Specification for Installation of Underground Conduit Systems

DOCUMENT NO. 1669

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DATE	REV.	DESCRIPTION	REVIEWED/CHECKED	APPROVED
AUG. 2022	6	Updated drawings and verbiage to reflect new and revised DSM 2023 standards	D. GRETCHEN W. HILLARY	D. WALDEN
SEPT. 2021	5	Conduits must be proved by mandrel, new duct crossing diagram, ownership transfer information.	D. GRETCHEN D. POWER	D. WALDEN
NOV. 2016	4	Update backfill and trench detail. Add Royal Pipe to approved list. Add manufacturer drawings of conduit	D. WALDEN A. BOWERS	D. KRENZ

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Note: All current revisions and additions are highlighted in grey.

1 Definitions

The following definitions shall apply to this document:

COMPANY shall mean FortisBC, or its duly authorized representatives.

CONTRACTOR shall mean a qualified constructor who holds a valid certificate issued by the Governing Authority. In the context of this document, the Contractor has been retained by, and is acting under the direction and authority of the Developer or their duly appointed representative to physically construct the underground distribution facilities as defined in the plans.

DEVELOPER shall mean the Registered Owner or Corporation, or its duly appointed representative(s), including their engineering consultant(s) and/or contractor(s), having an interest in the land on which the underground electrical system specified is being installed.

DEPOT shall mean a supplier's warehouse or storage yard, a Company storage yard or any other place or places designated by the Company as a material pick-up point.

GOVERNING AUTHORITY shall mean the British Columbia Safety Authority, City, Municipality, Regional District, Provincial Government Agency, First Nations Band or Federal Government Agency having jurisdiction over the work site.

PLANS shall mean the drawings, approved by the Governing Authority and issued by the Company, detailing the location and grades of conduit, pre-cast concrete boxes, and concrete pads or like structures required to be placed for the Company on a specific project.

PROPERTY OWNER shall mean the person(s) and/or entity(ies) named as the registered owner(s) of real property as registered on the property title with the Land Titles Office.

STANDARD DRAWINGS shall mean those drawings illustrating typical installations and/or specifying materials to be used.

Technical Safety British Columbia (TSBC) - Independent, self-funded organization that has jurisdiction over the safe installation and operation of customer owned technical systems and equipment across British Columbia.

UNDERGROUND ELECTRIC SYSTEM shall mean an underground network of underground electrical components used to supply and transfer electric power.

UNDERGROUND CIVIL SYSTEM shall mean the duct and structures referenced in Appendix B – Structure and Assembly Details – in which the electric system is installed in.

FIELD INSPECTIONS FORM – shall mean final document issued by FortisBC field inspector after civil work has been inspected.

2 References

- Joint Trenching Requirements for Shallow Utilities
- Joint Trenching Requirements for Shallow Utilities – Addendum A
- FortisBC Service and Metering Guide
- AASHTO HB-17 - Standard Specifications for Highway Bridges
- AASHTO M 306-10 - Standard Specifications for Drainage, Sewer, Utility and Related Castings

3 Scope

This specification describes the materials to be used, the standard of work required, and the responsibility of the Developer in the construction of the underground electrical system.

These standards in no way imply that the Developer is allowed to construct anything other than what they are authorized to do in the FortisBC design package or as otherwise instructed by the FortisBC local representative.

These Standards shall not be used for work other than for FortisBC as this document only applies to the FortisBC system. For installations that involve other utilities, the Developer shall carry out work under their standards and specification.

4 User Notifications

Use of FortisBC Engineering and Construction Standards.

a) In accordance with FortisBC Engineering Practices Policy, FortisBC Engineering and Construction Standards are developed and used only for FortisBC designs and construction, and only for FortisBC distribution facilities.

b) FortisBC Engineering and Construction Standards are copyright protected. Drawings and specification within this document, in whole or in part, shall not be copied, modified, amended nor changed without written consent from FortisBC.

c) Use of FortisBC Engineering and Construction Standards by any Developer is done at the Developer's own risk and liability.

d) These standards may carry the name or logo of "West Kootenay Power", "UtiliCorp Networks Canada" or "Aquila Networks Canada". Any such references shall be taken as reference to "FortisBC".

e) FortisBC expects that construction by others for any electrical system or distribution facility adjoining, attaching, or otherwise affecting FortisBC distribution facilities shall meet or exceed FortisBC Engineering and Construction Standards.

f) FortisBC recommends that the Developer retain a professional engineer to coordinate and assess the completeness of the overall project design and/or construction to ensure that it meets the requirements as defined by this document and those of other parties involved. Overall project design and/or construction includes, but is not limited to, underground electrical distribution facilities, underground sanitary sewer installations, underground storm sewer installations, underground water distribution and irrigation facilities, underground cable television facilities, underground natural gas facilities, underground telephone facilities, underground fiber optic cable installations, legal survey requirements, required permits, etc.

g) Review and/or comment on the overall project designs and/or constructions by FortisBC does not relieve the Developer from full responsibility and liability for designs and/or constructions produced by themselves or on their behalf.

h) By requesting and/or accepting copies of any FortisBC Engineering and Construction Standards, the Developer automatically accepts the terms and conditions of this letter.

5 Responsibility of Developer

- The Developer must construct FortisBC shallow electric utilities in compliance with this document.

- Where the Developer retains a Contractor to construct the underground civil system, the responsibilities outlined herein will remain with the Developer. The Developer is responsible to verify the qualifications of their retained Contractor and must be prepared to provide documentation of said qualifications at the request of FortisBC.

- Where there is any question regarding the interpretation of these standards, or where information may be lacking, it is incumbent upon the Developer or their representative to contact the local FortisBC representative for a written explanation.

- The Developer must obtain the latest revision of this document and the Company stamped **APPROVED FOR CONSTRUCTION** plans before commencing work**. Any work undertaken on the basis of supplied "preliminary information" is done so at the risk and responsibility of the Developer. Extra costs may result if not working from "approved for construction" drawings and information.**

- The Developer shall comply with all requirements of the Governing Authority as to the manner in which all work is done. This means that all conduit, grounding, bonding, and transformer pads are to be installed under the direct on-site supervision of a Field Service Representative (FSR) as per **Safety Standards Act ELECTRICAL SAFETY REGULATION (B.C. Reg 100/2004).** The on-site installation crew must be led by a certified FSR who must be present at all times that work is being performed.

- The Developer shall be fully responsible for proper coordination of the project including the provision of sufficient lead times for submission and approval of plans, field inspections, testing, and energization of the system.

- The Developer shall be responsible for all costs associated with:
  a) Purchase and installation of all materials necessary to install the civil system as specified in the Standard Drawings and Plans.
  b) Transportation of all materials supplied by the Company from the designated depots to the job site, and the return of surplus materials to the depots unless otherwise directed by the Company.
  c) Replacement of any materials lost or damaged after receipt of them.
  d) Supply of materials such as gravel, sand, pre-cast or poured in place material, forming lumber and other miscellaneous construction items.

e) All machine and hand excavations necessary for placing conduit, pre-cast concrete boxes, concrete pads, and other facilities as may be required in the standard drawings and plans.

- In all locations the Developer shall be responsible to minimize damage and restore all damaged pavement, sidewalks, curbs, gutters, developed or undeveloped areas to the satisfaction of the Property Owner(s) and the Governing Authority.

- Prior to excavation, the Developer shall:
  a) Comply with all regulatory requirements of the Governing Authority.
  b) Consult with the owners of buildings, retaining walls, poles, lamp standards, landscaping or any other structures which may be endangered by the work, and provide adequate support or measures necessary to protect those items to the satisfaction of the owner and the Governing Authority.
  c) Take the necessary safety precautions as outlined in Section 6 Safety Precautions.

- After civil construction has been completed the Developer shall provide “As-Built” information clearly noted in red on one of the FortisBC drawings. FortisBC will not issue a final “Field Inspection” with signoff or schedule electrical installation until “as-built” plans have been received by the Company.

- The Developer shall guarantee all grades. Any discrepancies between design and actual grades discovered during the final inspection shall be corrected by the Developer at the Developer's expense.

- The Developer shall be responsible for determining whether road cuts will be allowed by the Governing Authority. The Developer shall be responsible for any additional costs associated with boring or tunneling under road.

- Survey pins displaced by the Developer shall be reinstalled within 60 days by a legal surveyor at the Developer’s expense. Final approval cannot be granted by FortisBC until survey pins have been established.

- The Developer shall be responsible for maintaining the backfilled excavation until all settlement has ceased.

- The Developer shall maintain open excavations at his or her own liability and expense, and shall also be fully responsible to minimize hazards to people and property while trenches are open.

- When FortisBC facilities are to be installed jointly in the same trench with the facilities of telephone, cable, gas or any other utility, it is a responsibility of the Developer to ensure coordination is maintained with the respective parties. (See Appendix B – Structure and Assembly Details – for more details.)

- The Developer shall ensure that the minimum physical separations are maintained between FortisBC facilities and the facilities of other Utilities such as telephone, cable television, gas, water, sewer, fiber optic, etc. The Developer shall ensure that facility separations meet or exceed the requirements of all parties involved.
    - As per the British Columbia Fire Code 2018, Revision 1.01, Section 5.6.3.6 Hydrant Access, fire hydrants must have unobstructed clearance of 2 meters in all directions on construction sites.

- The Developer shall ensure the installation of the underground civil system resembles the plans. Any changes or alterations to the plan must be approved by the Company. These changes shall be reflected on "As-Built" drawings submitted to the Company upon the completion of the underground civil system.

6 Safety Precautions

- The Developer shall ensure compliance with BC Occupational Health and Safety (OHS) Regulations, Workers' Compensation Act and other applicable Standards, Codes and Regulations.

- Knowing what underground facilities are buried in or near your dig jobsite is essential if deadly, dangerous, or destructive accidents are to be avoided. The best way to find out what is buried on your dig site and which areas you must avoid when digging, call BC 1 Call at **1 800 474 6886** or log a ticket at www.bc1c.ca.

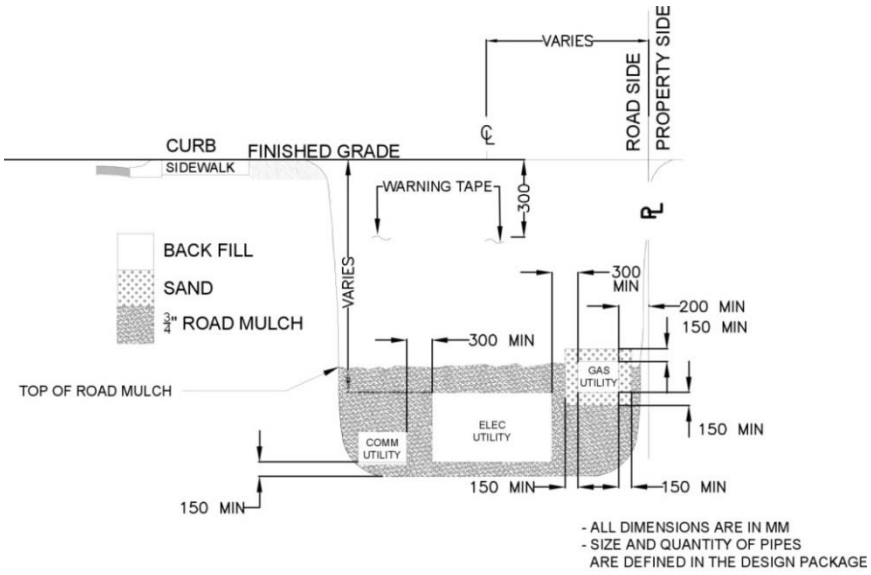
- If civil work is required on or near structures containing energized cables, the Developer shall give FortisBC 48 hour notice to arrange for a qualified Company representative to be on site during the excavation.

7 Joint Trenching

- The Developer shall ensure that the minimum physical separations are maintained between FortisBC facilities and the facilities of other Utilities such as telephone, cable television, gas, water, sewer, fiber optic, etc. For details refer to "Joint Trenching Requirements for shallow utilities" and "Joint Trenching Requirements for shallow utilities – Addendum A". Figure 1 of this document specifies FortisBC's minimum requirements; however, it should be noted that other Utilities may specify separations that exceed those of FortisBC. The Developer shall ensure that facility separations meet or exceed the requirements of all parties involved.

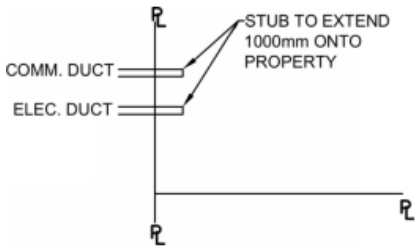
- Figures below only apply to the FortisBC Electric service territory.

Figure 1: Joint Trenching



- Service stubs at property line to be installed as per below

Figure 2: Service Stubs



8 Excavation and Trenching

Backfilling shall not be performed until a Company inspector has approved the phase of the project to be backfilled. Refer to Section 15 of this document. If native fill is specified it shall mean excavated material free of organic material and rock larger than 150 mm in diameter. Frozen material shall not be used as backfill.

- 150mm of duct bedding shall surround the utility facilities unless noted otherwise.

Table 1: Preferred Bedding Material

¾" Road Mulch MMCD Section 31-05-17-2.7 Granular Pipe, Bedding and Surround Material Type 1		
Sieve Designation	Lower Percentage Pass	Upper Percentage Pass
25.0mm	100	100
19.0mm	90	100
12.5mm	65	85
9.5mm	50	75
4.75mm	25	50
2.36mm	10	35
1.18mm	6	26
0.600mm	3	17
0.300mm	-	-
0.075mm	0	5

Table 2: Optional Bedding Material

City of Kelowna 3/8" Bedding Sand Specification		
Sieve Designation	Lower Percentage Pass	Upper Percentage Pass
12.5mm	100	100
4.75mm	35	100
2.36mm	20	98
1.14mm	13	92
0.600mm	8	80
0.300mm	5	60
0.150mm	2	25
0.075mm	0	8

- FortisBC reserves the right to request a Sieve Test to verify the material purchased by the Civil Contractor meets the gradation listed in Table 1 and 2. Sieve Test documentation to be requested by the FortisBC Civil Inspector and supplied by the Civil Contractor.

- Washed Bedding Material shall be used when installing Feeder Duct systems. Washed meaning, maximum 2% fines (less than 0.075mm) in the pan. The direction of when the material is required shall be indicated in the FortisBC design package.

- Under freezing conditions, backfill material shall be dry. Where no suitable backfill material is available all ducts shall be encased in concrete.

- Horizontal and vertical clearances shall be met as per the 1216 drawings in Appendix B – Structure and Assembly Details.

- Underground warning tape shall be installed 300 mm below finished grade. Only 150mm wide, red plastic tape bearing the words “CAUTION BURIED ELECTRIC LINE” shall be used.

- All backfilling and compaction shall be done to the satisfaction and acceptance of FortisBC and the Governing Authority, and shall be subject to inspection at all times.

- Road crossings shall be excavated at right angles to the road.

- For primary voltage ducts the preferred bedding material listed in Table 1 should be used. This is to ensure cable ampacity as outlined in drawing 1301, Underground and Riser Cable Ampacities, found in Appendix B – Structure and Assembly Details.

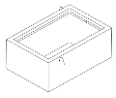
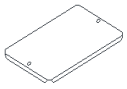
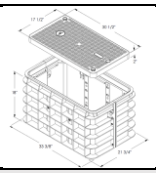
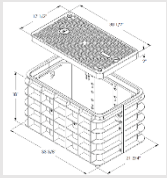
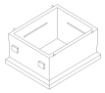
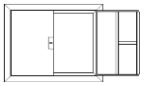
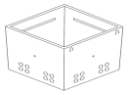
9 Source of Materials

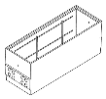
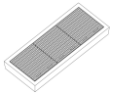
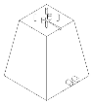
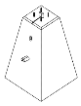
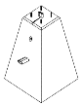
- FortisBC reserves the right to specify material manufacturers in order to ensure the quality of materials installed. Manufacturers and part numbers are listed in Table 3 below. The approved manufactures are:
    - Kon Kast
    - South Okanagan Concrete Products (SOCP)
    - Channell (distributed by EECOL)

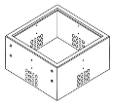
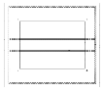
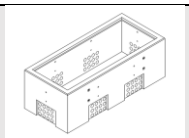
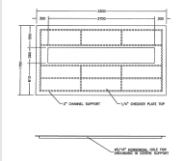
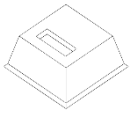
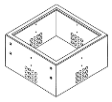
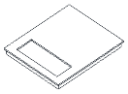
- The supply of conduit, fittings, pre-cast concrete products and grounding materials shall be the Developer's responsibility.

9.1 Pre-Cast Concrete Boxes, Vaults and Lids

Table 3: Common Structure Reference Numbers

Description	Manufacturer: Part No.	FortisBC Item No.	Assembly or Structure No.	H-20/HS-20 Impact rating	Reference Image
Service Box	Kon Kast: 1060 SOCP: 1100	755-0501	1590	N/A	
Service Box Lid	Kon Kast: 1061 SOCP: 1101			Group B	
HDPE Service Box - Small	Channell: BULKU173018J062223	755-0498		Group B	
HDPE Service Box - Medium	Channell: BULKU304824J082223	755-0499		Group B	
Single Phase Junction Box	Kon Kast: 1031 SOCP: 1105	755-0506	1591	N/A	
Single Phase Junction Box Lid	Kon Kast: 1037 SOCP: 1106	755-0611		Group B	
58" x 58" Civil Box	Kon Kast: 1021 SOCP: 1120	755-0509	1592	N/A	
58" x58" Civil Box Lid - Two Door	Kon Kast: 1025 SOCP: 1122	755-0612		Group B	
58" x58" Civil Box Lid - One Piece	Kon Kast: 1025S	-		Group B	

Description	Manufacturer: Part No.	FortisBC Item No.	Assembly or Structure No.	H-20/HS-20 Impact rating	Reference Image
832 Junction Box	Kon Kast: 1032 SOCP: 1125	755-0560	1594	N/A	
832 Junction Box Lid - Three Door	Kon Kast: 1033 SOCP: 1126			Group B	
832 Junction Box Lid - One Piece	Kon Kast: 1033S SOCP: 1127	755-0600		Group B	
Single Phase Transformer Box	Kon Kast: 1031 SOCP: 1105	755-0506	1593	N/A	
Single Phase Transformer Box Lid	Kon Kast: 1038 SOCP: 1107	755-0602		N/A	
Street Light Base	Kon Kast: 1045 SOCP: 1132	755-0206	1416	N/A	
	Kon Kast: 935 SOCP: 1134	755-0210	1418	N/A	
	SOCP: 1133	755-0207	1417	N/A	

Description	Manufacturer: Part No.	FortisBC Item No.	Assembly or Structure No.	H-20/HS-20 Impact rating	Reference Image
Switching Cubicle Box	Kon Kast: 1066 SOCP: 1129	755-0562	1595	N/A	
Switching Cubicle Box Lid	Kon Kast: 1066ELA	755-0619		Group B	
Switching Cubicle Box – One-Sided Switchgear	Kon Kast: By Request	755-0564		N/A	
Switching Cubicle Box Lid – One-Sided Switchgear	Kon Kast: By Request	755-0620		Group B	
Precast Pad 3 Phase Transformer 500kVA and Less	Kon Kast: 1058D SOCP: 1115	755-0507	1597	N/A	
3 Phase Transformer above 500kVA Deep Box	Kon Kast: 1066	755-0562	1596	N/A	
3 Phase Transformer above 500kVA Deep Box Lid	SOCP: 1130	755-0623		N/A	
Vehicle Bollard	Kon Kast: 1080	755-0100	1589	N/A	

9.1.1 Loading Standards

Structure lids shall comply with AASHTO H-20/HS-20 rating. For details refer to Section 3 of "AASHTO HB-17 Standard Specifications for Highway Bridges" and "AASHTO M306-10 - Standard Specifications for Drainage, Sewer, Utility and Related Castings"

- Group A – Structure Design to include a 30% impact factor (dynamic load). Structure application to be limited to:
  - Roadway
  - Highway
  - Highway on/off ramps

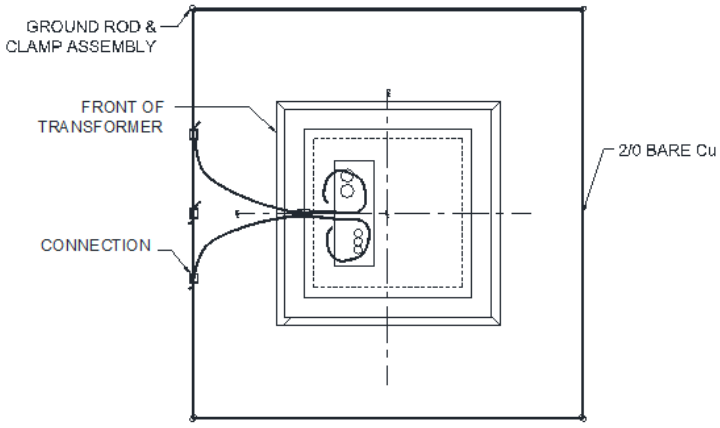
- Group B – Structure Design with no impact factor (static load). Structure application to be limited to:
  - Sidewalks
  - Boulevard
  - Driveway
  - Alleyway
  - Green space

9.2 Grounding

Table 4: Common Grounding Reference Numbers

Description	Manufacturer	Manufacturer Part No.	FortisBC Item No.
Cable, #2/0 stranded copper, soft drawn, bare	General Cable (BICC)/Nexans/Prysmian Cables and Systems	-	531-0202
Cable, #2/0 stranded copper, soft drawn, poly covered RW90, 600 volts	General Cable (BICC)/Nexans/Prysmian Cables and Systems	-	531-1122
Connector, copper, wrench installed, #2/0 copper to #2/0 copper	TE Connectivity	83747-4	553-0629
	Burndy	GXW26C26	
Connector, copper, wrench installed, #2/0 copper to 3/4" ground rod	TE Connectivity	83748-3	553-0626
	Burndy	GXW29C58	
Rod, ground, copperbonded, plain, 3/4" x 6’	Cadweld	613460	557-1308
	Erico	3406CC	
	Hubbell	613460	
	Hydel	C613460	
Cable, #4 stranded copper, soft drawn, bare, for welding or bonding	BICC Cable	166470	539-0602
	Carol Brand	1777	

Figure 3: Grounding Detail



9.3 Conduit and Fittings

- The Developer shall supply incidental construction materials such as PVC solvent weld, grout, sand and gravel appropriate for the construction method and conduit material.

Table 5: Common Conduit Component Reference Numbers

Description	Manufacturer	Manufacturer Part No.	FortisBC Item No.
Pipe			
Conduit, 2", rigid PVC, 10ft length, bell end	Ipex	32120	632-3058
	Royal Pipe Systems	RC4002010	
Conduit, 3", rigid PVC, 10ft length, bell end	Ipex	32130	632-3056
	Royal Pipe Systems	RC4003010	
Conduit, 4", rigid PVC, 10ft length, bell end	Ipex	32140	632-3051
	Royal Pipe Systems	RC4004010	
Conduit, 2", DB2, 20ft length, bell end	Ipex	08226 (gray)	632-3020
	Royal Pipe systems	DU02020	
Conduit, 3", DB2, 20ft length, bell end	Ipex	08234 (gray)	632-3030
	Royal Pipe Systems	DU03020	
Conduit, 4", DB2, 20ft length, bell end	Ipex	08241 (white)	632-3040
		08245 (gray)	
	Royal Pipe Systems	DU04020	
End Bell Fittings			
End bell, for 4" DB2	Ipex	29064	632-3640
	Royal Pipe Systems	BEL04	
End bell, socket molded, for 3" rigid PVC	Ipex	077328	632-3453
	Royal Pipe Systems	REB45	
End bell, socket molded, for 4" rigid PVC	Ipex	77330	632-3454
	Royal Pipe Systems	REB55	

Description	Manufacturer	Manufacturer Part No.	FortisBC Item No.
Couplers			
Coupler, DB2, 2”	Ipex	29001	632-3120
	Royal Pipe Systems	SWC02	
Coupler, DB2, 3”	Ipex	29002	632-3130
	Royal Pipe Systems	SWC03	
Coupler, DB2, 4”	Ipex	29004	632-3140
	Royal Pipe Systems	SWC04	
Coupler, rigid PVC, 2”	Ipex	77006	632-3172
	Royal Pipe Systems	REC35	
Coupler, rigid PVC, 3”	Ipex	77008	632-3173
	Royal Pipe Systems	REC45	
Coupler, rigid PVC, 4”	Ipex	77010	632-3174
	Royal Pipe Systems	REC55	
Sweeps			
Sweep, 90 degree, DB2, 2”, 24” radius	Ipex	29091	632-3220
	Royal Pipe Systems	90B2X24	
Sweep, 90 degree, DB2, 3”, 36” radius	Ipex	29093	632-3230
	Royal Pipe Systems	90B3X36	
Sweep, 90 degree, DB2, 4”, 36” radius	Ipex	29095	632-3240
	Royal Pipe Systems	90B4X36	
Sweep, 90 degree, rigid PVC, 2”, 24” radius	Ipex	NSL 2-24 or 69257	632-3352
Sweep, 90 degree, rigid PVC, 3”, 36” radius	Ipex	69261	632-3353
	Royal Pipe Systems	REE459036	
Sweep, 90 degree, rigid PVC, 4”, 36” radius	Ipex	69267	632-3354
	Royal Pipe Systems	REE559036	

Description	Manufacturer	Manufacturer Part No.	FortisBC Item No.
Adapters			
Adapter, rigid PVC to DB2, 2”	Ipex	ARIG20 or 29181	632-3455
	Royal Pipe Systems	ARIG02	
Adapter, rigid PVC to DB2, 3”	Ipex	29182	632-3459
	Royal Pipe Systems	ARIG03	
Adapter, rigid PVC to DB2, 4"	Ipex	29184	632-3457
	Royal Pipe Systems	ARIG04	
Miscellaneous			
Tape, underground warning, CAUTION BURIED ELECTRIC LINE, red tape with black lettering, 6” wide, heavy duty polyethylene 4.0 mil thick	Alarmaline	1000RG	492-0102
	Allen Systems	10571415	
	Brady	91296	
	Stranco Inc.	AL6100RE	
	Terra	BT61052	
	Top Tape and Label	PUWT-604	
Polyester Measure/Pulling Tape 3/4" (19.1 mm) Wide	DCD Design and Manufacturing	58500-730	559-3200

10 Conduit Installation

- Conduit installations shall be per structure 1214/1216/1218 in Appendix B – Structure and Assembly Details. In all cases the minimum depth of duct shall be 900mm. Exceptions to this minimum shall only be permitted with prior written approval through a Non-Standard Approval.

- Conduit shall not be installed below –10 °C temperature because of the high risk of duct damage and/or coupling separation.

- Conduit shall not be installed into any existing FortisBC infrastructure without a qualified Company representative on site. Modification of conduit entrance to structures, pads, buildings, etc., shall be pre-approved by FortisBC.

- Conduit terminating at buildings shall be installed in accordance with the latest version of **CSA standard C22.3 – No. 7, "Underground Systems"**, requiring that the ducts be adequately sealed, drained, graded or vented to prevent entry of gas or water, either from the outside surface or through the ducts.

- Conduit shall enter, exit, and be located in pre-cast concrete boxes and concrete pads in accordance with the following Standard Drawings (see Appendix B – Structure and Assembly Details for details).

- **All conduit terminated in full sized deep junction boxes shall be terminated with preformed end bells, grouted into place. All others shall be capped.**

- **Conduit terminating in side walls of junction and transformer boxes shall leave at right angles to the box wall for a minimum distance of 1 meter before being formed into the trench configuration.**

- All terminated conduit shall be capped (but not sealed) and shall be marked with lot number and or duct designation. All conduits shall have Polyester Measure/Pulling Tape 3/4" x 3.0" (19.1 mm x 914m) installed. The pulling tape shall have a minimum tensile strength of 11,000 N. It is permitted to reuse Pulling Tape but it must be one continuous piece.

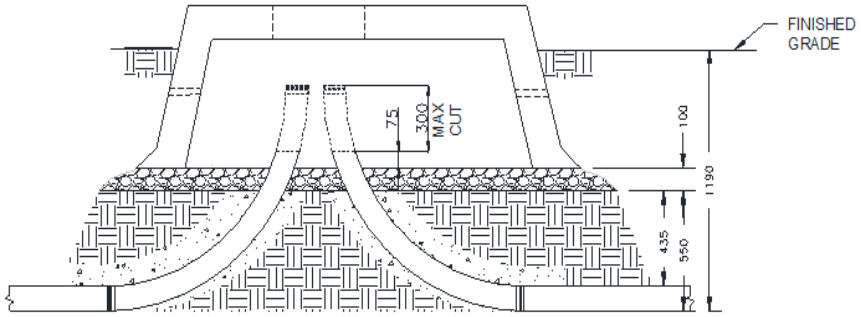
- The conduit shall be kept free of any obstructions and foreign material (including sand, gravel). After backfilling, the Developer shall prove the conduit via mandrel inspection with a solid disc or ridged plastic mandrel. After proving, the final pull string shall be installed, which can be used for conductor installation.

- All conduits shall extend at least 50 mm and no more than 100 mm above drain rock or finished grade.

Table 6: List of Facility Installation Standards found in Appendix B – Structure and Assembly Details

FortisBC Structure No.	Description
1203	Typ. Residential Subdivision Design
1204	Padmount Equipment Right of Way Requirements
1206	Padmount Equipment General Requirements
1214	Underground Road Crossings
1216	Trench Details
1218	Trench Details for 1PH Secondary Services up to and Including 200A
1301	15kV & 25kV Underground and Riser Cable Ampacities
1342	Riser Pole Transition Details
1416	Three Foot Base for Street lighting
1417	Highway, Collector and Arterial Type C-1, Controller Base
1418	Highway, Collector and Arterial Five Foot Concrete Base Type C, for Street Lighting
1589	Vehicle Protection (Bollard)
1590	Concrete Service box Civil
1591	Single Phase 200A 15/25 kV Junction Civil
1592	58” x 58” Civil Box
1593	1 Phase Low Profile Pad-mount Transformer
1594	3 Phase Junction Vault (200A) 15/25 kV 832 Style
1595	15 kV Pre-cast switch Cubicle Base
1596	3 Phase Transformer base larger than 500 KVA
1597	Pre-cast 3 phase transformer base 500 kVA or less
1598	Above Grade 200A Junction

Figure 4: *Conduit Termination*



11 Installing Duct Using Direction Drilling

- When the project calls for cable duct to be installed via direction drilling the Contractor must use Schedule 80 High Density Polyethylene smooth walled Duct. This duct must be red in colour throughout the entire thickness of the duct.

- The installation must use permanent markers at surface level to indicate electrical conductors buried below. The permanent markers shall be cast iron plates with hazard wording that are set into the concrete at a distance of 3m apart or as directed by FortisBC.

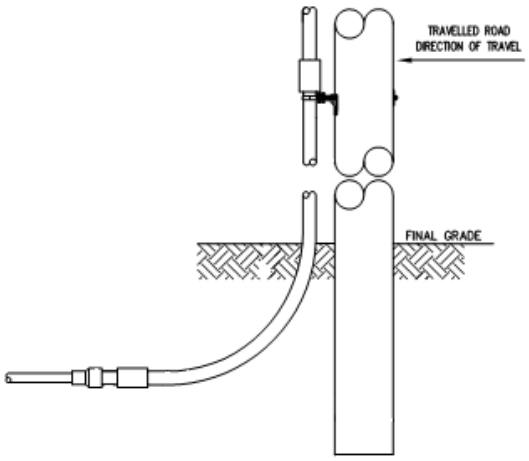
- The direction drill design and installation must be approved through the FortisBC Non-Standard Approval process. Please contact the FortisBC designer for further information.

- Surveyed As-Builts or equivalent accurate coordinates of the conduit must be submitted to FortisBC after construction. The required coordinate system shall be NAD 83.

12 Pole Risers

- Conduit bends shall be installed at the base of poles designated as riser poles on the plans. These bends shall be located on the quadrant of the pole as illustrated in Standard Structure Drawing No. 1342 (see Appendix A).
- All conduit bends shall be located to permit the use of standoff brackets on the pole.
- The Developer shall install appropriately sized 90° sweeps terminating at the base of the riser pole; these shall be capped and identified, but not sealed.
- For single phase installations of 200A or less FortisBC shall supply and install conduit up the riser structure when the underground electrical system installed by the Developer is connected to the FortisBC distribution system. In other words, the Developer shall not be required to supply nor install conduit up the pole when the underground system being installed connects to FortisBC's overhead primary facilities.
- On customer owned[1] secondary services greater than 200A, or any three phase secondary services, the Developer shall supply the duct required to run up the pole. FortisBC shall install this customer owned conduit up the pole.

Figure 5: *Riser Pole Detail*



[1] Refer to the FortisBC Service and Metering Guide available at www.fortisbc.com/servicemeterguide for more information on demarcation between customer and FortisBC owned and maintained facilities.

13 Drainage of Pre-Cast Boxes

- The Developer shall ensure that drain holes in all pre-cast boxes are clear and free draining (open), and are positioned or oriented at the lowest point of grade.

- Where water drains are required, the Developer shall provide a means of drainage to storm sewers or catch basins as indicated on the standard plans and drawings. Such drain systems shall meet the approval of the Company and the Governing Authority. Out-fall shall be proven prior to boxes being placed.

14 Concrete and Grout

- All concrete, reinforced or not, shall meet the requirements of the current edition of the Canadian Standards Association standard CSA-A23.1-00, "Concrete Materials and Methods of Concrete Construction".
- Concrete shall be sulphate resistant, Type 50, 3000 psi (20 MPA) minimum 28 day compressive strength.
- Air entraining agents shall be between 4-7% of final product, and shall conform to the requirements of ASTM International standard ASTM C260-01, "Standard Specification for Air-Entraining Admixtures for Concrete".
- Calcium chloride accelerators shall not be used in the pour. Alternate accelerators might be used, subject to FortisBC approval.
- Grout or mortar shall be prepared as per the manufacturer's instructions.
- All conduit sweeps except street lights shall be encased in concrete in accordance with the following Standard Drawings.

Table 7: List of Facilities Placement Standards found in Appendix B – Structure and Assembly Details

FortisBC Drawing No.	Description
F-20	Placement of Facilities; Concrete Encasement - Bends
F-21	Placement of Facilities; Concrete Encasement - Pole Riser
F-23	Placement of Facilities; Concrete Encasement - Deep Box Entry
G-23	Ground Rod Assembly

- Concrete encasement shall be formed in place and finished to a minimum thickness of 100 mm Maximum thickness shall not exceed 200 mm

15 Inspection of Installations

Inspection by FortisBC shall take place at the following construction phases. Inspections will only occur once all specified work has been completed (e.g. inspection D cannot occur before curb installation or road paving). Note that survey evidence must be in place before an inspection can commence.

A) **Trenching** – After ducts are installed, prior to backfill or concrete encasement

- Proper horizontal spacing between utility ducts
- Proper trench depth
- Concrete encase all horizontal bends
- Primary ducts are on the primary side of the transformer pad
- Secondary ducts are on the secondary side of the transformer pad

B) **Structure Grounding** – After ground rods and counterpoise connections have been made, prior to backfill

- Concrete encase all vertical bends into transformer pads and secondary boxes
- Ground grids/rods installed as per FortisBC structure standards
- Grounding wire is inside box

C) **Duct Work** – During installation of pull strings

- Pull rope and bell ends on all ducts
- Ducts are in good shape
- Ducts not too high or too low relative to drain rock

D) **Curb/Boulevard** – Upon completion of the curb installation or boulevard grading and road paving

- Top of Junction Boxes are at the proper elevation, per appendix B.
- Lids are not damaged
- Concrete box is in good shape
- Drain holes are opened and have drain rock underneath
- Drain rock in place within open bottom structures
- Eye bolts on ends are turned so eye (not nut) is inside the box (2 at each end)
- Grounding wire is inside box
- Street light base is in good shape
- Street light bolts are straight and have nuts
- Trench is properly backfilled (including behind street light bases)
- Prove ducts by mandrel inspection

E) **Completion** – After conduit system and structures have been installed, proved by mandrel, and ready for electrical construction

- Pull rope and bell ends on all ducts
- Boxes to be swept or vacuumed out prior to electrical installation or deficiency resolution

After any inspection, all openings in boxes must be covered with securely fastened 1/2" plywood

Ownership of underground equipment transfers to FortisBC after the Construction Complete Certificate is signed by FortisBC. Prior to that time the equipment is the Developer's responsibility.

15.1 Development Owner/Service Provider Constructed Subdivision Inspections

- FortisBC will have access and the right to inspect the conduit system at any point/phase in its construction.

Appendix A – Field Inspection Form

Field Inspections

Developer _____

Site Address _____

Contractor _____ Site Foreman _____

SAP WO # _____ FortisBC Inspector _____

◯ Accepted ◯ Rejected

Overhead Inspection List

Structures and Anchors

- ☐ Framing (to standard)
- ☐ Setting (depth / raked)
- ☐ Backfill (tamped)
- ☐ Correct class
- ☐ Anchor depth
- ☐ Anchor location and rod angle
- ☐ Guy tension
- ☐ Guy guards
- ☐ Insulators
- ☐ Right of way clearing
- ☐ Offset

Equipment

- ☐ Correct mounting
- ☐ Connections / lead size
- ☐ Bird proofed
- ☐ Grounding
- ☐ Cutout & arrestor
- ☐ Clearance

Protection

- ☐ Cutout rating
- ☐ Fuse link rating
- ☐ Mounting & grounding

Wire

- ☐ Size
- ☐ Sag
- ☐ Sleeves

Underground Inspection List

Trench and Conduit

- ☐ Trench depth
- ☐ Trench offset
- ☐ Trench condition
- ☐ Sand bed
- ☐ Correct duct installed
- ☐ Duct spacing
- ☐ Sanding / Backfill
- ☐ Compaction
- ☐ Warning tape
- ☐ String blown / duct / capped
- ☐ As Built

Structures

- ☐ Pad / box alignment
- ☐ Pad / box grade
- ☐ Box / pad grounding
- ☐ Proper offset / easement
- ☐ Backfilled
- ☐ Access
- ☐ Covers / lids
- ☐ Correct pad / base
- ☐ Property pins

Street Lights

- ☐ Base alignment
- ☐ Base grade
- ☐ Correct base size

Additional Comments:

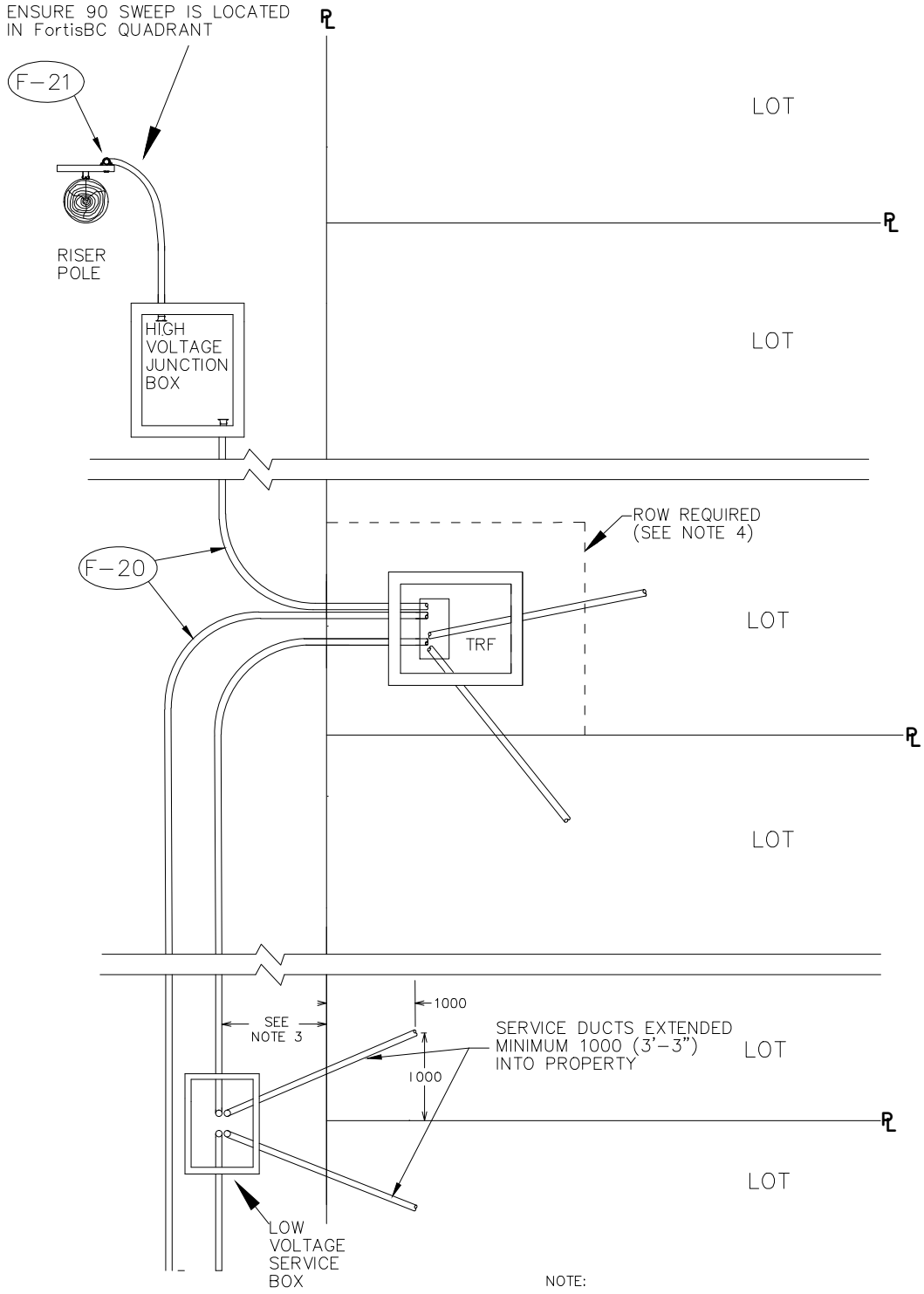
O/H Inspection Acceptance Date _____ By: _____

URD Inspection Acceptance Date _____ By: _____

One copy to file / One copy to site / One copy to Inspector

Printed - 10-12-15 2:02 PM

Appendix B – Structure and Assembly Details



NOTE:

1 – TRANSFORMER PAD TO BE PLACED IN THE CENTER OF ROW

2 – UNLESS OTHERWISE INDICATED ALL DIMENSIONS ARE IN MILLIMETRES

3 – DISTANCE OF TRENCH FROM PROPERTY LINE VARIES TO CONFORM TO LOCAL REGULATIONS

4 – REFER TO STR. 1204 FOR ROW REQUIREMENTS

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120
2016-03-04

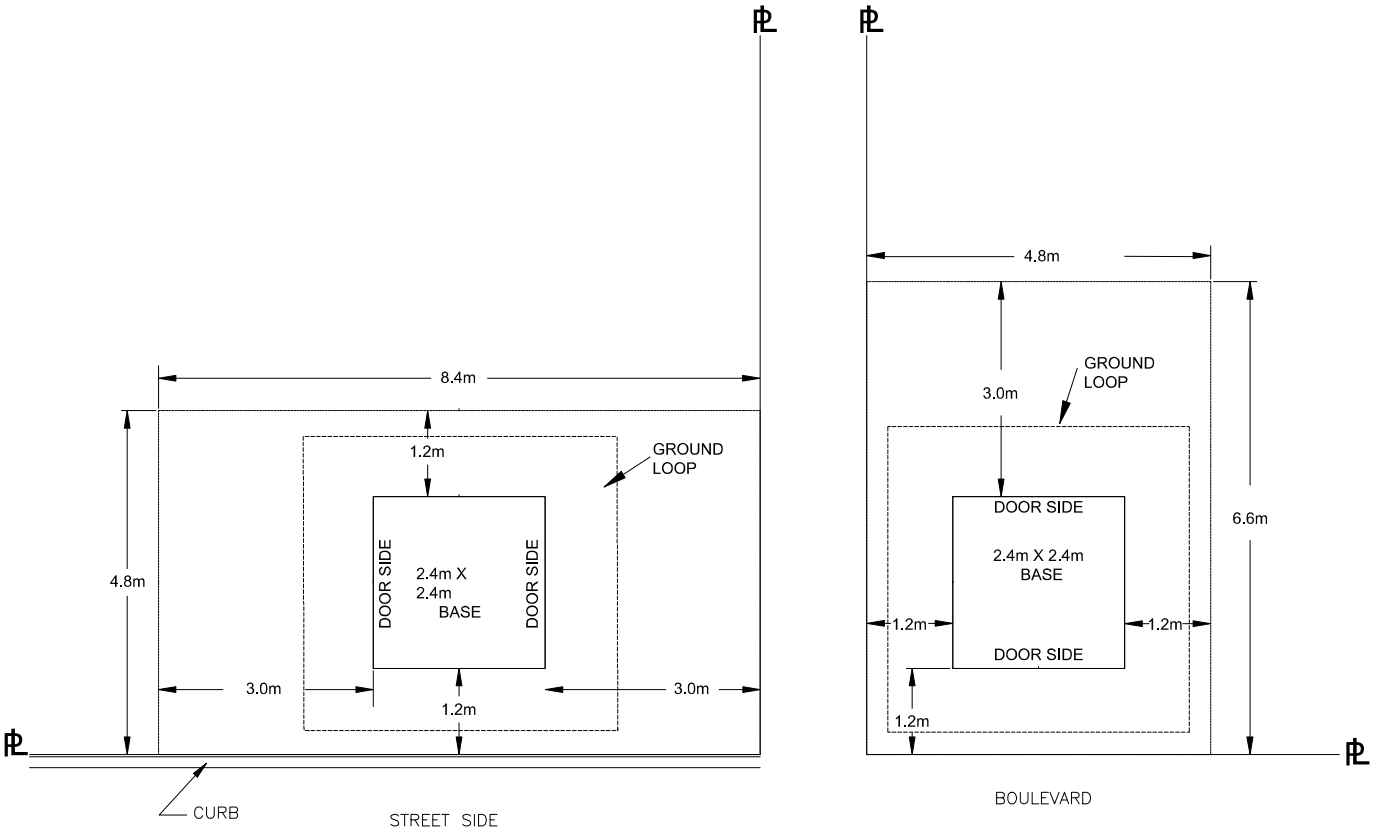
REV	DATE	BY	CHECKED	DESCRIPTION	APP.	DATE
6						
5						
4	JUL/15	DCW	DK	MODIFIED NOTE 4 – REFER TO STR. 1204	DCW	JUL/15
3	NOV/08	S.W.	NG	MODIFIED NOTE 4	BMB	NOV/08
2	MAR 08	SW	NG	REVISED DRAWING UPDATED OWNERSHIP	BMB	MAR 08
1	JAN 05	NS	NS	ADDED ASSEMBLY F-20, REFER TO STANDOFF BRACKET	RS	JAN 05

DRAWN BY		
CHECKED BY	NS	DEC 03
APPROVED BY	RS	DEC 03

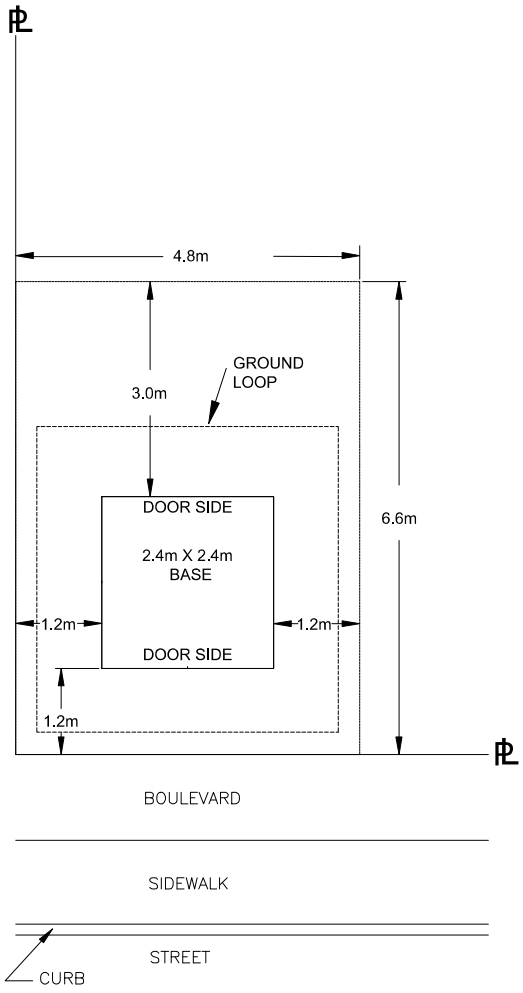
UNDERGROUND EQUIPMENT STRUCTURE
TYP. RESIDENTIAL SUBDIVISION DESIGN
PLAN VIEW
SHEET 1 OF 1

FORTIS BC

DRAWING No.	REV.
1203	4



OPTION A



OPTION B

NOTES:

1) OPTION A, DOORS NOT FACING STREETSIDE FOR HIGH TRAFFIC INSTALLATIONS
2) OPTION B, DOOR FACING STREET FOR NON TRAFFIC INSTALLATIONS
3) OPTION B – ANY STREET SIDE FENCE IS TO BE GATED, NOT TO RESTRICT ACCESS. NO FIXED STRUCTURE TO EXIST WITHIN A 3 METER CLEAR ZONE OF THE OPERATING DOORS.
4) LOCATE OIL FILLED SWITCHERS AS INDICATED IN C.E.C. 26–014 DIELECTRIC LIQUID–FILLED EQUIPMENT.
5) GROUND LOOP BURRIED 1M AWAY FROM EDGE OF EQUIPMENT.
6) IF REQUIRED BY PROJECT, 6m WIDE ACCESS ROW TO BE MEASURED FROM EDGE OF EQUIPMENT.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-06-30

REVISION DATE	JUN/22	
AUTHOR	DHG	JUN/22
CHECKED	JS	JUN/22
APPROVED	DCW	JUN/22
DESCRIPTION OF CHANGE: UPDATED TITLE AND TEMPLATE. REMOVED NOTE 4.		

P.ENG SEAL

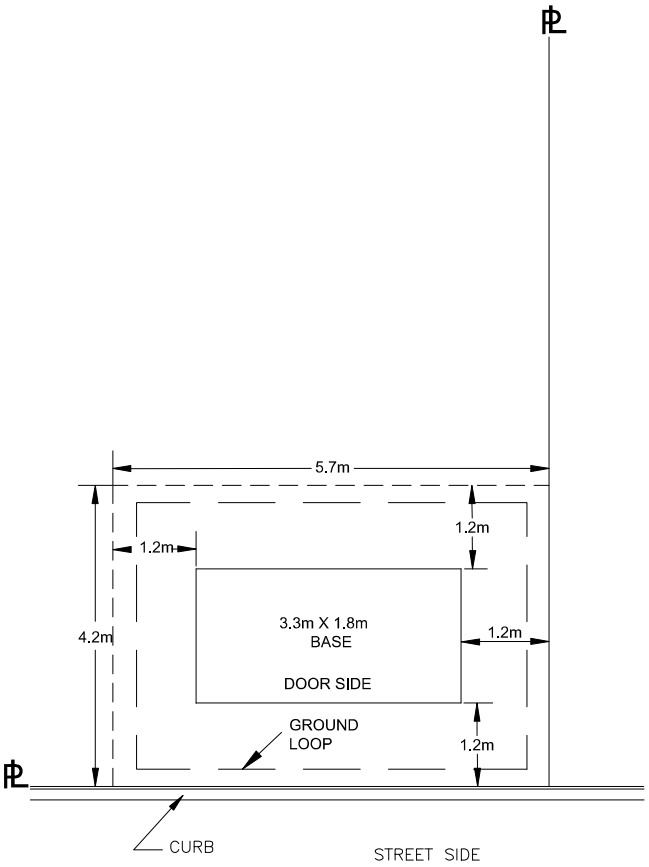
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D.H. GRETCHEN
52504
2022-06-30

ORIGINAL ISSUE		
AUTHOR	SS	JULY/07
CHECKED	HDB	DEC/11
APPROVED		

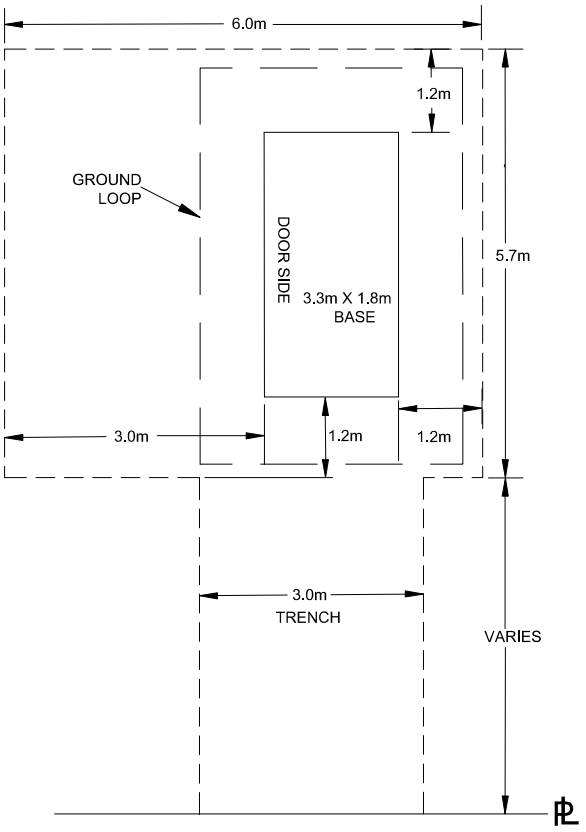
FORTIS BC

UG EQUIPMENT STRUCTURE
DOUBLE-SIDED SWITCHER AND PMU
PLAN VIEW
SHEET 1 OF 6

DRAWING No.	REV.
1204	3



OPTION A



OPTION B

NOTES:

1) OPTION A, DOORS FACING STREETSIDE
2) OPTION A – ANY STREET SIDE FENCE IS TO BE GATED, NOT TO RESTRICT ACCESS. NO FIXED STRUCTURE TO EXIST WITHIN A 3 METER CLEAR ZONE OF THE OPERATING DOORS.
3) OPTION B, DOORS FACING 3M LONG OPERATING ZONE (ON PRIVATE PROPERTY)
4) LOCATE ALL OIL FILLED SWITCHERS AS INDICATED IN C.E.C. 26–014 DIELECTRIC LIQUID–FILLED EQUIPMENT.
5) GROUND LOOP BURIED 1M AWAY FROM EDGE OF EQUIPMENT.
6) IF REQUIRED BY PROJECT, 6m WIDE ACCESS ROW TO BE MEASURED FROM EDGE OF EQUIPMENT.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-06-30

REVISION DATE		
AUTHOR		
CHECKED		
APPROVED		
DESCRIPTION OF CHANGE:		

P.ENG SEAL

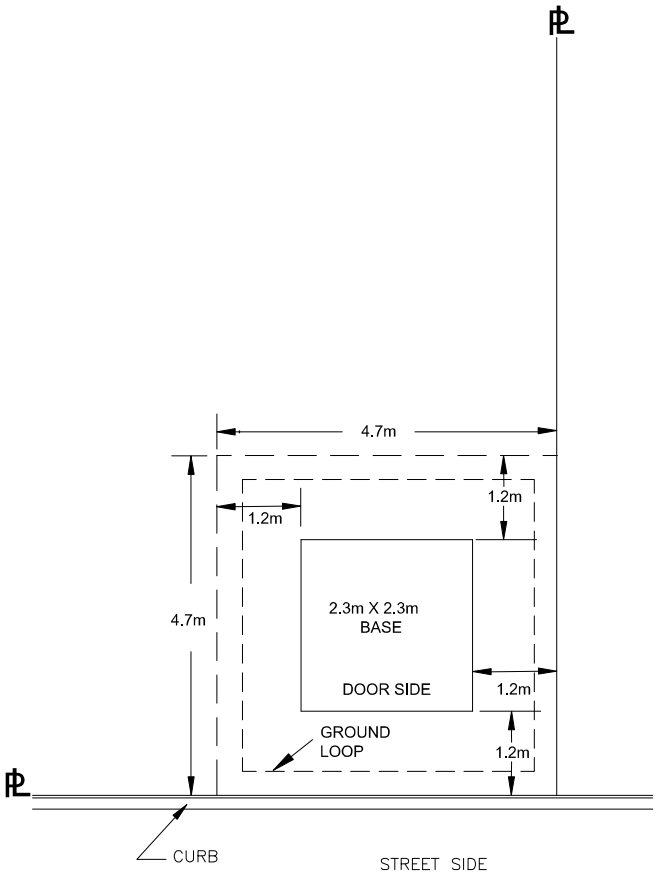
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D.H. GRETCHEN
52504
2022-06-30

ORIGINAL ISSUE		
AUTHOR	DHG	JUN/22
CHECKED	JS	JUN/22
APPROVED	DCW	JUN/22

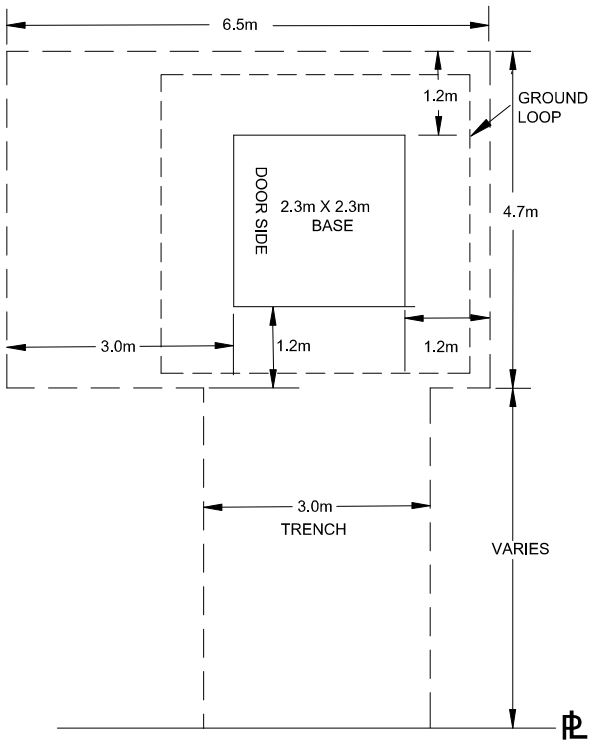
FORTIS BC

UG EQUIPMENT STRUCTURE
SINGLE-SIDED SWITCHER AND PMU
PLAN VIEW
SHEET 2 OF 6

DRAWING No.	REV.
1204	0



OPTION A



OPTION B

NOTES:

1) OPTION A, DOORS FACING STREETSIDE
2) OPTION A – ANY STREET SIDE FENCE IS TO BE GATED, NOT TO RESTRICT ACCESS. NO FIXED STRUCTURE TO EXIST WITHIN A 3 METER CLEAR ZONE OF THE OPERATING DOORS.
3) OPTION B, DOORS FACING 3M LONG OPERATING ZONE (ON PRIVATE PROPERTY)
4) LOCATE ALL TRANSFORMERS AS INDICATED IN C.E.C. 26–240. FORTISBC PADMOUNT DISTRIBUTION TRANSFORMERS ARE TYPICALLY PROTECTED WITH AN INTERNAL CURRENT LIMITING FUSE & EQUIPPED WITH A PRESSURE RELIEF DEVICE
5) GROUND LOOP BURIED 1M AWAY FROM EDGE OF EQUIPMENT.
6) IF REQUIRED BY PROJECT, 6m WIDE ACCESS ROW TO BE MEASURED FROM EDGE OF EQUIPMENT.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-06-30

REVISION DATE	JUN/22	
AUTHOR	DHG	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22
DESCRIPTION OF CHANGE: CHANGED SHEET NUMBERING AND UPDATED BORDER. REMOVED NOTE 4		

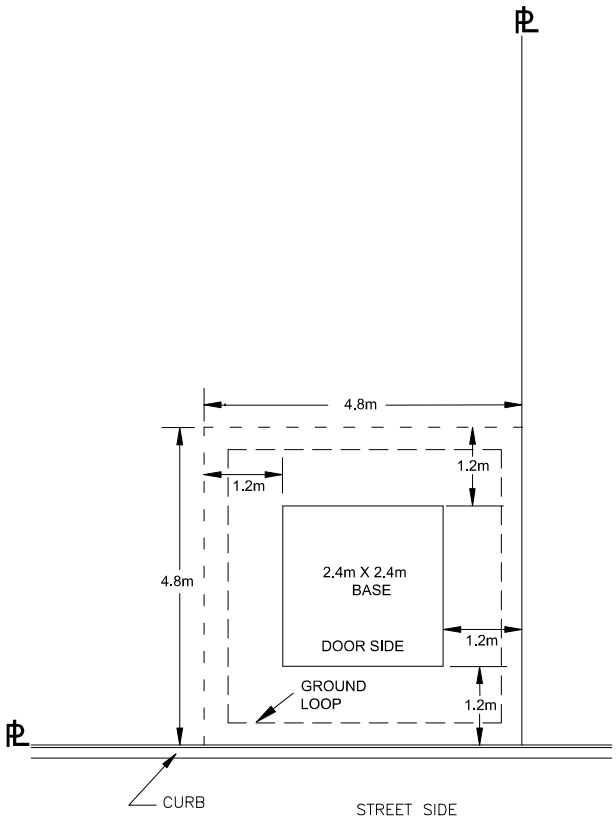
P.ENG SEAL
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-06-30

ORIGINAL ISSUE		
AUTHOR	SM	JUL/14
CHECKED	NM	SEP/14
APPROVED	DCW	SEP/14

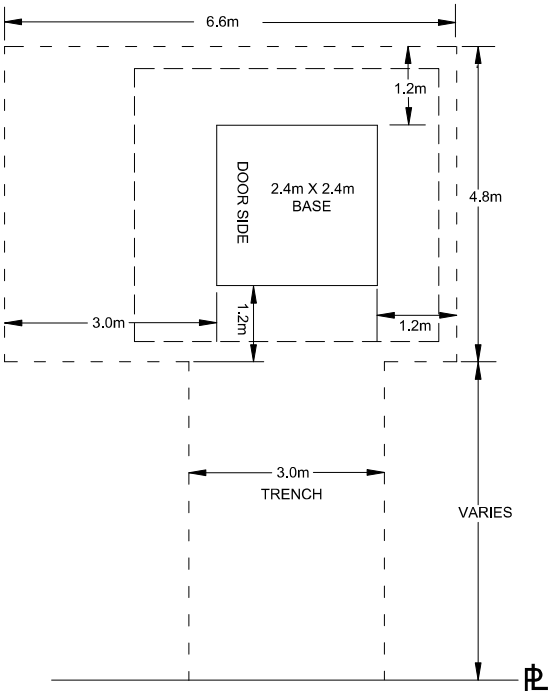
FORTIS BC

UNDERGROUND EQUIP. STR.
3PH TRANS 500kVA OR LESS ROW
PLAN VIEW
SHEET 3 OF 6

DRAWING No.	REV.
1204	1



OPTION A



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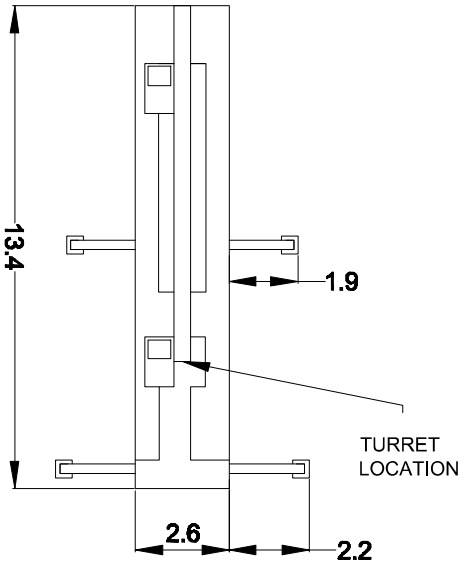


CRANE DIMENSIONS IN METERS

NOTES:

1) OPTION A, DOORS FACING STREETSIDE
2) OPTION A – ANY STREET SIDE FENCE IS TO BE GATED, NOT TO RESTRICT ACCESS. NO FIXED STRUCTURE TO EXIST WITHIN A 3 METER CLEAR ZONE OF THE OPERATING DOORS.
3) OPTION B, DOORS FACING 3M LONG OPERATING ZONE (ON PRIVATE PROPERTY)
4) LOCATE ALL TRANSFORMERS AS INDICATED IN C.E.C. 26–240. FORTISBC PADMOUNT DISTRIBUTION TRANSFORMERS ARE TYPICALLY PROTECTED WITH AN INTERNAL CURRENT LIMITING FUSE & EQUIPPED WITH A PRESSURE RELIEF DEVICE
5) GROUND LOOP BURIED 1M AWAY FROM EDGE OF EQUIPMENT.
6) IF REQUIRED BY PROJECT, 6m WIDE ACCESS ROW TO BE MEASURED FROM EDGE OF EQUIPMENT.
7) DESIGNER TO CONFIRM SPACE AVAILABLE FOR CRANE RIGGER SPREAD OF 7M.
8) MAXIMUM DISTANCE FROM THE CENTRE OF THE TURRET TO THE CENTRE OF THE LOAD (NEW TRANSFORMER PAD LOCATION) IS 50 FEET.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-06-30

REVISION DATE	JUN/22	
AUTHOR	DHG	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22
DESCRIPTION OF CHANGE: CHANGED SHEET NUMBERING AND REMOVED NOTE 4		

P.ENG SEAL

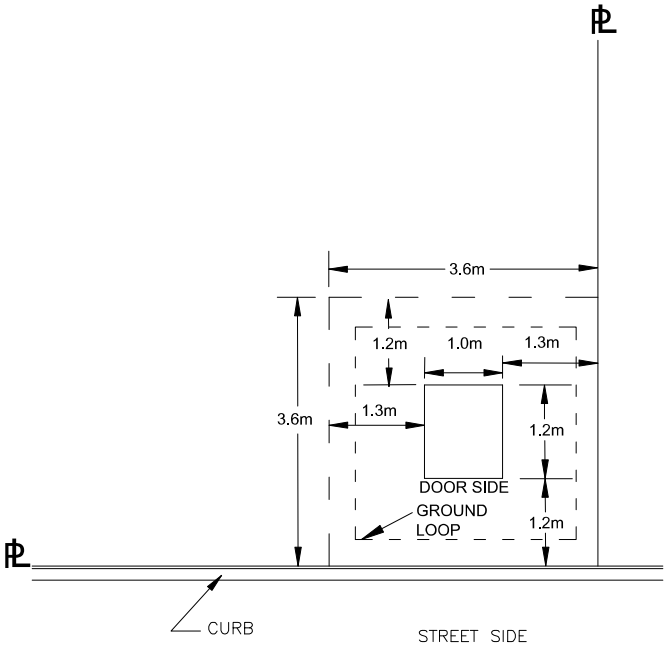
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-06-30

ORIGINAL ISSUE		
AUTHOR	SM	JUL/14
CHECKED	NM	SEP/14
APPROVED	DCW	SEP/14

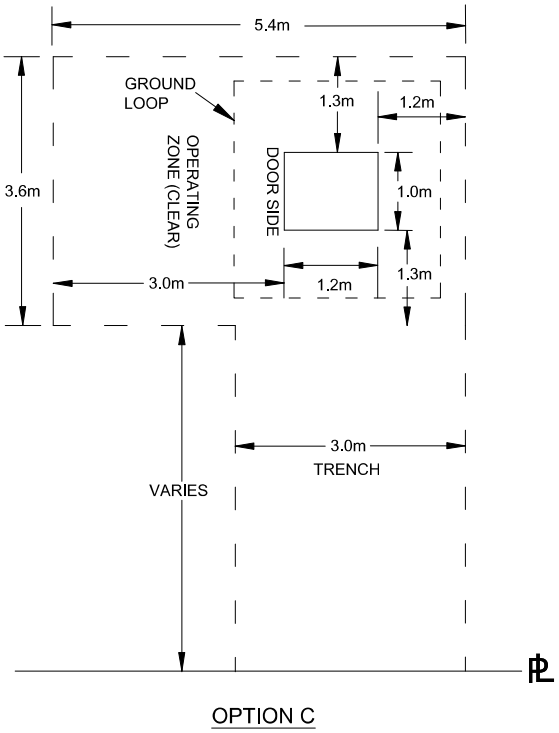
UNDERGROUND EQUIP. STR.
3PH TRANS OVER 500 KVA ROW
PLAN VIEW
SHEET 4 OF 6

FORTIS BC

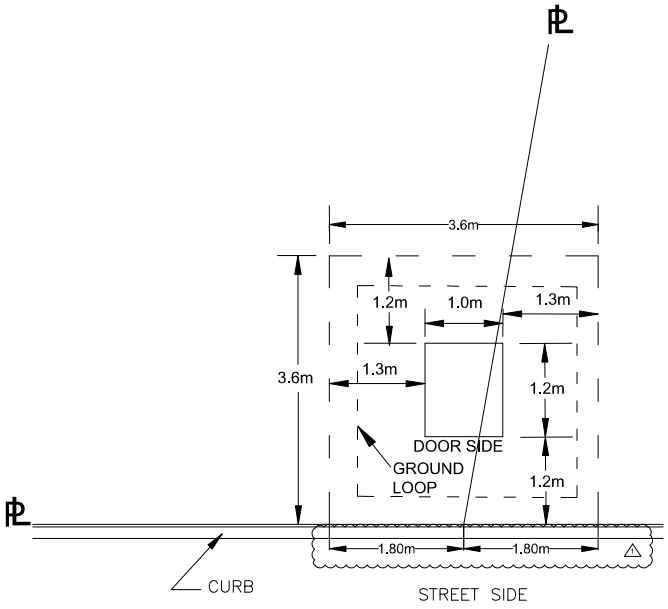
DRAWING No.	REV.
1204	2



OPTION A



OPTION C



OPTION B

NOTES:

1) OPTION A, DOORS FACING STREETSIDE
2) OPTION B, DOORS FACING STREETSIDE (R/W SPLIT ON TWO PROPERTIES)
3) OPTION A & B – ANY STREET SIDE FENCE IS TO BE GATED, NOT TO RESTRICT ACCESS. NO FIXED STRUCTURE TO EXIST WITHIN A 3 METER CLEAR ZONE OF THE OPERATING DOORS.
4) OPTION C, DOORS FACING 3M LONG OPERATING ZONE (ON PRIVATE PROPERTY)
5) LOCATE ALL TRANSFORMERS AS INDICATED IN C.E.C. 26–240. FORTISBC PADMOUNT DISTRIBUTION TRANSFORMERS ARE TYPICALLY PROTECTED WITH AN INTERNAL CURRENT LIMITING FUSE & EQUIPPED WITH A PRESSURE RELIEF DEVICE
6) GROUND LOOP BURIED 1m AWAY FROM EDGE OF EQUIPMENT.
7) IF REQUIRED BY PROJECT, 6m WIDE ACCESS ROW TO BE MEASURED FROM EGDE OF EQUIPMENT.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-06-30

REVISION DATE	JUN/22	
AUTHOR	DHG	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22
DESCRIPTION OF CHANGE:		
UPDATED OPTION B DIMENSIONS AND BORDER		
REMOVED NOTE 5		

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-06-30

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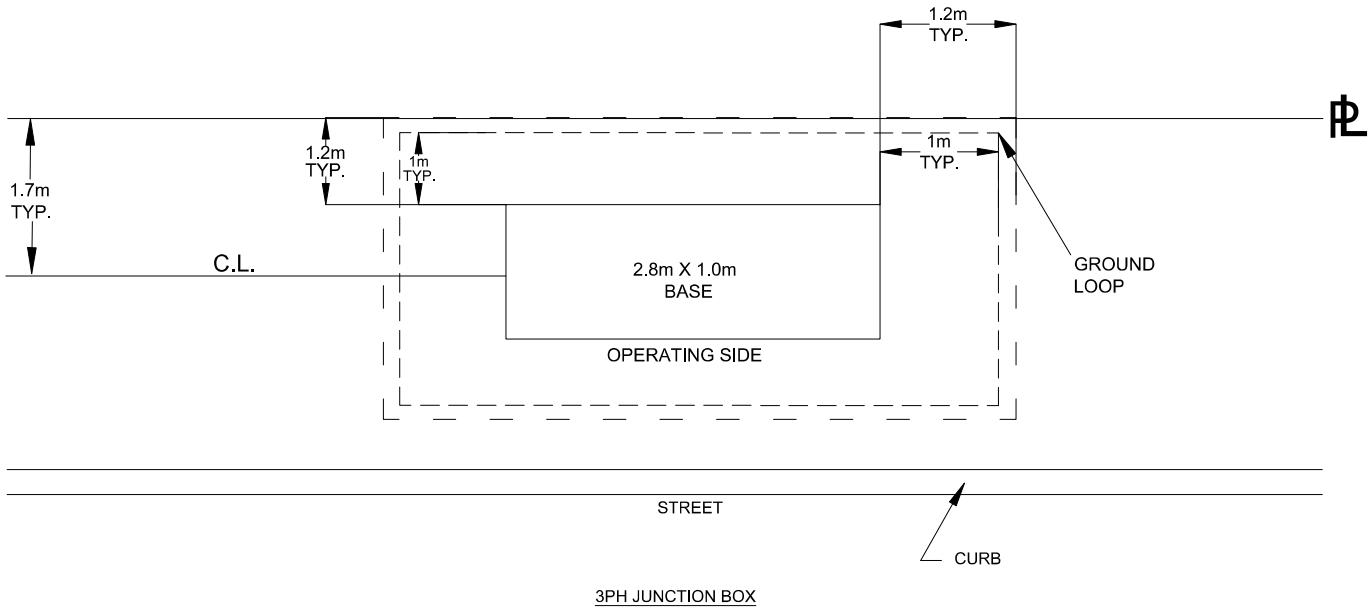
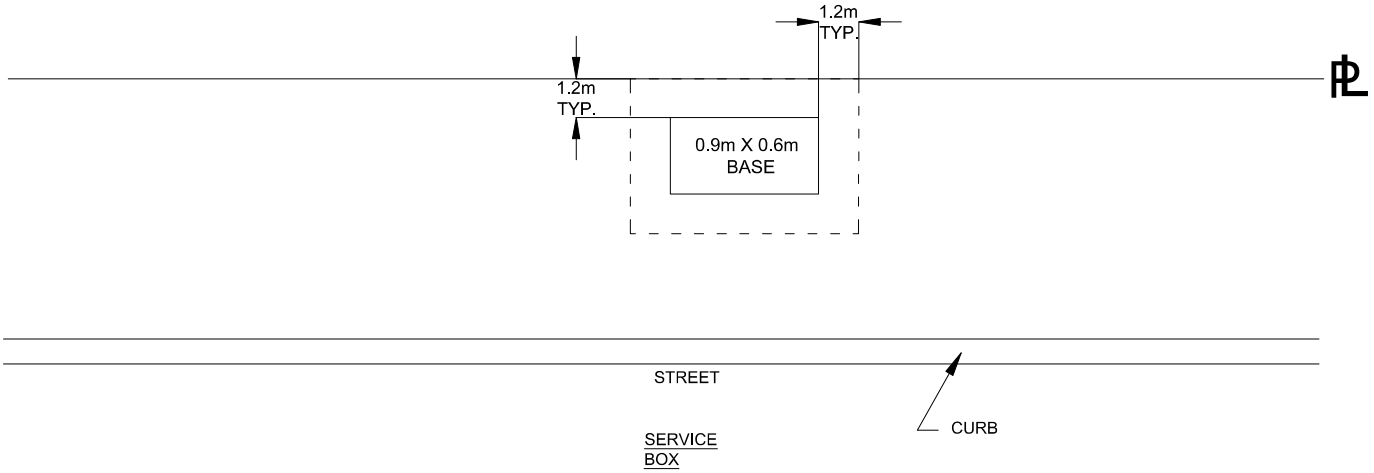
FORTIS BC

UNDERGROUND EQUIP. STR.
1PH TRANSFORMER ROW
PLAN VIEW
SHEET 5 OF 6

DRAWING No.	REV.
1204	1



3PH JUNCTION BOX



SERVICE
BOX

NOTES:

1) NO FIXED STRUCTURE TO EXIST WITH 3m CLEAR ZONE OF OPERATING SIDE.
2) LOCATION OF JUNCTION BOX COULD VARY DEPENDING ON PROJECT REQUIREMENTS.
3) GROUND LOOP BURIED 1m AWAY FROM EDGE OF JUNCTION BOX.
4) ROW SHALL BE AT LEAST 1.2m AWAY FROM EDGE OF EQUIPMENT

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Dane Gretchen
2022-06-30

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APPROVED	DCW	JUN/22
DESCRIPTION OF CHANGE:		
CHANGED SHEET NUMBERING		

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-06-30

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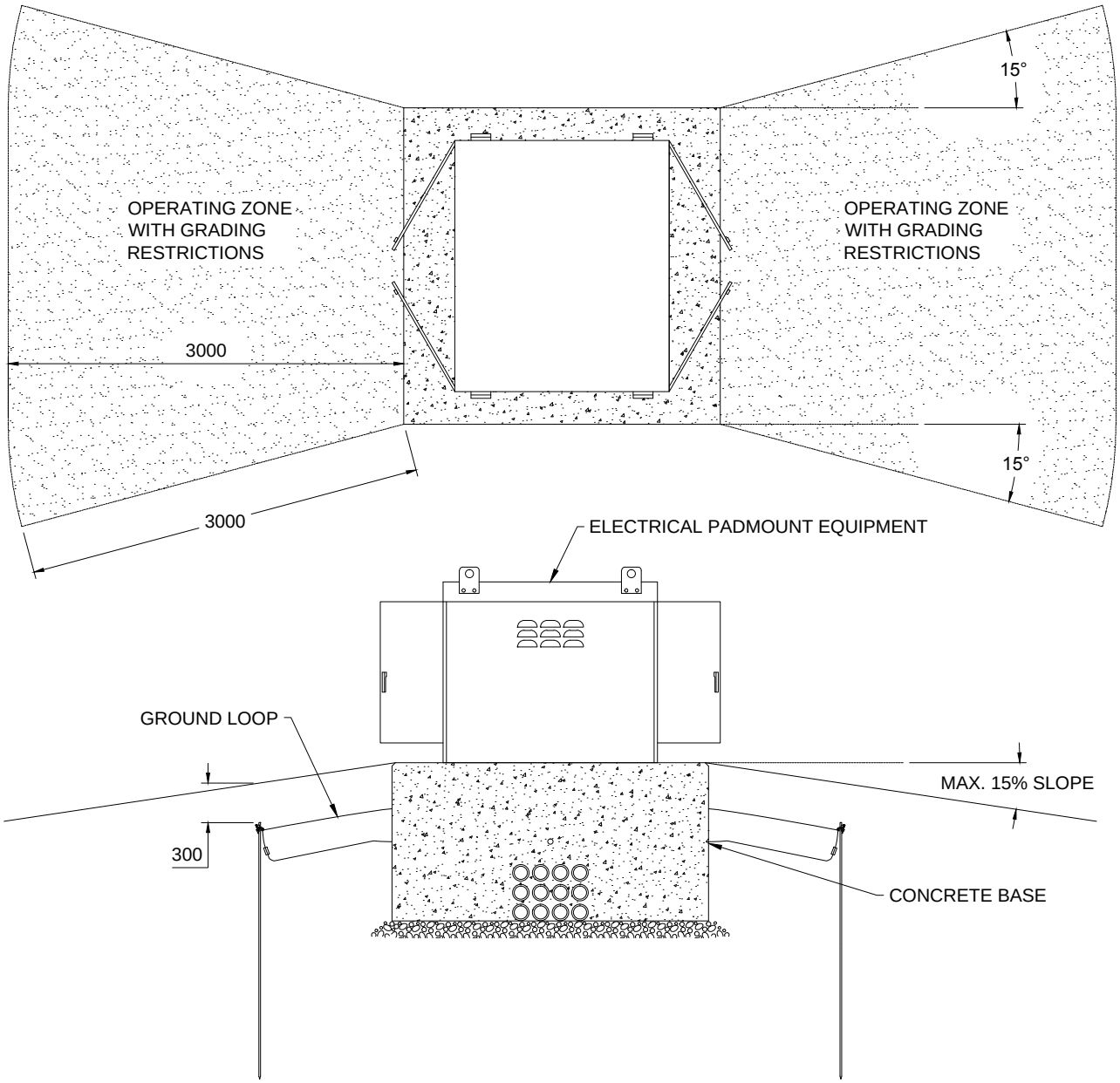
FORTIS BC

UNDERGROUND EQUIP. STR.
TYPICAL JUNCTION/SERVICE BOX
PLAN VIEW
SHEET 6 OF 6

DRAWING No.	REV.
1204	2



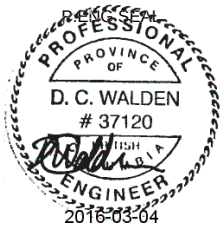
NOTES:

1. THIS STRUCTURE APPLIES TO ALL PADMOUNT EQUIPMENT. IN THE CASE WHERE THE EQUIPMENT HAS ONLY ONE SET OF DOORS, OPERATING ZONE AND GRADING REQUIREMENTS ONLY APPLY TO THAT SIDE.
2. LANDSCAPE GRADE WITHIN THE OPERATING ZONE OF PADMOUNT EQUIPMENT MUST NOT EXCEED ±15%. REQUIRED FOR SAFE FOOTING WHEN OPERATING THE EQUIPMENT.
3. THE SLOPE MUST NEVER EXPOSE THE GROUND LOOP.

REVISION DATE	JAN/16	
AUTHOR	DCW	DEC/15
CHECKED	DK	JAN/16
APPROVED	DK	JAN/16

DESCRIPTION OF CHANGE:

GENERAL REVISION OF FORMAT



ORIGINAL ISSUE		
AUTHOR		
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UNDERGROUND EQUIP STRUCTURES

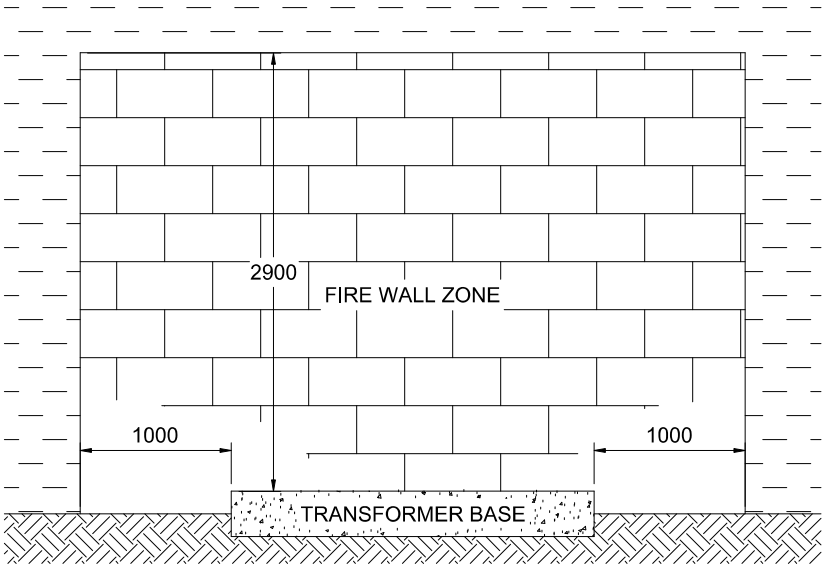
PADMOUNT EQUIP GENERAL REQ

GRADING OF LANDSCAPE

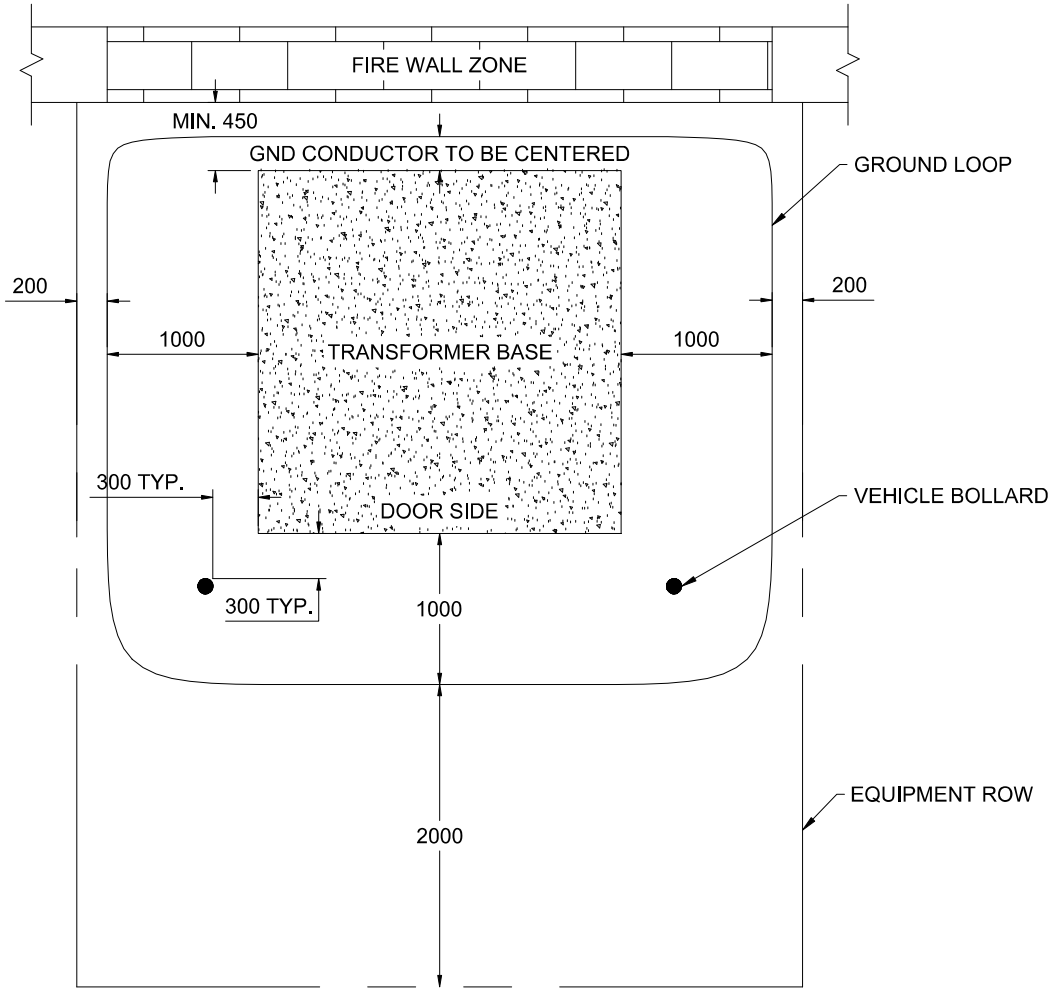
SHEET 1 OF 5

FORTIS BC

DRAWING No.	REV.
1206	4



FRONT VIEW



TOP VIEW

NOTE:

1. DIMENSIONS IN mm.
2. STR. SHALL ONLY BE USED WHEN 1m OFF BACK OF TRANS. PAD IS NOT AVAILABLE.
3. FIREWALL ZONE SHALL MEET THE REQUIREMENTS OF CEC 26.242. MUST BE NON-FLAMMABLE SURFACE.

FortisBC INC.
1001962

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Dane Gretchen
2022-06-30

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AUTHOR	DHG	JUN/22
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APPROVED	DCW	JUN/22

DESCRIPTION OF CHANGE:
UPDATED DRAWING TITLE

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-06-30

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AUTHOR	NS	DEC/03
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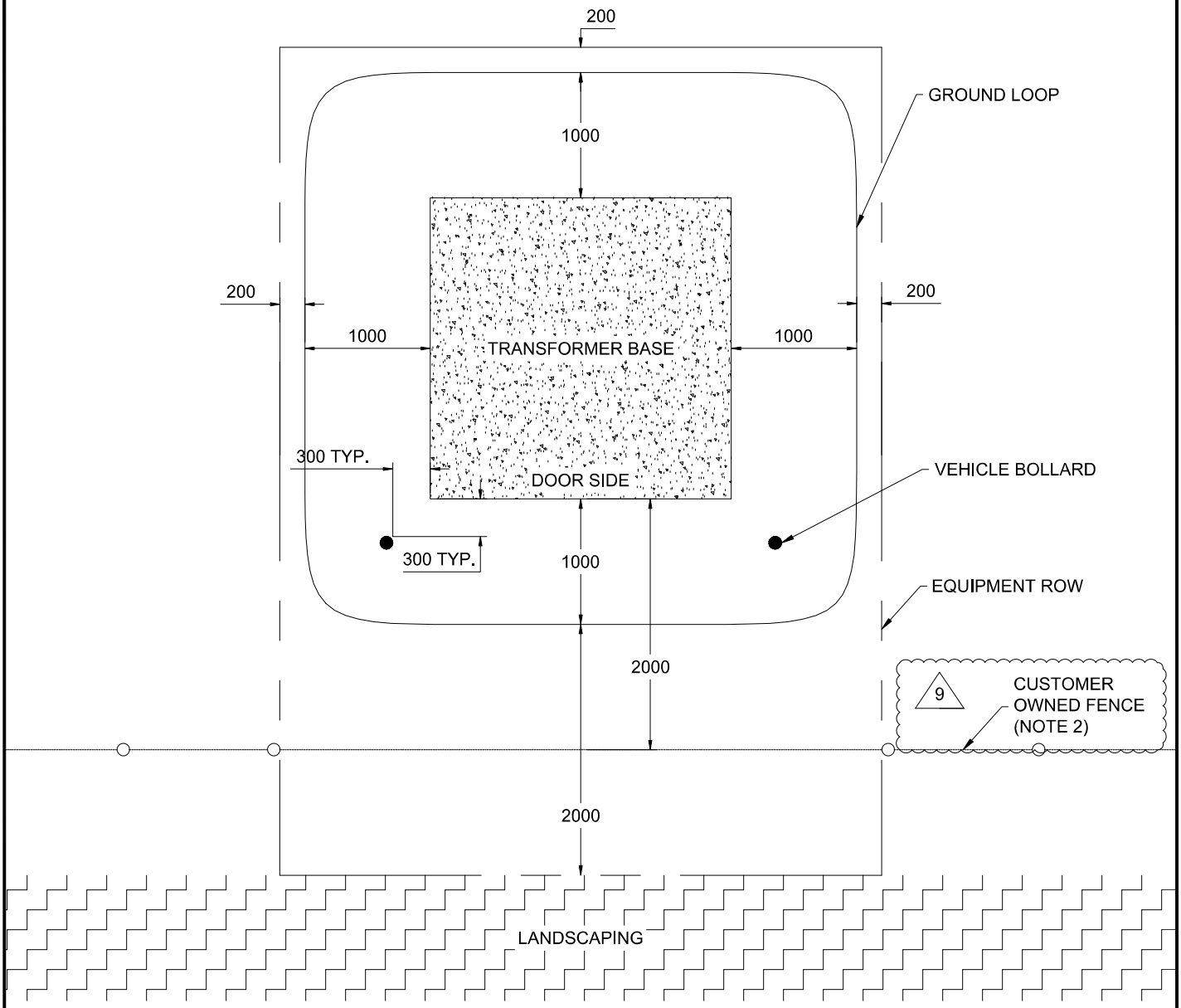
APPROVED	FC	DEC/03

FORTIS BC

UNDERGROUND EQUIP. STR.
PADMOUNT EQUIPMENT GEN. REQ.
TRANSFORMER WITH FIREWALL
SHEET 2 OF 5

DRAWING No.	REV.
1206	6



NOTE:

1. DIMENSIONS IN mm.
2. NO METALLIC OBJECTS SUCH AS FENCES OR GATES ARE PERMITTED WITHIN 2.0m OF THE TRANSFORMER BASE UNLESS EFFECTIVELY ISOLATED FROM EARTH AS SHOWN IN STRUCTURE 1206 SHEET 5.
3. THE CUSTOMER MUST PROVIDE FORTISBC ACCESS TO THE TRANSFORMER IF ANY FORM OF BARRIER IS INSTALLED, IE. FENCE. NO PERMANENT PORTION OF THIS STRUCTURE IS PERMITTED WITHIN THE RIGHT-OF-WAY.
4. NO LANDSCAPING IS PERMITTED WITHIN THE RIGHT-OF-WAY. FORTISBC RESERVES THE RIGHT REMOVE ANY LANDSCAPING PLACED BY THE CUSTOMER WITHIN THE RIGHT-OF-WAY.
5. VEHICLE BOLLARDS ARE REQUIRED FOR ALL 3PH TRANSFORMERS. MAY BE REQUIRED FOR 1PH TRANSFORMERS.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-06-30

REVISION DATE	JUN/22	
AUTHOR	DHG	JUN/22
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APPROVED	DCW	JUN/22
DESCRIPTION OF CHANGE:		
ADDED NOTE 2 CALLOUT UNDER CUSTOMER OWNED FENCE		

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-06-30

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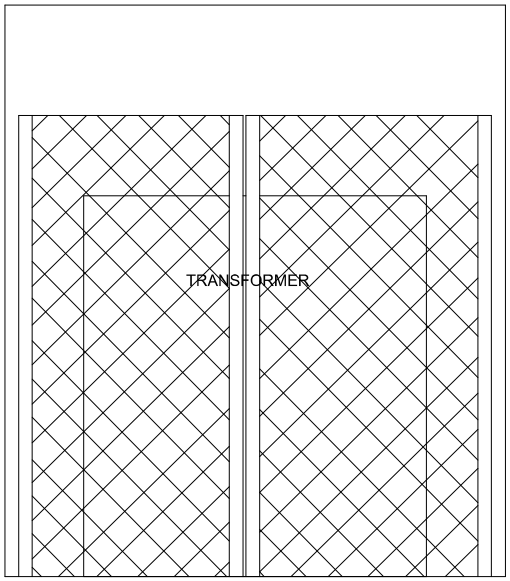
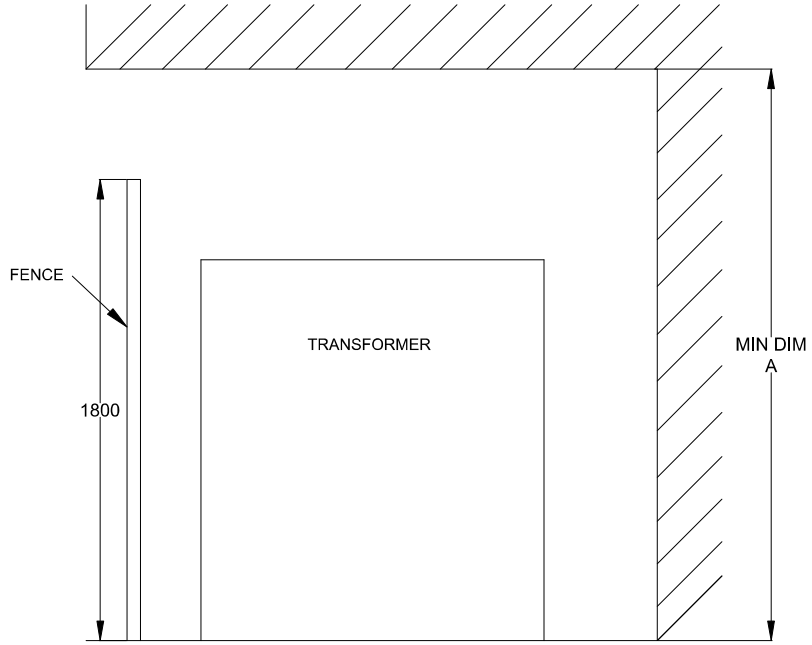
FORTIS BC

UNDERGROUND EQUIP. STR.
PADMOUNT EQUIPMENT GEN. REQ.
PADMOUNT TRANS. TYP. REQ'S
SHEET 3 OF 5

DRAWING No.	REV.
1206	9

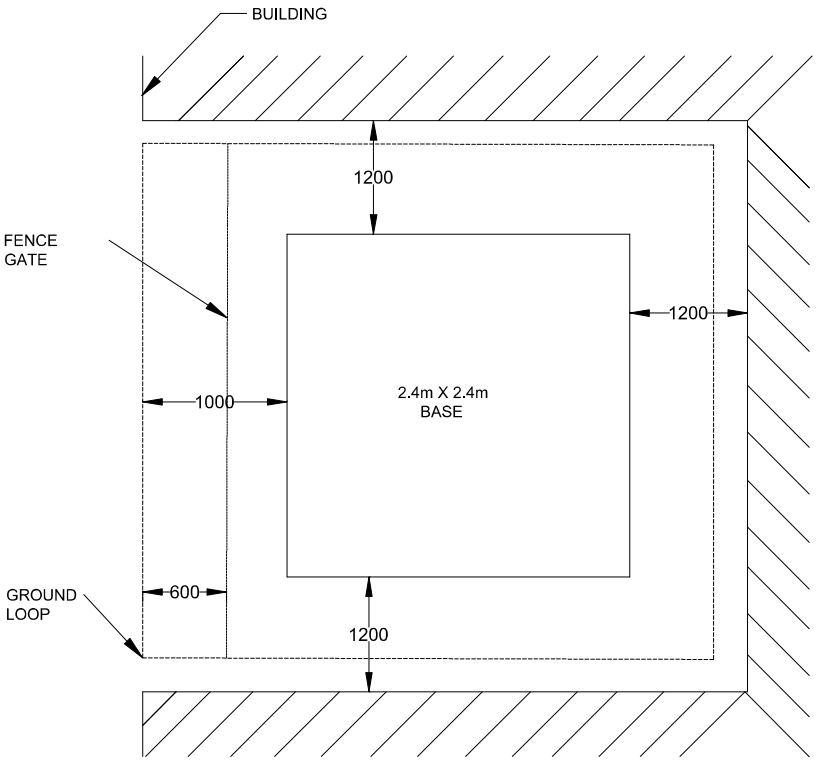


FRONT VIEW



SIDE VIEW

	DIMENSION A
UPTO 300kVA	5.0m
500kVA TO 2000kVA	8.3m



PLAN VIEW

NOTES:

1. DIMENSIONS IN mm UNLESS INDICATED OTHERWISE.
2. GROUND LOOP TO BE BURIED 1m AWAY FROM EQUIPMENT.
3. GATE SHALL ALLOW FULL ACCESS TO FONT OF TRANSFORMER. GATE SHALL NOT INHIBIT CRANE ACCESS.
4. GATE SHALL BE BONDED TO EQUIPMENT GROUND.
5. THIS STRUCTURE SHALL ONLY BE USED IF THERE IS 14.5m OF UNOBSTRUCTED SPACE IN FRONT OF THE TRANSFORMER CAVITY. MEASURING FROM THE EDGE OF THE BUILDING. REQUIRED FOR CRANE ACCESS.
6. ANY OTHER CONFIGURATION REQUIRE FBC APPROVAL.

FortisBC INC.
1001962

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Dane Gretchen
2022-06-30

REVISION DATE	JUN/22	
AUTHOR	DHG	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22

DESCRIPTION OF CHANGE:
CHANGED MAX TRANSFORMER SIZE TO 2000kVA
UPDATED DRAWING TITLE

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-06-30

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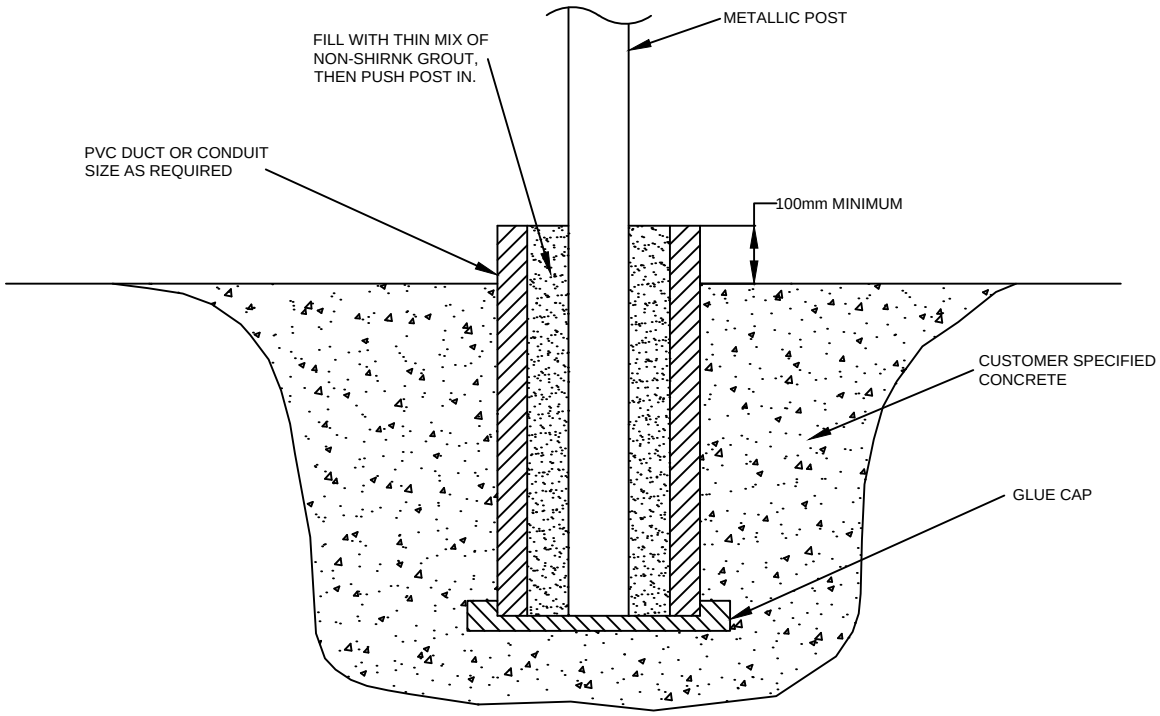
APPROVED	DCW	SEP/14

FORTIS BC

UNDERGROUND EQUIPENT STR.
PADMOUNT TRANS. GENERAL REQ.
ZERO SETBACK BUILDING TRANS.
SHEET 4 OF 5

DRAWING No.	REV.
1206	1



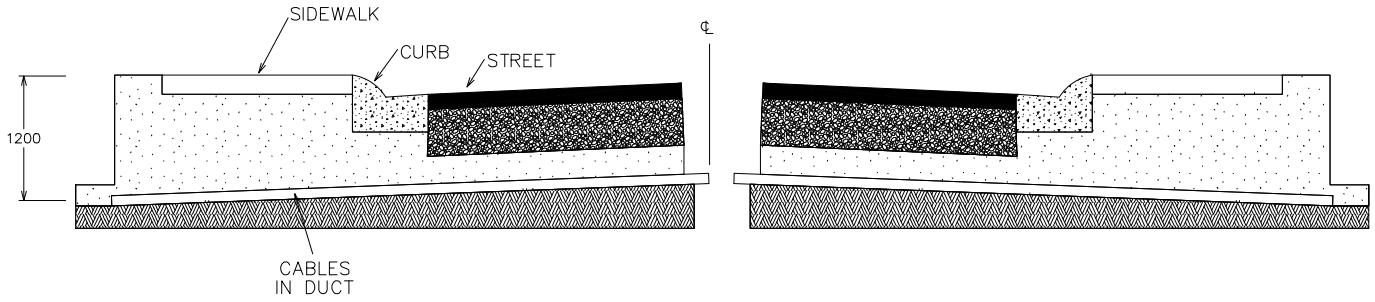
REV	DATE	BY	CHECKED	DESCRIPTION	APP.	DATE
6						
5						
4						
3						
2						
1						

DRAWN BY	SM	JUL/14
CHECKED BY	DK	SEP/14
APPROVED BY	DCW	SEP/14

UNDERGROUND EQUIPMENT STRUCTURES
PADMOUNT EQUIPMENT GENERAL REQ
ISOLATION OF METAL FENCE
SHEET 5 OF 5

FORTIS BC

DRAWING No.	REV.
1206	0



STREET CROSSING DESIGN
MONOLITHIC CURB & SIDEWALK

NOTE:

1. BACKFILL UNDER THE ROADWAY SHALL CONSIST OF COMPACTED SAND FILL, OR AS REQUIRED BY THE MUNICIPAL AUTHORITY OR DEVELOPER
2. NOMINAL BURIAL DEPTH IS 1.2m
3. DESIGNER MAY SPECIFY CONCRETE INCASEMENT ON FEEDER CLASS CROSSINGS

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-06-30

REVISION DATE	JUN/22	
AUTHOR	DHG	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22
DESCRIPTION OF CHANGE: UPDATED BORDER		

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-06-30

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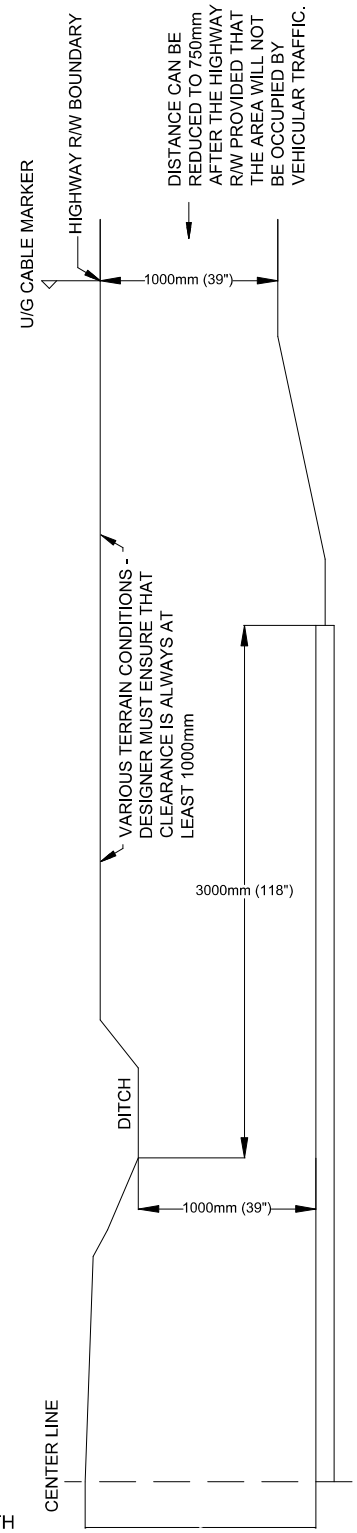
FORTIS BC

UNDERGROUND DISTRIBUTION
CONDUIT ROAD CROSSING
PLAN VIEW
SHEET 1 OF 3

DRAWING No.	REV.
1214	2



NOTES:

1. SEAL BOTH ENDS OF THE DUCT WITH SEALER PRIOR TO BACKFILLING.
2. DUCT/CABLING WILL BE PLACED ON A 152.4mm THICK LAYER OF SAND AND WILL BE COVERED WITH 152.4mm OF SAND. ABOVE THIS WILL BE NATIVE SOIL.
3. CROSSINGS WILL BE MADE AT 90 DEGREE ANGLES TO THE HIGHWAY.
4. ALL BORED DUCTS WILL BE 151.6mm DIAMETER.
5. RED BURIAL TAPE WILL BE PLACED HALF WAY BETWEEN THE DUCT/CABLE AND FINISHED GRADE.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-06-30

REVISION DATE	JUN/22	
AUTHOR	DHG	JUN/22
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APPROVED	DCW	JUN/22
DESCRIPTION OF CHANGE:		
UPDATED BORDER AND ROTATED NOTES		
INCREASED TEXT SIZE		

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-06-30

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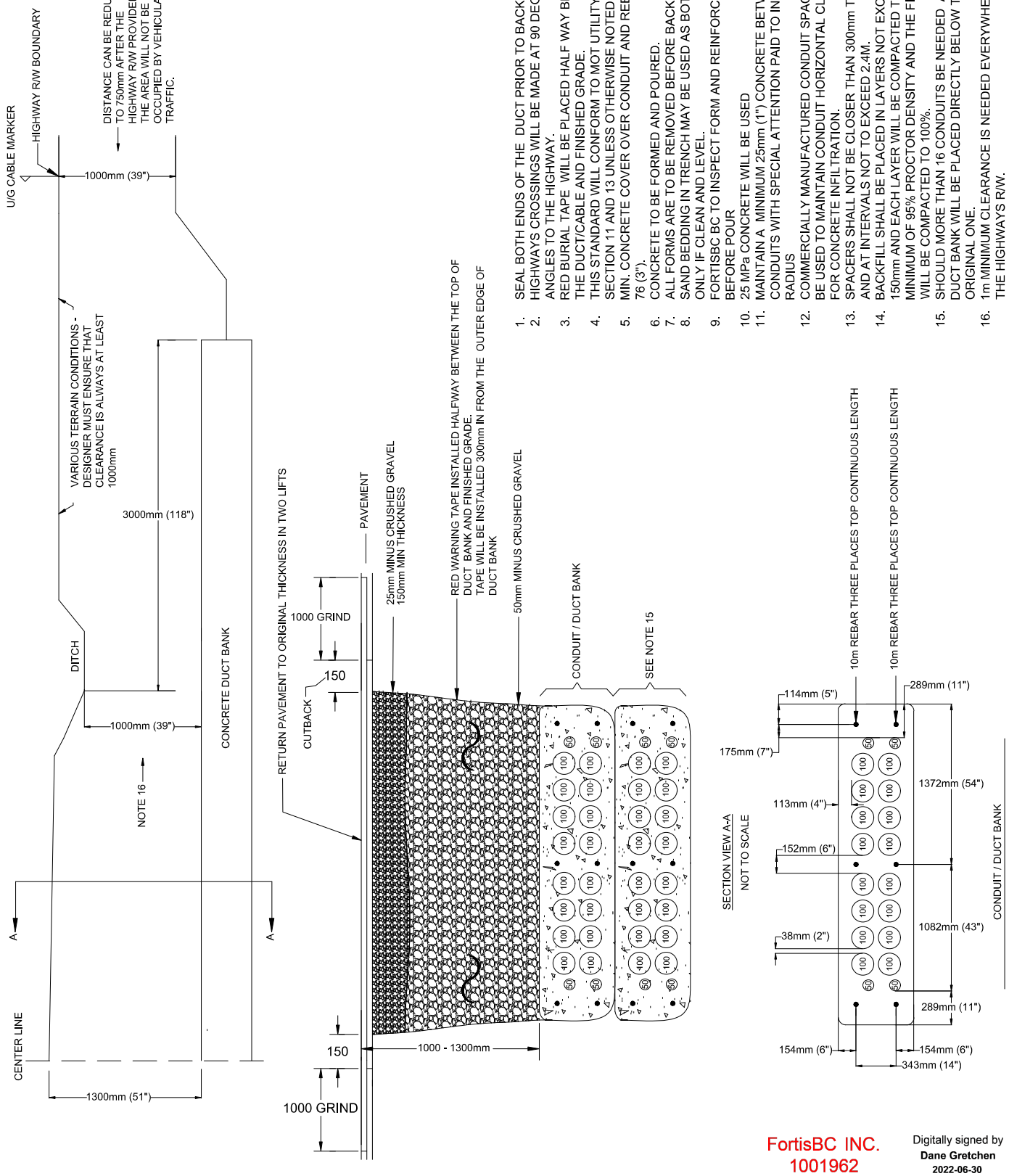
APPROVED	IF	NOV/08

FORTIS BC

UNDERGROUND DISTRIBUTION
EXISTING UG HIGHWAY CROSSING
PLAN VIEW
SHEET 2 OF 3

DRAWING No.	REV.
1214	1



1. SEAL BOTH ENDS OF THE DUCT PRIOR TO BACKFILLING.
2. HIGHWAYS CROSSINGS WILL BE MADE AT 90 DEGREE ANGLES TO THE HIGHWAY.
3. RED BURIAL TAPE WILL BE PLACED HALF WAY BETWEEN THE DUCT/CABLE AND FINISHED GRADE.
4. THIS STANDARD WILL CONFORM TO MOT UTILITY MANUAL SECTION 11 AND 13 UNLESS OTHERWISE NOTED
5. MIN. CONCRETE COVER OVER CONDUIT AND REBAR TO BE 76 (3").
6. CONCRETE TO BE FORMED AND POURED.
7. ALL FORMS ARE TO BE REMOVED BEFORE BACKFILL.
8. SAND BEDDING IN TRENCH MAY BE USED AS BOTTOM FORM ONLY IF CLEAN AND LEVEL.
9. FORTISBC BC TO INSPECT FORM AND REINFORCEMENT BEFORE POUR
10. 25 MPa CONCRETE WILL BE USED
11. MAINTAIN A MINIMUM 25mm (1") CONCRETE BETWEEN ALL CONDUITS WITH SPECIAL ATTENTION PAID TO INNER BEND RADIUS
12. COMMERCIALLY MANUFACTURED CONDUIT SPACERS SHALL BE USED TO MAINTAIN CONDUIT HORIZONTAL CLEARANCE FOR CONCRETE INFILTRATION.
13. SPACERS SHALL NOT BE CLOSER THAN 300mm TO JOINTS AND AT INTERVALS NOT TO EXCEED 2.4M.
14. BACKFILL SHALL BE PLACED IN LAYERS NOT EXCEEDING 150mm AND EACH LAYER WILL BE COMPACTED TO A MINIMUM OF 95% PROCTOR DENSITY AND THE FINAL 300mm WILL BE COMPACTED TO 100%.
15. SHOULD MORE THAN 16 CONDUITS BE NEEDED A DUPLICATE DUCT BANK WILL BE PLACED DIRECTLY BELOW THE ORIGINAL ONE.
16. 1m MINIMUM CLEARANCE IS NEEDED EVERYWHERE WITHIN THE HIGHWAYS R/W.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-06-30

REVISION DATE	JUN/22	
AUTHOR	DHG	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22

DESCRIPTION OF CHANGE:

UPDATED BORDER AND INCREASED TEXT SIZE

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504

2022-06-30

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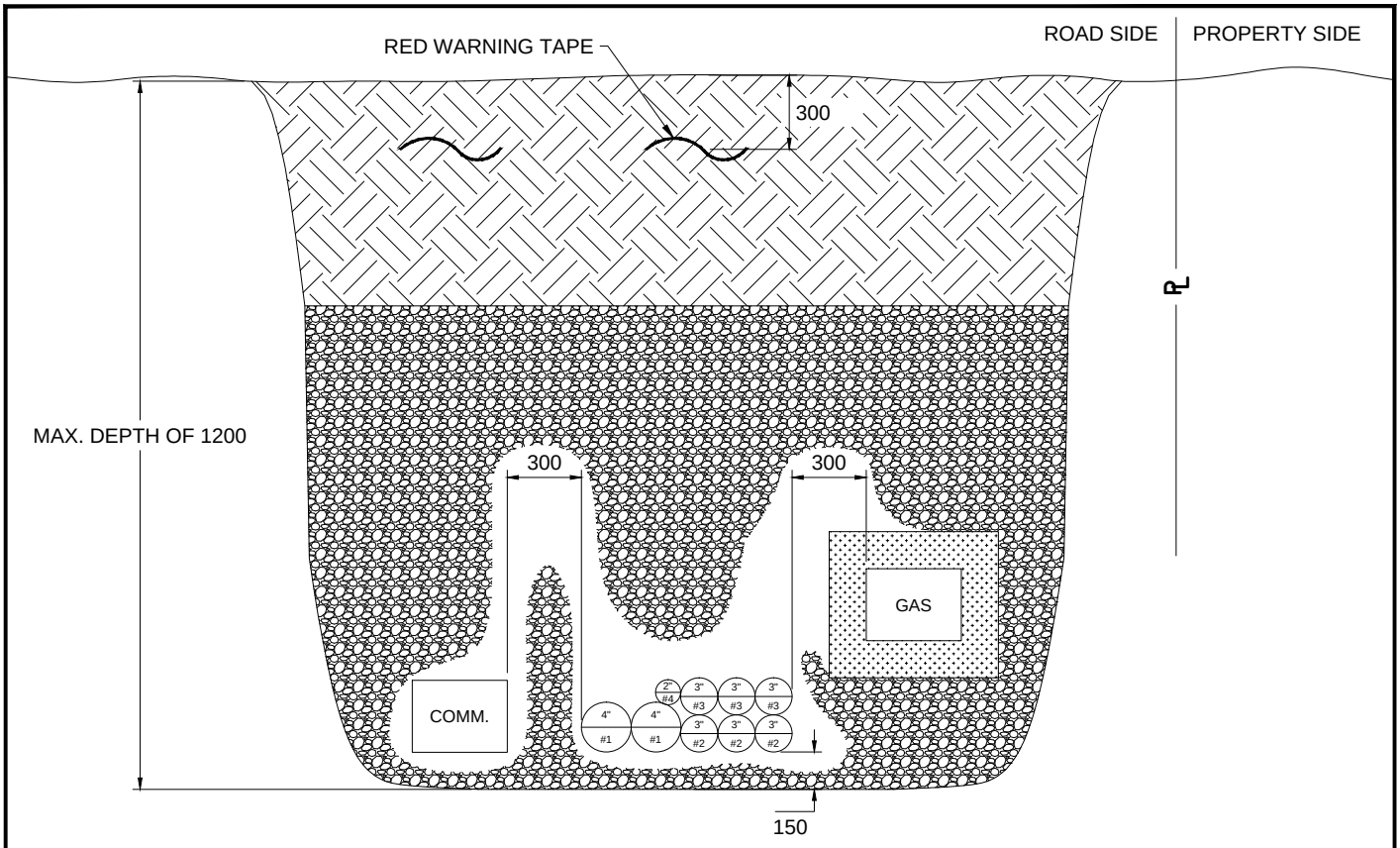
CHECKED	DMC	NOV/08
APPROVED	IF	NOV/08

FORTIS BC

UNDERGROUND DISTRIBUTION
NEW UG HIGHWAY CROSSINGS
PLAN VIEW
SHEET 3 OF 3

DRAWING No.	REV.
1214	1



NOTES:

1. ALL DIMENSIONS IN MILLIMETERS.
2. DRAWINGS DO NOT APPLY TO ROAD CROSSINGS. REFER TO STRUCTURE 1214.
3. TRENCH DEPTH IS DETERMINED FROM ROAD GRADE.
4. SIZE AND QUANTITY OF DUCTS MAY VARY FROM DRAWING AS REQUIRED IN DESIGN.
5. DRAWING SHOWS PREFERRED ORIENTATION OF PRIMARY, SECONDARY AND STREET LIGHT DUCT WITHIN TRENCH.
6. ELECTRICAL DUCT SHALL BE ON PROPERTY SIDE OF COMM. DUCT.
7. MINIMUM DEPTH OF ELECTICAL DUCT IS 900mm UNLESS SPECIFIED IN DESIGN. EXCEPTIONS ONLY PERMITTED AT DUCT CROSSINGS SUBJECT TO APPROVAL BY FORTISBC CIVIL INSPECTOR. (6)
8. $\frac{3}{4}$" ROAD MULCH SURROUNDING ELECTRICAL DUCT SHALL BE TYPE 1, 20mm SIEVE PER SECTION 31-05-17-2.7 OF THE MMCD.
9. MINIMUM HORIZONTAL DISTANCE OF 300mm MUST BE MAINTAINED BETWEEN ELECTRICAL DUCT OF OTHER UTILITIES.
10. MINIMUM VERTICAL SEPARATION AT CROSSINGS SHALL BE
    - 10.1. 150mm ELECTRICAL DUCT TO COMM. DUCT
    - 10.2. 300mm ELECTRICAL DUCT TO GAS LINE
    - 10.3. DISTANCES MAY BE REDUCED PROVIDED APPROVED BARRIERS ARE USED.
11. ELECTRICAL DUCTS SHALL HAVE 150mm $\frac{3}{4}$" ROAD MULCH BELOW DUCT BANK AND AT LEAST 150mm ABOVE DUCT BANK.
12. RED MARKER TAPE SHALL BE PLACED ABOVE ELECTRICAL DUCT.
13. TRENCH MUST BE SMOOTH AND LEVEL TO REDUCE STRESS ON DUCT.
14. THIS STRUCTURE REFERS TO FORTISBC ELECTRIC SPECIFIC REQUIREMENTS. REFER TO THE APPLICABLE STANDARDS FROM EACH UTILITY AS REQUIRED.
15. REFER TO THE "JOINT TRENCHING REQUIREMENTS FOR SHALLOW UTILITIES" WHERE APPLICABLE.
16. TRENCH ALIGNMENT SHALL BE DETERMINED BASED ON THE REQUIREMENTS LAID OUT BY THE AUTHORITIES HAVING JURISDICTION OF THE SITE. TYPICAL ALIGNMENT IS 1.8m OFF PL.

HATCH LEGEND

- CLEAN NATIVE SOIL
- 3/4" MINUS ROAD MULCH
- SAND

PIPE NUMBER LEGEND

- #1: 4" DUCT WITH 3 PHASE PRIMARY
- #2: 3" DUCT WITH 1 PHASE PRIMARY
- #3: 3" DUCT WITH 1 PHASE SECONDARY
- #4: 2" DUCT WITH STREET LIGHT CONDUCTOR

REVISION DATE	NOV/16	
AUTHOR	DC	NOV/16
CHECKED	AWB	NOV/16
APPROVED	DK	NOV/16

DESCRIPTION OF CHANGE:

CHANGE MINIMUM DEPTH DIMENSION

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120

2016-11-01

ORIGINAL ISSUE		
AUTHOR		
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APPROVED	RS	SEP/03

FORTIS BC

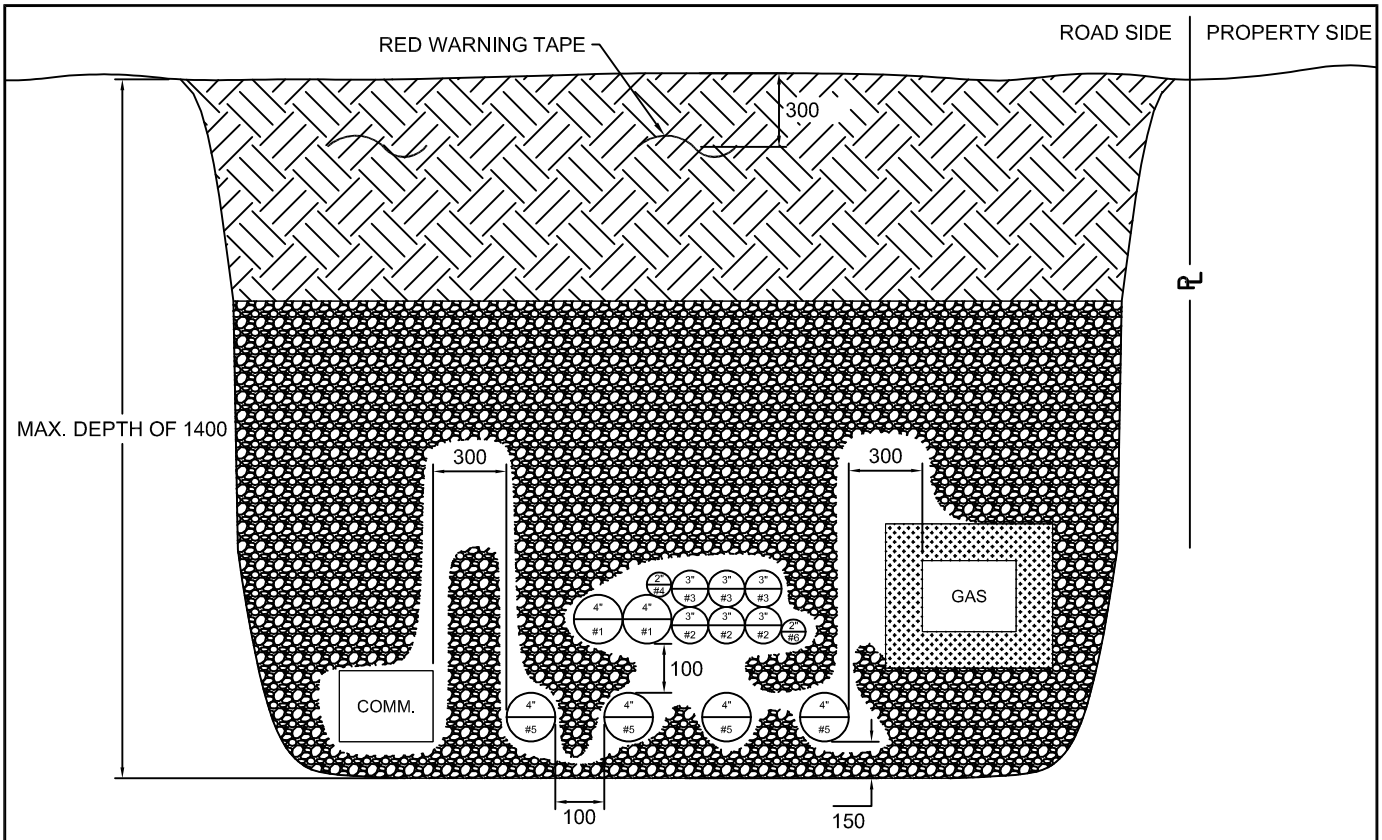
UNDERGROUND EQUIPMENT STRUCTURES

TRENCH DETAILS

ELECTRICAL DISTRIBUTION W/O FEEDER

SHEET 1 OF 3

DRAWING No.	REV.
1216	6



NOTES:

1. ALL DIMENSIONS IN MILLIMETERS.
2. DRAWINGS DO NOT APPLY TO ROAD CROSSINGS. REFER TO STRUCTURE 1214.
3. TRENCH DEPTH IS DETERMINED FROM ROAD GRADE.
4. SIZE AND QUANTITY OF DUCTS MAY VARY FROM DRAWING AS REQUIRED IN DESIGN.
5. DRAWING SHOWS PREFERRED ORIENTATION OF PRIMARY, SECONDARY AND STREET LIGHT DUCT WITHIN TRENCH.
6. ELECTRICAL DUCT SHALL BE ON PROPERTY SIDE OF COMM. DUCT.
7. MINIMUM DEPTH OF ELECTICAL DUCT IS 900mm UNLESS SPECIFIED IN DESIGN. EXCEPTIONS ONLY PERMITTED AT DUCT CROSSINGS SUBJECT TO APPROVAL BY FORTISBC CIVIL INSPECTOR.
8. $\frac{3}{4}$" ROAD MULCH SURROUNDING ELECTRICAL DUCT SHALL BE TYPE 1, 20mm SIEVE PER SECTION 31-05-17-2.7 OF THE MASTER MUNICIPAL CONSTRUCTION DOCUMENT.
9. MINIMUM HORIZONTAL DISTANCE OF 300mm MUST BE MAINTAINED BETWEEN ELECTRICAL DUCT OF OTHER UTILITIES.
10. MINIMUM VERTICAL SEPARATION AT CROSSINGS ARE NOTED IN SHEET 3.
11. ELECTRICAL DUCTS SHALL HAVE 150mm $\frac{3}{4}$" ROAD MULCH BELOW DUCT BANK AND AT LEAST 150mm ABOVE DUCT BANK.
12. RED MARKER TAPE SHALL BE PLACED ABOVE ELECTRICAL DUCT.
13. TRENCH MUST BE SMOOTH AND LEVEL TO REDUCE STRESS ON DUCT.
14. THIS STRUCTURE REFERS TO FORTISBC ELECTRIC SPECIFIC REQUIREMENTS. REFER TO THE APPLICABLE STANDARDS FROM EACH UTILITY AS REQUIRED.
15. REFER TO THE "JOINT TRENCHING REQUIREMENTS FOR SHALLOW UTILITIES" WHERE APPLICABLE.
16. TRENCH ALIGNMENT SHALL BE DETERMINED BASED ON THE REQUIREMENTS LAID OUT BY THE AUTHORITIES HAVING JURISDICTION OF THE SITE. TYPICAL ALIGNMENT IS 1.8m OFF PL.

FortisBC INC.
1001962

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Dane Gretchen
2021-09-23

HATCH LEGEND

CLEAN NATIVE SOIL

3/4" MINUS ROAD MULCH

SAND

PIPE NUMBER LEGEND

#1: 4" DUCT WITH 3 PHASE PRIMARY
#2: 3" DUCT WITH 1 PHASE PRIMARY
#3: 3" DUCT WITH 1 PHASE SECONDARY
#4: 2" DUCT WITH STREET LIGHT CONDUCTOR
#5: 4" DUCT WITH 1 PHASE FEEDER
#6: 2" DUCT WITH FEEDER NEUTRAL

REVISION DATE	JUN/21	
AUTHOR	GAHO	JUN/21
CHECKED	DDGP	JUN/21
APPROVED	DHG	JUN/21

DESCRIPTION OF CHANGE:
CHANGE MAXIMUM DEPTH DIMENSION
UTILITY CROSSING DETAILS MOVED TO SHEET 3

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504

2021-09-22

ORIGINAL ISSUE		
AUTHOR	DCW	AUG/15
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FORTIS BC

UNDERGROUND EQUIPMENT STRUCTURES
TRENCH DETAILS
ELECTRICAL DISTRIBUTION WITH FEEDER
SHEET 2 OF 3

DRAWING No.	REV.
1216	2

TYPICAL TRENCH WITH UTILITY CROSSINGS

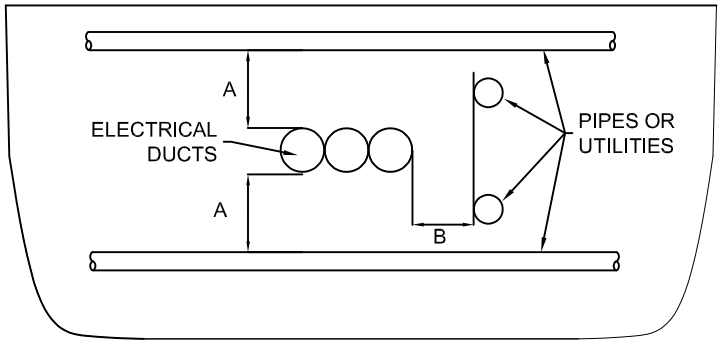

FIGURE 1 - SECTION VIEW

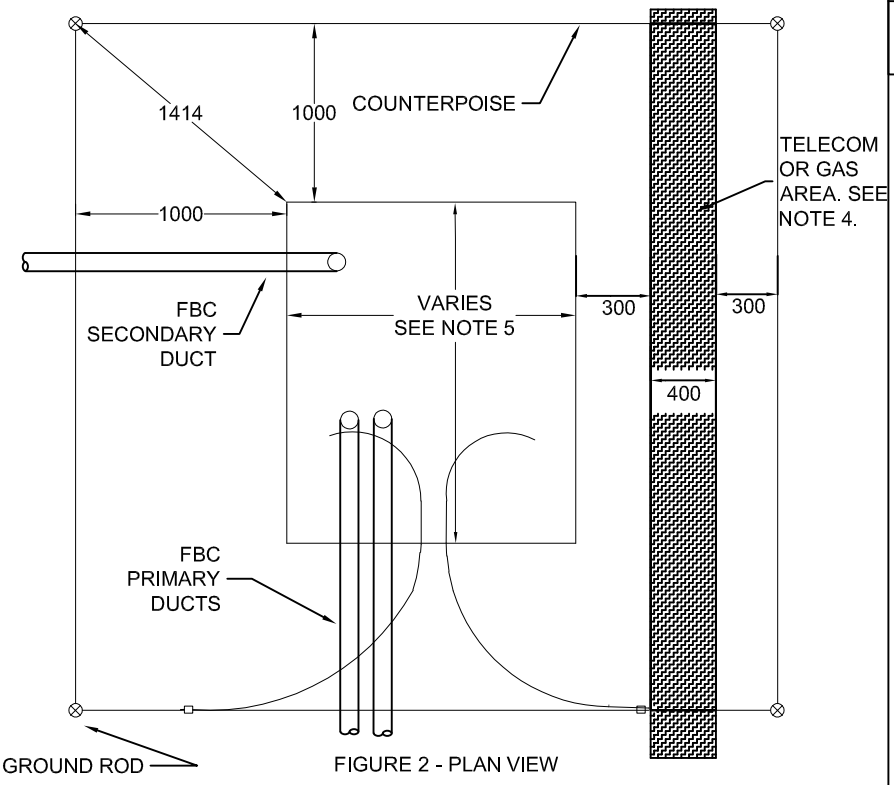

FIGURE 2 - PLAN VIEW

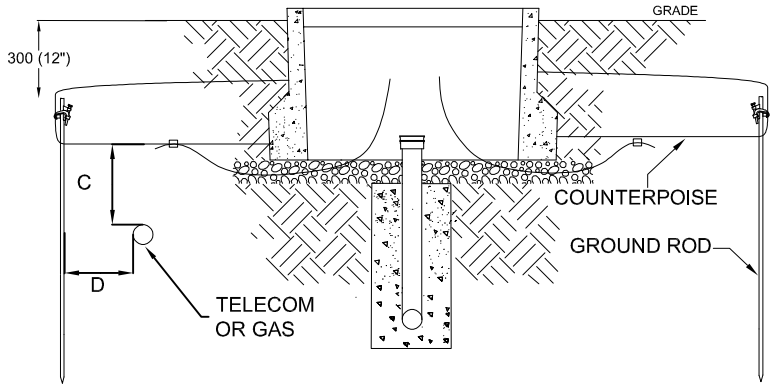

FIGURE 3 - SECTION VIEW

MINIMUM CLEARANCES BETWEEN ELECTRICAL DUCTS AND OTHER UTILITIES

TYPE OF PIPE	FORTISBC SUPPLY CABLES IN DUCTS (FIGURE 1)		FORTISBC GROUNDING RODS AND COUNTERPOISE (FIGURES 2, 3)	
MINIMUM CLEARANCE (mm)	A	B	C	D
TELEPHONE CABLE TV	150	300	300	300
GAS	300	300	300*	300*
WATER, SANITARY, SEWER	300	900	N/A**	N/A**

* GAS PIPE NOT TO EXCEED 50 mm DIAMETER. GAS LINE TO BE PROTECTED BY AN APPROPRIATELY COLOURED OR MARKED NON-METALLIC CASING PIPE FOR A DISTANCE OF 600 mm BEYOND THE COUNTERPOISE IN BOTH DIRECTIONS

** THESE UTILITIES SHALL NOT CROSS UNDERNEATH THE GROUND WIRE LOOP WITHOUT APPROVAL FROM FORTISBC

NOTES:

1. MINIMUM SET DEPTHS AS PER CSA 22.3 NO. 7 - UNDERGROUND SYSTEMS MUST BE MET BY EVERY UTILITY. MINIMUM SEPARATIONS ARE REQUIRED FROM OTHER UTILITIES TO PROVIDE CLEARANCE FOR REPAIRS
2. PIPE OR DUCT CROSSINGS MUST BE PERPENDICULAR
3. FORTISBC BOXES AND VAULTS MAY BE PLACED OFFSET FROM CENTER OF THE JOINT TRENCH TO AVOID CONFLICT WITH OTHER UTILITIES UPON APPROVAL FROM INSPECTOR
4. IF A UTILITY CROSSES OVER AN ELECTRIC DUCT WHILE CROSSING UNDERNEATH THE COUNTERPOISE, BOTH VERTICAL CLEARANCE REQUIREMENTS MUST BE MET
5. FORTISBC BOX VARIES IN SIZE AND SHAPE. COUNTERPOISE IS ALWAYS 1M OFFSET
6. SECONDARY SERVICE BOXES DO NOT HAVE COUNTERPOISE. CONTACT A FORTISBC DESIGNER TO DETERMINE WHAT TYPE OF EQUIPMENT IS PRESENT
7. GAS PIPE SHALL CROSS ABOVE ELECTRICAL AND COMMUNICATION DUCT. GAS PIPE WILL CROSS BELOW COUNTERPOISE OR SWEEP AROUND
8. 3m OF SEPARATION REQUIRED BETWEEN TELECOM WALK IN CLOSETS AND FORTISBC COUNTERPOISE
9. IF DUCTS NEED TO BE CLOSER THAN THOSE LISTED ABOVE ALL PARTIES INVOLVED SHALL AGREE ON A SOLUTION WHICH WILL PERMIT MAINTENANCE WITHOUT DAMAGE AND PREVENT FUTURE CONTACT WITH THE OTHER SYSTEM OR STRUCTURE

FortisBC INC.
1001962

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Dane Gretchen
2021-09-23

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DESCRIPTION OF CHANGE:		

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PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504

2021-09-22

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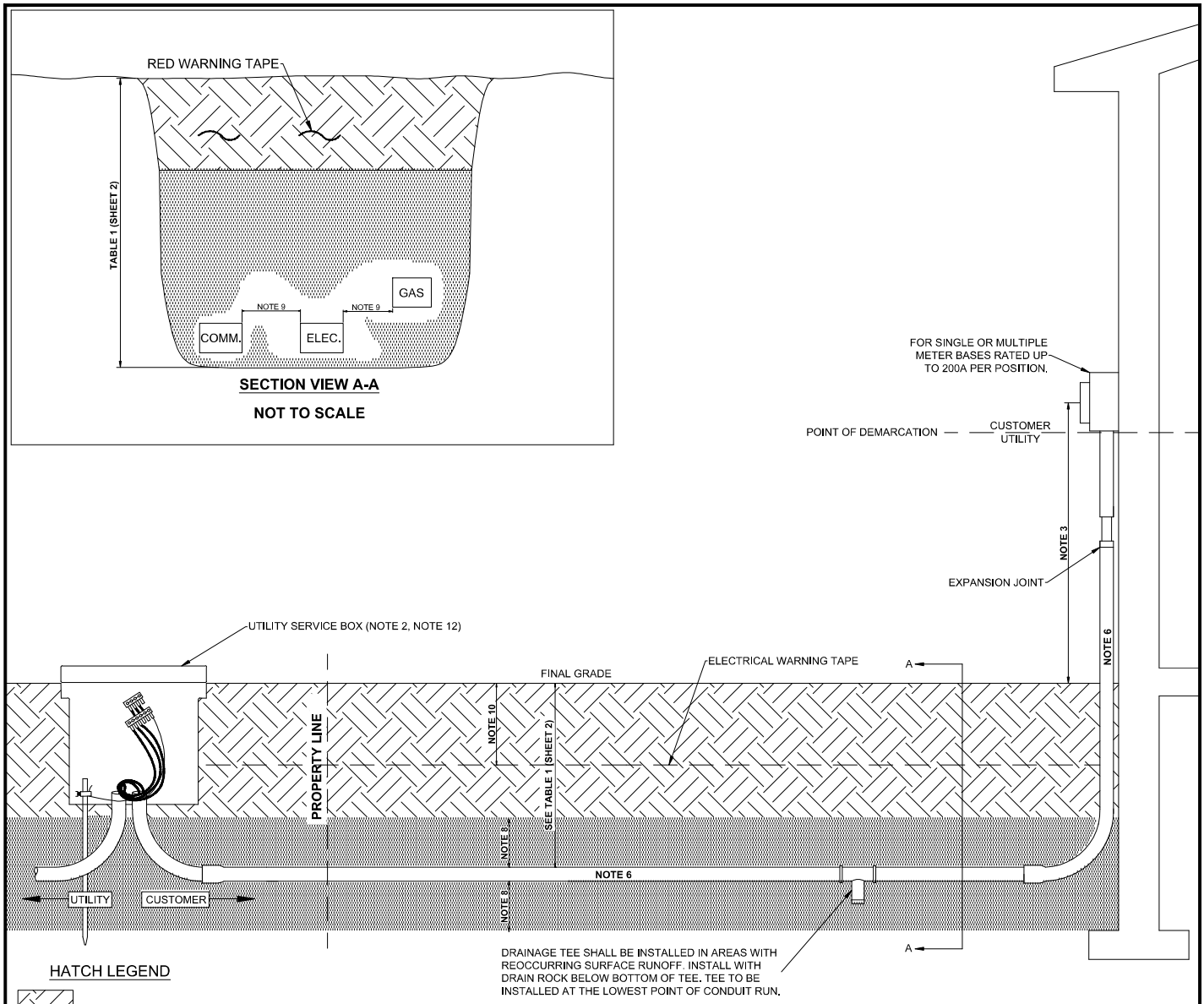
FORTIS BC

UNDERGROUND EQUIPMENT STRUCTURES
TRENCH DETAILS: CLEARANCE
DUCT CROSSINGS AND COUNTERPOISE
SHEET 3 OF 3

DRAWING No.	REV.
1216	0

SECTION VIEW A-A

NOT TO SCALE



HATCH LEGEND

CLEAN NATIVE SOIL

BEDDING SAND

NOTES:

1. THE POINT OF DEMARCATION IS TO BE THE UTILITY CONNECTIONS AT THE METER BASE.
2. FORTISBC MUST BE CONTACTED BEFORE CONDUIT IS RAN UP THE UTILITY POLE OR INTO THE UTILITY SERVICE BOX.
3. METER SOCKET TO BE INSTALLED AT A HEIGHT OF 1.4m (4' 7") TO 1.7m (5' 7") ABOVE FINISHED GRADE, MEASURED FROM THE SOCKET'S CENTER POINT.
4. DRAWING DOES NOT APPLY TO ROAD CROSSINGS.
5. MINIMUM CONDUIT SIZE OF 78mm (3") PVC.
6. DB2 IS ALLOWED FOR ALL BELOW GROUND PORTIONS OF CONDUIT OTHER THAN THE SWEEPS. CONDUIT SHALL BE RIGID PVC FROM END SWEEPS TO THE SERVICE BOX AND METER BASE. AN EXPANSION JOINT SHALL BE INSTALLED AT THE ABOVE GROUND PORTION OF CONDUIT, BELOW THE METER BASE.
7. ABOVE GROUND PORTION OF CONDUIT TO THE METER BASE MUST BE FLUSH AGAINST THE EXTERIOR WALL.
8. ENSURE THE CONDUIT IS SURROUNDED ABOVE AND BELOW BY A LAYER OF BEDDING SAND 75mm (3") DEEP, WITH A MAXIMUM PARTICLE SIZE OF 4.75mm.
9. MINIMUM HORIZONTAL DISTANCE OF 300mm (12") MUST BE MAINTAINED BETWEEN ELECTRICAL DUCTS AND OTHER SHALLOW UTILITIES (EX. COMMUNICATIONS, GAS) AND SHALL NOT BE PLACED DIRECTLY ABOVE DEEP UTILITIES (EX. WATER, SEWER).
10. RED MARKING TAPE SHALL BE BURIED HALFWAY BETWEEN FINAL GRADE AND THE TOP OF CONDUIT. THIS WARNING TAPE SHALL BE CONTINUOUS ALONG THE INSTALLATION
11. TRENCH MUST BE SMOOTH AND LEVEL TO REDUCE STRESS ON THE CONDUIT.
12. SEE FORTISBC STANDARD 1590 FOR SERVICE BOX INSTALLATION. MINIMUM CONDUIT OFFSET TO BE 13mm (0.5") WITH END BELLS INSTALLED.
13. SEE FORTISBC STANDARD 1342 FOR INSTALLATIONS WITH UTILITY POLES.
14. ALL CONDUIT INSTALLATION MUST COMPLY WITH THE NEWEST EDITION OF THE CANADIAN ELECTRICAL CODE, AND CSA C22.3 No. 7. IF A CONFLICT ARISES BETWEEN THIS STANDARD AND THE STANDARDS SPECIFIED ABOVE, THIS STANDARD WILL TAKE PRECEDENCE.

FortisBC INC.
1001962

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Dane Gretchen
2022-07-07

REVISION DATE		
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DESCRIPTION OF CHANGE:

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2022-07-07

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FORTIS BC

UNDERGROUND EQUIPMENT STR.
1PH SEC. SERVICES UP TO 200A
UG TRENCHING DETAIL
SHEET 1 OF 2

DRAWING No.	REV.
1218	0

TABLE 1: CONDUIT TRENCH DEPTH

	NON-VEHICULAR AREAS
MINIMUM DEPTH TO CENTER OF CONDUIT*	900mm
MAXIMUM DEPTH TO CENTER OF TRENCH	1200mm

*IF MINIMUM DEPTH CANNOT BE MET CONTACT FORTISBC.

TABLE 2: UG CONDUIT AND CONDUCTOR OWNERSHIP

MATERIAL	OWNERSHIP AND RESPONSIBILITIES	
	PUBLIC LAND	PRIVATE LAND
CONDUIT	FORTISBC (NOTE 3)	CUSTOMER (NOTE 4)
CONDUCTOR	FORTISBC (NOTE 3)	FORTISBC (NOTE 5)

NOTES:

1. MINIMUM DEPTH OF THE ELECTRICAL CONDUIT, AND TRENCH, IS DETERMINED FROM TABLE 1.
2. TABLE 1 TRENCH DEPTHS ARE MEASURED FROM ROAD GRADE.
3. FORTISBC IS RESPONSIBLE FOR INSTALLATION, REPAIR, AND REPLACEMENT OF BOTH THE CONDUIT AND CONDUCTOR, IN THE EVENT OF A FAILURE.
4. THE CUSTOMER IS RESPONSIBLE FOR INSTALLATION, REPAIR, AND REPLACEMENT OF THE CONDUIT, UP TO THE SERVICE BOX/POLE, IN THE EVENT OF A FAILURE.
5. FORTISBC IS RESPONSIBLE FOR INSTALLATION, REPAIR AND REPLACEMENT OF THE CONDUCTOR IN THE EVENT OF A FAILURE.

FortisBC INC.
1001962

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FORTIS BC

UNDERGROUND EQUIPMENT STR.
1PH SEC. SERVICES UP TO 200A
UG TRENCHING DETAILS (TABLES)
SHEET 2 OF 2

DRAWING No.	REV.
1218	0

FORTISBC UNDERGROUND AND RISER CABLES AMPACITIES (PER CABLE)

STUDY NUMBER	CABLE SIZE	VOLTAGE kV PHASE–TO–PHASE	FBC MATERIAL ITEM NUMBER	GROUNDING (NEUTRAL CONDUCTOR)	DUCT SIZE & TYPE	PHASES	CONDUCTOR PER PHASE	CONFIGURATION	NUMBER OF DUCTS	BURIED IN DUCT LOAD FACTOR vs TEMP (°C)									CABLE AT RISER LOAD FACTOR vs TEMP (°C)		
										LF = 1 90°C 20°C EARTH AMBIENT	LF = 1 110°C 20°C EARTH AMBIENT	LF = 1 130°C 20°C EARTH AMBIENT	LF = 0.8 90°C 20°C EARTH AMBIENT	LF = 0.8 110°C 20°C EARTH AMBIENT	LF = 0.8 130°C 20°C EARTH AMBIENT	LF = 0.6 90°C 20°C EARTH AMBIENT	LF = 0.6 110°C 20°C EARTH AMBIENT	LF = 0.6 130°C 20°C EARTH AMBIENT	LF = 1 90°C 40°C AIR AMBIENT	LF = 1 110°C 40°C AIR AMBIENT	LF = 1 130°C 40°C AIR AMBIENT
1	#2 Cu	15	534–3103	BOTH ENDS	3" PVC	1	1	1 CABLE 1 DUCT	1	177	197	214	182	203	221	187	208	226	128	155	179
2	#2 Cu	15	534–3103	BOTH ENDS	4" PVC	3	1	3 CABLE 1 DUCT	1	170	190	206	177	198	216	184	206	224	139	168	193
3	#1 Al	25	534–4103	BOTH ENDS	3" PVC	1	1	1 CABLE 1 DUCT	1	160	178	193	165	183	199	169	188	205	119	144	164
4	#1 Al	25	534–4103	BOTH ENDS	4" PVC	3	1	3 CABLE 1 DUCT	1	153	170	185	160	178	193	166	185	201	127	154	175
5	#1 Cu	25	534–4102	BOTH ENDS	3" PVC	1	1	1 CABLE 1 DUCT	1	202	225	245	208	232	252	214	238	259	150	182	208
6	#1 Cu	25	534–4102	BOTH ENDS	4" PVC	3	1	3 CABLE 1 DUCT	1	194	217	236	203	227	246	211	236	256	162	196	224
7	350 Al	15	534–3104	BOTH ENDS	3" PVC	3	1	1 CABLE 1 DUCT	3	350	394	431	374	421	461	398	448	491	312	381	439
8	350 Al	15	534–3104	BOTH ENDS	4" PVC	3	1	3 CABLE 1 DUCT	1	329	368	401	347	388	423	363	406	443	282	342	392
9	500 Al	25	534–4109	BOTH ENDS	4" PVC	3	1	1 CABLE 1 DUCT	3	403	455	500	433	488	537	462	522	574	388	473	544
10	500 Al	25	534–4109	ONE END	4" PVC	3	1	1 CABLE 1 DUCT	3	490	544	589	525	583	631	559	621	673	454	545	619
11	750 Al	15	534–3105	BOTH ENDS	4" PVC	3	1	1 CABLE 1 DUCT	3	449	509	562	484	549	607	520	590	653	441	542	630
12	750 Al	15	534–3105	ONE END	4" PVC	3	1	1 CABLE 1 DUCT	3	619	688	746	666	741	804	714	795	863	583	702	800
13	750 Al	25	534–4111	BOTH ENDS	4" PVC	3	1	1 CABLE 1 DUCT	3	455	516	569	491	557	615	527	598	661	450	550	638
15	750 Al	25	534–4111	ONE END	4" PVC	3	1	1 CABLE 1 DUCT	3	614	682	739	660	734	796	707	786	853	581	695	790
14	750 Al	25	534–4111	BOTH ENDS	4" PVC	3	2	1 CABLE 1 DUCT	6	390	441	485	433	490	540	480	544	601	450	550	638
16	750 Al	25	534–4111	ONE END	4" PVC	3	2	1 CABLE 1 DUCT	6	517	573	620	574	637	689	637	708	767	581	695	790
17	1000 Al	15	534–3107	BOTH ENDS	4" PVC	3	1	1 CABLE 1 DUCT	3	488	553	611	527	599	662	568	646	715	485	596	695
18	1000 Al	15	534–3107	ONE END	4" PVC	3	1	1 CABLE 1 DUCT	3	724	805	874	782	871	946	841	938	1019	693	833	950
19	1000 Al	25	534–4107	BOTH ENDS	4" PVC	3	1	1 CABLE 1 DUCT	3	496	526	620	537	609	673	578	657	726	500	611	707
21	1000 Al	25	534–4107	ONE END	4" PVC	3	1	1 CABLE 1 DUCT	3	718	798	865	774	861	935	831	926	1005	691	826	937
20	1000 Al	25	534–4107	BOTH ENDS	4" PVC	3	2	1 CABLE 1 DUCT	6	422	477	526	470	533	587	524	594	657	500	611	707
22	1000 Al	25	534–4107	ONE END	4" PVC	3	2	1 CABLE 1 DUCT	6	601	666	721	669	743	805	746	829	900	691	826	937
23	1000 Cu	25	534–4108	BOTH ENDS	4" PVC	3	1	1 CABLE 1 DUCT	3	569	643	708	615	695	767	661	749	826	557	680	788
25	1000 Cu	25	534–4108	ONE END	4" PVC	3	1	1 CABLE 1 DUCT	3	906	1010	1097	978	1091	1186	1051	1173	1276	874	1047	1191
24	1000 Cu	25	534–4108	BOTH ENDS	4" PVC	3	2	1 CABLE 1 DUCT	6	473	533	585	528	596	655	590	667	735	557	680	788
26	1000 Cu	25	534–4108	ONE END	4" PVC	3	2	1 CABLE 1 DUCT	6	757	842	914	844	940	1020	941	1049	1141	874	1047	1191

SEALED FOR REV 2 ONLY

NOTES ON SHEET 2

REV	DATE	BY	CHECKED	DESCRIPTION	APP.	DATE
6						
5						
4						
3						
2	MAY/21	GT	JN	UPDATED USING V7.0 OF CYMCAP SOFTWARE, ADDED STUDIES FOR 1000 MCM Al 25kV SINGLE RUN, AND DOUBLE RUN AMPACITIES. MOVED NOTES TO SHEET 2.	DG	JUN/21
1	MAY/11	ST	ST	REVISED ALL CABLE RISER VALUES. REPLACED CABLE 534–3106 WITH 534–4108. ADDED NOTE 8	SA	MAY/11

DRAWN BY	LDR	AUG/10	15kV & 25kV UNDERGROUND AND RISER CABLES AMPACITIES
CHECKED BY	ST	OCT/10	
APPROVED BY	SA	OCT/10	SHEET 1 OF 2

FORTIS BC

DRAWING No.	REV.
1301	2

NOTES:

1) THIS TABLE WAS CREATED WITH CYMCAP SOFTWARE WITH THE FOLLOWING ASSUMPTIONS:

1.1) PARAMETERS FOR UG INSTALLATION:
- ASSUMED EARTH AMBIENT TEMPERATURE = 20°C
- THERMAL RESISTIVITY OF BACKFILL = 0.7°C*m/W AS PER MEASURED VALUE OF PREFERRED BACKFILL FOUND IN POWERTECH DOCUMENT RL-FF-01292021-1 AND SPECIFIED IN DOCUMENT 801-07
- DUCT = 75 mm AND 100 mm PVC
- DEPTH TO CENTRE OF TOP DUCTS = 1m
- SPACING OF DUCTS, BOTH VERTICALLY AND HORIZONTALLY = 190 mm CENTRE-TO-CENTRE
- RESISTANCES: CALCULATED BY CYMCAP
- NEUTRAL BONDING: CALCULATED FOR ONE END BONDED AND FOR BOTH ENDS BONDED
- LOAD FACTORS OF 0.6, 0.8, & 1.0
- CABLE TEMPERATURES OF 90°C, 110°C, AND 130°C

1.2) PARAMETERS FOR RISER APPLICATION:
- ONLY A SINGLE RISER PER STRUCTURE (THE SOFTWARE ONLY SUPPORTS ONE RISER)
- NO WIND, FULL SUN, AND VENTED AT THE TOP OF DUCTS.
- INTENSITY OF SOLAR RADIATION: 925.013 W/m²
- AIR AMBIENT TEMPERATURE: 40°C
- DUCT MATERIAL: PVC
- SPACING BETWEEN DUCTS: 127mm CENTRE-TO-CENTRE
- LOAD FACTOR = 1.0
- RISER LENGTH: 9.14m

2) CURRENT RATINGS ARE PER CONDUCTOR AS STEADY STATE.

3) WHERE BONDING IS AT ONE END ONLY, A SEPARATE NEUTRAL CONDUCTOR IS USED FOR RETURN PATH.

4) THE LOAD FACTOR IS THE RATIO OF THE AVERAGE LOAD OVER A DESIGNATED PERIOD OF TIME TO THE PEAK LOAD OCCURRING IN THAT PERIOD. FOR VARIABLE CONTINUOUS LOADING, THE BASE PERIOD IS 24 HOURS.

5) OPERATION AT THE EMERGENCY OVERLOAD TEMPERATURE OF 130°C SHALL NOT EXCEED 100 HOURS IN ANY 12 CONSECUTIVE MONTHS NOR MORE THAN 500 HOURS DURING THE LIFETIME OF THE CABLE.

6) LOAD FACTOR FOR RISER APPLICATIONS IS CONSIDERED 1.0 FOR ALL SCENARIOS AS THE CABLES IN AIR RAPIDLY REACH STEADY STATE DUE TO LOW THERMAL TIME CONSTANT OF AIR.

7) THE TABLE REPRESENTS CABLE AMPACITY ONLY, NOT FEEDER AMPACITY. REFER TO FORTISBC DISTRIBUTION DESIGN CRITERIA FOR FEEDER AMPACITY CRITERIA.

8) CABLE AMPACITY VALUES WERE CALCULATED USING CYMCAP V7.0 R01

PROFESSIONAL ENGINEERING
P. L. WILSON
40147
BRITISH COLUMBIA
ENGINEER
2021-08-21

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REV	DATE	BY	CHECKED	DESCRIPTION	APP.	DATE
6						
5						
4						
3						
2	MAY/21	GT	JN	UPDATED USING V7.0 OF CYMCAP SOFTWARE, ADDED STUDIES FOR 1000 MCM AI 25kV SINGLE RUN, AND DOUBLE RUN AMPACITIES. MOVED NOTES TO SHEET 2.	DG	JUN/21
1	MAY/11	ST	ST	REVISED ALL CABLE RISER VALUES. REPLACED CABLE 534-3106 WITH 534-4108. ADDED NOTE 8	SA	MAY/11

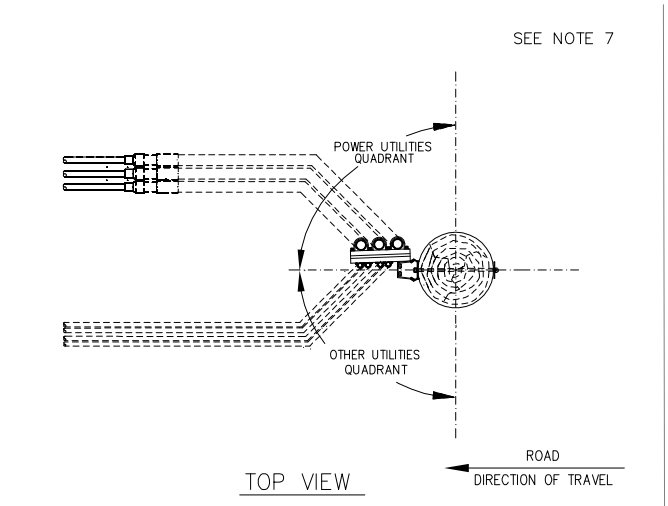
DRAWN BY	LDR	AUG/10
CHECKED BY	ST	OCT/10
APPROVED BY	SA	OCT/10

15kV & 25kV UNDERGROUND AND RISER CABLES AMPACITIES

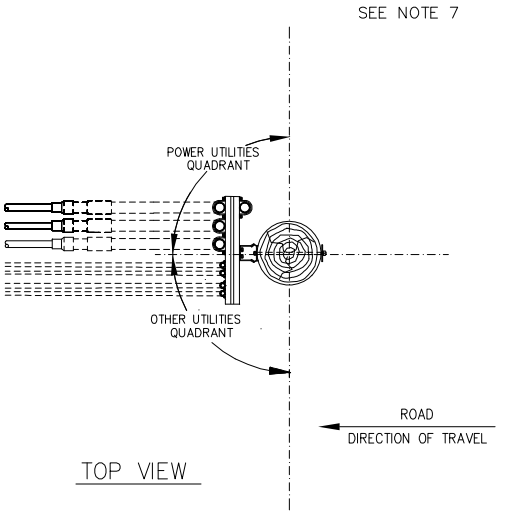
SHEET 2 OF 2

FORTIS BC

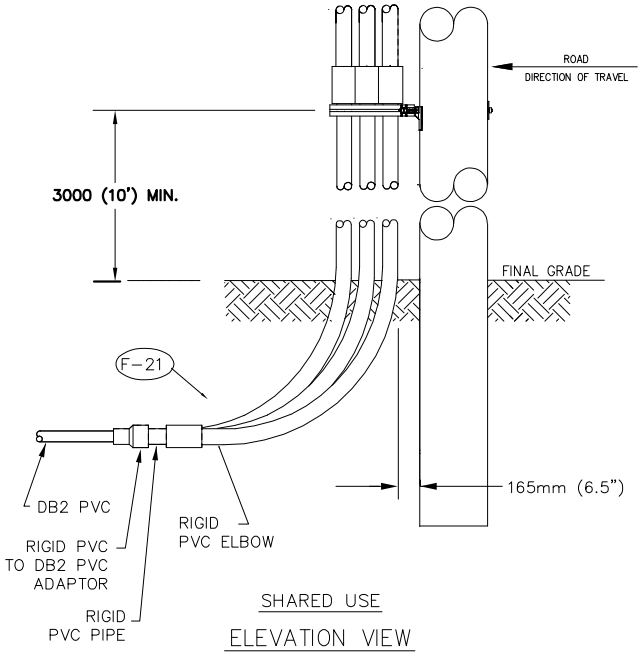
DRAWING No.	REV.
1301	2



TOP VIEW

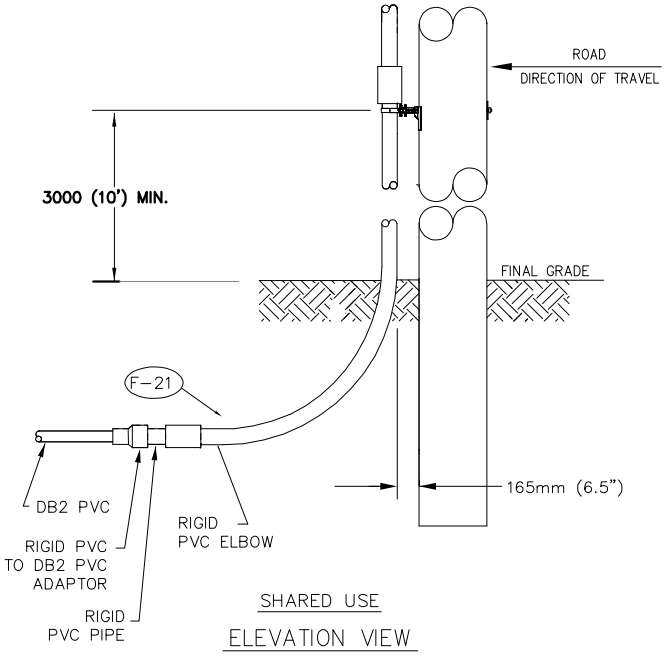


TOP VIEW



SHARED USE

ELEVATION VIEW



SHARED USE

ELEVATION VIEW

NOTES:

1 – VARIATION TO THIS ARRANGEMENT SHALL BE APPROVED BY FORTIS.

2 – DUCTS SHALL BE GROUPED AS CLOSELY AS POSSIBLE TO OTHER UTILITIES.

3 – BOLTS SHALL NOT BE TIGHTENED AS TO DEFORM THE DUCT.

4 – DUCTS SHALL NOT BE ENCASED IN PHONE COMPANIES CONCRETE PILASTER.

5 – POWER UTILITY DUCT SHALL NORMALLY BE LOCATED IN QUADRANT OPPOSITE NEAREST TRAFFIC FLOW.

6 – PVC CONDUIT TO BE CONCRETE CAPPED. ALL DUCT TO BE PVC.

7 – THE POWER UTILITIES QUADRANT MAY BE SWITCHED BY SPECIAL PERMISSION FROM FORTIS.

8 – CUT THE END OF THE BOLT FLUSH WITH THE POLE.

REV	DATE	BY	CHECKED	DESCRIPTION	APP.	DATE
6						
5						
4						
3						
2	JUN/12	NJI	BV	UPDATED BORDER/GENERAL REVISION	DCW	DEC/12
1	JUN/07	SS	BM	REVIEW STANDOFF HIGH, SEPER. POLE ADD NOTE 8	IF	JUN/07

DRAWN BY	NS	JUN/05
CHECKED BY	NS	JUN/05
APPROVED BY	RS	JUN/05

RISERS AND UNDERGROUND STRUCTURES
RISER FOR SINGLE OR MULTI DUCT
GENERAL ARRANGEMENT
SHEET 1 OF 1

FORTIS BC

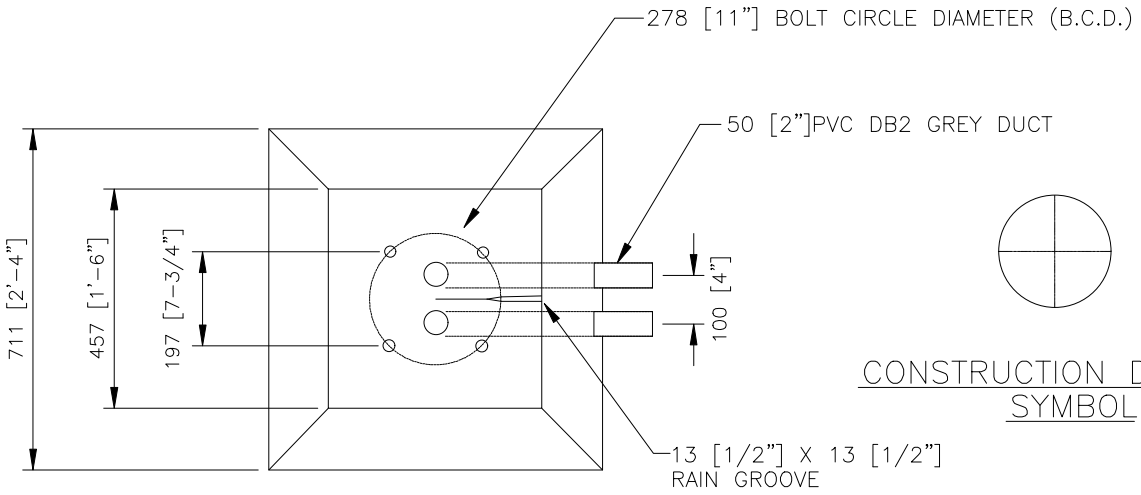
DRAWING No.	REV.
1342	2

BOM #	SAP Mat #	UI	-1	-2	-3	-4	Description
1	5132612		1	1	1	1	BOLT, MACHINE, GALV, 3/4" X 12",
2	5132614		1	1	1	1	BOLT, MACHINE, GALV, 3/4" X 14",
3	5132616		1	1	1	1	BOLT, MACHINE, GALV, 3/4" X 16",
4	5132618		1	1	1	1	BOLT, MACHINE, GALV, 3/4" X 18",
5	5138401		4	4	4	4	BOLT, LAG, GALVANIZED, 1/2" X 4",
6	5142206		4	4	4	4	WASHER, SQ, 3 X 3 X 1/4, 13/16 HOLE
7	5142603		4	4	4	4	WASHER, SPRING LOCK, DOUBLE 3/4
8	5890450		4	4	4	4	BRACKET, ALUMINUM, STANDOFF
9	5890456		4	4	4	4	BRACKET, T SLOT, 4 WAY, 24 INCHES LONG
10	6311109		8		12		STRAP, KIT, GALV, FOR 3",
11	6311110			8		12	STRAP, KIT, GALV, FOR 4",

REMARKS:

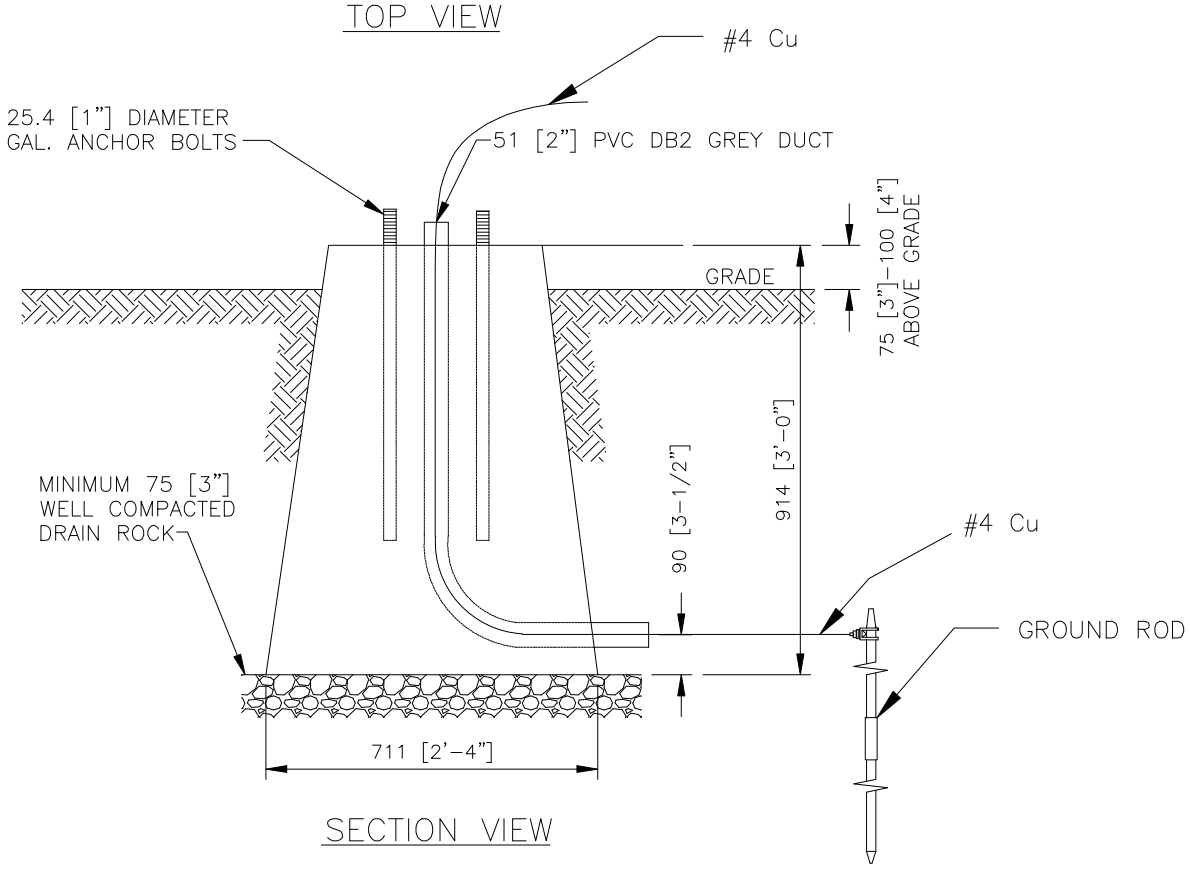
1. **1342-1 for single 3 inch duct entrance with provision for 1 extra conduit**
2. **1342-2 for single 4 inch duct entrance with provision for 1 extra conduit**
3. **1342-3 for multi duct entrance with provision for 3-3 inch duct**
4. **1342-4 for multi duct entrance with provision for 3-4 inch duct**
5. **Order additional length of T-Slots as required.**
   24" item 589-0456
   36" item 589-0457
   48" item 589-0458
6. **If necessary, order appropriate DB2 to Rigid PVC adaptor;**
   Item 632-3455 is for 2" applications
   Item 632-3459 is for 3" applications
   Item 632-3457 is for 4" applications

REVISION DATE	MAR/20		P.ENG. SEAL REV 2 ONLY	ORIGINAL ISSUE			RISERS AND UNDERGROUND STRUCTURES FOR SINGLE OR MULTI DUCT BILL OF MATERIAL BOM SHEET 1 OF 1
AUTHOR	GAHO	MAR/20		AUTHOR	FAB		
CHECKED				CHECKED	FAB		
APPROVED	DDGP			APPROVED	FAB		
DESCRIPTION OF CHANGE: UPDATED TABLE FORMAT CHANGED WORDING OF PVC ADAPTOR			PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA D. G. POWER #46842 2020-10-01	FORTIS BC			DRAWING No. 1342 / REV 2



CONSTRUCTION DRAWING SYMBOL

TOP VIEW



SECTION VIEW

NATIVE FILL

25mm [1"] CLEAN DRAIN ROCK

5mm [3/16"] SCREENED SAND COMPACTED

FILL REQUIRED BY TELCO OR CABLE

NOTES:

1) MAXIMUM POLE HEIGHT, 9mx2.4m [30'x8']

2) FOR POLE MOUNTING – RESIDENTIAL

3) SEE STANDARD 2592 FOR MINIMUM BURIAL DEPTH OF GROUND ROD

FortisBC INC.
1001962

Digitally signed by

REVISION DATE	JUL/22	
AUTHOR	WLH	JUL/22
CHECKED	GRMD	JUL/22
APPROVED	DCW	JUL/22

DESCRIPTION OF CHANGE:
ADDED GROUND ROD DETAIL TO DRAWING
ADDED NOTE 3

PROFESSIONAL ENGINEERS SEAL
PROVINCE OF BRITISH COLUMBIA
W. L. HILLARY
55484
ENGINEER

ORIGINAL ISSUE		
AUTHOR		SEP/03
CHECKED	N.S.	SEP/03
APPROVED	F.C.	SEP/03

FORTIS BC

STREETLIGHT STRUCTURES
THREE FOOT BASE
FOR STREET LIGHTING RESIDENTIAL
SHEET 1 OF 1

DRAWING No.	REV.
1416	4

BOM #	SAP Mat #	UI	-1	Description
1	5310220	M	2	WIRE, CU STR, #4, BARE, SOFT DRAWN
2	5571308		1	ROD, GROUND, COPPERBONDED, 3/4"
3	5571311		1	CONNECTOR, FOR 5/8" TO 3/4" GND. ROD
4	7550207		1	BASE,HIGH AND ROAD WAYS LIGHTING,TYPE C1

REMARKS:

1. **The base is used for mounting street lighting controller s1407**
2. **Meets MMCD requirements for highways, collector, and arterial roadways**
3. **Revision changes shown in bold red.**

FortisBC INC.
1001962

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REVISION DATE	JUN/22	
AUTHOR	WLH	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22

DESCRIPTION OF CHANGE:
ADDED GROUNDING MATERIAL (5310220, 5571308, AND 5571311) FROM STR 1407. UPDATED BORDER.

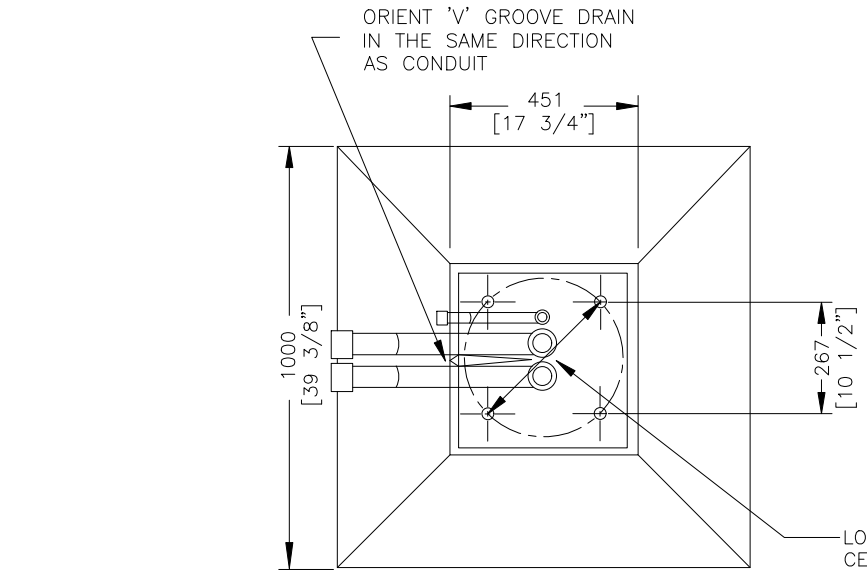
P.ENG. SEAL
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. L. HILLARY
55484
2022-06-17

ORIGINAL ISSUE		
AUTHOR		10/07
CHECKED		
APPROVED		

FORTIS BC

STREETLIGHT STRUCTURE
THREE FOOT BASE
FOR STREET LIGHTING RESIDENTIAL
BOM SHEET 1 OF 1

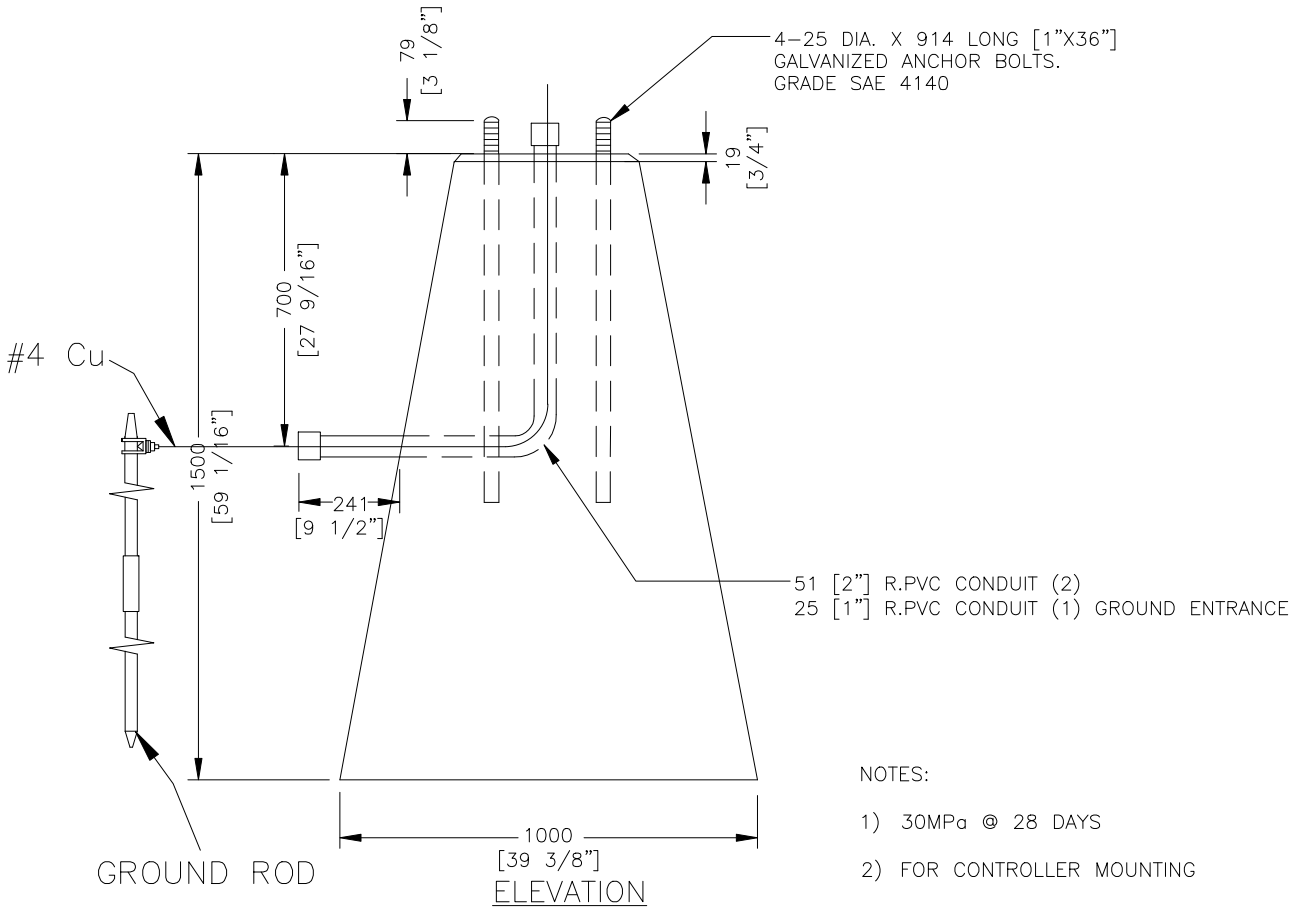
DRAWING No.	REV
1416	1



PLAN

BOLT CIRCLE DIAMETER=380 [14.96"]

CONSTRUCTION DRAWING SYMBOL



ELEVATION

NOTES:

1) 30MPa @ 28 DAYS

2) FOR CONTROLLER MOUNTING

3) SEE STANDARD 2592 FOR MINIMUM BURIAL DEPTH OF GROUND ROD

FortisBC INC.
1001962

Digitally signed by

REVISION DATE	JUL/22	
AUTHOR	WLH	JUL/22
CHECKED	GRMD	JUL/22
APPROVED	DCW	JUL/22
DESCRIPTION OF CHANGE:		
ADDED GROUND ROD TO DRAWING		
ADDED NOTE 3		

ENGINEER'S SEAL
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. L. HILLARY
55484
2022-07-11

ORIGINAL ISSUE		
AUTHOR	SW	APR/07
CHECKED	B.M.	05/07
APPROVED	L.F.	06/07

FORTIS BC

STREETLIGHT STRUCTURES
HIGHWAY, COLLECTOR, ARTERIAL
TYPE C-1 CONCRETE BASE
SHEET 1 OF 1

DRAWING No.	REV.
1417	2

BOM #	SAP Mat #	UI	-1	Description
1	5310220	M	2	WIRE, CU STR, #4, BARE, SOFT DRAWN
2	5571308		1	ROD, GROUND, COPPERBONDED, 3/4"
3	5571311		1	CONNECTOR, FOR 5/8" TO 3/4" GND. ROD
4	7550207		1	BASE,HIGH AND ROAD WAYS LIGHTING,TYPE C1

REMARKS:

1. **The base is used for mounting street lighting controller 1407**
2. **Meets MMCD requirements for highways, collector and arterial roadways**
3. **Revision changes shown in bold red.**

FortisBC INC.
1001962

Digitally signed by
2022-06-17

REVISION DATE		JUN/22
AUTHOR	WLH	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22

DESCRIPTION OF CHANGE:
ADDED GROUNDING MATERIAL (5310220, 5571308, AND 5571311) FROM STR 1407. UPDATED BORDER.

P.ENG. SEAL
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. L. HILLARY
55484
2022-06-17

ORIGINAL ISSUE		
AUTHOR		
CHECKED		
APPROVED		

FORTIS BC

STREET LIGHT STRUCTURES
HWY, COLLECTOR AND ARTERIAL
TYPE C-1, CONCRETE CONTROLLER BASE
BILL OF MATERIAL
BOM SHEET 1 OF 1

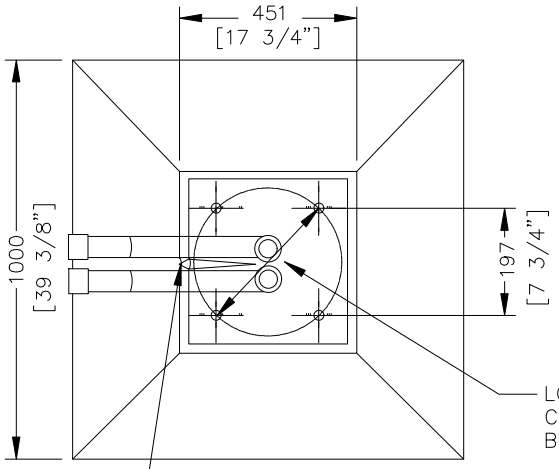
DRAWING No.	REV
1417	1

FortisBC INC.
1001962

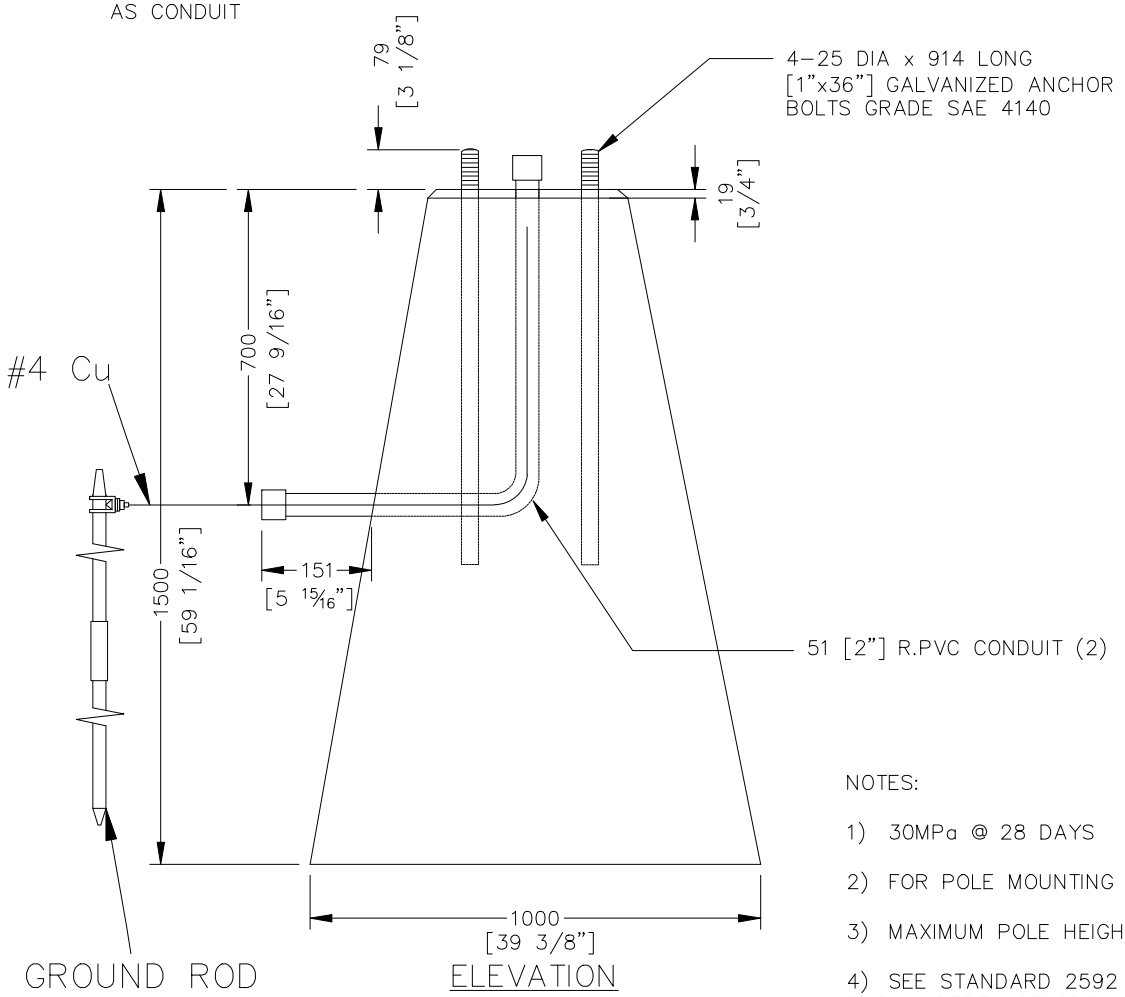
Digitally signed by
Dane Gretchen
2022-07-07

BOLT CIRCLE
DIAMETER = 280 [11"]

CONSTRUCTION DRAWING
SYMBOL



PLAN



ELEVATION

NOTES:

1) 30MPa @ 28 DAYS

2) FOR POLE MOUNTING – ARTERIAL

3) MAXIMUM POLE HEIGHT 11m [33']

4) SEE STANDARD 2592 FOR MINIMUM BURIAL DEPTH OF GROUND ROD

REVISION DATE	JUL/22	
AUTHOR	DHG	JUL/22
CHECKED	GRMD	JUL/22
APPROVED	DCW	JUL/22
DESCRIPTION OF CHANGE: ADDED GROUND ROD AND NOTE 4		

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D.H. GRETCHEN
52504
2022-07-07

ORIGINAL ISSUE		
AUTHOR	SW	APR/07
CHECKED	B.M.	05/07
APPROVED	I.F.	06/07

FORTIS BC

STREETLIGHT STRUCTURES
HIGHWAY, COLLECTOR, ARTERIAL
5 FT TYPE-C CONCRETE BASE
SHEET 1 OF 1

DRAWING No.	REV.
1418	2

BOM #	SAP Mat #	UI	-1	Description
1	5310220	M	2	WIRE, CU STR, #4, BARE, SOFT DRAWN
2	5571308		1	ROD, GROUND, COPPERBONDED, 3/4"
3	5571311		1	CONNECTOR, FOR 5/8" TO 3/4" GND. ROD
4	7550210		1	BASE,HIGH&ROAD WAYS POLEMOUNTING,TYPEC

REMARKS:

1. **The maximum pole height mounted on this base is 11 meters (33 feet).**
2. **Meets MMCD requirements for highway, collector, and arterial roadways.**
3. **Revision changes shown in bold red.**

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-07-07

REVISION DATE		JUL/22
AUTHOR	DHG	JUL/22
CHECKED	GRMD	JUL/22
APPROVED	DCW	JUL/22

DESCRIPTION OF CHANGE:
ADDED GROUNDING MATERIAL (5310220, 5571308, AND 5571311) FROM STR 1407. UPDATED BORDER.

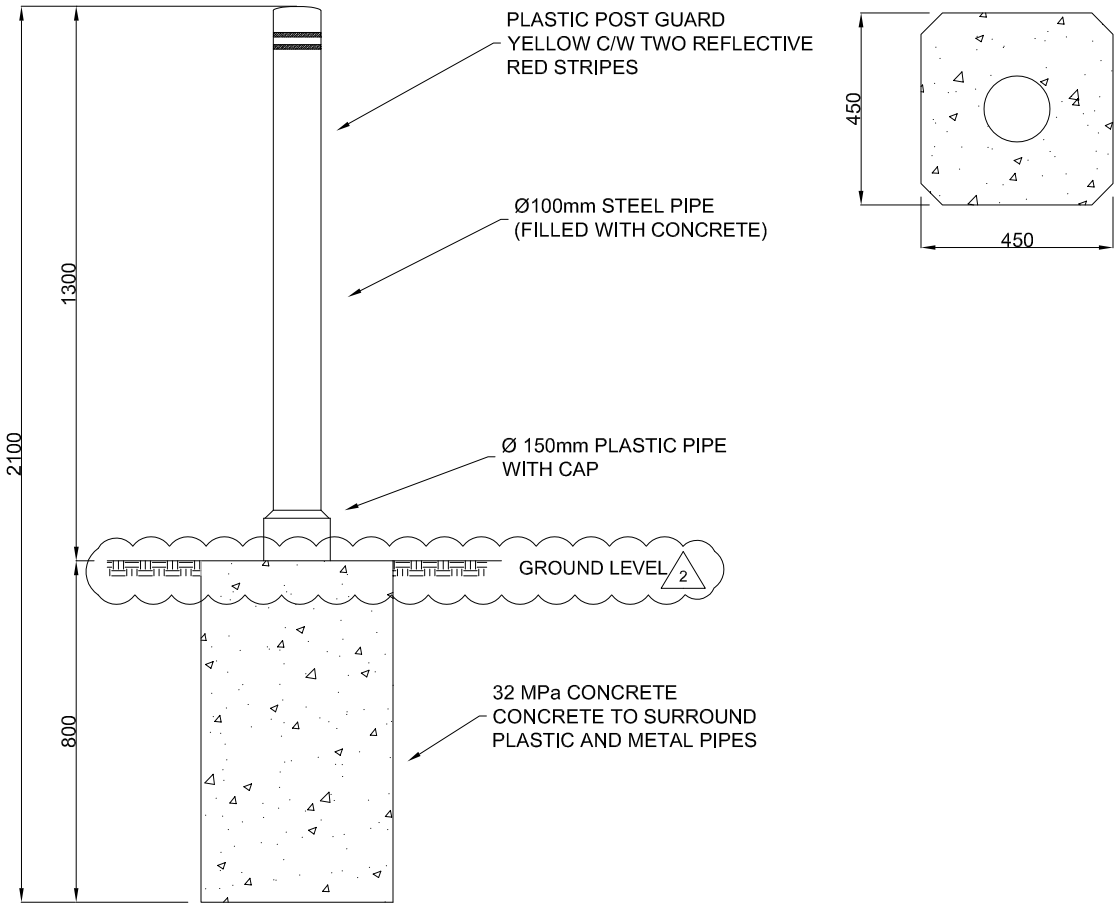
P.ENG. SEAL

ORIGINAL ISSUE		
AUTHOR		10/07
CHECKED		
APPROVED		

FORTIS BC

STREETLIGHT STRUCTURES
HIGHWAY, COLLECTOR, ARTERIAL
5 FT TYPE-C CONCRETE BASE
BOM SHEET 1 OF 1

DRAWING No.	REV
1418	1



NOTES:

1. THE PLASTIC PIPE OR CONDUIT AND CAP MUST BE INSTALLED TO INSULATE THE PIPE AND THUS PREVENT TRANSFER OF DANGEROUS TOUCH POTENTIAL IN THE EVENT OF THE FAULT.
2. PLASTIC CAP SHALL BE GLUED TO PLASTIC PIPE OR CONDUIT WITH CEMENT TO FORM A WATERPROOF JOINT
3. BOLLARDS SHALL BE PLACED SO AS NOT TO OBSTRUCT ANY DOORS NOR RESTRICT THE OPERATION OF THE UNIT.
4. ALL DIMENSIONS ARE IN MILLIMETERS.
5. PRECASE CONCRETE BASE TO BE 6X6–6/6 RE–ENFORCEMENT MESH.
6. APPROXIMATE WEIGHT: 440 kg

REVISION DATE	OCT/19	
AUTHOR	CM	OCT/19
CHECKED	GAHO	MAR/20
APPROVED	DDGP	MAR/20
DESCRIPTION OF CHANGE: ADDED IN GROUND LINE		

P.ENG SEAL
REV 2 ONLY

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. G. POWER
#46842

2020-10-15

ORIGINAL ISSUE		
AUTHOR	SW	SEPT/08
CHECKED	NG	SEPT/08
APPROVED	BM	SEPT/08

FORTIS BC

UNDERGROUND STRUCTURES
VEHICLE PROTECTION
DETAILED DIMENSIONS OF BOLLARD
SHEET 1 OF 1

DRAWING No.	REV.
1589	2

BOM #	SAP Mat #	UI	-1	Description
1	7550100		1	BOLLARD, 1.3M ABOVE GRD, 100MM DIA.

REMARKS:

1. **1589-1 is a precast bollard with yellow plastic high visibility cover.**
2. **FortisBC material number 7550100 is available at Kon Kast under part number 1080.**
3. **Revision changes shown in bold red.**

REVISION DATE		
AUTHOR		
CHECKED		
APPROVED		
DESCRIPTION OF CHANGE:		

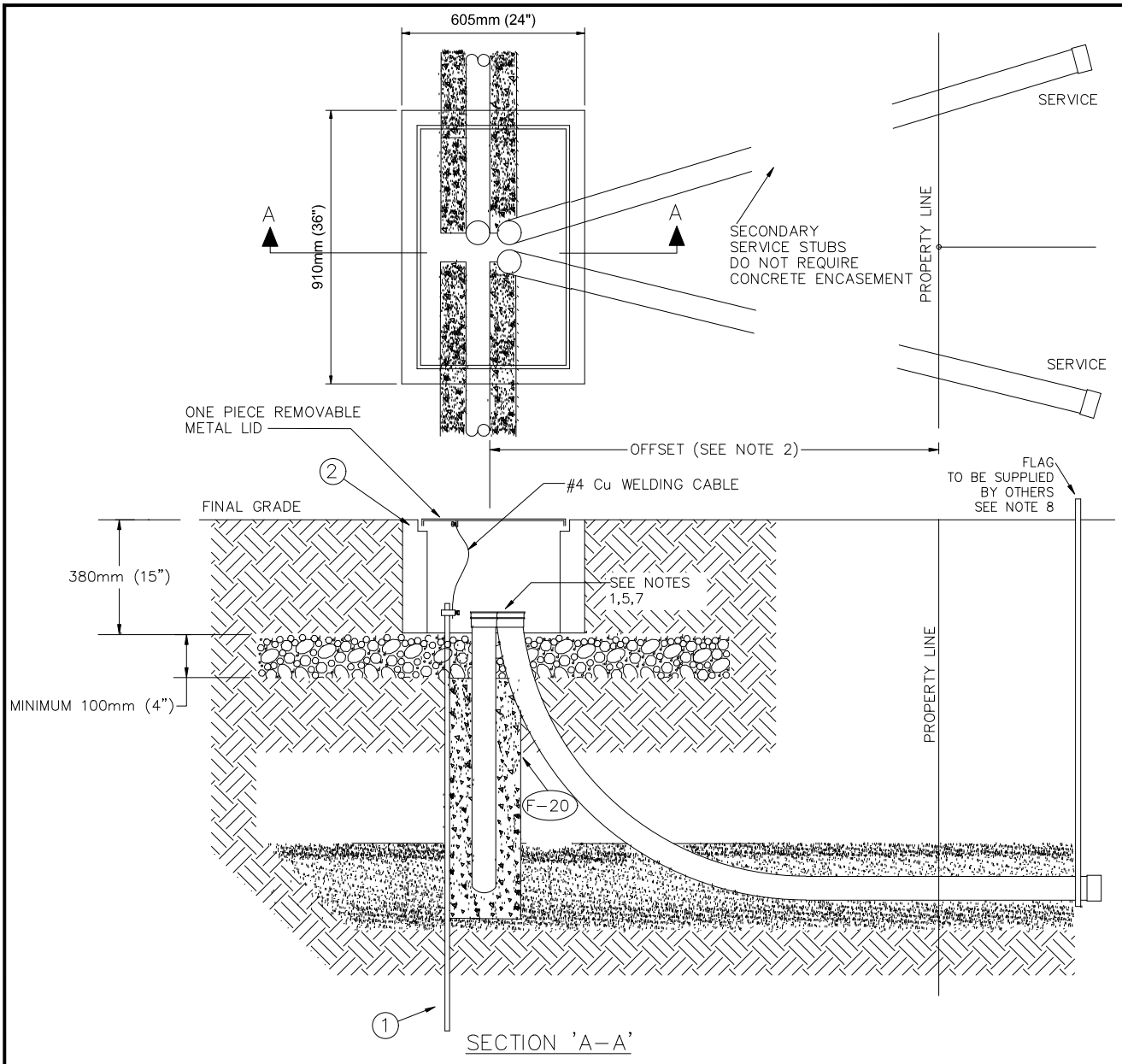
P.ENG. SEAL

ORIGINAL ISSUE		
AUTHOR		
CHECKED		
APPROVED		

FORTIS BC

UNDERGROUND STRUCTURES
VEHICLE PROTECTION
BILL OF MATERIAL
BOM SHEET 1 OF 1

DRAWING No.	REV
1589	0



NATIVE FILL

25mm (1") CLEAN DRAIN ROCK

ROAD MULCH

NOTE:

1 – CENTER CONDUITS IN BOX. BOX MAY BE PLACED OFFSET FROM CENTER TO AVOID CONFLICT WITH OTHER UTILITIES UPON APPROVAL FROM INSPECTOR.

2 – STANDARD CONDUIT OFFSET PER DESIGN DRAWING OR LOCAL AUTHORITY

3 – FOR LEVEL GRADES, BOX TO BE SET SO THAT LID IS 50mm (2")–80mm (3") ABOVE FINAL GRADE OR FLUSH IN SIDEWALK

4 – EXTEND CONDUIT 50mm (2") ABOVE TOP OF FILL INSIDE BOX

5 – PVC CONDUIT SHALL BE CONCRETE ENCASED AS PER ASSEMBLY F–20

6 – USE BOLTS TO SECURE LID

7 – CONDUIT SHALL BE INSTALLED WITH END BELL, CAPPED AND MARKED (IDENTIFIED BY LOT NO.)

8 – CABLE MARKER 22.2mm x 2.62m (7/8"x8') PVC OR 50.8mm x 1.22m (2"x 4') WOOD STAKE PAINTED RED

9 – ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-07-07

REVISION DATE	JUL/22	
AUTHOR	DHG	JUL/22
CHECKED	GRMD	JUL/22
APPROVED	DCW	JUL/22

DESCRIPTION OF CHANGE:
ADDED #4 WELDING CABLE. CORRECTED WOODEN STAKE DIMENSION IN NOTE 8.

P.ENG SEAL

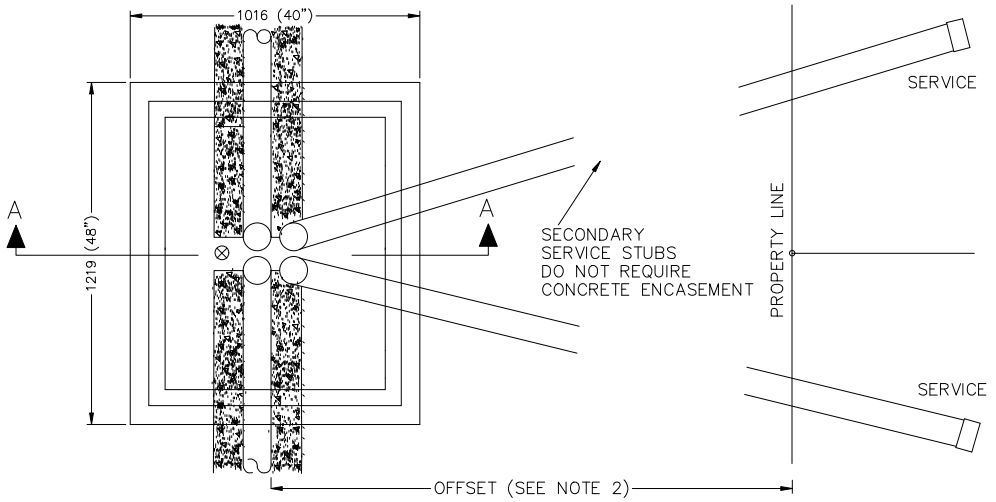
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-07-07

ORIGINAL ISSUE		
AUTHOR		
CHECKED	NS	MAY/02
APPROVED	FC	MAY/02

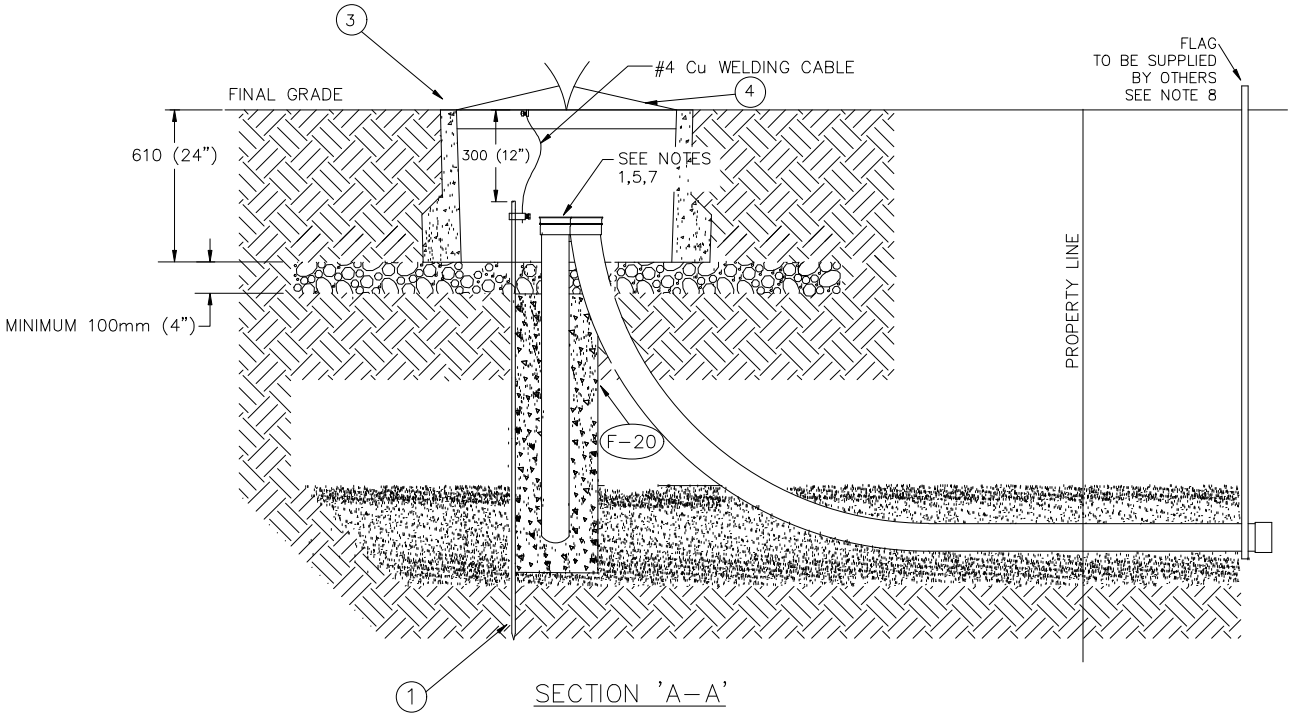
FORTIS BC

UNDERGROUND STRUCTURES
CONCRETE SERVICE BOX
SMALL SERVICE BOX
SHEET 1 OF 4

DRAWING No.	REV.
1590	9



PLAN VIEW



SECTION 'A–A'

NOTE:

1 – CENTER CONDUITS IN BOX. BOX MAY BE PLACED OFFSET FROM CENTER TO AVOID CONFLICT WITH OTHER UTILITIES UPON APPROVAL FROM INSPECTOR.

2 – STANDARD CONDUIT OFFSET PER DESIGN DRAWING OR LOCAL AUTHORITY

3 – FOR LEVEL GRADES, BOX TO BE SET SO THAT LID IS 50mm (2")–80mm (3") ABOVE FINAL GRADE OR FLUSH IN SIDEWALK

4 – EXTEND CONDUIT 50mm (2") ABOVE TOP OF FILL INSIDE BOX

5 – PVC CONDUIT SHALL BE CONCRETE ENCASED AS PER ASSEMBLY F–20

6 – USE BOLTS TO SECURE LID

7 – CONDUIT SHALL BE INSTALLED WITH END BELL, CAPPED AND MARKED (IDENTIFIED BY LOT NO.)

8 – CABLE MARKER 22.2mm x 2.62m (7/8"x8') PVC OR 50.8mm x 1.22m (2"x 4') WOOD STAKE PAINTED RED

9 – ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.

NATIVE FILL

25mm (1") CLEAN DRAIN ROCK

ROAD MULCH

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-07-07

REVISION DATE	JUL/22	
AUTHOR	DHG	JUL/22
CHECKED	GRMD	JUL/22
APPROVED	DCW	JUL/22

DESCRIPTION OF CHANGE:

ADDED #4 WELDING CABLE AND LID BOND.

CORRECTED WOOD STAKE MEASUREMENT (NOTE 8)

P.ENG SEAL

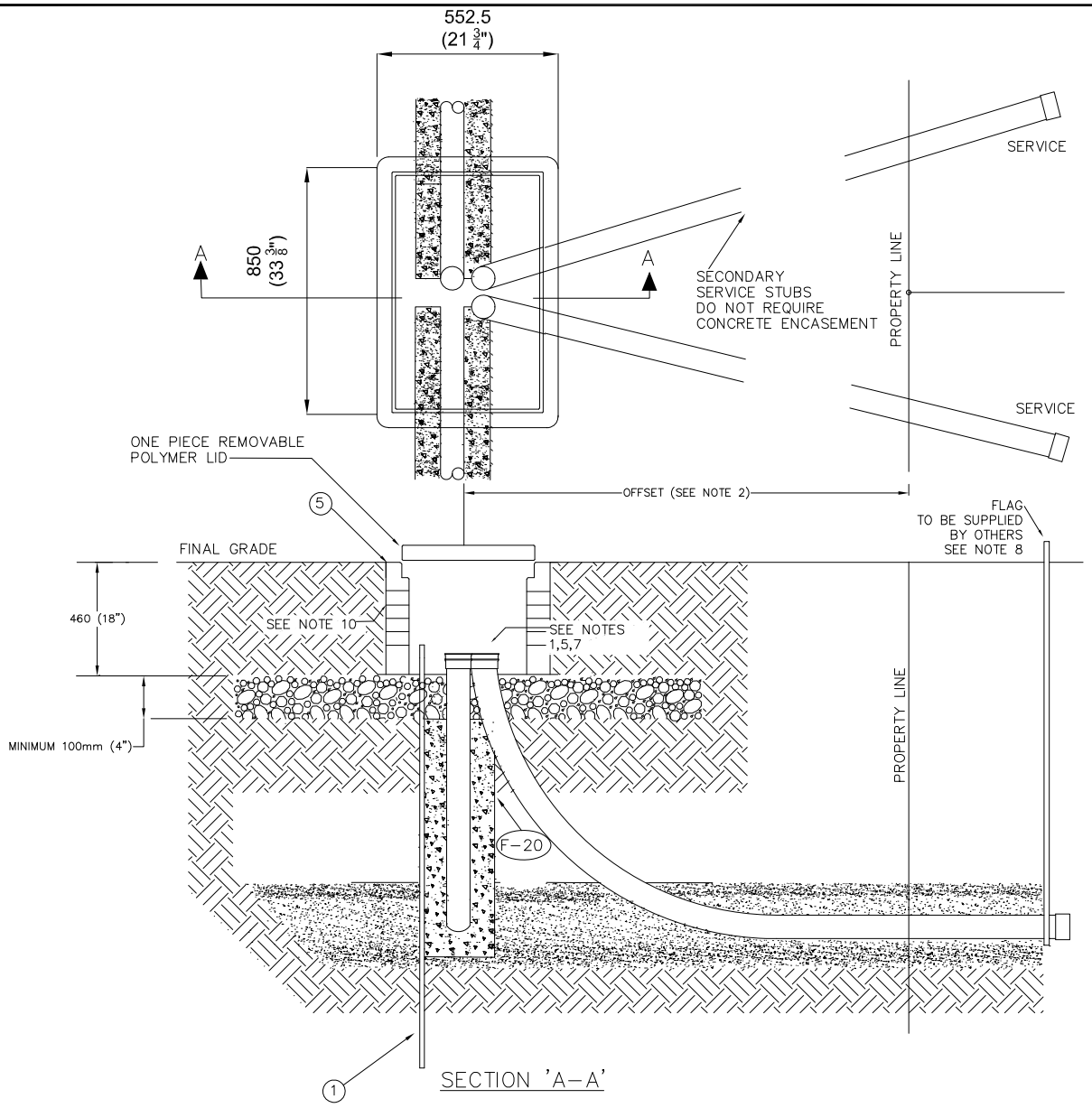
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-07-07

ORIGINAL ISSUE		
AUTHOR	JAS	NOV/15
CHECKED	JMS	NOV/15
APPROVED	DK	FEB/16

FORTIS BC

UNDERGROUND STRUCTURES
CONCRETE SERVICE BOX
LARGE SERVICE BOX
SHEET 2 OF 4

DRAWING No.	REV.
1590	3



NOTE:

1 – CENTER CONDUITS IN BOX. BOX MAY BE PLACED OFFSET FROM CENTER TO AVOID CONFLICT WITH OTHER UTILITIES UPON APPROVAL FROM INSPECTOR.

2 – STANDARD CONDUIT OFFSET PER DESIGN DRAWING OR LOCAL AUTHORITY

3 – FOR LEVEL GRADES, BOX TO BE SET SO THAT LID IS 50mm (2")–80mm (3") ABOVE FINAL GRADE OR FLUSH IN SIDEWALK

4 – EXTEND CONDUIT 50mm (2") ABOVE TOP OF FILL INSIDE BOX

5 – PVC CONDUIT SHALL BE CONCRETE ENCASED AS PER ASSEMBLY F–20

6 – USE PENTA HEAD BOLTS TO SECURE LID

7 – CONDUIT SHALL BE INSTALLED WITH END BELL, CAPPED AND MARKED (IDENTIFIED BY LOT NO.)

8 – CABLE MARKER 22.2mm x 2.62m (7/8"x8') PVC OR 50.8mm x 1.22m (2"x 4') WOOD STAKE PAINTED RED

9 – ENGINEERING AND DESIGN OF THE PRECAST POLYMER BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH POLYMER BASE/VAULT DESIGN.

10 – POLYMER BOX CAN BE CUT WITH A SAW FOR FIELD MODIFICATION.

NATIVE FILL

25mm (1") CLEAN DRAIN ROCK

ROAD MULCH

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-07-07

REVISION DATE	JUL/22	
AUTHOR	DHG	JUL/22
CHECKED	GRMD	JUL/22
APPROVED	DCW	JUL/22

DESCRIPTION OF CHANGE:
CORRECTED WOODEN STAKE MEASUREMENT IN NOTE 8

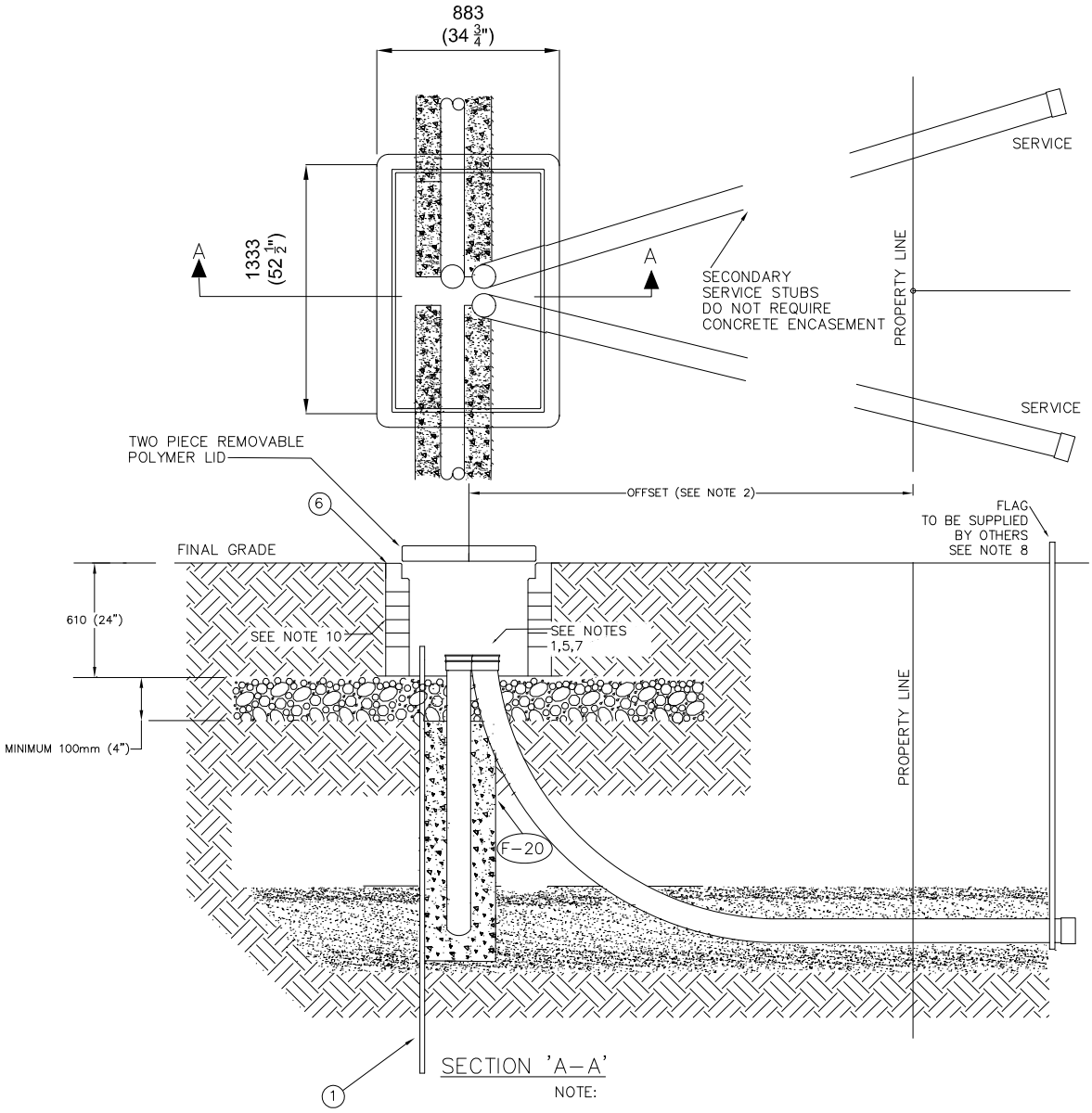
P.ENG SEAL
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-07-07

ORIGINAL ISSUE		
AUTHOR	CM	JUL/19
CHECKED	GAHO	FEB/20
APPROVED	DDGP	MAR/20

FORTIS BC

UNDERGROUND STRUCTURES
POLYMER SERVICE BOX
SMALL SERVICE BOX
SHEET 3 OF 4

DRAWING No.	REV.
1590	2



NATIVE FILL

25mm (1") CLEAN DRAIN ROCK

ROAD MULCH

NOTE:

1 – CENTER CONDUITS IN BOX. BOX MAY BE PLACED OFFSET FROM CENTER TO AVOID CONFLICT WITH OTHER UTILITIES UPON APPROVAL FROM INSPECTOR.

2 – STANDARD CONDUIT OFFSET PER DESIGN DRAWING OR LOCAL AUTHORITY

3 – FOR LEVEL GRADES, BOX TO BE SET SO THAT LID IS 50mm (2")–80mm (3") ABOVE FINAL GRADE OR FLUSH IN SIDEWALK

4 – EXTEND CONDUIT 50mm (2") ABOVE TOP OF FILL INSIDE BOX

5 – PVC CONDUIT SHALL BE CONCRETE ENCASED AS PER ASSEMBLY F–20

6 – USE PENTA HEAD BOLTS TO SECURE LID

7 – CONDUIT SHALL BE INSTALLED WITH END BELL, CAPPED AND MARKED (IDENTIFIED BY LOT NO.)

8 – CABLE MARKER 22.2mm x 2.62m (7/8"x8') PVC OR 50.8mm x 1.22m (2"x 4') WOOD STAKE PAINTED RED

9 – ENGINEERING AND DESIGN OF THE PRECAST POLYMER BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH POLYMER BASE/VAULT DESIGN.

10 – POLYMER BOX CAN BE CUT WITH A SAW FOR FIELD MODIFICATION.

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-07-07

REVISION DATE	JUL/22	
AUTHOR	DHG	JUL/22
CHECKED	GRMD	JUL/22
APPROVED	DCW	JUL/22
DESCRIPTION OF CHANGE: CORRECTED WOODEN STAKE MEASUREMENT IN NOTE 8		

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-07-07

ORIGINAL ISSUE		
AUTHOR	LWC	AUG/21
CHECKED	DDGP	AUG/21
APPROVED	DCW	AUG/21

FORTIS BC

UNDERGROUND STRUCTURES
POLYMER SERVICE BOX
MEDIUM SERVICE BOX
SHEET 4 OF 4

DRAWING No.	REV.
1590	1

BOM #	SAP Mat #	UI	-1	-3	-4	-5	Description
1	5571308		1	1	1	1	ROD, GROUND, COPPERBONDED, PLAIN 3/4"
2	7550501		1				VAULT, CONCRETE, SERVICE BOX
3	7550506			1			BOX-TRANSF.SUPPORT- 48X40X24 C/W UNISTRUT
4	7550611			1			LID-PLATE-STEEL-RECESSED-48X 40
5	7550498					1	VAULT, POLYMER, SMALL SERVICE BOX
6	7550499				1		VAULT, POLYMER, MEDIUM SERVICE BOX

REMARKS:

1. **For use with DSM structure 1501.**

2. **1590-1, 1590-3, 1590-4, and 1590-5 - All service boxes intended for use where occasional non-deliberate heavy vehicular traffic is present such as driveways, alleys and parking lots. Not intended for roadway/highway application. Designed to meet Group B loading as described in the FortisBC Specification for the Installation of Underground Conduit Systems (CRL 1669).**

3. **1590-3 and 1590-4 - Medium and large service boxes intended for installations where more than 4 runs of secondary cable are required in service box. The addition of a 2" conduit for street lighting is acceptable.**

4. **Revision changes shown in bold red.**

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-07-07

REVISION DATE	JUL/22		
AUTHOR	DHG	JUL/22	
CHECKED	GRMD	JUL/22	
APPROVED	DCW	JUL/22	

DESCRIPTION OF CHANGE:
CORRECTED DASH OPTIONS IN REMARK 1.

P.ENG. SEAL

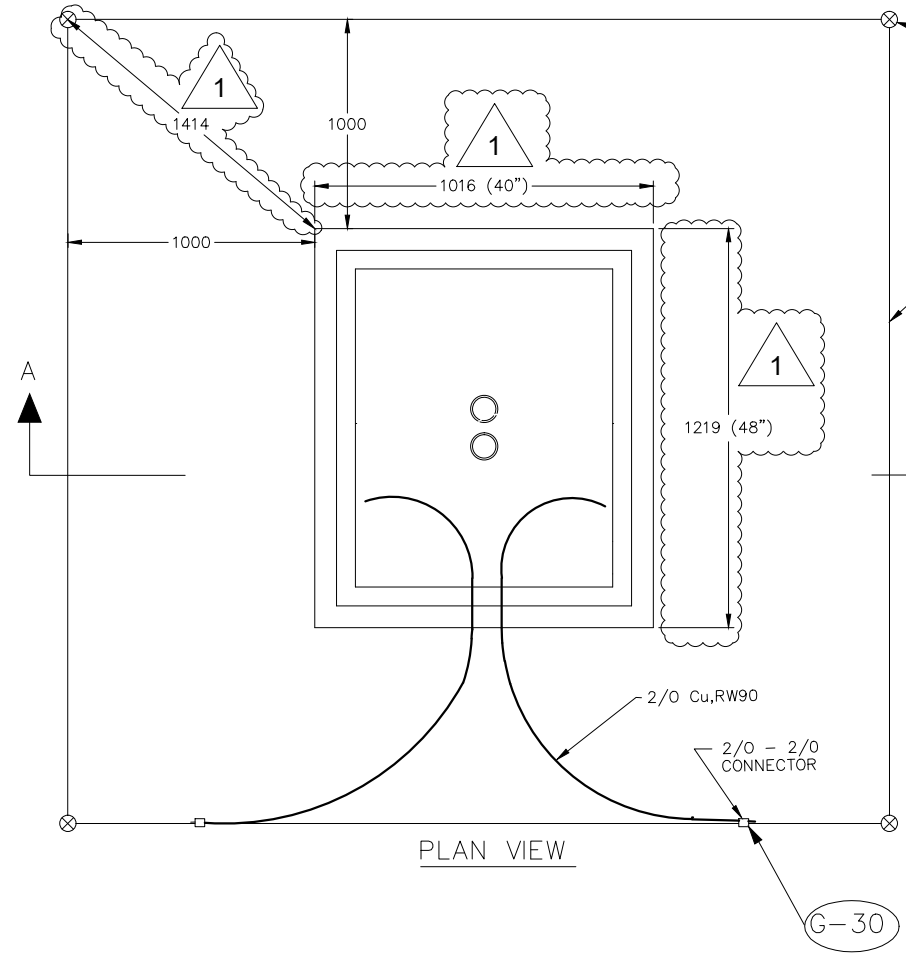
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504
2022-07-07

ORIGINAL ISSUE		
AUTHOR		
CHECKED		
APPROVED		

FORTIS BC

UNDERGROUND STRUCTURES
SERVICE BOX
CIVIL STRUCTURE
BOM SHEET 1 OF 1

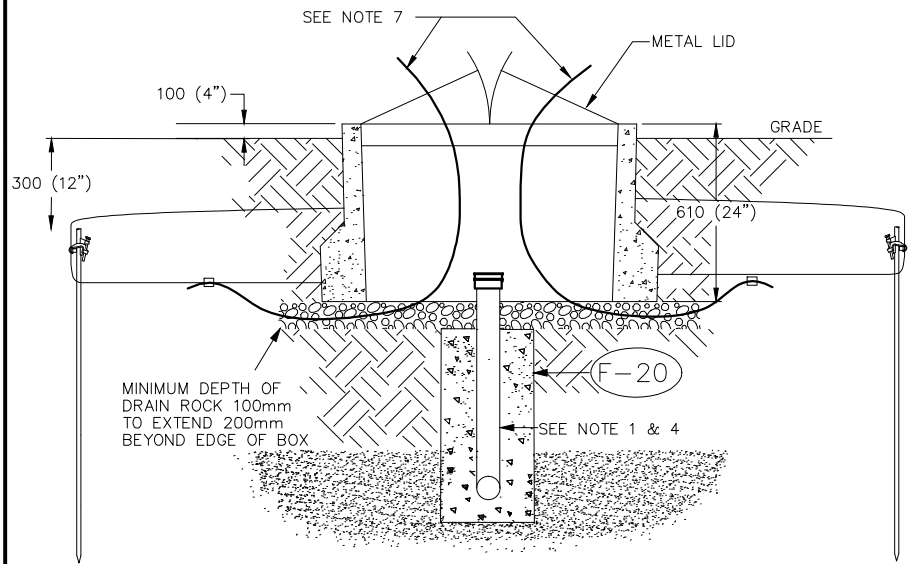
DRAWING No.	REV
1590	5



PLAN VIEW

NOTE:

1. CENTER CONDUITS IN BOX. BOX MAY BE PLACED OFFSET FROM CENTER TO AVOID CONFLICT WITH OTHER UTILITIES UPON APPROVAL FROM INSPECTOR
2. STANDARD CONDUIT OFFSET PER DESIGN DRAWING OR LOCAL AUTHORITY
3. EXTEND CONDUIT 50mm (2") ABOVE TOP OF FILL INSIDE BOX
4. PVC CONDUIT SHALL BE CONCRETE CAPPED AS PER ASSEMBLY F-20
5. FOR ELECTRICAL, SEE STRUCTURE 1511-1512
6. CONDUIT SHALL BE INSTALLED WITH END BELL, CAPPED AND MARKED/IDENTIFIED
7. EQUAL LENGTH SECTIONS OF 2/0 RW90 INSULATED COPPER
8. (1) ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.



SECTION 'A-A'

NATIVE FILL

25mm (1") CLEAN DRAIN ROCK

ROAD MULTCH (1)

REVISION DATE	FEB/1□	
AUTHOR	JAS	NOV/15
CHECKED	JMS	NOV/15
APPROVED	DK	FEB/1□

DESCRIPTION OF CHANGE:

ADDED DIMENSIONS TO DRAWING

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120
2016-03-04

ORIGINAL ISSUE		
AUTHOR	SW	JUL/08
CHECKED	NG	JUL/08
APPROVED	BM	JUL/08

UNDERGROUND STRUCTURES
1Ø JUNCTION BOX
CIVIL GENERAL ARRANGEMENT
SHEET 1 OF 1

FORTIS BC

DRAWING No.	REV.
1591	1

BOM #	SAP Mat #	UI	-1	Description
	5310202	M	13	WIRE, COPPER, STR, SD BARE, 2/0
	5311122	M	8	CONDUCTOR, STR CU, 2/0 POLY, 600 VOLTS
	5530626		4	CONNECT, 3/4 CU TO 2/0 COND.
	5530629		3	CONNECT, 2/0 CU COND.
	5571308		4	ROD, GROUND, COPPERBONDED, PLAIN 3/4"
	7550506		1	BOX-TRANSF. SUPPORT- 48 X 40 X 24 C/W UNISTRUT
	7550611		1	LID-PLATE-STEEL-RECESSED-48 X 40.

REMARKS:

1. **To be used with 1511 and 1512.**
2. **1591-1 is designed to meet H20/HS20 Group B loading as described in the FortisBC Civil Binder. Not intended for roadway application. Refer to the FortisBC Civil Binder for further clarification.**
3. **Revision changes shown in bold red.**

FortisBC INC.
1001962

Digitally signed by

REVISION DATE	JUN/22	
AUTHOR	WLH	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22

DESCRIPTION OF CHANGE:
CHANGED TITLE TO MATCH PREVIOUS SHEET

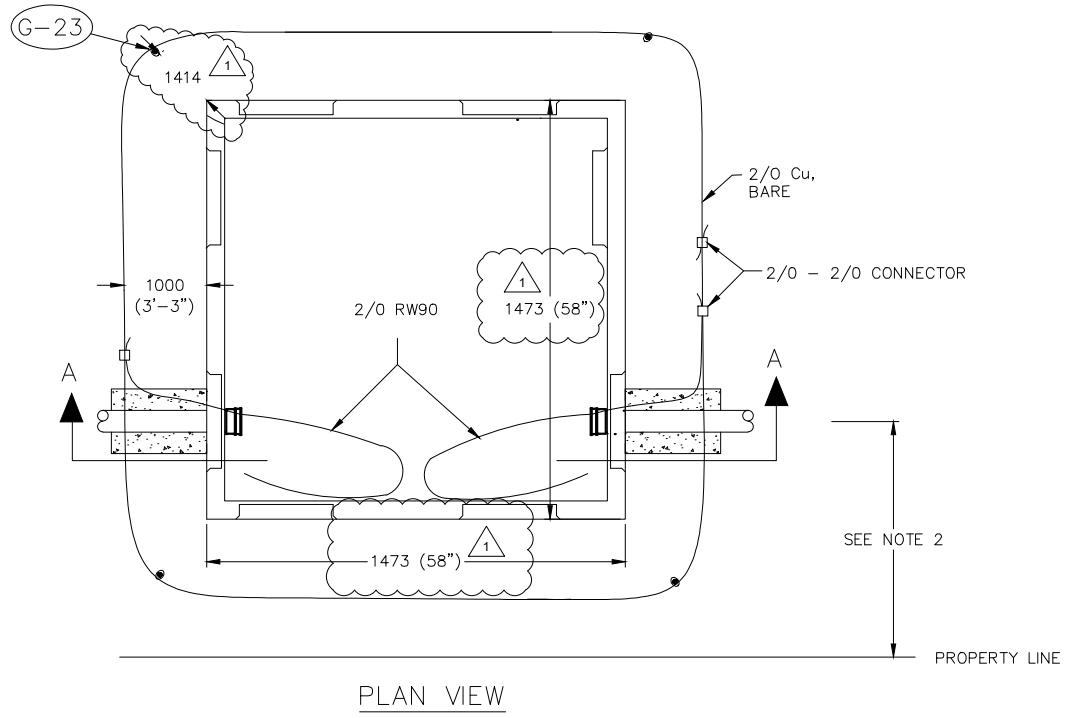
P.ENG. SEAL
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. L. HILLARY
55484
2022-06-01

ORIGINAL ISSUE		
AUTHOR	SW	JUL/08
CHECKED	NG	JUL/08
APPROVED	BM	JUL/08

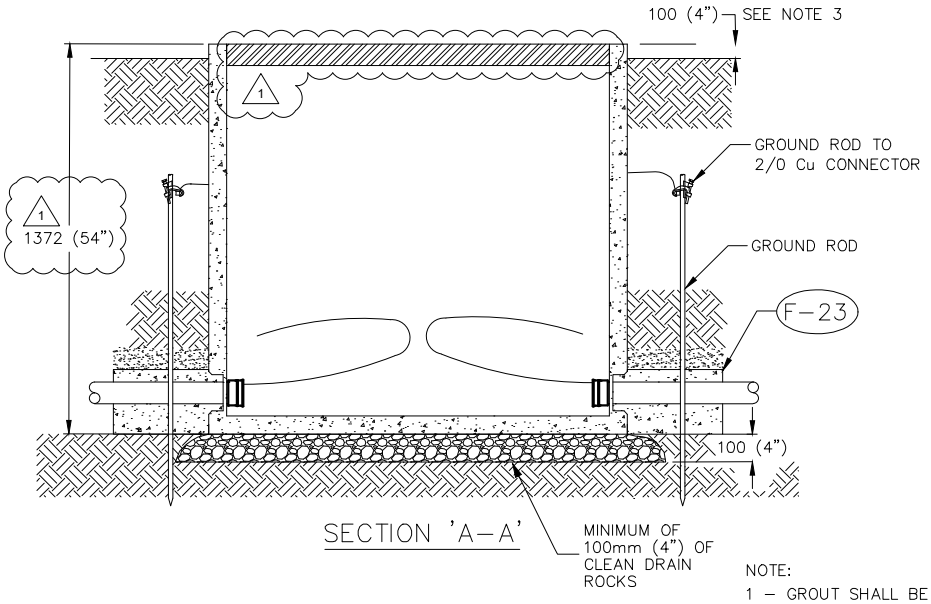
FORTIS BC

UDERGROUND STRUCTURES
1ϕ JUNCTION BOX
BILL OF MATERIAL
BOM SHEET 1 OF 1

DRAWING No.	REV
1591	2



PLAN VIEW



SECTION 'A–A'

NATIVE FILL

25mm (1") CLEAN DRAIN ROCK

ROAD MULCH 1

CONCRETE

STEEL 1

NOTE:

1 – GROUT SHALL BE USED TO ENSURE ADEQUATE SEAL BETWEEN DUCT AND BOX

2 – STANDARD CONDUIT OFFSET PER DESIGN DRAWING OR LOCAL AUTHORITY

3 – FOR LEVEL GRADES, BOX TO BE SET SO THAT LID IS 100mm ABOVE FINAL GRADE OR FLUSH IN SIDEWALK

4 – FOR PVC DUCT ONLY, END BELLS TO BE FLUSH WITH BOX

5 – CONDUIT SHALL BE INSTALLED WITH BELL END, CAPPED AND MARKED/IDENTIFIED

6 – PVC CONDUIT SHALL BE CONCRETE CAPPED AS PER ASSEMBLY F-23

7 – GROUND ROCK SHALL EXTEND 200mm BEYOND THE OUTSIDE OF BOX

1 8 – ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.

REVISION DATE	FEB/1□	
AUTHOR	SW	JUL/14
CHECKED	DCW	FEB/1□
APPROVED	DK	FEB/1□

DESCRIPTION OF CHANGE:

GENERAL REVISION

ADD DIM□ADD NOTE 8□UPDATE HATCH DESCRIP.

PROFESSIONAL ENGINEER SEAL
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120
2016-03-04

ORIGINAL ISSUE		
AUTHOR	SW	JAN/08
CHECKED	NG	JAN/08
APPROVED	BMB	MAY/08

UNDERGROUND STRUCTURES

58" □ 58" CIVIL BO□

CIVIL GENERAL ARRANGEMENT

SHEET 1 OF 1

FORTIS BC

DRAWING No.	REV.
1592	1

BOM #	SAP Mat #	UI	-3	Description
1	5310202	M	16	Wire, CU STR, 2/0, Bare, Soft Drawn
2	5311122	M	8	Conductor, CU STR, 2/0 Poly, 600V, RW90
3	5530626		4	Connector, 3/4 CU GRD Rod to 2/0 CU
4	5530629		3	Connector, 2/0 to 2/0 CU
5	5571308		4	Rod, Ground, Copper Bonded, Plain 3/4" Rod
6	7550509		1	Box – Concrete Pull – 58X58X54 c/w Unistruts
7	7550625		1	Lid – Plate Steel – Recessed – 58X58

REMARKS:

1. **Structure Descriptions**
   a. **1592-3 To be used with structure 1605**
2. **Designed to meet H20/HS20 Group B loading as described in the FortisBC Civil Binder. Not intended for roadway application. Refer to the FortisBC Civil Binder for further clarification.**
3. **Manufacturer owns liability associated with concrete base/vault design.**
4. **Revision changes shown in bold red.**

REVISION DATE	APR/20	
AUTHOR	GAHO	APR/20
CHECKED	CMM	APR/20
APPROVED	DDGP	APR/20

DESCRIPTION OF CHANGE:
REMOVED 1592-2 SINCE STRUCTURE 1533 IS NOW USED WITH 1594

P.ENG. SEAL
REV 3 ONLY

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA D. G. POWER #46842

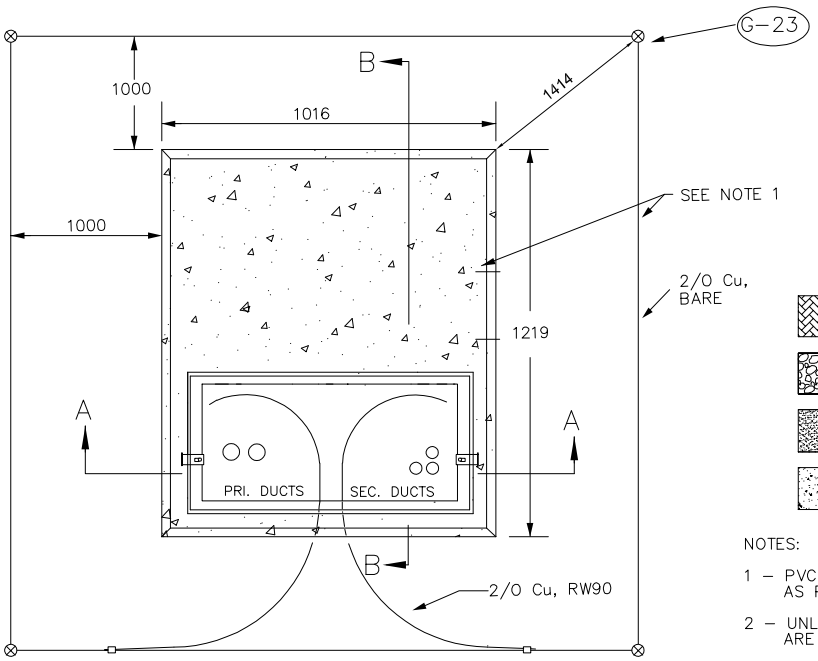
2020-10-15

ORIGINAL ISSUE		
AUTHOR	SM	07/17
CHECKED		
APPROVED		

FORTIS BC

UNDERGROUND STRUCTURES
58" X 58" CIVIL BOX
BILL OF MATERIALS
BOM SHEET 1 OF 1

DRAWING No.	REV
1592	3



PLAN VIEW

NATIVE FILL

25mm (1") CLEAN DRAIN ROCK

ROAD MULCH

CONCRETE

NOTES:

1 – PVC CONDUIT SHALL BE CONCRETE CAPPED AS PER ASSEMBLY F-20

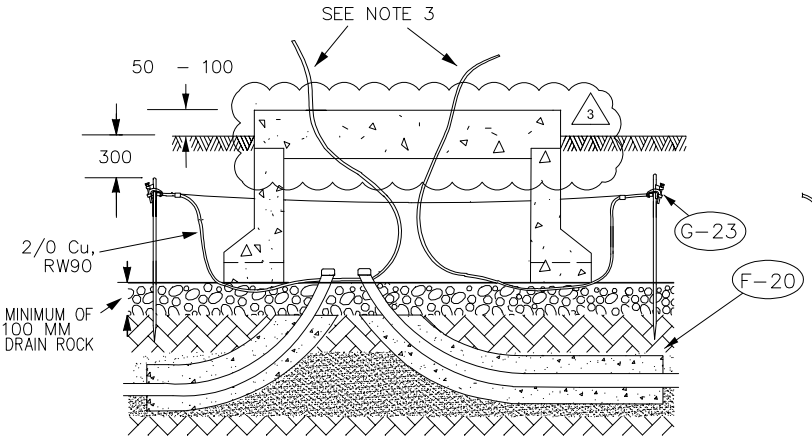
2 – UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

3 – ENSURE MINIMUM OF 1.5' OF EXCESS GROUND WIRE ABOVE PAD.

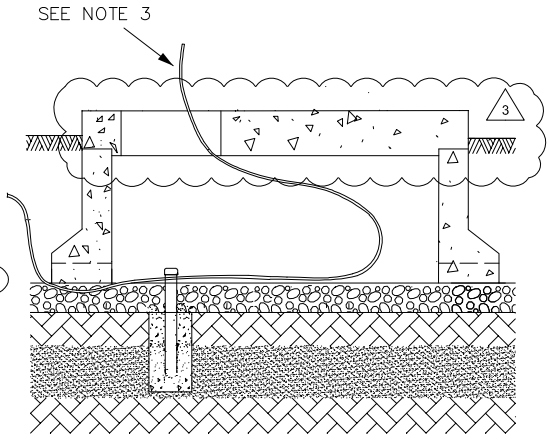
4 – TRANSFORMER ALIGNMENT NEEDS TO BE CONFIRMED WITH FORTIS BC CIVIL INSPECTOR

5 – TRANSFORMER PAD 1219 X 1016 mm

6 – ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.



SECTION 'A-A'



SECTION 'B-B'

REVISION DATE	MAR/20	
AUTHOR	GAHO	MAR/20
CHECKED	DDGP	MAR/20
APPROVED	DDGP	MAR/20

DESCRIPTION OF CHANGE:

ADDED LIPS ON VAULT LIDS

P.ENG SEAL
REV 3 ONLY

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
G. POWER
#46842

2020-10-15

ORIGINAL ISSUE		
AUTHOR		
CHECKED	NS	SEP/02
APPROVED	FC	SEP/02

FORTIS BC

UNDERGROUND STRUCTURES
1Ø LOW PROFILE TRANSFORMER
CIVIL GENERAL ARRANGEMENT
SHEET 1 OF 1

DRAWING No.	REV.
1593	3

BOM #	SAP Mat #	UI	-1	Description
	5310202	**M**	**13**	**WIRE, CU STR, 2/0, BARE, SOFT DRAWN,**
	5311122	M	8	CONDUCTOR,CU STR,2/0 POLY,600V, RW90,
	5530626		4	CONNECTOR, 3/4 CU GRD ROD TO 2/0 CU
	5530629		3	CONNECTOR, 2/0 TO 2/0 CU
	5571308		**4**	**ROD, GROUND, COPPERBONDED, PLAIN 3/4"ROD**
	7550506		1	BOX-TRANSF.SUPPORT- 48X40X24C/W UNISTRUT
	7550602		1	LID-CONCRETE #1038 48 X 40LESS METAL FIL

REMARKS:

1. **1593-1 is not intended for vehicle loading. It is only intended to support the equipment places on it.**
2. **Revision changes shown in bold red.**

REVISION DATE	FEB/16		
AUTHOR	SM	AUG/14	
CHECKED	DCW	FEB/16	
APPROVED	DK	FEB/16	

DESCRIPTION OF CHANGE:
CHANGED GND ROD NUMBER
ADDED NOTE 1. INCREASED LENGTH OF 2/0.

P.ENG. SEAL

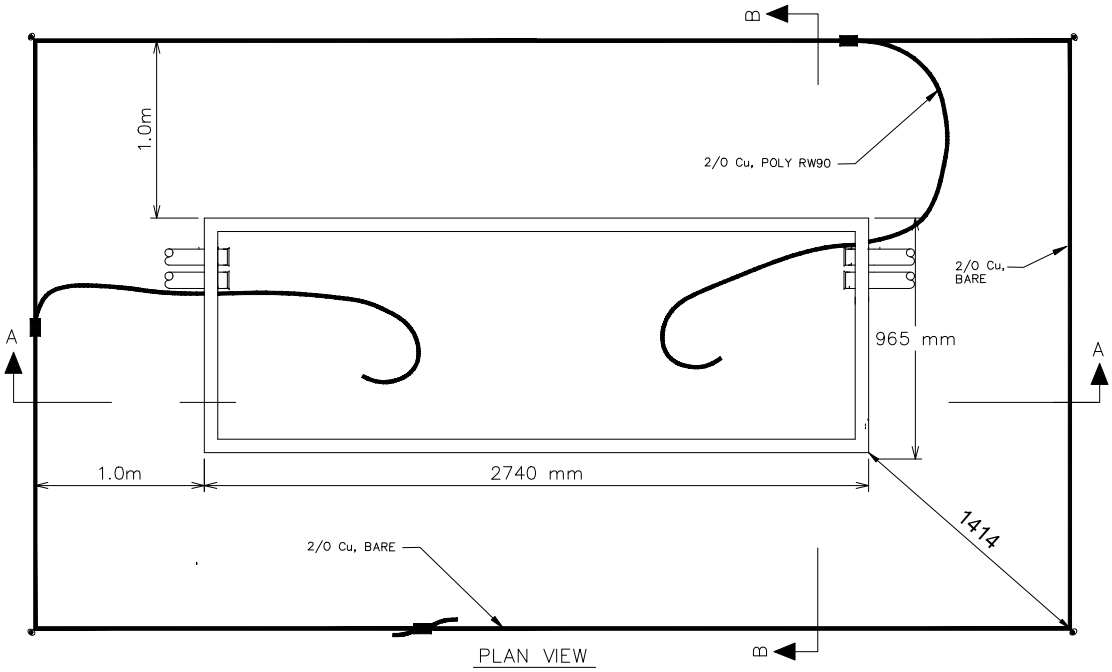
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120
2016-03-23

ORIGINAL ISSUE		
AUTHOR	SM	JUL/14
CHECKED		
APPROVED		

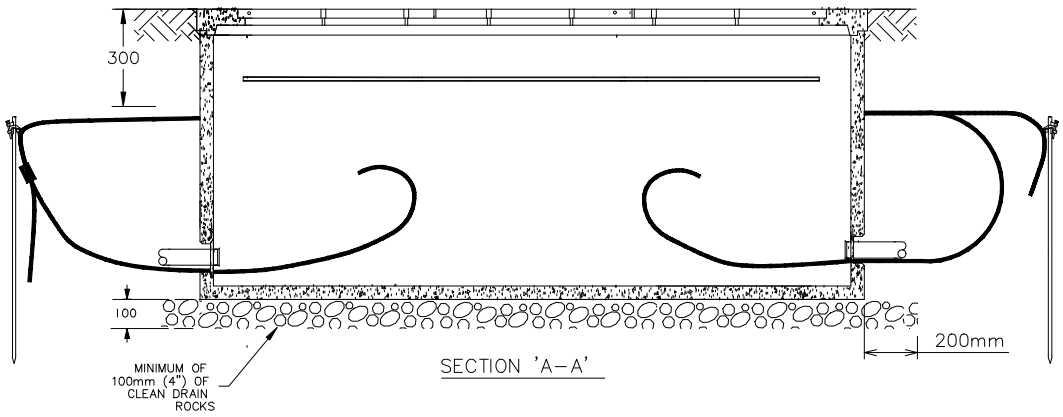
FORTIS BC

UNDERGROUND STRUCTURES
1ϕ LOW PROFILE PADMOUNT TRAN
BILL OF MATERIALS
BOM SHEET 1 OF 1

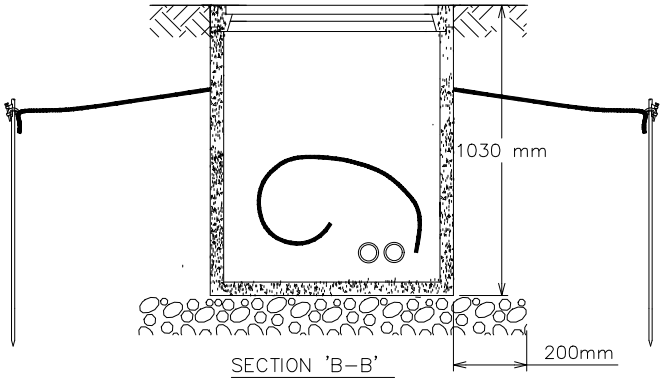
DRAWING No.	REV
1593	1



PLAN VIEW



SECTION 'A–A'



SECTION 'B–B'

NOTE:

1 – GROUT SHALL BE USED TO ENSURE ADEQUATE SEAL BETWEEN DUCT AND BOX

2 – FOR LEVEL GRADES, BOX TO BE SET SO THAT LID IS 100mm ABOVE FINAL GRADE OR FLUSH IN SIDEWALK

3 – FOR PVC DUCT, BELL ENDS TO BE FLUSH WITH BOX

4 – FOR 3 PHASE JUNCTION VAULT BILL OF MATERIALS ORDER STR 1536/1537

5 – ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.

2022-06-28

REVISION DATE	MAY/2020	
AUTHOR	GAHO	MAY/20
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22

DESCRIPTION OF CHANGE:

REMOVED 200A FROM TITLE.

SHEET WAS MISSED IN 2020 UPDATE.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. L. HILLARY
55484
2022-06-28

ORIGINAL ISSUE		
AUTHOR	SW	DEC/07
CHECKED	NG	JAN/08
APPROVED	BMB	JAN/08

FORTIS BC

UNDERGROUND STRUCTURES
3Ø JUNCTION VAULT
15/25kV 832 STYLE (CIVIL)
SHEET 1 OF 1

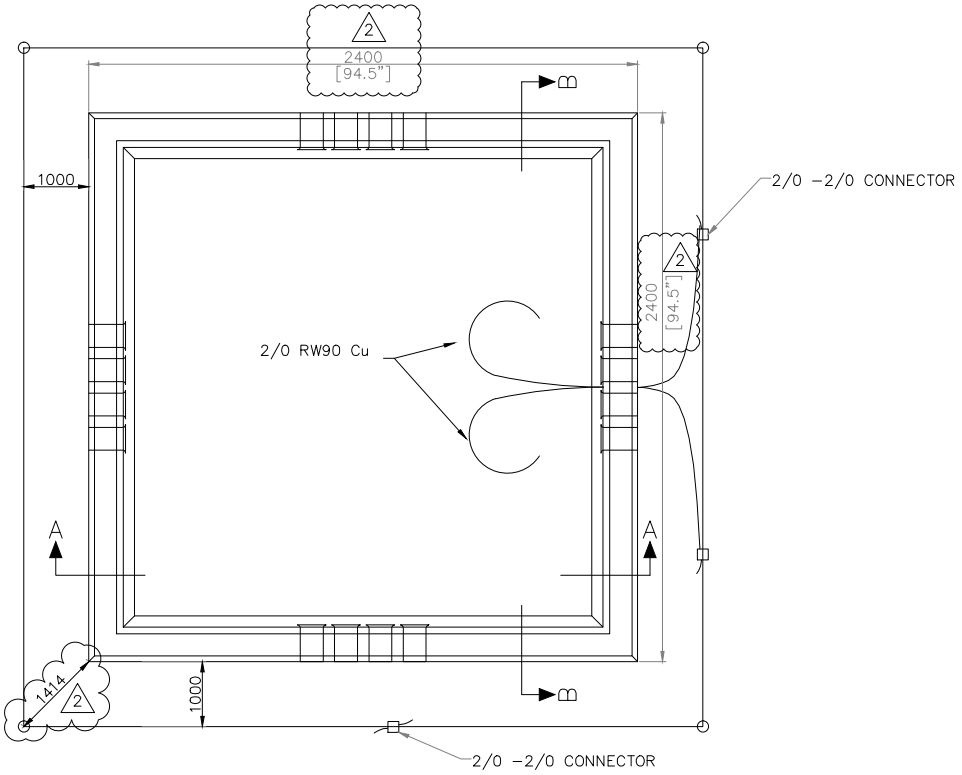
DRAWING No.	REV.
1594	2

BOM #	SAP Mat #	UI	-1	Description
1	5310202	M	17	WIRE, CU STR, 2/0, BARE, SOFT DRAWN,
2	5311122	M	10	CONDUCTOR,CU STR,2/0 POLY,600V, RW90,
3	5530626		4	CONNECTOR, 3/4 CU GRD ROD TO 2/0 CU
4	5530629		3	CONNECTOR, 2/0 TO 2/0 CU
5	5571308		4	ROD, GROUND, COPPERBONDED, PLAIN 3/4"ROD
6	7550560		1	VAULT, 832 JUNCTION, C/W COLLAR

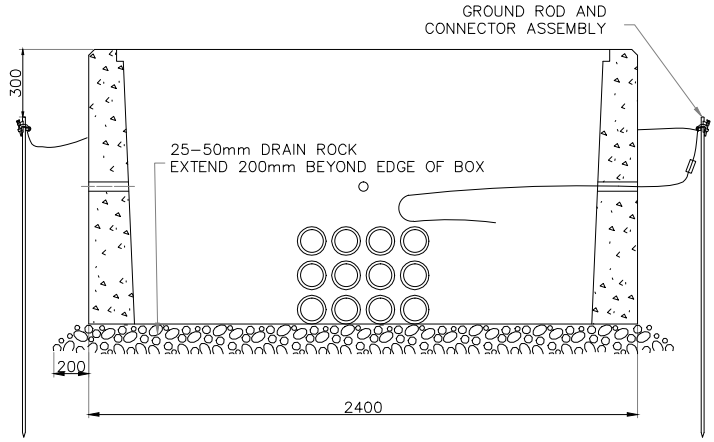
REMARKS:

1. **1594-1 is designed to meet H20/HS20 Group B loading as described in the FortisBC Civil Binder. Not intended for roadway application. Refer to the FortisBC Civil Binder for further clarification.**
2. **Revision changes shown in bold red.**

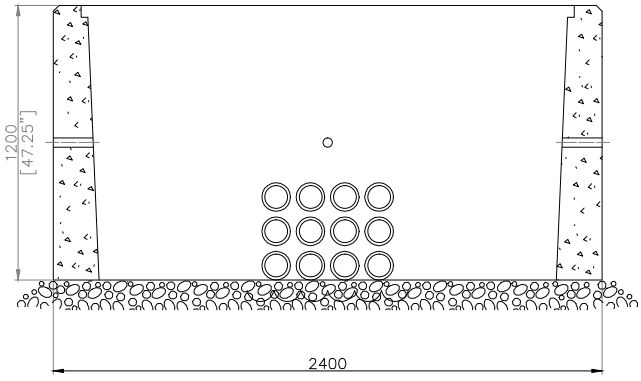
REVISION DATE	AUG/20		P.ENG. SEAL REV 2 ONLY	ORIGINAL ISSUE			UNDERGROUND STRUCTURES 3 PHASE JUNCTION VAULT BILL OF MATERIALS BOM SHEET 1 OF 1
AUTHOR	GAHO	AUG/20		AUTHOR	SM	JUL/14	
CHECKED				CHECKED			
APPROVED	DDGP	AUG/20		APPROVED			
DESCRIPTION OF CHANGE: ADDED BOM NUMBERS REMOVED 200A FROM TITLE			2020-10-15	FORTIS BC			DRAWING No. 1594 / REV 2



PLAN VIEW



SECTION A–A



SECTION B–B
(GROUNDING NOT SHOWN FOR CLARITY)

2 1. ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.

REVISION DATE	FEB/1□	
AUTHOR	JAS	SEP/15
CHECKED	JMS	SEP/15
APPROVED	DK	FEB/1□
DESCRIPTION OF CHANGE:		
GENERAL REVISION		
ADD NOTE 1		

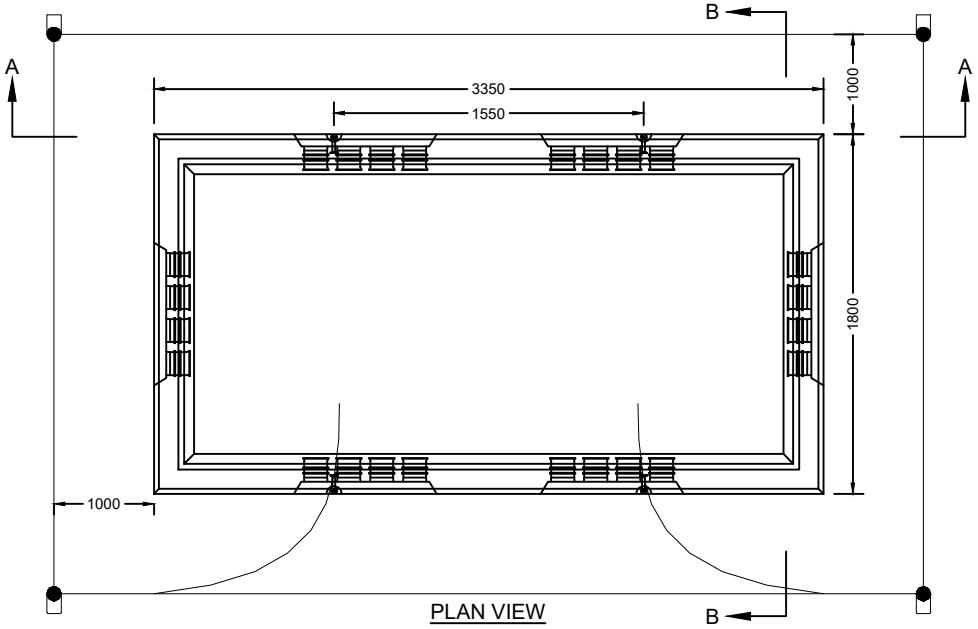
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120
2016-03-04

ORIGINAL ISSUE		
AUTHOR	SW	JAN/08
CHECKED		
APPROVED		

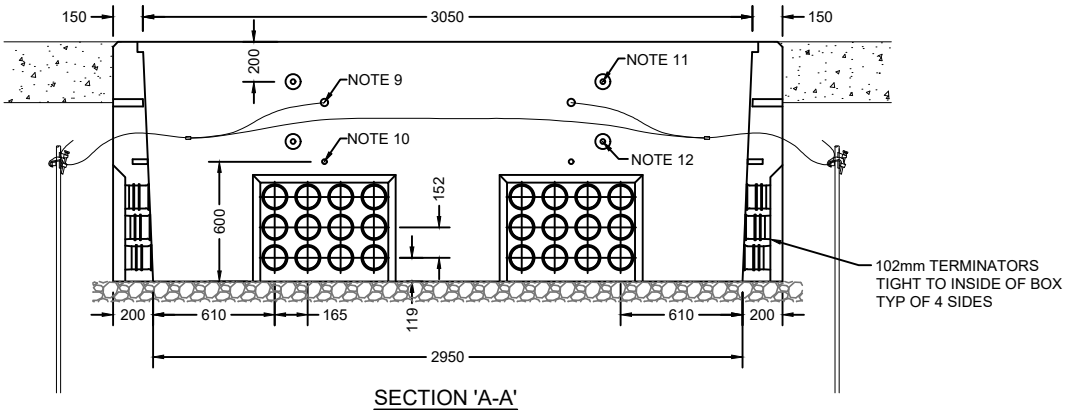
UNDERGROUND STRUCTURES
PADMOUNT SWITCHER BASE
CIVIL GENERAL ARRANGEMENT
SHEET 1 OF 1

FORTIS BC

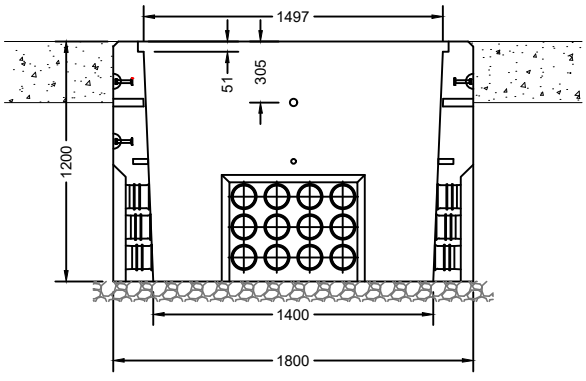
DRAWING No.	REV.
1595	2



PLAN VIEW



SECTION 'A-A'



SECTION 'B-B'

NOTE:

1. ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.
2. CONCRETE, MINIMUM 28 DAYS STRENGTH TO BE 30Mpa -TYPE 50
3. REINFORCEMENT TO BE WELDED WIRE FABRIC TO CSA G30.3-1983
4. SUFFICIENT LAP STRENGTH FOR REINFORCEMENT SHOULD BE PROVIDED TO ENSURE CONTINUITY OF REINFORCEMENT.
5. MINIMUM CONCRETE COVER FOR REINFORCEMENT
   A) 30mm FOR OUTSIDE FACE OF BOX PAD
   B) 20mm FOR INSIDE FACE OF BOX PAD
6. MASS: 9254 Lbs / 4205 Kg
7. UNLESS OTHERWISE INDICATED, ALL DIMENSIONS ARE IN MILLIMETRES
8. LIFTING ANCHOR IS 2.5 TON 3 3/8" LENGTH UNLIFTER
9. 38mm GROUND OPENING (TYP OF 6)
10. 25mm PULLING EYE INSERT (TYP OF 6)
11. 2.5T LIFTING ANCHORS (TYP OF 4)
12. 4T LIFTING ANCHORS FOR TURNING PRODUCT (TYP OF 2)

REVISION DATE		
AUTHOR		
CHECKED		
APPROVED		

DESCRIPTION OF CHANGE:

P.ENG SEAL
DSM 1595 SH. 2

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA J. G. POWER #46842

2020-11-25

ORIGINAL ISSUE		
AUTHOR	JSA	NOV/20
CHECKED	AWB	NOV/20
APPROVED	DDGP	NOV/20

FORTIS BC

UNDERGROUND STRUCTURES
25kV ONE-SIDED SWITCHGEAR VAULT
CIVIL GENERAL ARRANGEMENT
SHEET 2 OF 2

DRAWING No.	REV.
1595	0

BOM #	SAP Mat #	UI	-5	-7	-8	Description
	5310202	M	20	20	20	WIRE, CU STR, 2/0, BARE, SOFT DRAWN
	5311122	M	10	10	10	CONDUCTOR, CU STR, 2/0 POLY, 600V, RW90
	5530626		4	4	4	CONNECTOR, 3/4 CU FRD ROD TO 2/0 CU
	5530629		3	3		CONNECTOR, 2/0 TO 2/0 CU
	5530670				3	CONNECTOR, COMPRESSION, 2/0 TO 2/0 STR CU
	5571308		4	4	4	ROD, GROUND, COPPERBONDED, PLAIN 3/4"
	7550619		1			ADAPTOR PLATE, 15/25kV ELASTIMOLD SWITCH
	7550624			1		ADAPTOR PLATE, 15/25kV PADMOUNT PRIM. METER
	7550562		1	1		PULL BOX, PRECAST, 2.4m X 2.4m X 1.2m
	7550564				1	VAULT, PRECAST, ONE-SIDED SWITCHGEAR
	7550620				1	ADAPTOR PLATE, ELASTIMOLD 1-SIDED SWITCH

Remarks:

1. STRUCTURE DESCRIPTIONS
   a. **1595**-5 15/25kV TWO-SIDED ELASTIMOLD SWITCH
   b. 1595-7 15/25kV PRIMARY METER, KYE 24 (STRUCTURE 1605)
   c. 1595-8 25kV ONE-SIDED ELASTIMOLD SWITCH
2. 1595-5, 1595-7 AND 1595-8 ARE NOT INTENDED FOR VEHICLE LOADING. EACH IS ONLY INTENDED TO SUPPORT THE EQUIPMENT PLACED UPON IT.
3. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN
4. REVISION CHANGES SHOWN IN **BOLD RED.**

FortisBC INC.
1001962

Digitally signed by

REVISION DATE	JUN/22	
AUTHOR	WLH	JUN/22
CHECKED	GRMD	JUN/22
APPROVED	DCW	JUN/22

DESCRIPTION OF CHANGE:
CHANGED STRUCTURE NUMBER IN REMARKS.

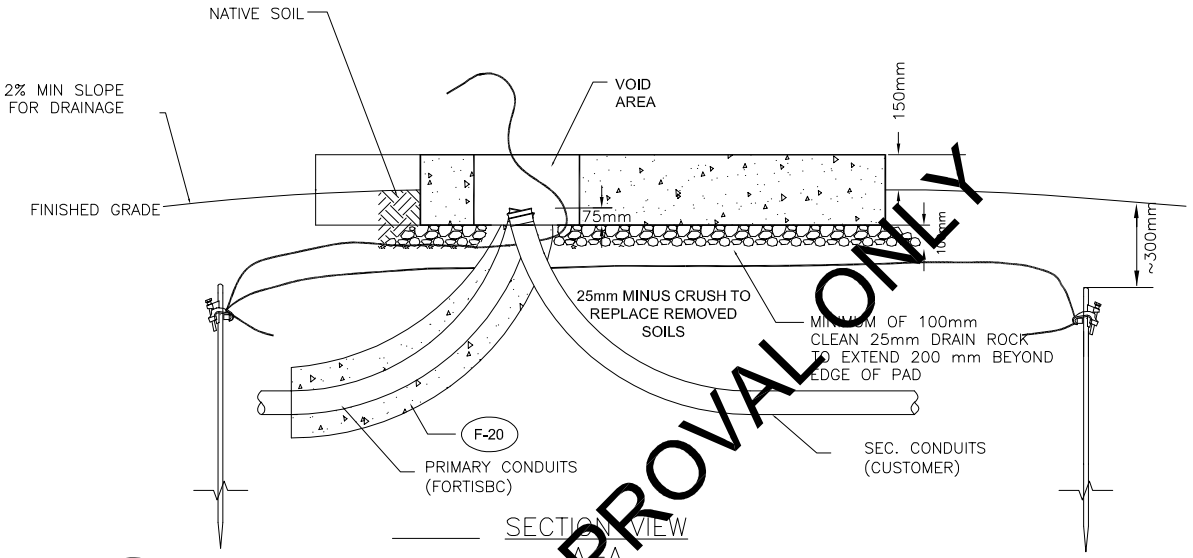
P.ENG. SEAL
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. L. HILLARY
55484
2022-06-01

ORIGINAL ISSUE		
AUTHOR		
CHECKED		
APPROVED		

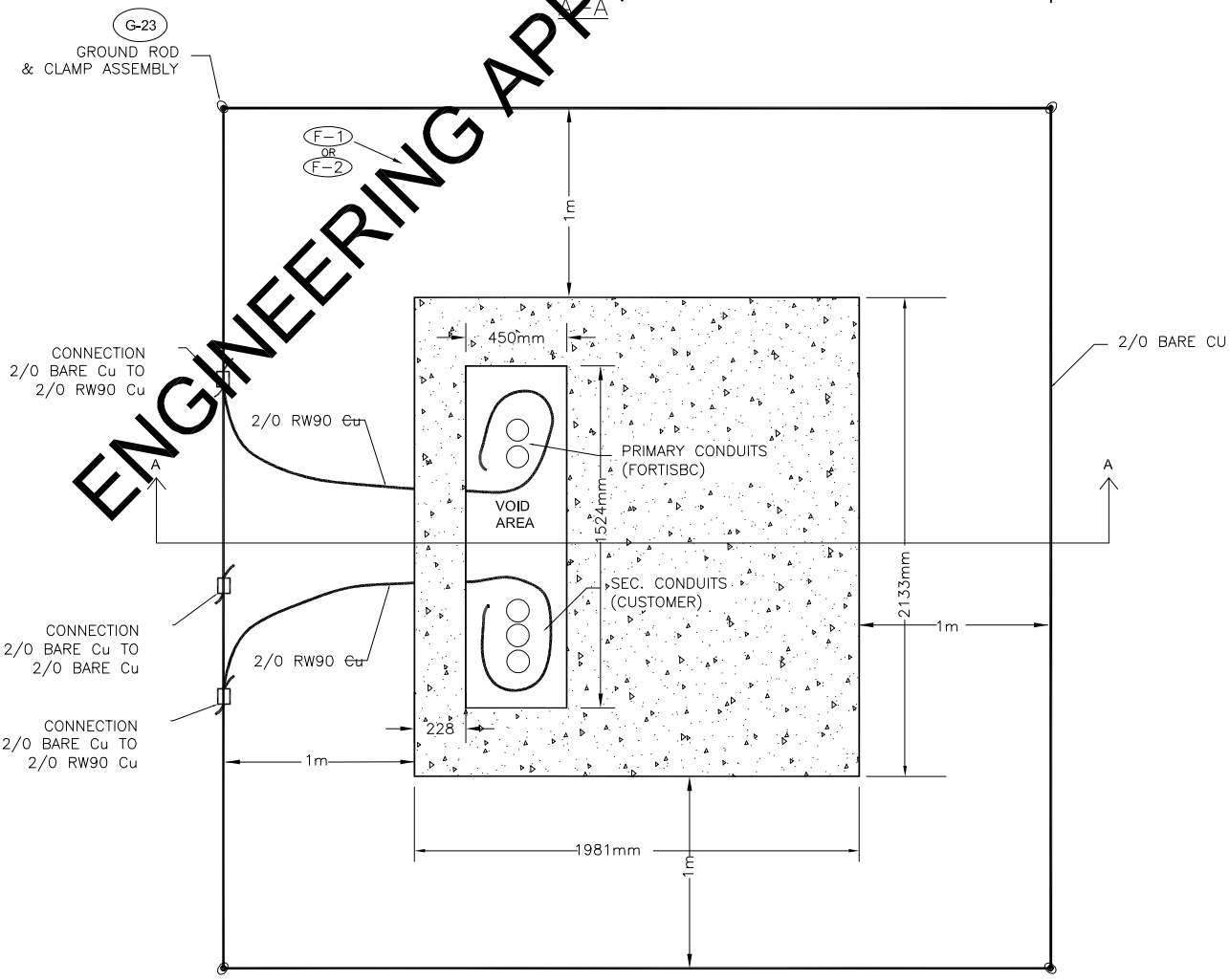
FORTIS BC

UNDERGROUND STRUCTURES
PADMOUNT SWITCHER BASE
BILL OF MATERIALS
SHEET 1 OF 1

DRAWING No.	REV
1595	4



SECTION VIEW
AREA



PLAN VIEW

REVISION DATE	JUN/20	
AUTHOR	GAHO	JUN/20
CHECKED	CMM	JUN/20
APPROVED	DDGP	JUN/20
DESCRIPTION OF CHANGE: ADDED ENGINEERING APPROVAL ONLY. UPDATED BORDER		

P.ENG SEAL
REV 2 ONLY
PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA
G. POWER
46842
2020-10-15

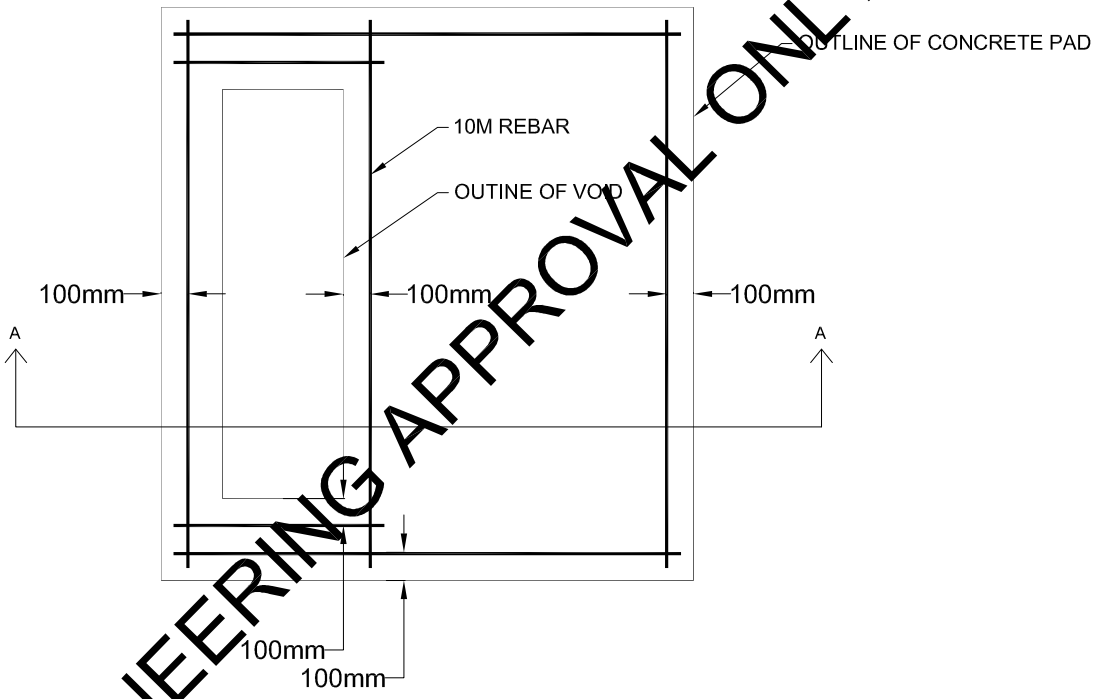
ORIGINAL ISSUE		
AUTHOR	NG	SEP/08
CHECKED	RBM	SEP/08
APPROVED	BM	SEP/08

FORTIS BC

UNDERGROUND STRUCTURES
3 PH TRANS (>500KVA) BASE
POUR IN PLACE GROUNDING
SHEET 1 OF 3

DRAWING No.	REV.
1596	2

REINFORCING STEEL LAYOUT
SECTION VIEW A–A



REINFORCING STEEL LAYOUT
PLAN VIEW

NOTES:

1. ALL REBAR SHALL BE MIN 10M
2. CONCRETE COVER OVER STEEL SHALL BE 75mm MINIMUM
3. STEEL REBAR MAY BE SUBSTITUTED WITH 150 X 150mm 6 GAUGE GALVANIZED MESH PROVIDED 2 LAYERS ARE INSTALLED AT THE SAME SPACING AS REBAR
4. TIE REBAR AT ALL INTERSECTIONS
5. ALL DISTURBED MATERIAL BELOW PAD MUST BE REPLACED WITH 25mm MINUS CRUSHED ROCK AND MACHINE COMPACTED IN LIFTS NOT TO EXCEED 200mm
6. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 28 MPa
7. FOR PLACEMENT OF TRANSFORMER, REFER TO 1206 SHT 2 OF 3
8. CUSTOMER TO CONFIRM PAD MEASUREMENTS WITH FORTISBC PRIOR TO INSTALLATION
9. REFER TO STR 1514 FOR ELECTRICAL DETAILS

REVISION DATE	AUG/20	
AUTHOR	GAHO	AUG/20
CHECKED		
APPROVED	DDGP	AUG/20

DESCRIPTION OF CHANGE:
ADDED ENGINEERING APPROVAL ONLY

P.ENG SEAL
REV 2 ONLY

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. POWER
#46842

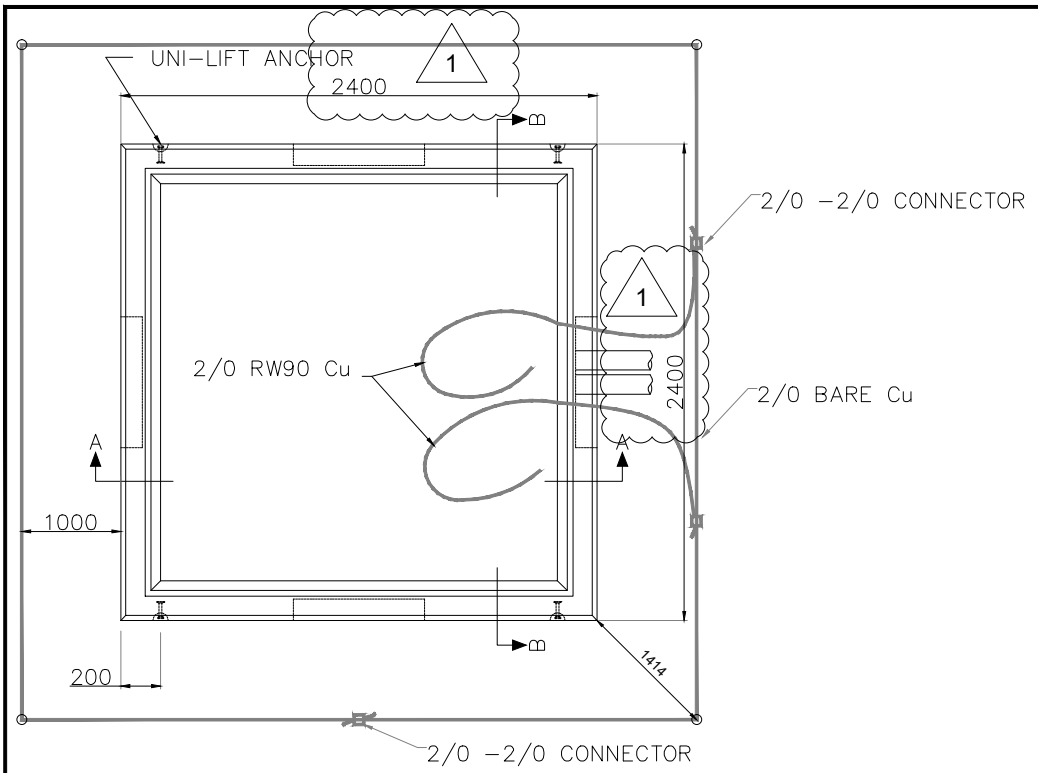
2020-10-15

ORIGINAL ISSUE		
AUTHOR	NG	SEP/08
CHECKED	RBM	SEP/08
APPROVED	BM	SEP/08

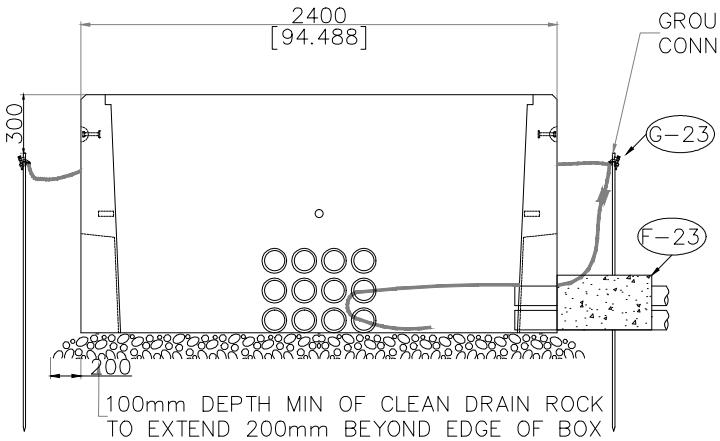
FORTIS BC

UNDERGROUND STRUCTURES
3Ø TRANS (>500kVA) BASE
POUR IN PLACE BASE DIMENSIONS
SHEET 2 OF 3

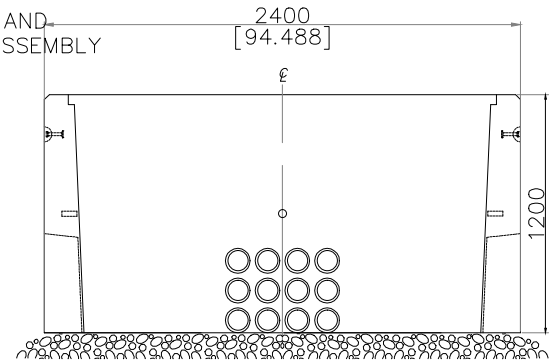
DRAWING No.	REV.
1596	2



PLAN VIEW



SECTION A-A



SECTION B-B

NOTE:

1 - GROUT SHALL BE USED TO ENSURE ADEQUATE SEAL BETWEEN DUCT AND BOX.

2 - FOR LEVEL GRADES, BOX TO BE SET SO THAT LID IS 100mm ABOVE FINAL GRADE.

3 - FOR PVC DUCT ONLY, BELL ENDS TO BE FLUSH WITH BOX

4 - FOR ELECTRICAL DETAILS, REFER TO DSM SECTION 1514

1 5 - ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.

REVISION DATE	FEB/1□	
AUTHOR	MK	AUG/15
CHECKED	DCW	FEB/1□
APPROVED	DK	FEB/1□

DESCRIPTION OF CHANGE:
REPLICATED THE DRAWING FROM SHEET 3 OF STRUCTURE 15□5

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120
2016-03-04

ORIGINAL ISSUE		
AUTHOR	FAB	SEPT/0□
CHECKED	BM	APRL/07
APPROVED	IF	APR/07

FORTIS BC

UNDERGROUND STRUCTURES
3 PH TRANS (□500KVA) BASE
DEEP POUR BASE
SHEET 3 OF 3

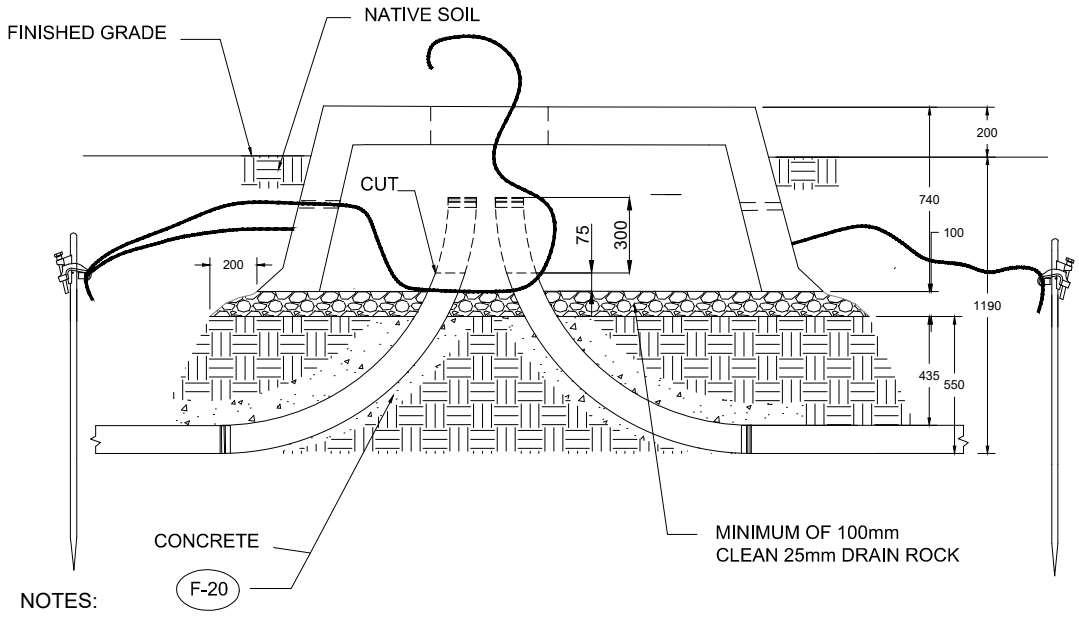
DRAWING No.	REV.
1596	1

BOM #	SAP Mat #	UI	-1	-2	Description
1	5310202	M	17	20	WIRE, CU STR, 2/0, BARE, SOFT DRAWN
2	5311122	M	6	10	CONDUCTOR,CU STR,2/0 POLY,600V, RW90,
3	5530626		4	4	CONNECTOR, 3/4 CU GRD ROD TO 2/0 CU
4	5530629		3	3	CONNECTOR, 2/0 TO 2/0 CU
5	5571308		4	4	ROD, GROUND, COPPERBONDED, PLAIN 3/4"ROD
6	7550623			1	ADAPTERLID,2350x2350,750-3000KVA TRANS
7	7550562			1	PULL BOX, PRECAST, 2.4M X 2.4M X 1.2M

Remarks:

1. 1596-1 is for concrete transformer base which may be poured on site or precast. – **FOR ENGINEERING APPROVAL ONLY**
2. 1596-2 is for deep pour transformer base.
3. 1596-1 & 1596-2 not intended for vehicle loading. They are only intended to support the equipment placed on it.
4. Revision changes are shown in **bold red**.

REVISION DATE	JUL/20		P.ENG. SEAL	ORIGINAL ISSUE	UNDERGROUND STRUCTURES 3 PH TRANS (>500KVA) BASE BILL OF MATERIALS BOM SHEET 1 OF 1
AUTHOR	GAHO	JUL/20	REV 2 ONLY	AUTHOR	
CHECKED	CMM	JUL/20	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA D. E. G. POWER #46842	CHECKED	
APPROVED	DDGP	JUL/20	2020-10-15	APPROVED	
DESCRIPTION OF CHANGE: MADE 1596-1 FOR ENGINEERING APPROVAL ONLY				FORTIS BC	DRAWING No. 1596 / REV 2

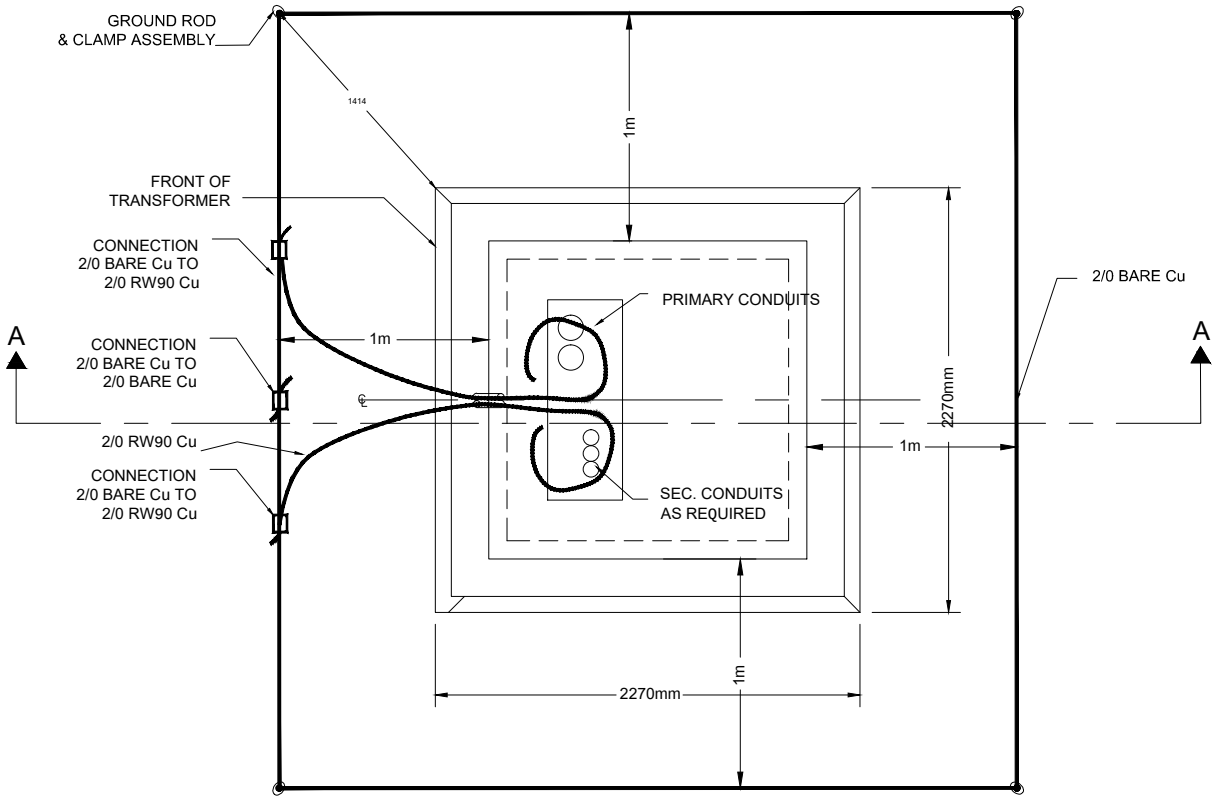


NOTES:

1. APPROXIMATELY 300MM [1FT] OF CONDUIT WILL NEED TO BE CUT OFF INSIDE THE VAULT.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
3. ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.

4

SECTION A-A



PLAN VIEW

REVISION DATE	FEB/16	
AUTHOR	NP	DEC/15
CHECKED	JP	DEC/15
APPROVED	DK	FEB/16

DESCRIPTION OF CHANGE:

ADDED NOTE 3

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120
2016-03-04

ORIGINAL ISSUE		
AUTHOR	SW	MAR/08
CHECKED	NG	APR/08
APPROVED	BMB	APR/08

FORTIS BC

UNDERGROUND STRUCTURES
PRE-CAST 3Ø TRANS BASE
500kVA OR LESS
SHEET 1 OF 1

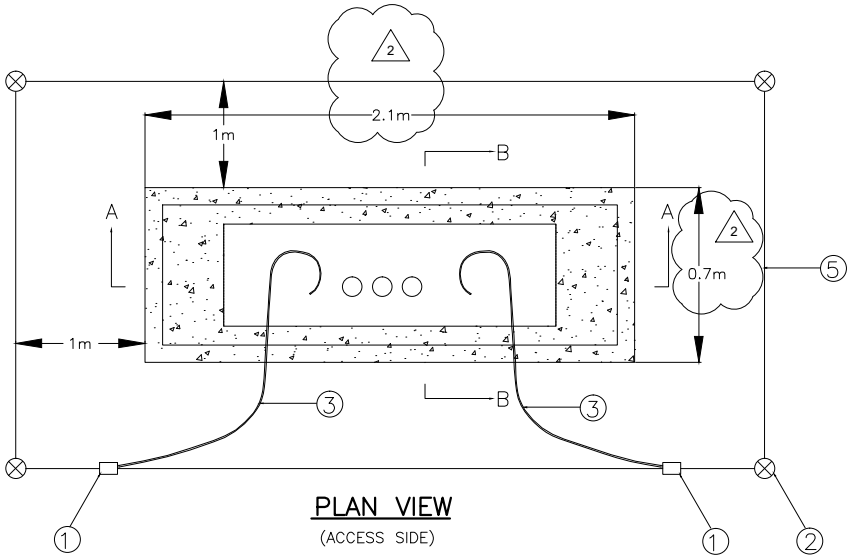
DRAWING No.	REV.
1597	4

BOM #	SAP Mat #	UI	-1	Description
	5310202	M	16	WIRE, CU STR, 2/0, BARE, SOFT DRAWN,
	5311122	M	8	CONDUCTOR,CU STR,2/0 POLY,600V, RW90,
	5530626		4	CONNECTOR, 3/4 CU GRD ROD TO 2/0 CU
	5530629		3	CONNECTOR, 2/0 TO 2/0 CU
	5571308		4	ROD, GROUND, COPPERBONDED, PLAIN 3/4"ROD
	7550507		1	PAD, PRECAST CONCRETE, TRANS, 75-500KVA

REMARKS:

1. **This structure not intended for vehicle loading. It is only intended to support the equipment placed on it.**
2. **Revision changes shown in bold red.**

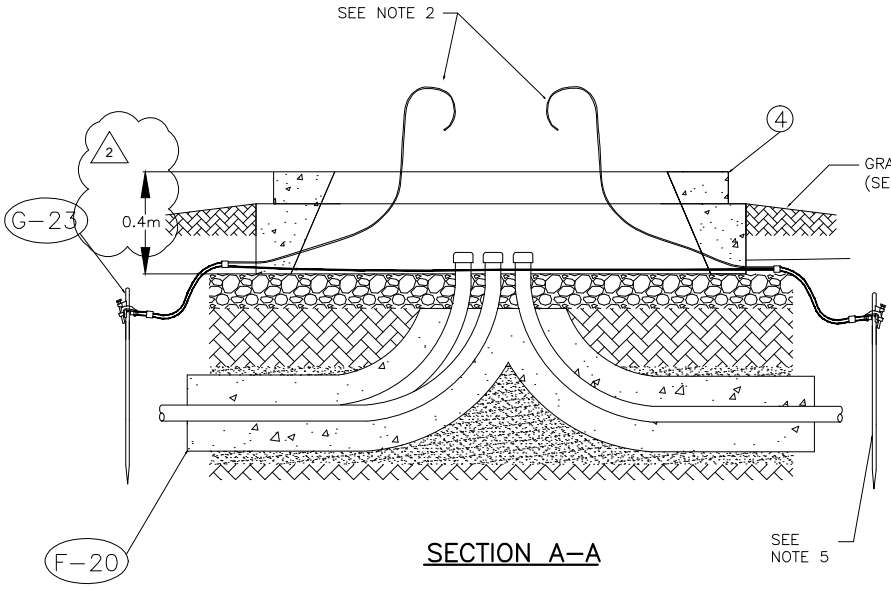
REVISION DATE	FEB/16		P.ENG. SEAL	ORIGINAL ISSUE			UNDERGROUND STRUCTURES PRE-CAST 3ϕ TRANS BASE BILL OF MATERIALS BOM SHEET 1 OF 1
AUTHOR	JAS	DEC/15	PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA D. C. WALDEN # 37120 2016-03-04	AUTHOR	SM	MAR/08	
CHECKED	JMS	DEC/15		CHECKED	NG	APR/08	
APPROVED	DK	FEB/16		APPROVED	BMB	APR/08	
DESCRIPTION OF CHANGE: ADDED NOTE 1.				FORTIS BC			DRAWING No. 1597 / REV 1



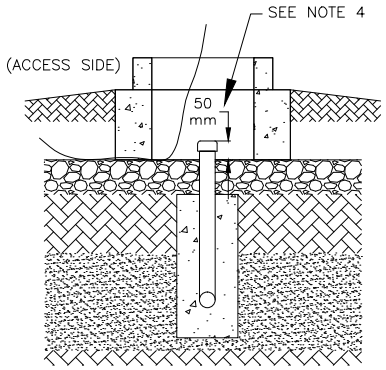
PLAN VIEW
(ACCESS SIDE)

HATCH DETAIL

- CONCRETE
- NATIVE FILL (FINAL GRADE)
- 25mm (1") CLEAN DRAIN ROCK
- ROAD MULCH



SECTION A–A



SECTION B–B

NOTES:

1 – SLOPE GRADE AWAY FROM BASE FOR DRAINAGE

2 – ENSURE A MINIMUM OF 1200 MM (4') OF EXCESS GROUND WIRE ABOVE PAD

3 – REFER TO ELECTRICAL DRAWING 1543 FOR ELECTRICAL DETAILS

4 – CONDUIT SHALL BE CAPPED, MARKED AND IDENTIFIED "TO DIRECTION". CENTER CONDUIT IN OPENING AND EXTEND CONDUIT 50 MM (2") ABOVE TOP OF FILL INSIDE BASE

5 – GROUND RODS TO BE 300 MM (12") BELOW FINISHED GRADE.

6 – CONCRETE ENCASE BENDS AS PER F–20

2 7 – ENGINEERING AND DESIGN OF THE PRECAST CONCRETE BASE/VAULT DONE BY THE MANUFACTURER. MANUFACTURER OWNS LIABILITY ASSOCIATED WITH CONCRETE BASE/VAULT DESIGN.

ITEM LIST:

1. 2/0–2/0 Cu CONNECTOR
2. GROUND ROD/CLAMP ASSEMBLY
3. 2/0 POLY COVERED Cu
4. PRECAST CONCRETE BASE
5. 2/0 BARE Cu

REVISION DATE	FEB/1□	
AUTHOR	JAS	DEC/15
CHECKED	JMS	DEC/15
APPROVED	DK	FEB/1□

DESCRIPTION OF CHANGE:
UPDATED BORDER
ADDED NOTE 7

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120
2016-03-04

ORIGINAL ISSUE		
AUTHOR	SS	JAN/08
CHECKED	NG	SEPT/08
APPROVED	BMB	SEPT/08

FORTIS BC

UNDERGROUND STRUCTURES
ABOVE GRADE 200A JUNCTION
CIVIL GENERAL ARRANGEMENT
SHEET 1 OF 1

DRAWING No.	REV.
1598	2

BOM #	SAP Mat #	UI	-1	Description
	5310202	M	**16**	WIRE, CU STR, 2/0, BARE, SOFT DRAWN,
	5311122	M	**8**	CONDUCTOR,CU STR,2/0 POLY,600V, RW90,
	5530626		4	CONNECTOR, 3/4 CU GRD ROD TO 2/0 CU
	5530629		3	CONNECTOR, 2/0 TO 2/0 CU
	5571308		**4**	**ROD, GROUND, COPPERBONDED, PLAIN 3/4"ROD**
	7550504		1	BASE, PRECAST FOR ABOVE GROUND 3 PHASE

REMARKS:

1. **1598-1 is the base foundation for standard structure 1543 (Above Grade 200A Junction)**
2. **This structure not intended for vehicle loading. It is only intended to support the equipment placed on it.**
3. **Revision changes shown in bold red.**

REVISION DATE	FEB/16		
AUTHOR	JAS	DEC/15	
CHECKED	JMS	DEC/15	
APPROVED	DK	FEB/16	

DESCRIPTION OF CHANGE:
UPDATED GND ROD.
ADDED NOTE 2.

P.ENG. SEAL

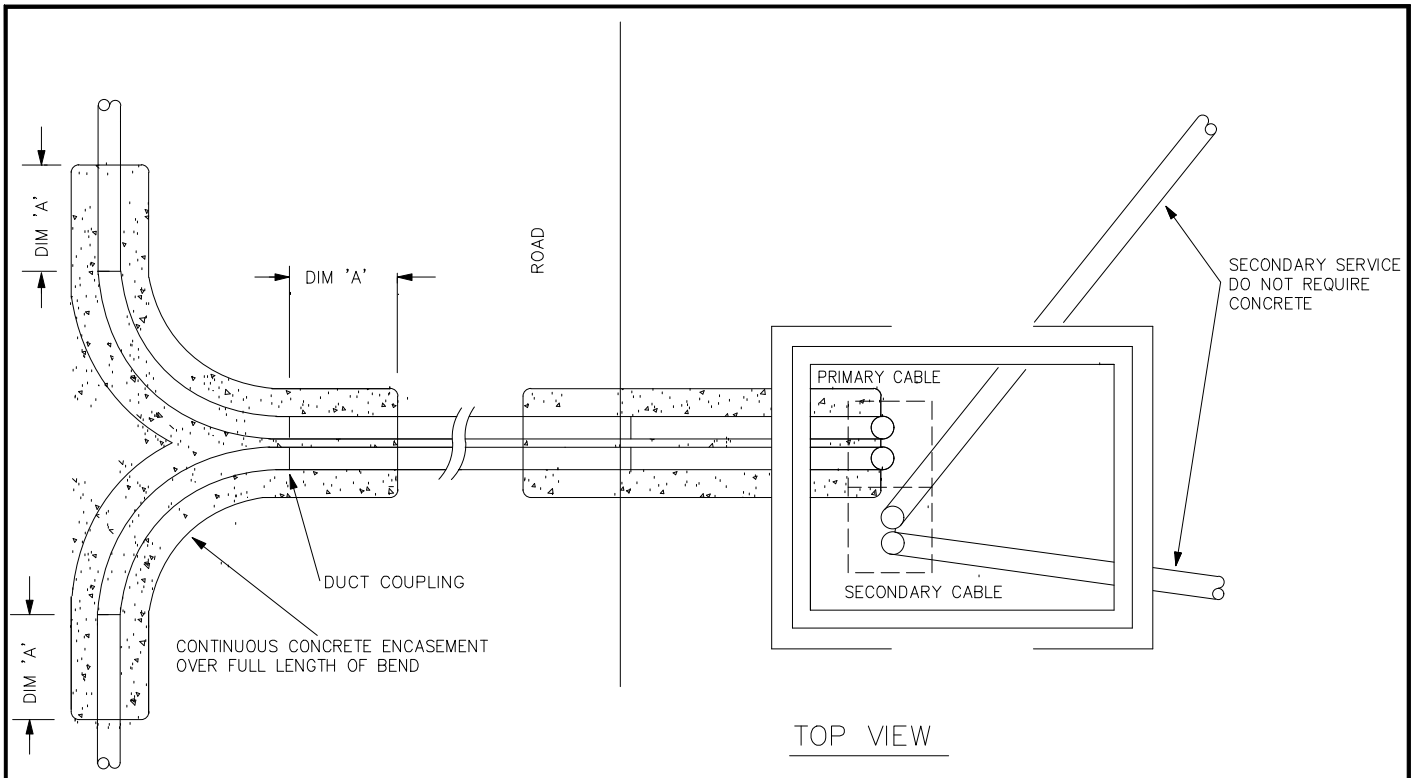
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. C. WALDEN
37120
2016-03-23

ORIGINAL ISSUE		
AUTHOR	SS	JAN/08
CHECKED	NG	SEPT/08
APPROVED	BMB	SEPT/08

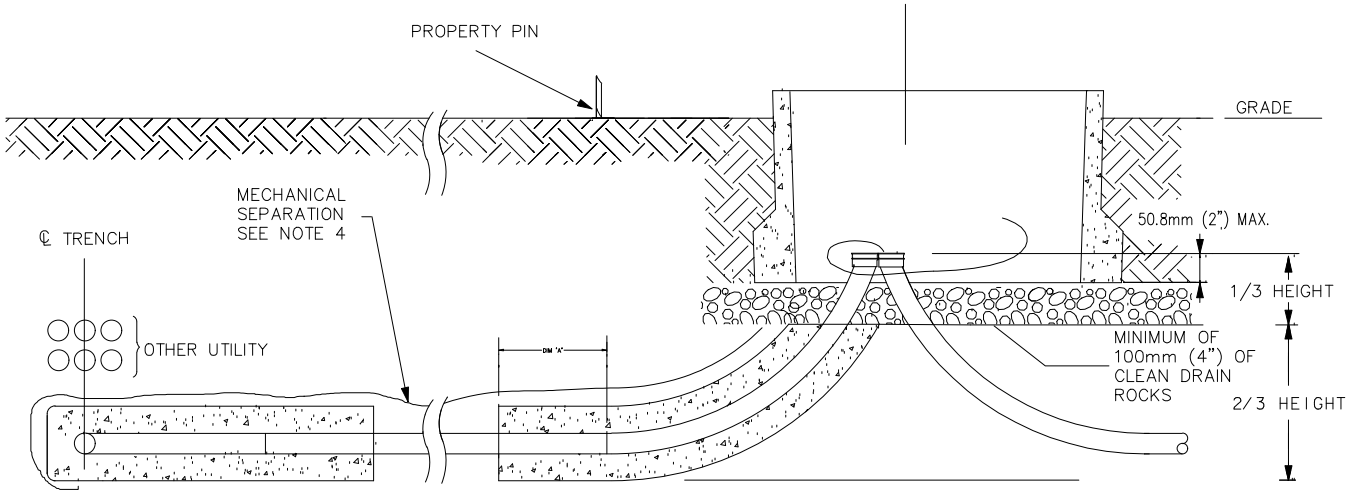
FORTIS BC

UNDERGROUND STRUCTURES
ABOVE GRADE 200A JUNCTION
BILL OF MATERIALS
BOM SHEET 1 OF 1

DRAWING No.	REV
1598	1



TOP VIEW



SECTION VIEW

NOTES:

1 – UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWING ALL PRIMARY PVC SWEEPS, EXCEPT SERVICE STUBS, TO BE CONCRETE ENCASED

2 – DIMENSION 'A' TO BE 4 TIMES NOMINAL PIPE DIAMETER. FOR 100mm (4") DUCT DIM 'A' = 400mm (16")

3 – STREET LIGHT DUCT DOES NOT REQUIRE CONCRETE ENCASEMENT

4 – MECHANICAL SEPARATION BETWEEN UTILITIES TO BE CONTINUOUS LAYER OF MINIMUM 6 MIL POLY SHEET OR 100mm (4") OF FINE CLEAN SAND

5 – CONCRETE REQUIRED ON ALL PRIMARY SWEEPS OR 90 DEGREE BENDS

FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2022-07-08

REVISION DATE	JUL/22	
AUTHOR	DHG	JUL/22
CHECKED	GRMD	JUL/22
APPROVED	DCW	JUL/22
DESCRIPTION OF CHANGE:		
REMOVED REFERENCES TO ENCASING SECONDARY CONDUIT		

P.ENG SEAL

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
D. H. GRETCHEN
52504

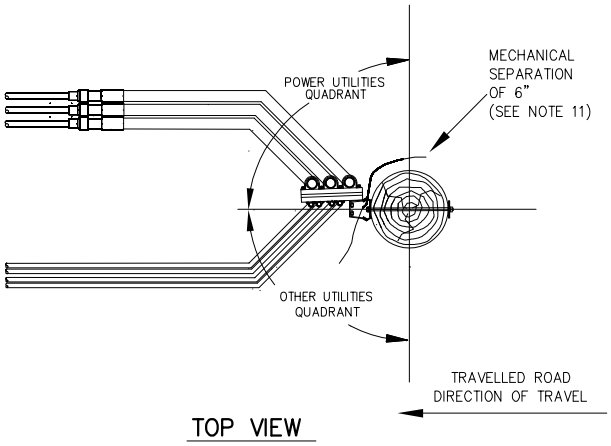
2022-07-08

ORIGINAL ISSUE		
AUTHOR		
CHECKED	NS	JUN/04
APPROVED	RS	JUN/04

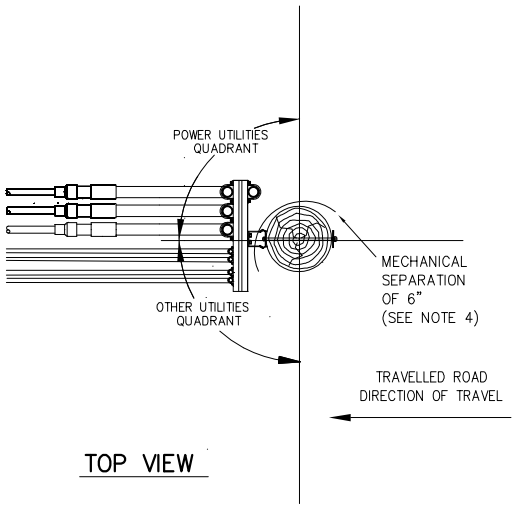
FORTIS BC

UNDERGROUND ASSEMBLY DRAWINGS
PALCEMENT OF FACILITIES
CONCRETE ENCASEMENT - BENDS
SHEET 1 OF 1

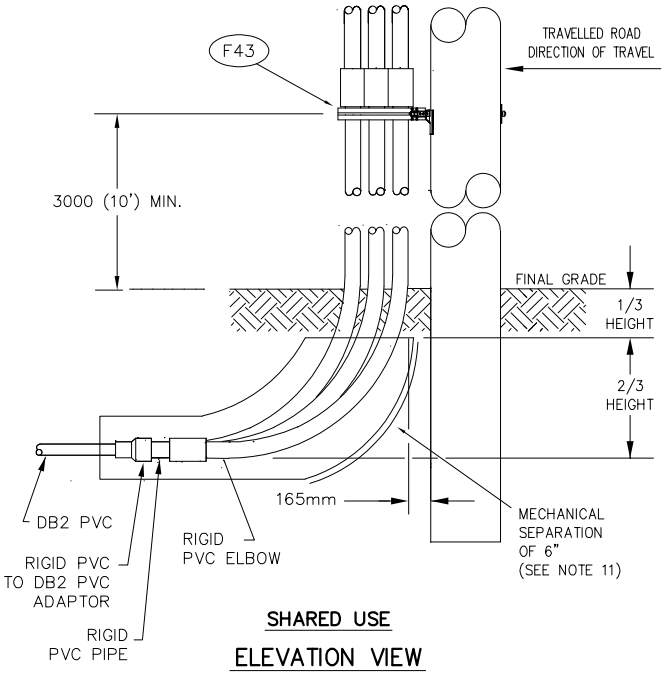
DRAWING No.	REV.
F-20	5



TOP VIEW

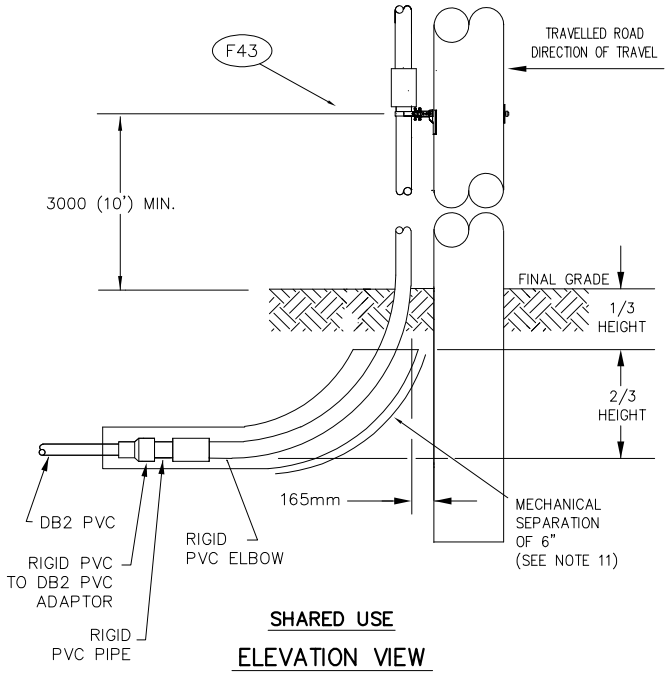


TOP VIEW



SHARED USE

ELEVATION VIEW



SHARED USE

ELEVATION VIEW

NOTES:

1 – VARIATION TO THIS ARRANGEMENT SHALL BE APPROVED BY FORTIS.

2 – DUCTS SHALL BE GROUPED AS CLOSELY AS POSSIBLE TO OTHER UTILITIES.

3 – BOLTS SHALL NOT BE TIGHTENED AS TO DEFORM THE DUCT.

4 – DUCTS SHALL NOT BE ENCASED IN PHONE COMPANY CONCRETE PILASTER.

5 – PVC CONDUIT TO BE CONCRETE ENCASED. ALL DUCT TO BE PVC.

6 – POWER UTILITY'S QUADRANT MAY BE SWITCHED BY SPECIAL PERMISSION FROM FORTIS.

7 – CUT THE END OF THE BOLT FLUSH WITH THE POLE

8 – UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWING ALL PVC SWEEPS, PRIMARY AND SECONDARY TO BE CONCRETE ENCASED.

9 – STREET LIGHT DUCT DOES NOT REQUIRE ENCASEMENT

10 – MECHANICAL SEPARATION BETWEEN UTILITIES TO BE CONTINUOUS LAYER OF MIN 6 MIL POLY SHEET OR 100 MM (4") OF FINE CLEAN SAND.

11 – ANY MECHANICAL SEPARATION TO KEEP CONCRETE MIN 6" FROM POLE

FortisBC INC. 1001962

Digitally signed by Dane Gretchen 2021-09-24

REVISION DATE	JUL/21	
AUTHOR	GAHO	JUL/21
CHECKED	DDGP	JUL/21
APPROVED	DHG	JUL/21

DESCRIPTION OF CHANGE:

REPLACED CAPPING W/ ENCASEMENT

UPDATED TITLE, NOTES 5, 8, AND 9

P.ENG SEAL

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA D. H. GRETCHEN # 52504

2021-09-24

ORIGINAL ISSUE		
AUTHOR		
CHECKED	NS	JUL/02
APPROVED	RS	JUL/02

FORTIS BC

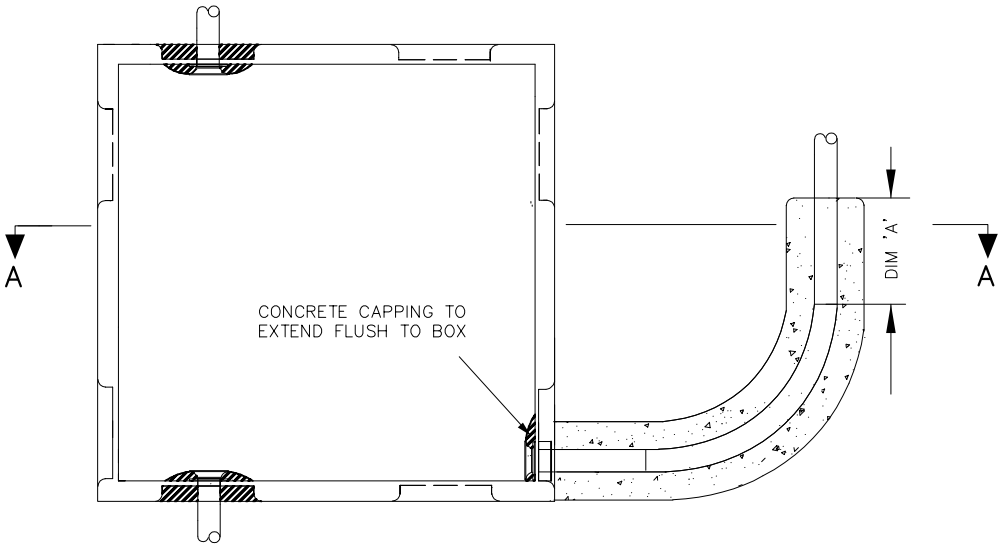
UNDERGROUND ASSEMBLY DRAWINGS

PALCEMENT OF FACILITIES

CONCRETE ENCASEMENT - POLE RISER

SHEET 1 OF 1

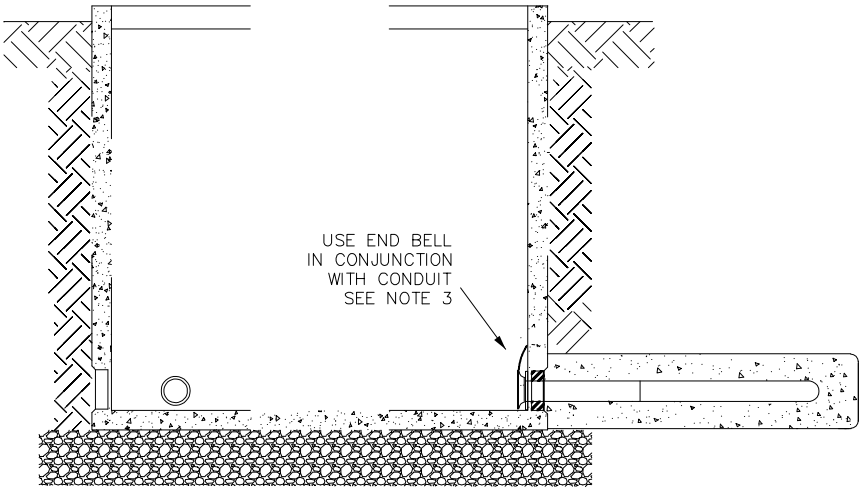
DRAWING No.	REV.
F-21	3



PLAN VIEW

HATCH DETAIL

GROUT



SECTION 'A–A'

NOTES:

1 – UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWING ALL PVC SWEEPS, PRIMARY AND SECONDARY, TO BE CONCRETE ENCASED.

2 – MECHANICAL SEPARATION BETWEEN UTILITIES TO BE CONTINUOUS LAYER OF MINIMUM 6 MIL POLY SHEET OR 100mm (4") OF FINE CLEAN SAND.

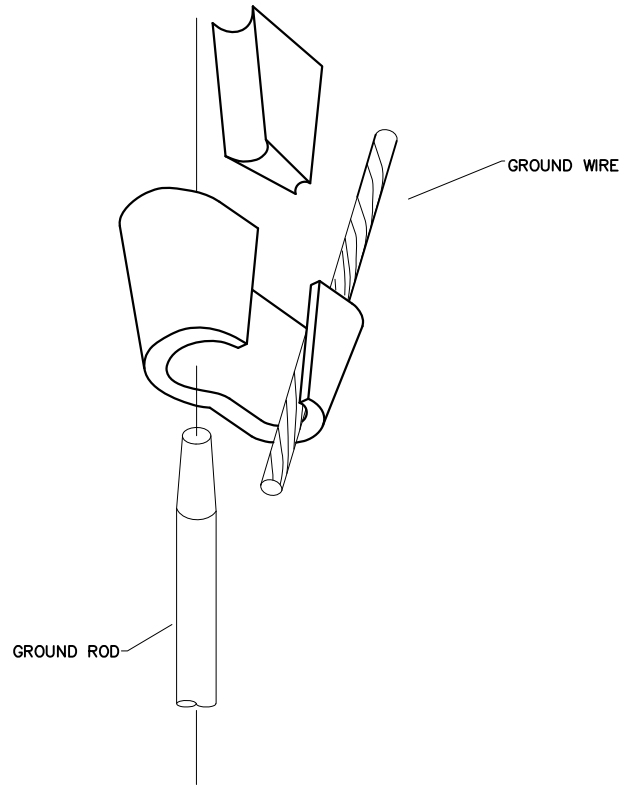
3 – BELL END SHOULD BE FLUSH OR NOT EXCEED 2" PAST BOX WALL

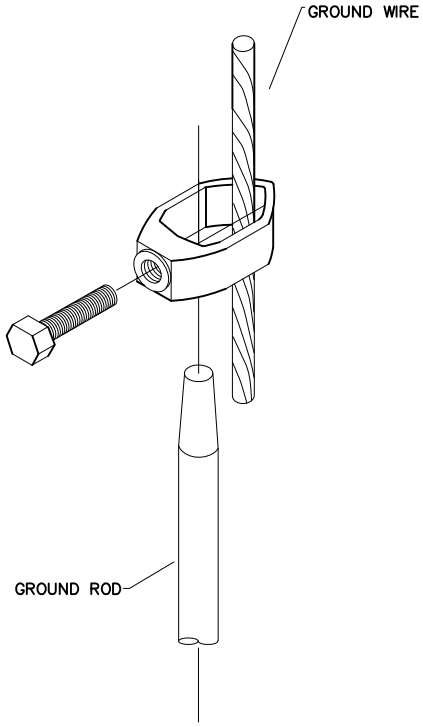
4 – DIMENSION 'A' TO BE 4 TIMES NOMINAL PIPE DIAMETER. FOR 100mm (4") DUCT DIM 'A' = 400mm (16")

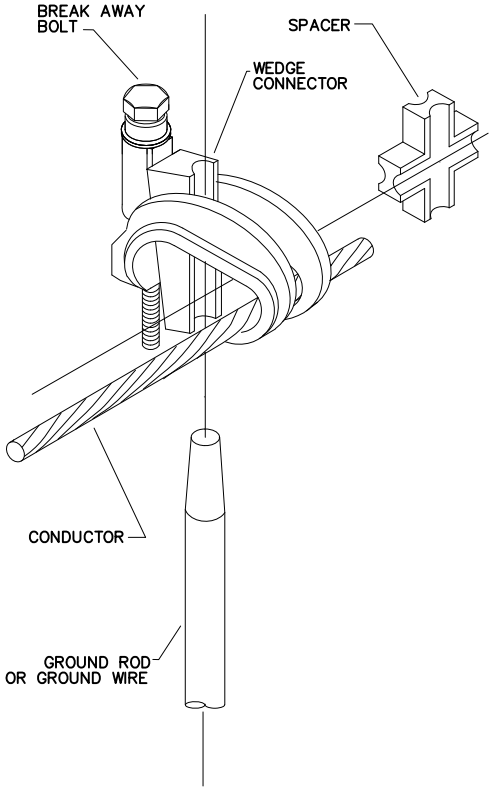
FortisBC INC.
1001962

Digitally signed by
Dane Gretchen
2021-09-24

REVISION DATE	JUL/21		P.ENG SEAL	ORIGINAL ISSUE			UNDERGROUND ASSEMBLY DRAWINGS
AUTHOR	GAHO	JUL/21		AUTHOR			PALCEMENT OF FACILITIES
CHECKED	DDGP	JUL/21		CHECKED	NS	DEC/02	CONCRETE ENCASEMENT - DEEP BOX ENTRY
APPROVED	DHG	JUL/21		APPROVED	RS	DEC/02	SHEET 1 OF 1
DESCRIPTION OF CHANGE: REPLACED CAPPING W/ ENCASEMENT UPDATED TITLE, NOTE 1			PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA D. H. GRETCHEN # 52504 2021-09-24	FORTIS BC			DRAWING No. F-23 / REV. 4







REV	DATE	BY	CHECKED	DESCRIPTION	APP.	DATE
6						
5						
4						
3	JUL/09	BD	BD	GENERAL REVISION	AK	JUL/09
2	FEB'08	TD	NG	ADDED CONNECTOR FOR SERVICE BOX	BMB	FEB/08
1	NOV'04	NS	NS	ADDED ALTERNATIVE GROUND CONNECTOR	FC	NOV'04

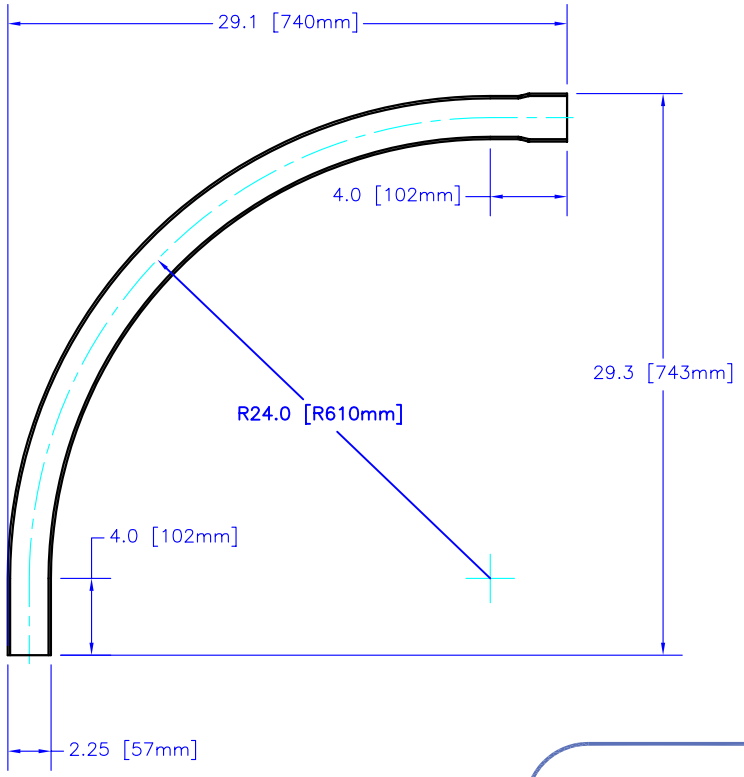
DRAWN BY		
CHECKED BY	NS	JAN'02
APPROVED BY	FC	JAN'02

GROUND ROD ASSEMBLY

FORTISBC

DRAWING No.	REV.
G–23	3

Appendix C – Conduit Manufacturer Drawings



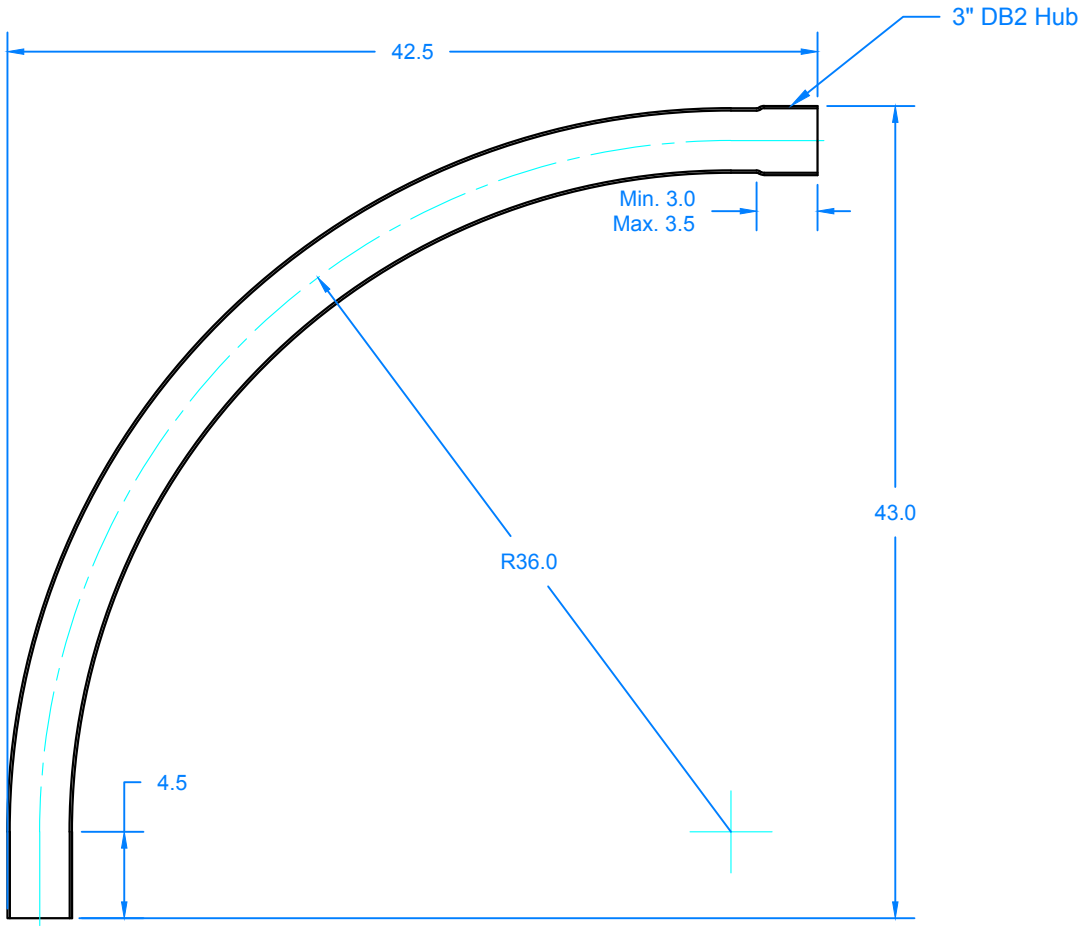
FIRST UNITS ARE IN INCHES [SECOND UNITS ARE IN MILLIMETERS]

DIMENSIONS ARE SUBJECT TO CHANGES WITHOUT NOTICE. CONFIRM DIMENSIONS WHEN ORDERING

DRAWING FILE: M:\LERON PART NUMBER\

Royal Pipe Systems

Royal Pipe Systems		
Part Description: BEND DB2 02x90' 24"R HxS		
Part Category: DB2 BENDS		
DRAWN BY: Alan Li	SCALE: 1:10	DATE: Apr. 1, 09
APPROVED BY: P. CREELMAN	REVISION NO:	
DRAWING NO.:	PART NUMBER: 90B2X24	



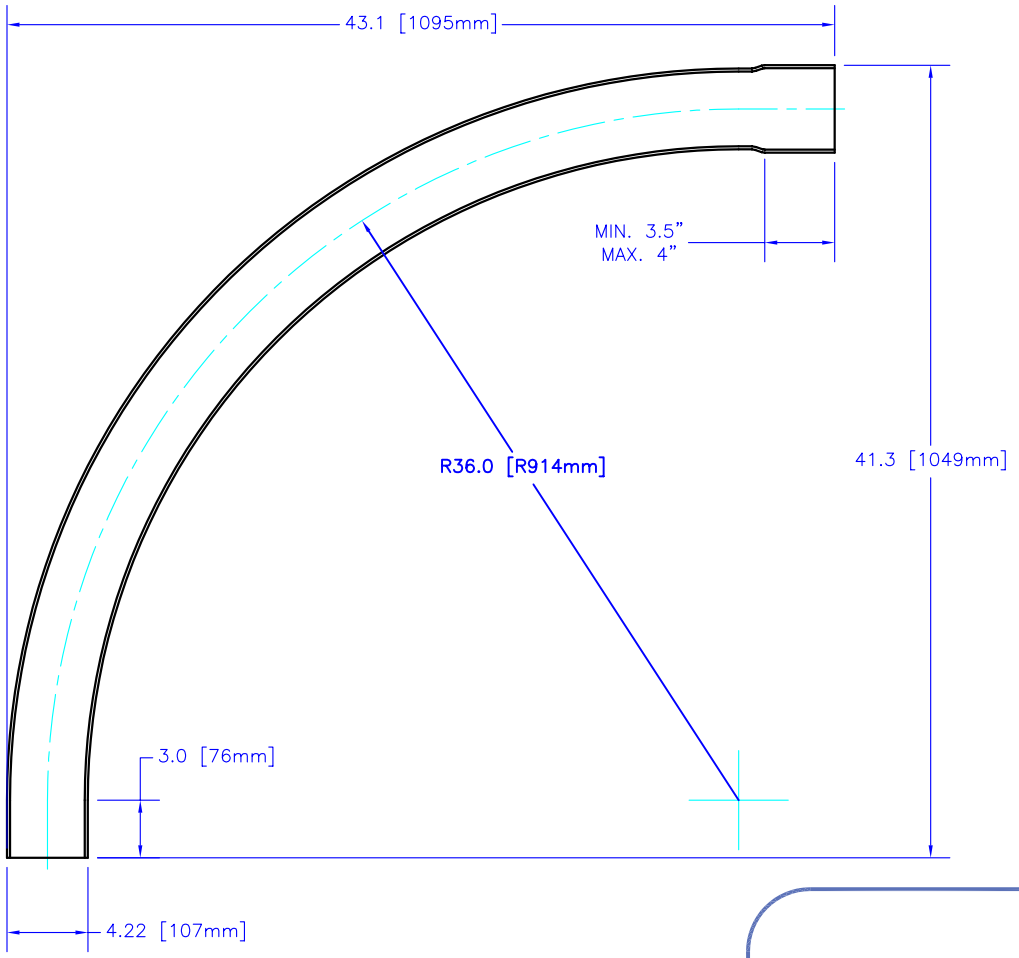
ALL UNITS ARE IN INCHES

DIMENSIONS ARE SUBJECT TO CHANGES WITHOUT NOTICE. CONFIRM DIMENSIONS WHEN ORDERING

DRAWING FILE: H:\Shared\Alan.LI\cad\TEL&DB2\90B3X36.dwg

ROYAL Municipal Solutions

PART DESCRIPTION: BEND DB2 3"X90° R36" HXS			
PART CATEGORY: DB2 BENDS			SCALE: N.T.S.
DRN BY: A. LI	APPRV BY: P. CREELMAN	DATE: 11/23/16	SHEET: 1-1
DWG NO.:	PART NUMBER: 90B3X36		



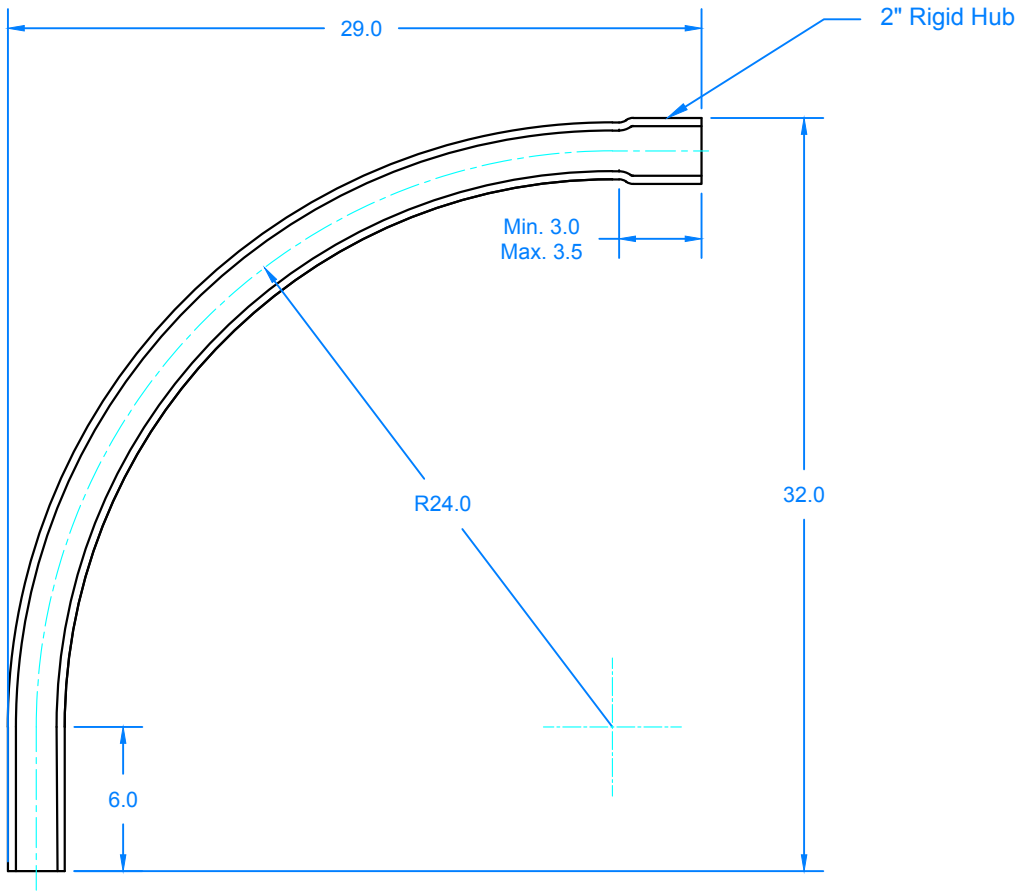
FIRST UNITS ARE IN INCHES [SECOND UNITS ARE IN MILLIMETERS]

DIMENSIONS ARE SUBJECT TO CHANGES WITHOUT NOTICE. CONFIRM DIMENSIONS WHEN ORDERING

DRAWING FILE: M:\LERON PART NUMBER\

Royal Pipe Systems

Royal Pipe Systems		
Part Description: BEND DB2 04x90' 36"R HxS		
Part Category: DB2 BENDS		
DRAWN BY: Alan Li	SCALE: 1:10	DATE: Apr. 1, 09
APPROVED BY: P. CREELMAN	REVISION NO:	
DRAWING NO.:	PART NUMBER: 90B4X36	



ALL UNITS ARE IN INCHES

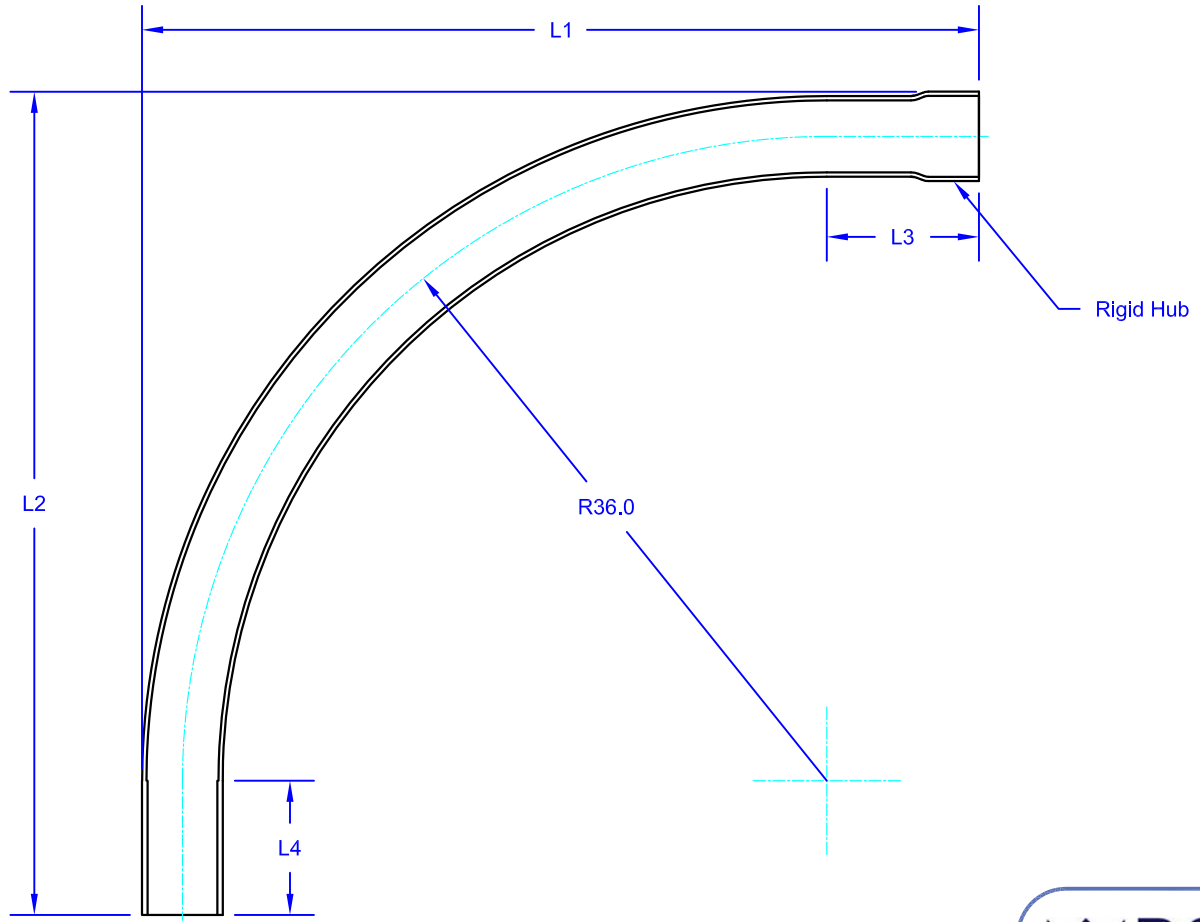
DIMENSIONS ARE SUBJECT TO CHANGES WITHOUT NOTICE. CONFIRM DIMENSIONS WHEN ORDERING

DRAWING FILE: H:\Shared\Alan.LI\cad\RIGID CONDUIT\REE359024.dwg

ROYAL Municipal Solutions

PART DESCRIPTION: BEND RIGID 2" X 90° R24" HXS			
PART CATEGORY: RIGID BENDS			SCALE: N.T.S.
DRN BY: A. LI	APPRV BY: P. CREELMAN	DATE: 11/23/16	SHEET: 1-1
DWG NO.:	PART NUMBER: REE359024		

SIZE	PART#	DIMENSIONS			
		L1	L2	L3	L4
2"	REE359036	42.0	42.5	5.0	5.0
2.5"	REE409036	45.3	45.7	8.0	8.0
3"	REE459036	42.5	43.0	5.0	5.0
4"	REE559036	46.8	46.0	8.5	8.5



ALL UNITS ARE IN INCHES

DIMENSIONS ARE SUBJECT TO CHANGES WITHOUT NOTICE. CONFIRM DIMENSIONS WHEN ORDERING

ROYAL Electrical Solutions

PART DESCRIPTION: BEND RIGID 2", 2.5", 3" and 4" X 90° R36 HxS			
PART CATEGORY: RIGID BENDS			SCALE: N.T.S.
DRN BY: A. LI	APPRV BY:	DATE: 9/14/15	SHEET: 1-1
DWG NO.:	PART NUMBER: REE--9036		

DRAWING FILE: H:\Shared\Alan.LI\cad\RIGID CONDUIT\REE--9036.dwg