEUTRAL SUPPORTED CABLE			
		OPSD 2242.01	



LINE POLE ATTACHMENT

Line Angle Less Than 30°

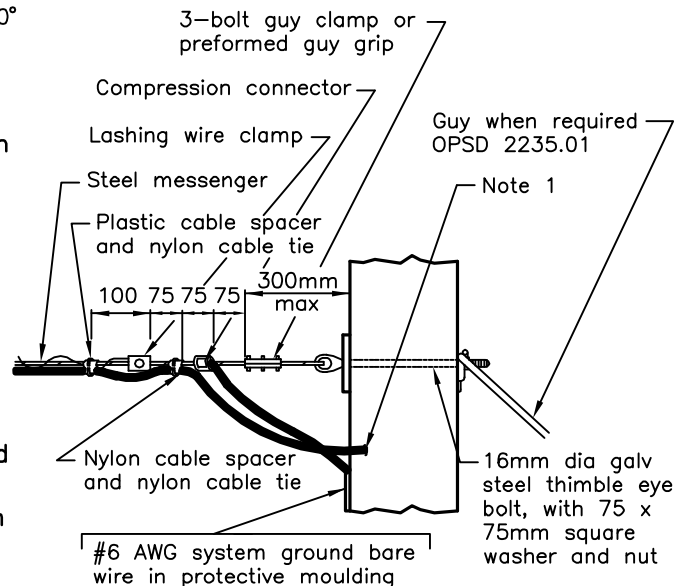


ANGLE POLE ATTACHMENT

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

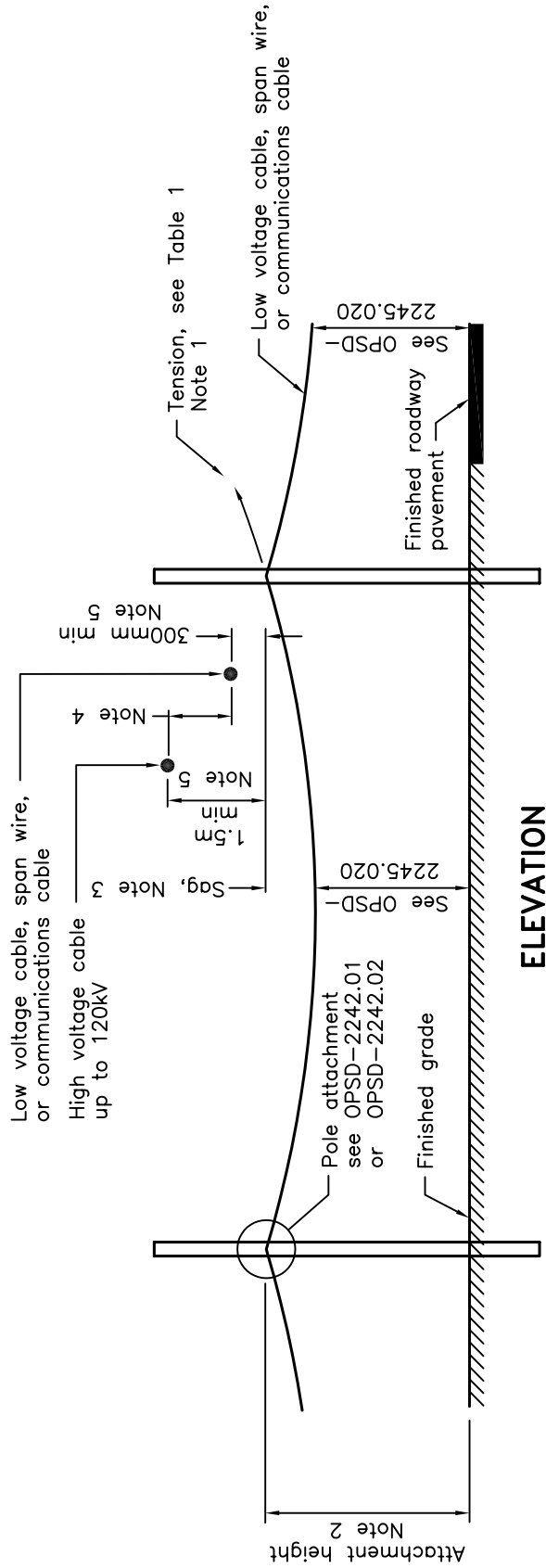
Nov 2013

Rev 2

WOODEN POLES WITH
AERIAL CABLES
LASHED ON MESSENGER

OPSD 2242.02





ELEVATION

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
-29	1480	1320	1500
-18	1300	1280	1460
0	1120	1210	1410
16	990	1170	1370
32	900	1120	1350
38	860	1070	1330
		7mm	Gr.110 9mm
			Gr.160
			13500
			12300
			10500
			8700
			6900
			3700
			6600

NOTES:

- 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.
- Minimum attachment height to be determined by addition of the clearance height to the maximum sag.
- Maximum sag shall be based on the heavy loading or thermal loading conditions specified in CSA C22.3, No.1-01. For maximum sag refer to cable manufacturer and the Ontario Electrical Safety Code sag tables.
- For minimum vertical clearances between the high voltage cables over 120kV and other cables, refer to CSA C22.3, No.1-01.
- Vertical clearance between wires to 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.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2004

Rev 2

INSTALLATION OF AERIAL CABLE SYSTEMS



OPSD - 2245.01

MINIMUM VERTICAL CLEARANCES

MINIMUM VERTICAL CLEARANCES ABOVE FINISHED GRADE												
LOCATION OF WIRES OR CABLES	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	6.1	6.4	6.9	10.5	15.7	20.7	
2	OVER KING'S HIGHWAYS AND OTHER ROADWAYS	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	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	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	4.5	4.9	5.2	5.5	5.8	6.3	6.5	7.5	8.7	
6	OVER RESIDENTIAL DRIVEWAYS	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	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	7.9	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 CSA C22.3, No.1-10.
 B Voltages are rms line to ground. Voltages in brackets are phase to phase.
 C All dimensions are in metres unless otherwise shown.

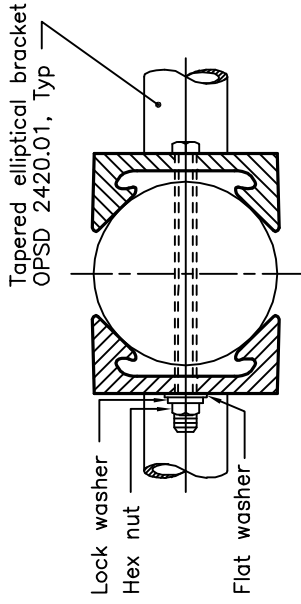


ONTARIO PROVINCIAL STANDARD DRAWING

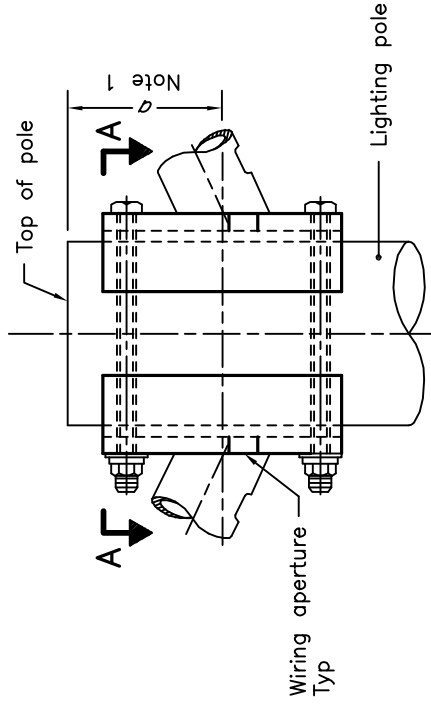
Nov 2011 Rev 1

MINIMUM VERTICAL CLEARANCES FOR AERIAL CABLE SYSTEMS

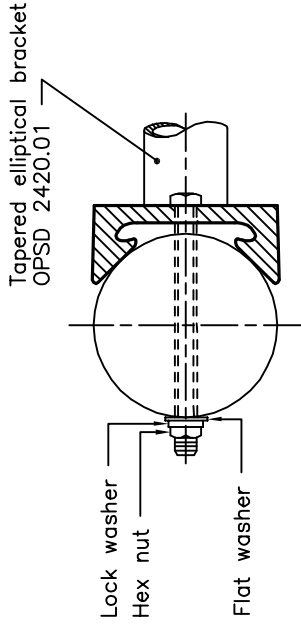
OPSD 2245.020



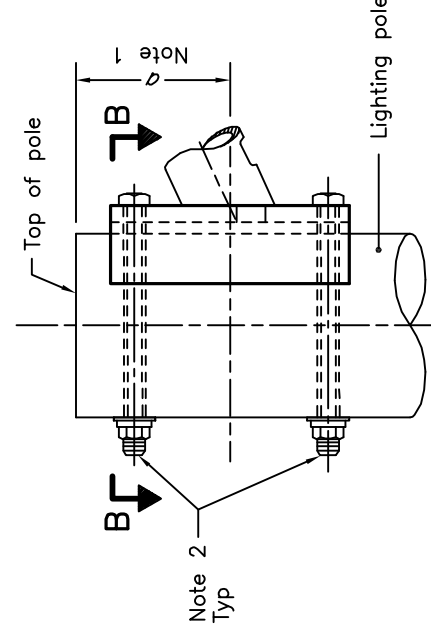
SECTION A-A



DOUBLE BRACKET



SECTION B-B



SINGLE BRACKET

NOTES:

- 1 For sectional steel poles, dimension $\sigma=300\text{mm}$.
For all other metal poles and concrete poles, dimension $\sigma=230\text{mm}$.
- 2 16mm diameter galvanized steel square head bolt. Bolt length to suit pole.

ONTARIO PROVINCIAL STANDARD DRAWING

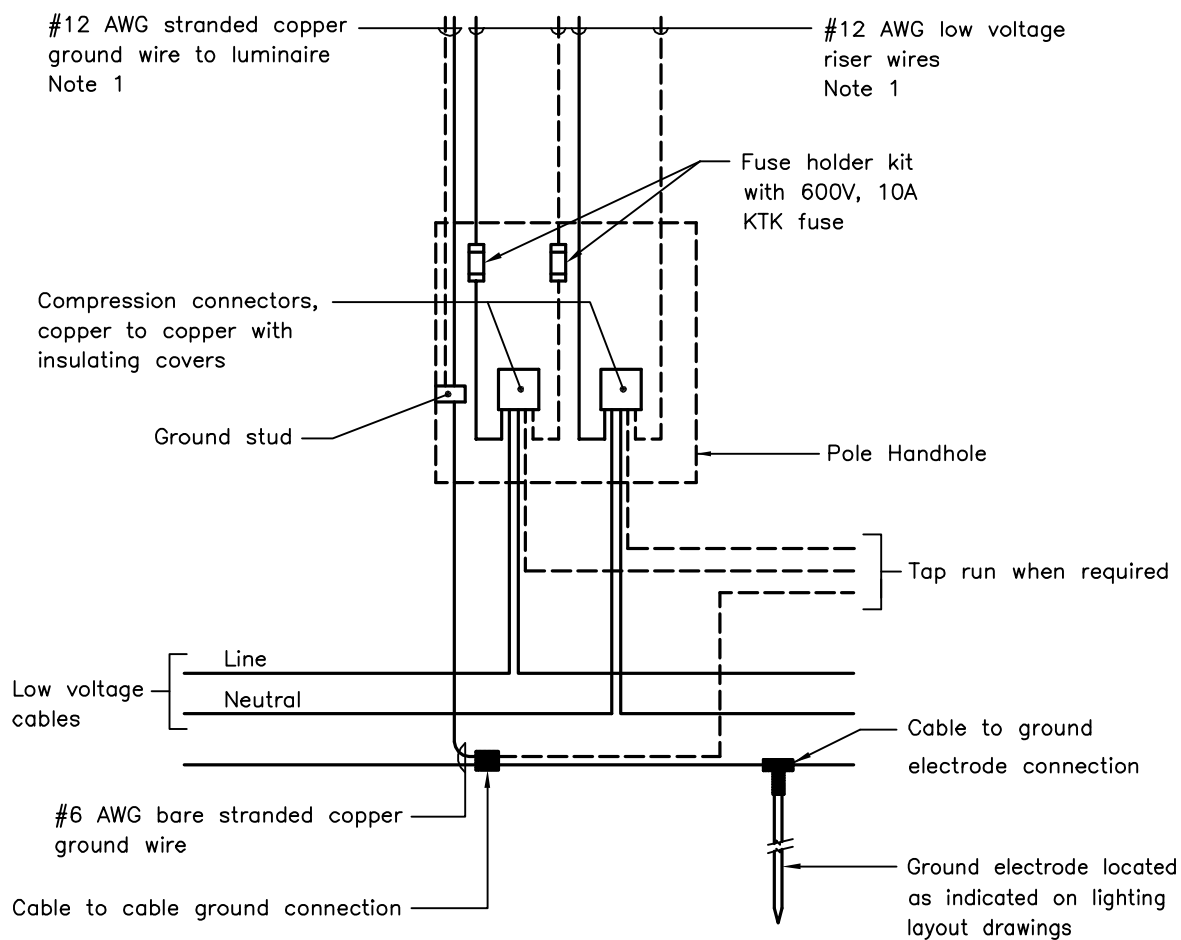
**ALUMINUM TAPERED ELLIPTICAL BRACKETS
ON METAL AND CONCRETE POLES
MOUNTING DETAILS**

Nov 2016

Rev 0



OPSD 2250.010

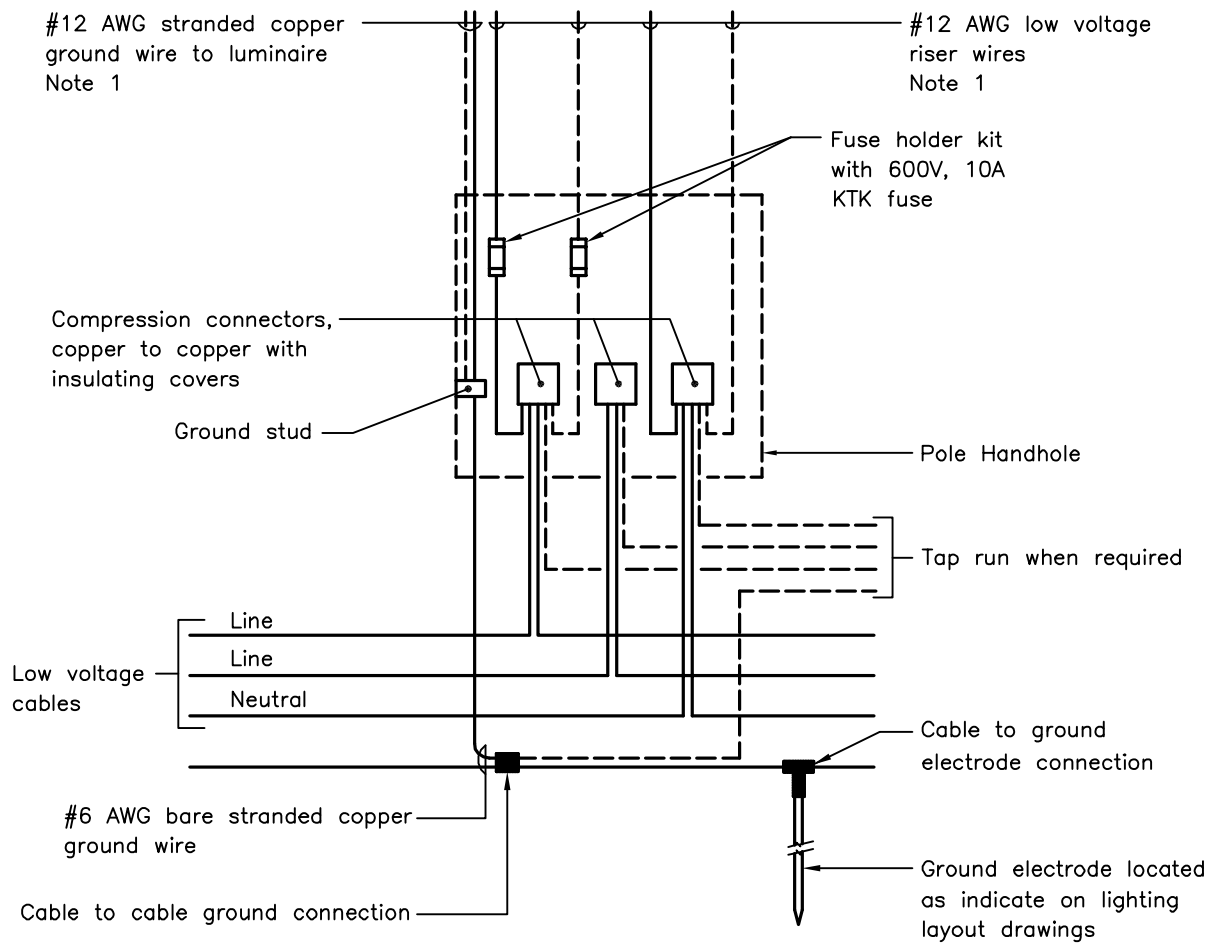


NOTE:

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

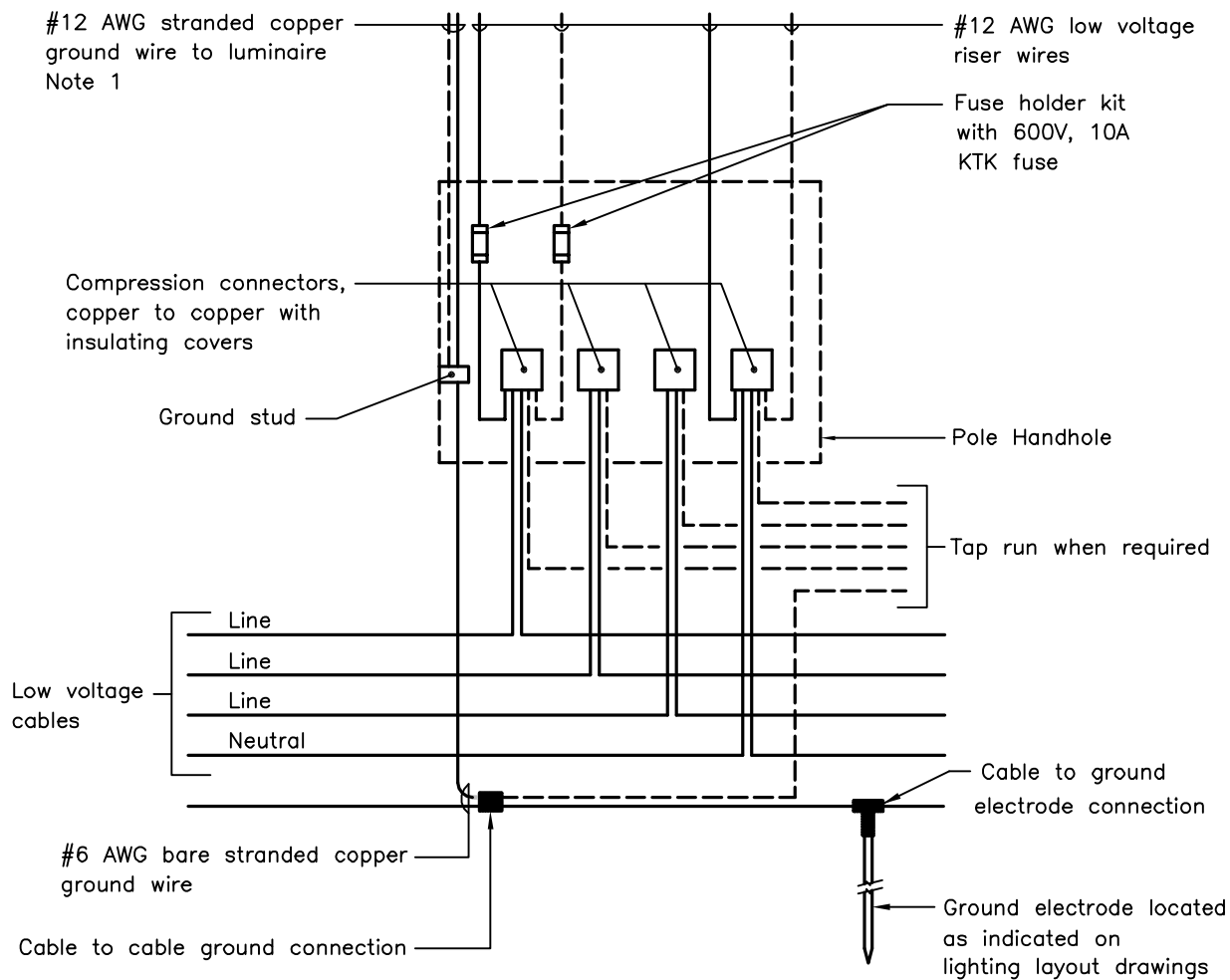
Nov 2013

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

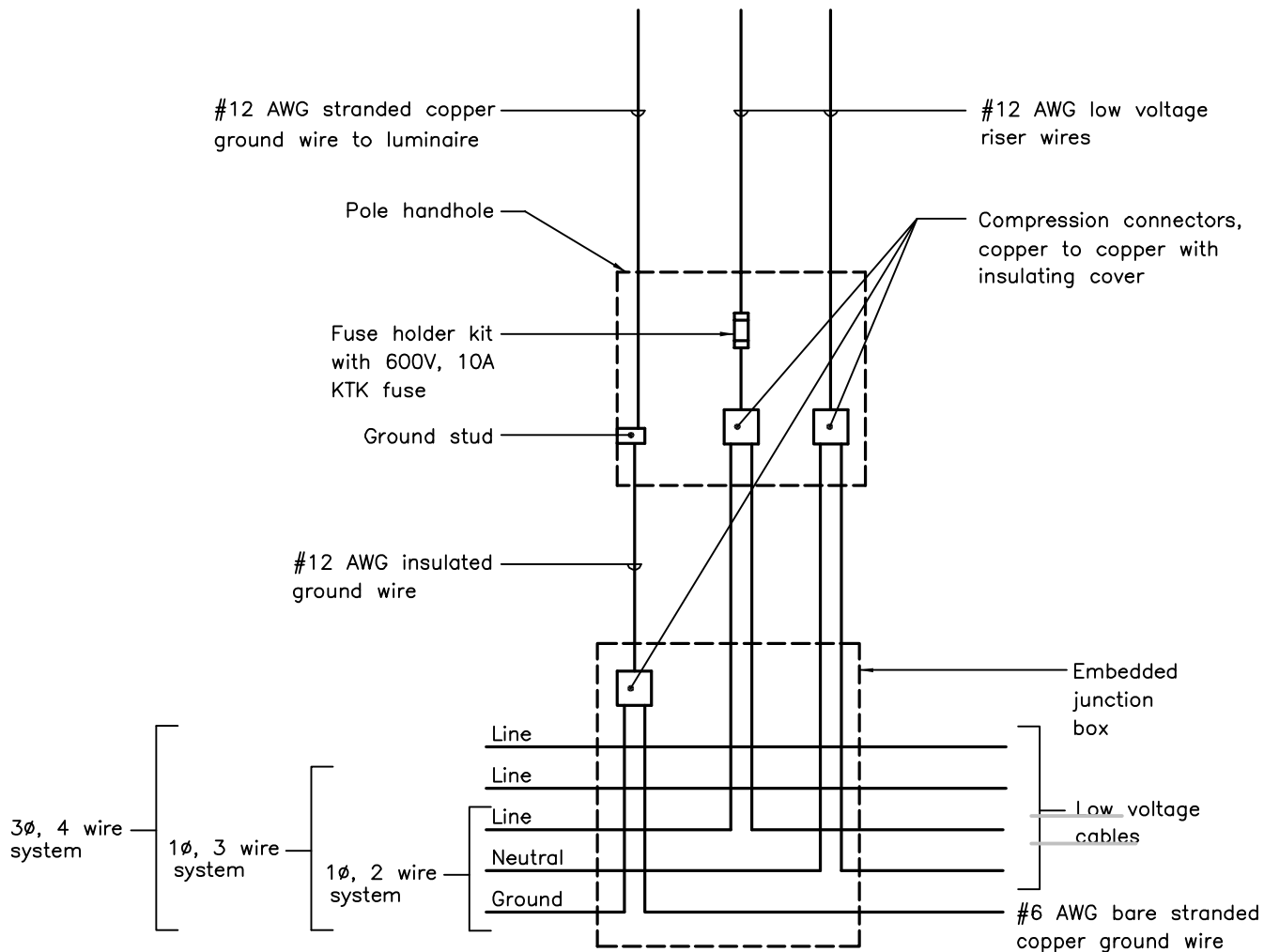
Rev 1

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

JUNCTION BOX ADAPTER SIZES

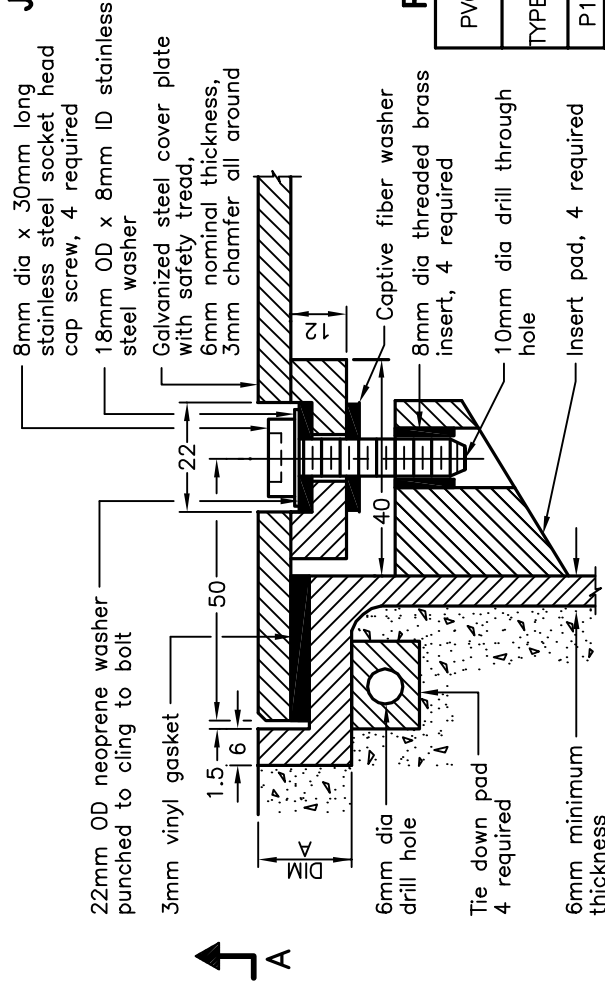
JUNCTION BOX ADAPTER	DRILL HOLE SIZES
25	33
30	42
40	48
50	60
65	73
75	88

DIMENSIONS OF TYPE P1 RIGID PVC JUNCTION BOXES

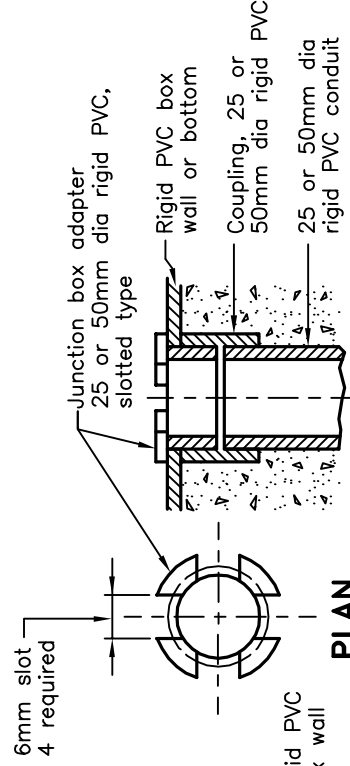
PVC BOX (INSIDE) DIMENSION	COVER THICKNESS		DIM A
	LENGTH	WIDTH	
P1-1	150	150	110
P1-2	150	150	160
P1-3	200	200	110
P1-4	200	200	160
P1-5	200	200	185
P1-6	250	200	185
P1-7	300	300	185
P1-8	400	200	185
P1-9	400	400	185

NOTES:

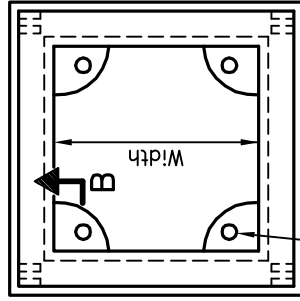
- 1 Rigid PVC transition coupling shall be suitable for use with embedded ducts.
- A For junction box conduit entries, refer to the Contract Drawings.
- B All dimensions are in millimetres unless otherwise shown.



SECTION B-B WITH COVER

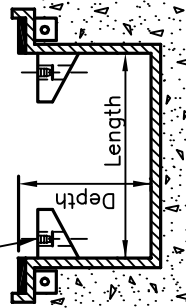


TYPICAL DETAIL FOR DRAINAGE

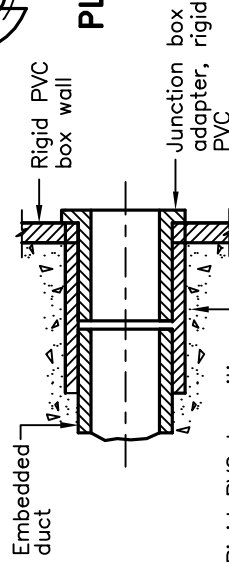


PLAN

4mm dia threaded brass insert 4 required



SECTION A-A



Embedded duct
Rigid PVC transition coupling
Note 1

TYPICAL CONNECTION FOR RIGID CONDUIT

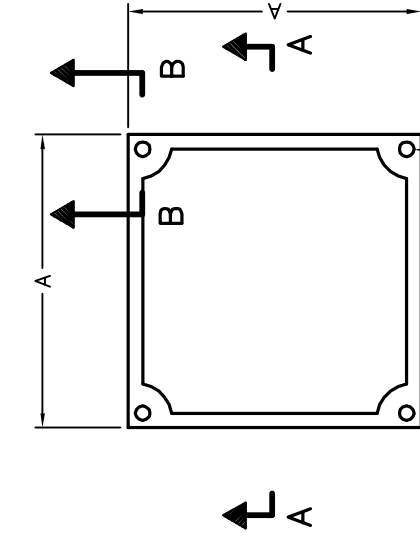
ONTARIO PROVINCIAL STANDARD DRAWING

RIGID PVC JUNCTION BOX TYPE P1

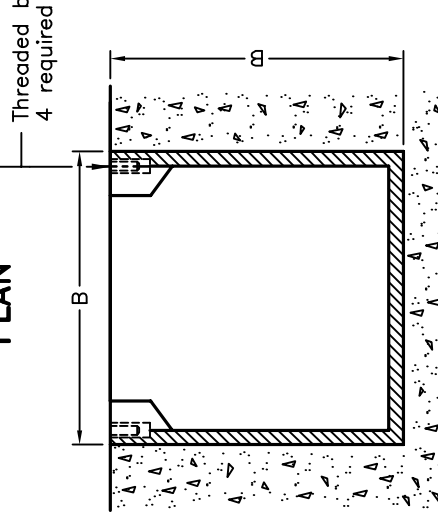
Nov 2013 Rev 1



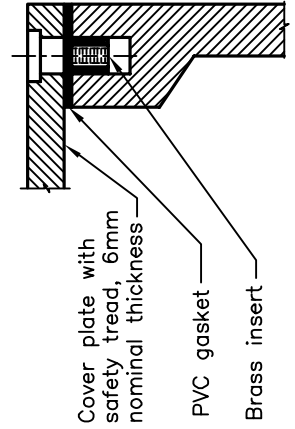
OPSD 2300.010



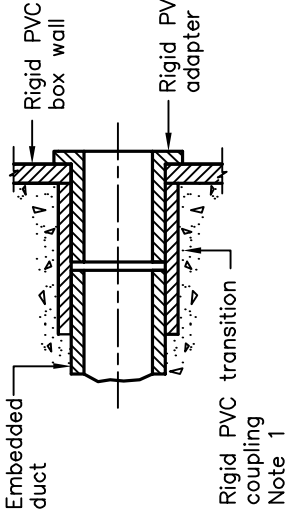
PLAN



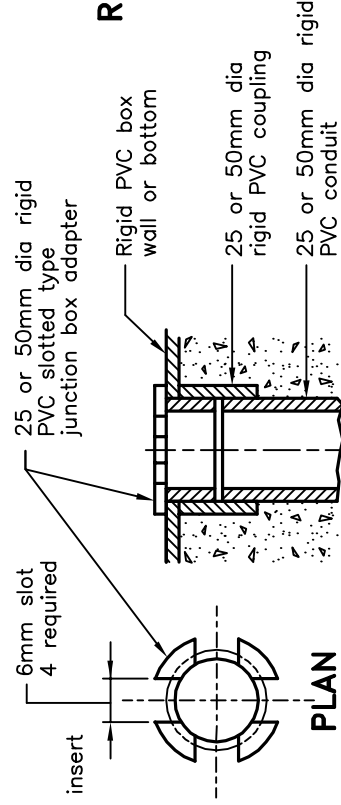
SECTION A-A



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

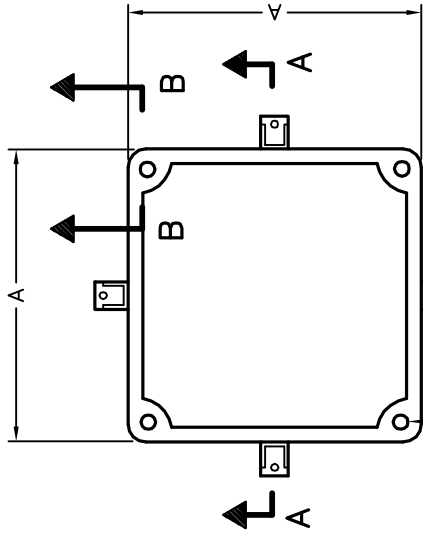
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 Rev 1

**RIGID PVC JUNCTION BOX
TYPE P2**

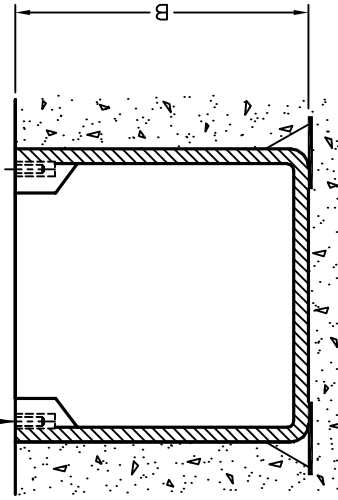
OPSD 2300.020



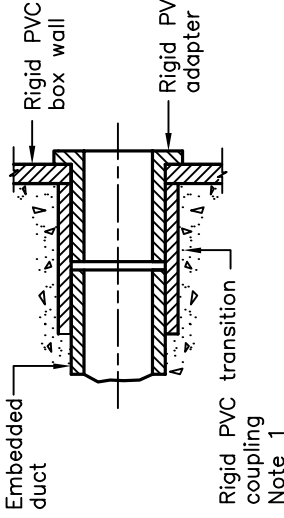
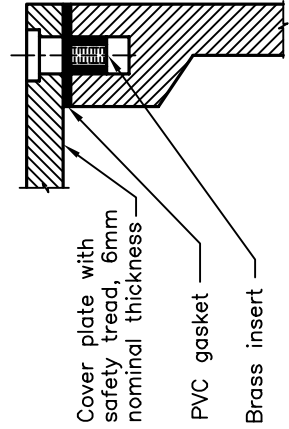


PLAN

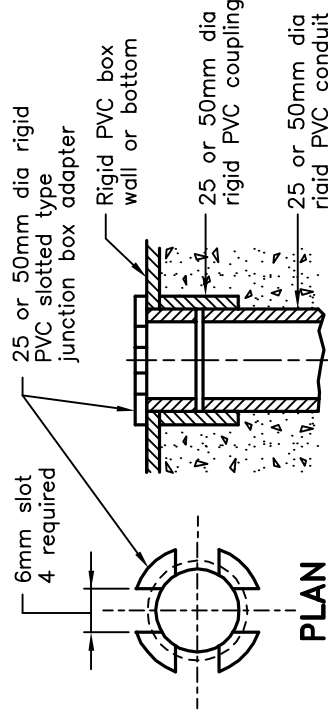
Threaded brass insert
4 required



SECTION A-A



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

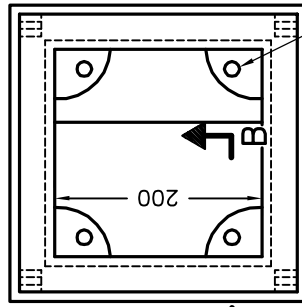
RIGID PVC JUNCTION BOX
TYPE P4

Nov 2013

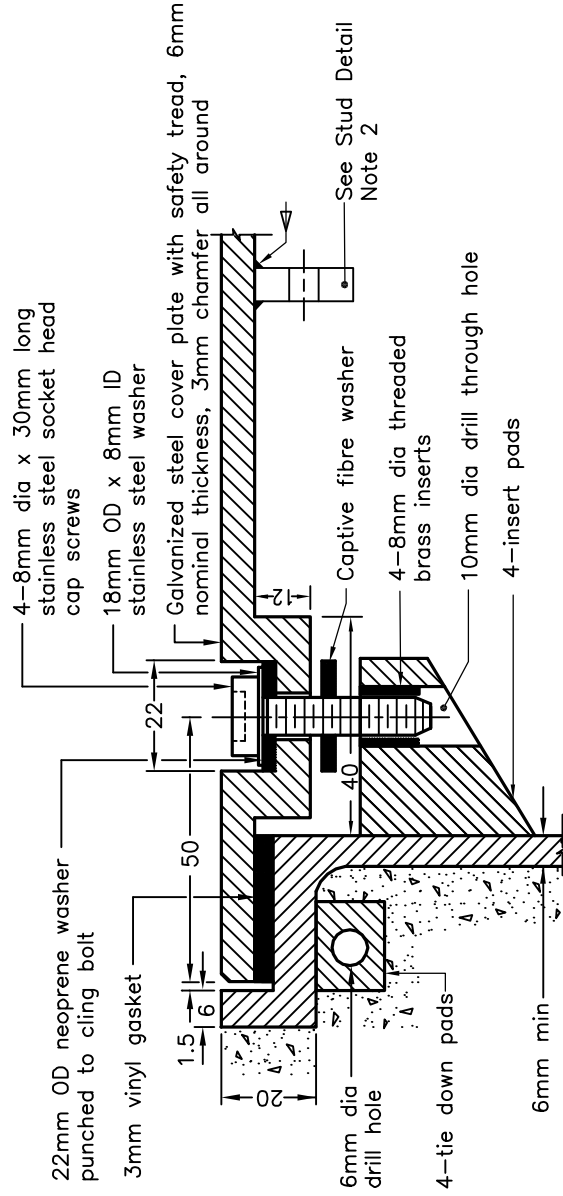
Rev 1



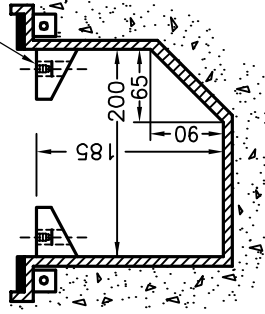
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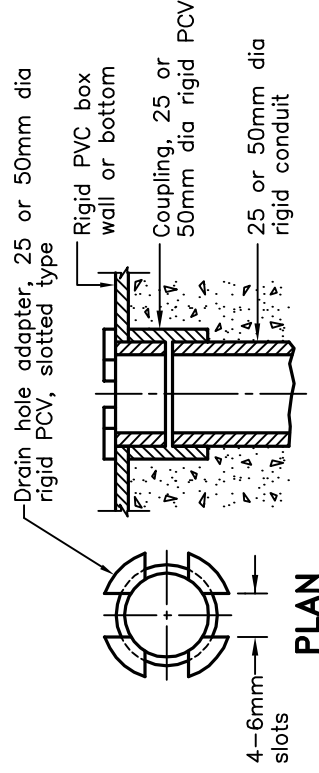
**RIGID PVC
JUNCTION BOX
PLAN**



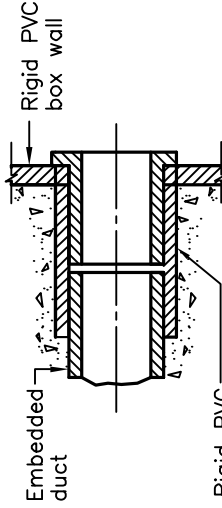
SECTION B-B WITH COVER



SECTION A-A



PLAN

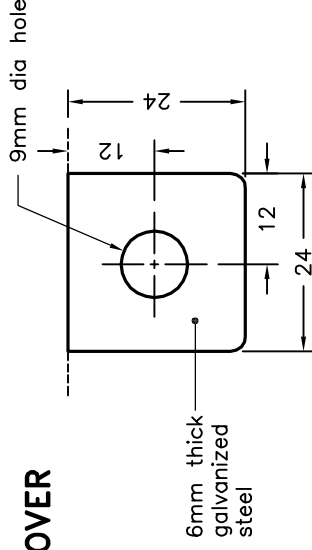


**TYPICAL CONNECTION
FOR RIGID CONDUIT**

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.

STUD DETAIL



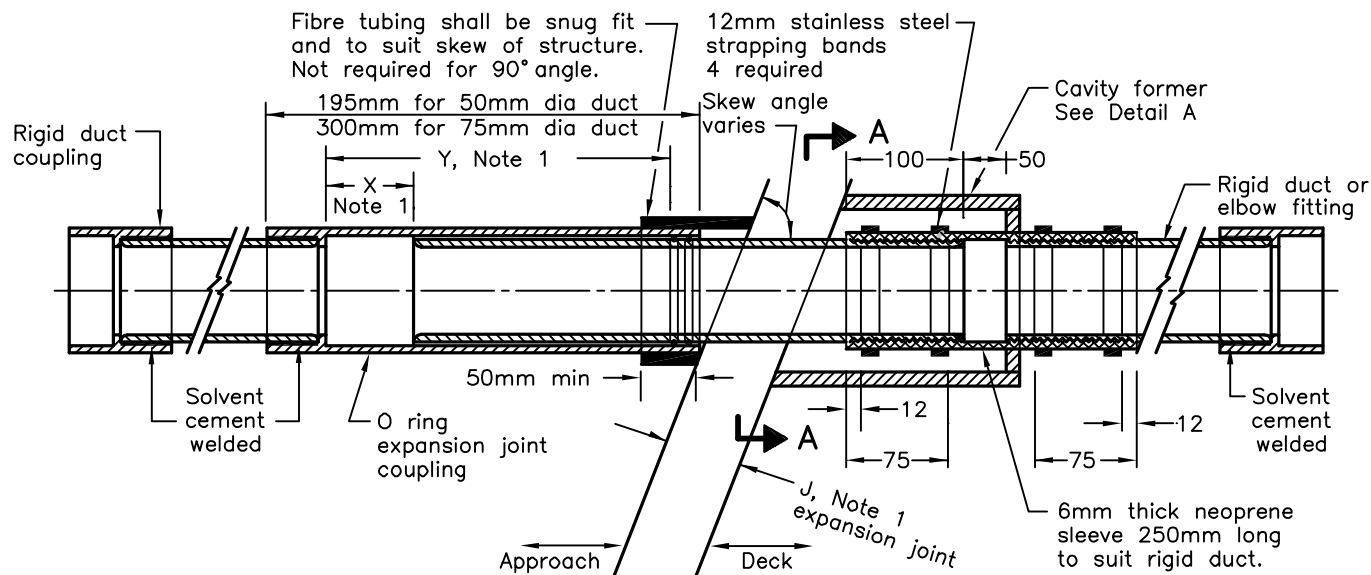
ONTARIO PROVINCIAL STANDARD DRAWING



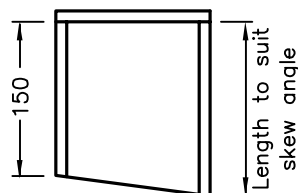
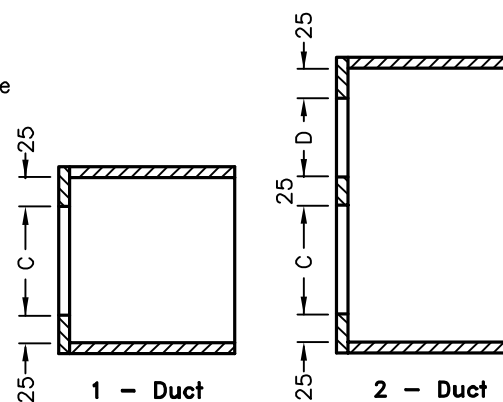
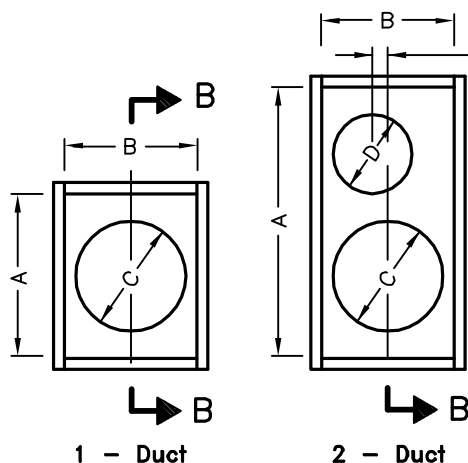
Nov 2010 Rev 1

EMBEDDED WORK DETAIL
FOR RIGID PVC JUNCTION BOX, TYPE P3-1,
FOR USE IN CONCRETE BARRIER WALL

OPSD 2302.010



PLAN - FITTING ASSEMBLY



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.
 $Y=\text{Max } J - \text{Min } J + 50$, 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

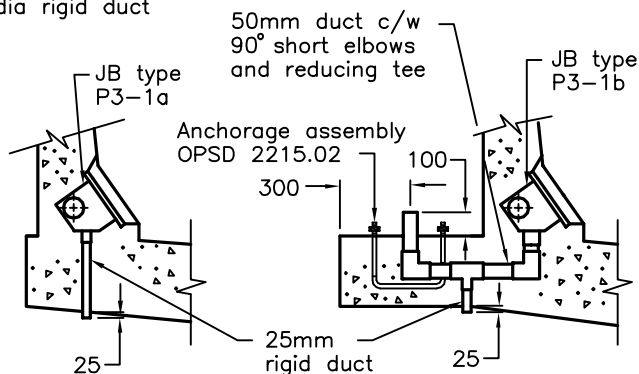
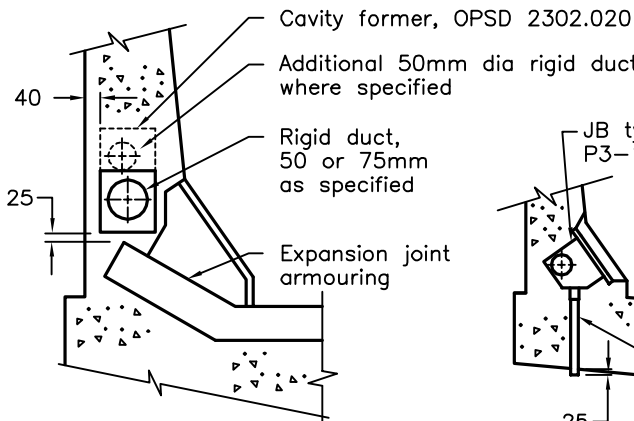
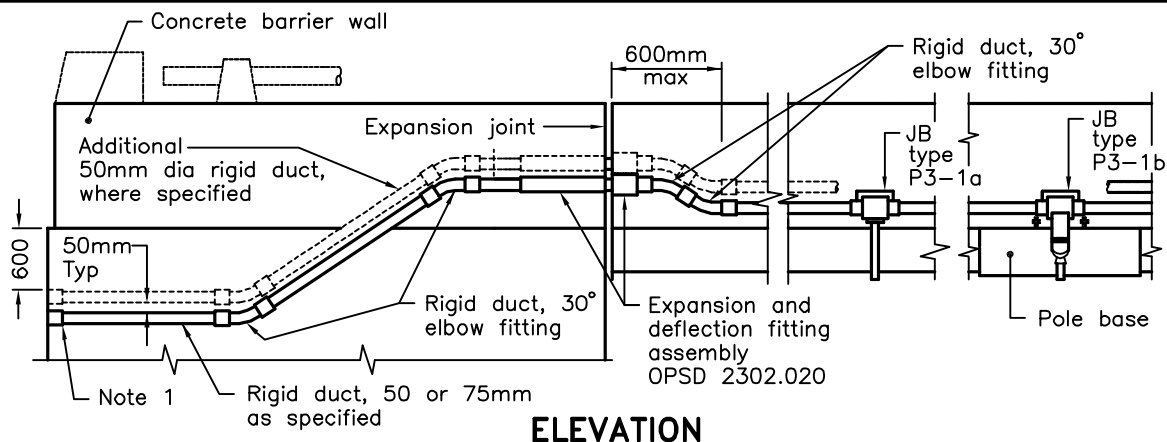
Nov 2013

Rev 0

EXPANSION AND DEFLECTION
FITTING ASSEMBLY
FOR 50 AND 75mm RIGID DUCTS

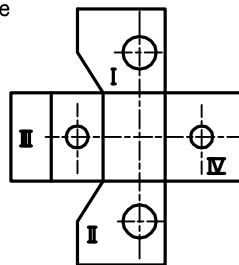
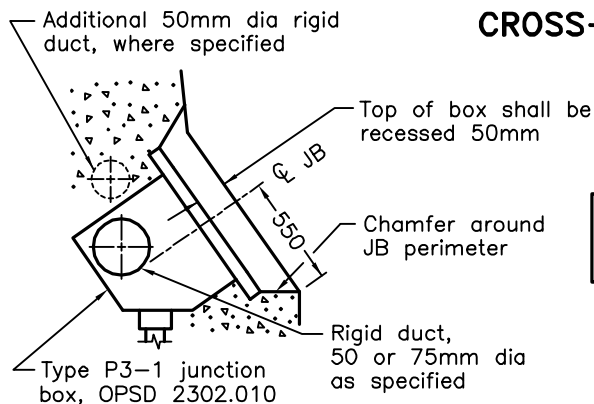


OPSD 2302.020



AT POLE BASE

CROSS-SECTION DETAILS



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

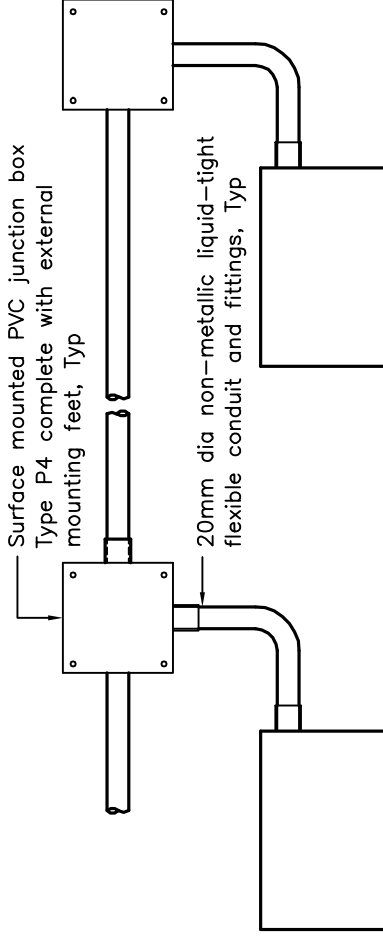
**EMBEDDED WORK
IN STRUCTURE**

NEW JERSEY TYPE CONCRETE BARRIER WALL

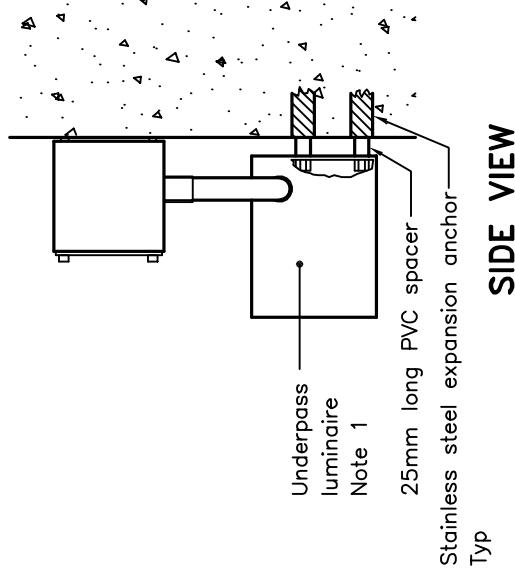


OPSD 2302.040

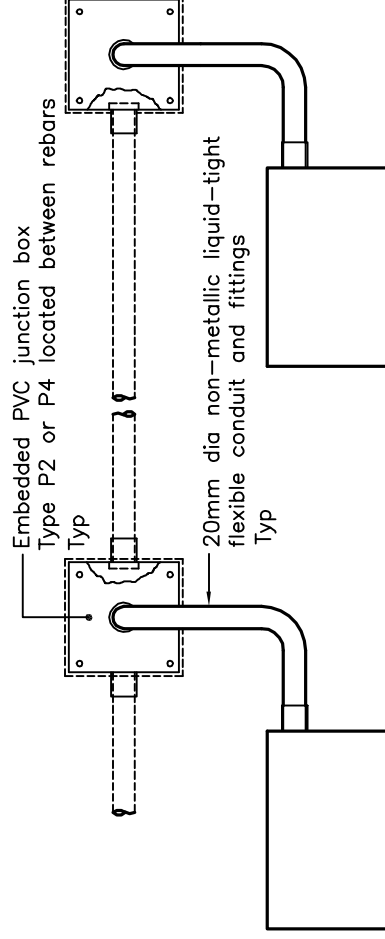




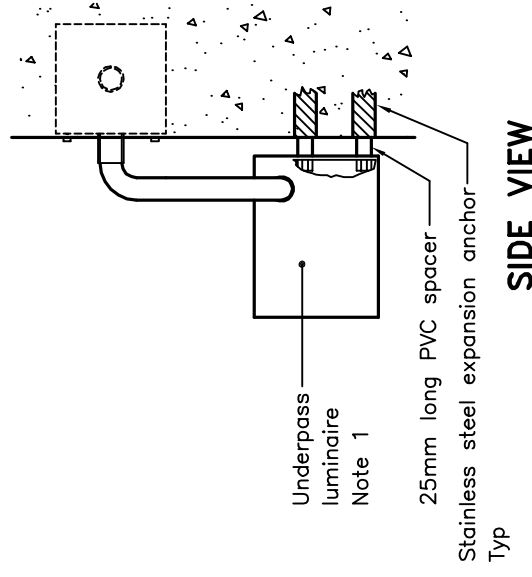
FRONT VIEW
SURFACE MOUNTED DUCTS AND JUNCTION BOXES



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.

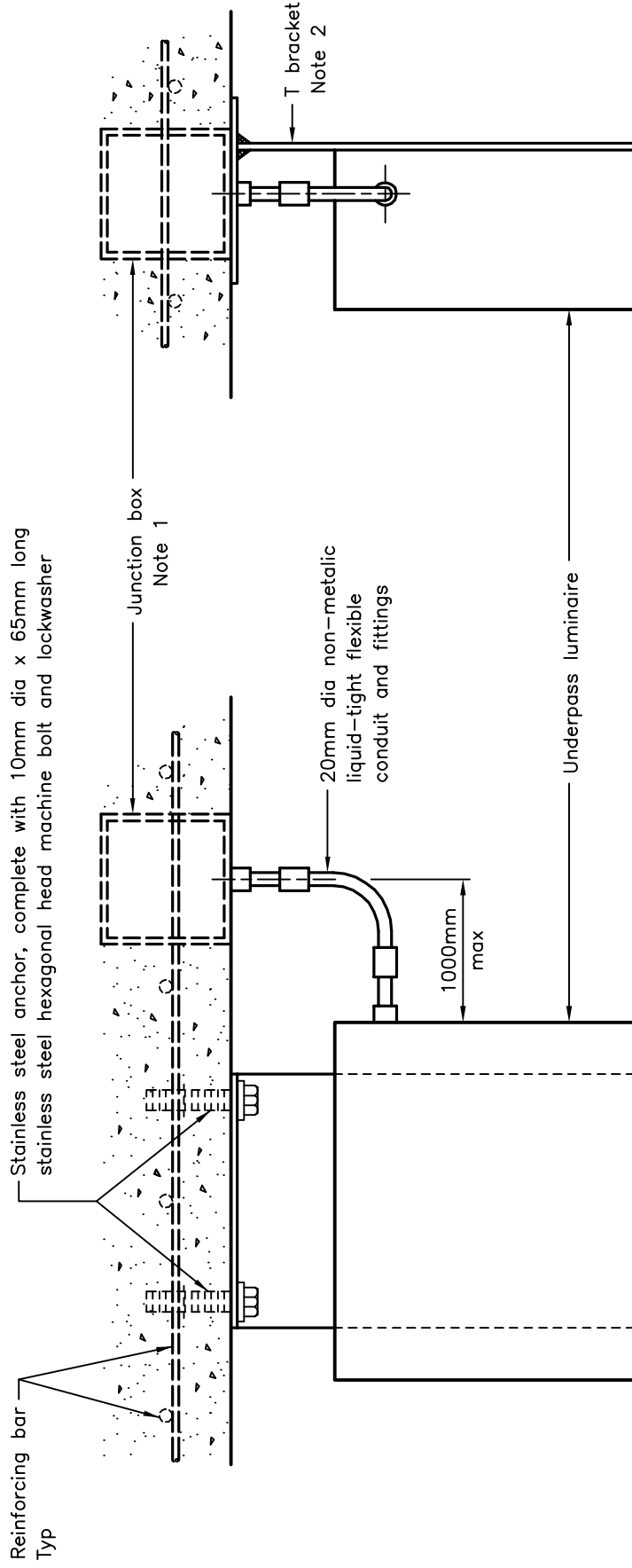
ONTARIO PROVINCIAL STANDARD DRAWING

UNDERPASS LUMINAIRES
WALL MOUNTED INSTALLATION

Nov 2016 Rev 2



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 OPD 2310.030.
- A This OPD shall be read in conjunction with OPD 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.

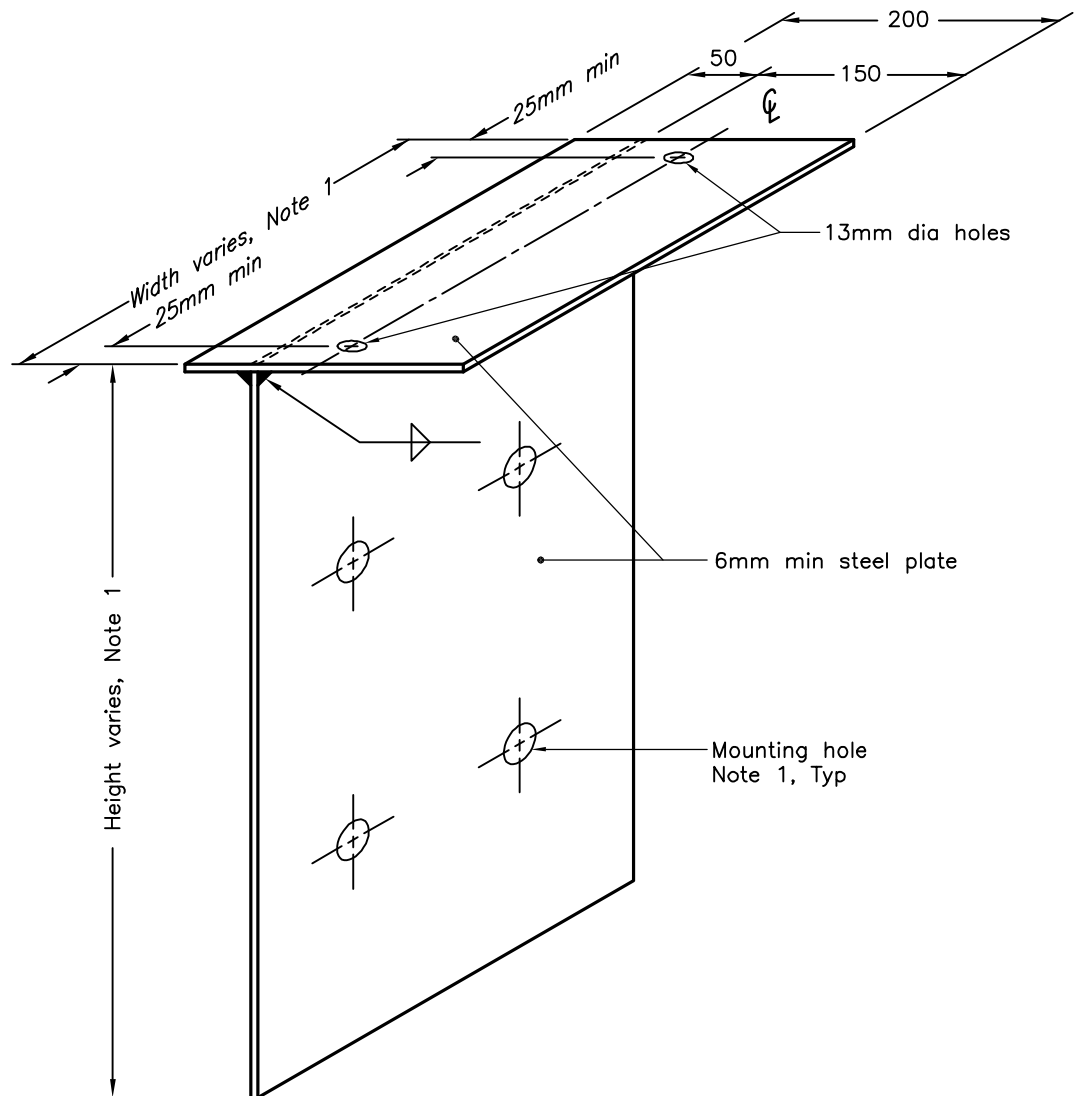
ONTARIO PROVINCIAL STANDARD DRAWING

UNDERPASS LUMINAIRE CEILING MOUNTED INSTALLATION WITH T BRACKET

Nov 2016 Rev 1



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

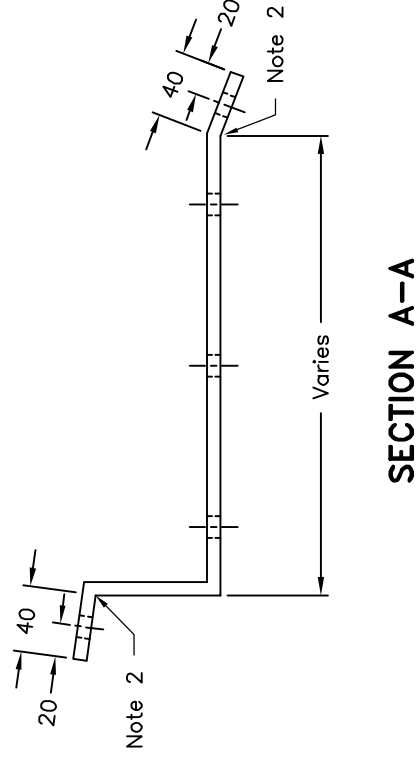
Nov 2016

Rev 2

T BRACKET FOR
CEILING MOUNTED UNDERPASS LUMINAIRE

OPSD 2310.020

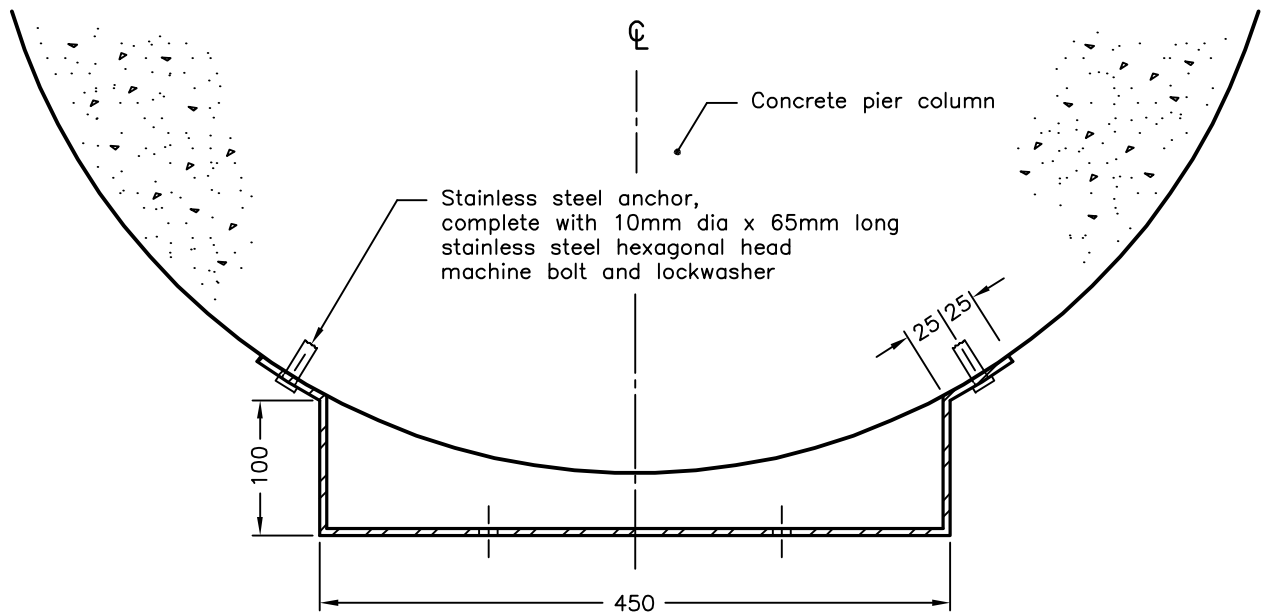




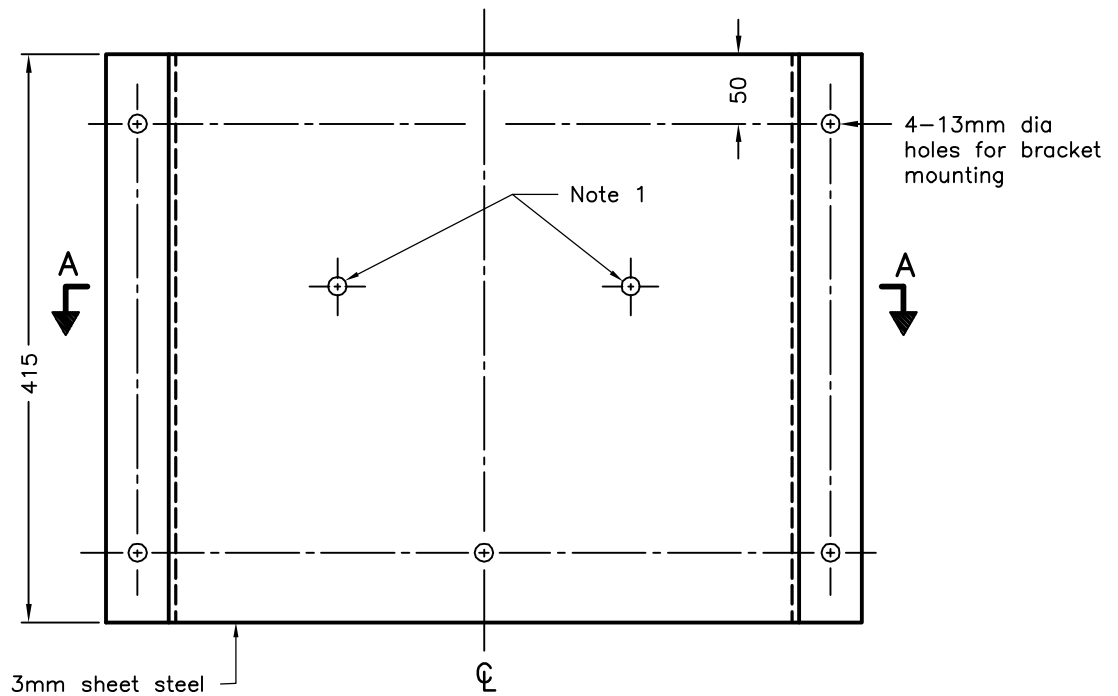
PLAN

- 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.

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

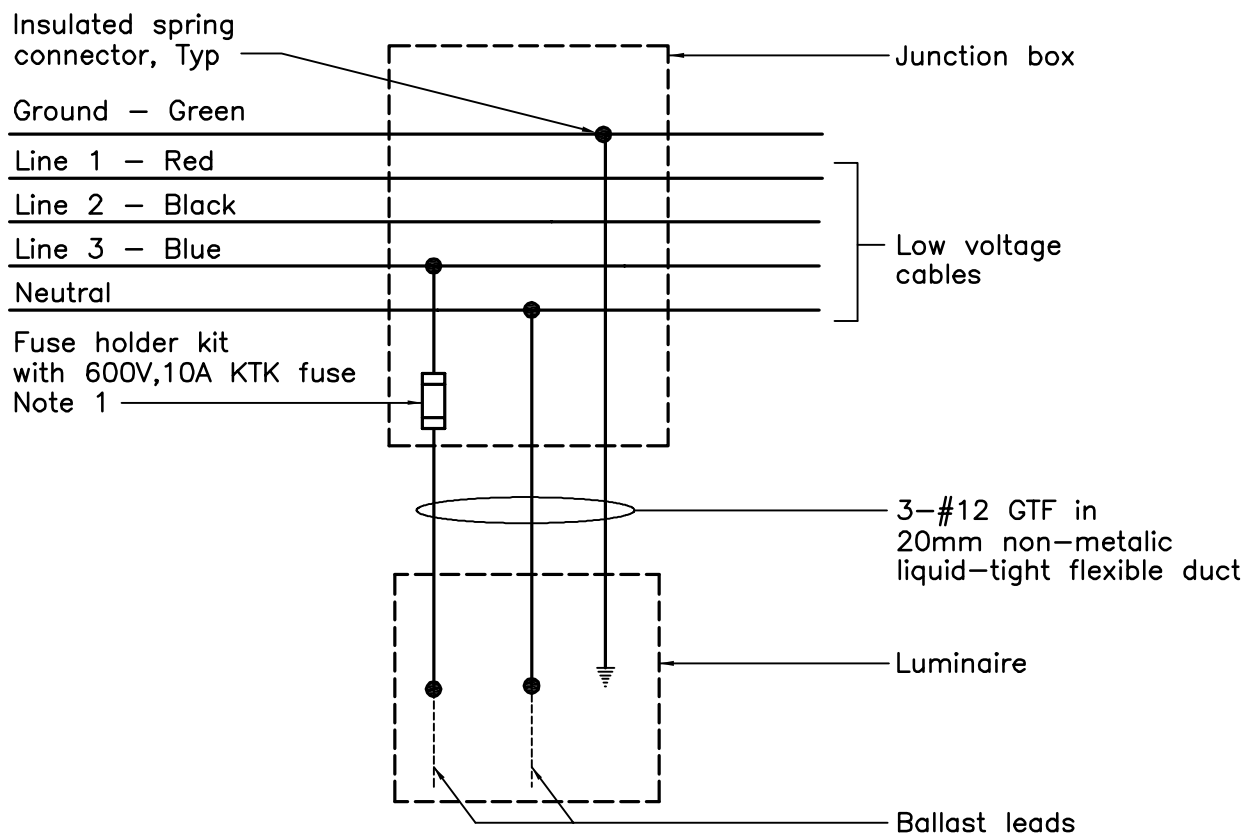
Nov 2016

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

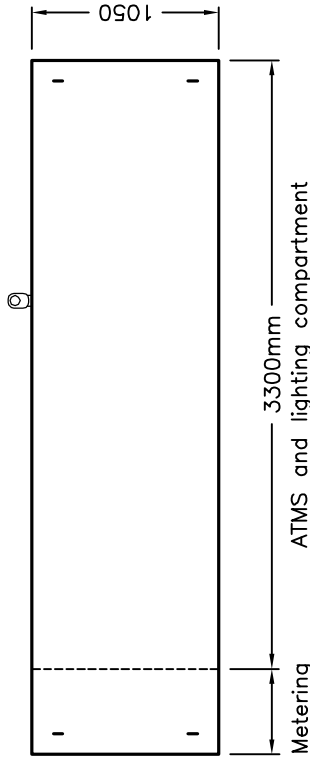
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 | Rev | 2

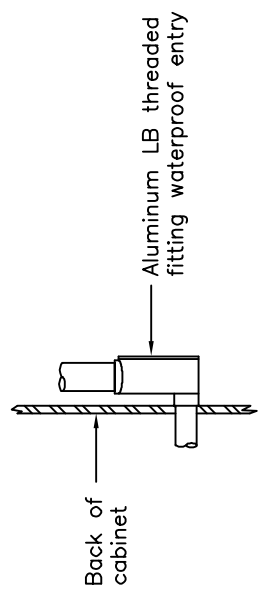
DISTRIBUTION ASSEMBLY LEGEND

OPSD 2400.000

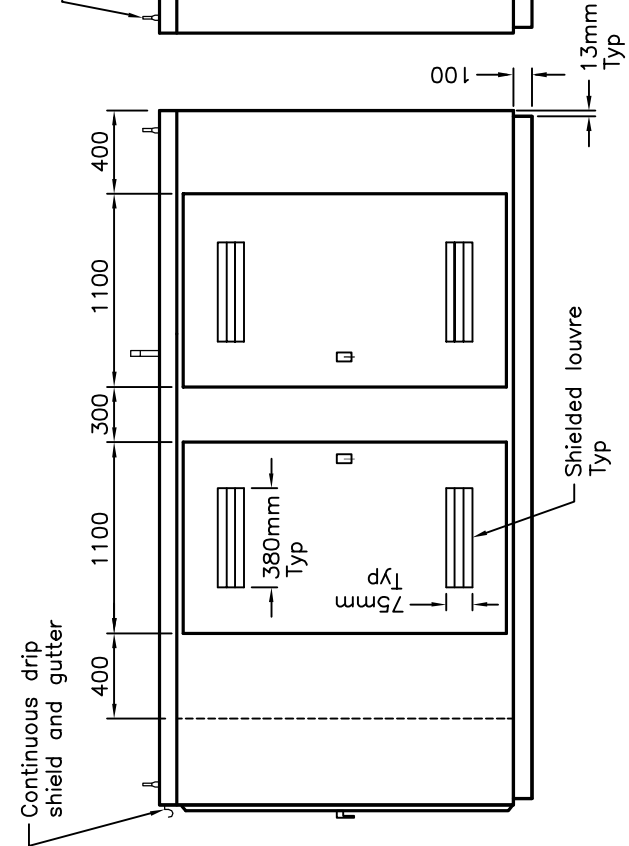




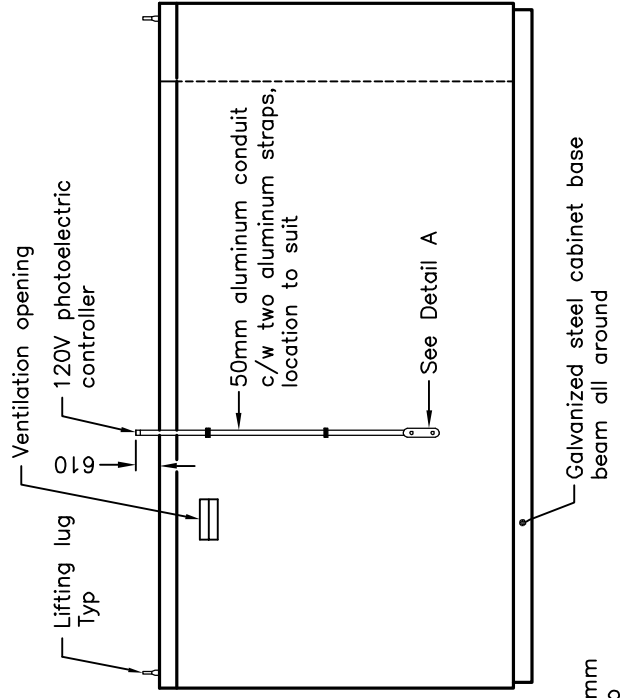
PLAN



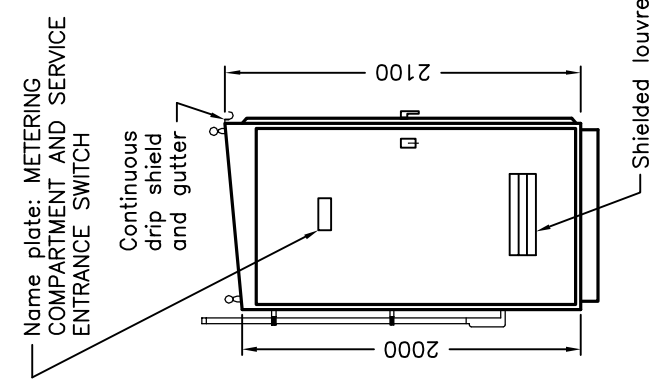
DETAIL A



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 OPD to be read in conjunction with OPD 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

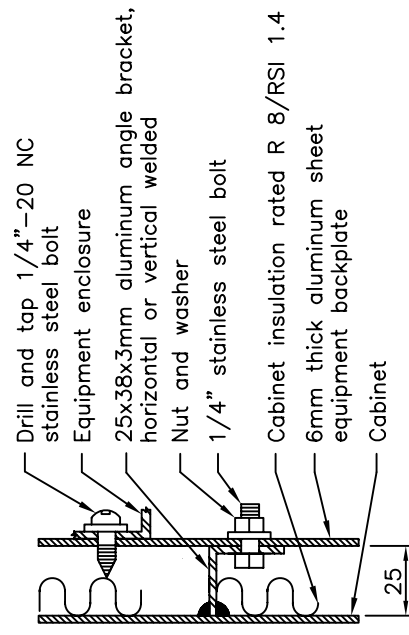
DISTRIBUTION ASSEMBLY

CABINET

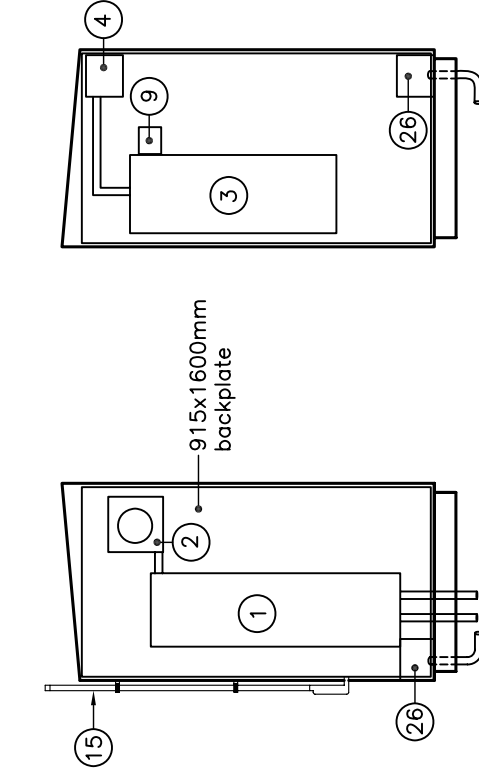
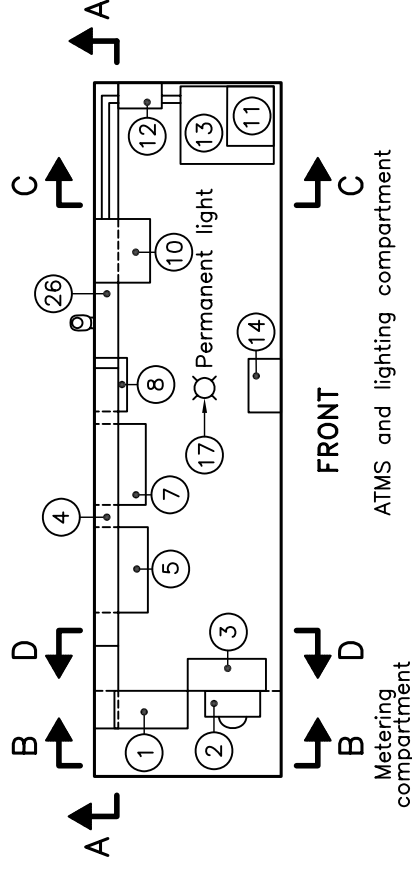


Nov 2010	Rev 2
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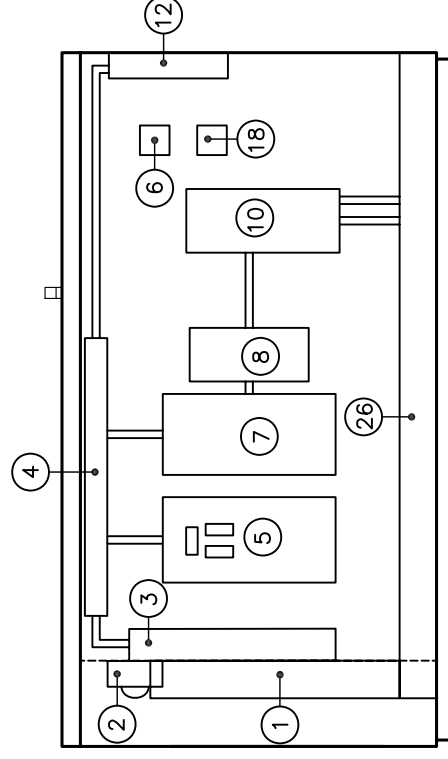
OPSD 2400.010



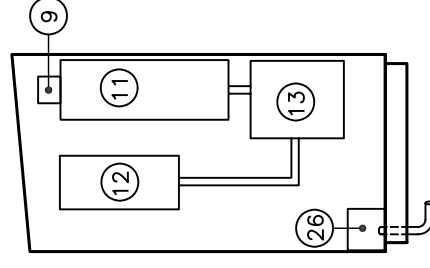
EQUIPMENT MOUNTING DETAIL



SECTION B-B



SECTION A-A

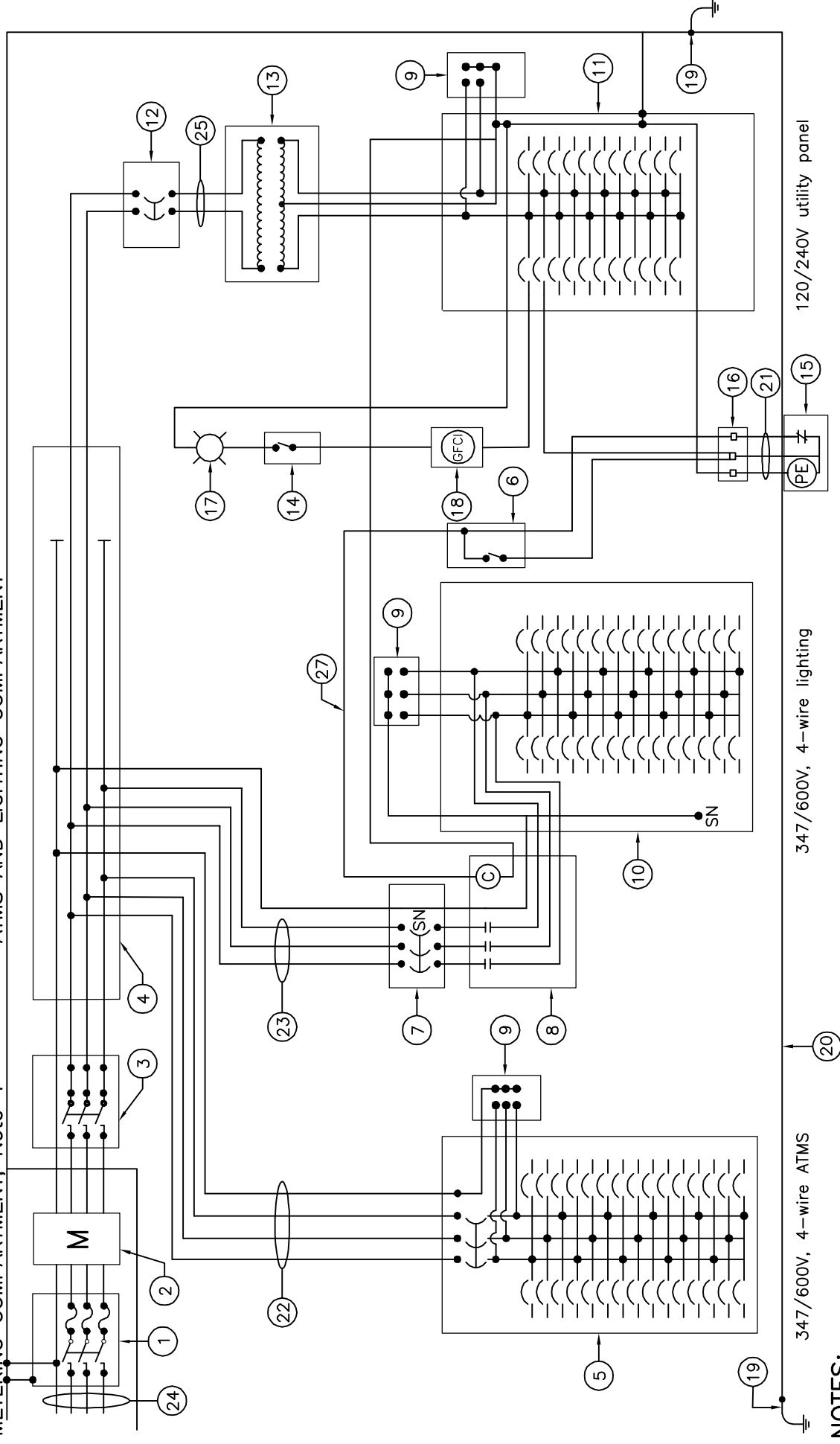


SECTION C-C

NOTES:

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

B All dimensions are in millimetres unless otherwise shown.



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 OPSP shall be read in conjunction with OPSP 2400.000.
- C All dimensions are in millimetres unless otherwise shown.

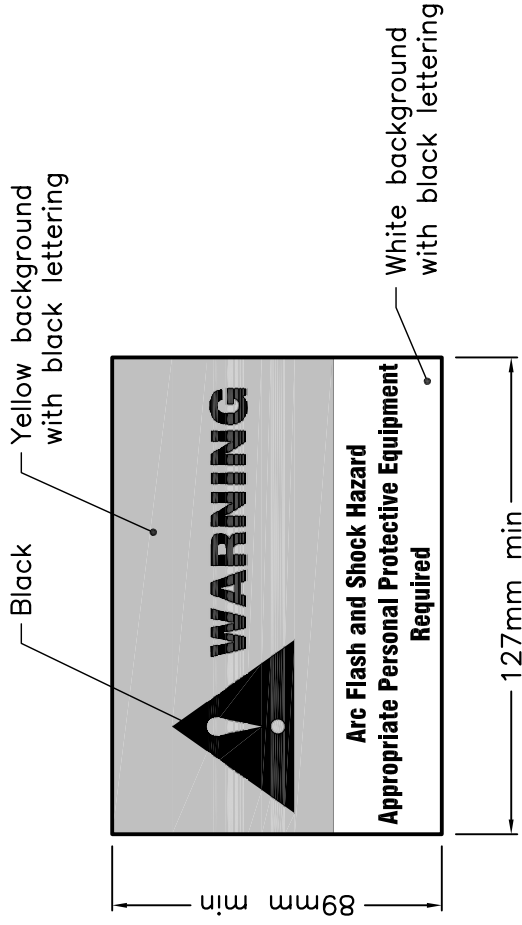
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 Rev 2

DISTRIBUTION ASSEMBLY WIRING SCHEMATIC



OPSD 2400.030



NOTES:

- A Signs shall be fabricated with permanent and weatherproof material.
- B All dimensions are in millimetres unless otherwise shown.

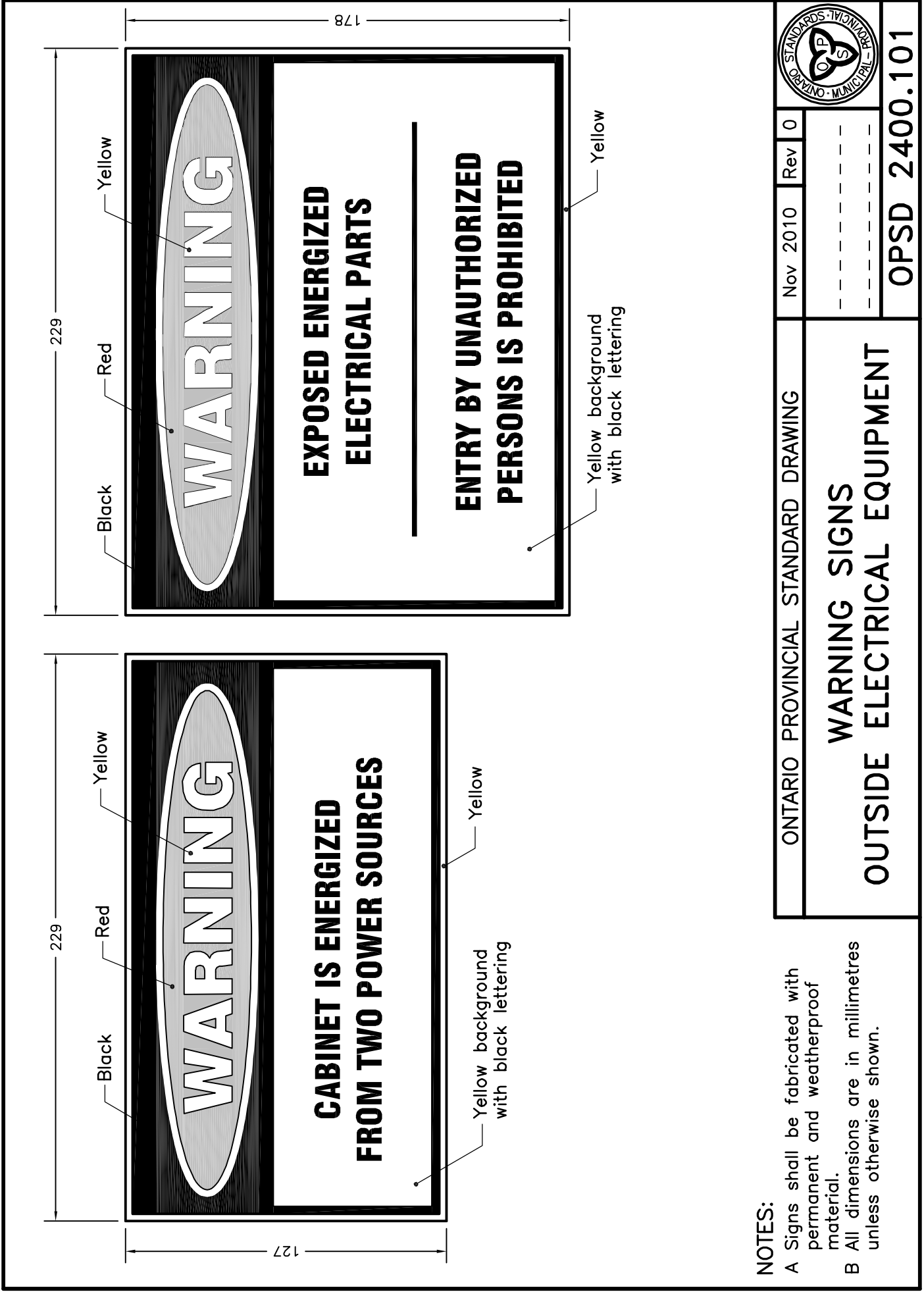
ONTARIO PROVINCIAL STANDARD DRAWING

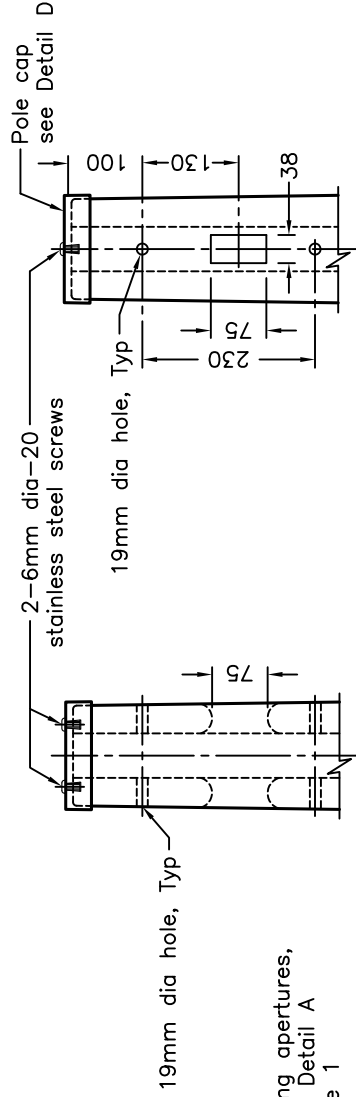
Nov 2008 Rev 0



WARNING SIGNS
FOR ELECTRICAL EQUIPMENT

OPSD 2400.100

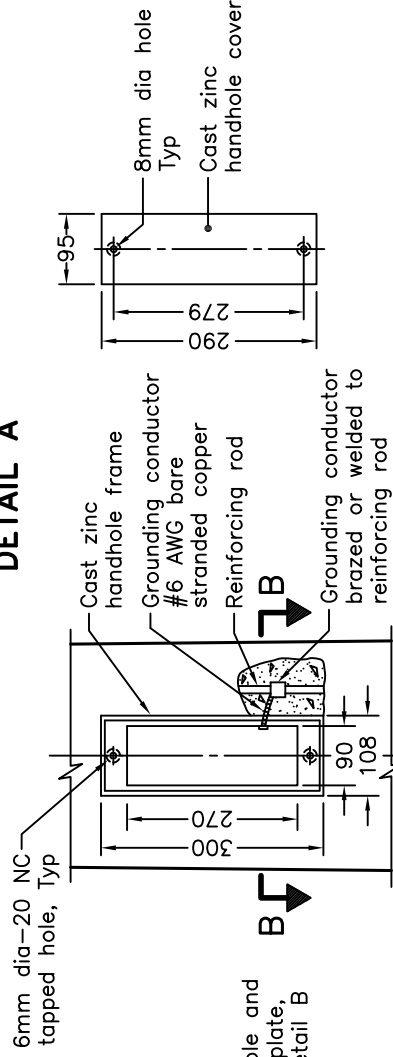




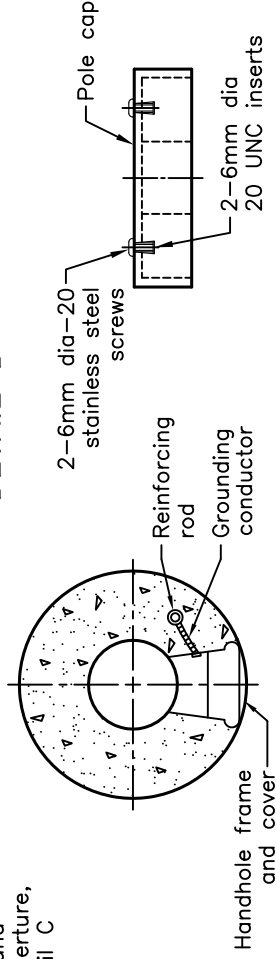
FRONT VIEW

SIDE VIEW

DETAIL A



DETAIL B



SECTION B-B

DETAIL D

SECTION C-C

DETAIL C

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	

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

Nov 2012 Rev 3



SPUN CONCRETE POLE

OPSD 2410.01



- 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.

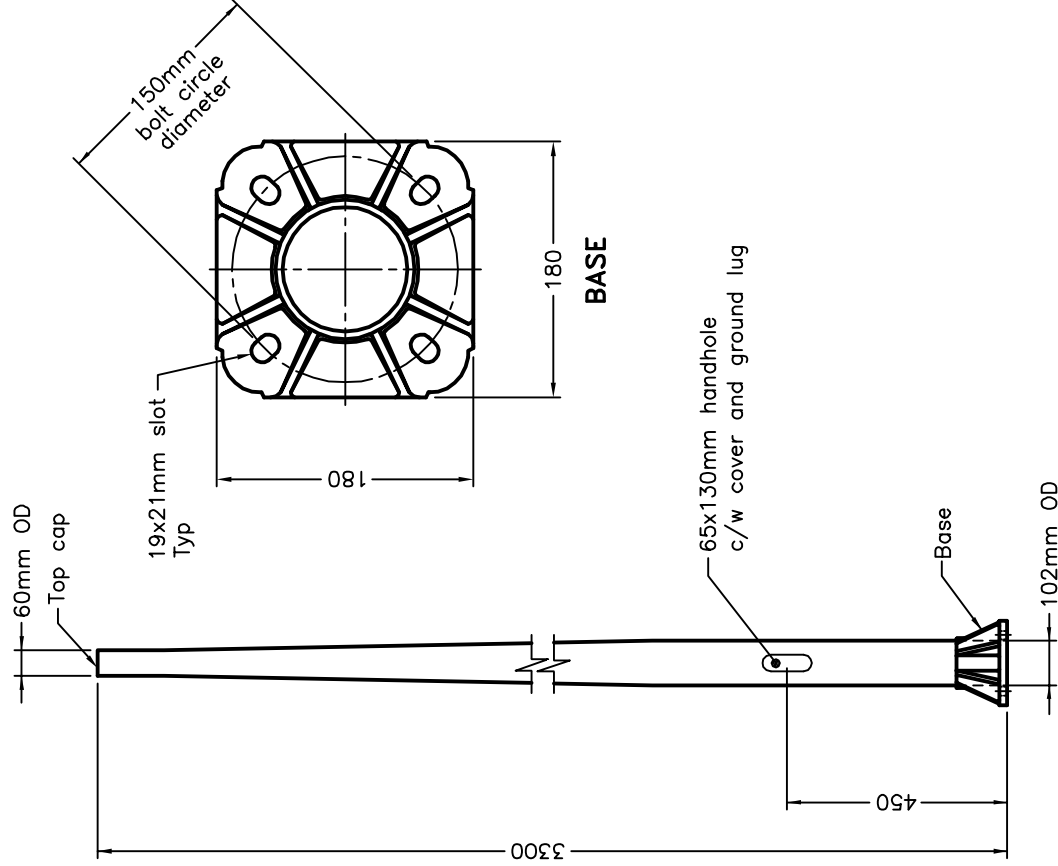


ONTARIO PROVINCIAL STANDARD DRAWING

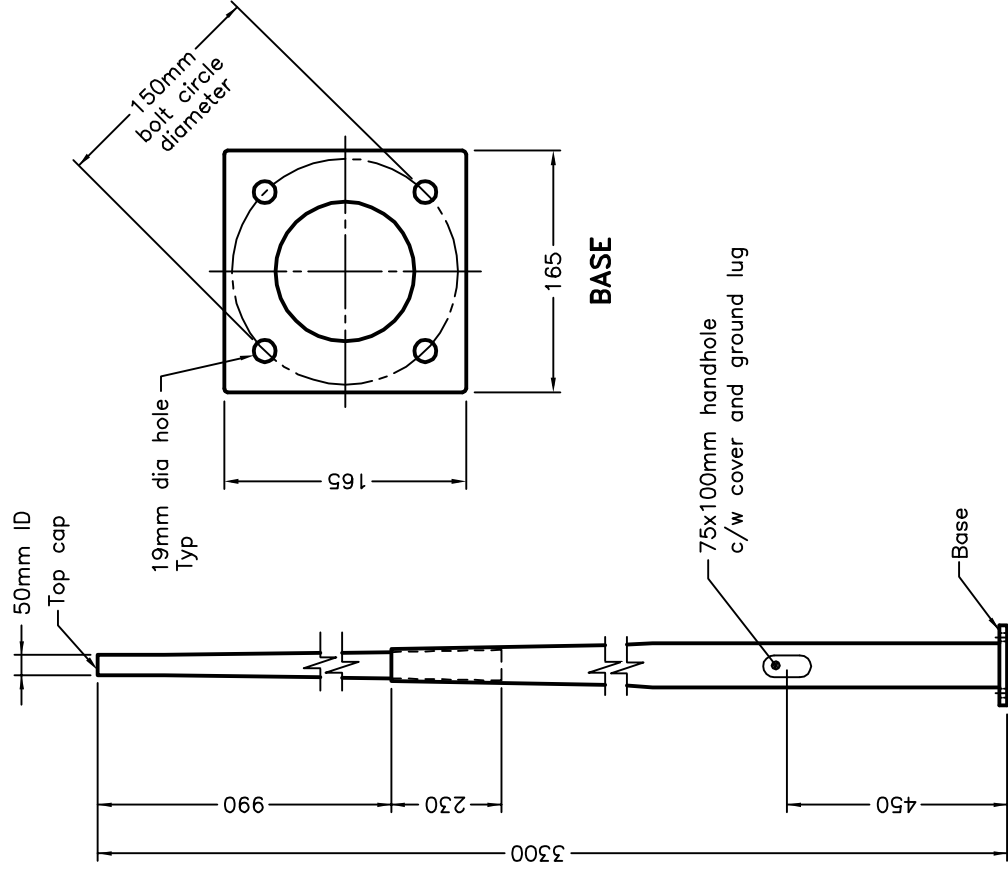
18.3m SPUN CONCRETE POLE FOR TV CAMERA MOUNTING

Nov 2012	Rev 0

OPSD 2410.020



ALUMINUM POLE



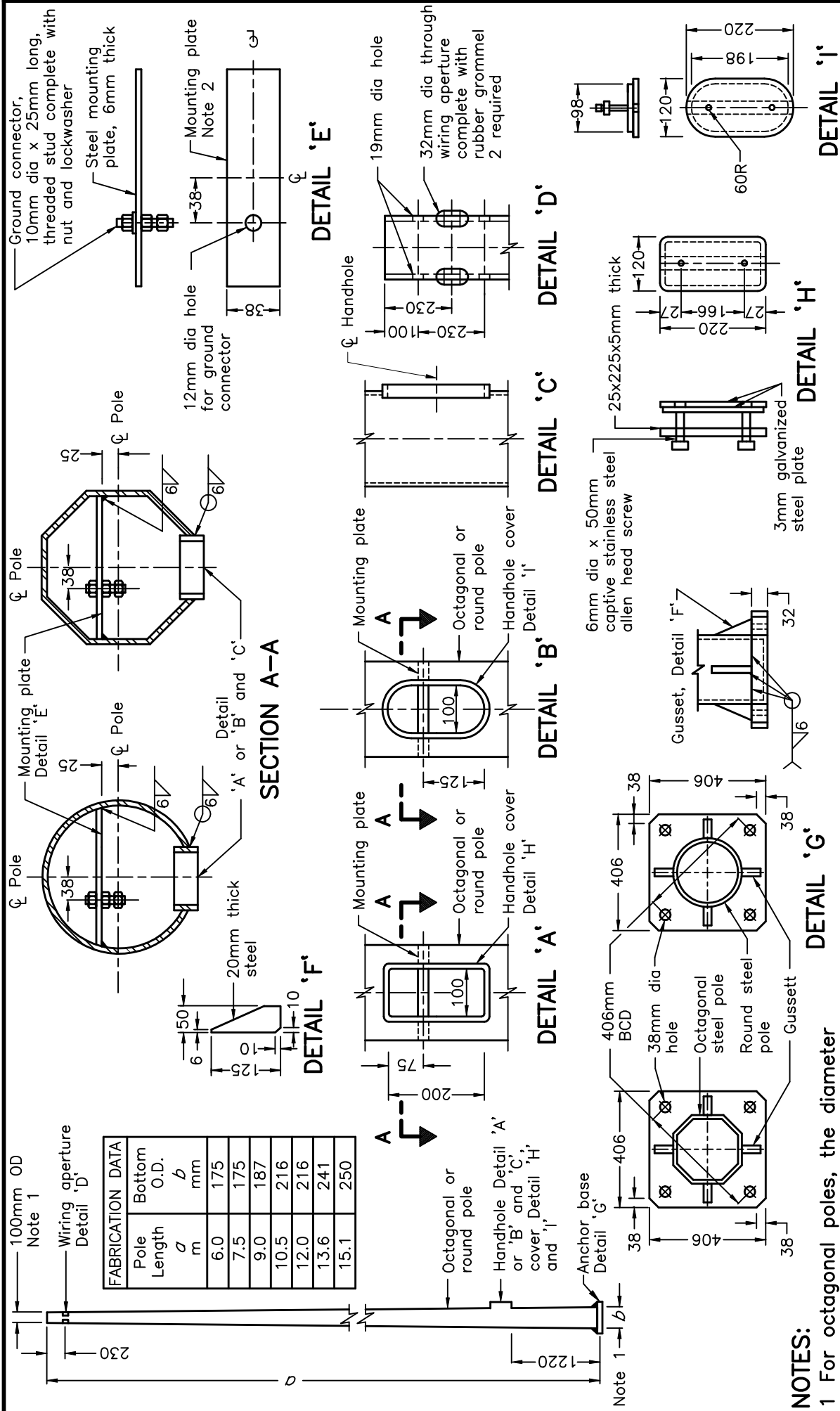
SECTIONAL STEEL POLE

NOTES:

- A This OPSP shall be read in conjunction with OPSP 2200.04.
- B All dimensions are in millimetres unless otherwise shown.

	Nov 2015	Rev 0
OPSP 2414.010		

ONTARIO PROVINCIAL STANDARD DRAWING
 3.3m ALUMINUM AND SECTIONAL
 STEEL POLES, BASE MOUNTED



NOTES:

- For octagonal poles, the diameter shall be measured across the flats
- Centre line of mounting plate, and ground connector to be 25mm above centre of handhole.
- All shafts shall be 4.5mm steel.
- All dimensions are in millimetres or metres unless otherwise shown.

OPSD - 2415.010

ONTARIO PROVINCIAL STANDARD DRAWING

1993 12 15

STEEL POLE BASE MOUNTING

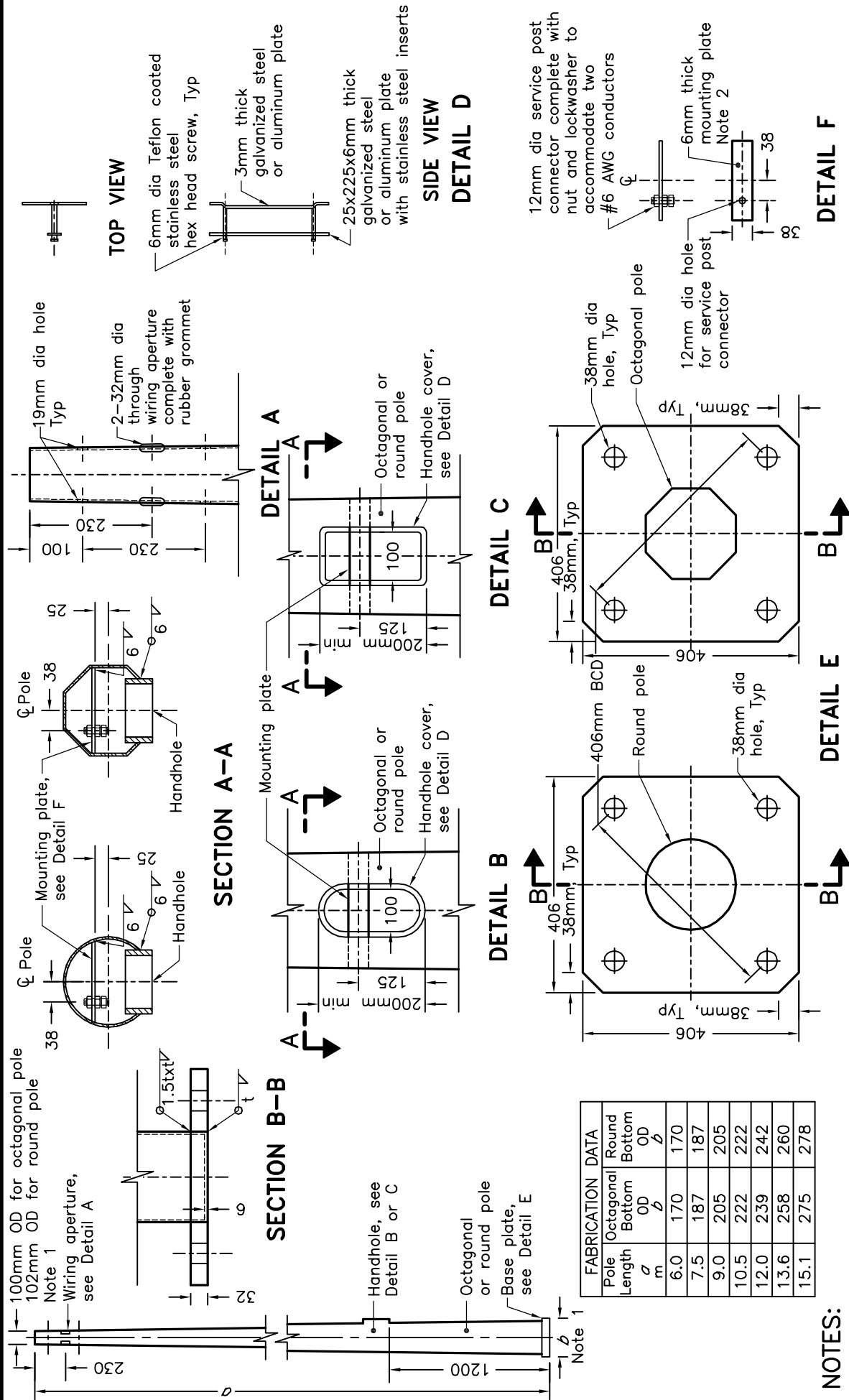
Rev

DATE

1993 12 15

DATE

1993 12 15



NOTES:

- For octagonal poles, the diameter shall be measured across the flats.
- Centreline of mounting plate and ground connector shall be 25mm above centreline of handhole.
- All shafts shall be 4.5mm thick steel.
- All dimensions are in millimetres unless otherwise shown.

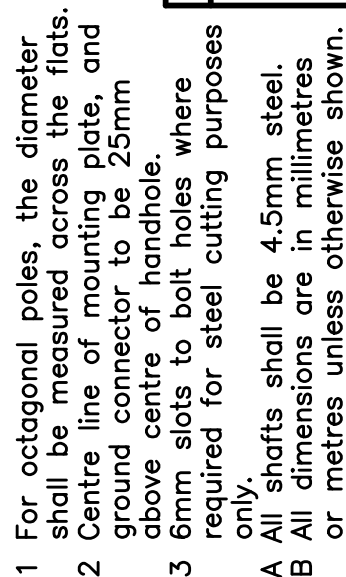
ONTARIO PROVINCIAL STANDARD DRAWING

STEEL POLE

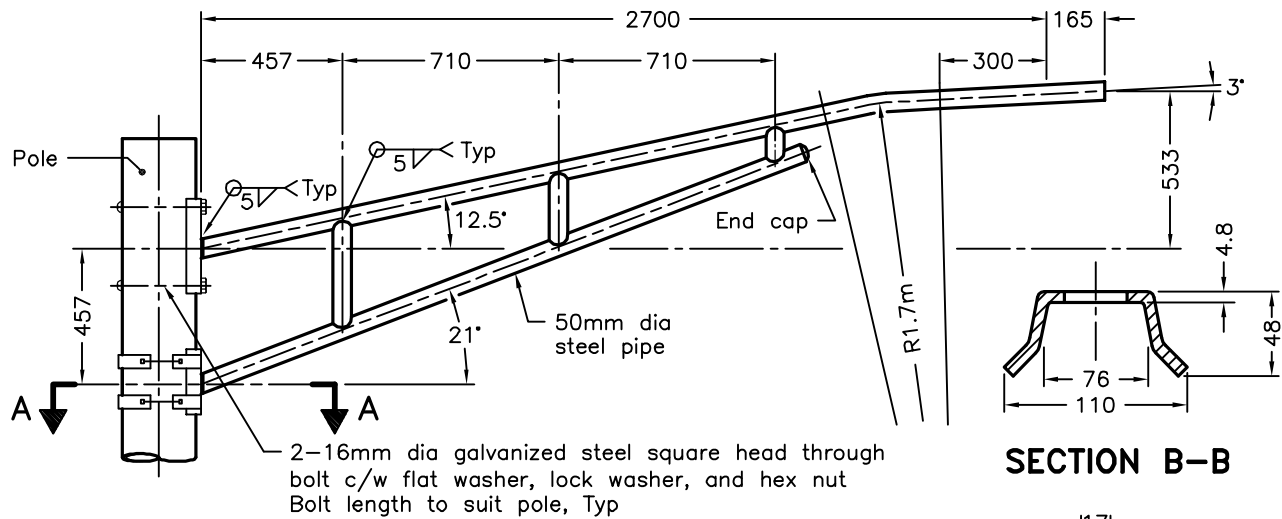
BASE MOUNTED WITHOUT GUSSETS

Nov 2010 Rev 0

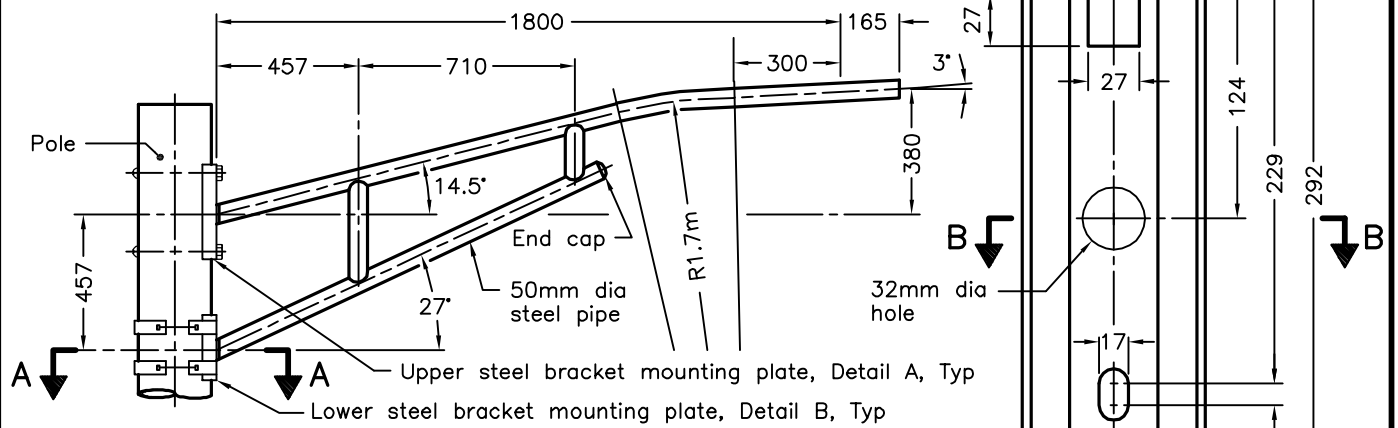
OPSD 2415.011



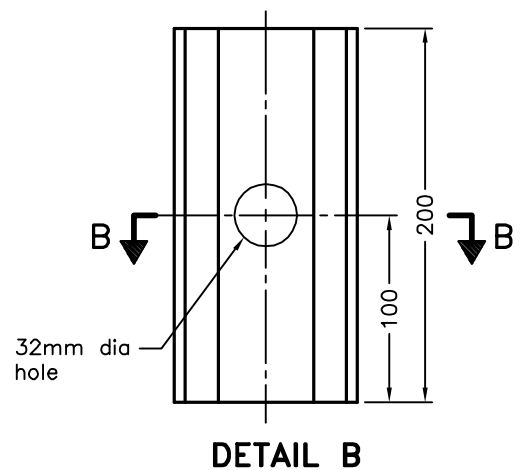
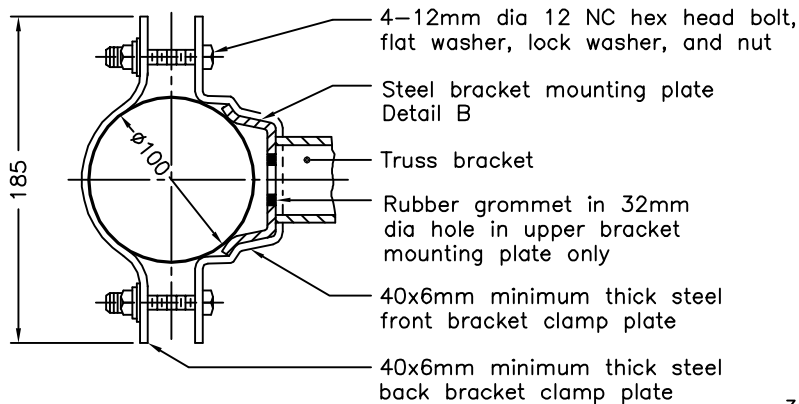
1993 12 15	Rev	
_____ Date _____		
OPSD – 2416.010		



2.7m STEEL TRUSS BRACKET



1.8m STEEL TRUSS BRACKET



NOTES:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

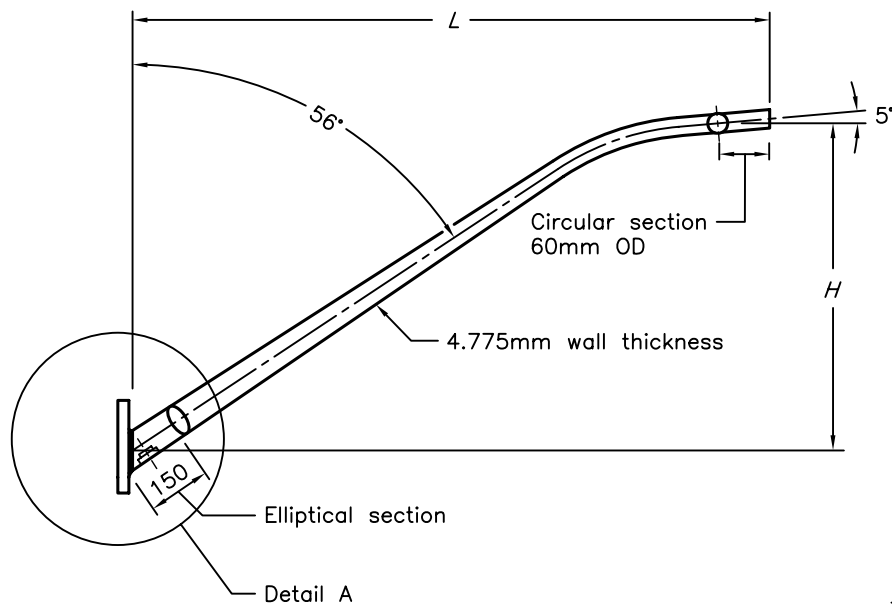
Nov 2016

Rev 2

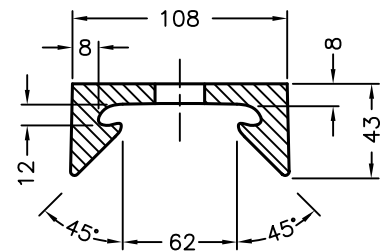
**1.8m AND 2.7m
STEEL TRUSS BRACKET
FOR STEEL POLES**



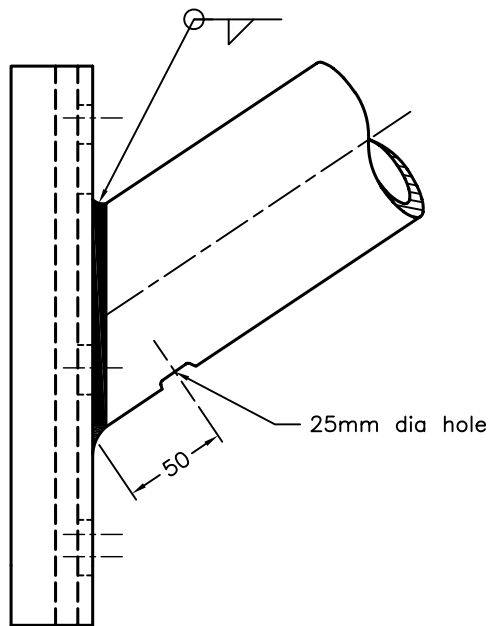
OPSD 2418.010



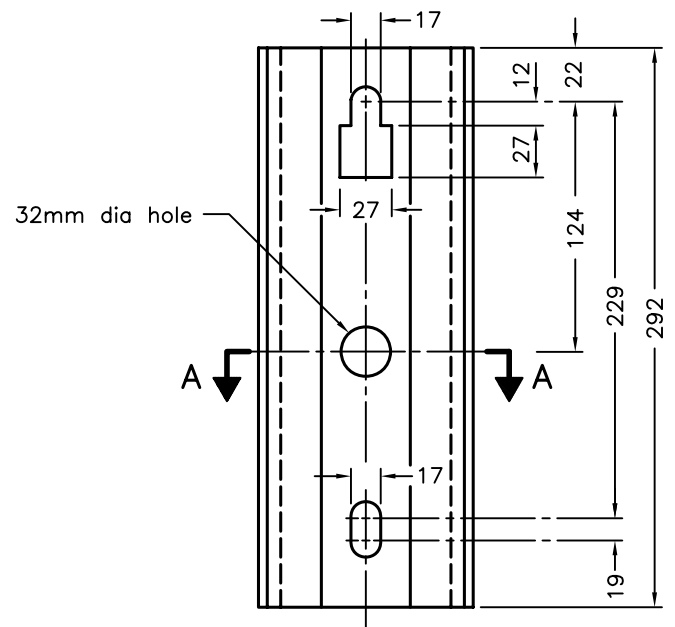
DIMENSION	BRACKET	
	1.8m	2.4m
L	1.8m	2.4m
H	0.9m	1.2m
Elliptical Section	64x108 mm OD	70x125 mm OD



SECTION A-A



DETAIL A



BRACKET BASE PLATE

NOTES:

A For mounting details, see OPSD 2250.01.

B All dimensions are in millimetres unless otherwise shown.

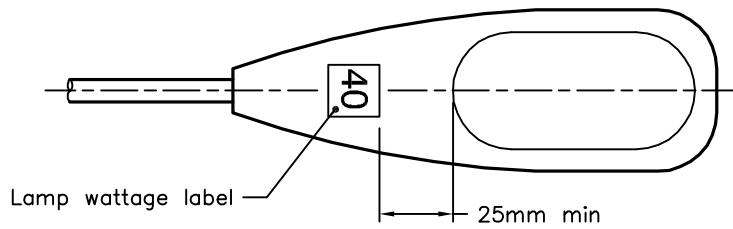
ONTARIO PROVINCIAL STANDARD DRAWING

April 2007 Rev 4

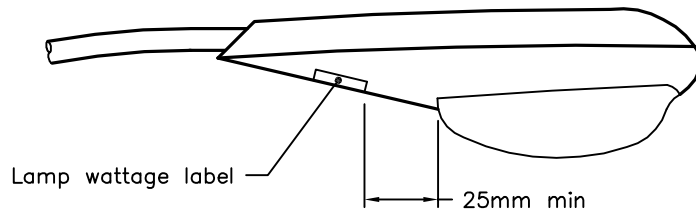
1.8m AND 2.4m ALUMINUM
TAPERED ELLIPTICAL BRACKET



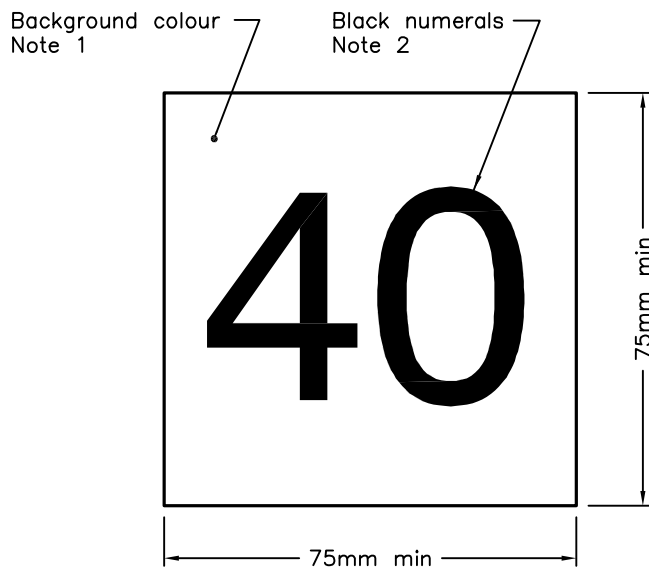
OPSD 2420.01



BOTTOM VIEW



SIDE VIEW



LABEL DIMENSIONS

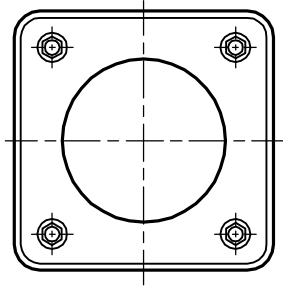
TYPICAL LAMP WATTAGE CODES	
IDENTIFYING NUMERAL	LAMP WATTAGE
7	70 W
10	100 W
15	150 W
25	250 W
35	350 W
40	400 W

NOTES:

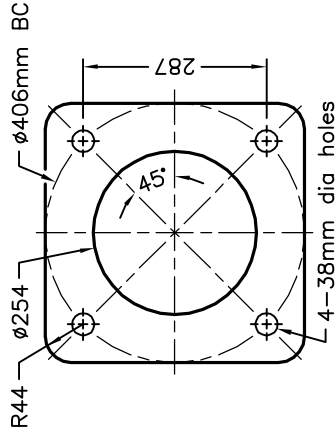
- 1 A gold background shall be used for high pressure sodium and fluorescent red background for the metal halide labels. Labels shall be made using high visibility reflective sheeting.
 - 2 All numerals on the labels shall be black and made from 9mm wide line and numerals shall be minimum of 50mm high.
- 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		-----			

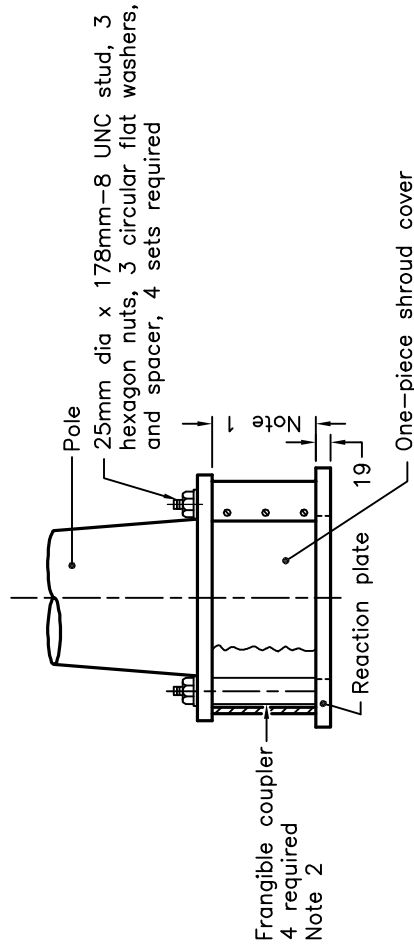
		OPSD 2421.010			



TOP VIEW



REACTION PLATE DETAIL



FRONT VIEW

ONE-PIECE SHROUD COVER

LEGEND:

BC – Bolt Circle

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

Nov 2010 Rev 3



FRANGIBLE BASES

OPSD 2428.01



- 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 Two screws shown. One screw in the middle of the cover is acceptable.
- A All dimensions are in millimetres unless otherwise shown.

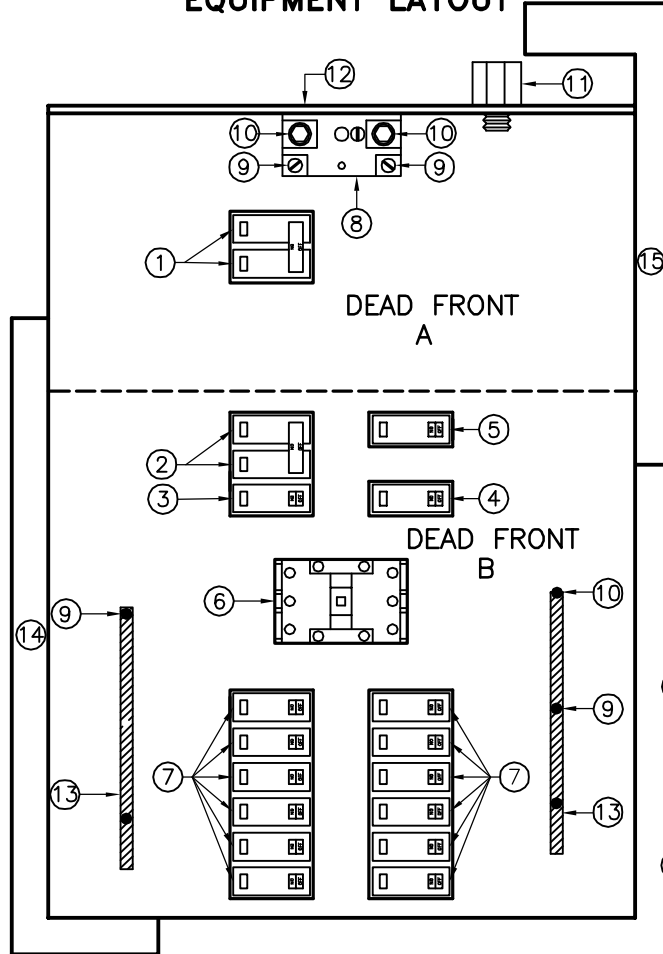
ONTARIO PROVINCIAL STANDARD DRAWING

ALUMINUM POLE BASE MOUNTED

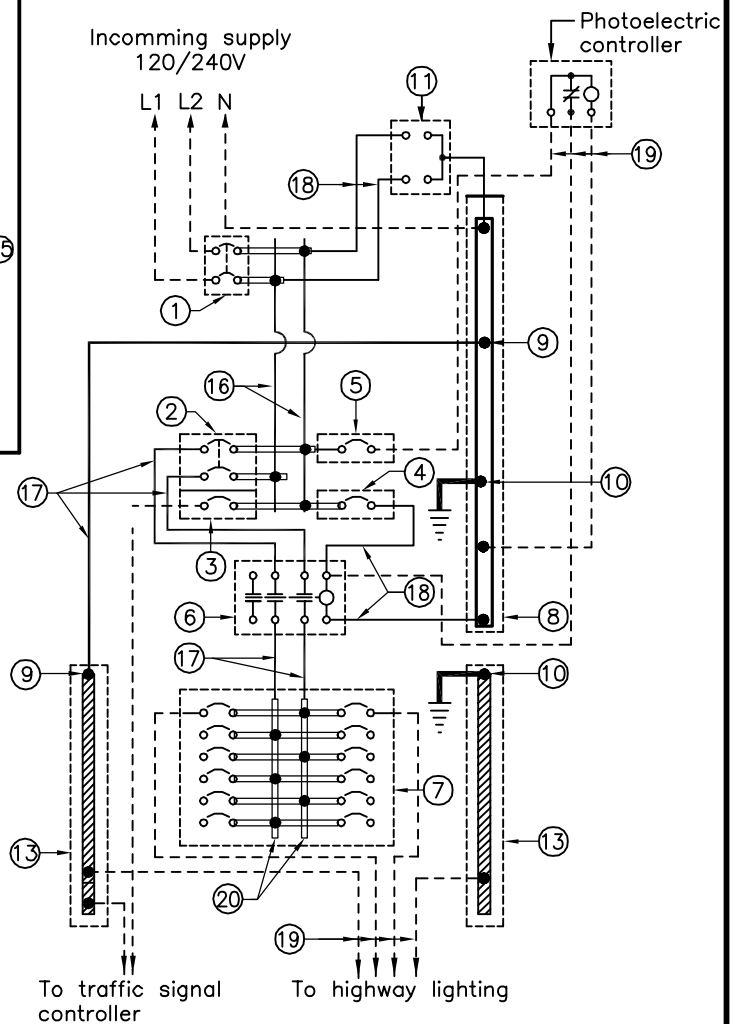
Nov 2010	Rev 1

OPSD 2432.010

EQUIPMENT LAYOUT



SCHEMATIC WIRING DIAGRAM



ELECTRICAL EQUIPMENT LIST

(1) Main circuit breaker – 100A, 2-pole	(10) Ground lug for No. 2/0 AWG stranded copper ground wire
(2) Lighting circuit breaker – 60A, 2-pole	(11) Secondary lightning arrester, 650V, 2-pole
(3) Traffic signal circuit breaker – 1-pole, ampacity as specified	(12) Drip shield
(4) Circuit breaker used for relamping – 15A, 1-pole	(13) Secondary neutral and ground bus according to CSA and as specified
(5) Circuit breaker for photoelectric controller – 15A, 1-pole	(14) Primary barrier
(6) Lighting contactor – 60A, 2-pole, 120V coil	(15) Secondary barrier
(7) Branch circuit breakers – 30A, 1-pole, number of breakers as specified	(16) No. 3 AWG RWU90 wire or copper bus bar
(8) Solid neutral assembly – 100A minimum, copper	(17) No. 6 AWG RWU90 wire
(9) Ground lug for No. 6 AWG stranded copper ground 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

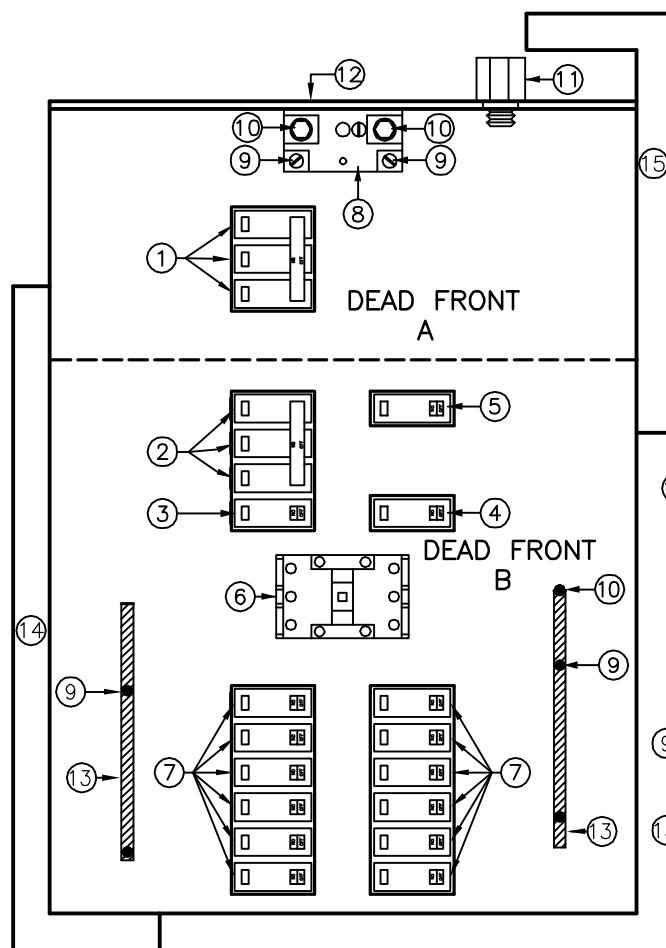
ASSEMBLY TYPE 1

120/240V, 100A, 1-PHASE, 3-WIRE

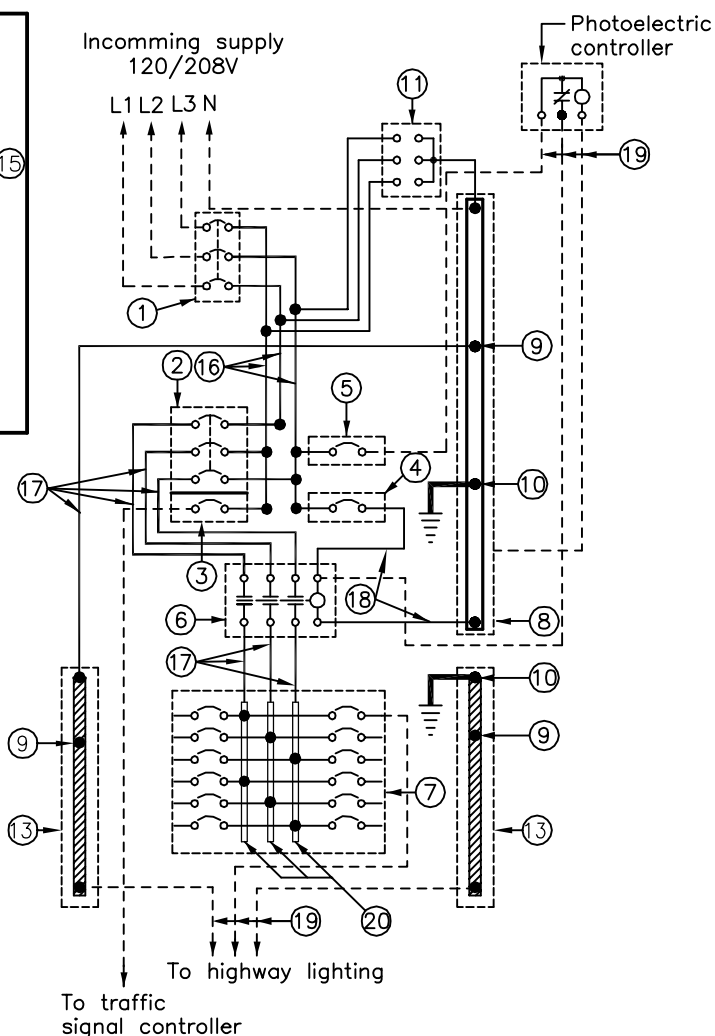


OPSD 2440.010

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

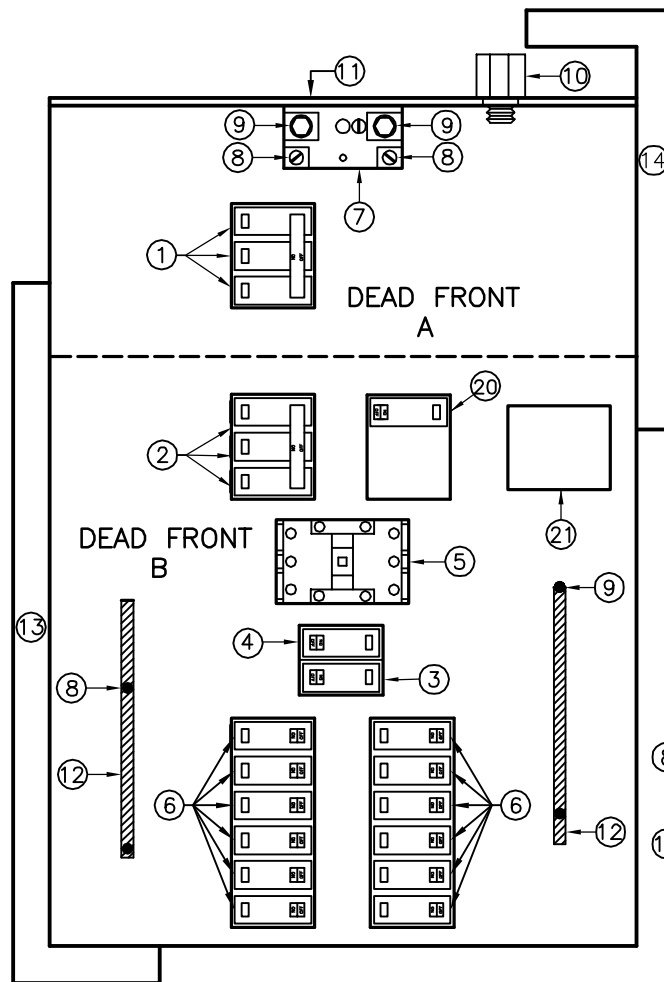
**SUPPLY CONTROL CABINET
ASSEMBLY TYPE 2**

120/208V, 100A, 3–PHASE, 4–WIRE

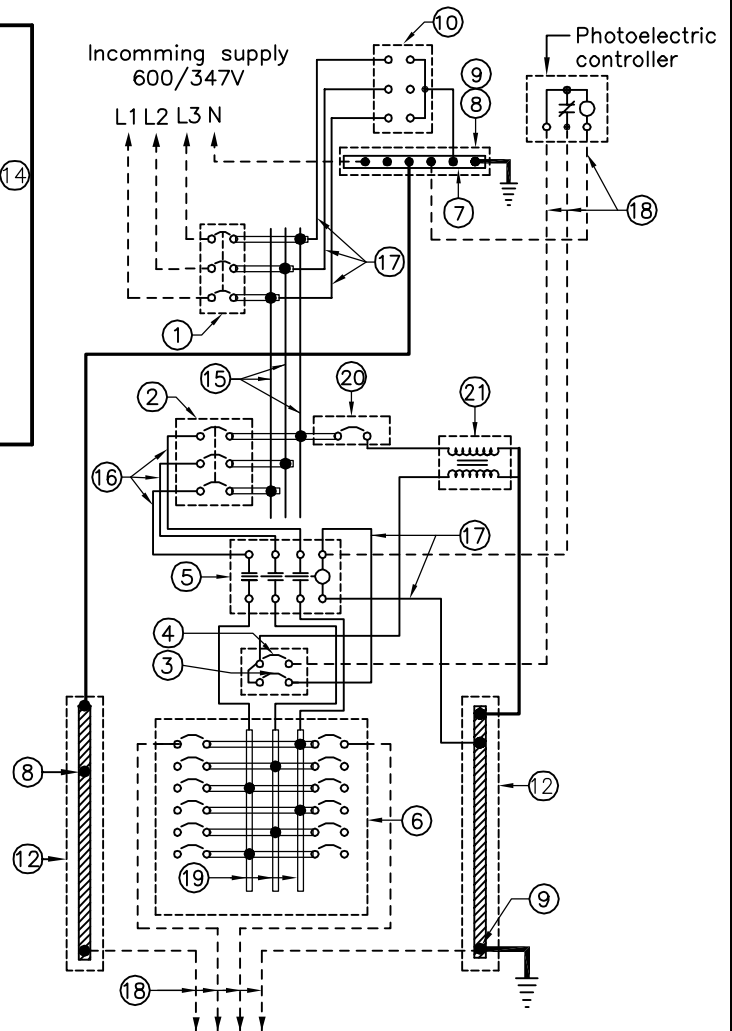


OPSD 2440.020

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

To highway lighting

- 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

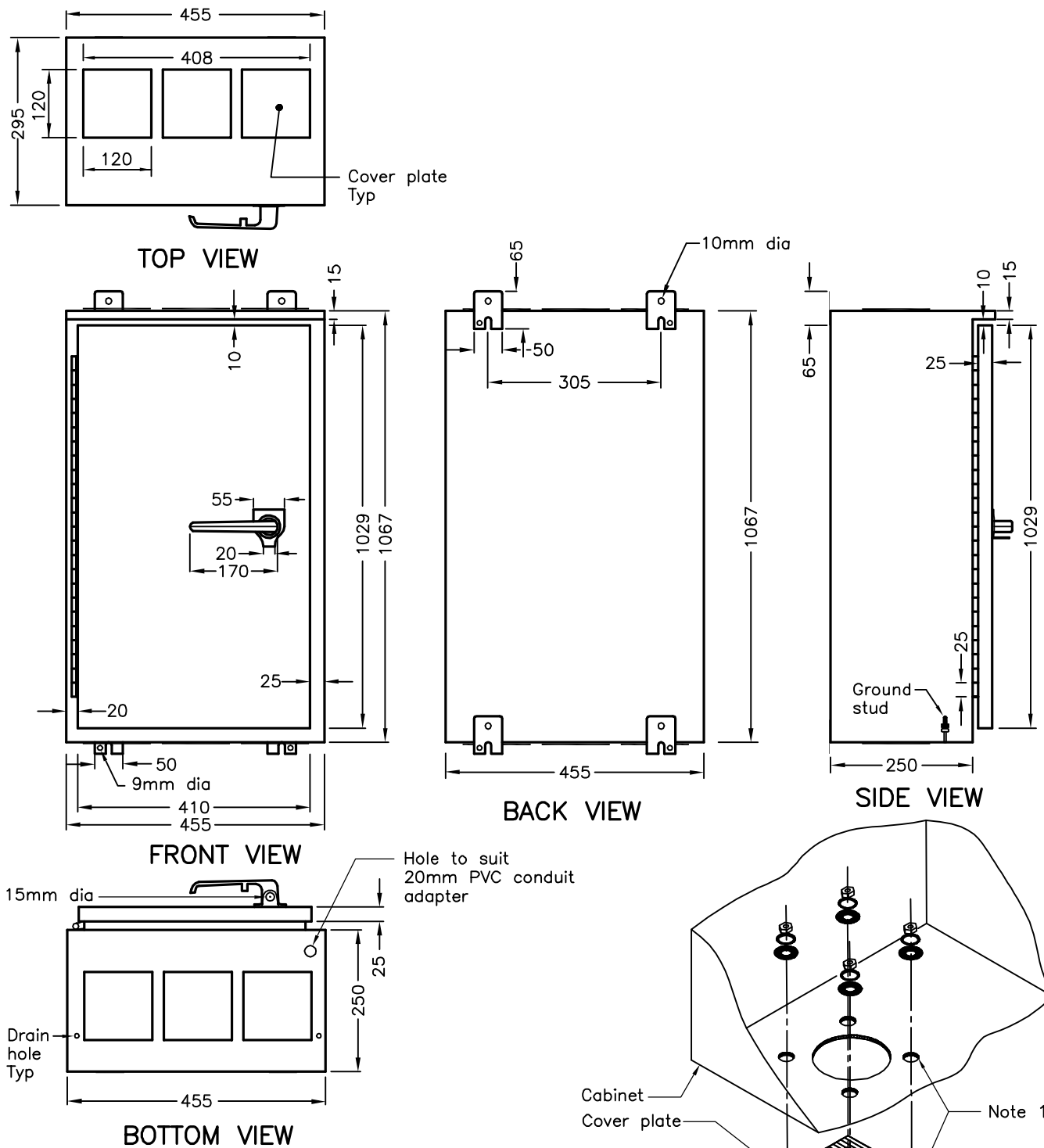
Rev 0

**SUPPLY CONTROL CABINET
ASSEMBLY TYPE 2**

600/347V, 100A, 3–PHASE, 4–WIRE



OPSD 2440.021



NOTES:

1 Bolt and hole pattern shall suit meter hub.

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

**SUPPLY CONTROL CABINET
ASSEMBLY TYPE 1 AND 2
ENCLOSURE**

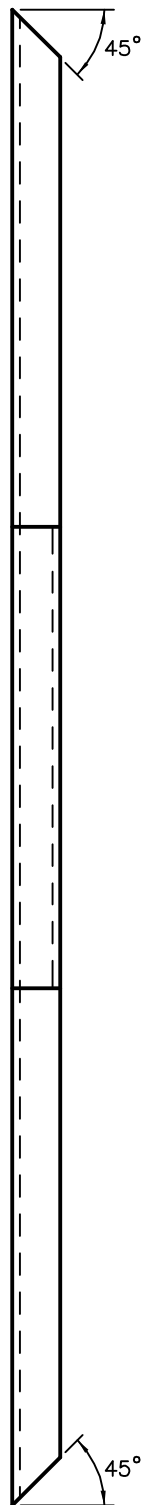
Nov 2014

Rev 1

COVER PLATE DETAIL

OPSD 2440.030

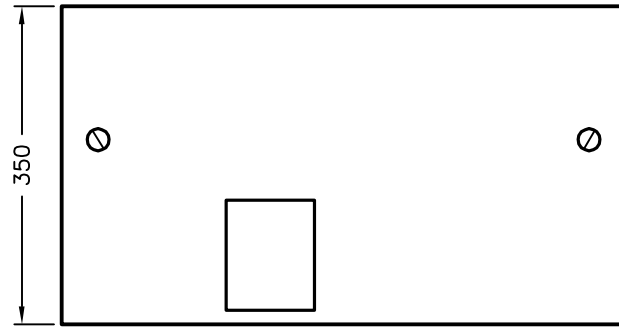




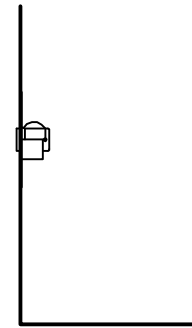
- 1 The pole mounting bracket for supply control cabinet assembly shall be #11 gauge stainless steel.
- A All burrs and sharp corners shall be removed.
- B Pole mounting bracket is required only when the supply cabinet does not have built-in pole mounting provision.
- C All dimensions are in millimetres unless otherwise shown.



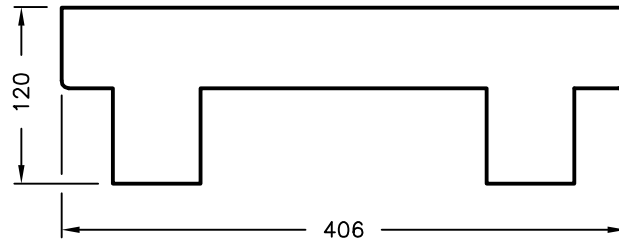
OPSD 2440.04



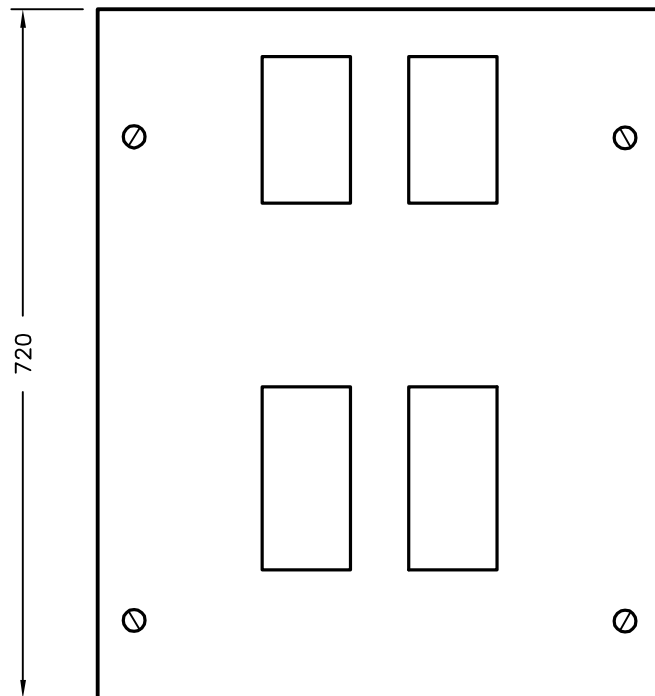
FRONT VIEW



SIDE VIEW



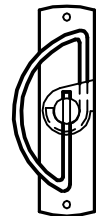
BOTTOM VIEW, Note 1
DEAD FRONT A



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 $\pm 3\text{mm}$ unless otherwise shown.
- B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

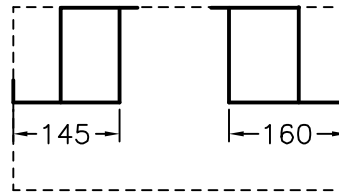
Nov 2014

Rev 1

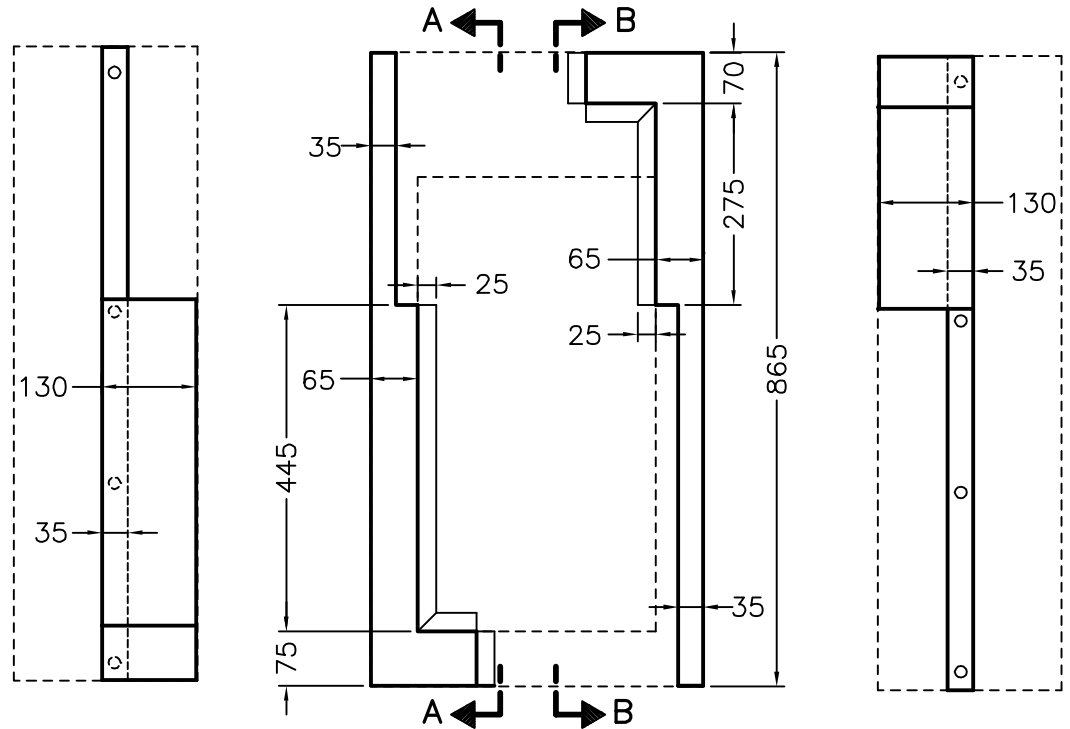
SUPPLY CONTROL CABINET
ASSEMBLY TYPE 1 AND 2
DEAD FRONT PANELS



OPSD 2440.050



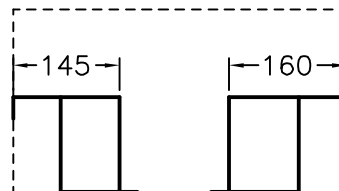
TOP VIEW



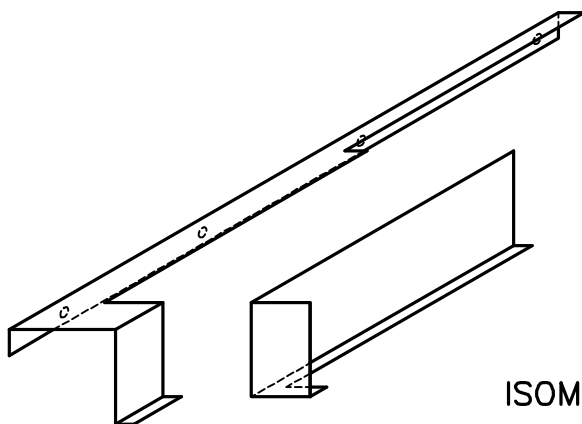
SECTION A-A

FRONT VIEW

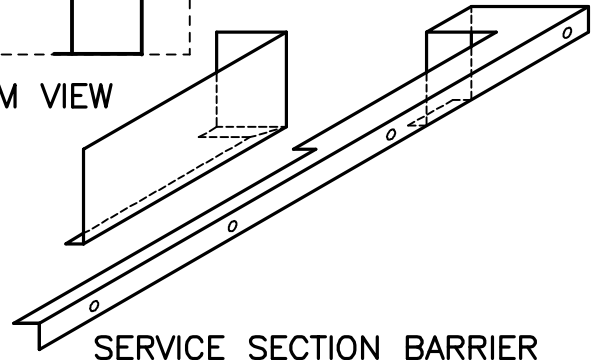
SECTION B-B



BOTTOM VIEW



ISOMETRIC VIEW



SERVICE SECTION BARRIER

BRANCH CIRCUIT SECTION BARRIER

NOTES:

- 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 2016

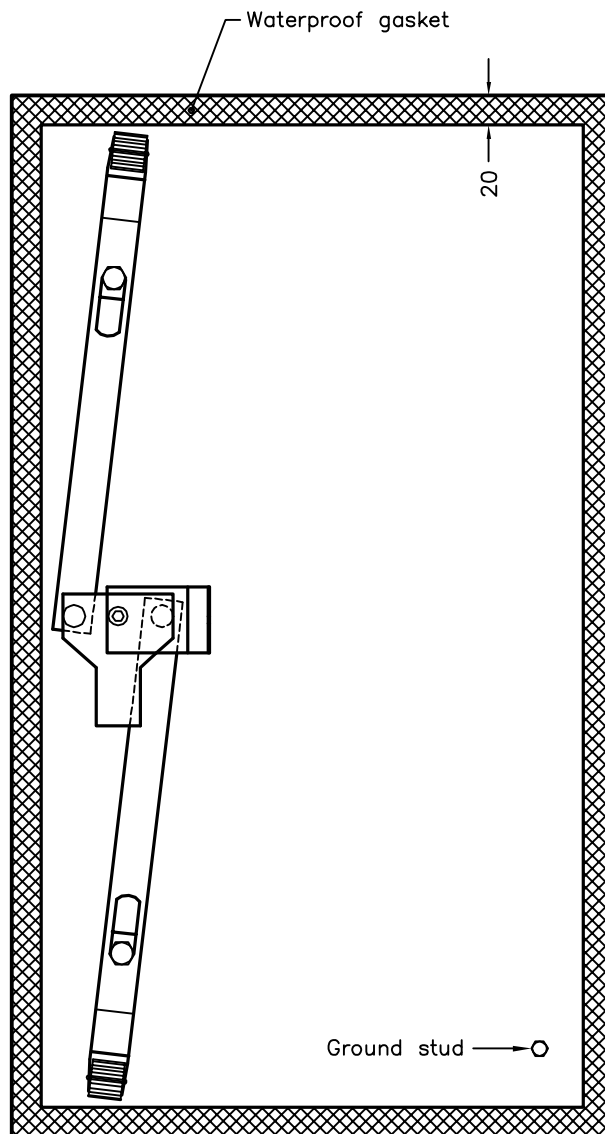
Rev 0

**SUPPLY CONTROL CABINET
ASSEMBLY TYPE 1 AND 2**

BARRIER DETAILS



OPSD 2440.051

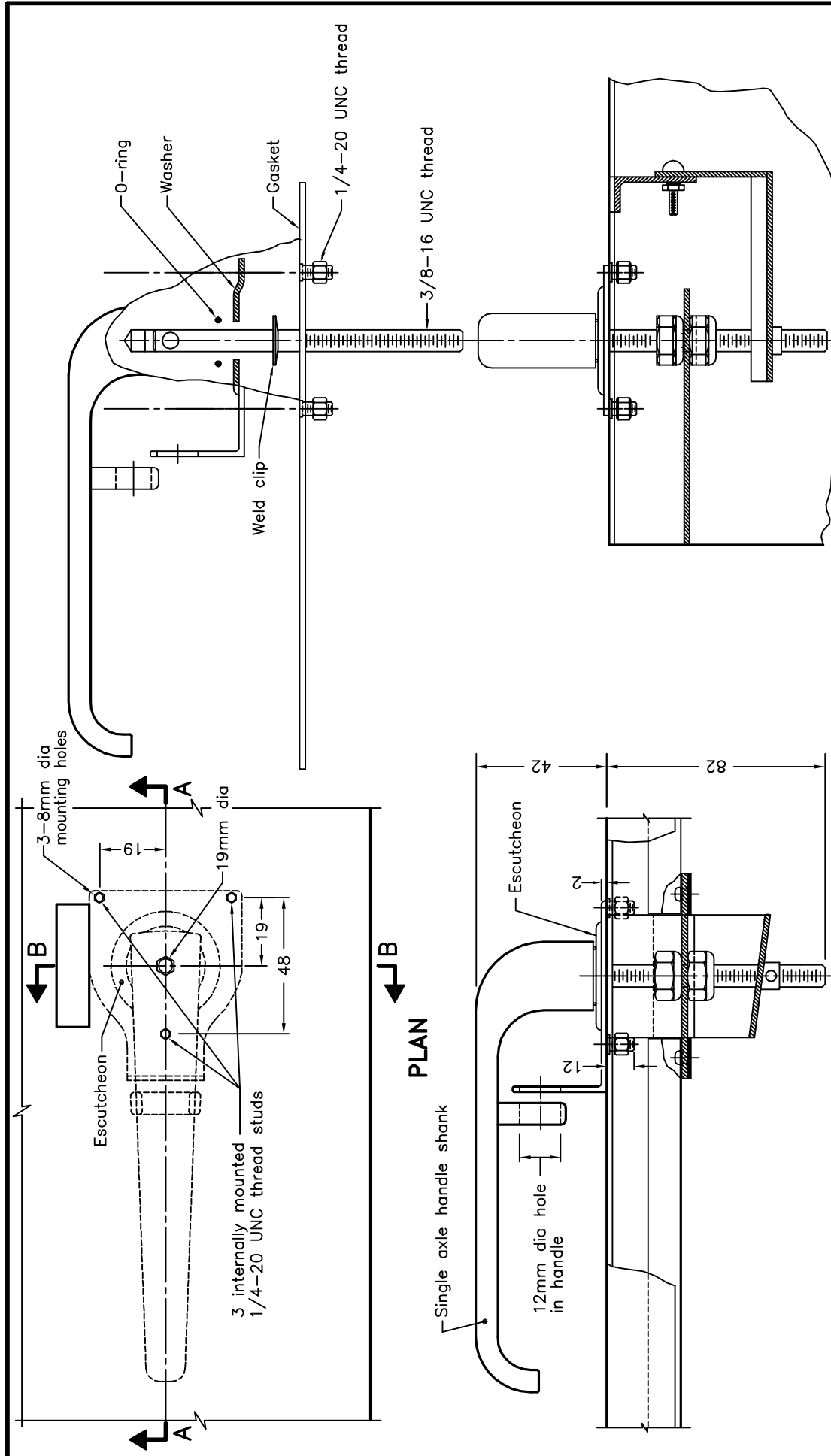


INSIDE DOOR VIEW

NOTES:

- A Tolerances shall be within $\pm 3\text{mm}$ 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				



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.

SECTION A-A

SECTION B-B

ONTARIO PROVINCIAL STANDARD DRAWING

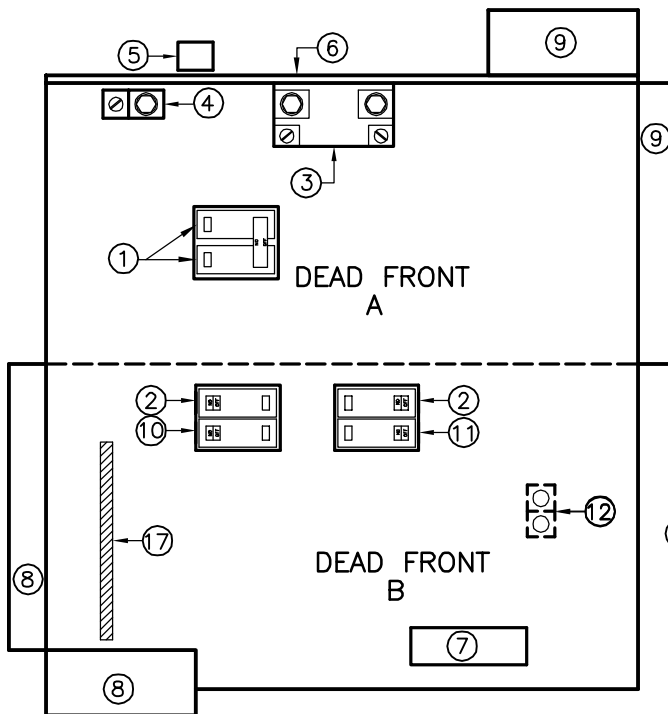
SUPPLY CONTROL CABINET ASSEMBLY TYPE 1, 2, AND 3 3-POINT STAINLESS STEEL DOOR HANDLE

Nov 2014 Rev 0

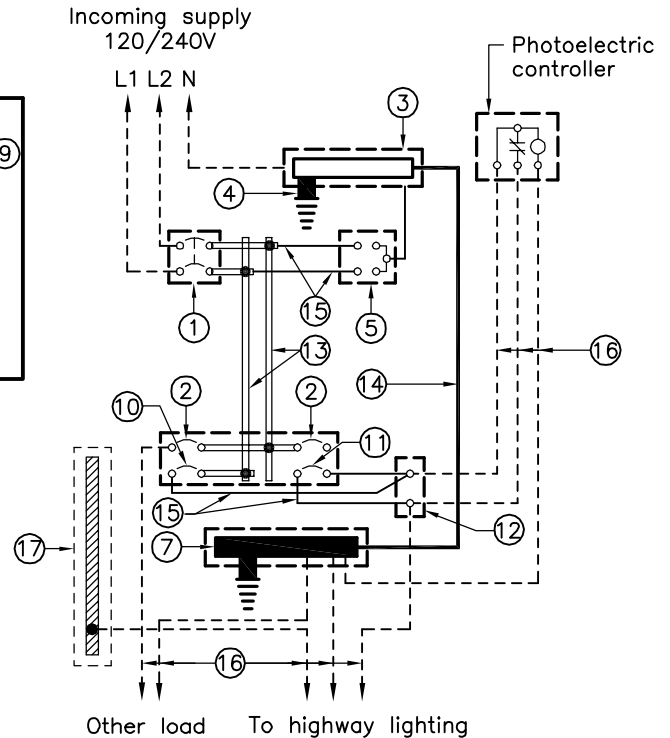


OPSD 2440.061

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

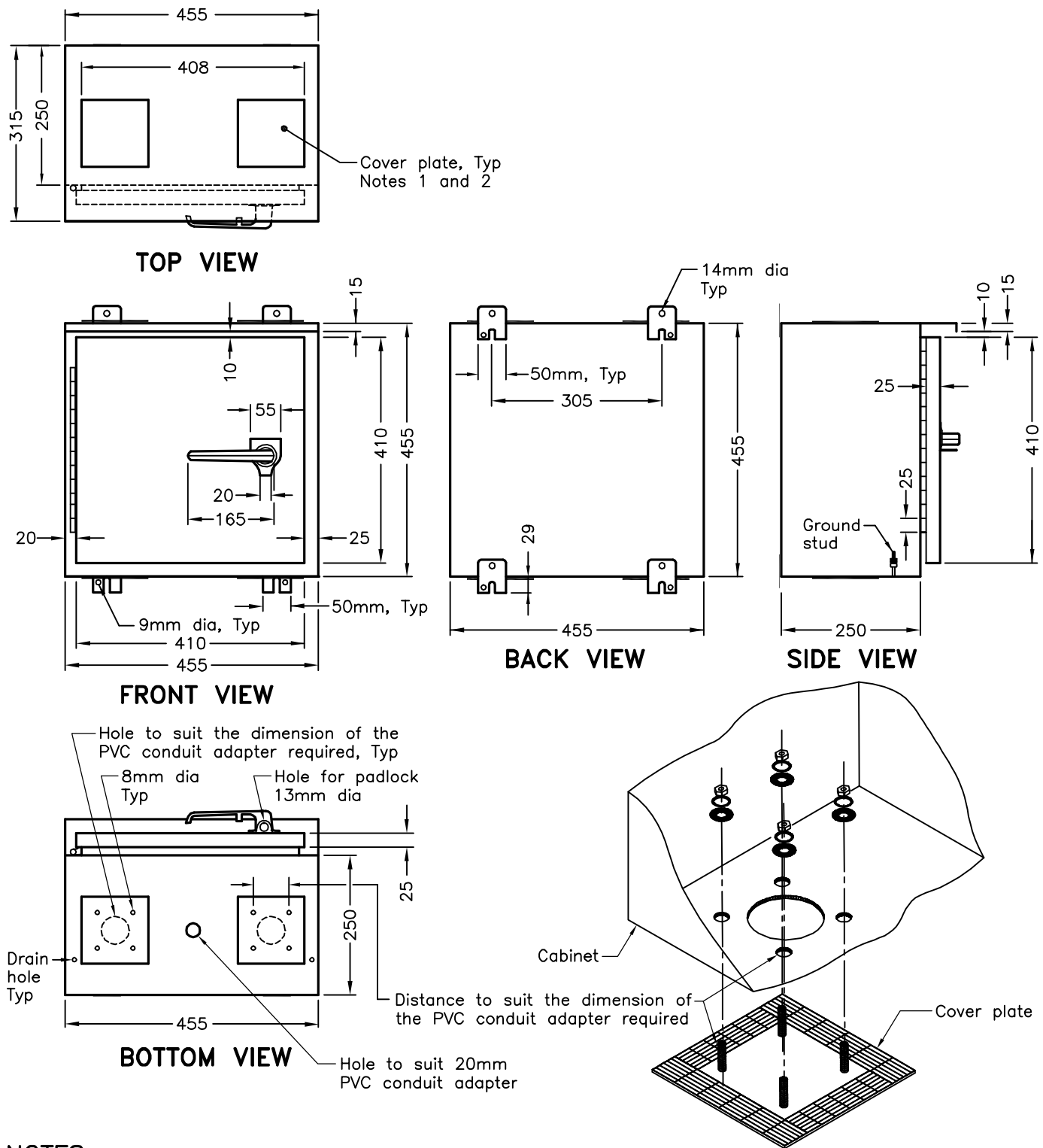
Nov 2014 | Rev | 1

**SUPPLY CONTROL CABINET
ASSEMBLY TYPE 3**

120/240V, 100A, 1–PHASE, 3–WIRE



OPSD 2441.000



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 $\pm 3\text{mm}$ unless otherwise shown.
 B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

SUPPLY CONTROL CABINET ASSEMBLY TYPE 3

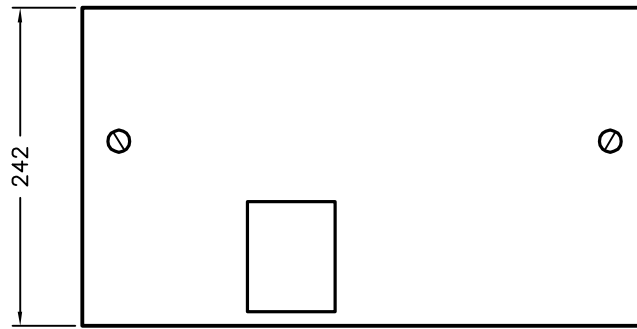
ENCLOSURE

Nov 2014

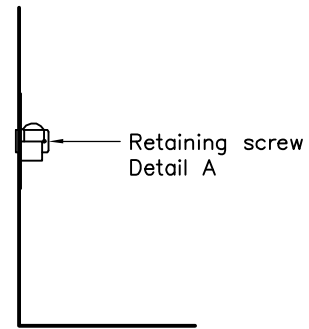
Rev 1



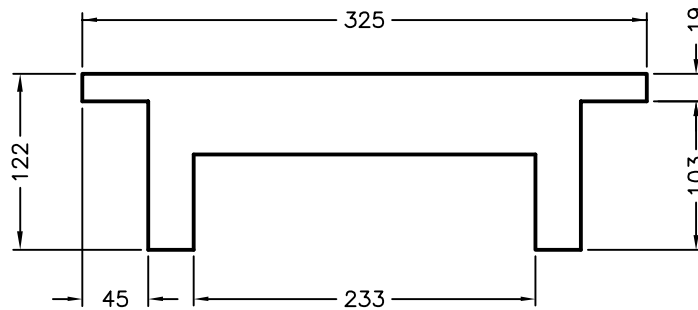
OPSD 2441.010



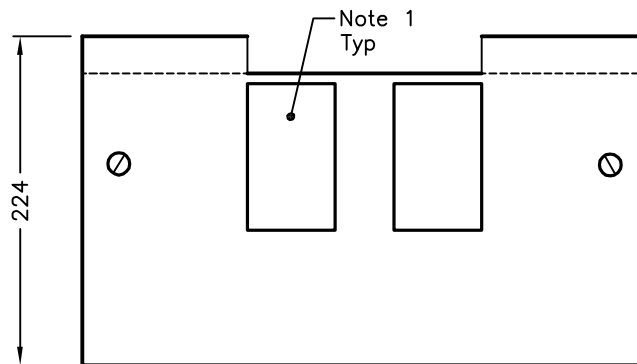
FRONT VIEW



SIDE VIEW



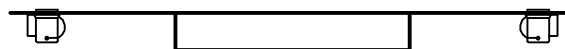
BOTTOM VIEW
DEAD FRONT A



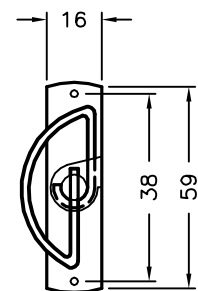
FRONT VIEW



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

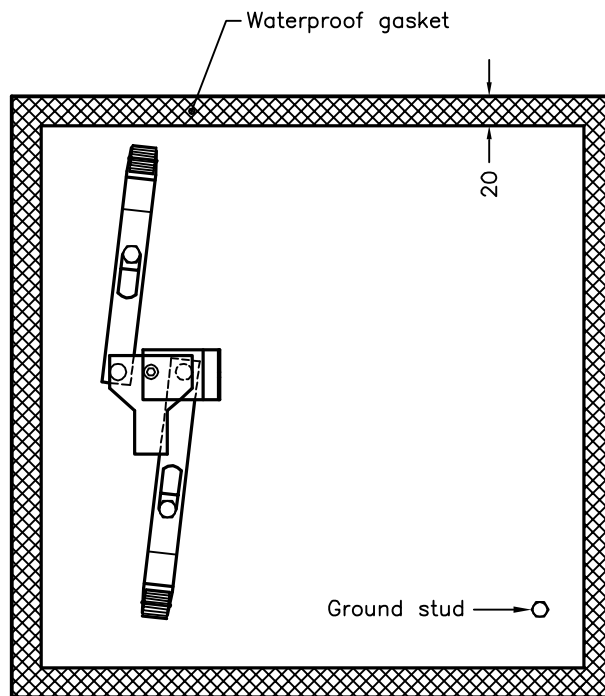
Nov 2014

Rev 1

**SUPPLY CONTROL CABINET
ASSEMBLY TYPE 3
DEAD FRONT PANELS**

OPSD 2441.020





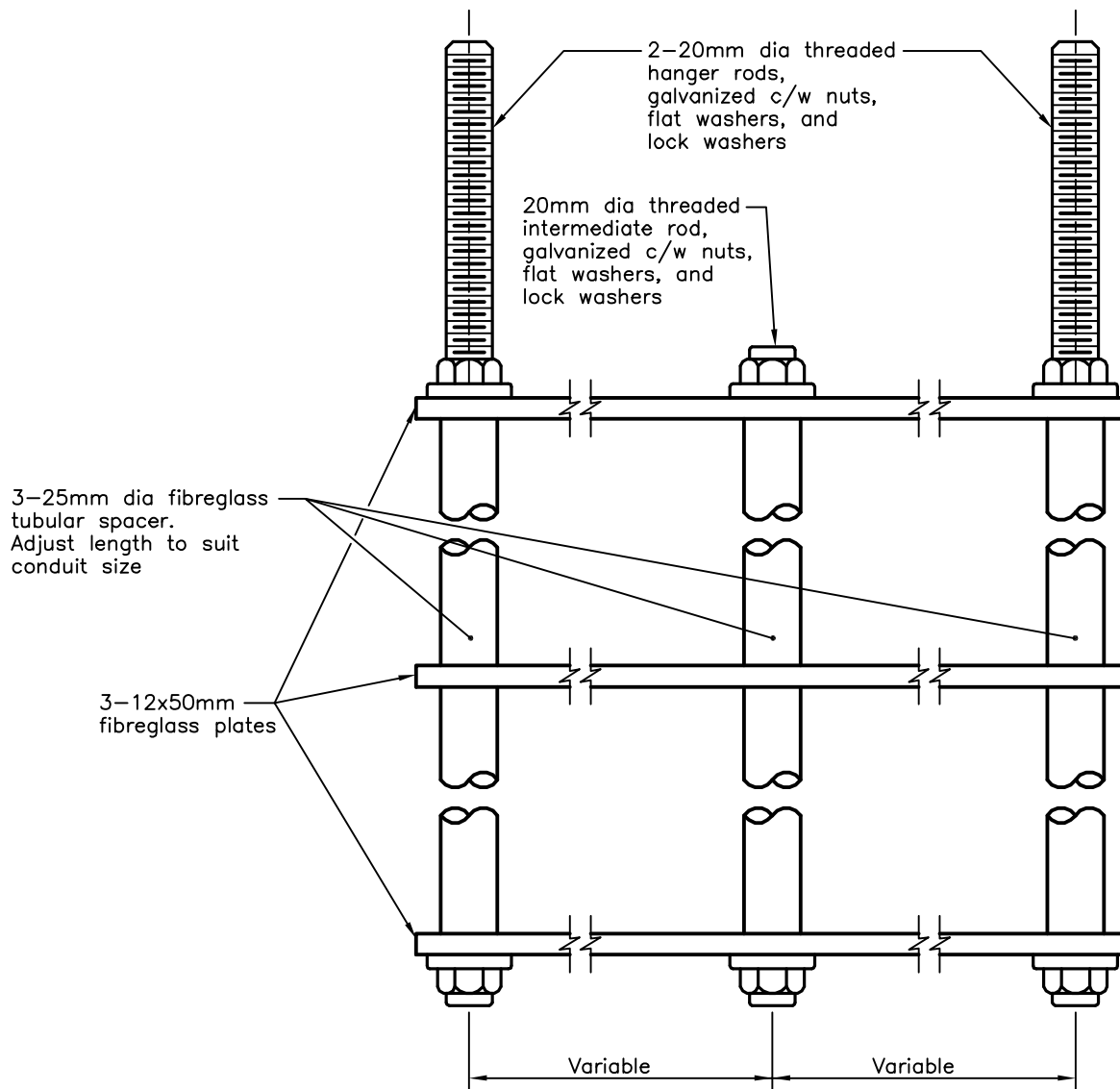
INSIDE DOOR VIEW

NOTES:

A Tolerances shall be within $\pm 3\text{mm}$ 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			

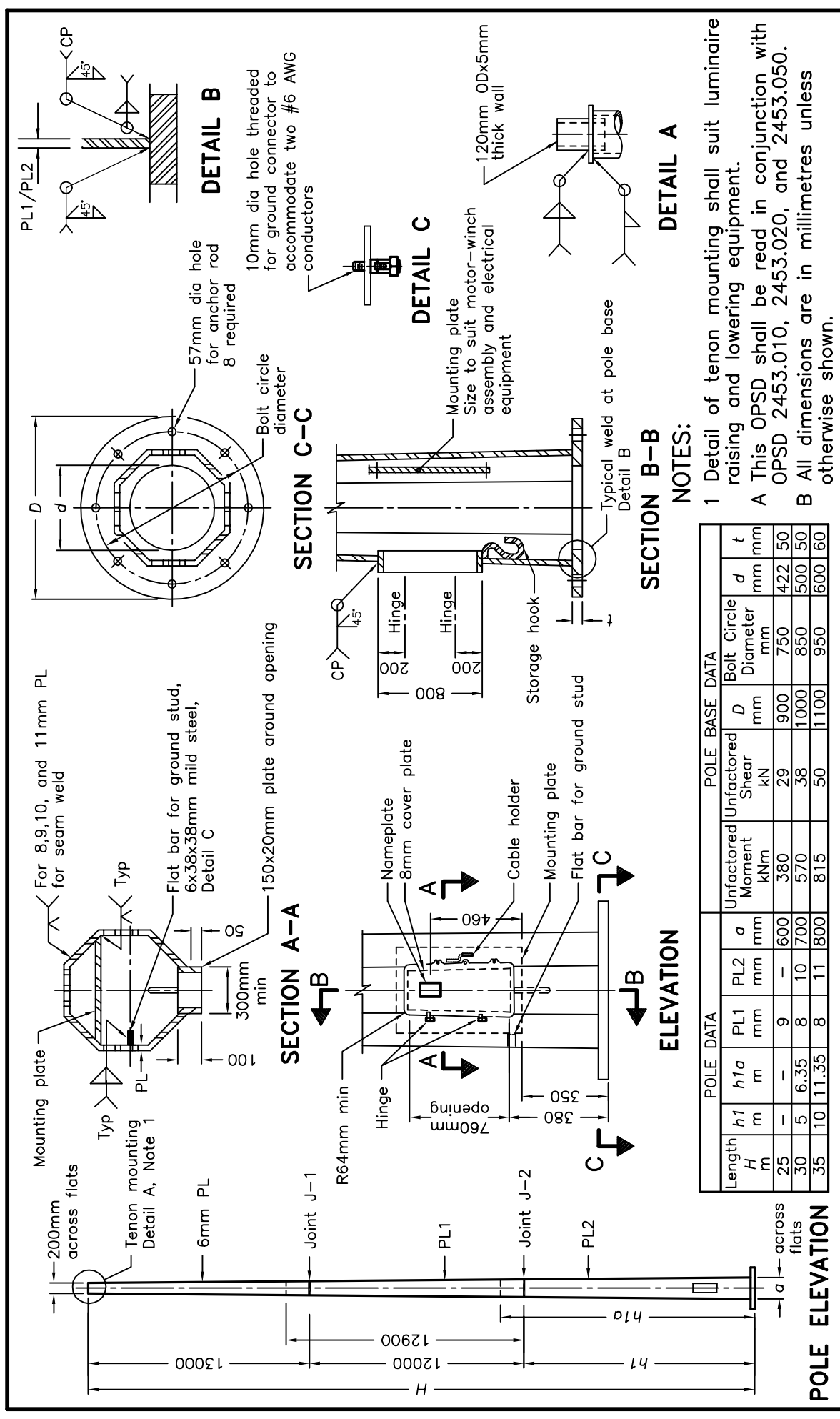


NOTES:

- 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					



ONTARIO PROVINCIAL STANDARD DRAWING

HIGH MAST LIGHTING POLE

25, 30, AND 35m 8-SIDED POLE

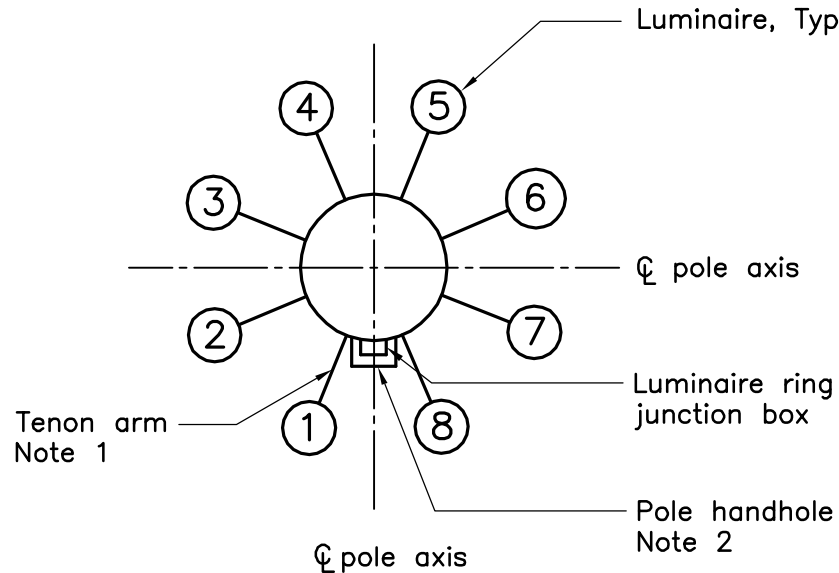
Nov 2016 Rev 1

OPSP 2450.011

FINAL FORCE OF ASSEMBLY	
J-1	26kN
J-2	46kN

POLE ELEVATION	
JOINT	
J-1	26kN
J-2	46kN

OPSP 2450.011



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

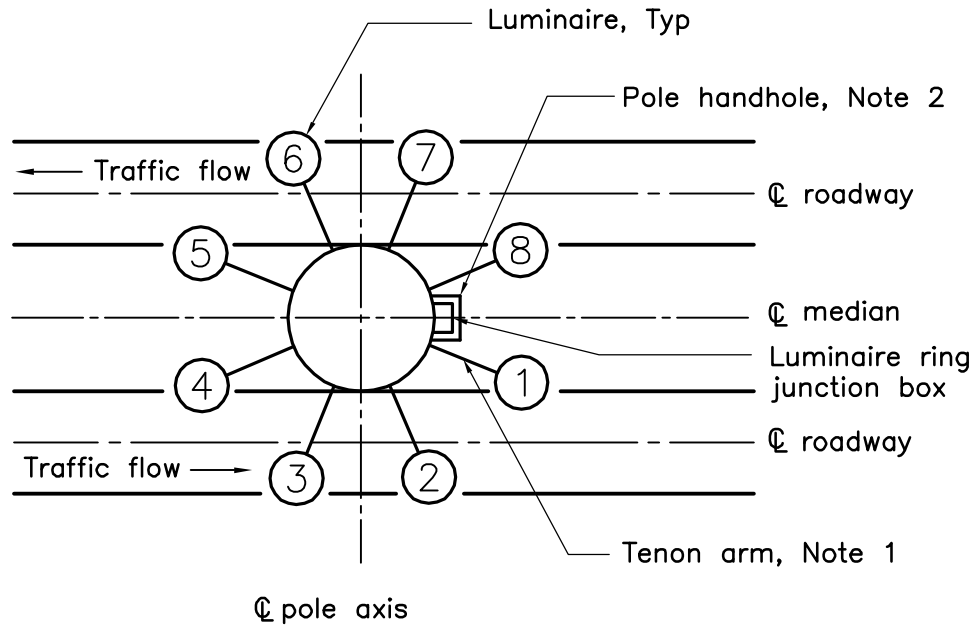
Nov 2016

Rev 1

**HIGH MAST LIGHTING POLE
LUMINAIRE AND HANDHOLE ORIENTATION**



OPSD 2453.000

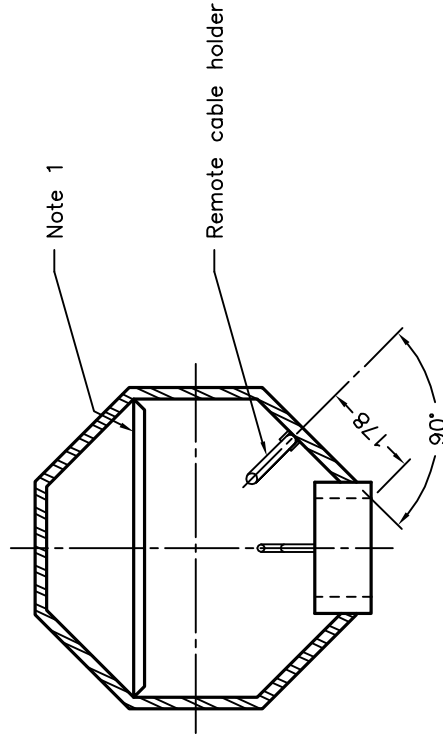


NOTES:

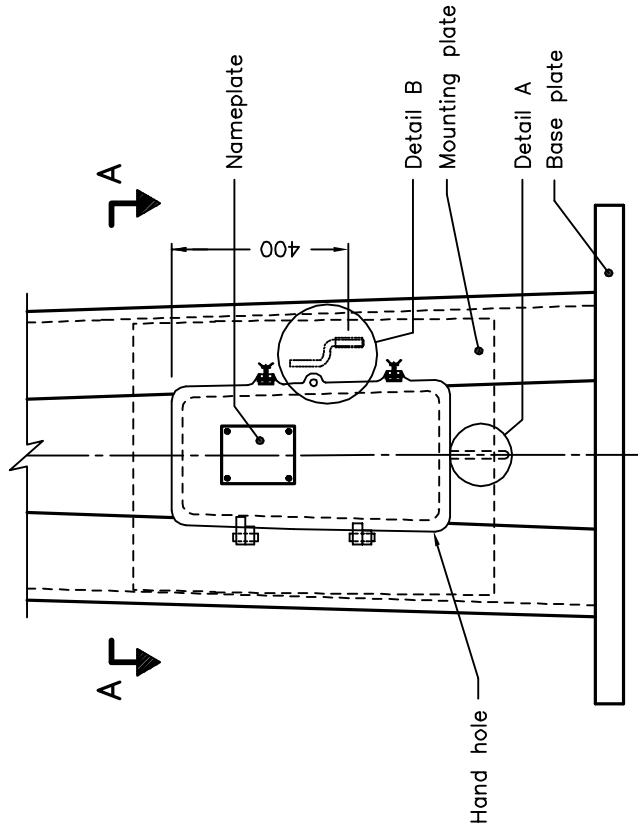
- 1 Tenon arm brackets shall be drilled and assembled so that luminaire No. 1 is always located to the left of the pole handhole and luminaire ring junction box.
- 2 The handhole shall be located such that the operator of the raising and lowering system can safely stand in front of the handhole and be 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		-----			

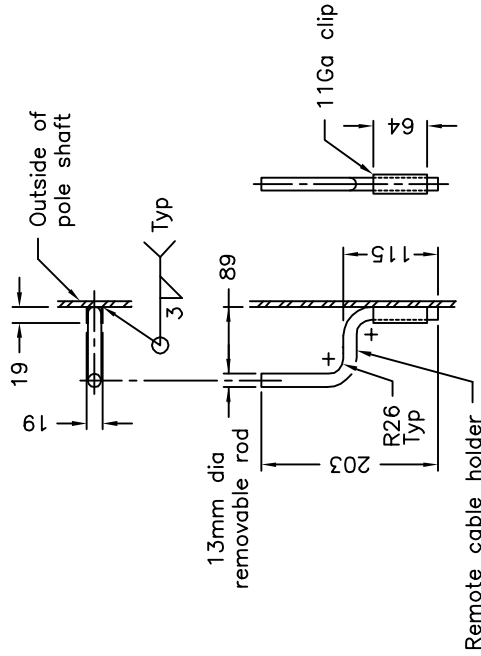
		OPSD 2453.001			



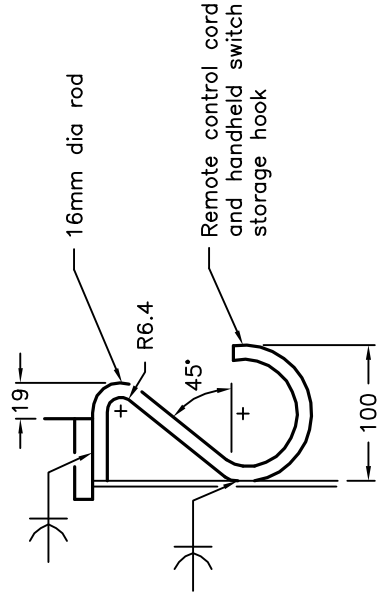
SECTION A-A



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

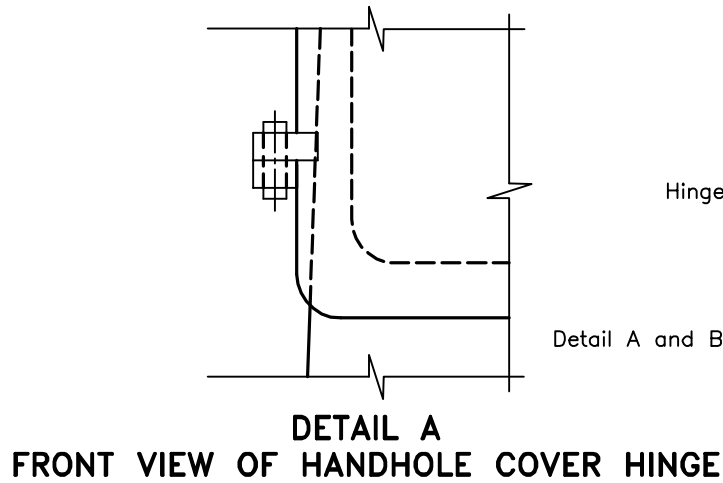
HIGH MAST LIGHTING POLE

CABLE HOLDER AND STORAGE HOOK DETAILS

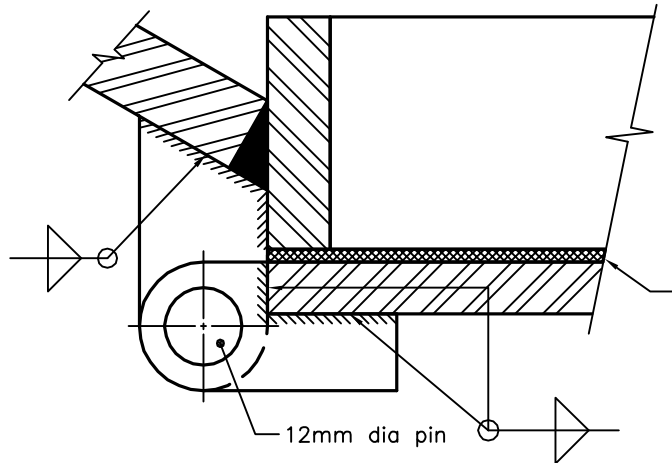
Nov 2016 Rev 1



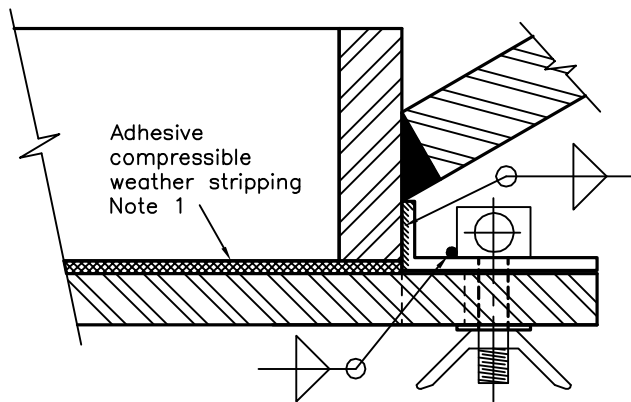
OPSD 2453.010



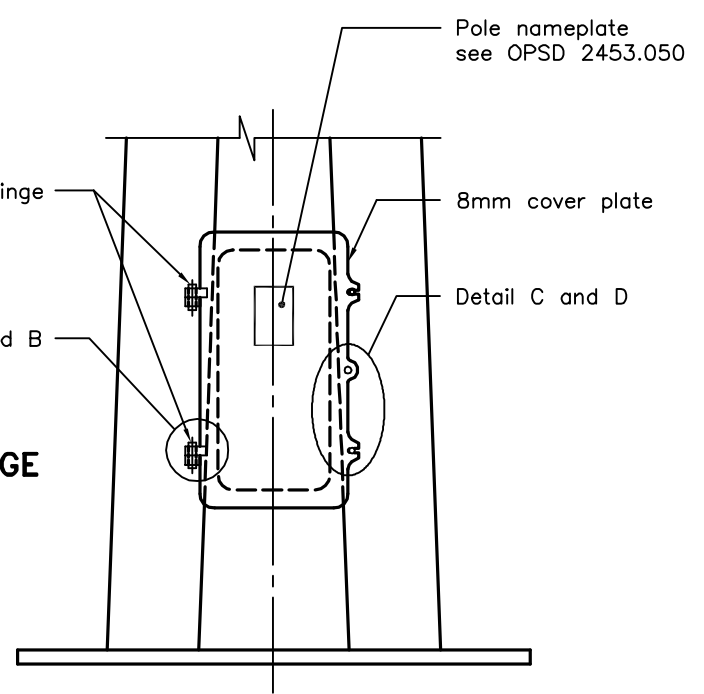
DETAIL A
FRONT VIEW OF HANDHOLE COVER HINGE



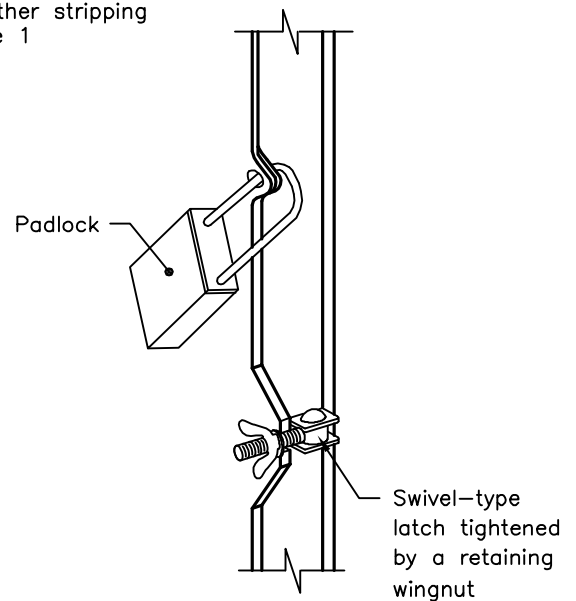
DETAIL B
TOP VIEW OF HANDHOLE COVER HINGE



DETAIL D
TOP VIEW OF HANDHOLE COVER LATCH



ELEVATION



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

150

200

POLE No. _____

POLE HEIGHT _____

CONTRACT No. _____

POLE MANUFACTURER _____

DATE OF MANUFACTURE _____

LUMINAIRE MANUFACTURER _____

LUMINAIRE DISTRIBUTION TYPE _____

LOWERING DEVICE MANUFACTURER _____

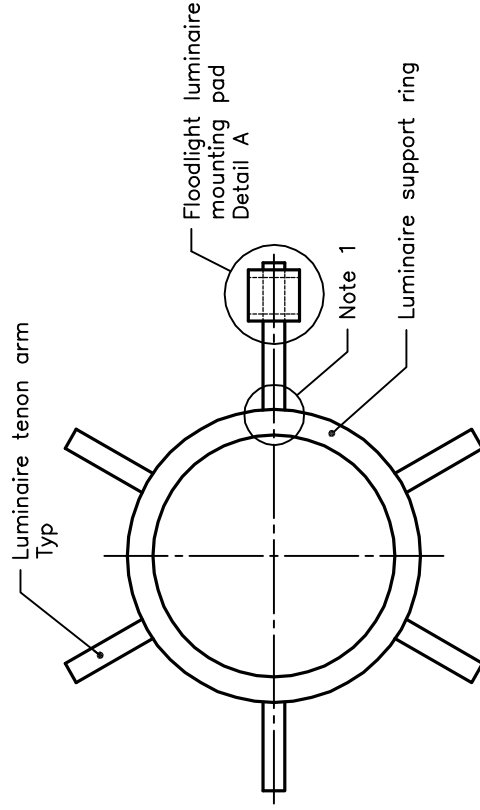
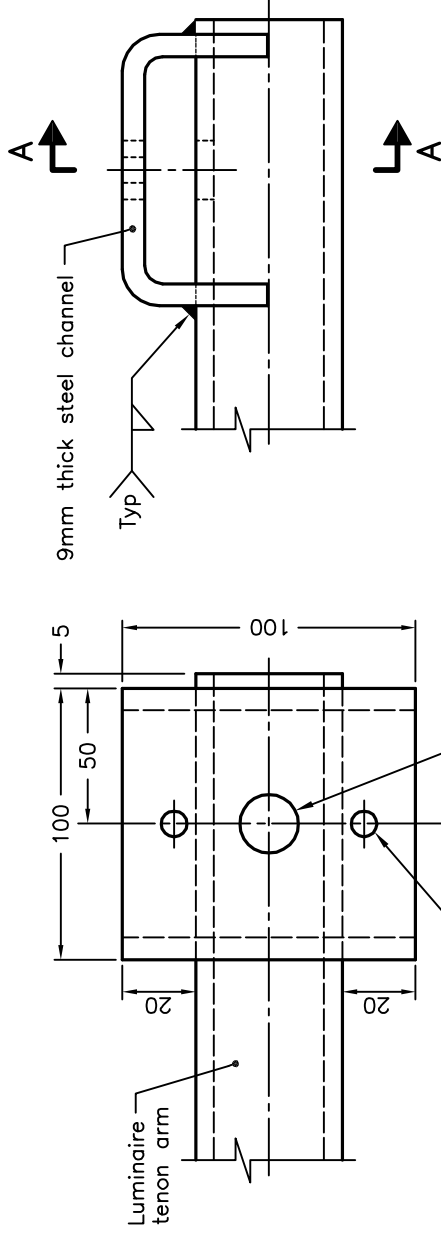
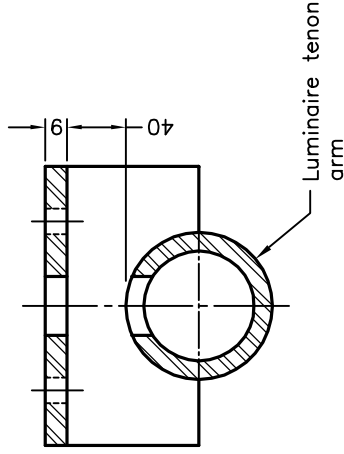
12mm
Typ

12mm
Typ

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					



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.

PLAN

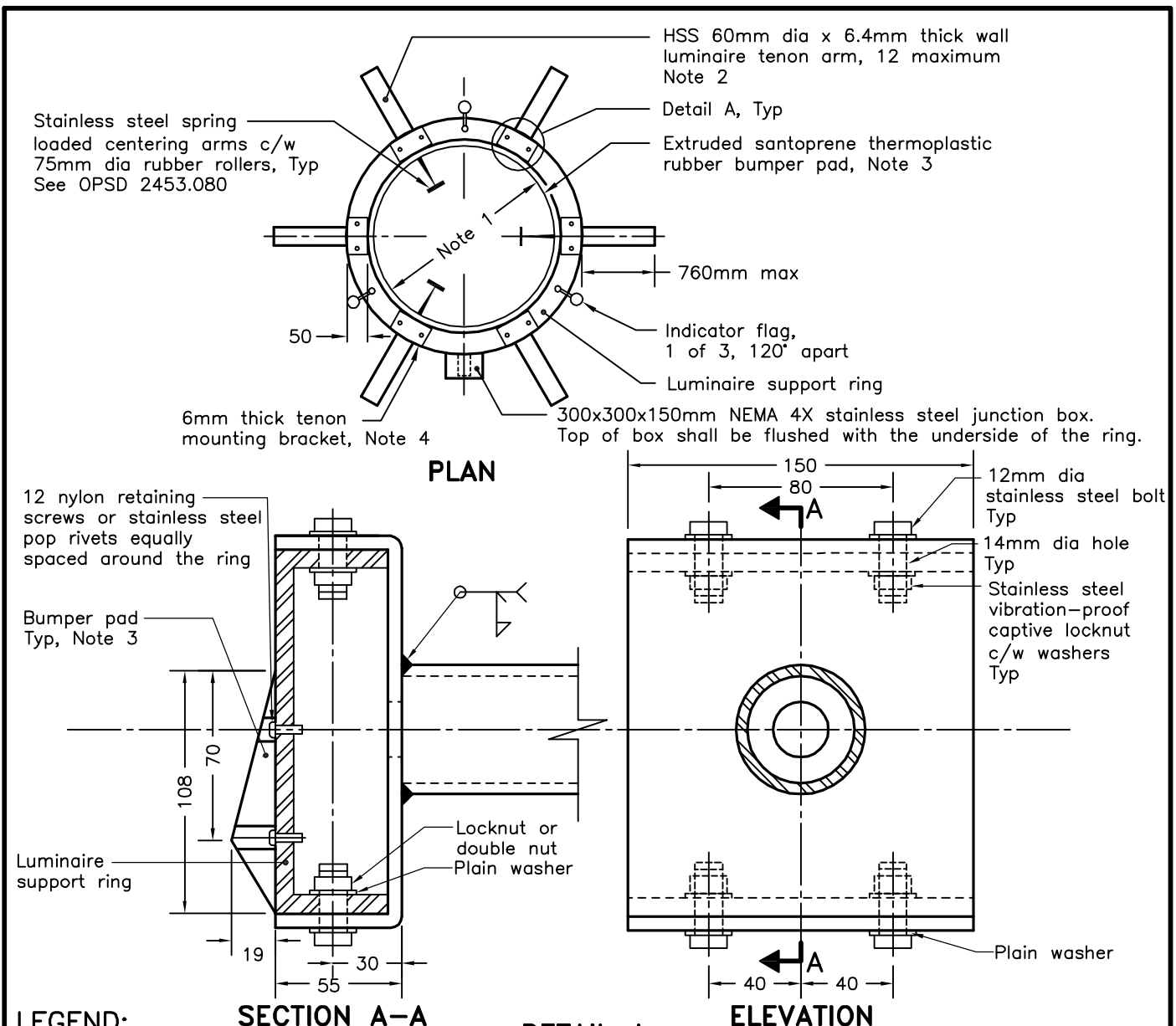
ONTARIO PROVINCIAL STANDARD DRAWING

HIGH MAST LIGHTING POLE
FLOOD LIGHT LUMINAIRE
MOUNTING DETAILS

Nov 2016 Rev 1



OPSD 2453.060



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 $F_u > 690$ MPa.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2016

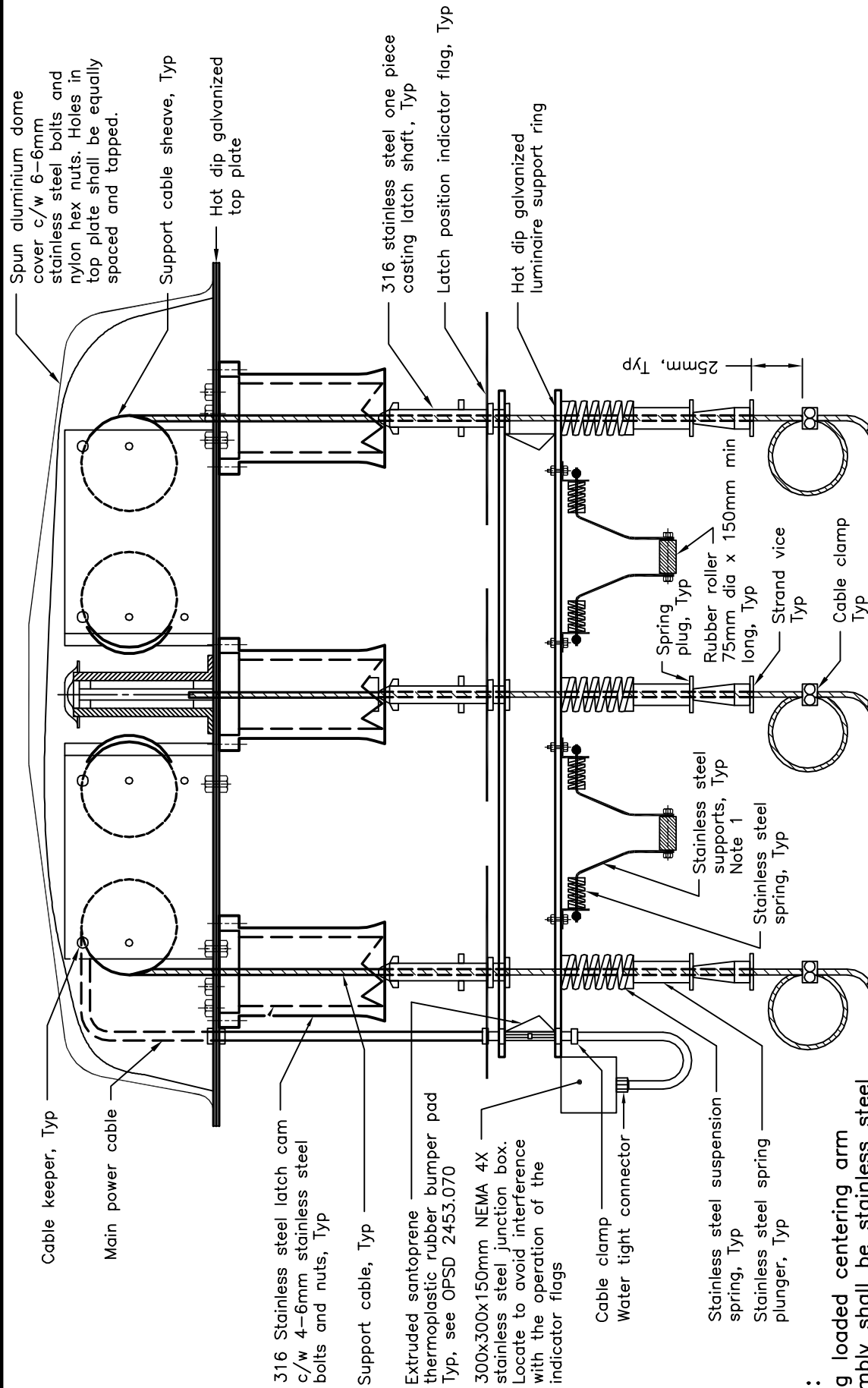
Rev 2

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

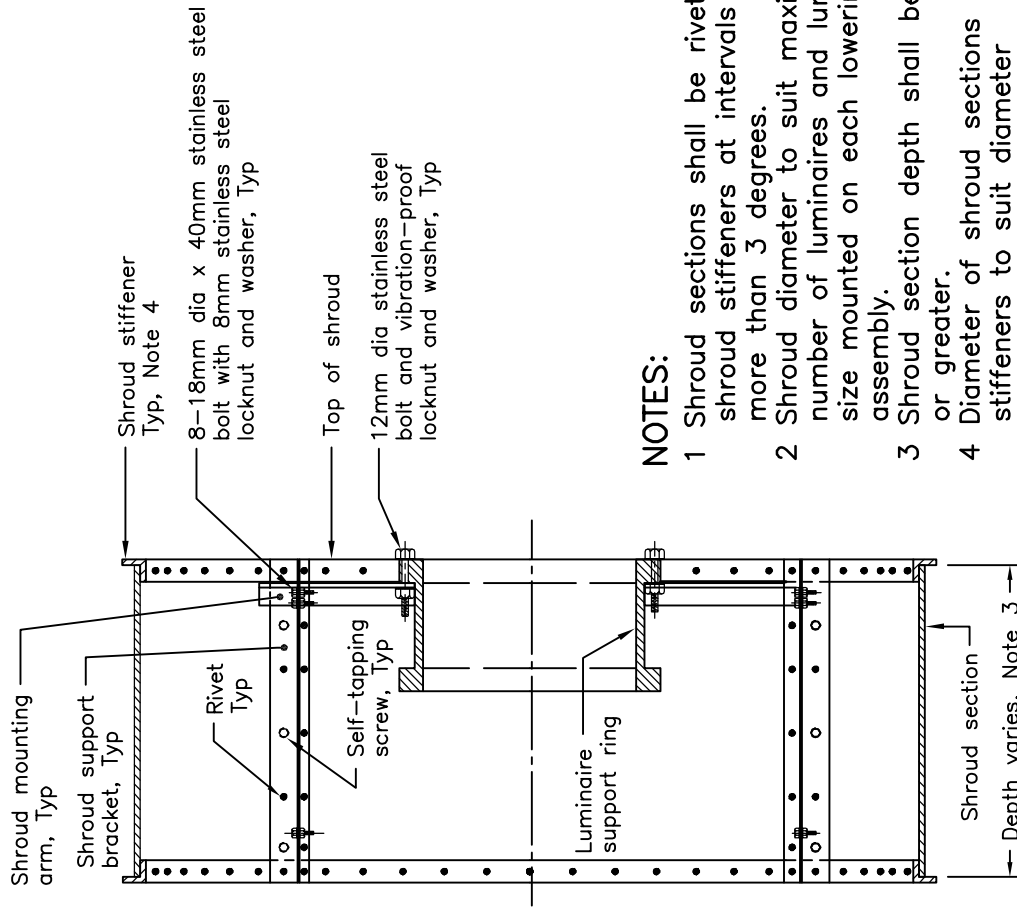
HIGH MAST LIGHTING POLE

HEAD FRAME AND RING ASSEMBLY

Nov 2016 Rev 2

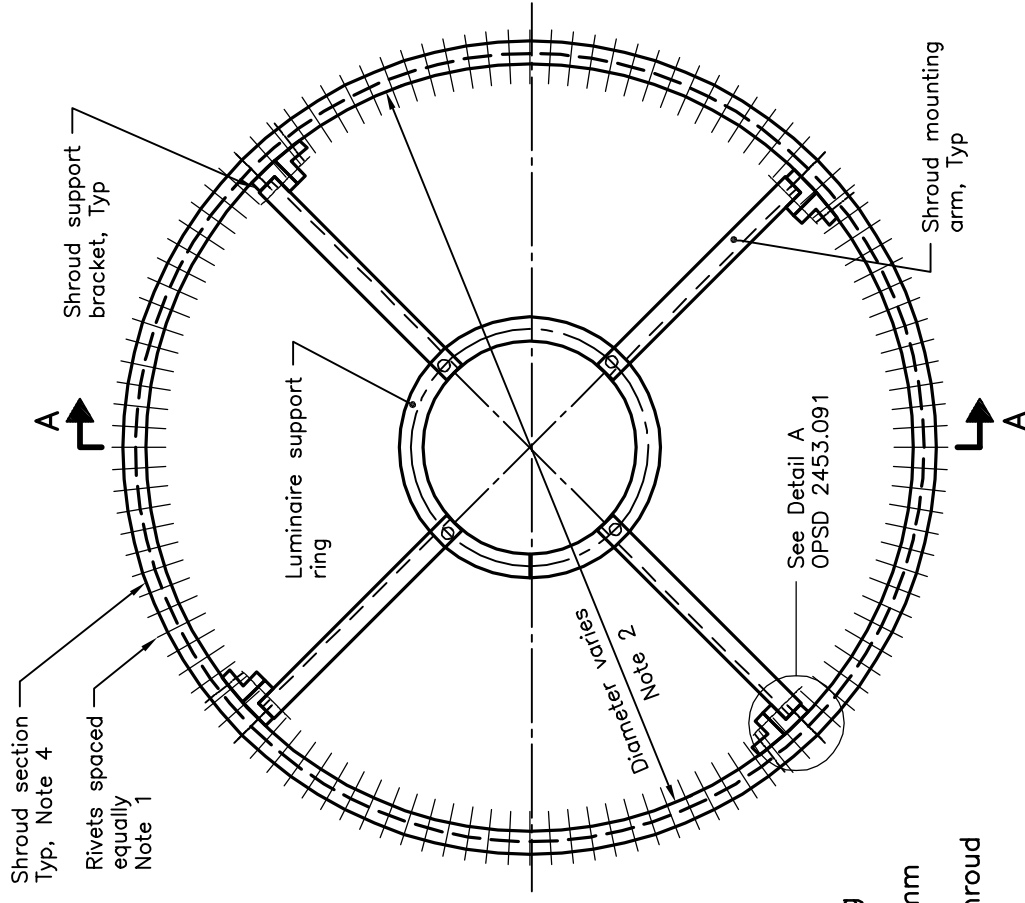


OPSD 2453.080



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.



SECTION A-A

PLAN SHROUD ASSEMBLY

ONTARIO PROVINCIAL STANDARD DRAWING

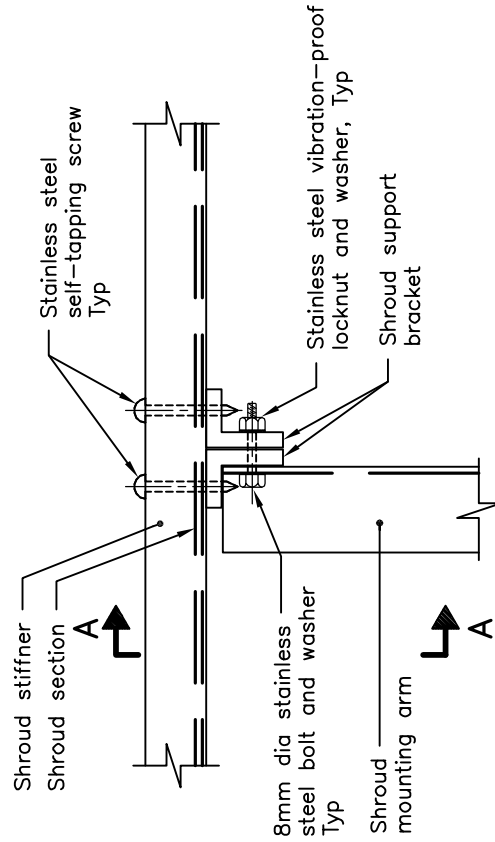
Nov 2016 Rev 1



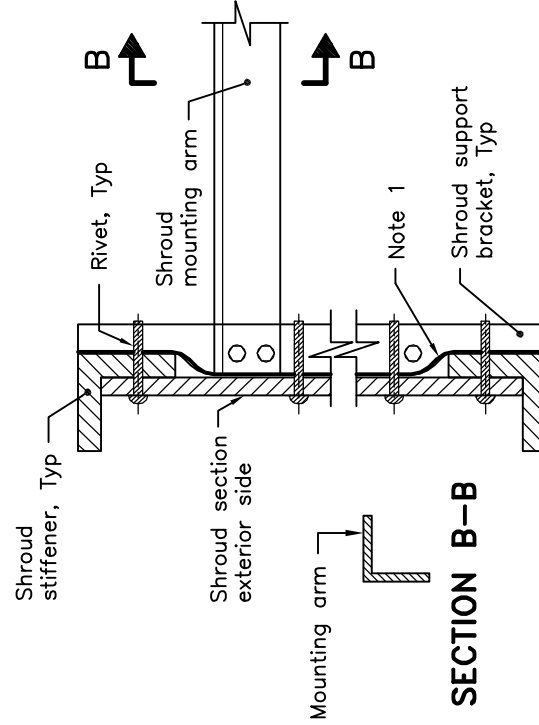
HIGH MAST LIGHTING POLE

SHROUD

OPSPD 2453.090

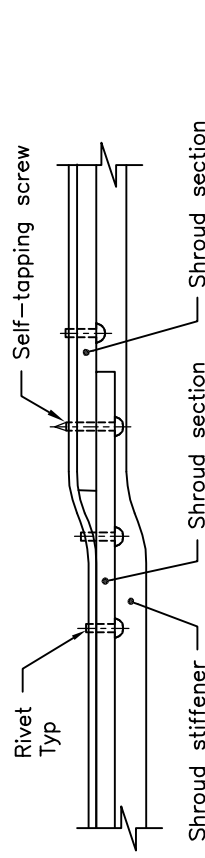


DETAIL A
ATTACHMENT OF SHROUD MOUNTING ARM
TO SHROUD SUPPORT BRACKET

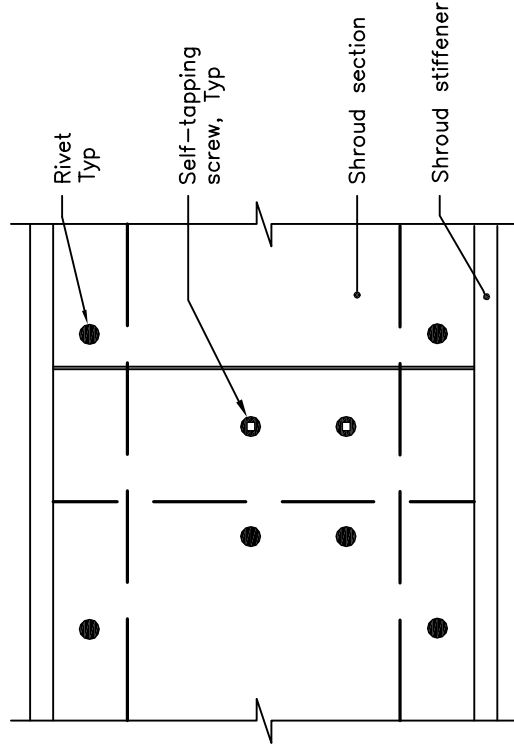


SECTION B-B

SECTION A-A



PLAN



ELEVATION

SHROUD SECTION OVERLAP

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 OPSP shall be read in conjunction with OPSP 2453.090.
- E All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

HIGH MAST LIGHTING POLE

SHROUD DETAILS

Nov 2016 Rev 1



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

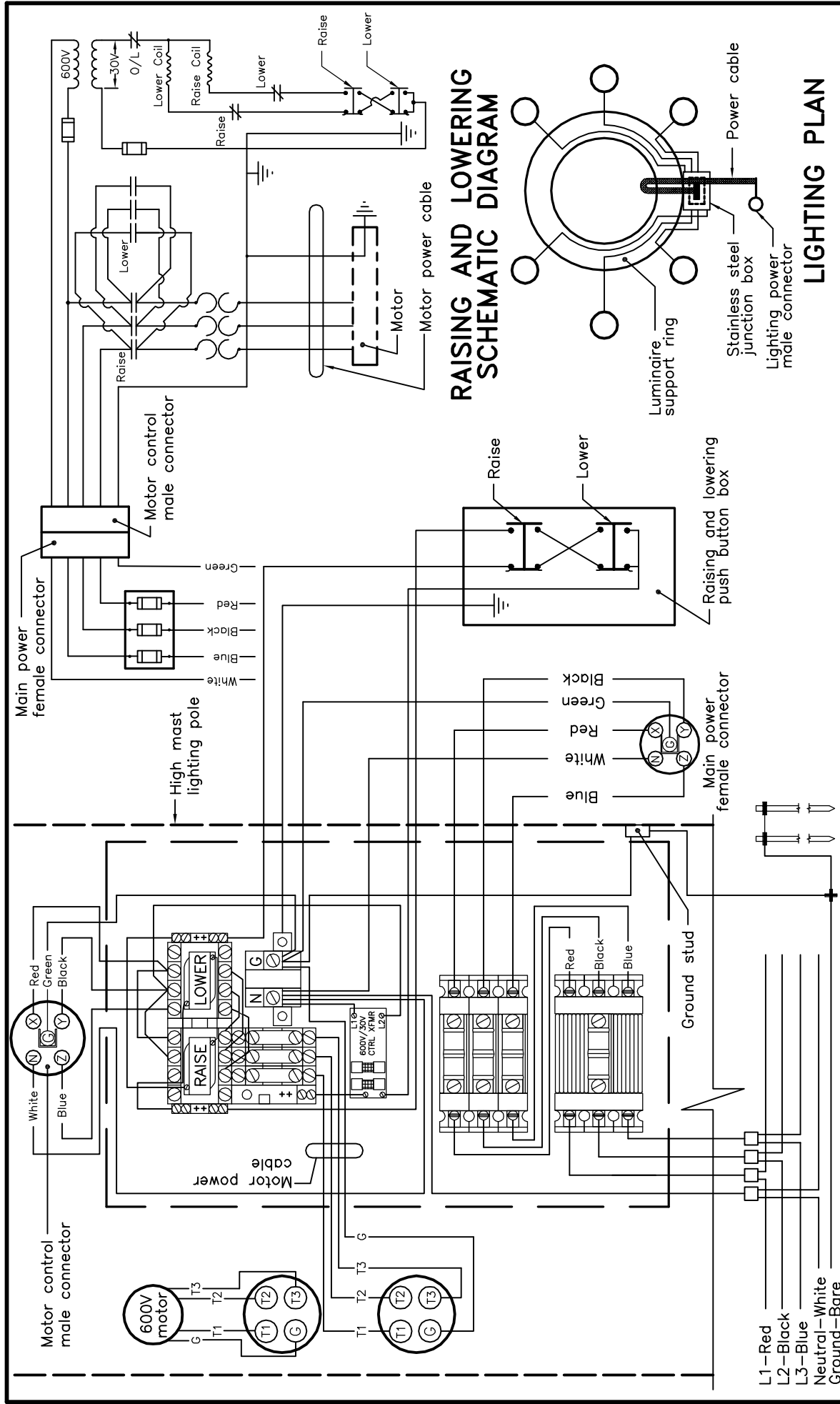
NOTES:

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		_____			

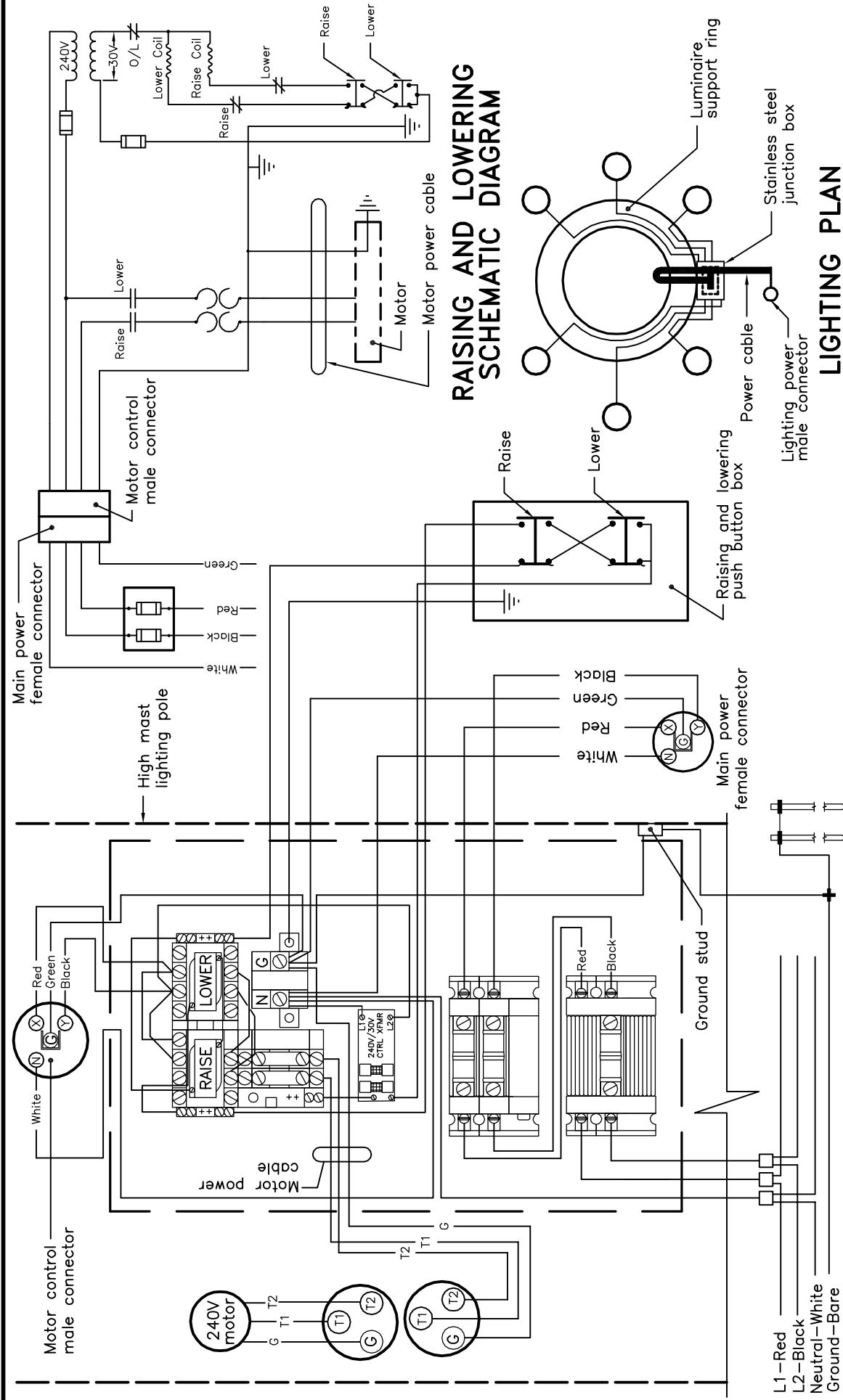
		OPSD 2453.140			



RAISING AND LOWERING SCHEMATIC DIAGRAM

LIGHTING PLAN

		OPSD 2453.170
ONTARIO PROVINCIAL STANDARD DRAWING		
HIGH MAST LIGHTING POLE INTERNAL DRIVE WIRING DIAGRAM 347/600V, 3-PHASE		
NOTE: A Male and female connectors for the motor shall be uniquely keyed to prevent mating with other connectors.	Nov 2016	Rev 1



ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2016 Rev 1



HIGH MAST LIGHTING POLE
INTERNAL DRIVE WIRING DIAGRAM
120/240V, 1-PHASE

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

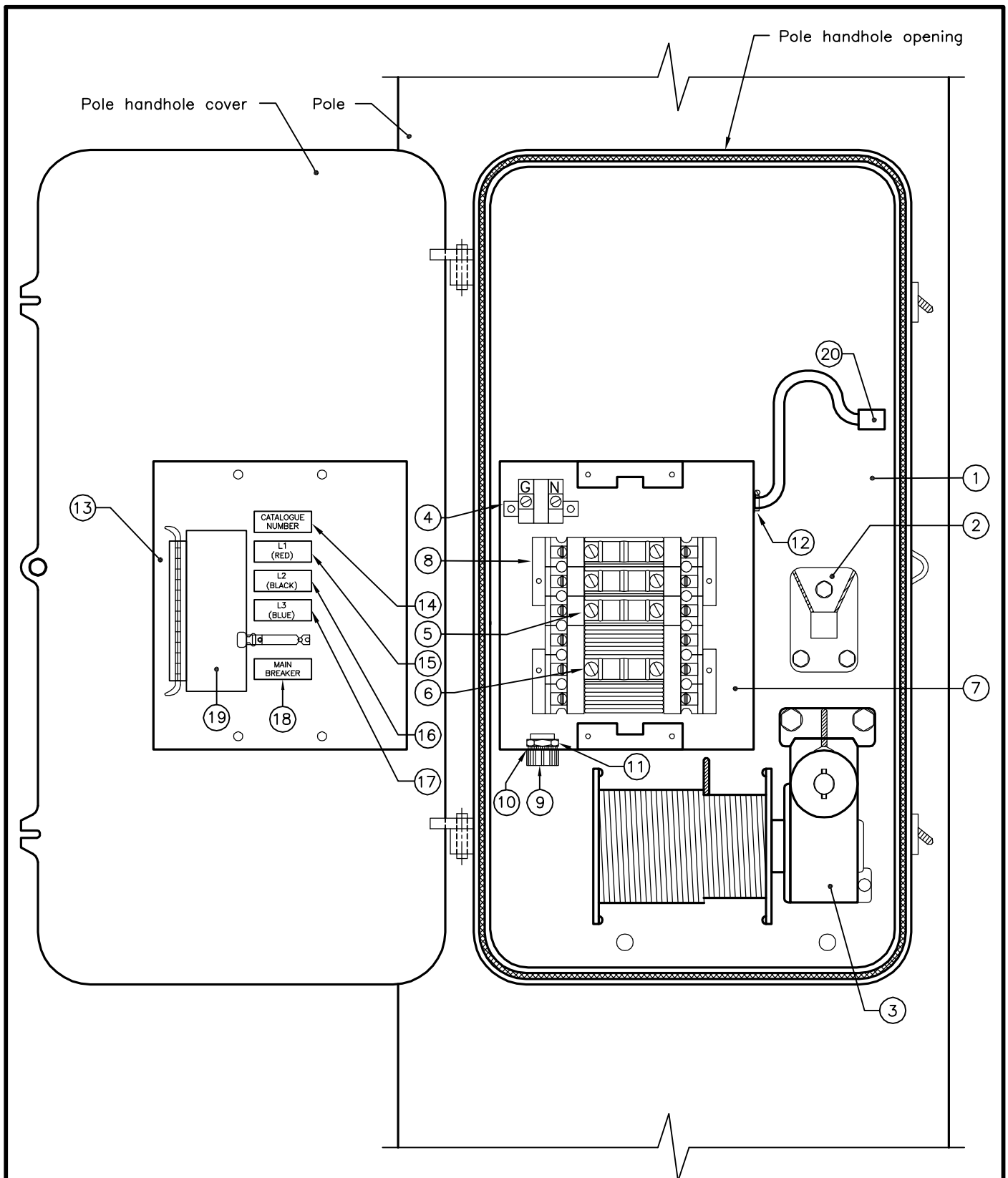
NOTES:

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			

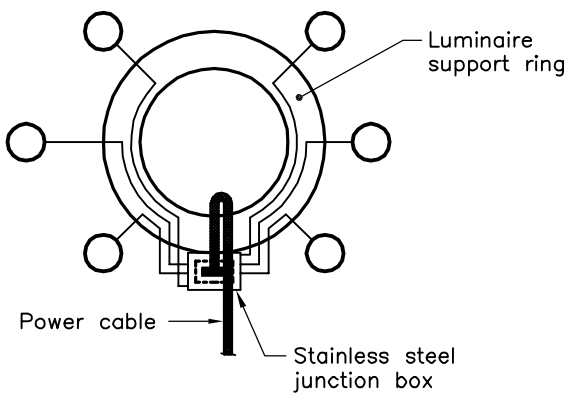


NOTES:

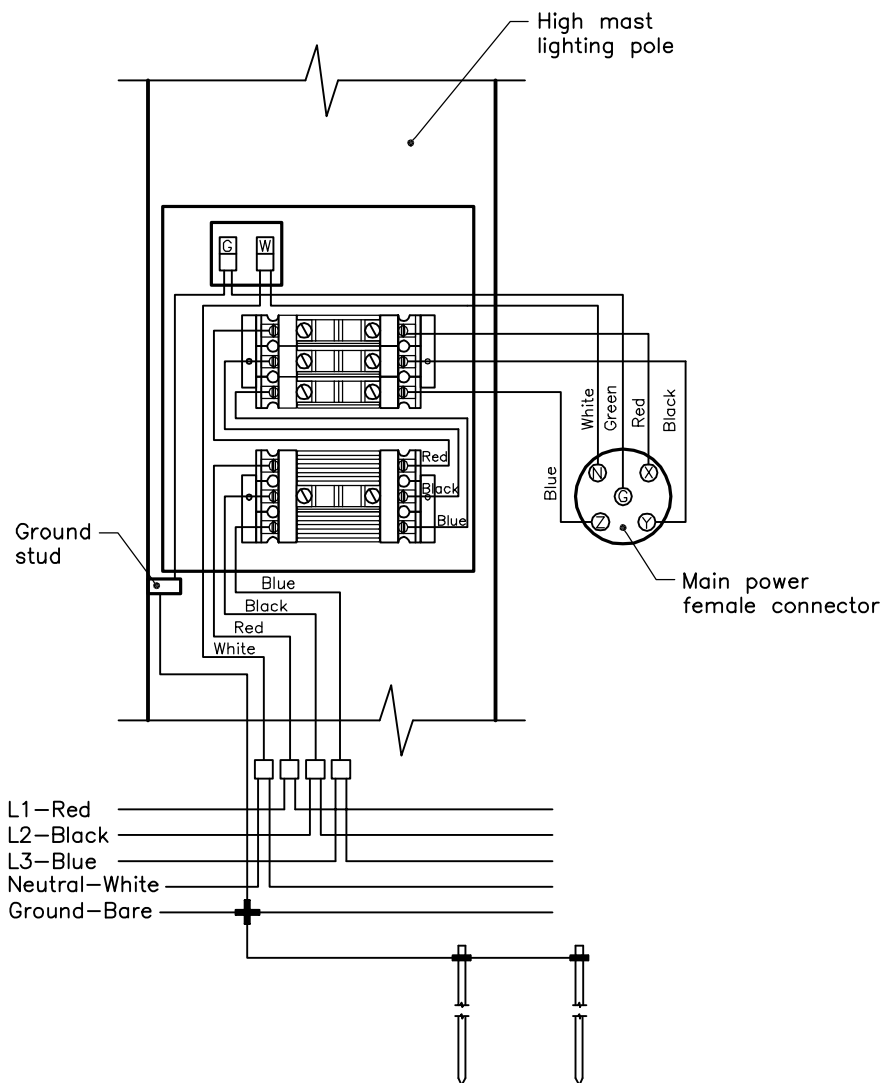
A This OPSD shall be read in conjunction with OPSD 2453.190.

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

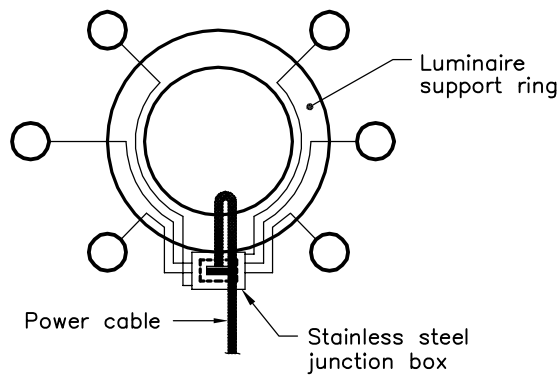
OPSD 2453.200				



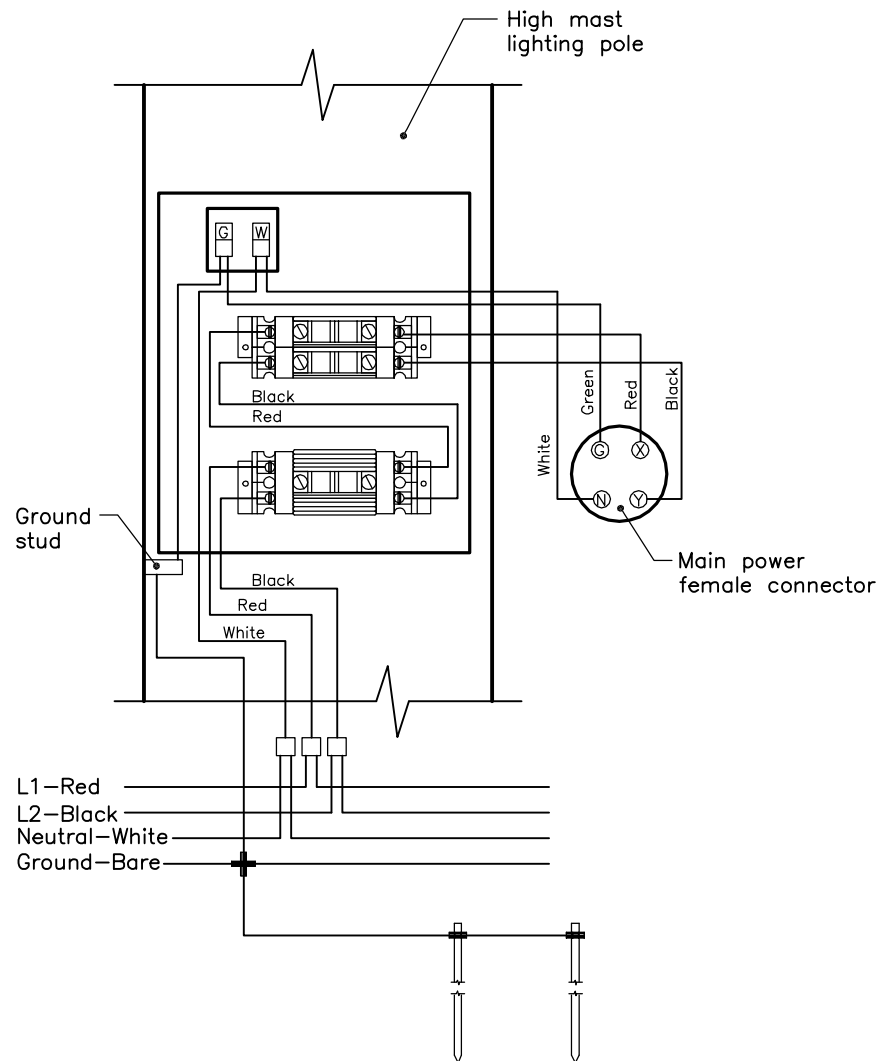
PLAN



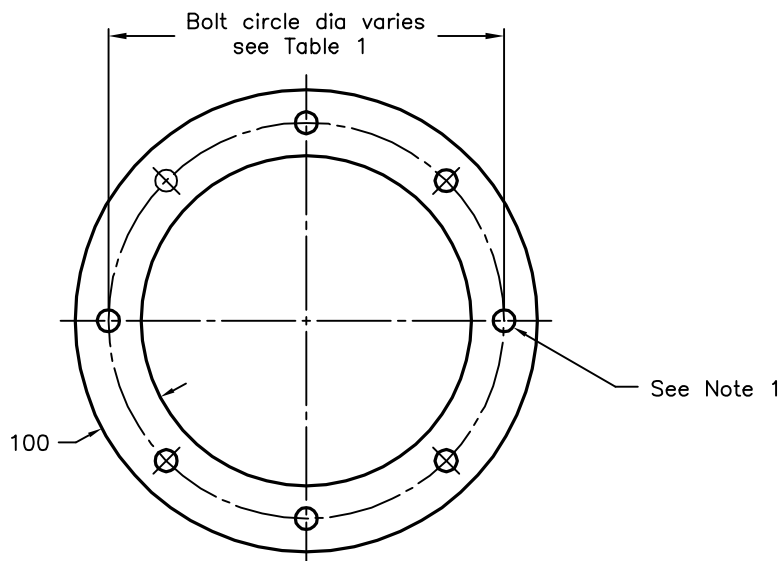
ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2016	Rev	1	
HIGH MAST LIGHTING POLE EXTERNAL DRIVE RAISING AND LOWERING EQUIPMENT 347/600V, 3-PHASE WIRING DIAGRAM		----- ----- -----			
		OPSD 2453.210			



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

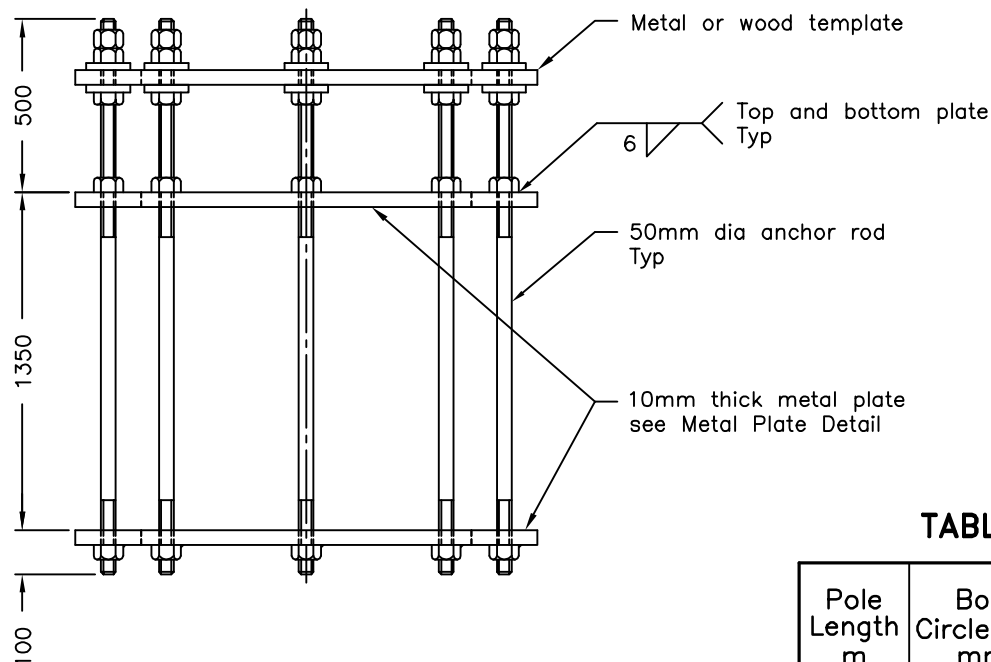


TABLE 1

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

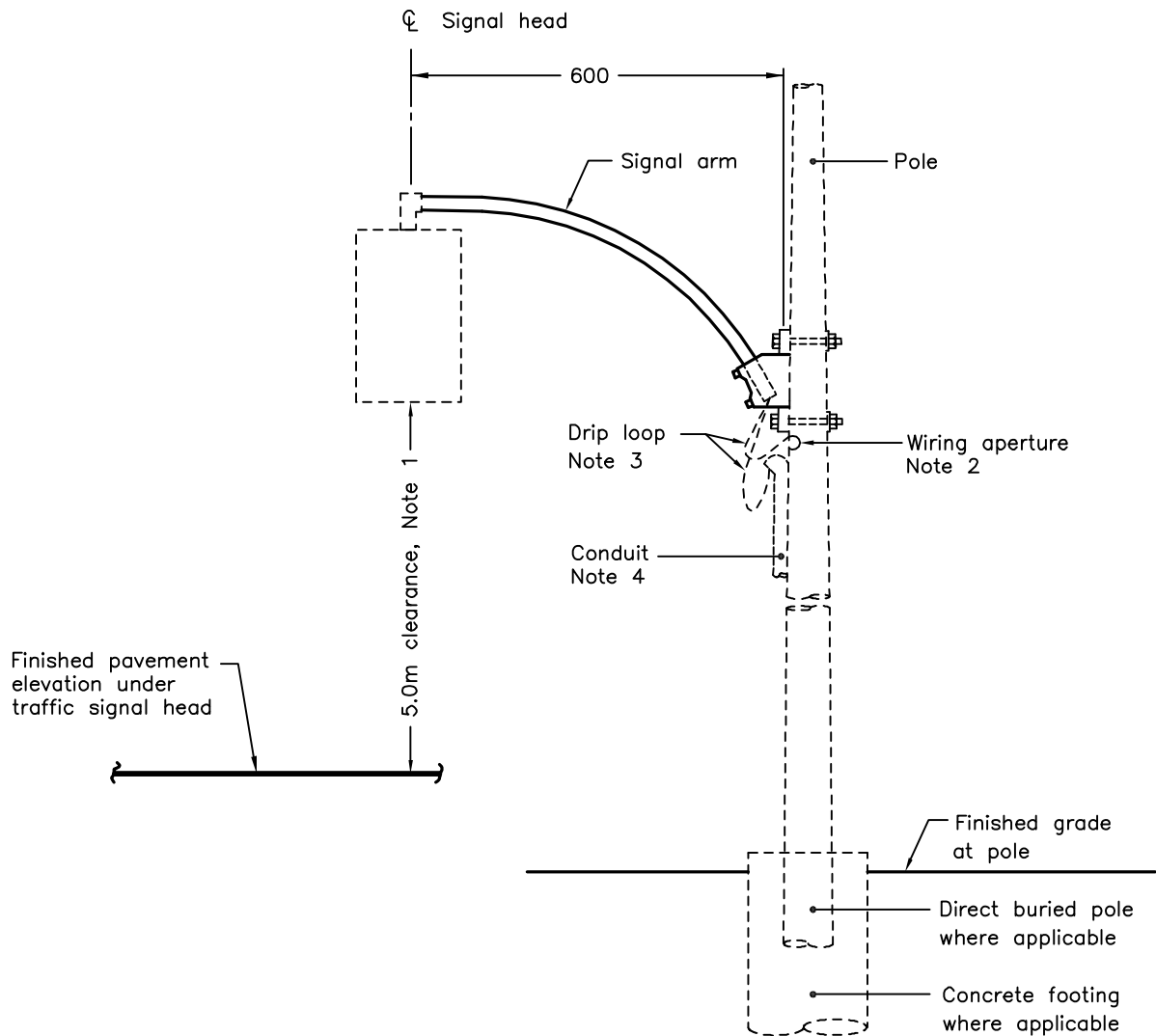
Rev 1

HIGH MAST LIGHTING POLE

ANCHORAGE ASSEMBLY DETAILS



OPSD 2456.011

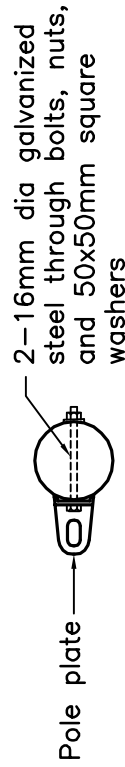


NOTES:

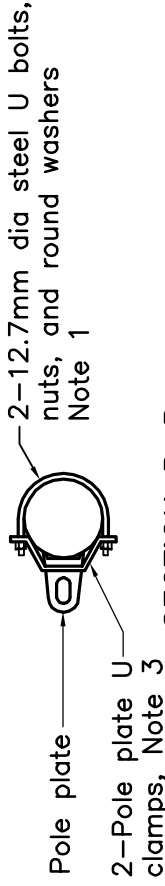
- 1 The bottom of the signal head shall be a minimum of 5.0m above the highest point on the roadway, regardless of whether the signal head is above the pavement or not.
 - 2 Wiring aperture shall be 25mm diameter field drilled complete with rubber grommet, 25mm below arm attachment or 25mm below overlapping sectional steel joints, de-burred, 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 2552.01 or OPSD 2554.010.
- A For arm attachment details refer to OPSD 2500.020.
 B For traffic signal head wiring details refer to OPSD 2528.01.
 C Traffic signal hanger details shall be as specified.
 D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2011	Rev	1	
600mm SIGNAL ARM AND SIGNAL HEAD	-----				

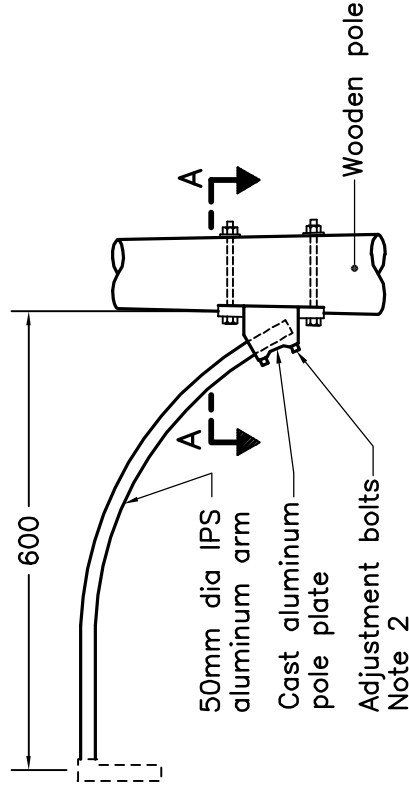
OPSD 2500.010					



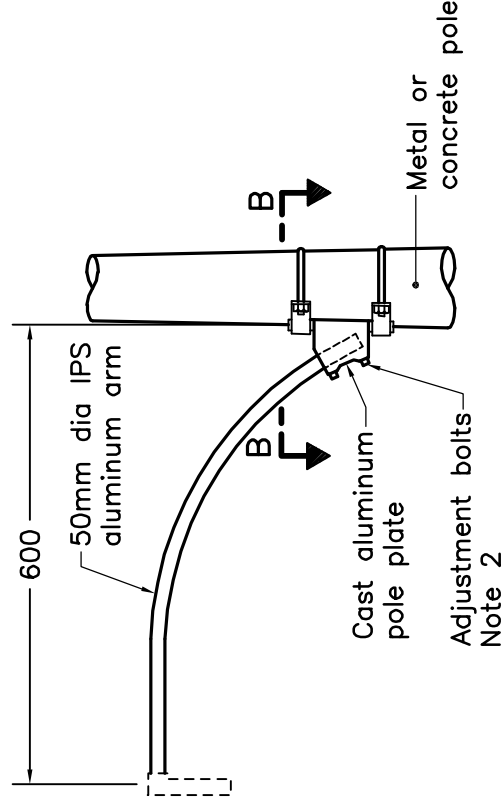
SECTION A-A



SECTION B-B



**ATTACHMENT TYPE 2
WOODEN POLE**



**ATTACHMENT TYPE 1
METAL AND CONCRETE POLE**

NOTES:

- 1 12.7mm dia 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 OPD to be read in conjunction with OPD 2500.010.
- B All dimensions are in millimetres unless otherwise shown.

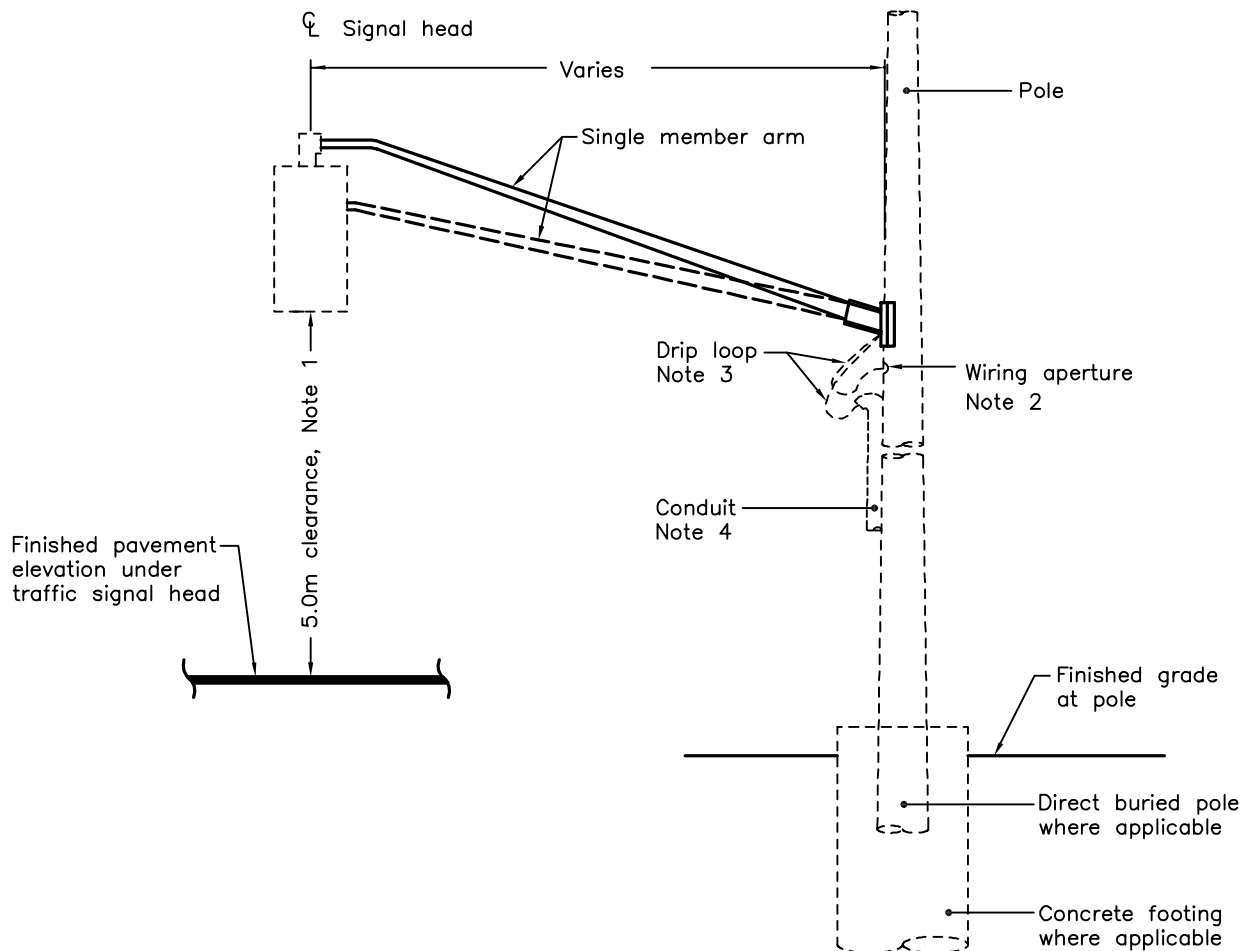
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2009 Rev 1



**600mm SIGNAL ARM
ATTACHMENT TO POLES**

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, de-burred, 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 2552.01 or OPSD 2554.010.
- A For arm attachment details refer to OPSD 2500.020.
 B For traffic signal head wiring details refer to OPSD 2528.01.
 C Traffic signal hanger details shall be as specified.
 D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

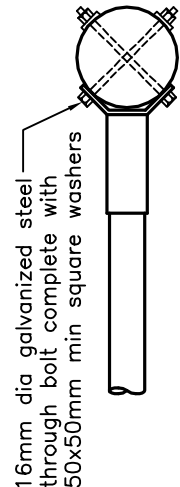
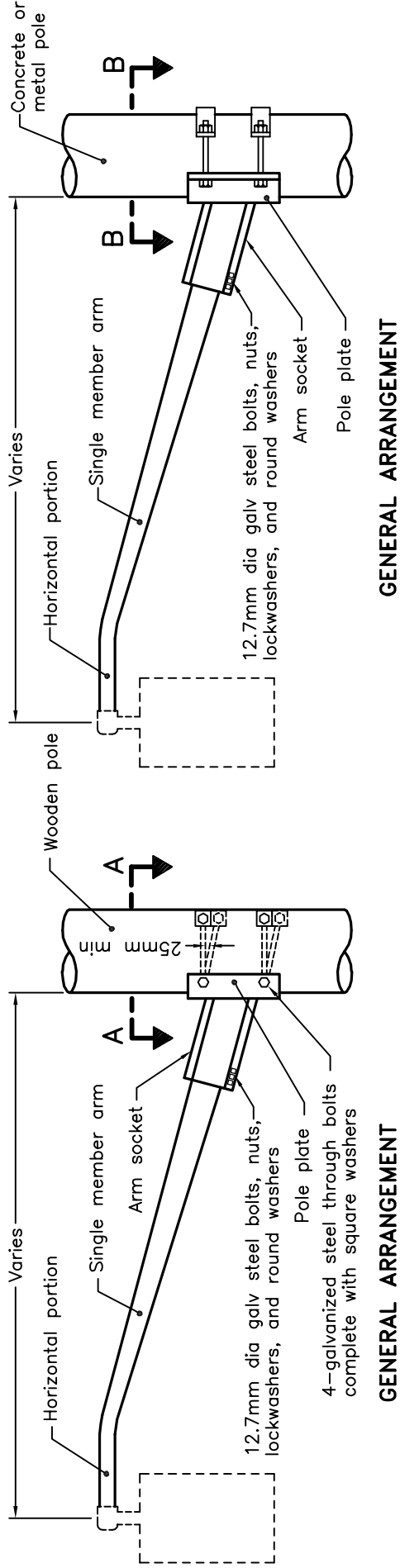
Nov 2011

Rev 2

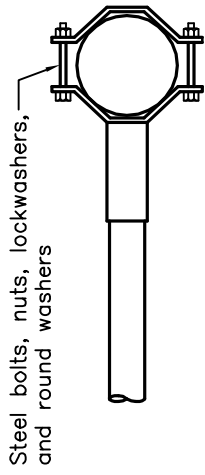
SINGLE MEMBER ARM AND SIGNAL HEAD

OPSD 2501.01





SECTION A-A
WOODEN POLE ATTACHMENT
NOTE 1

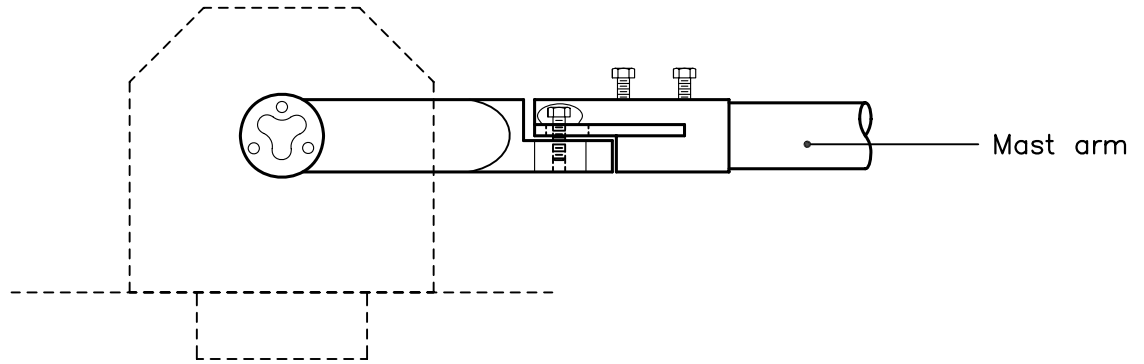


SECTION B-B
CONCRETE AND METAL POLE ATTACHMENT
NOTE 2

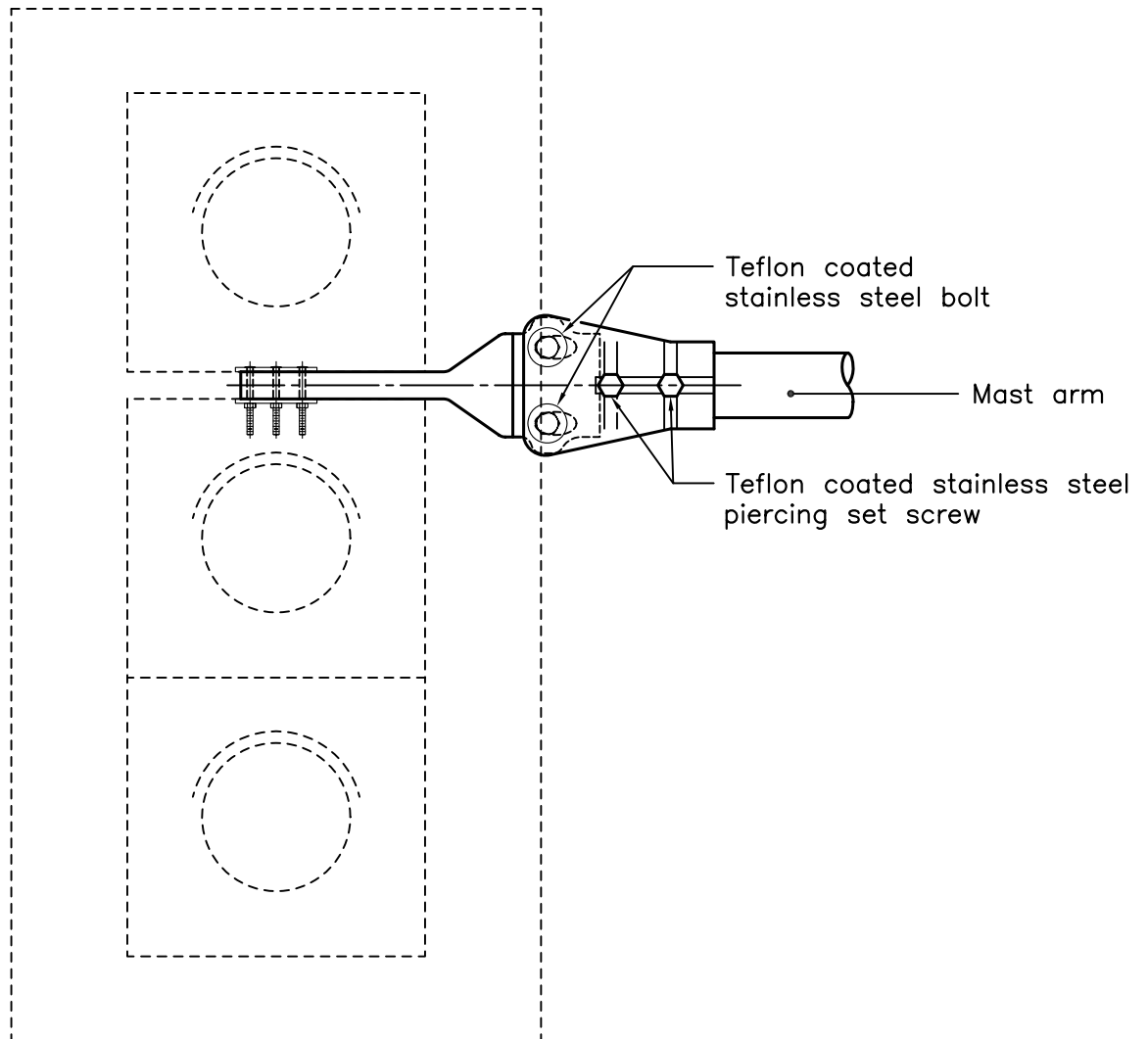
NOTES:

- 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 OPD 2501.01.
- B Traffic signal hanger details as specified.
- C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2011	Rev 2		OPSD 2501.02
ALUMINUM SINGLE MEMBER ARM ATTACHMENT DETAILS					



PLAN



ELEVATION

NOTE:

A This OPSD to be read in conjunction with OPSD 2501.01 and 2501.02.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2007

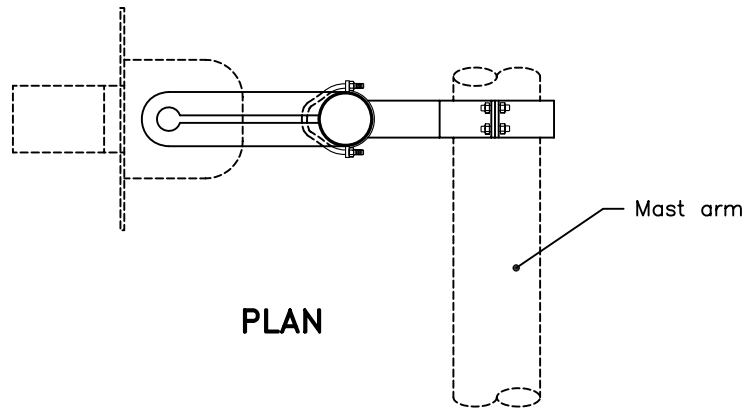
Rev 0

TRAFFIC SIGNAL

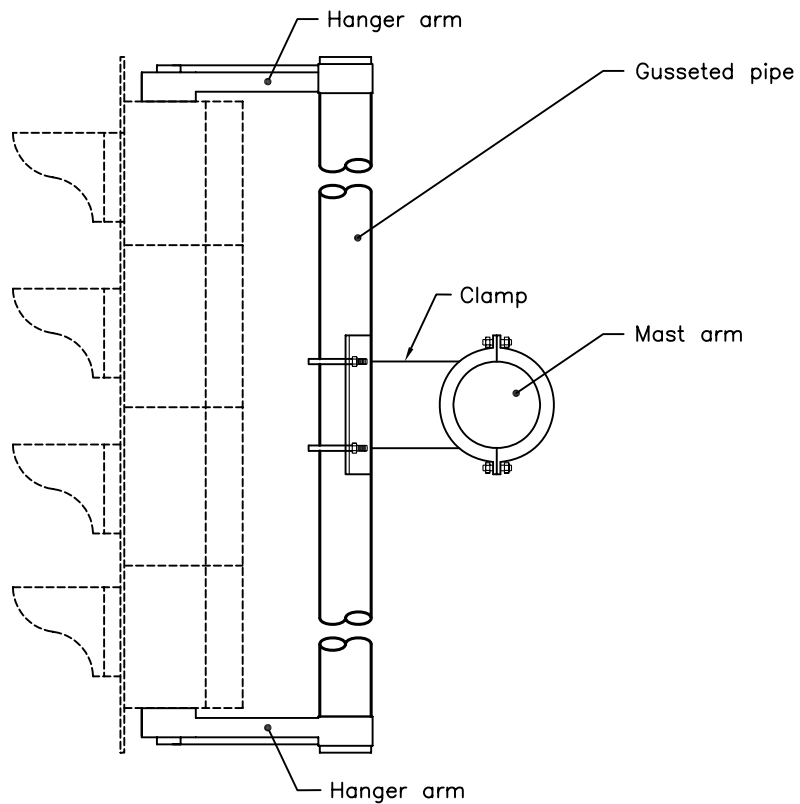
ADJUSTABLE MID-SECTION HANGER



OPSD 2502.010



PLAN



SIDE VIEW

NOTES:

A All fastening hardware shall be stainless steel.

B This OPSD to be read in conjunction with OPSD 2501.01 and 2501.02.

ONTARIO PROVINCIAL STANDARD DRAWING

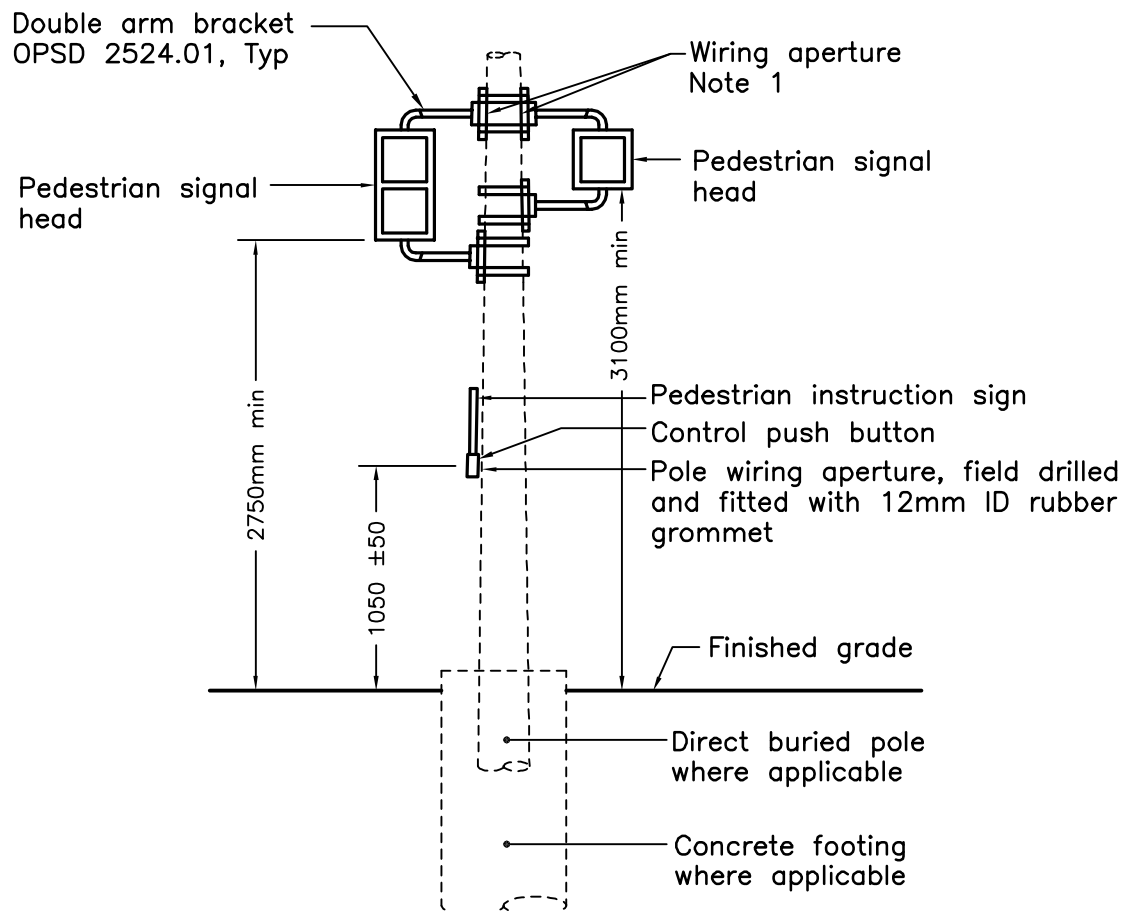
Nov 2007

Rev 0

TRAFFIC SIGNAL
DUAL-END HANGER

OPSD 2502.011



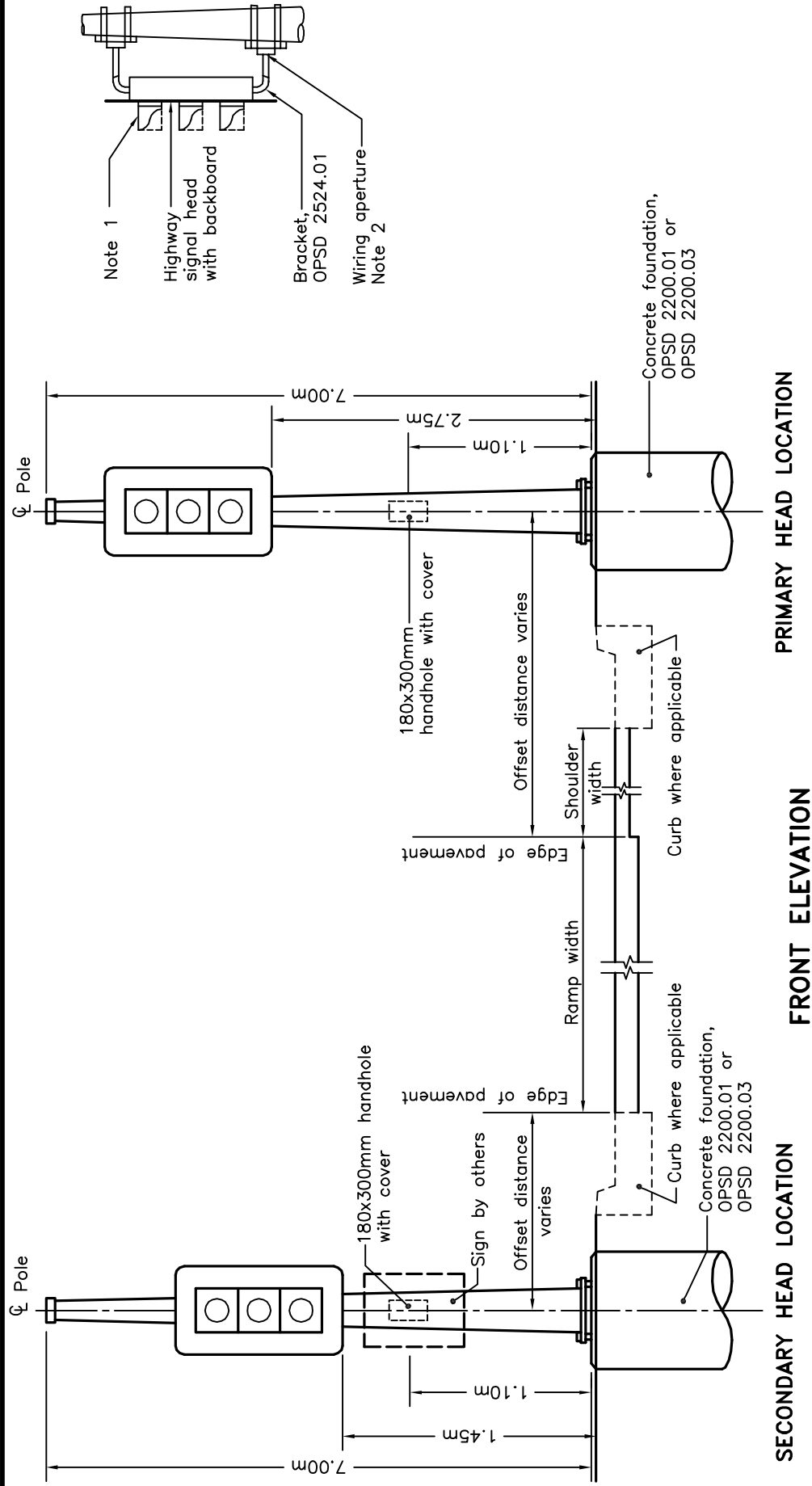


NOTES:

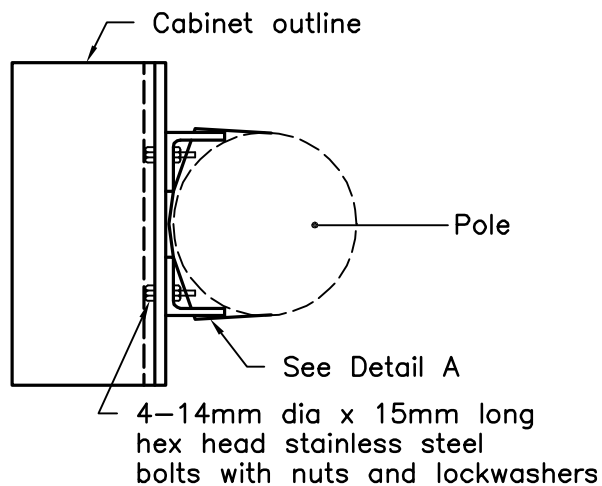
- 1 Wiring aperture shall be 25mm diameter field drilled complete with rubber grommet, de-burred, and protected with zinc rich paint.
- A For external conduit system on wooden or concrete poles refer to OPSD 2552.01 or OPSD 2554.010.
- B All dimensions are in millimetres unless otherwise shown.

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

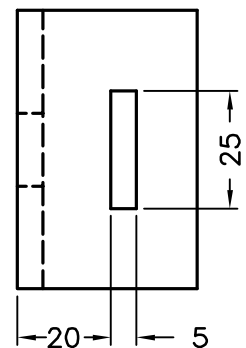
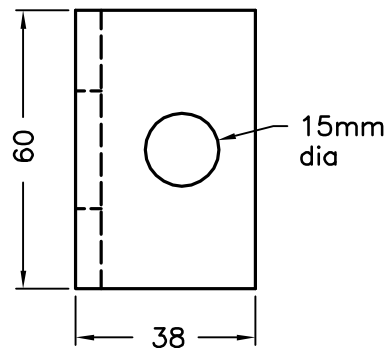
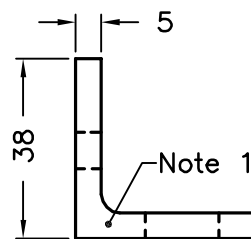
		OPSD 2505.010			



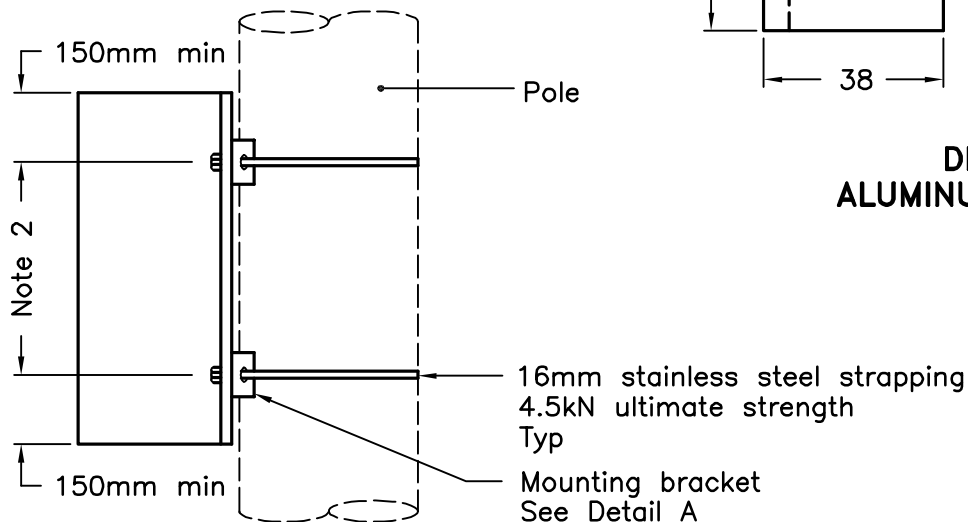
	Nov 2011	Rev 0
ONTARIO PROVINCIAL STANDARD DRAWING	0	0
TRAFFIC SIGNAL SECTIONAL STEEL POLES WITH PRIMARY AND SECONDARY SIGNAL HEADS FOR RAMP METERING	OPD	OPD 2508.010



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.

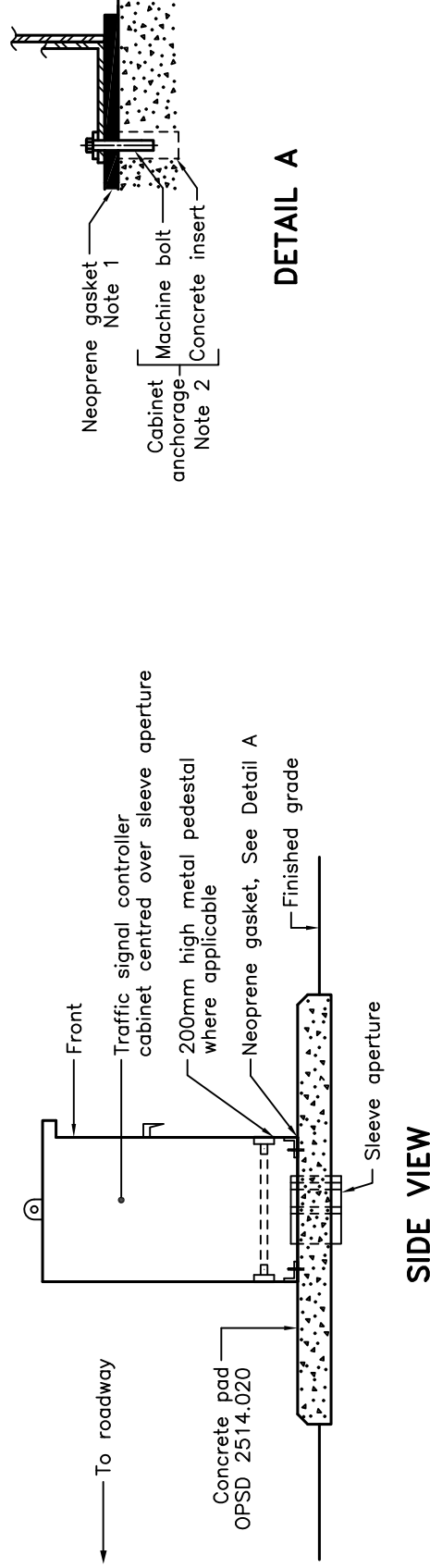
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2011 Rev 0

**MOUNTING BRACKET FOR POLE
MOUNTED CONTROLLER CABINET**

OPSD 2510.020



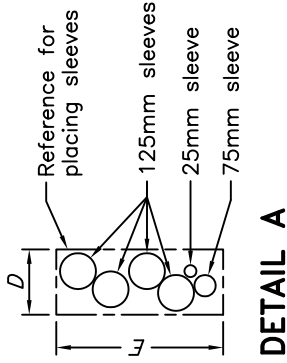


NOTES:

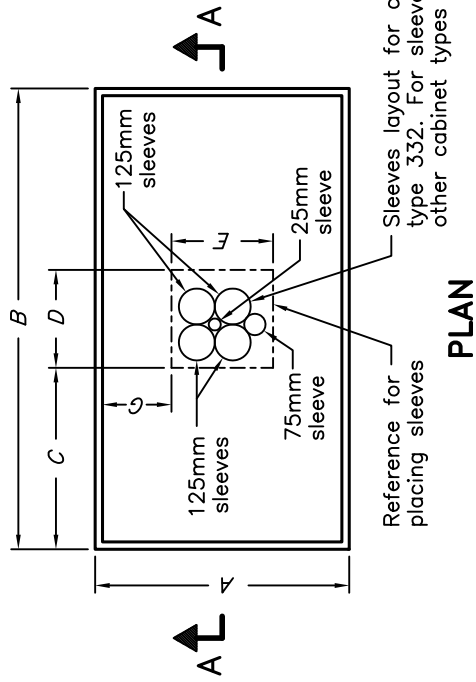
- 1 Cabinet shall be sealed around bottom perimeter with a 10mm thick by 65mm wide neoprene gasket. Gasket shall have a durometer hardness of 45 and shall be provided with adhesive backing for attachment to the cabinet.
- 2 Cabinet shall be secured to the pad, accurately aligned, with chuck end concrete 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			

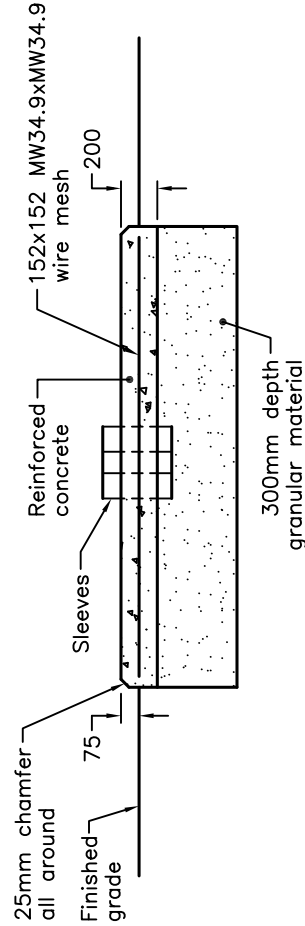




DETAIL A



PLAN



SECTION A-A

Cabinet Type	PAD DIMENSIONS				
	Dimensions mm				
	A	B	C	D	E
332	1000	2000	725	380	380
M	1000	1650	400	250	660
P	1250	1950	400	250	660
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.

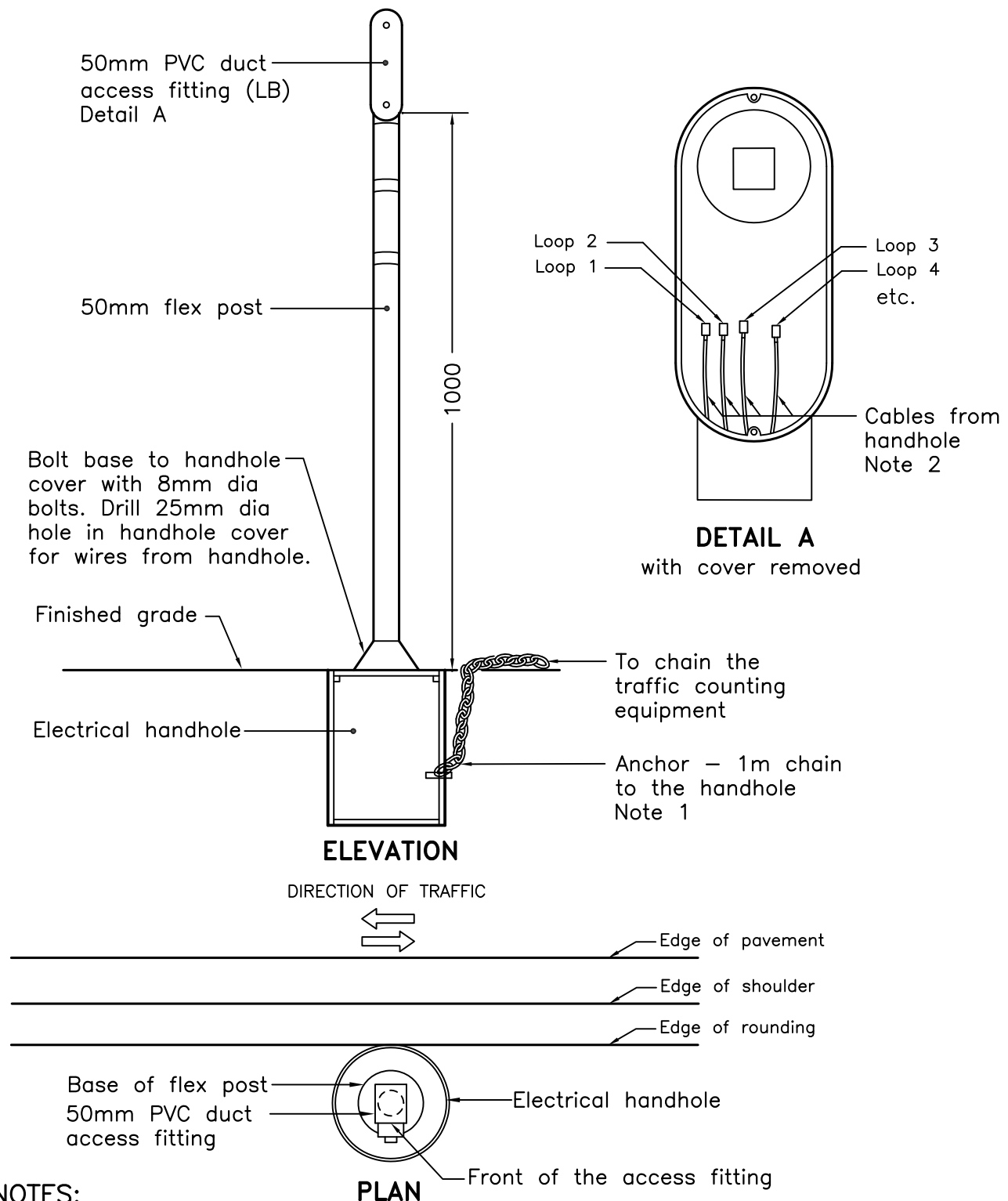
ONTARIO PROVINCIAL STANDARD DRAWING

**CONCRETE PAD
FOR CONTROLLER CABINET**



Nov 2012 Rev 0

OPSD 2514.020



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

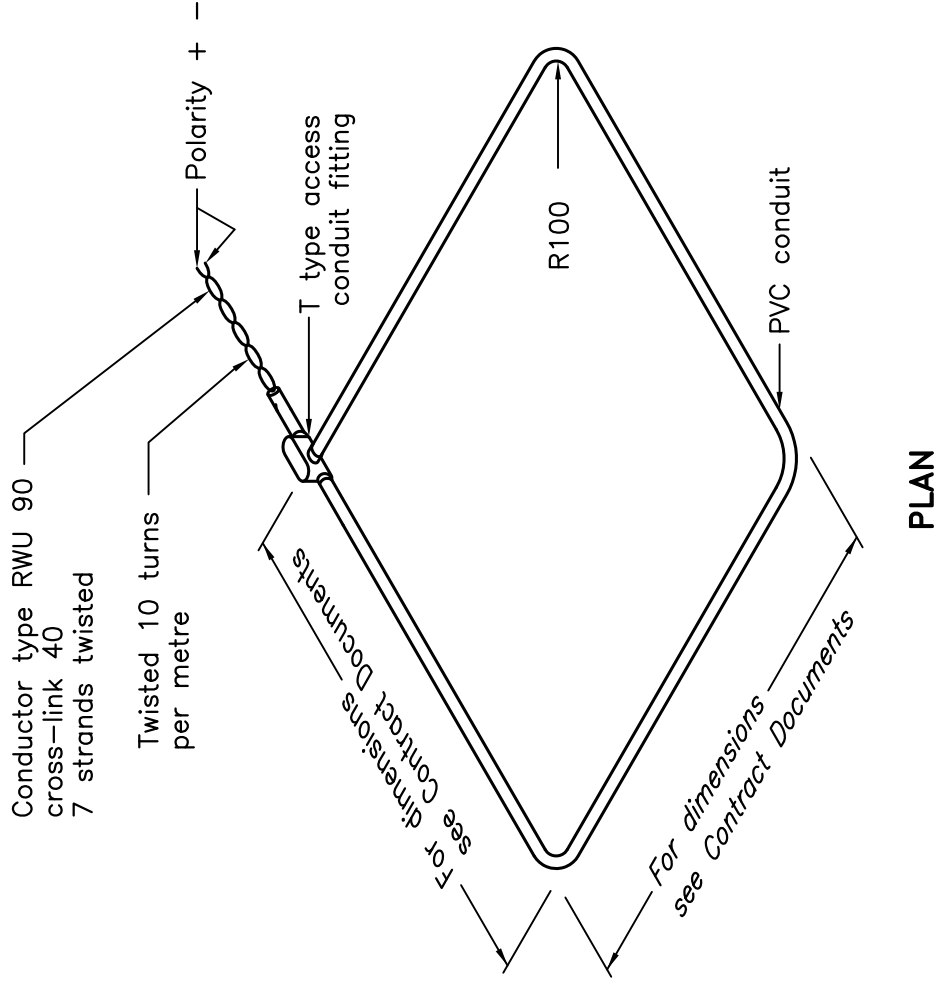
Nov 2012

Rev 0



TRAFFIC DATA COLLECTION
DATA STATION
TRAFFIC COUNTING STATION TYPE 2

OPSD 2516.102



NOTES:

A All dimensions are in millimetres
unless otherwise shown.

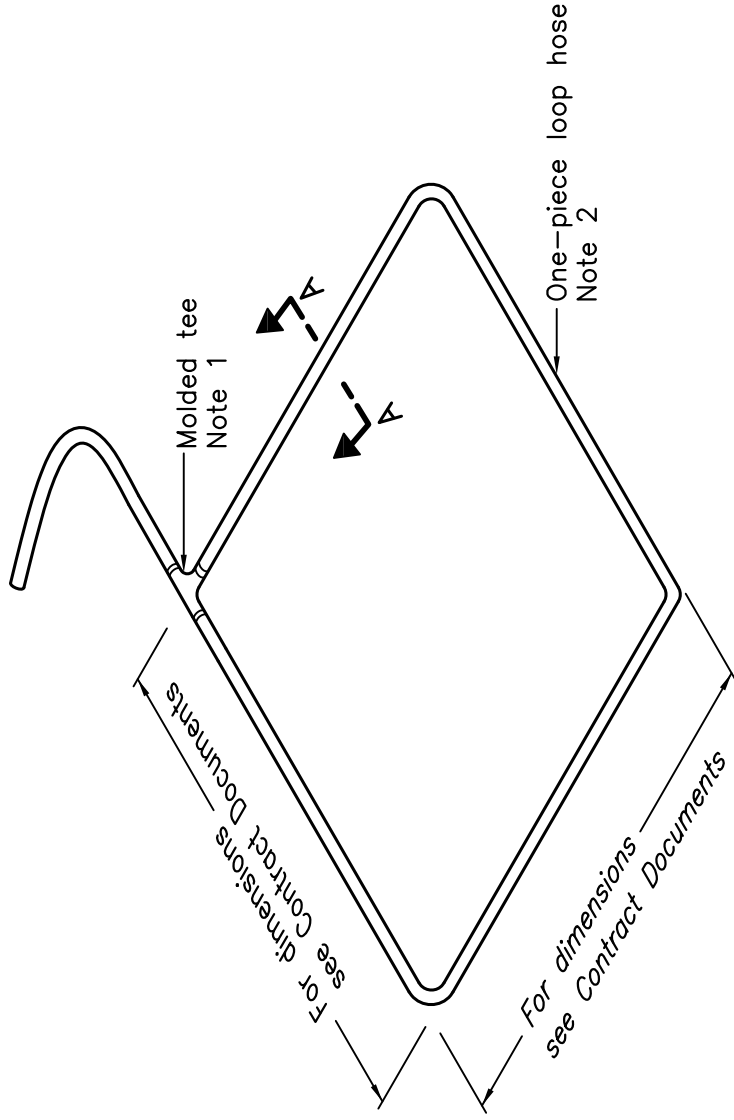
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2012 Rev 0

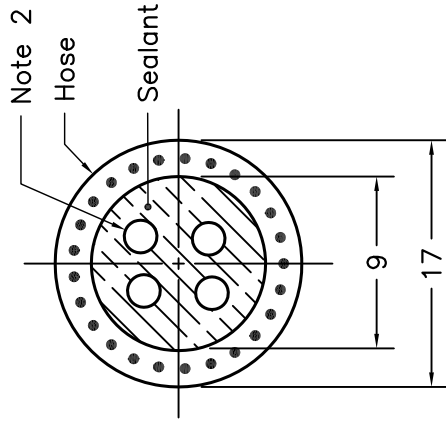


**PREFABRICATED
DETECTOR LOOP**

OPSD 2518.101



PLAN

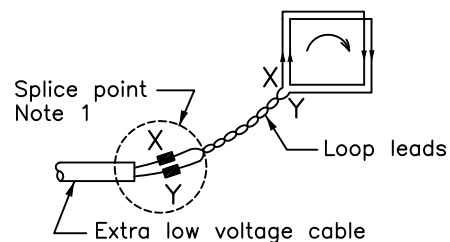
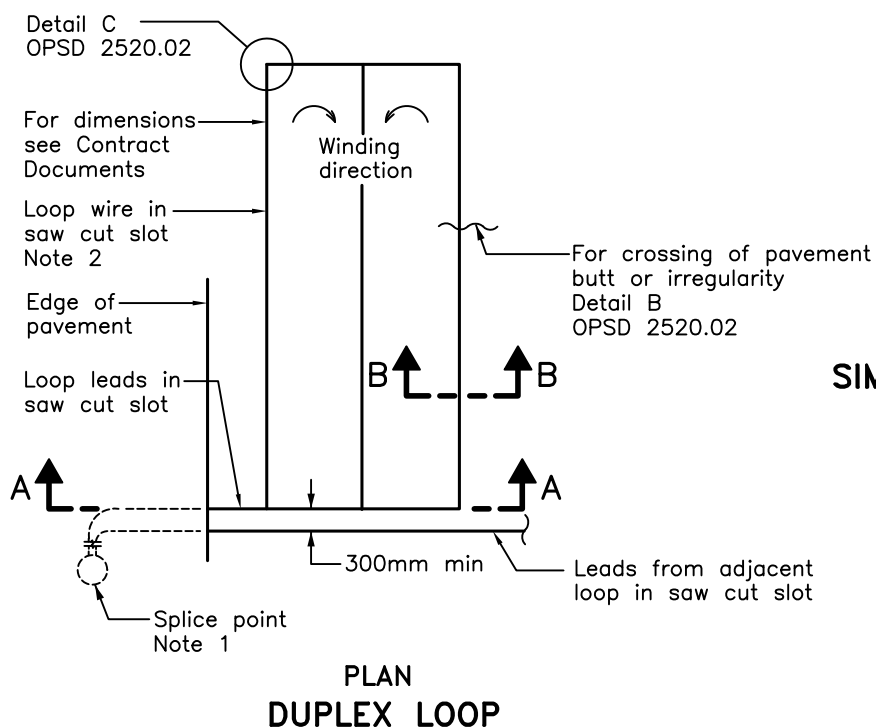
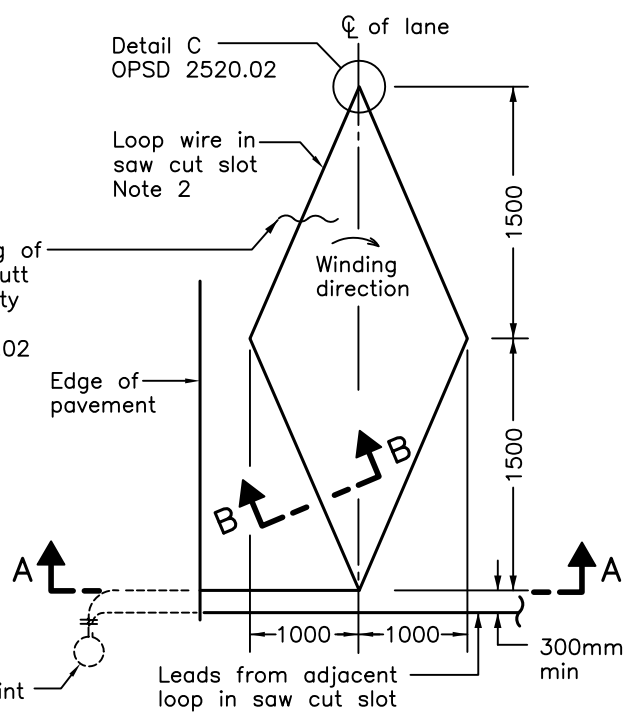
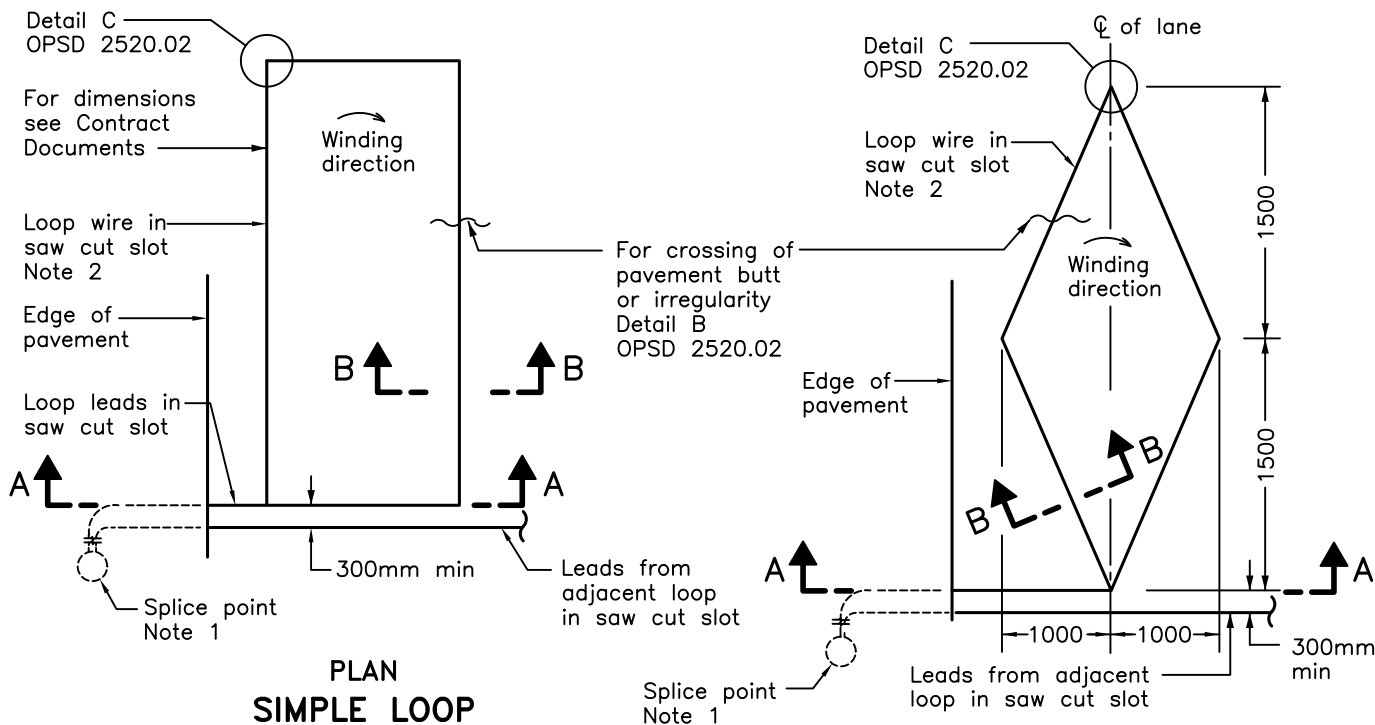


SECTION A-A

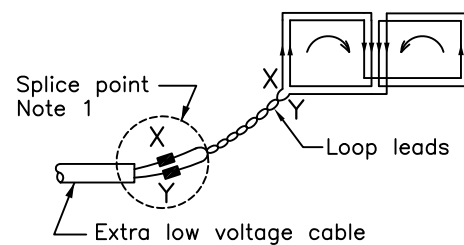
NOTES:

- 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 2012	Rev 0	
TRAFFIC DATA COLLECTION DETECTOR LOOPS HEAVY DUTY RUBBER		---	---	
		---	---	
		OPSD 2518.102		



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

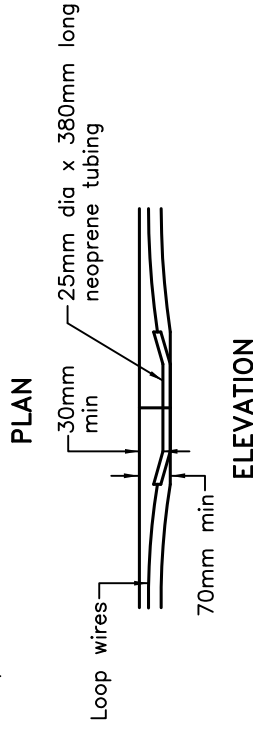
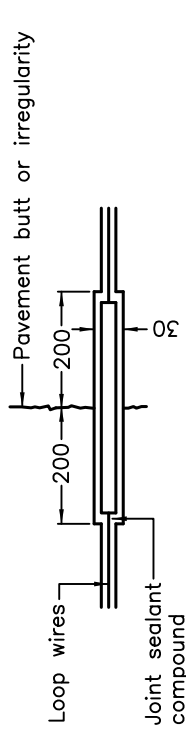
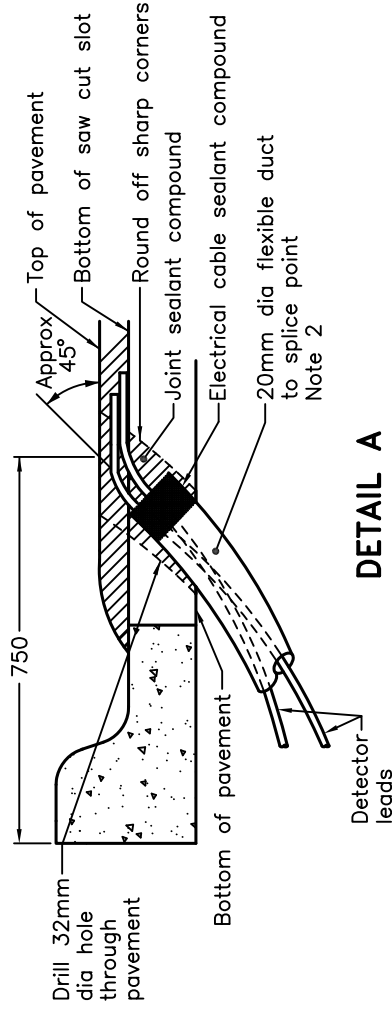
Nov 2012

Rev 0

LOOP DETECTOR INSTALLATION DETAILS I



OPSD 2520.010

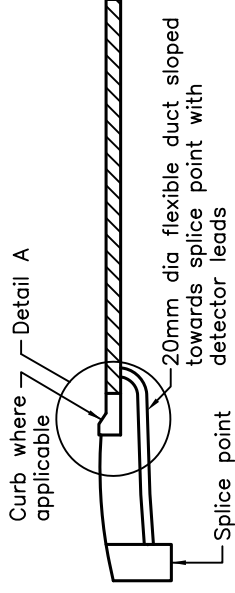


DETAIL B PAVEMENT BUTT OR IRREGULARITY

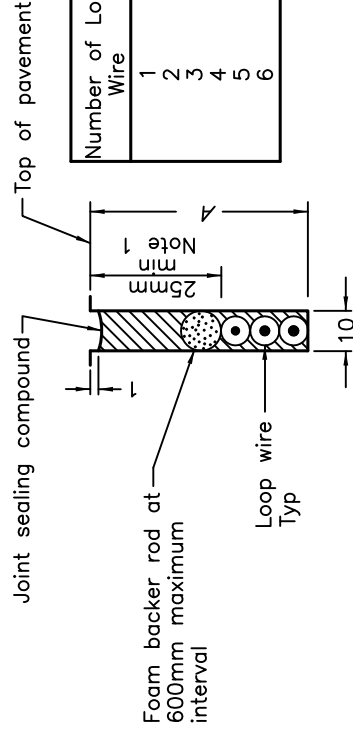
NOTES:

- 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.

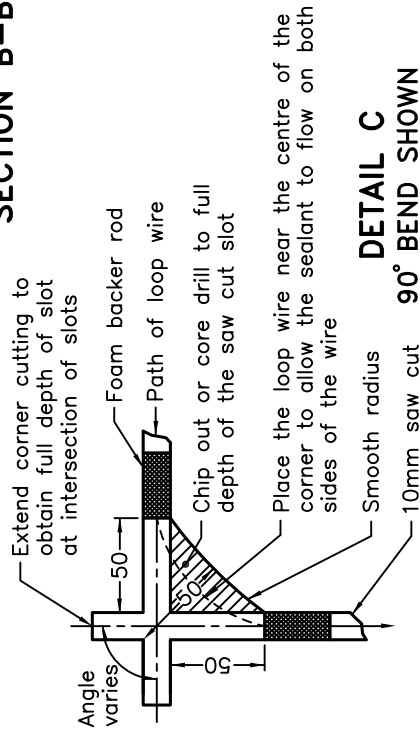


SECTION A-A



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

SECTION B-B



DETAIL C

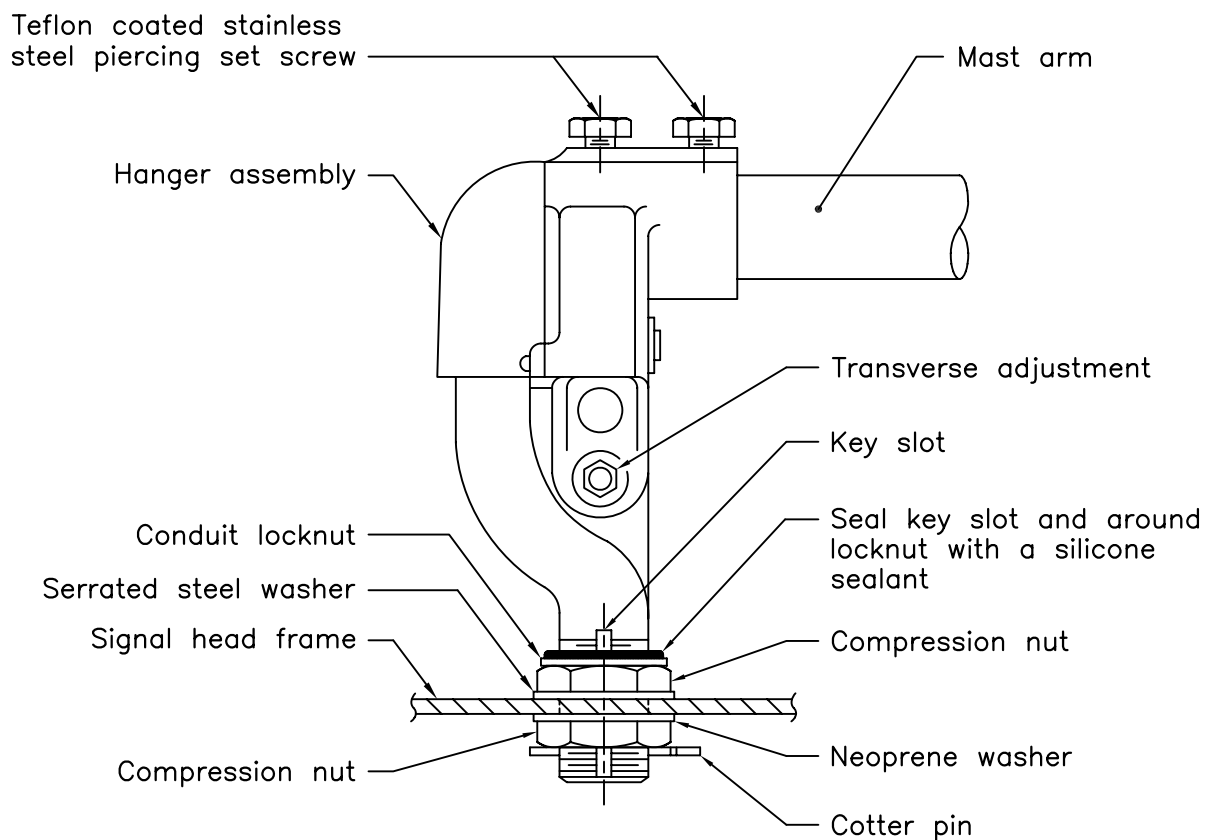
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2012 Rev 4



LOOP DETECTOR INSTALLATION DETAILS II

OPSD 2520.02



NOTE:

A This OPSD to be read in conjunction with OPSD 2501.01 and 2501.02.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2007

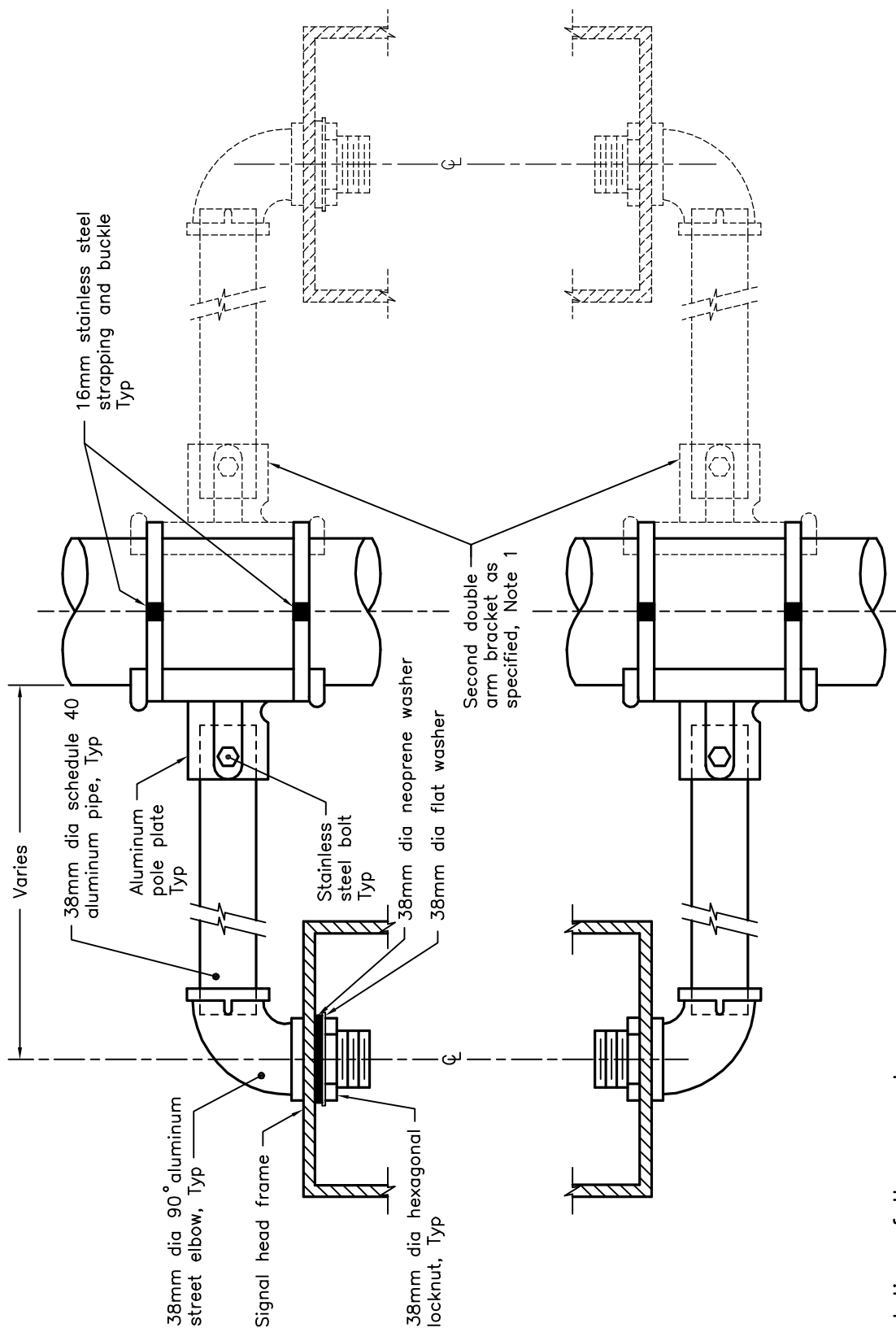
Rev 0

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.

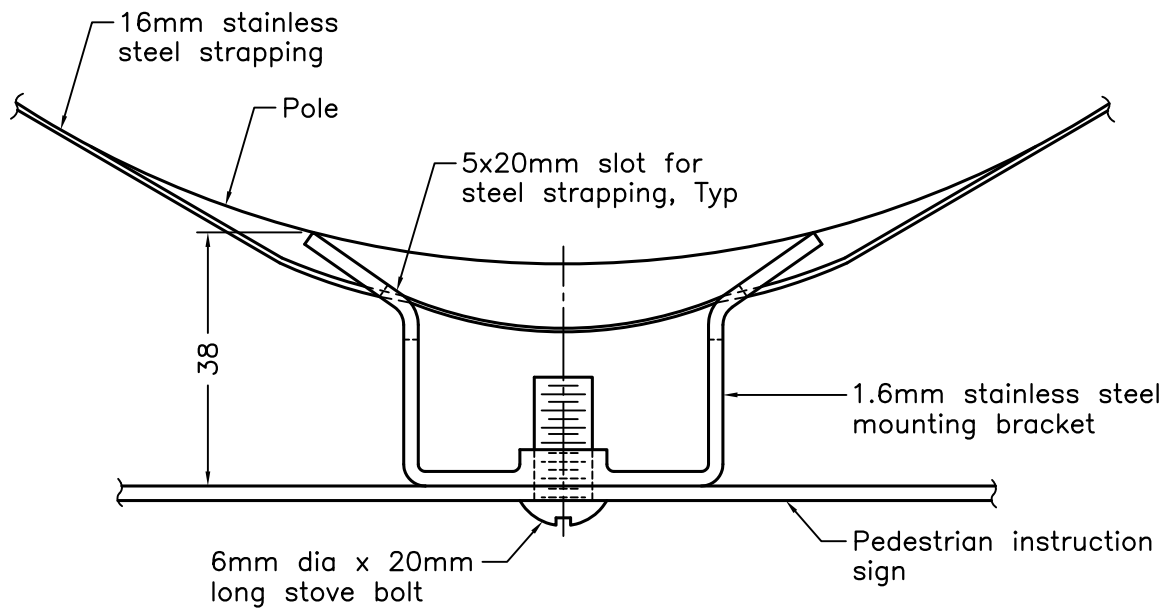
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2009 Rev 1

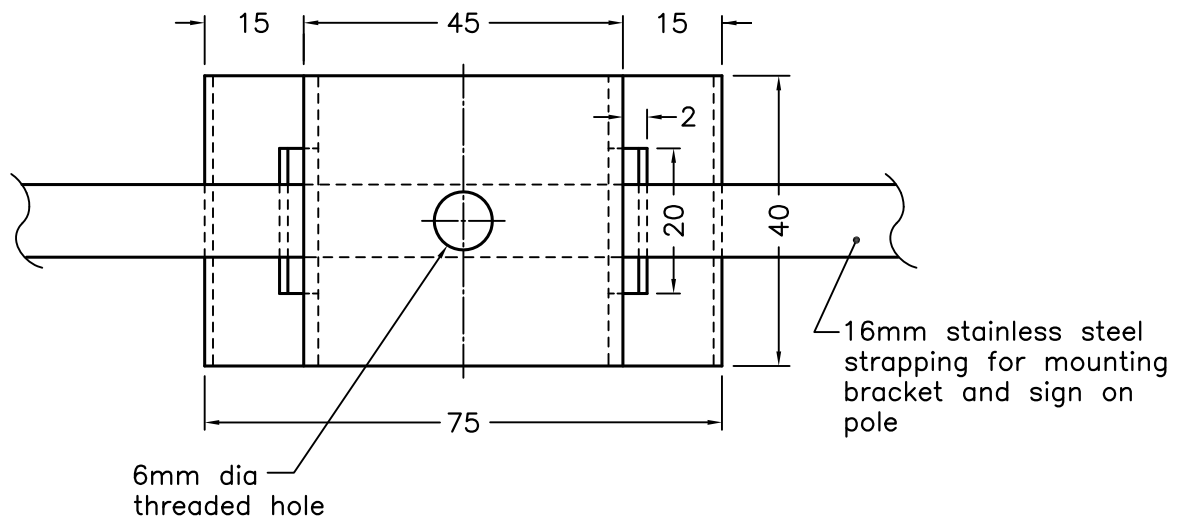


**TRAFFIC SIGNAL
DOUBLE ARM BRACKET**

OPSD 2524.01



PLAN



ELEVATION

NOTE:

A All dimensions are in millimetres unless otherwise shown.

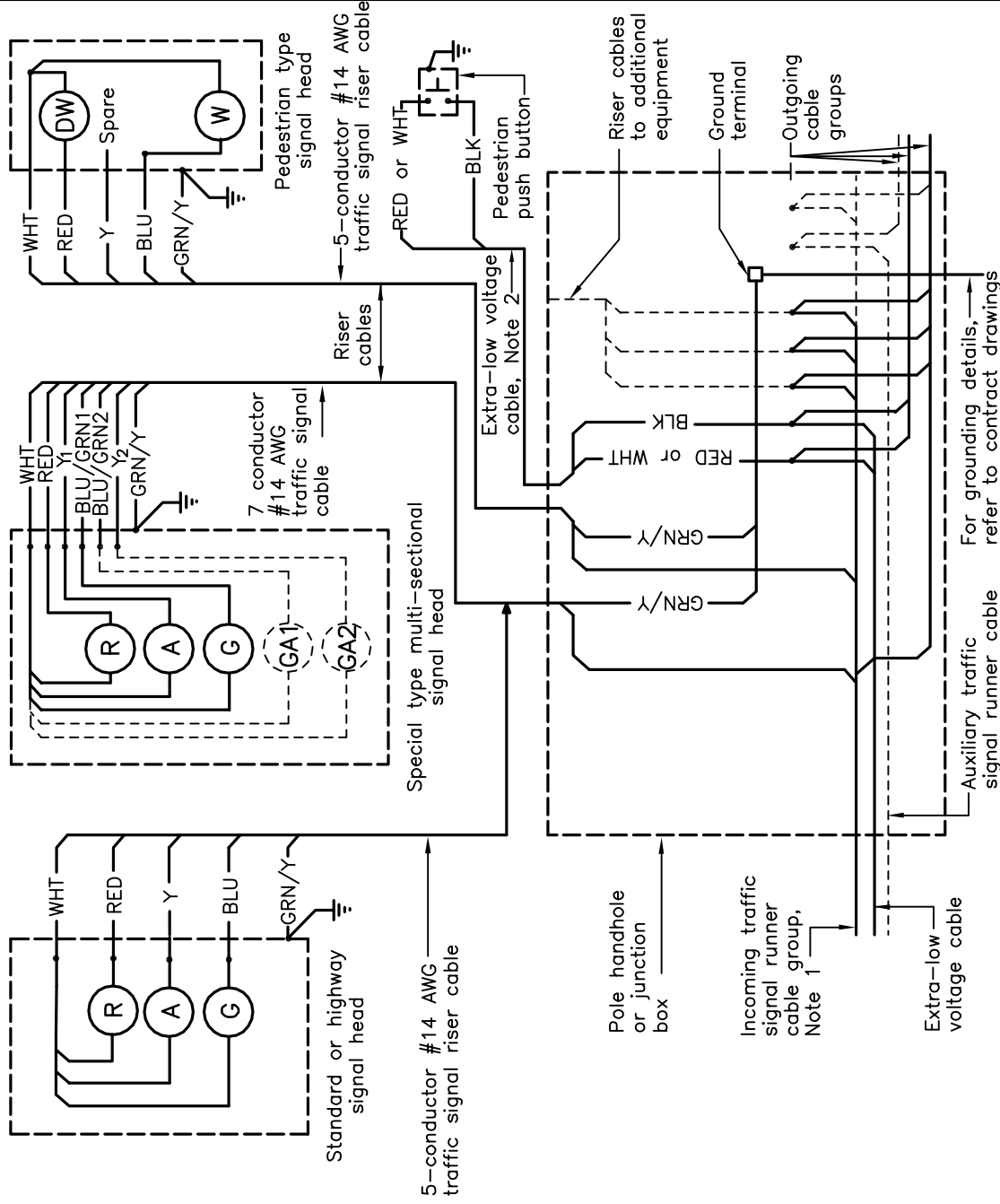
ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2012	Rev	1	
TRAFFIC SIGNAL BRACKET FOR MOUNTING PEDESTRIAN INSTRUCTION SIGN ON POLE					
		OPSD 2526.01			

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

Nov 2010 Rev 2

TRAFFIC SIGNAL EQUIPMENT

POLE WIRING DIAGRAM



OPSD 2528.01

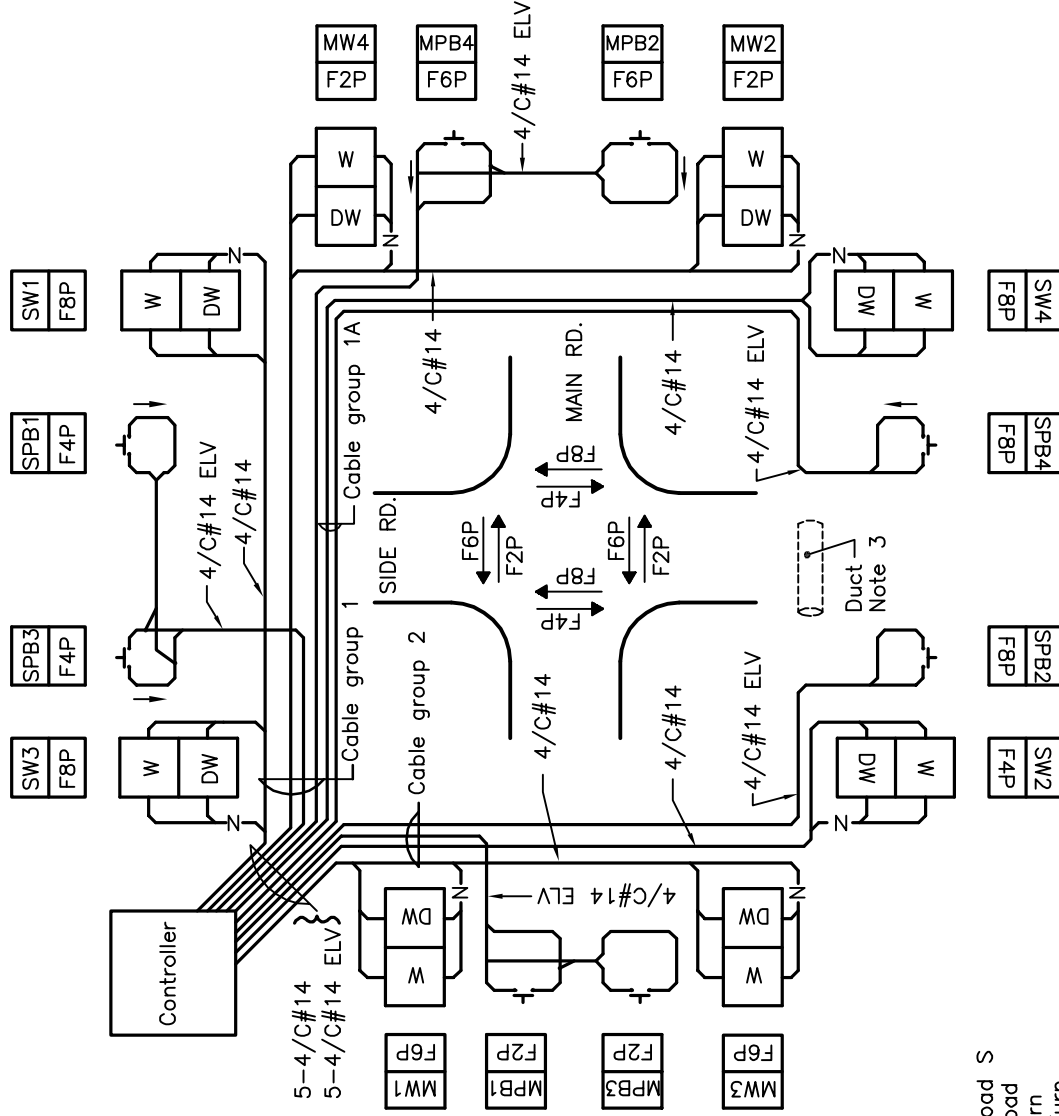
Cond #	Colour/Mark	Cable Group 1	Cable Group 2	Cable Group 1A
1	White	Neutral	Neutral	
2	Red	DW[MW2,MW4]	DW[MW3,MW1]	
3	Yellow	Not Used, Note 1	Not Used, Note 1	
4	Blue	W[MW2,MW4]	W[MW3,MW1]	
1	White	Neutral	Neutral	Neutral
2	Red	DW[SW3,SW1]	DW[SW2]	DW[SW4] Note 3
3	Yellow	Not Used, Note 1	Not Used, Note 1	Not Used, Note 1&3
4	Blue	W[SW3,SW1]	W[SW2]	W[SW4] Note 3
1	White	MPB2,MPB4	MPB1,MPB3	
2	Black	MPB2,MPB4	MPB1,MPB3	
3	Red	Spare	Spare	
4	Green	Spare	Spare	
1	White	SPB1,SPB3	SPB2	SPB4, Note 3
2	Black	SPB1,SPB3	SPB2	SPB4, Note 3
3	Red	Spare	Spare	
4	Green	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. #



ONTARIO PROVINCIAL STANDARD DRAWING

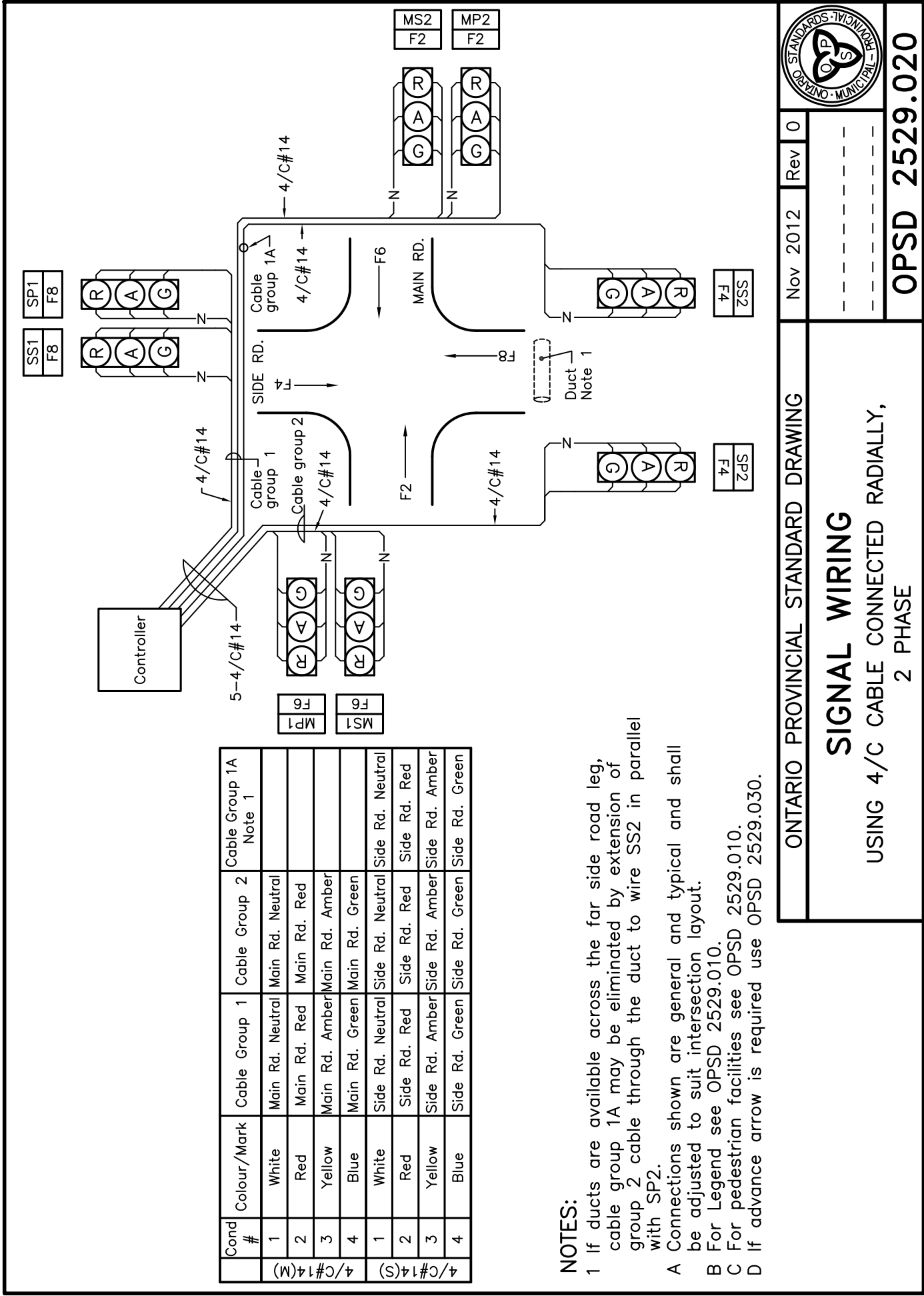
Nov 2015

Rev 1

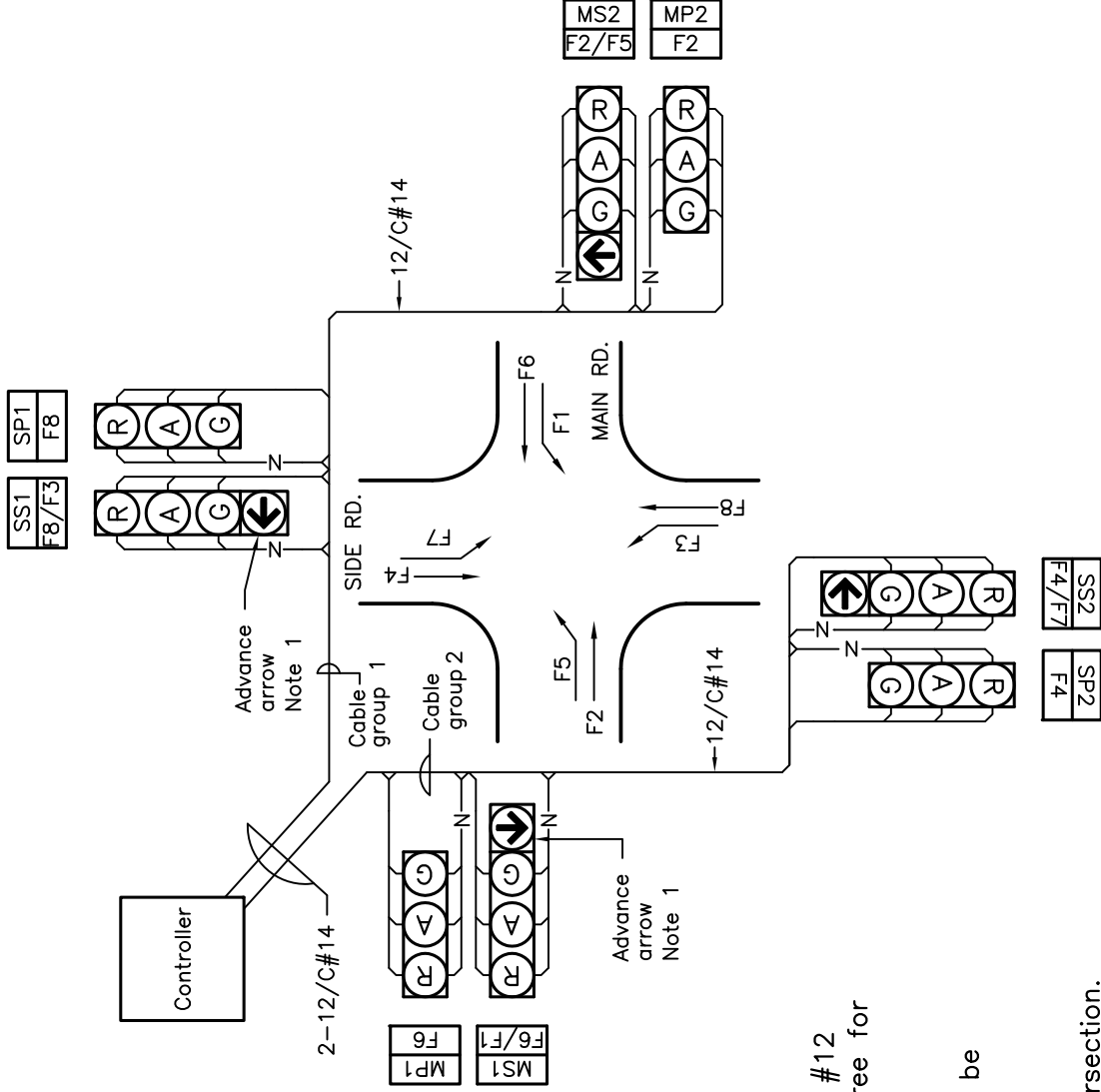


SIGNAL WIRING FOR PEDESTRIAN FACILITIES

OPSD 2529.010



Cond #	Colour/Mark	Cable Group 1	Cable Group 2
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:

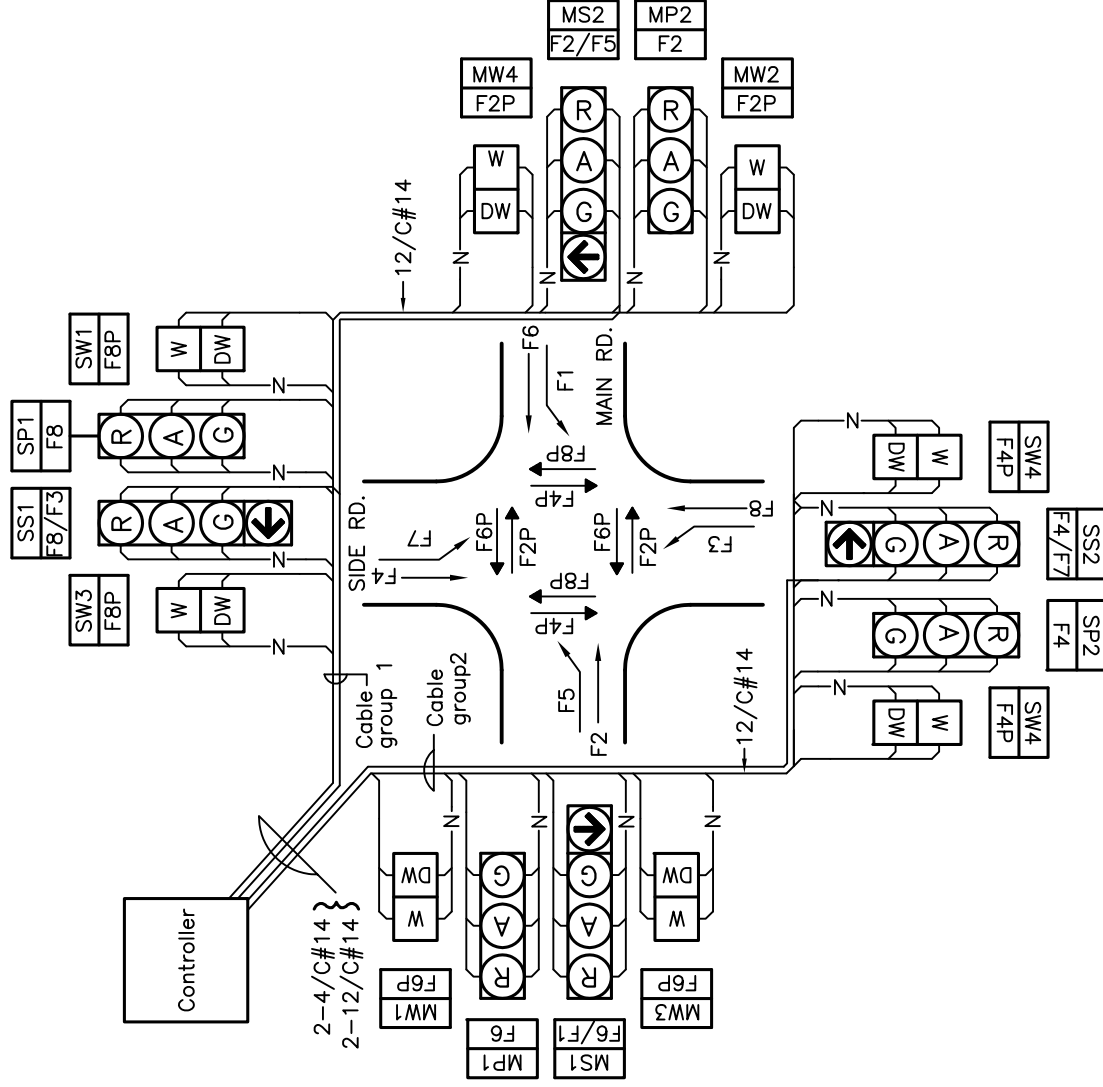
- When arrow advance greens are used, use conductor #12 Blue/Green Three and conductor #9 Yellow/Amber Three for the Main Road heads; and conductor #2 Black and conductor #3 Orange for the Side Road heads.
- Connections shown are general and typical and shall be adjusted to suit intersection layout.
- For Legend see OPD 2529.010.
- For pedestrian facilities see OPD 2529.010.
- The system shown requires ducts all around the intersection.

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2012	Rev 0
SIGNAL WIRING USING 12/C CABLE TAPPED, 2 TO 8 PHASE			
			
		OPSD 2529.030	

Cond #	Colour/Mark	Cable Group 1	Cable Group 2
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
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:

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



ONTARIO PROVINCIAL STANDARD DRAWING

SIGNAL WIRING

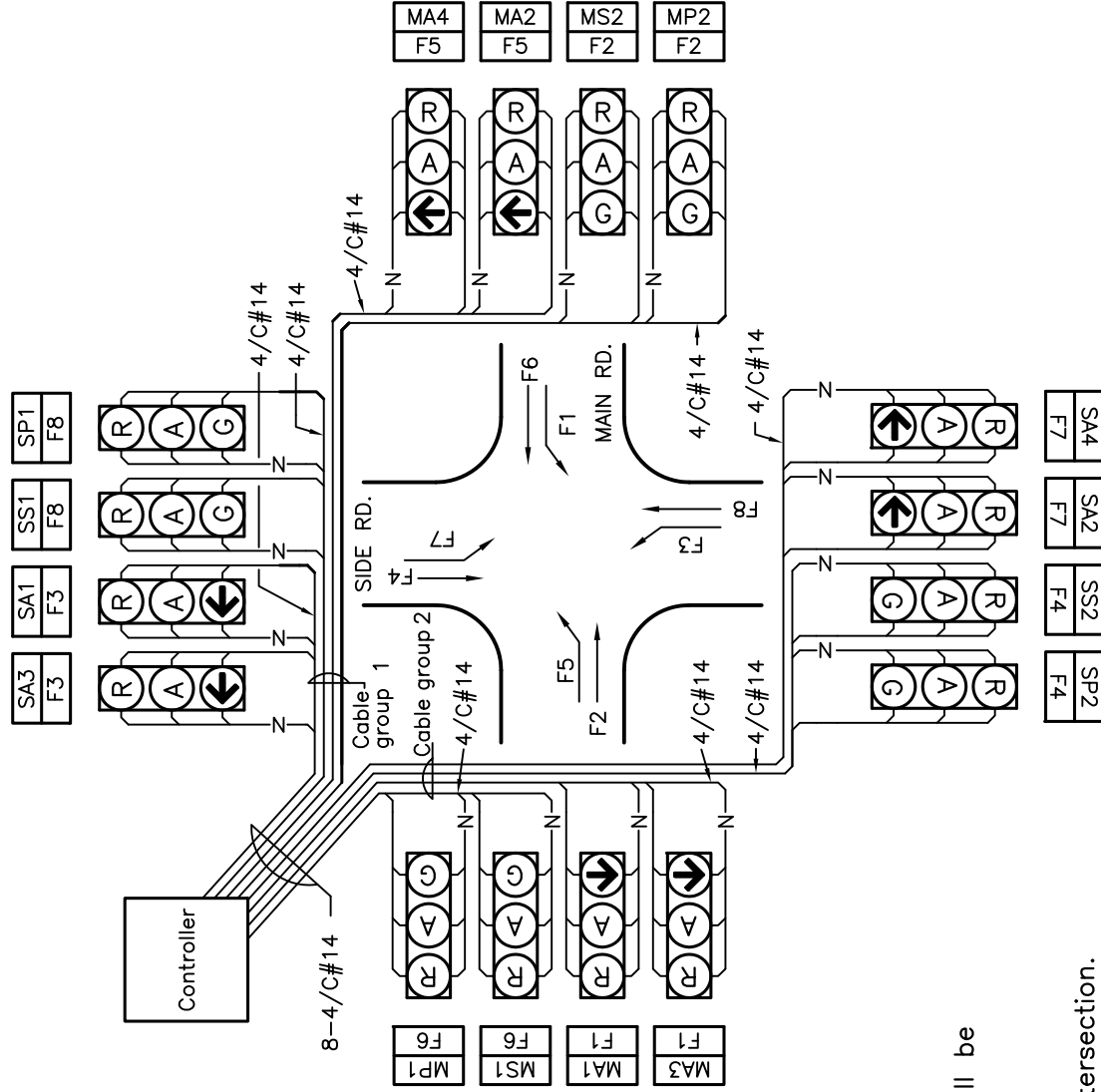
USING 4/C AND 12/C CABLE TAPPED,
2 TO 8 PHASE

Nov 2012 Rev 0



OPSD 2529.040

Cond #	Colour/Mark	Cable Group 1	Cable Group 2
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
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
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
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

Nov 2012 Rev 0

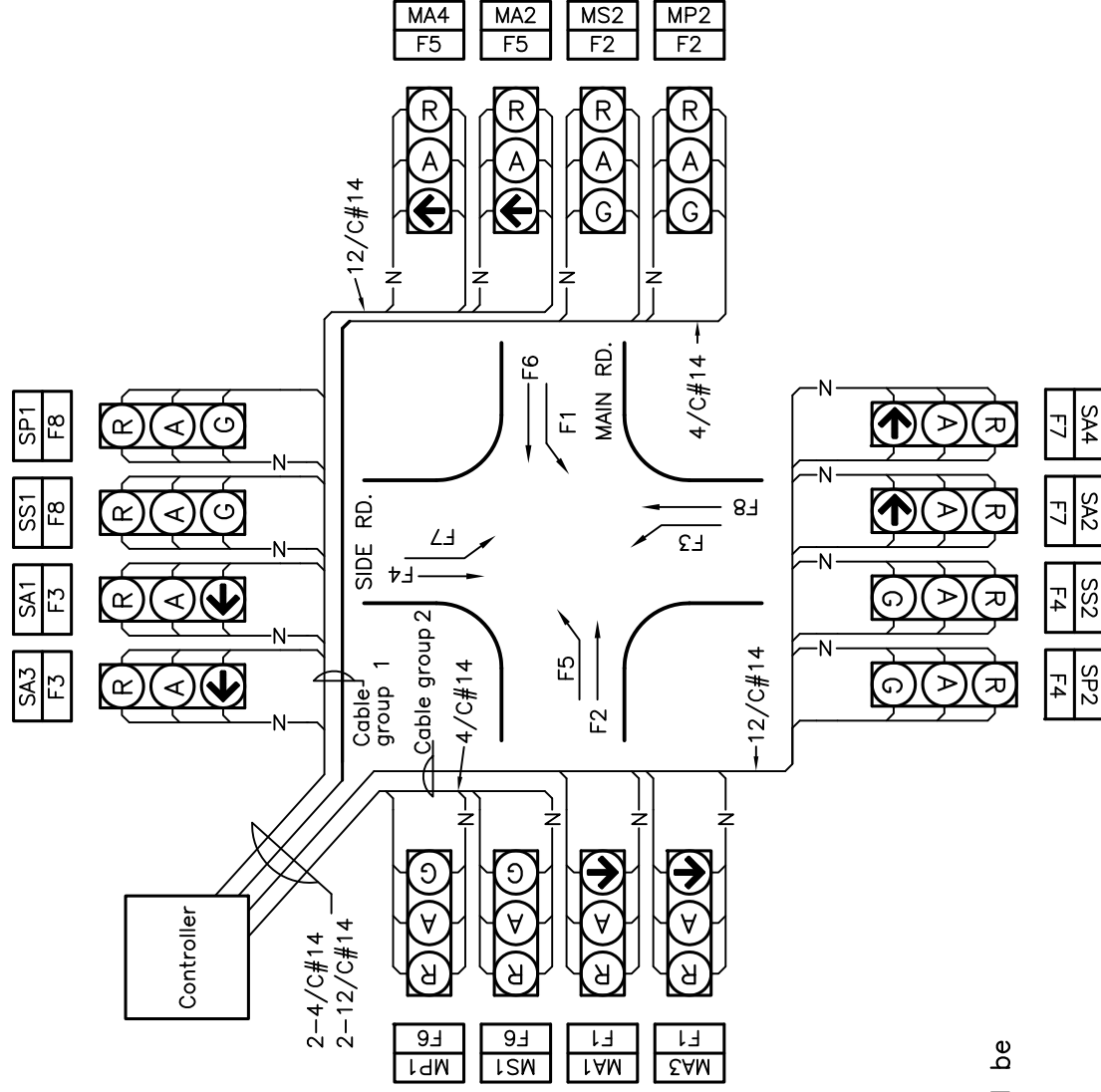
SIGNAL WIRING

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



OPSD 2529.050

Cond #	Colour/Mark	Cable Group 1	Cable Group 2
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
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

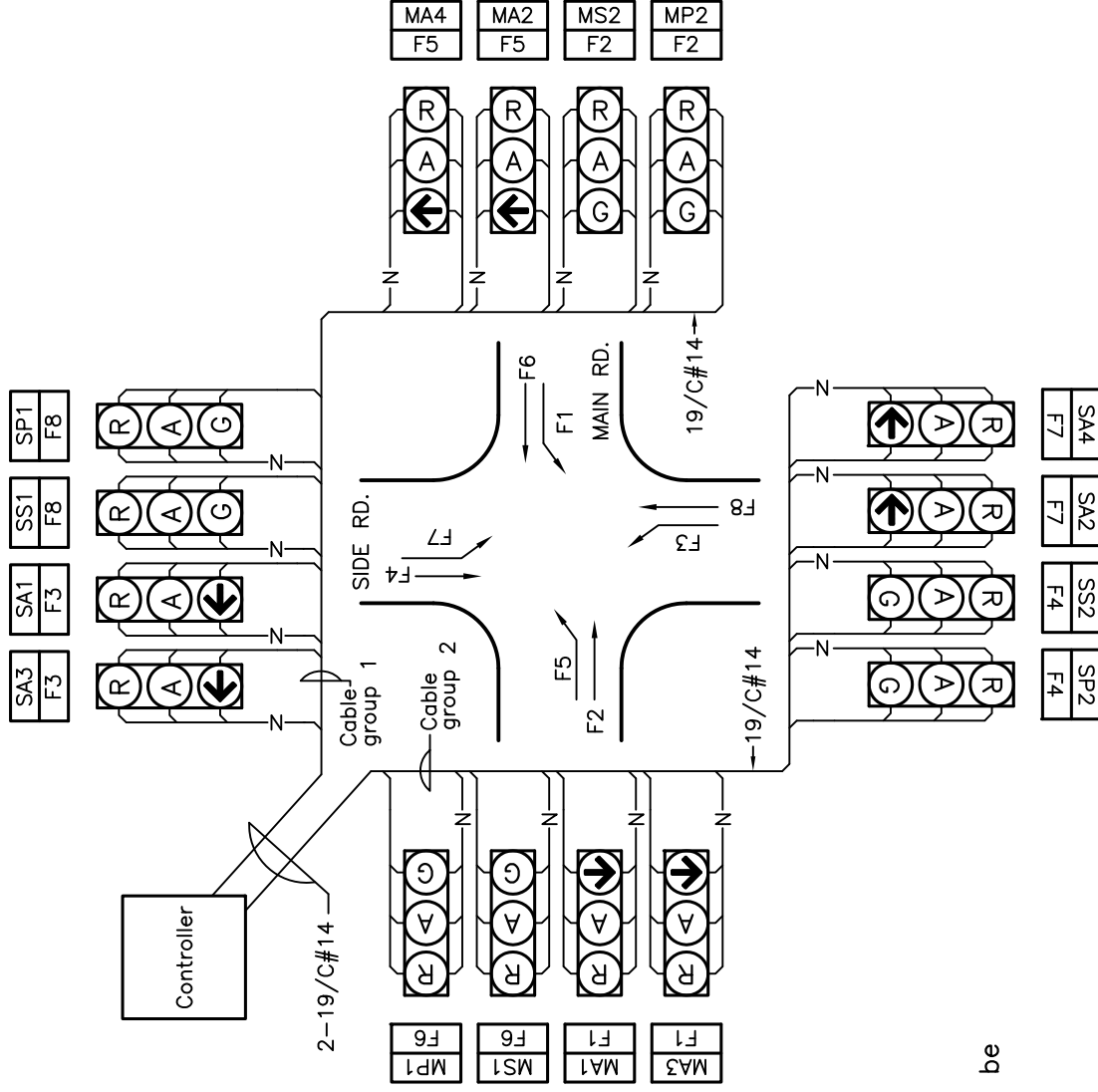


NOTES:

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

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2012	Rev 0
SIGNAL WIRING USING 4/C CABLE CONNECTED RADIALLY AND 12/C CABLE TAPPED, 2 TO 8 PHASE			
		OPSD 2529.060	

Cond #	Colour/Mark	Cable Group 1	Cable Group 2
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 OPD 2529.010.
- C For pedestrian facilities see OPD 2529.010.
- D The system shown requires ducts all around the intersection.

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2012 Rev 0

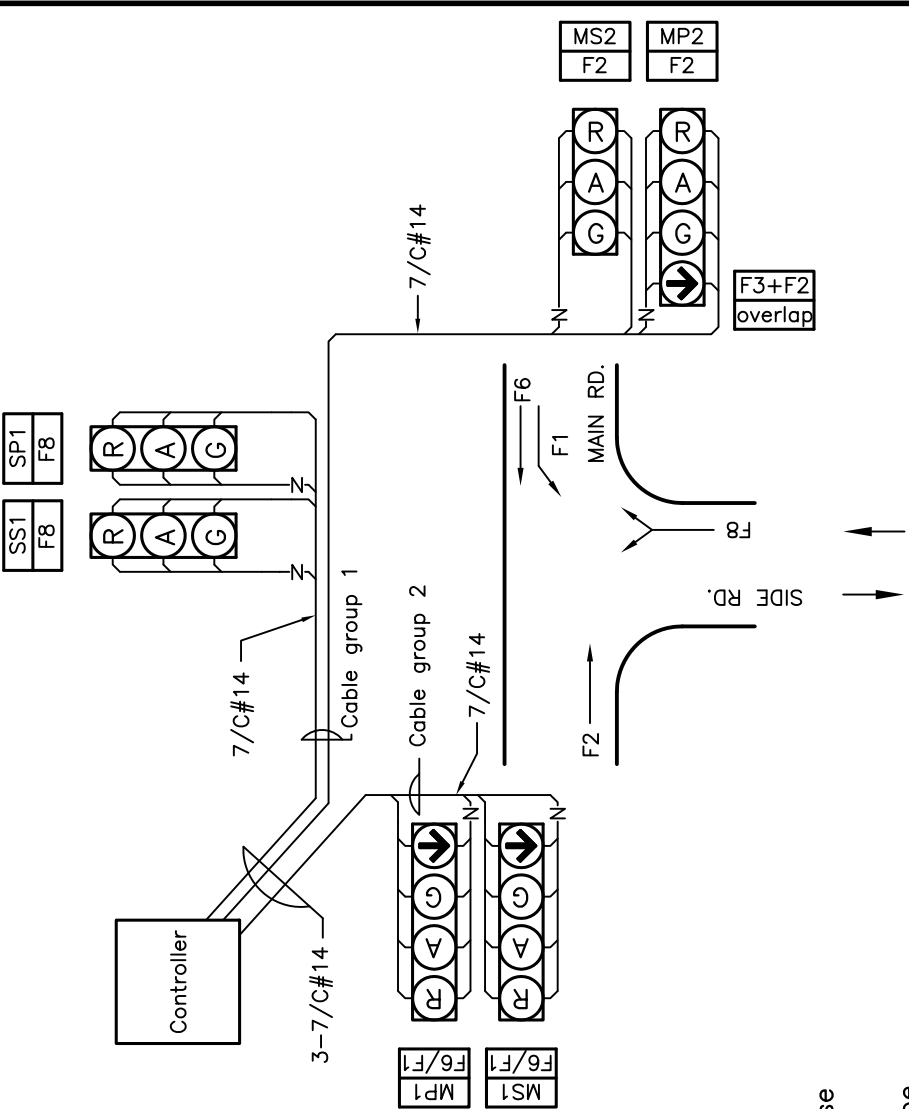
SIGNAL WIRING

USING 19/C CABLE TAPPED,
2 TO 8 PHASE



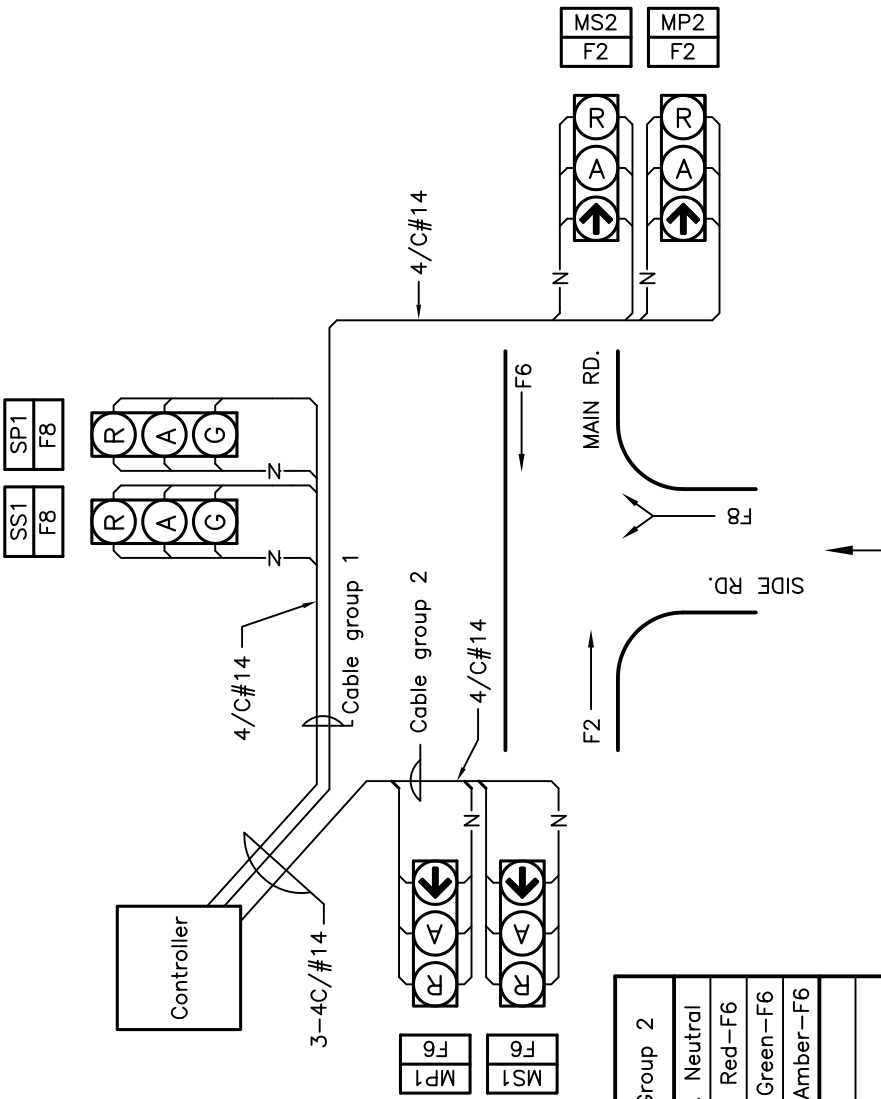
OPSD 2529.070

Cond #	Colour/Mark	Cable Group 1	Cable Group 2
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
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 OPD 2529.010.
- C For pedestrian facilities see OPD 2529.010.

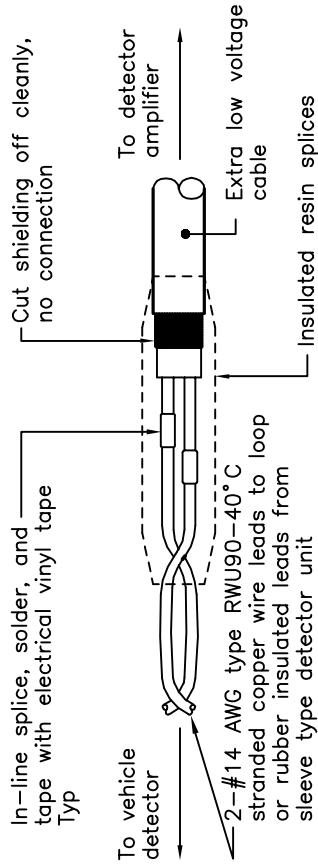


Cond #	Colour/Mark	Cable Group 1	Cable Group 2
1	White	Main Rd. Neutral	Main Rd. Neutral
2	Red	Main Rd. Red-F2	Main Rd. Red-F6
4	Blue	Main Rd. Green-F2	Main Rd. Green-F6
3	Yellow	Main Rd. Amber-F2	Main Rd. Amber-F6
1	White	Side Rd. Neutral	
2	Red	Side Rd. Red-F8	
4	Blue	Side Rd. Green-F8	
3	Yellow	Side Rd. Amber-F8	

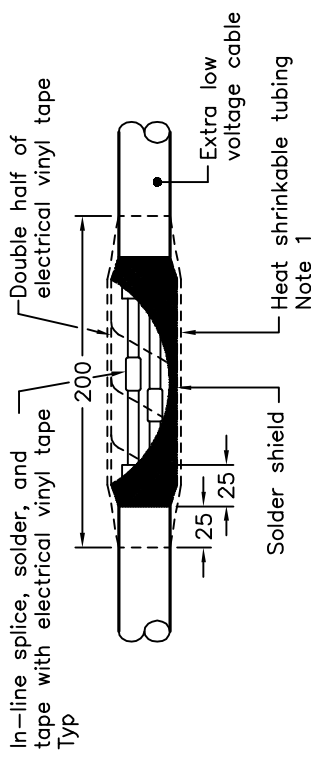
NOTES:

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

		Nov 2012	Rev 0
SIGNAL WIRING USING 4/C CABLE CONNECTED RADIALLY T-INTERSECTION, 2 PHASE			
OPSD 2529.090			

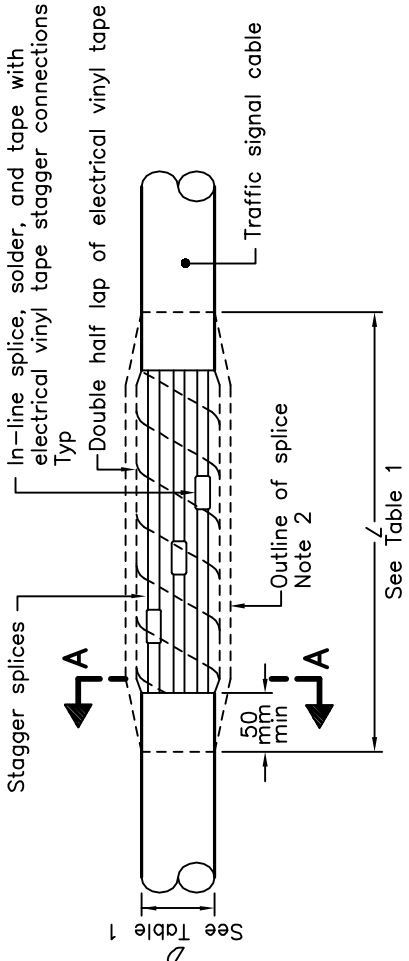


EXTRA LOW VOLTAGE CABLE TO DETECTOR CABLE SPICING DETAIL

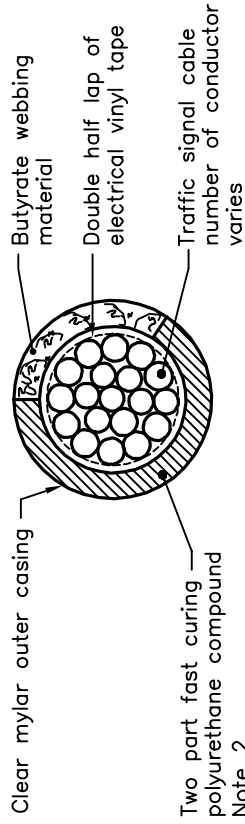


EXTRA LOW VOLTAGE CABLE SPICING DETAIL

- 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.



TRAFFIC SIGNAL CABLE SPICING 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

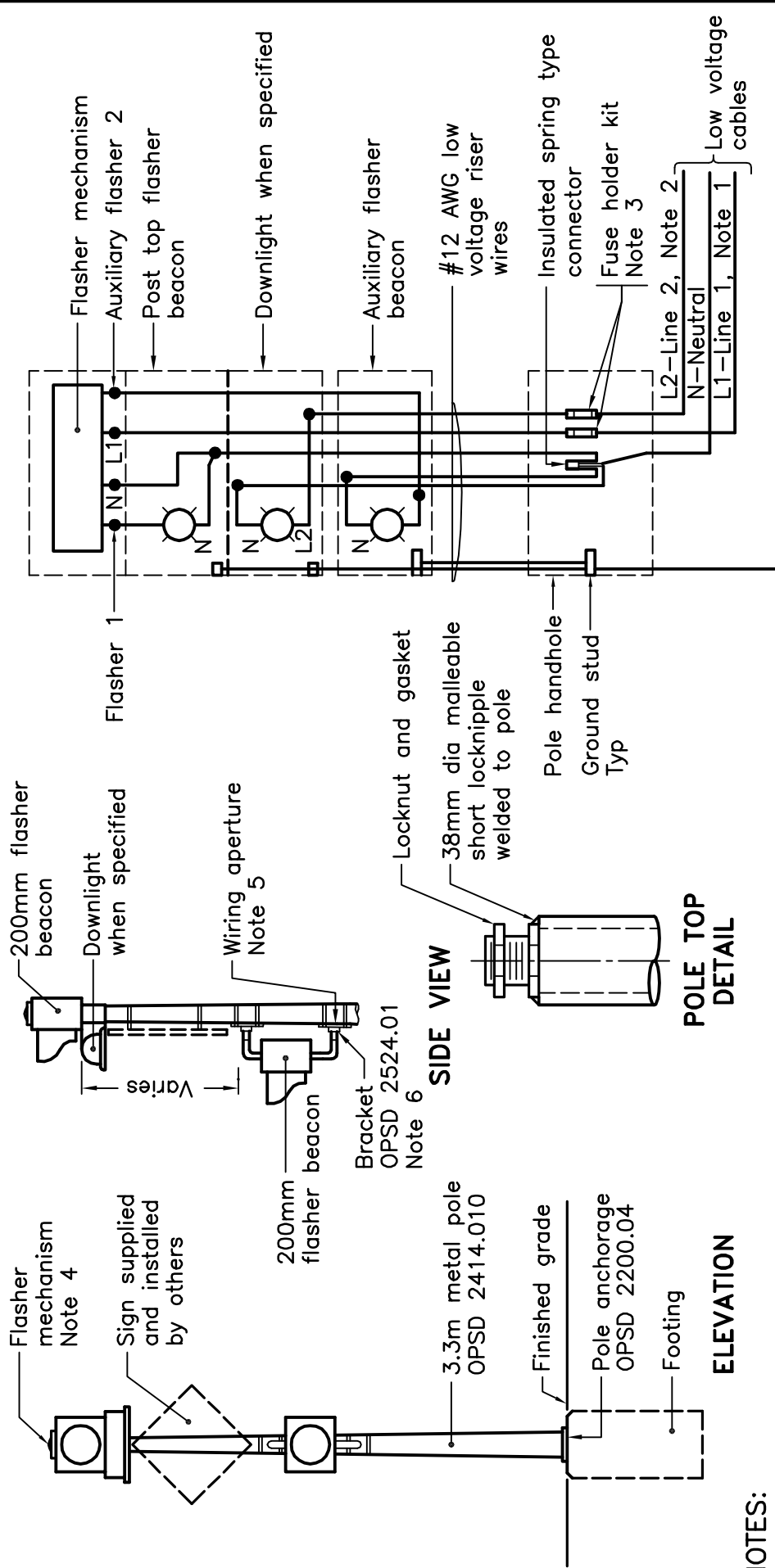
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2013 Rev 1

SPLICES FOR
TRAFFIC SIGNAL CABLE AND
EXTRA LOW VOLTAGE CABLE



OPSD 2530.01



NOTES:

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

#6 AWG bare stranded copper ground wire

WIRING DIAGRAM

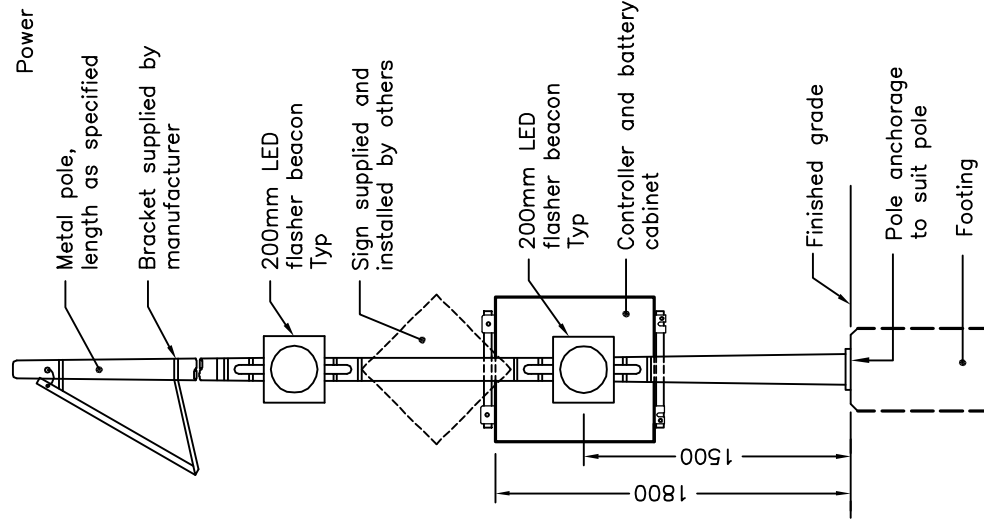
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2015 Rev 2

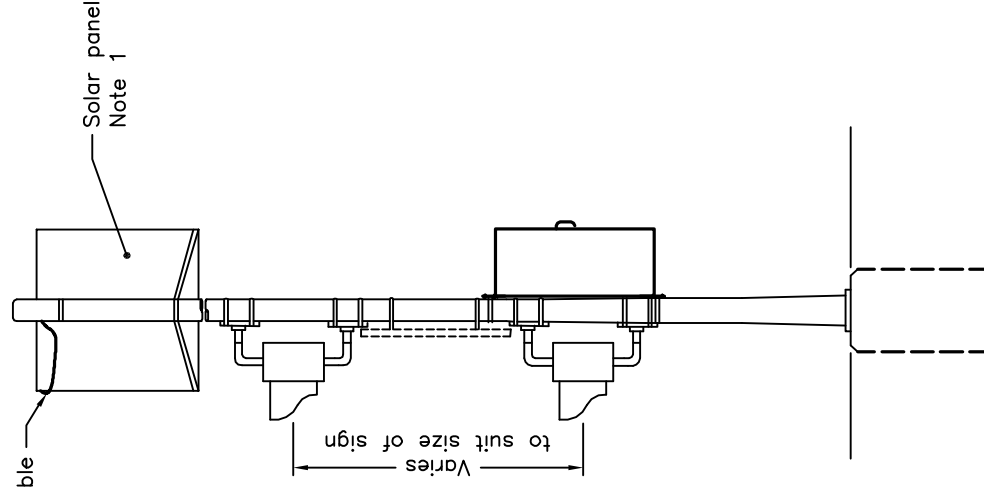


FLASHER BEACONS FOR ROADWAY SIGN AND DOWNLIGHT AND WIRING DIAGRAM

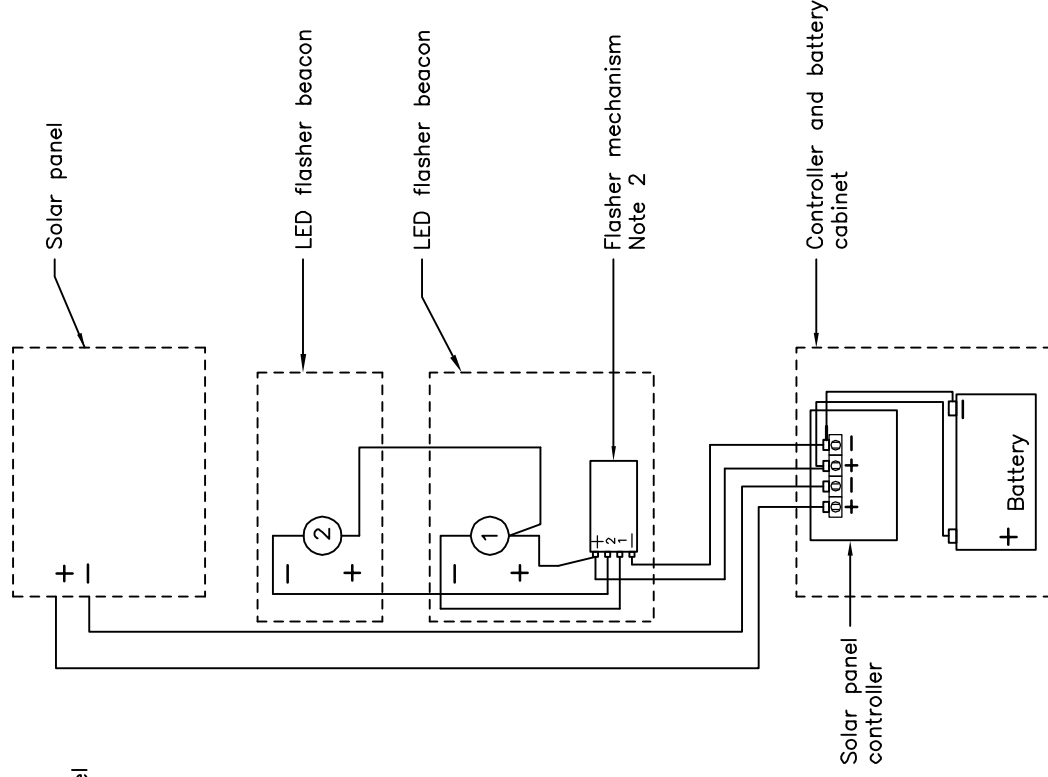
OPSD 2536.010



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

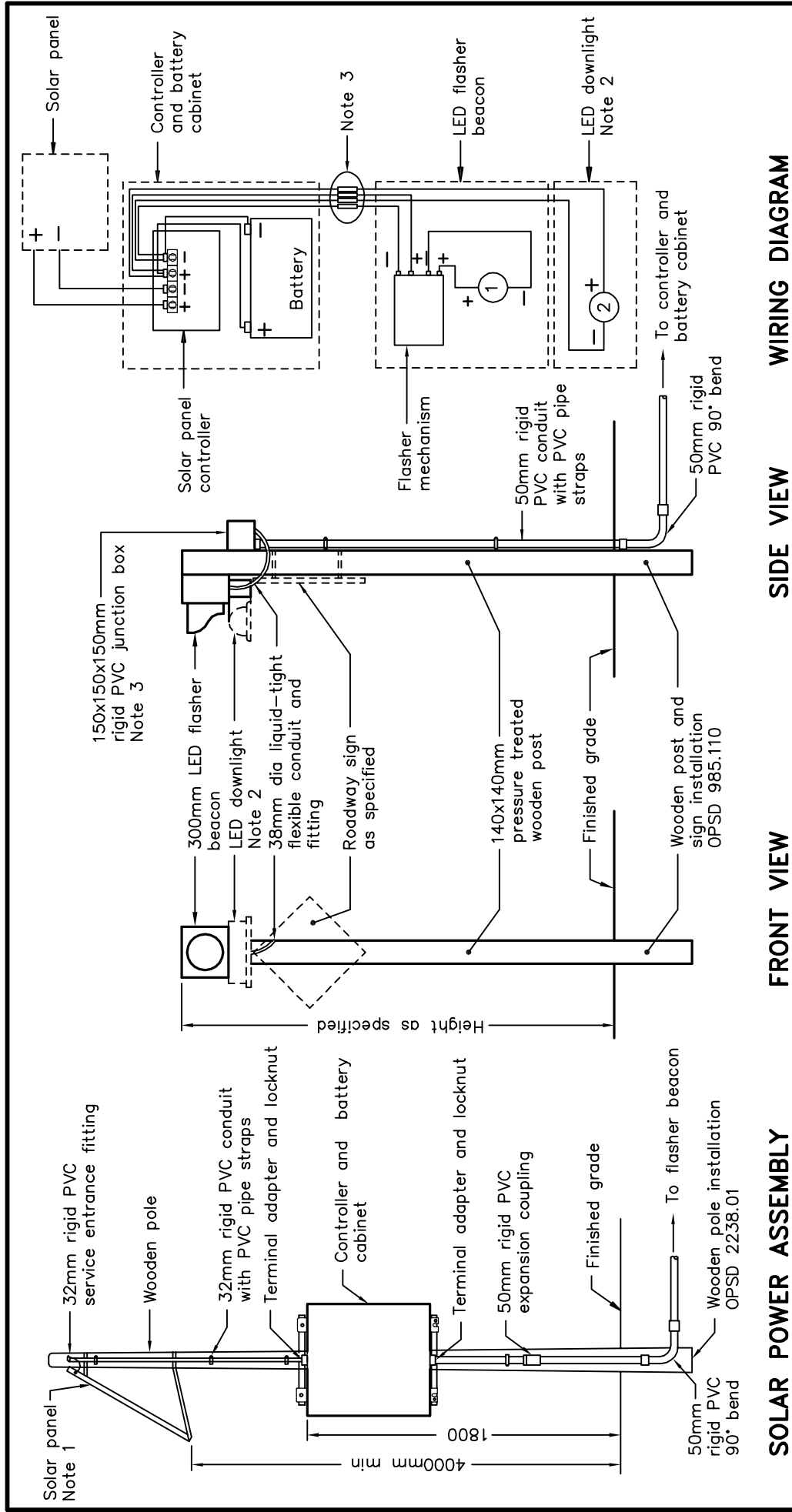
Nov 2015

Rev 0



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

OPSD 2536.030

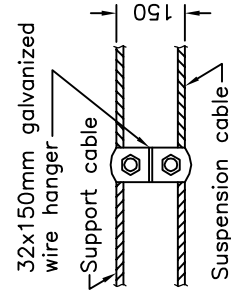


ONTARIO PROVINCIAL STANDARD DRAWING			Rev 0	
Nov 2015			0	
SOLAR POWERED LED FLASHER BEACON AND WIRING DIAGRAM FOR ROADWAY SIGN DIRECT BURIED POLE			OPSD 2536.032	



- 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.

CABLE ATTACHMENT HEIGHT		
Span	Attachment Height Suspension Cable	x Cable Separation
m	m	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

TABLE 1
Note 5

DETAIL A

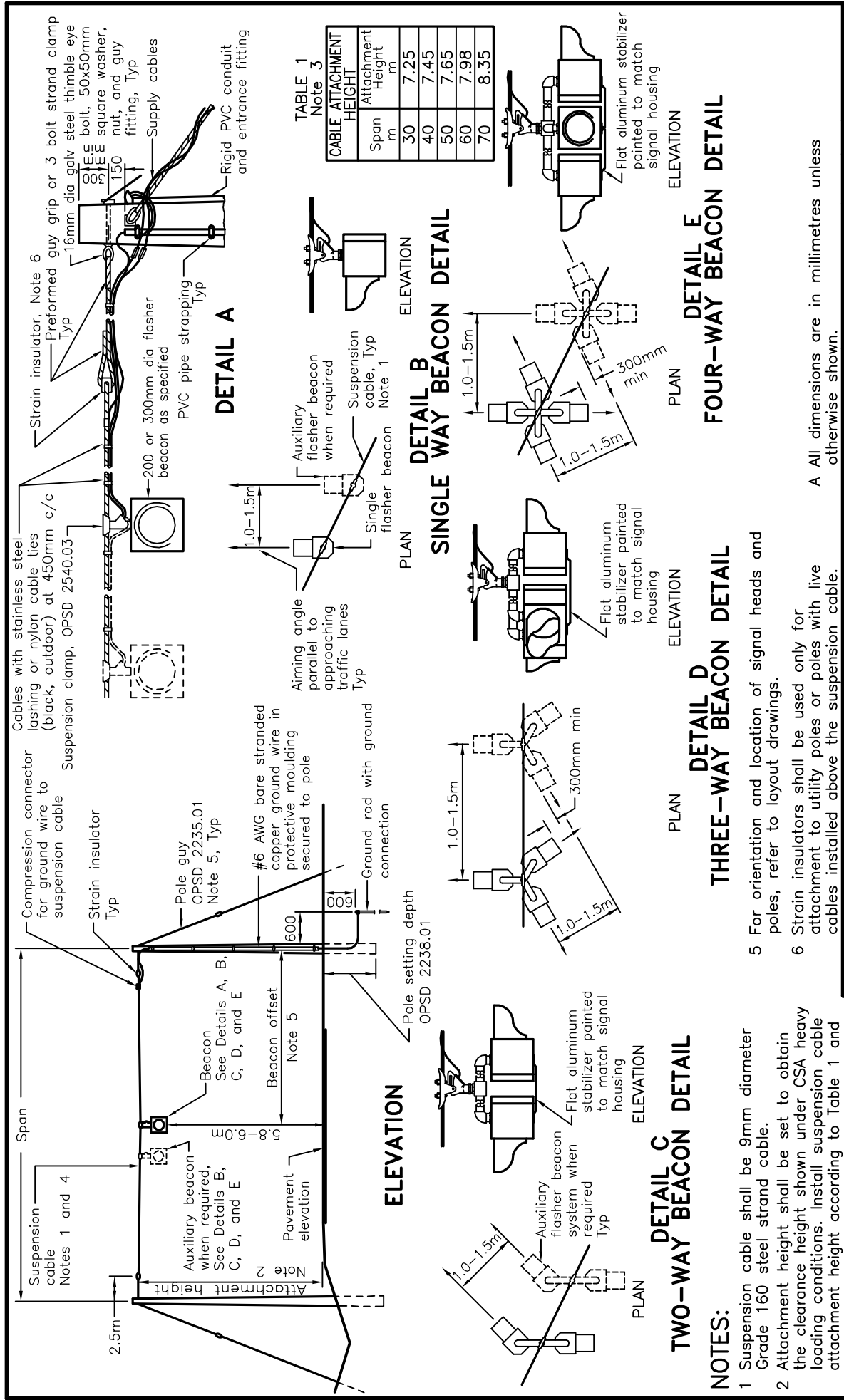


TABLE 1
Note 3

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

DETAIL A

**DETAIL B
SINGLE WAY BEACON DETAIL**

**DETAIL E
FOUR-WAY BEACON DETAIL**

**DETAIL D
THREE-WAY BEACON DETAIL**

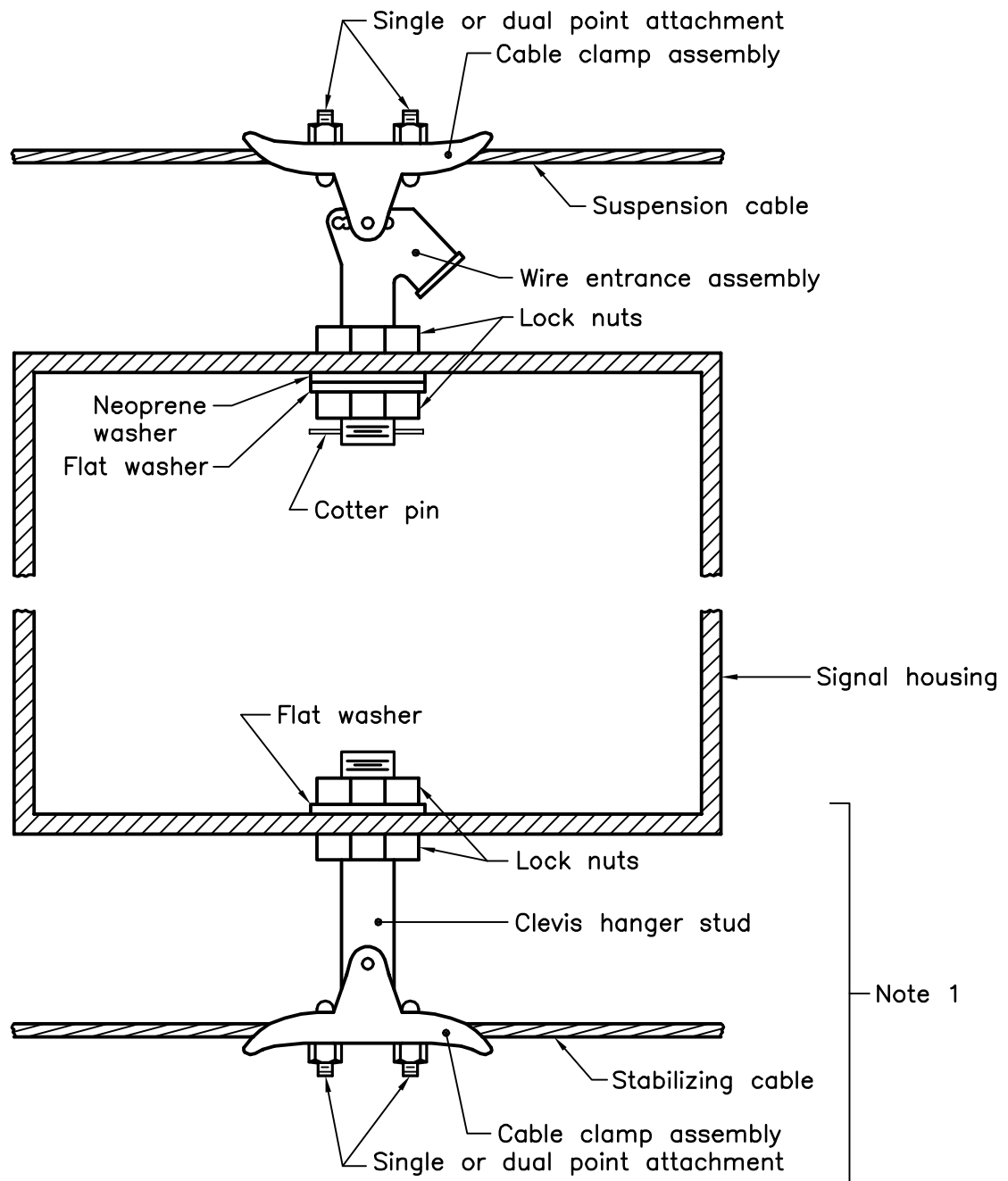
**DETAIL C
TWO-WAY BEACON DETAIL**

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 OPSPD 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
OPSPD 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

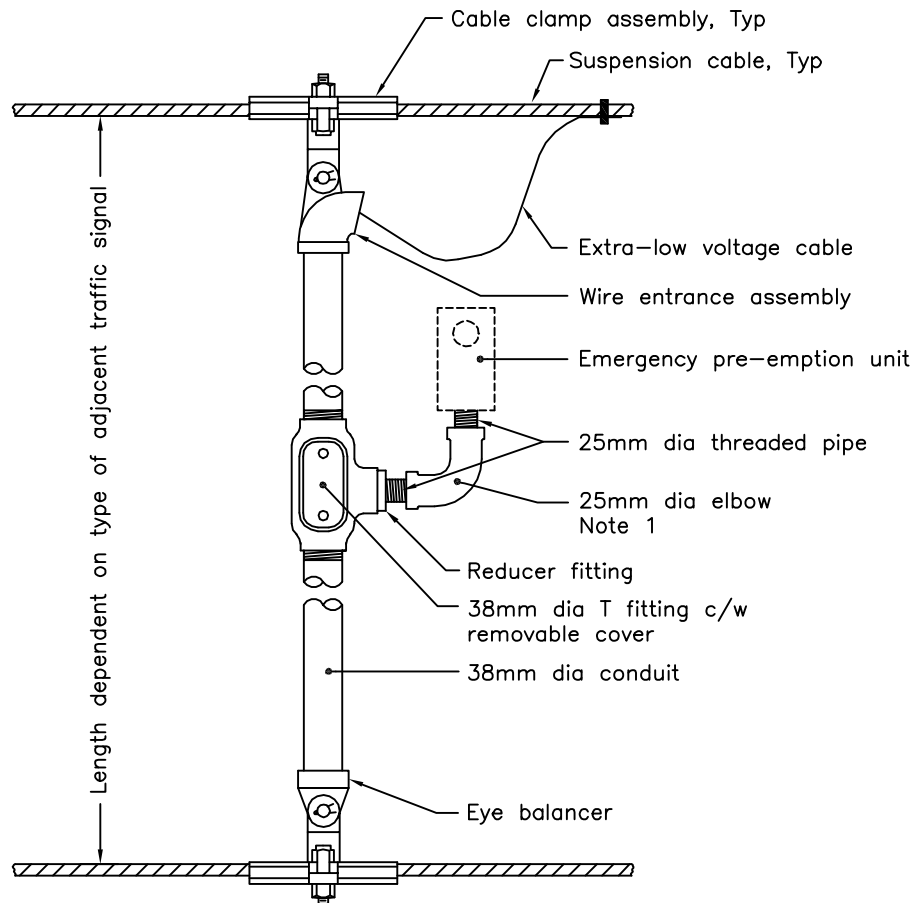
Nov 2013

Rev 0

**AERIAL SUSPENSION MOUNTING BRACKET
SIGNAL HEADS AND FLASHING BEACONS**



OPSD 2540.030



NOTES:

- 1 Elbow may be eliminated when side mounted emergency pre-emption unit is used.
- A Assembly shall be mounted on span cables as specified.
- B This OPSD to be read in conjunction with OPSD 2540.01.
- C All hardware fittings shall be cast aluminum with stainless steel mounting hardware.
- D All dimensions are in millimetres unless otherwise shown.

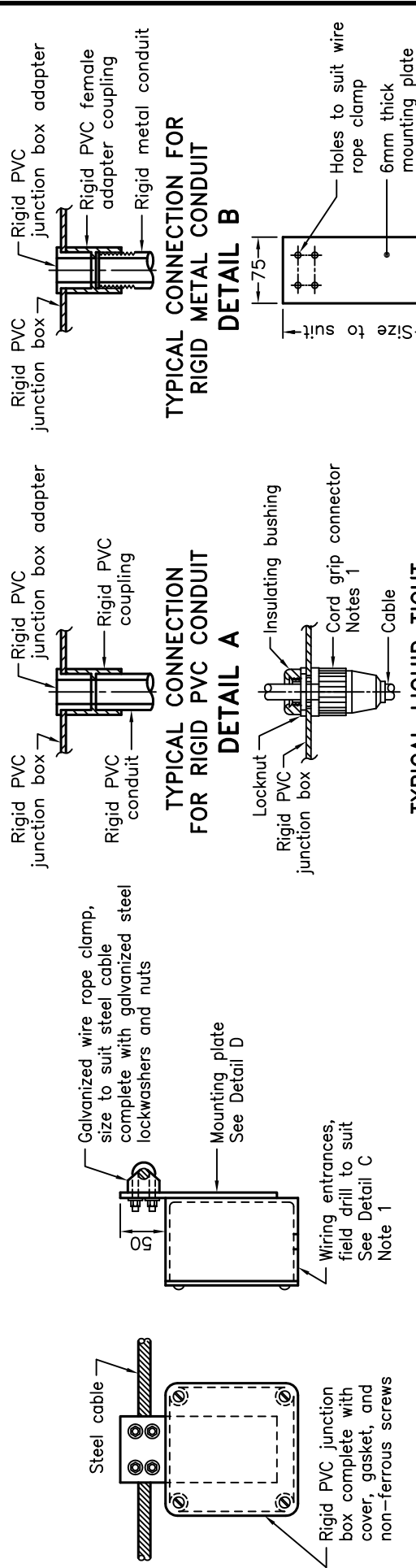
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2009 Rev 0

AERIAL SUSPENSION MOUNTING BRACKET EMERGENCY PRE-EMPTION UNIT



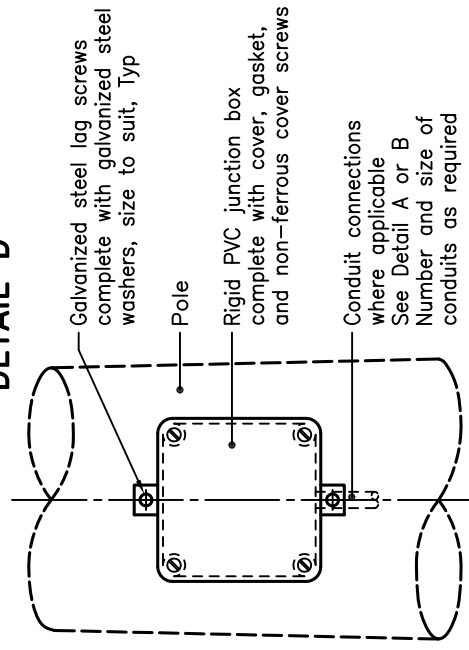
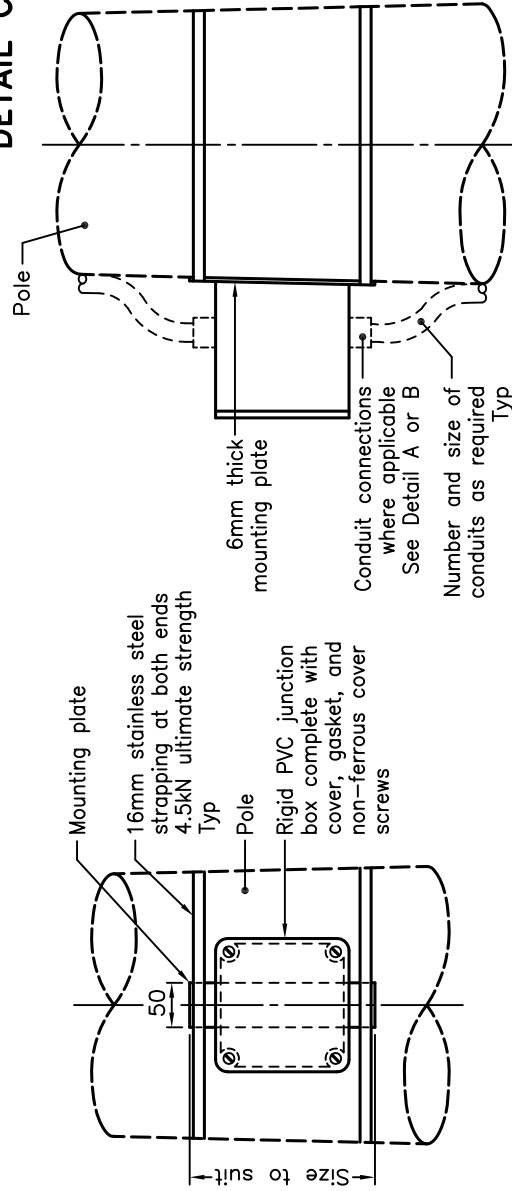
OPSD 2540.100



AERIAL SUSPENSION DETAIL

TYPICAL LIQUID TIGHT STRAIN RELIEF CONNECTOR DETAIL C

MOUNTING PLATE FOR AERIAL SUSPENSION DETAIL D



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.

MOUNTING ON WOODEN POLE

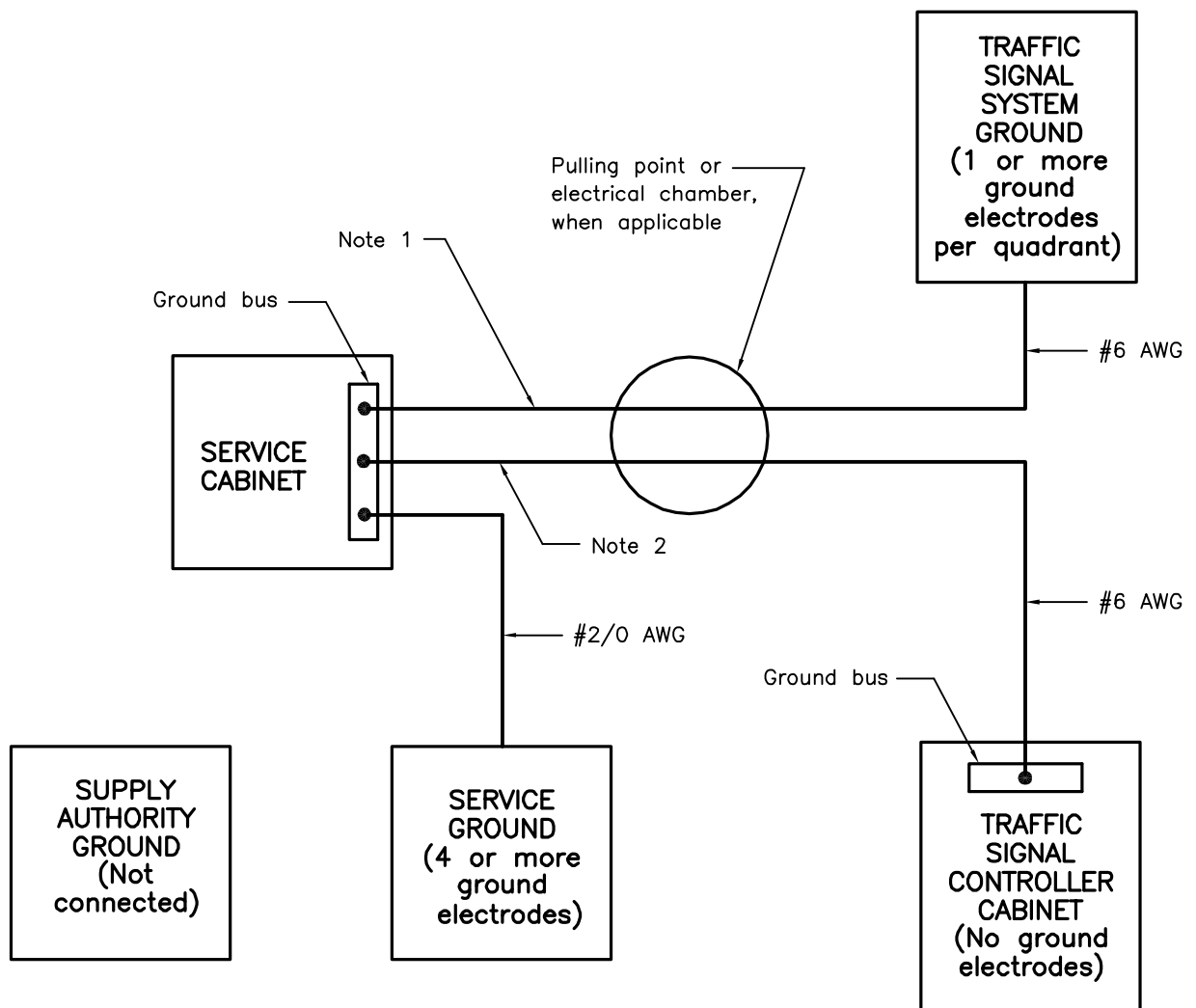
ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2012 Rev 1



PVC JUNCTION BOX FOR SIGNAL CABLE SPLICING

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

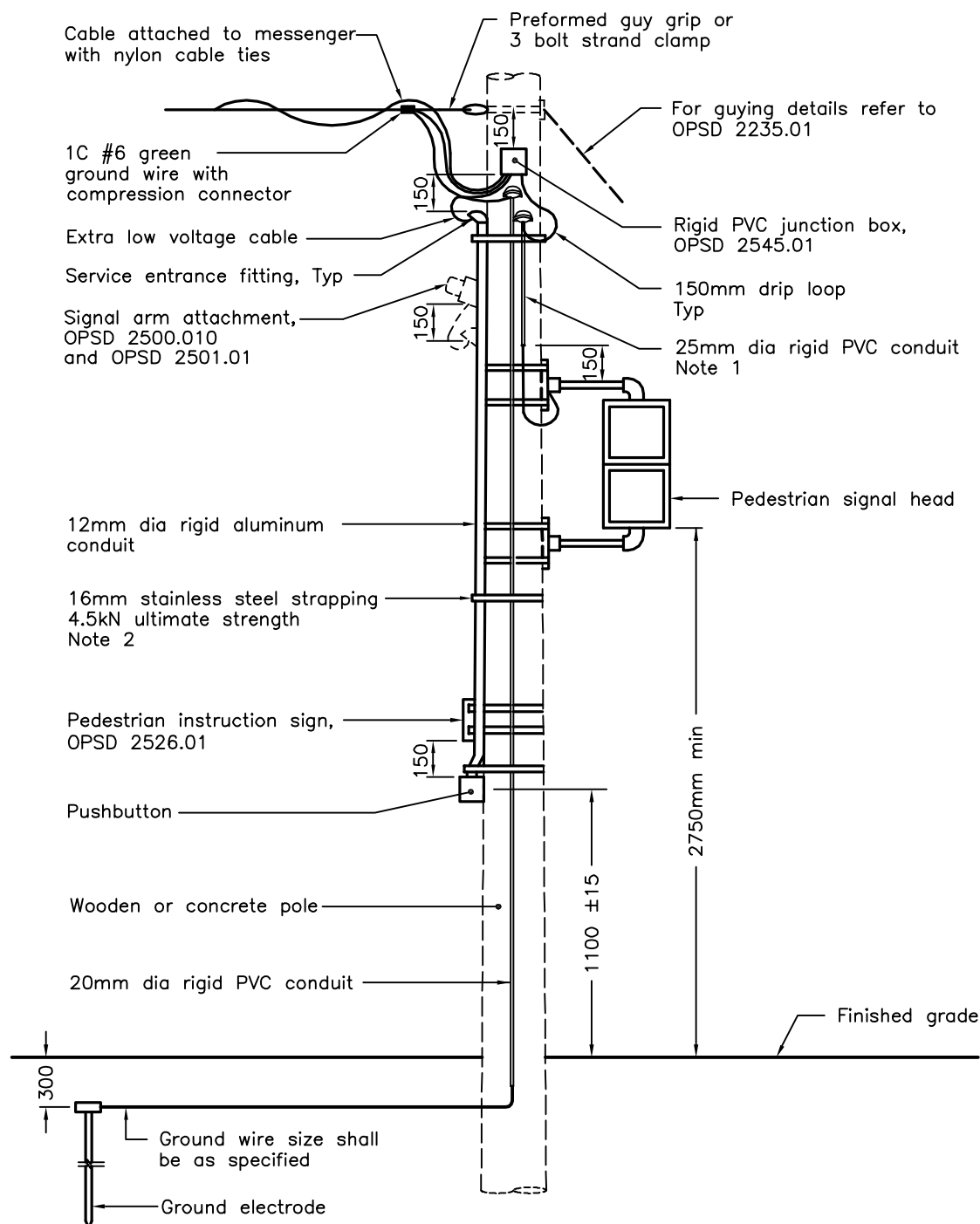
Nov 2014

Rev 1

TRAFFIC SIGNAL AND ILLUMINATION GROUNDING SYSTEM



OPSD 2547.010

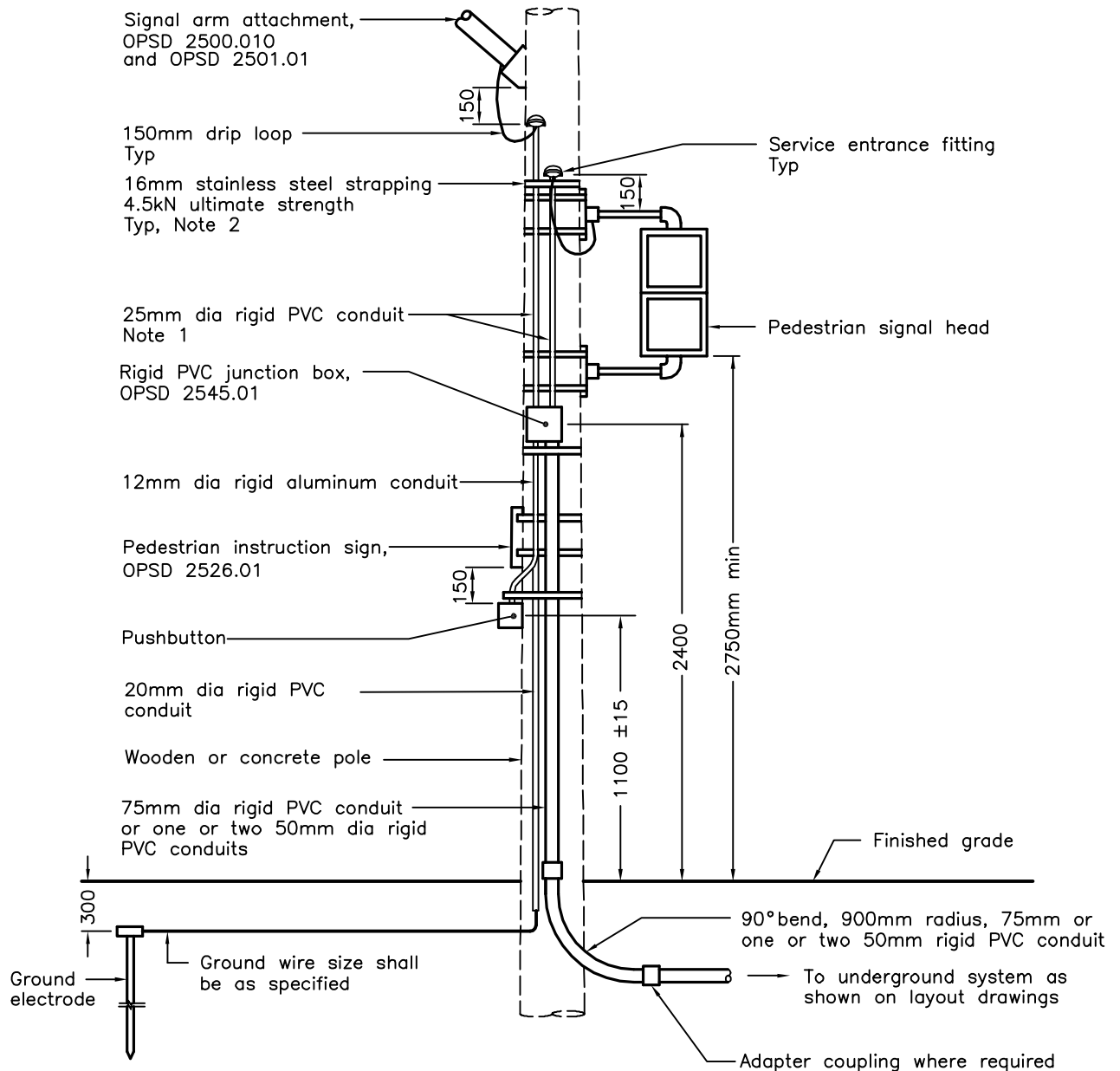


NOTES:

- 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 2011	Rev	2	
TRAFFIC SIGNAL SYSTEM EQUIPMENT ON WOODEN OR CONCRETE POLES OVERHEAD WIRING INSTALLATION	-----			

OPSD 2552.01				



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

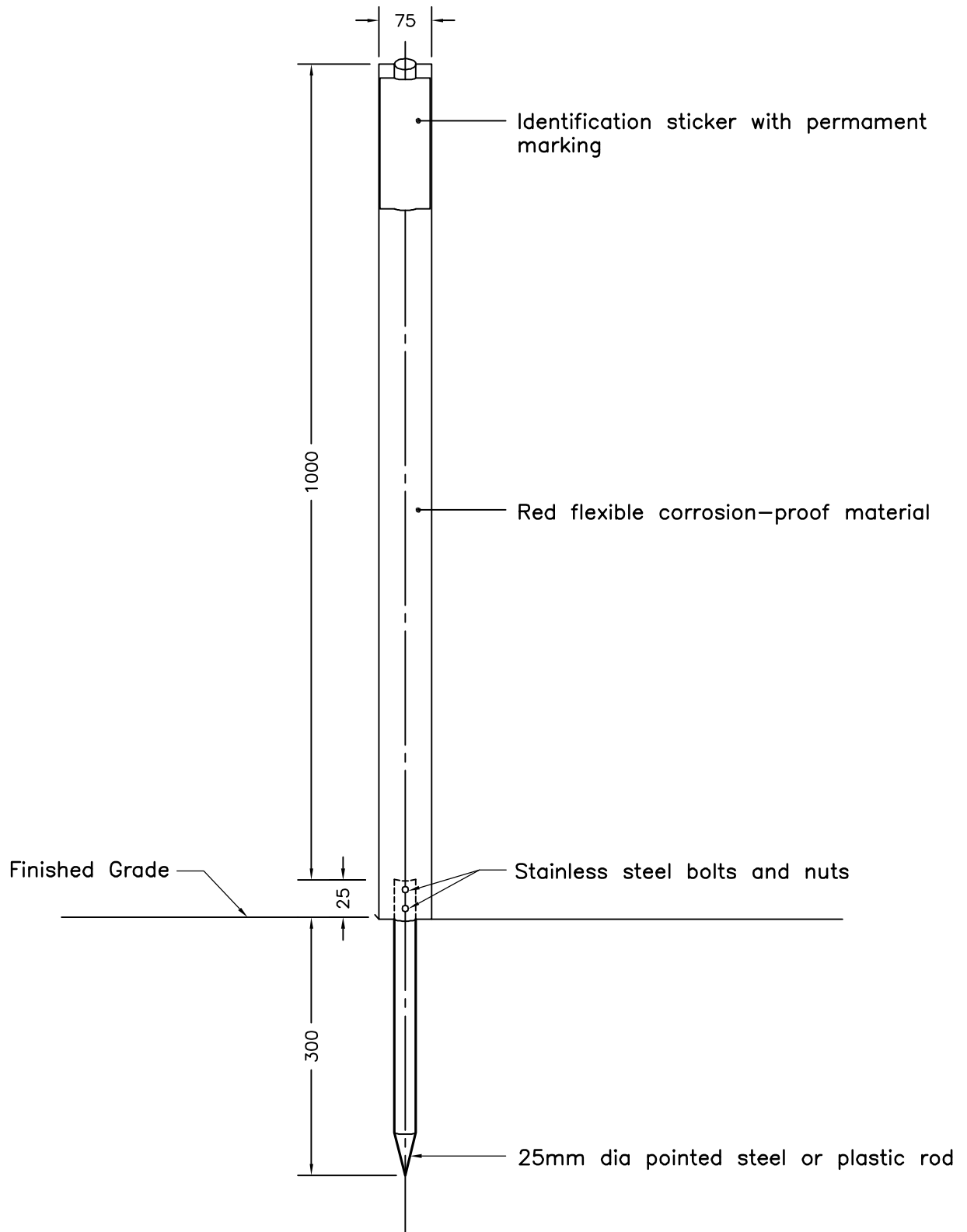
TRAFFIC SIGNAL SYSTEM EQUIPMENT
ON WOODEN OR CONCRETE POLES
UNDERGROUND WIRING INSTALLATION

Nov 2011

Rev 0



OPSD 2554.010



NOTES:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

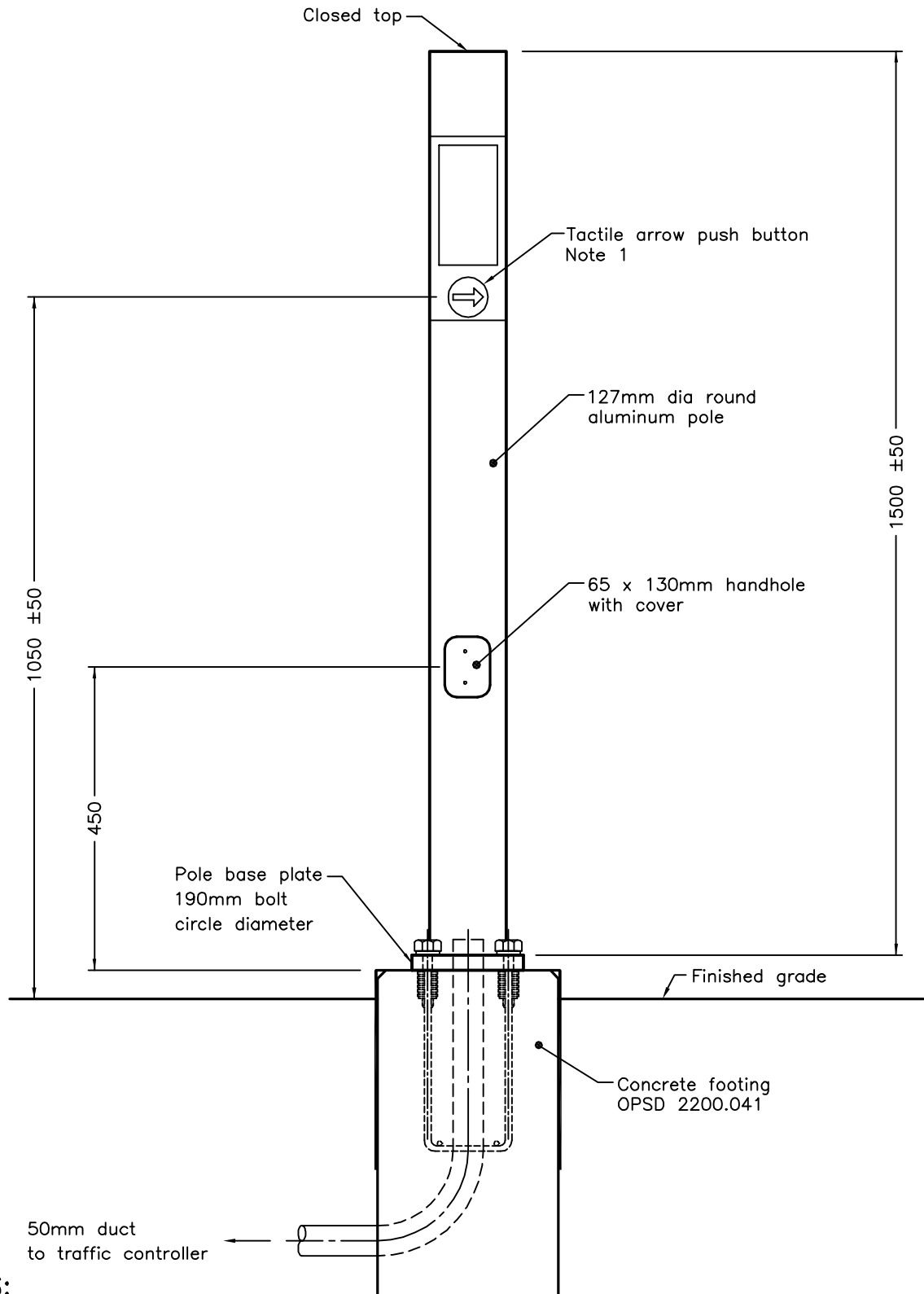
Nov 2016

Rev 0

FLEXIBLE UTILITY MARKER



OPSD 2555.010



NOTES:

- 1 Accessible Pedestrian Signal tactile arrow push button shall align with direction of crosswalk.
- A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

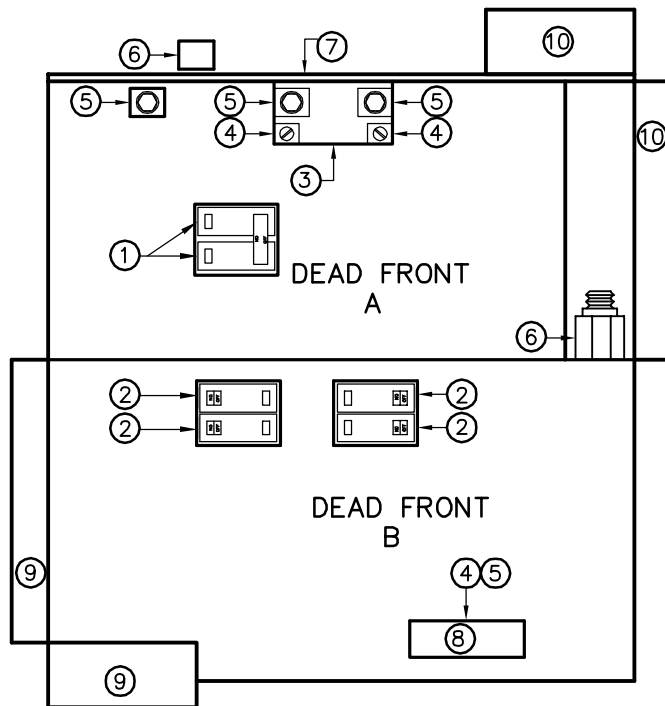
Nov 2014 | Rev | 0

**POLE FOR ACCESSIBLE
PEDESTRIAN SIGNAL PUSH BUTTON**

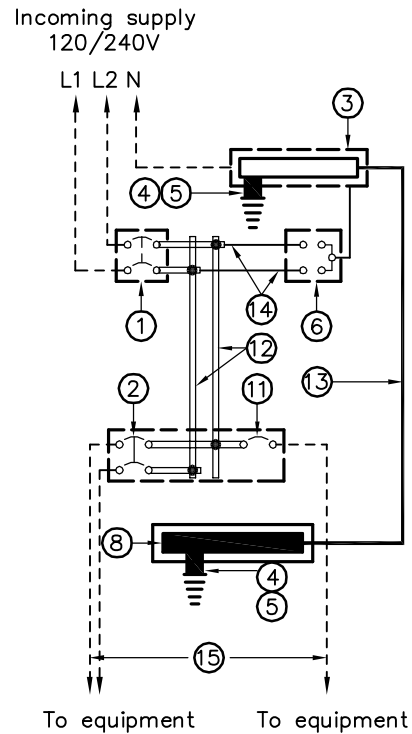


OPSD 2558.000

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		



