

City of Richmond Engineering Department Supplementary Specifications and Detail Drawings

Version 3, November 2016



**City of Richmond
Engineering Department**

**SUPPLEMENTARY SPECIFICATIONS
AND DETAIL DRAWINGS**

(To complement Master Municipal Construction Documents (MMCD) – Platinum Edition)

The following MMCD Supplemental Updates have been adopted:

- **MMCD Platinum Edition Supplemental Update November 02, 2015**
- **MMCD Platinum Edition Supplemental Update September 19, 2014**
- **MMCD Platinum Edition Supplemental Update July 15, 2014**
- **MMCD Platinum Edition Supplemental Update February 28, 2014**
- **MMCD Platinum Edition Supplemental Update June 13, 2013**
- **MMCD Platinum Edition Supplemental Update Aug 7, 2012**
- **MMCD Platinum Edition Supplemental Update Jun 8, 2012**
- **MMCD Platinum Edition Supplemental Update May 30, 2012**
- **MMCD Platinum Edition Supplemental Update Aug 8, 2011**
- **MMCD Platinum Edition Supplemental Update Aug 4, 2011**
- **MMCD Platinum Edition Supplemental Update May 18, 2010**
- **MMCD Platinum Edition Supplemental Update Mar 25, 2010**
- **MMCD Platinum Edition Supplemental Update Nov 19, 2009**

This is a live document and therefore is subject to changes and revisions. To ensure that you have the most recent version, visit www.richmond.ca

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SCHEDULE A

SCHEDULE A

SCHEDULE A

SUPPLEMENTARY SPECIFICATIONS FOR CIVIL, ROADWAY LIGHTING AND TRAFFIC SIGNAL WORKS

PREAMBLE

The following Supplementary represent additions, amendments and deletions to various Specifications in the Master Municipal Construction Documents (MMCD) – Platinum Edition to suit the requirements of the City of Richmond.

The City of Richmond Supplemental Specifications and Detail Drawings, and the MMCD Platinum Edition, are minimum standards. Designs shall be engineered to provide required service levels on a site-specific basis.

SUPPLEMENTARY SPECIFICATIONS

- All Supplementary Specifications clauses will be suffixed with “ss” with the keywords for the changes in **bold**.
- The original specification to be changed is always deleted and replaced with the applicable Supplementary Specification.
- It is the user’s responsibility to check for updates/addenda to this specification.
- **Personnel responsible for conduit installation is required to have the appropriate raceway certification.**

Section 01 52 01 – Temporary Structures			
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Add the following			
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1.0	.3 (ss) new	General	Location to be pre-approved by Contract Administrator.
1.1	.4 (ss) new	Section Includes	Portable washrooms.

Section 01 53 01 – Temporary Facilities			
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Add the following			
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1.0	.3 (ss) new	General	Location to be pre-approved by Contract Administrator.
1.6	.2 (ss) new	Hoarding	A license to encroach agreement is required for all hoarding structures on City property.

Section 01 55 00 – Traffic Control, Vehicle Access and Parking

Add the following

1.4	.14 (ss) new		Open excavation to be backfilled before the Contractor leaves the site at the end of the working day with the exception of a maximum of 12 m length (measured at the surface) that can be left open. At the discretion of the City, plating of the excavation may be permitted. Refer to 3.8.3 (ss) of Section 32 12 16, for paving requirements.
	.15 (ss) new		Maximum length of plate in a travel lane to be 12 m. Plates to be secured by pins and temporary asphalt ramp at edges of plates.
	.16 (ss) new		Authorized open excavation during non-working hours to be fenced off to prevent pedestrian access and a temporary vehicle barrier to be placed between the travel lane of traffic, if the excavation is within 1.5 m of the travelled roadway. The barrier to be a minimum of Transportation Association of Canada (TAC) standard.

Section 01 57 01 – Environmental Protection

Add the following

1.2.	1.4 (ss) new	Temporary Erosion and Sediment Controls	Pre-test all groundwater before conducting any dewatering activity to ensure that water quality is acceptable to Federal and Provincial requirements. Ensure quality of water discharged from work or extracted from ground is meeting Federal and Provincial requirements as well as the City's Pollution Prevention and Clean Up Bylaw No.8475, for discharging into watercourses and storm sewers and Greater Vancouver Storm and Sanitary District requirements for discharging into sanitary sewers throughout the dewatering period.
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Section 03 30 20 – Concrete Walks, Curbs and Gutters			
Delete			
		3.2.1 3.4 3.5.7 3.7.1	3.9.1 3.9.4 3.11.2 3.15.2
Add the following			
3.2	.1 (ss)	Subgrade Preparation	Place 115mm of – Granular base and 150mm of – 19mm clear crush rock as sub-base for curb and gutter and minimum of 100mm granular base material to design grade as shown on Contract Drawings, including Supplementary Detail Drawings .
3.4	(ss) new .2 (ss) new	Inspection and Survey	City survey checks to be performed on the same day as concrete placement.
3.5	.7 (ss)	Concrete Placement	Place concrete in forms, ensuring no segregation of aggregate and consolidate with approved mechanical vibrator or power screed unless otherwise specified .
3.5	.12 (ss) new	Monolithic Pour	No monolithic pours of concrete between sidewalk, driveways, driveway crossings and curb and gutter unless specifically shown on Contract Drawings or approved by Contract Administrator.
3.7	.1 (ss)	Driveway Crossings and Wheelchair Ramps	Construct driveway crossings and wheel chair ramps where shown on Contract Drawings to Standard Detail Drawings and directional wheelchair ramps to Supplementary Detail Drawing R-12-SD and lowered driveway crossings to Supplementary Detail Drawing R-16-SD .
3.9	.1 (ss)	Expansion Joints	Form transverse expansion joints at both ends of curb returns and at a maximum spacing of 9.0m for sidewalks, 9.0m for curb and gutter, at each end of driveway crossings, at tangent points on circular work, at catch basins, and driveway crossings .
3.15	.2 (ss)	Curing	Where temperature is below 5°C, maintain all concrete at temperature not less than 10°C for at least 72 hours and protect from freezing for at least another 72 hours or such time as required to ensure proper curing of concrete. Admixtures for prevention of freezing may only be used with the permission of the Contract Administrator .

3.17	.3 (ss) new	Acceptance	Minimum length of replacement of defective curb and gutter is 3.0m leaving a minimum of 3.0m existing.
3.19	.1 (ss) new	Temporary asphalt sidewalks	Temporary asphalt sidewalk shall be a minimum 50 mm asphalt over permanent sidewalk base. To be flush with adjacent sidewalk.
3.20	.1 (ss) new	Sidewalk replacement	Temporary or permanent sidewalk needs to be installed within 5 working days of concrete sidewalk removal.
3.21	.1 (ss) new	Highback curb	When replacing driveway letdown with highback curb, construct as shown on Supplementary Detail Drawing R-19-SD.

Section 26 42 13 – Cathodic Protection

Add the following

1.0.	.2 (ss) new	General	This section also applies to any other type of underground City infrastructure.
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Section 26 56 01 – Roadway Lighting			
Delete			
		2.5	2.14
		2.6	3.4.1 & 3.4.2
		2.7	3.5.1, 3.5.2, 3.5.3 & 3.5.5
		2.8.1	3.6.1, 3.6.2, 3.6.5, 3.6.7
		2.9	3.8.1, 3.8.3, 3.8.4, 3.8.6 to 3.8.11 (inclusive)
		2.10.1.1	3.9.1
		2.11	
Add the following			
1.3	.4 (ss)	Shop Drawings	Shop drawings for pole structures, where required, to be sealed by a Professional Engineer registered in British Columbia.
1.4	.4 (ss) new	Electrical Energy Supply	Arrange for and pay all necessary connection and disconnection fees charged by the Utility Company.
1.5	.1 (ss)	Contractor Qualifications	All electrical work to be performed by a Registered Electrical and Inspection Contractor under provisions of British Columbia Electrical Safety Act and licensed to do works within the City of Richmond.
1.6	.4 (ss) new .5 (ss) new .6 (ss) new	Permits and Tests	Contractor to arrange for all inspection of work as required by Contract Documents Obtain approval of all buried portions of the installation from the Electrical Energy Inspector and the City before any backfilling is commenced. Obtain certificate of approval from the Electrical Energy Inspector upon completion of all roadway lighting works and shall forward a copy of the said certificate to the Utility Company.
1.8	.2 (ss) new	Record Drawings	Final payment(s) will be withheld until record drawings are received.
2.2	.1.3 (ss) new .2.4 (ss) new .2.5 (ss) new	Conduit	Pipe, couplings, adaptors, bonds and fittings to be rigid steel hot dip galvanized. Only factory conduit bends acceptable. Each standard length of pipe, coupling, adaptor, bend and fitting to bear CSA certification label.
2.3	.1 (ss)	Trench Marker Tape	Minimum 150 mm wide, minimum 3.5 mil thick, heavy-duty polyethylene. Yellow with black letters displaying: "CAUTION – ELECTRICAL LINE BURIED BELOW"

	.3 (ss)		Poles and service base to be manufactured to meet or exceed Ministry of Transportation and Highways material standards, Section 301 - Traffic Signal, Luminaire and Sign Poles.
	.4 (ss)		Handholes to be supplied on poles on opposite side to direction of traffic.
2.8	.1 (ss) .5 (ss) new .5.1 (ss) .5.2 (ss) .5.3 (ss)	Conductors and Cables	Single conductors: 600V, conductor size (AWG) as noted on Contract drawings, stranded copper type RW90 <u>XLPE</u> insulated, to conform to CSA C22.2 No. 38, 90 ⁰ , and colour coded per CEC. Minimum conductor sizes to be as follows, unless specified otherwise on Contract Drawings: No. 6 AWG for feeder conductors in conduit. No. 8 AWG for bond conductors in conduit. No. 12 AWG for luminaire conductors in pole.
2.9	.1 (ss) new	Conductor Tags	Conductor tags in all pole handholes, junction boxes and all access points to be TY-RAP TY5532MX or approved equal.
2.10	.1 (ss) new	Conductor Connectors	Conductor connects to be Burndy Servit type KS. Soldered or screw type connections will NOT be accepted.
2.11	.1 (ss) new .2 (ss) new .3 (ss) new	Fuses and Fuse Holders	Fuses to be 10A Buss KTK for roadway lighting and 15A Buss KTK for roadway tree lighting. Fuse holders to be Elastimold or Buchanan 65 with 2 "L" type rubber insulating boots for single conductor and Elastimold or Buchanan D65 with 4 "L" type rubber insulating boots for two conductors. Fuses and fuse holders shall be rated at a minimum of 600V .
2.14	.1 (ss) .2 (ss) .3 (ss) .4(ss) .5 (ss) .6 (ss)	Luminaires	Luminaires to be City of Richmond pre-approved products. 120/240V dual ballast required for 120/240V and 240/480V 1Ø power systems and 347V for a 347/600V 3Ø power system. Refractors or lenses shall be glass only, for decorative luminaires acrylic or polycarbonate may be accepted upon prior approval by City of Richmond. Tempered glass shall be used for all flat glass lenses. Ballasts to generally be CWI type, CWA type may be accepted for 120V systems only upon prior approval by City of Richmond. Luminaires shall have an integral ballast with quick disconnect features.

	.7 (ss) .8 (ss) .9 (ss) .10 (ss)		HID lamp sockets to be Mogul base except for 100W metal halide City Centre luminaires which are to be medium base. Luminaire voltage, wattage and distribution type to be as specified on Contract Drawings. Confirm service voltage prior to ordering luminaires. Luminaire mounting to accommodate luminaire poles as shown on Contract Drawings and City of Richmond Detail Drawings.
2.18 new	.1 (ss) .1.1 (ss) .1.2 (ss) .1.3 (ss) .1.4 (ss)	Service Panels and Kiosks	Service panels and kiosks to be: City of Richmond pre-approved products; CSA approved, meet current Canadian Electrical Code requirements; EEMAC 3R enclosure manufactured out of stainless steel; and Type as detailed on Contract Drawings and City of Richmond Detail Drawings.
2.19 new	.1 (ss) .2 (ss) .3 (ss)	Grounding and Bonding	All grounding and bonding equipment to be in accordance with Canadian Electrical Code and latest Electrical Safety Branch amendments. Bond rigid steel conduits and junction box lids. Pole bonding as per City of Richmond Detail Drawings
2.20 new	.1 (ss) .2 (ss) .3 (ss)	Receptacles	Receptacle to be 15A-120V premium spec. grade corrosion resistant duplex. Cover to be double spring door type for wet locations (Crouse Hinds WLRD-1 or approved equal). Cover shall have Lamicaid name plate labelling maximum wattage
2.21 new	.1 (ss) .2 (ss)	Photocells and Receptacles	Photocell to be locking type, 120V, 208-277V and 347V or approved equal. Photocell receptacles to be locking type or approved equal.
2.22 new	.1 (ss)	HID Lamps	HID lamps to be Ministry of Transportation and Highways and City of Richmond pre-approved products.
2.23 new	.1 (ss)	Paint	Poles requiring painting to be supplied by pole fabricator. Paint specification and colour to be as specified on contract drawings. Finish coat shall be fully protected by pole fabricator to prevent any damage from occurring during shipping.

3.2	.1 (ss) .2 (ss) new	Excavating, Trenching and Backfilling	Refer to MMCD Section 31 23 01 - Excavating, Trenching and Backfilling in conjunction with City of Richmond Detail Drawings and Contract Drawings. Backfill shall be placed in lifts not exceeding 300mm in depth, each lift shall be compacted by approved means to obtain minimum compaction as specified in 3.2.1.
3.3	.1 (ss) new .7 (ss) new	Concrete Bases	Install concrete bases as shown on City of Richmond Detail Drawings and Contract Drawings. Use special precautions when installing bases near curb, gutter and sidewalk as to prevent undermining, breaking and cracking.
3.4	.1 (ss) .2 (ss)	Junction Boxes	Install junction boxes as shown on City of Richmond Detail Drawings and Contract Drawings. Install boxes on concrete brick base and drain rock.
3.5	.1 (ss) .2 (ss) .3 (ss) .4 (ss) new .5 (ss) new .6 (ss) new .7 (ss) new	Underground Conduit	Install R.PVC underground conduits as shown on City of Richmond Detail Drawings unless shown otherwise on Contract Drawings. Minimum cover over conduits to be 1000mm unless specified otherwise on Contract Drawings. Place trench marker tape 300mm below finished grade. No run of conduit shall contain more than the equivalent of 4-90 degree bends. Conduits shall be blown out with compressed air, from both ends if necessary, then swabbed out to remove stones, dirt, water and other materials which may have entered during installation. Nylon pull line shall be placed in all conduits installed by open trench and trenchless technology ready for installation of conductors. Unused conduit stub ends to be capped and location marked.
3.6	.1 (ss) .2 (ss)	Poles and Related Equipment	Install poles and related equipment as shown on City of Richmond Detail Drawings and Contract Drawings. Where minimum pole to powerline clearances as shown on City of Richmond Detail Drawing cannot be maintained, advise the Contract Administrator and defer further work pending instructions.

	.5 (ss)		Install davit pole arms at right angle to street centerline
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	.7 (ss)		unless shown otherwise on Contract Drawings.
	.8 (ss)		Install poles with handholes positioned on opposite side to direction of traffic unless specified otherwise on Contract Drawings.
	.11 (ss) new		Mount base of pole on lower nuts and washers placed on anchor bolts prior to erection of pole. Then install upper nuts and washers and secure snugly. The upper and lower nuts shall then be adjusted to plumb luminaire pole. Pole base to be located at approximately centerline of anchor bolt projection.
			Conductors located between top of concrete base and the bottom of pole base shall be in conduit. Exposed conductors will not be accepted.
3.8	.1 (ss)	Wiring	Install wiring in pole handholes as shown on City of Richmond Detail Drawings and Contract Drawings.
	.4 (ss)		Single conductor sizes and colour to be as specified on Contract Drawings and City of Richmond Detail Drawings.
	.6 (ss)		Wire each luminaire and receptacle separately from base of pole. Run separate neutral and bonding conductor from base of pole to each luminaire and receptacle.
	.7 (ss)		Neatly arrange and bundle wiring in junction boxes, pole handholes and service panels. Conductor connectors in all access points to be installed in the up-right position, allowing for easy access, to the satisfaction of the Contract Administrator.
	.8 (ss)		Secure conductor splices with split bolt type connectors only. Looping of conductors with "T" taps will NOT be accepted.
	.9 (ss)		Sealing of connections in all junction boxes shall be double dipped with 3M Scotchkote and then taped with Bishop BI-Seal, Phillips Rotunda or 3M Self-Holding Tape or approved equal, wrap tape in between the conductors to further prevent water entering and cover with PVC tape. (Minimum 6 layers of each).
	.10 (ss) new		Sealing of connections in pole handholes shall be insulated 3 mm (1/8") thick all around with 3M Scotch 33 Tape or approved equal.
	.11 (ss)		Bond all luminaires, receptacles and steel junction box lids with a No. 12 RW90 green conductor.
3.9	.1 (ss)	Pole Mounted	Install pole mounted and tree receptacles as shown on

		and Tree Receptacles	City of Richmond Detail Drawings and Contract Drawings.
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Section 31 23 01 – Excavating, Trenching and Backfilling			
Delete			
		3.6.6.4 3.6.7.1 3.6.7.3 to .8	
Add the following			
3.6	.6.4 (ss) new	Temporary Pavement Patching	Place temporary pavement as per Supplementary Detail Drawing G-5-SD.
3.6	.7.5 (ss) new	Permanent Pavement Restoration	Restore pavement as detailed on Supplementary Detail Drawing G-5-SD and as per the current City pavement restoration bylaw.

Section 31 23 23 – Controlled Density Fill			
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Add the following:			
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3.4	.9 (ss) new	Pipe-Filling	Fill-in procedure to be submitted for approval by Contract Administrator.
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Section 32 01 11 – Pavement Surface Cleaning and Removal of Pavement Markings

Add the following:

3.1	.5 (ss) new	Removals	Painting over with black paint is not acceptable.
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Section 32 12 16 – Hot-mix Asphalt Concrete Paving			
Delete			
		2.2.2 3.3.4 3.4.5 3.5.4	3.7.3.4 3.7.5
Add the following			
2.2	.2 (ss)	Mix Design	Mix may contain up to a maximum 10% by mass of Recycled Asphalt content (RAP). The use of shingles (recycled) is not permitted in the design mix.
3.3	.4 (ss)	Preparation	When matching new pavement with existing pavement, saw-cut or grind to make a nearly vertical (about 10 degree) cut to ensure the new pavement to bear onto the existing pavement.
3.4	.5 (ss)	Transportation of Mix	Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within specified range. Temperature of mix upon placement shall be within 15°C specified in the mix design.
3.5	.4 (ss) new	Lift Thickness	Place asphalt concrete in compacted lifts of thickness as shown on the Contract Drawings or as approved by the Contract Administrator (must meet compaction requirements): .1 Levelling course(s) to thickness required but not exceeding 50mm each. .2 Lower course in layers not to exceed 50mm each. .3 Surface course in layers of maximum 60mm each. .4 Bicycle lanes separated by curb and gutter or boulevard can be installed in one lift of 75mm.
3.7	.3.1 (ss) .4 (ss) .5 (ss)	Joints	Offset longitudinal joints in succeeding lifts by at least 150 mm. Longitudinal joints should not be in wheel path. Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with a lute or rake. Ensure that no loose material is disposed or broadcast onto the freshly laid asphalt. Construct butt joints at locations and to the details as shown on Contract Drawings. .1 Apply bitumous tack coat to the edge of adjacent asphalt mat when temperatures of the asphalt mat drop below 80°C.

3.8	.3 (ss) new	Pavement Patching	All excavations associated with underground utilities on all roads are to be reinstated to initial full depth (temporary or not) with hot mix asphalt at the end of the working day or as directed by the Contract Administrator . Contractor responsible for continued maintenance including but not limited to dust control, sweeping, etc. prior to patching.
	.4 (ss) new	Trench	Minimum widths: For section line, arterial, collector and local roads with buses on it, initial trench dimensions to be in accordance with Supplementary Detail Drawing G-5-SD with full depth asphalt restorations. Final trench restoration to be in accordance with the current City Pavement Restoration bylaw. For local roads: Initial: G-5-SD with full depth restoration Final: G-5-SD
3.12	.2 (ss) new	Clean-Up	Clean up all side casted asphalt from curb & gutter and boulevards and remove from site.
3.13 new	.1 (ss) new	Settling Period	Roadways are subject to the following minimum settling period prior to final paving: Arterial Highway or Bus Route: 3 Months Local Road: 6 Months

Section 32 12 17 – Superpave hot-mix asphalt concrete paving

Add the following:

2.1	.2 (ss)	Materials	Mix may contain up to a maximum 10% mass of RAP (recycled asphalt content). The use of shingles (recycled) is not permitted in the design mix.
3.12	.2 (ss)	Clean-Up	Clean up all side casted asphalt from curb & gutter and boulevards and remove from site.

Section 32 17 23 – Painted Pavement Markings			
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Add the following:			
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3.3	.3.2 (ss)	Application	Temperature of surface to be marked shall not be less than 10°C or as per manufacturer's specifications.
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Section 33 01 30.1 – CCTV Inspection of Pipes

Delete

1.6.6

Add the following:

3.1	.12.1 (ss)	CCTV Inspection	Manhole (from to) using the City’s manhole numbering system.
	.12.1.10 (ss) new		Pipe length reference number will conform to the City’s standard practices.
	.12.1.11 (ss) new		If a pipeline requires a reverse run, due to blockage or obstruction, then it should be clearly indicated on the CCTV footage and on the report that it is a reverse run.
	.19 (ss) new		If the presence of debris or roots is obstructing the CCTV inspection, the Contractor will be required to remove the debris and/or roots in accordance with Section 30 01 30.2, Cleaning of Sewers, of these specifications and attempt to retelevisé the sewer line. The additional set up time for the second attempt will be payable under clause 1.6.8 (ss).
	.20 (ss) new		In the interest of quality control an initial sample section of the CCTV inspection area, approximately 200m long, is to be submitted to the City to be assessed and evaluated to ensure the inspection and reports comply with WRc standards. Any deviation from these standards will be noted and returned to the Contractor to be redone. Once rectified, reports are to be submitted to the Contract Administrator concurrently with CCTV inspection on a bi-weekly basis.
	.21 (ss) new		Detailed daily schedules specifying where CCTV inspection is taking place will be submitted in advance to the Contract Administrator.
	.22 (ss) new		The CCTV inspection shall be carried out in a continuous manner, without changing or moving between different locations or catchment areas, in accordance with the inspection plan unless obstructions or high flows do not allow this.

	.23 (ss) new		Should a manhole be found that is not shown on the City Record Plans, the Contractor shall identify, reference and add such manholes to the City's inventory, obtaining a manhole number from the City. Should the Contractor not be able to locate a manhole shown on the City Record Plans, the Contractor shall await instructions from the City.
	.24 (ss) new		If any manhole or pipe line to be inspected lies within private property, the Contractor shall acquire permission to inspect the pipe from the owner of the property at least 3 day in advance.
3.8	.3 (ss)	Inspection Reporting Hard Copies & Digital Format	Present report in 215 mm x 280 mm three ring (D type) binder. DVD-R will be incorporated into the binder in an appropriate DVD/CD binder sleeve.
3.13 (ss) new		Manhole Inspection	Contractor is to carry out a visual inspection of the inside of all manholes from street level, note and photograph structural defects e.g. condition of ladder rungs, grouting etc., and submit findings in a separate 215 mm x 280 mm three ring (D-type) binder with DVD-R containing photographs inserted at the back of the binder in appropriate DVD/CD binder sleeves. Report to be in the format of a four column table where the first column will contain the four digit manhole number, the second will contain the location of the manhole, the third will contain the number of the DVD-R where the photographs are stored, and the forth will contain noted defects. Photographs are also to be incorporated into the report, clearly labelled with the manhole number.

Section 33 01 30.2 – Cleaning of Sewers			
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Delete			
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		1.5.2	
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Section 33 05 23 – Trenchless Sewer Pipe Bursting

Add the following

1.0	.1 (ss)		Section 33 05 23 refers to those portions of the work that are unique to the supply and installation of High Density Polyethylene (HDPE) and restrained PVC gravity sewer main by-pipe bursting. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.
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Section 33 05 24 – Cured-in-Place-Pipe Liners

Delete the following

		1.5.1 3.5.3 3.8.3	
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Add the following

1.0	.2 (ss) new	General	The Supplementary Specification also covers the repairs of defective sewers at select locations by Trenchless Point Repair (TPR) methods utilizing Cured-in-place-pipe products.
1.5	.1 (ss)	Submissions	The Contractor shall submit for approval the following information to the Contract Administrator for each manhole to manhole section and TPR at least seven (7) days prior to the commencement of any site work:
1.5	.1.7 (ss) new		Documentation that the resin proposed for use has not exceeded its shelf life as recommended by the manufacturer of the resin.
	.1.8 (ss) new		Details of grout system proposed for void filling and an installation protocol for same.
	.2 (ss) new		An operations protocol outlining:
	.2.1 (ss) new		Resin impregnation protocol, identifying;
	.2.2(ss) new		Details of the wet-out operation.
	.2.3(ss) new		Documentation that the resin proposed for use has not exceeded its shelf life as recommended by the manufacturer of the resin.
	.2.4(ss) new		The volume of resin to be impregnated at each repair location including the proposed excess allowable for polymerization and migration into cracks and joints of the host pipe.
1.5	.3 (ss) new		Construction installation protocol identifying;
	.3.1 (ss) new		Proposed methods to fill voids outside the host pipe (where required).
	.3.2 (ss) new		Limiting capacity of the flow through bypass piping.

	.3.3 (ss) new .3.4(ss) new .3.5(ss) new .3.6(ss) new		<p>Details of the proposed liner installation method.</p> <p>Means of curing proposed (ambient, steam, etc.) and quality assurance procedures in-place to determine curing requirements are achieved.</p> <p>The minimum pressure to hold the tube tight against the existing conduit and the maximum pressure so as not to damage the conduit.</p> <p>Anticipated timing for execution of the point repair, and, if appropriate, for service lateral reinstatement.</p>
1.6	.4 (ss) new	Records	<p>Upon completion of the point repairs, the Contractor shall provide the Contract Administrator with an inspection report, containing the pre and post-lining inspections prior to Total Performance. An inspection report containing the warranty inspection shall be submitted prior to Final Acceptance.</p>
1.7	.2 (ss) new .2.1 (ss) new .2.2 (ss) new .2.3 (ss) new .2.4 (ss) new .3 (ss) new	Material Samples	<p>Physical samples of point repairs shall be taken in accordance with the following:</p> <p>The Contractor shall be prepared to construct 1 field sample during the course of the work. Samples shall consist of a section of repair material that has been inserted through a like diameter form and cured in the invert of the manhole under existing flow conditions.</p> <p>The minimum sample size shall be 200 mm in length by the full diameter. The sample shall be provided to the Contract Administrator intact in the form. The Contractor shall provide the necessary forms for sample forming and secure the samples. The Contractor shall coordinate and pay for material testing.</p> <p>A plate sample shall be prepared for each point repair undertaken in addition to the physical samples noted above from material taken from the actual repair (tube and resin) and cured in a manhole section adjacent to the repair for the duration of the repair.</p> <p>Where feasible, connection coupons of sufficient size shall be obtained from connection reinstatement operations.</p> <p>All physical samples of point repair shall be tested to confirm the flexural strength and flexural modulus in accordance with the requirements of ASTM D5813 and D790</p>

1.7	.4 (ss) new		The point repair liner thickness will be measured in accordance with the requirements of ASTM D5813 and ASTM D3567 for conformance with the design requirements
2.5	.1(ss) new	CIPP Point Repair Products	<p>Minimum material requirements for Internal CIPP point repairs shall conform to ASTM D5813 “Standard Specification for Cured-In-Place Thermosetting Resin Sewer Pipe” and the supplemental requirements noted herein.</p> <p>In accordance with ASTM D5813 and the supplemental requirements noted herein, CIPP point repairs shall be designed as either Type II for end use in a partially deteriorated conduit or Type III for and use in a fully deteriorated conduit. CIPP point repairs shall be carried out with Grade 1 – thermosetting polyester resin or Grade 2 – epoxy resin.</p>
2.6	.1 (ss) new .1.1 (ss) new .1.2 (ss) new	Approved Products for Grouting Outside the Host Pipe	<p>Where voids are required to be filled outside the host pipe they shall be filled with either.</p> <p>An acrylamide grout with appropriate additives for external grouting such as diatomaceous earth, silica flour, bentonite, or Portland cement.</p> <p>A hydrophilic urethane grout.</p>
3.1	.1 (ss) new .3 (ss) new .4 (ss) new .5 (ss) new	Workmanship and Finish	<p>Finished CIPP liners and point repairs shall conform to Clause 6.2 <i>Workmanship</i> of ASTM D5813 and the supplementary requirements noted herein.</p> <p>If the CIPP liner or point repair does not fit tight against the host pipe at its termination points or at connecting pipe(s), the interface shall be completely sealed with acrylic grout compatible with the CIPP repair system.</p> <p>The termination points of the CIPP liner or point repair shall provide a smooth and uniform flow transition from the host pipe to the repair for the full circumference of the repair.</p> <p>The CIPP liner or point repair shall be cut to reinstate the full diameter of the existing service connection. The finish of the cut out shall provide a smooth transition from the connection to the CIPP liner or point repair.</p>

3.3	.4 (ss)	Sewer Flow	If the prevailing flow condition in the sewer to be repaired
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	<p>new</p> <p>.5 (ss) new</p> <p>.6 (ss) new</p>	Management	<p>is substantially in excess of the flow through capacity of the Contractor's proposed point repair system the Contractor shall be responsible for bypassing existing sewer flow from upstream sewers during construction around the point of repair. Under no circumstances shall sewer flow be diverted directly to the environment of storm sewers.</p> <p>The Contractor shall review the Environment Canada weather forecast prior to commencement of CIPP repair operations.</p> <p>Where the anticipated weather conditions are such that anticipated sewer flow will substantially exceed the flow through capacity of the Contractor's proposed CIPP repair system, commencement of construction shall be delayed until favourable weather is forecast.</p>
3.4	<p>.2 (ss) new</p> <p>.3 (ss) new</p> <p>.4 (ss) new</p> <p>.5 (ss) new</p>	Verifying Existing Sewer Dimensions	<p>Prior to manufacture of the point repair fabric tube for any location the Contractor shall site verify dimensional requirements (diameter, length, etc.) for each section of sewer where CIPP repairs are proposed.</p> <p>At each location a minimum of 2 sets of measurements shall be made on each pipe to confirm the existing pipe's cross section dimensions. The measurements shall be made at the entrance to the pipe and at a distance of 500 mm or greater within the section.</p> <p>Cross section dimensions shall be obtained by the use of a set of calibrated calipers, a steel tape, or other suitable measuring device. A cloth or non-calibrated tape is not suitable for use. The measurements shall be accurate to +/- 1 mm.</p> <p>Dimensional requirements for the remainder of the pipe shall be estimated based on the dimensional checks and the television inspection available for viewing during the bidding process.</p>
3.5	<p>.3</p> <p>.3.1 (ss) new</p> <p>.3.2 (ss) new</p>	Preparation	<p>The Contractor shall perform all sewer inspection in accordance with CCTV Video Inspection Supplementary Specifications. A minimum of three sewer inspections shall be performed during the course of the work.</p> <p>Pre-CIPP repair inspection (after sewer cleaning and preparation for lining).</p> <p>Post-CIPP repair inspection (subsequent to execution of the repairs and any service lateral reinstatement).</p>
	.3.3 (ss) new		Warranty inspection – final acceptance.
3.5	.7 (ss)	Preparation	At locations where existing voids are noted outside the

	new		host pipe, either in the Bid Documents or in the pre-point repair inspection, the voids shall be filled with an approved grout material either prior to or after effecting the point repair in a manner approved by the Contract Administrator.
3.8	.3 (ss) .3.1 (ss) new .3.2 (ss) new .5.1 (ss) .7 (ss) new	Service Reconnection	<p>After the point repair has adequately cured, the Contractor shall reinstate any existing active sewer connections effected by the repair. Reinstatement shall be performed from the interior of the pipeline by means of a television camera and a remote controlled cutting device or by manual means in man accessible and man entry diameter ranges. Sewer connection reinstatement shall fully 100% of the original cross sectional area of the service.</p> <p>Reinstatement of service connections shall be performed in such a manner so as to remove the coupon with as much material intact as practical. All connection coupons shall be provided to Contract Administrator immediately subsequent to reinstatement.</p> <p>Manual re-opening is acceptable in large diameter pipes where permitted by Worksafe BC regulations.</p> <p>Any voids between the point repair liner and the existing sewer connection shall be grouted with approved non-shrink cement grout material.</p> <p>In areas where CIPP repairs span an existing connection pipe the Contractor shall confirm the status of the connecting pipe by dye testing methods.</p>
3.11	.1 (ss) new	Design Objectives for TPR	In regards to Design Objectives for Trenchless Point Repair, refer to Contract Documents or Contract Administrator.

Section 33 11 01 – Waterworks

Delete

		2.1.1 2.2.1 2.2.2.2 (joints) 2.2.4.3 2.2.4.9 and .10 2.2.4.12.1.7 2.2.4.12.3 2.2.4.13.1 to .4 2.2.5 2.3.2.1 & .3 2.3.7.1 and .2 2.5.1 2.5.3.3.2.2	2.6.1.1 and .2 2.6.1.8 2.6.2 2.6.3 2.7.3.2 2.8.1 2.9.1 2.2.6.3 3.4.3 3.6.6 3.10.1, .2 & .7 3.12.2 3.13 3.14.1 3.19.2 3.21.2 & .8
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Add the following

2.1	.1 (ss) .4 (ss) new	General	Pipe material as shown on Contract Drawings, excluding main pipe within chambers which shall be steel, and leads to fire hydrants which shall be PVC. All products are to comply with NSF/ANSI 61
2.2	.2.2 (ss) .2.3 (ss) new .2.4 (ss) new	Polyvinyl Chloride (PVC) Pressure Pipe	It is mandatory that joints for bell and spigot PVC pipe to be push-on integrally thickened bell and spigot type to conform ASTM D3139, Clause 6.2 with single elastomeric to ASTM F477. Provide a minimum of one pipe length, at the discretion of the City, for testing purposes. Provide a length of pipe for every 1000 m of pipe installed. All pipe shall be DR18 minimum.
2.2	.3.3.5 (ss) new	Fittings	Electrofusion couplings to ANSI/NSF61, FM1613, ASTM F1055 and AWWA C906 suitable for pressure rating specified and fusion of the main as specified in Contract Documents.

2.2	.4.5 (ss)	Fittings	PVC fabricated fittings shall conform to either AWWA C900 or AWWA C905 and be certified to CSA B137.3. Fabricated fittings to be made from CSA certified PVC pipe of the same pressure class or pressure rating as the pipe. Use of multi-sectional PVC fittings for pipes 300 mm diameter and greater is not permitted
2.2	.4.9 (ss) new	Nuts & Bolts, Tie rods and Nuts	All bolts, nuts, internally threaded couplings, washers and tie rods for assembling and securing waterworks fittings and all gate valves referred to in this Section to be stainless steel Type 304 and passivated with yield point of not less than 276 MPa. "A food grade lubricant" to be used on all bolts and nuts.
2.2	.4.12.3 (ss) new	Coupling and Flanged Coupling Adapters	Mechanical couplings shall be supplied with central register removed. All components to be coated with epoxy or polyurethane conforming to AWWA C210 or C222. Gaskets to be of the "plain gasket" variety made from rubber. All bolts, nuts and tie rods to 2.2.4.9 (ss) of this Section. Anti-corrosion protection to 3.14 (ss) of this Section.
2.2	.4.13.1 (ss) new	Joint Restraint Devices	EBAA and Uni-Flange or approved equal. All bolts, nuts and tie rods to Sub-section 2.2.4.9 (ss) of this Section. Anti-corrosion protection to 3.14 (ss) of this Section.
2.2	.6.3 (ss)	Steel Pipe	Finishes: Exterior coating shall be liquid epoxy to AWWA C210 or Liquid polyurethane to AWWA C222. Interior lining shall be NSF 61 certified and shall be liquid epoxy to AWWA C210 or liquid polyurethane to AWWA C222.
2.2	.7 (ss) new .7.1 (ss) new	Pipe delivery	All piping to be capped and plugged by the factory prior to delivery to site.
2.3	.2.1 (ss) .2.3 (ss)	Mainline Gate Valves	Location of resilient seated valves as shown on Contract Drawings. Resilient seated gate valve to AWWA C509: 100mm to 600mm to working pressure 1725 kPa (250 psi) ; grey cast iron or cast ductile iron body, resilient seated, non-rising stem, hub or flanged ends, manganese bronze or approved equal and passivated valve stems and nuts, open counter-clockwise with secured wrench nut.
2.3	.8.1 (ss) .8.2 (ss)	Service Valve Boxes	Curb stop valve boxes (300 mm from property line) or smaller services to be as per Detail Drawing W2b-SD. Curb stop valve boxes (300 mm from property line) on 32mm to 50mm dia. services to be as per Detail Drawing W2b-SD

2.5	.1 (ss)	Service Connections, Pipe, Joints and Fittings	Pipe diameter 19mm to 50mm to be Polyethylene to AWWA C901, Pressure Class 160 tubing certified to CSA B137.1 complete with tracer wire in accordance with manufacturer's recommendations.
2.5	.6 (ss) new .6.1 (ss) new 6.2 (ss) new	Small Water Meter	<p>Meter</p> <ul style="list-style-type: none"> - Residential meters to be sized down. - To be positive displacement rotating disk type and shall conform to AWWA C700. - To have bronze case and iron pipe thread connections. - To have bronze base plate for inside application, and plastic base plate for outside application. - Minimum flow at 5 psi head loss for 19mm meter to be 24 gpm and for 25mm diameter meter to be 41 gpm. <p>Registers</p> <ul style="list-style-type: none"> - Encoder- type remote registration conforming to the latest version of AWWA C707 - Power for data transmission to be supplied by an interrogation device. - To be compatible with various brands of interrogation equipment. - Six digit visual registration in unit of cubic meters together with a full test sweep hand or dial divided in graduations of 0.01m³. - Encoder to simultaneously encode in digital format at least six significant digits of the meter reading to one cubic meter and meter identification number through a remote receptacle. - Month and year of manufacture and other identification information to be clearly shown on the face - To have moisture protection for internal components. Contact and connections to be corrosion-proof. - Terminal to be provided with port cover or to be factory sealed. - Wheels used in the register assembly to be provided with spring type or magnetic sensing type contacts. - To be sealed to prevent tampering and base and mounting to be integral components to prevent disassembly with attachment to the meter via a bayonet attachment together with a tamper-proof plastic seal pin. - To be removable from the meter without disassembling the meter body and without taking the

			<ul style="list-style-type: none"> - meter out of service. - To be easily upgraded to Automated Meter Reading through adding a meter interface unit. <p>Materials to be compatible with the normal water meter environment and with the materials in the water meter itself.</p>
2.5	6.3 (ss) new		<p>Remote Receptacles</p> <ul style="list-style-type: none"> - To be either wall or pit mount style with wall mounted units to accept terminal screw connection when installed. - Without showing identity number and with no data storage or poser source. - To be corrosion and ultra-violet degradation resistant and unaffected by rain or condensation and suitable for rugged long service life. - To be provided with colour coded wire terminals (red, green and black) and incorporated with the function of a cable clamp or strain relief coupling. - To provide interrogation through inductive coupling to transfer data without physical connection of the reading device.
2.6	.1.1 (ss) .1.2 (ss) .1.8 (ss) .1.12 (ss) new .1.13 (ss) new .1.14 (ss) new	Hydrants	<p>Shut-off: compression type as specified in Contract Documents.</p> <p>Inlet connection: to be 150mm nominal diameter, bell type with harness lugs or all flanged boots.</p> <p>Opening direction: counter clockwise with minimum 15 turns to fully open except for type C-71P hydrant, which has 12 turns, will be acceptable.</p> <p>O-ring seal ball thrust bearing operation mechanism.</p> <p>Positive, mechanically activated drain mechanism.</p> <p>Hydrant barrel and stem to have a reduced strength self-sealing breakaway section.</p>
2.6	.2 (ss) - new	Hydrants	<p>Hydrant parts shall be thoroughly wire brushed and painted as follows: The outside of the bonnet and smaller port caps shall receive two coats of white oil paint. All other outside ferrous parts, which after installation of hydrant will be above ground line, shall be given two coats of Fire Hydrant Red oil paint. All remaining internal and external ferrous parts shall be coated with a tough, durable coating or epoxy or polyurethane conforming to AWWA C210 or C222, or other approved equal.</p>

2.6	.3 (ss)	Hydrants	Approved standard 150mm fire hydrants are Terminal City
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			C-71P Traffic Type, Terminal City No. 1, Brigadeer Type , 1, Canada Valve Century type or approved equal. Only one type of hydrant per contract is permitted.
2.7	.3.2 (ss) new	Curb Stop	40mm and 50mm to be 50mm cast iron gate valve reduced with brass bushings to suit pipe or ball type construction.
2.7	.5 (ss) new .5.1 (ss) new .5.2 (ss) new .5.3 (ss) new .5.4 (ss) new .5.5 (ss) new	Small Water Meter Installation - Materials	<p>Valve</p> <ul style="list-style-type: none"> - To be of bronze case with compression fitting on one end and meter flange on the other. - To be ball or cylinder type using rubber o-ring seals. - To be actuated through a curb stop style operating nut with a lock wing on the valve case. <p>Dual Check Valve</p> <ul style="list-style-type: none"> - To have a meter flange on the upstream side and a compression fitting on the downstream side. - To be submitted to Contract Administrator for approval for use. <p>Bolts and Nuts – See 2.2.4.9 (ss)</p> <p>Meter Box – For Boulevard Use</p> <ul style="list-style-type: none"> - To be made of HDPE material with the lid in green in colour and rated for pedestrian loading. - Internal dimensions to be 616 x 952 x 457 mm (24.25 x 37.5 x 18 inches). - To be submitted to Contract Administrator for approval for use. <p>Meter Box – For Sidewalk and Driveway Use</p> <ul style="list-style-type: none"> - To be concrete number T2-66 box with a steel lid pre drilled for a box mounted remote receptacle and with the meter box and lid rated for H20 traffic loading.
2.8	.1 (ss)	Granular Pipe Bedding and Surround Material	As shown on Standard Detail Drawings with materials for bedding and surround as specified on Contract Drawings
2.9	.1 (ss)	Backfill Material	As shown on Standard Detail Drawings with materials for backfill and as specified on Contract Drawings

3.4	.3 (ss) new	Concrete Bedding and	Open excavation to be backfilled before the Contractor leaves the site at the end of the working day. Backfilling of
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		Encasement	uncured concrete will not be permitted. At the discretion of the City, plating of the excavation may be permitted.
3.6	.6 (ss) new	Pipe Installation	Joint deflection not permitted for PVC pipe. Deflections in PVC pipelines to be achieved using pre-fabricated 5 degree PVC bends or high deflection PVC couplings, both rated for 1380 kPa operating pressure. For other pipes, do not exceed maximum joint deflection specified in AWWA C600 or recommended by pipe manufacturer.
3.6	.10.11 (ss) new	Joints	Pipe joints to be wrapped with Denso tape within 3.0m horizontal or 0.5m vertical separation with storm and sanitary sewer including ditches as per Provincial Health Regulations. Pipe crossing within 0.5 m of a storm, sanitary sewer or ditch is to cross midway between joints. All joints to be wrapped 250mm either side for a total of 500mm linear coverage.
3.6	.10.12 (ss) new	Joints	Electrofusion couplings to be installed by certified trained personnel in accordance to manufacturer's recommendations. Contractor to provide copy of certificate.
3.6	.15 (ss) new	Crossing of Existing AC Watermain	Any crossings of existing AC watermains will be replaced with approved material by City Forces.
3.10	.1 (ss) .2 (ss) new .7 (ss)	Service Connection Installation	Install service connections to 3.6 of this Section and as shown on Supplementary Detail Drawings W2a-SD and W2b-SD , Contract Drawings or as directed by Contract Administrator. Construct service connections at right angles to watermain and property line unless otherwise directed by Contract Drawings or Contract Administrator. Tap main as shown on Supplementary Detail Drawings W2a-SD and W2b-SD , not closer to a joint nor closer to adjacent tapping than recommended by manufacturers, or 1.0m, whichever is greater. No two adjacent tappings on same pipe length to be on same plane of pipe.
3.10	.13 (ss) new	Tracer Wires	Tracer wire shall be 12 to 14 gauge coated copper and secured to top of pipe. Wrapping around the pipe will not be permitted. Install tracer wire on service connection. Tracer wire to be secured to connection and accessible to all valve boxes and / or meter boxes.
3.10	.14 (ss) new .14.1 (ss) new	Small Water Meter Installation	Water meter and meter box – Install in accordance with Supplementary Detail Drawing W2g-SD. - Meter box not to be located in present or future

	.14.2 (ss) new		vehicular parking or traffic areas. - All pipings to be aligned for meter to sit horizontally.
	.14.3 (ss) new		Radio Detect – Wall Mounted - Must be accessible for meter reading. - Install communication cable in accordance with the manufacturer’s instruction with length not exceeding 30.0m. Remote Receptacle – Meter Box Lid Mounted - Connecting cable to remote receptacle to be 1.8 m length minimum and of 22 gauges three colour wire. - Electrical connections to be waterproof.
3.10	.15.1 (ss) new	Service Connection installation	Sawcut adjacent curb on alignment of service connection and paint blue.
	.15.2 (ss) new		Grind or saw cut valve box frame on alignment of watermain or service connection as per W3a-SD
3.12	.2 (ss)	Hydrants	Install hydrant assemblies in accordance with AWWA Manual of Practice No. M17 and in accordance with Supplementary Detail Drawing W4a-SD, W4b-SD and W4c-SD.
3.13	(ss) new	Thrust Block	Thrust blocks shall not be used in the City of Richmond. Consideration for the use of thrust blocks will be given upon written application to the Contract Administrator.
3.14	.1 (ss) new	Corrosion Protection	Protect all metal fittings from corrosion by wrapping with 100mm wide Denso tape or approved equal.
3.19	.2 (ss)	Testing Procedure	With the exception of HDPE pipe, before pipe is filled with water, pipe bedding, installation of 75 x 300 mm (3” x 12”) wood blocking/wedges (pressure treated) underneath hydrants and valves and backfilling to be completed as required in this specification. Fill each section of pipe and allow to remain to be full of water for at least a period of 24 hours before commencement of any pressure test. Submit pipeline and appurtenances including fire hydrants to a test of 1035 kPa (150 psi) unless otherwise specified. Ensure that test pressure does not exceed pipe or thrust restraint design pressures. Minimum duration of test period to be 2 hours at 1035 kPa (150 psi) no leakage allowed. Maximum test pressure should not exceed those specified in CSA B137.3-Table 9.
	.7 (ss) new		Perform pressure and leakage testing of High Density Polyethylene (HDPE) piping to ASTM F2164, no leakage allowed.

3.21	.2 (ss) new	Disinfection and Flushing Procedures	Retain water containing not less than 25mg/L free chlorine in water system for a period of at least 16 h , in accordance with <u>AWWA C651</u> , Continuous Feed Method. Collect, using the sampling site procedures outlined, two samples a minimum of 15 min apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release. Submit outline of proposed disinfection procedure accompanied by marked up schematic drawing to Contract Administrator for approval 48 h in advance of commencement of disinfection.
3.21	.8 (ss) new	Disinfection and Flushing Procedures	After completion of chlorination, flush chlorinated water from system, hydrants and services until chlorine concentration in remaining water is higher than the incoming water by between 0 to 0.3 mg/L chlorine residual. Chlorine residual shall not exceed 0.5 mg/L. All chlorinated water including flushing water discharged upon completion of testing and flushing may be discharged into adjacent sanitary sewer system or trucked away. Contractor to notify GVSDD prior to discharging chlorinated and flushing water into sanitary sewer. Under no circumstances shall water be discharged into storm sewer system or natural streams without complete dechlorination.
3.21	.10 (ss) new	Disinfection and Flushing Procedures	Microbiological testing must be completed and accepted by the City prior to connection to the City system. Collection of the sample and analysis must be completed by an independent testing company approved by the City. The report received shall have a section specifically stating whether the results of the analysis pass or fail according to Provincial Requirements (Drinking Water Protection Act and Regulations). Sets of samples shall be collected every 100m (minimum two) plus one set from each the end of the line and at least one from each branch greater than one pipe length.
3.24	.1 (ss) new	Abandoned Watermains	Abandoned watermains in arterial, collector or bus routes to be filled with a control density fill or approved equal.

3.6	.14 (ss) new	Water-proofing concrete manholes and Inspection Chambers	Apply vapour barrier coating to concrete manholes and inspection chambers to ensure waterproofing.
3.6	.15 (ss) new	Crossings of existing AC sanitary sewer	Any crossings of existing AC sanitary sewers will be replaced by approved materials by City Forces.
3.10	.5 (ss) new	Service Connection Installation	Service connections 150mm or less to be SDR-28. Service connections larger than 150mm to be SDR-35
3.12	.1 (ss)	Leakage Testing - General	Upon completion of cleaning and flushing of each section, carry-out low pressure air leakage testing.
3.12	.4 (ss) new	Leakage Testing - General	Perform pressure and leakage testing of High Density Polyethylene (HPDE) piping to ASTM F1417.
3.16	.1 (ss) new	Short Term Deflection Test	Pass a mandrel (having a minimum dimension of 95% of base inside diameter of sewer pipe completely through pipes and appurtenances) or laser profiling, as approved by the Contract Administrator .
3.18	(ss) new	Video Inspection	The Contractor shall video inspect all completed sanitary sewers following completion of installation and at the end of the maintenance period prior to takeover . The video inspection report shall conform to Supplementary Specification Section 33 01 30.1 – CCTV Inspection of Pipelines. .1 Should video inspection indicate apparent deficiencies, Contract Administrator may direct Contractor to perform additional testing as follows. .2 Additional testing may include passing a mandrel (having a minimum dimension of 95% of base inside diameter of sewer pipe completely through pipes and appurtenances) or laser profiling, as approved by the Contract Administrator .
3.19	.5.2 (ss) new	Installation Standard	Mainline PVC and HDPE sewers:
3.21	(ss) new	Abandoned Sanitary Sewer	Abandoned sanitary sewers in arterial, collector or bus routes to be filled with a control density fill or approved equal.

Section 33 34 01 – Sewage Forcemain			
Delete			
		2.2.1 2.2.5.3 2.2.5.9 & .10 2.2.13.3 & .4 3.4.3 3.9 3.10.1 to .3	
Add the following			
2.2	.4.4 (ss) new	Electro-fusion couplings	Electrofusion couplings to FM1613, ASTM F1055 and AWWA C906 suitable for pressure rating specified and fusion of the main as specified in Contract Documents.
2.2	.5.9 (ss) new	Nuts, & Bolts Tie rods and Nuts	All bolts, nuts, internally threaded couplings, washers and tie rods for assembling and securing waterworks fitting and all gate valve and curb stop extension rods referred to in this Section to be stainless steel Type 304 and passivated with yield point of not less than 276 MPa. “Never Seez” or approved equal to be used on all bolts and nuts.
3.4	.3 (ss) new	Concrete Bedding and Encasement	Open excavation to be backfilled before the Contractor leaves the site at the end of the working day. Backfilling of uncured concrete will not be permitted. At the discretion of the City, plating of the excavation may be permitted.
3.6	.10.17 (ss) new	Joints	Electrofusion couplings to be installed by certified trained personnel and in accordance to manufacturer’s recommendations. Contractor to provide copy of certificate.
3.6	.10.18 (ss) new	Joints	Pipe joints to be wrapped with Denso tape within 3.0m horizontal or 0.5m vertical separation with storm and sanitary sewer including ditches as per Provincial Health Regulations. Pipe crossing within 0.5 m of a storm, sanitary sewer or ditch is to cross midway between joints. All joints to be wrapped 250mm either side for a total of 500mm linear coverage.
3.6	.11 (ss) new	Crossing of AC sewage forcemains	Any crossings of existing AC sewage forcemains will be replaced with approved materials by City forces.
3.9	(ss)	Thrust Blocks	Thrust blocks shall not be used in the City of Richmond. Consideration for the use of thrust blocks will be given upon written application to the Contract Administrator.

3.15	.6 (ss)	Pressure Testing Procedure	Perform pressure and leakage testing of High Density Polyethylene (HDPE) piping to ASTM F2164 and AWWA M55 ; no leakage allowed.
3.17	(ss) new	Abandoned Sewage Forcemains	Abandoned Sewage forcemains in arterial, collector or bus routes to be filled with control density fill or approved equal.
3.18	(ss) new	Video Inspection	<p>The Contractor shall video inspect all completed sanitary sewers following completion of installation and at the end of the maintenance period prior to takeover. The video inspection report shall conform to Supplementary Specification Section 33 01 30.1 – CCTV Inspection of Pipelines.</p> <p>.1 Should video inspection indicate apparent deficiencies, Contract Administrator may direct Contractor to perform additional testing as follows.</p> <p>.2 Additional testing may include passing a mandrel (having a minimum dimension of 95% of base inside diameter of sewer pipe completely through pipes and appurtenances) or laser profiling, as approved by the Contract Administrator.</p>

Section 33 40 01 – Storm Sewers			
Delete			
		2.1.1 2.1.2 2.3.3 2.5 2.6.6 2.6.8.1 2.7.1	3.4.3 3.6.6.1 3.6.6.2 3.12.1 &.2 3.13.5.2 3.15.2
Add the following			
2.1	.1 (ss) .2 (ss)	Concrete Pipe	Non-reinforced circular concrete pipe and fittings: to ASTM C14M class 3, minimum diameter 375mm , maximum diameter 600mm, designed for flexible rubber gasket joints to ASTM C443M. Reinforced circular concrete pipe and fitting: to ASTM C76M class III for all pipe greater than 600mm diameter and for 300mm diameter , designed for flexible rubber gasket joints to ASTM C443M.
2.3	.3 (ss) .6 (ss) new	PVC Pipe, Mainline Profile	Pipes to have factory assembled spigot gaskets and integral bell joint features; joints to conform to all requirements ASTM D3212; elastomeric gaskets to conform to ASTM F477 or manufacturer approved method . The use of spiral ribs is not permitted:
2.5	.1 (ss) new .2 (ss) new	High Density Polyethylene Pipe	Pipe .1 To AWWA C906 pressure class specified in Contract Documents. .2 Iron pipe size equivalent outside diameter. .3 To be compatible with specified mechanical joint fittings and valves without special adapters. .4 Other ribbed pipes of HDPE materials may be used where specified in the Supplementary Specifications or Contract Drawings. .5 Smooth transitions at invert for material and size changes. Joints .1 Heat butt fusion to ASTM D2657 and in accordance with manufacturer's recommendations. .2 Gasket joints for bell ends to ribbed HDPE pipes in accordance with manufacturer's recommendations. .3 Electrofusion couplings to be installed by certified trained personnel and in accordance to manufacturer's recommendations. Contractor to provide copy of certificate.

	.3 (ss) new		Fittings .1 Fabricated HDPE mitred fittings to AWWA C906 suitable for pressure rating specified in Contract Documents. .2 Moulded HDPE fittings to ASTM 3261 suitable for pressure rating specified and fusion to main pipe, dimensions as specified in Contract Documents. .3 Flanged joints to AWWA C906 flat faced stub end and loose hot-dip galvanized ductile iron (ASTM A536) backup ring drilling to ANSI B16.1, ANSI B16.5, or AWWA C207, class suitable for pressure rating specified in Contract Documents. .4 Nuts and bolts as specified for "Fittings" in this section. .5 Fittings for ribbed HDPE pipes to be compatible with the pipes specified.
2.6	.8.1 (ss) .8.3 (ss) new	Field installed Tees and Wyes	In-situ installation of tees and wyes into concrete, HDPE, PVC or steel spiral rib mainline pipes shall be made with approved PVC saddle installed to the manufacturer's specifications into a neatly cored hole in the pipe wall. Such installation may only be carried out in exceptional circumstances with specific prior approval of the Contract Administrator. Insertable tee's will only be permitted for new service connection to existing sewers. Manufactured wyes shall be used on all other new storm sewer systems. The use of electrofused tees and wyes to be approved by the Contract Administrator.
2.6	.11 (ss) new	Flexible Joints	Where connections join concrete pipes, manholes or catchbasins, provide flexible joints as shown on Supplementary Detail Drawing ST-19-SD .
2.9	.1 (ss)	Granular Pipe Bedding and Surround Material	As shown on Standard Detail Drawings with materials for bedding and surround and as specified on Contract Drawings
3.4	.3 (ss)	Concrete Bedding and Encasement	Open excavation to be backfilled before the Contractor leaves the site at the end of the working day. Backfilling of uncured concrete will not be permitted. At the discretion of the City, plating of the excavation may be permitted.
3.6	.6.1 (ss) 6.2 (ss)	Pipes on Curved Alignments	Concrete pipe and ribbed profile PVC plastic pipe. Do not exceed joint deflection recommended by pipe manufacturers or 3 degrees whichever is less. Smooth profile PVC pipe: for 100mm to 300mm sizes conform to required curvature by minimum bending pipe barrel through applying light manual pressure . For greater curvature, use 5 degree prefabricated PVC bends . Joint deflection not permitted for smooth profile PVC pipe.

3.6	.9.9 (ss) new	Joints	Pipe joints to be wrapped with Denso tape within 3.0m horizontal or 0.5m vertical separation with storm and sanitary sewer including ditches as per Provincial Health Regulations. Pipe crossing within 0.5 m of a storm, sanitary sewer or ditch is to cross midway between joints. All joints to be wrapped 250mm either side for a total of 500mm linear coverage.
3.6	.14 (ss) new	Crossing of AC storm sewers	Any crossings of existing AC storm sewers will be replaced with approved materials by City forces.
3.10	.1 (ss) .2 (ss) .3 (ss) .5 (ss) new	Service Connection Installation	Install service connections to 3.6 and as shown on Drawing ST-20-SD . Install 40 X 90 mm marker stake at service terminus. Paint and mark as shown on Supplementary Detail Drawing ST-20-SD. Where specified, install chamber at specified location, set plumb and to specified elevation as shown on Supplementary Detail Drawing ST-7-SD, ST-8-SD, ST-9-SD and ST-20-SD , as applicable. If inspection chamber located in driveway, lane or paved surface install cover or lid as shown on Supplementary Detail Drawing ST-8-SD, ST-9-SD and ST-20-SD as applicable. Service connections 150mm or less to be SDR-28. Service connections larger than 150mm to be SDR-35
3.12	.1 (ss) .3 (ss) new	Inspection and Testing	The Contractor shall video inspect all completed storm sewers following completion of installation and at the end of the maintenance period prior to takeover . The video inspection report shall conform to Supplementary Specification Section 33 01 30.1 –CCTV Inspection of Pipelines. Additional testing may include passing a mandrel (having a minimum dimension of 95% of base inside diameter of sewer pipe completely through pipes and appurtenances) or laser profiling, as approved by the Contract Administrator .
3.13	.5.2 (ss) new	Installation Standard	Mainline Plastic and HDPE sewers:
3.15	.2 (ss)	Perforated Drain Pipe	Drain pipe to be a 100 mm minimum and the insert at the catchbasin to be grouted in .
3.16	(ss) new	Abandoned Storm Sewers	Abandoned storm sewers in arterial, collector or bus routes to be filled with control density fill or approved equal.

Section 33 42 13 – Pipe Culverts

Delete			
		1.5.4 2.1 2.2.1 & .2	3.3 3.4.1.1 to .3
Add the following			
1.0	.2 (ss) new	General	Section 33 42 13 does not apply to ditch crossings and frontage tiles constructed by individual property owners with lines and levels not conforming to the future storm sewer design. For such ditch crossings and frontage tiles, the Richmond Watercourse Crossing Bylaw will apply.
2.2	.1 (ss) .2 (ss)	Concrete Pipe	Non-reinforced circular concrete pipe and fittings: to ASTM C14M class 3, minimum diameter 375mm , maximum diameter 600 mm, designed for flexible rubber gasket joints to ASTM C443M. Reinforced circular concrete pipe and fitting: to ASTM C76M Class III for all pipe greater than 600mm diameter and for 300mm diameter , strength class as shown on Contract Drawings, designed for flexible rubber gasket joints to ASTM C443M.
3.1	.4 (ss) new	Crossing of Existing AC Pipe Culverts	Any crossings of existing AC pipe culverts shall be replaced with approved materials by City forces.
3.4	.3 (ss) new	Joints Corrugated Steel Culverts	Use of mechanical coupler, construction joint or manhole when connecting to existing pipe culvert as permitted by Contract Administrator.
3.10	.2 (ss) new	Endwalls	PVC and fibreglass end walls may be considered. If accepted by the City, shop drawings shall be submitted for approval. Prefabricated headwalls can be used with permission from the Contract Administrator.
3.11	(ss) new	Abandoned Pipe Culverts	Abandoned pipe culverts in arterial, collector or bus routes to be filled with control density fill or approved equal.

Section 33 44 01 – Manholes and Catchbasins			
Delete			
		2.1.10.1 2.1.11 2.1.13 2.1.19 2.1.20 2.1.23	3.3.6.1 3.3.7 3.3.7 3.3.9 3.3.10 3.5.1 3.6.1
Add the following			
2.1	.7.4 (ss) new	Cast Iron Frame and Cover	Cover with at least two holes for lifting and ventilation and to have the words, “ RICHMOND STORM SEWER ” and a fish or “ RICHMOND SANITARY SEWER ”, cast in raised capital letters and pattern in the top face of the cover.
2.1	.10.1 (ss)	Precast Catchbasin Sections	As shown on Supplementary Detail Drawing ST-5-SD .
2.1	.11 (ss)	Catchbasin Leads	Catchbasin leads to be minimum 150mm diameter and of PVC DR28 .
2.1	.13 (ss) new	Catchbasin Frame and Grate	As shown on Supplementary Detail Drawings ST-5-SD, ST-6-SD. To be Dobney B25A or approved equal capable of withstanding H2O loading.
2.1	.19 (ss)	Inspection Chambers/ Lawn Drains	Inspection chambers/lawn drains to be as shown on Supplementary Detail Drawings ST-7-SD, ST-8-SD and ST-9-SD .
3.3	.5.1 (ss) new .5.1.1 (ss) .5.1.2 (ss) .5.1.3 (ss)	Manhole Installation	In order to allow sufficient manoeuvrability for CCTV camera inspection: 150 mm dia pipe installed at a 90 degree intersection requires at least 660 mm (26 in) separation. 200 mm pipe at a 90 degree intersection requires at least 500 mm (20 in) separation. Any larger pipe diameter will require at least 400 mm (16 in) separation.
3.3	.6.1 (ss) new		Manhole openings constructed in the field shall not exceed 150 mm larger than the outside pipe diameter. Under no circumstances shall there be less than 300 mm of intact and undamaged manhole remaining following opening construction.

3.3	.7 (ss) new	Manhole Installation	Connect PVC pipe to manhole or catchbasin using flexible joint, either sand coated pipe (maximum length of 300mm) or sand coated collar grouted in the wall using fast setting flexible grout, all as per ST-19-SD
3.3	.9 (ss) new	Manhole Installation	Set remaining precast riser sections plumb with joints consisting of cement mortar or gasket to ASTM C443M. Manhole ring joints to be grouted on inside and outside of manhole.
3.3	.10 (ss)	Benching	Where possible, form channelling using half-sections of pipe or suitable fittings. Bench to direct flow parallel to main flow of sewer. Form top of benching as high as half way up the sewer pipe to facilitate access to CCTV camera. Finish concrete to smooth surface using steel trowel.
3.3	.19 (ss) new	Paint Sanitary M.H. & I.C.	Paint outside surface of the completed sanitary manholes and inspection chambers with two coats of waterproof vapour barrier (Sika seal or approved similar) and left until thoroughly dry before placing any backfill material.
	.21 (ss) new	AC Mains	Any crossings of existing AC mains will be replaced with approved materials by City forces.
3.5	.1 (ss)	Catchbasin Installation	Install catchbasins as shown on Supplementary Detail Drawing ST-5-SD to general standards and installation procedures described in 3.3 of this section.
3.6	.1 (ss) new	Inspection Chambers/ Lawn Drain Installation	Install inspection chambers/lawn drains as shown on Supplementary Detail Drawing ST-7-SD, ST-8-SD and ST-9-SD.
3.12	(ss) new	Abandoned Mains	Abandoned mains in arterial, collector or bus routes to be filled with a control density fill or approved equal.

Section 34 41 13 – Traffic Signals

Delete

1.3.4	3.3.1
2.1.2 &.3	3.4.1
2.4	3.5.2
2.11.1 to .4	3.6.1
2.12	3.7.1 & .4
2.16.1 &.2	3.8.1 to .3
2.17 (refer to 2.16)	3.9.1
2.18	3.12
2.19.1 to .7	3.13.1
2.20	3.14.3 & .4
2.21.1 to .8	3.14.11.1 to .3
2.22.1 to 2.22.5	3.14.12
2.23	3.16.1
2.25	3.18
2.26.1 to .5	3.23
2.27.1 to 2.27.6	3.24
2.28.1	3.26
2.29.1	3.27.1

Add the following

1.0	.2 (ss) new	General	<p>The following MMCD Platinum Edition Standard Detail Drawings shall apply unless specifically referenced on the contract drawings. Some variations are listed in <i>italics</i> below:</p> <ul style="list-style-type: none"> • CE1.3 & CE1.4 Type C Base (<i>add 27mm ground conduit</i>) • CE1.5 & CE1.6 Type C Spread Footing Base (<i>add 27mm ground conduit</i>) • E1.1 & E1.2 Type M and P (NEMA Cabinet) Concrete Controller Base • E1.4 Controller Installation (for Type P and M Cabinets) • E2.2 Type 37 and 66 Concrete Junction Boxes • E2.3 & E2.4 Large Concrete Junction Boxes • E2.5 & E2.6 Concrete Vault • E3.1 Underground Conduit in Paved Areas (<i>1m depth of bury required in areas defined in section 3.5.2</i>) • E3.2 Underground Conduit in Non-Paved Areas (<i>1m depth of bury required in areas defined in section 3.5.2</i>) • E4.1 & E4.2 Luminaire Pole (Type 2 Shaft) • E4.11 to E4.13 Signal Pole (Type S Shaft) • E4.14 to E4.16 Signal Pole (Type L Shaft)
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			<ul style="list-style-type: none"> • E4.17 & E4.18 Signal Posts (Type 4A Shaft) • E4.22 Pole Accessories • E5.9 Overhead Signal Head Mounting (Adjustable Bracket Method) • E5.14 Video Detection Installation Detail on Signal Arm • E7.1 Underground Dip Service • E7.2 & E7.3 Service Panel in Service Base (Mounting Details) • E7.4 60A Streetlight and 100A Streetlight/Traffic Signal Service Panel in Service Base (Panel Details) • E7.7 & E7.8 100A Traffic Signal/Streetlighting Service Panel on Pole (Mounting Details) • E7.10 Service Ground Plate Installation Detail • E7.11 Luminaire Wiring in Pole Handhole • E7.12 Signal Cable Wiring in Pole Handhole • E7.14 Minimum Clearances to Overhead Powerlines (minimum clearance from secondary lines shall be 1.0m not 0.3m as shown) • E8.1 Typical Detector Loop Types • E8.3 Detector Loops • E8.5 & E8.6 Detector Loop Procedures and Rules
	.3 (ss) new		The City has specific Supplementary Detail Drawings which are listed in these specifications and shall apply to signal installations. For specific street lighting standards refer to the City Street Lighting Supplementary Specifications and Contract Drawings.
1.3	.4 (ss) new	Shop Drawings	Shop drawings for pole structures, where required, shall be sealed by a Professional Engineer registered with the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC).
1.4	.4 (ss) new	Electrical Energy Supply	The Contractor shall coil and tape conductors out of the weather head or in the service box. Utility company (BC Hydro) shall complete electrical service connections.
	.5 (ss) new		Once the system is ready to be energized the Contractor shall advise the City who will prepare and submit the service connection request to BC Hydro and will pay the service fee. It is the responsibility of the Contractor to allow sufficient time in their schedule for service connections.

1.5	.3 (ss) new	Electrician (Traffic Signal) qualification	All traffic signal installation shall be under the direct supervision of a primary journeyman electrician (supervisor) with proven experience in installing traffic signal systems. The supervisor shall oversee all work and shall report work progress to the City of Richmond Traffic Signal Operations and the Contract Administrator twice a week.
1.6	.5 (ss) new	Permits and Tests	Provide tests for powder coat finish on poles as noted under <u>2.33 Powder Coat Finish.</u>
1.8	.4 (ss) new	Record Drawings	Final payment(s) will be withheld until record drawings are received and accepted.
2.1	.2 (ss) new .3 (ss) new	General	All products supplied to be new, and in accordance with the Contract Documents and these Specifications. All products must bear evidence of either a mark or a label of a certification agency accredited by CSA or have an approved label issued by the BC Safety Authority. Specific materials shall conform to the City of Richmond Approved Products List for Traffic Signal Installations. The list is updated on an ongoing basis so contract the City of Richmond Traffic Signal Operations for a current list.
2.6	.9 (ss) new	Poles and Anchor Bolts	Pole types are defined on the Contract Drawings. Where noted poles shall have a powder coat finish (refer to <u>2.33 Powder Coat Finish</u>).
2.7	.5 (ss) new	Conductors and Cables	Refer to City Supplementary Detail Drawings SD_19CABLE-CC or SD_25CABLE-CC for signal cables.
2.11	.1 (ss) new	Service Panels	For UPS and Service Panel Cabinet refer to City Supplementary Detail Drawings SD_UPS_CABINET and SD_60A_PANEL
2.16	.1 (ss) new	Traffic and Pedestrian Signals	Traffic signal head sizes and displays shall be as defined on the Contract Drawings. Signal head housings shall be black (polycarbonate). Displays shall be LED. Backboards shall be aluminum painted yellow on the display side and flat black on the back side. Backboards shall have a yellow 75mm prismatic retro-reflective tape around outer edges (3M™ Scotchlite™ Diamond Grade™ VIP Reflective Sheeting Series 3990 or approved alternate) on the display side. All signal heads shall have black polycarbonate tunnel visors.

	.2 (ss) new		Pedestrian heads shall be as defined on the Contract Drawings. Each pedestrian signal head shall have bi-modal LED display (red solid hand and white solid walking person) in a black polycarbonate housing with a black polycarbonate square pedestrian head visor.
	.3 (ss) new		Fire signal heads shall as per Section 2.16.1.
2.19	.1 (ss) new	Signal Mounting Hardware	Refer to City Supplementary Detail Drawing D_SIG_HEAD_MTG and MMCD Standard Detail Drawing E5.9 and Contract Drawings for signal mounting. No signal head T type mount brackets shall be used.
2.21	.1 (ss) new	Pedestrian / Cyclist Pushbuttons	Pedestrian pushbuttons shall be Audible Pedestrian Signal (APS) pushbutton type complete with sign adaptor for City of Richmond standard (5" x 7.75") pedestrian sign unless otherwise noted on the Contract Drawings.
	.2 (ss) new		Cyclist pushbuttons shall be as noted on the Contract Drawings.
2.22	.1 (ss) new	Luminaires	Luminaire make and model number shall be defined on the Contract Drawings. All street lighting shall follow City of Richmond Standards.
2.26	.1 (ss) new	NEMA Traffic Controllers	Traffic controllers shall be supplied by the City or Richmond.
2.27	.1 (ss) new	Video Detection System	Video detection equipment shall be supplied by the City of Richmond.
2.28	.1 (ss) new	Uninterruptable Power Supply	Refer to City Supplementary Detail Drawings SD_UPS_CABINET and SD_UPS_CONC_BASE-1 &-2 for Uninterruptable Power Supply cabinet and base.
2.29	.1 (ss) new	Illuminated Crosswalk Signs	Crosswalk sign internal illumination shall be LED. Refer to City Supplementary Detail Drawing SD_ILL_PED_XWALK for details. Illuminated sign shall be supplied complete with an LED downlight.
2.33	.5 (ss) new	Powder Coat Materials	Pole powder coating and colour (RAL #) shall be specified on the Contract Drawings.

	<p>.6 (ss) new</p>		<p>Testing - Each run of product will have at least one sample tested for:</p> <ul style="list-style-type: none"> • Adhesion – The finished powder surface will have minimum pull-off strength exceeding 1000 PSI as tested in accordance with ASTM D4541. • Quality – The finished powder surface will be free from any holidays (skips or misses) as tested in accordance with ASTM D4541. The product will also be free from wrinkles, orange peel, cracking, pinholes, fish eyes and blisters by visual inspection. • Colour – The colour will be verified to be within 3 DE of specialized colour. <p>An independent firm who is qualified to test powder coat finish will do the testing at the supplier’s expense. The test results must be provided to the City of Richmond Traffic Signal Operations and the Contract Administrator prior to pole installation. A supplier who fails to test product as noted above will have their product rejected until the testing is completed and the product deemed acceptable by the testing agency. Where the tested product fails on a given production run then a minimum of 30% of the entire production run will be tested. If no other failures are found then the individual failed product will be stripped, reapplied and re-tested until it passes. If any of the 30% of product tested fails then the entire order will be stripped, re-applied and re-tested until it passes or replace in its entirety with new product complete with test results.</p>
	<p>.7 (ss) new</p>		<p>Field repairs will be undertaken as required to fix any scratches or imperfections in the final finish. Field repairs will be done as follows:</p> <ul style="list-style-type: none"> • Feather the damaged area with sandpaper. • Clean area with solvent. • Let dry. <p>Neatly brush on an application of Aliphatic Urethane Acrylic Semi-Gloss High Build applied at 2-4 mils DFT over the entire sanded and damaged area. The ambient conditions will be dry and over 10 degrees C when the paint is applied.</p>

	.8 (ss) new		The pole supplier will warranty the integrity of the surface for a minimum of 5 years from the date of installation. The warranty will include all labour and materials required to provide replacement product if required. The powder finish will be the responsibility of the pole supplier. The warranty will apply to adhesion, fading, blistering, cracking or chipping of the finish.
3.1	.5 (ss) new	General	When tying into or upgrading an existing installation, maintain the existing traffic signal operation at all times. Where the signal operation can't be maintained the Contractor shall obtain approval from the City of Richmond Traffic Signal Operations and provide traffic control and flagging to meet City requirements and to maintain safe and efficient traffic flow. If temporary or permanent relocations are required, such signal and signs shall be reinstated as required under the Contract Documents or as directed by the City of Richmond Traffic Signal Operations or the Contract Administrator.
3.3	.1 (ss) new	Concrete Bases	Refer to City Supplementary Detail Drawings SD_TYPE_B, SD_TYPE_S2&L2-1 & -2, SD_TYPE_S1&L1-1 to -3, SD_BASE-INSTALL, SD_UPS_CONC_BASE-1 & -2 and MMCD Standards Detail Drawings listed under Section 1.0.2 for concrete base details. Refer to Contract Drawings for base type.
.4	.1 (ss) new	Junction Boxes and Vaults	Refer to MMCD Standards Detail Drawings listed under Section 1.0.2 for junction box details.
3.5	.2 (ss) .6 (ss) new .7 (ss) new	Under- ground Conduit	<p>Conduit installed in boulevard areas to be a minimum of 1.0m deep to accommodate proposed and future tree planting. Conduit installed under paved surfaces or concrete sidewalk shall have a minimum of 0.6m cover.</p> <p>Conduit is shown diagrammatically on the Contract Drawings. The Contractor shall layout and install conduit so the number of bends in a conduit run doesn't exceed 360°.</p> <p>Traffic signal communications conduit shall NOT be installed using 90 degree bends with the exception of where it enters a controller base. When a change occurs in the running line gradual sweeping bends in the conduit shall be used. Communications conduits shall enter and exist the junction box (no bends) and shall run straight into the side of the junction box.</p>

.6	.1 (ss) (new)	Poles and Related Equipment	Install poles and related equipment as per MMCD Standards, MMCD Standards Detail Drawings listed under Section 1.0.2 and City Supplementary Detail Drawings SD_TYPE_CC – DEC_ARM, SD_TYPE_3 – DEC_ARM, SD_TYPE_7 – DEC_ARM and SD_ADJUST-LUM as shown on Contract Drawings.
3.7	.1 (ss) .4 (ss) new .5 (ss) new .6 (ss) new	Signal Heads Mounting	<p>Install traffic and pedestrian signal heads as per City Supplementary Detail Drawing SD_SIG_HEAD_MTG, SD_FIRE_SIG_HEAD_MTG and MMCD Standards MMCD Standards Detail Drawings listed under Section 1.0.2.</p> <p>Traffic signal heads and pedestrian signal heads shall be completely obscured with burlap or preapproved manufactured signal sacks from the time of installation until the system is in operation. Traffic signal head and pedestrian signal head lenses shall be cleaned prior to signal start-up.</p> <p>Primary traffic signal heads shall be minimum 5.0 meters and maximum 6.0 meters from the bottom of the primary traffic signal head backboard to the finished road grade below.</p> <p>Left side secondary traffic signal heads shall be minimum 3.0 meters from finished grade to the bottom of the backboard. Right side secondary traffic signal heads shall be mounted just below signal arm flange (5.2metres above grade) or as noted on the Contract Drawings. Pedestrian signal heads shall be minimum 2.5 meters from finished sidewalk or road grade (whichever is present) to the bottom of the signal head.</p>
3.9	.1 (ss) new	Pedestrian Pushbuttons	Install pedestrian pushbuttons and signs as shown on the Contract Drawings. Install so button is 1.0 metres above finished grade. Drill and tap pole and bolt to pole with SAE Grade 5 stainless bolts and washers.
3.10	.4 (ss) new .5 (ss) new	Luminaires and Photocells	<p>NEMA wattage label shall be visible at the bottom of the luminaire on all fixtures. Place label on the underside of the luminaire for cobra heads and on the neck or top of pole for post tops.</p> <p>Luminaires shall be securely fastened to the poles, leveled and cleaned after pole erection and plumbing is complete.</p>
3.13	.1 (ss) new	Electrical Service Panels	Mount electrical service panels in service base or on poles as shown on Standard Detail Drawings E7.2 to E7.4 and E7.7 & E7.8.

	.2 (ss) new		For UPS and Service Panel Cabinet refer to City Supplementary Detail Drawings SD_UPS_CABINET and SD_60A_PANEL.
3.14	.3 (ss) new .4 (ss) new	Wiring	With exception of conductor splices of detector loop wires to shielded cables, make conductor splices in pole handholes. Refer to Section <u>3.17 Detector Loops</u> for loops splicing information. Refer to City Supplementary Detail Drawings SD_19CABLE-CC or SD_25CABLE-CC for signal cables.
3.14	.11.1 (ss) new .11.2 (ss) new .11.3 (ss) new	Wiring	Wrap each conductor with rubber electrical insulating tape. Wrap complete splice with rubber electrical insulating tape. Completely cover complete splice with vinyl electrical sealing tape.
3.14	.12 (ss) new .14 (ss) new .15 (ss) new	Wiring	Use only PVC tape to coat duct seal. Self-holding tape shall not be used. Prior to capping or pulling conductors, conduits shall be blown out with compressed air, from both ends if necessary, then swabbed out to remove stones, dirt, water and other material which may have entered during installation. Looping of feeder conductors with “T” taps shall not be permitted.
3.16	.1 (ss) new .8 (ss) new .9 (ss) new .10 (ss) new .11 (ss) new	Traffic Controller	Traffic signal cabinet shall be mounted on the concrete base as per MMCD Standard Detail Drawing E1.4. Silicone sealant shall be used between the traffic signal cabinet and concrete base to ensure a weather tight seal. Duct-seal shall be placed over/in all underground conduits and wiring entering traffic signal cabinet. All un-used conduits shall be capped with an R.PVC cap (do not glue cap). The City will supply traffic signal cabinet padlocks and one (1) electrical service panel cabinet padlock. Contractor to install. Traffic signal cabinet interior must be kept dry when door is open during inclement weather.

3.17	<p>.3 (ss) new</p> <p>.4 (ss) new</p> <p>.5 (ss) new</p> <p>.6 (ss) new</p>	Detector Loops	<p>Detector loop shall be installed in the base lift of asphalt when possible.</p> <p>Loops in adjacent lanes shall be wound in opposite directions, i.e.; clockwise, counter clockwise, clockwise, etc.</p> <p>Each shielded cable shall run continuously with no splices from the traffic signal cabinet to the junction box. Splices between the detector loop and the shielded cable shall be connected with solderless gel filled Marrette™ type connectors and dipped in 3M ScotchKote™. Where the conductors first leave the protection of the insulated jacket the area and connector shall be wrapped with rubber electrical tape and then vinyl electrical tape and then coated with 3M ScotchKote™.</p> <p>Refer to Supplementary Detail Drawing SD_DET_LOOP_CONDUIT for loop detector conduit details.</p>
3.20	.5 (ss) new	Grounding & Bonding	<p>Additional to common bonding conductor all poles shall be connected to a ground plate which shall be located beside the concrete base. Refer to MMCD Standard Detail Drawing E7.10. The plate shall be locate a minimum of 600mm below grade.</p>
3.27	.1 (ss) new	Illuminated Crosswalk Signs	<p>Refer to City Supplementary Detail Drawing SD_ILL_PED_XWALK for details.</p>
3.28	.1 (ss) new	CCTV Cameras	<p>The Contractor shall install CCTV Cameras where noted on the Contract Drawings. Information related to cameras and cabling will be defined on the Contract Drawings.</p>
3.29	<p>.1 (ss) new</p> <p>.2 (ss) new</p>	Street Name Signs	<p>Illuminated street name signs shall be installed on signal pole arms as defined on the Contract Drawings. Signs shall be securely attached to the signal arm with applicable mounting hardware approved by the sign manufacturer and shall be installed level.</p> <p>Signs shall be safety cabled to the pole arm using 3/32" galvanized steel aircraft cable looped through the street name sign and fastened with a rope clip.</p>

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SCHEDULE B

SCHEDULE B

SCHEDULE B

SUPPLEMENTARY SPECIFICATIONS FOR HORIZONTAL DIRECTIONAL DRILLING

The Supplementary Specifications hereunder shall apply to all horizontal directional drilling in the City of Richmond.

1.0 GENERAL

- .1 This specification covers the requirements for furnishing all labour, equipment and materials associated with the installation of gravity sewer pipe and/or forcemain by directional drilling method. The gravity sewer pipe and/or forcemain shall be fusible high density polyethylene (HDPE) pipe as specified herein. This work shall include, but not be limited to, steerable directional boring equipment, boring pits and equipment, sheeting, maintenance of traffic and coordination with other contractors (if required), miscellaneous appurtenances to complete the work as shown on the contract drawings, cleanup and disposal of spoils, and restoration. Directional drilling operations shall be performed within the right of way and/or easements shown on the drawings.
- .2 The work may include but not limited to:
 - .1 Excavation of drilling and receiving pits.
 - .2 Potholing or other similar practices as required to verify underground utilities along the entry and exit drill paths.
 - .3 Drilling of a pilot hole at prescribed line and grade.
 - .4 Reaming of the hole (as needed).
 - .5 Pullback of the pipe through the hole.
 - .6 Connect piping to manhole(s), wetwell and existing forcemain(s), etc. (as applicable and shown of the contract drawings).
 - .7 Video inspection of gravity main(s) including cleaning and flushing the main and use of inclinometer in front of the video camera on each section of gravity main between manholes and acceptance by the City prior to moving onto the next sewer pipe section. Upon completion of the gravity system and connection to a pump station (if applicable), flush and video inspect the entire system.
 - .8 All incidental work such as horizontal and vertical control points, survey, grids, permits, slurry treatment and disposal, shoring and casing of the pits if required, and all else necessary for the complete installation of the pipe in accordance with these specifications and contract drawings.

1.1. Related Work

- | | |
|--|--------------------|
| .1 Traffic Control, Vehicle Access and Parking | Section 01 55 00 |
| .2 CCTV Inspection of Pipelines | Section 33 01 30.1 |
| .3 Cleaning of Sewers | Section 33 01 30.2 |
| .4 Storm Sewers | Section 33 40 01 |
| .5 Pipe Culverts | Section 33 42 13 |
| .6 Manhole and Catchbasins | Section 33 44 01 |
| .7 Sanitary Sewers | Section 33.30.01 |
| .8 Sewage Forcemains | Section 33 34 01 |
| .9 Waterworks | Section 33 11 01 |

1.2. Quality Assurance

- .1 The requirements set forth in this specification specify a wide range of procedural precautions necessary to ensure that the very basic, essential aspects of a proper directional bore installation are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this specification. Adherence to the specifications contained herein, or the City's approval of any aspect of any directional bore operation covered by this specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

1.3. Submittals

- .1 Work Plan:
 - .1 Prior to beginning work, the Contractor must submit to the City a general work plan outlining the procedure and schedule to be used to execute the project. Plan should document the thoughtful planning required to successfully complete the project.
 - .2 Such review and approval on behalf of the City shall be with respect to overall objectives of the project, impacts on existing facilities and businesses, and operational aspects only, and shall not in any way relieve the Contractor of his sole responsibility under this Contract for all aspects of final design and construction of the HDD installation.
 - .3 The submission shall include:
 - .1 Proposed drill path design (with drawings) for the City's approval. Drill path to clearly indicate radius of curvature, entrance / exit angles and depth of cover.
 - .2 Complete methodology specific to the HDD installation, including equipment specifications and capabilities, size of pilot hole, number and size of pre-reams, use of rollers, baskets, and side booms to suspend and direct pipe during pull back, type and capabilities of pilot hole tracking system including tolerances and operating personnel;
 - .3 Detailed drawing of work area(s), including locations and footprints of equipment, pipe storage/staging and the locations of drill entry, exit, and slurry containment pits;
 - .4 Detailed drawings of pull back installation showing surface features, and pipe handling;
 - .5 A sample of the proposed drilling, mud, survey, welding and pressure testing logs;
 - .6 Details illustrating response to inadvertent drill fluid migration (include drawings showing containment berms and pumps, etc.)
 - .7 All drill pipe used by the Contractor for pilot hole drilling, reaming and pull-back must have current mill inspection certificates (which are to be given to the City at time of contract award);
 - .8 Current mill inspection certificates for all down hole tools such as crossover subs, monels, hevi-wate, hole openers and any other tools

used by the Contractor (which are to be given to the City at time of contract award);

- .9 Calibration records of all surface and downhole surveying equipment prior to and after arrival on site; and
- .10 Details of fencing/hoarding for protection of public and site security.
- .11 Environmental Plan for groundwater disposal and treatment, drilling mud disposal, environmental protection plan and a sediment erosion control plan for the work including weekly field inspections and reporting during construction.
- .12 Contractor to submit pipe stress calculations for each stage of the installation process as the pipe is pulled through the bore. Calculations to clearly indicate if pipe is to be empty or filled with water during installation. Calculations to include:
 - .1 Internal pressure stress
 - .2 Bending stress
 - .3 Thermal stress
 - .4 Net longitudinal compressive stress (bending included)
 - .5 Equivalent tensile stress available to include progressive creep strain.
 - .6 Total longitudinal stress from sustained loads
 - .7 Short term and long term external differential pressure.
- .13 Contractor to submit detailed design analysis, and calculations in the form of a technical report, under the seal of a professional engineer, registered in the Province of British Columbia.

.2 Equipment:

- .1 Contractor to submit specifications on directional drilling equipment to be used to ensure that the equipment will be adequate to complete the project.

.3 Materials:

- .1 Specifications on material to be used to be submitted to City. Material shall include the pipe, fittings and any other item that is to be an installed component of the project.
- .2 The following Product Data is required from the pipe supplier and/or fusion provider:
 - .1 Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer.
 - .2 Product data and pipe supplier data indicating conformance with this specification and applicable standards, including written documentation regarding any intended variance from this specification and applicable standards. This will include experience of pipe supplier by years and number of projects; warranty information; and independent laboratory testing certification.

- .3 Test results will be prepared and made available from the pipe extruder to the City upon request, for each extrusion run.
- .4 As applicable, fusion joint data and fusion technician data indicating conformance with this specification and applicable standards, including written documentation regarding any intended variance from this specification and applicable standards. This will include fusion joint warranty information and recommended project specific fusion parameters, including criteria logged and recorded by data logger.

1.4. Job Conditions

.1 Environmental Requirements

- .1 Drilling operations must not interfere with or endanger surface and activity upon the surface. Areas outside designated work areas should not be disturbed. Examine work area and notify City of conditions that may adversely affect work.
 - .2 Contractor shall conduct operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians and to adjacent property owners.
- .2 Safety. The Contractor shall carry out the operations in strict accordance with all applicable health and safety regulations.

1.5. Payment

- .1 Payment shall be in accordance with the Contract Documents and Supplementary Specifications

2.0 PRODUCTS

2.1 General

- .1 HDPE pipe shall be from a single manufacturer, who is fully experienced, reputable and qualified in the manufacture of the HDPE pipe to be furnished. The pipe shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these specifications.
- .2 The pipe manufacturer shall provide a warranty against manufacturing defects of material and workmanship for a period of ten years after the final acceptance of the project by the City. The manufacturer shall replace at no expense to the City any defective pipe/fitting material including labour within the warranty period.

2.2 Connections

- .1 Connections: connections used in conjunction with tie-ins to other gravity sewer piping and structures, shall be as indicated on the drawings or as directed by the City.

.2 HDPE Pipe, Joints and Fittings:

.1 The pipe shall be high performance, high molecular weight, high density polyethylene (HDPE) pipe. The pipe shall have minimum dimension ratio DR 21. The Contractor shall complete his own calculations for minimum dimension ratio required to complete the installation and if necessary increase the thickness of the pipe to meet the requirements of HDD. Reduction of the DR rating will not be acceptable.

.2 Pipe shall be made of virgin materials. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant for resin of the same specification from the same raw material pipe.

.3 Fittings:

.1 All fittings for forcemains shall be Cast Iron Outside Dimension fittings fitted to stub end slip on flanges. Fittings for the gravity mains may be moulded or fabricated by the manufacturer. No Contractor fabricated fittings shall be used unless approved by the City.

.4 Pipe and Fittings shall be homogeneous throughout and free of: serious abrasion, cutting, or gouging of the outside surface extending to more than 10 percent of the minimum wall thickness in depth; cracks; kinking (generally due to excessive or abrupt bending); flattening; holes; blisters; and other injurious defects. They shall be uniform as commercially practical in color, opacity, density, and other physical properties. Any pipe and fittings not meeting these criteria shall be rejected.

.5 Joints:

.1 Pipe lengths shall be assembled in the field with butt-fused joints in accordance with ASTM D 2657 and the pipe manufacturer's written instructions shall apply. Joint strength shall be equal to or greater than the tensile strength of the pipe and shall indicate a ductile rather than brittle fracture when tested.

.2 Joint with Fusion Equipment: The fusion machine shall have hydraulic pressure control for fusing two pipe ends together and shall be equipped with gauges to monitor fusion pressures. The machine shall be equipped with an electric or gasoline engine powered facing unit to square and trim the pipe ends smooth and provide full surface contact with the heating plate. The heating plate on the fusion machine shall be electrically heated and thermostatically controlled with a temperature gauge and be capable of maintaining 500°F (260°C) with a tolerance of 10°F (2%). Fusion temperature shall be as recommended by the pipe manufacturer. The heater plate shall be equipped with suitable means to measure the temperature of plate surfaces and to assure uniform heating such as thermometers or pyrometers.

- .3 Where excavations for pipe installation are made between manholes, the pipe shall be joined by butt-fusion or per manufacturer's recommendations.
- .4 A factory qualified joining technician as designated by the pipe manufacturer shall perform all heat fusion joints.
- .6 The finished HDPE pipe shall be continuous over the entire length of run between two manholes and shall be free from visual defects.
- .7 Certification: Submit certified lab data or manufacturer's written certifications to verify the physical properties of the materials supplied under this specification.
- .8 Rejection: Polyethylene pipe and fittings may be rejected for failure to meet any of the requirements of this specification.
- .9 Pipe Dimension: Pipe supplied under this specification shall have an actual inside diameter not less than the diameters of pipe shown in the Contract Documents.

2.3 Directional Drilling Equipment

.1 General:

- .1 As a minimum, the directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the bore, a guidance system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle the drilling fluid volume, personnel meeting the training requirements, and all other equipment required to complete the installation. The Contractor has the option of using a drilling fluid recycling system capable of removing solids from the drilling fluid so that the fluid can be re-used.
- .2 Prior to delivery to the site, all drilling equipment shall be serviced, inspected for damage and repaired as necessary. The equipment shall be in good, safe operating condition.

.2 Drilling System:

- .1 Drilling Rig: The directional drilling machine shall consist of a hydraulically powered system to rotate, push, and pull hollow drive pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the bore. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pull-

back operations. The Contractor shall record this information and provide a copy to the City daily. The rig shall be grounded during drilling and pull-back operations. There shall be a system to detect electrical current from the drilling string and an audible alarm which automatically sounds when an electrical current is detected.

- .2 Drill Head: The drill head shall be steerable by changing its rotation and shall provide the necessary cutting surfaces and drilling fluid jets.
 - .3 Mud or Mechanical Motors (if required): Mud or Mechanical motors shall be of adequate power to turn the required drilling tools.
 - .4 Drill Pipe: Shall be constructed of high quality 4130 seamless tubing, grade D or better, with a threaded box and pins. Tool joints should be hardened to 32-36 RC. If the Contractor chooses another type of drill pipe, the Contractor shall supply to the City the reason for change along with drilling rig manufacturer's approval.
- .3 Guidance System:
- .1 A magnetic guidance system (MGS), grade beacon or proven gyroscopic system shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The directional drilling guidance system shall have the capability of measuring vertical and horizontal positions and roll. The system shall obtain an accuracy range within five (5) centimetres of the actual position of the drilling head. It shall enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction) and inclination (vertical direction).
 - .2 The Contractor shall compute the position in the X, Y, and Z axis relative to the ground surface a minimum of every 1 meter. Ground surface elevation shall be based on surveyed field conditions.
 - .3 The guidance system shall be of a proven type and shall be operated by personnel trained and experienced with the system.
 - .4 The Contractor shall demonstrate a viable method to eliminate error. Contractor shall submit calibration results showing that the equipment is within tolerance. The Contractor shall follow the manufacturer's recommended calibration sequence and calibration time schedule.
 - .5 The guidance system shall be capable of generating a plot of the bore hole survey for the purpose of an as-built drawing.
 - .6 Contractor shall use a locating and tracking system capable of ensuring that the proposed horizontal and vertical alignment is installed as intended.

.4 Drilling Fluid System:

- .1 Mixing System: A self contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid. Mixing system shall continually agitate the drilling fluid during drilling operations.
- .2 Drilling Fluid: The Contractor shall use a drilling fluid suitable for the soil conditions as they exist for the project. The Contractor shall fully determine the soil conditions prior to fluid selection (be it from additional geotechnical investigation, exposing utilities, digging a slurry catch pit or other method). This decision shall include product concentrations and additives.
- .3 Delivery System: The drilling fluid pumping system shall have a capacity to provide an adequate flow rate and pressure to facilitate the HDD operation as defined in the construction documents. The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and conveyed to the drilling fluid recycling system (if used). A berm or containment system, minimum of 300mm high, shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits, and drilling fluid recycling system to prevent spills into the surrounding environment. Pumps and or vacuum trucks of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage and recycling facilities.
- .4 Drilling Fluid Recycling System: If the Contractor chooses to use a drilling fluid recycling system, the system shall separate sand, dirt and other solids from the drilling fluid to render the drilling fluid re-usable. Spoils separated from the drilling fluid will be stored in a suitable location, as approved by the City, for later use or disposal.

2.4 Other Equipment

.1 Pipe Rollers:

Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe while being hydrotested and during pullback operations. Sufficient number of rollers shall used to prevent excess sagging of pipe. The pipe shall not be dragged across the surface.

.2 Pullback:

Contractor shall use breakaway swivel or mechanical “weak link” to prevent overstressing of the pipe.

.3 Pipe Rammers:

Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of the City.

.4 Restrictions:

Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the City prior to commencement of the work. Consideration for approval will be made on an individual basis for each specified location. The proposed device or system will be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the project.

3.0 EXECUTION

3.1 General

.1 Delivery, Storage and Handling:

- .1 The Contractor shall take precautions to protect the pipe while being handled. Chain, end hooks, or cables slings shall not be used to handle pipe.
- .2 Pipe shall be stored on clean, level ground to prevent undue scratching or gouging of the pipe.
- .3 Care shall be taken to protect the pipe from scarring, gouging, or excessive abrasion. Pipe with gouges greater than 10% of the minimum wall thickness will be rejected. The Contractor shall comply with the manufacturer's storage and handling requirements.

.2 The City must be notified 48 hours in advance of starting work. The Directional Drilling shall not begin until the City is present at the job site and agrees that proper preparations for the operation have been made. The City's approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.

.3 Construction Practices:

- .1 Repair of Damaged Sections: Segments of pipe having cuts or gouges on the exterior of the pipe in excess of 10% of the minimum wall thickness of the pipe shall be cut out and removed or that section of pipe will be rejected. The undamaged portions of the pipe shall be rejoined using the butt fusion joining method.
- .2 Pipe Joining: Sections of polyethylene pipe should be joined into continuous lengths on the job site above ground. The joining method shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedure shall be capable of meeting all conditions, alignment, and

fusion pressure. Pipe lengths to be joined by thermal butt fusion shall be of the same type, grade, and class of polyethylene compound and supplied from the same raw material supplier.

- .3 Handling of Fused Pipe: Fused segments of pipe shall be handled so as to avoid damage to the pipe. When lifting fused sections of pipe, chains or cable type chokers should be avoided. Nylon slings are preferred. Care should be exercised to avoid cutting or gouging the pipe.
- .4 The pipe fusion machine shall have the following minimum design features:
 - .1 Guide rods shall be in a plane that passes through the centerline of the pipe thus cancelling the bending forces in the machine caused by the fusion forces.
 - .2 The clamp shall be mechanically or hydraulically operated and have the strength to "round up" the pipe close to the fused joint and clamp each piece of pipe on continuing straight centerline. The jaws shall be designed for quick installation and removal of inserts for smaller pipe sizes.
 - .3 The heater-plate shall be electrically heated, and thermostatically temperature controlled. The surface shall be smooth with a high quality Ryton coating. The machine shall be capable of maintaining the surface temperature set at the pipe manufacturer's recommended temperature range. The heater plate shall be equipped with an indicating thermometer but surface temperatures should be checked with a pyrometer occasionally. The heater surface shall be kept clean and free from plastic accumulation.
 - .4 The hydraulically operated machines shall have a pressure regulator to preset the correct pressure for the desired fusion force, and there shall be an auxiliary system to control "feed" rate for the pipe face-off. Each machine shall be permanently equipped with a chart showing correct fusion pressure for each pipe size and wall thickness (DR).
- .4 Installation Tolerances:
 - .1 Tolerance requirements for the installed pipe are performance orientated. Tolerances specified herein are the minimum requirements. It is the sole responsibility of the Contractor to select the appropriate types of equipment, work methods and procedures to meet the tolerance requirements.
 - .2 Should the pipe convey sewerage by gravity; it is essential that minimal to no changes in pipe slope occur and that a downward slope be maintained throughout the entire length of pipe. The tie-in elevations shown for the beginning and ending of the HDD work of the project must meet the elevations shown on the plans. The ends of the pipe shall be located (horizontally and vertically) such that the directional drilled pipe installed

according to this specification can be tied to other segments of sewer line without negative slopes or sags.

- .3 The City reserves the right to reject pipes installed not meeting the tolerance requirements specified herein. It will be the responsibility of the Contractor to replace or repair rejected work with pipe meeting these requirements. No additional compensation shall be provided to the Contractor for replacement of pipe not meeting tolerance requirements.
- .4 Sags in the sewer pipe shall not exceed 10% of nominal pipe diameter. Sags will only be allowed where the entering and exiting grades are adequate to provide velocities through the sag area sufficient for moving solids. No more than one sag area shall occur between two manholes. The City must approve the alignment of the bore before pipe can be pulled. If the pilot bore fails to conform to the above tolerances, the City may require a new pilot boring be made or localized repairs be made.
- .5 It is the responsibility of the Contractor to implement means and procedures compatible with anticipated ground conditions. The Contractor shall have a representative who is thoroughly knowledgeable of the equipment and HDD procedures present at the job site during the entire installation and available to address immediate concerns and emergency operations.
- .6 The City must be notified immediately if any condition is encountered that stops the forward progress of drilling operations. When it is determined that it is impossible to continue drilling operations, the Contractor shall determine the best course of action. The Contractor may be allowed to abandon the completed portion in place and start a new hole as directed by the City at no additional cost to the City.
- .7 Contractor shall take responsibility for the restoration of any damage caused by heaving, settlement, separation of pavement, escaping drilling fluid, or the directional drilling operation, at no cost to the City.
- .8 The installation of the sewer pipe into the bore hole shall be on the same day that the bore is completed to ensure the necessary support exists.
- .9 The required piping shall be assembled in a manner that minimizes the obstruction of adjacent roadways, driveways or public activities. The Contractor shall erect temporary fencing around entry and exit pipes staging areas as needed. The Contractor staging areas shall be as approved by the City.
- .10 Permits: The Contractor is responsible for obtaining all necessary permits. Copies of each permit shall be available to the City at the work site.

3.2 Personnel Requirements

- .1 All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety.

3.3 Drilling Procedure

- .1 Site Preparation:

Work site as indicated on drawings, within right of way, shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made. Contractor shall confine all activities to designated work areas.

- .2 Environmental Protection:

Contractor shall place silt fence between all drilling operations and any drainage, wetland, waterway or other area designated for such protection by contract documents, state, federal and local regulations. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. Contractor shall adhere to all applicable environmental regulations.

- .3 Safety:

Contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner. Safety meetings shall be conducted at least weekly with a written record of attendance and topic submitted to the City.

- .4 Pilot Hole:

- .1 The Contractor shall follow the pipeline alignment as shown on the Drawings, within the specified tolerances. If adjustments are required, the Contractor shall notify the City for approval prior to making the adjustments.
- .2 In the event of difficulties at any time during HDD operations requiring the complete withdrawal from the bore, the Contractor may be allowed to withdraw and abandon the bore and begin a second attempt at a location approved by the City.
- .3 In the event that a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, contractor shall cease drilling and advise the City. The Contractor along with the manufacturer of the rig or drilling mud supplier or his geotechnical engineer shall advise the City in writing the proposed method to deal with breakout.

- .4 Establish an entry angle hole so that the curvature of the pilot hole does not exceed the allowable bending radius of the pipe. Entrance and exit angles of the drill should range between 8 and 20 degrees and 5 and 10 degrees respectively. Any deviation from those values shall first be approved by the Engineer.
 - .5 At completion of the pilot hole drilling, provide the City with tabulations of the horizontal and vertical alignment at minimum, intervals of 3 metres.
 - .6 Drilling mud shall be used during the drilling process. Contractor to limit mud pressure in the borehole to not exceed that which can be supported by the overburden to prevent heaving or hydraulic fracturing of the soil ("Frac-out").
- .5 Pipe Installation:
- .1 Horizontally directional drilled pipe shall be installed in accordance with the instruction of the manufacturer, as shown on the Drawings and as specified herein.
 - .2 Care shall be taken in loading, transporting and unloading to prevent injury to the pipe. Pipe or fitting shall not be dropped. All pipe or fitting shall be examined before installation, and no piece shall be installed which is found to be defective. Any damage to the pipe shall be repaired as directed by the City. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner by the contractor, at his own expense.
 - .3 Ropes, fabric or rubber protected slings and straps shall be used when handling pipes. Chains, cables or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe.
 - .4 After the pilot hole is completed, the Contractor shall enlarge the hole by prereaming (as needed), and install a swivel to the reamer and commence pullback operations.
 - .5 Drilling mud shall be used during the reaming process. Contractor to limit mud pressure in the borehole to not exceed that which can be supported by the overburden to prevent heaving or hydraulic fracturing of the soil ("Frac-out").
 - .6 The pilot hole shall be back-reamed to accommodate and permit free sliding of the product inside the borehole according to the following minimum specifications.

Normal Pipe Diameter (mm)	Back-Ream Hole Diameter (mm)
50	75 to 100
75	100 to 150
100	150 to 200
150	250 to 300
200	300 to 350
250	350 to 400
≥ 300	At least 1.5 times product OD

- .7 The pipe being pulled into the bore shall be protected and supported by rollers so that it moves freely and is not damaged by debris on the ground during installation. The pipe may not be dragged across the ground surface.
- .8 Pullback forces shall not exceed the allowable pulling forces for the product pipe. The thickness of the pipe shall be increased by Contractor at their cost if pullback forces are anticipated to exceed the allowable pulling force on the specified pipe.
- .9 The Contractor shall allow sufficient lengths of pipe to extend past the termination point 300mm minimum to allow connections to adjacent pipe sections or manholes. Pulled pipe shall be allowed 12 hours of stabilization prior making tie-ins. The length of extra product pipe shall be at the Contractor's discretion.

6 Drilling Fluid:

- .1 Disposal of excess drilling fluid and spoils will be the responsibility of the Contractor who shall comply with all relevant regulations, right-of-way, work space, and permit agreements. Excess drilling fluid and spoils shall be disposed of properly. The Contractor is responsible for transporting all excess drilling fluid and spoils to the disposal site and paying any disposal costs. Excess drilling fluid and spoils shall be transported in a manner that prevents accidental spillage onto roadways. Excess drilling fluid and spoils shall not be discharged into sanitary or storm systems, ditches or waterways.
- .2 Drilling fluid returns (caused by fracturing of formations) at locations other than the entry and exit points shall be minimized. The Contractor shall immediately clean up any drilling fluid that inadvertently surfaces.
- .3 The Contractor shall be responsible for all fees and provisions for a clean water supply for mixing of drilling fluid.

- .4 The Owner reserves the right to require an on-site representative of the directional drilling equipment manufacturer and/or a representative of the drilling fluids manufacturer, knowledgeable in the use of the product(s), for a minimum of three (3) Working Days to assist in optimizing the installation, obtaining tolerances required and improving procedures. The cost for the on-site representative(s) will be paid by the Contractor.

3.4 Testing

- .1 Video inspection shall be conducted as the project is being installed including cleaning and flushing. This includes all mainline sewer between manholes and service connections, including use of inclinometer in front of the video camera for mainline sections only and televised in accordance with Section 33 01 30.1. Upon completion of the gravity system and any connection that is required, the entire system shall be cleaned and televised in accordance with Sections 33 01 30.1 and 33 01 30.2.
- .2 Perform pressure and leakage testing of the completed forcemain to ASTM F2164, no leakage allowed.
- .3 Clean pipes, fittings, valves and appurtenances of debris and water before installation. Carefully inspect materials for defects before installing. Remove defective materials from site.
- .4 Prior to the flushing of the completed forcemain Contractor to submit a flushing methodology to the Contract Administrator for approval.

3.5 Cleaning, Site Restoration and Inspection

- .1 Following drilling operations, Contractor will demobilize equipment and restore the worksite to original condition. All mud shall be disposed of by the Contractor.
- .2 The Contractor is required to maintain the work site in a neat and orderly condition throughout the period of work and after completing the work at each site, remove debris, surplus material and temporary structures erected by the Contractor. Upon completion of work, the site must be restored to its former condition.

3.6 Record Keeping

- .1 Contractor shall maintain a daily project log of drilling operations (including mud pressures, pull back forces, etc.), pipe fusing and a guidance system log with a copy given to City at completion of project.
- .2 Contractor shall provide complete as-builts including horizontal and vertical alignments.

END OF SECTION

SCHEDULE C

SCHEDULE C

SCHEDULE C

SUPPLEMENTARY DETAIL DRAWINGS FOR INSTALLATION OF CIVIL WORKS

- The following Standard Detail Drawings in the Master Municipal Construction Documents are deleted and replaced by the listed Supplementary Detail Drawings.
- Minor changes to MMCD Standard Detail Drawings are identified by highlighting the changes and re-produced as Richmond's Supplementary Detail Drawings.
- More significant changes or additional details are presented as additional Supplementary Detail Drawings, which are also listed below:

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT/ ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Dwg. #	Drawing Title	Dwg. #	Drawing Title
		G-4a-SD	Clear Crush Bedding
G5	Pavement Restoration	G-5-SD	Pavement restoration
G6	Concrete Encasement for Watermain/Sewer Separation		
W2a	Water Service Connection - Service Box	W2a-SD	Standard 25mm dia. Service Connections
W2b W2d	Water Service Connection - Valve Box	W2b-SD	Standard 30mm, 40mm & 50mm Service Connections
		W2f-SD	Typical Commercial Meter Installation
		W2g-SD	Single Family Dwelling Water Meters and Meter Box Installation 50mm dia. and under for domestic use only.
		W2j-SD	Mechanical Room Water Metre Installation Requirements
		W2k-SD	38 & 50mm Water Metre and Chamber for Non-Fire Service
		W2l-SD	75 & 100mm Water Metre and Chamber for Non-Fire Service
		W2m-SD	75 & 100mm Water Metre and Chamber for Fire Service
		W2n-SD	150mm Water Metre and Chamber for Non-Fire Service

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT/ ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Dwg. #	Drawing Title	Dwg. #	Drawing Title
		W2o-SD	150mm Water Metre and Chamber for Fire Service
		W2p-SD	200mm Water Metre and Chamber for Fire Service
W3	Gate Valve Installation	W3a-SD	Bell Gate Valve Installation
W4	Fire Hydrant Installation	W4a-SD	Fire Hydrant Installation (flanged)
		W4b-SD	Fire Hydrant Installation (PVC Lead)
		W4c-SD	Fire Hydrant Installation (bottom draw)
W6	Air Valve Assemblies – 25mm and 50mm Valves		
W7	Air Valve Assembly - 100mm Valve		
W8	Blow-off for Watermain	W8-SD	100mm Capped End and Blow-off
W9	Blow-down Chamber		
W10	Waterworks Chamber Drain		
		ST-3-SD	Typical 1.20m x 1.20m Cast-in-situ Manhole
		ST-5-SD	600mm dia. Reinforced Concrete Catchbasin
		ST-6-SD	Prefabricated Pan Catchbasin
		ST-7-SD	PVC Inspection Chamber/Lawn Drain Type 1
		ST-7a-SD	PVC Inspection Chamber/Lawn Drain Type 1A
		ST-8-SD	Inspection Chamber Type 2
		ST-9-SD	Inspection Chamber Type 3
S10	Inspection Chamber for 250 to 375 Storm Sewer Connection		
		ST-10c-SD	Storm Sewer Inlet with Safety Grillage

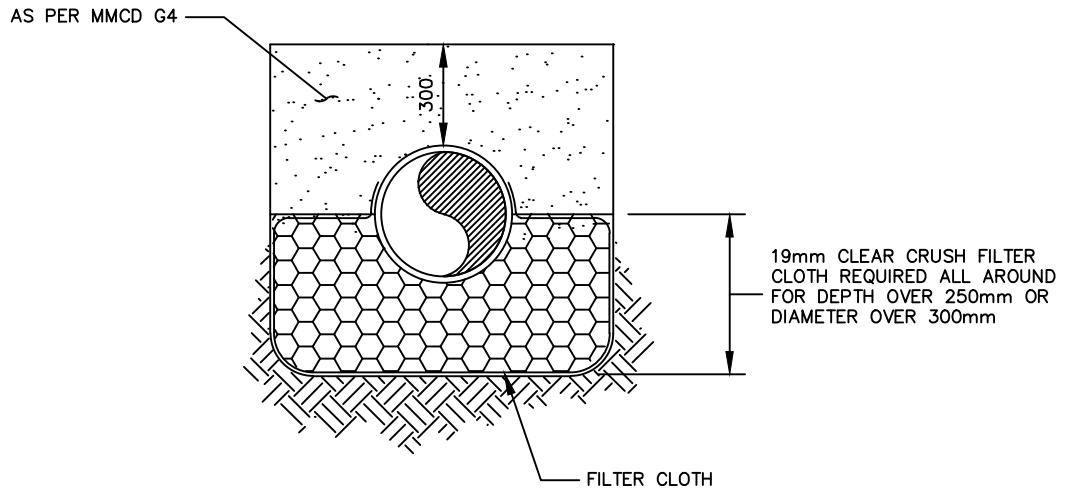
DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT/ ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Dwg. #	Drawing Title	Dwg. #	Drawing Title
		ST-19-SD	Typical Construction Details of Flexible Joints for Sewer Installations
S8	Storm Sewer Service Connection	ST-20-SD	Storm Sewer Service Connection
		ST-21-SD	Perforated Drainage Trench Detail
		ST-22-SD	Storm – Painted Fish Details
		SA-3-SD	Standard Construction Details for PVC Sanitary Sewer Installations
S4	Inside Drop Manhole	SA-4-SD	Inside Drop Manhole
		SA-6-SD	Outside Drop Manhole
S7	Sanitary Sewer Service Connection	SA-7-SD	Sanitary Sewer Service Connection
		SA-9-SD	SCADA Pole - T18-RM-9.14m
		SA-10-SD	SCADA Pole - T18-RM-12.20m
		SA-11-SD	SCADA Pole - T18-RM-02-15.24m
		SA-12-SD	Air Valve Kiosk
C1	Concrete Sidewalk, Infill and Barrier Curb	R-1-SD	Concrete Sidewalk, Infill and Barrier Curb
		R-1a-SD	Concrete Sidewalk, Boulevard and Barrier Curb
C2	Concrete Sidewalk and Barrier Curb	R-2-SD	Concrete Sidewalk and Barrier Curb
C3	Concrete Sidewalk and Rollover Curb	R-3-SD	Concrete Sidewalk and Rollover Curb
		R-4-SD	Gravel Shoulder
		R-5-SD	Concrete Curb - Wide Base
C7	Driveway Crossing for Barrier Curbs	R-7-SD	Driveway Crossing for Barrier Curbs

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT/ ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Dwg. #	Drawing Title	Dwg. #	Drawing Title
		R-7a-SD	Driveway Crossing for Barrier Curbs with varying Boulevard Widths
		R-8-SD	Existing Asphalt Driveway
		R-9-SD	Existing Concrete Driveway
		R-10-SD	Existing Gravel Driveway
		R-11-SD	Existing Driveway over 8 %
		R-12 -SD	Dual Wheelchair Ramp Design Standard (5% Wheelchair Ramp Slope)
		R-13 -SD	Dual Wheelchair Ramp Design Standard (6% Wheelchair Ramp Slope)
		R-14 -SD	Minimum Clearance for Pedestrian Facilities
		R-15 -SD	Single Wheelchair Ramp Design Standard
		R-16 -SD	Sidewalk Drop Detail
		R-17 -SD	Urban Curb and Urban Curbs & Gutter Details
		R-18 -SD	Pavers & Tactile Warning Strips
		R-19 -SD	Converting Letdown Curb to Highback Curb

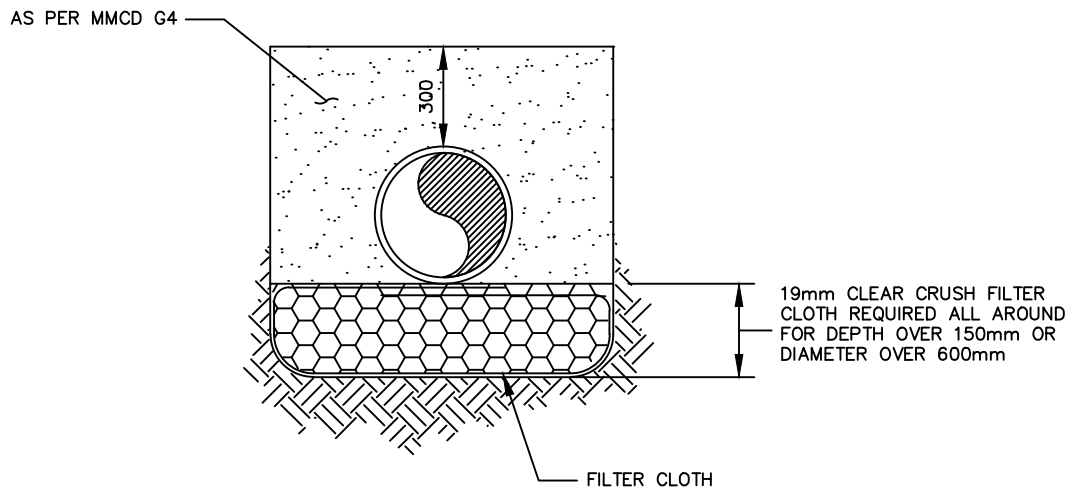
GENERAL DRAWINGS

GENERAL DRAWINGS

SUPPLEMENTARY DETAIL DRAWING



PIPE SIZE UP TO & INCLUDING 525mm ϕ



PIPE SIZE OVER 525mm ϕ

NOTES:

1. CITY APPROVAL REQUIRED PRIOR TO USE OF THIS DETAIL
2. 300 MIN OVERLAP OF FILTER CLOTH
3. IMPORTED GRANULAR BACKFILL COMPACTED TO 95% MODIFIED PROCTOR DENSITY MAY INCLUDE PIT RUN SAND, PIT RUN GRAVEL, CONTROLLED DENSITY FILL. RIVER SAND IS NOT PERMITTED.
4. GRANULAR PIPE BEDDING APPROVED NATIVE BACKFILL MAY BE USED AS GRANULAR PIPE BEDDING FOR DUCTILE IRON PIPE. BEDDING MATERIAL MAY NOT CONTAIN RECYCLED ASPHALT.



CLEAR CRUSH BEDDING

TECH. :	SCALE : NTS	DRAWING NUMBER : G-4a-SD
DR. :	DATE : DEC. 2010	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

ACCEPTABLE MATERIAL

ROAD BASE

- 19 MM CRUSHED GRAVEL

SUB BASE

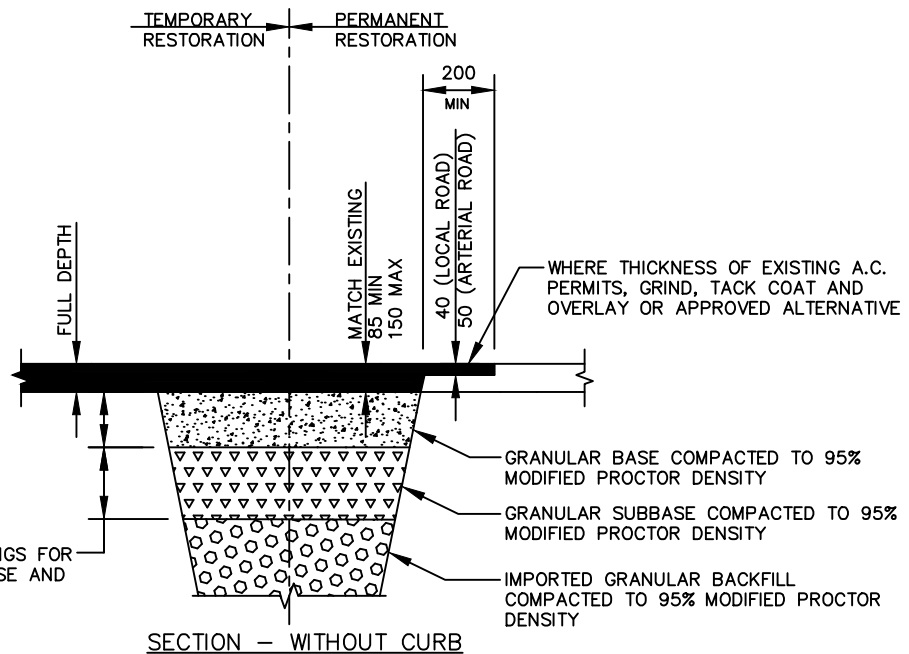
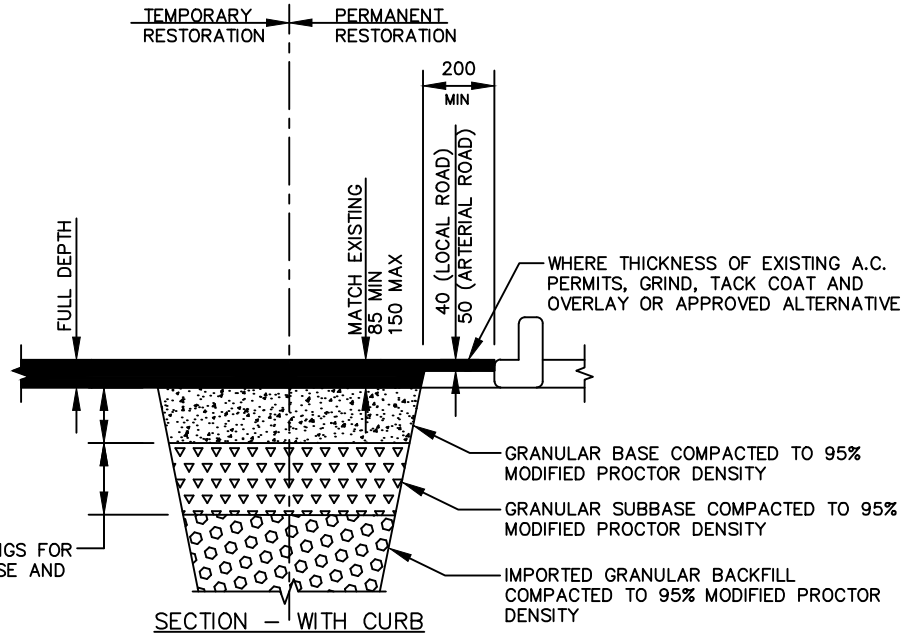
- SGSB, 75 MM PIT RUN GRAVEL, 75 MM MINUS CRUSHED GRAVEL, PIT RUN SAND

SUB GRADE (OVER-EX)

- GRANULAR PIPE BEDDING AND SURROUND MATERIAL, PIT RUN SAND, DRAIN ROCK, CONCRETE CONTROLLED DENSITY FILL

NOTE: RECYCLED AGGREGATE MATERIAL ALLOWED BUT MUST BE CLEAN AND SATISFY GRADATION REQUIREMENTS

REFER TO CONTRACT DRAWINGS FOR REQUIRED THICKNESS OF BASE AND SUBBASE



NOTES:

1. WHEN THE EDGE OF TRENCH IS 1.0m OR LESS FROM THE FRONT EDGE OF GUTTER OR EDGE OF PAVEMENT, MILL AND PAVE WILL REQUIRE THE ENTIRE 1.0m SECTION TO BE REPLACED FROM THE TRENCH TO THE EDGE OF THE GUTTER OR EDGE OF PAVEMENT.
2. ALL PAVEMENT RESTORATION ARE TO BE COMPLETED AS PER THE CURRENT CITY PAVEMENT RESTORATION BYLAW.
3. REFER TO CONTRACT DRAWINGS, SECTIONS 31 23 01 AND 32 12 16 FOR DETAILED SPECIFICATIONS.
4. ALLOW 6 MONTHS FOR SETTLEMENT ON LOCAL ROADS AND 3 MONTHS FOR SETTLEMENT OF ARTERIAL ROADS.



PAVEMENT RESTORATION

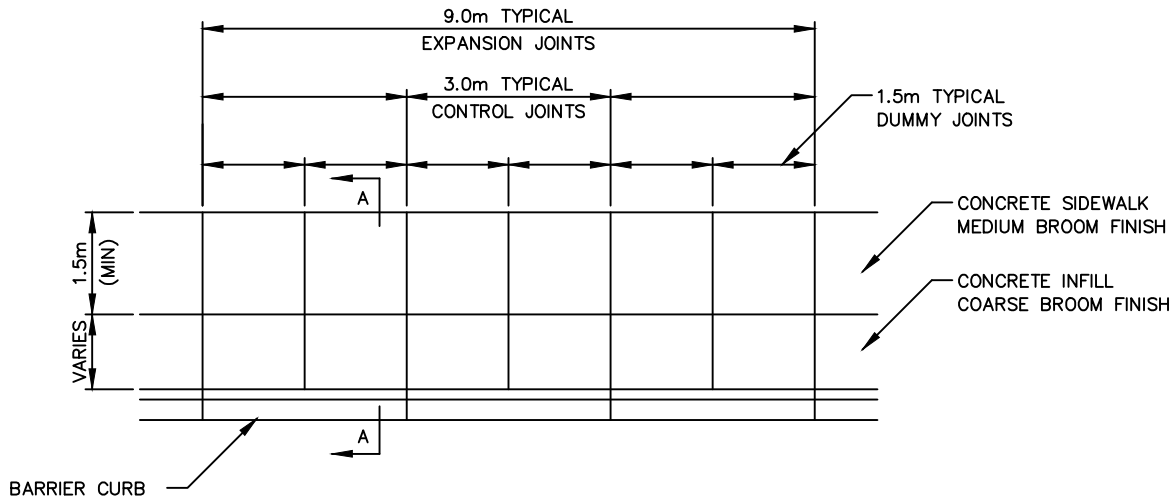
TECH. :	SCALE : NTS	DRAWING NUMBER : G-5-SD
DR. :	DATE : JAN. 2011	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

ROAD DRAWINGS

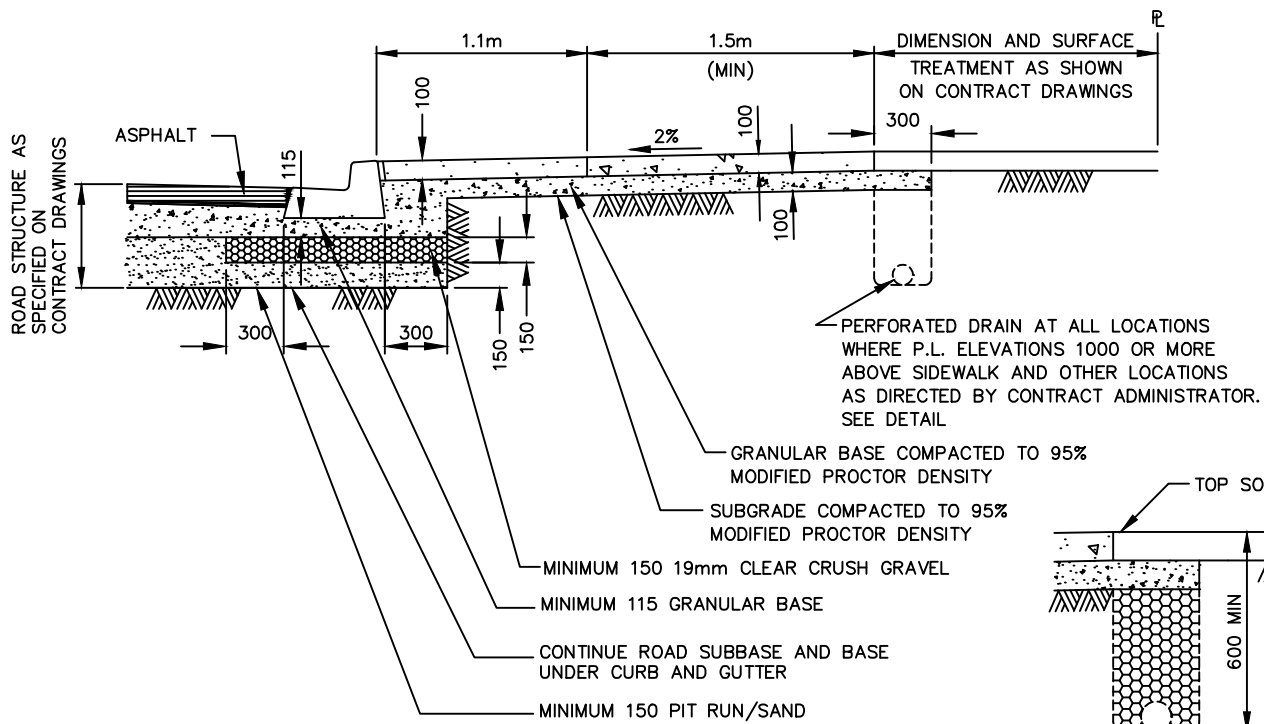
ROAD DRAWINGS

SUPPLEMENTARY DETAIL DRAWING

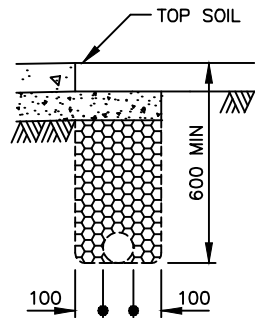
(SOURCE FROM: MMCD STD. DWG. C1)



PLAN



SECTION A-A



DETAIL

NOTES:

1. REFER TO DRAWING C4 OR C5 FOR CURB AND GUTTER DIMENSIONS.
2. REFER TO CONTRACT DRAWINGS AND SECTION 03 30 20 FOR DETAILED SPECIFICATIONS.
3. LONGITUDINAL EXPANSION JOINT FOR INFILL STRIP DELETED

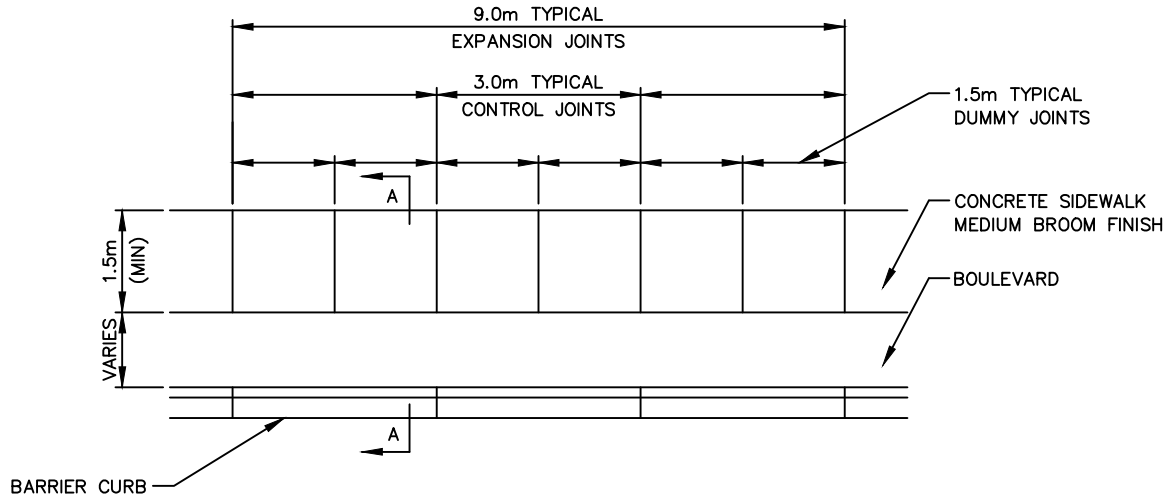


CONCRETE SIDEWALK, INFILL AND BARRIER CURB

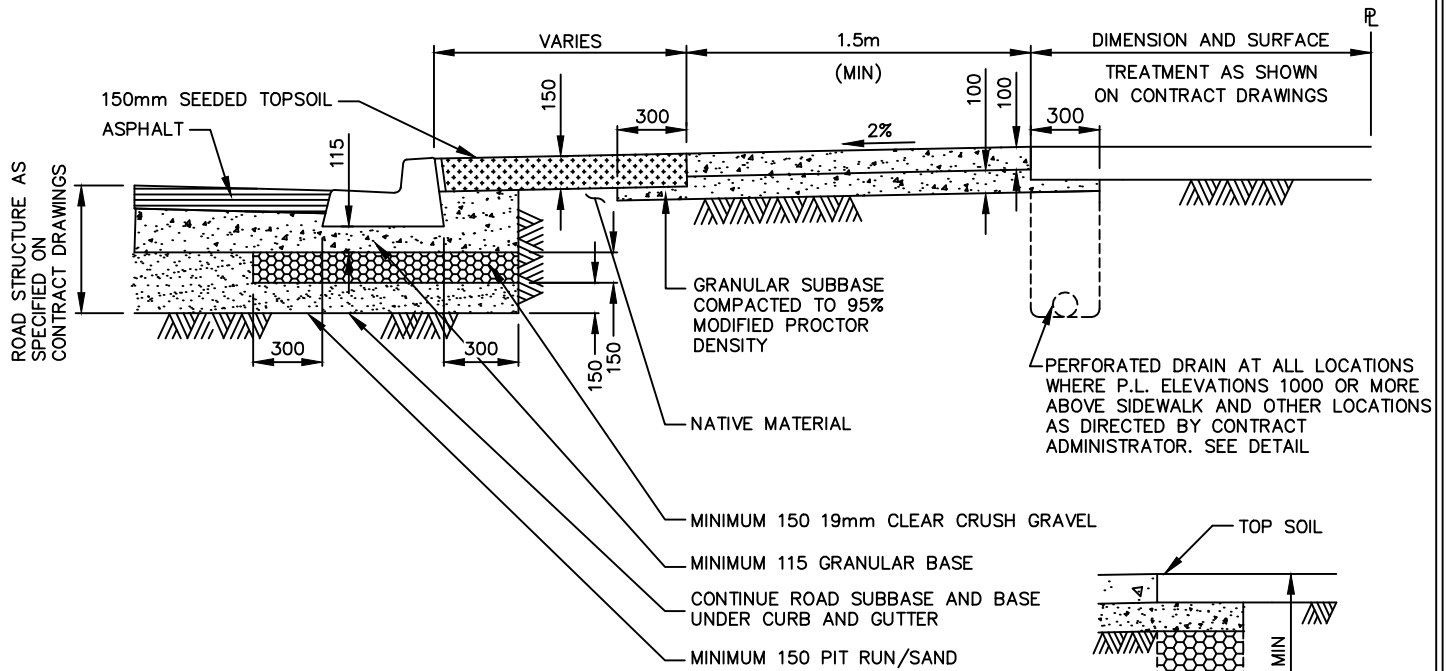
TECH. :	SCALE : NTS	DRAWING NUMBER : R-1-SD
DR. :	DATE : OCT. 2003	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG. C1)



PLAN



SECTION A-A

DETAIL

NOTES:

1. REFER TO DRAWING C4 OR C5 FOR CURB AND GUTTER DIMENSIONS.
2. REFER TO CONTRACT DRAWINGS AND SECTION 03 30 20 FOR DETAILED SPECIFICATIONS.
3. LONGITUDINAL EXPANSION JOINT FOR INFILL STRIP DELETED

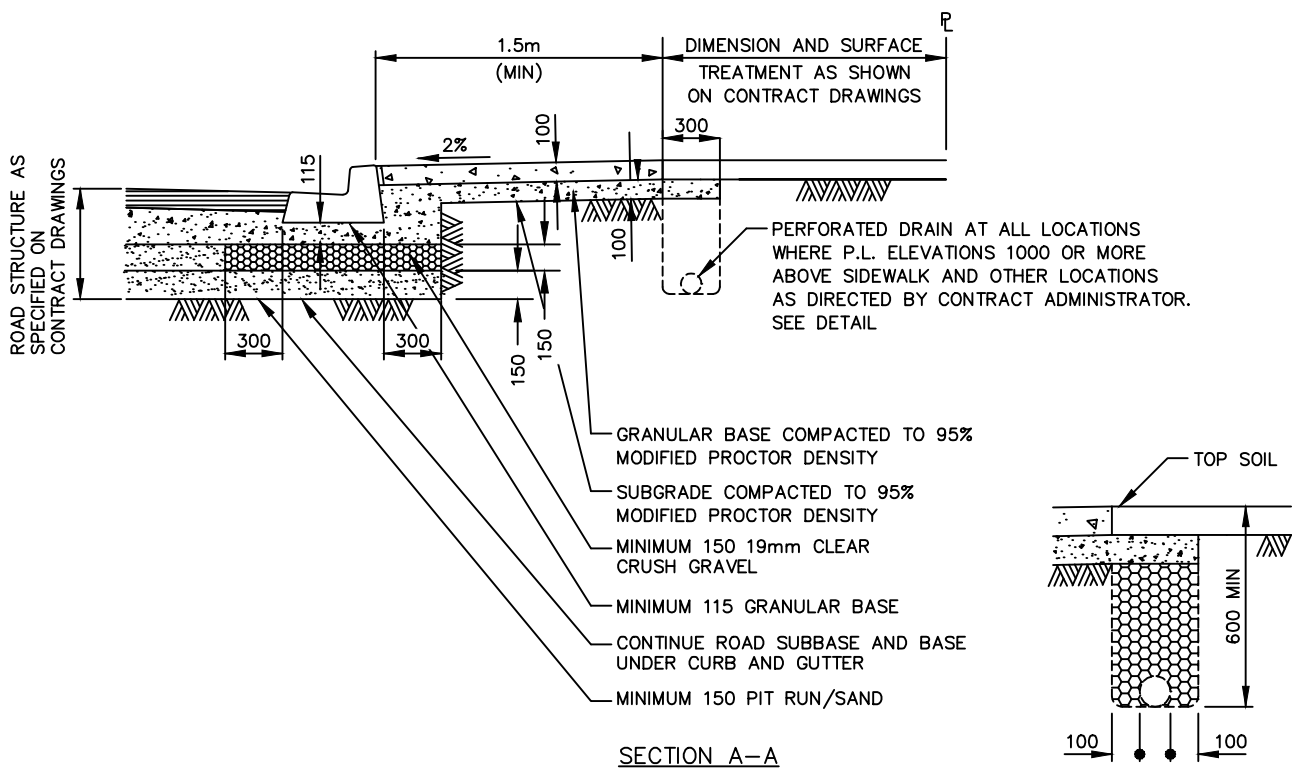
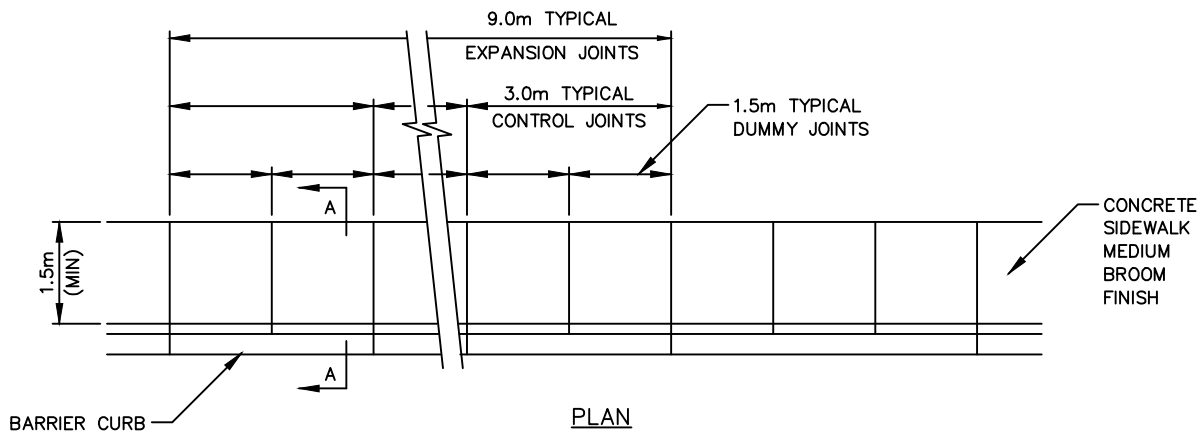


CONCRETE SIDEWALK, BOULEVARD AND BARRIER CURB

TECH. :	SCALE : NTS	DRAWING NUMBER : R-1a-SD
DR. :	DATE : DEC. 2010	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG. C2)



NOTES:

1. REFER TO DRAWING C4 OR C5 FOR CURB AND GUTTER DIMENSIONS.
2. REFER TO CONTRACT DRAWINGS AND SECTION 03 30 20 FOR DETAILED SPECIFICATIONS.
3. LONGITUDINAL EXPANSION JOINT BETWEEN CURB & SIDEWALK DELETED

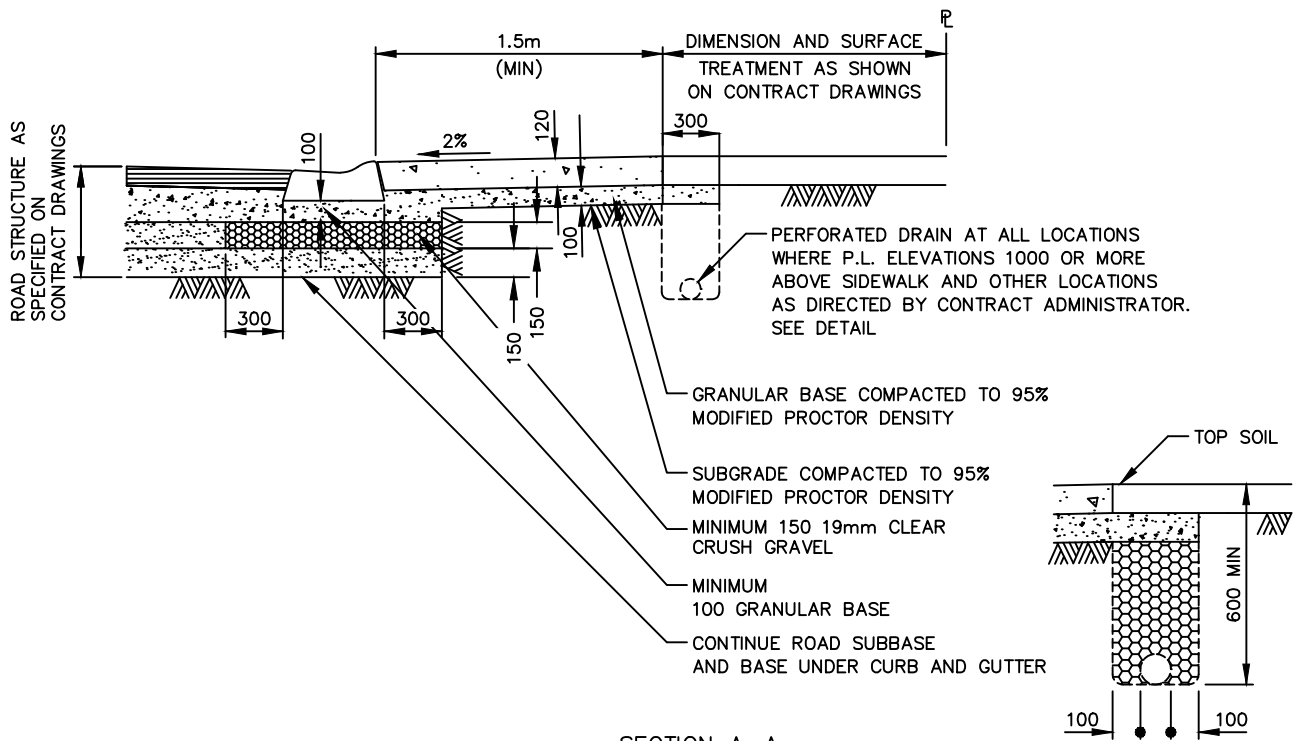
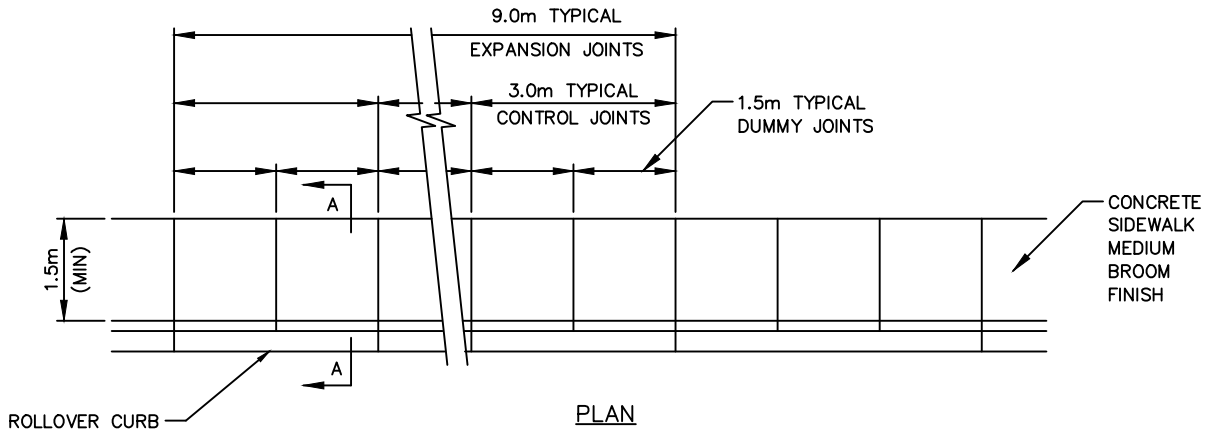


CONCRETE SIDEWALK AND BARRIER CURB

TECH. :	SCALE : NTS	DRAWING NUMBER : R-2-SD
DR. :	DATE : OCT. 2003	
ENG. :	REV. DATE : AUG./16	SHFFT No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG. C3)



NOTES:

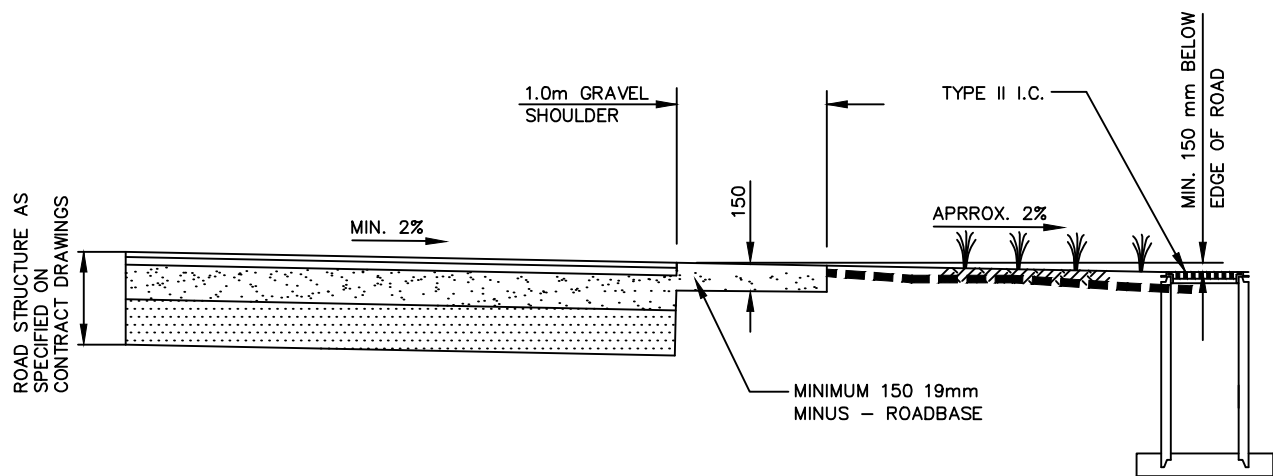
1. REFER TO DRAWING C4 OR C5 FOR CURB AND GUTTER DIMENSIONS.
2. REFER TO CONTRACT DRAWINGS AND SECTION 03 30 20 FOR DETAILED SPECIFICATIONS.
3. LONGITUDINAL EXPANSION JOINT BETWEEN CURB & SIDEWALK DELETED



CONCRETE SIDEWALK AND ROLLOVER CURB

TECH. :	SCALE : NTS	DRAWING NUMBER : R-3-SD
DR. :	DATE : OCT. 2003	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



SECTION

NOTES:

1. ENSURE NO PONDING OCCURS FROM GRAVEL SHOULD TO THE INSPECTION CHAMBER (I.C.)
2. DO NOT PLACE OBSTRUCTIONS (I.E. WOOD, LARGE ROCKS, ETC.) ON CITY BOULEVARD

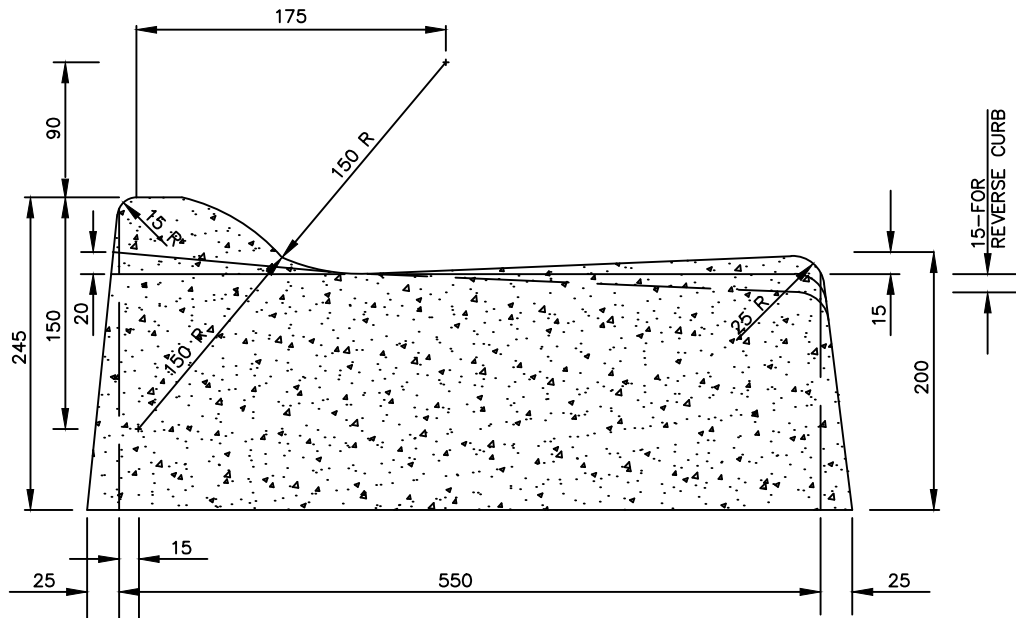
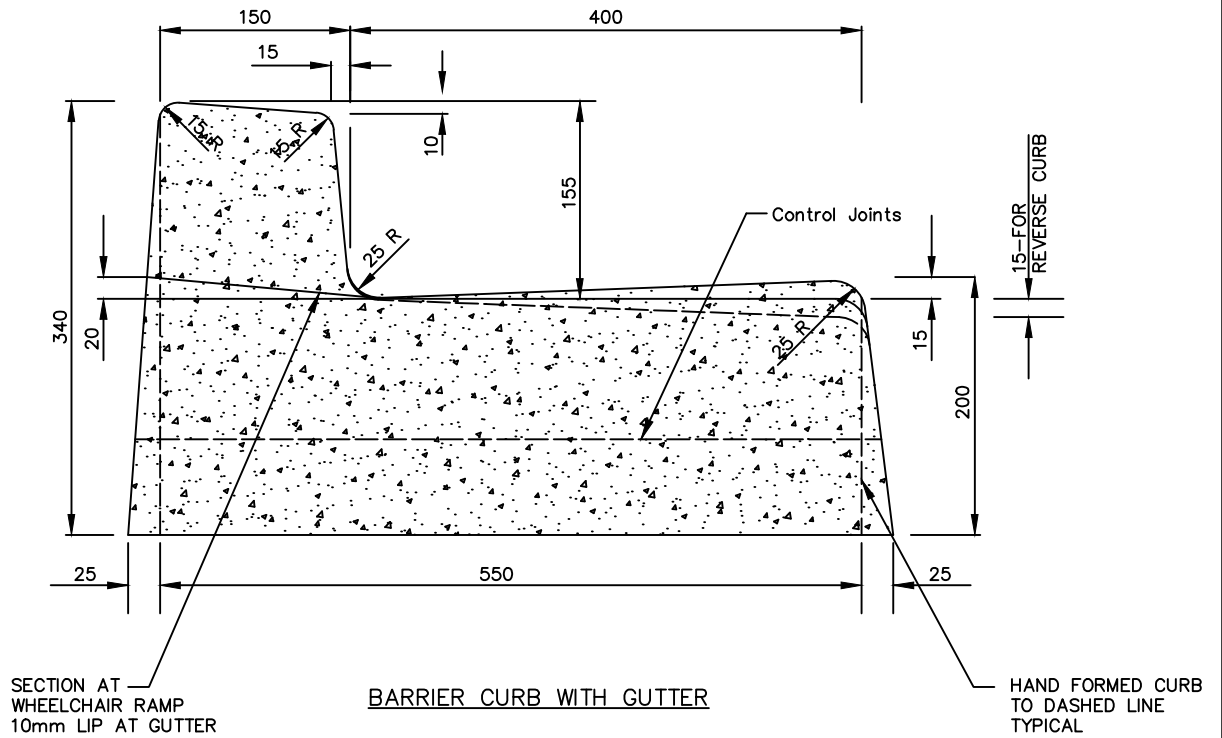


WATERCOURSE CROSSING DETAIL DRAWING

TECH. :	SCALE : NTS	DRAWING NUMBER : R-4-SD
DR. :	DATE : AUG./16	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG. C5)



NOTES:

1. SECTION SHOWN IS FOR MACHINE EXTRUDED CURBS
2. REFER TO CONTRAT DRAWINGS, SECTION 03 30 20 FOR DETAILED SPECIFICATIONS.
3. REFER TO DRAWING C1, C2 AND C3 FOR INSTALLATION DETAILS.
4. REFER TO DRAWING C4 FOR DIMENTIONS OF NARROW BASE CURB AND GUTTER

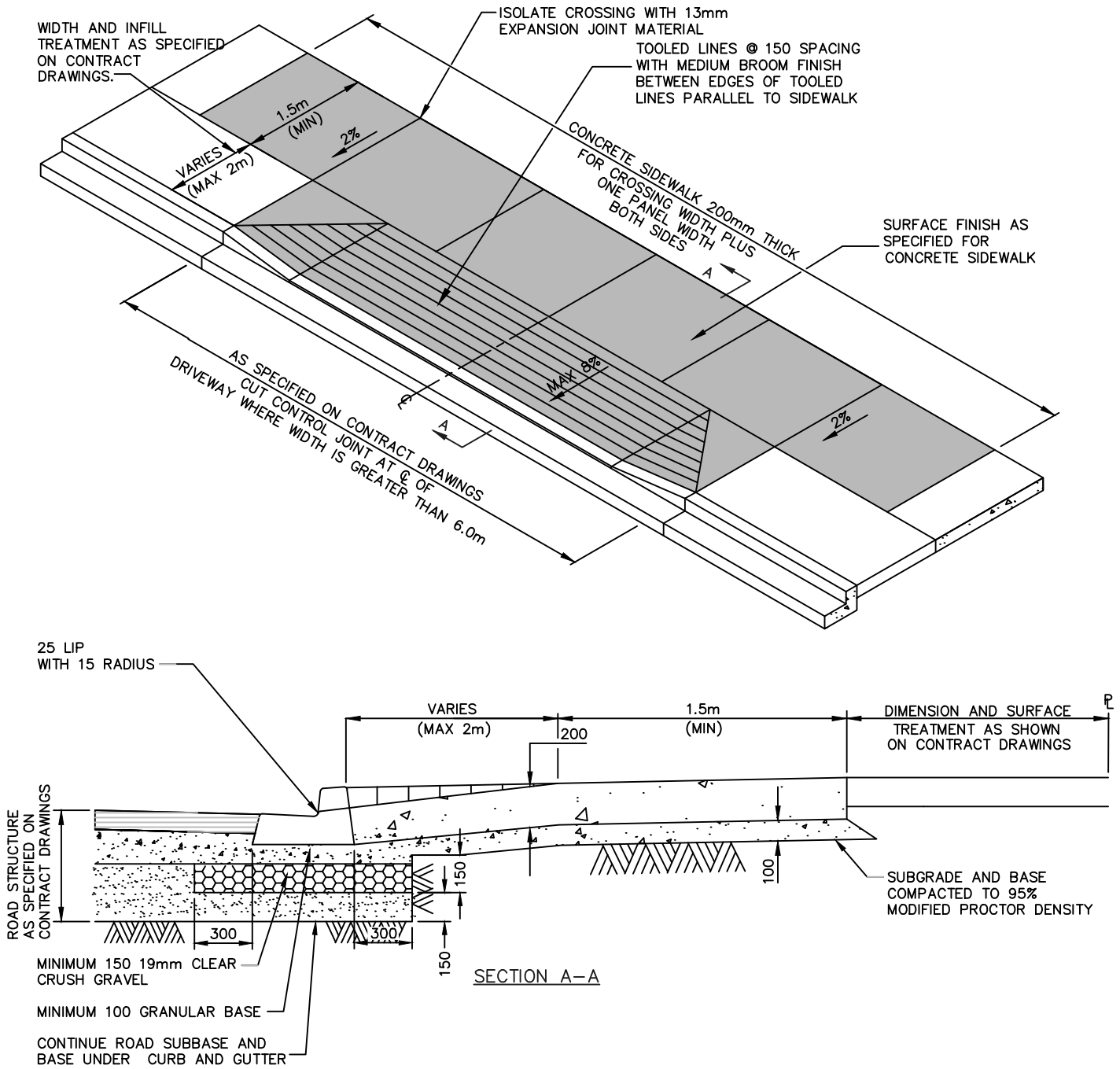


CONCRETE BARRIER CURB – WIDE BASE

TECH. :	SCALE : NTS	DRAWING NUMBER : R-5-SD
DR. :	DATE : SEP. 2016	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG. C7)



NOTES:

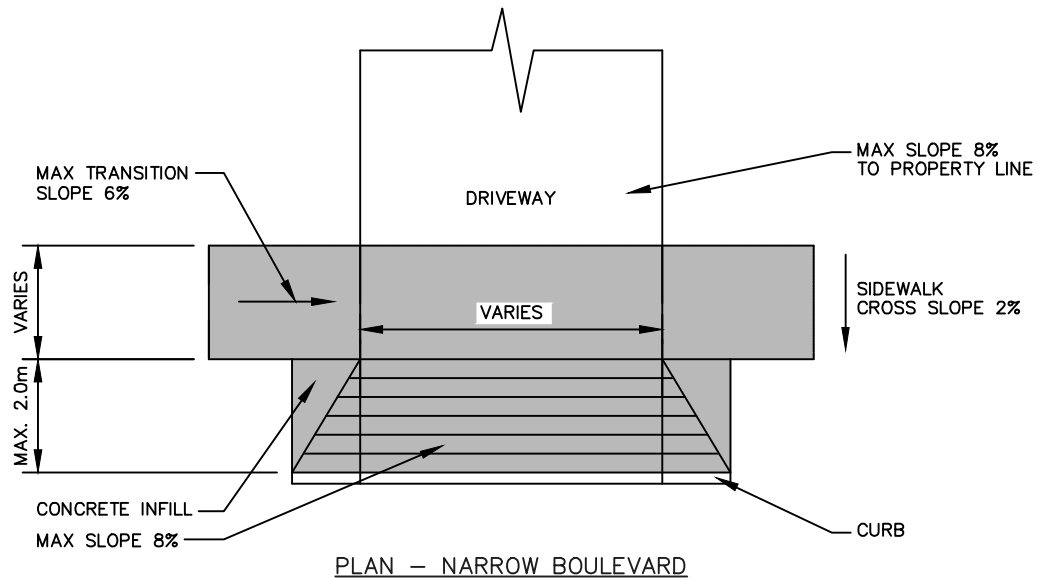
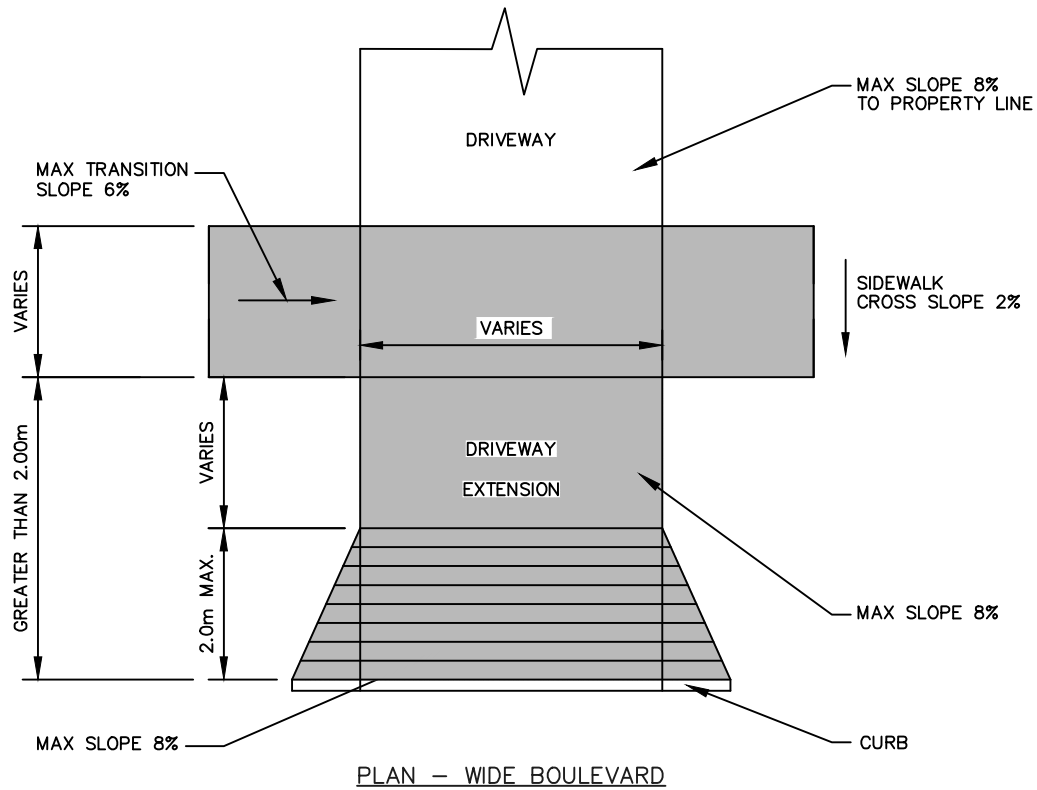
1. DRIVEWAYS ORIENTATED AT 90° TO CURB, UNLESS SPECIFIED OTHERWISE ON CONTRACT DRAWINGS.
2. REFER TO CONTRACT DRAWINGS AND SECTION 03 30 20 FOR DETAILED SPECIFICATIONS.
3. DRIVEWAYS CROSSINGS TO BE CONSTRUCTED IN ACCORDANCE WITH THE CITY'S CURRENT RESIDENTIAL LOT (VEHICULAR) ACCESS REGULATION BYLAW AND AS DIRECTED BY THE CITY ENGINEERING INSPECTOR.



DRIVEWAY CROSSING FOR BARRIER CURBS

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : OCT. 2003	R-7-SD
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



NOTES:

1. ALL CROSSINGS AND ONE PANEL ON EACH SIDE OF THE CROSSING SHALL BE 200mm IN THICKNESS.
2. IF NECESSARY THE SIDEWALK IS TO BE LOWERED TO MEET THE MAX. 8% SLOPE OF THE DRIVEWAY CROSSING RAMP, AS PER R-16-SD.
3. THE DRIVEWAY CROSSING RAMP SHALL NOT INTRUDE INTO THE SIDEWALK.

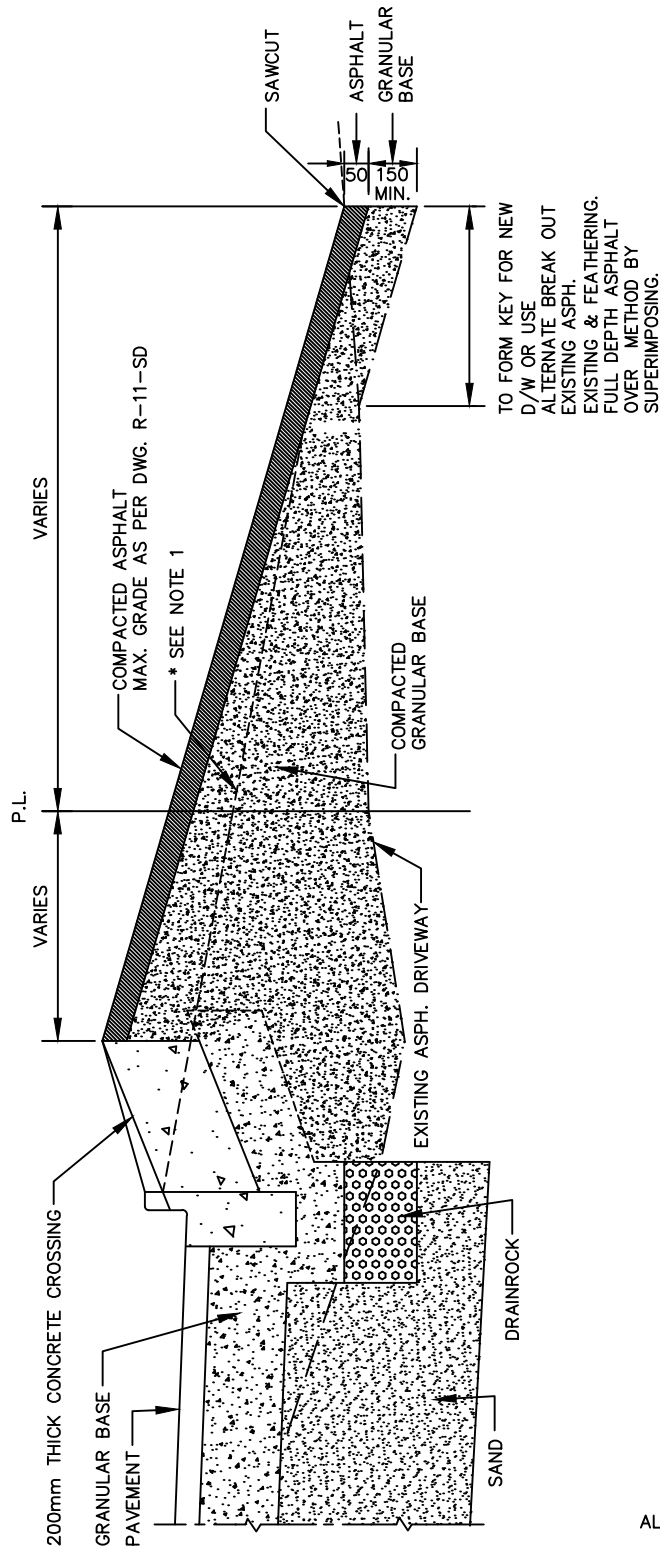


DRIVEWAY CROSSING FOR BARRIER CURBS WITH VARYING BOULEVARD WIDTHS

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : OCT. 2003	R-7a-SD
ENG. :	REV. DATE : AUG/16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. R-26-SD)



ALL DIMENSIONS SHOWN IN MILLIMETERS

NOTES:
 1) * WHERE NO SIDEWALK IS REQUIRED AS INDICATED BY THE BROKEN LINE, BASE MATERIALS, GRADE, ETC. SHALL BE TO THE SAME STANDARDS AS WHEN SIDEWALK IS REQUIRED.

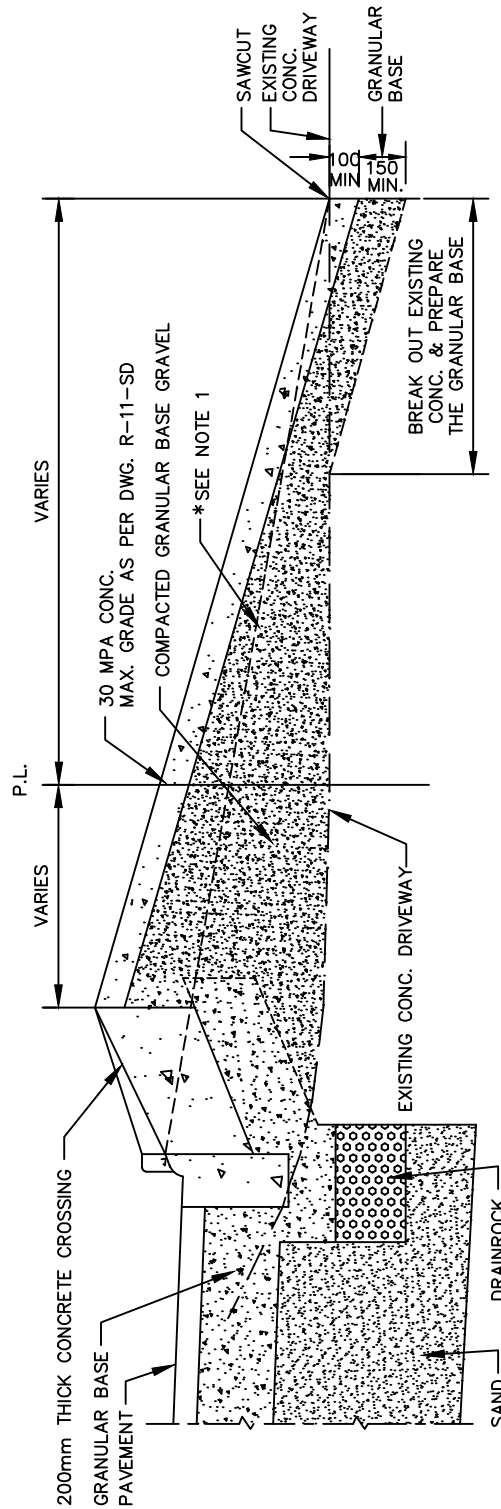
EXISTING ASPHALT DRIVEWAY



TECH. :	SCALE : NTS	DRAWING NUMBER : R-8-SD
DR. :	DATE : OCT. 2003	
ENG. :	REV. DATE : AUG/16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. R-27-SD)



ALL DIMENSIONS SHOWN IN MILLIMETERS

NOTES:
 1)* WHERE NO SIDEWALK IS REQUIRED AS INDICATED BY THE BROKEN LINE, BASE MATERIALS, GRADE, ETC. SHALL BE TO THE SAME STANDARDS AS WHEN SIDEWALK IS REQUIRED.

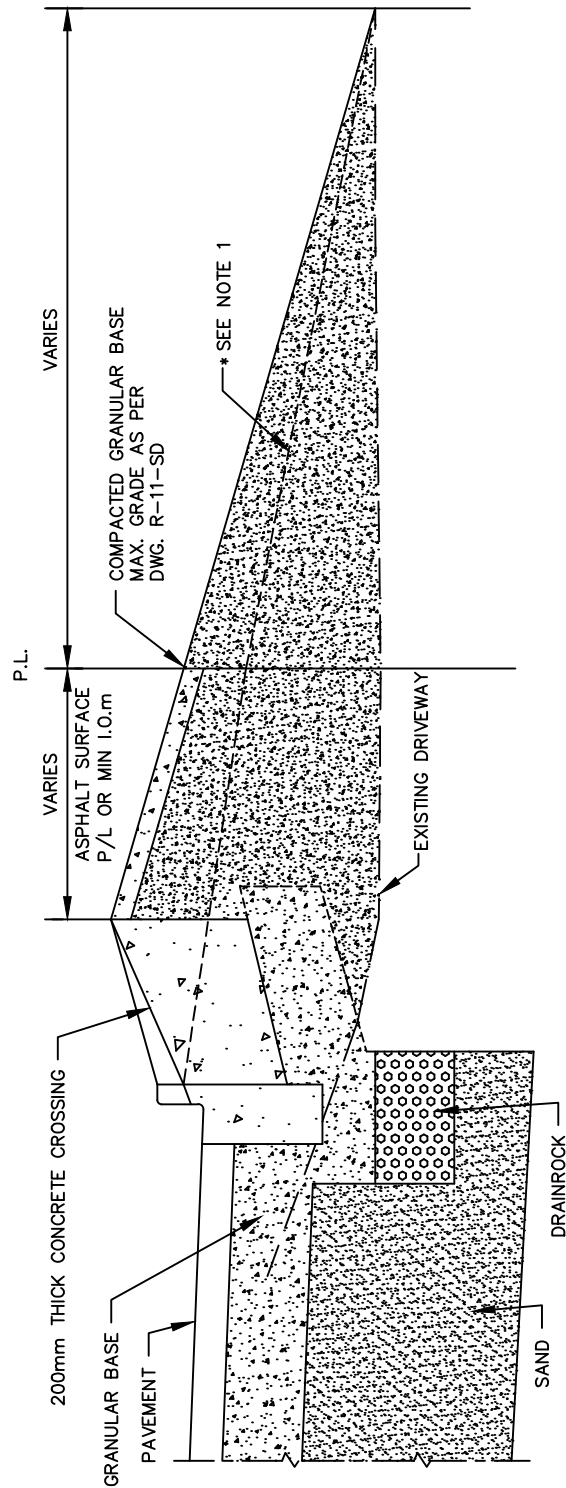


EXISTING CONCRETE DRIVEWAY

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : OCT. 2003	R-9-SD
ENG. :	REV. DATE : AUG/16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. R-28-SD)



NOTES:

1)* WHERE NO SIDEWALK IS REQUIRED AS INDICATED BY THE BROKEN LINE, BASE MATERIALS, GRADE, ETC. SHALL BE TO THE SAME STANDARDS AS WHEN SIDEWALK IS REQUIRED.

ALL DIMENSIONS SHOWN IN MILLIMETERS

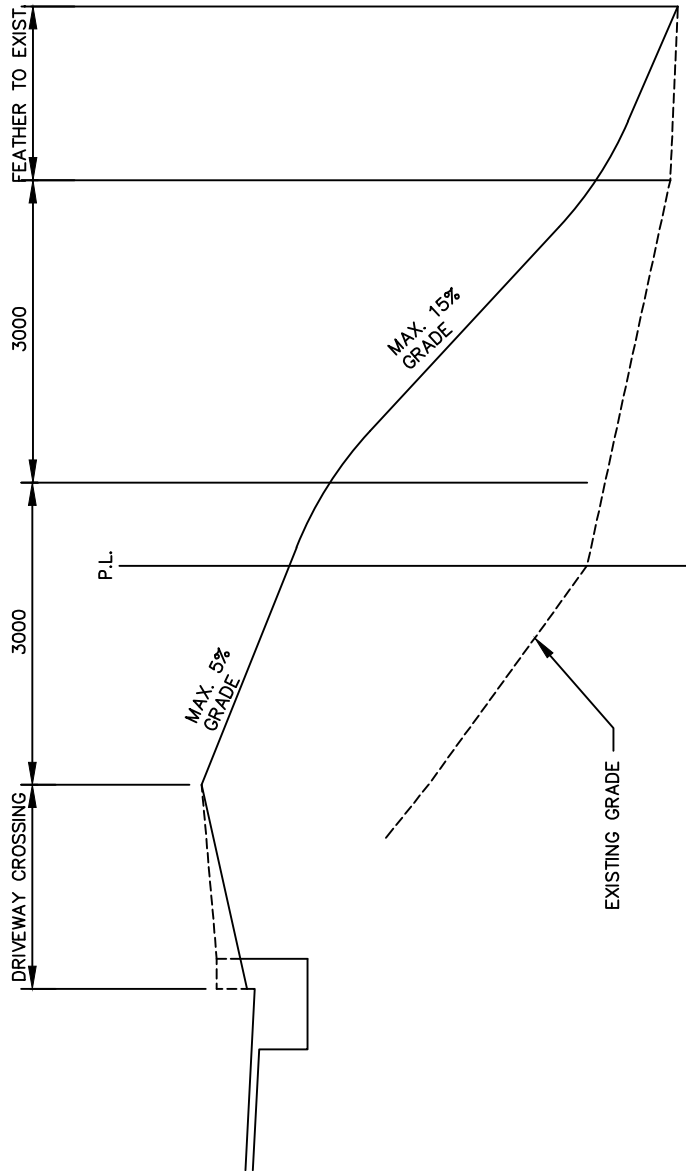


EXISTING GRAVEL DRIVEWAY

TECH. :	SCALE : NTS	DRAWING NUMBER : R-10-SD
DR. :	DATE : OCT. 2003	
ENG. :	REV. DATE : AUG/16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. R-28A-SD)



ALL DIMENSIONS SHOWN IN MILLIMETERS

NOTES:
1) WHERE STEEPER GRADES ARE NECESSARY, CONSULT ENGINEER

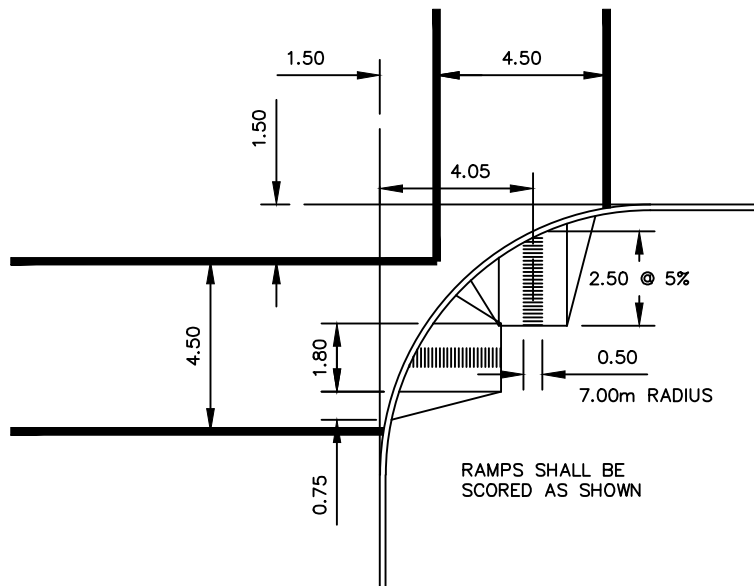
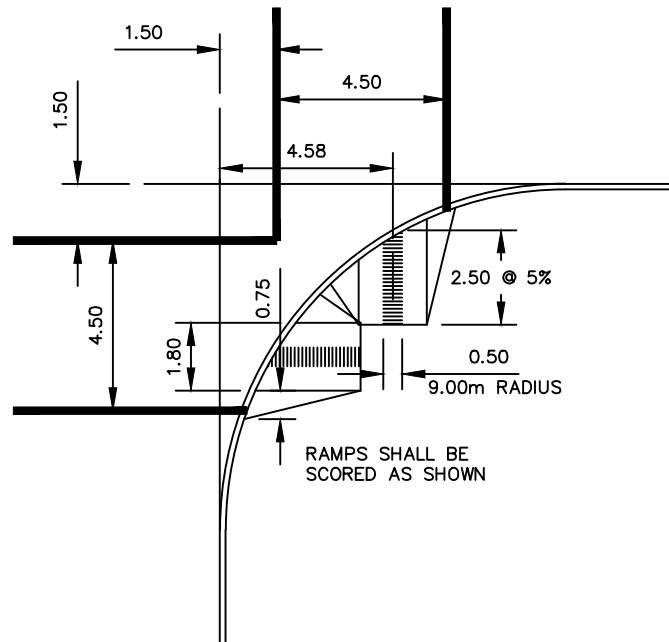


EXISTING DRIVEWAY OVER 8%

TECH. :	SCALE : NTS	DRAWING NUMBER : R-11-SD
DR. :	DATE : OCT. 2003	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. CC-RAMP)

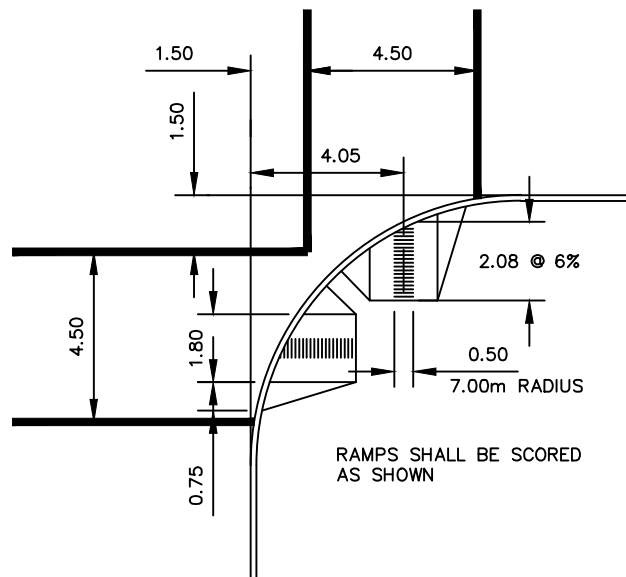
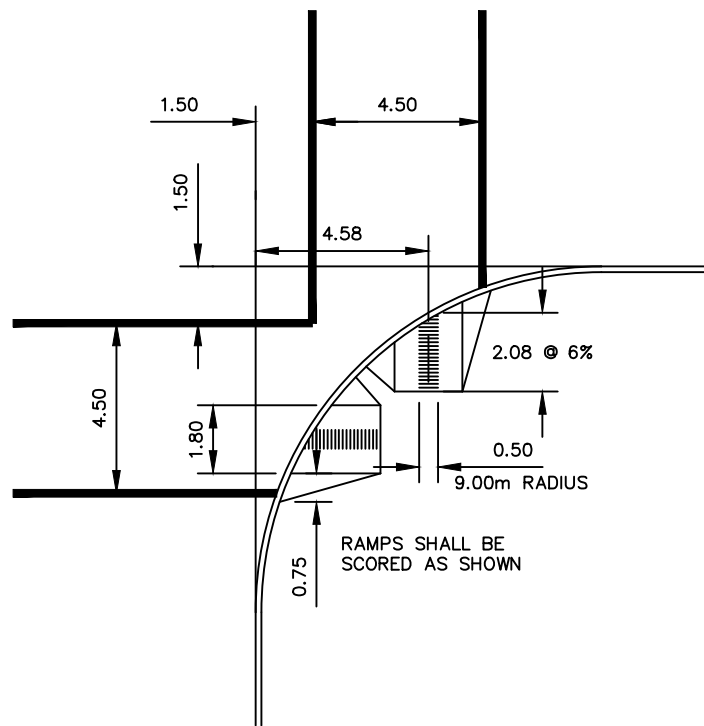


DUAL WHEELCHAIR RAMP DESIGN STANDARD (5% WHEELCHAIR RAMP SLOPE)

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : DEC. 2010	R-12-SD
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. CC-RAMP)

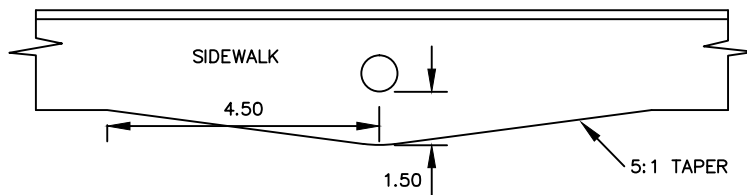
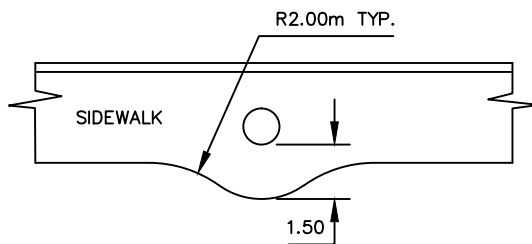
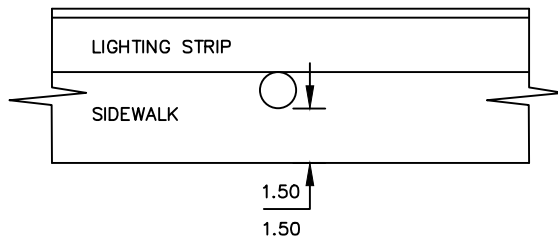
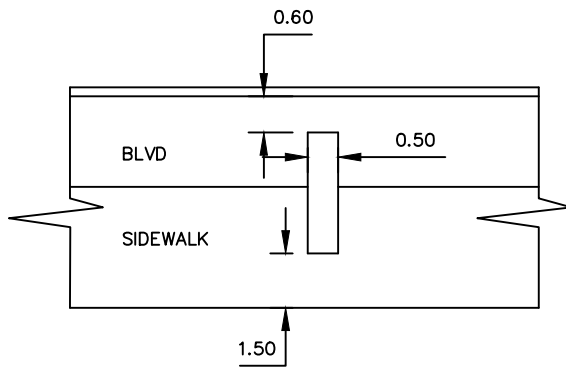


DUAL WHEELCHAIR RAMP DESIGN STANDARD (6% WHEELCHAIR RAMP SLOPE)

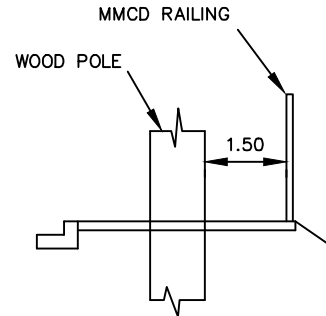
TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : DEC. 2010	R-13-SD
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. CC-RAMP)



PLAN - EXAMPLES



SECTION

THE REQUIREMENT FOR A SAFETY RAIL IS BASED ON THE BC MOTI, SUPPLEMENT TO TAC GEOMETRIC DESIGN GUIDE, SECTION 660. AS AMENDED FROM TIME TO TIME.

PREFERRED METHOD

NOTES:

THE MINIMUM CLEARANCE FROM VERTICAL OBSTRUCTIONS IN ALL CASES IS 1.50m FOR A MAXIMUM DISTANCE OF 0.5m.

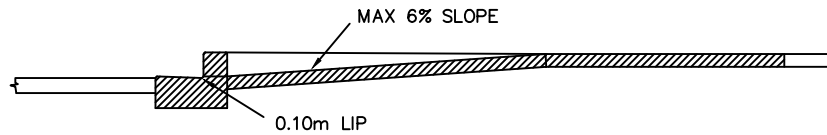
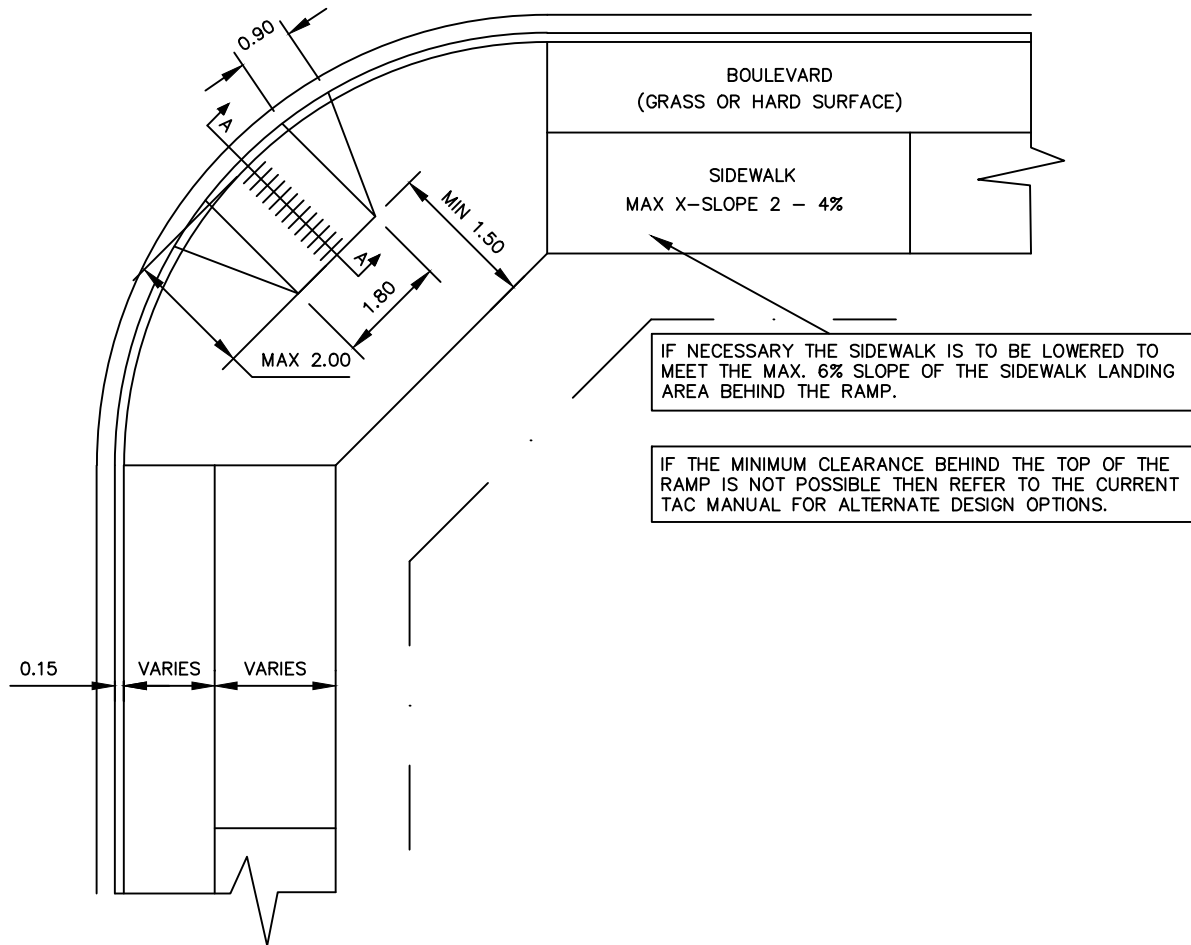


MINIMUM CLEARANCE FOR PEDESTRIAN FACILITIES

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : DEC. 2010	R-14-SD
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. CC-RAMP)



CROSS-SECTION A - A

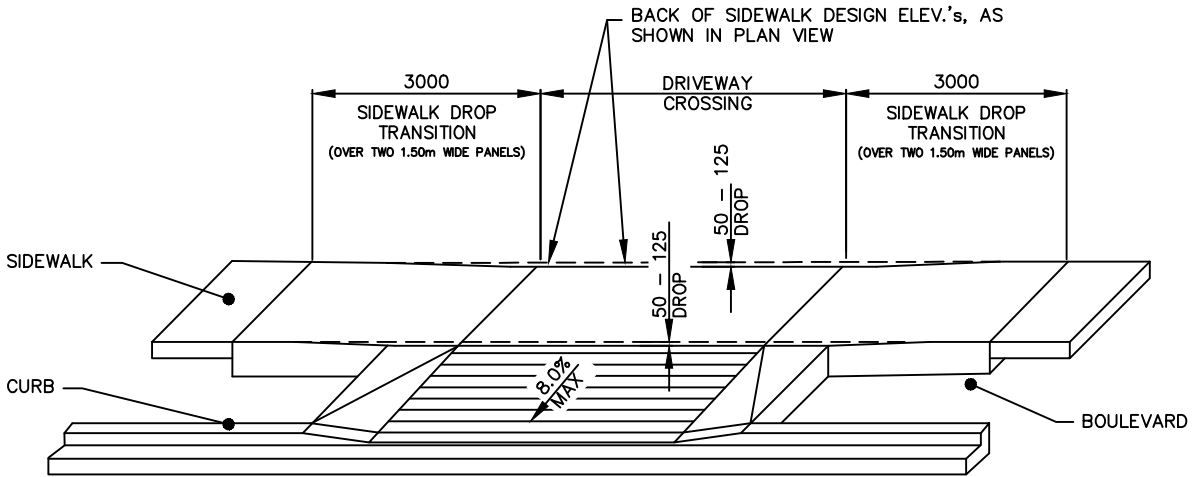


SINGLE WHEELCHAIR RAMP DESIGN STANDARD

TECH. :	SCALE : NTS	DRAWING NUMBER : R-15-SD
DR. :	DATE : DEC. 2010	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG.)



SIDEWALK 50mm - 125mm DROP DETAIL
(AT DRIVEWAYS)

FOR USE BY PERMISSION OF
THE CITY OF RICHMOND ONLY

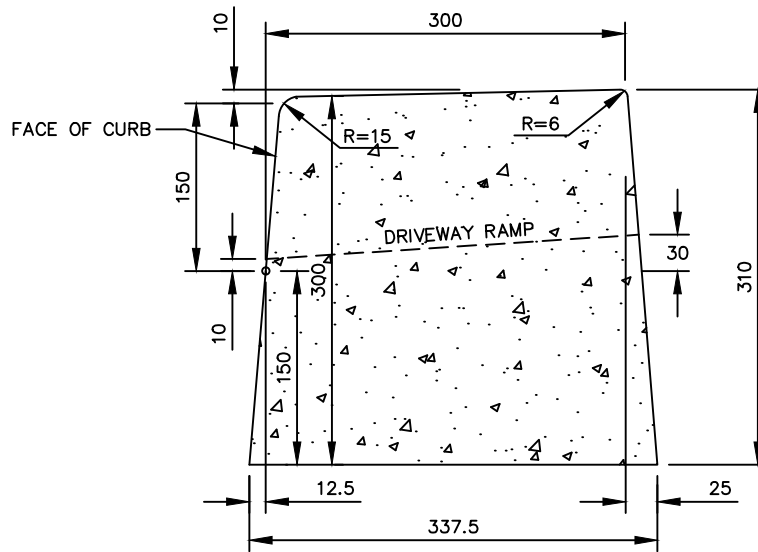


SIDEWALK DROP DETAIL

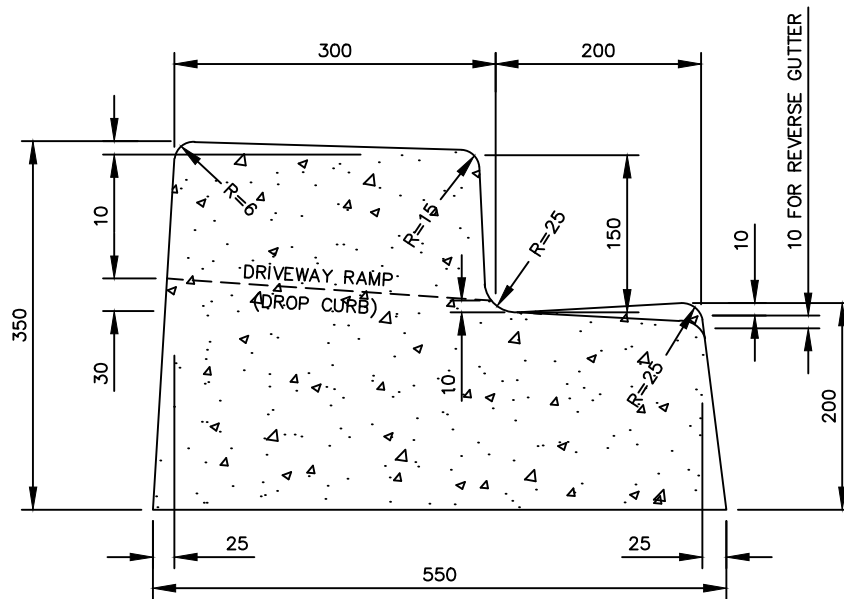
TECH. :	SCALE : NTS	DRAWING NUMBER : R-16-SD
DR. :	DATE : DEC. 2010	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG.)



URBAN CURB (RUC)



URBAN CURB & GUTTER (RUC-G)

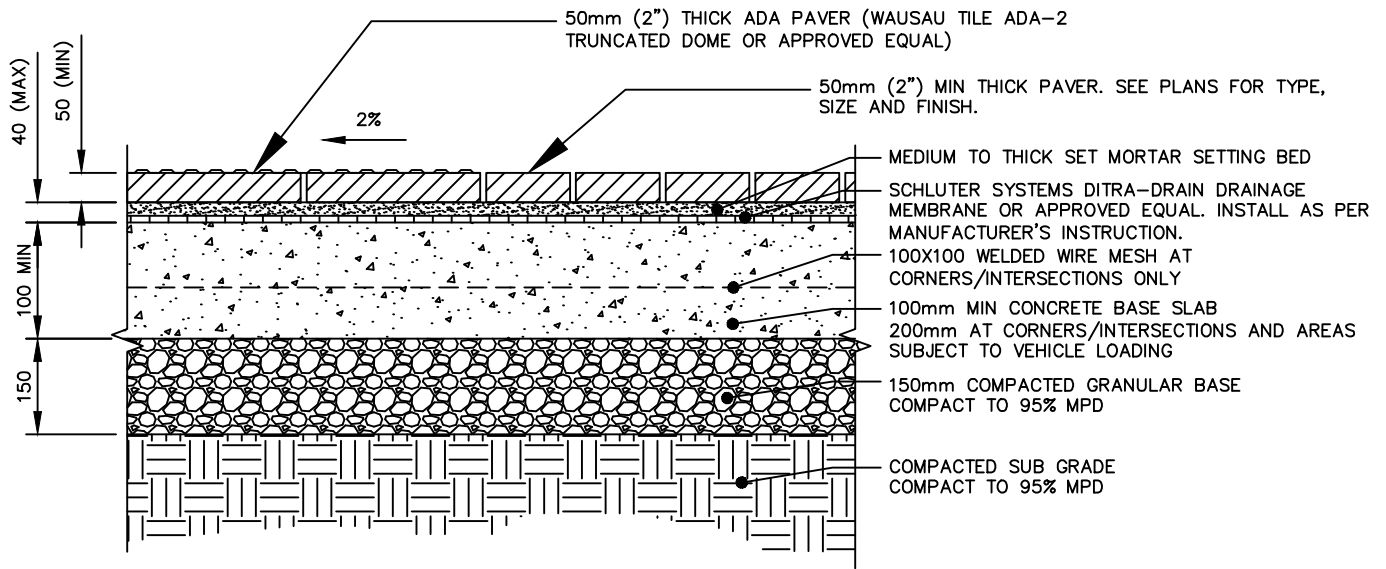


URBAN CURB AND URBAN CURB & GUTTER DETAILS

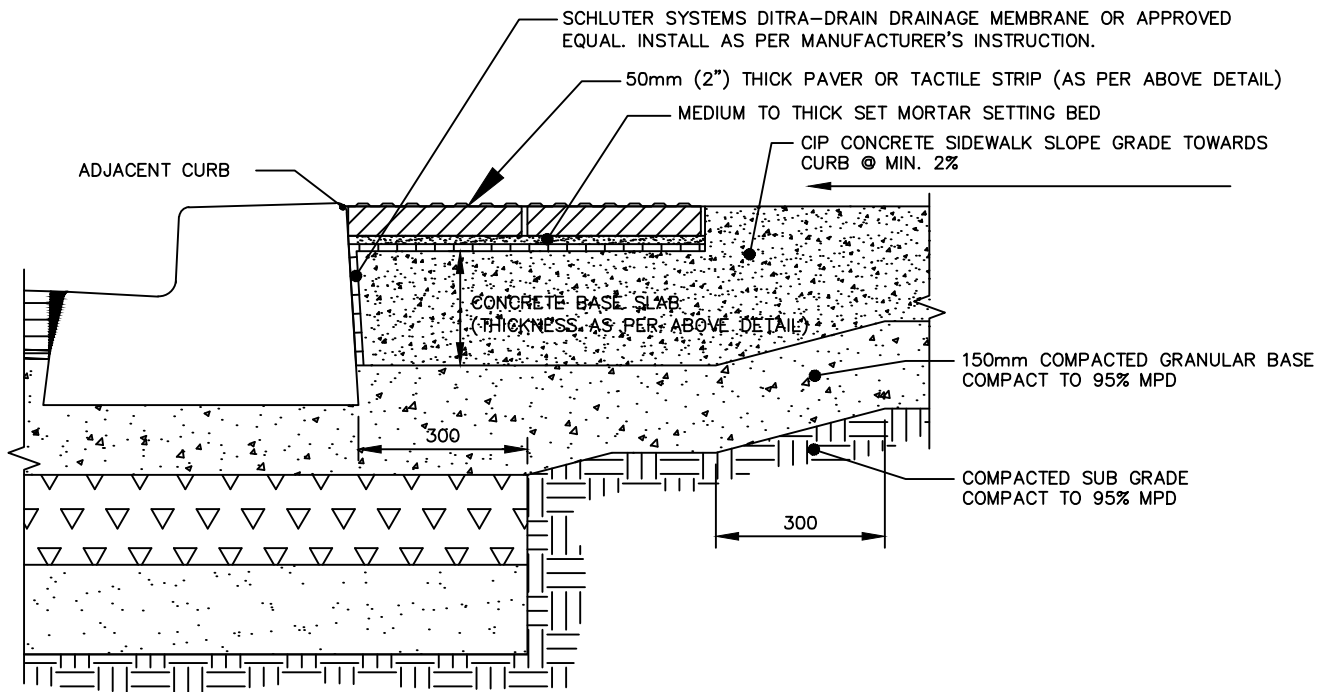
TECH. :	SCALE : NTS	DRAWING NUMBER : R-17-SD
DR. :	DATE : DEC. 2010	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG.)



TACTILE WARNING STRIP AND PAVER DETAIL



TACTILE WARNING STRIPS AND PAVERS AT CURB AND TRANSITION TO CONCRETE SIDEWALK

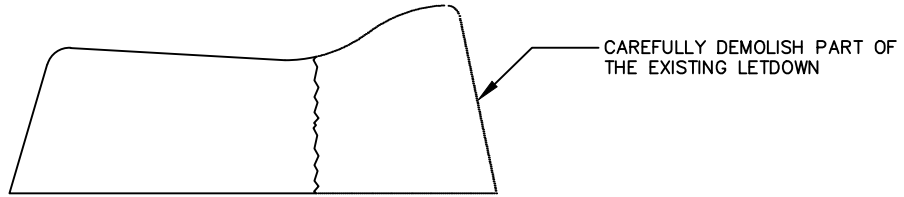
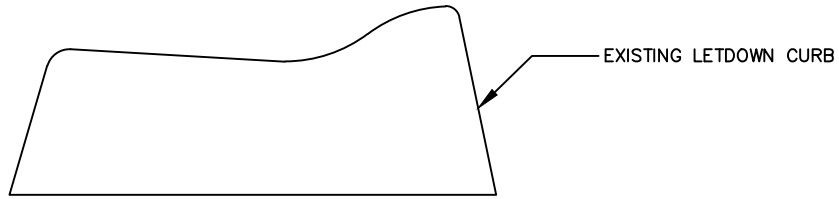


PAVERS & TACTILE WARNING STRIPS

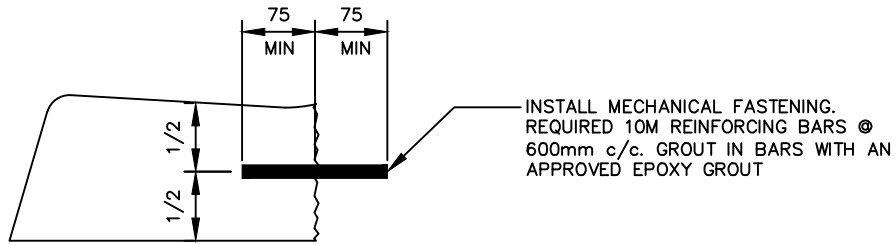
TECH. :	SCALE : NTS	DRAWING NUMBER : R-18-SD
DR. :	DATE : DEC. 2010	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

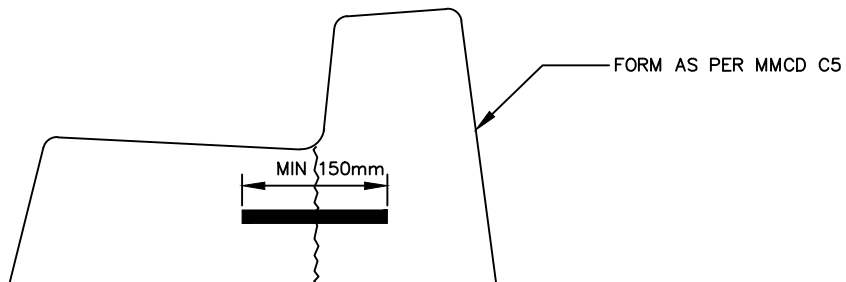
(SOURCE FROM: MMCD STD. DWG. C4)



STEP 1



STEP 2



STEP 3



CONVERTING LETDOWN CURB TO HIGHBACK CURB

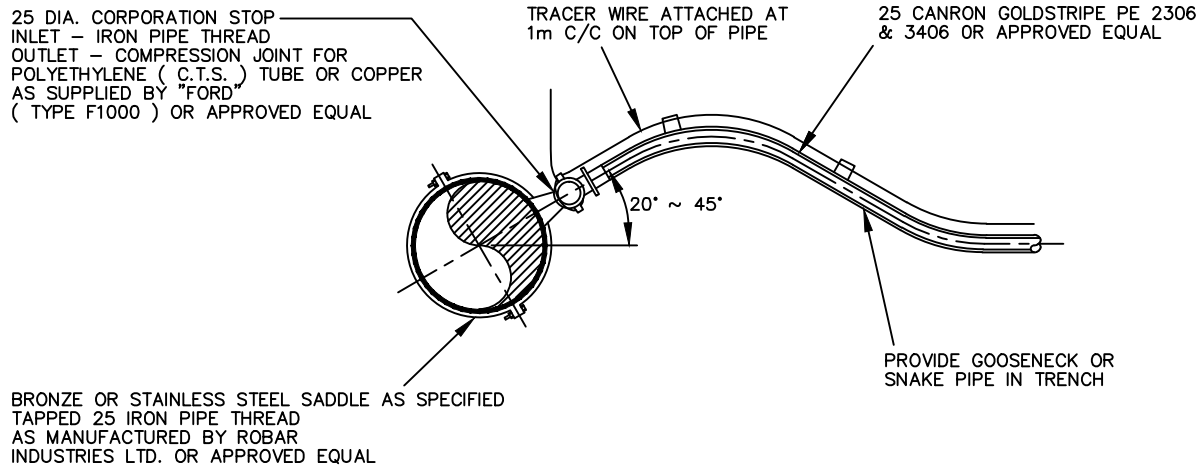
TECH. :	SCALE : NTS	DRAWING NUMBER : R-19-SD
DR. :	DATE : DEC. 2010	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

WATER DRAWINGS

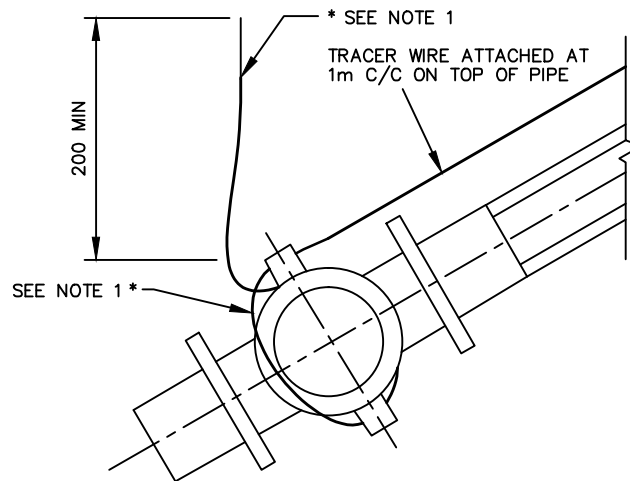
WATER DRAWINGS

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W-1)



SERVICE CONNECTION



TRACER WIRE CONNECTION DETAIL

NOTES:

- 1) * REMOVE TRACER WIRE CASING FROM PORTION OF TRACER WIRE INDICATED

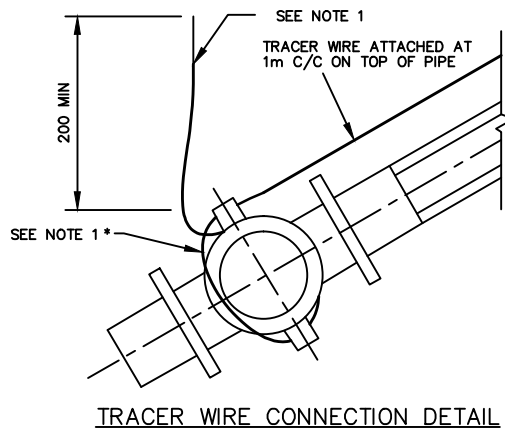
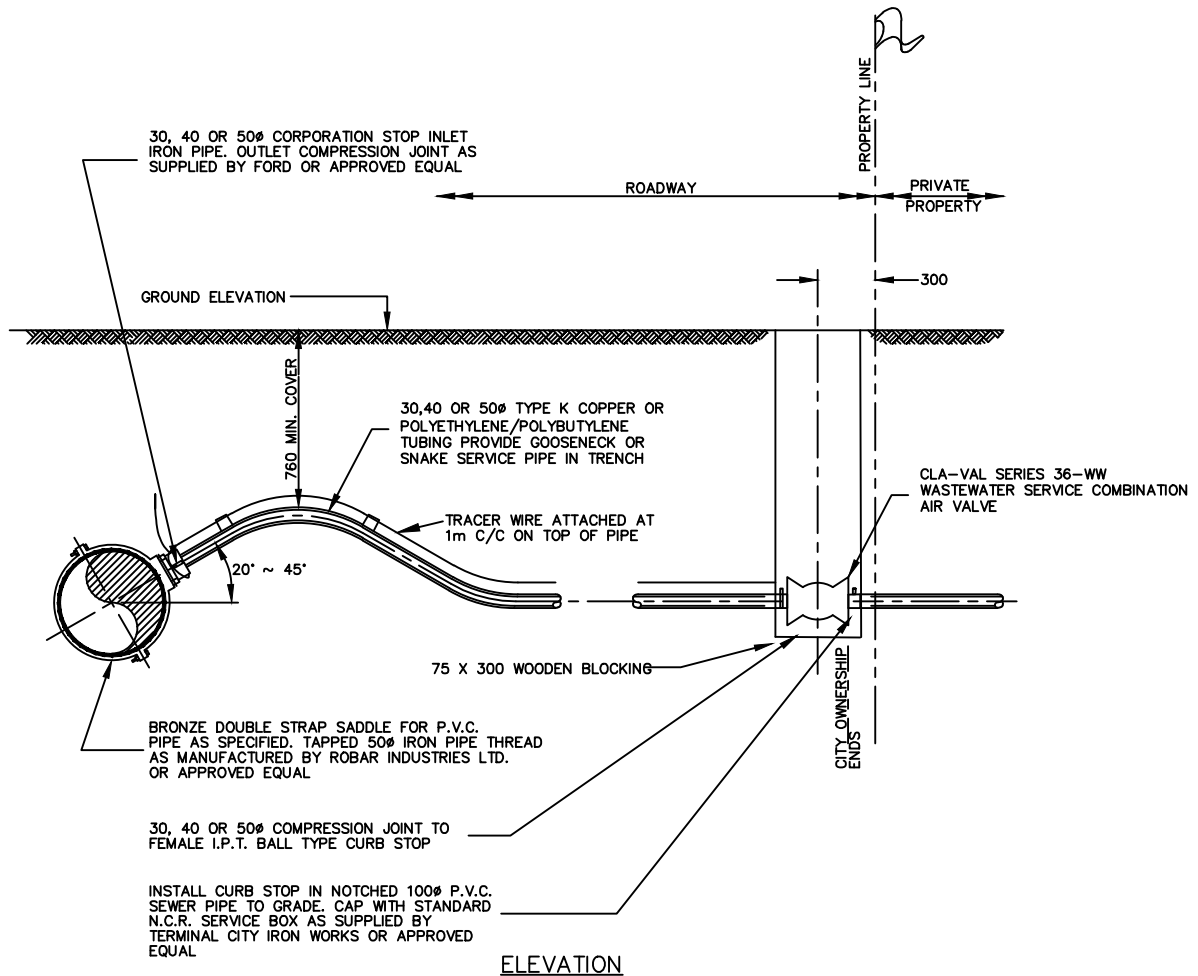


STANDARD 25mm DIA.
SERVICE CONNECTION

TECH. :	SCALE : NTS	DRAWING NUMBER : W2a-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W-2)



NOTES:

- 1)* REMOVE TRACER WIRE CASING FROM PORTION OF TRACER WIRE INDICATED

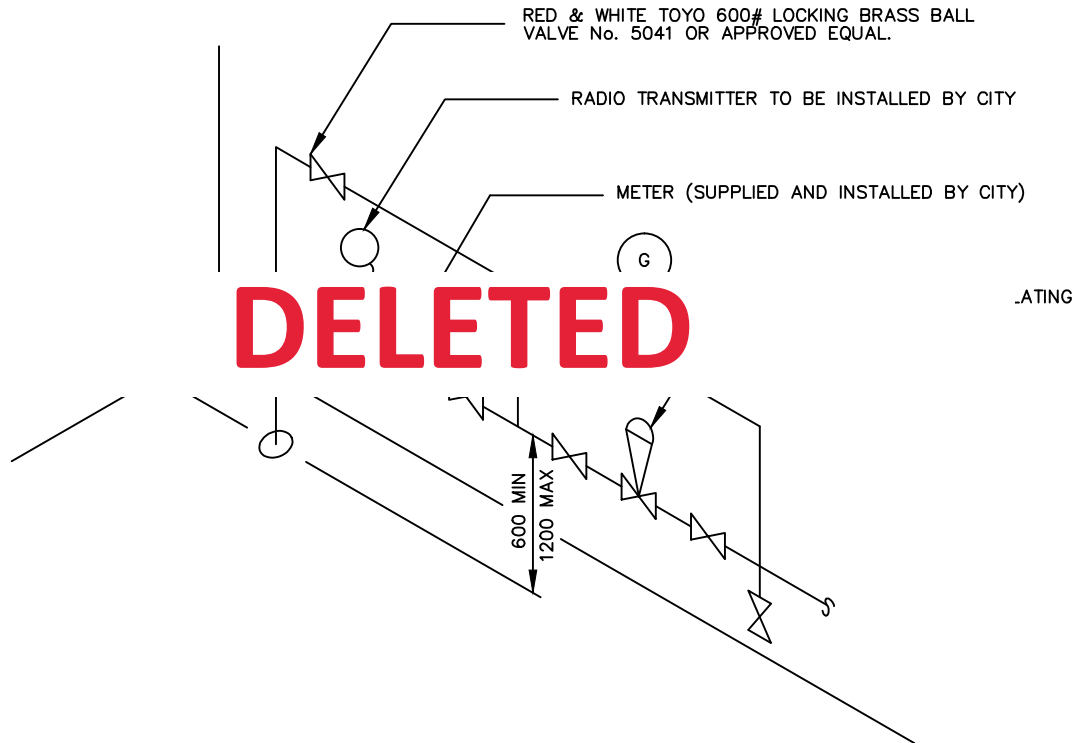


STANDARD 30mm, 40mm & 50mm SERVICE CONNECTIONS

TECH. :	SCALE : NTS	DRAWING NUMBER : W2b-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W-8)



NOTES:

1. REFER TO PERMITS & LICENCE DEPT. DWG. DR. NO. P - 106 FOR SIZES.
2. REMOTE READER TO BE SITUATED ON AN ACCESSIBLE OUTSIDE WALL.
3. 900 CLEARANCE REQUIRED IN FRONT FOR SERVICE.

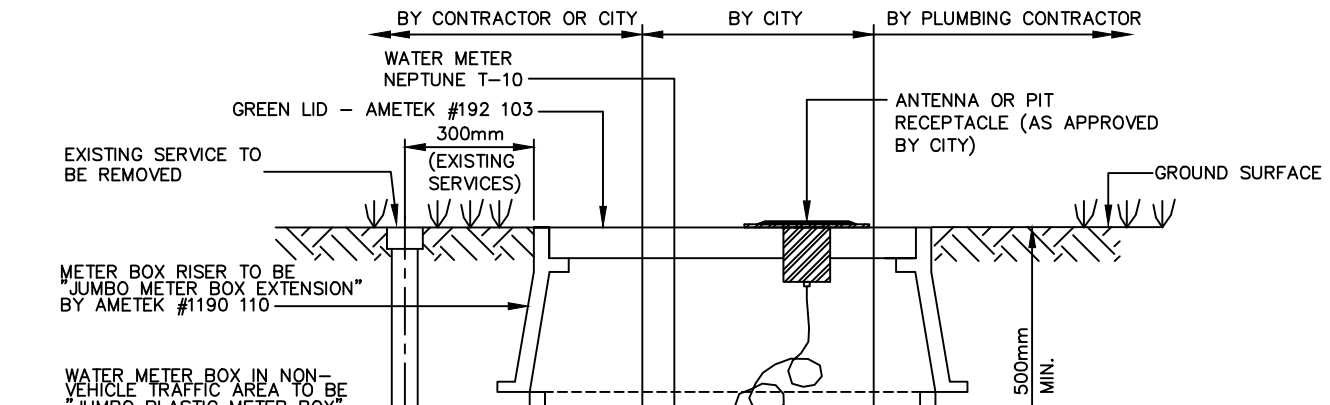


TYPICAL COMMERCIAL METER INSTALLATION

TECH. :	SCALE : NTS	DRAWING NUMBER : W2f-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W2g-SD)

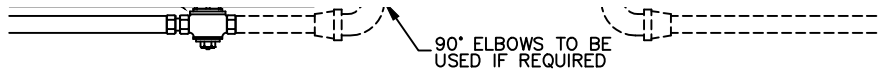


SUPERCEDED

Refer to Richmond Supplemental Specifications - Water Meter Standard Detail Drawings W2g to W2n (July 2022)

APPROVED M STRAIGHT OF INSTALLATION COMPRESSIOI WATER TRACER WIRE (REFER TO W2a-S FOR CONNECTION DETAILS) CURB STOP C, STANDPIPE (E: SERVICES)

L BASE



WATER METER BOX

NOTES:

1. ALL METER CHAMBERS TO BE LOCATED CLEAR OF DRIVEWAY.
2. MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE B.C. PLUMBING CODE.
3. CONNECTION SIZE RANGE 19mm-50mm.
4. RETROFITTING METERS ON EXISTING WATER CONNECTIONS, THAT CAN NOT BE RELOCATED OUT OF DRIVEWAYS, SHALL USE A.E. CONCRETE T266 SERVICE BOX C/W STEEL LID.
5. METER ASSEMBLIES SHALL BE INSTALLED CENTERED AND ALIGNED WITHIN METER BOXES.
6. FOR EXISTING SERVICES, METER TO BE INSTALLED IMMEDIATELY DOWNSTREAM OF EXISTING CURB-STOP. STANDPIPE TO REMAIN INTACT.
7. 19 mm (3/4") WATER METER TO BE INSTALLED ON ALL RESIDENTIAL APPLICATIONS.
8. WHERE DEPTH OF EXISTING WATER SERVICE CANNOT ACCOMMODATE 90° FITTINGS (i.e. SHALLOW SERVICE <500 mm DEPTH), STRAIGHT METER FITTINGS ARE TO BE USED. METER TO BE PLUMBED AT DEPTH OF EXISTING SERVICE. INSTALLATION WHERE METER BASE IS <400 mm TO BE DOCUMENTED AND EXISTING WATER SERVICE DEPTH NOTED.

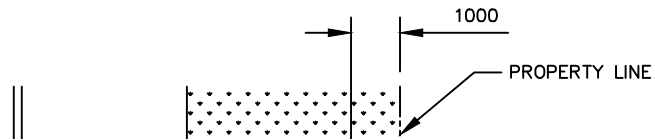


SINGLE FAMILY DWELLING
WATER METER AND METER BOX INSTALLATION
50mmØ & UNDER FOR DOMESTIC USE ONLY

TECH. :	SCALE : NTS	DRAWING NUMBER : W2g-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 2

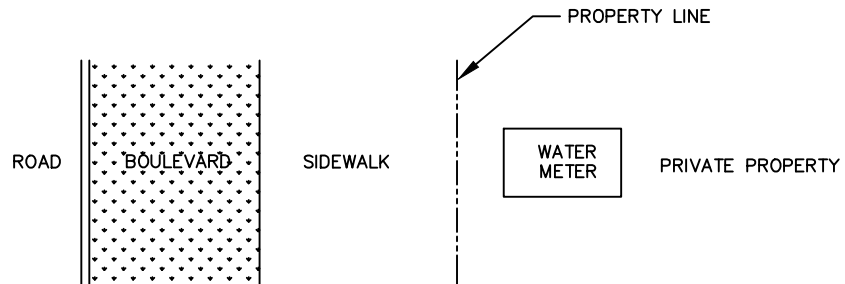
SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W2g-SD)



SUPERCEDED

Refer to Richmond Supplemental Specifications - Water Meter Standard Detail Drawings W2g to W2n (July 2022)



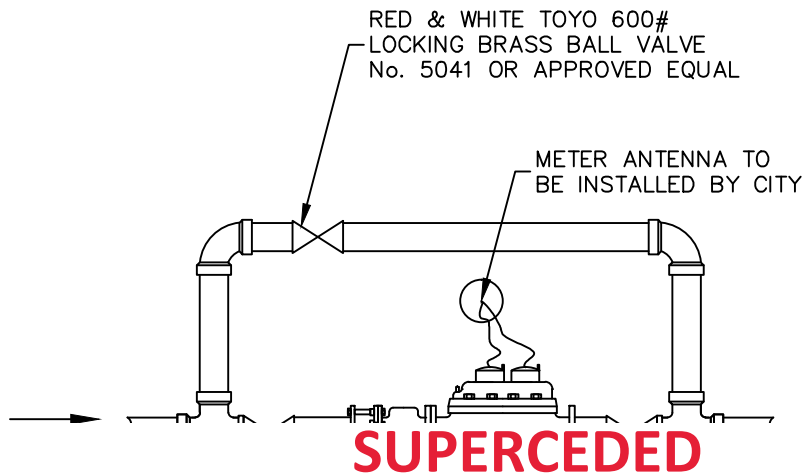
LOCATION OF METER INSTALLATION-OPTION 2



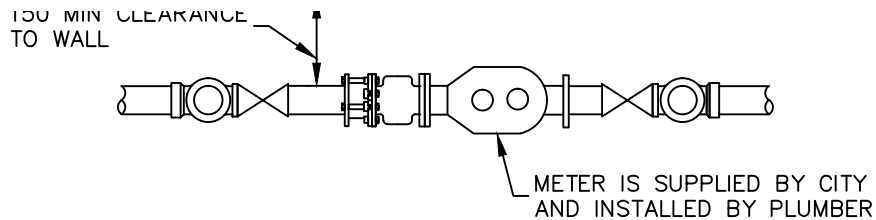
SINGLE FAMILY DWELLING
 WATER METER AND METER BOX LOCATION
 50mm ϕ & UNDER FOR DOMESTIC USE ONLY

TECH. :	SCALE : NTS	DRAWING NUMBER : W2g-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : AUG./16	SHEET No. : 2 OF 2

SUPPLEMENTARY DETAIL DRAWING



**Refer to Richmond Supplemental
Specifications - Water Meter Standard
Detail Drawings W2g to W2n (July 2022)**



GENERAL NOTES:

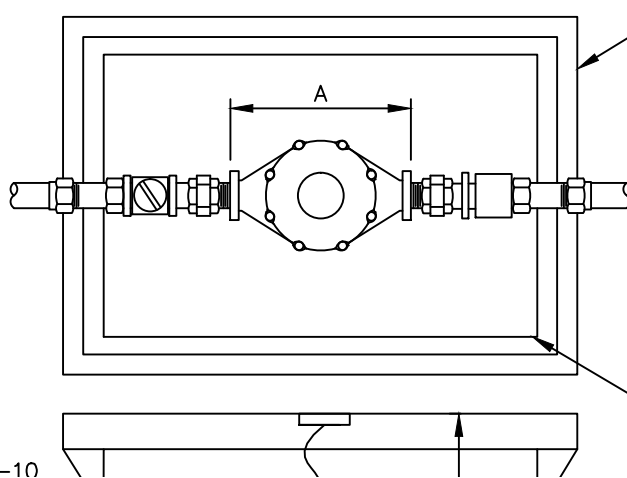
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CURRENT BC PLUMBING CODE AND THE CURRENT CITY OF RICHMOND SUPPLEMENTARY SPECIFICATIONS AND DETAIL DRAWINGS.
2. ALL MATERIALS SHALL BE CERTIFIED TO NSF/ANSI 61
3. BY-PASS VALVE TO BE LOCKABLE
4. BY-PASS LINE TO BE THE SAME PIPE DIAMETER AS SERVICE CONNECTION FOR FIRE SERVICE AND MINIMUM 1/2 SERVICE CONNECTION FOR NON-FIRE SERVICE
5. METER TO BE SIZED IN ACCORDANCE WITH APPROVED DRAWINGS.
6. METER TO BE INSTALLED AS PER MANUFACTURERS INSTALLATION AND MAINTENANCE GUIDE
7. 900 CLEARANCE REQUIRED IN FRONT FOR SERVICE



MECHANICAL ROOM WATER METER INSTALLATION REQUIREMENTS

TECH. : BD	SCALE : N.T.S.	DRAWING NUMBER : W2j - SD
DR. : BD	DATE : 2013-02-19	
ENG. : TB	REV. DATE : REV	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



PRECAST CONCRETE
SERVICE BOX 5686

PIPE SIZE	A (mm)
38	330
50	432

ACCESS LID TO BE LARGER THAN INSIDE DIAMETER OF CHAMBER c/w 1-7/8" HOLE FOR METER ANTENNA.
LIDS INSTALLED IN TRAFFIC TO BE RECESSED FOR ANTENNA AND REINFORCED TO MAINTAIN REQUIRED LOAD RATING

NEPTUNE T-10
WATER ME
(OR APPRO
EQL

SUPERCEDED

Refer to Richmond Supplemental Specifications - Water Meter Standard Detail Drawings W2g to W2n (July 2022)



MANUFACTURED METER SETTER WITH INTEGRAL 25mm BYPASS (FORD SERIES 70 OR APPROVED EQUAL)

GENERAL NOTES:

- ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CURRENT EDITION OF THE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS (MMCD), THE CURRENT BC PLUMBING CODE, AND THE CURRENT CITY OF RICHMOND SUPPLEMENTARY SPECIFICATIONS AND DETAIL DRAWINGS.
- ALL MATERIALS SHALL BE CERTIFIED TO NSF/ANSI 61
- ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
- ALL HARDWARE, SUCH AS NUTS, BOLTS, TIE RODS, ETC. ARE TO BE STAINLESS STEEL.
- BY-PASS VALVE TO BE LOCKABLE BALL VALVE AND INSTALLED IN CLOSED POSITION
- METER TO BE SIZED IN ACCORDANCE WITH APPROVED DRAWINGS.
- METER TO BE INSTALLED AS PER MANUFACTURERS INSTALLATION AND MAINTENANCE GUIDE
- MIN 100mm CLEARANCE FINISHED FLOOR TO PIPING.
- CONTRACTOR TO CHARGE METER AND BLOW OFF AIR FOLLOWING INSTALLATION.
- CHAMBER, COLLAR AND LID TO BE DESIGNED FOR H-20 TRAFFIC LOADING WHEN INSTALLED IN TRAFFIC AND FOR H-20 STATIC LOADING WHEN INSTALLED IN NON-TRAFFIC AREA.
- CHAMBER MUST HAVE SUFFICIENT COMPACTED GRAVEL BASE TO PREVENT EXCESSIVE SETTLEMENT.
- CITY TO SUPPLY METER, OWNER/S TO CONSTRUCT CHAMBER AND INSTALL METER.



38 & 50mm WATER METER AND
CHAMBER FOR NON-FIRE SERVICE

TECH. : BD

SCALE : N.T.S.

DRAWING NUMBER :

DR. : BD

DATE : 2013-05-06

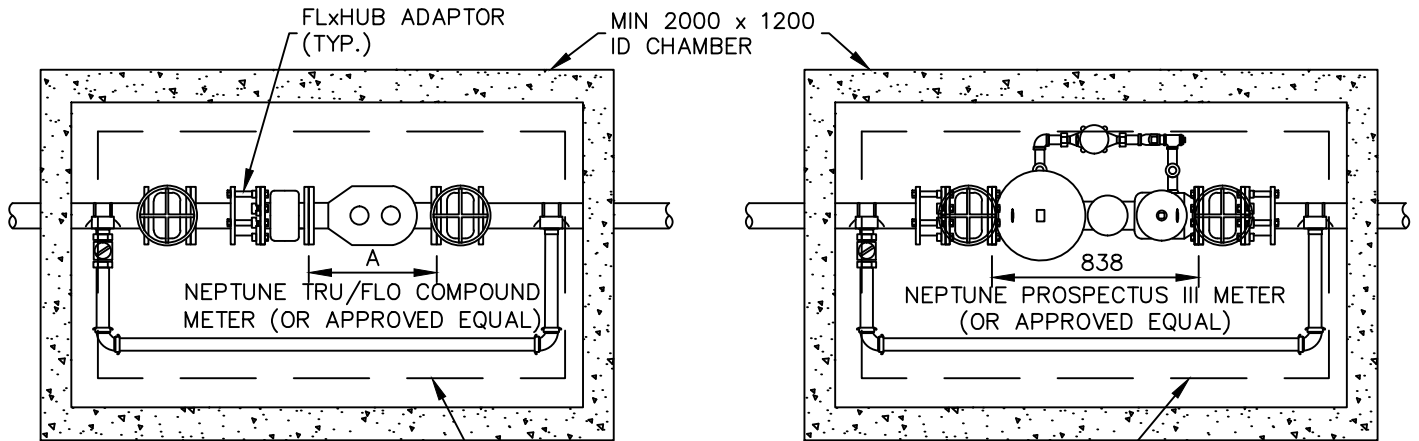
W2k - SD

ENG. : TB

REV. DATE : REV

SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

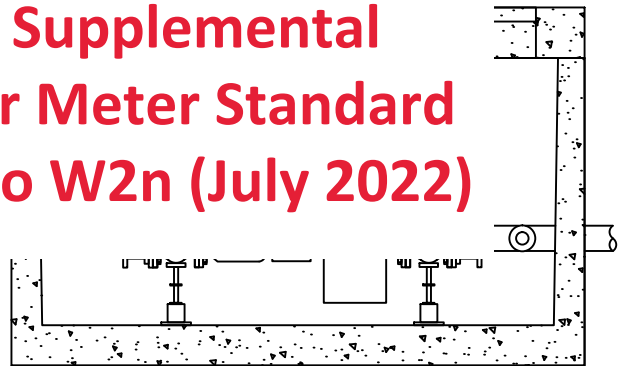
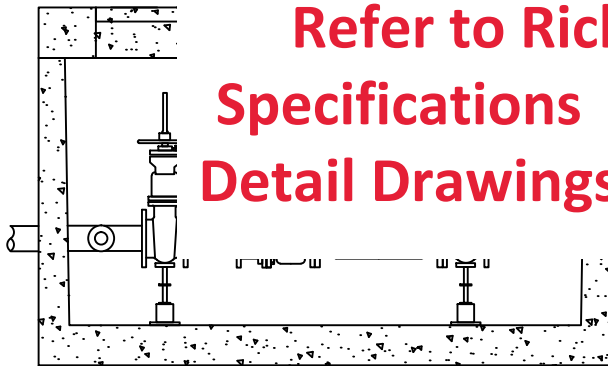


PIPE SIZE	A (mm)
75	470
100	

MIN 1700 x 800 ACCESS LID POSITIONED OVER METER c/w 1-7/8" HOLE FOR METER ANTENNA LIDS INSTALLED IN TRAFFIC TO BE

SUPERCEDED

Refer to Richmond Supplemental Specifications - Water Meter Standard Detail Drawings W2g to W2n (July 2022)



GENERAL NOTES:

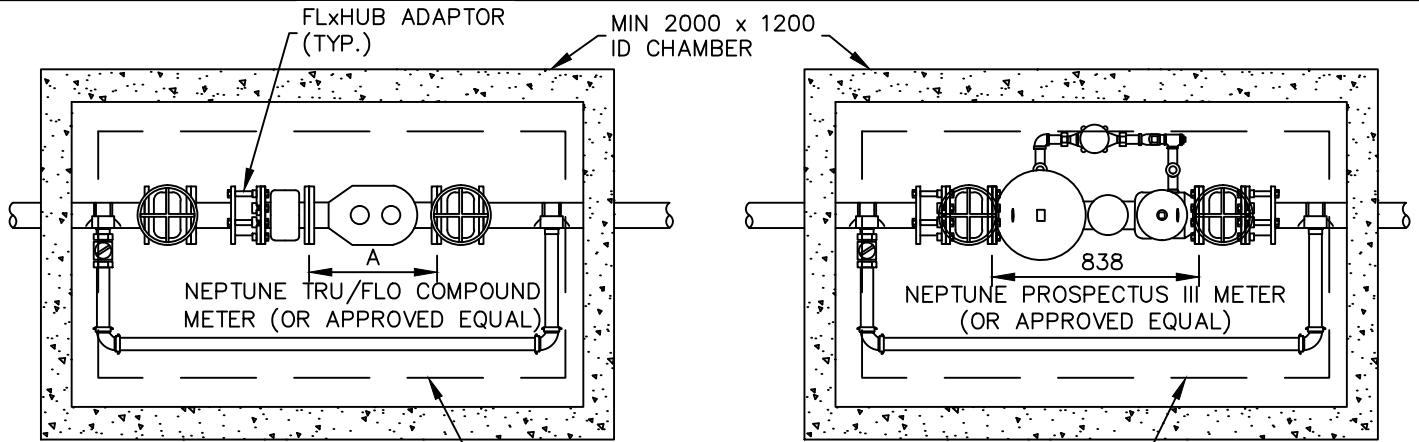
- ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CURRENT EDITION OF THE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS (MMCD), THE CURRENT BC PLUMBING CODE, AND THE CURRENT CITY OF RICHMOND SUPPLEMENTARY SPECIFICATIONS AND DETAIL DRAWINGS.
- ALL MATERIALS SHALL BE CERTIFIED TO NSF/ANSI 61
- ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
- ALL HARDWARE, SUCH AS NUTS, BOLTS, TIE RODS, ETC. ARE TO BE STAINLESS STEEL.
- BY-PASS IS TO BE MINIMUM 1/2 CONNECTION SIZE. BY-PASS VALVE TO BE LOCKABLE.
- PROVISION MUST BE MADE IN PIPING FOR REMOVAL OF METER.
- METER TO BE SIZED IN ACCORDANCE WITH APPROVED DRAWINGS.
- MIN 200mm CLEARANCE FINISHED FLOOR TO PIPING OR 150mm CLEARANCE FINISHED FLOOR TO METER BOTTOM.
- METER TO BE INSTALLED AS PER MANUFACTURERS INSTALLATION AND MAINTENANCE GUIDE
- CONTRACTOR TO CHARGE METER AND BLOW OFF AIR FOLLOWING INSTALLATION.
- WALLS AND FLOOR TO BE MONOLITHIC POUR OR FLEXIBLE SEALING MEMBER MUST BE INSTALLED BETWEEN FLOOR AND WALLS. PRECAST CHAMBERS MAY BE USED, BUT JOINTS MUST BE SEALED.
- CHAMBER, COLLAR AND LID TO BE DESIGNED FOR H-20 TRAFFIC LOADING AND BOLTED DOWN WHEN INSTALLED IN TRAFFIC AND FOR H-20 STATIC LOADING WHEN INSTALLED IN NON-TRAFFIC AREA.
- CHAMBER MUST HAVE SUFFICIENT COMPACTED GRAVEL BASE TO PREVENT EXCESSIVE SETTLEMENT.
- CITY TO SUPPLY METER, OWNER/S TO CONSTRUCT CHAMBER AND INSTALL METER.
- JOINT RESTRAINT OR PIPE TO WALL ANCHOR REQUIREMENTS TO BE SPECIFIED BY A PROFESSIONAL ENGINEER.
- PIPE PENETRATION THROUGH CHAMBER WALL TO BE SEALED WITH NON-SHRINK GROUT.
- METER AND BYPASS PIPE TO BE SUPPORTED WITH ADJUSTABLE METER SUPPORTS.



75 & 100mm WATER METER AND CHAMBER FOR NON-FIRE SERVICE

TECH. : BD	SCALE : N.T.S.	DRAWING NUMBER : W2I - SD
DR. : BD	DATE : 2013-05-06	
ENG. : TB	REV. DATE : REV	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

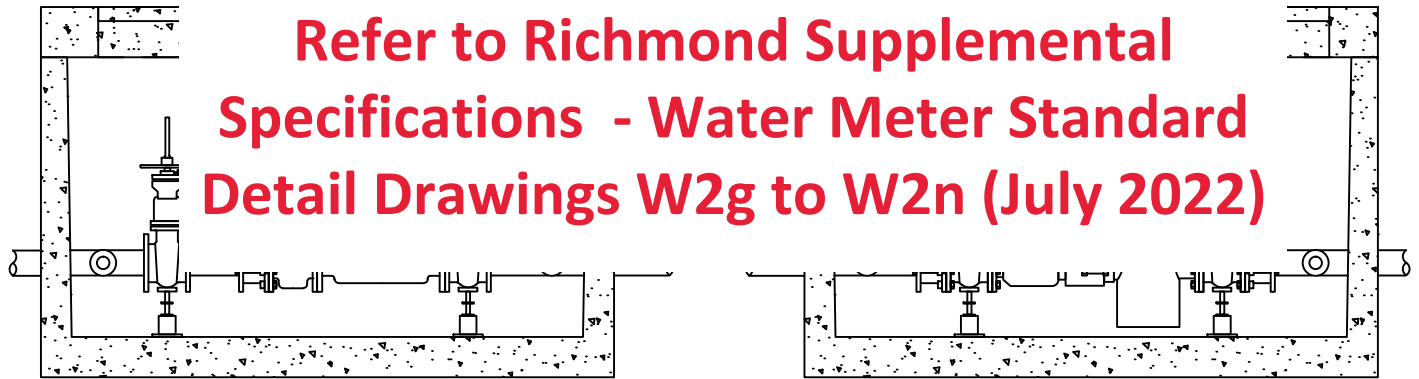


PIPE SIZE	A (mm)
75	432
100	

MIN 1700 x 800 ACCESS LID POSITIONED OVER METER c/w 1-7/8" HOLE FOR METER ANTENNA.
LIDS INSTALLED IN TRAFFIC TO BE RECESSED

SUPERCEDED

Refer to Richmond Supplemental Specifications - Water Meter Standard Detail Drawings W2g to W2n (July 2022)



GENERAL NOTES:

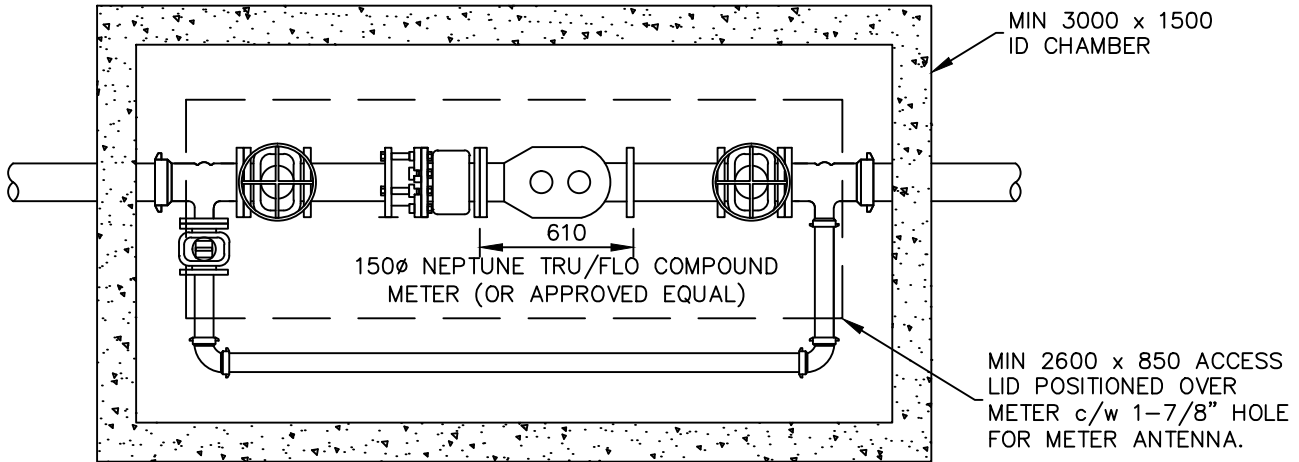
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- ALL MATERIALS SHALL BE CERTIFIED TO NSF/ANSI 61
- ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
- ALL HARDWARE, SUCH AS NUTS, BOLTS, TIE RODS, ETC. ARE TO BE STAINLESS STEEL.
- BY-PASS IS TO BE SAME PIPE DIAMETER AS SERVICE CONNECTION. BY-PASS VALVE TO BE LOCKABLE.
- PROVISION MUST BE MADE IN PIPING FOR REMOVAL OF METER.
- METER TO BE SIZED IN ACCORDANCE WITH APPROVED DRAWINGS.
- MIN 200mm CLEARANCE FINISHED FLOOR TO PIPING OR 150mm CLEARANCE FINISHED FLOOR TO METER BOTTOM.
- METER TO BE INSTALLED AS PER MANUFACTURERS INSTALLATION AND MAINTENANCE GUIDE
- CONTRACTOR TO CHARGE METER AND BLOW OFF AIR FOLLOWING INSTALLATION.
- WALLS AND FLOOR TO BE MONOLITHIC POUR OR FLEXIBLE SEALING MEMBER MUST BE INSTALLED BETWEEN FLOOR AND WALLS. PRECAST CHAMBERS MAY BE USED, BUT JOINTS MUST BE SEALED.
- CHAMBER, COLLAR AND LID TO BE DESIGNED FOR H-20 TRAFFIC LOADING AND BOLTED DOWN WHEN INSTALLED IN TRAFFIC AND FOR H-20 STATIC LOADING WHEN INSTALLED IN NON-TRAFFIC AREA.
- CHAMBER MUST HAVE SUFFICIENT COMPACTED GRAVEL BASE TO PREVENT EXCESSIVE SETTLEMENT.
- CITY TO SUPPLY METER, OWNER/S TO CONSTRUCT CHAMBER AND INSTALL METER.
- JOINT RESTRAINT OR PIPE TO WALL ANCHOR REQUIREMENTS TO BE SPECIFIED BY A PROFESSIONAL ENGINEER.
- PIPE PENETRATION THROUGH CHAMBER WALL TO BE SEALED WITH NON-SHINK GROUT.
- METER AND BYPASS PIPE TO BE SUPPORTED WITH ADJUSTABLE METER SUPPORTS.



75 & 100mm WATER METER AND CHAMBER FOR FIRE SERVICE

TECH. : BD	SCALE : N.T.S.	DRAWING NUMBER : W2m - SD
DR. : BD	DATE : 2013-05-06	
ENG. : TB	REV. DATE : REV	SHEET No. : 1 OF 1

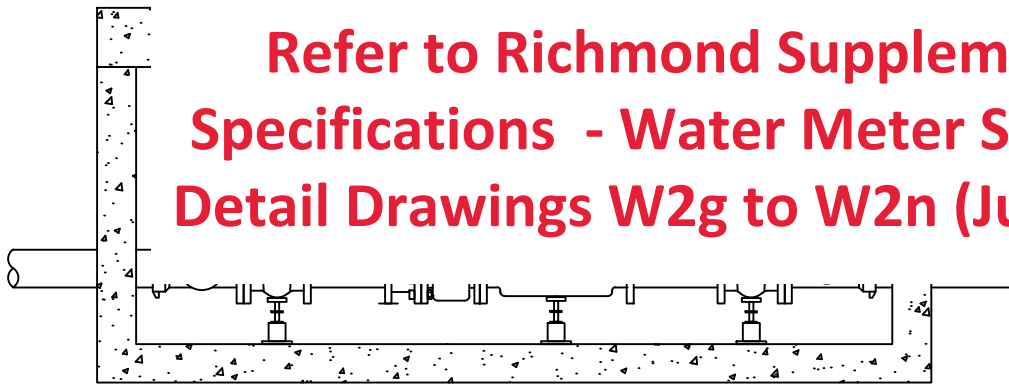
SUPPLEMENTARY DETAIL DRAWING



SUPERCEDED

Refer to Richmond Supplemental Specifications - Water Meter Standard Detail Drawings W2g to W2n (July 2022)

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GENERAL NOTES:

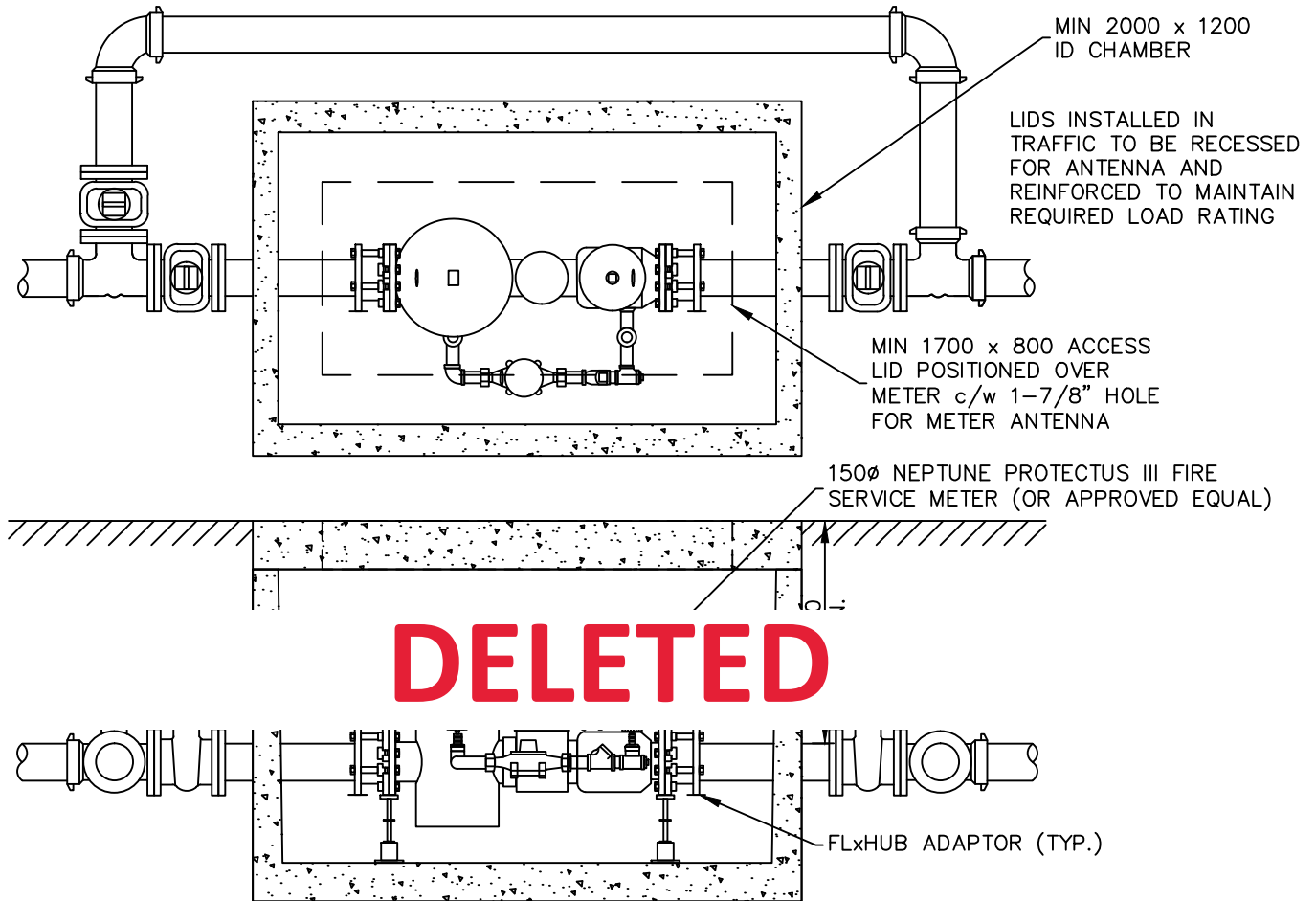
- ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CURRENT EDITION OF THE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS (MMCD), THE CURRENT BC PLUMBING CODE, AND THE CURRENT CITY OF RICHMOND SUPPLEMENTARY SPECIFICATIONS AND DETAIL DRAWINGS.
- ALL MATERIALS SHALL BE CERTIFIED TO NSF/ANSI 61
- ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
- ALL HARDWARE, SUCH AS NUTS, BOLTS, TIE RODS, ETC. ARE TO BE STAINLESS STEEL.
- BY-PASS IS TO BE MINIMUM 1/2 CONNECTION SIZE. BY-PASS VALVE TO BE LOCKABLE.
- PROVISION MUST BE MADE IN PIPING FOR REMOVAL OF METER.
- METER TO BE SIZED IN ACCORDANCE WITH APPROVED DRAWINGS.
- MIN 200mm CLEARANCE FINISHED FLOOR TO PIPING.
- METER TO BE INSTALLED AS PER MANUFACTURERS INSTALLATION AND MAINTENANCE GUIDE
- CONTRACTOR TO CHARGE METER AND BLOW OFF AIR FOLLOWING INSTALLATION.
- WALLS AND FLOOR TO BE MONOLITHIC POUR OR FLEXIBLE SEALING MEMBER MUST BE INSTALLED BETWEEN FLOOR AND WALLS. PRECAST CHAMBERS MAY BE USED, BUT JOINTS MUST BE SEALED.
- CHAMBER, COLLAR AND LID TO BE DESIGNED FOR H-20 TRAFFIC LOADING AND BOLTED DOWN WHEN INSTALLED IN TRAFFIC AND FOR H-20 STATIC LOADING WHEN INSTALLED IN NON-TRAFFIC AREA.
- CHAMBER MUST HAVE SUFFICIENT COMPACTED GRAVEL BASE TO PREVENT EXCESSIVE SETTLEMENT.
- CITY TO SUPPLY METER, OWNER/S TO CONSTRUCT CHAMBER AND INSTALL METER.
- JOINT RESTRAINT OR PIPE TO WALL ANCHOR REQUIREMENTS TO BE SPECIFIED BY A PROFESSIONAL ENGINEER.
- PIPE PENETRATION THROUGH CHAMBER WALL TO BE SEALED WITH NON-SHRINKGROUT.
- METER AND BYPASS PIPE TO BE SUPPORTED WITH ADJUSTABLE METER SUPPORTS.



150mm WATER METER AND CHAMBER FOR NON-FIRE SERVICE

TECH. : BD	SCALE : N.T.S.	DRAWING NUMBER : W2n - SD
DR. : BD	DATE : 2013-05-06	
ENG. : TB	REV. DATE : REV	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



GENERAL NOTES:

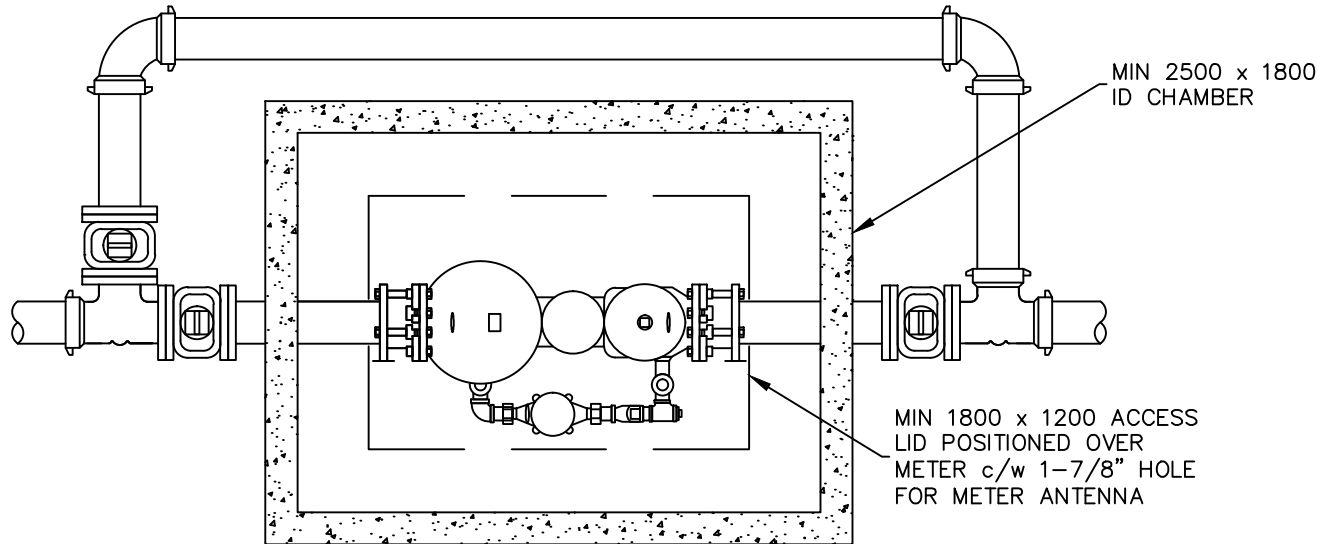
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CURRENT EDITION OF THE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS (MMCD), THE CURRENT BC PLUMBING CODE, AND THE CURRENT CITY OF RICHMOND SUPPLEMENTARY SPECIFICATIONS AND DETAIL DRAWINGS.
2. ALL MATERIALS SHALL BE CERTIFIED TO NSF/ANSI 61
3. ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
4. ALL HARDWARE, SUCH AS NUTS, BOLTS, TIE RODS, ETC. ARE TO BE STAINLESS STEEL.
5. BY-PASS IS TO BE THE SAME PIPE DIAMETER AS SERVICE CONNECTION. BY-PASS VALVE TO BE LOCKABLE.
6. PROVISION MUST BE MADE IN PIPING FOR REMOVAL OF METER.
7. METER TO BE SIZED IN ACCORDANCE WITH APPROVED DRAWINGS.
8. MIN 150mm CLEARANCE FINISHED FLOOR TO METER BOTTOM.
9. METER TO BE INSTALLED AS PER MANUFACTURERS INSTALLATION AND MAINTENANCE GUIDE
10. CONTRACTOR TO CHARGE METER AND BLOW OFF AIR FOLLOWING INSTALLATION.
11. WALLS AND FLOOR TO BE MONOLITHIC POUR OR FLEXIBLE SEALING MEMBER MUST BE INSTALLED BETWEEN FLOOR AND WALLS. PRECAST CHAMBERS MAY BE USED, BUT JOINTS MUST BE SEALED.
12. CHAMBER, COLLAR AND LID TO BE DESIGNED FOR H-20 TRAFFIC LOADING AND BOLTED DOWN WHEN INSTALLED IN TRAFFIC AND FOR H-20 STATIC LOADING WHEN INSTALLED IN NON-TRAFFIC AREA.
13. CHAMBER MUST HAVE SUFFICIENT COMPACTED GRAVEL BASE TO PREVENT EXCESSIVE SETTLEMENT.
14. CITY TO SUPPLY METER, OWNER/S TO CONSTRUCT CHAMBER AND INSTALL METER.
15. JOINT RESTRAINT OR PIPE TO WALL ANCHOR REQUIREMENTS TO BE SPECIFIED BY A PROFESSIONAL ENGINEER.
16. PIPE PENETRATION THROUGH CHAMBER WALL TO BE SEALED WITH NON-SHRINK GROUT.
17. METER TO BE SUPPORTED WITH ADJUSTABLE METER SUPPORTS.



150mm WATER METER AND CHAMBER FOR FIRE SERVICE

TECH. : BD	SCALE : N.T.S.	DRAWING NUMBER : W20 - SD
DR. : BD	DATE : 2013-05-06	
ENG. : TB	REV. DATE : REV	SHEET No. : 1 OF 1

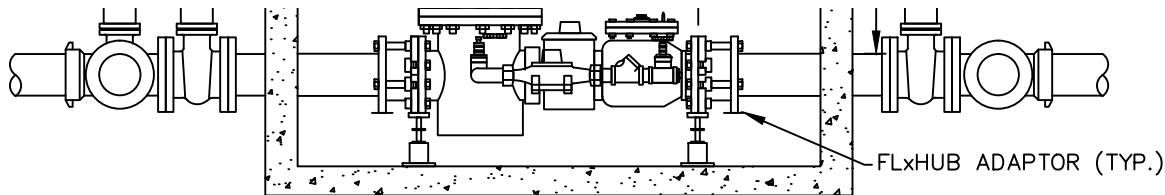
SUPPLEMENTARY DETAIL DRAWING



200 ϕ NEPTUNE PROTECTUS III FIRE SERVICE METER (OR APPROVED EQUAL)

LIDS INSTALLED IN TRAFFIC TO BE RECESSED FOR ANTENNA AND REINFORCED TO MAINTAIN FINISH

DELETED



GENERAL NOTES:

1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CURRENT EDITION OF THE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS (MMCD), THE CURRENT BC PLUMBING CODE, AND THE CURRENT CITY OF RICHMOND SUPPLEMENTARY SPECIFICATIONS AND DETAIL DRAWINGS.
2. ALL MATERIALS SHALL BE CERTIFIED TO NSF/ANSI 61
3. ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
4. ALL HARDWARE, SUCH AS NUTS, BOLTS, TIE RODS, ETC. ARE TO BE STAINLESS STEEL.
5. BY-PASS IS TO BE THE SAME PIPE DIAMETER AS SERVICE CONNECTION. BY-PASS VALVE TO BE LOCKABLE.
6. PROVISION MUST BE MADE IN PIPING FOR REMOVAL OF METER.
7. METER TO BE SIZED IN ACCORDANCE WITH APPROVED DRAWINGS.
8. MIN 150mm CLEARANCE FINISHED FLOOR TO METER BOTTOM.
9. METER TO BE INSTALLED AS PER MANUFACTURERS INSTALLATION AND MAINTENANCE GUIDE
10. CONTRACTOR TO CHARGE METER AND BLOW OFF AIR FOLLOWING INSTALLATION.
11. WALLS AND FLOOR TO BE MONOLITHIC POUR OR FLEXIBLE SEALING MEMBER MUST BE INSTALLED BETWEEN FLOOR AND WALLS. PRECAST CHAMBERS MAY BE USED, BUT JOINTS MUST BE SEALED.
12. CHAMBER, COLLAR AND LID TO BE DESIGNED FOR H-20 TRAFFIC LOADING AND BOLTED DOWN WHEN INSTALLED IN TRAFFIC AND FOR H-20 STATIC LOADING WHEN INSTALLED IN NON-TRAFFIC AREA.
13. CHAMBER MUST HAVE SUFFICIENT COMPACTED GRAVEL BASE TO PREVENT EXCESSIVE SETTLEMENT.
14. CITY TO SUPPLY METER, OWNER/S TO CONSTRUCT CHAMBER AND INSTALL METER.
15. JOINT RESTRAINT OR PIPE TO WALL ANCHOR REQUIREMENTS TO BE SPECIFIED BY A PROFESSIONAL ENGINEER.
16. PIPE PENETRATION THROUGH CHAMBER WALL TO BE SEALED WITH NON-SHRINK GROUT.
17. METER TO BE SUPPORTED WITH ADJUSTABLE METER SUPPORTS.

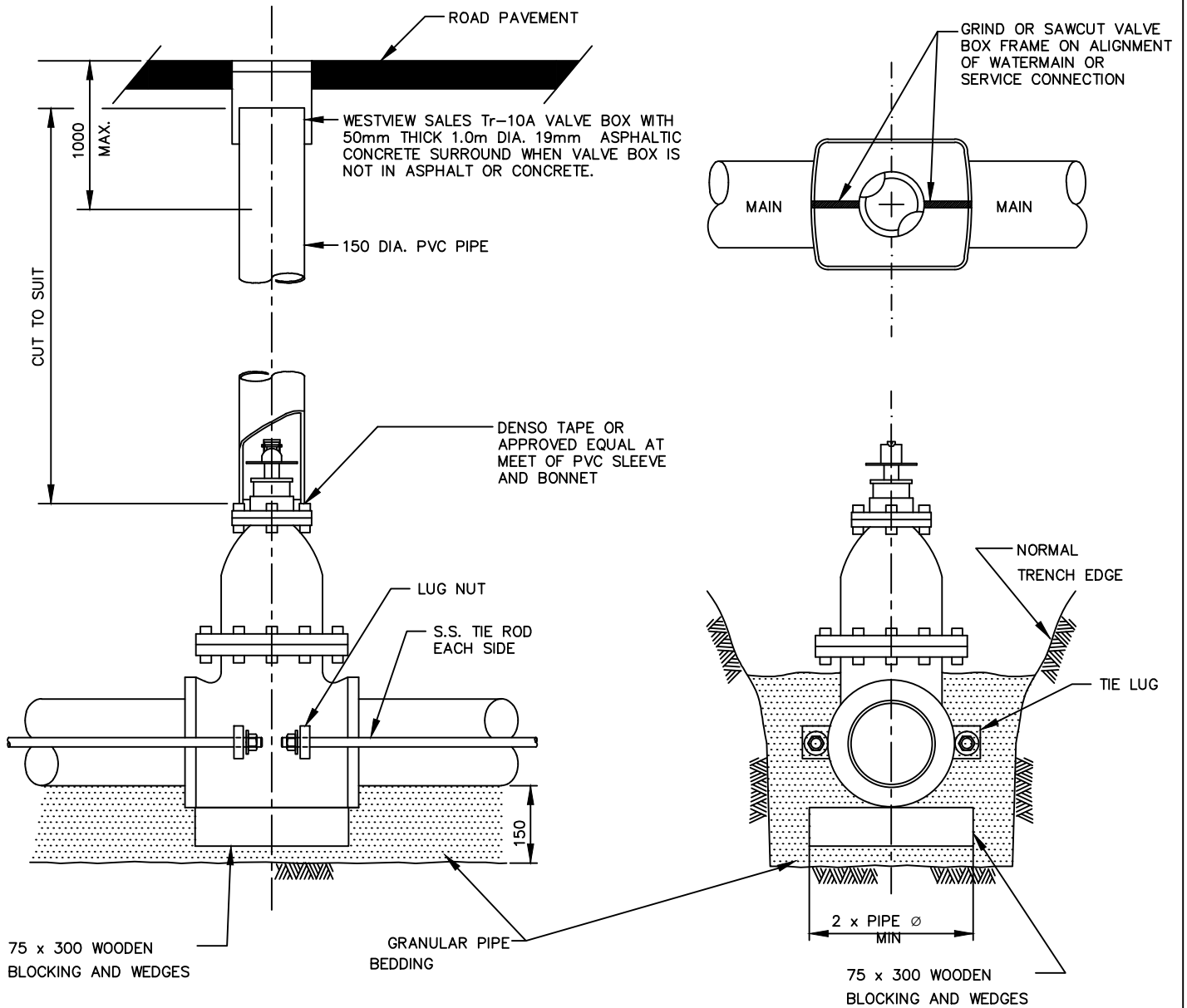


200mm WATER METER AND CHAMBER FOR FIRE SERVICE

TECH. : BD	SCALE : N.T.S.	DRAWING NUMBER : W2p - SD
DR. : BD	DATE : 2013-05-06	
ENG. : TB	REV. DATE : REV	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG. NO. W3)



NOTES:

REFER TO CONTRACT DRAWINGS AND SECTION 33 11 01 FOR DETAILED SPECIFICATIONS.

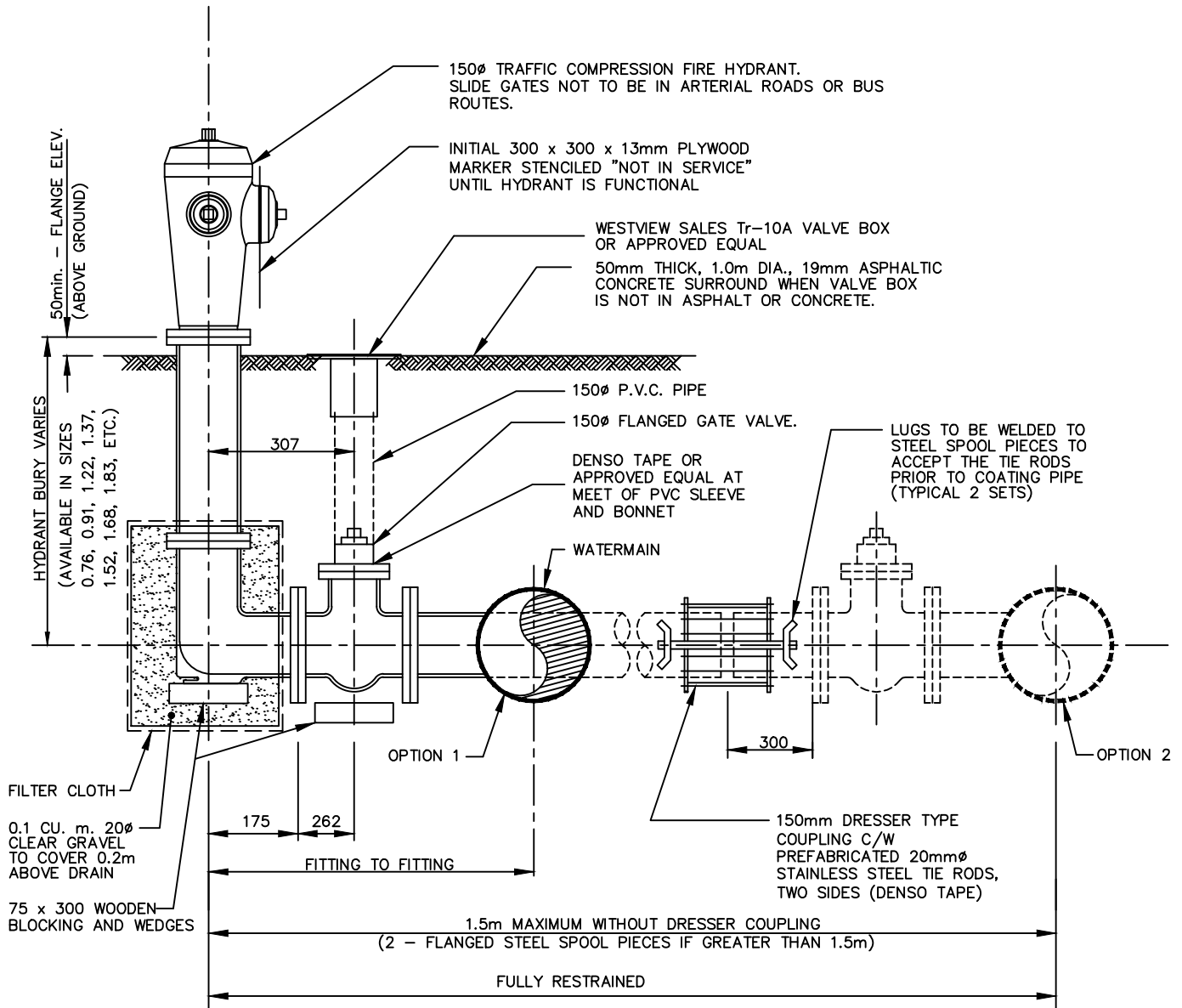


BELL GATE VALVE INSTALLATION

TECH. :	SCALE : NTS	DRAWING NUMBER : W3a-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : NOV/10	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W-3)

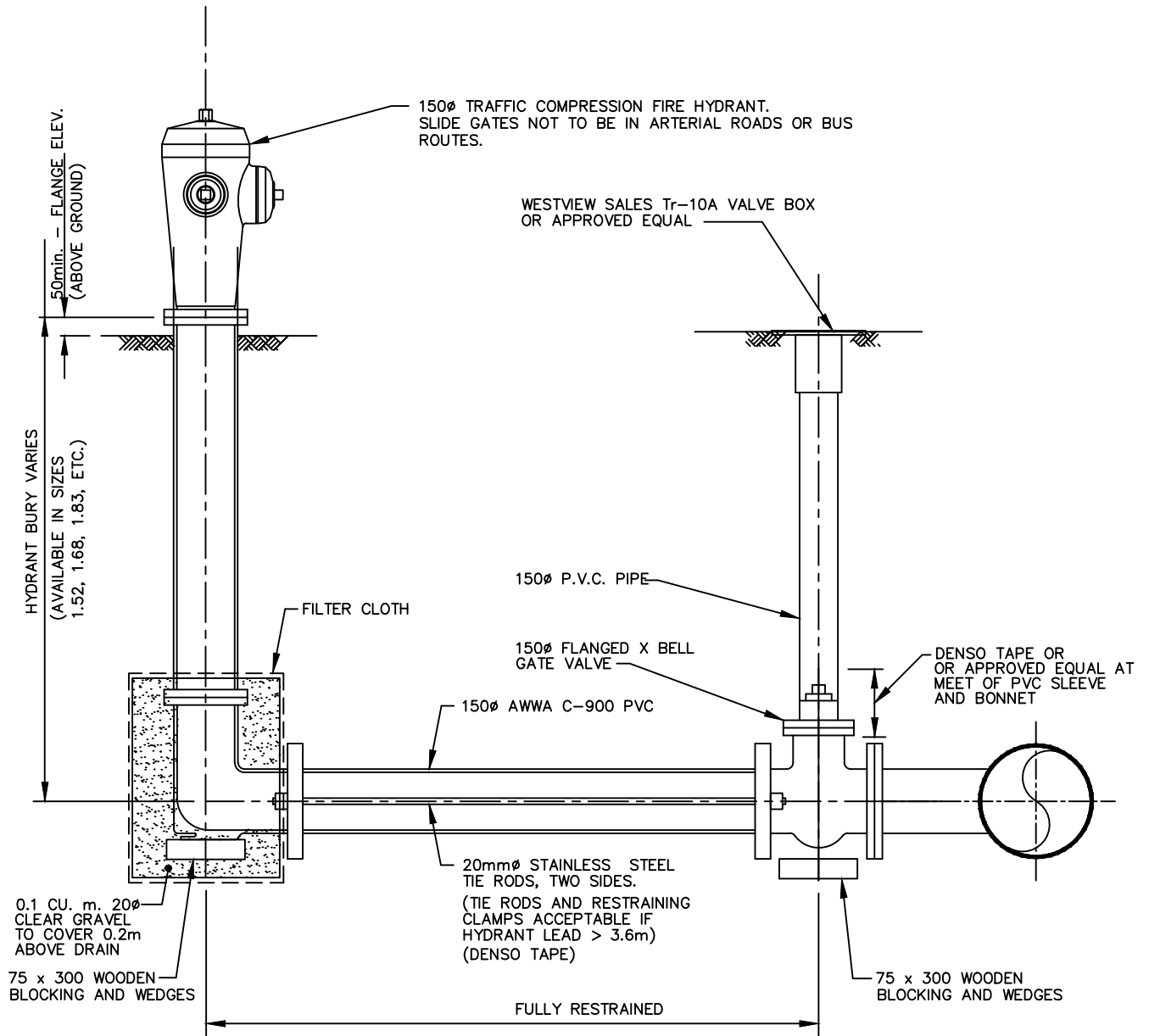


FIRE HYDRANT INSTALLATION (FLANGED)

TECH. :	SCALE : NTS	DRAWING NUMBER : W4a-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W-3a)



NOTES:

IF OFFSET IS REQUIRED, 0.9m MINIMUM
COVER MUST BE MAINTAINED, OTHERWISE
STEEL MUST BE USED. IF PVC IS USED ALL
JOINTS ON LEAD MUST BE JOINT RESTRAINED.

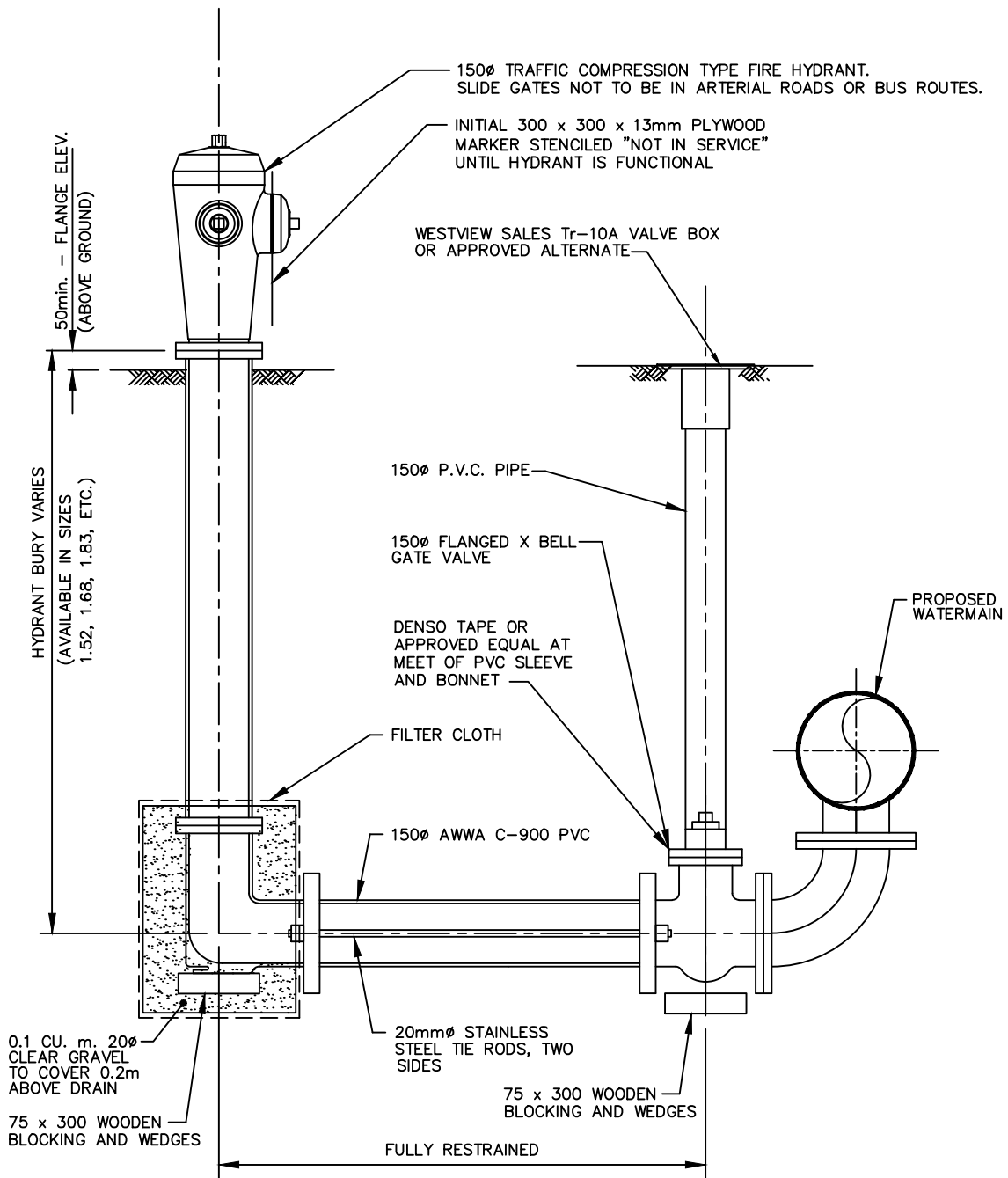


FIRE HYDRANT INSTALLATION (PVC LEAD)

TECH. :	SCALE : NTS	DRAWING NUMBER : W4b-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W-3b)



NOTES:

IF OFFSET IS REQUIRED, 0.9m MINIMUM COVER MUST BE MAINTAINED, OTHERWISE STEEL MUST BE USED. IF PVC IS USED ALL JOINTS ON LEAD MUST BE JOINT RESTRAINED.



FIRE HYDRANT INSTALLATION (BOTTOM DRAW)

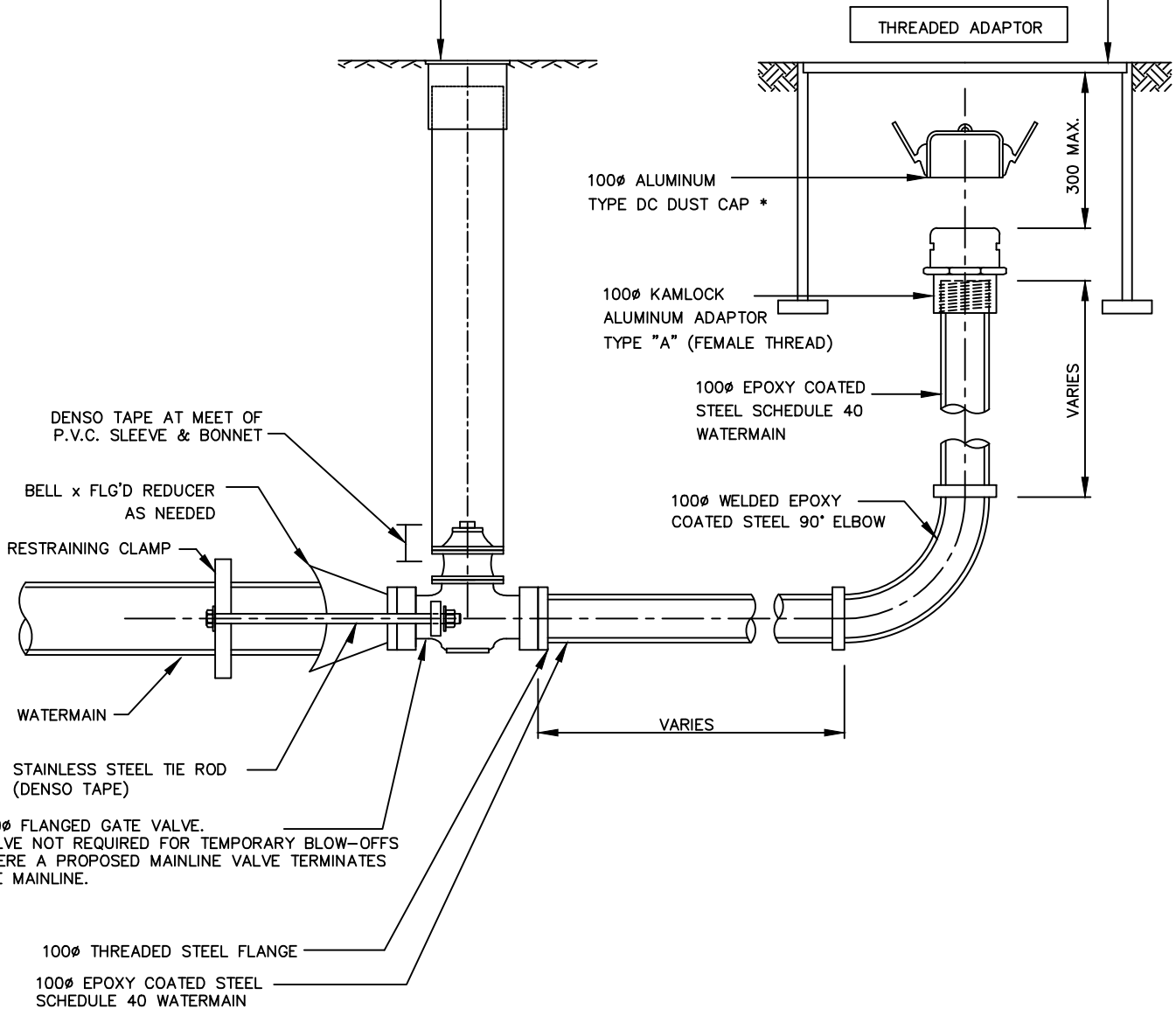
TECH. :	SCALE : NTS	DRAWING NUMBER : W4c-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W-6)

WESTVIEW SALES Tr-10A VALVE BOX WITH
50mm THICK, 1.0m DIA. 19mm ASPHALTIC
CONCRETE SURROUND WHEN VALVE BOX IS
NOT IN ASPHALT OR CONCRETE.

CONCRETE METER BOX No. 66
(400 x 700) INSIDE WITH H2O
RATED GALVANIZED SOLID STEEL
TRAFFIC COVER MARKED WATER



NOTES:

* - KAMLOCK, EVERTITE OR APPROVED EQUAL
(ASSEMBLY TO BE ACCOMMODATED IN PRECAST CONC. BOX BEHIND ROAD CURB AND SIDEWALK)



100mm CAPPED END & BLOW-OFF

TECH. :	SCALE : NTS	DRAWING NUMBER : W8-SD
DR. :	DATE : NOV. 2009	
ENG. :	REV. DATE : DEC/10	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. W8-SD)

WESTVIEW SALES Tr-10A VALVE BOX WITH
50mm THICK, 1.0m DIA. 19mm ASPHALTIC
CONCRETE SURROUND WHEN VALVE BOX IS
NOT IN ASPHALT OR CONCRETE.

CONCRETE METER BOX No. 66
(400 x 700) INSIDE WITH H2O
RATED GALVANIZED SOLID STEEL
TRAFFIC COVER MARKED WATER

THREADED ADAPTOR

100Ø ALUMINUM
TYPE DC DUST CAP *

300 MAX.

100Ø KAMLOCK
ALUMINUM ADAPTOR
TYPE "A" (FEMALE THREAD)

VARIES

100Ø C-900 WATERMAIN

90° C-907 ELBOW

VARIES

DENSO TAPE AT MEET OF
P.V.C. SLEEVE & BONNET

BELL x FLG'D REDUCER
AS NEEDED

RESTRAINING CLAMP

WATERMAIN

STAINLESS STEEL TIE ROD
(DENSO TAPE)

100Ø FLANGED GATE VALVE.
VALVE NOT REQUIRED FOR TEMPORARY BLOW-OFFS
WHERE A PROPOSED MAINLINE VALVE TERMINATES
THE MAINLINE.

100Ø 1300 RESTRAINT

100Ø C-900 WATERMAIN

19Ø STAINLESS READY ROD
(TYP.)

NOTES:

* - KAMLOCK, EVERTITE OR APPROVED EQUAL
(ASSEMBLY TO BE ACCOMMODATED IN PRECAST CONC. BOX BEHIND ROAD CURB AND SIDEWALK)



100mm CAPPED END & BLOW-OFF (PVC)

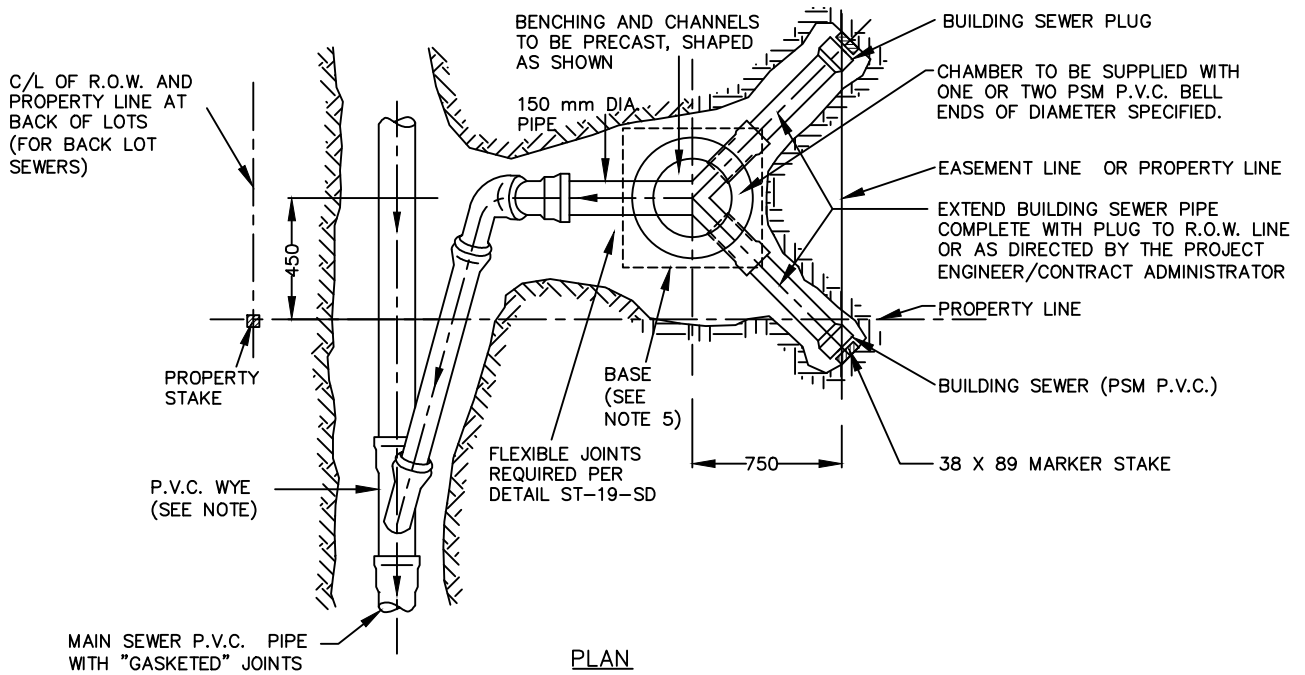
TECH. :	SCALE : NTS	DRAWING NUMBER : W12-SD
DR. :	DATE : AUG. 2016	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

SANITARY DRAWINGS

SANITARY DRAWINGS

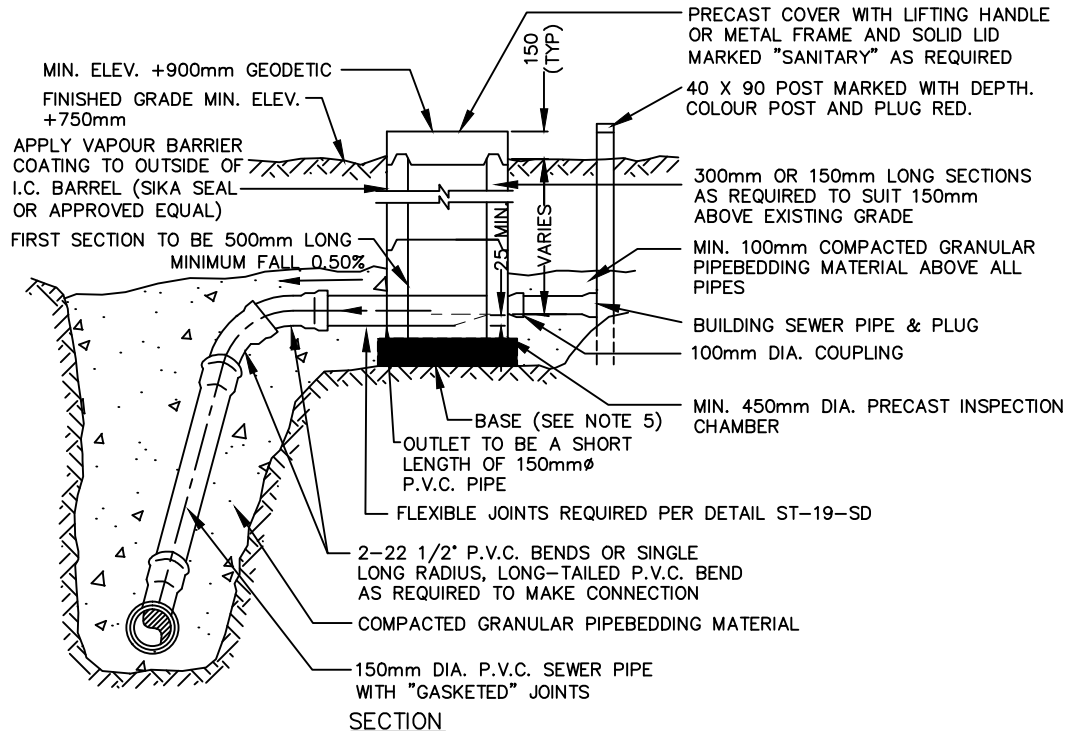
SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. SA-3)



NOTES:

- BRANCH SEWER CONNECTION PIPE TO BE 150 mm DIA. P.V.C. SEWER PIPE WITH "GASKETED" JOINTS. ALL FITTINGS TO BE INJECTION MOULDED IN P.V.C. MATERIALS WITH "GASKETED" JOINTS ON BELL ENDS.
- SURFACE OF ALL P.V.C. PIPE TO BE ENCASED IN CONCRETE SHALL BE SAND COATED BY PIPE MANUFACTURER BEFORE INSERTION IN INSPECTION CHAMBER WALL.
- FOR BRANCH SEWER CONNECTIONS UNDER EXISTING OR PROPOSED ROADS, BACKFILL SHALL BE PIT RUN SAND OR GRAVEL MATERIAL COMPACTED IN 225mm LAYERS TO 90% MAX. DENSITY.
- FOR IC'S INSTALLED WHERE H₂O LOADING IS REQUIRED,
 - 450mm IC REQUIRES 900mm x 900mm x 150mm BASE.
 - 600mm IC REQUIRES 1200mm x 1200mm x 100mm BASE.
- DUAL CONNECTIONS TO BE MIN 450mm DIA. PRECAST INSPECTION CHAMBER OR APPROVED EQUAL.
- SINGLE CONNECTIONS CAN BE 450mm DIA. PRECAST INSPECTION CHAMBER OR AS PER MMCD S9 OR APPROVED EQUAL.
- 600mm DIA. WITH SINGLE CONNECTION FOR MULTI FAMILY, COMMERCIAL, INDUSTRIAL OR INSTITUTIONAL.



**BRANCH SEWER CONNECTIONS
(COMPLETE CONNECTION)**

ALL DIMENSIONS SHOWN IN MILLIMETRES

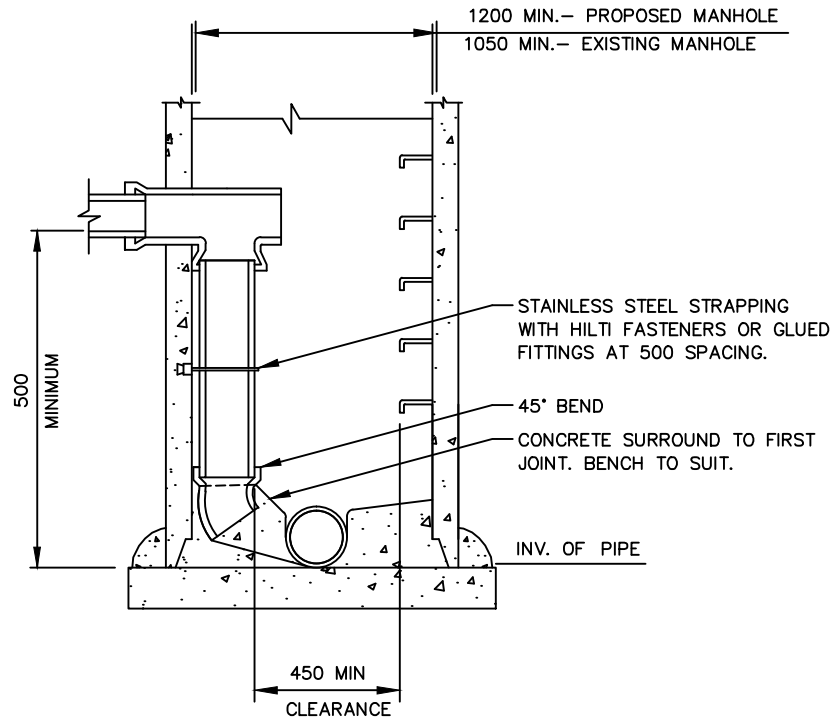


STANDARD CONSTRUCTION DETAILS FOR PVC SANITARY SEWER INSTALLATIONS

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : OCT. 2003	SA-3-SD
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG. S4)



INSIDE DROP TYPE

NOTES:

1. INSIDE DROP TO BE USED ONLY WHERE SPECIFIED BY CONTRACT ADMINISTRATOR.
2. ALL INSIDE PIPE AND FITTINGS PVC DR 28/35
3. THIS DRAWING SHOWS INSIDE DROP ONLY. SEE DRAWING S1 FOR ALL OTHER DETAILS PERTAINING TO MANHOLE REQUIREMENTS.
4. REFER TO CONTRACT DRAWINGS AND SECTION 33 44 01 FOR DETAILED SPECIFICATIONS

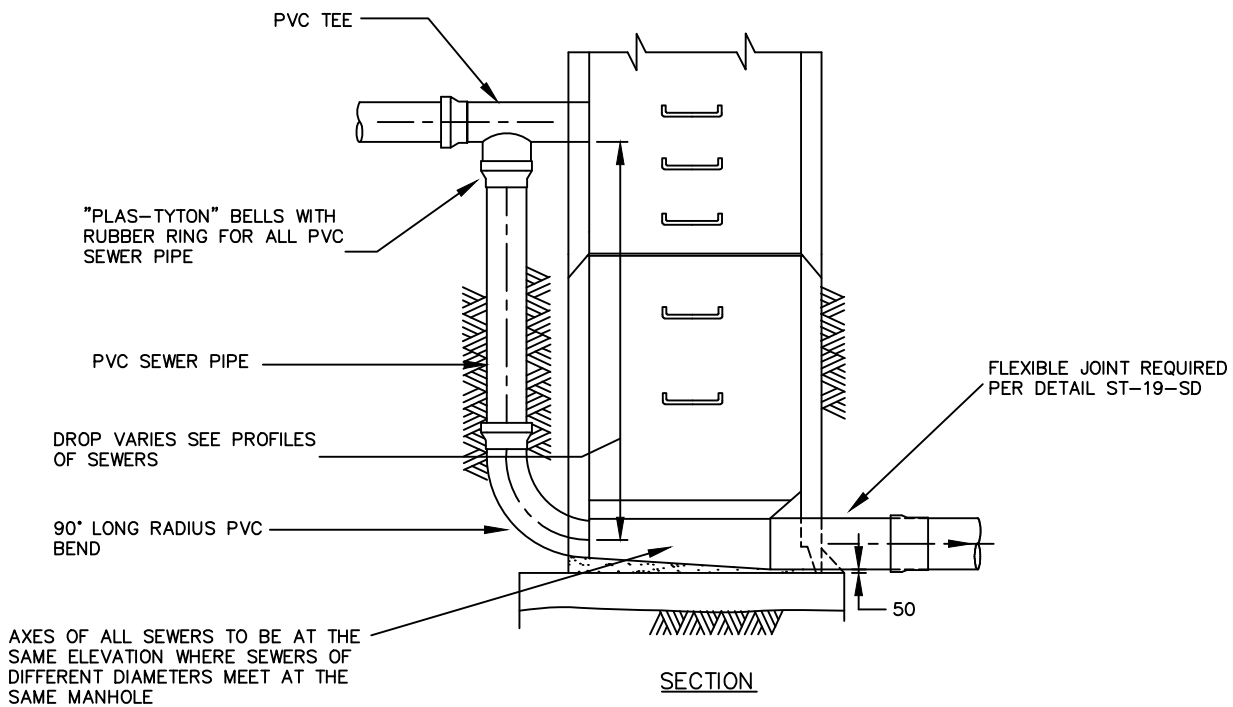
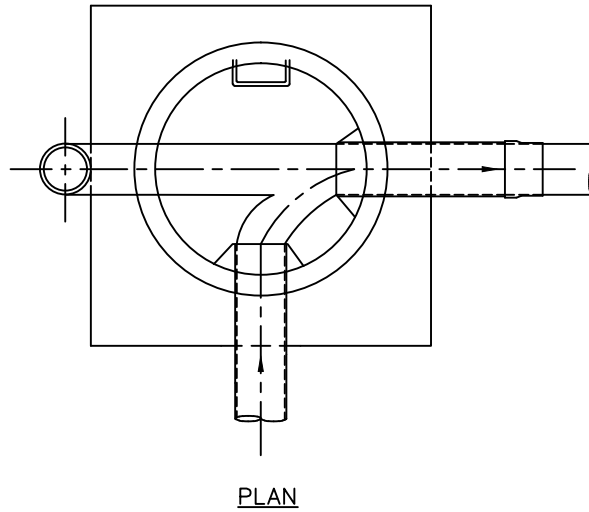


INSIDE DROP MANHOLE

TECH. :	SCALE : NTS	DRAWING NUMBER : SA-4-SD
DR. :	DATE : OCT. 2003	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. SA-6)



(SECTION SHOWN ON 150mm DIA. SEWER OTHER BACKDROP SIZES SIMILAR)

TYPICAL BACKDROP DETAILS FOR SEWERS

NOTES:

PVC PIPE INSTALLATION
 BACKDROPS MAY BE PRE-FABRICATED BY PIPE MANUFACTURER
 IN PVC MATERIAL BROUGHT TO SITE AS A COMPLETE UNIT

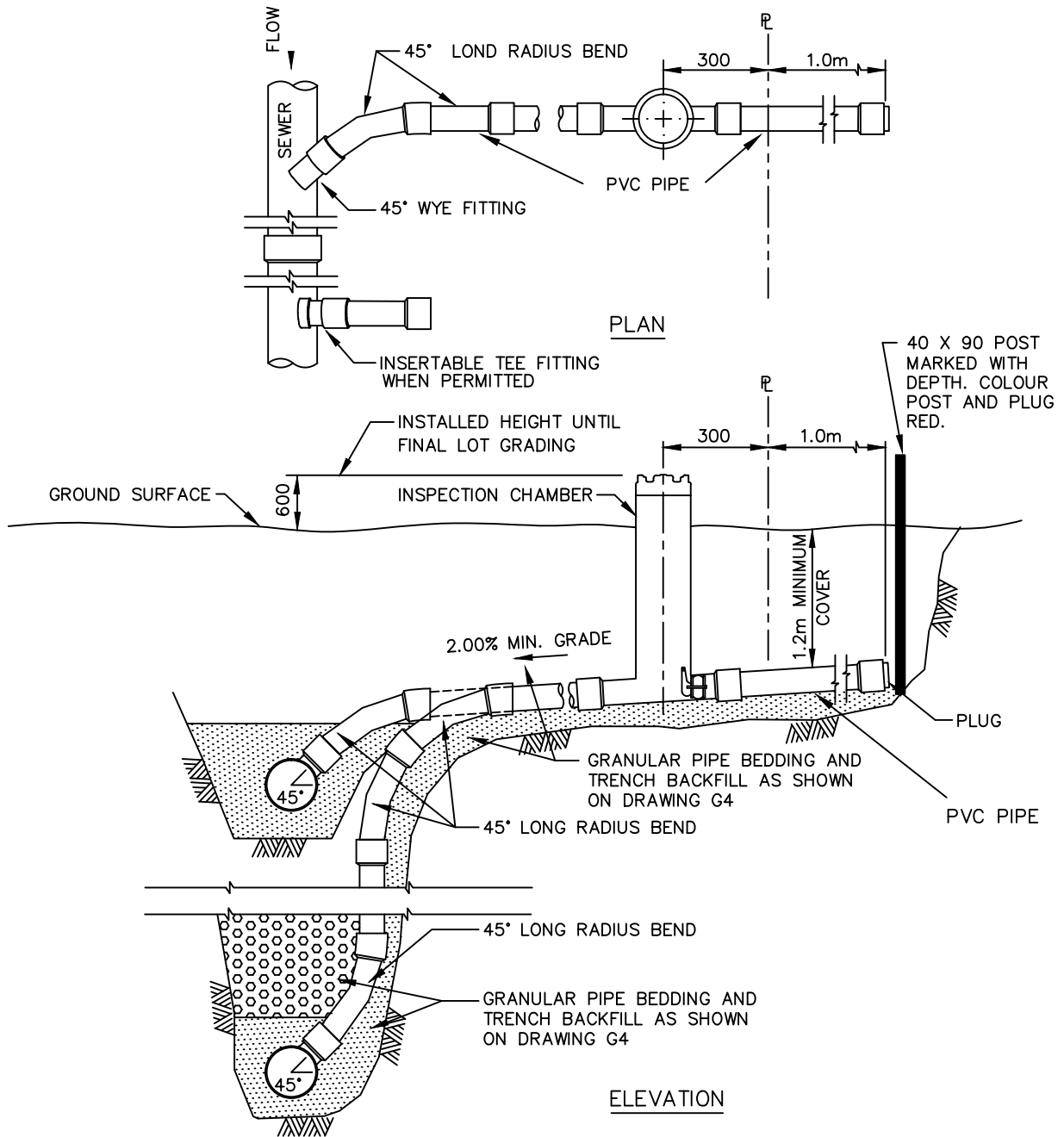


OUTSIDE DROP MANHOLE

TECH. :	SCALE : NTS	DRAWING NUMBER : SA-6-SD
DR. :	DATE : OCT. 2003	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG. S7)



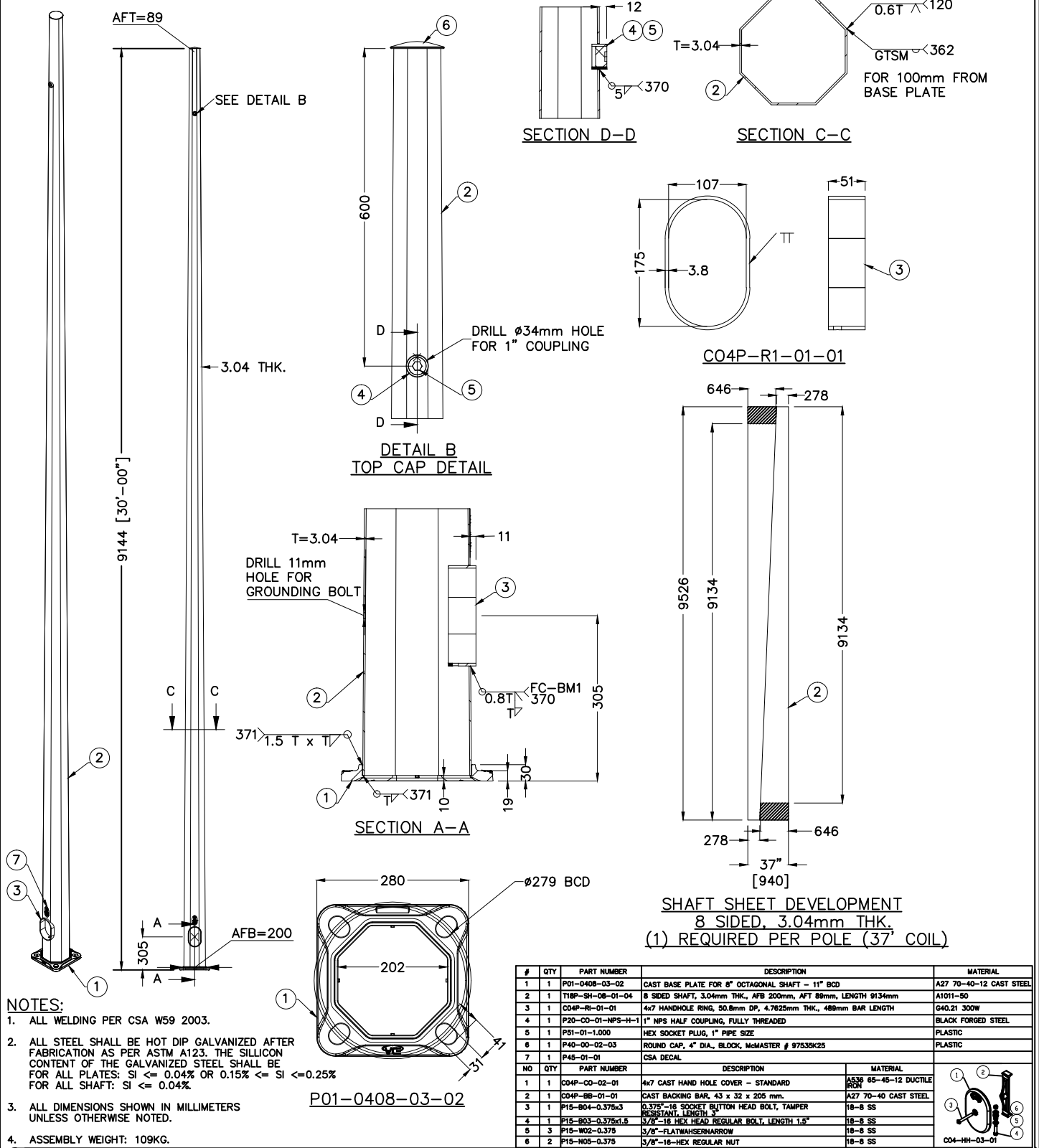
- NOTE:
1. CONNECTIONS TO BE 150 OR AS SPECIFIED ON CONTRACT DRAWINGS.
 2. RISER TYPE SERVICE TO BE USED ONLY WHEN SERVICE IS MORE THAN 2.4m ABOVE WYE INVERT OR AS DIRECTED BY CONTRACT ADMINISTRATOR.
 3. LOCATION OF SERVICE AND MARKER AS SHOWN ON CONTRACT DRAWINGS.
 4. SEE DRAWING S9 FOR DETAILS OF INSPECTION CHAMBER AND INSTALLATION REQUIREMENTS.
 5. FOR SINGLE FAMILY RESIDENTIAL USE ONLY (SINGLE CONNECTION).
 6. NOT FOR USE IN TRAFFICABLE AREAS.



SANITARY SEWER SERVICE CONNECTION FOR SINGLE FAMILY SINGLE SERVICE CONNECTION

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : OCT. 2003	SA-7-SD
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



- NOTES:**
- ALL WELDING PER CSA W59 2003.
 - ALL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION AS PER ASTM A123. THE SILICON CONTENT OF THE GALVANIZED STEEL SHALL BE FOR ALL PLATES: $Si \leq 0.04\%$ OR $0.15\% \leq Si \leq 0.25\%$ FOR ALL SHAFT: $Si \leq 0.04\%$.
 - ALL DIMENSIONS SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED.
 - ASSEMBLY WEIGHT: 109KG.

#	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	P01-0408-03-02	CAST BASE PLATE FOR 8" OCTAGONAL SHAFT - 11" BCD	A27 70-40-12 CAST STEEL
2	1	T1BP-SH-08-01-04	8 SIDED SHAFT, 3.04mm THK., AFB 200mm, LENGTH 9134mm	A1011-50
3	1	C04P-R1-01-01	4x7 HANDHOLE RING, 50.8mm DP, 4.7625mm THK., 489mm BAR LENGTH	G40.21 300W
4	1	P20-CO-01-NPS-H-1	1" NPS HALF COUPLING, FULLY THREADED	BLACK FORGED STEEL
5	1	P51-01-1.000	HEX SOCKET PLUG, 1" PIPE SIZE	PLASTIC
6	1	P40-00-02-03	ROUND CAP, 4" DIA., BLOCK, McMASTER # 97535K25	PLASTIC
7	1	P45-01-01	CSA DECAL	

NO	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	C04P-CO-02-01	4x7 CAST HAND HOLE COVER - STANDARD	A536 65-45-12 DUCTILE IRON
2	1	C04P-BB-01-01	CAST BACKING BAR, 43 x 32 x 205 mm.	A27 70-40 CAST STEEL
3	1	P15-804-0.375x3	0.375"-16 SOCKET BLITTON HEAD BOLT, TAMPER RESISTANT, LENGTH 3"	18-8 SS
4	1	P15-803-0.375x1.5	3/8"-18 HEX HEAD REGULAR BOLT, LENGTH 1.5"	18-8 SS
5	3	P15-W02-0.375	3/8"-FLATWASERNARROW	18-8 SS
6	2	P15-N05-0.375	3/8"-16-HEX REGULAR NUT	18-8 SS

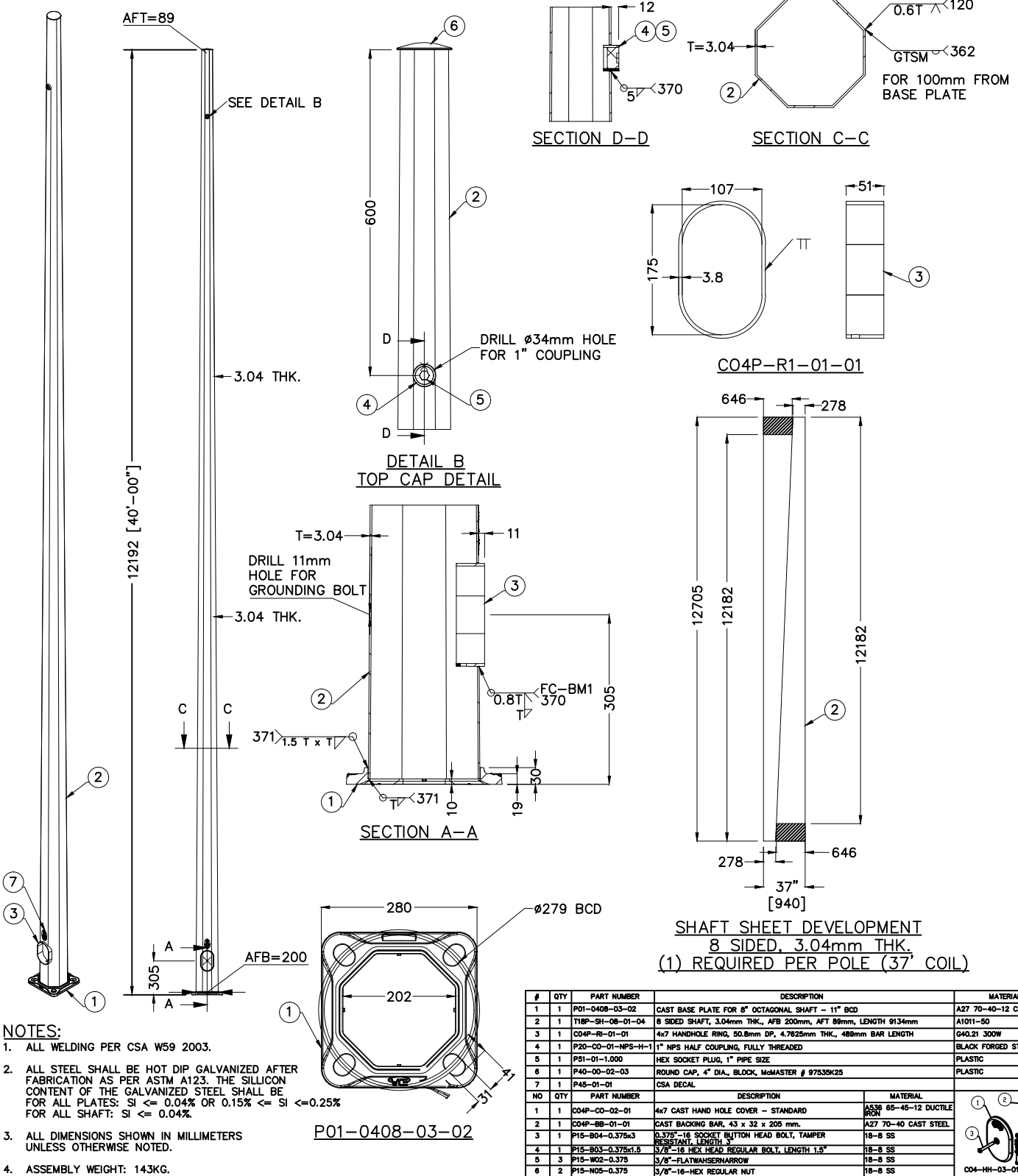
SHAFT SHEET DEVELOPMENT
8 SIDED, 3.04mm THK.
(1) REQUIRED PER POLE (37' COIL)



9.14m STRAIGHT SHAFT SCADA POLE

TECH. :	SCALE : NTS	DRAWING NUMBER : SA-9-SD
DR. :	DATE : AUG. 2016	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

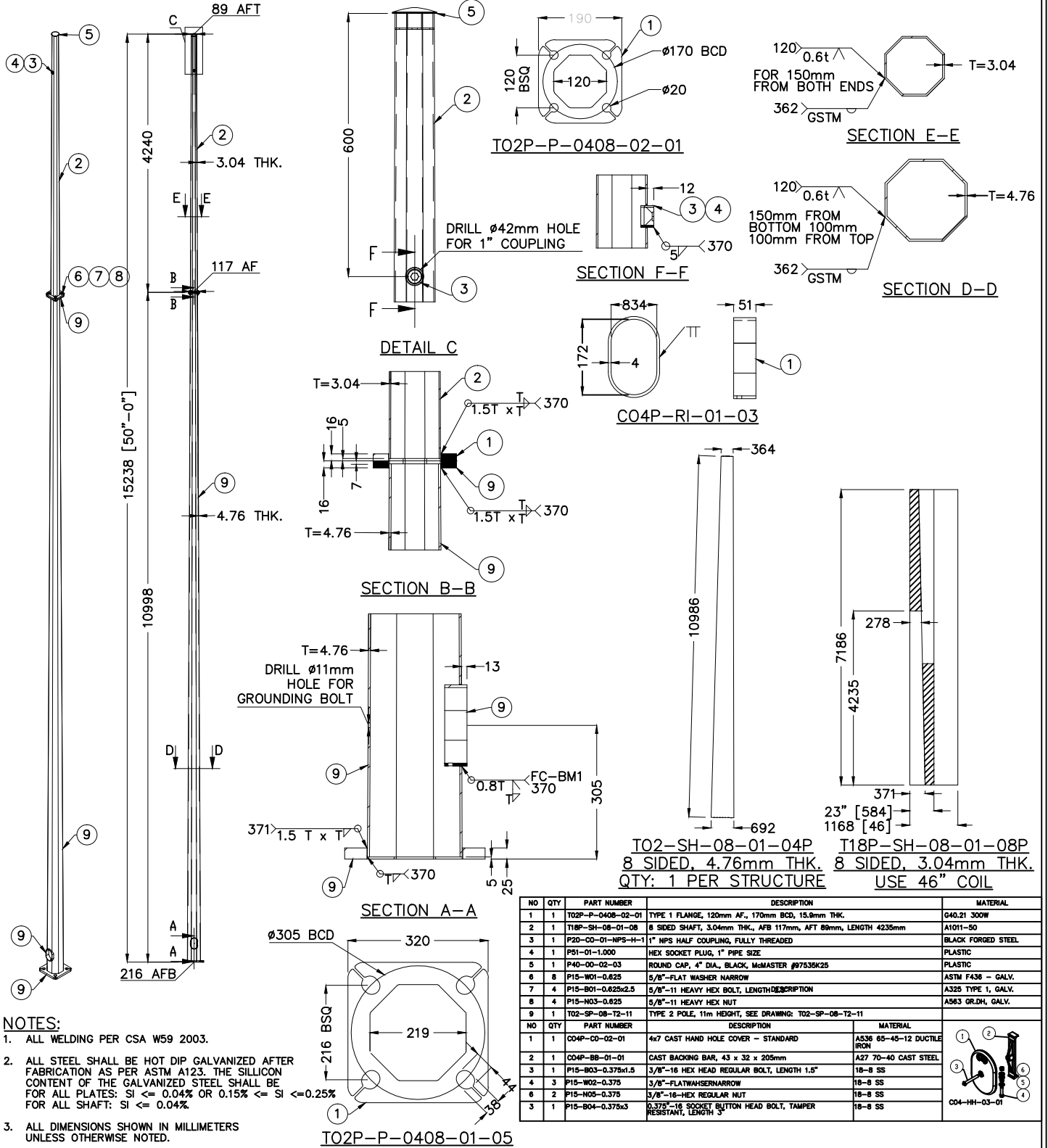
SUPPLEMENTARY DETAIL DRAWING



12.20m STRAIGHT SHAFT SCADA POLE

TECH. :	SCALE : NTS	DRAWING NUMBER : SA-10-SD
DR. :	DATE : AUG. 2016	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

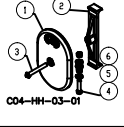


NOTES:

1. ALL WELDING PER CSA W59 2003.
2. ALL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION AS PER ASTM A123. THE SILICON CONTENT OF THE GALVANIZED STEEL SHALL BE FOR ALL PLATES: $SI \leq 0.04\%$ OR $0.15\% \leq SI \leq 0.25\%$ FOR ALL SHAFT: $SI \leq 0.04\%$.
3. ALL DIMENSIONS SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED.
4. ASSEMBLY WEIGHT: 273KG.

NO	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	T02P-P-0408-02-01	TYPE 1 FLANGE, 120mm AF., 170mm BCD, 15.9mm THK.	G40.21 300W
2	1	T18P-SH-08-01-08	8 SIDED SHAFT, 3.04mm THK., AFB 117mm, AFT 89mm, LENGTH 4235mm	A1011-50
3	1	P20-CO-01-NPS-H-1	1" NPS HALF COUPLING, FULLY THREADED	BLACK FORGED STEEL
4	1	P51-01-1.000	HEX SOCKET PLUG, 1" PIPE SIZE	PLASTIC
5	1	P40-00-02-03	ROUND CAP, 4" DIA., BLACK, McMASTER #97539K25	PLASTIC
6	8	P15-W01-0.625	5/8"-FLAT WASHER NARROW	ASTM F436 - GALV.
7	4	P15-B01-0.625x2.5	5/8"-11 HEAVY HEX BOLT, LENGTH DESCRIPTION	ASTM TYPE 1, GALV.
8	4	P15-N03-0.625	5/8"-11 HEAVY HEX NUT	A563 GR.DH, GALV.
9	1	T02-SP-08-T2-11	TYPE 2 POLE, 11m HEIGHT, SEE DRAWING: T02-SP-08-T2-11	

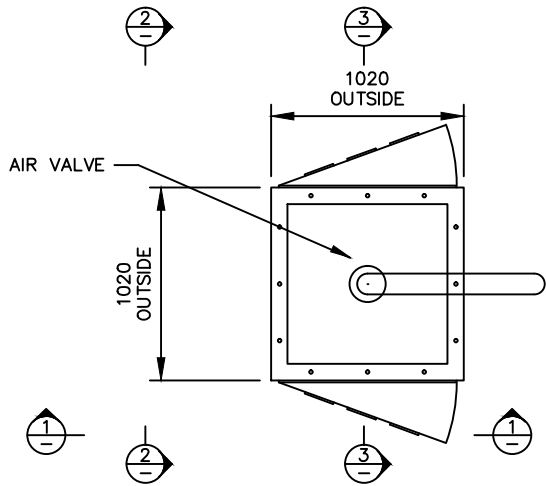
NO	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	C04P-CO-02-01	4x7 CAST HAND HOLE COVER - STANDARD	A536 65-45-12 DUCTILE IRON
2	1	C04P-BB-01-01	CAST BACKING BAR, 43 x 32 x 205mm	A27 70-40 CAST STEEL
3	1	P15-B03-0.375x1.5	3/8"-16 HEX HEAD REGULAR BOLT, LENGTH 1.5"	18-8 SS
4	3	P15-W02-0.375	3/8"-FLATWASHERNARROW	18-8 SS
6	2	P15-N05-0.375	3/8"-16-HEX REGULAR NUT	18-8 SS
3	1	P15-B04-0.375x3	3/8"-16 SOCKET BUTTON HEAD BOLT, TAMPER RESISTANT, LENGTH 3"	18-8 SS



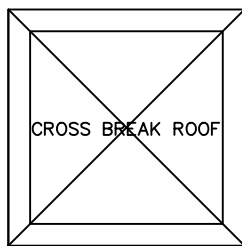
15.24m STRAIGHT SHAFT SCADA POLE

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : AUG. 2016	SA-11-SD
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

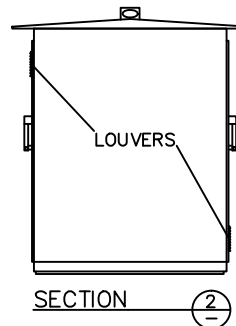
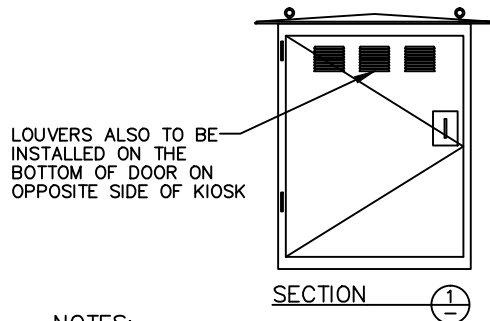
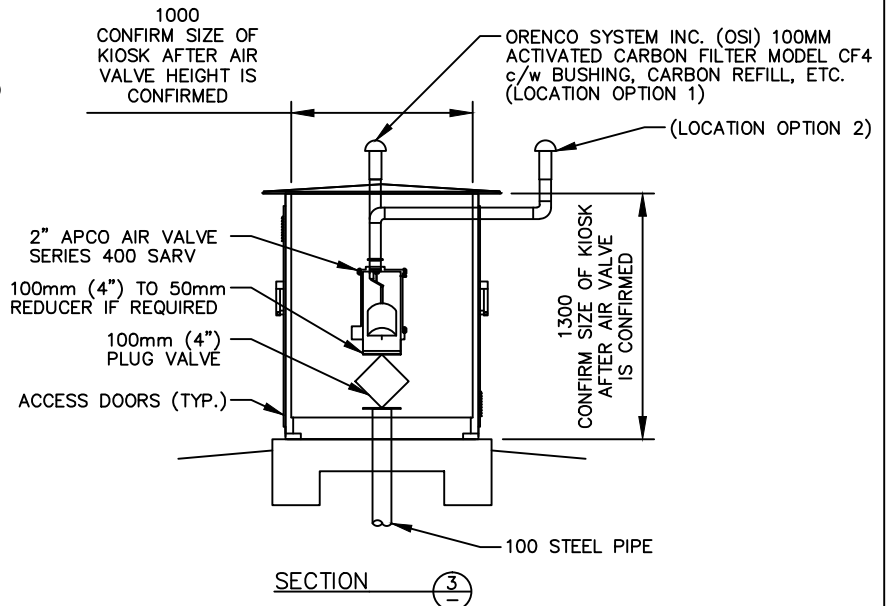
SUPPLEMENTARY DETAIL DRAWING



PLAN - AIR VALVE KIOSK



ROOF PLAN - AIR VALVE KIOSK



NOTES:

1. KIOSK SHALL BE FABRICATED FROM 12m GA STEEL.
2. FLOOR CHANNELS TO HAVE DRAINAGE HOLES IN FLANGE.
3. DPPRS SHALL HAVE A MINIMUM OF TWO HINGES EACH.
4. DOORS SHALL BE GASKETED, LOCKABLE AND ADEQUATELY BRACED TO PREVENT DISTORTION.
5. DOORS SHALL BE EQUIPPED WITH A THREE-POINT LATCHING DEVICE. LATCHES MUST BE DRILLED WITH A MINIMUM 12.7mm DIAMETER HOLE TO RECEIVE PADLOCKS.
6. INSTALL STAY BARS ON THE DOORS. MINIMUM STEEL DIAMETER = 12mm
7. 25mm INSULATION ON ALL STEEL WALLS AND DOORS.
11. KIOSK TO HAVE WELDED LIFTING EYES.
8. ALL SURFACES TO BE PRIOR PRIMED TO ASSEMBLY WITH CHROMEATIC PRIMER. TWO FINISH COATS OF AIR DRIED ENAMEL SHALL BE APPLIED TO KIOSK KIOSK SHALL PAINTED GREY OUTSIDE, WHITE INSIDE OR AS DIRECTED BY THE CONTRACT ADMINISTRATOR
9. KIOSK ROOF SHALL HAVE A CROSS BRACE & A 100mm OVERHANG
10. RAIN GUTTERS OVER THE DOORS.
12. RICHMOND TO SUBMIT PAINT SPECIFICATIONS.
13. INSTALL 6mm THICK NEOPRENE GASKET BETWEEN KIOSK BASE AND CONCRETE SLAB
14. SUBMIT SHOP DRAWINGS FOR APPROVAL BEFORE COMMENCEMENT OF FABRICATION.
15. PRESSED IN LOUVRES c/w BUG SCREEN AND REPLACEABLE FILTER.
16. WRAPPED AIR VALVE WITH FIBREGLASS INSULATION THROUGH WINTER.



AIR VALVE KIOSK

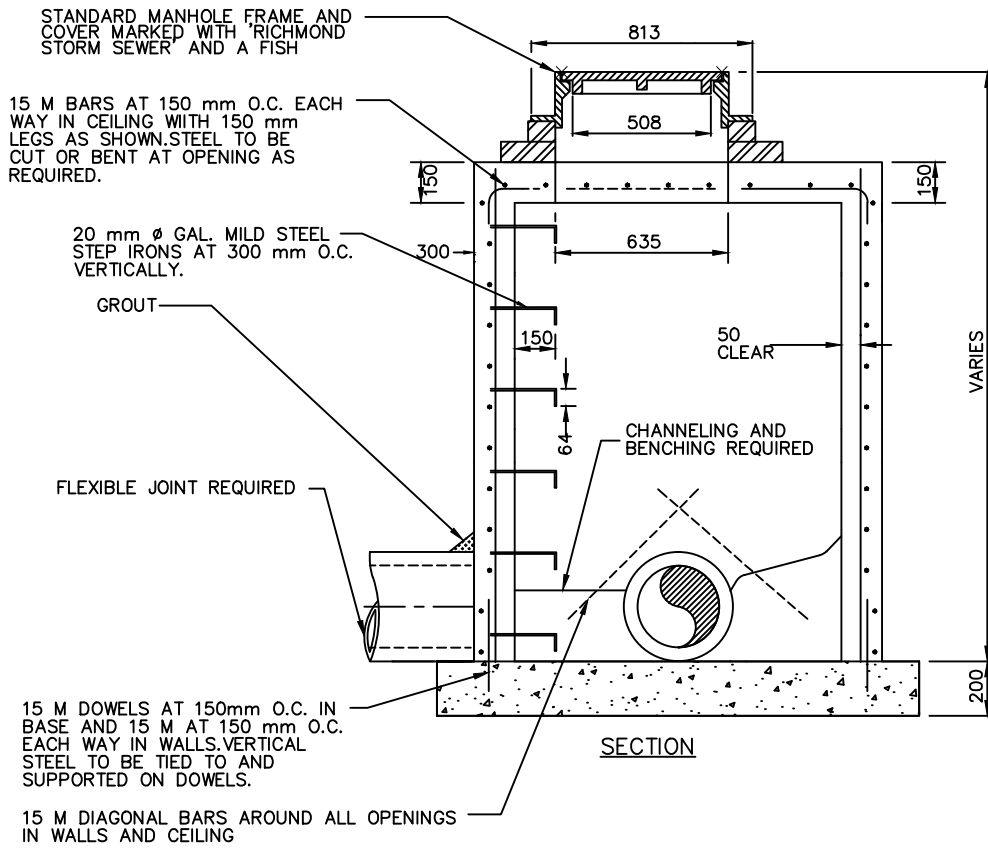
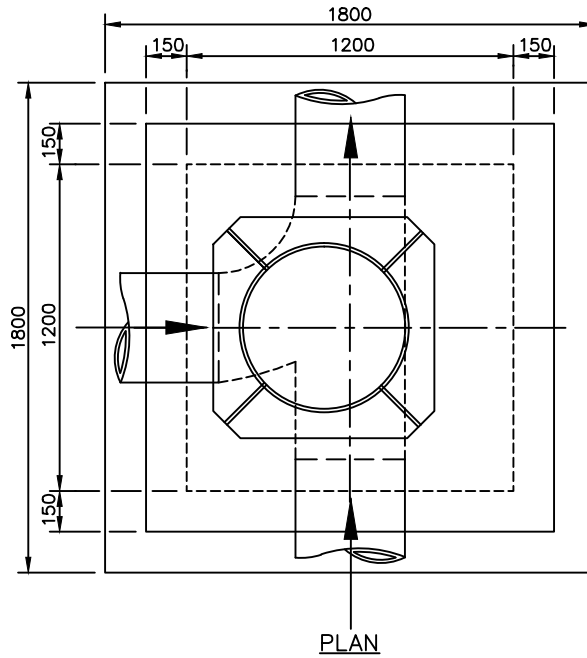
TECH. :	SCALE : NTS	DRAWING NUMBER : SA-12-SD
DR. :	DATE : OCT. 2016	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

STORM DRAWINGS

STORM DRAWINGS

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. ST-3)



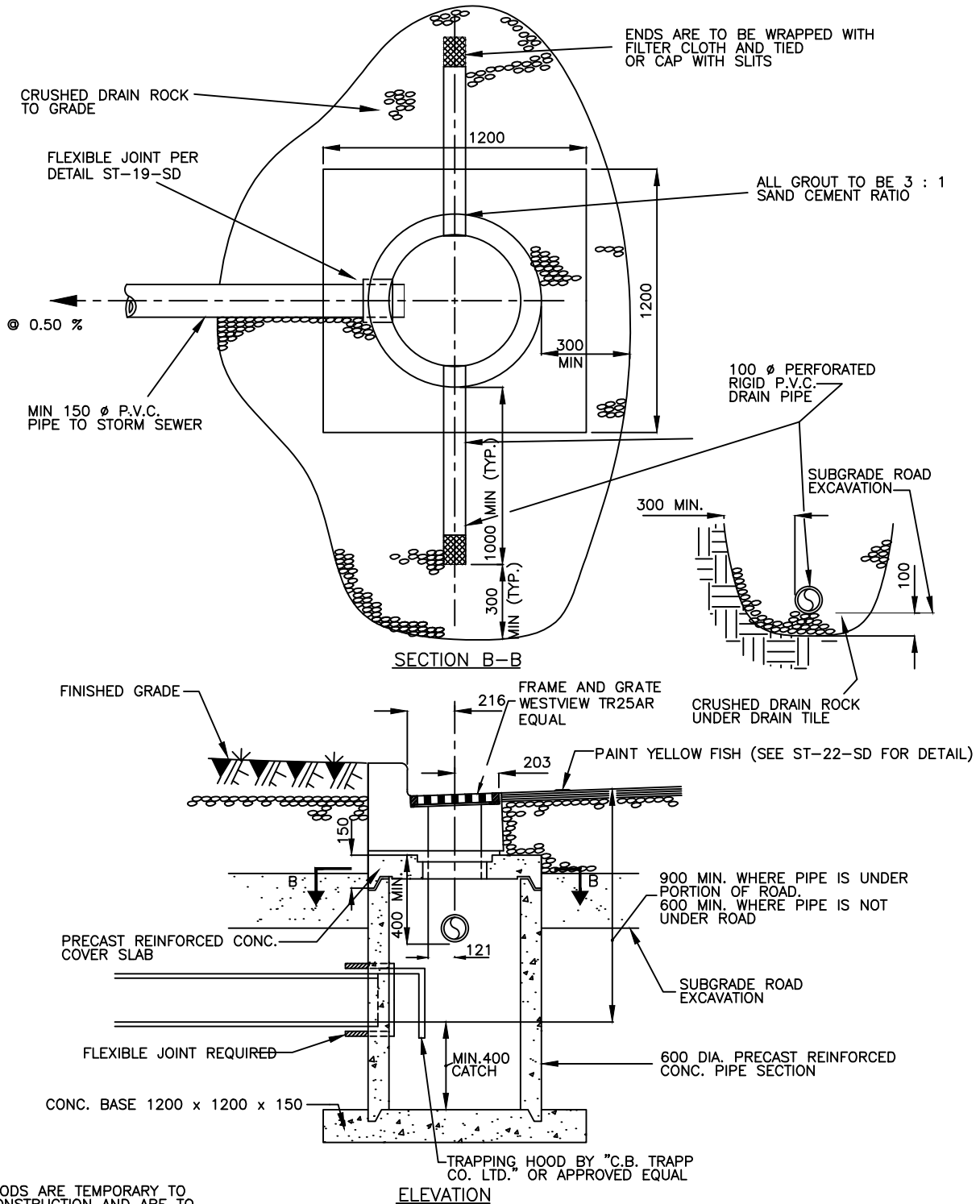
TYPICAL 1.20m x 1.20m CAST-IN-SITU MANHOLE



TECH. :	SCALE : NTS	DRAWING NUMBER : ST-3-SD
DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. ST-5)



NOTES:

TRAPPING HOODS ARE TEMPORARY TO FACILITATE CONSTRUCTION AND ARE TO BE REMOVED BY THE CONTRACTOR UPON CONTRACT COMPLETION.

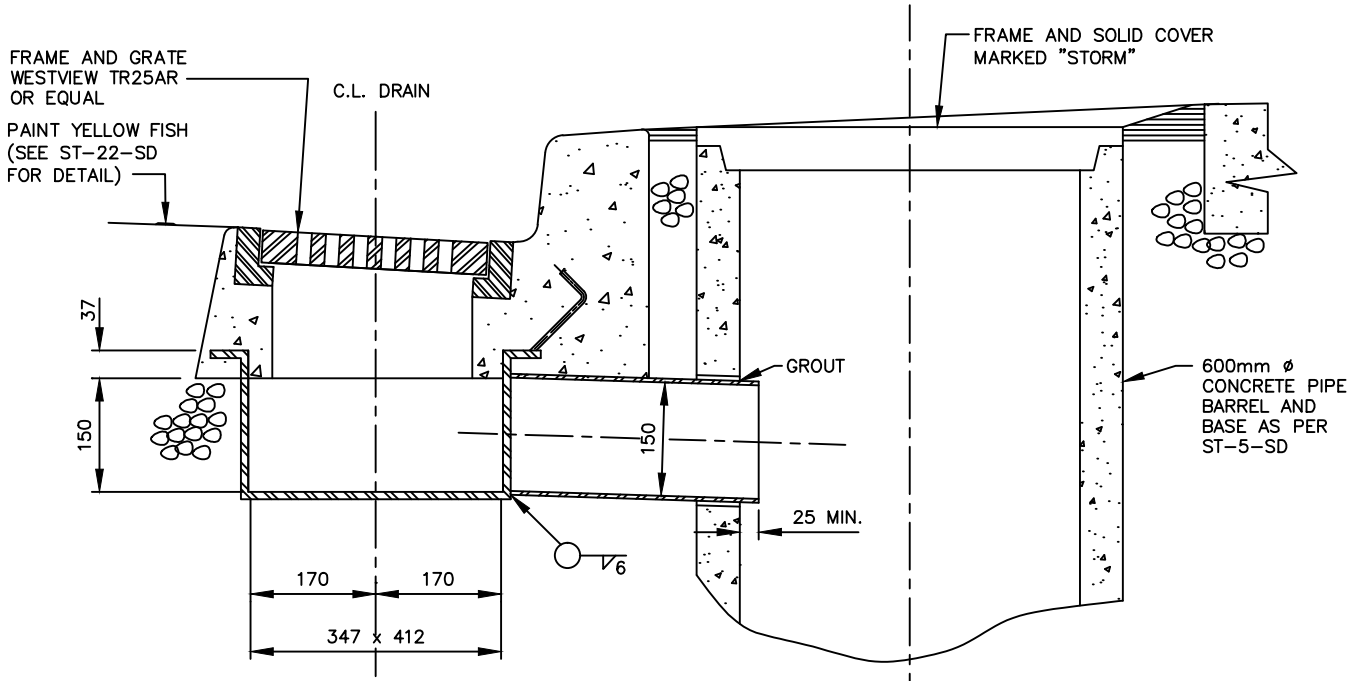
600mm Ø REINFORCED CONCRETE CATCHBASIN



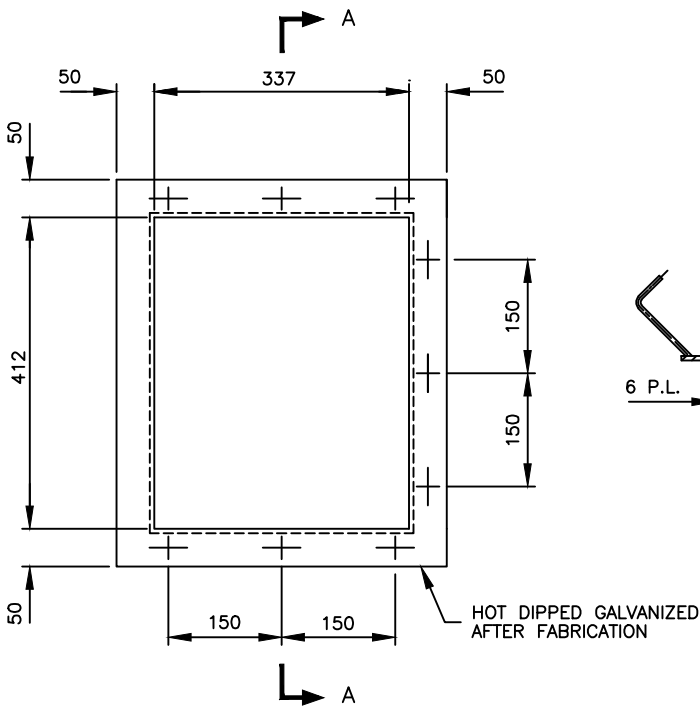
TECH. :	SCALE : NTS	DRAWING NUMBER : ST-5-SD
DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

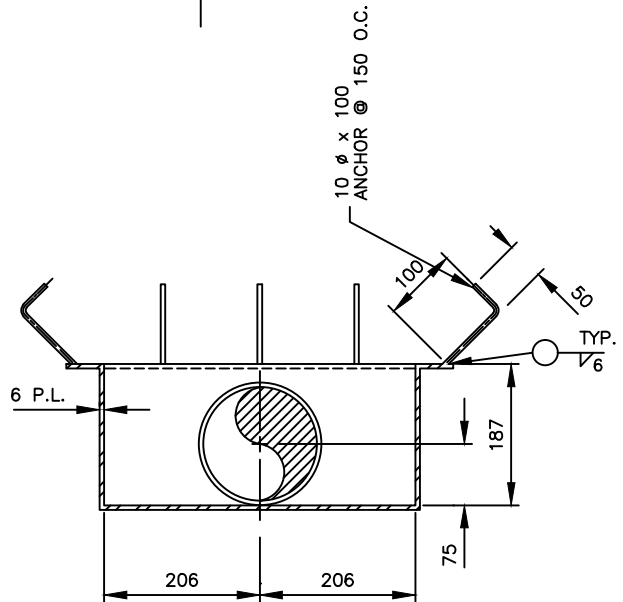
(SOURCE FROM: CITY OF RICHMOND STD. DWG. ST-6)



TYPICAL CROSS SECTION



PLAN OF CATCHBASIN TRAP



SECTION A-A

NOTES:

- 1) ALL WELDS PERFORMED AFTER FABRICATION TO BE PAINTED WITH GALV-COTE.
- 2) 100Ø CONNECTIONS TO BE PROVIDED FROM I.C. FOR DRAINAGE OF CURB BASE MATERIAL. FOR DETAIL SEE ST-5.

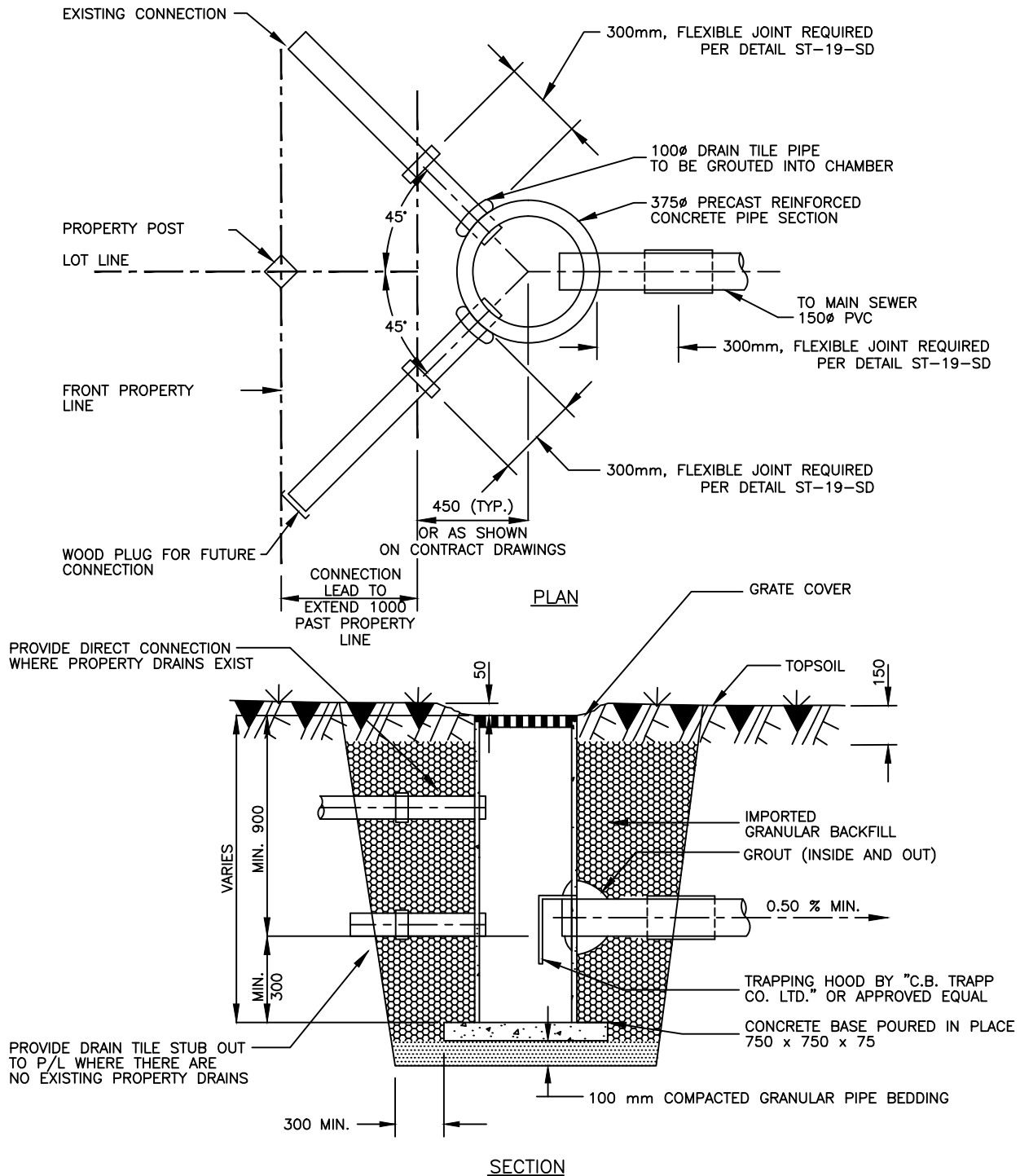


PREFABRICATED PAN CATCHBASIN

TECH. :	SCALE : NTS	DRAWING NUMBER : ST-6-SD
DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. ST-7A)



NOTES:

TRAPPING HOODS ARE TEMPORARY TO FACILITATE CONSTRUCTION AND ARE TO BE REMOVED BY THE CONTRACTOR UPON CONTRACT COMPLETION.

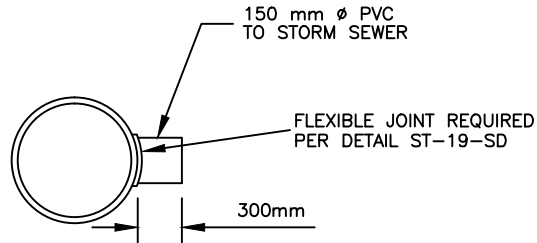


INSPECTION CHAMBER TYPE 1

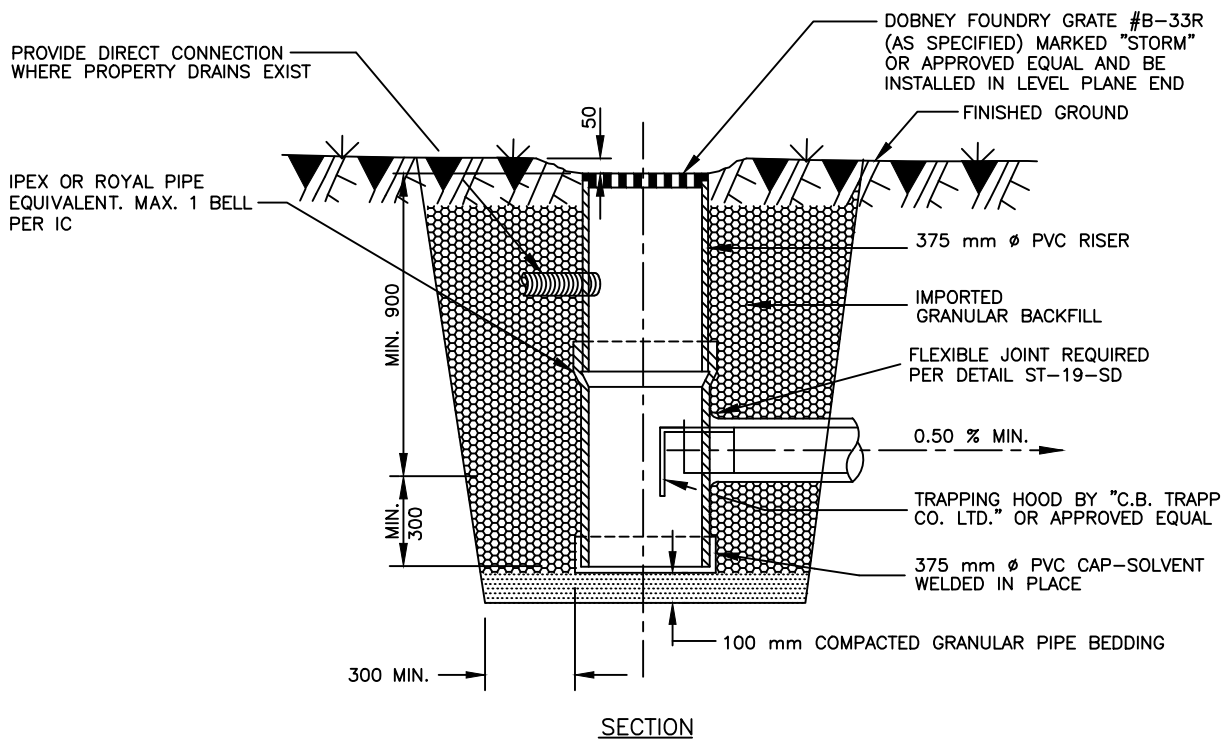
TECH. :	SCALE : NTS	DRAWING NUMBER : ST-7-SD
DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. ST-7A)



PLAN



SECTION

NOTES:

TRAPPING HOODS ARE TEMPORARY TO FACILITATE CONSTRUCTION AND ARE TO BE REMOVED BY THE CONTRACTOR UPON CONTRACT COMPLETION.

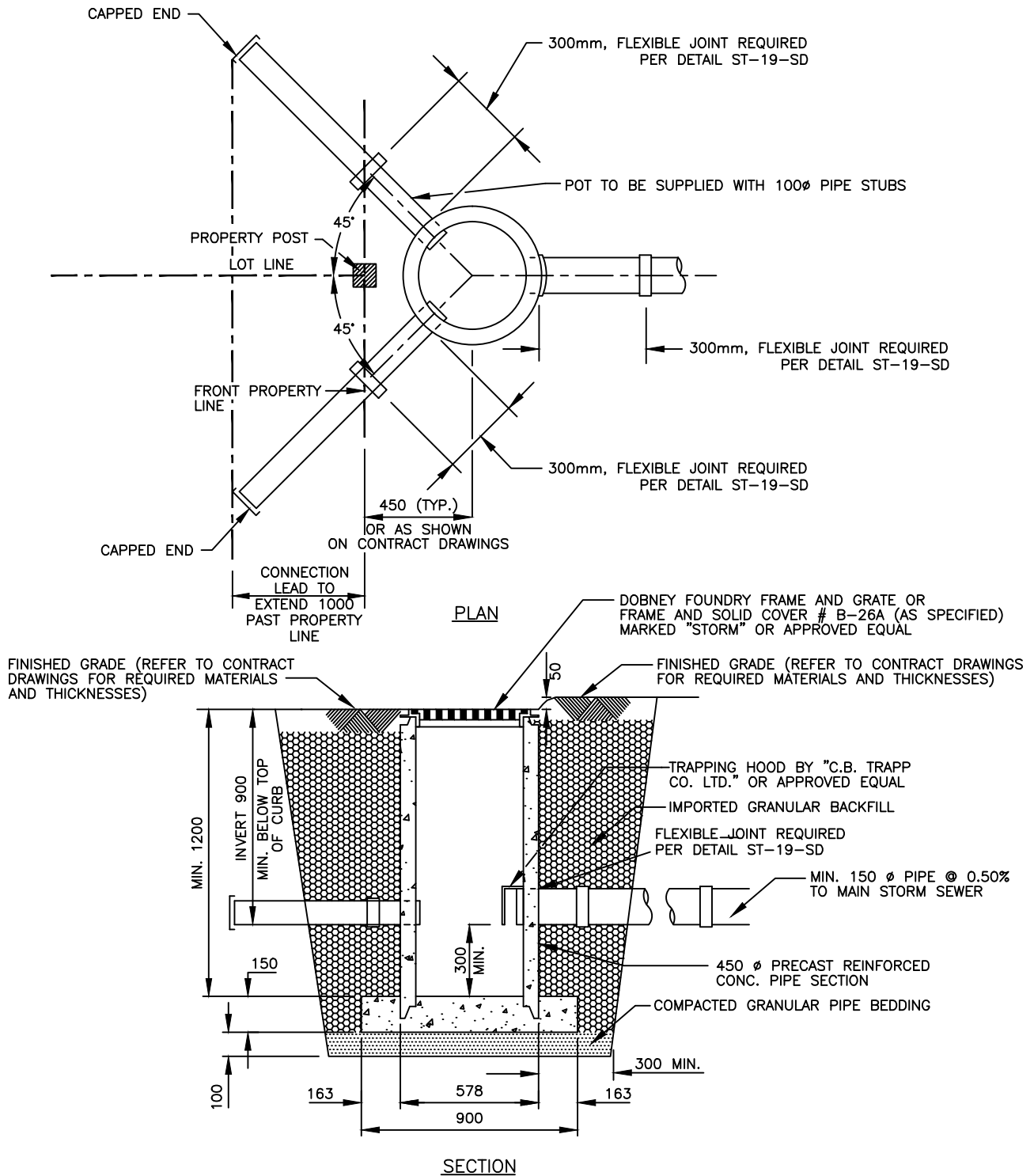


PVC INSPECTION CHAMBER/LAWN DRAIN TYPE 1A

TECH. :	SCALE : NTS	DRAWING NUMBER : ST-7a-SD
DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. ST-8)



NOTES:

TRAPPING HOODS ARE TEMPORARY TO FACILITATE CONSTRUCTION AND ARE TO BE REMOVED BY THE CONTRACTOR UPON CONTRACT COMPLETION.

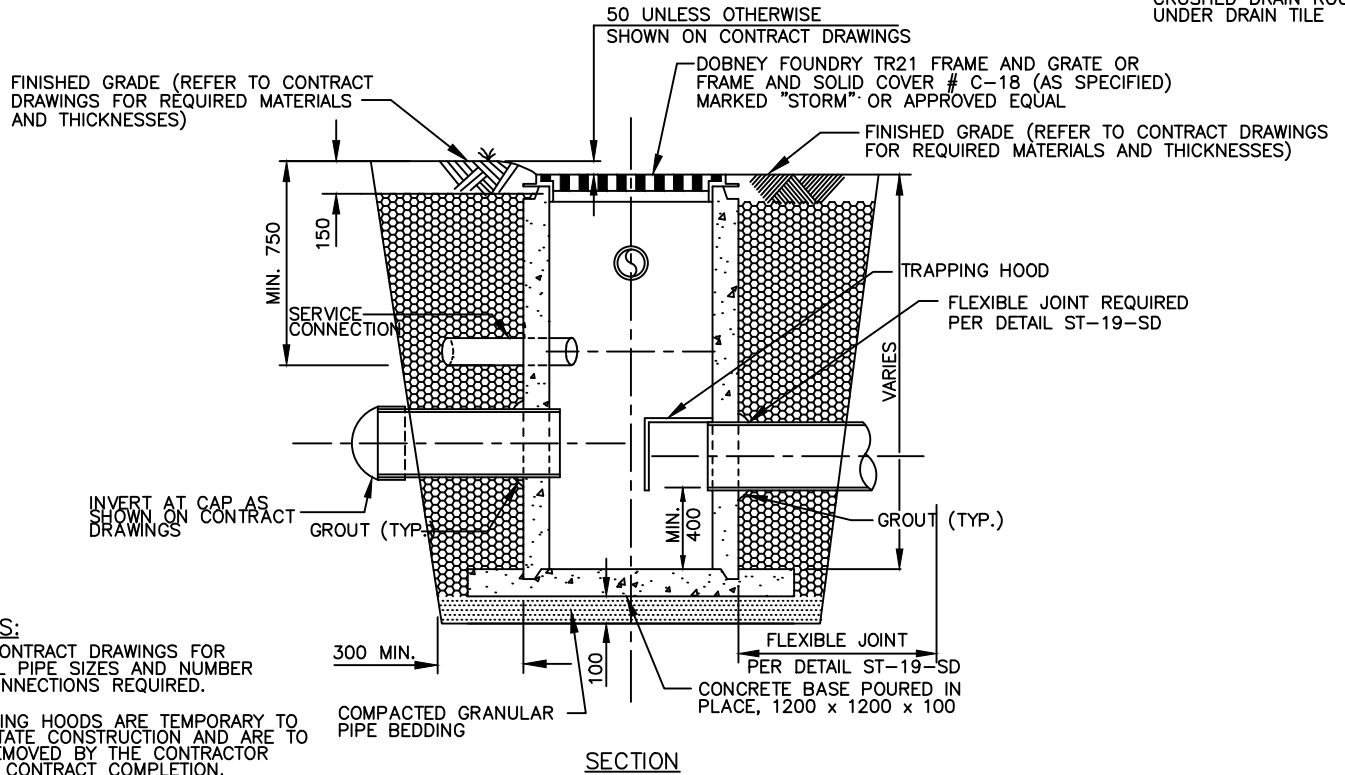
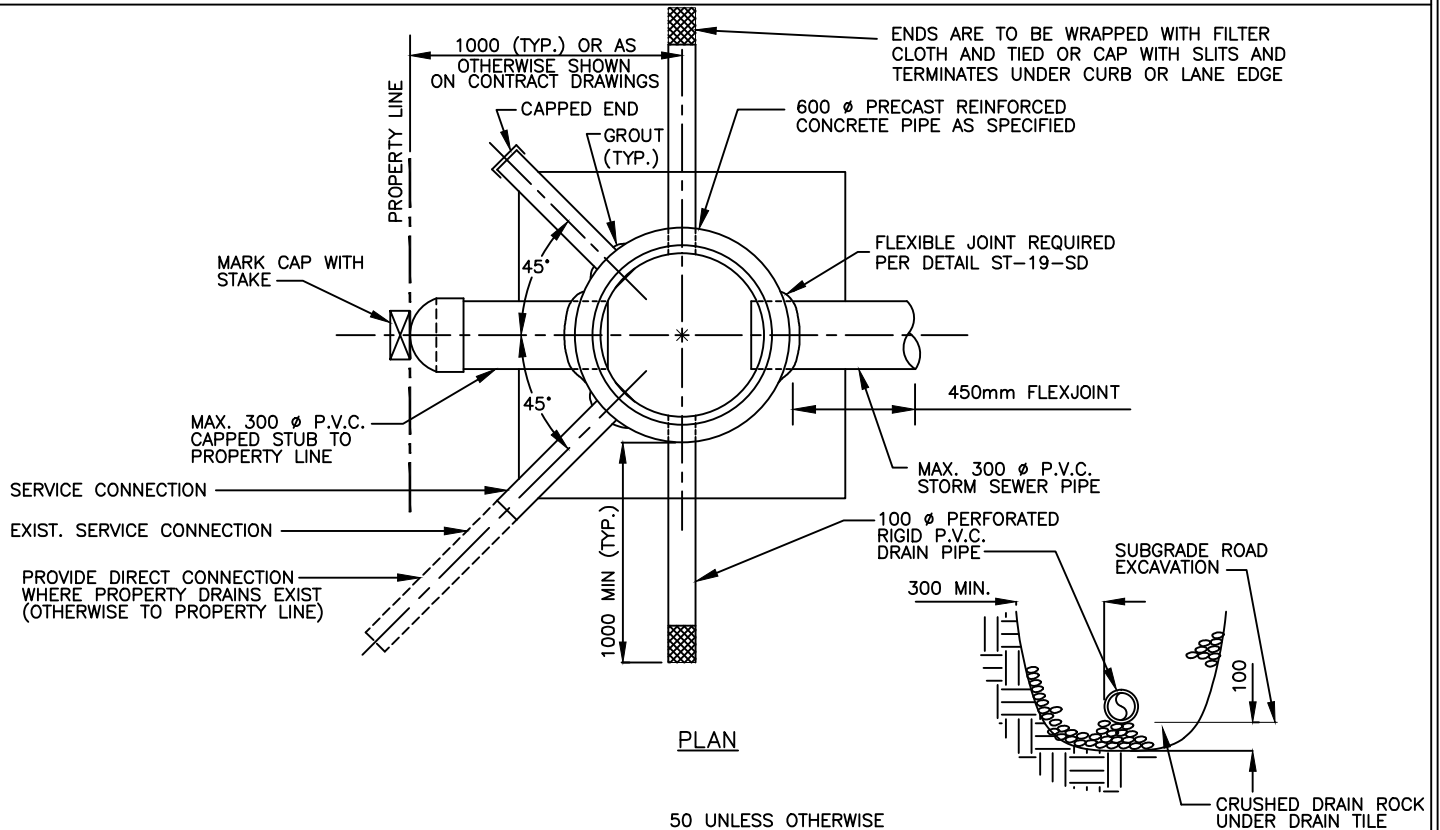


INSPECTION CHAMBER TYPE 2

TECH. :	SCALE : NTS	DRAWING NUMBER : ST-8-SD
DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: CITY OF RICHMOND STD. DWG. ST-9A)



NOTES:

SEE CONTRACT DRAWINGS FOR ACTUAL PIPE SIZES AND NUMBER OF CONNECTIONS REQUIRED.

TRAPPING HOODS ARE TEMPORARY TO FACILITATE CONSTRUCTION AND ARE TO BE REMOVED BY THE CONTRACTOR UPON CONTRACT COMPLETION.

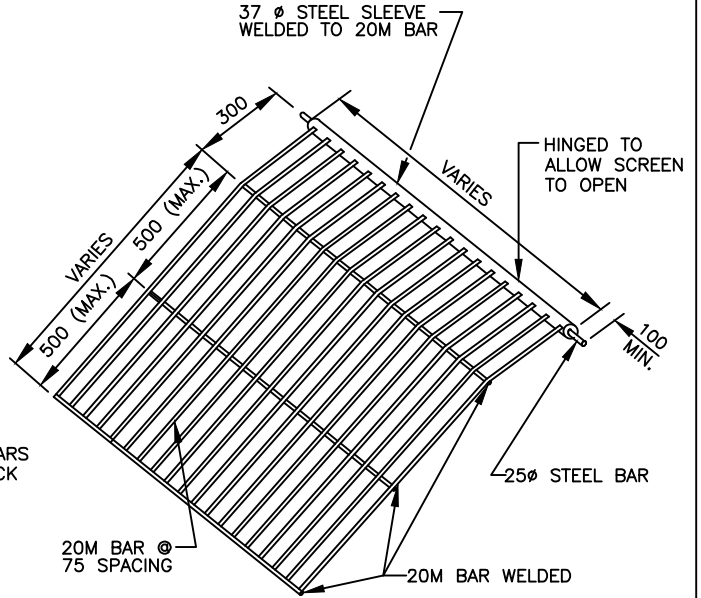
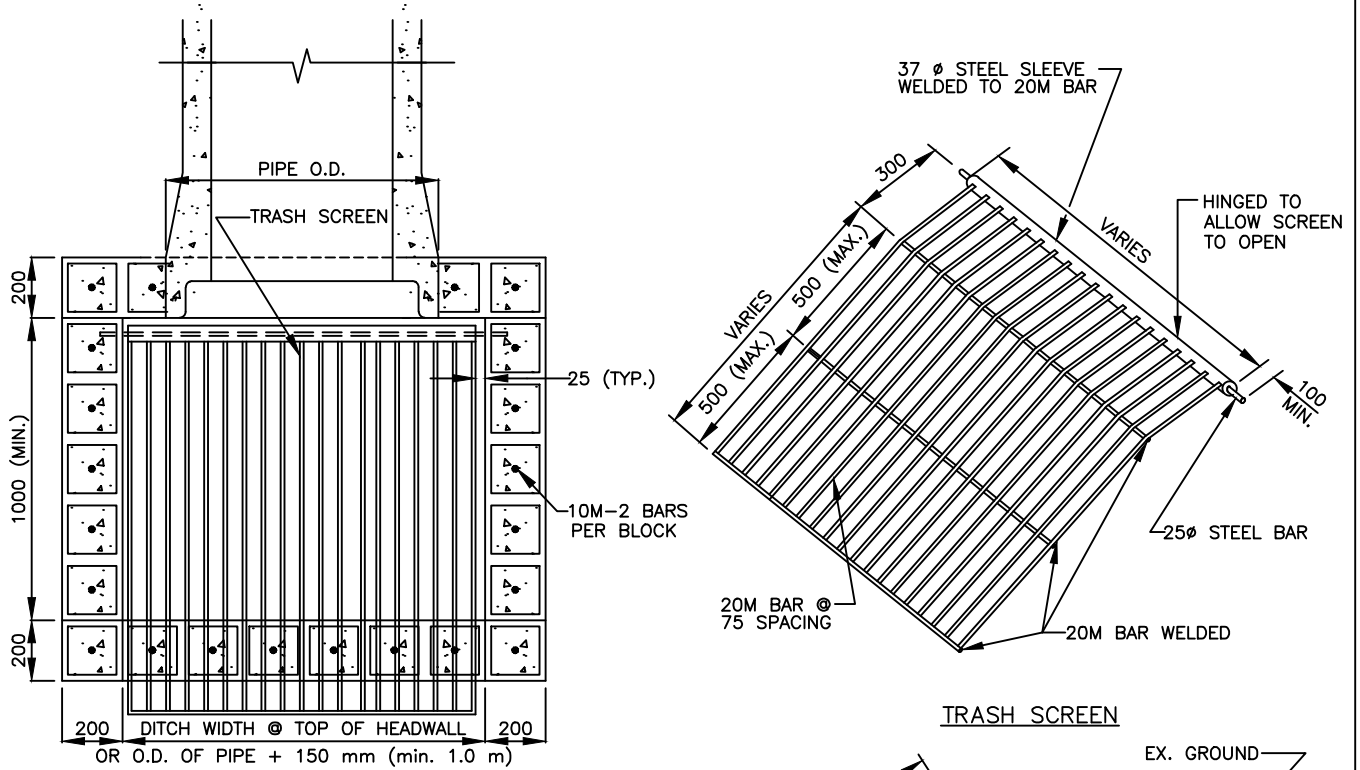
INSPECTION CHAMBER TYPE 3



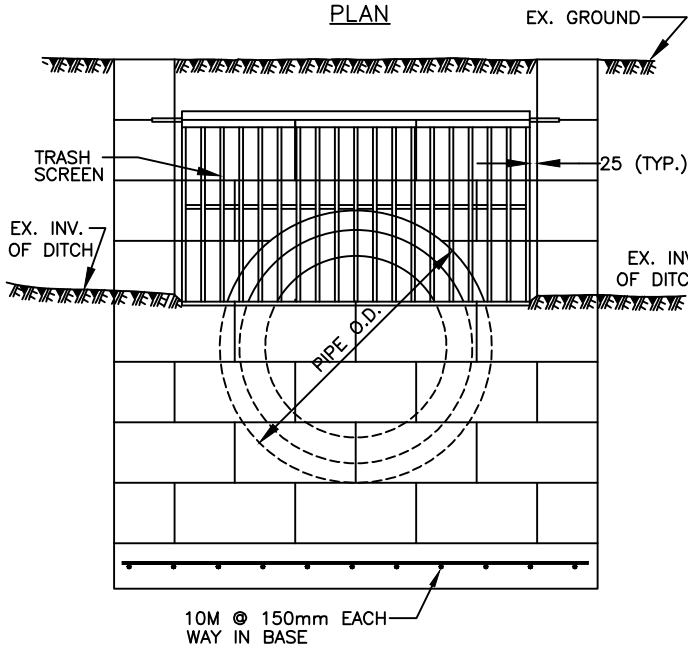
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DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

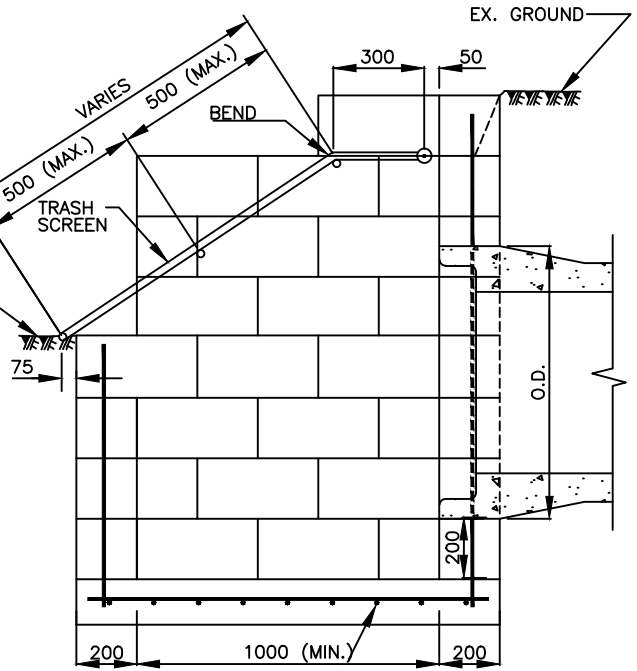
(SOURCE FROM: CITY OF RICHMOND STD. DWG. ST-10C)



TRASH SCREEN



ELEVATION



SECTION A-A
10M @ 150mm EACH WAY IN BASE



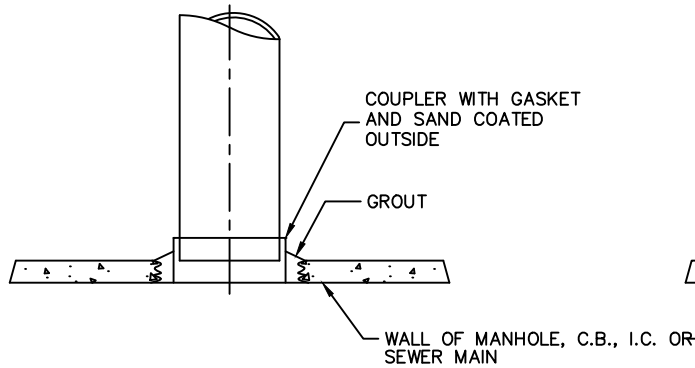
STORM SEWER INLET WITH SAFETY GRILLAGE

TECH. :	SCALE : NTS	DRAWING NUMBER : ST-10c-SD
DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

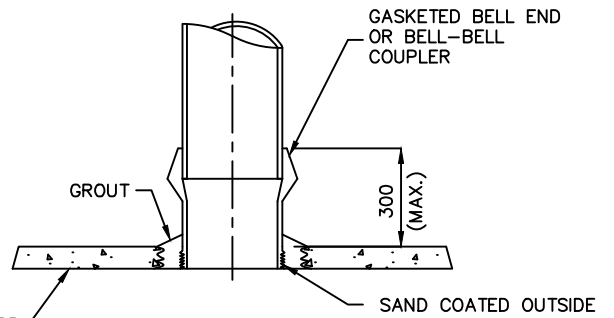
(SOURCE FROM: CITY OF RICHMOND STD. DWG. ST-19)

FLEXIBLE PIPE
600mm ϕ OR LESS



OPTION 1

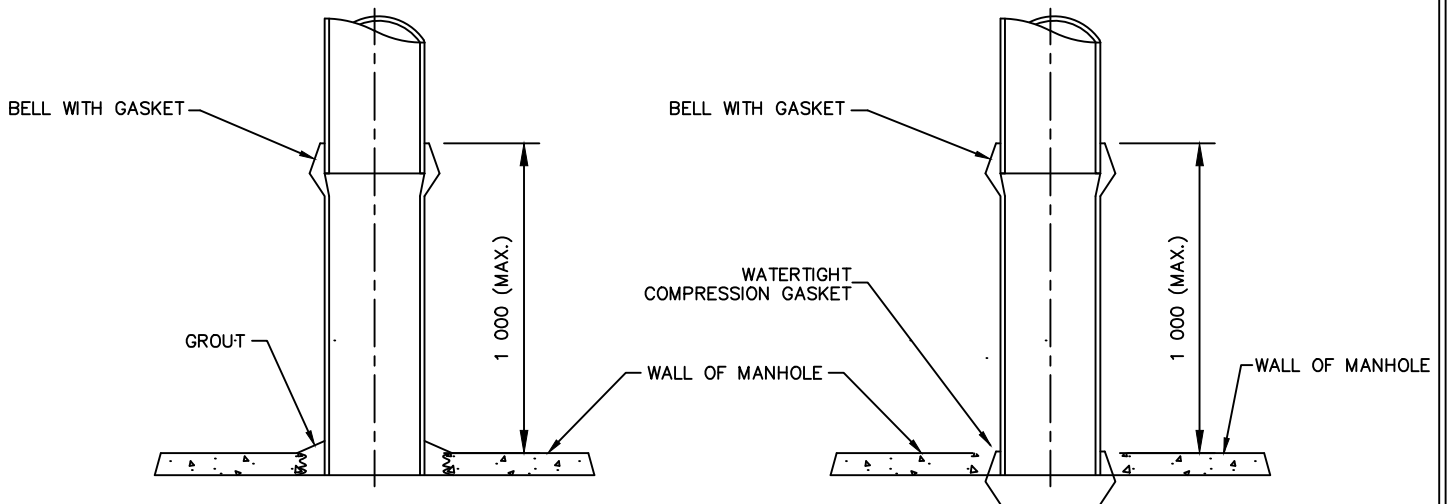
FLEXIBLE PIPE
600mm ϕ OR LESS



OPTION 2

CONCRETE PIPE OR FLEXIBLE PIPE
375 mm ϕ OR LESS GREATER THAN 600mm ϕ

RIGID OR FLEXIBLE PIPE
ANY ϕ



NOTES:

1. NO FLEXIBLE JOINT REQUIRED FOR ANY CONCRETE PIPE LARGER THAN 375mm ϕ .

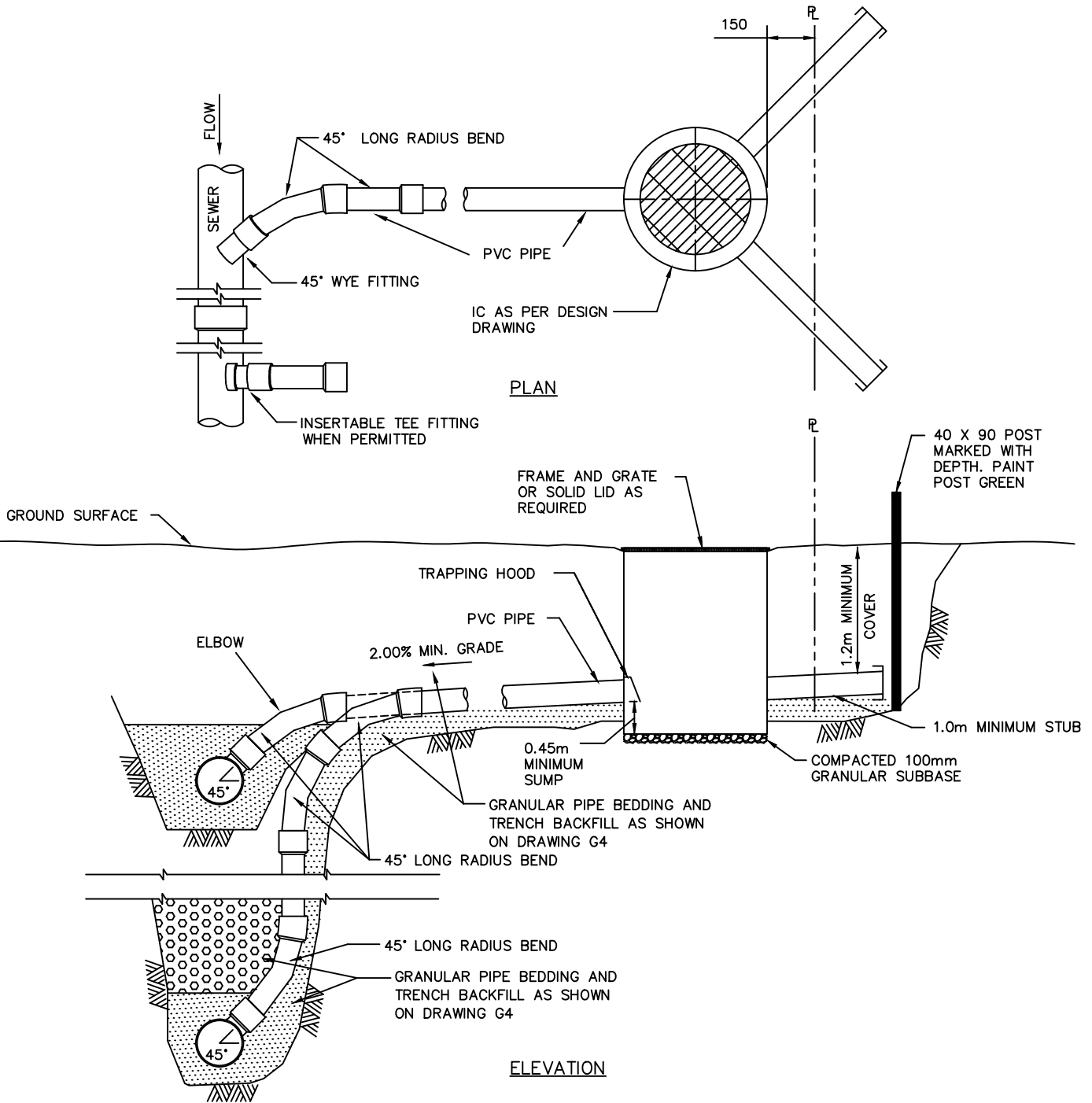


TYPICAL CONSTRUCTION DETAILS
OF FLEXIBLE JOINTS
FOR SEWER INSTALLATIONS

TECH. :	SCALE : NTS	DRAWING NUMBER : ST-19-SD
DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

(SOURCE FROM: MMCD STD. DWG. S8)



NOTES:

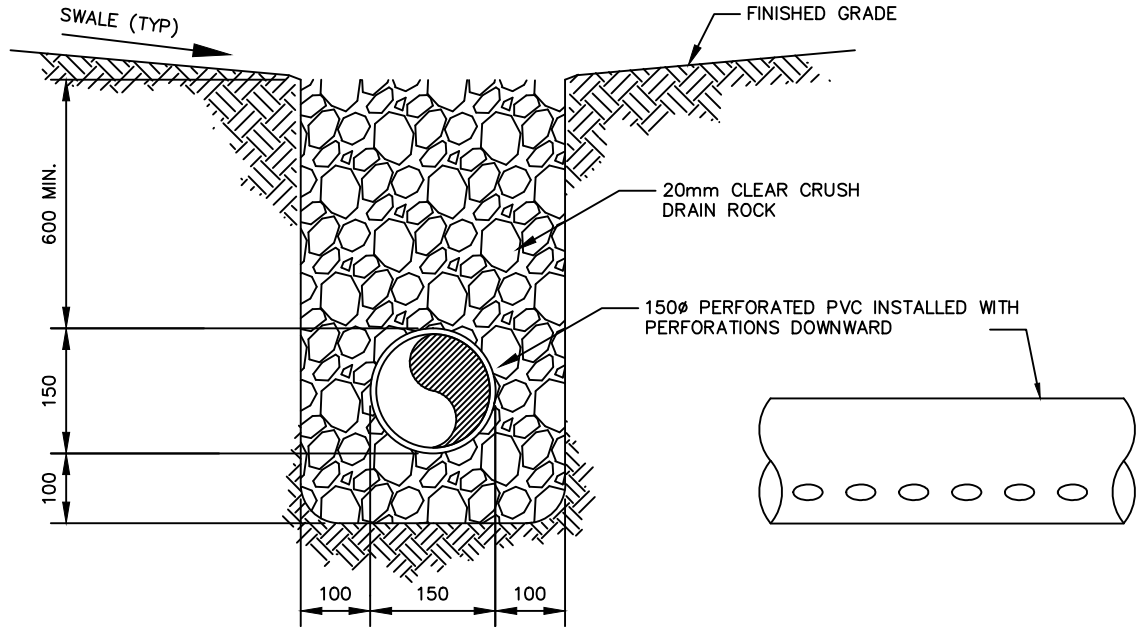
1. CONNECTIONS TO BE 150 MINIMUM OR LARGER AS SPECIFIED ON CONTRACT DRAWINGS.
2. RISER TYPE SERVICE TO BE USED ONLY WHEN SERVICE IS MORE THAT 2.4m ABOVE WYE INVERT OR AS DIRECTED BY CONTRACT ADMINISTRATOR.
3. LOCATION OF SERVICE AND MARKER AS SHOWN ON CONTRACT DRAWINGS.



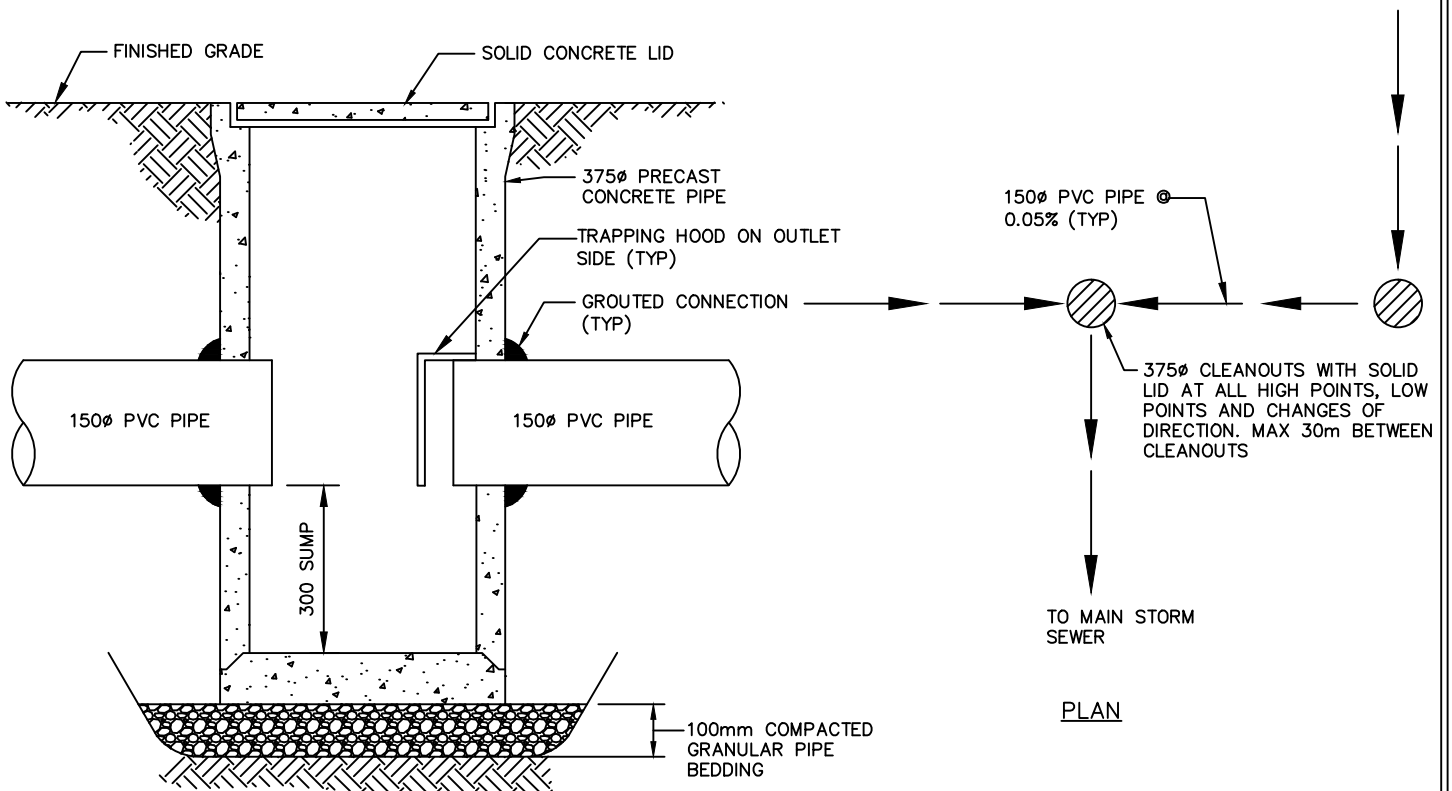
STORM SEWER SERVICE CONNECTION

TECH. :	SCALE : NTS	DRAWING NUMBER : ST-20-SD
DR. :	DATE : JAN. 2000	
ENG. :	REV. DATE : AUG./16	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



PERFORATED DRAINAGE TRENCH DETAIL



CONCRETE CLEANOUT WITH SOLID LID

PLAN



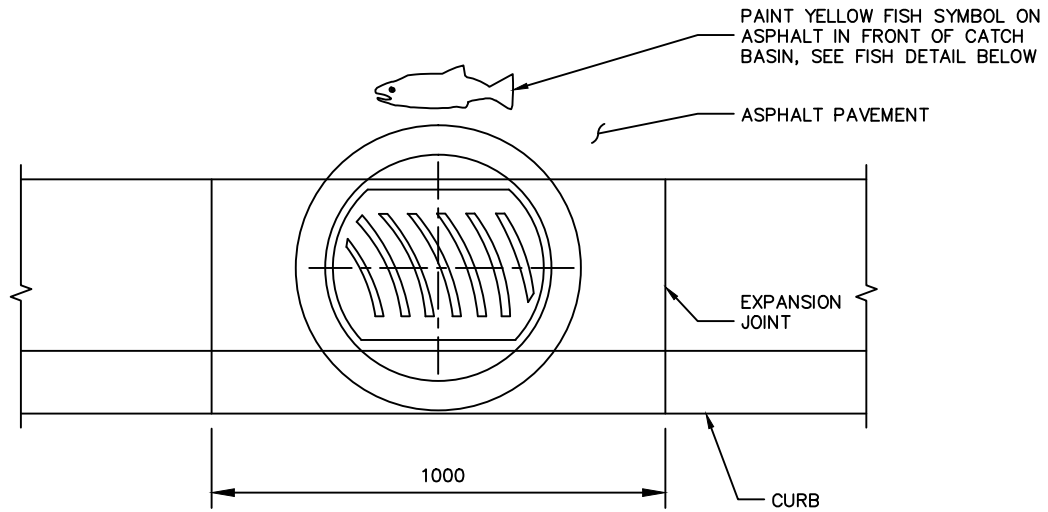
PERFORATED DRAINAGE TRENCH DETAIL

TECH. : R. KEATING
DR. :
ENG. :

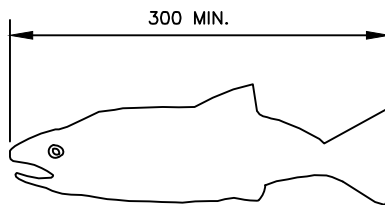
SCALE : NTS
DATE : NOV. 2010
REV. DATE :

DRAWING NUMBER :
ST-21-SD
SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



PLAN



FISH DETAIL

NOTES:

1. ALL STORM DRAINS TO BE MARKED WITH PAINTED YELLOW FISH OR DECAL
2. ENSURE AREA IS CLEAN AND DRY BEFORE APPLYING PAINT OR DECAL
3. PLACE DECAL ON ASPHALT (NOT ON CURB OR SIDEWALK)
4. FISH IS UPRIGHT WHEN VIEWED FROM SIDEWALK AND 50-100MM FROM DRAIN
5. STENCIL OR DECAL TO MATCH DETAIL.
6. YELLOW PAINT TO BE ROAD PAINT QUALITY



STORM – PAINTED FISH DETAILS

TECH. :	SCALE : NTS	DRAWING NUMBER : ST-22-SD
DR. :	DATE : NOV. 2010	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1

SCHEDULE D

SCHEDULE D

SCHEDULE D

SUPPLEMENTARY DETAIL DRAWINGS FOR INSTALLATION OF TRAFFIC SIGNALS

The following listed Standard Detail Drawings in the Master Municipal Construction Documents are deleted and/or replaced by the listed Supplementary Detail Drawings.

Significant changes or additional details are presented as Supplementary Detail Drawings, which are also listed below:

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT/ ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Dwg. #	Drawing Title	Dwg. #	Drawing Title
CE1.3 & CE1.4	Type C, C1, C2, C3 Trapezoidal Shape Concrete Bases		
CE1.5 & CE1.6	Type C4 & C5 Spread Footing Shape Concrete Bases		
E1.1	Type M (Nema Cabinet) Concrete Controller Base		
E1.2	Type P (Nema Cabinet) Concrete Controller Base		
E1.5	Controller insulation (for model 170 cabinets)		
E2.1	Round Plastic Junction Box		
E5.1	Post Top Signal Head Mounting		
E5.2	Side of Pole Signal Head Mounting (Method 1)		
E5.4	Side of Pole Signal Head Mounting (Method 3)		
E5.5	Overhead Signal Head Mounting (Spring Cushion End Hanger Method)		

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT/ ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Dwg. #	Drawing Title	Dwg. #	Drawing Title
E5.6	Overhead Signal Head Mounting (Spring Cushion Mid Hanger Method)		
E5.7	Overhead Signal Head Mounting (Plumbizer Method)		
E5.8	Overhead Signal Head Mounting (Plumbizer Method)		
E5.10	Overhead Signal Head Mounting On Pole Arm (Ball Hanger Method)		
E5.11	Overhead Signal Head Mounting On Span Wire (Ball Hanger Method)		
E6.2	Pedestrian Push Button With Integral Sign		
E7.5	40A (120/240V) Street Lighting Service Panel in Service Base Wiring Diagram		
E7.13	Signal Cable Colour Code Sample (Ontario Spec Method)		
E7.15	Pole Mounted Receptacle		
E8.2	Detector Loops		
E8.4	Detector Loop to Shielded Cable Splices		
E8.5	Detector Loop Procedures and Rules		
E8.6	Detector Loop Procedures and Rules		
E8.7	Typical Layout for Diamond and Round Traffic Signal Detector Loops		

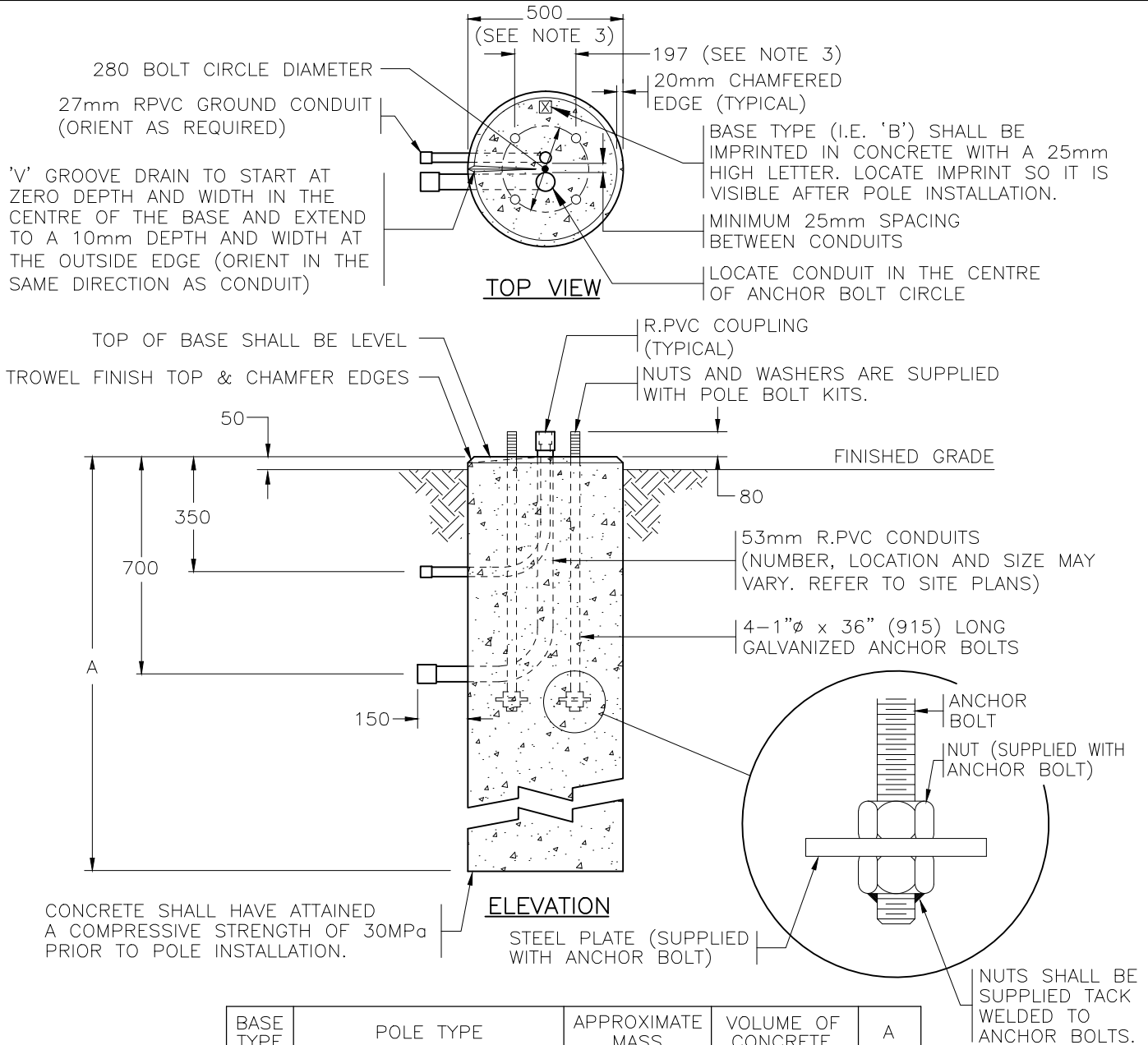
E8.8	Pre-formed Diamond Detector Loop Installation Details		
E8.9	Pre-formed Diamond Detector Loop Installation Details		
E8.10	Pre-formed Diamond Detector Loop Installation Details		
		SD_TYPE B	Type B Sonotube Concrete Base
		SD_TYPE_S2&L2	Type S2 & L2 Trapezoidal Shape Concrete Bases
		SD_TYPE_S1&L1	Type S2 & L1 Spread Footing Concrete Bases
		SD_BASE_INSTALL	Pole Base Installation Details
		SD_UPS_CONC_BASE	UPS, Service Cabinet Concrete Base & Bollard Detail
		SD_TYPE_CC-DEC_ARM	City Centre Type Decorative Luminaire Arm
		SD_TYPE_3-DEC_ARM	Type 3 Decorative Luminaire Arm
		SD_TYPE_7-DEC_ARM	Type 7 Decorative Luminaire Arm
		SD_ADJUST-LUM	Adjustable Luminaire Arm
		SD_DET_LOOP_CONDUIT	Detector Loop Conduit Stub Out Detail
		SD_19CABLE-CC	19 Conductor Signal Cable Colour Coding & Assignments
		SD_25CABLE-CC	25 Conductor Signal Cable Colour Coding & Assignments

		SD_ILL_PED_XWALK	Internally Illuminated Pedestrian Crosswalk Sign
		SD_SIG_HEAD_MTG	Side of Pole Signal Head Mounting
		SD_FIRE_SIG_HEAD_MTG	Fire Signal Head Mounting
		SD_UPS_CABINET	UPS & Service Cabinet
		SD_60A_PANEL	60A (120/240V) Traffic Signal/Street Lighting Service Panel Wiring diagram

TRAFFIC SIGNAL DRAWINGS

TRAFFIC SIGNAL DRAWINGS

SUPPLEMENTARY DETAIL DRAWING



BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A
B	TYPE 4A SIGNAL POST	760 kg	0.30 m ³	1500

NOTES

- REFER TO CONTRACT DRAWINGS, SECTIONS 03 30 53, 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
- BASE DIAMETER AND ANCHOR BOLT SPACING WILL VARY TO SUIT CITY CENTRE POSTS.

USE 450mm SQUARE TOP WHERE BASE IS LOCATED IN SIDEWALKS

City of
Richmond

6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE:

TYPE B SONOTUBE
CONCRETE BASE

DESIGN: MMCD (CE1.2)

DRAWN: R.F.

DWG. No. SD_TYPE_B

CHECKED: D.J.W.

SCALE: NOT TO SCALE

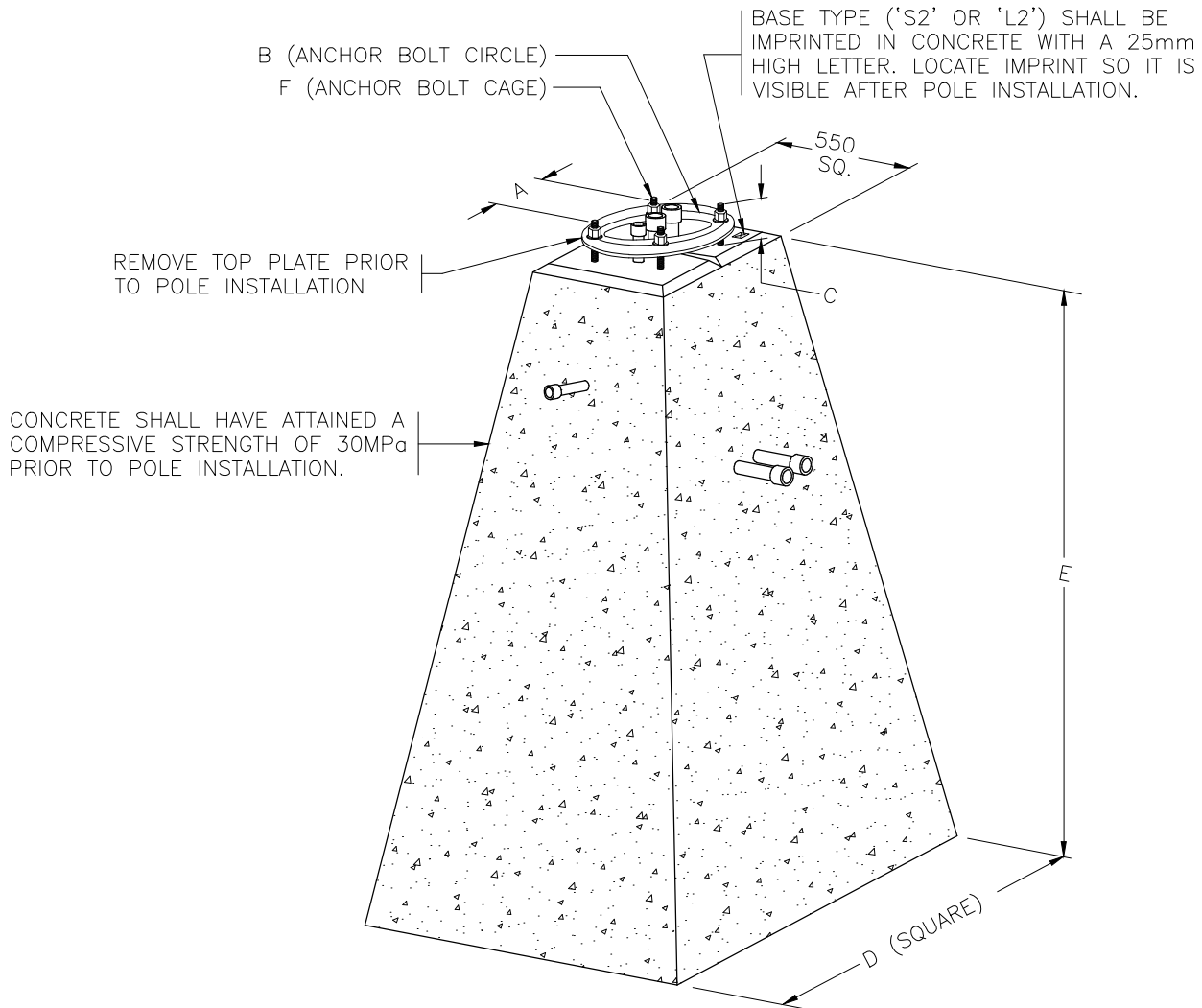
DATE: MARCH 9, 2016

ENGINEER: MMCD

SEC. No.

SHT. No. 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



PRECAST CONCRETE BASE

BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C	D	E	F (ANCHOR BOLTS)
S2	TYPE S POLES	4500 kg	1.8 m ³	243	343	140	1240	2100	4-32mmØ x 1220mm GALVANIZED AISI/SAE 4140 GRADE PRE-ASSEMBLED IN A CAGE
L2	TYPE L POLES	5040 kg	2.0 m ³	276	390	140	1300	2300	4-38mmØ x 1400mm GALVANIZED AISI/SAE 4140 GRADE PRE-ASSEMBLED IN A CAGE

NOTES

- REFER TO CONTRACT DRAWINGS, SECTIONS 03 30 53, 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

City of
Richmond

6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: TYPE S2 & L2 TRAPEZOIDAL SHAPE
CONCRETE BASES

DESIGN: MMCD (CE1.13 & 1.14)

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER: MMCD

DWG. No. SD_TYPE_S2&L2-1

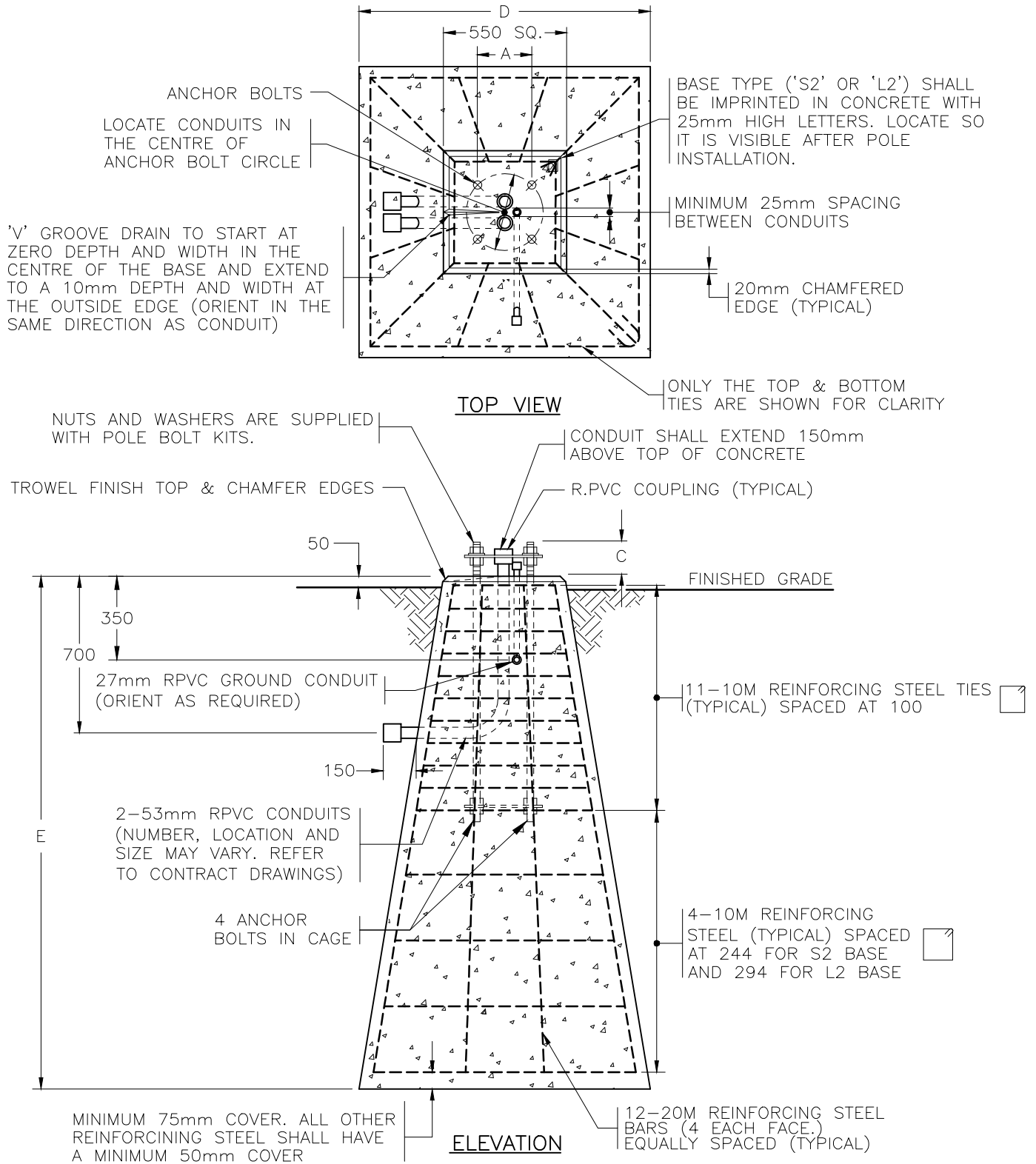
SCALE: NOT TO SCALE

SEC. No.

DATE: MARCH 9, 2016

SHT. No. 1 OF 2

SUPPLEMENTARY DETAIL DRAWING



City of
Richmond

TITLE: TYPE S2 & L2 TRAPEZOIDAL SHAPE
CONCRETE BASES

DESIGN: MMCD (CE1.13 & 1.14)

DRAWN: R.F.

DWG. No. SD_TYPE_S2&L2-2

CHECKED: D.J.W.

SCALE: NOT TO SCALE

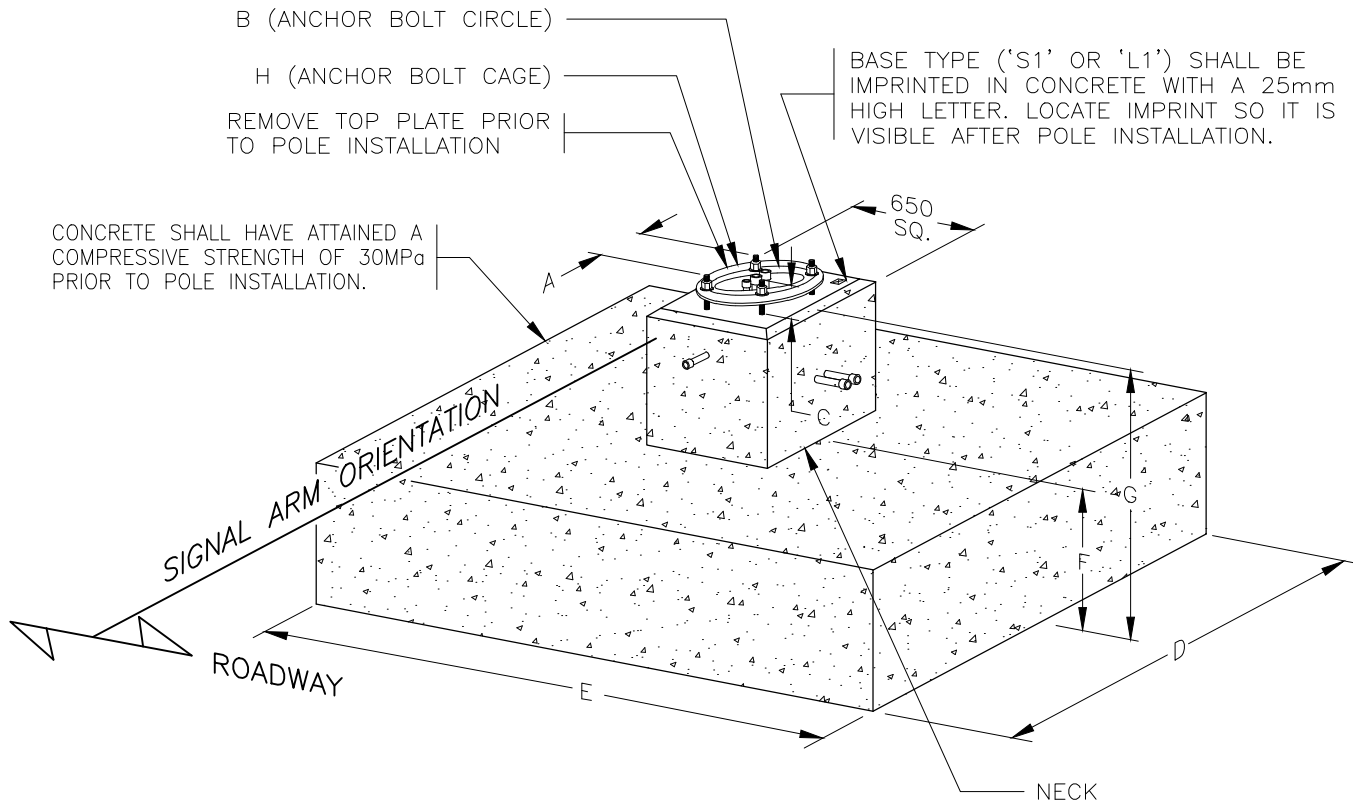
DATE: MARCH 9, 2016

ENGINEER: MMCD

SEC. No.

SHT. No. 2 OF 2

SUPPLEMENTARY DETAIL DRAWING



CONCRETE SPREAD FOOTING

BASE TYPE	POLE TYPE	VOLUME OF CONCRETE	APPROXIMATE MASS	A	B	C	D	E	F	G	H (ANCHOR BOLTS)
S1	TYPE S SIGNAL POLES	5.0m ³	12306 kg*	243	343	140	2000	3000	750	1800 TO 2150	4-32mm ϕ x 1220 GALVANIZED AISI/SAE 4140 GRADE PRE-ASSEMBLED IN A CAGE
L1	TYPE L SIGNAL POLES	5.0m ³	12306 kg*	276	390	140	2000	3000	750	1800 TO 2150	4-38mm ϕ x 1400 GALVANIZED AISI/SAE 4140 GRADE PRE-ASSEMBLED IN A CAGE

NOTES

- REFER TO CONTRACT DRAWINGS, SECTIONS 03 30 53, 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

BASE DESIGNED FOR SOILS WITH A MINIMUM BEARING PRESSURE OF 100KPa

City of Richmond

6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: TYPE S1 & L1 SPREAD FOOTING
CONCRETE BASES

DESIGN: MMCD (CE1.10-1.12)

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER: MMCD

DWG. No. SD_TYPE_S1&L1-1

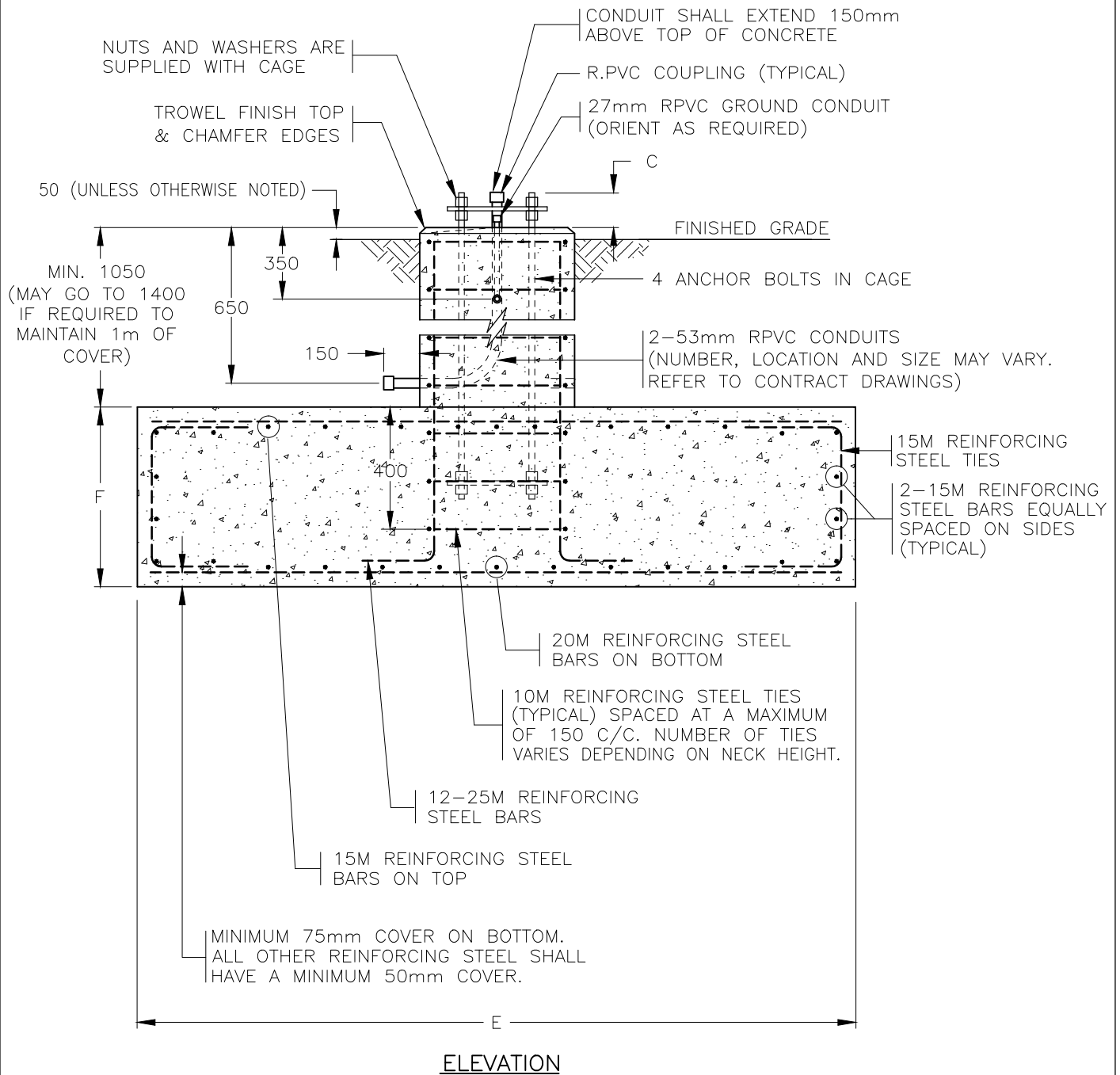
SCALE: NOT TO SCALE

SEC. No.

DATE: MARCH 9, 2016

SHT. No. 1 OF 3

SUPPLEMENTARY DETAIL DRAWING



City of
Richmond

6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: TYPE S1 & L1 SPREAD FOOTING
CONCRETE BASES

DESIGN: MMCD (CE1.10-1.12)

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER: MMCD

DWG. No. SD_TYPE_S1&L1-2

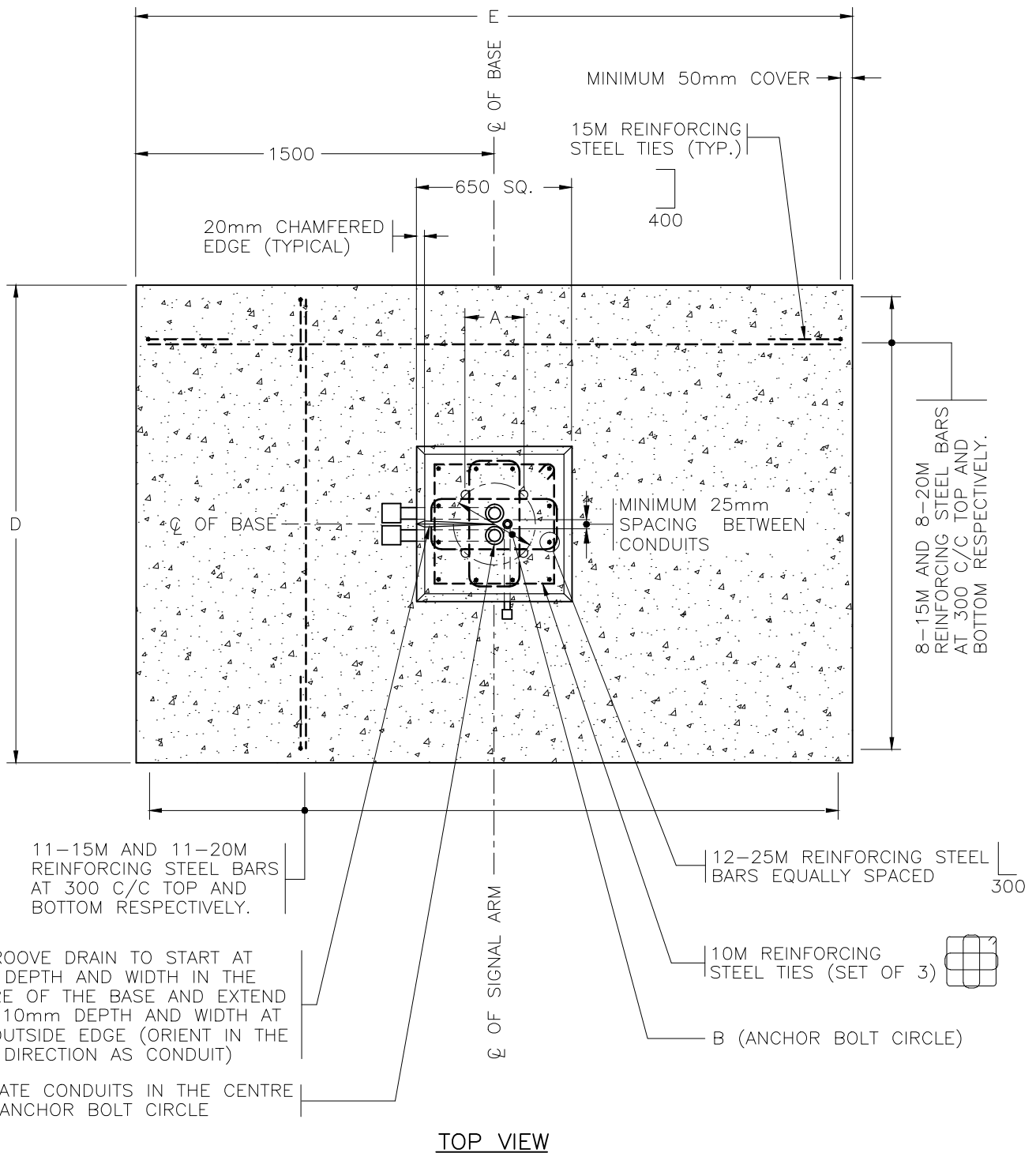
SCALE: NOT TO SCALE

SEC. No.

DATE: MARCH 9, 2016

SHT. No. 2 OF 3

SUPPLEMENTARY DETAIL DRAWING



**City of
Richmond**

6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: TYPE S1 & L1 SPREAD FOOTING
CONCRETE BASES

DESIGN: MMCD (CE1.10-1.12)

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER: MMCD

DWG. No. SD_TYPE_S1&L1-3

SCALE: NOT TO SCALE

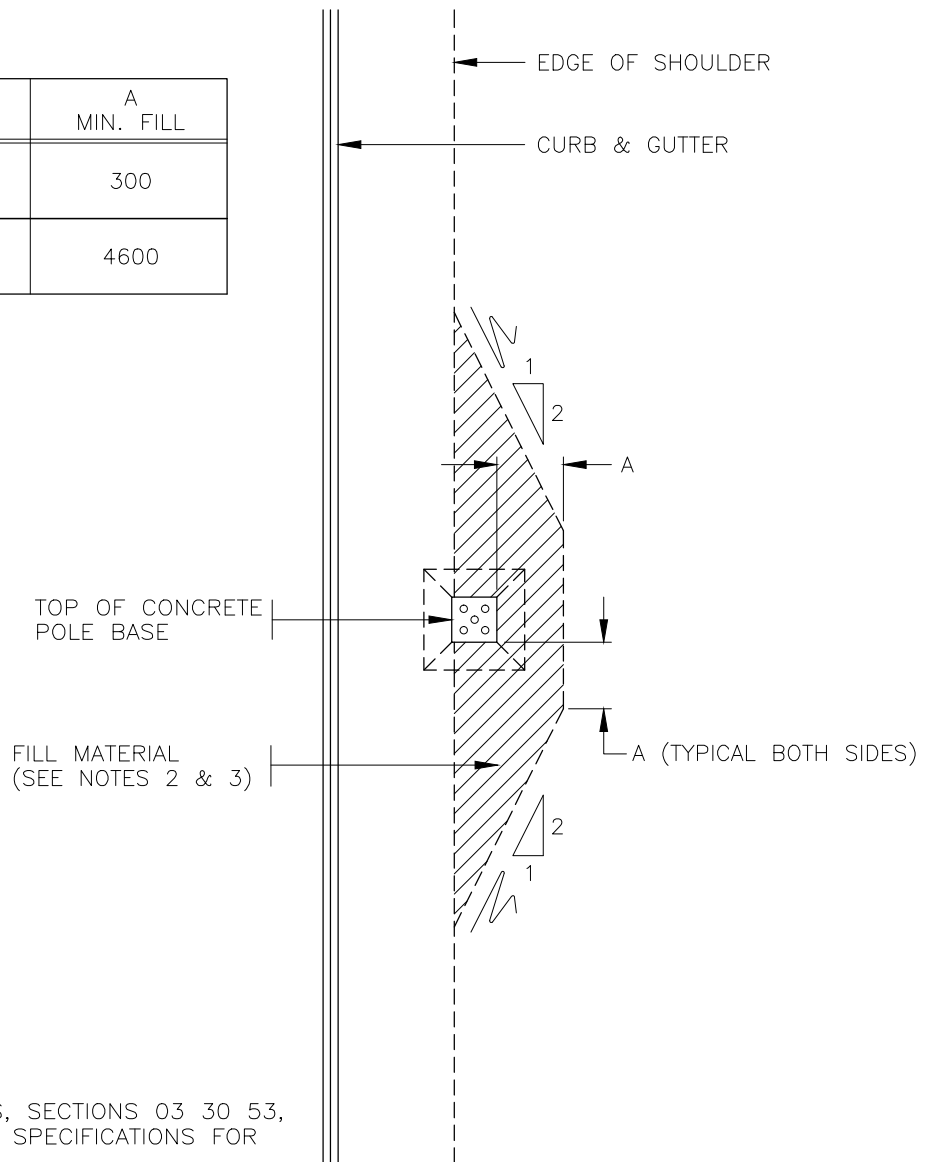
SEC. No.

DATE: MARCH 9, 2016

SHT. No. 3 OF 3

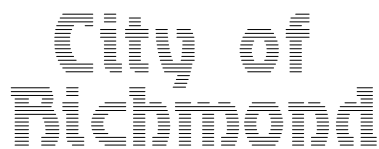
SUPPLEMENTARY DETAIL DRAWING

BASE TYPES	A MIN. FILL
TYPES B AND C CONCRETE BASES	300
TYPES S2 & L2 CONCRETE BASES	4600



NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 03 30 53, 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. FILL MATERIAL SHALL CONSIST OF CLEAN WELL GRADED GRANULAR SOIL HAVING A MAXIMUM FINES CONTENT OF 8% (SILT AND CLAY SIZE PARTICLES) AND A MAXIMUM AGGREGATE SIZE OF 100mm.
3. FILL MATERIAL SHALL BE SUPPLIED, INSTALLED AND FULLY COMPACTED IN ACCORDANCE WITH SECTION 02223 FOR THE MINIMUM AREA ALL AROUND THE BASE AS SHOWN ABOVE.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. MAINTAIN A MINIMUM 1.0m COVER OVER SPREAD FOOTING.



TITLE: POLE BASE INSTALLATION DETAILS

DESIGN: MMCD (CE1.20)

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER: MMCD

DWG. No. SD_BASE_INSTALL

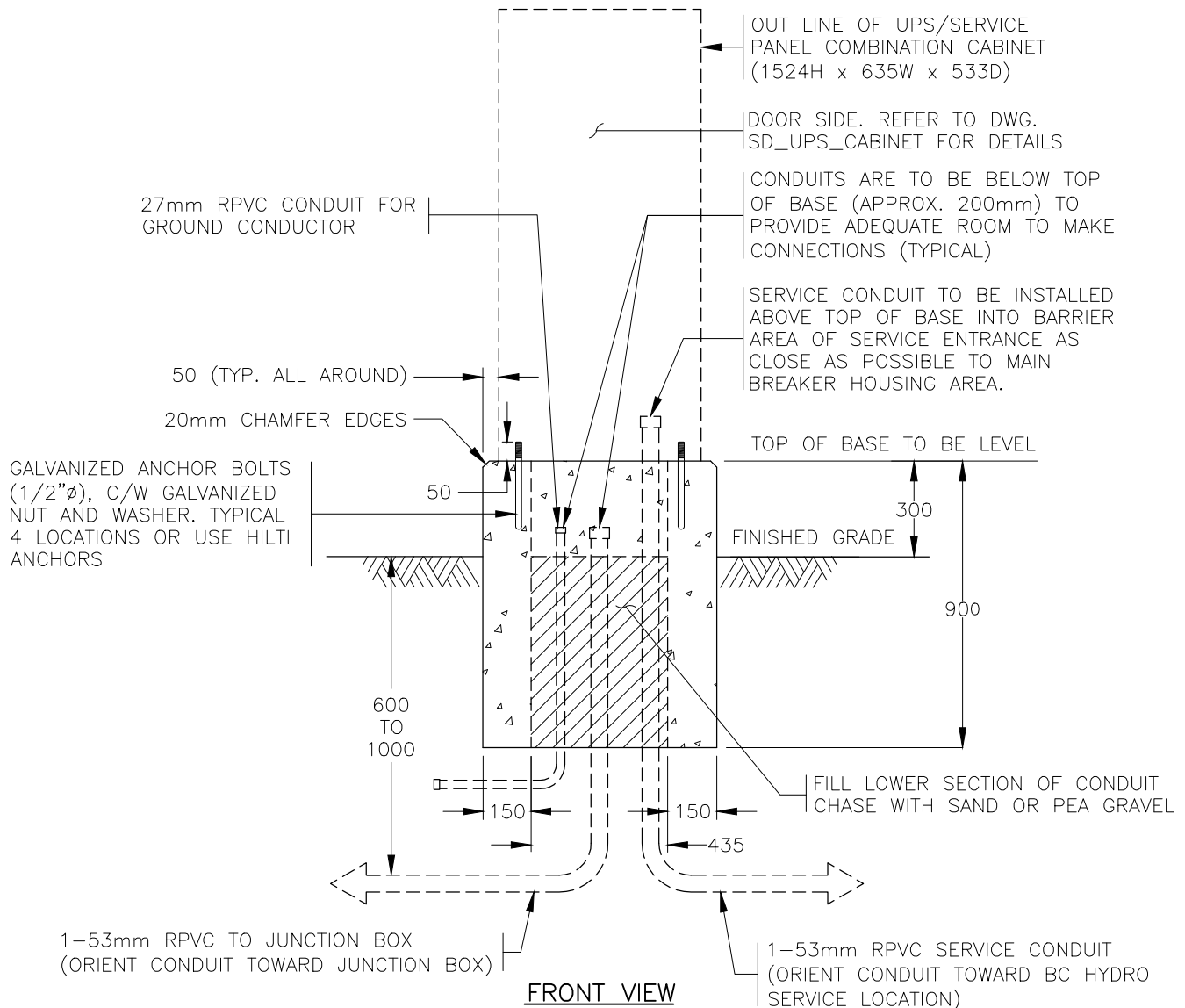
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SEC. No.

DATE: MARCH 9, 2016

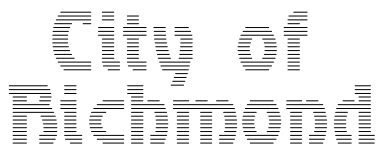
SHT. No. 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



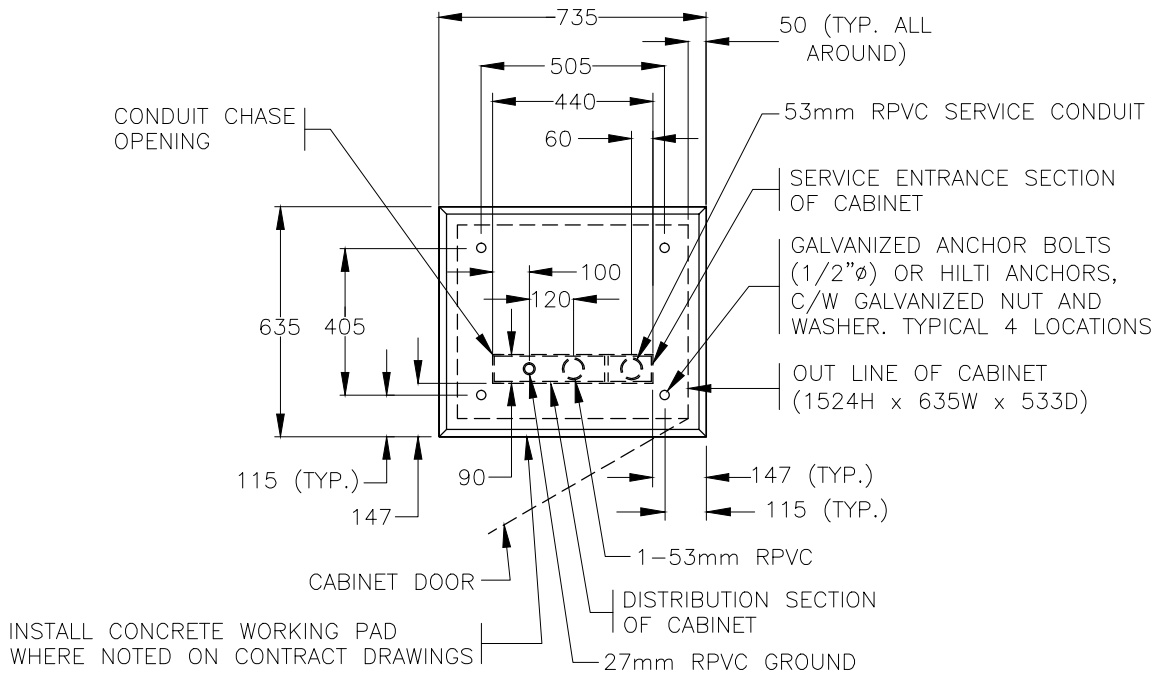
NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 03 30 53, 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. BASES TO BE PRE-CAST OR CAST-IN-PLACE.
4. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 30MPa AT 28 DAYS.
5. INSTALL MULTIPLE GROUND RODS OR PLATE WITH MINIMUM 3000 SEPARATION.

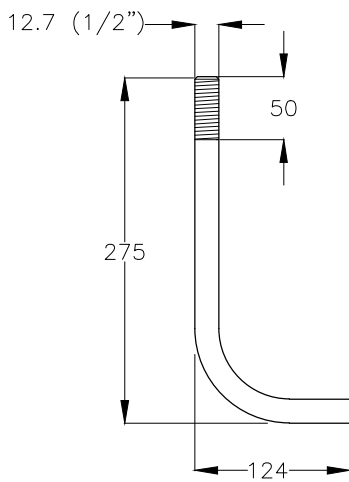


TITLE:		UPS, SERVICE CABINET CONCRETE BASE & BOLLARD DETAIL	
DESIGN:	D.S.M.	DWG. No.	SD_UPS_CONC_BASE-1
DRAWN:	R.F.		
CHECKED:	D.J.W.	SCALE:	N.T.S.
ENGINEER:		DATE:	MARCH 9, 2016
		SEC. No.	SHT. No. 1 OF 2

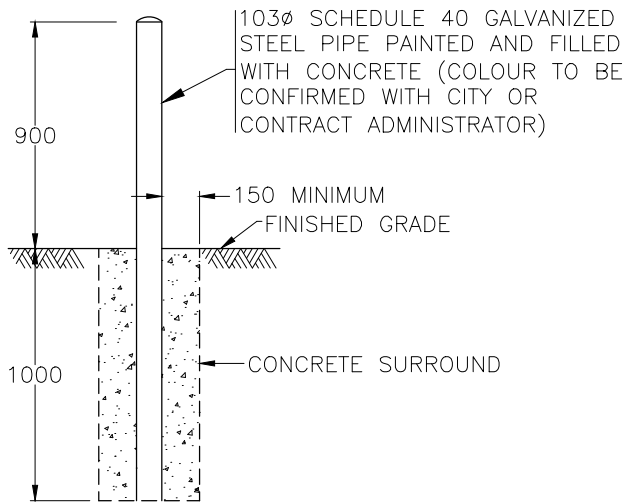
SUPPLEMENTARY DETAIL DRAWING



TOP VIEW



ANCHOR BOLT



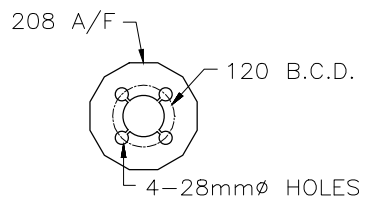
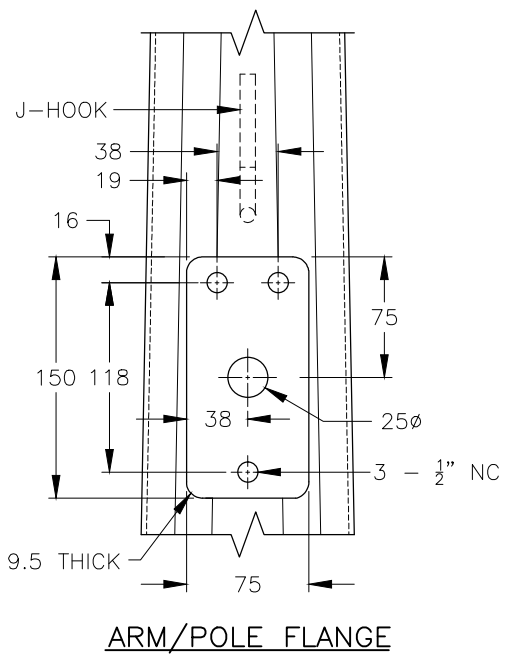
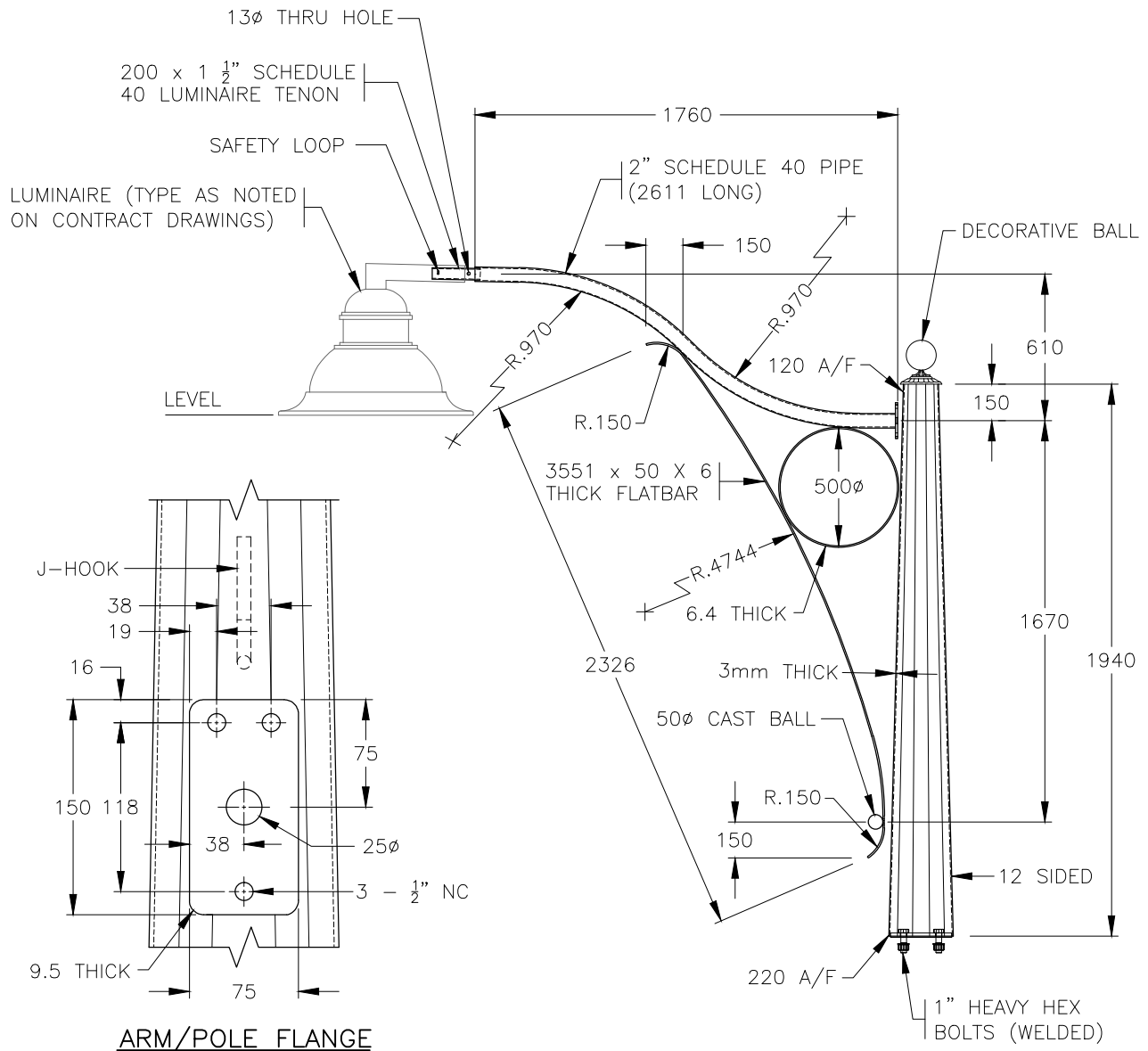
CONCRETE BOLLARD
(REFER TO CONTRACT DRAWINGS)

**City of
Richmond**

6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: UPS, SERVICE CABINET CONCRETE BASE & BOLLARD DETAIL	
DESIGN: D.S.M.	DWG. No. SD_UPS_CONC_BASE-2
DRAWN: R.F.	SCALE: N.T.S.
CHECKED: D.J.W.	DATE: MARCH 9, 2016
ENGINEER:	SEC. No. SHT. No. 2 OF 2

SUPPLEMENTARY DETAIL DRAWING



NOTES

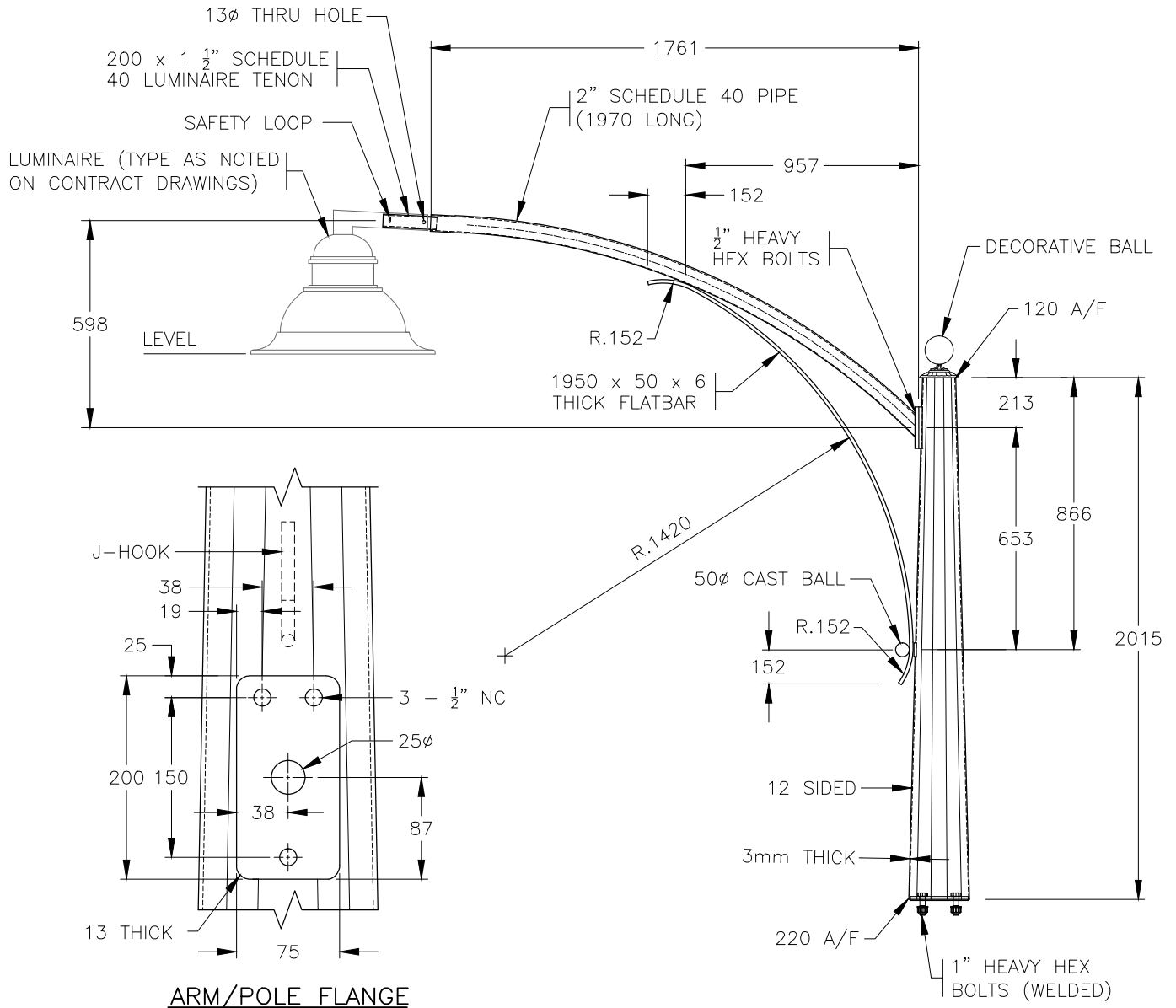
1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. DRAWING PROVIDED TO DEFINE GENERAL POLE DESIGN AND SIZES. PROVIDE SHOP DRAWINGS WITH ALL WELDING AND FABRICATION DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: CITY CENTRE TYPE DECORATIVE LUMINAIRE ARM	
DESIGN: VALMONT	DWG. No. SD_TYPE_CC-DEC_ARM
DRAWN: R.F.	SCALE: NOT TO SCALE
CHECKED: D.J.W.	DATE: MARCH 9, 2016
ENGINEER:	SEC. No. SHT. No. 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. DRAWING PROVIDED TO DEFINE GENERAL POLE DESIGN AND SIZES. PROVIDE SHOP DRAWINGS WITH ALL WELDING AND FABRICATION DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

City of
Richmond

6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: TYPE 3 DECORATIVE LUMINAIRE ARM

DESIGN: VALMONT

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER:

DWG. No. SD_TYPE_3-DEC_ARM

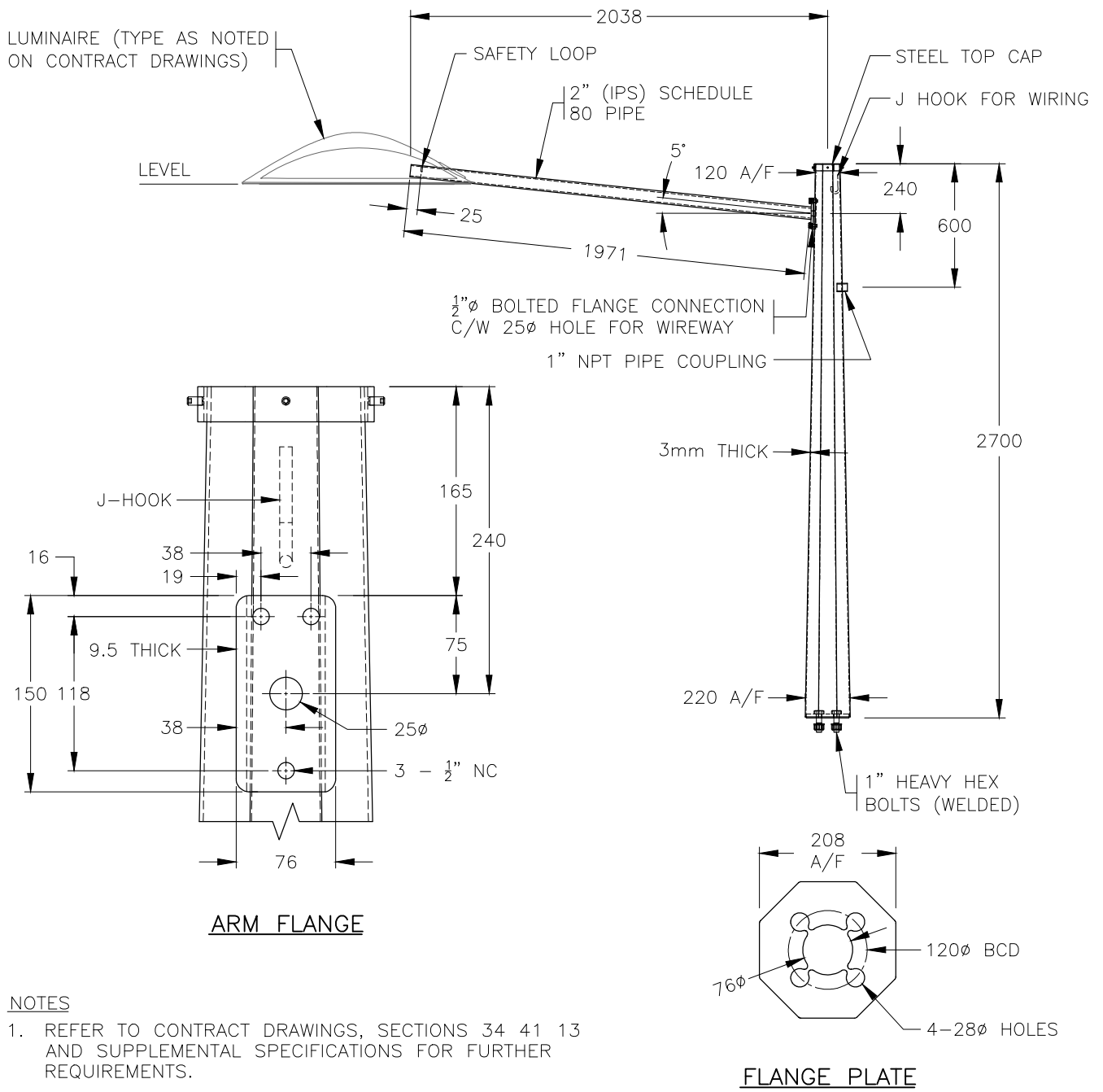
SCALE: NOT TO SCALE

SEC. No.

DATE: MARCH 9, 2016

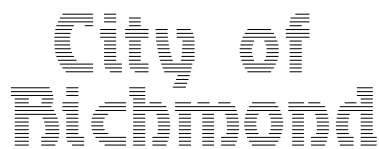
SHT. No. 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. DRAWING PROVIDED TO DEFINE GENERAL POLE DESIGN AND SIZES. PROVIDE SHOP DRAWINGS WITH ALL WELDING AND FABRICATION DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: TYPE 7 DECORATIVE LUMINAIRE ARM

DESIGN: VALMONT

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER:

DWG. No. SD_TYPE_7-DEC_ARM

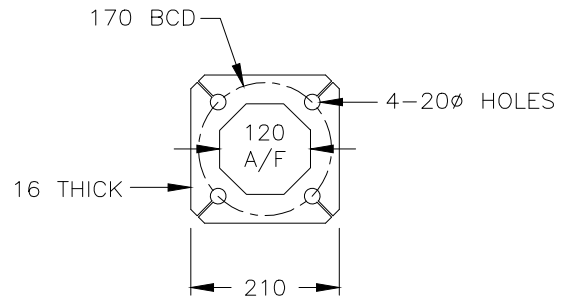
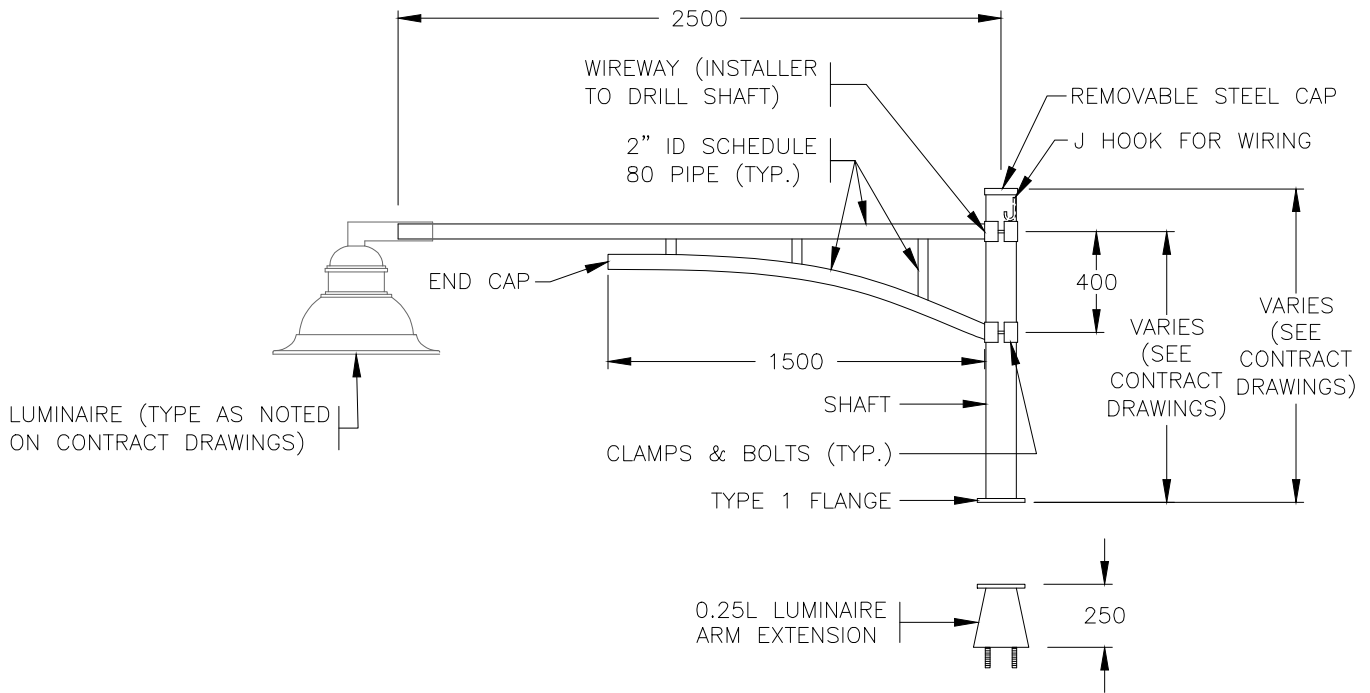
SCALE: NOT TO SCALE

SEC. No.

DATE: MARCH 9, 2016

SHT. No. 1 OF 1

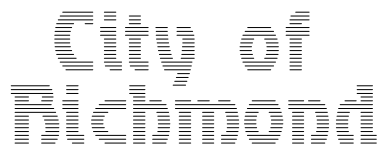
SUPPLEMENTARY DETAIL DRAWING



TYPE 1 FLANGE DETAIL

NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. DRAWING PROVIDED TO DEFINE GENERAL POLE DESIGN AND SIZES. PROVIDE SHOP DRAWINGS WITH ALL WELDING AND FABRICATION DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: ADJUSTABLE LUMINAIRE ARM

DESIGN: VALMONT

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER:

DWG. No. SD_ADJUST-LUM

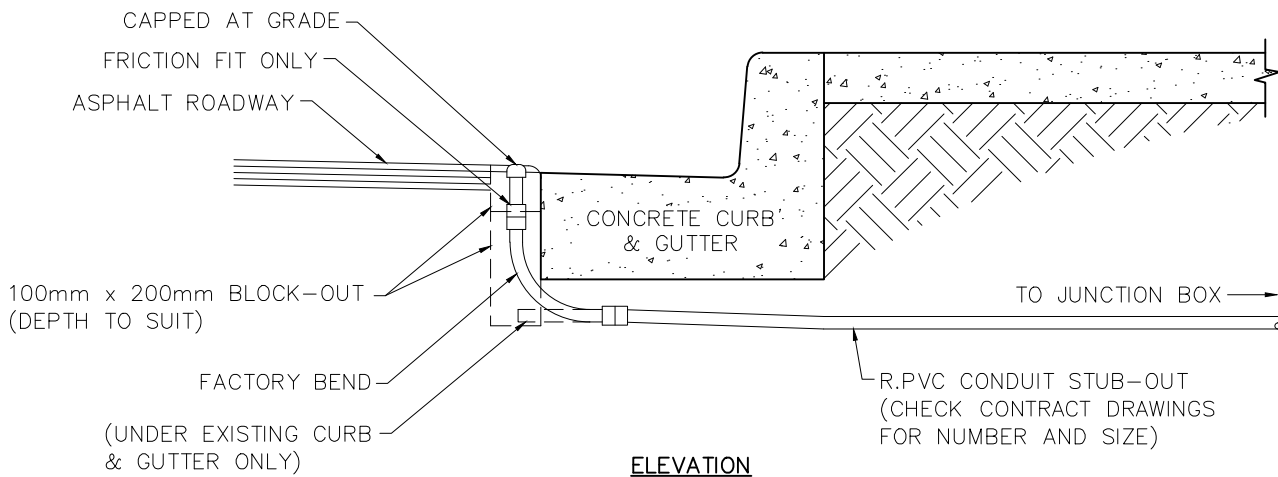
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SEC. No.

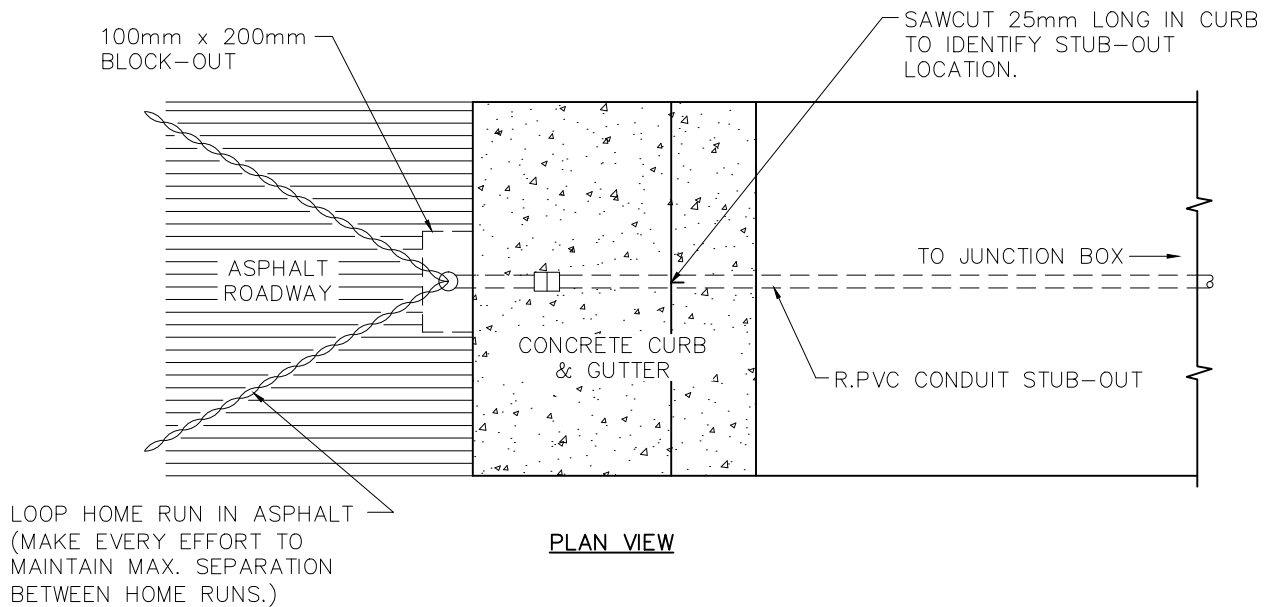
DATE: MARCH 9, 2016

SHT. No. 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



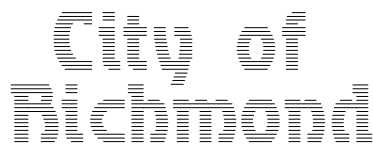
ELEVATION



PLAN VIEW

NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. THE SOFT SPOT CREATED TO GAIN ACCESS TO THE CONDUIT UNDER THE PAVEMENT MUST BE FILLED WITH INSTANT ASPHALT PATCH & ASPHALTIC JOINT SEALER. (STUFF FIBRE GLASS AROUND WIRES IN CONDUIT TO AVOID SEEPAGE OF ASPHALT PATCH)
3. UNDER NEW CONSTRUCTION ONLY – THE CAPPED SECTION OF R.PVC SHALL BE REMOVED
4. UNDER EXISTING CONSTRUCTION ONLY – THE R.PVC STUB-OUT SHALL EXTEND STRAIGHT OUT UNDER THE ASPHALT ROADWAY.
5. A 25mm LONG SAWCUT SHALL BE MADE IN THE CONCRETE CURB TO IDENTIFY THE LOCATION OF THE CONDUIT STUB-OUT FOR FUTURE USE.



6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: DETECTOR LOOP CONDUIT STUB OUT DETAIL	
DESIGN: RICHMOND	DWG. No. SD_DET_LOOP_CONDUIT
DRAWN: R.F.	
CHECKED: D.J.W.	SCALE: 1 : 15
ENGINEER:	DATE: JANUARY 1, 2003.
	SEC. No.
	SHT. No. 1 OF 1

SUPPLEMENTARY DETAIL DRAWING

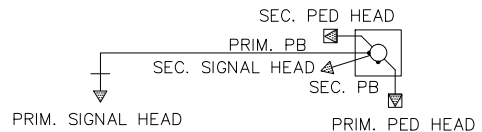
COLOUR CODING (MULTICONDUCTOR SIGNAL CABLE)

19 CONDUCTOR No. 14, CSA SPEC. No.C21.1 CABLE IN CONDUIT

CONDUCTOR No.	SIGNAL ASSIGNMENT	LETTERING	CONDUCTOR COLOUR	SINGLE CONDUCTOR COLOUR IN POLE
1	NEUTRAL	WHITE ONE	WHITE	WHITE
2	PRIM. PB RETURN	WHITE TWO	WHITE	BLACK
3	PRIM. PB	--	BLACK	BLACK
4	SEC. PB	--	ORANGE	BLACK (RED TT)
5	PRIM. RED	RED ONE	RED	RED
6	SEC. RED	RED TWO	RED	RED
7	SEC. PB RETURN	RED THREE	RED	BLACK (RED TT)
8	PRIM. PED DW	RED FOUR	RED	YELLOW or BROWN
9	SEC. PED DW	RED FIVE	RED	YELLOW or BROWN
10	PRIM. AMBER	AMBER ONE	YELLOW	YELLOW or BROWN
11	SEC. AMBER	AMBER TWO	YELLOW	YELLOW or BROWN
12	PRIM. LT AMBER	AMBER THREE	YELLOW	YELLOW or BROWN
13	SEC. LT AMBER	AMBER FOUR	YELLOW	YELLOW or BROWN
14	SEC. PED WALK	AMBER FIVE	YELLOW	BLUE
15	PRIM. GREEN	GREEN ONE	BLUE	BLUE
16	SEC. GREEN	GREEN TWO	BLUE	BLUE
17	PRIM. LT GREEN	GREEN THREE	BLUE	BLUE
18	SEC. LT GREEN	GREEN FOUR	BLUE	BLUE
19	PRIM. PED WALK	GREEN FIVE	BLUE	BLUE

LT – LEFT TURN SIGNAL
 DW – DON'T WALK
 PB – PEDESTRIAN PUSHBUTTON
 TT – TRACER TAPE

* YELLOW or BROWN DESIGNATIONS – YELLOW (N/B & S/B) & BROWN (E/B & W/B)



NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. WRAPPING OF CONDUCTORS INSIDE THE HAND HOLE SHALL BE AS FOLLOWS:
 - BLACK TAPE FOR PRIMARY THROUGH SIGNALS, PEDESTRIAN SIGNALS AND PUSHBUTTONS.
 - WHITE TAPE FOR PRIMARY LEFT TURN SIGNALS.
 - RED TAPE FOR SECONDARY THROUGH SIGNALS, PEDESTRIAN SIGNALS AND PUSHBUTTONS.
 - RED & WHITE TAPE FOR SECONDARY LEFT TURN SIGNALS.



6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: 19 CONDUCTOR SIGNAL CABLE
 COLOUR CODING & ASSIGNMENTS

DESIGN: RICHMOND

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER:

DWG. No. SD_19CABLE-CC

SCALE:

SEC. No.

DATE: MARCH 9, 2016

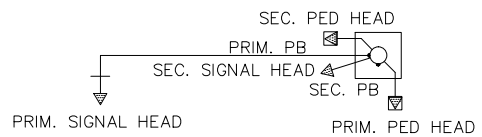
SHT. No. 1 of 1

SUPPLEMENTARY DETAIL DRAWING

COLOUR CODING (MULTICONDUCTOR SIGNAL CABLE)				
25 CONDUCTOR No. 14, CSA SPEC. No.C21.1 CABLE IN CONDUIT				
CONDUCTOR No.	SIGNAL ASSIGNMENT	LETTERING	CONDUCTOR COLOUR	SINGLE CONDUCTOR COLOUR IN POLE
1	NEUTRAL	WHITE ONE	WHITE	WHITE
2	PRIM. PB RETURN	WHITE TWO	WHITE	BLACK
3	PRIM. PB	--	BLACK	BLACK
4	SEC. PB	--	ORANGE	BLACK (RED TT)
5	PRIM. RED	RED ONE	RED	RED
6	SEC. RED	RED TWO	RED	RED
7	SEC. PB RETURN	RED THREE	RED	BLACK (RED TT)
8	PRIM. PED DW	RED FOUR	RED	YELLOW or BROWN
9	SEC. PED DW	RED FIVE	RED	YELLOW or BROWN
10	PRIM. AMBER	AMBER ONE	YELLOW	YELLOW or BROWN
11	SEC. AMBER	AMBER TWO	YELLOW	YELLOW or BROWN
12	PRIM. LT AMBER	AMBER THREE	YELLOW	YELLOW or BROWN
13	SEC. LT AMBER	AMBER FOUR	YELLOW	YELLOW or BROWN
14	SEC. PED WALK	AMBER FIVE	YELLOW	BLUE
15	PRIM. GREEN	GREEN ONE	BLUE	BLUE
16	SEC. GREEN	GREEN TWO	BLUE	BLUE
17	PRIM. LT GREEN	GREEN THREE	BLUE	BLUE
18	SEC. LT GREEN	GREEN FOUR	BLUE	BLUE
19	PRIM. PED WALK	GREEN FIVE	BLUE	BLUE
20	SPARE	RED SIX	RED	--
21	SPARE	RED SEVEN	RED	--
22	SPARE	AMBER SIX	YELLOW	--
23	SPARE	AMBER SEVEN	YELLOW	--
24	SPARE	GREEN SIX	BLUE	--
25	SPARE	GREEN SEVEN	BLUE	--

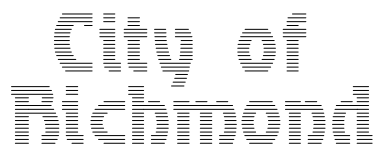
LT – LEFT TURN SIGNAL
 DW – DON'T WALK
 PB – PEDESTRIAN PUSHBUTTON
 TT – TRACER TAPE

* YELLOW or BROWN DESIGNATIONS – YELLOW (N/B & S/B) & BROWN (E/B & W/B)



NOTES

- REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
- WRAPPING OF CONDUCTORS INSIDE THE HAND HOLE SHALL BE AS FOLLOWS:
 - BLACK TAPE FOR PRIMARY THROUGH SIGNALS, PEDESTRIAN SIGNALS AND PUSHBUTTONS.
 - WHITE TAPE FOR PRIMARY LEFT TURN SIGNALS.
 - RED TAPE FOR SECONDARY THROUGH SIGNALS, PEDESTRIAN SIGNALS AND PUSHBUTTONS.
 - RED & WHITE TAPE FOR SECONDARY LEFT TURN SIGNALS.



6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE: 25 CONDUCTOR SIGNAL CABLE
 COLOUR CODING & ASSIGNMENTS

DESIGN: RICHMOND

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER:

DWG. No. SD_25CABLE-CC

SCALE:

SEC. No.

DATE: MARCH 9, 2016

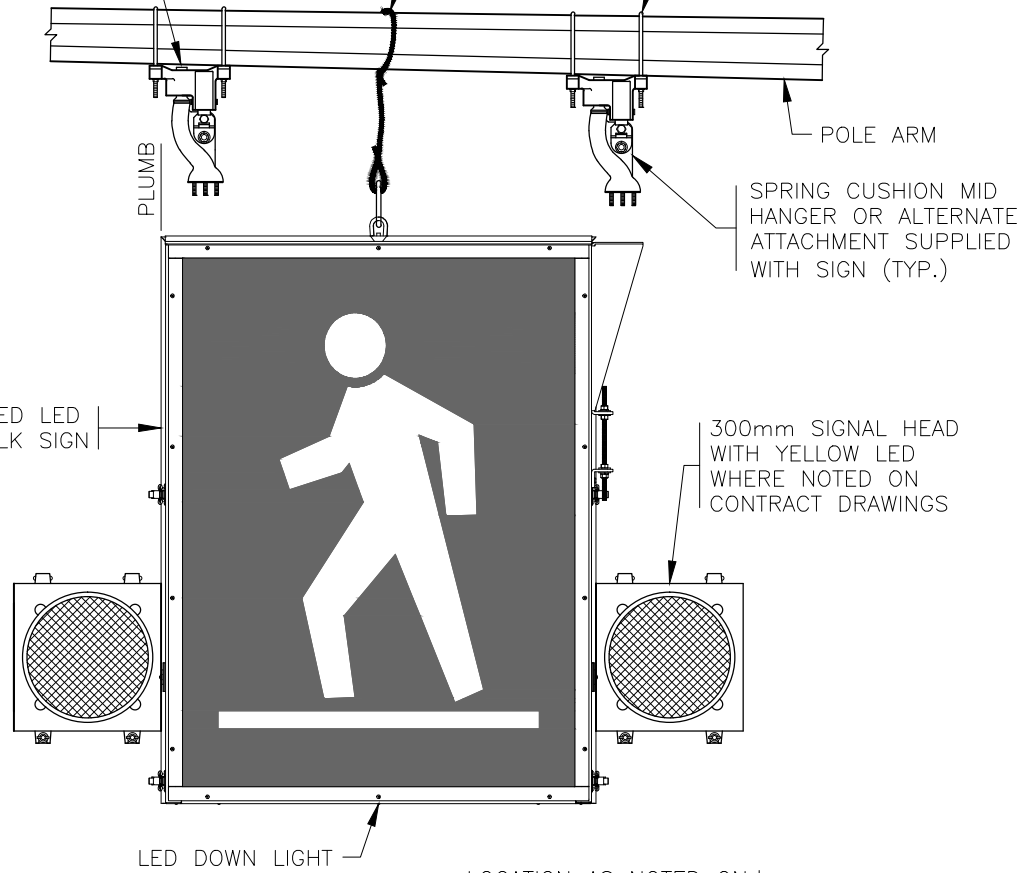
SHT. No. 1 of 1

SUPPLEMENTARY DETAIL DRAWING

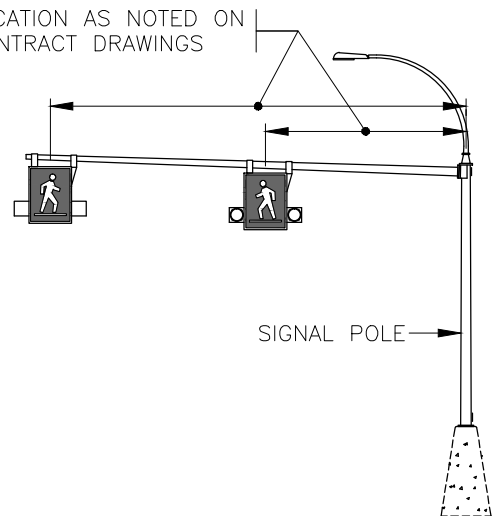
DRILL 18Ø HOLE FOR WIREWAY.
COAT HOLE WITH COLD GALVANIZING COMPOUND.

SAFETY CABLE (WRAP AROUND ARM AND ATTACH SNAP HOOK)

STANDARD U-BOLT FOR SPRING CUSION HANGER HAS 145mm I.D.

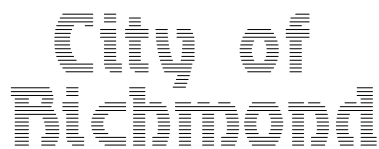


LOCATION AS NOTED ON CONTRACT DRAWINGS



NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



TITLE: INTERNALLY ILLUMINATED PEDESTRIAN CROSSWALK SIGN

DESIGN: MMCD (E5.15)

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER:

DWG. No. SD_ILL_PED_XWALK

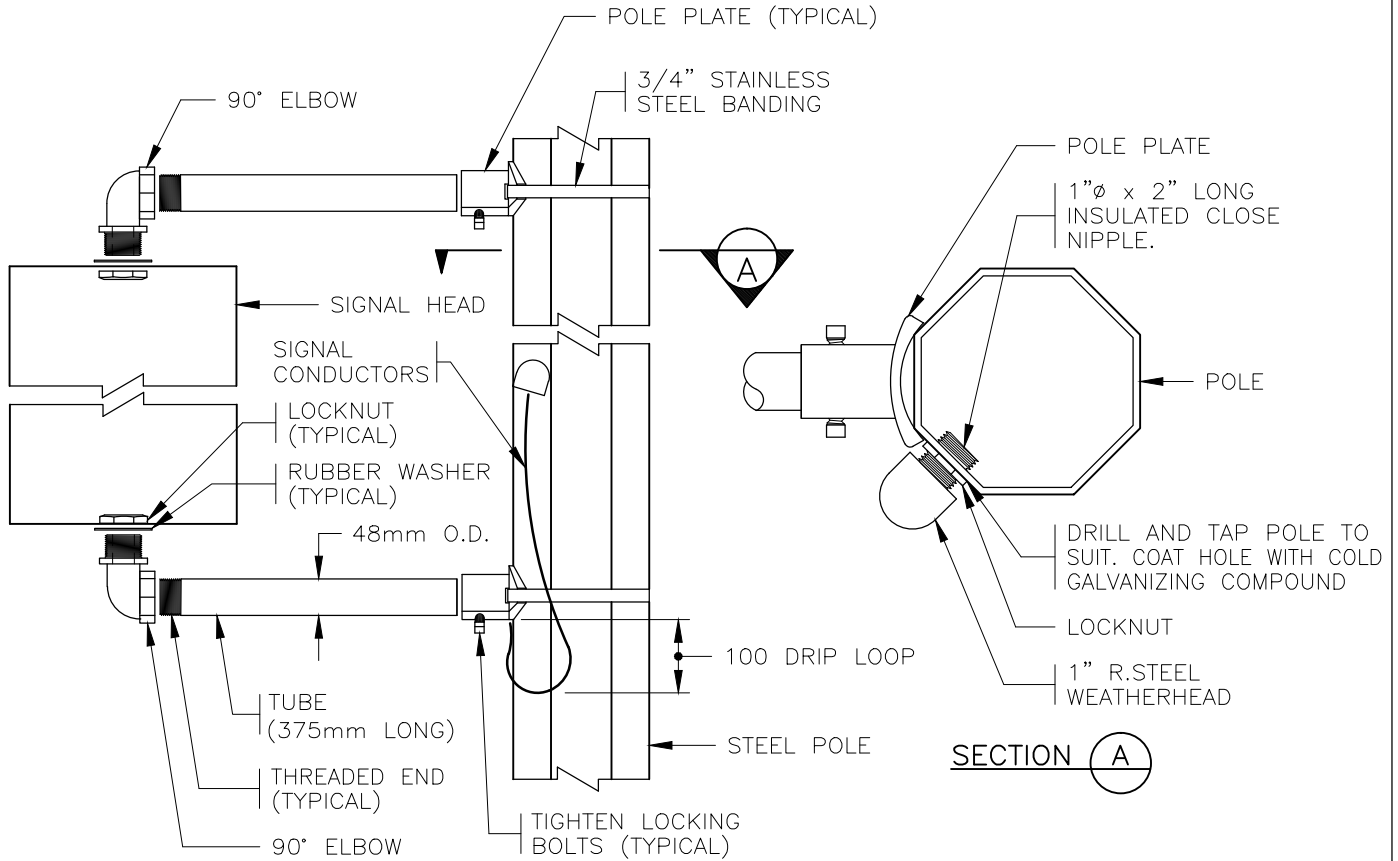
SCALE: N.T.S.

SEC. No.

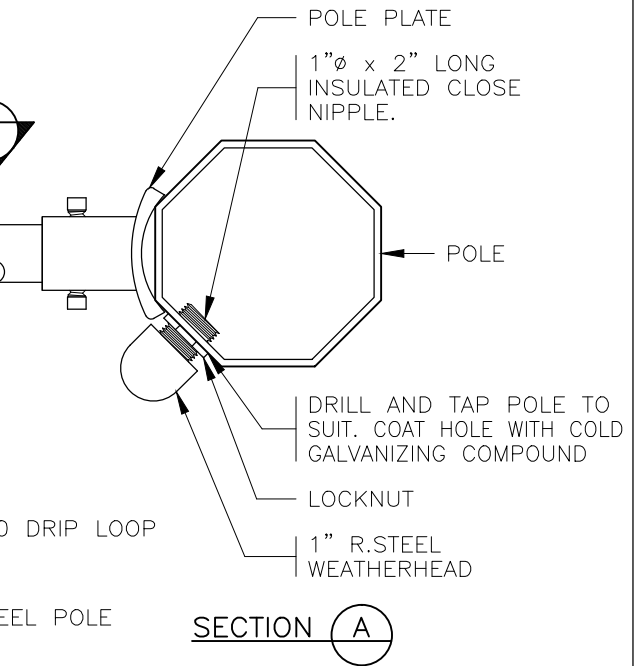
DATE: MARCH 9, 2016

SHT. No. 1 OF 1

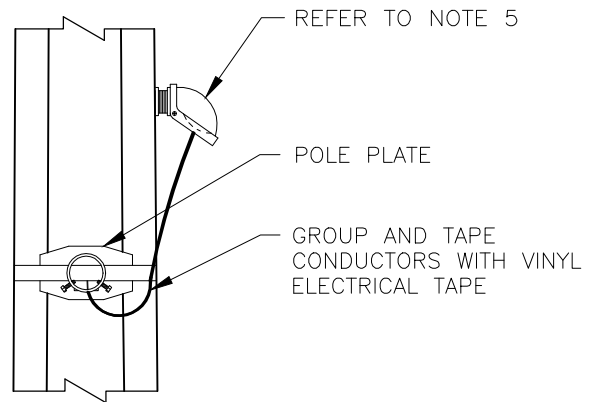
SUPPLEMENTARY DETAIL DRAWING



ELEVATION



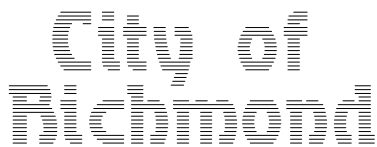
SECTION A



ENTRANCE CAP WIRING DETAIL

NOTES

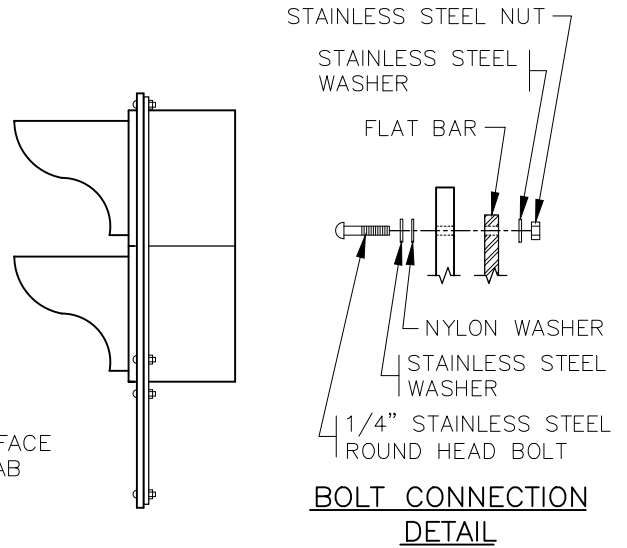
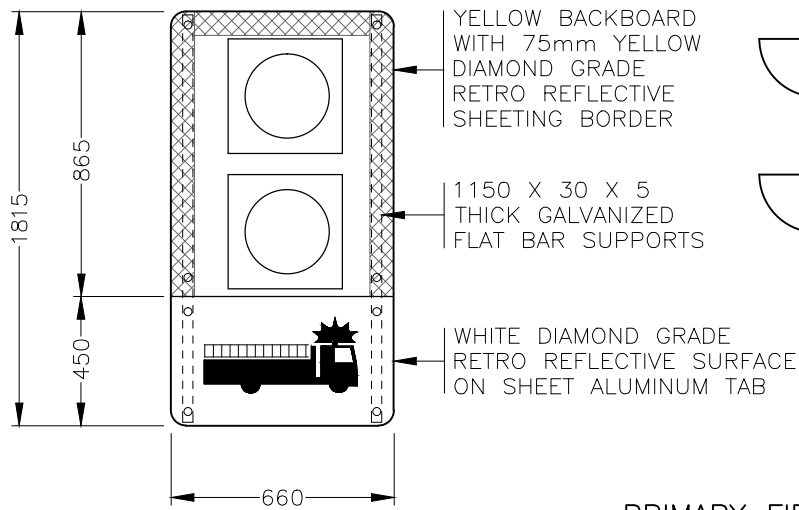
1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. AIM SIGNAL HEADS AS DIRECTED BY CONTRACT ADMINISTRATOR.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. ALL SIGNAL MOUNTING HARDWARE SHALL BE BLACK ALUMINUM.
5. LOCATE WEATHERHEAD ON BACK SIDE OF POLE (OPPOSITE SIDE OF SIGNAL ARM) AND 3.35m FROM BASE PLATE. FOR TERTIARY HEAD MOUNTED JUST BELOW SIGNAL ARM FLANGE, LOCATE WEATHERHEAD 5.5m FROM BASE PLATE.



6911 No. 3 Road Richmond B.C. V6Y 2C1

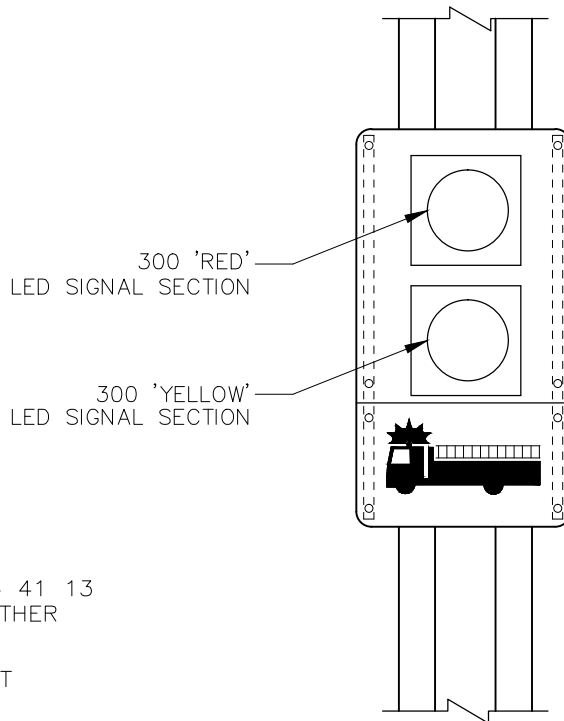
TITLE: SIDE OF POLE SIGNAL HEAD MOUNTING	
DESIGN: RICHMOND	DWG. No. SD_SIG_HEAD_MTG
DRAWN: R.F.	SCALE: N.T.S.
CHECKED: D.J.W.	DATE: MARCH 9, 2016
ENGINEER:	SEC. No. SHT. No. 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



PRIMARY FIRE SIGNAL HEAD MOUNTING

SUPPLEMENTARY TAB SIGN
(ID-22SR OR ID-22SL) AS PER MUTCD



**SECONDARY FIRE
SIGNAL HEAD MOUNTING**

NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. AIM SIGNAL HEADS AS DIRECTED BY CONTRACT ADMINISTRATOR.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. ALL SIGNAL MOUNTING HARDWARE SHALL BE BLACK ALUMINUM.

**City of
Richmond**

6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE:

FIRE SIGNAL
HEAD MOUNTING

DESIGN: CITY OF SURREY

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER:

DWG. No. SD_FIRE_SIG_HEAD_MTG

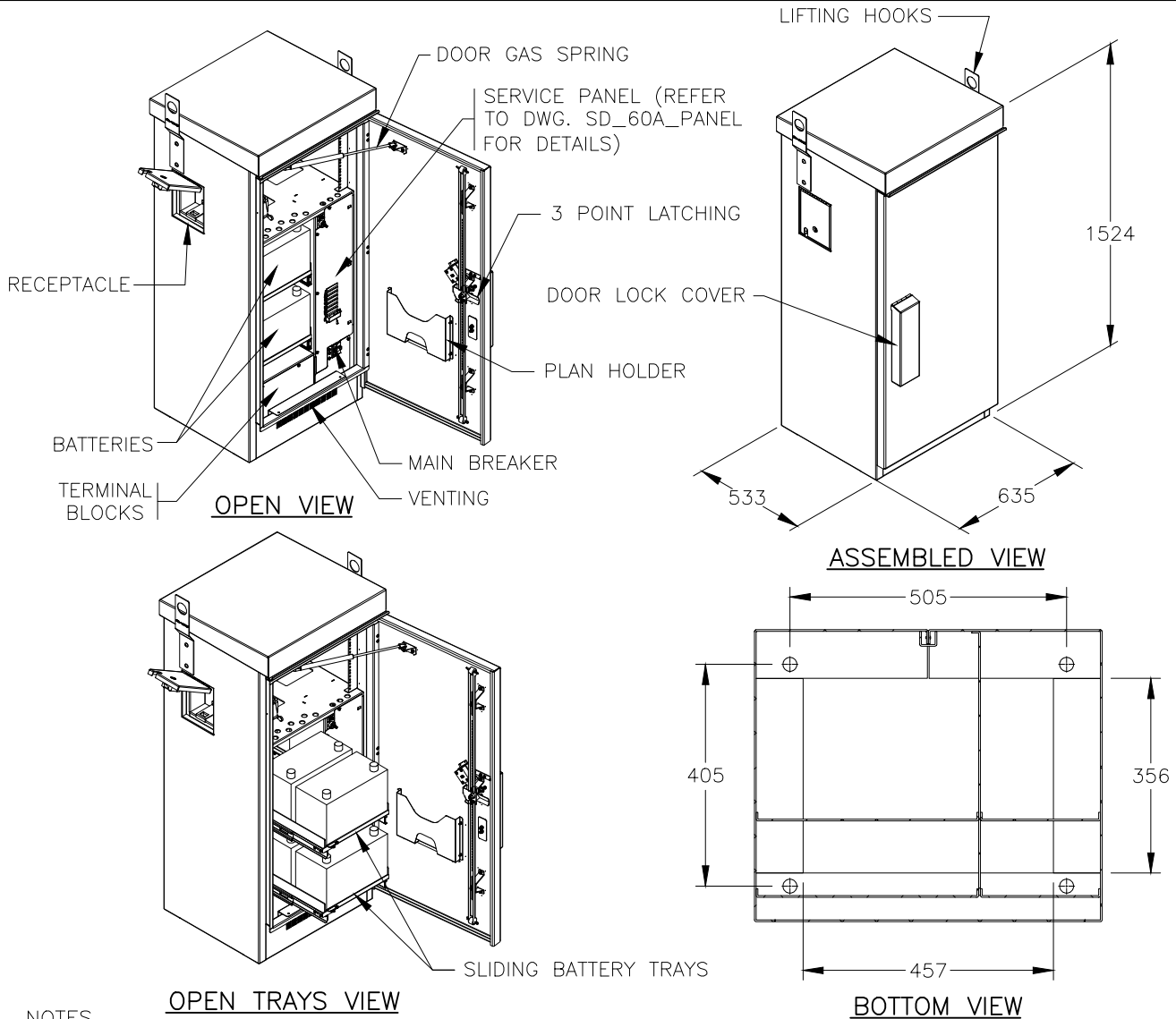
SCALE: N.T.S.

SEC. No.

DATE: MARCH 9, 2016

SHT. No. 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



NOTES

1. REFER TO CONTRACT DRAWINGS, SECTION 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. CABINET SHALL BE NEMA 3R RATED AND MANUFACTURED FROM 3/8" 5052-H2 ALUMINUM.
4. DOOR SHALL INCLUDE 3 POINT LATCHING SYSTEM, HANDLE AND PADLOCK WITH TAMPER PROOF SHROUD AND GAS SPRING AND CORBIN LOCK.
5. CABINET SHALL BE POWDER COATED PC101 GREY. INTERIOR PANELS AND BARRIER SHALL BE 16 GAUGE GALVANIZED STEEL.
6. 19" RACK MOUNT WITH SUITABLE MOUNTING SPACE AND DUAL SLIDING BATTERY TRAYS, FLUSH MOUNTED GENERATOR COMPARTMENT WITH CORBIN LOCK AND CORD CUTOUT IN FLIP-UP LID.
7. 30A, 3W 120V, L5-30 FLANGED INLET GENERATOR RECEPTACLE.
8. FLUSH MOUNTED PHOTOCCELL INSTALLED IN RIGHT SIDE OF ROOF.
9. 4" FAN WITH SNAP SWITCH AND LED LIGHTS (DOOR SWITCH CONTROLLED) INSTALLED IN CEILING PANEL.



6911 No. 3 Road Richmond B.C. V6Y 2C1

TITLE:

UPS & SERVICE CABINET

DESIGN: VALID

DRAWN: R.F.

CHECKED: D.J.M.

ENGINEER:

DWG. No. SD_UPS_CABINET

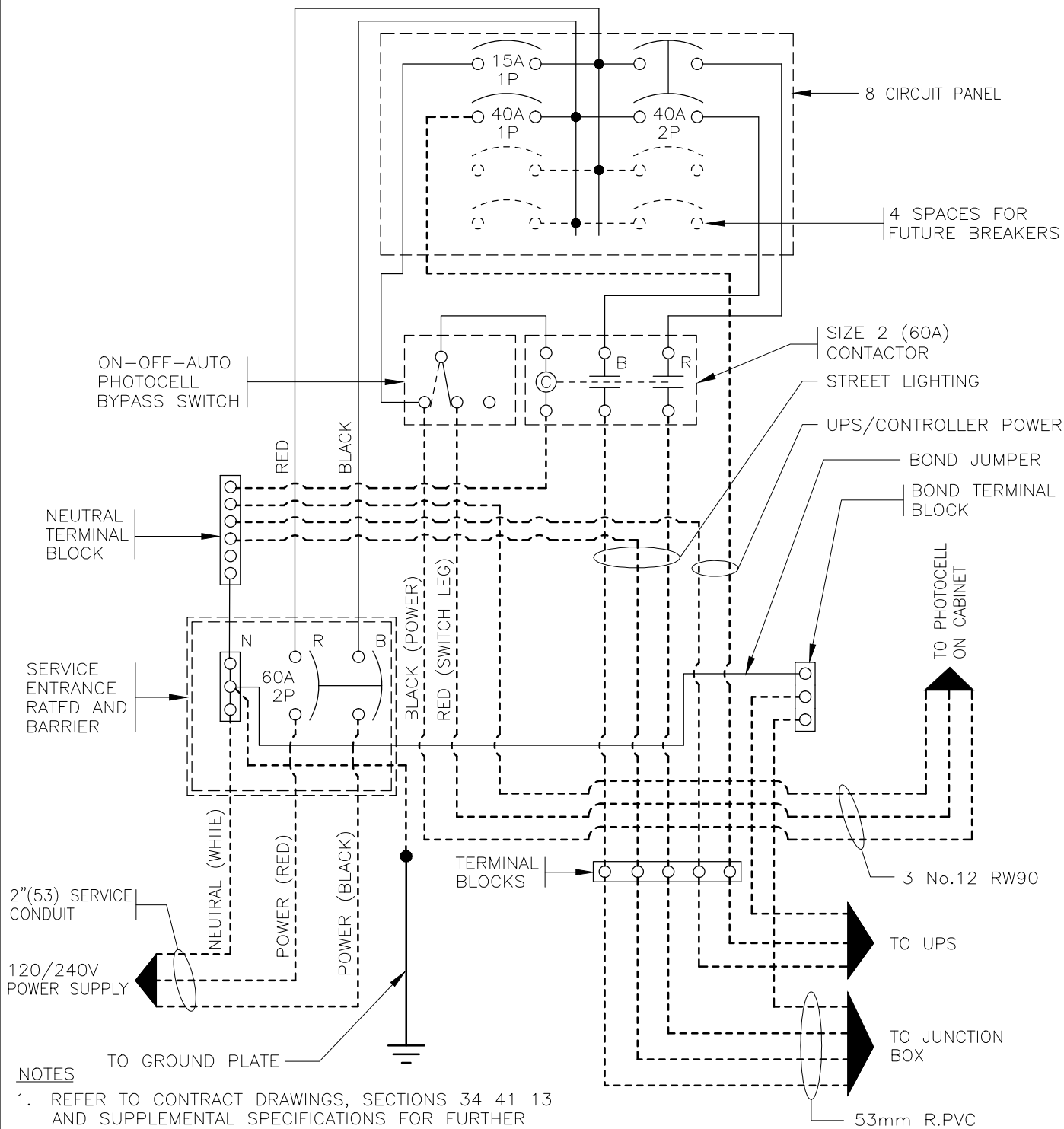
SCALE: N.T.S.

SEC. No.

DATE: MARCH 9, 2016

SHT. No. 1 OF 1

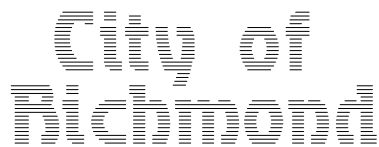
SUPPLEMENTARY DETAIL DRAWING



NOTES

1. REFER TO CONTRACT DRAWINGS, SECTIONS 34 41 13 AND SUPPLEMENTAL SPECIFICATIONS FOR FURTHER REQUIREMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

----- FIELD WIRING



TITLE: 60A (120/240V) TRAFFIC SIGNAL/STREET LIGHTING SERVICE PANEL WIRING DIAGRAM

DESIGN: D.S.M.

DRAWN: R.F.

CHECKED: D.J.W.

ENGINEER:

DWG. No. SD_60A_PANEL

SCALE: N.T.S.

SEC. No.

DATE: MARCH 9, 2016

SHT. No. 1 OF 1

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SCHEDULE E

SCHEDULE E

SCHEDULE E

SUPPLEMENTARY DETAIL DRAWINGS FOR ROADWAY LIGHTING

- The following Standard Detail Drawings in the Master Municipal Construction Documents are deleted and replaced by the listed Supplementary Detail Drawings.
- Minor changes to MMCD Standard Detail Drawings are identified by highlighting the changes and re-produced as Richmond’s Supplementary Detail Drawings.
- More significant changes or additional details are presented as additional Supplementary Detail Drawings, which are also listed below:

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT / ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Drawing No.	Drawing Title	Drawing No.	Drawing Title
CE1.1	Concrete Base Index		
CE1.2	Type A and B Sonotube Concrete Bases		
CE1.3	Type C, C1, C2 & C3 Trapezoidal Shape Concrete Bases		
CE1.4	Type C, C1, C2 & C3 Trapezoidal Shape Concrete Bases		
CE1.5	Type C4 & C5 Spread Footing Shape Concrete Bases		
CE1.6	Type C4 & C5 Spread Footing Concrete Bases		
CE1.7	Type C4 & C5 Spread Footing Concrete Bases		
CE1.8	Type E2 Trapezoidal Shape Concrete Base		
CE1.9	Type E2 Trapezoidal Shape Concrete Base		
CE1.10	Types F1, L1 & 1 Spread Footing Shape Concrete Bases		
CE1.11	Types F1, L1 & 1 Spread Footing Shape Concrete Bases		

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT / ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Drawing No.	Drawing Title	Drawing No.	Drawing Title
CE1.12	Types F1, L1 & 1 Spread Footing Shape Concrete Bases		
CE1.13	Types F2, L2 & S2 Trapezoidal Shape Concrete Bases		
CE1.14	Types F2, L2 & S2 Trapezoidal Shape Concrete Bases		
CE1.15	1" \varnothing Anchor Bolts		
CE1.16	Anchor Bolt Cage for Types 6, 7 and S Poles		
CE1.17	Anchor Bolt Cage for Types L Poles		
CE1.18	Concrete Base for Post Mounted Flasher Luminaire (Precast)		
CE1.19	Pole Base Installation Details		
CE1.20	Pole Base Installation Details		
		L0.1	Concrete Base Index
		L1.1	Type P1 and P6 Pedestal Concrete Base
		L1.2	Type P2 Service Pedestal Concrete Base
		L1.3	Type P3, P5 and P8 Pedestal Concrete Base
		L1.4	Type P4 Pedestal Concrete Base
		L1.5	Type P7 Pedestal Concrete Base
		L2.1	Type S1, S2, S7 and S8 Sonotube Concrete Base
		L2.2	Type S3 and S9 Sonotube

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT / ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Drawing No.	Drawing Title	Drawing No.	Drawing Title
			Concrete Base
		L2.3	Type S4 Sonotube Concrete Base
		L2.4	Type S5 Sonotube Concrete Base
		L2.5	Type S6 Service Sonotube Concrete Base
		L3.1	Type 1, 2 and 3 Anchor Bolts
		L3.2	Concrete Base Irrigation Conduit
		L4.1	Type S Service Kiosk Concrete Base
		L4.2	Type M Service Kiosk Concrete Base
		L5.1	Service Panel - Pole Mounted
		L5.2	Service Base Mounted Service Panel 120/240 Volt
		L5.3	Service Base Mounted Service Panel 347/600 Volt 3Ø
		L5.4	Service Pole Mounted Service Panel 120/240 Volt
		L5.5	Service Pole Mounted Service Panel 347/600 Volt 3Ø
		L5.6	Service Panel Wiring Diagram 120/240 Volt (For Standard Lighting)
		L5.7	Service Panel Wiring Diagram 347/600 Volt 3Ø (For Standard Lighting)
		L5.8	Service Panel in Service Base
		L5.9	Pole Mounted Service Panel on Electrical Utility Pole

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT / ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Drawing No.	Drawing Title	Drawing No.	Drawing Title
		L6.1	Type S Service Kiosk (For Decorative Lighting)
		L6.2	Type S Service Kiosk and Installation Detail (For Decorative Lighting)
		L6.3	Type M Service Kiosk (For City Centre Lighting and Tree Receptacles)
		L6.4	Type M Service Kiosk and Installation Detail (For City Centre Lighting and Tree Receptacles)
		L6.5	Service Kiosk Single Line Diagram 120/240 Volt (For City Centre Lighting)
		L6.6	Service Kiosk Single Line Diagram 120/240 Volt (For Tree Receptacles)
		L6.7	Service Kiosk Wiring Diagram 120/240 Volt (For Decorative Lighting)
		L7.1	120/240 Volt Pole Handhole Wiring Detail
		L7.2	120/240 Volt Pole Handhole Wiring Detail (For City Centre Lighting Only)
		L7.3	347/600 Volt 3Ø Pole Handhole Wiring Detail
		L7.4	240 Volt Pole Handhole Wiring Detail (For Extension of Existing Systems Only)
		L7.5	240/480 Volt Pole Handhole Wiring Detail (For Extension of Existing Systems Only)

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT / ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Drawing No.	Drawing Title	Drawing No.	Drawing Title
		L7.6	Conductor Colour Code
		L8.1	Street Light Wiring Inside Concrete Junction Box
		L8.2	Tree Receptacle Wiring Inside Concrete Junction Box
		L9.1	Tree Receptacle Installation Detail
		L9.2	Junction Box Installation Details
		L9.3	Conduit Bury Detail
		L10.1	Underground Conduit in Paved Areas
		L10.2	Underground Conduit in Non-Paved Areas
		L11.1	7.62m Davit Luminaire Poles
		L11.2	9.14m Davit Luminaire Poles
		L11.3	13.72m Davit Luminaire Poles
		L11.4	Post Top Luminaire Poles
		L11.5	Pathway and Laneway Side Mounted Luminaire Poles
		L12.1	City Centre Type Laneway Luminaire Pole
		L12.2	City Centre Type Pedestrian Luminaire Pole
		L12.3	City Centre Type Roadway/Pedestrian Luminaire Pole
		L12.4	Steveston Type Luminaire Pole
		L12.5	Type 1 and 2 Decorative Luminaire Poles

DELETED STANDARD DETAIL DRAWINGS		REPLACEMENT / ADDITIONAL SUPPLEMENTARY DETAIL DRAWINGS	
Drawing No.	Drawing Title	Drawing No.	Drawing Title
		L12.6	Type 3 Decorative Luminaire Pole
		L12.7	Type 4 Decorative Luminaire Pole
		L12.8	Type 5 Decorative Luminaire Pole
		L12.9	Type 6 Decorative Luminaire Pole
		L12.10	Type 7 Decorative Luminaire Pole
		L12.11	Type 8 Decorative Pedestrian Luminaire Pole
		L13.1	Service Base
		L13.2	Pole Handhole and Cover Detail
		L13.3	Pole and Concrete Base Installation Details – 1
		L13.4	Pole and Concrete Base Installation Details – 2
		L13.5	Pole and Concrete Base Installation Details – 3
		L14.1	Underground Dip Service Connection Details
		L14.2	Minimum Clearances to Overhead Powerlines

ROADWAY LIGHTING DRAWINGS

ROADWAY LIGHTING DRAWINGS

CONCRETE BASE INDEX		
TYPE	DRAWING	POLE TYPES
P1	L1.1	7.62m & 9.14m DAVIT LUMINAIRE POLES
P2	L1.2	SERVICE BASE
P3	L1.3	CITY CENTRE TYPE ROADWAY/PEDESTRIAN LUMINAIRE POLES
P4	L1.4	13.72m DAVIT LUMINAIRE POLES
P5	L1.3	8.55m TYPE 3 DECORATIVE LUMINAIRE POLE
P6	L1.1	7.33m TYPE 4 DECORATIVE LUMINAIRE POLE
P7	L1.5	5.27m TYPE 6 DECORATIVE LUMINAIRE POLE
P8	L1.3	9.14m TYPE 7 DECORATIVE LUMINAIRE POLE
S1	L2.1	4.57m PATHWAY & 5.79m LANEWAY SIDE MOUNTED LUMINAIRE POLES & 4.57m & 6.09m POST TOP LUMINAIRE POLES
S2	L2.1	4.88m STEVESTON TYPE LUMINAIRE POLE
S3	L2.2	CITY CENTRE TYPE PEDESTRIAN LUMINAIRE POLES & LANEWAY LUMINAIRE POLES
S4	L2.3	4.57m TYPE 1 AND TYPE 2 DECORATIVE LUMINAIRE POLES
S5	L2.4	7.62m & 9.14m DAVIT LUMINAIRE POLES (FOR USE BY PERMISSION OF THE CITY OF RICHMOND ONLY)
S6	L2.5	SERVICE BASE (FOR USE BY PERMISSION OF THE CITY OF RICHMOND ONLY)
S7	L2.1	4.57m TYPE 1 DECORATIVE LUMINAIRE POLE
S8	L2.1	4.82m TYPE 5 DECORATIVE LUMINAIRE POLE
S9	L2.2	4.70m TYPE 8 DECORATIVE LUMINAIRE POLE

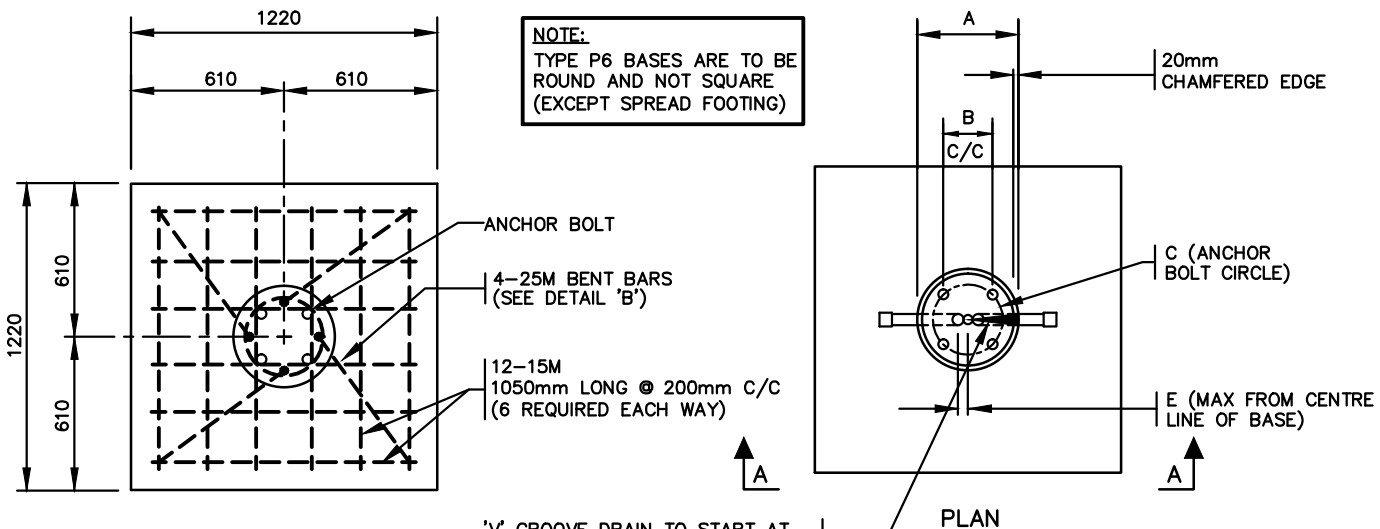
NOTES

1. REFER TO CONTRACT DRAWINGS AND SCHEDULE 'E' FOR DETAILED SPECIFICATIONS.

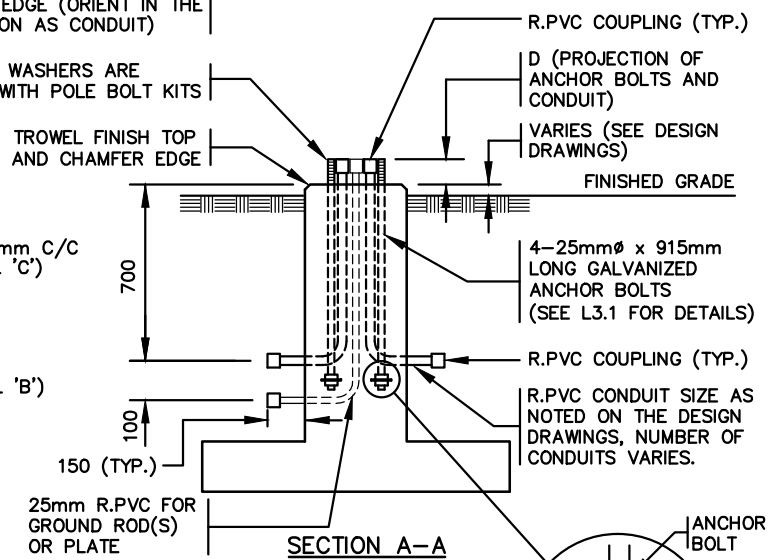
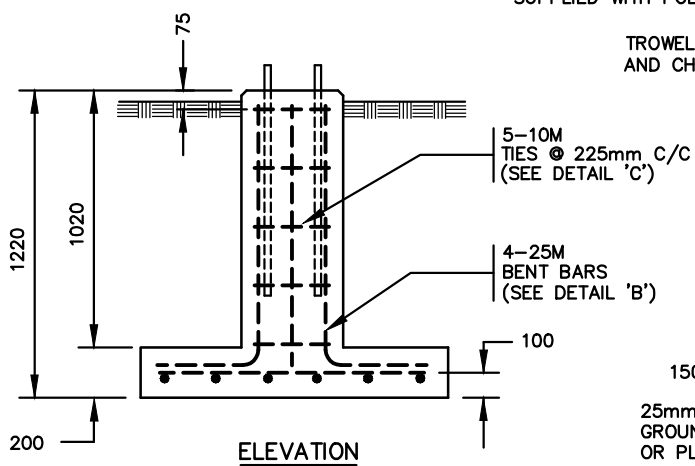


CONCRETE BASE INDEX

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L0.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JUNE/03	SHEET No. : 1 OF 1

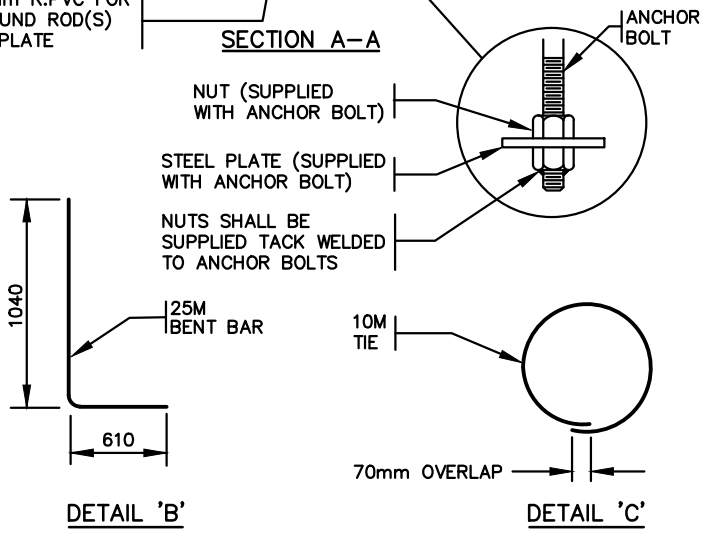


'V' GROOVE DRAIN TO START AT ZERO DEPTH AND WIDTH IN THE CENTRE OF THE BASE AND EXTEND TO A 10mm DEPTH AND WIDTH AT THE OUTSIDE EDGE (ORIENT IN THE SAME DIRECTION AS CONDUIT)



BASE TYPE	POLE TYPE	A	B	C	D	E
P1	7.62m AND 9.14m DAVIT LUMINAIRE POLE	400	197	279	100	40
P6	7.33m TYPE 4 DECORATIVE LUMINAIRE POLE	510	197	279	100	40

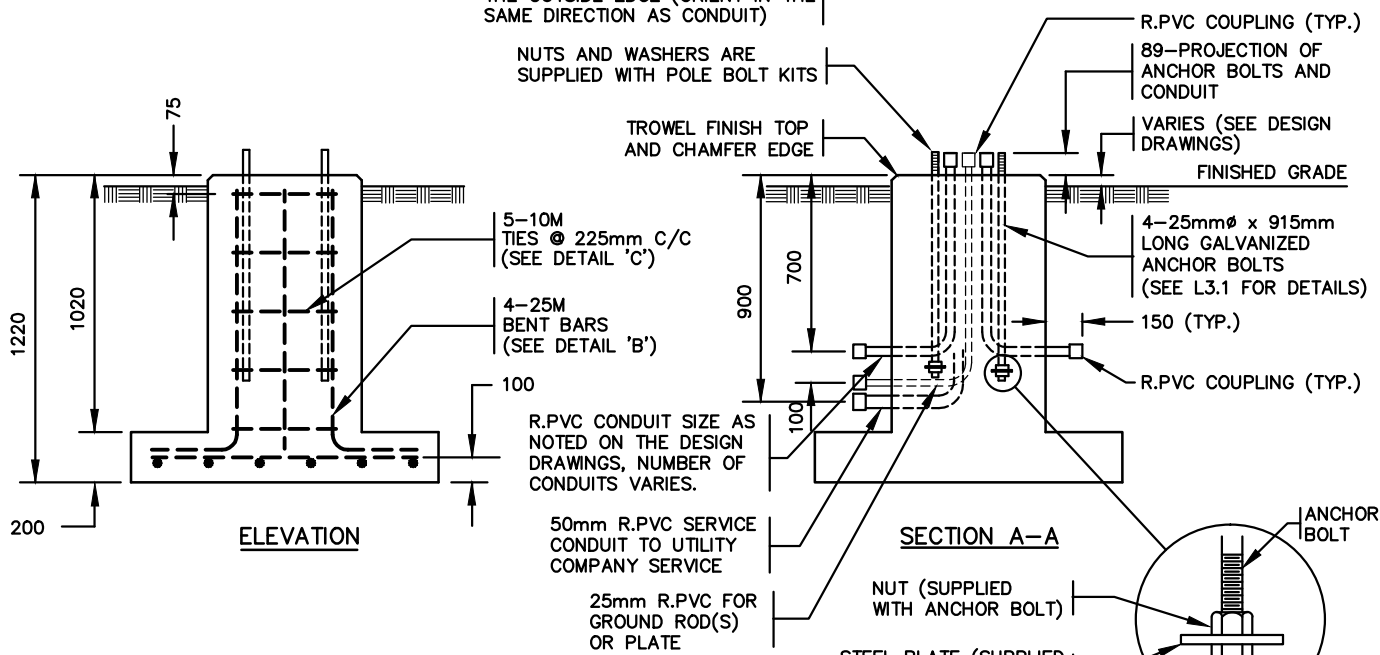
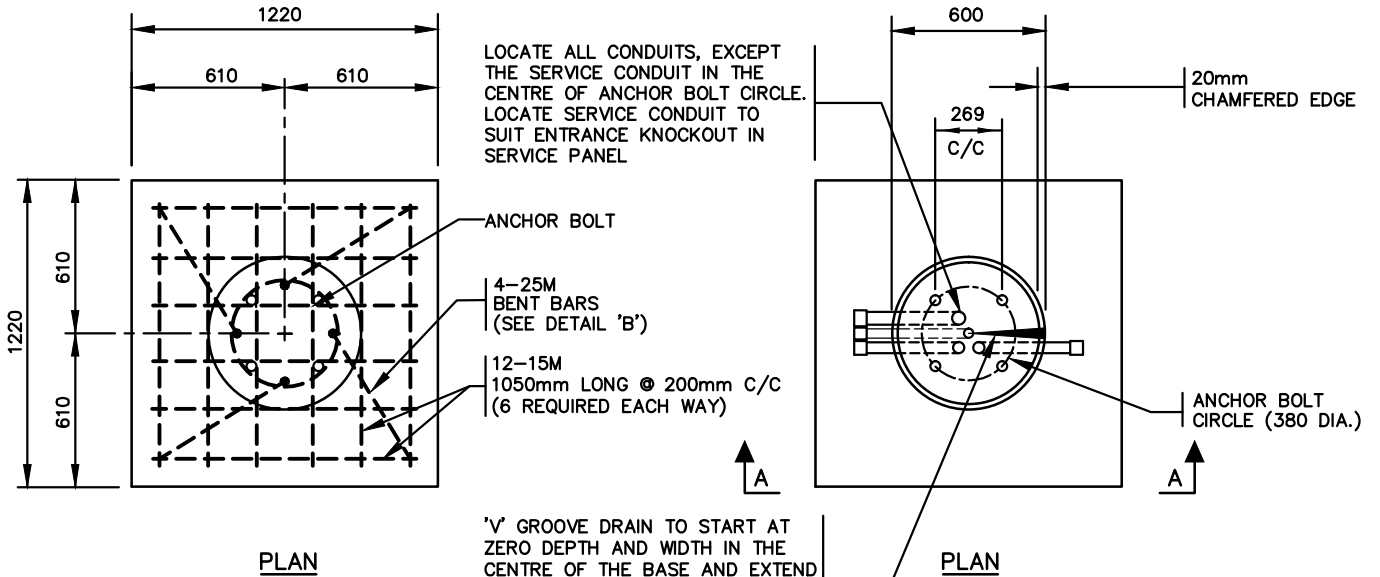
- NOTES**
- REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
 - ALL HARDWARE SHALL BE GALVANIZED.
 - APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
 - CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
 - YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MPa.
 - REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
 - ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



TYPE P1 AND P6 PEDESTAL CONCRETE BASE

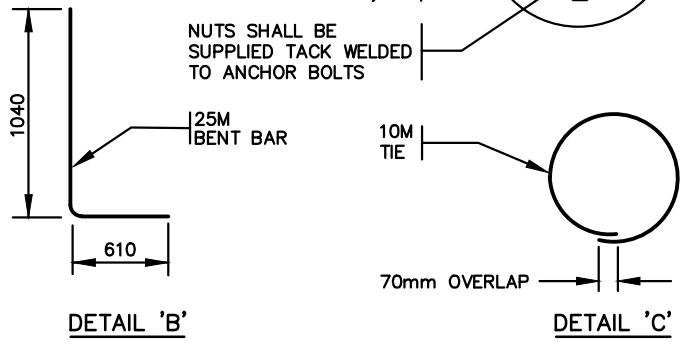


TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L1.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL HARDWARE SHALL BE GALVANIZED.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
5. YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MPa.
6. REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



TYPE P2 SERVICE PEDESTAL
CONCRETE BASE



TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L1.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1

25mm R.PVC IRRIGATION CONDUIT, CONFIRM ORIENTATION WITH LANDSCAPE CONTRACTOR (SEE NOTE 8)

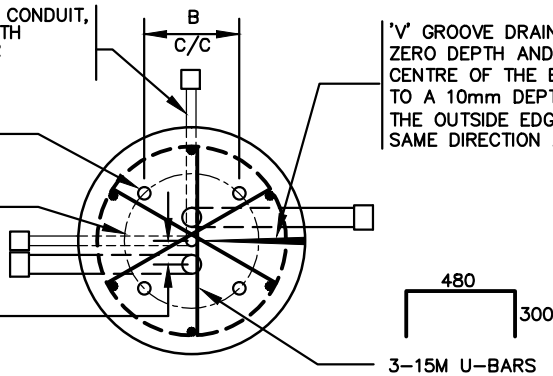
GALVANIZED ANCHOR BOLTS 32 ϕ x 1220 LONG, 4 REQ'D.

C (ANCHOR BOLT CIRCLE)

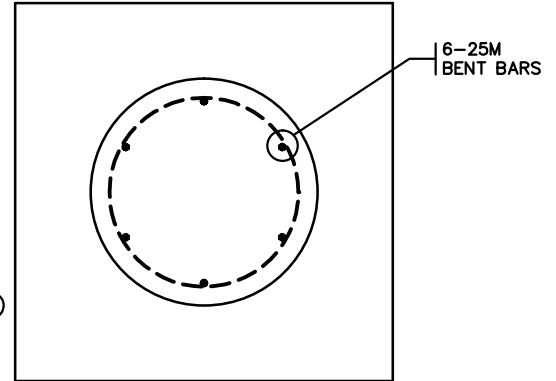
E (MAX FROM CENTRE LINE OF BASE)

'V' GROOVE DRAIN TO START AT ZERO DEPTH AND WIDTH IN THE CENTRE OF THE BASE AND EXTEND TO A 10mm DEPTH AND WIDTH AT THE OUTSIDE EDGE (ORIENT IN THE SAME DIRECTION AS CONDUIT)

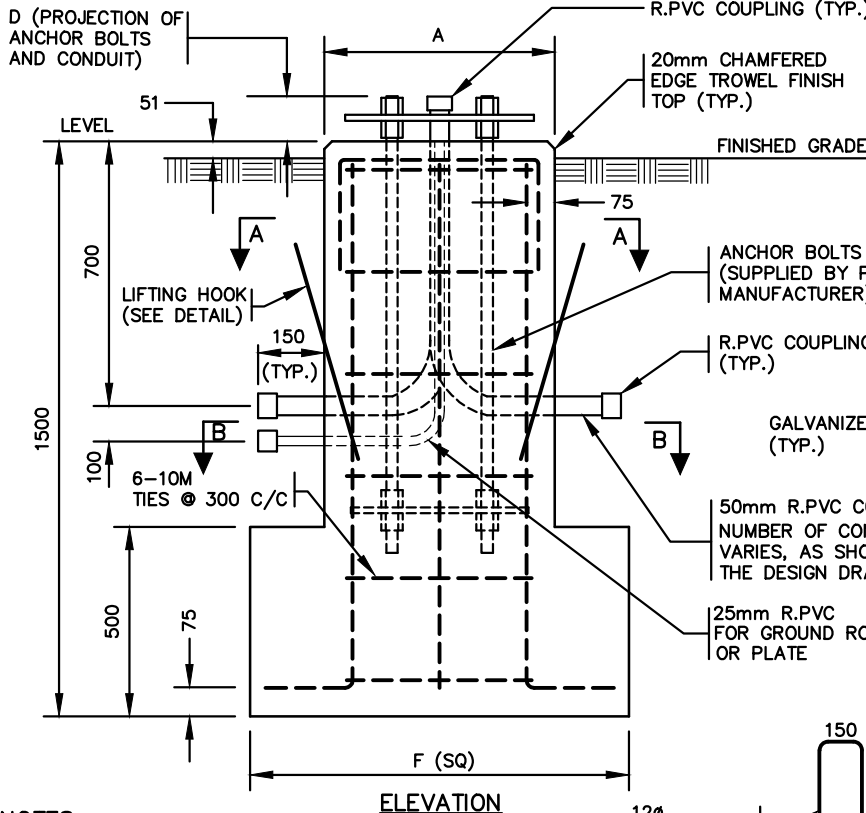
NOTE:
BASES ARE TO BE ROUND AND NOT SQUARE (EXCEPT SPREAD FOOTING)



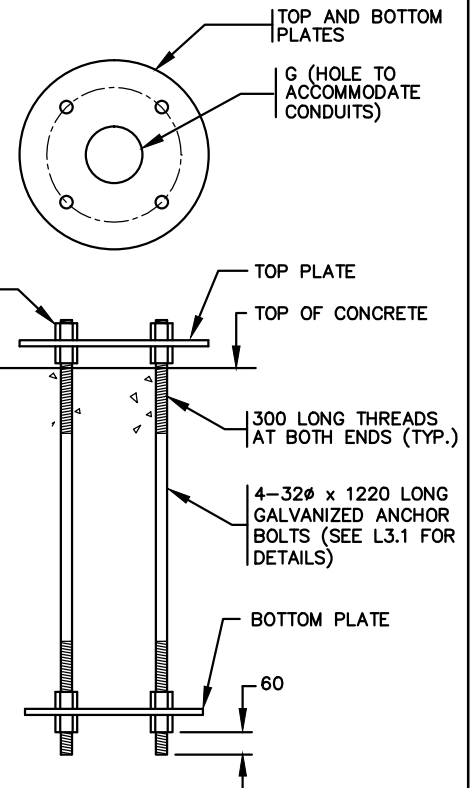
SECTION A-A



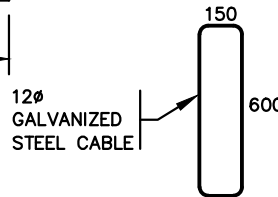
SECTION B-B



ELEVATION



ANCHOR BOLT CAGE DETAIL



LIFTING HOOK DETAIL

NOTES

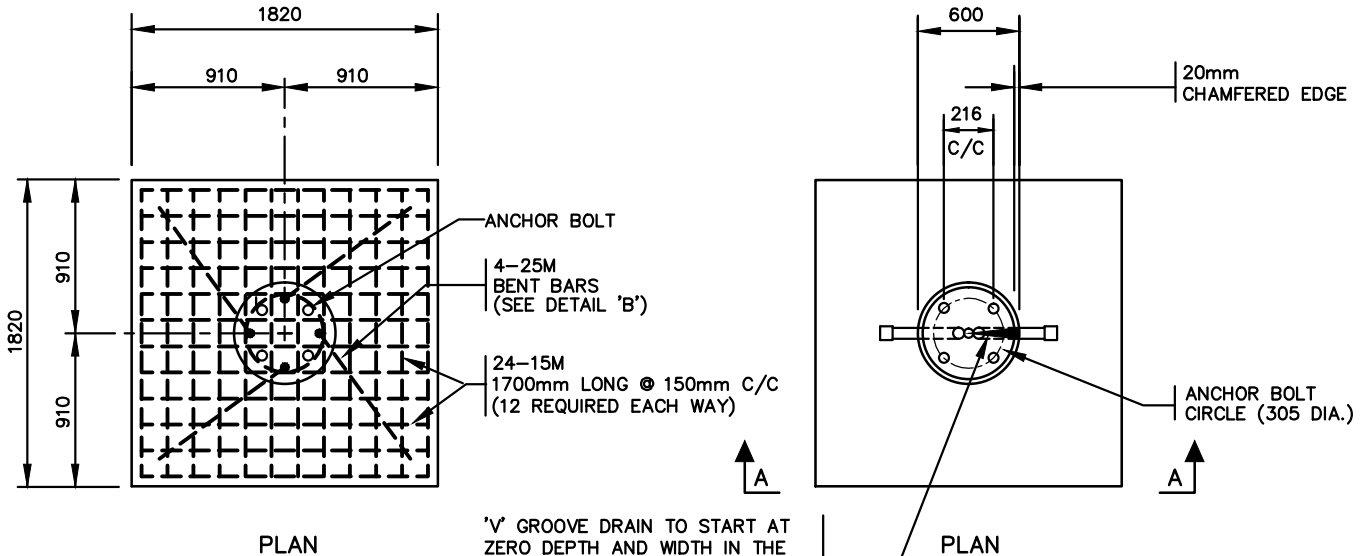
- REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
- ALL HARDWARE SHALL BE GALVANIZED.
- APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
- CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
- YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MPa.
- REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

BASE TYPE	POLE TYPE	A	B	C	D	E	F	G
P3	CITY CENTRE TYPE ROADWAY AND PEDESTRIAN LUMINAIRE POLE	600	252	356	120	40	1000	150
P5	8.55m TYPE 3 DECORATIVE LUMINAIRE POLE	530	206	292	120	40	1000	150
P8	9.14m TYPE 7 DECORATIVE LUMINAIRE POLE	600	206	292	120	40	1200	219

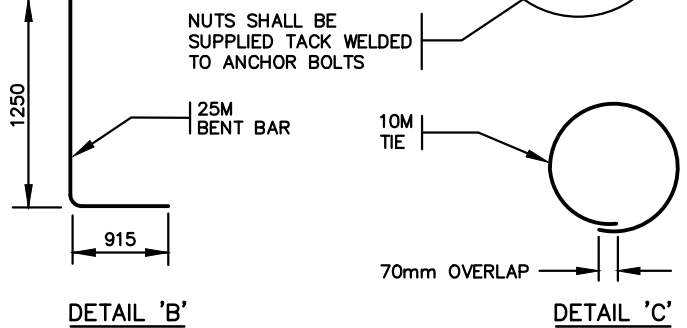
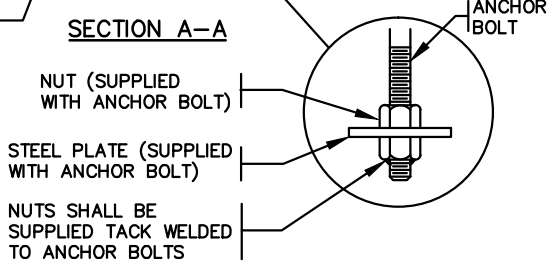
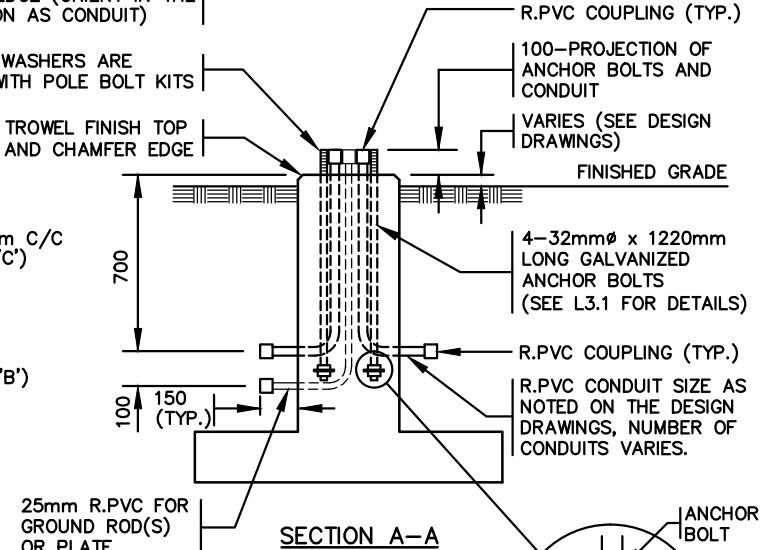
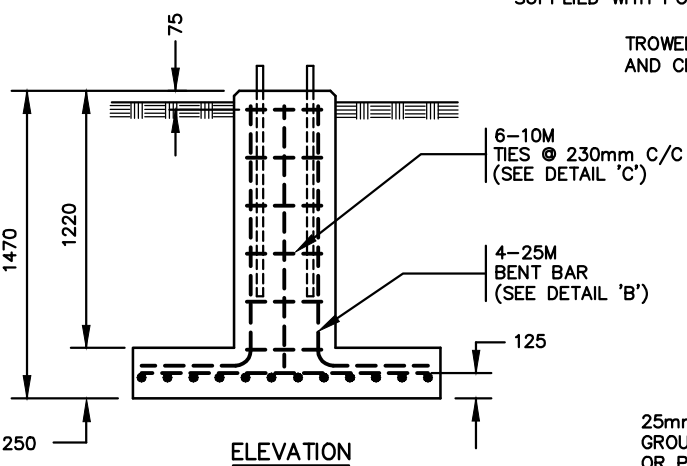


TYPE P3, P5 AND P8 PEDESTAL CONCRETE BASE

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L1.3
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



'V' GROOVE DRAIN TO START AT ZERO DEPTH AND WIDTH IN THE CENTRE OF THE BASE AND EXTEND TO A 10mm DEPTH AND WIDTH AT THE OUTSIDE EDGE (ORIENT IN THE SAME DIRECTION AS CONDUIT)



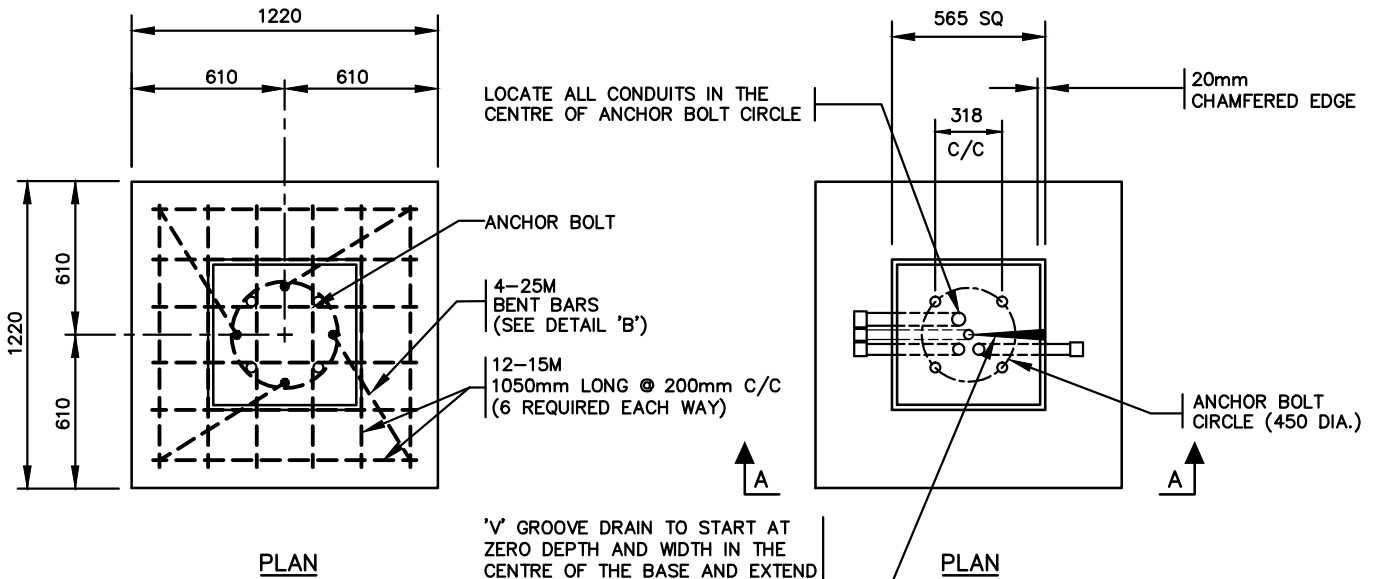
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL HARDWARE SHALL BE GALVANIZED.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
5. YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MPa.
6. REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

**TYPE P4 PEDESTAL
CONCRETE BASE**

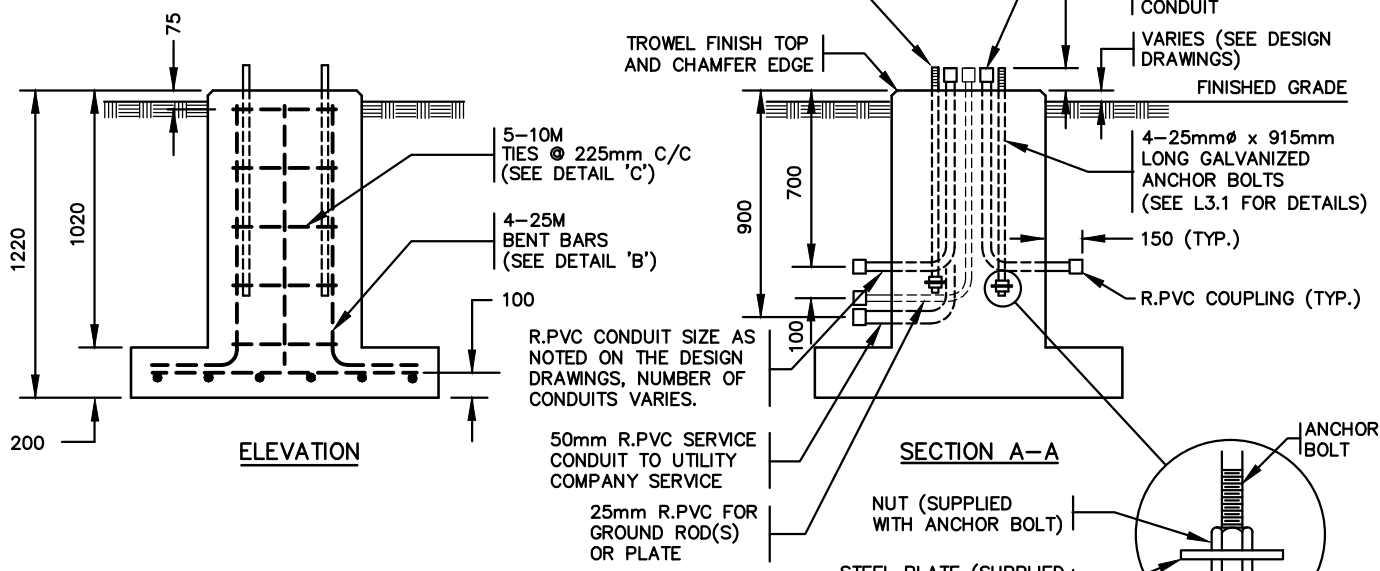


TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L1.4
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



NOTE:
BASES ARE TO BE SQUARE AND NOT ROUND

'V' GROOVE DRAIN TO START AT ZERO DEPTH AND WIDTH IN THE CENTRE OF THE BASE AND EXTEND TO A 10mm DEPTH AND WIDTH AT THE OUTSIDE EDGE (ORIENT IN THE SAME DIRECTION AS CONDUIT)



NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL HARDWARE SHALL BE GALVANIZED.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
5. YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MPa.
6. REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

**TYPE P7 PEDESTAL
CONCRETE BASE**

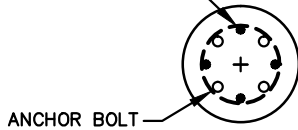


TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L1.5
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1

NOTE:
TYPE S2, S7 AND S8
BASES ARE TO BE ROUND
AND NOT SQUARE

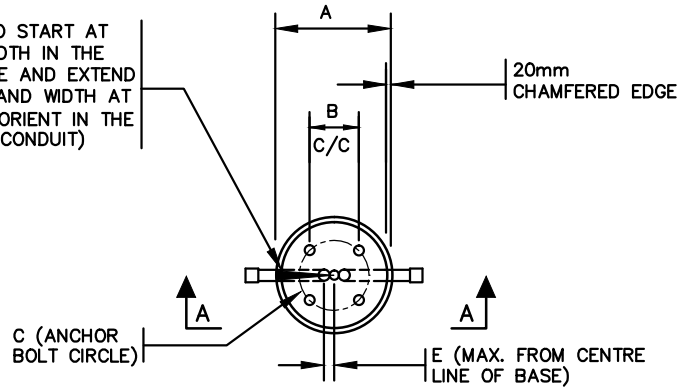
'V' GROOVE DRAIN TO START AT
ZERO DEPTH AND WIDTH IN THE
CENTRE OF THE BASE AND EXTEND
TO A 10mm DEPTH AND WIDTH AT
THE OUTSIDE EDGE (ORIENT IN THE
SAME DIRECTION AS CONDUIT)

4-25M
1070mm LONG BARS



ANCHOR BOLT

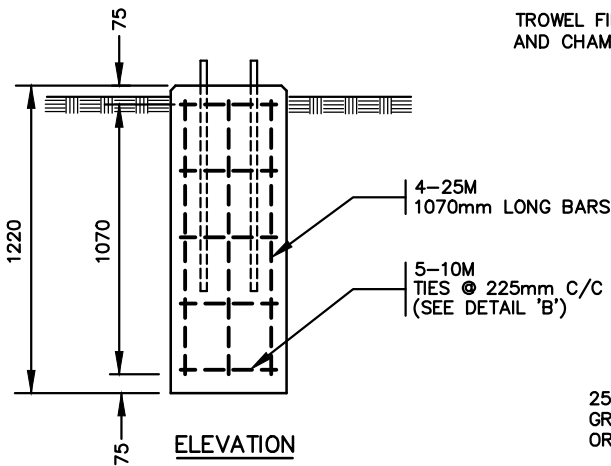
PLAN



C (ANCHOR
BOLT CIRCLE)

E (MAX. FROM CENTRE
LINE OF BASE)

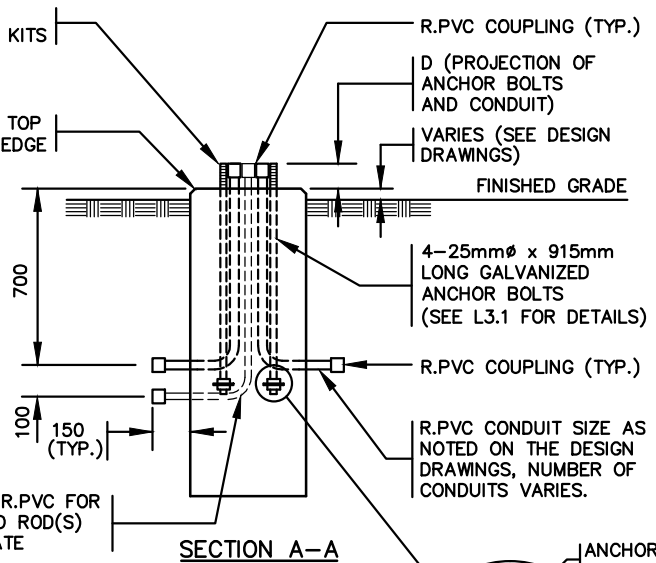
PLAN



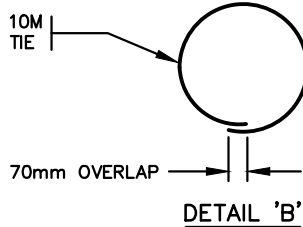
ELEVATION

NUTS AND WASHERS ARE
SUPPLIED WITH POLE BOLT KITS

TROWEL FINISH TOP
AND CHAMFER EDGE



SECTION A-A



DETAIL 'B'

NUT (SUPPLIED
WITH ANCHOR BOLT)

STEEL PLATE (SUPPLIED
WITH ANCHOR BOLT)

NUTS SHALL BE
SUPPLIED TACK WELDED
TO ANCHOR BOLTS

R.PVC COUPLING (TYP.)
D (PROJECTION OF
ANCHOR BOLTS
AND CONDUIT)
VARIES (SEE DESIGN
DRAWINGS)

FINISHED GRADE

4-25mm ϕ x 915mm
LONG GALVANIZED
ANCHOR BOLTS
(SEE L3.1 FOR DETAILS)

R.PVC COUPLING (TYP.)

R.PVC CONDUIT SIZE AS
NOTED ON THE DESIGN
DRAWINGS, NUMBER OF
CONDUITS VARIES.

25mm R.PVC FOR
GROUND ROD(S)
OR PLATE

ANCHOR
BOLT

NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL HARDWARE SHALL BE GALVANIZED.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MP α AT 28 DAYS.
5. YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MP α .
6. REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

BASE TYPE	POLE TYPE	A	B	C	D	E
S1	4.57m PATHWAY SIDE MOUNTED LUMINAIRE POLE	400	179	254	100	40
	5.79m LANEWAY SIDE MOUNTED LUMINAIRE POLE					
	4.5m POST TOP LUMINAIRE POLE					
	6.09m POST TOP LUMINAIRE POLE					
S2	4.88m STEVESTON TYPE LUMINAIRE POLE	400	179	254	89	32
S7	4.57m TYPE 1 DECORATIVE LUMINAIRE POLE	600	269	381	89	40
S8	4.82m TYPE 5 DECORATIVE LUMINAIRE POLE	510	197	279	100	40



TYPE S1, S2, S7 AND S8 SONOTUBE
CONCRETE BASE

TECH. : P. DISCUSSO

SCALE : NTS

DRAWING NUMBER :

DR. : C. YEUNG

DATE : JAN. 1998

L2.1

ENG. :

REV. DATE : APRIL/ 15

SHEET No. : 1 OF 1

GALVANIZED ANCHOR BOLTS 25 ϕ x 915 LONG, 4 REQ'D.

B (ANCHOR BOLT CIRCLE)

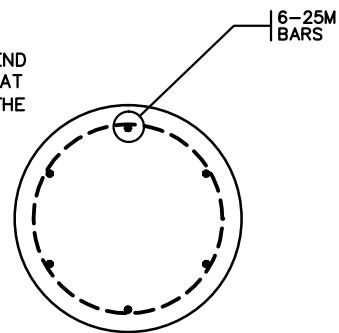
D (MAX FROM CENTER LINE OF BASE)

SECTION A-A

20mm R.PVC IRRIGATION CONDUIT, CONFIRM ORIENTATION WITH LANDSCAPE CONTRACTOR (SEE NOTE 8)

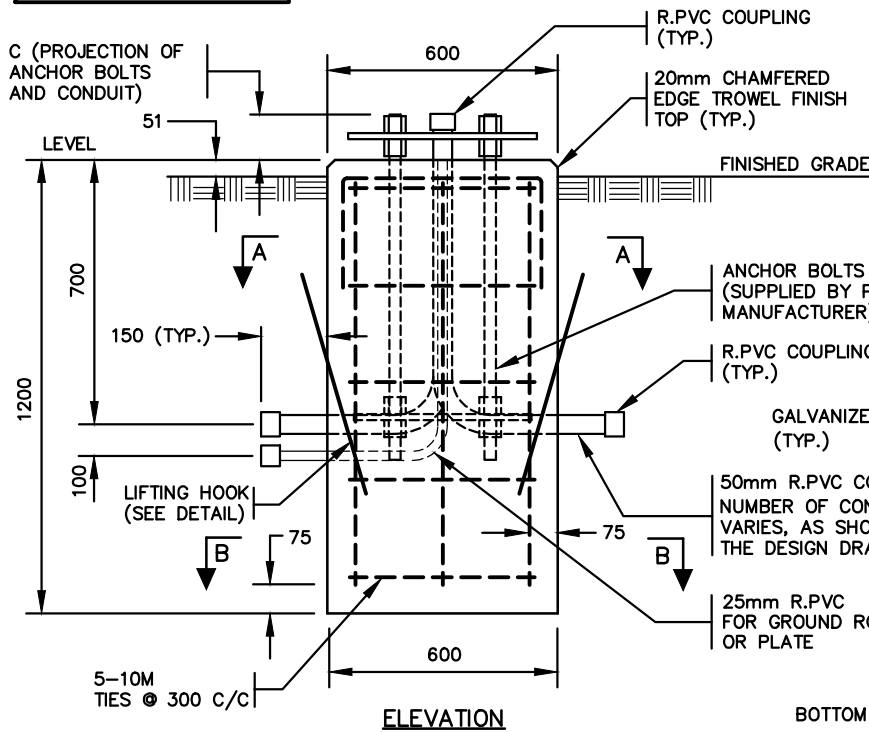
'V' GROOVE DRAIN TO START AT ZERO DEPTH AND WIDTH IN THE CENTRE OF THE BASE AND EXTEND TO A 10mm DEPTH AND WIDTH AT THE OUTSIDE EDGE (ORIENT IN THE SAME DIRECTION AS CONDUIT)

480
300
3-15M U-BARS

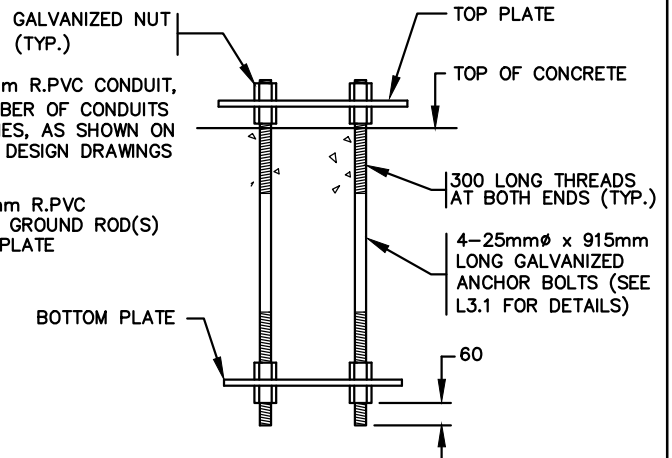
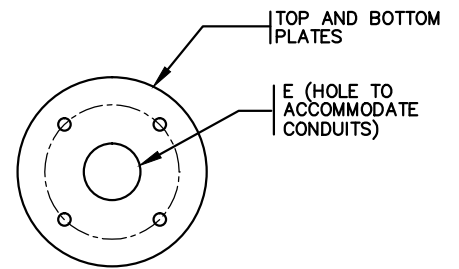


SECTION B-B

NOTE
BASES ARE TO BE ROUND AND NOT SQUARE



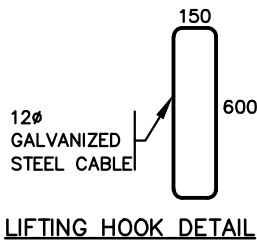
ELEVATION



ANCHOR BOLT CAGE DETAIL

NOTES

- REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
- ALL HARDWARE SHALL BE GALVANIZED.
- APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
- CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
- YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MPa.
- REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



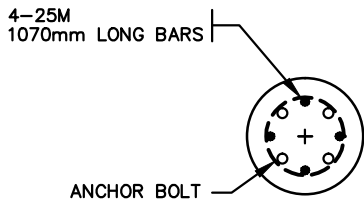
LIFTING HOOK DETAIL

BASE TYPE	POLE TYPE	A	B	C	D	E
S3	CITY CENTRE TYPE LANEWAY/ PEDESTRIAN LUMINAIRE POLE	216	305	120	40	150
S9	TYPE 8 DECORATIVE LUMINAIRE POLE	197	279	100	40	171



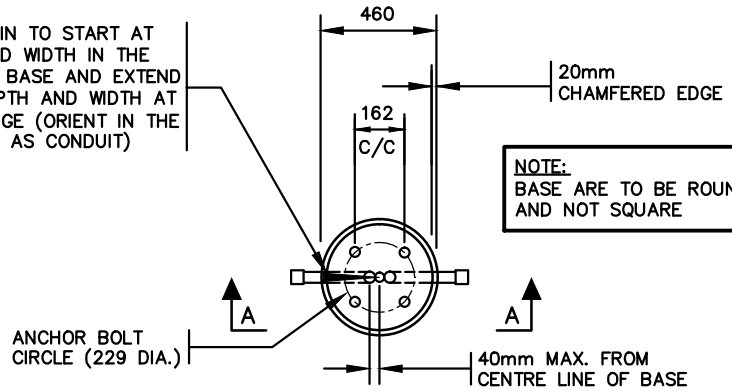
TYPE S3 AND S9 SONOTUBE CONCRETE BASE

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L2.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



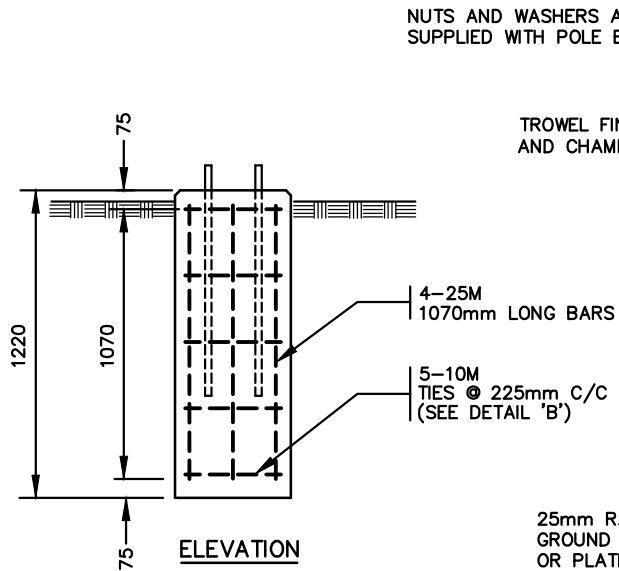
PLAN

*V GROOVE DRAIN TO START AT ZERO DEPTH AND WIDTH IN THE CENTRE OF THE BASE AND EXTEND TO A 10mm DEPTH AND WIDTH AT THE OUTSIDE EDGE (ORIENT IN THE SAME DIRECTION AS CONDUIT)



NOTE:
BASE ARE TO BE ROUND
AND NOT SQUARE

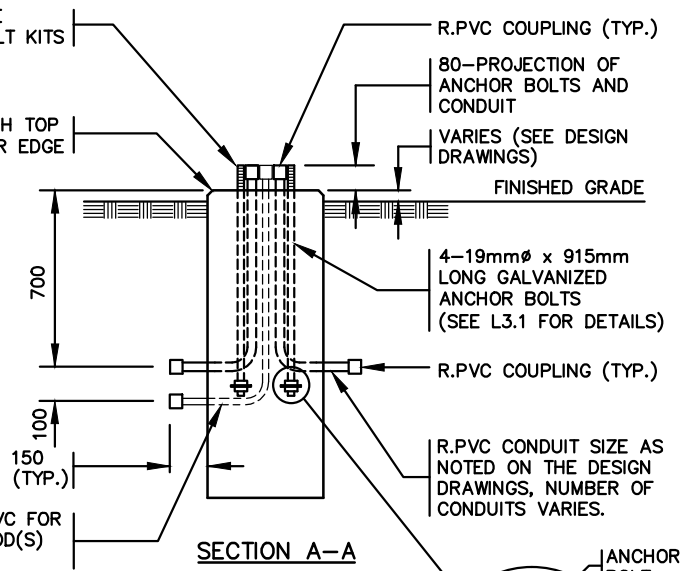
PLAN



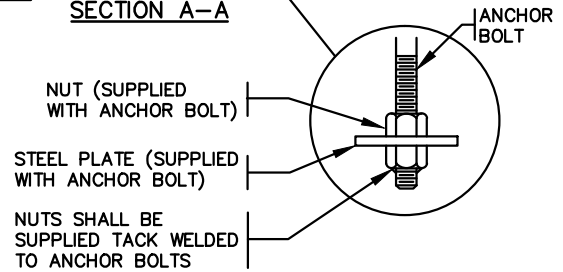
ELEVATION

NUTS AND WASHERS ARE SUPPLIED WITH POLE BOLT KITS

TROWEL FINISH TOP AND CHAMFER EDGE

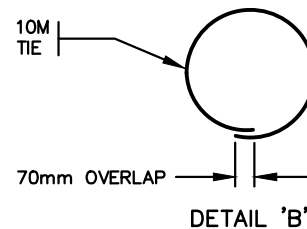


SECTION A-A



NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL HARDWARE SHALL BE GALVANIZED.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
5. YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MPa.
6. REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

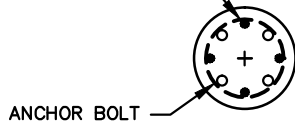


TYPE S4 SONOTUBE
CONCRETE BASE

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L2.3
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1

*V GROOVE DRAIN TO START AT ZERO DEPTH AND WIDTH IN THE CENTRE OF THE BASE AND EXTEND TO A 10mm DEPTH AND WIDTH AT THE OUTSIDE EDGE (ORIENT IN THE SAME DIRECTION AS CONDUIT)

4-25M
1680mm LONG BARS



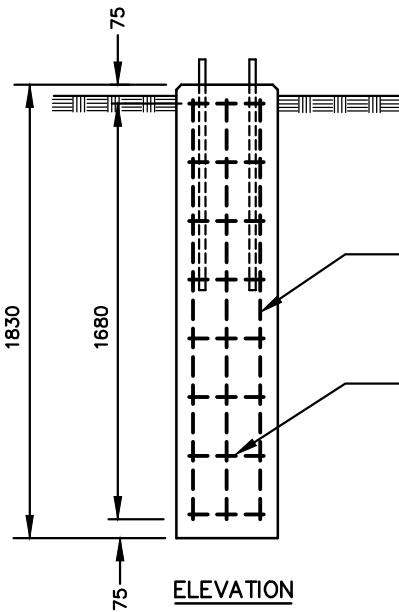
ANCHOR BOLT

PLAN

400
197
C/C
20mm
CHAMFERED EDGE

ANCHOR BOLT
CIRCLE (279 DIA.)

PLAN



ELEVATION

NUTS AND WASHERS ARE SUPPLIED WITH POLE BOLT KITS

TROWEL FINISH TOP AND CHAMFER EDGE

4-25M
1680mm LONG BARS

8-10M
TIES @ 225mm C/C
(SEE DETAIL 'B')

25mm R.PVC FOR
GROUND ROD(S)
OR PLATE

R.PVC COUPLING (TYP.)

100-PROJECTION OF
ANCHOR BOLTS AND
CONDUIT

VARIES (SEE DESIGN
DRAWINGS)

FINISHED GRADE

4-25mmØ x 915mm
LONG GALVANIZED
ANCHOR BOLTS
(SEE L3.1 FOR DETAILS)

R.PVC COUPLING (TYP.)

R.PVC CONDUIT SIZE AS
NOTED ON THE DESIGN
DRAWINGS, NUMBER OF
CONDUITS VARIES.

700

100

150
(TYP.)

SECTION A-A

FOR USE BY PERMISSION OF
THE CITY OF RICHMOND ONLY

NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL HARDWARE SHALL BE GALVANIZED.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
5. YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MPa.
6. REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

NUT (SUPPLIED WITH ANCHOR BOLT)

STEEL PLATE (SUPPLIED WITH ANCHOR BOLT)

NUTS SHALL BE SUPPLIED TACK WELDED TO ANCHOR BOLTS

ANCHOR BOLT

10M
TIE

70mm OVERLAP

DETAIL 'B'



TYPE S5 SONOTUBE
CONCRETE BASE

TECH. : P. DISCUSSO

DR. : C. YEUNG

ENG. :

SCALE : NTS

DATE : JAN. 1998

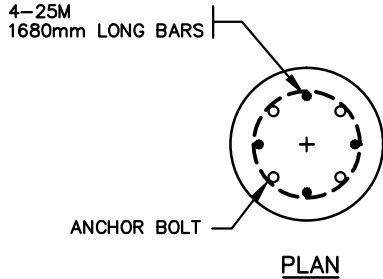
REV. DATE : APRIL/15

DRAWING NUMBER :

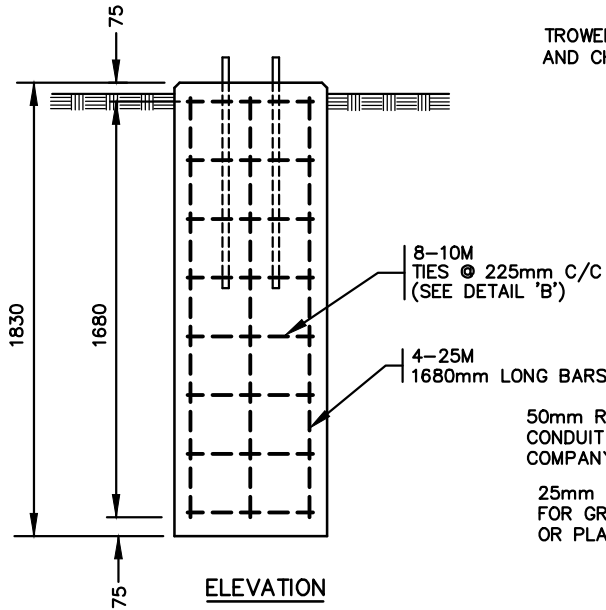
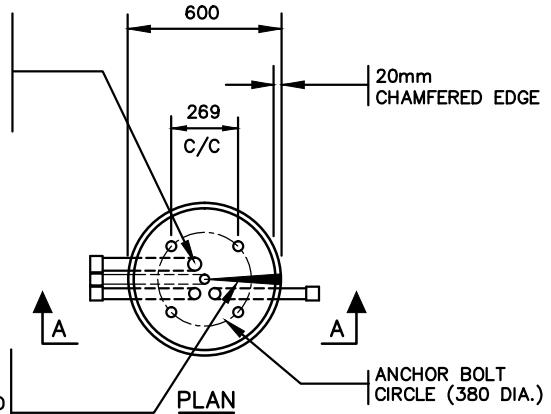
L2.4

SHEET No. : 1 OF 1

LOCATE ALL CONDUITS, EXCEPT THE SERVICE CONDUIT IN THE CENTRE OF ANCHOR BOLT CIRCLE. LOCATE SERVICE CONDUIT TO SUIT ENTRANCE KNOCKOUT IN SERVICE PANEL

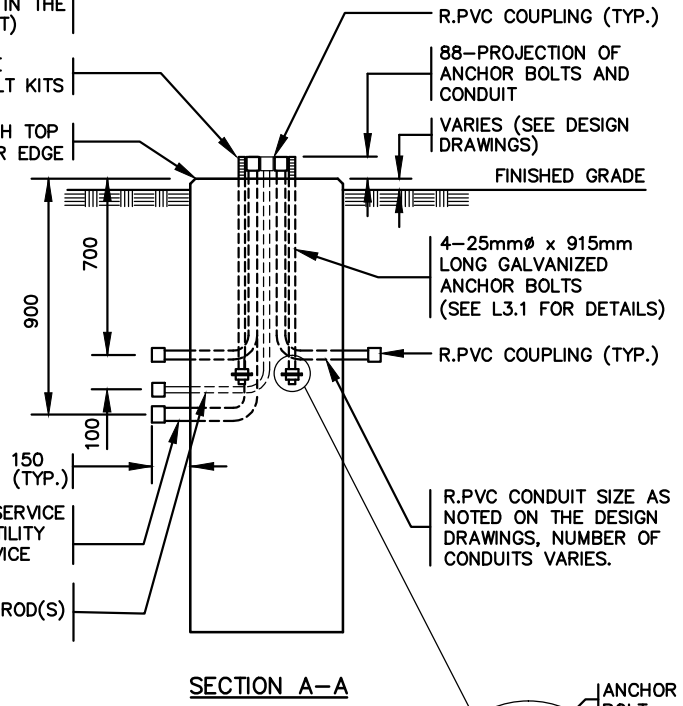


'V' GROOVE DRAIN TO START AT ZERO DEPTH AND WIDTH IN THE CENTRE OF THE BASE AND EXTEND TO A 10mm DEPTH AND WIDTH AT THE OUTSIDE EDGE (ORIENT IN THE SAME DIRECTION AS CONDUIT)



NUTS AND WASHERS ARE SUPPLIED WITH POLE BOLT KITS

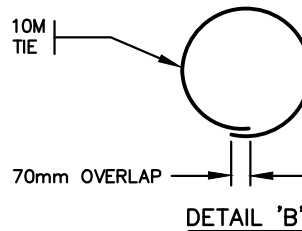
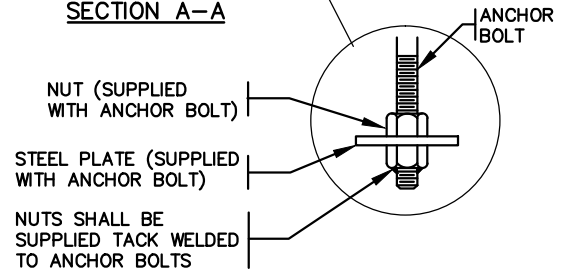
TROWEL FINISH TOP AND CHAMFER EDGE



FOR USE BY PERMISSION OF THE CITY OF RICHMOND ONLY

NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL HARDWARE SHALL BE GALVANIZED.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
5. YIELD STRENGTH OF REBAR SHALL BE MIN. 400 MPa.
6. REINFORCING STEEL SHALL HAVE MIN. 40mm COVER UNLESS OTHERWISE NOTED.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



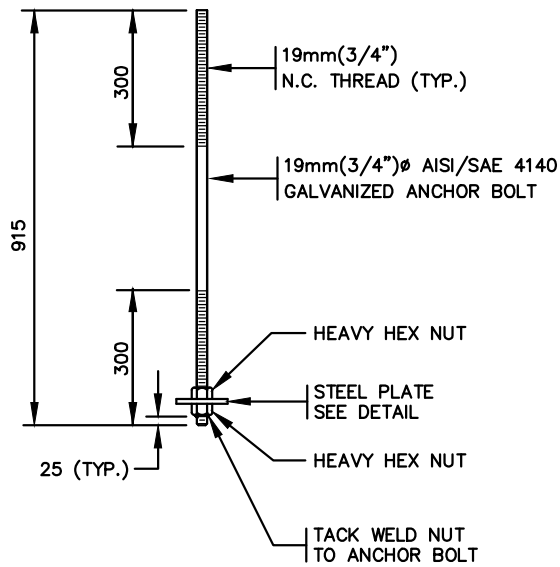
TYPE S6 SERVICE SONOTUBE
CONCRETE BASE



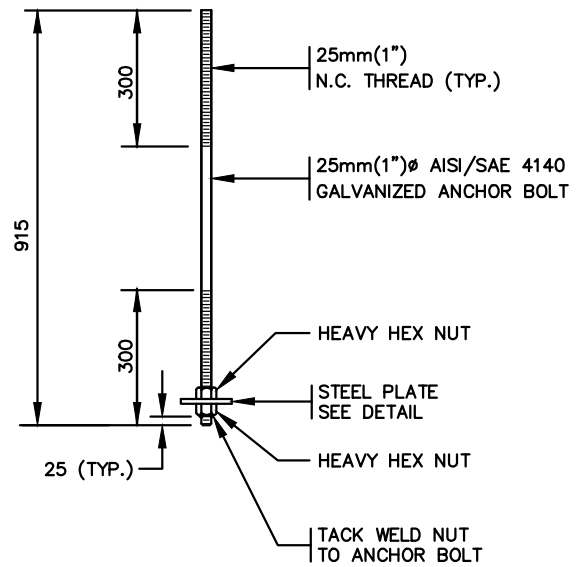
TECH. : P. DISCUSSO
DR. : C. YEUNG
ENG. :

SCALE : NTS
DATE : JAN. 1998
REV. DATE : APRIL/15

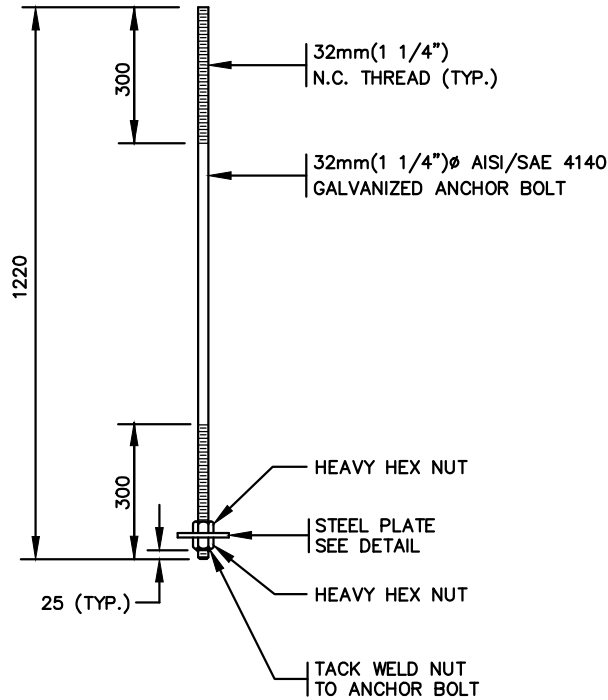
DRAWING NUMBER :
L2.5
SHEET No. : 1 OF 1



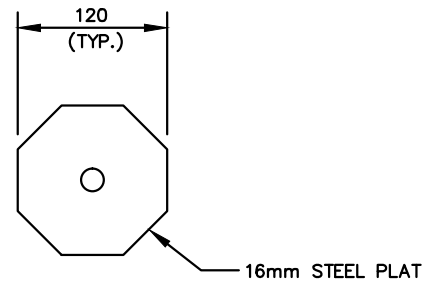
TYPE 1 ANCHOR BOLT
4 PER SET



TYPE 2 ANCHOR BOLT
4 PER SET



TYPE 3 ANCHOR BOLT
4 PER SET



STEEL PLATE DETAIL

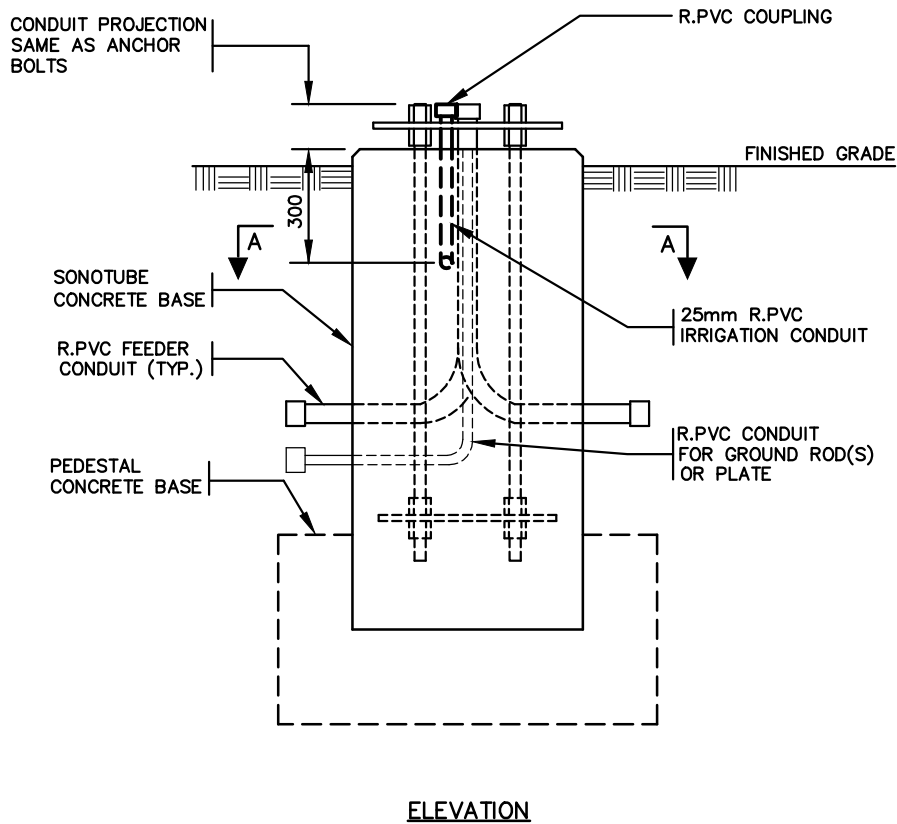
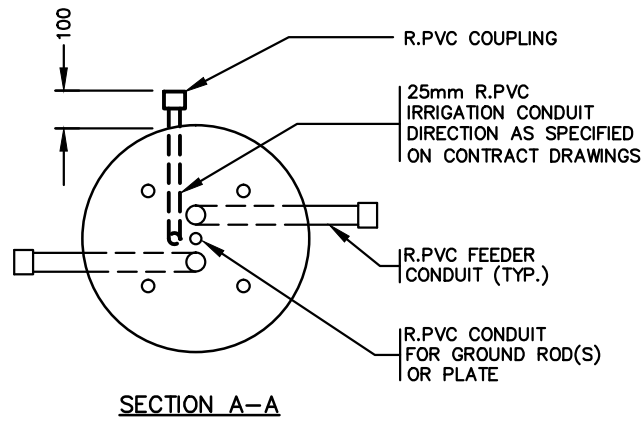
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL HARDWARE SHALL BE GALVANIZED.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



TYPE 1, 2 AND 3 ANCHOR BOLTS

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L3.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

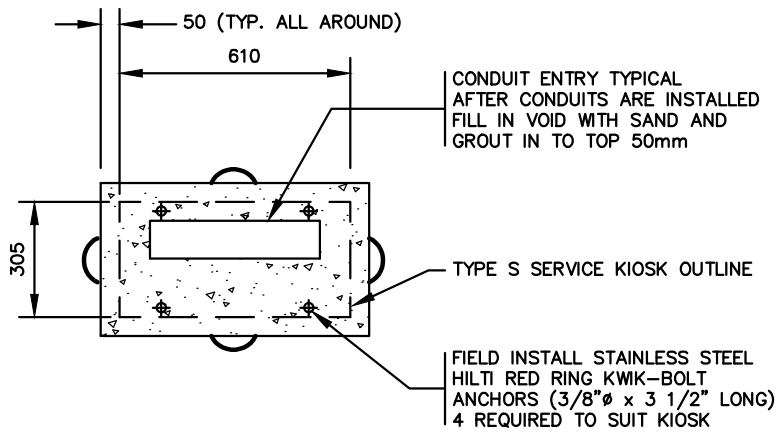


**CONCRETE BASE
IRRIGATION CONDUIT**

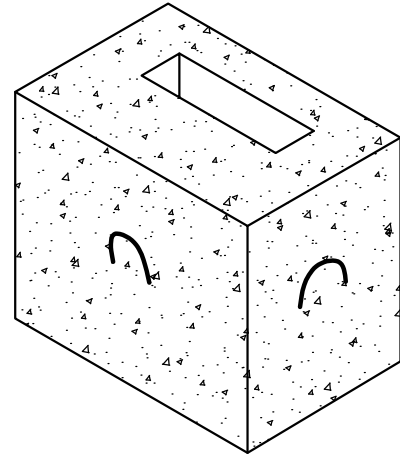
TECH. : P. DISCUSO
DR. : C. YEUNG
ENG. :

SCALE : NTS
DATE : JAN. 1998
REV. DATE : APRIL/15

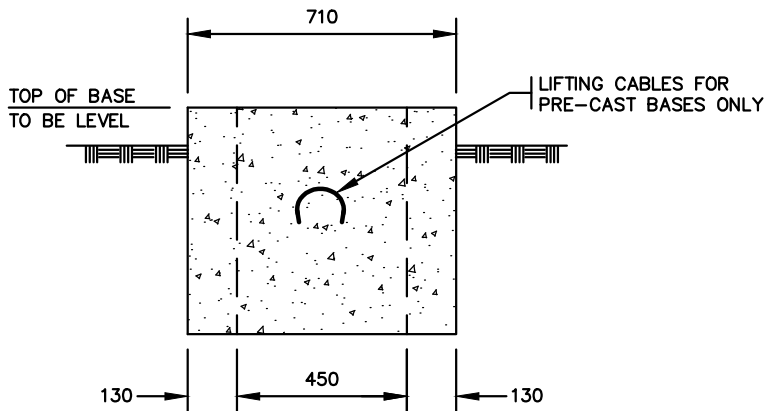
DRAWING NUMBER :
L3.2
SHEET No. : 1 OF 1



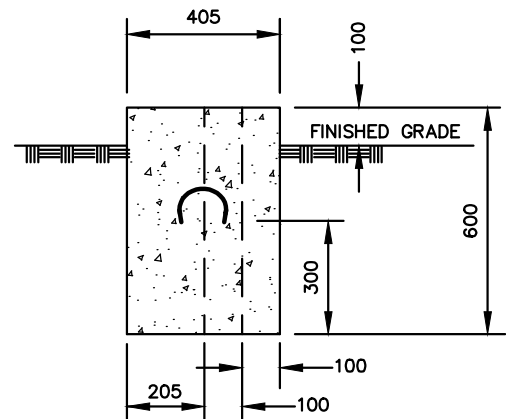
TOP VIEW



PICTORIAL VIEW



FRONT VIEW



SIDE VIEW

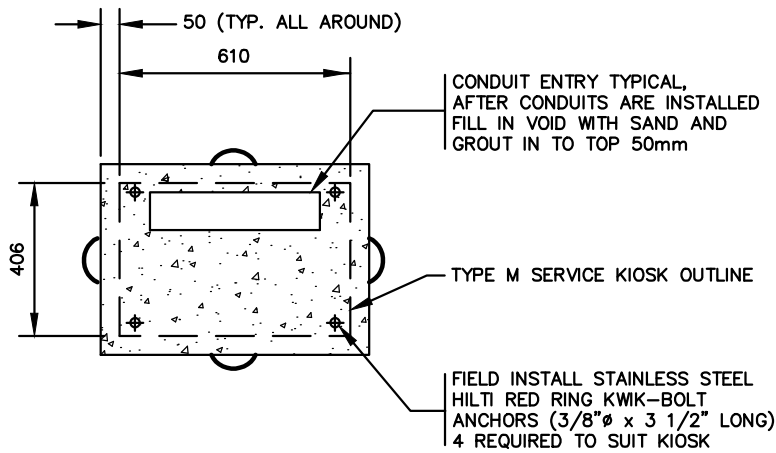
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
3. BASES TO BE PRE-CAST OR CAST-IN-PLACE.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

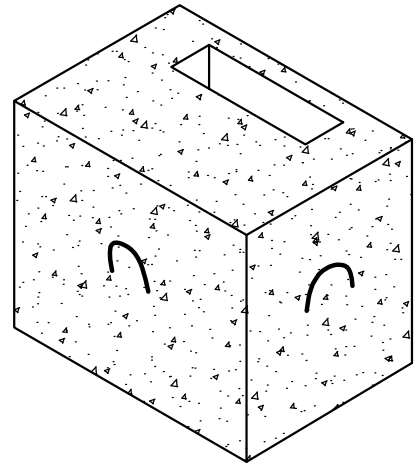


**TYPE S SERVICE KIOSK
CONCRETE BASE**

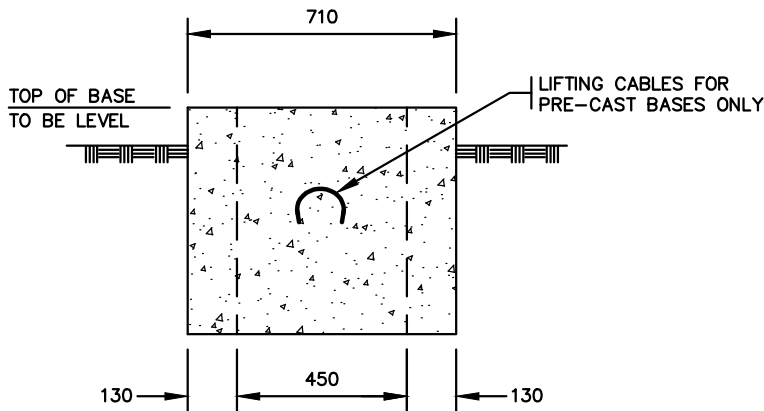
TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L4.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



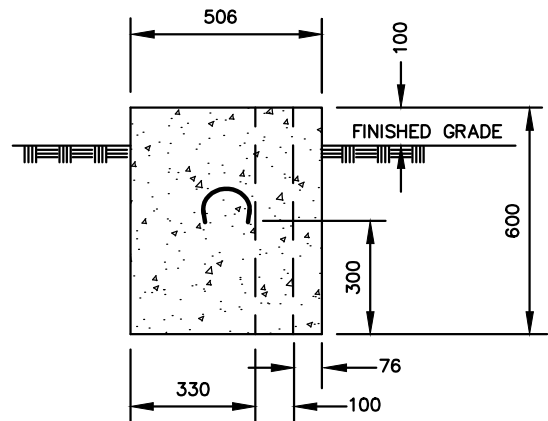
TOP VIEW



PICTORIAL VIEW



FRONT VIEW



SIDE VIEW

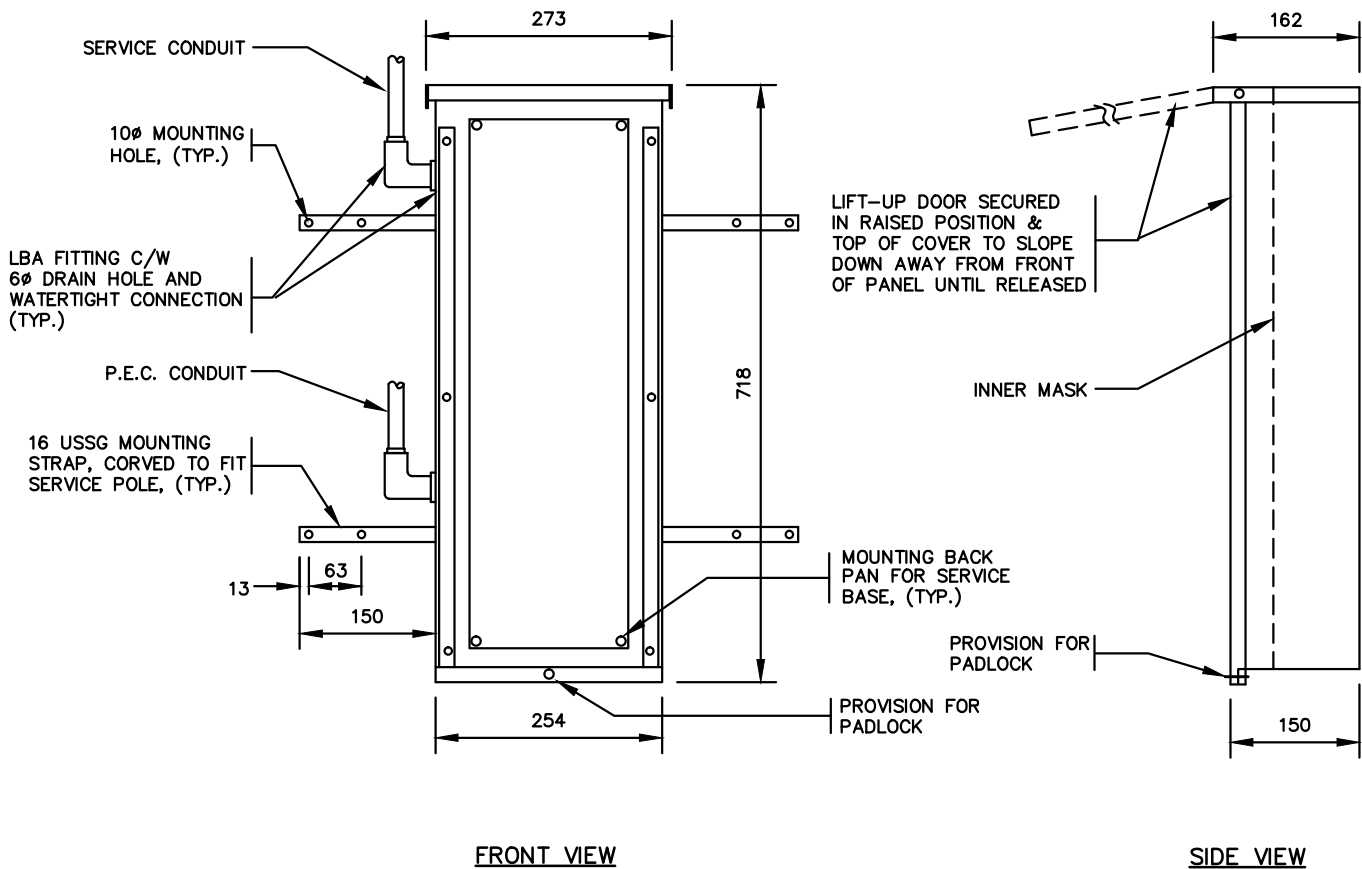
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30 MPa AT 28 DAYS.
3. BASES TO BE PRE-CAST OR CAST-IN-PLACE.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



TYPE M SERVICE KIOSK
CONCRETE BASE

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L4.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



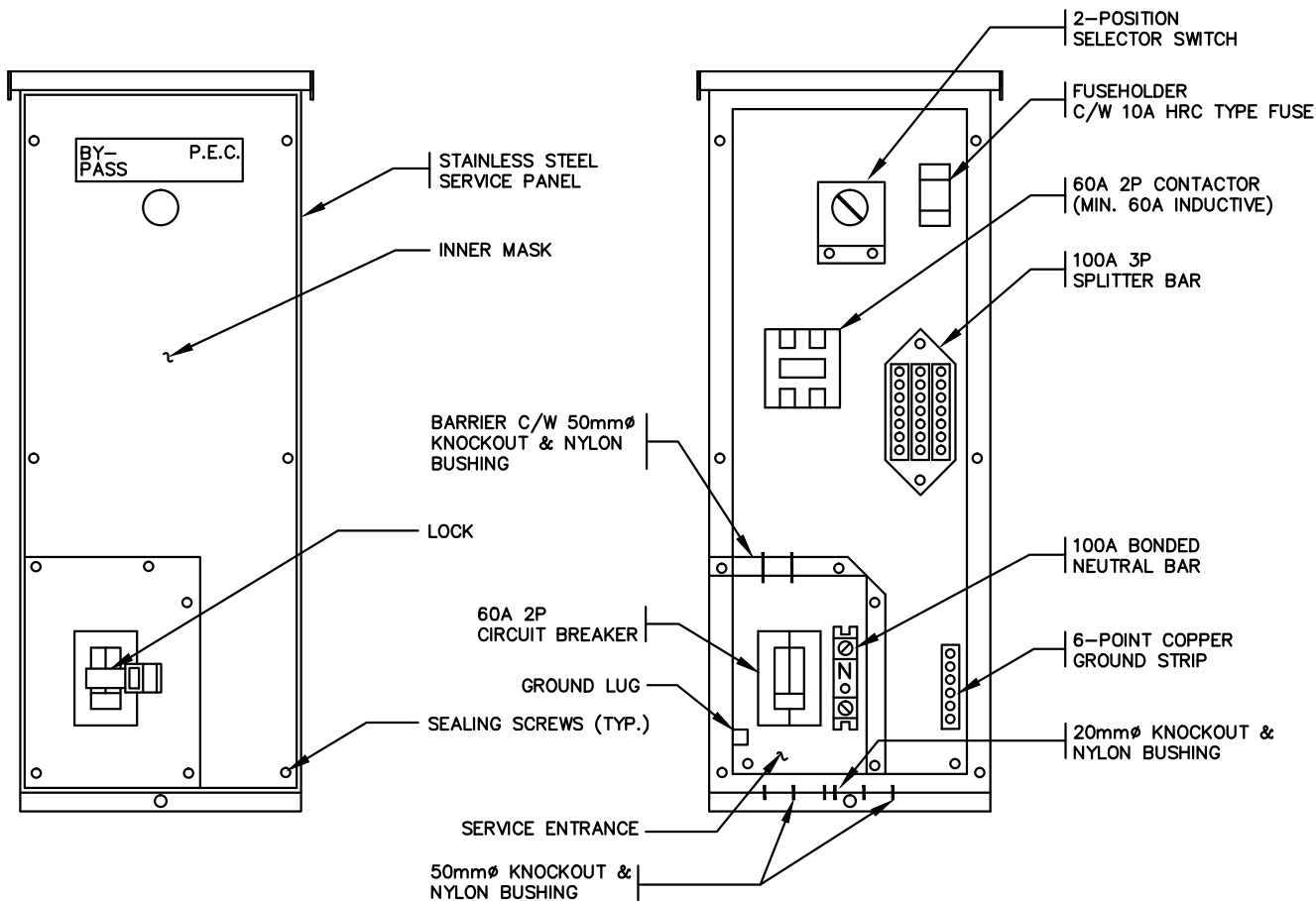
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SERVICE PANEL TO BE FABRICATED OUT OF 12 GA. STAINLESS STEEL.
3. LBA FITTINGS, STRAIN RELIEF CONNECTOR AND MOUNTING STRAPS TO BE INSTALLED FOR UTILITY POLE MOUNTED PANEL ONLY.
4. CONTRACTOR TO OBTAIN SPECIAL PERMISSION FROM UTILITY COMPANY TO INSTALL SERVICE PANEL ON THEIR POLE.
6. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



SERVICE PANEL – POLE MOUNTED

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L5.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



FRONT VIEW
(COVER REMOVED)

FRONT VIEW
(COVER & MASK REMOVED)

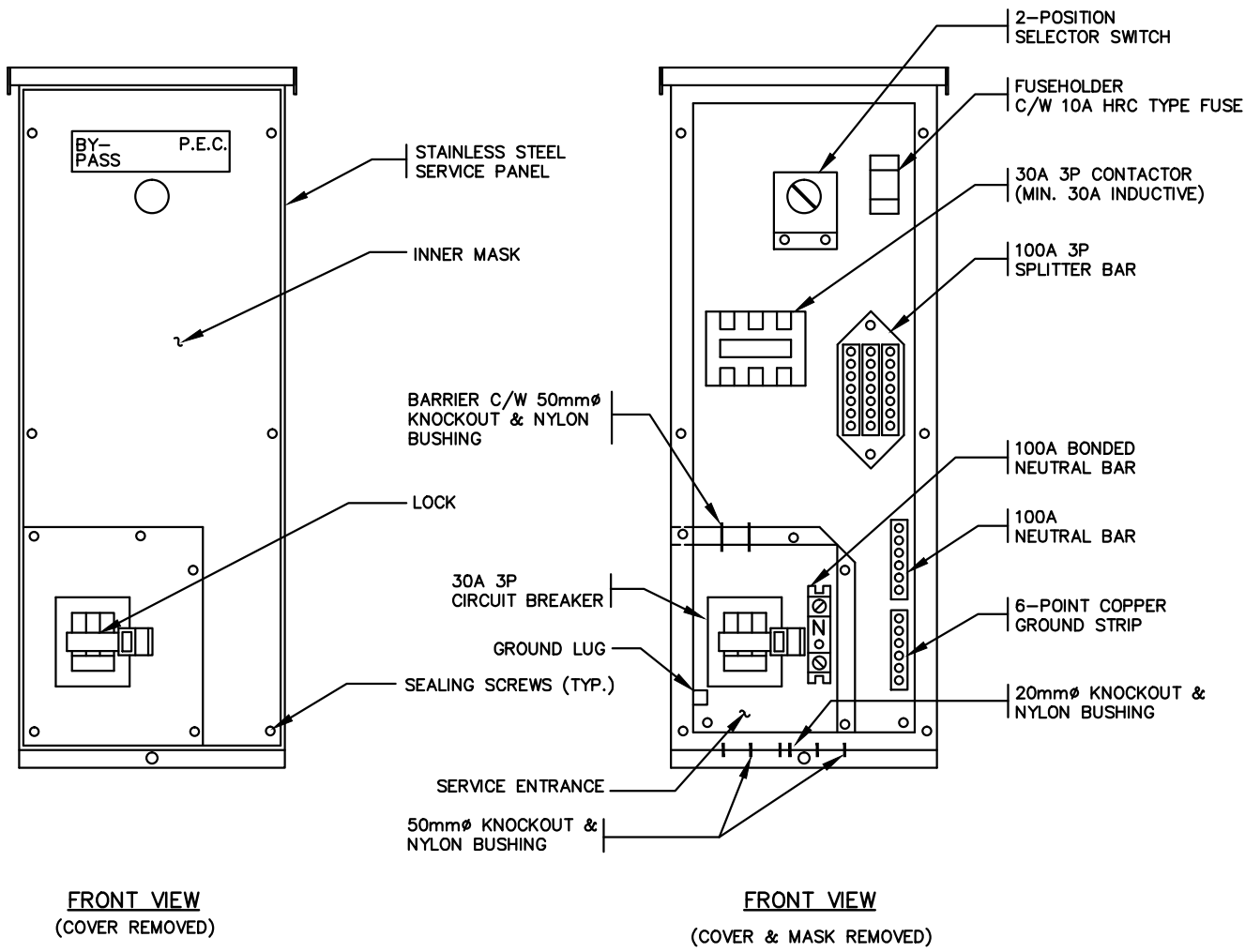
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
3. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
4. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
5. SERVICE PANEL SHALL HAVE LAMICOID NAME PLATES INDICATING VOLTAGES & LABELING ALL EQUIPMENT.
6. SEE DRAWINGS L5.1, L5.6 & L5.8 FOR ADDITIONAL DETAILS.



**SERVICE BASE MOUNTED
SERVICE PANEL 120/240 VOLT**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L5.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



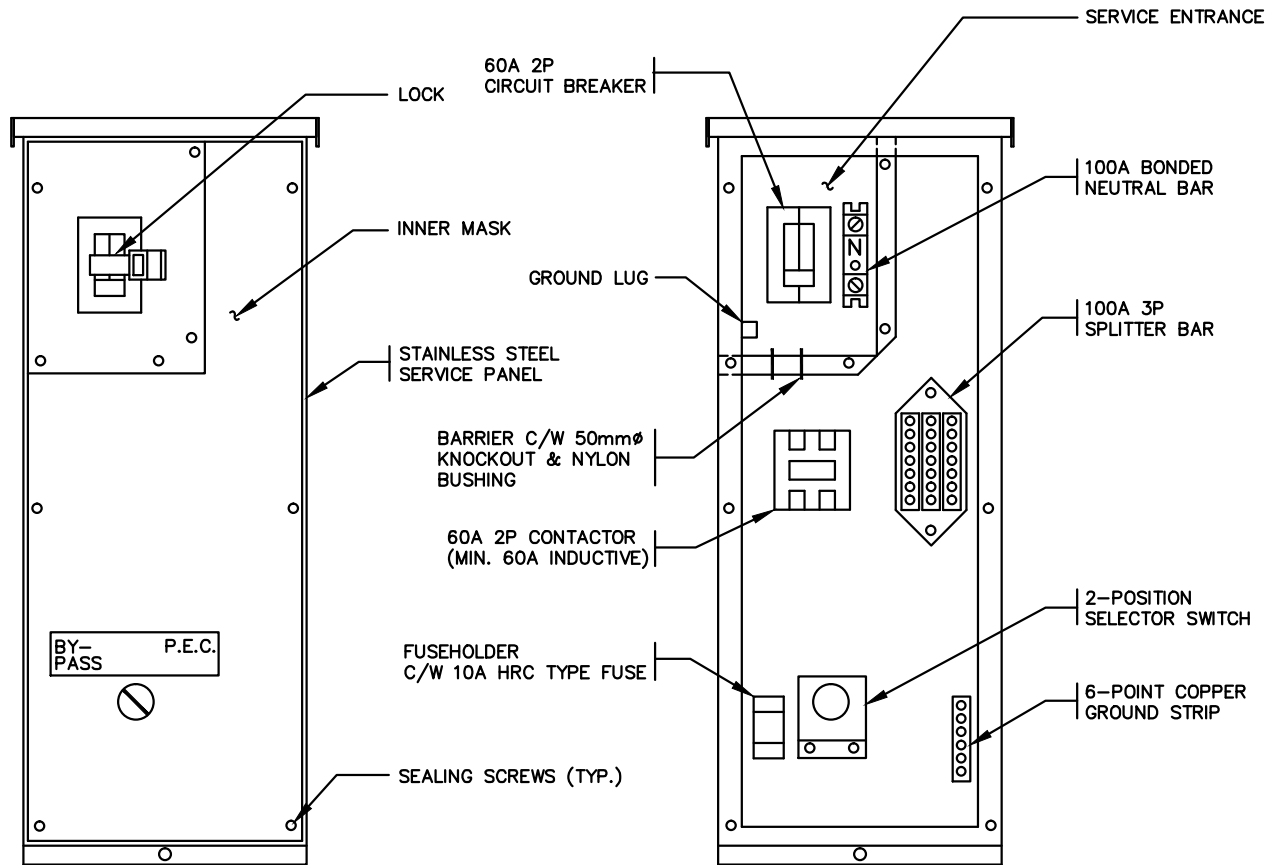
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
3. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
4. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
5. SERVICE PANEL SHALL HAVE LAMICOID NAME PLATES INDICATING VOLTAGES & LABELING ALL EQUIPMENT.
6. SEE DRAWINGS L5.1, L5.7 & L5.8 FOR ADDITIONAL DETAILS.



SERVICE BASE MOUNTED
SERVICE PANEL 347/600 VOLT 3 ϕ

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L5.3
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



FRONT VIEW
(COVER REMOVED)

FRONT VIEW
(COVER & MASK REMOVED)

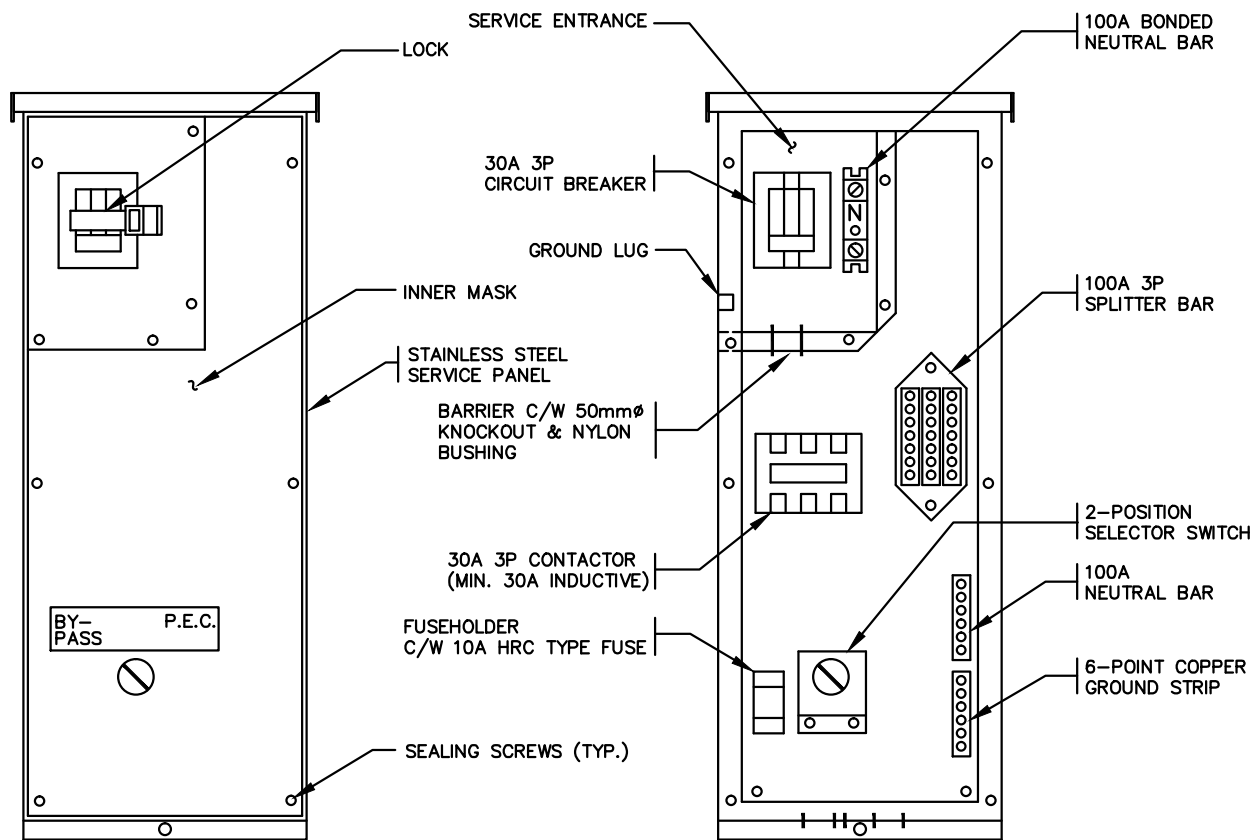
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
3. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
4. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
5. SERVICE PANEL SHALL HAVE LAMICOID NAME PLATES INDICATING VOLTAGES & LABELING ALL EQUIPMENT.
6. SEE DRAWINGS L5.1, L5.6 & L5.9 FOR ADDITIONAL DETAILS.
7. CONDUIT ENTRY AT SERVICE PANEL TO BE PROVIDED BY CONTRACTOR.



SERVICE POLE MOUNTED
SERVICE PANEL 120/240 VOLT

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L5.4
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



FRONT VIEW
(COVER REMOVED)

FRONT VIEW
(COVER & MASK REMOVED)

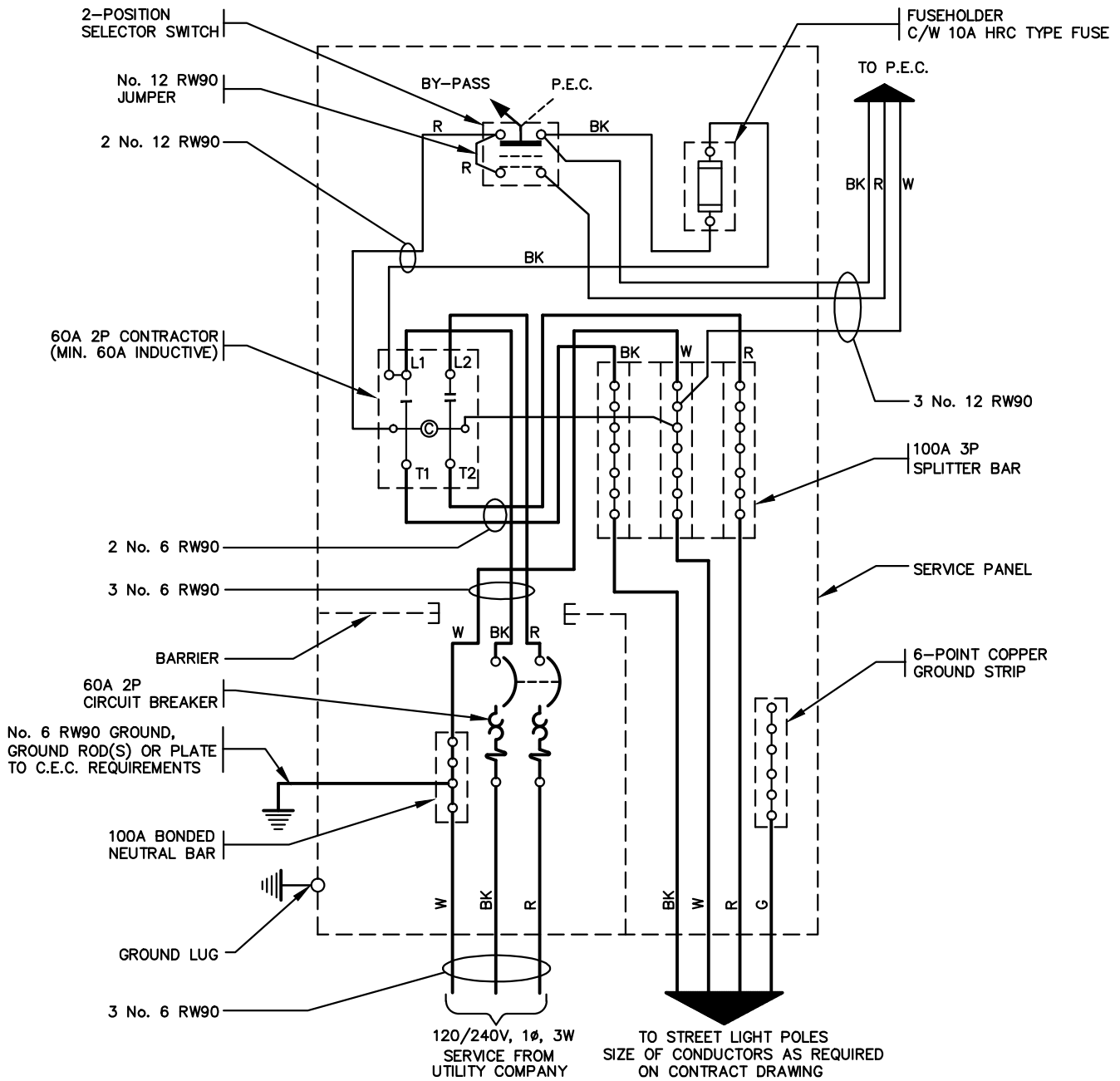
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
3. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
4. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
5. SERVICE PANEL SHALL HAVE LAMICOID NAME PLATES INDICATING VOLTAGES & LABELING ALL EQUIPMENT.
6. SEE DRAWINGS L5.1, L5.7 & L5.9 FOR ADDITIONAL DETAILS.
7. CONDUIT ENTRY AT SERVICE PANEL TO BE PROVIDED BY CONTRACTOR.



SERVICE POLE MOUNTED
SERVICE PANEL 347/600 VOLT 3Ø

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L5.5
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



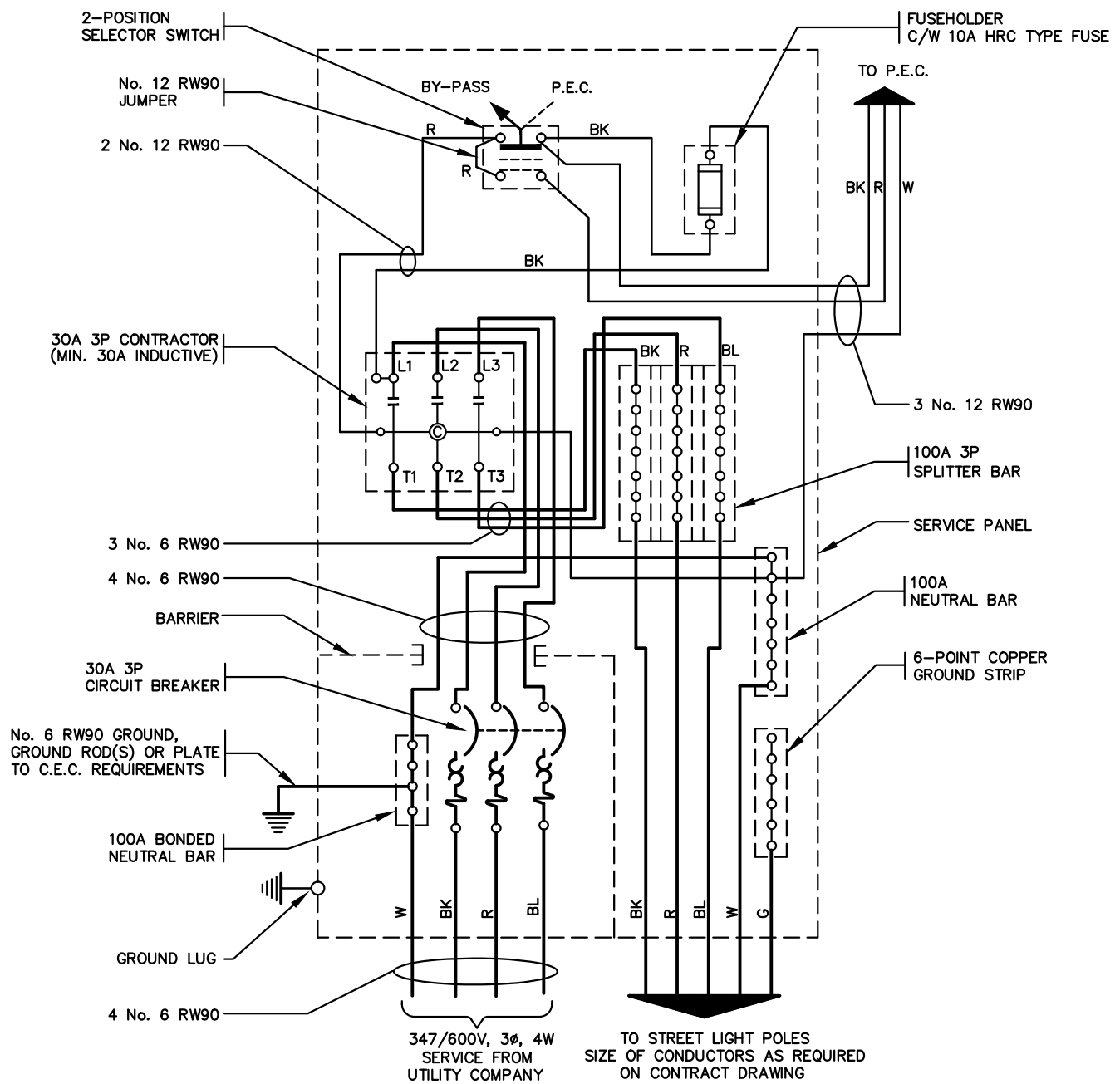
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SERVICE BASE MOUNTED PANEL WIRING DIAGRAM SHOWN. UTILITY POLE MOUNTED PANEL WIRING IS SAME AS ABOVE, EXCEPT FOR LOCATION OF EQUIPMENT, BARRIER AND UTILITY COMPANY SERVICE.
3. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
4. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
5. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
6. SEE DRAWINGS L5.1, L5.2 & L5.4 FOR ADDITIONAL DETAILS.



SERVICE PANEL
WIRING DIAGRAM 120/240 VOLT
(FOR STANDARD LIGHTING)

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L5.6
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



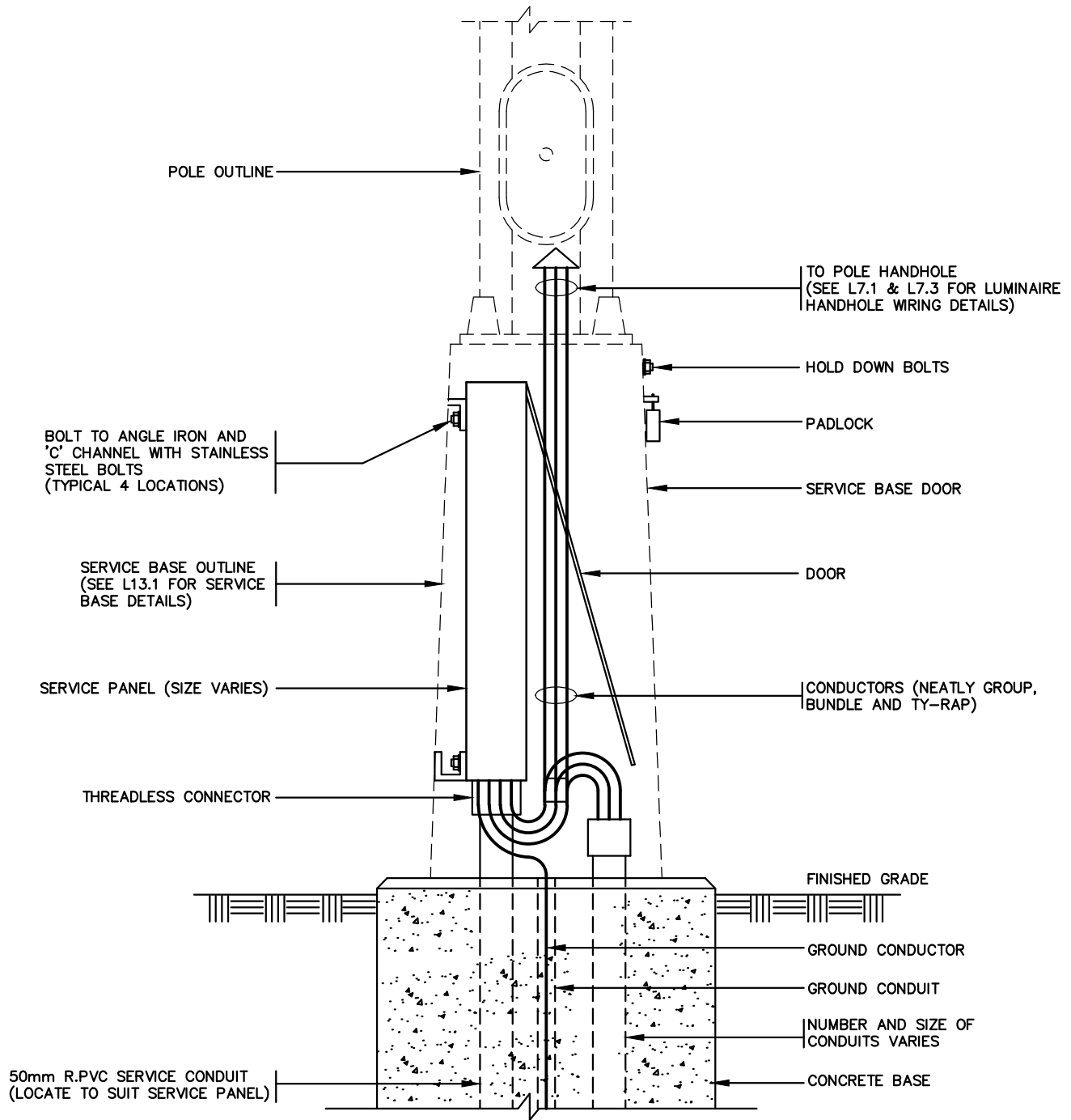
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SERVICE BASE MOUNTED PANEL WIRING DIAGRAM SHOWN. UTILITY POLE MOUNTED PANEL WIRING IS SAME AS ABOVE, EXCEPT FOR LOCATION OF EQUIPMENT, BARRIER AND UTILITY COMPANY SERVICE.
3. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
4. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
5. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
6. SEE DRAWINGS L5.1, L5.3 & L5.5 FOR ADDITIONAL DETAILS.



**SERVICE PANEL
WIRING DIAGRAM 347/600 VOLT 3 ϕ
(FOR STANDARD LIGHTING)**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER :
DR. : C. YEUNG	DATE : JAN. 1998	L5.7
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



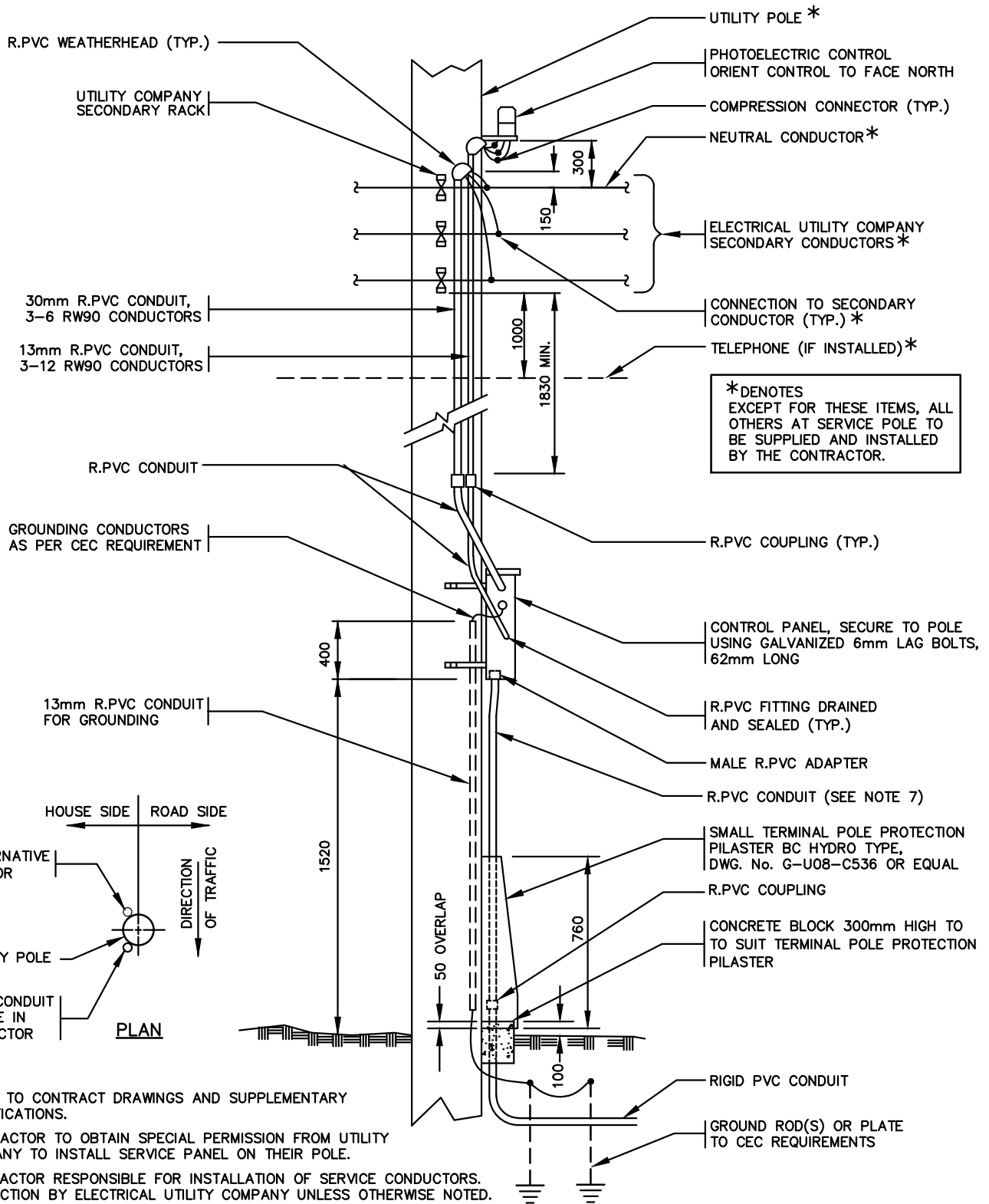
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.

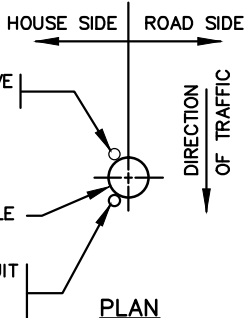


SERVICE PANEL IN SERVICE BASE

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L5.8
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



*DENOTES EXCEPT FOR THESE ITEMS, ALL OTHERS AT SERVICE POLE TO BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.



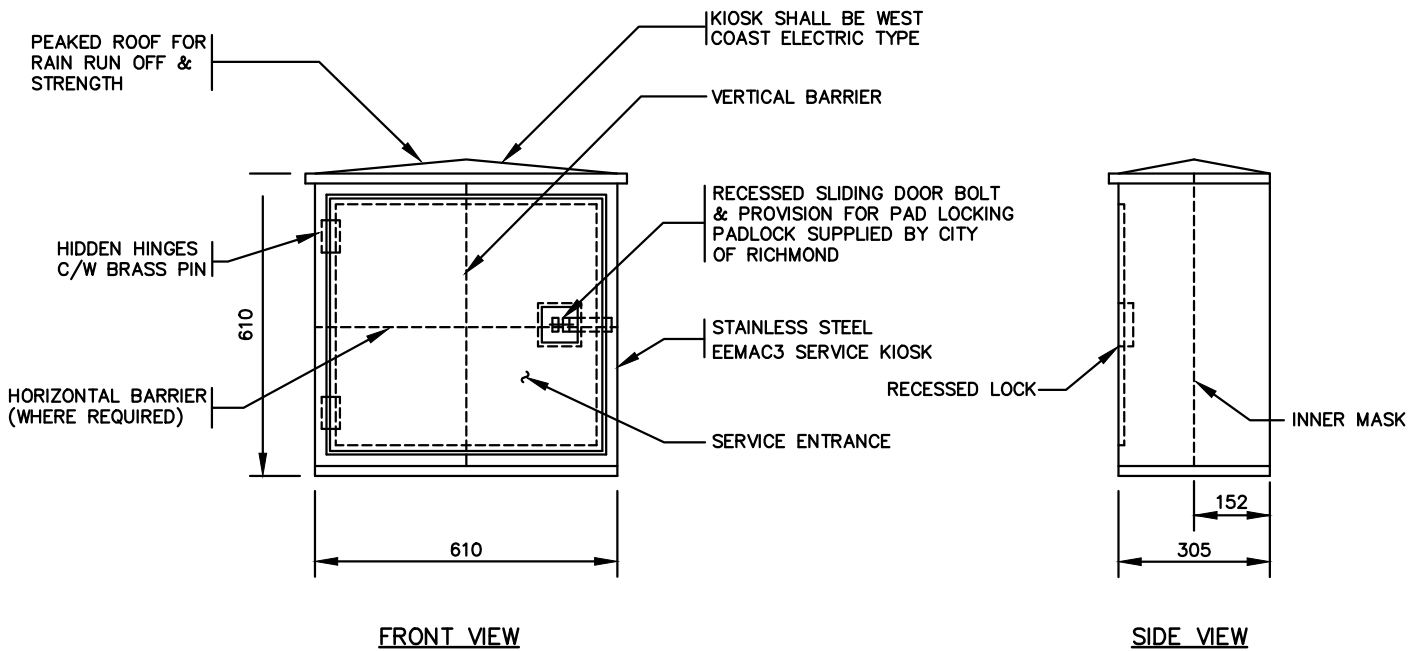
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CONTRACTOR TO OBTAIN SPECIAL PERMISSION FROM UTILITY COMPANY TO INSTALL SERVICE PANEL ON THEIR POLE.
3. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF SERVICE CONDUCTORS. CONNECTION BY ELECTRICAL UTILITY COMPANY UNLESS OTHERWISE NOTED.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. MOUNT CONDUIT ON CONCRETE POLE WITH 3/4" STAINLESS STEEL BANDING.
6. SERVICE CONDUCTORS AS DETAILED ON CONTRACT DRAWINGS.
7. CONDUIT UP POLE TO SUIT SERVICE CONDUCTORS (MINIMUM 30mm ϕ).

POLE MOUNTED SERVICE PANEL ON ELECTRICAL UTILITY POLE

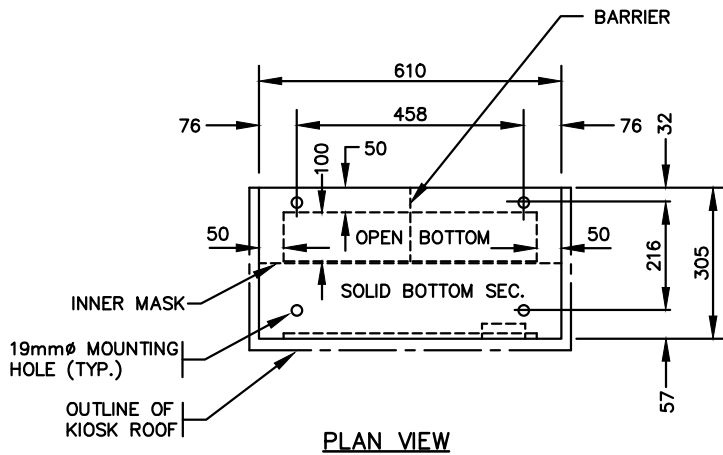


TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L5.9
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



FRONT VIEW

SIDE VIEW



PLAN VIEW

NOTES

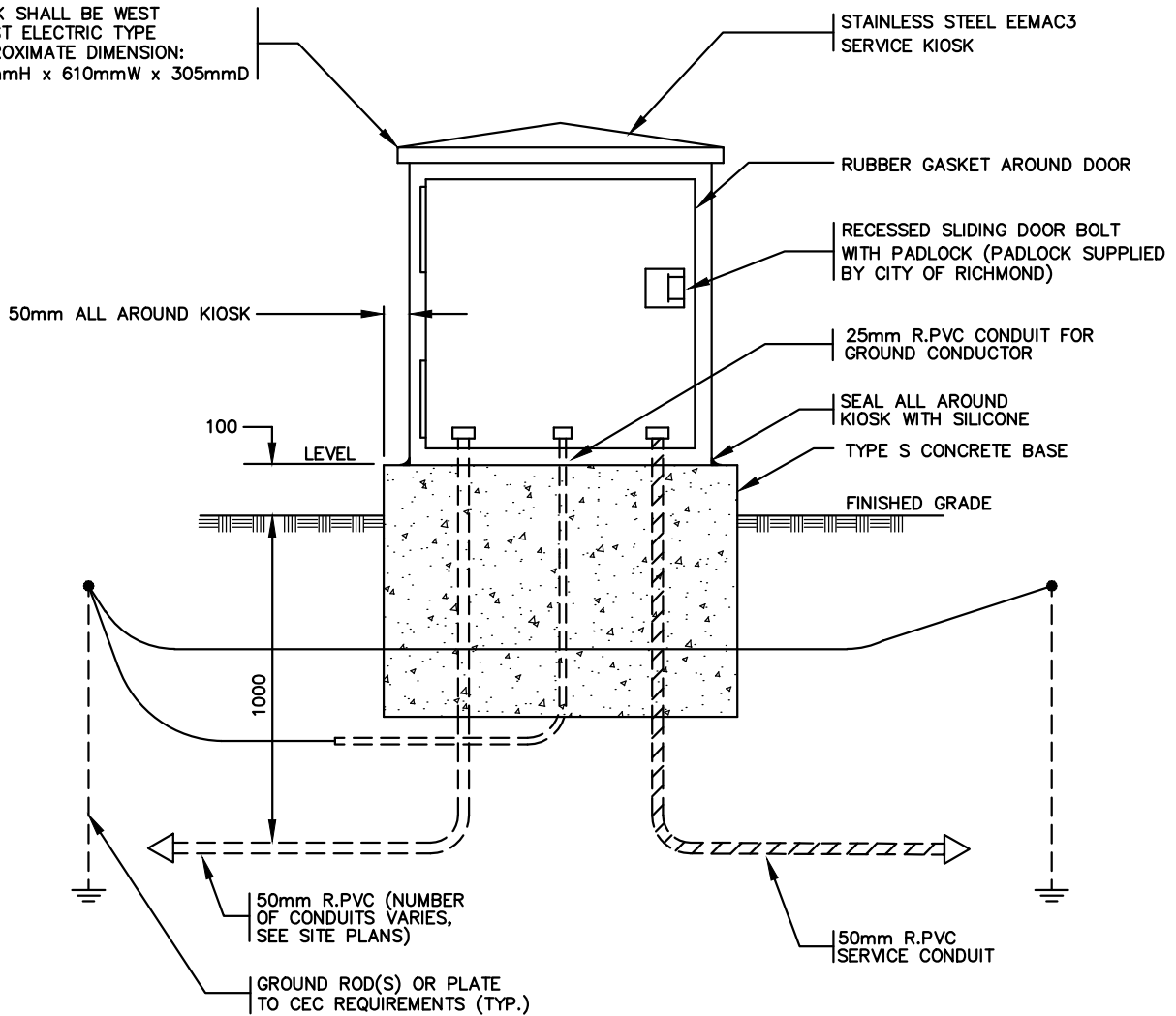
1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
3. KIOSK TO BE FABRICATED OUT OF 12 GA. STAINLESS STEEL.
4. KIOSK DOOR TO HAVE 6mm NEOPRENE GASKET ALL AROUND.
5. SERVICE PANEL SHALL HAVE LAMICOID NAME PLATES INDICATING VOLTAGES & LABELING ALL EQUIPMENT.
6. KIOSK SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
7. A TYPE WRITTEN PANEL DIRECTORY SHALL BE LOCATED ON THE INSIDE OF THE PANEL DOOR.
8. KIOSK SHALL BE PAINTED IN COLOUR SPECIFIED BY CITY OF RICHMOND.
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



**TYPE S SERVICE KIOSK
(FOR DECORATIVE LIGHTING)**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L6.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

KIOSK SHALL BE WEST
COAST ELECTRIC TYPE
APPROXIMATE DIMENSION:
610mmH x 610mmW x 305mmD



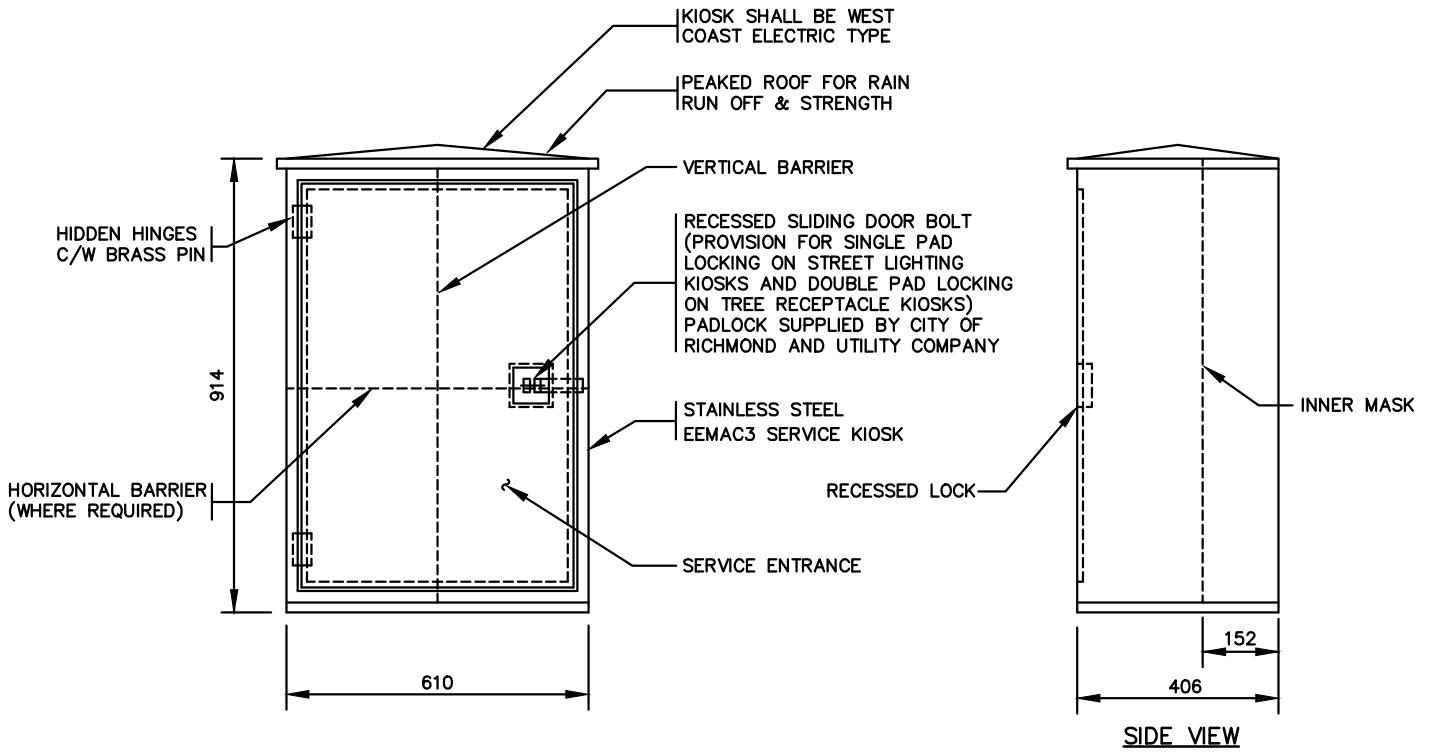
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CONTRACTOR SHALL SUPPLY KIOSK SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
3. KIOSK SHALL BE SECURED TO CONCRETE BASE WITH A MINIMUM OF CONCRETE INSERTS.
4. LOCATE CONDUIT IN CONCRETE BASE TO SUIT KIOSK EQUIPMENT.
5. KIOSK SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
6. SERVICE PANEL SHALL HAVE LAMICOID NAME PLATES INDICATING VOLTAGES & LABELING ALL EQUIPMENT.
7. A TYPE WRITTEN PANEL DIRECTORY SHALL BE LOCATED ON THE INSIDE OF THE PANEL DOOR.
8. KIOSK SHALL BE PAINTED IN COLOUR SPECIFIED BY CITY OF RICHMOND.
9. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
10. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
11. SEE DRAWINGS L4.1 & L6.1 FOR ADDITIONAL DETAILS.
12. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



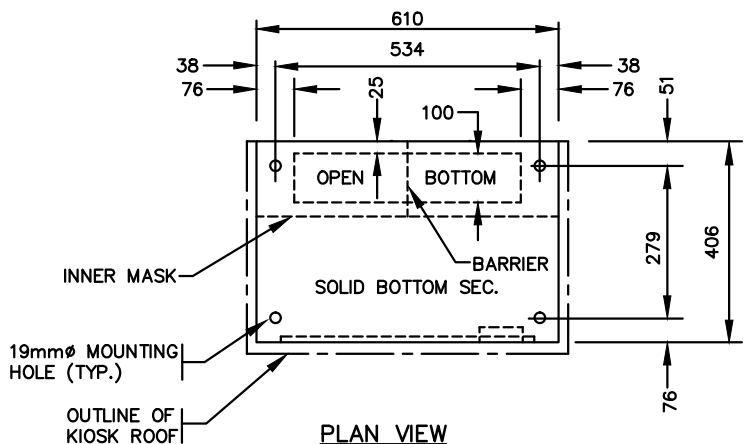
**TYPE S SERVICE KIOSK & INSTALLATION DETAIL
(FOR DECORATIVE LIGHTING)**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L6.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



FRONT VIEW

SIDE VIEW



PLAN VIEW

NOTES

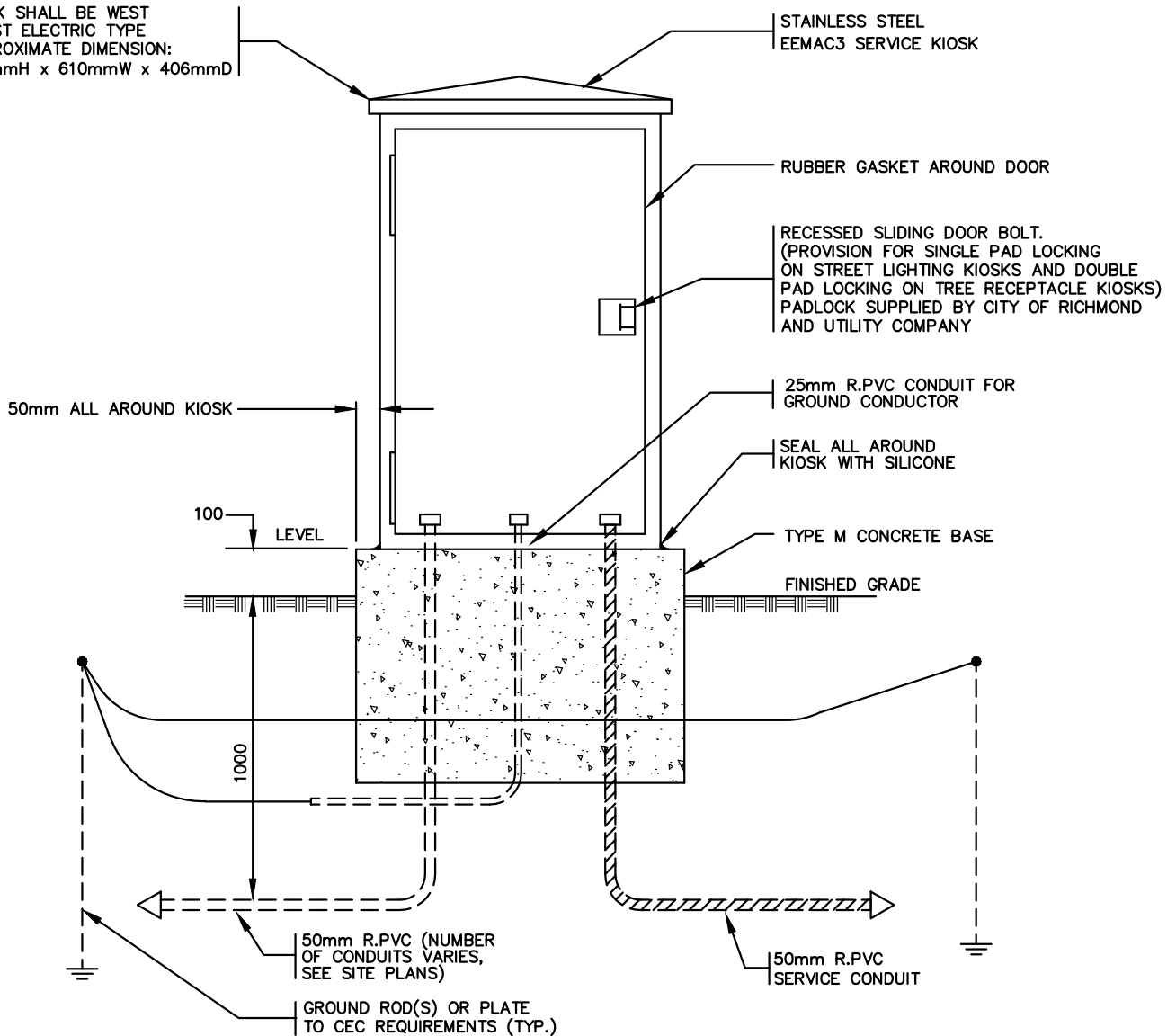
1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
3. KIOSK TO BE FABRICATED OUT OF 12 GA. STAINLESS STEEL.
4. KIOSK DOOR TO HAVE 6mm NEOPRENE GASKET ALL AROUND.
5. SERVICE PANEL SHALL HAVE LAMICOID NAME PLATES INDICATING VOLTAGES & LABELING ALL EQUIPMENT.
6. KIOSK SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
7. A TYPE WRITTEN PANEL DIRECTORY SHALL BE LOCATED ON THE INSIDE OF THE PANEL DOOR.
8. KIOSK SHALL BE PAINTED IN COLOUR SPECIFIED BY CITY OF RICHMOND.
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



**TYPE M SERVICE KIOSK
(FOR CITY CENTRE LIGHTING & TREE RECEPTACLES)**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L6.3
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1

KIOSK SHALL BE WEST
COAST ELECTRIC TYPE
APPROXIMATE DIMENSION:
914mmH x 610mmW x 406mmD



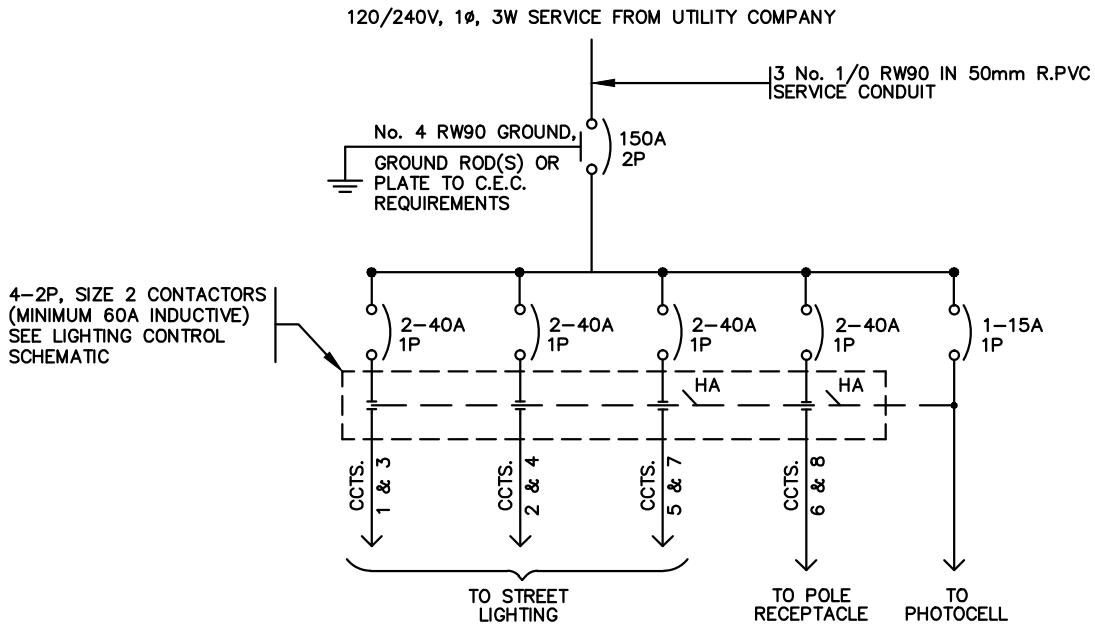
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CONTRACTOR SHALL SUPPLY KIOSK SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
3. KIOSK SHALL BE SECURED TO CONCRETE BASE WITH A MINIMUM OF 4 CONCRETE INSERTS.
4. LOCATE CONDUIT IN CONCRETE BASE TO SUIT KIOSK EQUIPMENT.
5. KIOSK SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
6. SERVICE PANEL SHALL HAVE LAMICOID NAME PLATES INDICATING VOLTAGES & LABELING ALL EQUIPMENT.
7. A TYPE WRITTEN PANEL DIRECTORY SHALL BE LOCATED ON THE INSIDE OF THE PANEL DOOR.
8. KIOSK SHALL BE PAINTED IN COLOUR SPECIFIED BY CITY OF RICHMOND.
9. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
10. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
11. SEE DRAWINGS L4.2 & L6.3 FOR ADDITIONAL DETAILS.
12. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

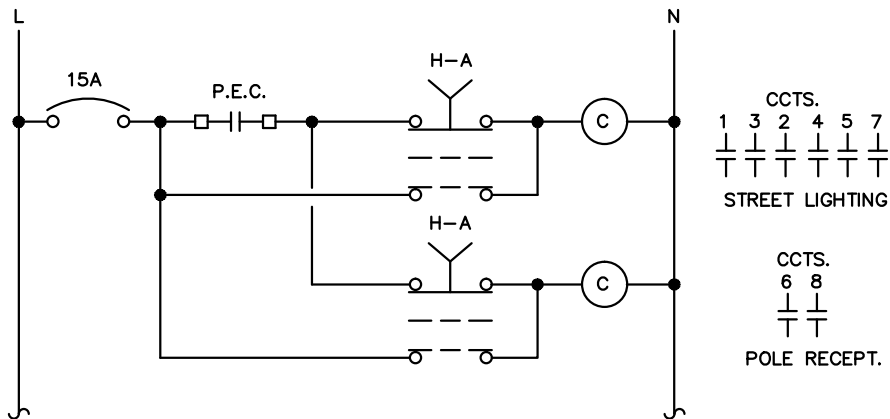


**TYPE M SERVICE KIOSK & INSTALLATION DETAIL
(FOR CITY CENTRE LIGHTING & TREE RECEPTACLES)**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L6.4
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



**SINGLE LINE DIAGRAM
(STREET LIGHTING KIOSK)**



**LIGHTING CONTROL SCHEMATIC
(STREET LIGHTING KIOSK)**

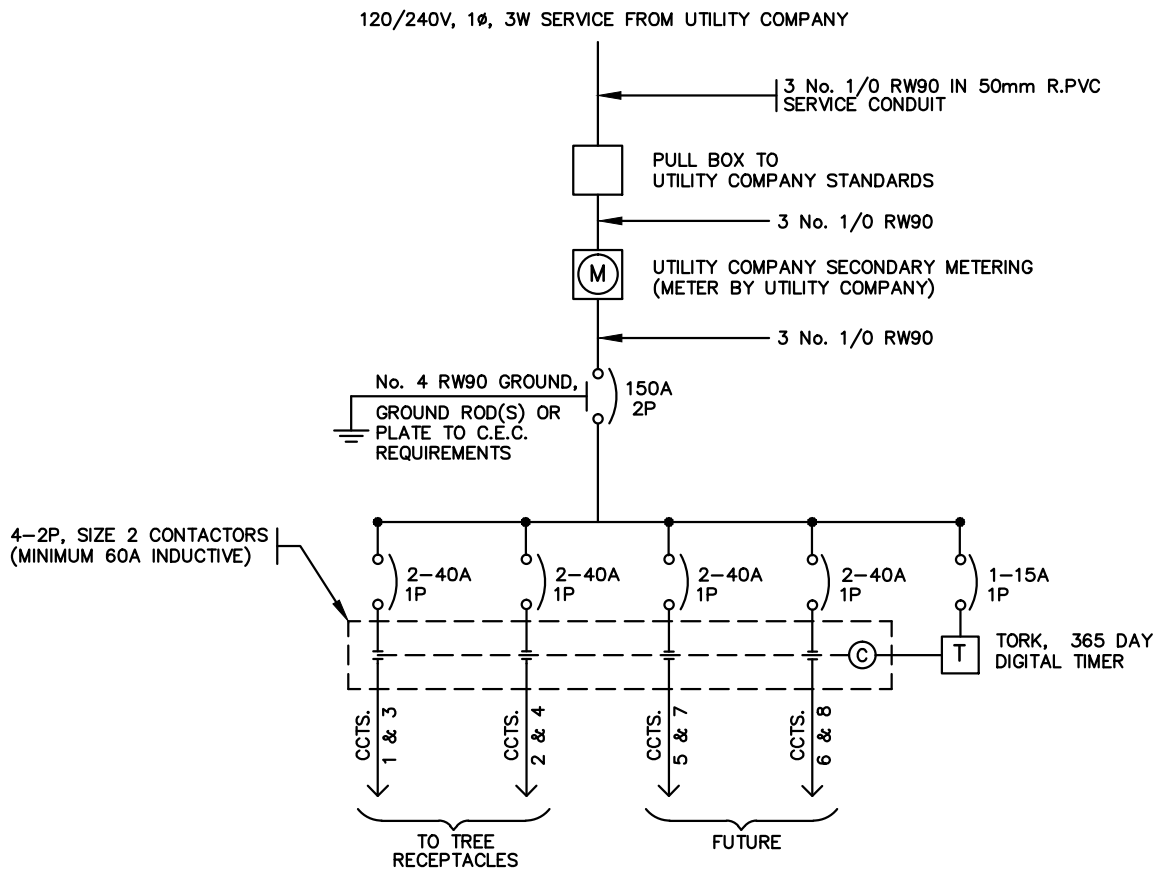
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
3. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
4. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
5. INSTALL IN A TYPE M SERVICE KIOSK, SEE DRAWINGS L6.3 & L6.4 FOR ADDITIONAL DETAILS.
6. CONTRACTOR SHALL SUPPLY KIOSK SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
7. TO BE MANUFACTURED WITH TYPE S OR TYPE M SERVICE KIOSK.



**SERVICE KIOSK
SINGLE LINE DIAGRAM 120/240 VOLT
(FOR CITY CENTRE LIGHTING)**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L6.5
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE :	SHEET No. : 1 OF 1



**SINGLE LINE DIAGRAM
(TREE RECEPTACLE KIOSK)**

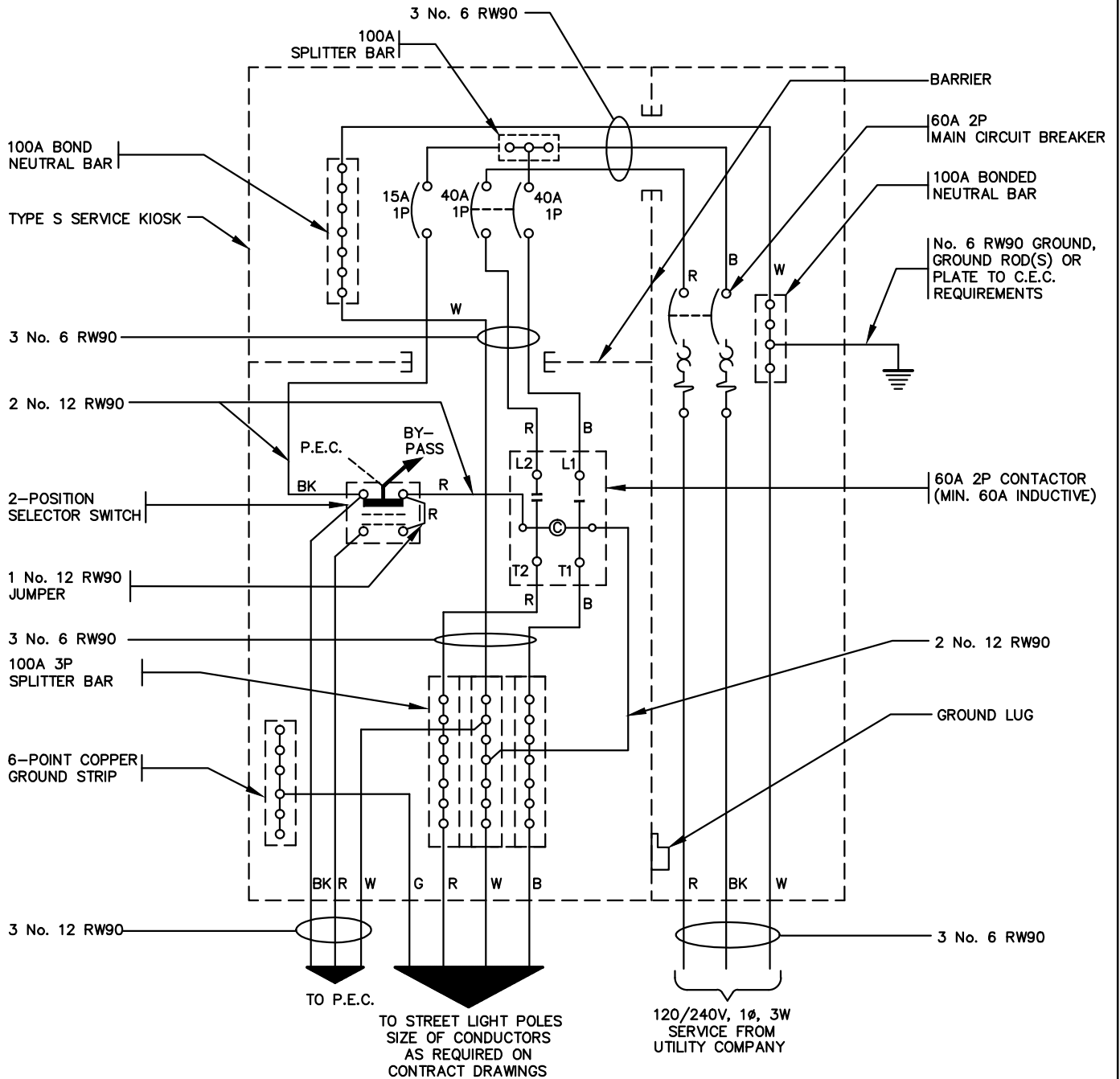
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
3. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
4. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
5. INSTALL IN A TYPE M SERVICE KIOSK, SEE DRAWINGS L6.3 & L6.4 FOR ADDITIONAL DETAILS.
6. CONTRACTOR SHALL SUPPLY KIOSK SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
7. TO BE MANUFACTURED WITH TYPE M SERVICE KIOSK.



**SERVICE KIOSK
SINGLE LINE DIAGRAM 120/240 VOLT
(FOR TREE RECEPTACLES)**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L6.6
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



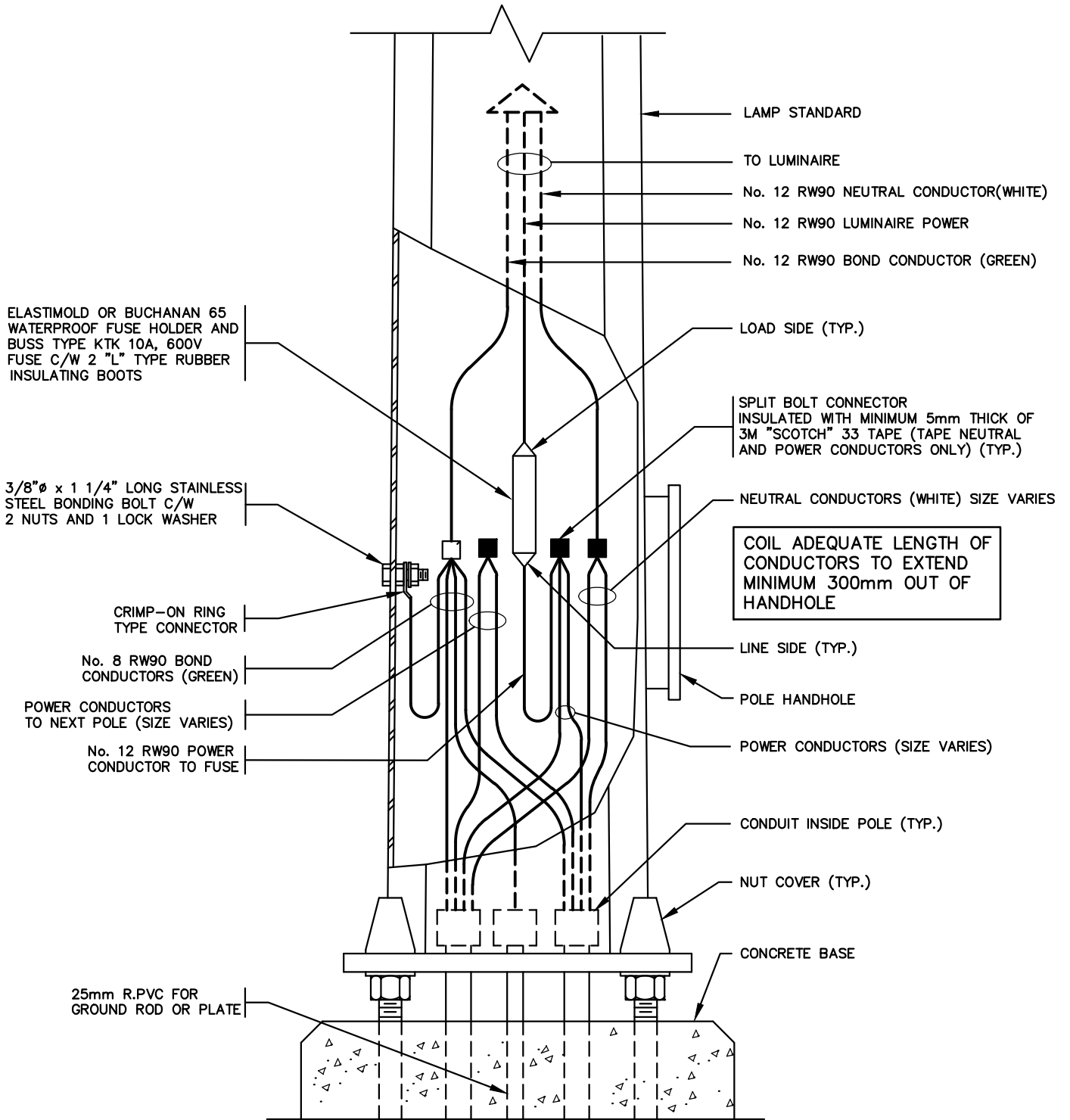
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL EQUIPMENT SHALL BE RATED AT A MINIMUM OF 600 VOLTS.
3. ALL BREAKERS SHALL BE RATED AT A MINIMUM OF 18,000 AIC.
4. SERVICE PANEL SHALL MEET THE APPROVAL OF THE PROVINCIAL ELECTRICAL INSPECTOR AND SHALL BEAR A 'PROVINCIAL INSPECTION' STICKER.
5. INSTALL IN A TYPE S SERVICE KIOSK, SEE DRAWINGS L6.1 & L6.2 FOR ADDITIONAL DETAILS.
6. CONTRACTOR SHALL SUPPLY KIOSK SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
7. TO BE MANUFACTURED WITH TYPE S SERVICE KIOSK.



**SERVICE KIOSK
WIRING DIAGRAM 120/240 VOLT
(FOR DECORATIVE LIGHTING)**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER :
DR. : C. YEUNG	DATE : JAN. 1998	L6.7
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



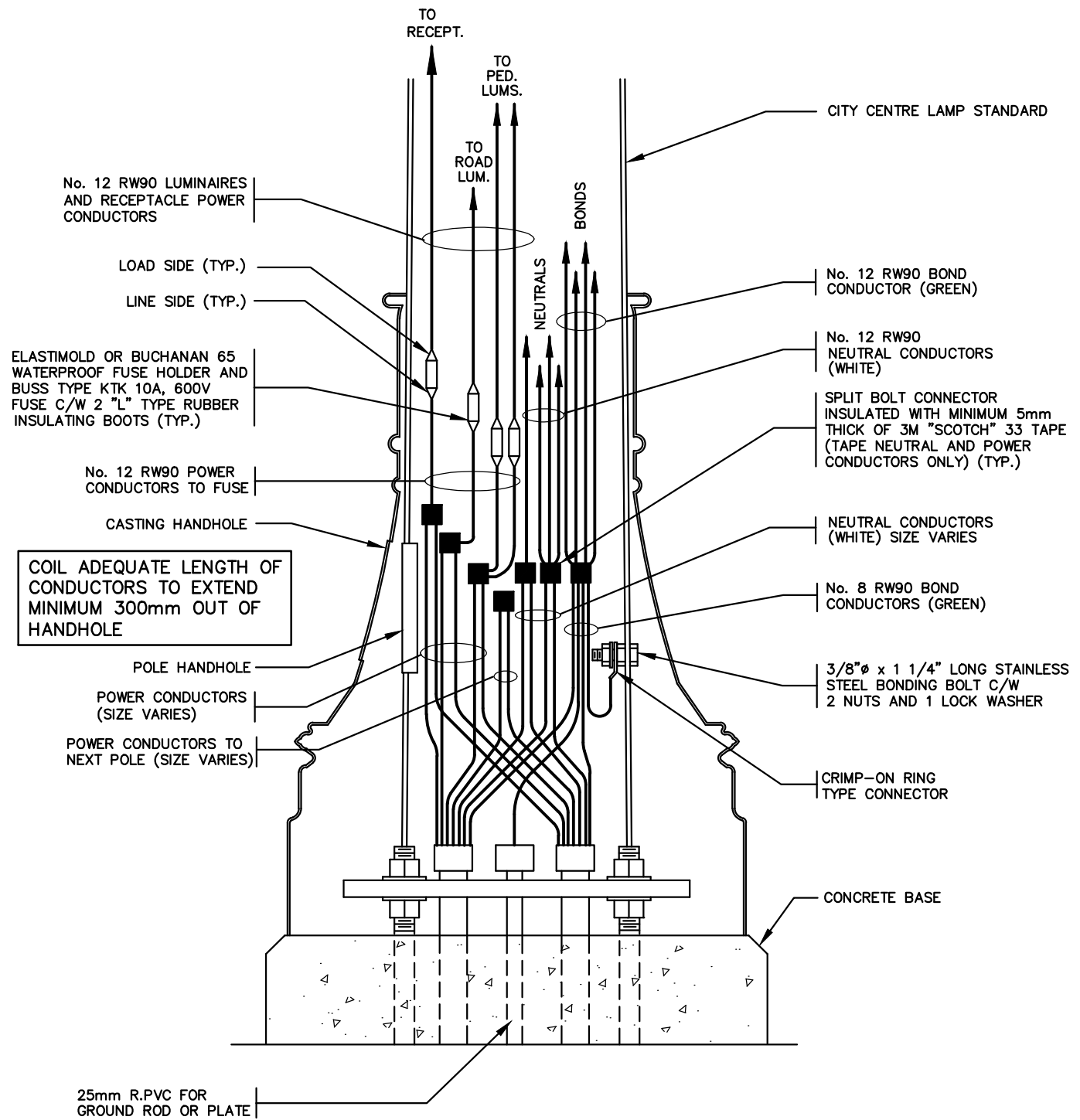
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. FOR POLES WITH DOUBLE DAVIT ARMS ADD A SECOND FUSEHOLDER(S) AND ASSOCIATED WIRING AS SHOWN.
3. SECURE CONDUCTOR SPLICES WITH SPLIT BOLT TYPE CONNECTORS ONLY. LOOPING OF CONDUCTORS WITH "T" TAPS WILL NOT BE ACCEPTED.



**120/240 VOLT
POLE HANDHOLE WIRING DETAIL**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER :
DR. : C. YEUNG	DATE : JAN. 1998	L7.1
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



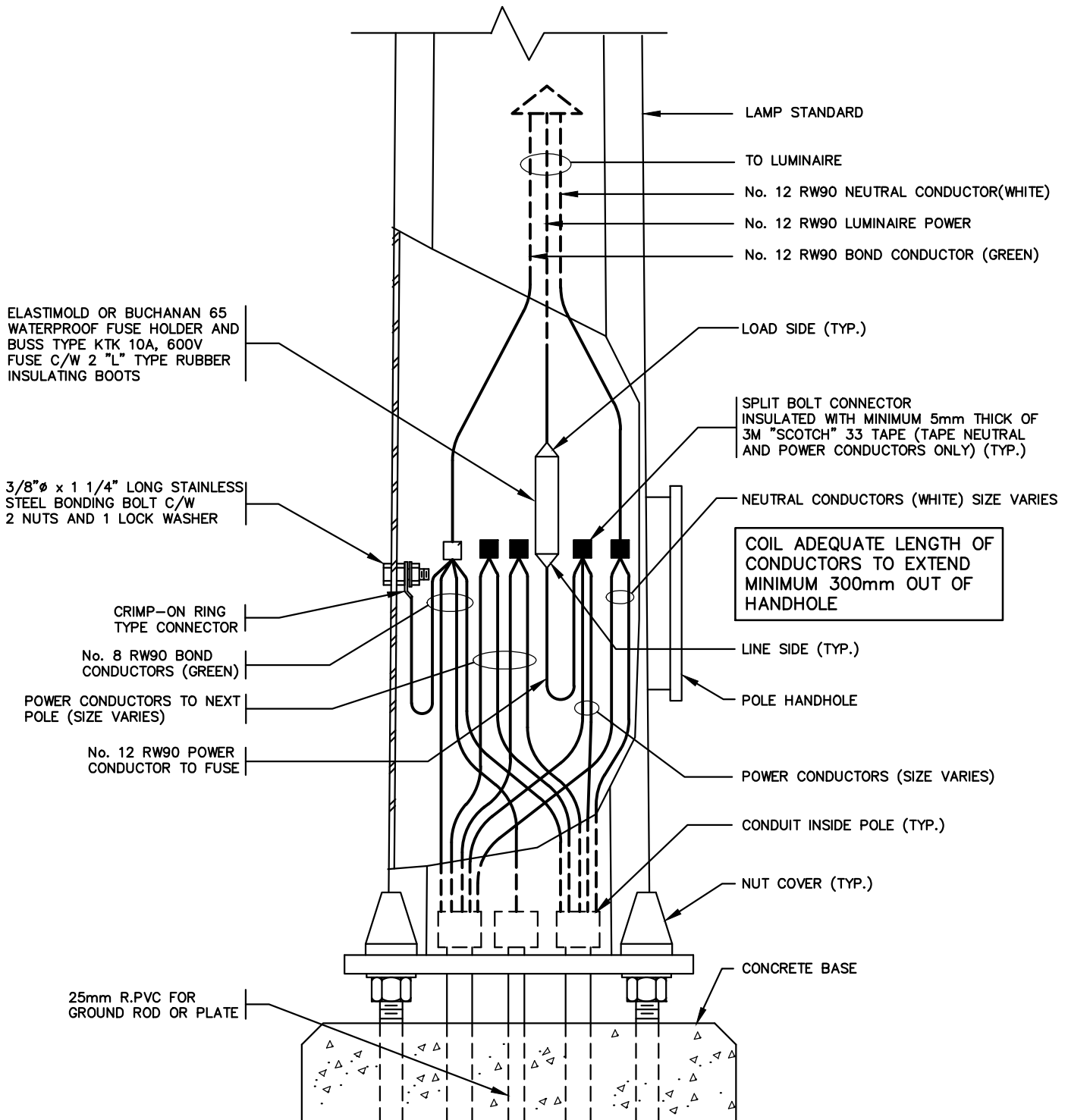
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SECURE CONDUCTOR SPLICES WITH SPLIT BOLT TYPE CONNECTORS ONLY. LOOPING OF CONDUCTORS WITH "T" TAPS WILL NOT BE ACCEPTED.



**120/240 VOLT
POLE HANDHOLE WIRING DETAIL
(FOR CITY CENTRE LIGHTING ONLY)**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER :
DR. : C. YEUNG	DATE : JAN. 1998	L7.2
ENG. :	REV. DATE : SEPT/16	SHEET No. : 1 OF 1



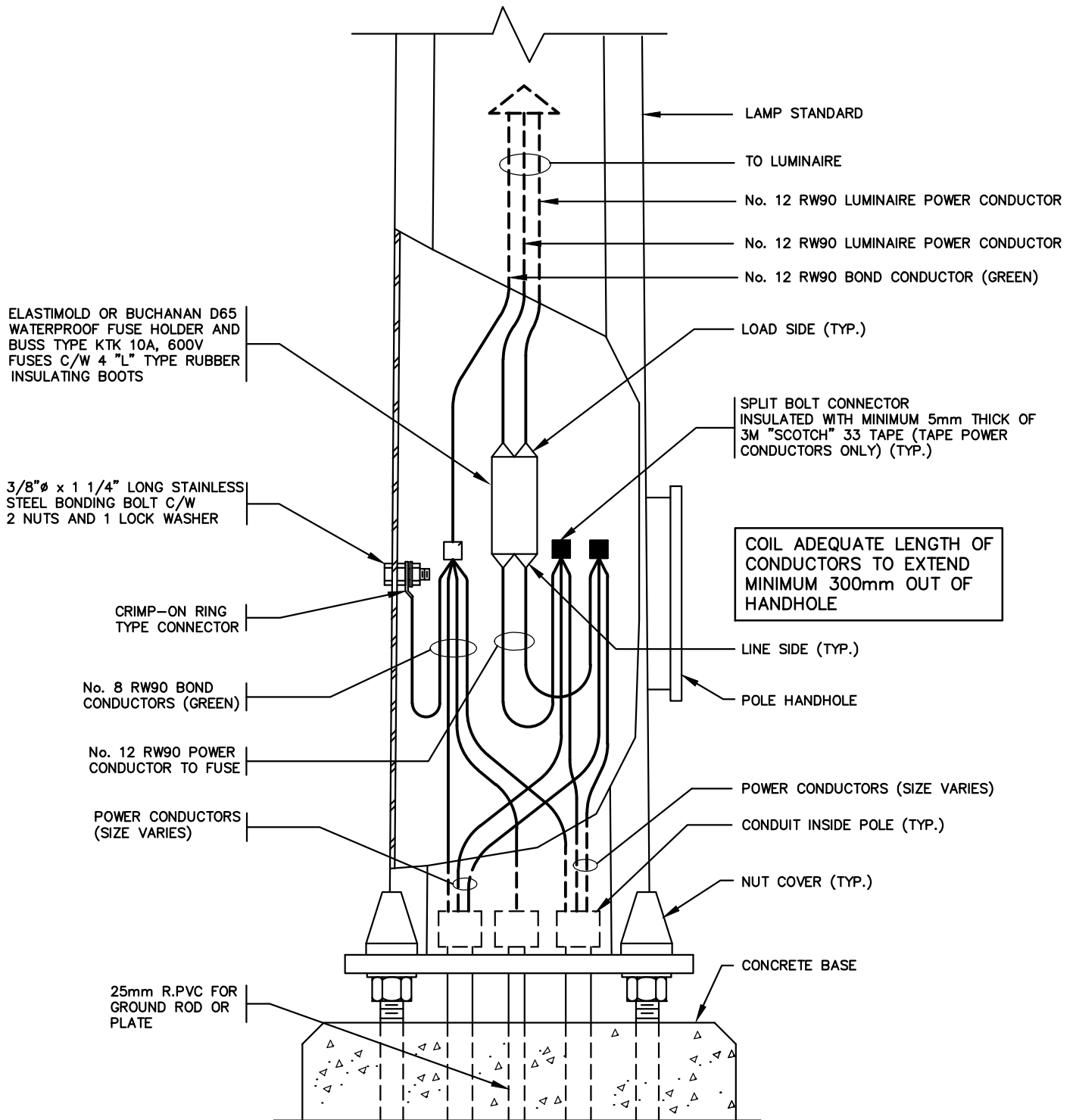
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. FOR POLES WITH DOUBLE DAVIT ARMS ADD A SECOND FUSEHOLDER(S) AND ASSOCIATED WIRING AS SHOWN.
3. SECURE CONDUCTOR SPLICES WITH SPLIT BOLT TYPE CONNECTORS ONLY. LOOPING OF CONDUCTORS WITH "T" TAPS WILL NOT BE ACCEPTED.



**347/600 VOLT 3 ϕ
POLE HANDHOLE WIRING DETAIL**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER :
DR. : C. YEUNG	DATE : JAN. 1998	L7.3
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



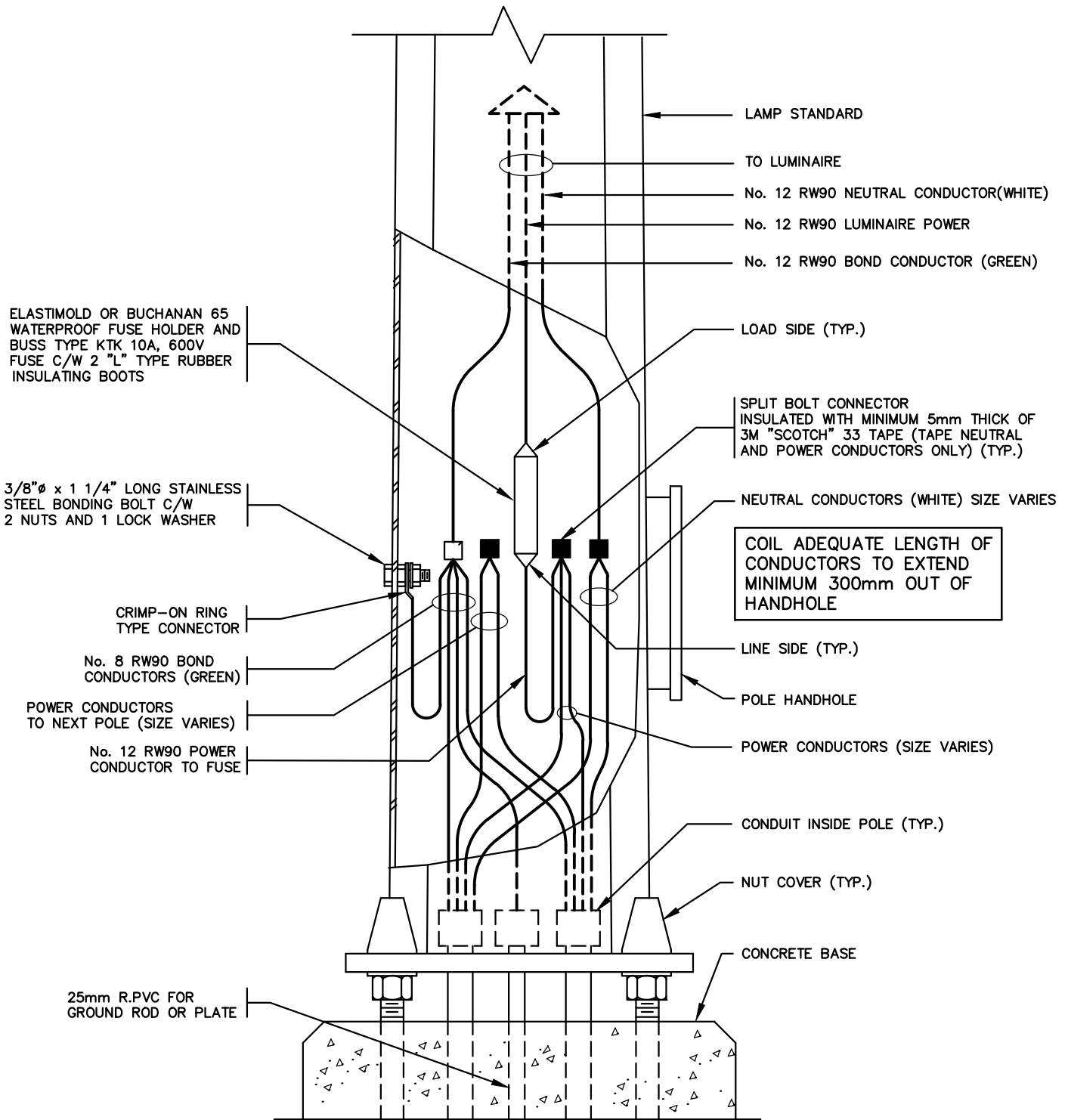
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. FOR POLES WITH DOUBLE DAVIT ARMS ADD A SECOND FUSEHOLDER(S) AND ASSOCIATED WIRING AS SHOWN.
3. SECURE CONDUCTOR SPLICES WITH SPLIT BOLT TYPE CONNECTORS ONLY. LOOPING OF CONDUCTORS WITH "T" TAPS WILL NOT BE ACCEPTED.



**240 VOLT
POLE HANDHOLE WIRING DETAIL
(FOR EXTENSION OF EXISTING SYSTEMS ONLY)**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER :
DR. : C. YEUNG	DATE : JAN. 1998	L7.4
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. FOR POLES WITH DOUBLE DAVIT ARMS ADD A SECOND FUSEHOLDER(S) AND ASSOCIATED WIRING AS SHOWN.
3. SECURE CONDUCTOR SPLICES WITH SPLIT BOLT TYPE CONNECTORS ONLY. LOOPING OF CONDUCTORS WITH "T" TAPS WILL NOT BE ACCEPTED.



**240/480 VOLT
POLE HANDHOLE WIRING DETAIL
(FOR EXTENSION OF EXISTING SYSTEMS ONLY)**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER :
DR. : C. YEUNG	DATE : JAN. 1998	L7.5
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

I.D. TAG DESIGNATION	COLOUR CODE			
LUM. CCTS. RECEPT. CCTS.	LUMINAIRE CIRCUITS	1 ϕ CIRCUITS	A	RED
			B	BLACK
			1	RED
			2	RED
			3	BLACK
			4	BLACK
			5	RED
			6	RED
	7	BLACK		
	8	BLACK		
	P.E.C.	PHOTOELECTRIC CELL	(LOAD)	RED
(LINE)			BLACK	
—	NEUTRAL	WHITE		
—	GROUND/BOND	GREEN		
—	NEUTRAL		A	RED
			B	BLACK
			C	BLUE

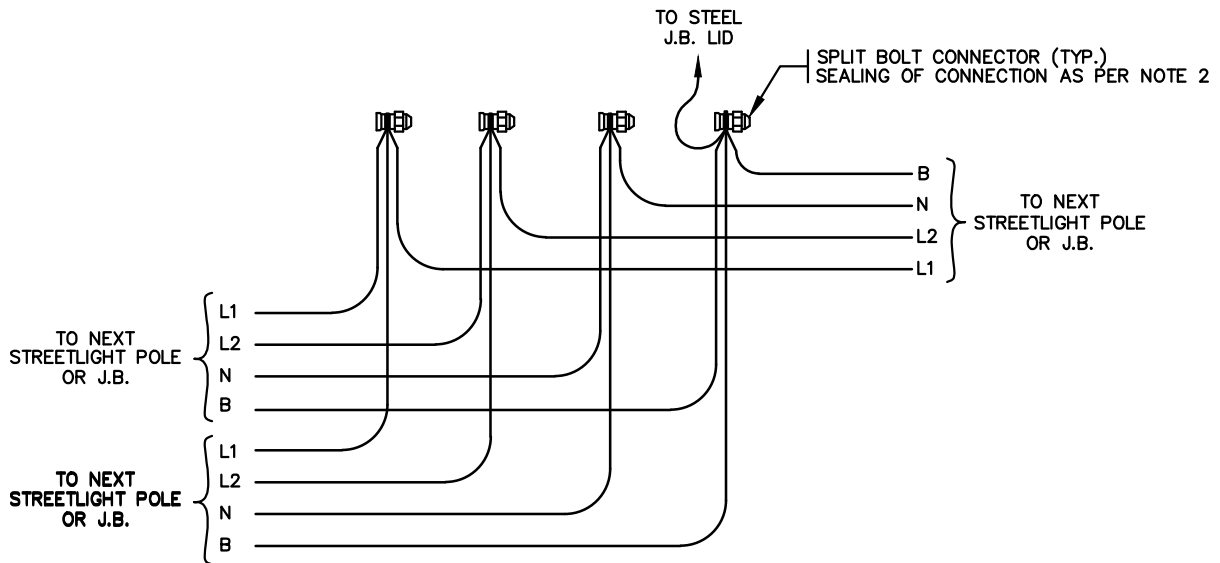
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CONDUCTORS SHALL BE IDENTIFIED IN ALL POLE HANDHOLES, J.B.'S AND ALL ACCESS POINTS. IDENTIFICATION SHALL BE MADE USING TY-RAP IDENTIFICATION TAGS (TY5532M OR APPROVED EQUAL) WITH I.D. TAG DESIGNATIONS CLEARLY MARKED USING A BLACK INDELIBLE MARKER PEN.

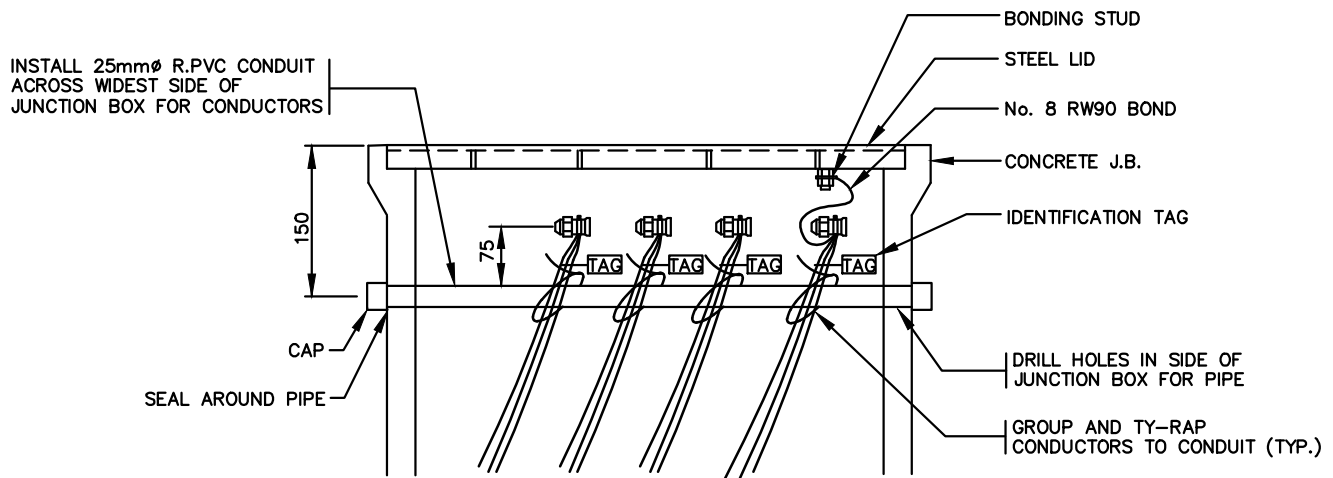


CONDUCTOR COLOUR CODE

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L7.6
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



**TYPICAL STREETLIGHT/POLE RECEPTACLE
SPlicing DETAIL IN J.B.**



**TYPICAL CONDUCTOR ARRANGEMENT IN
JUNCTION BOX**

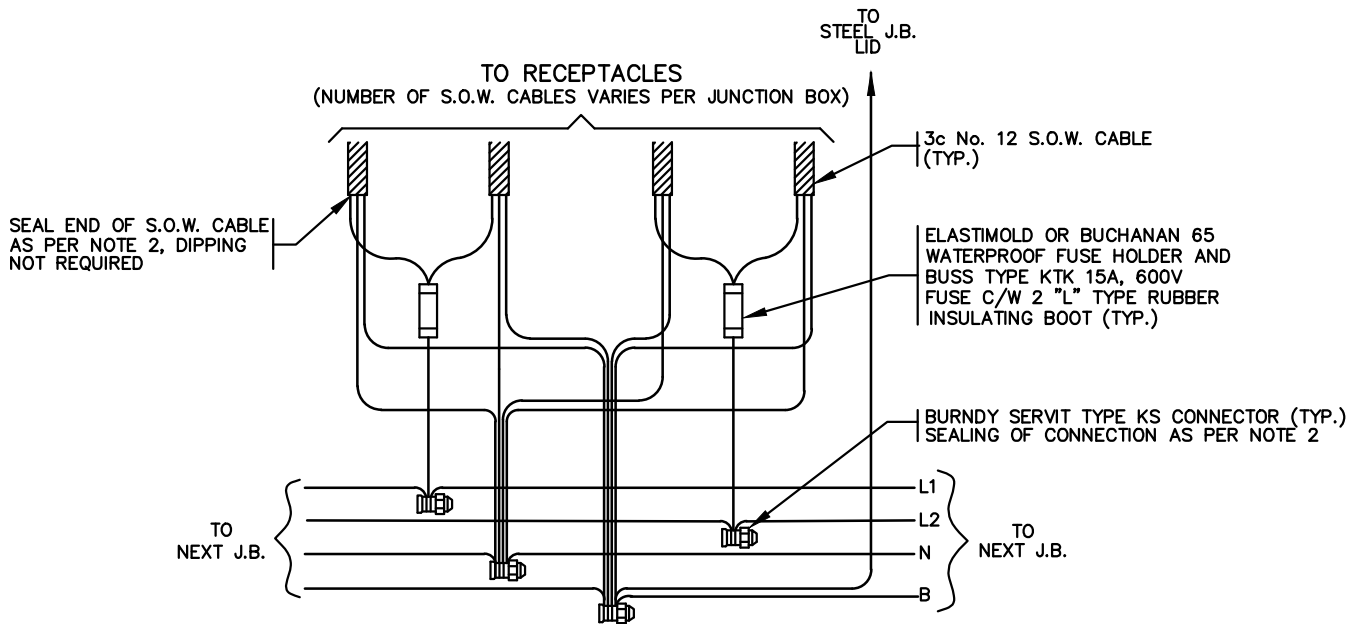
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEALING OF THE CONNECTIONS SHALL BE DOUBLE DIPPED WITH 3M SCOTCHCOTE AND THEN TAPED WITH BISHOP BI-SEAL, PHILLIPS ROTUNDA OR 3M SELF HOLDING TAPE OR APPROVED EQUAL, WRAP TAPE IN BETWEEN THE CONDUCTORS TO FURTHER PREVENT WATER ENTERING AND COVER WITH PVC TAPE (MINIMUM 6 LAYERS OF EACH).
3. SECURE CONDUCTOR SPLICES WITH SPLIT BOLT TYPE CONNECTORS ONLY. LOOPING OF CONDUCTORS WITH "T" TAPS WILL NOT BE ACCEPTED.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

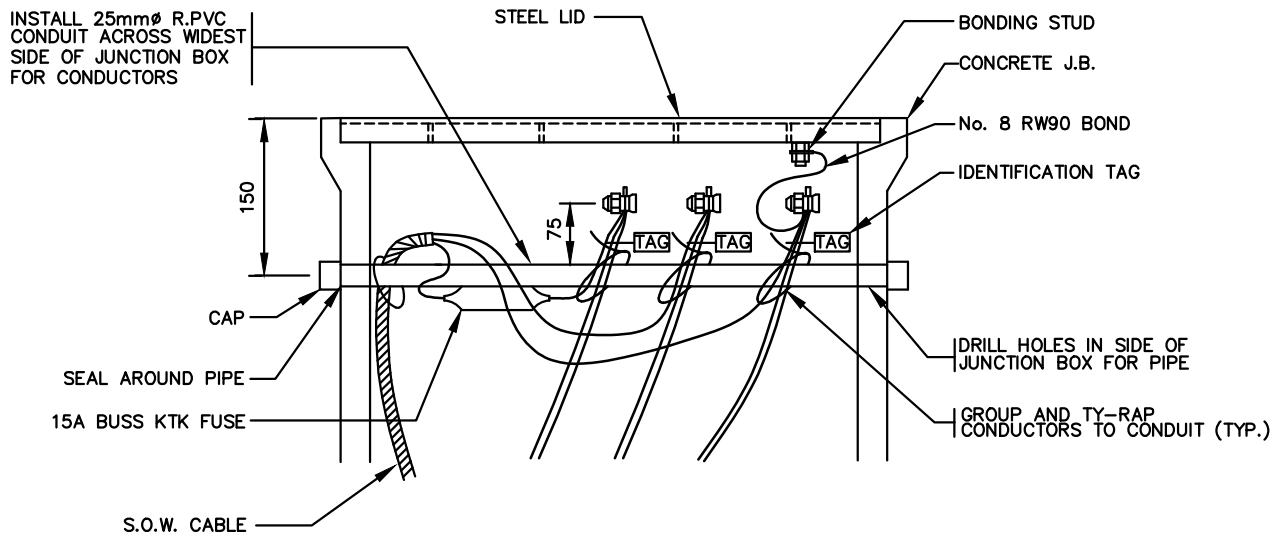


**STREET LIGHT WIRING
INSIDE CONCRETE JUNCTION BOX**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L8.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



TYPICAL TREE RECEPTACLE SPLICING DETAIL IN J.B.



TYPICAL CONDUCTOR ARRANGEMENT IN JUNCTION BOX

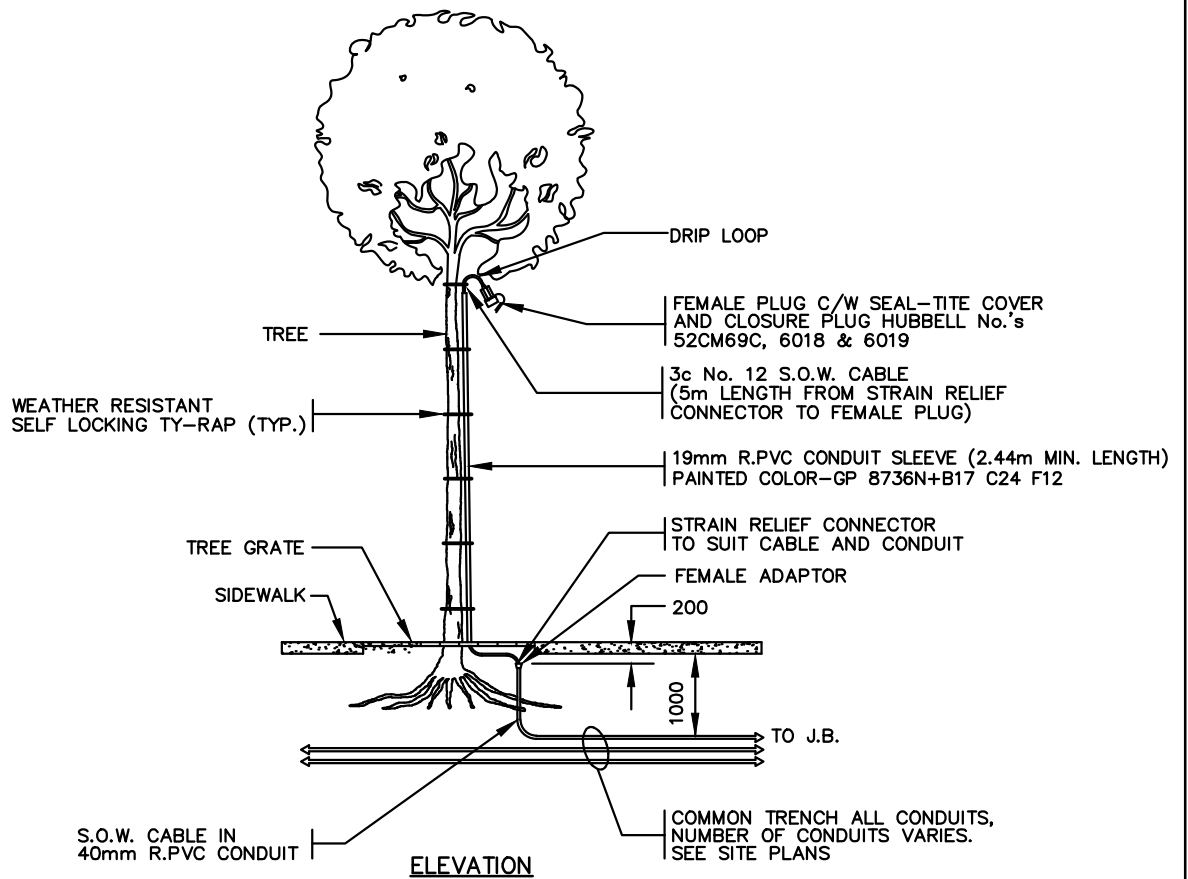
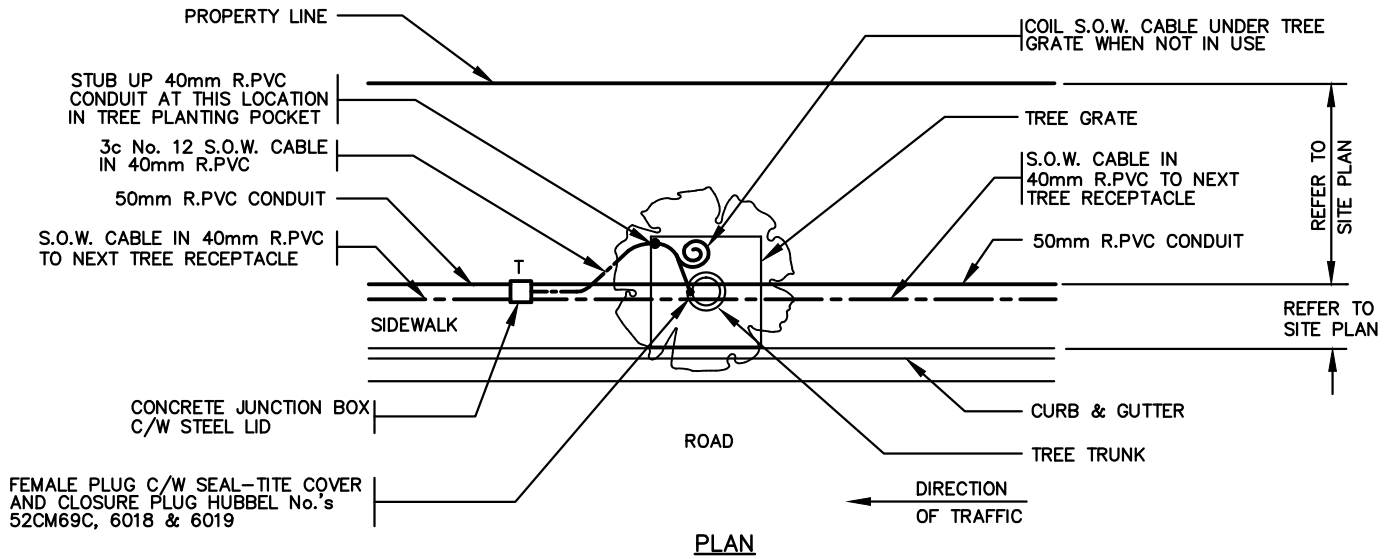
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEALING OF THE CONNECTIONS SHALL BE DOUBLE DIPPED WITH 3M SCOTCHCOTE AND THEN TAPED WITH BISHOP BI-SEAL, PHILLIPS ROTUNDA OR 3M SELF HOLDING TAPE OR APPROVED EQUAL, WRAP TAPE IN BETWEEN THE CONDUCTORS TO FURTHER PREVENT WATER ENTERING AND COVER WITH PVC TAPE (MINIMUM 6 LAYERS OF EACH).
3. SECURE CONDUCTOR SPLICES WITH SPLIT BOLT TYPE CONNECTORS ONLY. LOOPING OF CONDUCTORS WITH "T" TAPS WILL NOT BE ACCEPTED.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



TREE RECEPTACLE WIRING
INSIDE CONCRETE JUNCTION BOX

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L8.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



TREE RECEPTACLE/ST. LTG. CONDUITS, S.O.W. CABLE AND JUNCTION BOX LAYOUT

NOTES

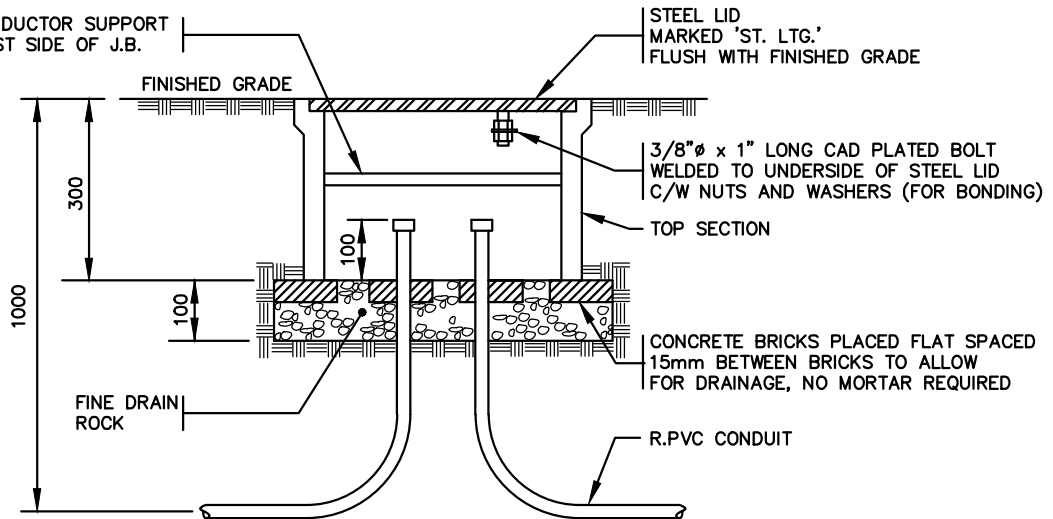
1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



**TREE RECEPTACLE
INSTALLATION DETAIL**

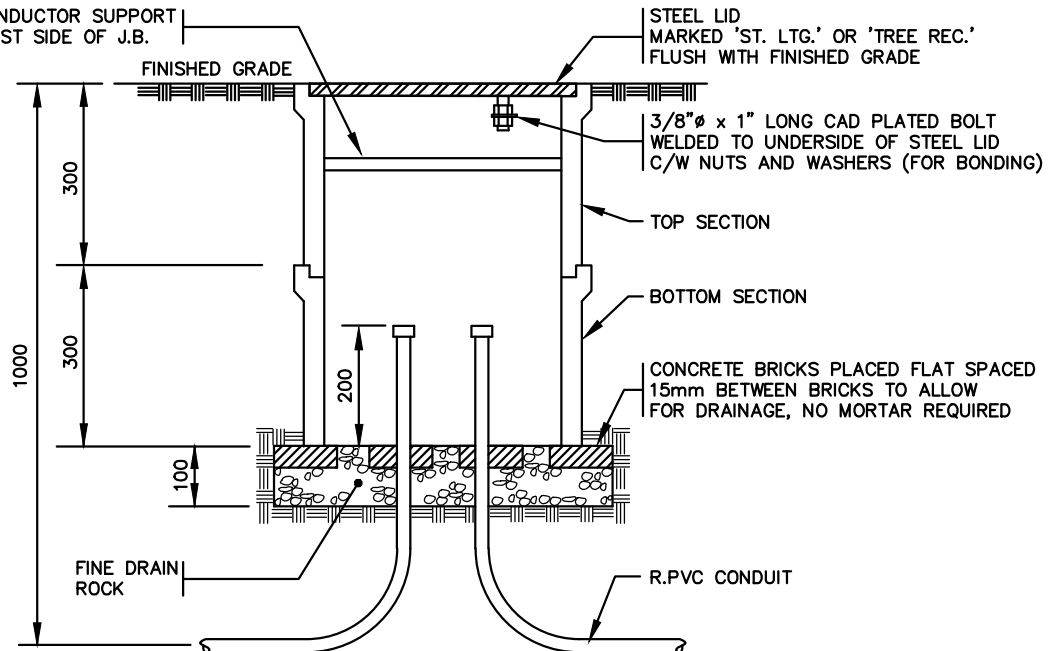
TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L9.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

25mm ϕ R.PVC CONDUCTOR SUPPORT BAR ACROSS WIDEST SIDE OF J.B.



**STREET LIGHTING
CONCRETE JUNCTION BOX**

25mm ϕ R.PVC CONDUCTOR SUPPORT BAR ACROSS WIDEST SIDE OF J.B.



**STREET LIGHTING AND TREE RECEPTACLE
CONCRETE JUNCTION BOX**

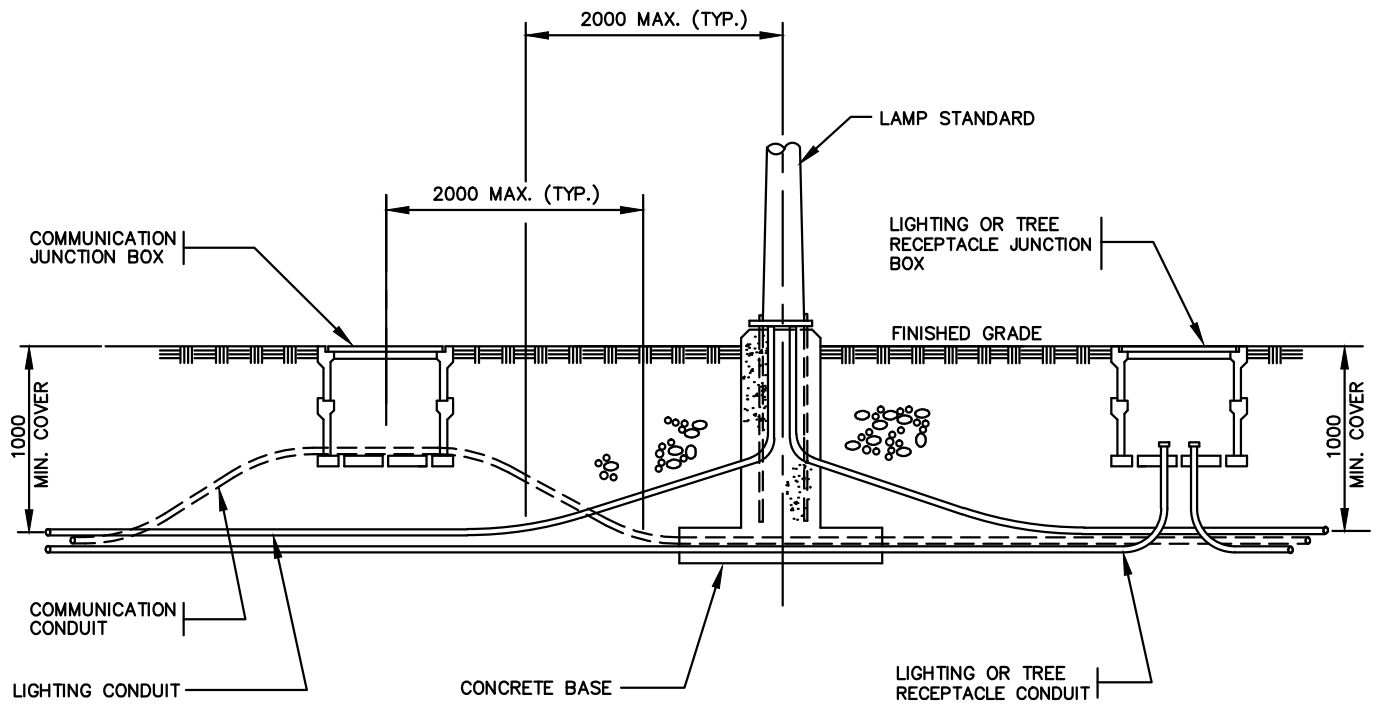
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. JUNCTION BOXES SHALL BE A.E. CONCRETE No. 37 OR No.66 TYPE OR APPROVED EQUAL.
3. BEDDING AND BACKFILL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm COMPACTED THICKNESS, AND SHALL BE COMPACTED USING A PNEUMATIC OR VIBRATING MECHANICAL COMPACTOR, TO 95% OF THE LABORATORY DENSITY (MODIFIED PROCTOR DENSITY) AS DETERMINED BY TEST BCH-1-14 (ASTM DESIGNATION D698) METHOD 'D'.
4. ADD BOTTOM SECTION TO JUNCTION BOX AS REQUIRED.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



**JUNCTION BOX
INSTALLATION DETAILS**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L9.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



TYPICAL STREET LIGHTING, TREE RECEPTACLE
AND TRAFFIC COMMUNICATION CONDUIT BURY DETAIL

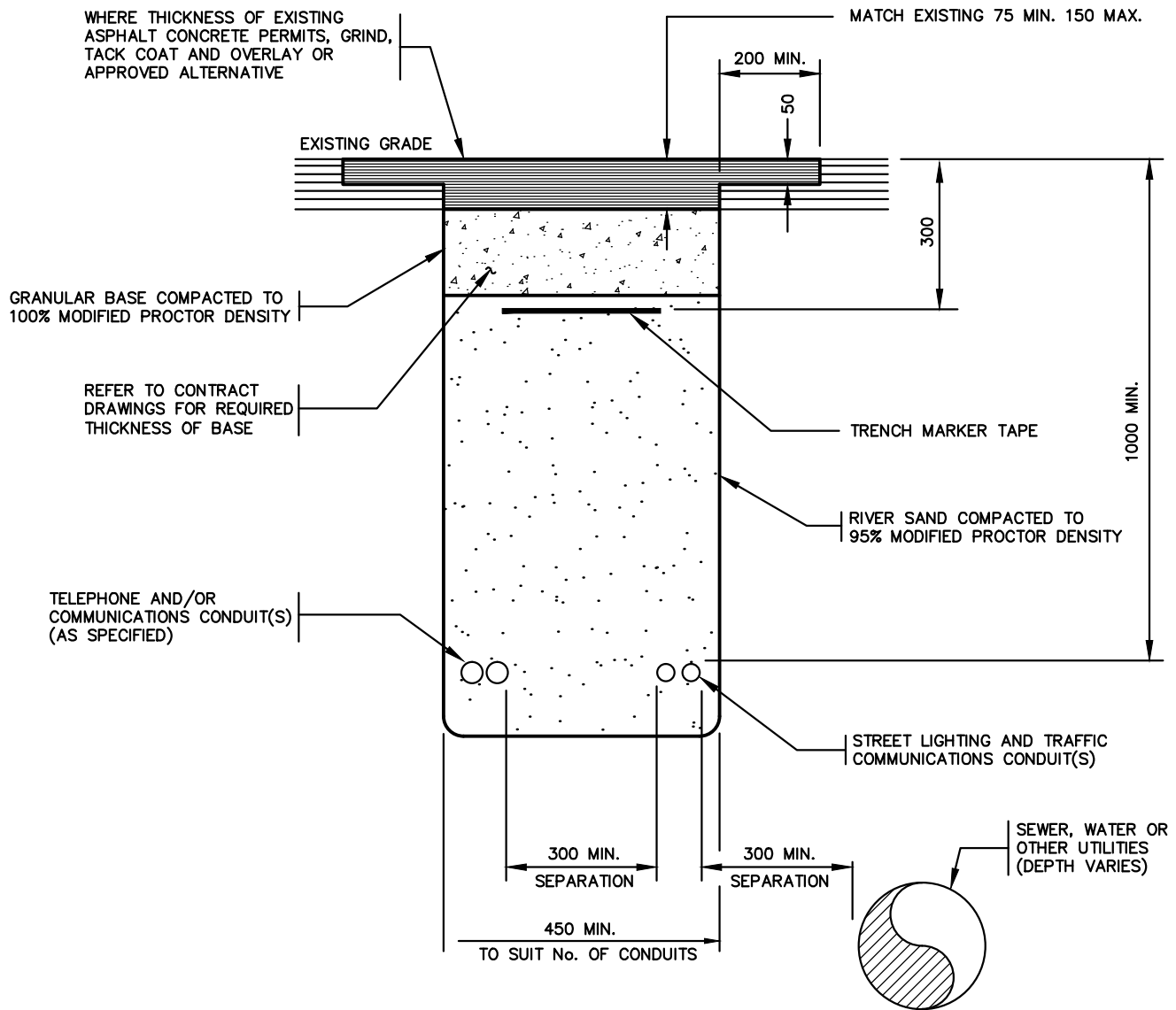
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL CONDUITS SHALL BE BURIED A MINIMUM 1000mm DEEP AND EMBEDDED IN SAND 75mm ABOVE AND 75mm BELOW AND BURIED CONDUIT MARKER TAPE SHALL BE INSTALLED IN ALL TRENCHES.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



CONDUIT BURY DETAIL

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L9.3
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



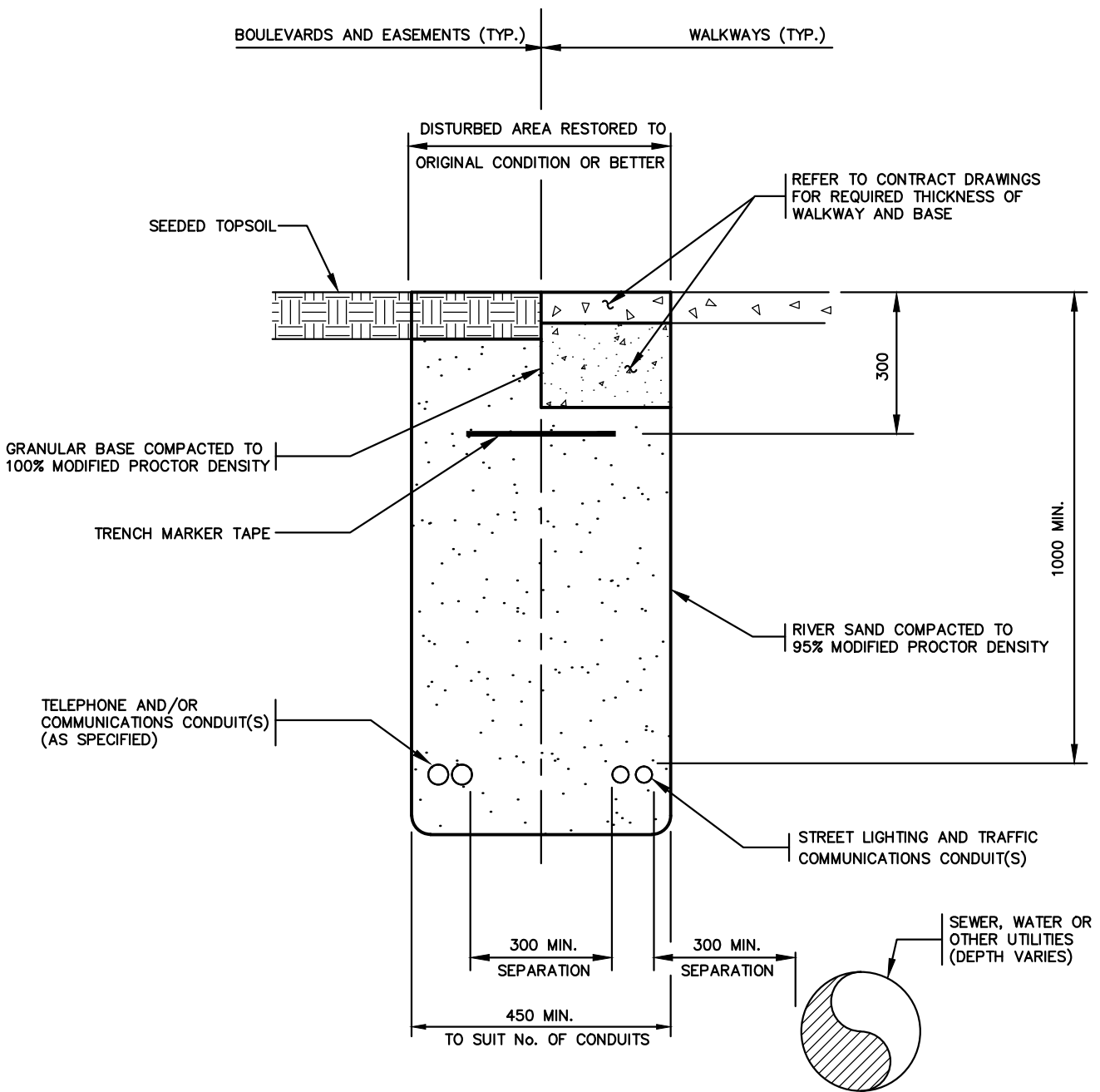
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL CONDUITS SHALL BE BURIED A MINIMUM 1000mm DEEP AND EMBEDDED IN SAND 75mm ABOVE AND 75mm BELOW AND BURIED CONDUIT MARKER TAPE SHALL BE INSTALLED IN ALL TRENCHES.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



UNDERGROUND CONDUIT IN PAVED AREAS

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L10.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



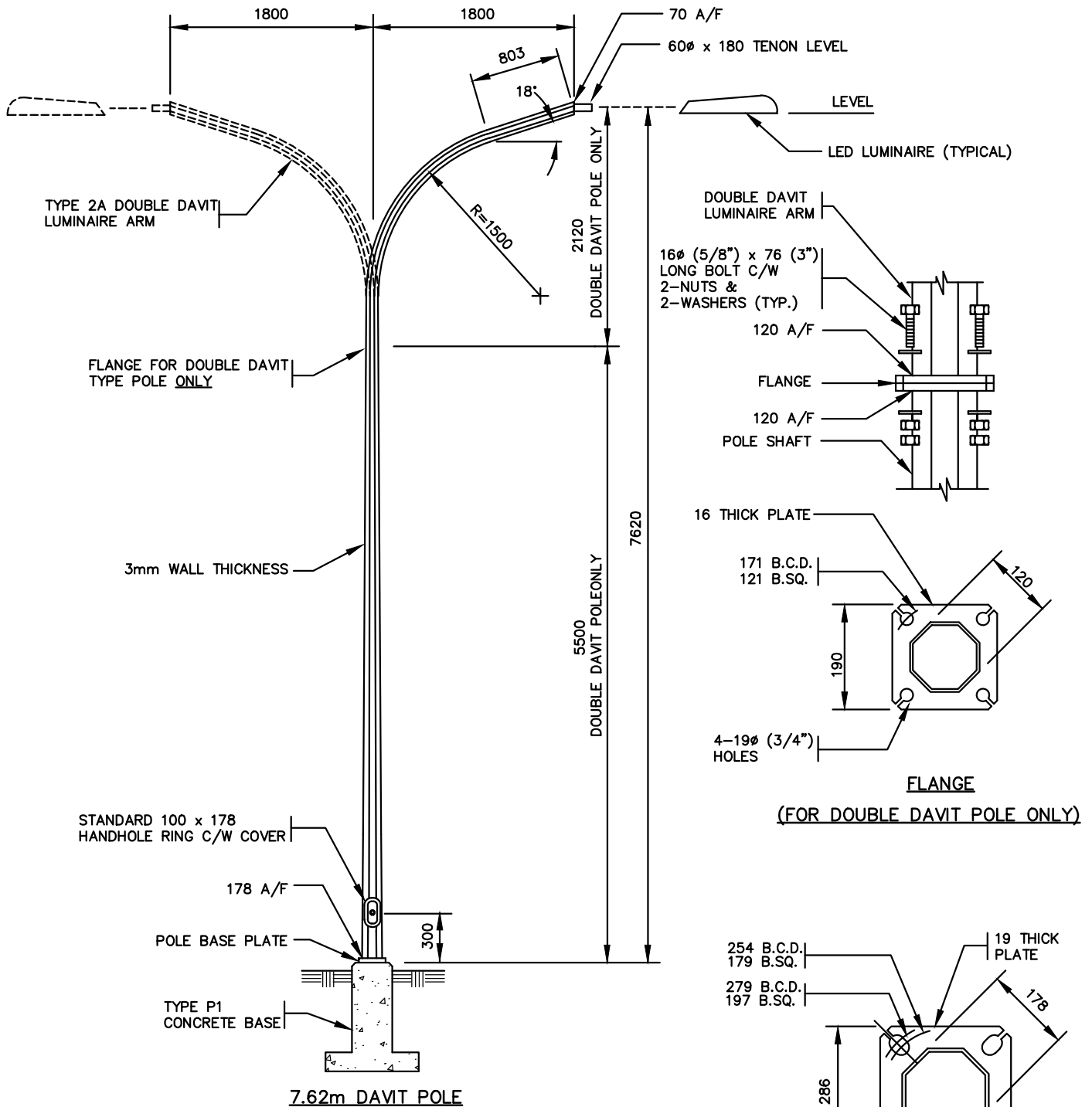
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL CONDUITS SHALL BE BURIED A MINIMUM 1000mm DEEP AND EMBEDDED IN SAND 75mm ABOVE AND 75mm BELOW AND BURIED CONDUIT MARKER TAPE SHALL BE INSTALLED IN ALL TRENCHES.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



UNDERGROUND CONDUIT IN NON-PAVED AREAS

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L10.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



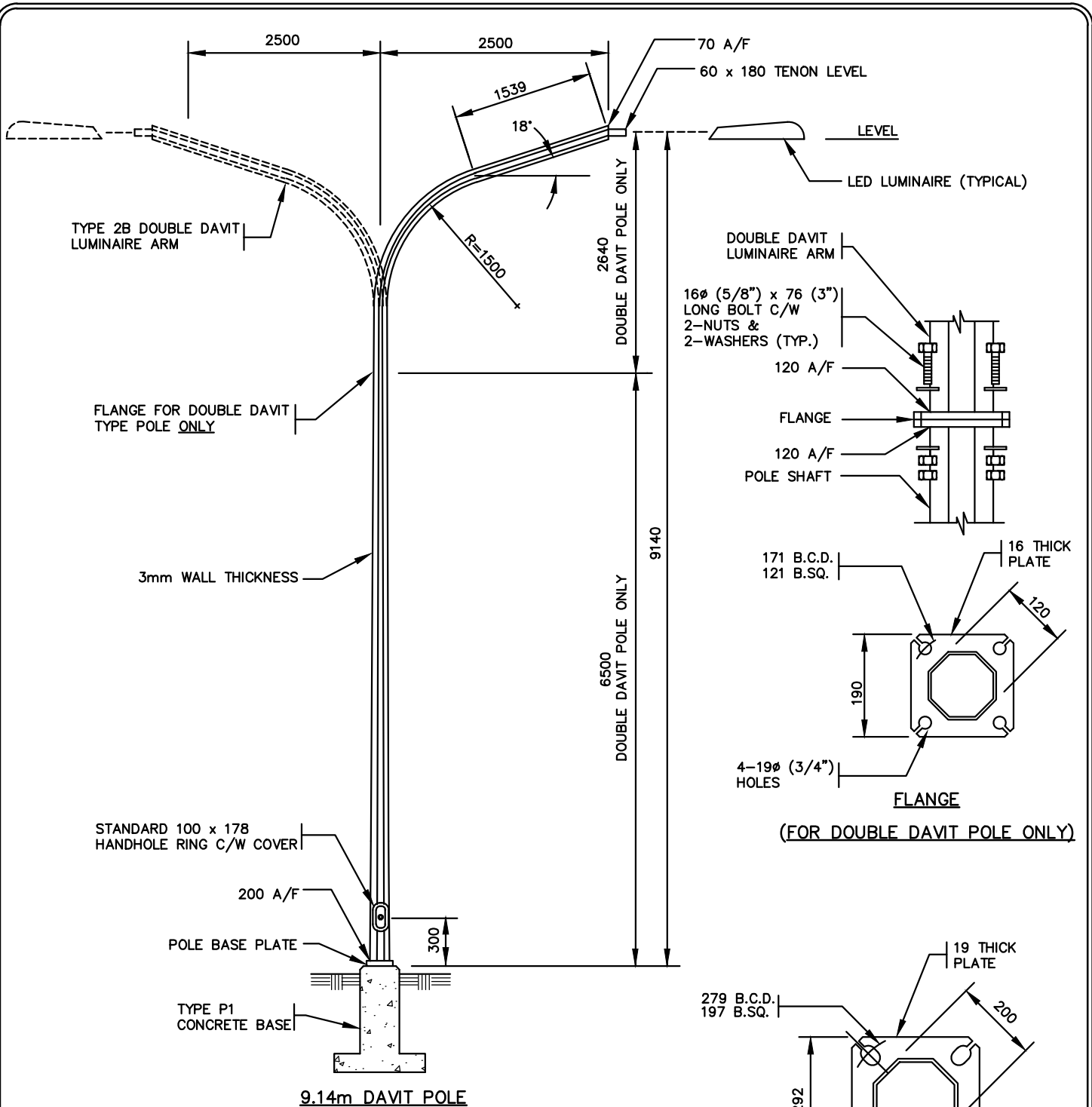
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWINGS L13.2 & L13.3 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES TO BE SUPPLIED WITH GALVANIZED FINISH, UNLESS OTHERWISE NOTED.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. POLE TO BE SUPPLIED 0.9m SHORTER WHEN INSTALLED ON SERVICE BASE.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



7.62m DAVIT LUMINAIRE POLES

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L11.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : NOV/16	SHEET No. : 1 OF 1

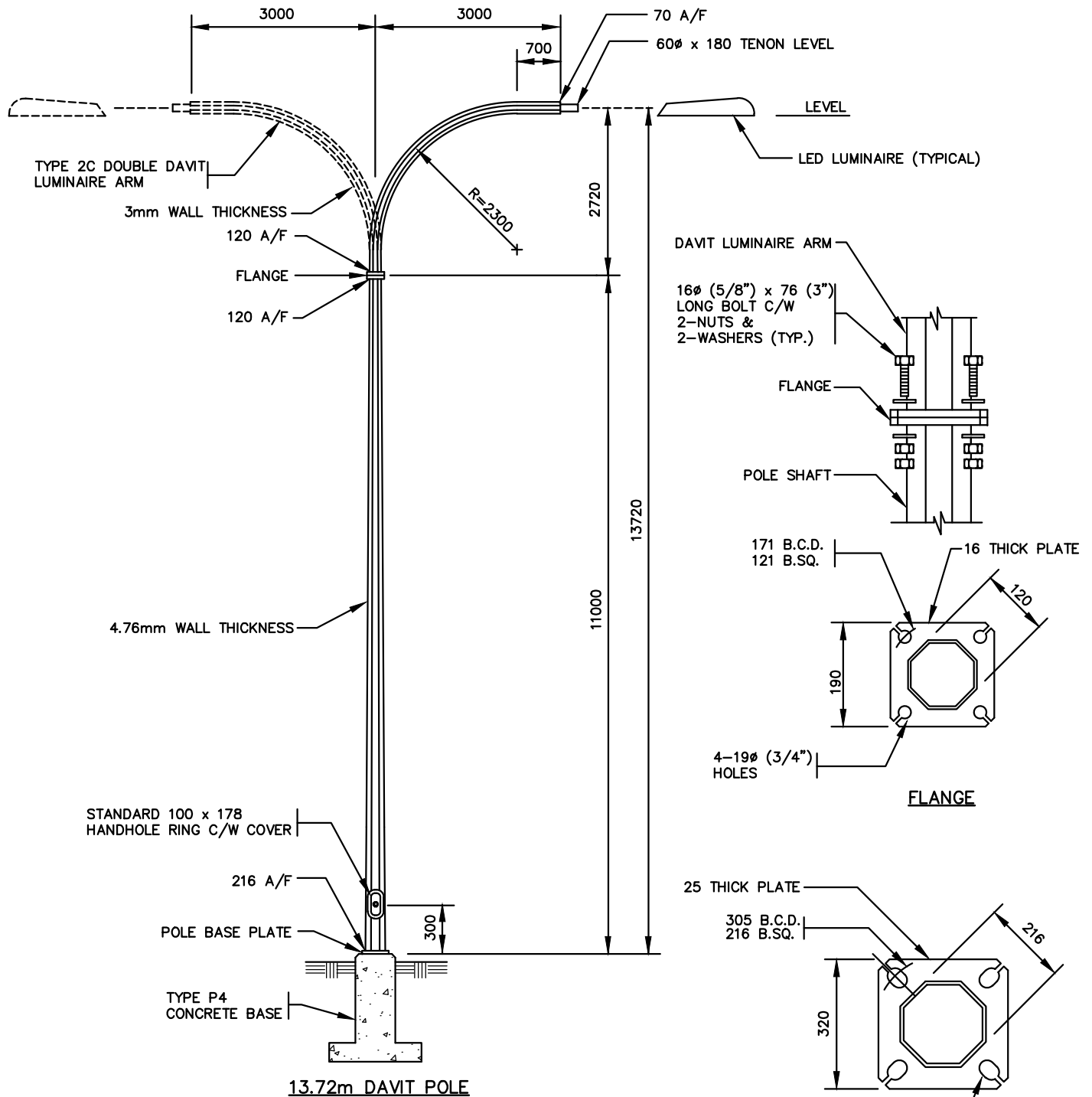


9.14m DAVIT POLE

NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWINGS L13.2 & L13.3 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES TO BE SUPPLIED WITH GALVANIZED FINISH, UNLESS OTHERWISE NOTED.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. POLE TO BE SUPPLIED 0.9m SHORTER WHEN INSTALLED ON SERVICE BASE.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

	9.14m DAVIT LUMINAIRE POLES		
	TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L11.2
	DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1	

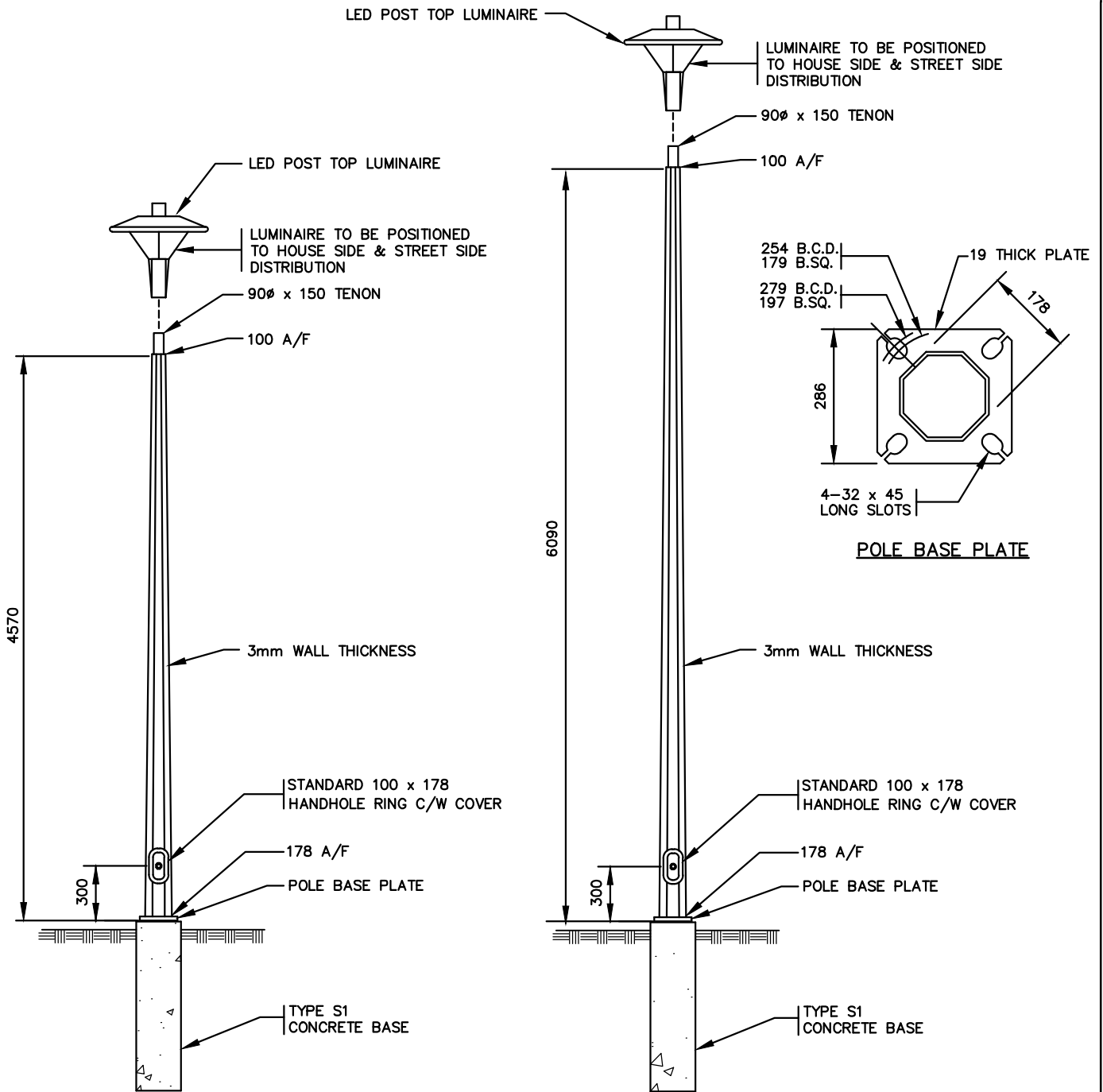


13.72m DAVIT POLE

NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWINGS L13.2 & L13.3 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES TO BE SUPPLIED WITH GALVANIZED FINISH, UNLESS OTHERWISE NOTED.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

	<h2 style="margin: 0;">13.72m DAVIT LUMINAIRE POLES</h2>		
	TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L11.3
	DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1	



4.57m POST TOP POLE

6.09m POST TOP POLE

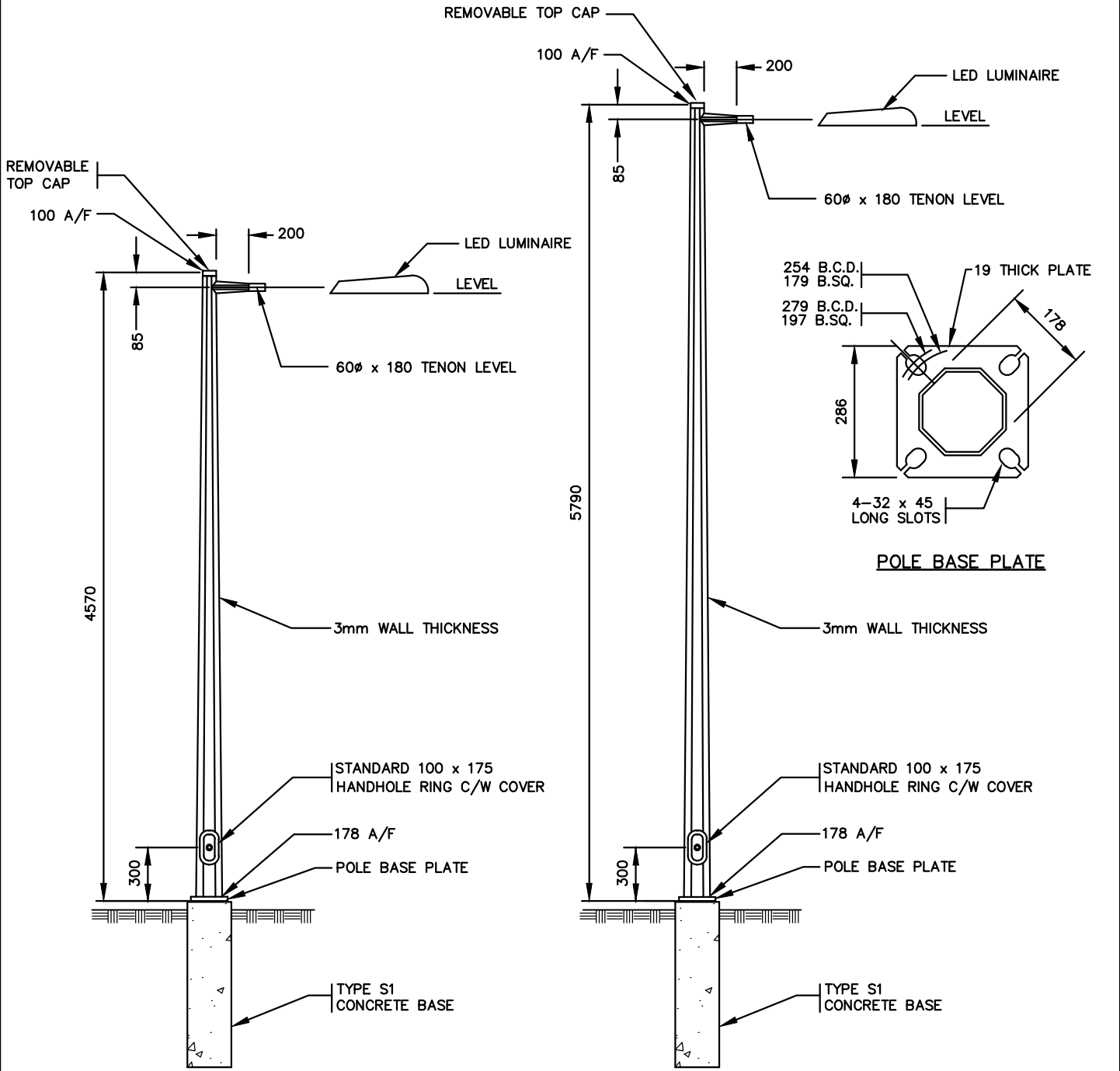
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWINGS L13.2 & L13.3 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES TO BE SUPPLIED WITH GALVANIZED FINISH, UNLESS OTHERWISE NOTED.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. POLE TO BE SUPPLIED 0.9m SHORTER WHEN INSTALLED ON SERVICE BASE.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



POST TOP LUMINAIRE POLES

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L11.4
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : NOV/16	SHEET No. : 1 OF 1



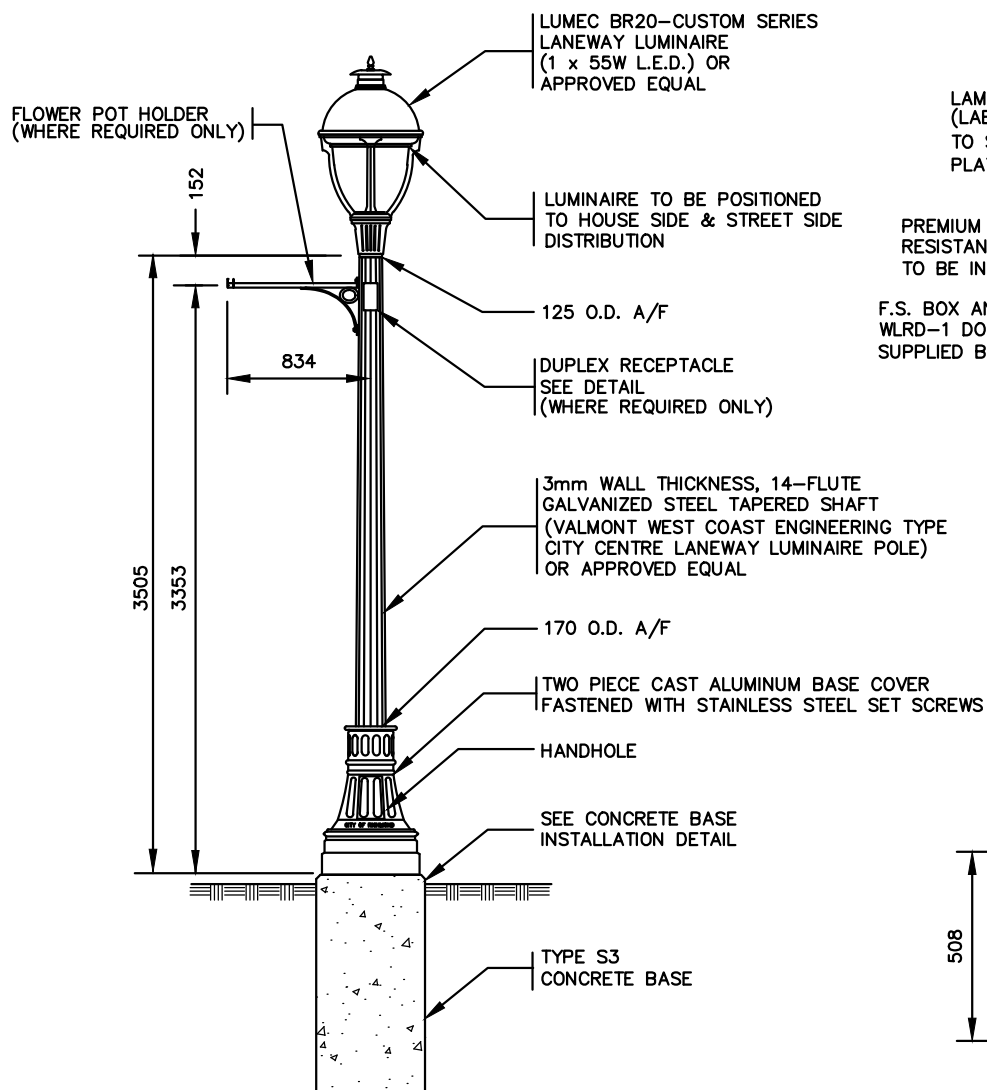
4.57m PATHWAY POLE

5.79m LANEWAY POLE

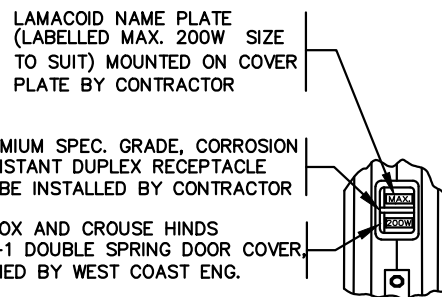
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWINGS L13.2 & L13.3 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES TO BE SUPPLIED WITH GALVANIZED FINISH, UNLESS OTHERWISE NOTED.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. POLE TO BE SUPPLIED 0.9m SHORTER WHEN INSTALLED ON SERVICE BASE.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

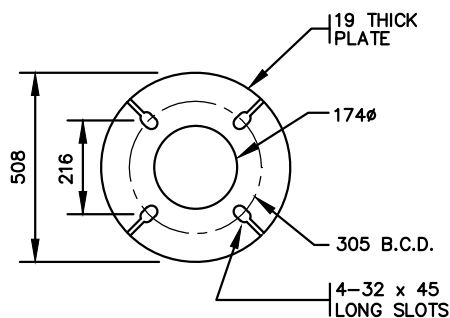
	<p>PATHWAY AND LANEWAY SIDE MOUNTED LUMINAIRE POLES</p>		
	TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER :
	DR. : C. YEUNG	DATE : JAN. 1998	L11.5
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1	



ELEVATION



DUPLEX RECEPTACLE



POLE BASE PLATE

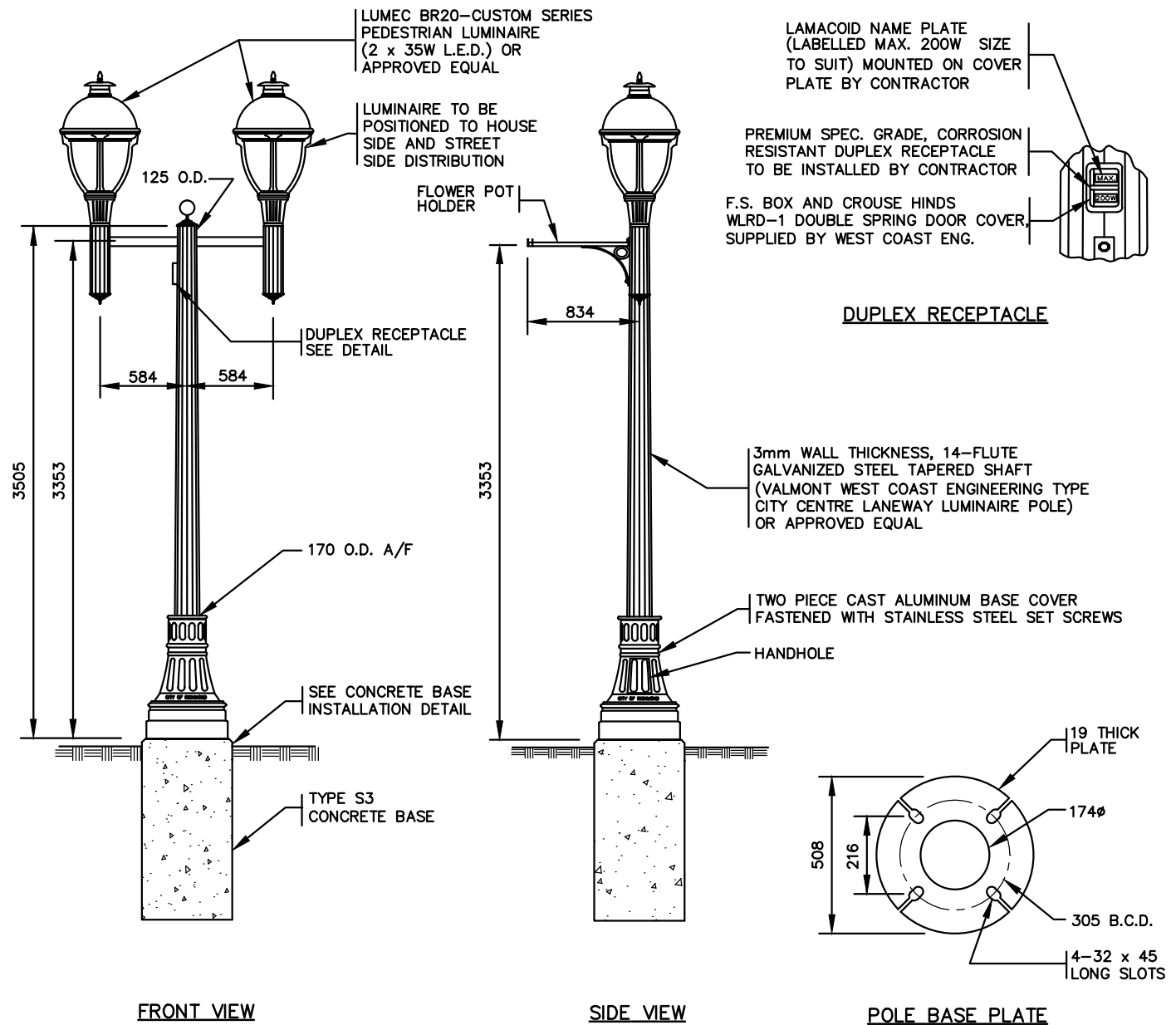
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.3 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.
5. POLES & LUMINAIRES SHALL BE POWDER COAT FINISHED, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
6. POLES SHALL BE CITY CENTRE TYPE AS MANUFACTURED BY VALMONT WEST COAST ENGINEERING FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
7. LUMINAIRES SHALL BE BR20-CUSTOM SERIES AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
9. FLOWER POT HOLDER TO ACCOMMODATE IRRIGATION SYSTEM (WHERE REQUIRED ONLY).



**CITY CENTRE TYPE
LANEWAY LUMINAIRE POLE**

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L12.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



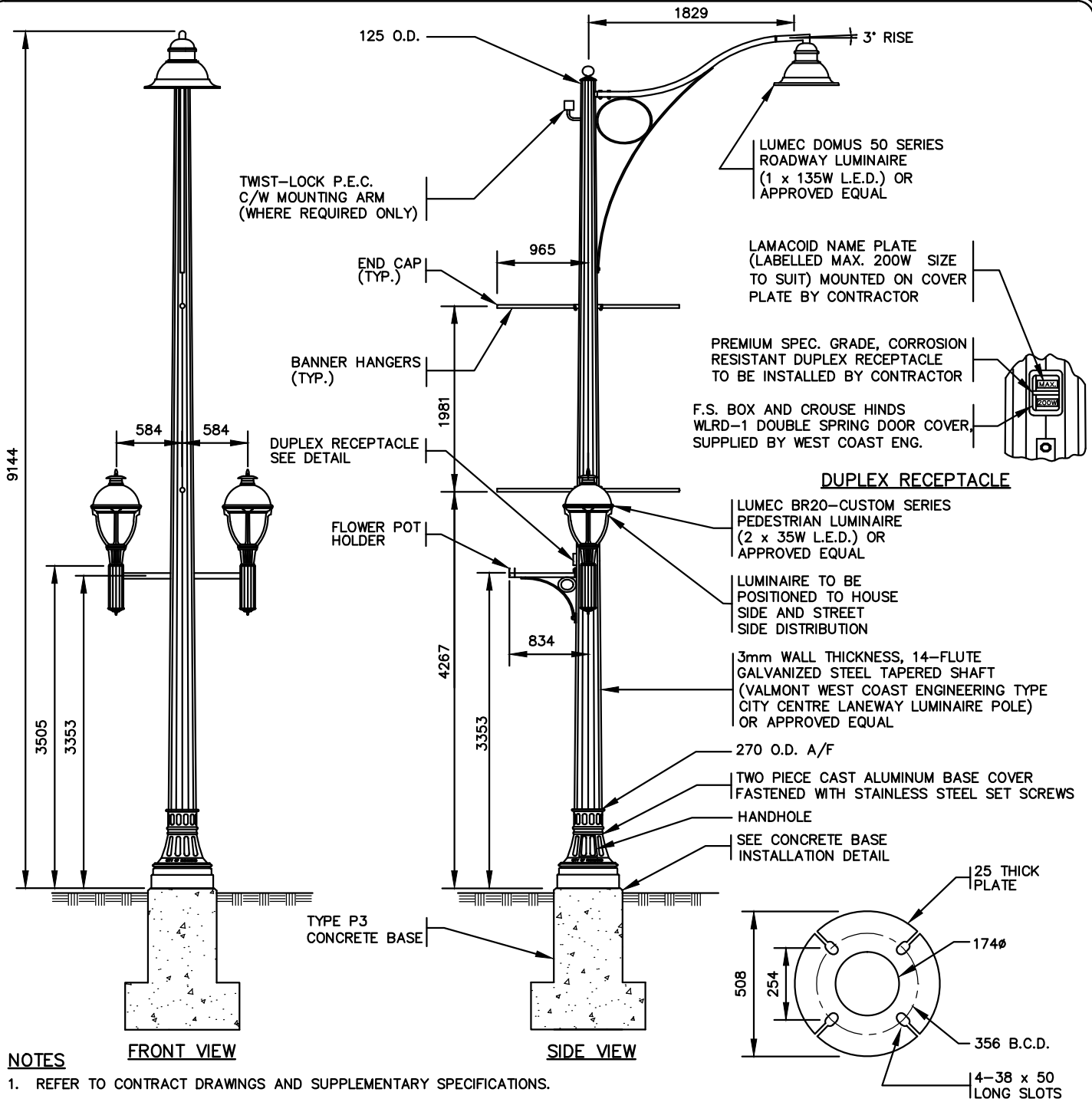
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.3 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.
5. POLES & LUMINAIRES SHALL BE POWDER COAT FINISHED, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
6. POLES SHALL BE CITY CENTRE TYPE AS MANUFACTURED BY VALMONT WEST COAST ENGINEERING FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
7. LUMINAIRES SHALL BE BR20-CUSTOM SERIES AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
9. FLOWER POT HOLDER TO ACCOMMODATE IRRIGATION SYSTEM (WHERE REQUIRED ONLY).



**CITY CENTRE TYPE
PEDESTRIAN LUMINAIRE POLE**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L12.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



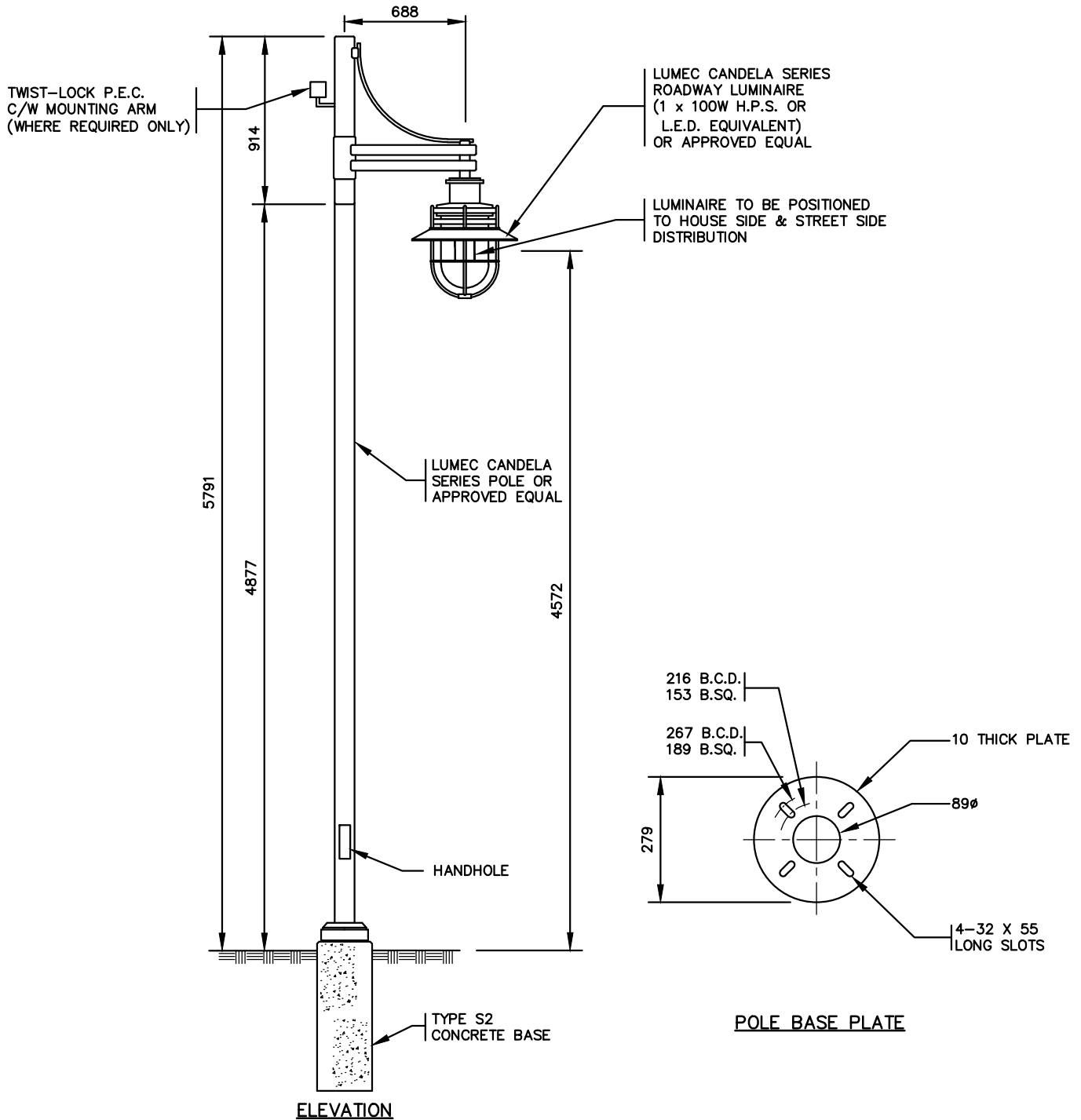
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.3 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.
5. POLES & LUMINAIRES SHALL BE POWDER COAT FINISHED, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
6. POLES SHALL BE CITY CENTRE TYPE AS MANUFACTURED BY VALMONT WEST COAST ENGINEERING FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
7. LUMINAIRES SHALL BE DOMUS 50 SERIES FOR ROADWAY LUMINAIRES AND BR20-CUSTOM SERIES FOR PEDESTRIAN LUMINAIRES AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
9. FLOWER POT HOLDER TO ACCOMODATE IRRIGATION SYSTEM (WHERE REQUIRED ONLY).



**CITY CENTRE TYPE
ROADWAY/PEDESTRIAN LUMINAIRE POLE**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER :
DR. : C. YEUNG	DATE : JAN. 1998	L12.3
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



ELEVATION

POLE BASE PLATE

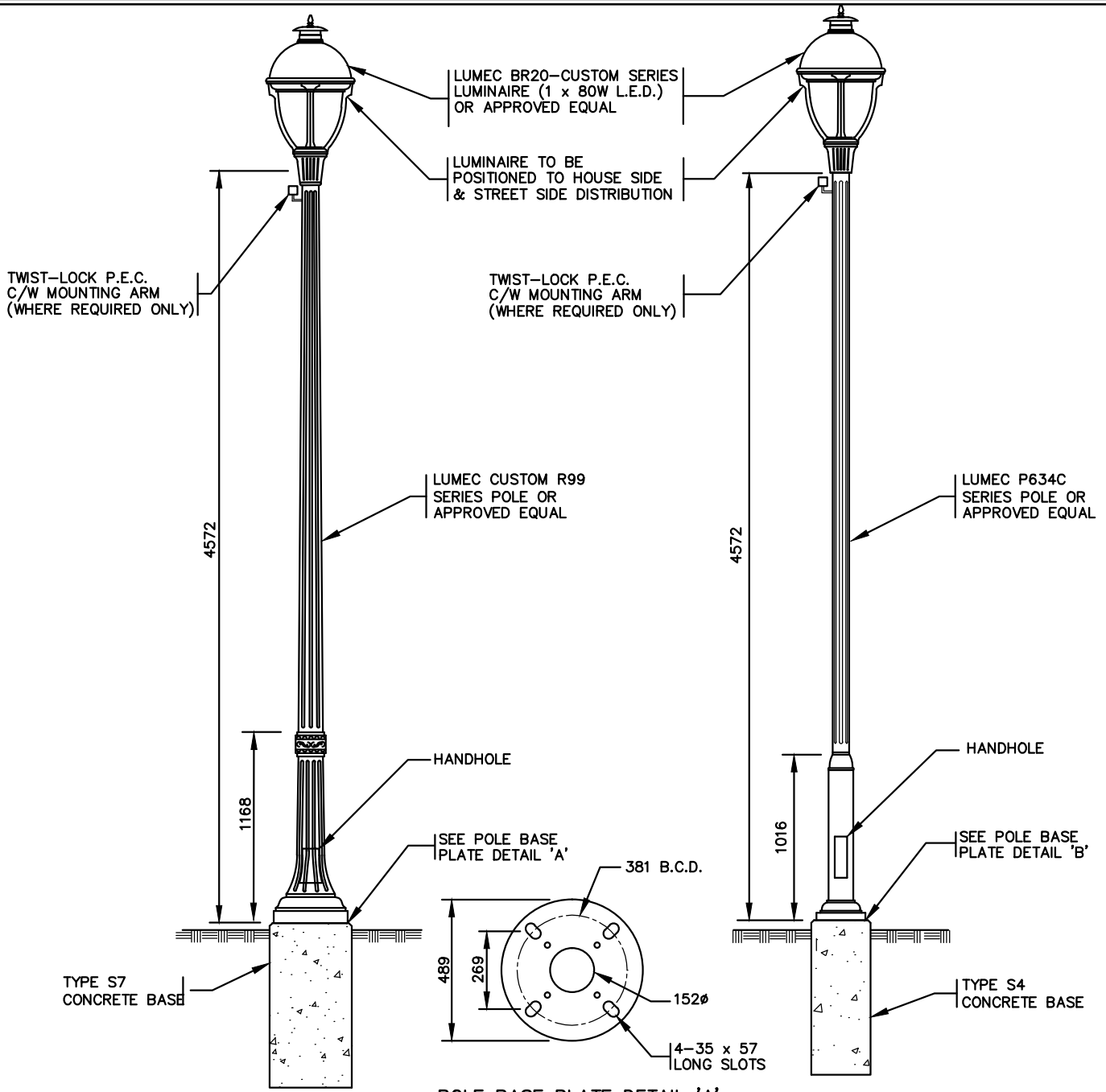
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.3 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES & LUMINAIRES SHALL BE POWDER COAT TEXTURED FINISH, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
5. POLE TO BE SUPPLIED 0.9m SHORTER WHEN INSTALLED ON A SERVICE BASE.
6. POLES & LUMINAIRES SHALL BE CANDELA SERIES AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



STEVESTON TYPE LUMINAIRE POLE

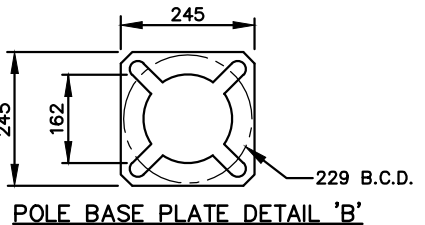
TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L12.4
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



TYPE 1 DECORATIVE LUMINAIRE POLE

POLE BASE PLATE DETAIL 'A'

TYPE 2 DECORATIVE LUMINAIRE POLE



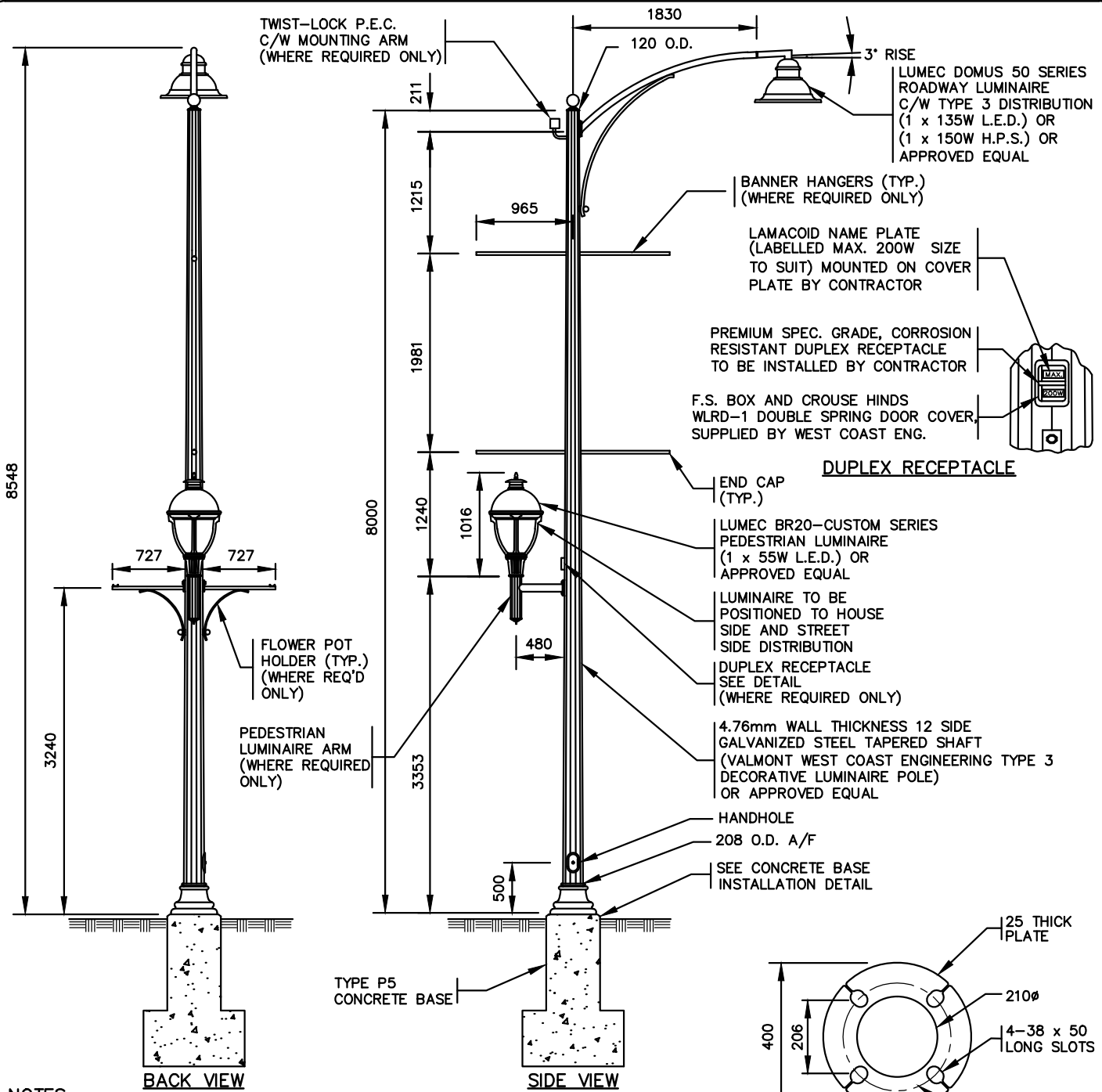
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.4 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES & LUMINAIRSE SHALL BE POWDER COAT TEXTURED FINISH, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
5. POLE TO BE SUPPLIED 0.9m SHORTER WHEN INSTALLED ON A SERVICE BASE.
6. TYPE 1 POLE SHALL BE CUSTOM R99 SERIES AND LUMINAIRE SHALL BE BR20-CUSTOM SERIES AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVED EQUAL. TYPE 2 POLE SHALL BE LUMEC P634C SERIES AND LUMINAIRSE SHALL BE BR20-CUSTOM Z10G SERIES AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



TYPE 1 AND 2 DECORATIVE LUMINAIRE POLES

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L12.5
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : NOV/16	SHEET No. : 1 OF 1



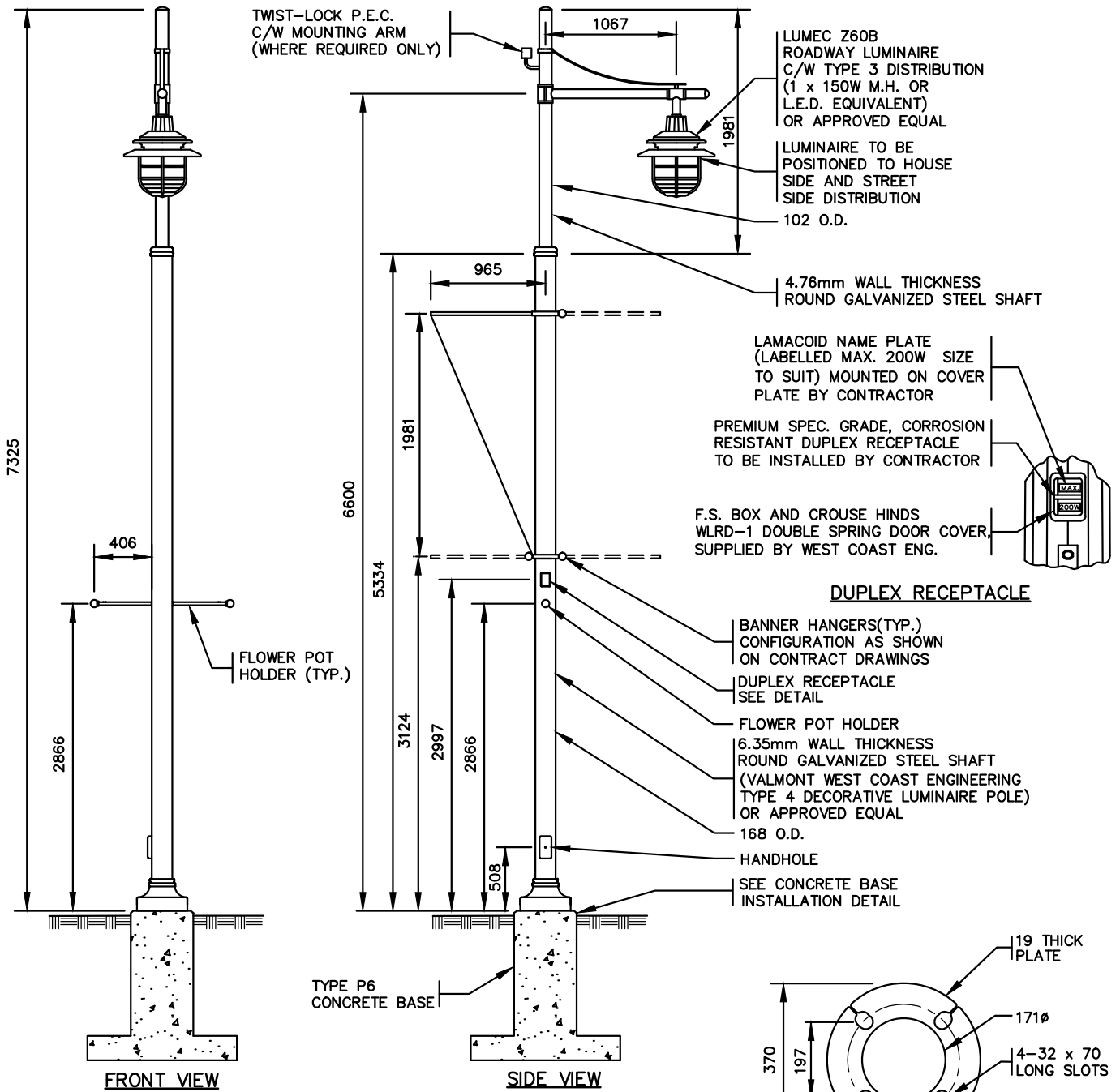
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.4 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.
5. POLES & LUMINAIRES SHALL BE POWDER COAT FINISHED, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
6. POLES SHALL BE TYPE 3 AS MANUFACTURED BY VALMONT WEST COAST ENGINEERING FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
7. LUMINAIRES SHALL BE DOMUS 50 SERIES FOR ROADWAY LUMINAIRES AND BR20-CUSTOM SERIES FOR PEDESTRIAN LUMINAIRES AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
9. FLOWER POT HOLDER TO ACCOMODATE IRRIGATION SYSTEM (WHERE REQUIRED ONLY).



TYPE 3 DECORATIVE LUMINAIRE POLE

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L12.6
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



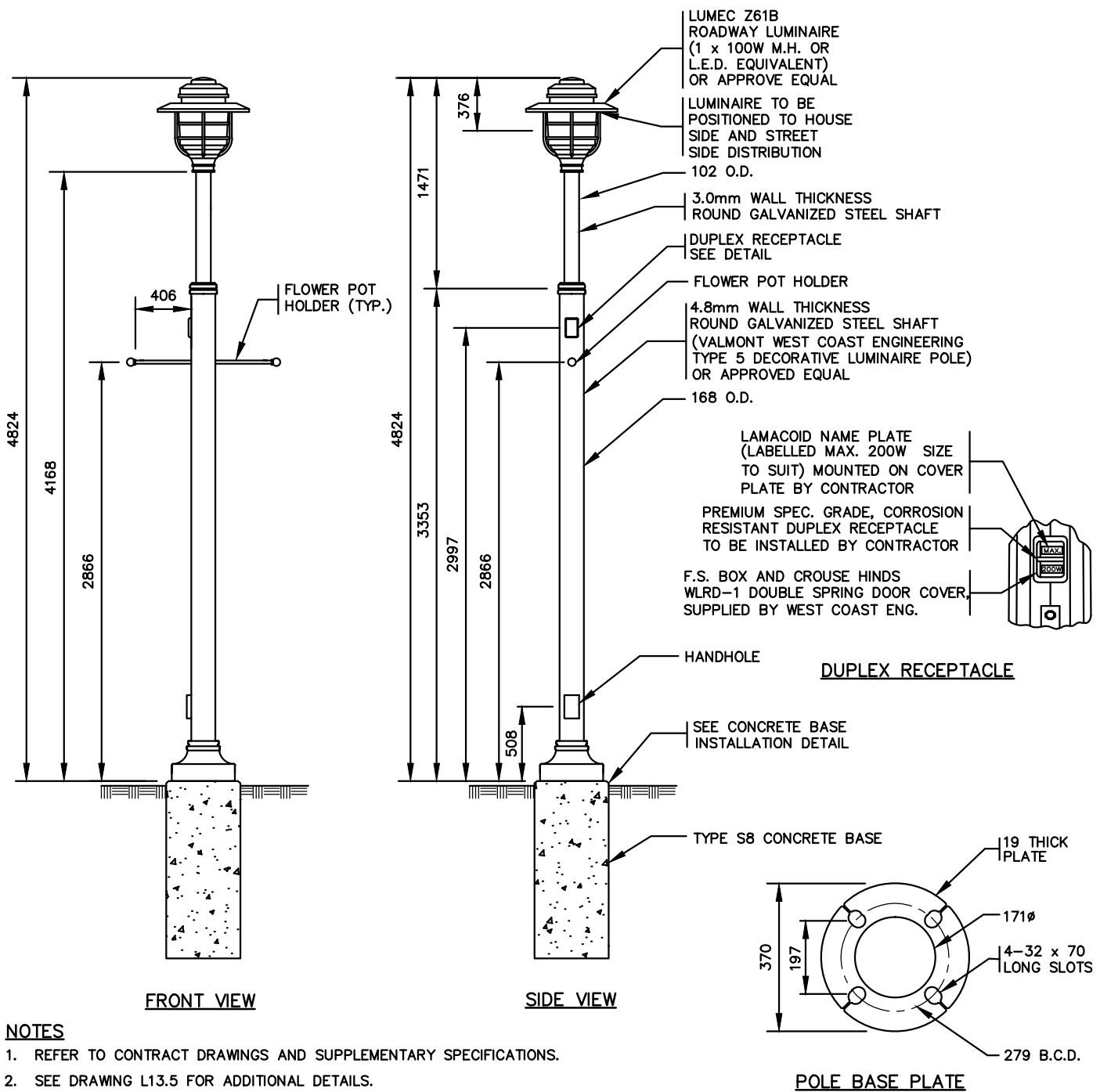
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.5 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.
5. POLES & LUMINAIRES SHALL BE POWDER COAT FINISHED, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
6. POLES SHALL BE TYPE 4 AS MANUFACTURED BY VALMONT WEST COAST ENGINEERING FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
7. LUMINAIRES SHALL BE Z60B AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVED EQUAL.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
9. FLOWER POT HOLDER TO ACCOMODATE IRRIGATION SYSTEM (WHERE REQUIRED ONLY).



TYPE 4 DECORATIVE LUMINAIRE POLE

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L12.7
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



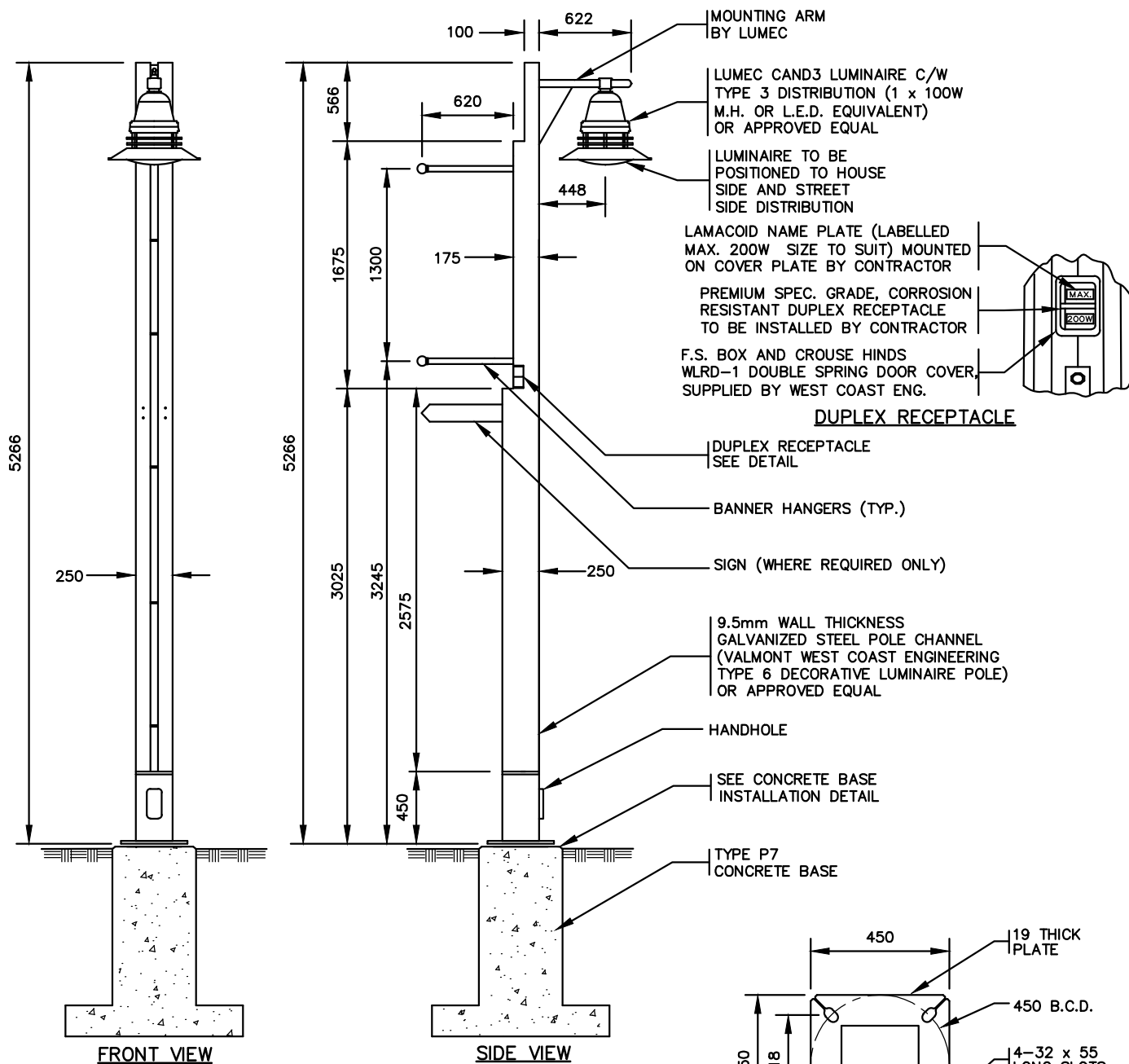
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.5 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.
5. POLES & LUMINAIRES SHALL BE POWDER COAT FINISHED, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
6. POLES SHALL BE TYPE 5 AS MANUFACTURED BY VALMONT WEST COAST ENGINEERING FOR THE CITY OF RICHMOND OR APPROVAL EQUAL.
7. LUMINAIRES SHALL BE Z61B AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVAL EQUAL.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
9. FLOWER POT HOLDER TO ACCOMODATE IRRIGATION SYSTEM (WHERE REQUIRED ONLY).



TYPE 5 DECORATIVE LUMINAIRE POLE

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L12.8
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



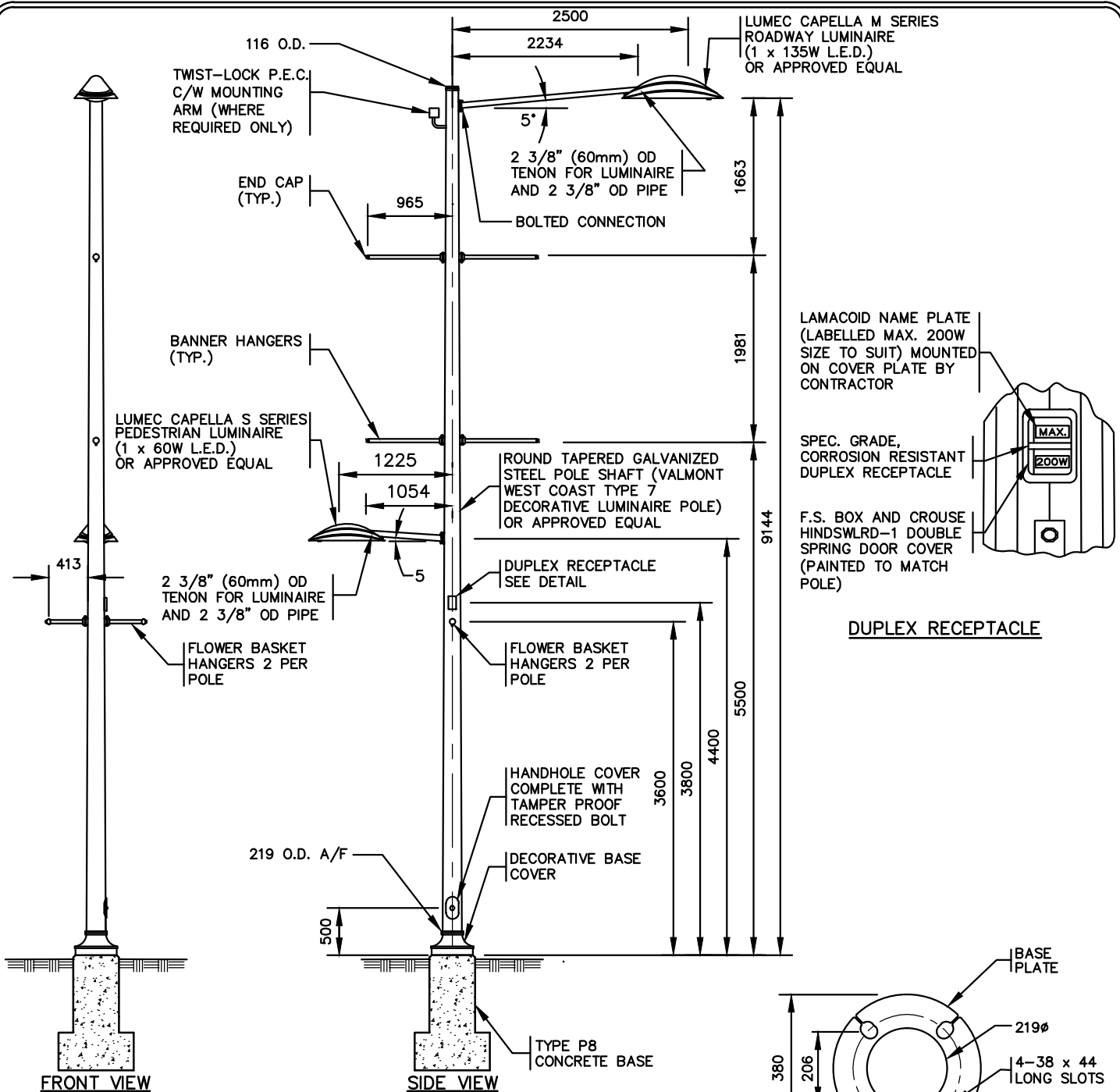
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.5 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.
5. POLES & LUMINAIRES SHALL BE POWDER COAT FINISHED, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
6. POLES SHALL BE TYPE 6 AS MANUFACTURED BY VALMONT WEST COAST ENGINEERING FOR THE CITY OF RICHMOND OR APPROVAL EQUAL.
7. LUMINAIRES SHALL BE CAND3 AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVAL EQUAL.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.



TYPE 6 DECORATIVE LUMINAIRE POLE

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L12.9
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



LAMACOID NAME PLATE (LABELLED MAX. 200W SIZE TO SUIT) MOUNTED ON COVER PLATE BY CONTRACTOR

SPEC. GRADE, CORROSION RESISTANT DUPLEX RECEPTACLE

F.S. BOX AND CROUSE HINDSWLRD-1 DOUBLE SPRING DOOR COVER (PAINTED TO MATCH POLE)

DUPLEX RECEPTACLE

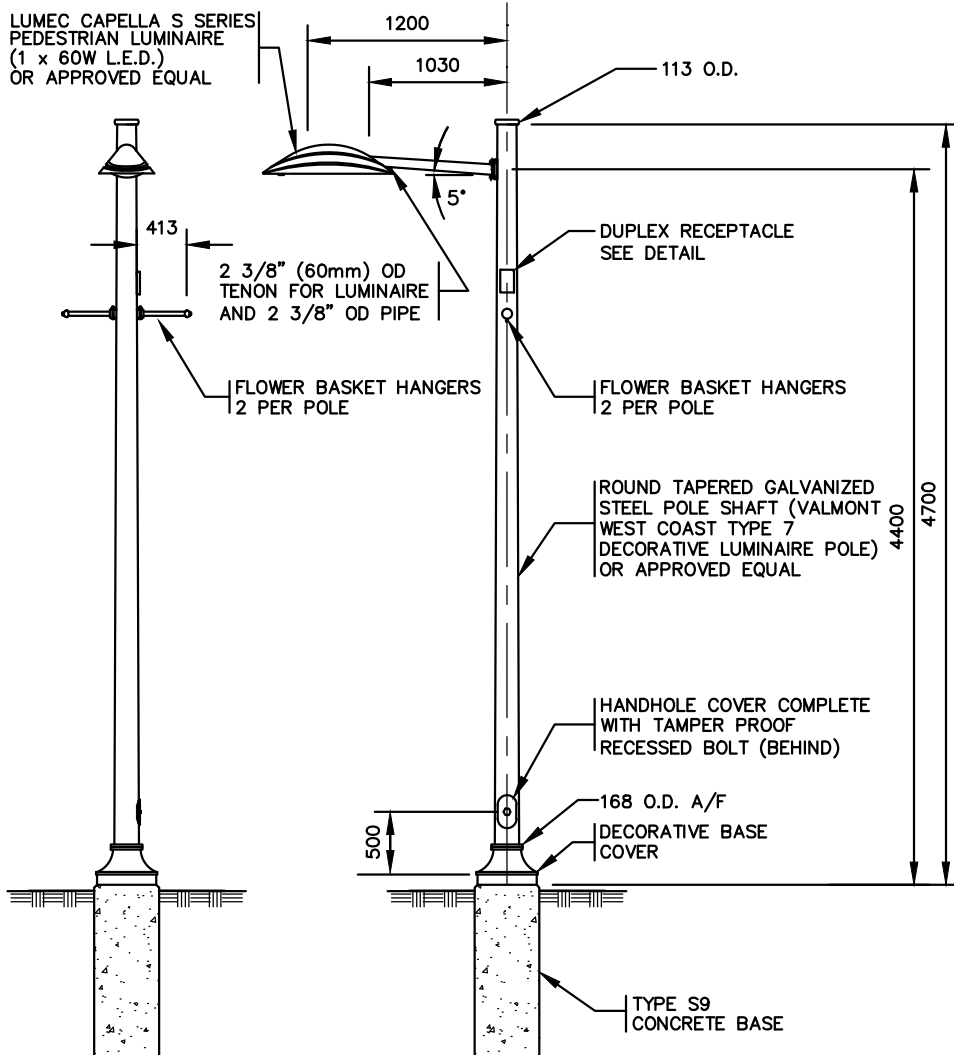
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.5 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.
5. POLES & LUMINAIRES SHALL BE POWDER COAT FINISHED, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
6. POLES SHALL BE TYPE 7 AS MANUFACTURED BY VALMONT WEST COAST ENGINEERING FOR THE CITY OF RICHMOND OR APPROVAL EQUAL.
7. LUMINAIRES SHALL BE CAPELLA LARGE SERIES FOR ROADWAY LUMINAIRES AND CAPELLA SMALL SERIES FOR PEDESTRIAN LUMINAIRES AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVAL EQUAL.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
9. FLOWER POT HOLDER TO ACCOMODATE IRRIGATION SYSTEM (WHERE REQUIRED ONLY).



TYPE 7 DECORATIVE LUMINAIRE POLE

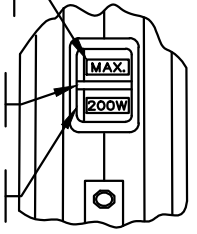
TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L12.10
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



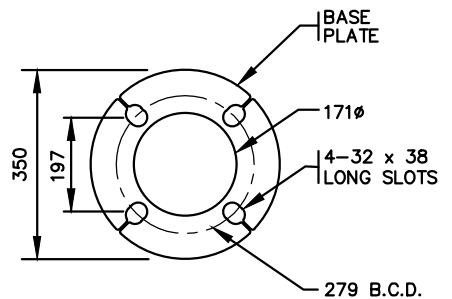
LAMACOID NAME PLATE (LABELLED MAX. 200W SIZE TO SUIT) MOUNTED ON COVER PLATE BY CONTRACTOR

SPEC. GRADE, CORROSION RESISTANT DUPLEX RECEPTACLE

F.S. BOX AND CROUSE HINDSWLRD-1 DOUBLE SPRING DOOR COVER (PAINTED TO MATCH POLE)



DUPLEX RECEPTACLE



POLE BASE PLATE

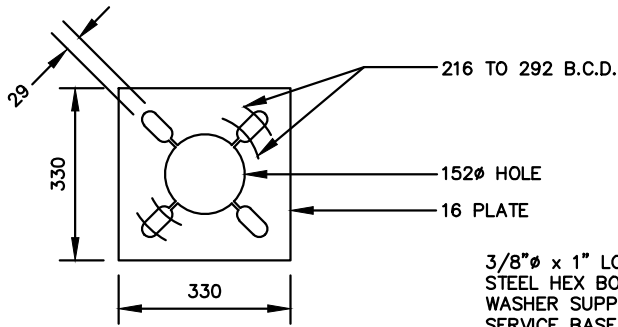
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SEE DRAWING L13.5 FOR ADDITIONAL DETAILS.
3. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.
4. POLES SHALL BE GALVANIZED, UNLESS OTHERWISE NOTED.
5. POLES & LUMINAIRES SHALL BE POWDER COAT FINISHED, IN COLOUR SPECIFIED BY CITY OF RICHMOND.
6. POLES SHALL BE TYPE 8 AS MANUFACTURED BY VALMONT WEST COAST ENGINEERING FOR THE CITY OF RICHMOND OR APPROVAL EQUAL.
7. LUMINAIRES SHALL BE CAPELLA SMALL SERIES AS MANUFACTURED BY PHILIPS LUMEC FOR THE CITY OF RICHMOND OR APPROVAL EQUAL.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
9. FLOWER POT HOLDER TO ACCOMODATE IRRIGATION SYSTEM (WHERE REQUIRED ONLY).

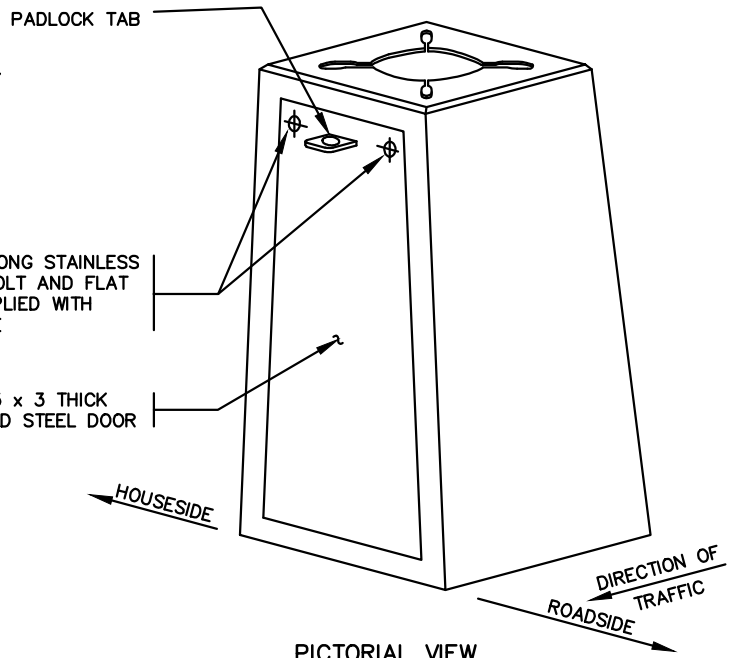


TYPE 8 DECORATIVE PEDESTRIAN LUMINAIRE POLE

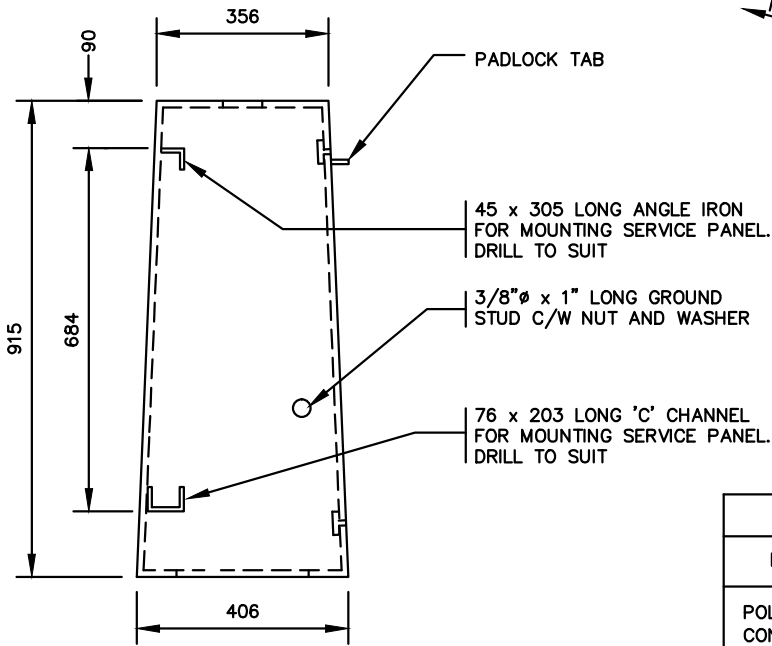
TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L12.11
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : APRIL/15	SHEET No. : 1 OF 1



TOP VIEW

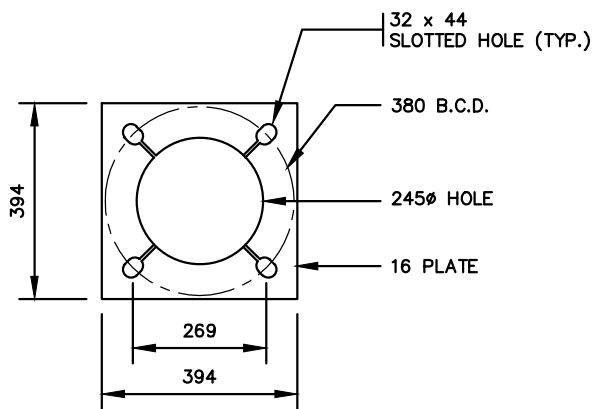


PICTORIAL VIEW



ELEVATION

SERVICE BASE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
POLE CONNECTION BOLTS	4	1" ϕ x 3" LONG GALVANIZED SAE GRADE 5 BOLT, NUT AND 2 WASHERS



BOTTOM VIEW

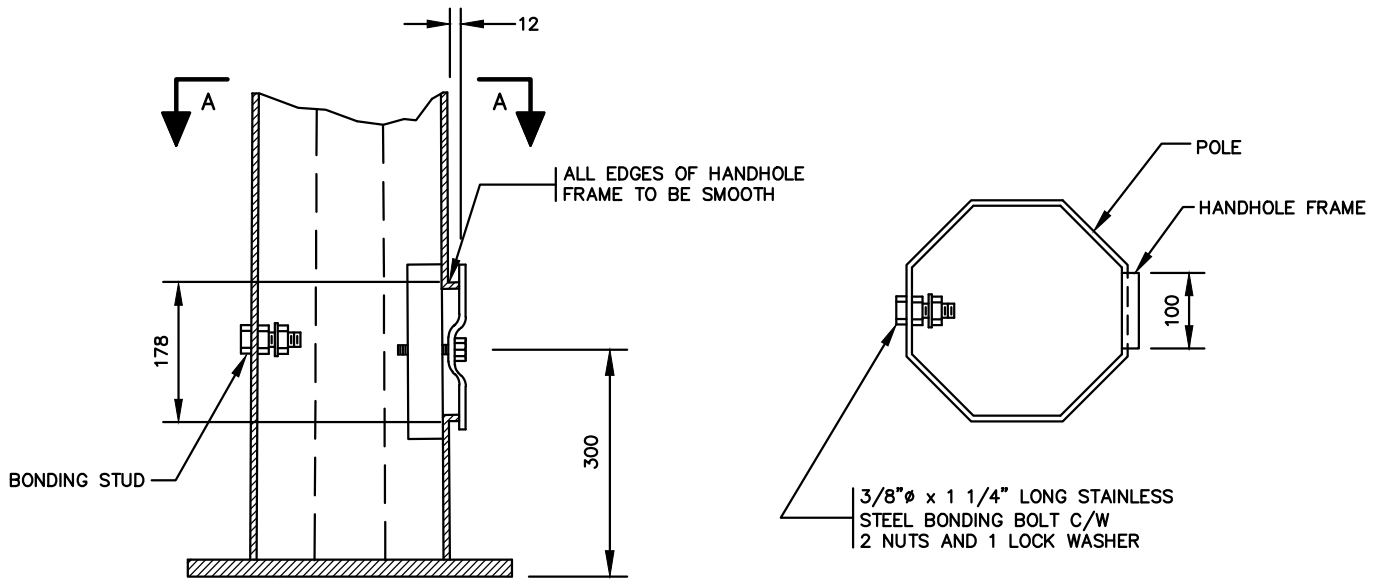
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. SERVICE BASE FABRICATION TO MEET THE REQUIREMENTS OF THE MINISTRY OF TRANSPORTATION AND HIGHWAYS MATERIAL STANDARDS SECTION 301—TRAFFIC SIGNAL, LUMINAIRE AND SIGN POLES.
3. SERVICE BASE TO BE HOT DIP GALVANIZED AFTER FABRICATION.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. STREET LIGHT POLES ON SERVICE BASE TO BE SHORTENED 0.9m.
6. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS FOR APPROVAL PRIOR TO MANUFACTURING.

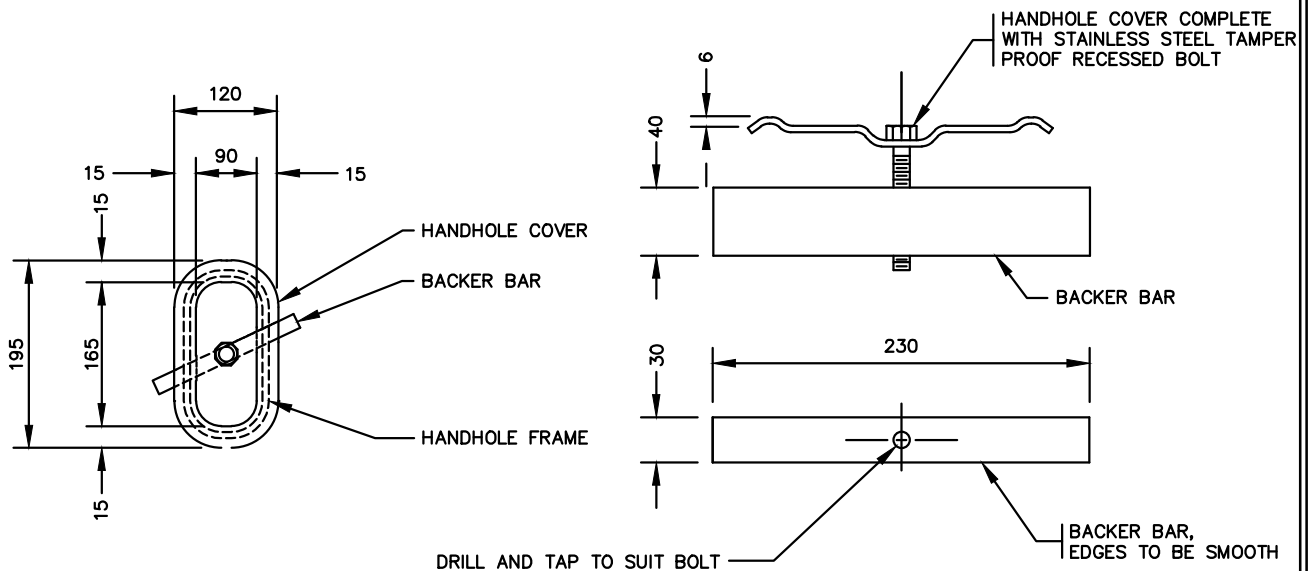


SERVICE BASE

TECH. : P. DISCUSSO	SCALE : NTS	DRAWING NUMBER : L13.1
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



SECTION A-A



HANDHOLE AND COVER DETAIL

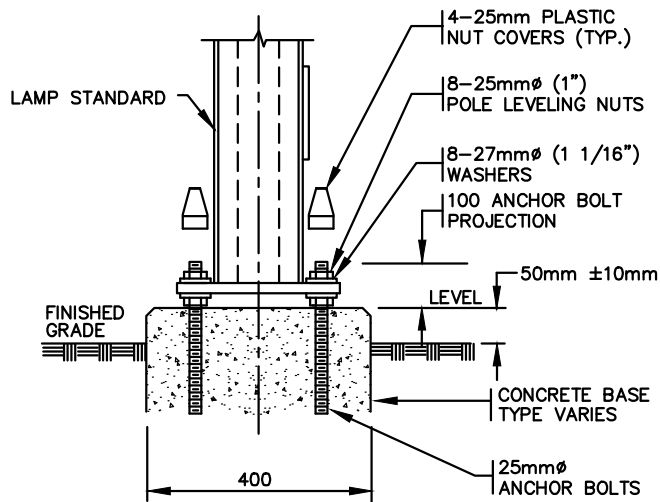
NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. ALL HARDWARE SHALL BE GALVANIZED UNLESS OTHERWISE NOTED.
3. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

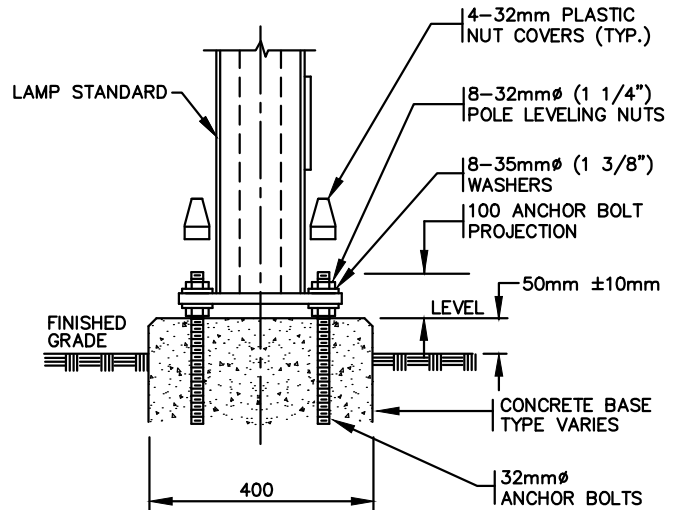


POLE HANDHOLE AND COVER DETAIL

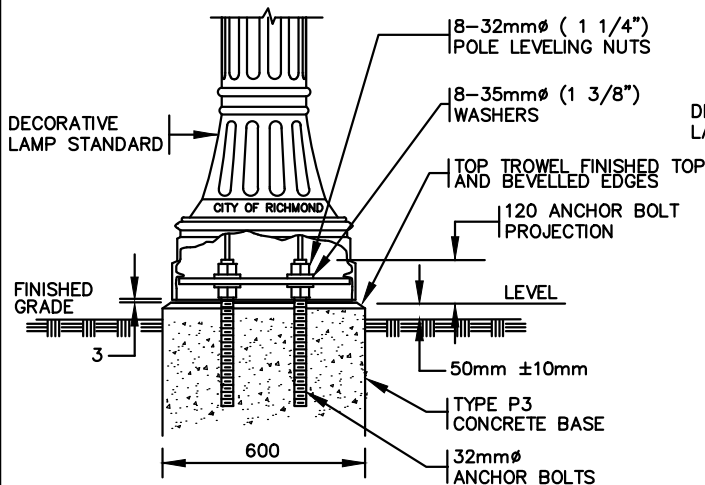
TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L13.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



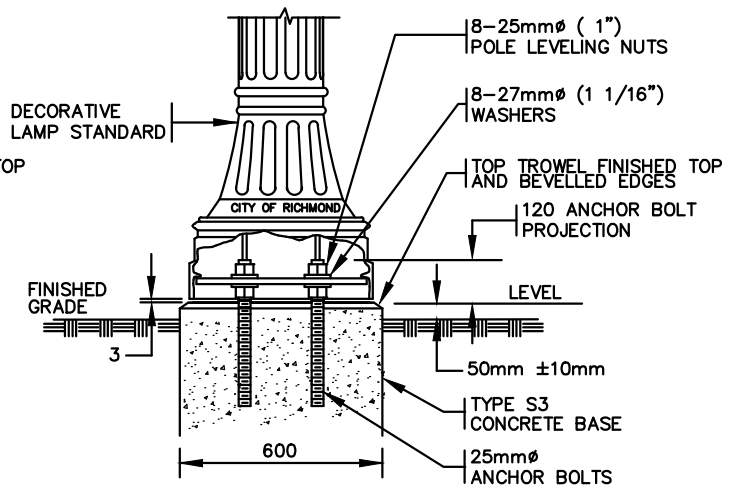
**4.57m-9.14m OCTAGONAL GALVANIZED
STEEL TYPE POLE**



**13.72m DAVIT OCTAGONAL GALVANIZED
STEEL TYPE POLE**



**CITY CENTRE TYPE
ROADWAY/PEDESTRIAN POLE**



**CITY CENTRE TYPE
PEDESTRIAN/LANEWAY POLE**

NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. POLES ARE TO BE INSTALLED PLUMB.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. ALL HARDWARE SHALL BE GALVANIZED.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND AND PAINTED SURFACES WITH TOUCH UP PAINT, COLOR AS SPECIFIED BY CITY OF RICHMOND.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

NOTE

IF THE TOP OF THE CONCRETE BASE IS NOT LEVEL OR IF THE CONCRETE BASE IS NOT WITHIN $\pm 10\text{mm}$ OF THE SPECIFIED HEIGHT ABOVE FINISHED GRADE THEN THE TOP 75mm OF THE PEDESTAL SHALL BE BROKEN OFF BY HAND AND REFORMED AS DIRECTED BY THE ENGINEER.



**POLE AND CONCRETE BASE
INSTALLATION DETAILS-1**

TECH. : P. DISCUSSO

SCALE : NTS

DRAWING NUMBER :

DR. : C. YEUNG

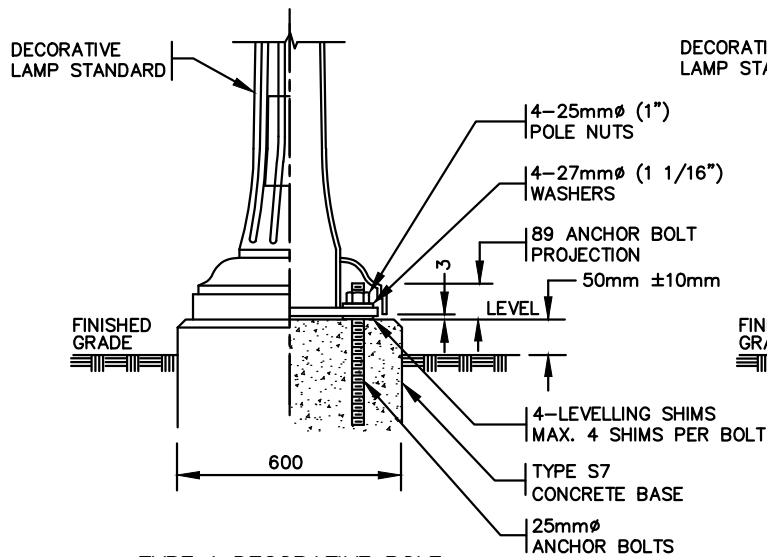
DATE : JAN. 1998

L13.3

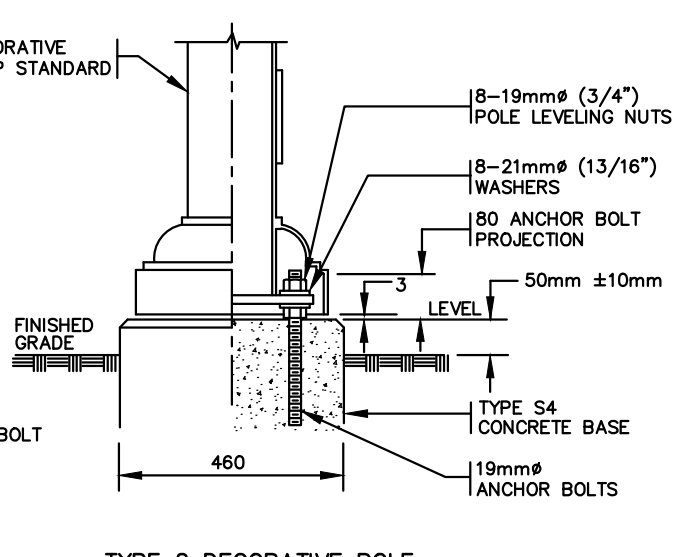
ENG. :

REV. DATE : JULY/10

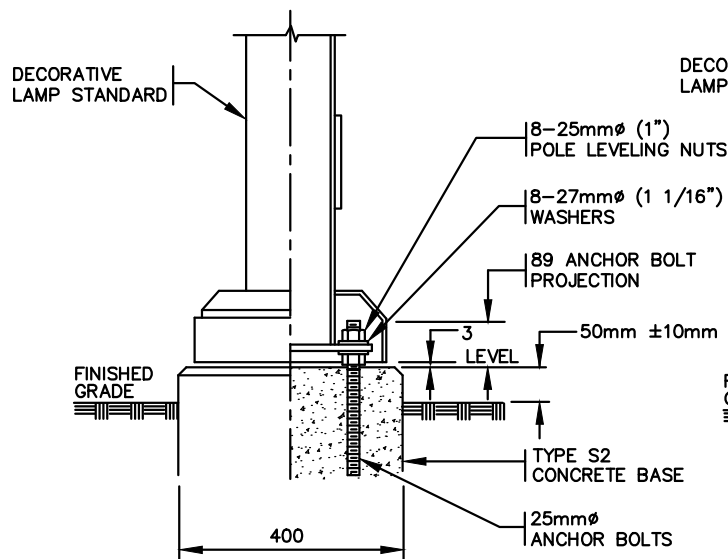
SHEET No. : 1 OF 1



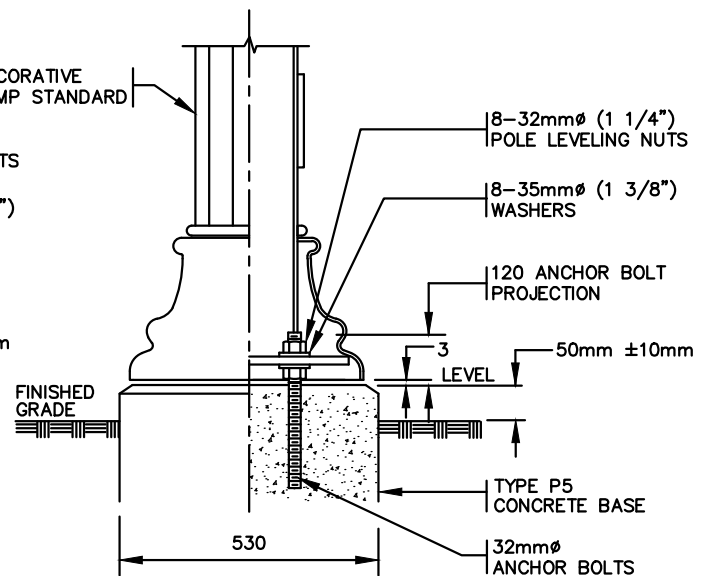
TYPE 1 DECORATIVE POLE



TYPE 2 DECORATIVE POLE



STEVESTON TYPE POLE



TYPE 3 DECORATIVE POLE

NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. POLES ARE TO BE INSTALLED PLUMB.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. ALL HARDWARE SHALL BE GALVANIZED.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND AND PAINTED SURFACES WITH TOUCH UP PAINT, COLOR AS SPECIFIED BY CITY OF RICHMOND.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

NOTE

IF THE TOP OF THE CONCRETE BASE IS NOT LEVEL OR IF THE CONCRETE BASE IS NOT WITHIN \pm 10mm OF THE SPECIFIED HEIGHT ABOVE FINISHED GRADE THEN THE TOP 75mm OF THE PEDESTAL SHALL BE BROKEN OFF BY HAND AND REFORMED AS DIRECTED BY THE ENGINEER.



**POLE AND CONCRETE BASE
INSTALLATION DETAILS-2**

TECH. : P. DISCUSSO

SCALE : NTS

DRAWING NUMBER :

DR. : C. YEUNG

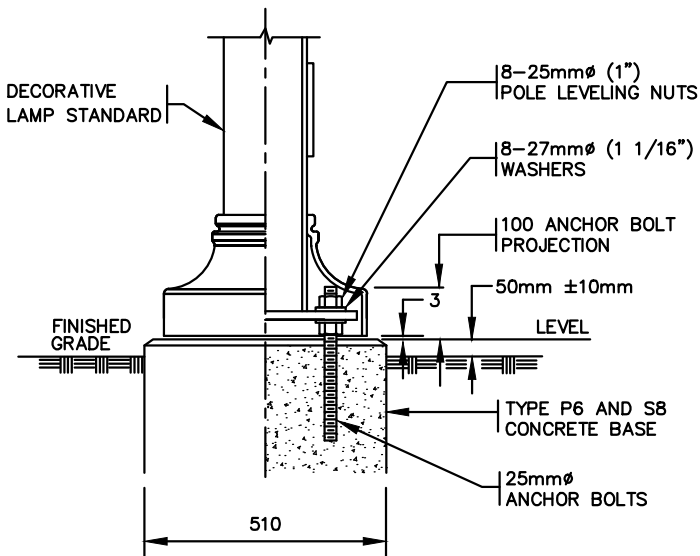
DATE : JAN. 1998

L13.4

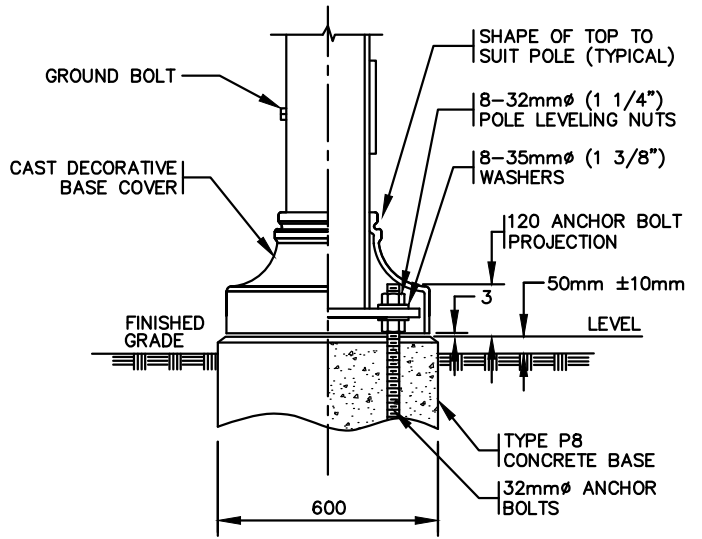
ENG. :

REV. DATE : JULY/10

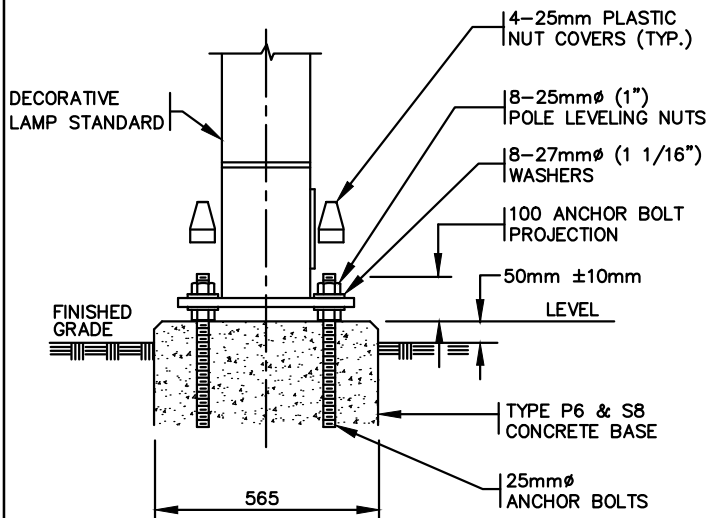
SHEET No. : 1 OF 1



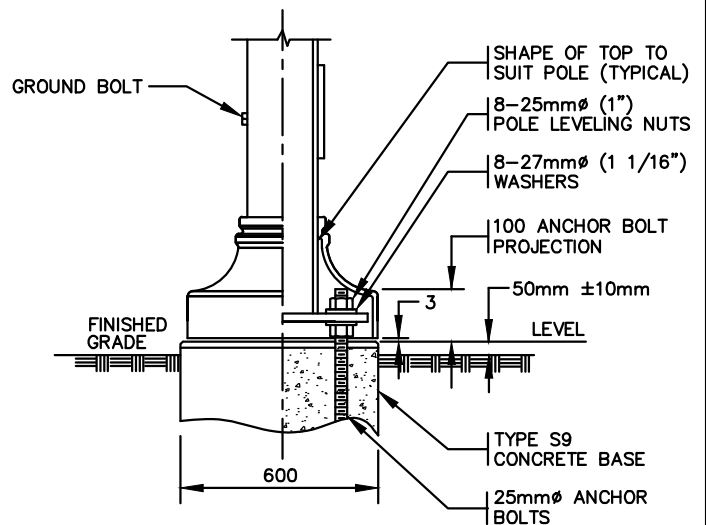
TYPE 4 AND 5 DECORATIVE POLE



TYPE 7 DECORATIVE POLE



TYPE 6 DECORATIVE POLE



TYPE 8 DECORATIVE POLE

NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. POLES ARE TO BE INSTALLED PLUMB.
3. APPLY LUBRIPLATE OR OTHER SUITABLE GREASE TO EXPOSED PORTION OF ANCHOR BOLTS AND NUTS.
4. ALL HARDWARE SHALL BE GALVANIZED.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND AND PAINTED SURFACES WITH TOUCH UP PAINT, COLOR AS SPECIFIED BY CITY OF RICHMOND.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

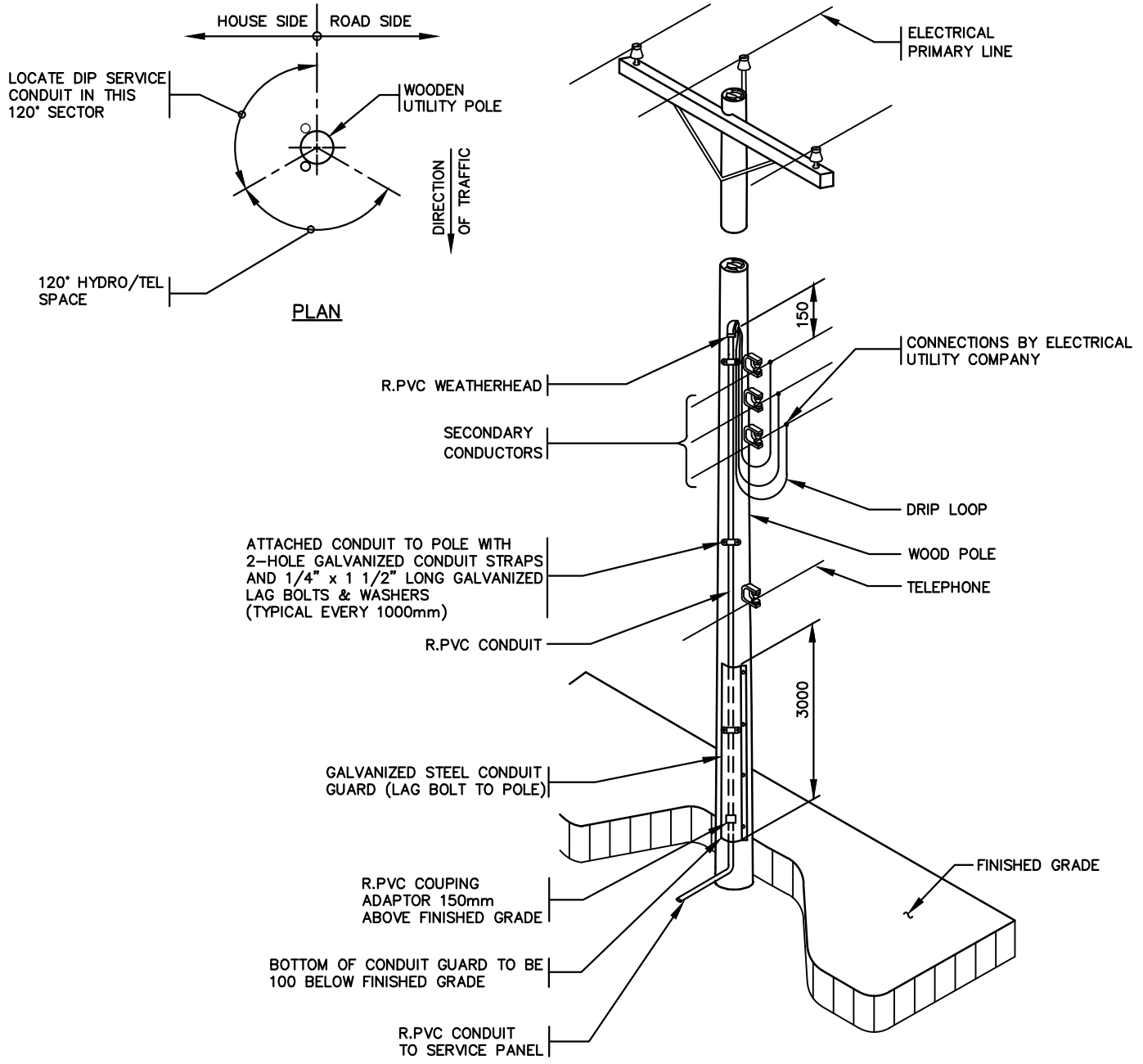
NOTE

IF THE TOP OF THE CONCRETE BASE IS NOT LEVEL OR IF THE CONCRETE BASE IS NOT WITHIN $\pm 10\text{mm}$ OF THE SPECIFIED HEIGHT ABOVE FINISHED GRADE THEN THE TOP 75mm OF THE PEDESTAL SHALL BE BROKEN OFF BY HAND AND REFORMED AS DIRECTED BY THE ENGINEER.



**POLE AND CONCRETE BASE
INSTALLATION DETAILS-3**

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L13.5
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1



NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF SERVICE CONDUCTORS. CONNECTION BY ELECTRICAL UTILITY COMPANY UNLESS OTHERWISE NOTED.
3. CONTRACTOR TO OBTAIN PERMISSION FROM UTILITY COMPANY PRIOR TO INSTALLING CONDUIT ON THEIR POLE.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. SERVICE CONDUCTORS AS DETAILED ON CONTRACT DRAWINGS.
6. MOUNT CONDUIT ON CONCRETE POLE WITH 3/4" STAINLESS STEEL BANDING.
7. ALL HARDWARE SHALL BE GALVANIZED UNLESS OTHERWISE NOTED.
8. CONDUIT UP POLE TO SUIT SERVICE CONDUCTORS (MINIMUM 50mm).

**UNDERGROUND DIP SERVICE
CONNECTION DETAILS**

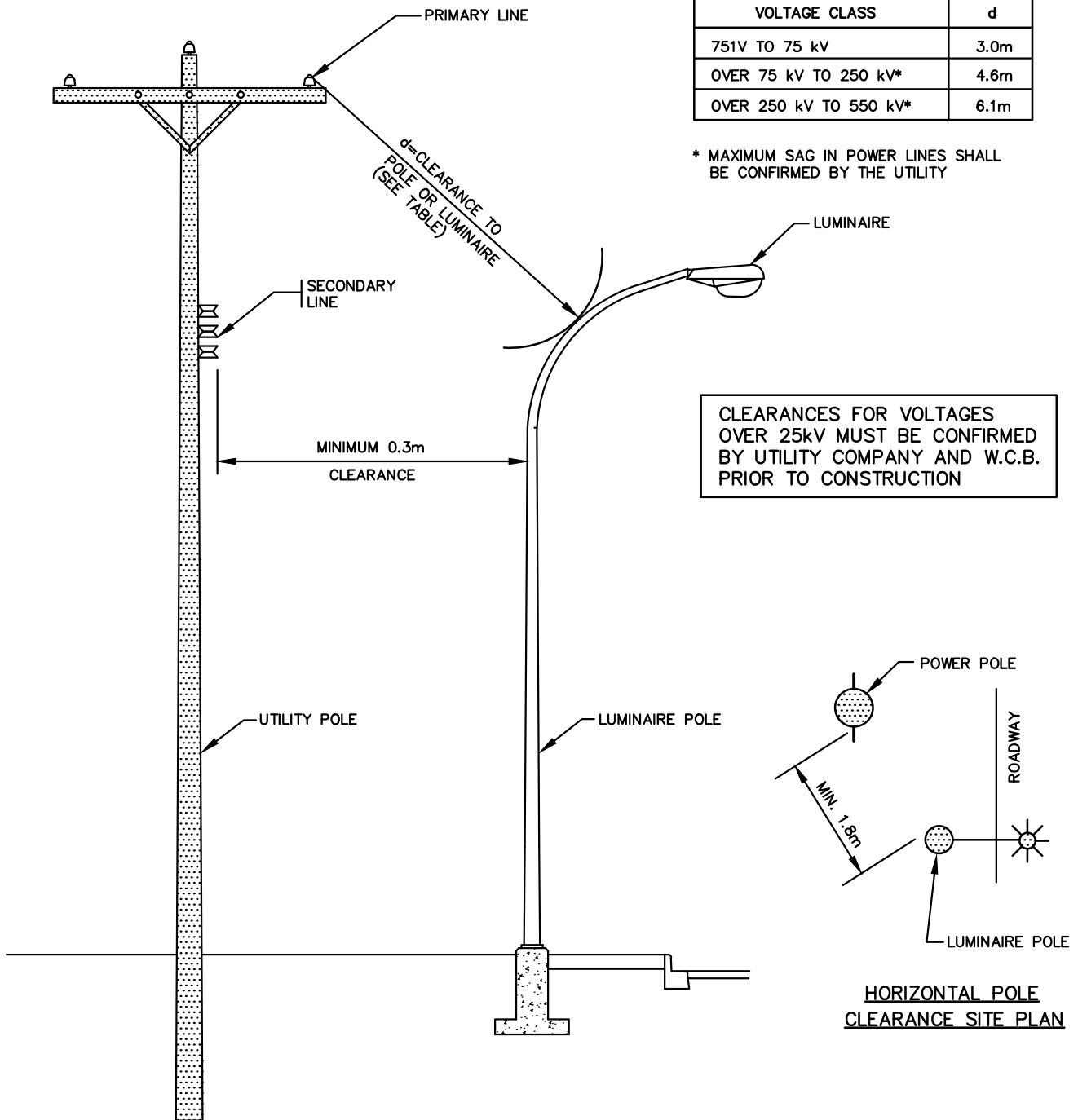


TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER :
DR. : C. YEUNG	DATE : JAN. 1998	L14.1
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

PRIMARY LINE CLEARANCE TABLE

VOLTAGE CLASS	d
751V TO 75 kV	3.0m
OVER 75 kV TO 250 kV*	4.6m
OVER 250 kV TO 550 kV*	6.1m

* MAXIMUM SAG IN POWER LINES SHALL BE CONFIRMED BY THE UTILITY



NOTES

1. REFER TO CONTRACT DRAWINGS AND SUPPLEMENTARY SPECIFICATIONS.
2. CLEARANCES LISTED ABOVE TO BE USED AS A GUIDELINE ONLY. EXACT REQUIRED CLEARANCES MAY VARY AND MUST BE CONFIRMED BY CONTRACTOR PRIOR TO CONSTRUCTION.
3. FOR CLEARANCES LESS THAN 3.0m FROM PRIMARY LINES CONTRACTOR TO OBTAIN APPROVAL FROM UTILITY COMPANY AND WORKERS COMPENSATION BOARD PRIOR TO INSTALLATION.



MINIMUM CLEARANCES TO OVERHEAD POWERLINES

TECH. : P. DISCUSO	SCALE : NTS	DRAWING NUMBER : L14.2
DR. : C. YEUNG	DATE : JAN. 1998	
ENG. :	REV. DATE : JULY/10	SHEET No. : 1 OF 1

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SCHEDULE F

SCHEDULE F

SCHEDULE F

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SCHEDULE G

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SCHEDULE G

SUPPLEMENTARY SPECIFICATIONS AND DETAIL DRAWINGS FOR TREE PLANTING ON SIDEWALKS AND BOULEVARDS

PREAMBLE

The Supplementary Specifications hereunder shall apply to all tree planting work in the City of Richmond. They **replace the specifications in Section 32 93 01 – Planting of Trees, Shrubs and Ground Covers** in the Master Municipal Construction Documents (MMCD) – Platinum Edition except in particular items where specific reference are made to items under the MMCD.

The City of Richmond Supplemental Specifications, the MMCD Platinum Edition and the BC Landscape Standard are minimum standards. Designs shall be engineered to provide required service levels on a site specific basis. The Supplementary Specifications shall be read in conjunction with all City approved design drawings, the latest version of the BC Landscape Standard, the MMCD Platinum Edition and forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts of the Contract Documents in conjunction with the General Conditions of the Contract.

Below is a list of technical and construction specification manuals for Parks Design that are **NOT** included in the Richmond Engineering Department Supplemental Specification. They are available by contacting the Parks Planning, Design & Construction Department directly.

Ensure you have the latest edition of these specifications:

- Park Storm Drainage
- New Asphalt Surface – Sports Courts
- Hard Surface Overlay – Tennis Courts
- Playing Line Markings – Tennis Courts
- Acrylic Surface Coatings – Tennis Courts
- Fencing –Chainlink Wire Mesh
- Hydroseeding
- Sports Lighting Criteria
- All Weather Sports Playing Fields Development

Materials and Workmanship

All materials shall be as specified on drawings or approved equal. All alternative materials to those specified must meet with preapproval from the Parks Planners, City Engineering Inspections and/or Plumbing Department of the Permits and Licences Division and/or **Parks Planning, Design & Construction Department**.

Labour used in the installation of the work shall be skilled in the appropriate classes of work in accordance with the generally established, approved and accepted standard

practices currently recognized by the respective trades in the construction industry, and exhibit the highest quality of workmanship. The City reserves the right to request the Contractor to remove any labour considered to be unsuitable.

Supervision

The Contractor shall employ and maintain on site at all times during the installation, a fully experienced, qualified, informed and competent supervisor in each class of work included in the installation.

The person designated responsible for supervision shall ensure that the required standard of work, materials quality and quantity, and safety are achieved. This includes but is not limited to, confirmation of safety codes and utility layout, records of changes, on-site coordination, scheduling and management.

The Contractor shall employ qualified personnel with experience pertinent to the landscape and other work.

The Contractor shall enforce a high standard of work quality, good discipline, order and professionalism on the site. Personnel supervising all landscape work should have post-secondary education related to the industry or industry certification and demonstrated expertise at supervising landscape projects.

Post-secondary education includes:

- Landscape Horticultural Journeyperson with a Certificate of Qualification by the Industry Training Authority of BC.
- Horticultural degree or diploma, from a provincially accredited institution.

Industry Certification includes:

- Certified Landscape Designer (CLD) under the CNLA/BCLNA certification program
- Certified Landscape Professional (CLP) under the CNLA/BCLNA certification program
- Certified Horticulture Technician (CHT) under the CNLA/BCLNA certification program.

The irrigation contractor shall be a member of the Irrigation Industry Association of British Columbia (IIABC).

All work done under this division of the specifications shall be in strict accordance with relevant codes, regulations and requirements including local building/plumbing codes and latest amendments thereof.

All necessary permits and clearances are to be obtained before proceeding with any work, and all approvals and inspections are to be arranged and responsibility accepted by the person in charge of the project, or his respective discipline.

It will be the responsibility of the project supervisor/coordinator to inform the City Plumbing Inspection Department of the scope and purpose of the project.

Materials

1.0 Definition

- .1 **City** shall mean authorized representative of the Engineering Inspection Department

1.1 Tree Species

- .1 The selection of tree species shall **be** approved by the City. Should the specified tree not be available, **the developer/contractor shall notify the Engineering & Public Works Department (Inspections) and make a request for substitution. The Developer/contractor must provide a list of a minimum of ten nurseries that were contacted to verify that the specified trees are not available. If Engineering & Public Works Department is satisfied that a reasonable search has been completed, then the Engineering & public Works Department shall consult with the Parks Department for the approval of a substitute.** The developer/contractor shall not make substitutions without approval of the City.

1.2 Origin

- .1 All plant material shall be nursery grown stock.
- .2 All plant material shall comply with the B.C.S.L.A./C.S.N.T./B.C.N.T.A. Landscape Standard for container grown plants.

1.3 Tree Dimensions

- .1 Each tree shall have a calliper of 7cm or not be less than 3m in overall height unless otherwise approved by the City. Each tree shall have a sturdy, straight trunk. Lowest branch height on all trees shall be at 1.8m unless otherwise approved by the City. **All trees shall be measured for calliper at 1.4 m above the rootball as per ISA BMP.** Each tree shall have a well-balanced branching head with the branches growing out from the stem with reasonable symmetry. All trees shall be in wire baskets unless otherwise approved by the City. (Refer to Tables 9-1 and 9-2).

1.4 Root System

- .1 All trees shall be in wire baskets unless otherwise approved by the City. Container grown stock shall have sufficiently well-established root system **reaching the sides of the container but not growing around the inside of the container, the soil must** hold together when removed from the container. In all cases, the root system shall be strong, fibrous, free of disease, insects, defects or injuries and shall be sufficiently developed to guarantee successful transplantation.

- .2 Burlap sacks, if approved by the Contract Administrator, must be untreated.

**TABLE 9-1
MINIMUM ROOTBALL DIAMETERS FOR CONIFEROUS TREES**

Height (cm)	Minimum Rootball Diameters (cm)		
	Dwarf and Medium	Tall and Columnar	Tall and Broad
30 cm	20	-	-
40 cm	25	-	-
50 cm	30	25	25
60 cm	30	30	30
80 cm	35	30	35
1.0 M	45	35	40
1.25 M	50	35	45
1.50 M	60	40	50
1.75 M	70	45	55
2.0 M	-	50	60
2.5 M	-	55	70
3.0 M	-	70	85

• For conifers 200 cm and taller, caliper shall override height using the same caliper to rootball diameter as deciduous trees.

**TABLE 9-2
MINIMUM ROOTBALL DIAMETERS FOR DECIDUOUS TREES**

Caliper	Minimum Rootball Diameters (cm)	
	Zone 5 & Below	Zone 6 & Above
4	50	-
4.5	55	50
5	60	55
6	70	60
7	75	70
8	80	80
9	95	90
10	105	100
12.5	125	110
15	150	120
17.5	170	130
20	200	140

For every 2.5 cm of caliper over 20 cm, rootball diameter shall increase by 10 cm.

1.5 Condition

- .1 All plant material shall be of good health, **structure**, and vigour with no visible signs of disease, insect pests, damage or other objectionable disfigurements.
- .2 The contractor is responsible for contacting the City for inspection and approval of the trees on site and before planting.

Installation

1.6 Subgrade and Topsoil

- .1 Prior to placing topsoil in boulevard planting areas, the subgrade shall be established at 300mm below finished grade for all ground cover areas, and 450mm below finished grade for all shrub areas.
- .2 Grade transitions shall be smooth and even, and shall be such that ponding cannot occur on the subgrade surface.
- .3 Debris, roots, branches, stones, building material, contaminated subsoil, visible weeds and anything else that may interfere with the proper growth and development of the planted boulevard, shall be removed from the subgrade prior to installing the topsoil.
- .4 Screened topsoil shall be installed at the following minimum depths prior to shrub planting in the **City maintained boulevards**: ground cover areas - 300mm, shrub areas - 450mm, **grass areas – 200mm**.
- .5 Growing Medium shall be installed as a 800mm deep continuous trench and the width of the rootball plus 600mm in boulevards and medians where no utility conflicts exist.

1.7 Time of Planting

- .1 Planting work is to be completed during normal planting seasons as dictated by prevailing weather conditions. Planting in frozen ground or with frozen rootballs is not acceptable.
- .2 Planting will not be permitted during extremely hot, dry weather, or during heavy rain. **Planting or ordering of trees will not be permitted during the time of June 1 to August 31 to ensure best survivability of the trees, unless approved by the Contract Administrator.**
- .3 All necessary precautions are to be taken to protect the plant material from prevailing weather conditions **and mechanical damage** during transportation, storage and planting.

1.8 Location of Planting

- .1 Trees are to be planted no more than 9.0m apart, unless otherwise approved by the City. Actual tree numbers, spacing and locations will vary according to site conditions and amenities. Locations will be staked out by the developer/contractor according to the plans and verified on site by the City prior to planting. If underground obstructions are uncovered these are to be reported to the City for resolution.

Minimum Standards for Street Tree Placement
Trees shall not be planted within:
6.0M from Street Lights
2.0M from Catch Basins
7.5M from Street Intersections
3.0M from Hydrants
2.0M from Manholes
2.0M from Driveways
2.0 M from Kiosks
No underground utilities to pass directly under the rootball

1.9 Planting Procedures - Trees

- .1 A Red Seal Horticulturist must be present for all planting and soil placement.
- .2 All trees shall be planted as per Supplementary Detail Drawings G-1-SD and G-2-SD.
- .3 All trees shall be planted, set plumb, in holes large enough to accommodate the entire rootball plus topsoil. Therefore, holes should be excavated the diameter of the rootball plus 600 mm. The holes shall then be backfilled with topsoil to bring the plant material to the depth they were originally growing in the nursery. All trees shall be planted so that after settlement they will be at the original growing medium depth.
- .4 Ensure top of rootball is at or slightly above finished grade. Remove top 1/3 of Burlap from rootball and twine from base of trunk (and/or wire basket "lifting loops" and top row of basket). Remove any soil on top of "original" rootball.
- .5 Once the trees are in place, the holes are to be backfilled with **growing medium** mixed with a high phosphate fertilizer applied at a rate according to the manufacturer's recommendations. The holes shall be backfilled, tamped and watered in layers to help secure the tree and eliminate large air pockets.
- .6 Once planted, the trees are to be securely staked using two (2) **1.2 m high**, 50mm to 75mm diameter pressure treated stakes and tied with Arborite® or approved equal banding attached to each stake with a shingle nail **or staple**.
- .7 Install Aborguard® to protect the tree trunk.
- .8 Install tree water bags when no irrigation is present.

1.10 Planting Procedures

- .1 All plants for planting areas shall be delivered to the site and protected from sun and drying winds. Plants that cannot be planted immediately on delivery shall be kept well watered.
- .2 Plants shall be planted so that after settlement they will be at the original growing medium depth. Allow for settling of the growing medium after planting so that the total depth of the rootball remains in the **growing medium**.
- .3 Plants shall be set plumb in the planting beds or planting pits, except where the plant's character requires variation from this.
- .4 Upon completion of boulevard planting, the soil shall be raked to remove any debris brought to the surface by the planting operations. After raking the planting area should be mulched with 75mm of bark mulch placed in an even layer over the soil surface. **Saucer shape the growing medium around the base of the tree to hold water in place when required.**
- .5 Once planting and mulching is completed, the site shall be cleaned of all excess soil, rock and debris.
- .6 **Subsoil removed from excavation may not be used as backfill, unless approved the Contract Administrator.**
- .7 **Obstructions: Notify the Contract Administrator if unexpected rock or obstructions detrimental to trees or shrubs are encountered during excavation.**

1.11 Plant Maintenance

- .1. The developer/contractor is responsible for all necessary maintenance of the plant material for the duration of the Maintenance Period. This shall include any procedure necessary to maintain all plants in a healthy growing condition such as watering, plant nutrition, weeding, pruning and treatment for disease and pests. All planting beds shall have all weeds removed at least once per **week** during the **maintenance period** by hand-pulling or hoeing. Plants are to be watered as often as required to ensure that no stress occurs to the plants during hot weather. (As often as twice per week in hot weather).

1.12 Root Barrier and Geomembrane

- .1. Root Barrier and Geomembranes must be installed without removing the integral strength of the adjoining hard surface base material and allowing the installation of irrigation lines and sprinkler heads beside the hard surface.

Root Barrier must be the 2mm thickness style with a smooth folded or rolled top. Geomembranes must be 2.03mm thickness.

Use specified material lengths required for project conditions, width to be 450mm minimum.

Root barriers and Geomembranes are to installed no higher than 10mm lower than adjoining hard surface and no lower than 20mm from adjoining hard surface.

1.13 Maintenance Procedures

1. **The following maintenance procedures must be supervised by a Red Seal Horticulturist.**

Lawn Care Maintenance
<p>Soil Testing During Maintenance Period:</p> <ul style="list-style-type: none">• Examine the site to determine any areas where the plant material is performing poorly. If required and as directed by the Parks Planner or Representative or City Engineering Inspector take soil samples from the affected areas to an approved soils testing laboratory for soils analysis. Costs for such testing shall be borne by the Contractor.• Determine the problem and correct deficiencies to the soil such as poor texture, chemical residues, nutrient level or organic matter by appropriate means as recommended by the soils testing laboratory. Correct the situation at the appropriate time of year as coordinated by the Parks Planner and or City Staff Inspector. <p>Liming:</p> <ul style="list-style-type: none">• In January within the first year after installation, lime all exterior sod with application of dolomite lime at the rate of 10lbs per 1000 square feet of soil surface, or as otherwise recommended by the soil testing laboratory. <p>Mowing and trimming:</p> <ul style="list-style-type: none">• Mow all lawns with a sharp reel or rotary mower when the grass reaches a height of 60mm.• Mow to a height of 40mm, the height of the lawn between cuttings shall not exceed 60mm.• Mow and trim a minimum of 32 times per annum, weekly from April to September, three times in October, twice in March and November.• Cut as required in December, January and February. City will advise.• Trim all edges walks, curbs, mowing strips or planting beds at each mowing with a nylon line type power trimmer to ensure a clean straight edge.• Remove all excess grass clippings from the grass and planted areas after each mowing, sweep all paving and other surface clear of clippings.• Contractor is responsible for the maintenance of turf with hording fence for the duration of the project to the acceptance of the City. <p>Lawn remediation:</p> <ul style="list-style-type: none">• Inspect the site and correct all the thin areas or bare patches caused by poor maintenance practices or other reasons such as improper watering, lack of fertilizer,

incorrect cutting height, chemical or mechanical damage

Tree protection:

- All trees shall be protected against wind and snow damage by adequate staking, guying, tying or wrapping as conditions require.
- Guys, wire ties and stakes shall conform to Richmond Supplemental Specification Drawing P-1-SD.
- Trees must be inspected at frequent intervals with adjustments or replacements made to prevent any abrasions, cuts or other damage to the trees.

Boulevard and Park Planting Bed Maintenance

Weed Control:

- The Contractor shall be responsible for the regular inspection and removal of weeds from all landscape portions of the project.
- Weeding shall be done at a weekly interval during the maintenance period, followed by an inspection by the Consultant or Owner along with the Contractor.
- Any weeds that are identified shall be removed within 1 week of inspection. In no cases shall weeds be allowed to be greater than 50 mm in spread and shall not have grown to seed stage.
Weeds should be removed in their entirety, including root systems or any other below ground parts.
- Weeds are defined as undesirable plants and will include all plant species not intentionally planted or seeded, unless mutually agreed upon by the Consultant or Owner and Contractor.
- Weeds will include, but not be limited to such plants as annual bluegrass, barnyard grass, chickweed, crabgrass, clover, couch grass, dandelion, groundsel, horsetail, mallow, morning glory, prickly lettuce, mustards, oxalis, pigweed, pineapple weed, plantain, shepherd's purse, smartweed, snap weed, sow thistle, stork's bill, thistle and will also include invasive, non-native species such as Scotch broom, Himalayan blackberry, purple loosestrife.
- Weeds will also be defined as any of the grass seedlings that germinate and develop in the mulched shrub bed areas that are caused by an over application in the seeding or hydro seeding operation.
- The Contractor shall monitor the site for the presence of weeds growing in pathways, roadways, shoulders, rock work, and hard construction. All weeds in these areas shall be removed at least once per month.
- The type of weeds in an area shall determine the method of treatment. Weed control may consist of, but is not limited to the following: hand-pulling, digging, cultivation, encouraging the growth of desired plants which can compete with weeds, and timing the mowing of grass areas to correspond with the seeding cycle of weeds.
- In situations where there is doubt concerning the necessity or effectiveness of a weed control measure, the decision of the Parks Planners or Inspectors shall be final.

Maintenance of Plants and Planted Areas:

- The Contractor shall be responsible for the maintenance of all plants. Maintenance shall include all measures necessary to maintain plants in a vigorous, healthy, normal growing condition, providing an appearance characteristic of their species and appropriate to their surroundings.
- Such maintenance shall include but not be limited to general cultivation, weed, pest and disease control, mulching, moisture conservation and watering, fertilizing, plant protection, pruning, and general clean-up.
- Begin maintenance immediately after installation and continue for one year after Substantial Completion.
- All plant material shall be alive and in a healthy growing condition at the end of the maintenance period. Plant material which is not in such a condition or which has problems which, in the opinion of the Consultant or Owner, are sufficient to detract from the function, character or form of the plant material, will be rejected, and shall be removed from the site and replaced.
- The landscape maintenance period shall begin at the time each plant is planted and shall continue for one (1) year from the date of certified Substantial Performance of the Work.
- Remove and replace dead plants and plants not in healthy growing condition upon notification. Make replacements in same manner as specified for original plantings and within 10 days of notification either verbal or written request from Consultant or Owner, weather and conditions permitting.
- In the event of replacing plants or trees during the maintenance period an additional one year maintenance period will begin at the time of the new planting for these replacements.
- Regular and adequate watering shall be provided in order to promote healthy plant growth. In the event of watering restrictions which prohibit the use of the automatic irrigation system or in areas which lack an automatic irrigation system, manual watering shall be performed in quantities and at intervals required to promote healthy, vigorous plant growth. Planted areas shall be watered at frequencies required to replace moisture at the root zone. Reform damaged watering saucers at the base of all trees.

Record of maintenance Operations:

- An up-dated log book of all work performed indicating areas of work, materials used, quantities used and dates when work performed, together with a brief description shall be kept by the maintenance personnel. This log book shall include all grass cutting and weeding dates. A copy shall be made available to the Consultant and/or Owner at all times to indicate compliance with these specifications.
- Apply pesticides use in accordance with Section 32 17 23 3.10.1 (ss)

Note: These specifications apply to City Parks, boulevards and mediums that are maintained by City of Richmond Parks Department. Other Landscape areas that are maintained by private residents or corporations shall refer to BCLC and or MMCD Topsoil and Finish Grading Specifications.

Section 32 91 21 – Topsoil and Finish Grading			
Delete			
		1.3.1 1.3.2 2.2.1.3 2.3 2.4 2.6 2.8 2.9 Table 1 2.10.4 2.10.5	2.10.8 2.10.9 2.10.10 2.10.11 2.10.12 2.10.14 2.10.17 Table 2 3.4 Table 3 3.5
Add the following			
1.3	.1 (ss) new	Soil Quality Control	Growing medium preparation to be done by a company with a minimum of five (5) years experience in the process of measuring and mixing of constituent components that make up a prepared medium mix.
	.2 (ss) new		The prepared growing medium shall match the standard established by the approved tested sample after all recommended amendments have been added.
1.5	.2 (ss) new	Inspection and Testing	Submit to the Contract Administrator a copy of a growing medium analysis from a laboratory approved by the Contract Administrator. The analysis shall be of tests done on the proposed growing medium from samples taken at the supply source within three weeks immediately prior to soil placement. Cost of initial analysis and subsequent tests to ensure compliance with specification shall be borne by the Contractor. Results of these tests shall be presented to the <i>Contract Administrator</i> for review at least seven (7) days BEFORE any growing medium delivery to site.
	.3 (ss) new		The analysis shall include break down of the following components: particle size class and properties, total nitrogen by weight, carbon to nitrogen ratio, available levels of phosphorus, potassium, calcium, magnesium in parts per million, electrical conductive, soluble salt content, organic matter by weight, and pH value.
	.4 (ss) new		The analysis shall outline the testing laboratory's recommendations for amendments, fertilizer and other required modifications to make the proposed growing

			medium meet the requirements of this specification. The soil test results from the testing laboratory shall be legible (i.e. type-written not hand written) and signed by a qualified soil scientist. Any further testing due to growing medium failing to meet specifications will be paid by the Contractor.
	.5 (ss) new		At the discretion of the Contract Administrator submit up to two additional samples at intervals outlined by Contract Administrator of growing medium taken from material delivered to site. Samples shall be taken from a minimum of three random locations and mixed to create a single uniform sample for testing. Results of these tests shall be presented to the Contract Administrator for review.
	.6 (ss) new		Growing medium failing to satisfy specifications or being considered by the Contract Administrator to be uneconomical to be adjusted will be rejected and not permitted for use in the project.
	.7 (ss) new		In the event of a dispute on the quality of the growing medium, the Contract Administrator will perform independent testing and the Contract Administrator's results will be binding.
1.6 new	.1 (ss) .1.1 (ss) .1.2 (ss) .2 (ss)	Samples	Submit to the Contract Administrator samples of the following materials: Dolomite Limestone: .5 kg (1.1 lbs.) Organic Material: .5 kg (1.1 lbs.) Growing Medium Sample: One composite sample. Samples shall be composite of at least three samplings from the proposed source, and shall be at least one (1) litre in volume and taken from a stockpile to be used for work of this project. Samples older than one (1) month will be rejected.
1.7 new	.1 (ss) .2 (ss) .3 (ss)	Product Handling	Do no move or work growing medium or additives when they are excessively wet, extremely dry, frozen or in any manner which will adversely affect growing medium structure. Growing medium whose structure has been compromised by handling under these conditions will be rejected and shall be replaced by the Contractor at no cost to the Contract Administrator. Protect growing medium and additives against extreme wetting by rain or other agents, and against contamination by weeds and insects. Deliver fertilizer and other chemicals in manufacturer's original containers. Protect against and moisture until incorporated into the work.
	.4 (ss)		All growing medium will be delivered to site premixed from the approved supplier. The Contractor shall maintain the same supplier throughout the life of the project.

2.6	.1 (ss) new	Sand	Hard, sharp, granular, river pump sand, well washed and free of contaminants, chemical and organic matter. Particle sizes by weight:																											
			<table border="1"> <thead> <tr> <th>SIEVE SIZE</th> <th>CLASSIFICATION</th> <th>% RETAINED</th> </tr> </thead> <tbody> <tr> <td>No. 4 (4.76 mm)</td> <td>Fine gravel</td> <td>0%</td> </tr> <tr> <td>No. 10 (2.0 mm)</td> <td>Fine gravel</td> <td>0 – 5%</td> </tr> <tr> <td>No. 18 (1.0 mm)</td> <td>Very coarse sand</td> <td>1 – 10%</td> </tr> <tr> <td>No. 35 (0.50 mm)</td> <td>Coarse sand</td> <td>15 – 20%</td> </tr> <tr> <td>No. 60 (0.25 mm)</td> <td>Medium sand</td> <td>50 – 75%</td> </tr> <tr> <td>No. 140 (0.105 mm)</td> <td>Fine sand</td> <td>5 – 15%</td> </tr> <tr> <td>No. 270</td> <td>Very fine sand</td> <td>0 – 2%</td> </tr> <tr> <td>Passing No. 270</td> <td>Silt, clay</td> <td>0%</td> </tr> </tbody> </table>	SIEVE SIZE	CLASSIFICATION	% RETAINED	No. 4 (4.76 mm)	Fine gravel	0%	No. 10 (2.0 mm)	Fine gravel	0 – 5%	No. 18 (1.0 mm)	Very coarse sand	1 – 10%	No. 35 (0.50 mm)	Coarse sand	15 – 20%	No. 60 (0.25 mm)	Medium sand	50 – 75%	No. 140 (0.105 mm)	Fine sand	5 – 15%	No. 270	Very fine sand	0 – 2%	Passing No. 270	Silt, clay	0%
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Passing No. 270	Silt, clay	0%																												
2.8	.1 (ss) new	Wood Residuals	Wood residuals in the form of saw dust, wood chips, etc. shall not be included in the make up of the growing medium.																											
2.9	.1 (ss)	Fertilizer	Complete commercial synthetic slow release fertilizer meeting the requirements of the Canada Fertilizer Act, packed in water proof containers, clearly marked with the name of the manufacture, weight and analysis.																											
	.2 (ss)		Formulation ratio: as per soil test recommendations.																											
	.3 (ss)		To be the fertilizers recommended in the soils analysis report or approved by the Contract Administrator.																											
	.4 (ss)		Contractor to provide proof of purchase and application of fertilizers and liming agents in the forms of receipts.																											
	.5 (ss)		Substitutions for fertilizers will not be permitted without the approval of the Contract Administrator.																											
2.10	.4 (ss) new	Growing Medium	Available Calcium to be 500 to 2500 ppm by dry weight.																											
	.5 (ss) new		For growing media high in % sand, a soil may become acceptable after leaching with fresh water followed by thorough drainage prior to planting																											
	.8 (ss)		Total Nitrogen to be 0.2 to 0.5 % by dry weight																											
	.9 (ss)		Available Phosphorus to be 25 to 250 ppm by dry weight																											
	.10 (ss)		Available Potassium to be 50 to 1,000 ppm by dry weight																											
	.11 (ss) new		Available Magnesium to be 50 to 500 ppm by dry weight																											
	.12 (ss)		Carbon to Nitrogen ratio (C/N) to be not more than 20:1 .																											

	.14 (ss) new		Texture: particle sizes and proportions of each size particle to be within ranges shown in Table 2 for intended application. Where “Gravel” in Table 2 is indicated, this should be read to include debris and wood chips.																																																									
2.11 (ss) new	.1	Standard for Prepared Growing Medium	<table border="1"> <thead> <tr> <th>Table 2</th> <th colspan="2">(Measured in % Dry Weight)</th> </tr> <tr> <th>1. Particle Size Class and Properties</th> <th>Lawns</th> <th>Other Planting Areas</th> </tr> </thead> <tbody> <tr> <td>Sand (Larger than 0.05 mm and smaller than 0.02 mm)</td> <td>75 – 85%</td> <td>70 – 80%</td> </tr> <tr> <td>Silt (Larger than 0.002 mm and smaller than 0.05 mm)</td> <td>2 – 5%</td> <td>5 – 10%</td> </tr> <tr> <td>Clay (Smaller than 0.002 mm)</td> <td>2 – 5%</td> <td>2 – 5%</td> </tr> <tr> <td>Organic Material Content</td> <td>5 – 10%</td> <td>10 – 15%</td> </tr> <tr> <td>Rock and Gravel Foreign matter (>2 mm and <30mm)</td> <td>0 – 0.5%</td> <td>0 – 0.5%</td> </tr> <tr> <td>(Particle size in Per cent (%) of Dry Weight)</td> <td></td> <td></td> </tr> <tr> <td>2. Acidity (pH):</td> <td>6.0 – 6.5</td> <td>5.0 – 6.0</td> </tr> <tr> <td>3. Cation exchange capacity:</td> <td>30 – 50 meq.</td> <td>30 – 50 meq.</td> </tr> <tr> <td>4. Carbon to nitrogen ratio:</td> <td>Maximum 40:1</td> <td>Maximum 40:1</td> </tr> <tr> <td>5. Fertility:</td> <td></td> <td></td> </tr> <tr> <td>Total nitrogen:</td> <td>0.4 – 0.8% by weight</td> <td>0.4 – 0.8% by weight</td> </tr> <tr> <td>Available phosphorus</td> <td>70 – 80 ppm</td> <td>70 – 80 ppm</td> </tr> <tr> <td>Available potassium</td> <td>150 – 250 ppm</td> <td>150 – 250 ppm</td> </tr> <tr> <td>Available magnesium</td> <td>50 – 500 ppm</td> <td>50 – 500ppm</td> </tr> <tr> <td>Available calcium</td> <td>500 – 2500 ppm</td> <td>500 – 2500 ppm</td> </tr> <tr> <td>6. Salinity: Maximum saturation extract conductivity: 3.0 millihos/cm at 25 degrees C.</td> <td></td> <td></td> </tr> <tr> <td>7. Hydraulic Conductivity: Minimum saturated hydraulic conductivity 5.0 – 7.0 cm/hour in place.</td> <td></td> <td></td> </tr> </tbody> </table>	Table 2	(Measured in % Dry Weight)		1. Particle Size Class and Properties	Lawns	Other Planting Areas	Sand (Larger than 0.05 mm and smaller than 0.02 mm)	75 – 85%	70 – 80%	Silt (Larger than 0.002 mm and smaller than 0.05 mm)	2 – 5%	5 – 10%	Clay (Smaller than 0.002 mm)	2 – 5%	2 – 5%	Organic Material Content	5 – 10%	10 – 15%	Rock and Gravel Foreign matter (>2 mm and <30mm)	0 – 0.5%	0 – 0.5%	(Particle size in Per cent (%) of Dry Weight)			2. Acidity (pH):	6.0 – 6.5	5.0 – 6.0	3. Cation exchange capacity:	30 – 50 meq.	30 – 50 meq.	4. Carbon to nitrogen ratio:	Maximum 40:1	Maximum 40:1	5. Fertility:			Total nitrogen:	0.4 – 0.8% by weight	0.4 – 0.8% by weight	Available phosphorus	70 – 80 ppm	70 – 80 ppm	Available potassium	150 – 250 ppm	150 – 250 ppm	Available magnesium	50 – 500 ppm	50 – 500ppm	Available calcium	500 – 2500 ppm	500 – 2500 ppm	6. Salinity: Maximum saturation extract conductivity: 3.0 millihos/cm at 25 degrees C.			7. Hydraulic Conductivity: Minimum saturated hydraulic conductivity 5.0 – 7.0 cm/hour in place.		
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2.12 new	.1	Lime	Coarse (unless noted otherwise), ground dolomite limestone containing minimum 85% of total carbonates.
2.13	.1 (ss) new	Organic Materials	Submit sample prior to shipping to site.
	.2 (ss) new .3 (ss) new .4 (ss) new .5 (ss) new		Organic Material shall be, black/brown in colour made up of fully composted organics (i.e. no sawdust or wood chips) Growing medium deficient of organic matter and fertility will be achieved using fully composed organic matter either peat or animal manure. A surface horizon of increased organic matter and fertility will be achieved by top dressing the required depth of organic matter following by thorough tillage into the top 15 cm of soil. Peat is recommended for soils requiring an immediate acidification (lower pH). Proposed peats will be locally harvested offering a pH between 3.0 and 5.0.
2.14 new	.1 (ss) new	Mulch	Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 25 mm sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows: 1. Organic Matter Content: 50 to 60 percent of dry weight. 2. Colour: dark brown to black. 3. No visible signs of Cedar wood chips
3.2	.6 (ss) new .7 (ss) new	Preparation of Subgrade	Scarify and / or break up and loosen existing sub grade and compacted gravel areas to a minimum depth of design growing medium to allow for proper drainage in all planting areas and tree pits. Compacted gravel subgrades may require drainage by drainage pits od clear crush rock. Ensure proper drainage in all tree pits, shrub beds, planters and miscellaneous planting areas.
3.3	.4 (ss) new	Processing Growing Medium	Screen growing medium with mechanical screening equipment. Thoroughly mix imported growing medium with recommended additives during screening process to produce a growing medium structure with the particle size class and properties as specified in 2.02. No hand mixing will be accepted unless specifically approved by the <i>Contract Administrator</i> .

	.5 (ss) new		Screening and mixing of growing medium on site will be not be allowed. All growing medium is to arrive pre-mixed.										
3.4	.1 (ss) new	Placement of Growing Medium	Do not place growing medium until <i>Contract Administrator</i> has reviewed subgrade.										
	.2 (ss) new .3 (ss) new .4 (ss) new		<p>Ensure that irrigation lines, tree root barriers, subgrade drainage, etc. to be installed have been reviewed by the Contract Administrator prior to the placing of growing medium.</p> <p>Break up and loosen subgrade and compacted gravel areas to allow for proper drainage in planting areas and planted islands.</p> <p>Place prepared growing medium in compacted layers of 100 mm to 150 mm (4" to 6") in planting areas on grade. Lightly roll each layer of placed topsoil, firm against deep foot printing, with a fine loose texture.</p>										
	.5 (ss) new .5.1 (ss) new .6 (ss) new .7 (ss) new .8 (ss) new		<p>Ensure proper drainage in all shrub and tree pits. Compacted gravel subgrades require drainage by drainage pits of clear crush rock. Native soils may be used as a subgrade in planted islands with approval of the Contract Administrator.</p> <p>Subgrade must be free of invasive and noxious weeds.</p> <p>Place growing medium to the required finished grades with adequate moisture, in uniform layers, during dry weather, over approved, dry, unfrozen subgrade where planting is indicated to the following minimum depths:</p> <table> <tr> <td>Tree pits:</td> <td>Rootball depth + 600mm</td> </tr> <tr> <td>Shrub beds:</td> <td>450 mm (1'-6")</td> </tr> <tr> <td>Ground cover areas:</td> <td>300 mm (1'-0")</td> </tr> <tr> <td>City Median and Planting Strip:</td> <td>200 mm (8")</td> </tr> <tr> <td>Private Home Boulevard Lawn Area:</td> <td>150 mm (6")</td> </tr> </table> <p>Apply lime, or other growing medium amendment at rate determined by testing laboratory's recommendations.</p> <p>Mix amendments well into full depth of growing medium by cultivating or roto tilling prior to application of fertilizer.</p>	Tree pits:	Rootball depth + 600mm	Shrub beds:	450 mm (1'-6")	Ground cover areas:	300 mm (1'-0")	City Median and Planting Strip:	200 mm (8")	Private Home Boulevard Lawn Area:	150 mm (6")
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Private Home Boulevard Lawn Area:	150 mm (6")												
3.5	.1 (ss) new .2 (ss) new	Application of Fertilizer	<p>Apply fertilizer at least two weeks after lime application and at least 6 days before planting.</p> <p>Spread fertilizer with mechanical spreaders over entire area of growing medium at rate recommended by the testing laboratory. Mix fertilizer thoroughly into upper 100 mm (4") of growing medium.</p>										

	.3 (ss) new .4 (ss) new		Incorporate lime into the top 15 cm depth of growing medium. Slow release fertilizers will be surface applied to avoid contact with applied lime.
	.5 (ss) new		Spread fertilizer evenly over growing medium with a suitable mechanical spreader. Applications of fertilizer or lime by hand is not acceptable.
3.6	.3 (ss) new	Finish Grading	Fine grade (manually) growing medium to contours and elevations shown on drawings or as directed by Contract Administrator. Eliminate rough spots and low areas to ensure positive drainage.
	.4 (ss) new		Leave surface smooth, uniform, firm against deep foot printing, with a fine loose texture.
3.7	.2 (ss) new .3 (ss) new	Acceptance	Eliminate all weeds and weed roots from growing medium. Contract Administrator to review all methods of weed removal other than by mechanical or hand pulling prior to start of operation.
3.10	.1 (ss) new	Pest and weed control	All methods of pest and weed control to be in compliance with the City's "Pesticide use control bylaw" and Provincial IPM Act and Regulations.

Section 32 92 23 - Sodding			
Delete			
		2.1.1	
Add the following			
2.1	.1 (ss) new	Sod	Sod to be approved by Contract Administrator and to be nursery grown, true to type, conforming to standards of Nursery Sod Growers' Association and their Nursery Sod Specifications. Sod to be quality, cultured turf grass grown from seed approved by Canada Department of Agriculture, free of diseases, clovers, stones, pests and debris. Sod with mesh embedded to facilitate handling will not be accepted. Sod to be relatively free of weeds, containing no more than two broadleaf weeds or ten annual weeds or weedy grasses per 40.0m ² .

Section 32 93 01 – Planting of Trees, Shrubs and Ground Cover

Section 32 93 01 – “Planting of Trees, Shrubs and Ground Covers” will not be applicable for which the Supplementary Specifications and Detail Drawings in Schedule G will apply.

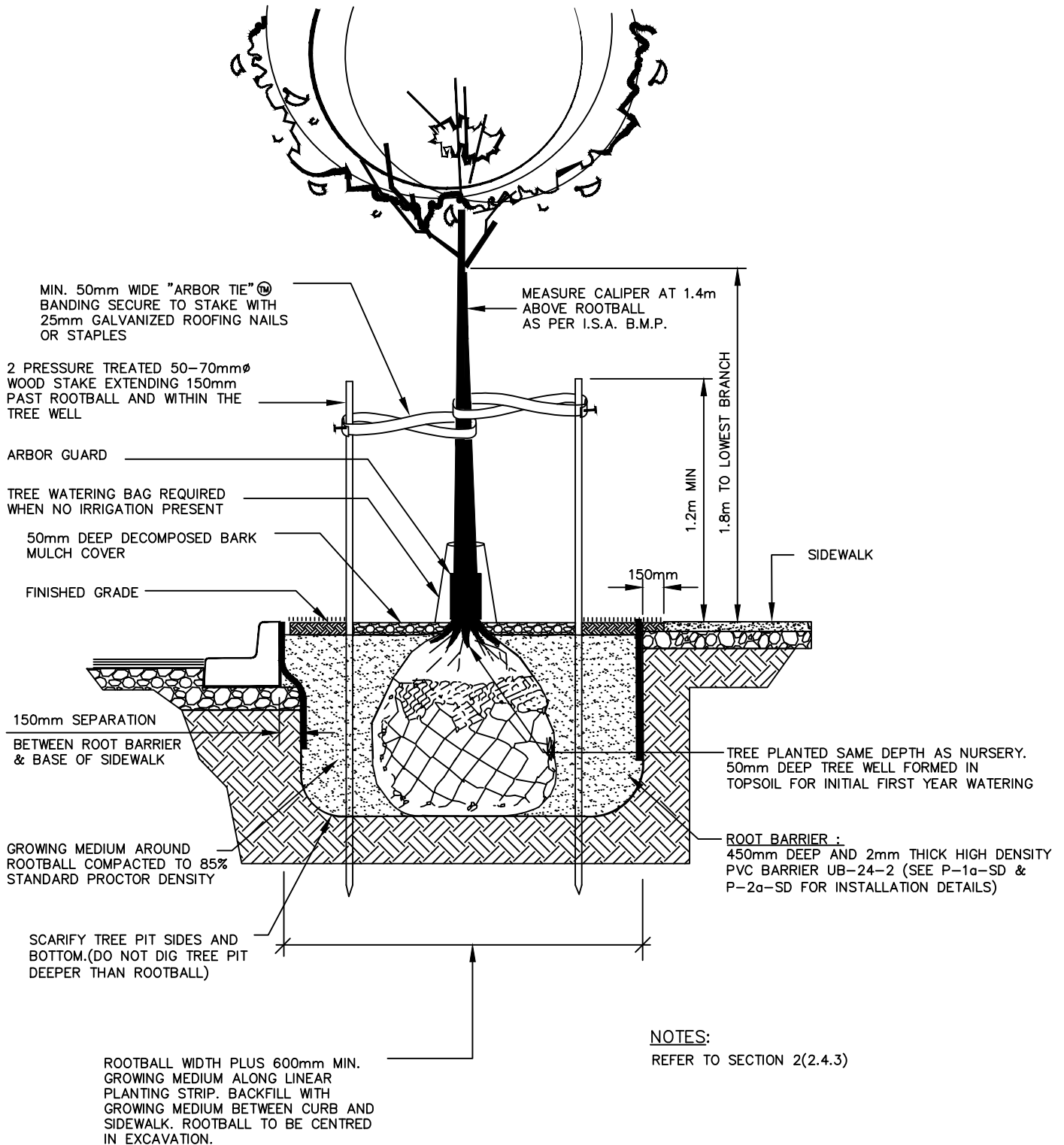
Supplementary Detail Drawings

Additional Supplementary Detail Drawings	
Drawing No.	Drawing Title
P-1-SD	Tree Planting Detail – Profile (Detached Sidewalk)
P-1a-SD	Root Barrier Detail – Plan (Detached Sidewalk)
P-2-SD	Tree Planting Detail – Profile (Paved Blvd / Sidewalk)
P-2a-SD	Root Barrier Detail – Plan (Paved Blvd / Sidewalk)
P-3-SD	Concrete Tree Grate (With Tree Grate Support)
P-4-SD	Concrete Tree Grate (With Concrete Collar)
P-5-SD	Ductile Tree Grate (with Concrete Collar)
P-6-SD	Tree Planting Distances
P-7a-SD	Tree Protection and Tree Protection Distance Table
P-7b-SD	Typical Drip Line on a Tree

PARKS DRAWINGS

PARKS DRAWINGS

SUPPLEMENTARY DETAIL DRAWING



TREE PLANTING DETAIL – PROFILE (DETACHED SIDEWALK)

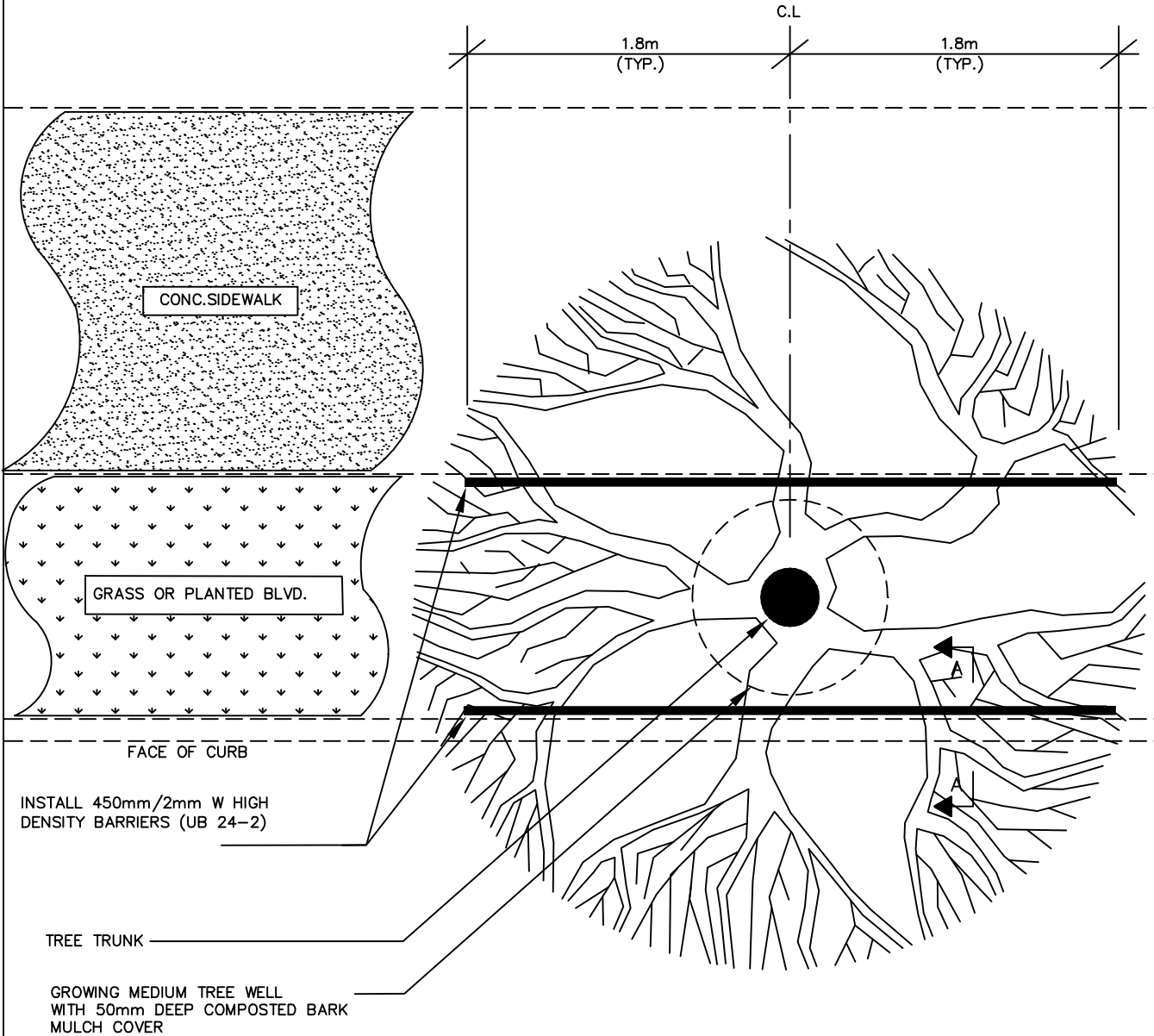


TECH. : F. CHOE
DR. : F. CHOE
ENG. :

SCALE : NTS
DATE : APR. 2010
REV. : SEPT. 2016

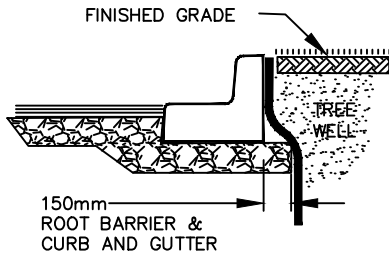
DRAWING NUMBER :
P-1-SD
SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



NOTES:

1. ROOT BARRIERS SHALL BE REQUIRED FOR ALL TREES PLANTED WITHIN 2.0m OF HARDSCAPE. (MEASURED FROM CENTRE OF TREE TRUNK)
2. 450mm HIGH DENSITY PVC BARRIER AS APPROVED BY CITY OF RICHMOND PARKS DEPARTMENT.
3. TOP OF ROOT BARRIER SHALL BE SET 25mm ABOVE FINISHED GRADE OF SOIL. HOWEVER UNDER NO CIRCUMSTANCES SHALL THE TOP OF ROOT BARRIER EXTEND ABOVE ADJACENT CURB, SIDEWALK OR OTHER SURFACING.



DETAIL: A-A



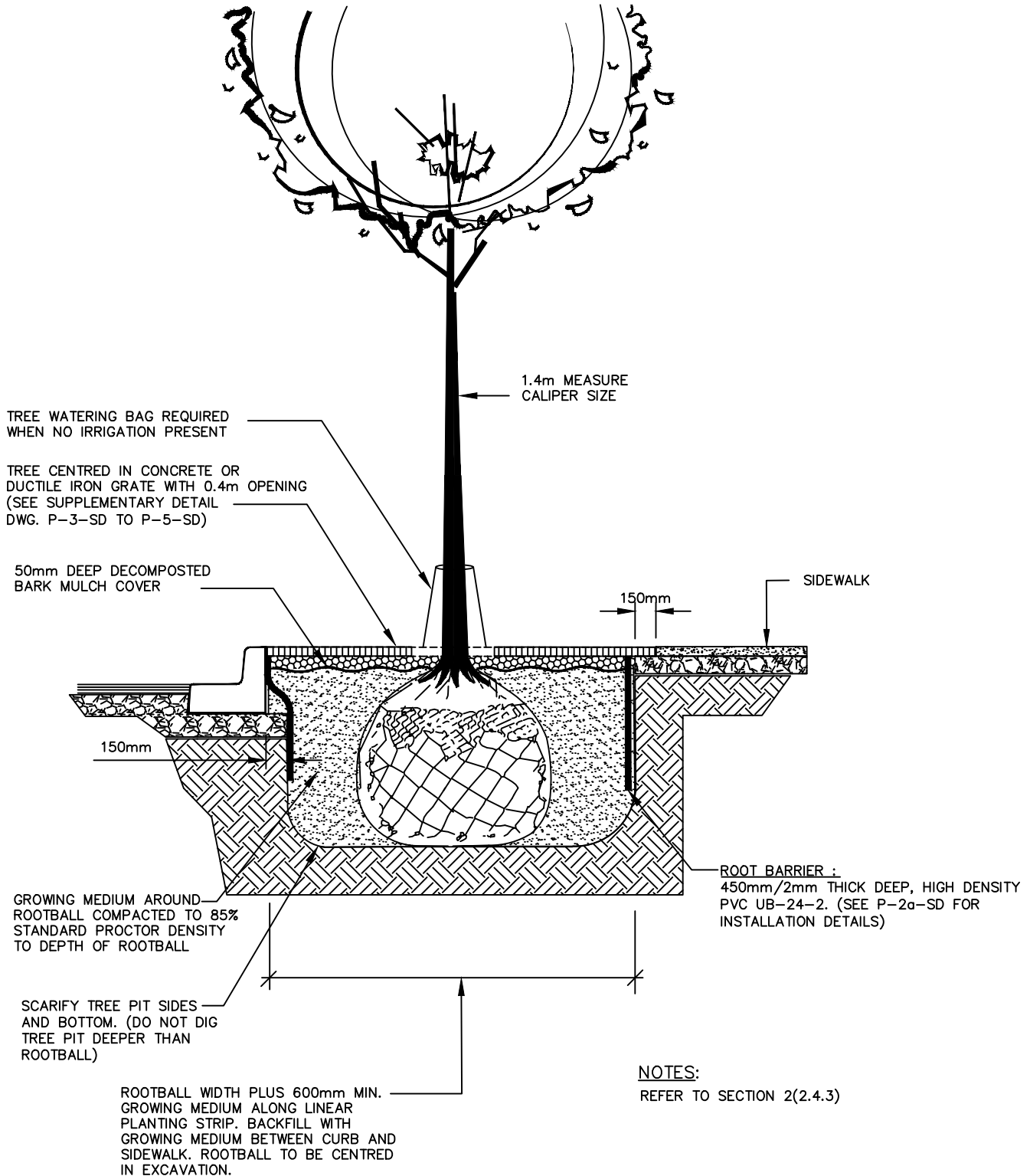
ROOT BARRIER DETAIL – PLAN (DETACHED SIDEWALK)

TECH. : F. CHOE
DR. : F. CHOE
ENG. :

SCALE : NTS
DATE : APR. 2010
REV. : SEPT. 2016

DRAWING NUMBER :
P-1a-SD
SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



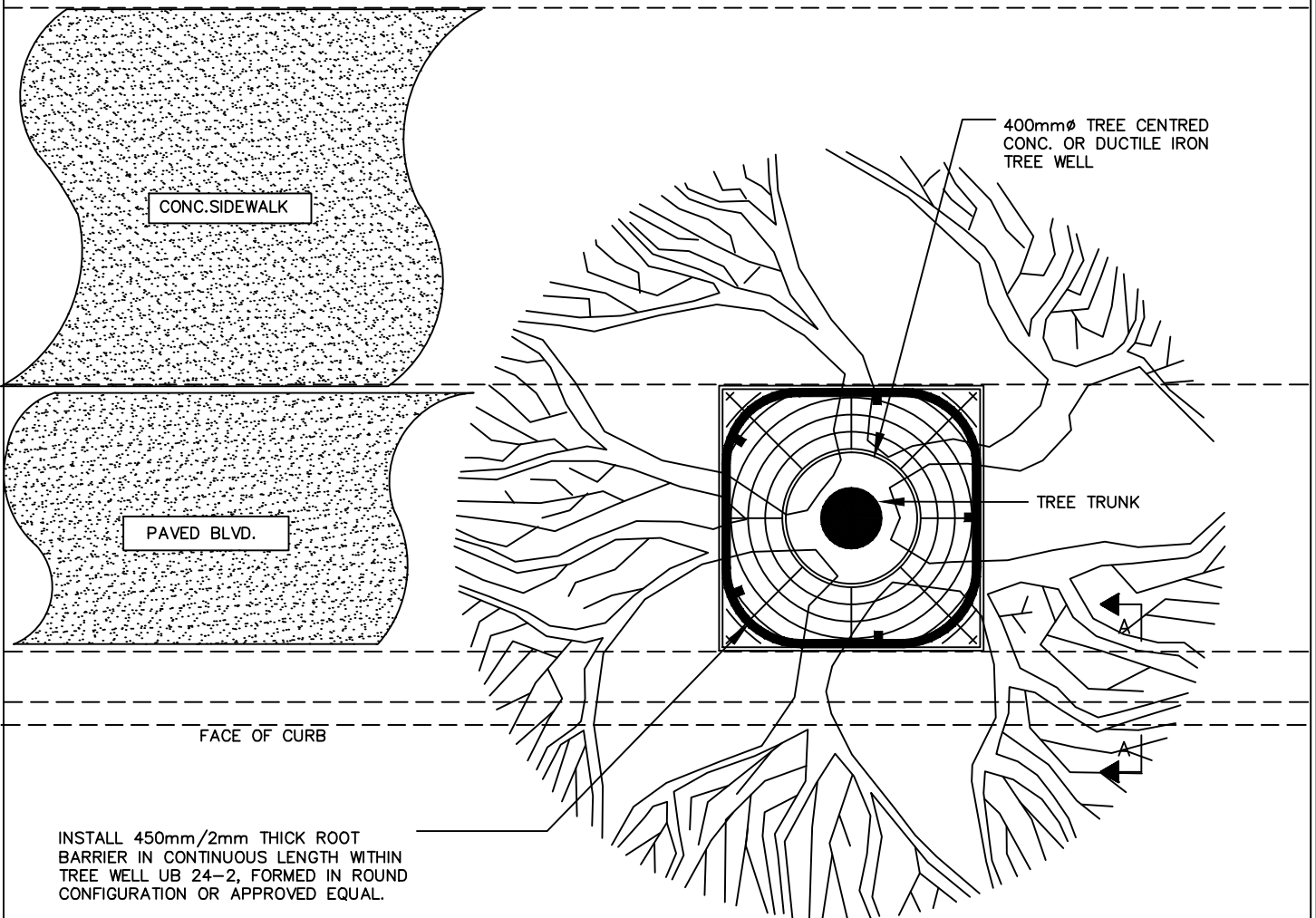
TREE PLANTING DETAIL – PROFILE (PAVED BLVD/SIDEWALK)

TECH. : F. CHOE
DR. : F. CHOE
ENG. :

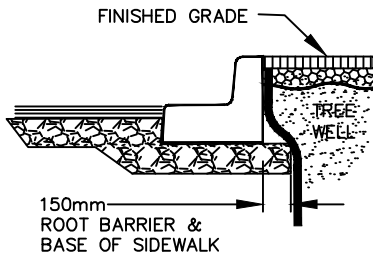
SCALE : NTS
DATE : APR. 2010
REV. : SEPT. 2016

DRAWING NUMBER :
P-2-SD
SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



INSTALL 450mm/2mm THICK ROOT BARRIER IN CONTINUOUS LENGTH WITHIN TREE WELL UB 24-2, FORMED IN ROUND CONFIGURATION OR APPROVED EQUAL.



DETAIL: A-A

NOTES:

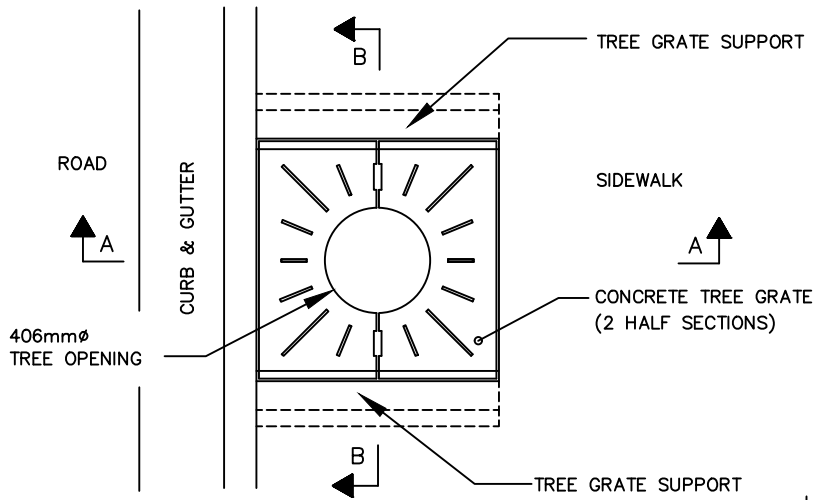
1. 450mm/2mm THICK ROOT BARRIER SHALL BE HIGH DENSITY & HIGH IMPACT PLASTIC.
2. TOP OF ROOT BARRIER SHALL BE SET 25mm ABOVE FINISHED GRADE OF SOIL. HOWEVER UNDER NO CIRCUMSTANCES SHALL THE TOP OF ROOT BARRIER EXTEND ABOVE ADJACENT CURB, SIDEWALK OR OTHER SURFACING.

ROOT BARRIER DETAIL – PLAN (PAVED BLVD/SIDEWALK)

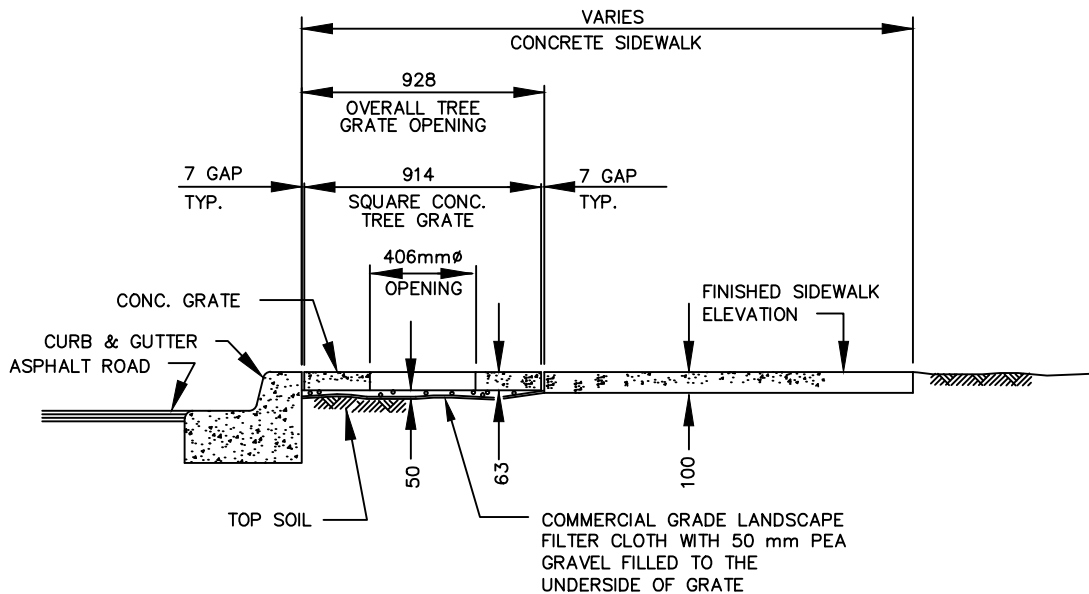
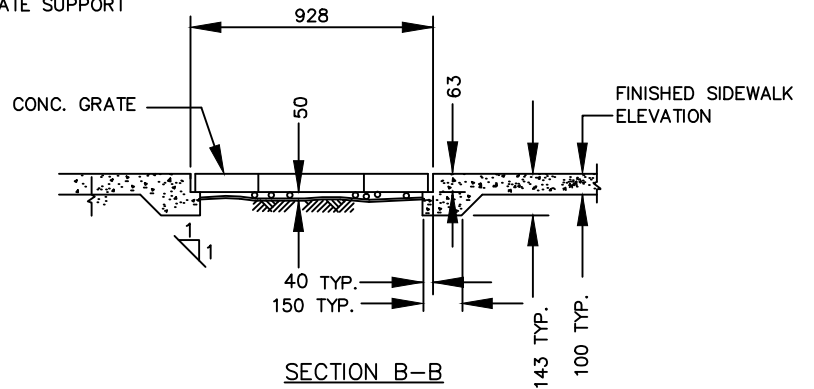


TECH. : F. CHOE	SCALE : NTS	DRAWING NUMBER : P-2a-SD
DR. : F. CHOE	DATE : APR. 2010	
ENG. :	REV. : SEPT. 2016	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



TREE GRATE DETAIL
(TREE IN WALKWAY C/W GRATE)



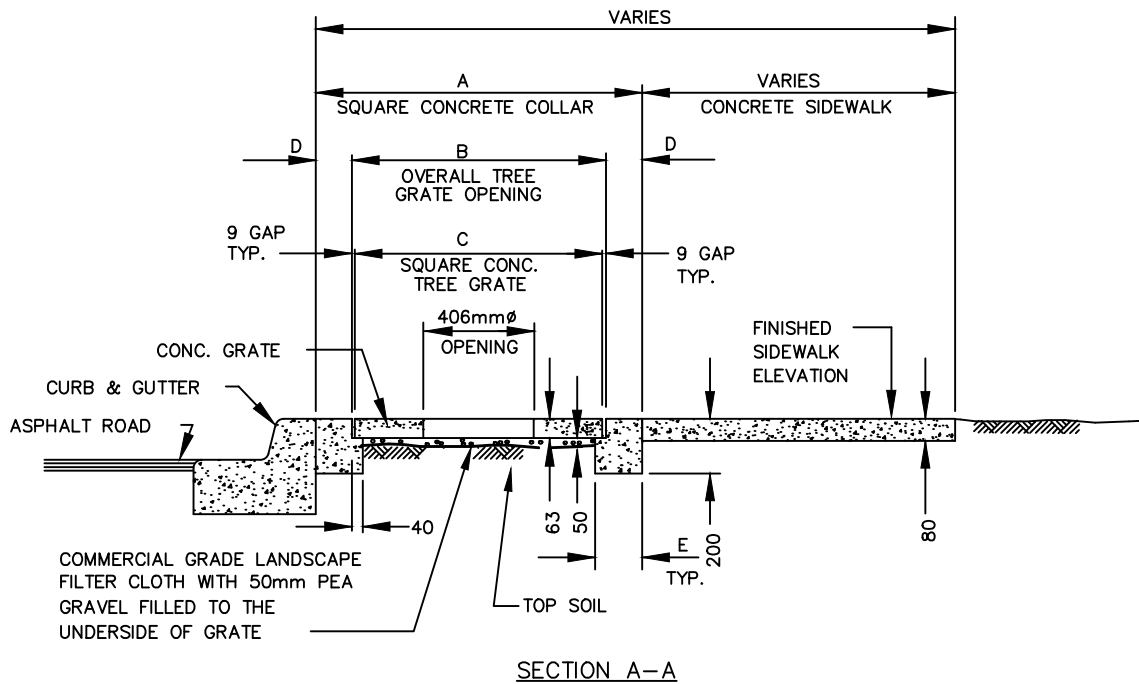
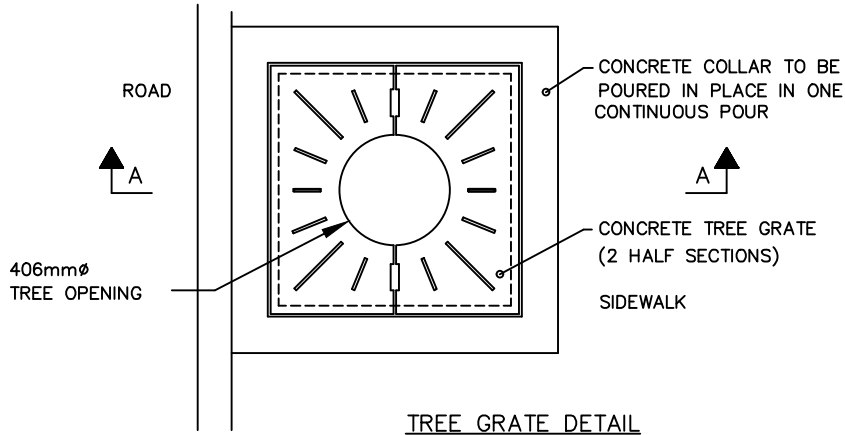
SECTION A-A



CONCRETE TREE GRATE (WITH TREE GRATE SUPPORT)

TECH. : F. CHOE	SCALE : NTS	DRAWING NUMBER : P-3-SD
DR. : F. CHOE	DATE : APR. 2010	
ENG. :	REV. : SEPT. 2010	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



NOTES:

1. OVERALL TREE GRATE COLLAR SHALL BE SQUARE.
2. OVERALL TREE GRATE OPENING SHALL BE SQUARE.
3. LEDGE AND OPENING DIMENSIONS TO BE CONSTRUCTED WITHIN 5mm±.
4. TREE GRATES AND CONSTRUCTION SHALL BE PEDESTRIAN FRIENDLY, SAFE AND TO WITHSTAND MAXIMUM PEDESTRIAN LOADING.
5. CONCRETE TREE GRATE COVERS SHALL BE SUPPLIED IN TWO HALF SECTIONS.
6. FOR OVERALL TREE GRATE DIMENSIONS AND THICKNESS SEE TABLE 'A'.

DESCRIPTION (COLLAR)	DIMENSION				
	A	B	C	D	E
1200mm SQUARE	1200	932	914	134	174
1500mm SQUARE	1500	1237	1219	132	172

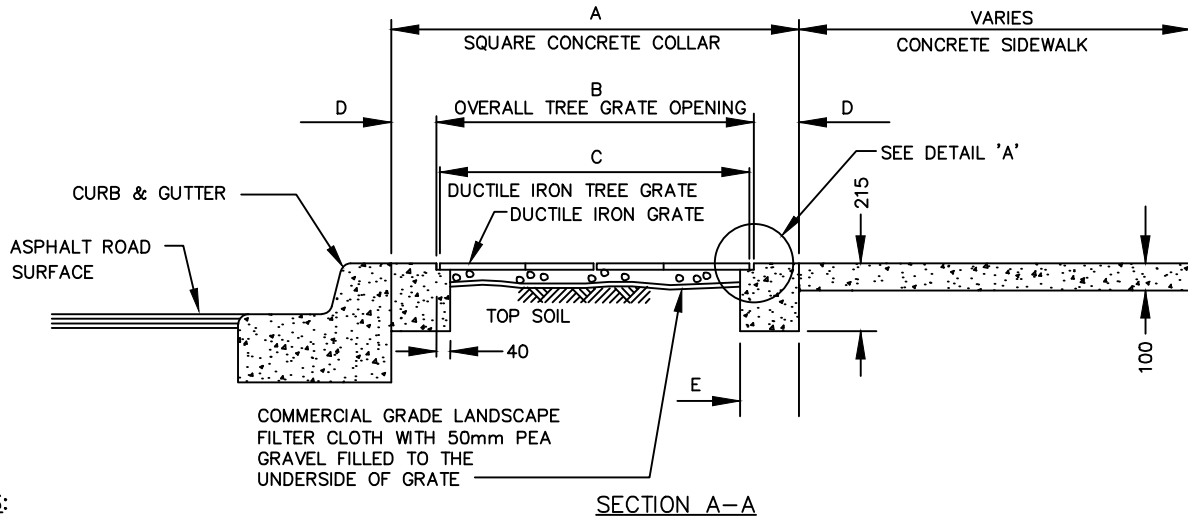
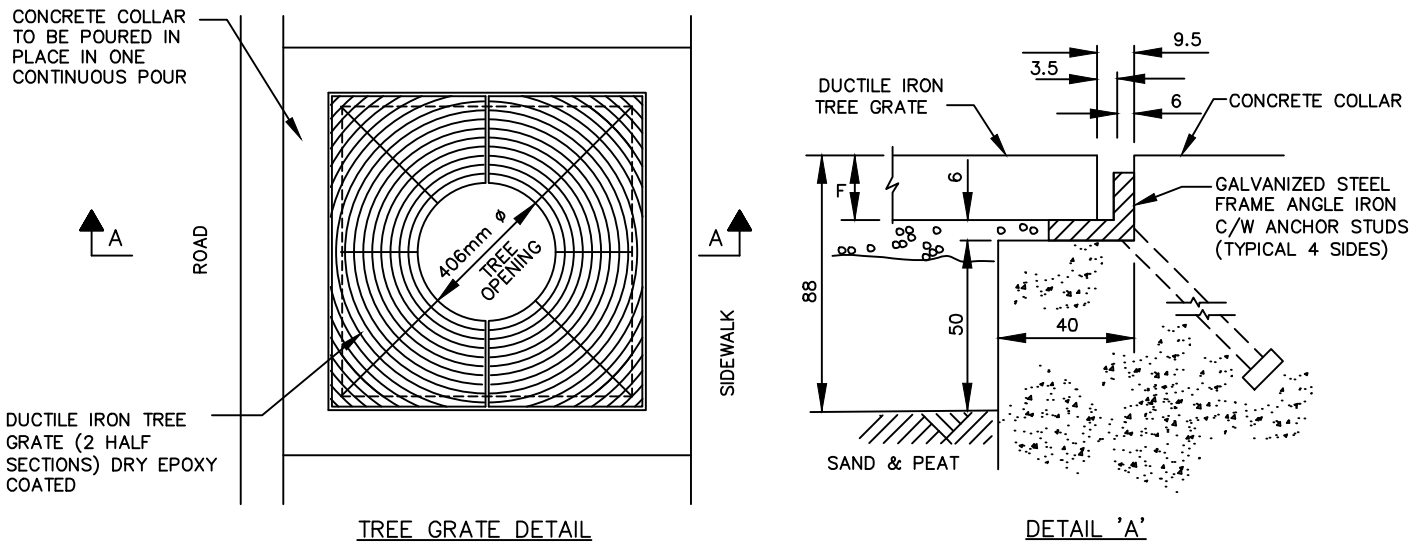
TABLE 'A'



CONCRETE TREE GRATE (WITH CONCRETE COLLAR)

TECH. : F. CHOE	SCALE : NTS	DRAWING NUMBER : P-4-SD
DR. : F. CHOE	DATE : APR. 2010	
ENG. :	REV. : SEPT. 2010	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



NOTES:

1. OVERALL TREE GRATE COLLAR SHALL BE SQUARE.
2. DUCTILE IRON TREE GRATE COVERS SHALL BE NYE'S FOUNDRY OR APPROVED EQUAL. (NYE PAT. No. 798)
3. DUCTILE IRON TREE GRATES SHALL BE IN TWO HALF SECTIONS WITH A 406mm TREE OPENING AT CENTRE OF GRATE THAT IS EXPANDABLE. OUTER EDGE IS SUPPORTED BY A RECESSED CURB ANGLE IRON.
4. STEEL TRIM/FRAME OR CURB ANGLE IRON SHALL BE 25 x 25 x 6mm. COMPLETE WITH 13mm ϕ ANCHOR BOLTS SPACED AT 300mm O/C CAST INTO PLACE, AND BE COMPATIBLE WITH GRATE.
5. FRAMES MUST BE POSITIONED BEFORE CONCRETE IS POURED AND MUST BE LEVELED TO PREVENT ANY ROCKING OF TREE GRATES.
6. OVERALL TREE GRATE DIMENSIONS AND THICKNESS SEE TABLE 'A'.
7. LEDGE AND OPENING DIMENSIONS TO BE CONSTRUCTED WITHIN 5mm \pm .
8. TREE GRATES AND CONSTRUCTION SHALL BE PEDESTRIAN FRIENDLY, SAFE AND TO WITHSTAND MAXIMUM PEDESTRIAN LOADING.

DESCRIPTION (COLLAR)	DIMENSION					
	A	B	C	D	E	F
1200mm SQUARE	1200	932	914	134	174	20
1500mm SQUARE	1500	1238	1219	131	171	32

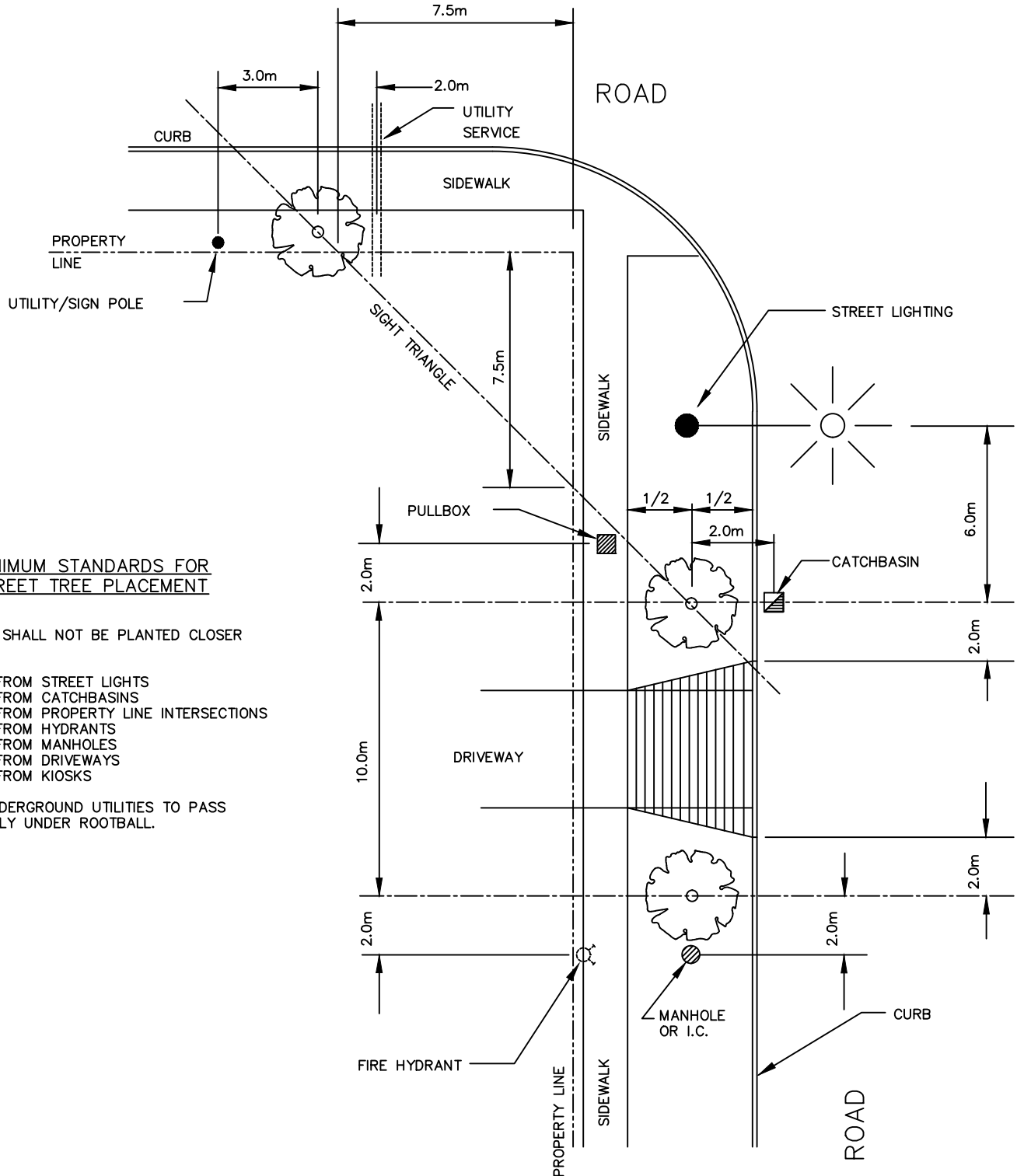
TABLE 'A'



DUCTILE IRON TREE GRATE (WITH CONCRETE COLLAR)

TECH. : F. CHOE	SCALE : NTS	DRAWING NUMBER : P-5-SD
DR. : F. CHOE	DATE : APR. 2010	
ENG. :	REV. : SEPT. 2010	SHEET No. : 1 OF 1

SUPPLEMENTARY DETAIL DRAWING



MINIMUM STANDARDS FOR STREET TREE PLACEMENT

TREES SHALL NOT BE PLANTED CLOSER THAN:

- 6.0m FROM STREET LIGHTS
- 2.0m FROM CATCHBASINS
- 7.5m FROM PROPERTY LINE INTERSECTIONS
- 2.0m FROM HYDRANTS
- 2.0m FROM MANHOLES
- 2.0m FROM DRIVEWAYS
- 2.0m FROM KIOSKS

NO UNDERGROUND UTILITIES TO PASS DIRECTLY UNDER ROOTBALL.

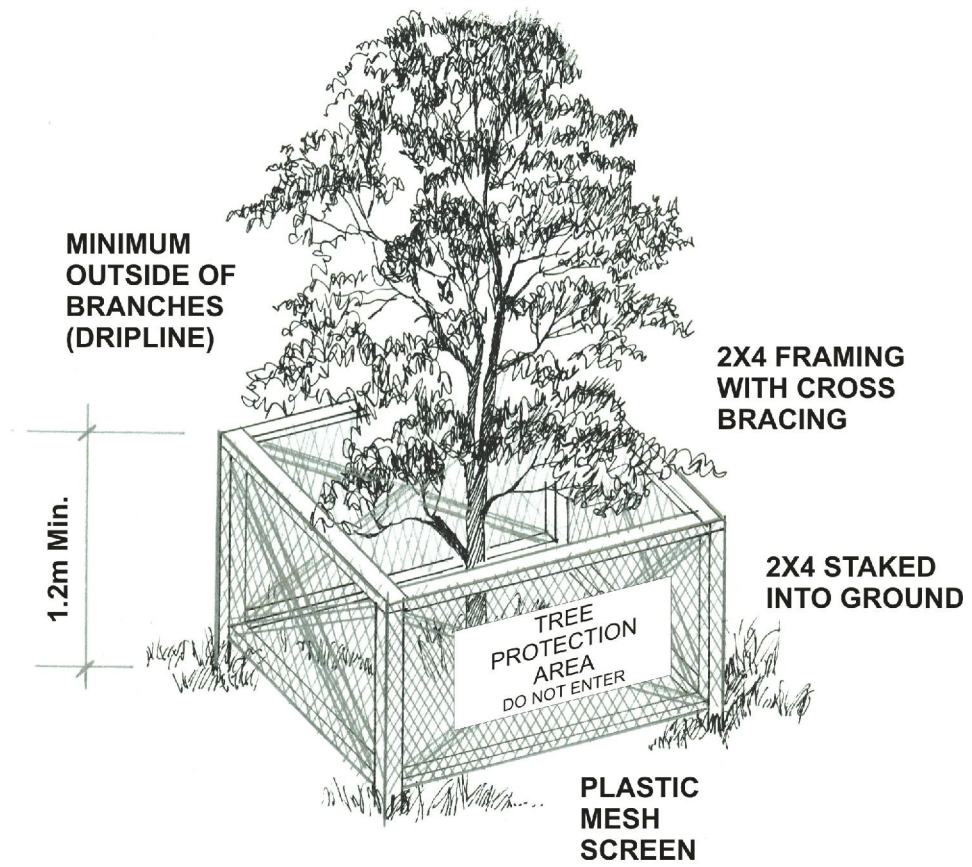
TREE PLANTING DISTANCES



TECH. : F. CHOE
DR. : F. CHOE
ENG. :

SCALE : NTS
DATE : APR. 2010
REV. : SEPT. 2016

DRAWING NUMBER :
P-6-SD
SHEET No. : 1 OF 1



NOTE:
 WOOD FRAME CONSTRUCTION STAKED INTO THE GROUND IS REQUIRED.
 (METAL FRAMING DOES NOT MEET CITY STANDARDS).

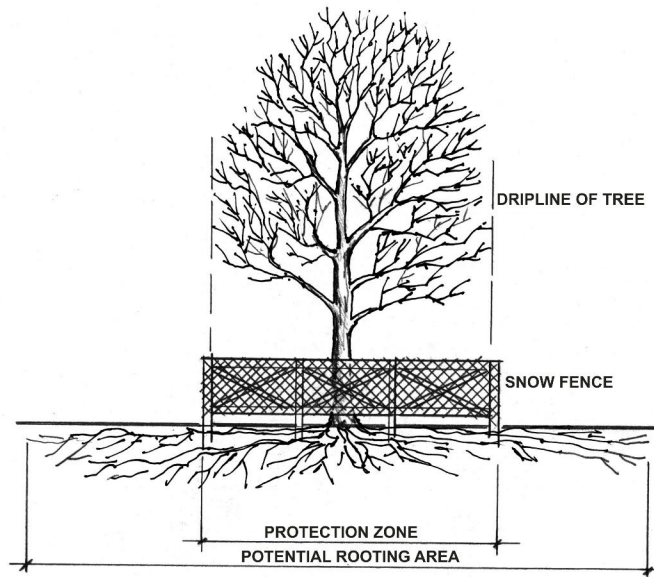
TREE TRUNK DIAMETER			DISTANCE FROM TRUNK		TOTAL DIAMETER	
cm	inches	feet	m	feet	m	feet
20	8	0.6	1.2	3.9	2.60	8.5
25	10	0.8	1.5	4.9	3.25	10.7
30	12	1.0	1.8	5.9	3.90	12.8
35	14	1.2	2.1	6.9	4.55	14.9
40	16	1.3	2.4	7.9	5.20	17.1
45	18	1.5	2.7	8.9	5.85	19.2
50	20	1.7	3.0	9.8	6.50	21.3
55	22	1.8	3.3	10.8	7.15	23.5
60	24	2.0	3.6	11.8	7.80	29.6
75	26	2.5	4.5	14.8	9.75	32.0
90	32	3.0	5.0	16.4	10.90	35.8
100	36	3.3	6.0	19.7	13.00	42.7

TREE PROTECTION TABLE
 MINIMUM PROTECTION REQUIRED AROUND TREE

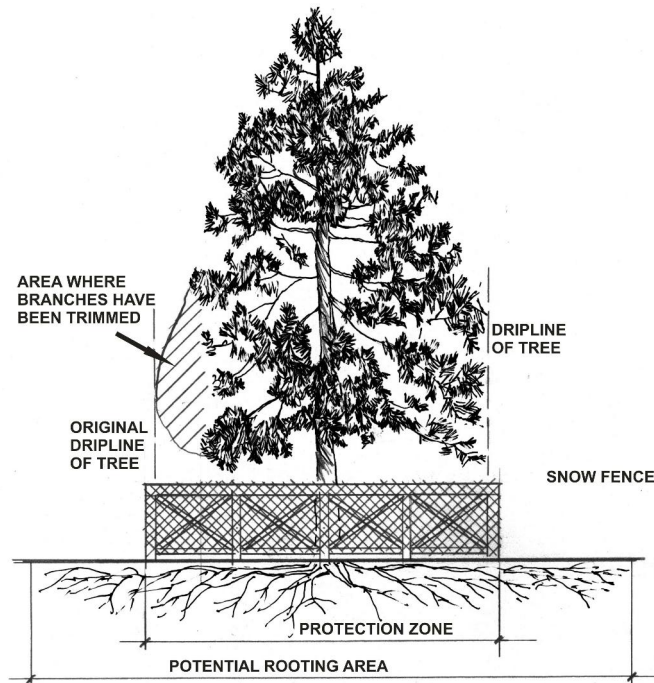


**TREE PROTECTION AND
 TREE PROTECTION DISTANCE TABLE**

TECH. :	SCALE : NTS	DRAWING NUMBER : P-7a-SD
DR. :	DATE : DEC. 2010	
ENG. :	REV. :	SHEET No. : 1 OF 1



TYPICAL DRIP LINE ON A TREE



TYPICAL DRIP LINE ON A TREE WITH ONE SIDE PRUNED

TYPICAL DRIPLINE OF A TREE



TECH. :	SCALE : NTS	DRAWING NUMBER : P-7b-SD
DR. :	DATE : DEC. 2010	
ENG. :	REV. :	SHEET No. : 1 OF 1

SCHEDULE H

SCHEDULE H

SCHEDULE H

SUPPLEMENTARY SPECIFICATIONS AND DETAIL DRAWINGS FOR IRRIGATION

All City Centre Planted Mediums must be irrigated. Other city medians may require irrigation at the discretion of the Parks Manager

1.0 GENERAL

1.1. General Requirements

- .1 Refer to Division 1, General Requirements.
- .2 All contract documents form an Integral part of this section.

1.2. Related Work

- .1 Growing Medium Preparation and Placement: Section 32 91 21
- .2 Sodding: Section 32 92 23
- .3 Supplementary Specifications and detail drawings for tree planting on sidewalk and boulevards: Schedule G

1.3. Codes and Regulation

- .1 All work shall be installed in accordance with the requirements of local and applicable provincial and federal regulations. Any work shown on the drawings or described in the specifications which is at variance with the regulations shall be changed to comply with the requisite authority at no cost to the Contract Administrator.
- .2 Workers' Compensation Board regulations shall be followed.

1.4. Permits and Fees

- .1 Obtain and pay for all permits covering the work connected with the installation of the systems specified and as shown on the drawings.

1.5. Contract Drawings

- .1 Drawings are diagrammatic and indicate the general arrangement of systems and work included in the contract. Do not scale drawings.

1.6. Guarantee

- .1 The contractor hereby warrants that the irrigation system, as installed will remain free of defects in accordance the General Conditions for a period of one (1) year from the date of Substantial Performance. The contractor shall make all corrections, adjustments and maintenance operations required as a result of failure of the irrigation system to perform due to the work in this Contract.
- .2 Manufactured products, including, but not limited to irrigation heads, quick couplers, controllers, valve boxes and valves, will be warranted as per the manufacture's standard warranty period or a minimum of one (1) year, whichever is greater.

1.7. As-Built Drawings

- .1 The Contractor, at their expense, shall obtain from the Contract Administrator additional base drawings on which they shall mark, as the work progresses any changes and deviations in runs of piping or head and valve locations, from those indicated in the contract documents. At the completion of the project, the landscape subcontractor shall supply the Contract Administrator with electronic as-built drawings in the latest and three (3) sets of hard copy as-built drawings. The as-built drawings shall be certified by the landscape subcontractor as being an accurate record of installation.

1.8. Quality Control

- .1 Irrigation Supervisor must be a member of the Irrigation Industry Association of British Columbia (IIABC).
- .2 All irrigation work will be done by an experienced and competent irrigation Contractor having the facilities and personnel adequate for the work specified.

1.9. Submittals and Instructions

- .1 Maintenance Date and Operation Instructions:
 - .1 Prior to and as a condition of Substantial Performance, submit to the Contract Administrator, three (3), copies of an operating and maintenance manual containing operational information for all operating components, cleaning and lubrication schedules, overhaul and adjustment schedule and similar maintenance operations.
 - .2 Each manual will be bound in a three (3) ring binder.
 - .3 Three (3) copies of schematic zone map (letter size) which clearly indicates the zone number as it relates to the various irrigation zones in the field and the irrigation controller set up.

- .2 Instructions:
 - .1 Instruct a designed representative of the Contract Administrator in the complete operating and maintenance procedures of the irrigation system.
- .3 Keys and miscellaneous Hardware:
 - .1 Submit all keys, wrenches and miscellaneous hardware supplied by the manufacturer for operation and maintenance of component irrigation parts to the Contract Administrator.
- .4 Material List:
 - .1 Within thirty (30) days after the award of the Contract, submit three (3) copies of the complete list of materials to the Contract Administer) which are proposed for installation.
 - .2 All materials shall be listed by manufacturer and model numbers.
 - .3 Only those materials and items of equipment listed and reviewed by Contract Administrator shall be used for work in this section.

1.10. Protection

- .1 Protect all existing buildings, equipment, sidewalks, landscape reference points, monuments, markers and other completed work. Make good any damage resulting from work of the Contract at no expense to the Contract Administrator.
- .2 Protect the work and material of all other trades from damage. Make good all damages from work of the Contract at no expense to the Contract Administrator.
- .3 The Contractor shall be responsible for work and equipment until finally reviewed, tested, and accepted by Contract Administrator.
- .4 Store materials and equipment received on site which is not immediately installed in a secure location.
- .5 Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructive material.
- .6 Trenches and other excavations are not to be left open overnight unless protected as per W.C.B. standards. In all areas excavated trenches must be covered and barricaded to ensure public safety.

1.11. Equals

- .1 All items are as specified or pre-approved equals by the City's Park Contract Administrator.

1.12. Site Conditions

- .1 Existing Conditions:
 - .1 Verify the location of all site utilities prior to start of work. Ensure uninterrupted existing utility service during construction period.
 - .2 Notify Contract Administrator of any existing utilities encountered during excavation or installation of irrigation system.
- .2 Site Preparation:
 - .1 Prior to starting work, carefully inspect any installed work other trades or contractors. Verify all duck work is complete to the extent that the work of the section may commence.
- .3 Sequencing:
 - .1 Ensure the installation of sleeves and irrigation pipe under paved surfaces and through planter walls as required.
 - .2 Verify location of water supply and electrical conduit for the low voltage wire from the irrigation controller to the electrical stub out.
- .4 Plastic Pipe Fittings and Connections
 - .1 Schedule 80 PVC designed for solvent welding to PVC pipe must be used in the construction of backflow assemblies.
 - .2 All plastic pipe fittings used for solvent welding to PVC shall be Schedule 40.
 - .3 Fittings for PVC pipe will be ½ to 2/3 interface fit to ensure a full sealed joint.
 - .4 When connection is plastic to metal, male adapters shall be used. The male adapter shall be hand tightened, plus one turn with a strap wrench.
 - .5 Plastic to metal connections shall be made with PVC male connectors and metal female connectors.
 - .6 Joint Compound: Shall be Teflon tape.
- .5 Back Flow Preventer:
 - .1 Back flow preventers shall have bronze body construction with ball valve test cocks and gate valves, and with corrosion resistant internal parts. Type and model to be Zurn Wilkins model 350 (XL)

for Double Check Valves and Zurn Wilkins 975XL for Reduced Pressure Backflow Assemblies.

- .6 Pipe Solvent:
 - .1 CSA approved type as recommended by pipe manufacturer. Delivered in sealed containers clearly marked with the name of manufacturer and lot number.
- .7 Copper Pipe:
 - .1 Type L hard copper installed inside the building, insulated if required by code.
 - .2 Type K hard copper installed outside the building.
- .8 Sleeves:
 - .1 All sleeves under roadways shall be a minimum 100mm diameter Schedule 80 PVC. Multiple or larger sleeves are required if the mainline or pipe is larger than 50mm with large wire bundles.
 - .2 All other sleeves shall be 100mm diameter Schedule 40 PVC.
- .9 Automatic Solenoid Control Valves:
 - .1 Shall be first quality, type and size as noted on the drawing.
 - .2 Operating rating of a minimum of 150 psi.
 - .3 Manual open/close control normally closed.
 - .4 Adjustable flow control.
 - .5 24VAC 50/60 cycle solenoid. (9V latching Solenoids to be TBOS latching solenoids)
 - .6 Valves will be the same size/diameter as the pipes they control as long as the valve meets the flow requirements of the station.
- .10 Quick Coupler Valves:
 - .1 Brass Toro or Rain Bird quick coupler sized to fit pipe.
- .11 Control Valve Boxes:
 - .1 All control valves shall be installed in a thermoplastic valves access box NDS or approved equal. Control valve boxes shall be complete with approved steel cover and captive lock bolts.

- .2 Control Valve box sizes:
 - .1 910 for one 40mm valve or two 25mm valves.
 - .2 1419 for two 40mm valves or one 75mm valve.
 - .3 1320 for three 40mm valves or four 25mm valves.
- .12 Isolation Valves:
 - .1 Isolation valve at water source of sizes 50mm and smaller shall be all bronze ball valves.
- .13 Sprinkler Heads:
 - .1 All approved fixed spray or rotor sprinklers shall have an adjustable triple swing joint riser assembly with at least three schedule 40 street elbows located as recommended by the sprinkler manufacturer.
 - .2 All swing joint risers shall be of a length required for proper installation of the sprinkler head.
 - .3 The sprinklers shall be of sufficient height so as not to cause any interruption of the stream from the sprinkler nozzle when the plant material has reached its optimum growth.
- .14 Automatic Controller:
 - .1 As noted on the irrigation drawings or City of Richmond irrigation specifications. Toro Sentinel Central Control Systems or Adequate Battery operated controllers
 - .2 One irrigation controller is to be used per irrigation system. The practice of installing irrigation controllers at each valve location is not permitted. Temporary battery operated controllers can be used for a period of time until the main controller is operational.
- .15 Wiring:
 - .1 Wiring to be used for connecting the automatic control valves to the irrigation controller shall be T.W.U. minus 40C, 14 gauge solid direct burial wire
 - .2 All wiring to be bundled and taped at 10 ft (3M) intervals and installed beneath the irrigation piping or in appropriately sized conduit if run independently.
 - .3 Sufficient extra wire shall be left in each valve box such that the splice be lifted 12" (300mm) above grade

.4 All wiring shall be installed to meet local electrical codes.

.16 Blowout Tee:

.1 25mm Toro or Rain Bird brass quick couplers.

2.0 PRODUCTS

2.1. Products

.1 Wherever “as per Manufacture’s specifications” is used, it shall mean in strict accordance with the manufactures printed directions and this specification with the Contract Administer prior to processing with work.

.2 All material throughout the system shall be new and in perfect condition and conform to the City of Richmond’s Parks supplementary specifications.

.3 Plastic Pipe:

.1 Plastic pipe shall be ridged un-plasticized Polyvinyl-Chloride (PVC) Class 200 PVC for all construction downstream of the backflow preventer.

.2 CSA approved glue, primer and schedule 40 PVC pipe with schedule 80 fittings to be used for the construction of back flow assemblies.

.3 All pipe to be continuously and permanently marked showing manufacture’s name or trademark, type of material, pipe size and pressure rating.

.4 The pipe shall be homogenous throughout and free from visible cracks and holes.

3.0 EXECUTION

3.1. Pipe and Trench Layout

.1 Obtain the Contract Administrator's review of rough grades prior to the installation of any pipe.

.2 Layout the piping system in accordance with the Contract Drawings. Pipe shall be run in straight lines between fittings.

.3 Trenches shall be straight and true. Bottom of trench to have uniform slopes.

.4 No irrigation pipe will be directly over and parallel to another irrigation pipe or pipe of another trade.

- .5 Where possible, main line supply pipes may occupy the same trench as irrigation sprinkler pipes. Provide a minimum horizontal clearance of 150 mm between main line and supply pipes.
- .6 Pipe Clearances:
 - .1 Underground lines shall have a minimum horizontal clearance of 150 mm from each other.
 - .2 All lines shall have a minimum horizontal clearance of 300 mm from the lines of other trades.
 - .3 Lines crossing at angles from 45 to 90 degrees with each other shall have a minimum 25mm vertical clearance between each other.
 - .4 No pipe shall be installed closer than 600mm to any parallel electrical conduit.
 - .5 All pipe to have a minimum of 250mm offset from back of curb.

3.2. Trench and Pipe Depths

- .1 PVC Main Service Pipe Lines:
 - .1 In planting areas "on grade" shall have a cover of 300 mm below finished grade.
 - .2 Under paving where it shall be enclosed in a sleeve and a minimum of 300 mm below the finished grade.
- .2 PVC Sports Field PVC Pipe:
 - .1 On grade shall have a cover of 450 mm below finished layer grade.
 - .2 Over structural slab pipe shall be on top of filter cloth or above drainage.

3.3. Installation of Pipe and Trench Back Fill Procedure

- .1 All piping and materials shall be installed in strict accordance with the manufacturer's printed instructions and requirements except as such requirements may be exceeded or supplemented herein. All installation shall be in full accordance with all codes, rules, regulations and the like having jurisdiction.
- .2 Do not drag individual lengths of pipe or assembled sections of pipe along the ground.

- .3 Bottom of trenches to be free of sharp and large rocks and any other material that may damage pipe. Holes below grade lines caused by removal of stones must be filled and compacted to 95% MPD.
- .4 Pipe Bedding , Cover and Back fill:
 - .1 Bed pipe on a minimum of 50mm sand.
 - .2 Back fill trench with native material up to minimum depth of growing medium. Back fill remainder of trench with growing medium in planting and lawn areas and detailed sub grade material in paved areas.
 - .3 Back fill trenches in 150 mm lifts, tamping as required to assure compaction of 80% MPD in planting and lawn areas, 95% MPD in paved Areas.
- .5 Do not support intermediate points of pipe runs with stones, bricks or other hard material. All pipes bedded in trench as noted in 3.0.3.6.
- .6 Pipe sections damaged during installation or back fill shall be removed and new pipe sections shall be installed with new couplings.
- .7 The Contractor shall ensure that corrections to the surface grade made after the trench is back filled will not reduce the cover below minimum figures.
- .8 The Contractor shall make good all existing surfaces disturbed during the installation of irrigation sleeves.

3.4. Installation of Valves and Valve Boxes

- .1 Top of valve box to be level and flush with surrounding finish grade.
- .2 Install valves horizontally and centered in valve box for easy access. Valves to be mounted on section of pipe elevated off main line minimum 150 mm and easily accessible for servicing.
- .3 Use only close fitting, square or hex-shaped wrench or spud-type monkey wrench for tightening unions and valves with hex nuts.
- .4 Support the valve boxes with brick or concrete blocks to ensure that neither the blocks nor valve box is sitting directly on pipe below.
- .5 Provide a minimum of 150 mm deep, 19 mm drain rock at bottom of each valve box.

- .6 Install quick coupler at locations shown on drawings. Accommodate quick coupler in valve box or separate enclosure, as required upstream from valve.
- .7 All wiring connections in valve boxes to be of sufficient length to permit removal of the top of valve from valve box.

3.5. Installation and Adjustment of Sprinkler Heads

- .1 Risers: Size to match sprinkler intakes. Install sprinkler on riser as specified.
- .2 Street elbows: Connect bottom street elbow to the side outlet of the lateral line.
- .3 Pop up sprinklers: Install the swing assembly at a 45 degree angle to the lateral line.
- .4 Stationary spray sprinklers: Ensure PVC nipple is sized to allow it to extend a minimum of 100 mm above finished grade.
- .5 Lawn and Turf Sprinkler Heads:
 - .1 Full circle heads: install as noted on the drawings.
 - .2 Part circle heads: Install 25mm away from banding, paving, mow strips, curbs or hard surfaces. Ensure head is flush with adjacent surface.
- .6 Shrub and ground cover heads:
 - .1 Heads shall be installed 50 mm above finished grade.
 - .2 Ensure edging, banding, mow strips, curbs or hard surfaces are in place prior to installation of sprinkler heads.
- .7 Minor changes in sprinkler head location required as a result of on-site conditions shall be made by the contractor at no additional cost to the Contract Administrator. Ensure head to head coverage is maintained.

3.6. Installation of Wiring

- .1 Control wire to be placed under PVC piping in same trench and/or sleeves.
- .2 All electrical connections to be made in an accessible valve box.
- .3 Provide sufficient extra wire neatly bundled in valve box to allow valve assembly to be lifted 300 mm above finished grade.
- .4 Wiring Sealing .1 Stripped wire to be bonded together using CSA approved water tight connections.

3.7. Flushing

- .1 The entire sprinkler irrigation system shall be thoroughly flushed with water diverted to remove all dirt, scale, and foreign matter of any nature before installing the sprinkler nozzles.

3.8. Winterizing

- .1 Winterize the system for the first time with the Owner's designated representatives observing. Winterizing shall include all operations necessary to protect the system from freezing temperatures, including manual and solenoid valve operations to isolate vulnerable parts of the system and draining components and pipes and/or blowing out of all pipes with compressed air.

3.9. Adjustment

- .1 Adjust the irrigation heads for optimum coverage and rate of flow. Set automatic controllers to operate system as per the Metro Vancouver Water Shortage Response plan.
- .2 The contractor shall balance and adjust the various components of the irrigation system to ensure the efficient operation of the system. This includes but is not limited to:
 - .1 Adjustment of pressure regulators.
 - .2 Adjustment of part circle sprinklers.
 - .3 Adjustment of controller(s).

3.10. Coverage Test

- .1 When the irrigation system has been completed, a coverage test shall be performed in the presence of the Contract Administrator to ensure head to head coverage has been provided to all lawn and planting areas. The contractor shall complete all necessary adjustments as required.
- .2 Prior to final acceptance of the irrigation system by the Contract Administrator, the automatic controller(s) shall be tested through all their cycles in the presence of the Contract Administrator and any necessary adjustments shall be made.

3.11. Final Submittal

- .1 Submit Certificate of proof of Double Check Valve Assembly Test and pass to Contract Administrator for their records.

Supplementary Detail Drawings

Drawing No.	Drawing Title
IR-B-1	Basket Irrigation Detail on City Centre Lighting Pole
IR-C-1	Above Ground Chamber for Double Check Valve Assemblies 38 mm to 19 mm (1 ½" to ¾")
IR-C-2	Above Ground Chamber for Double Check Valve Assemblies (50 mm ø or Greater)
IR-C-3	Typical Master Valve and Flow Meter Detail
IR-C-4	Automatic Valve Box Detail
IR-S-1	Sports Field / Large Park: Hydraulic Rotor Sprinkler Detail
IR-S-2	Median / Boulevard: Irrigation Sprinkler Detail
IR-S-3	Irrigation Detail: Boulevard Tree with Grate

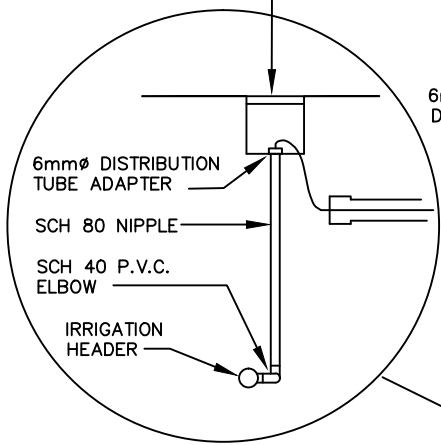
IRRIGATION DRAWINGS

IRRIGATION DRAWINGS

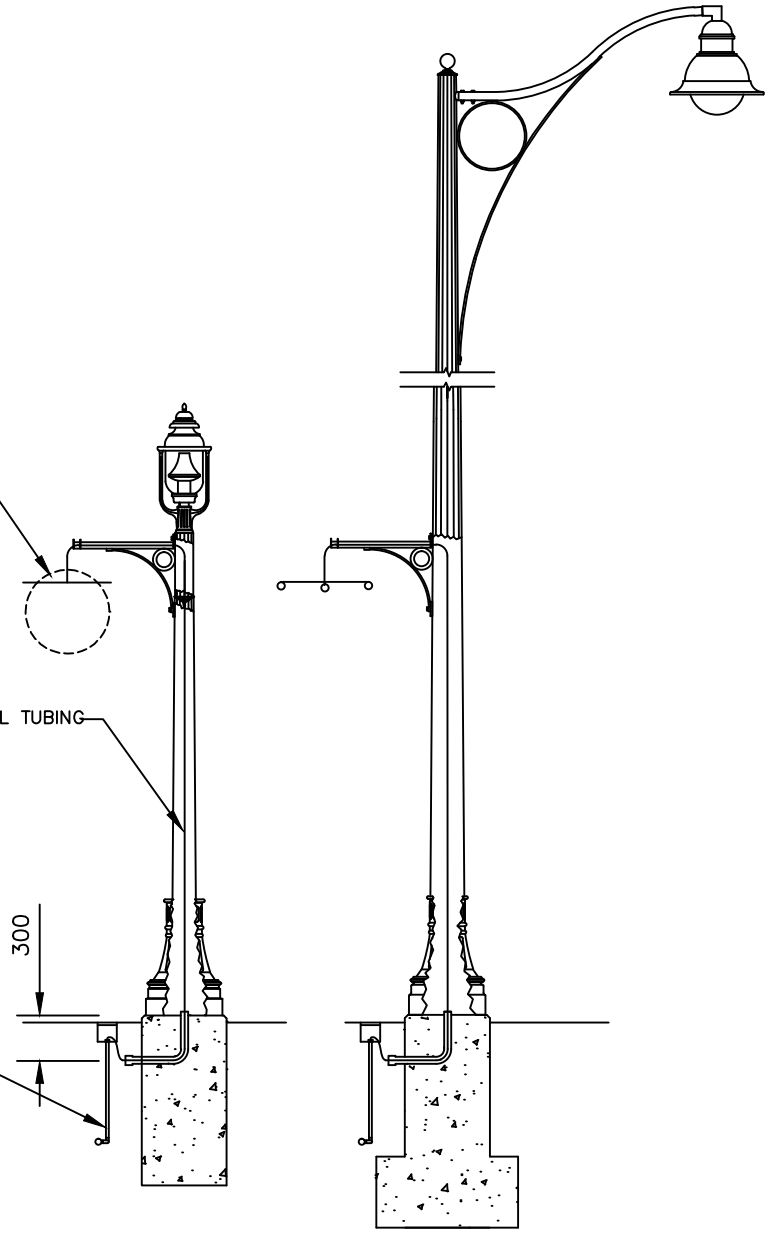
SUPPLEMENTARY DETAIL DRAWING

CONTRACTOR TO PROVIDE
(3) x 2 GPH EMITTERS PER BASKET.
EACH EMITTER WILL HAVE A STAKE.
6mm ϕ TUBING NIPPLES TO SUIT

250mm VALVE BOX C/W CAP
FOR INSTALLATION IN S/W



6mm ϕ VINYL TUBING
DT-025 *



NOTES:

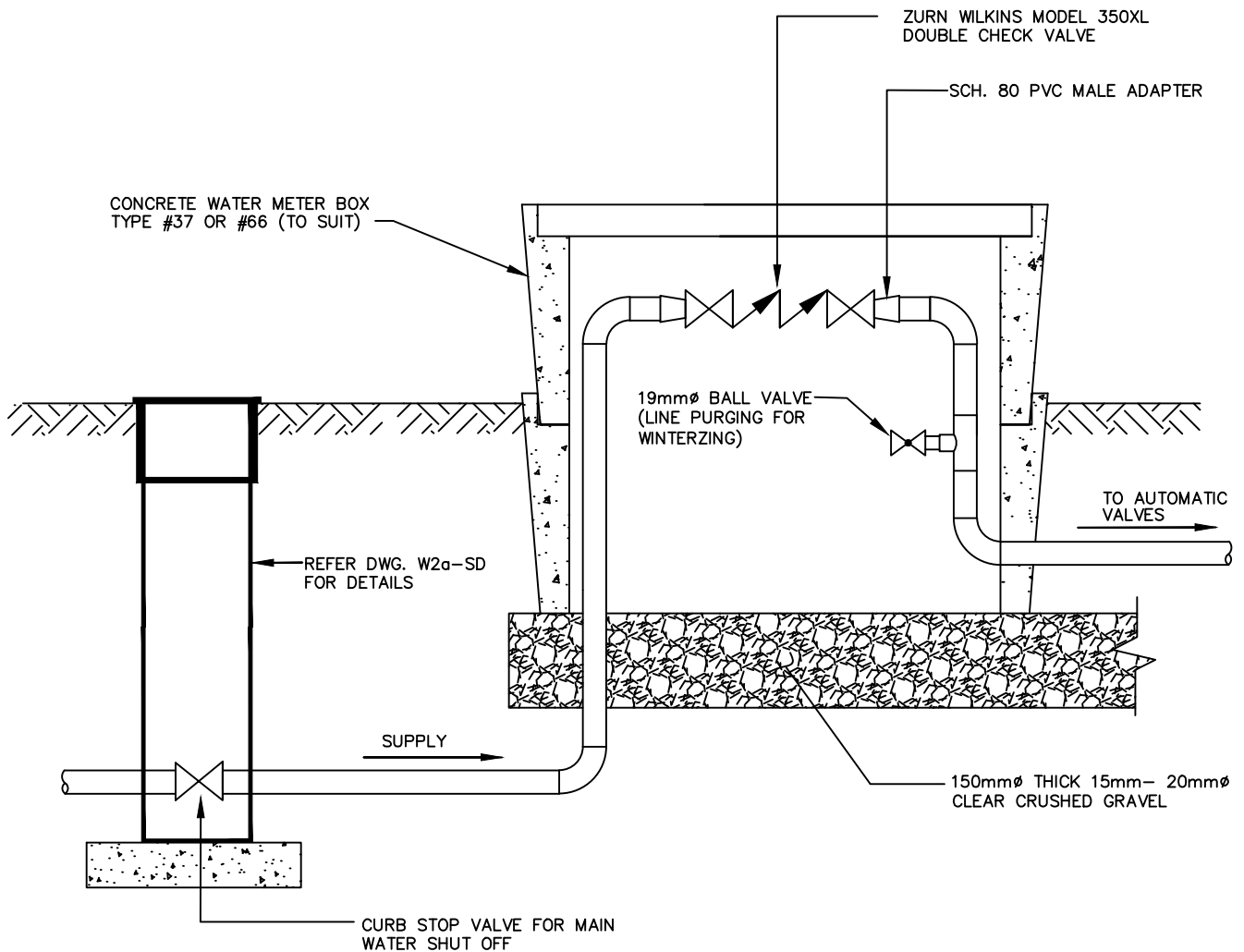
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CITY'S SUPPLEMENTARY SPECIFICATIONS.
2. ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
3. ALL PIPE DOWNSTREAM OF THE DOUBLE CHECK VALVE TO BE CLASS 200 P.V.C PIPE AND FITTINGS TO BE SCHEDULE 40 P.V.C UNLESS OTHERWISE NOTED ON THE PLAN OR INSTALLED UNDER ASPHALT OR CONCRETE
4. ALL PVC PIPE INSTALLED FOR DRIP OR HANGING BASKET IRRIGATION COVERED BY CONCRETE OR ASPHALT MUST BE SCHEDULE 40 P.V.C. PIPE
5. THE LAST POLE ON A DRIP STATION (END OF THE LINE) WILL REQUIRE A 20mm VALVE FOR WINTERIZING



Basket Irrigation Detail on City Centre Lighting Pole

TECH. :	SCALE : NTS	DRAWING NUMBER : IR-B-1
DR. :	DATE : FEB. 2010	
ENG. :	REV. : OCT. 2016	SHEET No. :

SUPPLEMENTARY DETAIL DRAWING



NOTES:

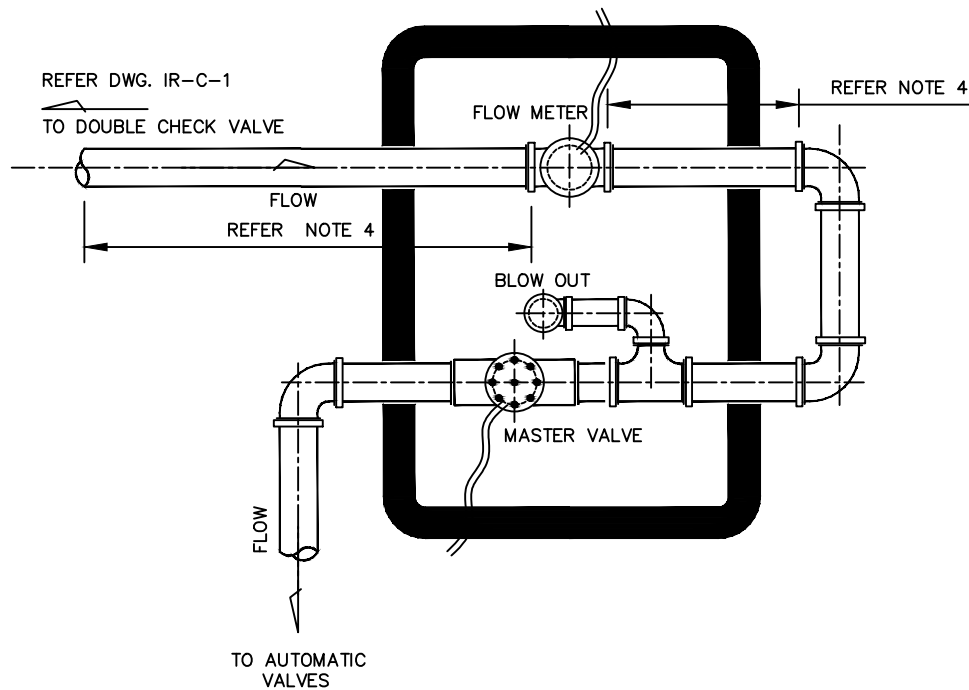
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CITY'S SUPPLEMENTARY SPECIFICATIONS.
2. ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
3. ALL PIPE UPSTREAM OF THE DOUBLE CHECK VALVE SIZED 2" OR LESS TO BE CSA APPROVED SCHEDULE 40 P.V.C PIPE & THE FITTINGS SCHEDULE 80 P.V.C.
4. ALL PIPE DOWNSTREAM OF THE DOUBLE CHECK VALVE TO BE CLASS 200 P.V.C PIPE & THE FITTINGS SCHEDULE 40 P.V.C UNLESS OTHERWISE NOTED ON THE PLAN
5. DOUBLE CHECK VALVES ARE TO BE FACTORY ASSEMBLED 'ZURN WILKINS MODEL 350XL'.
6. DRAWING IR-C-1 FOR INSTALLATIONS LOCATED OFFSITE ONLY (NOT UNDER RICHMOND PLUMBING CODE) REFER TO DRAWING P-108 FOR DOUBLE CHECK VALVES LOCATED ONSITE
7. ALL GLUE AND PRIMER MUST BE C.S.A. APPROVED



Double Check Valve Assemblies for offsite installations, 50mm to 19mm (2" to 3/4")

TECH. :	SCALE : NTS	DRAWING NUMBER : IR-C-1
DR. :	DATE : APR. 2010	
ENG. :	REV. : OCT. 2016	SHEET No. :

SUPPLEMENTARY DETAIL DRAWING



Plan

NOT TO SCALE

NOTES:

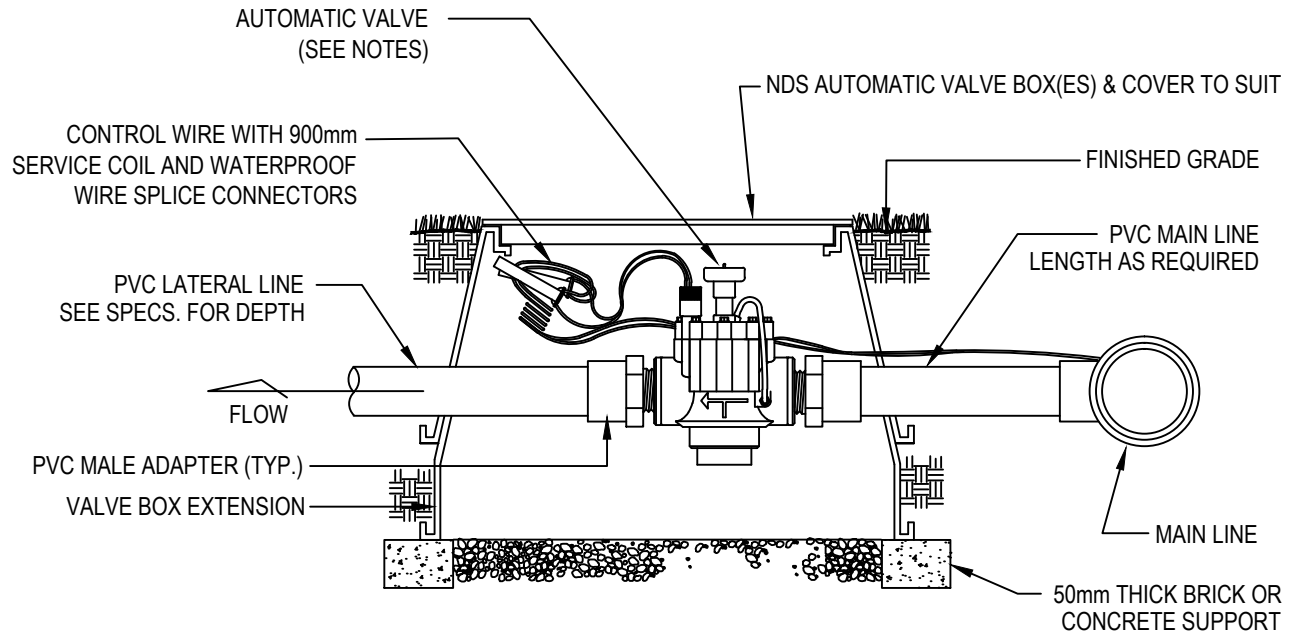
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CITY'S SUPPLEMENTARY SPECIFICATIONS.
2. ALL SURFACE TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
3. FLOW METER MODEL IS DATA INDUSTRIAL SERIES 228PV PLASTIC TEE FLOW SENSOR
4. INSTALL ALONG THE PIPE WHERE TEN (10) PIPE DIAMETERS UPSTREAM AND FIVE (5) PIPE DIAMETERS DOWNSTREAM OF THE SENSOR PROVIDE NO FLOW RESTRICTIONS OR DISTURBANCE. PIPE BENDS, VALVES, OTHER FITTINGS, PIPE ENLARGEMENTS OR REDUCTIONS WILL NOT BE PRESENT IN THIS LENGTH OF PIPE. (EXAMPLE : 50mm (2") FLOW SENSOR REQUIRES A MINIMUM OF 500mm (20") BEFORE AND 250mm (10") AFTER SENSOR)
5. FLOW METER TO BE DISASSEMBLED (REMOVED) PRIOR TO GLUING PIPING.



Typical Master Valve & Flow Meter Detail

TECH. :	SCALE : NTS	DRAWING NUMBER : IR-C-2
DR. :	DATE : FEB. 2009	
ENG. :	REV. : OCT. 2016	SHEET No. :

SUPPLEMENTARY DETAIL DRAWING



SECTION/ELEVATION

NOT TO SCALE

NOTES:

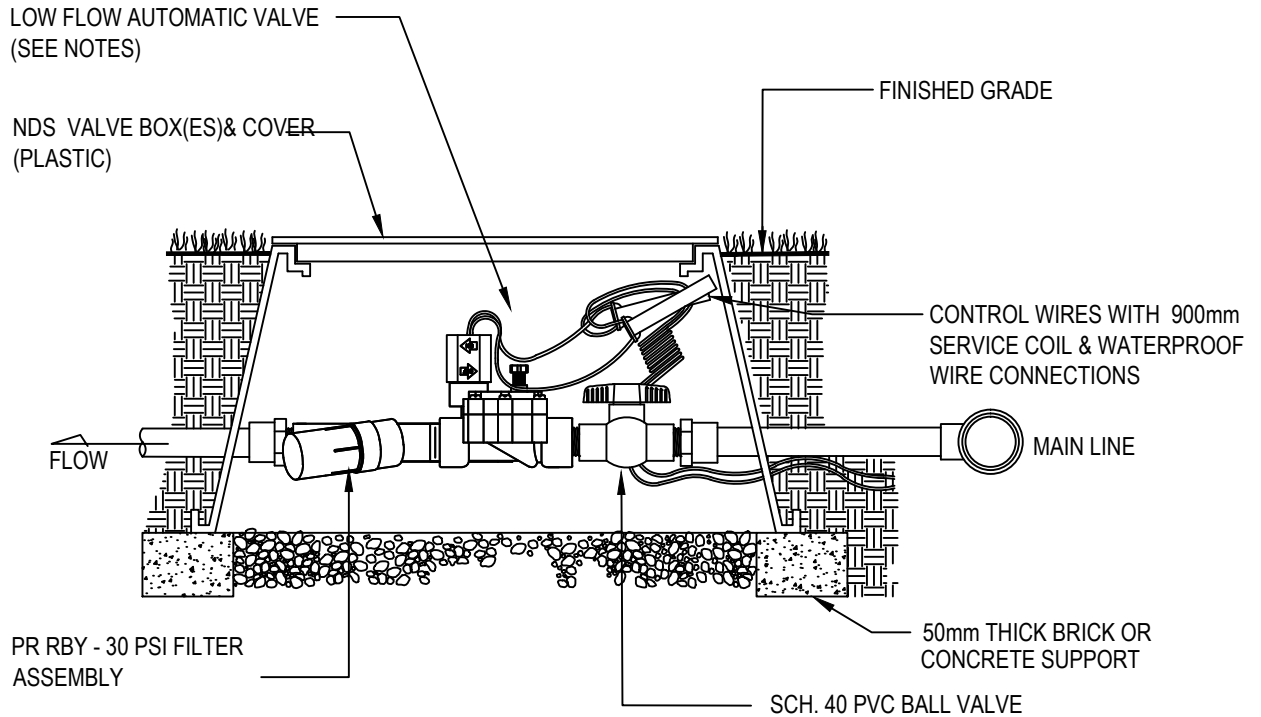
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CITY'S SUPPLEMENTARY SPECIFICATIONS.
2. ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
3. AUTOMATIC VALVES TO BE 'RAIN BIRD PEB' SERIES
4. 9 V BATTERY OPERATED SYSTEMS: USE 9V 'TBOS POTTED LATCHING SOLENOIDS' WITH 'RAIN BIRD PEB' AUTOMATIC VALVES.
5. LOW FLOW DRIP STATIONS USE 'RAIN BIRD XCZ-100-PRF' INLINE VALVE KIT.
6. ALL PIPE DOWNSTREAM OF THE DOUBLE CHECK VALVE TO BE CLASS 200 PVC AND FITTINGS TO BE SCHEDULE 40 PVC UNLESS OTHERWISE NOTED ON THE PLAN.



Automatic Valve Detail

TECH. :	SCALE : NTS	DRAWING NUMBER : IR-C-3
DR. :	DATE : FEB. 2010	
ENG. :	REV. : OCT. 2016	SHEET No. :

SUPPLEMENTARY DETAIL DRAWING



SECTION / ELEVATION

NOT TO SCALE

NOTES:

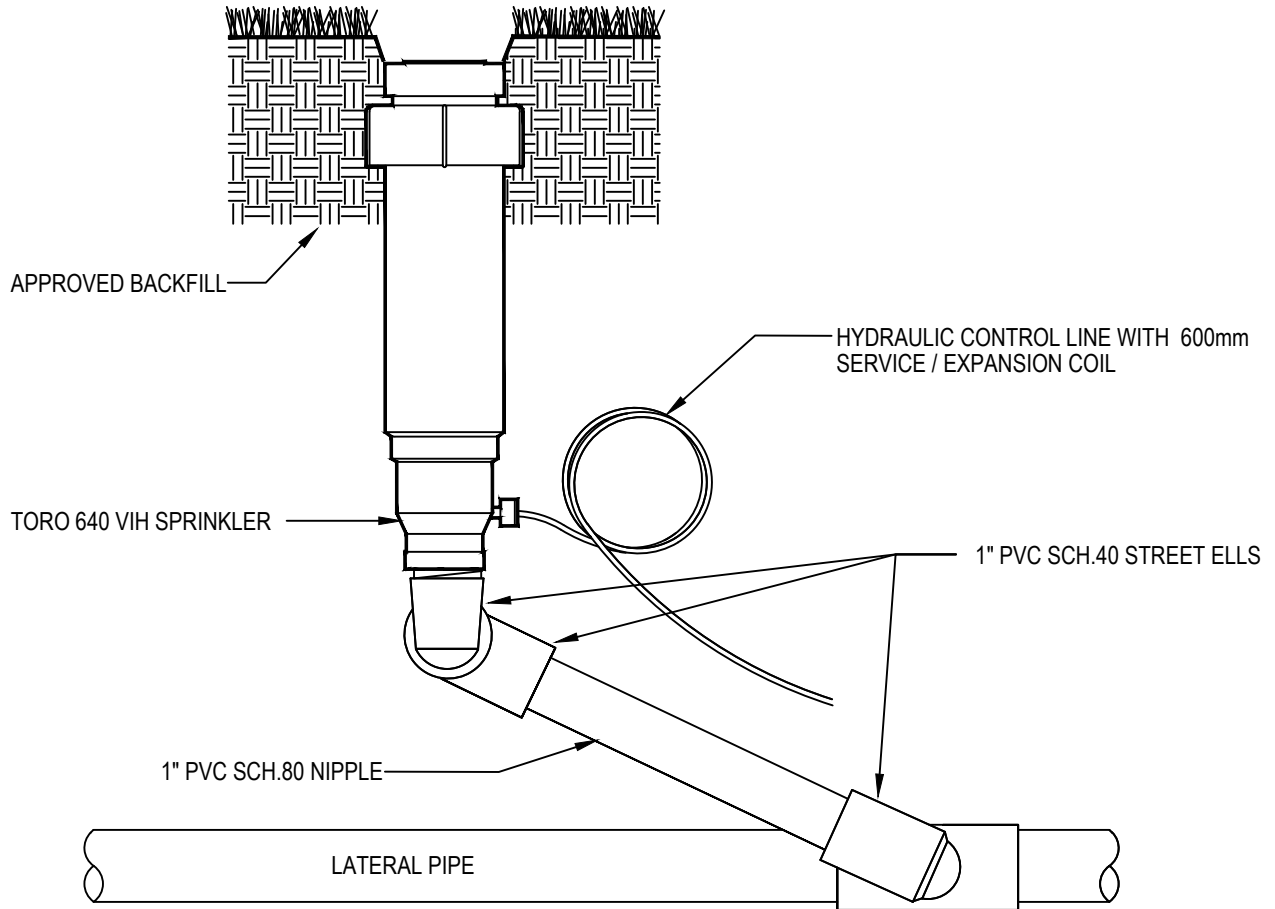
1. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE CITY'S SUPPLEMENTARY SPECIFICATIONS.
2. ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION.
3. 9 V BATTERY OPERATED SYSTEMS: USE 9V 'TBOS POTTED LATCHING SOLENOIDS' WITH 'RAIN BIRD PEB' AUTOMATIC VALVES.
4. AUTOMATIC VALVES FOR LOW FLOW SYSTEMS USE 'RAIN BIRD XCZ-100-PRF' INLINE VALVE KIT.
5. ALL PIPE DOWNSTREAM OF THE DOUBLE CHECK VALVE TO BE CLASS 200 PVC AND FITTINGS TO BE SCHEDULE 40 PVC UNLESS OTHERWISE NOTED ON THE PLAN.



Low Flow Automatic Valve Filter & Pressure Regulator Detail

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : OCT. 2015	IR-C-4
ENG. :	REV. : OCT. 2016	SHEET No. :

SUPPLEMENTARY DETAIL DRAWING



SECTION / ELEVATION
NOT TO SCALE

NOTES:

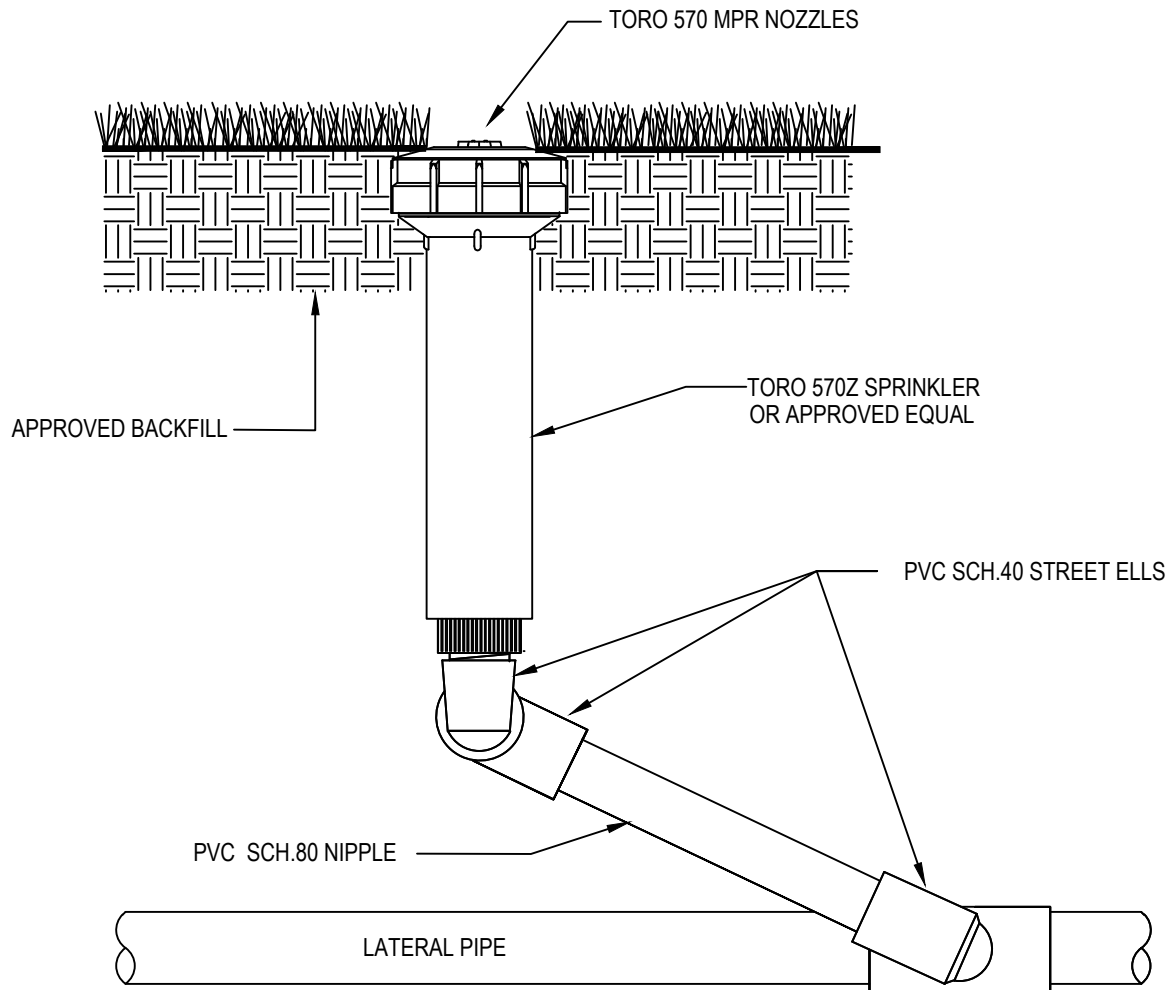
1. ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION
2. ALL PVC IRRIGATION PIPE TO BE CLASS 200 & FITTINGS TO BE SCHEDULE 40 PVC (ALL EXCEPT FOR SPRINKLER SWING JOINTS WHICH SHALL BE 3 SCHEDULE 40 STREET ELLS AND 1 SCHEDULE 80 NIPPLE)
3. ALL THREADED FITTINGS REQUIRE TEFLON



Hydraulic Rotor Sprinkler Detail

TECH. :	SCALE : NTS	DRAWING NUMBER : IR-S-1
DR. :	DATE : FEB. 2010	
ENG. :	REV. : OCT. 2016	SHEET No. :

SUPPLEMENTARY DETAIL DRAWING



SECTION/ELEVATION

NOT TO SCALE

NOTES:

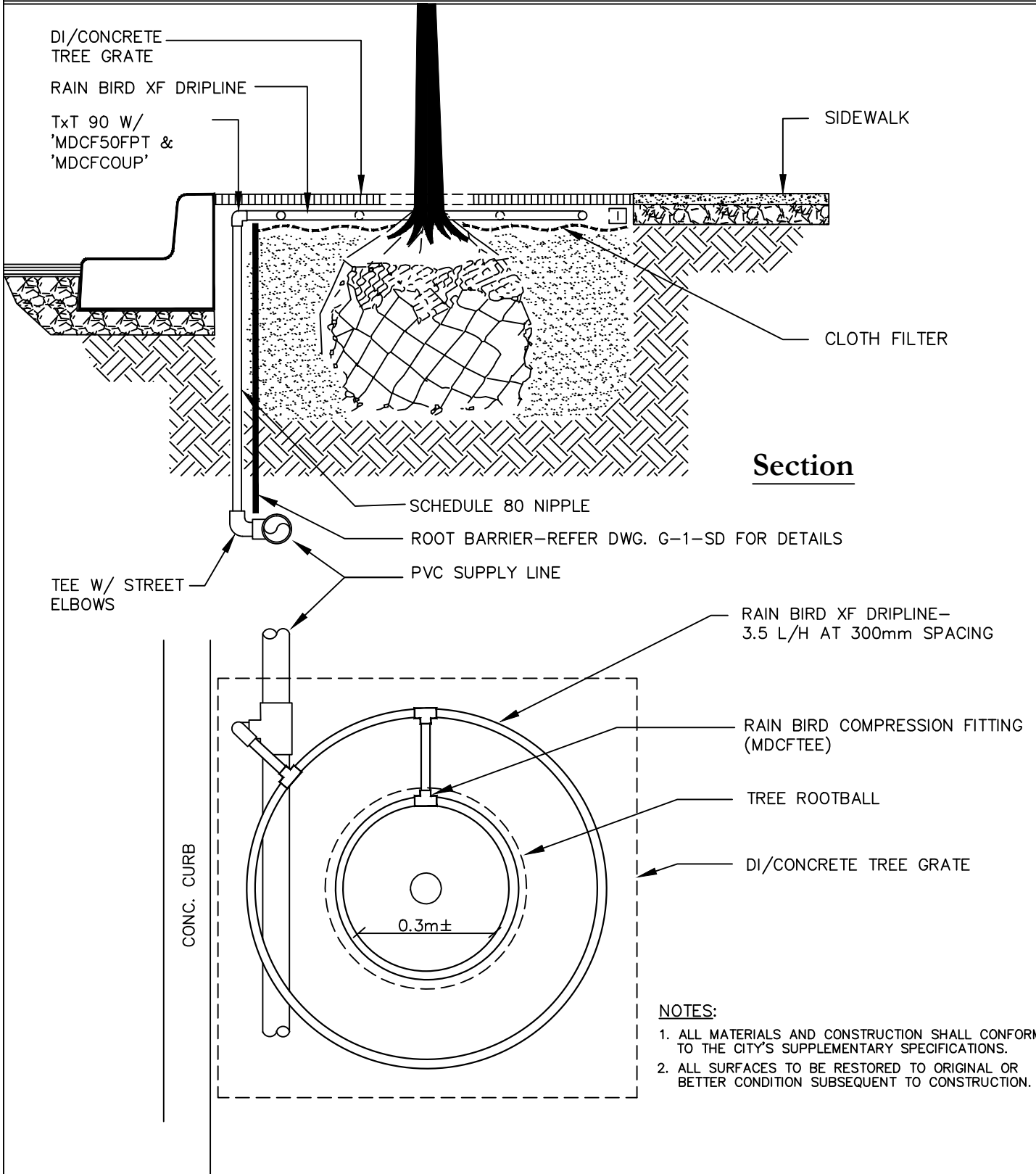
1. ALL SURFACES TO BE RESTORED TO ORIGINAL OR BETTER CONDITION SUBSEQUENT TO CONSTRUCTION
2. TORO SUPER FUNNY AND RAIN BIRD SA SERIES SWING ASSEMBLIES ARE PERMITTED
3. ALL FIXED SPRAY HEADS TO BE TORO 570'S w/ MPR NOZZLES, MID SIZED ROTORS TO BE RAIN BIRD 5004'S AND LARGE ROTORS TO BE RAIN BIRD 8005'S
4. ALL PVC THREADED FITTINGS REQUIRE TEFLON



Irrigation Sprinkler Detail

TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : FEB. 2009	IR-S-2
ENG. :	REV. : OCT. 2016	SHEET No. :

SUPPLEMENTARY DETAIL DRAWING



Irrigation Detail Boulevard Tree with Grate



TECH. :	SCALE : NTS	DRAWING NUMBER :
DR. :	DATE : FEB. 2009	IR-S-3
ENG. :	REV. : OCT. 2016	SHEET No. :

SCHEDULE I

SCHEDULE I

SCHEDULE I

CITY OF RICHMOND QUALITY CONTROL PROGRAM

Construction Materials Testing - Revision 1
Effective January 01, 2012

This document forms and becomes part of the City's Supplementary Specifications and Detail Drawings (April 2011).

1. Purpose

This document specifies minimum material testing requirements and frequencies for concrete, aggregates, asphalt and topsoil used for municipal infrastructure construction in Richmond. All testing herein shall be provided by the contractor at the contractor's cost, as required to meet:

- The requirements contained in this document;
- Any additional tests or inspection requirements for compliance to geotechnical reports and recommendations;
- Other tests, inspection requirements or recommendations by the engineer of record;
- Any testing or inspection requirements specified in the contract documents and design drawings.

2. Testing and Inspections

Additional testing may be requested as permitted by MMCD General Condition 3.4. Testing and Inspections and the payment thereof shall be in accordance with MMCD General Condition 4.12 - Tests and Inspections. Correction of deficient work shall be completed as per MMCD General Condition 4.13 - Rejected Work.

At the City's sole discretion, the Quality Control Requirements may be reduced on a project specific basis subject to the contractor's performance.

'**Small construction**' will not be required to meet the minimum testing requirements specified by the Quality Control Program. Such construction may be tested by an independent agency at the City's cost through the Quality Assurance Program. Contractors will permit such testing to occur and must provide reasonable assistance to the City to complete this testing. MMCD General Conditions 4.12 - Tests and Inspections and 4.13 - Rejected Works will apply to such projects.

For large or unique projects the City may require the Contractor to prepare, implement and maintain a project specific quality control program. This program must be approved by the City prior to construction.

3. Certification

All testing shall be completed by a Canadian Standards Association (CSA) and/or Canadian Council of Independent Laboratories (CCIL) certified laboratory. Technicians must be certified to carry out the particular testing procedure.

4. Material Testing Minimum Standards

4.1. EARTHWORKS

4.1.1. Excavation, Trenching and Backfilling

A sieve analysis and a modified proctor density test for each type of material being delivered from each source or supplier shall be submitted a minimum of one (1) week

prior to delivery of material to the site. The testing shall have been performed by an independent testing agency and shall have been completed not more than three (3) months prior to the date of delivery. If the material source or supplier changes during construction, the above requirements shall apply.

During placement of aggregates and granular materials in trench applications, the testing shall be carried out as described in Table 1.

Table 1 – Testing of Granular Materials and Placement for Trench Applications

Sieve Analysis of Aggregates (ASTM C-117 and C-136)	One (1) test per 2000 tonnes (1000m ³) produced and delivered and each change in source or supplier
Modified Proctor Density	One (1) test per 2000 tonnes (1000m ³) produced and delivered and each change in source or supplier
Field Density - Nuclear Method	One (1) test per 20 linear metres per lift (or thickness as specified by a geotechnical engineer); Minimum one (1) test per trench.*
Moisture Content - Nuclear Method	Same as Field Density Test.

***Notes:**

1. Total project trench length less than 5m is considered '**Small Construction**'.
2. The Contract Administrator or Inspector may request additional sieve analysis and modified proctor tests during construction to verify material specification conformance.
3. During construction only, sieve and proctor samples shall be taken at the time of material delivery; therefore, the requirement to provide test results one (1) week prior to delivery shall not be in effect.

4.2. Roads and Site Improvements

4.2.1. Aggregates and Granular Materials

A sieve analysis and a modified proctor density test for each type of material being delivered from each source or supplier shall be submitted a minimum of one (1) week prior to delivery of material to the site. The testing shall have been performed by an independent testing agency and shall have been completed not more than three (3) months prior to the date of delivery. If the material source or supplier changes during construction, the above requirements shall apply.

The Contract Administrator or Inspector may request the results of an aggregate soundness test to confirm the quality of material being supplied.

During placement of aggregates and granular materials, the testing of subgrade, subbase and base materials for roads, sidewalks and pathways, and curb and gutter shall be carried out as described in Table 2.

Table 2 – Aggregates and Granular Materials for Roads and Site Improvements

Sieve Analysis of Aggregates (ASTM C-117 and C-136)	One (1) test per 2000 tonnes (1000m ³) produced and delivered and each change in source or supplier
Modified Proctor Density	One (1) test per 2000 tonnes (1000m ³) produced and delivered and each change in source or supplier
Field Density - Nuclear Method	Subgrade: One (1) test per 20m per lane per 500mm depth; Locations of tests to be staggered across the width of the lane; Minimum one (1) test per site. [†] Subbase and Base: One (1) test per 20m per lane per lift; Locations of tests to be staggered across the width of the lane; Minimum one (1) test per lift. [†] Sidewalk, pathways and curb and gutter: One (1) test per 40 linear metres and one test at each driveway; Locations of tests to be chosen at random across the width Minimum one (1) test per location. [†]
Moisture Content - Nuclear Method	Same as field density test.

† Notes:

1. The Contract Administrator or Inspector may request additional sieve and modified proctor tests during construction to verify material specification conformance.
2. Road segments less than 20m in length are considered '**Small Construction**'.
3. Sidewalk segments less than 10m in length are considered '**Small Construction**'.
4. Curb segments less than 15m in length are considered '**Small Construction**'.
5. During construction only, sieve and proctor samples shall be taken at the time of material delivery; therefore, the requirement to provide test results one (1) week prior to delivery shall be not be in effect.

4.2.2. Paving

Hot-Mix Asphalt Concrete Paving

One (1) week prior to delivery on site, results from one (1) set of tests to demonstrate that the materials and mix design(s) meet the MMCD specifications for Hot-Mix Asphalt Concrete Paving (Section 32 12 16) shall be submitted for each blend/each mix type/each asphalt cement type to be used. This testing shall include but is not limited: to aggregate testing, asphalt cement testing, Marshall Mix design tests and trial mix tests.

During placement of Hot-Mix Asphalt Concrete Paving, the testing of materials shall be carried out as described in Table 3.

Table 3 - Testing of Hot-Mix Asphalt Concrete Materials and Placement

Density of Hot-Mix Asphalt Concrete – Nuclear Method	For each day of operation, one (1) test every 20m stationing per lane per lift; minimum one (1) test per lift, minimum two (2) locations per test [‡]
Full Marshall Test	One (1) set of tests per 500 tonnes; Minimum one (1) set of tests per lot per day [‡]

Superpave Hot Mix Asphalt Paving

One (1) week prior to delivery on site, results from one (1) set of tests to demonstrate that the materials and mix designs(s) meet the MMCD specifications for Superpave Hot Mix Asphalt Paving (section 32 12 17) shall be submitted for each unique mix to be used. This testing shall include but is not limited to: aggregate testing, performance-graded binder testing, mineral filler testing, Superpave mix design and trial mix testing.

During Production, Delivery and Placement the testing shall be carried out as described in Table 4.

Table 4 – Testing of Superpave Hot Mix Asphalt Paving

Density of Bituminous Concrete – Nuclear Method	For each day of operation, one (1) test every 20m stationing per lane per lift; minimum one (1) test per lift, minimum two (2) locations per test [‡]
Materials testing to meet MMCD specifications and Superpave Mix Design SP2	One (1) set of tests per 500 tonnes; Minimum one (1) set of tests per lot per day [‡]

[‡]**Note: ‘Small Construction’** paving projects are as follows.

Local Road – less than 1 lane width and less than 20m long or less than 20 tonnes.

Collector Road – less than 1 lane width and less than 20m long or less than 40 tonnes.

Arterial Road – less than 1 lane width and less than 20m long or less than 25 tonnes.

Coring

Coring may be requested by the Inspector or Contract Administrator to verify the properties of the placed asphalt mix.

For street paving operations, core locations will be selected for each pass of the paving machine by the Inspector or the CA as follows:

- Across the width, core locations will be selected randomly.
- Along the length, core locations will have a randomly selected starting station with subsequent cores spaced at approximately 50m intervals.

For all other operations:

- A minimum of one core for every 250m² of asphalt mix placed.

4.3. CONCRETE

4.3.1. Concrete Reinforcement

Mill certificates including heat numbers and CSA conformance shall be provided for each delivery to the site

4.3.2. Cast-in-Place Concrete

Aggregate soundness test results, admixture(s) and chemical mixture(s) and Portland cement certification may be requested by the CA or Inspector.

Compressive Strength, Air Content, Slump and Temperature shall be tested starting with the first load of concrete delivered and continue as follows:

- Sidewalks and pathways
 - One (1) set of tests per 225m² placed; minimum one (1) test per day.
 - Sidewalk construction less than 15m² is consider '**Small Construction**'.

- Curb and gutter
 - One (1) set of tests per 150 linear metres placed; minimum one (1) test per day.
 - Placement of less than 15 linear meters of curbing is considered '**Small Construction**'.

Batching slips from the plant shall be provided for each load at the time of delivery.

4.3.3. Pre-Cast Concrete

The Inspector or CA may require the contractor to provide quality control documentation or physical testing of pre-cast concrete products.

4.4. Topsoil and Finish Grading

Topsoil and finish grading testing shall be conducted as described in Section 32 91 21 of the City's Supplementary Specifications and Detail Drawings (April 2011).

