



# 2020 Standard Specifications for Highway Construction



BRITISH  
COLUMBIA

Ministry of  
Transportation  
and Infrastructure

Volume 2 of 2  
Adopted November 1, 2020





**2020**

**STANDARD SPECIFICATIONS  
FOR HIGHWAY CONSTRUCTION**

**VOLUME 2**

**Adopted November 1, 2020**

**Construction and Maintenance Branch**

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<https://www.flickr.com/photos/tranbc/25142726038/in/album-72157689494520851/>  
Installing rock-fall protection mesh  
Hoffman's Bluff on Trans-Canada Hwy #1, east of Kamloops, BC  
Contractor: Emil Anderson Construction Co. Ltd.  
50° 43' 37.26" N; 119° 45' 55.49" W

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# NOTICE TO USERS

Generally, text significantly changed or added since the 2016 edition is shown with single underlining and a vertical bar in the margin; deletions are marked only by the vertical change bars. Not all changes are marked. Minor corrections such as typos have not been marked.

Extensively modified Sections are watermarked as “Revised Section”; new Sections are watermarked “New Section”, and neither have updates marked.

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Free PDF versions of the current and historical editions of these specifications are available for downloading at:

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Please contact Construction and Maintenance Branch  
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## SECTION 000

### NOTES

**000.01 Interpretation** – Ministry names may have changed from those identified in the Standard Specifications. A list of current Ministries may be found at the following link

<https://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries>

Upon request by the Contractor, the Ministry Representative will provide clarification as to which Ministry is currently responsible for any particular reference.

**000.02 Hyperlinks** – In the PDF version of this document, many reference sources have been hyperlinked (such as the reference in Note 000.01) and will show as blue underlined text.

Clicking on the link will open the resource in your web browser.

Generally, links to test methods and specification organizations (like [CSA](#) or [ASTM](#)) will take you to a site where you can purchase and download the associated specifications; a link to a Ministry document, and some others, within the text of a Section should take you to a website where you can download the referenced document free of charge.

**Note:** Due to MS Word® prioritizing “Track Changes” formatting over other formatting, some newly inserted hyperlinks are not shown in blue. If there is underlined black text that looks like it might warrant a hyperlink, hover your mouse over it to see if it does have an embedded link.

**000.02.01 Disclaimer** – Any information, including statutes and regulations, that may be found by accessing URLs or websites (including via hyperlinks) in these Standard Specifications are not the official versions and may not be accurate, complete, current or reliable.

**000.03 General Condition (GC) References** – Where these Standard Specifications make a reference to a General Condition (e.g. GC 38.00 Changes to Work), that reference

is to the applicable clause of the Ministry’s [Major Works General Conditions](#).

Where the Work is being performed under a different set of terms and conditions (e.g the [Minor Works General Conditions](#)), the reference shall be read as being to the most comparable term and condition of the actual Contract.

In the event there is uncertainty in determining the applicable clause, the Ministry Representative will determine how the reference is to be interpreted.

**000.04 Engineer of Record (EoR) / Professional of Record (PoR)** – These two terms are used, essentially interchangeably, within these Standard Specifications and are based on the Association of Professional Engineers and Geoscientists of the Province of British Columbia’s (APEGBC) definition and recent terminology change from EoR to PoR.

APEGBC’s definition, as expressed within their “Use of Seal” (and other) Quality Management Guidelines, is:

*Professional of Record: The Engineering / Geoscience Professional or licensee with the lowest level of direct professional responsibility for the engineering or geoscience work and any related engineering or geoscience documents produced, and whose seal appears on the documents. A test of “direct professional responsibility” is the ability of that Engineering/Geoscience Professional to alter or revise the engineering or geoscience content in the master documents.*

Whereas APEGBC is concerned only with Professional Engineers and Geoscientists, usage in these Standard Specifications may also capture other registered professions such as Registered Professional Foresters (RPF), Registered Professional Biologists (RPBio), and other disciplines, as appropriate to the circumstances.

Each EoR/PoR is professionally responsible to the Ministry for the works they have designed.

## SECTION 604

### STEEL TRAFFIC BARRIER CONSTRUCTION

#### DESCRIPTION

**604.01 Scope** – This Section covers the construction of roadside and median steel traffic barriers in accordance with the general layout and details indicated on SS Drawings of the SP312 series.

Steel beam guardrail, treated wood posts, steel posts and accessory materials are specified by SS 312.

Design and part number references are taken from the Task Force 13 Hardware Guide, as noted in SS 312.

**604.02 Provision of Steel Barriers** – Barriers of the type(s) called for shall be constructed at the locations and as shown on the Contract Drawings with the materials, accessories and necessary ancillary work all in accordance with the details indicated on the Contract Drawings, Specifications, Special Provisions and/or typical standard SP Drawings or to the direction of the Ministry Representative.

All materials will be supplied by the Contractor, unless otherwise stated in the Special Provisions.

Construction shall be carried out with all labour, tools, equipment and incidentals necessary to complete all barrier work in accordance with good work practice, for a substantially supported and anchored steel barrier developing a continuous beam strength together with necessary crashworthy end treatment.

#### MATERIALS

**604.10 Materials** – Detailed material requirements are set out in SS 312 and indicated on SS Drawings SP312-1, SP312-2, SP312-3, SP312-4, SP312-6, SP312-7, SP312-8, SP312-11 and the manufacturer's drawings.

Unless otherwise specified, treated wood shall meet the requirements of SS 908.

Touch-up treatment for damaged galvanized metal surfaces shall be two heavy coats of zinc-rich paint selected from the Ministry's Recognized Products List under the category of "Additional Paint Coatings – Zinc-Rich Touch-up Paints and Primers".

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**604.20 Post Installation** – Posts shall be set true to the lines, spacing, depth(s) and height(s) indicated or required to provide a smooth, continuous installation. The layout, type of support and fixing treatment at ends of barriers or where adjacent to abutments and the like shall be as indicated on the Contract Drawings and relevant SS

Drawings SP312-1, SP312-2 and SP312-3, and/or to the direction of the Ministry Representative.

The permissible tolerances for post installation are ±1.5 degrees from vertical for plumb and ±6 mm for alignment.

Treated wood posts shall be driven in place with equipment approved by the Ministry Representative or set in augered or dug holes with necessary dampened and well tamped layers of approved backfill material. Excavated material which is unsuitable for use as backfill shall be substituted with granular material at the Contractor's expense. Backfill shall be thoroughly compacted, using pneumatic tampers, in layers not exceeding 150 mm, for the full depth of the excavation.

Driving will be permitted only if no damage results to shoulders and adjacent slopes. In broken rock embankments the prepunching of holes will be permitted only prior to final compaction, surfacing and paving. Construction details appertaining on exposed rock, rock with minimum overburden or on concrete shall be to the indicated requirements and/or the direction of the Ministry Representative.

All work preparatory to and for the installation of posts shall be to the direction and prior approval of the Ministry Representative for each type of sub-surface condition to produce a thoroughly sound guardrail support system.

Surplus excavated material remaining after guardrail support installation shall be disposed of in a uniform manner within the right of way or cleared away, as directed by the Ministry Representative.

Tops of all posts shall be set a uniform 25 mm ±5 mm above the line of the beam's top edge and where necessary cut to line up.

Posts damaged by the driving operation or other damage from their handling and installation not acceptable to the Ministry Representative shall be replaced at the Contractor's expense.

Minor damage to the tops of posts and other wood components and any field cuts and borings shall receive field treatment in accordance with SS 908.

**604.21 Steel Beam Erection** – Beam sections will normally be supplied or required for joining at 3.81 m intervals.

All punching, cutting or welding shall be shop executed except for special details in unforeseen and exceptional cases and to the prior approval of the Ministry Representative.

## SECTION 604

Sections shall have full bearing one to another at laps with splicing bolts drawn tight to 100 Nm for a continuous beam effect. Where guardrail is on a curve, the beam sections shall make close contact over the whole splice area. Shop bent beams will normally be supplied or required for curvature radii under 45 metres.

Beam sections shall be bolted to posts so that the edges and centre portion(s) of beams make full bearing with each offset block or where applicable with back-up plate, post or other support.

Bolts shall not extend more than 15 mm beyond the fixing nut when tightened, with any excess removed and the threads burred.

Washers shall be used only where indicated on the SP312 Drawing series.

**604.22 End Assemblies** – End assemblies shall be carried out strictly according to the manufacturer’s specifications unless specifically directed otherwise by the Ministry Representative in writing as to approved alternative methods and the like.

End assemblies shall be “Manual for Assessing Safety Hardware (MASH)” certified.

Note the safety preference for the following items, which will be shown on the Drawings if required:

- (a) Continuing guardrail to shield the entire length of any hazard (as indicated on SS Drawing SP312-1), bridge

## STEEL TRAFFIC BARRIER CONSTRUCTION

abutment and the like, rather than a bolted connector (like [RWE02b](#)).

- (b) Approach transitions stiffened by means of reduced post spacing and, where necessary, the use of Thrie-beam or nested twin W-beams.

### MEASUREMENT AND PAYMENT

**604.90 Measurement and Payment** – Measurement of steel traffic barriers will be by the linear metre from end to end of all rail sections along the line of the completed guardrail or centreline of any doubled median barrier and, unless otherwise specified, overall terminal assemblies.

Payment will be made for steel traffic barrier work at the contract unit price(s) for standard steel W-beam shoulder or median barrier guardrail supplied and/or installed complete in place or for Thrie-beam shoulder or median barrier guardrail supplied and/or installed complete in place.

The contract price(s) shall be accepted as full compensation for supply of all materials, labour, tools, equipment and incidental work to complete the required installation including bolting, transitions, curves, all excavation, backfilling, and surplus disposal.

## SECTION 635

### ELECTRICAL AND SIGNING

#### PART A – GENERAL

**635.01 Scope** – This Section covers the requirements for electrical and signing works. Temporary construction signing is covered in SS 194 – Traffic Control.

The installation of materials shall be in accordance with the SS Drawings of the SP635 series unless otherwise specified.

Ministry Electrical Maintenance will be undertaken by non-Ministry forces, referred to as the “Electrical Maintenance Contractor”. The Contractor will be required to coordinate the work with the Electrical Maintenance Contractor and the appropriate Ministry Electrical Services Manager in the Regions. Contact information is available from the Ministry Representative, if necessary.

The Contractor shall arrange the supply, installation and removal of temporary C-63 (Traffic Pattern Changed), C-64 (Signal Operation Changed Signs) and W-329 (New) tabs with the Ministry Electrical Maintenance Contractor. The Electrical Maintenance Contractor will supply, install and remove these signs at no expense to the Contractor.

The Contractor shall comply with the following Ministry publications:

- (a) [Standard Specifications for Highway Construction](#)
- (b) [Electrical & Traffic Engineering Manual](#)
- (c) [Electrical & Signing Materials Standards](#)
- (d) [Manual of Traffic Signs & Pavement Marking](#)
- (e) [Technical Bulletins & Technical Circulars](#) (in effect at the Tender Closing Date)

Materials used must listed on the Ministry Recognized Products List or approved by the Ministry Representative.

The above documents can be downloaded from the Ministry Engineering website at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines>

**635.02 Work Regulations** – All electrical work shall comply with the latest edition of the Canadian Electrical Code and BC amendments, and any applicable standards or regulations published by the Province of British Columbia.

The Contractor shall conform to all applicable Occupational Health and Safety regulations and, if required, submit a WorkSafeBC Notice of Project Form 52E49 before commencing a Ministry project. The Notice of Project form can be completed online at:

<https://www.worksafebc.com/en/for-employers/just-for-you/submit-notice-project>

If working near overhead power lines the Contractor must submit a WorkSafeBC Assurance of Compliance with Occupational Health and Safety Regulation, Part 19 form 30M33. A sample of this document can be downloaded at:

<https://www.worksafebc.com/en/resources/health-care-providers/forms/assurance-of-compliance-with-occupational-health-and-safety-regulation-part-19-form-30m33>

**635.03 Electrical Permits & Inspections** – Electrical work shall be performed by a contractor licensed to do so by Technical Safety BC. The licensed electrical contractor shall appoint at least one licensed representative whose qualifications comply with the provisions of Technical Safety BC. The Contractor shall provide the Ministry Representative with the name and phone number of the licensed representative prior to starting construction.

Prior to construction the Contractor shall obtain and pay for all permits required by Technical Safety BC and submit a copy of all permits to the Ministry Representative.

Upon completion of an installation and prior to energizing, the Contractor shall advise the Ministry Representative that the work is complete and ready for final inspection. The Ministry Representative will arrange for an inspection of the installation and report deficiencies to the Contractor. The Engineer of Record will conduct a review of the installation and assess conformance to the requirements of the Contract. The Engineer of Record will then report all findings to the Ministry Representative.

Once deficiencies identified by the Ministry Representative and Engineer of Record have been corrected the Contractor will advise the Ministry Representative who will undertake a final inspection and advise if acceptable. If acceptable, the Ministry Representative will advise the Contractor the installation has been completed satisfactorily. If not, additional corrections will be required by the Contractor.

The Ministry will not accept the installation until all work has been approved by Technical Safety BC and the Ministry Representative.

**635.04 Electrical Energy Supply** – The electrical energy will be supplied from overhead lines of the utility company's secondary distribution system unless otherwise noted on the Drawings.

The Engineer of Record shall determine all service connection points as noted on the Drawings. The Contractor shall confirm all service connection points before installing service equipment.

The Contractor shall be responsible for making the necessary arrangements with the utility company for the

connection of new service(s) and, if required, the disconnection of existing service(s). The Ministry will pay all utility connection costs.

**635.05 Materials** – The Contractor shall supply all materials necessary for the satisfactory completion of the project except those materials listed in the Special Provisions as supplied by the Ministry. All materials shall be new and conform to the requirements of the Drawings, other Subsections of the Specifications, the Special Provisions, and the Ministry Electrical and Signing Material Standards.

A paper copy of the Electrical and Signing Material Standards may be purchased from:

Government of British Columbia  
 Ministry of Management Services  
 Publication Index Website:  
<http://crownpub.bc.ca>  
 (Go Shopping)  
 (Keywords: *Electrical and Signing Material Standards Manual*)  
 email: [crownpub@gov.bc.ca](mailto:crownpub@gov.bc.ca)  
 Phone: (250) 387-6409 or 1-800-663-6105  
 Fax: (250) 387-1120  
 Address: PO BOX 9452 STN PROV GOVT  
 VICTORIA BC V8W 9V7

An electronic copy of the Electrical and Signing Material Standards may be downloaded free of charge from the Ministry of Transportation engineering website at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/electrical-engineering>

All products contained in the *Electrical and Signing Material Standards* shall be supplied from the Ministry's *Recognized Products List*. This list identifies the manufacturer, the approved product, the product model number, and the product approval date. An electronic copy of the Ministry Recognized Products List can be downloaded from the Ministry of Transportation engineering website at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/recognized-products-list>

This list is updated regularly.

Electrical materials shall meet the requirements of the Canadian Electrical Code, conform to applicable CSA Standards, and meet the approval of Technical Safety BC.

If specified in the Special Provisions, shop drawings shall be submitted to the Ministry Representative for review by the Engineer of Record. Equipment shall not be ordered until the contractor has received approval from the Ministry Representative.

Unless noted otherwise, all permanent signs shall meet current Ministry specifications. The Ministry *Specifications for Standard Highway Sign Materials, Fabrication and Supply* may be downloaded from the Ministry of Transportation engineering website at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/traffic-engineering-safety/traffic-signs-markings>

Alternate materials must be approved by the Ministry Representative prior to their use.

**635.06 Utilities** – Existing utilities are generally not shown on the electrical and signing Drawings. Where utilities are shown on the Drawings, their locations are approximate.

The Contractor shall locate and protect all existing utilities such as power lines, fibre optic cables, telephone lines, gas and oil pipelines, sewers, water works, etc. The Contractor shall conduct its operations in accordance with the requirements of the utility authorities having jurisdiction. In the event of any damage to utilities, the Contractor shall be held responsible for the cost of all necessary repairs and restoration to the satisfaction of the Ministry Representative and Utility Authority.

All costs for locating and protecting utilities will be considered incidental to the Work.

## PART B – UNDERGROUND

**635.07 Concrete Bases** – Concrete bases shall be constructed in accordance with SS Drawings SP635-1.1.1 through SP635-1.1.47 and SP635-1.4.1 through SP635-1.4.5. The use of the term "concrete bases" in SS 635 shall also mean "concrete spread footings" where applicable.

The Drawings may refer to concrete bases that are poured-in-place or precast. If there is no reference to poured-in-place bases, concrete bases shall be precast.

Concrete single post sign bases listed in the Ministry Recognized Products List (RPL) shall be considered acceptable alternates to the Ministry Standard concrete single post sign bases when approved by the Engineer of Record for the sign base.

Supply and installation of concrete bases shall include the following:

- excavation and backfill;
- supply and installation of concrete and formwork;
- supply and installation of reinforcing steel;
- supply and installation of conduit;
- supply and installation of steel tubing sleeves in sign post bases; and

**SECTION 635**

**ELECTRICAL AND SIGNING**

- installation of anchor bolts.

The Contractor shall check for conflicts with overhead lines prior to excavating for concrete bases. If it appears there may be an overhead conflict, the Contractor shall contact the Ministry Representative for further instructions. If the Contractor installs a concrete base in a location where the pole conflicts with overhead power lines, the Contractor shall remove the pole and relocate the concrete base to a location approved by the Ministry Representative. The Contractor shall pay all costs for pole and base relocation.

**635.07.01 Excavation and Backfill** – Excavations shall meet the requirements, but not the Quantities and Payment provisions of SS 407 – Foundation Excavation.

All excavation work shall be carried out as required to suit concrete bases. Where directed by the Ministry Representative, excavations shall be shored to avoid the cutting of pavement, sidewalks, and curb and gutter.

Base excavations shall be backfilled using the excavated material provided it consists of clean well graded granular soil having a maximum fines content of 8% (silt and clay size particles) and a maximum aggregate size of 100 mm. Where backfill material does not conform as noted above, base excavation shall be backfilled with 25 mm Well Graded Base Course Aggregate material as specified in SS 635.16. Unacceptable materials shall be disposed of as specified in SS 635.17.

Backfill shall be placed in layers not exceeding 150 mm compacted thickness (100 mm compacted thickness in the top 300 mm) and shall be compacted to a minimum 100% of the Standard Proctor maximum dry density obtained by ASTM D698. Layer thickness shall be reduced and moisture content of the material adjusted as required to achieve compaction. Care shall be taken not to damage conduits.

All excavated and backfilled areas shall be restored to their original condition.

Asphalt restoration shall be performed in accordance with SS 635.12.

Concrete curb and gutter restoration shall be performed in accordance with SS 635.15.

**635.07.02 Concrete and Formwork** – Precast concrete bases shall meet the requirements of CSA A23.4. Suppliers of precast concrete bases listed on the Ministry Recognized Products List shall be considered as prequalified manufacturers of concrete bases under CSA A23.4.

Alternatively, manufacturers shall be prequalified under CSA A23.4 by one of the following certification bodies:

- (a) The Canadian Precast Concrete Quality Assurance (CPCQA) Certification Program
- (b) The CSA Group Testing & Certification Inc. (CSA) Certification Program.

(c) QCAST Certification Program by the American Concrete Pipe Association for Precast Products

(d) National Precast Concrete Association (NPCA) Plant Certification

(e) Other certification organizations acceptable to the Ministry Representative that are accredited by the Standards Council of Canada for the certification of manufacturers for these products.

For all contracts awarded after December 31, 2021, manufactures shall be prequalified under CSA A23.4 by one of the above listed certification bodies.

Cast-in-place concrete bases and precast concrete bases that are fabricated on site shall meet the requirements of CSA A23.1 and the Contractor shall notify the Ministry Representative 48 hours prior to pouring concrete. Proportioning of the concrete mixes shall be the responsibility of the Contractor. SS 211 shall only apply when specifically referenced.

The concrete mix shall meet the specifications listed in Table 635- A.

**Table 635- A: Concrete Mix**

<u>Property</u>	<u>Criteria</u>
<u>Minimum compressive strength at 28 days</u>	<u>30 MPa</u>
<u>Nominal maximum aggregate size</u>	<u>20 mm or 28 mm</u>
<u>Maximum W/C<sub>m</sub> ratio by mass</u>	<u>0.40</u>
<u>Air content – 20 mm nominal maximum aggregate</u>	<u>5-8%</u>
<u>Air content – 28 mm nominal maximum aggregate</u>	<u>4-7%</u>
<u>Maximum Plasticized Slump</u>	<u>80 ± 20 mm</u>
<u>Class of Exposure</u>	<u>S1 with the addition of chloride and freeze-thaw exposures</u>

All exposed concrete surfaces shall be given a Class 3 finish and all buried surfaces a Class 1 finish in accordance with SS 211.17.

When constructing poured-in-place concrete bases, the Contractor shall have the concrete compressive strength verified, using concrete test cylinders, prior to installing the structure onto the base.

The Contractor must provide written confirmation of concrete test cylinder compressive strength results prior to installing any structure on the bases.



The top finished surface of a concrete base shall not vary by more than 3 mm in depth as measured across the widest surface. If this variation exceeds 3 mm then the top 50 mm of the base shall be broken off by hand and reformed or the base shall be replaced, as directed by the Ministry Representative.

**635.07.03 Reinforcing Steel** – Reinforcing steel shall meet the requirements, but not the payment provisions, of SS 412 – Reinforcing Steel.

All reinforcing steel shall conform to CSA G30.18-M, Grade 400W or 400R.

The Contractor shall adjust the spacing of reinforcing steel to suit anchor bolts and conduit.

**635.07.04 Anchor Bolts and Conduit** – Anchor bolts and conduits shall be cast into the concrete bases.

Where an anchor bolt is damaged it shall be repaired in accordance with SS Drawings SP635-1.1.43 and SP635-1.1.44.

Welding of anchor bolts shall not be permitted.

**635.07.05 Steel Pipe Sleeves** – Steel pipe sleeves shall be cast into the concrete bases. The type of sleeve shall be as noted on the Drawings and shall be in accordance with SS 635.30 or SS 635.31

**635.07.06 Payment** – Payment for CONCRETE BASES will be at the Unit Price per base.

The Unit Price shall include all costs for the supply and installation of the bases, including but not limited to, all Type D excavation; supply and installation of shoring to meet Workers Compensation Act and Occupational Health and Safety Regulation requirements; formwork, concrete, reinforcing steel and conduit; supply and installation of grout and sand to fill knock-out voids in bases, controller bases and concrete pads in front of controller bases; supply and installation of steel sleeves in sign post bases; installation of individual anchor bolts or anchor bolts in cages; placing and compaction of excavated material as backfill; removal and disposal of excess excavated material; and all other labour, equipment, and materials necessary to complete the installation.

Any additional costs for supplying higher strength concrete shall be borne by the Contractor.

Payment for excavation of Type A material (solid rock) and de-watering of excavations will be made in accordance with GC 38.00 Changes to Work.

Where excavated material is ruled unacceptable for backfill, payment for 25 mm Well Graded Base Course Aggregate used as backfill will be made under SS 635.16.01.

### **635.08 Junction Boxes and Vaults**

#### **635.08.01 – General**

(a) **Plastic Junction Boxes** – Plastic junction boxes and their lids/hatches shall be in accordance with SS Drawings SP635-1.2.1 through SP635-1.2.16 and SP635-1.4.1 through SP635-1.4.3.

(b) **Concrete Junction Boxes** – Concrete junction boxes and their lids/hatches shall be in accordance with SS Drawings SP635-1.3.1 through SP635-1.3.4.

(c) **Concrete Vaults** – Concrete vaults and their lids/hatches shall be in accordance with SS Drawings SP635-1.3.3 and SP635-1.3.4.

**635.08.02 Plastic Junction Boxes** – Plastic junction boxes listed in the Contract documents, Special Provisions or in the Ministry Recognized Products List (RPL) shall be considered acceptable. Installation of plastic junction boxes shall be accordance with SS Drawings SP635-1.2.1 through SP635-1.2.16 and SP635-1.4.1 through SP635-1.4.3.

**635.08.03 Concrete Junction Boxes and Vaults Not Located in an Area with Routine Vehicle Access** – Concrete junction boxes, concrete vaults and their lids/hatches that are located in areas that do not have routine traffic access, including but not limited to, sidewalks and landscaped areas, shall meet the requirements of SS 635.08.03.

Concrete junction boxes, concrete vaults and their lids/hatches that are located in areas that do not have routine traffic access shall be designed by engineers registered with the Association of Professional Engineers and Geoscientists of the Province of BC. The design shall be in accordance with recognised and applicable CSA, ASTM or AASHTO standards. Design drawings and Letters of Assurance meeting the requirements of the Ministry Technical Circular T-06/09 Engineer of Record and Field Review Guidelines shall be submitted to the Ministry Representative for review and acceptance at least two (2) weeks prior to delivery. Concrete vaults and their lids/hatches shall meet the requirements for non-deliberate vehicular loading using the wheel loading for either of the following:

(a) The design live load in accordance with the Ministry Supplement to the CHBDC S6, or

(b) AASHTO Standard Specification for Highway Bridges HL-93, H-20 or HS-20

**635.08.04 Concrete Junction Boxes and Vaults located in Traffic Areas** – Concrete junction boxes, concrete vaults and their lids/hatches that are located in areas with routine traffic access, including but not limited to, vehicular roadways, vehicular pull-outs, parking areas, and driveways, shall meet the requirements of SS 635.08.04.

Concrete junction boxes, concrete vaults and their lids/hatches shall be designed by engineers registered with the Association of Professional Engineers and Geoscientists

of the Province of BC. Design drawings and Letters of Assurance meeting the requirements of the Ministry Technical Circular T-06/09 Engineer of Record and Field Review Guidelines shall be submitted to the Ministry Representative for review and acceptance at least two (2) weeks prior to delivery.

Concrete junction boxes and concrete vaults located in areas with routine vehicle access shall be designed in accordance with the Canadian Highway Bridge Design Code (CHBDC) CSA S6 and the Ministry Supplement to CHBDC S6. The design live load shall be in accordance with the Ministry Supplement to the CHBDC S6.

The lids/hatches for concrete vaults that are located in areas with routine traffic access shall be designed in accordance with either of the following:

- (a) Canadian Highway Bridge Design Code (CHBDC) CSA S6 and the Ministry Supplement to CHBDC S6, or
- (b) ASTM 1802 – Standard Specification for Design, Testing, Manufacture, Selection, and Installation of Fabricated Metal Horizontal Access Hatches for Utility, Water, and Wastewater Structures, Load Level 7, Full Traffic.

**635.08.05 Concrete for Junction Boxes and Vaults – SS 211 shall only apply to concrete for junction boxes and vaults when specifically referenced.**

- (a) Concrete for junction boxes and vaults that are located in areas that do not have routine traffic access shall be in accordance with CSA A23.1 and CSA A23.4 based on a minimum service life of 40 years and shall meet the following:
  - (i) Minimum specified compressive strength of 35 MPa at 28 days
  - (ii) S1 class of exposure with the addition of chloride exposure
  - (iii) Exposed to cycles of freeze/thaw
  - (iv) Maximum water-to-cementitious materials ratio (W/C<sub>m</sub>) of 0.40
  - (v) Rapid chloride permeability test result (ASTM C1202) of less than 1000 coulombs within 91 days
  - (vi) Minimum cover on exterior surfaces 40 mm; minimum cover on interior surfaces 25 mm
- (b) No-slump concrete meeting the requirements of CSA A23.1 shall be an acceptable alternative for concrete junction boxes located in areas that do not have routine traffic access. Galvanized or stainless steel reinforcement shall be used with no-slump concrete when the minimum concrete cover identified above cannot be achieved for thin products. When using galvanized or stainless steel reinforcement with no-slump concrete, the minimum product thickness shall

be 25 mm and the minimum cover shall be 10 mm. When requested, the Contractor shall submit the proposed mix design and detailed documentation for ministry review, a minimum of 14 days in advance of fabrication, which shall include as a minimum the following:

- (i) Details of the products the Contractor proposes to fabricate using no-slump concrete, and
- (ii) Reinforcement details and concrete cover for reinforcement, and
- (iii) Concrete mix design submittals in accordance with SS635.09, and
- (iv) Documentation demonstrating that the proposed mix design will achieve the required strength, durability, and performance requirements including the documentation and test results for the proposed mix design in accordance with CSA A23.1 Clause 8.9 – No-slump concrete.

The Ministry Representative may also request additional documentation be submitted to assist in the ministry review of the mix design for no-slump concrete. If, in the sole discretion of the Ministry Representative, the submitted documentation does not demonstrate acceptable performance of the no-slump concrete, then no-slump concrete shall not be used.

- (c) Concrete for junction boxes and vaults that are located in areas with routine traffic access shall be in accordance with CSA S6 for exposure to harsh conditions and shall meet the following:
  - (i) Minimum specified compressive strength of 35 MPa at 28 days
  - (ii) S1 class of exposure with the addition of chloride exposure
  - (iii) Exposed to cycles of freeze/thaw
  - (iv) Maximum water-to-cementitious materials ratio (W/C<sub>m</sub>) of 0.40
  - (v) Rapid chloride permeability test result (ASTM C1202) of less than 1000 coulombs within 91 days

#### **635.08.06 Concrete Junction Box and Vault Fabrication**

- (a) Certified Manufacturers – For all contracts awarded after December 31, 2021, concrete junction boxes and vaults shall be fabricated in facilities that are certified by an independent industry recognized certification body specific to the products being fabricated.

The certification body shall be qualified to inspect and evaluate all the relevant procedures, facilities, and personnel of the manufacturer as to conformity with required standards and shall be acceptable to the Ministry. Certification shall be in effect prior to the

beginning of Work and shall be maintained throughout the period of manufacture.

Concrete junction boxes and vaults shall be fabricated in accordance with CSA A23.4. Acceptable certification bodies for concrete junction boxes and vault manufacturers include:

- (i) The Canadian Precast Concrete Quality Assurance (CPCQA) Certification Program
- (ii) Certification organizations accredited by the Standards Council of Canada (i.e. Canadian Standards Association (CSA))
- (iii) QCAST Certification Program by the American Concrete Pipe Association for Precast Products
- (iv) National Precast Concrete Association (NPCA) Plant Certification

**(b) Lids and Hatches** – All junction box and vault lids and hatches shall be galvanized steel and shall be fabricated in accordance with SS 422.

**635.08.07 Installation** – Excavations for junction boxes and vaults shall meet the requirements, but not the Quantities and Payment provisions, of SS 407 – Foundation Excavation.

All excavation work shall be carried out as required to suit junction boxes and vaults. Where directed by the Ministry Representative, excavations shall be shored to avoid the cutting of pavement, sidewalks and curb and gutter.

Junction boxes and vaults shall be installed on a bedding of 25 mm Well Graded Base Course Aggregate material in accordance with SS 202 – Granular Surfacing, Base and Sub-bases.

If accepted by the Ministry Representative, junction box or vault excavations may be backfilled using the excavated material. Where new material is required, 25 mm Well Graded Base Course Aggregate material shall be used as specified in SS 635.16.

Unacceptable materials shall be disposed of as specified in SS 635.17.

Bedding and backfill material shall be placed in layers not exceeding 100 mm compacted thickness and shall be compacted to a minimum 95% of the Standard Proctor maximum dry density obtained by ASTM D698. Layer thickness shall be reduced and moisture content of the material adjusted as required to achieve compaction. Care shall be taken not to damage conduits.

Unless otherwise shown, the top of junction boxes and vaults shall be installed so that they are flush with the finished grade. Concrete for junction box collars shall conform to SS 635.08.05

All areas where excavation and backfilling have been performed shall be restored to their original condition.

Asphalt restoration shall be performed in accordance with SS 635.14.

Concrete curb and gutter restoration shall be performed in accordance with SS 635.15.

Lid/hatch hold down bolts shall be coated with anti-seize lubricant.

**635.08.08 Payment** – Payment for PLASTIC JUNCTION BOXES will be at the Contract Unit Price per junction box.

The Unit Price shall include all costs of excavation, other than concrete and asphalt removal; installation of junction box sections, steel lids/hatches, drain plates, adapter plates and braces; supply and installation of shoring to meet WCB requirements, conductor support bars in boxes, concrete collars, 25 mm Well Graded Base Course Aggregate material below the junction box; placing and compaction of excavated material as backfill; removal and disposal of excess excavated material; and all other labour, equipment and materials necessary to complete the installation.

Payment for the excavation of Type A material (solid rock), de-watering of excavations, and additional drainage in vaults will be made in accordance with GC 38.00 Changes to Works.

Where excavated material is ruled unacceptable for backfill, payment for 25 mm Well Graded Base Course Aggregate will be made under SS 635.16.01.

**635.08.09 Payment** – Payment for CONCRETE JUNCTION BOXES AND VAULTS will be at the Contract Unit Price per junction box or vault.

The Unit Price shall include all costs of excavation, other than concrete and asphalt removal; supply and installation of the concrete junction box or vault complete with collar and lid/hatch; supply and installation of conductor supports; supply and installation of 25 mm Well Graded Base Course Aggregate material below concrete junction box or the vault; placing and compaction of excavated material as backfill; removal and disposal of excess excavated material; and all other labour, equipment and materials necessary to complete the installation.

Payment for the excavation of Type A material (solid rock) de-watering of excavations, and additional drainage in vaults will be made in accordance with GC 38.00 Changes to Works.

Where excavated material is ruled unacceptable for backfill, payment for 25 mm Well Graded Base Course Aggregate will be made under SS 635.16.01.

**635.09 Concrete Mix Design Submittals** – When requested by the Ministry Representative, the Contractor shall submit concrete mix design information for bases, junction boxes and vaults for Ministry quality assurance and compliance review. Submittals shall be done using the requirements of CSA A23.1 Table 5 Alternative 1. The

submittals shall meet the requirements of CSA A23.1 and include the following.

### **635.09.01 Project Specifics**

- (a) Name and location of the proposed supplier.**
- (b) Expected method of batching, transporting and placing concrete.**
- (c) Mix parameters including plastic properties, structural requirements and durability requirements.**
- (d) Name and contact information of quality control testing laboratory and certified testing personnel.**

### **635.09.02 Materials**

- (a) Cementitious Materials – Types and source of each material including mill test reports and manufacturer’s certificates of compliance.**
- (b) Aggregates – Type and source of all individual aggregate products including individual gradations and aggregate quality testing**
- (c) Admixtures – Type and source of all admixtures, point of addition to the mix, and individual technical data sheets.**
- (d) Water – The source of mixing water and water quality test data**
- (e) Miscellaneous – Documentation for all other materials proposed for the mix, showing conformance with applicable requirements and manufacturer/industry guidelines and standards.**

**635.09.03 Documentation – Documentation demonstrating that the proposed mix design will achieve the required plastic properties, strength, durability, and performance requirements.**

**635.10 Self Consolidating Concrete - Self Consolidating Concrete (SCC) meeting the requirements of CSA A23.1 may be considered for use on a product and project specific basis. The use of SCC is subject to the approval of the Ministry Representative.**

**635.10.01 Consideration of SCC – For the use of SCC to be considered, the Contractor shall submit the proposed mix design and detailed documentation for ministry review, a minimum of 28 days in advance of fabrication, which shall include as a minimum the following:**

- (a) Details of the products the Contractor proposes to fabricate using SCC, and**
- (b) Concrete mix design submittals in accordance with SS635.09, and**
- (c) Documentation in accordance with either of the following:**
  - (i) Details in accordance with CSA A23.2-24C documenting the proven history of successful**

performance for the required strength, durability, and other performance requirements of the proposed mix design in the fabrication of products similar to those proposed for the use of SCC in the Work, or

- (ii) A full-scale test shall be used to verify the self-consolidating characteristics for placement and for the hardened concrete properties of the mix design for the proposed application. Documentation in accordance with CSA A23.2-24C shall be submitted demonstrating that the proposed mix design will achieve the required strength, durability, and performance requirements.**

The Ministry Representative may also request additional documentation be submitted to assist in the ministry review. If, in the sole discretion of the Ministry Representative, the submitted documentation does not demonstrate acceptable performance of the SCC, then SCC shall not be used.

**635.11 Conduits** – All electrical conduits shall be installed in accordance with the Drawings.

Rigid PVC (RPVC) conduit shall be unplasticized polyvinyl chloride and conform to CSA C22.2 No. 211.2. Couplings, adapters, bends and fittings shall be unplasticized polyvinyl chloride and conform to CSA C22.2 No. 85. RPVC conduit shall be installed using CSA certified cement. Each standard length of RPVC conduit and fitting shall bear a certification mark to the applicable CSA standard.

Rigid metal conduit (RMC) shall be hot-dipped galvanized rigid steel and conform to CSA C22.2 No. 45. Any exposed metal on conduit shall be coated with cold galvanizing compound in accordance with SS 635.25.

High-density polyethylene (HDPE) conduit shall conform to CSA 22.2 No. 327. Markings on the conduit shall meet the requirements of the Canadian Electrical Code. Communication conduits shall be orange in colour.

Flexible liquid-tight non-metallic conduit (FC) shall conform to CSA 22.2 No. 227.2. All joints shall be made with FC threaded couplers, adapters or conduit fittings.

Flexible liquid-tight metal conduit (FMC) shall conform to CSA 22.2 No. 56. All joints shall be made with FMC threaded couplers, adapters or conduit fittings.

Conduit straps shall be galvanized steel single hole or double hole type (sized to suit conduit).

All empty conduits shall have a pull string and shall be capped in accordance with SS Drawings SP635-1.2.16, SP635-1.3.5, and SP635-1.7.1. Pull string shall be polypropylene with a minimum tensile strength of 1.1 kN.

The Contractor shall lay out conduit so that 90° bends are avoided. Where 90° bend cannot be avoided, only one will be allowed for each conduit run.

## SECTION 635

## ELECTRICAL AND SIGNING

Conduit couplings or bell ends damaged when pulling conductors shall be rejected and replaced at the Contractor's expense. An appropriate pulling jig or method shall be used to avoid damaging conduit or fittings when pulling conductors.

**635.11.01 Payment** – Payment for CONDUIT will be at the Unit Price per metre.

The Unit Price shall include all costs for the supply and installation of underground conduit, fittings, cement and pull strings; and all other labour, equipment and materials necessary to complete the installation.

Payment for conduits installed above ground on poles or sign structures is not included in this Subsection.

**635.12 Trenching and Backfilling for Conduit** – Trenching and backfilling shall be performed in accordance with SS Drawings SP635-1.5.1, SP635-1.5.2, SP635-1.6.1, SP635-1.6.2 and SP635-1.7.1.

RPVC conduits shall be installed in an open trench in accordance with SS Drawings SP635-1.5.1, SP635-1.5.2, SP635-1.6.1, SP635-1.6.2 and SP635-1.7.1 except where conduits are to be drilled or pushed under the surface as specified in SS 635.13.

Trenches shall be excavated with neat, uniform sides to the minimum width necessary, but not less than the minimum dimensions indicated on SS Drawings SP635-1.5.1 and SP635-1.5.2 (care shall be taken to prevent sloughing). Material in the floor of the trench shall be undisturbed, or if disturbed shall be re-compacted to the requirement herein for backfill.

Where approved by the Ministry Representative excavated material may be used as backfill. Where new material is required, 25 mm Well Graded Base Course Aggregate material shall be used as specified in SS 635.16. Unacceptable materials shall be disposed of as specified in SS 635.17.

A 150 mm wide yellow plastic marker tape indicating "WARNING ELECTRICAL" shall be installed in each trench for the complete length of the trench. The location of the marker tape shall be as shown on SS Drawings SP635-1.5.1 and SP635-1.5.2.

Bedding and backfill material shall be placed in layers not exceeding 100 mm compacted thickness and shall be compacted to a minimum 100% (for road crossings) and 95% (for shoulder trenches) of the Standard Proctor maximum dry density obtained by ASTM D698. Layer thickness shall be reduced, and moisture content of the material adjusted as required to achieve compaction. Care shall be taken not to damage conduits.

All areas where trenching and backfilling have been performed shall be restored to their original condition.

Asphalt restoration shall be performed in accordance with SS 635.14.

Concrete curb and gutter and sidewalk restoration shall be performed in accordance with SS 635.15.

**635.12.01 Payment** – Payment for TRENCHING AND BACKFILLING FOR CONDUIT will be at the Unit Price per metre.

The Unit Price shall include all costs of Type D excavation, other than concrete and asphalt removal; placing and compaction of excavated material as backfill; dewatering; supply and installation of trench marker tape; removal and disposal of excess excavated material; and all other labour, equipment and materials necessary to complete the installation.

Payment for excavation of Type A material (solid rock) will be made in accordance with GC 38.00 Changes to Work.

Where excavated material is ruled unacceptable for backfill, payment for 25 mm Well Graded Base Course Aggregate will be made under SS 635.16.01.

**635.13 Trenchless Conduit Installation** – Where noted on the Drawings the Contractor shall install the conduit using a suitable trenchless technology to avoid cutting the existing pavement or sidewalk.

The trenchless technology selected shall suit the site conditions.

The Contractor shall notify the Ministry Representative a minimum of 48-hours prior to installing conduits.

The Contractor shall locate all underground utilities prior to installing conduits.

**635.13.01 Payment** – Payment for installing conduit using trenchless technology will be at the Contract Unit Price per metre.

The Unit Price shall include all costs of excavation for set up; backfilling and restoration when finished, and all other labour, equipment and materials necessary to complete the installation.

No separate payment will be made for unsuccessful installation.

Payment for the supply and installation of conduit is covered under SS 635.11.01.

**635.14 Asphalt Pavement** – Asphalt paving shall be performed in accordance with SS 502.

Asphalt patching of conduit trenches shall be performed in accordance with SS Drawing SP635-1.5.1. Asphalt patching of excavations for junction boxes, vaults and bases shall be performed similar to the details shown on SS Drawing SP635-1.5.1.

Contrary to the requirements of Section 502, Asphalt placing by a paving machine will not be required. Asphalt pavement restoration shall be Class 1 medium mix installed in three 50 mm lifts unless otherwise noted or directed by the Ministry Representative.

The Contractor shall use a pavement saw to cut pavement and shall exercise care to obtain a neat, uniform excavation line along the edge of the pavement. The Contractor shall also prevent the existing base gravel from sloughing and undermining the pavement.

Where three lifts of asphalt pavement are being placed to reinstate a trench, the first two lifts shall be compacted with vibratory equipment capable of operating within the excavated area and of compacting over the whole of it. The third lift shall be compacted with rolling equipment to produce a uniform surface matching the adjacent existing pavement.

**635.14.01 Payment** – Payment for ASPHALT PAVEMENT for electrical and signing work will be as follows:

- (a) Where the electrical work forms part of a paving or road construction Project, measurement and payment will be made in accordance with SS 502.
- (b) Where the electrical work does not form part of a paving or road construction Project, payment shall be made in accordance with SS 502, except that:
  - (i) No separate payment shall be made for spray primer and tack coat and all costs of this work shall be included.
  - (ii) Measurement for payment for conduit trenches shall be made in cubic meters of mix compacted in place and shall be calculated using a 450 mm wide trench plus 300 mm (asphalt is excavated 150 mm beyond the trench on both sides as noted on SS Drawing SP635-1.5.1).
  - (iii) Measurement for payment for installation of all other works shall be made in cubic metres of mix compacted in place and shall be calculated from measurements of the work.

**635.14.02 Payment** – Payment for REMOVAL OF ASPHALT will be made at the Contract Unit Price per cubic metre.

The Unit Price shall include all costs of cutting, removing and disposing of existing asphalt; and all other labour, equipment and materials necessary to complete the removal of asphalt.

The volume for payment of asphalt removal for conduit trenches will be calculated by the actual volume of asphalt removed within a 450 mm wide trench plus 300 mm (asphalt is excavated 150 mm beyond the trench on both sides as noted on SS Drawing SP635.1.5.1).

The volume for payment of asphalt removal for all other work will be calculated from measurements of the work.

**635.15 Concrete Curbs and Sidewalks** – Concrete curbs and sidewalks shall be installed in accordance with SS 582 – Concrete Curb and Gutter and Storm Drainage.

Concrete shall meet the requirements of Note 1 on SS Drawing SP582-01.01.

The Contractor shall use a pavement saw to cut existing concrete unless otherwise directed by the Ministry Representative, and shall obtain a neat, uniform cut along the edge of concrete. The Contractor shall also prevent base gravel from sloughing and undermining the concrete.

**635.15.01 Payment** – Payment for CONCRETE CURBS will be at the Contract Unit Price in accordance with SS 582 – Concrete Curb and Gutter and Storm Drainage.

The Unit Price shall include all costs of excavation, other than concrete and asphalt removal; supply and installation of 25 mm Well Graded Base Course Aggregate bedding material; supply and installation of formwork, concrete and expansion joint material; removal and disposal of excess excavated material; and all other labour, equipment and materials necessary to complete the installation.

**635.15.02 Payment** – Payment for SIDEWALKS will be at the Contract Unit Price per square metre.

The Unit Price shall include all costs of excavation, other than concrete and asphalt removal; supply and installation of 25 mm Well Graded Base Course Aggregate bedding material; supply and installation of formwork, concrete and expansion joint material; removal and disposal of excess excavated material; and all other labour, equipment and materials necessary to complete the installation.

**635.15.03 Payment** – Payment for REMOVAL OF CONCRETE will be at the Contract Unit Price per cubic metre.

The Unit Price shall include all costs for the cutting, removing and disposing of existing concrete roadway, sidewalk, etc.; and all other labour, equipment and materials necessary to complete the removal of concrete.

The volume for payment of concrete removal for conduit trenches will be calculated by the actual volume of concrete removed within a 450 mm wide trench.

The volume for payment of concrete removal for all other work will be calculated from measurements of the work.

**635.15.04 Payment** – Payment for REMOVAL OF CONCRETE CURBS will be at the Contract Unit Price per metre.

The Unit Price shall include all costs for cutting, removing and disposing of existing concrete; and all other labour, equipment and materials necessary to complete the removal of concrete curbs.

**635.16 25 mm Well Graded Base Course Aggregate** – 25 mm Well Graded Base Course Aggregate shall meet the requirements of SS 202 – Granular Surfacing, Base and Sub-bases.

When acceptable excavated material is not available, 25 mm Well Graded Base Course Aggregate shall be used

as backfill. It shall also be used for additional backfill around bases, junction boxes, vaults, median island fill, and other work as approved by the Ministry Representative.

**635.16.01 Payment** – Payment for 25 mm WELL GRADED BASE COURSE AGGREGATE will be at the Contract Unit Price per cubic metre.

The Unit Price shall include all costs of the supply, hauling, placing, trimming and compacting the material, and all other labour and equipment necessary to complete the installation.

Where the 25 mm Well Graded Base Course Aggregate material is used to backfill a conduit trench, its volume shall be calculated in place using:

- (a) The actual length of trench from which the material is designated unacceptable;
- (b) a 450 mm wide trench; and
- (c) the actual depth of this material compacted in place.

Where 25 mm Well Graded Base Course Aggregate material is used to backfill bases, junction boxes, vaults, or other work the volume will be calculated by the actual compacted volume of material installed in the excavation less the volume of the item installed in the excavation.

**635.17 Removal of Rejected Excavated Material** – Where excavated material is designated unacceptable for backfill by the Ministry Representative it shall be removed from the work site and disposed of by the Contractor.

The disposal site shall be approved by the Ministry Representative.

**635.17.01 Payment** – Payment for the REMOVAL OF REJECTED EXCAVATED MATERIAL will be at the Contract Unit Price per cubic metre.

The Unit Price shall include all costs of removal and disposal, and all other labour, equipment and materials necessary to complete the removal of rejected material.

Where the rejected material has been excavated from a conduit trench, its volume shall be calculated in place using:

- (a) The actual length of trench from which the material is designated unacceptable;
- (b) a 450 mm wide trench; and
- (c) the actual depth of material removed.

Where the rejected material has been excavated for bases, junction boxes, vaults or other work the volume will be calculated by the actual volume of excavated material less the volume of the item installed in the excavation.

**635.18 Restoration** – Areas where work has been performed shall be returned to their original condition and must be left in a neat state to the satisfaction of the Ministry Representative. All costs for restoration will be considered incidental to the Work.

## PART C – ELECTRICAL

**635.19 Luminaire, Signal and Sign Poles** – Luminaire and signal poles shall be installed in accordance with SS Drawings SP635-2.1.1 through SP635-2.1.14, and SP635-2.2.1 through SP635-2.2.10.

Where specified, luminaire poles shall be mounted on frangible or breakaway bases in accordance with SS Drawings SP635-2.1.15 and 2.1.16.

Sign poles shall be installed in accordance with SS Drawings SP635-3.1.1 through SP635-3.1.22.

Poles shall not be erected until concrete bases have attained a strength of 30 MPa.

Push button and signal head locations shall be verified with the Drawings, before poles are drilled and assembled.

Field drilling of holes larger than 33 mm (1 5/16") diameter will not be permitted in Type 1, 3, 6, 7, L, M and H shafts, and all arms and extensions. Where larger holes are required, the holes shall be reinforced with a welded bushing in accordance with SS Drawing SP635-2.4.17.

All components of the luminaire, signal and sign poles shall be handled with care to prevent stress to the components through bending or twisting. A nylon sling shall be used to transport and erect the components. The use of steel chains as slings will not be permitted. Any damage to the components through overstress, scratching or denting shall be repaired or replaced at the Contractor's expense to the satisfaction of the Ministry Representative.

All pole shafts shall be installed plumb. Where possible, all luminaire poles shall be positioned with the hand-hole oriented opposite the road and if not possible, on the downstream traffic side.

All wiring inside the poles shall be in accordance with SS 635.21.

Pole shafts shall mount directly on concrete bases and, where necessary, shall be trued to plumb using levelling shims.

The Contractor shall tighten all bolts and nuts to 1/3 rotation past snug tight. "Snug-tight" is the tightness attained by a few impacts of an impact wrench or the full effort of a person using a spud wrench.

All scratches in poles and all field drilled holes shall be coated with cold galvanizing compound as per SS 635.25.

Hand hole bolts shall be coated with anti-seize lubricant.

**635.19.01 Traffic and Pedestrian Signal Heads** – Traffic and pedestrian signal heads shall be installed in accordance with SS Drawings SP635-2.3.1 through SP635-2.3.7 and -SP635-2.3.10.

All traffic and pedestrian signal heads and mounting hardware shall be securely attached to the pole.

The Contractor shall aim all traffic signal heads in accordance with SS Drawing SP635-2.3.11. Pedestrian signal heads shall be aimed to line up with the opposing wheelchair ramp or centre of the crosswalk.

Traffic and pedestrian signal heads shall be aimed in the field to the satisfaction of the Ministry Representative.

All traffic and pedestrian signal heads shall have LED (light emitting diode) traffic signal heads unless noted otherwise on the Drawings.

The Contractor shall completely cover all traffic and pedestrian signal heads with dark coloured pre-manufactured signal cover bags from the time they are installed until the system is required by the Ministry.

**635.19.02 Pedestrian Pushbuttons and Signs** – Pedestrian pushbuttons and signs shall be installed in accordance with SS Drawing SP635-2.3.8 and SP635-2.3.14.

Pedestrian push buttons and signs shall be securely attached to the pole. Pedestrian pushbutton signs shall be temporarily covered until the signal is in operation.

**635.19.03 Luminaires and Photocells** – Luminaires and photocells shall be installed as per manufacturer's instructions or as noted on the Drawings. Luminaires shall be installed level.

Roadway luminaires shall be oriented parallel to the roadway surface to reduce glare.

Sign luminaires are typically no longer used. If specified, sign luminaires will require different aiming depending on the manufacturer. Aiming angles shall be noted on the Drawings or shall be requested from the Ministry Representative.

Photocell eyes shall be aimed north.

**635.19.04 Street name Signs** – Street name signs shall be bolted directly to the pole arms in accordance with SS Drawing SP635-3.2.1.

**635.19.05 Audible Signals** – Audible Signals shall be installed on pedestrian signal heads in accordance with SS Drawing SP635-2.3.9. The Contractor shall aim and adjust the audible signal heads to the satisfaction of the Ministry Representative.

**635.19.06 Emergency Vehicle Pre-emption Equipment** – Emergency vehicle pre-emption equipment shall be installed in accordance with the Drawings and manufacturer's instructions. The Contractor shall undertake all commissioning and set-up of the equipment under the direction of the supplier's technical representative.

**635.19.07 Small Overhead Signs** – Small overhead signs are classed as signs 1200 mm x 900 mm or smaller. Small overhead signs shall be installed in accordance with SS Drawings SP635-3.2.2 through SP635-3.2.6.

Sign installations shall meet the requirements of SS 635.34.

**635.19.08 Video Detection Equipment** – Video Detection equipment shall be installed in accordance with the Drawings and manufacturer's instructions. The cameras shall be installed on signal arms or on special combination Type 2A luminaire / camera arms in accordance with SS Drawings SP635-2.3.12 and SP635-2.3.13. The Contractor shall undertake all commissioning and set-up of the equipment under the direction of the supplier technical representative.

**635.19.09 Payment** – Payment for the installation of each SIGNAL POLE will be at the Lump Sum Price for that pole.

The Lump Sum Price shall include all costs for the installation of traffic signal poles and arms, traffic signal heads including mounting hardware, pedestrian pushbuttons and signs, luminaires and photocells, audible signals, street name signs, small overhead signs, and fire indication lights; supply and installation of wiring to the handhole at the base of the pole, fuse holders, fuses and splices; and all other labour, equipment and material necessary to complete the installation.

**635.19.10 Payment** – Payment for the installation of LUMINAIRE POLES will be at the Unit Price for each pole.

The Unit Price shall include all costs for the installation of luminaire poles, luminaires and photocells, and frangible or breakaway bases; supply and installation of wiring to the handhole at the base of the pole, fuse holders, fuses and splices; and all other labour, equipment and materials necessary to complete the installation.

**635.19.11 Payment** – Payment for the supply and installation of EMERGENCY VEHICLE PRE-EMPTION EQUIPMENT will be made at the Lump Sum Price for each signal.

The Lump Sum Price shall include all costs for the installation of the pre-emption equipment, commissioning, set-up and adjusting.

**635.19.12 Payment** – Payment for the supply and installation of VIDEO DETECTION EQUIPMENT will be made at the Lump Sum Price for each signal.

The Lump Sum Price shall include all costs for the supply and installation of the video detection equipment, commissioning, set-up and adjusting.

**635.20 Service Equipment** – Service equipment shall be installed in accordance with SS Drawings SP635-2.4.1 through SP635-2.4.20.

Service Equipment shall include electrical panels and telephone demarcation panels.

Specialized service equipment (e.g., service kiosks) shall be installed in accordance with the Drawings and Special Provisions.

Service equipment shall be securely attached to the poles.



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**635.20.01 Payment** – Payment for the installation of SERVICE EQUIPMENT will be at the Lump Sum Price for that service area.

The Lump Sum Price shall include all costs for the supply and installation of electrical service, distribution and disconnect panels and telephone demarcation panels including the pole where a separate service pole is required; supply and installation of service wiring including wiring between the disconnect and distribution panels; supply and installation of rigid metal conduit, fittings, mounting hardware, ground wire, ground clamp, insulating clevis, ground plate and branch circuit wiring to the handhole at the base of the pole; supply and installation of a working pad including additional fill as required (see SS Drawing SP635-2.4.20); and all other labour, equipment and materials necessary to complete the installation.

**635.21 Wiring** – All wiring shall be installed in accordance with the Drawings or as directed by the Ministry Representative.

All conductors shall be stranded copper, RW90 XLPE insulated unless otherwise noted.

Conductor gauges (AWG) shall be as specified on the Drawings.

Shielded detector loop and telephone demarcation cables shall be 2 conductor No. 18 Ministry pre-approved product. Shielded detector loop cables shall run continuous with no splices, from the traffic controller (or other type of control equipment) to the respective detector loop conductor.

Single conductor colour coding and labelling is required and shall be as noted on SS Drawings SP635-2.5.7 and 2.5.8. Conductor colour coding shall also meet the requirements of the Canadian Electrical Code.

Where specifically noted on the Drawings signal cable shall be used. Signal cable colour coding and conductor designations shall be as noted on SS Drawing SP635-2.5.9. Where signal cable is used all conductor splices shall be made in pole hand holes in accordance with SS Drawing SP635-2.5.10.

Each traffic and pedestrian signal head section and luminaire shall be wired separately to the base of the pole. A separate neutral and bond conductor shall run to each signal head and luminaire from the base of the pole. The neutral and bond conductors shall be bundled with the feeder circuits.

Luminaire conductor wiring and fusing in pole handholes shall conform to SS Drawing SP635-2.5.6.

Wiring inside junction boxes and vaults shall conform to SS Drawings SP635-2.5.1 through SP635-2.5.5.

Conductor splices shall be secured with solderless "Marrette" type connectors. Where the number and/or size of conductors exceed the capacity of the Marrette, split bolt connectors shall be used.

All wiring shall be neatly bundled and labelled in all junction boxes, vaults, traffic controllers, handholes at pole bases, and service panels.

Sealing of connections shall be performed using one of the following methods:

- (a) Double dipping using 3M "Scotchcote" or approved alternate. Dipping shall be performed strictly adhering to the manufacturer's specifications.
- (b) Each conductor shall have a wrap of the self-holding tape (3M Linerless Rubber Splicing Tape, Steadfast 8 Ounce Splicing tape or approved alternate), then the complete splice shall be wrapped. PVC tape shall then be applied to cover the complete splice.

If conductor connections require the use of split bolts or similar style devices due to wire size, then the splice shall be completely covered with Duct Seal to form a ball over the connection. This Duct Seal shall be thick enough to prevent sharp ends of the conductors and/or points of the connector from protruding through the taped connection. Once the duct seal has been applied, the splice shall be taped with self-holding and PVC tape as described in SS 635.21(b).

All luminaires and signal heads shall be bonded with a No. 12 RW90 conductor. Steel junction box lids and steel vault lids shall be bonded in accordance with SS Drawings SP635-2.5.1 through SP635-2.5.5.

**635.21.01 Payment** – Payment for the installation of WIRING will be at the Lump Sum Price for all underground wiring included in the Work.

The Lump Sum Price shall include all costs for the supply and installation of wiring and cables located in the underground conduit system (unless otherwise noted) and splices; labelling of underground conductors; and all other labour, equipment and materials necessary to complete the installation.

**635.22 Traffic Counter Stations** – Traffic counter stations shall be short-duration type or permanent type.

Short duration traffic counter stations shall be constructed as noted on the Drawings and shall be installed in accordance with SS Drawing SP635-2.6.1.

Perforated square steel tubing shall conform to SS 635.30.

Permanent traffic counter stations shall be constructed as noted on the Drawings and shall be installed in accordance with SS Drawing SP635-2.6.2 and 2.6.3.

The Contractor will install all pole mount cabinets. The Ministry Electrical Maintenance Contractor will connect all field wiring in cabinets, trouble-shoot problems in the cabinet and undertake all equipment set-up.

**635.22.01 Payment** – Payment for the installation of TRAFFIC COUNTER STATIONS will be at the Unit Price per traffic counter station.

The Unit Price shall include all costs for the supply and installation of perforated steel tubing, above ground conduit and junction boxes, connectors; supply and installation of rigid metal conduits, fittings, mounting hardware and branch circuit wiring to the handhole at the base of pole for pole mount cabinets; installation of counter cabinet including the pole where a separate pole is required; Supply and installation of W-55 signs and concrete pad in front of the controller door; and all other labour, equipment and materials necessary to complete the installation.

**635.23 Controllers** – Type B, C, M, S and P6 traffic controller cabinets shall be installed in accordance with SS Drawings SP635-2.7.1 through SP635-2.7.4.

The Ministry Electrical Maintenance Contractor will install all base mount traffic controllers and cabinets. The Contractor will install all pole mount cabinets. The Ministry Electrical Maintenance Contractor will connect all field wiring in controller cabinets, trouble-shoot problems in the cabinet, enter all signal timings, undertake modifications to existing signal phasing and timings, start-up controller and complete Ministry signal turn-on sheets.

The Contractor shall be on hand to assist with controller start-up and make any repairs to field wiring or hardware as required. The Contractor shall provide traffic control and assistance during the controller start-up.

The Contractor shall coil and label 2 m of each conductor inside the traffic controller for connections by the Ministry Electrical Maintenance Contractor. The Contractor shall verify that all traffic and pedestrian signal phases are wired as shown on the Drawings and that all circuits are tested prior to activation. The Contractor shall verify that all signal and pedestrian phases are properly colour coded and labelled with identification tags.

**635.23.01 Payment** – Payment for the installation of each CONTROLLER will be at the Lump Sum Price for that controller.

The Lump Sum Price shall include all costs for the installation of pole mount cabinets and installation of the pole where a separate pole is required, rigid metal conduits, fittings, mounting hardware and branch circuit wiring to the handhole at the base of pole for pole mount cabinets; testing of all circuits; labelling of all conductors; traffic control and all other labour, equipment and materials necessary to complete the installation.

**635.24 Detector Loops** – Detector loops shall be constructed as noted on the Drawings and shall be installed in accordance with SS Drawings SP635-2.8.1 through SP635-2.8.17. Loop check sheets shall be completed and submitted to the Ministry Representative prior to signal start-up.

**635.24.01 Payment** – Payment for DETECTOR LOOPS will be at the Unit Price per loop.

The Unit Price shall include all costs for layout of the loop, asphalt cutting and preparation of pavement cuts; supply and installation of loop conductors or preformed loops as applicable, to the underground junction box, traffic counter post or cabinet; supply and installation of backer rod, sand and loop sealant; and all other labour, equipment and materials necessary to complete the installation.

**635.25 Repairing Galvanized Surfaces** – Any spots where the galvanized finish is damaged due to drilling, tapping, reaming or welding and any surface damage incurred during transportation and erection shall be refinished with cold galvanizing compound. Cold galvanizing compound shall be selected from the Ministry Recognized Products List under the category ‘Additional Paint Coatings – Zinc Rich Touch-up Paints and Primers’. The application of cold galvanizing compound shall conform to the Manufacturer's instructions, ‘Notes for Use’ on the Recognized Products List, and the following:

- (a) The surface shall be mechanically cleaned with a wire brush or grinder and chemically cleaned to remove all welding flux, paint, grease, oil, rust, scale or other detrimental foreign matter.
- (b) The surface shall be absolutely dry and the ambient temperature shall be over 10°C.
- (c) Uniform coats shall be applied. Each coat shall be as thick as possible without causing runs on the finished surface.

All costs for the repair of galvanized surfaces will be considered incidental to the Work.

**635.26 Flasher Luminaires** – Flasher luminaires shall be mounted on perforated square steel tubing in accordance with SS Drawings SP635-2.9.1 through SP635-2.9.3.

Flasher luminaires shall be mounted on poles in accordance with SS Drawings SP635-2.9.4 through SP635-2.9.6.

All perforated square steel tubing shall be in accordance with SS 635.30.

**635.26.01 Payment** – Payment for the installation of Flasher Luminaires on Perforated Square Steel Tubing will be at the Unit Price for a one or two sign unit.

The Unit Price shall include all costs for the supply and installation of perforated square steel tubing, mounting hardware, wiring to the junction box nearest to the flasher post, ty-raps and connectors, signs, flasher luminaires, lamps; and all other labour, equipment and materials necessary to complete the installation.

**635.26.02 Payment** – Payment for the installation of Flasher Luminaires on Poles will be at the Unit Price for each item.

The Unit Price shall include all costs for the supply and installation of all fittings, hardware and wiring to the underground junction box nearest the pole, signs, flasher

luminaires and lamps; and all other labour, equipment and materials necessary to complete the installation.

#### PART D – SIGNING

Note: Removal of existing signs shall be in accordance with SS 200.

**635.27 Overhead Signs** – Overhead signs are categorized in two classes:

- small overhead signs are 1200 mm x 900 mm or smaller and made from sheet aluminium;
- large overhead signs are larger than 1200 mm x 900 mm and made from sheet aluminium or extruded aluminum.

Note: Signs are no longer made from plywood.

Small overhead signs are generally mounted on signal poles and shall be installed in accordance with SS Drawings SP635-3.2.2 through SP635-3.2.6.

Large overhead sheet aluminum signs are installed on sign poles in accordance with SS Drawings SP635-3.3.1 through 3.3.4, unless otherwise noted. Large overhead extruded aluminum signs are installed on sign poles in accordance with SS Drawings SP635-3.3.5 through SP635-3.3.15, and 3.3.18 unless otherwise noted. Sign poles shall be installed in accordance with SS Drawings SP635-3.1.1 through SP635-3.1.22.

Sign lighting is used only when specified by the Ministry. If specified, it shall be installed in accordance with SS Drawing SP635-3.3.2 and 3.3.16 and SS 635.19.03.

Overhead signs shall be securely installed on sign pole structures.

All horizontal supports and signs shall be level and vertical supports plumb.

Sign Poles shall be installed in accordance with SS 635.19.

Advance warning signs shall be extruded aluminum and shall be installed in accordance with SS Drawings SP635-3.3.5 through SP635-3.3.8.

All signs shall be installed in accordance with SS 635.34.

**635.27.01 Payment** – Payment for the installation of each OVERHEAD SIGN POLE will be at the Lump Sum Price for that sign pole.

The Lump Sum Price shall include all costs for installation of sign poles and arms, overhead signs complete with T Section mounting brackets and clips, advance warning flasher equipment, sign luminaires and mounting hardware; small overhead signs and mounting brackets, wiring to the handhole at the base of the pole, fuse holders, fuses, junction boxes on pole arms, splices; and all other labour, equipment and materials necessary to complete the installation.

Where small overhead signs are installed on signal poles, payment will be made under SS 635.19.09.

**635.28 Breakaway Sign Structures** – Breakaway sign structures shall be installed in accordance with SS Drawings SP635-3.4.1 through SP635-3.4.10.

After concrete bases are installed, the Contractor shall survey the finished base elevations to determine the correct leg lengths. The fabricator shall cut legs to the correct lengths.

Legs and columns are to be transported in an unstressed manner.

Breakaway structures shall be installed with the legs and columns plumb, and the battens and signs level.

The Contractor shall tighten all bolts and nuts with a torque wrench to the torque specified on the Drawings.

Signs shall be sheet aluminum or extruded aluminum, as specified.

Extruded aluminum signs shall be installed in accordance with SS Drawings SP635-3.4.7 through SP635-3.4.10 and SS 635.34.

Extruded aluminum signs on breakaway sign structures shall not be illuminated.

All sign installations shall be in accordance with SS 635.34.

**635.28.01 Payment** – Payment for the installation of each BREAKAWAY SIGN STRUCTURE will be at the Lump Sum Price for that breakaway sign structure.

The Lump Sum Price shall include all costs for the installation of breakaway sign legs, columns, stub posts, fuse and connection joints, sign or signs, sign luminaires and mounting brackets, battens, painting (where required), sign mounting bolts and hardware for signs; and all other labour, equipment and materials necessary to complete the installation.

**635.29 Wood Post Sign Structures** – Wood post sign structures shall be installed in accordance with SS Drawings SP635-3.5.1 through SP635-3.5.9.

Excavations for wood posts shall be wide enough to allow for proper compaction of backfill around the wood posts. Wood posts shall be embedded in the ground to the depths indicated on SS Drawings SP635-3.5.1 through SP635-3.5.3.

Wood post excavations shall be backfilled using the excavated material except where excavated material is ruled unacceptable by the Ministry Representative. Where new material is required, 25 mm Well Graded Base Course Aggregate material shall be used as specified in SS 635.16. Unacceptable materials shall be disposed of as specified in SS 635.17.

Wood posts shall be Douglas Fir/Larch, No. 1 Grade or pressure treated, surfaced four sides, and shall be supplied in complete lengths without splices. Posts shall be straight and free of cracks.

All wood products used in wood sign post structures shall be preservative treated and meet the requirements of SS 908.

Wood posts shall be installed plumb and at the proper offset and elevation.

Backfill material shall be placed in layers not exceeding 150 mm compacted thickness and shall be compacted to a minimum 100% of the Standard Proctor maximum dry density obtained by ASTM D698. Layer thickness and moisture content of the material shall be adjusted as necessary to achieve compaction.

All areas excavated and backfilled shall be restored to their original condition.

Signs on single wood post structures shall be sheet aluminum and shall be installed in accordance with SS Drawing SP635-3.5.1 and SS 635.34.

Signs on multiple wood post structures shall be sheet aluminum or extruded aluminum.

Extruded aluminum signs shall be installed in accordance with SS Drawings SP635-3.5.6 through SP635-3.5.9 and SS 635.34.

All areas around the post shall be fully restored to their original condition.

**635.29.01 Payment** – Payment for the installation of SINGLE WOOD POST SIGN STRUCTURES will be at the Unit Price for each wood post sign structure.

The Unit Price shall include all costs of Type D excavation, other than concrete or asphalt removal; supply and installation of wood posts, painting (where required), sign mounting bolts and hardware and signs; placing and compaction of excavated materials as backfill; removal of excess excavated material; restoration; and all other labour, equipment and materials necessary to complete the installation.

Payment for excavation of Type A material (solid rock) and de-watering of excavations will be made in accordance with GC 38.00 Changes to Work.

Where excavated material is ruled unacceptable for backfill, payment for 25 mm Well Graded Base Course Aggregate will be made under SS 635.16.01.

**635.29.02 Payment** – Payment for the installation of each MULTI POST WOOD POST SIGN STRUCTURE will be at the Lump Sum Price for that wood post sign structure.

The Lump Sum Price shall include all costs of Type D excavation, other than concrete or asphalt removal; supply and installation of wood posts, painting (where required), sign mounting bolts and hardware, battens for signs, sign(s) and aluminum angle sign supports for extruded aluminum signs; placing and compaction of excavated materials as backfill; removal of excess excavated material; restoration

and all other labour, equipment and materials necessary to complete the installation.

Payment for excavation of Type A material (solid rock) and de-watering of excavations will be made in accordance with GC 38.00 Changes to Work.

Where excavated material is ruled unacceptable for backfill, payment for 25 mm Well Graded Base Course Aggregate will be made under SS 635.16.01.

**635.30 Perforated Square Steel Sign Post Structures** – Perforated Square Steel Sign Post shall be supplied in accordance with SS Drawings SP635-3.6.1 through SP635-6.4.

Sign posts shall be perforated square steel tubing. The perforated square steel tubing will be required in different outside dimensions as noted on the Drawings. The perforated square steel tubing shall be formed from 12 gauge hot rolled steel, conforming to ASTM A1011 Grade 50 The tubing shall be hot dipped galvanized conforming to ASTM A653 Designation G-90 or CSA G164. Steel tubing shall have 7/16" holes on all four sides at 1" centres.

Galvanized perforated square steel tubing shall be supplied in continuous lengths, with no splices, and shall be field cut to suit the installation. All field cuts shall be painted with cold galvanizing compound in accordance with SS 635.25.

Perforated square steel tubing sign posts shall be installed on concrete bases or direct buried in accordance with SS Drawing SP635-3.6.1

Perforated square steel tubing posts shall be installed plumb.

Signs installed on single or double perforated square steel sign posts shall be sheet aluminum. Sheet aluminum signs shall be installed in accordance with SS Drawings SP635-3.6.1 through SP635-3.6.4 and SS 635.34.

**635.30.01 Payment** – Payment for the installation of SINGLE PERFORATED SQUARE STEEL SIGN POST STRUCTURES will be at the Unit Price for each structure.

The Unit Price shall include all costs for the supply and installation of perforated square steel tubing, mounting hardware, sign(s); and all other labour, equipment and materials necessary to complete the installation.

**635.30.02 Payment** – Payment for DOUBLE PERFORATED SQUARE STEEL SIGN POST STRUCTURES will be at the Unit Price for each sign structure.

The Unit Price shall include all costs for the supply and installation of perforated square steel tubing; mounting hardware, sign(s); and all other labour, equipment and materials necessary to complete the installation.

**635.31 Round Steel Sign Post Structures** – Round Steel sign posts shall be installed in accordance with SS Drawings SP635-3.8.1 through SP635-3.8.3.

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Barrier sign posts shall be mounted on barrier stands, which shall be securely bolted to concrete roadside or concrete median barriers.

Posts and pipe sleeves shall be round Schedule 40 steel pipe conforming to ASTM A53, Grade A or B, Type E or S. The pipe shall be hot dip galvanized in accordance with CSA G164. Pipe shall be field cut to lengths to suit sign mounting heights as noted on the Drawings or as directed by the Ministry Representative. All field cuts in galvanized steel pipes shall be coated with cold galvanizing compound in accordance with SS 635.25.

Signs shall be installed in accordance with SS 635.34.

**635.31.01 Payment** – Payment for the installation of ROUND STEEL SIGN POST STRUCTURES will be at the Unit Price for each sign post.

The Unit Price shall include all costs for the supply and installation of sign or signs and barrier stands, sign posts and mounting hardware, breakaway devices, where warranted, pipe sleeves including trenching and backfilling where posts are installed in concrete sidewalks; and all other labour, equipment and materials necessary to complete the installation.

**635.32 Sign Mounting on the Side of Poles** – Signs mounted on the side of steel poles shall be installed in accordance with SS Drawing SP635-3.9.1.

Signs shall be securely attached to poles.

Signs shall be installed in accordance with SS 635.34.

Holes drilled in galvanized steel poles shall be coated with cold galvanizing compound in accordance with SS 635.25.

**635.32.01 Payment** – Payment for the installation of SIGN INSTALLATION ON THE SIDE OF POLES will be at the Unit Price for signs installed on each pole.

The Unit Price shall include all costs for the supply and installation of signs, sign mounting hardware; and all other labour, equipment and materials necessary to complete the installation.

Where multiple signs are to be installed on a pole only one unit item will be paid.

**635.33 Delineators** – Delineators shall be wood, perforated steel tubing or plastic as noted on the Drawings or as directed by the Ministry Representative.

Wood delineator posts shall be installed in accordance with Drawing SP635-3.10.1.

Perforated square steel tubing delineator posts shall be installed in accordance with SS Drawing SP635-3.10.2.

Where delineators are mounted on a pole, sign post or structure, they shall be installed in accordance with SS Drawing SP635-3.10.3.

Where plastic delineators are specified, they shall be a Ministry preapproved type and shall be installed in accordance with the manufacturer's instructions and SS Drawing SP635-3.10.4.

Delineator post excavation, backfill, type of wood, painting (where required) and installation methods shall be in accordance with SS 635.29.

Perforated square steel tubing shall be in accordance with SS 635.30.

All holes drilled in galvanized surfaces shall be coated with cold galvanizing compound in accordance with SS 635.25.

**635.33.01 Payment** – Payment for the installation of DELINEATORS will be at the Unit Price for each delineator.

The Unit Price shall include all costs of excavation, other than concrete or asphalt removal; supply and installation of delineator posts and mounting hardware, W-055 background plate and reflectors for perforated sign posts and W-055 reflectors for wood sign posts; placing and compaction of excavated materials as backfill; removal of excess excavated materials; and all other labour, equipment and materials necessary to complete the installation.

**635.34 Signs** – Signs smaller than 1200 mm x 900 mm shall be sheet aluminum. Signs 1200 mm x 900 mm or larger shall be extruded aluminum.

All sign installations shall meet the requirements of the most current edition of the Ministry *Manual of Standard Traffic Signs and Pavement Markings* available at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/traffic-engineering-safety/traffic-signs-markings>

The Contractor shall have a current copy of this document on site when installing signs.

Signs shall be completely covered with a suitable grade of polyethylene sheeting from the time they are installed until the roadway is in full operation, unless otherwise directed by the Ministry Representative. The polyethylene sheeting material shall prevent sign messages from being visible.

Signs shall be handled so as not to damage them in any way. Slip sheets between signs shall be removed carefully to avoid damage due to adhesion of the slip sheet to the sign. Signs shall be stored on end on dunnage or racks in a dry, covered area, protected from damage. Damaged signs shall be replaced by the Contractor at the Contractor's expense. Taping, screwing, nailing, gluing, bolting or stapling to sign faces or back is prohibited unless otherwise noted.

The Contractor shall confirm that signs have the correct messaging. The Contractor shall verify that signs are free of cracks, dents or warpage prior to installation. Any flaws

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with the sign shall be immediately reported to the Ministry Representative prior to installation.

Signs shall be bolted to the mounting hardware or structure as indicated on the applicable Drawings. The sign panels shall be tightened to eliminate sign movement but not over tightened so as to recess the bolt heads into the sign face.

Sheet aluminum signs larger than 1200 mm x 3000 mm will consist of multiple panels. Each panel shall be correctly aligned so that no gaps exist between sign panels. The bottom of the sign panel shall be installed level.

Sheet aluminum exit number tabs shall attach to extruded aluminum signs in accordance with SS Drawings SP 635-3.7.1.

Extruded aluminum signs will be supplied unassembled. Aluminum sign sections shall be assembled and correctly aligned to the satisfaction of the Ministry Representative.

Extruded aluminum signs are supplied in typical widths shown on SS Drawing SP635-3.3.11.

Extruded aluminum exit number tabs shall attach to extruded aluminum signs in accordance with SS Drawings SP635-3.7.2 and SP635-3.7.3.

Patching material shall meet current Ministry Specifications.

Custom sheet aluminum and extruded aluminum signs will be identified with their sign numbers labelled on the back.

The Contractor shall maintain all signs installed as part of the work within the project area for the duration of the Work. Maintenance shall be performed for the duration of the work in accordance with the following:

- (a) Sign maintenance shall include the straightening, replacing, repairing, and cleaning of all signs installed as part of the Work. Sign maintenance shall be at the discretion of the Ministry Representative.
- (b) The Contractor shall regularly inspect the signs to ensure consistent maintenance for maximum visibility.
- (c) Where directed by the Ministry Representative the Contractor shall clean the signs by power washing or steam cleaning using pressures not exceeding 7 MPa and temperatures not exceeding 65°C. Chemical washing of sign faces is not permitted.

All costs for installation and maintenance of signs shall be included in the prices for the applicable items.

CONCRETE BASES AND RELATED DETAILS			
BASE TYPE	SP635 DRAWING	SUPPORTED STRUCTURE	STYLE
A	1.1.2	TYPE 4 POLES	SONOTUBE
B	1.1.2	TYPE 4A AND 5 POLES	SONOTUBE
C/CM	1.1.3/1.1.3a	7.5m, 9.0m AND 11.0m TYPE 2 POLES, TYPES 4, 4A AND 5 POLES	TRAPEZOIDAL
D1	1.1.4 TO 1.1.6	13.5m TYPE 2 POLES	SPREAD FOOTING
D2	1.1.7 & 1.1.8		TRAPEZOIDAL
D3	1.1.9 & 1.1.10		RECTANGULAR
E1	1.1.4 TO 1.1.6	TYPE 1 & 3 POLES	SPREAD FOOTING
E2	1.1.7 & 1.1.8		TRAPEZOIDAL
E3	1.1.9 & 1.1.10		RECTANGULAR
F1	1.1.11 TO 1.1.13	TYPE 6 & 7 POLES	SPREAD FOOTING
F2	1.1.14 & 1.1.15		TRAPEZOIDAL
F3	1.1.16 & 1.1.17		RECTANGULAR
S1	1.1.11 TO 1.1.13	TYPE S POLES	SPREAD FOOTING
S2	1.1.14 & 1.1.15		TRAPEZOIDAL
S3	1.1.16 & 1.1.17		RECTANGULAR
L1	1.1.11 TO 1.1.13	TYPE L POLES	SPREAD FOOTING
L2	1.1.14 & 1.1.15		TRAPEZOIDAL
L3	1.1.16 & 1.1.17		RECTANGULAR
-	1.1.18	ANCHOR BOLT CAGE FOR TYPE 6, 7, & S POLES	-
-	1.1.19	ANCHOR BOLT CAGE FOR TYPE L POLES	-
M1	1.1.20 TO 1.1.22	TYPE M POLES	SPREAD FOOTING
M2	1.1.23 & 1.1.24		RECTANGULAR
-	1.1.25	ANCHOR BOLT CAGE FOR TYPE M POLES	-
H1	1.1.26 TO 1.1.28	TYPE H POLES	SPREAD FOOTING
H2	1.1.29 & 1.1.30		RECTANGULAR
-	1.1.31	ANCHOR BOLT CAGE FOR TYPE H POLES	-
-	1.1.32 TO 1.1.34	BREAKAWAY SIGN STRUCTURES	SPREAD FOOTING
-	1.1.35 & 1.1.36	SIGN POSTS BASES	SONOTUBE
-	1.1.37	POST MOUNTED FLASHER CONCRETE BASE	SONOTUBE
-	1.1.38 TO 1.1.42	CONTROLLER BASE	TRAPEZOIDAL
-	1.1.43 & 1.1.44	ANCHOR BOLT REPAIR PROCEDURES	-
-	1.1.45 TO 1.1.47	STEEL SIGN/FLASHER POST	TRAPEZOIDAL

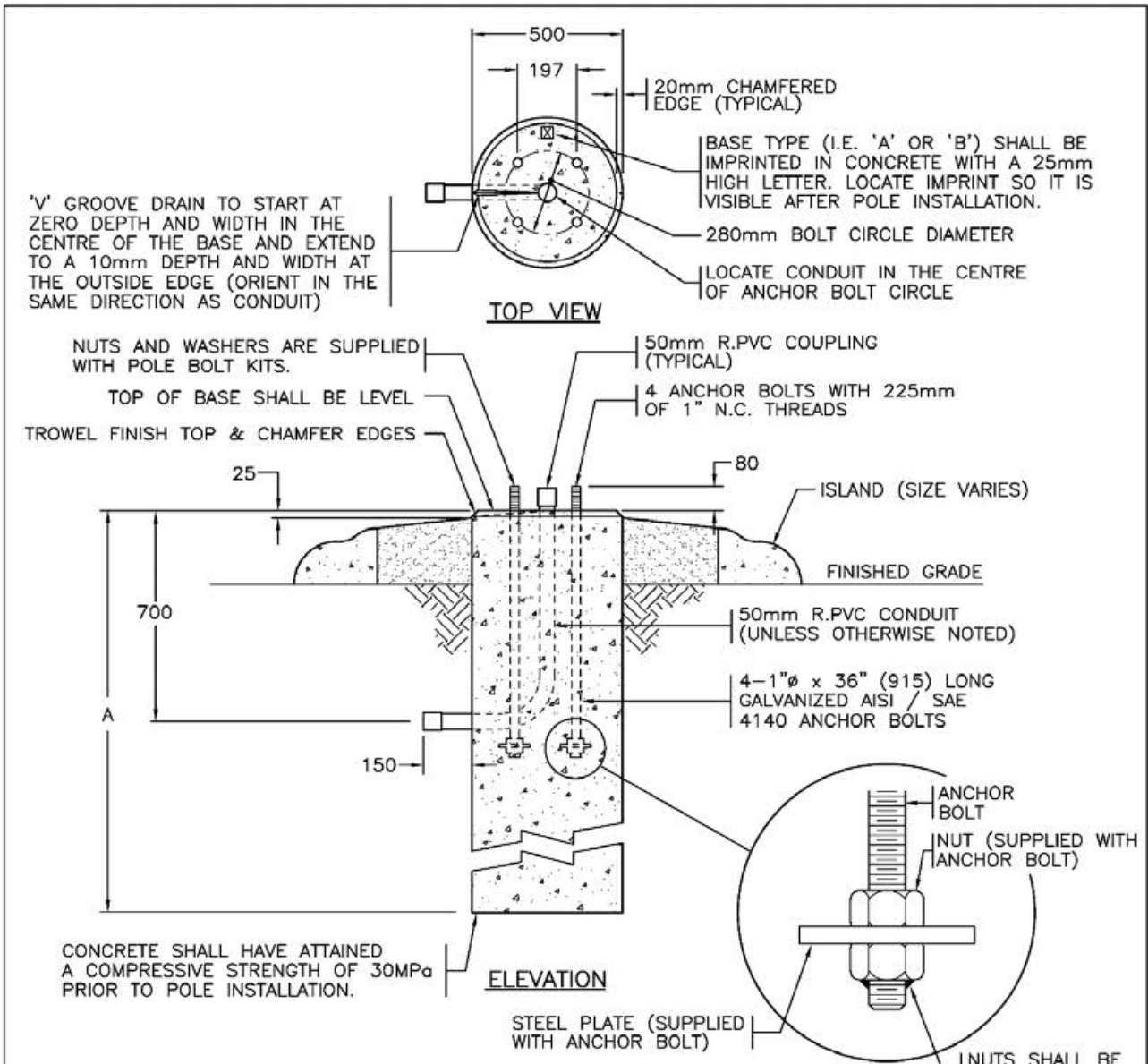
**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.



Ministry of Transportation and Infrastructure

No.	Revision	Date	CONCRETE BASE INDEX		
F					
E					
D	GENERAL REVISIONS	APR 17	Date	Approved	
C	TYPE S BASES ADDED	OCT 03	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
B	DRAWING LIST REVISED	AUG 95			SPECIFICATION DRAWING No.
A	GENERAL REVISIONS	AUG 94			SP635-1.1.1



BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A
A	TYPE 4 POLE	620 kg	0.24 m <sup>3</sup>	1200
B	TYPE 4A AND 5 POLES	760 kg	0.30 m <sup>3</sup>	1500

**NOTES**

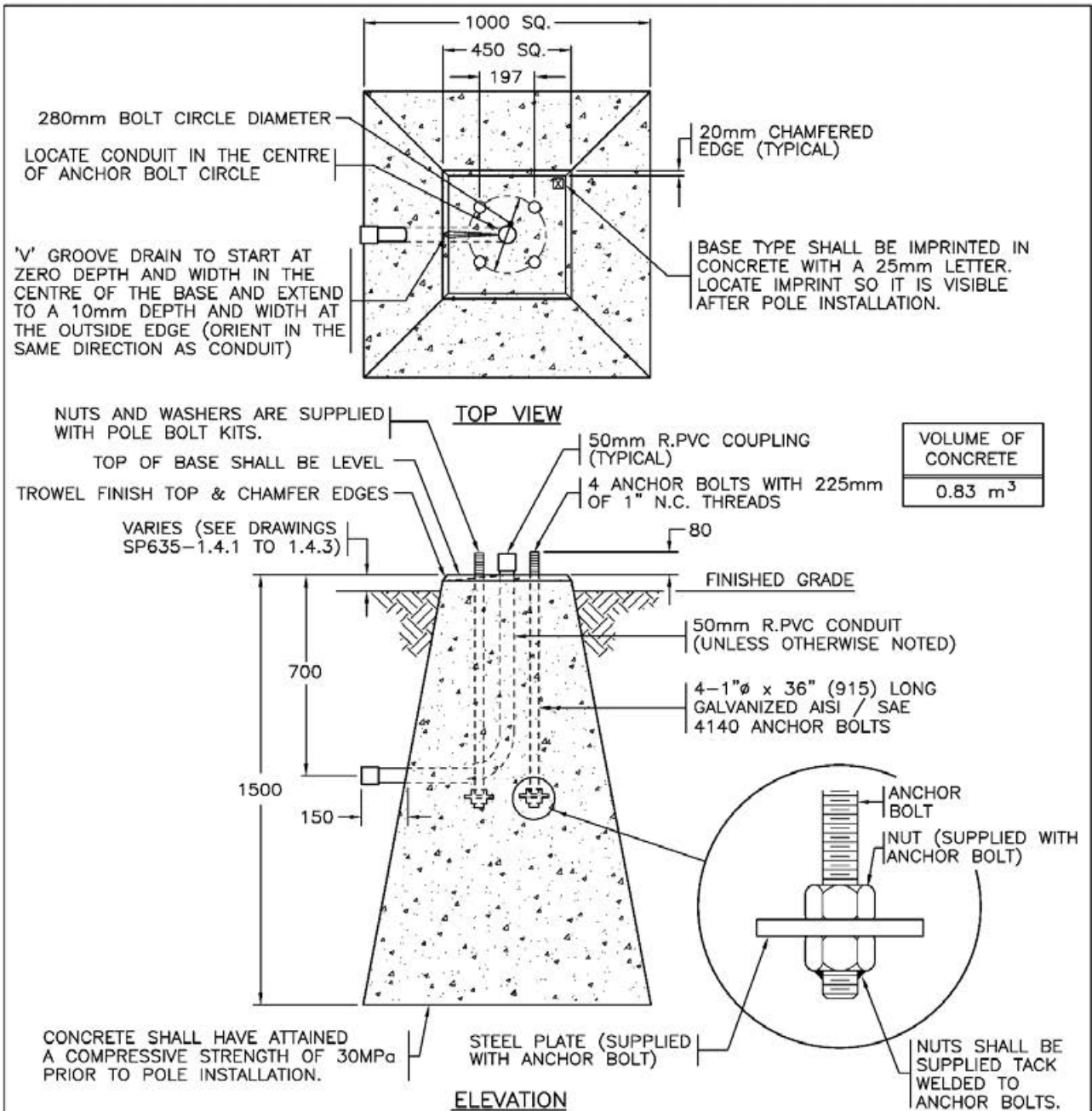
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. SEE DRAWINGS SP635-1.4.1 TO 1.4.4 FOR BACKFILL REQUIREMENTS.

NOT TO SCALE



No.	Revision	Date	Date		Approved	SPECIFICATION DRAWING No.
F						SP635-1.1.2
E						
D	TITLE UPDATED	APR 20	30/09/93		E.L. (Signature on File)	
C	GENERAL REVISIONS	APR 17			Chief Highway Engineer	
A	GENERAL REVISIONS	AUG 94				





**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
- SEE DRAWINGS SP635-1.4.1 TO 1.4.4 FOR BACKFILL REQUIREMENTS.

NOT TO SCALE

BASE TYPE	POLE TYPE	APPROXIMATE MASS
C	7.5m, 9.0m AND 11.0m TYPE 2 AND TYPES 4, 4A AND 5 POLES	2000 kg



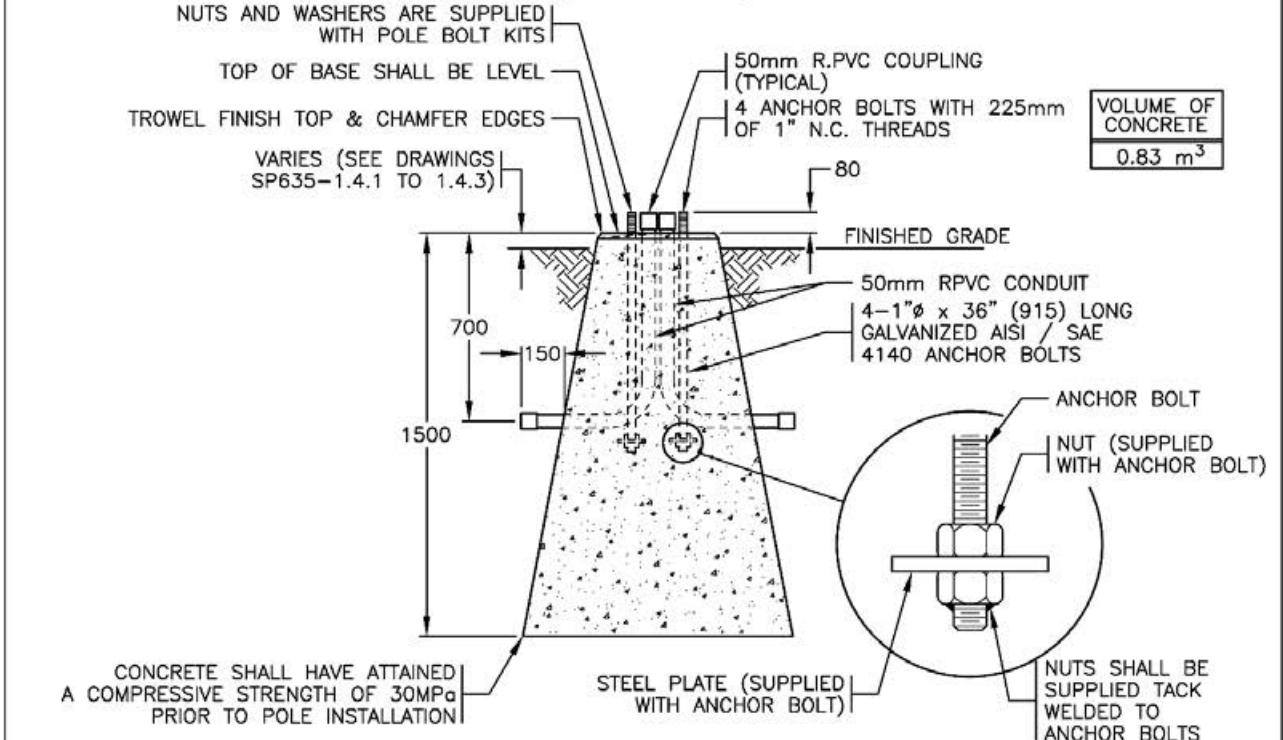
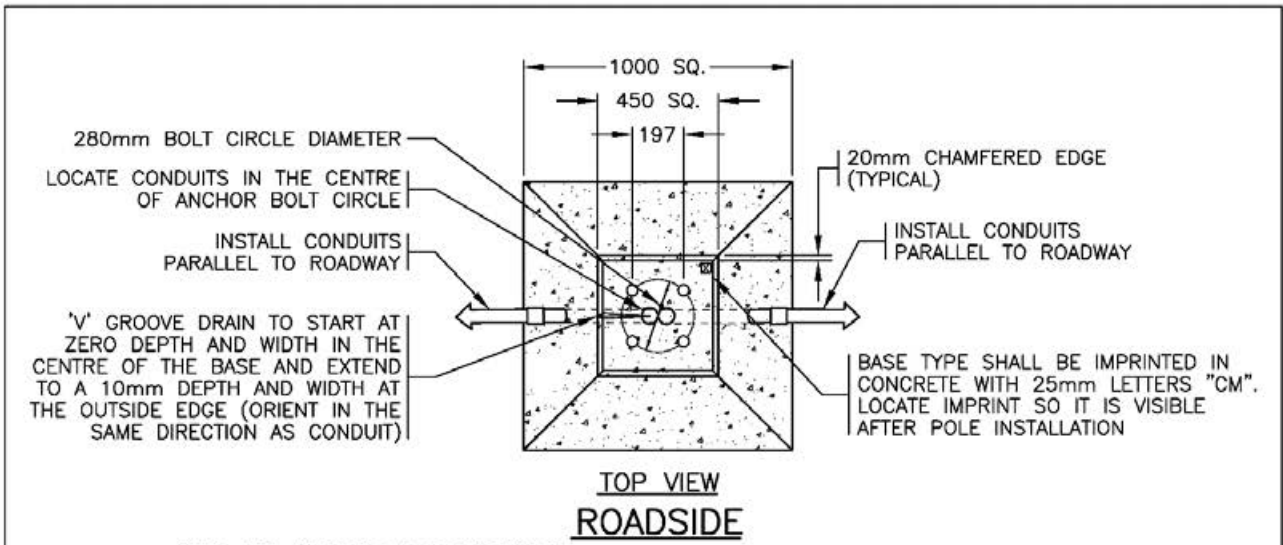
Ministry of Transportation and Infrastructure

No.	Revision	Date
F		
E		
D	TITLE UPDATED	APR 20
C	GENERAL REVISIONS	APR 17
B	ELEVATION OF BASE TO FINISHED GRADE REVISED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE C CONCRETE BASE (PRECAST OR CAST IN PLACE)**

Date: 30/09/93  
 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-1.1.3



**NOTES:**

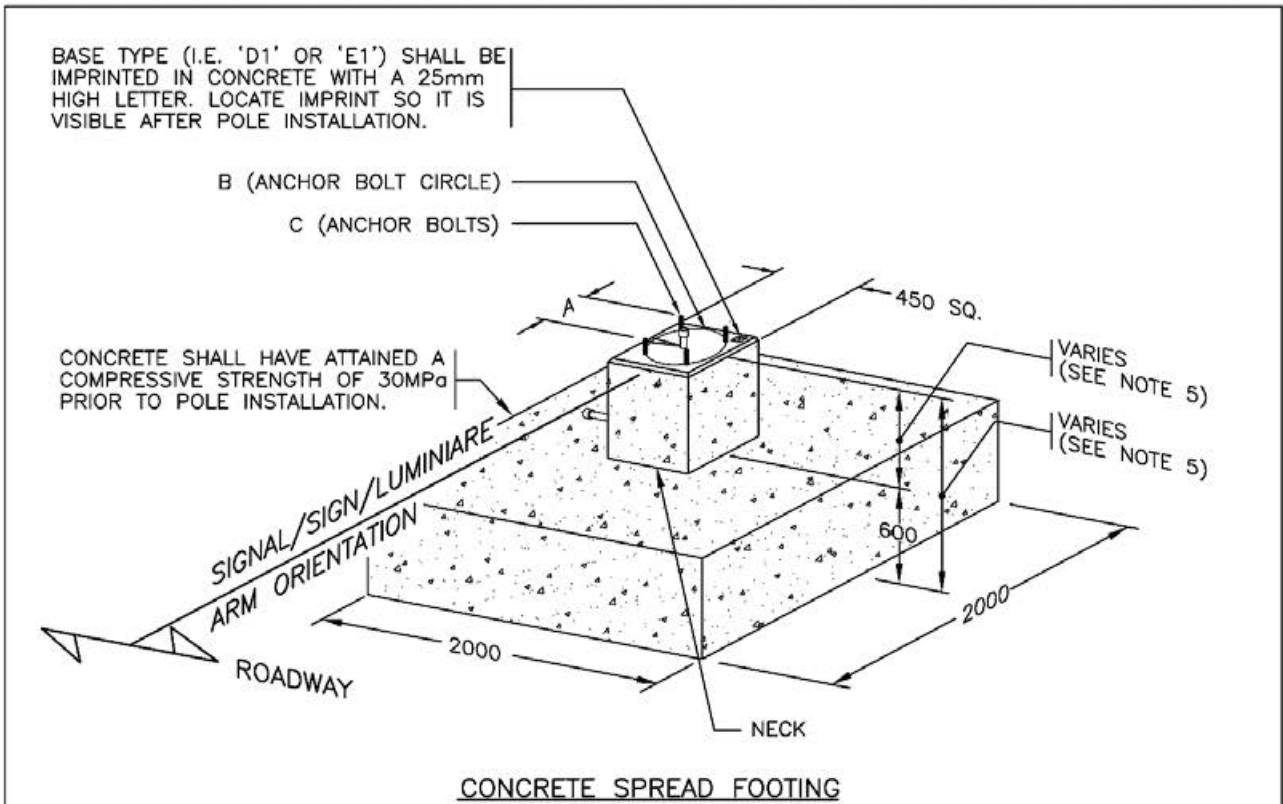
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. SEE DRAWINGS SP635-1.4.1 TO 1.4.4 FOR BACKFILL REQUIREMENTS.

BASE TYPE	POLE TYPE	APPROXIMATE MASS
CM	7.5m, 9.0m AND 11.0m TYPE 2 AND TYPES 4, 4A AND 5 POLES	2000 kg

NOT TO SCALE



No.	Revision	Date	TYPE CM MODIFIED TYPE C CONCRETE BASE (PRECAST OR CAST IN PLACE)	
F			Date	Approved
E			09/02/16	D.N. (Signature on File)
D			SPECIFICATION DRAWING No.	
C			SP635-1.1.3a	
B	TITLE UPDATED	APR 20	Chief Highway Engineer	
A	GENERAL REVISIONS	APR 17		



BASE TYPE	POLE TYPE	VOLUME OF CONCRETE	MASS OF REBAR	FORMWORK	APPROXIMATE MASS	A	B	C (ANCHOR BOLTS)
D1	13.5m TYPE 2 POLES	2.7 m <sup>3</sup> *	260 kg *	7.3 m <sup>2</sup> *	6600 kg*	216	305	4-1 1/4"φ x 48" (1220) GALVANIZED AISI / SAE 4140
E1	TYPE 1 AND 3 POLES	2.7 m <sup>3</sup> *	260 kg *	7.3 m <sup>2</sup> *	6600 kg*	197	280	4-1"φ x 36" (915) GALVANIZED AISI / SAE 4140

(\*) BASED ON SPREAD FOOTING WITH 1400 HIGH NECK

**NOTES**

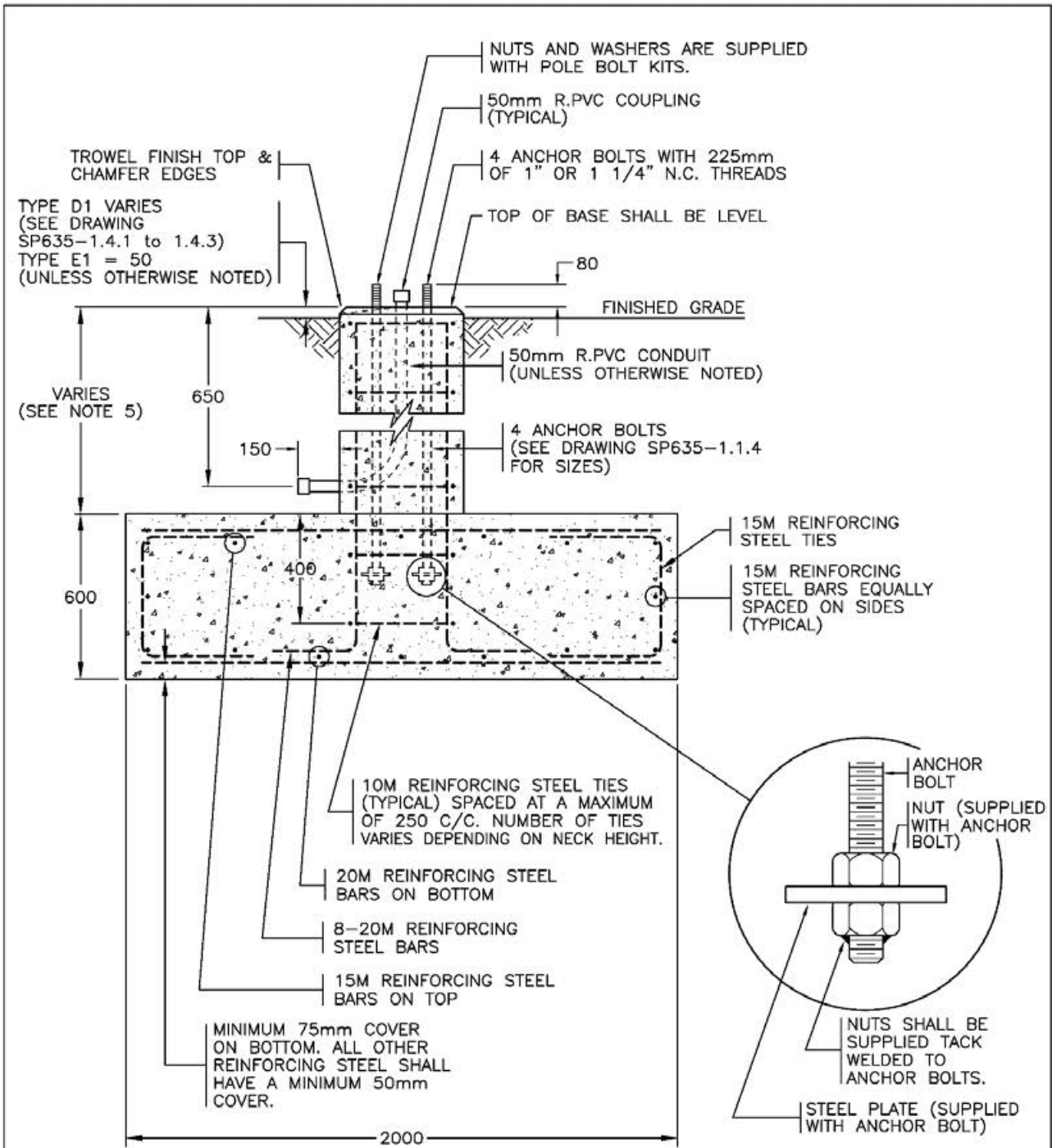
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- SEE PLANS FOR SIGNAL/SIGN/LUMINIARE ARM ORIENTATION.
- SEE DRAWINGS SP635-1.1.5, 1.1.6 & 1.4.5 FOR ADDITIONAL DETAILS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
- NECK HEIGHT MAY VARY FROM 750 TO 1400. SEE DRAWING SP635-1.4.5 FOR MORE INFORMATION.

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



NOT TO SCALE

No.	Revision	Date	<b>TYPE D1 &amp; E1 CONCRETE SPREAD FOOTINGS (PRECAST OR CAST IN PLACE)</b>	
F				
E			Date	Approved
D			15/11/95	M.C. (Signature on File)
C			Chief Highway Engineer	
B	TITLE UPDATED	APR 20	SPECIFICATION DRAWING No. <b>SP635-1.1.4</b>	
A	GENERAL REVISIONS	APR 17		



ELEVATION

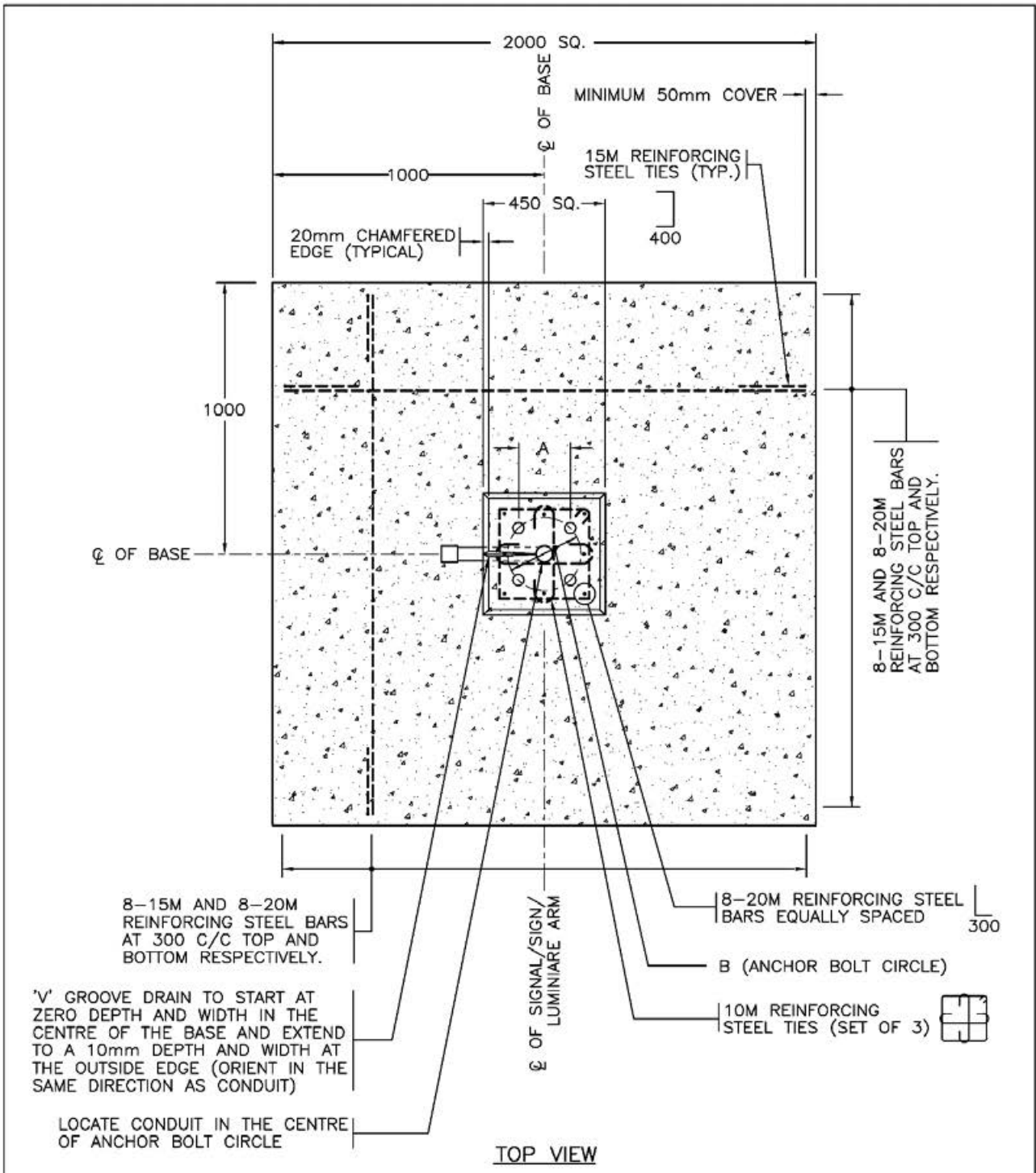
SEE DRAWING SP635-1.1.4 FOR NOTES AND ADDITIONAL DETAILS



NOT TO SCALE

No.	Revision	Date
F		
E		
D		
C	GENERAL REVISIONS	APR 20
B	GENERAL REVISIONS	APR 17
A	ELEVATION OF BASE TO FINISHED GRADE REV'D	AUG 96

<p><b>TYPE D1 &amp; E1 CONCRETE SPREAD FOOTINGS (PRECAST OR CAST IN PLACE)</b></p>		
Date	Approved	SPECIFICATION DRAWING No.
15/11/95	M.C. (Signature on File) Chief Highway Engineer	SP635-1.1.5

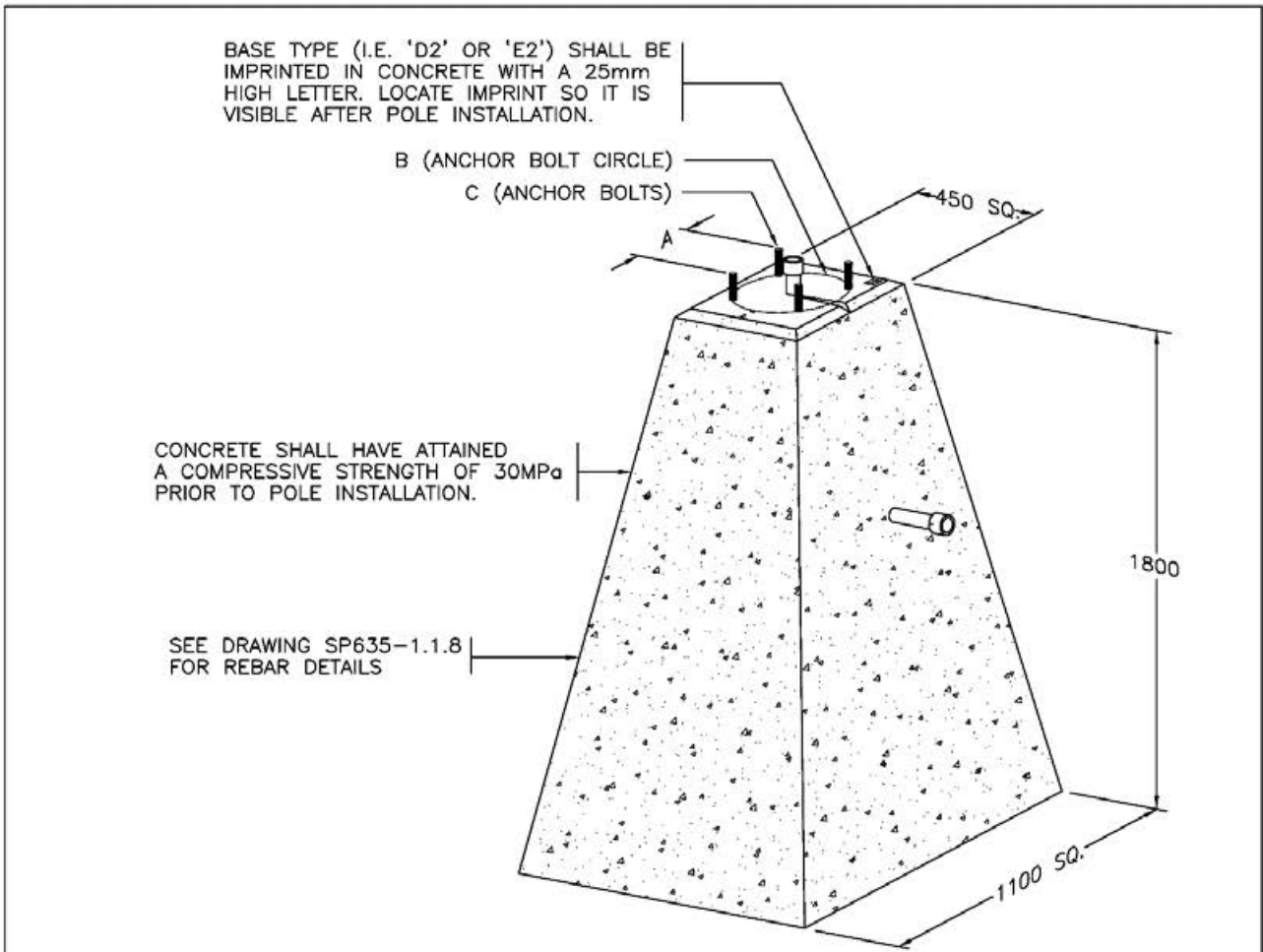


SEE DRAWING SP635-1.1.4 FOR NOTES AND ADDITIONAL DETAILS



NOT TO SCALE

No.	Revision	Date	TYPE D1 & E1 CONCRETE SPREAD FOOTINGS (PRECAST OR CAST IN PLACE)		SPECIFICATION DRAWING No. SP635-1.1.6
F			Date	Approved	
E			15/11/95	M.C. (Signature on File)	
D			Chief Highway Engineer		
C					
B	TITLE UPDATED	APR 20			
A	GENERAL REVISIONS	APR 17			



PRECAST CONCRETE BASES

BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C (ANCHOR BOLTS)
D2	13.5m TYPE 2 POLES	2450 kg	1.0 m <sup>3</sup>	216	305	4-1 1/4"φ x 48" (1220) GALVANIZED AISI / SAE 4140
E2	TYPE 1 AND 3 POLES	2410 kg	1.0 m <sup>3</sup>	197	280	4-1"φ x 36" (915) GALVANIZED AISI / SAE 4140

NOTES

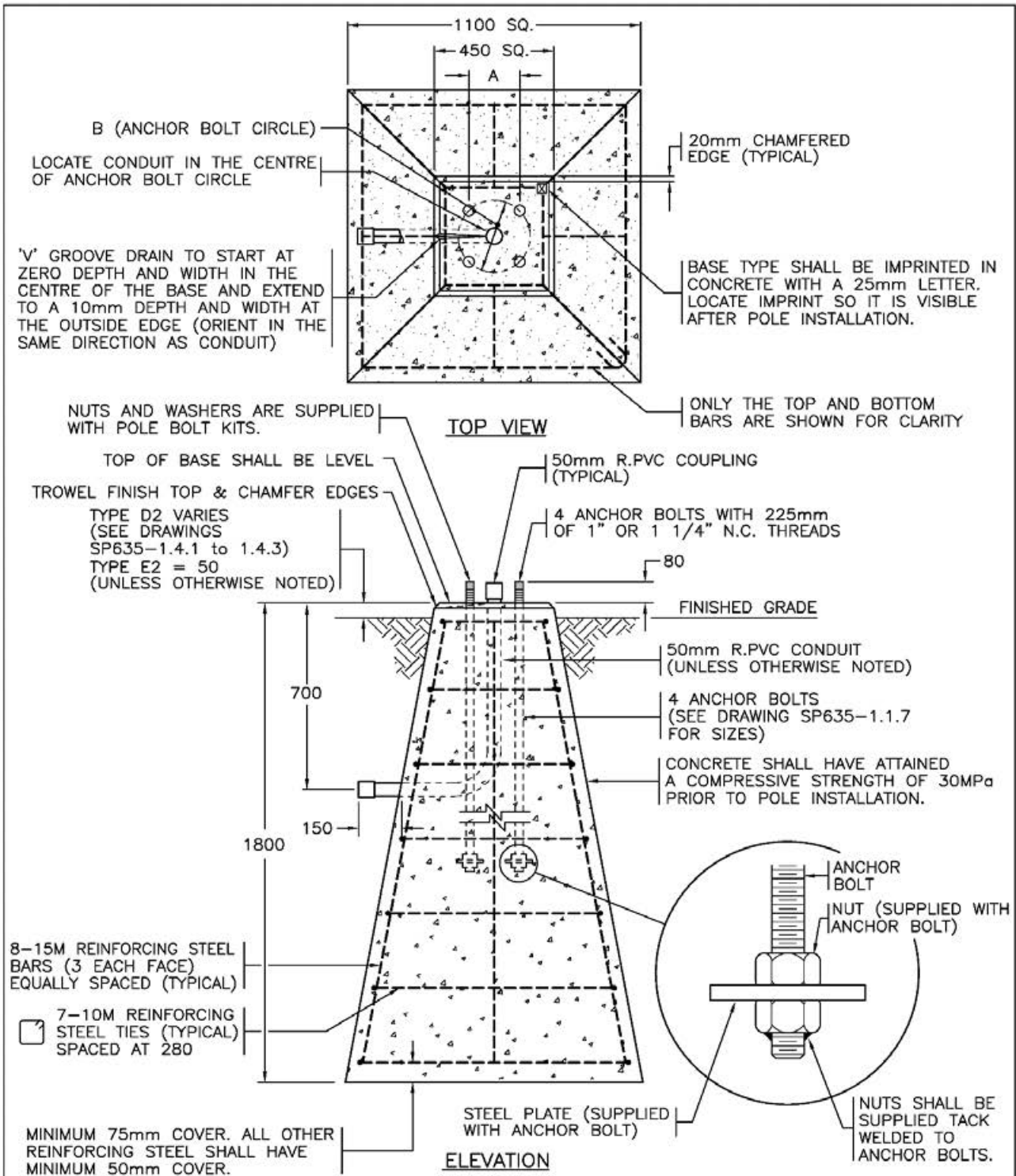
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
- SEE DRAWING SP635-1.1.8 FOR ADDITIONAL DETAILS.
- SEE DRAWINGS SP635-1.4.1 TO 1.4.4 FOR BACKFILL REQUIREMENTS.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	TYPES D2 AND E2 CONCRETE BASES (PRECAST)		SPECIFICATION DRAWING No. SP635-1.1.7
F			Date	Approved	
E			30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	GENERAL REVISIONS	APR 17			
C	REBAR DRAWING REFERENCE REVISED	AUG 96			
B	DRAWING NUMBER CHANGED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



SEE DRAWING SP635-1.1.7 FOR NOTES AND ADDITIONAL DETAILS

NOT TO SCALE



No.	Revision	Date
F		
E	GENERAL REVISIONS	APR 20
D	GENERAL REVISIONS	APR 17
C	ELEVATION OF BASE TO FINISHED GRADE REV'D	AUG 96
B	REBAR ADDED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE D2 AND E2 CONCRETE BASES (PRECAST)**

Date	Approved	SPECIFICATION DRAWING No.
30/09/93	E.L. (Signature on File) Chief Highway Engineer	SP635-1.1.8

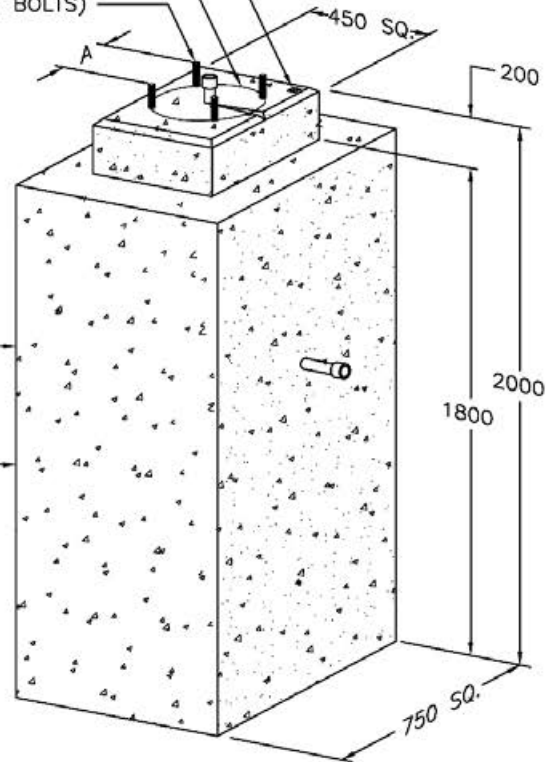
BASE TYPE (I.E. 'D3' OR 'E3) SHALL BE IMPRINTED IN CONCRETE WITH A 25mm HIGH LETTER. LOCATE IMPRINT SO IT IS VISIBLE AFTER POLE INSTALLATION.

B (ANCHOR BOLT CIRCLE)

C (ANCHOR BOLTS)

CONCRETE SHALL HAVE ATTAINED A COMPRESSIVE STRENGTH OF 30MPa PRIOR TO POLE INSTALLATION.

SEE DRAWING SP635-1.1.10 FOR REBAR DETAILS.



POURED IN PLACE CONCRETE BASES

BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C (ANCHOR BOLTS)
D3	13.5m TYPE 2 POLES	2550 kg	1.05 m <sup>3</sup>	216	305	4-1 1/4"∅ x 48" (1220) GALVANIZED AISI / SAE 4140
E3	TYPE 1 AND 3 POLES	2510 kg	1.05 m <sup>3</sup>	197	280	4-1"∅ x 36" (915) GALVANIZED AISI / SAE 4140

NOTES

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
- SEE DRAWINGS SP635-1.1.10 FOR ADDITIONAL DETAILS.
- SEE DRAWINGS SP635-1.4.1 TO 1.4.4 FOR BACKFILL REQUIREMENTS.

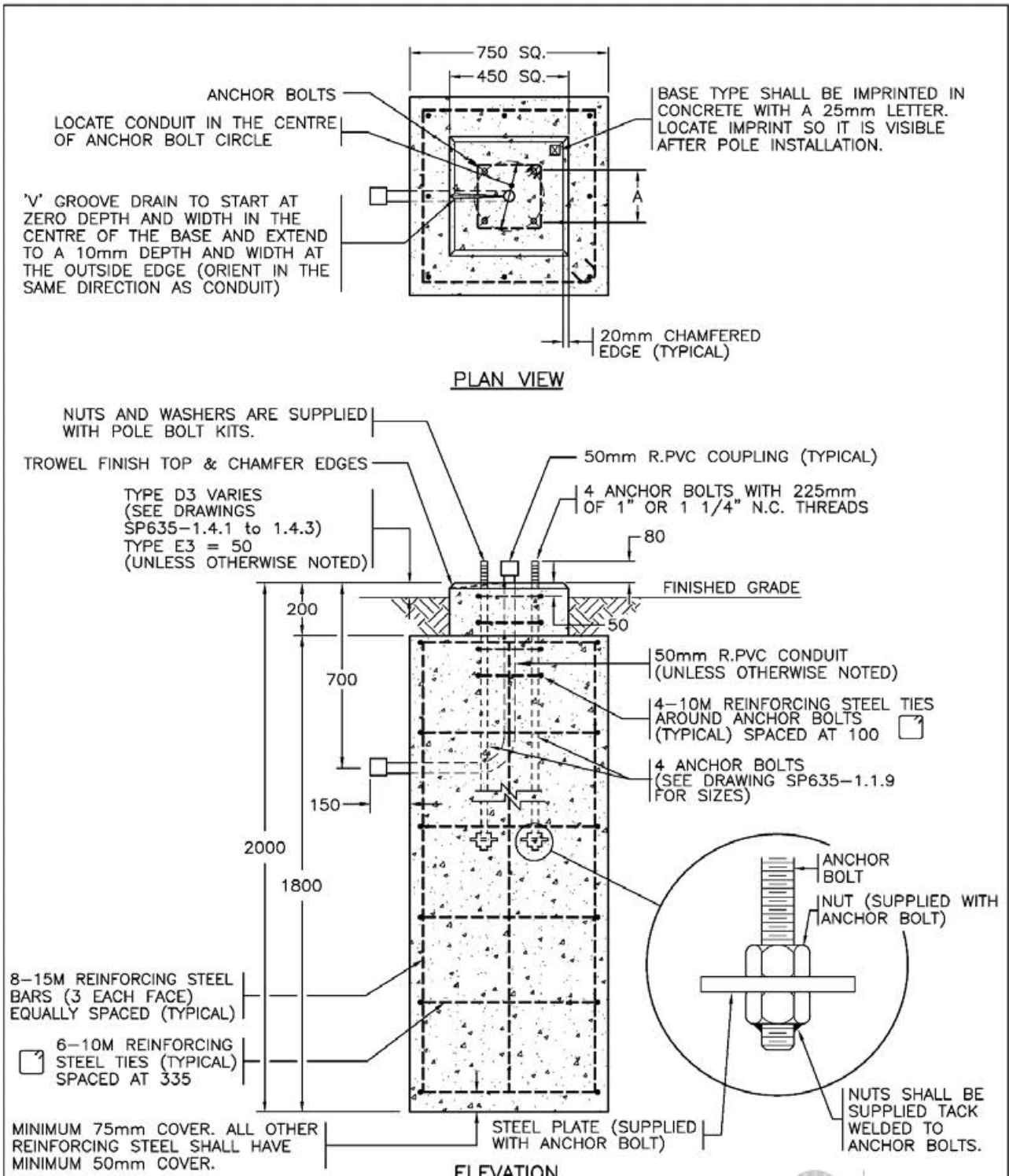
NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	TYPE D3 AND E3 CONCRETE BASES (CAST IN PLACE)		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-1.1.9
E			30/09/93	E.L. (Signature on File)	
D	TITLE UPDATED	APR 20	Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	DRAWING NUMBER CHANGED	AUG 95			
A	GENERAL REVISIONS	AUG 94			





SEE DRAWING SP635-1.1.9 FOR NOTES AND ADDITIONAL DETAILS

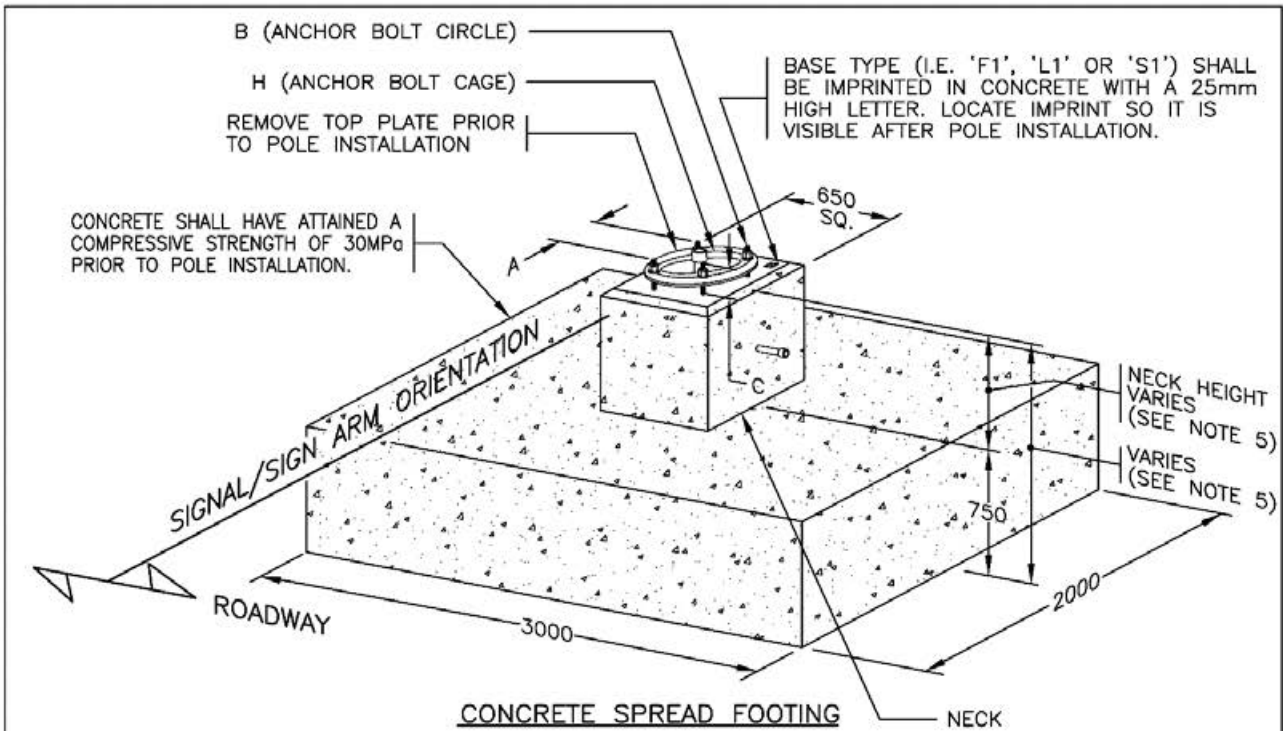
NOT TO SCALE



No.	Revision	Date
F		
E	TITLE UPDATE	APR 20
D	GENERAL REVISIONS	APR 17
C	ELEVATION OF BASE TO FINISHED GRADE REV'D	AUG 96
B	REBAR ADDED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE D3 AND E3 CONCRETE BASES  
(CAST IN PLACE)**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-1.1.10</b>



BASE TYPE	POLE TYPE	VOLUME OF CONCRETE	MASS OF REBAR	APPROXIMATE MASS	FORMWORK	A	B	C	H (ANCHOR BOLTS)
F1	TYPE 6 AND 7 POLES	5.0m <sup>3</sup>	455 kg*	12306 kg*	11.0m <sup>2</sup>	243	343	160	4-1"φ x 48" (1220) GALVANIZED GRADE 150 DYWIDAG PRE-ASSEMBLED IN A CAGE
S1	TYPE S POLES	5.0m <sup>3</sup>	455 kg*	12306 kg*	11.0m <sup>2</sup>	243	343	160	4-1"φ x 48" (1220) GALVANIZED GRADE 150 DYWIDAG PRE-ASSEMBLED IN A CAGE
L1	TYPE L POLES	5.0m <sup>3</sup>	455 kg*	12306 kg*	11.0m <sup>2</sup>	276	390	140	4-1 1/2"φ x 54" (1370) GALVANIZED AISI / SAE 4140 PRE-ASSEMBLED IN A CAGE

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE PLANS FOR SIGNAL/SIGN ARM ORIENTATION.
3. SEE DRAWINGS SP635-1.1.12, 1.1.13 & 1.4.5 FOR ADDITIONAL DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. NECK HEIGHT MAY VARY FROM 750 TO 1400. SEE DRAWING SP635-1.4.5 FOR MORE INFORMATION.

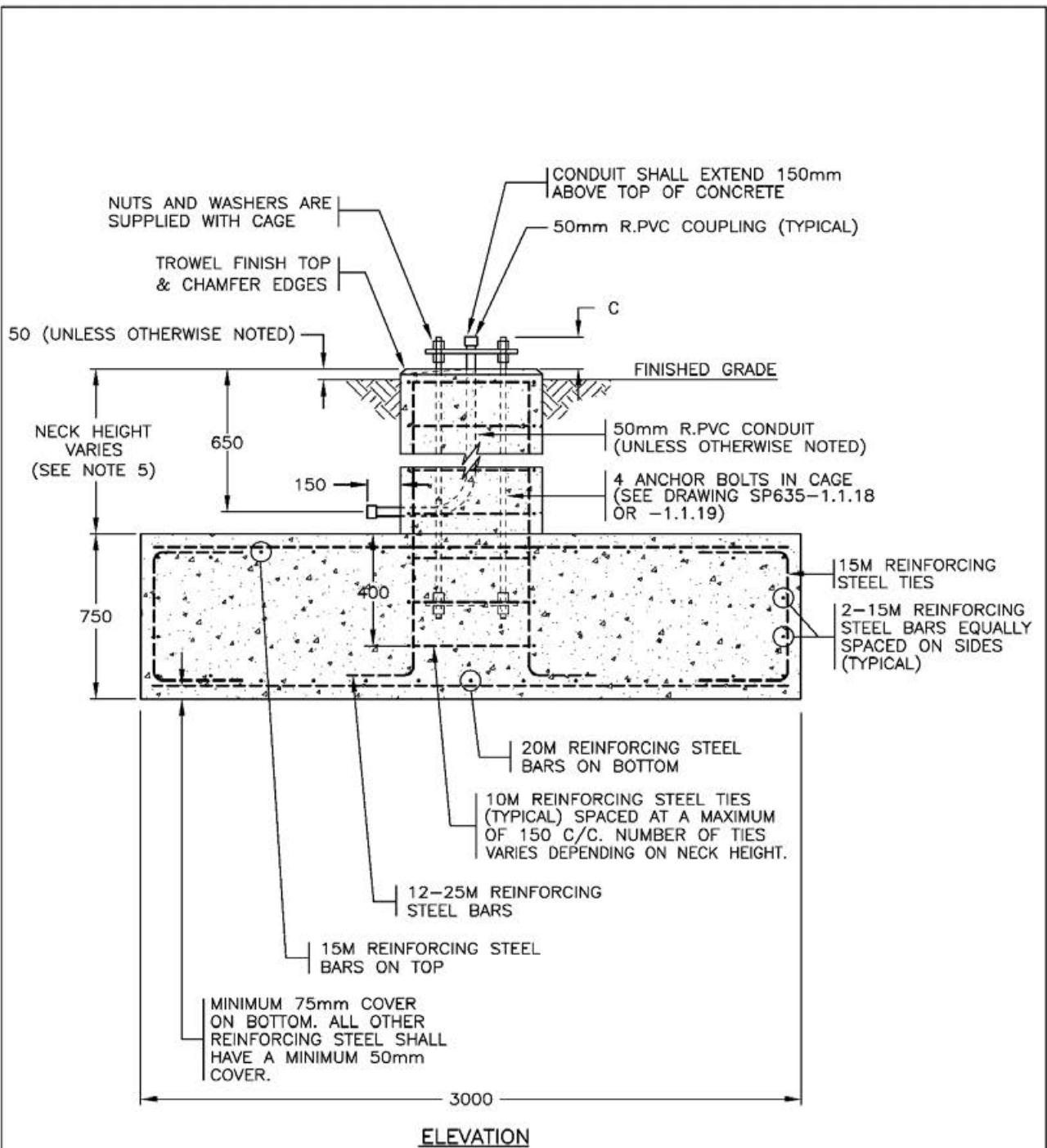
BASE DESIGNED FOR SOILS WITH A MINIMUM BEARING PRESSURE OF 100KPa

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	<b>TYPE F1, L1 &amp; S1 CONCRETE SPREAD FOOTINGS (CAST IN PLACE)</b>	
F				
E			Date	Approved
D			15/11/95	M.C. (Signature on File)
C	TITLE UPDATE	APR 20	Chief Highway Engineer	
B	GENERAL REVISIONS	APR 17		
A	TYPE S1 BASE ADDED	OCT 03		
			SPECIFICATION DRAWING No. <b>SP635-1.1.11</b>	

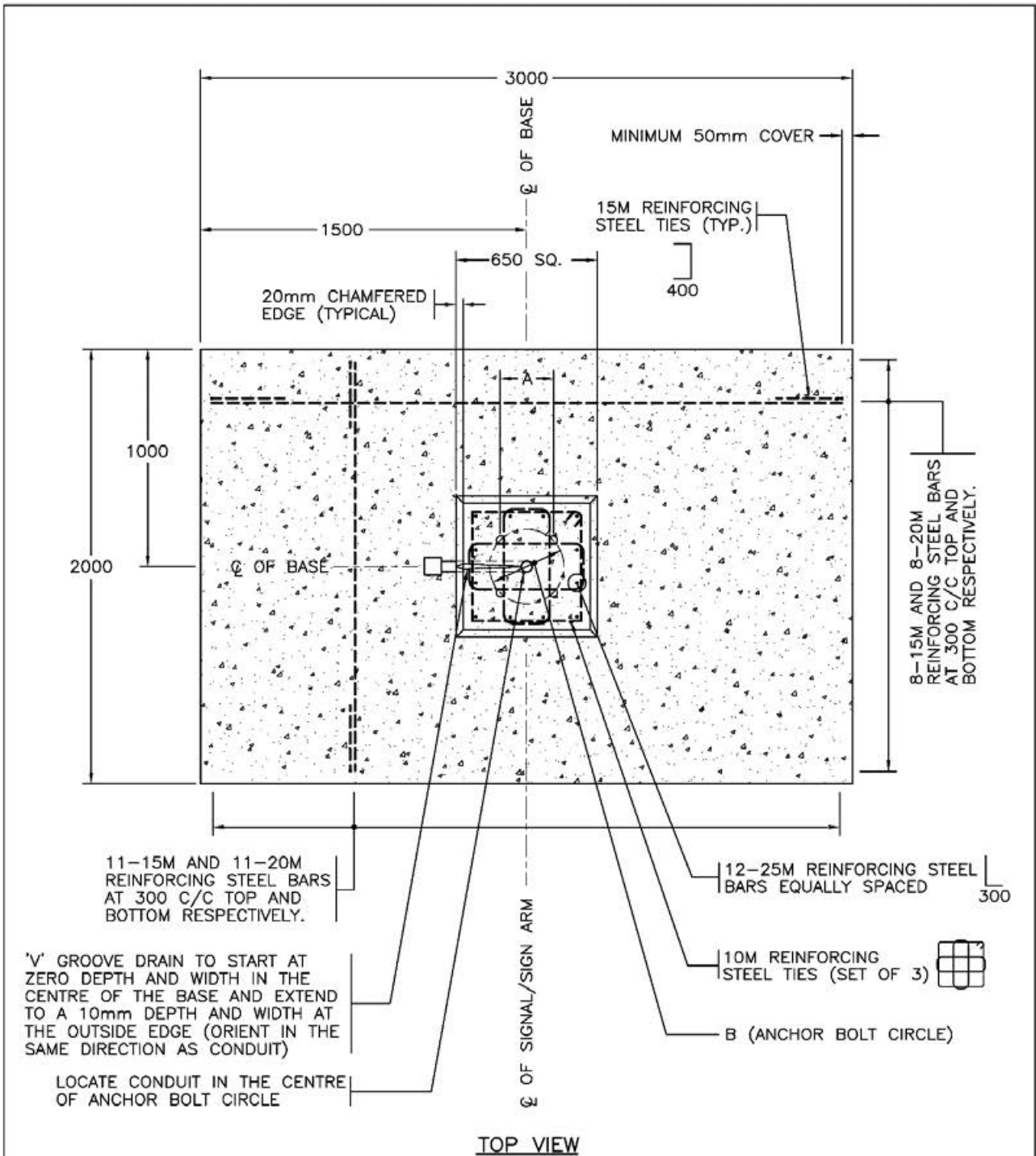


SEE DRAWING SP635-1.1.11 FOR NOTES AND ADDITIONAL DETAILS



NOT TO SCALE

No.	Revision	Date	TYPE F1, L1 & S1 CONCRETE SPREAD FOOTINGS (CAST IN PLACE)		SPECIFICATION DRAWING No. SP635-1.1.12
F			Date	Approved	
E			15/11/95	M.C. (Signature on File)	
D	TITLE UPDATED	APR 20	Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	TYPE S1 BASE ADDED	OCT 03			
A	ELEVATION OF BASE TO FINISHED GRADE REV'D	AUG 96			

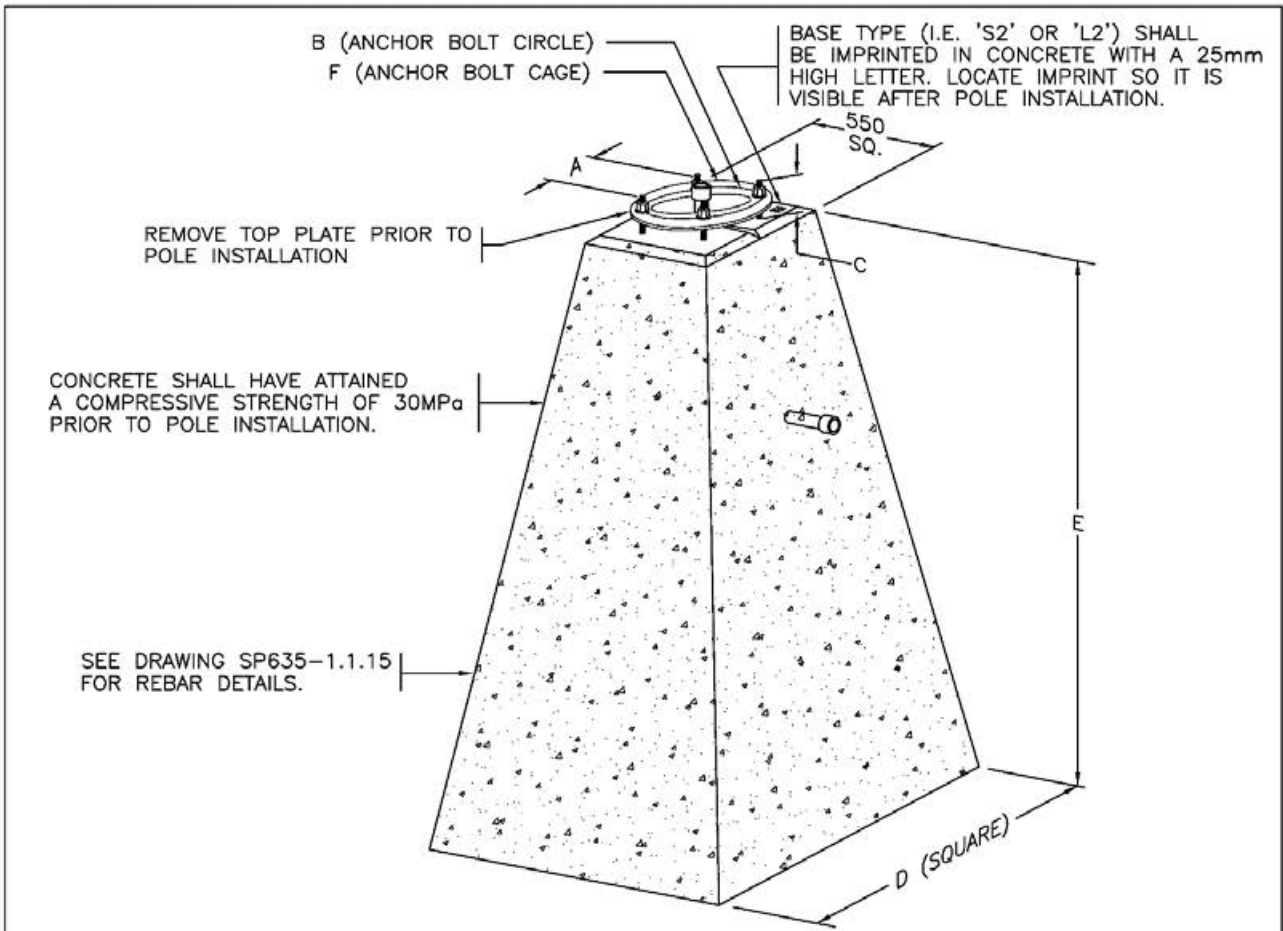


SEE DRAWING SP635-1.1.11 FOR NOTES AND ADDITIONAL DETAILS



NOT TO SCALE

No.	Revision	Date	TYPE F1, L1 & S1 CONCRETE SPREAD FOOTINGS (CAST IN PLACE)		SPECIFICATION DRAWING No. SP635-1.1.13
F			Date	Approved	
E			15/11/95	M.C. (Signature on File)	
D			Chief Highway Engineer		
C	TITLE UPDATED	APR 20			
B	GENERAL REVISIONS	APR 17			
A	TYPE S1 BASE ADDED	OCT 03			



**PRECAST CONCRETE BASES**

BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C	D	E	F (ANCHOR BOLTS)
S2 F2	TYPE S, 6 AND 7 POLES	4500 kg	1.8 m <sup>3</sup>	243	343	160	1240	2100	4-1"φ x 48" (1220) GALVANIZED GRADE 150 DYWIDAG PRE-ASSEMBLED IN A CAGE
L2	TYPE L POLES	5040 kg	2.0 m <sup>3</sup>	276	390	140	1300	2300	4-1 1/2"φ x 54" (1370) GALVANIZED AISI/SAE 4140 PRE-ASSEMBLED IN A CAGE

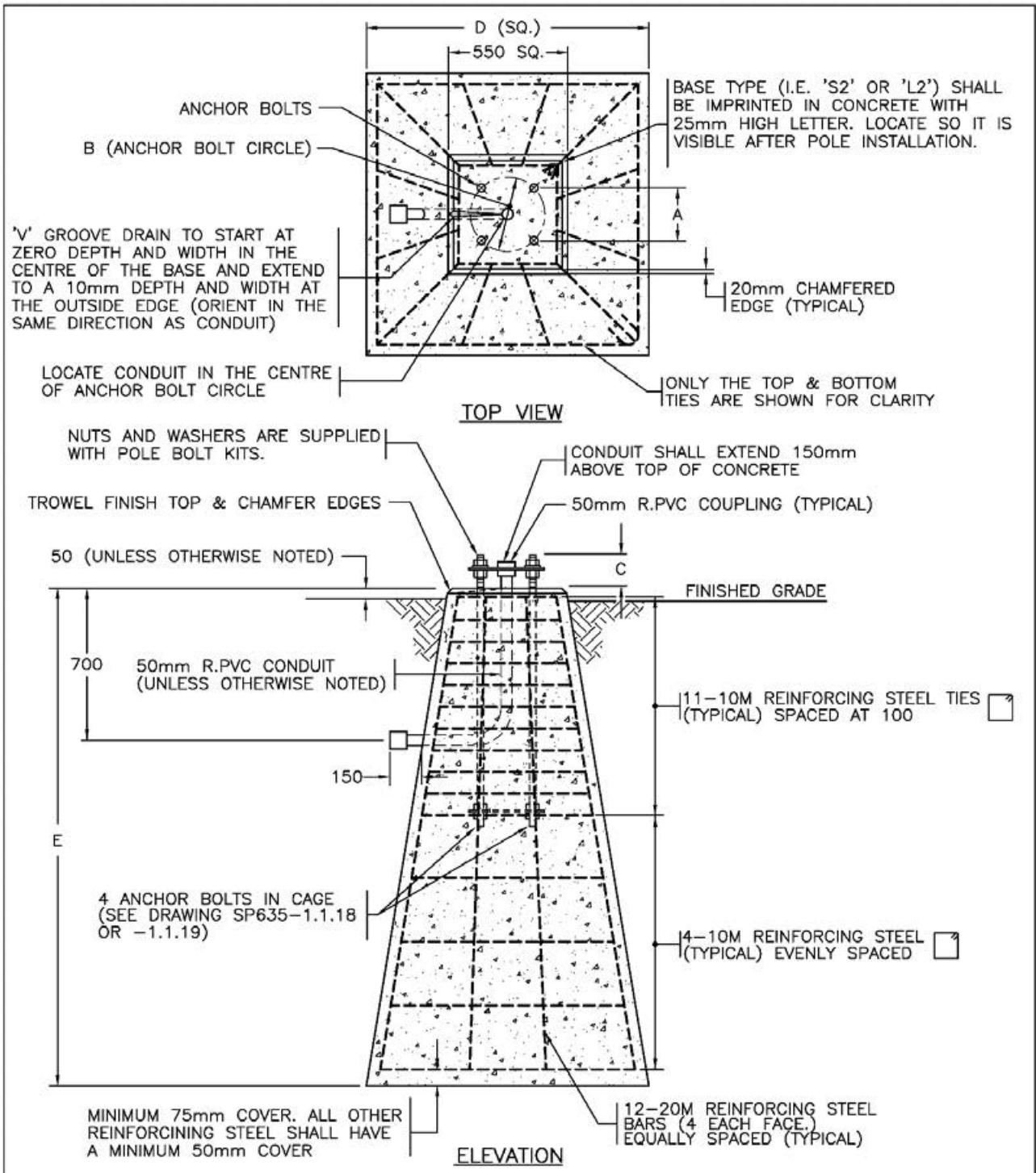
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. SEE DRAWING SP635-1.1.15 FOR ADDITIONAL DETAILS.
4. SEE DRAWINGS SP635-1.4.1 TO 1.4.4 FOR BACKFILL REQUIREMENTS.

NOT TO SCALE



No.	Revision	Date	TYPE F2, L2 AND S2 CONCRETE BASES (PRECAST)		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-1.1.14
E	COMBINED S2 AND F2 BASE	APR 20	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	GENERAL REVISIONS	APR 17			
C	TYPE S2 BASE ADDED	OCT 03			
B	DRAWING NUMBER CHANGED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



SEE DRAWING SP635-1.1.14 FOR NOTES AND ADDITIONAL DETAILS



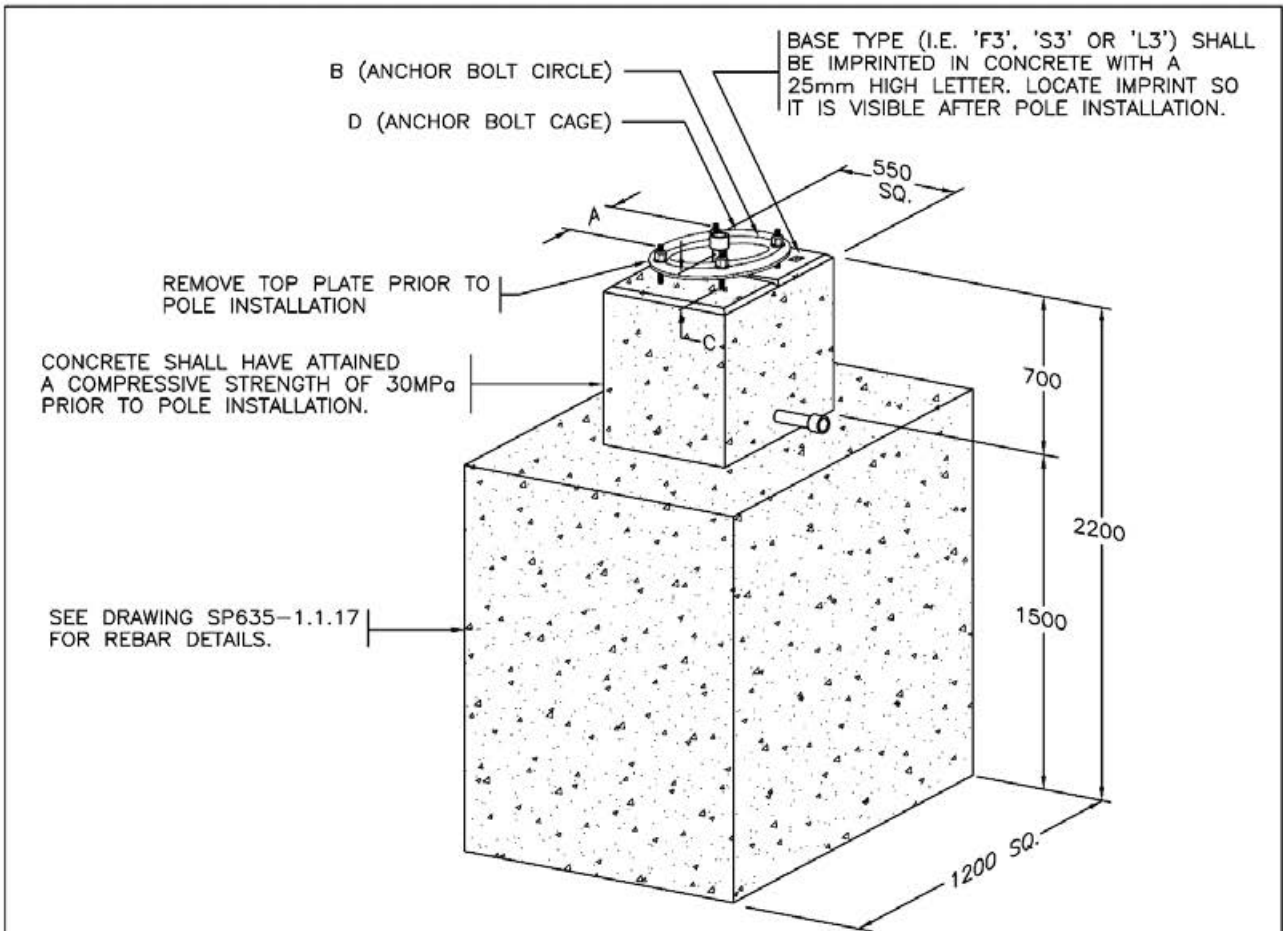
NOT TO SCALE

No.	Revision	Date
F	COMBINED S2 AND F2 BASE	APR 20
E	GENERAL REVISIONS	APR 17
D	TYPE S2 BASE ADDED	OCT 03
C	ELEVATION OF BASE TO FINISHED GRADE REVISED	AUG 96
B	ELEVATION OF BASE TO FINISHED GRADE REVISED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE F2, L2 AND S2 CONCRETE BASES (PRECAST)**

Date: 30/09/93  
 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-1.1.15



POURED IN PLACE CONCRETE BASES

BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C	D (ANCHOR BOLTS)
F3	TYPE 6 AND 7 POLES	5925 kg	2.37m <sup>3</sup>	243	343	160	4-1"φ x 48" (1220) GALVANIZED GRADE 150 DYWIDAG BOLTS PRE-ASSEMBLED IN A CAGE
S3	TYPE S POLES	5925 kg	2.37m <sup>3</sup>	243	343	160	4-1"φ x 48" (1220) GALVANIZED GRADE 150 DYWIDAG BOLTS PRE-ASSEMBLED IN A CAGE
L3	TYPE L POLES	5965 kg	2.37m <sup>3</sup>	276	390	140	4-1 1/2"φ x 54" (1370) GALVANIZED AISI / SAE 4140 BOLTS PRE-ASSEMBLED IN A CAGE

NOTES

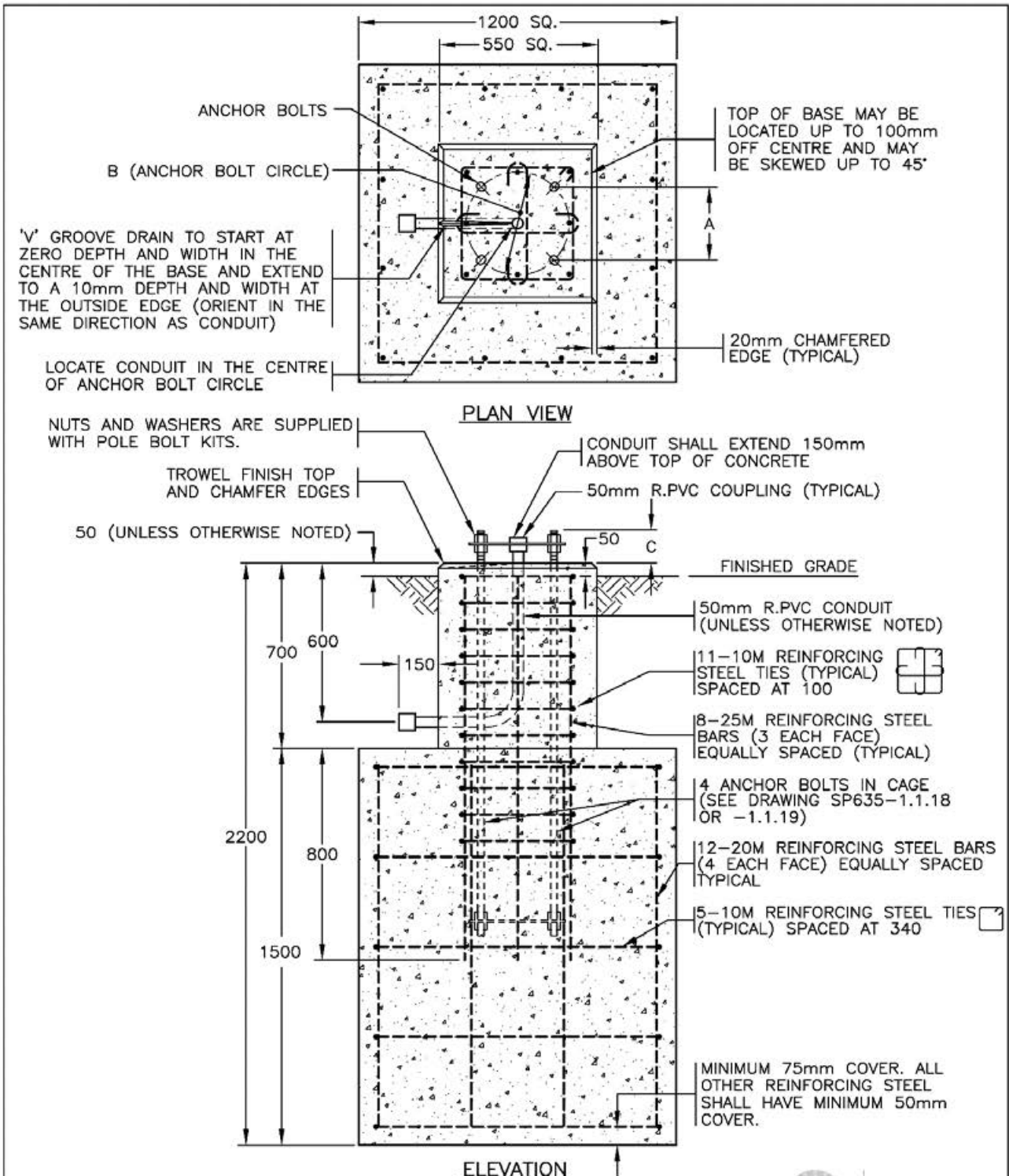
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. SEE DRAWING SP635-1.1.17 FOR ADDITIONAL DETAILS.
4. SEE DRAWINGS SP635-1.4.1 TO 1.4.4 FOR BACKFILL REQUIREMENTS.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	TYPE F3, L3 & S3 CONCRETE BASES (CAST IN PLACE)		
F			Date	Approved	
E	GENERAL REVISIONS	APR 20	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	GENERAL REVISIONS	APR 17			SPECIFICATION DRAWING No.
C	TYPE S3 BASE ADDED	OCT 03			
B	DRAWING NUMBER CHANGED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



SEE DRAWING SP635-1.1.16 FOR NOTES AND ADDITIONAL DETAILS

NOT TO SCALE

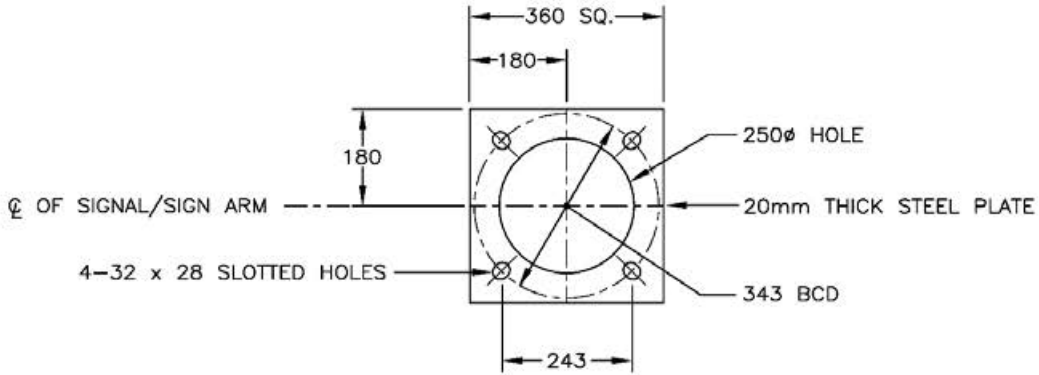


No.	Revision	Date
F	TITLE UPDATED	APR 20
E	GENERAL REVISIONS	APR 17
D	TYPE S3 BASE ADDED	OCT 03
C	ELEVATION OF BASE TO FINISHED GRADE REVISED	AUG 96
B	NECK WIDTH REVISED & REBAR ADDED	AUG 95
A	GENERAL REVISIONS	AUG 94

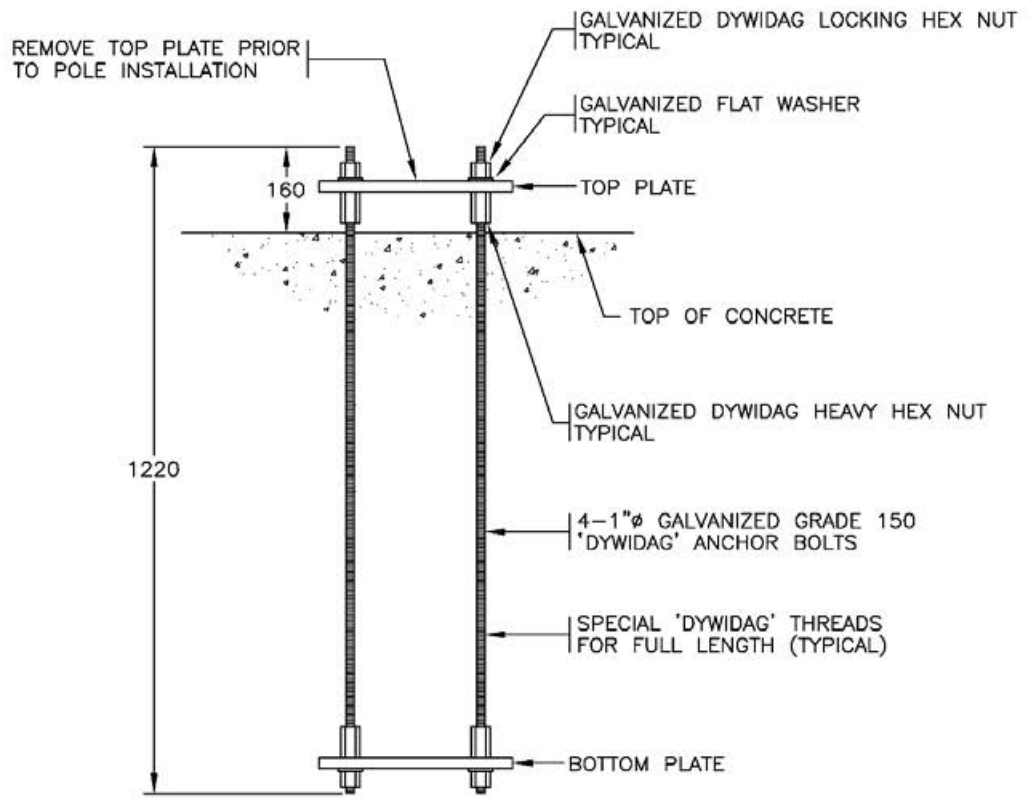
**TYPE F3, L3 & S3 CONCRETE BASES  
(CAST IN PLACE)**

Date	Approved	SPECIFICATION DRAWING No.
30/09/93	E.L. (Signature on File) Chief Highway Engineer	SP635-1.1.17





**TOP AND BOTTOM PLATES**



**ANCHOR BOLT CAGE**

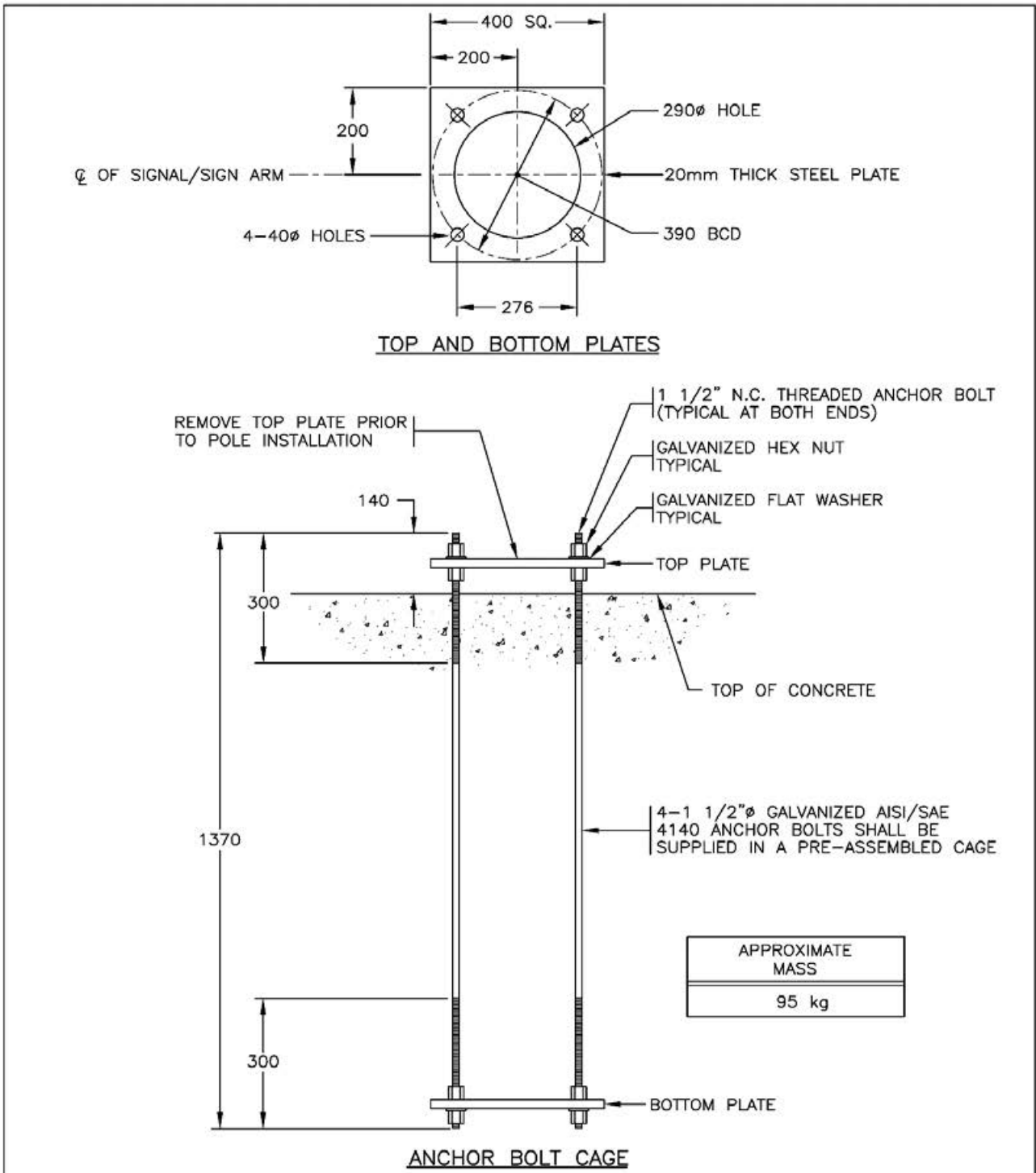
APPROXIMATE MASS
60 kg

SEE DRAWINGS SP635-1.1.11, 1.1.14 AND 1.1.16 FOR NOTES AND ADDITIONAL DETAILS



NOT TO SCALE

No.	Revision	Date	ANCHOR BOLT CAGE FOR TYPE 6, 7 & S POLES	
F			Date	Approved
E			30/09/93	E.L. (Signature on File)
D	GENERAL REVISIONS	APR 17	SPECIFICATION DRAWING No. SP635-1.1.18	
C	TYPE S POLE ADDED & TOP PLATE NOTE REVISED	OCT 03	Chief Highway Engineer	
B	HOLE SIZE IN PLATE ADDED	AUG 95		
A	GENERAL REVISIONS	AUG 94		



SEE DRAWINGS SP635-1.1.11, 1.1.14 AND 1.1.16 FOR NOTES AND ADDITIONAL DETAILS

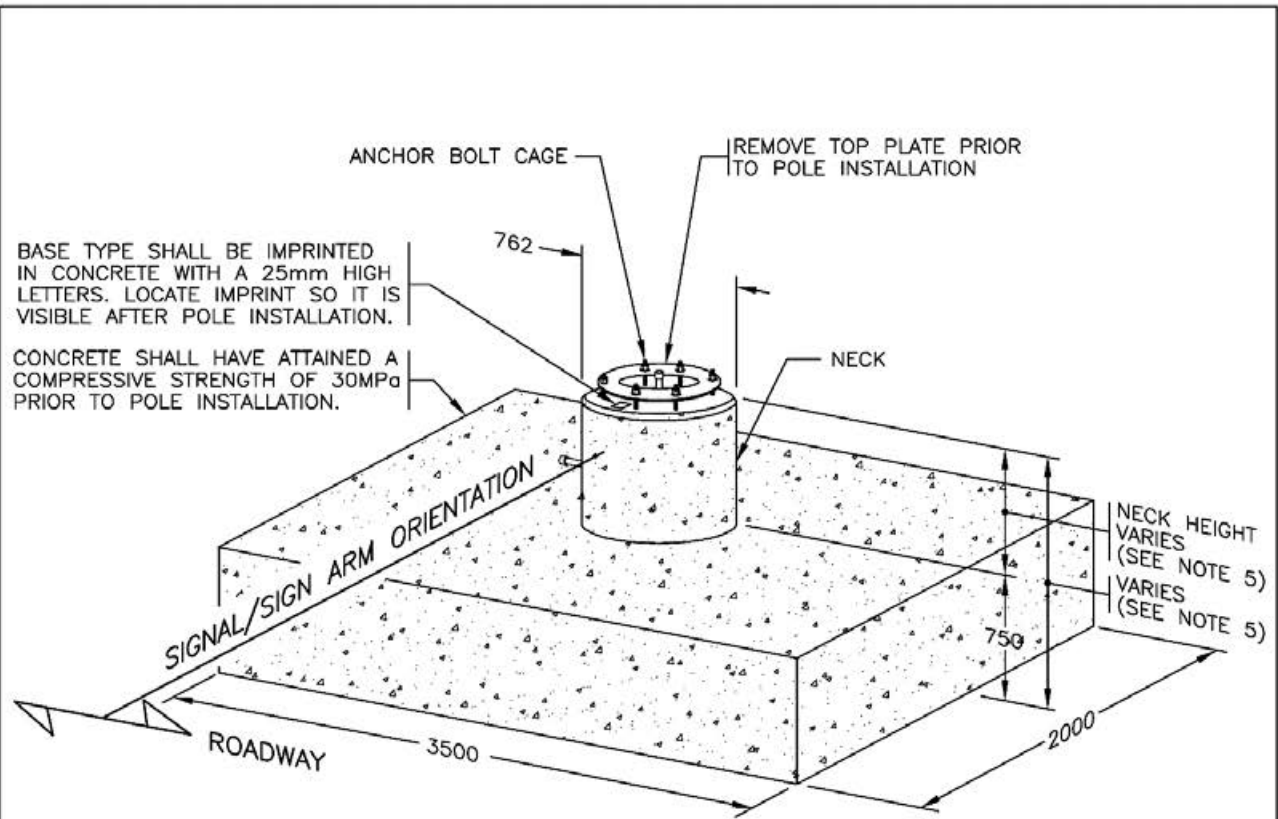


NOT TO SCALE

No.	Revision	Date
F		
E		
D	GENERAL REVISIONS	APR 17
C	TOP PLATE NOTE REVISED	OCT 03
B	HOLE SIZE IN PLATE REVISED	AUG 95
A	GENERAL REVISIONS	AUG 94

**ANCHOR BOLT CAGE FOR TYPE L POLES**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-1.1.19</b>



CONCRETE SPREAD FOOTING

BASE TYPE	POLE TYPE	VOLUME OF CONCRETE	MASS OF REBAR	FORMWORK	APPROXIMATE MASS
M1	TYPE M POLES	5.90 m <sup>3</sup> *	540 kg *	11.6 m <sup>2</sup> *	14400 kg *

(\* ) BASED ON SPREAD FOOTING WITH 1400 HIGH NECK

NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE PLANS FOR SIGNAL/SIGN ARM ORIENTATION.
3. SEE DRAWINGS SP635-1.1.21, 1.1.22 & 1.4.5 FOR ADDITIONAL DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. NECK HEIGHT MAY VARY FROM 750 TO 2000. SEE DRAWING SP635-1.4.5 FOR MORE INFORMATION.

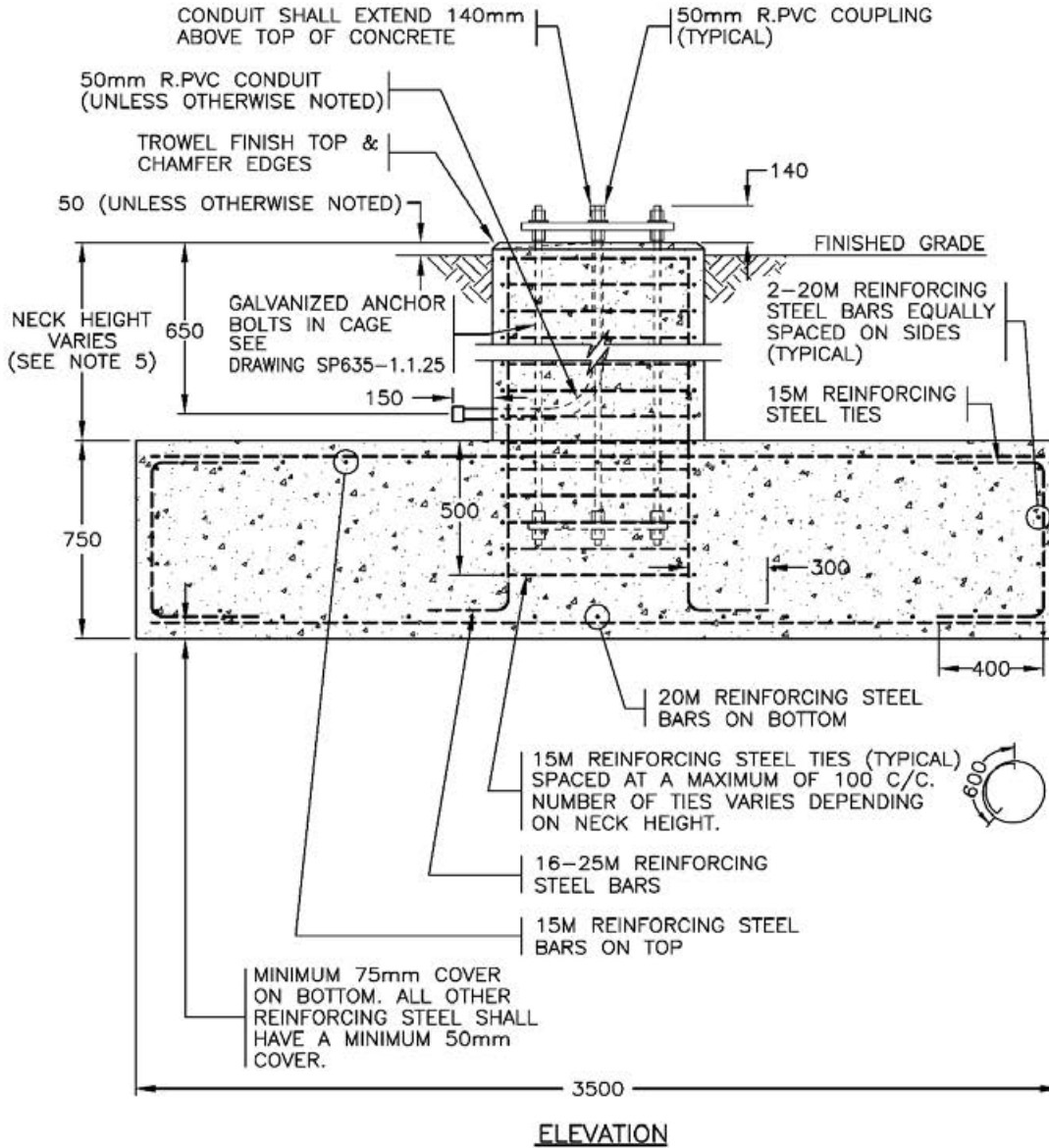
BASE DESIGNED FOR SOILS WITH A MINIMUM BEARING PRESSURE OF 100KPa

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	TYPE M1 CONCRETE SPREAD FOOTING (CAST IN PLACE)		SPECIFICATION DRAWING No.
F					
E	TITLE UPDATED	APR 20			
D	GENERAL REVISIONS	APR 17	Date	Approved	
C	NECK HEIGHT REVISED	AUG 96	30/09/93	E.L. (Signature on File)	SP635-1.1.20
B	NECK HEIGHT REVISED & REBAR ADDED	AUG 95			
A	GENERAL REVISIONS	AUG 94	Chief Highway Engineer		



SEE DRAWING SP635-1.1.20 FOR NOTES AND ADDITIONAL DETAILS

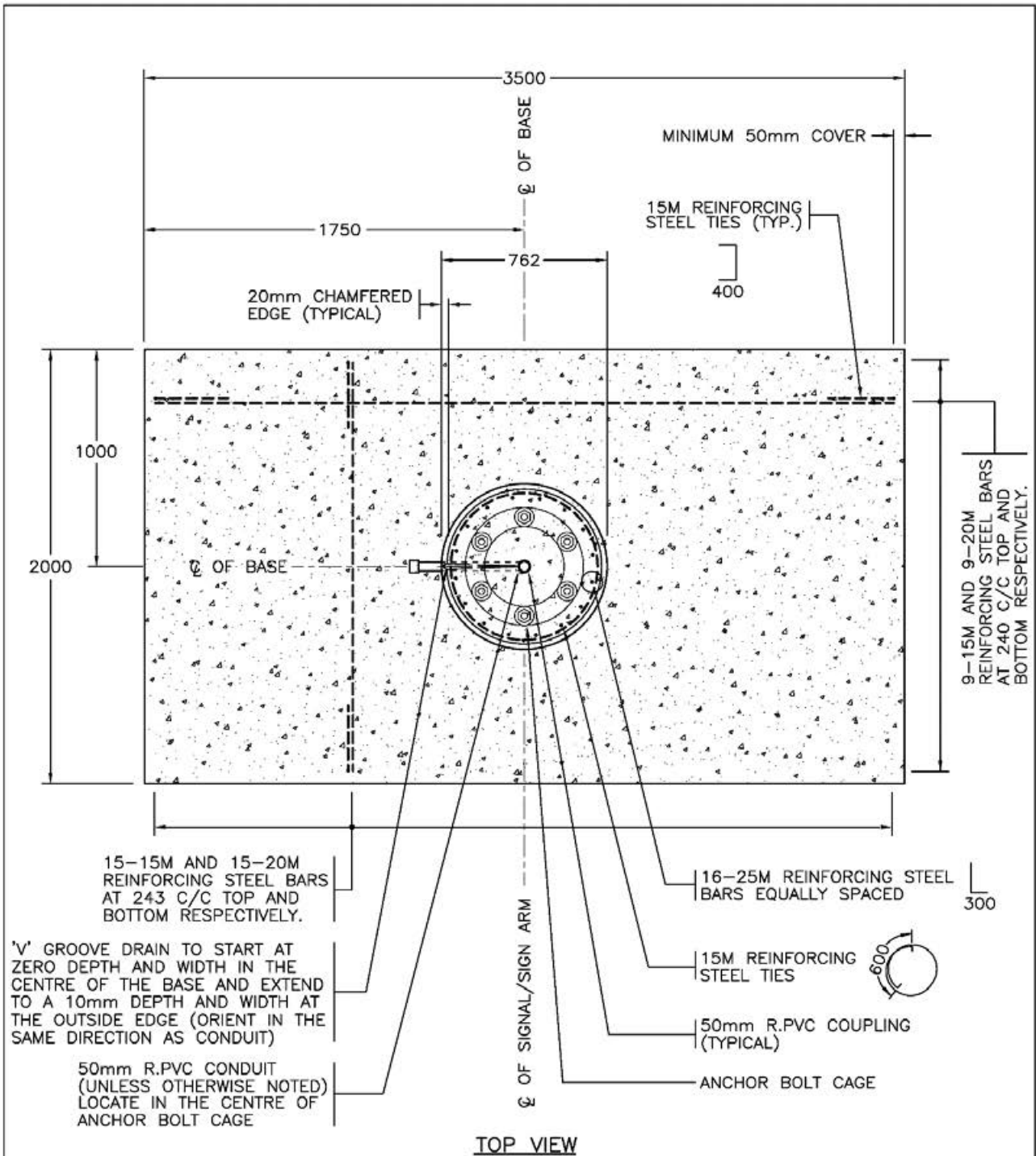


NOT TO SCALE

No.	Revision	Date
F		
E	TITLE UPDATED	APR 20
D	GENERAL REVISIONS	APR 17
C	REBAR IN NECK & BASE ELEVATION REVISED	AUG 96
B	NECK HEIGHT REVISED & REBAR ADDED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE M1 CONCRETE SPREAD FOOTING  
(CAST IN PLACE)**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-1.1.21</b>



SEE DRAWING SP635-1.1.20 FOR NOTES AND ADDITIONAL DETAILS

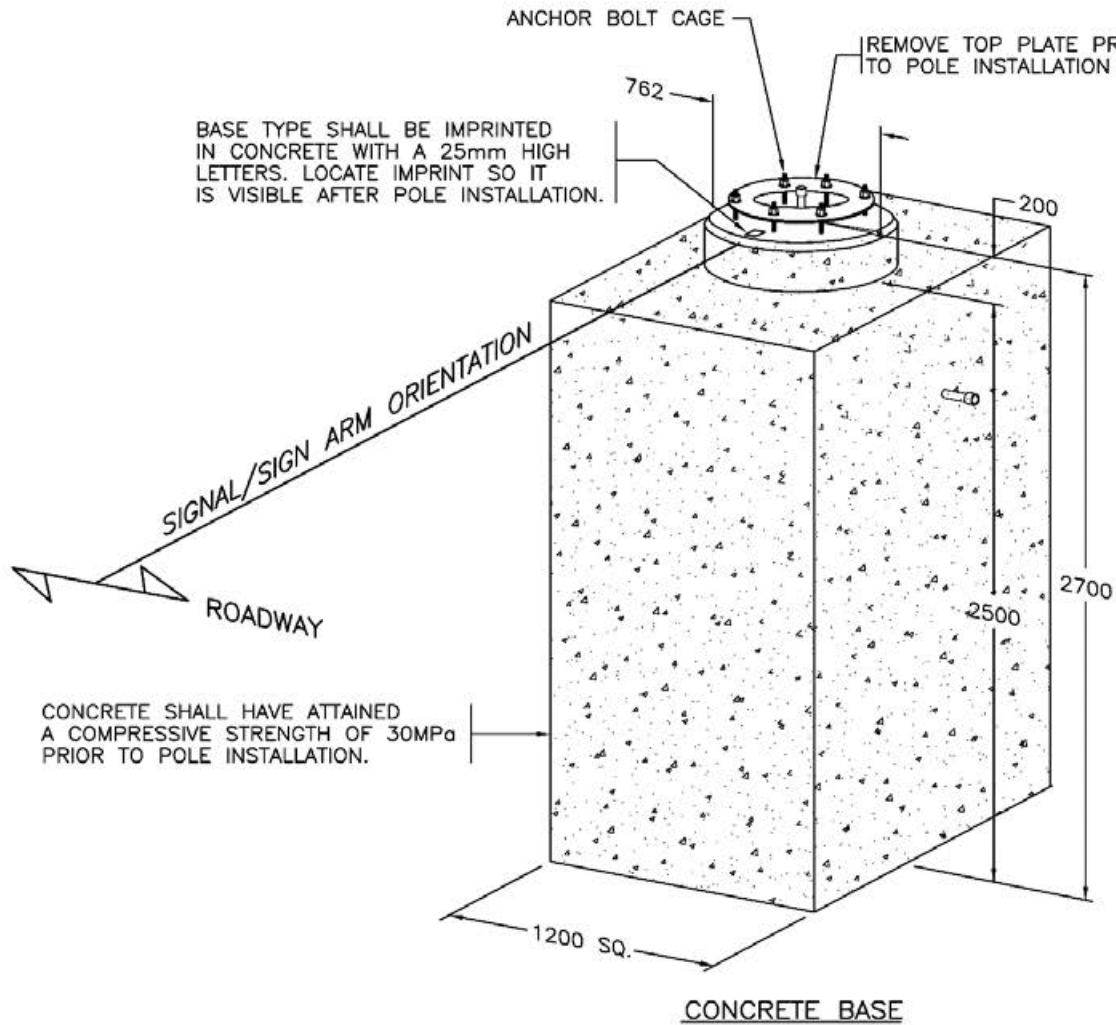


NOT TO SCALE

No.	Revision	Date
F		
E		
D	TITLE UPDATED	APR 17
C	GENERAL REVISIONS	APR 17
B	LENGTH REVISED & REBAR ADDED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE M1 CONCRETE SPREAD FOOTING  
(CAST IN PLACE)**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-1.1.22</b>



BASE TYPE	POLE TYPE	VOLUME OF CONCRETE	MASS OF REBAR	FORMWORK	APPROXIMATE MASS
M2	TYPE M POLES	3.7 m <sup>3</sup>	100 kg	12.5 m <sup>2</sup>	8935 kg

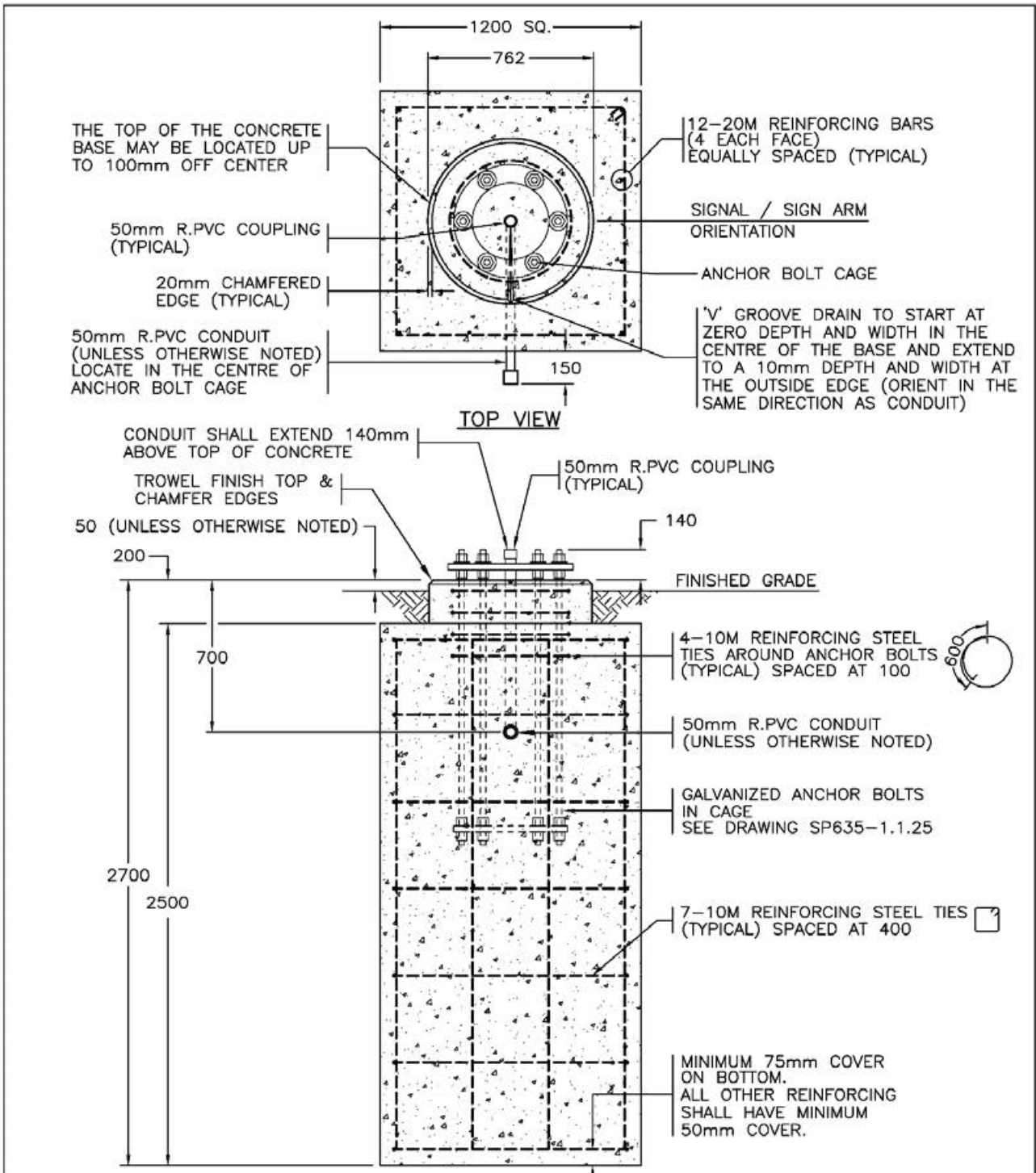
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE PLANS FOR SIGNAL/SIGN ARM ORIENTATION.
3. SEE DRAWINGS SP635-1.1.24 & 1.4.1 to 1.4.4 FOR ADDITIONAL DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. SEE DRAWINGS SP635-1.4.1 TO 1.4.4 FOR BACKFILL REQUIREMENTS.

NOT TO SCALE



No.	Revision	Date	TYPE M2 CONCRETE BASE (CAST IN PLACE)		SPECIFICATION DRAWING No.
F					
E	TITLE UPDATED	APR 20			
D	GENERAL REVISIONS	APR 17	Date	Approved	
C	NOTE 4 REVISED	AUG 96	30/09/93	E.L. (Signature on File) Chief Highway Engineer	SP635-1.1.23
B	NOTE 4 REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



SEE DRAWING SP635-1.1.23 FOR NOTES AND ADDITIONAL DETAILS



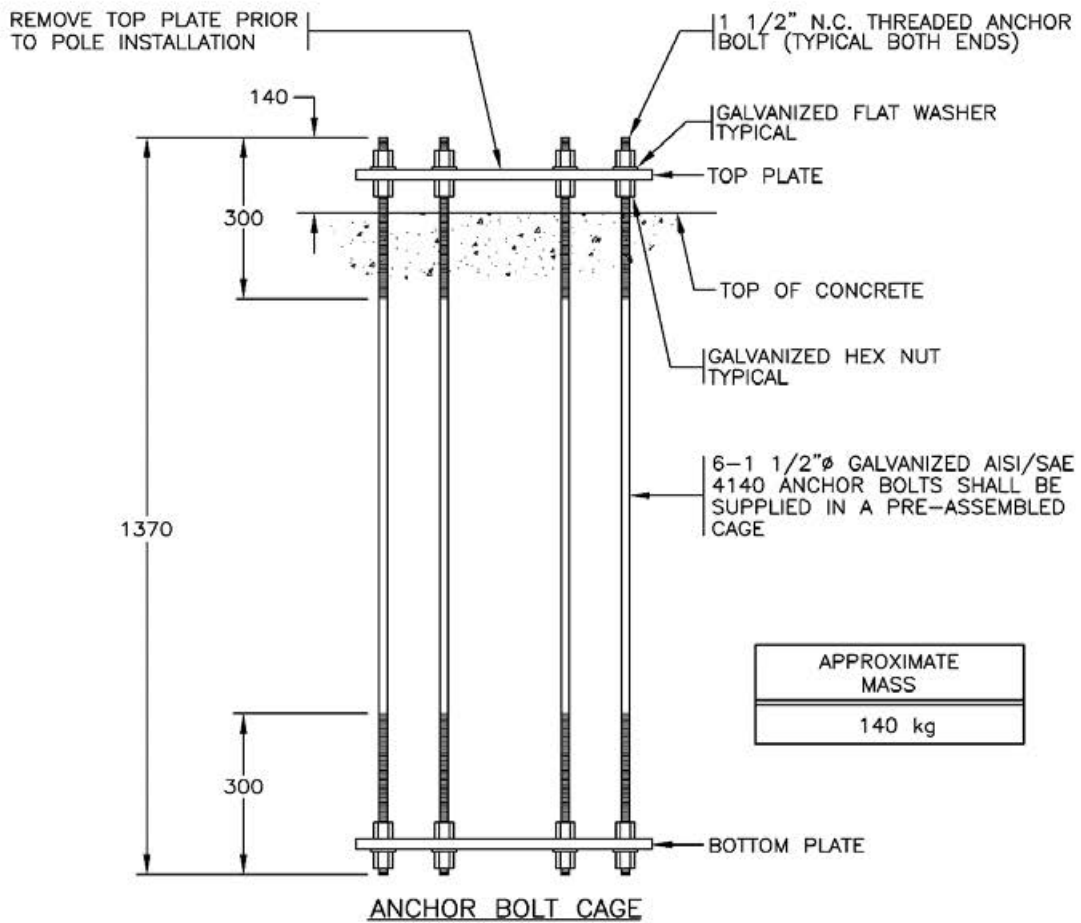
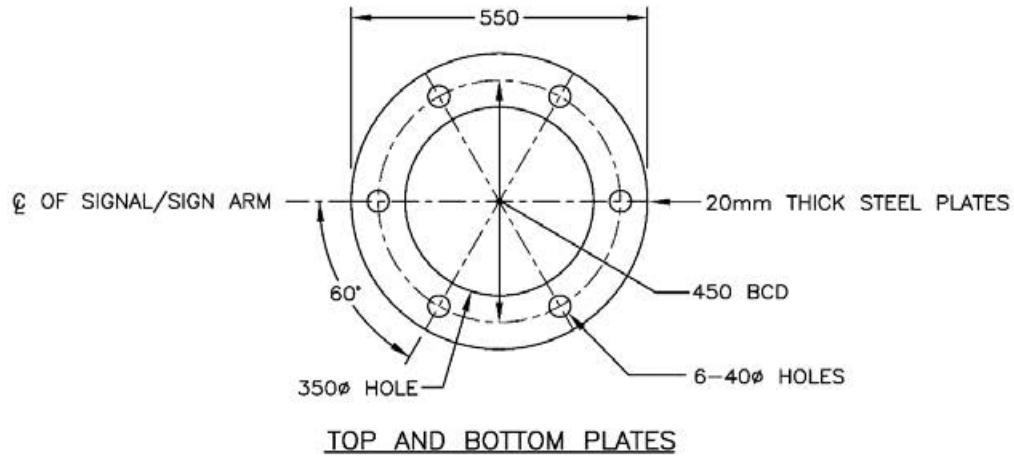
NOT TO SCALE

No.	Revision	Date
F		
E	TITLE UPDATED	APR 20
D	GENERAL REVISIONS	APR 17
C	ELEVATION OF BASE TO FINISHED GRADE REVISED	AUG 96
B	DRAWING REFERENCE CHANGED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE M2 CONCRETE BASE  
(PRECAST OR CAST IN PLACE)**

Date: 30/09/93  
 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No.  
 SP635-1.1.24



SEE DRAWINGS SP635-1.1.20 AND 1.1.23 FOR NOTES AND ADDITIONAL DETAILS

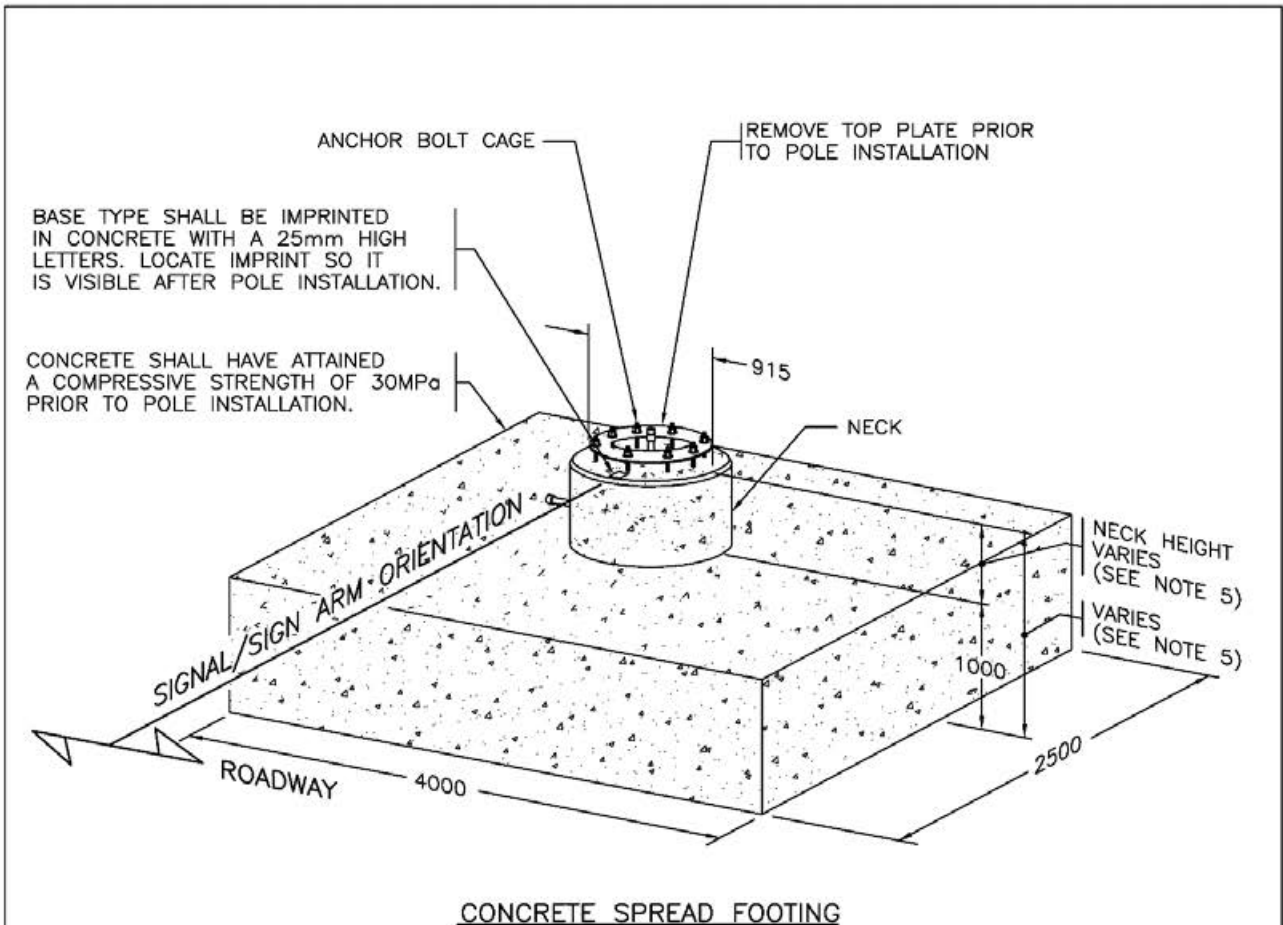


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NOT TO SCALE

No.	Revision	Date	ANCHOR BOLT CAGE FOR TYPE M POLES		SPECIFICATION DRAWING No. SP635-1.1.25
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D	GENERAL REVISIONS	APR 17	Chief Highway Engineer		
C	TOP PLATE NOTE REVISED	OCT 03			
B	HOLE SIZE IN PLATE REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			





BASE TYPE	POLE TYPE	VOLUME OF CONCRETE	MASS OF REBAR	FORMWORK	APPROXIMATE MASS
H1	TYPE H POLES	10.9 m <sup>3</sup> *	760 kg*	17.0 m <sup>2</sup> *	26700 kg*

(\* ) BASED ON SPREAD FOOTING WITH 1400 HIGH NECK

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE PLANS FOR SIGN ARM ORIENTATION.
3. SEE DRAWINGS SP635-1.1.27, 1.1.28 & 1.4.5 FOR ADDITIONAL DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. NECK HEIGHT MAY VARY FROM 750 to 2500. SEE DRAWING SP635-1.4.5 FOR MORE INFORMATION.

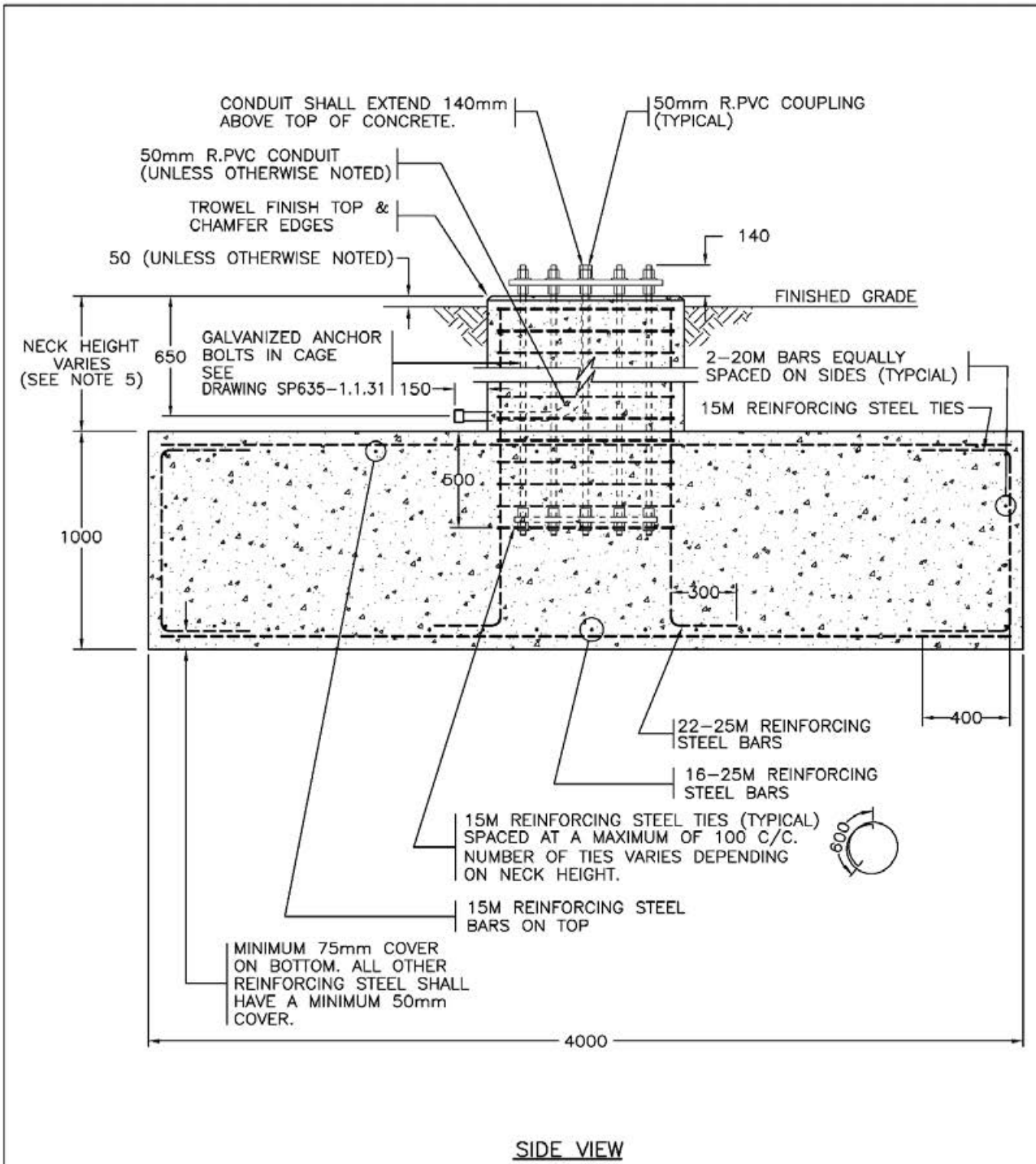
BASE DESIGNED FOR SOILS WITH A MINIMUM BEARING PRESSURE OF 100KPa

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	TYPE H1 CONCRETE SPREAD FOOTING (CAST IN PLACE)		SPECIFICATION DRAWING No.
F					
E	TITLE UPDATED	APR 20	Date	Approved	
D	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	SP635-1.1.26
C	NECK HEIGHT REVISED	AUG 96			
B	NECK HEIGHT REVISED & REBAR ADDED	AUG 95			
A	GENERAL REVISIONS	AUG 94	Chief Highway Engineer		



SEE DRAWING SP635-1.1.26 FOR NOTES AND ADDITIONAL DETAILS

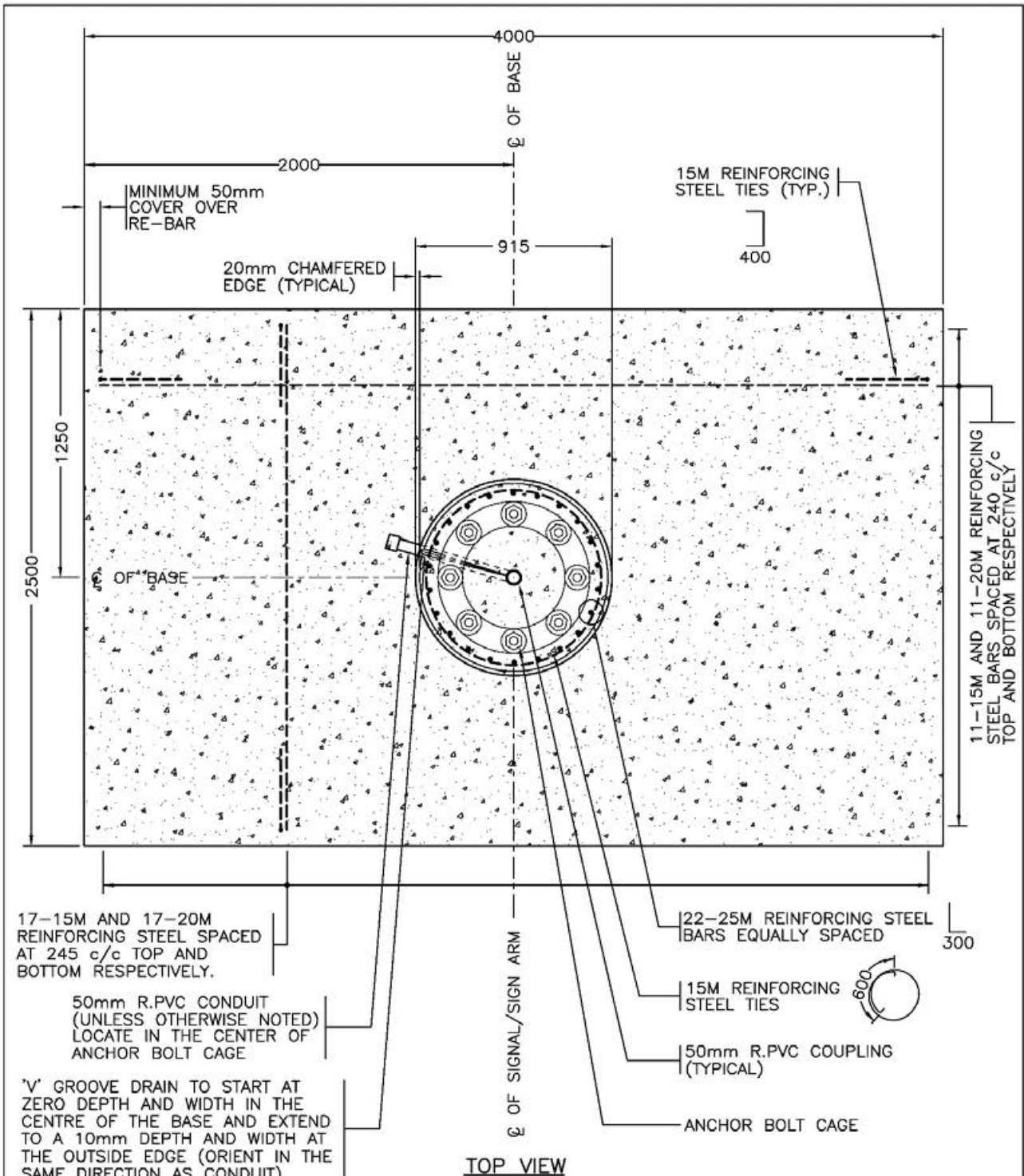


NOT TO SCALE

No.	Revision	Date
F	TITLE UPDATED	APR 20
E	GENERAL REVISIONS	APR 17
D	BOTTOM REBAR REVISED	FEB 12
C	REBAR IN NECK & BASE ELEVATION REVISED	AUG 96
B	NECK HEIGHT REVISED & REBAR ADDED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE H1 CONCRETE SPREAD FOOTING  
(POURED IN PLACE)**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-1.1.27</b>



17-15M AND 17-20M REINFORCING STEEL SPACED AT 245 c/c TOP AND BOTTOM RESPECTIVELY.

50mm R.PVC CONDUIT (UNLESS OTHERWISE NOTED) LOCATE IN THE CENTER OF ANCHOR BOLT CAGE

'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)

TOP VIEW

SEE DRAWING SP635-1.1.26 FOR NOTES AND ADDITIONAL DETAILS

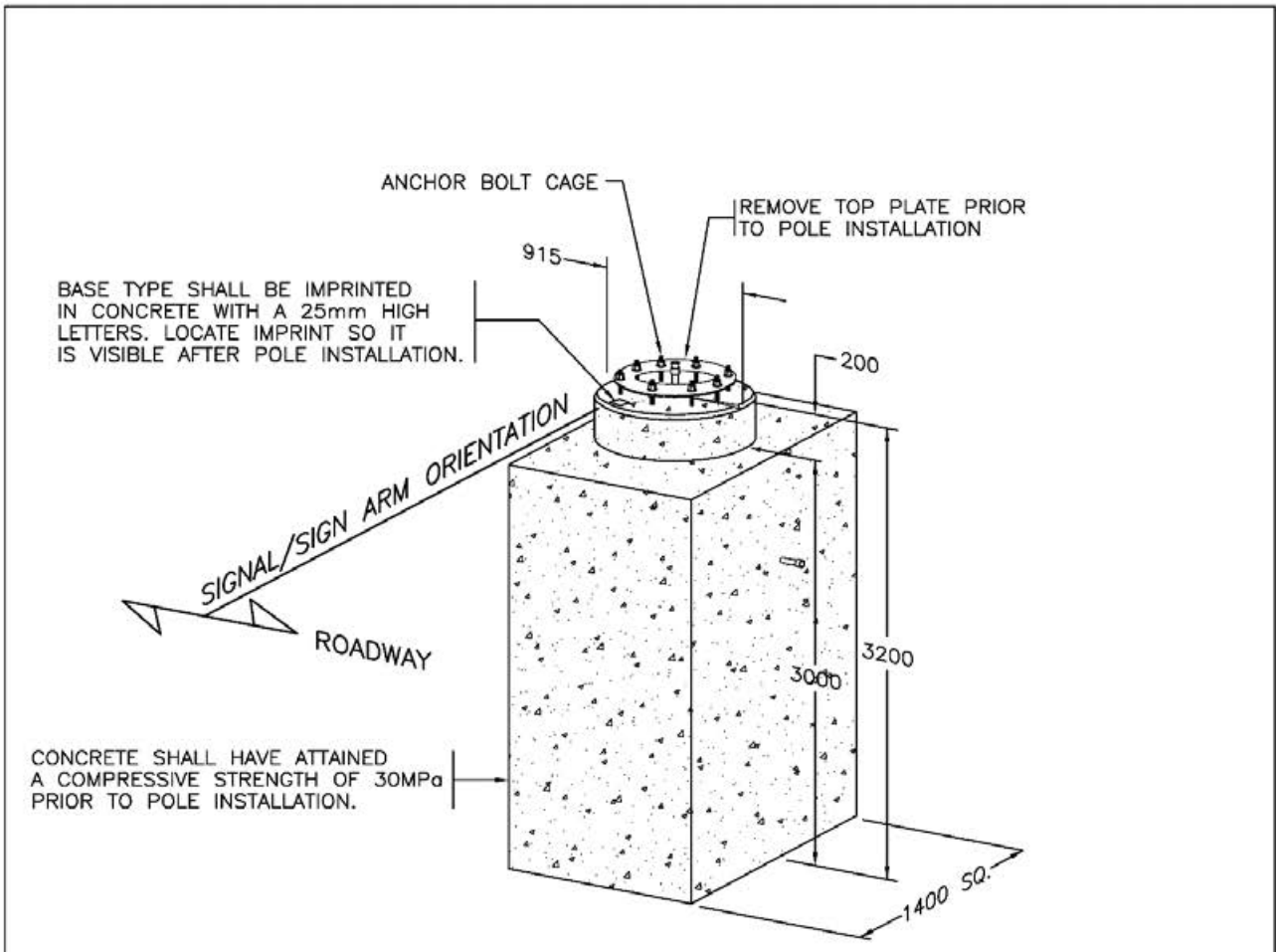
NOT TO SCALE



No.	Revision	Date
F		
E		
D	TITLE UPDATED	APR 20
C	GENERAL REVISIONS	APR 17
B	REBAR ADDED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE H1 CONCRETE SPREAD FOOTING  
(CAST IN PLACE)**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-1.1.28</b>



**CONCRETE BASE**

BASE TYPE	POLE TYPE	VOLUME OF CONCRETE	MASS OF REBAR	FORMWORK	APPROXIMATE MASS
H2	TYPE H POLES	6.0 m <sup>3</sup>	155 kg	17.4 m <sup>2</sup>	14445 kg

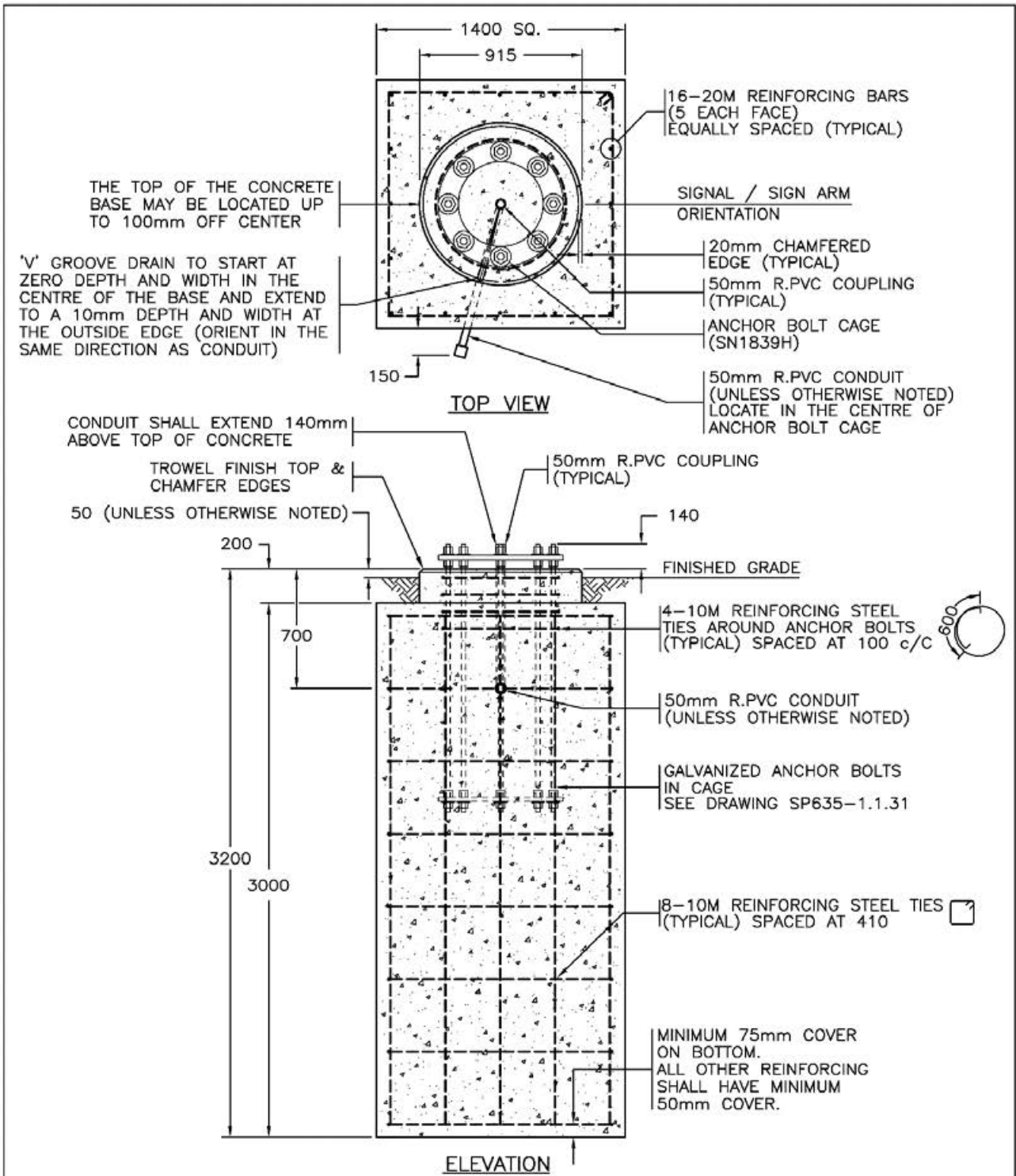
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE PLANS FOR SIGN ARM ORIENTATION.
3. SEE DRAWINGS SP635-1.1.30 & 1.4.1 to 1.4.3 FOR ADDITIONAL DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. SEE DRAWINGS SP635-1.4.1 TO 1.4.4 FOR BACKFILL REQUIREMENTS.

NOT TO SCALE



No.	Revision	Date	TYPE H2 CONCRETE BASE (PRECAST OR CAST IN PLACE)		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-1.1.29
E	TITLE UPDATED	APR 20	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	GENERAL REVISIONS	APR 17			
C	NOTE 4 REVISED	AUG 96			
B	NOTE 4 REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



SEE DRAWING SP635-1.1.29 FOR NOTES AND ADDITIONAL DETAILS

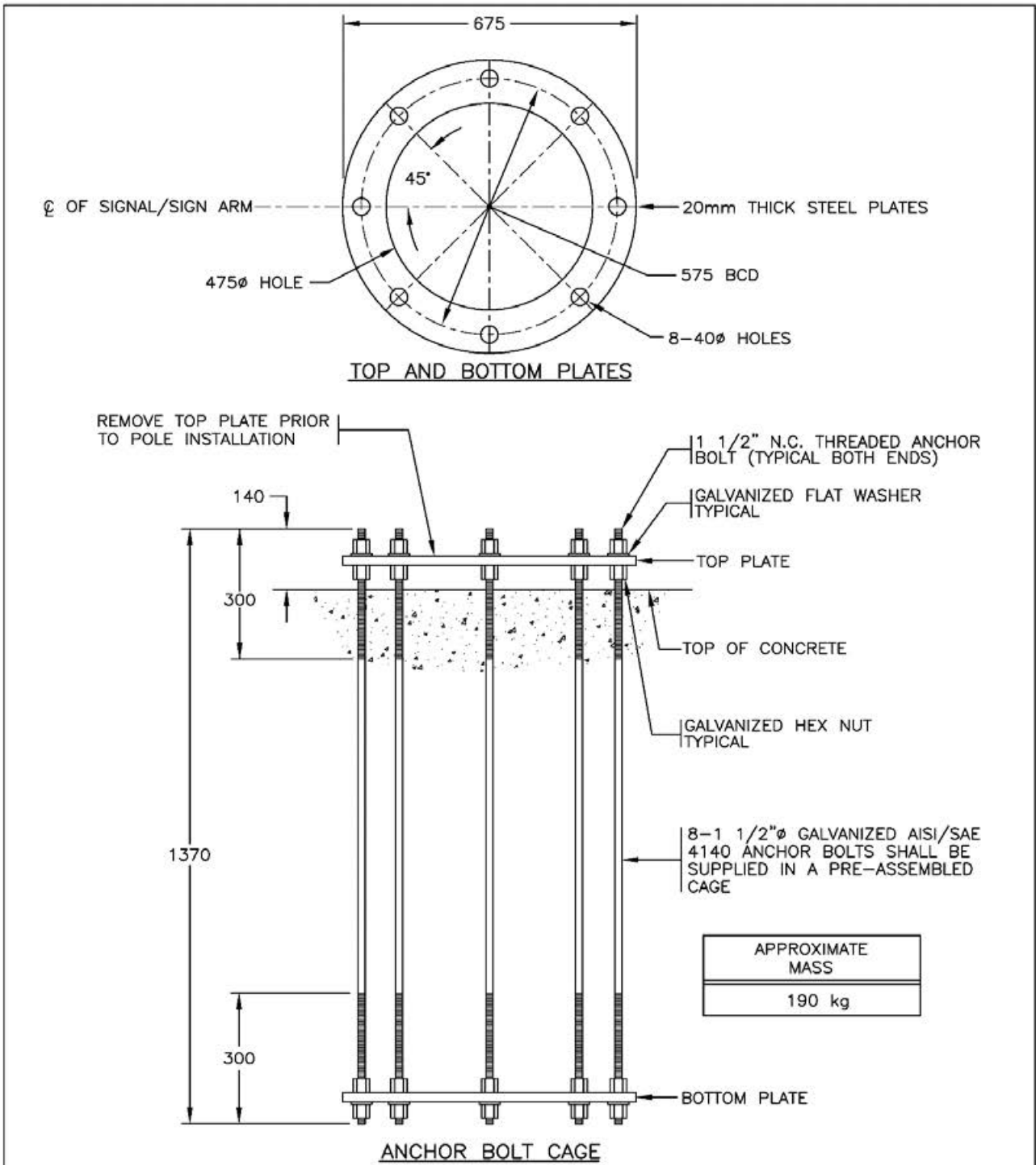


NOT TO SCALE

No.	Revision	Date
F		
E	TITLE UPDATED	APR 20
D	GENERAL REVISIONS	APR 17
C	ELEVATION OF BASE TO FINISHED GRADE REVISED	AUG 96
B	DRAWING REFERENCE CHANGED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE H2 CONCRETE BASE  
(CAST IN PLACE)**

Date	Approved	SPECIFICATION DRAWING No.
30/09/93	E.L. (Signature on File) Chief Highway Engineer	SP635-1.1.30



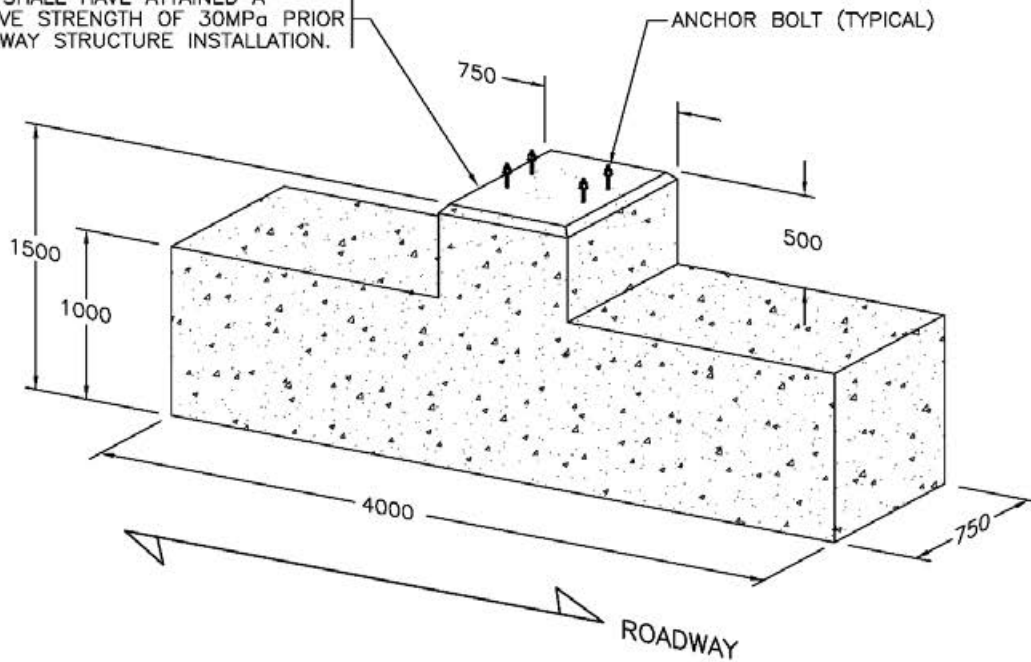
SEE DRAWINGS SP635-1.1.26 AND -1.1.29 FOR NOTES AND ADDITIONAL DETAILS



NOT TO SCALE

No.	Revision	Date	ANCHOR BOLT CAGE FOR TYPE H POLES		SPECIFICATION DRAWING No. SP635-1.1.31
F			Date	Approved	
E			30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	GENERAL REVISIONS	APR 17			
C	TOP PLATE NOTE REVISED	OCT 03			
B	HOLE SIZE IN PLATE REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			

CONCRETE SHALL HAVE ATTAINED A COMPRESSIVE STRENGTH OF 30MP<sub>a</sub> PRIOR TO BREAKAWAY STRUCTURE INSTALLATION.



CONCRETE SPREAD FOOTING

BASE DESIGNED FOR SOILS WITH A MINIMUM BEARING PRESSURE OF 75KPa

APPROXIMATE MASS
8000 kg
VOLUME OF CONCRETE
3.28 m <sup>3</sup>

NOTES

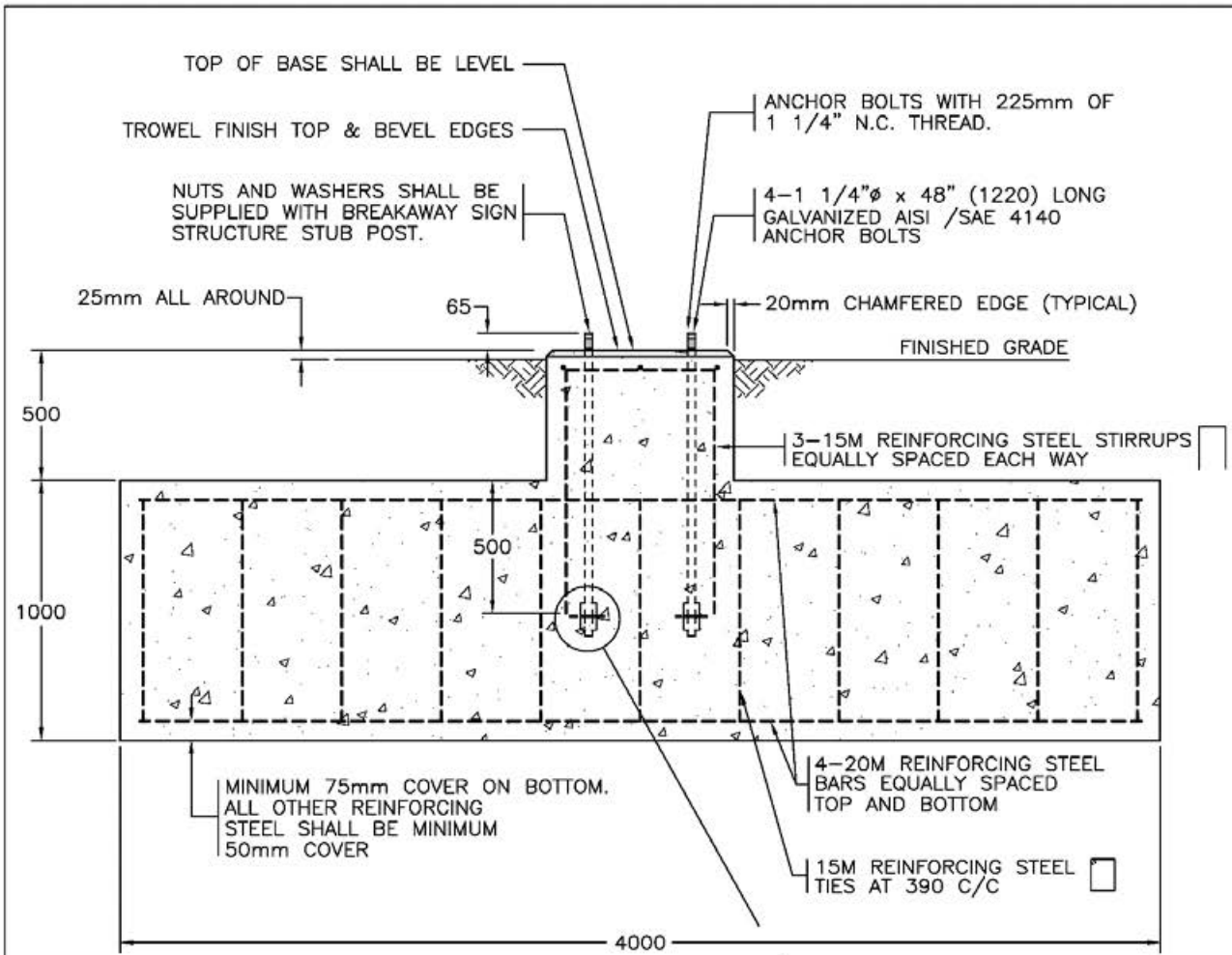
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. MINIMUM 2 BASES REQUIRED PER BREAKAWAY SIGN INSTALLATION.
3. SEE DRAWINGS SP635-1.1.33 AND 1.1.34 FOR ADDITIONAL DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE

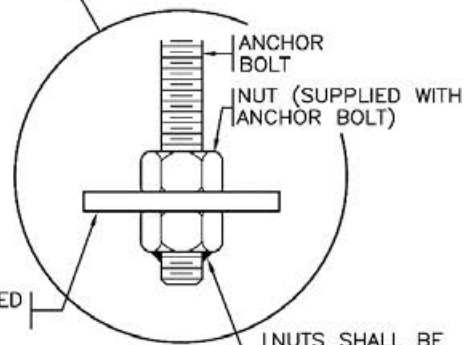


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No.	Revision	Date	CONCRETE SPREAD FOOTING FOR BREAKAWAY SIGN STRUCTURE (CAST IN PLACE)	
F			Date	Approved
E			30/09/93	E.L. (Signature on File)
D	TITLE UPDATED	APR 20	SPECIFICATION DRAWING No.	
C	GENERAL REVISIONS	APR 17	SP635-1.1.32	
B	DRAWING TITLE & NUMBER CHANGED	AUG 95		
A	GENERAL REVISIONS	AUG 94		



SIDE VIEW



NUTS SHALL BE SUPPLIED TACK WELDED TO ANCHOR BOLTS.

SEE DRAWING SP635-1.1.32 FOR NOTES AND ADDITIONAL DETAILS



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NOT TO SCALE

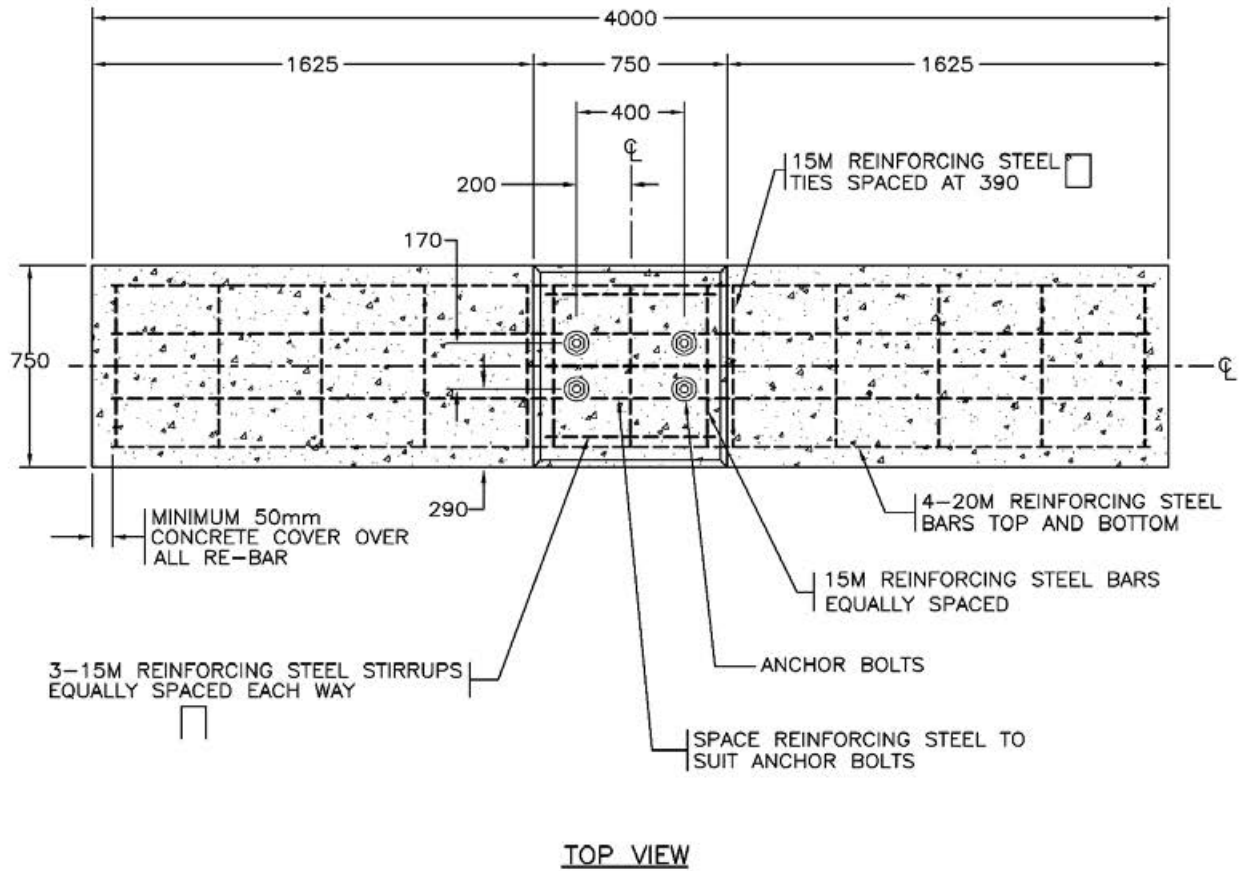
No.	Revision	Date
F		
E		
D	TITLE UPDATED	APR 20
C	GENERAL REVISIONS	APR 17
B	DRAWING TITLE & NUMBER CHANGED	AUG 95
A	GENERAL REVISIONS	AUG 94

CONCRETE SPREAD FOOTING FOR BREAKAWAY SIGN STRUCTURE (CAST IN PLACE)

Date: 30/09/93  
 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-1.1.33



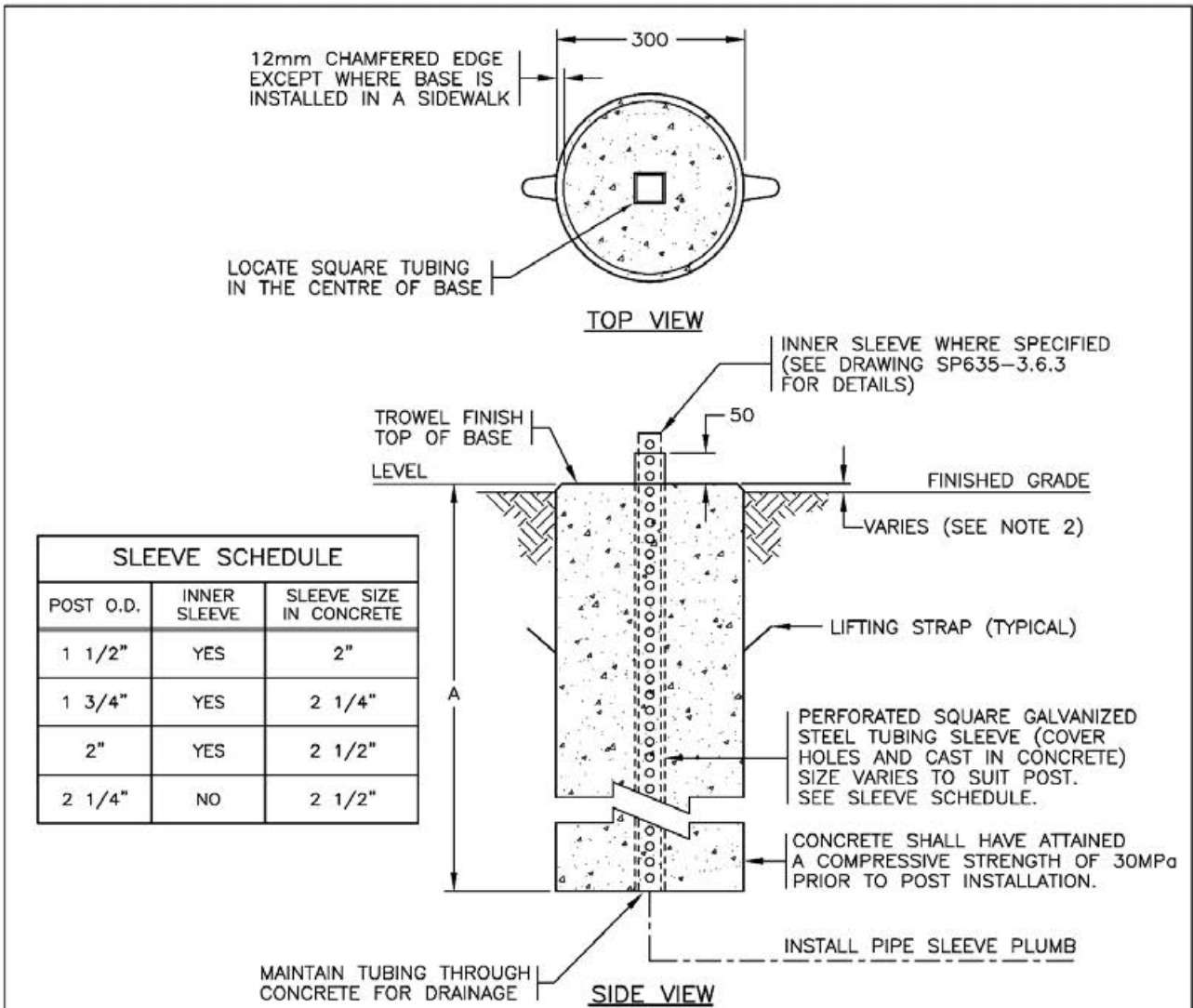


SEE DRAWING SP635-1.1.32 FOR NOTES AND ADDITIONAL DETAILS



NOT TO SCALE

No.	Revision	Date	CONCRETE SPREAD FOOTING FOR BREAKAWAY SIGN STRUCTURE (CAST IN PLACE)		SPECIFICATION DRAWING No. SP635-1.1.34
F			Date	Approved	
E			<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	
D	TITLE UPDATED	APR 20			
C	GENERAL REVISIONS	APR 17			
B	DRAWING TITLE & NUMBER CHANGED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



SLEEVE SCHEDULE		
POST O.D.	INNER SLEEVE	SLEEVE SIZE IN CONCRETE
1 1/2"	YES	2"
1 3/4"	YES	2 1/4"
2"	YES	2 1/2"
2 1/4"	NO	2 1/2"

BASE TYPE	APPLICATION	APPROXIMATE MASS	VOLUME OF CONCRETE	A
1	SINGLE POST SIGNS IN PAVED ISLANDS OR CONCRETE SIDEWALKS	100 kg	0.04 m <sup>3</sup>	600
2	SINGLE OR TWO POST SIGNS IN GRAVEL SHOULDER	147 kg	0.06 m <sup>3</sup>	800

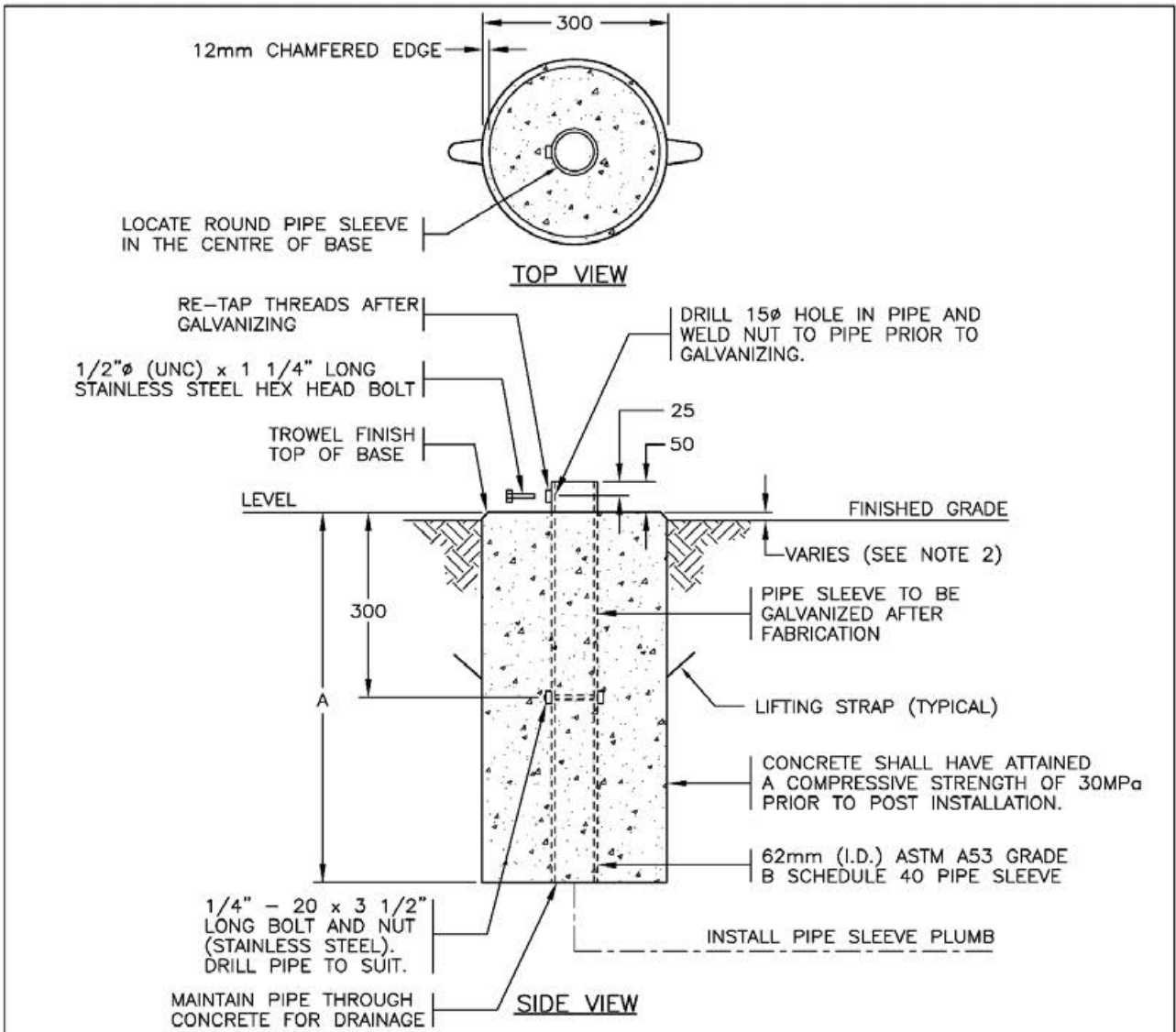
- NOTES**
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  - BASE SHALL BE INSTALLED 25mm ABOVE FINISHED GRADE EXCEPT WHERE INSTALLED IN SIDEWALK IT SHALL BE FLUSH WITH TOP OF SIDEWALK WITH NO CHAMFERED EDGE.
  - ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

SEE SPECIAL PROVISIONS FOR ALTERNATIVE BASES FOR SINGLE POST SIGNS



NOT TO SCALE

No.	Revision	Date	Date Approved		SPECIFICATION DRAWING No.
H	GENERAL REVISIONS	APR 20	<b>MAR 94</b> <b>E.L. (Signature on File)</b> Chief Highway Engineer		<b>SP635-1.1.35</b>
G	GENERAL REVISIONS	APR 17			
F	REVISED NOTE	JUN 08			
E	GENERAL REVISIONS	APR 05			
D	NOTE IN BOX ADDED	NOV 98			
C	DRAWING NUMBER CHANGED	AUG 95			



BASE TYPE	APPLICATION	APPROXIMATE MASS	VOLUME OF CONCRETE	A
1	SINGLE POST SIGNS IN PAVED ISLANDS OR CONCRETE SIDEWALKS	100 kg	0.04 m <sup>3</sup>	600
2	SINGLE OR TWO POST SIGNS IN GRAVEL SHOULDER	147 kg	0.06 m <sup>3</sup>	800

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. BASE SHALL BE INSTALLED 25mm ABOVE FINISHED GRADE EXCEPT WHERE INSTALLED IN SIDEWALK IT SHALL BE FLUSH WITH TOP OF SIDEWALK WITH NO CHAMFERED EDGE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

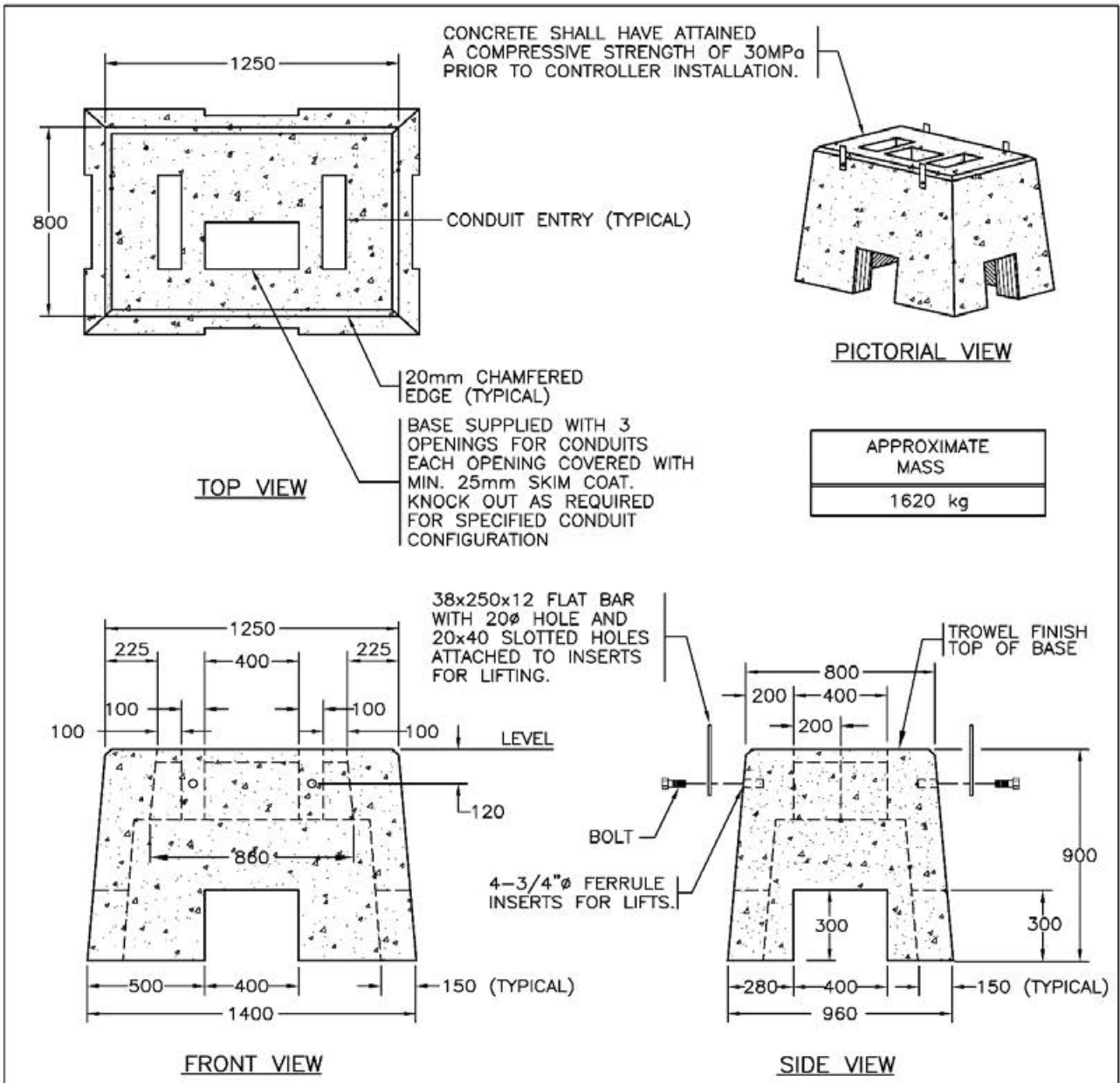
SEE SPECIAL PROVISIONS FOR ALTERNATIVE BASES FOR SINGLE POST SIGNS

NOT TO SCALE



No.	Revision	Date	ROUND CONCRETE BASES FOR ROUND STEEL SIGN POSTS (PRECAST OR CAST IN PLACE)		SPECIFICATION DRAWING No.
G	TITLE UPDATED	APR 20	Date	Approved	SP635-1.1.36
F	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
E	REVISED NOTE	JUN 08	Chief Highway Engineer		
D	GENERAL REVISIONS	APR 05			
C	NOTE IN BOX ADDED	NOV 98			
B	DRAWING NUMBER CHANGED	AUG 95			





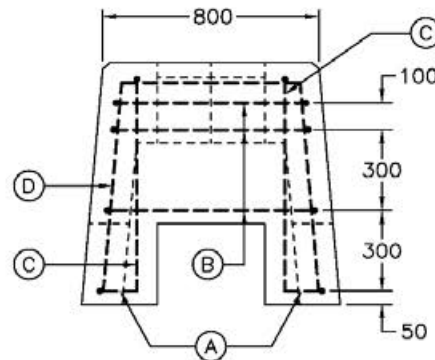
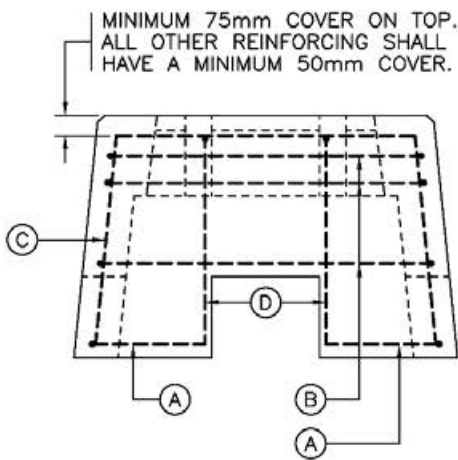
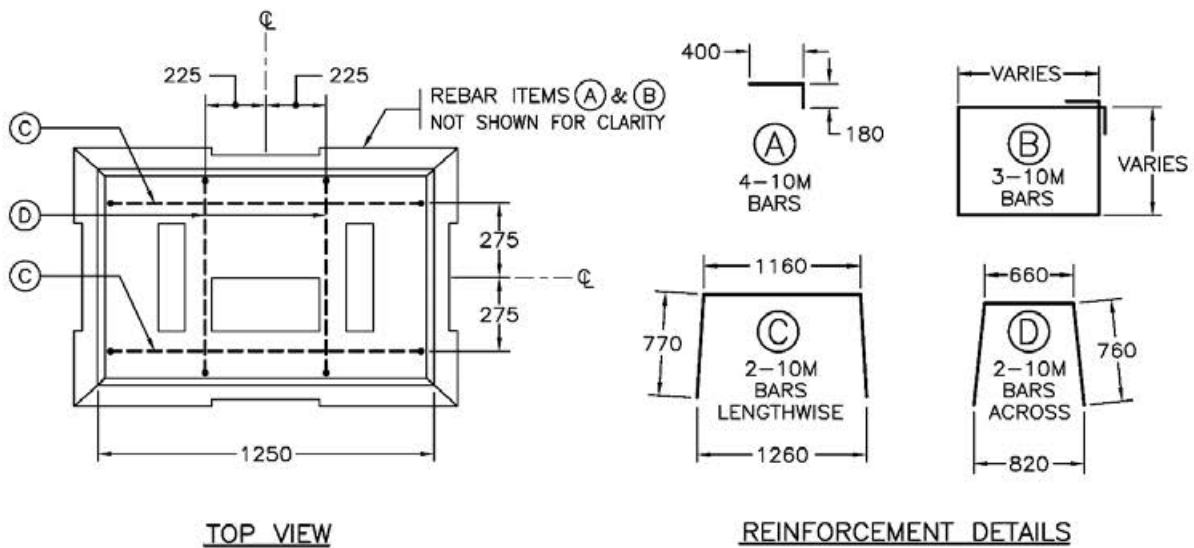
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-1.1.39 FOR REBAR DETAILS, AND DRAWINGS SP635-1.1.40, 1.1.41 AND 1.1.42 FOR INSTALLATION DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	CONCRETE CONTROLLER BASE DETAILS (PRECAST)		SPECIFICATION DRAWING No. SP635-1.1.38
F			Date	Approved	
E			05/02/16	D.N. (Signature on File)	
D	GENERAL REVISIONS	FEB 16	Chief Highway Engineer		
C	DRAWING REFERENCE NUMBERS REVISED	AUG 96			
B	DRAWING NUMBER CHANGED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



**NOTES**

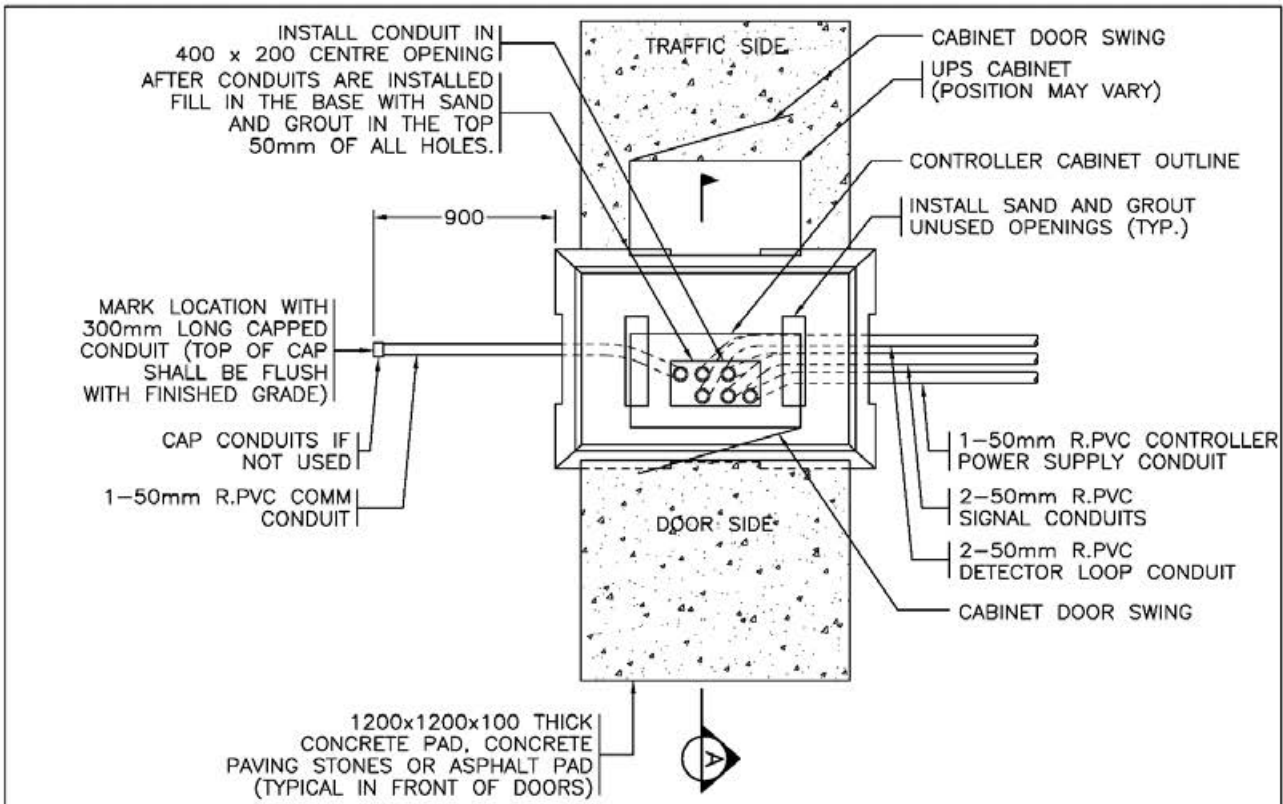
1. CONDUITS AND ROUTING MAY VARY. EXACT CONDUIT ROUTING SHALL BE AS INDICATED ON THE TRAFFIC SIGNAL DESIGN DRAWINGS. UTILIZE 75mm SIGNAL CONDUIT FOR SIGNAL CABLE APPLICATIONS.

SEE DRAWING SP635-1.1.38 FOR NOTES AND DETAILS

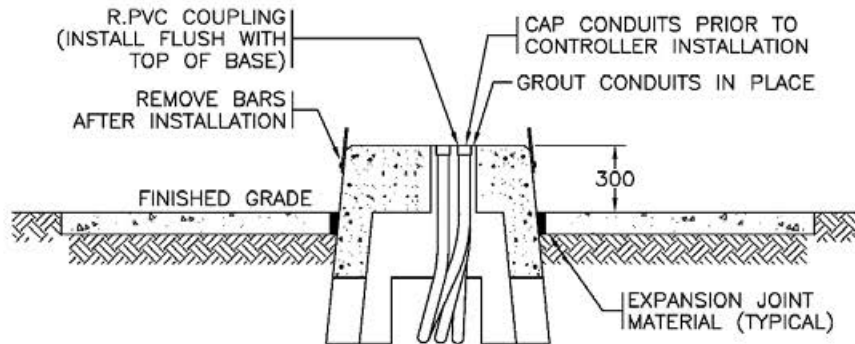
NOT TO SCALE



No.	Revision	Date	CONCRETE CONTROLLER BASE REBAR DETAILS (PRECAST)		SPECIFICATION DRAWING No. SP635-1.1.39
F			Date	Approved	
E			05/02/16	D.N. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISIONS	FEB 16			
B	DRAWING NUMBER CHANGED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



**CONDUIT FIELD INSTALLATION**



**SECTION A**

**NOTES**

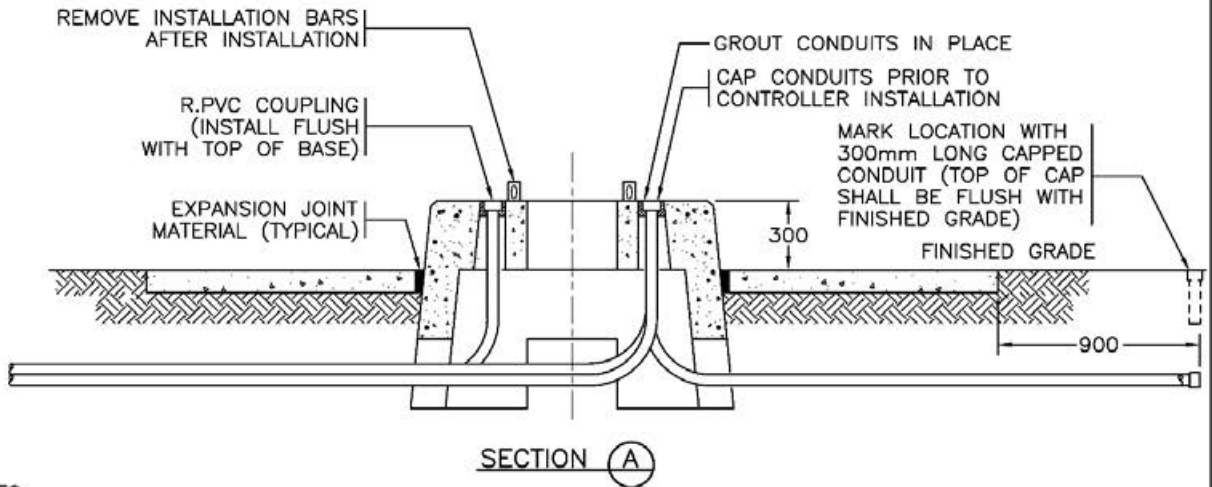
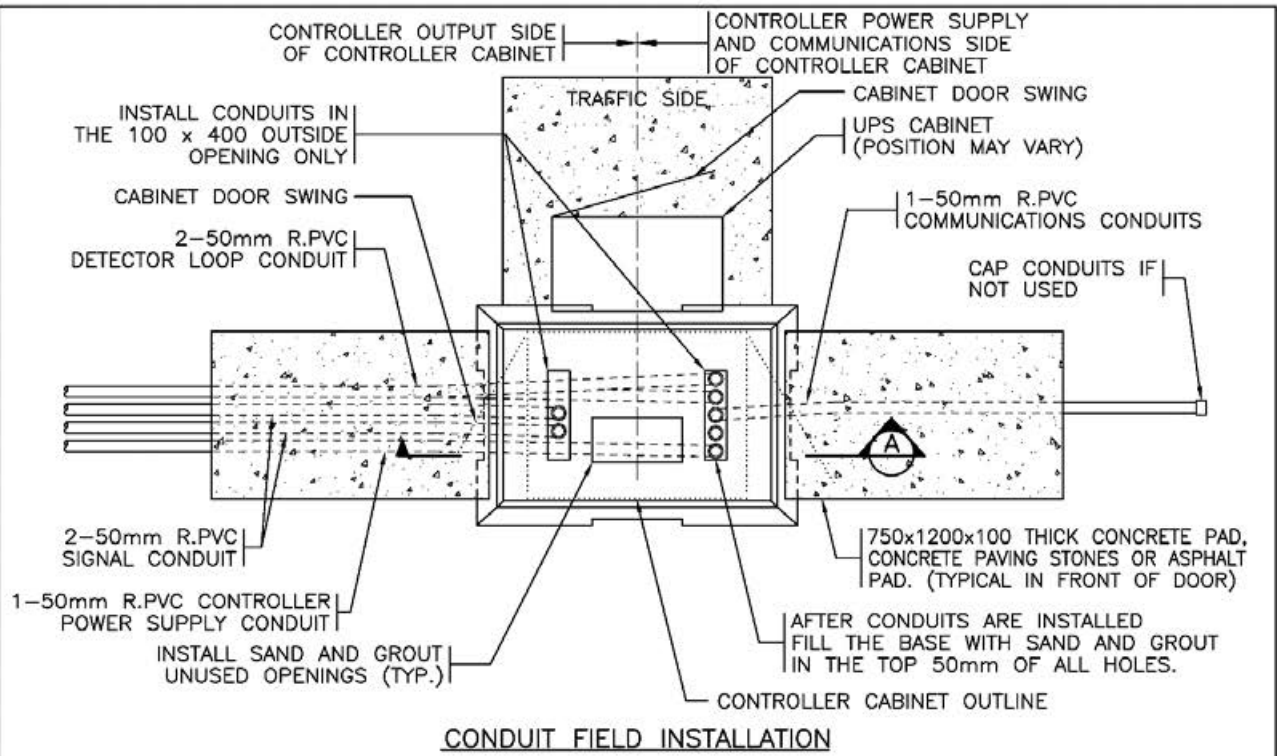
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. INSTALL CONDUITS AND GROUT PRIOR TO CONTROLLER INSTALLATION.
3. CONDUITS AND ROUTING MAY VARY. EXACT CONDUIT ROUTING SHALL BE AS INDICATED ON THE TRAFFIC SIGNAL DESIGN DRAWINGS. UTILIZE 75mm SIGNAL CONDUIT FOR SIGNAL CABLE APPLICATIONS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



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No.	Revision	Date	CONTROLLER BASE INSTALLATION DETAILS (FOR TYPE M CABINET)		SPECIFICATION DRAWING No. SP635-1.1.40
F			Date	Approved	
E			05/02/16	D.N. (Signature on File)	
D	UPS CABINET ADDED	APR 17	Chief Highway Engineer		
C	GENERAL REVISIONS	FEB 16			
B	MARKER ADDED TO LOCATE CONDUIT STUBS	AUG 95			
A	GENERAL REVISIONS	AUG 94			



**NOTES**

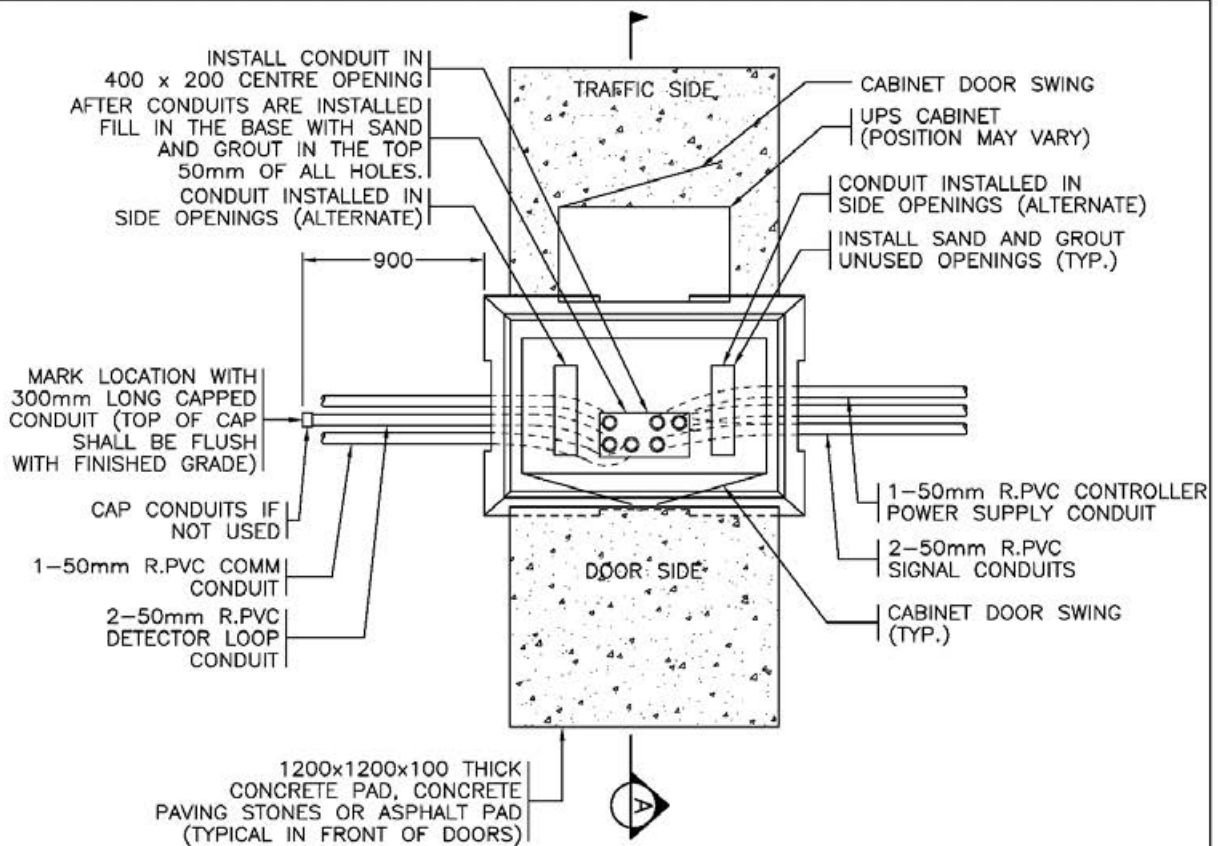
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. INSTALL CONDUITS AND GROUT PRIOR TO CONTROLLER INSTALLATION.
3. CONDUITS AND ROUTING MAY VARY. EXACT CONDUIT ROUTING SHALL BE AS INDICATED ON THE TRAFFIC SIGNAL DESIGN DRAWINGS. UTILIZE 75mm SIGNAL CONDUIT FOR SIGNAL CABLE APPLICATIONS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE

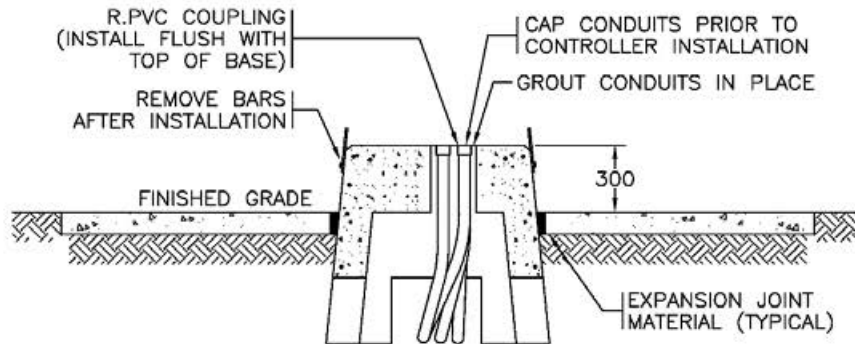


No.	Revision	Date	CONTROLLER BASE INSTALLATION DETAILS (FOR TYPE S CABINET)		SPECIFICATION DRAWING No. SP635-1.1.41
F			Date	Approved	
E			05/02/16	D.N. (Signature on File)	
D	UPS CABINET ADDED	APR 17	Chief Highway Engineer		
C	GENERAL REVISIONS	FEB 16			
B	MARKER ADDED TO LOCATE CONDUIT STUBS	AUG 95			
A	GENERAL REVISIONS	AUG 94			





CONDUIT FIELD INSTALLATION



SECTION A

NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. INSTALL CONDUITS AND GROUT PRIOR TO CONTROLLER INSTALLATION.
3. CONDUITS AND ROUTING MAY VARY. EXACT CONDUIT ROUTING SHALL BE AS INDICATED ON THE TRAFFIC SIGNAL DESIGN DRAWINGS. UTILIZE 75mm SIGNAL CONDUIT FOR SIGNAL CABLE APPLICATIONS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



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No.	Revision	Date	CONTROLLER BASE INSTALLATION DETAILS (FOR TYPE P6 CABINET)	
E			Date	Approved
D			05/02/16	D.N. (Signature on File)
C			Chief Highway Engineer	
B			SPECIFICATION DRAWING No.	
A	NEW DRAWING - PREVIOUS DRAWING 1.1.42 RENUMBERED TO 1.1.43	FEB 16	SP635-1.1.42	

## ANCHOR BOLT REPAIR PROCEDURES

### 1.0 GENERAL

ANCHOR BOLT DAMAGE IS CLASSED AS THE BENDING OR STRETCHING OF THE BOLTS TO THE POINT THAT A POLE CAN NOT BE REMOVED OR INSTALLED.

### 2.0 REPAIR PROCEDURE

REPAIR OF ANCHOR BOLTS SHALL BE AS DETAILED ON DRAWING SP635-1.1.44.

WHERE AN ANCHOR BOLT REQUIRES REPAIR, THE BOLT SHALL BE CUT OFF AND A COUPLER INSTALLED. ANCHOR BOLT COUPLERS SHALL BE USED AS FOLLOWS:

- A) 4 ANCHOR BOLT BASE – MAXIMUM 1 COUPLER PER BASE
- B) 6 TO 8 ANCHOR BOLT BASE – MAXIMUM 2 COUPLERS PER BASE
- C) 10 TO 12 ANCHOR BOLT BASE – MAXIMUM 3 COUPLERS PER BASE

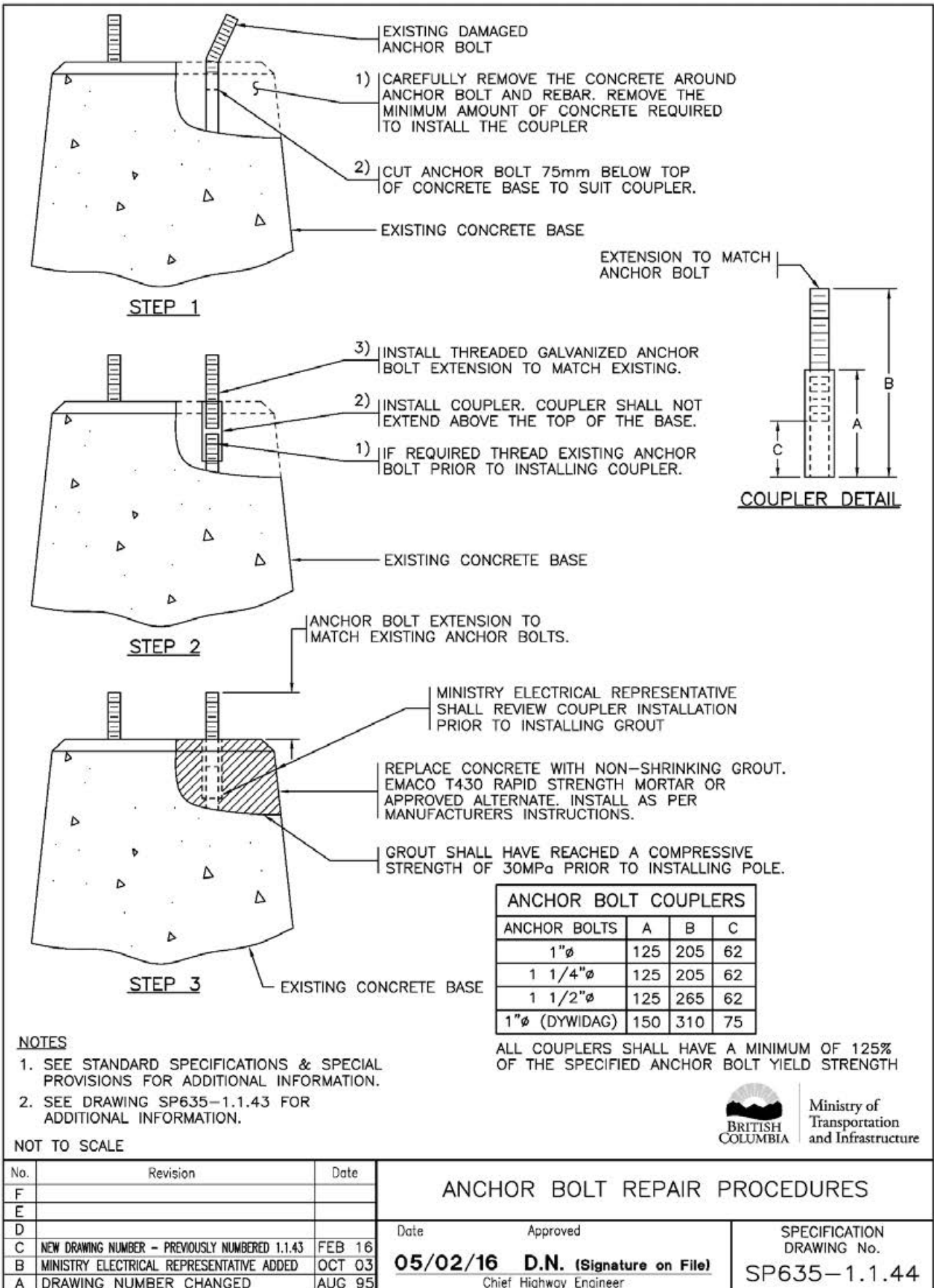
WHERE THE NUMBER OF COUPLERS REQUIRED PER BASE EXCEEDS THE NUMBER ALLOWED, THE BASE MUST BE REPLACED.

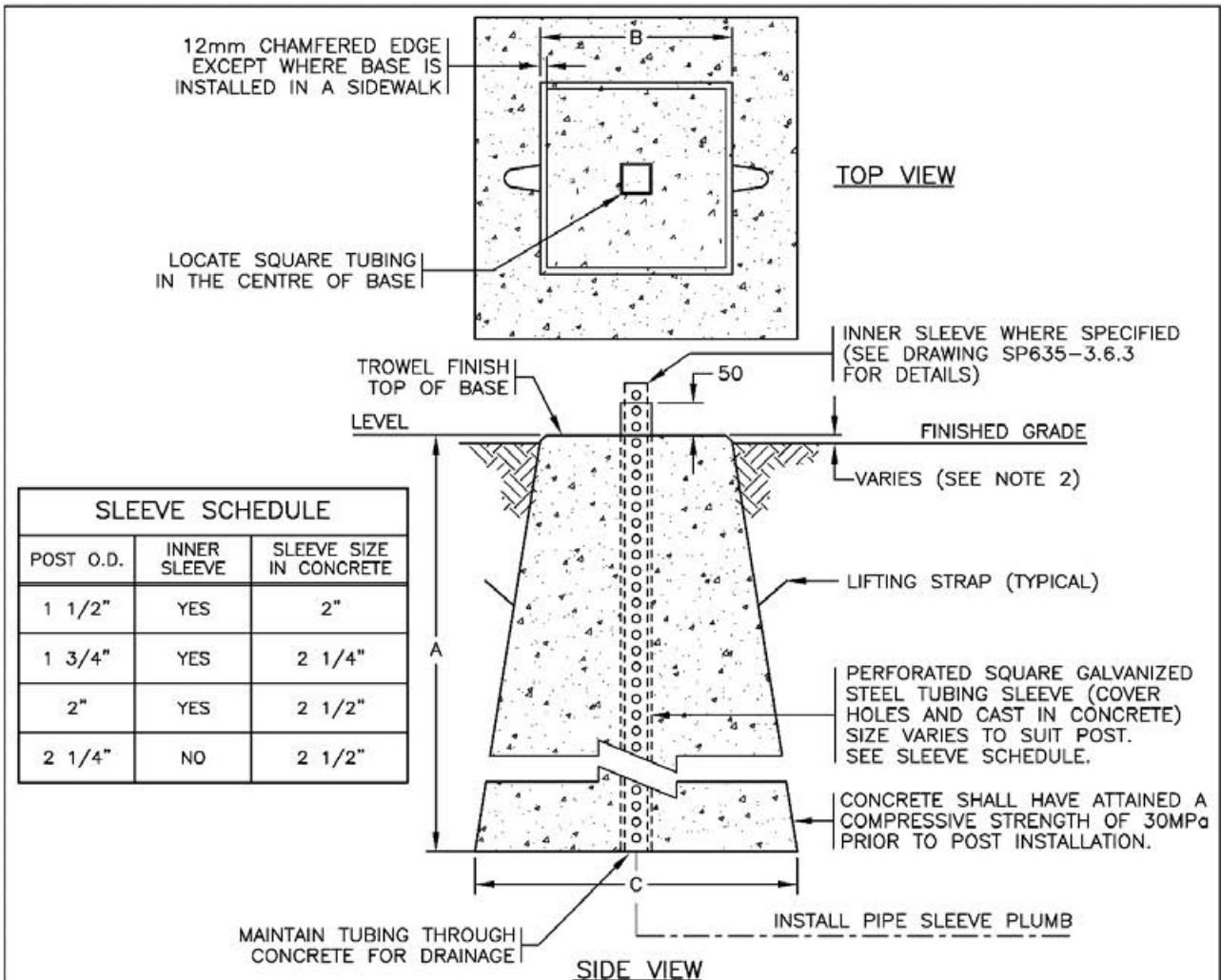
ANY DEVIATIONS FROM THESE PROCEDURES MUST BE APPROVED BY THE "MINISTRY ELECTRICAL REPRESENTATIVE" PRIOR TO CONSTRUCTION.



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No.	Revision	Date	<b>ANCHOR BOLT REPAIR PROCEDURES</b>	
F				
E				
D			Date	Approved
C	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 1.1.42	FEB 16	<b>05/02/16</b>	<b>D.N. (Signature on File)</b> Chief Highway Engineer
B	REFERENCE CHANGED TO "MINISTRY ELECTRICAL REPRESENTATIVE"	OCT 03		
A	DRAWING NUMBER CHANGED	AUG 95		
			SPECIFICATION DRAWING No.	<b>SP635-1.1.43</b>





SLEEVE SCHEDULE		
POST O.D.	INNER SLEEVE	SLEEVE SIZE IN CONCRETE
1 1/2"	YES	2"
1 3/4"	YES	2 1/4"
2"	YES	2 1/2"
2 1/4"	NO	2 1/2"

BASE TYPE	APPLICATION	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C
a	SINGLE POST SIGNS IN PAVED ISLANDS OR CONCRETE SIDEWALKS	34 kg	0.015 m <sup>3</sup>	400	160	230
b	SINGLE OR TWO POST SIGNS IN GRAVEL SHOULDER UP TO 1.0 x 1.2m	166 kg	0.068 m <sup>3</sup>	470	300	460
c	TWO POST SIGNS IN GRAVEL SHOULDER UP TO 1.0 x 1.2m ≤ 1.2 x 2.4m	390 kg	0.16 m <sup>3</sup>	750	330	600

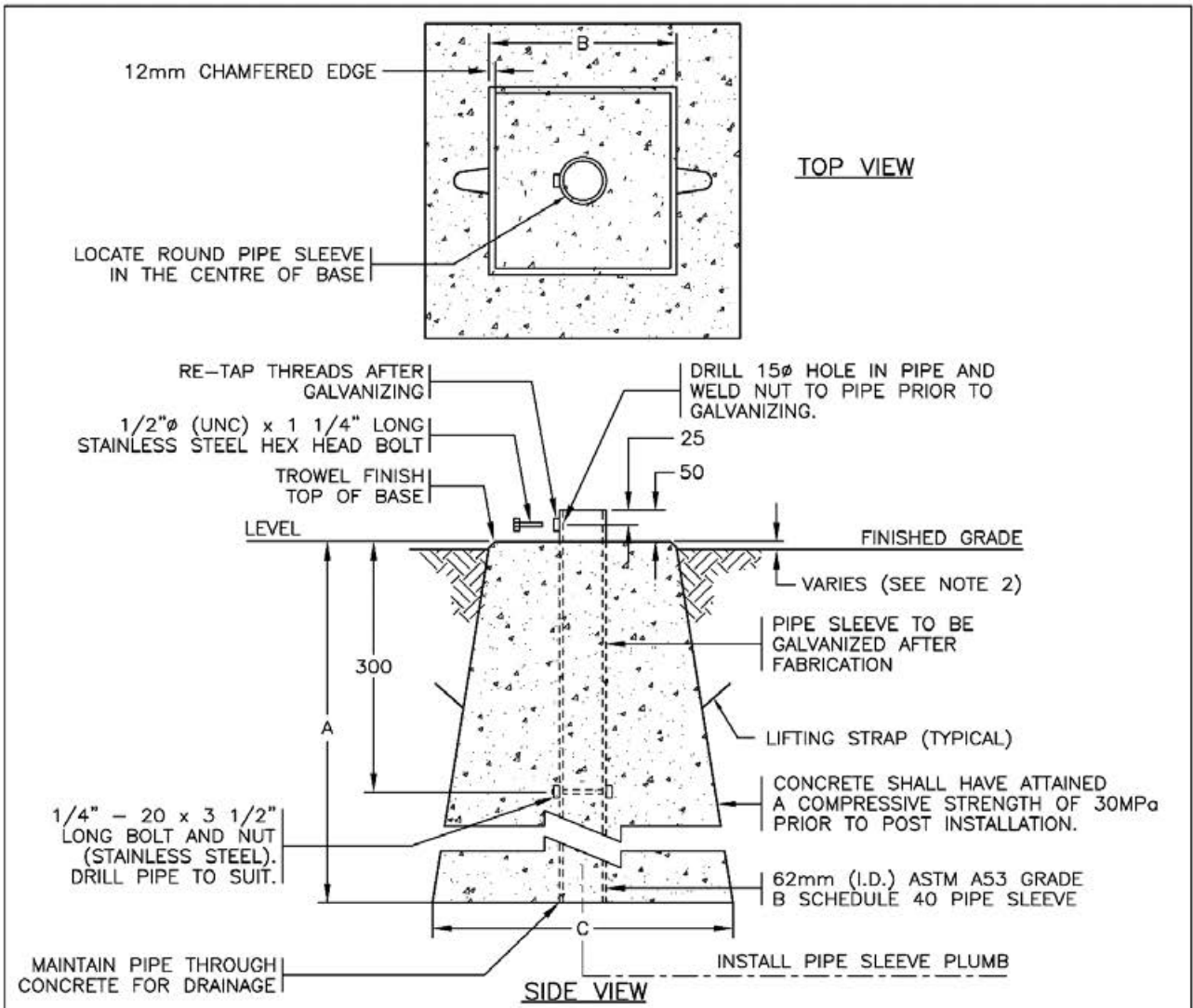
**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- BASE SHALL BE INSTALLED 25mm ABOVE FINISHED GRADE EXCEPT WHERE INSTALLED IN SIDEWALK IT SHALL BE FLUSH WITH TOP OF SIDEWALK WITH NO CHAMFERED EDGE.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	TRAPEZOIDAL CONCRETE BASES FOR PERFORATED SQUARE STEEL SIGN POSTS (PRECAST OR CAST IN PLACE)		SPECIFICATION DRAWING No. <b>SP635-1.1.45</b>
F					
E			Date	Approved	
D			<b>05/02/16</b>	<b>D.N. (Signature on File)</b>	
C	GENERAL REVISIONS	APR 20	Chief Engineer		
B	GENERAL REVISIONS	APR 17			
A	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 1.1.44	FEB 16			



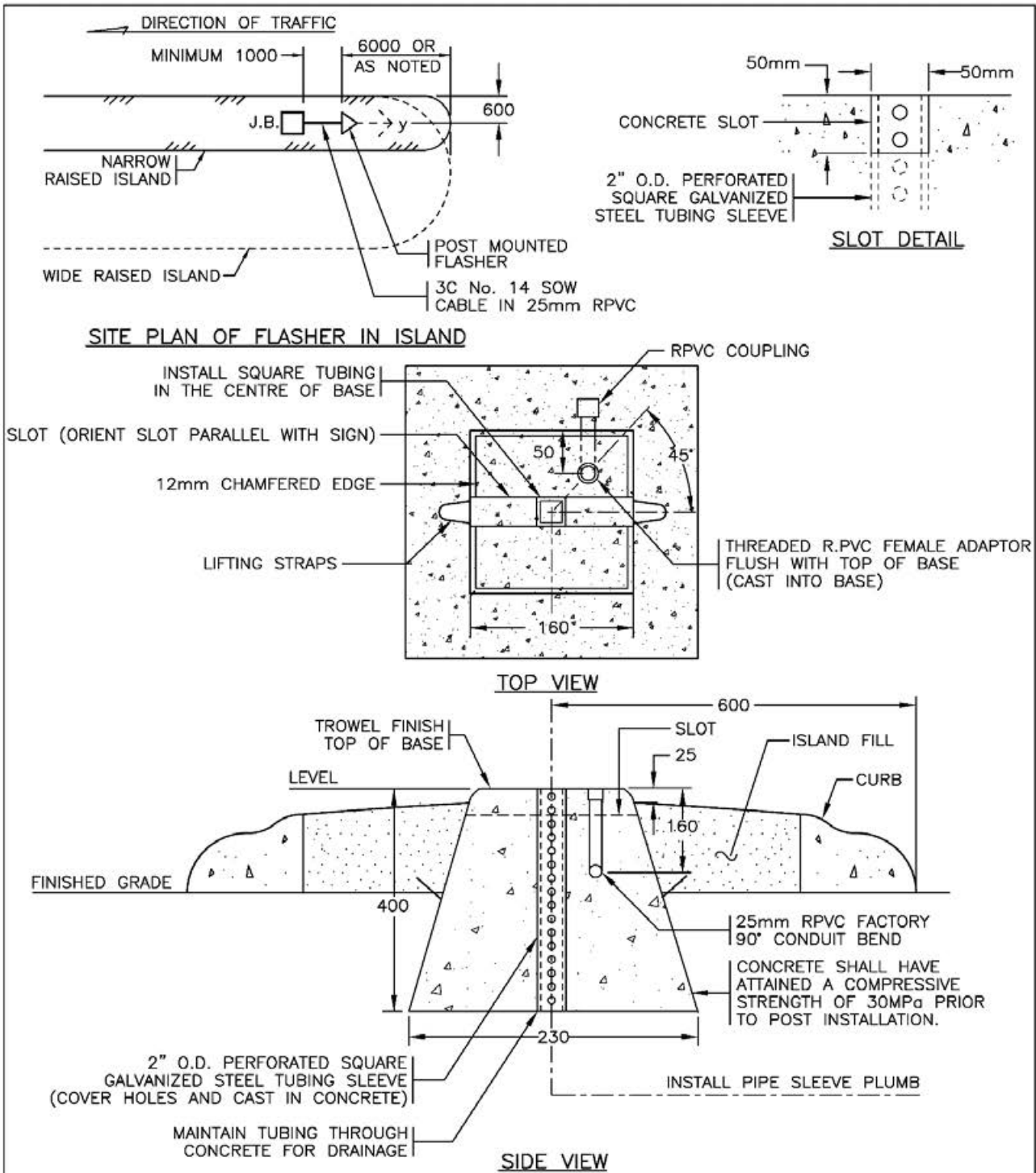
BASE TYPE	APPLICATION	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C
a	SINGLE POST SIGNS IN PAVED ISLANDS OR CONCRETE SIDEWALKS	34 kg	0.015 m <sup>3</sup>	400	160	230
b	SINGLE OR TWO POST SIGNS IN GRAVEL SHOULDER UP TO 1.0 x 1.2m	166 kg	0.068 m <sup>3</sup>	470	300	460
c	TWO POST SIGNS IN GRAVEL SHOULDER UP TO 1.0 x 1.2m ≤ 1.2 x 2.4m	390 kg	0.16 m <sup>3</sup>	750	330	600

- NOTES**
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  - BASE SHALL BE INSTALLED 25mm ABOVE FINISHED GRADE EXCEPT WHERE INSTALLED IN SIDEWALK IT SHALL BE FLUSH WITH TOP OF SIDEWALK WITH NO CHAMFERED EDGE.
  - ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	TRAPEZOIDAL CONCRETE BASE FOR ROUND STEEL SIGN POST (PRECAST OR CAST IN PLACE)		
F					
E					
D					
C	TITLE UPDATED	APR 20	Date	Approved	SPECIFICATION DRAWING No. SP635-1.1.46
B	GENERAL REVISIONS	APR 17	05/02/16	D.N. (Signature on File)	
A	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 1.1.45	FEB 16		Chief Engineer	

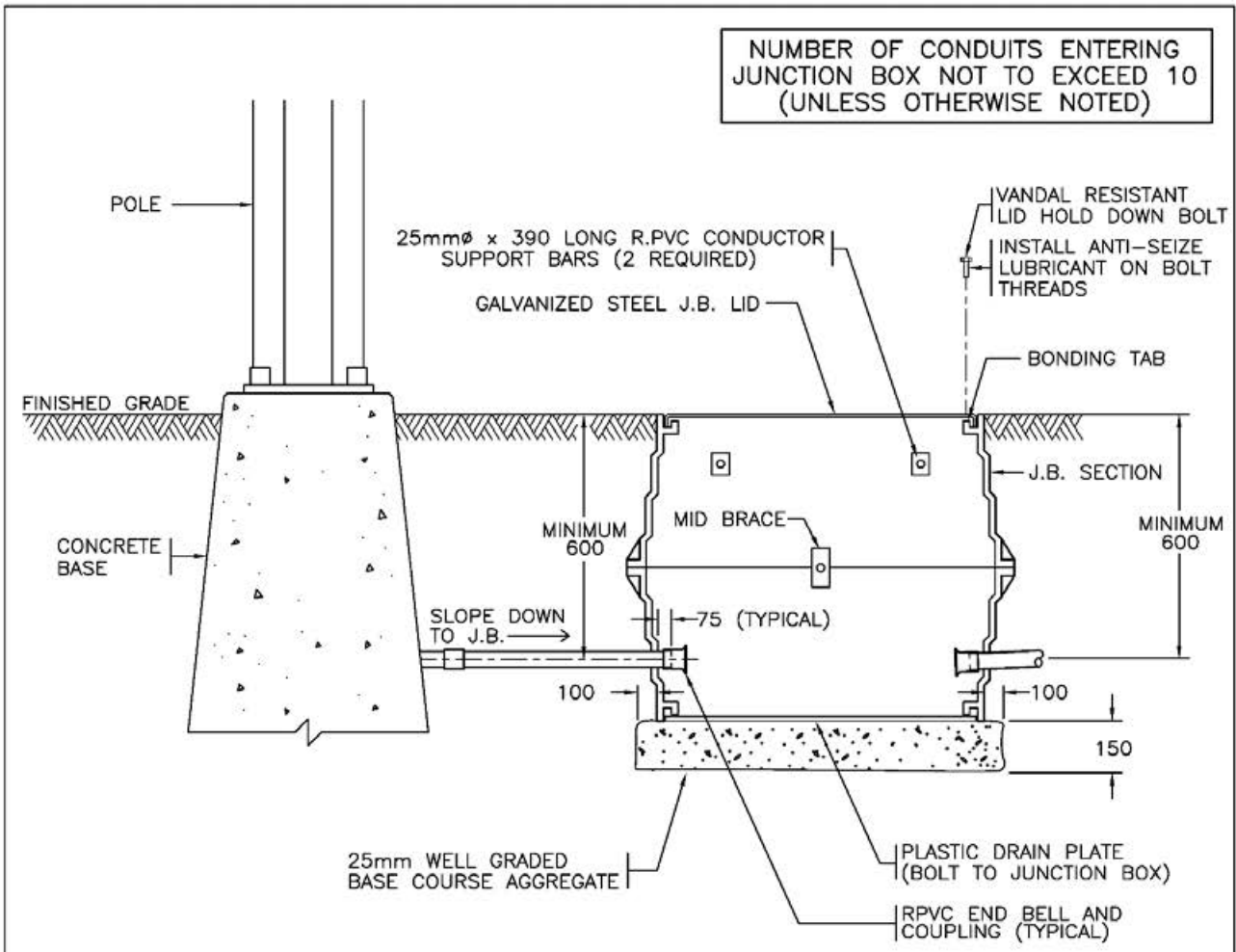


**NOTES**  
 1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.



NOT TO SCALE

No.	Revision	Date	TRAPEZOIDAL POST MOUNTED FLASHER CONCRETE BASE (PRECAST OR CAST IN PLACE)		
F					
E			Date	Approved	SPECIFICATION DRAWING No. SP635-1.1.47
D			05/02/16	D.N. (Signature on File) Chief Highway Engineer	
C	GENERAL REVISIONS	APR 20			
B	GENERAL REVISIONS	APR 17			
A	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 1.1.46	FEB 16			



**TYPE 6 JUNCTION BOX**

- TWO J.B. SECTIONS
- ONE LID
- ONE MID BRACE
- ONE DRAIN PLATE

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. PLACE LID ON BOX & MID BRACE INSIDE BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

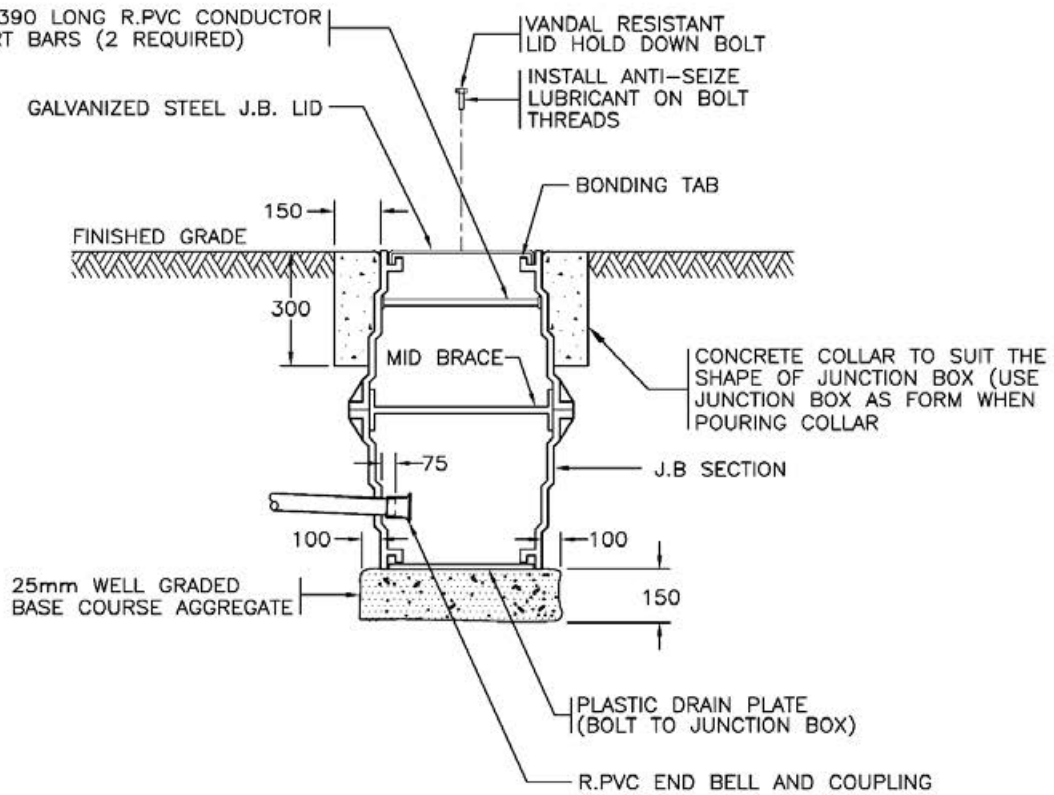
NOT TO SCALE



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and Infrastructure

No.	Revision	Date	TYPE 6 RECTANGULAR PLASTIC JUNCTION BOX INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-1.2.1
E			Date	Approved	
D	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98	Chief Highway Engineer		
B	LID STOCK NUMBER REVISED	AUG 96			
A	GENERAL REVISIONS	AUG 94			

NUMBER OF CONDUITS ENTERING  
JUNCTION BOX NOT TO EXCEED 10  
(UNLESS OTHERWISE NOTED)



**\* TYPE 6 'SPECIAL' JUNCTION BOX**

- TWO J.B. SECTIONS
- ONE LID
- ONE MID BRACE
- ONE DRAIN PLATE

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. PLACE LID ON BOX & MID BRACE INSIDE BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

DENOTED AS 6\*  
ON DRAWINGS

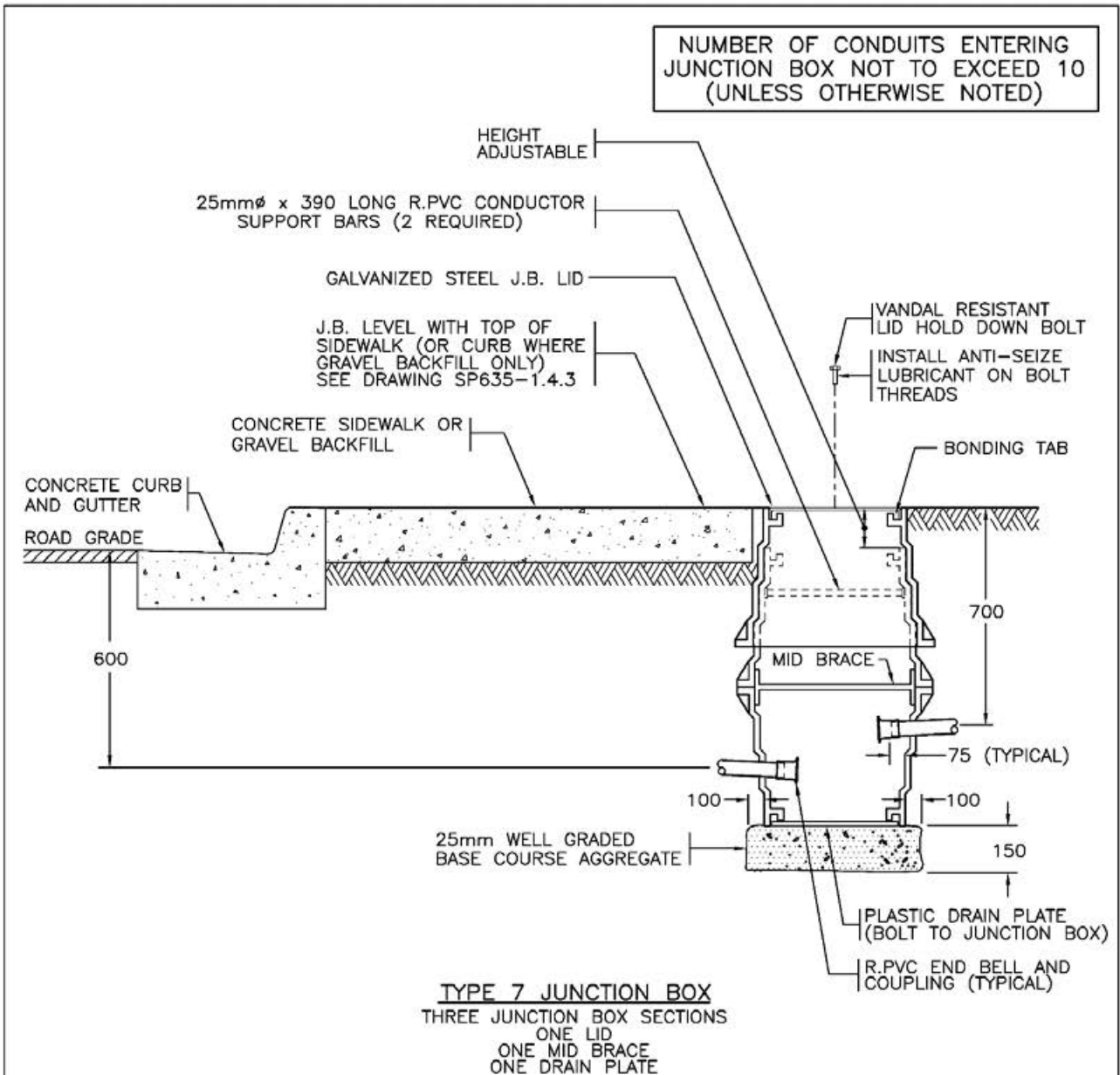
NOT TO SCALE



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and Infrastructure

No.	Revision	Date	TYPE 6 'SPECIAL' RECTANGULAR PLASTIC JUNCTION BOX INSTALLATION DETAILS	
E				
D	GENERAL REVISIONS	APR 17		
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98	Date	Approved
B	LID STOCK NUMBER REVISED	AUG 96	30/09/93	E.L. (Signature on File)
A	GENERAL REVISIONS	AUG 94	SPECIFICATION DRAWING No. SP635-1.2.2	
			Chief Highway Engineer	





**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. PLACE LID ON BOX & MID BRACE INSIDE BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

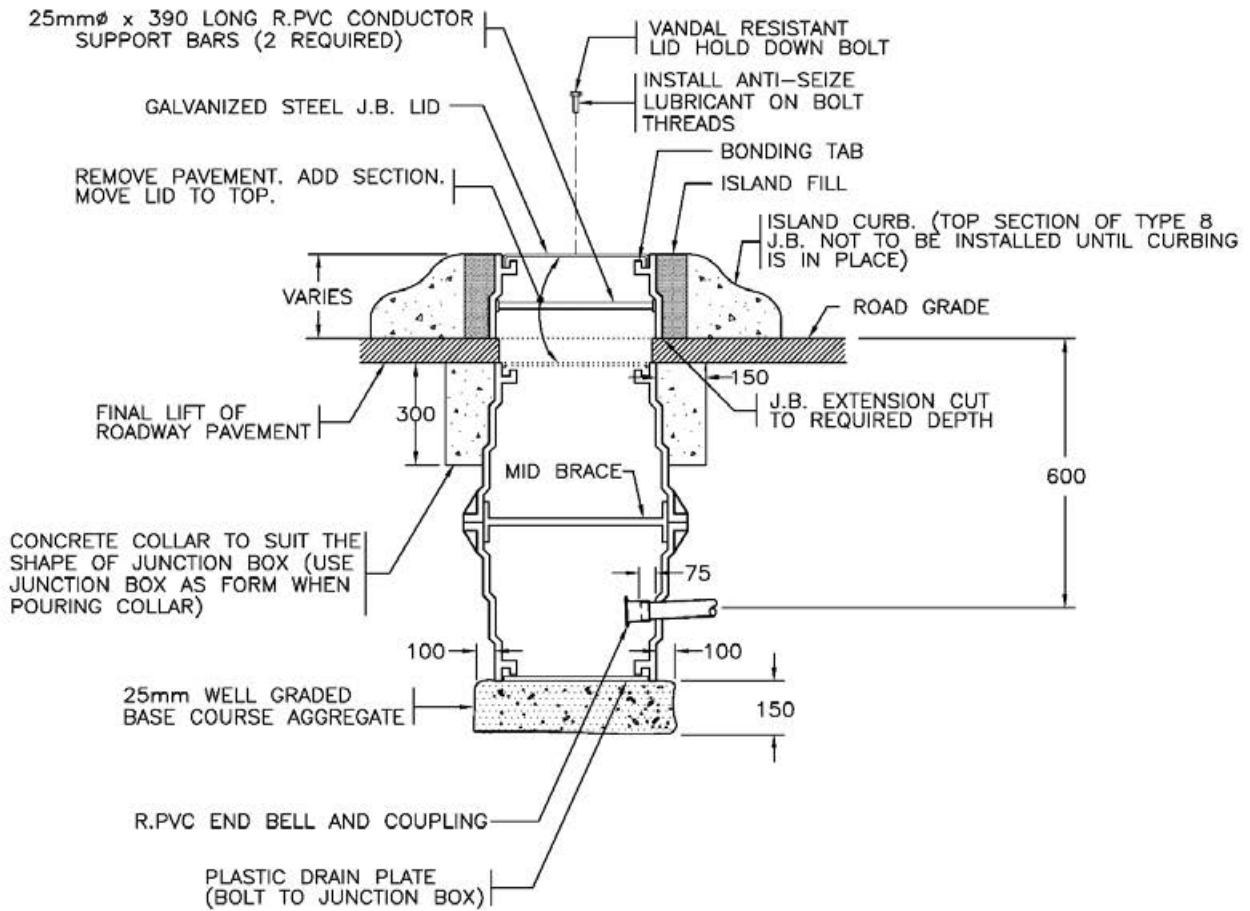
NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	TYPE 7 RECTANGULAR PLASTIC JUNCTION BOX INSTALLATION DETAILS		SPECIFICATION DRAWING No.
E					
D	GENERAL REVISIONS	APR 17			
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98	Date	Approved	
B	LID STOCK NUMBER REVISED	AUG 96	30/09/93	E.L. (Signature on File)	
A	GENERAL REVISIONS	AUG 94	Chief Highway Engineer		SP635-1.2.3

NUMBER OF CONDUITS ENTERING JUNCTION BOX NOT TO EXCEED 10 (UNLESS OTHERWISE NOTED)



**TYPE 8 JUNCTION BOX**  
 THREE JUNCTION BOX SECTIONS  
 ONE LID  
 ONE MID BRACE  
 ONE DRAIN PLATE

**NOTES**

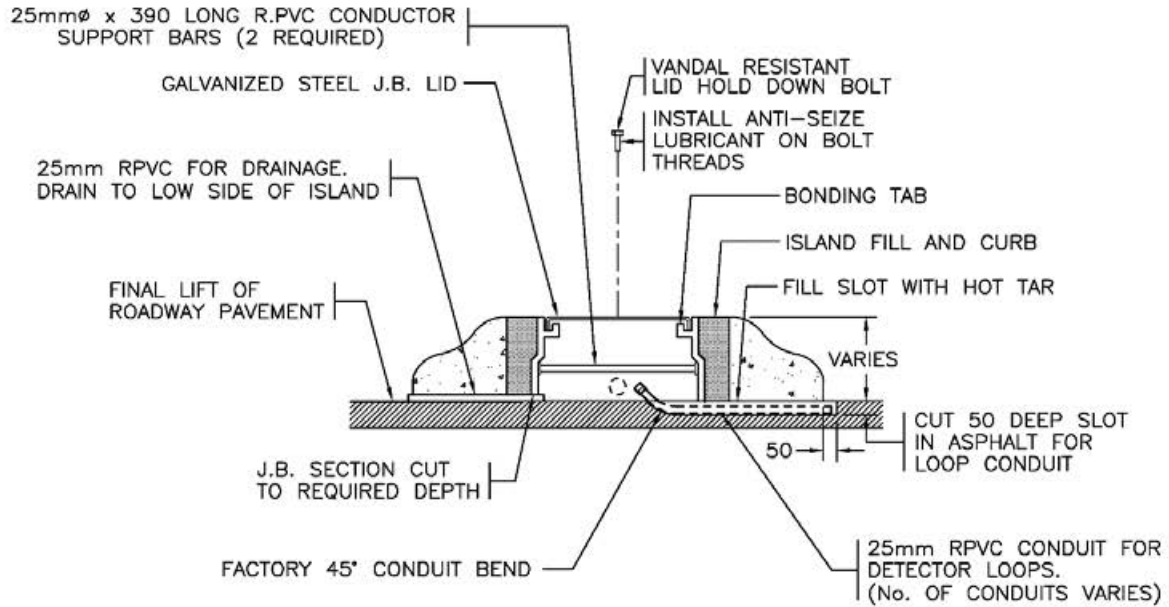
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. PLACE LID ON BOX & MID BRACE INSIDE BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



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No.	Revision	Date	TYPE 8 RECTANGULAR PLASTIC JUNCTION BOX INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-1.2.4
E			Date	Approved	
D	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98	Chief Highway Engineer		
B	LID STOCK NUMBER REVISED	AUG 96			
A	GENERAL REVISIONS	AUG 94			



**TYPE 9 JUNCTION BOX**  
ONE JUNCTION BOX SECTION  
ONE LID

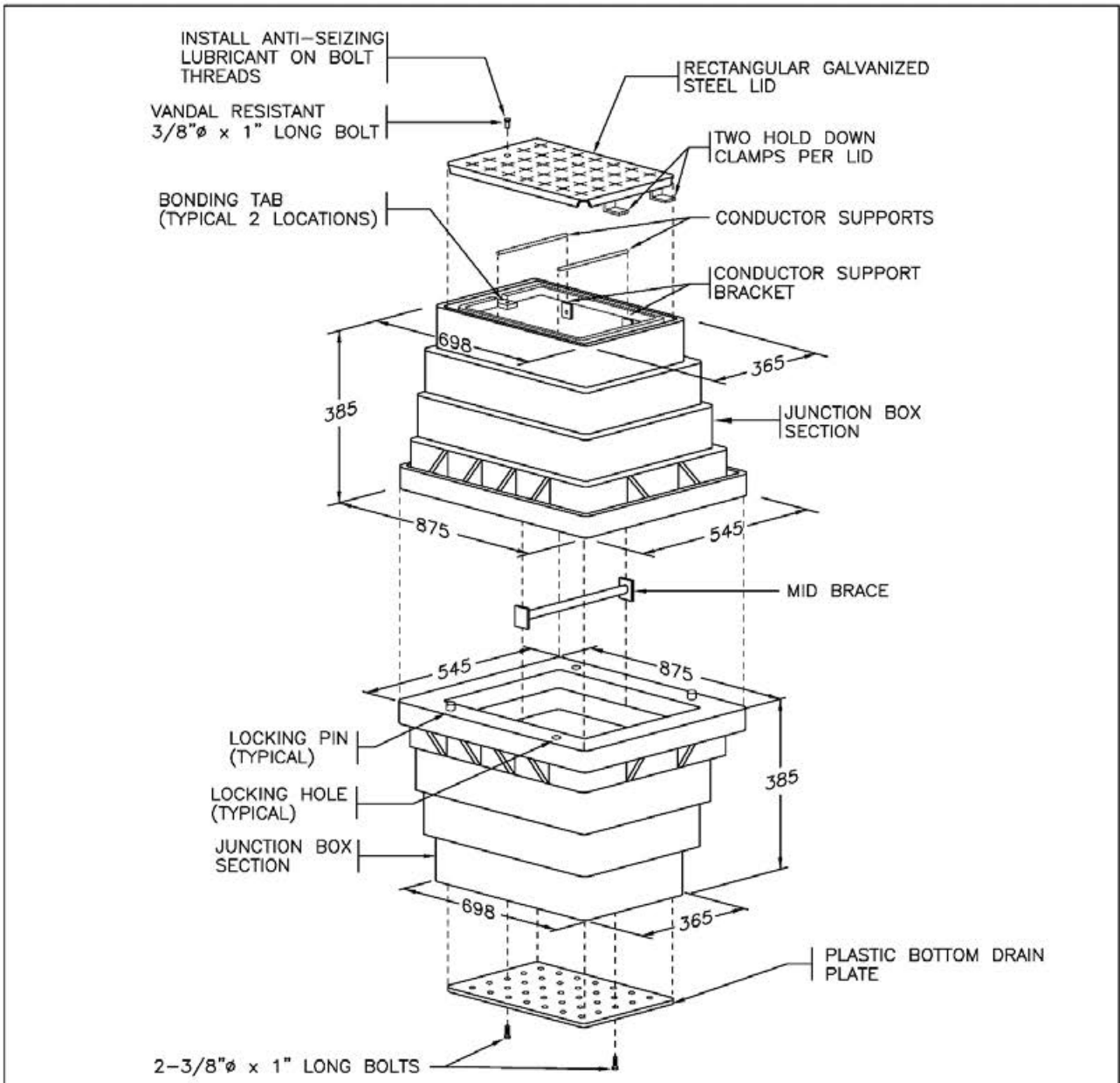
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. PLACE LID ON BOX & MID BRACE INSIDE BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	TYPE 9 RECTANGULAR PLASTIC JUNCTION BOX INSTALLATION DETAILS		SPECIFICATION DRAWING No.
E					
D	GENERAL REVISIONS	APR 17	Date	Approved	
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98	30/09/93	E.L. (Signature on File)	
B	LID STOCK NUMBER REVISED	AUG 96	Chief Highway Engineer		SP635-1.2.5
A	GENERAL REVISIONS	AUG 94			



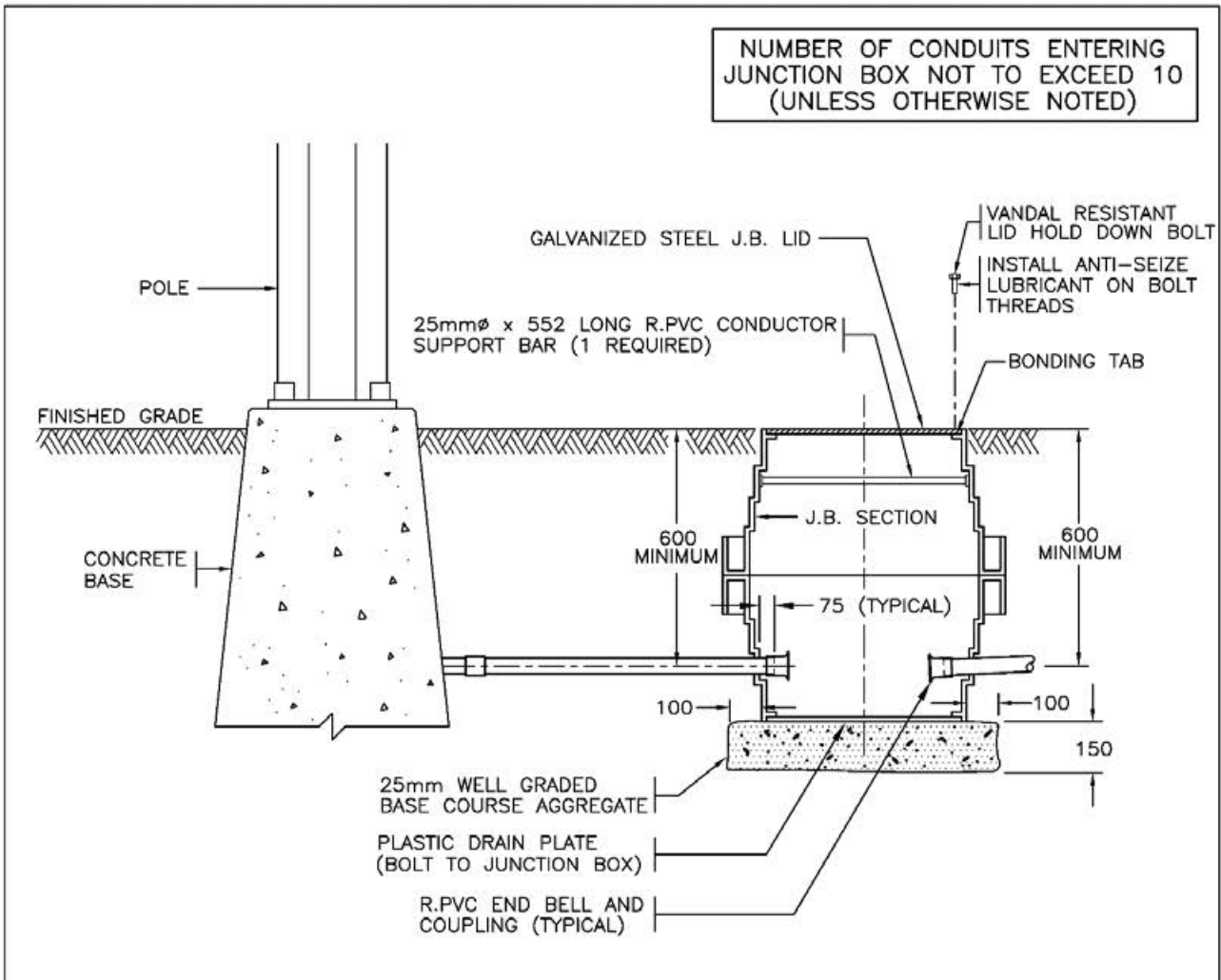
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. PLACE LID ON BOX & MID BRACE INSIDE BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	RECTANGULAR PLASTIC JUNCTION BOX DETAILS		SPECIFICATION DRAWING No. SP635-1.2.6
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D	GENERAL REVISIONS	APR 17	Chief Highway Engineer		
C	ANTI-SEIZING LUBRICANT NOTED	NOV 98			
B	LID STOCK NUMBER REVISED	AUG 96			
A	GENERAL REVISIONS	AUG 94			



**TYPE 10 JUNCTION BOX**  
 TWO J.B. SECTIONS  
 ONE PLASTIC LID OR ONE STEEL LID  
 ONE DRAIN PLATE

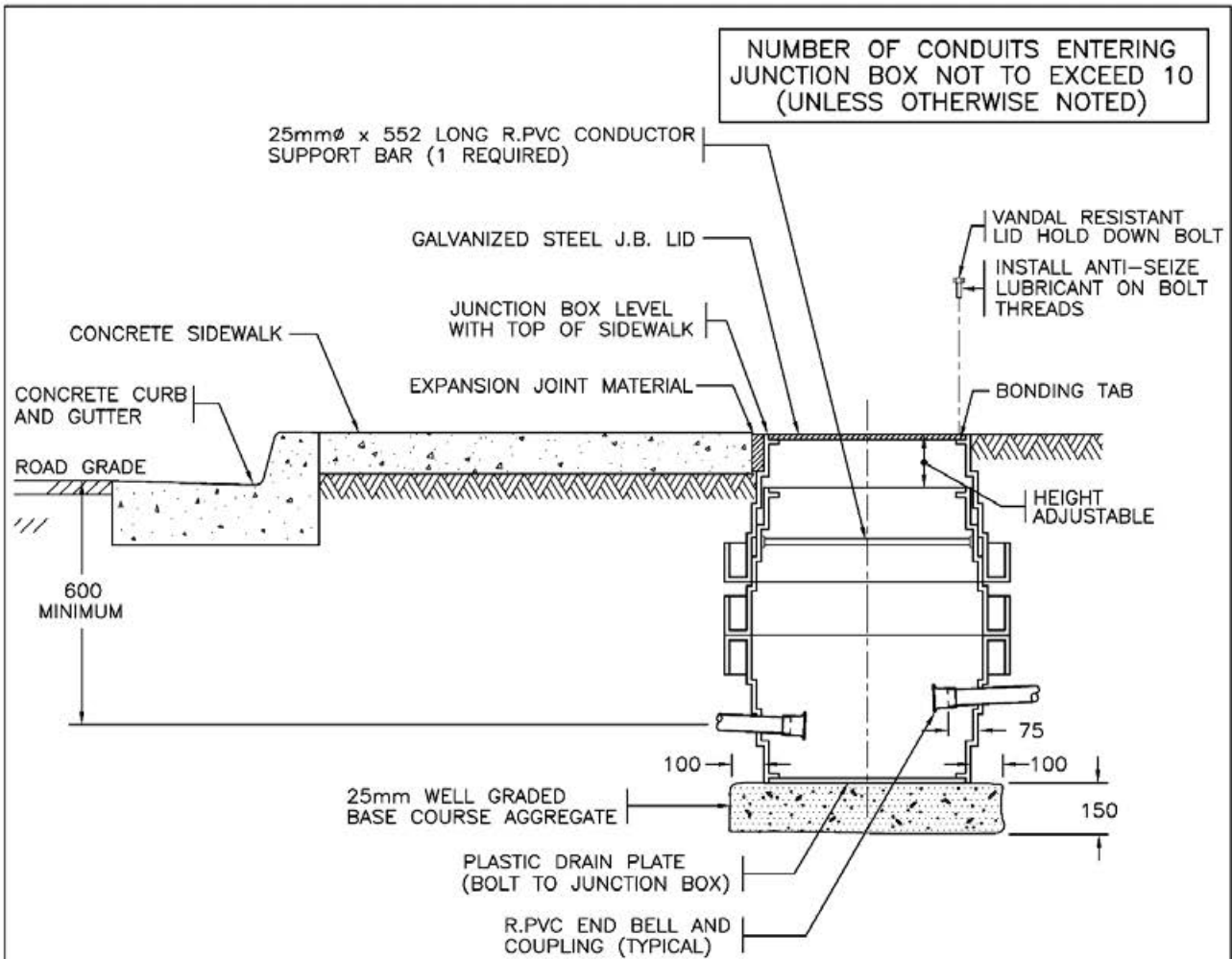
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. BOLT DOWN LID ON BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



NOT TO SCALE

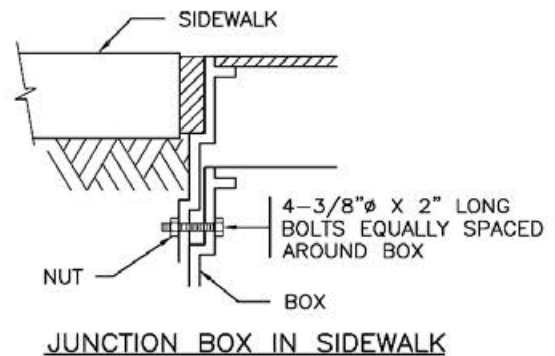
No.	Revision	Date	TYPE 10 ROUND PLASTIC JUNCTION BOX INSTALLATION DETAILS		SPECIFICATION DRAWING No.
E					
D	GENERAL REVISIONS	APR 17			
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98	Date	Approved	
B	LID & DRAIN PLATE STOCK NUMBER REVISED	AUG 96	<b>30/09/93</b>	<b>E.L. (Signature on File)</b>	
A	GENERAL REVISIONS	AUG 94	Chief Highway Engineer		<b>SP635-1.2.7</b>



**TYPE 11 JUNCTION BOX**  
 THREE JUNCTION BOX SECTIONS  
 ONE STEEL LID  
 ONE DRAIN PLATE

**NOTES**

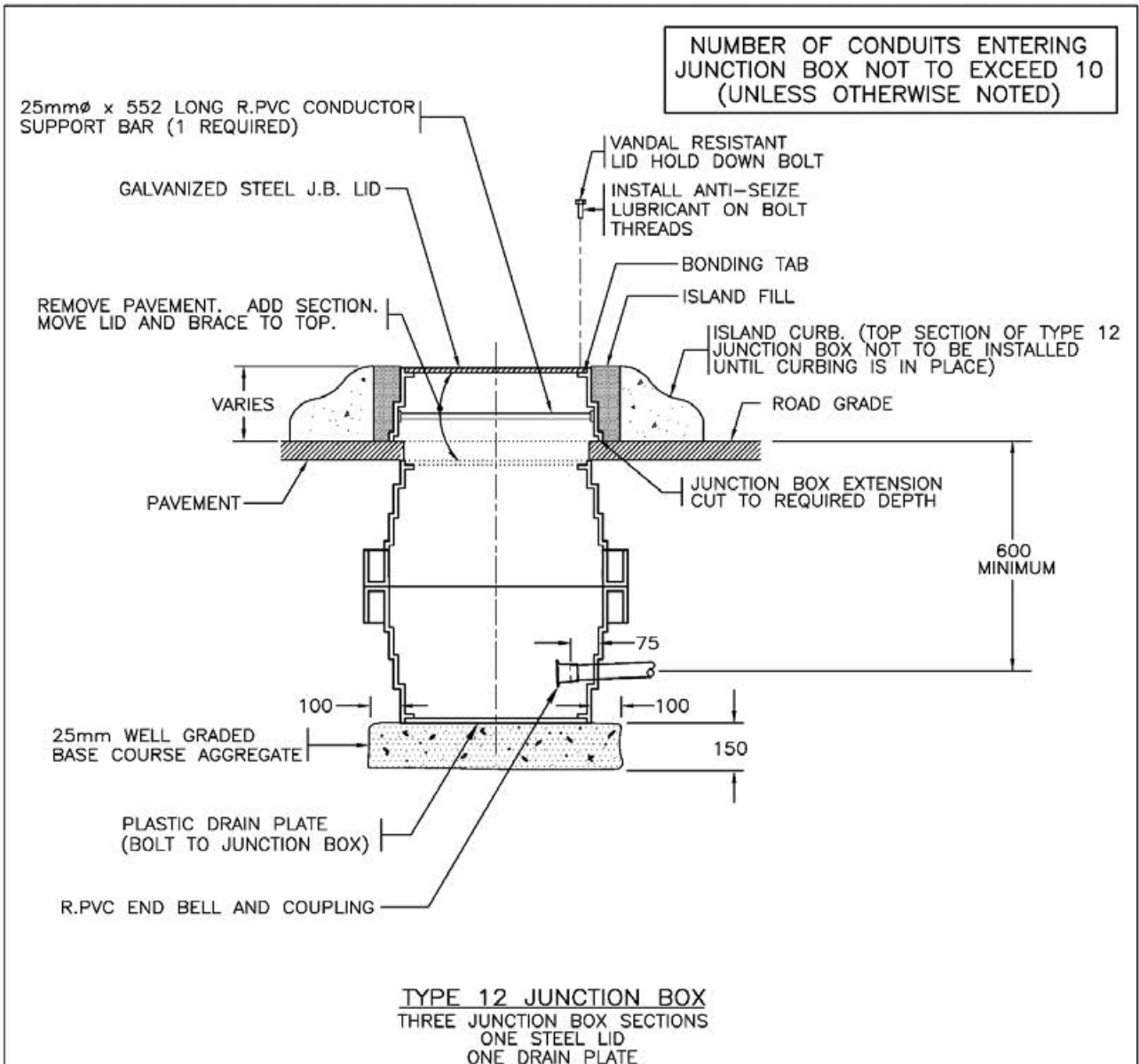
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. BOLT DOWN LID ON BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



NOT TO SCALE



No.	Revision	Date	TYPE 11 ROUND PLASTIC JUNCTION BOX INSTALLATION DETAILS	
F	GENERAL REVISIONS	APR 17	Date	Approved
E	DETAIL REVISED	APR 05	30/09/93	E.L. (Signature on File)
D	DETAIL ADDED	OCT 03	SPECIFICATION DRAWING No. SP635-1.2.8	
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98	Chief Highway Engineer	
B	LID & DRAIN PLATE STOCK NUMBER REVISED	AUG 96		



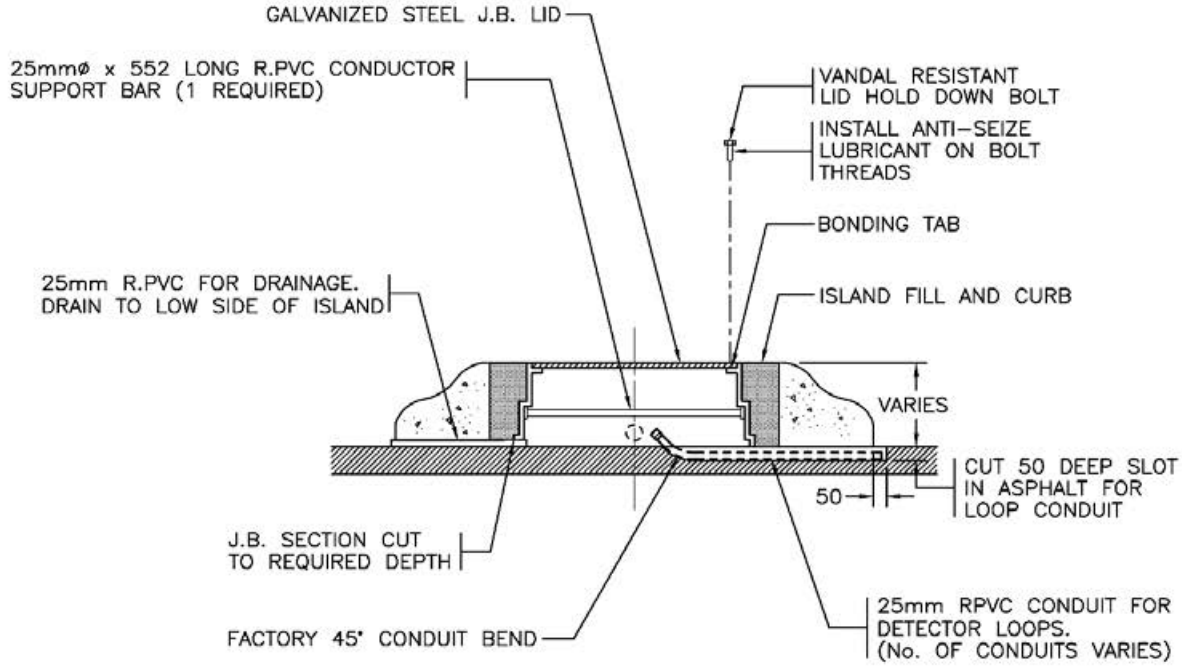
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. BOLT DOWN LID ON BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



NOT TO SCALE

No.	Revision	Date	TYPE 12 ROUND PLASTIC JUNCTION BOX INSTALLATION DETAILS		
E					
D	GENERAL REVISIONS	APR 17			
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98	Date	Approved	SPECIFICATION DRAWING No.
B	LID & DRAIN PLATE STOCK NUMBER REVISED	AUG 96	<b>30/09/93</b>	<b>E.L. (Signature on File)</b>	<b>SP635-1.2.9</b>
A	GENERAL REVISIONS	AUG 94	Chief Highway Engineer		



**TYPE 13 JUNCTION BOX**  
ONE JUNCTION BOX SECTION  
ONE STEEL LID

**NOTES**

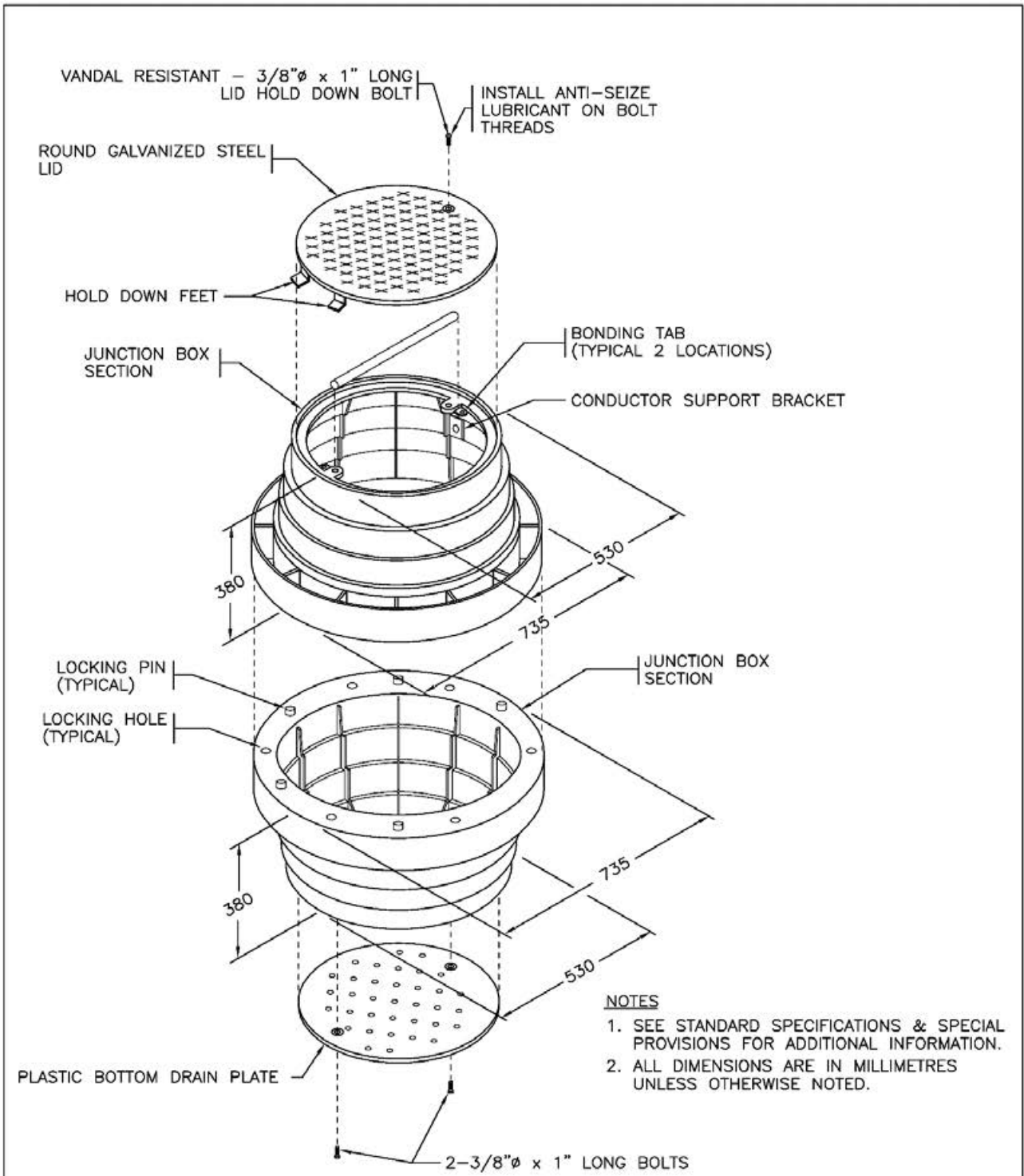
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. BOLT DOWN LID ON BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. SEE DRAWINGS SP635-1.4.1, 1.4.2 & 1.4.3 FOR J.B. INSTALLATION DETAILS.
4. ALL CONDUITS SHALL DRAIN TO J.B.'S
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	TYPE 13 ROUND PLASTIC JUNCTION BOX INSTALLATION DETAILS	
E	GENERAL REVISIONS	APR 17	Date Approved <b>30/09/93 E.L. (Signature on File)</b> Chief Highway Engineer	
D	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98		
C	STEEL LID STOCK NUMBER REVISED	AUG 96		
B	STEEL LID TYPE NOTE CHANGED	AUG 95		
A	GENERAL REVISIONS	AUG 94		
			SPECIFICATION DRAWING No. <b>SP635-1.2.10</b>	



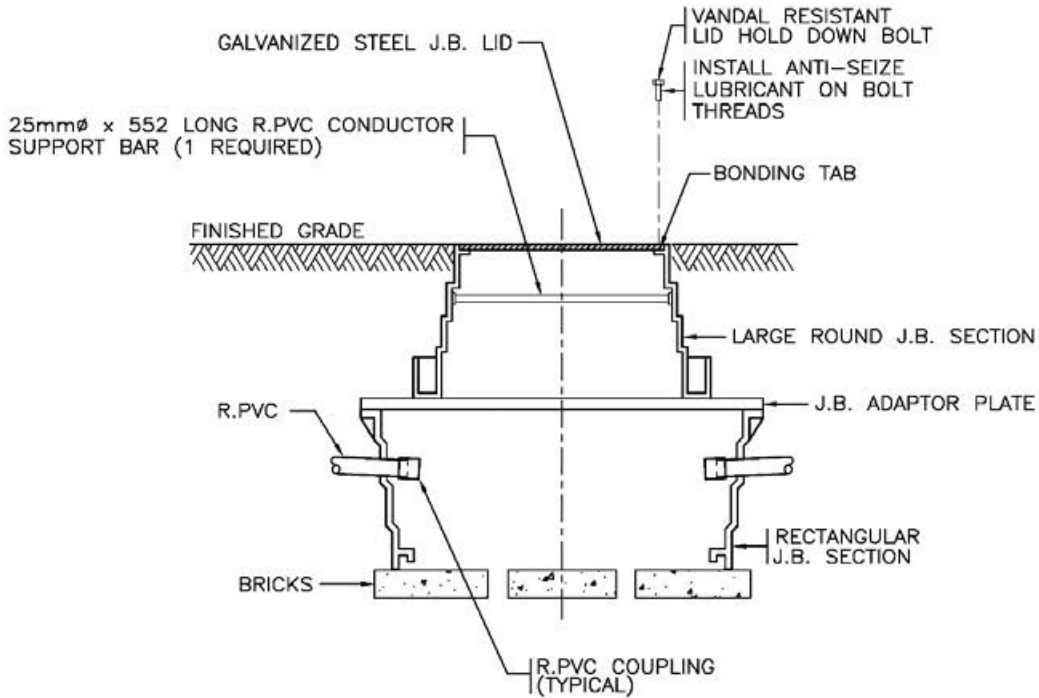


- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	ROUND PLASTIC JUNCTION BOX DETAILS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-1.2.11
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	ANTI-SEIZING LUBRICANT NOTED	NOV 98			
C	STEEL LID STOCK NUMBER REVISED	AUG 96			
B	STEEL LID REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



**JUNCTION BOX**  
 ONE J.B. SECTION  
 ONE STEEL LID  
 ONE J.B. ADAPTOR

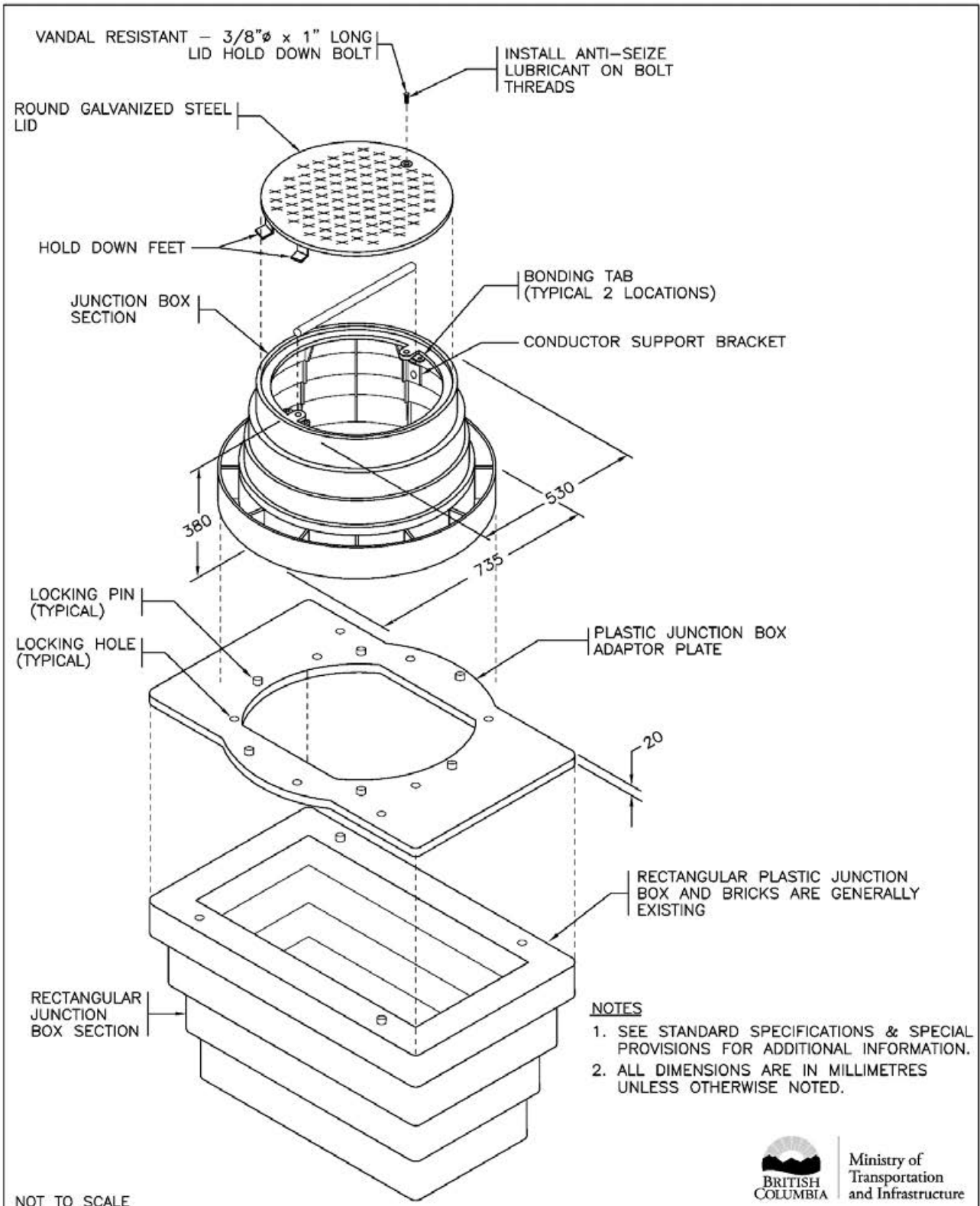
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. BOLT DOWN LID ON BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



NOT TO SCALE

No.	Revision	Date	RECTANGULAR TO ROUND PLASTIC JUNCTION BOX INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-1.2.12
E			Date	Approved	
D	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98			
B	LID & JUNCTION BOX STOCK NUMBER REVISED	AUG 96			
A	GENERAL REVISIONS	AUG 94			

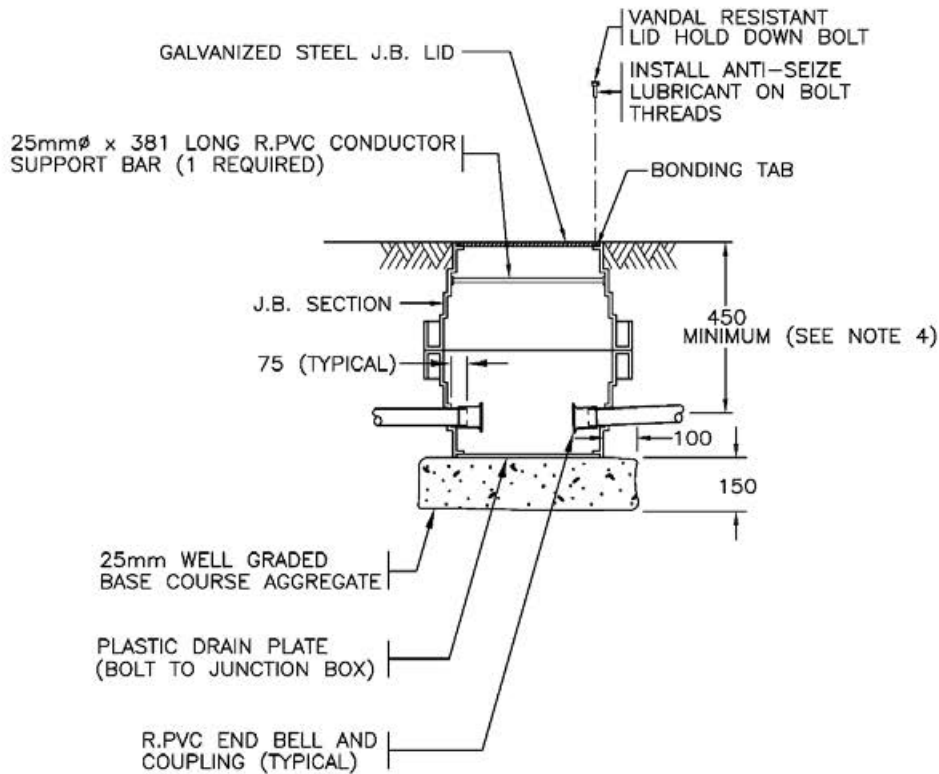


- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



NOT TO SCALE

No.	Revision	Date	RECTANGULAR TO ROUND PLASTIC JUNCTION BOX ADAPTOR DETAILS		SPECIFICATION DRAWING No. SP635-1.2.13
F			Date	Approved	
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	ANTI-SEIZING LUBRICANT NOTED	NOV 98			
C	LID STOCK NUMBER REVISED	AUG 96			
B	STEEL LID REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



**TYPE 14 JUNCTION BOX**

TWO J.B. SECTIONS  
ONE STEEL LID  
ONE DRAIN PLATE

**NOTES**

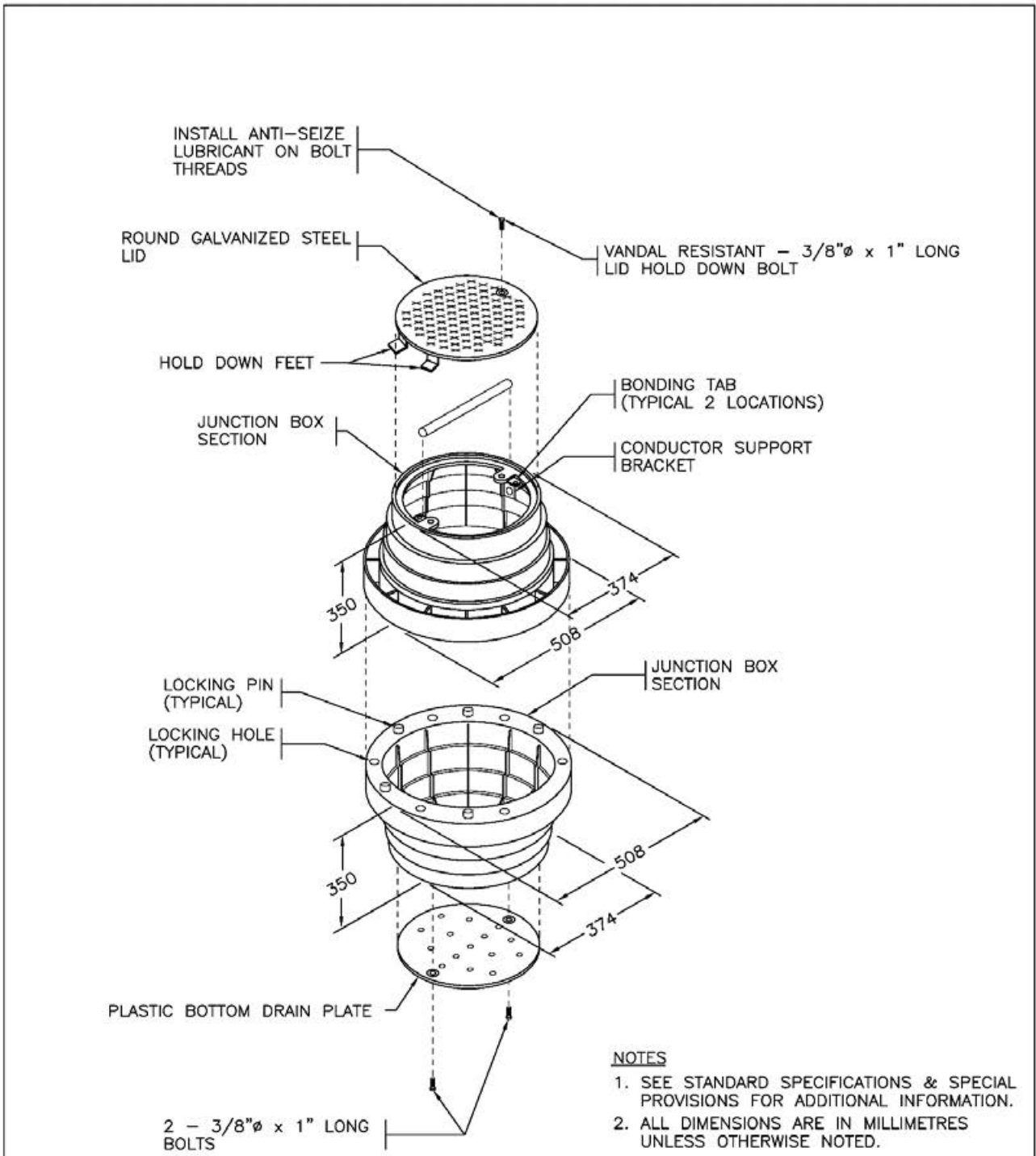
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. BOLT DOWN LID ON BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. ALL CONDUITS SHALL DRAIN TO J.B.'S
4. SEE CEC FOR APPLICATIONS ALLOWABLE FOR CONDUITS BURIED AT THE 450MM DEPTH.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



Ministry of  
Transportation  
and Infrastructure

NOT TO SCALE

No.	Revision	Date	TYPE 14 SMALL ROUND PLASTIC JUNCTION BOX INSTALLATION DETAILS	
E			Date	Approved
D				
C	NOTE 4 ADDED	APR 20		
B	GENERAL REVISIONS	APR 17		
A	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98	<b>17/11/94</b> Chief Highway Engineer	<b>E.L. (Signature on File)</b> SPECIFICATION DRAWING No. <b>SP635-1.2.14</b>

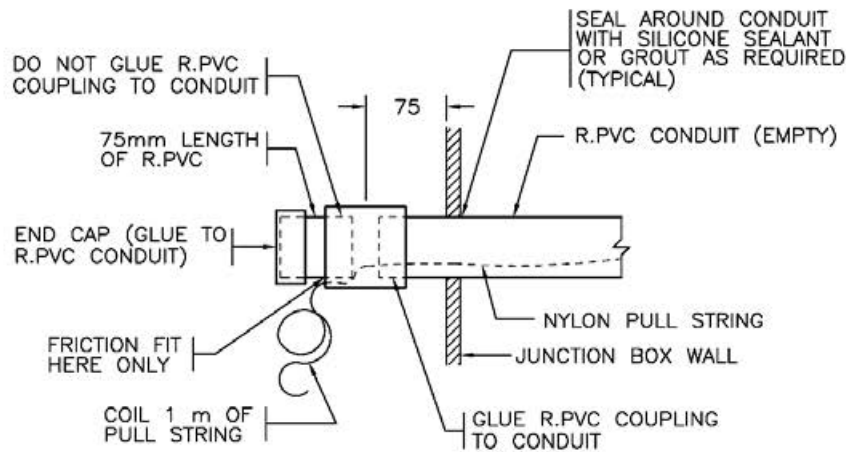


- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

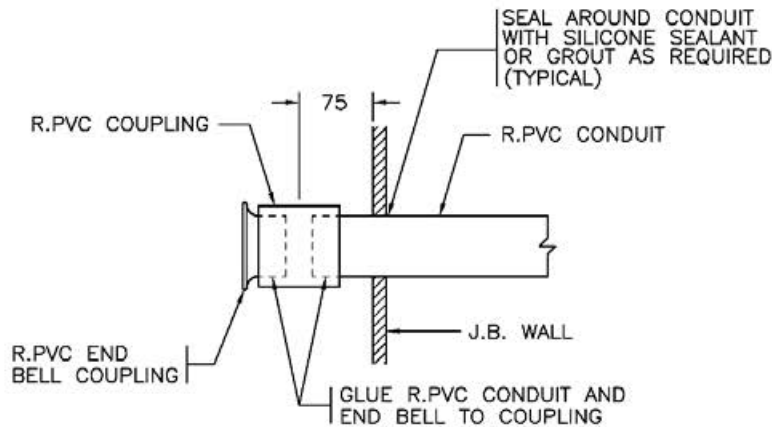
NOT TO SCALE



No.	Revision	Date	SMALL ROUND PLASTIC JUNCTION BOX DETAILS		SPECIFICATION DRAWING No. SP635-1.2.15
E			Date	Approved	
D			17/11/94	E.L. (Signature on File)	
C			Chief Highway Engineer		
B	GENERAL REVISIONS	APR 17			
A	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98			



CAPPED EMPTY CONDUIT  
ENTRY TO JUNCTION BOX



NOTE: ALL CONDUITS TO DRAIN TO J.B.

CONDUIT ENTRY TO J.B.

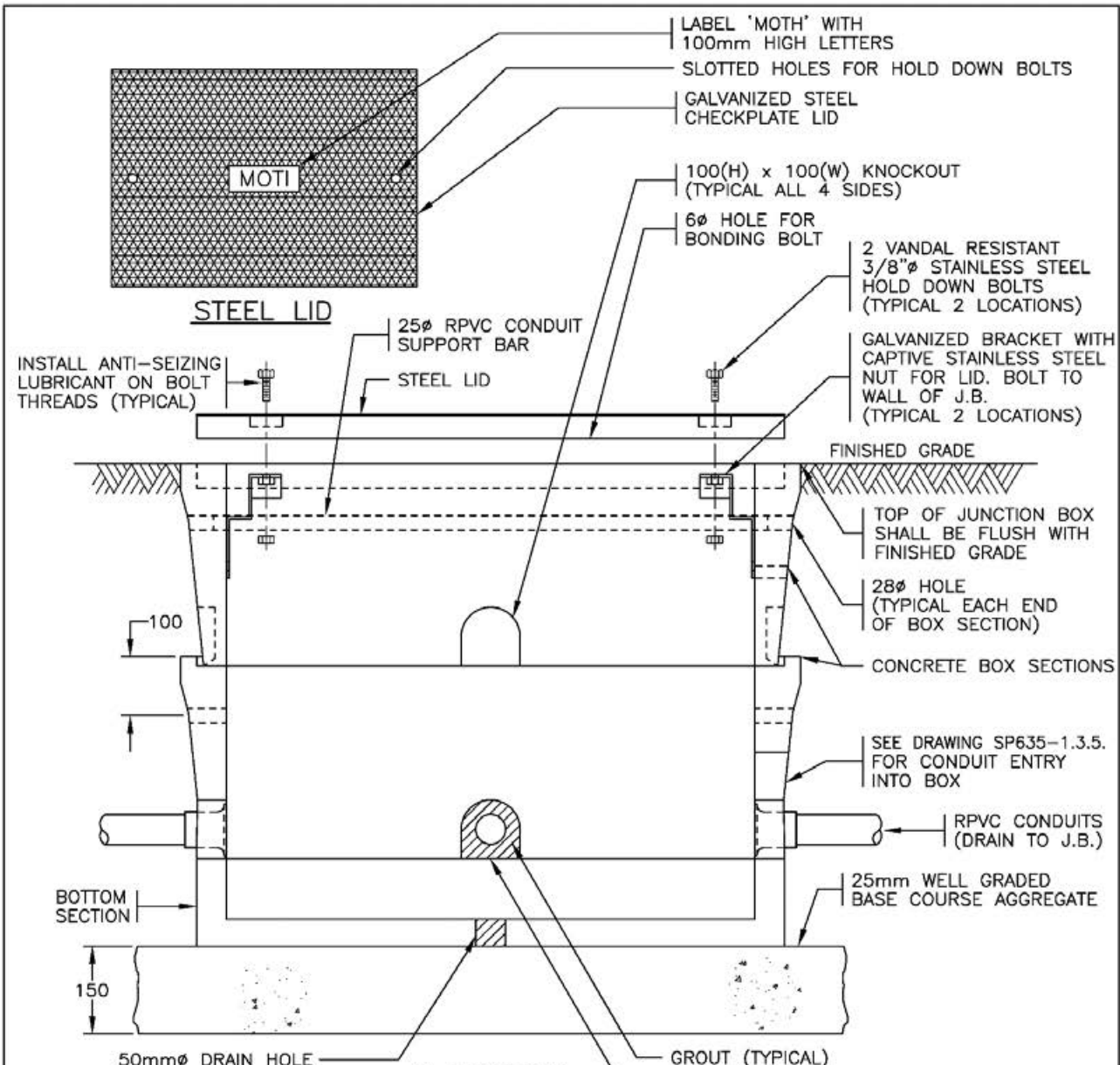
NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. PULL STRING SHALL BE POLYPROPYLENE WITH A MINIMUM TENSILE STRENGTH OF 1.1kN. (BC HYDRO SPEC.)



NOT TO SCALE

No.	Revision	Date	CONDUIT ENTRY INTO PLASTIC JUNCTION BOXES	
F				
E				
D	GENERAL REVISIONS	APR 17	Date	Approved
C	NOTE 3 ADDED	NOV 98	30/09/93 <b>E.L. (Signature on File)</b> Chief Highway Engineer	SPECIFICATION DRAWING No. SP635-1.2.16
B	CONDUIT GLUING CLARIFIED	OCT 97		
A	GENERAL REVISIONS	AUG 94		



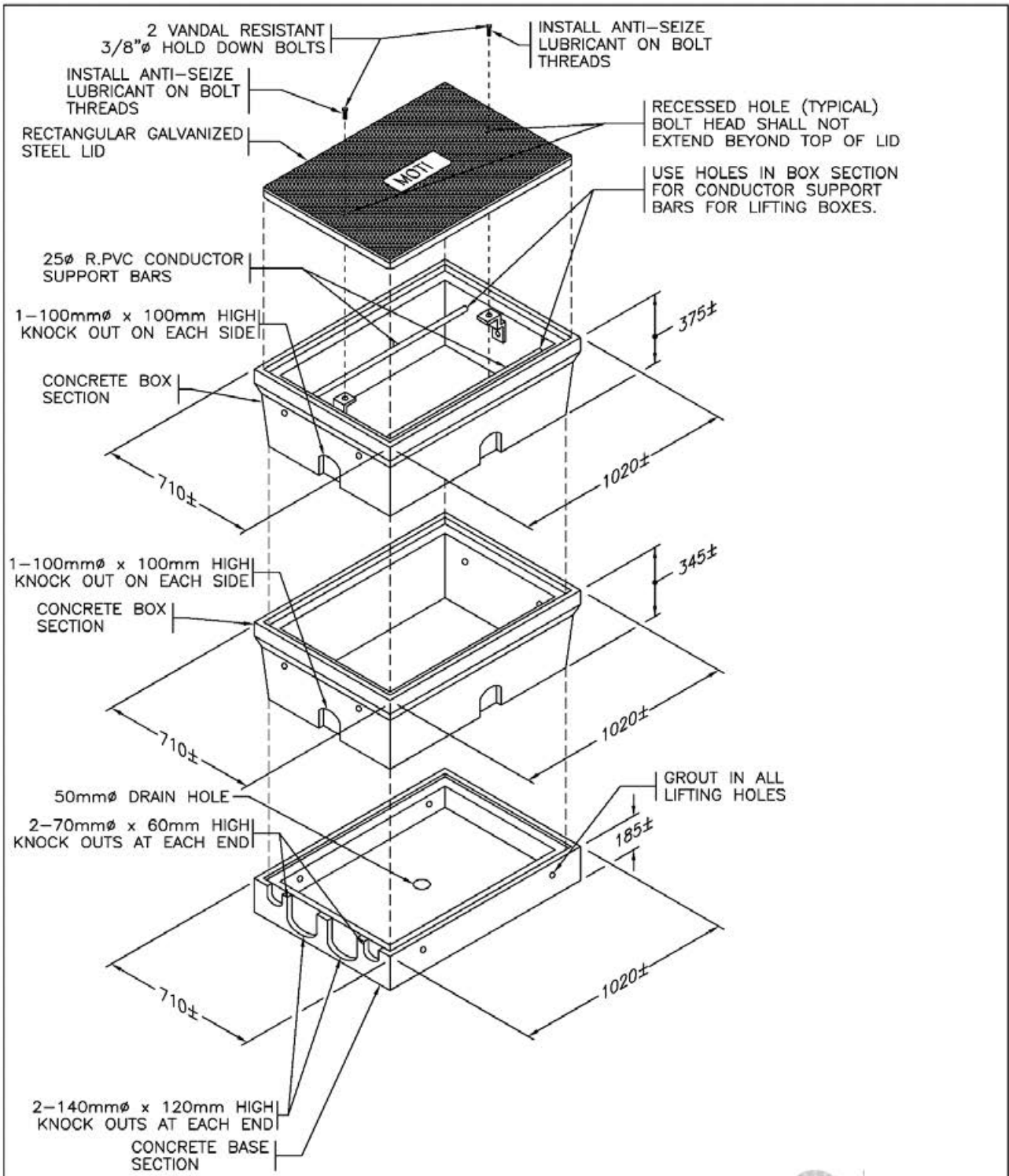
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. JUNCTION BOXES AND THEIR LIDS/HATCHES SHALL BE DESIGNED BY ENGINEERS REGISTERED WITH THE ASSOCIATION OF PROFESSIONAL ENGINEERS AND GEOSCIENTISTS OF THE PROVINCE OF BC.
3. CONCRETE JUNCTION BOXES AND THEIR LIDS/HATCHES SHALL BE DESIGNED FOR STATIC NON-DELIBERATE VEHICULAR LOADING USING AN UNFACTORED DESIGN WHEEL LOAD OF 5000 KG.
4. VAULTS SHALL BE PRE-CAST CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 35 MPa AT 28 DAYS.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	CONCRETE JUNCTION BOX DETAILS (FOR LOCATIONS NOT ROUTINELY SUBJECTED TO TRAFFIC)		SPECIFICATION DRAWING No.
F	GENERAL REVISIONS	APR 20	Date	Approved	SP635-1.3.1
F	GENERAL REVISIONS	APR 17	18/11/94	E.L. (Signature on File)	
E	GENERAL REVISIONS	APR 05	Chief Highway Engineer		
D	KON KAST PRODUCT DELETED	OCT 03			
C	ANTI-SEIZING LUBRICANT NOTED	NOV 98			
B	LID HOLD DOWN REVISED	AUG 96			



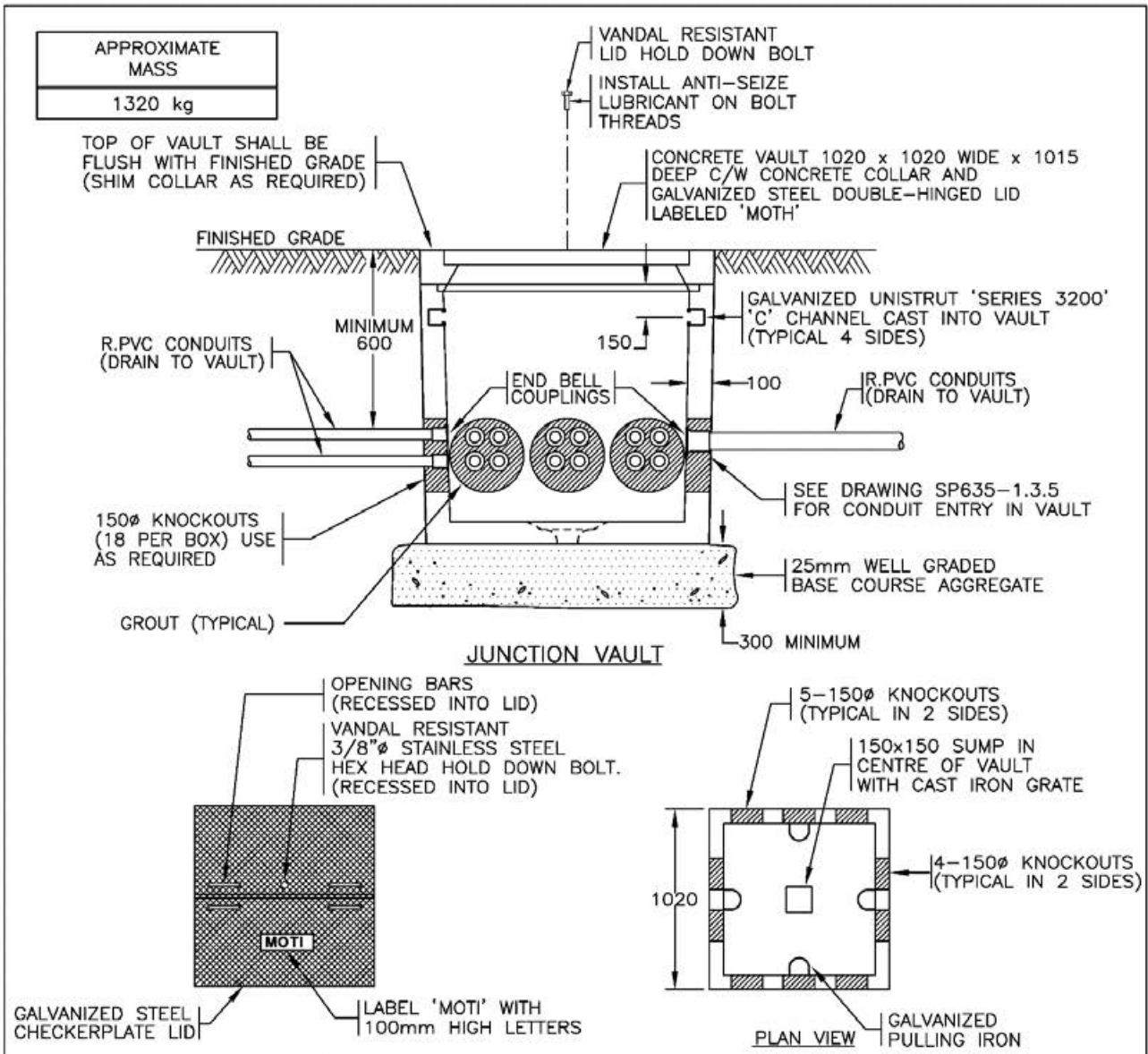
SEE DRAWING SP635-1.3.1 FOR NOTES



NOT TO SCALE

No.	Revision	Date	CONCRETE JUNCTION BOX DETAILS (FOR LOCATIONS NOT ROUTINELY SUBJECTED TO TRAFFIC)		SPECIFICATION DRAWING No.
G	GENERAL REVISIONS	APR 20	Date	Approved	SP635-1.3.2
F	GENERAL REVISIONS	APR 17	18/11/94	E.L. (Signature on File) Chief Highway Engineer	
E	GENERAL REVISIONS	APR 05			
D	KON KAST PRODUCT DELETED	OCT 03			
C	A.E. CONCRETE DIMS. REVISED & ANTI-SEIZE LUBRICANT NOTED	NOV 98			





**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. JUNCTION BOXES AND THEIR LIDS/HATCHES SHALL BE DESIGNED BY ENGINEERS REGISTERED WITH THE ASSOCIATION OF PROFESSIONAL ENGINEERS AND GEOSCIENTISTS OF THE PROVINCE OF BC.
3. CONCRETE JUNCTION BOXES AND THEIR LIDS/HATCHES SHALL BE DESIGNED FOR STATIC NON-DELIBERATE VEHICULAR LOADING USING THE WHEEL LOADING FROM EITHER OF THE FOLLOWING:
  1. CANADIAN HIGHWAY BRIDGE DESIGN CODE CSA S6 CL-625;
  2. AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS HL-93; OR
  3. AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES H-20 OR HS-20.
4. VAULTS SHALL BE PRE-CAST CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 35 MPa AT 28 DAYS.
5. FOR CONCRETE VAULTS IN LOCATIONS ROUTINELY SUBJECTED TO TRAFFIC, VAULTS AND LIDS/HATCHES SHALL BE DESIGNED FOR FULL HIGHWAY LOADING INCREASED BY THE DYNAMIC LOAD ALLOWANCE.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

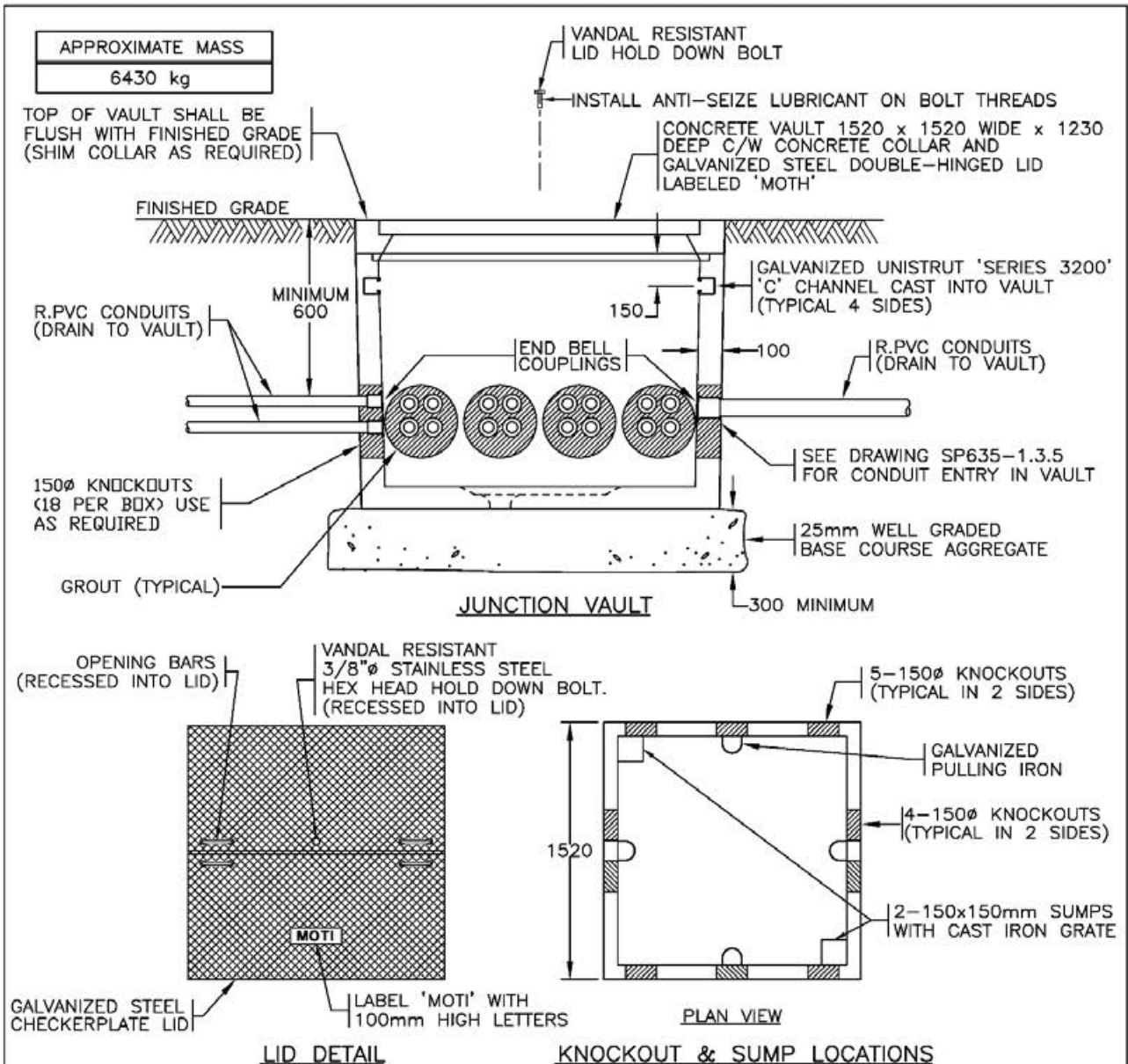
NOT TO SCALE



No.	Revision	Date
E	GENERAL REVISIONS	APR 20
D	GENERAL REVISIONS	APR 17
C	LID HOLD DOWN BOLT & ANTI-SEIZE LUBRICANT NOTED	NOV 98
B	NOTE 2 REVISED	AUG 95
A	GENERAL REVISIONS	AUG 94

**SMALL CONCRETE VAULT DETAILS - 1020 SQUARE X 1015 DEEP (FOR LOCATIONS NOT ROUTINELY SUBJECTED TO TRAFFIC)**

Date	Approved	SPECIFICATION DRAWING No.
30/09/93	E.L. (Signature on File) Chief Highway Engineer	SP635-1.3.3



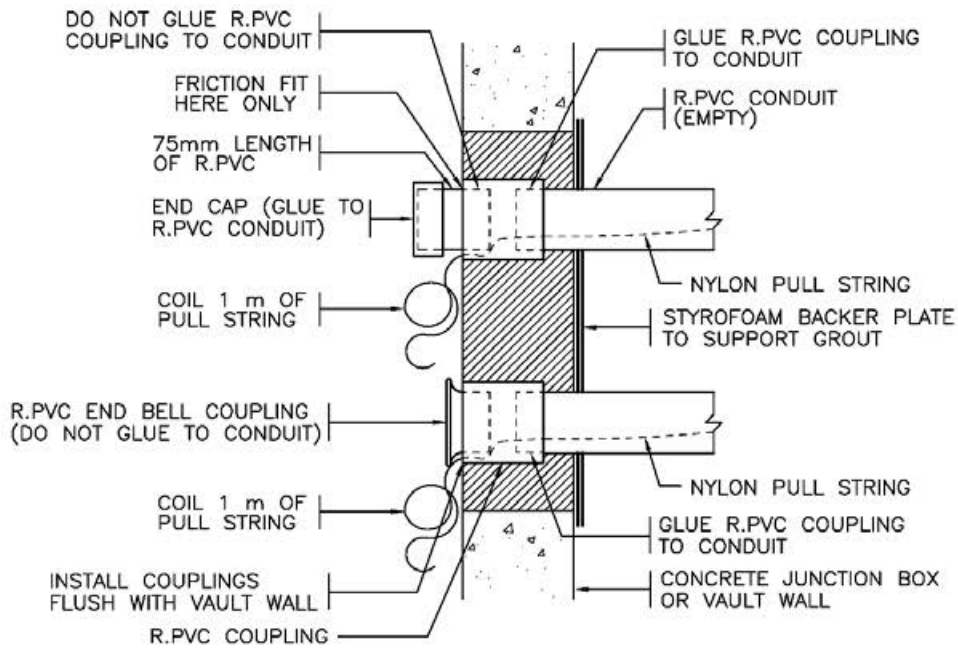
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. JUNCTION BOXES AND THEIR LIDS/HATCHES SHALL BE DESIGNED BY ENGINEERS REGISTERED WITH THE ASSOCIATION OF PROFESSIONAL ENGINEERS AND GEOSCIENTISTS OF THE PROVINCE OF BC.
3. CONCRETE JUNCTION BOXES AND THEIR LIDS/HATCHES SHALL BE DESIGNED FOR STATIC NON-DELIBERATE VEHICULAR LOADING USING THE WHEEL LOADING FROM EITHER OF THE FOLLOWING:
  1. CANADIAN HIGHWAY BRIDGE DESIGN CODE CSA S6 CL-625;
  2. AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS HL-93; OR
  3. AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES H-20 OR HS-20.
4. VAULTS SHALL BE PRE-CAST CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 35 MPa AT 28 DAYS.
5. FOR CONCRETE VAULTS IN LOCATIONS ROUTINELY SUBJECTED TO TRAFFIC, VAULTS AND LIDS/HATCHES SHALL BE DESIGNED FOR FULL HIGHWAY LOADING INCREASED BY THE DYNAMIC LOAD ALLOWANCE.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	<b>CONCRETE VAULT DETAILS - 1520 SQUARE X 1230 DEEP (FOR LOCATIONS NOT ROUTINELY SUBJECTED TO TRAFFIC)</b>
F			
E			
D			
C			
B			
A	GENERAL REVISIONS	APR 20	Date _____ Approved _____ _____ Chief Highway Engineer SPECIFICATION DRAWING No. SP635-1.3.4



CONDUIT ENTRY TO VAULT OR CONCRETE JUNCTION BOX

**NOTES**

1. SEE DRAWINGS SP635-1.3.1 TO -1.3.4 FOR NOTES AND ADDITIONAL DETAILS.
2. PULL STRING SHALL BE POLYPROPYLENE WITH A MINIMUM TENSILE STRENGTH OF 1.1kN. (BC HYDRO SPEC.)

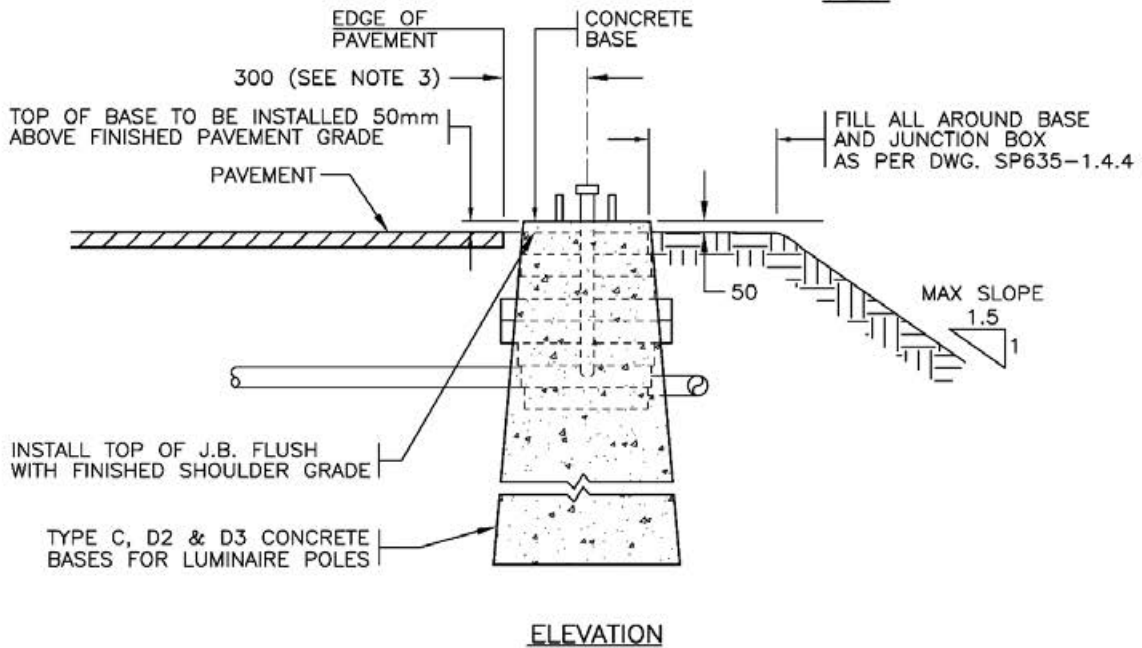
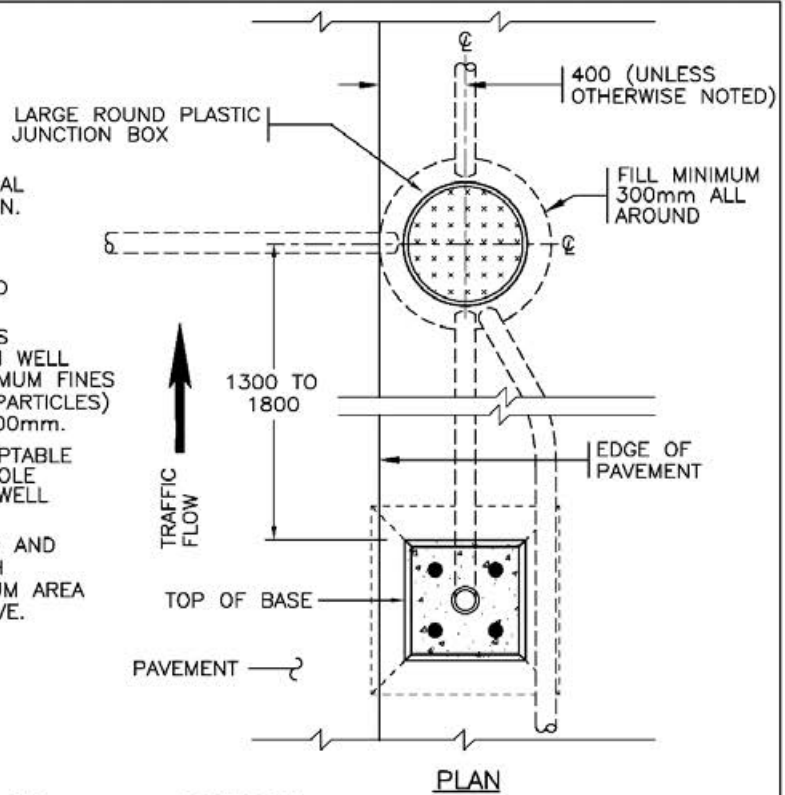


NOT TO SCALE

No.	Revision	Date	CONDUIT ENTRY INTO CONCRETE VAULT OR JUNCTION BOX		SPECIFICATION DRAWING No.
F					SP635-1.3.5
E					
D	GENERAL REVISIONS	APR 17	Date	Approved	
C	NOTES 1 & 2 ADDED	NOV 98	30/09/93	E.L. (Signature on File)	
A	GENERAL REVISIONS	AUG 94	Chief Highway Engineer		

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. OFFSET SHOWN MAY VARY WHERE NOTED ON THE PLANS.
4. EXCAVATED MATERIAL SHALL BE USED AS BACKFILL WHERE IT CONSISTS 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.
5. WHERE EXCAVATED MATERIAL IS UNACCEPTABLE OR EXTRA FILL IS REQUIRED AROUND POLE BASE & JUNCTION BOXES, USE 25mm WELL GRADED BASE COURSE AGGREGATE.
6. BACKFILL MATERIAL SHALL BE INSTALLED AND FULLY COMPACTED IN ACCORDANCE WITH SUBSECTION 635.07.01 FOR THE MINIMUM AREA ALL AROUND THE BASE AS SHOWN ABOVE.



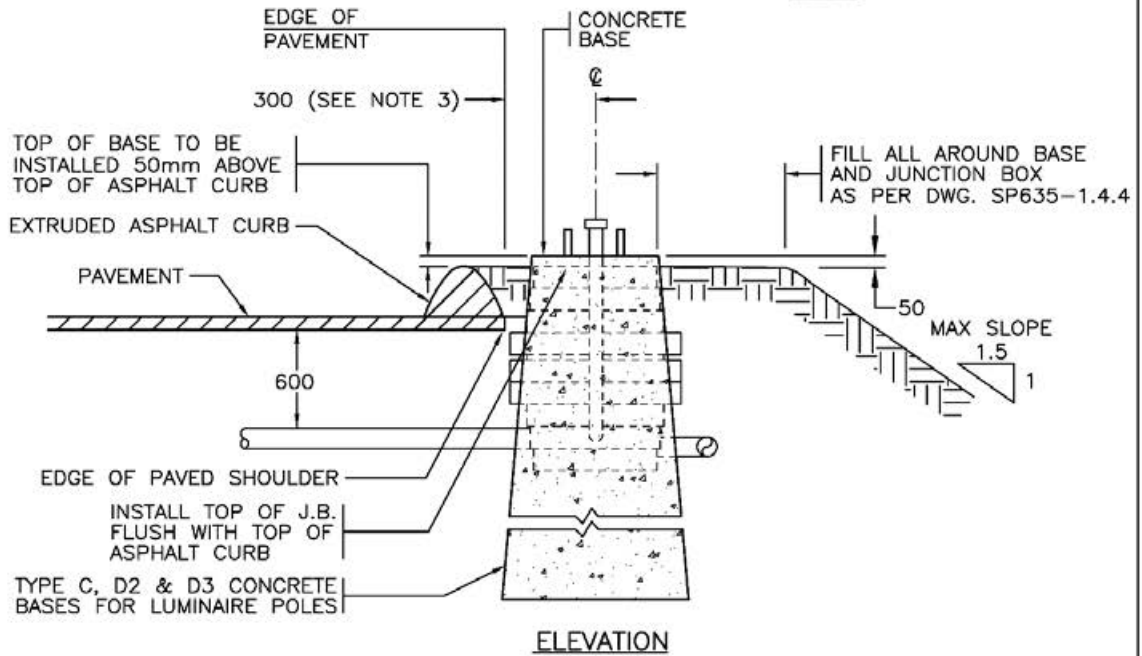
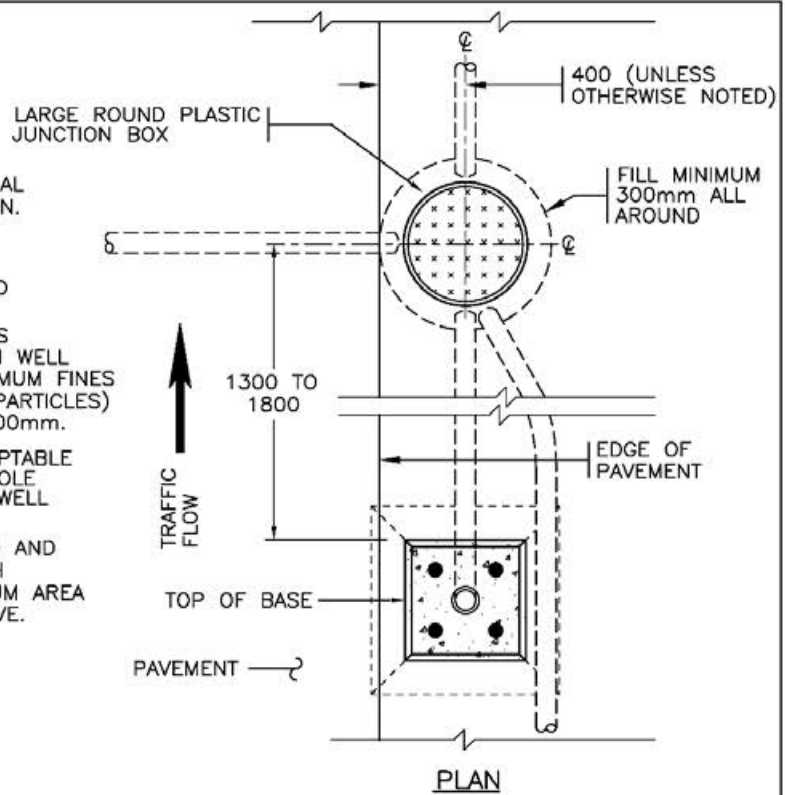
NOT TO SCALE



No.	Revision	Date	Date	Approved	SPECIFICATION DRAWING No.
F	GENERAL REVISIONS	APR 20			
E	GENERAL REVISIONS	APR 17			
D	NOTES 4, 5 & 6 REVISED	OCT 97			
C	REVISED TO SUIT ONLY LUMINAIRE POLE BASES	AUG 96			
B	BACKFILL REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			
			30/09/93	E.L. (Signature on File) Chief Highway Engineer	SP635-1.4.1

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. OFFSET SHOWN MAY VARY WHERE NOTED ON THE PLANS.
4. EXCAVATED MATERIAL SHALL BE USED AS BACKFILL WHERE IT CONSISTS 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.
5. WHERE EXCAVATED MATERIAL IS UNACCEPTABLE OR EXTRA FILL IS REQUIRED AROUND POLE BASE & JUNCTION BOXES, USE 25mm WELL GRADED BASE COURSE AGGREGATE.
6. BACKFILL MATERIAL SHALL BE INSTALLED AND FULLY COMPACTED IN ACCORDANCE WITH SUBSECTION 635.07.01 FOR THE MINIMUM AREA ALL AROUND THE BASE AS SHOWN ABOVE.



NOT TO SCALE



No.	Revision	Date	Date	Approved	SPECIFICATION DRAWING No.
F	GENERAL REVISIONS	APR 20	30/09/93	E.L. (Signature on File) Chief Highway Engineer	SP635-1.4.2
E	GENERAL REVISIONS	APR 17			
D	NOTES 4, 5 & 6 REVISED	OCT 97			
C	REVISED TO SUIT ONLY LUMINAIRE POLE BASES	AUG 96			
B	BACKFILL REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. OFFSET SHOWN MAY VARY WHERE NOTED ON THE PLANS.
4. EXCAVATED MATERIAL SHALL BE USED AS BACKFILL WHERE IT CONSISTS 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.
5. WHERE EXCAVATED MATERIAL IS UNACCEPTABLE OR EXTRA FILL IS REQUIRED AROUND POLE BASE & JUNCTION BOXES, USE 25mm WELL GRADED BASE COURSE AGGREGATE.
6. BACKFILL MATERIAL SHALL BE INSTALLED AND FULLY COMPACTED IN ACCORDANCE WITH SUBSECTION 635.07.01 FOR THE MINIMUM AREA ALL AROUND THE BASE AS SHOWN ABOVE.

LARGE ROUND PLASTIC JUNCTION BOX

300 (UNLESS OTHERWISE NOTED). WHERE NO SIDEWALK, OFFSET TO MATCH CONCRETE BASE. (UNLESS OTHERWISE NOTED)

FILL MINIMUM 300mm ALL AROUND

1300 TO 1800

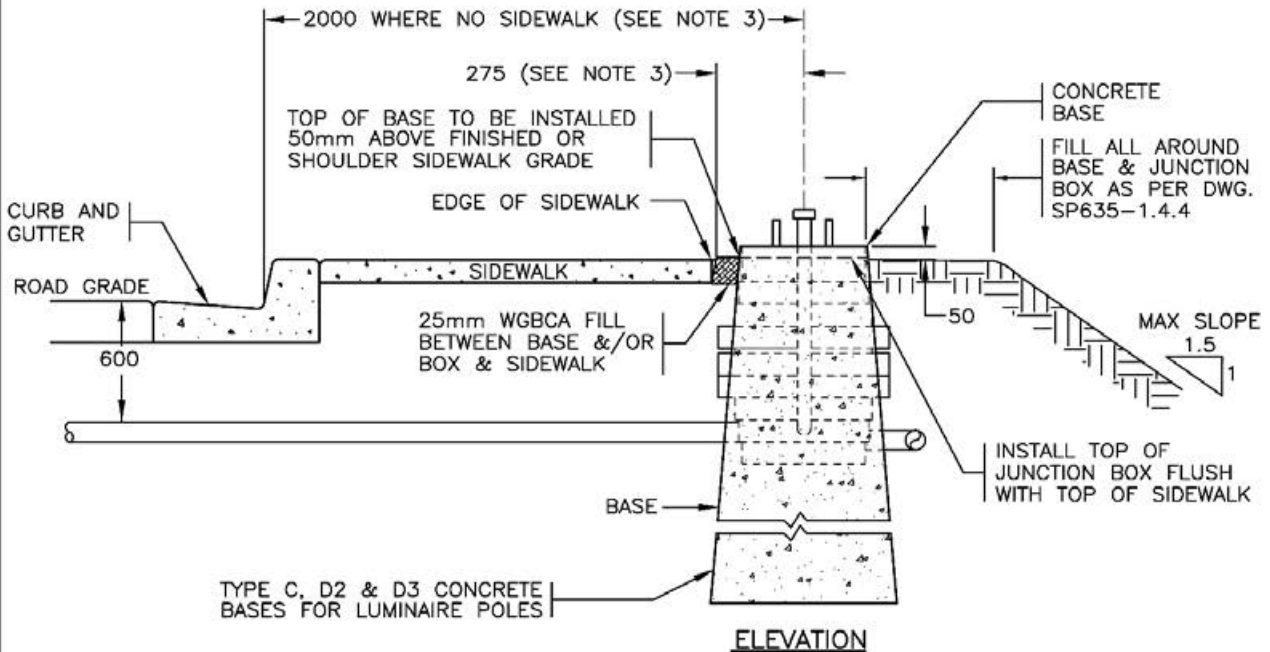
EDGE OF PAVEMENT

↑  
TRAFFIC FLOW

TOP OF BASE

PAVEMENT

**PLAN**



**ELEVATION**

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date
F	GENERAL REVISIONS	APR 20
E	GENERAL REVISIONS	APR 17
D	NOTES 4, 5 & 6 REVISED	OCT 97
C	REVISED TO SUIT ONLY LUMINAIRE POLE BASES	AUG 96
B	BACKFILL REVISED	AUG 95
A	GENERAL REVISIONS	AUG 94

**LUMINAIRE POLE BASE AND JUNCTION BOX INSTALLATION DETAIL FOR SIDEWALK**

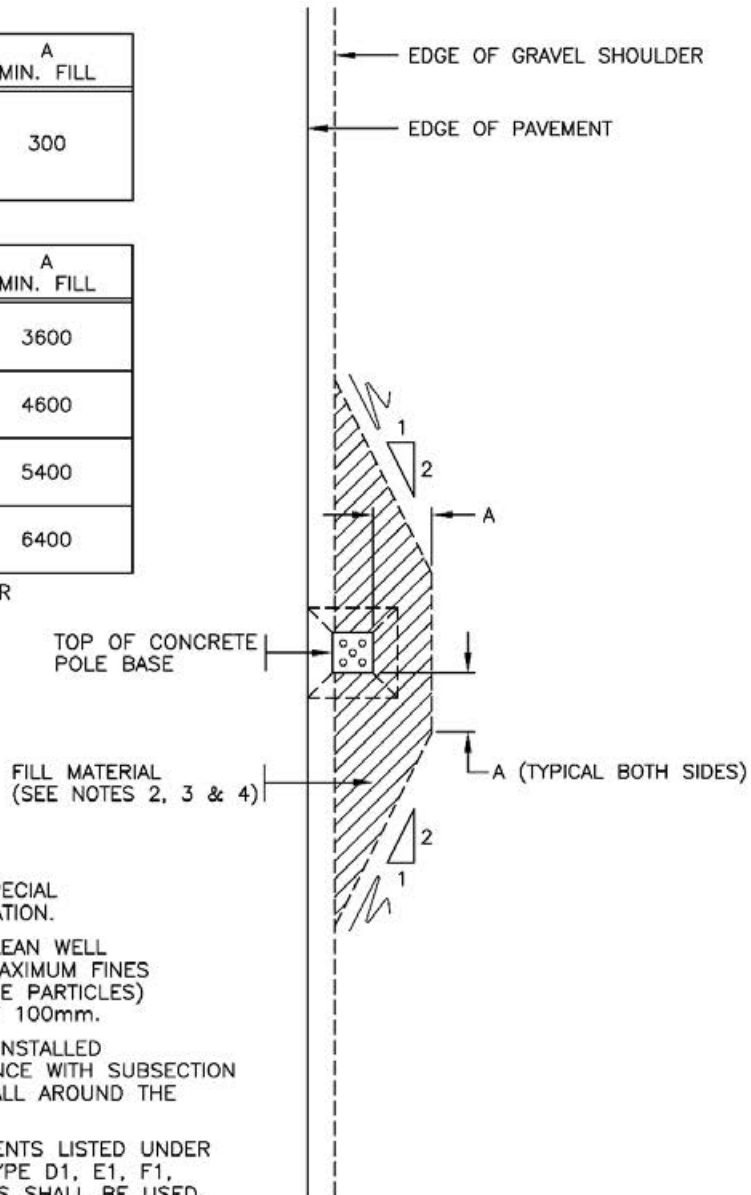
Date: 30/09/93  
 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-1.4.3

BASE TYPES	A MIN. FILL
TYPES A, B AND C CONCRETE BASES (SEE SP635-1.1.2 & 1.1.3 FOR DETAILS AND POLE TYPES)	300

BASE TYPES*	A MIN. FILL
TYPES D2, D3, E2 AND E3 CONCRETE BASES	3600
TYPES F2, F3, L2, L3, S2 AND S3 CONCRETE BASES	4600
TYPE M2 CONCRETE BASES	5400
TYPE H2 CONCRETE BASES	6400

\*SEE SP635-1.1.3a TO 1.1.30 FOR  
DETAILS AND POLE TYPES.



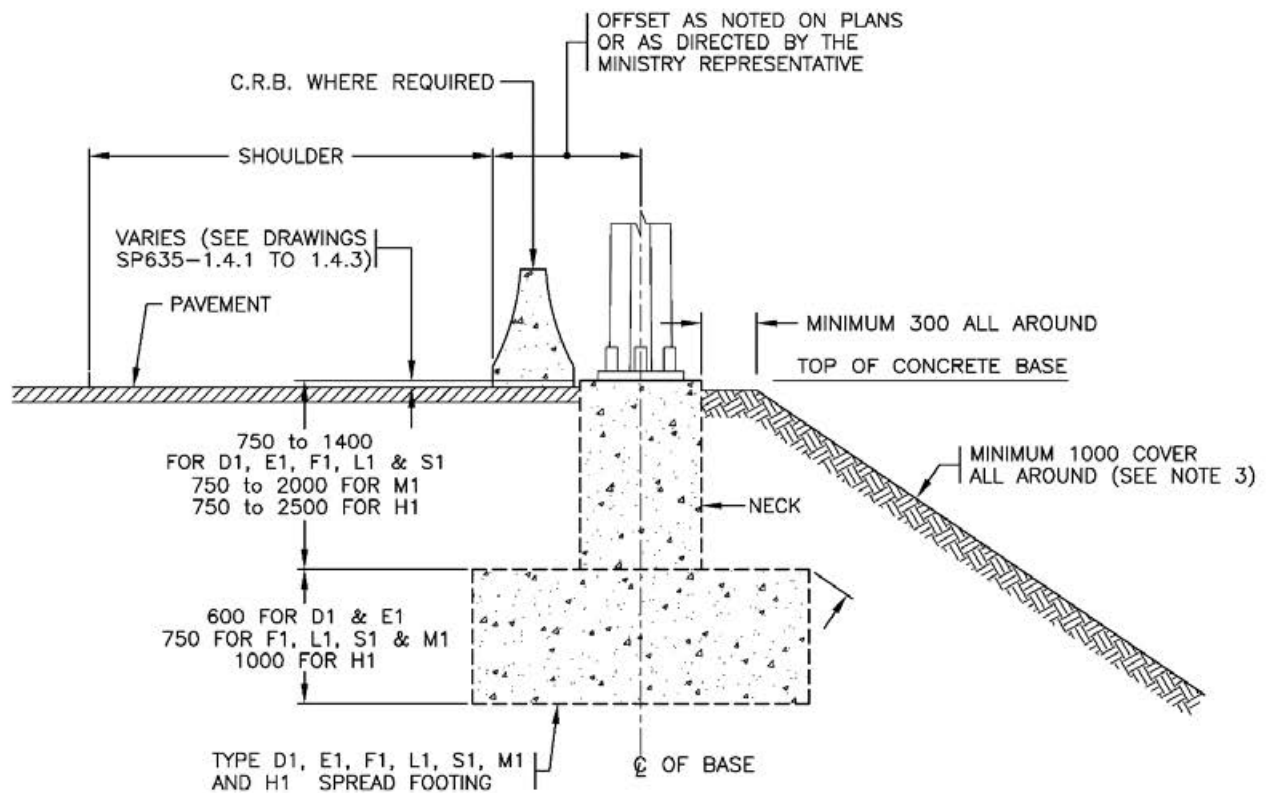
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
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 SUBSECTION 635.07.01 FOR THE MINIMUM AREA ALL AROUND THE BASE AS SHOWN ABOVE.
4. WHERE THE MINIMUM FILL REQUIREMENTS LISTED UNDER NOTES 2 AND 3 CANNOT BE MET, TYPE D1, E1, F1, L1, S1, M1 OR H1 SPREAD FOOTINGS SHALL BE USED.
5. TYPICAL OFFSETS OF TYPE C, D2 & D3 LUMINAIRE POLE BASES ARE SHOWN ON DRAWINGS SP635-1.4.1 TO 1.4.3 OFFSETS OF TYPE A, B, E2, E3, F2, F3, L2, L3, S2, S3, M2 & H2 SIGNAL & SIGN POLE BASES SHALL BE NOTED ON PLANS OR AS DIRECTED BY THE MINISTRY ELECTRICAL REPRESENTATIVE.

NOT TO SCALE



No.	Revision	Date	BACKFILL REQUIREMENTS FOR TYPE A, B, C, D2, D3, E2, E3, F2, F3, L2, L3, S2, S3, M2 & H2 CONCRETE BASES	
E			Date	Approved
D	TABLES FORMATTED FOR CLARITY	APR 20	15/11/95	M.C. (Signature on File)
C	GENERAL REVISIONS	APR 17	SPECIFICATION DRAWING No.	
B	TYPE S BASES ADDED & REFERENCE CHANGED TO "MINISTRY ELECTRICAL REPRESENTATIVE"	OCT 03	SP635-1.4.4	
A	NOTE 5 ADDED	AUG 96	Chief Highway Engineer	



ELEVATION

NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. VARY NECK HEIGHT UP TO THE MAXIMUMS SHOWN TO PROVIDE COVER AROUND SPREAD FOOTING.
4. BACKFILL MATERIAL SHALL BE INSTALLED & FULLY COMPACTED IN ACCORDANCE WITH SUBSECTION 635.07.01 TO PROVIDE THE MINIMUM COVER OVER THE SPREAD FOOTING.

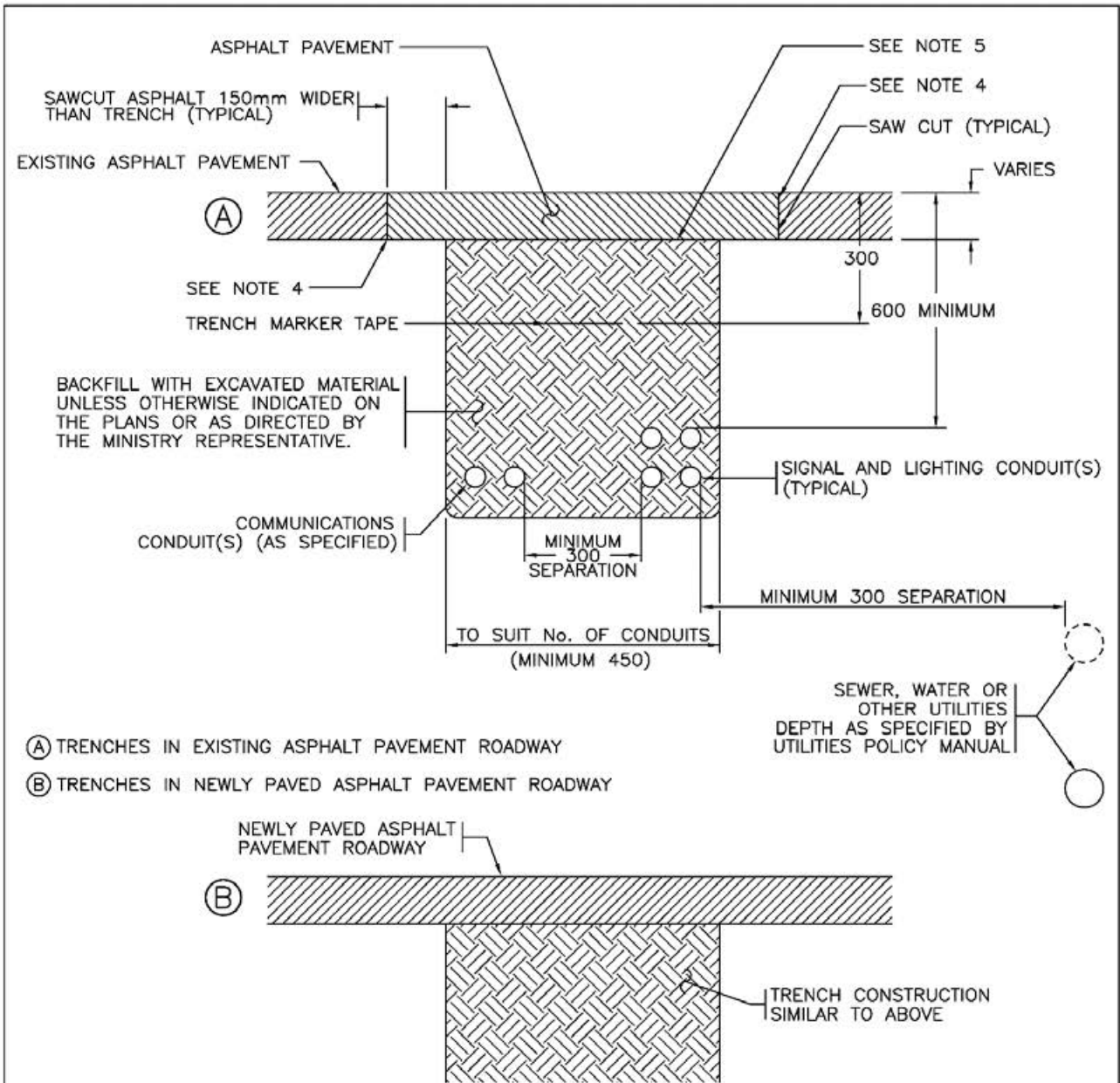
NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	BACKFILL REQUIREMENTS FOR TYPE D1, E1, F1, L1, S1, M1 & H1 CONCRETE SPREAD FOOTINGS	
F				
E				
D			Date	Approved
C	GENERAL REVISIONS	APR 17	15/11/95	M.C. (Signature on File)
B	TYPE S1 BASES ADDED	OCT 03		Chief Highway Engineer
A	MAX. SLOPE DELETED & NECK HEIGHT REV'D	AUG 96		
			SPECIFICATION DRAWING No. SP635-1.4.5	





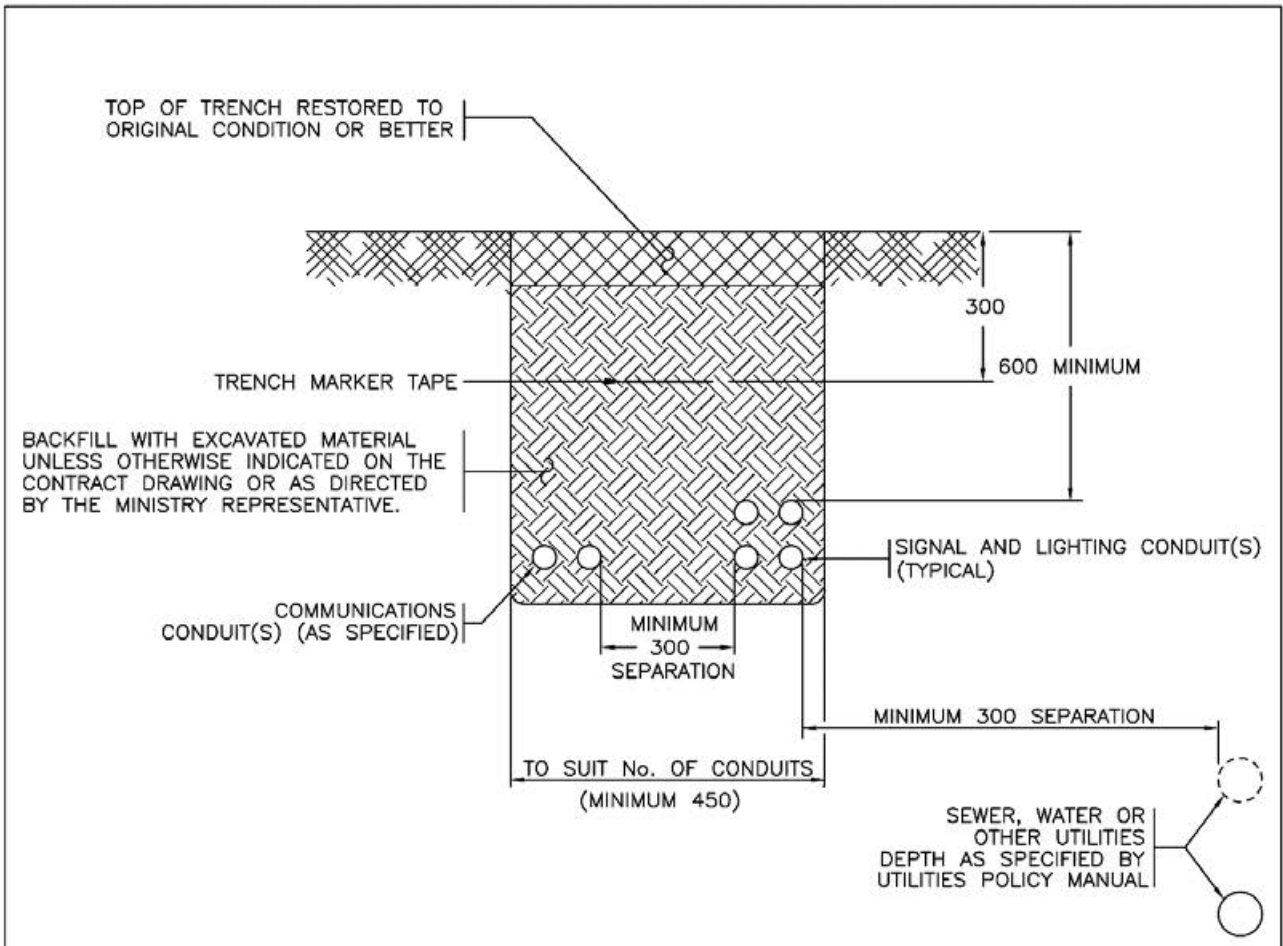
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. WHERE MINIMUM CLEARANCES FROM UTILITIES CAN NOT BE MAINTAINED, NOTIFY THE MINISTRY REPRESENTATIVE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. APPLY 0.25 L/m<sup>2</sup> OF RM-20 SEALANT TO THE EDGE OF EXISTING ASPHALT.
5. APPLY 1.5 L/m<sup>2</sup> OF RM-20 SEALANT TO THE GRAVEL BASE.



NOT TO SCALE

No.	Revision	Date	CONDUIT INSTALLATION IN PAVED AREAS	
F				
E				
D				
C	GENERAL REVISIONS	APR 20	Date	Approved
B	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)
A	GENERAL REVISIONS	AUG 94		Chief Highway Engineer
			SPECIFICATION DRAWING No. SP635-1.5.1	



**NOTES**

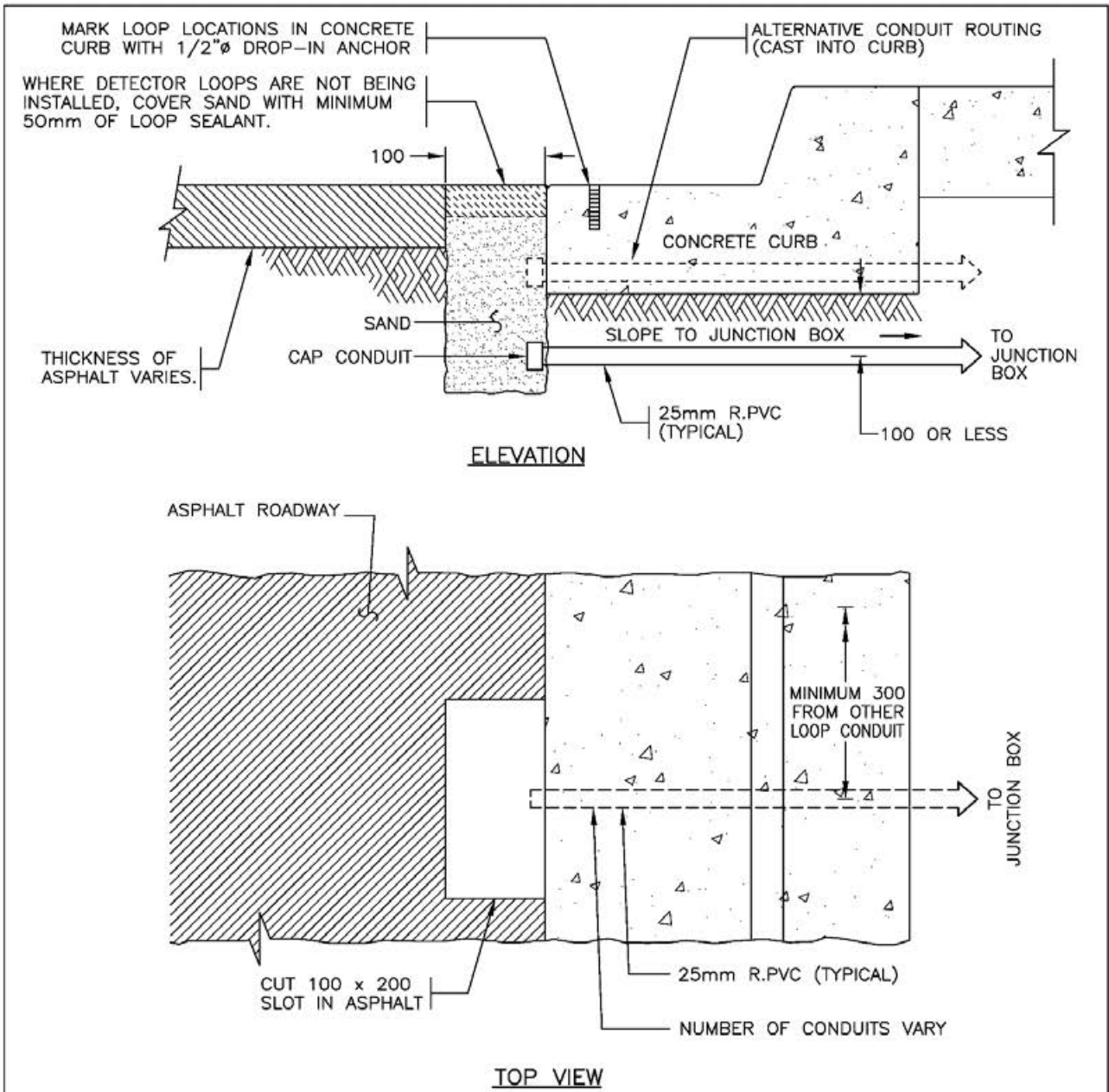
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. WHERE MINIMUM CLEARANCES FROM UTILITIES CAN NOT BE MAINTAINED, NOTIFY THE MINISTRY REPRESENTATIVE.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	CONDUIT INSTALLATION IN NON-PAVED AREAS	
F			Date	Approved
E			30/09/93	E.L. (Signature on File)
D			SPECIFICATION DRAWING No. SP635-1.5.2	
C	GENERAL REVISIONS	APR 20	Chief Highway Engineer	
B	GENERAL REVISIONS	APR 17		
A	GENERAL REVISIONS	AUG 94		



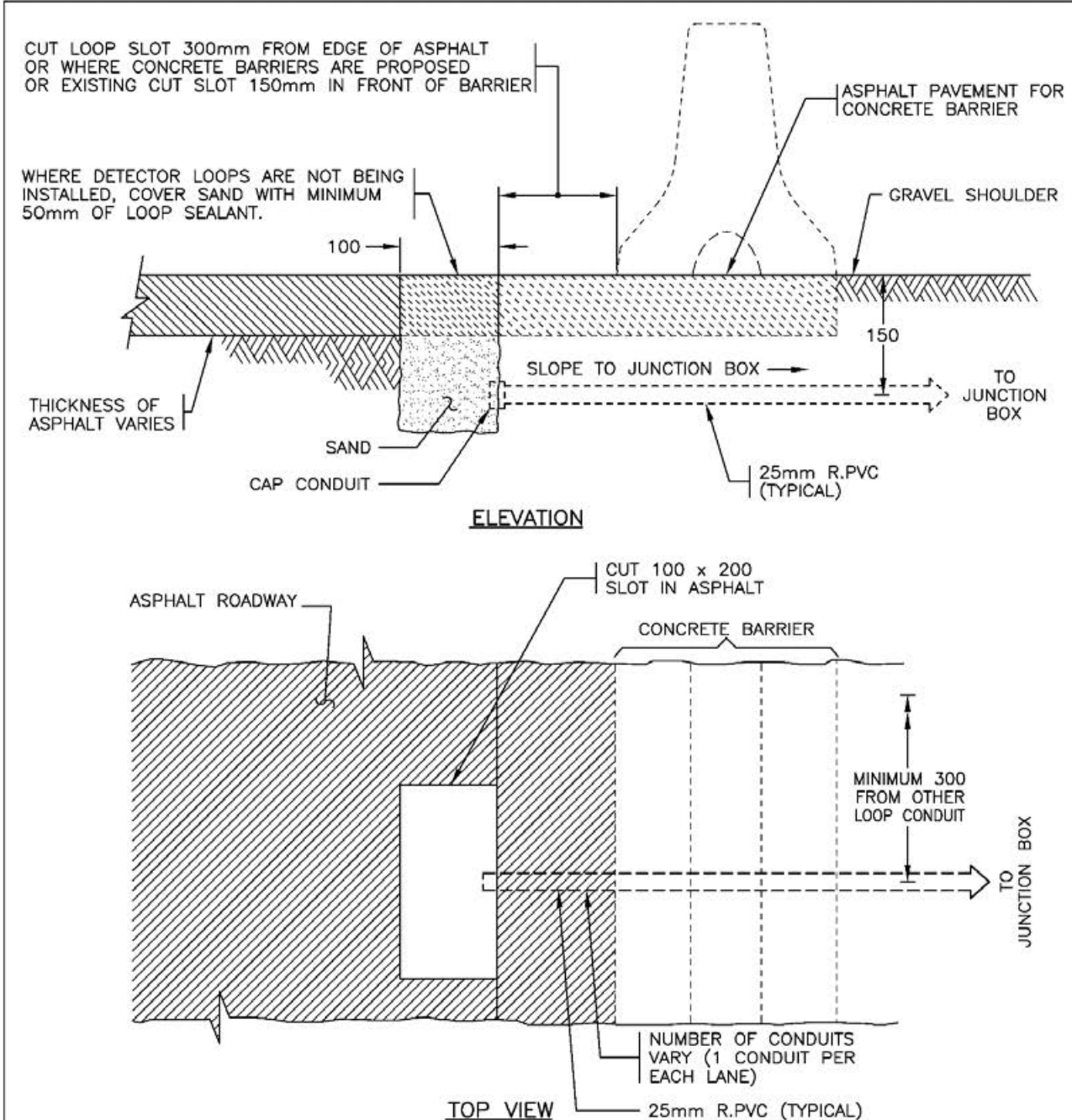
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. LOCATE LOOP CONDUIT IN ASPHALT TO SUIT LOOP LOCATIONS AND TO MINIMIZE THE LENGTH OF HOME RUN SLOTS IN THE ASPHALT.



NOT TO SCALE

No.	Revision	Date	LOOP CONDUIT INSTALLATION DETAILS AT CONCRETE CURB		SPECIFICATION DRAWING No. SP635-1.6.1
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D				Chief Highway Engineer	
C	GENERAL REVISIONS	APR 17			
B	CONDUIT SLOT REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			

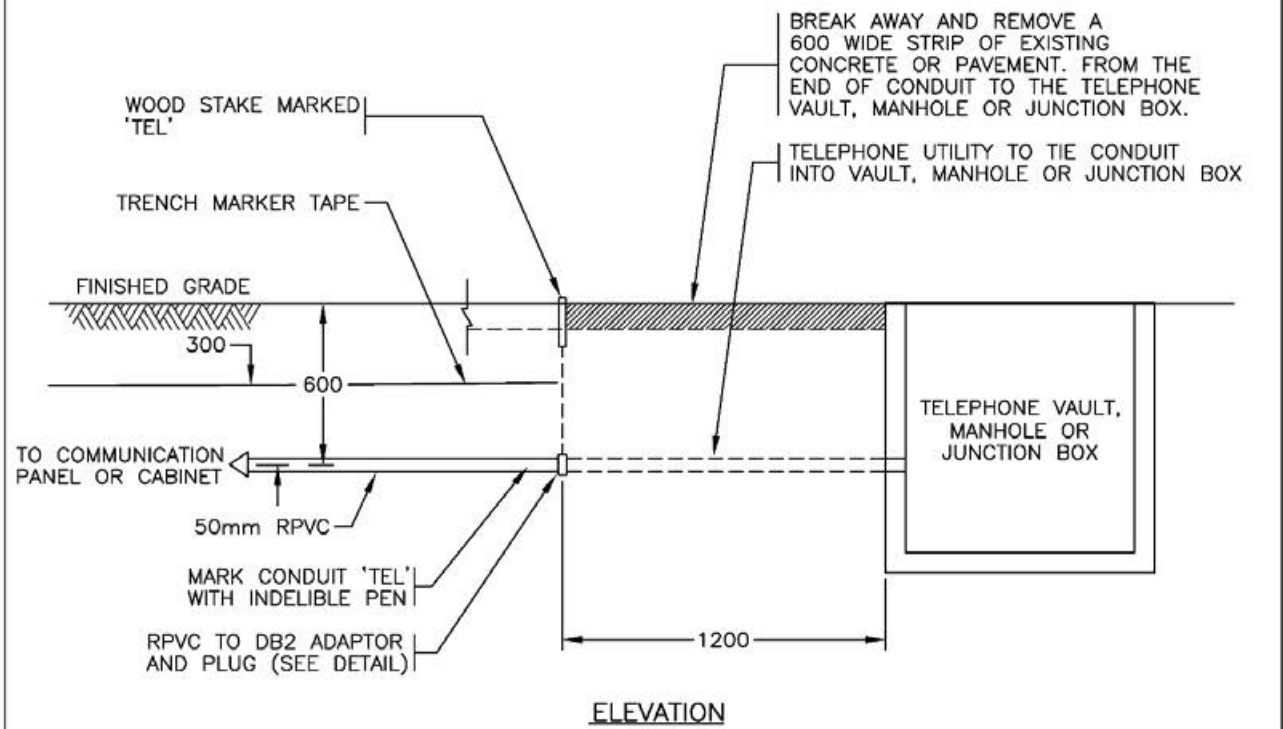
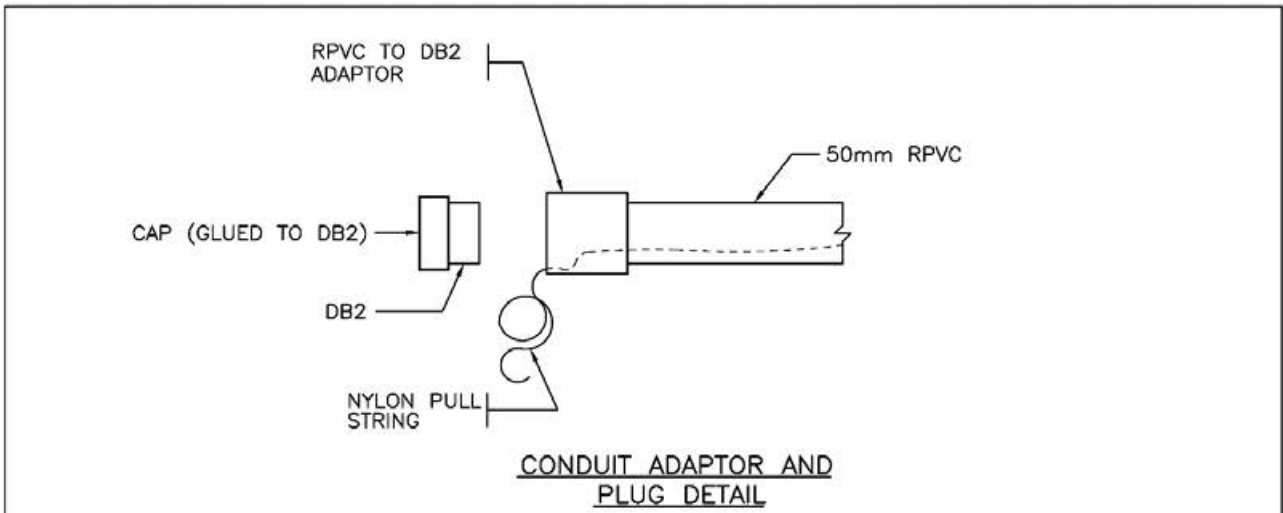


- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
  3. LOCATE LOOP CONDUIT IN ASPHALT TO SUIT LOOP LOCATIONS AND TO MINIMIZE THE LENGTH OF HOME RUN SLOTS IN THE ASPHALT.



NOT TO SCALE

No.	Revision	Date	LOOP CONDUIT INSTALLATION DETAILS IN GRAVEL SHOULDER		SPECIFICATION DRAWING No. SP635-1.6.2
F			Date	Approved	
E			18/11/94	E.L. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	CONCRETE BARRIER SHOWN	NOV 98			
A	CONDUIT SLOT REVISED	AUG 95			



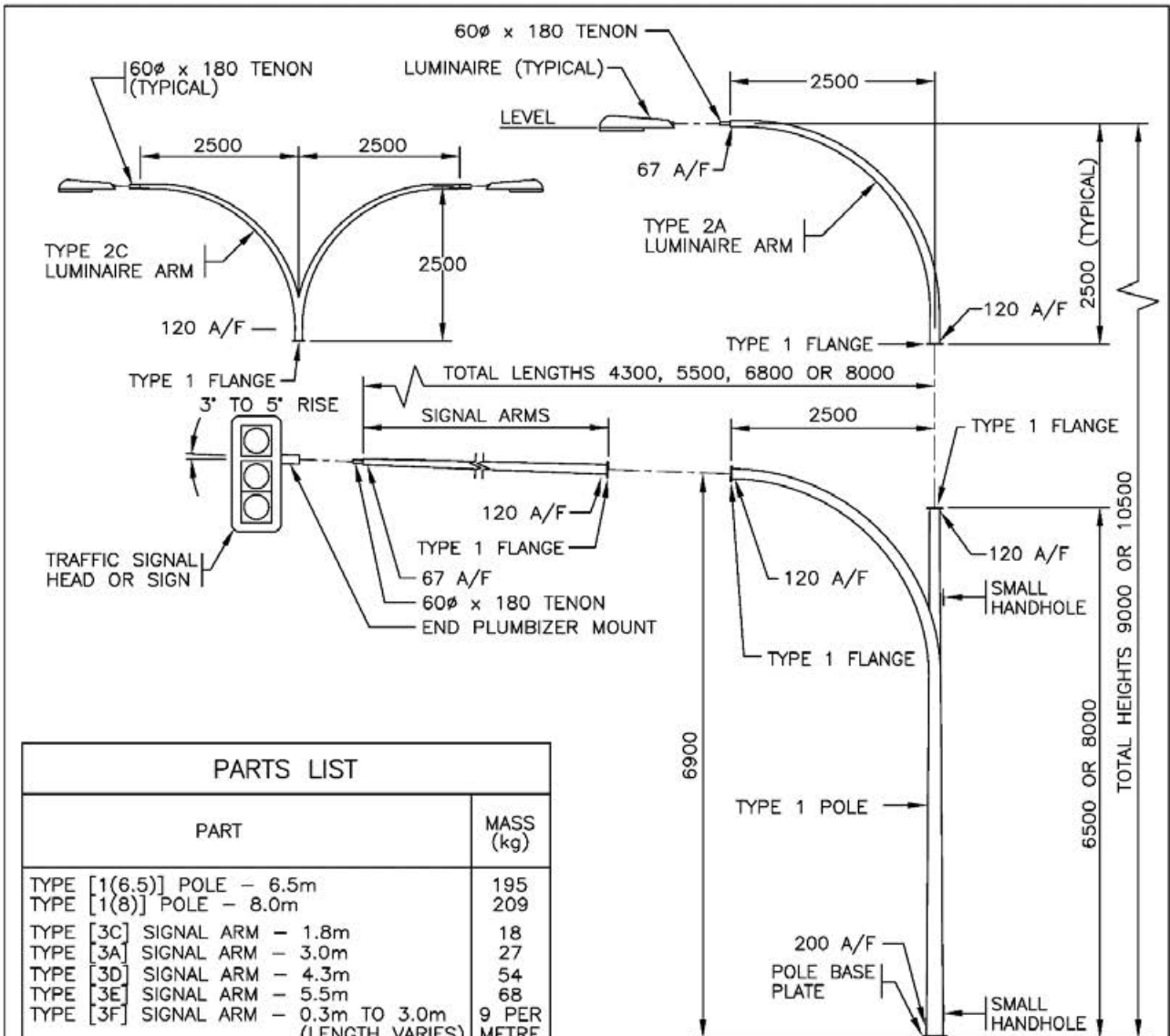
**NOTES**

1. SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	<b>CONDUIT TIE-IN TO TELEPHONE VAULT, MANHOLE OR JUNCTION BOX</b>	
F			Date	Approved
E			<b>17/11/94</b>	<b>E.L. (Signature on File)</b>
D			Chief Highway Engineer	
C			SPECIFICATION DRAWING No.	
B	GENERAL REVISIONS	APR 20	<b>SP635-1.7.1</b>	
A	GENERAL REVISIONS	APR 17		



PARTS LIST	
PART	MASS (kg)
TYPE [1(6,5)] POLE - 6.5m	195
TYPE [1(8)] POLE - 8.0m	209
TYPE [3C] SIGNAL ARM - 1.8m	18
TYPE [3A] SIGNAL ARM - 3.0m	27
TYPE [3D] SIGNAL ARM - 4.3m	54
TYPE [3E] SIGNAL ARM - 5.5m	68
TYPE [3F] SIGNAL ARM - 0.3m TO 3.0m (LENGTH VARIES)	9 PER METRE
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
POST TOP TENON [PTT]	5
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5

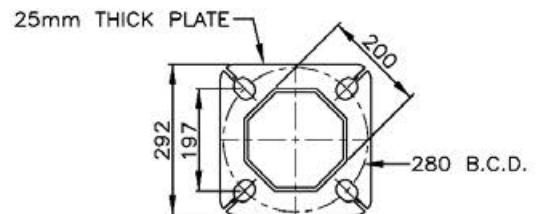
\* [ ] I.D. LABEL ON POLE

**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- SEE DRAWING SP635-2.1.2 FOR TYPE 1 POLE, BOLT KITS AND POLE ASSEMBLY DETAILS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE

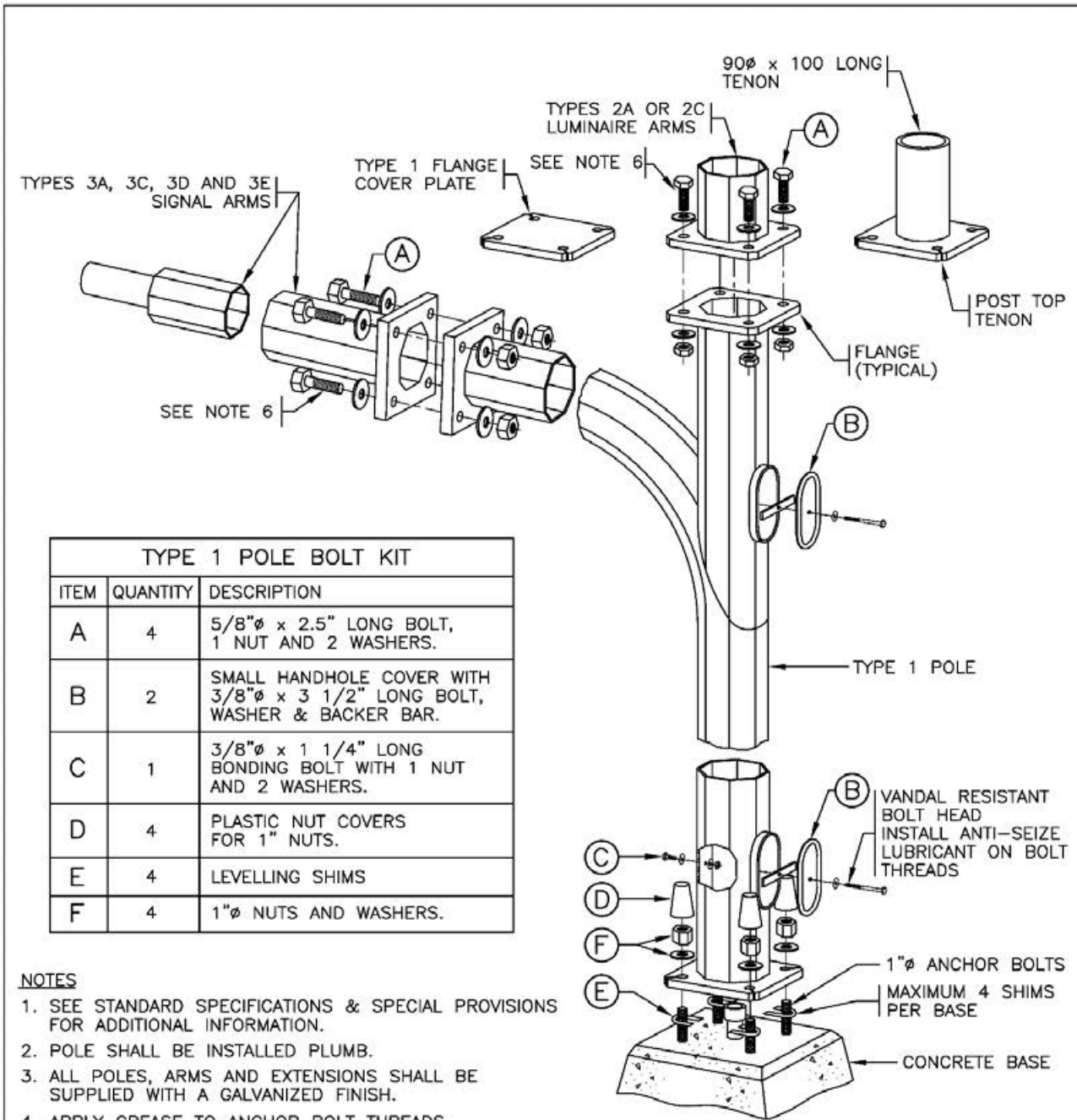
**ELEVATION**



**POLE BASE PLATE**



No.	Revision	Date	TYPE 1 POLE INSTALLATION DETAILS (SIGNAL POLE)		SPECIFICATION DRAWING No.
F	GENERAL REVISIONS	APR 20	Date	Approved	SP635-2.1.1
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
D	SIGNAL HEAD MOUNTING REVISED	OCT 03	Chief Highway Engineer		
C	3F ARM ADDED	AUG 96			
B	SIGNAL HEAD REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



TYPE 1 POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"Ø x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	2	SMALL HANDHOLE COVER WITH 3/8"Ø x 3 1/2" LONG BOLT, WASHER & BACKER BAR.
C	1	3/8"Ø x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
D	4	PLASTIC NUT COVERS FOR 1" NUTS.
E	4	LEVELLING SHIMS
F	4	1"Ø NUTS AND WASHERS.

**NOTES**

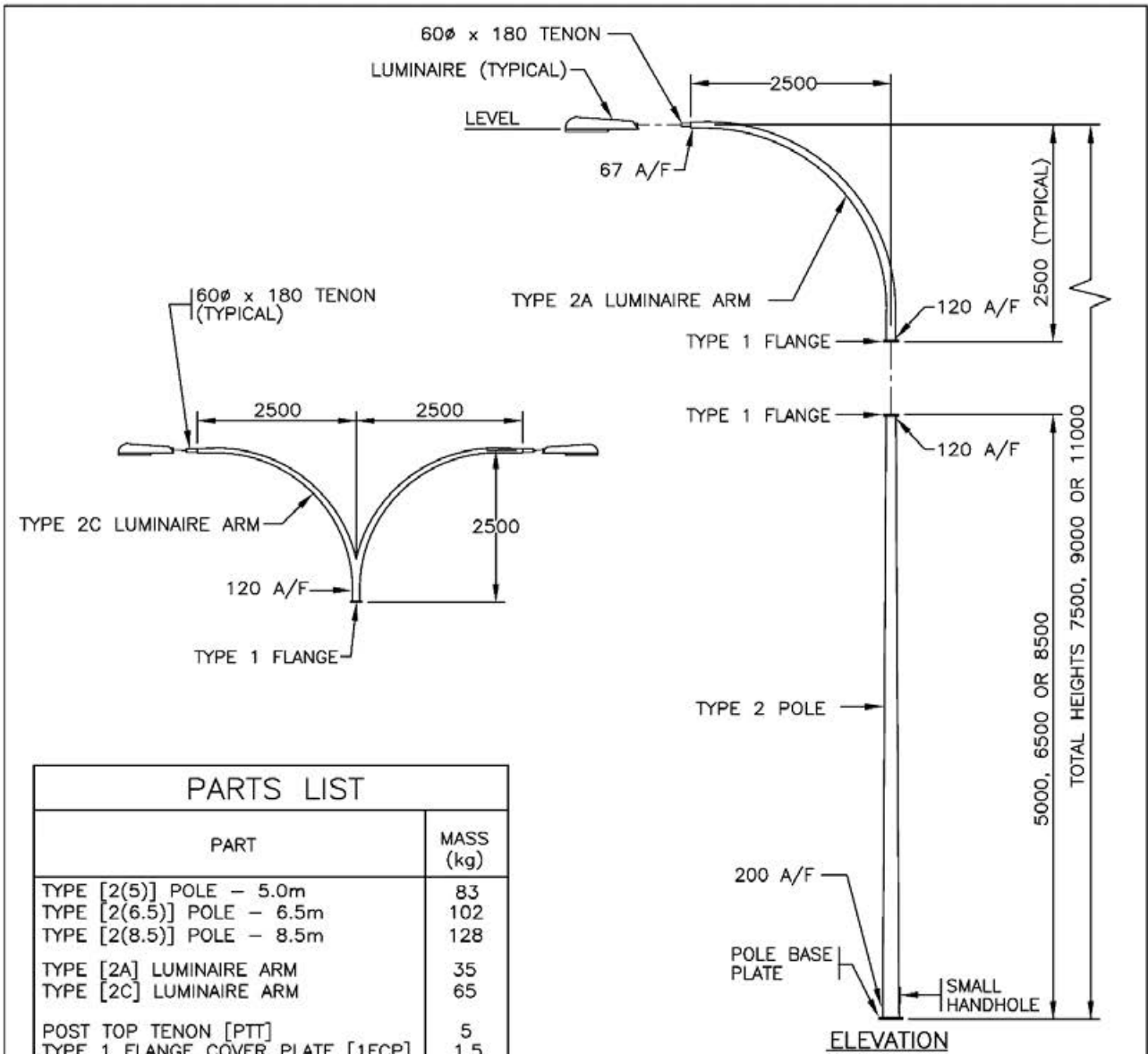
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- POLE SHALL BE INSTALLED PLUMB.
- ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
- APPLY GREASE TO ANCHOR BOLT THREADS.
- TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
- BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

**POLE ASSEMBLY DETAIL**



NOT TO SCALE

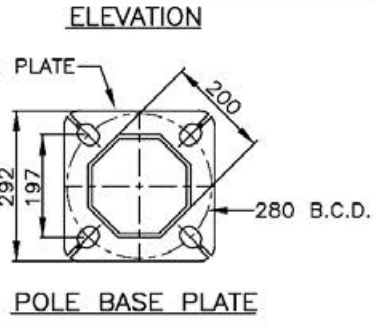
No.	Revision	Date	TYPE 1 POLE INSTALLATION DETAILS (SIGNAL POLE)		SPECIFICATION DRAWING No. SP635-2.1.2
F	GENERAL REVISIONS	APR 20	Date	Approved	
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
D	TYPE 1 FLANGE BOLTS CHANGED TO A325	DEC 10	Chief Highway Engineer		
C	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98			
B	HANDHOLE BOLT LENGTH REVISED	AUG 96			



PARTS LIST	
PART	MASS (kg)
TYPE [2(5)] POLE - 5.0m	83
TYPE [2(6.5)] POLE - 6.5m	102
TYPE [2(8.5)] POLE - 8.5m	128
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
POST TOP TENON [PTT]	5
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5

\* [ ] I.D. LABEL ON POLE

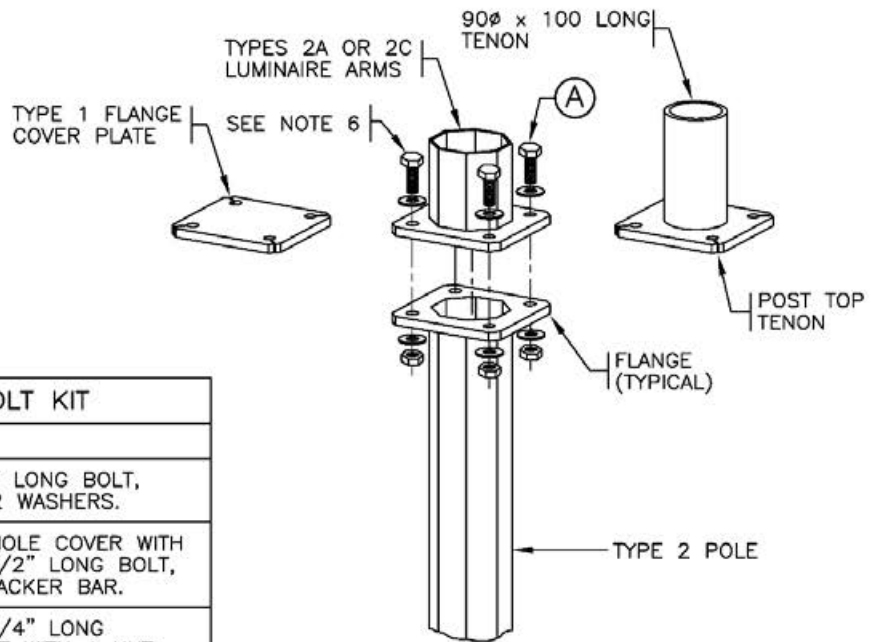
- NOTES**
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  - SEE DRAWING SP635-2.1.4 FOR TYPE 2 POLE, BOLT KITS AND POLE ASSEMBLY DETAILS.
  - ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



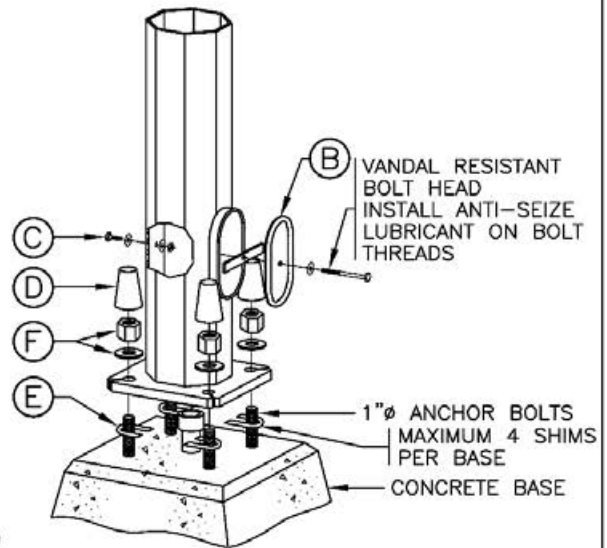
NOT TO SCALE

No.	Revision	Date	TYPE 2 POLE INSTALLATION DETAILS (7.5 m, 9.0 m AND 11.0 m LUMINAIRE POLES)	
F				
E			Date	Approved
D			30/09/93	E.L. (Signature on File)
C			Chief Highway Engineer	
B	GENERAL REVISIONS	APR 17	SPECIFICATION DRAWING No. SP635-2.1.3	
A	GENERAL REVISIONS	AUG 94		





TYPE 2 POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"ø x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	1	SMALL HANDHOLE COVER WITH 3/8"ø x 3 1/2" LONG BOLT, WASHER & BACKER BAR.
C	1	3/8"ø x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
D	4	PLASTIC NUT COVERS FOR 1" NUTS.
E	4	LEVELLING SHIMS.
F	4	1"ø NUTS AND WASHERS.



POLE ASSEMBLY DETAIL

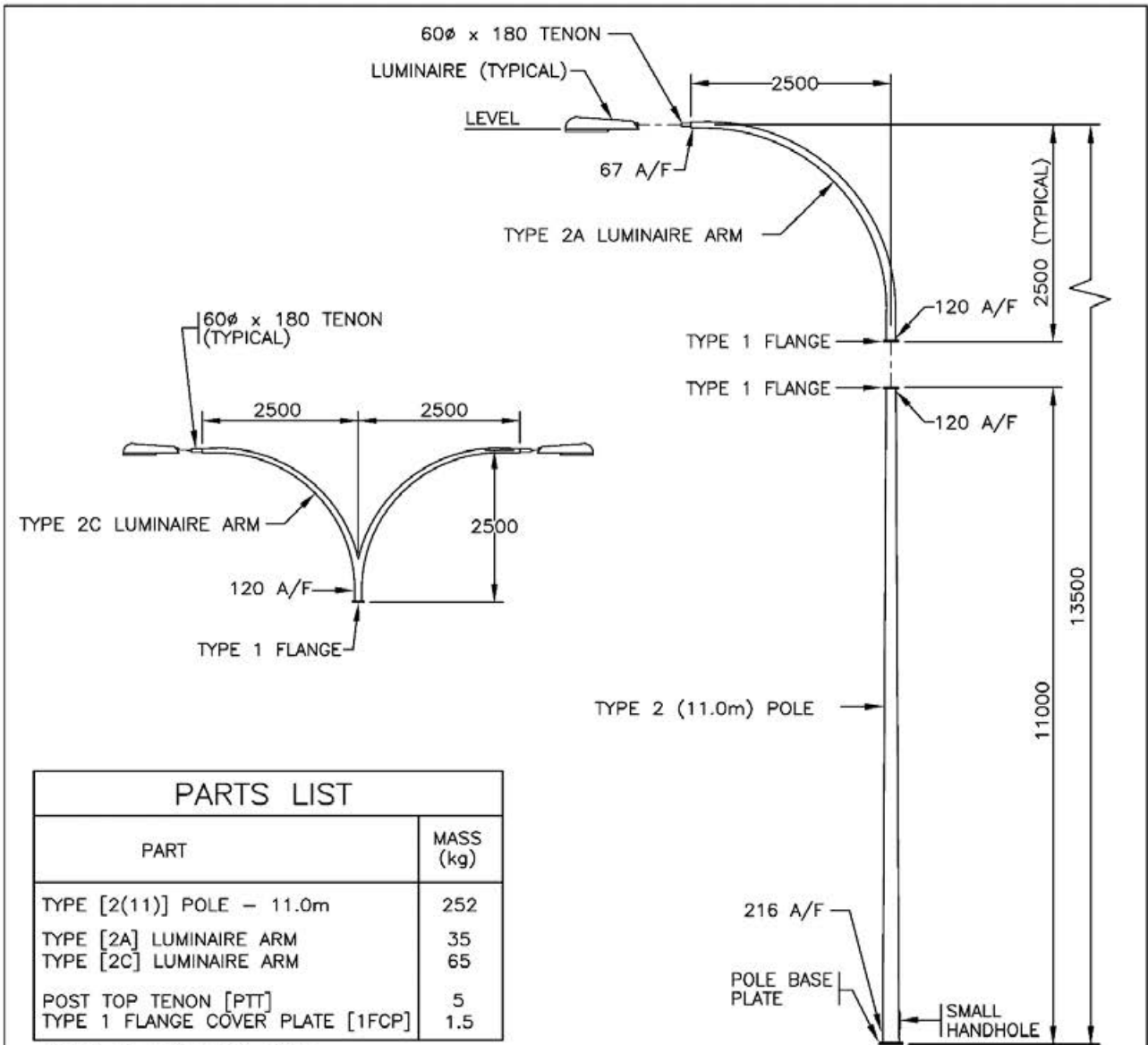
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. POLE SHALL BE INSTALLED PLUMB.
3. ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
4. APPLY GREASE TO ANCHOR BOLT THREADS.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

NOT TO SCALE



No.	Revision	Date	TYPE 2 POLE INSTALLATION DETAILS (7.5 m, 9.0 m AND 11.0 m LUMINAIRE POLES)		SPECIFICATION DRAWING No.
F	GENERAL REVISIONS	APR 20	Date	Approved	SP635-2.1.4
E	GENERAL REVISIONS	APR 17			
D	TYPE 1 FLANGE BOLTS CHANGED TO A325	DEC 10	30/09/93	E.L. (Signature on File)	
C	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98		Chief Highway Engineer	
B	HANDHOLE BOLT LENGTH REVISED	AUG 96			



PARTS LIST	
PART	MASS (kg)
TYPE [2(11)] POLE - 11.0m	252
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
POST TOP TENON [PTT]	5
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5

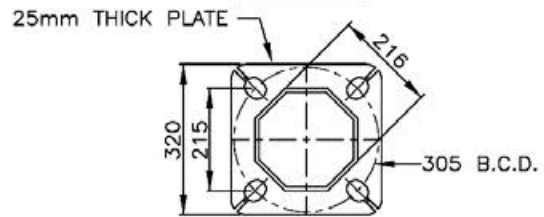
\* [ ] I.D. LABEL ON POLE

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-2.1.6 FOR TYPE 2 POLE, BOLT KITS AND POLE ASSEMBLY DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE

**ELEVATION**



**POLE BASE PLATE**

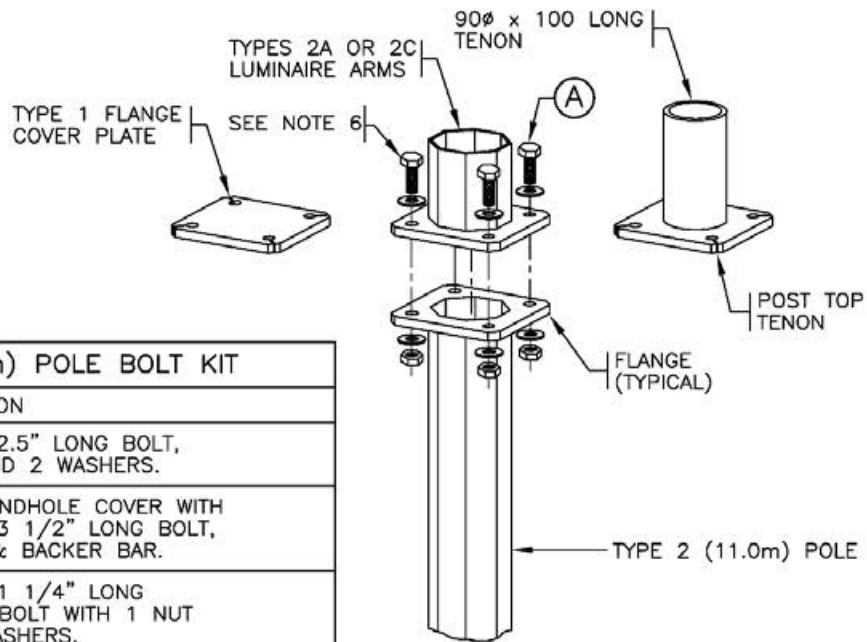


No.	Revision	Date
F		
E		
D		
C		
B	GENERAL REVISIONS	APR 17
A	GENERAL REVISIONS	AUG 94

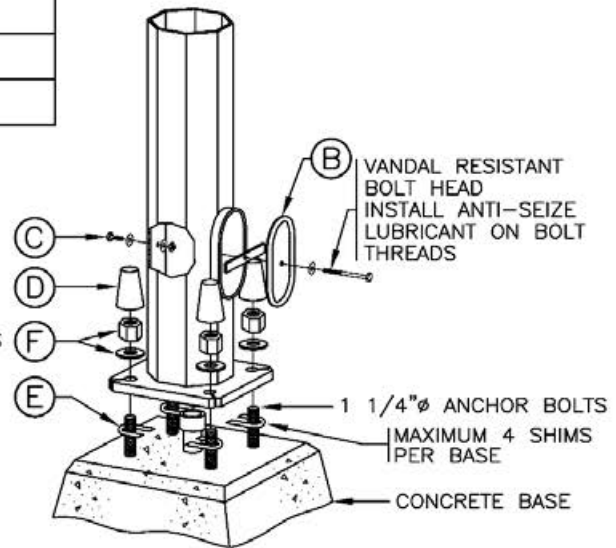
**TYPE 2 POLE INSTALLATION DETAILS  
(13.5 m LUMINAIRE POLE)**

Date Approved  
**30/09/93 E.L. (Signature on File)**  
 Chief Highway Engineer

SPECIFICATION  
 DRAWING No.  
**SP635-2.1.5**



TYPE 2 (11.0m) POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"φ x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	1	SMALL HANDHOLE COVER WITH 3/8"φ x 3 1/2" LONG BOLT, WASHER & BACKER BAR.
C	1	3/8"φ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
D	4	PLASTIC NUT COVERS FOR 1 1/4" NUTS.
E	4	LEVELLING SHIMS.
F	4	1 1/4"φ NUTS AND WASHERS.



**NOTES**

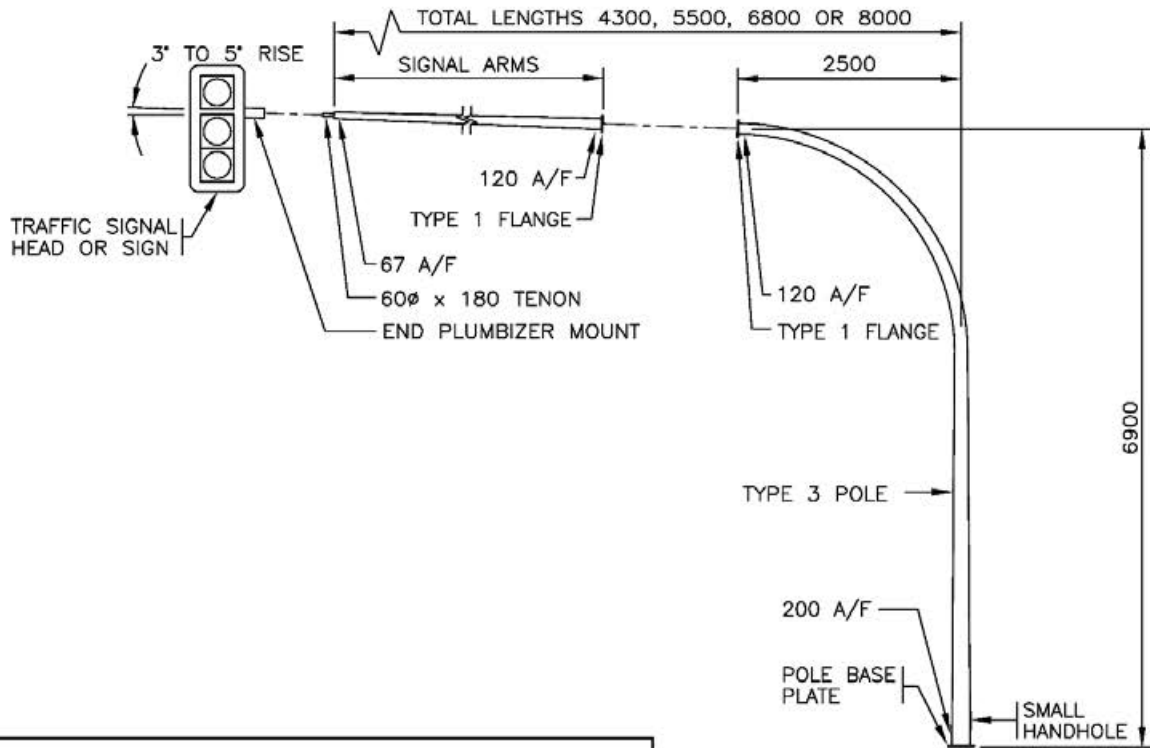
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- POLE SHALL BE INSTALLED PLUMB.
- ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
- APPLY GREASE TO ANCHOR BOLT THREADS.
- TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
- BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

**POLE ASSEMBLY DETAIL**

NOT TO SCALE



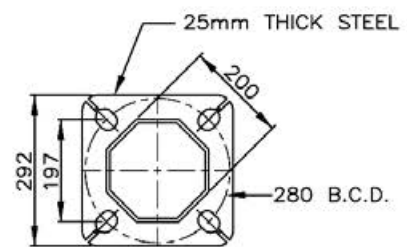
No.	Revision	Date	TYPE 2 POLE INSTALLATION DETAILS (13.5 m LUMINAIRE POLE)		SPECIFICATION DRAWING No.
F	GENERAL REVISIONS	APR 20	Date	Approved	SP635-2.1.6
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
D	TYPE 1 FLANGE BOLTS CHANGED TO A325	DEC 10	Chief Highway Engineer		
C	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98			
B	HANDHOLE BOLT LENGTH REVISED	AUG 96			



PARTS LIST	
PART	MASS (kg)
TYPE [3] POLE	186
TYPE [3C] SIGNAL ARM - 1.8m	18
TYPE [3A] SIGNAL ARM - 3.0m	27
TYPE [3D] SIGNAL ARM - 4.3m	54
TYPE [3E] SIGNAL ARM - 5.5m	68
TYPE [3F] SIGNAL ARM - 0.3m to 3.0m (LENGTH VARIES)	9 PER METRE

\* [ ] I.D. LABEL ON POLE

ELEVATION



POLE BASE PLATE

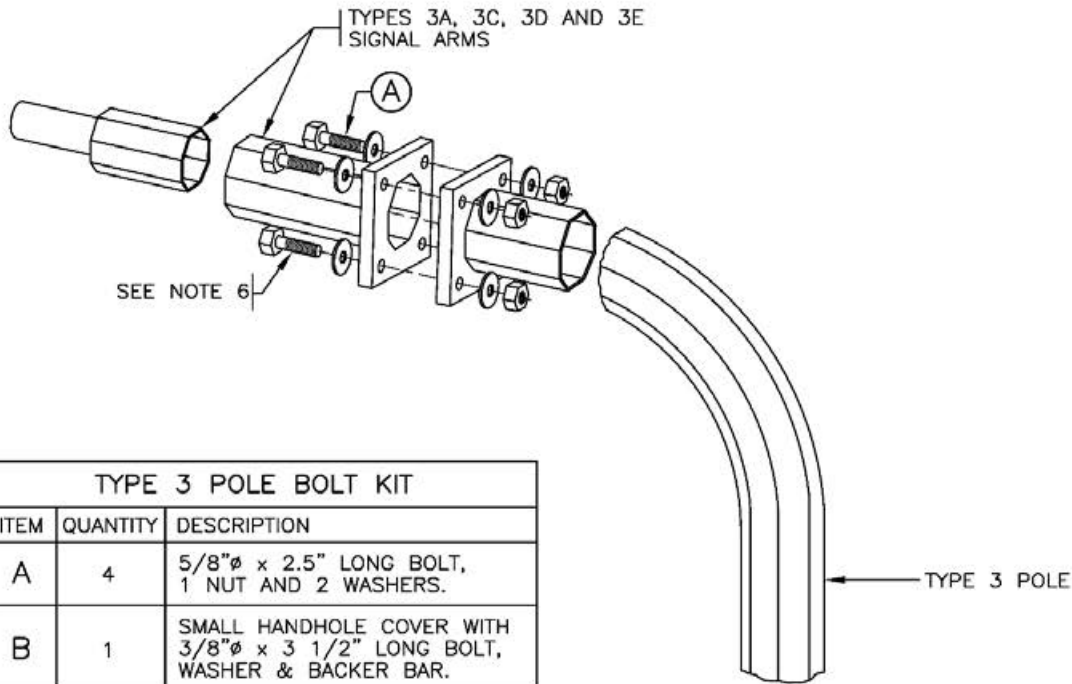
NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-2.1.8 FOR TYPE 3 POLE, BOLT KITS AND POLE ASSEMBLY DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



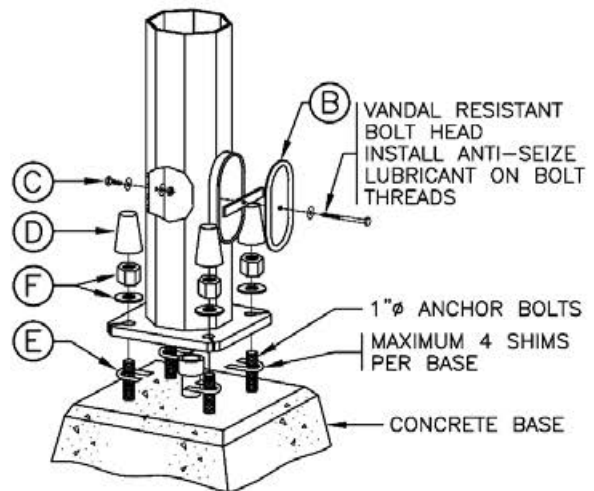
No.	Revision	Date	TYPE 3 POLE INSTALLATION DETAILS (SIGNAL POLE)		SPECIFICATION DRAWING No.
F	GENERAL REVISIONS	APR 20	Date	Approved	SP635-2.1.7
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	SIGNAL HEAD MOUNTING REVISED	OCT 03			
C	3F ARM ADDED	AUG 96			
B	SIGNAL HEAD REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



TYPE 3 POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"Ø x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	1	SMALL HANDHOLE COVER WITH 3/8"Ø x 3 1/2" LONG BOLT, WASHER & BACKER BAR.
C	1	3/8"Ø x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
D	4	PLASTIC NUT COVERS FOR 1" NUTS.
E	4	LEVELLING SHIMS.
F	4	1"Ø NUTS AND WASHERS.

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. POLE SHALL BE INSTALLED PLUMB.
3. ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
4. APPLY GREASE TO ANCHOR BOLT THREADS.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

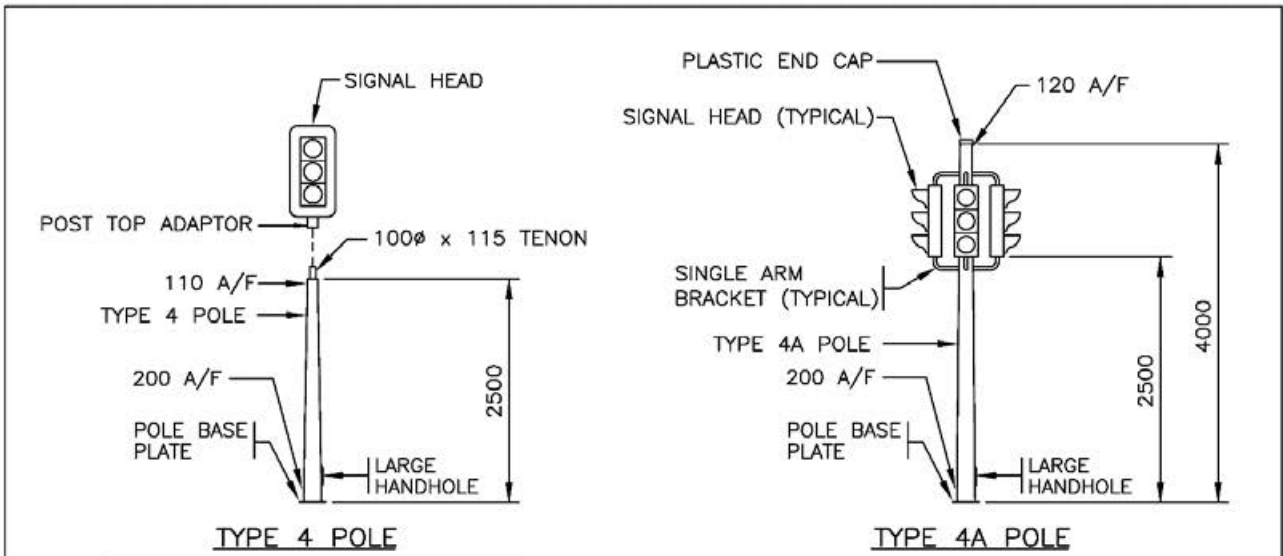


**POLE ASSEMBLY DETAIL**

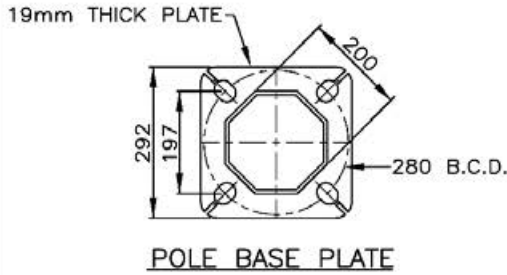
NOT TO SCALE



No.	Revision	Date	TYPE 3 POLE INSTALLATION DETAILS (SIGNAL POLE)		SPECIFICATION DRAWING No. SP635-2.1.8
F	GENERAL REVISIONS	APR 20	Date	Approved	
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
D	TYPE 1 FLANGE BOLTS CHANGED TO A325	DEC 10	Chief Highway Engineer		
C	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98			
B	HANDHOLE BOLT LENGTH REVISED	AUG 96			

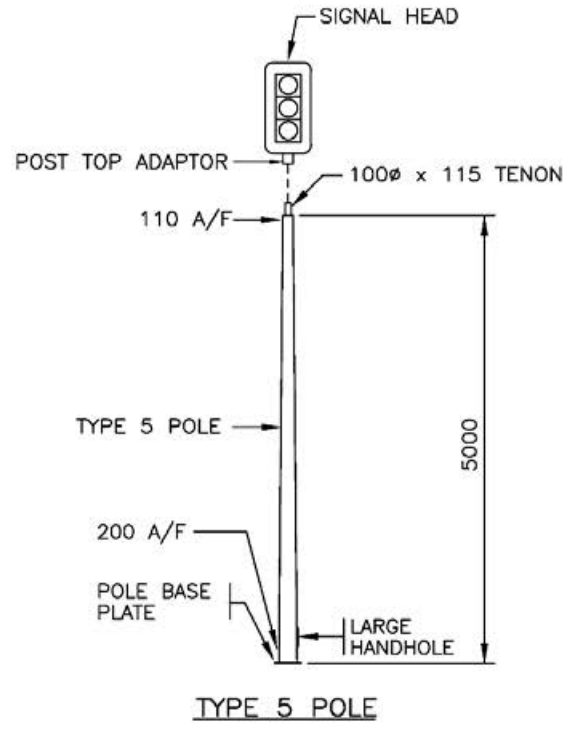


**FOR REFERENCE ONLY**  
 USE TYPE 4A SHAFT IN PLACE OF  
 TYPE 4 SHAFT AND MOUNT SIGNAL  
 HEADS WITH SINGLE ARM BRACKETS



PARTS LIST	
PART	MASS (kg)
TYPE [4] POLE	45
TYPE [4A] POLE	66
TYPE [5] POLE	77

\* [ ] I.D. LABEL ON POLE



**FOR REFERENCE ONLY**  
 USE TYPE 2-6.5m SHAFT IN PLACE OF  
 TYPE 5 SHAFT AND MOUNT SIGNAL HEADS  
 WITH SINGLE ARM BRACKETS

- NOTES**
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  - SEE DRAWING SP635-2.1.10 FOR TYPE 4, 4A AND 5 POLE, BOLT KITS AND POLE ASSEMBLY DETAILS.
  - ALL DIMENSION ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

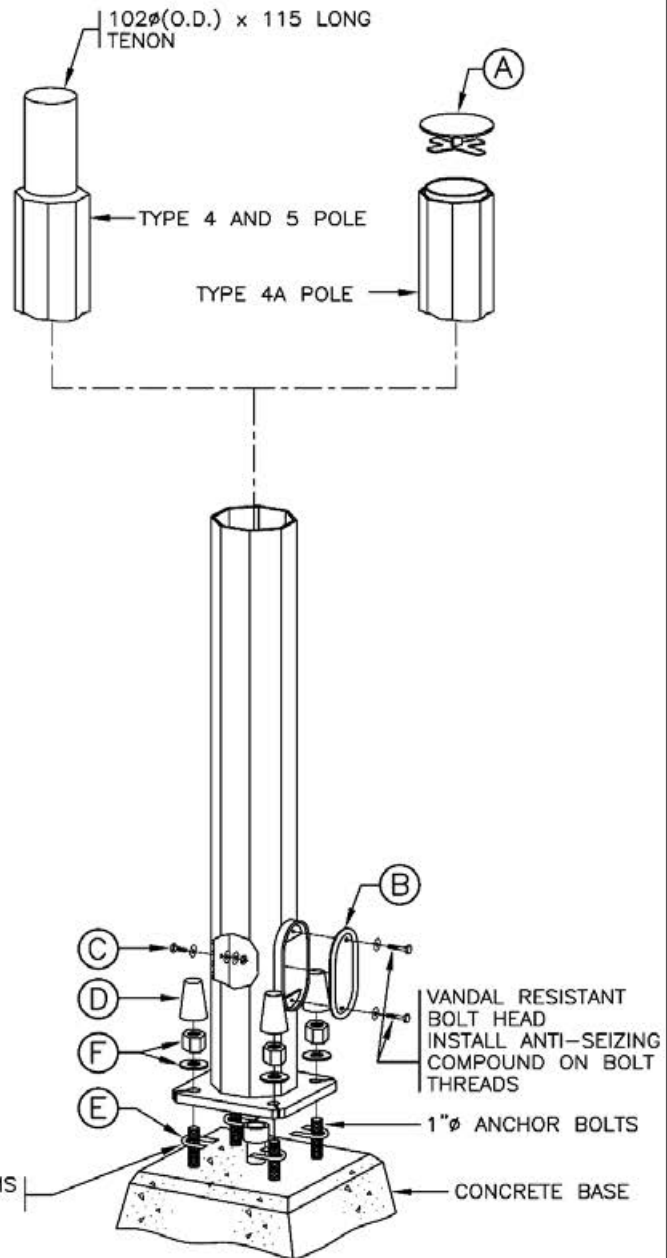


NOT TO SCALE

No.	Revision	Date	TYPE 4, 4A AND 5 POLE INSTALLATION DETAILS	
F			Date	Approved
E			30/09/93	E.L. (Signature on File)
D			Chief Highway Engineer	
C	GENERAL REVISIONS	APR 17	SPECIFICATION DRAWING No.	
B	ALTERNATES NOTED	OCT 03	SP635-2.1.9	
A	GENERAL REVISIONS	AUG 94		

TYPE 4 & 5 POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
B	1	LARGE HANDHOLE COVER WITH 2-3/8"φ x 1 1/4" LONG BOLTS AND 2 WASHERS.
C	1	3/8"φ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 3 WASHERS.
D	4	PLASTIC NUT COVERS FOR 1" NUTS.
E	4	LEVELLING SHIMS.
F	4	1"φ NUTS AND WASHERS.

TYPE 4A POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	1	PLASTIC END CAP
B	1	LARGE HANDHOLE COVER WITH 2-3/8"φ x 1 1/4" LONG BOLTS AND 2 WASHERS.
C	1	3/8"φ x 1" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
D	4	PLASTIC NUT COVERS FOR 1" NUTS.
E	4	LEVELLING SHIMS.
F	4	1"φ NUTS AND WASHERS.



POLE ASSEMBLY DETAIL

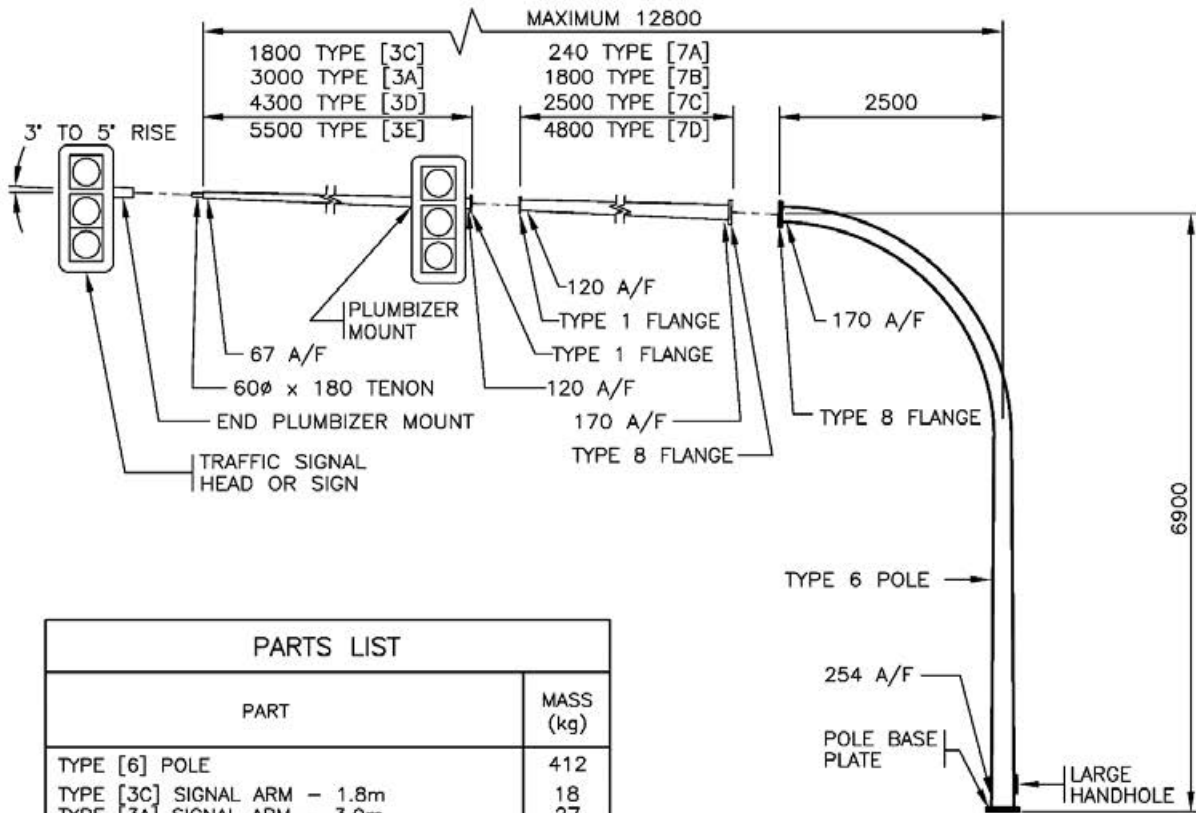
NOTES

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- POLE SHALL BE INSTALLED PLUMB.
- ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
- APPLY GREASE TO ANCHOR BOLT THREADS.
- TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.

NOT TO SCALE



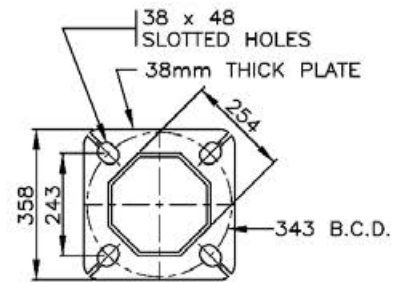
No.	Revision	Date	TYPE 4, 4A AND 5 POLE INSTALLATION DETAILS (SIGNAL POSTS)	
E			Date	Approved
D	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)
C	ANTI-SEIZING COMPOUND NOTED ON HANDHOLE BOLTS	NOV 98	SPECIFICATION DRAWING No.	
B	HANDHOLE BOLT LENGTH REVISED	AUG 95	SP635-2.1.10	
A	GENERAL REVISIONS	AUG 94	Chief Highway Engineer	



PARTS LIST	
PART	MASS (kg)
TYPE [6] POLE	412
TYPE [3C] SIGNAL ARM - 1.8m	18
TYPE [3A] SIGNAL ARM - 3.0m	27
TYPE [3D] SIGNAL ARM - 4.3m	54
TYPE [3E] SIGNAL ARM - 5.5m	68
TYPE [3F] SIGNAL ARM - 0.3m to 3.0m (LENGTH VARIES)	9 PER METRE
TYPE [7A] EXTENSION - 0.24m	20
TYPE [7B] EXTENSION - 1.8m	69
TYPE [7C] EXTENSION - 2.5m	86
TYPE [7D] EXTENSION - 4.8m	154
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5
TYPE 8 FLANGE COVER PLATE [8FCP]	2.5

\* [ ] I.D. LABEL ON POLE

ELEVATION



POLE BASE PLATE

NOTES

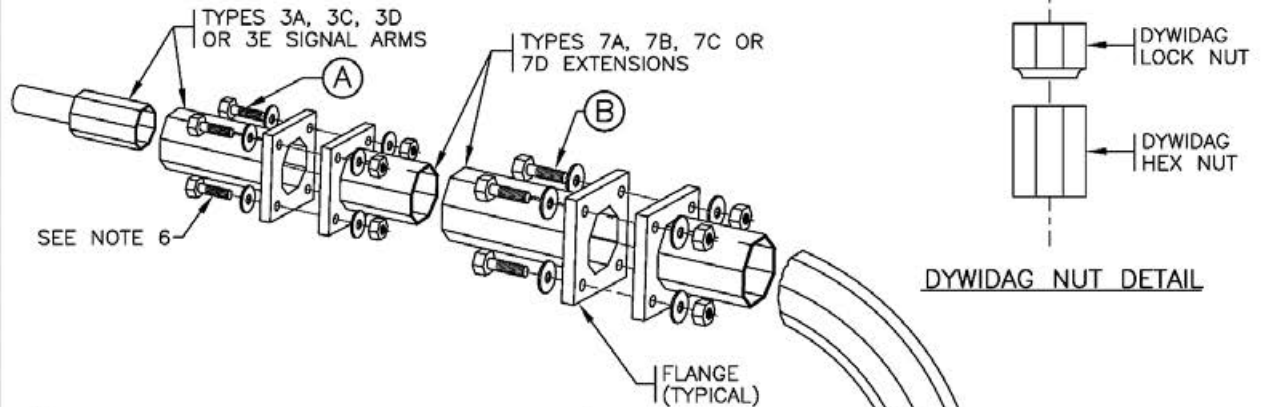
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- SEE DRAWING SP635-2.1.12 FOR TYPE 6 POLE, BOLT KITS AND POLE ASSEMBLY DETAILS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	TYPE 6 POLE INSTALLATION DETAILS (SIGNAL POLE)		SPECIFICATION DRAWING No. SP635-2.1.11
F	GENERAL REVISIONS	APR 20	Date	Approved	
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
D	SIGNAL HEAD MOUNTING REVISED	OCT 03	Chief Highway Engineer		
C	3F ARM ADDED	AUG 96			
B	SIGNAL HEAD REVISED & PLATE HOLE SIZE ADDED	AUG 95			
A	GENERAL REVISIONS	AUG 94			

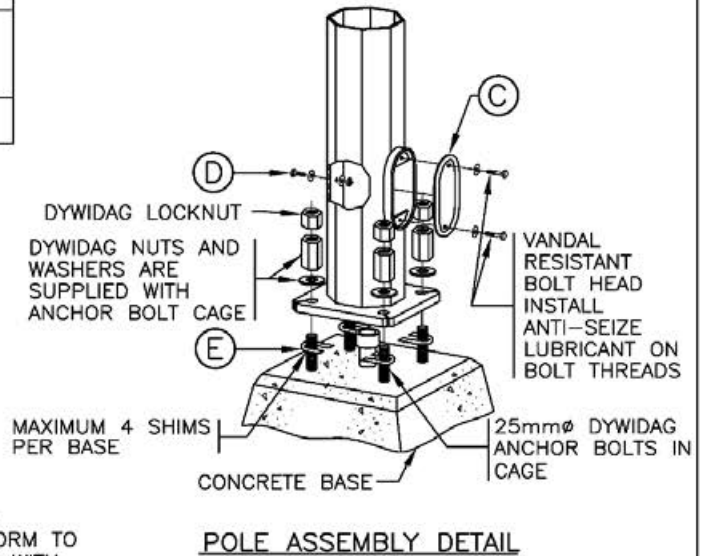




TYPE 6 POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8" $\phi$ x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	4	1" $\phi$ x 4" LONG BOLT, 1 NUT AND 2 WASHERS.
C	1	LARGE HANDHOLE COVER WITH 2-3/8" $\phi$ x 1" LONG BOLTS AND 2 WASHERS.
D	1	3/8" $\phi$ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
E	4	LEVELLING SHIMS.

**NOTES**

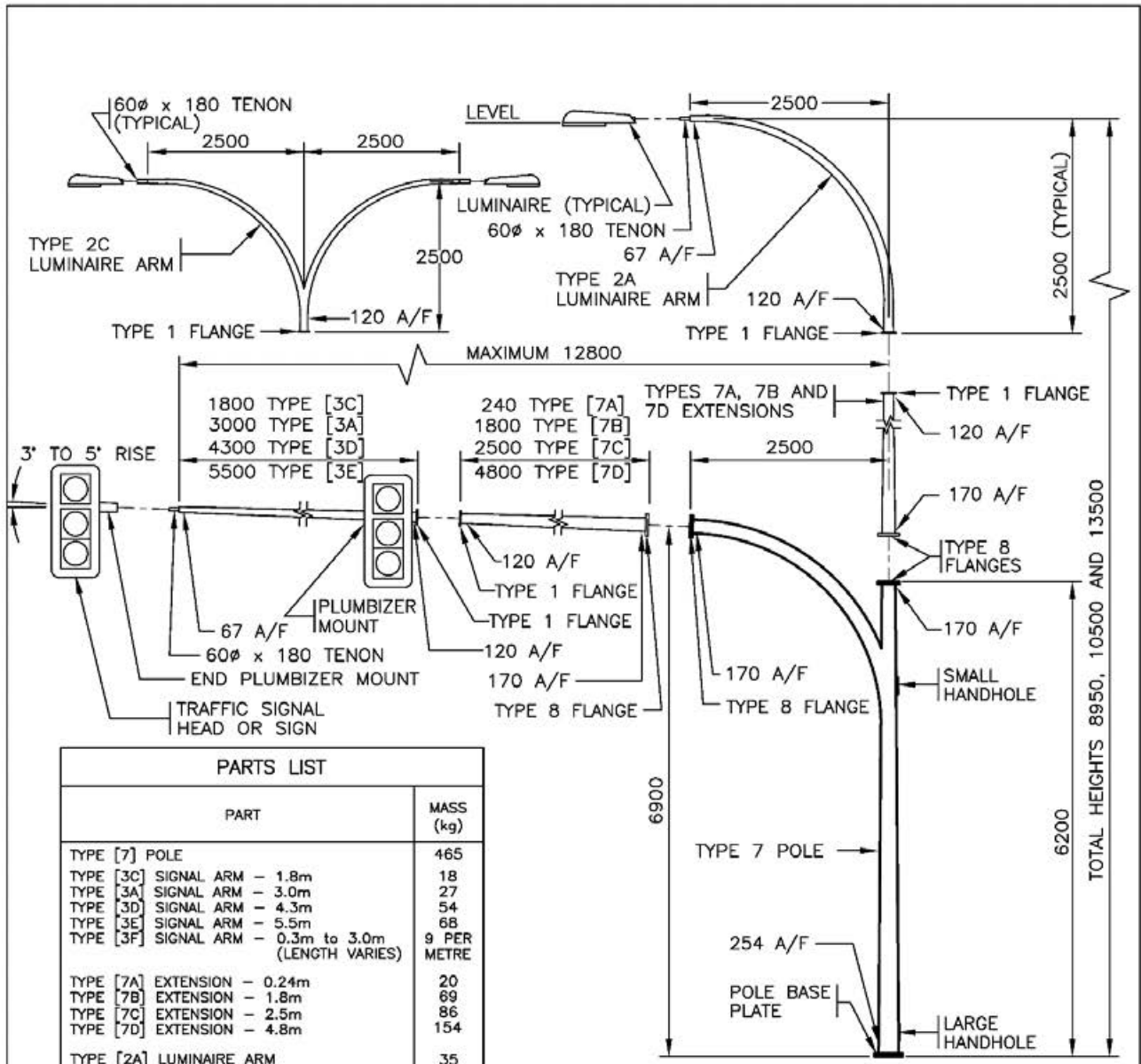
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- POLE SHALL BE INSTALLED PLUMB.
- ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
- APPLY GREASE TO ANCHOR BOLT THREADS. TO ANCHOR BOLT THREADS.
- TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
- BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.



NOT TO SCALE



No.	Revision	Date	TYPE 6 POLE INSTALLATION DETAILS (SIGNAL POLE)		SPECIFICATION DRAWING No. SP635-2.1.12
F	GENERAL REVISIONS	APR 20	Date	Approved	
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
D	TYPE 1 & 8 FLANGE BOLTS CHANGED TO A325	DEC 10	Chief Highway Engineer		
C	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98			
B	HANDHOLE BOLT LENGTH REVISED	AUG 95			

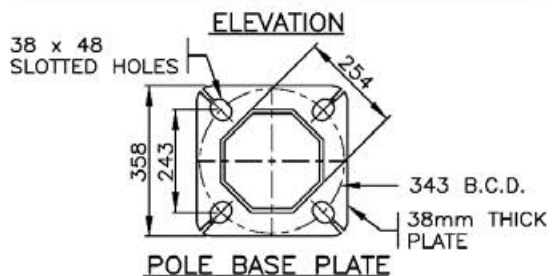


PARTS LIST	
PART	MASS (kg)
TYPE [7] POLE	465
TYPE [3C] SIGNAL ARM - 1.8m	18
TYPE [3A] SIGNAL ARM - 3.0m	27
TYPE [3D] SIGNAL ARM - 4.3m	54
TYPE [3E] SIGNAL ARM - 5.5m	68
TYPE [3F] SIGNAL ARM - 0.3m to 3.0m (LENGTH VARIES)	9 PER METRE
TYPE [7A] EXTENSION - 0.24m	20
TYPE [7B] EXTENSION - 1.8m	69
TYPE [7C] EXTENSION - 2.5m	86
TYPE [7D] EXTENSION - 4.8m	154
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
POST TOP TENON [PTT]	5
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5
TYPE 8 FLANGE COVER PLATE [8FCP]	2.5

\* [ ] I.D. LABEL ON POLE

- NOTES**
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  - SEE DRAWING SP635-2.1.14 FOR TYPE 7 POLE, BOLT KITS AND POLE ASSEMBLY DETAILS.
  - ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE

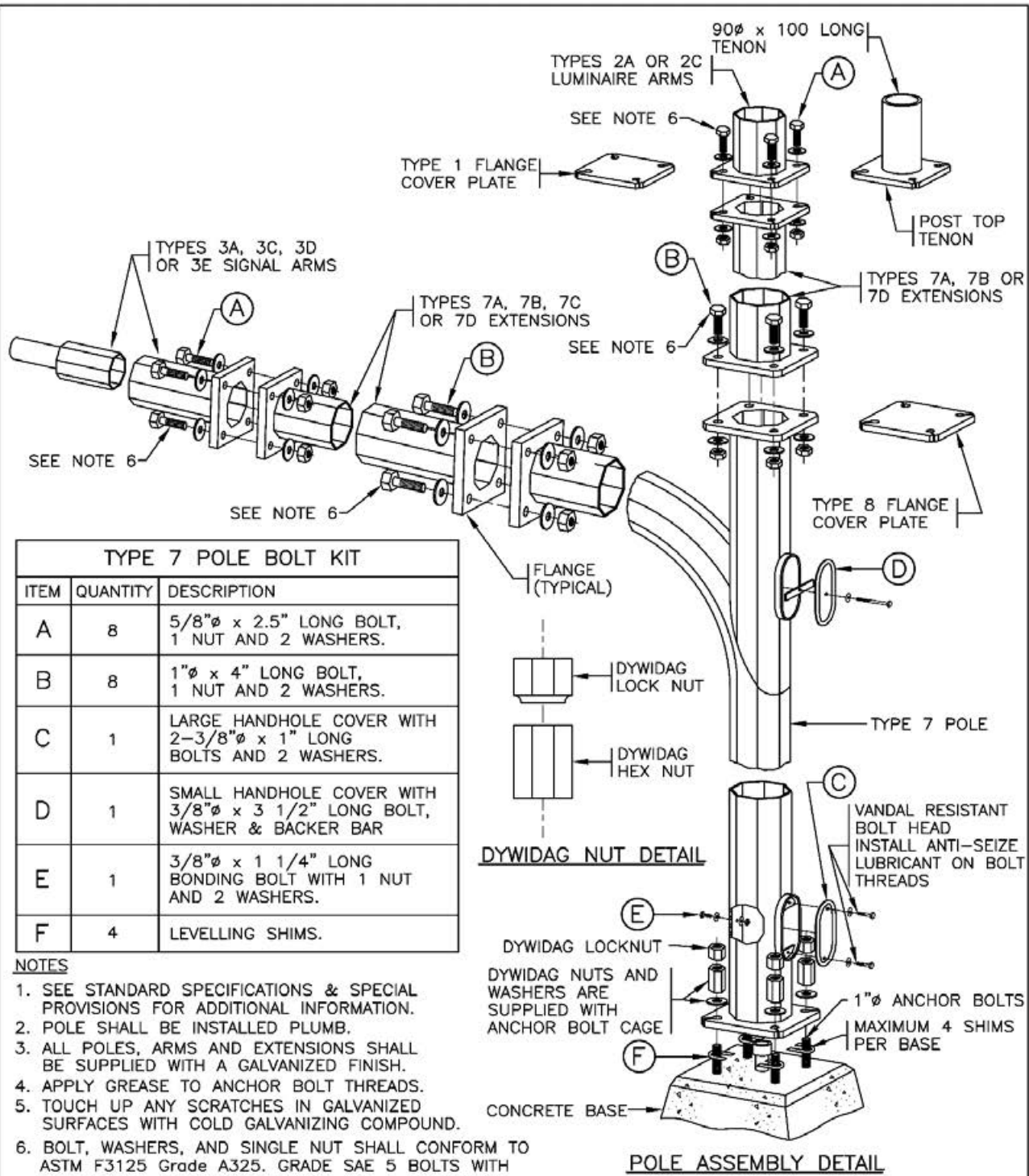


No.	Revision	Date
F	GENERAL REVISIONS	APR 20
E	GENERAL REVISIONS	APR 17
D	SIGNAL HEAD MOUNTING REVISED	OCT 03
C	3F ARM ADDED	AUG 96
B	SIGNAL HEAD REVISED & PLATE HOLE SIZE ADDED	AUG 95
A	GENERAL REVISIONS	AUG 94

**TYPE 7 POLE INSTALLATION DETAILS (SIGNAL POLE)**

Date: 30/09/93 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-2.1.13



TYPE 7 POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	8	5/8"φ x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	8	1"φ x 4" LONG BOLT, 1 NUT AND 2 WASHERS.
C	1	LARGE HANDHOLE COVER WITH 2-3/8"φ x 1" LONG BOLTS AND 2 WASHERS.
D	1	SMALL HANDHOLE COVER WITH 3/8"φ x 3 1/2" LONG BOLT, WASHER & BACKER BAR
E	1	3/8"φ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
F	4	LEVELLING SHIMS.

**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- POLE SHALL BE INSTALLED PLUMB.
- ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
- APPLY GREASE TO ANCHOR BOLT THREADS.
- TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
- BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 Grade A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

NOT TO SCALE

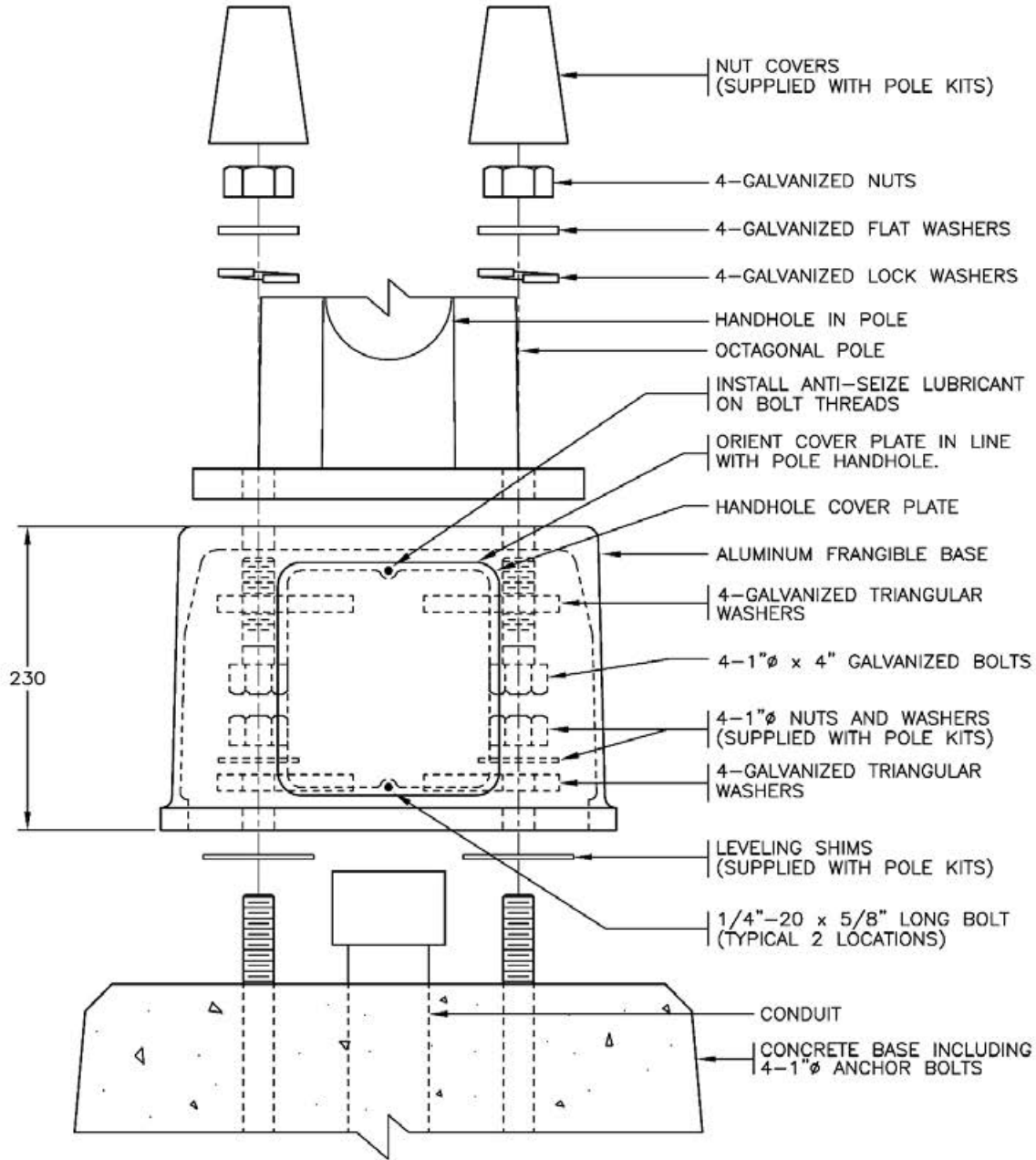
No.	Revision	Date
H	GENERAL REVISIONS	APR 20
G	GENERAL REVISIONS	APR 17
F	TYPE 1&8 FLANGE BOLTS CHANGED TO A325	DEC 10
E	7C LUM EXTENSION CHANGED TO 7B	OCT 03
D	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98

**TYPE 7 POLE INSTALLATION DETAILS (SIGNAL POLE)**

Date: 30/09/93  
 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-2.1.14





**FRANGIBLE BASE ASSEMBLY**

**NOTES:**

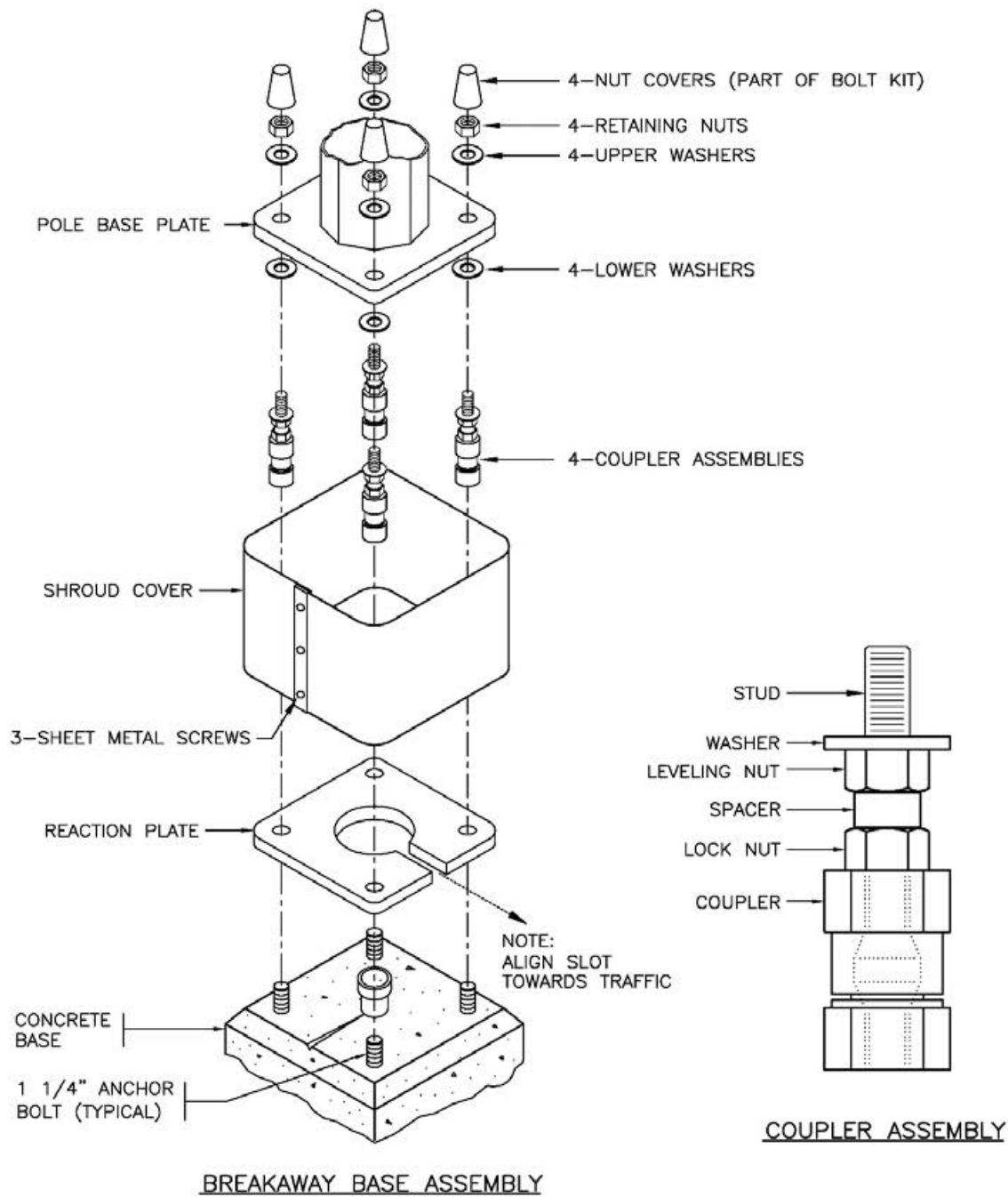
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	ALUMINUM FRANGIBLE BASE FOR 9.0 m AND 11.0 m LUMINAIRE POLES		SPECIFICATION DRAWING No. SP635-2.1.15
E	GENERAL REVISIONS	APR 17	Date	Approved	
D	LOCK WASHERS ADDED	SEPT 00	30/09/93 E.L. (Signature on File)		
C	ANTI-SEIZING LUBRICANT NOTED ON COVER PLATE BOLTS	NOV 98	Chief Highway Engineer		
B	SPRING LOCK WASHERS REMOVED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



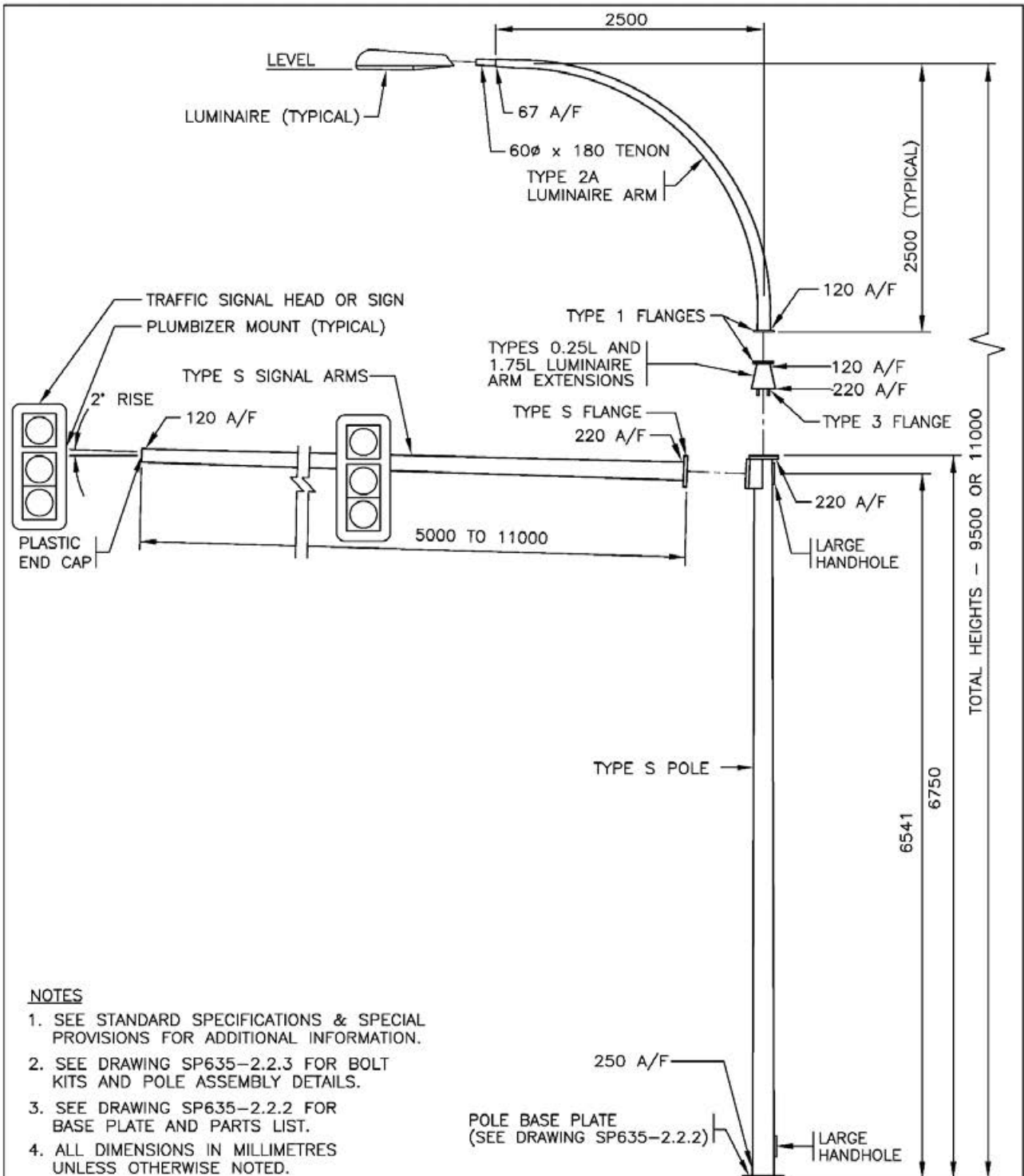
**NOTES:**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. INSTALL BASE AND TIGHTEN BOLTS AS PER MANUFACTURERS INSTRUCTIONS.

NOT TO SCALE



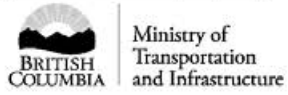
No.	Revision	Date	BREAKAWAY BASE FOR 13.5 m LUMINAIRE POLES		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-2.1.16
E			30/09/93	E.L. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	NOTE 2, COUPLERS & REACTION PLATE REV'D	JAN 97			
A	GENERAL REVISIONS	AUG 94			



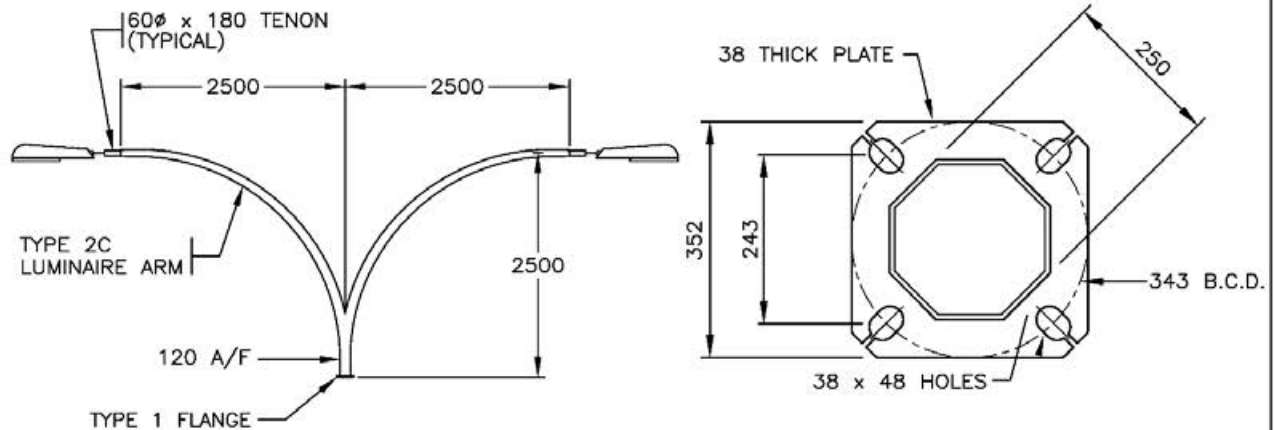
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-2.2.3 FOR BOLT KITS AND POLE ASSEMBLY DETAILS.
3. SEE DRAWING SP635-2.2.2 FOR BASE PLATE AND PARTS LIST.
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. SEE DRAWING SP635-2.2.2 FOR TYPE 2C LUMINAIRE ARM DETAILS.

NOT TO SCALE



No.	Revision	Date	TYPE S SIGNAL POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.2.1
E			Date	Approved	
D			14/11/03	D.N. (Signature on File)	
C	GENERAL REVISIONS AND NEW DRAWING NUMBER	APR 20	Chief Engineer		
B	GENERAL REVISIONS	APR 17			
A	NEW DRAWING—PREVIOUS DRAWING 2.2.7 TO MOVED TO 2.2.10	OCT 03			



**TYPE 2C LUMINAIRE ARM DETAILS**

**TYPE S POLE BASE PLATE**

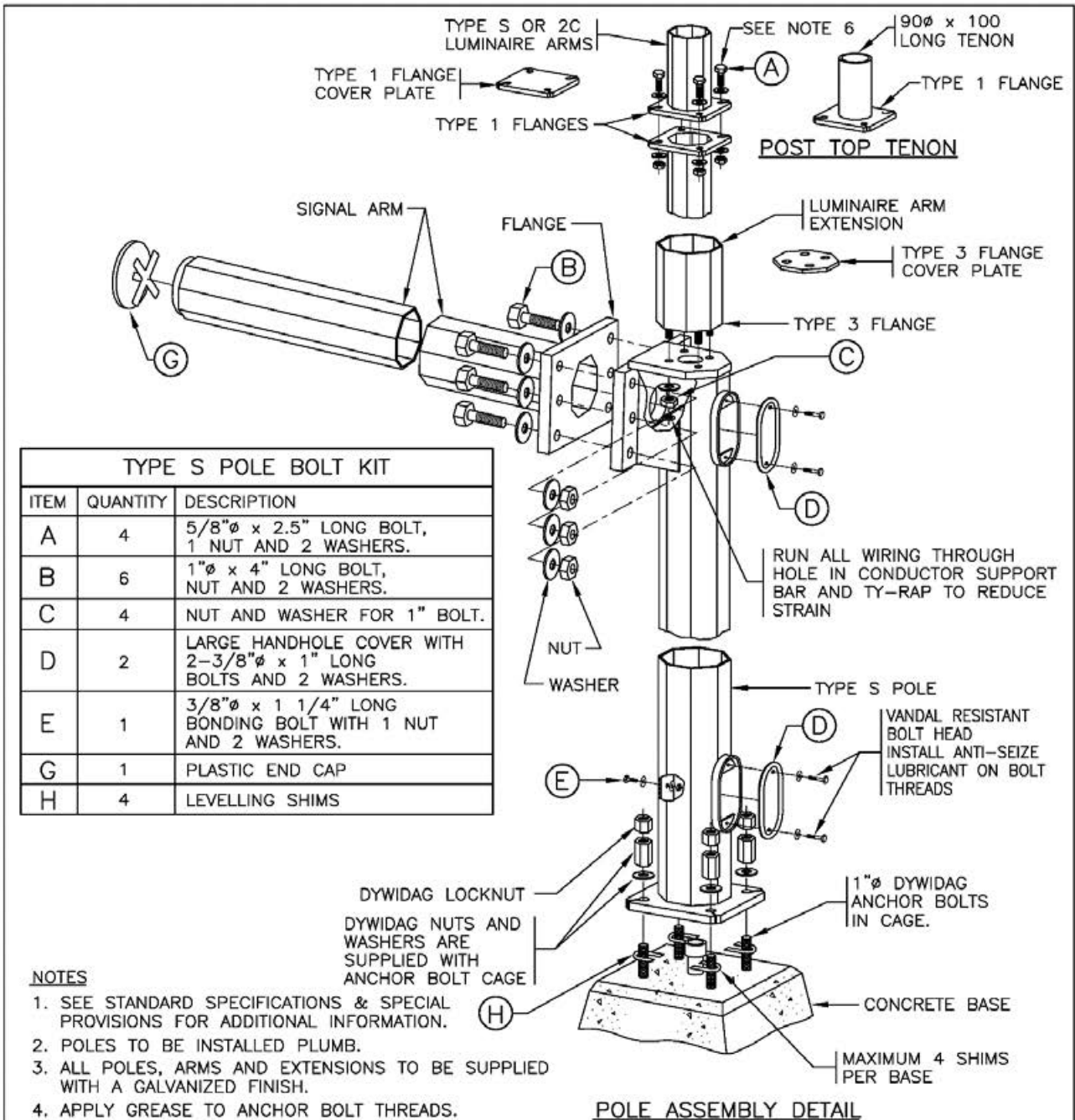
PARTS LIST FOR TYPE S SIGNAL POLE		
PART		MASS (kg)
TYPE [S] POLE		385
TYPE [5S] SIGNAL ARM - 5.0m		104
TYPE [5.5S] SIGNAL ARM - 5.5m		111
TYPE [6S] SIGNAL ARM - 6.0m		118
TYPE [6.5S] SIGNAL ARM - 6.5m		125
TYPE [7S] SIGNAL ARM - 7.0m		132
TYPE [7.5S] SIGNAL ARM - 7.5m		192
TYPE [8S] SIGNAL ARM - 8.0m		204
TYPE [8.5S] SIGNAL ARM - 8.5m		214
TYPE [9S] SIGNAL ARM - 9.0m		224
TYPE [9.5S] SIGNAL ARM - 9.5m		292
TYPE [10S] SIGNAL ARM - 10.0m		306
TYPE [10.5S] SIGNAL ARM - 10.5m		320
TYPE [11S] SIGNAL ARM - 11.0m		340
TYPE [1.75L] LUMINAIRE ARM EXTENSION - 1.75m		29
TYPE [0.25L] LUMINAIRE ARM EXTENSION - 0.25m		10
TYPE [2A] LUMINAIRE ARM		35
TYPE [2C] LUMINAIRE ARM		65
TYPE 1 FLANGE COVER PLATE [1 FCP]		1.5
TYPE S FLANGE COVER PLATE [S FCP]		3
TYPE 3 FLANGE COVER PLATE [3 FCP]		4
POST TOP TENON [PTT]		5

\* [ ] I.D. LABEL ON POLE

NOT TO SCALE



No.	Revision	Date	TYPE S SIGNAL POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.2.2
F					
E			Date	Approved	
D			14/11/03	D.N. (Signature on File)	
C				Chief Engineer	
B	NEW DRAWING NUMBER	APR 20			
A	GENERAL REVISIONS	APR 17			



**NOTES**

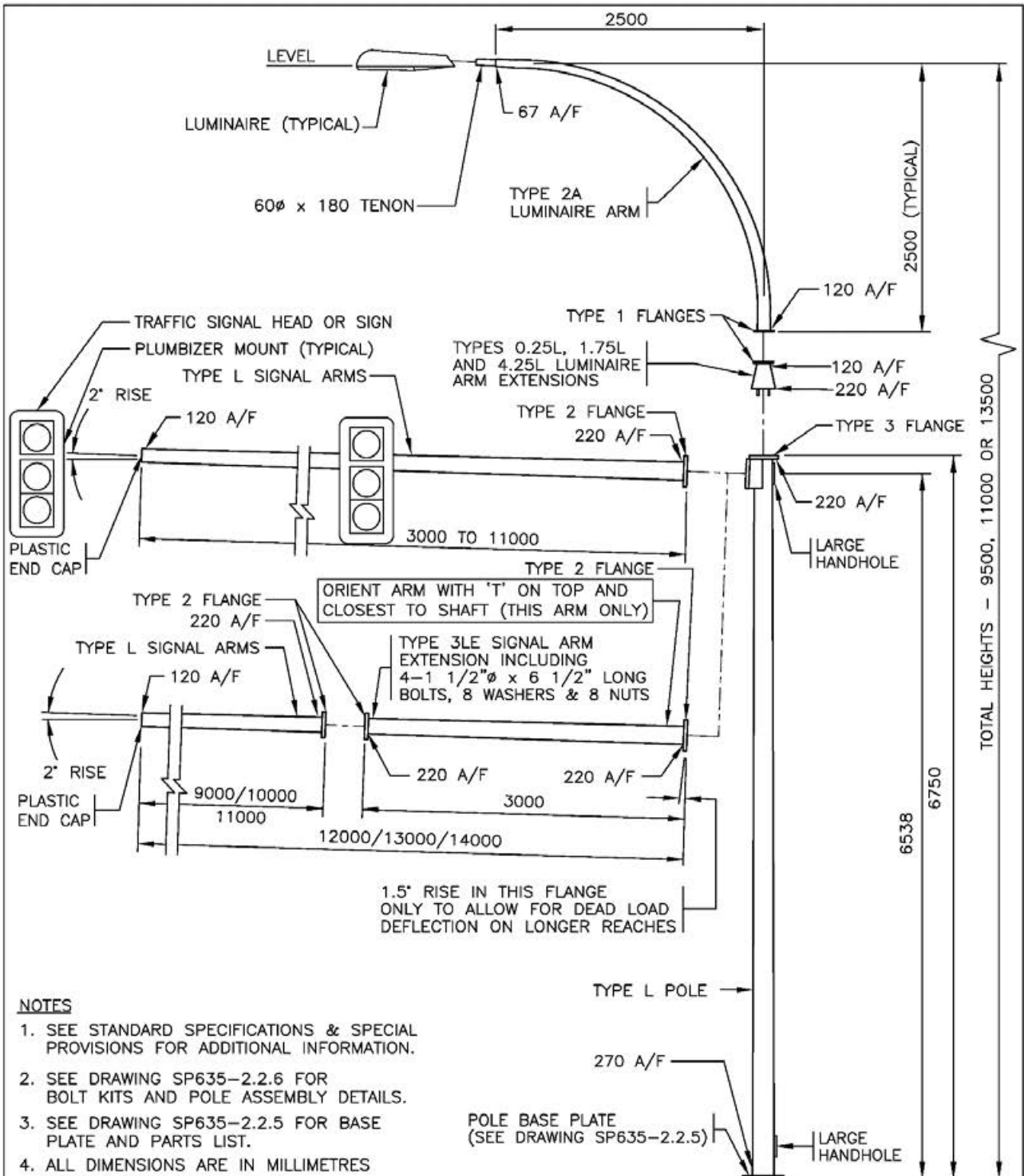
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. POLES TO BE INSTALLED PLUMB.
3. ALL POLES, ARMS AND EXTENSIONS TO BE SUPPLIED WITH A GALVANIZED FINISH.
4. APPLY GREASE TO ANCHOR BOLT THREADS.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

NOT TO SCALE



No.	Revision	Date	TYPE S SIGNAL POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.2.3
F			Date	Approved	
E			14/11/03	D.N. (Signature on File) Chief Engineer	
D					
C	GENERAL REVISIONS AND NEW DRAWING NUMBER	APR 20			
B	GENERAL REVISIONS	APR 17			
A	TYPE 1 FLANGE BOLTS CHANGED TO A325	DEC 10			





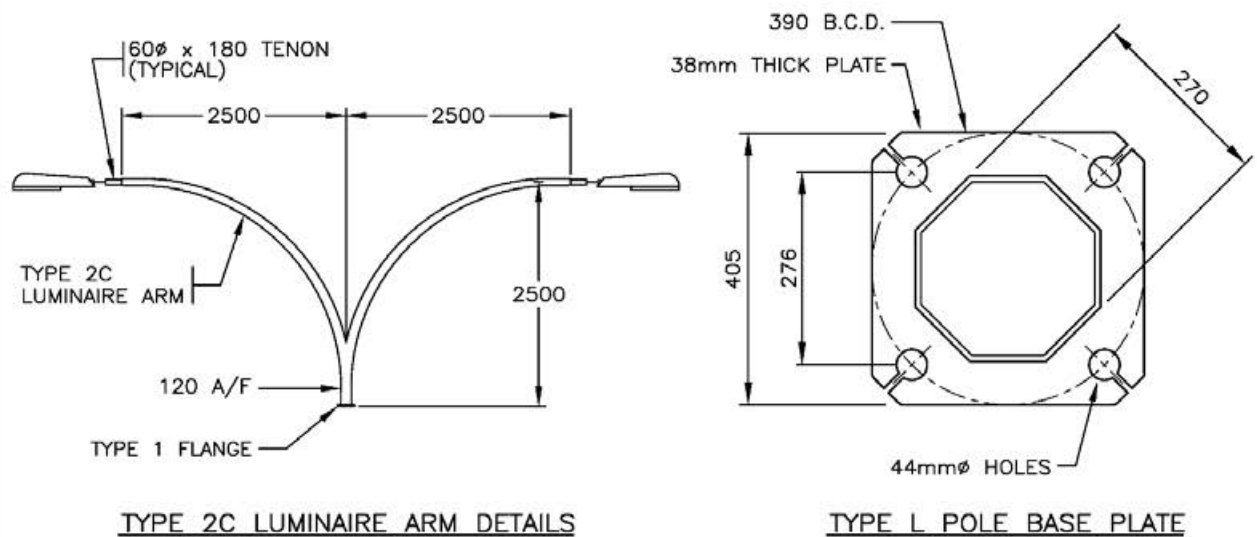
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-2.2.6 FOR BOLT KITS AND POLE ASSEMBLY DETAILS.
3. SEE DRAWING SP635-2.2.5 FOR BASE PLATE AND PARTS LIST.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. SEE DRAWING SP635-2.2.5 FOR TYPE 2C LUMINAIRE ARM DETAILS.

NOT TO SCALE



No.	Revision	Date	TYPE L SIGNAL POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.2.4
F	GENERAL REVISIONS AND NEW DRAWING NUMBER	APR 20	Date	Approved	
E	GENERAL REVISIONS	APR 17	<b>30/09/93 E.L. (Signature on File)</b> Chief Highway Engineer		
D	SIGNAL HEAD MOUNTING ADDED	OCT 03			
C	BOLTS ON EXTENSION ARM REVISED	AUG 96			
B	NOTE 5 ADDED & 3LE ARM REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



TYPE 2C LUMINAIRE ARM DETAILS

TYPE L POLE BASE PLATE

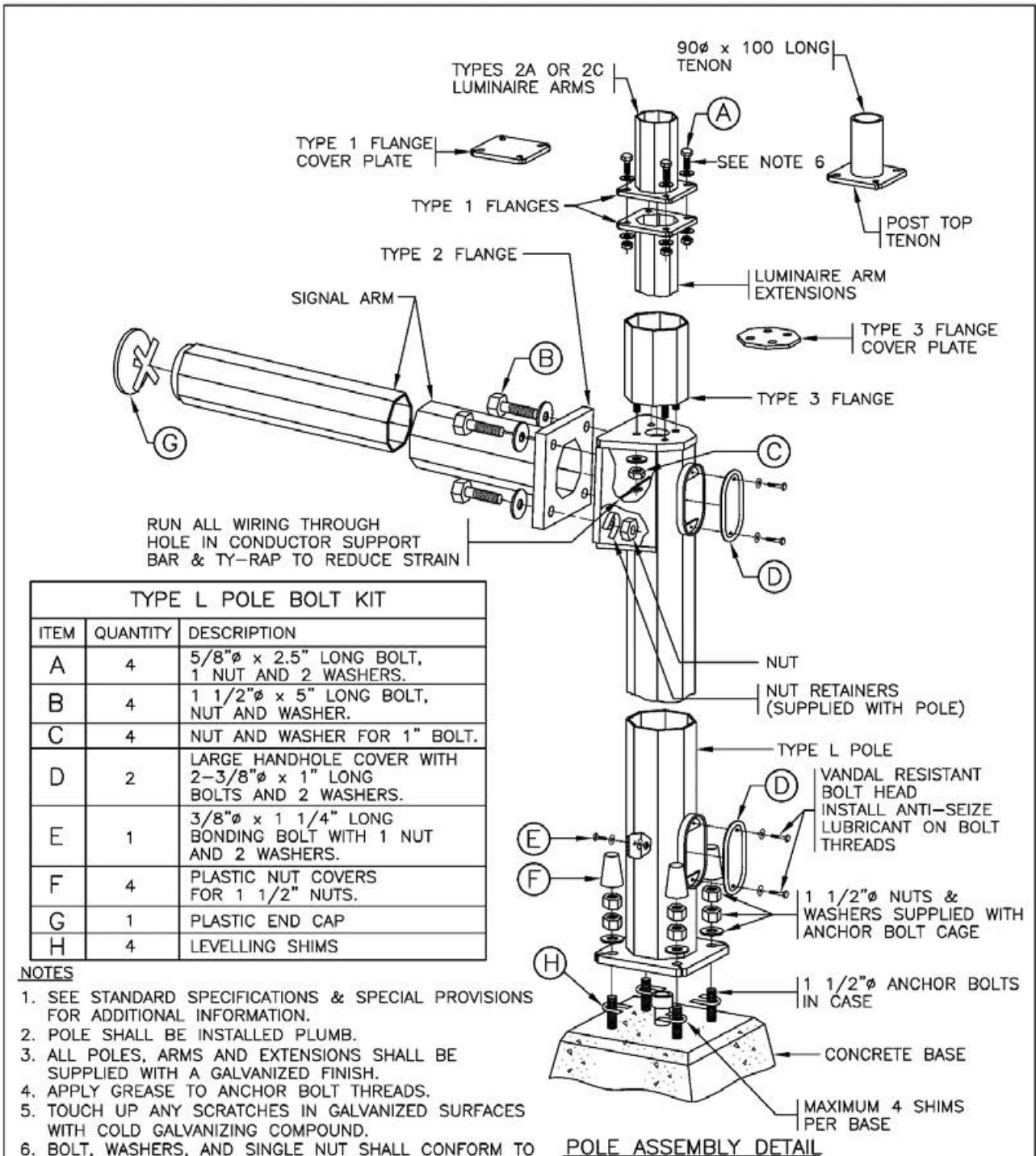
PARTS LIST FOR TYPE L SIGNAL POLE	
PART	MASS (kg)
TYPE [L] POLE	442
TYPE [3L] SIGNAL ARM - 3.0m	97
TYPE [4L] SIGNAL ARM - 4.0m	118
TYPE [5L] SIGNAL ARM - 5.0m	173
TYPE [6L] SIGNAL ARM - 6.0m	201
TYPE [7L] SIGNAL ARM - 7.0m	229
TYPE [8L] SIGNAL ARM - 8.0m	259
TYPE [9L] SIGNAL ARM - 9.0m	284
TYPE [10L] SIGNAL ARM - 10.0m	377
TYPE [11L] SIGNAL ARM - 11.0m	410
TYPE [3LE] SIGNAL ARM EXTENSION - 3.0m	114
TYPE [4.25L] LUMINAIRE ARM EXTENSION - 4.25m	82
TYPE [1.75L] LUMINAIRE ARM EXTENSION - 1.75m	29
TYPE [0.25L] LUMINAIRE ARM EXTENSION - 0.25m	10
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
TYPE 1 FLANGE COVER PLATE [1 FCP]	1.5
TYPE 2 FLANGE COVER PLATE [2 FCP]	4
TYPE 3 FLANGE COVER PLATE [3 FCP]	4
POST TOP TENON [PTT]	5

\* [ ] I.D. LABEL ON POLE

NOT TO SCALE



No.	Revision	Date	TYPE L SIGNAL POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.2.5
F					
E					
D	NEW DRAWING NUMBER	APR 20	Date	Approved	
C	GENERAL REVISIONS	APR 17	30/09/93 E.L. (Signature on File)	Chief Highway Engineer	
B	HOLE SIZE REVISED & 2C ARM ADDED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



TYPE L POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"φ x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	4	1 1/2"φ x 5" LONG BOLT, NUT AND WASHER.
C	4	NUT AND WASHER FOR 1" BOLT.
D	2	LARGE HANDHOLE COVER WITH 2-3/8"φ x 1" LONG BOLTS AND 2 WASHERS.
E	1	3/8"φ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
F	4	PLASTIC NUT COVERS FOR 1 1/2" NUTS.
G	1	PLASTIC END CAP
H	4	LEVELLING SHIMS

**NOTES**

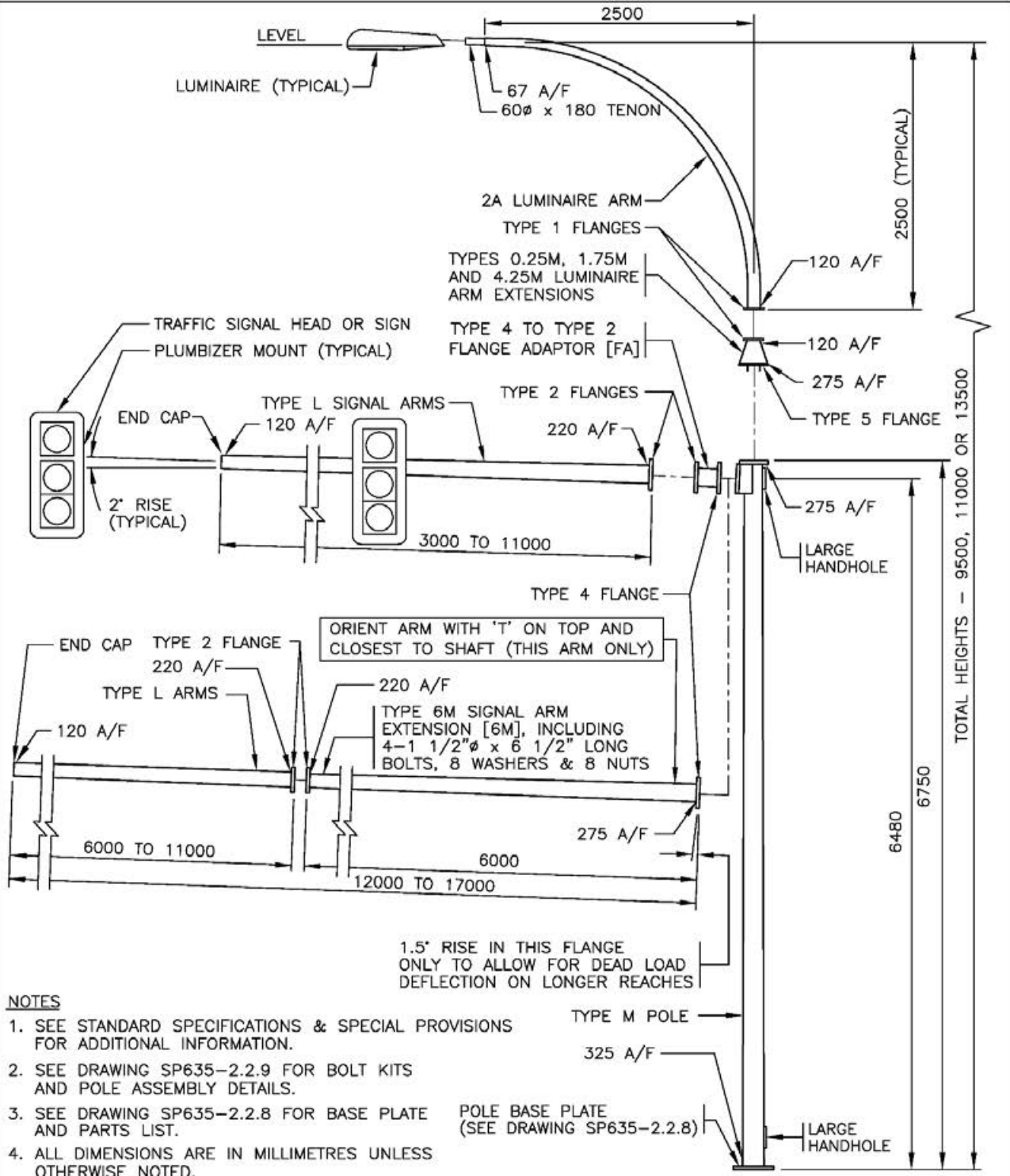
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- POLE SHALL BE INSTALLED PLUMB.
- ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
- APPLY GREASE TO ANCHOR BOLT THREADS.
- TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
- BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

NOT TO SCALE

No.	Revision	Date
G	GENERAL REVISIONS AND NEW DRAWING NUMBER	APR 20
F	GENERAL REVISIONS	APR 17
E	TYPE 1&2 FLANGE BOLTS CHANGED TO A325	DEC 10
D	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98
C	CONDUCTOR SUPPORT BAR ADDED	AUG 96

<b>TYPE L SIGNAL POLE INSTALLATION DETAILS</b>		SPECIFICATION DRAWING No. <b>SP635-2.2.6</b>
Date <b>30/09/93</b>	Approved <b>E.L. (Signature on File)</b> Chief Highway Engineer	





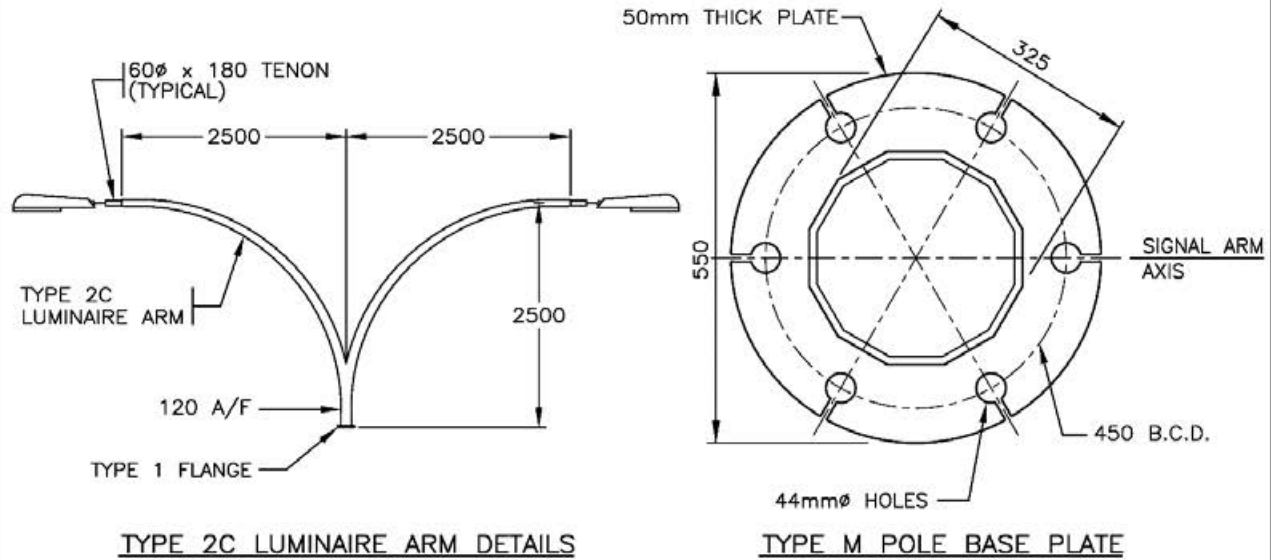
NOTES

- 1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- 2. SEE DRAWING SP635-2.2.9 FOR BOLT KITS AND POLE ASSEMBLY DETAILS.
- 3. SEE DRAWING SP635-2.2.8 FOR BASE PLATE AND PARTS LIST.
- 4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
- 5. SEE DRAWING SP635-2.2.8 FOR TYPE 2C LUMINAIRE ARM DETAILS.

NOT TO SCALE



No.	Revision	Date	TYPE M SIGNAL POLE INSTALLATION DETAILS	Date	Approved	SPECIFICATION DRAWING No. <b>SP635-2.2.7</b>
F	GENERAL REVISIONS AND NEW DRAWING NUMBER	APR 20				
E	GENERAL REVISIONS	APR 17	Date <b>30/09/93</b> E.L. (Signature on File) Chief Highway Engineer			
D	SIGNAL HEAD MOUNTING ADDED	OCT 03				
C	TYPE 6M EXTENSION ARM NOTE REVISED	AUG 96				
B	6M ARM REVISED	AUG 95				
A	GENERAL REVISIONS	AUG 94				



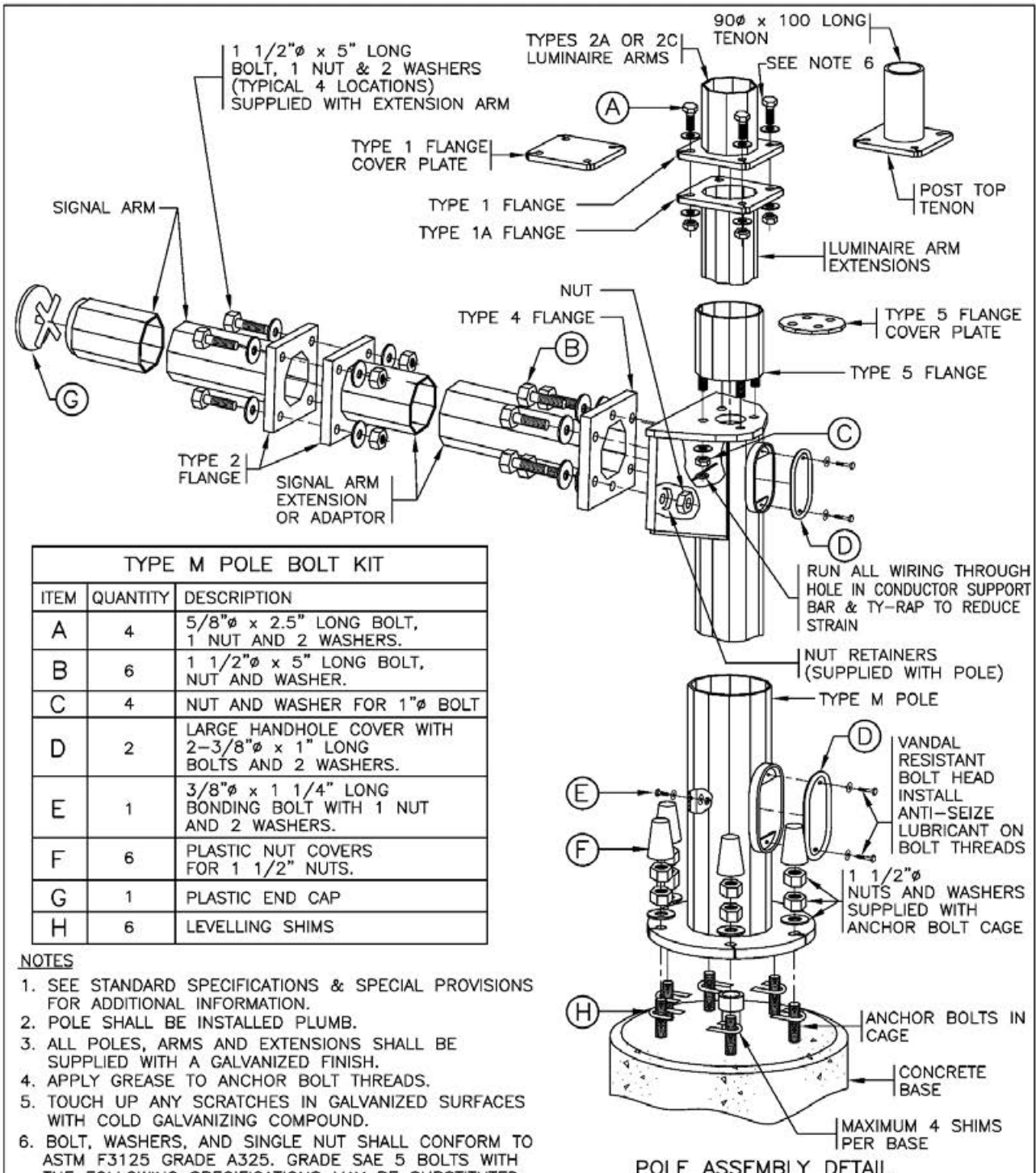
PARTS LIST FOR TYPE M SIGNAL POLE	
PART	MASS (kg)
TYPE [M] POLE	565
TYPE [6M] SIGNAL ARM EXTENSION - 6.0m	360
TYPE [3L] SIGNAL ARM - 3.0m	97
TYPE [4L] SIGNAL ARM - 4.0m	118
TYPE [5L] SIGNAL ARM - 5.0m	173
TYPE [6L] SIGNAL ARM - 6.0m	201
TYPE [7L] SIGNAL ARM - 7.0m	229
TYPE [8L] SIGNAL ARM - 8.0m	257
TYPE [9L] SIGNAL ARM - 9.0m	284
TYPE [10L] SIGNAL ARM - 10.0m	377
TYPE [11L] SIGNAL ARM - 11.0m	410
TYPE [4.25M] LUMINAIRE ARM EXTENSION - 4.25m	115
TYPE [1.75M] LUMINAIRE ARM EXTENSION - 1.75m	38
TYPE [0.25M] LUMINAIRE ARM EXTENSION - 0.25m	14
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
TYPE 1 FLANGE COVER PLATE [1 FCP]	1.5
TYPE 3 FLANGE COVER PLATE [3 FCP]	4
TYPE 4 FLANGE COVER PLATE [4 FCP]	8
TYPE 5 FLANGE COVER PLATE [5 FCP]	4
TYPE 4 TO 2 FLANGE ADAPTOR [FA]	75
POST TOP TENON [PTT]	5

\* [ ] I.D. LABEL ON POLE



NOT TO SCALE

No.	Revision	Date	TYPE M SIGNAL POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-2.2.8
E			30/09/93	E.L. (Signature on File)	
D	NEW DRAWING NUMBER	APR 20	Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	HOLE SIZE REVISED & 2C ARM ADDED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



TYPE M POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"φ x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	6	1 1/2"φ x 5" LONG BOLT, NUT AND WASHER.
C	4	NUT AND WASHER FOR 1"φ BOLT
D	2	LARGE HANDHOLE COVER WITH 2-3/8"φ x 1" LONG BOLTS AND 2 WASHERS.
E	1	3/8"φ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
F	6	PLASTIC NUT COVERS FOR 1 1/2" NUTS.
G	1	PLASTIC END CAP
H	6	LEVELLING SHIMS

- NOTES**
- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  - POLE SHALL BE INSTALLED PLUMB.
  - ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
  - APPLY GREASE TO ANCHOR BOLT THREADS.
  - TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
  - BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

NOT TO SCALE

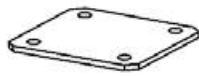
No.	Revision	Date
G	GENERAL REVISIONS AND NEW DRAWING NUMBER	APR 20
F	GENERAL REVISIONS	APR 17
E	TYPE 1&2 FLANGED BOLTS CHANGED TO A325	DEC 10
D	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98
C	BOLT KIT LIST REVISED & CONDUCTOR SUPPORT ADDED	AUG 96

**TYPE M SIGNAL POLE INSTALLATION DETAILS**

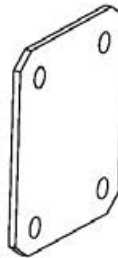
Date: 30/09/93 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-2.2.9



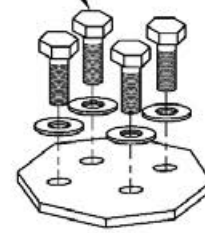


TYPE 1 FLANGE COVER PLATE

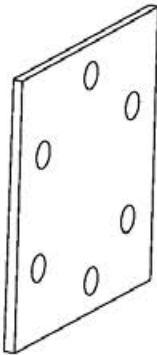


TYPE 2 FLANGE COVER PLATE

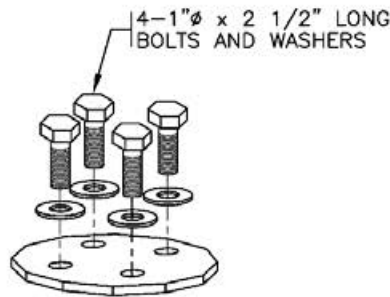
4-1"φ x 2 1/2" LONG BOLTS AND WASHERS



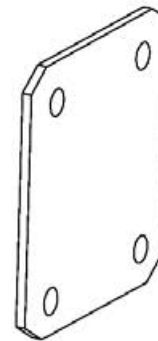
TYPE 3 FLANGE COVER PLATE



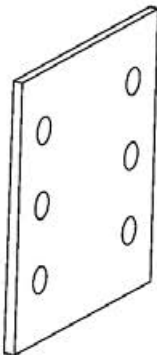
TYPE 4 FLANGE COVER PLATE



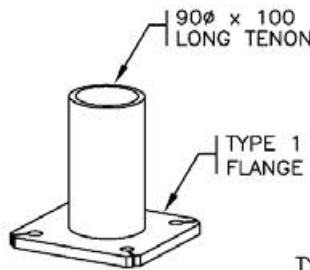
TYPE 5 FLANGE COVER PLATE



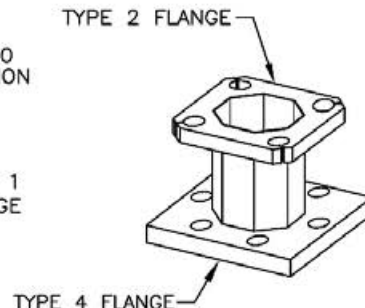
TYPE 8 FLANGE COVER PLATE



TYPE S FLANGE COVER PLATE



POST TOP TENON



TYPE 4 TO TYPE 2 FLANGE ADAPTOR

**NOTES**

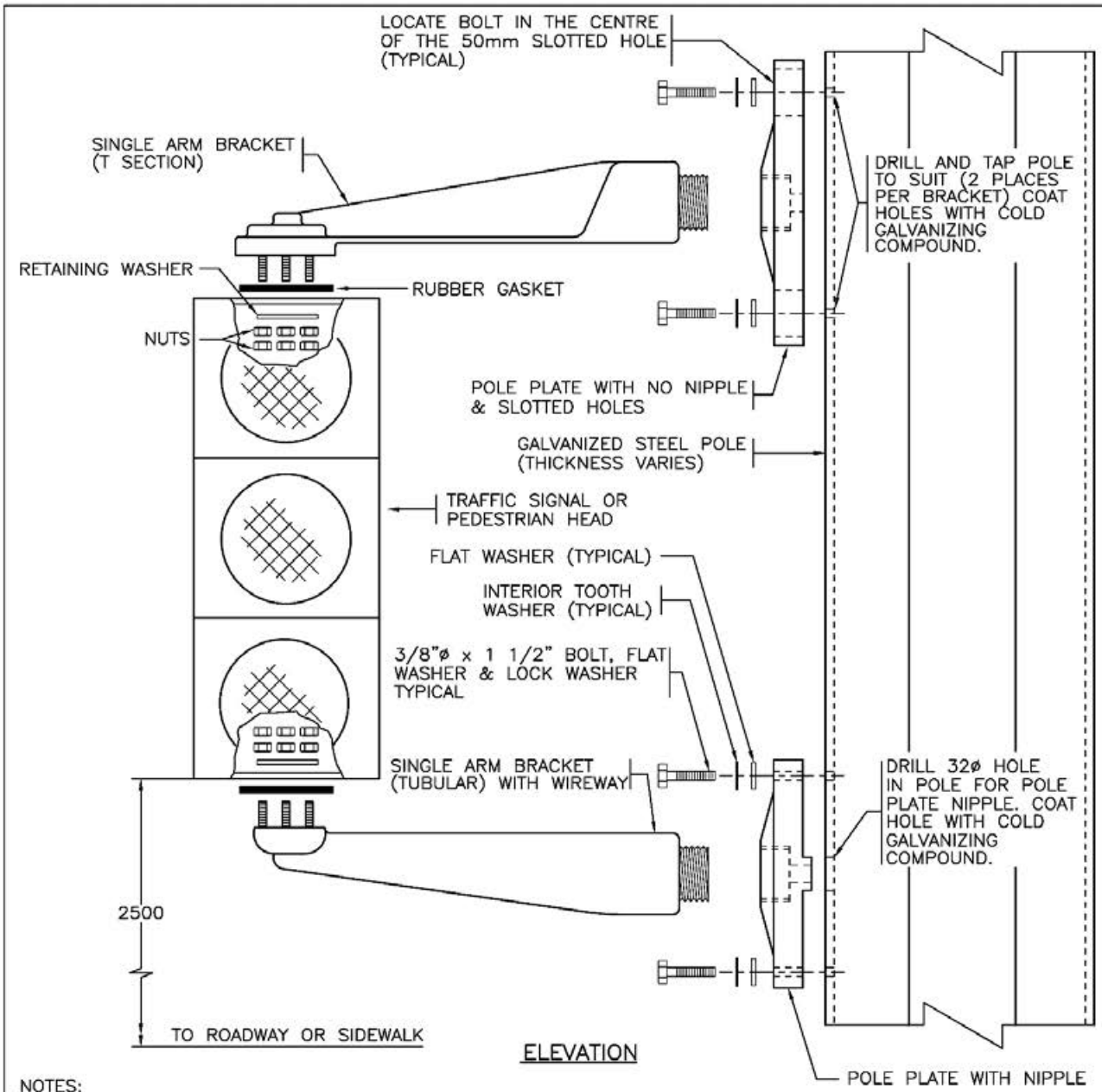
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	SIGNAL POLE ACCESSORIES	
F			Date	Approved
E			14/11/03	D.N. (Signature on File)
D				Chief Engineer
C				
B	GENERAL REVISIONS	APR 17		SPECIFICATION DRAWING No.
A	TYPE S FLANGE COVER PLATE ADDED	OCT 03		SP635-2.2.10



**NOTES:**

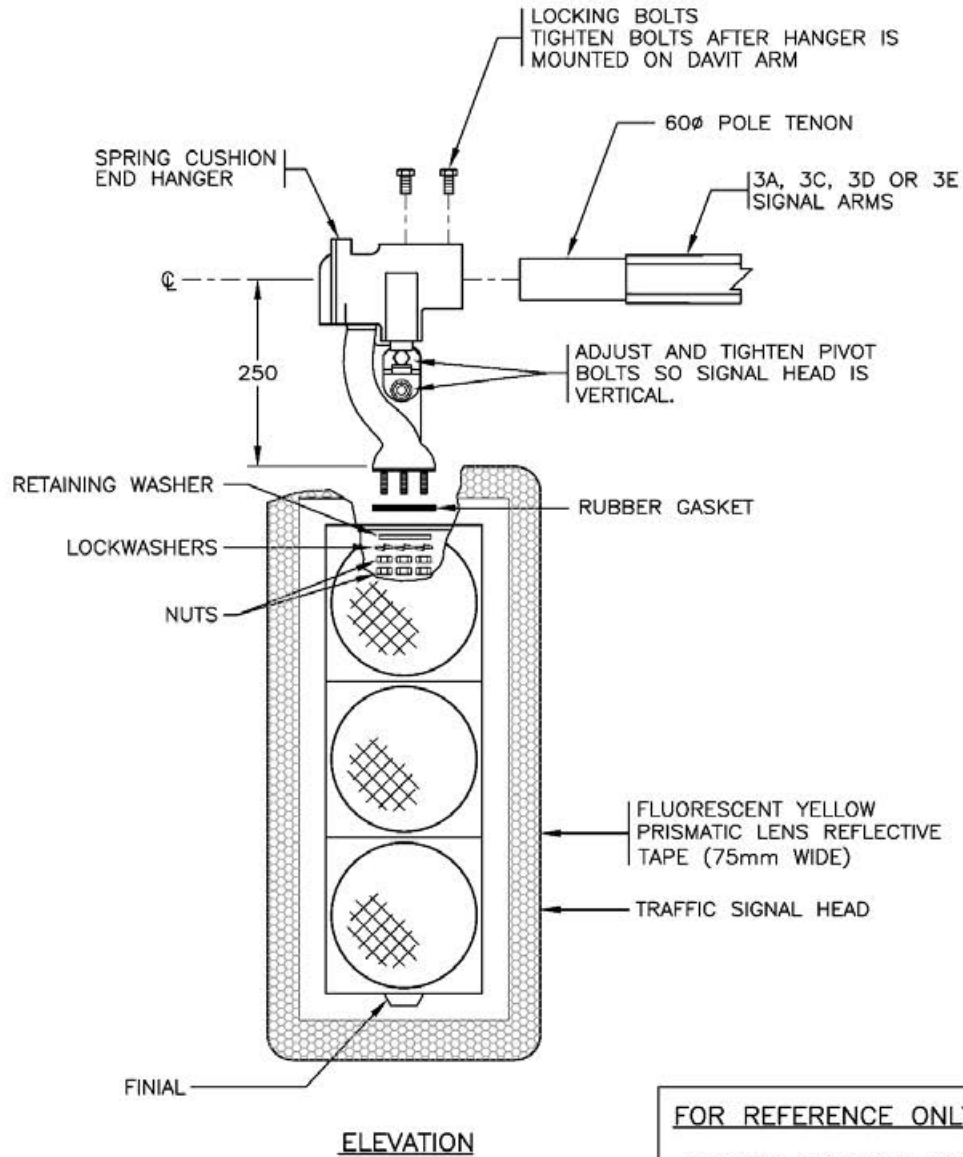
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION
2. AIM SIGNAL HEADS IN ACCORDANCE WITH DRAWING SP635-2.3.11
3. WHERE 3 OR MORE SIDE MOUNT SIGNAL HEADS ARE REQUIRED ON A POLE LOCATE THE 3rd AND 4th PEDESTRIAN HEAD ARM BRACKETS WITH WIREWAY AND POLE PLATE WITH THE NIPPLE TO THE TOP OF THE HEAD TO AVOID EXCESSIVE DRILLING OF THE POLE IN ONE AREA.

NOT TO SCALE



No.	Revision	Date	SIGNAL AND PEDESTRIAN HEAD SIDE MOUNT INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.3.1
F	GENERAL REVISIONS	APR 20	Date	Approved	
E	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
D	NOTE 2 REVISED	OCT 03	Chief Highway Engineer		
C	NYLOCK NUTS REMOVED. DOUBLE NUTS ADDED	AUG 99			
B	SIGN MOUNTING HEIGHT ADDED	AUG 95			
A	GENERAL REVISIONS	AUG 94			





**FOR REFERENCE ONLY**

USE END PLUMBIZER FOR INSTALLATIONS UNLESS OTHERWISE NOTED (SEE SP635-2.3.4 AND SP635-2.3.5)

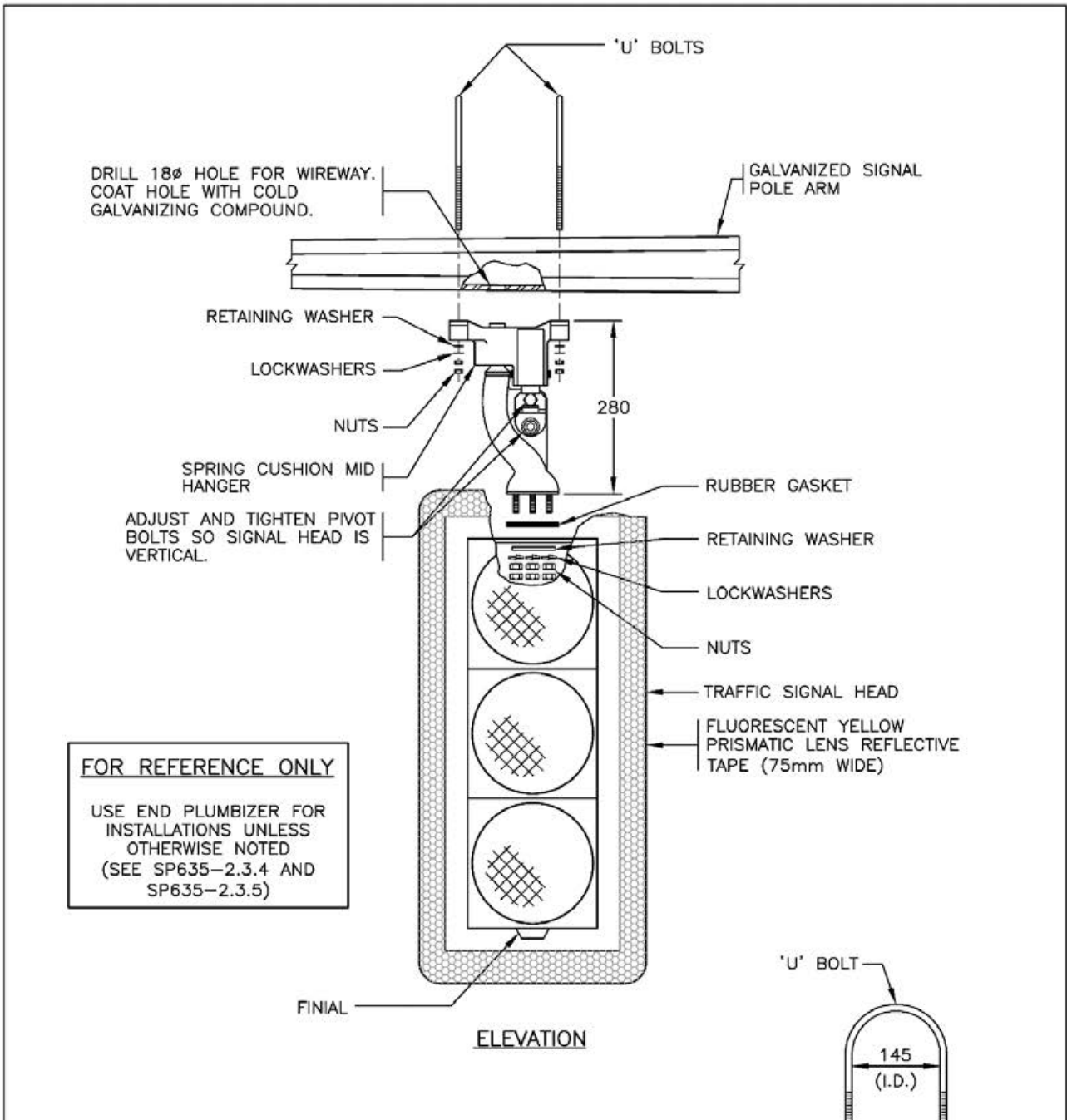
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. AIM SIGNAL HEADS IN ACCORDANCE WITH DRAWING SP635-2.3.11

NOT TO SCALE



No.	Revision	Date	OVERHEAD SPRING CUSHION END SIGNAL HEAD HANGER INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.3.2
H	REFERENCE NOTE UPDATED	APR 20	Date	Approved	
G	GENERAL REVISIONS	APR 17	<b>30/09/93 E.L. (Signature on File)</b> Chief Highway Engineer		
F	NOTE 2 REVISED	OCT 03			
E	REFLECTIVE TAPE ADDED	NOV 01			
D	NYLOCK NUTS REMOVED. DOUBLE NUTS ADDED	AUG 99			
C	NEW DRAWING	OCT 97			



**FOR REFERENCE ONLY**

USE END PLUMBIZER FOR INSTALLATIONS UNLESS OTHERWISE NOTED (SEE SP635-2.3.4 AND SP635-2.3.5)

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. AIM SIGNAL HEADS IN ACCORDANCE WITH DRAWING SP635-2.3.11

NOT TO SCALE

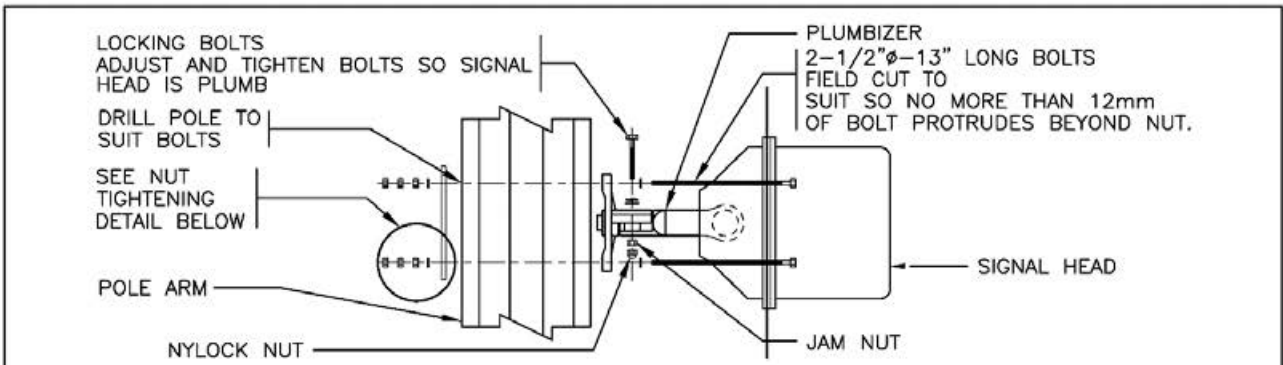


No.	Revision	Date
I	REFERENCE NOTE UPDATED	APR 20
H	GENERAL REVISIONS	APR 17
G	GENERAL REVISIONS	APR 17
F	NOTE 2 REVISED	OCT 03
E	REFLECTIVE TAPE ADDED	NOV 01
D	NYLOCK NUTS REMOVED. DOUBLE NUTS ADDED	AUG 99

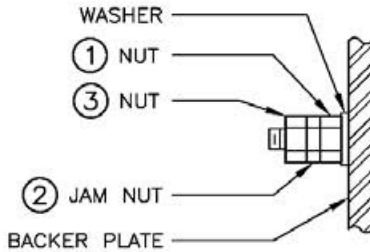
**OVERHEAD SPRING CUSHION MID HANGER  
SIGNAL HEAD INSTALLATION DETAILS**

Date: 30/09/93  
Approved: E.L. (Signature on File)  
Chief Highway Engineer

SPECIFICATION  
DRAWING No.  
SP635-2.3.3

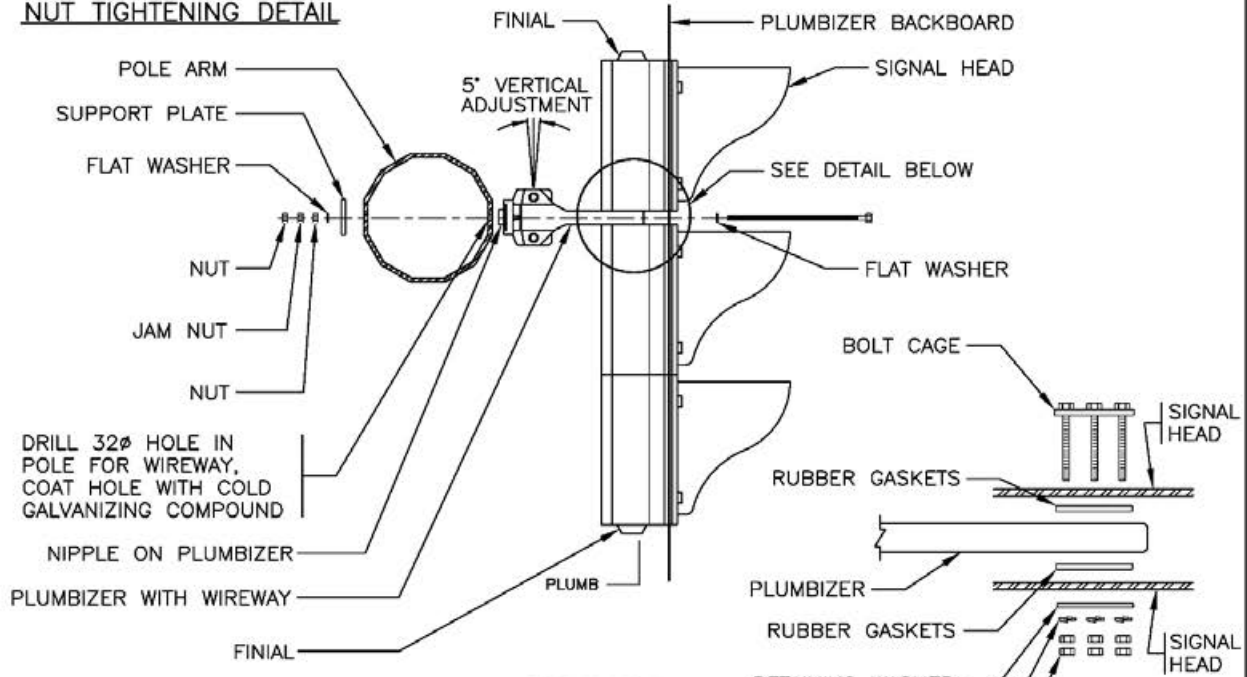


TOP VIEW



NUT TIGHTENING DETAIL

- TIGHTEN NUT ① AGAINST WASHER,
- TIGHTEN JAM NUT ② AGAINST NUT ①,
- SNUG NUT ③ AGAINST JAM NUT ② AND THEN TIGHTEN NUT ③ AND JAM NUT ② INTO EACH OTHER.



ELEVATION

DETAIL

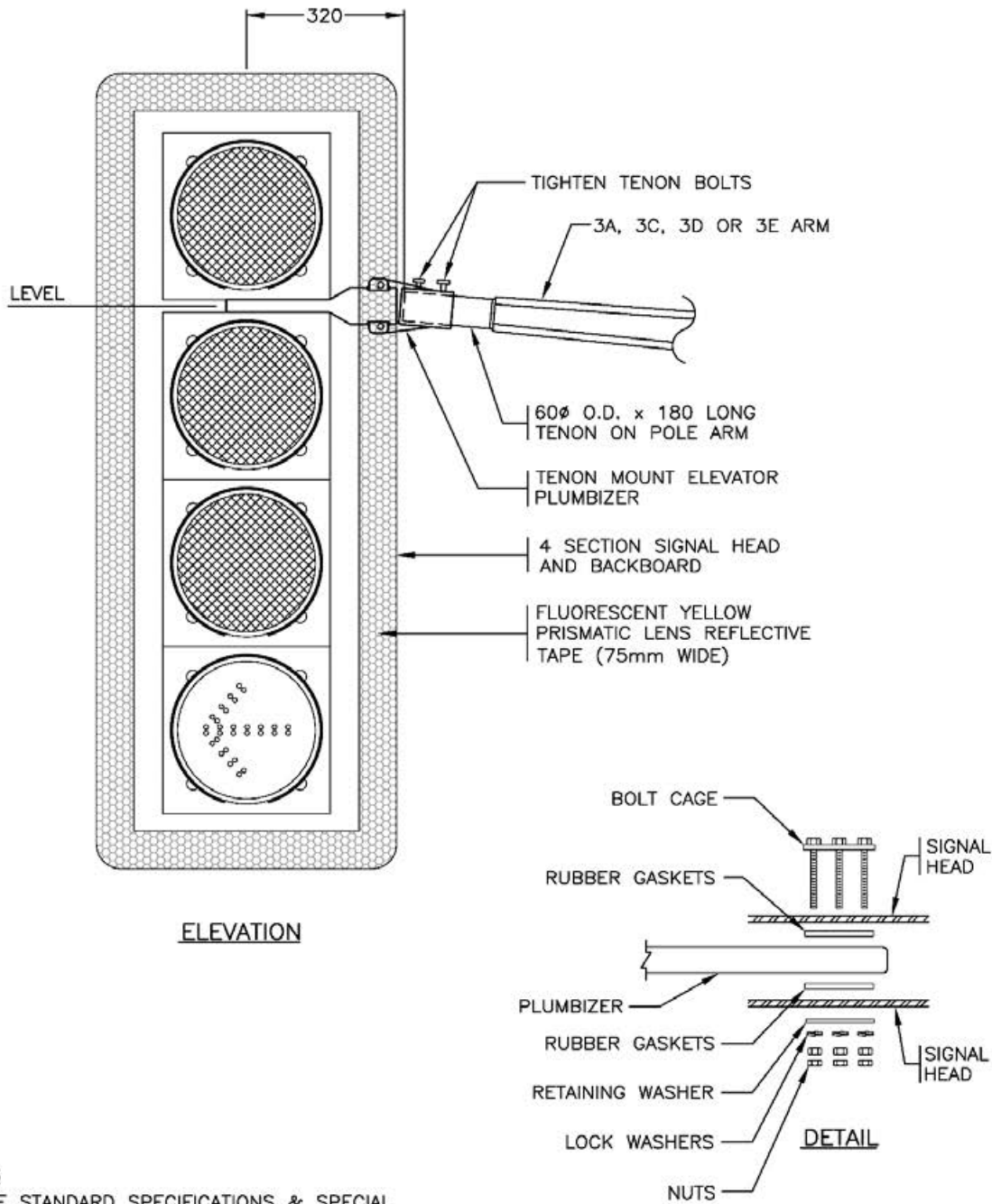
NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. AIM SIGNAL HEADS IN ACCORDANCE WITH DRAWING SP635-2.3.11

NOT TO SCALE



No.	Revision	Date	SIGNAL HEAD PLUMBIZER INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.3.4
G	GENERAL REVISIONS	APR 17	Date	Approved	
F	NOTE 2 REVISED	OCT 03	30/09/93	E.L. (Signature on File)	
E	DETAILS FROM SP635-2.3.5 ADDED	NOV 01	Chief Highway Engineer		
D	NYLOCK NUTS REMOVED, DOUBLE NUTS ADDED	AUG 99			
C	NEW DRAWING NUMBER	OCT 97			
B	CONNECTION BOLTS REVISED	AUG 95			



ELEVATION

DETAIL

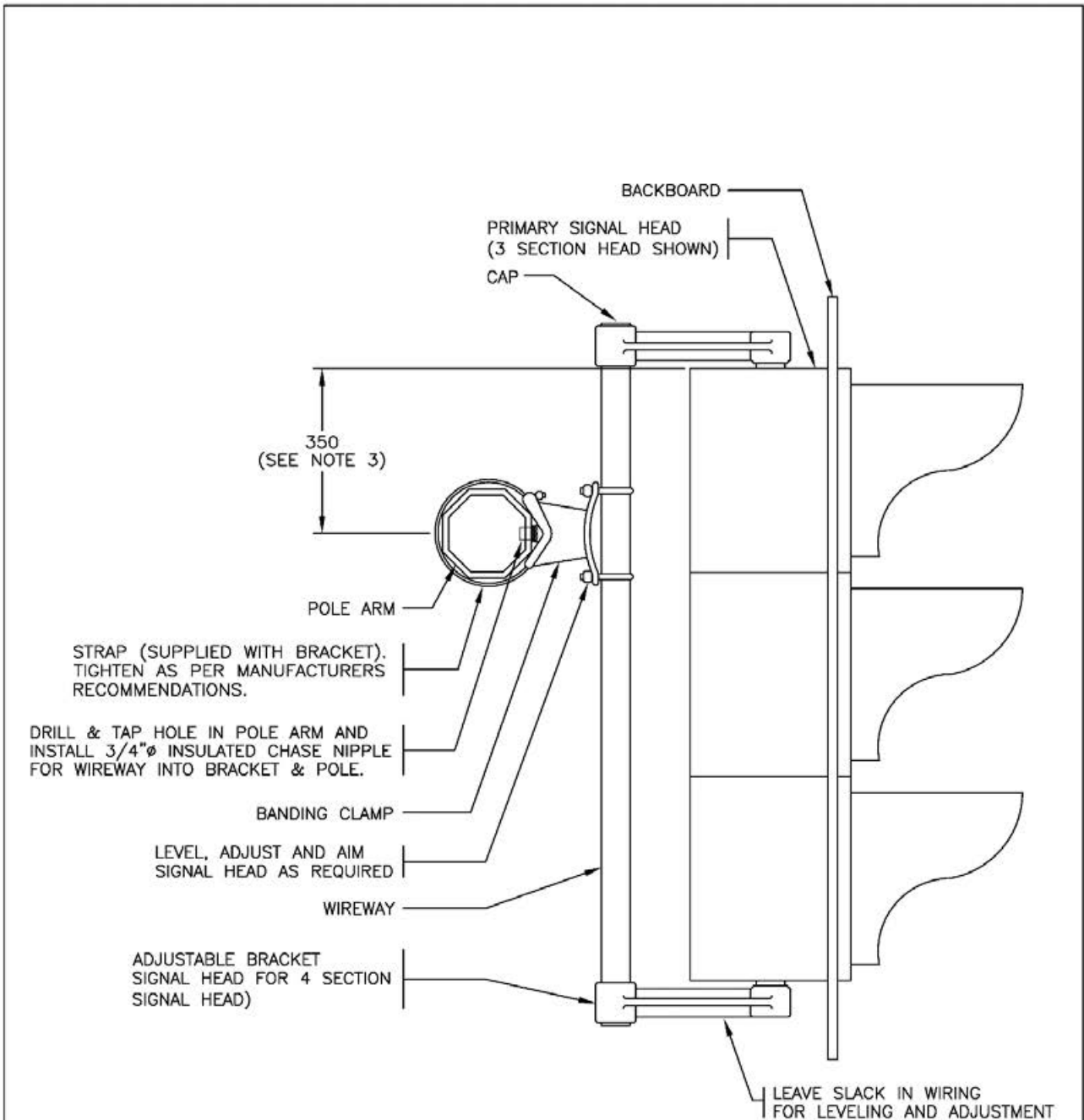
NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. AIM SIGNAL HEADS IN ACCORDANCE WITH DRAWING SP635-2.3.11.

NOT TO SCALE



No.	Revision	Date	SIGNAL HEAD PLUMBIZER INSTALLATION DETAILS (FOR TYPE 3 SIGNAL ARMS)		SPECIFICATION DRAWING No. SP635-2.3.5
F			Date	Approved	
E			14/11/03	D.N. (Signature on File)	
D				Chief Engineer	
C					
B					
A	GENERAL REVISIONS	APR 17			



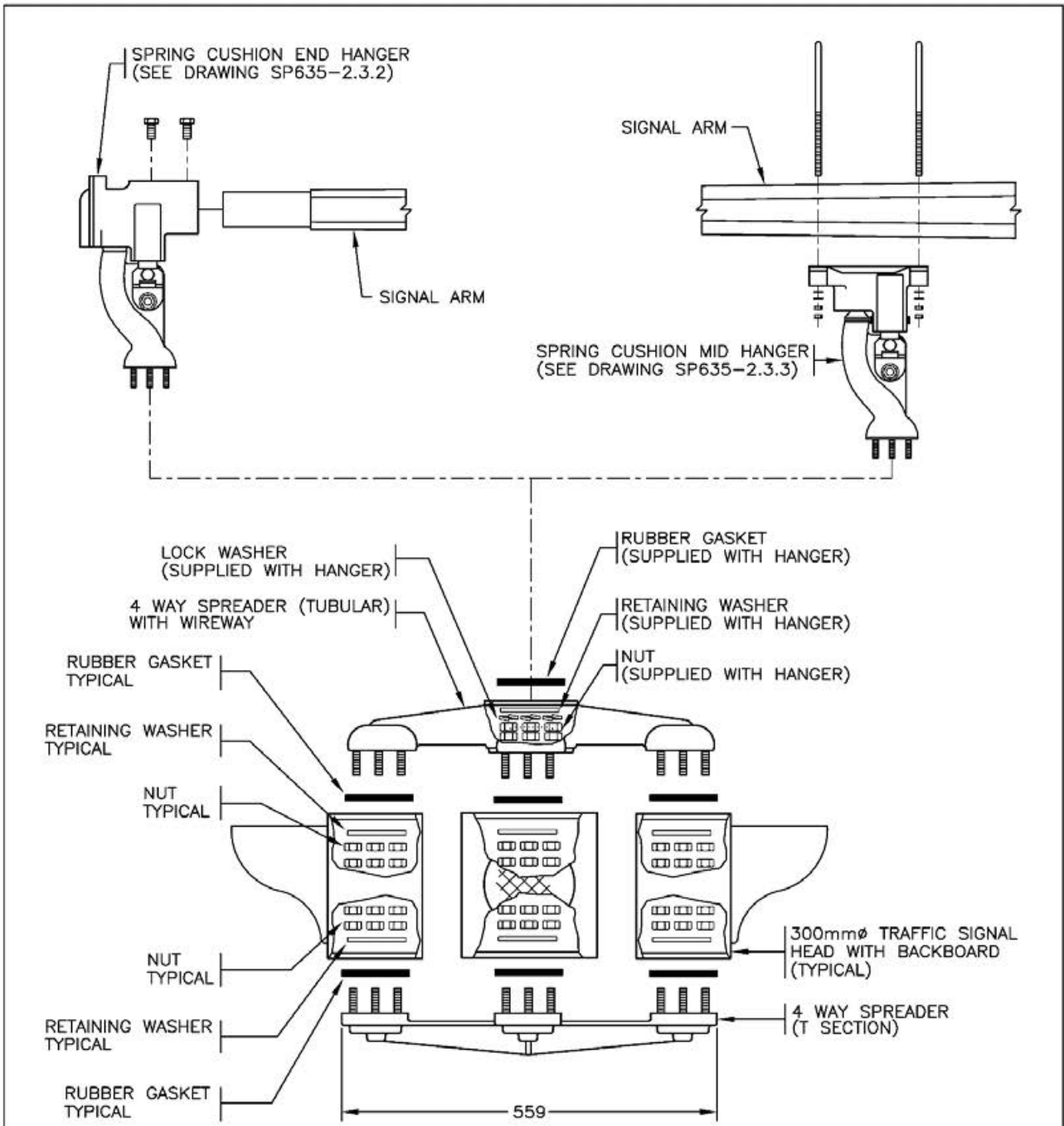
- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. AIM SIGNAL HEADS IN ACCORDANCE WITH DRAWING SP635-2.3.11
  3. ADJUST SIGNAL HEAD MOUNTING HEIGHT AS DIRECTED TO AVOID CONFLICTS.



NOT TO SCALE

No.	Revision	Date
F		
E		
D		
C		
B	GENERAL REVISIONS	APR 17
A	NOTE 2 REVISED	OCT 03

<b>SIGNAL HEAD ADJUSTABLE BRACKET DETAILS</b>		
Date	Approved	SPECIFICATION DRAWING No.
2001/12/13	<b>D.N. (Signature on File)</b> Chief Highway Engineer	SP635-2.3.6



**NOTES**

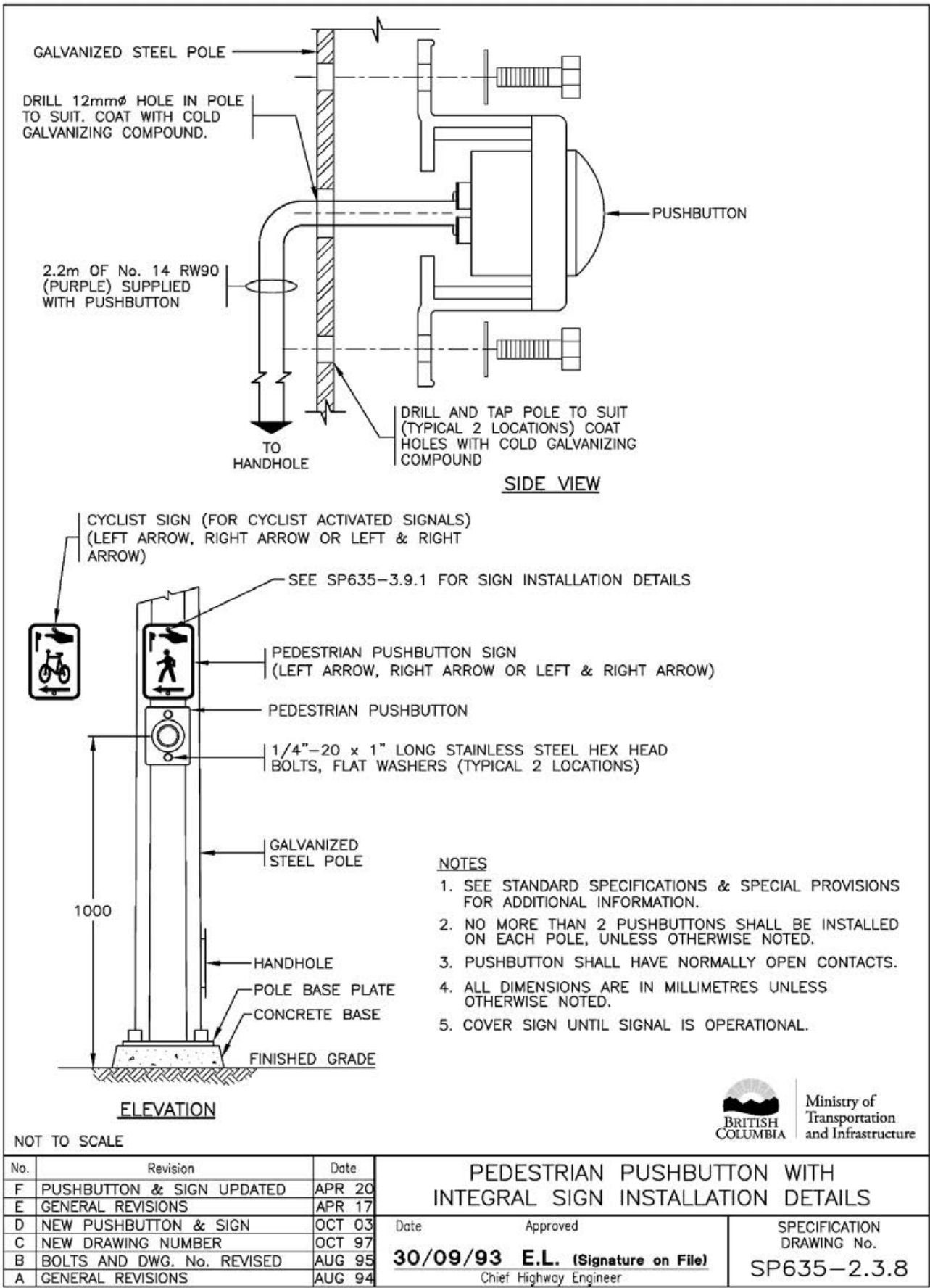
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. AIM SIGNAL HEADS IN ACCORDANCE WITH DRAWING SP635-2.3.11

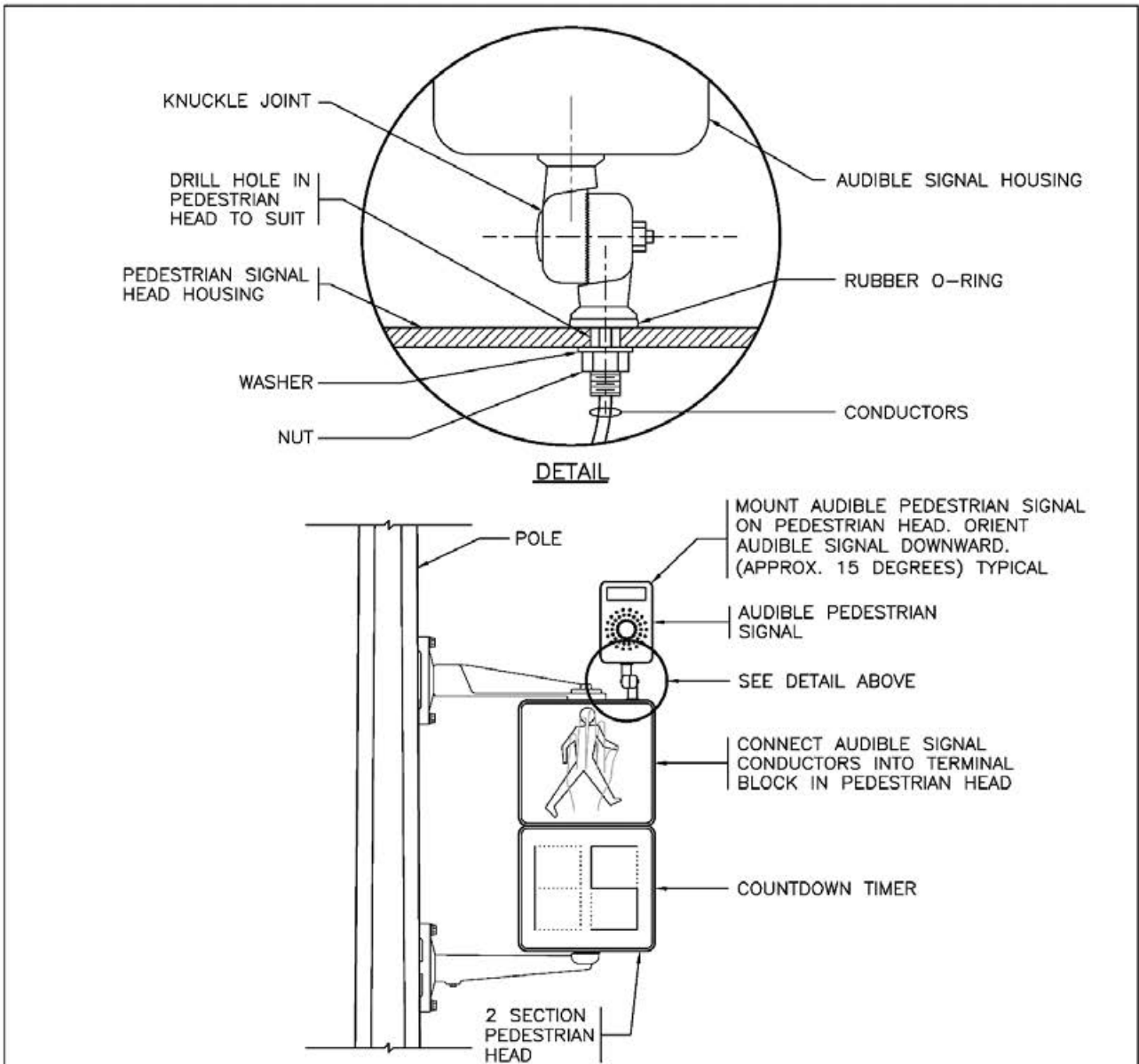
MOUNTING FOR 2, 3 AND 4 WAY SPREADERS IDENTICAL

NOT TO SCALE



No.	Revision	Date	FOUR-WAY OVERHEAD FLASHING SIGNAL HEAD INSTALLATION DETAILS		
H	GENERAL REVISIONS	APR 20	Date	Approved	SPECIFICATION DRAWING No. <b>SP635-2.3.7</b>
G	GENERAL REVISIONS	APR 17	<b>30/09/93</b> <b>E.L. (Signature on File)</b> Chief Highway Engineer		
F	NOTE 2 REVISED	OCT 03			
E	NYLOCK NUTS REMOVED. DOUBLE NUTS ADDED	AUG 99			
D	NEW DRAWING NUMBER	OCT 97			
C	STOCK NUMBERS REVISED	AUG 96			





**NOTES**

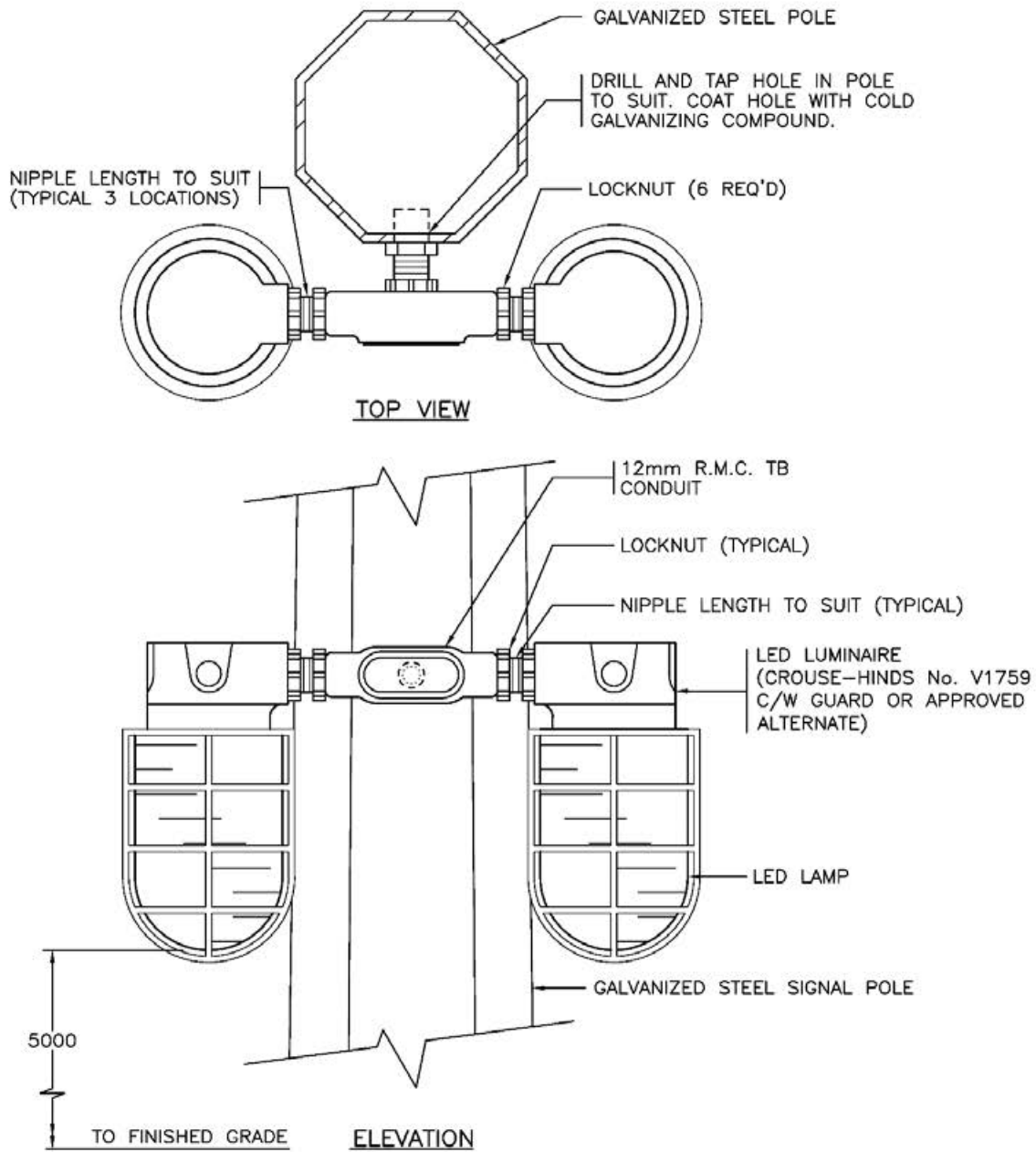
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. AIM, ADJUST AND CONNECT AUDIBLE SIGNAL AS PER MANUFACTURERS INSTRUCTIONS TO THE SATISFACTION OF THE MINISTRY REPRESENTATIVE.
3. AUDIBLE SIGNAL SHALL 'CHIRP-CHIRP' FOR EAST TO WEST CROSSINGS AND 'CUCKOO' FOR NORTH TO SOUTH CROSSINGS. AT INTERSECTIONS WHERE NORTH/SOUTH AND EAST/WEST ARE NOT EASILY DEFINED CONTACT THE MINISTRY REPRESENTATIVE.



NOT TO SCALE

No.	Revision	Date	AUDIBLE SIGNAL INSTALLATION DETAILS	
F	GENERAL REVISIONS	APR 17	Date Approved <b>21/11/94 E.L. (Signature on File)</b> Chief Highway Engineer	
E	GENERAL REVISIONS	OCT 03		
D	ALTERNATE SINGLE SECTION LED PED. HEAD ADDED	NOV 01		
C	NOTE 3 REVISED	NOV 98		
B	NEW DRAWING NUMBER	OCT 97		
A	N/S CROSSING SOUND & DWG. No. REVISED	AUG 95		
			SPECIFICATION DRAWING No.	SP635-2.3.9





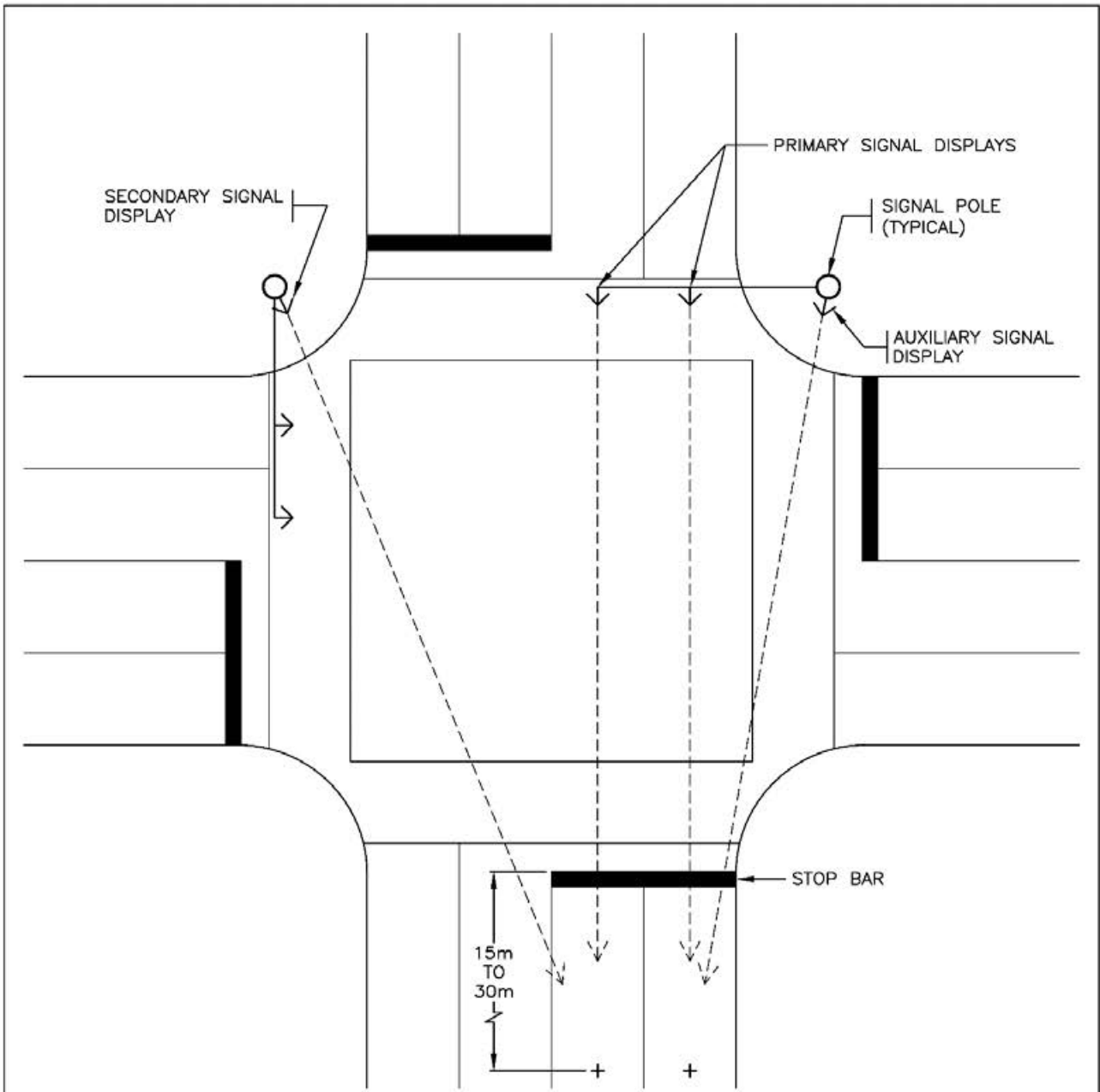
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL NUTS, WASHERS, NIPPLES & BUSHINGS SHALL BE GALVANIZED.
3. ORIENT FIRE LIGHTS ON POLE SO VISIBLE BY FIRE TRUCK DRIVER.

NOT TO SCALE



No.	Revision	Date	FIRE SIGNAL INDICATION LIGHT INSTALLATION DETAIL		SPECIFICATION DRAWING No. SP635-2.3.10
F			Date	Approved	
E	LED LAMP	APR 20	18/11/94	E.L. (Signature on File) Chief Highway Engineer	
D	GENERAL REVISIONS	APR 17			
C	LUMINAIRE MODEL No. UPDATED	OCT 03			
B	NEW DRAWING NUMBER	OCT 97			
A	DRAWING NUMBER REVISED	AUG 95			



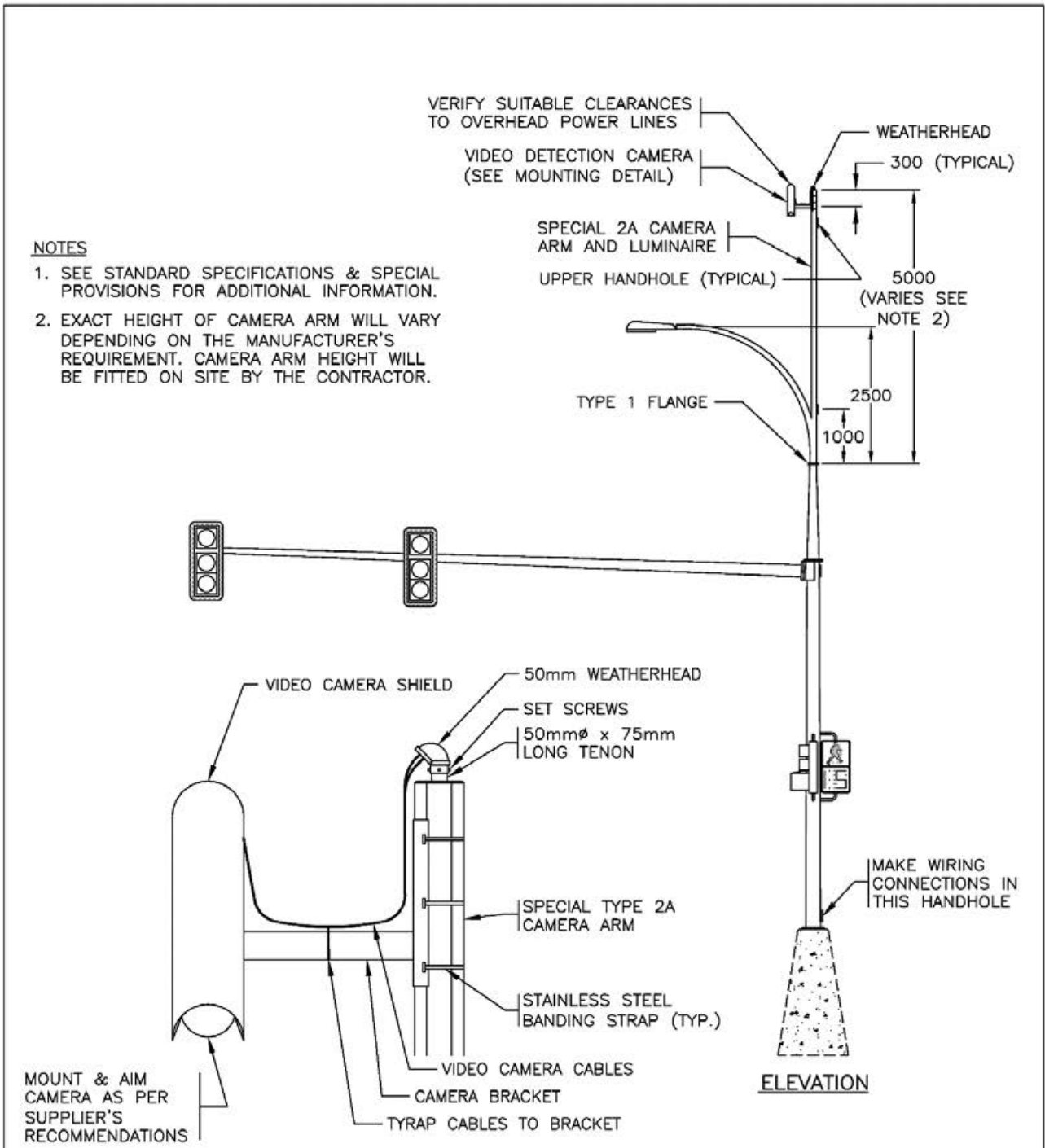
**NOTES**

1. DESIGNER SHALL REVIEW SIGNAL HEAD AIMING PRIOR TO SIGNAL START UP.
2. SIGNAL HEADS SHALL BE VISIBLE FROM THE MINIMUM DISTANCE SHOWN IN THE TAC MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.



NOT TO SCALE

No.	Revision	Date	SIGNAL HEAD AIMING DIAGRAM		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-2.3.11
E			14/11/03	D.N. (Signature on File)	
D				Chief Engineer	
C					
B	AUXILIARY SIGNAL HEAD	APR 20			
A	GENERAL REVISIONS	APR 17			



- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. EXACT HEIGHT OF CAMERA ARM WILL VARY DEPENDING ON THE MANUFACTURER'S REQUIREMENT. CAMERA ARM HEIGHT WILL BE FITTED ON SITE BY THE CONTRACTOR.

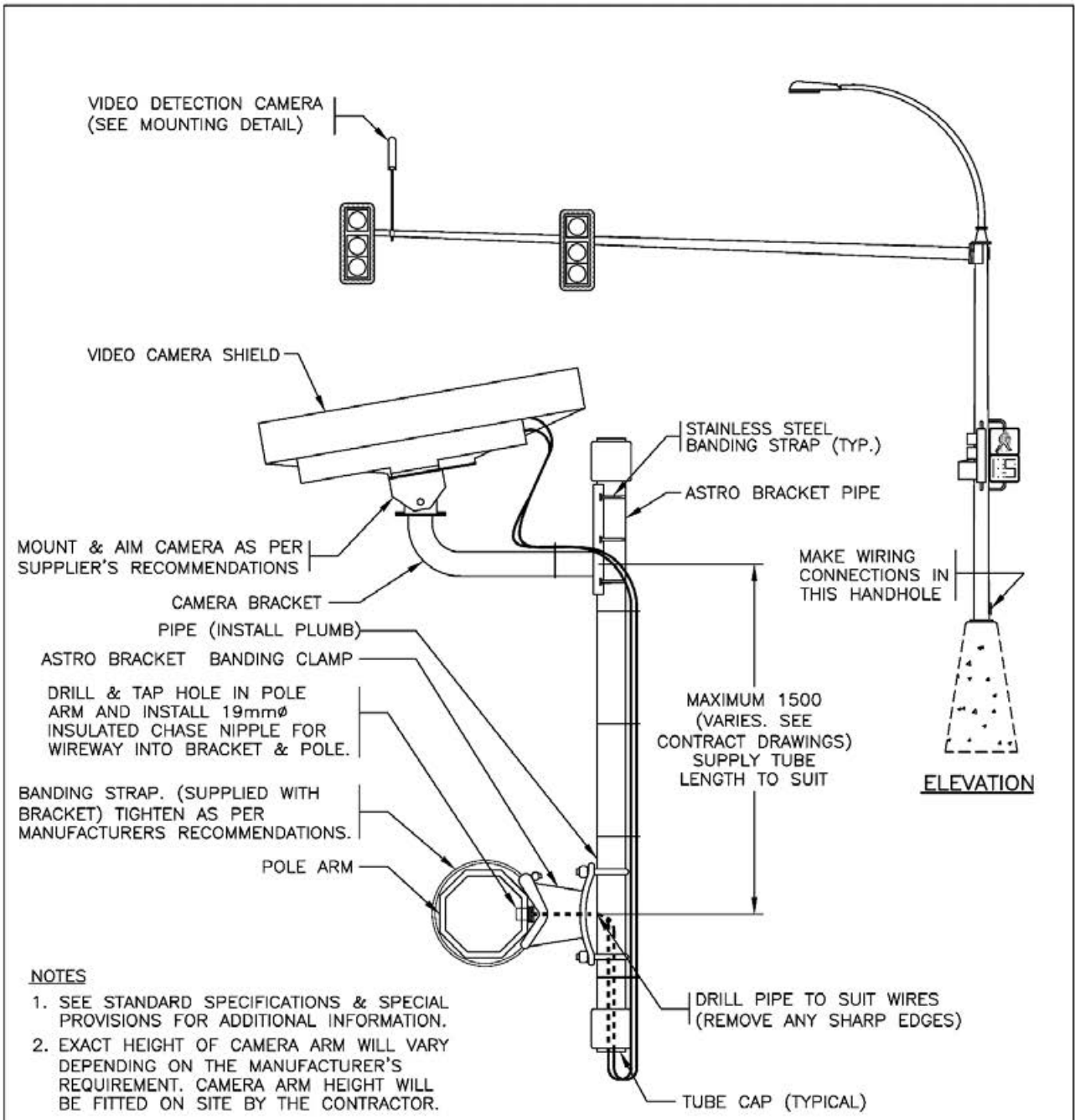
**VIDEO DETECTION CAMERA  
POLE MOUNTING DETAIL**  
N.T.S.

NOT TO SCALE



No.	Revision	Date
F		
E		
D		
C		
B	NOTE 2 REVISION	APR 20
A	GENERAL REVISIONS	APR 17

VIDEO DETECTION INSTALLATION DETAIL ON SPECIAL 2A ARM		
Date	Approved	SPECIFICATION DRAWING No.
14/11/03	D.N. (Signature on File) Chief Engineer	SP635-2.3.12



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. EXACT HEIGHT OF CAMERA ARM WILL VARY DEPENDING ON THE MANUFACTURER'S REQUIREMENT. CAMERA ARM HEIGHT WILL BE FITTED ON SITE BY THE CONTRACTOR.

**VIDEO DETECTOR CAMERA  
SIGNAL ARM MOUNTING DETAIL**

N.T.S.

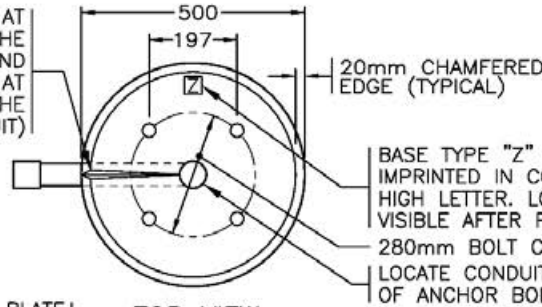
NOT TO SCALE



No.	Revision	Date
F		
E		
D		
C		
B	NOTE 2 ADDED	APR 20
A	GENERAL REVISIONS	APR 17

VIDEO DETECTION INSTALLATION DETAIL ON SIGNAL ARM		
Date	Approved	SPECIFICATION DRAWING No.
14/11/03	D.N. (Signature on File) Chief Engineer	SP635-2.3.13

'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 "Z" SHALL BE IMPRINTED IN CONCRETE WITH A 25mm HIGH LETTER. LOCATE IMPRINT SO IT IS VISIBLE AFTER POLE INSTALLATION.  
280mm BOLT CIRCLE DIAMETER  
LOCATE CONDUIT IN THE CENTRE OF ANCHOR BOLT CIRCLE

3mm THICK STEEL PLATE WELDED TO TOP (TYPICAL)

TOP VIEW

SQUARE STEEL POST (HSS 152x152x4.7, G40.21-M350W)

SEE SP635-3.9.1 FOR SIGN INSTALLATION DETAILS  
CYCLIST OR PEDESTRIAN SIGN, AS APPROPRIATE

1/4"-20 x 1" LONG STAINLESS STEEL HEX HEAD BOLTS, FLAT WASHERS (TYPICAL 2 LOCATIONS)

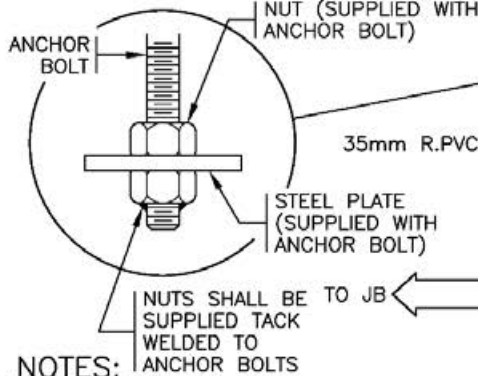
SMALL HANDHOLE COVER

3/8"φ x 1 1/4" LONG STAINLESS STEEL HEX HEAD BONDING BOLT, NUT AND 2 WASHERS

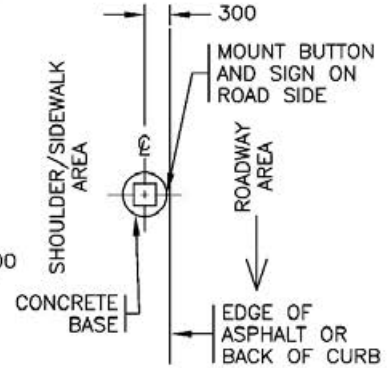
R.PVC COUPLING

GALVANIZED NUT AND WASHER (TYPICAL)

3/4"φ x 12" LONG GALVANIZED ANCHOR BOLTS



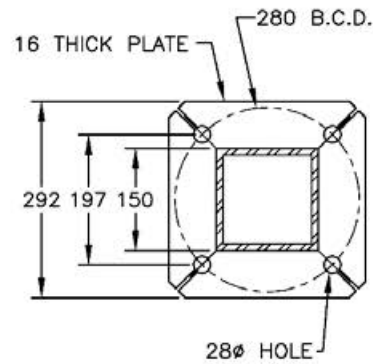
ELEVATION



PLAN

TOP OF BASE SHALL BE LEVEL AND INSTALLED 25mm ABOVE FINISHED PAVEMENT GRADE

FINISHED ROAD GRADE



BASE PLATE

NOTES:

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. POST TO BE HOT DIP GALVANIZED AFTER FABRICATION.
3. CONCRETE BASE TO BE 30MPa BEFORE POST INSTALLATION.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



Ministry of Transportation and Infrastructure

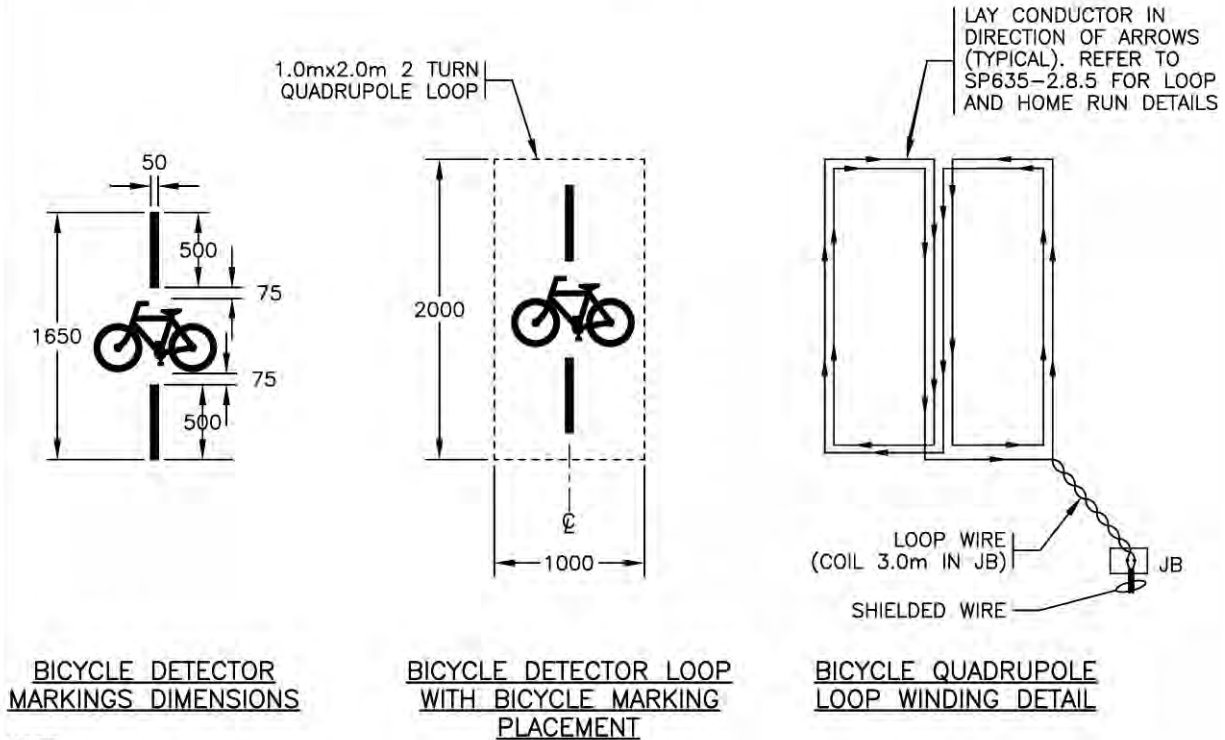
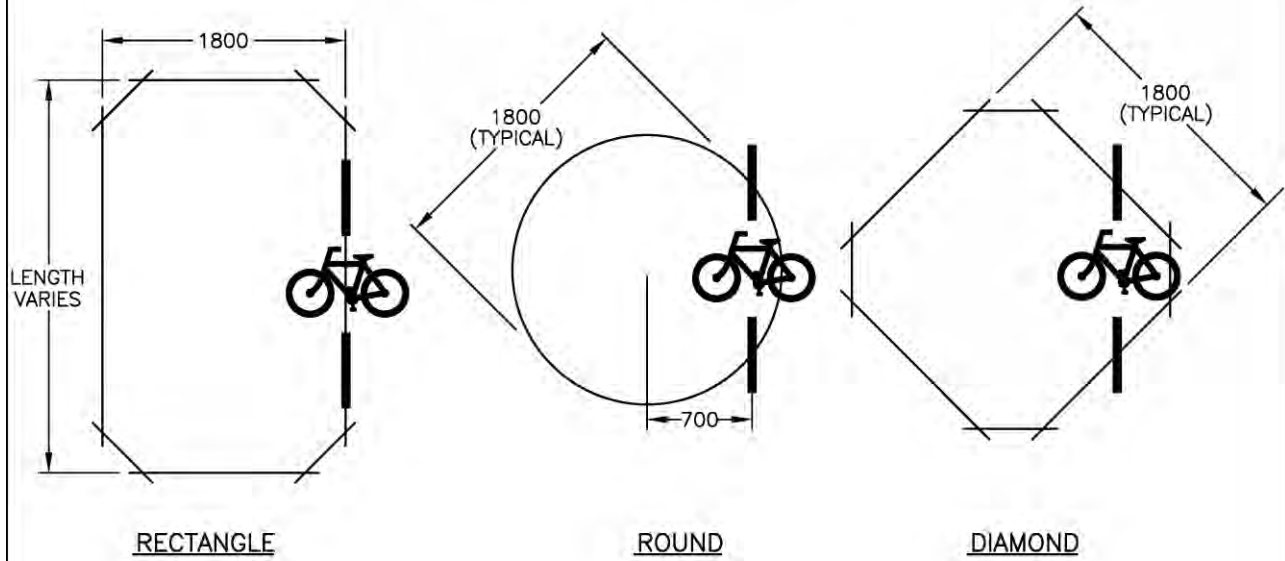
No.	Revision	Date
F		
E		
D		
C		
B	GENERAL REVISIONS	APR 20
A	GENERAL REVISIONS	APR 17

PUSHBUTTON POST INSTALLATION DETAILS

Date: 09/02/16  
Approved: D.N. (Signature on File)  
Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-2.3.14

BICYCLE MARKING PLACEMENT



NOTE

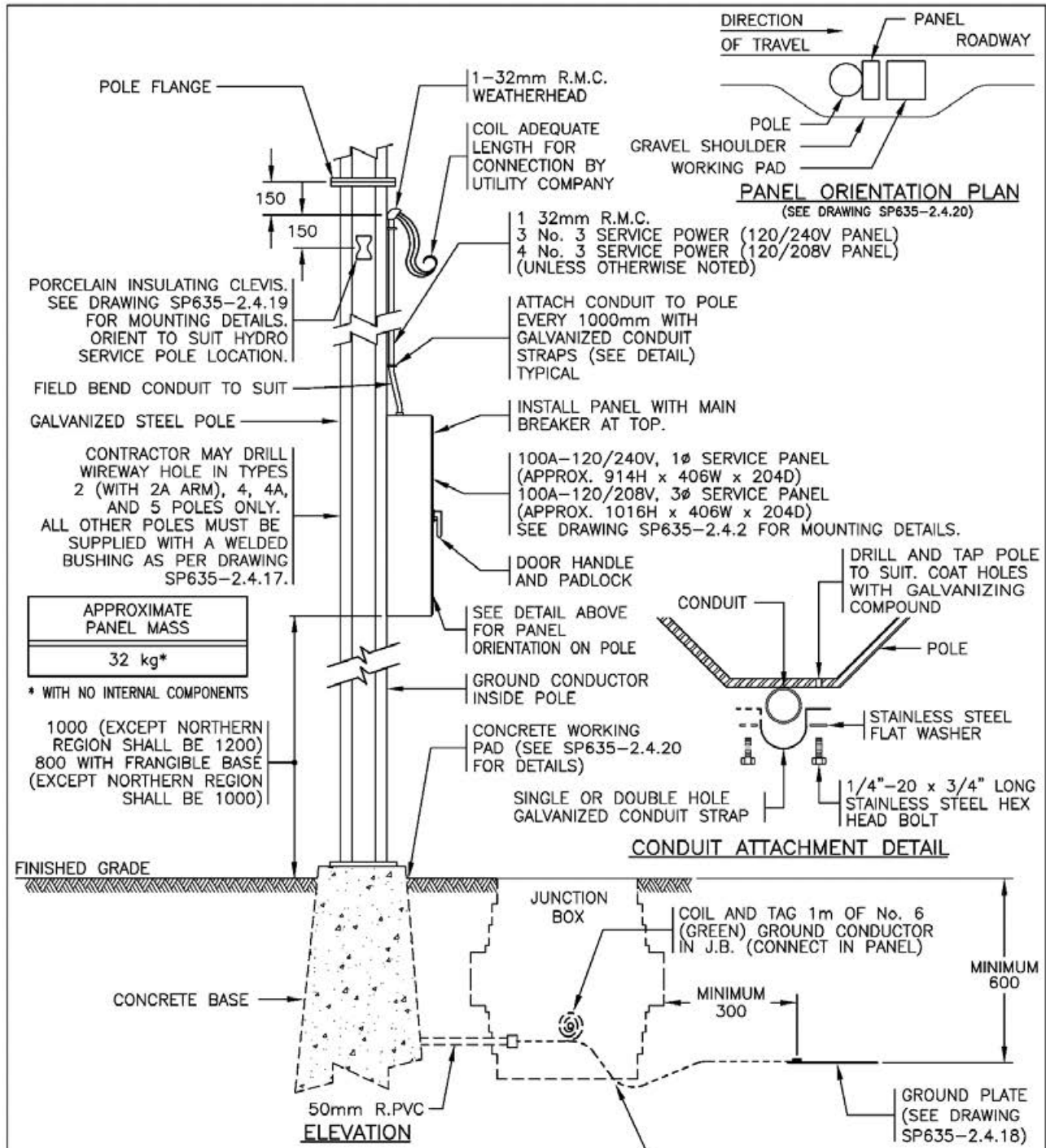
1. PAINT MARKING AND POSITIONING TO BE CONFIRMED WITH MINISTRY REPRESENTATIVE.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	BICYCLE DETECTOR LOOPS AND MARKINGS		SPECIFICATION DRAWING No. SP635-2.3.15
F			Date	Approved	
E			09/02/16	D.N. (Signature on File)	
D				Chief Highway Engineer	
C					
B					
A					



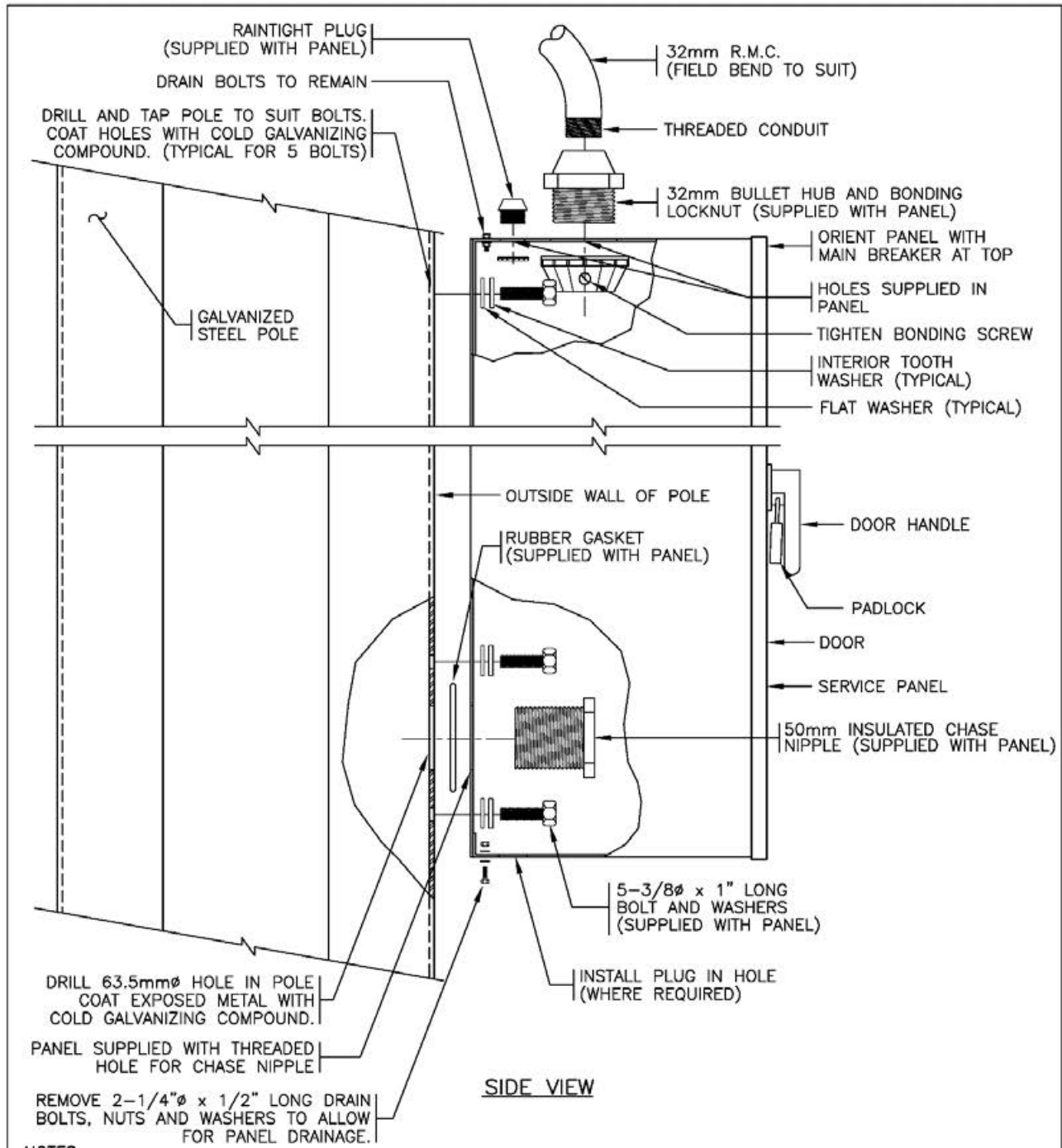
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	100A - OVERHEAD SERVICE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.4.1
G	GENERAL REVISIONS	APR 20	Date	Approved	
F	GENERAL REVISIONS	APR 17	05/02/16	D.N. (Signature on File)	
E	GENERAL REVISIONS	FEB 16			
D	MOUNTING HEIGHT REVISED	AUG 99			
C	MOUNTING HEIGHT CHANGED TO FINISHED GRADE & PANEL ORIENTATION DETAIL ADDED	NOV 98	Chief Highway Engineer		



SIDE VIEW

NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. PANEL ASSEMBLY AND INSTALLATION INSTRUCTIONS SUPPLIED WITH PANEL.

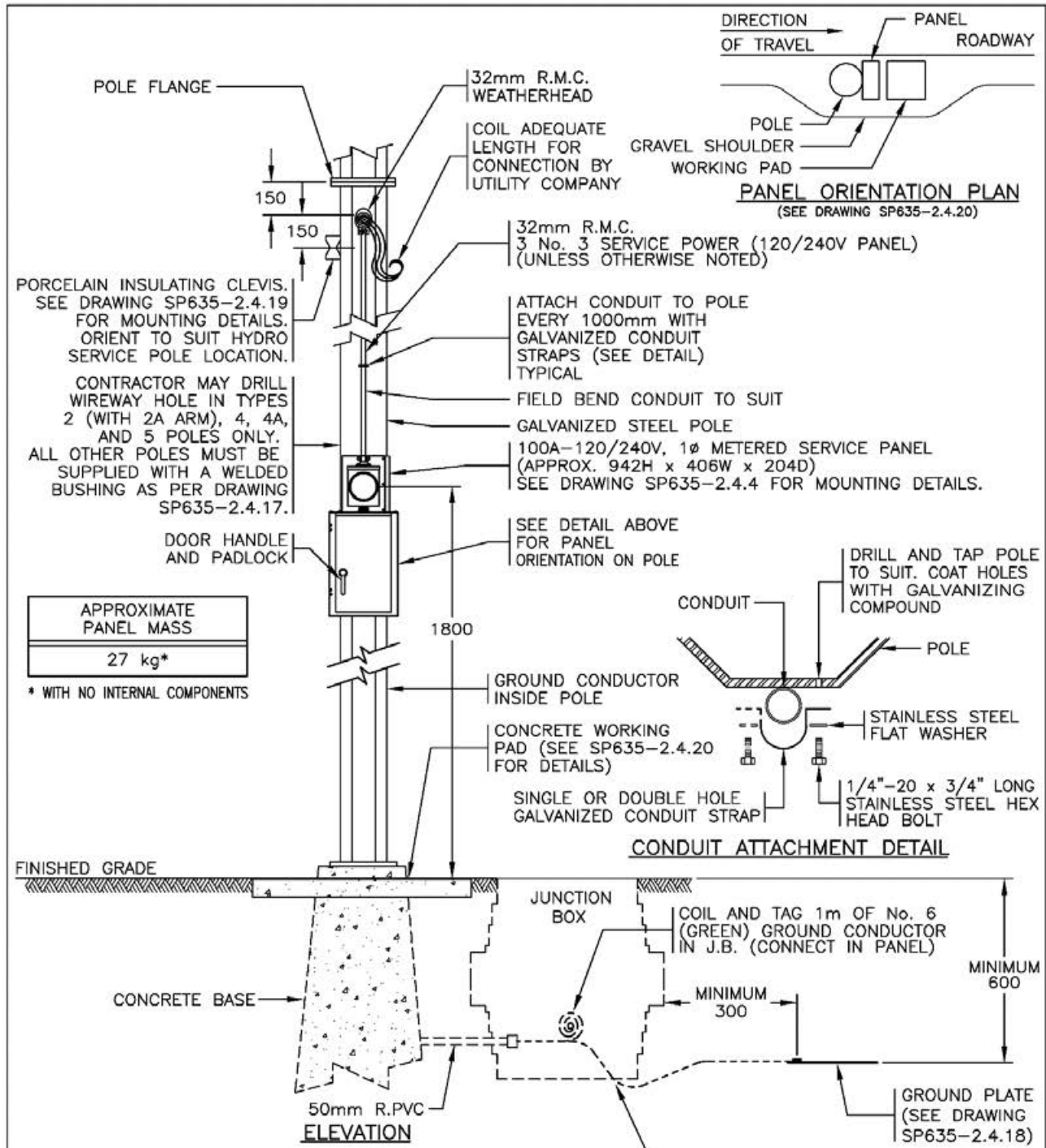
NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	100A – OVERHEAD SERVICE PANEL INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.4.2
F			Date	Approved	
E			05/02/16	D.N. (Signature on File)	
D	GENERAL REVISIONS	FEB 16	Chief Highway Engineer		
C	BONDING LOCKNUT ADDED	AUG 96			
B	GROUND CONDUIT DELETED	AUG 95			
A	GENERAL REVISIONS	AUG 94			





PORCELAIN INSULATING CLEVIS. SEE DRAWING SP635-2.4.19 FOR MOUNTING DETAILS. ORIENT TO SUIT HYDRO SERVICE POLE LOCATION.

CONTRACTOR MAY DRILL WIREWAY HOLE IN TYPES 2 (WITH 2A ARM), 4, 4A, AND 5 POLES ONLY. ALL OTHER POLES MUST BE SUPPLIED WITH A WELDED BUSHING AS PER DRAWING SP635-2.4.17.

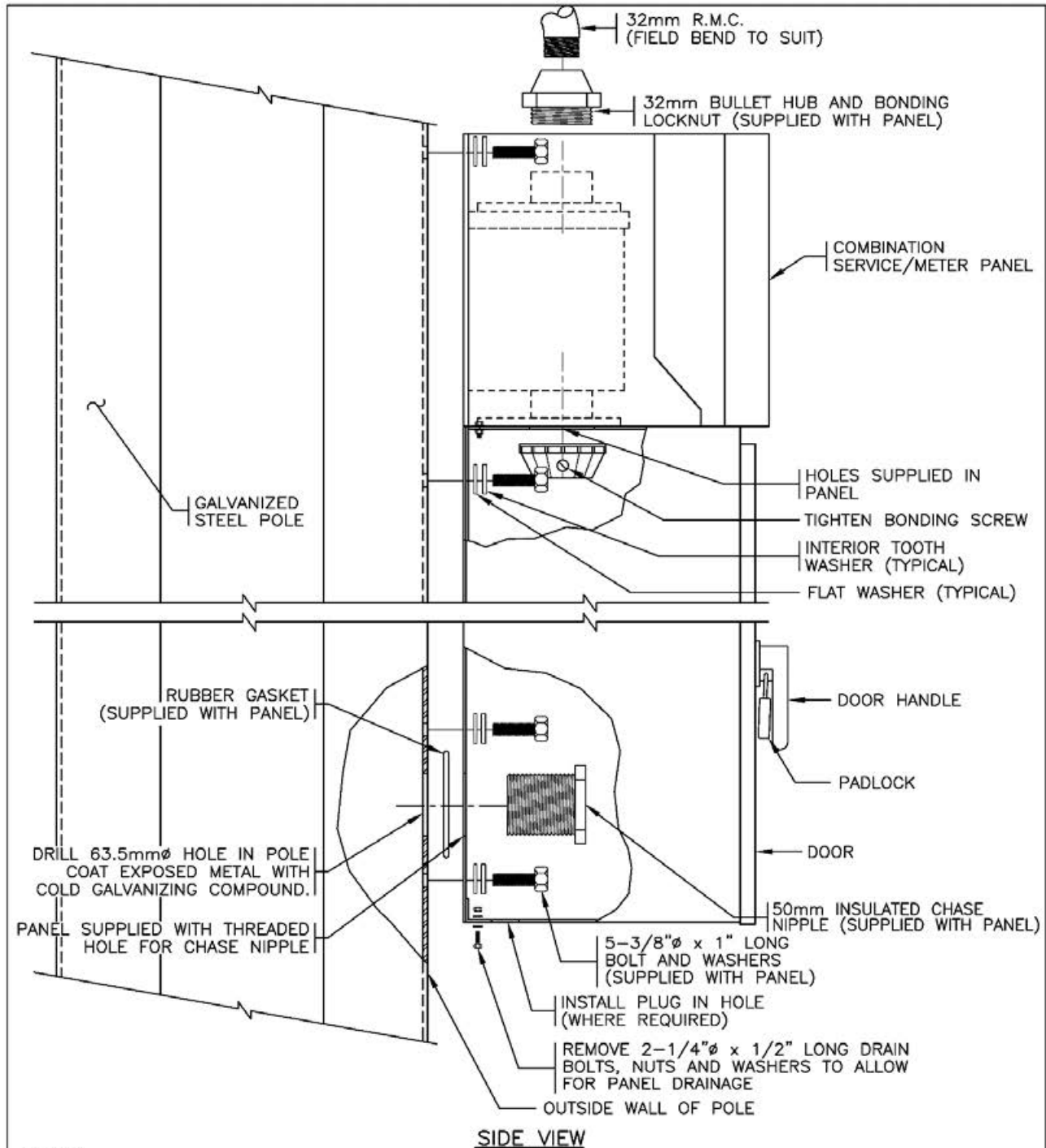
APPROXIMATE PANEL MASS
27 kg*

\* WITH NO INTERNAL COMPONENTS

- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
- NOT TO SCALE



No.	Revision	Date	100A - 120/240V SINGLE PHASE OVERHEAD SERVICE INSTALLATION DETAILS (METERED)	
E			Date	Approved
D			05/02/16	D.N. (Signature on File)
C	GENERAL REVISIONS	APR 20	Chief Highway Engineer	
B	GENERAL REVISIONS	APR 17	SPECIFICATION DRAWING No.	
A	DRAWING REVISED TO OVERHEAD 120/240V SINGLE PHASE SERVICE (METERED)	FEB 16	SP635-2.4.3	



SIDE VIEW

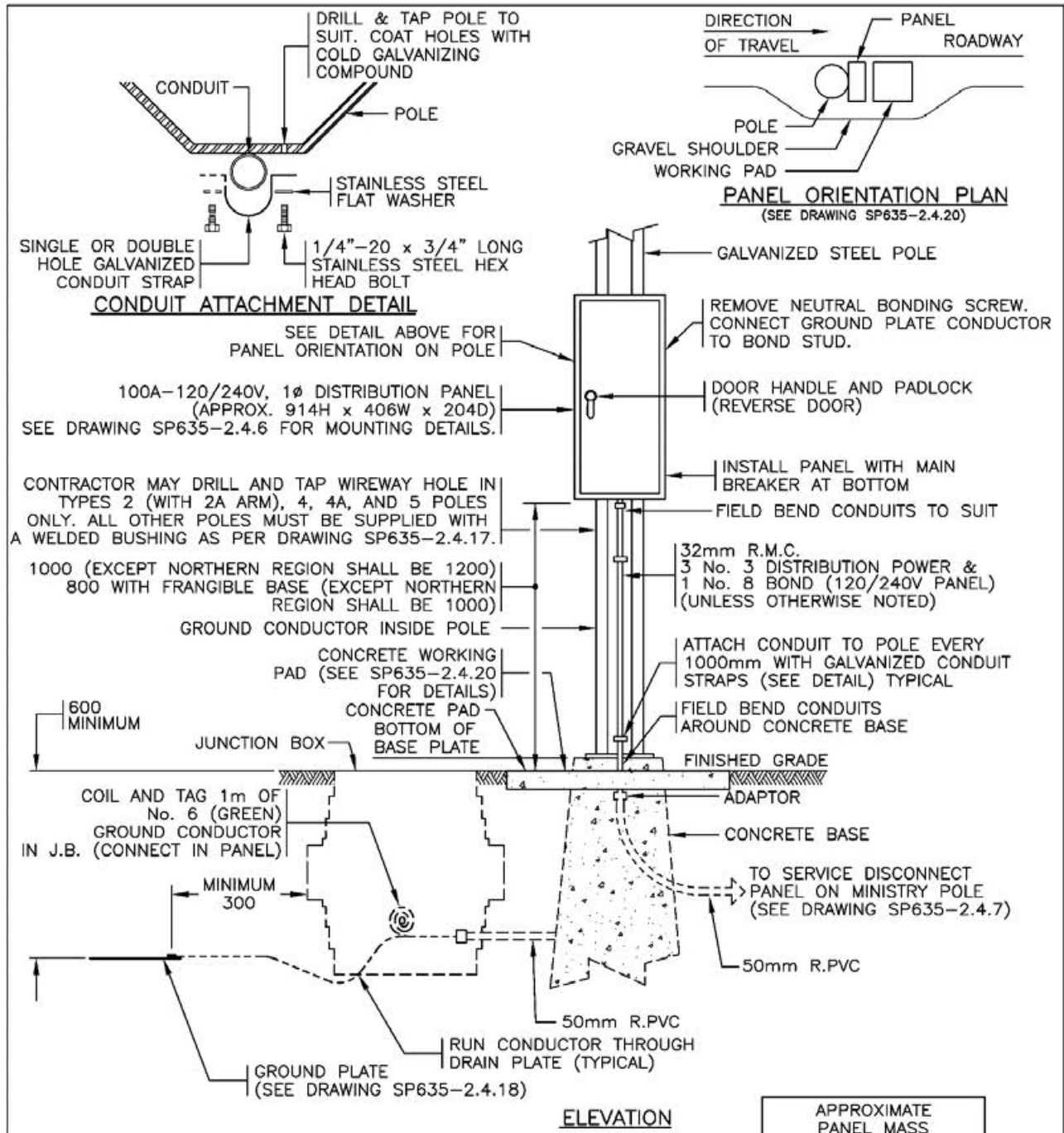
NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. PANEL ASSEMBLY AND INSTALLATION INSTRUCTIONS SUPPLIED WITH PANEL.

NOT TO SCALE



No.	Revision	Date	100A - 120/240V SINGLE PHASE OVERHEAD SERVICE PANEL INSTALLATION DETAILS (METERED)		SPECIFICATION DRAWING No. SP635-2.4.4
E			Date	Approved	
D			05/02/16	D.N. (Signature on File)	
C			Chief Highway Engineer		
B					
A	DRAWING REVISED TO OVERHEAD 120/240V SINGLE PHASE SERVICE (METERED)	FEB 16			



- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

APPROXIMATE PANEL MASS
30 kg*

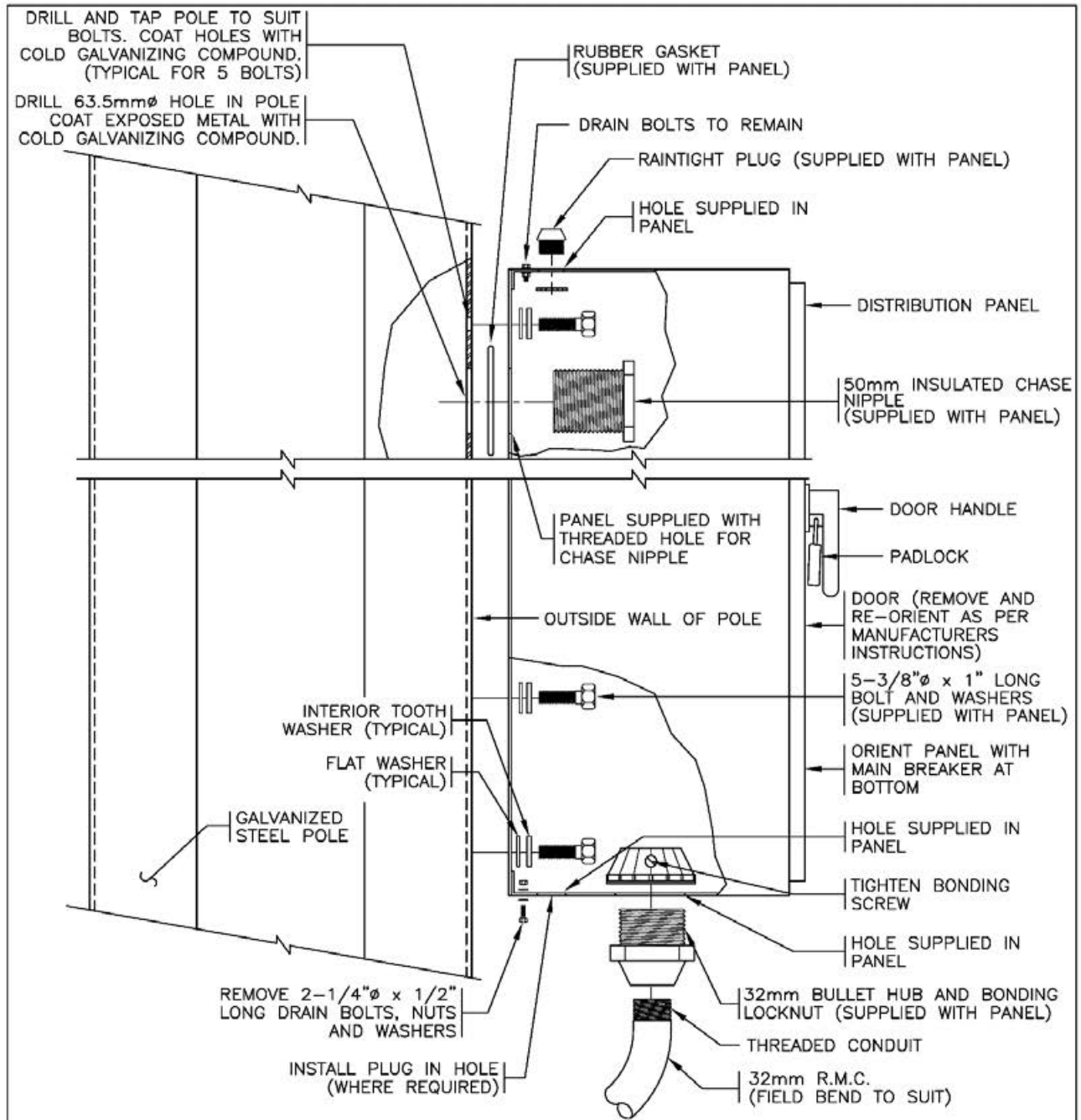
\* WITH NO INTERNAL COMPONENTS



No.	Revision	Date
G	GENERAL REVISIONS	APR 20
E	GENERAL REVISIONS	FEB 16
D	BOND CONDUCTOR & GROUND PLATE CONDUCTOR CONNECTION CLARIFIED, MOUNTING HEIGHT REVISED	AUG 99
C	MOUNTING HEIGHT CHANGED TO FINISHED GRADE & PANEL ORIENTATION DETAIL ADDED	NOV 98

**100A – UNDERGROUND DISTRIBUTION  
INSTALLATION DETAILS**

Date	Approved	SPECIFICATION DRAWING No.
<b>05/02/16</b>	<b>D.N. (Signature on File)</b> Chief Highway Engineer	<b>SP635-2.4.5</b>



**NOTES**

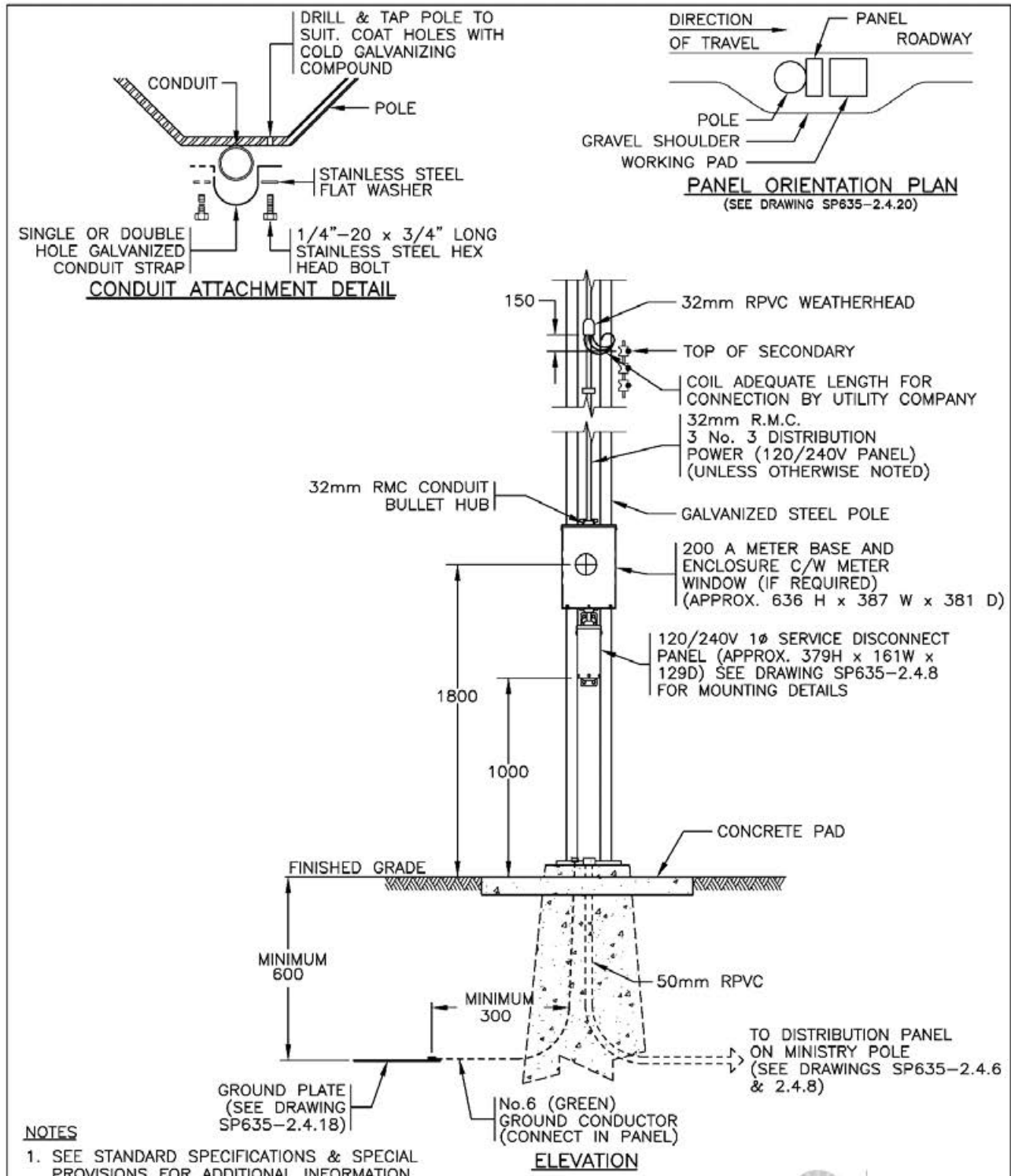
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. PANEL ASSEMBLY AND INSTALLATION INSTRUCTIONS SUPPLIED WITH PANEL.

**SIDE VIEW**



NOT TO SCALE

No.	Revision	Date	100A – UNDERGROUND DISTRIBUTION PANEL INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.4.6
F			Date	Approved	
E			05/02/16	D.N. (Signature on File)	
D	GENERAL REVISIONS	FEB 16	Chief Highway Engineer		
C	BONDING LOCKNUT ADDED	AUG 96			
B	GROUND CONDUIT DELETED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



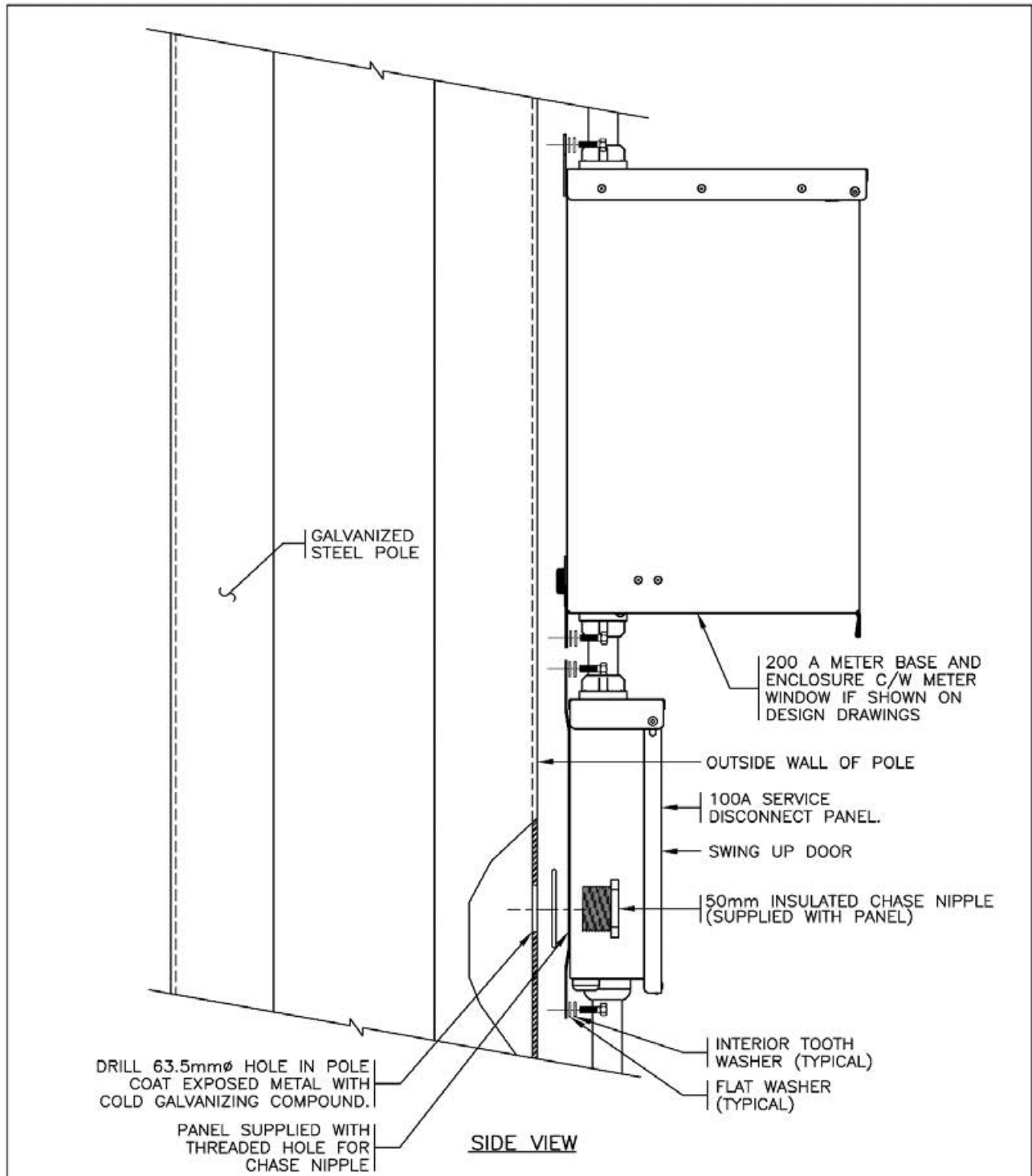
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	100A - DIP SERVICE DISCONNECT INSTALLATION DETAILS (METERED)	
F	GENERAL REVISION	APR 20	Date	Approved
E	WOOD UTILITY POLE REPLACED WITH STEEL POLE METER ENCLOSURE ADDED	FEB 16	05/02/16	D.N. (Signature on File)
D	CONDUIT AND WEATHERHEAD RPVC	APR 05	SPECIFICATION DRAWING No. SP635-2.4.7	
C	BOND CONDUCTORS ADDED	AUG 99		
B	GROUND PLATE ADDED	AUG 95	Chief Highway Engineer	



**NOTES**

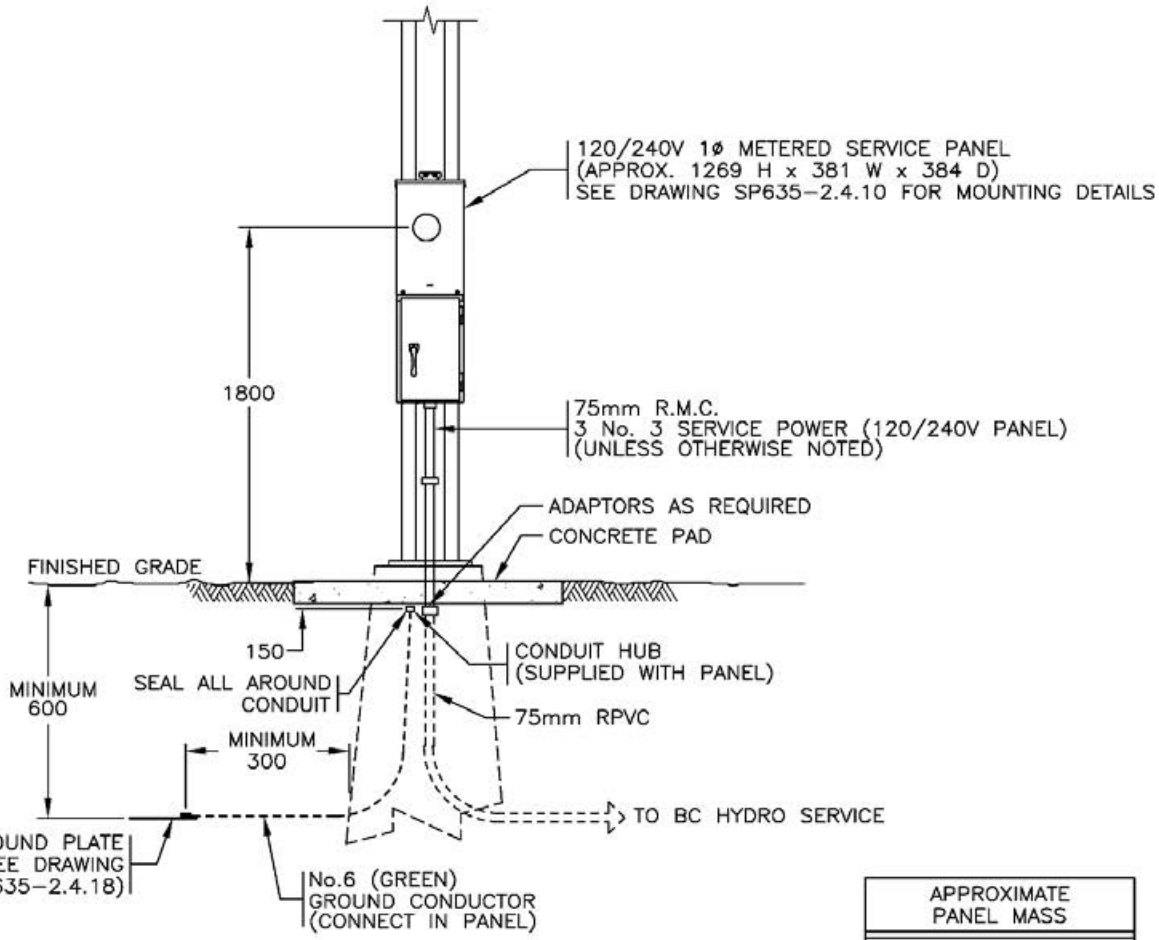
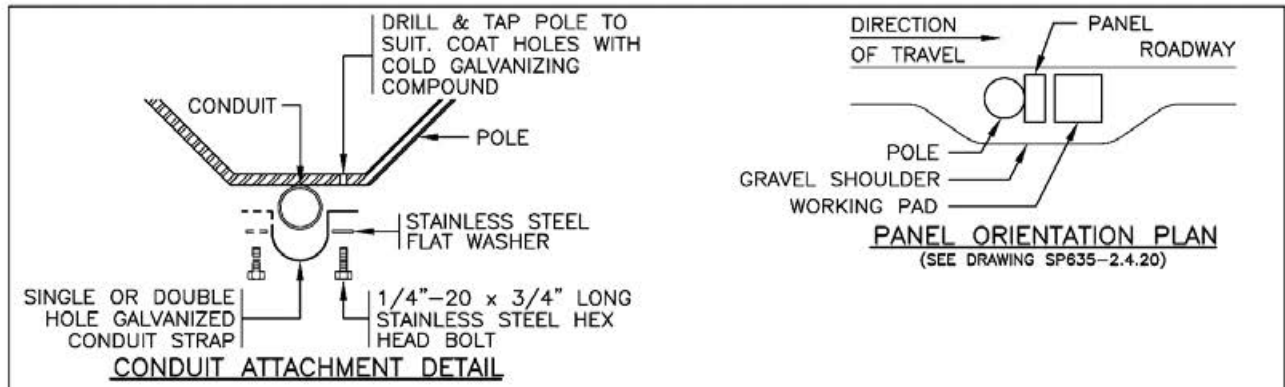
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	100A – DIP SERVICE DISCONNECT & METER INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.4.8
E			Date	Approved	
D	WOOD UTILITY POLE REPLACED WITH STEEL POLE METER ENCLOSURE ADDED	FEB 16	05/02/16	D.N. (Signature on File)	
C	RPVC CONDUIT/ADAPTER ADDED	APR 05		Chief Highway Engineer	
B	BONDING LOCKNUT ADDED	AUG 96			
A	GENERAL REVISIONS	AUG 94			



APPROXIMATE  
PANEL MASS  
**51 kg\***

\* WITH NO INTERNAL COMPONENTS

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

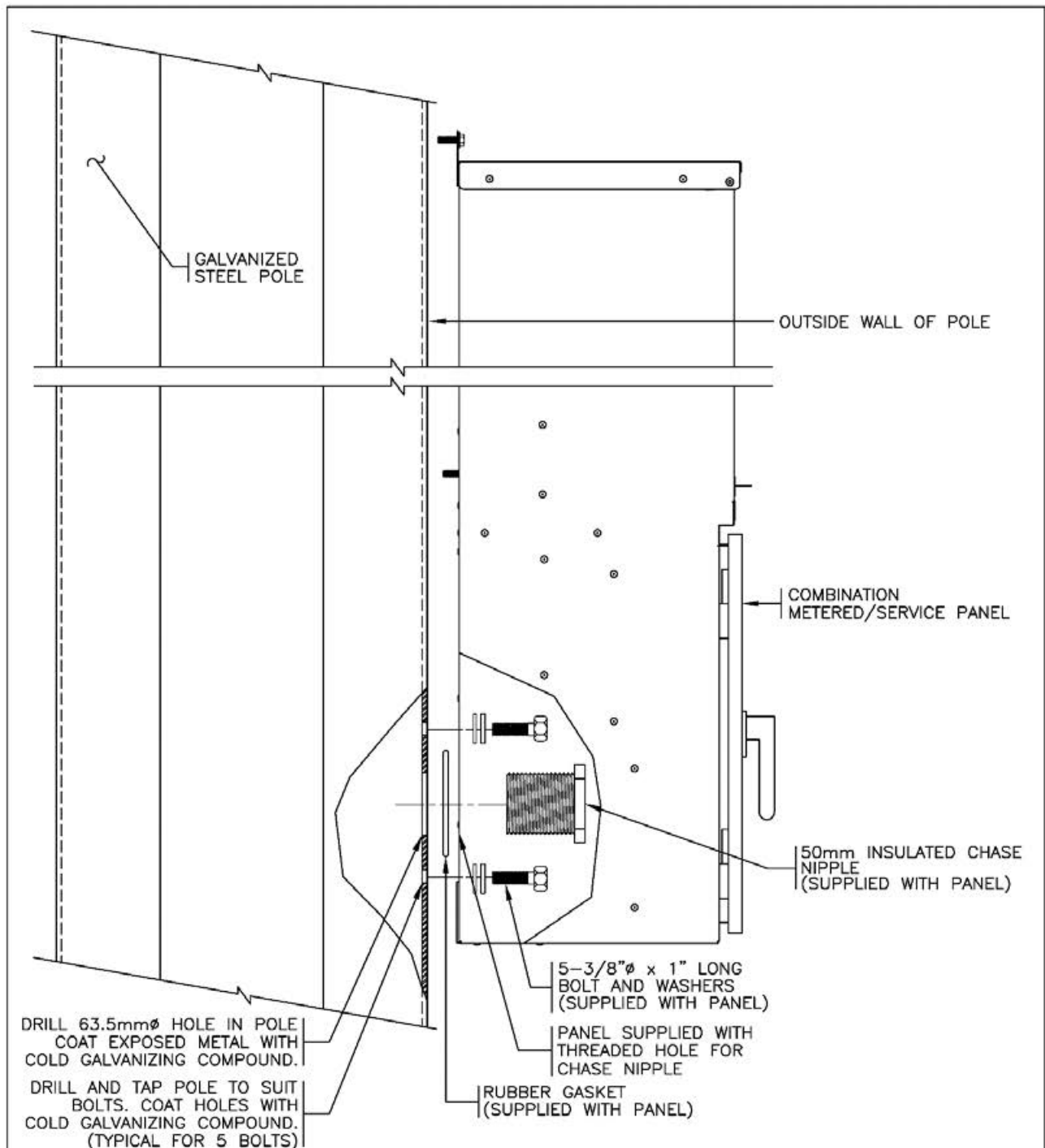
NOT TO SCALE



No.	Revision	Date
G	GENERAL REVISIONS	APR 20
F	GENERAL REVISIONS	APR 17
E	DRAWINGS REVISED TO UNDERGROUND METERED SERVICE	FEB 16
D	CONDUIT AND WEATHERHEAD RPVC	APR 05
C	BOND CONDUCTORS ADDED	AUG 99
B	GROUND PLATE ADDED	AUG 95

**100A – UNDERGROUND SERVICE  
INSTALLATION DETAILS (METERED)**

Date	Approved	SPECIFICATION DRAWING No.
<b>05/02/16</b>	<b>D.N. (Signature on File)</b> Chief Highway Engineer	<b>SP635-2.4.9</b>



DRILL 63.5mmØ HOLE IN POLE  
COAT EXPOSED METAL WITH  
COLD GALVANIZING COMPOUND.  
DRILL AND TAP POLE TO SUIT  
BOLTS. COAT HOLES WITH  
COLD GALVANIZING COMPOUND.  
(TYPICAL FOR 5 BOLTS)

**SIDE VIEW**

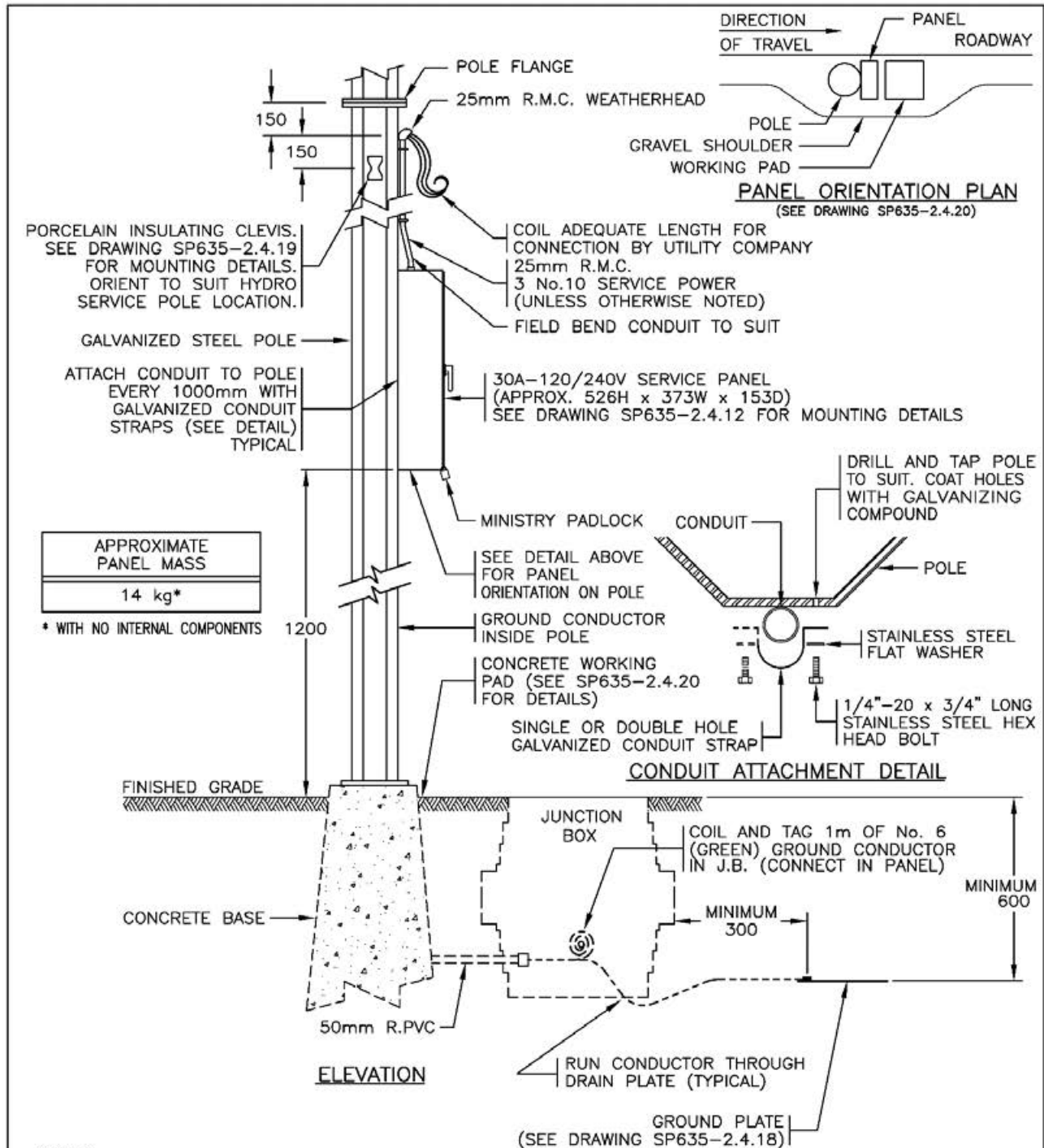
**NOTES**  
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.



NOT TO SCALE

No.	Revision	Date	100A – UNDERGROUND SERVICE & METER PANEL INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.4.10
F			Date	Approved	
E			<b>05/02/16</b>	<b>D.N. (Signature on File)</b> Chief Highway Engineer	
D	DRAWINGS REVISED TO UNDERGROUND METERED SERVICE	FEB 16			
C	RPVC CONDUIT/ADAPTER ADDED	APR 05			
B	BONDING LOCKNUT ADDED	AUG 96			
A	GENERAL REVISIONS	AUG 94			





APPROXIMATE PANEL MASS
14 kg*

\* WITH NO INTERNAL COMPONENTS

**NOTES**

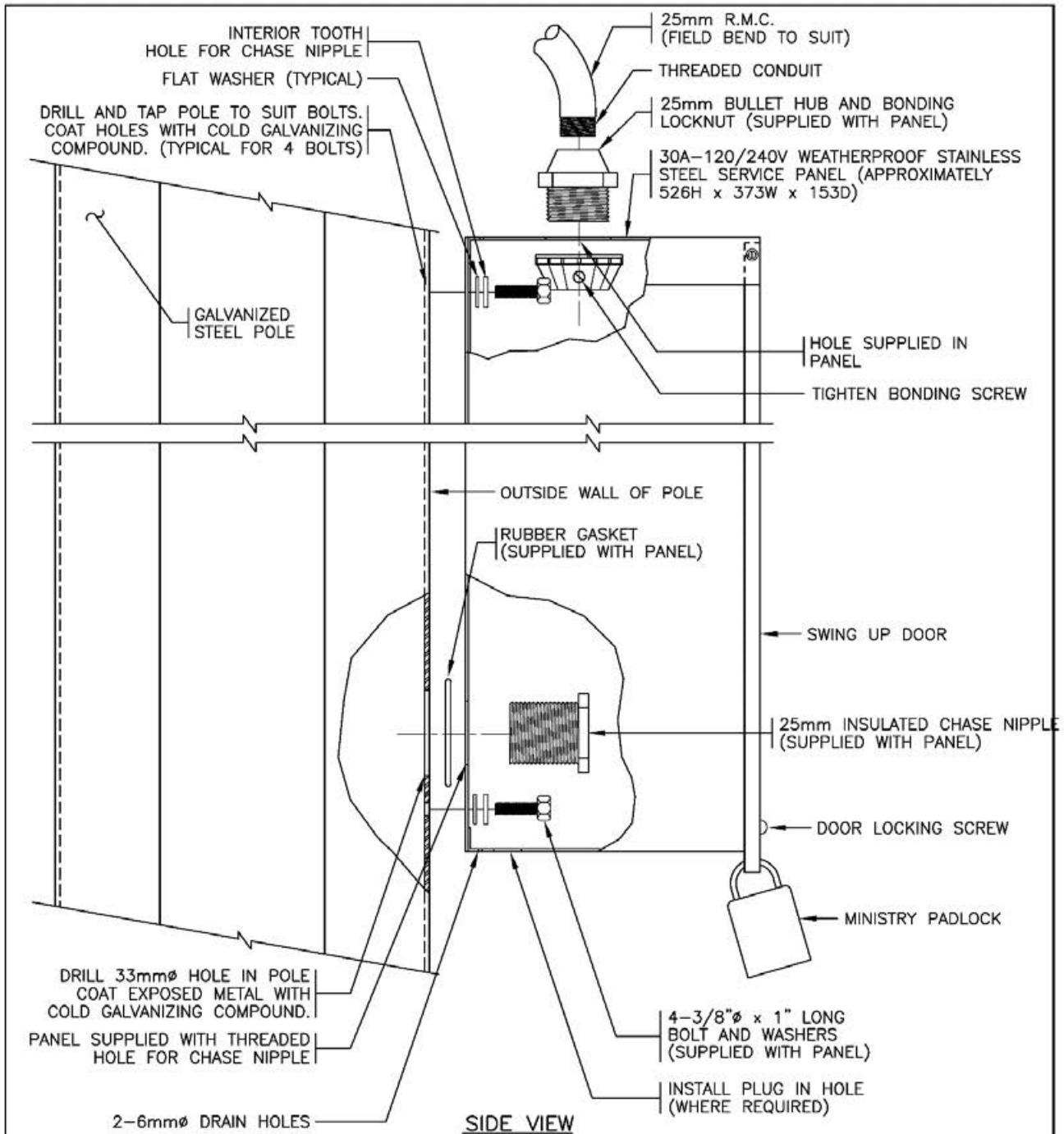
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



Ministry of  
Transportation  
and Infrastructure

<table border="1"> <tr> <th>No.</th> <th>Revision</th> <th>Date</th> </tr> <tr> <td>E</td> <td>GENERAL REVISIONS</td> <td>APR 20</td> </tr> <tr> <td>D</td> <td>GENERAL REVISIONS</td> <td>APR 17</td> </tr> <tr> <td>C</td> <td>GENERAL REVISIONS - DRAWING RENUMBERED PREVIOUSLY 2.4.7</td> <td>FEB 16</td> </tr> <tr> <td>B</td> <td>MOUNTING HEIGHT CHANGED TO FINISHED GRADE &amp; PANEL ORIENTATION DETAIL ADDED</td> <td>NOV 98</td> </tr> </table>		No.	Revision	Date	E	GENERAL REVISIONS	APR 20	D	GENERAL REVISIONS	APR 17	C	GENERAL REVISIONS - DRAWING RENUMBERED PREVIOUSLY 2.4.7	FEB 16	B	MOUNTING HEIGHT CHANGED TO FINISHED GRADE & PANEL ORIENTATION DETAIL ADDED	NOV 98	<p><b>30A - OVERHEAD SERVICE INSTALLATION DETAILS</b></p>		<p>SPECIFICATION DRAWING No. <b>SP635-2.4.11</b></p>
No.	Revision	Date																	
E	GENERAL REVISIONS	APR 20																	
D	GENERAL REVISIONS	APR 17																	
C	GENERAL REVISIONS - DRAWING RENUMBERED PREVIOUSLY 2.4.7	FEB 16																	
B	MOUNTING HEIGHT CHANGED TO FINISHED GRADE & PANEL ORIENTATION DETAIL ADDED	NOV 98																	
		<p>Date: <b>05/02/16</b> Approved: <b>D.N. (Signature on File)</b> Chief Highway Engineer</p>																	



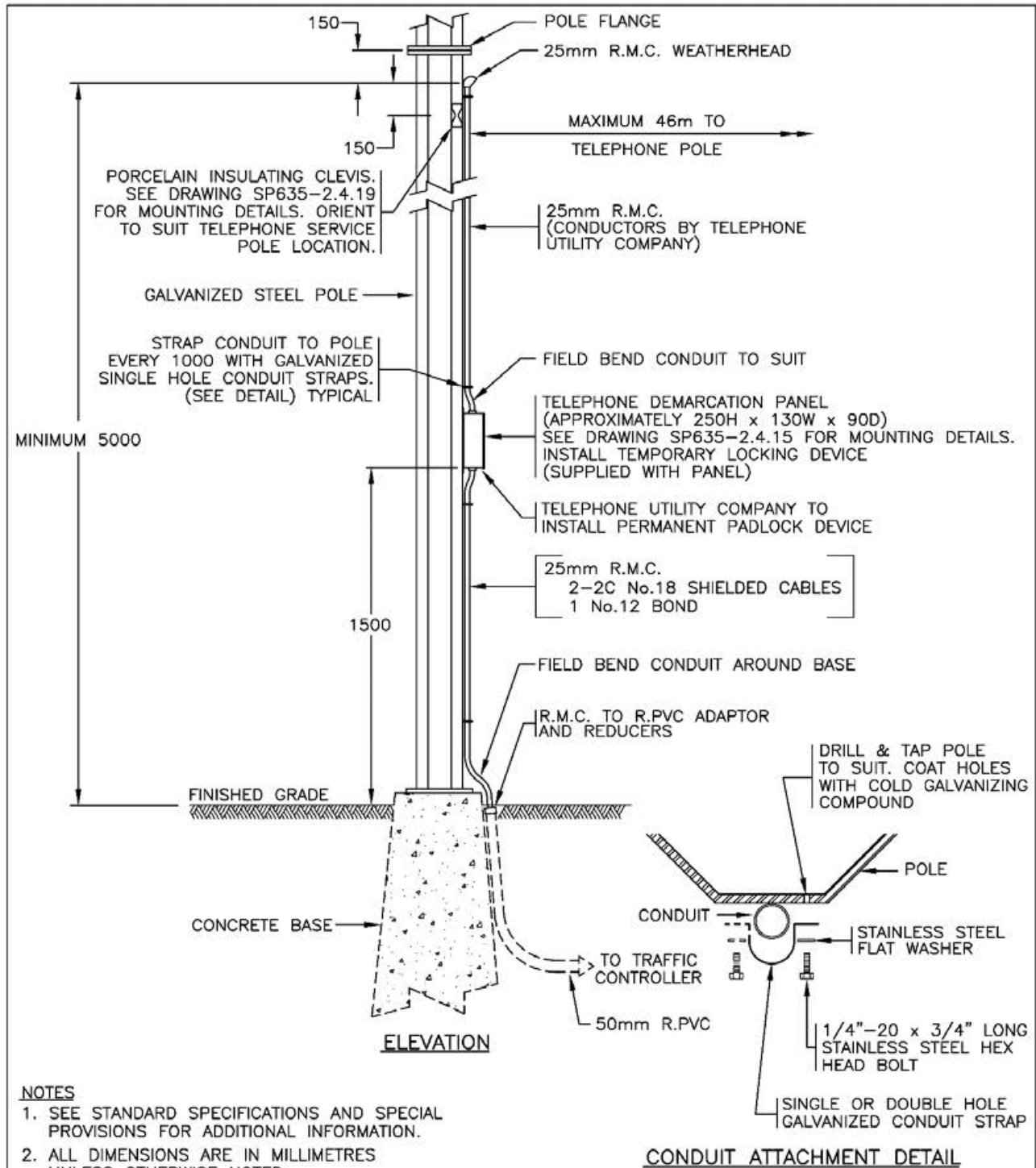
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	30A – OVERHEAD SERVICE PANEL INSTALLATION DETAILS		SPECIFICATION DRAWING No. <b>SP635-2.4.12</b>
E			Date	Approved	
D			<b>05/02/16</b>	<b>D.N. (Signature on File)</b> Chief Highway Engineer	
C	GENERAL REVISIONS – DRAWING RENUMBERED PREVIOUSLY 2.4.8	FEB 16			
B	BONDING LOCKNUT ADDED	AUG 96			
A	GROUND CONDUIT DELETED	AUG 95			



**NOTES**

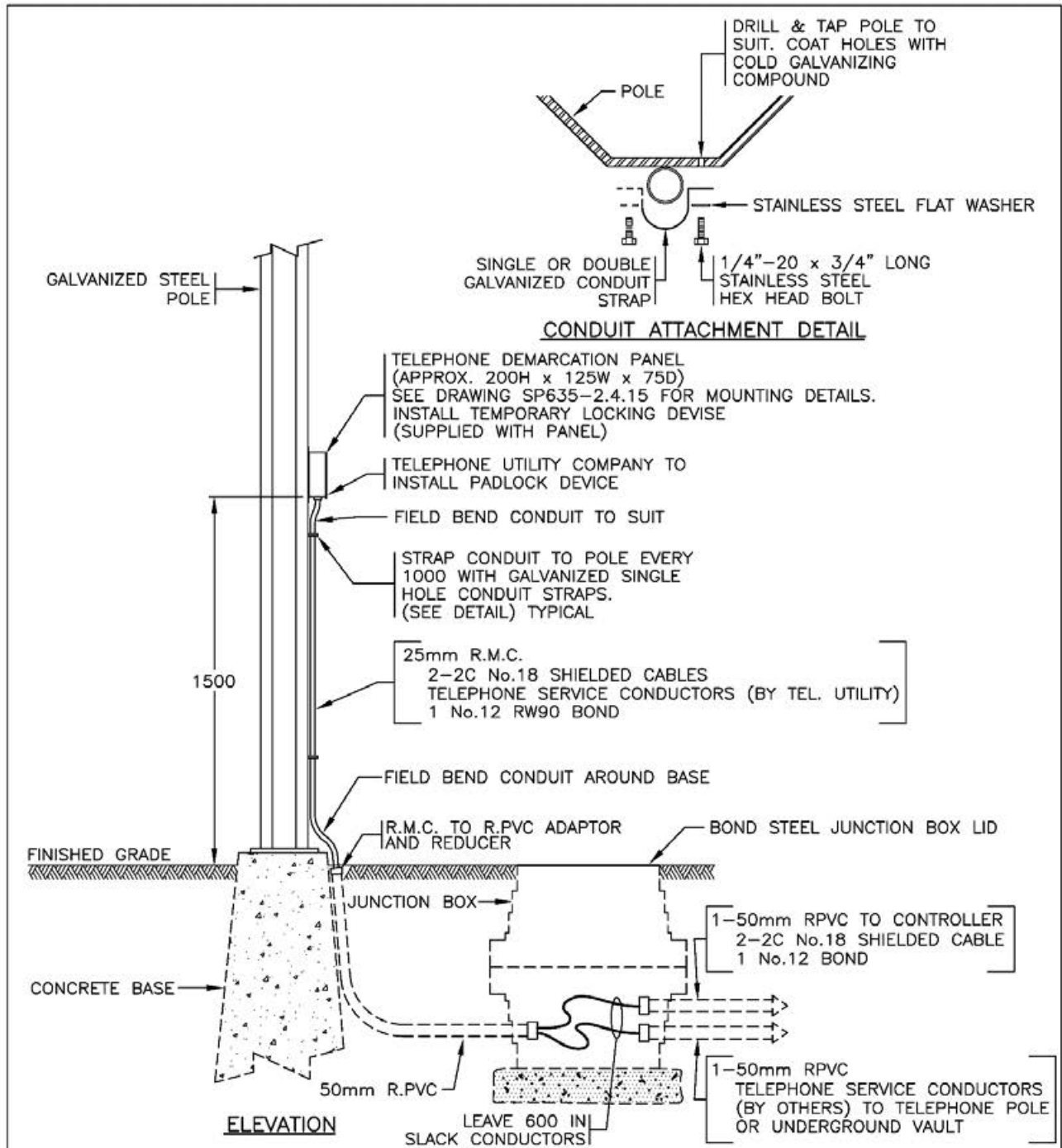
1. SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. WHERE PANEL AND CONDUITS ARE TO BE INSTALLED ON A TELEPHONE/POWER POLE THE INSTALLATION SHALL BE CARRIED OUT BY THE TELEPHONE UTILITY COMPANY.

NOT TO SCALE



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No.	Revision	Date	TELEPHONE OVERHEAD DROP SERVICE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.4.13
F	GENERAL REVISIONS	APR 20	Date	Approved	
E	GENERAL REVISIONS	APR 17	05/02/16	D.N. (Signature on File)	
D	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 2.4.9	FEB 16	Chief Highway Engineer		
C	TEMPORARY LOCKING DEVICE NOTE ADDED	SEPT 00			
B	MOUNTING HEIGHT CHANGED TO FINISHED GRADE	NOV 98			
A	PANEL SIZE & STOCK NUMBER REVISED	AUG 96			



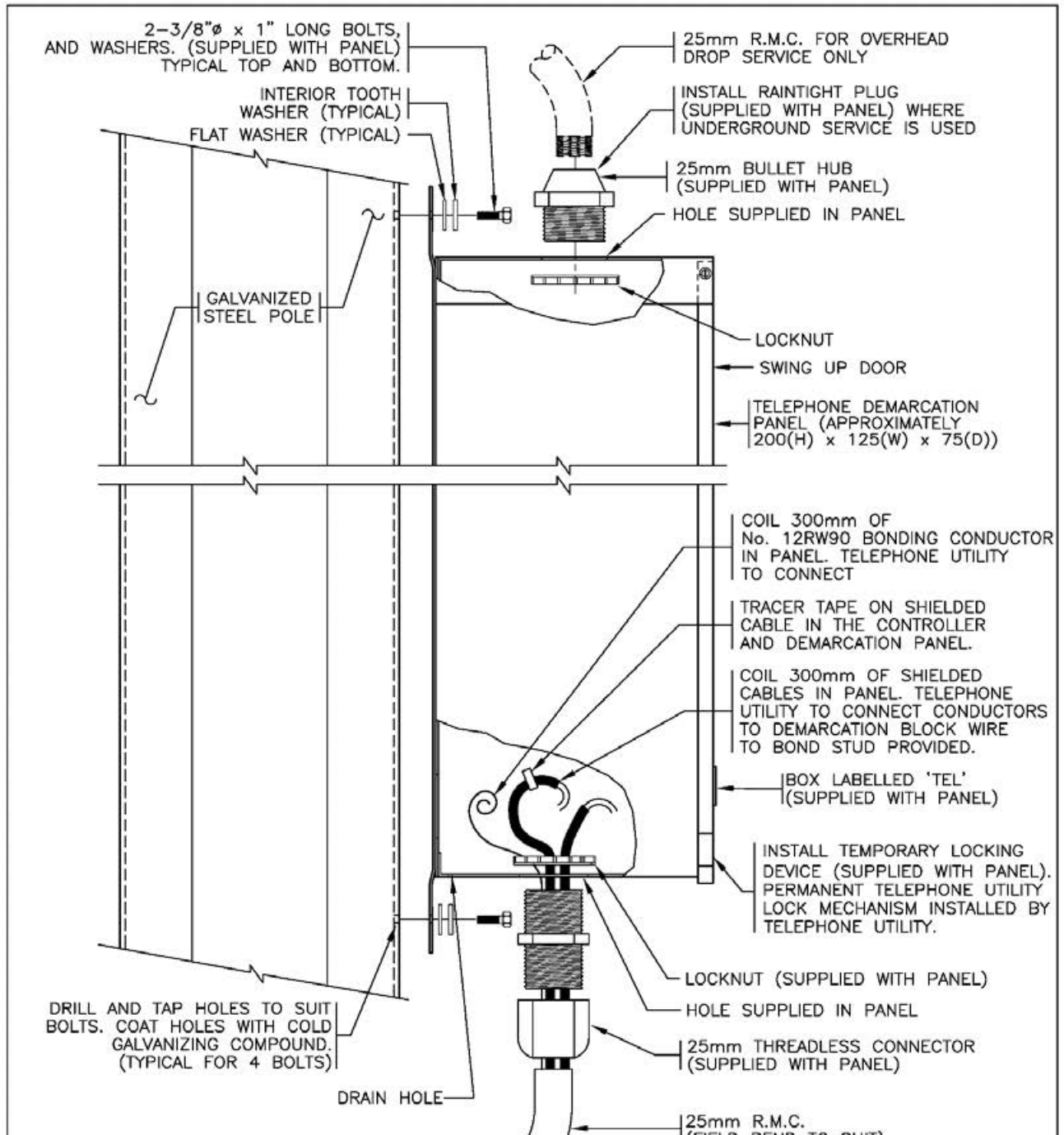
**NOTES**

1. SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	TELEPHONE UNDERGROUND SERVICE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.4.14
F			Date	Approved	
E			05/02/16	D.N. (Signature on File)	
D	GENERAL REVISIONS	APR 20	Chief Highway Engineer		
C	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 2.4.10	FEB 16			
B	TEMPORARY LOCKING DEVICE NOTE ADDED	SEPT 00			
A	MOUNTING HEIGHT CHANGED TO FINISHED GRADE	NOV 98			



**NOTES**

1. SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

**SIDE VIEW**



Ministry of Transportation and Infrastructure

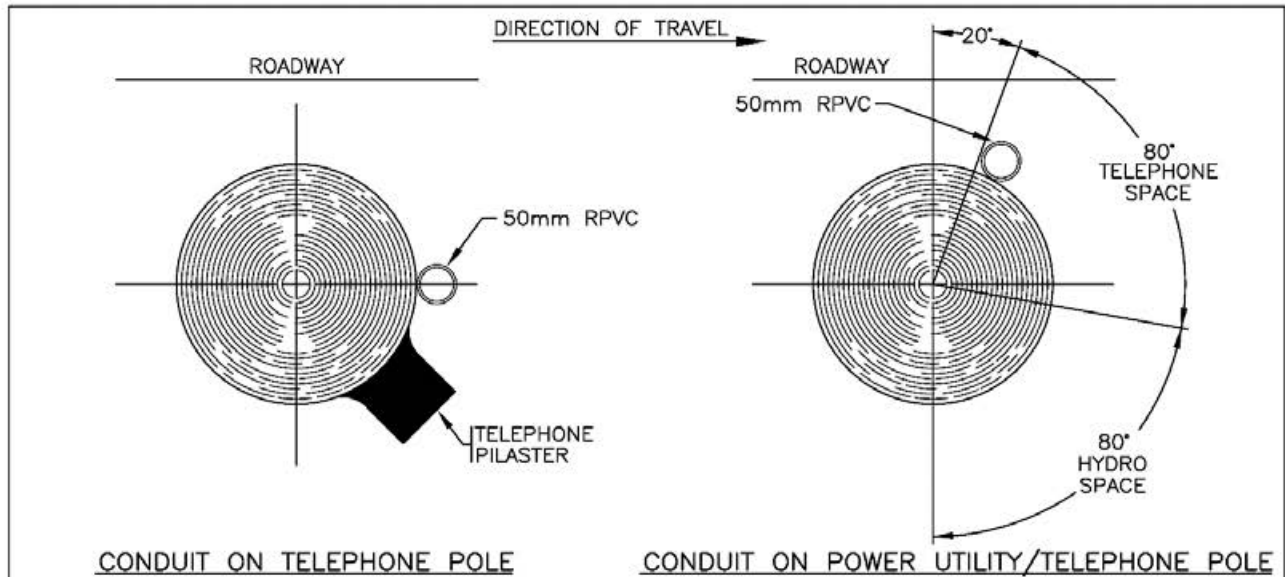
NOT TO SCALE

No.	Revision	Date
F		
E		
D		
C		
B	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 2.4.11	FEB 16
A	TEMPORARY LOCKING DEVICE NOTE ADDED	SEPT 00

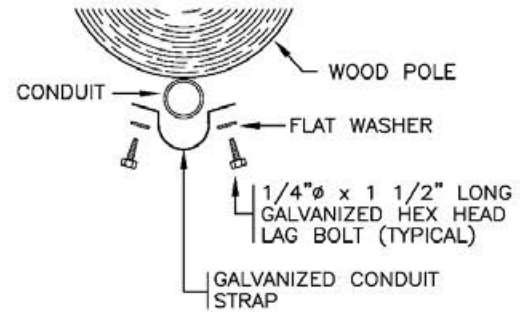
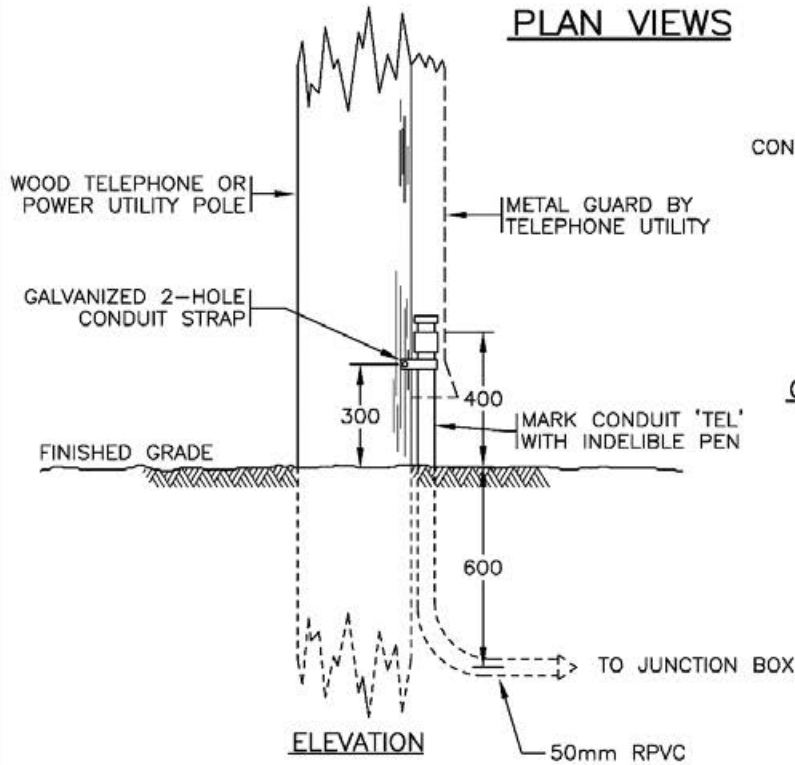
**TELEPHONE DEMARICATION PANEL INSTALLATION DETAILS**

Date Approved  
**05/02/16 D.N. (Signature on File)**  
 Chief Highway Engineer

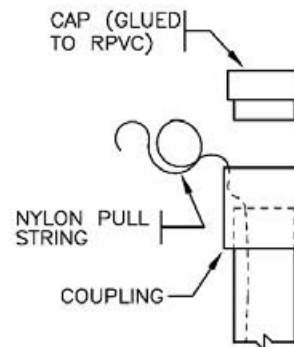
SPECIFICATION DRAWING No.  
**SP635-2.4.15**



**PLAN VIEWS**



**CONDUIT ATTACHMENT DETAIL**



**CAP DETAIL**

**NOTES**

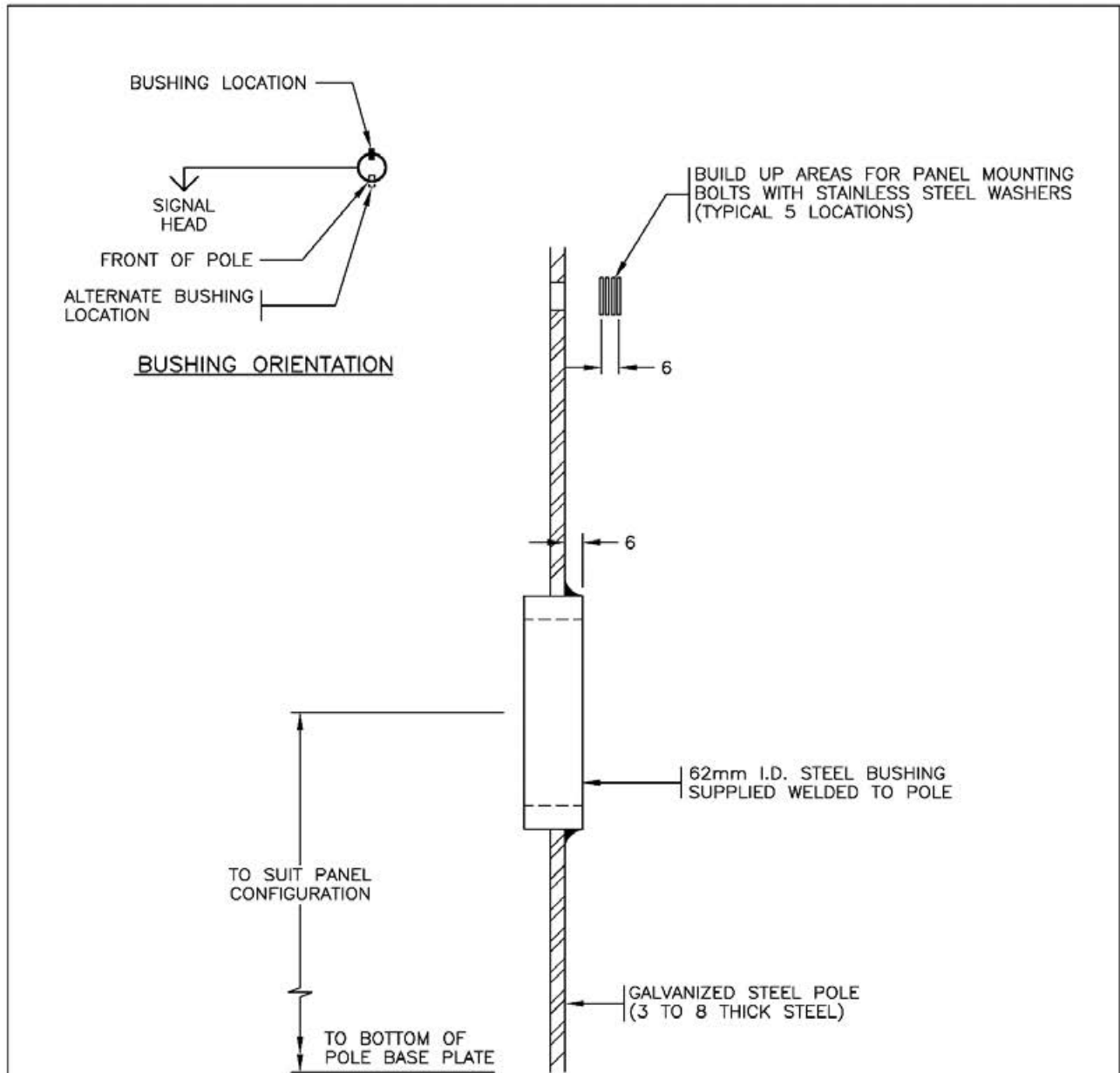
1. SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	TELEPHONE CONDUIT INSTALLATION DETAILS (WOOD POLE)		
F			Date	Approved	SPECIFICATION DRAWING No. <b>SP635-2.4.16</b>
E			05/02/16	D.N. (Signature on File)	
D			Chief Highway Engineer		
C					
B	GENERAL REVISIONS	APR 17			
A	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 2.4.12	FEB 16			



**NOTES**

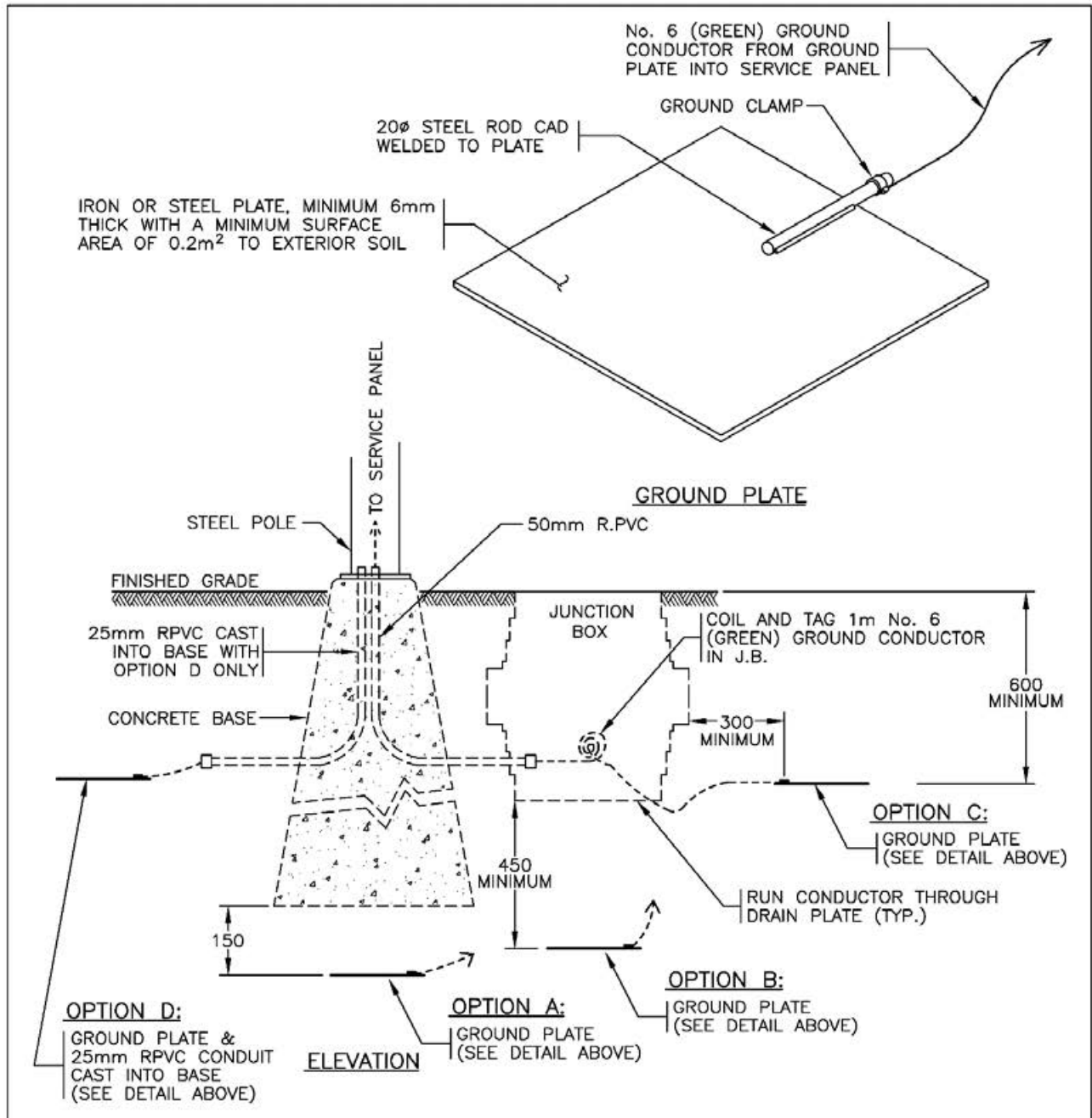
1. SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES.

POLE SHALL BE SUPPLIED WITH BUSHING INSTALLED, UNLESS OTHERWISE NOTED



NOT TO SCALE

No.	Revision	Date	SERVICE PANEL BUSHING DETAIL	
F			Date: <b>05/02/16</b> Approved: <b>D.N. (Signature on File)</b> Chief Highway Engineer	
E	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 2.4.13	FEB 16		
D	REGION 4 CHANGED TO 3	OCT 03		
C	BUSHING LOCATION REVISED	AUG 99		
B	BUSHING LOCATION REVISED	AUG 96		
A	BUSHING ORIENTATION & MOUNTING HEIGHTS ADDED	AUG 95		
			SPECIFICATION DRAWING No.	SP635-2.4.17



**NOTES**

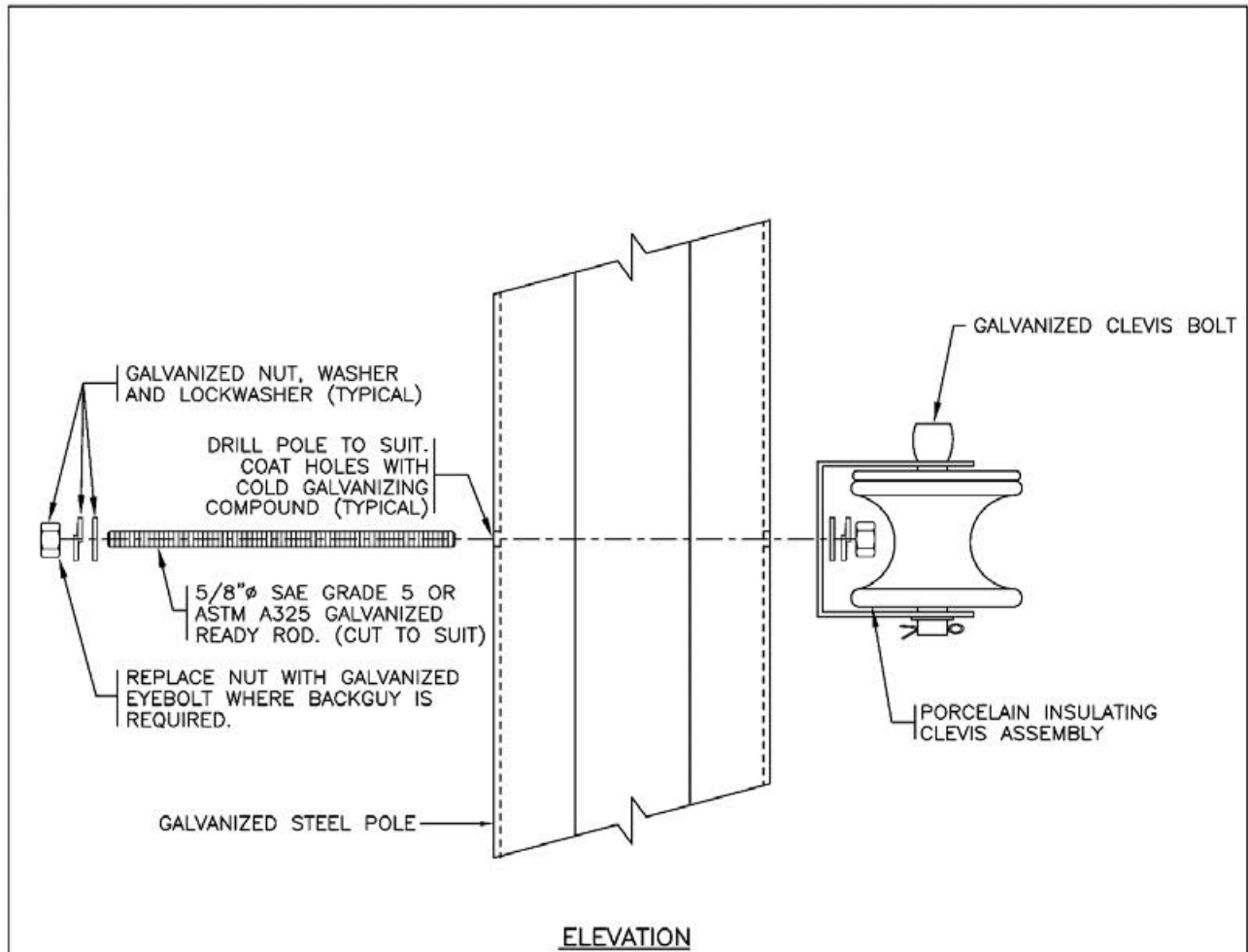
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. WHERE PLATE CAN NOT BE INSTALLED UNDER THE BASE IT SHALL BE INSTALLED AT A MINIMUM DEPTH OF 600mm BELOW FINISHED GRADE, BESIDE THE BASE



NOT TO SCALE

No.	Revision	Date	GROUND PLATE INSTALLATION DETAIL		SPECIFICATION DRAWING No. SP635-2.4.18
F			Date	Approved	
E	GENERAL REVISION	APR 20	05/02/16	D.N. (Signature on File)	
D	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 2.4.14	FEB 16	Chief Highway Engineer		
C	GROUND PLATE REVISED	OCT 03			
B	OPTION D ADDED	AUG 96			
A	GENERAL REVISION	OCT 95			





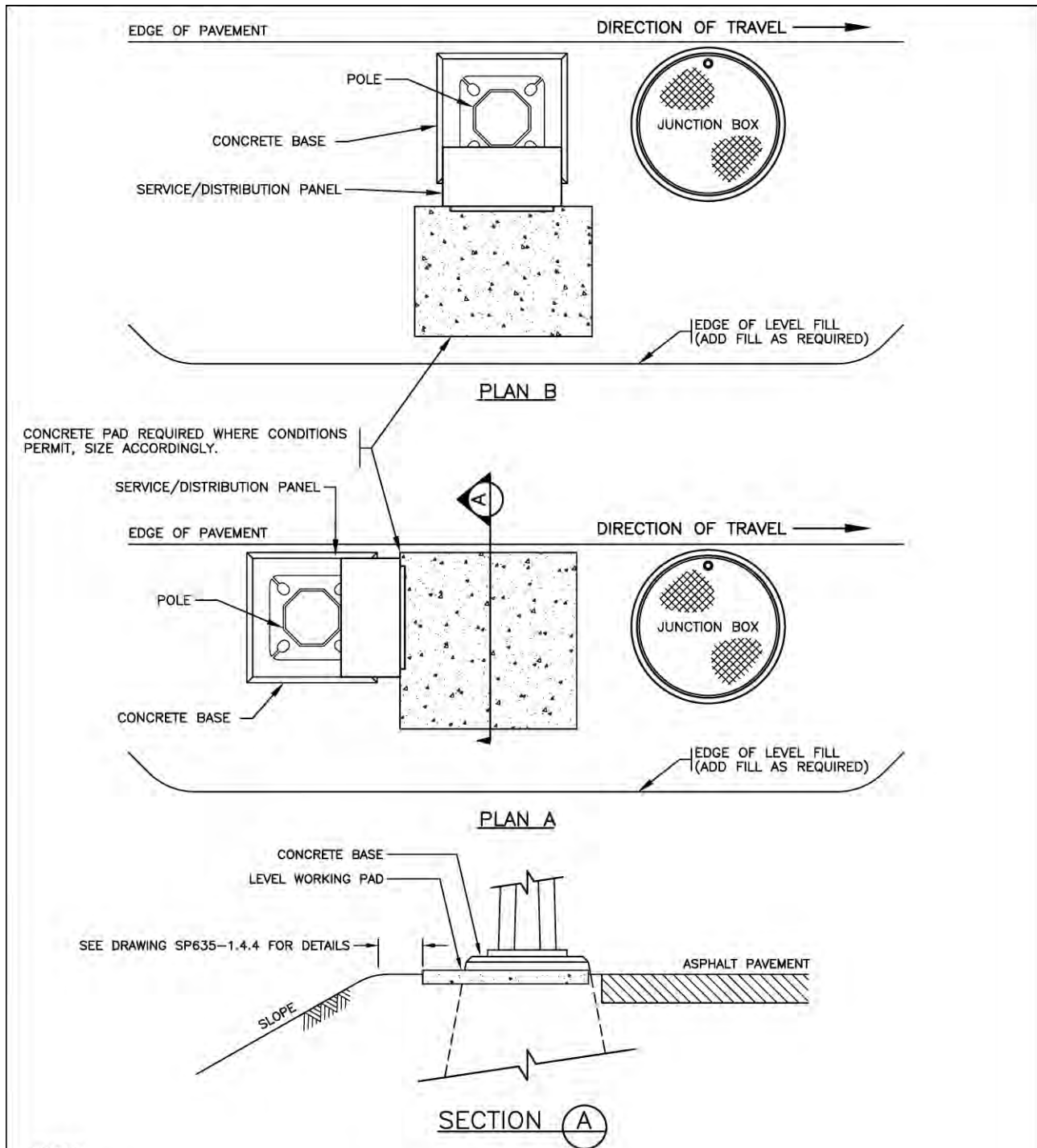
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.

NOT TO SCALE



No.	Revision	Date	INSULATING CLEVIS INSTALLATION DETAILS		
F			Date	Approved	SPECIFICATION DRAWING No. <b>SP635-2.4.19</b>
E			<b>05/02/16</b>	<b>D.N. (Signature on File)</b>	
D				Chief Highway Engineer	
C					
B	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 2.4.15	FEB 16			
A	GENERAL REVISIONS	AUG 94			



**NOTES**

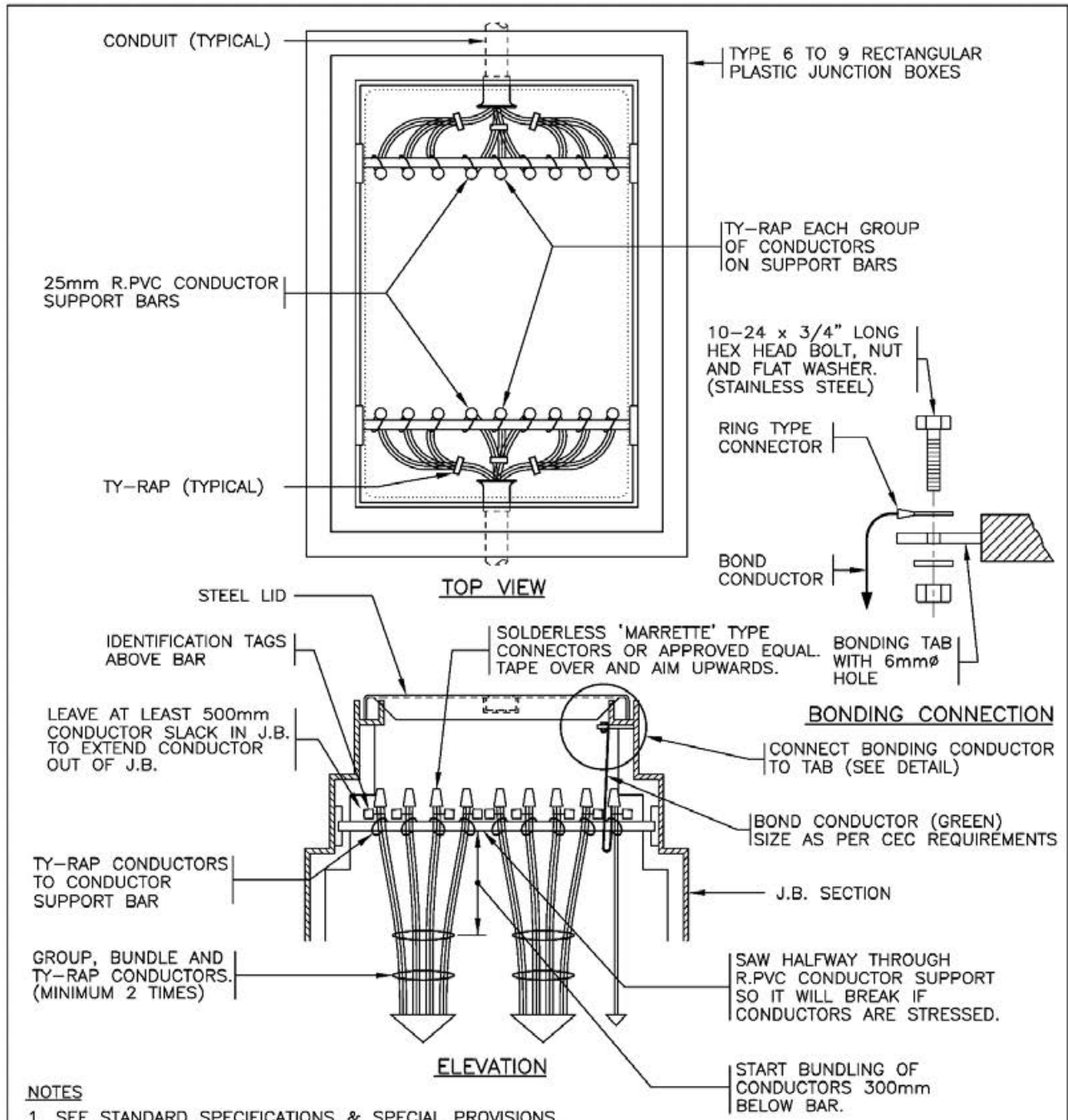
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



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No.	Revision	Date	SERVICE PANEL WORKING PAD DETAIL		SPECIFICATION DRAWING No.
F	GENERAL REVISION	APR 20	Date	Approved	SP635-2.4.20
E	JUNCTION BOX MOVED TO DOWNSTREAM SIDE	APR 16	05/02/16	D.N. (Signature on File) Chief Highway Engineer	
D	NEW DRAWING NUMBER - PREVIOUSLY NUMBERED 2.4.16	FEB 16			
C	JUNCTION BOX LOCATION REVISED	FEB 12			
B	PLAN B ADDED	MAR 11			
A	ORIENTATION REVISED	SEPT 00			



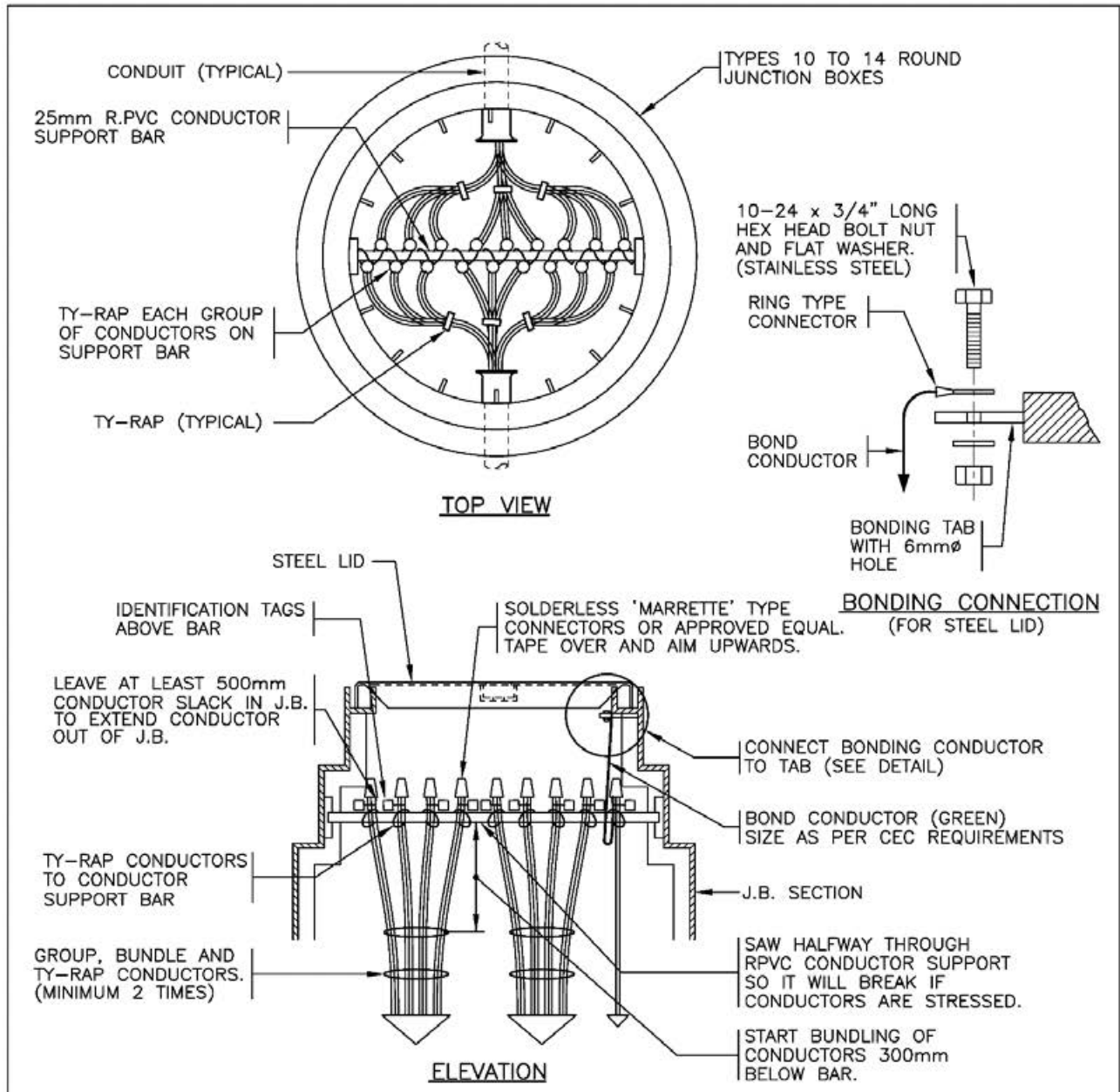
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. GROUP, BUNDLE & LABEL ALL CONDUCTORS SEPARATELY AS FOLLOWS:
  - DETECTOR LOOP CONDUCTORS
  - SIGNAL CONDUCTORS
  - LIGHTING & MISC. CONDUCTORS
3. IDENTIFICATION TAGS SHALL BE NEATLY MARKED WITH A BLACK INDELIBLE PEN.
4. SEE DRAWING SP635-2.5.7 FOR I.D. TAG TYPES AND DESIGNATIONS.

NOT TO SCALE



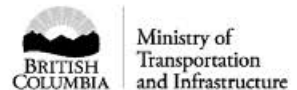
No.	Revision	Date	WIRING INSIDE TYPES 6 TO 9 RECTANGULAR PLASTIC JUNCTION BOXES		SPECIFICATION DRAWING No. SP635-2.5.1
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D	GENERAL REVISION	APR 20	Chief Highway Engineer		
C	No. 12 BOND REFERENCE REMOVED	JAN 19			
B	GENERAL REVISIONS	APR 17			
A	GENERAL REVISIONS	AUG 94			



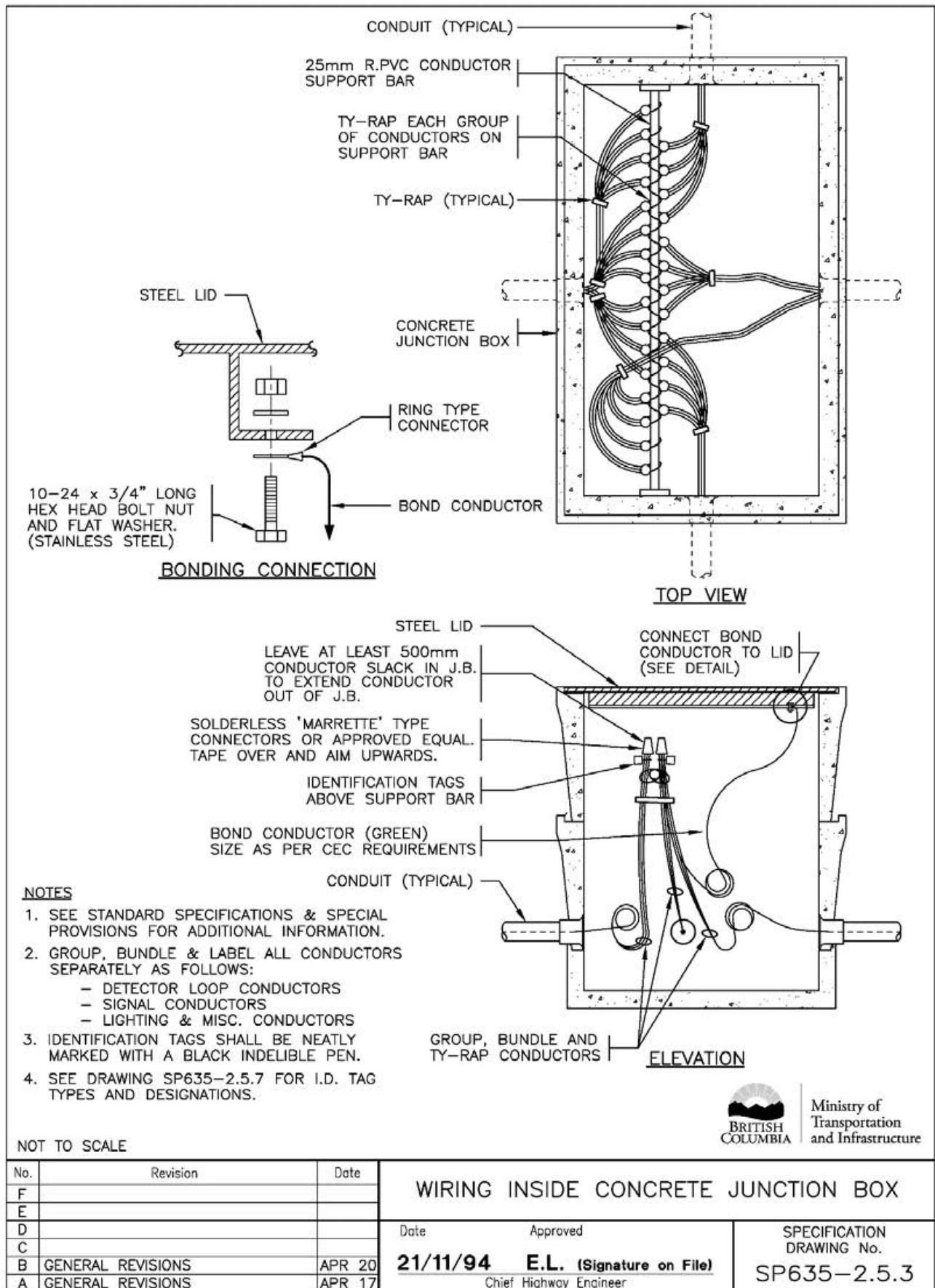
**NOTES**

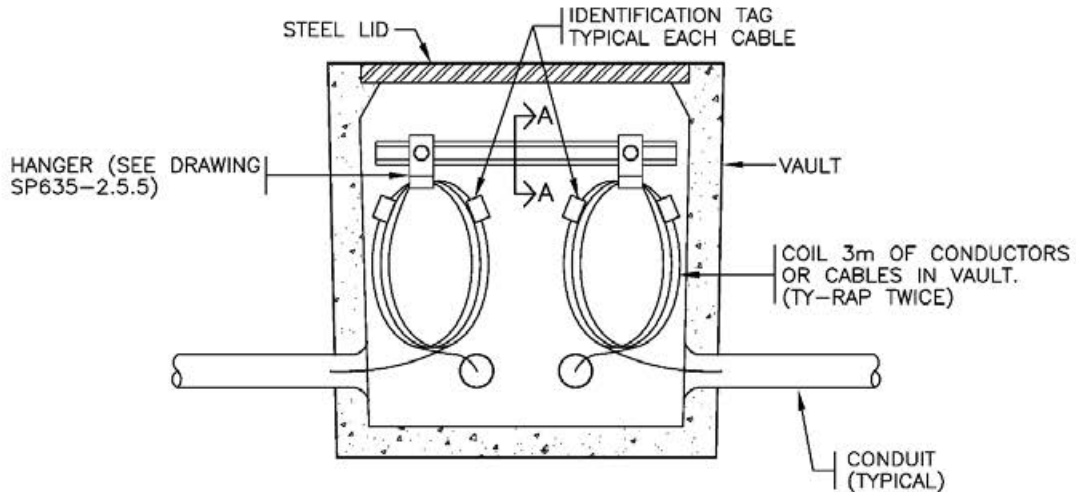
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. GROUP, BUNDLE AND LABEL ALL CONDUCTORS SEPARATELY AS FOLLOWS:
  - DETECTOR LOOP CONDUCTORS
  - SIGNAL CONDUCTORS
  - LIGHTING & MISC. CONDUCTORS
3. IDENTIFICATION TAGS SHALL BE NEATLY MARKED WITH A BLACK INDELIBLE PEN.
4. SEE DRAWING SP635-2.5.7 FOR I.D. TAG TYPES AND DESIGNATIONS.

NOT TO SCALE

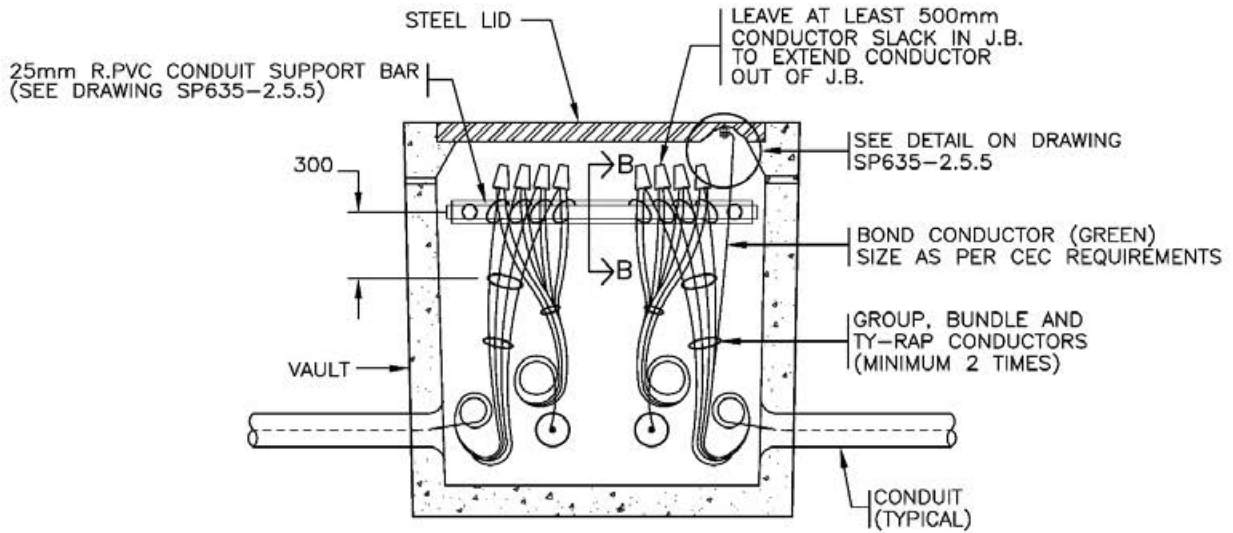


No.	Revision	Date	WIRING INSIDE TYPES 10 TO 14 ROUND PLASTIC JUNCTION BOXES		SPECIFICATION DRAWING No. SP635-2.5.2
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISIONS	APR 20			
B	GENERAL REVISIONS	APR 17			
A	GENERAL REVISIONS	AUG 94			





**DETAIL OF CONDUCTORS OR CABLES THROUGH VAULTS**  
(TYPICAL 2 SIDES OF VAULT)



**DETAIL OF CONDUCTOR SPLICES IN VAULTS**  
(TYPICAL 2 SIDES OF VAULT)

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-2.5.5 FOR ADDITIONAL NOTES AND DETAILS.
3. GROUP & BUNDLE ALL CONDUCTORS SEPARATELY AS FOLLOWS:
  - DETECTOR LOOP CONDUCTORS
  - SIGNAL CONDUCTORS
  - LIGHTING & MISC. CONDUCTORS
4. IDENTIFICATION TAGS SHALL BE NEATLY MARKED WITH A BLACK INDELIBLE PEN.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
6. SEE DRAWING SP635-2.5.7 FOR I.D. TAG TYPES AND DESIGNATIONS.

NOT TO SCALE



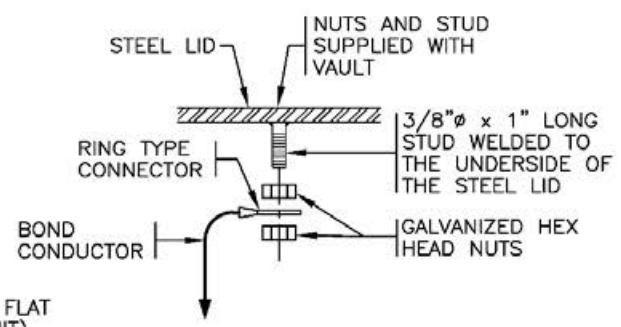
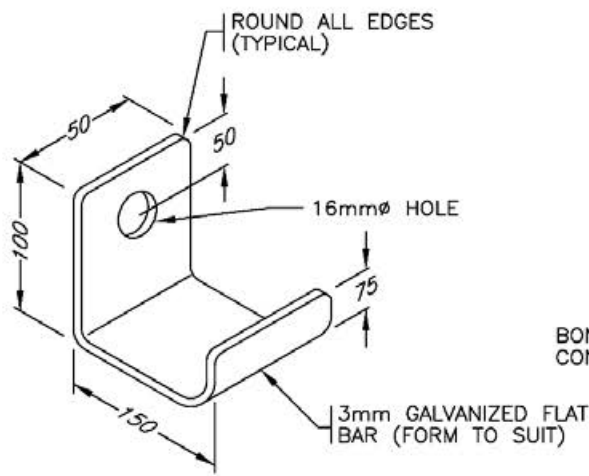
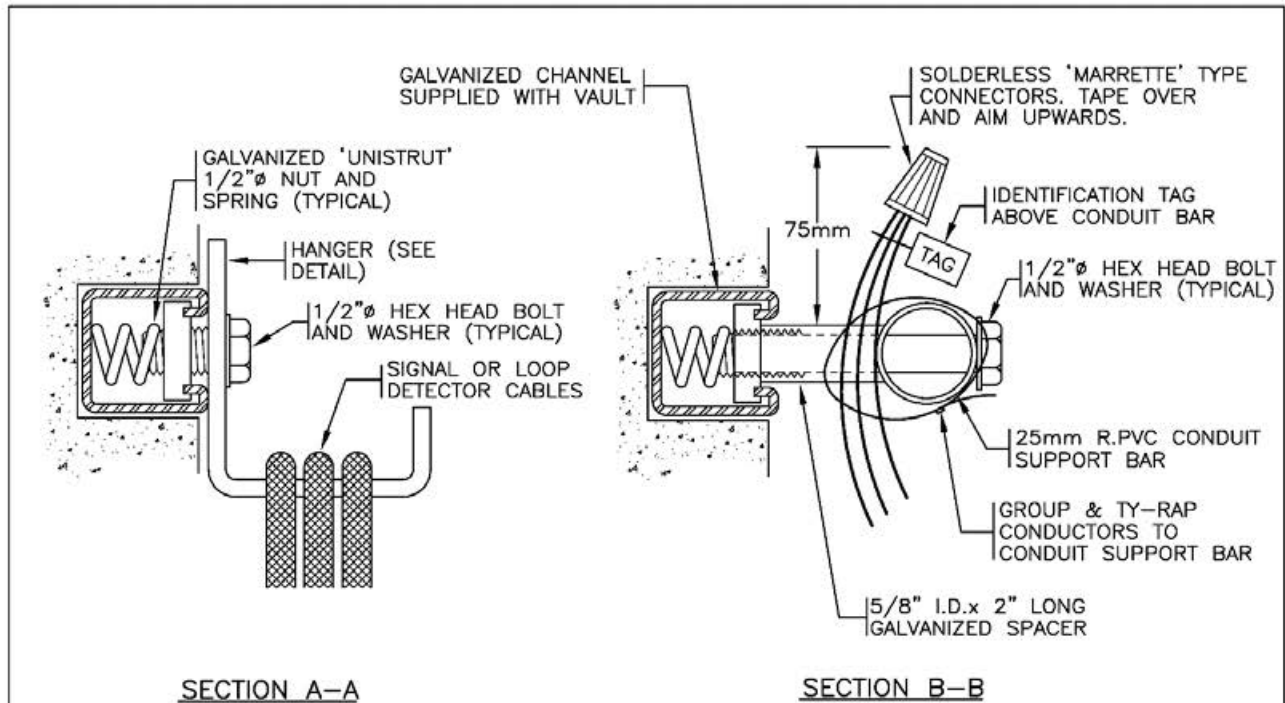
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No.	Revision	Date
F		
E		
D		
C	GENERAL REVISIONS	APR 20
B	GENERAL REVISIONS	APR 17
A	GENERAL REVISIONS	AUG 94

**WIRING INSIDE CONCRETE VAULTS**

Date: 30/09/93  
Approved: E.L. (Signature on File)  
Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-2.5.4

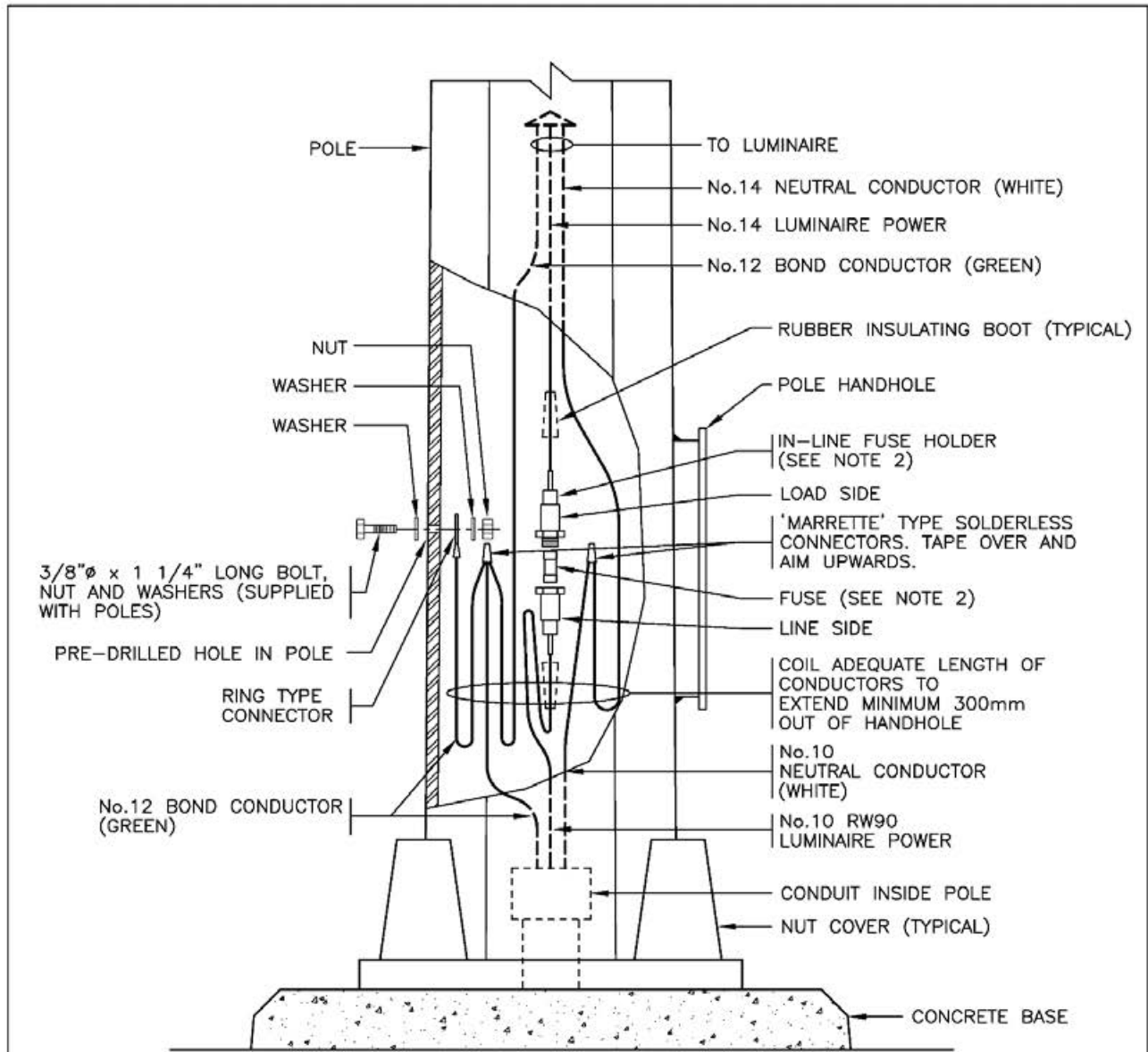


- NOTES**
1. SEE DRAWING SP635-2.5.4 FOR ADDITIONAL NOTES & DETAILS.
  2. ALL BOLTS & WASHERS SHALL BE GALVANIZED.

NOT TO SCALE



No.	Revision	Date	WIRING INSIDE CONCRETE VAULTS		SPECIFICATION DRAWING No. SP635-2.5.5
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D			Chief Highway Engineer		
C					
B	GENERAL REVISIONS	APR 17			
A	GENERAL REVISIONS	AUG 94			



ELEVATION

NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. IN-LINE FUSE HOLDER SHALL BE A TRON HEB-AA WEATHERPROOF FUSE HOLDER OR A GOULD SHAWMUT GEB-11-11 C/W 5A GOULD SHAWMUT ATM OR BUSS KTK FUSE (347V) OR A 10A GOULD SHAWMUT OTM OR BUSS BAN-10 FUSE (120V) AND 2 'L' TYPE INSULATING BOOTS.
3. FUSE INSTALLATION IN JUNCTION BOXES SIMILAR.



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NOT TO SCALE

No.	Revision	Date	LUMINAIRE WIRING IN POLE HANDHOLE		SPECIFICATION DRAWING No. SP635-2.5.6
F			Date	Approved	
E	GENERAL REVISIONS	APR 20	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	GENERAL REVISIONS	APR 17			
C	FUSEHOLDER TYPE REVISED	AUG 99			
B	NOTES REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



I.D. TAG DESIGNATIONS		CONDUCTOR COLOUR CODING			
ADV. WARN. FLASH. No.X	ADVANCE WARNING FLASHERS	No. 1	No. 2	No. 3	No. 4
		YELLOW	YELLOW (RD TT)	YELLOW (OR TT)	YELLOW (BL TT)
		BROWN	BROWN	BROWN	BROWN
FLASH. BEACON	FLASHING BEACON	FLASHER CONTROL TO BASE OF POLE : BLACK		BASE OF POLE TO SIGNAL HEADS : RED YELLOW	
ISLAND FLASH.	ISLAND FLASHER	ORANGE			
CONT. PWR.	CONTROLLER POWER	BLACK			
RAIL. PRE-EMPT.	RAILWAY PRE-EMPTION	2C No. 18 SHIELDED CABLE WHITE/BLACK		* SEE NOTE 3	
EMERG. PRE-EMPT. No.X	EMERG. PRE-EMPTION	2C No. 18 SHIELDED CABLE WHITE/BLACK		* SEE NOTE 3	
TEL	TELEPHONE	2C No. 18 SHIELDED CABLE WHITE/BLACK		* SEE NOTE 3	
LOOP No.X	DETECTOR LOOPS	2C No. 18 SHIELDED CABLE WHITE/BLACK		* SEE NOTE 3	
EMERG. IND. LIGHTS	EMERG. INDICATION LIGHTS	BLUE LIGHT	RED (WHITE TT)		
		WHITE LIGHT	RED		
LUM. CCTS. (A, B, ETC.)	LUMINAIRE CIRCUITS	1ø CIRCUITS	A and C	RED	
			B and D	BLACK	
		3ø CIRCUITS	A,D and G	RED	
			B,E and H	BLACK	
P.E.C.	PHOTOELECTRIC CELL	SWITCH LEG	RED		
		POWER	BLACK		
—	NEUTRAL	WHITE			
—	GROUND	GREEN			

**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- TT DENOTES TAPE TRACER (WH - WHITE, BL - BLUE, OR - ORANGE, RD - RED, BR - BROWN)
- EACH SHIELDED CABLE SHALL BE IDENTIFIED AT BOTH ENDS. IDENTIFICATION SHALL BE MADE USING TY-RAP IDENTIFICATION TAGS (T&B TY5532 OR APPROVED ALTERNATE) WITH THE LOOP NUMBER OR PRE-EMPTION AND PHASE TYPE CLEARLY MARKED USING A BLACK INDELIBLE MARKING PEN.
- SEE DRAWING SP635-2.8.6 FOR DETECTOR LOOP CONDUCTOR COLOUR CODING.
- SEE DRAWING SP635-2.5.8 FOR TRAFFIC SIGNAL COLOUR CODING.
- CONDUCTORS SHALL BE IDENTIFIED IN ALL J.B'S, TRAFFIC CONTROLLERS AND ALL ACCESS POINTS. IDENTIFICATION SHALL BE MADE USING TY-RAP IDENTIFICATION TAGS (T&B TY5532 OR APPROVED ALTERNATE) INDICATING SIGNAL PHASES OR PEDESTRIAN PHASES AS NOTED ON DRAWING SP635-2.5.8. TAGS SHALL BE CLEARLY MARKED WITH A BLACK INDELIBLE PEN.
- 'X' DENOTES ASSIGNMENT NUMBERS FOR ADVANCED WARNING FLASHERS, FIRE PRE-EMPTIONS, OR LOOPS.




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No.	Revision	Date	SINGLE CONDUCTOR COLOUR CODING	
F				
E			Date Approved	
D				
C	GENERAL REVISIONS	APR 20	30/09/93	E.L. (Signature on File)
B	GENERAL REVISIONS	APR 17		
A	GENERAL REVISIONS	AUG 94		
			SPECIFICATION DRAWING No. SP635-2.5.7	

CONDUCTOR COLOUR CODING					
TRAFFIC SIGNAL HEAD	SIGNAL SECTION	1	2	3 or x	4 or y
A	RED	RED	RED	RED (BL TT)	RED (BL TT)
	YELLOW	YELLOW	YELLOW (RD TT)	YELLOW	YELLOW (RD TT)
	GREEN	BLUE	BLUE	BLUE	BLUE
	YELLOW ARROW	ORANGE (WH TT)	ORANGE (WH TT)	ORANGE (WH TT)	ORANGE (WH TT)
	GREEN ARROW	BLUE (WH TT)	BLUE (WH TT)	BLUE (WH TT)	BLUE (WH TT)
B	RED	RED	RED	RED (BL TT)	RED (BL TT)
	YELLOW	BROWN	BROWN (OR TT)	BROWN	BROWN (OR TT)
	GREEN	BLUE	BLUE	BLUE	BLUE
	YELLOW ARROW	ORANGE (WH TT)	ORANGE (WH TT)	ORANGE (WH TT)	ORANGE (WH TT)
	GREEN ARROW	BLUE (WH TT)	BLUE (WH TT)	BLUE (WH TT)	BLUE (WH TT)
C	RED	RED	RED	RED (BL TT)	RED (BL TT)
	YELLOW	ORANGE	ORANGE (BL TT)	ORANGE	ORANGE (BL TT)
	GREEN	BLUE	BLUE	BLUE	BLUE
	YELLOW ARROW	ORANGE (WH TT)	ORANGE (WH TT)	ORANGE (WH TT)	ORANGE (WH TT)
	GREEN ARROW	BLUE (WH TT)	BLUE (WH TT)	BLUE (WH TT)	BLUE (WH TT)
D	RED	RED			
	YELLOW	ORANGE (RD TT)			
	GREEN	BLUE			
	YELLOW ARROW	ORANGE (WH TT)			
	GREEN ARROW	BLUE (WH TT)			
PA	DON'T WALK	YELLOW	YELLOW (RD TT)	YELLOW (OR TT)	YELLOW (BL TT)
	WALK	BLUE	BLUE	BLUE	BLUE
	PEDESTRIAN PUSHBUTTON	PURPLE (Y TT)	PURPLE (RD TT)	PURPLE (OR TT)	PURPLE (BL TT)
		PURPLE (Y TT)	PURPLE (RD TT)	PURPLE (OR TT)	PURPLE (BL TT)
PB	DON'T WALK	BROWN	BROWN (OR TT)	BROWN (RD TT)	BROWN (BL TT)
	WALK	BLUE	BLUE	BLUE	BLUE
	PEDESTRIAN PUSHBUTTON	PURPLE (BR TT)	PURPLE (OR TT)	PURPLE (RD TT)	PURPLE (BL TT)
		PURPLE (BR TT)	PURPLE (OR TT)	PURPLE (RD TT)	PURPLE (BL TT)
PC	DON'T WALK	ORANGE	ORANGE (BL TT)		
	WALK	BLUE	BLUE		
	PEDESTRIAN PUSHBUTTON	PURPLE (OR TT)	PURPLE (BL TT)		
		PURPLE (OR TT)	PURPLE (BL TT)		
PD	DON'T WALK	RED (BL TT)			
	WALK	BLUE			
	PEDESTRIAN PUSHBUTTON	PURPLE			
		PURPLE			
FS	RED	RED			
	YELLOW	YELLOW			

TT - DENOTES TRACER TAPE  
 WH - WHITE  
 BL - BLUE  
 OR - ORANGE  
 RD - RED  
 BR - BROWN

**NOTES:**  
 1. SEE DRAWING SP635-2.5.7 FOR NOTES AND ADDITIONAL COLOUR CODING.



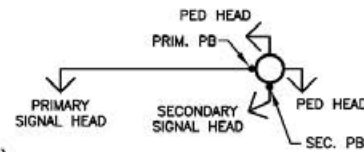
Ministry of Transportation and Infrastructure

'FS' INDICATES 'FIRE SIGNAL' HEAD

No.	Revision	Date	<b>SINGLE CONDUCTOR COLOUR CODING</b>		
F			Date                      Approved <b>30/09/93</b> <b>E.L. (Signature on File)</b> Chief Highway Engineer		
E					
D			SPECIFICATION DRAWING No. <b>SP635-2.5.8</b>		
C					
B	GENERAL REVISIONS	APR 17			
A	GENERAL REVISIONS	AUG 94			

COLOUR CODING (MULTICONDUCTOR SIGNAL CABLE)					
19, 21 OR 25 CONDUCTOR No. 14 (41 STRAND) CSA SPEC. C22.2 No. 210					
CONDUCTOR No.	SIGNAL ASSIGNMENT	LETTERING	CONDUCTOR COLOUR	ALTERNATE COLOUR CODE	SINGLE CONDUCTOR COLOUR IN POLE
1	NEUTRAL	WHITE ONE	WHITE	WHITE	WHITE
2	PRIMARY PB RETURN	WHITE TWO	WHITE	BLACK, RED T.T.	PURPLE
3	PRIMARY PB	—	BLACK	BLACK, WHITE T.T.	PURPLE
4	SECONDARY PB	—	ORANGE	BLACK, ORANGE T.T.	PURPLE
5	PRIMARY RED	RED ONE	RED	RED	RED*
6	SECONDARY RED	RED TWO	RED	RED (BLACK T.T.)	RED*
7	SECONDARY PB RETURN	RED THREE	RED		PURPLE
8	PRIMARY PED DW	RED FOUR	RED	YELLOW, RED T.T.	YELLOW, BROWN, ORANGE OR RED(*)
9	SECONDARY PED DW	RED FIVE	RED	BROWN (ORANGE T.T.)	YELLOW, BROWN, ORANGE OR RED(*)
10	PRIMARY YELLOW	YELLOW ONE	YELLOW	YELLOW	YELLOW, BROWN OR ORANGE(*)
11	SECONDARY YELLOW	YELLOW TWO	YELLOW	BROWN (BLACK T.T.)	YELLOW, BROWN OR ORANGE(*)
12	PRIMARY LT YELLOW	YELLOW THREE	YELLOW	ORANGE, WHITE T.T.	ORANGE(*)
13	SECONDARY LT YELLOW	YELLOW FOUR	YELLOW	ORANGE, WHITE T.T.	ORANGE(*)
14	SECONDARY PED WALK	YELLOW FIVE	YELLOW	BLUE, ORANGE T.T.	BLUE(*)
15	PRIMARY GREEN	GREEN ONE	BLUE	BLUE	BLUE(*)
16	SECONDARY GREEN	GREEN TWO	BLUE	BLUE (BLACK T.T.)	BLUE(*)
17	PRIMARY LT GREEN	GREEN THREE	BLUE	BLUE (WHITE T.T.)	BLUE(*)
18	SECONDARY LT GREEN	GREEN FOUR	BLUE		BLUE(*)
19	PRIMARY PED WALK	GREEN FIVE	BLUE	BLUE, RED T.T.	BLUE(*)
20	PRIMARY LT RED	RED SIX	RED		RED (BLUE T.T.)
21	SECONDARY LT RED	RED SEVEN	RED		RED (BLUE T.T.)
22	SPARE/PRE-EMPT	AMBER SIX	YELLOW	YELLOW - GREEN T.T.	—
23	SPARE/PRE-EMPT	AMBER SEVEN	YELLOW	BLUE - GREEN T.T.	—
24	SPARE	GREEN SIX	BLUE	ORANGE	—
25	SPARE	GREEN SEVEN	BLUE	ORANGE/BLACK TRACE	—
	GROUND			GREEN	

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)



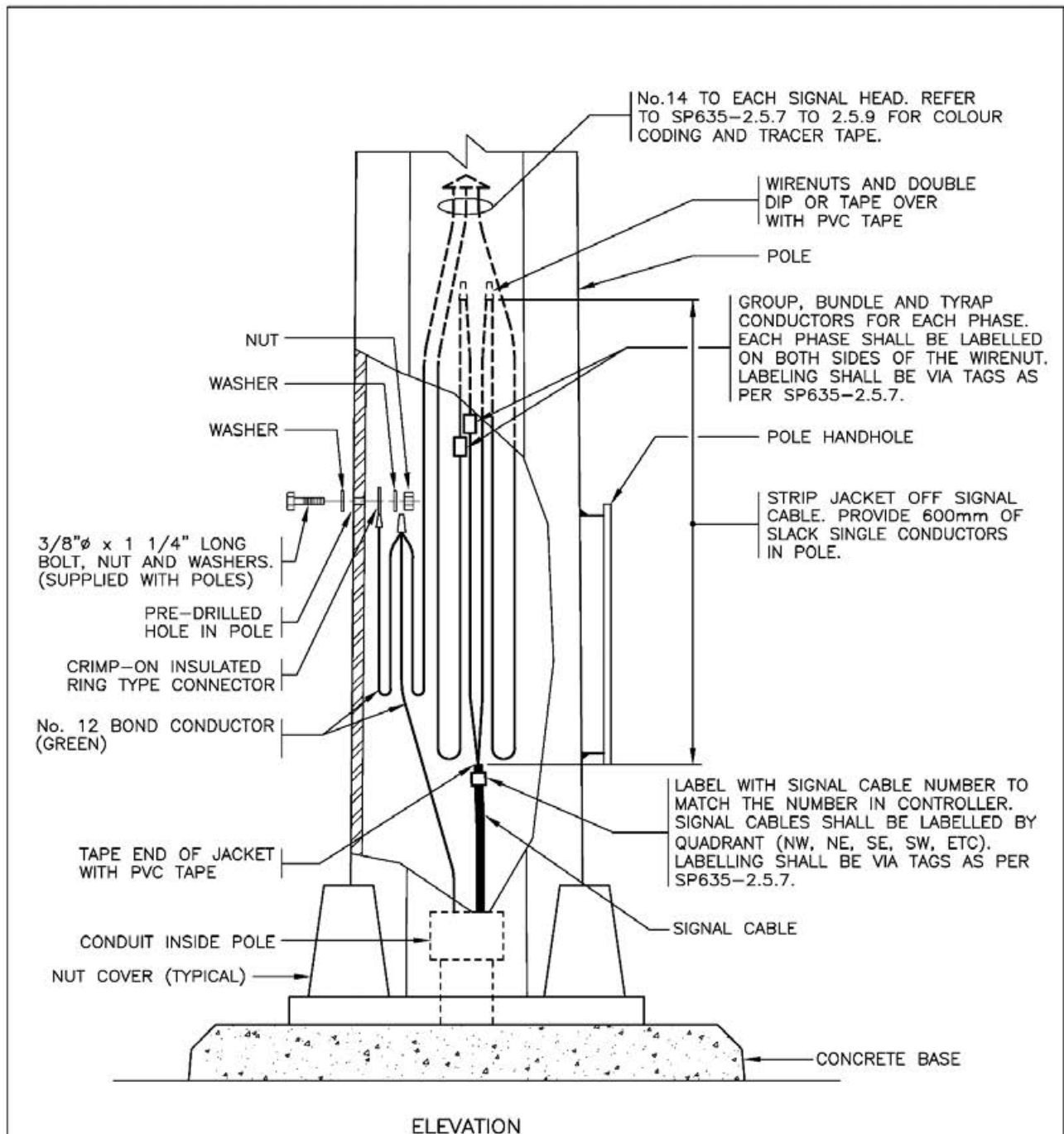
(\*) SEE NOTE 3

**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- COLOUR CODING AND TRACER TAPE INSIDE POLES SHALL BE IN ACCORDANCE WITH SP635-2.5.7 & 2.5.8.



No.	Revision	Date	SIGNAL CABLE WIRING & COLOUR CODING	
E				
D			Date	Approved
C			14/11/03	D.N. (Signature on File)
B	CSA SPEC UPDATE & 21C CABLE ADDED NOTE 2 REMOVED	APR 20	SPECIFICATION DRAWING No. SP635-2.5.9	
A	GENERAL REVISIONS	APR 17		

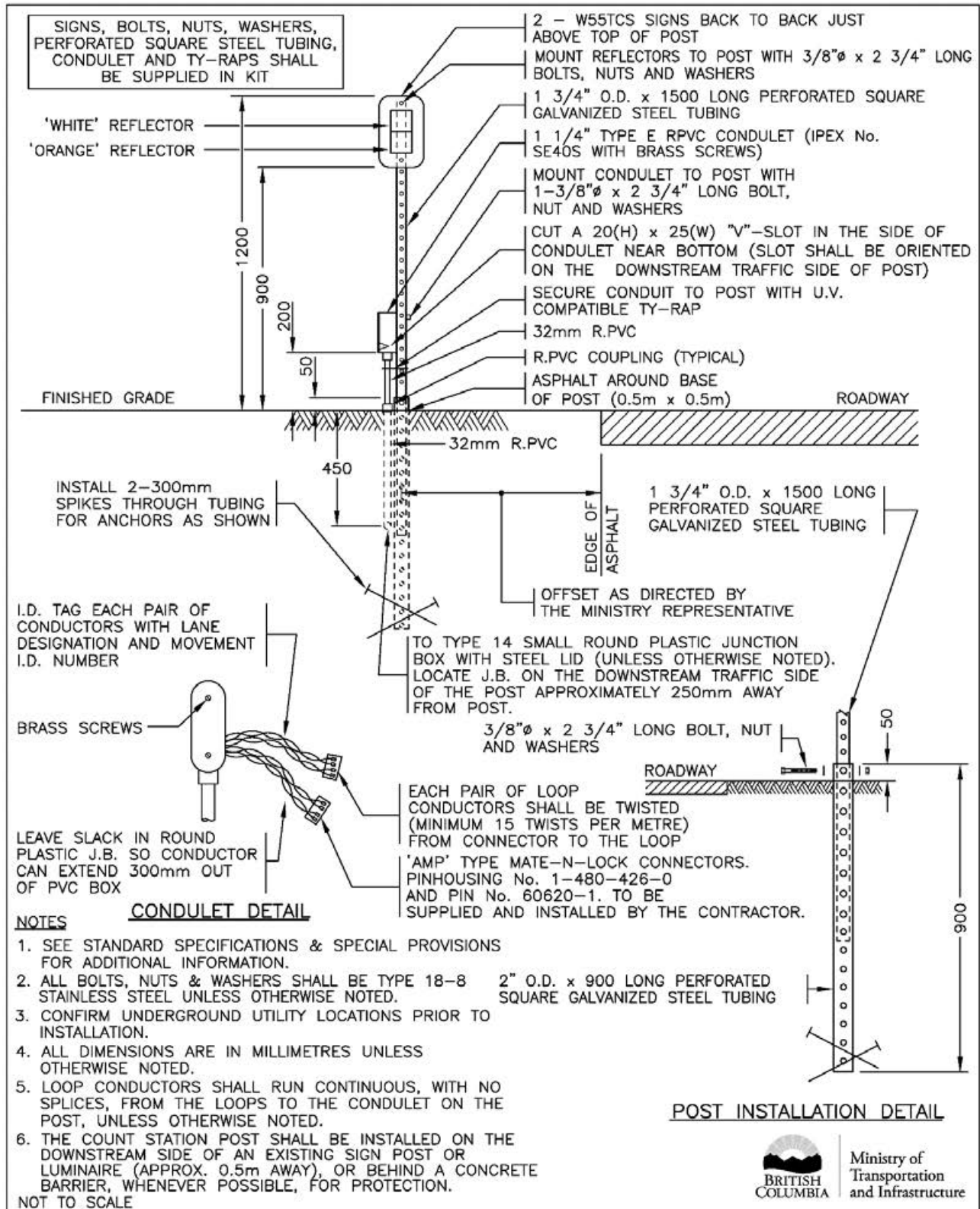


- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. REFER TO SP635-2.5.7 FOR CONDUCTOR LABELING.



NOT TO SCALE

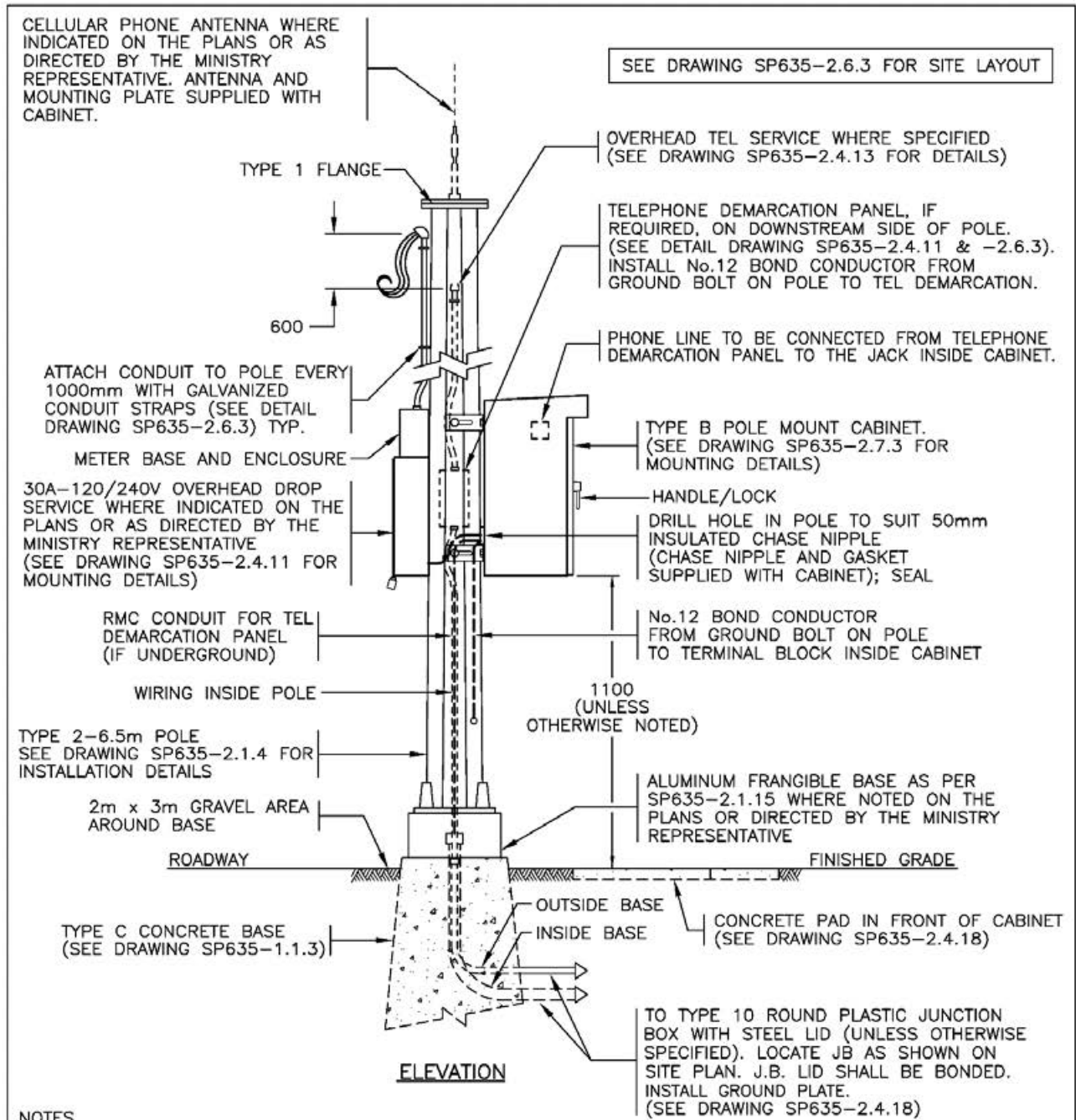
No.	Revision	Date	SIGNAL CABLE WIRING IN POLE HANDHOLE		SPECIFICATION DRAWING No. SP635-2.5.10
F			Date	Approved	
E			14/11/03	D.N. (Signature on File)	
D				Chief Engineer	
C					
B	GENERAL REVISIONS	APR 20			
A	GENERAL REVISIONS	APR 17			



No.	Revision	Date
I	GENERAL REVISIONS	APR 20
H	GENERAL REVISIONS	APR 17
G	COLD PATCH ADDED & UPPER SPIKES REMOVED	NOV 01
F	GENERAL REVISIONS	SEPT 00
E	NOTE 6 ADDED	AUG 99
D	KIT NOTE ADDED, NOTES REVISED	NOV 98

**SHORT COUNT STATION  
INSTALLATION DETAILS**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-2.6.1</b>



NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. CONTRACTOR TO CONFIRM ORIENTATION OF CABINET WITH THE MINISTRY REPRESENTATIVE PRIOR TO INSTALLATION.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. 2m OF LOOP WIRE AND/OR SHIELDED CABLE SHALL BE COILED IN THE CABINET FOR CONNECTIONS BY MINISTRY. TAG AND LABEL CABLES IN ACCORDANCE WITH DRAWING SP635-2.5.7. THE CABINET LOOP OPENING SHALL BE DUCT-SEALED ONCE WIRING IS PULLED THRU.

NOT TO SCALE

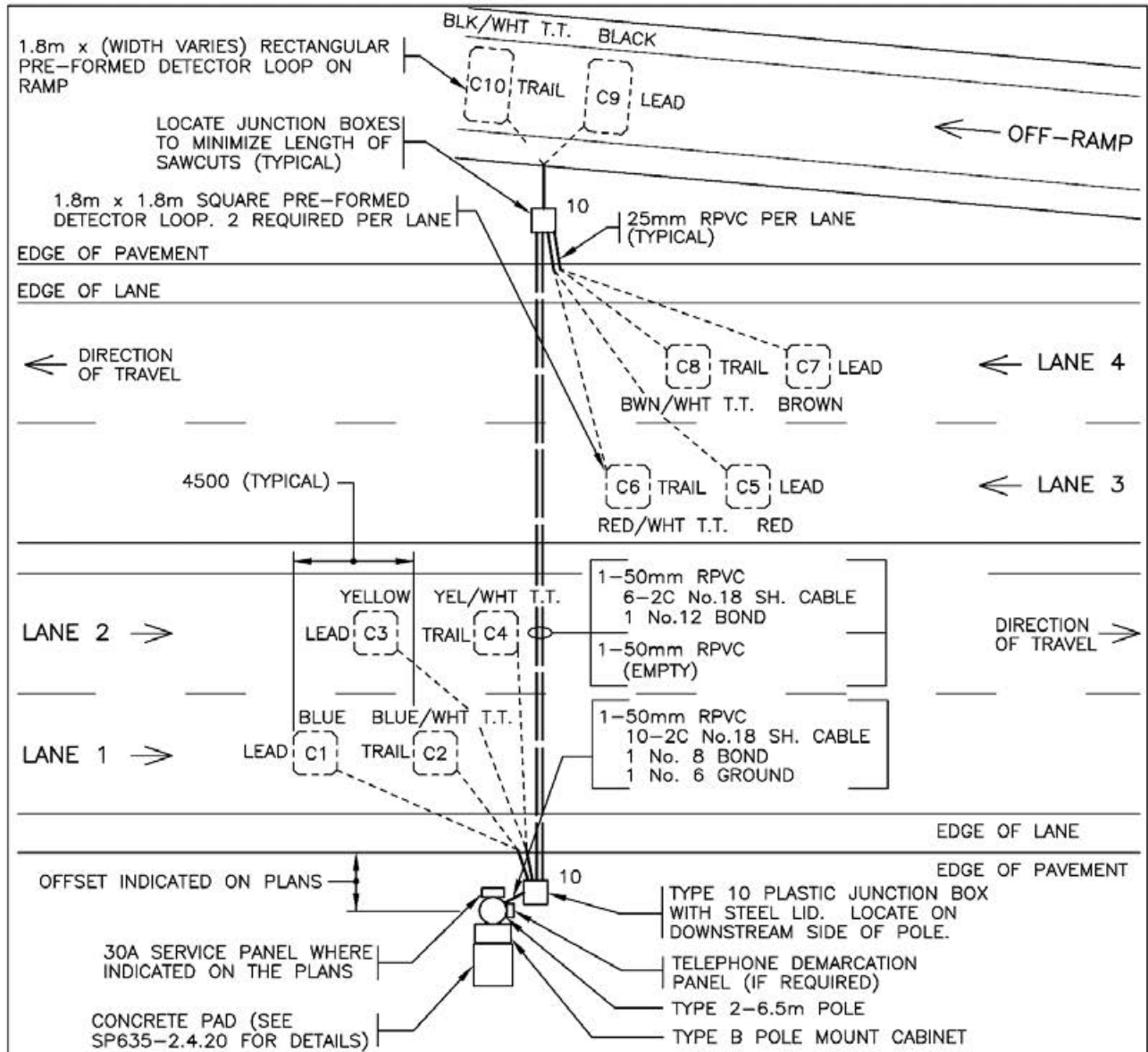


No.	Revision	Date
F	GENERAL REVISIONS	APR 20
E	GENERAL REVISIONS	APR 17
D	GENERAL REVISIONS	SEPT 00
C	TEL DEMARCATION PANEL RELOCATED	AUG 99
B	TEL DEMARCATION & CONCRETE PADS SHOWN	NOV 98
A	O/H TEL & POWER SERVICES ADDED	OCT 97

PERMANENT COUNT STATION  
INSTALLATION DETAILS

Date: 30/09/93  
Approved: E.L. (Signature on File)  
Chief Highway Engineer

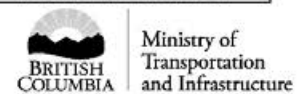
SPECIFICATION  
DRAWING No.  
SP635-2.6.2



NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. CONTRACTOR TO CONFIRM ORIENTATION OF CABINET AND SITE PLAN LAYOUT WITH THE MINISTRY REPRESENTATIVE PRIOR TO INSTALLATION.
3. 1-25mm RPVC LOOP CONDUIT REQUIRED PER LANE.
4. LOOPS SHALL BE NUMBERED SEQUENTIALLY FROM CABINET SIDE OUT.
5. LOOPS SHALL BE CUT 4500mm FROM LEADING EDGE OF THE LEADING LOOP TO THE LEADING EDGE OF THE TRAILING LOOP PER LANE.
6. LOCATE LOOPS IN CENTRE OF LANES UNLESS OTHERWISE NOTED ON THE PLANS.

SEE DRAWING SP635-2.6.2 FOR POLE ELEVATION

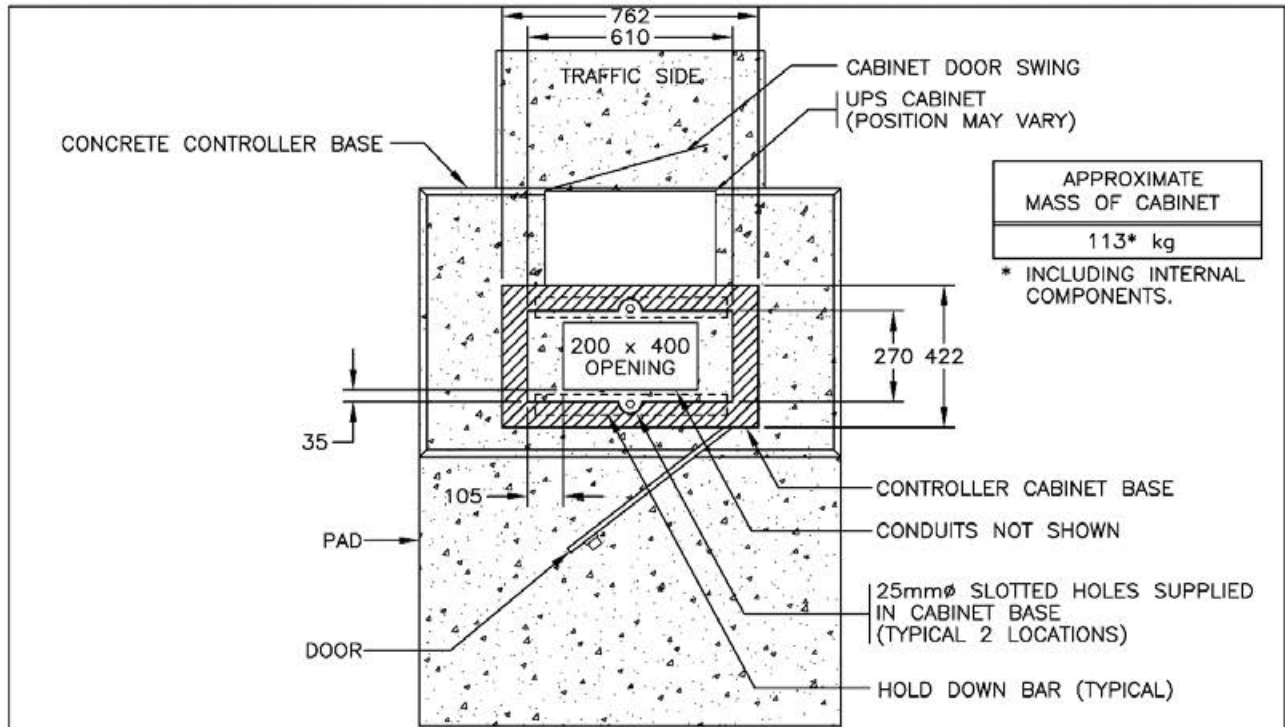


No.	Revision	Date
F	GENERAL REVISIONS	APR 20
E	GENERAL REVISIONS	APR 17
D	GRAVEL CHANGED TO CRUSH IN NOTE 9	NOV 01
C	CONDUIT CROSSING & NOTES REVISED	SEPT 00
B	LOOP LAYOUT REVISED	AUG 99
A	LOOP LAYOUT REVISED	NOV 98

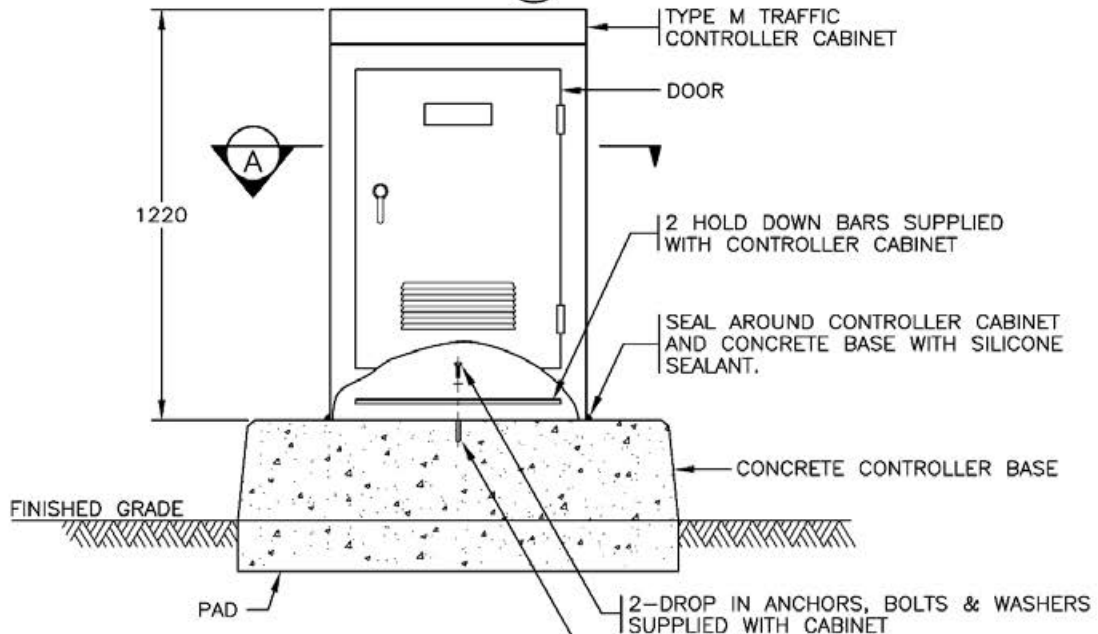
**SITE PLAN AND LOOP LAYOUT FOR PERMANENT COUNT STATIONS**

Date: 18/02/98      Approved: **D.M. (Signature on File)**  
 Chief Highway Engineer

SPECIFICATION DRAWING No. **SP635-2.6.3**



SECTION A



NOTES

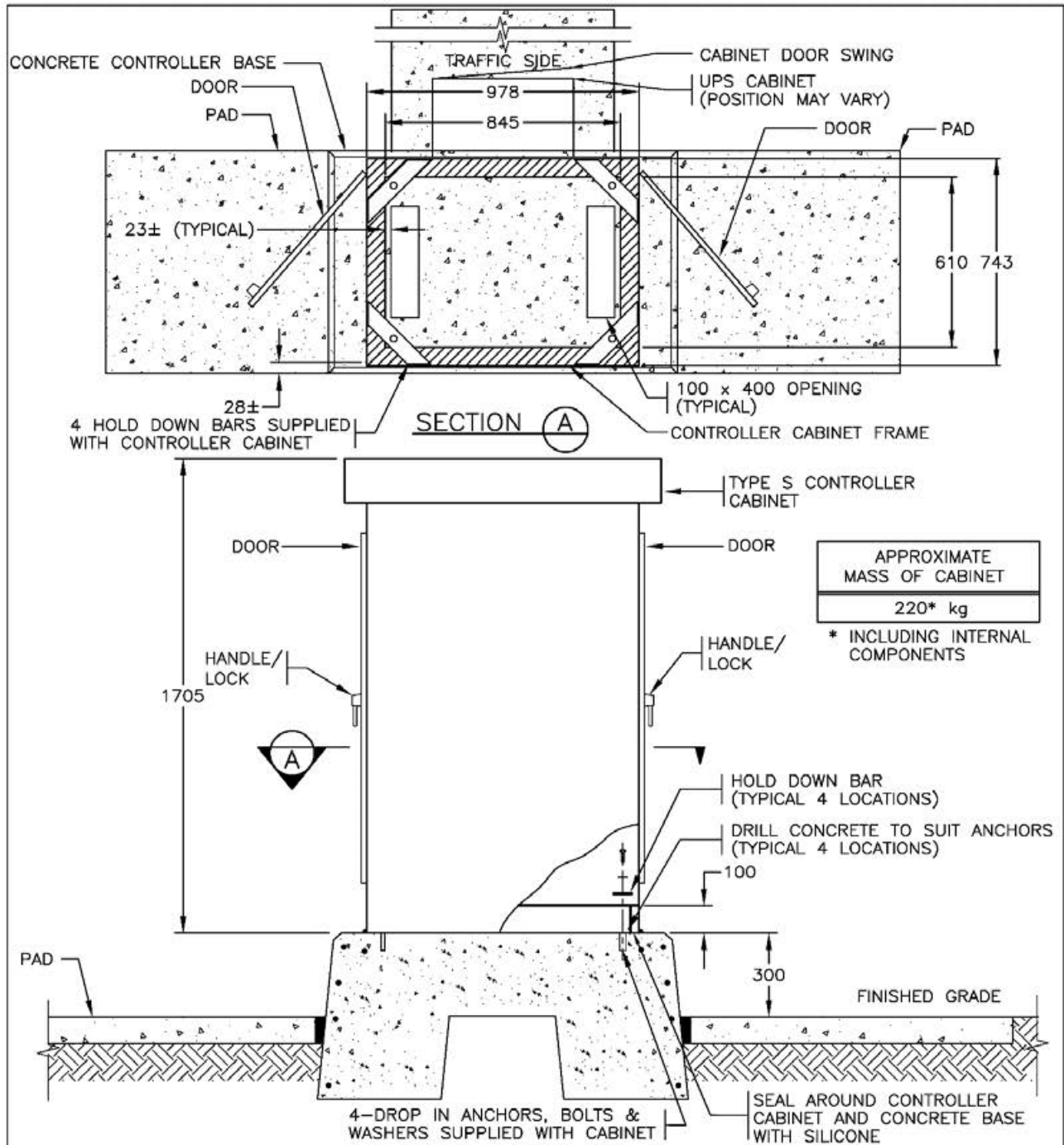
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-1.1.38 FOR BASE DIMENSIONS.
3. SEE DRAWING SP635-1.1.40 FOR BASE INSTALLATION DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED. NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	TYPE M CONTROLLER CABINET INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.7.1
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISIONS	APR 20			
B	GENERAL REVISIONS	APR 17			
A	GENERAL REVISIONS	AUG 94			





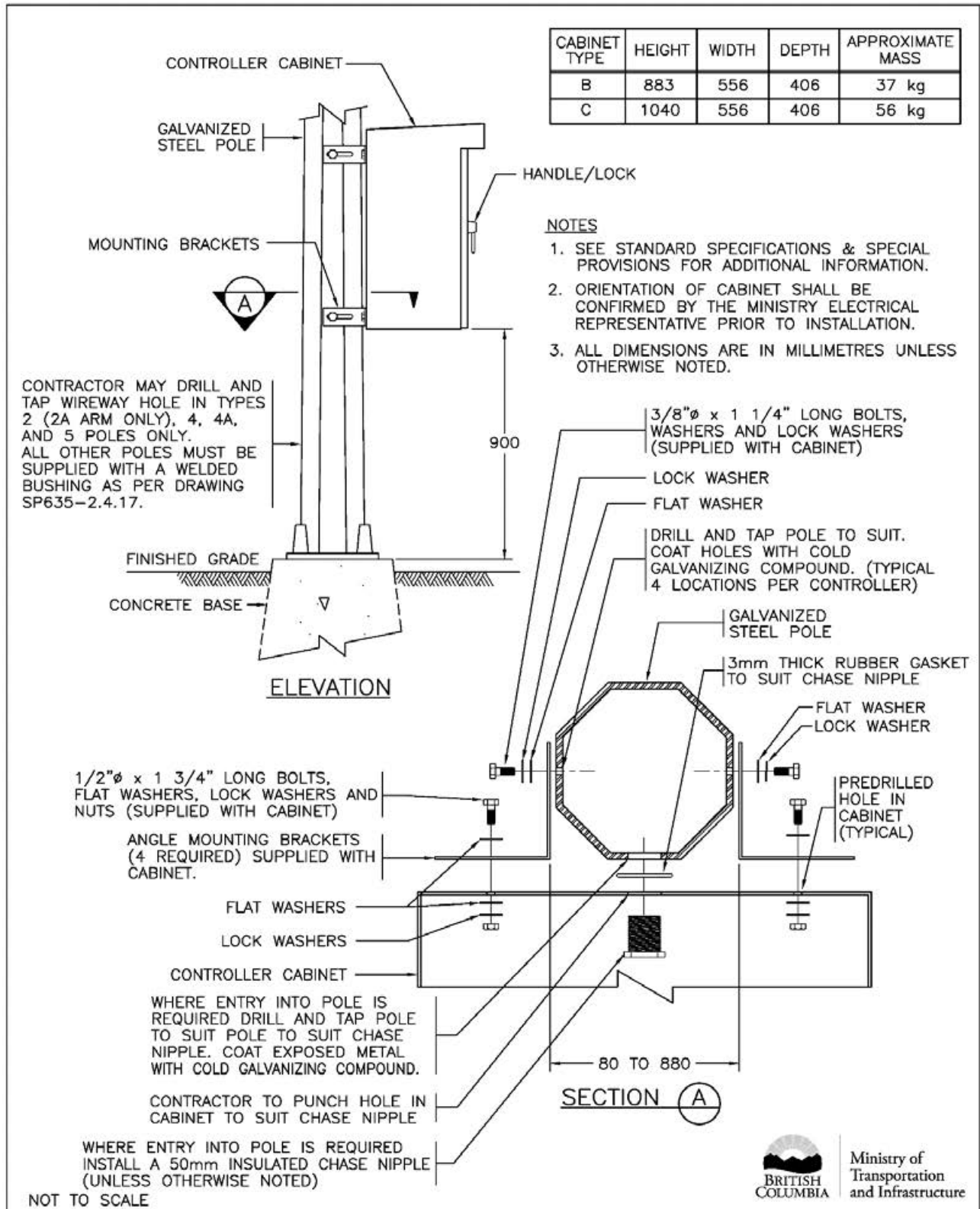
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-1.1.38 FOR BASE DIMENSIONS.
3. SEE DRAWING SP635-1.1.41 FOR BASE INSTALLATION DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

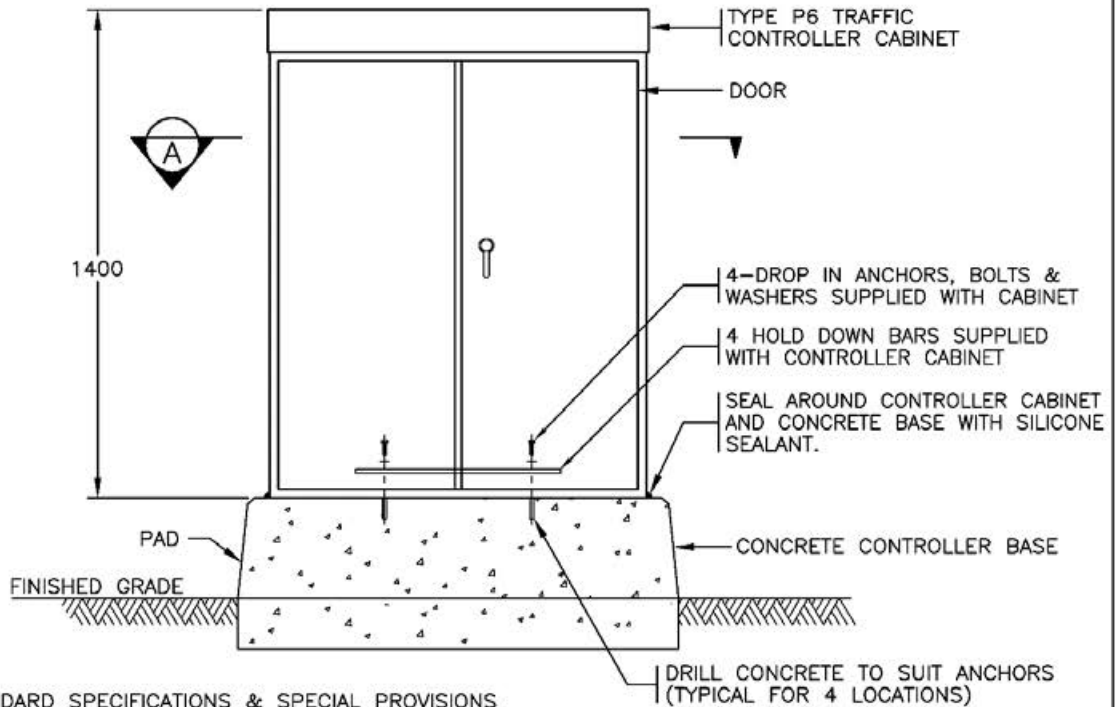
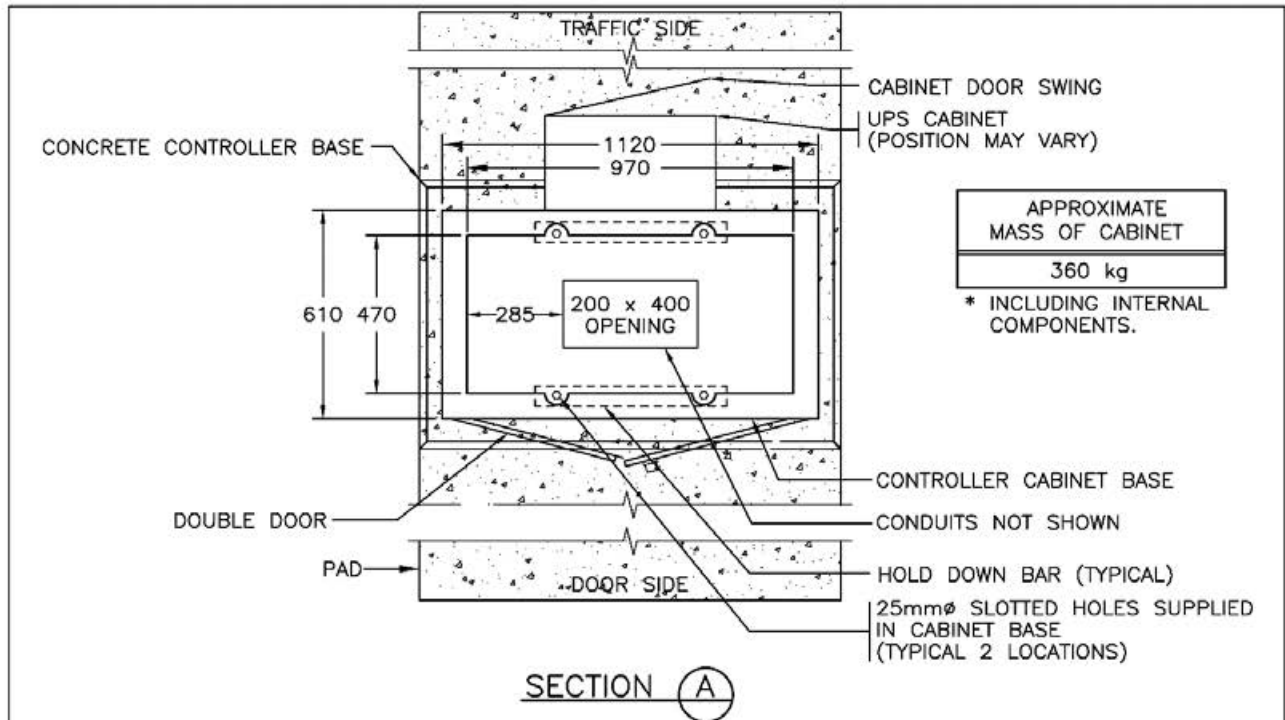
NOT TO SCALE



No.	Revision	Date	TYPE S CONTROLLER CABINET INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.7.2
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D				Chief Highway Engineer	
C	GENERAL REVISIONS	APR 20			
B	GENERAL REVISIONS	APR 17			
A	GENERAL REVISIONS	AUG 94			



No.	Revision	Date	TYPES B AND C CONTROLLER CABINET INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.7.3
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D	GENERAL REVISIONS	APR 17	Chief Highway Engineer		
C	TYPE G CABINET DELETED	OCT 03			
B	MOUNTING HEIGHT REVISED	OCT 97			
A	GENERAL REVISIONS	AUG 94			

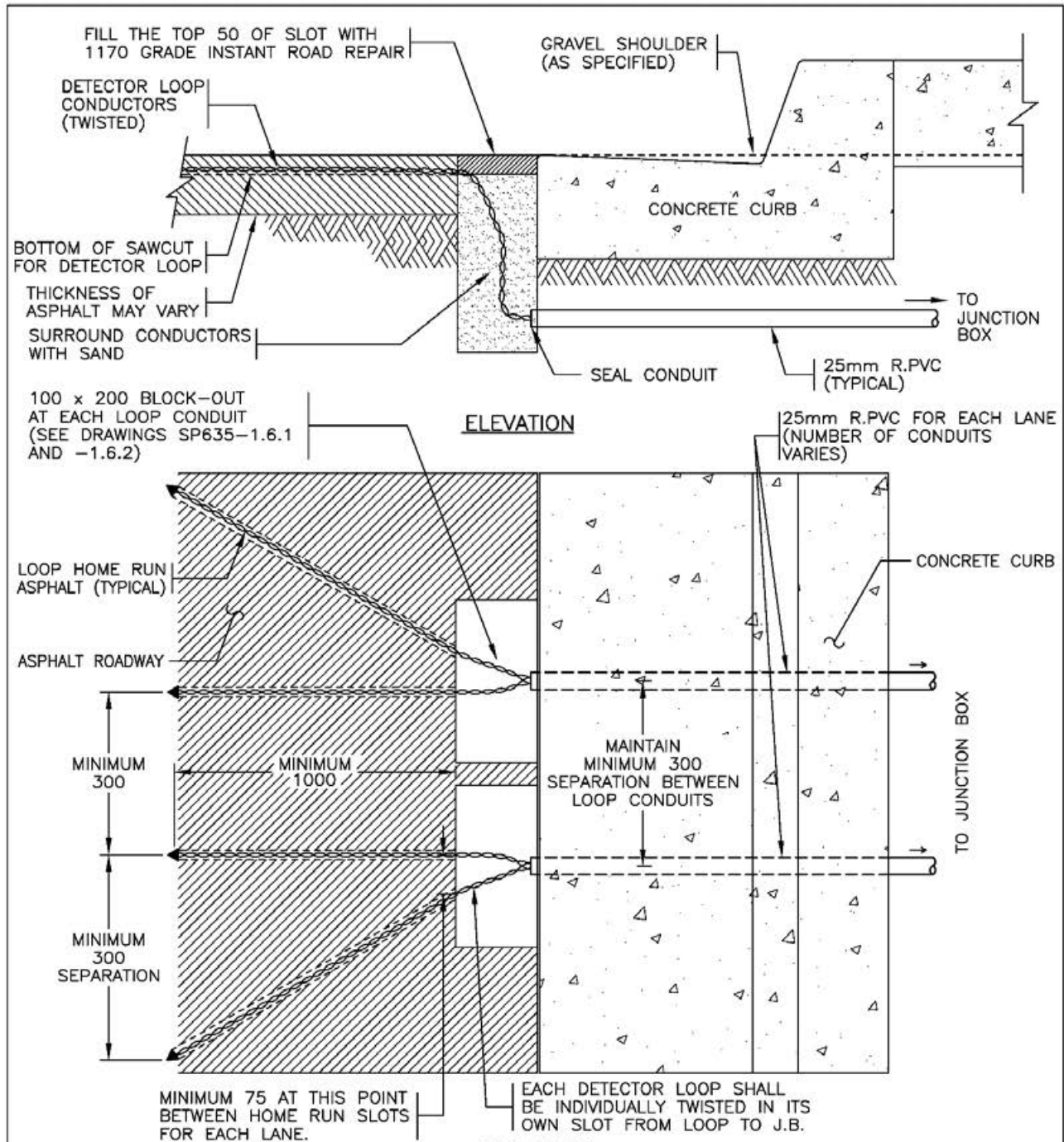


**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. SEE DRAWING SP635-1.1.38 FOR BASE DIMENSIONS.
  3. SEE DRAWING SP635-1.1.42 FOR BASE INSTALLATION DETAILS.
  4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
- NOT TO SCALE



No.	Revision	Date	TYPE P6 CONTROLLER CABINET INSTALLATION DETAILS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-2.7.4
E					
D					
C					
B					
A	GENERAL REVISIONS	APR 20		Chief Highway Engineer	



**NOTES**

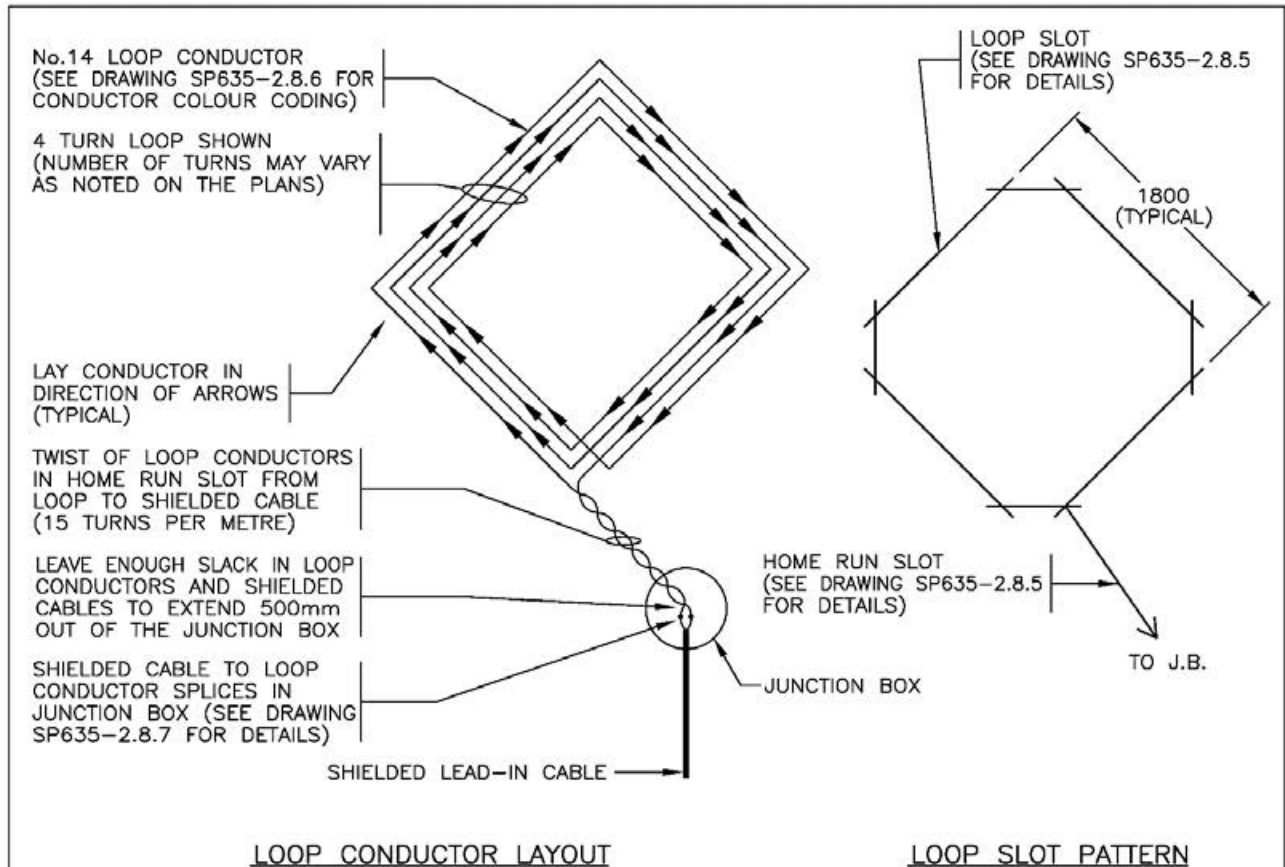
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-2.8.6 FOR LOOP COLOR CODING.
3. SEE DRAWING SP635-1.6.1 & 1.6.2 FOR LOOP CONDUIT INSTALLATION DETAILS.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	DETECTOR LOOP INSTALLATION DETAILS	
F				
E				
D	GENERAL REVISIONS	APR 20	Date	Approved
C	GENERAL REVISIONS	APR 17	15/11/95	M.C. (Signature on File)
B	REFERENCED DWG. No. REV'D (NOTE 2)	DEC 98		
A	SPELLING REVISION	AUG 96	Chief Highway Engineer	



TURNS	INDUCTANCE
4	120 $\mu\text{H}$
5	180 $\mu\text{H}$
6	252 $\mu\text{H}$
7	336 $\mu\text{H}$

LOOP INDUCTANCE SHALL BE GREATER THAN THE SHIELDED CABLE INDUCTANCE. (A 2:1 RATIO IS PREFERABLE). SHIELDED CABLE INDUCTANCE IS 0.56  $\mu\text{H}$  PER METRE FOR 18 AWG WIRE.

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. LOOP CONDUCTORS SHALL BE INSTALLED IN THE SAWCUT SLOT.
4. LOOP INSTALLATION PROCEDURES & RULES SHALL BE FOLLOWED IN ACCORDANCE WITH DRAWINGS SP635-2.8.8 AND -2.8.9.
5. ALL DIAMOND DETECTOR LOOPS SHALL BE A MINIMUM OF 4 TURNS.
6. DIAMOND LOOPS SHALL NOT BE USED FOR SHORT DURATION OR PERMANENT TRAFFIC COUNTER STATION INSTALLATIONS.

NOT TO SCALE

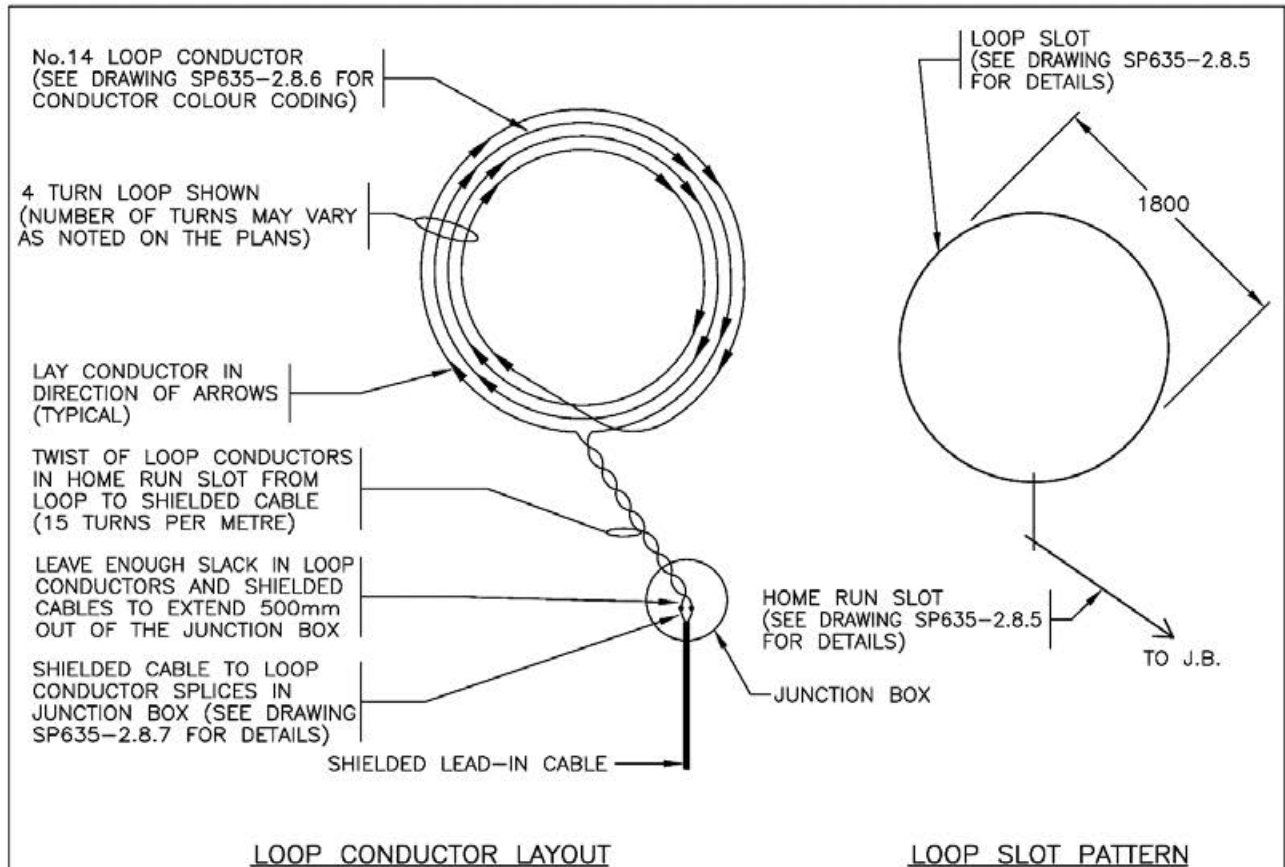


No.	Revision	Date
F		
E		
D	GENERAL REVISIONS	APR 20
C	GENERAL REVISIONS	APR 17
B	SHIELDED CABLE WIRE SIZE NOTED, NOTE 6 ADDED	NOV 98
A	SHIELDED CABLE INDUCTANCE REVISED	AUG 96

**DIAMOND DETECTOR LOOP  
INSTALLATION DETAILS**

Date                      Approved  
**15/11/95**    **M.C. (Signature on File)**  
Chief Highway Engineer

SPECIFICATION  
DRAWING No.  
**SP635-2.8.2**



TURNS	INDUCTANCE
4	95 µH
5	140 µH
6	195 µH
7	260 µH

LOOP INDUCTANCE SHALL BE GREATER THAN THE SHIELDED CABLE INDUCTANCE. (A 2:1 RATIO IS PREFERABLE). SHIELDED CABLE INDUCTANCE IS 0.56 µH PER METRE FOR 18 AWG WIRE.

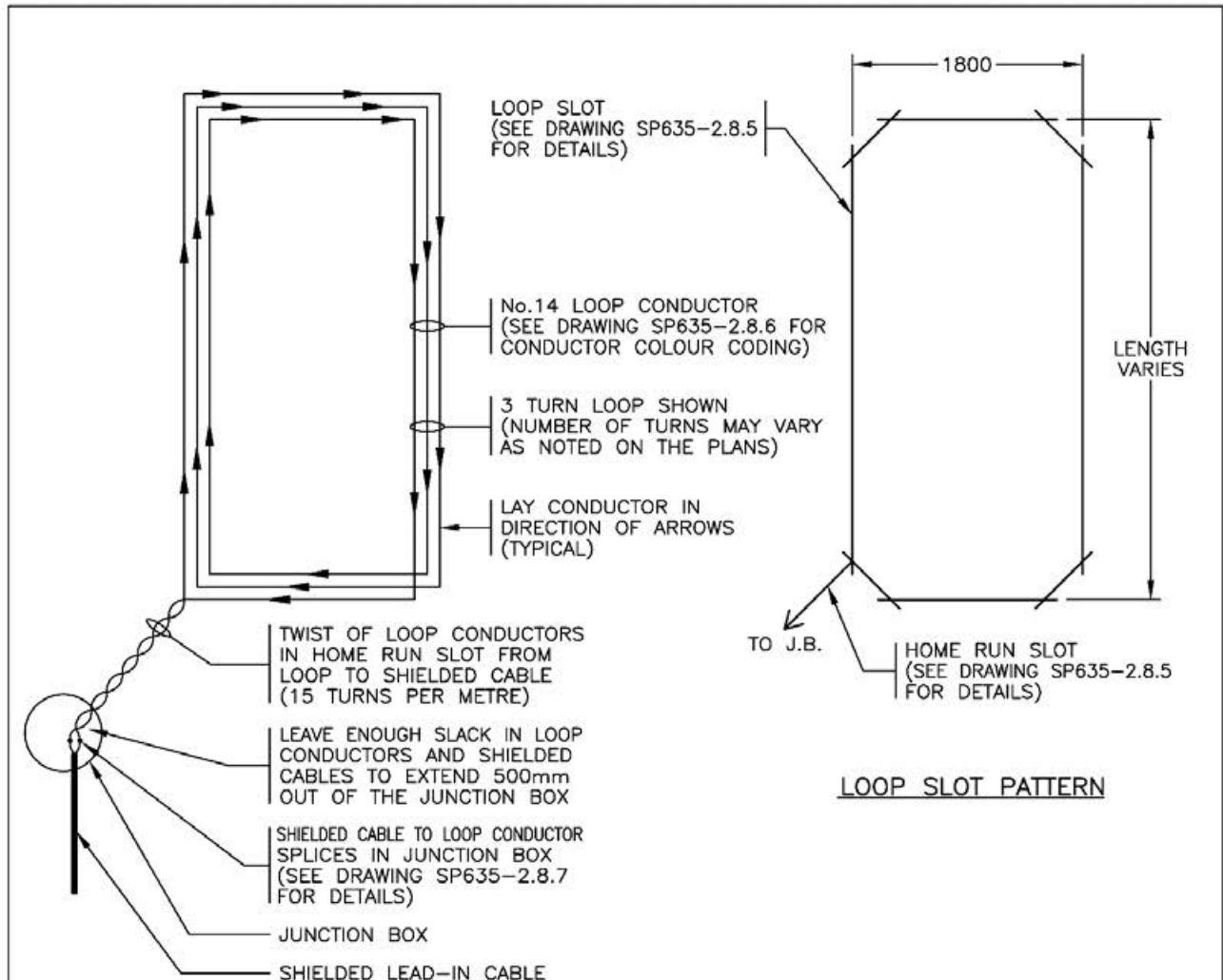
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. LOOP CONDUCTORS SHALL BE INSTALLED IN THE SAWCUT SLOT.
4. LOOP INSTALLATION PROCEDURES & RULES SHALL BE FOLLOWED IN ACCORDANCE WITH DRAWINGS SP635-2.8.8 AND -2.8.9.
5. ALL ROUND DETECTOR LOOPS SHALL BE A MINIMUM OF 4 TURNS.
6. ROUND LOOPS SHALL NOT BE USED FOR SHORT DURATION OR PERMANENT TRAFFIC COUNTER STATION INSTALLATIONS.

NOT TO SCALE



No.	Revision	Date	ROUND DETECTOR LOOP INSTALLATION DETAILS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-2.8.3
E			30/09/93	E.L. (Signature on File)	
D				Chief Highway Engineer	
C	GENERAL REVISIONS	APR 20			
B	GENERAL REVISIONS	APR 17			
A	ALTERNATE NOTE REMOVED	OCT 03			



**LOOP CONDUCTOR LAYOUT**

**LOOP SLOT PATTERN**

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. LOOP CONDUCTORS SHALL BE INSTALLED IN THE SLOTTED SAWCUT.
4. LOOP INSTALLATION PROCEDURES & RULES SHALL BE FOLLOWED IN ACCORDANCE WITH DRAWINGS SP635-2.8.8 AND -2.8.9.
5. ALL RECTANGULAR DETECTOR LOOPS SHALL BE A MINIMUM OF 3 TURNS.

**LOOP INDUCTANCE FORMULA ( $\mu\text{H}$ )**  
(LESS SHIELDED LEAD-IN CABLE INDUCTANCE)

$$L = P/4 (3.28)(N^2 + N)$$

L = LOOP INDUCTANCE ( $\mu\text{H}$ )  
P = PERIMETER (METRES)  
N = NUMBER OF TURNS

LOOP INDUCTANCE SHALL BE GREATER THAN THE SHIELDED CABLE INDUCTANCE. (A 2:1 RATIO IS PREFERABLE). SHIELDED CABLE INDUCTANCE IS 0.56  $\mu\text{H}$  PER METRE FOR 18 AWG WIRE.

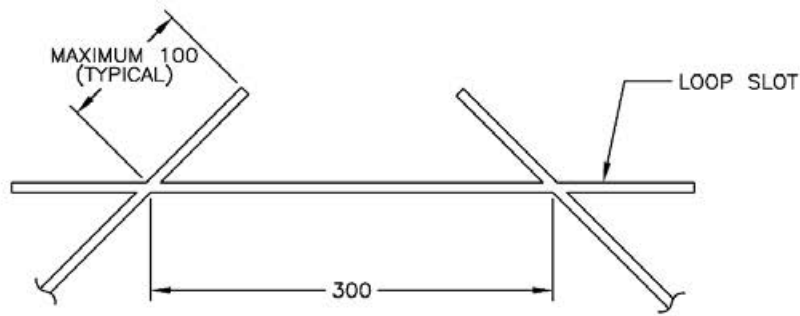


NOT TO SCALE

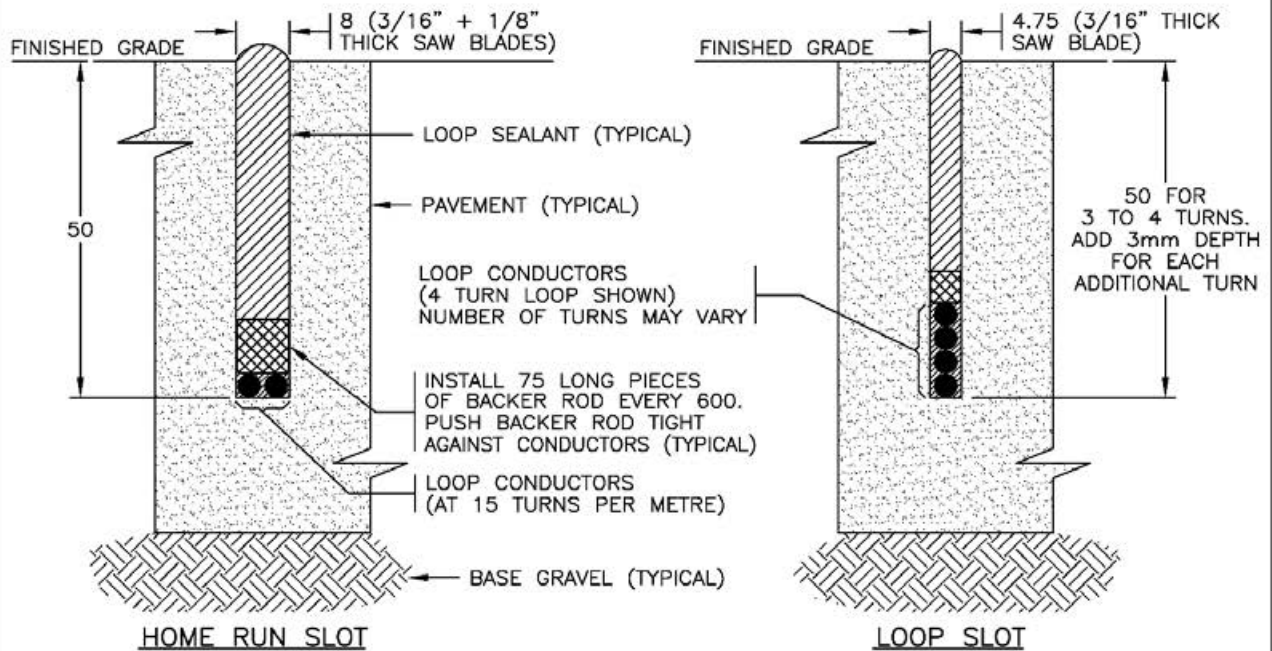
No.	Revision	Date
E		
D	GENERAL REVISIONS	APR 20
C	GENERAL REVISIONS	APR 17
B	DRAWING NUMBER CHANGED & SHIELDED CABLE WIRE SIZE NOTED	NOV 98
A	SHIELDED CABLE INDUCTANCE REVISED	AUG 96

**RECTANGULAR DETECTOR LOOP  
INSTALLATION DETAILS**

Date	Approved	SPECIFICATION DRAWING No.
15/11/95	M.C. (Signature on File)	SP635-2.8.4
Chief Highway Engineer		



**TYPICAL LOOP CORNER DETAIL**  
(FOR DIAMOND & RECTANGULAR LOOPS)



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
3. APPROVED LOOP SLOT SEALANTS MUST MEET ASTM D6690 TYPE 1. ALTERNATE PRODUCTS MUST MEET MINISTRY APPROVAL.
4. ONLY ONE LOOP SHALL BE INSTALLED IN EACH HOME RUN SLOT.

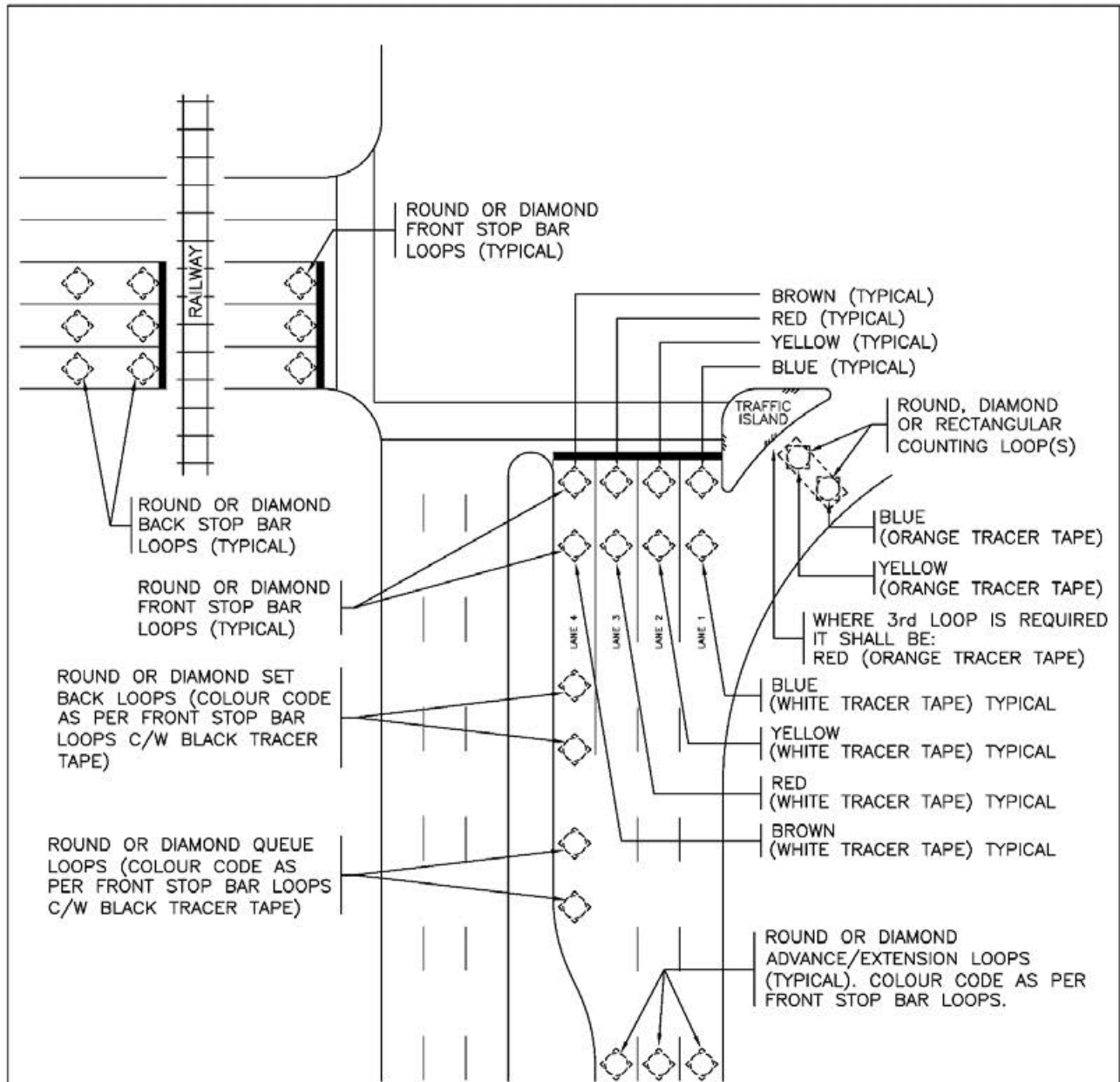
NOT TO SCALE



No.	Revision	Date	Date		Approved	SPECIFICATION DRAWING No.
F			<b>15/11/95</b> <b>M.C.</b> (Signature on File) Chief Highway Engineer		SP635-2.8.5	
E						
D	NOTE 3 UPDATED. NOTE 4 REMOVED.	APR 20				
C	GENERAL REVISIONS	APR 17				
B	APPROVED SEALER ADDED	AUG 99				
A	DRAWING NUMBER CHANGED	NOV 98				

**LOOP AND HOME RUN SLOT DETAILS**





**DETECTOR LOOPS**

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION
2. COLOUR CODE IS BASED ON USING RIGHT HAND CURB OF ROAD AS POINT OF REFERENCE & WORKING LOOP CONDUCTORS LEFT TOWARDS CENTRE OF ROADWAY. WHERE A 5th LANE, USE ORANGE CONDUCTOR COLOUR.
3. RECTANGULAR DETECTOR LOOP CONDUCTORS SHALL BE BLACK.

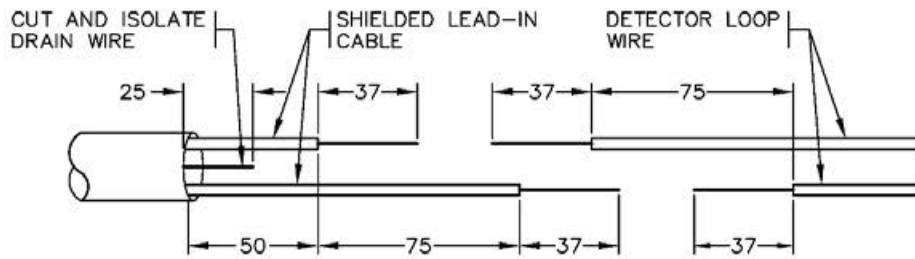


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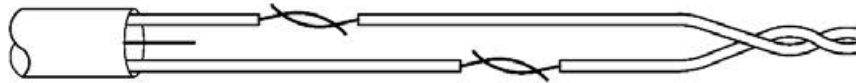
NOT TO SCALE

No.	Revision	Date	DETECTOR LOOP TYPES COLOUR CODING	
E				
D				
C	GENERAL REVISIONS	APR 17	Date	Approved
B	SETBACK, QUEUE & ADVANCE LOOPS ADDED	SEPT 00	<b>15/11/95</b>	<b>M.C. (Signature on File)</b>
A	DRAWING NUMBER CHANGED, ROUND LOOPS ADDED	NOV 98	SPECIFICATION DRAWING No. SP635-2.8.6	
			Chief Highway Engineer	

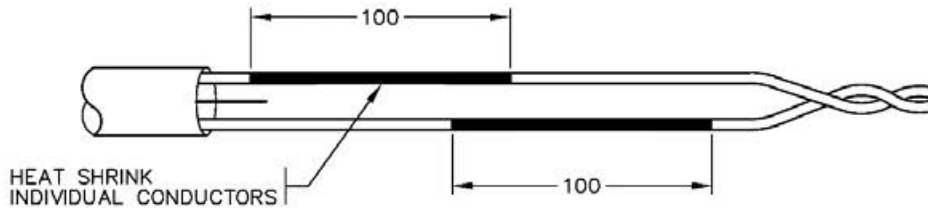
STEP 1. STRIP LOOP WIRES AND LEAD-IN CABLE AND SLIDE ON HEAT SHRINKS



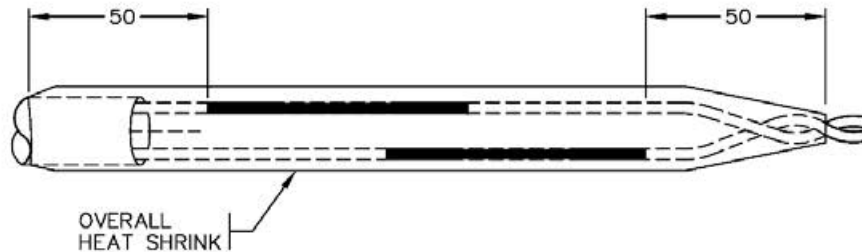
STEP 2. CONNECT AND SOLDER. TWIST BARE CONDUCTORS TOGETHER AND SOLDER WITH 60/40 (TIN/LEAD) RESIN SOLDER.



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY SEAL TOTAL SPLICE.



NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
3. HEAT SHRINK SHALL BE PREMIER CLEAR-SEAL (6mm I.D. INDIVIDUAL CONDUCTORS & 10mm I.D. FOR OVERALL) OR APPROVED ALTERNATE.

NOT TO SCALE



No.	Revision	Date	DETECTOR LOOP TO SHIELDED CABLE SPLICING DETAILS		SPECIFICATION DRAWING No. SP635-2.8.7
F			Date	Approved	
E			15/11/95	M.C. (Signature on File)	
D			Chief Highway Engineer		
C					
B	GENERAL REVISIONS	APR 17			
A	DRAWING NUMBER CHANGED	NOV 98			

**STEP BY STEP LOOP INSTALLATION PROCEDURES AND RULES ARE AS FOLLOWS:**

- STEP 1** CONFIRM THE TYPE OF LOOP TO BE INSTALLED, LOOP TYPES ARE DETAILED ON DRAWINGS SP635-2.8.2 to -2.8.4.
- STEP 2** LAYOUT DETECTOR LOOPS AND REVIEW LOCATIONS WITH THE MINISTRY REPRESENTATIVE PRIOR TO SAWCUTTING THE ROADWAY. THE GENERAL LAYOUT OF THE DETECTOR LOOPS IS INDICATED ON DRAWINGS SP635-2.8.11 to -2.8.14. STOP BARS AND LANE LINES MUST BE LAID OUT PRIOR TO LOCATING DETECTOR LOOPS.

**RULE 1** DETECTOR LOOPS SHALL NOT BE INSTALLED WHEN THE ROAD IS WET OR WHEN THE AMBIENT (AIR) TEMPERATURE IS LOWER THAN 5°C, UNLESS APPROVED IN WRITING BY THE MINISTRY ELECTRICAL REPRESENTATIVE. SEALANTS DO NOT ADHERE PROPERLY IN WET CONDITIONS. SHOULD THE CONTRACTOR BE ASKED IN WRITING BY THE MINISTRY ELECTRICAL REPRESENTATIVE TO INSTALL LOOPS IN THE WET AND/OR WHEN THE AIR TEMPERATURE IS BELOW 5°C, THE INSTALLATION WARRANTY WILL NOT BE ENFORCED.

**RULE 2** DETECTOR LOOPS SHALL NOT BE INSTALLED WHEN THE PAVEMENT IS CRACKED OR BADLY RUTTED UNLESS THE INSTALLATION IS APPROVED IN WRITING BY THE MINISTRY ELECTRICAL REPRESENTATIVE. SAW CUTS CAN OFTEN CAUSE PAVEMENT CONDITIONS TO DETERIORATE FURTHER. IF RE-SURFACING OF THE INTERSECTION IS NOT PLANNED THEN PHOTOGRAPHS SHOULD BE TAKEN TO DOCUMENT THE PAVEMENT CONDITIONS BEFORE AND AFTER THE LOOP INSTALLATION. PHOTOGRAPHS SHALL BE LABELED WITH THE LOOP NUMBERS AND THEN SUBMITTED TO THE THE MINISTRY ELECTRICAL REPRESENTATIVE AFTER THE INSTALLATION IS COMPLETED.

- STEP 3** CUT LOOP AND HOME RUN SLOTS IN ASPHALT. ALL LOOP AND HOME RUN SLOTS SHALL BE CUT TO THE SAME DEPTH, WITH A PAVEMENT SAW. SLOTS SHALL NOT PASS THROUGH PAVEMENT INTO THE BASE GRAVEL.

**RULE 3** LOOP AND HOME RUN SLOT MUST BE INSTALLED AT LEAST 300mm FROM ANY OTHER LOOP AND EACH LEAD-IN SLOTS, EXCEPT WHERE THE LEAD-IN CONDUCTORS ENTER THE 1" RPVC CONDUIT. THIS WILL REDUCE THE PROBABILITY OF INTERFERENCE BETWEEN LOOPS.

**RULE 4** WHEN REPLACING LOOPS, CUT THROUGH TWICE ON EACH SIDE OF EXISTING LOOP. THIS MAY REQUIRE ADDITIONAL SAW CUTS, IF THE EXISTING LOOP IS NOT LOCATED IN THE SAW CUT PATH OF THE NEW LOOP. THIS WILL ELIMINATE THE POSSIBILITY OF INTERFERENCE BETWEEN THE OLD AND THE NEW LOOP.

- STEP 4** CLEAN THE SLOT WITH A PROFESSIONAL GRADE PRESSURIZED WATER SYSTEM. REMOVE ALL WATER AND DIRT OUT OF THE SLOT CUT AND THE SURROUNDING 100mm OF ROAD SURFACE USING COMPRESSED AIR. SLOT MUST REMAIN COMPLETELY CLEAN AND DRY UNTIL THE SLOT IS SEALED.

- STEP 5** INSTALL THE LOOP CONDUCTOR INTO THE LOOP SLOT. ENSURE CONDUCTORS ARE TIGHTLY WOUND AND PUSHED INTO THE BOTTOM OF THE SLOT. TWIST CONDUCTOR HOME RUN AT 15 TURNS PER METRE. INSTALL 75mm STRIPS OF BACKER ROD EVERY 600mm TO HOLD CONDUCTORS INTO SLOT.

**RULE 5** ONLY ONE CONTINUOUS CONDUCTOR SHALL BE INSTALLED IN EACH LOOP AND HOME RUN SLOT TO THE JUNCTION BOX.

**RULE 6** LOOP CONDUCTORS MUST BE INSTALLED IMMEDIATELY AFTER THE LOOP AND HOMERUN SLOTS ARE CUT.

- STEP 6** INSTALL LOOP SEALANT AFTER CONDUCTORS HAVE BEEN INSTALLED. LOOP SEALANTS SHALL BE HEATED AS PER MANUFACTURER'S INSTRUCTIONS AND NEATLY APPLIED USING A FUNNEL WITH A NARROW SPOUT. ANY EXCESS SEALANT ON ROAD SURFACE SHALL BE REMOVED. AN ADDITIONAL APPLICATION OF LOOP SEALANT MAY BE REQUIRED WHERE THE SEALANT IS NOT UP TO THE PAVEMENT GRADE.

- STEP 7** ONCE THE SEALING OF THE SLOT HAS BEEN PROPERLY COMPLETED, A DUST SUCH AS PORTLAND CEMENT SHALL BE SPRINKLED ONTO THE SEALANT TO PREVENT TRACKING BY ROADWAY TRAFFIC. ANY EXCESS DUST SHALL BE SWEEPED OFF THE ROADWAY PRIOR TO ALLOWING TRAFFIC TO PASS OVER THE SEALED SLOT.

**RULE 7** SPLICES WILL NOT BE ALLOWED IN LOOP CONDUCTORS OR SHIELDED CABLES.

**NOTES**

- 1. SEE DRAWING SP635-2.8.9 FOR CONTINUATION OF PROCEDURES AND RULES.



Ministry of Transportation and Infrastructure

No.	Revision	Date	DETECTOR LOOP INSTALLATION PROCEDURES AND RULES		SPECIFICATION DRAWING No.
D	GENERAL REVISIONS	APR 20	Date	Approved	SP635-2.8.8
C	GENERAL REVISIONS	APR 17			
B	MINISTRY REPRESENTATIVE CHANGED TO MINISTRY ELECTRICAL REPRESENTATIVE	OCT 03	15/11/95	M.C. (Signature on File)	
A	DRAWING NUMBER CHANGED, ROUND LOOPS ADDED	NOV 98		Chief Highway Engineer	

**CONTINUED FROM DRAWING SP635-2.8.8**

**STEP 8** A LOOP CHECK SHEET AS SHOWN ON DRAWING SP635-2.8.1 SHALL BE COMPLETED EACH TIME A NEW LOOP IS INSTALLED. PAVEMENT CONDITIONS ARE TO BE RECORDED BEFORE ANY SAW CUTS HAVE BEEN MADE. WEATHER CONDITIONS ARE TO BE RECORDED AT THE TIME THAT THE LOOPS ARE SEALED. MEASUREMENTS SHALL BE TAKEN AT THE JUNCTION BOX CLOSEST TO THE LOOP. (SEE RULE 8)

**STEP 9** THE SPLICES BETWEEN DETECTOR LOOP CONDUCTORS AND THE SHIELDED CABLE ARE TO BE SOLDERED AND SEALED WITH HEAT SHRINK IN ACCORDANCE WITH DRAWING SP635-2.8.7.

**STEP 10** REPEAT STEP 8 AT THE JUNCTION BOX OR VAULT NEAREST CONTROLLER.

**RULE 8** LOOP DETECTOR RESISTANCE TO GROUND SHALL BE GREATER THAN 1 MEGAOHM, LOOP RESISTANCE SHALL BE FROM 0 TO 5 OHMS & LOOP INDUCTANCE SHALL BE WITHIN 20% OF THE VALUES SHOWN ON DRAWINGS SP635-2.8.2 TO -2.8.4 OR AS NOTED ON THE PLANS.

**STEP 11** SUBMIT THE COMPLETED LOOP CHECK SHEET AND ANY RELEVANT PHOTOGRAPHS TO THE MINISTRY REPRESENTATIVE. THE TOTAL CIRCUIT INDUCTANCE VALUES AND THE MEGGER TEST VALUES WILL BE USED AS A BASELINE TO VERIFY DEGRADATION IN LOOP PERFORMANCE.

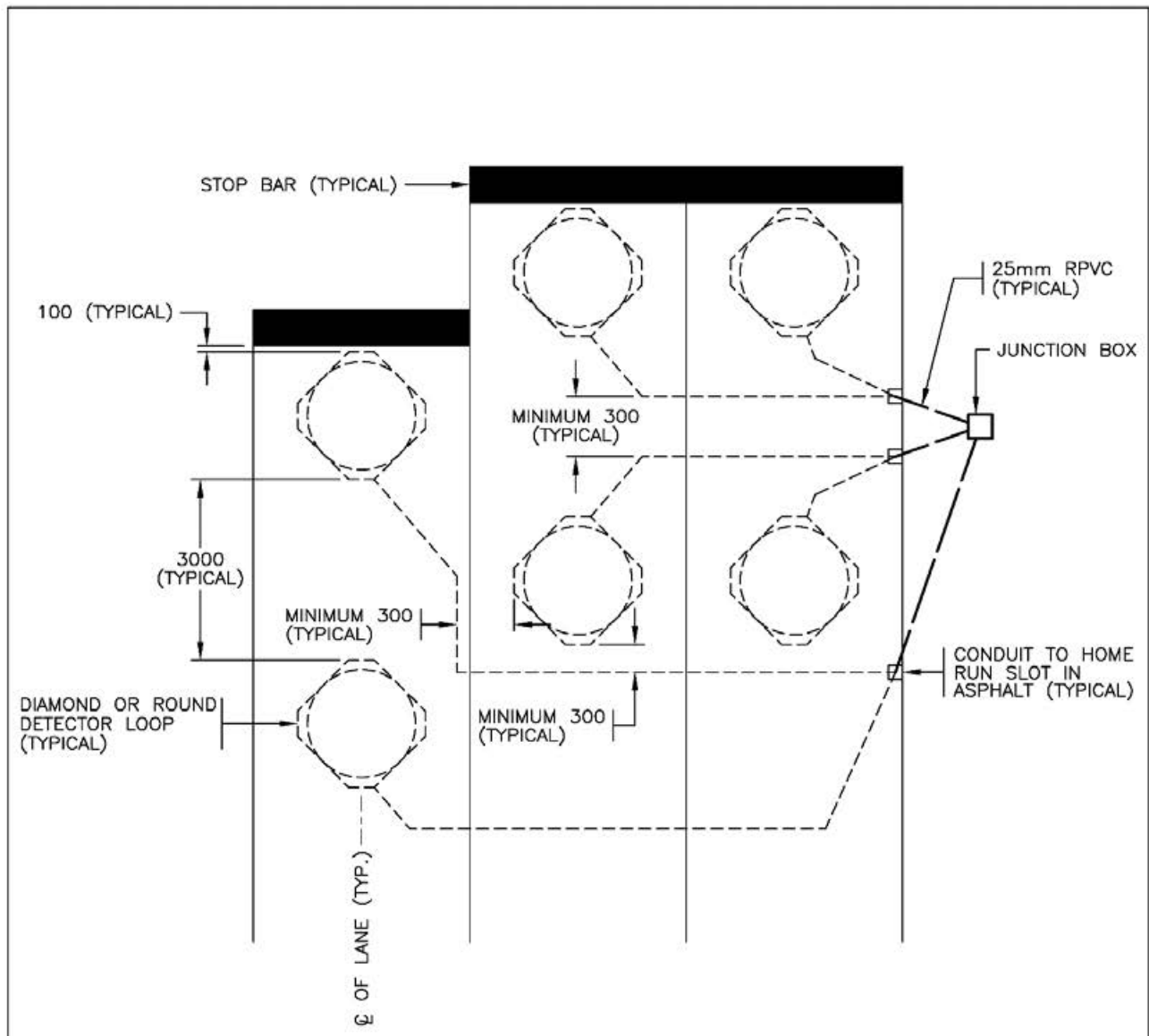
**STEP 12** TAG EACH LOOP CABLE AS NOTED ON DRAWINGS SP635-2.5.5 AND -2.5.7.

**RULE 9** MAINTAIN THE MAXIMUM SEPARATION POSSIBLE IN THE JUNCTION BETWEEN THE LOOP CONDUCTORS AND POWER CONDUCTORS.



No.	Revision	Date	DETECTOR LOOP INSTALLATION PROCEDURES AND RULES		SPECIFICATION DRAWING No.
F					
E	STEP 11 UPDATED	APR 20			
D	GENERAL REVISIONS	APR 17	Date	Approved	
C	STEP 11 CLARIFIED	OCT 03	15/11/95	M.C. (Signature on File)	
B	DRAWING NUMBER CHANGED	NOV 98		Chief Highway Engineer	SP635-2.8.9
A	RULE 8 REVISED	AUG 96			





TYPICAL LOOP LAYOUT

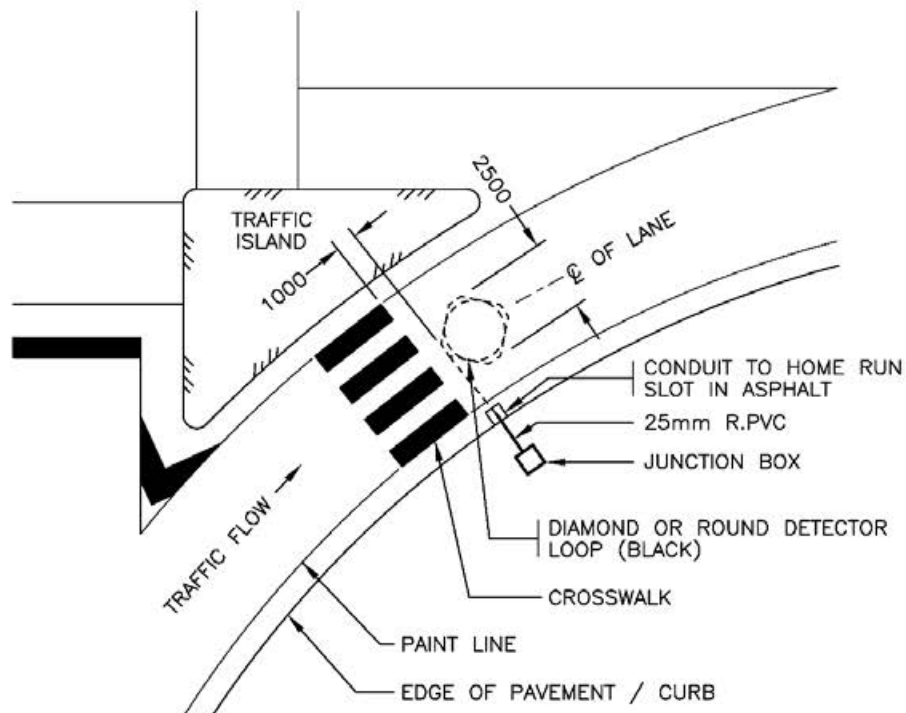
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. LOCATE LOOP CONDUITS IN ASPHALT TO SUIT LOOP LOCATIONS & MINIMIZE THE LENGTHS OF HOME RUN SLOTS IN THE ASPHALT.



NOT TO SCALE

No.	Revision	Date	LAYOUT FOR DIAMOND OR ROUND TRAFFIC SIGNAL DETECTOR LOOPS		SPECIFICATION DRAWING No. SP635-2.8.11
E			Date	Approved	
D			15/11/95	M.C. (Signature on File)	
C			Chief Highway Engineer		
B	GENERAL REVISIONS	APR 17			
A	DRAWING NUMBER CHANGED, ROUND LOOPS ADDED	NOV 98			



**RIGHT TURN LANE WITH TRAFFIC ISLAND SCENARIO SHOWN**  
PAVEMENT WIDTH UP TO 5900

**NOTES**

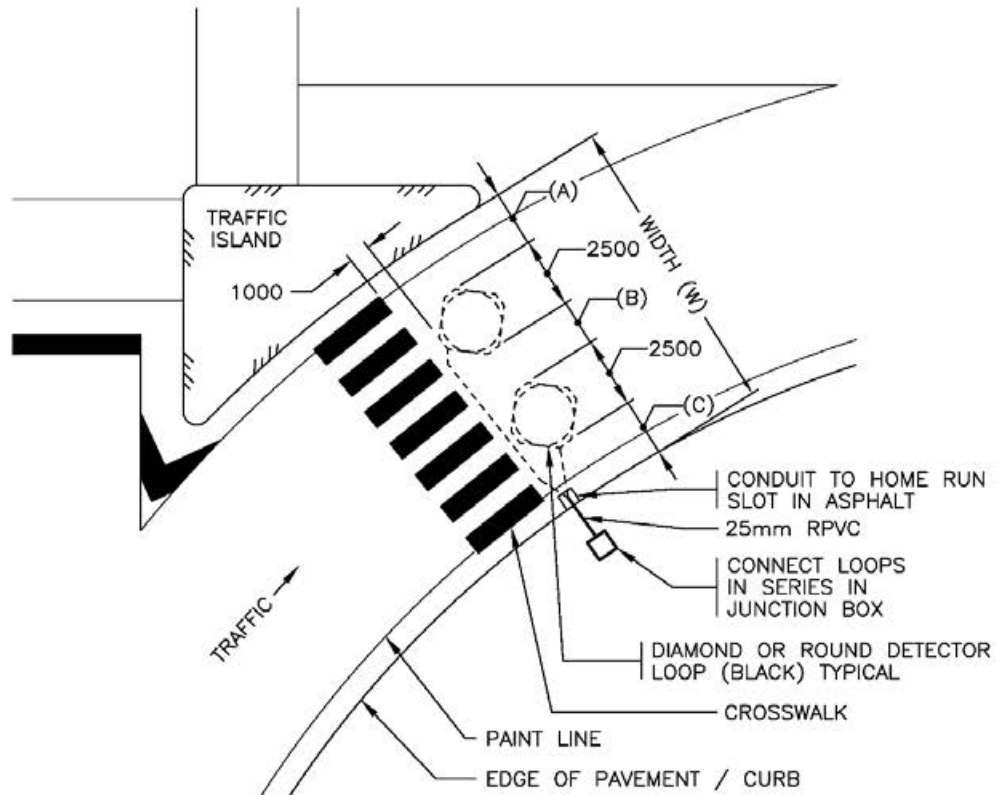
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. FOR DIAMOND LOOP DETECTOR DETAILS SEE DRAWING SP635-2.8.2 FOR ROUND LOOP DETECTOR DETAILS SEE DRAWING SP635-2.8.3
4. LOCATE LOOP CONDUITS IN ASPHALT TO SUIT LOOP LOCATIONS & MINIMIZE THE LENGTHS OF HOME RUN SLOTS IN THE ASPHALT.



NOT TO SCALE

No.	Revision	Date	LAYOUT FOR DIAMOND OR ROUND COUNTING DETECTOR LOOP		SPECIFICATION DRAWING No.
E			Date	Approved	SP635-2.8.12
D			15/11/95	M.C. (Signature on File)	
C			Chief Highway Engineer		
B	GENERAL REVISIONS	APR 17			
A	DRAWING NUMBER CHANGED, ROUND LOOPS ADDED	NOV 98			

LOOP SPACING TABLE			
WIDTH (W)	(A)	(B)	(C)
6000	400	200	400
7000	750	500	750
8000	1100	800	1100
9000	1500	1000	1500



**RIGHT TURN LANE WITH TRAFFIC ISLAND SCENARIO SHOWN**

PAVEMENT WIDTH BETWEEN 6000 AND 9000

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. FOR DIAMOND DETECTOR LOOP DETAILS SEE DRAWING SP635-2.8.2. FOR ROUND DETECTOR LOOP DETAILS SEE DRAWING SP635-2.8.3.
4. LOCATE LOOP CONDUITS IN ASPHALT TO SUIT LOOP LOCATIONS & MINIMIZE THE LENGTHS OF HOME RUN SLOTS IN THE ASPHALT.

NOT TO SCALE

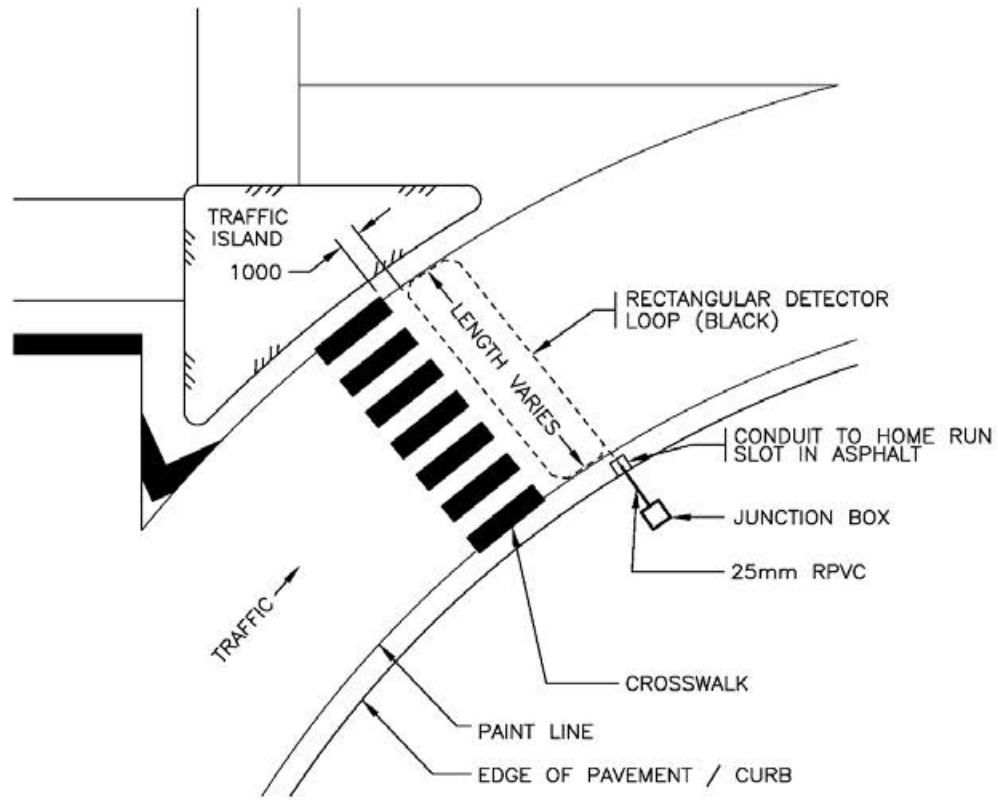


Ministry of Transportation and Infrastructure

No.	Revision	Date	LAYOUT FOR DIAMOND OR ROUND COUNTING DETECTOR LOOPS		SPECIFICATION DRAWING No.
E			Date	Approved	SP635-2.8.13
D			15/11/95	M.C. (Signature on File)	
C			Chief Highway Engineer		
B	GENERAL REVISIONS	APR 17			
A	DRAWING NUMBER CHANGED, ROUND LOOPS ADDED	NOV 98			



ON STRAIGHT SECTIONS OF ROAD, THE LOOP WILL BE CENTERED IN THE LANE.  
 ON CURVED ROADS (AS SHOWN BELOW) THE LOOP WILL BE LOCATED, SHAPED AND SIZED TO BEST REFLECT THE TRAVEL PATHS OF VEHICLES.



RIGHT TURN LANE WITH TRAFFIC ISLAND SCENARIO SHOWN

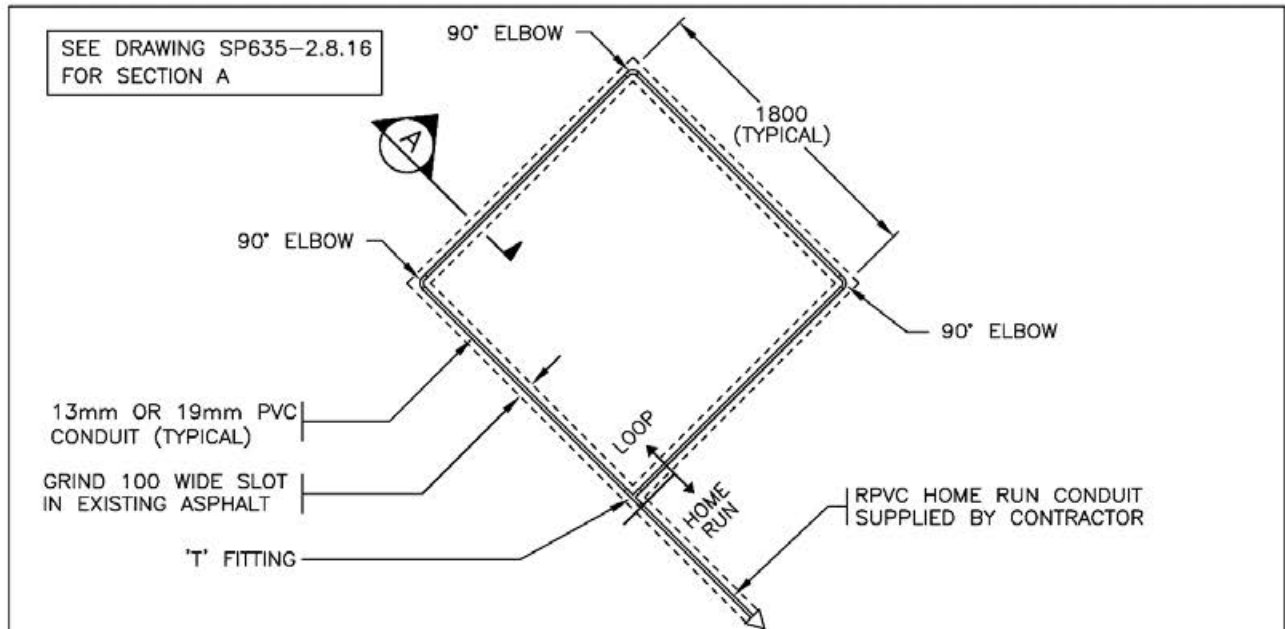
NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. FOR RECTANGULAR DETECTOR LOOP DETAILS SEE DRAWING SP635-2.8.4
4. LOCATE LOOP CONDUITS IN ASPHALT TO SUIT LOOP LOCATIONS & MINIMIZE THE LENGTHS OF HOME RUN SLOTS IN THE ASPHALT.



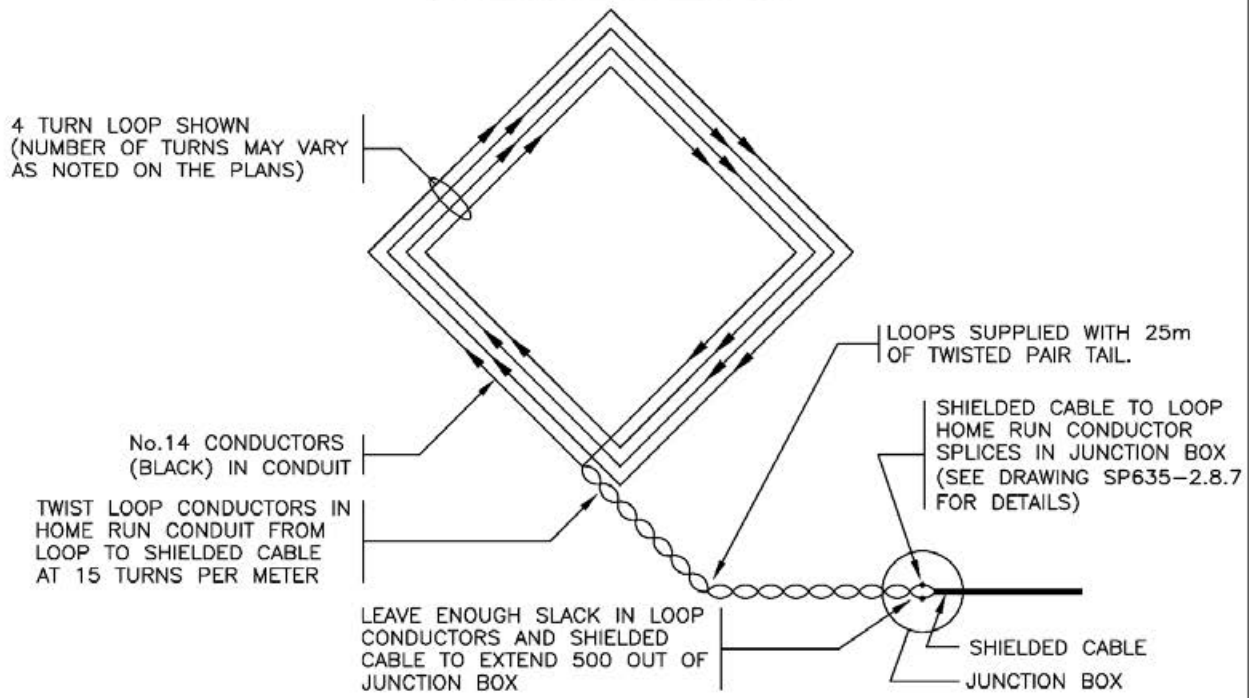
NOT TO SCALE

No.	Revision	Date	LAYOUT FOR RECTANGULAR COUNTING DETECTOR LOOPS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-2.8.14
E			15/11/95	M.C. (Signature on File)	
D				Chief Highway Engineer	
C					
B	GENERAL REVISIONS	APR 17			
A	DRAWING NUMBER CHANGED,	NOV 98			



**PREFORMED LOOP LAYOUT**

4 TURN LOOP SHOWN  
(NUMBER OF TURNS MAY VARY AS NOTED ON THE PLANS)



**CONDUIT LAYOUT IN PREFORMED LOOP**

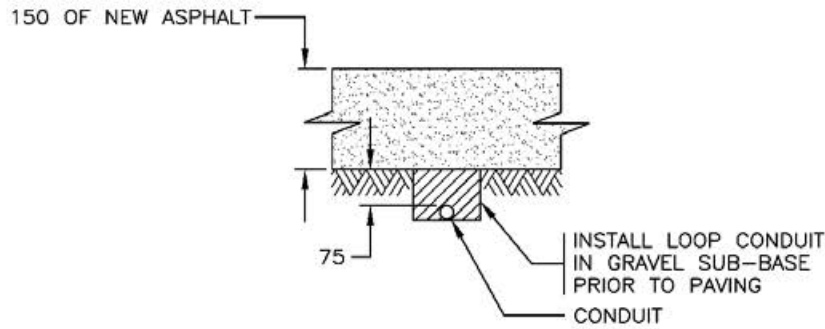
SEE DRAWING SP635-2.8.16 FOR NOTES

SEE DRAWING SP635-2.8.2 FOR LOOP INDUCTANCE TABLE

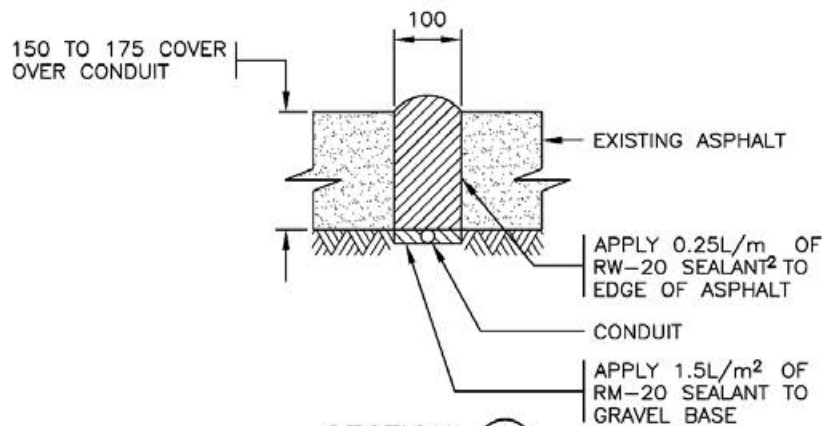


NOT TO SCALE

No.	Revision	Date	PRE-FORMED DIAMOND DETECTOR LOOP INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-2.8.15
F			Date	Approved	
E			16/10/00	M.C. (Signature on File)	
D				Chief Engineer	
C					
B	GENERAL REVISIONS	APR 20			
A	GENERAL REVISIONS	APR 17			



SECTION A  
NEW ROAD CONSTRUCTION



SECTION A  
EXISTING ROAD SURFACE

NOTES

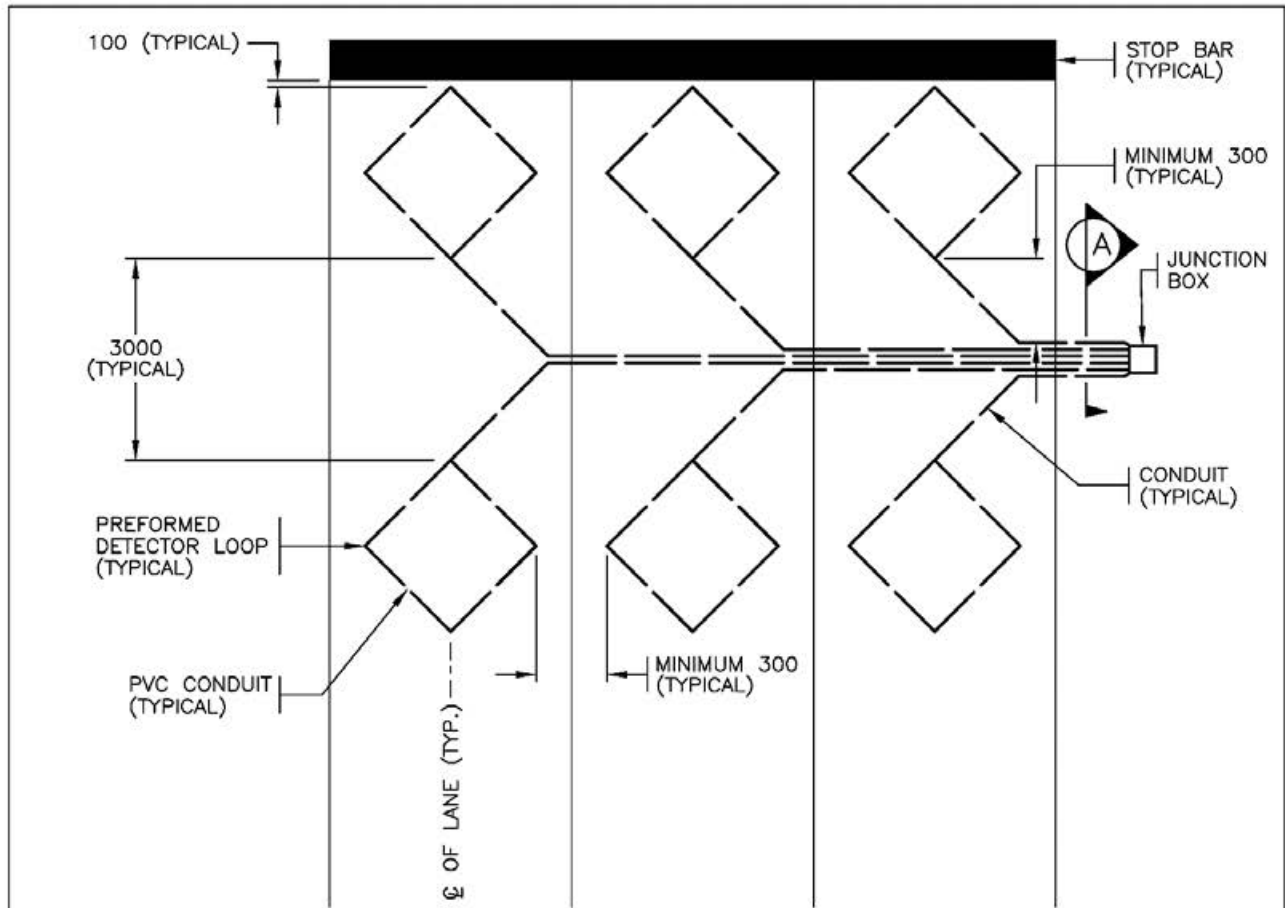
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. WHERE INSTALLING PREFORMED LOOPS IN EXISTING ASPHALT GRIND OUT SLOT AND INSTALL PREFORMED LOOP. BACKFILL SLOT WITH HOT MIXED ASPHALT PAVEMENT. COMPACT ASPHALT WITH VIBRATING MECHANICAL COMPACTOR WITH 75mm SQUARE PLATE. WHERE INSTALLING PREFORMED LOOPS IN NEW ROAD CONSTRUCTION, PLACE CONDUIT IN GRAVEL SUB-BASE JUST BELOW ASPHALT. LAYOUT STOP BARS, CURB RETURNS, ISLANDS, MEDIANS, LANE LINES AND LOOPS AND VERIFY WITH MINISTRY REPRESENTATIVE PRIOR TO CONSTRUCTION. FAILURE TO CORRECTLY LOCATE THE LOOPS IN THEIR REQUIRED LOCATIONS WILL RESULT IN REINSTALLATION OF THE LOOPS AT THE CONTRACTORS EXPENSE.
4. PREFORMED LOOPS SHALL BE REVIEWED WITH THE MINISTRY REPRESENTATIVE PRIOR TO INSTALLATION.
5. CONTRACTOR SHALL VERIFY LOOPS LOCATIONS (CUT INTO OVERLAYED OR NEW PAVED ROADWAYS) WITH THE MINISTRY REPRESENTATIVE AFTER INSTALLATION.
6. PRE-APPROVED LOOPS ARE NOTED ON THE MINISTRY "RECOGNIZED PRODUCTS LIST". PRE-FORMED LOOPS OR EITHER RIGID OR FLEXIBLE PVC TYPE AND ARE COMPLETE WITH 25m HOME RUN OF CONDUCTOR. AS THE HOME RUN LENGTHS WILL VARY, THE CONTRACTOR SHALL SUPPLY PVC CONDUIT FOR HOME RUNS.

NOT TO SCALE



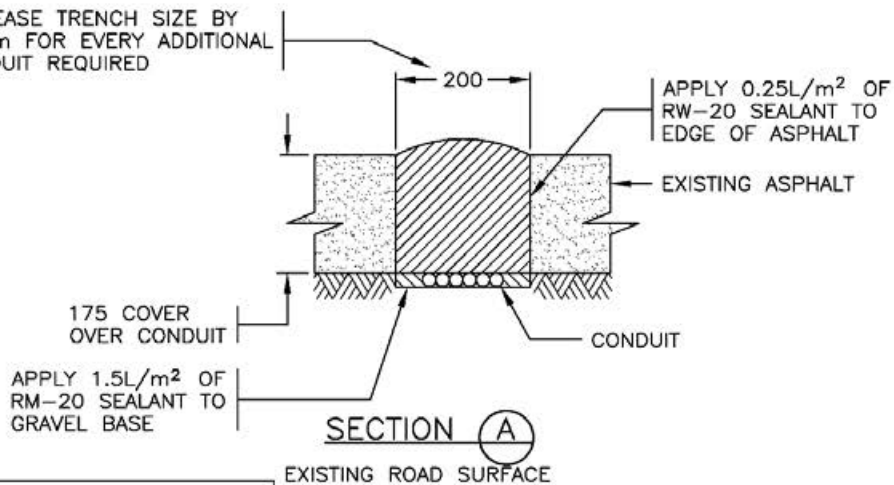
Ministry of  
Transportation  
and Infrastructure

No.	Revision	Date	PRE-FORMED DIAMOND DETECTOR LOOP INSTALLATION DETAILS	
F			Date	Approved
E			16/10/00	M.C. (Signature on File)
D			Chief Highway Engineer	
C	NOTE 4 AND 6 UPDATED	APR 20	SPECIFICATION DRAWING No.	
B	GENERAL REVISIONS	APR 17	SP635-2.8.16	
A	NOTE 6 REVISED	OCT 03		



TYPICAL PREFORMED LOOP LAYOUT

INCREASE TRENCH SIZE BY 20mm FOR EVERY ADDITIONAL CONDUIT REQUIRED



SEE DRAWING SP635-2.8.16 FOR NOTES

SEE DRAWING SP635-2.8.2 FOR LOOP INDUCTANCE TABLE

NOT TO SCALE



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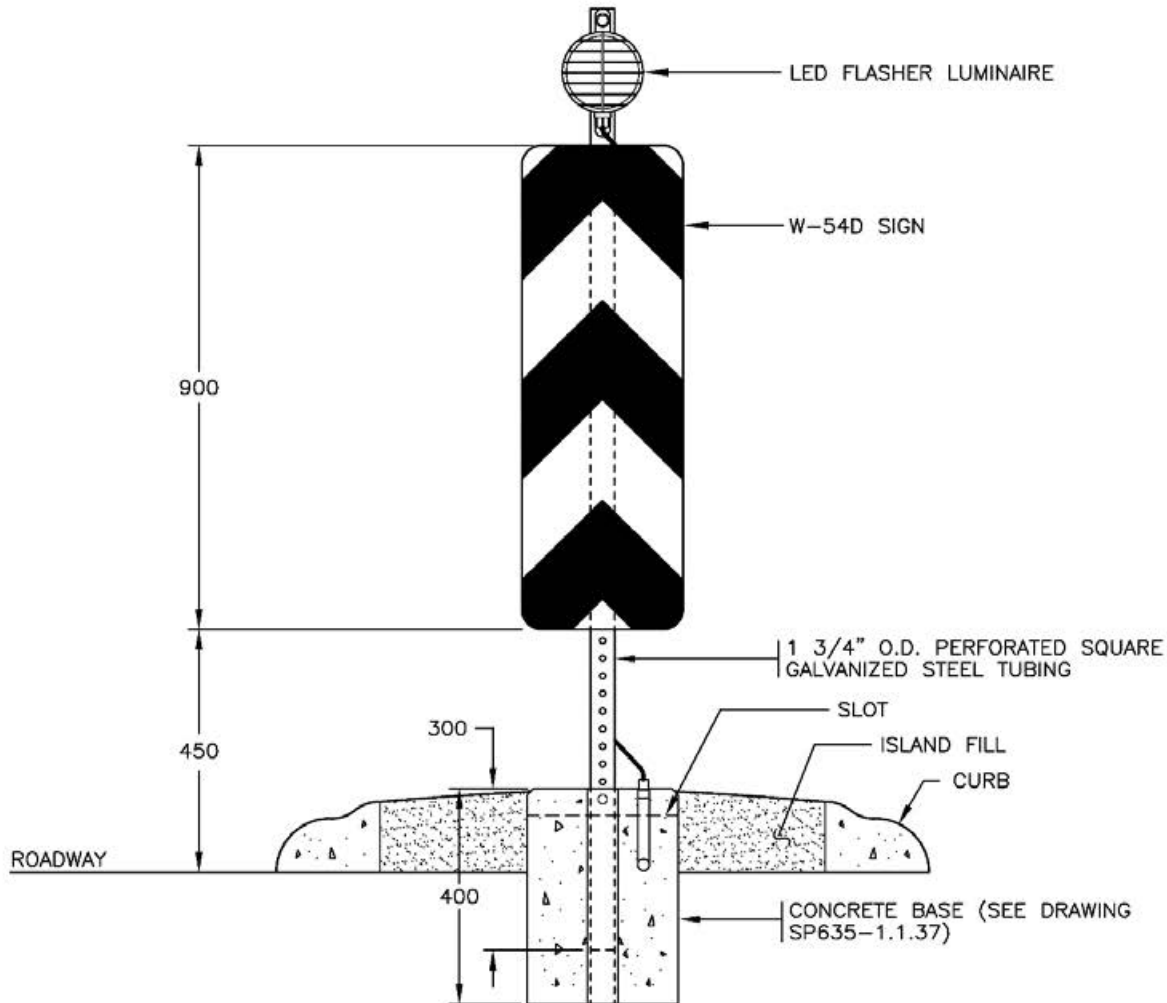
No.	Revision	Date
F		
E		
D		
C		
B		
A	GENERAL REVISIONS	APR 17

LAYOUT FOR PRE-FORMED TRAFFIC SIGNAL DETECTOR LOOPS

Date Approved  
**16/10/00 M.C. (Signature on File)**  
 Chief Engineer

SPECIFICATION DRAWING No.  
**SP635-2.8.17**

REFER TO THE MINISTRY'S MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS FOR APPLICATIONS WHICH APPLY TO THIS SIGN



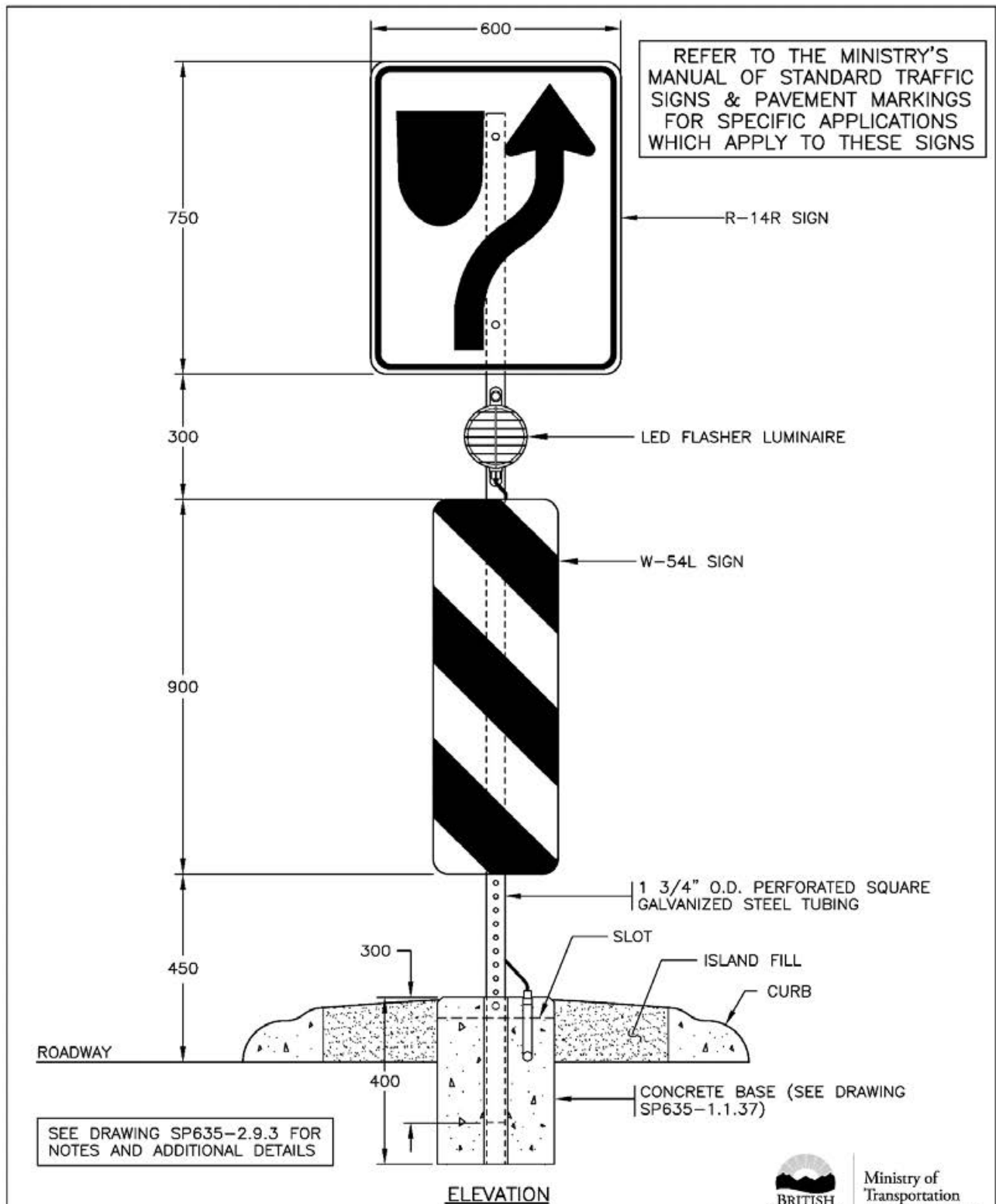
ELEVATION

SEE DRAWING SP635-2.9.3 FOR NOTES AND ADDITIONAL DETAILS



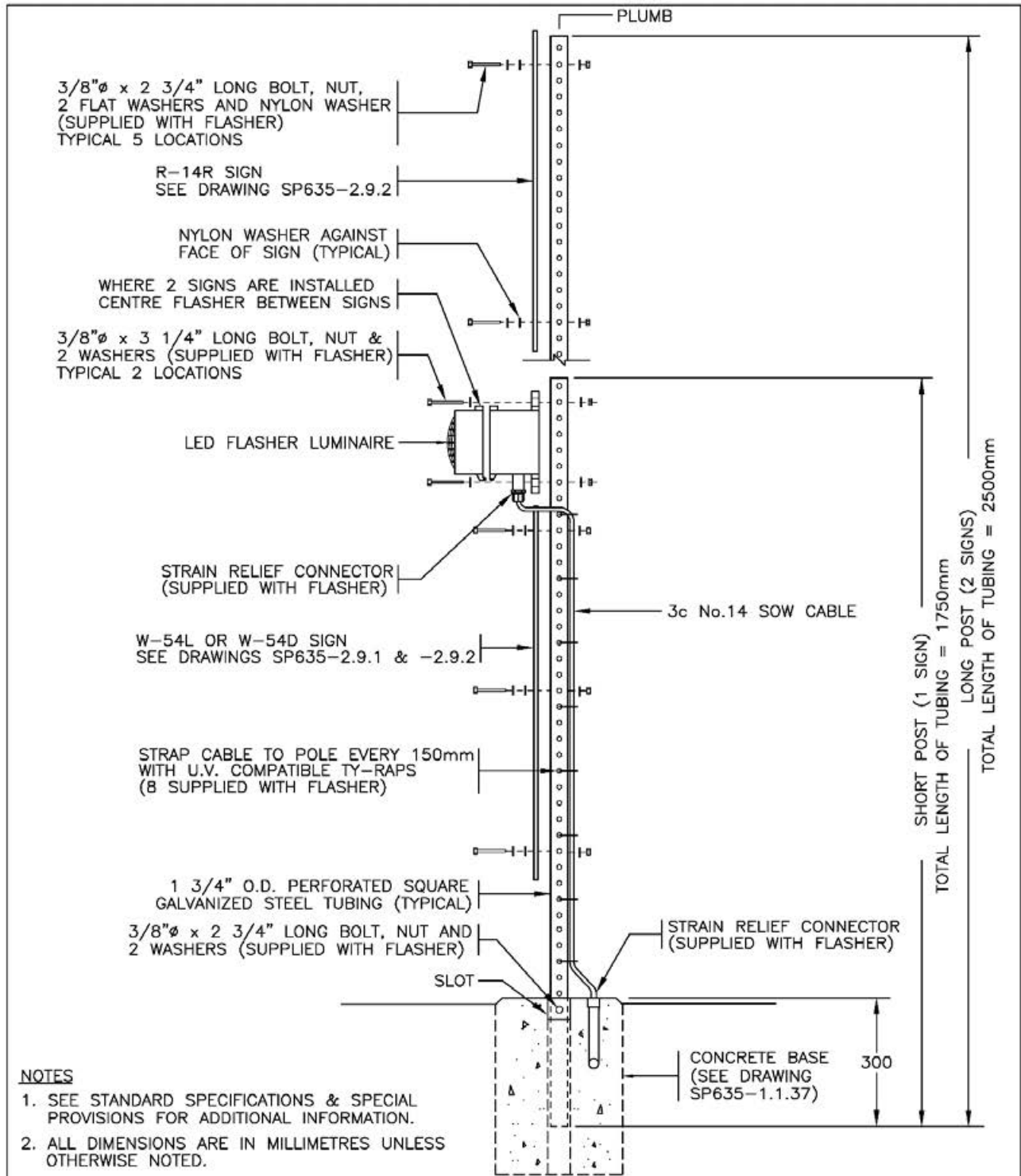
NOT TO SCALE

No.	Revision	Date	FLASHER LUMINAIRE INSTALLATION DETAILS ON PERFORATED SQUARE STEEL TUBING (1 SIGN)		SPECIFICATION DRAWING No. SP635-2.9.1
F			Date	Approved	
E	GENERAL REVISIONS	APR 20	<p><b>MAR 94 E.L. (Signature on File)</b> Chief Highway Engineer</p>		
D	GENERAL REVISIONS	APR 17			
C	CONCRETE BASE DRAWING REFERENCE REVISED	AUG 96			
B	REVISION NOTE 'A' ADDED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



NOT TO SCALE

No.	Revision	Date	FLASHER LUMINAIRE INSTALLATION DETAILS ON PERFORATED SQUARE STEEL TUBING (2 SIGNS)			
F			Date	Approved		
E			SPECIFICATION DRAWING No. <b>SP635-2.9.2</b>			
D	GENERAL REVISIONS	APR 20			<b>MAR 94 E.L. (Signature on File)</b> Chief Highway Engineer	
C	GENERAL REVISIONS	APR 17				
B	CONCRETE BASE DRAWING REFERENCE REVISED	AUG 96				
A	GENERAL REVISIONS	AUG 94				



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

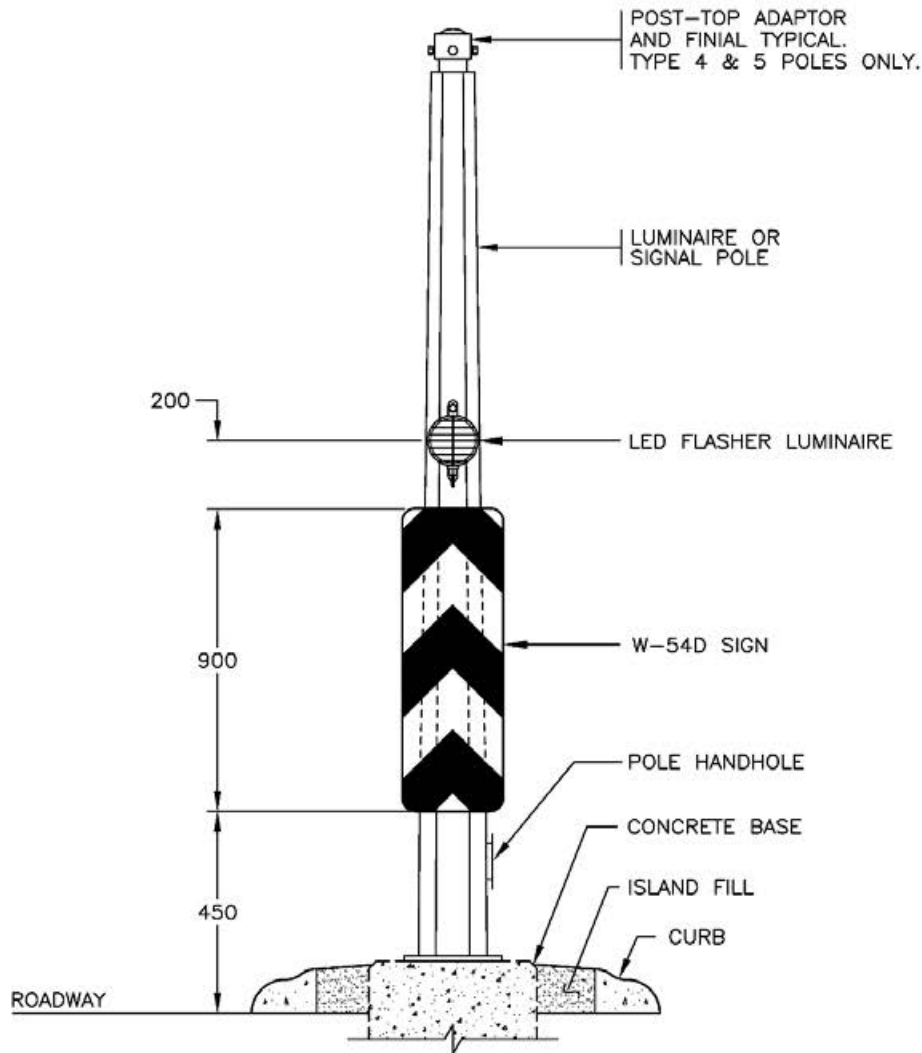
**SIDE VIEW**



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NOT TO SCALE

No.	Revision	Date	FLASHER LUMINAIRE INSTALLATION DETAILS ON PERFORATED SQUARE STEEL TUBING	
F				
E				
D	GENERAL REVISIONS	APR 20	Date	Approved
C	GENERAL REVISIONS	APR 17	<b>MAR 94 E.L. (Signature on File)</b> Chief Highway Engineer	
B	3c No.14 CABLE NOT SUPPLIED WITH FLASHER	AUG 96		
A	GENERAL REVISIONS	AUG 94		



ELEVATION

REFER TO THE MINISTRY'S MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS FOR APPLICATIONS WHICH APPLY TO THIS SIGN

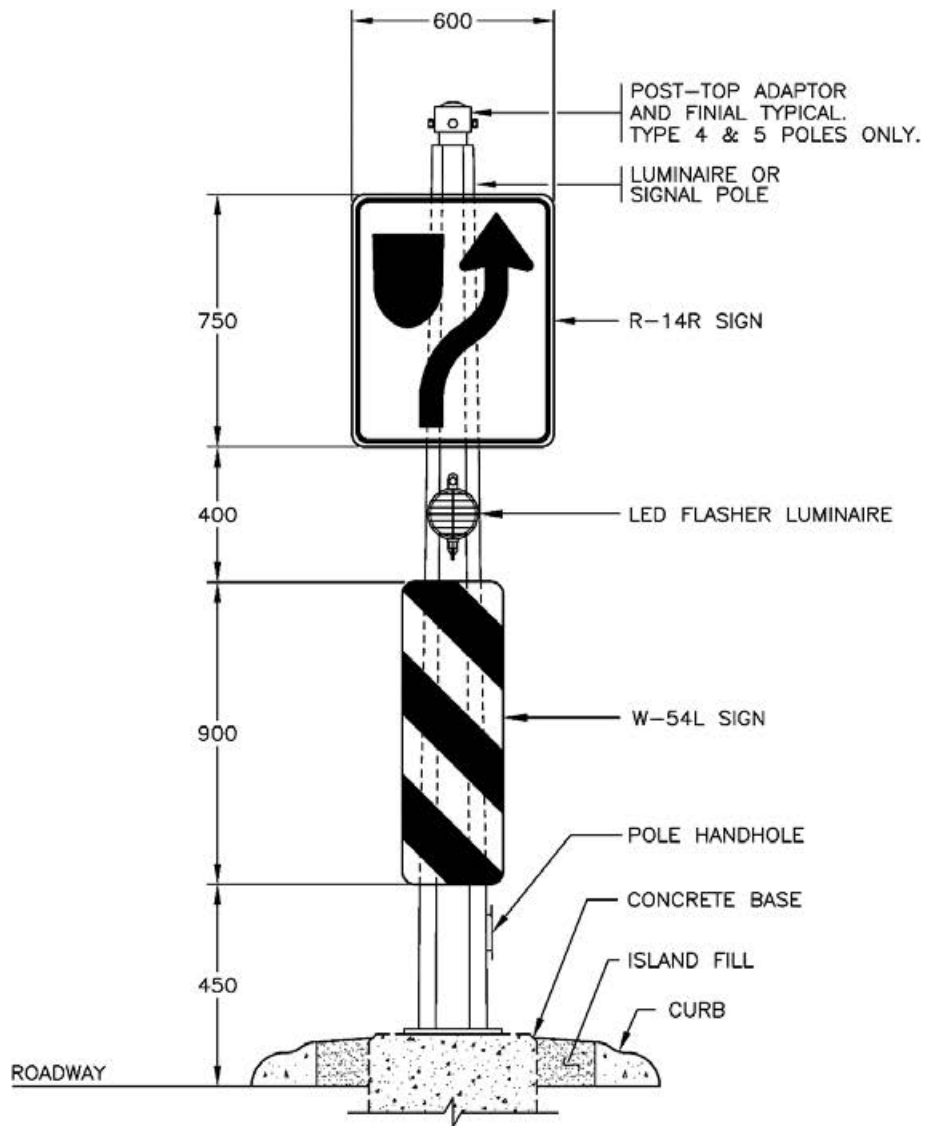
SEE DRAWING SP635-2.9.6 FOR NOTES AND ADDITIONAL DETAILS



NOT TO SCALE

No.	Revision	Date	FLASHER LUMINAIRE INSTALLATION DETAILS ON STEEL POLE (1 SIGN)		SPECIFICATION DRAWING No. SP635-2.9.4
F			Date	Approved	
E			18/11/94	E.L. (Signature on File)	
D				Chief Highway Engineer	
C					
B	GENERAL REVISIONS	APR 20			
A	GENERAL REVISIONS	APR 17			





ELEVATION

REFER TO THE MINISTRY'S MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS FOR APPLICATIONS WHICH APPLY TO THIS SIGN

SEE DRAWING SP635-2.9.6 FOR NOTES AND ADDITIONAL DETAILS



Ministry of Transportation and Infrastructure

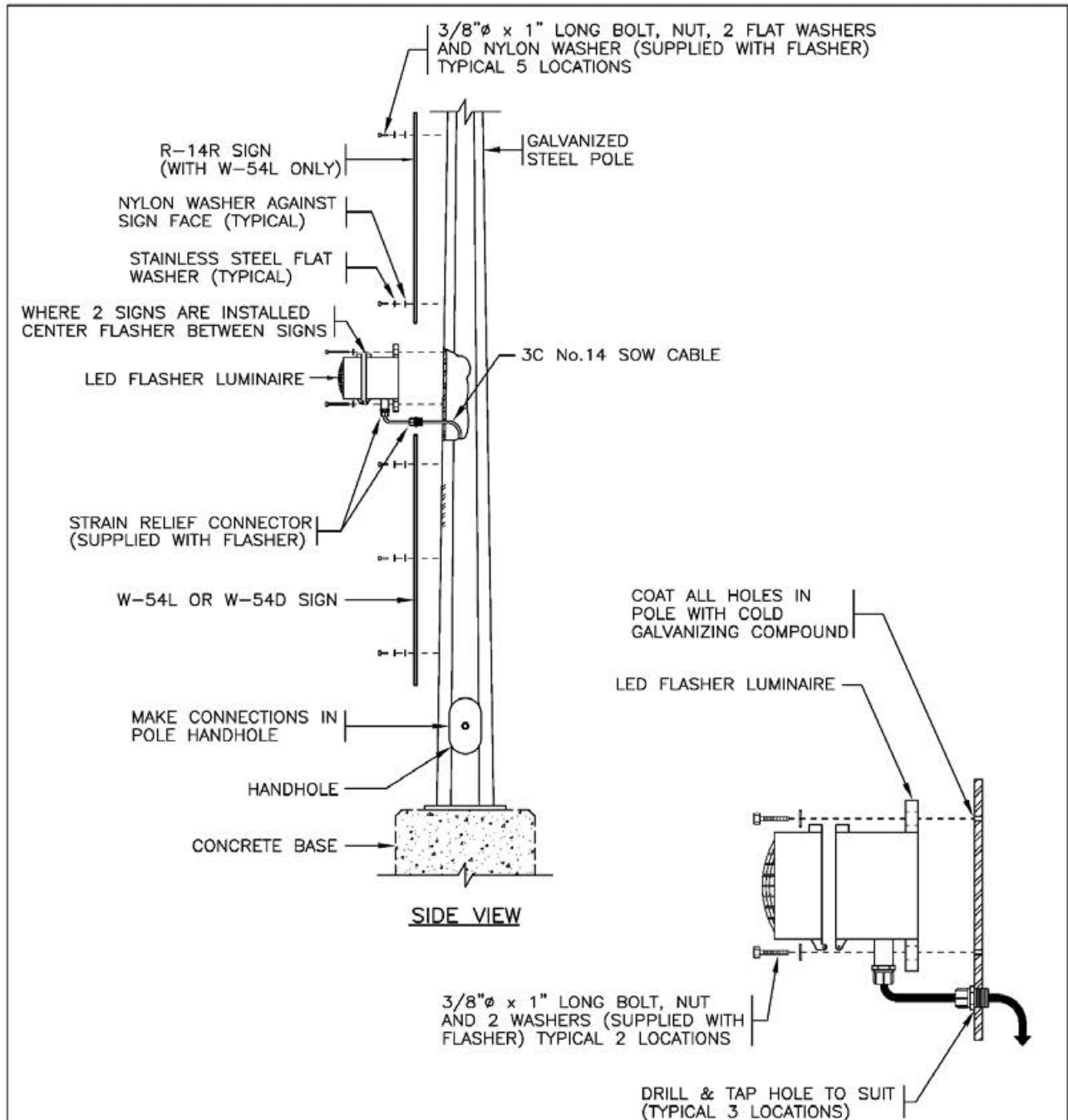
NOT TO SCALE

No.	Revision	Date
F		
E		
D		
C		
B	GENERAL REVISIONS	APR 20
A	GENERAL REVISIONS	APR 17

FLASHER LUMINAIRE INSTALLATION DETAILS ON STEEL POLE (2 SIGNS)

Date: 18/11/94  
 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-2.9.5



FLASHER LUMINAIRE MOUNTING DETAIL  
N.T.S.

NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

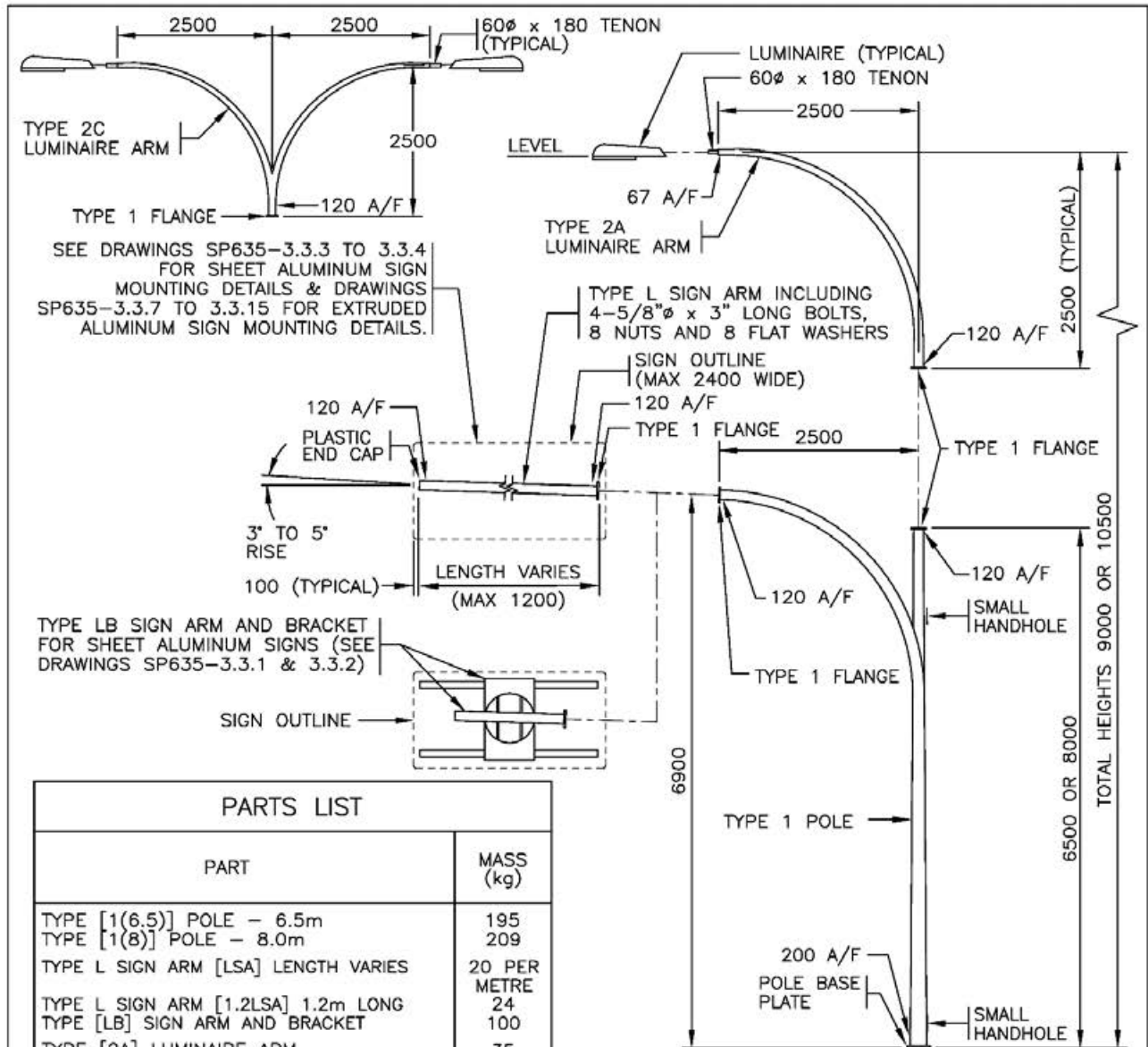
NOT TO SCALE



No.	Revision	Date
F		
E		
D		
C	GENERAL REVISIONS	APR 20
B	GENERAL REVISIONS	APR 17
A	3C No.14 NOT SUPPLIED WITH FLASHER	AUG 96

FLASHER LUMINAIRE INSTALLATION DETAILS ON STEEL POLE

Date	Approved	SPECIFICATION DRAWING No.
18/11/94	M.C. (Signature on File) Chief Highway Engineer	SP635-2.9.6



SEE DRAWINGS SP635-3.3.3 TO 3.3.4 FOR SHEET ALUMINUM SIGN MOUNTING DETAILS & DRAWINGS SP635-3.3.7 TO 3.3.15 FOR EXTRUDED ALUMINUM SIGN MOUNTING DETAILS.

TYPE LB SIGN ARM AND BRACKET FOR SHEET ALUMINUM SIGNS (SEE DRAWINGS SP635-3.3.1 & 3.3.2)

PARTS LIST	
PART	MASS (kg)
TYPE [1(6.5)] POLE - 6.5m	195
TYPE [1(8)] POLE - 8.0m	209
TYPE L SIGN ARM [LSA] LENGTH VARIES	20 PER METRE
TYPE L SIGN ARM [1.2LSA] 1.2m LONG	24
TYPE [LB] SIGN ARM AND BRACKET	100
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
POST TOP TENON [PTT]	5
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5

\* [ ] I.D. LABEL ON POLE

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-3.1.2 FOR TYPE 1 POLE, BOLT KITS AND POLE ASSEMBLY DETAILS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE

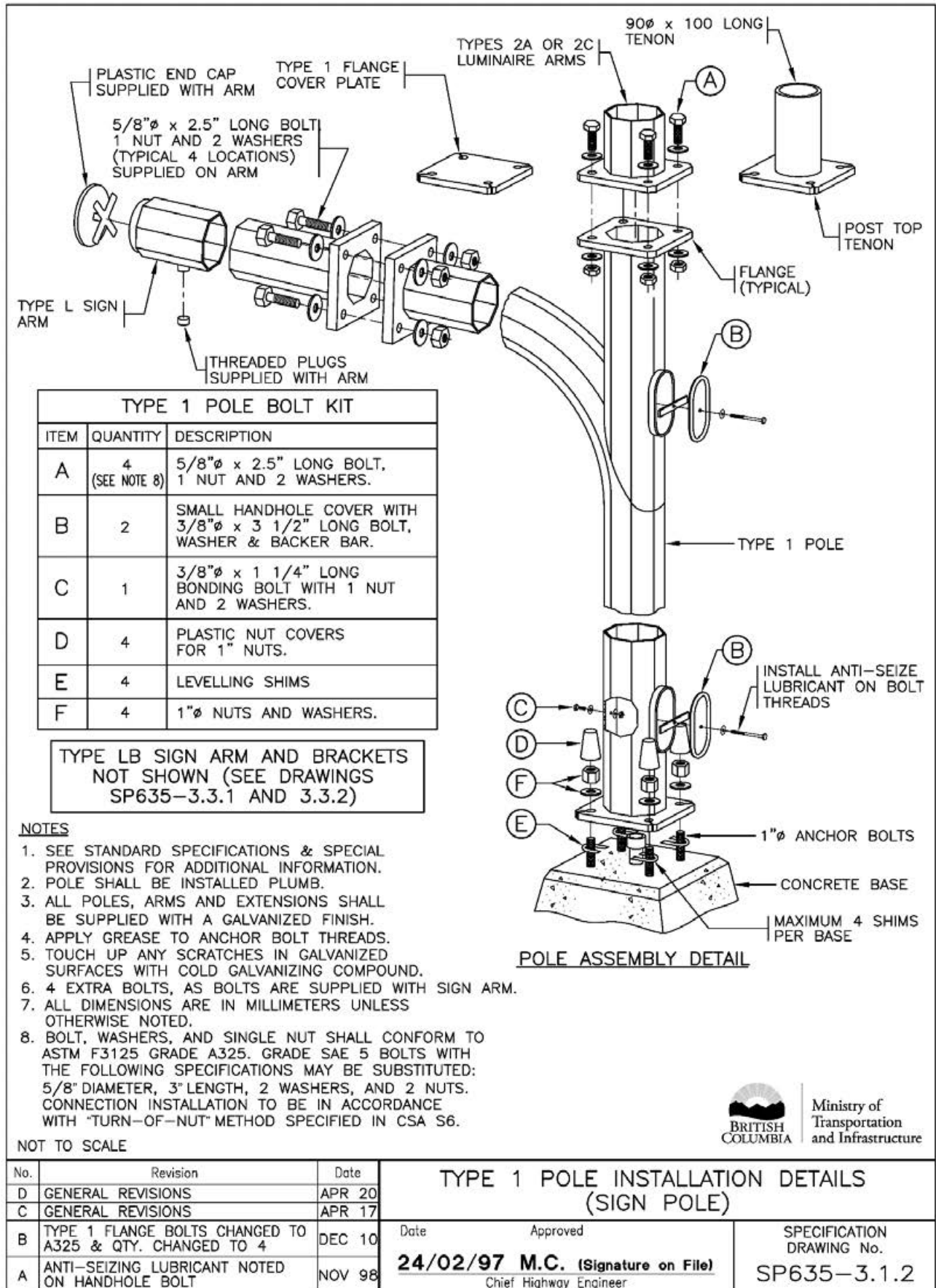
No.	Revision	Date
F		
E		
D	PLYWOOD SIGN DETAILS REMOVED	APR 20
C	GENERAL REVISIONS	APR 17
B	SHEET ALUMINUM SIGN ADDED	APR 05
A	COUPLING DELETED ON SIGN ARM	NOV 01

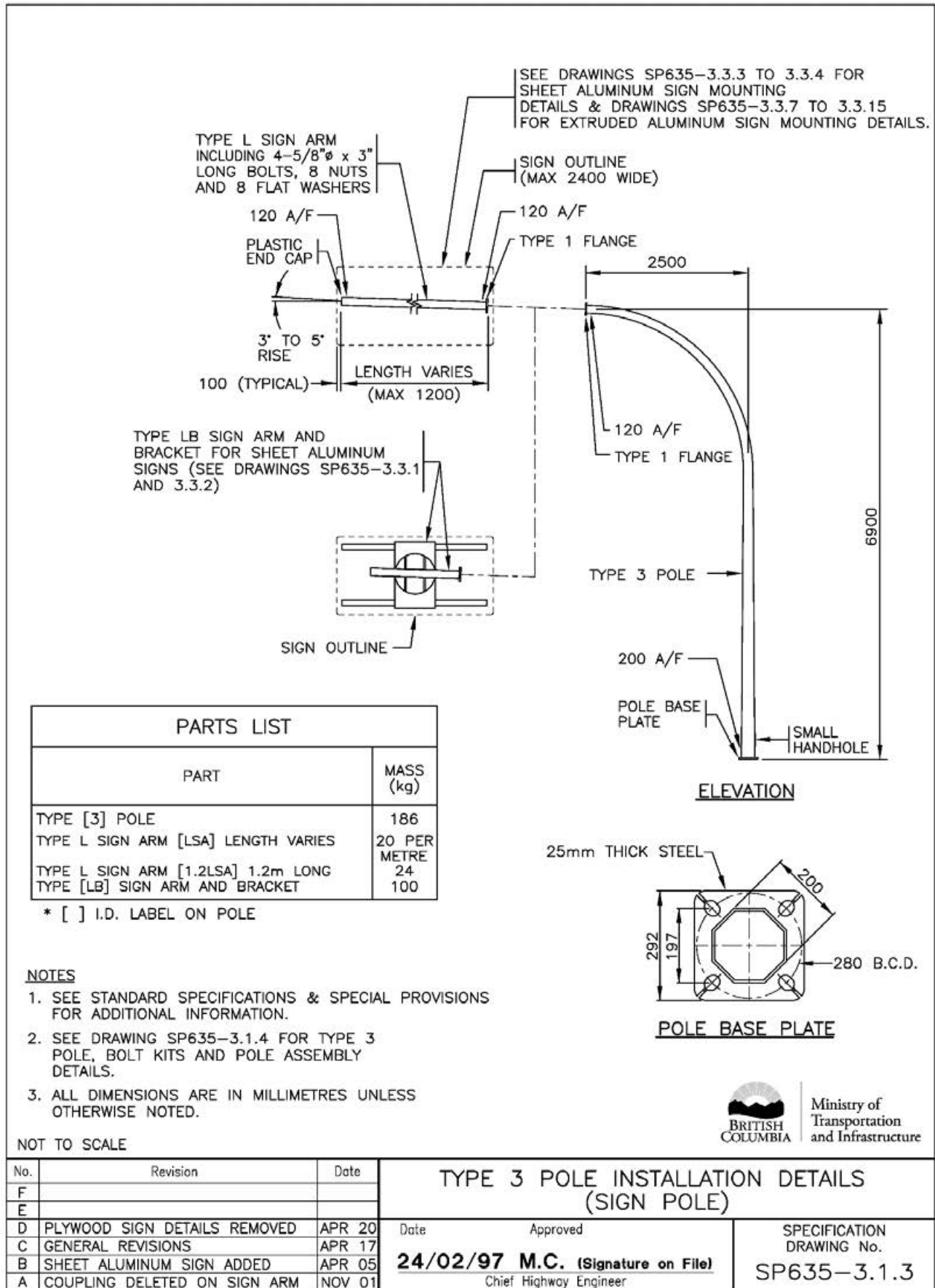
**TYPE 1 POLE INSTALLATION DETAILS (SIGN POLE)**

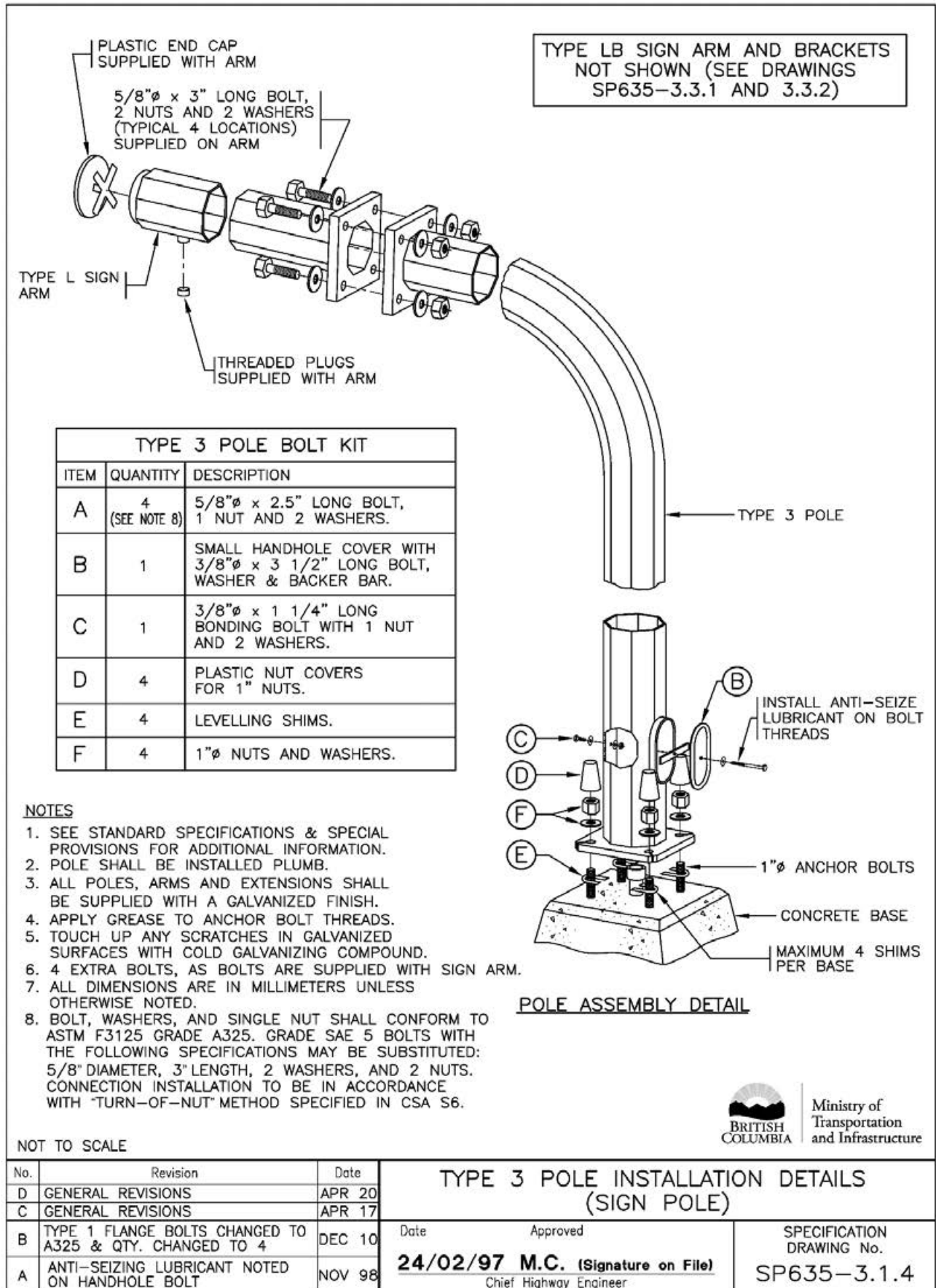
Date: 24/02/97  
 Approved: M.C. (Signature on File)  
 Chief Highway Engineer

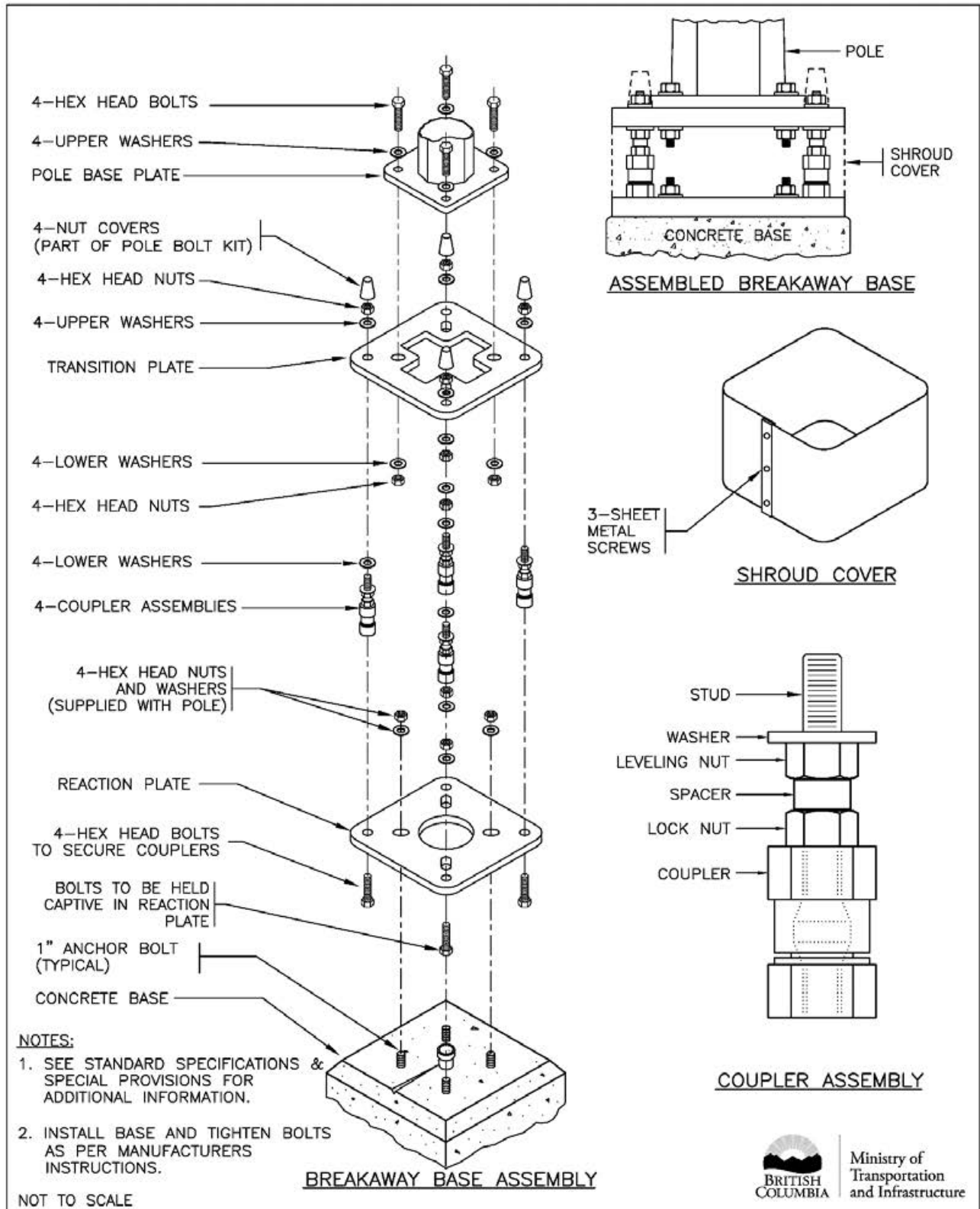
SPECIFICATION DRAWING No. SP635-3.1.1





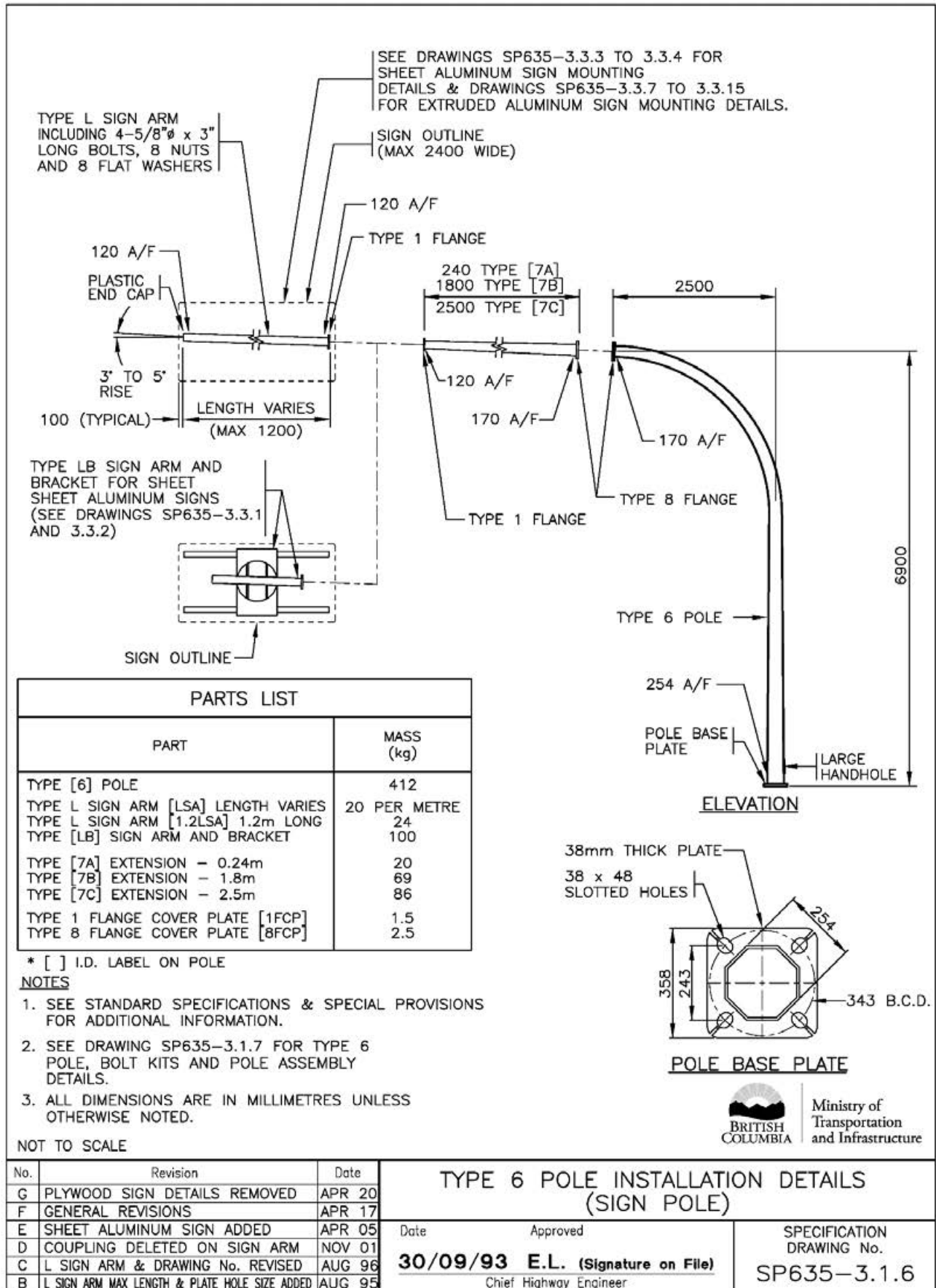




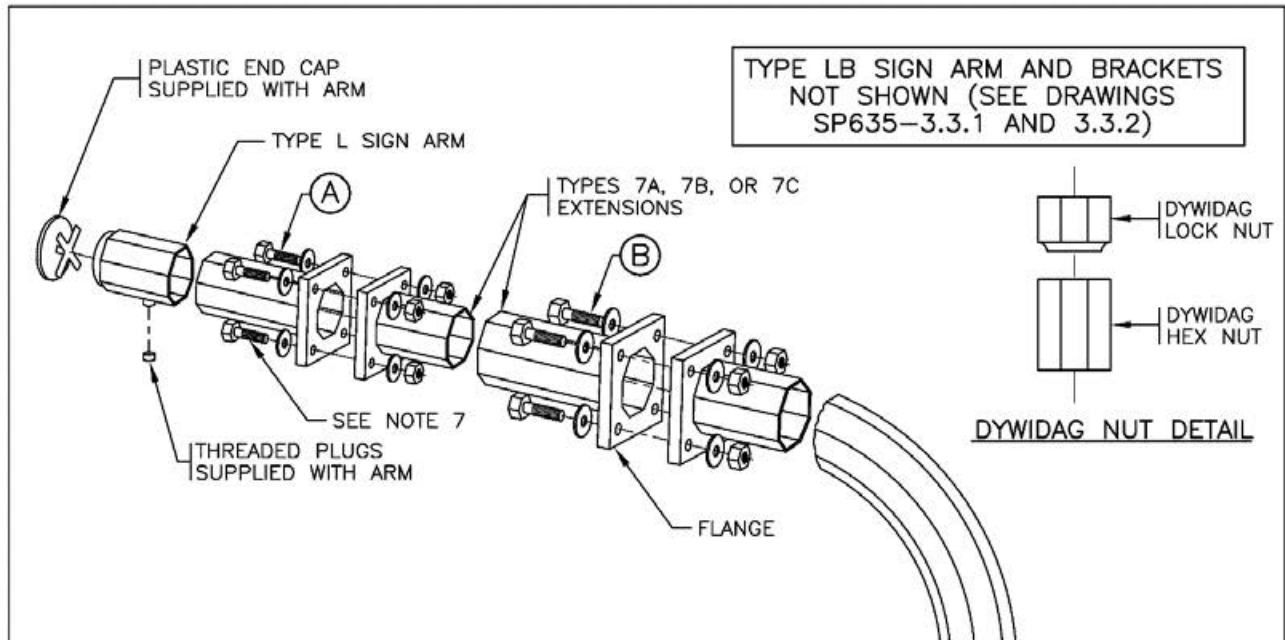


No.	Revision	Date	BREAKAWAY BASE FOR ADVANCED WARNING AND DIRECTIONAL SIGNS ON TYPE 1 AND 3 POLES		SPECIFICATION DRAWING No. SP635-3.1.5
F			Date	Approved	
E			24/02/97	M.C. (Signature on File)	
D				Chief Highway Engineer	
C					
B					
A	GENERAL REVISIONS	APR 17			





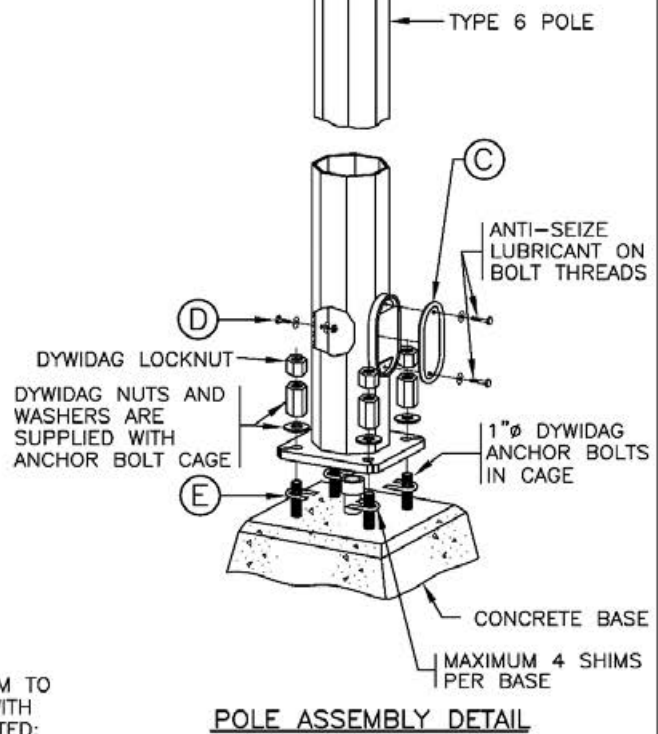




TYPE 6 POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"φ x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	4	1"φ x 4" LONG BOLT, 1 NUT AND 2 WASHERS.
C	1	LARGE HANDHOLE COVER WITH 2-3/8"φ x 1" LONG BOLTS AND 2 WASHERS.
D	1	3/8"φ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
E	4	LEVELLING SHIMS.

**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. POLE SHALL BE INSTALLED PLUMB.
3. ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
4. APPLY GREASE TO ANCHOR BOLT THREADS.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
7. BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.



NOT TO SCALE



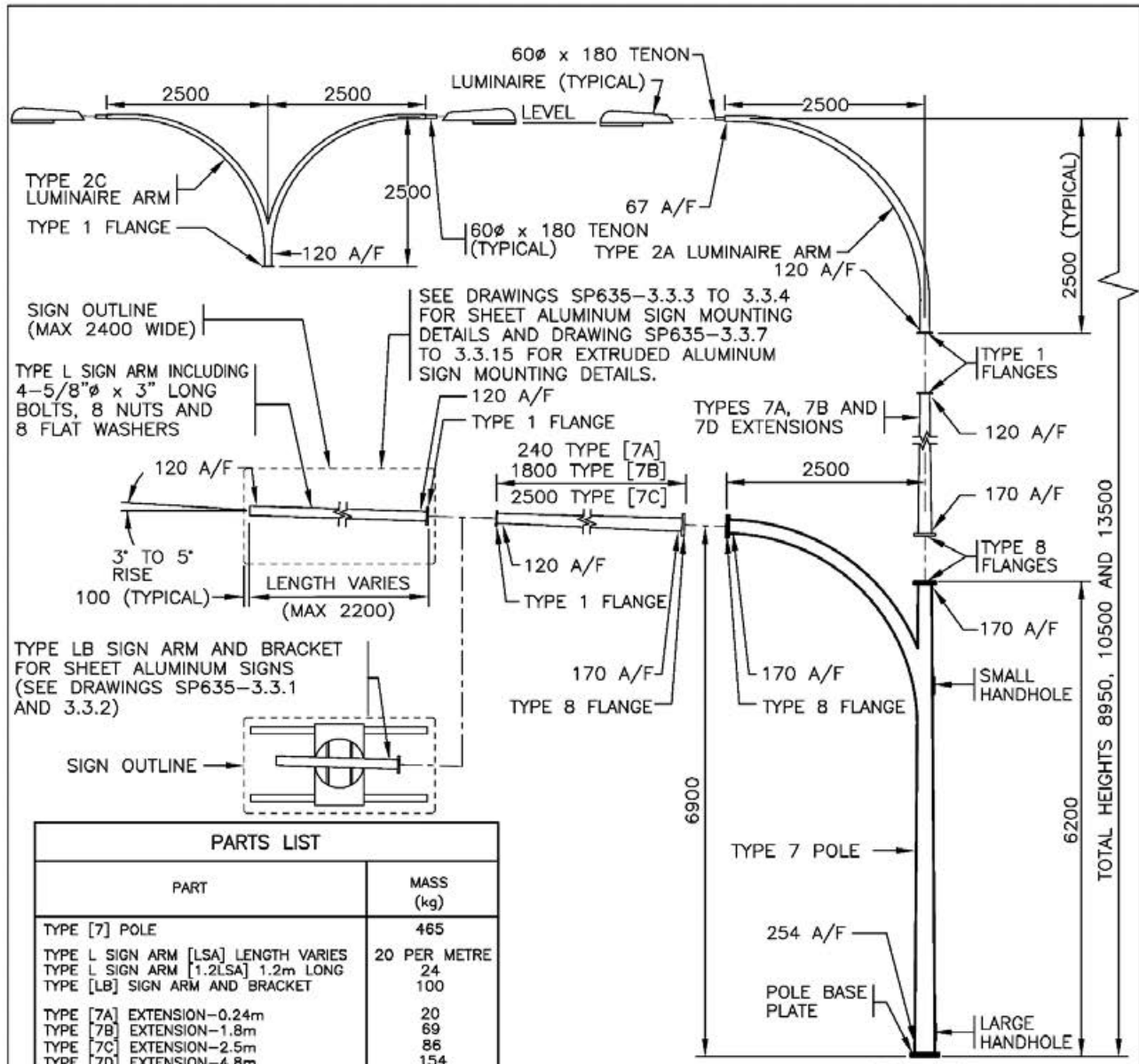
Ministry of Transportation and Infrastructure

No.	Revision	Date
F	GENERAL REVISIONS	APR 20
E	TYPE 1 & 8 FLANGE BOLTS CHANGED TO A325	DEC 10
D	ANTI-SEIZE LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98
C	DRAWING NUMBER REVISED	AUG 96
B	END CAP SUPPLIED ON L SIGN ARM	AUG 95

**TYPE 6 POLE INSTALLATION DETAILS (SIGN POLE)**

Date: 30/09/93  
 Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-3.1.7



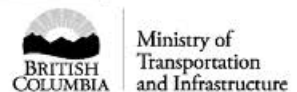
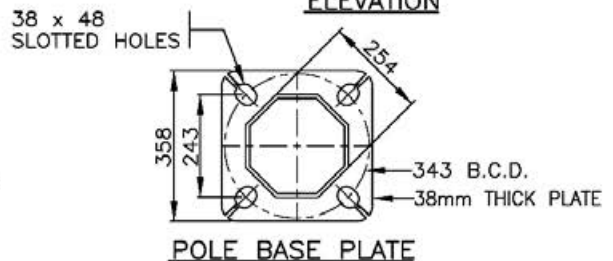
PARTS LIST	
PART	MASS (kg)
TYPE [7] POLE	465
TYPE L SIGN ARM [LSA] LENGTH VARIES	20 PER METRE
TYPE L SIGN ARM [1.2LSA] 1.2m LONG	24
TYPE [LB] SIGN ARM AND BRACKET	100
TYPE [7A] EXTENSION-0.24m	20
TYPE [7B] EXTENSION-1.8m	69
TYPE [7C] EXTENSION-2.5m	86
TYPE [7D] EXTENSION-4.8m	154
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
POST TOP TENON [PTT]	5
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5
TYPE 8 FLANGE COVER PLATE [8FCP]	2.5

\* [ ] I.D. LABEL ON POLE

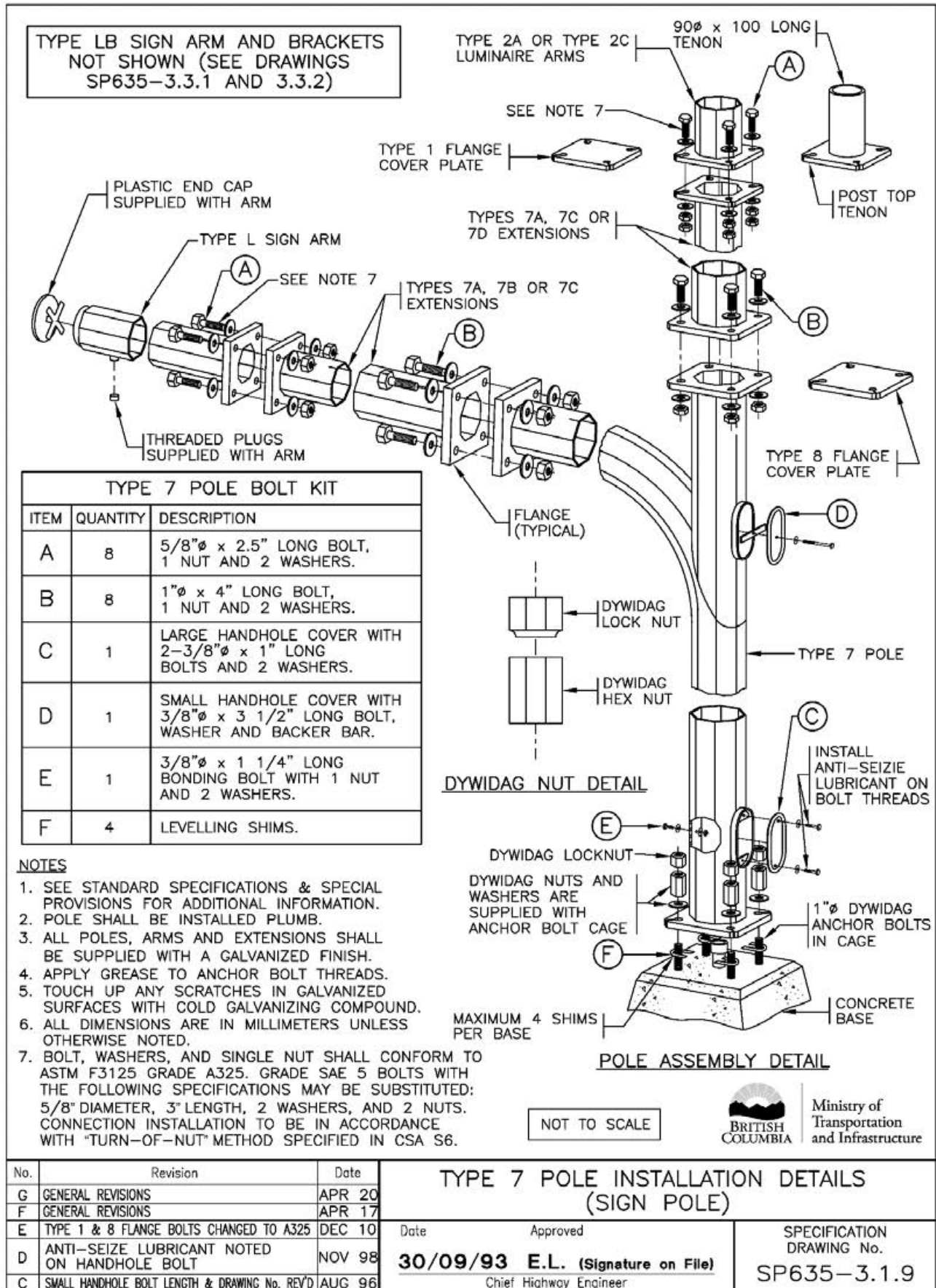
**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- SEE DRAWING SP635-3.1.9 FOR TYPE 7 POLE, BOLT KITS AND POLE ASSEMBLY DETAILS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



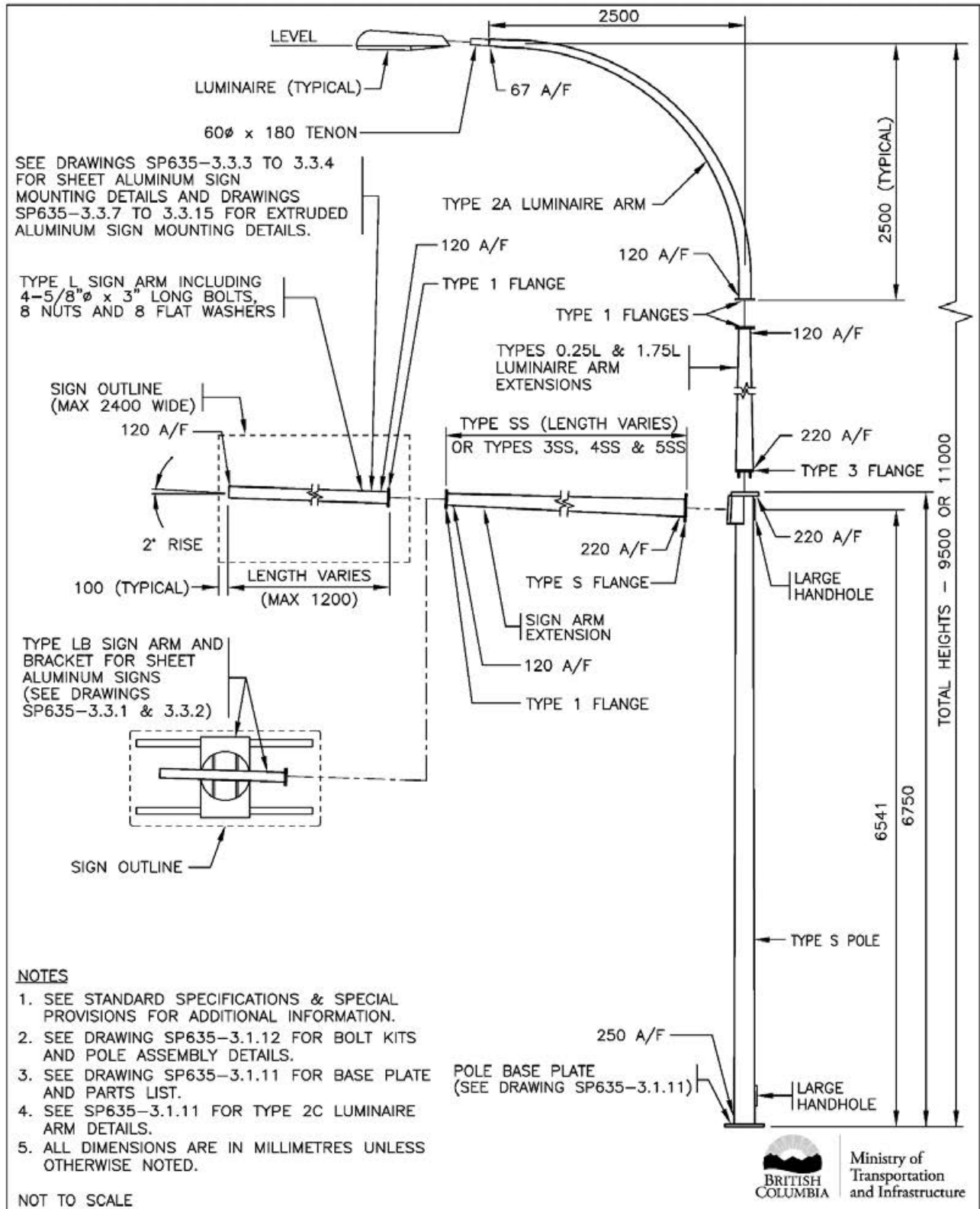
No.	Revision	Date	TYPE 7 POLE INSTALLATION DETAILS (SIGN POLE)		SPECIFICATION DRAWING No. SP635-3.1.8
G	PLYWOOD SIGN DETAILS REMOVED	APR 20	Date	Approved	
F	GENERAL REVISIONS	APR 17	<b>30/09/93 E.L. (Signature on File)</b> Chief Highway Engineer		
E	SHEET ALUMINUM SIGN ADDED	APR 05			
D	COUPLING DELETED ON SIGN ARM	NOV 01			
C	L SIGN ARM & DRAWING No. REVISED	AUG 96			
B	L SIGN ARM MAX LENGTH & 7C EXT. ADDED	AUG 95			



No.	Revision	Date
G	GENERAL REVISIONS	APR 20
F	GENERAL REVISIONS	APR 17
E	TYPE 1 & 8 FLANGE BOLTS CHANGED TO A325	DEC 10
D	ANTI-SEIZE LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98
C	SMALL HANDHOLE BOLT LENGTH & DRAWING No. REV'D	AUG 96

**TYPE 7 POLE INSTALLATION DETAILS (SIGN POLE)**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-3.1.9</b>



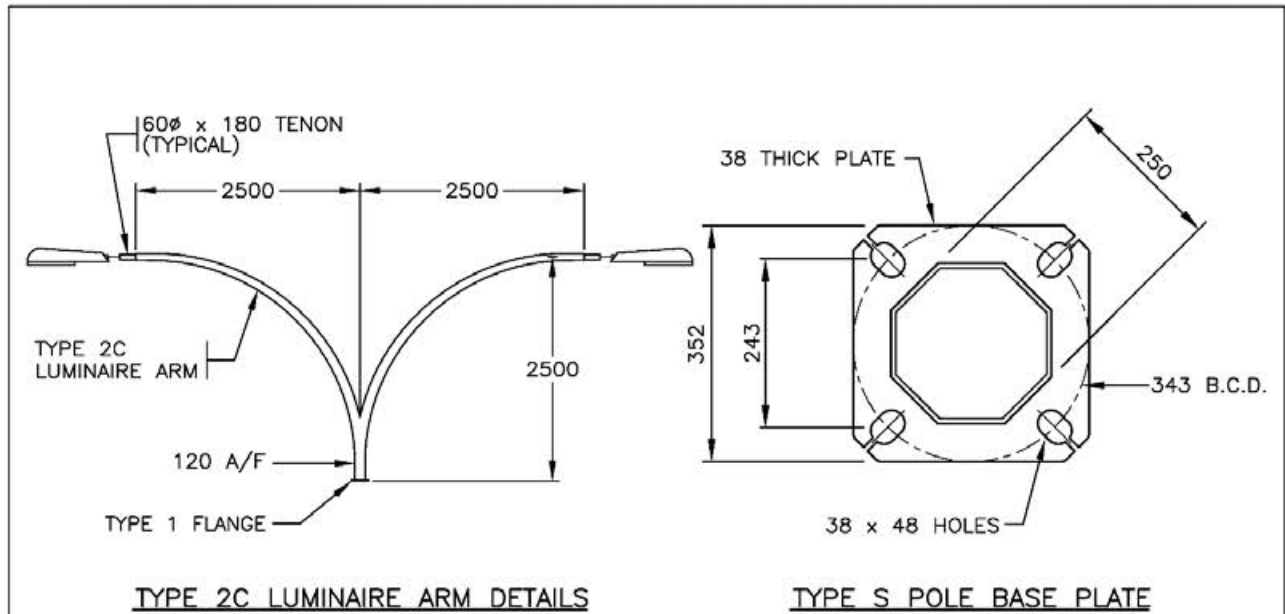
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-3.1.12 FOR BOLT KITS AND POLE ASSEMBLY DETAILS.
3. SEE DRAWING SP635-3.1.11 FOR BASE PLATE AND PARTS LIST.
4. SEE SP635-3.1.11 FOR TYPE 2C LUMINAIRE ARM DETAILS.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE

No.	Revision	Date
F		
E		
D		
C	PLYWOOD SIGN DETAILS REMOVED & NEW DRAWING NUMBER	APR 20
B	GENERAL REVISIONS	APR 17
A	SHEET ALUMINUM SIGN ADDED	APR 05

TYPE S SIGN POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No.
Date	Approved	SP635-3.1.10
14/11/03	D.N. (Signature on File) Chief Engineer	



PARTS LIST FOR TYPE S SIGN POLE	
PART	MASS (kg)
TYPE [S] POLE	385
TYPE L SIGN ARM [LSA] LENGTH VARIES	20 PER METRE
TYPE L SIGN ARM [1.2LSA] 1.2m LONG	24
TYPE [LB] SIGN ARM AND BRACKETS	100
TYPE [SS] SIGN ARM EXTENSION - LENGTH VARIES	45 PER METRE
TYPE [3SS] SIGN ARM EXTENSION - 3.0m	135
TYPE [4SS] SIGN ARM EXTENSION - 4.0m	180
TYPE [5SS] SIGN ARM EXTENSION - 5.0m	225
TYPE [1.75L] LUMINAIRE ARM EXTENSION - 1.75m	29
TYPE [0.25L] LUMINAIRE ARM EXTENSION - 0.25m	10
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5
TYPE S FLANGE COVER PLATE [SFCP]	3
TYPE 3 FLANGE COVER PLATE [3FCP]	4
POST TOP TENON [PTT]	5

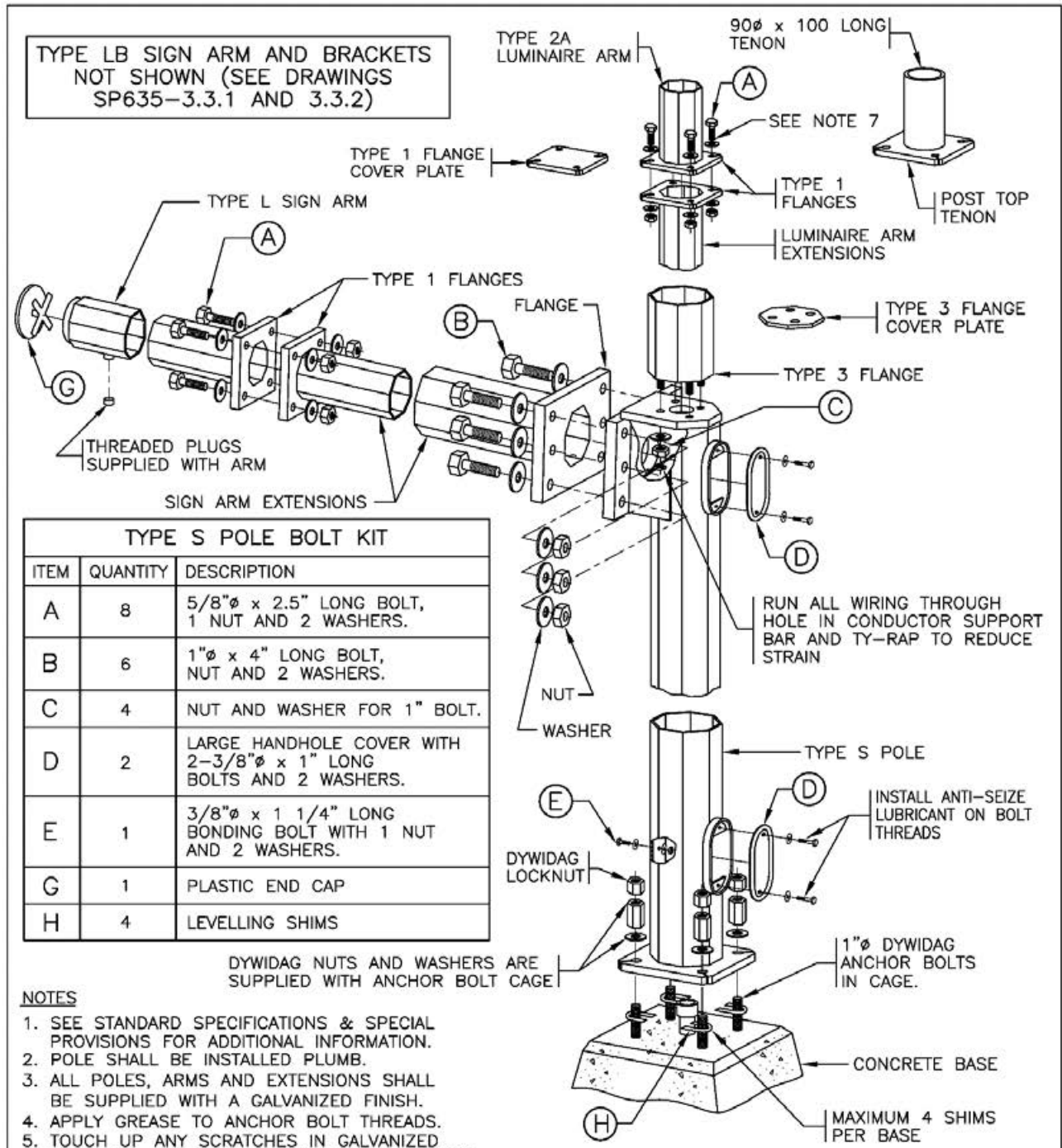
\* [ ] I.D. LABEL ON POLE

NOT TO SCALE



Ministry of Transportation and Infrastructure

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No.	Revision	Date																								
F																										
E																										
D																										
C																										
B	NEW DRAWING NUMBER	APR 20																								
A	GENERAL REVISIONS	APR 17																								
Date <b>14/11/03</b>		Approved <b>D.N. (Signature on File)</b> Chief Engineer																								



TYPE LB SIGN ARM AND BRACKETS NOT SHOWN (SEE DRAWINGS SP635-3.3.1 AND 3.3.2)

TYPE S POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	8	5/8"Ø x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	6	1"Ø x 4" LONG BOLT, NUT AND 2 WASHERS.
C	4	NUT AND WASHER FOR 1" BOLT.
D	2	LARGE HANDHOLE COVER WITH 2-3/8"Ø x 1" LONG BOLTS AND 2 WASHERS.
E	1	3/8"Ø x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
G	1	PLASTIC END CAP
H	4	LEVELLING SHIMS

DYWIDAG NUTS AND WASHERS ARE SUPPLIED WITH ANCHOR BOLT CAGE

RUN ALL WIRING THROUGH HOLE IN CONDUCTOR SUPPORT BAR AND TY-RAP TO REDUCE STRAIN

INSTALL ANTI-SEIZE LUBRICANT ON BOLT THREADS

1"Ø DYWIDAG ANCHOR BOLTS IN CAGE.

MAXIMUM 4 SHIMS PER BASE

POLE ASSEMBLY DETAIL

NOT TO SCALE

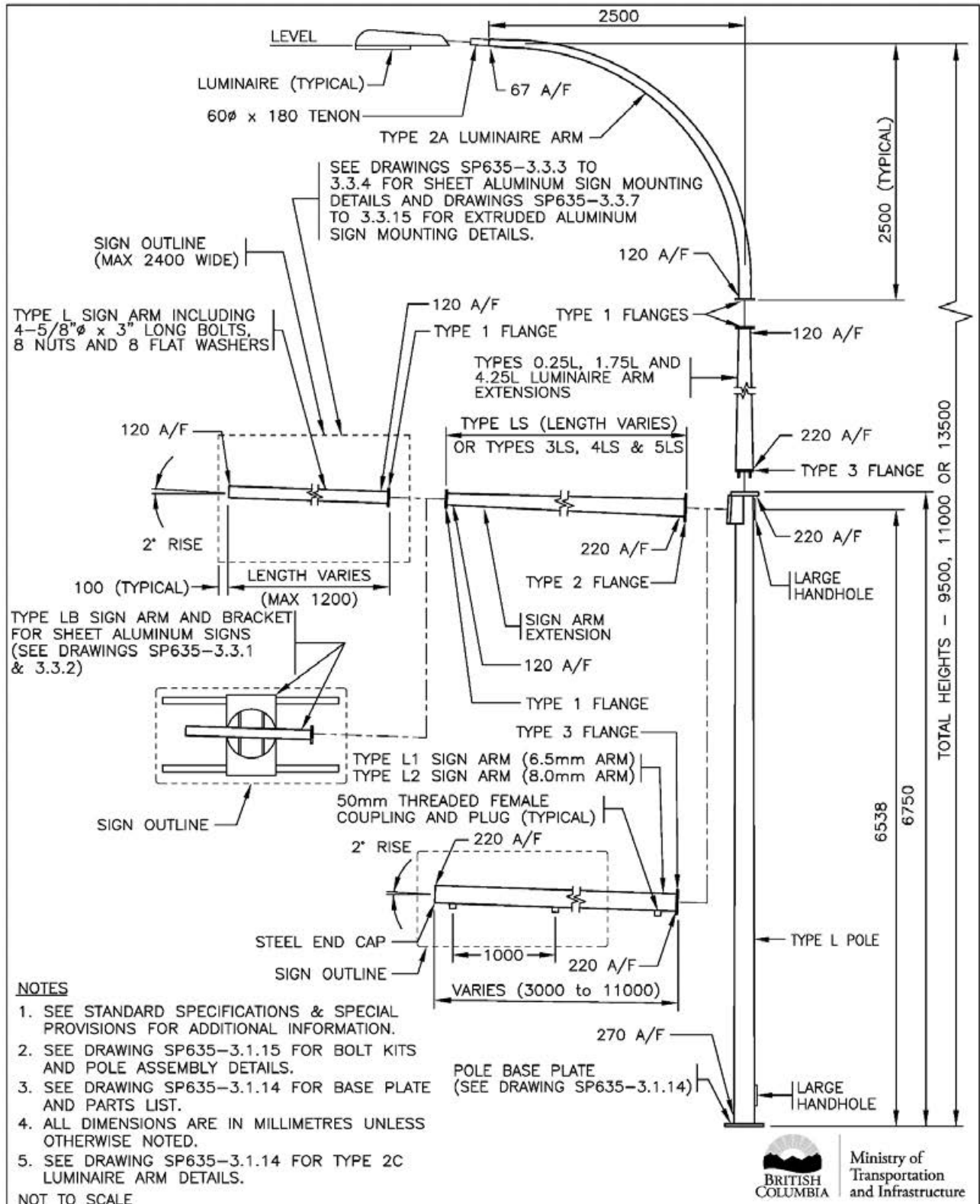
NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. POLE SHALL BE INSTALLED PLUMB.
3. ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
4. APPLY GREASE TO ANCHOR BOLT THREADS.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
7. BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.



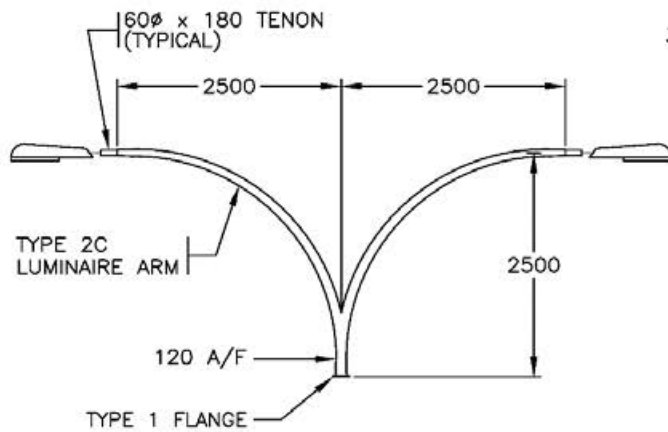
No.	Revision	Date
F		
E		
D		
C	GENERAL REVISION AND NEW DRAWING NUMBER	APR 20
B	GENERAL REVISIONS	APR 17
A	TYPE 1 & ARM FLANGE BOLTS CHANGED TO A325	DEC 10

<p>TYPE S SIGN POLE INSTALLATION DETAILS</p>		<p>SPECIFICATION DRAWING No. <b>SP635-3.1.12</b></p>
<p>Date <b>14/11/03</b></p>	<p>Approved <b>D.N. (Signature on File)</b> Chief Engineer</p>	

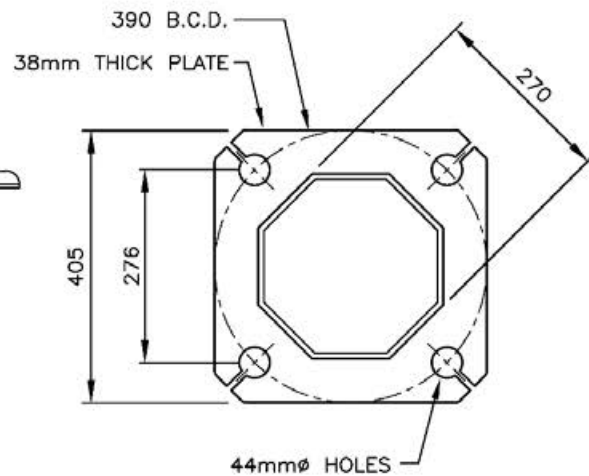


No.	Revision	Date
G	PLYWOOD SIGN DETAILS REMOVED & NEW DRAWING NUMBER	APR 20
F	GENERAL REVISIONS	APR 17
E	SHEET ALUMINUM SIGN ADDED	APR 05
D	COUPLING DELETED ON SIGN ARM	NOV 01
C	L SIGN ARM & DWG. No. REV'D & 4LS EXT ADDED	AUG 96
B	L1/L2 SIGN ARMS & NOTE 5 ADDED	AUG 95

<b>TYPE L SIGN POLE INSTALLATION DETAILS</b>		Date	Approved	SPECIFICATION DRAWING No.
		<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-3.1.13</b>



TYPE 2C LUMINAIRE ARM DETAILS



TYPE L POLE BASE PLATE

PARTS LIST FOR TYPE L SIGN POLE	
PART	MASS (kg)
TYPE [L] POLE	442
TYPE L SIGN ARM [LSA] LENGTH VARIES	20 PER METRE
TYPE L SIGN ARM [1.2LSA] 1.2m LONG	24
TYPE L1 SIGN ARM [L1SA] LENGTH VARIES	39 PER METRE
TYPE L2 SIGN ARM [L2SA] LENGTH VARIES	46 PER METRE
TYPE [LB] SIGN ARM AND BRACKETS	100
TYPE [LS] SIGN ARM EXTENSION - LENGTH VARIES	45 PER METRE
TYPE [3LS] SIGN ARM EXTENSION - 3.0m	135
TYPE [4LS] SIGN ARM EXTENSION - 4.0m	180
TYPE [5LS] SIGN ARM EXTENSION - 5.0m	225
TYPE [4.25L] LUMINAIRE ARM EXTENSION - 4.25m	82
TYPE [1.75L] LUMINAIRE ARM EXTENSION - 1.75m	29
TYPE [0.25L] LUMINAIRE ARM EXTENSION - 0.25m	10
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5
TYPE 2 FLANGE COVER PLATE [2FCP]	4
TYPE 3 FLANGE COVER PLATE [3FCP]	4
POST TOP TENON [PTT]	5

\* [ ] I.D. LABEL ON POLE

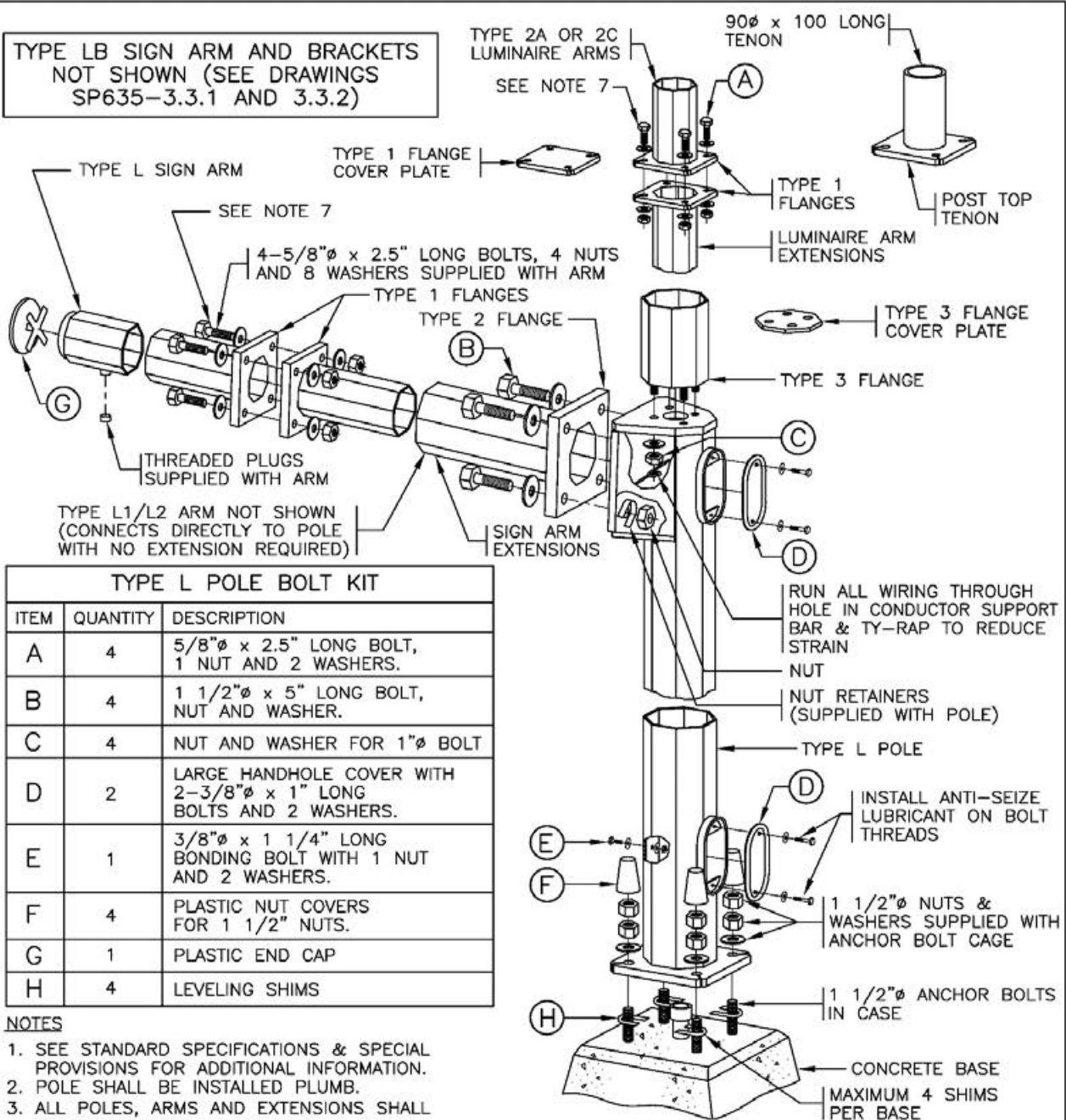
NOT TO SCALE



No.	Revision	Date	TYPE L SIGN POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No.
F					
E	NEW DRAWING NUMBER	APR 20			
D	GENERAL REVISIONS	APR 17	Date	Approved	
C	TYPE L SIGN ARM & DWG. No. REV'D & 4LS EXT ADDED	AUG 96	30/09/93	E.L. (Signature on File)	SP635-3.1.14
B	L1/L2 SIGN ARMS & 2C ARM ADDED	AUG 95			
A	GENERAL REVISION	AUG 94			



TYPE LB SIGN ARM AND BRACKETS NOT SHOWN (SEE DRAWINGS SP635-3.3.1 AND 3.3.2)



TYPE L POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"φ x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	4	1 1/2"φ x 5" LONG BOLT, NUT AND WASHER.
C	4	NUT AND WASHER FOR 1"φ BOLT
D	2	LARGE HANDHOLE COVER WITH 2-3/8"φ x 1" LONG BOLTS AND 2 WASHERS.
E	1	3/8"φ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
F	4	PLASTIC NUT COVERS FOR 1 1/2" NUTS.
G	1	PLASTIC END CAP
H	4	LEVELING SHIMS

NOTES

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- POLE SHALL BE INSTALLED PLUMB.
- ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
- APPLY GREASE TO ANCHOR BOLT THREADS.
- TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
- BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

POLE ASSEMBLY DETAIL

NOT TO SCALE

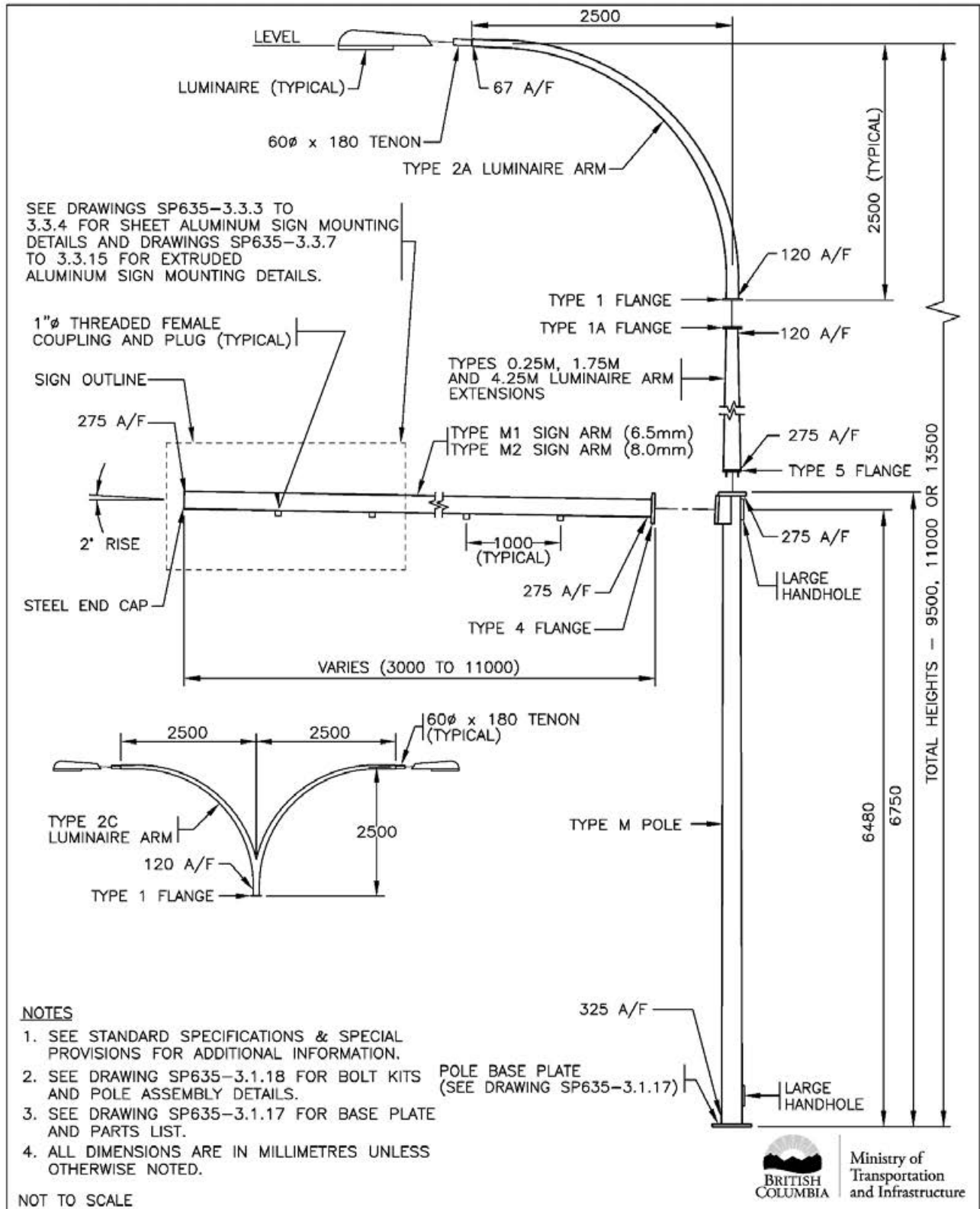


No.	Revision	Date
G	GENERAL REVISIONS AND NEW DRAWING NUMBER	APR 20
F	GENERAL REVISIONS	APR 17
E	TYPE 1 & ARM FLANGE BOLTS CHANGED TO A325	DEC 10
D	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98
C	SIGN ARM & DRAWING NUMBERS REVISED	AUG 96

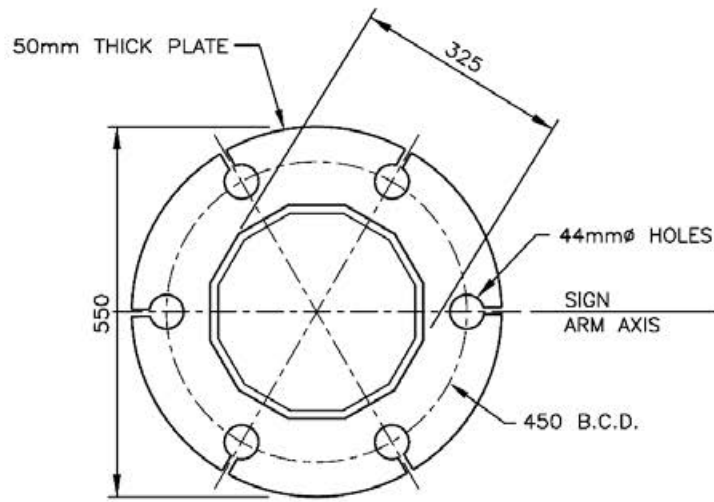
**TYPE L SIGN POLE  
INSTALLATION DETAILS**

Date: 30/09/93      Approved: E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION  
DRAWING No.  
SP635-3.1.15



No.	Revision	Date	TYPE M SIGN POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-3.1.16
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D	PLYWOOD SIGN DETAILS REMOVED & NEW DRAWING NUMBER	APR 20	Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	DRAWING REFERENCES & DRAWING NUMBER REVISED	DEC 96			
A	GENERAL REVISION	AUG 94			



**TYPE M POLE BASE PLATE**

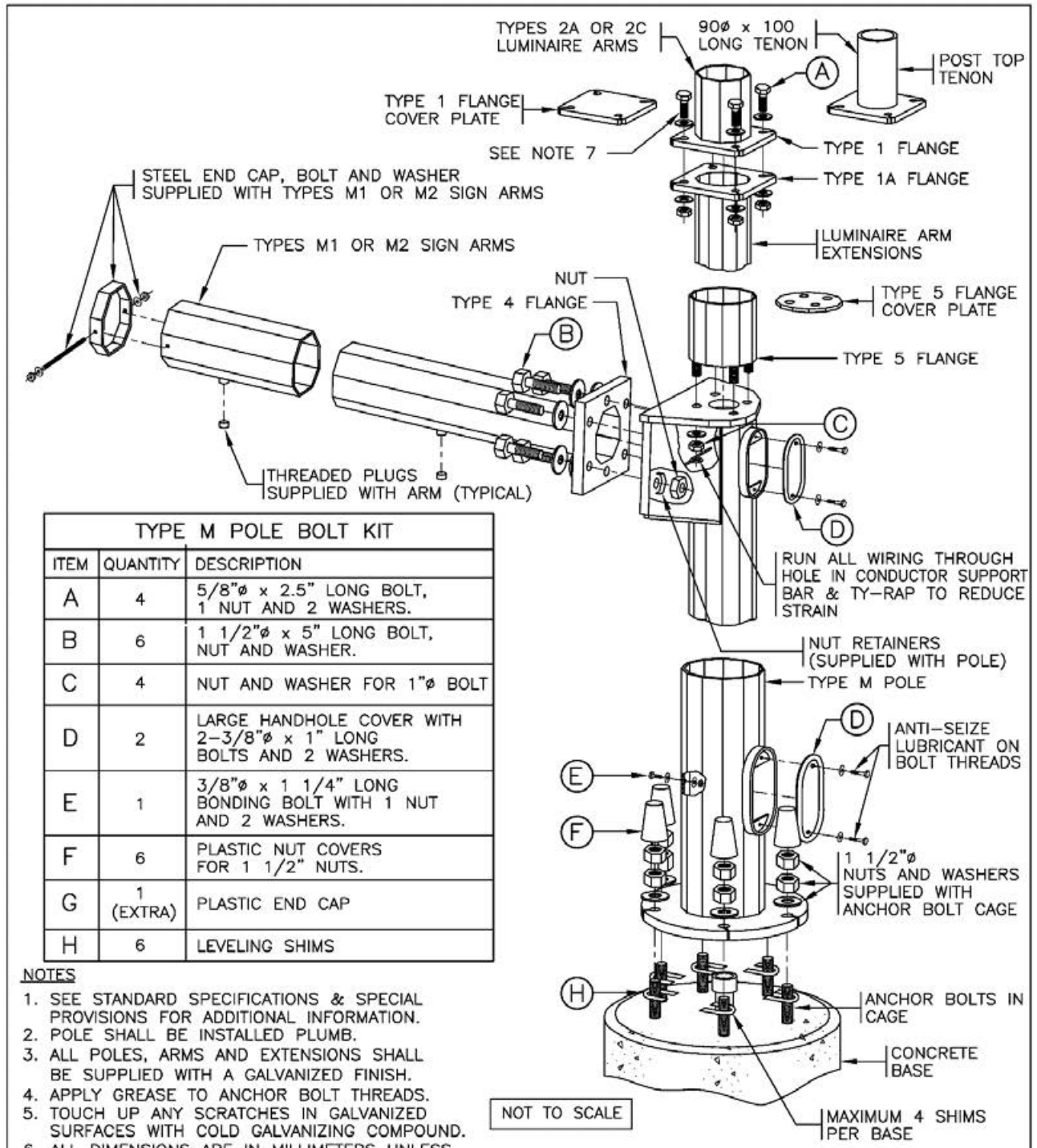
PARTS LIST FOR TYPE M SIGNAL POLE	
PART	MASS (kg)
TYPE [M] POLE	565
TYPE [M1] SIGN ARM (LENGTH VARIES)	55 PER METRE
TYPE [M2] SIGN ARM (LENGTH VARIES)	65 PER METRE
TYPE [4.25M] LUMINAIRE ARM EXTENSION - 4.25m	115
TYPE [1.75M] LUMINAIRE ARM EXTENSION - 1.75m	38
TYPE [0.25M] LUMINAIRE ARM EXTENSION - 0.25m	14
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5
TYPE 3 FLANGE COVER PLATE [3FCP]	4
TYPE 4 FLANGE COVER PLATE [4FCP]	8
TYPE 5 FLANGE COVER PLATE [5FCP]	4
TYPE 4 TO 2 FLANGE ADAPTOR [FA]	75
POST TOP TENON [PTT]	5

\* [ ] I.D. LABELS ON POLE



NOT TO SCALE

No.	Revision	Date	<b>TYPE M SIGN POLE INSTALLATION DETAILS</b>		SPECIFICATION DRAWING No. <b>SP635-3.1.17</b>
F					
E	NEW DRAWING NUMBER	APR 20	Date	Approved	
D	GENERAL REVISIONS	APR 17	<b>30/09/93</b>	<b>E.L. (Signature on File)</b>	
C	DRAWING NUMBER REVISED	AUG 96		Chief Highway Engineer	
B	HOLE SIZES REVISED	AUG 95			
A	GENERAL REVISION	AUG 94			



TYPE M POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"φ x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	6	1 1/2"φ x 5" LONG BOLT, NUT AND WASHER.
C	4	NUT AND WASHER FOR 1"φ BOLT
D	2	LARGE HANDHOLE COVER WITH 2-3/8"φ x 1" LONG BOLTS AND 2 WASHERS.
E	1	3/8"φ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
F	6	PLASTIC NUT COVERS FOR 1 1/2" NUTS.
G	1 (EXTRA)	PLASTIC END CAP
H	6	LEVELING SHIMS

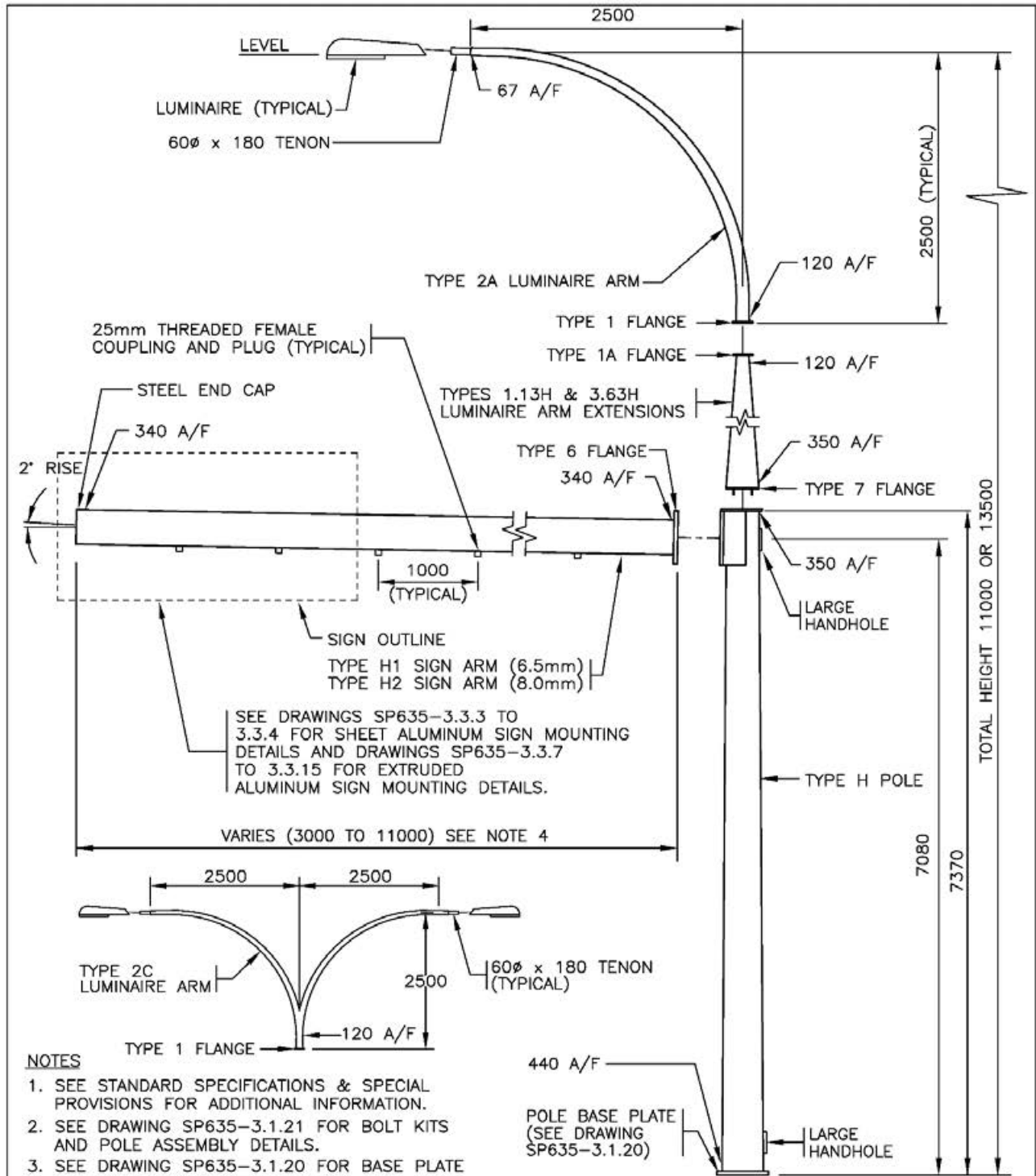
**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- POLE SHALL BE INSTALLED PLUMB.
- ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
- APPLY GREASE TO ANCHOR BOLT THREADS.
- TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
- BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.



**POLE ASSEMBLY DETAIL**

No.	Revision	Date	TYPE M SIGN POLE INSTALLATION DETAILS		SPECIFICATION DRAWING No. <b>SP635-3.1.18</b>
G	GENERAL REVISIONS AND NEW DRAWING NUMBER	APR 20	Date	Approved	
F	GENERAL REVISIONS	APR 17	<b>30/09/93 E.L. (Signature on File)</b> Chief Highway Engineer		
E	TYPE 1 & 8 FLANGE BOLTS CHANGED TO A325	DEC 10			
D	ANTI-SEIZING LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98			
C	BOLT KIT LIST & DWG. No. REV'D & CONDUCTOR SUPPORT ADDED	AUG 96			



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWING SP635-3.1.21 FOR BOLT KITS AND POLE ASSEMBLY DETAILS.
3. SEE DRAWING SP635-3.1.20 FOR BASE PLATE AND PARTS LIST.
4. TYPE H1 SIGN ARM MAXIMUM LENGTH IS 8000mm.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



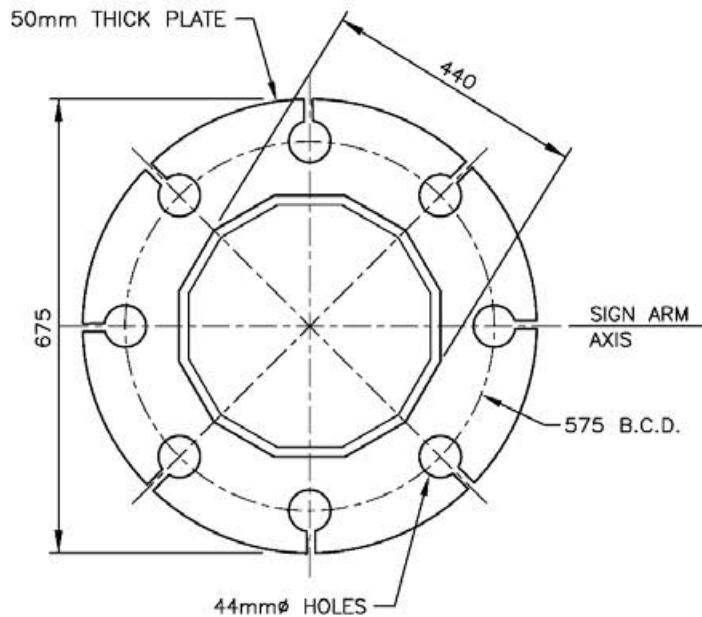
Ministry of Transportation and Infrastructure

No.	Revision	Date
F		
E	H1 SIGN ARM MAX LENGTH ADDED	OCT 20
D	PLYWOOD SIGN DETAILS REMOVED & NEW DRAWING NUMBER	APR 20
C	GENERAL REVISIONS	APR 17
B	DRAWING NUMBER & DRAWING REFERENCES REVISED	DEC 96
A	GENERAL REVISION	AUG 94

**TYPE H SIGN POLE  
INSTALLATION DETAILS**

Date: **30/09/93**  
 Approved: **E.L. (Signature on File)**  
 Chief Highway Engineer

SPECIFICATION  
 DRAWING No.  
**SP635-3.1.19**



**TYPE H POLE BASE PLATE**

PARTS LIST FOR TYPE H SIGNAL POLE	
PART	MASS (kg)
TYPE [H] POLE	870
TYPE [H1] SIGN ARM (LENGTH VARIES)	73 PER METRE
TYPE [H2] SIGN ARM (LENGTH VARIES)	86 PER METRE
TYPE [3.63H] LUMINAIRE ARM EXTENSION - 3.63m	118
TYPE [1.13H] LUMINAIRE ARM EXTENSION - 1.13m	36
TYPE [2A] LUMINAIRE ARM	35
TYPE [2C] LUMINAIRE ARM	65
TYPE 1 FLANGE COVER PLATE [1FCP]	1.5
TYPE 6 FLANGE COVER PLATE [6FCP]	12
TYPE 7 FLANGE COVER PLATE [7FCP]	6
POST TOP TENON [PTT]	5

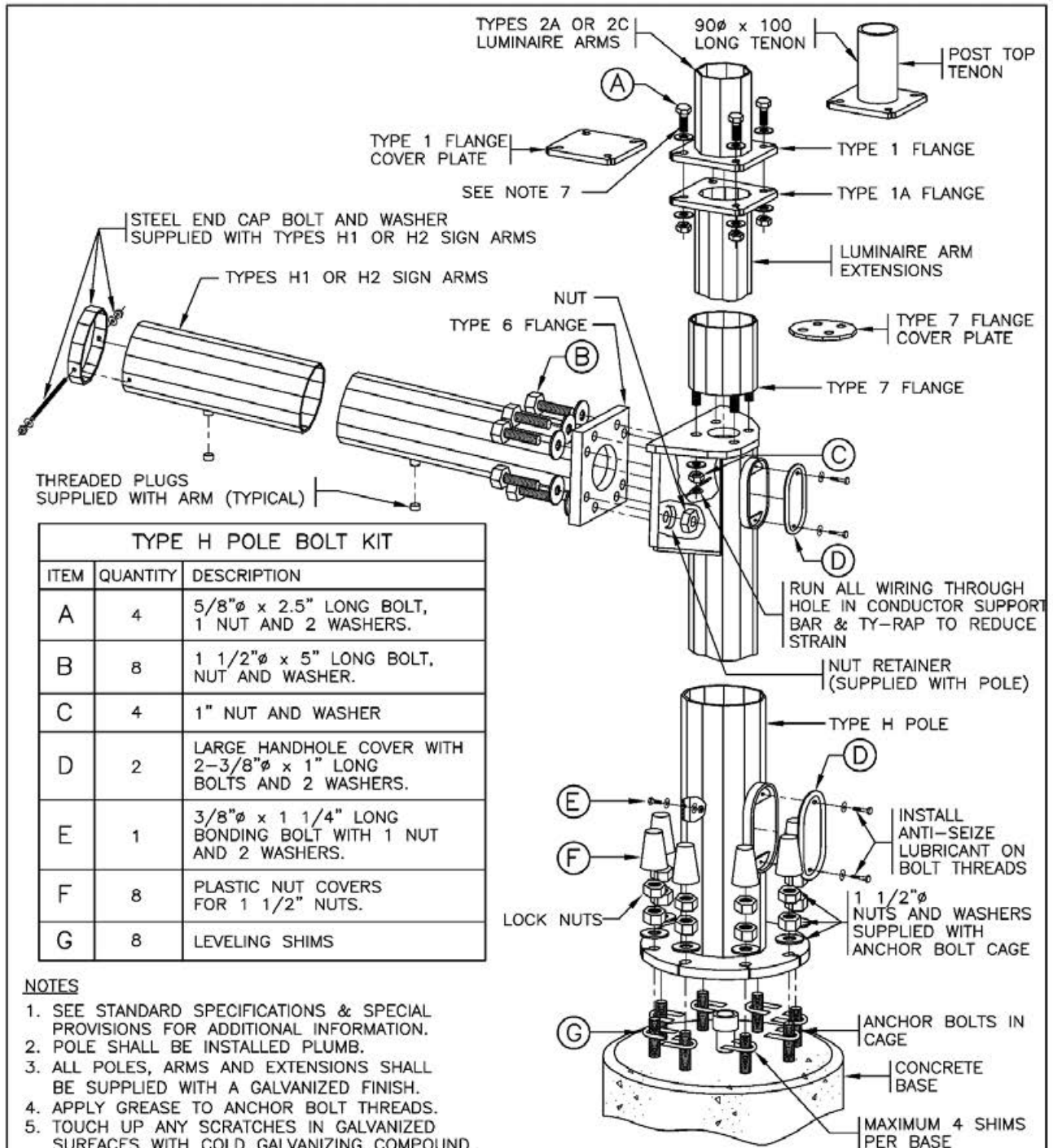
\* [ ] I.D. LABEL ON POLE

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.		Revision		Date		<b>TYPE H SIGN POLE INSTALLATION DETAILS</b>	
F							
E		NEW DRAWING NUMBER		APR 20		Date Approved <b>30/09/93 E.L. (Signature on File)</b> Chief Highway Engineer	
D		GENERAL REVISIONS		APR 17			
C		DRAWING NUMBER REVISED		AUG 96			
B		HOLE SIZE REVISED		AUG 95			
A		GENERAL REVISION		AUG 94			
						SPECIFICATION DRAWING No. <b>SP635-3.1.20</b>	



TYPE H POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"φ x 2.5" LONG BOLT, 1 NUT AND 2 WASHERS.
B	8	1 1/2"φ x 5" LONG BOLT, NUT AND WASHER.
C	4	1" NUT AND WASHER
D	2	LARGE HANDHOLE COVER WITH 2-3/8"φ x 1" LONG BOLTS AND 2 WASHERS.
E	1	3/8"φ x 1 1/4" LONG BONDING BOLT WITH 1 NUT AND 2 WASHERS.
F	8	PLASTIC NUT COVERS FOR 1 1/2" NUTS.
G	8	LEVELING SHIMS

**NOTES**

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- POLE SHALL BE INSTALLED PLUMB.
- ALL POLES, ARMS AND EXTENSIONS SHALL BE SUPPLIED WITH A GALVANIZED FINISH.
- APPLY GREASE TO ANCHOR BOLT THREADS.
- TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
- BOLT, WASHERS, AND SINGLE NUT SHALL CONFORM TO ASTM F3125 GRADE A325. GRADE SAE 5 BOLTS WITH THE FOLLOWING SPECIFICATIONS MAY BE SUBSTITUTED: 5/8" DIAMETER, 3" LENGTH, 2 WASHERS, AND 2 NUTS. CONNECTION INSTALLATION TO BE IN ACCORDANCE WITH "TURN-OF-NUT" METHOD SPECIFIED IN CSA S6.

**POLE ASSEMBLY DETAIL**

NOT TO SCALE

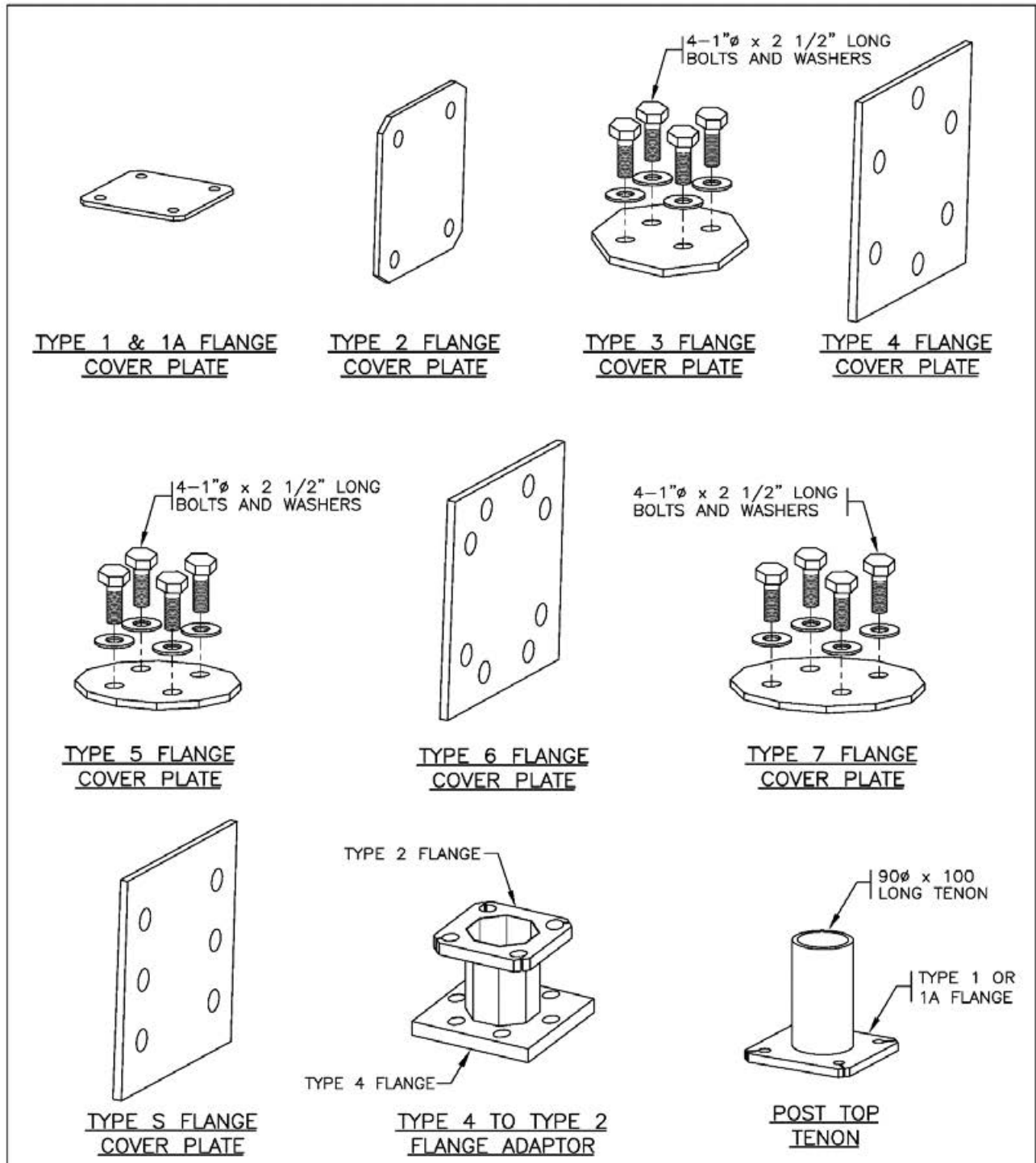


No.	Revision	Date
G	GENERAL REVISIONS AND NEW DRAWING NUMBER	APR 20
F	GENERAL REVISIONS	APR 17
E	TYPE 1 & ARM FLANGE BOLTS CHANGED TO A325	DEC 10
D	ANTI-SEIZE LUBRICANT NOTED ON HANDHOLE BOLT	NOV 98
C	DRAWING NUMBER REVISED & CONDUCTOR SUPPORT ADDED	AUG 96

**TYPE H SIGN POLE  
INSTALLATION DETAILS**

Date: 30/09/93  
Approved: E.L. (Signature on File)  
Chief Highway Engineer

SPECIFICATION  
DRAWING No.  
**SP635-3.1.21**



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.

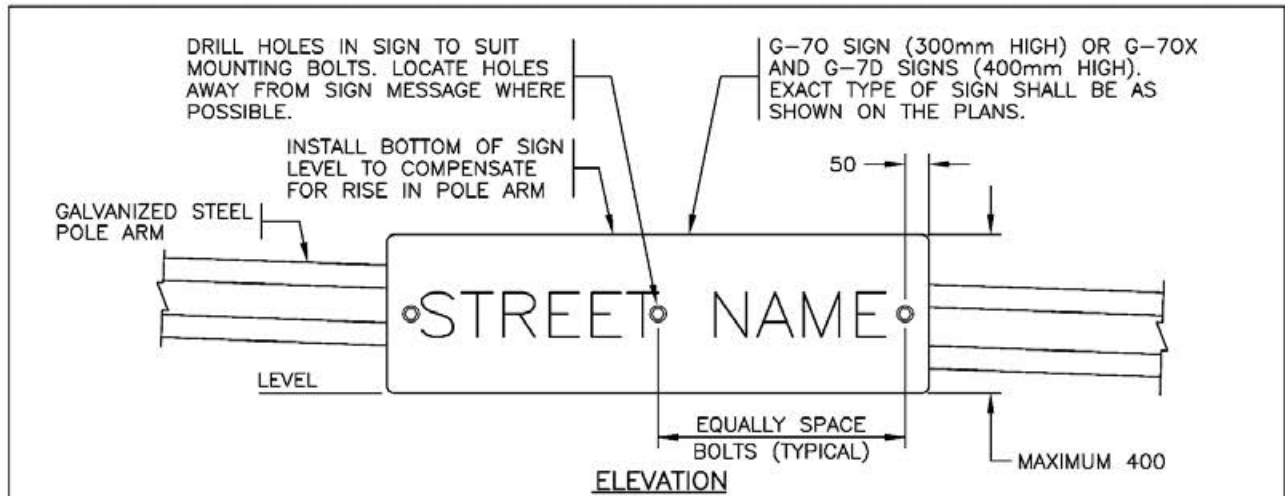
NOT TO SCALE



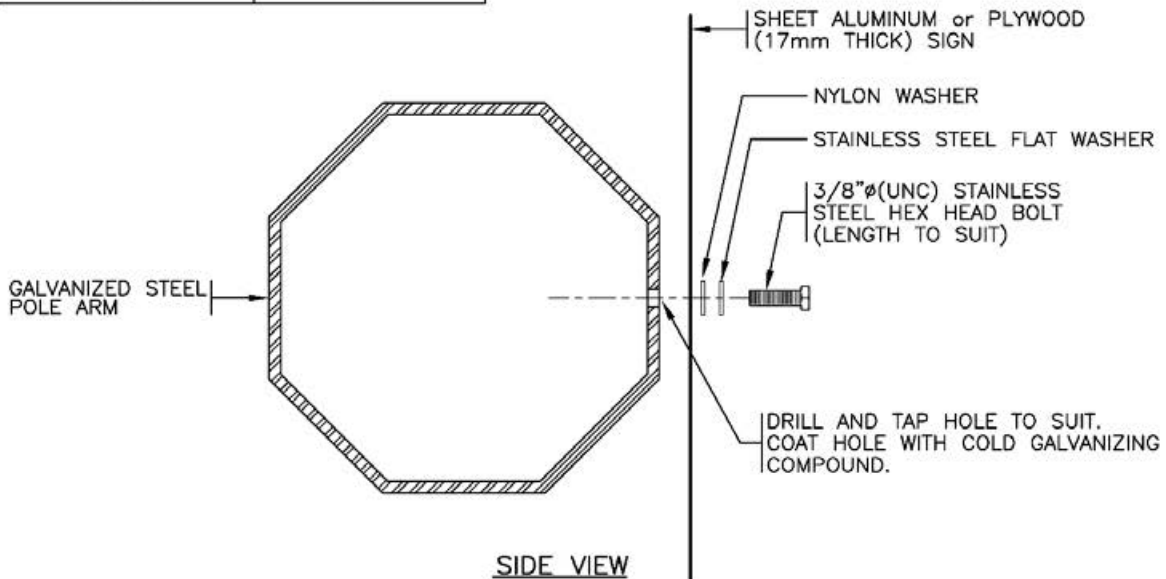
Ministry of Transportation and Infrastructure

No.	Revision	Date	SIGN POLE ACCESSORIES	
F			Date	Approved
E			14/11/03	D.N. (Signature on File)
D				Chief Engineer
C			SPECIFICATION DRAWING No.	
B	GENERAL REVISIONS	APR 17	SP635-3.1.22	
A	TYPE S FLANGE COVER PLATE ADDED	OCT 03		





SIGN WIDTH	NUMBER OF BOLTS
900	3
1200	4
1500	5
1800	6
2100	7



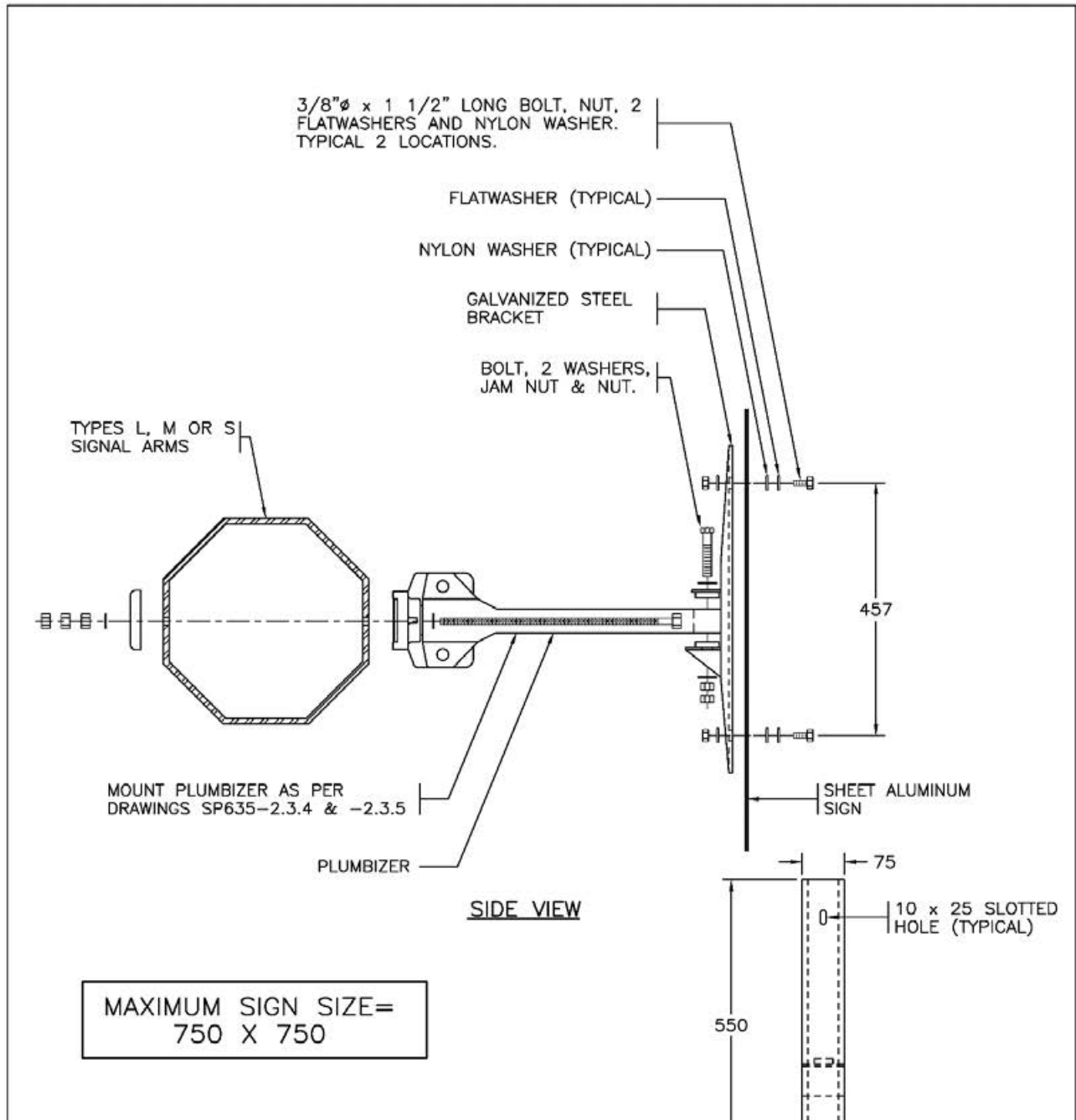
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. POSITION SIGN ON POLE ARM AS INDICATED ON THE PLANS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	OVERHEAD STREETNAME SIGN INSTALLATION DETAILS (ON SIGNAL POLE ARMS)		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-3.2.1
E	GENERAL REVISIONS	APR 20	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	GENERAL REVISIONS	APR 17			
C	GENERAL REVISIONS	AUG 96			
B	SIGN NUMBER AND SIZES REVISED	AUG 95			
A	GENERAL REVISION	AUG 94			



MAXIMUM SIGN SIZE =  
750 X 750

**NOTES**

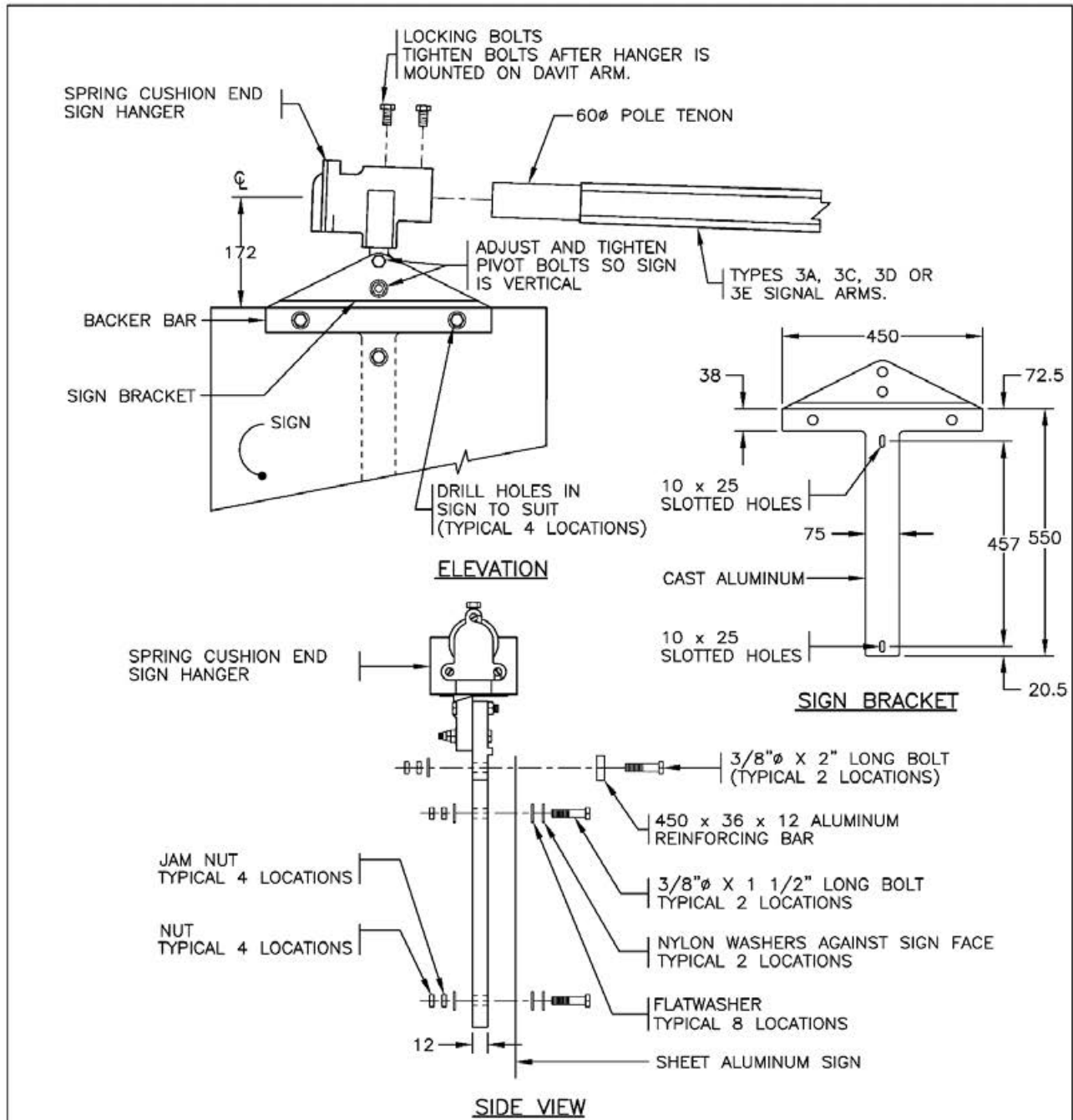
1. SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. AIM SIGN AS PER PLANS.

NOT TO SCALE



No.	Revision	Date	Date		Approved	SPECIFICATION DRAWING No.
F						
E	NOTE 3 UPDATED	APR 20				
D	GENERAL REVISIONS	APR 17				
C	NYLOCK NUT REMOVED. NUT ADDED	AUG 99				
B	REFERENCED DWG Nos. REVISED	DEC 98				
A	PLUMBIZER BOLTING REVISED	AUG 95				
			18/11/94		E.L. (Signature on File) Chief Highway Engineer	SP635-3.2.2

SMALL OVERHEAD SIGN INSTALLATION  
DETAILS (ON TYPE S, L & M SIGNAL POLES)



NOTES

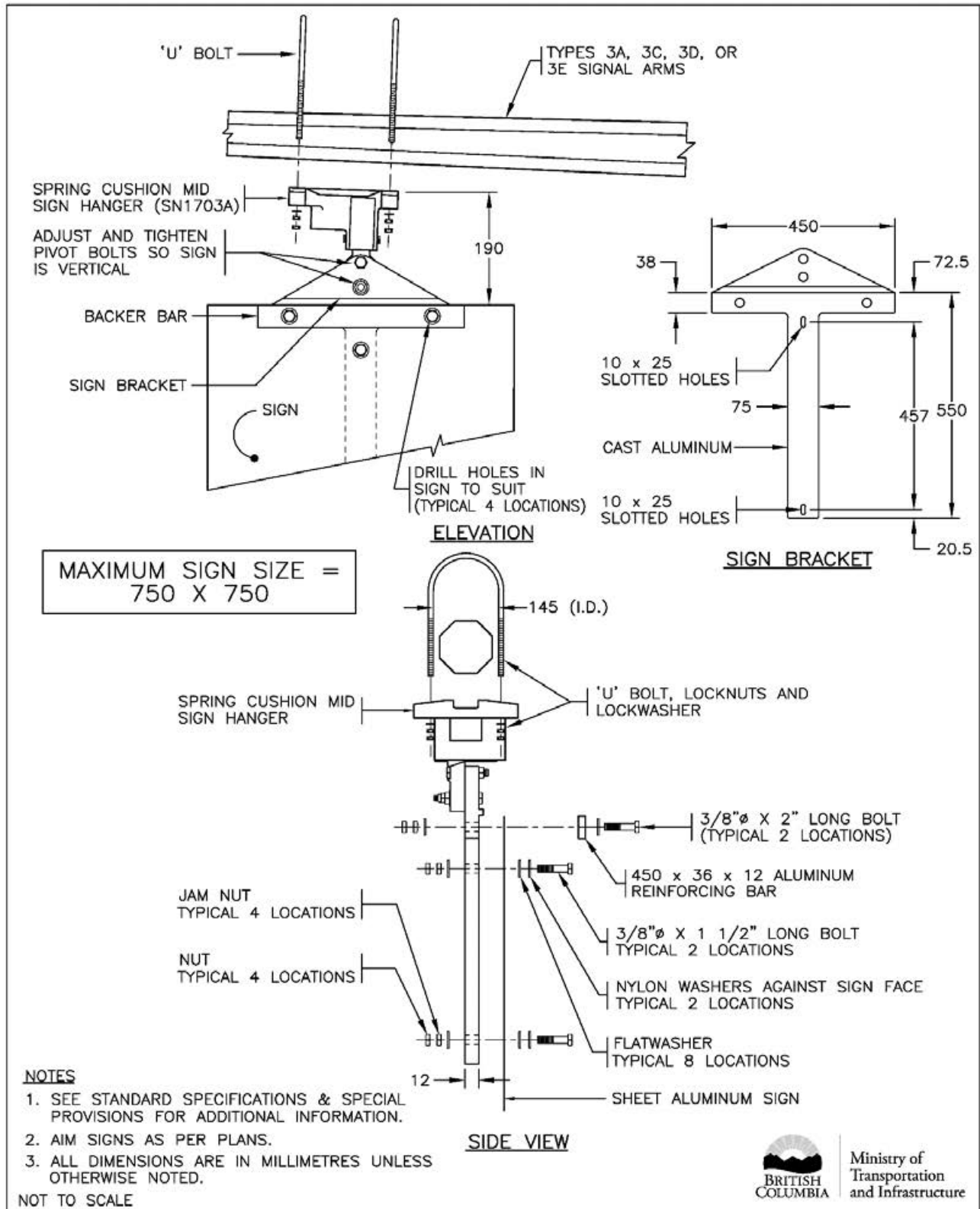
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. AIM SIGNS AS PER PLANS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

MAXIMUM SIGN SIZE =  
750 X 750

NOT TO SCALE



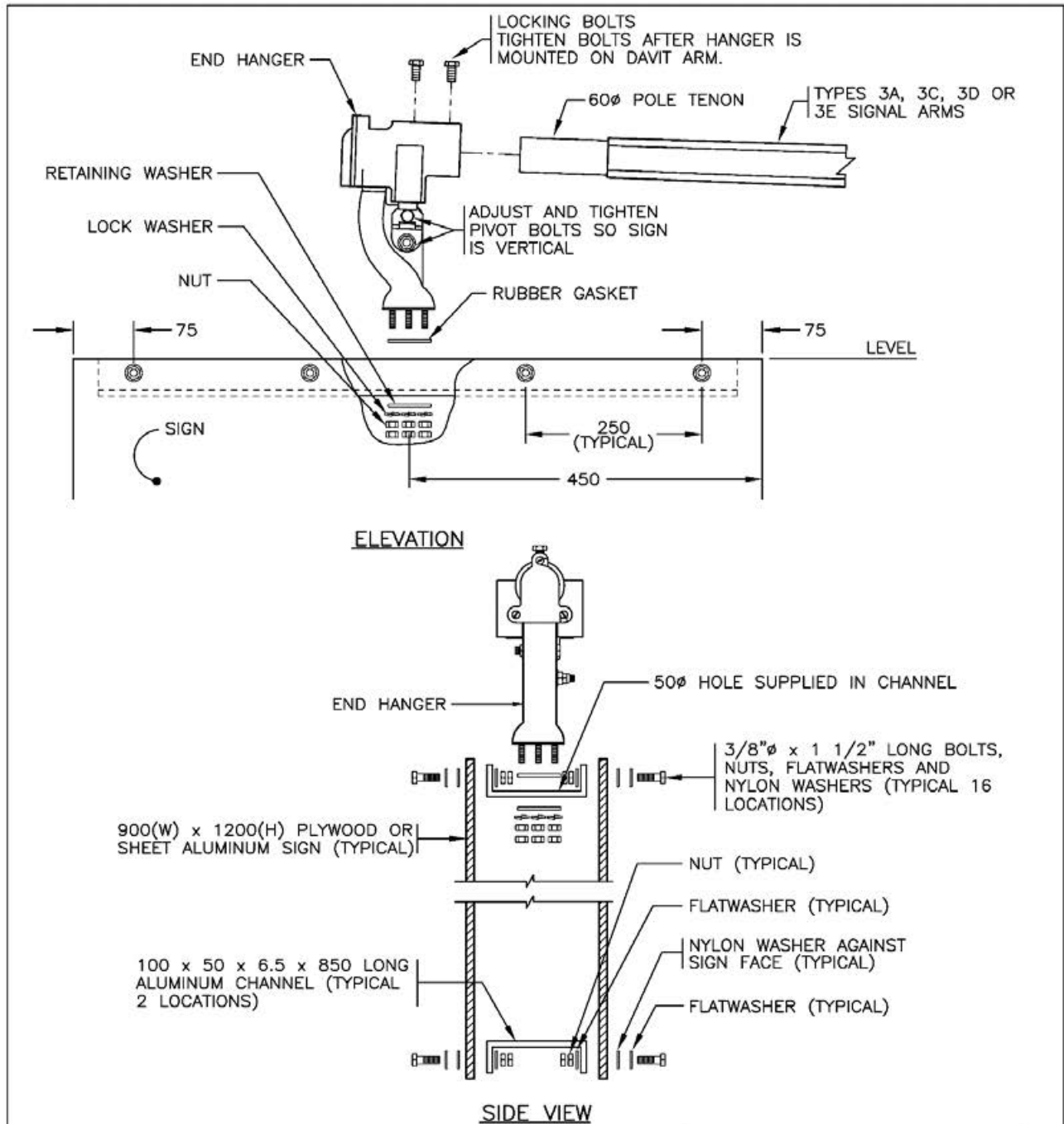
No.	Revision	Date	SMALL OVERHEAD SIGN INSTALLATION DETAILS (ON TYPE 3 SIGNAL ARMS)		SPECIFICATION DRAWING No. SP635-3.2.3
F			Date	Approved	
E	NOTE 2 UPDATED	APR 20	30/09/93	E.L. (Signature on File) Chief Highway Engineer	
D	GENERAL REVISIONS	APR 17			
C	NYLOCK NUT REMOVED. NUT ADDED	AUG 99			
B	SIGN BOLTING TO BRACKET MODIFIED	AUG 95			
A	GENERAL REVISION	AUG 94			



No.	Revision	Date
F		
E	NOTE 2 UPDATED	APR 20
D	GENERAL REVISIONS	APR 17
C	NYLOCK NUT REMOVED. NUT ADDED	AUG 99
B	SIGN BOLTING TO BRACKET MODIFIED	AUG 95
A	GENERAL REVISION	AUG 94

**SMALL OVERHEAD SIGN INSTALLATION  
DETAILS (ON TYPE 3 SIGNAL ARMS)**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-3.2.4</b>



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. AIM SIGN AS PER PLANS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

MAXIMUM SIGN SIZE =  
1200 X 900

NOT TO SCALE

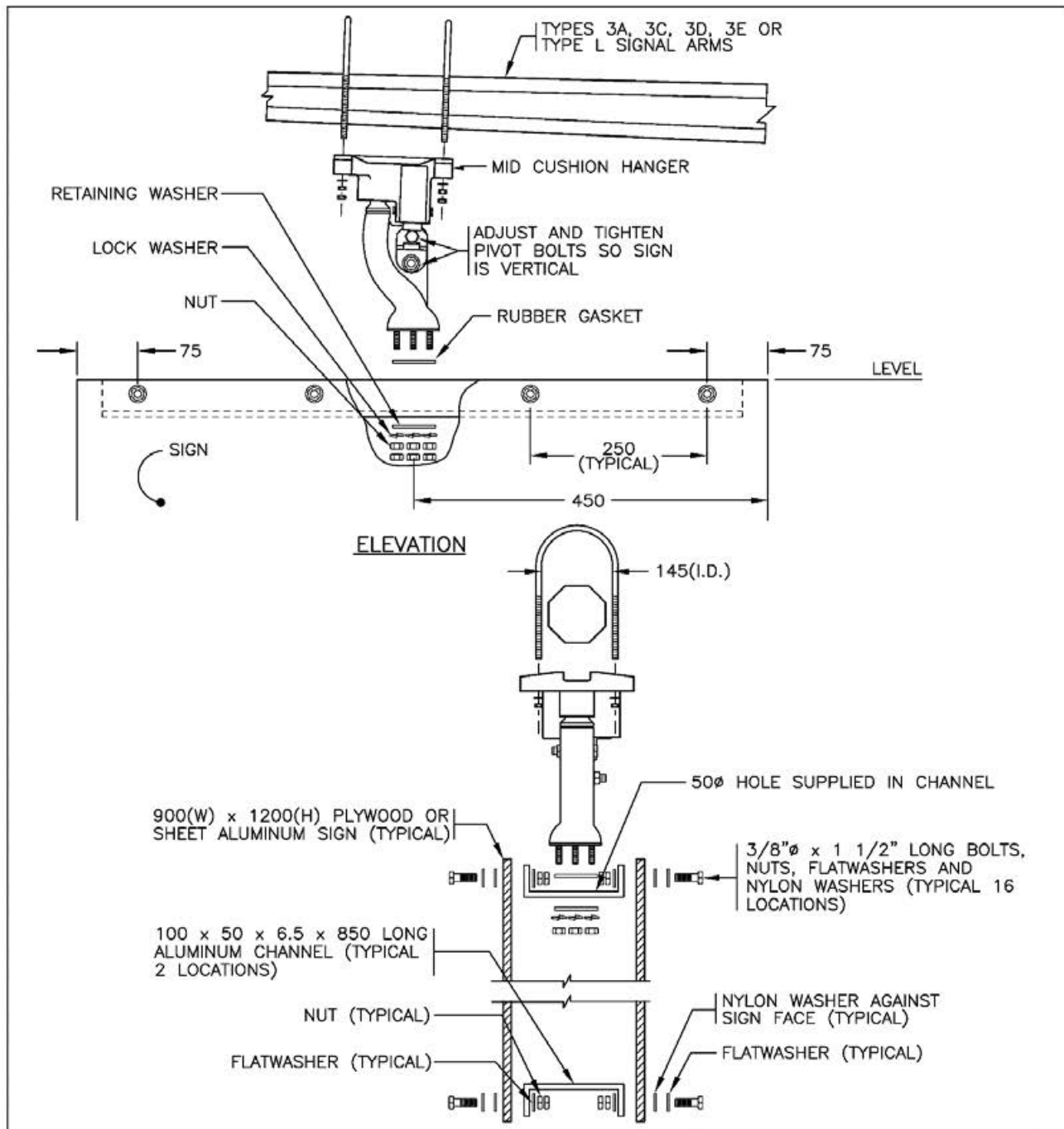


No.	Revision	Date
F		
E	NOTE 2 UPDATED	APR 20
D	GENERAL REVISIONS	APR 17
C	SHEET ALUMINUM SIGN ADDED	APR 05
B	NYLOCK NUTS REMOVED. DOUBLE NUTS ADDED	AUG 99
A	GENERAL REVISION	AUG 94

**2-WAY SMALL OVERHEAD SIGN INSTALLATION  
DETAILS (ON TYPE 3 SIGNAL ARMS)**

Date: **30/09/93** Approved: **E.L. (Signature on File)**  
Chief Highway Engineer

SPECIFICATION  
DRAWING No.  
**SP635-3.2.5**



MAXIMUM SIGN SIZE =  
1200 X 900

**NOTES**

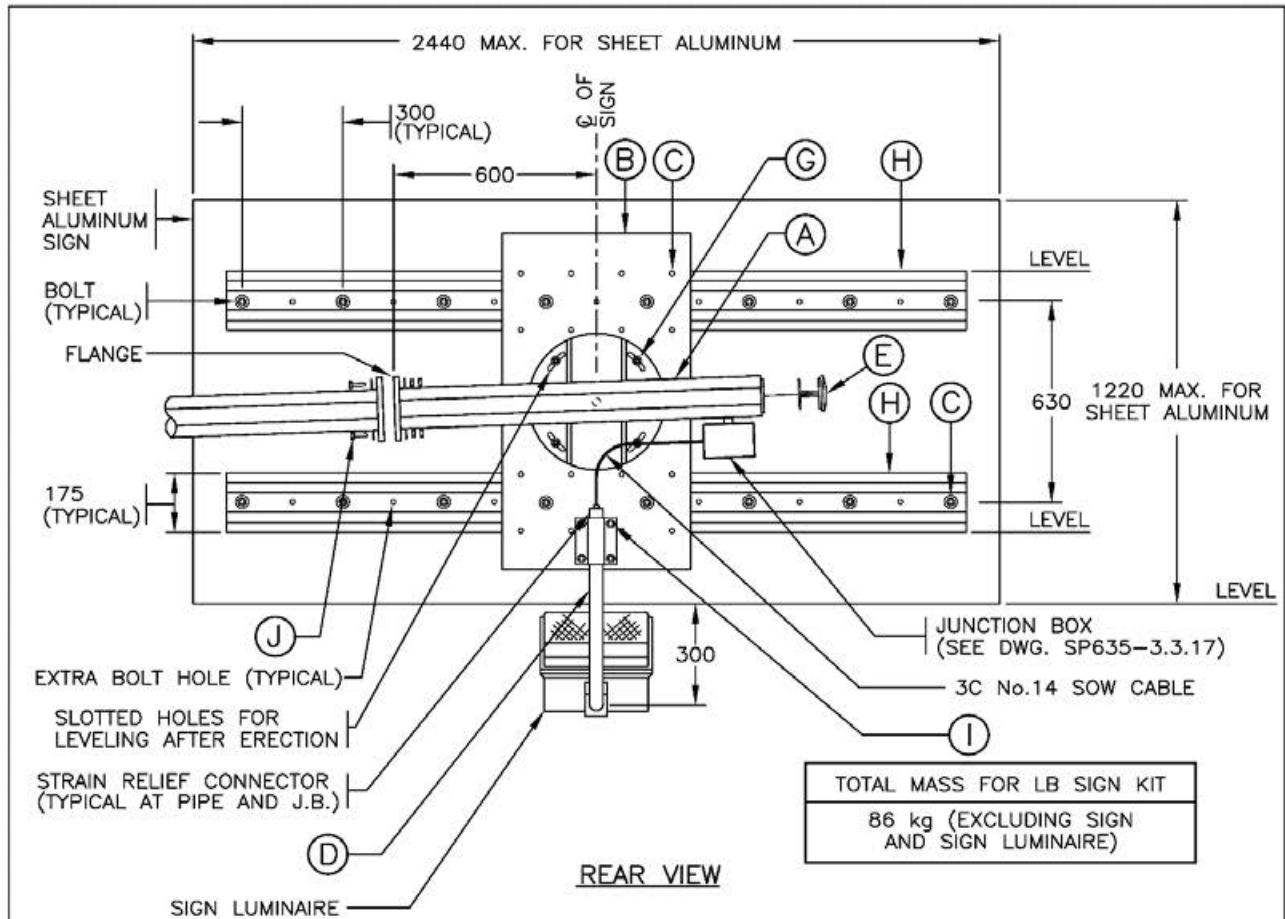
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. AIM SIGN AS PER PLANS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



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Transportation  
and Infrastructure

No.	Revision	Date	2-WAY SMALL OVERHEAD SIGN INSTALLATION DETAILS (FOR TYPE 3 AND L SIGNAL ARMS)		SPECIFICATION DRAWING No. SP635-3.2.6
F	GENERAL REVISIONS	OCT 20	Date	Approved	
E	NOTE 2 UPDATED	APR 20	<b>30/09/93 E.L. (Signature on File)</b> Chief Highway Engineer		
D	GENERAL REVISIONS	APR 17			
C	SHEET ALUMINUM SIGN ADDED	APR 05			
B	NYLOCK NUTS REMOVED. DOUBLE NUTS ADDED	AUG 99			
A	GENERAL REVISION	AUG 94			



TYPE LB SIGN MOUNTING KIT		
ITEM	QUANTITY	DESCRIPTION
A	1	TYPE LB GALVANIZED SIGN ARM
B	1	550 x 1000 GALVANIZED SIGN SUPPORT MOUNTING PLATE
C	16	3/8"φ x 1 1/2" LONG BOLT, NUT, 2 FLATWASHERS, LOCKWASHER AND NYLON WASHER.
D	1	SIGN LUMINAIRE PIPE BRACKET
E	1	PLASTIC END CAP
F	1	PIPE MOUNTING CLAMP
G	4	1/2"φ x 1 1/4" LONG BOLT, FLATWASHER AND LOCKWASHER
H	2	2350 LONG GALVANIZED HORIZONTAL SIGN SUPPORTS
I	4	1/2"φ x 1 1/2" LONG BOLT, NUT, 2 FLATWASHERS AND LOCKWASHER
J	4	5/8"φ x 3" LONG BOLT, 2 NUTS AND 2 FLATWASHERS

SEE DRAWING SP635-3.3.2 FOR NOTES

NOT TO SCALE

SIGN LUMINAIRES SHALL BE USED ONLY WHEN SPECIFICALLY NOTED ON THE DESIGN DRAWINGS



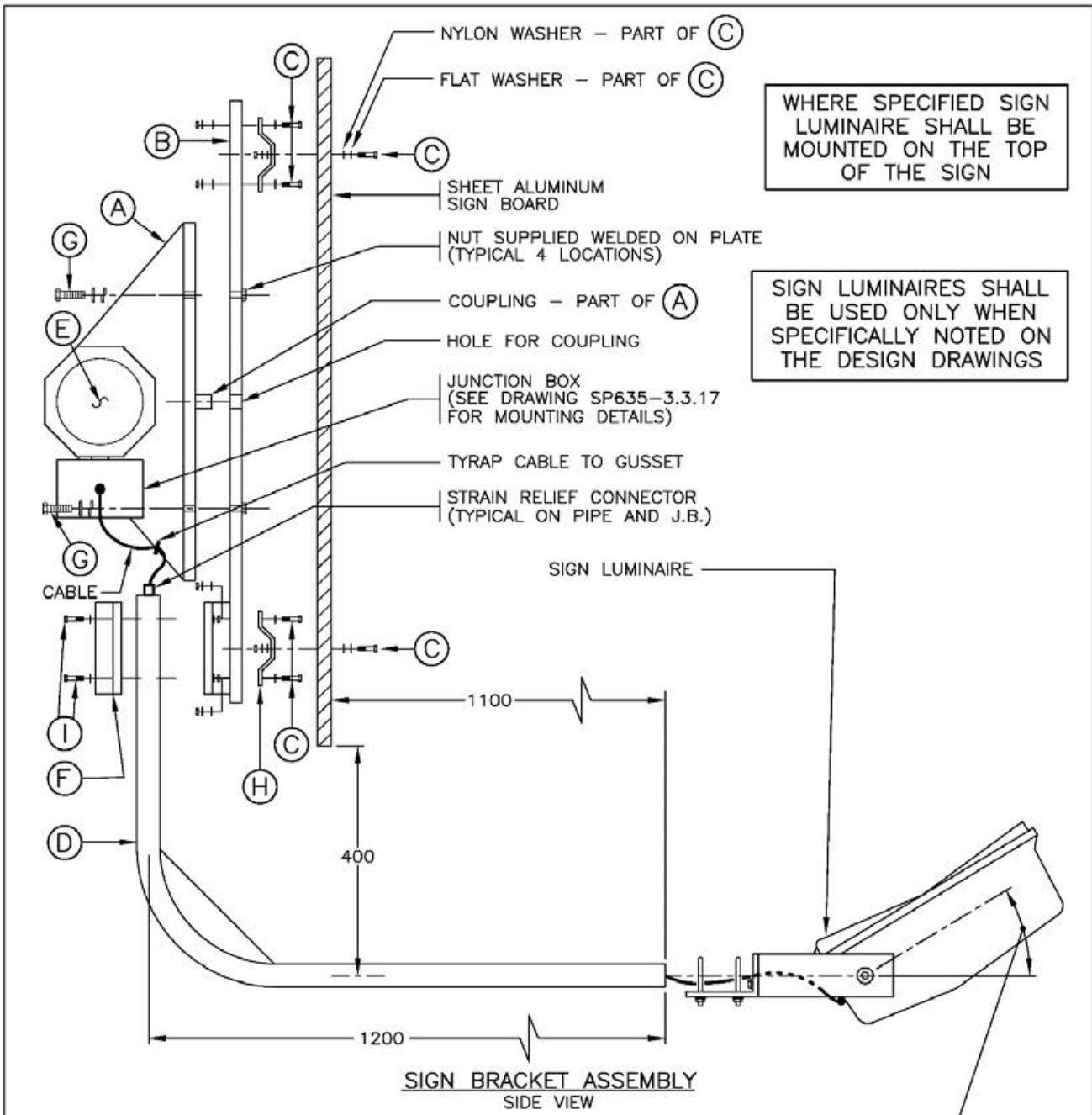
Ministry of Transportation and Infrastructure

No.	Revision	Date
G	PLYWOOD SIGN REMOVED	APR 20
F	SHEET ALUMINUM SIGN ADDED	APR 05
E	SIGN LUMINAIRE NOTE ADDED	SEPT 00
D	J.B. DRAWING REFERENCE REVISED	DEC 98
C	J.B. DRAWING REFERENCE REVISED	DEC 96
B	LUMINAIRE CHANGED & J.B. ADDED	AUG 95

LARGE OVERHEAD GUIDE SIGN INSTALLATION DETAILS  
(UP TO 1220 X 2440 SHEET ALUMINUM)

Date: 30/09/93  
Approved: E.L. (Signature on File)  
Chief Highway Engineer

SPECIFICATION DRAWING No.  
SP635-3.3.1



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

SEE DRAWING SP635-3.3.1 FOR ADDITIONAL DETAILS

NOT TO SCALE

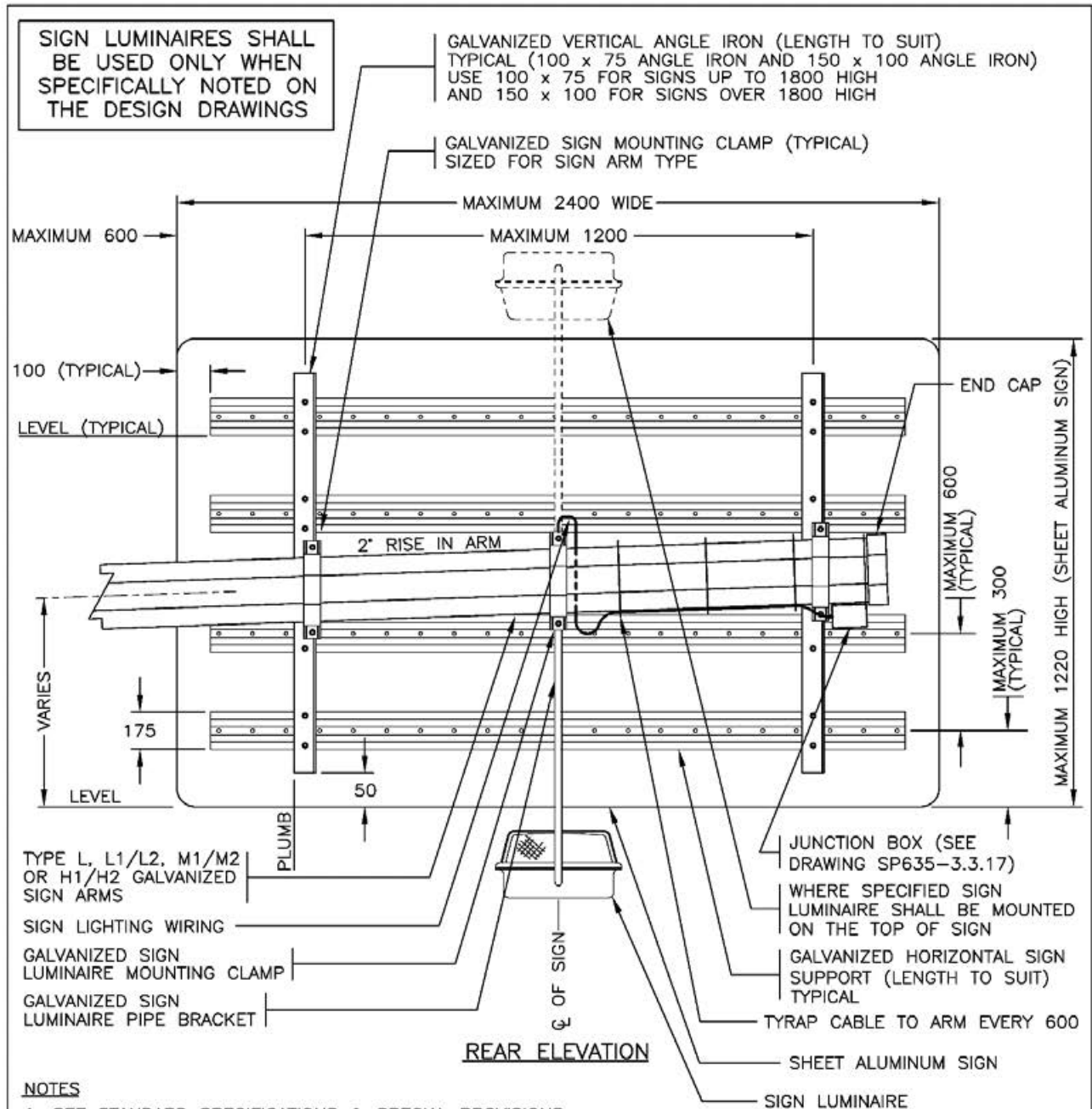
REFER TO THE PLANS FOR SIGN LUMINAIRE WATTAGE AND AIMING ANGLE



Ministry of Transportation and Infrastructure

No.	Revision	Date	LARGE OVERHEAD PLYWOOD GUIDE SIGN INSTALLATION DETAILS (UP TO 1220 X 2440 SHEET ALUMINUM)	
G	GENERAL REVISION	APR 20	Date	Approved
F	SHEET ALUMINUM SIGN ADDED	APR 05	<b>30/09/93</b>	<b>E.L. (Signature on File)</b>
E	SIGN LUMINAIRE NOTE ADDED	SEPT 00	Chief Highway Engineer	
D	SIGN LUMINAIRE TYPE C CHANGED TO TYPE A	NOV 98	SPECIFICATION DRAWING No.	
C	SIGN LUMINAIRE & MOUNTING REVISED	DEC 96	<b>SP635-3.3.2</b>	
B	LUMINAIRE CHANGED & J.B. ADDED	AUG 95		





**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. A SKETCH DETAILING THE EXACT SPACING OF VERTICAL ANGLE IRONS AND HORIZONTAL SIGN SUPPORTS WILL BE SUPPLIED WITH SIGN BRACKET ASSEMBLY.
3. NUMBER OF SIGN LUMINAIRES MAY VARY.
4. SIGN LUMINAIRE, PIPE CLAMP AND CABLE ARE NOT REQUIRED FOR NON-ILLUMINATED SIGN.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



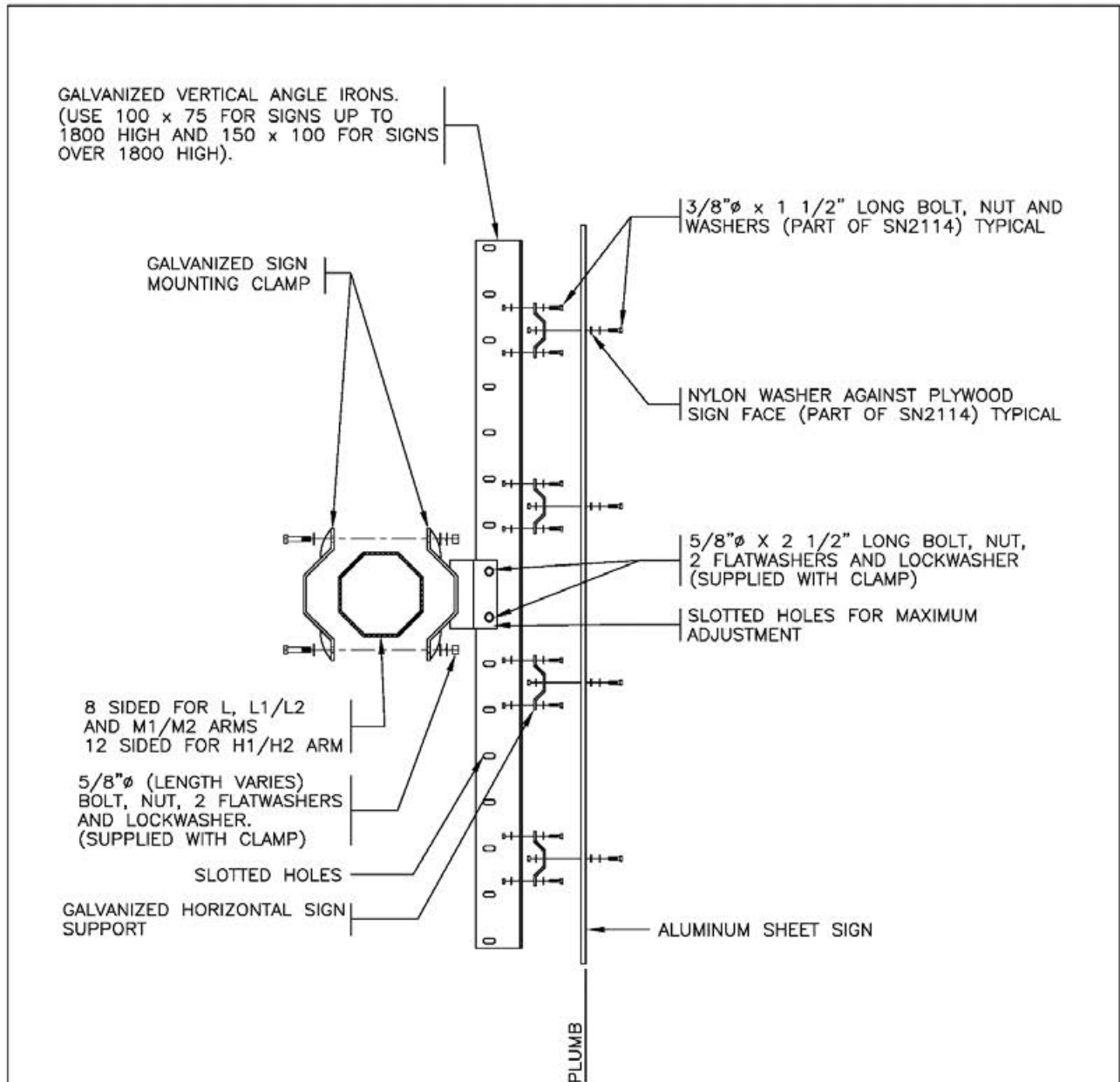
Ministry of Transportation and Infrastructure

No.	Revision	Date
H	GENERAL REVISIONS	APR 20
G	SHEET ALUMINUM SIGN ADDED	APR 05
F	JUNCTION BOX ON SIGNAL ARM RELOCATED	NOV 01
E	SIGN LUMINAIRE NOTE ADDED	SEPT 00
D	J.B. DRAWING REFERENCE REVISED	DEC 98
C	SIGN LUMINAIRE CLAMP REVISED	DEC 96

**LARGE OVERHEAD SHEET ALUMINUM GUIDE SIGN INSTALLATION DETAILS (UP TO 2400 WIDE SIGNS)**

Date: 30/09/93  
Approved: E.L. (Signature on File)  
Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-3.3.3



**SIGN BRACKET ASSEMBLY**  
SIDE VIEW

**NOTES**

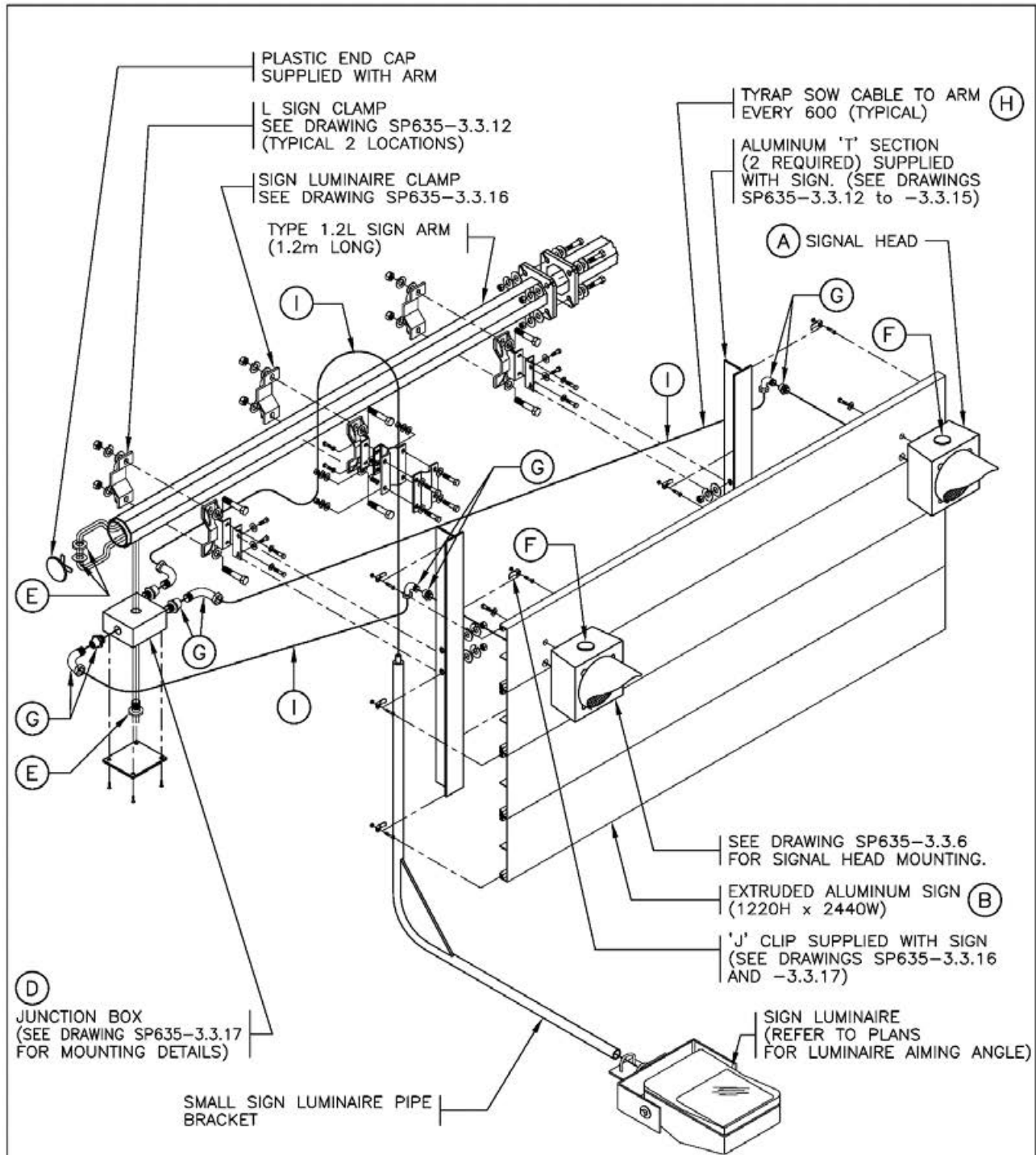
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



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Transportation  
and Infrastructure

No.	Revision	Date	LARGE OVERHEAD SHEET ALUMINUM GUIDE SIGN ASSEMBLY DETAILS		
F					
E					
D	GENERAL REVISION	APR 20	Date	Approved	
C	SIGN MOUNTING CLAMPS REVISED	DEC 96	30/09/93 <b>E.L.</b> (Signature on File)	SPECIFICATION DRAWING No.	
B	L1/L2 ARMS ADDED & CLAMP REVISED	AUG 95		Chief Highway Engineer	SP635-3.3.4
A	GENERAL REVISION	AUG 94			



SEE DRAWING SP635-3.3.6 FOR NOTES AND ADDITIONAL DETAILS

SIGN LUMINAIRES SHALL BE USED ONLY WHEN SPECIFICALLY NOTED ON THE DESIGN DRAWINGS



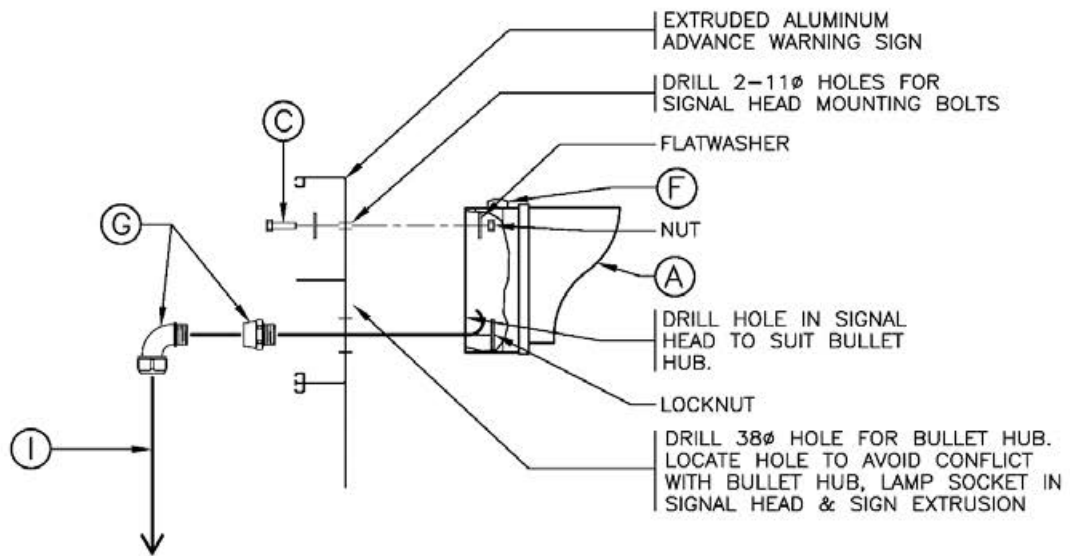
NOT TO SCALE

No.	Revision	Date
F		
E	GENERAL REVISION	APR 20
D	JUNCTION BOX MOUNTING REVISED	NOV 01
C	SIGN LUMINAIRE TYPE C CHANGED TO TYPE A	NOV 98
B	SIGN ARM REDRAWN	OCT 97
A	MOUNTING CLAMPS REVISED	AUG 96

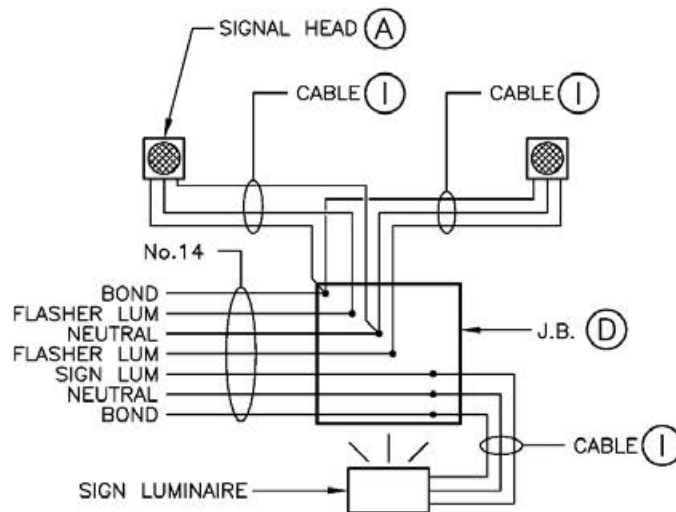
LARGE OVERHEAD EXTRUDED ALUMINUM ADVANCE WARNING SIGN ASSEMBLY DETAILS

Date: 15/11/95  
 Approved: M.C. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-3.3.5



SIGNAL HEAD MOUNTING DETAIL



WIRING DIAGRAM

SIGN LUMAIRES SHALL BE USED ONLY WHEN SPECIFICALLY NOTED ON THE DESIGN DRAWINGS

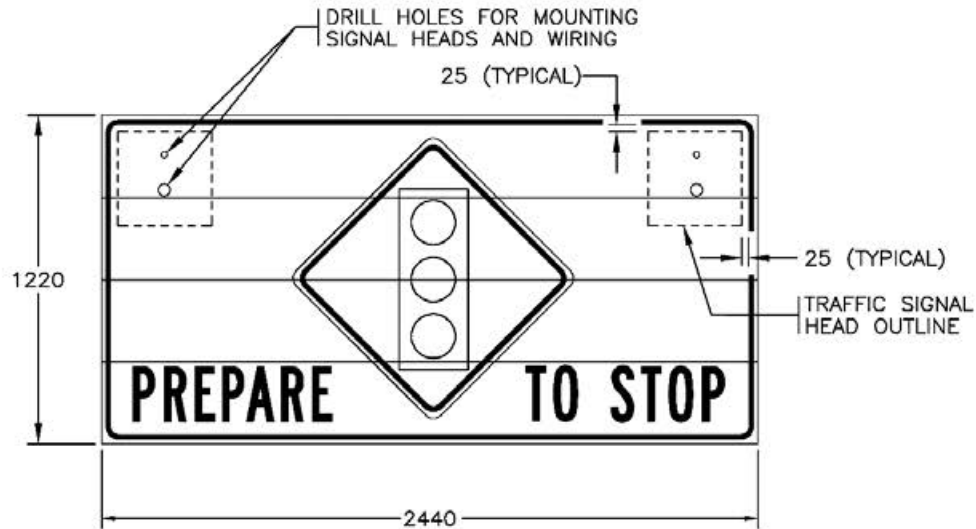
NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SEE DRAWINGS SP635-3.3.7 & -3.3.8 FOR PARTS LISTS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	LARGE OVERHEAD EXTRUDED ALUMINUM ADVANCE WARNING SIGN INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-3.3.6
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISION	APR 20			
B	SIGN CHANGED TO ALUMINUM EXTRUDED	AUG 95			
A	GENERAL REVISION	AUG 94			



TRAFFIC SIGNAL ADVANCE WARNING SIGN

TRAFFIC SIGNAL ADVANCE WARNING SIGN KIT		
ITEM	QUANTITY	DESCRIPTION
A	2	300mm SIGNAL HEAD SECTION C/W YELLOW LENS, LAMP AND COWL VISOR
B	1	TRAFFIC SIGNAL EXTRUDED ALUMINUM ADVANCE WARNING SIGN BOARD
C	2	3/8"ø x 1 1/2" LONG STAINLESS STEEL HEX HEAD BOLT, NUT, 2 FLAT WASHERS AND 1 LOCKWASHER
D	1	150 x 150 x 100 PVC J.B.
E	1	3/4" INSULATED CHASE NIPPLE, LOCKNUT AND FLAT WASHER
F	2	FINIAL
G	4	1/2" BULLET HUB AND 90° STRAIN RELIEF CONNECTOR AND LOCKNUT
H	5	LARGE TY-RAP
I	7m	3C No. 14 S.O.W. CABLE

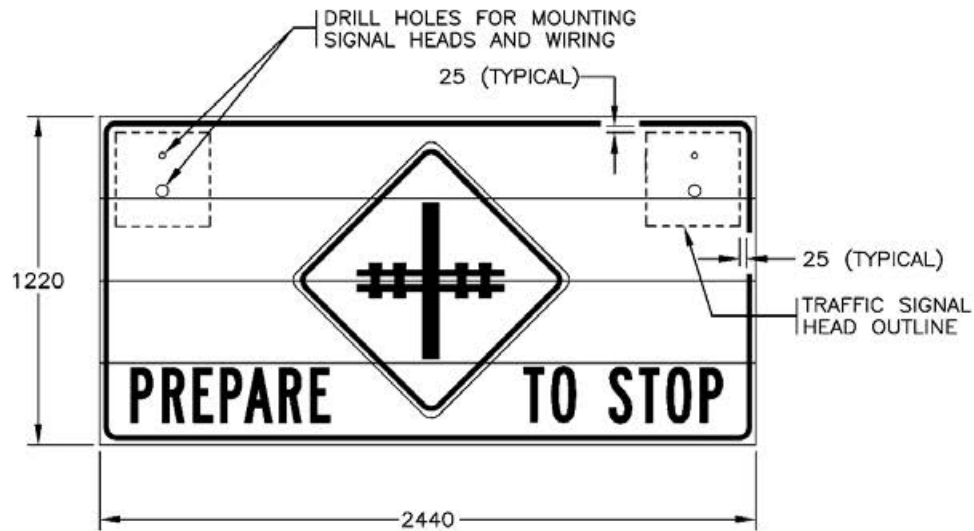
SEE DRAWING SP635-3.3.6 FOR NOTES

NOT TO SCALE



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No.	Revision	Date	LARGE OVERHEAD EXTRUDED ALUMINUM TRAFFIC SIGNAL ADVANCE WARNING SIGN INSTALLATION DETAILS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-3.3.7
E			30/09/93	E.L. (Signature on File)	
D	GENERAL REVISIONS	APR 20	Chief Highway Engineer		
C	ITEM E REVISED	NOV 01			
B	SIGN CHANGED TO ALUMINUM EXTRUDED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



RAILWAY ADVANCE WARNING SIGN

TRAFFIC SIGNAL ADVANCE WARNING SIGN KIT		
ITEM	QUANTITY	DESCRIPTION
A	2	300mm SIGNAL HEAD SECTION C/W YELLOW LENS, LAMP AND COWL VISOR
B	1	EXTRUDED ALUMINUM RAILWAY ADVANCE WARNING SIGN BOARD
C	2	3/8"Ø x 1 1/2" LONG STAINLESS STEEL HEX HEAD BOLT, NUT, 2 FLAT WASHERS AND 1 LOCKWASHER
D	1	150 x 150 x 100 PVC J.B.
E	1	3/4" INSULATED CHASE NIPPLE, 2 LOCKNUTS AND 2 FLAT WASHERS
F	2	FINIAL
G	4	1/2" BULLET HUB AND 90° STRAIN RELIEF CONNECTOR AND LOCKNUT
H	5	LARGE TY-RAP
I	7m	3C No. 14 S.O.W. CABLE

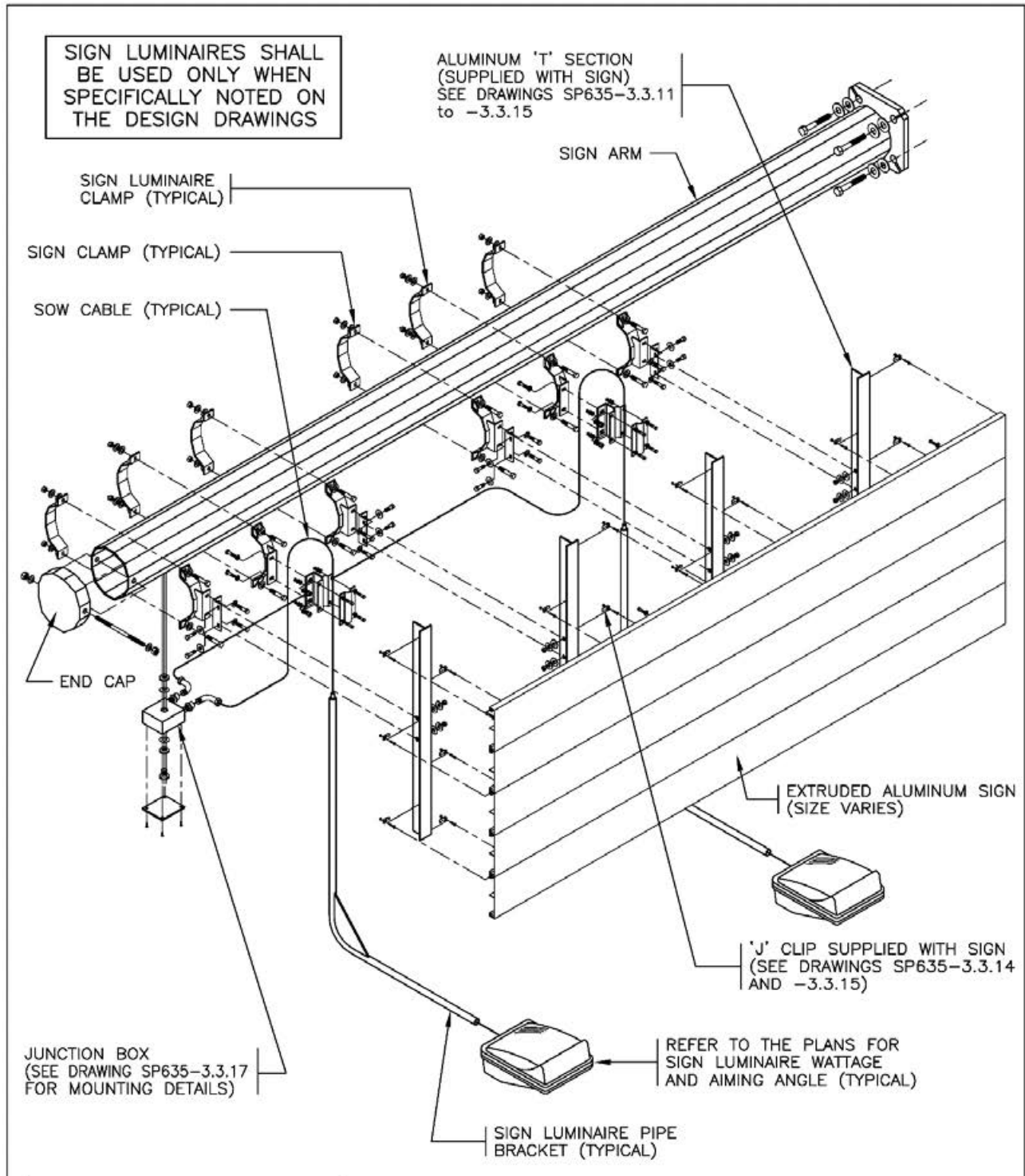
SEE DRAWING SP635-3.3.6 FOR NOTES

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	LARGE OVERHEAD EXTRUDED ALUMINUM RAILWAY ADVANCE WARNING SIGN INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-3.3.8
F			Date	Approved	
E			18/11/94	E.L. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISIONS	APR 20			
B	SIGN CHANGED TO ALUMINUM EXTRUDED	AUG 95			
A	GENERAL REVISIONS	AUG 94			



SEE DRAWING SP635-3.3.10 FOR NOTES AND ADDITIONAL DETAILS

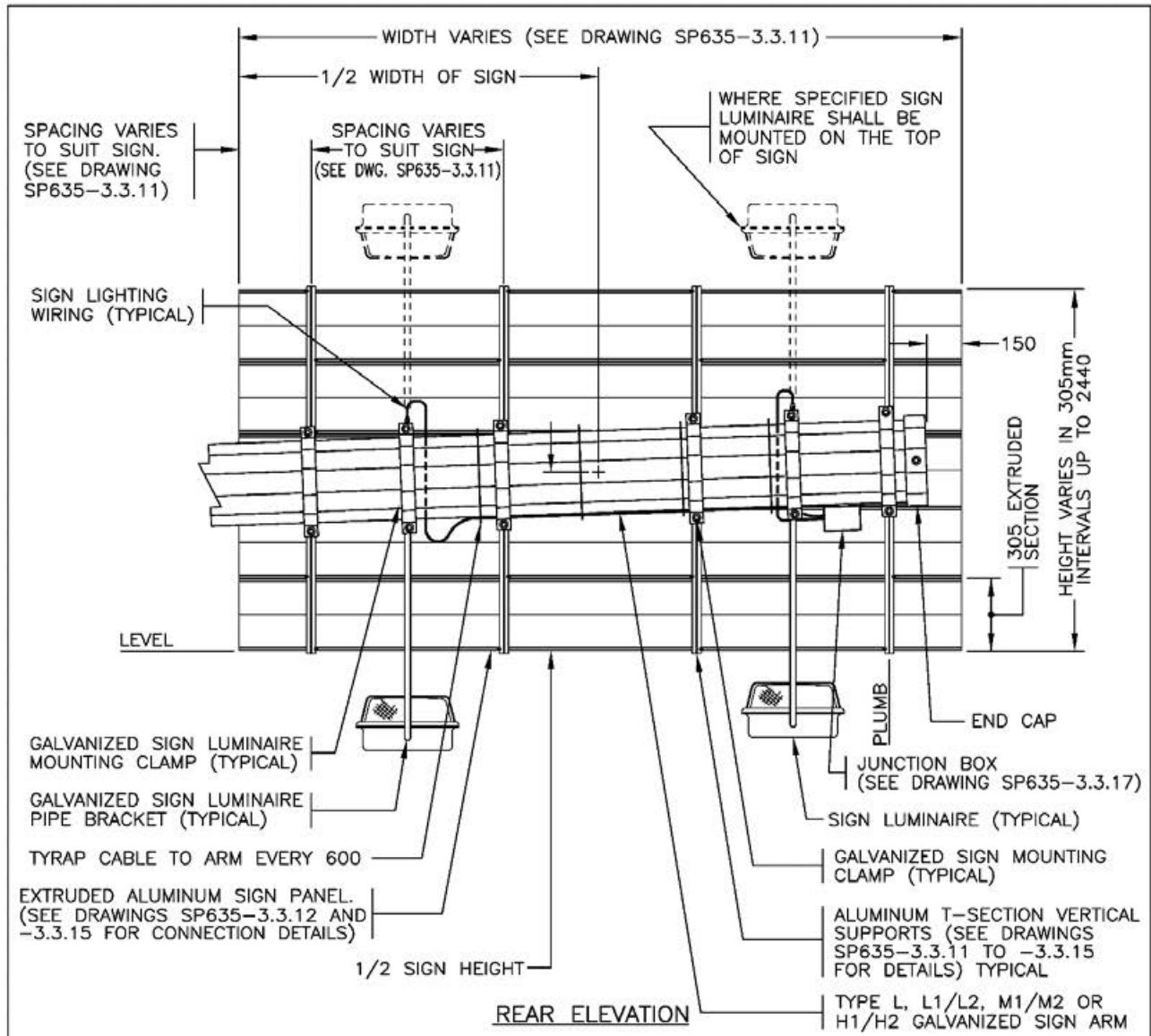
NOT TO SCALE



No.	Revision	Date
F		
E		
D	GENERAL REVISION	APR 20
C	SIGN LUMINAIRE NOTE ADDED	SEPT 00
B	SIGN LUMINAIRE TYPE B NOTE DELETED	NOV 98
A	MOUNTING CLAMPS REVISED	AUG 96

**LARGE OVERHEAD EXTRUDED ALUMINUM GUIDE SIGN ASSEMBLY DETAILS**

Date	Approved	SPECIFICATION DRAWING No.
15/11/95	M.C. (Signature on File) Chief Highway Engineer	SP635-3.3.9



TOTAL MASS
EACH EXTRUDED ALUMINUM SIGN SECTION = 4 kg/m

SIGN LUMINAIRES SHALL BE USED ONLY WHEN SPECIFICALLY NOTED ON THE DESIGN DRAWINGS

- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. NUMBER OF SIGN LUMINAIRES MAY VARY.
  3. FUSE SIGN LUMINAIRES IN POLE HANDHOLE.
  4. SIGN LUMINAIRE, MOUNTING PIPE, CLAMP AND CABLE IS NOT REQUIRED FOR NON-ILLUMINATED SIGN.
  5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

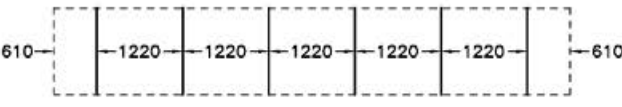
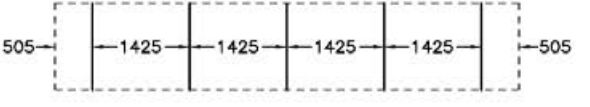
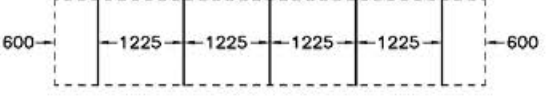
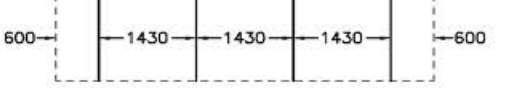
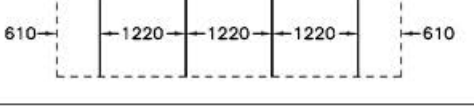
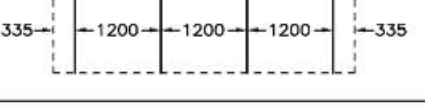
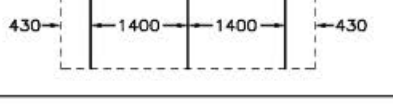
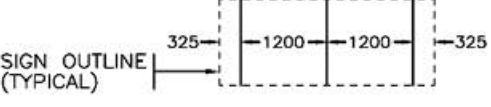
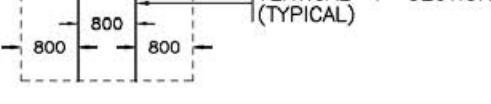
NOT TO SCALE



No.	Revision	Date
F		
E	GENERAL REVISION	APR 20
D	SIGN LUMINAIRE NOTE ADDED	SEPT 00
C	J.B. DRAWING REFERENCE REVISED	DEC 98
B	SIGN LUMINAIRE CLAMPS REVISED	DEC 96
A	L1/L2 ARMS & JUNCTION BOX ADDED	AUG 95

<b>LARGE OVERHEAD EXTRUDED ALUMINUM GUIDE SIGN INSTALLATION DETAILS</b>		Date	Approved	SPECIFICATION DRAWING No.
		<b>21/11/94</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-3.3.10</b>



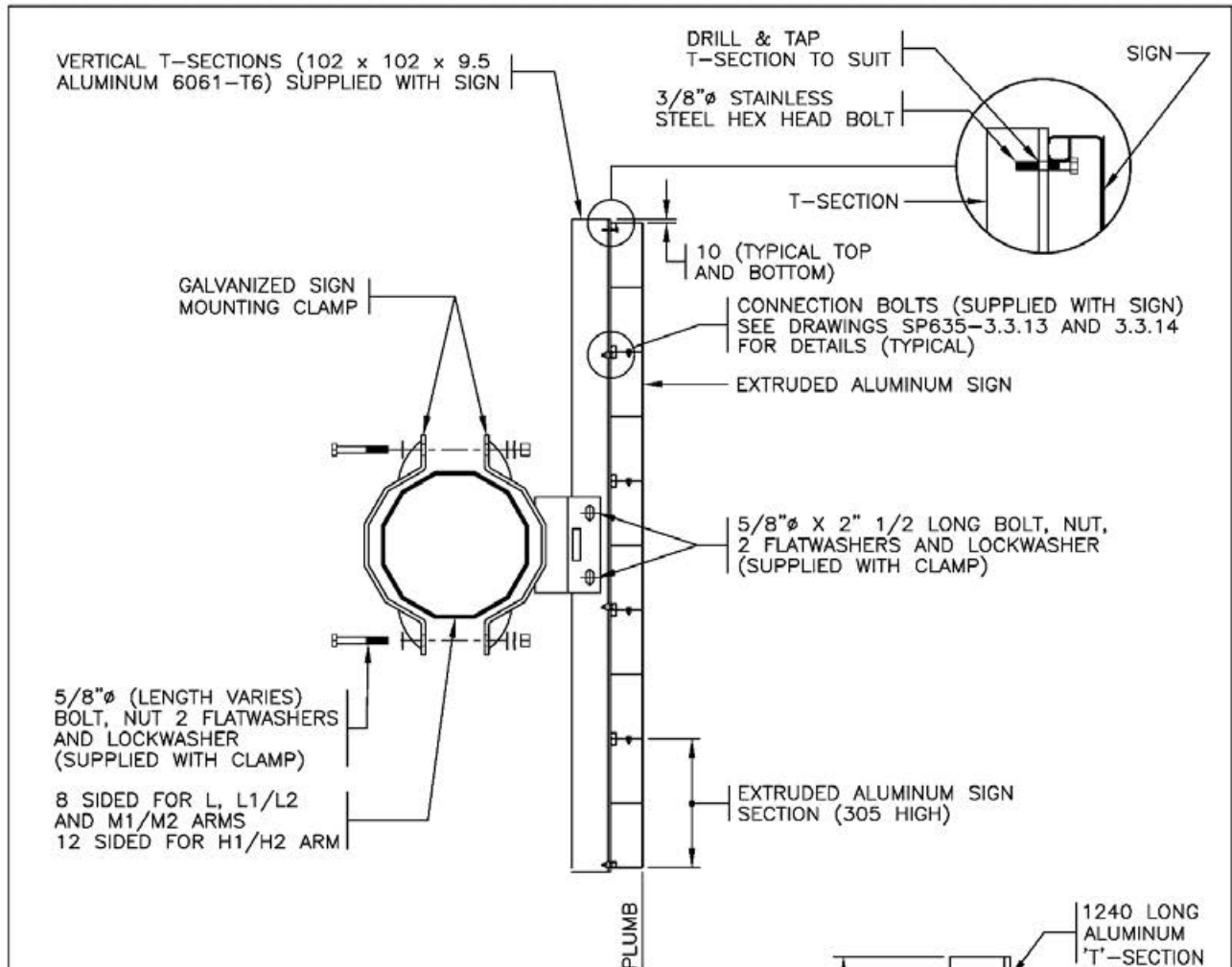
TYPICAL SIGN WIDTH	SPACING OF VERTICAL T-SECTIONS	NUMBER OF VERTICALS
7320mm		6
6710mm		5
6100mm		5
5490mm		4
4880mm		4
4270mm		4
3660mm		3
3050mm		3
2440mm		2

SEE DRAWING SP635-3.3.10 FOR NOTES AND ADDITIONAL DETAILS

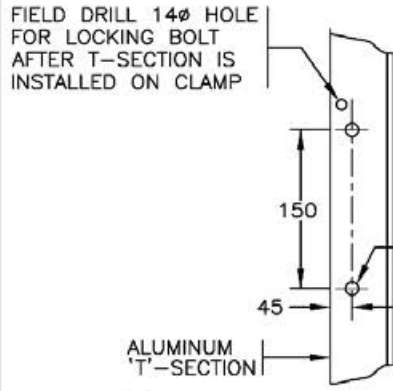


NOT TO SCALE

No.	Revision	Date	<b>LARGE OVERHEAD EXTRUDED ALUMINUM GUIDE SIGN INSTALLATION DETAILS</b>		
F					
E					
D					
C	GENERAL REVISION	APR 20			
B	T-SECTION SPACING FOR 2440 WIDE SIGN REVISED	AUG 96	Date	Approved	SPECIFICATION DRAWING No. <b>SP635-3.3.11</b>
A	SIGN WIDTHS & T-SECTION SPACING REVISED	AUG 95	<b>18/11/94</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	



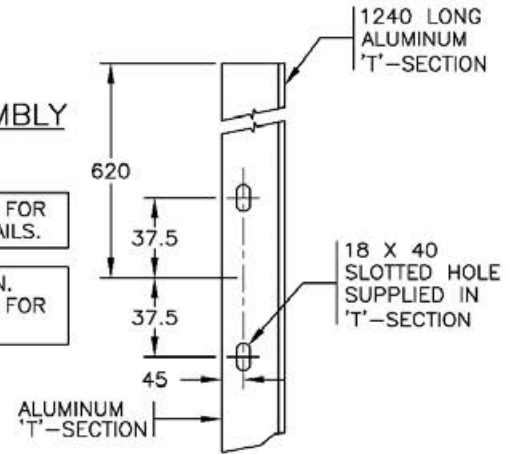
**SIGN BRACKET ASSEMBLY**  
SIDE VIEW



**'T'-SECTION HOLE DETAIL**  
(FOR L1/L2, M1/M2 & H1/H2 SIGN ARMS)

SEE DRAWING SP635-3.3.10 FOR NOTES AND ADDITIONAL DETAILS.

SIGN LIGHTING NOT SHOWN. SEE DRAWING SP635-3.3.16 FOR SIGN LIGHTING DETAILS.



**'T'-SECTION SLOT DETAIL**  
(FOR 1.2m(H) X 2.4m(W) SIGN ON L SIGN ARM)

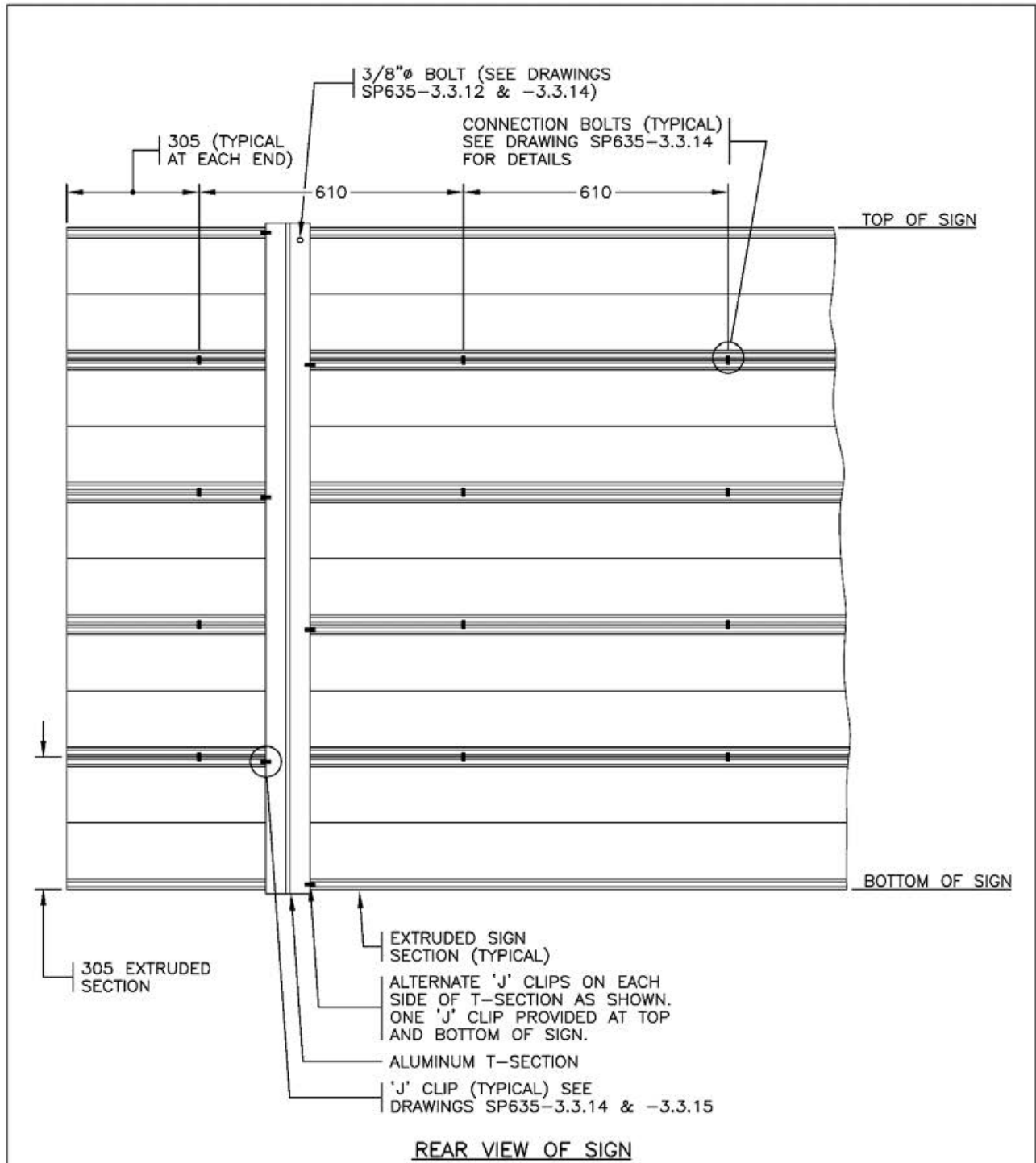
NOT TO SCALE



No.	Revision	Date
F		
E		
D	GENERAL REVISION	APR 20
C	'T'-SECTION SLOT DETAIL ADDED	NOV 01
B	MOUNTING CLAMPS REV'D & SAFETY BOLT ADDED	AUG 96
A	L1/L2 ARMS ADDED & T-SECTION DETAILS REVISED	AUG 95

**LARGE OVERHEAD EXTRUDED ALUMINUM GUIDE SIGN ASSEMBLY DETAILS**

Date	Approved	SPECIFICATION DRAWING No.
<b>18/11/94</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-3.3.12</b>

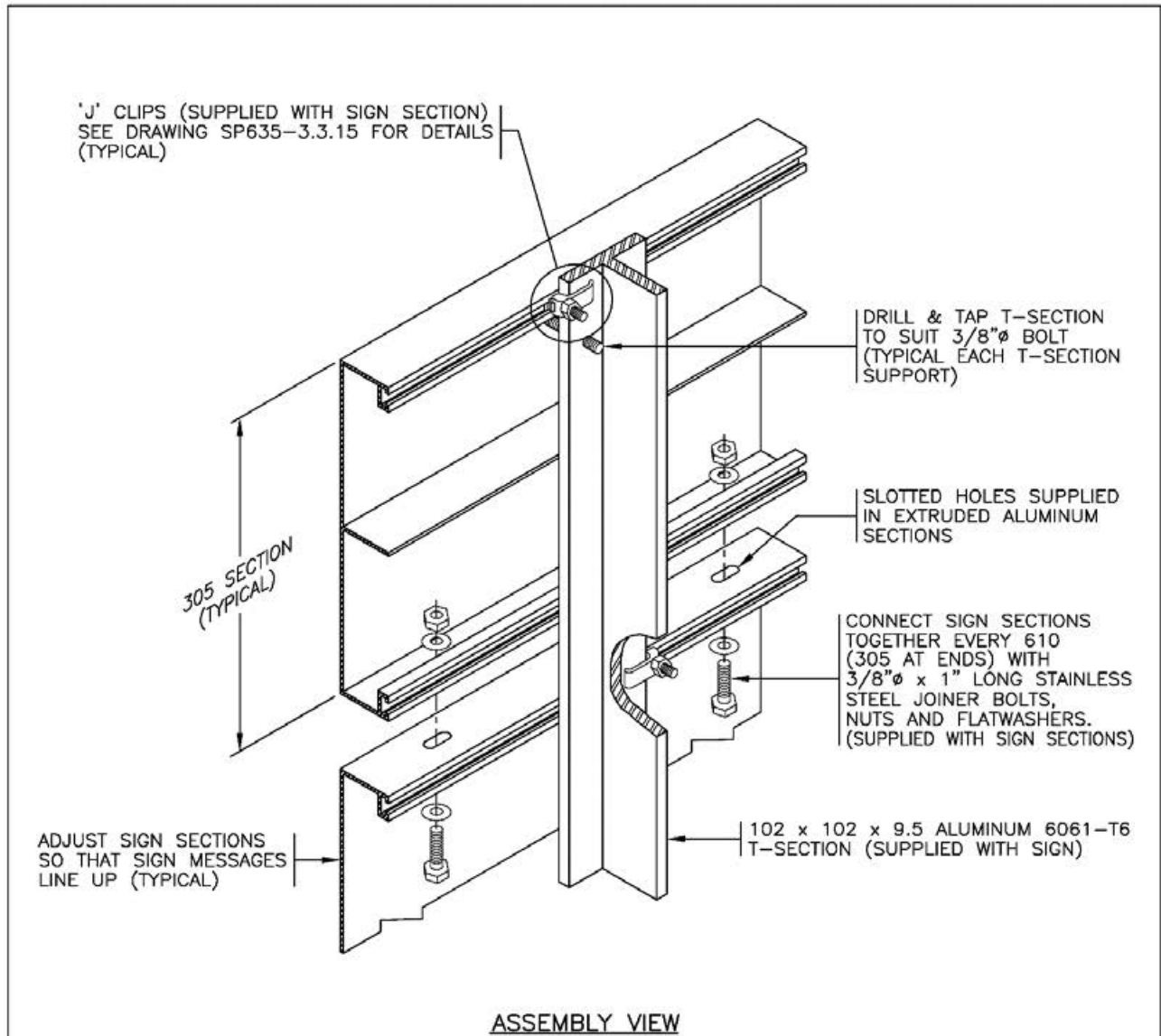


SEE DRAWING SP635-3.3.10 FOR NOTES AND ADDITIONAL DETAILS.



NOT TO SCALE

No.	Revision	Date	LARGE OVERHEAD EXTRUDED ALUMINUM GUIDE SIGN ASSEMBLY DETAILS		SPECIFICATION DRAWING No. SP635-3.3.13
F			Date	Approved	
E			18/11/94	E.L. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISION	APR 20			
B	SAFETY BOLT ADDED	AUG 96			
A	END HOLE SPACING REVISED	AUG 95			



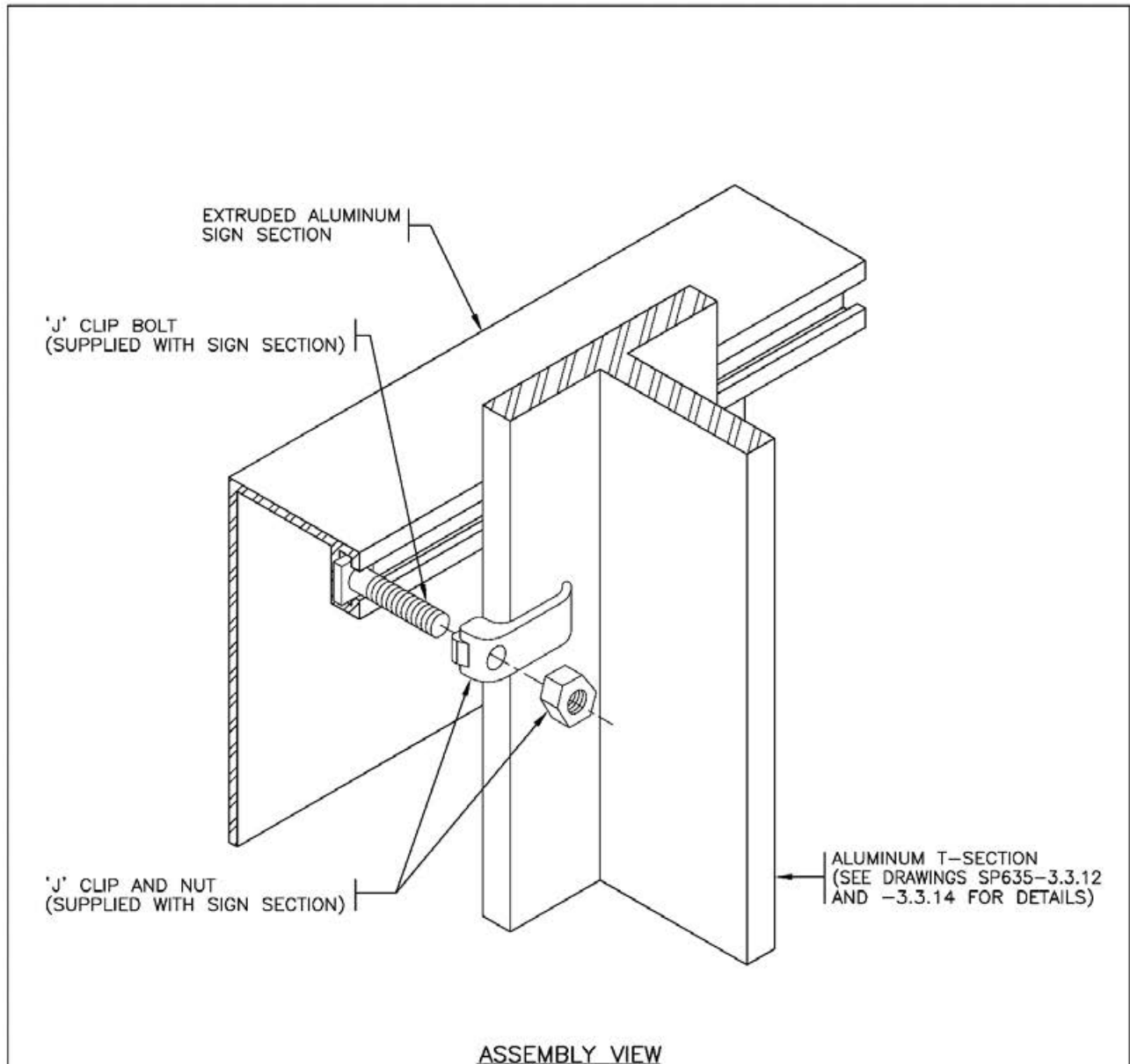
TORQUE JOINER BOLTS AND  
'J' CLIPS TO 19 ft. lbs.

SEE DRAWING SP635-3.3.10 FOR  
NOTES AND ADDITIONAL DETAILS.



NOT TO SCALE

No.	Revision	Date	LARGE OVERHEAD EXTRUDED ALUMINUM GUIDE SIGN ASSEMBLY DETAILS		SPECIFICATION DRAWING No. SP635-3.3.14
F			Date	Approved	
E			18/11/94	E.L. (Signature on File)	
D				Chief Highway Engineer	
C	GENERAL REVISIONS	APR 20			
B	SAFETY BOLT ADDED	AUG 96			
A	END HOLE SPACING REVISED	AUG 95			



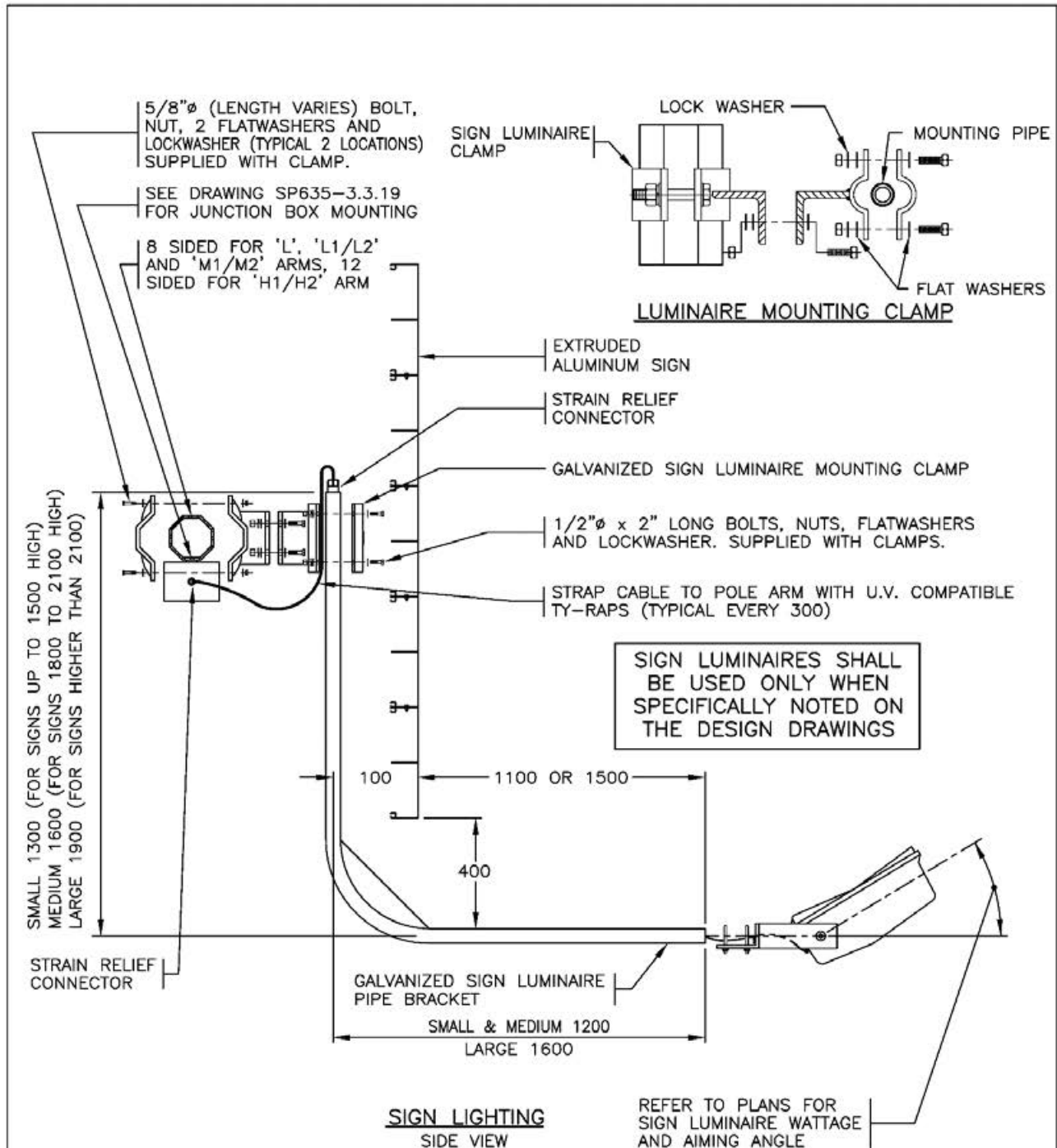
TORQUE JOINER BOLTS AND 'J' CLIPS TO 19 ft. lbs.

SEE DRAWING SP635-3.3.10 FOR NOTES AND ADDITIONAL DETAILS.

NOT TO SCALE



No.	Revision	Date	LARGE OVERHEAD EXTRUDED ALUMINUM GUIDE SIGN ASSEMBLY DETAILS		
F			Date	Approved	SPECIFICATION DRAWING No. <b>SP635-3.3.15</b>
E			<b>18/11/94</b>	<b>E.L. (Signature on File)</b>	
D				Chief Highway Engineer	
C					
B	GENERAL REVISIONS	APR 20			
A	DRAWING NUMBER REVISED	AUG 95			



**NOTES**

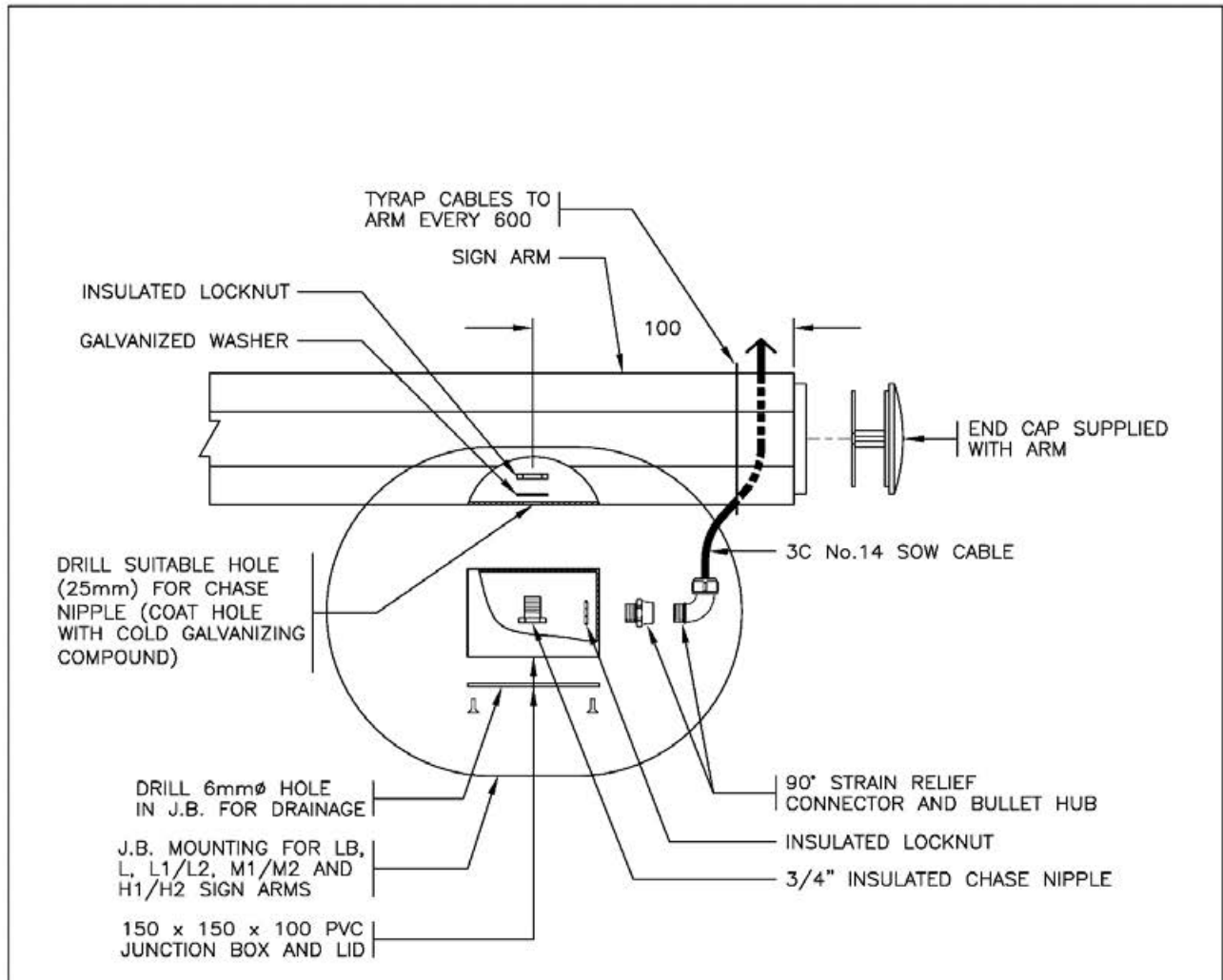
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	LARGE OVERHEAD GUIDE SIGN LUMINAIRE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-3.3.16
G	GENERAL REVISIONS	APR 20	Date	Approved	
F	JUNCTION BOX MOUNTING REVISED	NOV 01	<p><b>30/09/93 E.L. (Signature on File)</b> Chief Highway Engineer</p>		
E	SIGN LUMINAIRE NOTE ADDED	SEPT 00			
D	SIGN LUMINAIRE MOUNTING DIMENSIONS CHANGED	NOV 98			
C	SIGN LUMINAIRE & MOUNTING REVISED	DEC 96			
B	TYPE C LUMINAIRE & J.B. ADDED	AUG 95			



J.B. MOUNTING DETAIL

**NOTES**

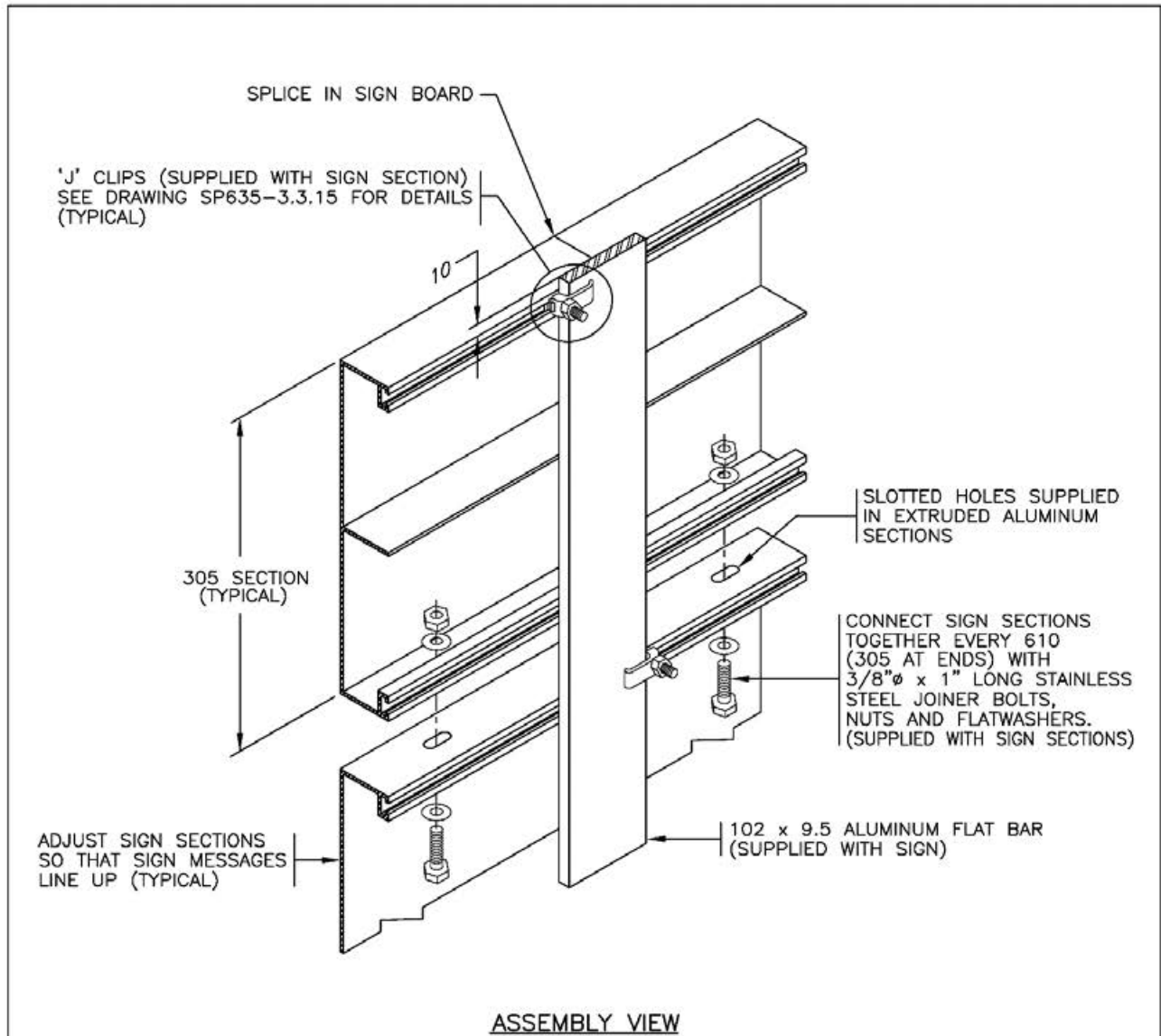
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



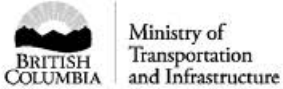
Ministry of  
Transportation  
and Infrastructure

No.	Revision	Date	JUNCTION BOX INSTALLATION DETAILS ON SIGN ARMS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-3.3.17
E			15/11/95	M.C. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISION	APR 20			
B	MOUNTING REVISED	NOV 01			
A	DRAWING NUMBER REVISED	DEC 98			



TORQUE JOINER BOLTS AND 'J' CLIPS TO 19 ft. lbs.

SEE DRAWING SP635-3.3.10 FOR NOTES AND ADDITIONAL DETAILS.

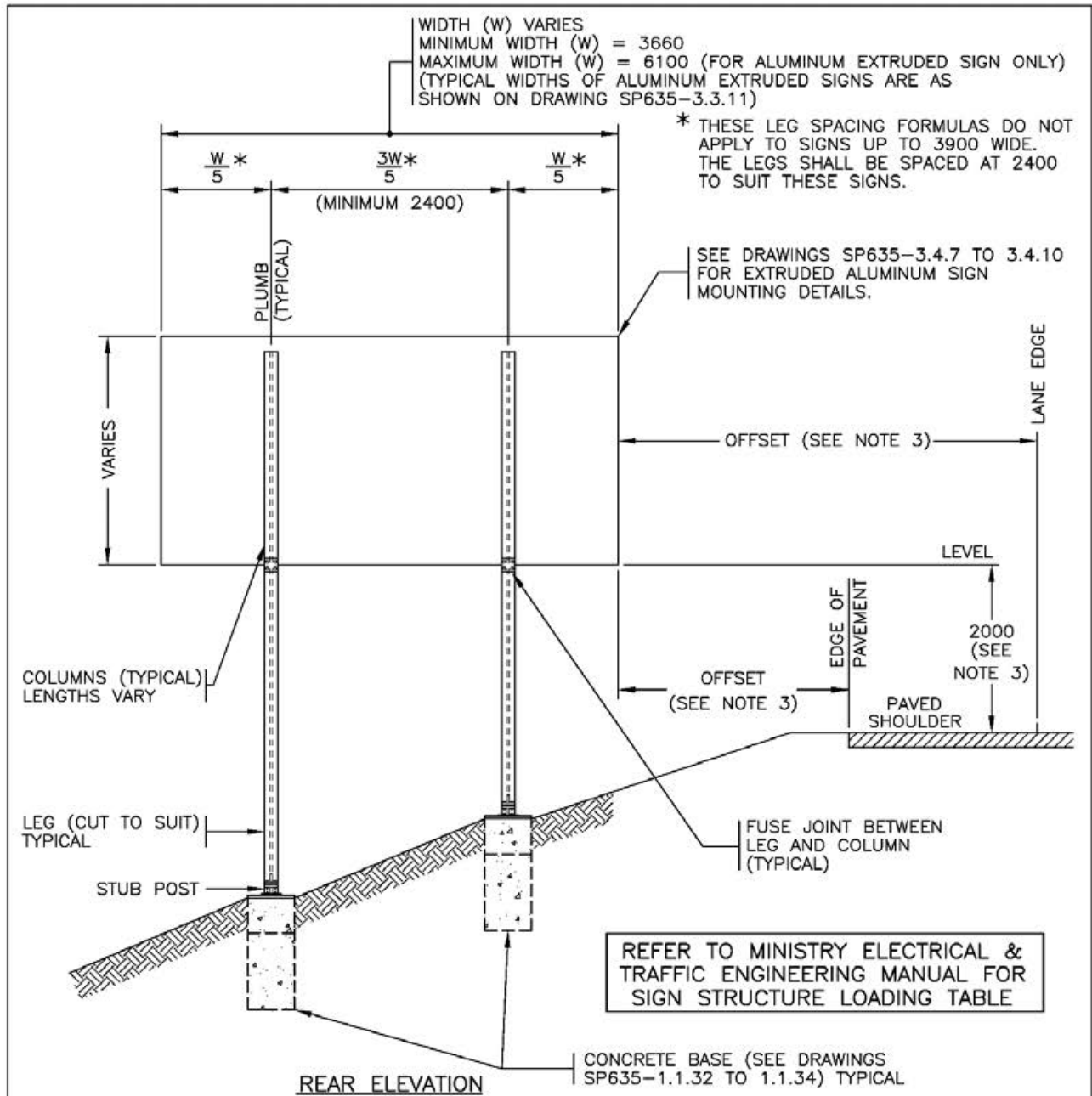


NOT TO SCALE

No.	Revision	Date
F		
E		
D		
C		
B	GENERAL REVISION	APR 20
A	DRAWING NUMBER REVISED	DEC 98

<b>LARGE OVERHEAD EXTRUDED ALUMINUM GUIDE SIGN FLAT BAR AT SPLICE DETAILS</b>		SPECIFICATION DRAWING No. <b>SP635-3.3.18</b>
Date	Approved	
_____ Chief Highway Engineer		





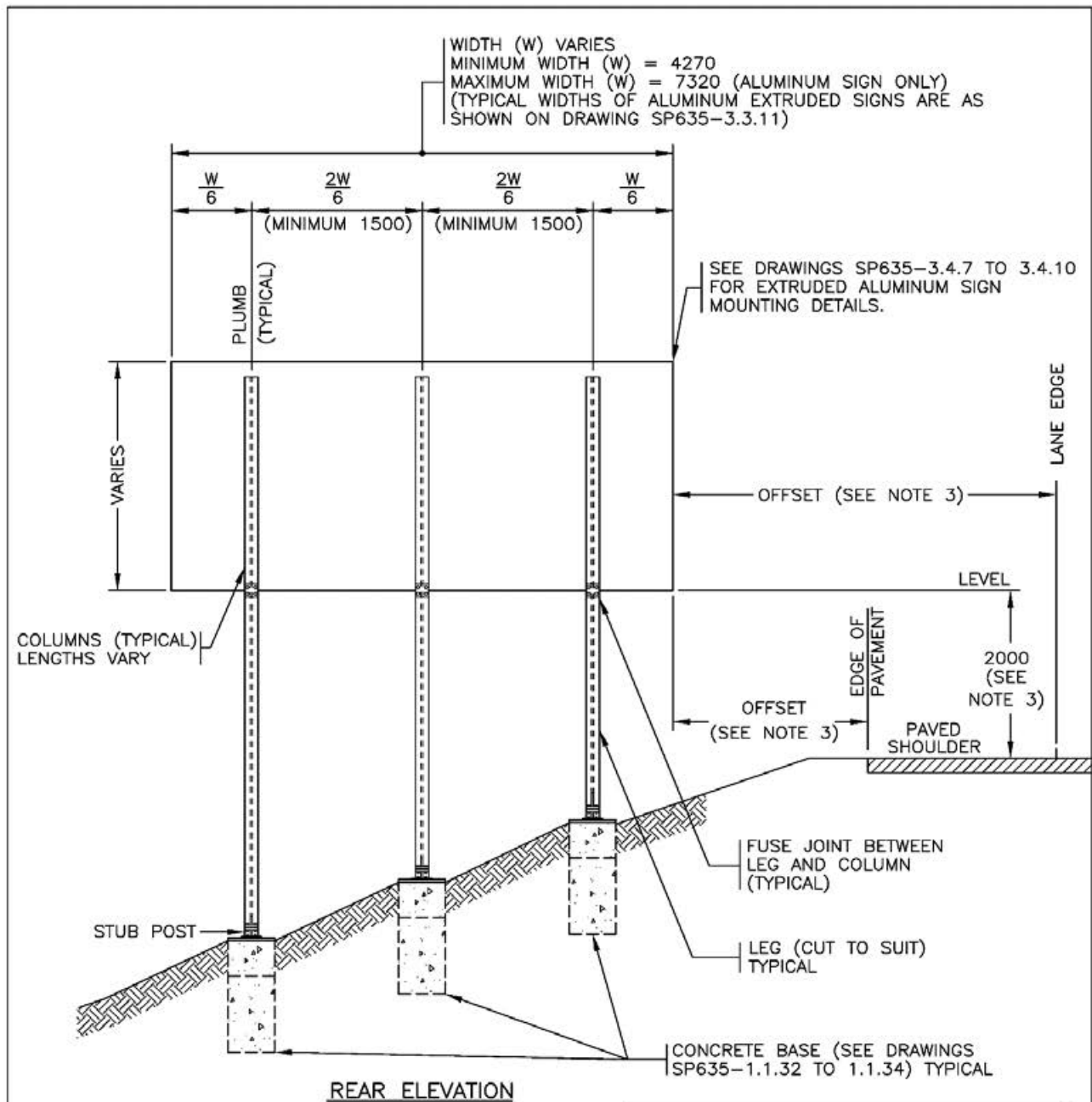
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

NOT TO SCALE



No.	Revision	Date	TWO LEG BREAKAWAY SIGN STRUCTURE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-3.4.1
G	REMOVED PLYWOOD SIGN DETAILS	APR 20	Date	Approved	
F	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
E	GENERAL REVISIONS	APR 05	Chief Highway Engineer		
D	MOUNTING HEIGHTS & OFFSETS REFERED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98			
C	SLOPE & BASE DWG. REFERENCES REV'D	AUG 96			



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

REFER TO MINISTRY ELECTRICAL & TRAFFIC ENGINEERING MANUAL FOR SIGN STRUCTURE LOADING TABLE

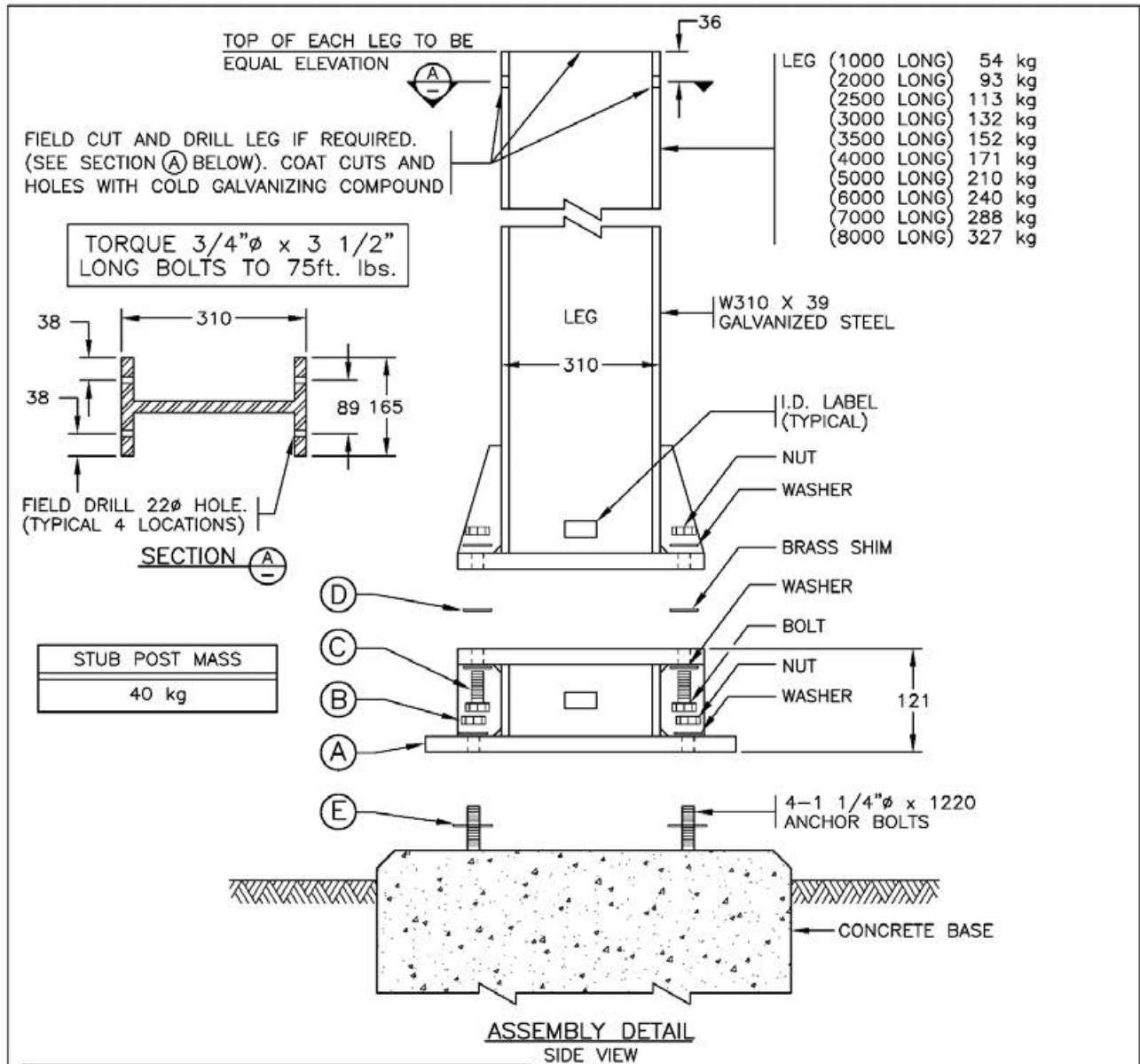
NOT TO SCALE



No.	Revision	Date
E	REMOVED PLYWOOD SIGN DETAILS	APR 20
E	GENERAL REVISIONS	APR 17
D	MOUNTING HEIGHTS & OFFSETS REFERRED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98
C	SLOPE & BASE DWG. REFERENCES REV'D	AUG 96
B	SLOPE SHOWN & TYPICAL SIGN WIDTHS SHOWN	AUG 95

**THREE LEG BREAKAWAY SIGN STRUCTURE  
INSTALLATION DETAILS**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-3.4.2</b>



STUB POST KIT		
ITEM	QUANTITY	DESCRIPTION
A	1	GALVANIZED STEEL STUB POST
B	4	GALVANIZED NUT AND WASHER FOR 1 1/4"φ ANCHOR BOLT
C	4	3/4"φ x 3 1/2" LONG GALVANIZED BOLT, 2 WASHERS AND NUT
D	4	BRASS SHIMS (1 PER BOLT)
E	4	LEVELING SHIMS (MAX 4 PER BOLT)

NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



Ministry of Transportation and Infrastructure

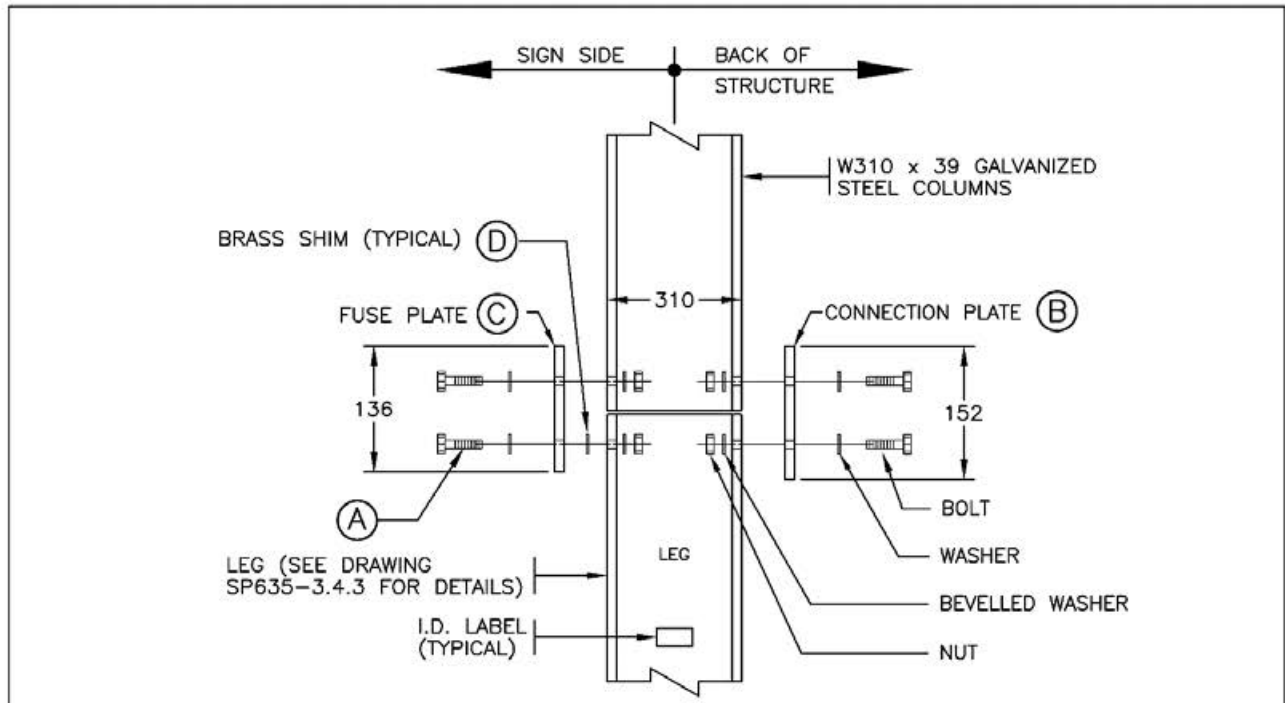
NOT TO SCALE

No.	Revision	Date
F		
E		
D		
C		
B	GENERAL REVISIONS	APR 17
A	GENERAL REVISIONS	AUG 94

BREAKAWAY LEG AND STUB POST INSTALLATION DETAILS

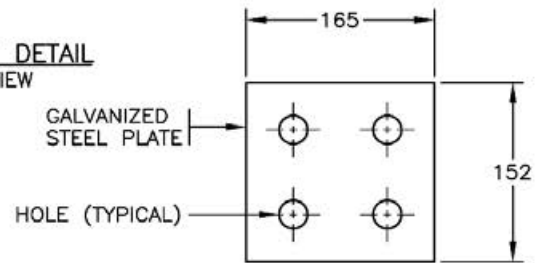
Date Approved  
 30/09/93 E.L. (Signature on File)  
 Chief Highway Engineer

SPECIFICATION DRAWING No.  
 SP635-3.4.3

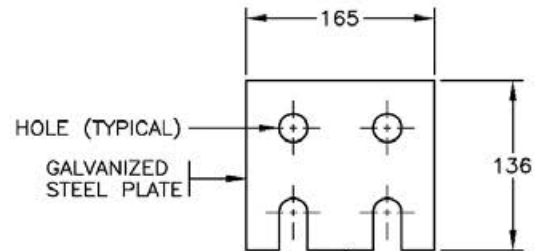


ASSEMBLY DETAIL  
SIDE VIEW

TORQUE 3/4"φ x 2" LONG BOLTS TO 262ft. lbs.



CONNECTION PLATE  
(ITEM B)



FUSE PLATE  
(ITEM C)

FUSE JOINT KIT		
ITEM	QUANTITY	DESCRIPTION
A	8	3/4"φ x 2" LONG GALVANIZED BOLT, NUT, WASHER AND BEVELLED WASHER.
B	1	CONNECTION PLATE
C	1	FUSE PLATE
D	2	BRASS SHIMS

NOTES

- SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



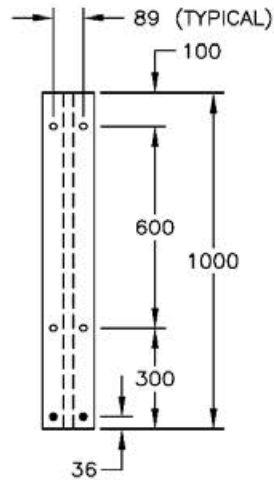
Ministry of  
Transportation  
and Infrastructure

No.	Revision	Date
F		
E		
D		
C		
B	GENERAL REVISIONS	APR 17
A	GENERAL REVISIONS	AUG 94

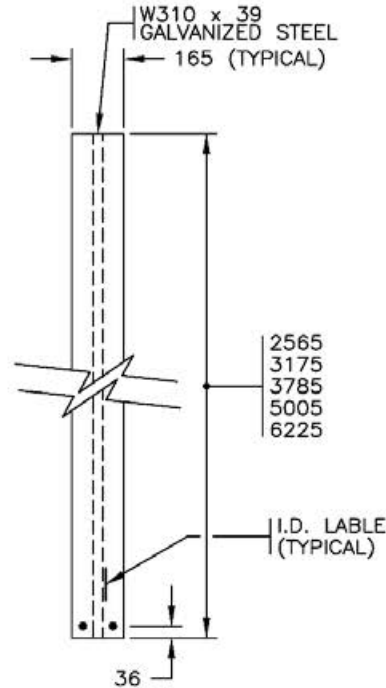
BREAKAWAY FUSE JOINT  
INSTALLATION DETAILS

Date Approved  
30/09/93 E.L. (Signature on File)  
Chief Highway Engineer

SPECIFICATION  
DRAWING No.  
SP635-3.4.4



**SUPPORT COLUMN FOR SHEET ALUMINUM SIGNS**



**SUPPORT COLUMN FOR EXTRUDED ALUMINUM SIGNS**

COLUMNS	
LENGTH	MASS (kg)
1000	39
2565	100
3175	124
3785	148
5005	195
6225	243

**NOTES**

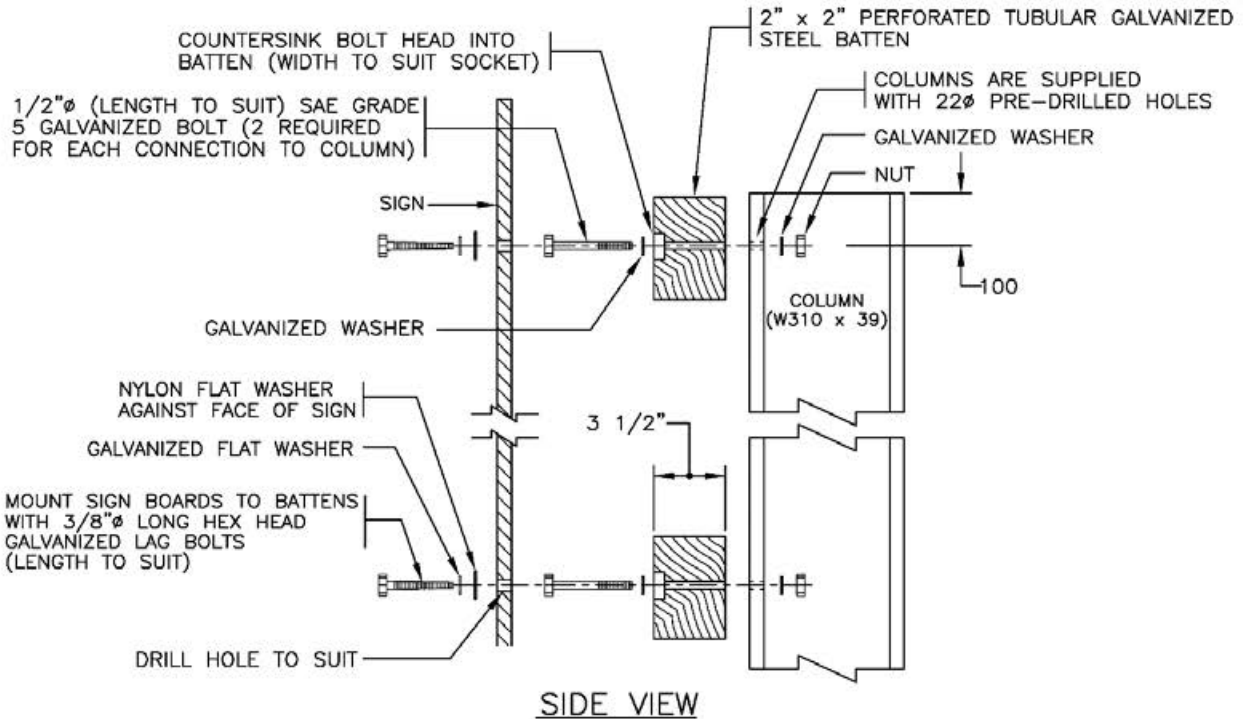
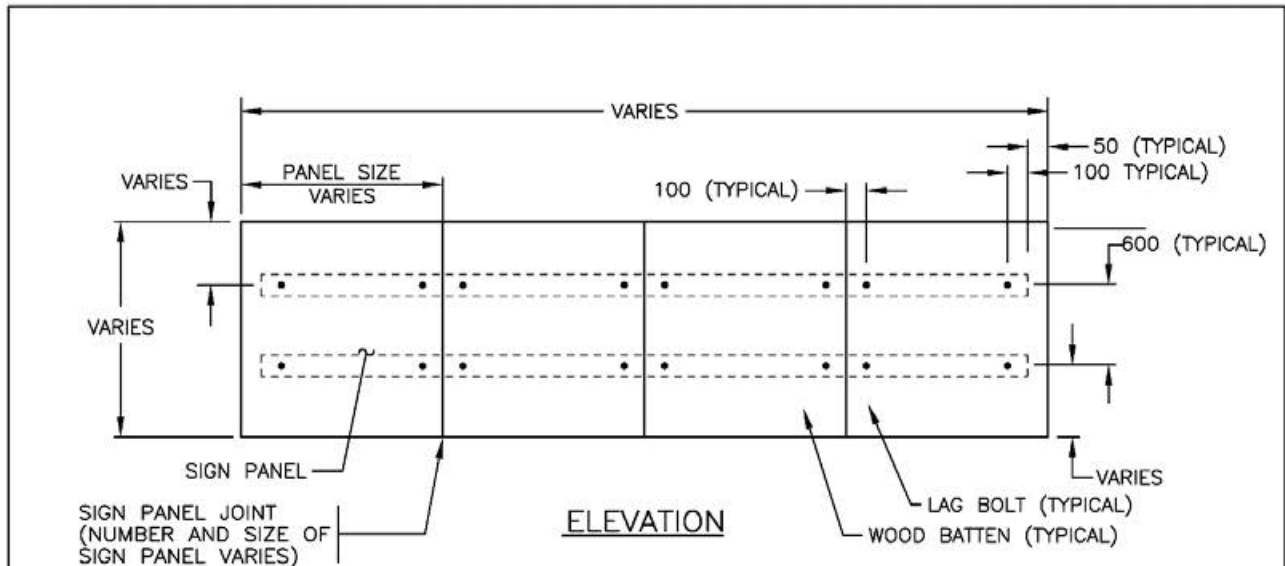
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. HOLES SHOWN ● ARE FOR FUSE OR CONNECTION PLATES ONLY
3. HOLES SHOWN ○ ARE FOR BATTENS ONLY
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	BREAKAWAY SIGN SUPPORT COLUMN DETAILS	
E			Date	Approved
D			30/09/93	E.L. (Signature on File)
C			Chief Highway Engineer	
B	REMOVED PLYWOOD SIGN DETAILS NEW DRAWING NUMBER	APR 20	SPECIFICATION DRAWING No. SP635-3.4.5	
A	GENERAL REVISION	AUG 94		



- NOTES**
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
  2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

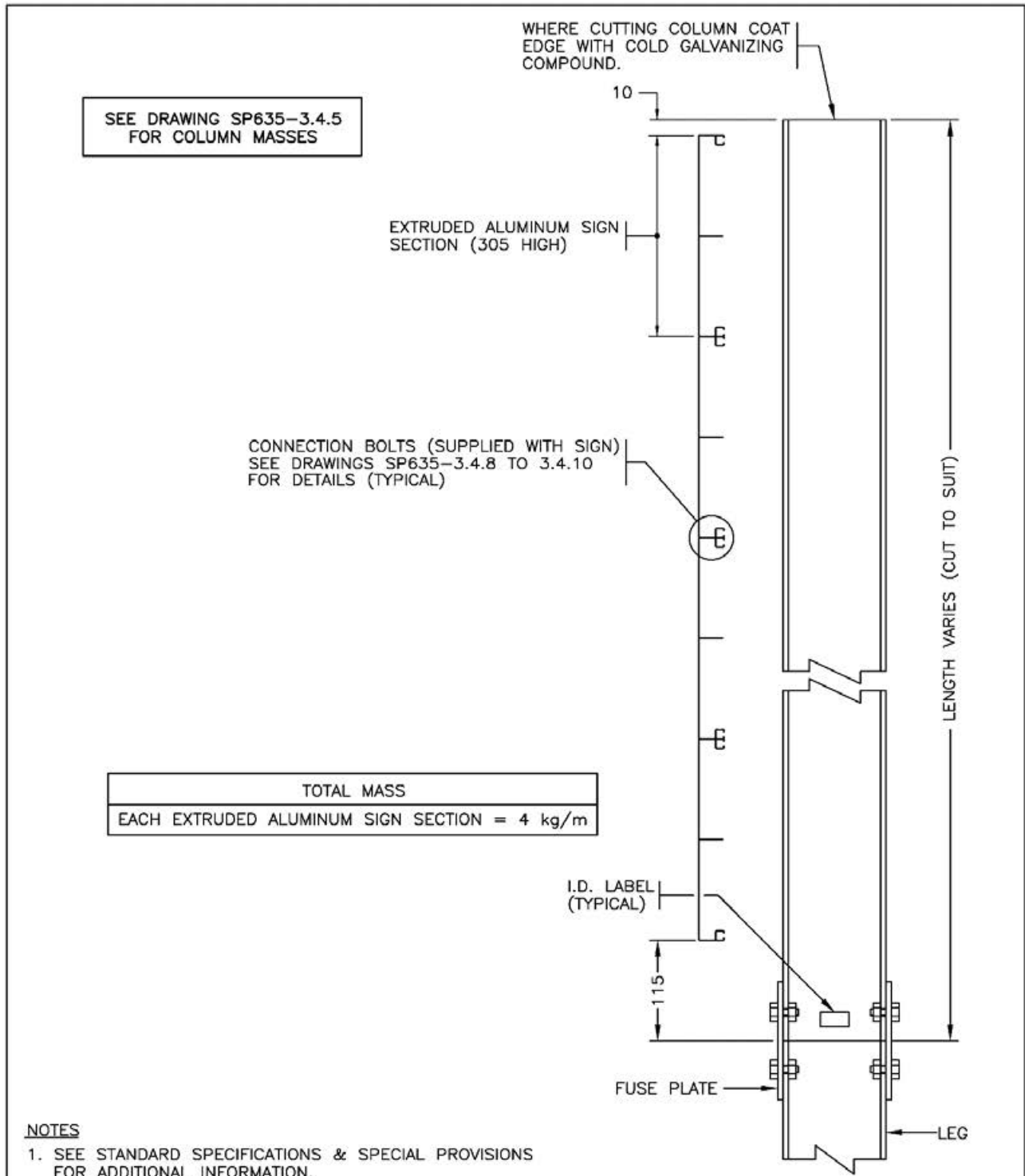


NOT TO SCALE

No.	Revision	Date
E		
D		
C	REMOVED PLYWOOD SIGN DETAILS NEW DRAWING NUMBER	APR 20
B	GENERAL REVISIONS	APR 05
A	GENERAL REVISIONS	AUG 94

**SHEET ALUMINUM SIGN MOUNTING DETAILS  
ON BREAKAWAY SIGN STRUCTURE**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-3.4.6</b>



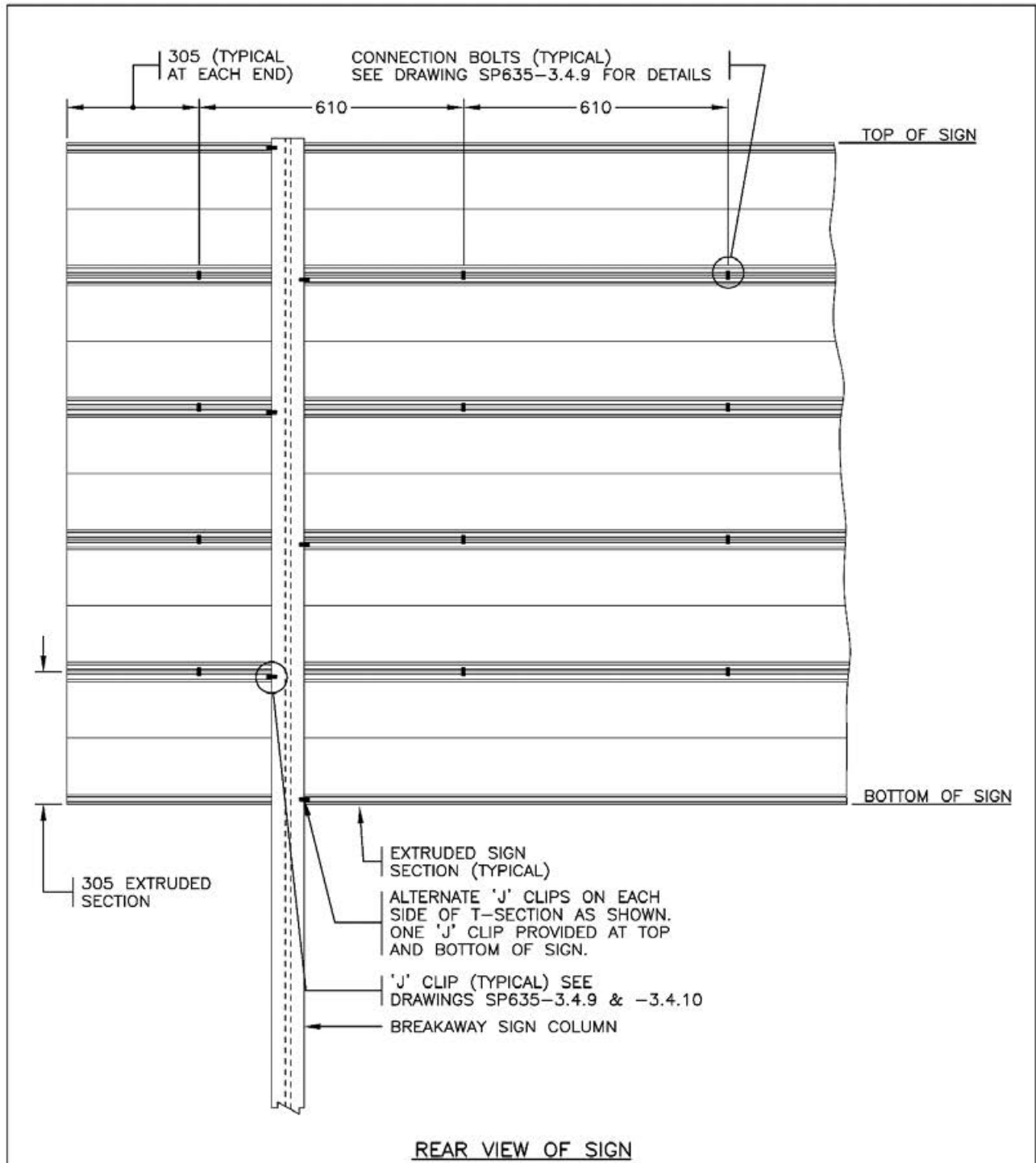
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



No.	Revision	Date	EXTRUDED ALUMINUM SIGN MOUNTING DETAILS ON BREAKAWAY SIGN STRUCTURE		SPECIFICATION DRAWING No. <b>SP635-3.4.7</b>
E			Date	Approved	
D			<b>18/11/94</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	
C	GENERAL REVISIONS NEW DRAWING NUMBER	APR 20			
B	GENERAL REVISIONS	APR 17			
A	NEW DRAWING NUMBER	OCT 97			



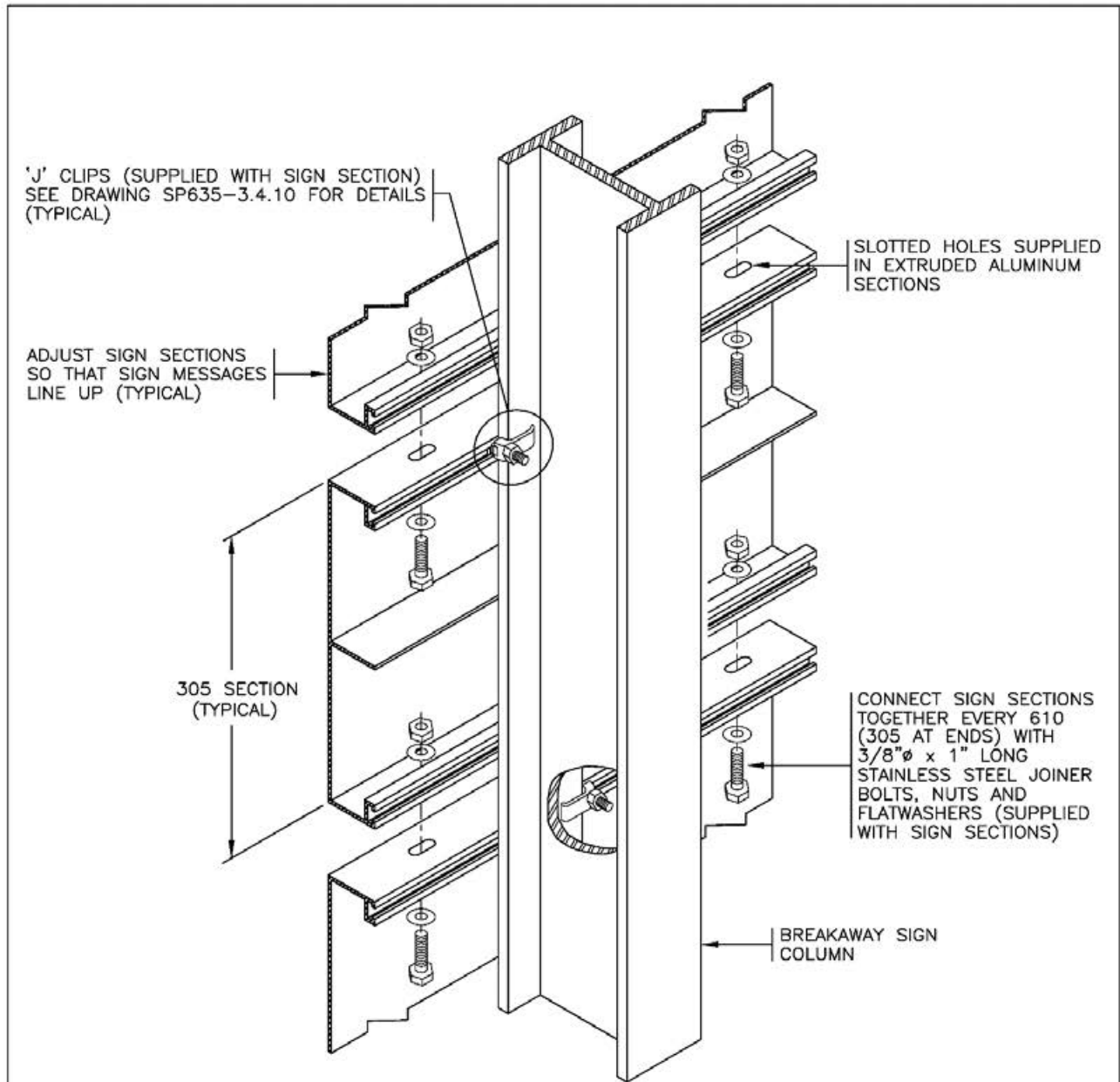
SEE DRAWING SP635-3.4.7 FOR NOTES AND ADDITIONAL DETAILS.



NOT TO SCALE

No.	Revision	Date	EXTRUDED ALUMINUM SIGN MOUNTING DETAILS ON BREAKAWAY SIGN STRUCTURE		SPECIFICATION DRAWING No.
E			Date	Approved	SP635-3.4.8
D	GENERAL REVISIONS NEW DRAWING NUMBER	APR 20	18/11/94	E.L. (Signature on File)	
C	GENERAL REVISIONS	APR 17	Chief Highway Engineer		
B	NEW DRAWING NUMBER	OCT 97			
A	END HOLE SPACING REVISED	AUG 95			





ASSEMBLY VIEW

TORQUE JOINER BOLTS AND 'J' CLIPS TO 19 ft. lbs.

SEE DRAWING SP635-3.4.7 FOR NOTES AND ADDITIONAL DETAILS.

NOT TO SCALE

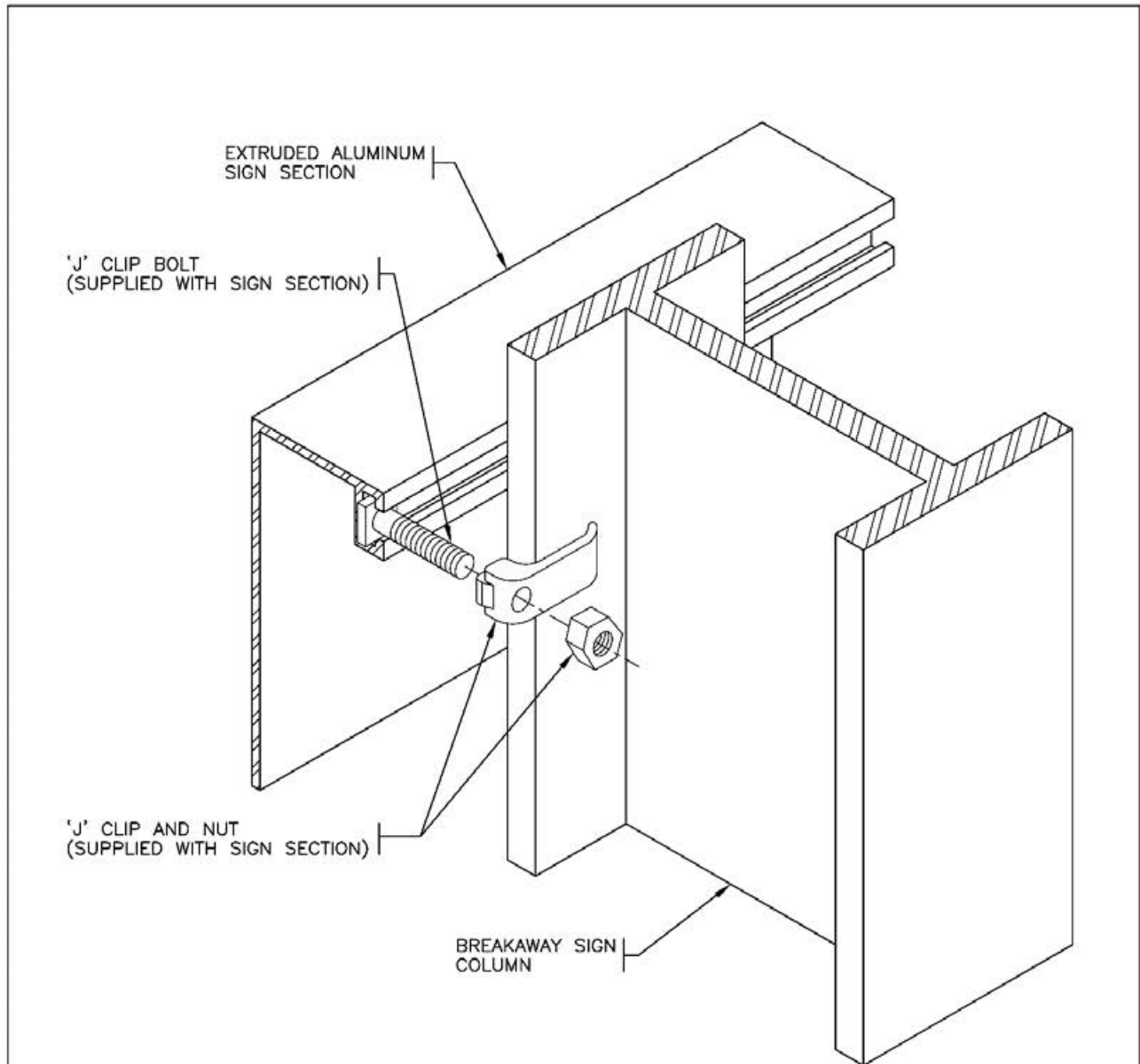


No.	Revision	Date
E		
D	GENERAL REVISIONS NEW DRAWING NUMBER	APR 20
C	GENERAL REVISIONS	APR 17
B	NEW DRAWING NUMBER	OCT 97
A	END HOLE SPACING REVISED	AUG 95

EXTRUDED ALUMINUM SIGN MOUNTING  
DETAILS ON BREAKAWAY SIGN STRUCTURE

Date: 18/11/94  
Approved: E.L. (Signature on File)  
Chief Highway Engineer

SPECIFICATION  
DRAWING No.  
SP635-3.4.9



ASSEMBLY VIEW

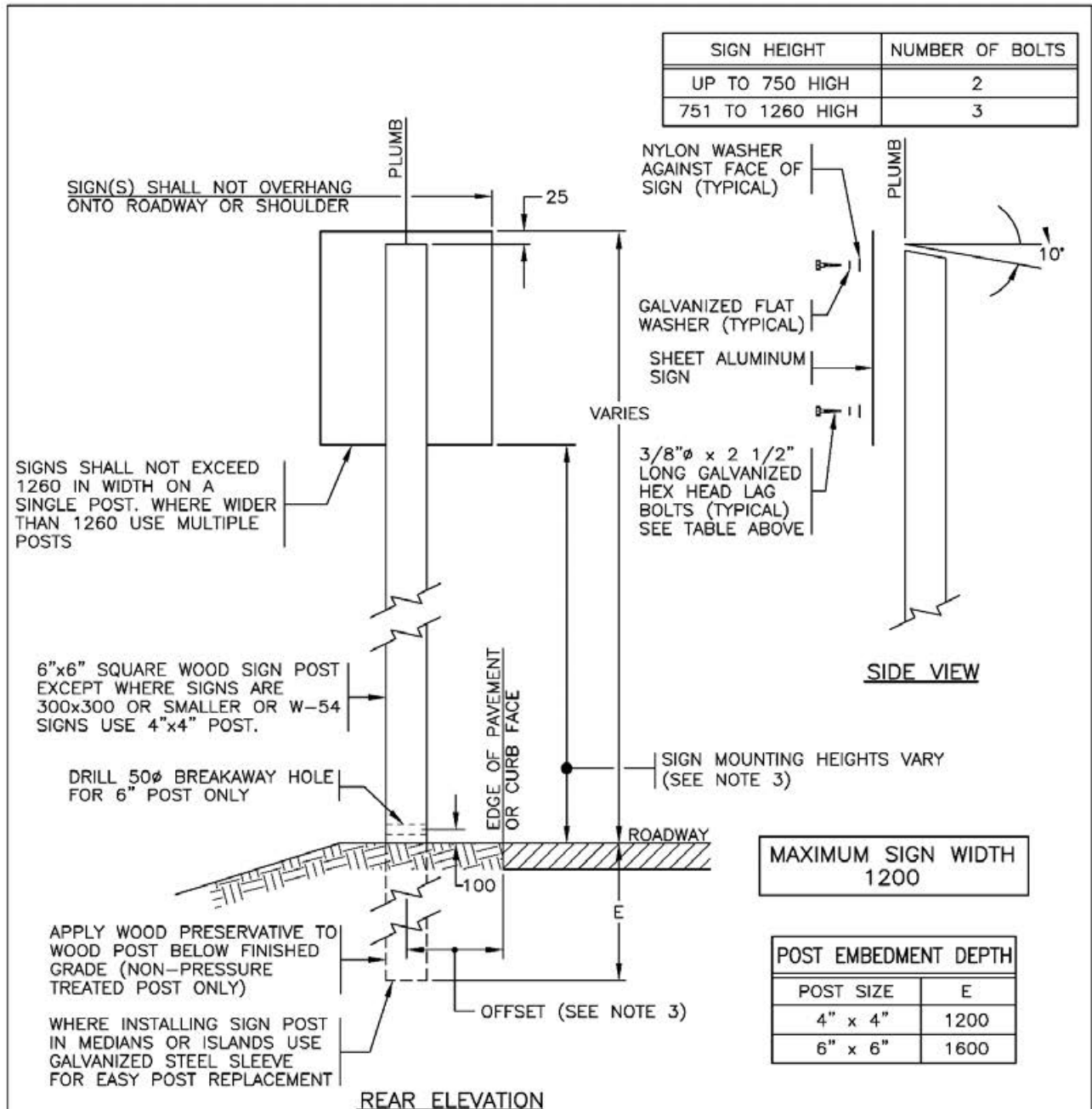
TORQUE JOINER BOLTS AND 'J' CLIPS TO 19 ft. lbs.

SEE DRAWING SP635-3.4.7 FOR NOTES AND ADDITIONAL DETAILS.



NOT TO SCALE

No.	Revision	Date	EXTRUDED ALUMINUM SIGN MOUNTING DETAILS ON BREAKAWAY SIGN STRUCTURE		SPECIFICATION DRAWING No. SP635-3.4.10
E			Date	Approved	
D			<b>18/11/94</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	
C	GENERAL REVISIONS NEW DRAWING NUMBER	APR 20			
B	GENERAL REVISIONS	APR 17			
A	NEW DRAWING NUMBER	OCT 97			



**NOTES**

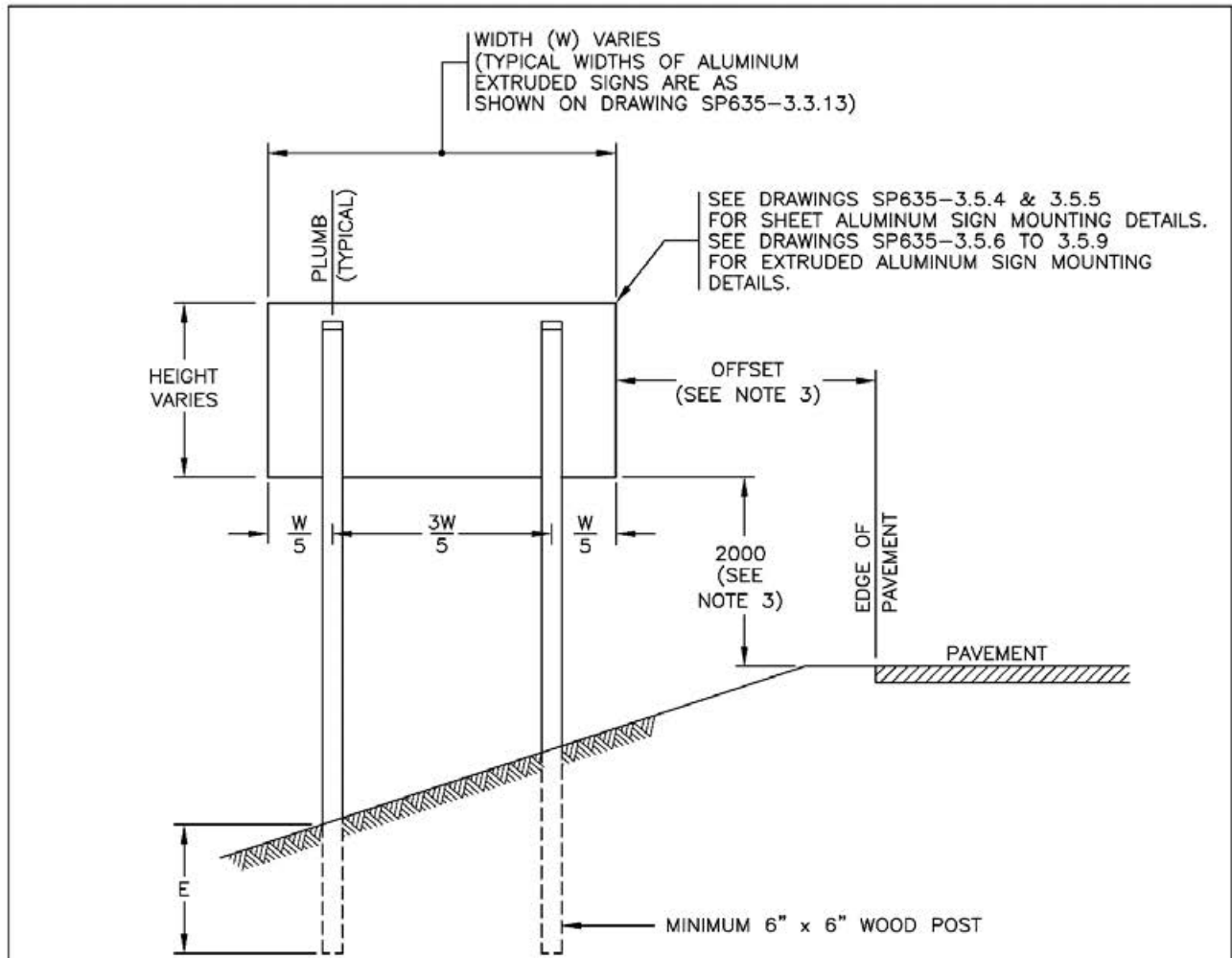
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

REFER TO MINISTRY ELECTRICAL & TRAFFIC ENGINEERING MANUAL FOR SIGN STRUCTURE LOADING TABLE

NOT TO SCALE



No.	Revision	Date	SINGLE WOOD POST SIGN STRUCTURE INSTALLATION DETAILS		SPECIFICATION DRAWING No. SP635-3.5.1
H	REMOVED PLYWOOD SIGN DETAILS	APR 20	Date	Approved	
G	GENERAL REVISIONS	APR 17	30/09/93 E.L. (Signature on File)		
F	REF. TO NON-PRESSURE TREATED POSTS	APR 05	Chief Highway Engineer		
E	MOUNTING HEIGHTS & OFFSETS REFERRED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98			
D	PAINTING NOTE REVISED	NOV 98			



REAR ELEVATION

EMBEDMENT DEPTH	
POST SIZE	E
6" x 6"	1600
8" x 8"	2000
10" x 10"	2200

REFER TO MINISTRY ELECTRICAL & TRAFFIC ENGINEERING MANUAL FOR SIGN STRUCTURE LOADING TABLE

NOTES

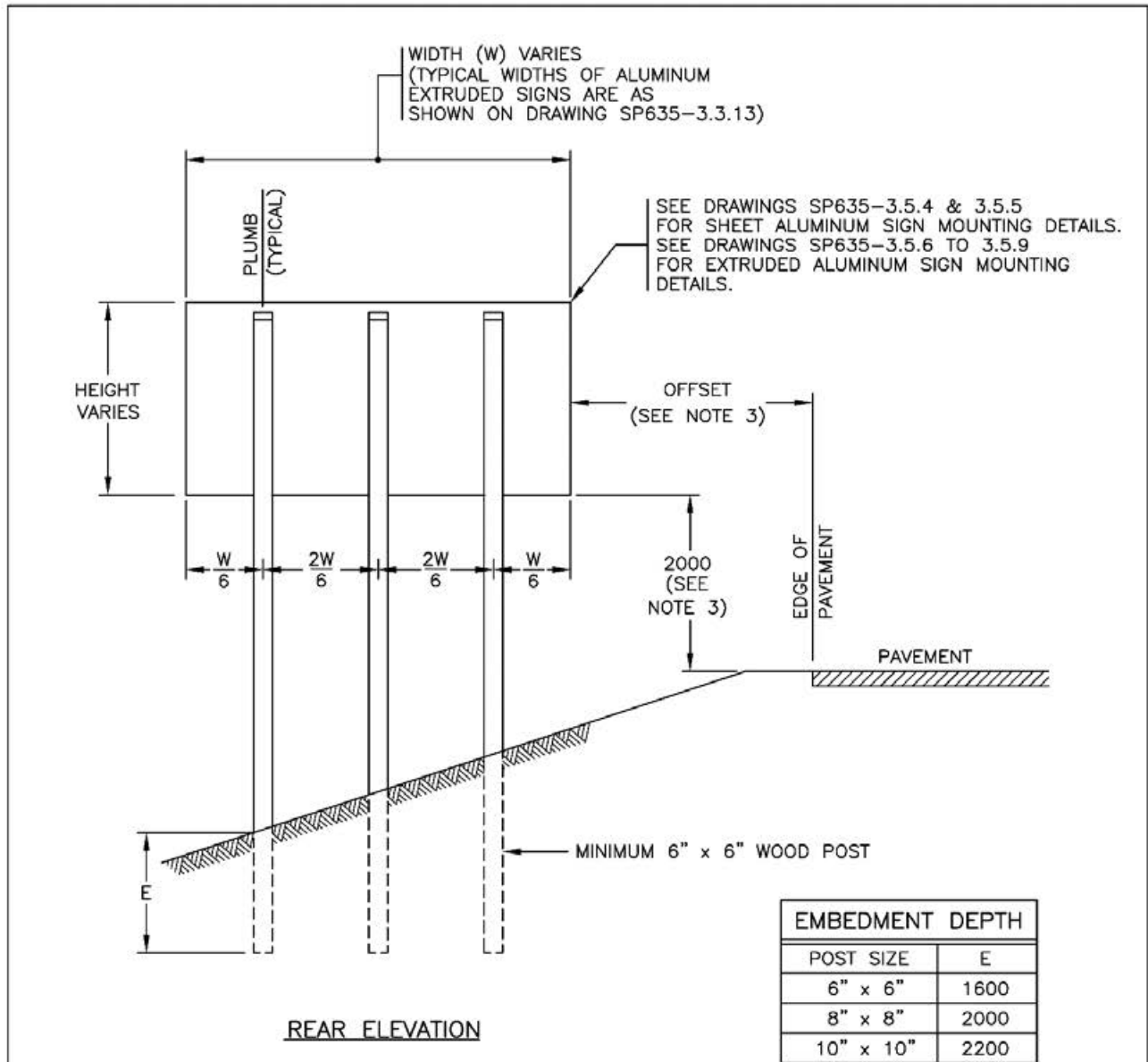
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	WOOD POST SIGN STRUCTURE INSTALLATION DETAILS (TWO POST)		SPECIFICATION DRAWING No.
G	REMOVED PLYWOOD SIGN DETAILS	APR 20	Date	Approved	SP635-3.5.2
F	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
E	SHEET ALUMINUM SIGN ADDED	APR 05	Chief Highway Engineer		
D	MOUNTING HEIGHTS & OFFSETS REFERED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98			
C	LOADING TABLE REFERENCE NOTE REVISED	AUG 96			



REFER TO MINISTRY ELECTRICAL & TRAFFIC ENGINEERING MANUAL FOR SIGN STRUCTURE LOADING TABLE

NOTES

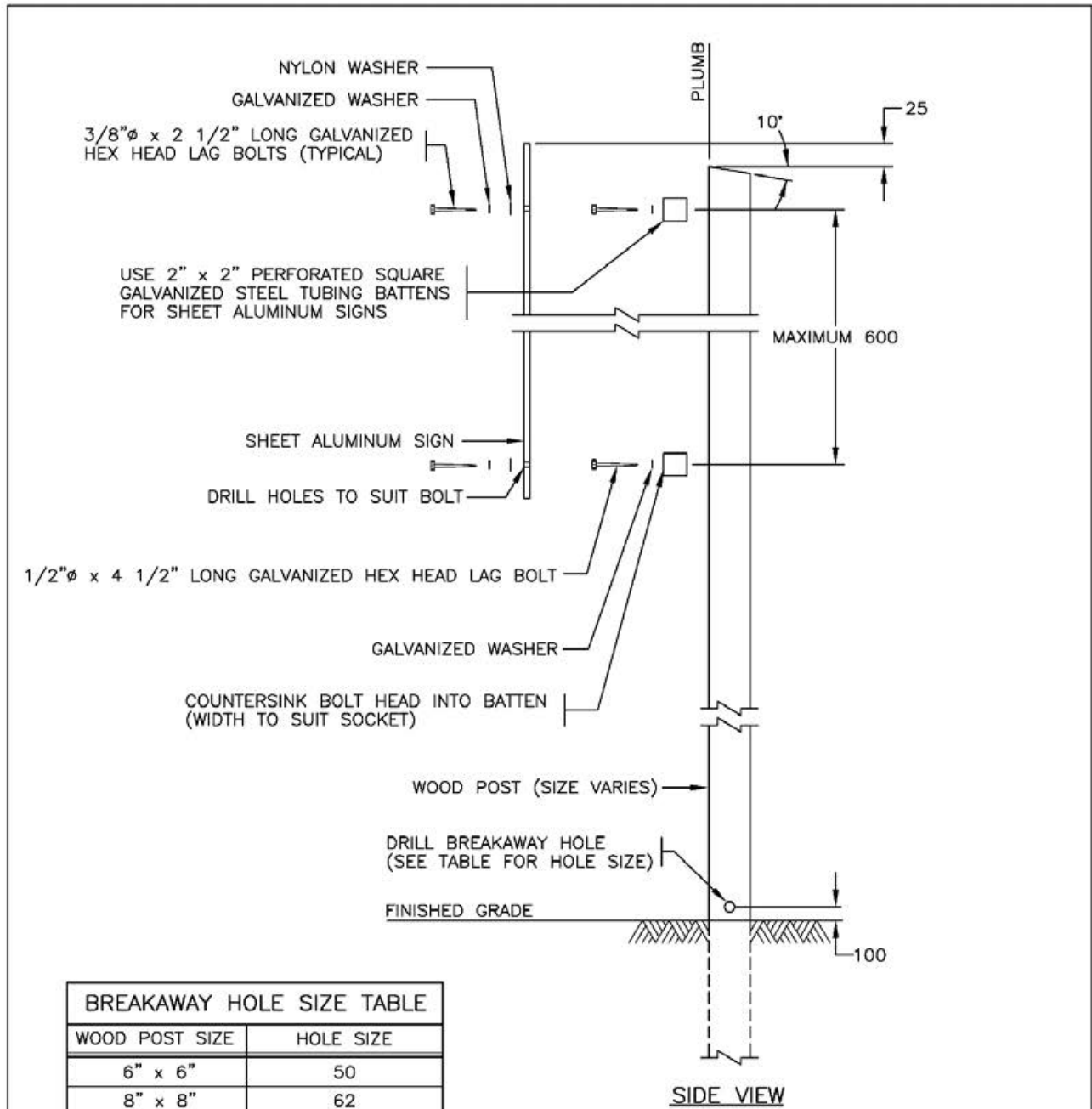
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	WOOD POST SIGN STRUCTURE INSTALLATION DETAILS (THREE POST)		SPECIFICATION DRAWING No.
G	REMOVED PLYWOOD SIGN DETAILS	APR 20	Date	Approved	SP635-3.5.3
F	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
E	SHEET ALUMINUM SIGN ADDED	APR 05	Chief Highway Engineer		
D	MOUNTING HEIGHTS & OFFSETS REFERED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98			
C	LOADING TABLE REFERENCE NOTE REVISED	AUG 96			



BREAKAWAY HOLE SIZE TABLE	
WOOD POST SIZE	HOLE SIZE
6" x 6"	50
8" x 8"	62
10" x 10"	75

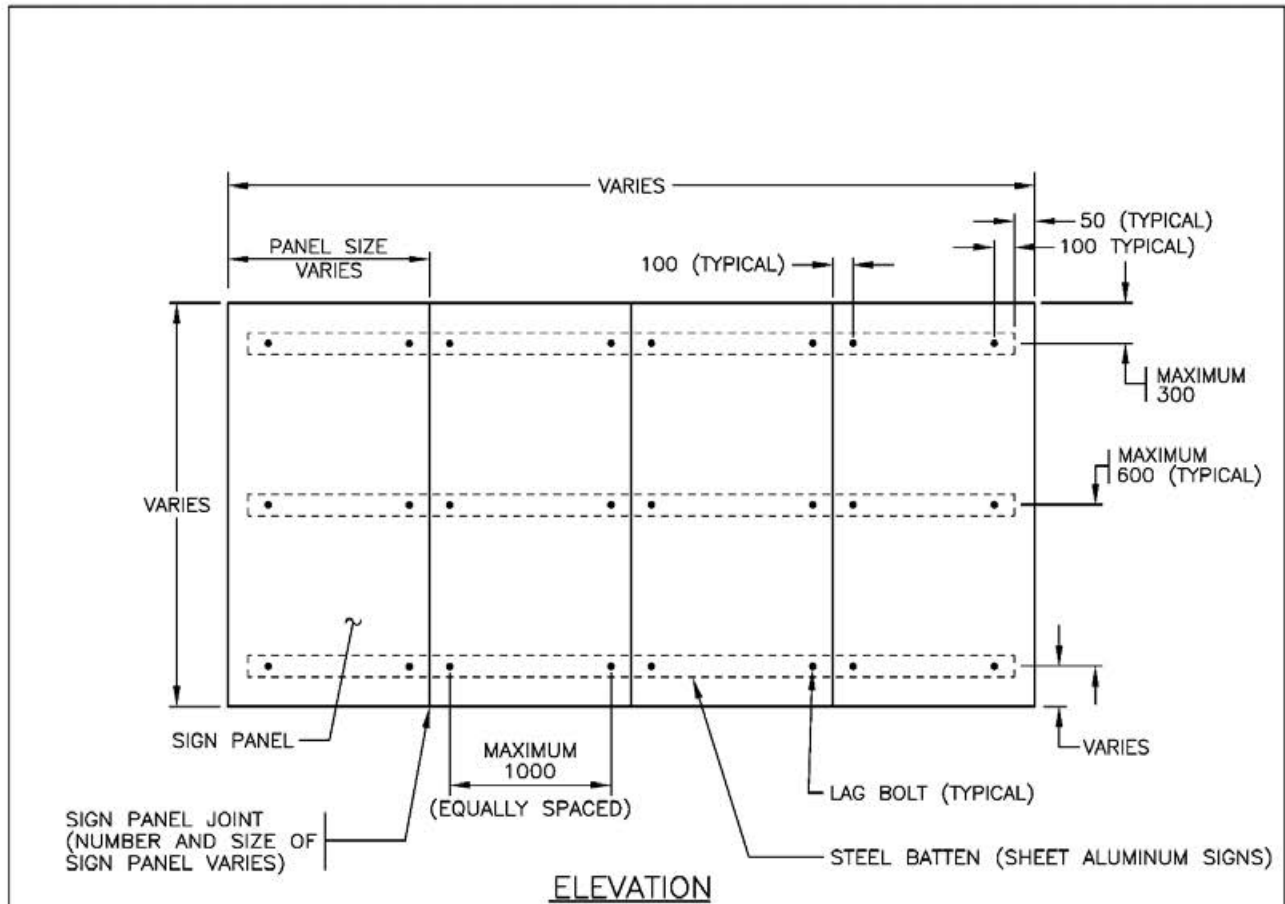
**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

NOT TO SCALE



<table border="1"> <thead> <tr> <th>No.</th> <th>Revision</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>F</td> <td></td> <td></td> </tr> <tr> <td>E</td> <td>REMOVED PLYWOOD SIGN DETAILS</td> <td>APR 20</td> </tr> <tr> <td>D</td> <td>GENERAL REVISIONS</td> <td>APR 17</td> </tr> <tr> <td>C</td> <td>GENERAL REVISION</td> <td>APR 05</td> </tr> <tr> <td>B</td> <td>ANGLE CUT ADDED TO TOP OF POST</td> <td>AUG 95</td> </tr> <tr> <td>A</td> <td>GENERAL REVISION</td> <td>AUG 94</td> </tr> </tbody> </table>			No.	Revision	Date	F			E	REMOVED PLYWOOD SIGN DETAILS	APR 20	D	GENERAL REVISIONS	APR 17	C	GENERAL REVISION	APR 05	B	ANGLE CUT ADDED TO TOP OF POST	AUG 95	A	GENERAL REVISION	AUG 94	<p><b>SIGN INSTALLATION DETAILS ON WOOD POSTS (2 &amp; 3 POST STRUCTURES)</b></p>		<p>SPECIFICATION DRAWING No. <b>SP635-3.5.4</b></p>
No.	Revision	Date																								
F																										
E	REMOVED PLYWOOD SIGN DETAILS	APR 20																								
D	GENERAL REVISIONS	APR 17																								
C	GENERAL REVISION	APR 05																								
B	ANGLE CUT ADDED TO TOP OF POST	AUG 95																								
A	GENERAL REVISION	AUG 94																								
		<p>Date      Approved</p> <p><b>30/09/93 E.L. (Signature on File)</b></p> <p>Chief Highway Engineer</p>																								



**NOTES**

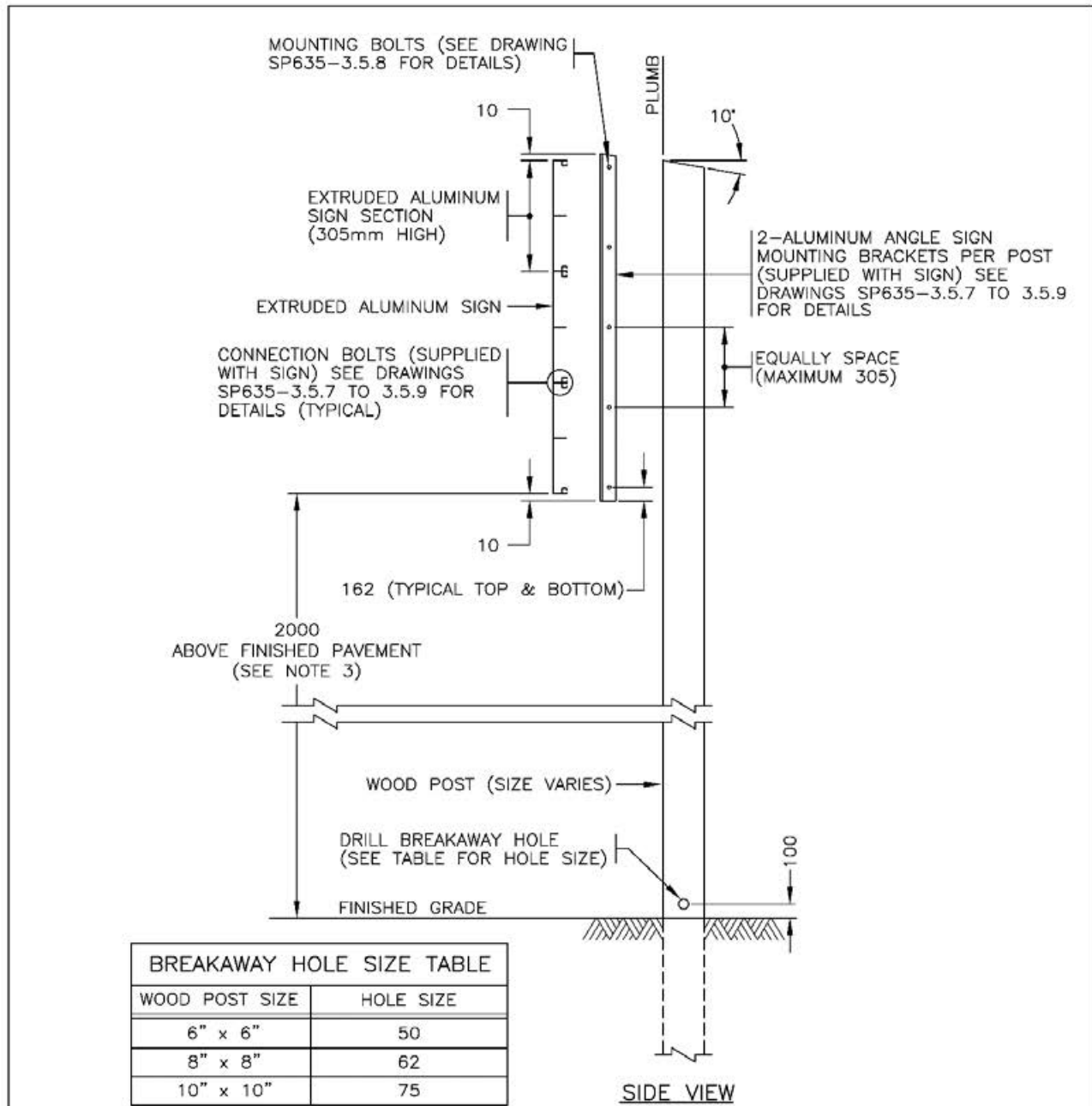
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

TOTAL MASS
SIGNBOARD = 10 kg/m <sup>2</sup>

NOT TO SCALE



No.	Revision	Date	SIGN INSTALLATION DETAILS ON WOOD POSTS		SPECIFICATION DRAWING No. <b>SP635-3.5.5</b>
F			Date	Approved	
E			<b>30/09/93</b>	<b>E.L. (Signature on File)</b>	
D	PLYWOOD SIGN DETAILS REMOVED	APR 20	Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	SHEET ALUMINUM SIGN ADDED	APR 05			
A	GENERAL REVISION	AUG 94			



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

NOT TO SCALE

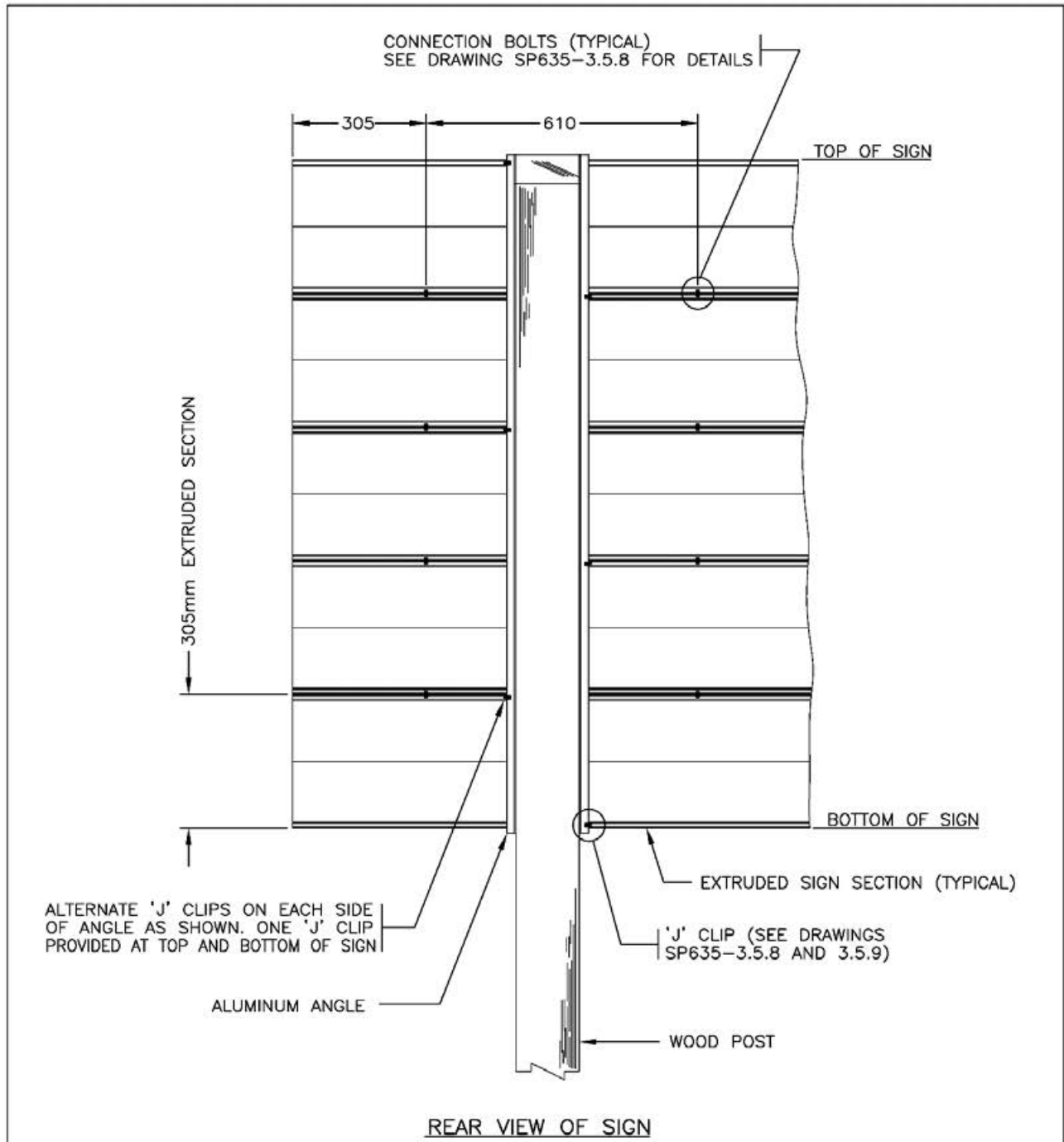
TOTAL MASS
EACH EXTRUDED ALUMINUM SIGN SECTION = 4 kg/m



Ministry of Transportation and Infrastructure

No.	Revision	Date	<b>EXTRUDED ALUMINUM SIGN INSTALLATION DETAILS ON WOOD POSTS</b>		
E			Date	Approved	
D					SPECIFICATION DRAWING No.
C	GENERAL REVISIONS	APR 17	<b>17/11/94</b>	<b>E.L. (Signature on File)</b>	<b>SP635-3.5.6</b>
B	MOUNTING HEIGHTS & OFFSETS REFERED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98	Chief Highway Engineer		
A	ANGLE CUT ADDED ON TOP OF POST	AUG 95			



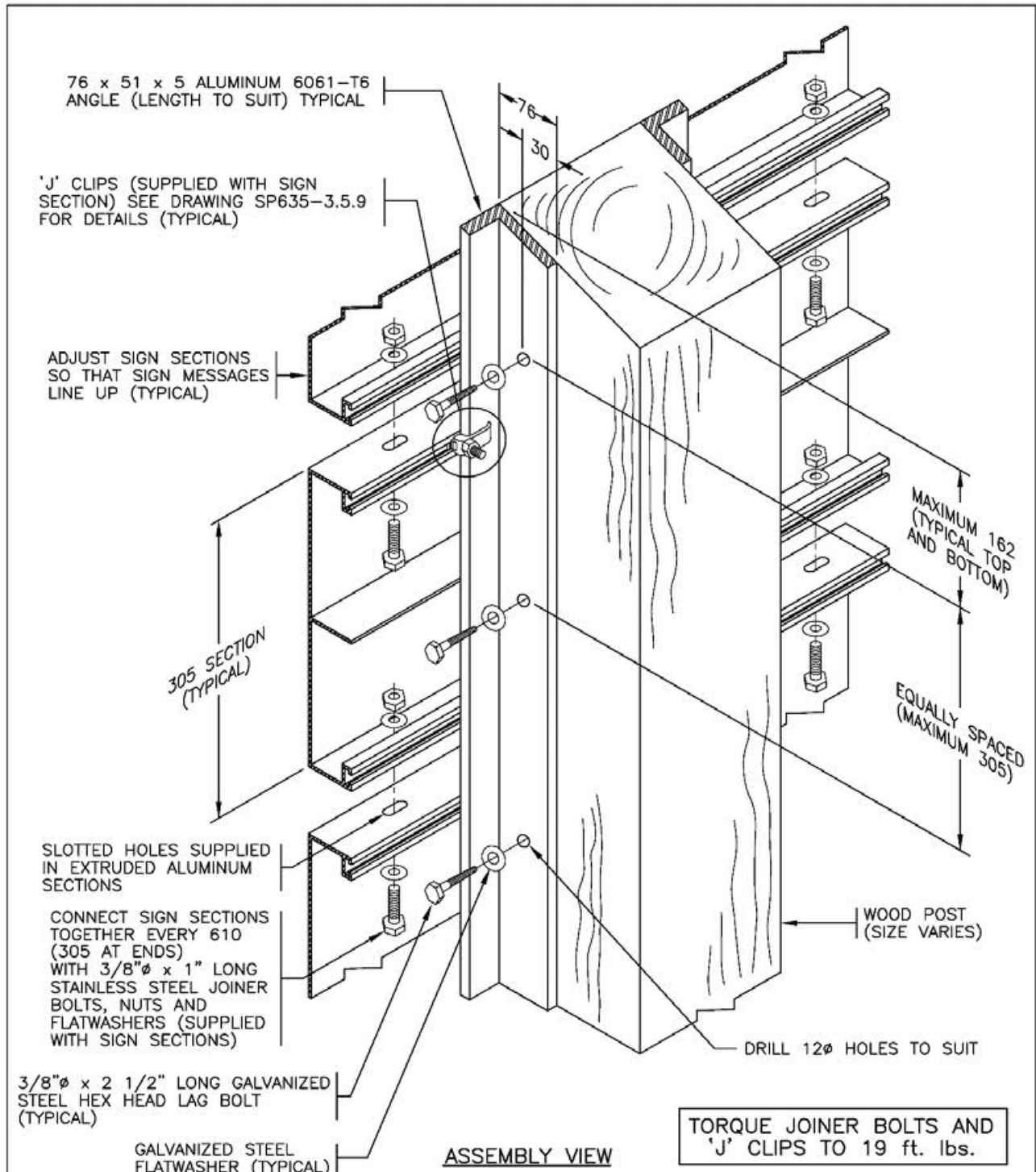


SEE DRAWING SP635-3.5.6 FOR NOTES AND ADDITIONAL DETAILS.



SCALE 1:12.5

No.	Revision	Date	EXTRUDED ALUMINUM SIGN INSTALLATION DETAILS ON WOOD POSTS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-3.5.7
E			18/11/94	E.L. (Signature on File)	
D				Chief Highway Engineer	
C					
B	GENERAL REVISIONS	APR 17			
A	END HOLE SPACING REVISED	AUG 95			



SEE DRAWING SP635-3.5.6 FOR NOTES AND ADDITIONAL DETAILS.

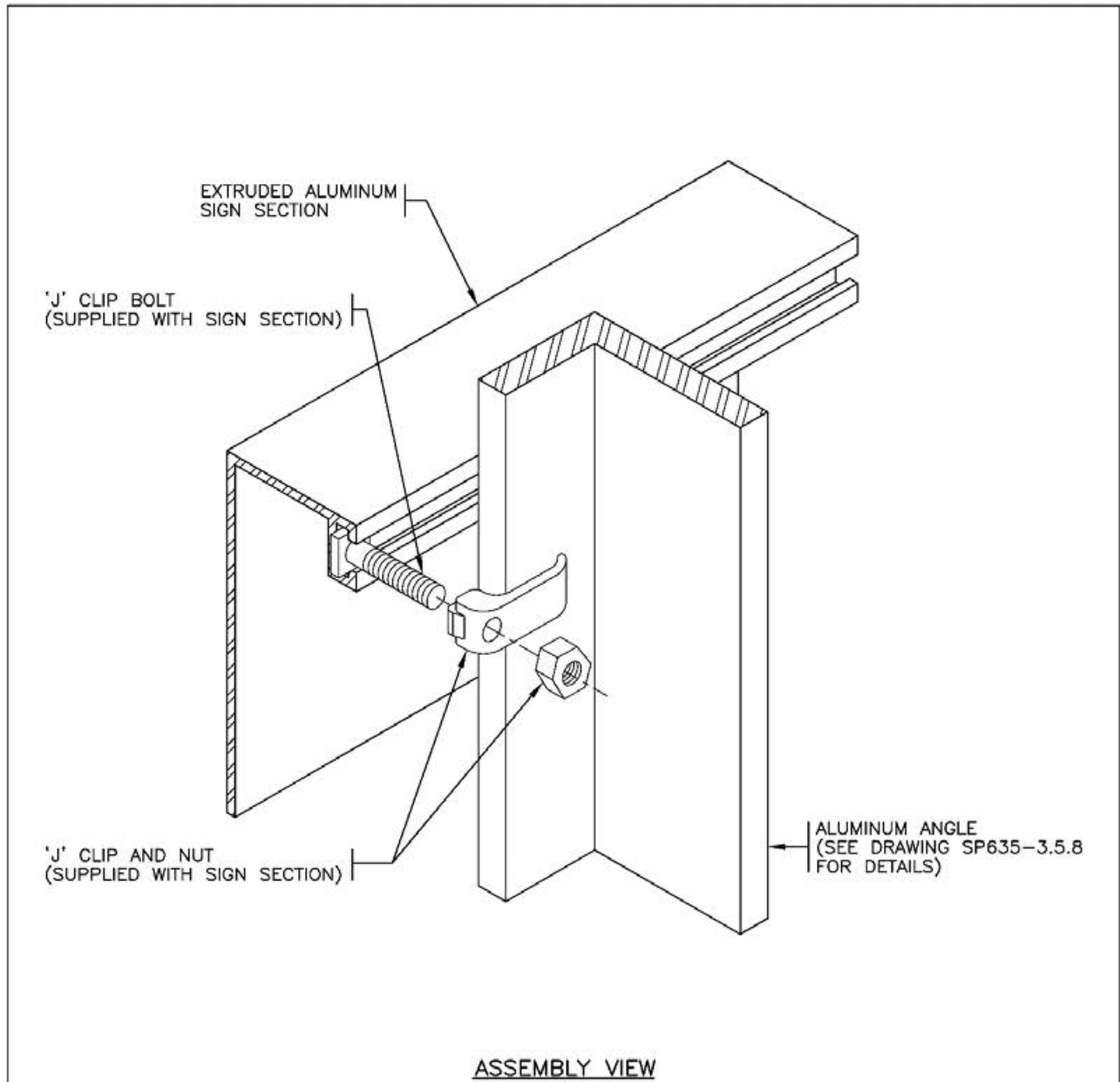


NOT TO SCALE

No.	Revision	Date
F		
E		
D		
C		
B	GENERAL REVISIONS	APR 17
A	END HOLE SPACING REVISED & ANGLE CUT ADDED	AUG 95

**EXTRUDED ALUMINUM SIGN INSTALLATION  
DETAILS ON WOOD POST**

Date	Approved	SPECIFICATION DRAWING No.
18/11/94	E.L. (Signature on File) Chief Highway Engineer	SP635-3.5.8



TORQUE JOINER BOLTS AND 'J' CLIPS TO 19 ft. lbs.

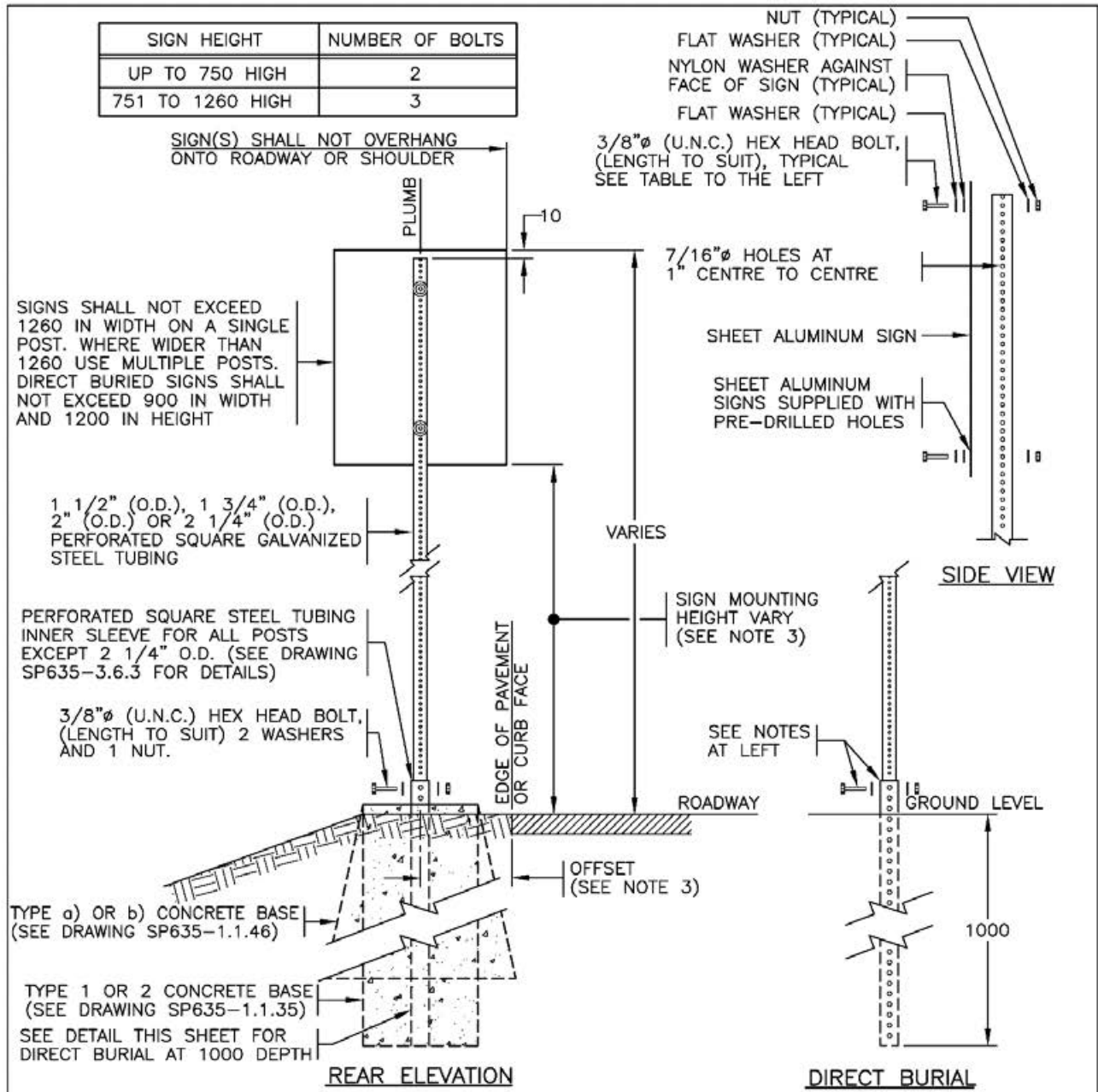
SEE DRAWING SP635-3.5.6 FOR NOTES AND ADDITIONAL DETAILS.



NOT TO SCALE

No.	Revision	Date
F		
E		
D		
C		
B		
A	GENERAL REVISIONS	APR 17

<b>EXTRUDED ALUMINUM SIGN INSTALLATION DETAILS ON WOOD POST</b>		
Date	Approved	SPECIFICATION DRAWING No.
<b>18/11/94</b>	<b>E.L. (Signature on File)</b> <small>Chief Highway Engineer</small>	<b>SP635-3.5.9</b>



NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

NOT TO SCALE

REFER TO MINISTRY ELECTRICAL & TRAFFIC ENGINEERING MANUAL FOR SIGN STRUCTURE LOADING TABLE

ALL NUTS, BOLTS AND WASHERS SHALL BE STAINLESS STEEL

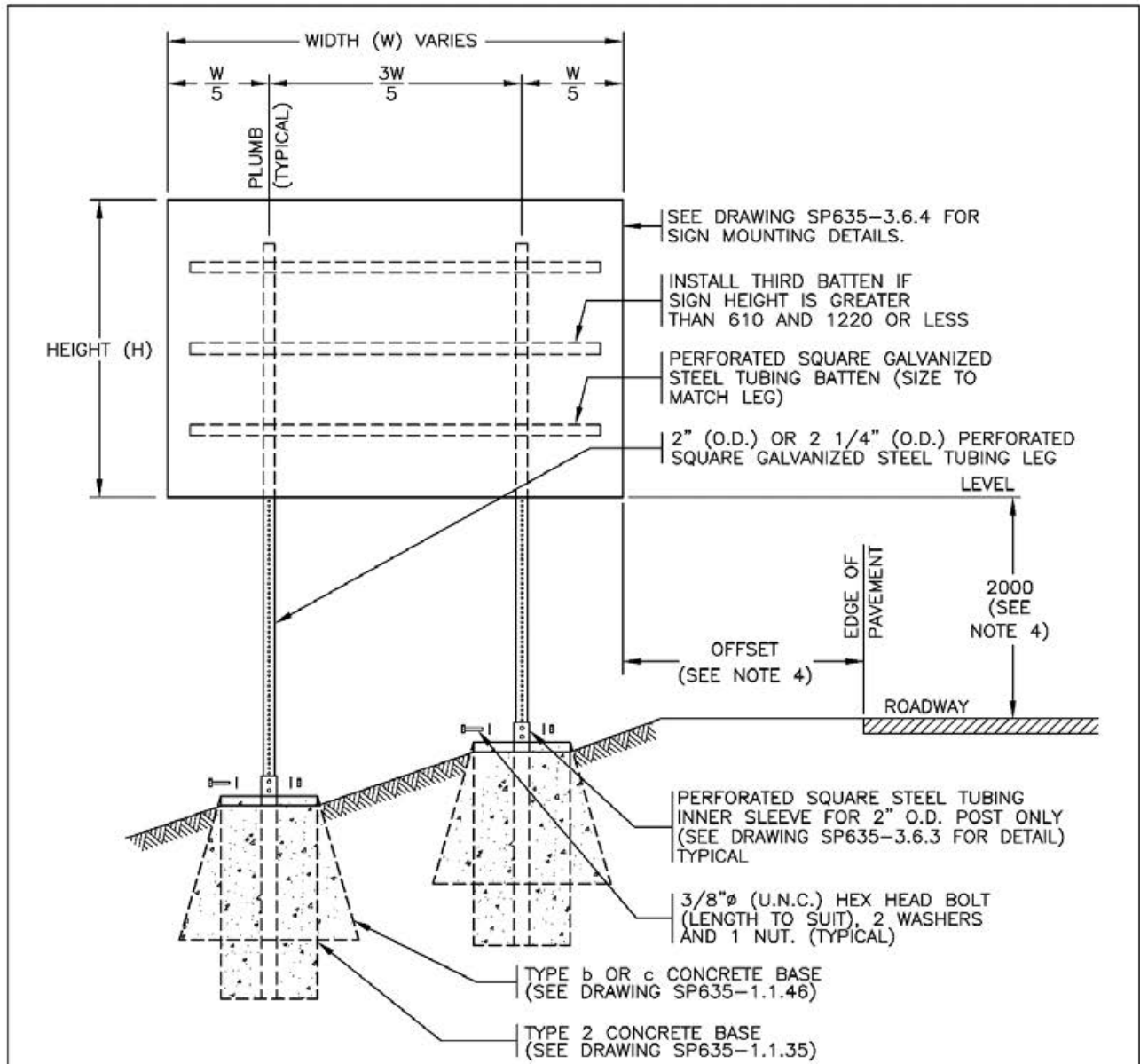


No.	Revision	Date
G	GENERAL REVISIONS	APR 20
F	GENERAL REVISIONS	APR 17
E	TRAPEZOIDAL BASE & DIRECT BURIAL DETAIL ADDED	APR 05
D	MOUNTING HEIGHTS & OFFSETS REFERED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98
C	SIGN MOUNTING HEIGHT REVISED	DEC 96

PERFORATED SQUARE GALVANIZED STEEL SIGN POST INSTALLATION DETAIL (ONE POST)

Date: 30/09/93  
Approved: E.L. (Signature on File)  
Chief Highway Engineer

SPECIFICATION DRAWING No. SP635-3.6.1



ELEVATION

NOTES

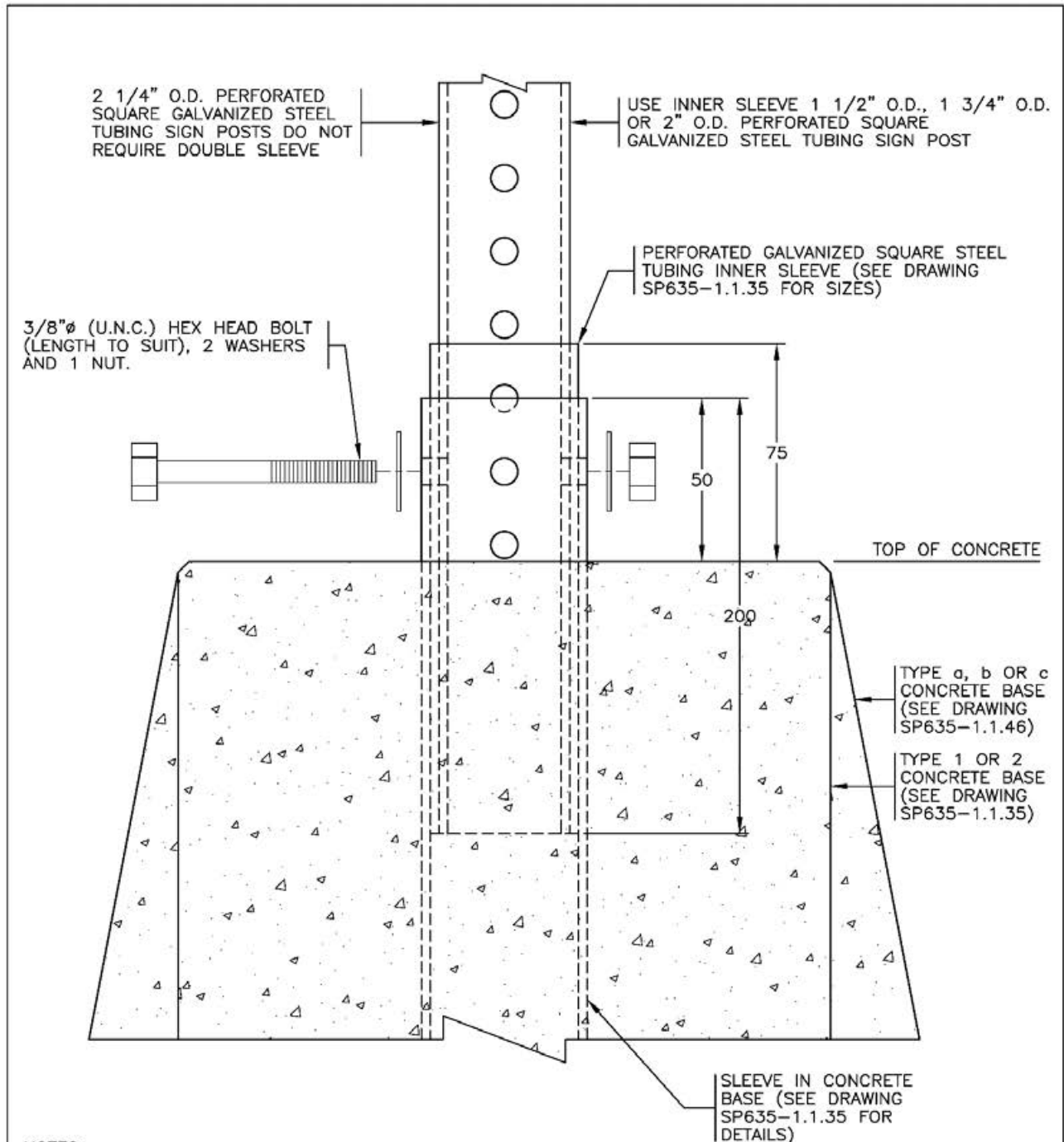
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. ALL BOLTS, NUTS AND WASHERS SHALL BE STAINLESS STEEL.
4. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

REFER TO MINISTRY ELECTRICAL & TRAFFIC ENGINEERING MANUAL FOR SIGN STRUCTURE LOADING TABLE

NOT TO SCALE



No.	Revision	Date	PERFORATED SQUARE GALVANIZED STEEL SIGN POST INSTALLATION DETAIL (TWO POST)		SPECIFICATION DRAWING No.
F	GENERAL REVISIONS	APR 20	Date	Approved	SP635-3.6.2
E	GENERAL REVISIONS	APR 17	18/11/94	E.L. (Signature on File)	
D	TRAPEZOIDAL BASE ADDED	APR 05	Chief Highway Engineer		
C	MOUNTING HEIGHTS & OFFSETS REFERRED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98			
B	BASE DWG. & LOADING TABLE REFERENCE NOTES REV'D	AUG 96			



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

ALL NUTS, BOLTS AND WASHERS SHALL BE STAINLESS STEEL

NOT TO SCALE

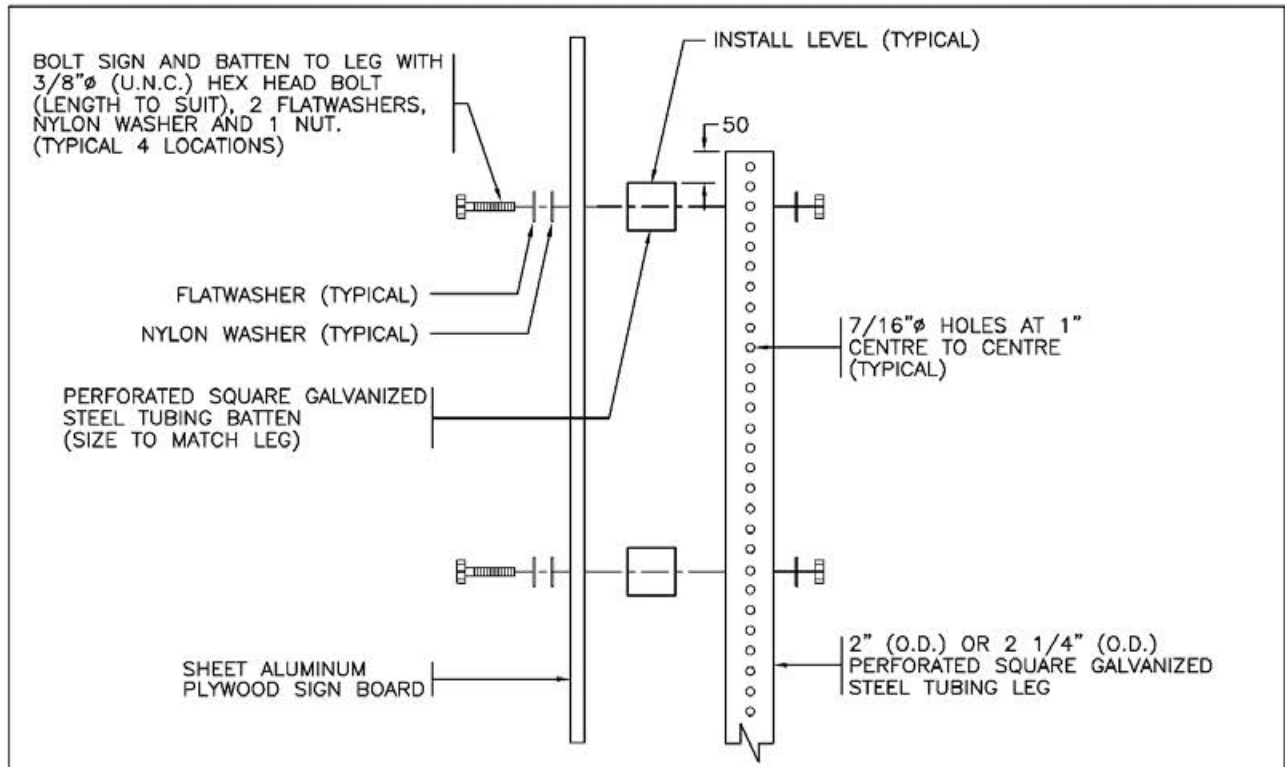


No.	Revision	Date
F	GENERAL REVISIONS	APR 20
E	GENERAL REVISIONS	APR 17
D	REVISION TO SLEEVE HEIGHT	DEC 06
C	TRAPEZOIDAL BASE ADDED	APR 05
B	BASE DRAWING REFERENCES REVISED	AUG 96
A	GENERAL REVISIONS	AUG 95

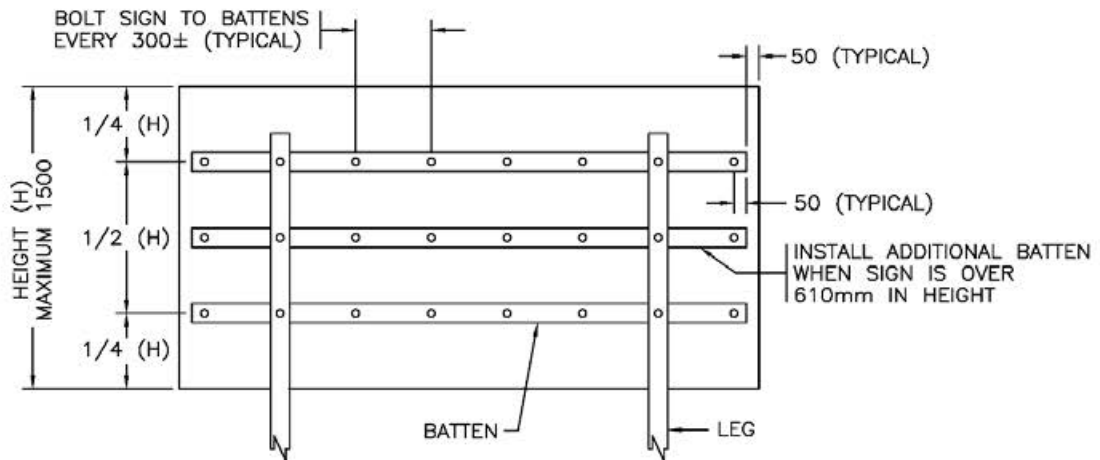
**PERFORATED SQUARE GALVANIZED STEEL  
SIGN POST INSTALLATION DETAIL**

Date: **18/11/94** Approved: **E.L. (Signature on File)**  
Chief Highway Engineer

SPECIFICATION  
DRAWING No.  
**SP635-3.6.3**



SIDE VIEW



ELEVATION

NOTES

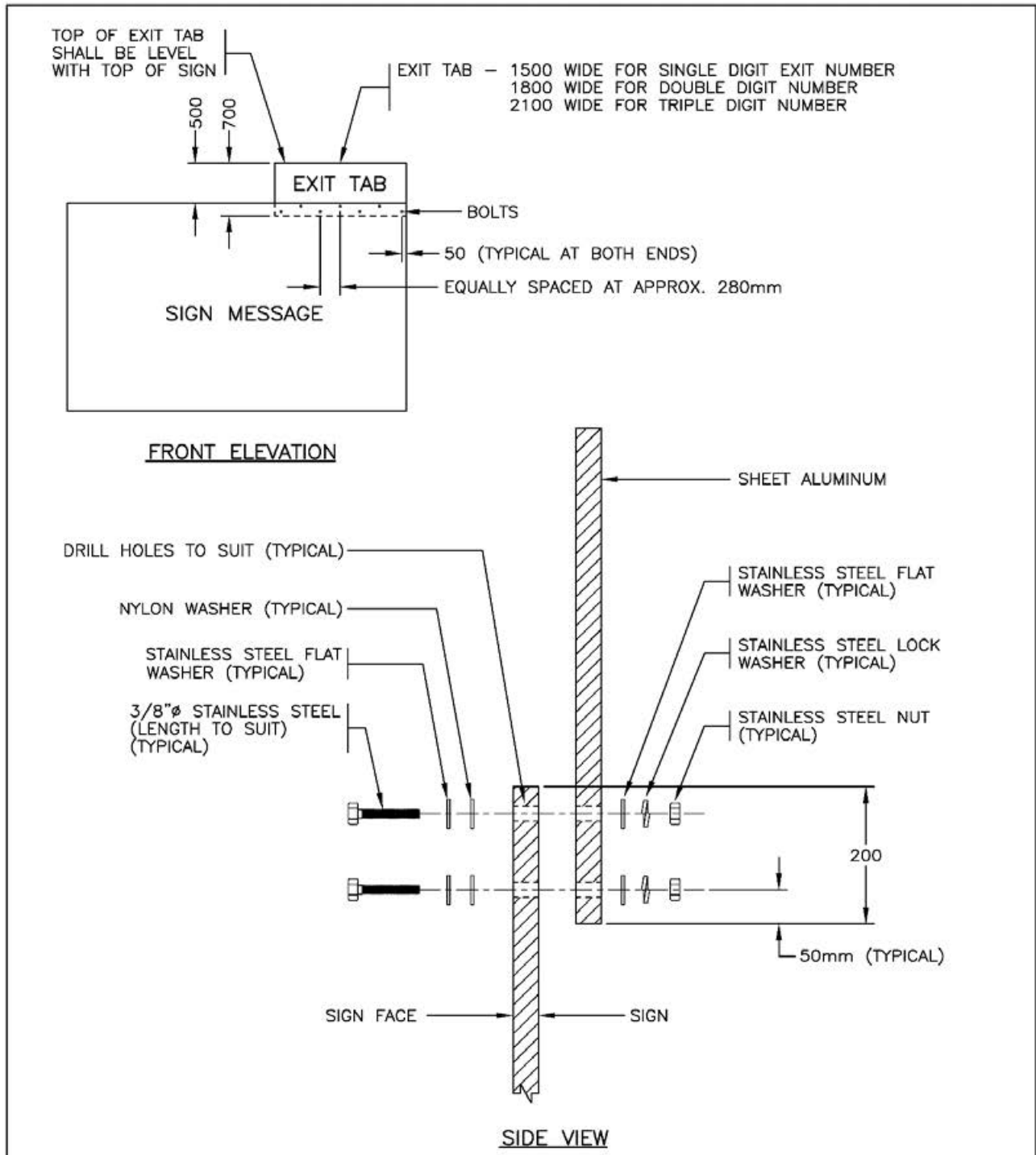
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

ALL NUTS, BOLTS AND WASHERS SHALL BE STAINLESS STEEL

NOT TO SCALE



No.	Revision	Date	SIGN MOUNTING DETAILS ON PERFORATED SQUARE GALVANIZED STEEL TWO POST SIGN STRUCTURE		
E					
D					
C	GENERAL REVISIONS	APR 20	Date	Approved	SPECIFICATION DRAWING No. <b>SP635-3.6.4</b>
B	GENERAL REVISIONS	APR 17	<b>18/11/94</b>	<b>E.L. (Signature on File)</b>	
A	3rd BATTEN ADDED FOR SIGNS OVER 610mm IN HEIGHT	APR 05		Chief Highway Engineer	



**NOTES**

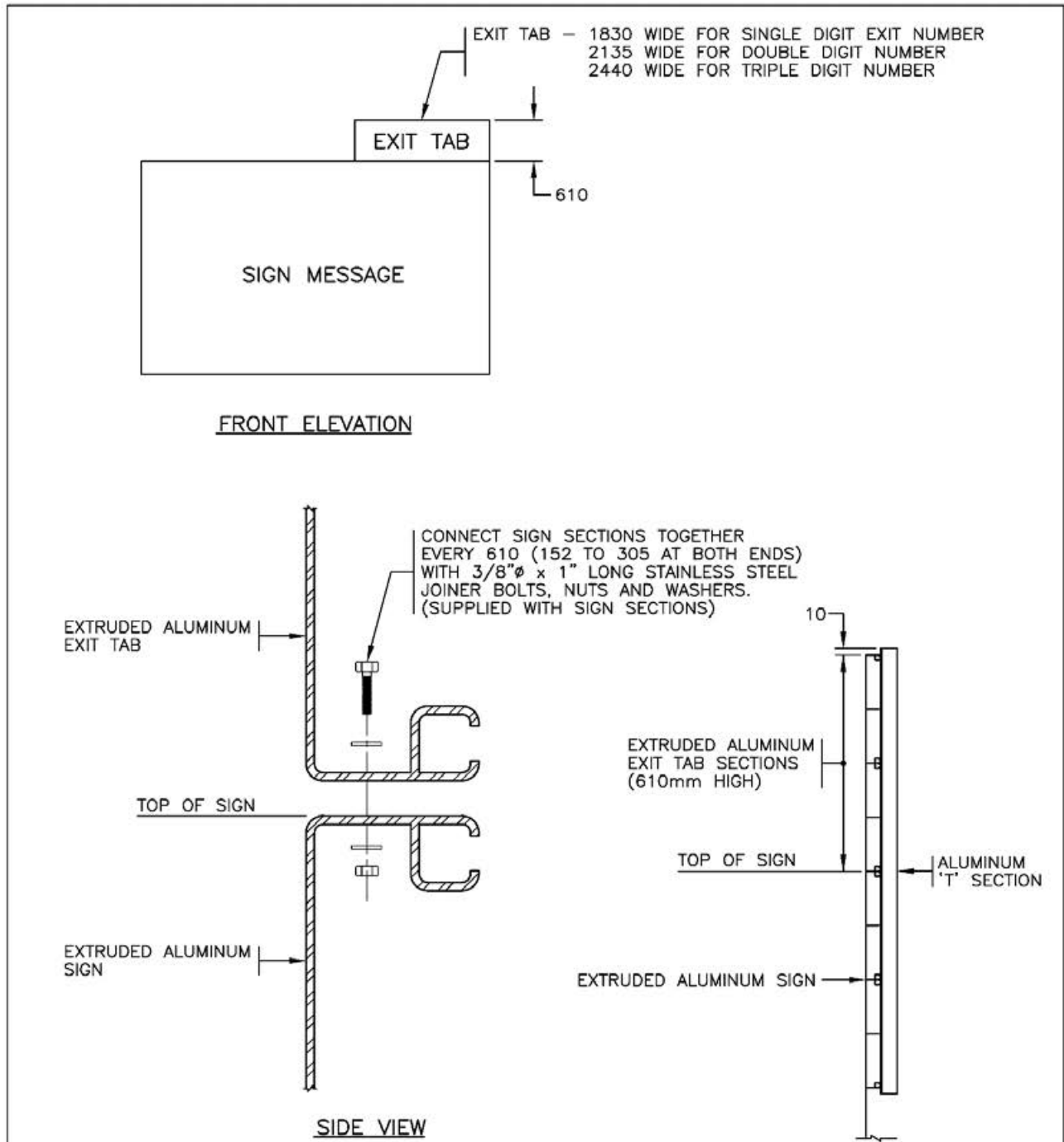
- 1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.

NOT TO SCALE



No.	Revision	Date	EXIT TAB MOUNTING DETAILS		SPECIFICATION DRAWING No. SP635-3.7.1
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D	REMOVED PLYWOOD TAB DETAILS	APR 20	Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	GENERAL REVISIONS	APR 05			
A	GENERAL REVISIONS	AUG 94			





**NOTES**

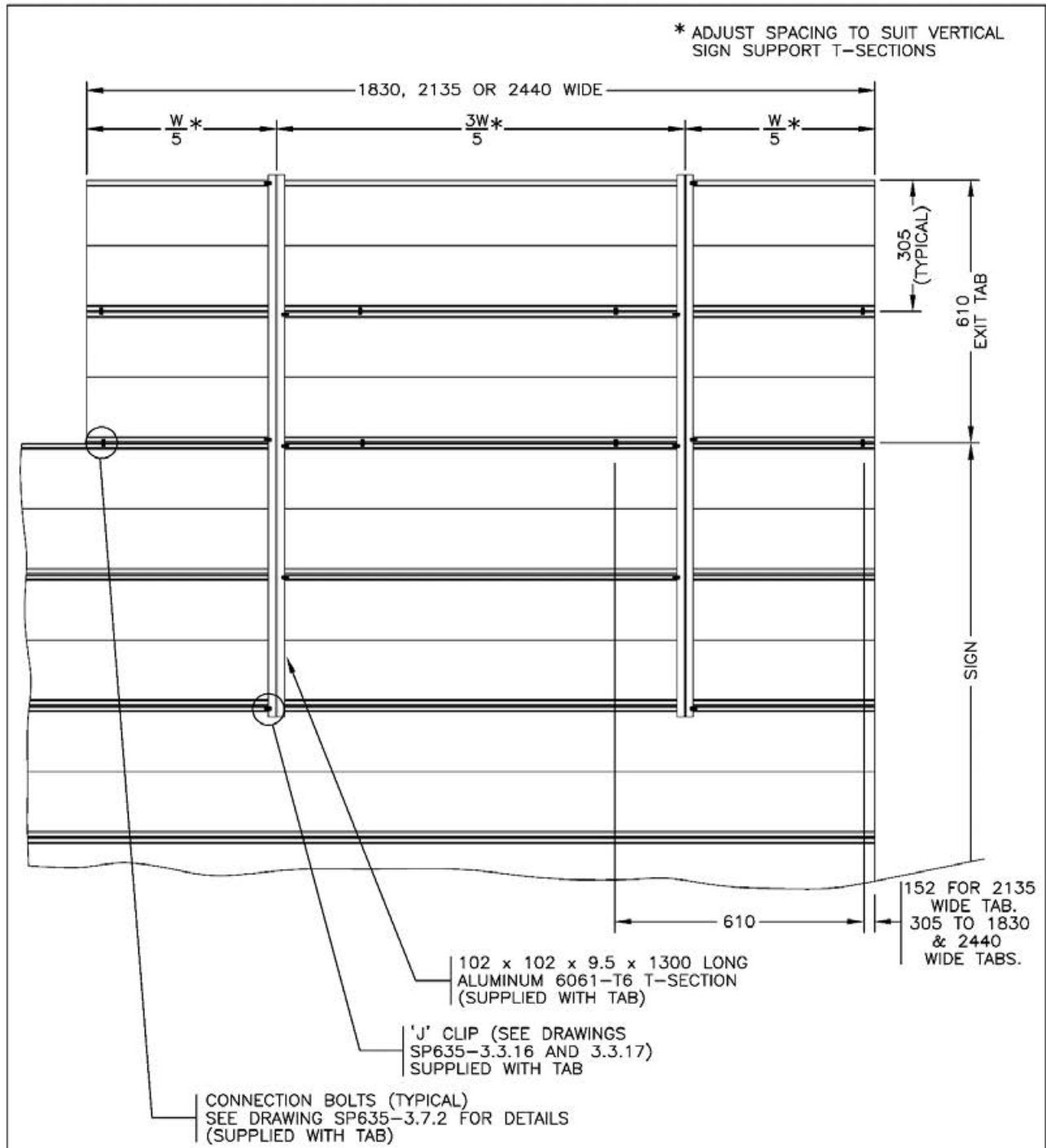
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	EXTRUDED ALUMINUM EXIT TAB MOUNTING DETAILS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-3.7.2
E			18/11/94	E.L. (Signature on File)	
D			Chief Highway Engineer		
C					
B	GENERAL REVISIONS	APR 17			
A	TAB WIDTHS & END HOLE SPACINGS REVISED	AUG 95			



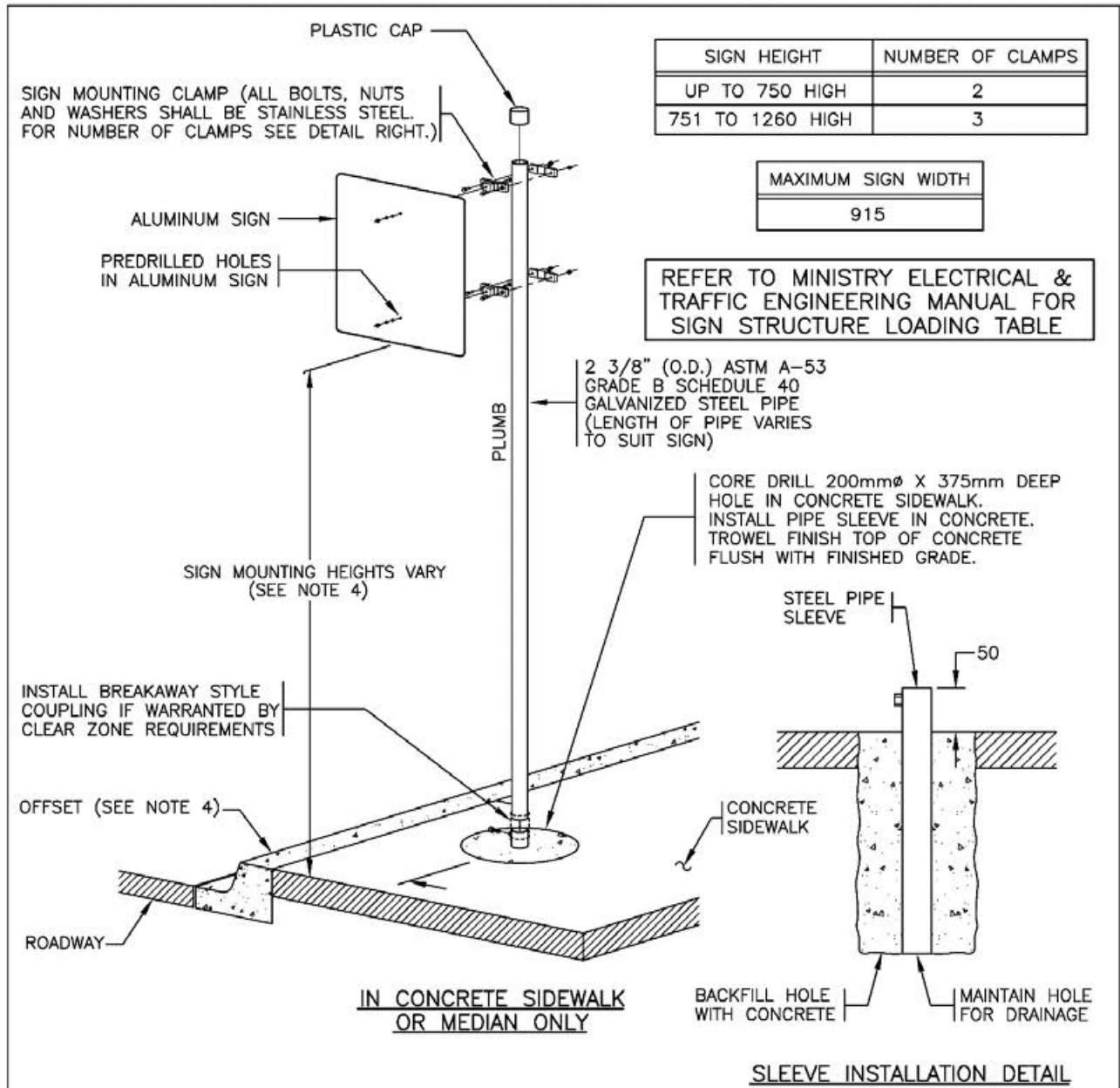
REAR VIEW OF SIGN

SEE DRAWING SP635-3.7.2 FOR NOTES AND ADDITIONAL DETAILS.



NOT TO SCALE

No.	Revision	Date	EXTRUDED ALUMINUM EXIT TAB MOUNTING DETAILS		SPECIFICATION DRAWING No. SP635-3.7.3
F			Date	Approved	
E			18/11/94	E.L. (Signature on File)	
D			Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	DRAWING REFERENCE NUMBERS REVISED	AUG 96			
A	SIGN WIDTHS & END HOLE SPACING REVISED	AUG 95			



**NOTES**

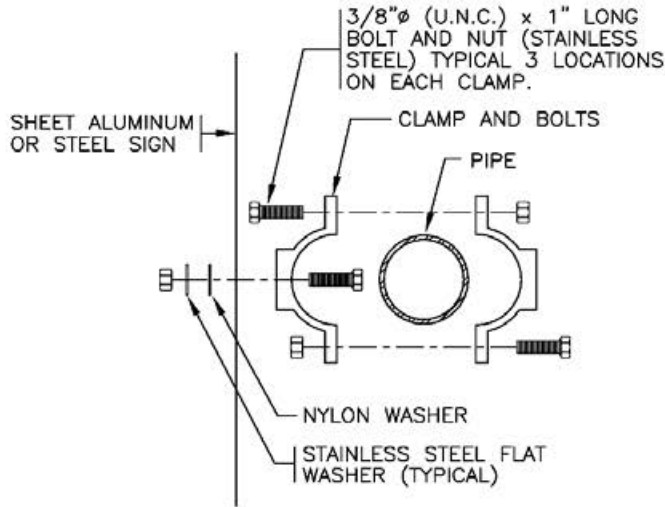
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. CONCRETE SHALL HAVE A MINIMUM STRENGTH OF 30MPa PRIOR TO POST INSTALLATION.
4. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

WHERE INSTALLED IN GRAVEL SHOULDER OR ASPHALT ISLANDS, INSTALL POST ON CONCRETE BASE AS PER DRAWING SP635-1.1.36

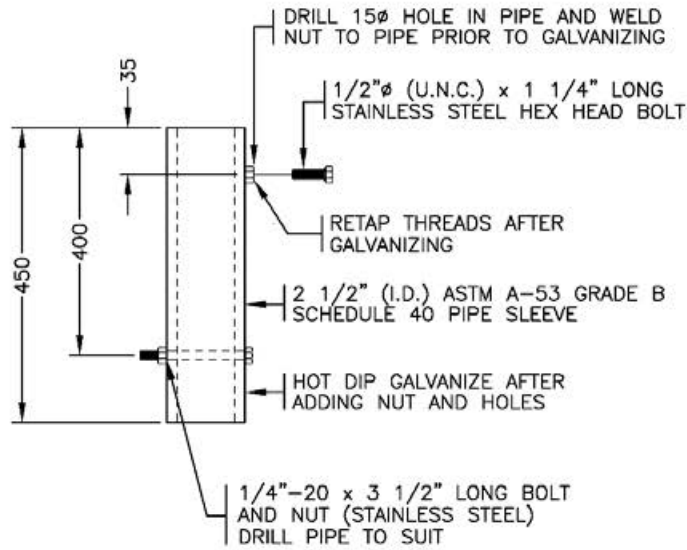
NOT TO SCALE



<table border="1"> <tr> <th>No.</th> <th>Revision</th> <th>Date</th> </tr> <tr> <td>F</td> <td>GENERAL REVISIONS</td> <td>APR 20</td> </tr> <tr> <td>E</td> <td>GENERAL REVISIONS</td> <td>APR 17</td> </tr> <tr> <td>D</td> <td>MAXIMUM SIGN WIDTH REVISED BREAKAWAY COUPLING NOTE ADDED</td> <td>APR 05</td> </tr> <tr> <td>C</td> <td>MOUNTING HEIGHTS &amp; OFFSETS REFERED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS</td> <td>NOV 98</td> </tr> </table>		No.	Revision	Date	F	GENERAL REVISIONS	APR 20	E	GENERAL REVISIONS	APR 17	D	MAXIMUM SIGN WIDTH REVISED BREAKAWAY COUPLING NOTE ADDED	APR 05	C	MOUNTING HEIGHTS & OFFSETS REFERED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98	<p><b>ROUND STEEL SIGN POST INSTALLATION DETAILS</b></p>		<p>Specification Drawing No. <b>SP635-3.8.1</b></p>	
No.	Revision	Date																		
F	GENERAL REVISIONS	APR 20																		
E	GENERAL REVISIONS	APR 17																		
D	MAXIMUM SIGN WIDTH REVISED BREAKAWAY COUPLING NOTE ADDED	APR 05																		
C	MOUNTING HEIGHTS & OFFSETS REFERED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98																		
		<p>Date: <b>30/09/93</b> Approved: <b>E.L. (Signature on File)</b> Chief Highway Engineer</p>																		



SIGN MOUNTING DETAILS



GALVANIZED PIPE SLEEVE DETAIL

NOTES

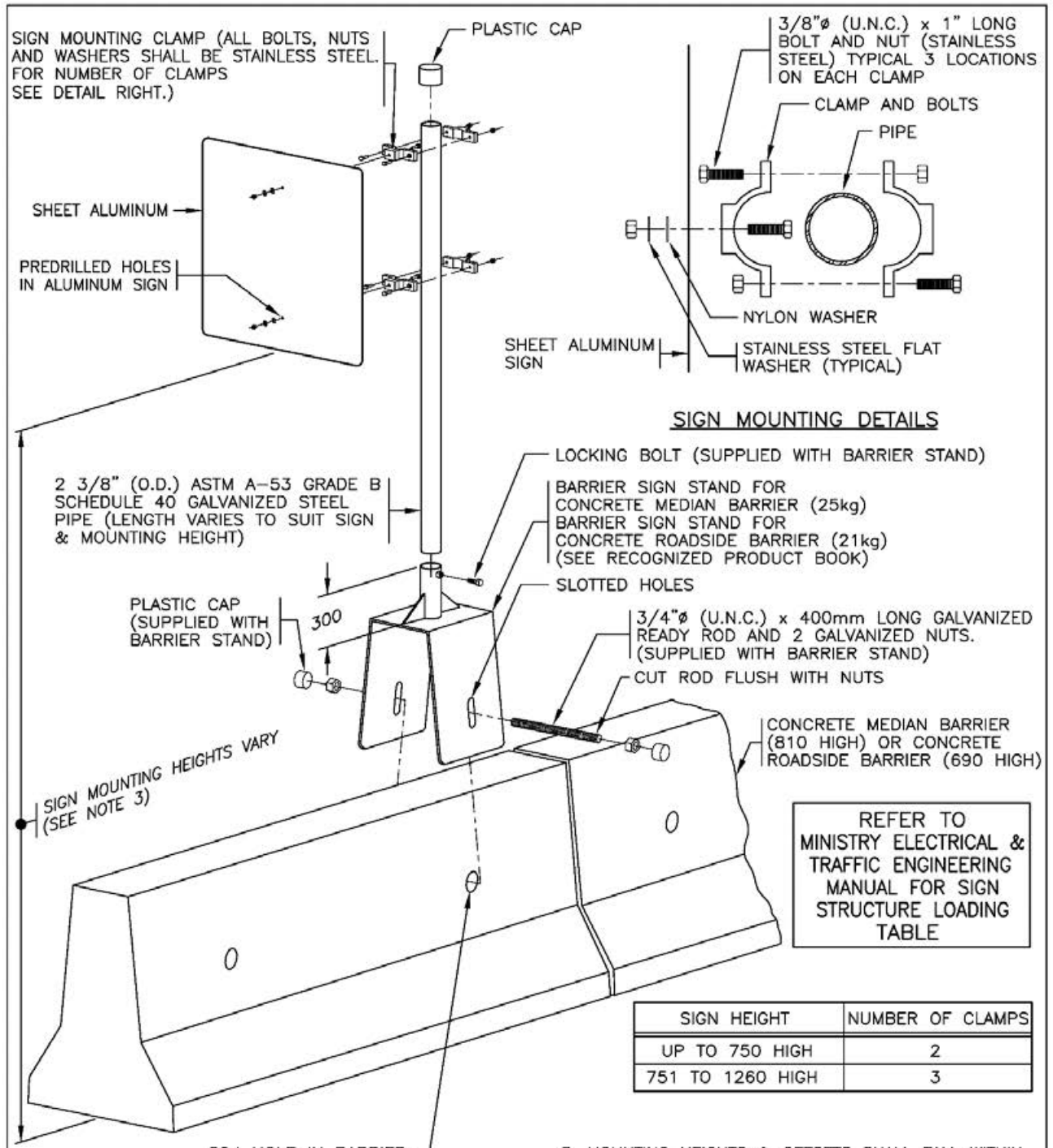
1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

NOT TO SCALE



Ministry of Transportation and Infrastructure

No.	Revision	Date	ROUND STEEL SIGN POST INSTALLATION DETAILS		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-3.8.2
E			18/11/94	E.L. (Signature on File)	
D				Chief Highway Engineer	
C					
B	GENERAL REVISIONS	APR 20			
A	GENERAL REVISIONS	APR 17			



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

3. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

NOT TO SCALE



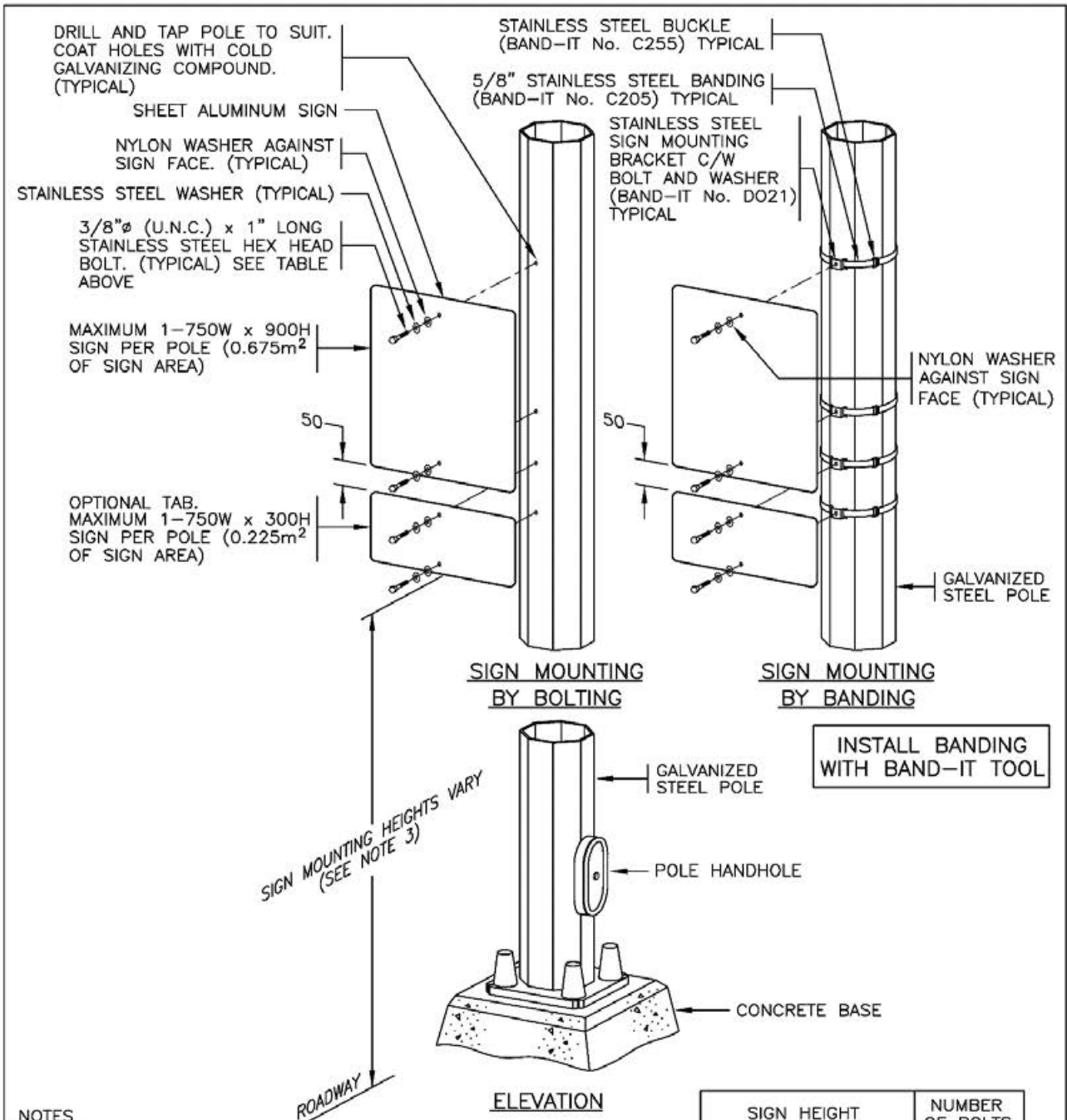
No.	Revision	Date
G	GENERAL REVISIONS	APR 20
F	GENERAL REVISIONS	APR 17
E	REFER TO RECOGNIZED PRODUCT BOOK	APR 05
D	MOUNTING HEIGHTS & OFFSETS REFERED THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS	NOV 98
C	DWG. No. & MOUNTING HEIGHTS REV'D	DEC 96

**ROUND STEEL SIGN POST ON BARRIER SIGN STAND INSTALLATION DETAILS**

Date: **30/09/93** Approved: **E.L. (Signature on File)**  
 Chief Highway Engineer

SPECIFICATION DRAWING No.  
**SP635-3.8.3**

SIGN HEIGHT	NUMBER OF CLAMPS
UP TO 750 HIGH	2
751 TO 1260 HIGH	3



**NOTES**

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. MOUNTING HEIGHTS & OFFSETS SHALL FALL WITHIN THE RANGES NOTED IN THE MINISTRY MANUAL OF STANDARD TRAFFIC SIGNS & PAVEMENT MARKINGS.

SIGN HEIGHT	NUMBER OF BOLTS
UP TO 750 HIGH	2
751 TO 1200 HIGH	3

NOT TO SCALE

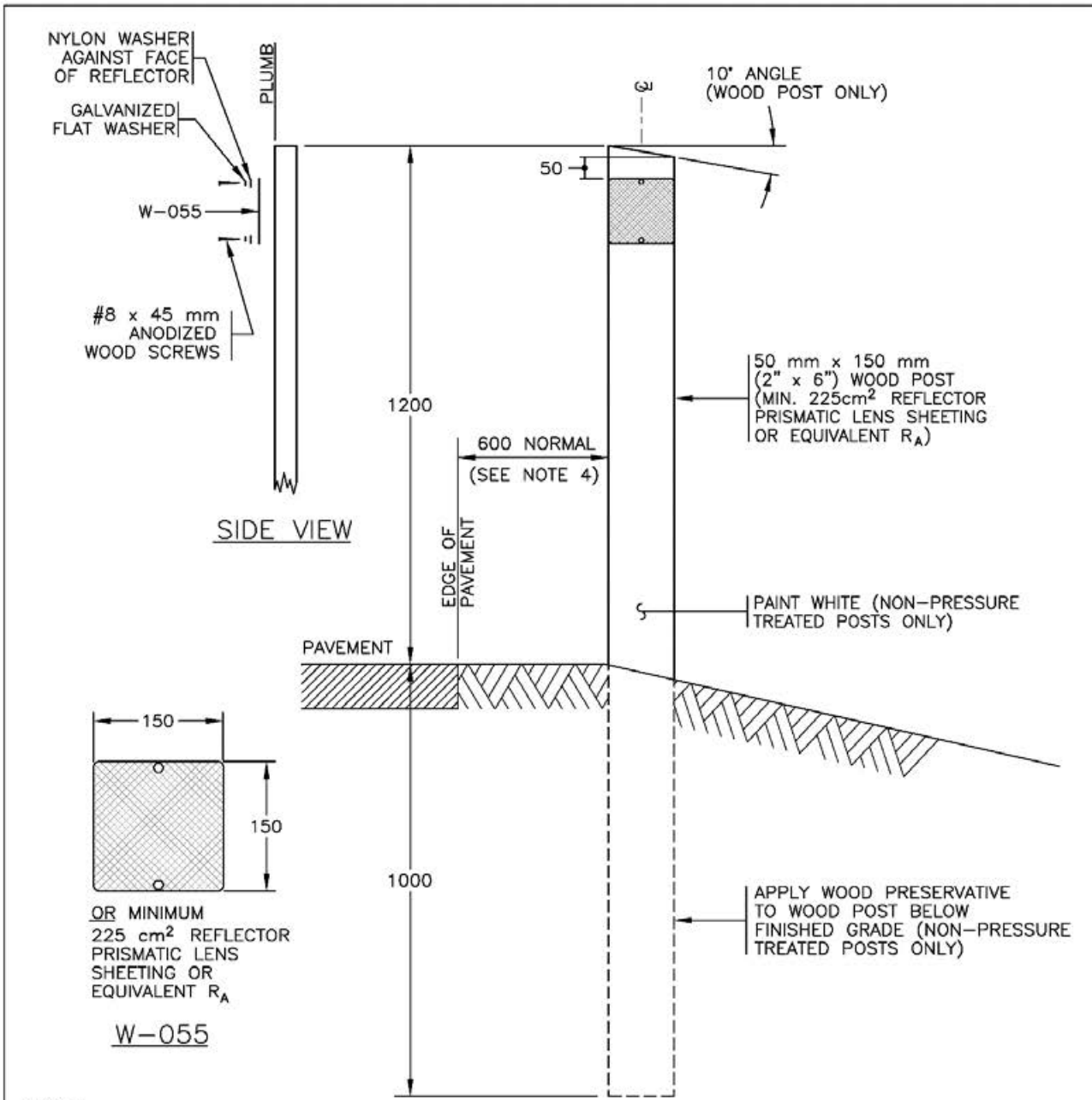


Ministry of Transportation and Infrastructure

No.	Revision	Date
I	GENERAL REVISIONS	APR 20
H	GENERAL REVISIONS	APR 17
G	MINISTRY APPROVAL NOTE REVISED	APR 05
F	MINISTRY APPROVAL NOTE ADDED	NOV 01
E	BANDING SIGN MOUNTING ADDED	SEPT 00

**SIGN INSTALLATION ON THE SIDE OF POLES**

Date	Approved	SPECIFICATION DRAWING No.
<b>30/09/93</b>	<b>E.L. (Signature on File)</b> Chief Highway Engineer	<b>SP635-3.9.1</b>



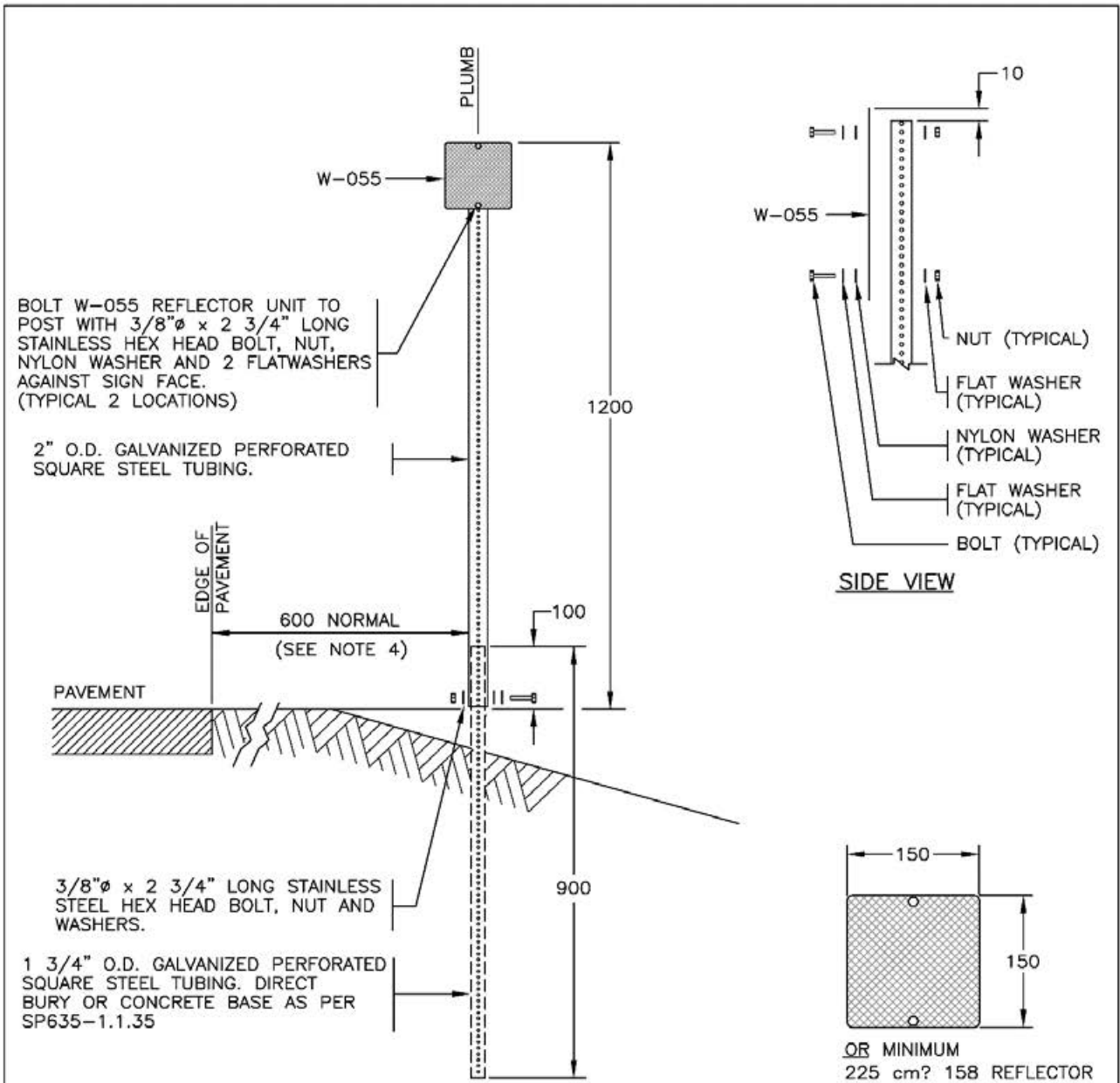
NOTES

1. SEE THE MINISTRY'S "MANUAL OF STANDARD TRAFFIC SIGNS AND PAVEMENT MARKINGS" TABLE 7.4a-b FOR DELINEATOR SPACING ON HORIZONTAL CURVES.
2. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. POST PLACED A MINIMUM OF 1.0 m TO A MAXIMUM OF 3.6 m FROM EDGE OF TRAVELLED LANE.

NOT TO SCALE



No.	Revision	Date	WOOD DELINEATOR POST INSTALLATION DETAILS		SPECIFICATION DRAWING No.
G	NOTE 1 UPDATED	APR 20	Date	Approved	SP635-3.10.1
F	GENERAL REVISIONS	APR 17	30/09/93	E.L. (Signature on File)	
E	PRESSURE TREATED POSTS ADDED	APR 05	Chief Highway Engineer		
D	SIZE & NUMBER OF REFLECTORS	NOV 01			
C	SIGN NUMBER REVISED	AUG 96			
B	OFFSETS ADDED	AUG 95			



NOTES

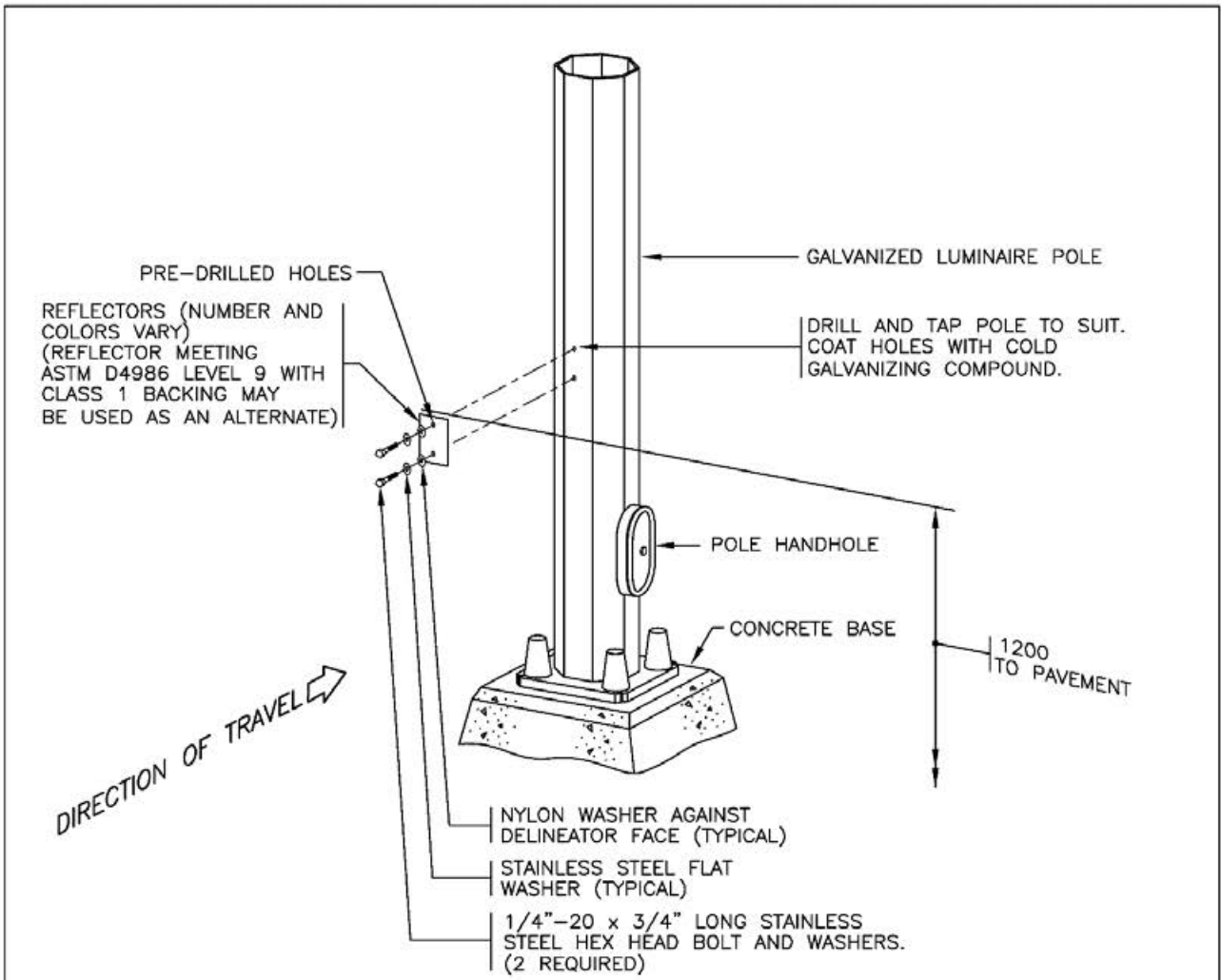
1. SEE THE MINISTRY'S "MANUAL OF STANDARD TRAFFIC SIGNS AND PAVEMENT MARKINGS" TABLE 7.4a-b FOR DELINEATOR SPACING ON HORIZONTAL CURVES.
2. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. POST PLACED A MINIMUM OF 1.0 m TO A MAXIMUM OF 3.6 m FROM EDGE OF TRAVELLED LANE.

NOT TO SCALE

No.	Revision	Date	PERFORATED SQUARE STEEL TUBING DELINEATOR POST INSTALLATION DETAILS		SPECIFICATION DRAWING No.
G	NOTE 1 UPDATED	APR 20	Date	Approved	SP635-3.10.2
F	GENERAL REVISIONS	APR 17	18/11/94	E.L. (Signature on File)	
E	GENERAL REVISION	APR 05	Chief Highway Engineer		
D	SIZE & NUMBER OF REFLECTORS	NOV 01			
C	OFFSET & POST LENGTHS REVISED	OCT 99			
B	W-055 SIGN REFERENCES REVISED	AUG 96			







**ASSEMBLY DETAIL**

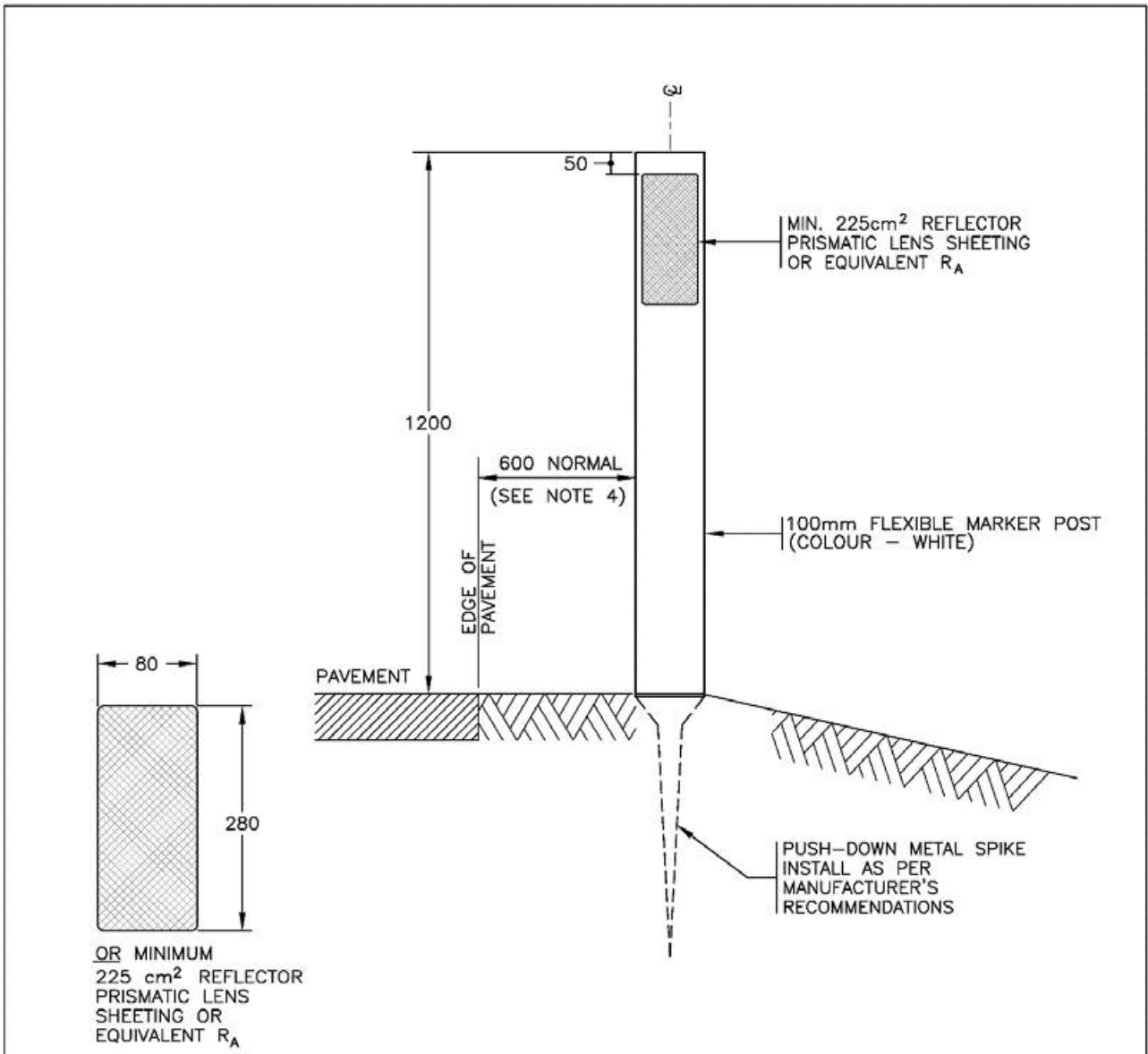
**NOTES**

1. NUMBER, COLOUR, SIZE AND SHAPE OF REFLECTORS VARIES. SEE THE MINISTRY'S MANUAL OF STANDARD TRAFFIC SIGNS AND PAVEMENT MARKINGS FOR MORE INFORMATION.
2. DELINEATOR MANUFACTURER MUST MEET MINISTRY APPROVAL.
3. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. INSTALL REFLECTOR ON LUMINAIRE POLE (OR SIMILAR) IF DELINEATOR TO BE POSITIONED WITHIN 5m OF POLE (OR SIMILAR).

NOT TO SCALE



No.	Revision	Date	PLASTIC DELINEATOR INSTALLATION ON POLE		SPECIFICATION DRAWING No. SP635-3.10.3
F			Date	Approved	
E			30/09/93	E.L. (Signature on File)	
D	GENERAL REVISIONS	APR 20	Chief Highway Engineer		
C	GENERAL REVISIONS	APR 17			
B	NOTE 5 ADDED	APR 05			
A	GENERAL REVISION	AUG 94			



W-055

**NOTES**

1. SEE THE MINISTRY'S "STANDARD TRAFFIC SIGNS AND PAVEMENT MARKING MANUAL" TABLE 7.4a-b FOR DELINEATOR SPACING ON HORIZONTAL CURVES.
2. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. POST PLACED A MINIMUM OF 1.0 m TO A MAXIMUM OF 3.6 m FROM EDGE OF TRAVELLED LANE.



NOT TO SCALE

No.	Revision	Date	FLEXIBLE DELINEATOR POST INSTALLATION DETAILS	
F			Date	Approved
E			20/04/05	D.N. (Signature on File)
D			SPECIFICATION DRAWING No.	
C			SP635-3.10.4	
B	NOTE 1 UPDATED	APR 20	Chief Highway Engineer	
A	GENERAL REVISIONS	APR 17		

## SECTION 700

### WILDLIFE EXCLUSION FENCING

#### DESCRIPTION

**700.01 Scope** – This Section covers the construction of wildlife exclusion fencing with galvanized wire mesh, pressure treated wood posts and/or galvanized steel posts, one-way gates, lockable human access gates and double swing gates and, with reference to SS Drawings of the SP700 series, is intended to specify acceptable standards and some optional features as may be required by the Special Provisions.

Alternative construction may be called for by the Drawings, the Special Provisions or instructions of the Ministry Representative, and alternative methods may be acceptable upon submission to the Ministry Representative.

#### MATERIALS

**700.10 Post Type** – Posts may be wood or steel, except that steel posts shall be used:

- where it is not possible to attain the required embedment for wood posts, such as where bedrock or boulders obstruct the post hole;
- on ground slopes steeper than 1.5 horizontal to 1 vertical (34°);
- in wetlands, in areas frequently under water, or in areas of soft organic soils; and
- where it is determined that wood posts are unsuitable for the existing ground conditions, topography or other environmental factors.

#### 700.11 Treated Wood Materials

**700.11.01 General** – Wood posts, braces and other timbers shall be supplied by the Contractor in accordance with the requirements of SS 909.

All wood products used in wildlife exclusion fence construction shall be preservative treated and meet the requirements of SS 908.

No cutting of preservative treated wood posts will be permitted without authorization of the Ministry Representative.

When cutting is authorized, the cut must be only at the top of the posts.

All cuts, holes, and superficial damage shall be field treated immediately with a preservative in accordance with SS 908.

#### 700.11.02 Posts

**(a) Round Wood Post Material** – Treated Round Wood posts shall be prepared from straight peeled Jack Pine or Lodgepole Pine.

**(b) Dimensional Tolerances** – In addition to the requirements in SS 909, treated round wood posts shall have the following dimensions, each within a 2% tolerance:

**(i)** Length shall be 4300 mm or as necessary to comply with the applicable SS 700 SP Drawings, for the fence type specified and the soil type encountered;

**(ii)** minimum tip diameter of 150 mm; and

**(iii)** maximum butt diameter of 200 mm.

**(c) Bottom Tapers** – The bottoms of the round wood posts must be tapered to a rounded end for driveability.

**700.13 Steel Posts and Steel Components** – All steel posts and steel components shall be hot-dipped galvanized in accordance with ASTM A153 or ASTM A123, as applicable.

Steel posts shall generally be Schedule 40, except shall be Schedule 80 where located in wetlands, in areas frequently under water, or in areas of soft organic soils.

The steel posts will not have an outside diameter less than 73 mm. The length of steel posts may vary between 3560 mm and 4500 mm according to installation conditions as shown on the Drawings.

Upon approval by the Ministry Representative, short steel posts may be lengthened, by a maximum of 1000 mm, by a welded extension. All welds shall be inspected by the Ministry Representative. Welds will be ground as necessary to achieve a smooth, bare metal surface and immediately coated per SS 700.14.

**700.14 Touch-up Treatment for Galvanized Metal Surfaces** – Touch-up treatment for field-damaged galvanizing of steel posts and braces shall be two coats of an organic, zinc rich paint selected from the Ministry's Recognized Products List under the category of "Additional Paint Coatings – Zinc-Rich Touch-up Paints and Primers and applied" on a thoroughly cleaned surface.

**700.15 Fabric and Wire** – The fence fabric will be 2.44 m (8 ft) high with 150 mm (6 in) horizontal and graduated vertical spacing, 12.5 gauge high tensile wire with a twisted friction type joint at each horizontal/vertical contact point. The fence fabric will have a minimum of 20 horizontal wires, with graduated vertical spacing ranging from 7.62 cm (3 inches) at the bottom to 17.78 cm (7 inches) at the top.

## SECTION 700

## WILDLIFE EXCLUSION FENCING

The fence fabric and wire will be galvanized in accordance with ASTM A123, to a retention of not less than 240 g/m<sup>2</sup>. The horizontal wires will have a minimum tensile strength of 1234 MPa (179 ksi).

All wire used for braces and other use shall be galvanized to minimum Class 3 in accordance with ASTM A641.

**700.15.01 Fence Fabric in Confined Locations** – Where space limitations do not permit the handling of the full 2.44 m (8 ft) section of fence, it will be permissible, where approved by the Ministry Representative, to use two, 1.22 m (4 ft) sections of fencing. These sections will be connected by galvanized steel compression hog rings every 150 mm or joined longitudinally with a continuous 3 mm (11 gauge) galvanized wire woven through the mesh and wrapped every 150 mm.

**700.16 One-Way Gates** – Gates shown on the Drawings shall be of the prefabricated type indicated on SS Drawings SP700-12.1 to SP700-12.6 and as specified in SS 316.11 and/or in the Special Provisions. The one-way gates must be test assembled in shop, adjusted and lubricated to swing freely without binding, and quietly shut from any position. All metal components of gates shall be galvanized.

**700.16.01 One-Way Gate Tines** – Tines shall be fabricated from AISI 4140 high tensile steel to avoid animals or people bending them. Subsequent to cold-bending the tines, and prior to hot-dipped galvanizing, the material shall be heat treated and stress relieved to achieve a Rockwell C Hardness (HRC) value of 30-35. The vertical gap between sections of tines must not exceed 200 mm. The horizontal gap between the left and right sections of tines of the one-way gates must not exceed 100 mm.

All metal in one-way gates must be galvanized. Acid bath treatment of the tines prior to galvanization shall be controlled to minimize potential weakening of welds.

**700.17 Lockable Human Access Gates** – Gates shown on the Drawings shall be of the prefabricated type indicated on SS Drawings SP700-14.1 to SP700-14.2. The lockable human access gates must be adjusted and lubricated to swing and shut freely without binding in the field. Lock assemblies must be adjusted to work in the field. All metal components of gates shall be galvanized.

**700.18 Double-Swing Gates** – Gates shown on the Drawings shall be of the prefabricated double-swing type indicated on SS Drawings SP700-13.1 to SP700-13.2. The human access gates must be adjusted and lubricated to swing and shut freely without binding in the field. Lock assemblies must be adjusted to work in the field. All metal components of gates shall be galvanized.

## CONSTRUCTION

**700.20 Provision of Fencing** – Fencing shall be carried out at the locations and as shown on the Drawings with the

materials to the height, spacing and with accessories all in accordance with the details indicated on the Drawings, Standard Specifications, and Special Provisions or to the direction of the Ministry Representative.

All material shall be supplied by the Contractor, except where supply in whole or in part by the Ministry, f.o.b. the Contractor's job site yard or Ministry's yard, is specified in the Special Provisions.

Construction shall be carried out with all labour, tools, equipment and incidentals supplied by the Contractor, as necessary, to complete all fencing work in accordance with good work practice.

**700.21 Clearing & Grading** – Prior to commencing fencing work, both sides of the fence line must be free of all clearing and grubbing debris. All trees, other than those required by the Ministry Representative to remain, and all brush and other obstacles which interfere with the construction and maintenance of fencing and not removed by the normal clearing operations, must be removed.

The cleared and graded area must be a minimum of 3 m wide on each side of the fence to permit access for fence repairs and maintenance, unless a lesser width is permitted by the Ministry Representative. The graded area shall have a 2-5% cross-fall towards the open side of the slope to provide drainage. No fill shall be placed in any drainage path that crosses the fence line.

The ground line for the fence should be smooth and continuous for a minimum of 1 m on both sides of the fence. Minor ground undulations shall be corrected to obtain a smooth uniform grade, but appreciable grade depressions may be backfilled only with the permission of the Ministry Representative.

The site shall be left in a smooth and tidy condition.

**700.22 Setting Out and Connections to Existing Fences** – Fence line, as shown on the Drawings, generally will be located a minimum of 3 m from the right-of-way boundary, unless a lesser distance is permitted by the Ministry Representative.

In areas of heavy snow, where the 10 year average total annual snowfall is greater than 2 m, as identified in Special Provisions, the fence line must be offset a minimum of 4 m from the edge of the highway shoulder to reduce damage from snowplows. Otherwise, the fence line must be offset a minimum of 3 m from the edge of the highway shoulder.

Post installation in fill material or minimum overburden shall be carried out according to the Ministry Representative's directions. Where it is not possible to drive or set wood posts to proper depth or to relocate same along the fence line, steel fence posts as specified or, where permitted, multiple wood post and brace assemblies shall be substituted.

Existing fences shall be connected to new fences with posts and braces for tensioning fencing wire in every direction in accordance with the SP700 series of SS Drawings.

**700.23 Post Spacing** – Except in areas of heavy snow, line posts shall be spaced 5 m apart measured horizontally. It will be permissible to move a post, up to 0.3 m ahead or back along the fence line, to avoid an obstruction preventing advancement of the post hole, provided that the average spacing does not exceed 5 m.

In areas of heavy snow, where the 10-year average total annual snowfall is greater than 2 m, as identified in Special Provisions, the line post spacing must be reduced to 3.5 m to reduce fence fabric sagging and tearing.

**700.23.01 Installation of Wood Posts** – Wood posts shall be installed plumb and to a depth of 1500 mm, as indicated on the Drawings. Posts may be either driven or set in excavated holes, provided that a rigid installation is achieved, capable of withstanding a horizontal load of 32 kg (70 lb), applied 1.5 m above the ground, in any direction in the horizontal plane, without any movement in excess of 25 mm. When a wood post is set in an excavated hole, the soil around the wood post must be compacted to the satisfaction of the Ministry Representative. The horizontal load test must be conducted after the post is installed but before the fabric wire is attached. It is the responsibility of the Contractor to conduct and record the horizontal load test. The results of the horizontal load test must be submitted to the Ministry Representative.

Where the slope of the terrain along the fence line approaches 1.5H:1V (34°), embedment of wood posts may be reduced to a minimum of 1200 mm, with permission of the Ministry Representative. Where fence gradients are steeper than 1.5H:1V (34°), steel posts must be used, as indicated on the Drawings.

**700.23.02 Concrete** – All concrete used as post anchorage backfill shall be well-consolidated Class C concrete conforming to SS 218 Table 218-A, or a non-shrink grout, minimum compressive strength of 20 MPa at 28 days, approved by the Ministry Representative.

**700.23.03 Installation of Steel Posts** – Steel line posts, end posts, corner posts and brace posts embedded in solid rock shall be set in concrete or non-shrink grout.

Where bedrock is encountered on steep slopes (steeper than 1.5H:1V; 34°) at depths less than 1200 mm, the total embedment length may be reduced to 1000 mm. Of the 1000 mm, a minimum of 200 mm shall be set into the bedrock with the remainder set in concrete footings not less than 350 mm in diameter. The top surface of all concrete footings shall be a minimum of 25 mm above ground and slope away from the post to provide positive drainage as indicated on the Drawings.

Steel posts will be installed plumb and to the specified depth, as indicated on the Drawings. Notwithstanding, anything to the contrary in the steel post embedment details

shown on the Drawings, any part of the post embedment that is excavated will be backfilled entirely with concrete.

Steel posts set in organic or other soft soils shall have a total embedment length of 1800 mm. If the post is driven, the top 800 mm will be set in a concrete footing with a minimum diameter of 350 mm.

Steel corner posts or brace panel posts in soft ground will also have an embedment length of 1800 mm. If the post is driven, the top 1250 mm will be set in concrete footings with a minimum diameter of 350 mm.

Any cut or abraded steel posts must be painted immediately with metal primer paint to inhibit corrosion, according to SS 700.14. Any damage to galvanized coatings must be repaired according to SS 700.14.

Steel posts will be installed with galvanized steel post caps.

Steel posts will be set to provide a rigid installation capable of withstanding a horizontal load of 32 kg (70 lb), applied 1.5 m above the ground, in any direction in the horizontal plane, without any movement in excess of 25 mm. The horizontal load test must be conducted after the post is installed but before the fabric wire is attached. It is the responsibility of the Contractor to conduct and record the horizontal load test. The results of the horizontal load test must be submitted to the Ministry Representative prior to the fabric wire being attached.

**700.24 Fence Ties** – Fencing shall be tied into structures, gates and existing fencing as staked in the field or as directed by the Ministry Representative. Fencing ties will at no time leave a gap greater than 100 mm.

Care must be taken to ensure that the fencing ties and post installation does not compromise the effectiveness of the adjacent structures.

At ungulate guards and bridges, posts may be wood or steel as permitted by the Ministry representative. Where steel posts are used, steel posts shall be bolted to the concrete abutments using 20 mm diameter galvanized or stainless steel corrosion resistant concrete anchors that have manufacturer's specifications that recommend use for installations in accordance with the available concrete edge distance and that are acceptable to the Ministry Representative. Where wood posts are used, wood posts shall be located as close to the abutments as possible.

**700.25 Brace Panels** – Brace panels will include intermediate brace panels, double intermediate brace panels consisting of two intermediate brace panels back to back and end post panels.

Brace panels shall be constructed and installed as shown on the SS Drawings SP700-01 to SP700-02. Cross wires shall be twisted to provide suitable tension, in the manner illustrated on the SS Drawing SP700-01.

Bracing wire must be galvanized and a minimum of 9.75 gauge.

The spacing between adjacent intermediate brace panels, and between intermediate brace panels and end post panels, will not be more than 54 m, unless otherwise permitted by the Ministry Representative.

Intermediate brace panels shall be installed where necessary to meet the foregoing requirement, and also where required by the Ministry representative at changes in vertical or horizontal alignment.

Double brace panels will be used at corners and other sharp changes in the vertical or horizontal alignment, and at any other locations where they are, in the judgement of the Ministry Representative, required to maintain the integrity of the fence.

End post panels will be installed where the fence ties in to structures or gates, at ungulate guards and at any other termination of the fence. The requirement for brace panels at one-way wildlife gates is shown on SS Drawing SP700-12.1.

**700.26 Fence Fabric Installation** – The fence fabric will be fastened to posts on the surface facing away from the highway right-of-way, except where the fence is located adjacent to concrete barriers and overpasses.

For wood posts, the wire fence fabric shall be stapled to each post, using a maximum vertical spacing of 150 mm including both the top and bottom wires. Staples will be barbed and galvanized steel, 3.5 mm in diameter with a driven length of at least 50 mm.

The fence fabric will be attached to steel posts with a minimum of four (4) galvanized muffler clamps (e.g. MC12300 P type); one on the top strand, one 0.60 m below the top strand, one 1.20 m below the top strand, and one on the bottom wire of the fence fabric. Intermediate connections will be made every 300 mm along the post with 3.5 mm galvanized wire twisted to form a tight connection.

The wire fence fabric shall be tensioned to provide a uniform pull in order to minimize distortion of the fabric. Each run of fence fabric between brace panels will be tensioned before staples are set or clamps tightened.

The tension of the fence fabric will be considered adequate when the fabric cannot be pulled more than 100 mm out of line with a 13.6 kg (30 lb) pull at any point from top to bottom between the posts. The allowable 100 mm will include any deflection of the post, should this occur.

The fence fabric will be as close to the ground as possible, but in any case, the vertical distance between the bottom strand of wire and the existing ground will nowhere exceed 150 mm. Unerodible, clean fill material, neatly trimmed, will be added to obtain this clearance, where practical.

Where the fence crosses gullies or drainage channels, a specially fabricated section of fence will be cut to fit the opening and will be fastened to the bottom wire and the streambed as shown on the Drawings. Alternatively, but

only where required by the Ministry Representative, culvert pipe will be installed at specific crossings in accordance with the Special Provisions.

**700.27 Connection Treatments at Structures** – Fences must be securely attached to walls, abutments, ungulate guards and other structures to ensure stability of the fences and to prevent animals from passing between the fence and the structure. The fence must be attached as per SP700-11 using concrete anchors as per SS 700.24. Fence must be securely attached to rock faces in accordance with SS Drawing SP700-04.

**700.28 Gates** – Hardware shall be securely attached to permit the gate to open correctly and prevent the easy removal of the gate and hardware. Hinges shall be installed to permit the gate to swing back one-way against the fence. Locking hardware shall be of the type specified in SS Drawing SP700-13.2.

**700.29 Lockable Human Access Gates** – Access must be provided to allow inspection access from the highway of all points of all bridges, both ends of culverts greater than 2 m in diameter, retaining walls over 2 m in height, tunnels, and farm and wildlife crossing structures.

Lockable human access gates must be located where they can be safely used, avoiding cliffs, steep slopes, swamps, areas frequently under water, and where unstable ground conditions exist. The gates must be located within 25 m of the structures and culverts they provide access to, unless a greater distance is permitted by the Ministry Representative. The gates shall be of the type specified in SS Drawing SP700-14.1.

Unless otherwise permitted by the Ministry Representative, the minimum number of lockable human gates required at specific features are:

- (a) **Culverts greater than 2 m in diameter** – One (1) gate for each fence located adjacent to the culvert.
- (b) **Retaining walls greater than 2 m in height:**
  - (i) Retaining walls less than 200 m long: 1 gate where the wildlife exclusion fencing abuts the wall.
  - (ii) Retaining walls greater than 200 m long: One (1) gate at each location of the wall where the wildlife exclusion fencing abuts the wall.
- (c) **Tunnels** – One (1) gate at each tunnel portal.
- (d) **Bridges** – One (1) gate for each location where the wildlife exclusion fencing abuts a bridge. The total number of gates required for a bridge may be reduced by the Ministry Representative if sufficient access, during median flow of water conditions, can be provided and maintained with fewer gates.

**QUALITY ASSURANCE**

**700.30 Quality Assurance** – The Ministry Representative must be provided a reasonable opportunity to conduct acceptance testing.

The Contractor will disassemble and relocate any elements of the fence necessary for testing at the discretion of the Ministry Representative. If the test of an element is successful, the Ministry shall pay all costs for the replacement of the materials and reconstruction of the element tested.

The Ministry Representative may require any element not tested, or failing the test, to be replaced and retested.

When the Ministry Representative requests a test of an element of the fence and the test fails, all costs will be to the Contractor’s account, including the replacement of the materials and reconstruction of the element tested, and all costs associated with the retesting.

**700.30.01 Removal and Replacement at Contractor’s Expense** – The Ministry Representative may require any fencing materials that do not meet the Ministry’s specifications to be removed and replaced at the Contractor’s expense.

The Ministry Representative may require any constructed fencing or gates that do not meet the Ministry’s specifications to be removed and replaced at the Contractor’s expense.

**MEASUREMENT**

**700.40 Fencing** – Fencing will be measured by the LINEAL METRE. Measurements will be made parallel to the top wire of complete fencing, including any tensioning assemblies, but excluding gate openings.

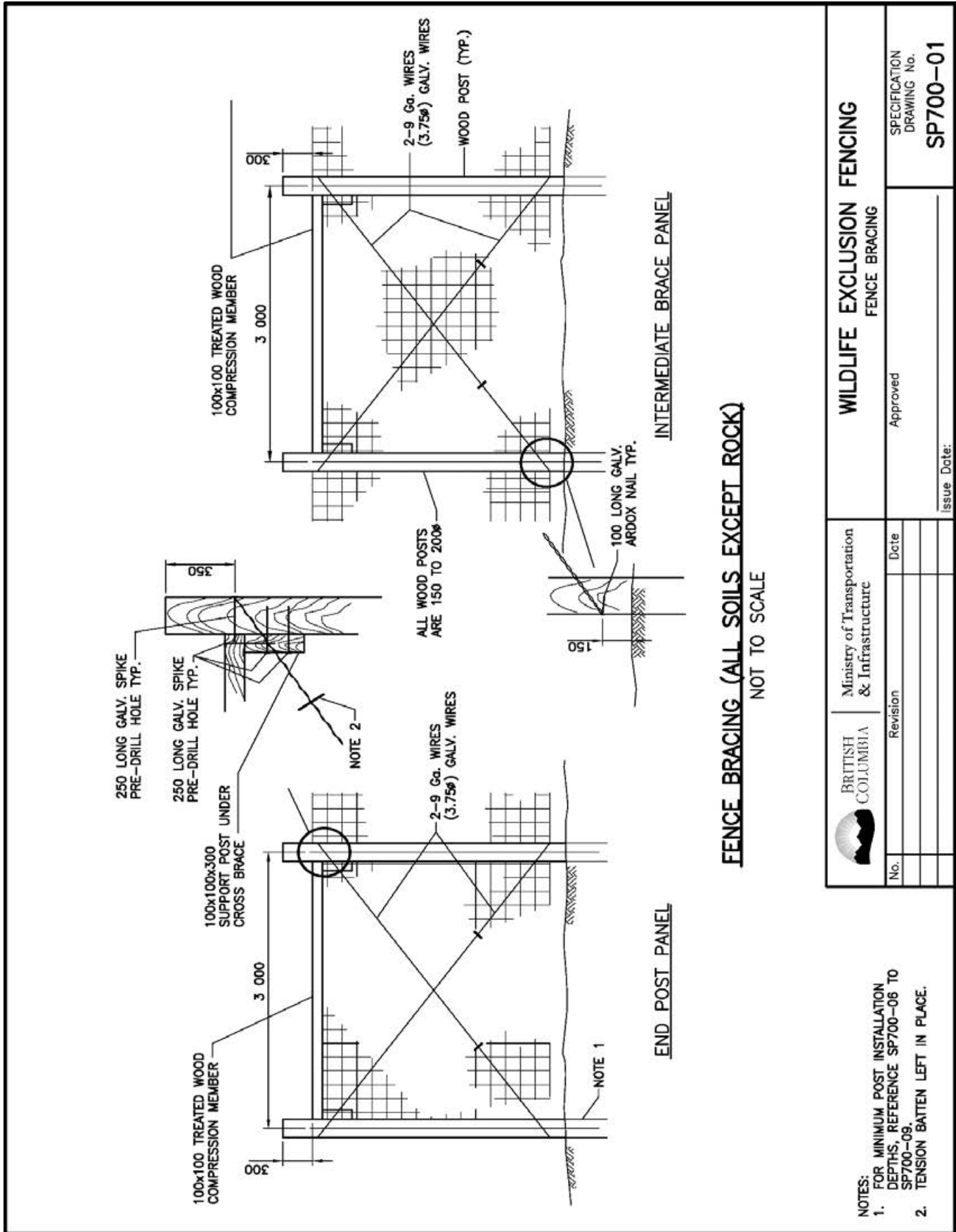
**700.41 One-Way Gates, Lockable Human Access Gates and Double Swing Gates** – Gates will be measured by the unit for EACH type and size furnished and/or installed complete in place.


**PAYMENT**

**700.50 Fencing** – Payment for FENCING, meeting the requirements as specified to the satisfaction of the Ministry Representative, will be at the Contract Unit Price per lineal metre of complete fencing, including any tensioning assemblies, but excluding one-way gates, lockable human access gates, double swing gates.

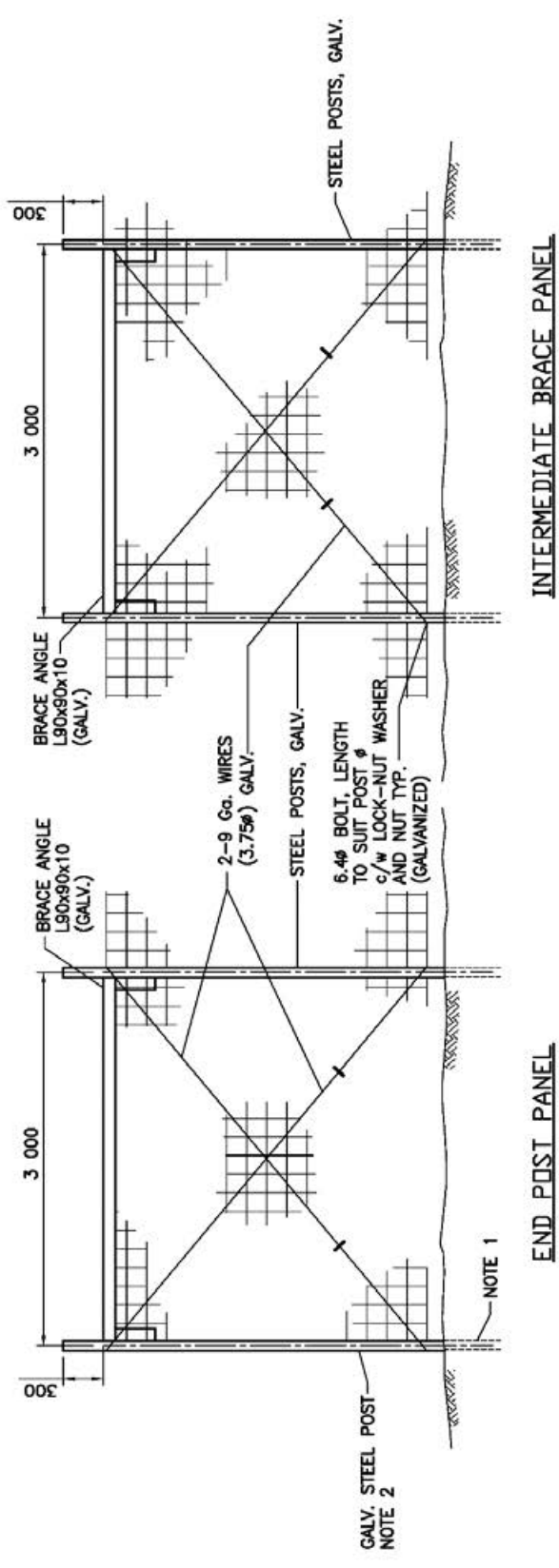
The Contract Unit Price(s) shall be accepted as full compensation for furnishing all material and/or taking delivery of Ministry supplied material as and where noted, all labour, tools, equipment and incidentals to complete the required installation, including the clearing of any additional right of way, construction of temporary fencing, connection to existing fences and/or structures, and final clean up.

**700.51 Gates** – Payment for ONE-WAY GATES, LOCKABLE HUMAN ACCESS GATES, and DOUBLE SWING GATES, meeting the requirements as specified to the satisfaction of the Ministry Representative, will be at the Contract Unit Price for each type and size furnished and/or installed complete in place.



 BRITISH COLUMBIA		Ministry of Transportation & Infrastructure	
No.	Revision	Date	Issue Date:
<b>WILDLIFE EXCLUSION FENCING</b> FENCE BRACING		Approved _____ SPECIFICATION DRAWING No. <b>SP700-01</b>	

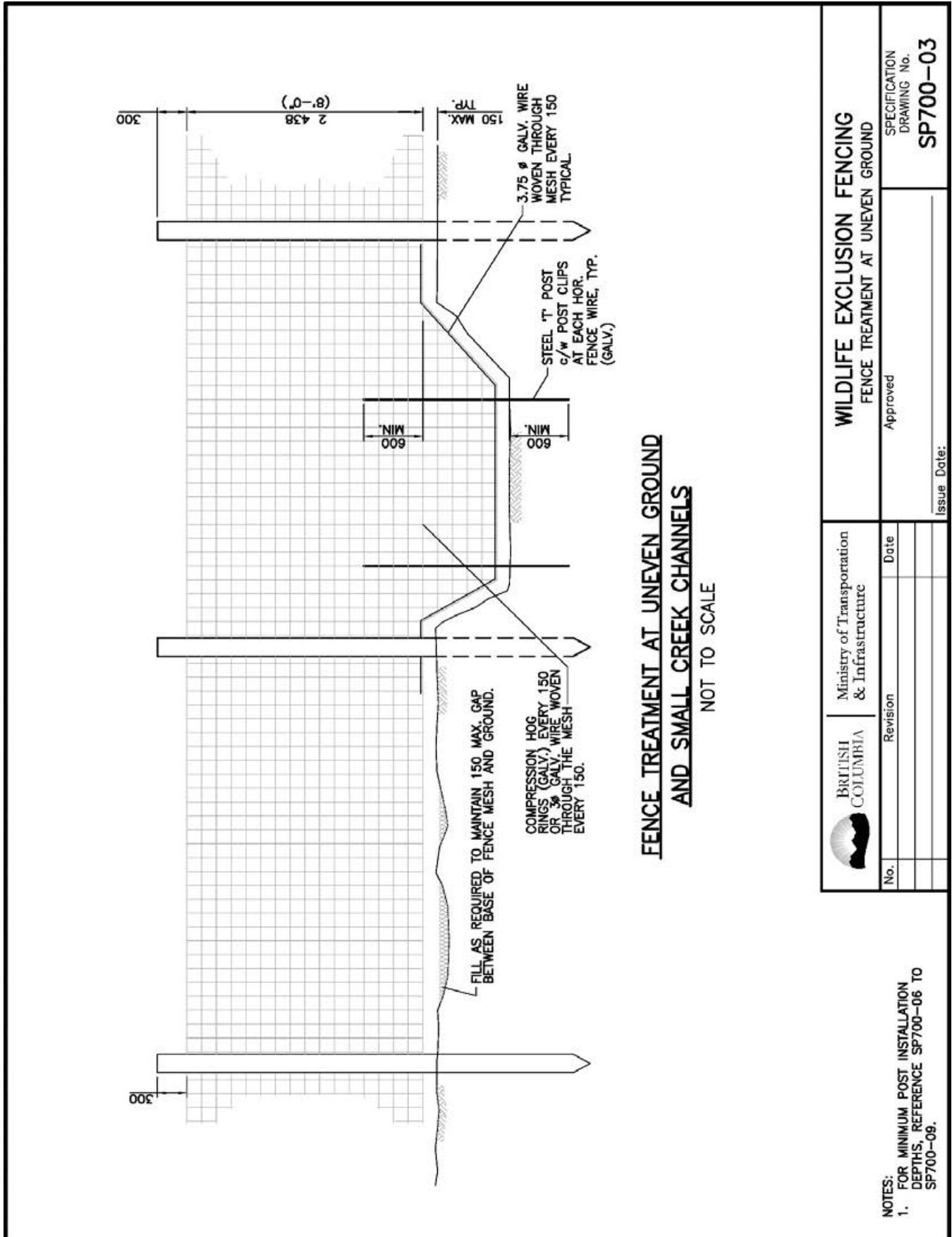


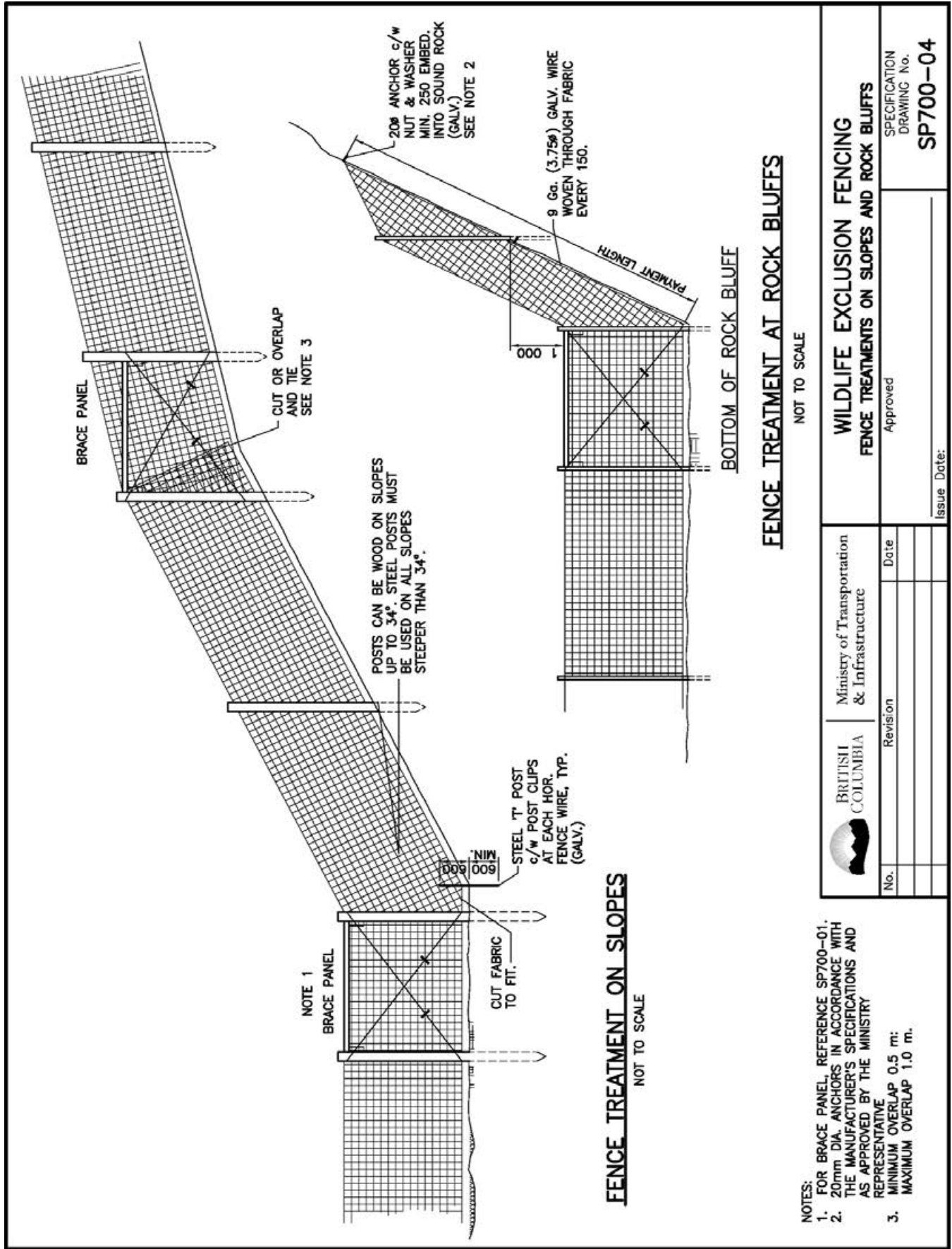


**FENCE BRACING IN ROCK**  
NOT TO SCALE

- NOTES:
1. FOR MINIMUM POST INSTALLATION DEPTHS, REFERENCE SP700-06 TO SP700-09.
  2. REPAIR OF DAMAGED ZINC COATING SHALL BE IN ACCORDANCE WITH SS 422.40.
  3. FOR FASTENING DETAILS FOR STEEL POSTS, REFERENCE SP700-10.

	Ministry of Transportation & Infrastructure	Approved _____	
		SPECIFICATION DRAWING No. <b>SP700-02</b>	
No.	Revision	Date	Issue Date:



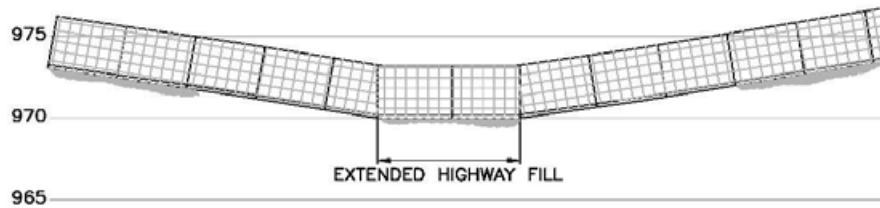


- NOTES:
1. FOR BRACE PANEL, REFERENCE SP700-01.
  2. 20mm DIA. ANCHORS IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND AS APPROVED BY THE MINISTRY REPRESENTATIVE
  3. MINIMUM OVERLAP 0.5 m;  
MAXIMUM OVERLAP 1.0 m.

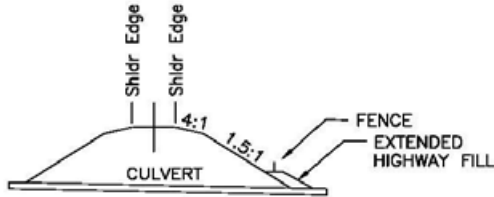
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	Approved
No.	
Revision	
Date	

**WILDLIFE EXCLUSION FENCING**  
**FENCE TREATMENTS ON SLOPES AND ROCK BLUFFS**  
 SPECIFICATION DRAWING No. **SP700-04**

Issue Date:

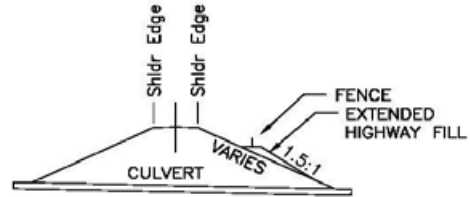


PROFILE  
A-A  
(ALONG FENCE LINE)



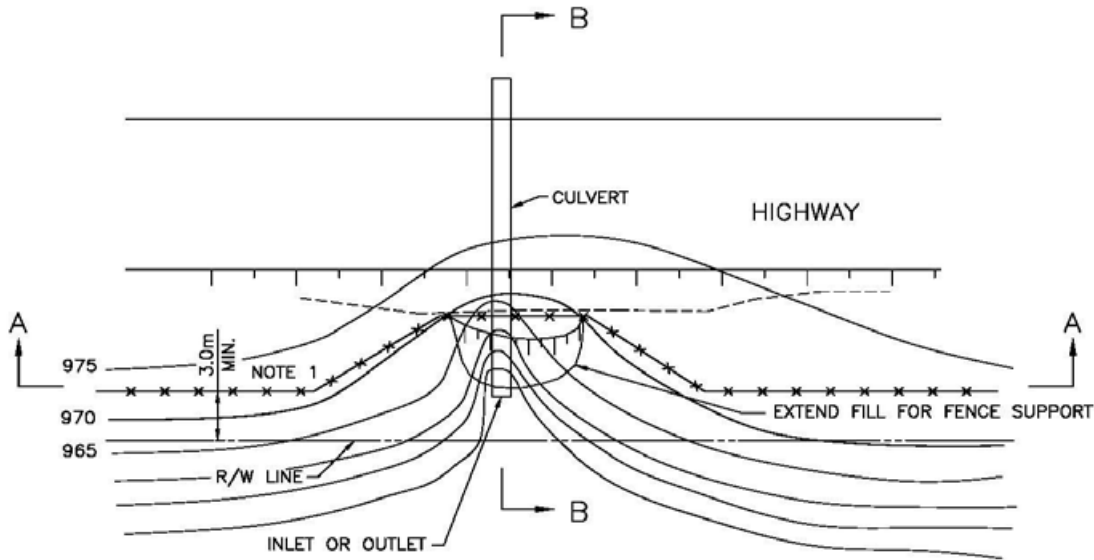
INSTALLATION ON NEW HIGHWAY CONSTRUCTION

SECTION  
B-B



INSTALLATION ON EXISTING HIGHWAY FILL SLOPES

SECTION  
B-B




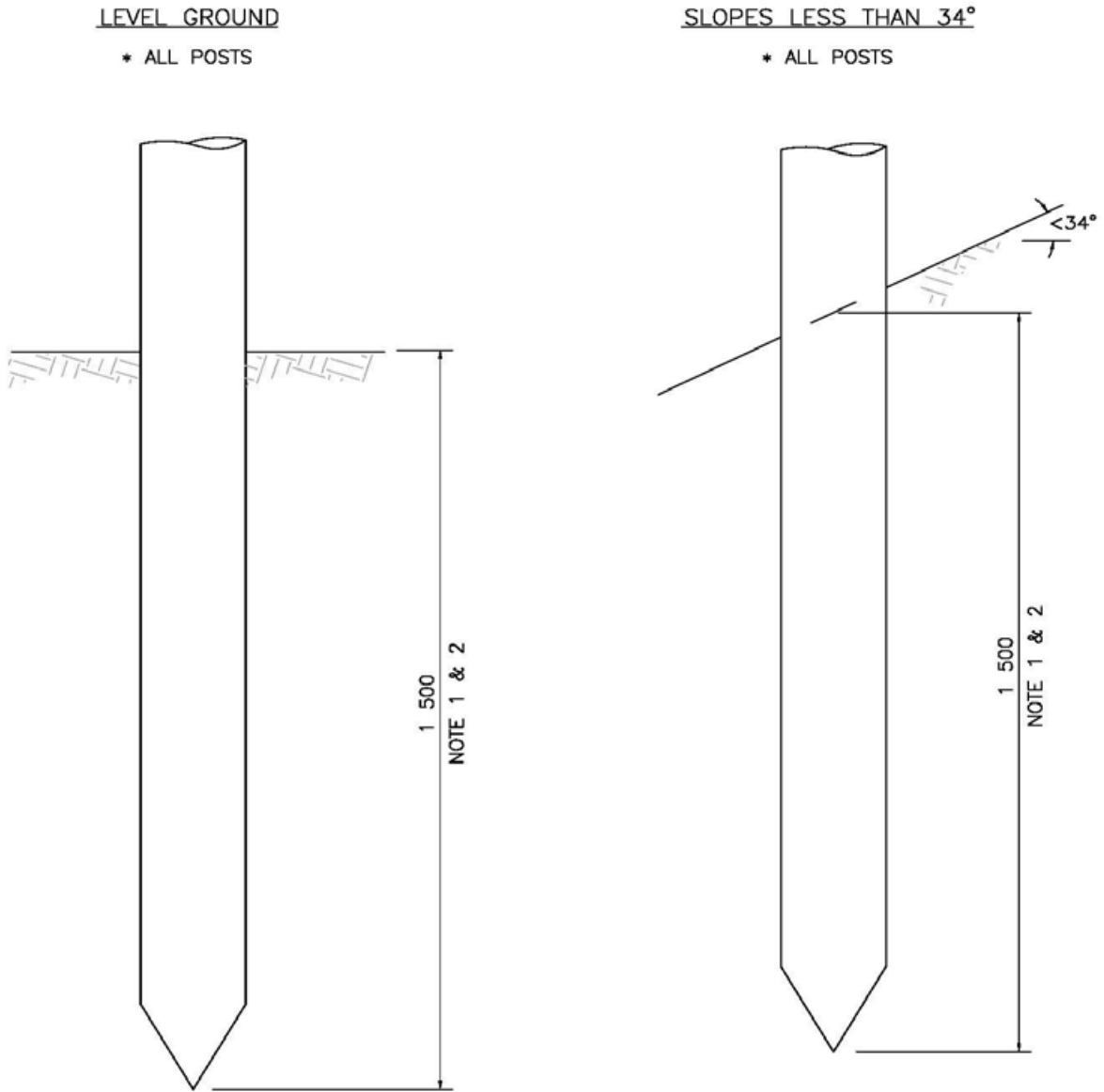
PLAN

**FENCE TREATMENT AT LARGE GULLIES**

NOTES:


1. FENCE TO BE CONSTRUCTED INSIDE THE RIGHT-OF-WAY LINE AND MUST BE OUTSIDE OF THE HIGHWAY CLEAR ZONE (9.0m MINIMUM).
2. LOCKABLE HUMAN ACCESS GATE MUST BE PROVIDED WITHIN 25m OF CULVERTS THAT ARE GREATER THAN 2m IN DIAMETER.

 <b>BRITISH COLUMBIA</b>		Ministry of Transportation & Infrastructure	<b>WILDLIFE EXCLUSION FENCING</b> FENCE TREATMENTS AT LARGE GULLIES	
No.	Revision	Date	Approved	SPECIFICATION DRAWING No. <b>SP700-05</b>
			Issue Date:	

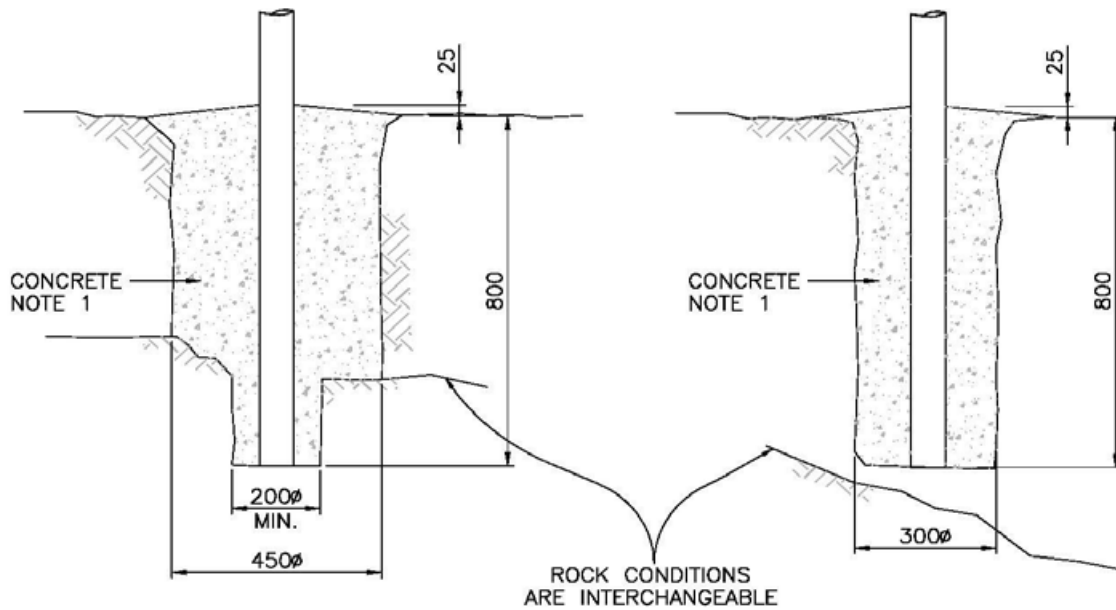


FENCING IN EARTH  
(WOOD POSTS)

1. 1500mm MINIMUM PROVIDED THAT IT MEETS THE REQUIREMENTS OF THE HORIZONTAL LOAD TEST.
2. WHEREVER THE REQUIREMENTS OF THE HORIZONTAL LOAD TEST CANNOT BE MET FOR WOOD POSTS, STEEL POSTS SHALL BE USED WHEN DIRECTED BY THE MINISTRY REPRESENTATIVE.

 <b>BRITISH COLUMBIA</b>		Ministry of Transportation & Infrastructure	<b>WILDLIFE EXCLUSION FENCING</b> EMBEDMENT DETAILS FOR WOOD POSTS IN EARTH	
No.	Revision	Date	Approved	
			Issue Date: JULY 2008	
			SPECIFICATION DRAWING No. <b>SP700-06</b>	

- CORNER POSTS
- END POSTS
- LINE POSTS
- BRACE POSTS




GALVANIZED STEEL POSTS IN ORGANIC MATERIAL OR COMBINATION OF ROCK AND ORGANIC MATERIAL

EMBEDMENT DETAILS  
NOT TO SCALE

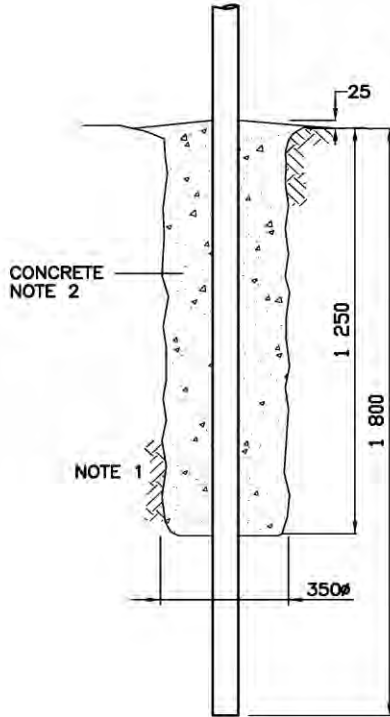
NOTES:

1. CONCRETE SHALL CONFORM TO SS 218, CLASS C (20mm COARSE AGGREGATE).

 <b>BRITISH COLUMBIA</b>		Ministry of Transportation & Infrastructure	<b>WILDLIFE EXCLUSION FENCING</b> EMBEDMENT DETAILS FOR FENCING IN EARTH	
No.	Revision	Date	Approved	
			Issue Date:	SPECIFICATION DRAWING No. <b>SP700-07</b>

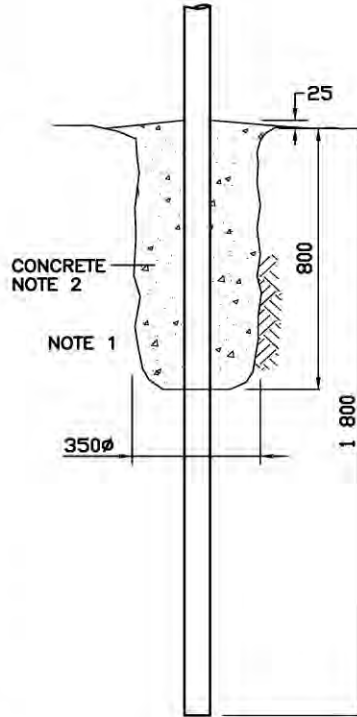
LEVEL GROUND

- CORNER POSTS
- END POSTS



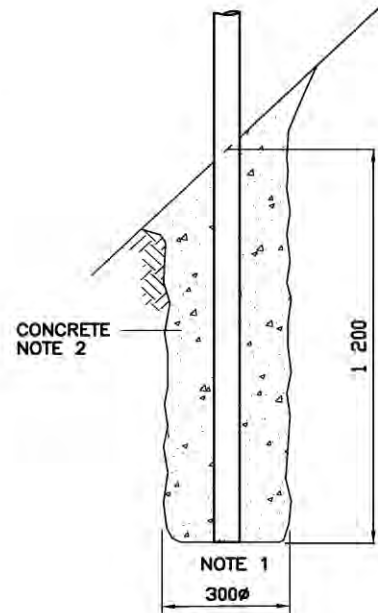
LEVEL GROUND

- LINE POSTS
- BRACE POSTS



SLOPES  
34° TO 50°

- ALL POSTS



FENCING IN SOFT ORGANIC SOILS OR WETLANDS  
(AS DIRECTED BY MINISTRY REPRESENTATIVE)


GALVANIZED STEEL POSTS

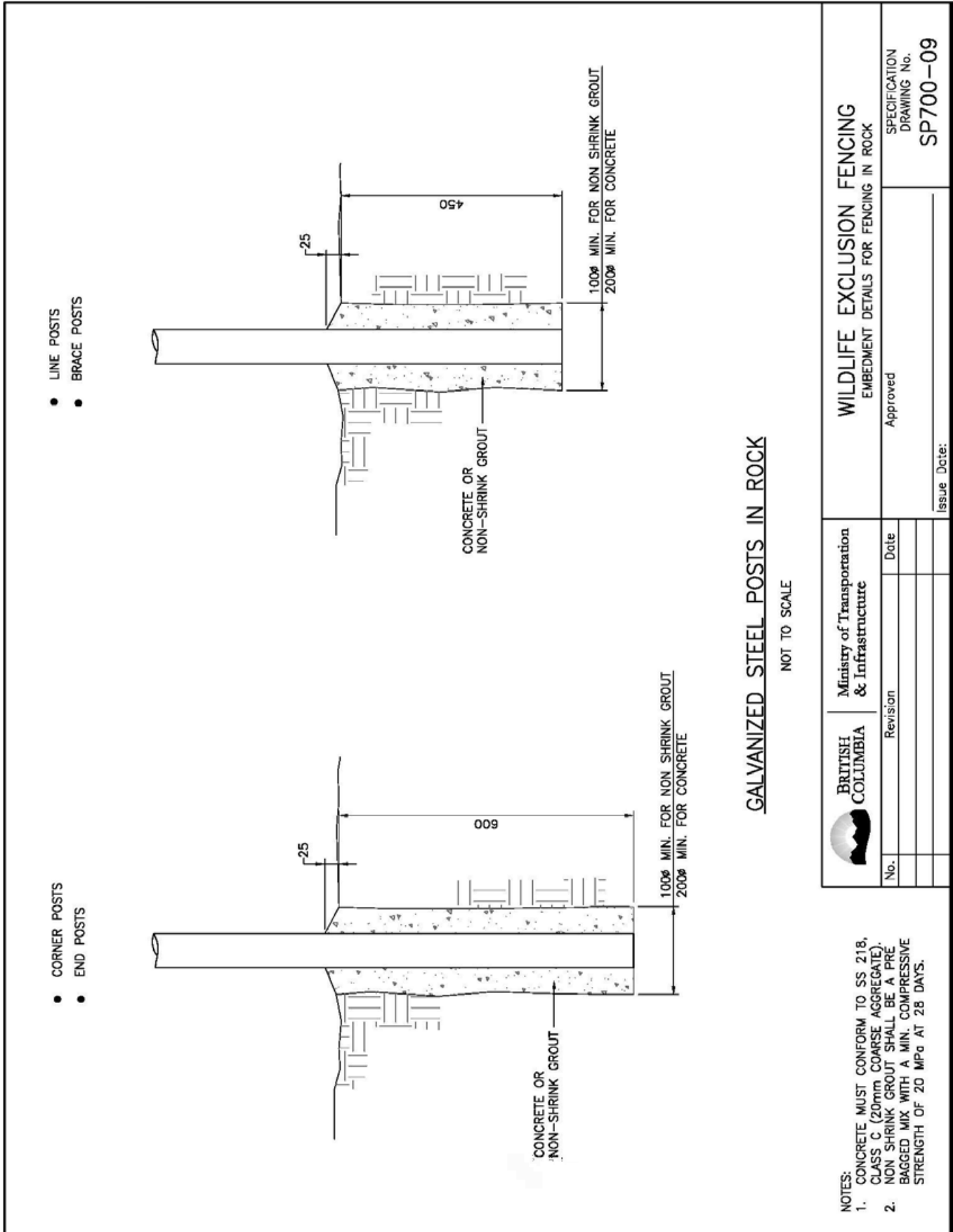
EMBEDMENT DETAILS

NOT TO SCALE

NOTES:

1. OVERSIZED HOLES SHALL BE COMPLETELY BACKFILLED WITH CONCRETE OR WELL TAMPED GRAVEL AROUND CONCRETE FOOTING.
2. CONCRETE MUST CONFORM TO SS 218, CLASS C (20mm COARSE AGGREGATE).

 BRITISH COLUMBIA		Ministry of Transportation & Infrastructure		<b>WILDLIFE EXCLUSION FENCING</b> EMBEDMENT DETAILS FOR SOFT ORGANIC SOILD OR WETLANDS	
No.	Revision	Date	Approved		SPECIFICATION DRAWING No. <b>SP700-08</b>
			Issue Date:		



**WILDLIFE EXCLUSION FENCING**  
EMBEDMENT DETAILS FOR FENCING IN ROCK

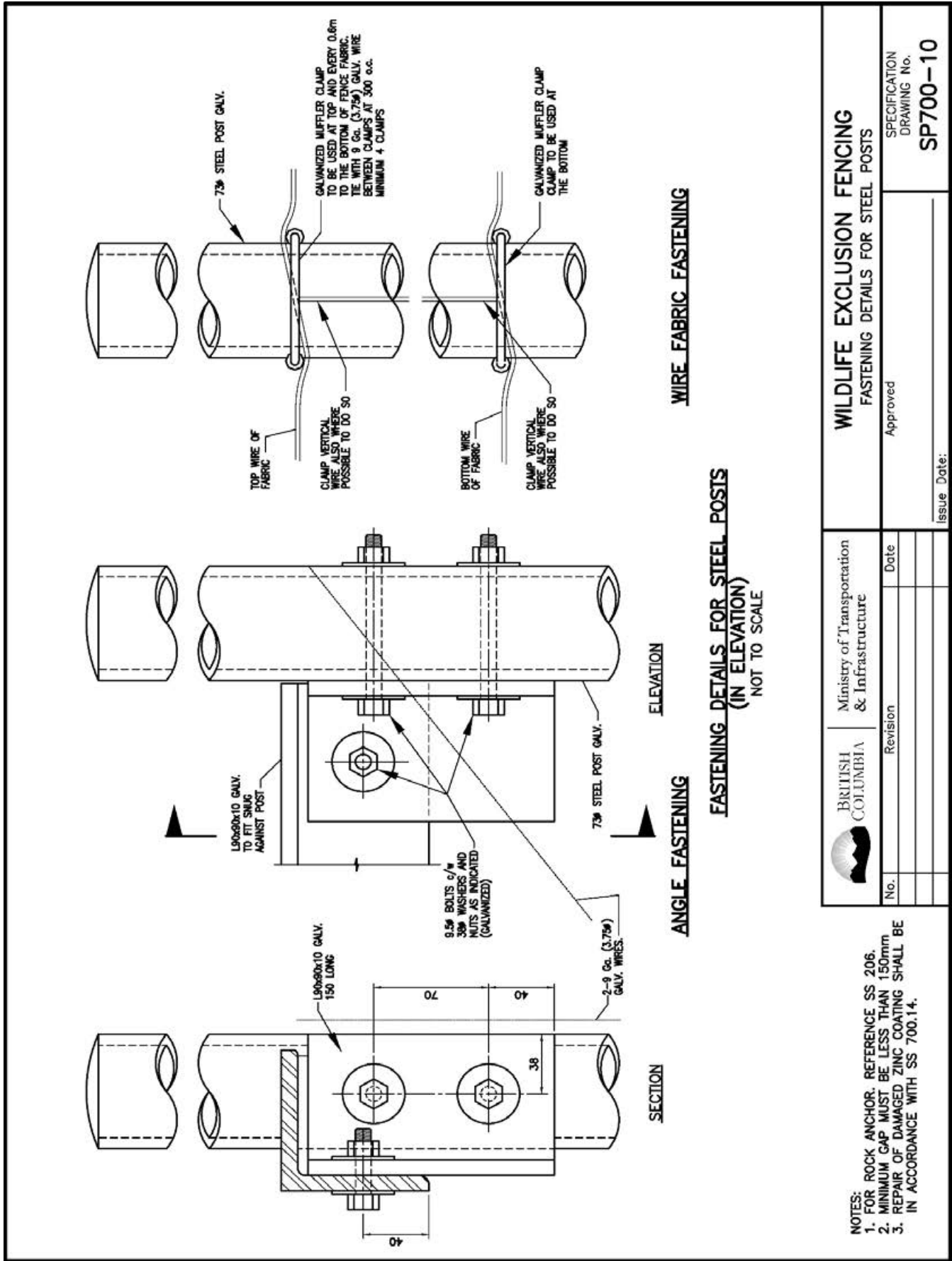
BRITISH COLUMBIA  
Ministry of Transportation & Infrastructure

No.	Revision	Date

Approved \_\_\_\_\_  
SPECIFICATION DRAWING No. **SP700-09**

Issue Date: \_\_\_\_\_





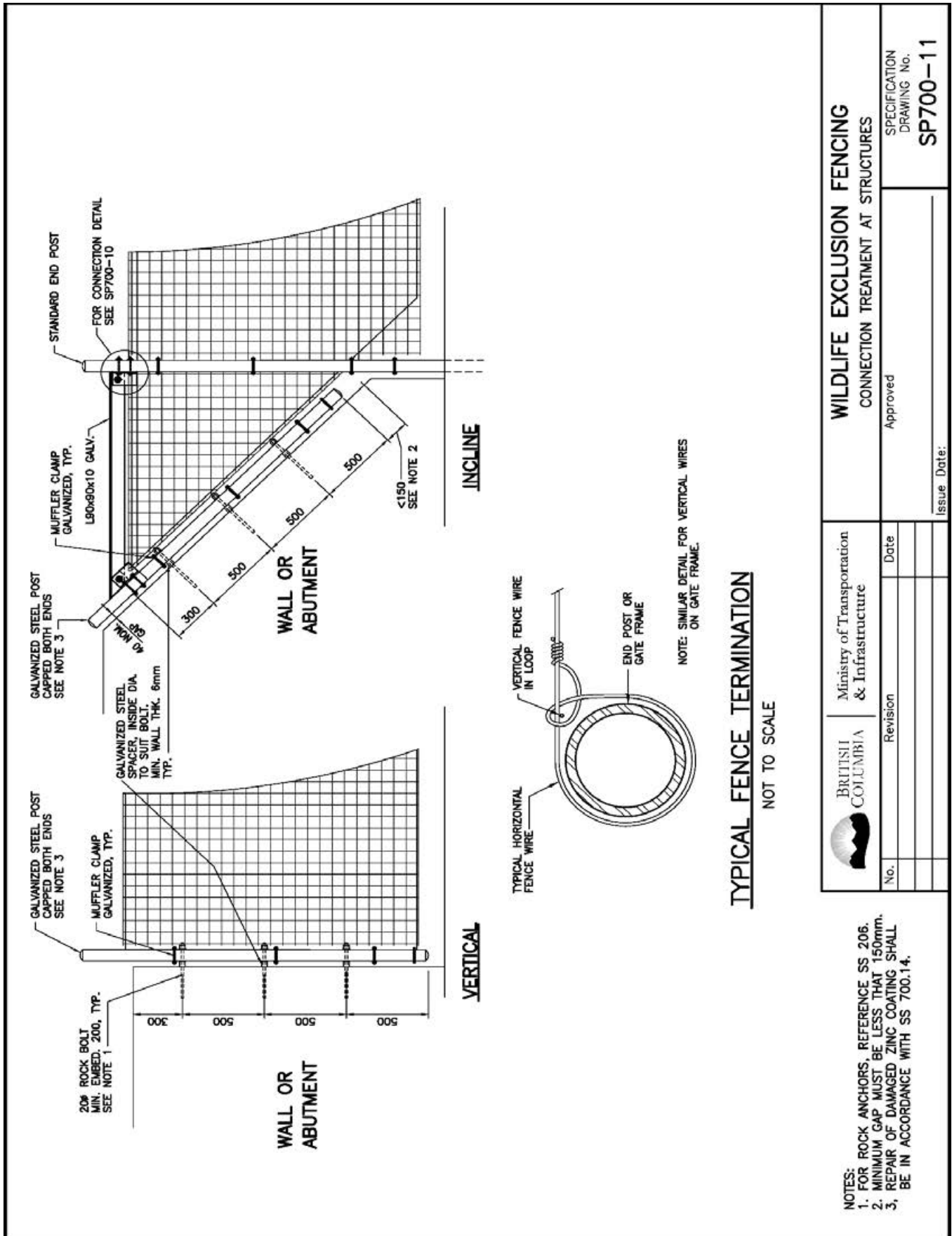
**WILDLIFE EXCLUSION FENCING**  
FASTENING DETAILS FOR STEEL POSTS

Approved \_\_\_\_\_  
SPECIFICATION  
DRAWING No.  
**SP700-10**

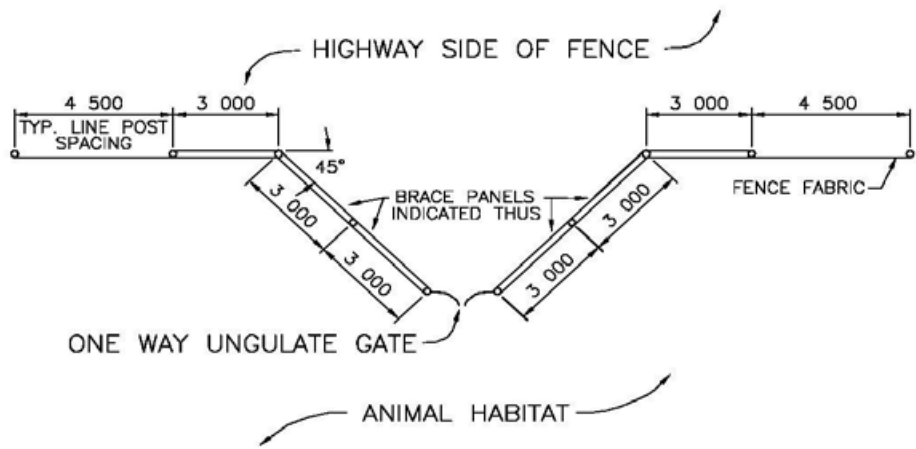
**BRITISH COLUMBIA**  
Ministry of Transportation & Infrastructure

No.	Revision	Date

Issue Date: \_\_\_\_\_




		Ministry of Transportation & Infrastructure	
No.	Revision	Date	Issue Date:
WILDLIFE EXCLUSION FENCING CONNECTION TREATMENT AT STRUCTURES		Approved	
SPECIFICATION DRAWING No.		SP700-11	

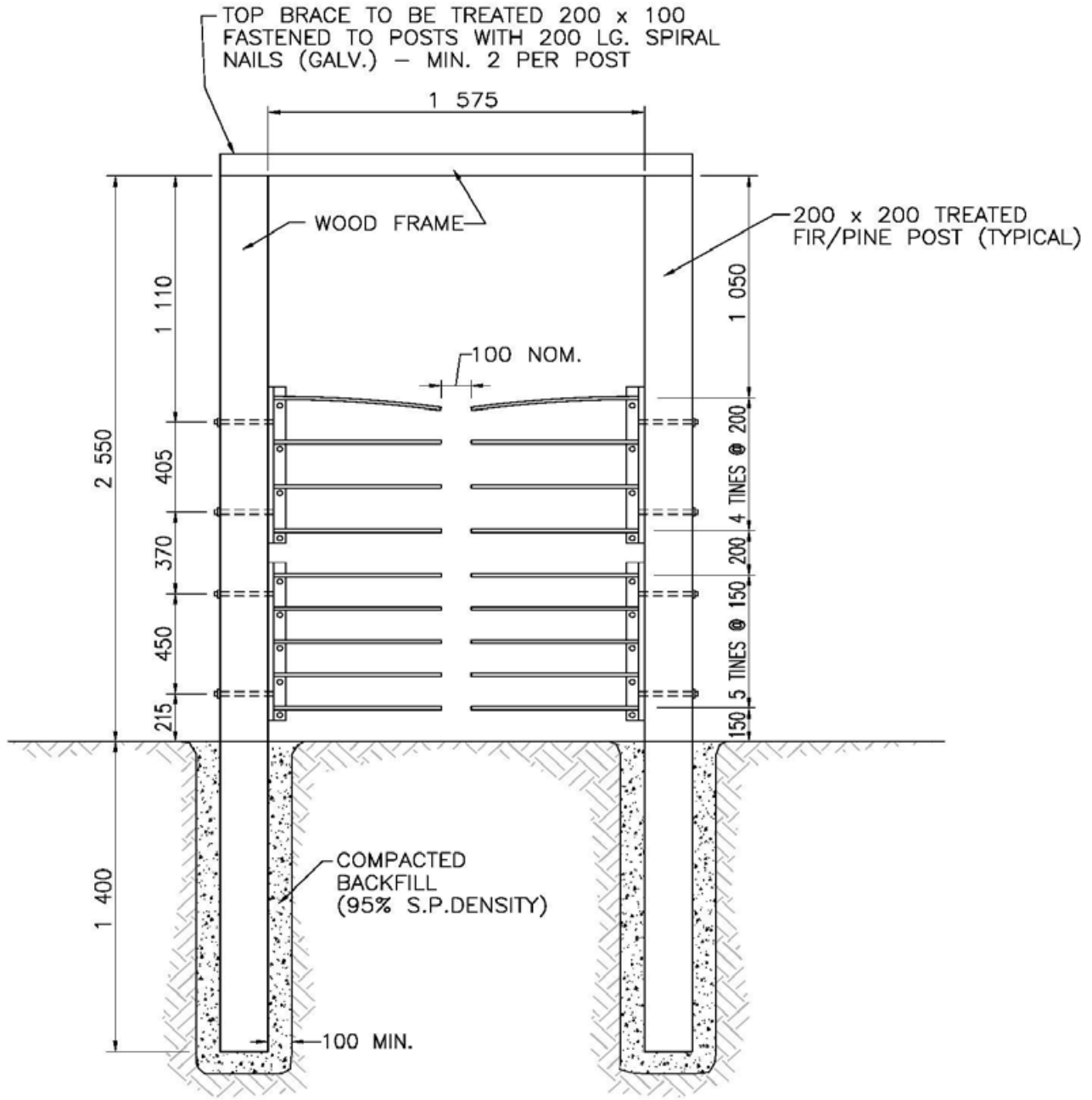


PLAN VIEW  
 SINGLE ONE WAY UNGULATE GATE LAYOUT  
 NOT TO SCALE


**NOTES:**

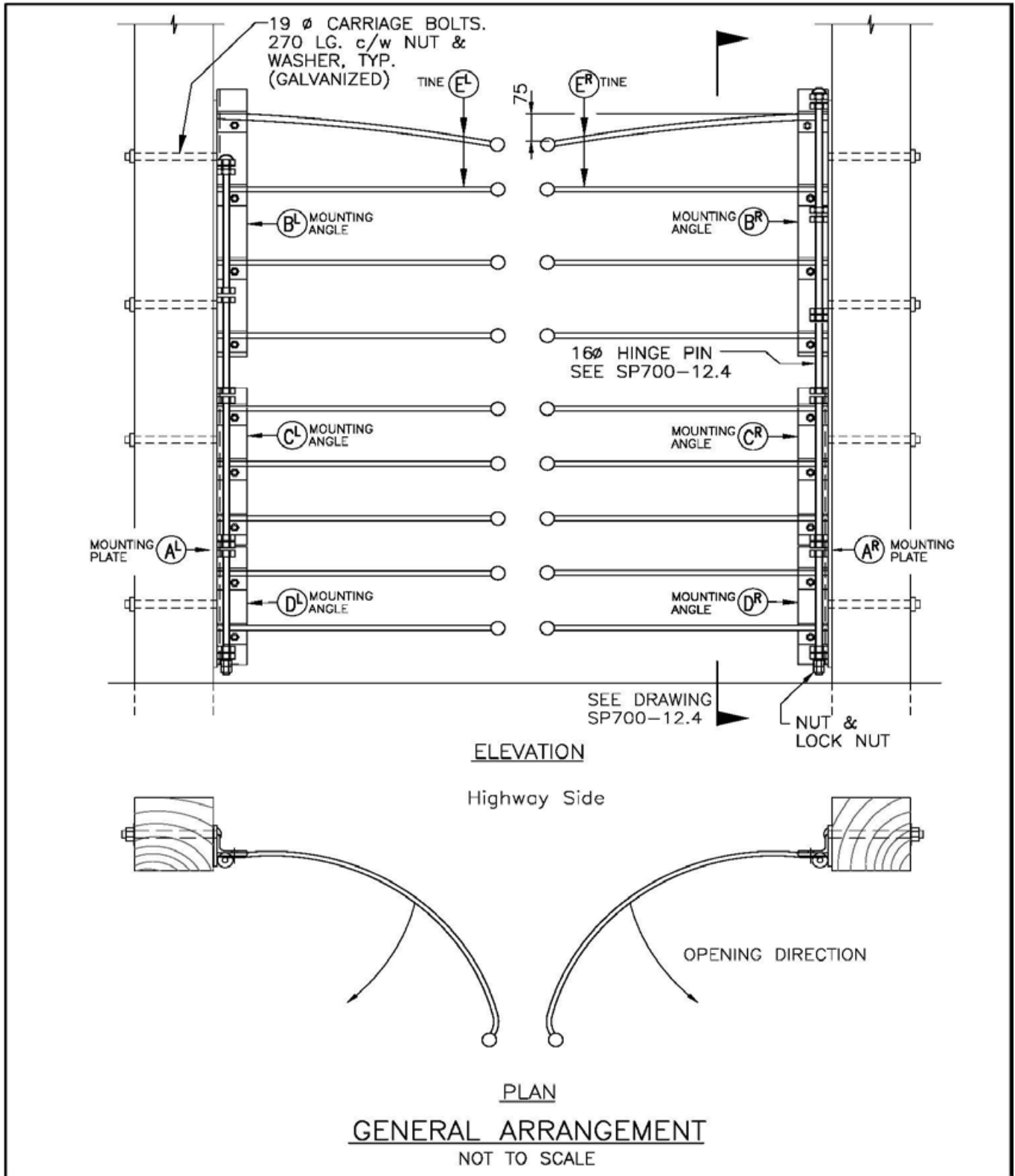
- 1) NYLON, OR OTHER SUITABLE PLASTIC, BUSHINGS SHALL BE INSTALLED ON THE GATE HINGES, TO LAY AGAINST THE MOUNTING PLATE.
- 2) 38mm X 50mm PATCHES OF 3mm NEOPRENE RUBBER SHALL BE PERMANENTLY ATTACHED TO EACH SWINGING SECTION, USING A SILICON ADHESIVE, SO THAT THE GATE CAN BE SLAMMED SHUT WITHOUT NOISE.
- 3) ALL METAL IN THE GATE ASSEMBLY SHALL BE GALVANIZED.
- 4) THE GATE TINES ONLY SHALL BE HEAT TREATED TO ROCKWELL HRC 30 TO 35.
- 5) ACID BATH TREATMENT OF THE TINES PRIOR TO GALVINIZING SHALL BE CONTROLLED TO MINIMIZE POTENTIAL WEAKENING OF WELDS.
- 6) GATES SHALL BE CAREFULLY FABRICATED AND WELDED TO AVOID BINDING. COMPLETED GATES SHALL BE TEST ASSEMBLED IN SHOP, ADJUSTED AND LUBRICATED TO SWING FREELY AND QUIETLY SHUT FROM ANY POSITION.
- 7) ALL STEELWORK TO BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SS422. GALVANIZING TO BE IN ACCORDANCE WITH ASTM A153 AND A123.
- 8) DRAWING TO BE READ IN CONJUNCTION WITH SP700-12.2 TO 12.7
- 9) BACKFILL TO BE a) IN FREE DRAINING NON-COHESIVE SOILS - NATIVE MATERIALS  
 b) IN COHESIVE SOILS - MIX NATIVE MATERIAL 1 TO 1 WITH COARSE ROCK AGGREGATE (MAX 75mm  $\phi$ )
- 10) DRAWINGS TO BE READ IN CONJUNCTION WITH STANDARD SPECIFICATION SECTION 422 MISCELLANEOUS STEELWORK.


 <b>BRITISH COLUMBIA</b>		<b>Ministry of Transportation &amp; Infrastructure</b>		<b>ONE WAY UNGULATE GATE</b> UNGULATE GATE SHOP DRAWING ASSEMBLY LAYOUT	
No.	Revision	Date	Approved		SPECIFICATION DRAWING No. <b>SP700-12.1</b>
			Issue Date: _____		

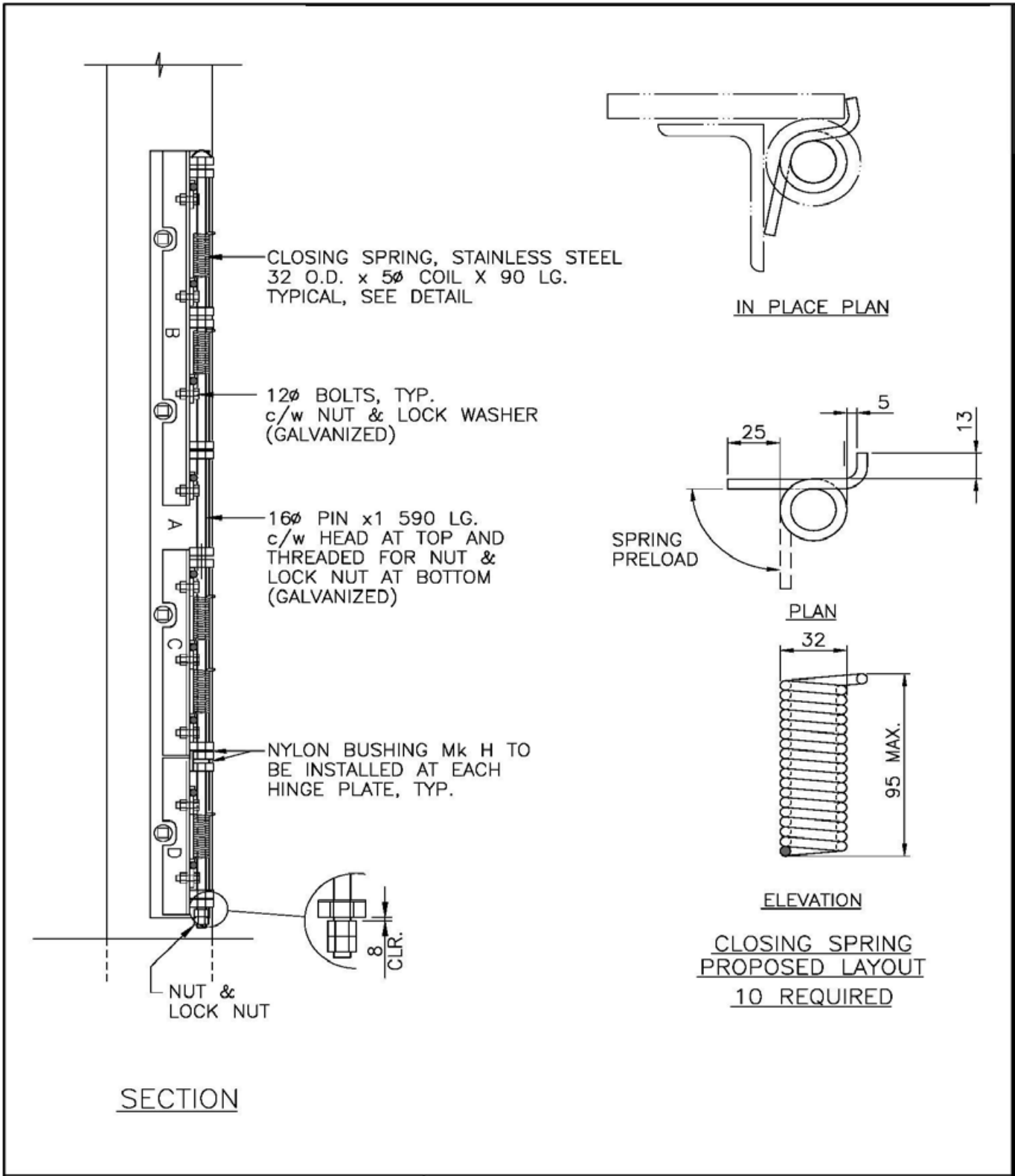



ONE WAY UNGULATE GATE ASSEMBLY  
NOT TO SCALE

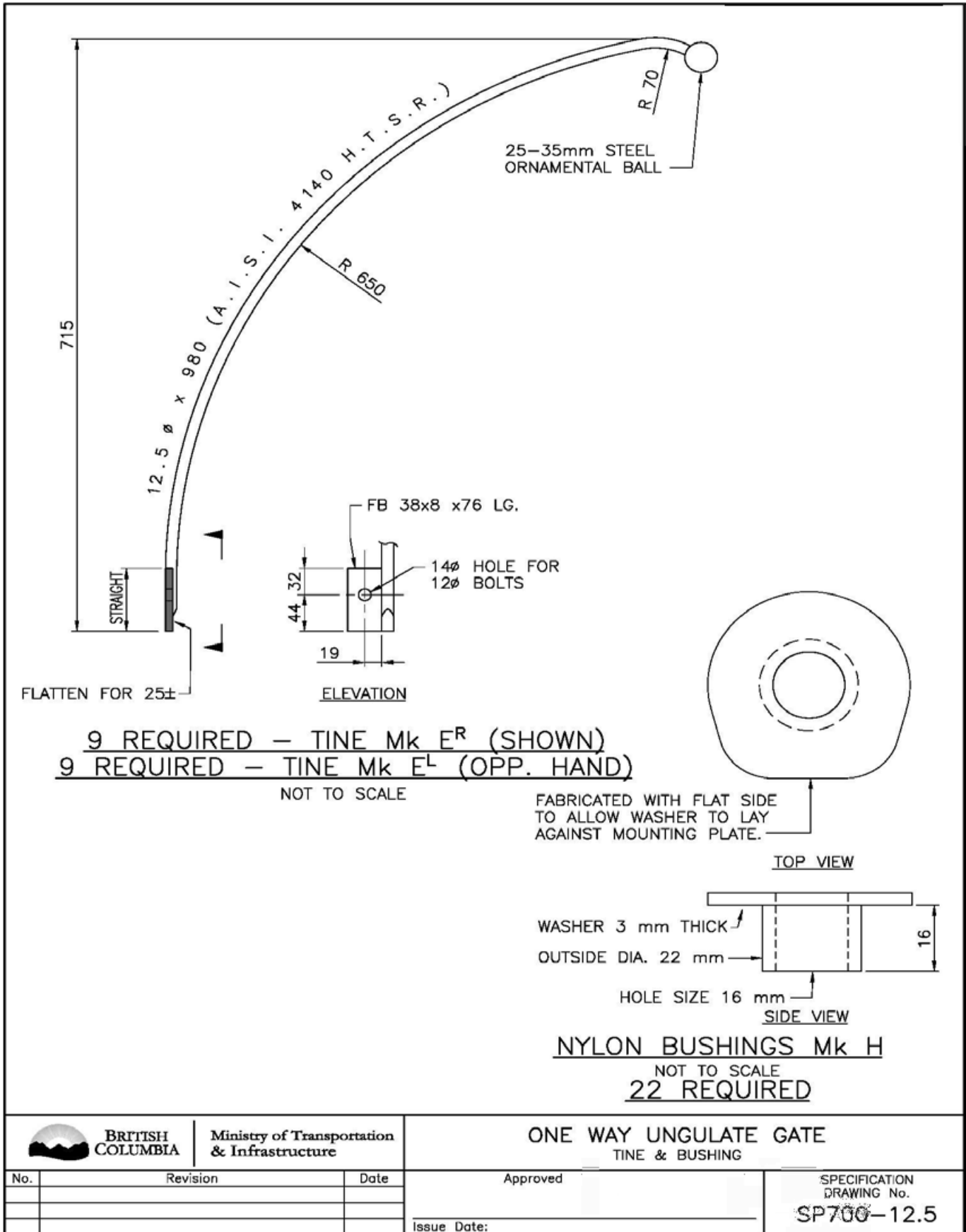
 <b>BRITISH COLUMBIA</b>		Ministry of Transportation & Infrastructure	<b>ONE WAY UNGULATE GATE</b> UNGULATE GATE SHOP DRAWING ASSEMBLY LAYOUT	
No.	Revision	Date	Approved	
			_____	
			Issue Date:	SPECIFICATION DRAWING No. <b>SP700-12.2</b>

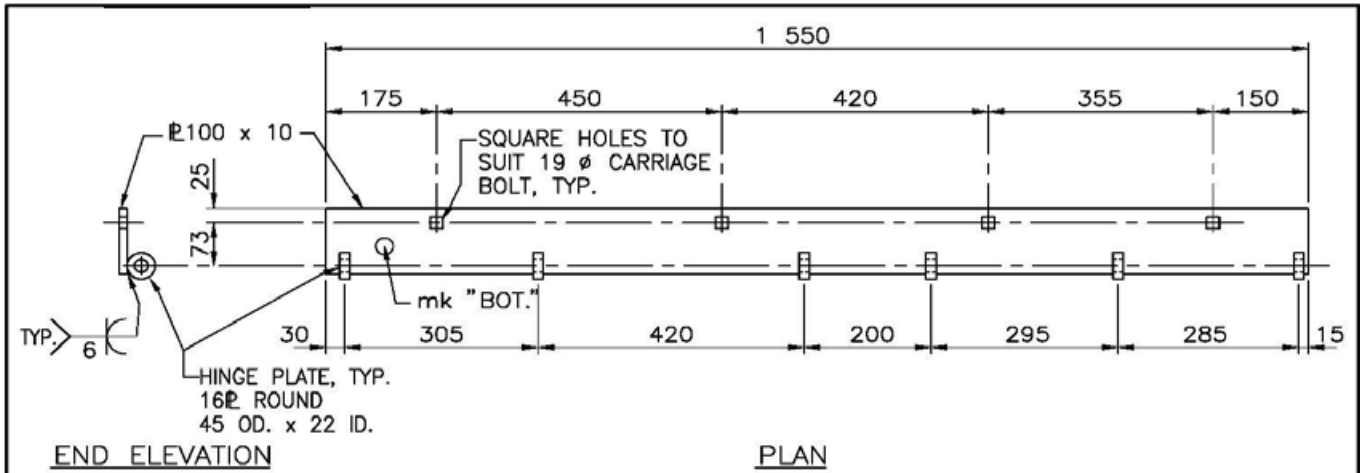


 <b>BRITISH COLUMBIA</b>		Ministry of Transportation & Infrastructure	<b>ONE WAY UNGULATE GATE</b> GENERAL GATE ASSEMBLY	
No.	Revision	Date	Approved	
			Issue Date: _____	
			SPECIFICATION DRAWING No. <b>SP700-12.3</b>	

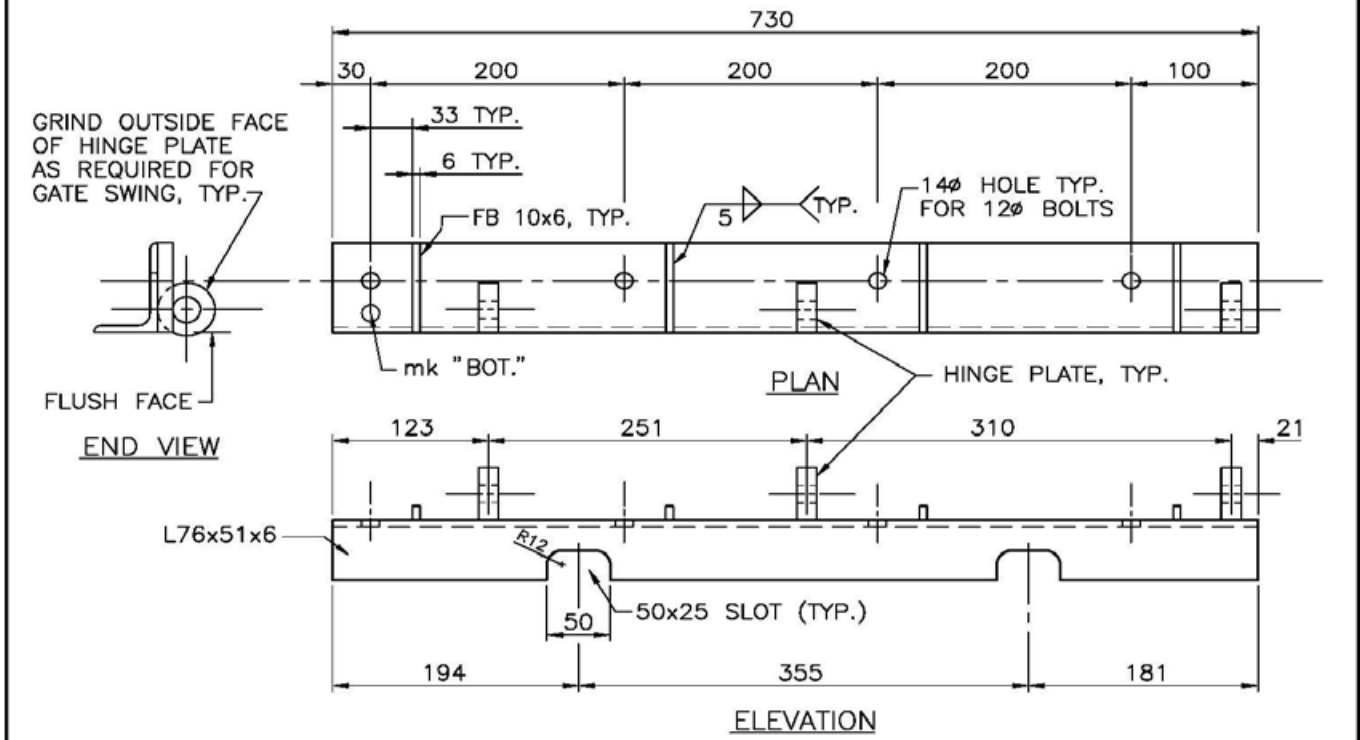


 <b>BRITISH COLUMBIA</b>			<b>Ministry of Transportation &amp; Infrastructure</b>		<b>ONE WAY UNGULATE GATE</b> GATE ASSEMBLY – SIDE VIEW		
No.	Revision	Date	Approved			SPECIFICATION DRAWING No.	
			Issue Date: _____			SP700-12.4	





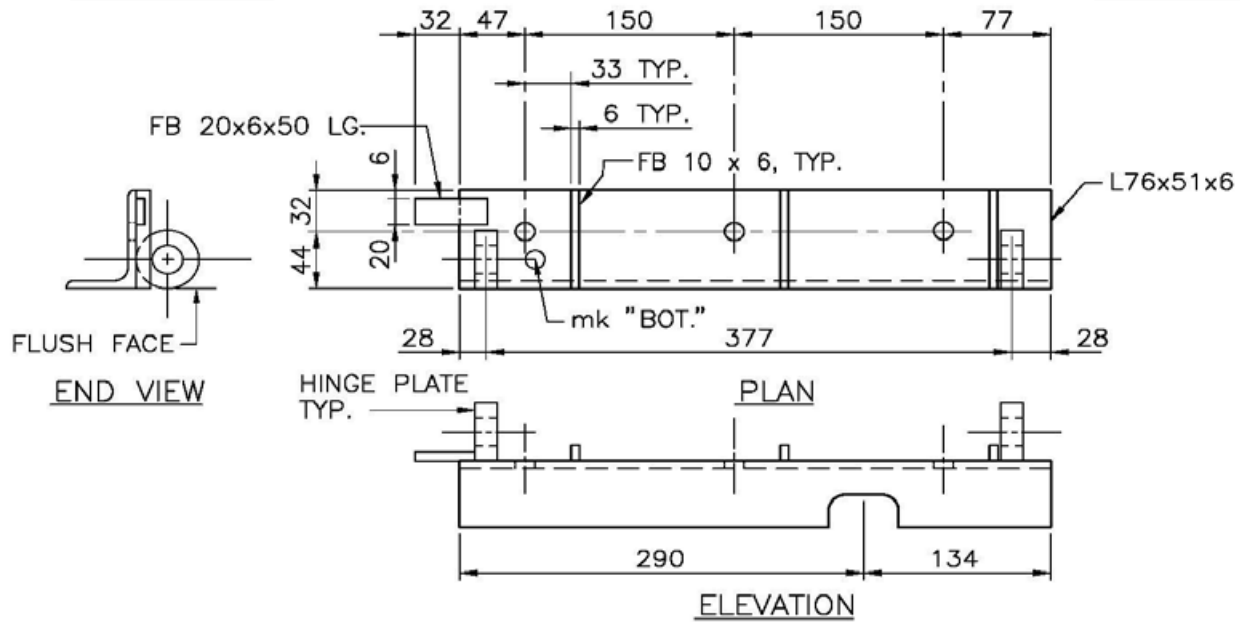
ONE REQUIRED – MOUNTING  $\bar{\text{P}}$  – Mk. A1<sup>R</sup> (SHOWN)  
ONE REQUIRED – MOUNTING  $\bar{\text{P}}$  – Mk. A1<sup>L</sup> (OPP. HAND)  
 NOT TO SCALE



ONE REQUIRED – ANGLE Mk B<sup>R</sup> (SHOWN)  
ONE REQUIRED – ANGLE Mk B<sup>L</sup> (OPP. HAND)  
 NOT TO SCALE

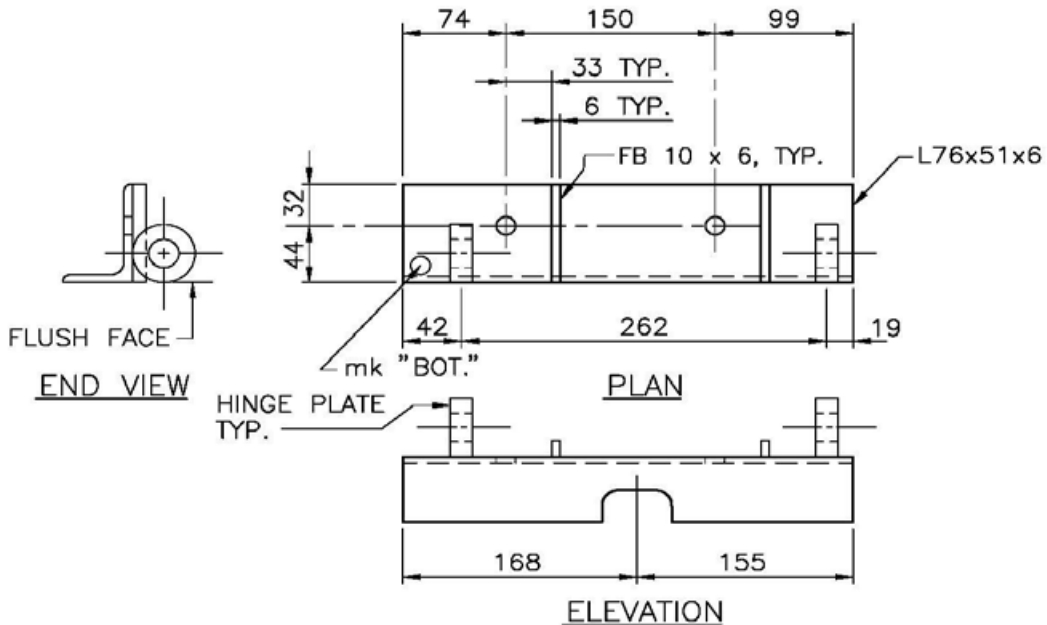
BRITISH COLUMBIA		Ministry of Transportation & Infrastructure		<b>ONE WAY UNGULATE GATE</b> MOUNTING BRACKETS Mk. A & B	
No.	Revision	Date	Approved		SPECIFICATION DRAWING No. <b>SP700-12.6</b>
			Issue Date:		






ONE REQUIRED – ANGLE Mk. C<sup>R</sup> (SHOWN)  
ONE REQUIRED – ANGLE Mk. C<sup>L</sup> (OPP. HAND)

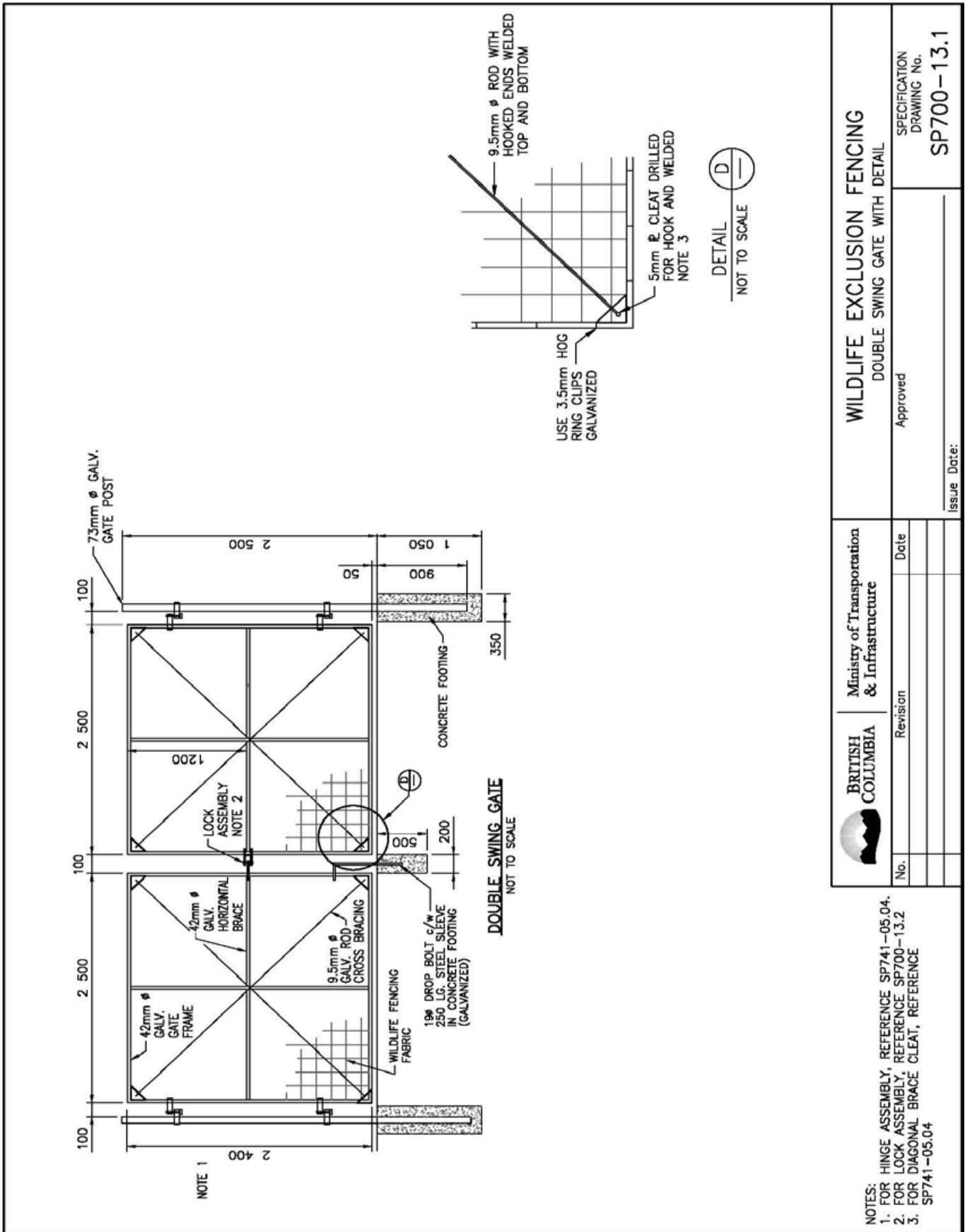
NOT TO SCALE



ONE REQUIRED – ANGLE Mk. D<sup>R</sup> (SHOWN)  
ONE REQUIRED – ANGLE Mk. D<sup>L</sup> (OPP. HAND.)

NOT TO SCALE

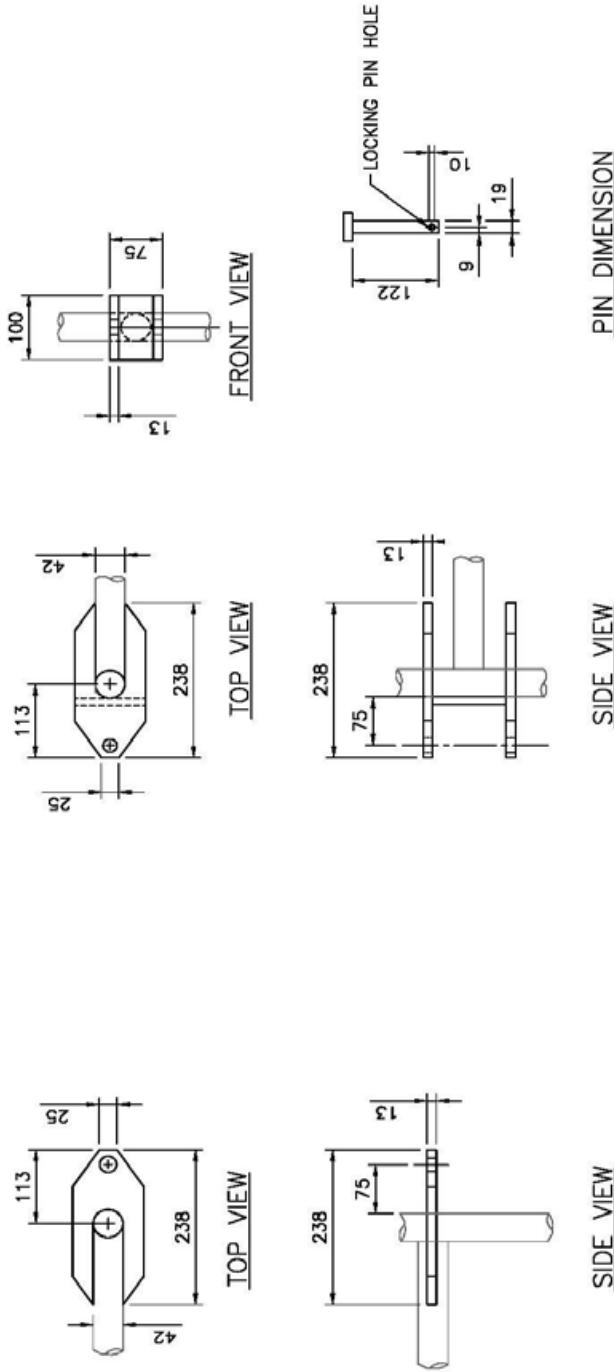
 <b>BRITISH COLUMBIA</b>		Ministry of Transportation & Infrastructure	<b>ONE WAY UNGULATE GATE</b> MOUNTING BRACKETS Mk. C & D	
No.	Revision	Date	Approved	SPECIFICATION DRAWING No. <b>SP700-12.7</b>
			Issue Date:	



- NOTES:
1. FOR HINGE ASSEMBLY, REFERENCE SP741-05.04.
  2. FOR LOCK ASSEMBLY, REFERENCE SP700-13.2
  3. FOR DIAGONAL BRACE CLEAT, REFERENCE SP741-05.04

	Ministry of Transportation & Infrastructure
	Approved
No.	Date
Revision	

WILDLIFE EXCLUSION FENCING DOUBLE SWING GATE WITH DETAIL	SPECIFICATION DRAWING No. SP700-13.1
Issue Date:	




**LOCK ASSEMBLY DETAIL -- LEFT GATE**  
NOT TO SCALE

**LOCK ASSEMBLY DETAIL -- RIGHT GATE**  
NOT TO SCALE

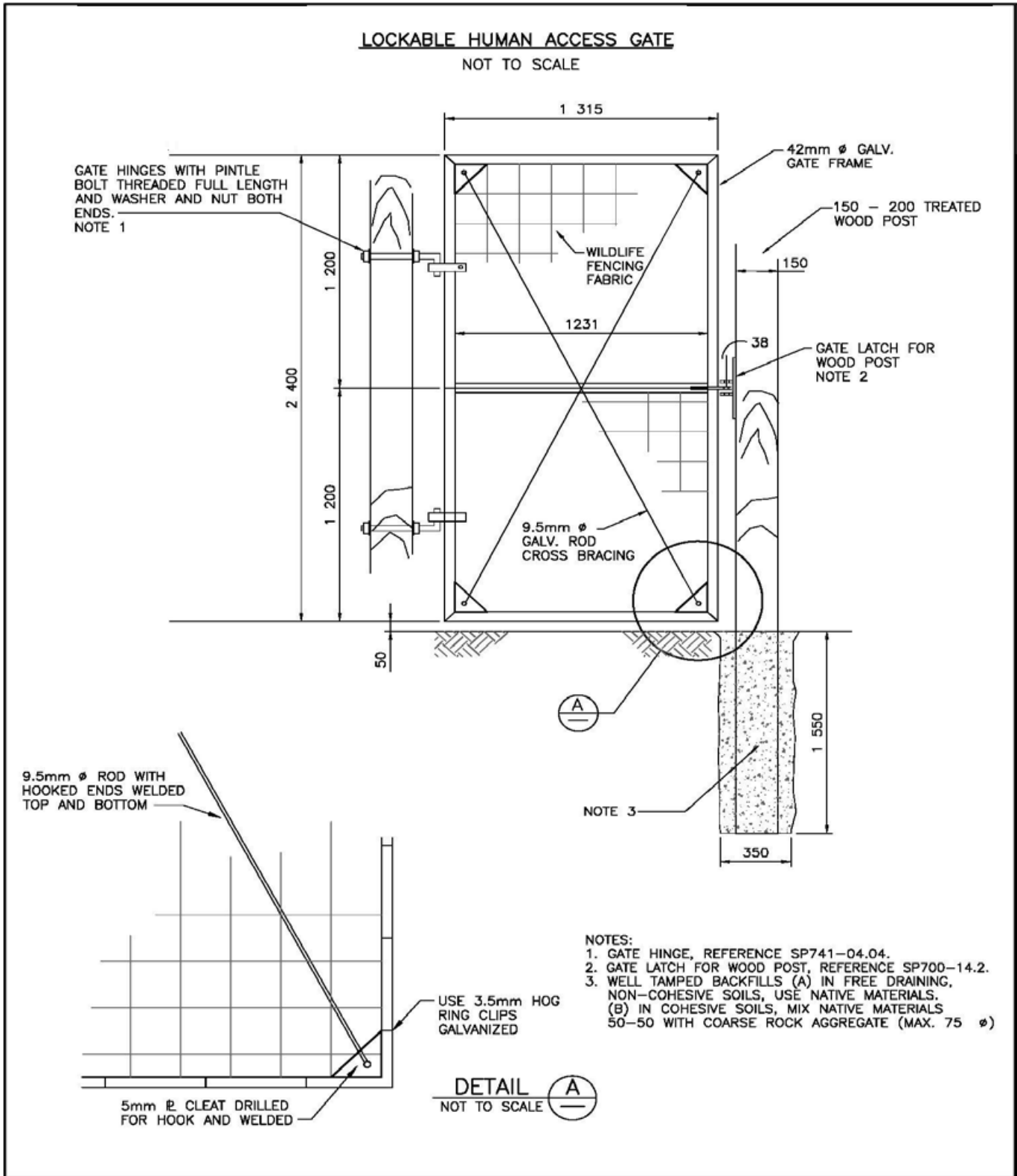
**LOCK MECHANISM DETAIL**

NOTES:  
1. FOR DOUBLE SWING GATE, REFERENCE SP700-13.1.

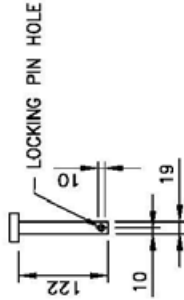
 <b>BRITISH COLUMBIA</b>	Ministry of Transportation & Infrastructure	
	No.	Date
Revision		

**WILDLIFE EXCLUSION FENCING**  
DOUBLE SWING GATE LOCK MECHANISM DETAILS

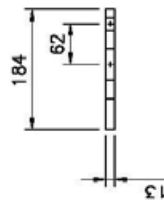
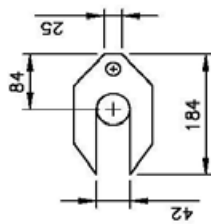
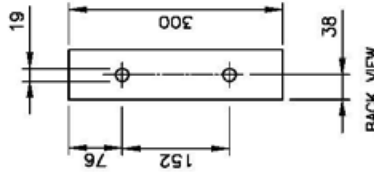
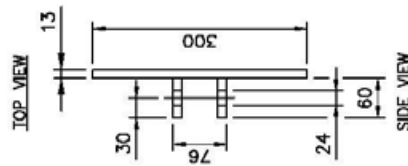
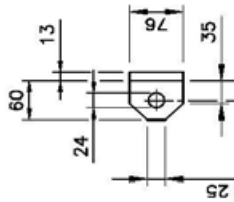
Approved \_\_\_\_\_  
 SPECIFICATION DRAWING No. **SP700-13.2**  
 Issue Date: \_\_\_\_\_



<b>BRITISH COLUMBIA</b>		<b>Ministry of Transportation &amp; Infrastructure</b>	<b>WILDLIFE EXCLUSION FENCING</b> HUMAN ACCESS GATE AND DETAIL	
No.	Revision	Date	Approved	SPECIFICATION DRAWING No. <b>SP700-14.1</b>
			Issue Date:	



PIN DIMENSION



LOCK MECHANISM DETAIL

LOCKING GATE LATCH MECHANISM DETAIL

LOCK ASSEMBLY DETAIL – GATE

NOT TO SCALE

LATCH ASSEMBLY DETAIL – WOOD POST

NOT TO SCALE

NOTES:  
1. FOR HUMAN ACCESS GATE, REFERENCE SP700-14.1

BRITISH COLUMBIA  
Ministry of Transportation & Infrastructure

WILDLIFE EXCLUSION FENCING  
HUMAN ACCESS GATE WOOD POST LOCK ASSEMBLY

No.	Revision	Date

Approved

Issue Date:

SPECIFICATION  
DRAWING No.  
SP700-14.2

## SECTION 741

### FENCE CONSTRUCTION

#### DESCRIPTION

**741.01 Scope** – This Section covers the construction of wire fencing with wood and/or metal posts, gates, wood privacy and noise barrier fencing, and steel sidewalk fencing and, with reference to SS Drawings of the SP741 series, is intended to specify acceptable standards and some optional features as may be required by the Special Provisions.

The types of standard wire and chain link fencing covered by this Section are designated in Table 741-A.

**Table 741-A: Types of Standard Wire and Chain Link Fencing**

<u>Type</u>	<u>Description</u>	<u>SP drawing</u>
<u>A</u>	<u>Special Wire Fabric Fence for use only on railway right-of-way</u>	<u>SP741-01.01</u>
<u>B</u>	<u>Standard Wire Fabric Fence</u>	<u>SP741-01.01</u>
<u>C</u>	<u>Standard Barbed Wire Fence</u>	<u>SP741-02.01</u>
<u>D</u>	<u>Chain Link Fence</u>	<u>SP741-05.01</u>

Note: The requirements for Type C fencing are acceptable to the Provincial Wildlife Branch and the B.C. Cattlemen's Association.

See SS 700 for wildlife exclusion fencing.

#### MATERIALS

**741.10 General** – Steel and wire fence materials including wire fabric, barbed and high-tensile wire, chain link mesh and metal posts and rails are specified in SS 316.

Chain link fabric as protection on rock slopes is covered by SS 207 and SS 316.

All materials shall be supplied by the Contractor unless Ministry-supply is specified in the Special Provisions.

#### **741.11 Treated Wood Materials**

**741.11.01 General** – Wood posts, droppers, and braces shall be supplied by the Contractor in accordance with the requirements of SS 909.

Treated wood products used in fence construction shall meet the requirements of SS 908 as well as the product specific requirements in the following related Standard Specification sections:

- SS 316 Steel and Wire Fence Materials
- SS 700 Wildlife Exclusion Fencing
- SS 909 Treated Wood Fence Posts

#### **741.11.02 Posts**

**(a) Round Wood Post Material** – Treated Round Wood posts shall be prepared from straight peeled Lodgepole Pine or Jack Pine.

**(b) Dimensional Tolerances** – In addition to the requirements in SS 909, treated round wood posts shall have the following dimensions, each within a 2% tolerance:

**(i)** Length as necessary to comply with the applicable SS 741 SP Drawings, for the fence type specified and the soil type encountered;

**(ii)** minimum tip diameter of 150 mm; and

**(iii)** maximum butt diameter of 200 mm.

**(c) Bottom Tapers** – The bottoms of the round wood posts must be tapered to a rounded end for driveability.

**741.11.03 Droppers** – All droppers shall be free from knots and other imperfections injurious to strength.

Droppers shall be:

- 1100 mm ± 25 mm long for 4-wire Type C fences; and
- 1200 mm ± 25 mm for Type C and C2 fences.

Approved proprietary grooved wood droppers with necessary wire clips may be specified or approved by the Ministry Representative for high-tensile smooth-wire fencing.

**Note:** For Type C fencing, proprietary prefabricated galvanized sheet metal and clip droppers may be approved by the Ministry Representative as an alternative to the above wood droppers. Galvanized twisted wire fence stays may be specified or permitted only for the extension of normal fence heights to deer height and the like.

**741.12 Standard Wire Type A, B & C Fences and Gates** – Materials generally shall be in accordance with the requirements set out on SS Drawings SP741-01.01 and SP741-02.01, the relevant subsections of SS 316 and and/or the Special Provisions.

**741.12.01 Gates** – Gates shown on the Drawings shall be of the prefabricated type indicated on SS Drawings SP741-04.04, SP741-04.05 and as specified in SS 316.11 and/or as specified in the Special Provisions.

**741.13 High-tensile Smooth-wire Fences** – Materials to be supplied include:

- high-tensile smooth galvanized wire 2.5 mm nominal diameter
- mechanical wire splices and fasteners for high-tensile wire

- in-line high-tensile wire tensioning devices
- metal or wood droppers for high-tensile fencing.

together with steel posts, gates and hardware, brace wire, dowels, staples and the like in accordance with the relevant subsections of SS 316.

**741.14 Chain Link Type D Fences and Gates** – Chain link mesh, steel pipe and accessory materials generally shall be in accordance with the requirements set out on SS Drawings SP741-05.01 and SP741-05.02, the relevant subsections of SS 316, and/or the Special Provisions.

**741.14.01 Gates** – Gates shown on the Drawings shall be of the type indicated on SS Drawings SP741-05.03 and SP741-05.04 and/or specified by the Special Provisions, and shall be equipped with hinges (or sliding) and locking hardware.

**741.15 Wood Fences** – Materials used for the fabrication and installation of wood fences shall be as follows:

**741.15.01 Concrete Footings** – All concrete used as post anchorage backfill shall be well-consolidated Class C concrete conforming to SS 218 Table 218-A, or a non-shrink grout, minimum compressive strength of 20 MPa at 28 days, approved by the Ministry Representative.

**741.15.02 Lumber** – Rough sawn or dressed, as specified, shall be of Western Red Cedar with:

- Wood posts and stringers of "No. 1 Structural" grade posts and framing or plank
- Boards and planks of "Quality Fencing" grade except where noise barrier fencing is specified for "Select Fencing" or plank equivalent.

**741.15.03 Galvanized steel pipe** – 48 mm OD for privacy fence posts shall conform to the requirements of SS 316.10 with weatherproof caps where open ends are not covered by wood members.

**741.15.04 Steel** – Steel used as posts for noise barrier fences or as wood post supports shall be of the structural shape(s) indicated in accordance with CSA G40.21, Grade 300W and where galvanized, hot dipped to the requirements of ASTM A123.

**741.15.05 Fastenings:** Bolts generally shall conform to ASTM A307, nuts to ASTM A563 Grade A, plain washers to Type A, plate washers, where required, to ASTM A36; all galvanized according to CSA G164. Nails shall be casing headed heavy gauge of appropriate length, hot dip galvanized with deformed shank (annular, barbed or helical) for noise barrier fence plank fixing.

**741.15.06 Finish** – If required, penetrating stain with preservative shall be of type and colour specified in the Contract, and be applied to all surfaces after cutting to size, prior to prefabrication or installation, and on any cuts before final fitment.

## CONSTRUCTION

**741.30 Cutting and Boring Treated Wood Products** – No cutting of pressure treated wood posts will be permitted without authorization of the Ministry Representative.

**741.30.01 Cut at Top** – When cutting is authorized, the cut must be only at the top of the round wood post.

**741.30.01 Treatment** – All cuts, borings and superficial damage shall be treated immediately with a preservative in accordance with SS 908.

**741.31 Provision of Fencing** – Fencing of the type(s) called for shall be carried out at the locations and as shown on the Drawings with the materials to the height, spacing and with accessories all in accordance with the details indicated on the Drawings, Standard Specifications, Special Provisions and SP Drawings or to the direction of the Ministry Representative.

All material shall be supplied by the Contractor except where supply in whole or in part by the Ministry f.o.b. the Contractor's job site yard or Ministry's yard is specified.

Construction shall be carried out with all labour, tools, equipment and incidentals supplied by the Contractor, as necessary, to complete all fencing work in accordance with good work practice.

**741.32 Clearing & Grading** – All trees (other than any required by the Ministry Representative to remain), all brush and other obstacles which interfere with the construction and maintenance of fencing and not removed by the normal clearing operations, shall be removed prior to commencing fencing work so that both sides of the fence line are free of all clearing and grubbing debris.

The cleared and graded area must be a minimum of 3 m wide on each side of the fence to permit access for fence repairs and maintenance, unless a lesser width is permitted by the Ministry Representative. The graded area shall have a 2-5% cross-fall towards the open side of the slope to provide drainage. No fill shall be placed in any drainage path that crosses the fence line.

The ground line for the fence should be smooth and continuous for a minimum of 1 m on both sides of the fence. Minor ground undulations shall be corrected to obtain a smooth uniform grade, but appreciable grade depressions may be backfilled only with the permission of the Ministry Representative.

The site shall be left in a smooth and tidy condition.

**741.33 Setting Out and Connections to Existing** – Fence line, as shown on the Drawings, generally will be along the right-of-way boundary. Where undergrowth clearing is carried out to the right-of-way boundary, the fence line will be offset 0.5 m in from the boundary.

Post installation in fill material or minimum overburden shall be carried out to the Ministry Representative's directions. Where it is not possible to drive or set wood posts to proper

depth or to relocate same along the fence line, steel fence posts as specified or, where permitted, multiple wood post and brace assemblies shall be substituted.

Existing cross fences shall be connected to new with posts and braces for tensioning fencing wire in every direction in accordance with SS Drawings SP741-01.03 and SP741-02.02.

#### 741.34 Standard Wire Type A, B & C Fences and Gates

**741.34.01 Post Installation** – Fence posts shall be driven in place with equipment acceptable to the Ministry Representative, set in augered pilot holes or, where permitted by the Ministry Representative, set in dug holes with necessary well tamped backfill for a firm installation and post penetration to at least the depth indicated on SS Drawings SP741-01.01 and SP741-02.01.

On straight alignments all posts shall be plumb. On appreciable grades, posts shall be installed perpendicular to the slope.

On curved alignments, the posts shall be set 50 mm off plumb away from the curve centre, with a post spacing in accordance with SS Drawing SP741-04.02 and increased post lengths and bury depth for post stability where necessary.

Gate post sizes and stabilizing shall be as required by the Special Provisions and/or SS Drawing SP741-04.04.

Steel fence posts, as specified by SS 316.09, are required on exposed rock or rock with "minimum overburden" (as defined on SS Drawing SP741-04.01) and shall be driven and/or wedged to the full depth in a vertical drilled hole of minimum diameter or set plumb and rigid in cement and sand or fine aggregate mortar all as indicated by SS Drawing SP741-04.01.

**Note:** Assemblies of securely wire tied multiple wood posts/braces may be specified or permitted by the Ministry Representative especially for minor rock outcropping and unforeseen minimum overburden occurrences.

When full bury depth of wood posts is not attainable, the specified steel fence posts shall be used to the full penetration into rock, all as indicated on SS Drawing SP741-04.01.

Tops of all posts shall be set to a uniform 50 mm above the level of the top wire of fencing and, where necessary, cut to line-up in vertical uniformity after inspection by the Ministry Representative. Wood post tops where cut, shall be bevelled and preservative treated in two heavy applications.

Wood posts which are burred, split or otherwise damaged from the installation, and which are not acceptable to the Ministry Representative shall be replaced at the Contractor's expense.

**741.34.02 Bracing for Fence Tensioning** – Braces of treated wood and twisted galvanized diagonal wire shall be installed between end posts and adjoining panel posts to stabilize the tensioning of the fencing fabric and/or barbed wire, all as indicated by SS Drawings SP741-01.03 and SP741-02.03.

Corner and intersection assemblies shall be similarly tensioned in each fence direction.

Intermediate tensioning assemblies shall be provided within the maximum spacings indicated on SS Drawings SP741-01.02 and SP741-02.02 to make use of rolls of fabric etc. of standard length with a minimum of cutting and waste.

Steel corner, intersection and intermediate tensioning assemblies with steel angle posts and diagonal bracing are indicated on SS Drawing SP741-04.01.

Horizontal alignment changes over 30° with wood posts and over 15° with steel posts shall be stabilized as for corners above. Where a change is less than 30° with wood posts, a pair of line posts, set 2.4 m or 3.0 m apart, shall be stabilized with a horizontal wood brace and diagonal wire bracing both ways. For a change of less than 15° with steel posts, a steel line post at the change shall be stabilized in both directions with diagonal steel braces to adjoining line posts as indicated on SS Drawing SP741-04.01.

Similar requirements shall be maintained at each change to or within any curved fence alignment where the closer post spacing indicated by SS Drawing SP741-04.02 is not considered adequate.

**Note:** The previous requirements for alignment changes may be waived by the Ministry Representative wherever, from consideration of the soil conditions, the Ministry Representative directs that the stability and strength of the fence is not likely to be appreciably lessened by such change of alignment.

Vertical alignment changes shall be stabilized, and fence requirements at ditch and gully conditions shall be as called for by SS Drawing SP741-04.03 or as the Ministry Representative may direct.

**741.34.03 Fabric and Wire** – Fence fabric shall normally be installed on the side of the posts away from the highway, stretched between end type assemblies and intermediate tensioning assemblies with proper equipment (tensioning directly by truck or tractor will not normally be permitted) and securely stapled in accordance with good practice to wood posts, as indicated by SS Drawing SP741-01.01, or securely wired or clipped to steel posts to permit free wire movement on line posts. Similarly, barbed wire shall be installed so as to allow it to "prestretch" before final tensioning, and shall be securely stapled to tensioning assemblies.

For fencing on a curve requiring the fabric and/or barbed wire on the highway side of the posts, all line wires shall be double stapled and the top wire shall be securely wire tied to posts in addition where the adjoining property has livestock.

Barbed wire Type C fences shall normally have wood droppers "interwoven" and securely figure-of-eight wire tied to every line wire, as indicated by SS Drawing SP741-02.01. Alternatively, proprietary galvanized sheet metal prefabricated droppers of pre-approved design for secure clip-on application may be approved.



**Note:** High livestock pressures may warrant Type C1 fencing and nursery livestock enclosures Type C1 or B fencing. Where such fences, 1200 mm and higher, are in wildlife sensitive areas, the top strand may be specified smooth (barbless) as Type C2 or B1 fences.

**741.34.04 Gates** – Hardware, of design to permit the gate to operate correctly, shall be securely attached to prevent the easy removal of the gate and hardware. Hinges shall be installed to permit the gate to swing back one-way against the fence. Locking hardware shall be of the type specified.

**741.35 High-tensile Smooth-wire Fences** – For rangeland and other locations with favourable terrain, soil conditions and fence alignment at the locations indicated on Drawings, construct high-tensile smooth-wire fencing between rigid end, gates, corner and any necessary intermediate tensioning assemblies in general accordance with SS Drawings SP741-03.01 through SP741-03.03.

**741.35.01 Fence Style** – Fence style for wildlife crossing areas shall comprise 5 wires, the bottom wire for installation at 250 mm ± 50 mm above grade at and between posts, the next two wires at 200 mm spacing and the top two 225 mm for a total height of 1100 mm, as indicated by SS Drawing SP741-03.01 for HT Fences. Elsewhere, and for nursery livestock enclosures and other areas of high livestock pressure, a 6-wire fence may be specified, having the bottom wire 200 mm ± 50 mm above grade at and between posts with the remaining wires at 200 mm spacing for a total height of 1200 mm indicated as HT-1 Fences.

**741.35.02 Post and Brace Installation** – Fence posts shall be driven in place with equipment acceptable to the Ministry Representative and set out in general accordance with the recommendations of the [B.C. Ministry of Agriculture “BC Agricultural Fencing Handbook”](#), good local trade practice and to the Ministry Representative's direction.

Terminal (end and gate) tensioning assemblies and any intermediate assemblies shall be "single" assemblies and at the spacings and post bury depths indicated by SS Drawing SP741-03.02 (or such greater depths and/or decreased spacings as may be directed by Ministry Representative) with "double" assemblies used with scant bury depths all to form rigid, stable and accurately aligned assemblies for tensioning line wires.

Line posts 100 mm minimum diameter driven to a depth of not less than 650 mm in firm soil, or as otherwise required by SS Drawing SP741-03.01, or directed, shall be spaced up to a maximum of 15 m where permitted, but normally at 10 m spacing and such closer spacing at changes in horizontal and vertical alignments to keep the bottom wire at the regular specified ground clearance.

**741.35.03 Wire and Dropper Installation** – Wires shall be installed on the side of the fence posts away from the highway except on such curves requiring the wires on the highway side so as to bear on the posts.

Stapling doubled at curves, etc. and mechanical fasteners at tied-off ends and splices (where permitted) shall be to [BC Ministry of Agriculture](#) recommended practice.

With supplied tensioning devices installed in each line, all wires shall be individually tensioned in stages and after "wire-set" to 1.33 kN (300 lbs) at completion.

Droppers, as supplied, shall be installed and securely clipped to all line wires at 3 to 4 m spacing.

#### 741.36 Chain Link Type D Fences and Gates

##### 741.36.01 Post and Rail Installation

- (a) All terminal posts (posts at ends, gates, corners and intersections), all line posts and any intermediate tensioning posts shall be set plumb into concrete footings in augered or dug holes to the depths and regular spacing all as shown on SS Drawing SP741-05.01, or as otherwise specified or directed.
- (b) Gate post sizes and stabilizing shall be as required by the Special Provisions and/or SS Drawing SP741-05.03.
- (c) On exposed rock, posts shall be set without concrete footings to full depth and fully grouted in holes, 25 mm greater than the pipe diameter, drilled to a depth into solid rock of half the depth of pipe bury to that indicated for concrete footings on Drawing SP741-05.01 (i.e. c/2 and f/2)

Grout shall be non-shrink cement and sand mortar. Standard length posts may be used where the overburden depth is such that the depth of bury into solid rock is less than that specified above, provided normal diameter concrete footings of the diameter indicated on SS Drawing SP741-05.01 are formed from solid rock to grade level. Similarly, form concrete footings for posts set in loose or friable rock. Sleeves shall be provided to form holes similar in diameter and depth to above for casting into concrete where shown or specified.

- (d) Tops of all posts shall be set or cut for an even height of top rail, which shall form a continuous brace and mesh support between terminal posts and any intermediate tensioning posts. Top rails shall pass through line post caps and be joined in the length with internal sleeves to allow expansion and contraction. All posts shall be fitted with appropriate weathertight caps securely fixed.

**741.36.02 Bracing for Fence Tensioning** – Bottom tension wire shall be securely fixed taut and sag free to terminal posts and any intermediate tensioning posts. Similarly, provide top tension wire, when specified, in place of top rail to pass through line post tops except on uneven terrain where the height of the top tension wire shall be such that it is secured to all line posts and the mesh within the top 300 mm of the mesh.

Terminal posts, where more than 10 m apart in any fence run, shall have horizontal pipe braces to adjoining line posts. Diagonal pipe braces may be called for where soil conditions

warrant, especially where fencing without top rails is specified, but no pipe bracing is normally required for residential height fences.

Intermediate tensioning assemblies shall be provided where terminal posts are more than 150 m apart, and at any subsequent 150 m maximum spacing, to consist of a straining post (to full height of fence where barbed wire on extension arms is specified) with horizontal pipe braces at the mid to two-thirds height above grade to adjoining line posts each way for the discontinuity of top rail, tension and/or barbed wire and mesh; provide similar tensioning assembly at abrupt vertical alignment changes.

Horizontal alignment changes where abrupt shall be considered as corners.

At changes in horizontal alignment and to curved fence alignments, where the top rail can be continuous by accurately bending to proper curvature without damage to the galvanized coating, a pair of line posts shall be stabilized and tensioned as follows:

- (a) A horizontal pipe brace shall be securely fixed to adjoining line posts at the two-thirds height above grade.
- (b) Crossed diagonal wire braces shall each be two strands of 3.5 mm nominal diameter galvanized wire securely fixed to the brace band fixing of the horizontal brace and to a brace band 100 mm above grade.
- (c) Each pair of wires shall be twisted taut to mutually stabilize the assembly with the tensioning battens left in place.

Similar requirements shall be maintained within any curved fence alignment over 30 m in length.

**Note:** The previous requirements may be waived by the Ministry Representative wherever the Ministry Representative directs that, from consideration of the soil conditions and footing sizes, especially where with continuous top rail, the stability and strength of the fence is not likely to be appreciably lessened by the change in alignment.

Fencing where continuous over a creek or ditch shall be stabilized with a horizontal pipe brace and diagonal brace wires as specified above, and the bottom tension wire shall be wire tied to a similar pipe brace. In addition, in-fill under where specified or required, shall be a hanging or rigidly fixed bent pipe of brace diameter hung or in-filled with closely spaced barbed wire or suitable fence fabric (similar to that indicated on SS Drawing SP741-04.03), all to the Ministry Representative's direction.

**741.36.03 Fabric and Wire** – Chain link fencing mesh shall be stretched between terminal posts and any intermediate tensioning posts with proper equipment (tensioning directly by truck or tractor will not normally be permitted), and secured with tension bars and bands, tie wire and clips all in accordance with the requirements shown on Drawing

SP741.05.02. The mesh shall be installed on the highway side of the fence posts, or as otherwise specified or directed, and joints in the length shall be made by weaving the meshes together with a single wire picket to form a neat continuous fabric mesh.

Security barbed wire, where specified, shall be installed in the slots of all extension arms and secured to extended height terminal and any intermediate tensioning posts taut and free of sag.

**741.36.04 Gates** – Hardware, of design to permit the gate to operate correctly, shall be securely attached to prevent the easy removal of the gate and hardware. Hinged gates shall be installed to permit the gate to swing back one-way against the fence.

#### 741.37 Wood Fences

**741.37.01 Privacy Fences** – Galvanized pipe posts shall be set plumb in concrete footings in augered or dug holes to the depth and regular spacing all as shown on Drawing SP741-06.02.

Wood fixing members for fence panels shall be securely nailed, "II-shaped" frames fixed and supported with 9.5 mm (3/8") galvanized bolts and nuts to pipe posts all as indicated on SS Drawing SP741-06.01.

Metal fixing members for fence panels, when specified, shall be of named or otherwise pre-approved proprietary brand or detailed formed metal channel and strap, bolted on around pipe posts and securely machine screwed and tapped at the correct levels all as indicated on SS Drawing SP741-06.03.

Fence panels of boards and stringers prestained, if specified, shall be prefabricated to the required design, as indicated by the Contract Drawings, Special Provisions and/or SS Drawings SP741-06.01 through SP741-06.03, and shall be accurately fitted and securely nailed to fixing members on steel posts to form uniformly level and/or stepped fencing.

**741.37.02 Noise Barrier Fences** – Posts of indicated type, size and length shall be set plumb in concrete footings in augered or dug holes to the depth and regular spacing all as shown on the Contract Drawings.

Stringers, to bear full width of post at each end of "alternating" or "zig zag" (on plan) panels, shall be securely bolted with large washers behind head and nut.

Planking shall be firmly secured to stringers with deformed shank nails to form close butted and battened or tightly overlapped vertical planked panels. All gaps, especially at bottom, shall not exceed 1% of the total area of the fencing. Ends of panels shall be closed over the gap between stringer and post with return plank material.

**741.38 Steel Sidewalk Fencing** – Steel sidewalk fence and bicyclist sidewalk fencing shall be installed in accordance with SS Drawings SP741-07.01, SP741-07.02 and SP741-07.03 as applicable.

741.39 Touch-up of Galvanized Coatings – Touch-up treatment for damaged galvanizing of steel posts and braces shall be with two heavy coats of zinc rich paint selected from the Ministry’s Recognized Products List under the category of “Additional Paint Coatings – Zinc-Rich Touch-up Paints and Primers.

#### MEASUREMENT

**741.81 Fencing** – Fencing will be measured by the LINEAR METRE. Measurements will be made parallel to the ground line of complete fencing, including any tensioning assemblies, but excluding gate openings.

**741.82 Gates and Cattleguards** – Gates and cattleguards will be measured by the unit for EACH type and size furnished and/or installed complete in place.

#### PAYMENT

**741.91 Fencing** – Payment for FENCING will be at the Contract Unit Price per metre of complete fencing, including any tensioning assemblies, but excluding gate openings.

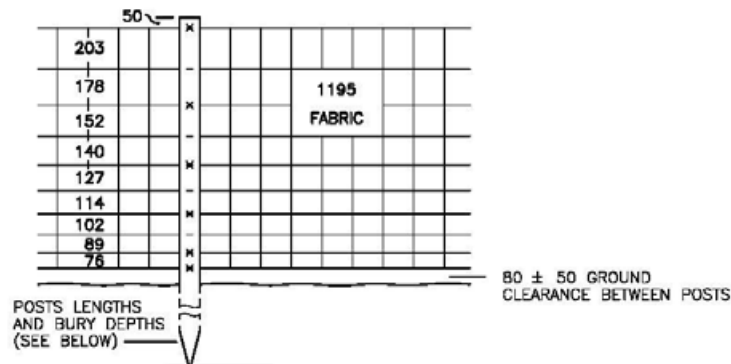
The Contract Unit Price(s) shall be accepted as full compensation for furnishing all material and/or taking delivery of Ministry supplied material; as and where noted, all labour, tools, equipment and incidentals to complete the required installation, including the clearing of any additional right of way, construction of temporary fencing, connection to existing fences and structures, and final clean up; but excluding any work as may be required to be separately paid for, such as the extra cost of extensive fencing on rock at the contract or agreed price for each hole drilled for metal posts.

**741.92 Gates and Cattleguards** – Payment for GATES and CATTLEGUARDS will be at the Contract Unit Price for each type and size furnished and/or installed complete in place.

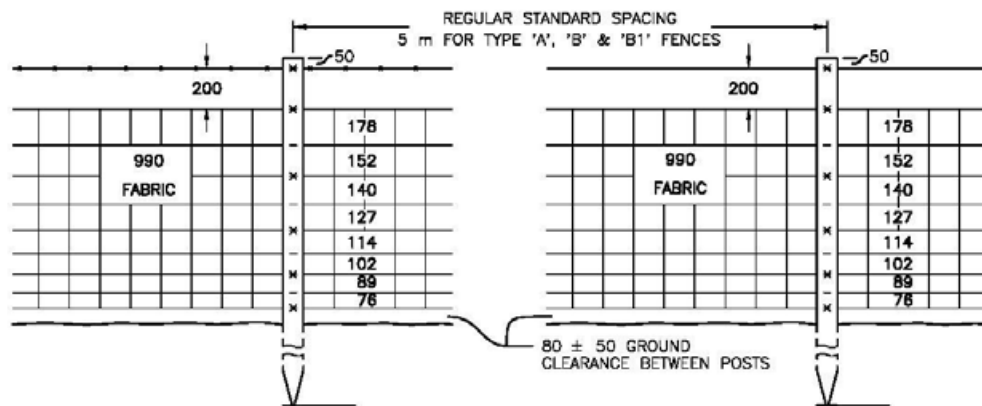
**741.93 Steel Sidewalk Fencing** – Payment for steel sidewalk fence and bicyclist sidewalk fencing will be at the Contract Unit Price per metre of complete fencing.

TYPE A, B & B1 STANDARD WIRE FENCE

SP741-01.01



**TYPE 'A' FENCE 10476**  
(RAILWAY RIGHT OF WAY)



**\* TYPE 'B' FENCE 9396**  
(HIGHWAY)

**TYPE 'B1' FENCE 9396**  
(HIGHWAY - WILD-LIFE SENSITIVE AREAS)

**\* USE OF TYPE 'B' FENCE REQUIRES A REVIEW BY THE CHIEF ENVIRONMENTAL OFFICER AND WRITTEN APPROVAL MUST BE RECEIVED PRIOR TO INSTALLATION.**

**NOTES:**

1. FENCE CONSTRUCTION SHALL BE IN ACCORDANCE WITH SECTION 741 OR AS OTHERWISE SPECIFIED OR REQUIRED.
2. PRESSURE TREATED WOOD POST AND BRACE MATERIAL AS SPECIFIED IN SECTION 909
3. DOUBLE STRANDED GALVANIZED BARBED WIRE AS SPECIFIED BY ASTM A 121 AND SUBSECTION 316.06 FOR TYPE 'B' FENCE.
4. SINGLE STRAND HIGH-TENSILE WIRE AS SPECIFIED IN SUBSECTION 316.07 FOR TYPE 'B1' FENCE.
5. WIRE FABRIC AS SPECIFIED BY ASTM A 116 AND SUBSECTION 316.03
6. TYPE 'A' - HEAVY FARM-FIELD GALVANIZED WIRE FABRIC 1195 mm HIGH STYLE 10.47.6.
7. TYPE 'B' - HEAVY FARM-FIELD GALVANIZED WIRE FABRIC 990 mm HIGH STYLE 9.39.6.
8. STAPLES: 45 mm LONG OF 3.75 mm NOMINAL DIAMETER GALVANIZED WIRE TO EVERY LINE OF BARBED AND SMOOTH WIRE AND ALTERNATE LINE WIRE OF FABRIC FENCING AS INDICATED.
9. LINE POSTS: 100 mm MINIMUM DIAMETER, POINTED FOR DRIVING, SET PLUMB AND FIRM.
 

BURY DEPTH (mm)	POST LENGTH (m)
STANDARD 850	2.2
PEAT SOIL 1050	2.4
10. ROCK, SHALE AND FRIABLE ROCK CONDITIONS WARRANT METAL POSTS - SEE SP741-04.01 FOR MINOR ROCK OUTCROPPINGS AND UNFORESEEN MINIMUM OVERBURDEN OCCURENCES, WIRE TIED MULTIPLE WOOD POST/BRACE ASSEMBLIES MAY BE PERMITTED BY THE MINISTRY REPRESENTATIVE.

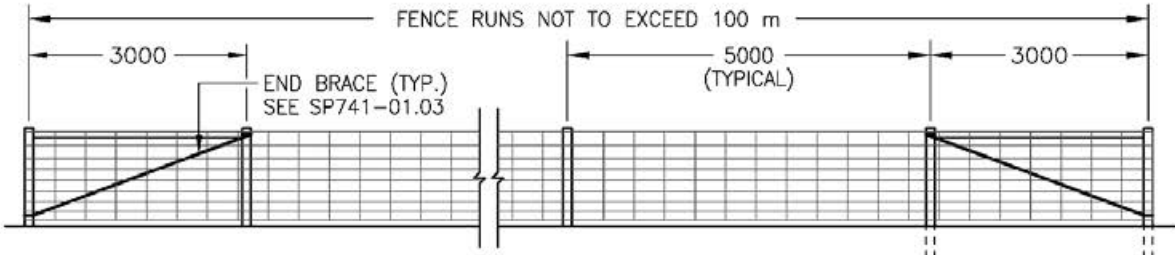
NOT TO SCALE  
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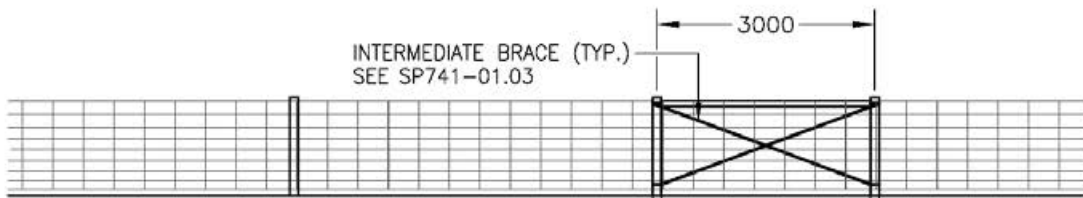
TYPE A, B & B1 FENCE STABILIZATION REQUIREMENTS

SP741-01.02



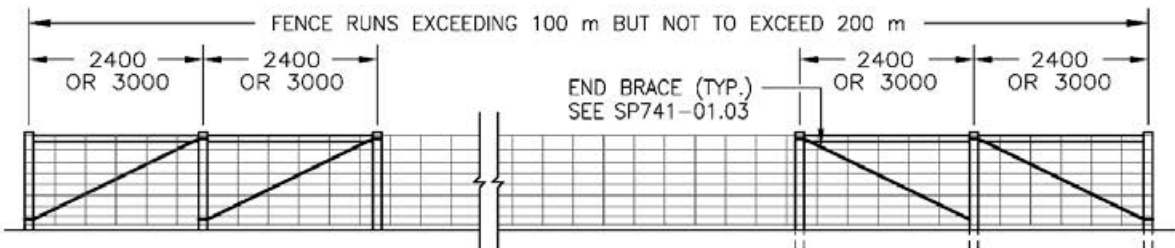
**END CONDITIONS**  
(CORNER AND INTERSECTION ASSEMBLIES SIMILAR)

BURY DEPTH  
SEE SP741-01.03



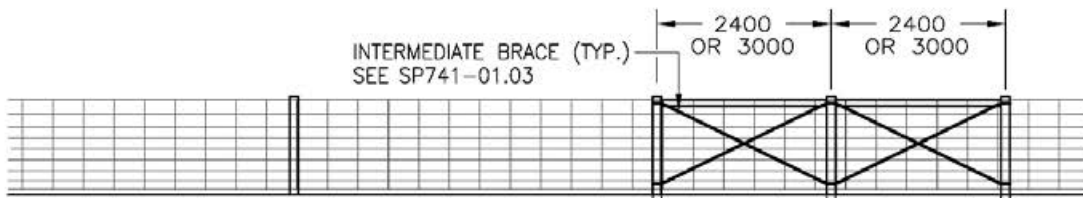
**BRACE PANEL(S)**  
(INTERMEDIATE TENSIONING  
AT NOT EXCEEDING 100 m SPACING)

BURY DEPTH  
SEE SP741-01.03



**ALTERNATIVE**

BURY DEPTH  
SEE SP741-01.03



**STRAINING PANEL(S)**  
(INTERMEDIATE TENSIONING  
AT NOT EXCEEDING 200 m SPACING)

BURY DEPTH  
SEE SP741-01.03

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

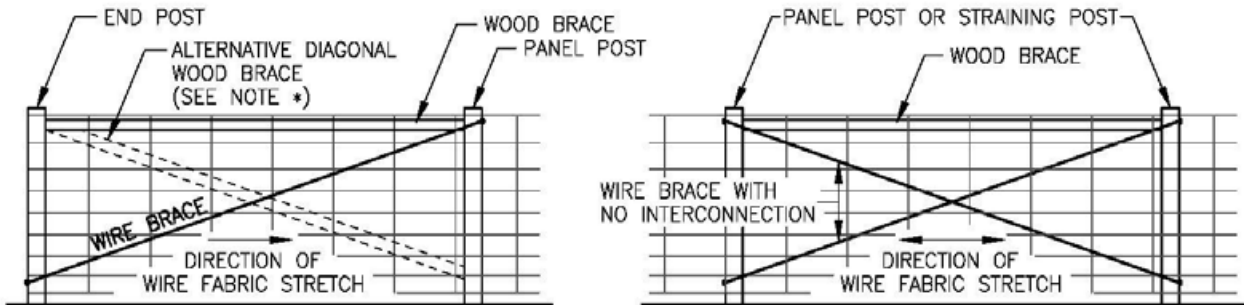


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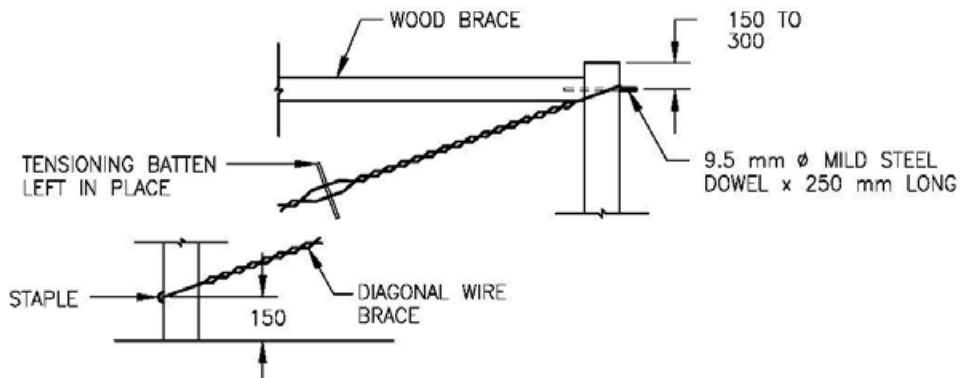
TYPE A, B & B1 FENCE STABILIZATION REQUIREMENTS

SP741-01.03



**END BRACE**  
(BASIC END TENSIONING PANEL)

**INTERMEDIATE BRACE**  
(BASIC INTERMEDIATE TENSIONING PANEL)



**WOOD AND WIRE BRACE DETAIL**

GENERAL NOTES:

WIRE FABRIC ROLL LENGTH 100 m.

STRAINING PANELS AND/OR BRACE PANELS ARE REQUIRED FOR TENSIONING FABRIC AND AT SIGNIFICANT CHANGES IN FENCE ALIGNMENT.

POST SIZES: ALL POSTS - 120 mm (MIN.) DIAMETER EXCEPT:  
LINE POSTS - 100 mm (MIN.) DIAMETER  
CORNER POSTS - 140 mm (MIN.) DIAMETER

POST LENGTH: ALL POSTS TO BE THE SPECIFIED LINE POST LENGTH (SEE SP741-01.01) PLUS 400mm FOR THE STABILIZING INCREASED DEPTH OF BURY.

BURY DEPTH: DEPTH OF END AND PANEL POSTS NORMALLY NOT LESS THAN 1200 mm. WHERE 1200 mm NOT ATTAINABLE BUT EXCEEDING 900 mm, USE DOUBLE TENSIONING STRAINING PANEL ASSEMBLIES AT NOT EXCEEDING 200 m SPACING. GREATER MINIMUMS ARE REQUIRED FOR PEAT SOILS, ETC.

POST SPACING AND WOOD BRACES:

WOOD BRACE	SIZE	LENGTH	POST SPACING APPROXIMATE
HORIZONTAL	80 mm	2.4 m	2.5 m
HORIZONTAL	100 mm	3.0 m	3.1 m
* DIAGONAL	100 mm	3.0 m	2.9 m

- \* NOTE: SOFT, MARSH AND/OR PEAT SOIL CONDITIONS MAY WARRANT DIAGONAL WOOD BRACES IN PLACE OF HORIZONTALS IN ADDITION TO THE LONGER POSTS.
- NOTE: ROCK, SHALE OR FRIABLE ROCK CONDITIONS SEE SP741-04.01 FOR METAL POSTS AND BRACES.
- WIRE BRACES: 2 STRANDS OF 3.75 mm NOMINAL DIAMETER GALVANIZED WIRE WITH LOOPED ENDS AROUND DOWEL AND STAPLED TO POSTS - TWISTED TAUT ONE WAY OR

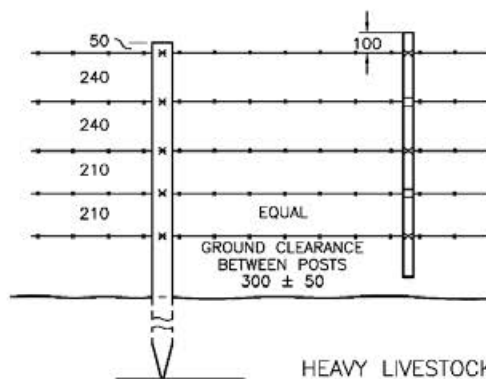
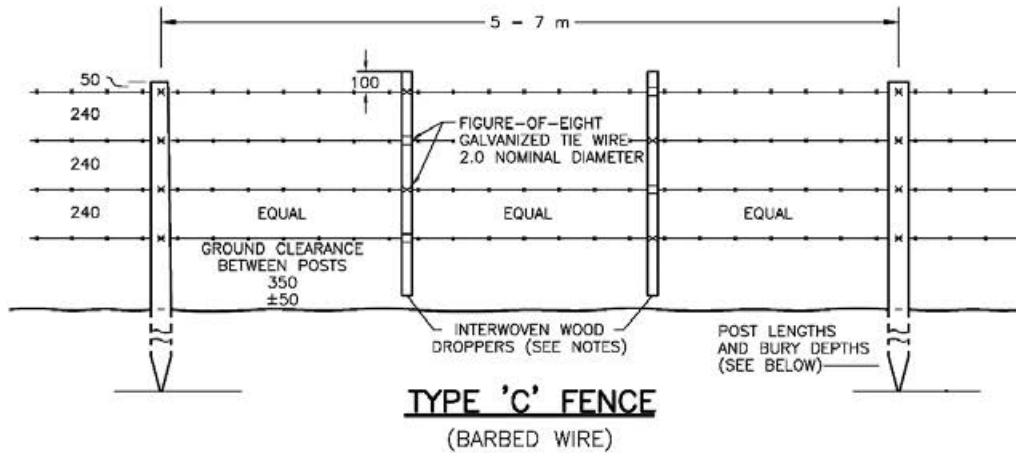
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ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



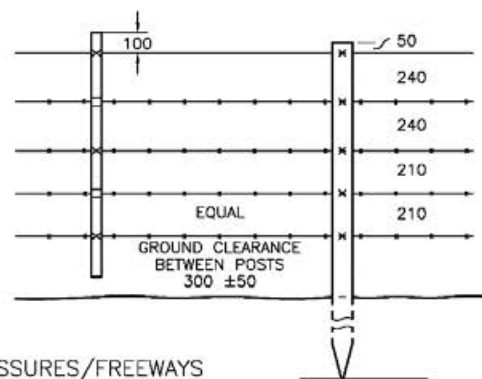
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& Infrastructure

TYPE C, C1, & C2 STANDARD WIRE FENCE

SP741-02.01



**TYPE 'C1' FENCE**  
(BARBED WIRE)



**TYPE 'C2' FENCE**  
(WILD-LIFE SENSITIVE AREAS)

**NOTES:**

1. FENCE CONSTRUCTION SHALL BE IN ACCORDANCE WITH SECTION 741 OR AS OTHERWISE SPECIFIED OR REQUIRED.
2. PRESSURE TREATED WOOD POST AND BRACE MATERIAL AS SPECIFIED IN SECTION 909.
3. DOUBLE STRANDED GALVANIZED BARBED WIRE AS SPECIFIED BY ASTM A 121 AND SUBSECTION 316.06 FOR TYPE 'C' & 'C1' FENCE.
4. SINGLE STRAND HIGH-TENSILE WIRE AS SPECIFIED IN SUBSECTION 316.07 FOR TYPE 'C2' FENCE.
5. STAPLES: 45 mm LONG OF 3.5 mm NOMINAL DIAMETER GALVANIZED WIRE TO EVERY LINE OF BARBED AND SMOOTH WIRE.
6. DROPPERS: WOOD 50 mm DIAMETER OR OTHER ALTERNATIVE SPECIFIED BY SUBSECTION 909.08.
7. LINE POSTS: 100 mm MINIMUM DIAMETER POINTED FOR DRIVING SET PLUMB AND FIRM.

BURY DEPTH (mm)	POST LENGTH (m)	
	TYPE 'C'	TYPE 'C1' & 'C2'
STANDARD 850	2.0	2.1
PEAT SOIL 1050	2.2	2.3

8. ROCK, SHALE AND FRIABLE ROCK CONDITIONS WARRANT METAL POSTS - SEE SP741-04.01 FOR MINOR ROCK OUTCROPPINGS AND UNFORESEEN MINIMUM OVERBURDEN OCCURENCES, WIRE TIED MULTIPLE WOOD POST/BRACE ASSEMBLIES MAY BE PERMITTED BY THE MINISTRY REPRESENTATIVE.

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

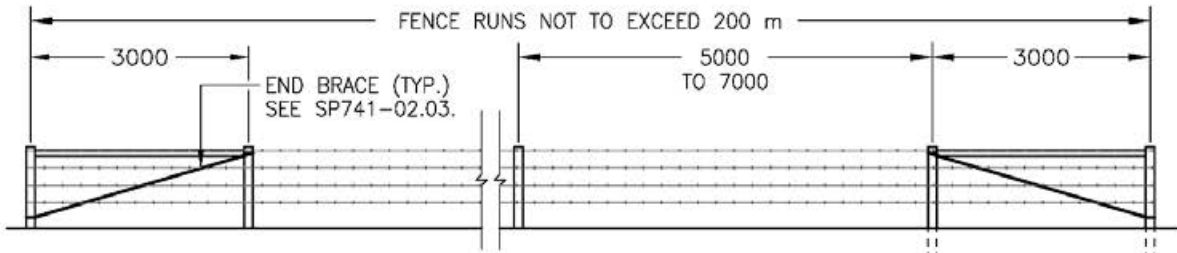


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TYPE C, C1 & C2 FENCE STABILIZATION REQUIREMENTS

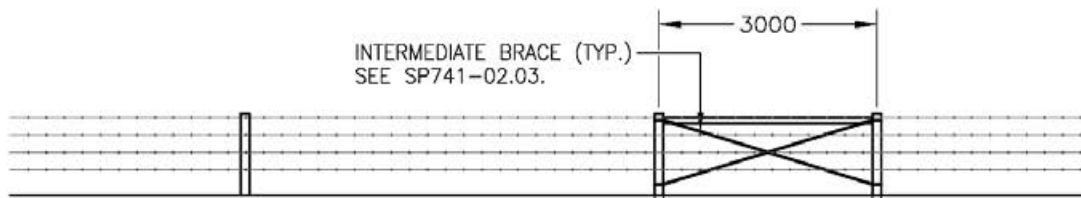
SP741-02.02



**END CONDITIONS**

(CORNER AND INTERSECTION ASSEMBLIES SIMILAR)

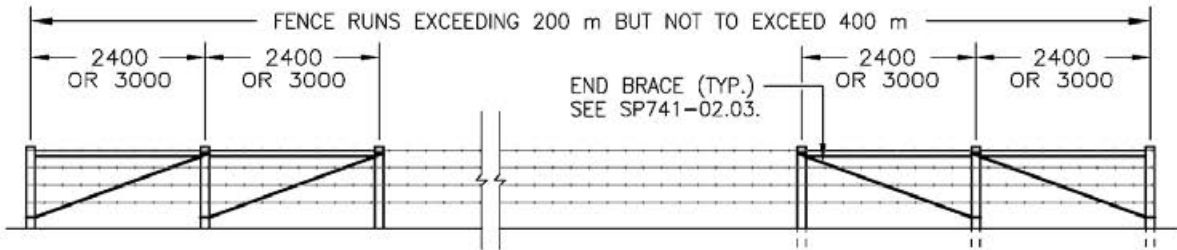
BURY DEPTH  
SEE SP741-02.03.



**BRACE PANEL(S)**

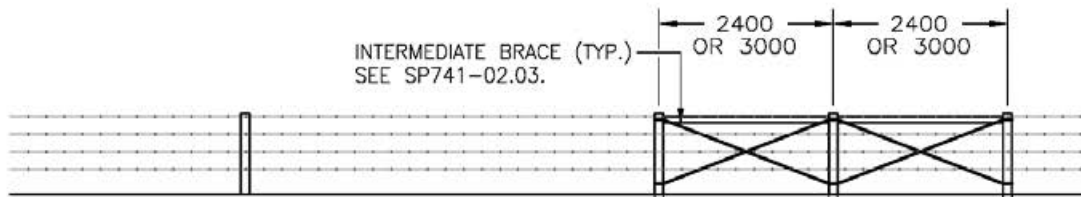
(INTERMEDIATE TENSIONING  
AT NOT EXCEEDING 200 m SPACING)

BURY DEPTH  
SEE SP741-02.03.



**ALTERNATIVE**

BURY DEPTH  
SEE SP741-02.03.



**STRAINING PANEL(S)**

(INTERMEDIATE TENSIONING  
AT NOT EXCEEDING 400 m SPACING)

BURY DEPTH  
SEE SP741-02.03.

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



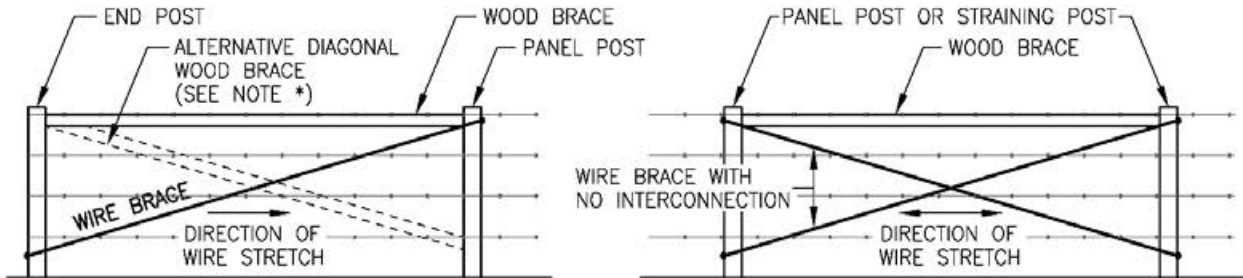
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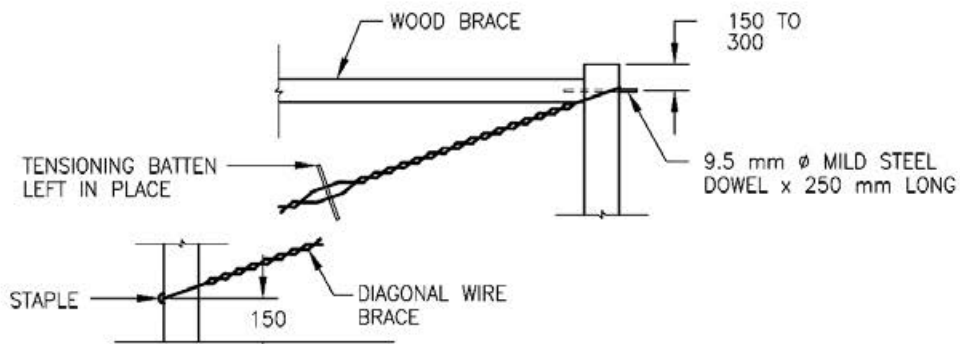
TYPE C, C1 & C2 FENCE STABILIZATION REQUIREMENTS

SP741-02.03



**END BRACE**  
(BASIC END TENSIONING PANEL)

**INTERMEDIATE BRACE**  
(BASIC INTERMEDIATE TENSIONING PANEL)



**WOOD AND WIRE BRACE DETAIL**

**GENERAL NOTES:**

BARBED WIRE SPOOL LENGTH 400 m.

STRAINING PANELS AND/OR BRACE PANELS ARE REQUIRED FOR TENSIONING WIRE AND AT SIGNIFICANT CHANGES IN FENCE ALIGNMENT.

POST SIZES: ALL POSTS - 120 mm (MIN.) DIAMETER EXCEPT:  
 LINE POSTS - 100 mm (MIN.) DIAMETER  
 CORNER POSTS - 140 mm (MIN.) DIAMETER

POST LENGTH: ALL POSTS TO BE THE SPECIFIED LINE POST LENGTH (EXCEPT LINE POSTS AND GATE POSTS) (SEE SP741-01.01) PLUS 400 mm FOR THE STABILIZING INCREASED DEPTH OF BURY.

BURY DEPTH: DEPTH OF END AND PANEL POSTS NORMALLY NOT LESS THAN 1200 mm. WHERE 1200 mm NOT ATTAINABLE BUT EXCEEDING 900 mm, USE DOUBLE TENSIONING STRAINING PANEL ASSEMBLIES AT NOT EXCEEDING 200 m SPACING. GREATER MINIMUMS ARE REQUIRED FOR PEAT SOILS, ETC.

**POST SPACING AND WOOD BRACES:**

WOOD BRACE	SIZE	LENGTH	POST SPACING APPROXIMATE
HORIZONTAL	80 mm	2.4 m	2.5 m
HORIZONTAL	100 mm	3.0 m	3.1 m
* DIAGONAL	100 mm	3.0 m	2.9 m

\* NOTE: SOFT, MARSH AND/OR PEAT SOIL CONDITIONS MAY WARRANT DIAGONAL WOOD BRACES IN PLACE OF HORIZONTALS IN ADDITION TO THE LONGER POSTS.

NOTE: ROCK, SHALE OR FRIABLE ROCK CONDITIONS SEE SP741-04.01 FOR METAL POSTS AND BRACES.

WIRE BRACES: 2 STRANDS OF 3.5 mm NOMINAL DIAMETER GALVANIZED WIRE WITH LOOPED ENDS AROUND DOWEL AND STAPLED TO POSTS - TWISTED TAUT ONE WAY OR BOTH WAYS AS INDICATED ABOVE.

NOT TO SCALE  
 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

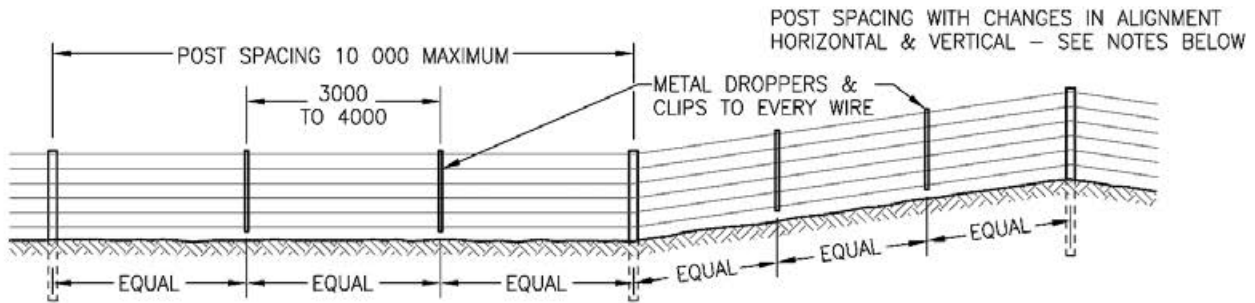


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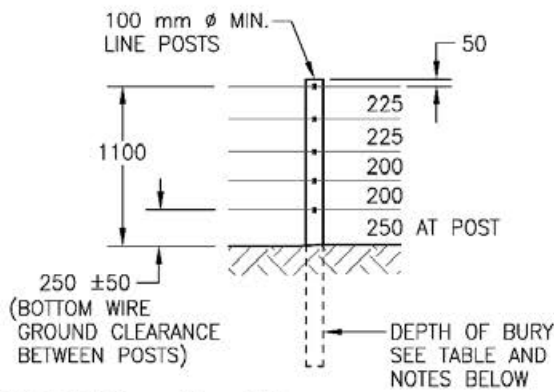
HIGH-TENSILE FENCES (SMOOTH WIRE & WOOD POSTS)

SP741-03.01



**HIGH-TENSILE SMOOTH-WIRE FENCING**

FOR RANGE LAND AND OTHER LOCATIONS WITH FAVOURABLE TERRAIN, SOIL CONDITIONS AND FENCE ALIGNMENT.

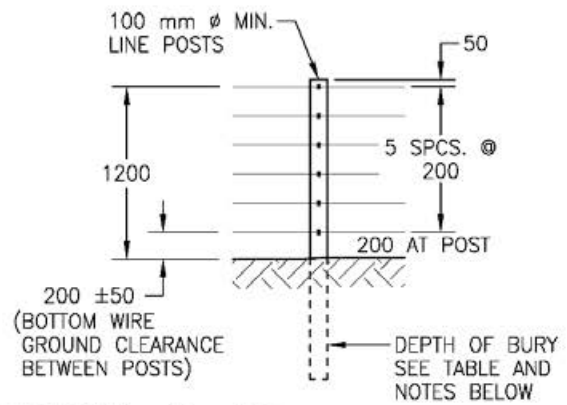


POST SPACING: 10 m MAX.  
(HIGH SNOW AREAS 7 m MAX.)

	DEPTH OF BURY	POST LENGTH
FIRM SOIL	650 mm	1.8 m
MEDIUM CLAY	850 mm	2.0 m
PEAT SOIL	1050 mm	2.2 m

**TYPE HT FENCE**

RANGELAND AND WILD LIFE SENSITIVE AREAS



POST SPACING: 7 m MAX.

	DEPTH OF BURY	POST LENGTH
FIRM SOIL	750 mm	2.0 m
MEDIUM CLAY	950 mm	2.2 m
PEAT SOIL	1150 mm	2.4 m

**TYPE HT-1 FENCE**

HEAVY LIVESTOCK PRESSURES/FREEWAYS (WHERE PERMITTED OR REQUIRED)

**NOTE:** REDUCE LINE POST SPACING FOR SUCH AS NURSERY LIVESTOCK ENCLOSURES (HT-1 FENCE) AND AT ALL MINOR HORIZONTAL AND VERTICAL ALIGNMENT CHANGES. SEE SP741-03.03 FOR "SHALLOW", "MEDIUM" CURVES AND CORNER CHANGES IN ALIGNMENT.

**GENERAL NOTES:**

SETTING OUT AND CONSTRUCTION SHALL BE IN GENERAL ACCORDANCE WITH SECTION 741 AND MINISTRY OF AGRICULTURE AND FOOD PUBLICATION #ISBN 0-7719-9824-4 (BCMAF) PROCEDURES OR AS OTHERWISE REQUIRED.

POST AND BRACES: PRESSURE TREATED WOOD AS SPECIFIED IN SECTION 909.

WIRE: 2.5 mm NOMINAL DIAMETER HIGH-TENSILE GALVANIZED WIRE AS SPECIFIED BY SUBSECTION 316.07.

METAL DROPPERS AND CLIPS, SPLICERS AND FASTENERS & TENSIONING DEVICES. } PROPRIETRY MANUFACTURE TO SUBSECTION 316.12.

STAPLES: 45 mm LONG OF 3.5 mm NOMINAL DIAMETER GALVANIZED WIRE: DOUBLE STAPLE ON CURVES AND RISE AND DIP POSTS TO BCMAF RECOMMENDATIONS.

LINE POSTS: 100 mm MINIMUM DIAMETER SET FIRM BY DRIVING AND SET PLUMB EXCEPT FOR REQUIRED LEAN ON "MINOR" CURVES, SEE POST SIZE AND LENGTH FOR OTHER CURVES ON SP741-03.02 & SP741-03.03.

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

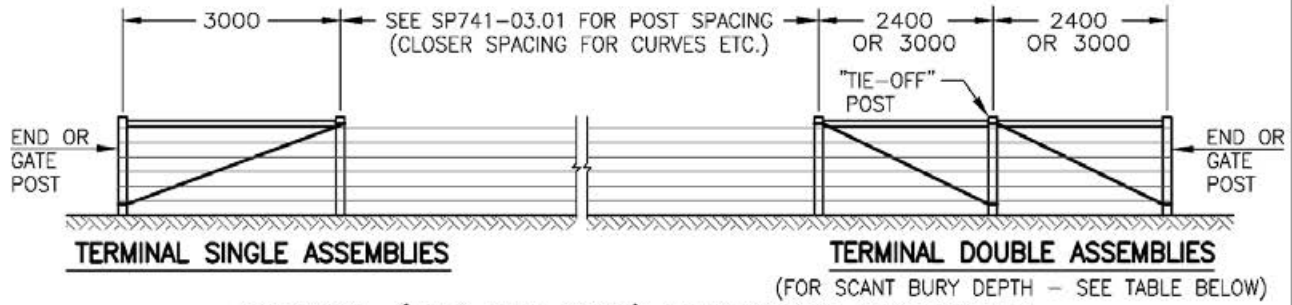


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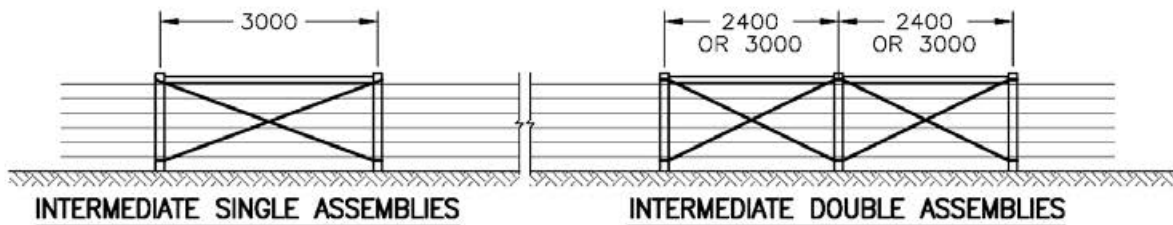
HIGH-TENSILE FENCE STABILIZATION

SP741-03.02

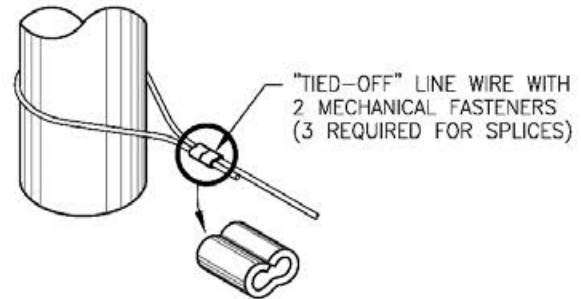


TERMINAL (END AND GATE) TENSIONING ASSEMBLIES

(CORNER AND INTERSECTION ASSEMBLIES SIMILAR)



INTERMEDIATE TENSIONING ASSEMBLIES



GENERAL NOTES:

COIL OF SMOOTH HIGH-TENSILE WIRE IN EXCESS OF 1000 m (APPROX. 100#)

POST SIZES: ALL 120 mm  $\phi$  MINIMUM EXCEPT  
 LINE POSTS 100 mm  $\phi$  MIN., CORNER POSTS 140 mm  $\phi$   
 MINIMUM AND GATE POSTS 190 mm  $\phi$  MINIMUM.  
 HORIZONTAL BRACES: 100 mm  $\phi$  MIN., 3.0 m LONG  
 (2.4 m LONG PERMITTED WITH DOUBLE ASSEMBLIES).

TERMINAL (END AND GATE) TENSIONING ASSEMBLIES SHALL BE PROVIDED TO TENSION EVERY LINE WIRE. WHERE TERMINAL SPACING IS IN EXCESS OF 1000 m \*, INTERSPERSE WITH INTERMEDIATE TENSIONING ASSEMBLIES, UTILIZING ANY REQUIRED INTERSECTION AND CORNER ASSEMBLIES AT NOT EXCEEDING 1000 m \* SPACINGS.

\* SEE REDUCED SPACING REQUIREMENTS BELOW: NORMALLY 400 TO 600 m BUT MINIMUM 150 m.  
 FOR CONSTRUCTION OF SINGLE AND DOUBLE ASSEMBLIES SEE SP741-01.02, SP741-01.03, SP741-02.02 & SP741-02.03 BUT USE HIGH TENSILE WIRE FOR WIRE BRACES.

DEPTH OF BURY AND POST LENGTH FOR SINGLE AND DOUBLE ASSEMBLIES.

TYPICAL SOIL TYPE	HT (5 WIRE) FENCE				HT-1 (6 WIRE) FENCE			
	SINGLE		DOUBLE		SINGLE		DOUBLE	
	BURY DEPTH (mm)	LENGTH (m)	BURY DEPTH (mm)	LENGTH (m)	BURY DEPTH (mm)	LENGTH (m)	BURY DEPTH (mm)	LENGTH (m)
FIRM SOIL	1050	2.2	850	2.0	1150	2.4	950	2.2
MEDIUM CLAY	1250	2.4	1050	2.2	1350	2.6	1150	2.4
PEAT SOIL	-	-	1250	2.4	-	-	1350	2.6

REDUCE SPACING OF TENSIONING ASSEMBLIES WHERE ABOVE BURY DEPTHS ARE NOT ADEQUATE FOR THE PARTICULAR SOIL CONDITION AND FOR CHANGES IN HORIZONTAL ALIGNMENT AT CURVES AND UNTIED-OFF CORNERS:  
 3 m REDUCTION FOR EVERY 1' OF DEFLECTION CHANGE

NOTE: ALL "CURVE" POSTS TO BE 120 mm  $\phi$  MIN. WITH LENGTHS AND BURY AS FOR END POSTS.

REDUCTION OF ASSEMBLY SPACING FOR UNEVEN TERRAIN CHANGE IN VERTICAL ALIGNMENT:  
 - 50 m PER HUMP AND DIP AND 100 m PER MAJOR HUMP AND DIP.

NOT TO SCALE  
 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



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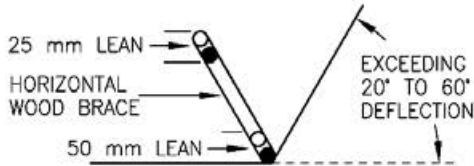
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HIGH-TENSILE FENCE STABILIZATION

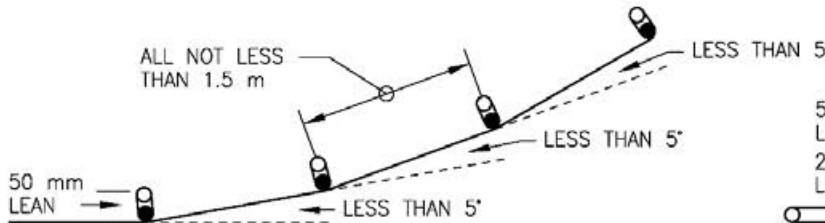
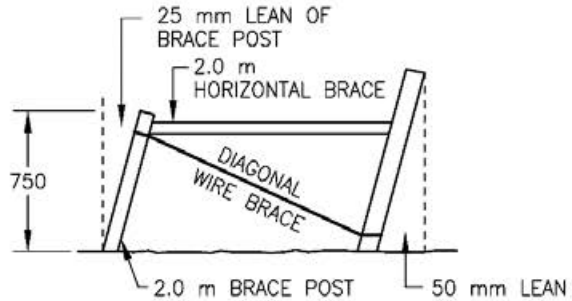
SP741-03.03



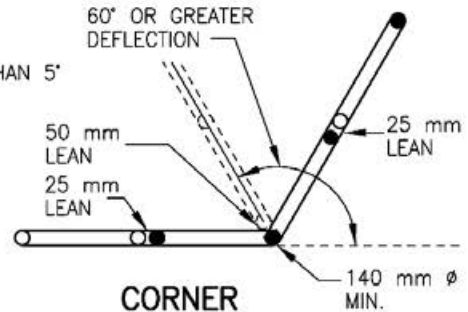
MINOR CURVE



MEDIUM CURVE



SHALLOW CURVE



CORNER

NOTE: BRACES ON OUTSIDE OF CURVE WHERE NECESSARY WITH OPPOSITE LEAN AND WIRE BRACE.

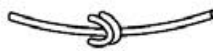
TENSIONING DEVICES IN EVERY MECHANICALLY FASTENED "TIED-OFF" LINE WIRE. AT MID-SPAN OR TOWARDS END WITH THE MAJORITY OF ALIGNMENT CHANGES, BETWEEN ADJOINING ASSEMBLIES (FOR STRAIGHT AND LEVEL FENCE RUNS UNDER 200 m: DEVICES NEXT TO ONE TENSIONING ASSEMBLY).

DIP POSTS TO BE PROVIDED WITH STEEL POST(S) OR FOOTING BLOCKS TO BCMAF RECOMMENDATIONS TO RESIST POST LIFTING IN HOLLOW.

DOUBLE STAPLE ALL LINE WIRES AT CURVES, CORNERS, DIPS AND RISES AS INDICATED BELOW AND AS INDICATED \* FOR HEAVY SNOW AREAS.



RISE POST



DIP POST



SHALLOW CORNER



RIGHT ANGLE

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

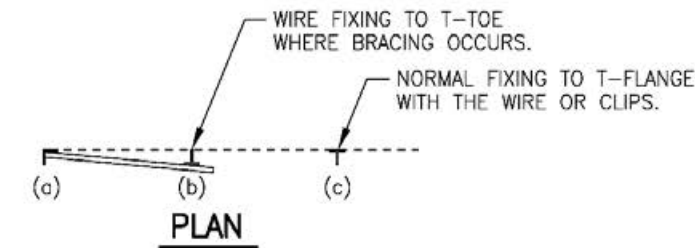


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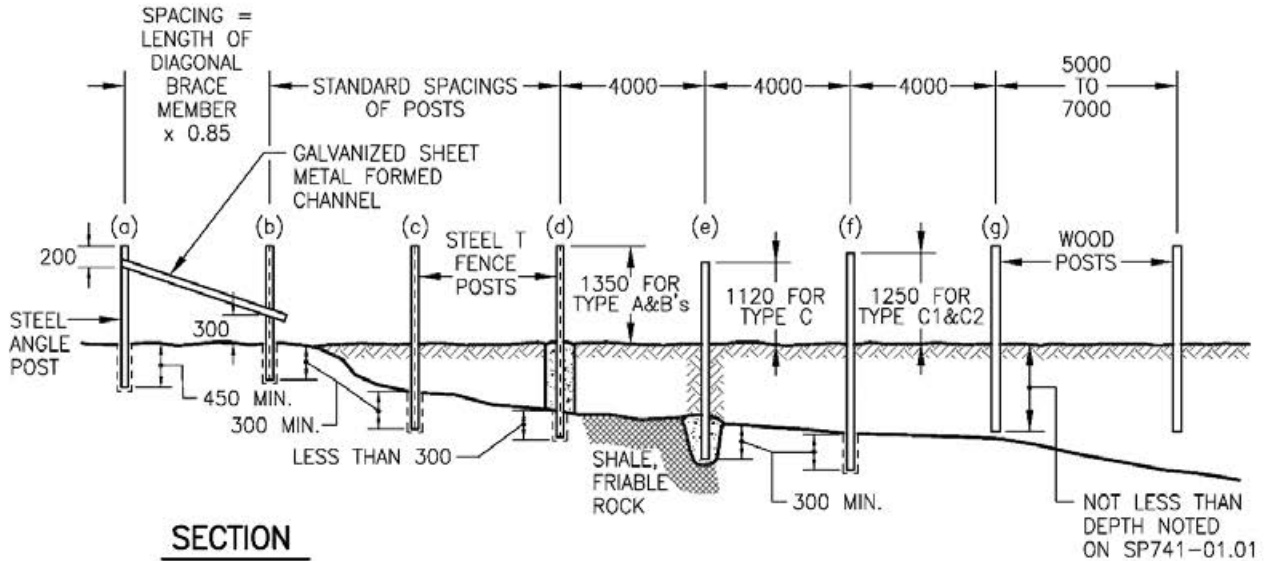
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TYPE A, B, B1, C, C1 & C2 FENCE ON OR OVER ROCK

SP741-04.01



**NOTE:**  
FOR MINOR ROCK OUTCROPPING AND UNFORESEEN MINIMUM OVERBURDEN OCCURRENCES WIRE TIED MULTIPLE WOODPOST/BRACE ASSEMBLIES MAY BE APPROVED BY THE MINISTRY REPRESENTATIVE.



**SECTION**  
**EXPOSED ROCK AND OVERBURDEN CONDITIONS**

**NOTES:**

STEEL ANGLE END POST (a) AND SIMILAR CORNER AND INTERSECTION POSTS SET IN CEMENT AND SAND NON-SHRINK MORTAR WITH STEEL BRACE(S) TO ADJOINING STEEL FENCE POST(S) (b) SECURELY AND BOLTED EACH END.

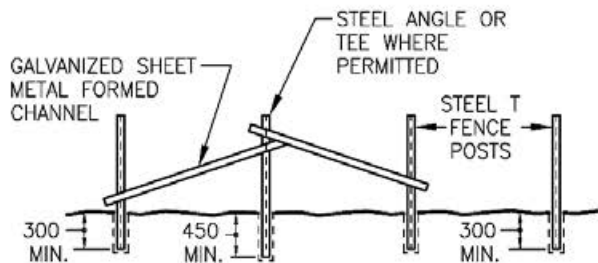
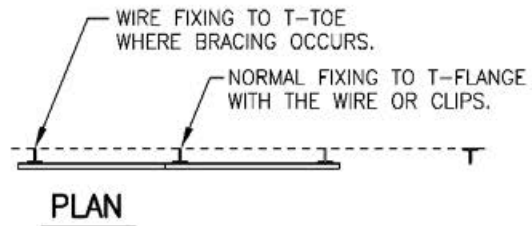
STEEL TEE FENCE POSTS SHALL BE USED ON:

- ROCK (b)
- MINIMUM OVERBURDEN (c) OR (d)
- WITH OVERBURDEN (f) LESS THAN THE NORMAL BURY
- DEPTH FOR WOOD POSTS REQUIRED ON SP741-01.01
- TO SHALE, LOOSE OR FRIABLE ROCK (e)
- ENLARGED DRILLED HOLE SET IN CEMENT MORTAR.

WHERE DEPTH OF BURY OF A STEEL POST INTO SOLID ROCK IS LESS THAN (a) & (b) ABOVE AS AT (d) CONCRETE FOOTING (4:2:1 MIX) OF ADEQUATE SIZE MAY BE APPROVED BY THE MINISTRY REPRESENTATIVE.

CURVED ALIGNMENT SPACING OF STEEL POSTS SEE SP741-04.02.

STEEL ANGLE AND TEE POSTS CHANNEL BRACES ARE SPECIFIED BY SUBSECTION 316.09 AND INSTALLATION BY SUBSECTION 741.34.



**SECTION**  
**INTERMEDIATE TENSIONING ASSEMBLY**

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



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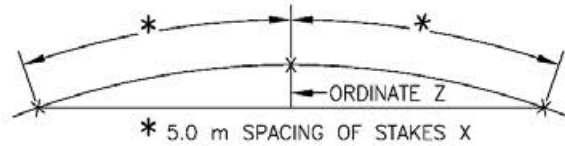
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TYPE A, B, B1, C, C1 & C2 FENCE SPECIAL CONDITIONS

SP741-04.02

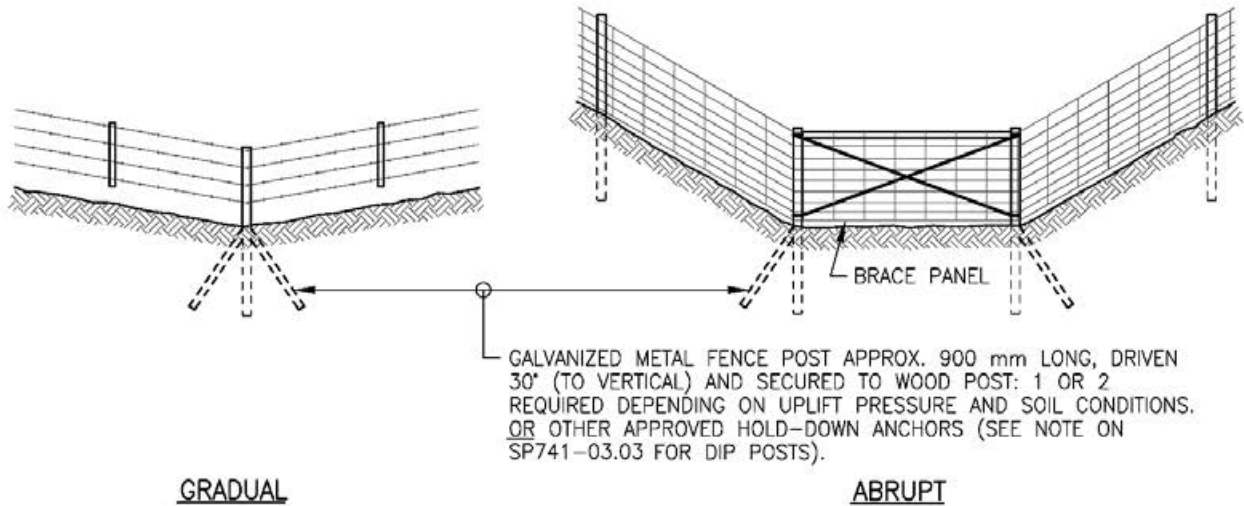
FENCE POST SPACING (m)

<u>ORDINATE Z (mm)</u>	<u>WOOD POST</u>	<u>STEEL POST</u>
LESS THAN 100	5.0	4.0
GREATER THAN 100 TO 150	4.5	3.6
GREATER THAN 150 TO 200	4.0	3.2
GREATER THAN 200 TO 350	3.2	2.6
GREATER THAN 350	2.4	2.0



CURVED HORIZONTAL ALIGNMENTS

REDUCED LINE POST SPACING



GRADUAL

ABRUPT

NOTES

1. BRACE PANELS OR STRAINING PANELS, (SEE SP741-01.03 & SP741-02.03) ARE REQUIRED ON EITHER SIDE OF AN ABRUPT DEPRESSION TO RELIEVE FENCING TENSION AND MINIMIZE UPLIFT TENDENCY.
2. KEEP POST OR ASSEMBLY OUT OF WET CONDITIONS.

CHANGE OF VERTICAL ALIGNMENT

DEPRESSION – AS SHOWN

SUMMIT – SIMILAR EXCEPT NO HOLD-DOWN ANCHORS REQUIRED.

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

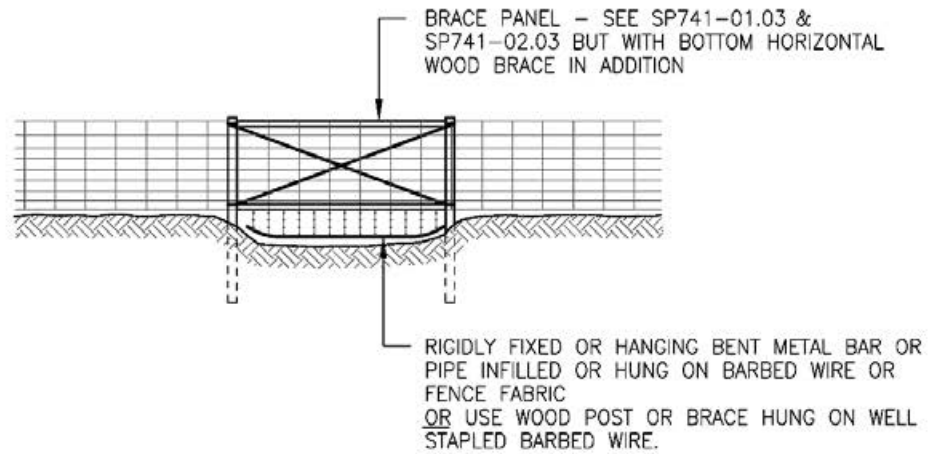


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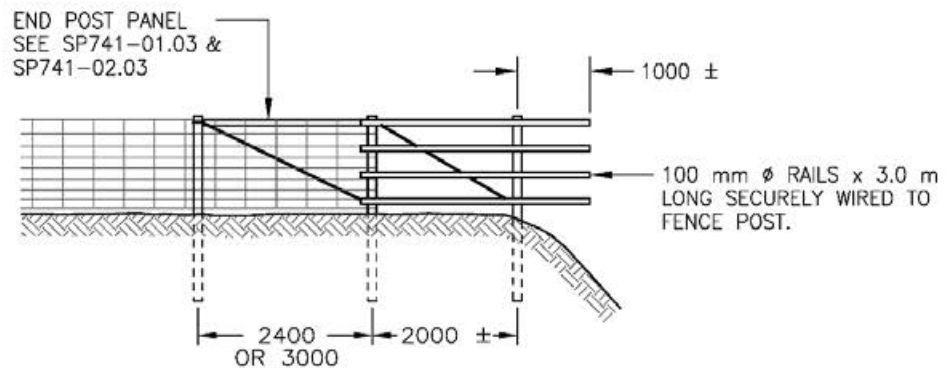
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TYPE A, B, B1, C, C1 & C2 FENCE SPECIAL CONDITIONS

SP741-04.03



**CONTINUOUS FENCING**  
(AT DITCHES, ETC.)



**INTERRUPTED FENCES**  
(AT GULLEY OR CREEK)

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

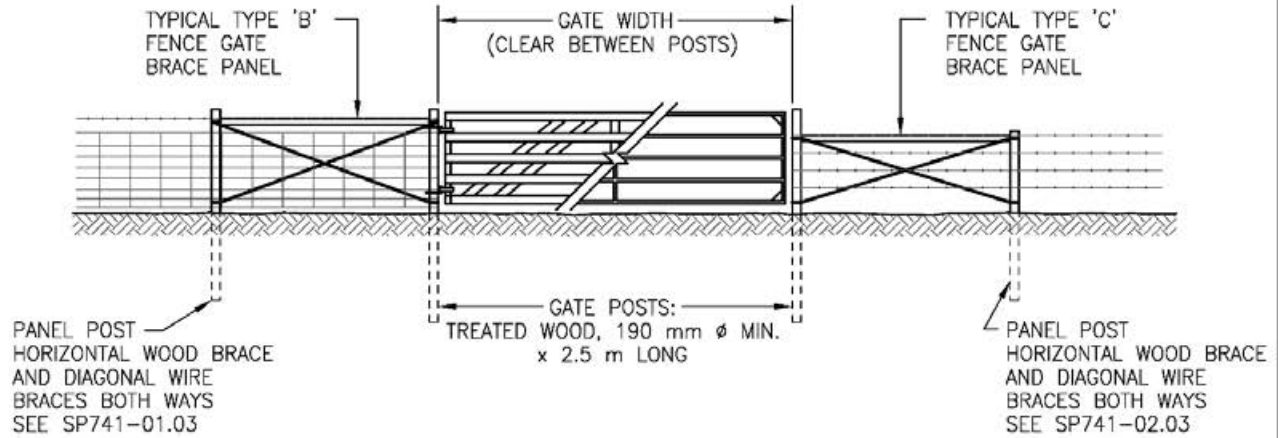


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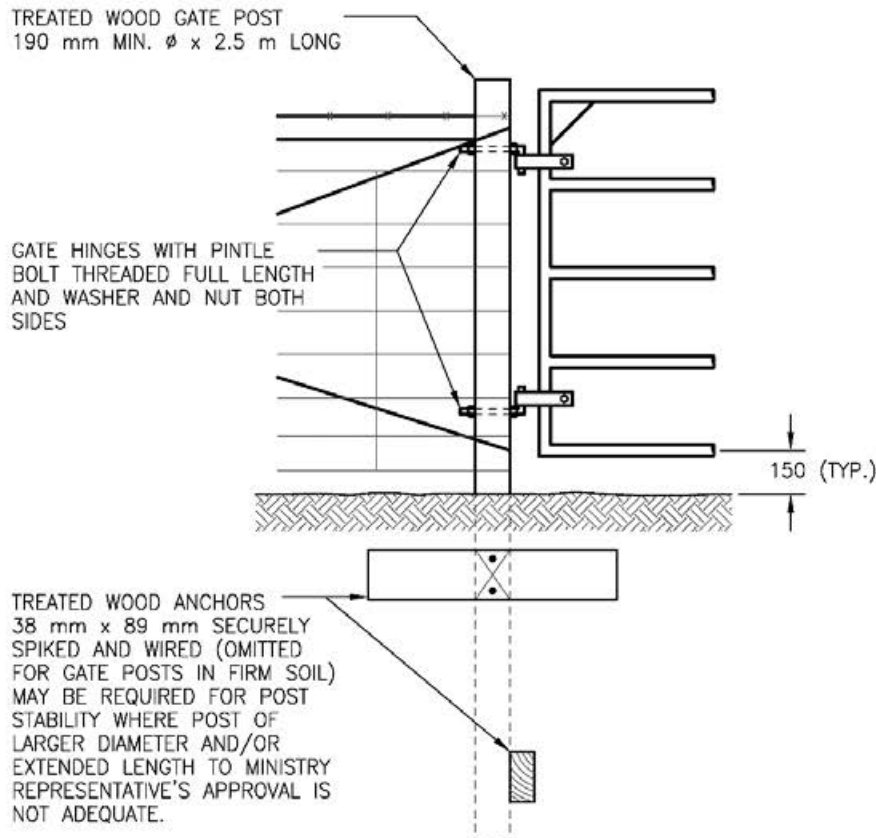
FARM AND RANGE GATES

SP741-04.04



**GATES IN TYPE A, B, B1, C, C1 & C2 FENCES**

(SEE SP741-05.03 FOR TYPE D FENCE GATE)



**TYPICAL HINGE DETAILS**

NOTE: SEE SP741-04.05 FOR GATE TYPES AND APPLICATIONS

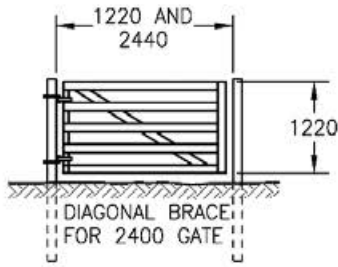
NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

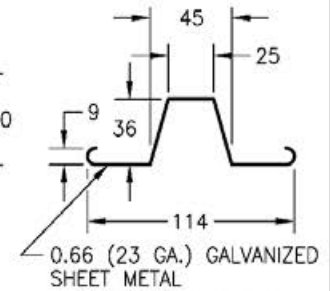
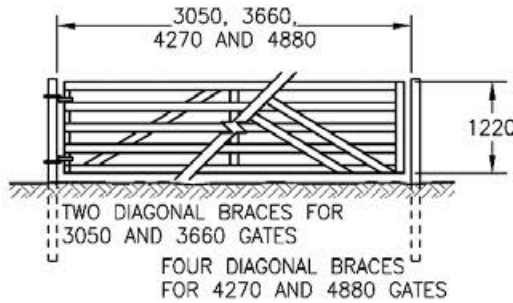


FARM AND RANGE GATES

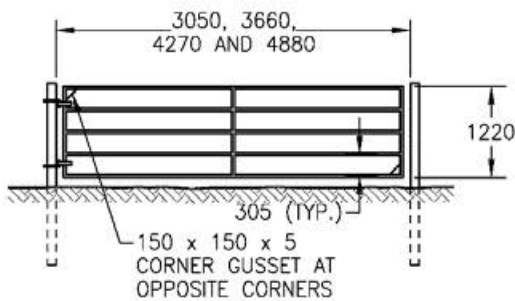
SP741-04.05



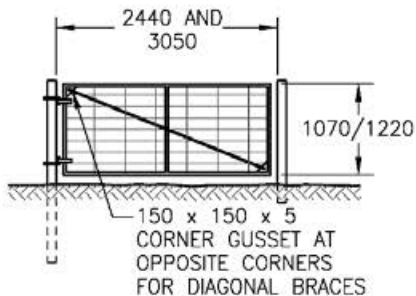
**TYPE 1 GATE**  
(SHEET METAL MEMBERS)



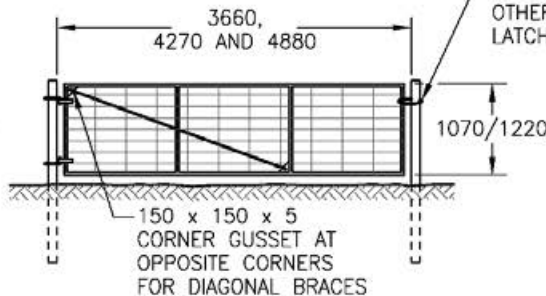
**GATE MEMBER**



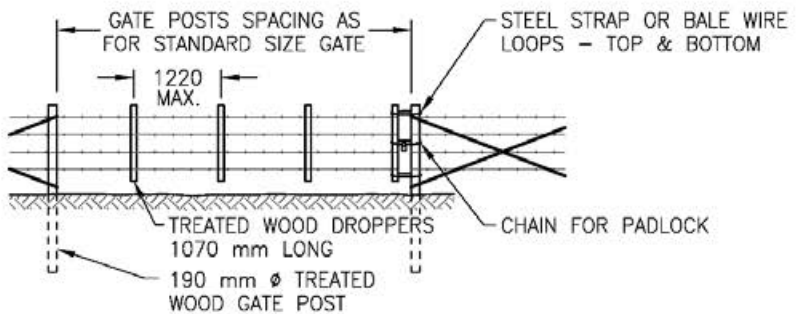
**TYPE 2 GATE**  
(ALL PIPE)



**TYPE 3 GATE**  
(PIPE AND WIRE FABRIC INFILL)



NOTE:  
GATE CONSTRUCTION AND HARDWARE SPECIFICATION SEE SUBSECTION 316.11



**TYPE 5 GATE**  
(RANGE SLIP-WIRE)

NOTE:  
SEE SP741-04.04 FOR GATE DETAILS

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

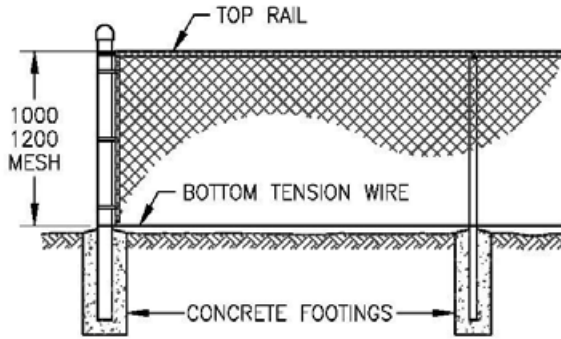


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TYPE D – CHAIN LINK FENCE – GENERAL LAYOUT

SP741-05.01



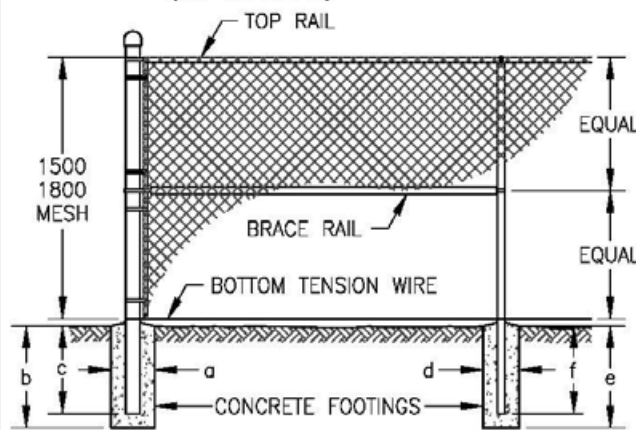
**RESIDENTIAL HEIGHT**  
(1.0 OR 1.2 m)

**CONCRETE FOOTINGS**

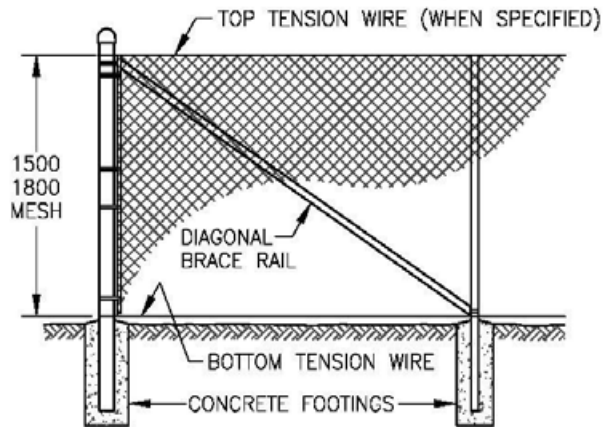
CONCRETE TO CONFORM TO SS 218, CLASS C OR 20 MPa GROUT.

MESH HEIGHT "X" (mm)	CONCRETE FOOTINGS SIZE * (mm)					
	TERMINAL POSTS			LINE POSTS		
	a	b	c	d	e	f
1000	200	750	600	200	600	450
1200	200	750	600	200	600	450
1500	300	1050	900	250	750	600
1800	300	1050	900	250	750	600
2100	350	1050	900	300	900	750
2400	350	1050	900	300	900	750

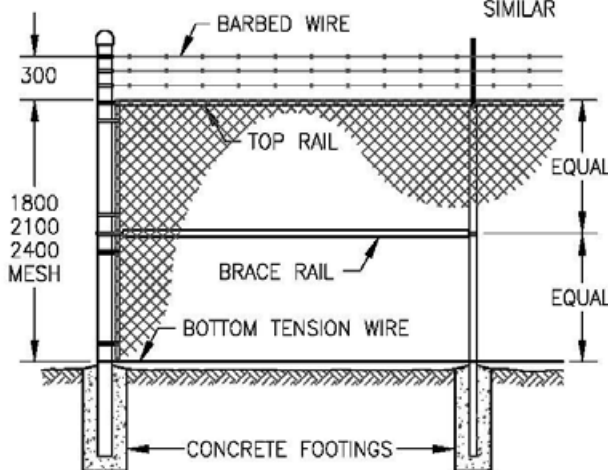
\* INCREASE FOR PEAT SOIL ETC. FOR ROCK AND OTHER CONDITIONS SEE SUBSECTION 741.36.01(iii)



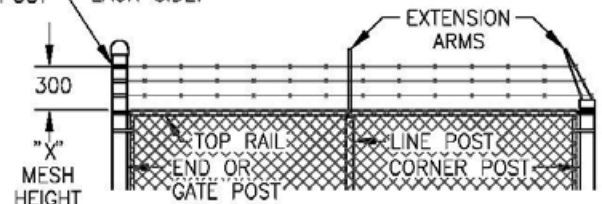
**STANDARD HEIGHT**  
(1.5 OR 1.8 m)



NOTE: INTERMEDIATE TENSION ASSEMBLIES WITH TOP TENSION WIRE REQUIRE DIAGONAL BRACE ON EACH SIDE.



**SECURITY HEIGHT**  
(1.8, 2.1 OR 2.4 m EXCLUSIVE OF BARBED WIRE HEIGHT)



**SECURITY FENCE**

(EXTENSION ARMS AND EXTRA HEIGHT END, GATE AND STRAINING POSTS FOR 3 STRANDS OF BARBED WIRE)

**GENERAL NOTES:**

- MATERIAL SPECIFICATIONS FOR PIPE, MESH AND BARBED WIRE SEE SECTION 316.
- MESH FABRIC SELVAGE EDGE:
  - TWISTED EDGE UP FOR 1.8 m OR GREATER HEIGHT EXCEPT
  - KNUCKLE EDGE UP FOR 1.8 m HEIGHTS FOR SCHOOL, PARK OR PLAYGROUNDS
  - KNUCKLE SELVAGE BOTH EDGES FOR 1.5 m AND LESS.
- ACCESSORY MATERIAL SEE SP741-05.02.
- INSTALLATION, INCLUDING STRAINING POST REQUIREMENTS SEE SUBSECTION 741.36.
- GATE DETAILS SEE SP741-05.03 & SP741-05.04.

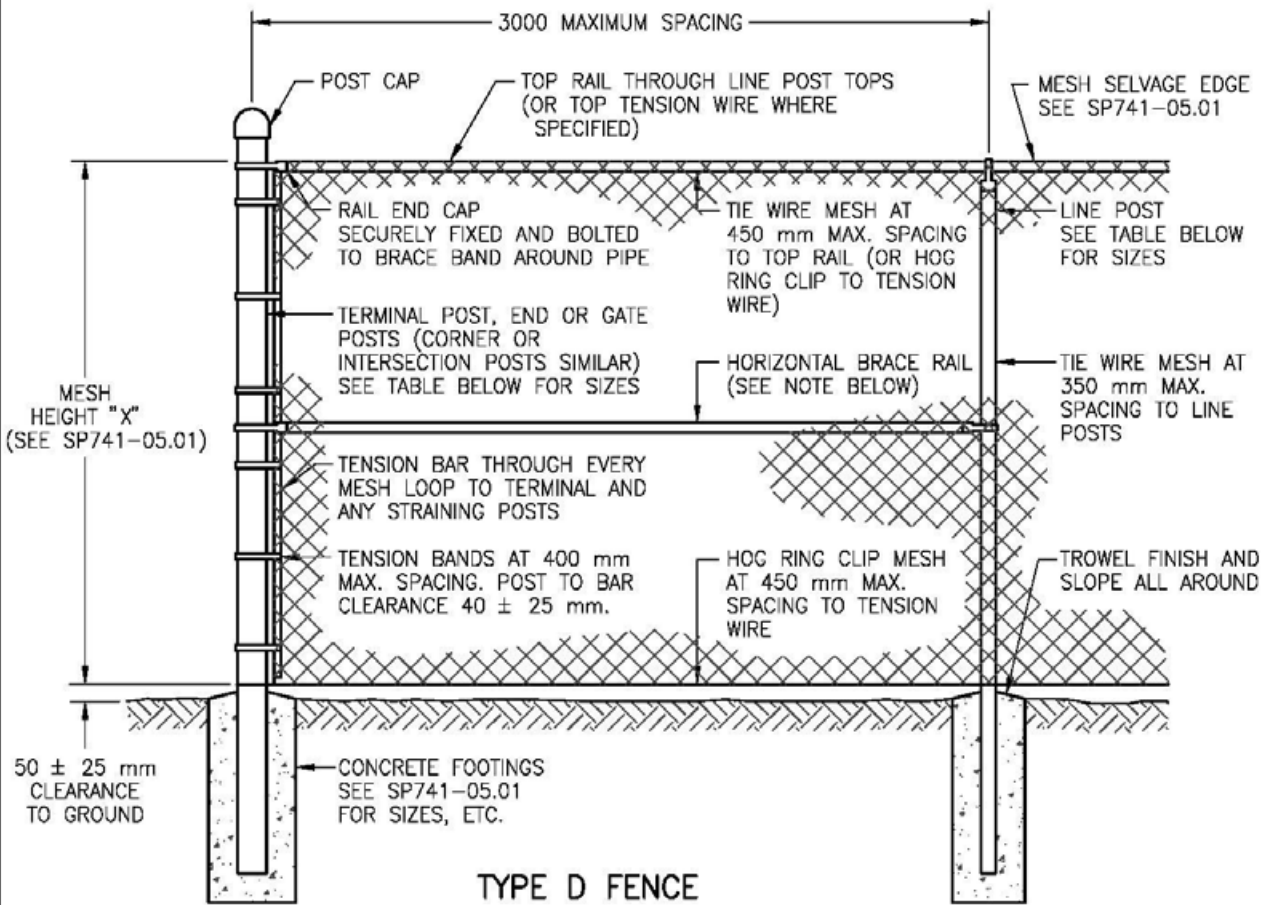
NOT TO SCALE  
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TYPE D – CHAIN LINK FENCE COMPONENTS

SP741-05.02



TYPE D FENCE

(CHAIN LINK WIRE MESH AND STEEL PIPE RAILS. RESIDENTIAL, STANDARD AND SECURITY HEIGHTS SEE SP741-05.01)

ACCESSORY MATERIAL

**POST AND RAIL CAPS:** OF APPROVED DESIGN OF PRESSED STEEL OR CAST OR MALLEABLE IRON AND GALVANIZED MINIMUM 600 g/m<sup>2</sup>, OR CAST ALUMINUM.

**GALVANIZING COATING:** TO STEEL WIRE, CLIPS, BARS AND BANDS, MINIMUM 360 g/m<sup>2</sup>.

**TENSION WIRE:** BOTTOM AND TOP WHEN SPECIFIED NOMINAL 5.0 mm Ø (6 ga.) MEDIUM TENSILE GALVANIZED WIRE; NOMINAL 3.75 mm Ø (9 ga.) FOR RESIDENTIAL HEIGHT FENCES.

**TIE WIRE:** NOMINAL 3.75 mm (9 ga.) ALUMINUM WIRE FOR MESH FIXING TO TOP RAIL AND LINE POSTS.

**HOG RING CLIPS:** NOMINAL 3.75 mm (9 ga.) GALVANIZED STEEL WIRE CLIPS FOR MESH FIX TO BOTTOM (OR TOP) TENSION WIRE.

**TENSION BAR:** MINIMUM 5 mm x 16 mm GALVANIZED MILD STEEL FLAT BAR.

**TENSION OR BRACE BANDS:** MINIMUM 3 mm x 16 mm GALVANIZED FORMED MILD STEEL FLATBARS WITH GALVANIZED BOLTS AND NUTS FOR ALL RAIL END CAP AND TENSION BAR FIXING.

POST AND RAIL SIZES – O.D. MINIMUM (mm)

	RESIDENTIAL	STANDARD	SECURITY
LINE POSTS	38	48	60
END, CORNER & STRAINING POSTS	48	60	73
TOP RAILS	33	33	42
HORIZONTAL BRACE RAILS*	--	33	42

\*NOTE: DIAGONAL PIPE BRACES MAY BE SPECIFIED WHERE SOIL CONDITIONS WARRANT ESPECIALLY WHERE TOP TENSION WIRE IS CALLED FOR IN PLACE OF TOP RAIL. FOR GATE POST SIZES SEE SP741-05.04.

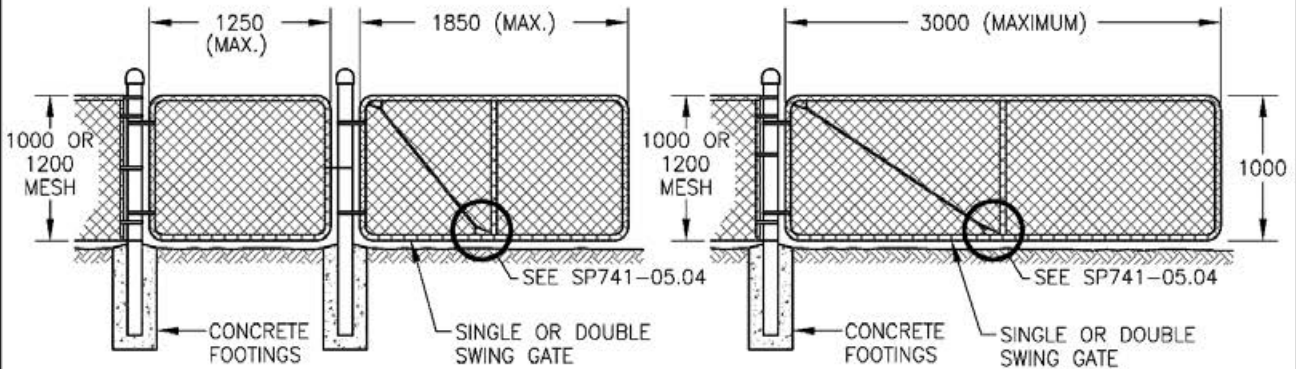
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TYPE D – CHAIN LINK FENCE GATES

SP741-05.03

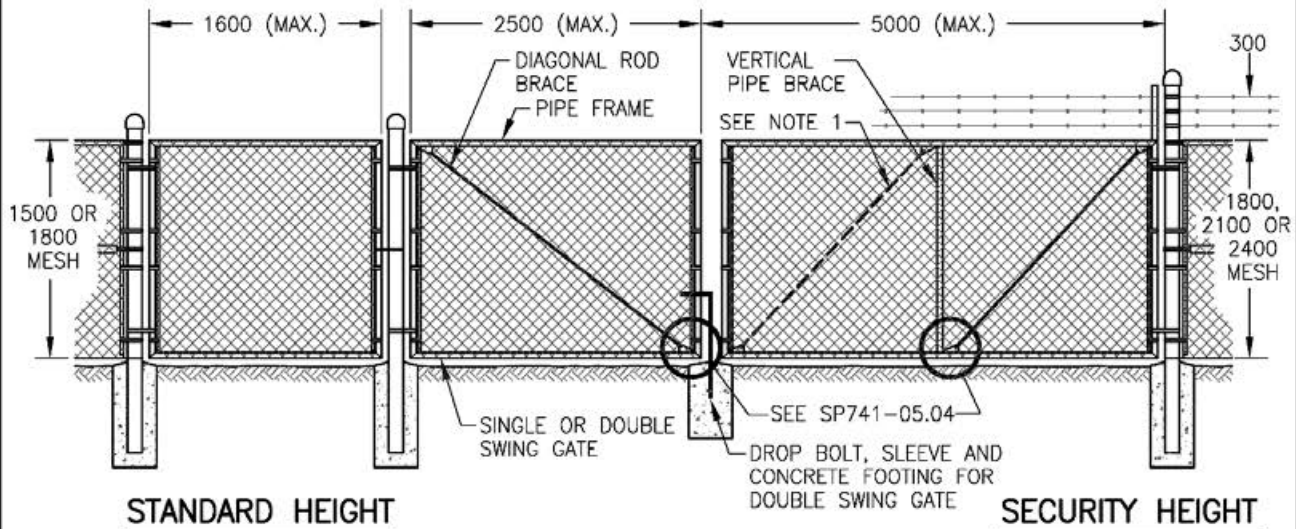


- GATES NOT EXCEEDING 1.85 m WIDTH OF OPENING
- GATE FRAME: 33 mm O.D. GALVANIZED TUBING 1.9 kg/m
  - VERTICAL PIPE BRACE: 27 mm O.D. GALVANIZED TUBING 1.5 kg/m
  - DIAGONAL BRACE: 5.0 mm NOMINAL DIAMETER GALVANIZED TENSION WIRE TO 5 mm CLEATS AS ON SP741-05.04.

- GATES NOT EXCEEDING 3.0 m WIDTH OF OPENING
- GATE FRAME: 33 mm O.D. GALVANIZED TUBING 2.5 kg/m
  - VERTICAL BRACE: 27 mm O.D. GALVANIZED PIPE 1.7 kg/m
  - DIAGONAL BRACE: 9.5 mm NOMINAL DIAMETER GALVANIZED ROD WITH HOOKED ENDS TO 5 mm CLEATS AS ON SP741-05.04

RESIDENTIAL HEIGHT GATES

(TYPE IV – SEE SUBSECTION 316.11.05)



- STANDARD HEIGHT
- GATE FRAME: 42 mm OD GALVANIZED PIPE 3.4 kg/m.
  - VERTICAL PIPE BRACE: 33 mm OD GALVANIZED PIPE 2.5 kg/m
  - DIAGONAL BRACE: 9.5 mm DIAMETER GALVANIZED ROD TO 5 mm CLEATS AS SHOWN ON SP741-05.04.

NOTE 1: SECOND DIAGONAL ROD BRACE REQUIRED FOR ALL GATES OVER 3.0 m TO 5.0 m WIDTH OF OPENINGS; REVERSE SLOPE OF SECOND ROD FOR ALL SLIDING GATES.

STANDARD AND SECURITY HEIGHT GATES

(TYPE IV – SEE SUBSECTION 316.11.05)

NOTE:  
FOR FENCE GATE DETAILS SEE SP741-05.04.

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

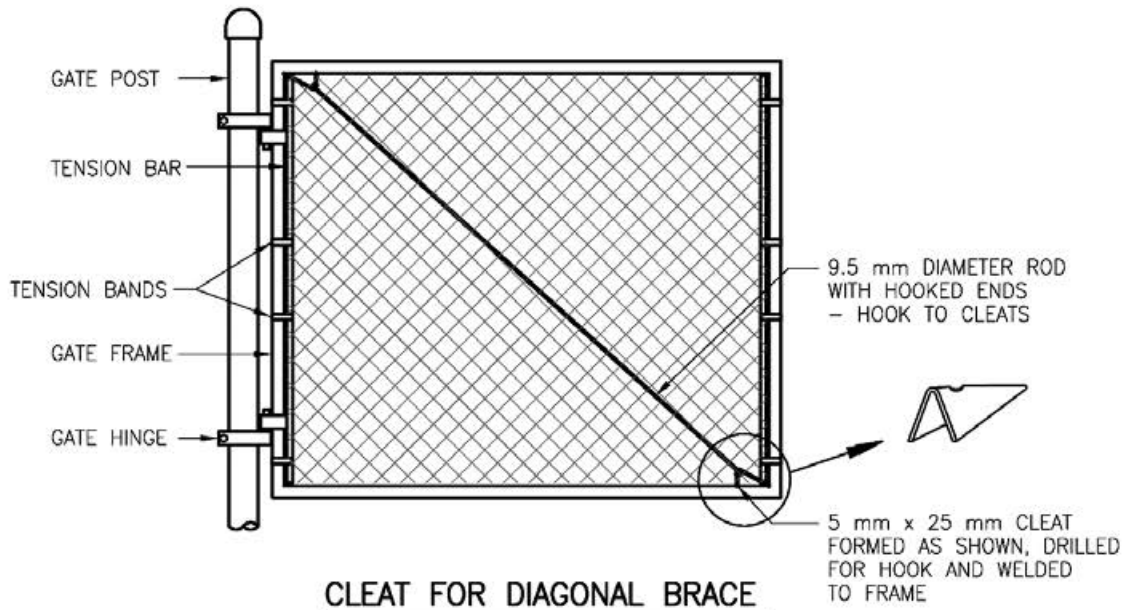


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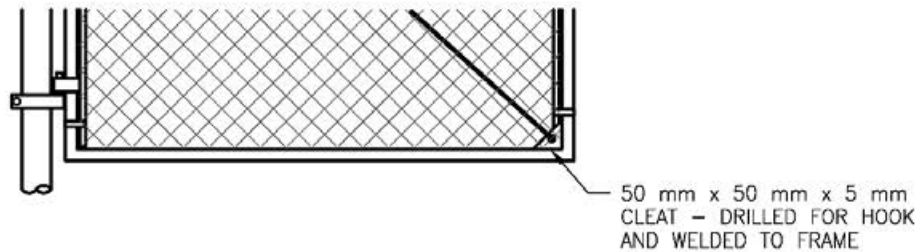
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TYPE D – CHAIN LINK FENCE GATE DETAILS

SP741–05.04



CLEAT FOR DIAGONAL BRACE



ALTERNATE CLEAT FOR DIAGONAL BRACE

GATE POST SIZES – NOMINAL OUTSIDE DIAMETER

RESIDENTIAL		48 mm
STANDARD HEIGHT FENCE GATE	NOT EXCEEDING 2.5 m	60 mm
	EXCEEDING 2.5 m	73 mm
SECURITY HEIGHT FENCE GATE	NOT EXCEEDING 2.5 m	73 mm
	EXCEEDING 2.5 m	89 mm

CONCRETE FOOTING SIZES – UP TO 2.5 m WIDE GATES SEE SP741–05.01.  
 – OVER 2.5 m WIDTH, FOOTINGS 400 mm  $\phi$ , 1250 mm DEEP

SECURITY HEIGHT FENCE GATES TYPE 4

SIMILAR TO STANDARD HEIGHT BUT WITH EXTENDED VERTICAL STILES (AND BRACE) FOR BARBED WIRE OVER.

GENERAL NOTES

- MATERIAL SPECIFICATIONS FOR PIPE, MESH AND BARBED WIRE, SEE SECTION 316.
- CAPS AND ACCESSORY MATERIAL, SEE SP741–05.02.
- HARDWARE, SEE SUBSECTION 316.11.05.
- SLIDING GATE MAY BE DETAILED FOR GATE OPENINGS OVER 4.0 m WITH ROLLING HARDWARE AS REFERRED TO IN SUBSECTION 316.11.05.

NOT TO SCALE  
 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

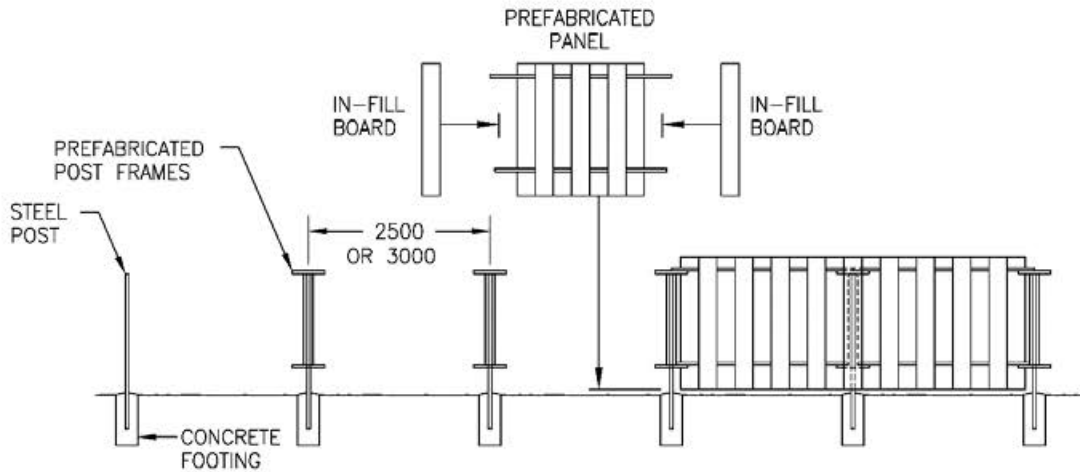


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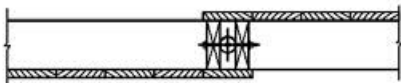
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WOOD FENCE – PRIVACY – GENERAL ARRANGEMENT

SP741-06.01



**GENERAL ARRANGEMENT**  
ELEVATION

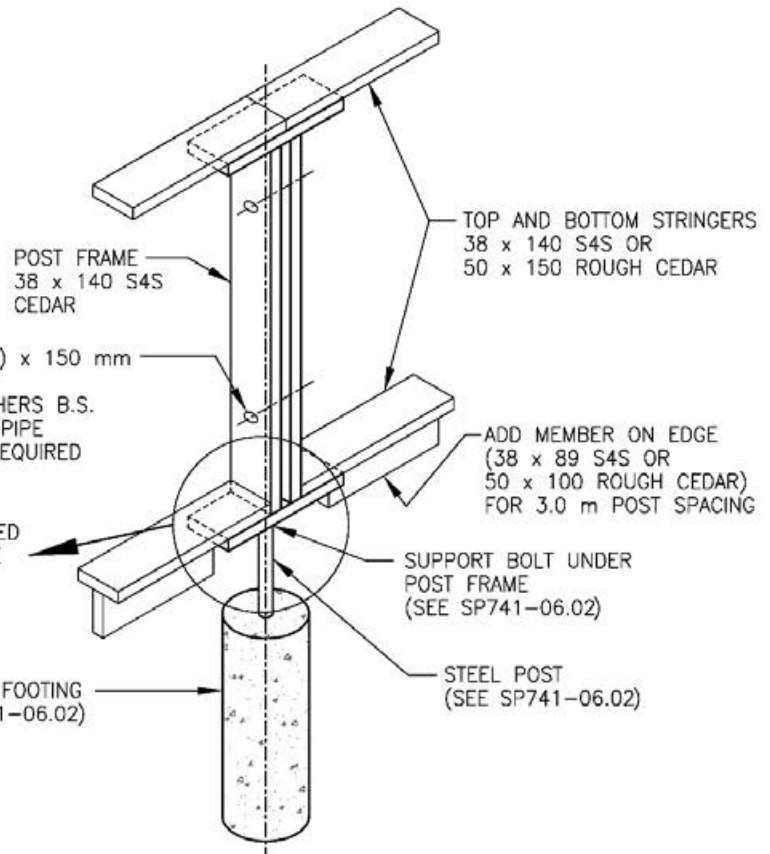


**CLOSE BOARDING**  
(IN ALTERNATE PANELS)



**STAGGERED BOARDING**

**BOARDING ARRANGEMENT**



**ISOMETRIC DETAIL**

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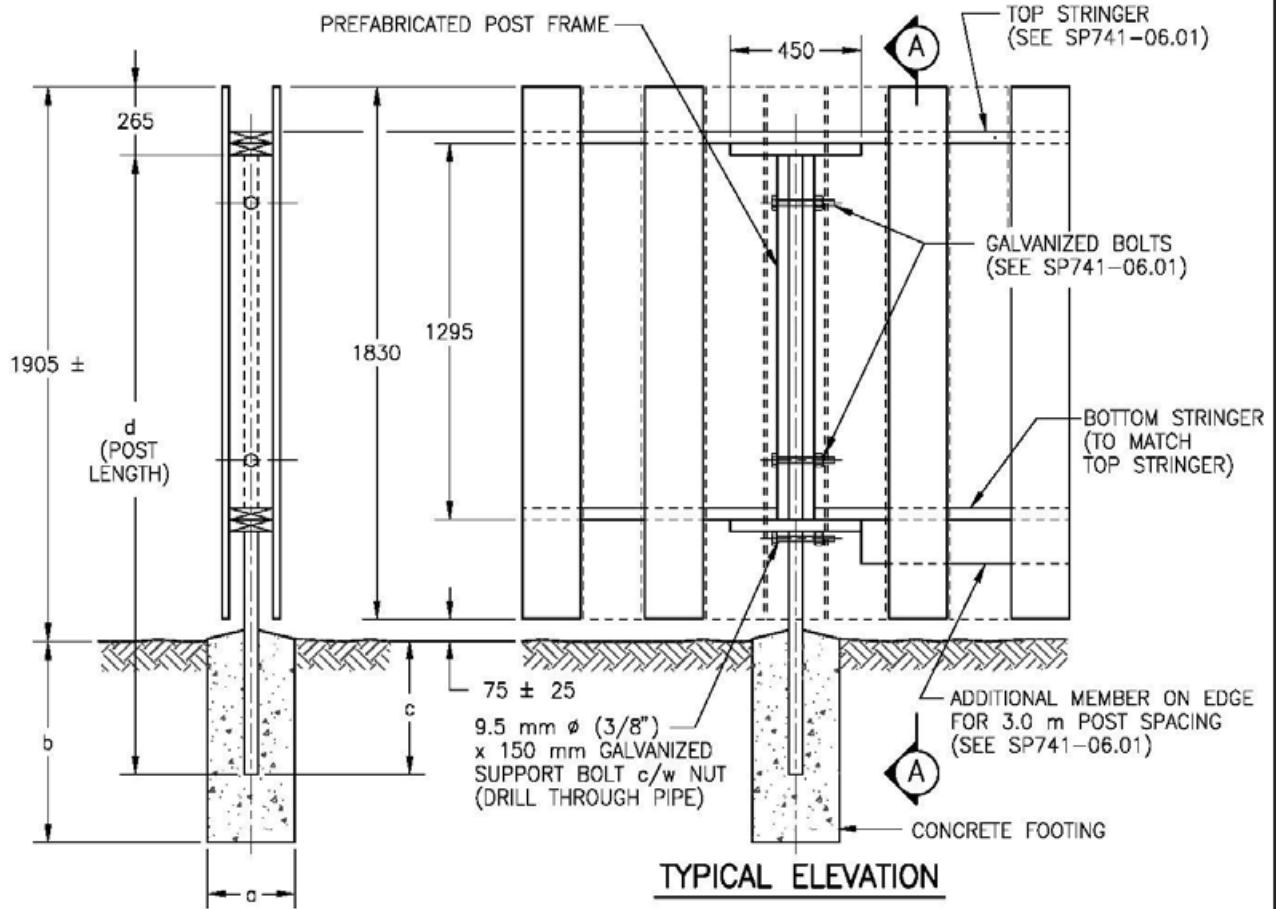


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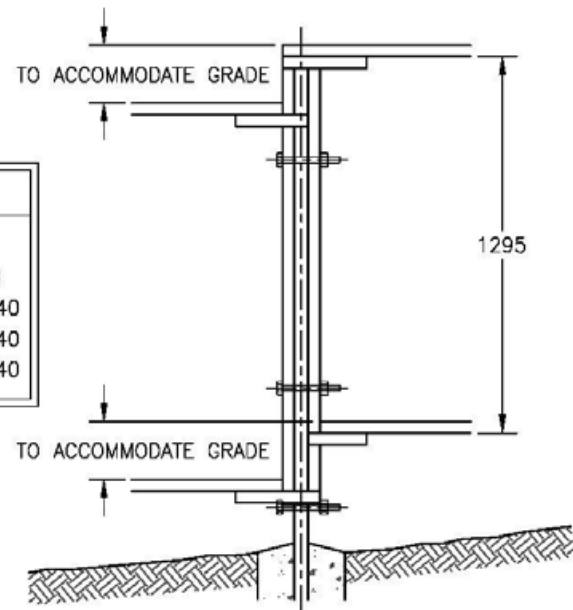
WOOD FENCE – PRIVACY – DETAILS

SP741-06.02



TYPICAL ELEVATION

SECTION A



DETAIL – STEPPED POST FRAME

CONCRETE FOOTING AND POST

POST SPACING	2.5 m				3.0 m			
	a	b	c	d	a	b	c	d
FIRM SOIL	200	750	500	2140	250	750	500	2140
STANDARD	250	750	500	2140	300	750	500	2140
PEAT SOIL	300	750	500	2140	300	1000	800	2440

**CONCRETE FOOTINGS:**  
 CONCRETE TO CONFORM TO SS 218, CLASS C OR 20 MPa GROUT.

**STEEL POSTS:**  
 POSTS TO BE 48 mm O.D. GALVANIZED STANDARD WEIGHT TUBING.

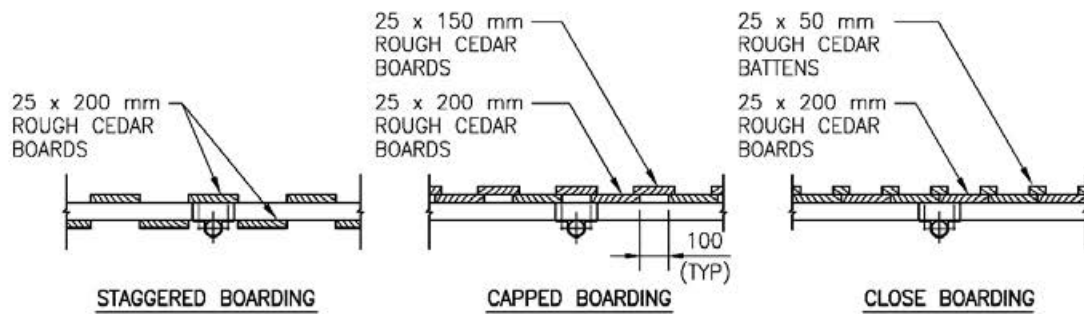
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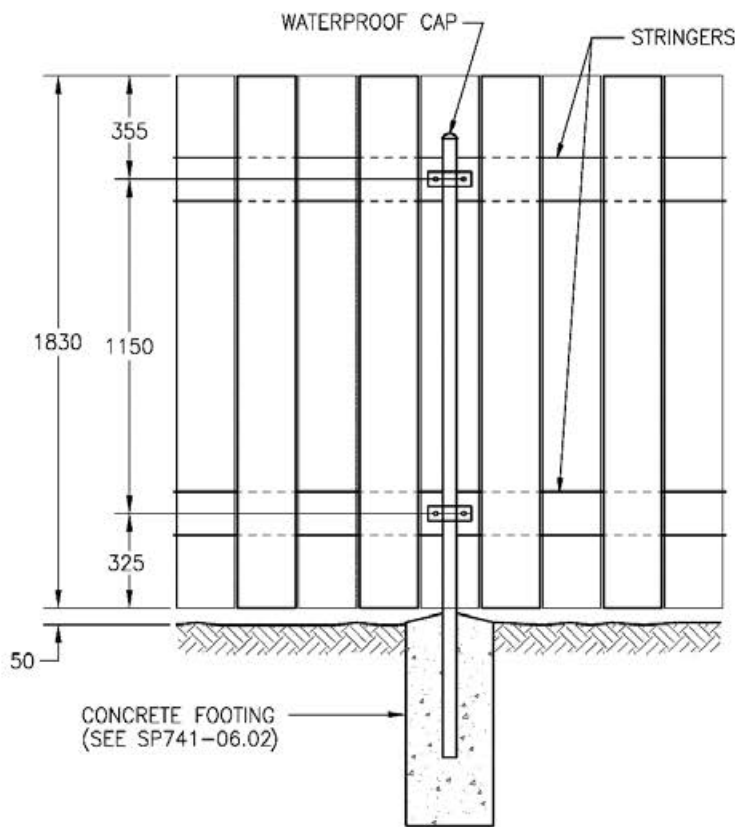
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WOOD FENCE – PRIVACY – GENERAL ARRANGEMENT

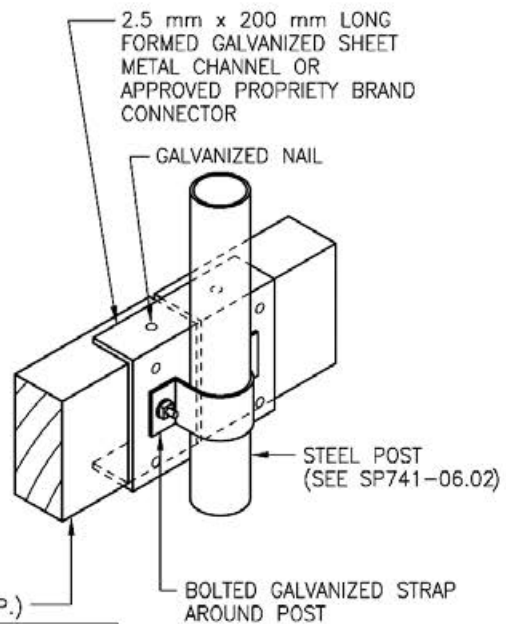
SP741-06.03



**BOARDING ARRANGEMENT**



**TYPICAL ELEVATION**



STRINGERS: (TYP.)

50 x 100 ROUGH CEDAR FOR 2.5 m POST SPACING

50 x 150 ROUGH CEDAR FOR 3.0 m POST SPACING

**ISOMETRIC DETAIL**

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



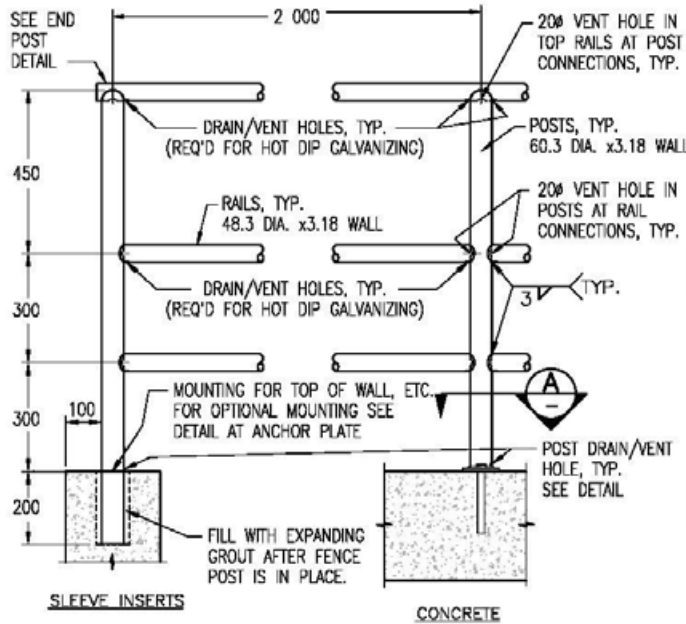
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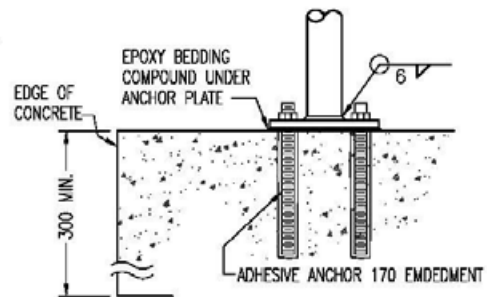
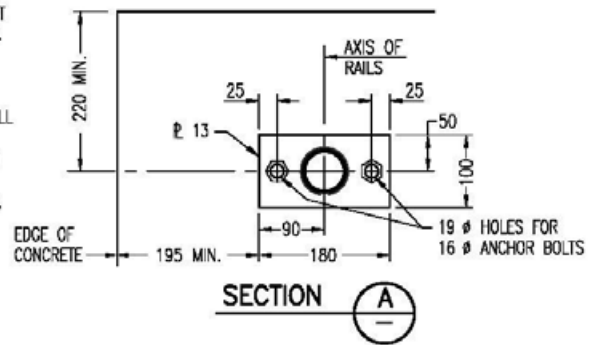


**PEDESTRIAN SIDEWALK FENCE – WELDED**  
 SUITABLE FOR LOCATIONS WHERE GATHERING OF MANY PEOPLE IMPROBABLE

SP741-07.01

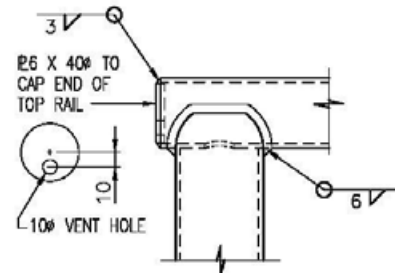


**WELDED FENCE**

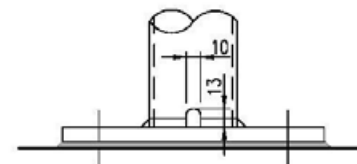


**NOTES:**

1. ALL RAIL AND POSTS TO BE CAN/CSA G40.21 GRADE 350W OR ASTM A500 GRADE C. MISCELLANEOUS PLATE TO BE CAN/CSA G40.21 GRADE 300W.
2. ALL ROUGH EDGES SHALL BE GROUND SMOOTH AND WELD SPLATTER SHALL BE REMOVED.
3. WELDED FENCE SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123/A123M.
4. FIELD WELDING SHALL BE KEPT TO A MINIMUM. DAMAGED GALVANIZING SHALL BE REPAIRED IN ACCORDANCE WITH SS 741.39.
5. VENT AND DRAIN HOLES:
  - A. RAILS SHALL BE PROVIDED WITH A BOTTOM DRAIN/VENT HOLE AT BOTH ENDS BETWEEN POSTS.
  - B. WHERE A POST IS EMBEDDED IN CONCRETE WITH A SLOPED TOP SURFACE OR WHERE IT IS SUPPORTED ON A SLOPED BASE PLATE, THE DRAIN/VENT HOLE NEAR THE BOTTOM OF THE POST SHALL BE LOCATED ON THE LOWER SIDE OF THE SLOPE.
6. POST ANCHORS SHALL BE ASTM A307 THREADED ROD, GALVANIZED TO THE REQUIREMENTS OF ASTM A153/A153M.
7. ACCEPTABLE ADHESIVES FOR BONDING THE ANCHORS INTO CONCRETE INCLUDE:
  - A. HILTI HIT HY-200
  - B. REDHEAD EPCON C6+
  - C. UCAN FLO-ROX FR6-SD
  - D. POWERS PE1000+
8. ANCHORS SHALL BE INSTALLED IN ACCORDANCE WITH THE ADHESIVE MANUFACTURE'S INSTRUCTIONS.
9. HOLES IN CONCRETE FOR ANCHORS MUST BE DRILLED WITH A HAMMER DRILL AND A CARBIDE TIPPED BIT. CONCRETE IN HOLES MUST BE WATER-SATURATED OR DRY WHEN INSTALLING ANCHORS.
10. ALTERNATIVE ANCHOR INSTALLATIONS THAT DO NOT MEET THE DETAILS ON THIS DRAWING WILL REQUIRE AN ENGINEERED DESIGN DEMONSTRATING THAT THE ALTERNATIVE INSTALLATION DETAILS ARE CAPABLE OF CARRYING THE REQUIRED LOADS. NATIONAL BUILDING CODE OF CANADA LOADING REQUIREMENTS ON "GUARDS" AND ON "HANDRAILS" SHALL BE CONSIDERED IN DETERMINING POST ANCHOR LOADING.



**END POST DETAIL**



**DRAIN/VENT HOLE DETAIL**  
 TYPICAL AT ENDS OF POSTS AND RAILS, HOLES FOR POSTS TO BE ON THE SAME AXIS AS RAILS

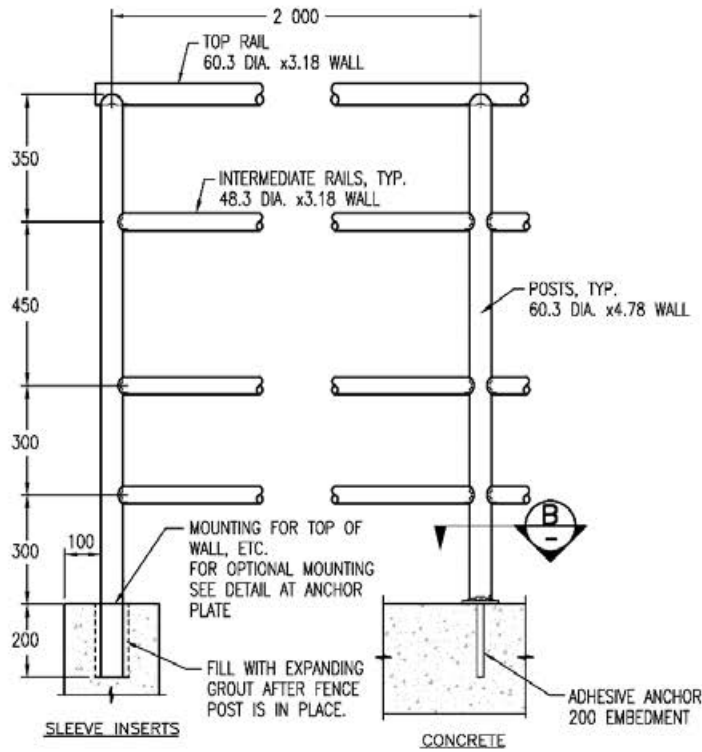
NOT TO SCALE  
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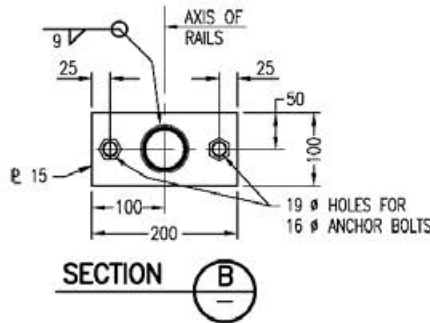
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**BICYCLIST SIDEWALK FENCE – WELDED**  
 SUITABLE FOR LOCATIONS WHERE GATHERING OF MANY PEOPLE IMPROBABLE

SP741-07.02



**WELDED FENCE**



**NOTES:**

1. ALL DETAILS NOT SHOWN SIMILAR TO SP741-07.01.
2. SEE NOTES ON SP741-07.01.

NOT TO SCALE  
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No.	Revision	Date
A	GENERAL REVISIONS, SLIP JOINT FENCE DELETED	FEB 2016



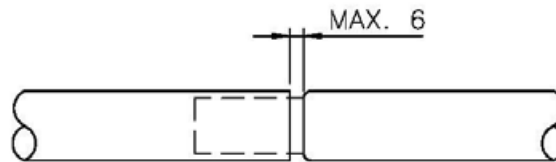
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## FENCE – WELDED OR SLIP-ON RAIL SPLICE

SP741–07.03

MECHANICALLY REDUCED  
PIPE SECTION, OUTSIDE DIA.  
REDUCED TO BE ABLE TO  
SLIDE INTO NORMAL PIPE  
SECTION WITH 2mm CLR.

SWAGE PIPE ENDINSTALLATION OF SWAGE PIPE END

NOTE: SPLICE SPACING TO BE APPROX. 7 TO 9m, WITH RAIL TO BE  
CONTINUOUS OVER A MINIMUM OF TWO POSTS.

NOT TO SCALE  
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



Ministry of  
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## SECTION 751

### TOPSOIL AND LANDSCAPE GRADING

#### DESCRIPTION

**751.01 Scope** – This Section refers to those portions of work that are unique to the supply and placement of topsoil and subsequent finish grading. In this Section, the term "topsoil" is used to identify:

- On-Site topsoil: material stockpiled for use, or
- Imported topsoil, or
- Manufactured topsoil (Growing Medium), including Biosolids Growing Medium (BGM) or Biotic Soil Matrix (BSM) products where specified in the Contract.

#### 751.02 Related Work

- SS 754, Planting of Trees, Shrubs and Ground Covers;
- SS 757, Revegetation Seeding.

#### 751.03 References

- [Canadian Landscape Standard](#),
- [Canadian System of Soil Classification](#),
- [Canada Fertilizers Act and Fertilizers Regulations](#),
- [Canadian National Master Specification](#),
- [Weed Control Act & Weed Control Regulation](#),
- [B.C Field Sampling Manual](#),
- [Environmental Management Act - Organic Matter Recycling Regulation](#), and
- [Open Burning Smoke Control Regulation](#).

**751.04 Topsoil Supplied by the Contractor** – The Contractor shall advise the Ministry Representative of the sources of topsoil not less than seven days before any is used in the work.

The Contractor shall, at the Contractor's expense, acquire a soil analysis from an accredited soil testing laboratory, to verify that supplied material is within the requirements indicated. All soil tests shall follow the British Columbia Field Sampling and Environmental Lab Manual. Results of the soil test are to be submitted to the Ministry Representative prior to installation.

The Ministry Representative will approve all topsoil once it has met the standard required at the source.

#### MATERIALS

**751.11 General** – In this Section, a range of measurable physical and chemical properties are set out as being acceptable in a topsoil. Compliance with this Section shall be determined by testing for those properties. When imported or on-Site topsoil is used, it shall be tested and modified as necessary by a mixture of other components to bring its properties to within the range set in SS 751.16, or as stated in the Special Provisions. Topsoil shall not be prepared or handled in an excessively wet or frozen condition, or in any manner in which structure is adversely affected.

**751.12 Topsoil Types** – Three topsoil types are described in SS 751.13 through SS 751.15. Regardless of origin, all types shall conform to SS 751.16.

**751.13 On-Site Topsoil** – On-Site topsoil may be used, as specified in the Special Provisions, provided that it meets the standard set for imported topsoil and can be modified to meet the requirements set out for the specified topsoil. On-Site topsoil shall be defined as the existing "A" horizon containing accumulated organic matter. On-Site topsoil shall be tested prior to stockpiling. Upon approval by the Ministry Representative of the suitability of the on-Site topsoil for topsoil, a sufficient quantity of stripped on-Site topsoil shall be stockpiled where shown on the Drawings or in areas designated for stockpiling.

**751.14 Imported Topsoil** – Imported topsoil shall be of a sandy loam or loamy sand texture (no less than 50% sand by weight) containing between 4% and 15% organic matter (dry weight basis).

Imported topsoil shall be free of propagules of plant species designated as noxious under the [Weed Control Act & Regulation](#), and other invasive or undesirable plant species, as determined by the Ministry Representative.

At least 80% of imported topsoil shall pass a Tyler #10 sieve after appropriate crushing of structural units using accepted laboratory test methods.

**751.15 Manufactured Topsoil** – Manufactured topsoil is any soil or growing medium mixture with chemical and physical properties that fall within ranges required by this Section for a particular application.

Manufactured topsoil shall meet the requirements in the Organic Matter Recycling Regulation and conform to SS 751.16 or as specified in the Special Provisions.

**751.15.01 Biotic Soil Media (BSM)** – Where specified in the Contract, the BSM shall be designed as an alternative to topsoil and/or compost to accelerate development of

**SECTION 751**

depleted soils/substrates with low organic matter, low nutrient levels and limited biological activity.

BSM products used must be non-toxic with fibers that have been phytosanitized to eliminate potential weed seeds and pathogens prior to the introduction of soil building components.

BSM products shall not be used for erosion control and shall be applied to enhance vegetation establishment and growth only.

Where erosion control is required, the BSM shall be installed in a two-phase process with the BSM hydraulically applied first with the seed, then covered with an erosion control product. BSM products may also be applied dry with broadcast seeding methods. Refer to SS 757.

**751.16 Requirements for Topsoil** – Acceptance of commercially processing and mixing of topsoil components shall only be from a facility operating under a valid permit under the Environmental Management Act. The resulting product shall be a homogenous mixture having the required properties throughout.

The general amendment of any topsoil by mixing in situ with rototill cultivation equipment or using equipment with tracks to ensure mixing and good contact with subsurface soils after placement, is acceptable if carried out to the satisfaction of the Ministry Representative. Fertilizers typically used at time of seeding or planting will be surface applied and incorporated as described in SS 751.33.

The Contractor shall also require the laboratory to include recommendations for incorporating fertilizers and other soil amendments into the topsoil as needed for plant establishment and maintenance, and as they specifically relate to:

- grassed areas;
- ground covers, shrubs and trees;
- container or planter box installations; and,
- to site conditions and season of planting.

Refer to Table 751-A for required properties of growing medium for different applications.

**715.16.01 Specific Requirements** – Other specific requirements are as follows:

**(a) Fertility:**

- (i) **Nitrogen** – total nitrogen shall be 0.2% to 0.6% by weight.
- (ii) **Phosphorus** – available phosphorus shall be 20 to 250 ppm.
- (iii) **Potassium** – available potassium shall be 50 to 1000 ppm.
- (iv) **Boron** – concentration in saturation extract shall not exceed 1 ppm

**TOPSOIL AND LANDSCAPE GRADING**

**(b) General:**

- (i) **Acidity** – in accordance with Table 751-A. Maximum of 0.5 kg/m<sup>2</sup> of dolomite lime to achieve the required pH level.
- (ii) **Salinity** – saturation extract conductivity shall not exceed 3.0 mmho/cm at 25°C. Sodium absorption ration (SAR) as calculated from analysis of saturated extract shall not exceed 8.0.
- (iii) **C/N Ratio** – carbon to nitrogen ratio shall not exceed 40:1.
- (iv) **Texture** – in accordance with Table 751-A.
- (v) **Organic Content** – in accordance with Table 751-A.

**Table 751-A: Properties of Topsoil for Different Applications**

Properties	Low Traffic Lawn Areas Trees and Large Shrubs	Planting Areas, Planters, Shrub and Groundcover Areas
<b>Texture:</b> by particle size classes <sup>1</sup>	Percent of Dry Weight Mineral Fraction (%)	
• <u>Coarse Gravel</u> > 19 mm < 40 mm	0 – 3	0 – 3
• <u>All Gravel</u> > 2 mm < 40 mm	0 – 10	0 – 10
• <u>Sand</u> (0.05 to 2 mm)	30 – 70	30 – 70
• Silt & Clay combined	Maximum 60%	Maximum 60%
<b>Acidity (pH)</b>	6.0 – 7.0	4.5 – 7.0
<b>Drainage:</b> Minimum saturated hydraulic conductivity (cm/hr) in place	2.0	2.0
<b>Organic Content:</b> Percent of Dry Weight (%)	2 – 10	5 – 20

<sup>1</sup> Note: Per the Canadian Landscape Standard and Canadian System of Soil Classification

## SECTION 751

## TOPSOIL AND LANDSCAPE GRADING

(vi) **Sawdust** - Cedar or redwood sawdust shall not be present in the topsoil.

(vii) **Deleterious Materials** - Soil shall be virtually free from subsoil, wood including woody plant parts, toxic materials, stones over 30 mm, foreign objects, and propagules of plant species designated as noxious under the Weed Control Act & Weed Control Regulation, and other invasive or undesirable plant species, as determined by the Ministry Representative,

(viii) **Drainage** – in accordance with Table 751-A. Drainage of growing medium can be measured only after growing medium is in place. Mixing and handling of growing medium shall be done in such a manner that the minimum saturated hydraulic conductivity indicated is achieved.

**751.17 Soil Amendments** – The following soil amendments shall be added to the topsoil as required.

**751.17.01 Peat Moss** – Peat moss shall be Horticultural grade, partially decomposed fibrous or cellular stems and leaves of sphagnum mosses with a texture varying from porous to spongy fibrous, fairly elastic and substantially homogeneous with pH value not less than 3.5 and not greater than 6.5, medium to coarse shredded, suitable for horticultural purposes.

**751.17.02 Sand** – Sand shall be clean river pump sand or alternative source approved by the Ministry Representative, free of impurities, chemical or organic matter.

Particle size in sand shall be as follows:

- 95 – 100% passing a 4.75 mm sieve;
- 0 – 40% passing a 0.600 mm sieve;
- 0 – 5% passing a 0.075 mm sieve.

**751.17.03 Manure and Compost** – Manure shall be well-rotted farm animal manure or mushroom manure, rotted to the extent that the material is crumbly. Manure shall be free from propagules of plant species designated as noxious under the BC Weed Control Act & Regulation, and other invasive or undesirable plant species, rocks, sticks, rubble, and shall contain not more than 40% composted sawdust, straw or shavings.

Commercial compost shall be free from propagules of plant species designated as noxious under the BC Weed Control Act & Regulation, and other invasive or undesirable plant species, as determined by the Ministry Representative, coliform, pathogens and chemical or toxic contaminants. Physical contaminants such as rocks, plastic, metal or glass shall be less than 0.5%. Compost shall not be derived from or contain processed municipal sewage sludge (i.e. biosolids), unless such product is authorized for use by Provincial Environmental Agencies, and meets all local regulations and approvals.

**751.17.04 Wood Residuals** – Raw sawdust and wood waste are not acceptable components of topsoil. Wood residuals used as a component of topsoil, compost, farm animal manure or mushroom manure are acceptable provided they are rotted and the total Carbon to total Nitrogen ratio for the topsoil is a maximum of 40:1.

**751.18 Fertilizers** – Fertilizers shall be standard commercial brands, meeting the requirements of the Canada Fertilizers Act and Fertilizers Regulations.

All fertilizers shall be in granular, pelleted or prill form, and shall be dry, free-flowing and free from lumps.

Fertilizers shall be packed in standard waterproof containers, clearly marked with the name of the manufacturer, weight and guaranteed analysis.

All fertilizer shall be stored in a weatherproof storage place and in such a manner that it will stay dry and its effectiveness will not be impaired.

The types, formulations, and rates of application for fertilizers and liming agents to topsoil supplied by the Contractor shall be as recommended by a laboratory soil specialist on the basis of tests of the topsoil, and as approved by the Ministry Representative.

Substitutions or variations in fertilizers and methods shall be made only upon pre-approval by the Ministry Representative.

**751.19 Fill Material** – Fill Material shall not be toxic to plant and animal life in part or in concentration and may not contain invasive knotweed plant material (*Polygonum* or *Fallopia* spp.).

## CONSTRUCTION

### 751.31 Area Preparation

**751.31.01 Stripping of Topsoil** – Existing top soil material, shall be stripped and removed to stockpile(s) within the project area at least 10 m from water unless otherwise approved by the Ministry Representative, kept properly drained, and maintained in a neat and presentable condition free of spoil, propagules of invasive plants and other weedy species and subsoil material for subsequent spreading on prepared rough graded areas.

Sites chosen for storage of topsoil shall be free of noxious weeds and invasive plants. If invasive plants or noxious weeds are present at a storage site, propagules shall be removed prior to stockpiling topsoil at the site.

If topsoil is planned to be or actually is stockpiled for more than one month, those stockpiles must be covered or seeded to prevent erosion and invasive plant or noxious weed establishment.

Stockpiled topsoil shall be inspected for the presence of invasive plants or noxious weeds prior to spreading onto

## SECTION 751

## TOPSOIL AND LANDSCAPE GRADING

prepared rough graded areas, and any topsoil containing noxious weeds shall either be treated prior to use to remove all propagules or disposed of appropriately at the contractor's expense, unless the Ministry Representative authorizes its use as fill elsewhere on the project. Topsoil containing knotweed plant material (*Polygonum* or *Fallopia* spp.) shall not be used as fill.

The storage of topsoil shall not interfere with the effective utilization of a granular source or borrow pits. See also SS 165.06.02 Placement of Stripped Material.

**751.31.02 Preparation of Landscape Area Subgrade** – This Section applies only to grading of landscaped areas outside the roadway prism.

Rough grading shall be carried out by necessary cutting and filling work to produce the lines and grades shown on the Drawings and as directed by the Ministry Representative, allowing for the stipulated new topsoil thickness.

Surplus excavated material shall be removed from the Site and disposed of at the Contractor's expense unless the Ministry Representative authorizes its use as fill elsewhere on the project.

The landscape area subgrade shall be prepared to a consistent 80 – 85% Standard Proctor maximum dry density in accordance with ASTM D698.

Soft and unstable areas below the landscape area subgrade that cannot be compacted to this standard shall be excavated and filled with suitable fill material, except in locations where special environmental conditions have been identified. In such cases, appropriate alternative solutions shall be approved by the Ministry Representative and Environmental Agencies as required and carried out.

Debris, roots, branches, stones, building material, contaminated subsoil, visible invasive plants or weeds and anything else that may interfere with the proper growth and development of the planned finished landscaping shall be removed.

Fill materials shall be placed so as to achieve stability. This may necessitate placing in lifts of 225 mm and compacting each layer to 80 – 85% Standard Proctor maximum dry density.

Grade transitions of landscape area subgrade should be smooth and even and shall be such that ponding cannot occur on the landscape area subgrade surface.

Existing landforms shall be warped and blended into the landscaped areas with a minimum of visual disharmony.

**751.31.03 Fine Grading** – Areas requiring topsoil shall be fine graded by raking out spoil material and debris such as rocks, asphalt and concrete over 50 mm in diameter.

Naturalized areas not requiring topsoil shall be similarly cleaned, raked and manicured.

**751.31.04 Scarifying** – All landscape area subgrade shall be scarified to a minimum depth of 150 mm perpendicular to the slope immediately before placing topsoil.

**751.31.05 Cleanup** – All unsuitable material and inorganic debris shall be removed from the project area by the Contractor unless the Ministry Representative authorizes its use in fill areas on the project.

All surplus or unsuitable organic waste and debris shall be removed from the Site and disposed in a suitable location unless its complete burning is approved by the Ministry Representative in compliance with the B.C. Open Burning Smoke Control Regulation.

**751.32 Placing Topsoil** – The landscape area subgrade shall be inspected and approved by the Ministry Representative, before topsoil is placed.

The topsoil shall be:

- placed over the prepared landscape area subgrade and shall be allowed to settle or be compacted by light rolling such that it is firm against deep footprints and shall not be compacted more than necessary to meet this requirement;
- moist (25% to 75% of field capacity) but not wet when placed, and shall not be handled if frozen or wet such that its structure will be altered;
- manually spread around trees, shrubs and obstacles;
- evenly spread to a depth which after settlement or light compaction will be that shown in the Drawings or as directed by the Ministry Representative.

During hauling and spreading, the paved roadway and other finished surfaces including subgrade under future base courses shall be kept clean and free of all topsoil.

Placement of manufactured soil shall follow the manufacturer's specifications.

**751.33 Applying Fertilizers** – Fertilizers and soil amendments shall be added to bring topsoil fertility within the ranges set out in this Section or as specified in the Special Provisions.

Manufactured topsoil and processed imported topsoil will typically have fertilizers and amendments incorporated at the time of mixing and screening, while other topsoil will receive in situ amendment.

Fertilizers normally applied at the time of seeding and planting are specified under the appropriate sections. These fertilizers are generally supplemental to the base fertility requirements outlined for topsoil and are applied after topsoil is in place.

Surface applied fertilizers shall be evenly spread over the topsoil with a suitable mechanical spreader and fully incorporated to a minimum depth of 50 mm.

## SECTION 751

Lime used for top dressing shall be thoroughly cultivated into the top 100 mm of topsoil.

**751.34 Finish Grading** – After placing the topsoil to the finish elevations and contours required, the grade shall be finished to a high standard, to the grades shown on the Drawings with a smooth and even surface. Rough spots and low areas shall be eliminated to ensure positive surface drainage, and the surface shall be left smooth, uniform, free of debris and firm enough to resist deep footprinting.

Topsoil placed in traffic islands and medians shall be crowned for drainage, as shown on SS Drawing SP751-01.

### MEASUREMENT

**751.81 General** – Measurement for the supply of topsoil by the Contractor will be by the CUBIC METRE in the truck at the point of delivery. Topsoil removed from stockpiles will be measured in place in the stockpile.

The placing of topsoil will be measured by the SQUARE METRE for the stipulated topsoil thickness, unless stated otherwise in the Special Provisions.

## TOPSOIL AND LANDSCAPE GRADING

### PAYMENT

**751.91 General** – Payment for TOPSOIL supplied by the Contractor will be at the Contract Unit Price bid per cubic metre. The Unit Price bid for topsoil supplied by the Contractor shall be accepted as full compensation for all handling, any necessary screening and testing of topsoil, and for delivery and off-loading on the area to be topsoiled.

Payment for TOPSOIL SPREADING will be at the Contract Unit Price bid per square metre. The Unit Price bid for topsoil spreading shall be full compensation for all labour and equipment required for the specified preparation, spreading, and finish grading of the topsoil, and for all incidental work not required to be separately paid for.

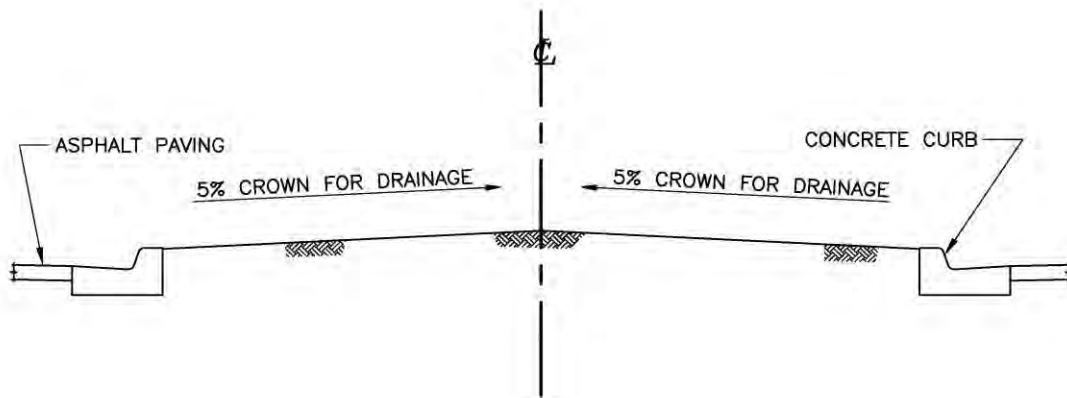
Separate prices may be included in the Contract to cover the area preparation work such as:

- clearing and grubbing,
- stripping existing topsoil and removal to stockpile,
- rough grading and fill,
- naturalizing with fine grading,
- rotovating and soil conditioning, and
- trenching for irrigation and sub-soil drainage systems.



CROWNING DETAIL FOR ISLANDS & MEDIANS

SP751-01



NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

## SECTION 754

### PLANTING OF TREES, SHRUBS, AND GROUND COVERS

#### DESCRIPTION

**754.01 Scope** – This Section refers to those portions of the work that are unique to the supply and planting of trees, shrubs and ground covers, including seeded and sodded areas that are not designated for treatment under SS 757 “Revegetation Seeding”. This Section must be referenced and interpreted simultaneously with all other Sections pertinent to the works described herein.

#### 754.02 Related Work

- SS 751, Topsoil and Landscape Grading;
- SS 757, Revegetation Seeding.

#### 754.03 References

- [Canadian Nursery Stock Standard](#) (Canadian Nursery Trades Association),
- [BC Weed Control Act & Regulations](#),
- [Integrated Pest Management Act & Regulation](#),
- [Canada Seeds Act & Seeds Regulations](#),
- [Fertilizers Act & Fertilizers Regulations](#),
- [British Columbia Standard for Turfgrass Sod](#), and the
- [Silviculture Manual](#) (Ministry of Forests, Lands, Natural Resource Operations, and Rural Development).

#### 754.04 Guarantee/Maintenance

**754.04.01 Commencement** – The Contractor shall guarantee and maintain all materials and quality of work for a period of one full year, commencing when the following conditions have been met:

- (a) the supply and installation of all plant materials have been completed as per SS 754.43,
- (b) all seeding/sodding has been completed (but is not necessarily yet established), and
- (c) installation and hydrostatic testing of the irrigation system have been completed as per SS 766.42, and the system is fully operational.

**754.04.02 Scope** – The guarantee includes replacing all plants as determined by the Ministry Representative which are found dead or failing during the entire maintenance and guarantee period. Replacements shall be made immediately unless otherwise directed by the Ministry Representative, and conditions of the guarantee shall apply to all replacement seeding for one full growing season.

Approval of plant material at the source does not preclude rejection of non-conforming stock on the Site prior to, or after planting.

The guarantee shall not apply to plants and planted areas damaged after Acceptance by causes beyond the Contractor's control, such as vandalism, "acts of God", "excessive wear and tear", or abuse.

#### MATERIALS

**754.11 Source Quality Control** – The Contractor shall notify the Ministry Representative of the sources of plant materials to be supplied at least two weeks prior to commencing the landscape work. All non-seed plant materials shall be made available for inspection at the nursery by the Ministry Representative upon at least three days notice. Field grown material is not to be dug prior to inspection. All materials shall be free of plant species designated as noxious under the BC Weed Control Act & Regulation, and other invasive or undesirable plant species as determined by the Ministry Representative.

Approval of plant material at the source does not preclude rejection of non-conforming stock on the Site prior to, or after planting.

Imported plant material shall be accompanied by all necessary permits and import licences and shall conform to federal and provincial regulations.

It shall be the Contractor's responsibility to ensure that all regulations pertaining to the import of plant materials or their movement to or from a particular region of the province are adhered to, and all inspection certificates required by the Ministry of Agriculture are completed to the satisfaction of that Ministry.

#### 754.12 Transporting Plants to Site

##### 754.12.01 Dormant Period

- (a) **Deciduous: Bare Root Stock** (only in dormant period): Adequate protection shall be given in order to preserve moisture around the root system. For short transit period, four hours or less, maximum temperature in the truck shall not be above 20°C. In all cases, at all times, roots should be protected from frost, wind and sun (e.g., a closed van with wet straw or other suitable packing material protecting the roots). The temperature shall be maintained as uniformly as possible by mechanical means, or in any event to prevent frost damage to roots. The appropriate temperature range shall be between 1°C and 10°C.

(b) **Evergreens:** It is recommended that root balls not be subjected to freezing temperatures below  $-5^{\circ}\text{C}$  for a period longer than four hours. Plants shall be protected to prevent desiccation by wind and sun.

**754.12.02 Non-Dormant period** – Deciduous and Evergreen plant material shall be transported in a closed van or well-covered truck with a tarp or similar material in order to protect the leaves or needles from windburn. When in transit, with protection of a tarp cover only, it is recommended that foliage be sprayed with an antidesiccant. For the above material in transit for more than three days, it shall be unloaded and then stored away from direct sun for 24 hours to avoid leaf burning.

**754.13 Unloading and Handling Procedures** – Plants shall be carefully handled to minimize disturbance to root systems and damage to stems and branches. Plants shall not be dropped to the ground when unloading. Plant material that is mishandled and showing evidence of damage to root balls, or undue damage and breakage to top growth will be rejected.

Plants are to be kept in a moist condition at all times. All plants shall be well protected against physical damage and desiccation until they are planted on the Site.

**754.13.01 B.R. (Bare Roots) Stock** – Roots shall be covered and protected immediately from frost, sun and wind.

**754.13.02 Stock in Pots/Containers** – Shall be handled as much as possible by pots only in order to reduce breakage of branches/leaves.

**754.13.03 Balled & Burlapped (B & B) Material** – Plants shall be handled by holding the root ball and supporting the stem to minimize disturbance to the root ball and damage to stems and branches.

**754.13.04 Material in Wire Basket** – Specimen trees shall be lifted and supported by the wire basket and not by the trunk.

All plants shall be promptly unloaded, and their condition checked immediately upon arrival. Watering shall be provided as required and necessary pruning of minor breakage on branches performed.

**754.13.05 Protection Against Stem and Branch Damage** – During loading, transportation, off-loading and planting, all trees shall be protected against damage to stems and branches. This applies particularly to larger wire-basketed trees.

Bark shall be protected against chafing and cuts by providing a wrapping of cardboard, sackcloth or other material as appropriate and when required.

**754.13.06 Sod** – Sod shall be protected during transportation to prevent drying out and shall arrive at the site in a fresh and healthy condition.

#### 754.14 Storage

**754.14.01 Storage During Growing Season** – All plants in containers, balled and burlapped, or in wire basket, if not

planted within three days, shall be stored in an upright position in an area providing even light and offering protection from wind and sun scald. Enough space shall be provided between plants so that light reaches all around to the bottom of the plant in order to avoid leaf burning when planted out.

(a) **Sod** – Sod shall be installed as soon as possible after delivery. If there is a delay of more than 24 hours, the sod shall be properly stored and kept moist and cool until it is placed. Sod shall not be stacked more than three levels high while being stored.

(b) **Balled and Burlapped Material** – Special attention shall be given to the root ball, and unless weather is rainy or cool, root balls shall be protected by covering with material suitable to protect them from drying out (e.g. sawdust, peat moss, topsoil). Plants intended to be planted in the open shall not be kept stored in a building or any area of low light intensity for a period exceeding seven days. All plants shall be kept well watered and protected from heat and frost.

(c) **Containerized Plants** – In extreme weather, freezing or high dry heat, the containers shall be buried in a protective medium. Plants intended to be planted in the open shall not be kept stored in a building, truck or any area of low light intensity for a period exceeding seven days during the growing season.

**754.14.02 Storage During Dormant Period** – Plants shall be cared for according to each plant's requirement for winter protection, and according to geographical location.

#### 754.15 Plant Material

**754.15.01 Species** – Selection of species shall be as specified. Every effort shall be made by the Contractor to obtain the plant material specified. Where evidence is submitted that a specified plant cannot be obtained, substitutions in kind, size and grade shall be made upon written approval by the Ministry Representative.

**754.15.02 Origin and Requirements** – All plant material shall be nursery grown stock or approved collected native plants unless specified otherwise. Plant material will be inspected by the Ministry Representative upon delivery to the Site.

All nursery grown plants shall, as a minimum, comply with the Canadian Nursery Landscape Association Specification "Canadian Nursery Stock Standard" with respect to sizing, grading and quality.

Plants shall be true to name, type and form and shall be representative of their species and variety.

All plants shall be sturdy stock, with tree and shrub heights proportional to trunk caliper, overall plant width and size of root ball, as determined by the Ministry Representative. Plants that are weak and thin, and those showing effects of

being grown too closely together or poorly maintained, will not be accepted.

Plants shall be vigorous and healthy with normal, well developed branches and good fibrous root systems and be free from decay, physical injury, disease and insect damage and infestation.

In particular, conifers shall have a healthy, single leader with well shaped whorls of vigorous, newly growing branches and shall exhibit natural growth habit characteristic of the species and variety. Trees sheared as Christmas trees are not acceptable.

The root balls of dug material and the soil of containerized plants shall be free from pernicious perennial weeds. All balled and burlapped plant stock shall be supplied in biodegradable root ball sacking.

The search area for plants shall include, but not necessarily be limited to, the provinces of British Columbia, Alberta and the states of Washington, Oregon, California (northern portion), Idaho and Montana. All plant material being sourced from milder areas shall be properly "hardened off" prior to shipping and planting.

**754.15.03 Nursery Grown Stock** – All plants specified "Container" shall be grown for the length of time necessary to permit the roots to fill and hold the soil within the container, as required by the Canadian Standards for Nursery Stock.

Similarly, all field dug material will show evidence of having been root pruned to encourage fibrous root system development and resulting in root balls that retain their integrity during handling.

Forestry seedlings shall be supplied and handled in accordance with the requirements of the [Silvicultural Manual](#), Ministry of Forests, Lands, Natural Resource Operations, and Rural Development, Province of B.C..

All plant material shall be appropriately identified and individually labelled with weatherproof tags. In the case of small containerized plants such as ground covers and bundled bare root seedlings, which are supplied in large numbers, labelling shall be limited to identification of group lots as permitted by the Ministry Representative.

**754.15.04 Collected Plant Stock** – The Contractor shall provide either permits or verification that permission was obtained for collecting native and/or introduced plant materials. Information shall be supplied on where, when and how collection was made.

All collected plant material shall have been grown and maintained in a nursery environment for a minimum of one growing season, unless, at the sole discretion of the Ministry Representative, certain species are approved for a lesser period of time. As for nursery grown stock, collected plants shall be held long enough prior to planting to allow roots to fill the container or the dug root ball and to retain the soil within.

Collected plant stock shall be appropriately labeled with weather proof tags for easy identification at the job site.

**754.15.05 Seed** – Seed quality and type shall conform to that specified in the Special Provisions.

All other requirements are per SS 757 Revegetation Seeding.

**754.15.06 Sod** – Sod shall be nursery grown, true to type and conform to the British Columbia Standard for Turfgrass Sod, and the general requirements of the Canadian [Nursery Stock Standard](#).

Sod grade shall be as specified in the Special Provisions.

**754.16 Water** – Water shall be clean and potable and shall be supplied by the Contractor.

**754.17 Fertilizer** – Fertilizer shall comply with the provisions of the Canada Fertilizers Act and Fertilizer Regulations. Fertilizer shall be supplied to the specifications in the Special Provisions.

**754.18 Bark Mulch** – Bark mulch shall be sized 25 mm and minus, Douglas Fir or Hemlock bark chips and fines, or a combination of both types and of the quality used for decorative landscape mulching purposes. It should be free of chunks and sticks, dark brown in colour and free of all soil, stones, roots or other extraneous matter.

**754.19 Backfill Topsoil** – Backfill topsoil for planting operations shall conform to the requirements of SS 751 – Topsoil and Landscape Grading.

**754.20 Other Materials** – When required, various other materials such as soil amendments, erosion control products, hydraulic mulches, etc. shall be supplied to the specifications in the Special Provisions.

## CONSTRUCTION

**754.31 Scheduling** – Work shall be scheduled to meet the milestone dates provided in the Special Provisions, and to ensure its execution meets the requirements of living plant material.

The work shall be co-ordinated with the schedule of other [trades and](#) be well integrated with other specific requirements such as Sediment and Drainage Management Drawings, which may be provided for any given project.

**754.32 Pre-planting Operations** – The plant material shall be approved by the Ministry Representative prior to installation. The Contractor shall ensure that all requirements of SS 754.11 through SS 754.15 have been met and that any minor damage to plant stock is taken care of through appropriate pruning or other measure. When directed by the Ministry Representative, the Contractor shall apply anti-desiccant to large conifers and deciduous trees that are in leaf. Application will be in accordance with the manufacturer's instructions for the particular product.

All invasive plants on site shall be removed or controlled prior to planting, seeding or installation of sod.

**754.33 Location of Planting** – Locations, quantities and spacing of trees, shrubs, vines and groundcovers as shown on the Drawings shall be considered approximate and may be adjusted by the Ministry Representative to meet field and recommended micro-site conditions as specified in the Silviculture Manual. Tree numbers, spacings and locations will vary according to the Site conditions and amenities. The Contractor may adjust plantings to meet field conditions, with the approval of the Ministry Representative. Locations shall be staked as shown on the Drawings and verified on Site with the Ministry Representative prior to planting. If underground obstructions are uncovered, they shall be reported to Ministry Representative for resolution.

#### 754.34 Area Preparation

**754.34.01 Finish Grade Preparation** – The Contractor shall verify that grades are correct. If discrepancies occur, the Ministry Representative shall be notified, and work shall be halted until otherwise instructed by the Ministry Representative.

**754.34.02 Planting Beds and Grass Areas** – Prepare planting beds and grass areas in accordance with SS 751 – Topsoil and Landscape Grading.

**754.34.03 Planting Holes** – Planting holes shall be dug in accordance with the specific requirements described below. The bottom of planting holes shall be scarified and loosened to a depth of 100 mm prior to placement of plants and backfill soil.

Subsoil, rocks, roots and extraneous material shall be removed from excavated material that will be used as planting backfill soil. Unsuitable or excess material shall be disposed of.

Holes dug by a mechanical tree spade shall have their sides scarified to loosen any compaction glazing caused by the blades. Planting holes shall be tested by filling with water. Inadequate drainage conditions permitting the retention of water in planting pits for more than 12 hours shall be reported to the Ministry Representative before proceeding with the work.

**(a) Free Draining Sub-Grade:** Where the subgrade and existing native surface soils are of good drainage and of a non-compacted nature, planting holes shall be excavated and prepared to allow the following depth of topsoil backfill underneath and around the root ball:

- (i) For plants up to and including 27 cm (#5) pot size – not less than 150 mm.
- (ii) For plants larger than 27 cm (#5) pot size – not less than 300 mm.

**(b) Poor Draining Sub Grade:** Where the subgrade and existing native surface soils are of poor texture and conditions are generally compacted, planting holes shall

be excavated and prepared to allow the following depth of topsoil backfill underneath and around the root ball:

- (i) For plants up to and including 27 cm (#5) pot size – not less than 300 mm
  - (ii) For plants up to 45 cm pot size – not less than 450 mm
  - (iii) For tree root balls larger than 45 cm – not less than 600 mm
- (c) Severely Compacted Conditions** – If severely compacted conditions are encountered, and surface or ground water entering the excavations does not drain, the Contractor shall correct the problem by:
- (i) providing a means of sub-surface drainage;
  - (ii) utilizing elevated planting techniques where some of the planting soil will be placed into a partial excavation and the remainder on the surface to meet the depth requirement for growing medium; or
  - (iii) considering alternate planting sites.

These alternatives shall receive prior approval by the Ministry Representative, as applicable to the Site.

**754.35 Time of Planting** – All planting operations shall be performed during the normal planting season for each type of material, and within the milestone dates provided in the Special Provisions, unless otherwise authorized in writing. During the specified timeframe, planting operations shall, as far as practicable, take advantage of soil and weather conditions favourable to the work. Late spring or early fall planting is recommended unless supplemental watering is available.

Planting shall occur when risk of frost or snowfall is minimal. Planting into frozen ground is not acceptable.

#### 754.36 Planting Procedures – Trees and Shrubs

**754.36.01 General Procedure** – Plants shall be installed so that after settlement they will be at the same planting depth they were at in the field or in containers. The soil mark on the stem is an indication of this, and it shall be flush with the finished level allowing for settling of the topsoil after planting and settlement. The entire root ball shall be covered with growing medium.

Once the bottom of the planting hole is scarified and the initial lift of backfill topsoil is placed, the holes shall be pre-watered and allowed to drain prior to installation of plant material.

Plants shall be set plumb in the planting beds or in the centre of the pits except where the plant's character requires variation from this.

The growing medium shall be placed in layers around the roots or ball, preferably by hand. Each layer shall be firmed to eliminate air void and ensure good soil contact with the roots. The process shall be carried out carefully to avoid injuring the roots or ball or disturbing the position of the plant.

Trees requiring staking shall have support stakes placed carefully between the roots before backfilling. Specifications for tree supports are described in SS\_754.

After the planting hole is filled with soil to ground level, the plant shall receive a thorough watering. A final backfill layer shall be applied to form a saucer-like berm around the circumference of the planting hole in order to catch and hold rainwater. This rain basin shall be maintained until final acceptance of the work.

Once planting and mulching is complete, the Site shall be cleaned of all excess soil, rock and debris.

#### **754.36.02 Specific Planting Requirements:**

(a) **Bare Root Stock** – The roots of bare root plant material shall be soaked in water prior to planting. During installation, the plant roots shall be evenly spread out over a cone of soil in the bottom of the hole, and the plant supported to the correct depth as backfilling takes place. The plant shall be gently shaken in a vertical motion to ensure that soil particles sift into the root system and establish close contact with the roots.

(b) **Container Stock** – Non-perishable, impervious containers such as plastic pots and tubs shall be removed from plants before planting. Once plants are removed from these containers, root systems shall not be disturbed with the exception of unraveling any roots starting to spiral around the root ball.

Bio-degradable containers such as peat or paper fibre pots shall not be removed before planting but shall be thoroughly soaked with water prior to placement in the holes. This will ensure that containers absorb subsequent watering and not repel it due to the presence of a dry barrier. The rim of such containers shall be not be exposed to the air, and when necessary, shall be removed after planting.

(c) **Balled and Burlapped Stock** – When backfill soil is placed to approximately two-thirds of the root ball height, the ties on the sacking shall be cut and the top portion of the burlap folded back carefully to avoid disturbing the integrity of the root ball. The sacking shall not be removed. The remainder of the hole will then be backfilled and firmed.

Where wire baskets are used to encase and support the root ball of supplied plant material, these shall not be removed. The top of the wire basket shall be cut away or completely folded back and buried without disturbing the integrity of the root ball.

(d) **Forestry Seedlings** – Planting of forestry seedlings shall be in accordance with the Silviculture Manual.

(e) **Tree Support** – All trees of a size requiring staking or guy wiring shall be supported in accordance with the details and instructions provided on Drawings SP754-04 through SP754-07 of these Standard Specifications. All

hardware required shall be installed without damage to plants.

Trees that are dislodged during the contract period shall be uprighted and re-secured as required. Trees that are damaged shall be replaced by the Contractor at the Contractor's expense.

**754.37 Seeding** – Application of seed, fertilizer, and other materials shall be at the rates specified in the Special Provisions.

The requirements for construction shall be in accordance with SS 757 Revegetation Seeding.

**754.38 Sodding** – The required fertilizer shall be applied at the rates specified in the Special Provisions and worked well into the topsoil prior to laying the sod.

Sod shall be laid within 24 hours after delivery unless proper storage arrangements can be made.

The sections of sod shall be laid close together with joints staggered. No open joints are to be visible, and no pieces are to overlap.

Sod shall be laid smooth and flush with the adjoining grass areas, adjacent hard surfacing, and the tops of curbs and planting bed liners, unless otherwise shown on the Drawings. All necessary cutting shall be done using sharp implements.

On slopes of approximately 2.5 to 1 and steeper, the sod shall be laid lengthwise across the slope, and the material secured with wooden stakes driven flush with the sod at intervals not exceeding 0.5 metres. There shall be at least three stakes per individual sod piece. On slopes of gradients between 2.5 and 1.5 to 1, the bottom three rows of sod and every third subsequent row shall be secured with stakes. For slopes steeper than 1.5 to 1, every sod course shall be staked. Stakes shall be removed before pedestrian traffic is permitted on the sod.

Sodded areas shall be rolled or suitably tamped to ensure a good bond with the topsoil, and then subsequently protected from heavy foot traffic or equipment travel.

Unless otherwise indicated, sodded areas shall be evenly watered within 12 hours of installation, and with sufficient quantity to saturate the grass and the upper portion of the topsoil.

**754.39 Watering** – All trees, shrubs, groundcovers, vines, and designated grass areas, shall be watered immediately after planting, and regular watering shall continue as required for plant health until final acceptance of the work.

**754.40 Pruning** – Pruning shall be limited to the minimum necessary to remove dead or injured tissue and branches interfering with desirable growth habit and overall health of the plant.

Pruning shall be done in accordance with proper horticultural practice, using clean, sharp tools appropriate to the task and in a manner that preserves the natural character of the plant.

## SECTION 754

## PLANTING OF TREES, SHRUBS, AND GROUND COVERS

**754.41 Mulching** – When specified in the Drawings and Special Provisions, individual tree pits and planting beds shall be mulched.

Mulching of tree pits and planting beds shall be carried out after watering, to an even depth of 50 mm after settlement, unless otherwise specified on the Drawings and in the Special Provisions.

**754.42 Clean-up** – All plant containers and waste materials resulting from landscaping and planting operations shall be removed from the Site and appropriately disposed of.

**754.43 Conditions for Acceptance** – The Contractor shall ensure that the following conditions are met for all planted and grassed areas.

### **751.43.01 Conditions**

- (a) Topsoil quality, fertility levels, depths and surface conditions are as set out in the Drawings and Specifications;
- (b) All plants are of the species and varieties specified and planted in the locations shown on Drawings;
- (c) All plants are healthy and growing vigorously. Seeded grass areas are sufficiently established into the underlying growing medium, are free of thin and bare patches, free of invasive plants, and are relatively free of other weedy species: not more than 5% in lawn areas, and not more than 15% in rough grass areas;
- (d) The water content in the topsoil, i.e. – when irrigation is provided, is to the satisfaction of the Ministry Representative;
- (e) Trees are supported, as specified;
- (f) Pruning is complete, in accordance with proper horticultural practice and to the satisfaction of the Ministry Representative;
- (g) All planting beds and tree pits are free of invasive plants and other weedy species;
- (h) Mulch is in place, as required;
- (i) Unmulched areas are cultivated to leave a loose, friable, water-permeable surface, and;
- (j) Maintenance procedures set out in SS 754.71 have been carried out.

## MAINTENANCE

**754.71 Maintenance** – The following maintenance operations shall be performed from the time of landscape installation, until the earlier of the Actual Completion Date and expiry of the landscape maintenance period as defined in the contract documents.

### **754.71.01 Maintenance Operations**

- (a) When specified, water shall be applied in sufficient quantity and by appropriate method to maintain optimum soil moisture conditions for healthy plant establishment, without causing surface soil erosion.
- (b) Invasive plant and weed control will be carried out, as required, to prevent competition with establishing planted material and to maintain the aesthetic appearance of landscaped areas. Invasive plants must be removed completely, unless otherwise stated in the Special Provisions or otherwise directed by the Ministry Representative. The presence of other weedy species in plantation beds, individual planting pits, and designated lawn areas, is limited to a maximum of 5% of the surface area at any given time, unless otherwise stated in the Special Provisions or otherwise directed by the Ministry Representative. The use of herbicides for the control of invasive plants must be approved by the Ministry Representative prior to use, and must be conducted under a confirmed Integrated Pest Management Plan, in accordance with the Integrated Pest Management Act and associated Regulations, and must be completed by a Certified Pesticide Applicator. The use of herbicides for control of other non-invasive weedy species is not permitted.
- (c) Mowing shall be carried out at regular intervals, as required, to maintain grass in the areas designated, and at the height(s) specified in the Special Provisions. Edges of areas designated “Lawn” shall be neatly trimmed. Excess clippings shall be removed immediately after mowing and trimming.
- (d) Fertility levels in planted and grassed areas shall be maintained in accordance with the requirements of the plant material.
- (e) Bark Mulch shall be maintained to the specified depth.
- (f) For non-mulched areas, the soil surface shall be cultivated, as required, to keep it loose and friable.
- (g) Establishment pruning to encourage proper shape and health of plants by removing dead or broken and interfering branches and diseased or damaged tissue.
- (h) Maintenance of tree stakes, guy wires and tree ties to prevent plant dislodgement and damage to trunk and branches.
- (i) All plant material shall be alive and maintained in a healthy growing condition during the entire establishment period. Plant material which has died or is not healthy, and in the opinion of the Ministry Representative, does not perform its function, will be removed and replaced by the Contractor at the earliest opportunity, weather and season permitting. Grassed areas that show deterioration or bare spots shall be repaired immediately. Unless otherwise directed by the Ministry Representative, all repair and/or replacement

## SECTION 754

## PLANTING OF TREES, SHRUBS, AND GROUND COVERS

shall be in accordance with the original specifications and requirements.

### MEASUREMENT

**754.81 Planting** – The unit of measurement for plants will generally be PER PLANT, unless otherwise specified in the Special Provisions.

**754.82 Seeding and Sodding** – The unit of measurement for seeded and sodded areas will generally be by the SQUARE METRE, unless otherwise specified in the Special Provisions.

**754.83 Mulch** – The unit of measurement for supply and installation of bark mulch will generally be by the SQUARE METRE for the stipulated mulch thickness, unless otherwise specified in the Special Provisions.

### PAYMENT

**754.91 General** – Payment for plants will be at the contract unit prices bid for PLANTING of the types, species and sizes

called for, and shall constitute full compensation for supplying and delivering plants; for supplying and delivering topsoil for plant backfill, fertilizer and all incidental materials; for digging holes for plants; for planting, pruning, staking and guying, mulching, rain basin formation, clean up after planting and maintenance of plants; and for all labour, equipment and tools and incidentals necessary to complete the work prescribed in this Section.

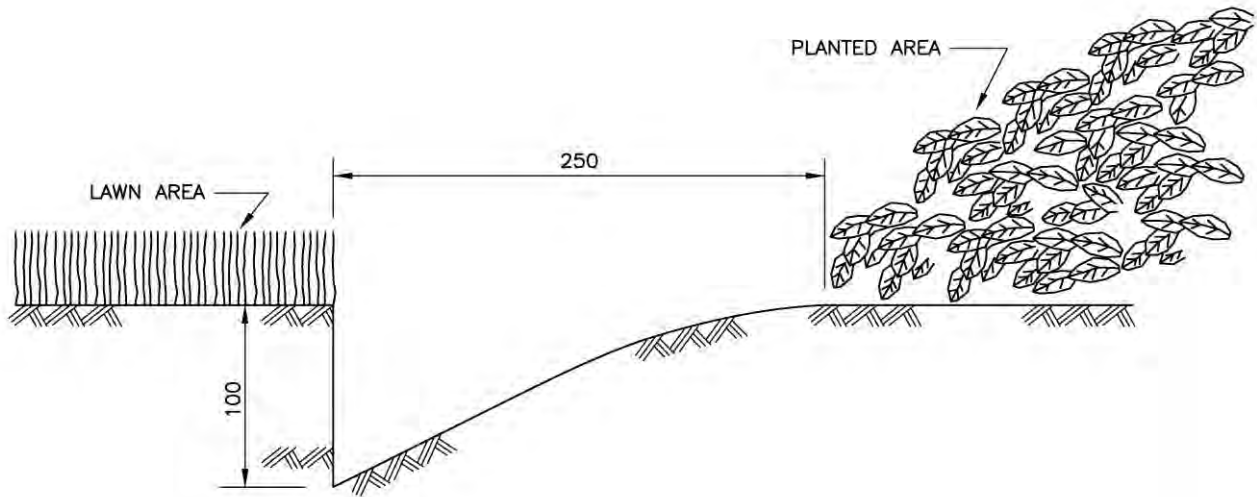
Payment for SEEDING and SODDING will be at the contract unit price bid per square metre. The unit price shall be full compensation for work described and all work subsidiary and incidental thereto for which separate payment is not elsewhere provided.

Payment for MULCHING will be at the contract unit price bid per square metre. The unit price bid for mulching shall be full compensation for all labour and equipment required for supplying and spreading of the mulch and for all incidental work not required to be separately paid for.



PLANTATION EDGING DETAIL

SP754-01

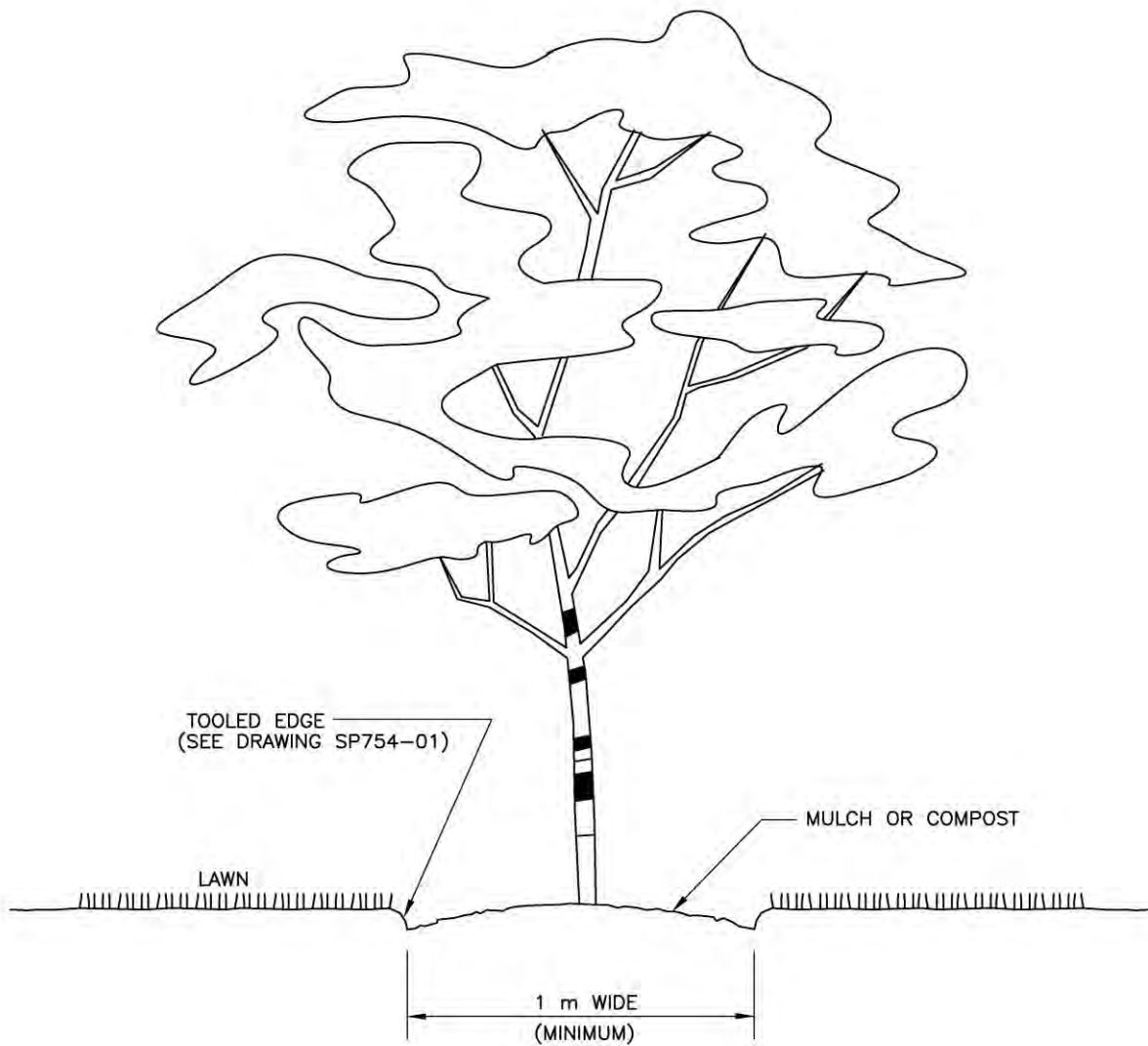


NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

TREES WITHIN LAWN AREAS

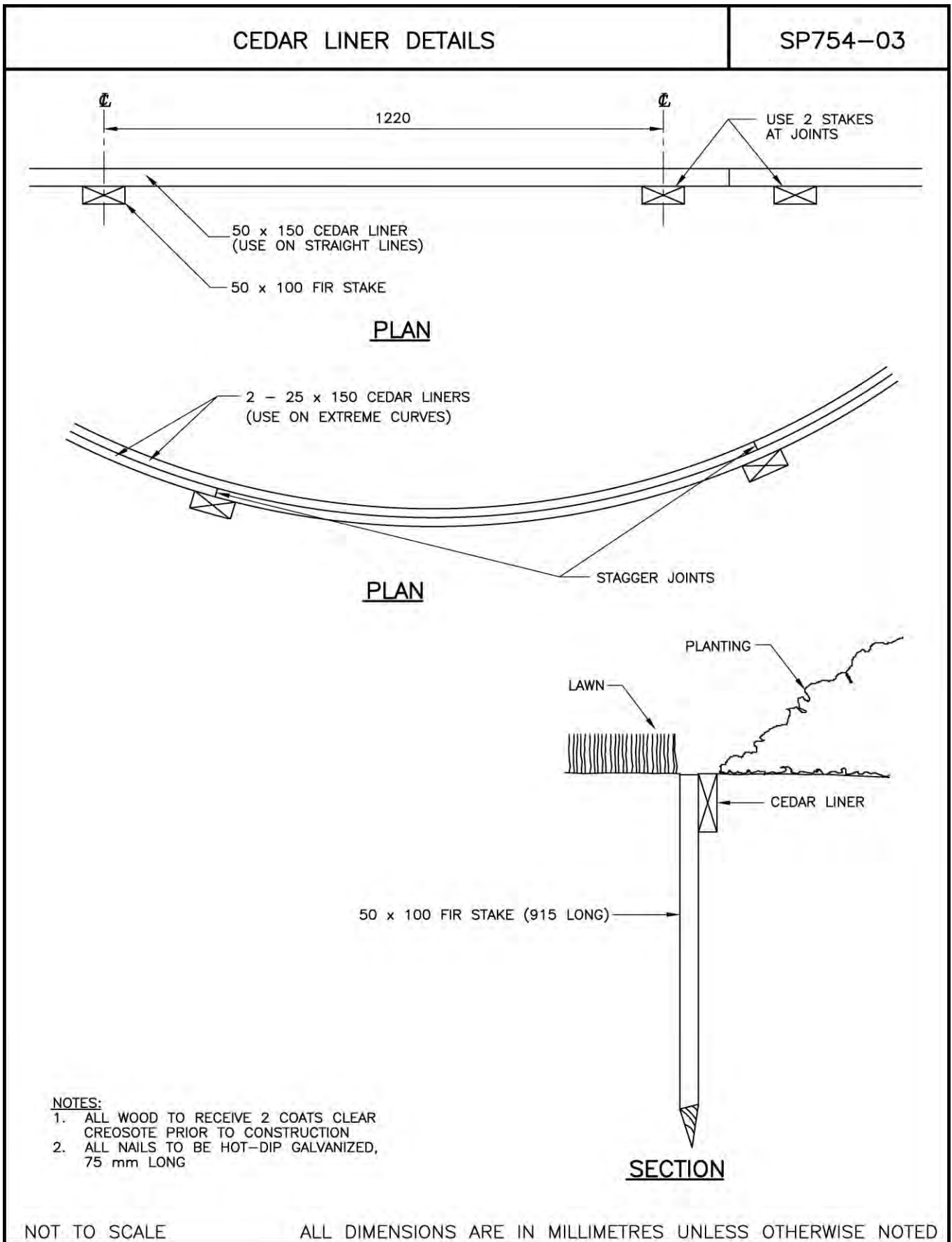
SP754-02



NOTE:  
MAINTAIN VEGETATION FREE BASE

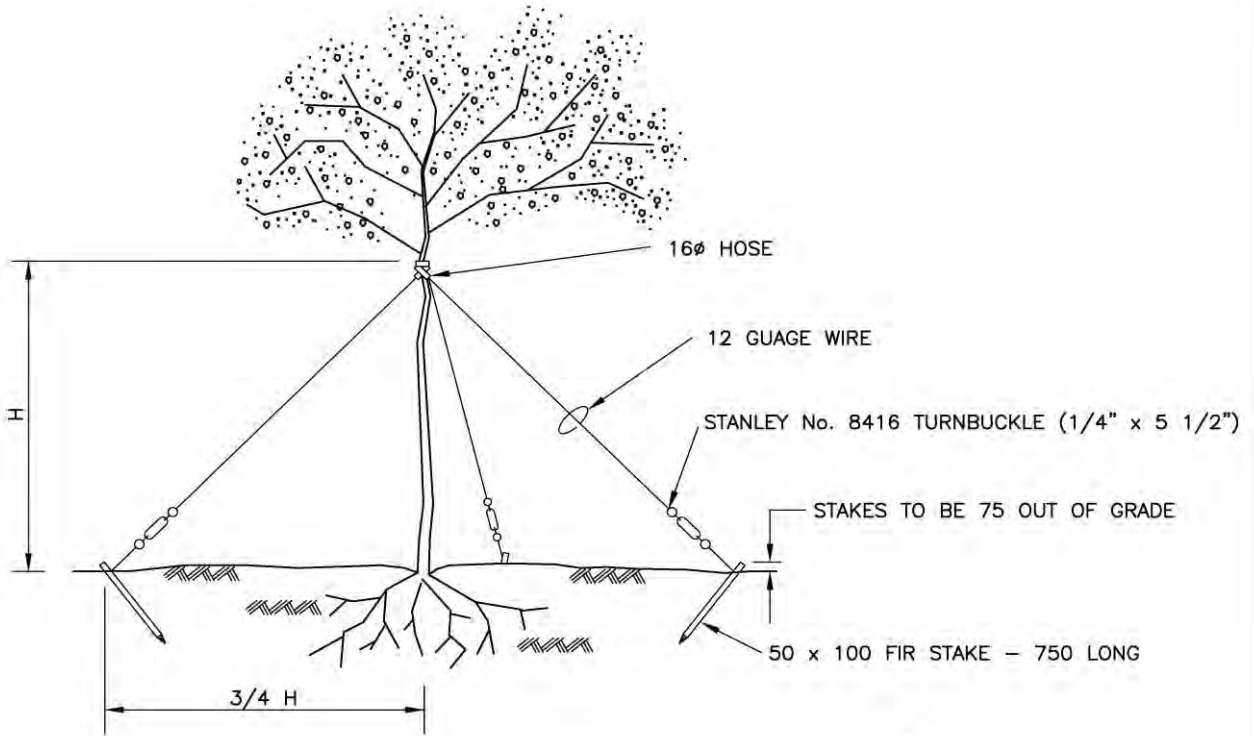
NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

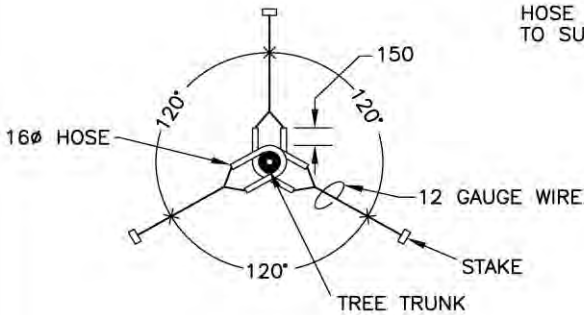


TRIPOD BRACING DETAIL

SP754-04



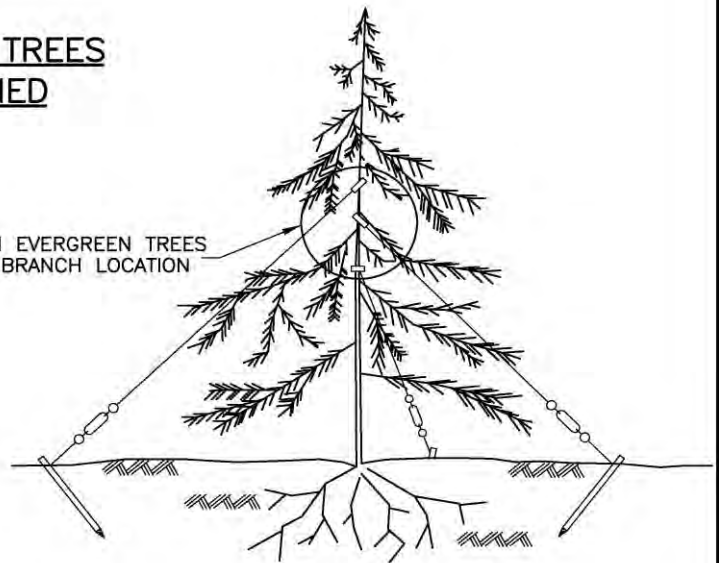
FOR DECIDUOUS TREES  
WHEN SPECIFIED



PLAN VIEW

TURNBUCKLES NOT SHOWN FOR CLARITY

HOSE ON EVERGREEN TREES  
TO SUIT BRANCH LOCATION



FOR CONIFEROUS TREES  
WHEN SPECIFIED

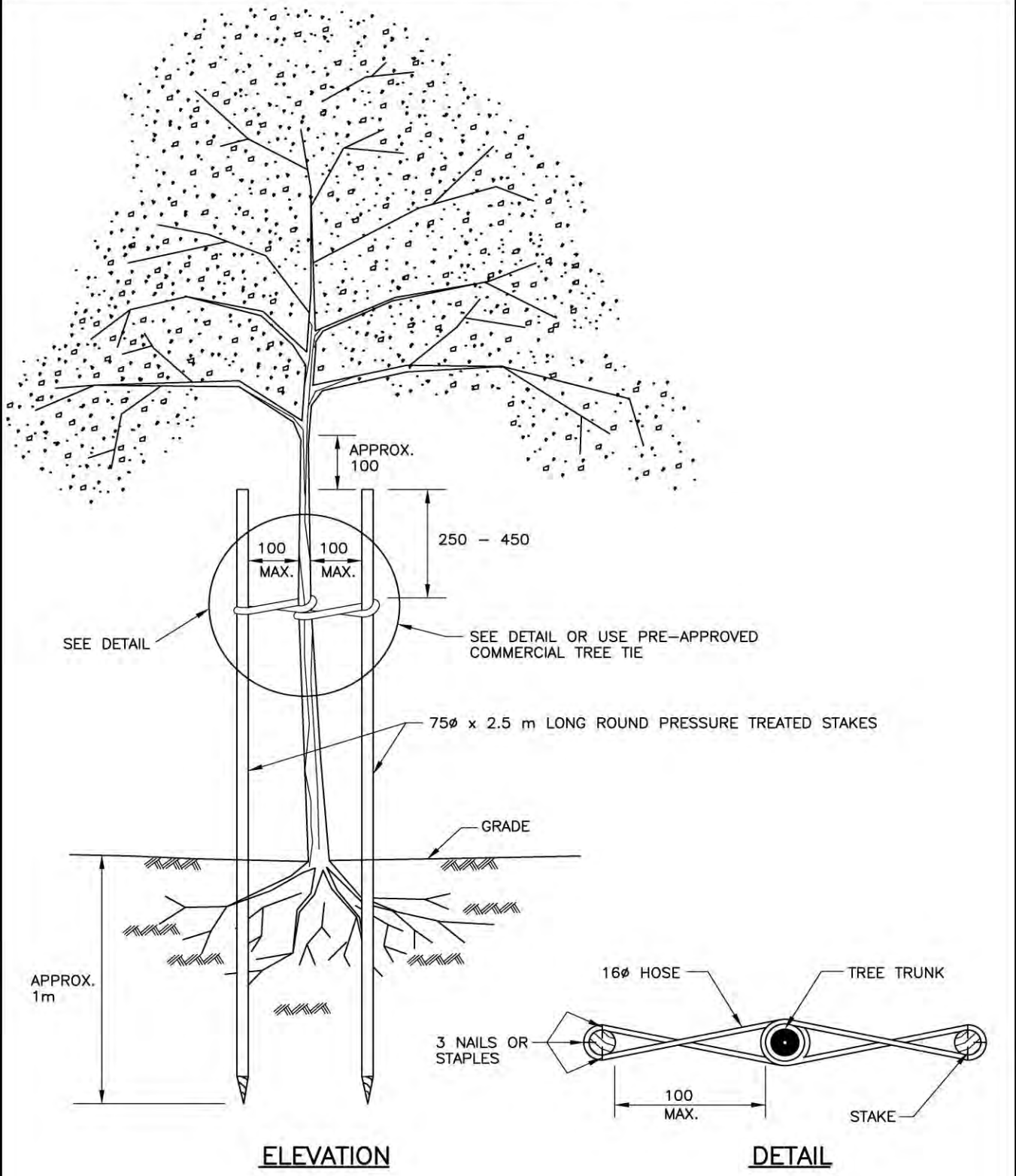
NOTE:  
TIGHTEN WIRE BY ADJUSTING TURNBUCKLES

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

DOUBLE TREE STAKES FOR TREES OVER 3 m HIGH

SP754-05

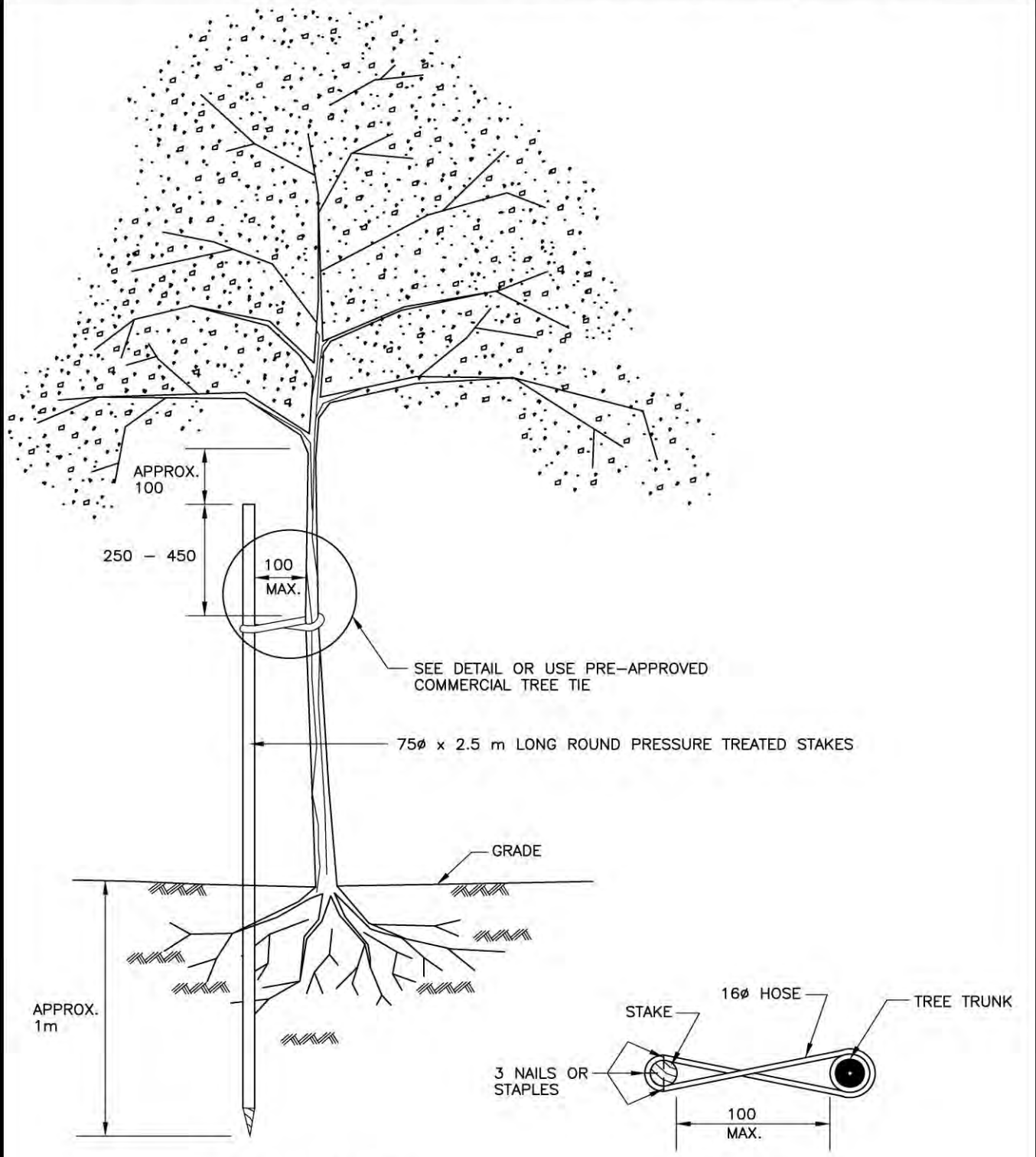


NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

SINGLE TREE STAKE FOR TREES 1.5 m TO 3 m HIGH

SP754-06



ELEVATION

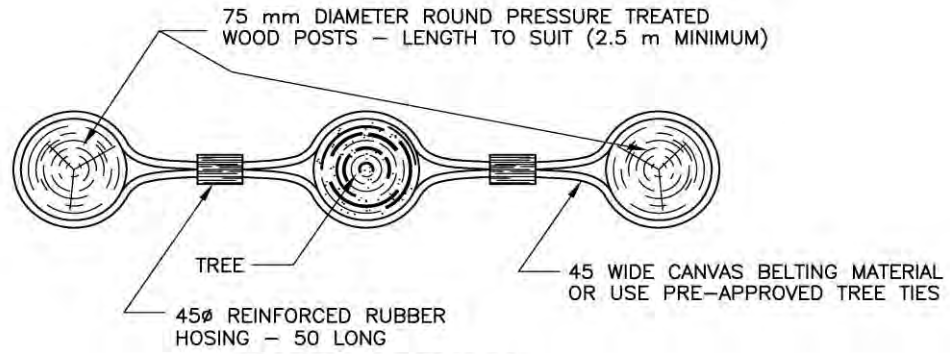
DETAIL

NOT TO SCALE

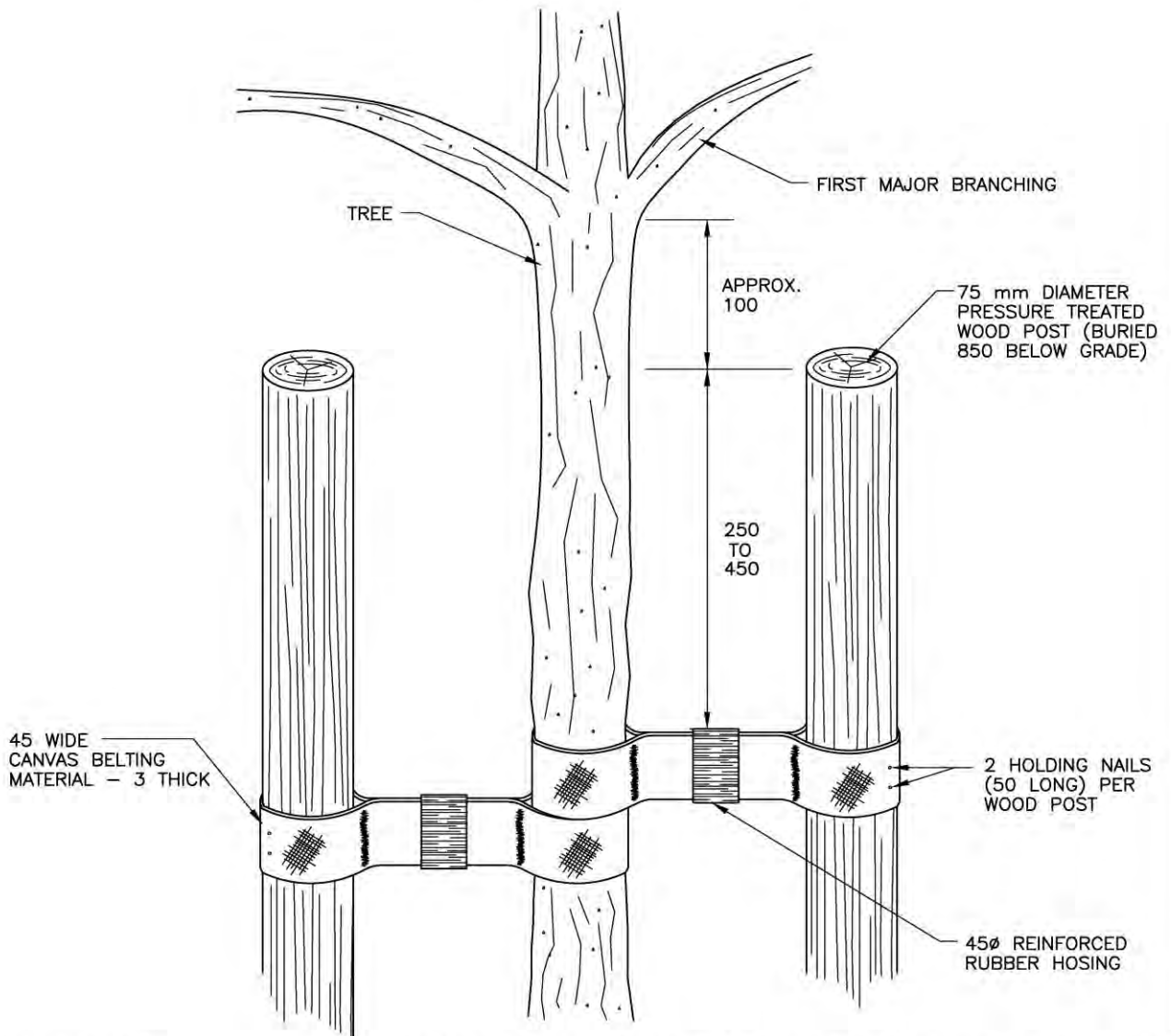
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

DOUBLE TREE STAKES FOR BOULEVARD PLANTING AREAS

SP754-07



CROSS SECTION



NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

## SECTION 757

### REVEGETATION SEEDING

#### DESCRIPTION

**757.01 Scope** – This Section refers to those portions of the work that are unique to the supply and application of seed, fertilizer, mulch, tackifier, and other materials used for revegetating disturbed areas, and that are not designated for treatment under SS 754 Planting of Trees, Shrubs, and Ground Covers or SS 751 Topsoil and Landscape Grading. This Section must be referenced and interpreted simultaneously with all other Sections pertinent to the works described herein.

#### 757.02 References

- BC Hydro [Electrical safety resources](#),
- [Canada Seeds Act](#) & [Seeds Regulations](#),
- [Weed Control Act](#) & [Weed Control Regulation](#), and
- [Canada Fertilizers Act](#) & [Fertilizers Regulations](#)

**757.11 Handling and Storage** – All hydraulic or rolled erosion control products, seed, mulch, fertilizers and other dry materials shall be stored in a dry, weather proof storage place and shall be protected from damage by heat, moisture, weather, excessive temperatures, rodents, construction operations, or other causes until the time of seeding. All manufacturer's instructions regarding storage, handling, blending and installation shall be adhered to unless otherwise specified by the Contract. Supplier labels or other identification are not to be removed or defaced.

#### 757.12 Seed

**757.12.01 Supply of Seed** – All seed specified shall be supplied by the Contractor and obtained from a recognized source.

**757.12.02 Seed Type and Grade** – All seed supplied either as individual species, or as a seed mix, shall comply with the requirements of the [Canada Seed Act](#) and [Seeds Regulations](#), and the grade standards for that particular crop kind. Grass seed shall meet or exceed Common No. 1 grade prior to mixing with other species. Seed shall be free of propagules of plant species designated as noxious under the [Weed Control Act](#) & [Weed Control Regulation](#), any BC Proposed Prohibited Species, any sweet clover and any other undesirable contaminants indicated in the Contract.

Seed mixes used for general roadside revegetation, and for the general conditions and areas indicated, shall be as shown on [Table 757-A](#) unless otherwise specified in the Special Provisions. When specified, specialized seed mixes, or forb, shrub or tree seed shall be supplied to the requirements of the Special Provisions. Legumes and other species palatable

to wildlife shall not be included unless specified by the Contract.

**757.12.03 Seed Analysis Report** – The Contractor shall provide valid Certificates of Seed Analysis for each species and seed lot to be used in a mix at least five working days prior to the desired blending of mixes and shipping of the seed from the seed supplier to the Contractor, for the approval by the Ministry Representative. The Certificates of Seed Analysis shall set out details of the seed as specified in the Canada Seeds Act and shall be completely free of any noxious weeds listed on the Weed Control Regulation, any BC proposed prohibited species, any sweet clover and any other undesirable contaminants indicated in the Contract.

The Ministry Representative will review the Certificates of Seed Analysis and, if the specifications are met, give the Contractor approval to proceed with blending and seed use.

**757.12.04 Packaging and Labelling** – Seed shall be supplied in the original sealed packages, with legible labels securely attached, and providing the following information:

- Supplier's name and address
- Analysis of seed mixture – the grade, and the name and percentage by weight of individual seed species
- Percentage of Pure Live Seed (PLS) for each species
- Lot number and crop year for each species in the mix
- Net weight (mass)
- Date and location of packaging

**757.13 Fertilizer** – Fertilizer shall comply with the provisions of the [Canada Fertilizer Act](#) and [Seeds Regulations](#). Fertilizer shall be supplied as noted on [Table 757-A](#) unless otherwise specified in the Special Provisions. All fertilizer shall be a coated, slow release Nitrogen type formulation.

**757.14 Hydraulic Erosion Control Products (HECPs)** – HECPs shall either be a 100% wood fibre type or be listed on the Ministry's Recognized Products List. HECPs shall be manufactured, degradable, pre-packaged fibrous materials specifically designed for hydraulic application.

HECPs shall be supplied in weather resistant packages bearing the manufacturer's label, clearly indicating the weight and product name, and shall be protected following the manufacturer's recommendations and protected from climatic conditions, including excessive sunlight to avoid packaging deterioration

The fibres shall be dyed green with a water-soluble non-toxic dye that will not stain masonry, concrete, asphalt or



painted surfaces, and shall be non-toxic to plant or animal life.

**757.15 Tackifier** – Tackifier shall be an organic guar gum or starch base product specifically designed for use with HECPs and/or seeding operations. If supplied separately with a mulch product, the tackifier shall be supplied in packages bearing the manufacturer's label, clearly indicating product name, content, and application instructions.

HECPs may contain a pre-mixed tackifier, which shall adhere to mulch to prevent separation during shipment and to avoid chemical agglomeration during mixing in hydraulic mulching equipment. Mulch and tackifier combination products must be premixed and bagged by the manufacturer to ensure quality control.

**757.16 Water** – Water used for hydraulic seeding operations shall be free of impurities that would inhibit germination and growth or may be harmful to the environment. Unless otherwise noted in the Special Provisions, the Contractor shall be responsible for securing a water source for hydraulic application of materials, including obtaining use permits under the Water Act if water is to be drawn from waterbodies, and for all cost to supply. Obtaining water from waterbodies without use permits is not permissible.

**757.17 Other Materials** – Where steep slopes, poor soils or sensitive areas exist, specialized HECPs including Bonded Fiber Matrix (BFM) products, Soil Amendments, including Biotic Soil Media (BSM) and other materials including Rolled Erosion Control Products (RECPs) may be specified in the Contract. Unless otherwise stated in the Contract or approved by the Ministry Representative, installation shall be in strict compliance with the manufacturer's rates and/or instructions for the slope and site.

Bonded Fiber Matrix coverings, erosion control blankets, soil amendments and other materials shall be supplied to the specifications in the Special Provisions.

**757.17.01 Bonded Fiber Matrix (BFM) Products** - Where specified in the Contract, all hydraulically applied BFM products used shall be designed to bond with the soil surface and create a continuous, porous, absorbent and flexible erosion resistant mat to all disturbed areas. The BFM product shall be designed to stand up to multiple rainfall events for reliable erosion protection for a minimum of 6 months.

The BFM product shall be composed of sterilized wood fibers and may contain organic guar gum or starch base tackifiers in addition to the proprietary components or be listed on the Ministry's Recognized Products List. All components of the BFM product shall be 100% biodegradable, non-toxic to plant or animal life and shall not form a water-impermeable crust or otherwise inhibit plant growth.

**757.17.02 Biotic Soil Media (BSM)** - Where specified for use, the BSM shall be designed as an alternative to topsoil and/or compost to accelerate development of depleted soils/substrates with low organic matter, low nutrient levels and limited biological activity. BSM products used must be non-toxic with fibers that have been phytosanitized to eliminate potential weed seeds and pathogens - prior to the introduction of soil building components. BSM products shall not be used for erosion control and shall be applied to enhance vegetation establishment and growth only. Where erosion control is required, the BSM shall be hydraulically installed in a two-phase process with the BSM installed first with the seed, then covered with the mulch and tackifier or BFM product. BSM products may also be applied by hand in conjunction with broadcast seeding.

## EQUIPMENT

**757.21 General** – Equipment used shall be capable of applying the materials listed in the Special Provisions uniformly over the designated areas.

Equipment shall not cause soil rutting or other site damage.

**757.22 Hydraulic Seeding/Mulching Equipment** – Equipment shall have the tank volume identified by an identification plate or sticker, which shall be affixed in plain view.

The hydraulic machine shall be capable of sufficient agitation to mix the materials into a homogenous slurry, and to maintain the slurry in a homogeneous state until and during application.

Equipment shall be adequately sized to the task, to complete work efficiently within the time frame specified, and to permit application of materials without excess water being applied, or undue time lapse between operations. Hydraulic machines should be capable of producing slurry viscosities containing approximately 18 to 30 kg of mulch per 500 litres of water.

Extension hoses or pipes shall be provided to reach areas not accessible from the hydraulic seeder.

## CONSTRUCTION

**757.31 Scheduling** – Work shall be scheduled to ensure a minimum duration of on-Site storage of materials, minimum compaction of topsoil, and prompt seeding/mulching operations.

The work shall be coordinated with the schedule of other trades, and be well integrated with specific requirements such as Sediment and Drainage Management Plans and best practices, which may be provided for any given project.

**757.32 Protection** – Existing Site equipment, roadways, landscaping, reference points, monuments, markers, utilities, and structures shall be protected from damage by

hydraulic application method. No overspray is to occur into waterbodies or environmentally sensitive areas. When necessary to ensure protection of these areas, dry, hand broadcasting of materials will be employed.

Areas treated with HECs shall be protected from foot and vehicle traffic, grazing and other disturbances. Any damaged areas that result in disturbance of the continuous mat of HEC materials and exposed soil shall be repaired within 24 hours of notification of the damage.

**757.33 Substrate and Seedbed Preparation** - Prior to installation of HECs, the Contractor will all ensure all slopes are geotechnically stable and have been designed to divert runoff away from the face of the slope where required. All pre-existing rills or gullies shall be repaired prior to installation, and slopes shall be suitably roughened to the Ministry Representative's satisfaction. Slopes shall not be left in a smooth or glazed condition that functions to prevent water and plant root infiltration. Slope roughening techniques may include, but not be limited to, track walking, imprinting, harrowing, or placement of woody debris. Indentations must be horizontally installed to the slope rather than vertically, to ensure they function to trap water and seed rather than accelerate erosion. Any slope interruption devices specified shall be correctly installed prior to application of the HEC.

**757.34 Timing of Material Application** - Material application shall be carried out in accordance with the construction schedule and shall occur as soon as possible following the disturbance. Reseeding during extreme drought or heat may result in failure and should be avoided. Hydraulically applied erosion control products shall not be applied to saturated soils or substrates, and shall not be installed immediately before, during, or after rainfall, such that the slurry will have opportunity to dry for up to 24 hours after installation, unless otherwise approved by the Ministry Representative or permitted by the Manufacturer's specifications for the product being used.

**757.35 Methods** - The methods chosen for material application shall be at the Contractor's discretion, unless otherwise specified in the Special Provisions.

**757.36 Rates of Application** - Unless otherwise specified by the manufacturer, standard material application rates for mulch and tackifier shown in Table 757-A shall be followed. Fertilizer shall be applied as recommended by soil testing or following Table 757-A. Site conditions including allowances for increased surface area due to roughening or scarification during substrate and seedbed preparation shall be taken into account when determining quantities of materials required to reach the specified application rates. Application rate may need to be increased by up to 20% for tracked surfaces.

**757.37 Record of Application** - The Contractor shall maintain a record of all pertinent application information on the form accepted by the Ministry Representative. Refer to Figure 757-1.

**757.38 Application Method for Mechanical Drop or Broadcast Dry Seeding** - Seed shall be applied in two intersecting directions, and overlap adjoining ground cover by 300 mm except where conditions dictate seeding in one direction only.

Dry seeding must occur during spring or fall timing windows and shall be installed at a rate of 30kg/ha. Seed shall be raked or rolled into the soil after sowing, and where necessary, may be covered with a layer of thin and continuous layer of straw to help protect the seed from wildlife and prevent erosion

### 757.39 Hydraulic Application of Materials

**757.39.01 General** - The hydraulic machine shall be operated in compliance with Ministry safety standards including those detailed in the BC Hydro Electrical safety resources and the Ministry's Traffic Management Manual for Work on Roadways.

Materials shall not be sprayed on objects not expected to support plant growth. Existing Site equipment, roadways, landscaping, reference points, monuments, markers, utilities, and structures shall be protected from damage by hydraulic application method. No overspray is to occur into waterbodies or environmentally sensitive areas. HECs are not intended to be applied in channels, swales, or other areas where concentrated flows are anticipated unless installed in conjunction with RECs. When necessary to introduce vegetation to these areas, dry, hand broadcasting of materials shall be employed.

The Contractor shall be responsible for any overspray or damages incurred during hydroseeding. Any overspray or damage shall be made good at no cost, to the satisfaction of the Ministry Representative.

**757.39.02 Mixing** - The required quantities of seed, fertilizer, mulch, tackifier and other material shall be charged into the tank accurately by weight or by an acceptable system of mass calibrated volume measurement, following the manufacturer's specifications.

The materials shall be thoroughly mixed into homogeneous water slurry for a minimum of 10 minutes prior to application for each load.

All seed shall be added last when mixing. Pellet inoculated seed shall be applied immediately after placement into tank, and if this is not possible, dry application methods must be used. Other seed shall not be left in the tank for unreasonable lengths of time prior to application, i.e. - exceeding one or two hours, particularly when in contact with fertilizer solution.

The Ministry Representative will determine if Seed that remains in the tank for periods longer than specified can be used. Rejected seed shall be replenished with fresh stock.

**757.39.03 Application** - HECs shall be applied to form an even, uniform mat blended 150 mm into adjacent vegetated areas or previous mulch applications. HECs shall be

## SECTION 757

applied from opposing directions to achieve soil coverage except where conditions dictate seeding in one direction only.

**757.40 Related Work** – Additional related work such as the application of Rolled Erosion Control Products (RECPs), compost blankets, or other coverings, and harrowing or discing of soil following material application, shall be as specified in the Special Provisions and be installed in accordance with the manufacturer's specifications.

**757.41 Clean-up** – All surplus and waste materials resulting from seeding operations shall be removed from the job site after empty product containers have been inspected by the Ministry Representative.

Hydraulic seeding and/or mulching overspray that may cause problems on areas or objects not designated for re-vegetation shall be removed in an appropriate manner.

**757.42 Conditions for Acceptance** – Treated areas will be accepted by the Ministry when the following conditions have been met.

### **757.42.01 Conditions**

- (a) Treated areas are not thin with bare patches, or uneven in distribution.
- (b) Empty containers of materials used during the work are stored neatly on Site for inspection by the Ministry Representative.

## REVEGETATION SEEDING

**757.43 Guarantee & Repairs** – The Contractor shall restore disturbed areas beyond the cut slopes at the direction of the Ministry Representative. Seeded areas that show thin application or bare spots shall be re-treated with the specified materials at the earliest opportunity, weather and season permitting. No additional payment will be made for the repairs.

### **MEASUREMENT**

**757.81 General** – Revegetation Seeding shall be measured by the area treated, to the nearest tenth of a hectare (0.1 ha). The treated areas will be calculated by actual measurement along the slope, and within the right-of-way, or as directed by the Ministry Representative.

### **PAYMENT**

**757.91 General** – Payment for REVEGETATION SEEDING will be at the Unit Price per hectare bid for "Revegetation Seeding" in Schedule 7, as measured in place. The Contract Unit Price shall be accepted as full compensation for the work described and all work subsidiary and incidental thereto for which separate payment is not elsewhere provided.

Figure 757-1: Daily Seeding / Application Record

MINISTRY OF TRANSPORTATION AND HIGHWAYS

DAILY SEEDING/APPLICATION RECORD

SHEET # \_\_\_\_\_  
PROJECT # \_\_\_\_\_

DATE	LOAD #	AREA COVERED IN HECTARES			SEED APPLIED* (IN KG.)			OTHER MATERIALS* (IN KG.)			REMARKS
		GRASS	MULCH	REFERT	GRASS	RYE	OTHER	FERT	MULCH	TACK	
	1										
	2										
	3										
	4										
	5										
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										
<b>Total of Sheet</b>											
<p><i>*Provide details of seed mixes and other materials, as required, in this space.</i></p>											
<p><b>THIS SHEET CERTIFIED CORRECT:</b></p> <p>FOR MINISTRY _____</p> <p>FOR CONTRACTOR _____</p> <p>DATE: _____</p>											

**Table 757-A: Standard Grass Seed Mixes and Material Application Rates for Revegetation of British Columbia Roadside**

Unless otherwise specified by the manufacturer, standard application rates are as follows:

- Grass seed Mix 75\_kg/ha
- Nurse Crop\_Grass (when specified)
  - Fall Rye 50\_kg/ha
  - Axcella Annual Rye 25\_kg/ha
- Fertilizer 300\_kg/ha
- Wood Fibre Mulch 1500\_kg/ha
- Tackifier Per Manufacturer’s Instructions

Where seeding for landscaped or turfgrass areas is required, the mixture shall be of turf-type: Perennial ryegrass, Kentucky bluegrass, and Red Fescue, unless otherwise specified. Turfgrass mix shall be composed of any two or more of the above species mixed in combinations such that no single kind constitutes more than 75% of the grass in the turf.

Fertilizer N-P-K proportions shall be as recommended by soil testing (preferred), or following Table 757-A.

Average annual precipitation values may be found on-line, including from Environment Canada at:

- [http://climate.weather.gc.ca/climate\\_normals/index\\_e.html](http://climate.weather.gc.ca/climate_normals/index_e.html)
- [http://climate.weather.gc.ca/historical\\_data/search\\_historic\\_data\\_e.html](http://climate.weather.gc.ca/historical_data/search_historic_data_e.html)

Climatic Area	Standard Mixes (by weight)	Application
South Coast	<b>Vancouver Island / Coast Mix</b> <u>Canada bluegrass</u> 5% <u>Creeping red fescue</u> 29% <u>Hard fescue/Sheep fescue</u> 17% <u>Perennial ryegrass</u> 37% <u>Redtop</u> 3% <u>Timothy</u> 9%	General seeding coastal locations where mean annual precipitation is > 90 cm. Fertilizer: 16-32-6, or pre-approved equivalent
	<b>Interior Forestland Mix</b> <u>Annual ryegrass</u> 11% <u>Canada bluegrass</u> 3% <u>Hard fescue/Sheep fescue</u> 13% <u>Intermediate wheatgrass</u> 50% <u>Perennial ryegrass</u> 22% <u>Redtop</u> 1%	General seeding inland where mean annual precipitation is > 50 cm. Fertilizer: 16-32-6, or pre-approved equivalent
	<b>Interior Dryland Mix</b> <u>Crested Wheatgrass</u> 40% <u>Hard Fescue</u> 15% <u>Slender Wheatgrass</u> 20% <u>Tall Wheatgrass</u> 25%	General seeding inland where mean annual precipitation is < 30 cm. Fertilizer: 16-32-6, or pre-approved equivalent

Climatic Area	Standard Mixes (by weight)	Application
<b>Thompson – Okanagan</b>	<b>Interior Forestland Mix</b> <u>Annual ryegrass</u> 11% <u>Canada bluegrass</u> 3% <u>Hard fescue/Sheep fescue</u> 13% <u>Intermediate wheatgrass</u> 50% <u>Perennial ryegrass</u> 22% <u>Redtop</u> 1%	General seeding inland where mean annual precipitation is > 50 cm.  Fertilizer: 22-11-11, or pre-approved equivalent
	<b>Interior Dryland Mix</b> <u>Crested Wheatgrass</u> 40% <u>Hard Fescue</u> 15% <u>Slender Wheatgrass</u> 20% <u>Tall Wheatgrass</u> 25%	General seeding inland where mean annual precipitation is < 30 cm.  Fertilizer: 22-11-11, or pre-approved equivalent
	<b>Alkaline Tolerant Blend</b> <u>Canada Bluegrass</u> 15% <u>Crested Wheatgrass</u> 35% <u>Hard Fescue</u> 25% <u>Sherman Big Bluegrass</u> 25%	General seeding in alkaline soils.  Fertilizer: 22-11-11, or pre-approved equivalent
<b>Kootenays</b>	<b>Interior Forestland Mix</b> <u>Annual ryegrass</u> 11% <u>Canada bluegrass</u> 3% <u>Hard fescue/Sheep fescue</u> 13% <u>Intermediate wheatgrass</u> 50% <u>Perennial ryegrass</u> 22% <u>Redtop</u> 1%	General seeding inland where mean annual precipitation is > 50 cm.  Fertilizer: 22-11-11, or pre-approved equivalent
	<b>Kootenay Dryland</b> <u>Canada bluegrass</u> 3% <u>Crested wheatgrass</u> 24% <u>Hard fescue/Sheep fescue</u> 13% <u>Redtop</u> 1% <u>Tall wheatgrass</u> 59%	General seeding inland where mean annual precipitation is < 50 cm.  Fertilizer: 22-11-11, or pre-approved equivalent
<b>Northern (Prince George Area)</b>	<b>North East General Mix</b> <u>Creeping red fescue</u> 25% <u>Perennial ryegrass</u> 30% <u>Tall fescue</u> 30% <u>Timothy</u> 15%	General seeding inland where mean annual precipitation is > 50 cm.  Fertilizer: 26-16-8, or pre-approved equivalent
	<b>North East Dryland Mix</b> <u>Creeping red fescue</u> 22% <u>Crested wheatgrass</u> 38% <u>Intermediate Wheatgrass</u> 40%	General seeding inland where mean annual precipitation is < 50 cm.  Fertilizer: 26-16-8, or pre-approved equivalent

Climatic Area	Standard Mixes (by weight)	Application
<b>Northern (Terrace Area)</b>	<b>North West General Mix</b> <u>Creeping red fescue</u> 50% <u>Timothy</u> 8% <u>Kentucky bluegrass</u> 7% <u>Hard fescue/Sheep fescue</u> 35%	General seeding inland where mean annual precipitation is > 50 cm. For use in CWH and ICH biogeoclimatic zone. Fertilizer: 22-11-11, or pre-approved equivalent
	<b>North West Dryland Mix</b> <u>Intermediate wheatgrass</u> 61% <u>Crested wheatgrass</u> 23% <u>Hard fescue/Sheep fescue</u> 15% <u>Kentucky bluegrass</u> 1%	General seeding inland where mean annual precipitation is < 50 cm. For use in SBS biogeoclimatic zone (East of Moricetown to West of Endako) Fertilizer: 22-11-11, or pre-approved equivalent
	<b>Northern Coastal Mix</b> <u>Intermediate wheatgrass</u> 52% <u>Kentucky bluegrass</u> 12% <u>Hard fescue/Sheep fescue</u> 27% <u>Timothy</u> 9%	General seeding coastal locations where mean annual precipitation is > 90 cm. For use in CWH biogeoclimatic zone (QCI, Prince Rupert to Pacific) Fertilizer: 22-11-11, or pre-approved equivalent
	<b>Northern Mix</b> <u>Crested wheatgrass</u> 35% <u>Creeping red fescue</u> 35% <u>Kentucky bluegrass</u> 30%	General seeding coastal locations where mean annual precipitation is > 90 cm. For use in ICH and BWBS biogeoclimatic zones. <ul style="list-style-type: none"> <li>• (ICH – Pacific to Moricetown, Kitwanga to Thomas Creek 220 km N)</li> <li>• (BWBS – Thomas Creek to Yukon border)</li> </ul> Fertilizer: 22-11-11, or pre-approved equivalent
	<b>Ditch Vegetation Seed Mixture</b> <u>Crested wheatgrass</u> 67% <u>Creeping meadow foxtail</u> 8% <u>Kentucky bluegrass</u> 3% <u>Tufted hairgrass</u> 22%	For use in revegetating roadside ditches following ditch maintenance operations. Fertilizer: 22-11-11, or pre-approved equivalent
<b>Vancouver Island</b>	<b>Vancouver Island / Coast Mix</b> <u>Canada bluegrass</u> 5% <u>Creeping red fescue</u> 29% <u>Hard fescue/Sheep fescue</u> 17% <u>Perennial ryegrass</u> 37% <u>Redtop</u> 3% <u>Timothy</u> 9%	General seeding coastal locations where mean annual precipitation is > 90 cm. Fertilizer: 18-18-18
<b><u>Riparian Areas</u></b>	<b><u>Riparian Area Mix</u></b> <u>Slender wheatgrass</u> 40% <u>Perennial rye</u> 25% <u>Kentucky bluegrass</u> 15% <u>Timothy</u> 10% <u>Redtop</u> 5% <u>Junegrass</u> 5%	<u>General purpose for riparian or saturated soil areas throughout the Province.</u> Fertilizer: 18-18-18

## SECTION 766

### IRRIGATION

#### DESCRIPTION

**766.01 Scope** – The work consists of the supply of all material, labour and equipment to install a complete and operating irrigation system as shown on the Drawings. The Contractor shall be responsible for obtaining all permits required.

**766.02 References – Codes & Standards** – In the absence of other instructions, the provisions of all the following codes and standards shall apply:

- The National Building Code of Canada;
- Current CSA Specifications for copper, steel and plastic pipe;
- AWWA Specification, current editions.

**766.03 Site Security** – The Contractor shall be responsible for maintaining all security at the project Site at all times, and shall ensure that no loss, damage or breakage occurs to stockpiled materials or to the partially installed irrigation system. The Contractor shall make good all damage resulting from acts of vandalism throughout the period of installation and subsequent maintenance.

**766.04 Electrical Trades** – The Contractor shall contact the Electrical Trades Supervisor prior to performing work on any existing Ministry owned equipment. All AC electrical connections shall be done by a qualified electrician.

**766.05 Drawings and Instructions** – The Contractor shall install the irrigation system as shown and detailed on the Drawings and Specifications. No deviation from the indicated make and model or installed location of valves, mains, laterals or any other irrigation system component will be allowed without first obtaining written permission from the Ministry Representative.

The Contractor shall maintain a daily record of construction activities. Upon completion of the Contract, the Contractor shall incorporate all accumulated information relevant to the Contract into the required as-built drawings. The as-built drawings shall be to the Ministry Representative's satisfaction, shall be reproducible, and shall be compiled by a competent professional draftsman.

The Contractor shall prepare drawings showing the final location and make of all heads, emitter locations, pipe layout and other pertinent information, and shall submit two sets of these drawings to the Ministry Representative. The Contractor shall prepare another Drawing showing the wiring and automatic controller station numbers with all electrical data. The Contractor shall submit two copies of this Drawing and one set of the operating instructions for the controller, complete with spare parts list to the Ministry Representative. All drawings, spare parts lists, and

operating instructions shall be Cerlox bound into a plastic covered 8½" x 11" booklet.

After the system has been completed, the Contractor shall instruct the Ministry Representative's agent in the proper use of the equipment.

Completion will not be certified until adjustments and drawings are approved.

#### MATERIALS

**766.11 General** – Shipping, handling and installation of materials shall be to manufacturer's recommended instructions, and best work practice. Particular care shall be taken to avoid scratches and nicks on the plastic pipe. Pipe must be properly stacked and stored in a clean place on the Site, keeping dirt out of the pipe at all times.

**766.12 Pipes and Fittings** – Galvanized pipe, Schedule 40, with galvanized fittings, shall be used inside culverts. The pipe shall be connected to the plastic main or lateral 450 mm clear of the culvert.

Plastic pipe shall be used for the submain and laterals of the irrigation system. Plastic pipe shall be semi-rigid extruded from PVC (Polyvinyl Chloride) resin, Type 1, grade 2, normal impact.

The minimum classes to be used are listed in Table 766-A.

Fittings shall be PVC plastic, Schedule 40 or 80, designed for solvent welding to PVC pipe. All fittings must have 1/2 to 2/3 interface fit to ensure a fully seated joint. Individual fittings shall be selected to ensure a proper fit, or they will be rejected.

All pipe and fittings shall be continuously and legibly marked with at least the following information:

- Manufacturer's name or trademark;
- Pressure rating;
- Type of material.

Pipe that is not marked to the satisfaction of the Ministry Representative will be rejected and shall be removed from the Site by the Contractor.

**Table 766-A: Minimum Classes of Plastic Pipe**

Up to 25 mm diameter	Class 200 for excavated trenches
30 mm diameter and larger	Class 160 for excavated trenches
All sizes	Class 200 for pipe flow



**766.13 Cement** – Pipe cement for solvent welding shall be of the type and make recommended by the pipe manufacturer, supplied to the Site in sealed containers clearly marked with the name of the manufacturer and the lot number. The Contractor shall comply with the manufacturer's instructions and safety procedures.

**766.14 Sprinkler Heads** – Risers for turf heads, lawn heads, impact heads, shrub heads and quick-coupling (QC) valves shall be swing joint type, fabricated from Schedule 80 PVC or Schedule 40 galvanised pipe and fittings, as detailed in the Specifications. Teflon tape shall be used on all threaded connections.

Sprinkler heads shall be as detailed on the Drawings.

**766.15 Valves** – Automatic valves shall be as detailed on the Drawings and the same make shall be used throughout. Automatic valves shall have flow control stems.

Valves shall be installed in Carson Industries No. 1419 valve boxes or other approved alternative complete with extensions and covers, as required. The top of all valve box covers shall be flush with the finished grade.

**766.16 Controllers** – Automatic controllers shall be supplied to operate the electrically controlled automatic valves. Controllers shall be 24-volt A.C. outlet, Class 2 rating, compatible with the valves used. Controllers and automatic valves shall be by the same manufacturer, unless otherwise noted. Controllers and transformers must bear CSA or Provincial stamps of approval. Controllers shall be as detailed on the Drawings.

Controllers shall be installed in Ministry standard controller box 30-A-120/240V, weatherproof, stainless steel service panel SN1765A as shown on SS Drawing SP635-2.4.8, or pre-approved equal complete with a Masterlock No. 15 padlock and two sets of keys for the lock.

**766.17 Wiring** – Wire between controllers and automatic valves shall be of a type approved for direct burial. Where control wires are exposed or pass through culverts, they shall be installed in rigid electrical conduit.

Wire shall be minimum 14-gauge single strand T.W.U.

**766.18 Selected Native Fill** – Native fill selected for backfilling shall be free draining, fine grained sand and/or gravel, containing no material larger than 19 mm in diameter, wood, or other debris; or may other approved fill material. All backfill shall be subject to the approval of the Ministry Representative.

## CONSTRUCTION

**766.31 General – Damaged Material** – Damaged material shall be rejected on the decision of the Ministry Representative.

Plastic pipe, fittings, valves and appurtenances shall not be repaired by patching or taping. Where materials have been

damaged, the damaged materials shall be removed and new parts or sections shall be installed .

**766.32 Line Location** – The Contractor shall ensure that all irrigation pre-ducts for passage of irrigation lines under roadways, medians, traffic islands and other surface impediments have been installed and are clearly marked at all entry points.

No irrigation line shall be installed parallel to and directly over another irrigation line or line of another trade. Lines laid in the same trench shall be a minimum of 50 mm apart. No pipe shall be installed closer than 300 mm to any parallel electric conduit as shown on SS Drawing SP635-1.5.2.

**766.33 Compaction** – Before laying the pipe, the Contractor shall be satisfied as to the extent of compaction in the lawn and planting areas.

**766.34 Excavation** – Excavated soil shall be carefully placed adjacent to the trench for convenient backfilling. Topsoil and subsoil shall be piled separately to avoid contamination of the topsoil.

Stones or other objects larger than 75 mm at their widest point shall be removed from the trenches. Holes below grade lines, caused by the removal of stones, must be filled in and compacted uniformly with the adjacent trench.

**766.35 Laying the Pipe** – Pipe shall be laid by trench excavation or by an approved vibrating pipe plough. Plastic pipe shall be laid on sand or selected native fill to a compacted depth of 50 mm. A further 75 mm of sand or selected native fill shall be placed over plastic pipes prior to backfilling. Pipes shall be run in straight lines between fittings. Pipe must not be supported at intermediate points on stones, bricks or other hard material.

All mains and laterals shall have a minimum cover of 400 mm of soil as measured from the top of the pipe to the finished grade.

Lawn and planting areas shall be disturbed as little as possible.

The Contractor shall manicure the finished grade over all mains and laterals upon completion of the pipe installation. All debris, rocks over 50 mm diameter, etc., that have been brought to the grade surface shall be removed to the Contractor's disposal location. The area over all trenches shall be fine graded and shall conform to SS 751.34.

**766.36 Connections** – The Contractor shall make connection to the existing water supply where shown on the Drawings. The Contractor shall ensure that the recommended operating pressure of the irrigation system is not exceeded by the water pressure at the source, by installing pressure regulators as required.

**766.37 Inspection and Testing** – After the pipe is in place in the bottom of the trench with risers in place, the risers shall be capped where the sprinklers will be attached, and all pipe fittings exposed. The maximum pressure shall be

applied to the system and maintained for a minimum of one hour.

All fittings shall be visually inspected and any that leak shall be cut out and replaced. Leaks shall not be repaired by patching or taping. The test pressure shall be maintained for one hour after replacing any defective sections. The section shall be re-inspected as before.

The system shall be flushed out to remove dirt and then the sprinklers shall be attached using Teflon tape or pre-approved non-setting pipe thread compound.

**766.38 Backfill** – After approval by the Ministry Representative, the trenches shall be backfilled, maintaining pressure in the line. If there is any indication of a leak, the defective section shall be located and replaced.

The trenches shall be carefully backfilled with the subsoil, followed by the topsoil. Both shall be compacted to the same density as the soil in the trench walls to minimize differential settlement. Backfill around turf heads with 0.03 m<sup>3</sup> of sand.

**766.39 Controller Installation** – The location of the controllers shall be determined on Site in the areas indicated on the Drawings. The Contractor shall have a qualified electrician connect the controllers to the electrical supply.

**766.40 Adjustments** – The sprinkler system shall be adjusted section by section to give satisfactory coverage to all areas. Pressure at the heads and/or Q.C. valves shall be as noted on the Drawings. Turf heads, lawn heads and Q.C. valves shall be set flush with the final turf grade by adjusting the swing joint riser, as required. During the landscape maintenance/guarantee period, the Contractor will return twice and adjust the heads, as required, to be flush with the final turf grade.

These call-backs shall be done within five days of notification by the Ministry Representative and shall be considered part of the Contract requirements.

**766.41 Surplus Material** – Surplus materials shall be removed from the Site.

**766.42 Conditions for Acceptance** – Completion will not be certified until adjustments are completed and as-built drawings prepared, approved, and bound into an approved booklet to the Ministry Representative's satisfaction. A copy of the inspection certificate issued by the Ministry of Competition, Science and Enterprise indicating compliance with the Electrical Code and a copy of the "Irrigation Systems Loss Calculation Sheet" found in the Ministry of Transportation Landscape Policy – Appendix 3 shall be included in the hardcover booklet.

**766.43 Monitoring and Winterization** – The Contractor shall monitor the operation of the system and carry out all minor repairs and required adjustments to the spray coverage of irrigation heads and operating times.

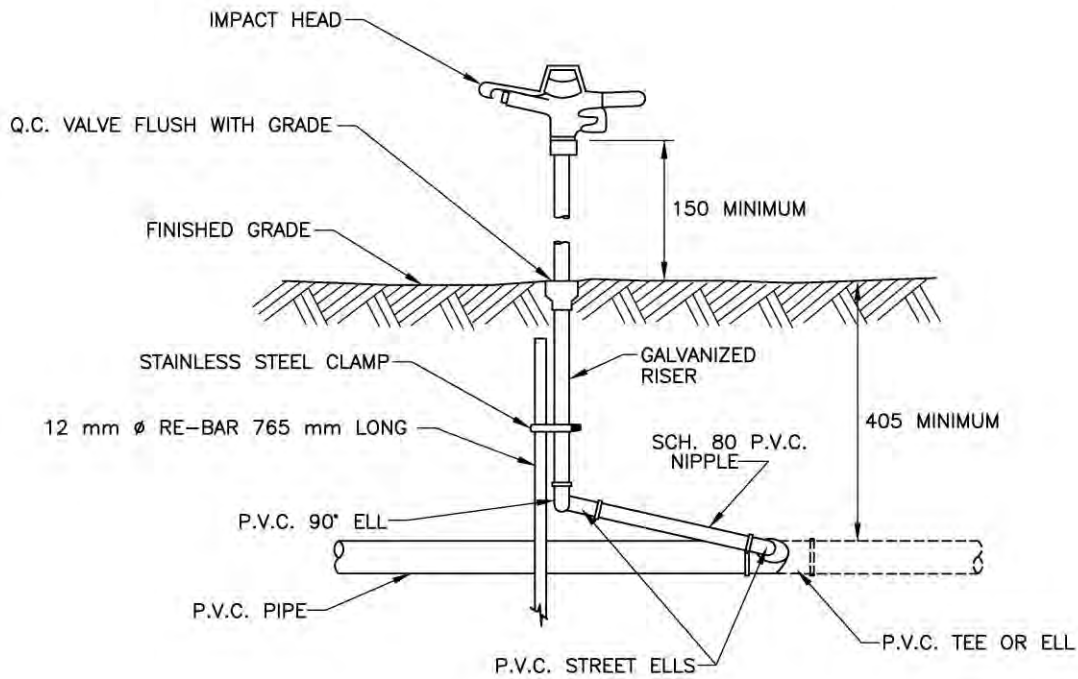
The irrigation system shall be properly winterized at the appropriate time of the season.

## PAYMENT

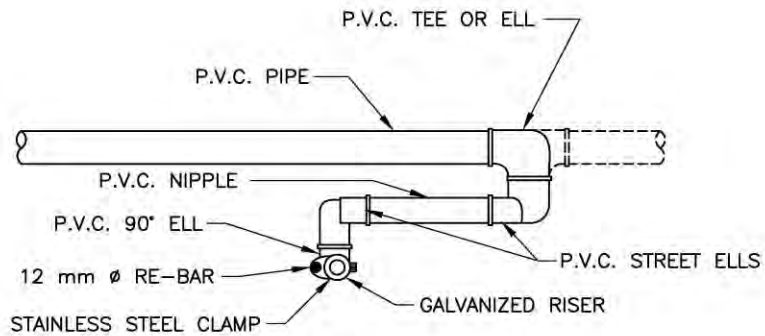
**766.91 General** – Payment for the supply and installation of the irrigation system will be at the lump sum bid. The lump sum price bid shall be full compensation for all labour and equipment required for the specified preparation, trenching, installation, connection, testing, backfilling, clean-up, preparation of as-built drawings, and instruction in the proper use of the equipment and for all incidental work not required to be separately paid for.

SWING JOINT DETAIL – IMPACT HEAD

SP766-01



**ELEVATION**



**PLAN**

SHOWN FOR IMPACT HEAD  
QUICK-COUPLING VALVE SIMILAR

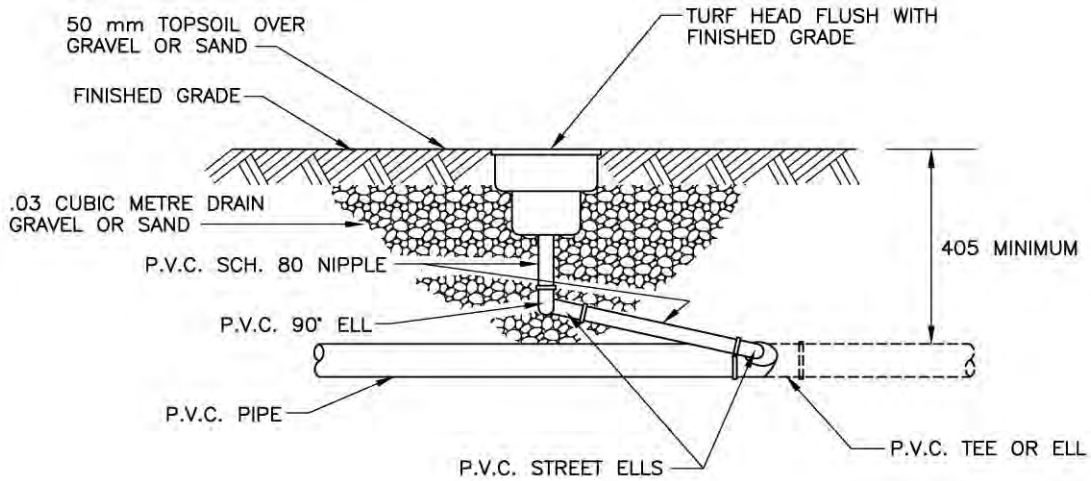
**NOTE:**  
USE TEFLON TAPE ON ALL THREADED CONNECTIONS

NOT TO SCALE

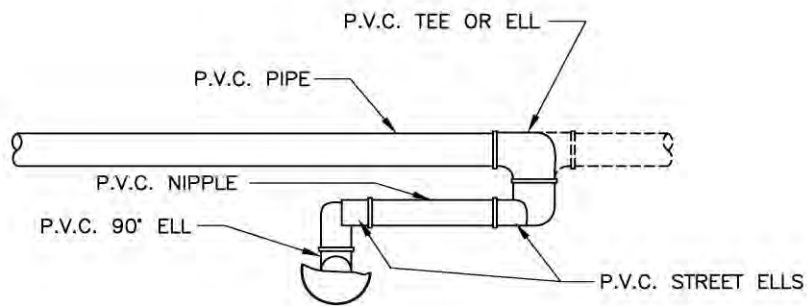
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

SWING JOINT DETAIL – TURF HEAD

SP766-02



**ELEVATION**



**PLAN**

SHOWN FOR TURF HEAD  
LAWN HEAD SIMILAR

**NOTE:**  
USE TEFLON TAPE ON ALL THREADED CONNECTIONS

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

## SECTION 769

### PROTECTION AND RETENTION OF VEGETATION

#### DESCRIPTION

**769.01 Scope** – This Section refers to the protective measures required to safeguard vegetation from construction operations, equipment and vehicles, where vegetation is not designated for removal under the Contract, and covers the installation of barriers.

#### 769.02 Related Work –

- SS 165, Protection of the Environment;
- SS 200, Clearing and Grubbing;
- SS 201, Roadway and Drainage Excavation;
- SS 751, Topsoil and Landscape Grading.

#### 769.03 Definitions

- **Barrier** – means fence consisting of approved material, supported by steel posts and being a minimum of 2.0 m high, without breaks or unsupported sections.
- **Dripline** – means the location on the ground surface directly beneath a theoretical line described by the tips of the outermost branches of trees.
- **Native Vegetation** – means areas of existing and/or indigenous shrubs, trees and groundcover.
- **Specimen Trees** – means trees so designated in the Contract Documents.

#### MATERIALS

**769.11 Water** – Water shall be free of impurities that would inhibit germination and growth or may be harmful to the environment.

The Contractor shall supply the water.

**769.12 Fertilizer** – Fertilizer shall be supplied to the specifications of the Special Provisions and to SS 751.18.

#### CONSTRUCTION

**769.31 Operational Constraints** – The Contractor's operations shall not damage vegetation designated for retention.

Existing Native Vegetation shown on the Drawings or designated by the Ministry Representative to be retained shall be marked by the Contractor and inspected by the Ministry Representative, who may adjust the limits. A minimum of 48 hours notice shall be given to the Ministry Representative for this purpose.

Areas shown on the Drawings adjacent to streams or as designated by the Ministry Representative as "Vegetation to Remain" areas are not to be disturbed, cleared or logged.

The Contractor's operations shall not cause flooding, sediment deposits or deposition of debris in "Vegetation to Remain" areas.

Where construction procedures substantially alter natural drainage patterns, interim drainage or irrigation shall be provided as necessary to compensate for construction interference.

Construction procedures, stockpiling of materials or debris burning or disposal shall not be undertaken adjacent to Specimen Trees and/or Native Vegetation retained.

Unless the Contract requires work within the dripline of Specimen Trees, equipment shall not be operated within that dripline. When the Contract requires work within the dripline of Specimen Trees, operation of equipment within that dripline area shall be kept to the minimum necessary to perform the work required, as required by the Ministry Representative. Tree roots shall be protected from compaction by temporary placement of hog fuel or other lightweight insulation material, as required by the Ministry Representative.

Equipment or vehicles shall not be parked, repaired or refuelled, construction materials shall not be stored and earth materials shall not be stockpiled within the dripline area of any Specimen Trees.

If Giant, Bohemian, Japanese or Himalayan Knotweed species are found within the project footprint, they shall not be disturbed or removed without an invasive species management plan and pre-approval by the Ministry Representative. Vehicles, equipment, or materials shall not be parked or stored in areas where knotweed species are present.

**769.32 Clearing and Grubbing** – No clearing and grubbing shall be conducted for a radius of 3 m from the trunks which lie on the edge of clearing and grubbing zones, or as directed by the Ministry Representative.

Trees to be removed shall be felled toward the centre of an area, away from selectively cleared or retained vegetation.

Where Drawings or Special Provisions call for areas of "Close Cut No Grubbing", existing trees within the removal zones shall be carefully and cleanly cut as close to the ground as possible, with the understory vegetation retained, and the root zone protected from excessive disturbance.

**769.33 Barriers for Existing Vegetation Protection** – Barriers for existing vegetation protection shall be erected prior to commencement of construction operations, at

## SECTION 769

locations specified in the Drawings, to provide a continuous barricade between vegetation and the area of work. The barriers shall be maintained erect and in good repair throughout the duration of construction operations, and shall be removed upon completion of the work, and disposed of off site of the project by the Contractor.

The barrier shall be placed at the dripline of trees or forest edges and Native Vegetation unless there is inadequate space to provide a 1.5 m buffer zone between the barrier and the limit of grading. The barrier shall be placed within the dripline if necessary to provide a buffer zone of up to 1.5 m. Under no circumstance shall it be placed less than 0.75 m from the circumference of the trunk. When the trunks of trees are less than 4.5 m apart, the trees shall be considered a group, and the barrier shall be placed to form a continuous barricade as specified in the Drawings.

A barrier is not required where an existing fence will serve the same purpose. At such locations, the barrier shall terminate at the existing fence so that a continuous barricade is provided between the trees and the area of work.

**769.34 Pruning and Repair of Specimen Trees** – Specimen trees and trees safeguarded by barriers shall be repaired in accordance with this Subsection.

One third of the tree branches shall be selectively removed to reduce transpiration and compensate for dieback of roots in fill conditions and damage to the root system in cut conditions.

Within five calendar days of damage, branches 25 mm or greater in diameter that are broken as a result of the Contractor's operations shall be cut back cleanly at the break, or to within 10 mm of their base, if a substantial portion of the branch is damaged. Cuts shall be perpendicular to the growth of the branch to avoid leaving sharp points.

Roots 25 mm or larger in diameter that are exposed by the Contractor's operations, shall be cut back cleanly to the soil surface within five calendar days of exposure.

## PROTECTION AND RETENTION OF VEGETATION

Bark that is damaged by the Contractor's operations shall be neatly trimmed back to uninjured bark, without causing further injury, within five calendar days of damage.

### MAINTENANCE

**769.71 Watering** – The retained Specimen Trees and Native Vegetation shall be watered a minimum of three times during the summer or as stated in the Special Provisions or as directed by the Ministry Representative. The area immediately below the tree crown shall be soaked sufficiently to reach the feeder roots.

**769.72 Fertilizing** – Where specified or directed by the Ministry Representative, fertilizer shall be applied at a rate of 50 g/mm of caliper to existing Specimen Trees to be retained. The caliper measurement shall be taken 0.3 m above the grade. The fertilizer shall be applied once early in the growing season unless specified otherwise.

### MEASUREMENT

**769.81 General** – Measurement for barriers will be made in metres according to the length of barrier installed to protect vegetation.

### PAYMENT

**769.91 General** – Payment at the Unit Price bid for barriers shall be full compensation for work described and all work subsidiary and incidental thereto for which separate payment is not elsewhere provided.

Compensation for all costs other than installation of barriers associated with the work of protecting and maintaining Native Vegetation and Specimen Trees shall be deemed to be included in the Contract prices for the various Items of the contract.

## SECTION 904

### TIMBER (TREATED AND UNTREATED)

**904.01 Grading and Species** - Unless specifically stated otherwise elsewhere in the Contract, all timber shall be graded in accordance with the current [Standard Grading Rules for Canadian Lumber](#) of the National Lumber Grades Authority. Each piece of timber should be marked with a grade stamp from [a lumber grading agency accredited by the Canadian Lumber Standards Accreditation Bureau \(CLSAB\)](#). Timber supplied without a grade stamp, or where the grade stamp is obscured, shall have a certificate from a lumber grading agency accredited by the CLSAB that verifies the grade and species. Copies of the grading certificate shall be kept by the Contractor and provided to the Ministry Representative upon request.

Timber species, grade and preservative treatment shall be as specified in the Contract Documents.

Coastal Douglas Fir [*Pseudotsuga menziesii* var. *menziesii*] shall be used when Douglas Fir products are specified to receive preservative treatment.

**904.02 Framing** – All the cutting, boring, framing, match marking, etc. required on all timber shall be done by competent framers in a thorough manner, in accordance with good work practice. It shall be done such that surfaces in contact shall bear evenly and fully; no shims or open joints are permitted. All measurements shall be accurate. Gains and daps shall have plane, smooth surfaces.

**904.03 – Ministry Quality Assurance and Inspection** – The Ministry will carry out Quality Assurance and also may elect to arrange for its own inspection, before or after shipment to the Site. The Ministry inspection shall not relieve the Contractor of responsibility to provide lumber with grade stamps or certificates of compliance.

The Contractor shall provide the necessary facilities to enable the Ministry Representative to expeditiously examine as many pieces as are deemed necessary.

All material rejected (after maximum allowances are reached per applicable standards grading rules) shall be replaced at the Contractor's expense including shipping charges and removal of rejected material at the Site.

Inspection of timber before shipment shall not prevent its subsequent rejection at the construction site if found to fail any requirements of this specification.

The Contractor shall provide seven (7) days notice to the Ministry Representative regarding intent to ship a unit or product and the unit or product shall be made available for inspection prior to loading and shipping.

No material shall be shipped prior to inspection or until a release for shipment has been issued by the Ministry Representative.

**904.04 Handling of Untreated Timber** - All materials shall be handled with reasonable care. Timber shall not be bashed, bruised, gouged, cracked, split or otherwise damaged. Minor damage, in the opinion of the Ministry Representative, shall be repaired at the Contractor's expense; severely damaged materials will be rejected and replaced entirely at the Contractor's expense including all shipping and disposal charges.

**904.06 Treated Timber** – Treated timber shall be treated and handled in accordance with SS 908, Preservative Treatment - Wood Products. After treatment, timber with checks exceeding the limiting sizes in the [NLGA Standard Grading Rules for Canadian Lumber](#) for the grade specified on the purchase order, Work Order, Special Provisions or Drawings shall be rejected.

## SECTION 905

### TIMBER – GLUED LAMINATED

**905.01 General** – The requirements of the current CSA O122 - Structural Glued-Laminated Timber shall apply to all glued laminated members. Wood species shall be as specified, except that if the members are specified to be Douglas Fir - Larch, and to be pressure treated, they may only be of Coast Region Douglas Fir.

Cutting, framing and boring of glulam members to receive preservative treatment shall be done before treatment insofar as possible.

**905.02 Prefabrication Meeting** – The Ministry will at its discretion, convene a prefabrication meeting with the Contractor to confirm the Ministry’s requirements and to review issues such as, but not limited to, schedule, lines of communication, fabricator and sub-fabricator scope of work, location of all work, procedures on quality control, procedures for testing, lumber grading, preservative treatment and any other specific requirements as it relates to the Work.

**905.03 Classification** – Unless otherwise specified, the appearance grade shall be “Industrial” and the service grade shall be “Exterior”. The stress grade shall be as shown on the Drawings, Contract, purchase order or work order.

**905.04 Quality Control** – The Contractor shall implement a quality control program to meet the Contract requirements. The quality control plan shall be made available to the Ministry Representative for review.

Laminations shall be grade-marked and the marking shall be visible until the glue has been applied.

The shear tests described in Appendices "A" and "B" of CSA O122 shall be carried out by the Contractor. Vacuum-pressure cycle tests described in CSA O122 shall be carried out by the Contractor.

The Contractor shall provide test results from the shear and vacuum-pressure tests to the Ministry Representative.

**905.05 Quality Assurance** – The Ministry will implement a quality assurance program by auditing the Contractor's quality control program and by inspection and testing at its discretion.

The Contractor shall notify the Ministry Representative at least 14 days before fabrication has commenced. The Contractor shall allow the Ministry Representative access to all parts of the Work, and shall supply such information and assistance as is required. All timber and all phases of the work including pressure treatment, if applicable, may be inspected by the Ministry Representative.

The Ministry Representative shall be given 48 hours notice of commencement of gluing and pressure treating. If the schedule is subsequently changed, the Contractor shall

provide the 48 hours notice from the time that the Ministry is notified of this change. If the product is not available or is not sufficiently complete for inspection as notified, at the sole discretion of the Ministry Representative, the Contractor shall be charged stand-by costs for the Ministry’s quality assurance inspectors.

The Contractor shall provide the necessary facilities to enable the Ministry Representative to expeditiously examine as many pieces as are deemed necessary. All material rejected shall be replaced. Inspection by the Ministry of glued laminated timber before shipment shall not prevent its subsequent rejection at the construction site if found to fail any requirements of the Contract.

No material shall be shipped from the glue laminating plant prior to inspection or before a release for shipment has been issued by the Ministry Representative.

**905.06 Incising** – All surfaces of members shall be incised prior to pressure treatment.

**905.07 Preservative Treated Glued Laminated Members** – Preservative treatment and handling of preservative treated wood shall be in accordance with CSA O122 and SS 908.

Members shall be protected to avoid damage due to handling: dogs, hooks, peavies or other equipment shall not be used on the side surfaces of treated timber. All handling of treated timber with pointed tools shall be confined to end grain and done in a manner to avoid damage to the original pressure-treated surface.

The Contractor shall field treat any damage of treated timber by the methods outlined in the current edition of CSA O80 Wood Preservation or the AWWA Standards. For bridge components, creosote and copper naphthenate shall be the only permitted field treatment preservatives. At the discretion of the Ministry Representative, timber which cannot be repaired by such methods will be rejected.

**905.08 Storage of Glued Laminated Members** – Members lying in storage shall be supported evenly on a flat surface. When stored for a prolonged time, they shall be gapped to permit air circulation and covered to prevent UV damage.

**905.09 Working Drawings** – Working drawings shall consist of the following:

- Shop drawings,
- Transportation details, and
- Erection drawings

Transportation details and erection drawings shall be prepared and sealed by a professional engineer registered



with the Association of Professional Engineers and Geoscientists of the Province of British Columbia (APEGBC).

When the Contractor is responsible for the design of items that are detailed on the shop drawings, the shop drawings shall be prepared and sealed by a professional engineer registered with the Association of Professional Engineers and Geoscientists of the Province of British Columbia (APEGBC).

Working drawings shall be in the same system of units as the design drawings.

Lettering for notes and dimensions shall be at least 2.5 mm and 4 mm for headings. Drawings shall be legible when printed on 11" x 17" sheets.

**905.10.01 Shop Drawings** – Shop drawings shall show all information and details needed for the fabrication of the members including, but not limited to, such items as member shapes and dimensions, camber diagram, complete geometric information that member dimensions and shapes are based on, connection details, material and product standards, mark numbers and general arrangement of member locations, details of attachments, fastener details, mass of members, special tolerances, special handling instructions, lifting details and lifting locations.

A copy of the shop drawings shall be available at all times at the location where the components shown on the drawings are being fabricated. Changes to the glue laminated timber from what is shown on the reviewed shop drawings, or repairs made during fabrication and/or construction, shall be indicated by the Contractor on a marked-up set of shop drawings in digital format and submitted to the Ministry Representative at the completion of the Work.

**905.10.02 Transportation Details** – Transportation details shall include such items as:

- Description of hauling and handling equipment
- Weight of members
- Length and height of loads
- Location and method of member support
- Details for handling, storing, and loading of members.

**905.10.03 Erection Drawings** – Erection drawings shall show in detail the method of erection including, but not limited to, the following:

- Erection procedures
- Procedures for off loading of members upon delivery
- Details for temporary storage and support of members on site prior to erection
- Equipment to be used
- Layout or general arrangement drawing showing the

layout of the members, equipment positioning, and access roads

- Crane make, model, and capacity charts, boom length(s), crane placement, and access for transporting of members to crane(s)
- Radii and loads for crane lifts
- Rigging details
- Mass of members, rigging and special installation equipment
- Details for installation and removal of all falsework, temporary supports, temporary bearings, bracing, guys, dead-men, and lifting devices
- Attachments to the bridge members and bridge structure for temporary support and special launching equipment
- Detailed description of sequence of operations
- Details for special installation equipment such as a launching truss, launching nose, head frames, spreader beams and rollers
- Details for installation of members onto the permanent bearings
- Traffic control plan for roadway and rail traffic
- Details for protection of existing utilities affected by the erection procedures
- Layout and details of fall protection and their sequence of installation.

The Contractor shall be responsible for the lateral stability of members and shall design and provide bracing as necessary until completion of the Work.

The erection drawings shall be complete in detail for all anticipated phases and conditions during erection and during the temporary support of members. The Contractor shall submit calculations, upon request, to the Ministry Representative that demonstrate that specified factored demand/capacity ratios or allowable stresses are not exceeded in members, falsework, temporary bracing and temporary supports and that member capacities and final geometry will be correct. These calculations shall be sealed by the professional engineer who sealed the erection drawings.

Falsework, temporary supports and temporary bracing shall meet the requirements of CSA S269.1, "Falsework and Formwork" and shall also meet all the requirements for falsework given in Clauses 20.17 to 20.26 inclusive of the WCB Occupational Health and Safety Regulation.

A professional engineer registered with APEGBC shall be responsible for any field designs and any changes made to the erection procedures. Field designs and changes to the erection procedures must be documented and sealed by the

responsible professional engineer and must be available at the Site prior to the affected erection Work being carried out.

Immediately before placement of loading on falsework, the Contractor must ensure that the falsework is inspected and a sealed engineering certificate is issued by a professional engineer registered with APEGBC which:

- Indicates the specific areas inspected and
- Certifies that the falsework has been erected in accordance with the latest approved erection drawings and supplementary instructions.

**905.10.04 Submittals** – The Contractor shall submit to the Ministry Representative one set of all working drawings in digital format. Prior to submission to the Ministry Representative, working drawings shall be reviewed and approved by the Contractor. By this review and approval, the Contractor represents that it has determined and verified all field measurements, field construction criteria, materials, and similar data, and that it has checked and coordinated each working drawing with the requirements of the work and the contract documents. The Contractor shall indicate its review and approval by including on each drawing the date and signature of a person designated by the Contractor as being responsible for the Work.

Working drawings shall be submitted at least fourteen days prior to the fabrication of the Work and shall be accompanied by a transmittal listing each of the drawings submitted. At the time of submission, the Contractor must notify the Ministry Representative in writing of any deviations in the shop drawings from the requirements of the contract documents. Any Work done or materials ordered prior to the review of the working drawings shall be at the Contractor's risk. The Ministry will review the drawings for general compliance with the contract requirements.

If modifications to the drawings are required, the Ministry Representative will return one set of drawings, marked up, to the Contractor. The Contractor shall re-submit one complete set of the revised drawings in digital format to the Ministry Representative. Any drawing that has changed from the version originally submitted shall be identified as such on a transmittal accompanying the revised drawing set.

If no exceptions are taken to the drawings, the Ministry Representative will return one set of reviewed drawings to the Contractor.

Shop drawings will not be reviewed without the transportation details and erection drawings applicable to the members in question.

Erection will not be allowed to proceed without the Ministry Representative's review of the method proposed.

Review of working drawings shall not relieve the Contractor of responsibility for carrying out the work in accordance with the contract documents.

If so agreed to in advance by the Ministry Representative, working drawings may be submitted in paper format. The reference to shop drawing submittal copies shall be increased to four paper copies in this case.

At least 14 days before fabrication is to commence, or as otherwise requested by the Ministry Representative, the fabricator shall submit a schedule of fabrication to the Ministry Representative in the form of a Gantt Chart. At the discretion of the Ministry, the schedule shall be updated on no less than a monthly basis. The schedule shall be made available to the Ministry Representative for reference and planning of inspections and progress reporting. At the request of the Ministry Representative, the Contractor shall report any interim variations to the schedule.

**905.10.05 Working Drawing Format** – The Contractor shall transmit working drawings through attachments to e-mail. Unless otherwise agreed to by the Ministry Representative, electronic attachments to an email must total no more than 7 MB and must be submitted unzipped. (Note: BC Government servers reject, without notice, all e-mails with “zipped” attachments.) Drawing files shall be submitted in PDF format to print out on 11” x 17” size pages. PDF sets shall be created by “distilling” CAD sheets rather than by scanning paper plan sets. Unless otherwise agreed to by the Ministry Representative, electronic attachments greater than 7 MB in size shall be sent in two parts by separate emails, denoting “1 of 2” and “2 of 2” in the subject lines after other required subject-line information.

If agreed to by the Ministry Representative, the Contractor may employ a document and data management service such as SharePoint® to transmit working drawings. If this process is used, the limitation on drawing file size is waived. The Contractor shall be responsible for setting up the appropriate folders within the document and data management software and for providing access to these folders to the fabricator, Ministry Representative and the design engineer. The Contractor and the Ministry Representative shall send e-mail notification to each other whenever they post drawings to the document and data management folders.

The resolution of drawings shall be such that the finest detail must be legible at full scale on a monitor without zooming in (1-in. width on an 11”x17” sheet is 1 in. on the monitor).

Drawings shall be black images on a white background.

All PDF sheets shall be assembled within a single file ensuring that all sheets are rotated to a “ready to read” orientation within the PDF file set. Generally, 11” x17” plan sheets should be in landscape and 8½” x 11” note sheets in portrait, so that the majority of text is vertical. PDF

## SECTION 905

sheets shall be ready to print out on appropriately sized paper sheets with no additional formatting required by the viewer.

Drawing sets that are not legible or that do not conform to submission requirements will be returned to the Contractor without being reviewed and the Contractor shall submit four paper copies of the drawing set as substitutes. Drawings of large or complicated pieces, where it is not practical to show all details on an 11" x 17" sheet, may be submitted on full size paper drawings, in which case the Contractor shall submit four copies of the drawing set. When revisions to full size paper drawings are required, the Contractor shall supply four complete sets to the Ministry Representative.

## TIMBER – GLUED LAMINATED

### 905.11 Payment

**905.11.01 Supply and Fabrication** – Payment for supply and fabrication of glued laminated timber will be made at the lump sum price bid. Payment shall be for quality control, working drawings, the supply and fabrication of all necessary work. Payment shall also cover storage as necessary.

**905.11.02 Shipping and Erection** – Payment for shipping and erection of glued laminated timber will be made at the lump sum price bid. Payment shall be for quality control and the loading, shipping and unloading of glued laminated timber. Payment shall also cover falsework if necessary and the erection of glued laminated timber.

## SECTION 906

### ROUND TIMBER PILES

**906.01 Scope** – This Section covers the quality and manufacture of untreated and pressure-treated round timber piles.

**Note:** Round timber piles may be used in the completed Work only when explicitly identified in the Contract as an acceptable product.

Where convenient, the requirements contained in this Section use the wording of the current CSA O56 Round Wood Piles, in particular for term definition (see Appendix 906-A) and the majority of measurement and material requirements.

Preservative treatment of piles shall conform to the requirements of SS 908.

#### 906.02 Species

**906.02.01 Untreated Piles** – This specification does not restrict the species used for untreated piles except as may be specified in the Contract Documents.

**906.02.02 Pressure Treated Piles** – Species of piles to be pressure treated shall be as specified and restricted to those for which pressure treating specifications are included in CSA O80 Wood Preservation.

**906.03 Size** – The size of a pile shall be designated by length, minimum and maximum butt diameter and minimum tip diameter. Sizes of piles normally available are shown in Table 906-A.

**Table 906-A: Sizes of Timber Piles**

Length in Metres	Size Designation Minimum Diameter at Extreme Butt or Large End (mm)					
	360	330	300	280	250	230
	Minimum Diameter at Small End Tip (mm)					
Up to 6.1	250	250	230	200	180	150
6.1 to 10.4	250	230	200	180	150	150
10.7 to 13.4	230	200	180	150	-	-
13.7 to 18.0	200	180	180	-	-	-
18.3 to 21.0	200	180	150	-	-	-
21.3 to 27.1	180	150	-	-	-	-
27.4 to 32.0	150	130	-	-	-	-

Diameters in Table 906-A are minimum, except for the tolerance permitted in SS 906.03.01(f).

#### 906.03.01 Diameter

- (a) All measurements of diameter shall be made inside the bark.
- (b) The diameter of treated piles shall be measured after treatment.
- (c) Butt diameters shall be measured at the extreme butt. Maximum diameter at the butt shall not exceed 500 mm for any pile size.
- (d) Tip diameters shall be measured at the extreme tip.
- (e) The diameter of a pile at a given point along its length shall be determined either by measuring the circumference at that point and dividing the result by 3.14 or by taking the average of the maximum and minimum diameters measured at the point in question.
- (f) A variation of -13 mm in the diameter at the tip or at the butt but not in both, shall be allowed in not more than 25% of the piles within a given substructure element provided there are at least four piles in that element.
- (g) If allowances are specified, they shall supersede SS 906.03.01(f).

#### 906.03.02 Length

- (a) Pile lengths shall be measured in metres.
- (b) A variation of  $\pm 0.15$  m from designated lengths will be permitted, unless allowable over and under lengths are specified.

**906.04 General Material Requirements** – Piles shall be cut from sound live trees. Sides and end surfaces of the piles shall be free of ice, snow and mud, and exposed for visual inspection.

**906.04.01 Untreated Piles** – Untreated piles shall be sound and close-grained.

**906.04.02 Treated Piles** – Treated piles shall meet the following:

- (a) have not less than 20 mm sapwood, and shall be cleanly peeled;
- (b) in any 300 mm length of the pile, the maximum combined total depth of all trimmed scars shall not exceed 25 mm;
- (c) not be cored until 24 hours after treatment; and
- (d) be cored in the middle third of the length of the pile.

**906.05 Defects****906.05.01 Prohibited Defects**

- (a) Through checks
- (b) Bird holes
- (c) Cross-breaks of grain (cracks)
- (d) Decay
- (e) Nails, spikes and other metal or foreign substance
- (f) Holes in treated piles (except holes for test purposes, which shall be properly plugged). Holes for brailing purposes shall be drilled prior to treatment
- (g) Shakes in the tip
- (h) Splits in the tip
- (i) Insect damage
- (j) Any abnormal change in cross-section (including ground swell)
- (k) Knot clusters
- (l) Unsound scars (cat faces)
- (m) Short crooks (see SS Drawing SP906-01)
- (n) Reverse sweep (see SS Drawing SP906-02)
- (o) Burst - unsound piling which have 15 mm or more of a concentration of oil in the deadwood

**906.05.02 Permitted Defects**

- (a) Firm red heart
- (b) Hard stain
- (c) Compression wood

**906.05.03 Limited Defects**

- (a) Checks caused by treating and normal seasoning shall not exceed the following:
  - (i) Checks in the tips of the pile from the pith to the circumference shall not be wider than 10 mm at the circumference.
  - (ii) If checks are wider than 10 mm but not deeper than 1/3 of the diameter of the pile, not more than three of these checks shall occur in the circumference of the pile at that point. If checks are deeper than 1/3 of the diameter of the pile but not to the heart, and not wider than 10 mm, then only two such checks shall occur in the circumference of the pile at that point. The sum of all the widths of checks in a pile shall not exceed 1/4 of the diameter where they occur.
- (b) Sound Knots will be permitted as follows:
  - (i) For piles 15 m and less in length, knots up to 100 mm in diameter will be permitted provided that

the sum of all knot diameters does not exceed 1/3 of the diameter of the pile at the section where they occur;

- (ii) For piles more than 15 m in length, knots between:
  - (A) mid-length and butt shall conform to the requirements for piles of 15 m or less;
  - (B) mid-length and the tip, up to 125 mm in diameter, will be permitted provided that the sum of all knots does not exceed 1/2 of the diameter of the pile at the cross-section where they occur.
- (c) Shakes in the butt end of a pile are permitted provided that the length of any single shake, or the total length of any number of shakes, measured along the line of the shake, does not exceed 1/3 of the measured diameter of the butt.
- (d) Splits in the butt end of a pile are permitted provided that they are not longer than the diameter of the butt.
- (e) Sweep is permitted provided that it cannot be classified as short crook or reverse sweep and provided that:
  - (i) For piles less than 21 m in length, a straight line joining the mid-point of the butt and the mid-point of the tip does not at any intermediate point pass outside the surface of the pile;
  - (ii) for piles 21 m and up to 24 m in length, a similar straight line does not lie more than 25 mm outside the surface of the pile; or
  - (iii) for piles over 24 m in length, a similar line does not lie more than 50 mm outside the surface of the pile.

Note: See SS Drawing SP906-01.

- (f) Holes for untreated piles less than 13 mm in average diameter will be permitted provided that:
  - (i) they are scattered over the surface of the pile; and
  - (ii) the sum of the average diameter of all holes in any square 300 mm x 300 mm of pile surface does not exceed 38 mm and the depth of any one hole does not exceed 38 mm.
- (g) Spiral Grain shall not exceed 1/2 turn in any 6 m length of pile.

**906.06 Manufacturing Requirements** – All piles shall be cut above the ground swell and have a uniform taper throughout their whole length.

Completely overgrown knots rising more than 30 mm above the pile surface, branch stubs, and partially overgrown knots shall be trimmed close.

Peeling of piles by hand or machine shall be done carefully so as not to gouge or otherwise damage the surface of the pile, and the reduction in thickness of sapwood shall be the minimum possible.

Sawing of butts and tips shall be cut perpendicular to the axis of the pile. Bevelling at the ends of the piles shall not be permitted.

**906.07 Storage** – Piles shall be stacked in treated or other non-decaying skids of such dimensions, and so arranged as to support the piles without producing noticeable distortion of any of them. A cover should be put over them to protect against the elements.

**906.08 Handling** – Handling of preservative treated piles shall be in accordance with SS 908.

**906.08.01 Additional Handling Requirements** – Handling shall also meet the following:

- (a) All piles shall be handled with reasonable care. Piles shall not be bruised or otherwise damaged. Minor damage shall be repaired and severely damaged piles shall be replaced. Handling damage will be unacceptable if it reduces the depth of sapwood so as to render the pile untreatable.
- (b) During lifting, long piles shall be supported at a sufficient number of properly located points to prevent damage due to excessive bending.
- (c) Dogs, hooks, peavies or other equipment shall not be used on the round surface of treated piling, except in the last one metre of the butt end.
- (d) The Contractor shall make good any superficial damage of treated piles by field treatment methods in accordance with CSA O80 Wood Preservation. Piles, which, in the opinion of the Ministry Representative, cannot be made good by such methods, will be rejected.

**906.09 Quality Control** – Quality control inspection of any preservative treatment shall be in accordance with SS 908.

Treated piles being supplied from previously treated stock shall have been clearly stamped with the applicable Charge Number or other positive identification, and the appropriate treatment records shall be made available to the Ministry Representative for inspection.

All piles being supplied from previously treated stock shall be subject to re-inspection which shall be in accordance with SS 908.

Piles to be supplied from previously treated stock which have been stored in water shall, if ordered by the Ministry Representative, be removed from the water if such action is required to provide adequate inspection. At the Contractor's option, such inspection may be carried out at the Site. All piles rejected at the Site shall be removed and replaced.

**906.10 Quality Assurance** – The Ministry will implement a quality assurance program by auditing the Contractor's quality control program and by inspection and testing at its discretion.

Piles may have quality assurance inspection before shipment to the Site, at the Site or both. The Contractor shall provide the necessary facilities to enable the Ministry Representative to expeditiously examine all parts of each pile. All piles rejected shall be replaced at the Contractor's expense, including shipping charges and removal of reject piles from the Site, if applicable. Inspection of the piles before shipment shall not prevent their subsequent rejection at the Site if found to fail any requirements of this Section.

**APPENDIX 906-A – DEFINITIONS**

**Check:** separation of the wood along the grain, the greater part of which occurs across the rings of annual growth.

**Through check:** a check, which extends from surface to surface of the pile, usually through the pith centre.

**Compression wood:** wood which has grown abnormally as often occurs on the lower side of branches and inclined trunks of coniferous trees.

Compression wood:

- is denser and harder than normal wood but may be lower in strength for its mass.
- is characterized by relatively wide annual rings, usually eccentric.
- has a relatively high proportion of summerwood (frequently more than 50% of the width of the annual rings in which it occurs).
- exhibits little contrast in colour between springwood and summerwood, and
- shrinks excessively lengthwise as compared with normal wood.

**Crack:** separation of the wood cells across the grain (this may be due to internal strains resulting from unequal longitudinal shrinkage or to external forces).

**Decay (rot, dote):** the disintegration of the wood substance, due to the action of wood-destroying fungi (rot and dote mean the same as decay).

**Grain:** the direction, size, arrangement, and appearance of fibres in a pile.

**Spiral grain:** a type of growth in which the fibres take a spiral course about the bole of a tree instead of the normal vertical course. The spiral may extend right-handed or left-handed around the tree trunk. The amount of spiral grain in a pile is measured as the distance in metres, along the axis of the pile in which one complete twist of the spiral occurs, and is expressed as, for example, one (1) turn in 12 m.

**Hole:** an opening, perforation or cavity in a pile.

**Bird holes:** holes and damage caused by woodpeckers and other species of birds.

**Plugged holes:** holes that have been filled by forcing in another piece of wood.

**Insect damage:** result of boring in the pile by insects or insect larvae. Scoring or channelling of the surface is not classified as insect damage.

**Knot:** that portion of a branch or limb that has become incorporated into the body of a tree.

**Knot cluster:** two or more knots grouped together as a unit with the fibres of wood deflected around the entire unit.

**Knot diameter:** the diameter of a knot as it appears on the surface of a pile measured in a direction at right angles to the lengthwise axis of the pile.

**Unpeeled:** no attempt is made to remove the bark from the pile, but does not mean that all of the bark is on the pile as it may be scuffed, knocked, or worn off after the pile is cut.

**Rough peeled:** all of the outer bark is removed from the pile.

**Clean peeled:** all of the rough bark is removed from the pile, and all of the inner bark from at least 80% of the surface of the pile, no piece of inner bark more than 200 mm long remains on the surface of the pile, and there is at least 30 mm of clean wood surface between any two strips of inner bark.

**Red heart:** a condition caused by fungus (*Fomes pini*, *Trametes pini*) which occurs in the living trees of some conifers. It is characterized in the early stages of infection by a reddish or brownish colour in the heartwood. Later the wood in the living tree disintegrates (decays) in small, usually distinct areas that develop into white-lined pockets.

**Firm red heart:** the early stages of infection, characterized by a reddish or brownish colour in the heartwood, which does not affect the strength of the pile.

**Scar (cat face):** a depression in the surface of the pile resulting from a wound where healing has not re-established the normal cross-section of the pile.

**Shake:** a separation along the grain, the greater part of which occurs between the rings of annual growth.

**Short crook:** a localized deviation from straightness which, within any section 1.5 m or less in length, is more than 65 mm (see SS Drawing SP906-01).

**Sound:** free from decay and insect holes.

**Split:** a lengthwise separation of the wood due to the tearing apart of the wood cells which usually extends from surface to surface of the pile.

**Stain:** a discolouration on or in the wood other than its natural colour, caused by the action of certain moulds and fungi.

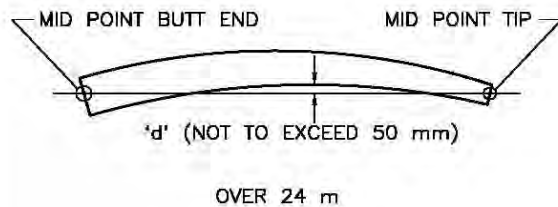
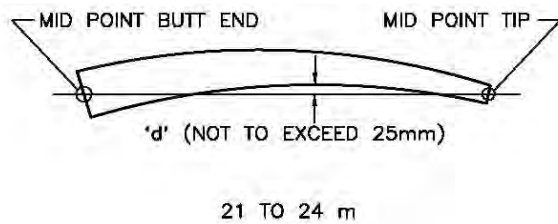
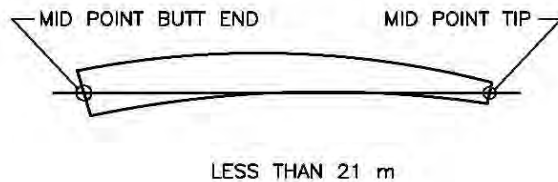
**Hard stain:** a stain, which is not accompanied by softening or other disintegration of the wood.

**Sweep:** the deviation of the pile from straightness (see SS Drawing SP906-01).

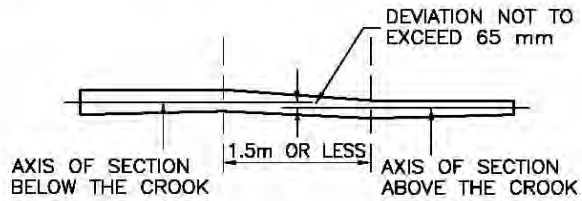
**Reverse sweep:** a deviation from straightness, which changes direction or reverses direction in the length of the pile (see SS Drawing SP906-02).

MEASUREMENT OF SWEEP AND CROOK IN PILES

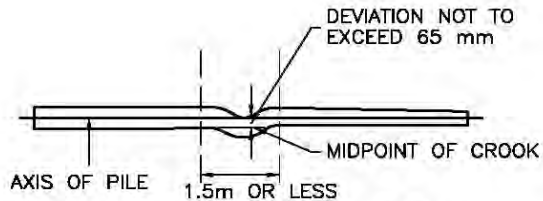
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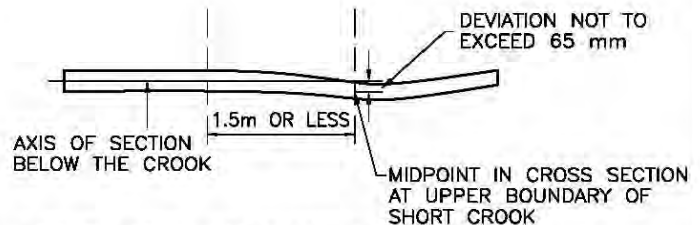
MEASUREMENT OF SWEEP



CASE 1: WHERE THE REFERENCE AXES ARE APPROXIMATELY PARALLEL.



CASE 2: WHERE AXES OF SECTIONS ABOVE AND BELOW THE CROOK COINCIDE OR ARE PRACTICALLY COINCIDENT.



CASE 3: WHERE AXIS OF SECTION ABOVE SHORT CROOK IS NOT PARALLEL OR COINCIDENT WITH AXIS BELOW THE CROOK.

MEASUREMENT OF SHORT CROOK

**NOTE:**  
THE THREE CASES SHOWN ARE TYPICAL AND INTENDED TO ESTABLISH THE PRINCIPLE OF MEASURING SHORT CROOKS. THERE MAY BE OTHER CASES NOT EXACTLY LIKE THOSE ILLUSTRATED.

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



## REVERSE SWEEP IN PILES

SP906-02



## REVERSE SWEEP IN PILES

**NOTES:** WHEN CONDITIONS OF DESIGN REQUIRE, THE FOLLOWING REQUIREMENTS APPLY:

1. FOR PILES LESS THAN 10 m IN LENGTH, A STRAIGHT LINE CONNECTING THE MID-POINT AT THE BUTT AND THE MID-POINT AT THE TIP SHALL NOT LIE LESS THAN 75 mm INSIDE THE SURFACE OF THE PILE;
2. FOR PILES 10 m AND UP TO 12 m IN LENGTH, A SIMILAR STRAIGHT LINE SHALL NOT LIE LESS THAN 50 mm INSIDE THE SURFACE OF THE PILE;
3. FOR PILES 12 m AND UP TO 15 m IN LENGTH, A SIMILAR STRAIGHT LINE SHALL NOT LIE LESS THAN 25 mm INSIDE THE SURFACE OF THE PILE; OR
4. FOR PILES OVER 15 m IN LENGTH, A SIMILAR STRAIGHT LINE SHALL NOT PASS THROUGH THE SURFACE OF THE PILE.

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

## SECTION 908

### PRESERVATIVE TREATMENT – WOOD PRODUCTS

**908.01 Scope** – This Section covers the quality and requirements for preservative treatment of wood products using pressure treatment.

**908.02 General** – Treated wood shall meet the requirements of SS 908 as well as the product specific requirements in the following related Standard Specification sections, as applicable to the intended use:

- SS 213 Timber Bridges - Construction
- SS 214 Timber Piling Construction
- SS 604 Steel Traffic Barrier Construction
- SS 635 Electrical and Signing
- SS 700 Wildlife Exclusion Fencing
- SS 741 Fence Construction
- SS 904 Timber (Treated and Untreated)
- SS 905 Timber – Glued Laminated;
- SS 906 Round Timber Piles
- SS 909 Treated Wood Fence Posts

**908.03 References** – The standards, specifications and publications as listed in Table 908-A shall apply to all treated wood products.

When a requirement of the CSA O80 Series of Standards conflicts with a requirement of an AWPA Standard, the requirement of the CSA O80 Series of Standards shall take precedence.

**908.04 Timber Grading** – All timber (excluding round fence posts) shall be graded in accordance with the National Lumber Grades Authority’s current [Standard Grading Rules](#) for Canadian Lumber.

Each piece of timber (excluding fence posts) should be marked with a grade stamp from [a lumber grading agency accredited by the Canadian Lumber Standards Accreditation Bureau \(CLSAB\)](#).

Timber supplied without a grade stamp, or where the grade stamp is obscured, shall have a certificate from a lumber grading agency accredited by the CLSAB that verifies the grade and species. Copies of the grading certificate shall be kept by the Contractor and provided to the Ministry Representative upon request.

**908.05 Species and Grade** – Timber species and Grade shall be as specified in the related Standard Specification sections and Contract Documents.

“Coastal” Douglas Fir [*Pseudotsuga menziesii* var. *menziesii*] shall be used when Douglas Fir products are specified to receive preservative treatment.

**Table 908-A: Standards, Specifications, and Publications**

Agency / Spec.	Description
<a href="#"><u>CSA</u></a>	<b>Canadian Standards Association</b>
O80	Wood Preservation Series of standards
O80.0	General Requirements for Wood Preservation
O80.1	Specification of Treated Wood
O80.2	Processing and Treatment
O80.3	Preservative Formulations
<a href="#"><u>AWPA</u></a>	<b>American Wood Protection Association</b>
M1	Standard for the Purchase of Treated Wood Products
M2	Standard for the Inspection of Preservative Treated Products for Industrial Use
M3	Standard for the Quality Control of Preservative Treated Products for Industrial Use
T1	Use Category System: Processing and Treatment Standard
U1	Use Category System: User Specification for Treated Wood
<a href="#"><u>ALSC</u></a>	<b>American Lumber Standard Committee</b> <a href="#"><u>Treated Wood Program</u></a>
<a href="#"><u>CLSAB</u></a>	<b>Canadian Lumber Standards Accreditation Board</b>
<a href="#"><u>CWPCA</u></a>	<b>Canadian Wood Preservation Certification Authority</b>
<a href="#"><u>NLGA</u></a>	<b>National Lumber Grades Authority</b> <a href="#"><u>Standard Grading Rules for Canadian Lumber</u></a>
<a href="#"><u>WWPI</u></a>	<b>Western Wood Preservers Institute</b> <a href="#"><u>Best Management Practices for Use of Wood in Aquatic and Other Sensitive Environments</u></a>

**908.06 Conditioning** – All timber shall be air seasoned sufficiently and properly conditioned in accordance with CSA O80 prior to treatment to ensure proper penetration of preservative during the treatment process and to prevent checking after treatment.

In exceptional circumstances, the Ministry Representative may permit conditioning by steaming as per CSA O80.2, clause 4.4.4 and/or the latest AWPA T1 Standard.

## SECTION 908

## PRESERVATIVE TREATMENT – WOOD PRODUCTS

**908.07 Preservative Treatment** – All treated wood materials shall be pressure treated in accordance with CSA O80.

The preservative treatment of laminated veneer lumber shall be in accordance with AWPA U1 and parallel strand lumber shall be in accordance with AWPA U1 and AWPA T1.

**908.07.01 Acceptable Preservatives** – One of the following preservatives shall be used:

- (a) creosote;
- (b) pentachlorophenol in Type A hydrocarbon solvent;
- (c) copper naphthenate in Type A hydrocarbon solvent;
- (d) chromated copper arsenate, Type C (CCA);
- (e) ammoniacal copper zinc arsenate (ACZA);
- (f) alkaline copper quaternary, Type A (ACQ-A);
- (g) alkaline copper quaternary, Type C (ACQ-C);
- (h) alkaline copper quaternary, Type D (ACQ-D); or
- (i) copper azole Type B (CA-B).

**908.07.02 Certified Treatment Facilities** – All pressure treated material shall come from a treatment plant/facility that is certified under and in compliance with the Canadian Wood Preservation Certification Authority (CWPCA) program.

A copy of the CWPCA certificate and certification letter must be submitted to the Ministry Representative upon request.

- (e) **Table 908-B**; and lastly
- (f) CSA O80, Table 2 “Use categories for specific products, uses and exposures”.

**908.07.06 Pre-cut or Field Treat** – Cutting, framing, and boring of timbers to receive preservative treatment shall be done before treatment insofar as possible. In the event that cutting or drilling becomes necessary after treatment, a field treatment preservative specified in CSA O80 or the AWPA M4 shall be used and applied in accordance to its label. For bridge components, creosote and copper naphthenate shall be the only permitted field treatment preservatives. At least two coats shall be applied and where possible, the colour of the preservative treatment used for protecting field cuts shall match the original preservative treatment colour.

### **908.08 Hardware, Fasteners and Metalwork**

**908.08.01 General** – All hardware, fasteners and metal work in contact with treated wood products used in permanent structures shall be stainless steel or hot-dipped galvanized in accordance with the ASTM A123, ASTM A153 (Class D) or ASTM A653 (G90 coating class) as applicable.

**908.07.03 Environmental Compliance** – Preservatives shall comply with all required environmental regulations. Treated wood for use in bridges or for use near or in aquatic environments shall be treated in accordance with the most recent version of [Best Management Practices for Use of Wood in Aquatic and Other Sensitive Environments](#), published by [Western Wood Preservers Institute](#) et al ([WWPI BMPs](#)).

**908.07.04 Other Conditions** – The type of preservative, conditioning, treatment, penetration and retention for the treated wood product shall be appropriate for the species, size, and end use of the product.

All sawn wood and glued-laminated members shall be incised before treatment in accordance with CSA O80.

All treated wood shall be substantially devoid of free surface preservative liquid and preservative deposits.

**908.07.05 Use Category** – The Use Category and the type of preservative for treated wood materials shall be in accordance with the following requirements. If there is any conflict between any of these requirements, the following shall apply in the descending order of precedence:

- (a) Special Provisions;
- (b) Drawings;
- (c) Related Standard Specifications as listed in SS 908.02;
- (d) SS 908 and

**908.08.02 Wood Treated with CCA, ACZA, ACQ-A, ACQ-C, ACQ-D, or CA-B** – All hardware, fasteners and metal work used in permanent structures shall be hot-dipped galvanized in accordance with the ASTM A123, ASTM A153 (Class D) or ASTM A653 (G185 coating class) as applicable. Nails, spikes and sheet metal fastenings shall be 304 or 316 stainless steel when specified.

**908.08.03 Galvanized fastenings** – Galvanized nuts shall be retapped to allow for the increased diameter of the bolt due to galvanizing. Heat-treated alloy components and fastenings that may be affected by the heat of the zinc bath shall have corrosion protection provided by an alternate means as approved by the Designer and the Ministry Representative.

**908.09 Handling of Treated Wood Products** – All treated wood materials shall be handled with reasonable care to prevent damage of the pressure-treated surface such as puncture, cutting or crushing of fibre. Severely damaged pieces will be rejected at the discretion of the Ministry Representative.

Table 908-B: Use Category

Type of Wood Product	Use Category per CSA O80
All treated wood products exposed to brackish water or salt water	UC 5A
Cribbing, ballast walls	UC 4.2
Timber for bridge barrier and railings	UC 4.2
Timber for bridge decks, floor beams, stringers *	UC 4.2
Glued-Laminated Timber (see SS 905)	UC 4.2
Round Timber Piles, Pile Cap Beams and Pile Bracing (see SS 906)	UC 4.2
Sign Posts and associated components (see SS 635)	UC 4.1
Roadside guardrail posts and other guardrail components (see SS 312 and SS 604)	UC 4.2
Pedestrian and cyclist railings (excluding bridge barrier and roadside guardrail)	UC 4.1 (using preservative safe for pedestrian contact)
Wood Fence Posts and associated wood fence components (see SS 700, SS 741, and SS 909)	UC 4.1

\* Bridge deck running planks do not require preservative treatment

Subject to the approval of the Ministry Representative, the Contractor shall treat any small areas of superficial damage of treated wood materials using the field treatment methods specified in CSA O80 or AWP A M4. For bridge components, creosote and copper naphthenate shall be the only permitted field treatment preservatives. At least two coats shall be applied and where possible, the colour of the preservative treatment used for repair shall match the original preservative treatment colour. At the sole discretion of the Ministry Representative, treated wood materials which cannot be made acceptable by such methods will be rejected.

When unloading at the Site, the various pieces shall be sorted and stacked in such a manner as to require a minimum of re-handling before being placed in the structure.

The Contractor shall make good, at the Contractor's expense, any damage to treated wood materials supplied and/or supplied by the Ministry after having taken delivery of same.

#### 908.10 Quality Control at Treatment Plant

**908.10.01 General** – A quality control program shall be implemented at the treatment plant in accordance with CSA O80, CWPCA, and AWP A M3. Treated products shall be inspected in accordance with AWP A M2.

The quality control program shall include conducting and applying all quality control steps and inspections, including third-party inspections, as per industry standards and as required to meet these specifications. The quality control program shall maintain and properly document all records

of quality control inspection reports, worksheets, checklists, testing and data verification and types of treatments.

Quality control shall include plant inspection of treated wood products before, during, and after preservative pressure treatment to ensure the final treated wood products meet these specifications.

Copies of any quality control records for any treatment charge and treatment test shall be made available to the Ministry Representative upon request.

**908.10.02 Third Party Inspection** - Quality control shall include third-party inspection. Third-party quality control inspections must be performed at the treatment plant.

The third-party inspection agency shall meet the one of the following requirements:

- Accreditation by the American Lumber Standard Committee (ALSC) under their [treated wood program](#), or,
- Experience acceptable to the Ministry Representative and the Contractor.

The third-party inspection agency and the Ministry Representative shall have safe access to all parts of the treatment facility and shall be supplied information and assistance as required.

The third-party inspection agency shall provide an inspection report that confirms the treated wood conforms to the preservation requirements of CSA O80 and/or where applicable AWP A U1 and AWP A T1 and/or the [WWPI BMPs](#). Inspected material meeting these requirements shall be stamped with a certification mark. Alternatively, for

## SECTION 908

## PRESERVATIVE TREATMENT – WOOD PRODUCTS

round fence posts or when otherwise acceptable to the Ministry Representative, the third-party inspection agency shall provide a certificate of compliance that confirms that the inspected material has been treated in accordance with CSA O80.

Inspection reports must indicate both the “Use Category” and the type of preservative used.

Inspection reports shall be submitted to the Ministry Representative prior to the material being incorporated into the Work and shall be made available to the Contractor and the treatment facility.

No material shall be shipped prior to completion of the third-party inspection indicating that the treated products meet the specified requirements.

**908.11 Quality Assurance** – The Ministry may implement a quality assurance program by auditing the Contractor's quality control program and by inspection and testing at its discretion. The Ministry reserves the right to conduct whatever tests are deemed necessary to confirm that the material complies with the requirements of this specification before a release for shipment is issued.

The Ministry may elect to arrange for its own quality assurance inspection of any products by a lumber grading agency accredited by the CLSAB, the ALSC, and/or a third party inspection company, before or after shipment to the Site.

The Ministry Representative or delegate shall be granted complete access to the treatment plant and all its facilities,

at any time during business hours, to conduct quality assurance inspections and testing. QA may be performed on the wood product or treatment products at any time, including before, during, and after treatment.

The Contractor shall notify the Ministry Representative at least ten (10) full working days before the material is ready for quality assurance inspection prior to shipment.

The Ministry inspection shall not relieve the Contractor of responsibility to provide fully compliant treated wood products, including grade stamps or certificates of compliance.

The Contractor shall provide the necessary facilities to enable the Ministry Representative to expeditiously examine as many pieces as are deemed necessary.

**908.12 Approval of Materials** – Inspection of treated wood products before shipment shall not prevent its subsequent rejection at the Site if found to fail any requirements of the specifications.

Rejected material (after maximum allowance is reached per CSA O80) shall be replaced at the Contractor's expense including shipping charges and removal of rejected materials if applicable.

Any rejected material shall be removed from the Site and replaced at the Contractor's expense immediately after notification.

Ministry costs for re-inspection or re-testing for rejected material shall be at the Contractor's expense.

## SECTION 909

### TREATED WOOD FENCE PRODUCTS

**909.01 Scope** – This Section covers the quality and manufacturing requirements for preservative Pressure Treated Wood Fence Products (“Fence Products”) such as fence posts, gateposts, braces, and droppers used in Ministry Work.

Treated wood shall meet the requirements of SS 909 as well as the product-specific requirements in the following related Standard Specification sections:

- SS 700 – Wildlife Exclusion Fencing
- SS 741 – Fence Construction
- SS 908 – Preservative Treatment – Wood Products

**909.02 General** – Fence Products shall be supplied in the sizes, species, and grading specified, in conformity with this Section, and as generally shown on the applicable drawings in SS 700 and SS 741.

Fence Products shall be newly manufactured products. Previously used Fence Products are not accepted for the Work.

**909.03 Material – Wood Species** – All Fence Products such as round fence posts (including line, straining, corner, intersection, gate and end posts) and any required round wood braces and droppers shall be Lodgepole Pine or Jack Pine cut from live growing trees.

Use of other species or use of wood not cut from live trees (such as from slash piles, blown down trees, or kill stands) must be as specified in the Contract, Drawings or Special Provisions or must be approved in writing by the Ministry Representative prior to supply. Cedar, either split or whole, will not be approved.

Tree species not meeting specified requirements are subject to rejection with no payment to the Supplier and/or Contractor.

**909.04 Preservation Preparation and Wood Quality** – All fence posts and bracing shall be clean peeled with minimum removal of sapwood for their full length with all bark and cambium removed, and free from glazed surfacing left by dried sap.

All materials shall have sufficient sapwood in the outer periphery to obtain the specified penetration of preservative.

All sound knots or projections shall be shaved smooth and flush with the surface of surrounding wood.

#### **909.05 Defects**

**909.05.01 Prohibited Defects** – All round fence posts and braces shall be free of the following defects:

- (a) Decay, rot, stain and red heart;

- (b) Holes (except for test purposes, which shall be properly plugged);
- (c) Nails, spikes and other metal or foreign substances;
- (d) Loose or unsound knots including spike knots and knot clusters;
- (e) Excessive sweep, reverse sweep and short crook;
- (f) Cracks, splits or through checks, other than limited defects as defined below;
- (g) Shakes in the top or butt, and
- (h) Unsound scars (cat faces).

**909.05.02 Limited Defects** – All round fence posts and braces are permitted limited, in the opinion of the Ministry Representative, defects as follows:

- (a) Season checks less than 10 mm in width if less than 500 mm in length, or less than 5 mm in width if more than 500 mm in length.
- (b) The depth of splits or checks shall not exceed the depth of 40% of the post diameter or thickness, regardless of their length or width.
- (c) Sound scars (cat faces) permitted if the depth of the trimmed scar is less than 20 mm in depth, less than 300 mm in length, and which does not impair strength and durability
- (d) Sound, tight, well-spaced knots permitted provided they do not exceed 38 mm in diameter
- (e) Insect damage consisting of holes 1.6 mm or less in diameter. Scoring or channelling of the surface is permitted. All other forms of insect damage are prohibited.
- (f) Two coats of field treatment preservative shall be applied to splits and checks that meet the criteria for limited defects and that occur after pressure treatment.

#### **909.06 Treated Material Requirements**

**909.06.01 General** – Round wood posts, sawn timber posts and other wood fence components shall be treated in accordance with SS 908 and this Section.

Where applicable, treatment to “refusal” shall be as defined in CSA O80:

*Treatment to refusal (refusal treatment) — treatment of wood under specified conditions until the quantity of preservative absorbed during two consecutive half-hours is not more than 2% of the amount already injected.*

## SECTION 909

## TREATED WOOD FENCE PRODUCTS

### **909.06.02 Round Fence Posts and Braces Dimensions –**

All dimensions shall apply inside the bark and to the fully seasoned and treated fence posts or braces.

#### **(a) Dimensions**

**(i) Diameter Class** – Round fence posts and braces shall be classified as to size on the basis of the smaller diameter and length.

**(ii) Length and Diameter** – Wood post length and diameter shall be as specified SS 700 and SS 741 and their respective SP Drawings or as specified in the Contract.

The diameter specified shall be the minimum with a tolerance of +20 mm and the length shall not vary by more than ±25 mm from that specified.

**(iii) Taper** – The maximum permitted taper shall be such that the larger diameter shall not exceed that of the specified diameter by more than 25 mm over a 2 m length of post or brace.

The maximum permitted taper shall be proportional for posts and braces of lengths other than 2 m.

In cases where the post or brace is not truly circular, the diameter shall be obtained by measuring the circumference and dividing by 3.14.

**(iv) Straightness (Sweep)** – When dried, all posts shall be:

- straight;
- free from sweep, short crooks or reverse sweep; and
- free of bends in more than one plane.

Straightness shall be measured by a straight line joining the mid-point of the butt and the mid-point of the tip.

The straight line shall not fall outside the body of the post, nor be more than 50 mm from the geometric centre of the post at any point.

**(b) Post Ends** – Ends of posts and braces shall be cut square to the specified length and, unless otherwise specified, the butt end (larger diameter) shall be machine “pencil” pointed or chiselled before treatment to permit driving of posts.

The diameter at the point shall be not less than 18 mm and not more than 35 mm, and the pointing shall extend over a length of 150 mm to 200 mm of the post, or opposite sides shall be tapered to a "chisel point" of similar basic dimensions.

The top (smaller diameter) end of the post shall be domed (chamfered) or rounded 15 mm to 30 mm at approximately 30° to 45° around the circumference edge.

**909.06.03 Sawn Lumber Posts and Braces** – Gate posts and braces not stipulated as round, together with any anchor cleats, shall be Standard and Better S4S Lodgepole Pine, Jack Pine or Coast Douglas Fir, to the current NLGA grading rules and in the required lengths and sizes.

**909.06.04 Fence Droppers Dimensions** – Wood droppers to stabilize barbed wire fencing (Type C) between posts shall be one of the following:

- Round fence posts Lodgepole Pine, Jack Pine of 50 mm (smaller) diameter, or
- 25 mm x 50 mm sawn lumber, Standard and better, S4S, Lodgepole Pine, Jack Pine or Coast Douglas Fir, to the current NLGA grading rules,
- 50 mm x 50 mm sawn lumber, Standard and better, S4S, Lodgepole Pine, Jack Pine or Coast Douglas Fir, to the current NLGA grading rules.

Wood dropper length shall be as specified SS 700 and SS 741 and their respective SP Drawings or as specified in the Contract.

#### **909.07 Pressure Treatment**

**909.07.01 Sampling Zone** – The sample zone for penetration and retention shall be to at least a depth of 25 mm from the surface.

**909.07.02 Preservative Penetration and Retention** – Retention and penetration shall be in accordance with SS 908, as per CSA O80 UC4.1.

For sawn or dressed fence braces, anchor cleats and droppers, the Ministry Representative may accept a preservative penetration depth “to refusal” upon review of the plant records of penetration time applied for these types of Fence Products.

The treatment plant shall be responsible to certify and document that the final Fence Products meet the minimum retention and penetration requirements.

Materials not meeting the minimum specified penetration depths may be rejected by the Ministry Representative at the Supplier’s or Contractor’s expense.

**909.08 Quality Assurance** – The Ministry Representative may conduct, or may have a third-party conduct, quality assurance testing and reviews.

## SECTION 911

### STEEL AND IRON

**911.01 Scope** – This standard only applies to materials used in the maintenance and rehabilitation of existing log and timber bridges and log or timber components such as log crib retaining walls, timber piers, wood sign structures, etc.

**911.02 Materials** – These materials shall be in accordance with the current editions of the following Specifications:

- Structural Steel, CSA G40.21 Grade 260 or better
- Steel Bolts, ASTM A307
- Steel Nuts, ASTM A563
- Carbon Steel Castings, ASTM A27
- Iron Castings, ASTM A48
- Pipe Steel, ASTM A53

**911.03 Tension and Lateral Rods** – Tension and lateral rods shall be of structural steel. Upset ends shall be upset by hand or machine and welds will not be allowed. The dimensions of upset ends shall be made as shown on the Drawings. When upsetting by machine, the ends shall be upset to a little oversize, after which they should be heated to welding temperature and then swaged to the proper size. The nuts shall be made hexagonal, U.S. Standard sizes and threads. The threads on rods and nuts shall be full, smooth, uniform and of the same pitch throughout. They shall be such that the nuts can be run on by hand the full length of the threads on the rods without showing undue or uneven slackness.

**911.04 Machine Bolts** – Machine bolts shall conform to ASTM A307.

**911.05 Carriage Bolts** – Carriage bolts shall conform to ASTM A307. They shall be of the common type with button head, square neck and square or hex nut.

**911.06 Drift Bolts or Pins** – Drift bolts or pins shall be of structural steel. They shall be cut from plain, round bars unless otherwise called for on the Drawings. The ends of drift pins or bolts shall be tapered or shaped so that the pin may be easily driven into pre-bored holes in the wood being fastened.

**911.07 Dowels** – Dowels shall be of structural steel. They shall be cut from plain round bars and any ragged ends shall be removed.

**911.08 Lag Screws** – Lag screws shall conform to ASME B18.2.1, be made of steel that meets or exceeds the properties of ASTM A307 Grade A or SAE J429 Grade 1, and have square heads and cone points.

**911.09 Plate Washers or Wrought Washers** – Plate washers or wrought washers shall be of structural steel or

wrought iron; they shall be round or square as specified. Round washers shall be according to Canadian Manufacturer's Standards. Square washers shall be made to the dimensions called for on the Drawings.

**911.10 Ogee Washers** – Ogee washers shall be of cast iron. The proportions of these washers adopted by some of the manufacturers differ somewhat in detail, but to be acceptable the diameter should not be less than four times the diameter of the bolt for which it is to be used and the thickness should be approximately equal to the diameter of the bolt.

**911.11 Special Castings** – Special castings shall be true to pattern, free from excessive shrinkage or overrun, be made in accordance with good work practice, and be free from defects. Castings, which show defects after machining, will be rejected notwithstanding any previous acceptance at the manufacturer's works.

**911.12 Steel Splice-Joint Fastenings** – Plates and bars, etc., for these joints shall be of structural steel. All parts shall be made in accordance with the Drawings. Bolt holes shall be drilled from the solid or sub-punched and reamed. In sub-punched and reamed work, the holes shall be punched 3/16" smaller and after assembling, reamed 1/16" larger than the nominal diameter of the bolt.

**911.13 Galvanizing** – Unless otherwise specified, all steel hardware, steel fasteners and other steelwork shall be galvanized. Galvanizing shall be in accordance with ASTM A123 or ASTM A153, as applicable.

**911.14 Plates** – The various plates designated on the Drawings as gib, bearing, bed, joint, lateral, etc., shall be of structural steel.

**911.15 Welding** – Welding shall conform to the requirements of CSA W59.

**911.16 Pipe Fastenings** – Pipe fastenings shall be Schedule 80 pipe. Nuts shall be hexagonal machine lock nuts, U.S. Standard as to outside dimensions and threads. The threads on nuts and pipes shall be full, smooth, uniform and of the same pitch; they shall be such that they can be run on by hand the full length of the thread on pipe without undue or uneven slackness.

**911.17 Cleaning and Painting** – Painting of steel and iron components shall be in accordance with SS 216.10 Application Methods (Excluding metalizing and Hot Dip galvanizing). No paint shall be applied to surfaces which are to be encased in concrete.

**911.18 Machine Finished Surfaces** – Machine finished surfaces and threaded ends of tension and lateral rods shall be coated with an anti-corrosion lubricant applied as soon



## SECTION 911

## STEEL AND IRON

as the surfaces and threads are finished and accepted by the Inspector.

**911.19 Inspection** – All materials and quality of work shall be subject to inspection by the Ministry Representative. The Contractor shall allow the Ministry Representative free access to the shops at all times when work on the materials is being done and the Contractor shall provide every reasonable facility to assist the Ministry

Representative in the inspection of both material and quality of work. The Ministry Representative may reject material which does not meet the requirements of the Contract. Rejected material or poor quality of work shall be replaced promptly with materials meeting the requirements and quality at no cost to the Ministry.

**911.20 Shipping** – The threaded ends of all rods shall be protected from damage.

## SECTION 941

### PRECAST REINFORCED CONCRETE BARRIERS

**941.01 Scope** – This Section covers the quality and manufacture of precast reinforced concrete roadside and median barriers for highway and other off-highway traffic confinement use.

The concrete traffic barrier units shall be supplied in the sizes and types as required by the Contract, Purchase Order, Work Order or Drawings in strict conformity with this Section and pertinent SS Drawings of the SP941 Series.

#### 941.02 Concrete

##### 941.02.01 Concrete Quality

- (a) Concrete quality shall conform to CSA A23.1 and CSA A23.2 except where amended hereafter. SS 211 shall only apply when specifically referenced.
- (b) The manufacturer shall implement a quality control program to meet the specified requirements. The quality control plan shall be made available to the Ministry Representative for review.
- (c) The Ministry may implement a quality assurance program by auditing the manufacturer's quality control program and by inspection and testing at its discretion.
- (d) When requested by the Ministry Representative, the manufacturer shall submit concrete mix design information, using the requirements of CSA A23.1 Table 5, Alternative 1, for Ministry quality assurance and compliance review.
- (e) A compressive strength test result is defined as the average of the strengths of three 28 day compressive test cylinder breaks.
- (f) The strength level of the concrete represented by the test shall be considered satisfactory if the test result equals or exceeds 32 MPa and no individual cylinder strength is less than 28.5 MPa. If this condition is not met, the concrete will be considered to have failed the strength requirements. No other form of testing to prove the relative strength at a later date will be allowed without the approval of the Ministry Representative.
- (g) Concrete testing cylinders shall be cast by the precast concrete manufacturer or their authorized representative at the time of placing concrete. Frequency of testing will be one cylinder collected at the start of placement, at the mid-way point and at the end of placement of the concrete used for the making of the barrier with that batch run. Concrete cylinder samples may be collected by the Ministry Representative at any time and tested to ensure the concrete is meeting specification requirements.
- (h) Calcium chloride or admixtures containing calcium chloride shall not be used in the concrete.

**941.02.02 Concrete Mix Design** - Concrete shall meet the following requirements:

- (a) Minimum specified 28 day compressive strength of 32 MPa.
- (b) Class of exposure C-2.
- (c) Maximum water/cementitious material ratio ( $W/C_m$ ) of 0.45.
- (d) Coarse aggregate of a nominal maximum size either 20 mm or 28 mm.
- (e) Maximum Plasticized Slump of 80 mm  $\pm$  20 mm.
- (f) Air content of 4 to 7%.

**941.02.03 Self-Consolidating Concrete** – Self-Consolidating Concrete (SCC) may be used in the manufacture of precast concrete barrier, but only under the following conditions:

- (a) The self-consolidating concrete mix shall conform to the requirements of CSA A23.1, including Clause 8.6 and Table 22, and
- (b) The Contractor shall submit the following for review upon request by the Ministry Representative:
  - (i) a full copy of the applicable concrete mix design utilized in the manufacture of precast concrete barrier, which may include a slump greater than that specified in SS 941.02.02(e); and
  - (ii) Documentation in accordance with either of the following:
    - (A) Details in accordance with CSA A23.2-24C documenting the proven history of successful performance for the required strength, durability, and other performance requirements of the proposed mix design in the manufacture of precast concrete barrier, or
    - (B) A full-scale test shall be used to verify the self-consolidating characteristics for placement and for the hardened concrete properties of the mix design for the precast concrete barrier. Documentation in accordance with CSA A23.2-24C shall be submitted demonstrating that the proposed mix design will achieve the required strength, durability, and performance requirements.

## SECTION 941

## PRECAST REINFORCED CONCRETE BARRIERS

### 941.03 Reinforcing Steel, Fibrillated Fibres, Attachment Hardware & Miscellaneous Items

**941.03.01 Steel Mesh Reinforcement** – Welded steel wire mesh reinforcement shall be supplied and installed in each section as shown on the SS Drawings, and in accordance with SS 412. Additional reinforcement may be installed to assist handling during the precasting operations but shall be subject to prior approval by the Ministry Representative.

**941.03.02 Fibre Reinforcement** – Fibrillated Fibres (polyolefin or polypropylene or a blend of these fibres) are an acceptable substitute of welded wire mesh. Fibrillated fibres shall meet requirements of ASTM C1116 Synthetic Fiber Reinforced Concrete, Type III fibre.

Fibres shall have a minimum length of 50 mm, added at a dosage rate of 1 kg/m<sup>3</sup> (min of 0.1% by volume) and shall be thoroughly mixed with concrete before placement into the forms.

Fibres shall have a minimum tensile strength of 350 MPa and a minimum modulus of elasticity of 4.2 GPa.

Fibres are to be added early in the mixing process following the manufacturer's recommendations to ensure evenly distributed fibres.

The supplier/manufacturer of the fibre must furnish test data in accordance with ASTM C1399 to the precast concrete manufacturer to show the fibre complies with the specification requirements as part of the precast concrete manufacturer's quality control plan.

When the fibre option is used, a single length of 15 mm rebar shall be wire tied to the horizontal sections of the hook or eye assemblies as shown on the SS Drawings.

Steel fibres shall not be used in the concrete mix for concrete barriers.

**941.03.03 Steel for Anchors** – Steel for anchors shall conform to CSA G40.21-M Grade 260W and shall be carefully bent to the radii detailed and installed as shown on the SS Drawings.

The steel manufacturer shall provide, to the precast concrete manufacturer, a certificate giving the results of each of the mechanical and chemical tests applicable to the steel material produced, confirming that the material has been produced in accordance with the specified requirements. This certificate shall be provided to the Ministry Representative upon request.

Bending shall be done by methods that will not produce fracture or other injury. The metal heating shall not be to a higher temperature than that producing a "dark cherry red" colour. After heating, the metal shall be cooled as slowly as possible. Following the bending, the surface of the metal shall be carefully inspected for evidence of fracture, and any fractured pieces shall be replaced.

Prior to delivery, exposed surfaces of connections shall be prepared for and given a heavy application of zinc rich coating selected from the Ministry's Recognized Products List under

the category of "Additional Paint Coatings – Zinc-Rich Touch-up Paint and Primers".

**941.03.04 Pick-up Point Forming** – Pick-up points for handling units shall be formed with accurately placed rigid P.V.C. or steel pipe recessed 15 mm from both finished surfaces as detailed.

**941.03.05 Optional Features** – Where barrier is ordered with drainage slots or grouting holes or both, they shall be accurately cast-in as detailed. Facilities for the installation of anti-glare screens will be detailed as and when required.

### 941.04 Placing and Finishing of Concrete

**941.04.01 Placing and Consolidating** – Concrete shall be placed in the forms and carefully consolidated in strict accordance with CSA A23.4, Clause 21.

**941.04.02 Curing and Protection** – Curing and protection shall be carried out strictly according to CSA A23.4, Clause 23 and as follows:

- (a) Curing shall be considered complete when test cylinders reach the specified 28-day compressive strength provided such strength is reached not later than 28 days after the barriers are cast.
- (b) Steam curing is permissible for either the entire curing period or portion thereof and shall be carried out in accordance with CSA A23.4, Clause 23.2.3.
- (c) At no time during or at completion of the curing period shall the temperature differential between the concrete surface and the ambient temperature be greater than 20°C.
- (d) If steam is used for a portion of the curing period, additional normal curing shall be carried out after the steam curing, according to CSA A23.4 Clause 23 until such time as strength tests of concrete test cylinders that have been both steam and normally cured with the barriers reach the specified concrete strength.

**941.04.03 Exposed Surfaces** – Exposed surfaces shall be uniform in texture and colour as produced from well-maintained steel form surfaces and proper vibration methods without excessive surface fines or laitance.

**941.04.04 Defects** – Defects of the exposed surface will normally be cause for the rejection of any unit except where such are within the permissible limits or are subject to making good as follows:

- (a) Unobtrusive defects of any kind where their total area is not in excess of 2% of the exposed surface area of the unit.
- (b) Air holes not greater than 3 mm in diameter and not more than twenty (20) holes in any isolated 300 mm X 300 mm area.
- (c) Sharp protrusions at the edges of the exposed surfaces where necessary shall be softened by careful rubbing or grinding.

## SECTION 941

## PRECAST REINFORCED CONCRETE BARRIERS

(d) Patching of isolated small holes, cavities and similar self-confining defects may be permitted when authorized in writing by the Ministry Representative.

**941.04.05 Patching** – Patching, only when authorized by the Ministry Representative, shall have the defective area well saturated with water and the defect prepared with cement paste and filled with mortar. The mortar, properly proportioned of the same sand and cement as the original concrete and reasonably colour matched to the cured dry unit with the addition of white cement where necessary, shall be pre-shrunk for about one hour before re-tempering and use. The patching mortar shall be well tooled in, finished flush and smooth and the area covered to cure adequately.

**941.04.06** All concrete surfaces prior to shipment shall be accurate to detail and, in particular at the end connections, true to dimension tolerances. End connection surfaces shall be cleared out of any out-of-tolerance material, to allow a secure connection between components.

**941.05 Tolerances** – Allowable Tolerances for the concrete dimensions of the barriers shall be  $\pm 3$  mm except as otherwise indicated on the detail drawings.

**941.06 Procedure of Manufacture** – The Contractor (or the manufacturer, if the Ministry is purchasing directly) shall notify the Ministry a minimum of seven (7) days in advance

concerning the date when the order is to be manufactured, so that the Ministry Quality Assurance may be carried out. All processes shall be open for inspection and approval by the Ministry Representative.

Material shipped prior to the inspection or written release for shipment by the Ministry Representative shall be at the Contractor's risk (or supplier's risk, where the Ministry is purchasing directly).

The manufacturer's name or trademark, year of manufacture and form number shall be embedded on the end of each unit in a manner, size and depth that are permanently legible.

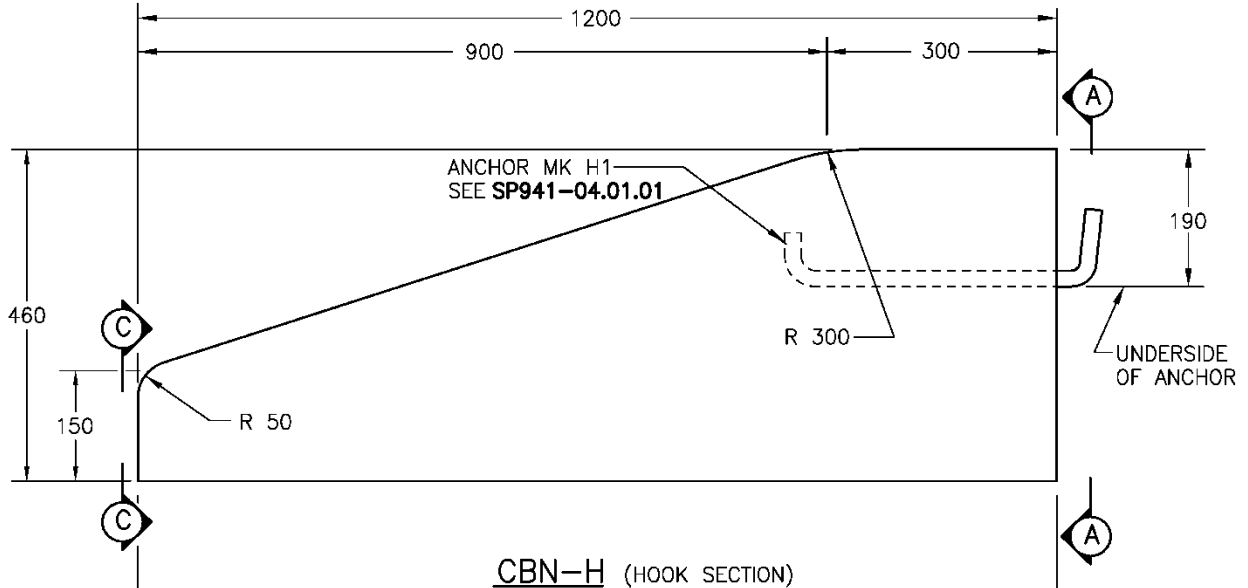
Authorized patching or making good may be inspected before shipment or upon delivery and the rejected unit(s) shall be replaced at no cost to the Ministry.

**941.07 Handling** – In handling the finished product, the concrete and connecting devices shall not be damaged or distorted.

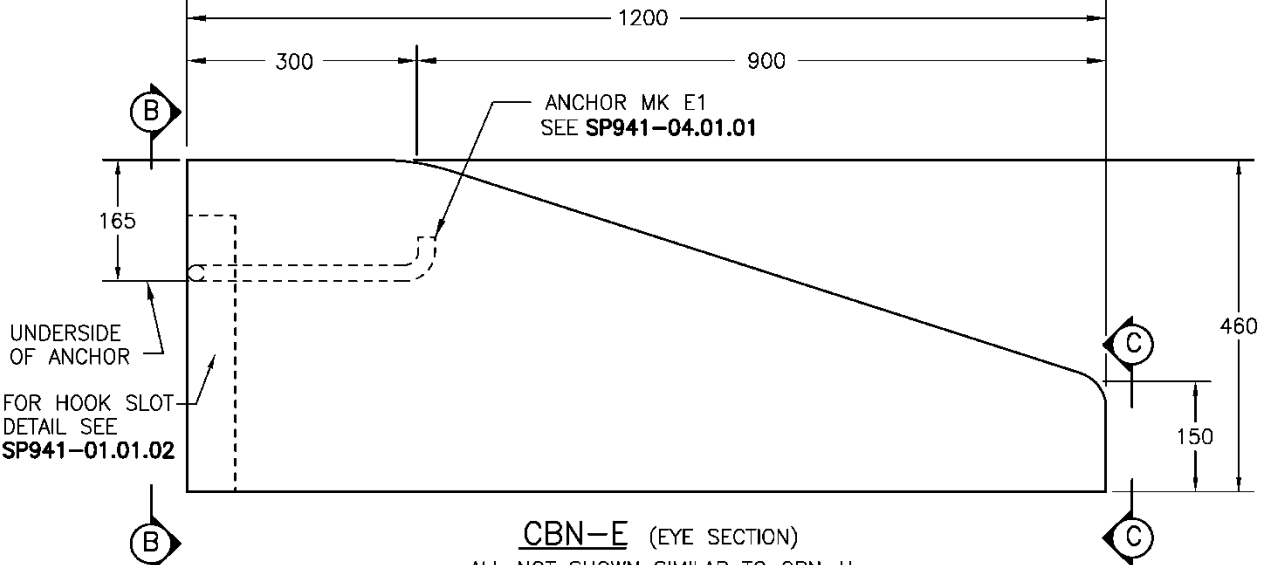
**941.08 Payment** – Payment shall be at Unit Price bid per unit (section). The price bid shall be full compensation for everything furnished and done including, but not limited to, supply of forms and all materials, placing, vibrating, curing, quality control, concrete quality control testing, stripping, finishing, general clean-up and delivery.

PRECAST CONCRETE BULL-NOSE  
460 mm – CBN-H & CBN-E

SP941-01.01.01



**CBN-H** (HOOK SECTION)



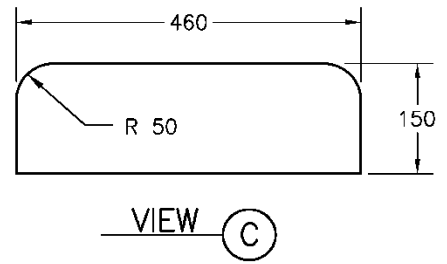
**CBN-E** (EYE SECTION)

ALL NOT SHOWN SIMILAR TO CBN-H

ELEVATION

GENERAL NOTES:

1. FOR VIEW (A) & (B) SEE SP941-01.01.02
2. FIBRILLATED FIBRE STRAND REINFORCED CONCRETE TO BE USED FOR BULL-NOSE (CBN).
3. FIBRILLATED FIBRE STRAND REINFORCED CONCRETE MAY BE SUBSTITUTED FOR STEEL REINFORCED CONCRETE IN LOW BARRIER (CLB-H & E).
4. MATERIALS AND QUALITY OF WORK TO BE IN ACCORDANCE WITH SECTION 941.
5. STANDARD CBN-E MAY BE MANUFACTURED ONLY WITH PRIOR WRITTEN PERMISSION FROM THE HIGHWAY SAFETY BRANCH.



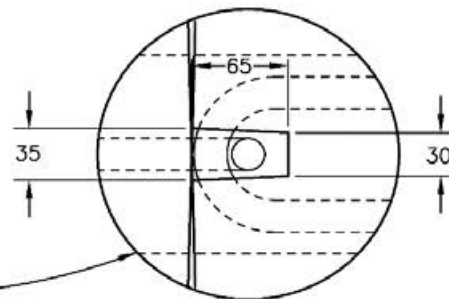
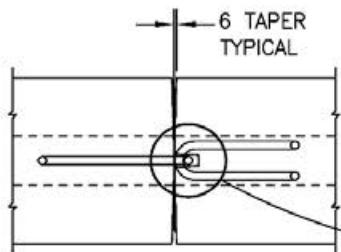
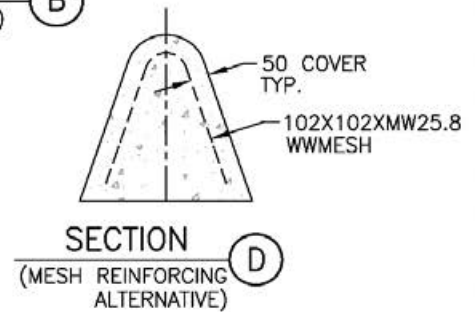
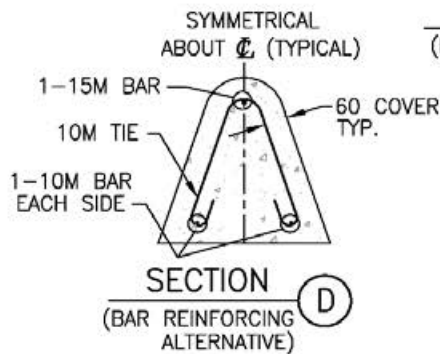
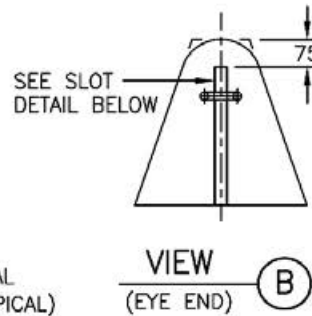
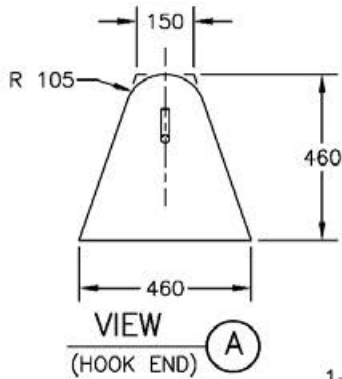
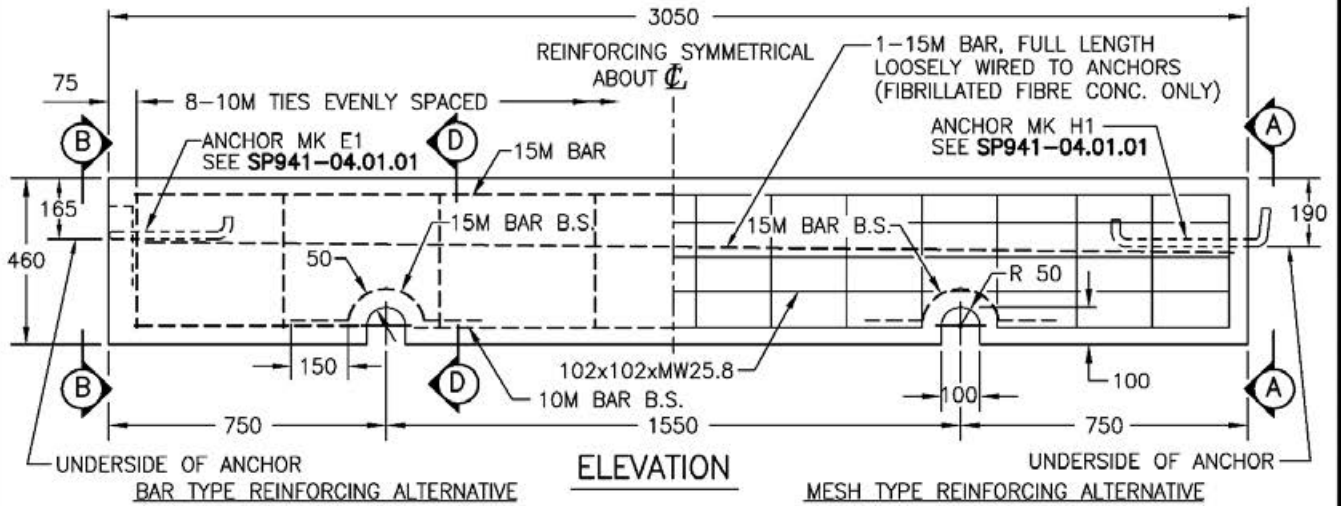
VIEW (C)

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

PRECAST CONCRETE LOW BARRIER  
460 mm – CLB-E+H

SP941-01.01.02

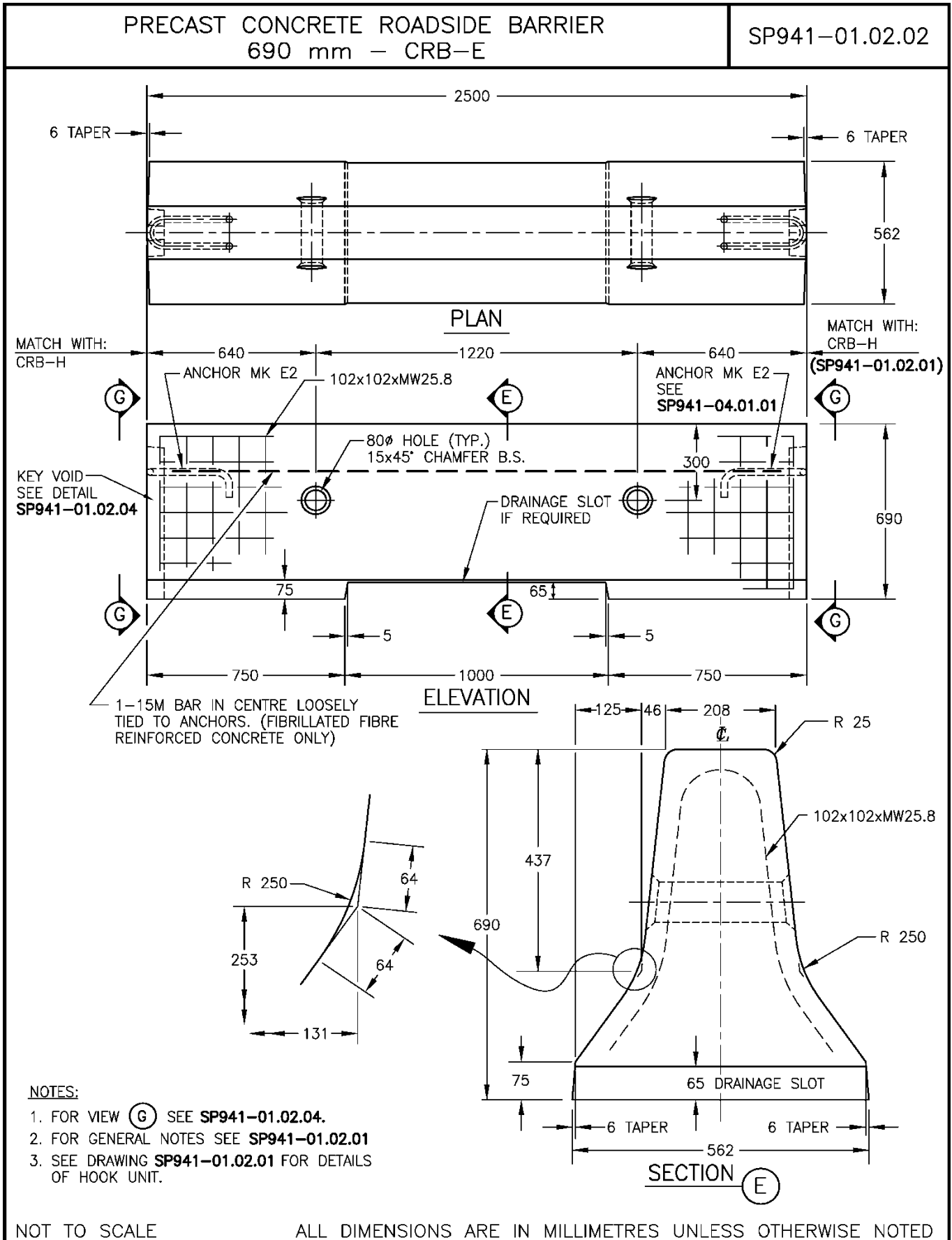


NOTE: FOR GENERAL NOTES SEE SP941-01.01.01

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

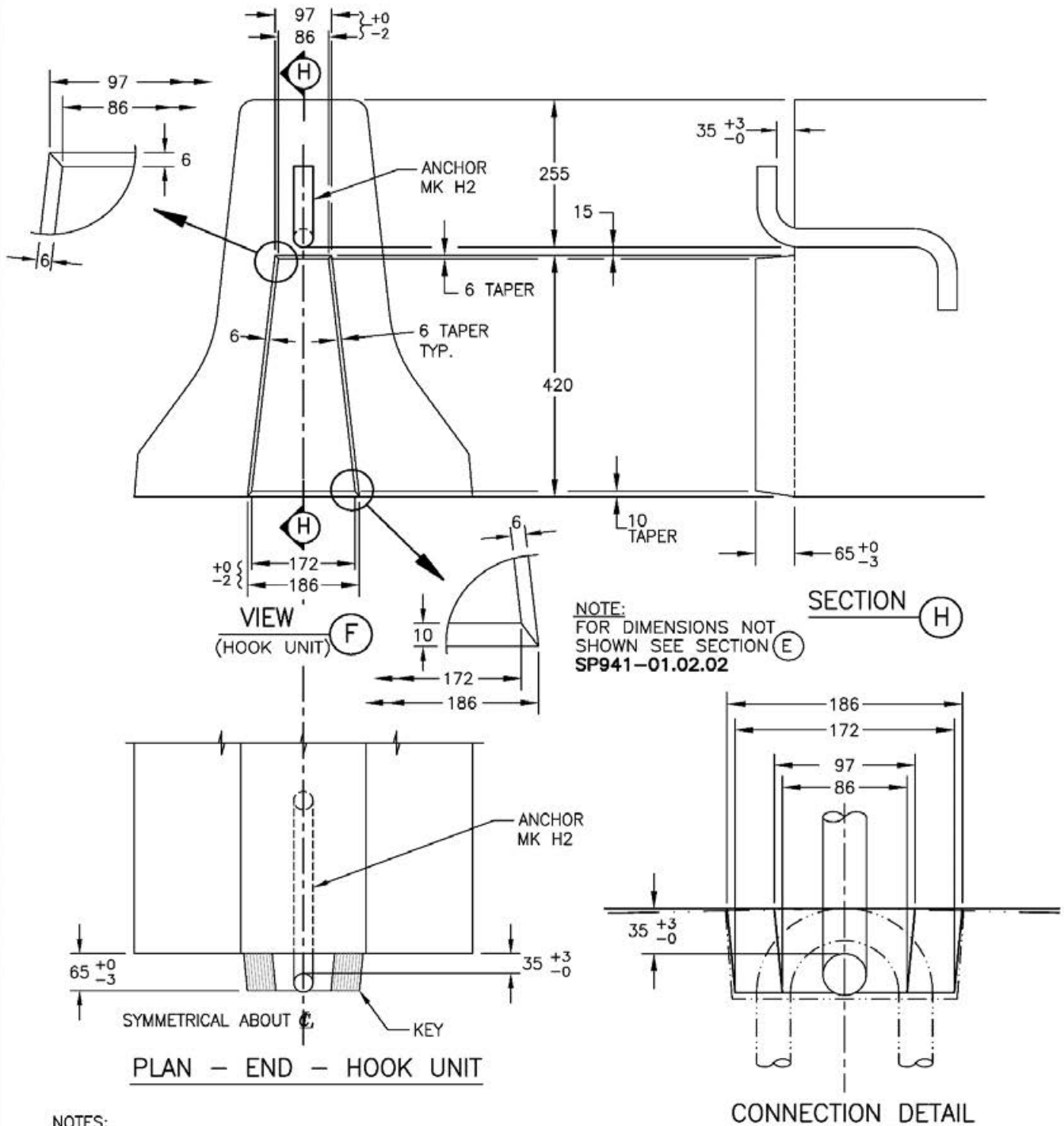






PRECAST CONCRETE ROADSIDE BARRIER  
690 mm – CRB–H DETAILS

SP941–01.02.03



NOTE:  
FOR DIMENSIONS NOT SHOWN SEE SECTION (E)  
SP941–01.02.02

NOTES:

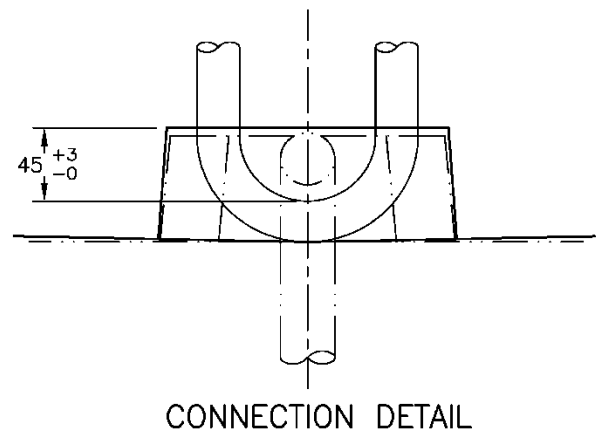
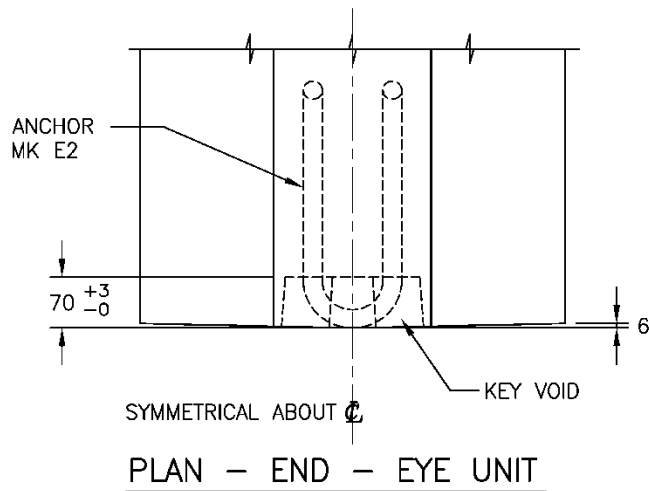
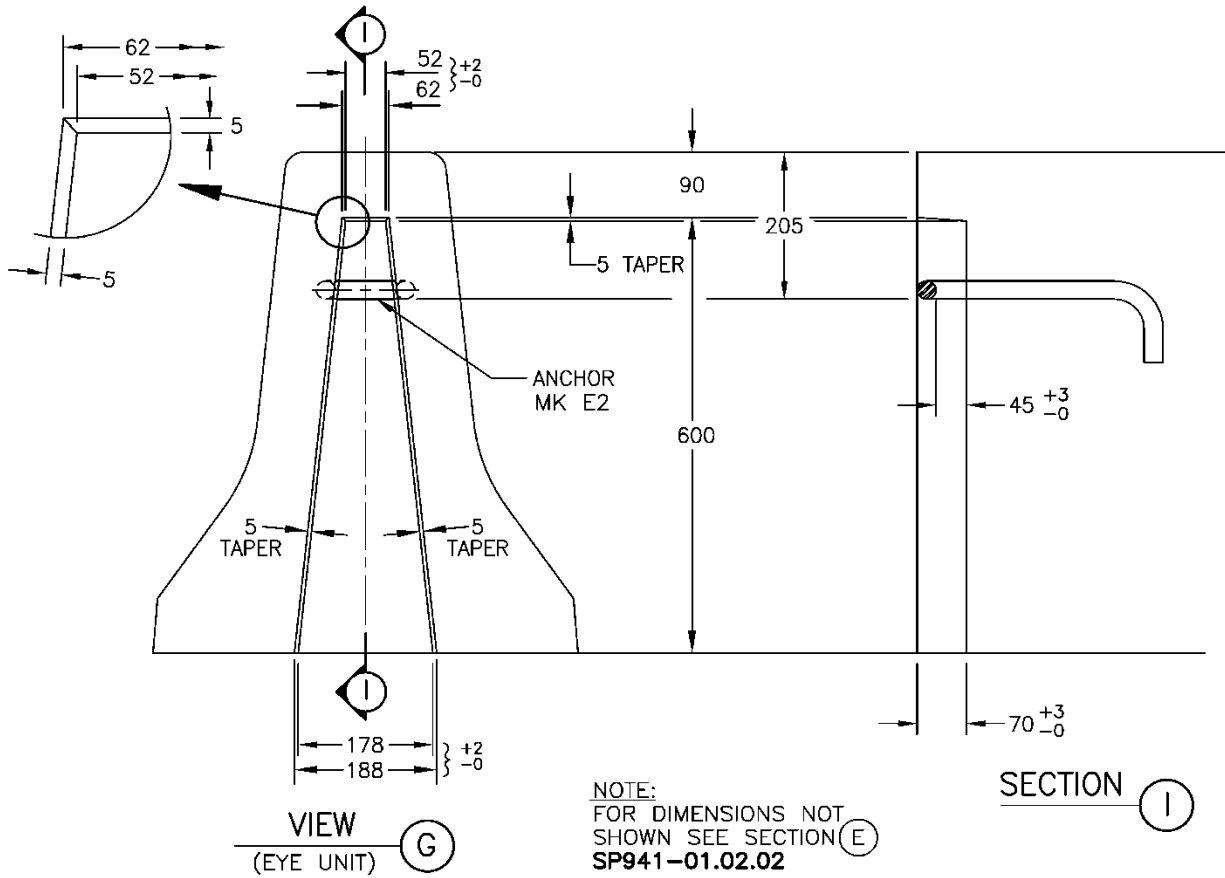
1. FOR LOCATION OF VIEW (F) SEE SP941–01.02.01, SP941–03.02.01, SP941–03.03.01 & SP941–03.03.03.
2. FOR GENERAL NOTES SEE SP941–01.02.01
3. FOR DETAILS OF ANCHORS SEE SP941–04.01.01.
4. THE CONNECTION DIMENSIONS ON A CRB–E UNIT PERMIT INSTALLATION TO A MINIMUM HORIZONTAL CURVE RADIUS OF 51 METRES. FOR TIGHT CURVATURE INSTALLATION SEE SP941–02.01.08 & SP941–02.01.09.

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

PRECAST CONCRETE ROADSIDE BARRIER  
690 mm – CRB-E DETAILS

SP941-01.02.04

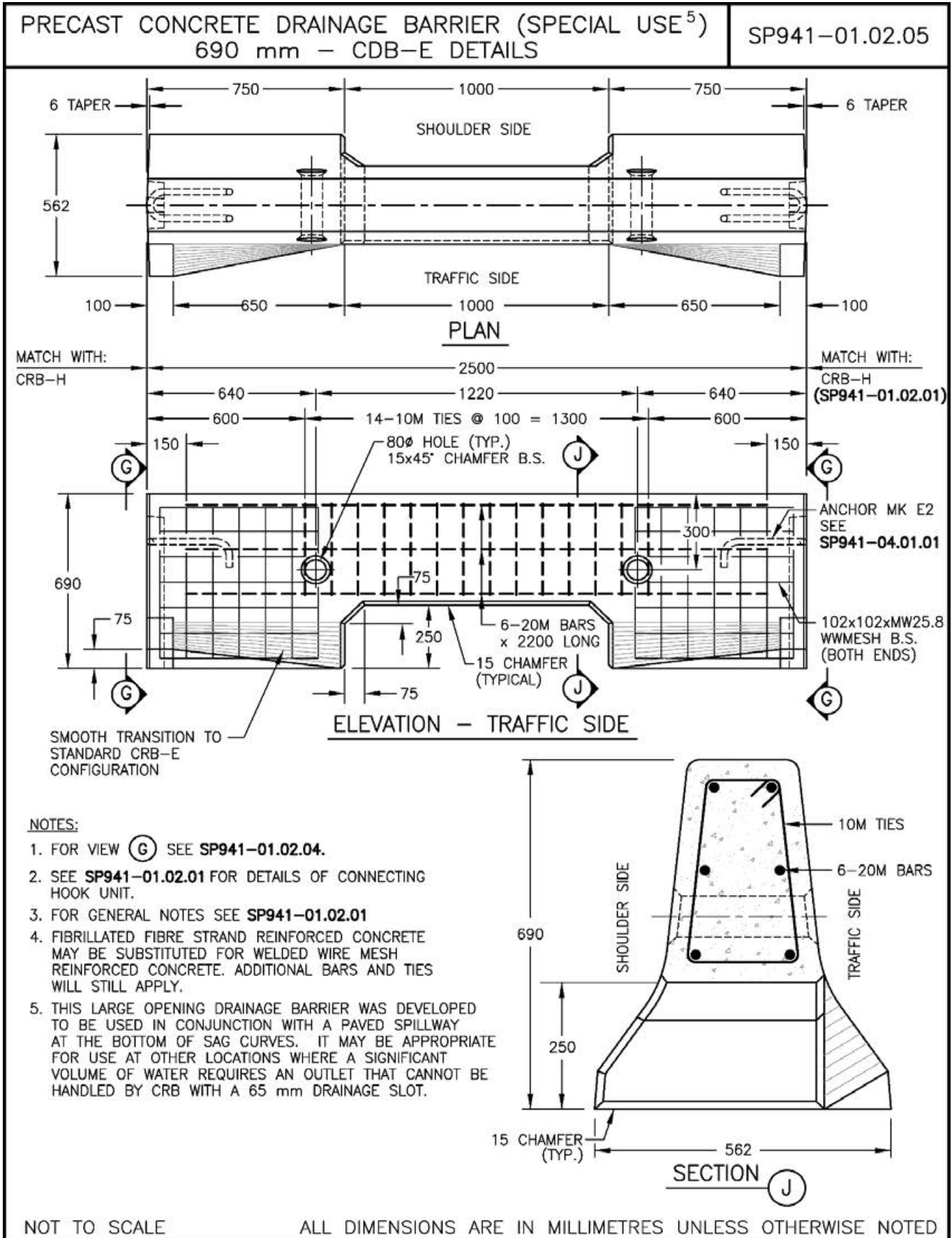


NOTES:

1. FOR LOCATION OF VIEW G SEE SP941-01.02.02, SP941-01.02.05 & SP941-03.01.01.
2. FOR GENERAL NOTES SEE SP941-01.02.01.
3. FOR DETAILS OF ANCHORS SEE SP941-04.01.01.
4. THE CONNECTION DIMENSIONS ON A CRB-E UNIT PERMIT INSTALLATION TO A MINIMUM HORIZONTAL CURVE RADIUS OF 51 METRES. FOR TIGHT CURVATURE INSTALLATION SEE SP941-02.01.08 & SP941-02.01.09.

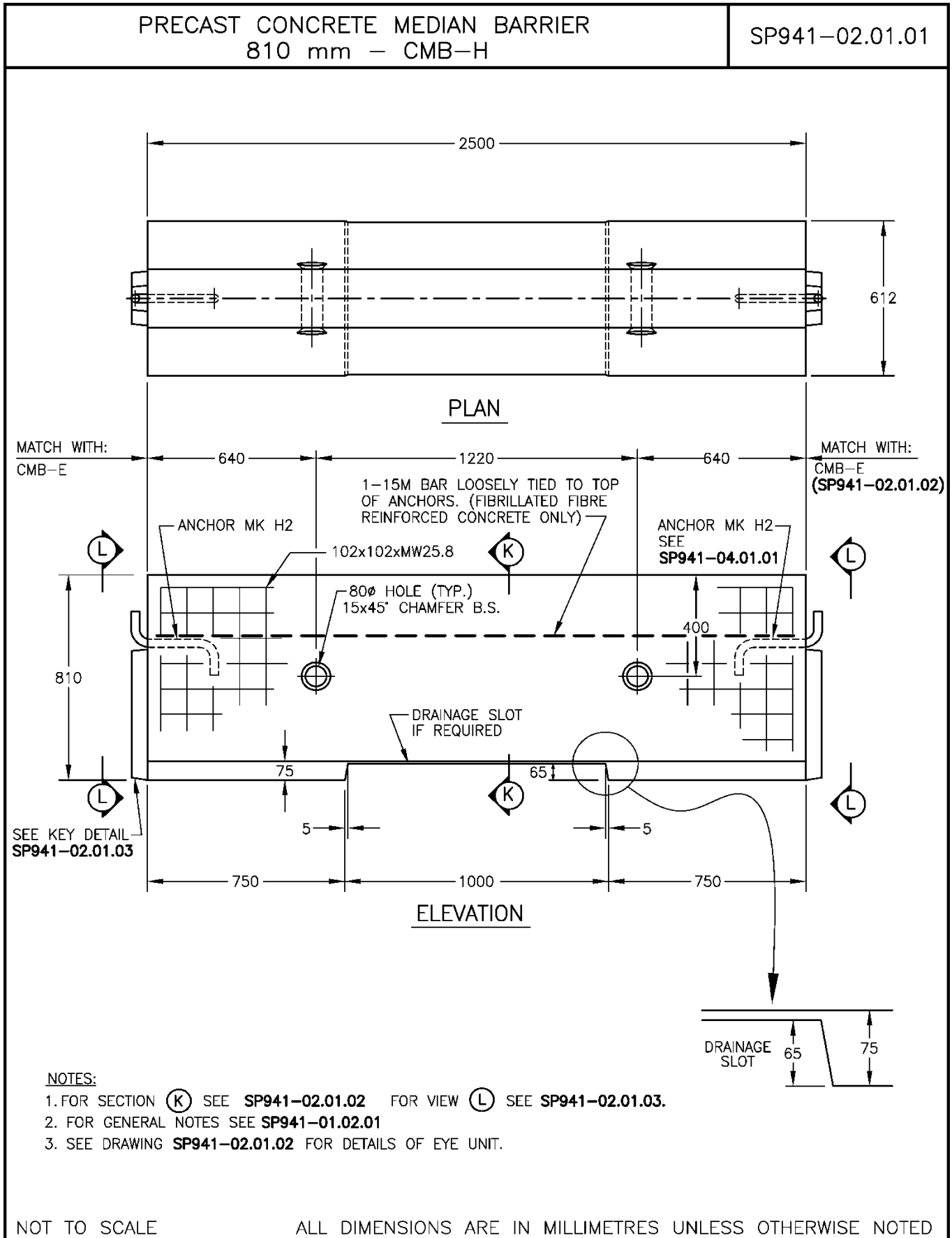
NOT TO SCALE

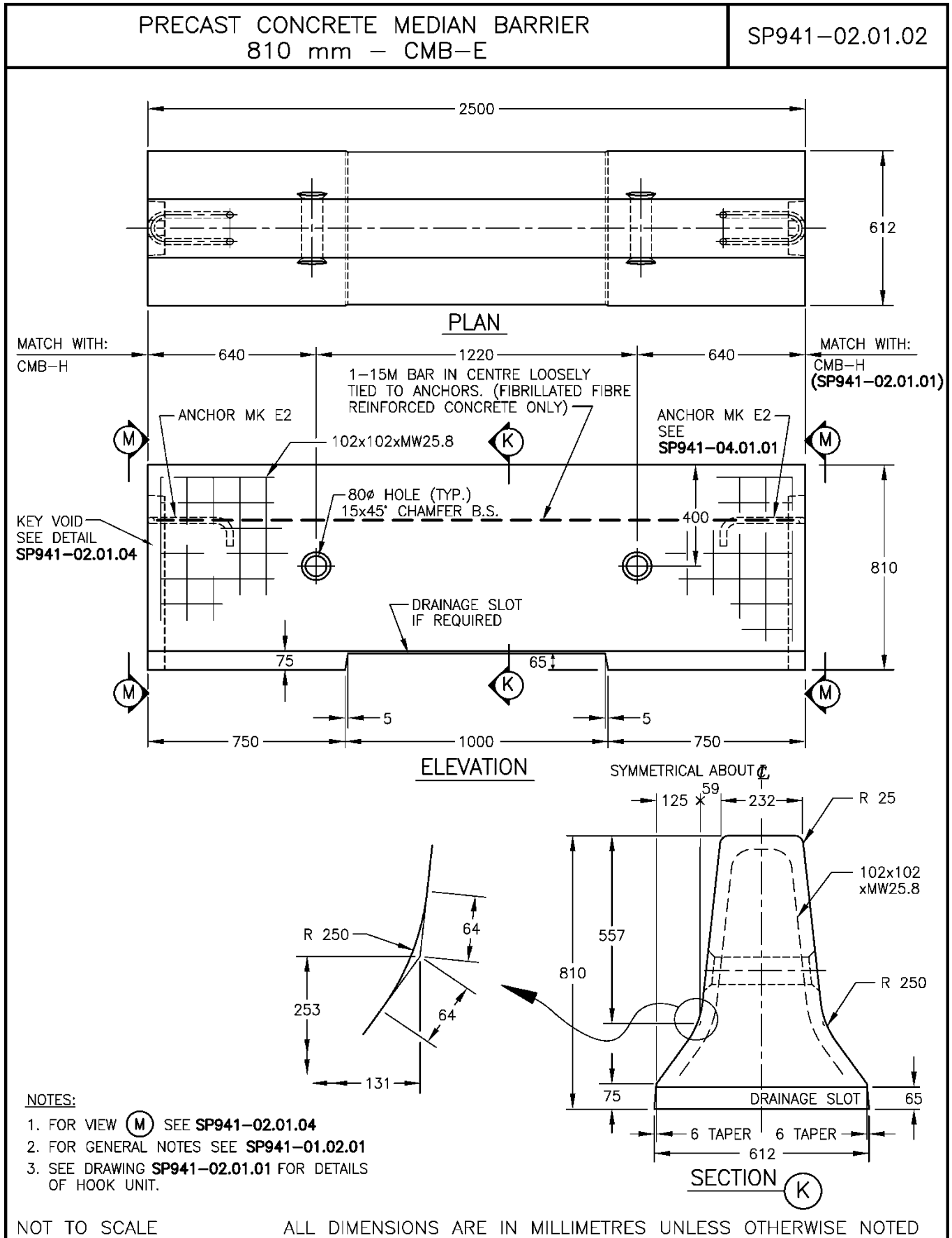
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



NOT TO SCALE

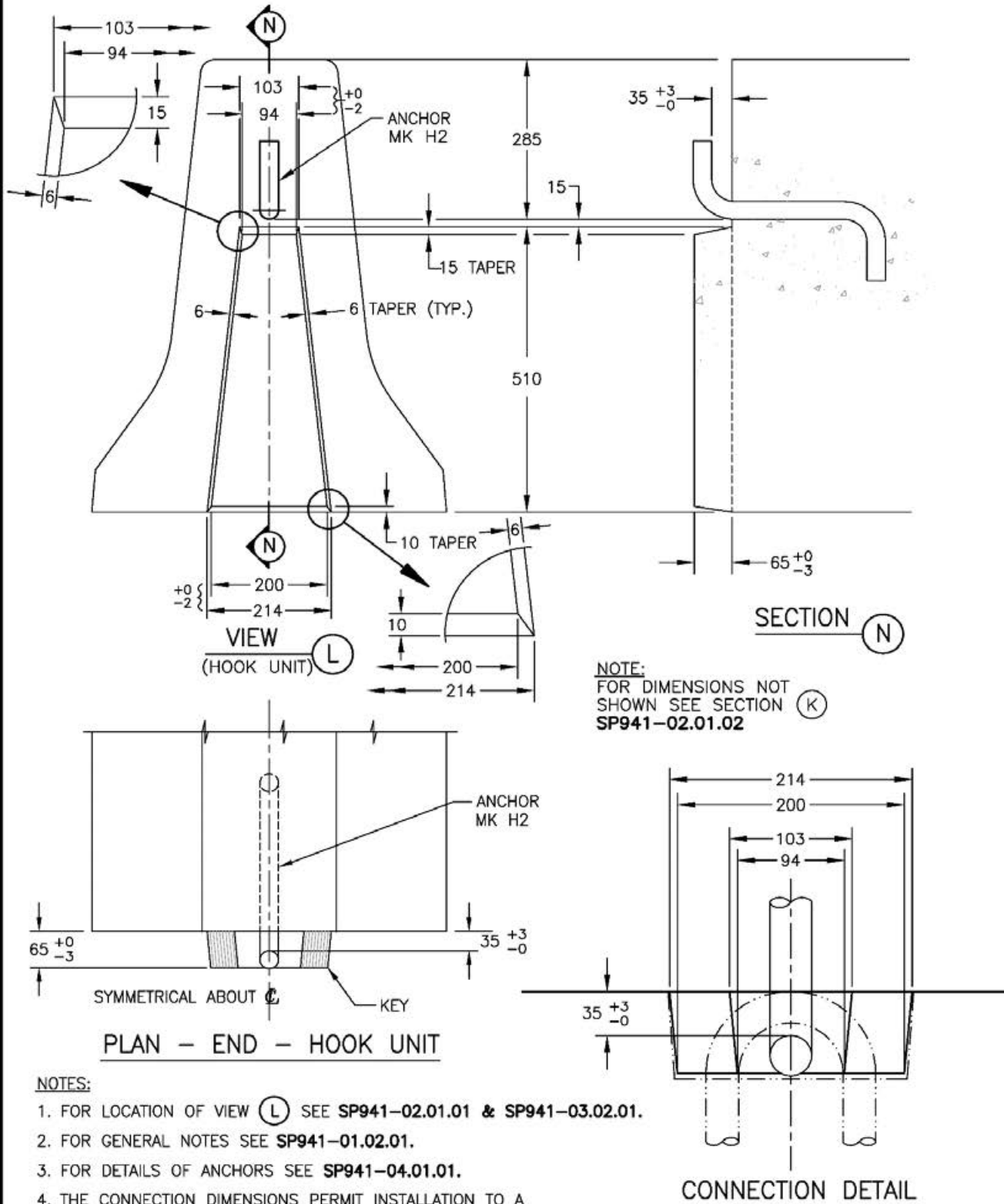
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED





PRECAST CONCRETE MEDIAN BARRIER  
810 mm – CMB-H DETAILS

SP941-02.01.03



NOTES:

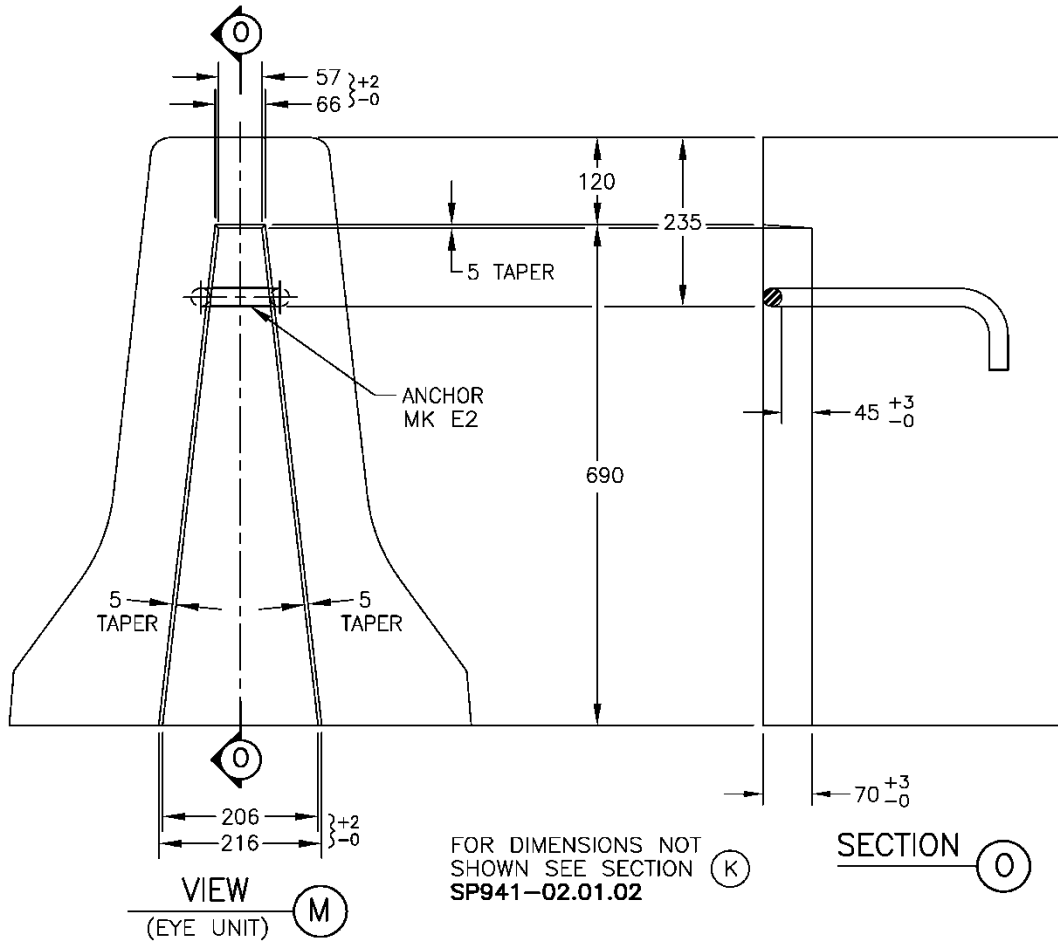
1. FOR LOCATION OF VIEW (L) SEE SP941-02.01.01 & SP941-03.02.01.
2. FOR GENERAL NOTES SEE SP941-01.02.01.
3. FOR DETAILS OF ANCHORS SEE SP941-04.01.01.
4. THE CONNECTION DIMENSIONS PERMIT INSTALLATION TO A MINIMUM HORIZONTAL CURVE RADIUS OF 95.5 METRES.

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

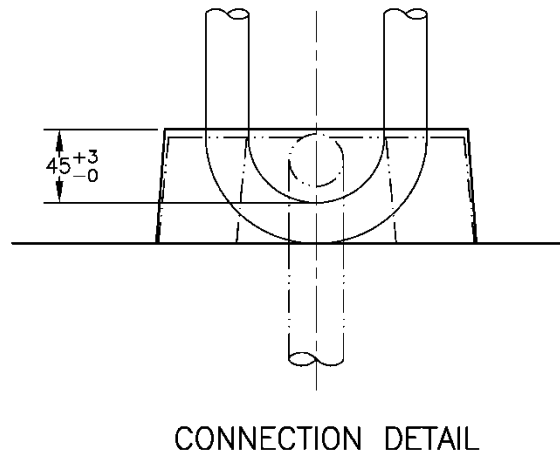
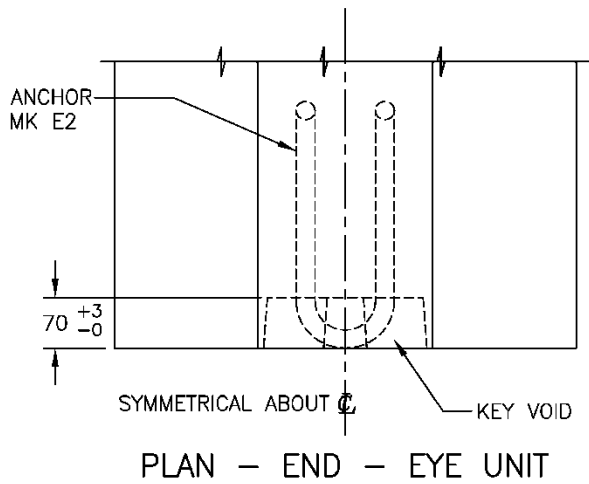
PRECAST CONCRETE MEDIAN BARRIER  
810 mm – CMB-E DETAILS

SP941-02.01.04



FOR DIMENSIONS NOT SHOWN SEE SECTION (K) SP941-02.01.02

SECTION O



NOTES:

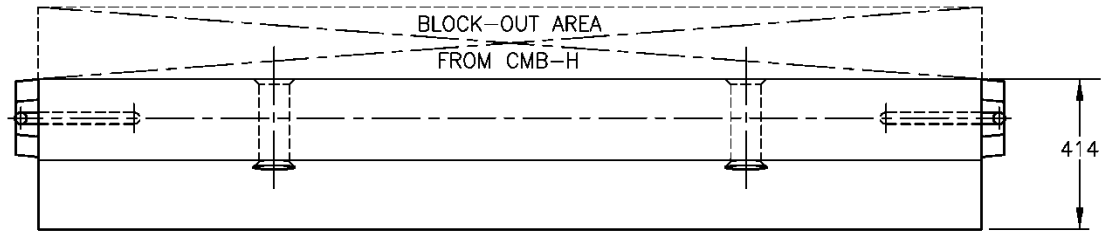
1. FOR LOCATION OF VIEW (M) SEE SP941-02.01.02.
2. FOR GENERAL NOTES SEE SP941-01.02.01.
3. FOR DETAILS OF ANCHORS SEE SP941-04.01.01.
4. THE CONNECTION DIMENSIONS PERMIT INSTALLATION TO A MINIMUM HORIZONTAL CURVE RADIUS OF 95.5 METRES.

NOT TO SCALE

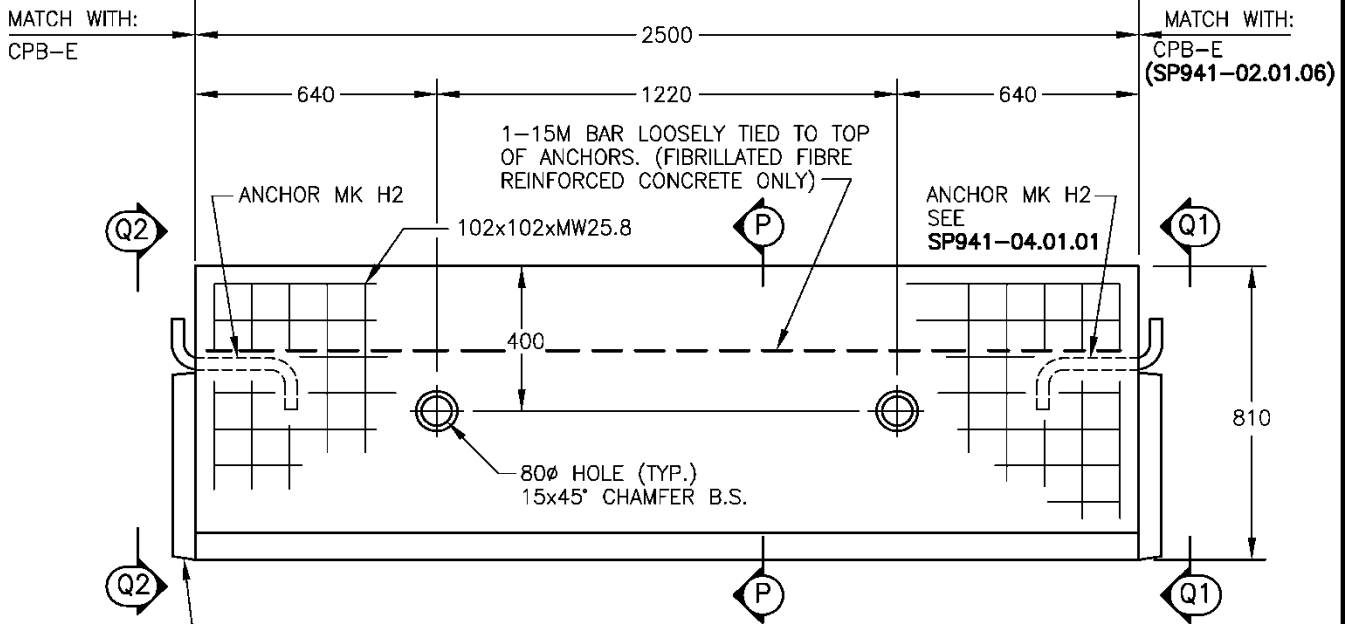
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

PRECAST CONCRETE PIER BARRIER  
810 mm – CPB-H

SP941-02.01.05



PLAN



ELEVATION

SEE KEY DETAIL  
SP941-02.01.07

NOTES:

1. FOR SECTION (P) SEE SP941-02.01.06.  
FOR VIEW (Q1) & (Q2) SEE SP941-02.01.07.
2. FOR GENERAL NOTES SEE SP941-01.02.01
3. SEE DRAWING SP941-02.01.06 FOR DETAILS  
OF EYE UNIT.
4. THESE UNITS ARE INTENDED TO BE USED AGAINST BRIDGE  
SUPPORT STRUCTURES AND SIMILAR WALLS.
5. IT IS INTENDED THAT EXISTING CMB MOLDS WILL BE  
ADAPTED TO PRODUCE THESE CPB UNITS.

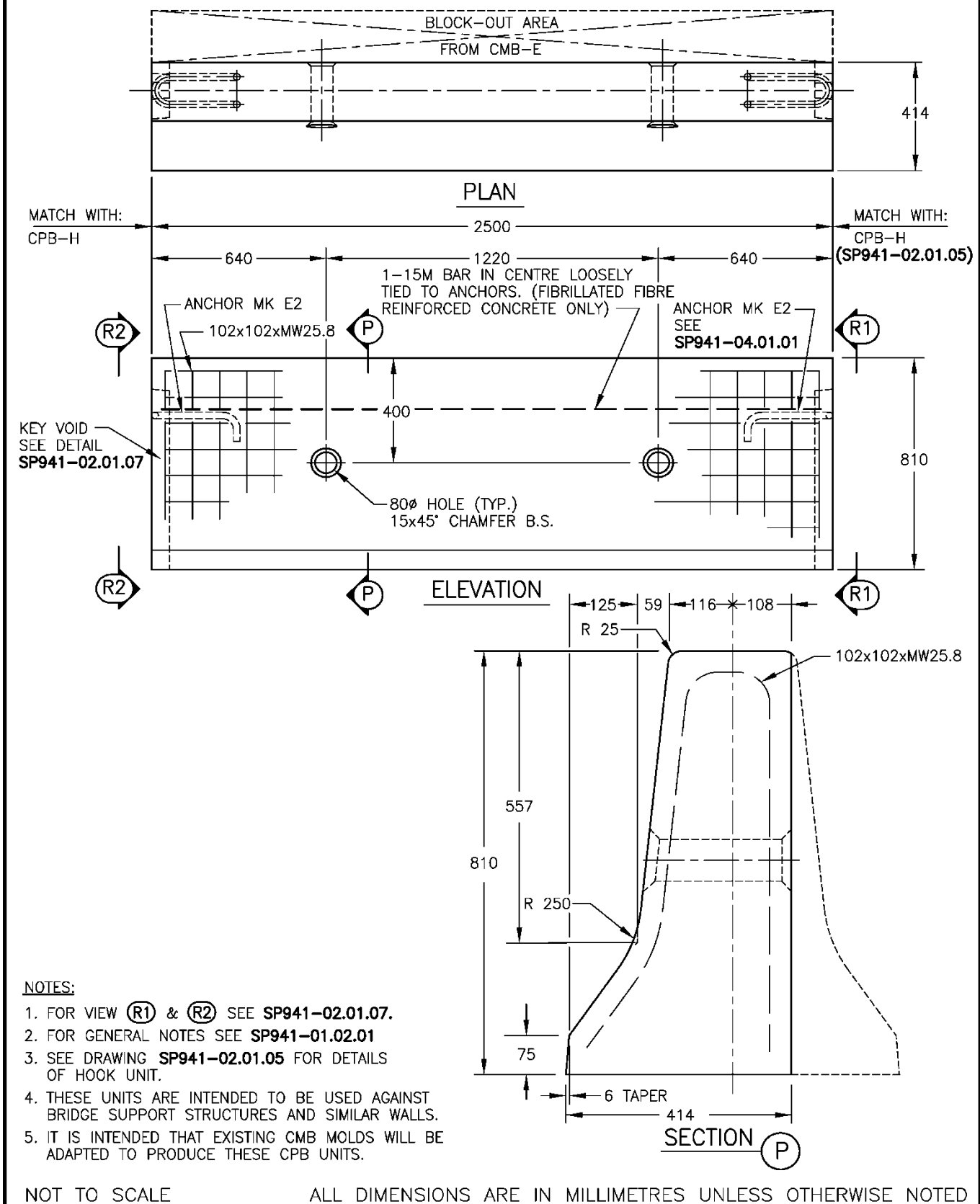
NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



PRECAST CONCRETE PIER BARRIER  
810 mm – CPB-E

SP941-02.01.06



NOTES:

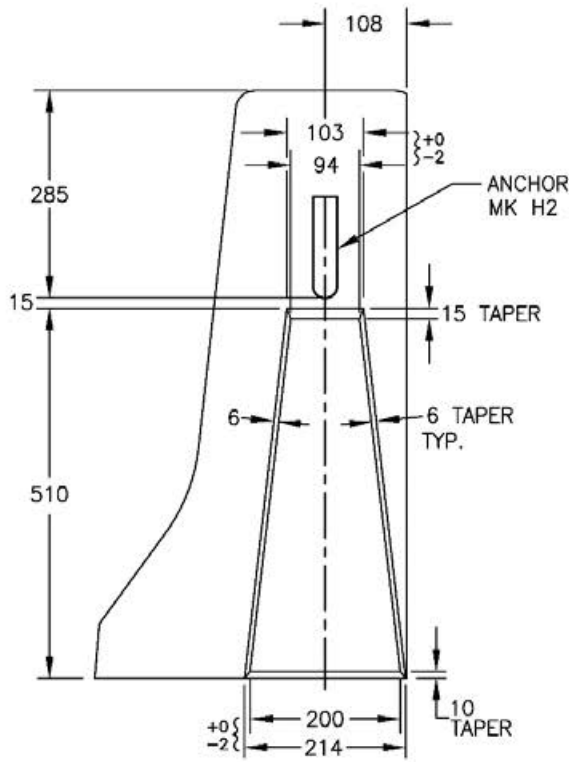
1. FOR VIEW (R1) & (R2) SEE SP941-02.01.07.
2. FOR GENERAL NOTES SEE SP941-01.02.01
3. SEE DRAWING SP941-02.01.05 FOR DETAILS OF HOOK UNIT.
4. THESE UNITS ARE INTENDED TO BE USED AGAINST BRIDGE SUPPORT STRUCTURES AND SIMILAR WALLS.
5. IT IS INTENDED THAT EXISTING CMB MOLDS WILL BE ADAPTED TO PRODUCE THESE CPB UNITS.

NOT TO SCALE

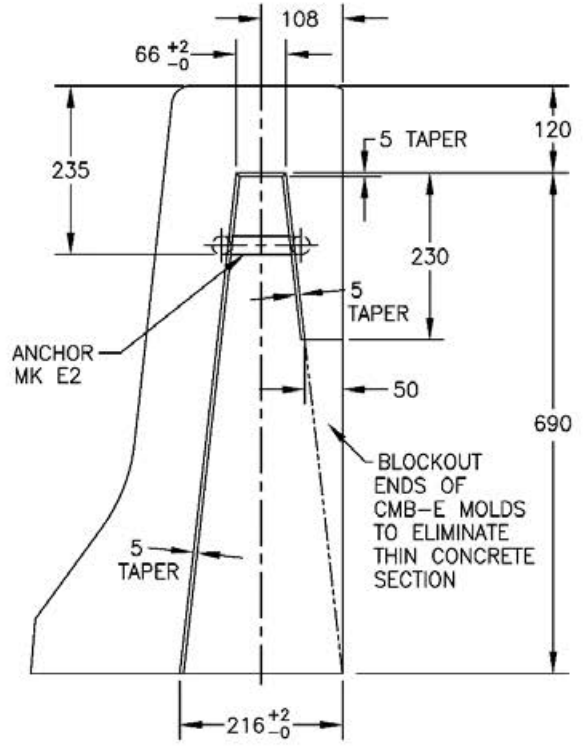
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

PRECAST CONCRETE PIER BARRIER  
810 mm – CPB–H & CPB–E DETAILS

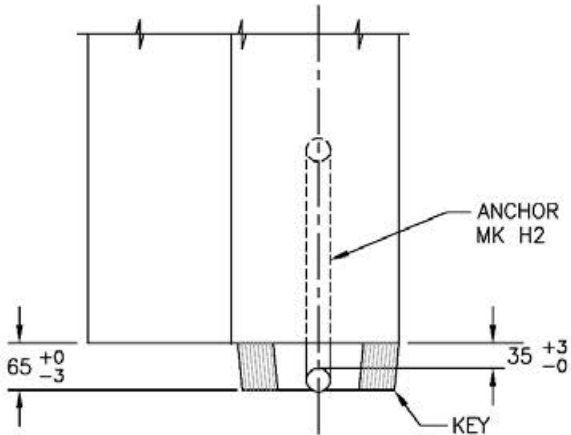
SP941–02.01.07



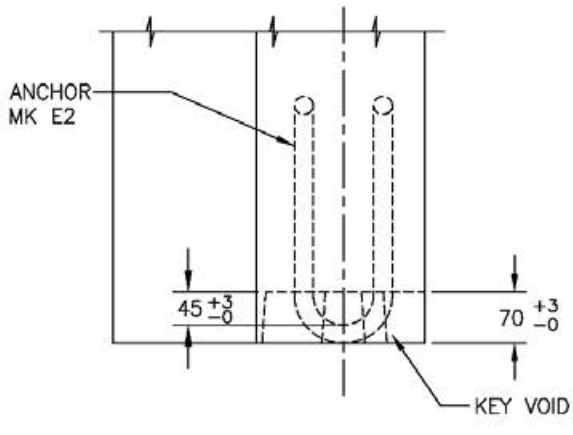
VIEW (HOOK UNIT) **Q1** AS SHOWN  
VIEW **Q2** OPPOSITE HAND



VIEW (EYE UNIT) **R1** AS SHOWN  
VIEW **R2** OPPOSITE HAND



PLAN – END – HOOK UNIT



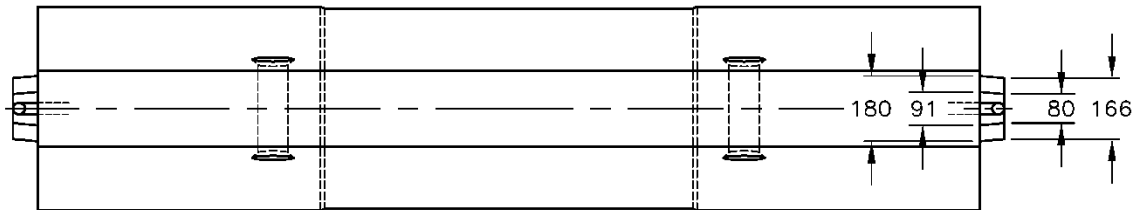
PLAN – END – EYE UNIT

- NOTES:
1. FOR LOCATION OF VIEW **Q1** & **Q2** SEE SP941–02.01.05.
  2. FOR LOCATION OF VIEW **R1** & **R2** SEE SP941–02.01.06.
  3. FOR GENERAL NOTES SEE SP941–01.02.01
  4. FOR DETAILS OF ANCHORS SEE SP941–04.01.01.

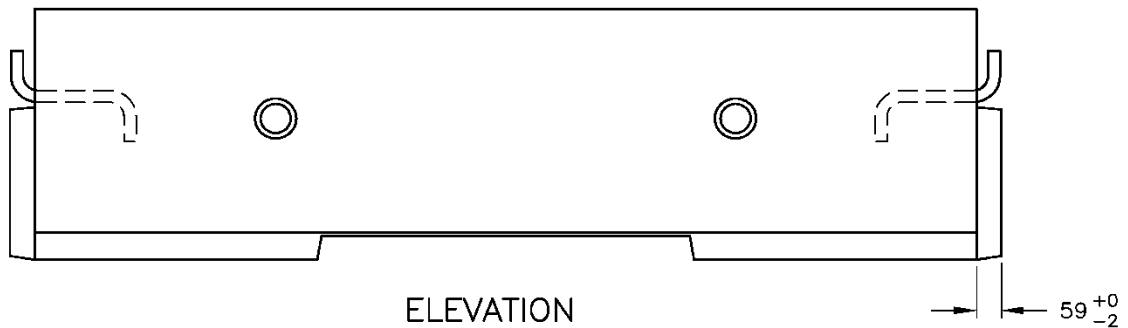
NOT TO SCALE ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

PRECAST CRB-H  
MODIFICATIONS FOR TIGHT CURVATURE INSTALLATION

SP941-02.01.08



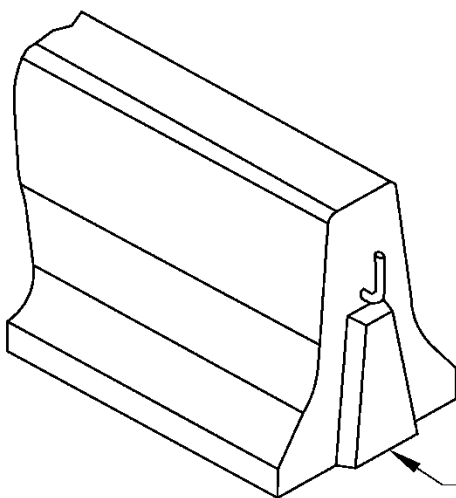
PLAN



ELEVATION

NOTES:

1. THIS DRAWING MUST BE READ WITH CRB DRAWINGS SP941-01.02.01 TO 941-01.02.04 FOR FULL DETAILS OF UNITS.
2. IT IS INTENDED THAT EXISTING CRB MOLDS BE ADAPTED TO DIMENSIONS NOTED ON THIS DRAWING TO PRODUCE UNITS CAPABLE OF BEING PLACED TO A MINIMUM CURVE RADIUS OF APPROXIMATELY 17 m.
3. ALL TOLERANCES AS PER CRB UNIT DRAWINGS.
4. THIS MODIFIED UNIT IS INTENDED TO BE USED ON TIGHT CURVATURE AT INTERSECTIONS ONLY.



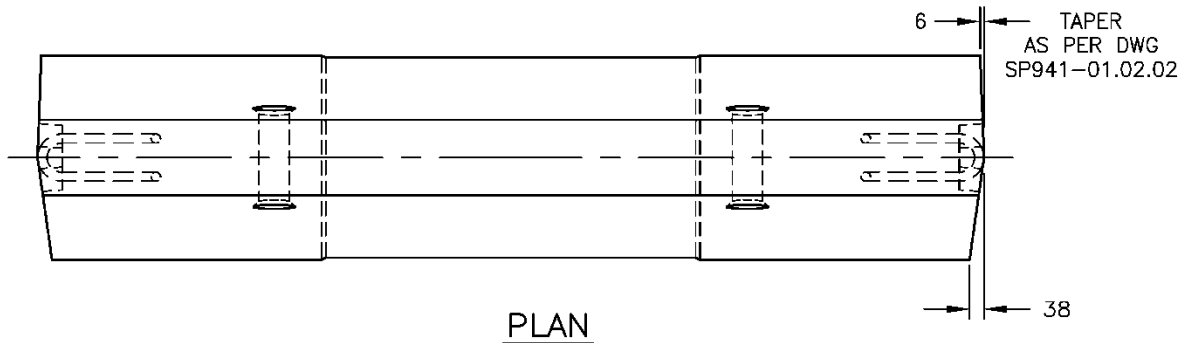
HOOK KEY MADE SMALLER BY USE OF 6 mm PLATE INSERT ON BOTH KEY ENDS, AND 3 mm PLATE INSERTS ON BOTH SIDES OF KEYS DURING CASTING.

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

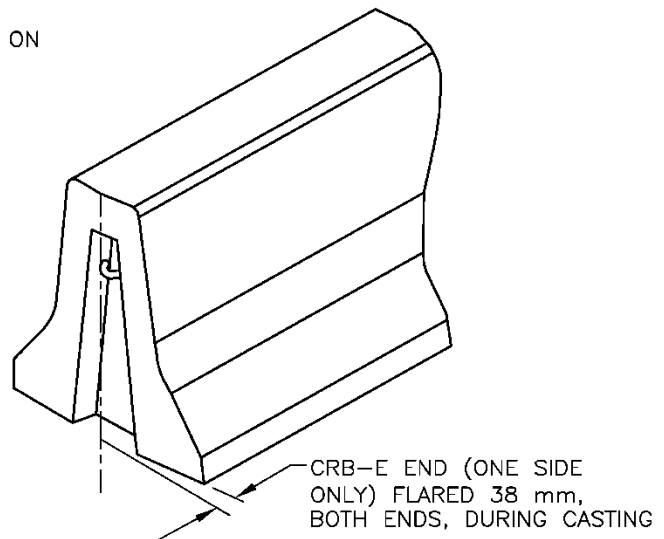
PRECAST CRB-E  
MODIFICATIONS FOR TIGHT CURVATURE INSTALLATION

SP941-02.01.09



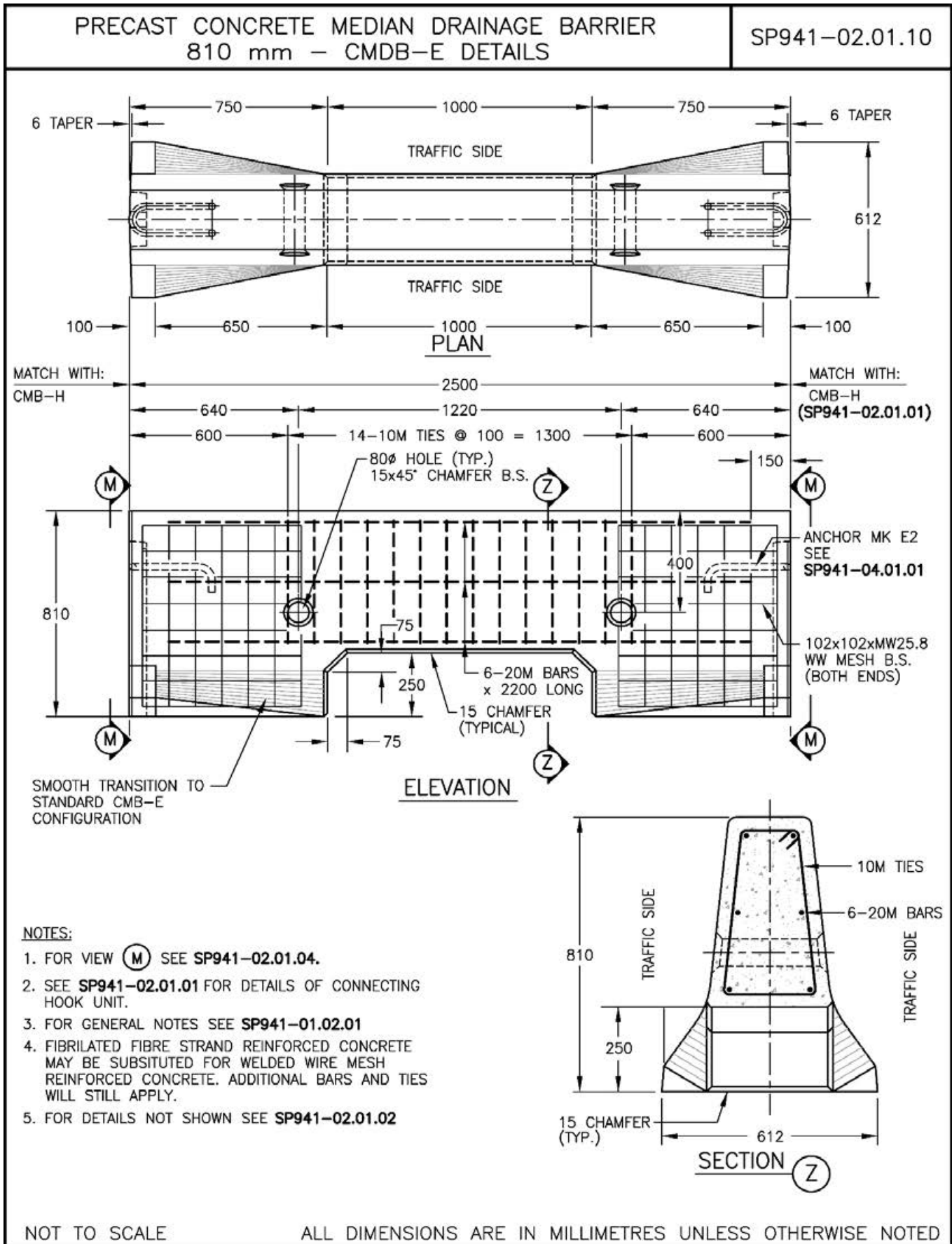
NOTES:

1. THIS DRAWING MUST BE READ WITH CRB DRAWINGS SP941-01.02.01 TO 941-01.02.04 FOR FULL DETAILS OF UNITS.
2. IT IS INTENDED THAT EXISTING CRB MOLDS BE ADAPTED TO DIMENSIONS NOTED ON THIS DRAWING TO PRODUCE UNITS CAPABLE OF BEING PLACED TO A MINIMUM CURVE RADIUS OF APPROXIMATELY 17 m.
3. ALL TOLERANCES AS PER CRB UNIT DRAWINGS.
4. THIS MODIFIED UNIT IS INTENDED TO BE USED ON TIGHT CURVATURE AT INTERSECTIONS ONLY.



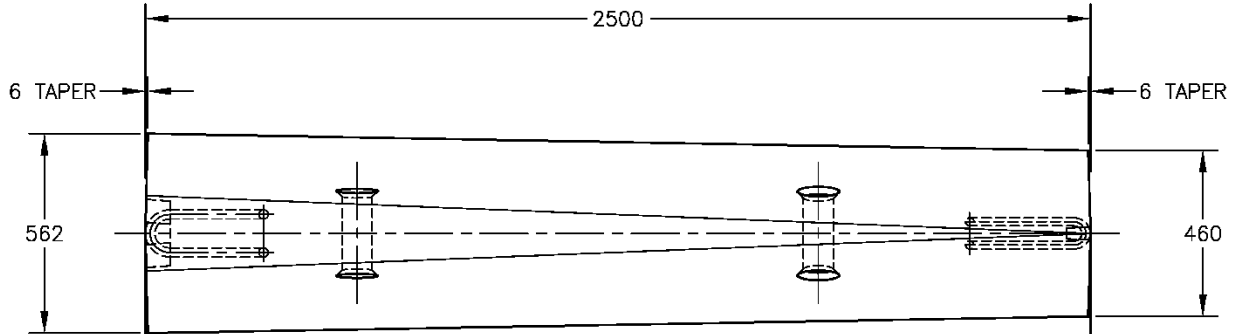
NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

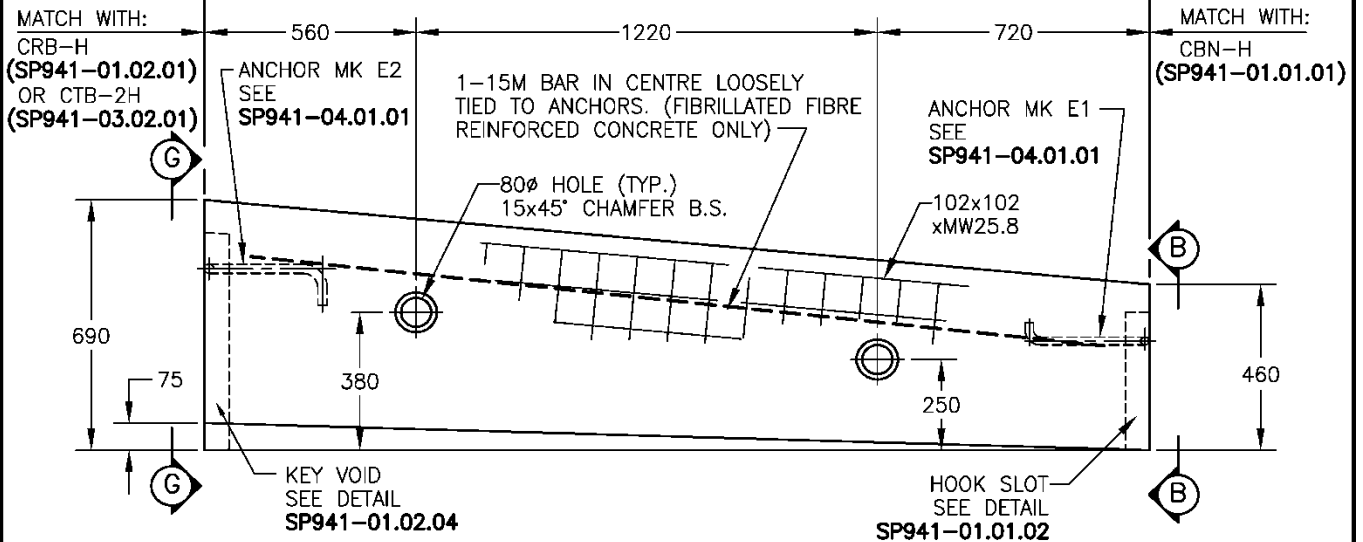


PRECAST CONCRETE TRANSITION BARRIER  
690 mm TO 460 mm – CTB-1E

SP941-03.01.01



PLAN



ELEVATION

NOTES:

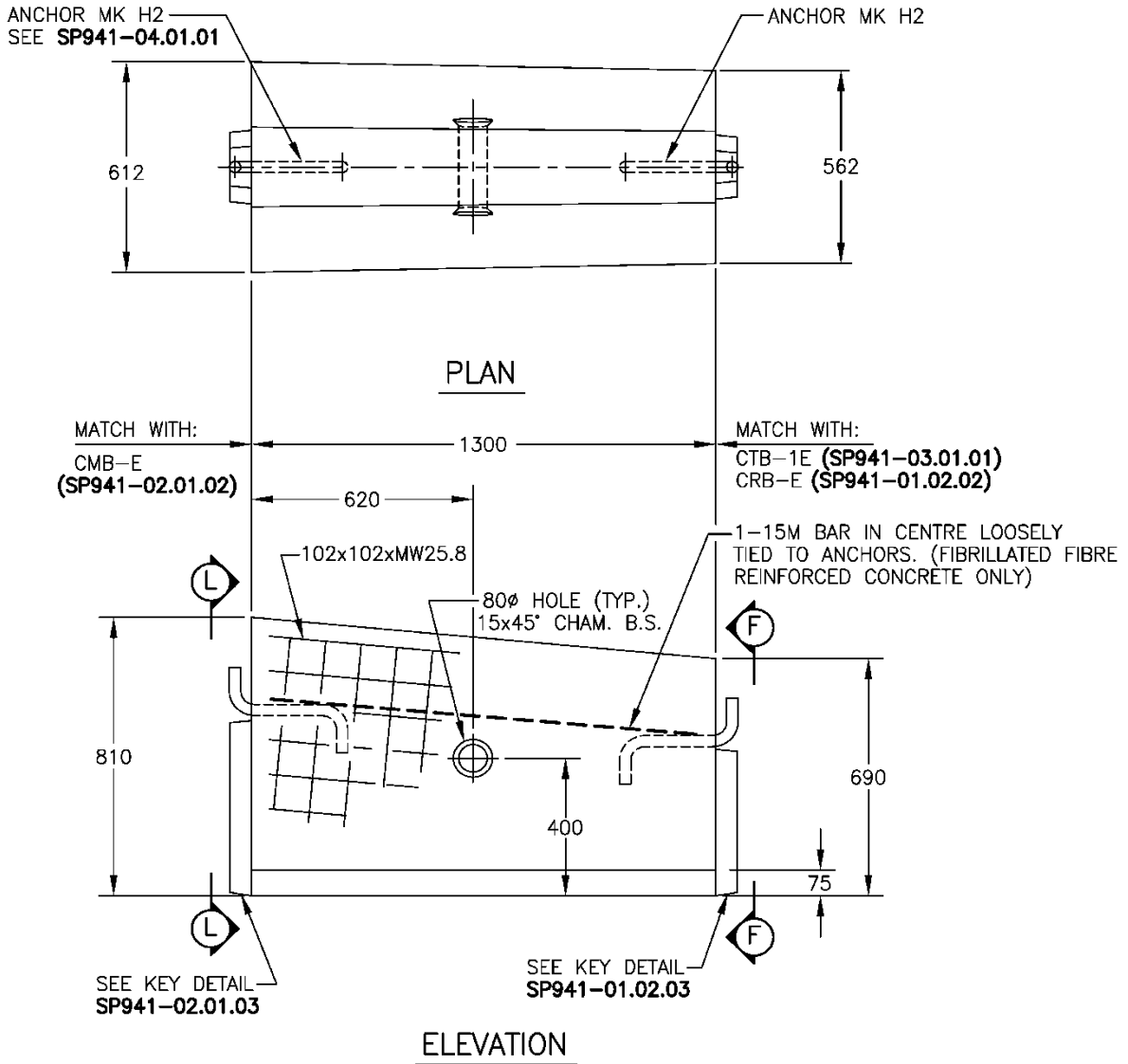
1. FOR VIEW (B) SEE SP941-01.01.02. FOR VIEW (G) SEE SP941-01.02.04.
2. FOR GENERAL NOTES SEE SP941-01.02.01.
3. SEE DRAWINGS SP941-01.01.01 AND SP941-01.01.02 FOR DETAILS OF 460 mm UNIT AND BULLNOSE. SEE DRAWING SP941-01.02.01 FOR DETAILS OF 690 mm HOOK UNIT OR SP941-03.02.01 FOR DETAILS OF 810 TO 690 TRANSITION UNIT.

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

PRECAST CONCRETE TRANSITION BARRIER  
810 mm TO 690 mm – CTB-2H

SP941-03.02.01



NOTES:

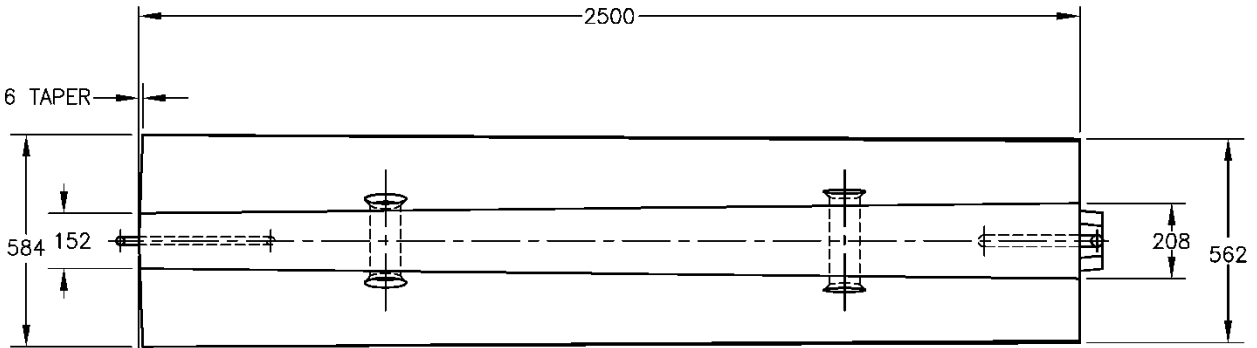
1. FOR VIEW (F) SEE SP941-01.02.03.  
FOR VIEW (L) SEE SP941-02.01.03.
2. FOR GENERAL NOTES SEE SP941-01.02.01.
3. SEE DRAWING SP941-02.01.02 FOR DETAILS OF 810 mm EYE UNIT.  
SEE DRAWING SP941-01.02.02 FOR DETAILS OF 690 mm EYE UNIT  
OR SP941-03.01.01 FOR DETAILS OF 690 TO 460 TRANSITION UNIT.

NOT TO SCALE

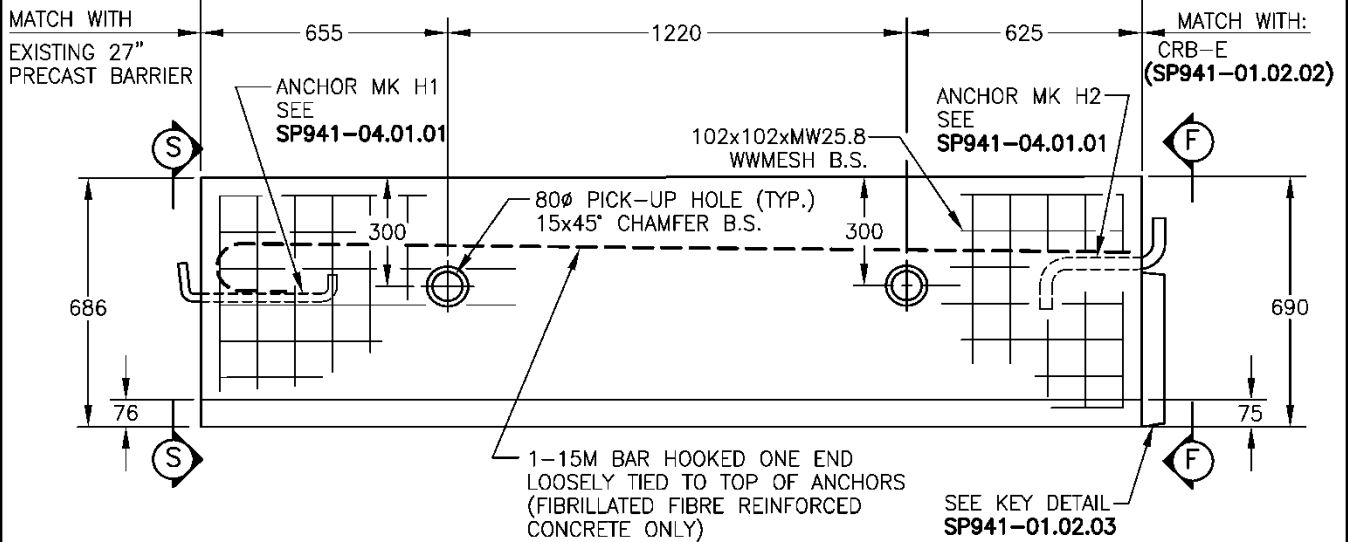
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

PRECAST CONCRETE TRANSITION BARRIER  
686 mm TO 690 mm – CTB-3H

SP941-03.03.01



PLAN



ELEVATION

NOTES:

1. FOR VIEW (F) SEE SP941-01.02.03. FOR VIEW (S) SEE SP941-03.03.02
2. FOR GENERAL NOTES SEE SP941-01.02.01
3. SEE DRAWING SP941-01.02.02 FOR DETAILS OF 690 mm EYE UNIT.
4. THIS UNIT TO BE USED WITH EXISTING 27" BARRIER. 27" BARRIERS ARE NO LONGER USED IN NEW INSTALLATIONS

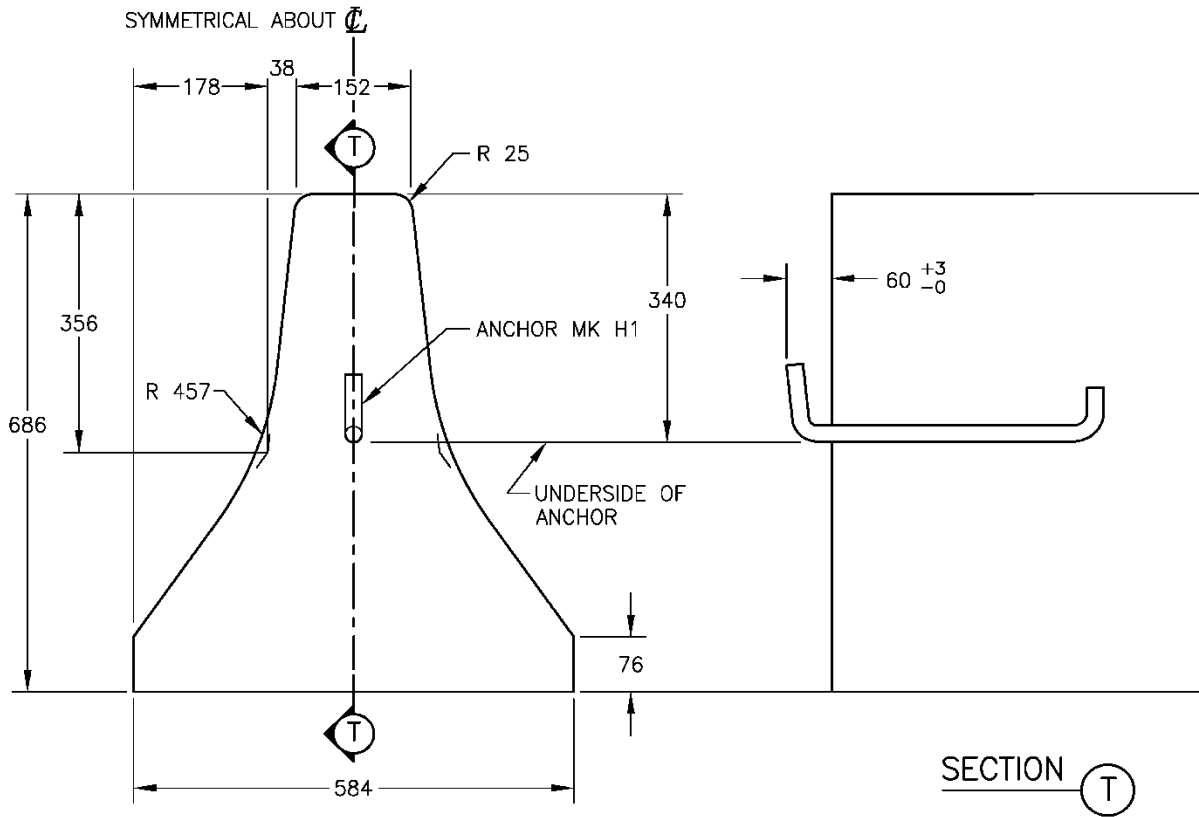
NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



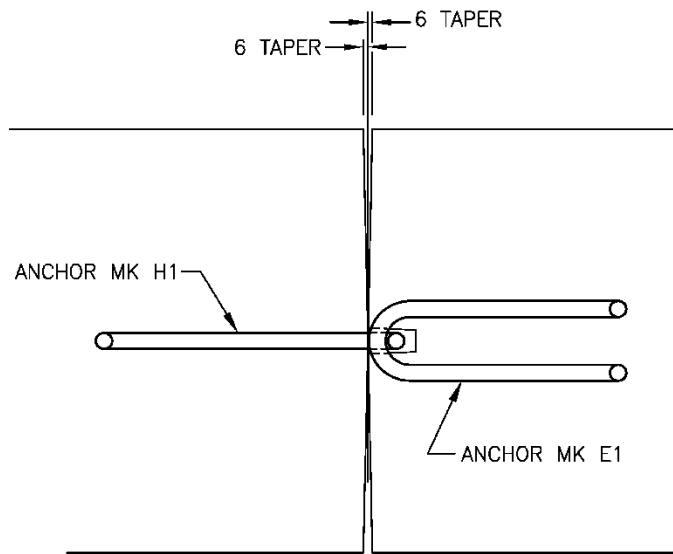
PRECAST CONCRETE TRANSITION BARRIER  
686 mm TO 690 mm – CTB-3H DETAILS

SP941-03.03.02



VIEW (HOOK UNIT) **S**

SECTION **T**



HOOK AND EYE DETAIL

NOTES:

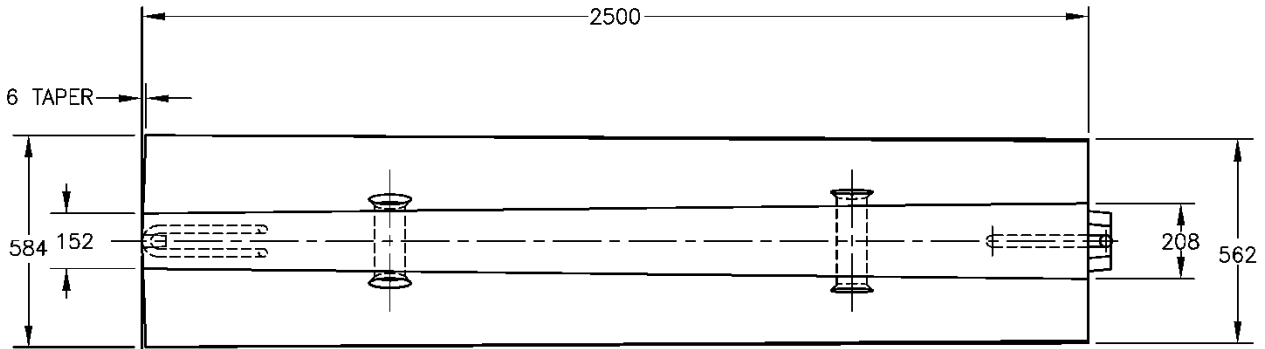
1. FOR LOCATION OF VIEW **S** SEE SP941-03.03.01
2. FOR GENERAL NOTES SEE SP941-01.02.01
3. FOR DETAILS OF ANCHORS SEE SP941-04.01.01.

NOT TO SCALE

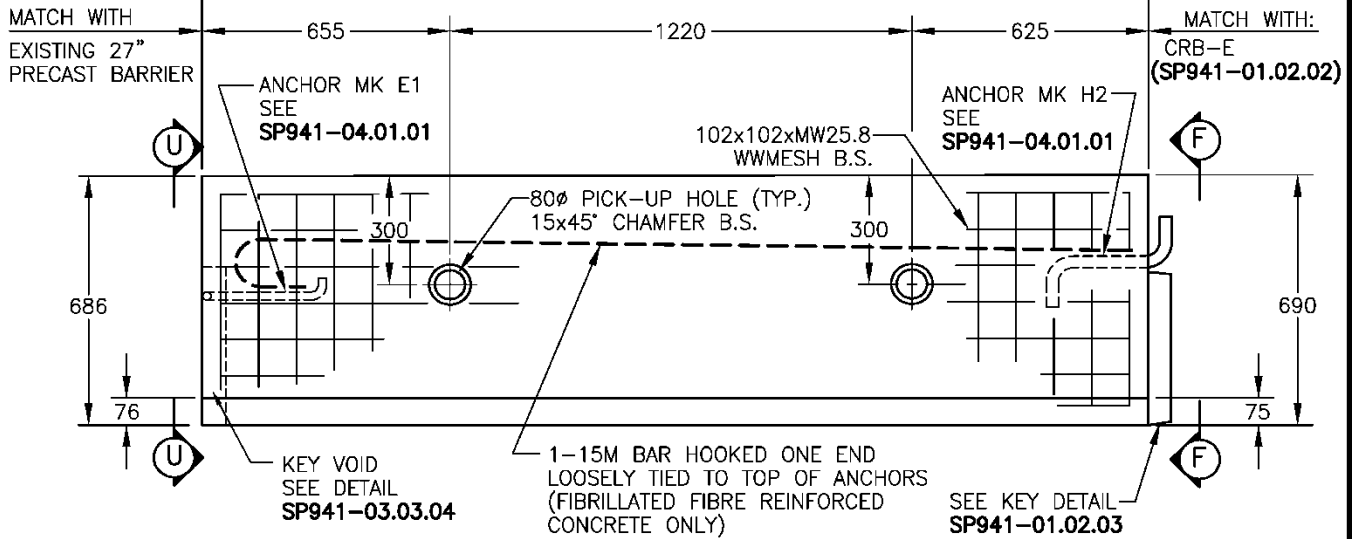
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

PRECAST CONCRETE TRANSITION BARRIER  
686 mm TO 690 mm – CTB-3E+H

SP941-03.03.03



PLAN



ELEVATION

NOTES:

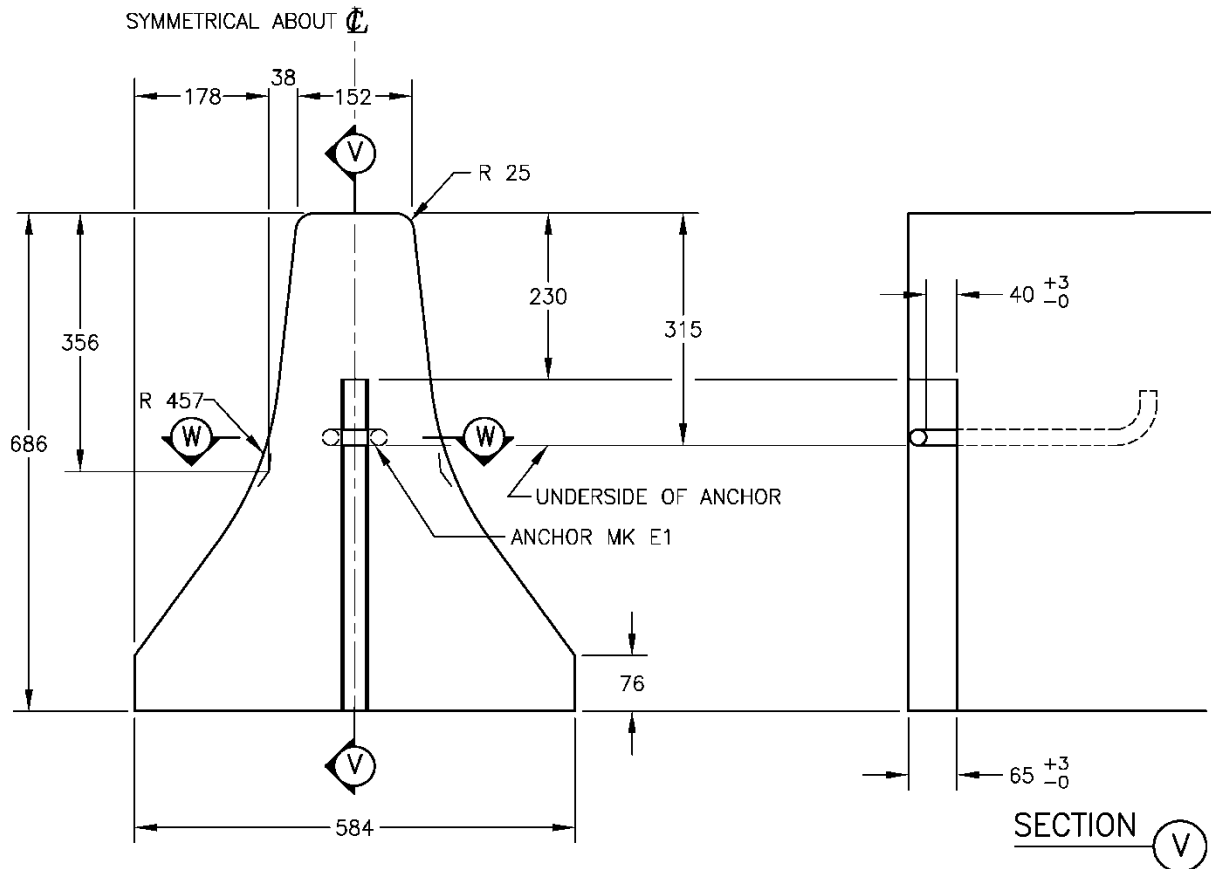
1. FOR VIEW (F) SEE SP941-01.02.03.. FOR VIEW (U) SEE SP941-03.03.04
2. FOR GENERAL NOTES SEE SP941-01.02.01
3. SEE DRAWING SP941-01.02.01 FOR DETAILS OF 690 mm HOOK UNIT.
4. THIS UNIT TO BE USED WITH EXISTING 27" BARRIER. 27" BARRIERS ARE NO LONGER USED IN NEW INSTALLATIONS

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

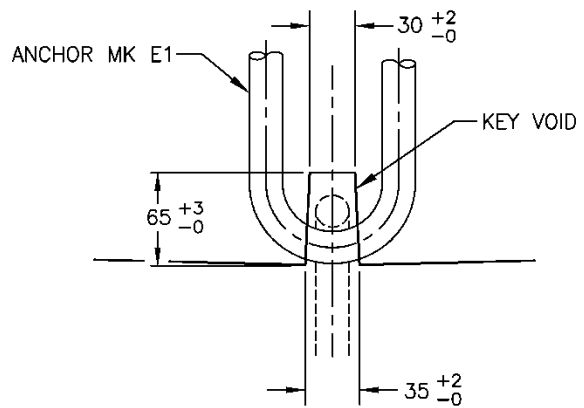
PRECAST CONCRETE TRANSITION BARRIER  
686 mm TO 690 mm – CTB-3E+H DETAILS

SP941-03.03.04



VIEW (EYE AND HOOK UNIT) U

SECTION V



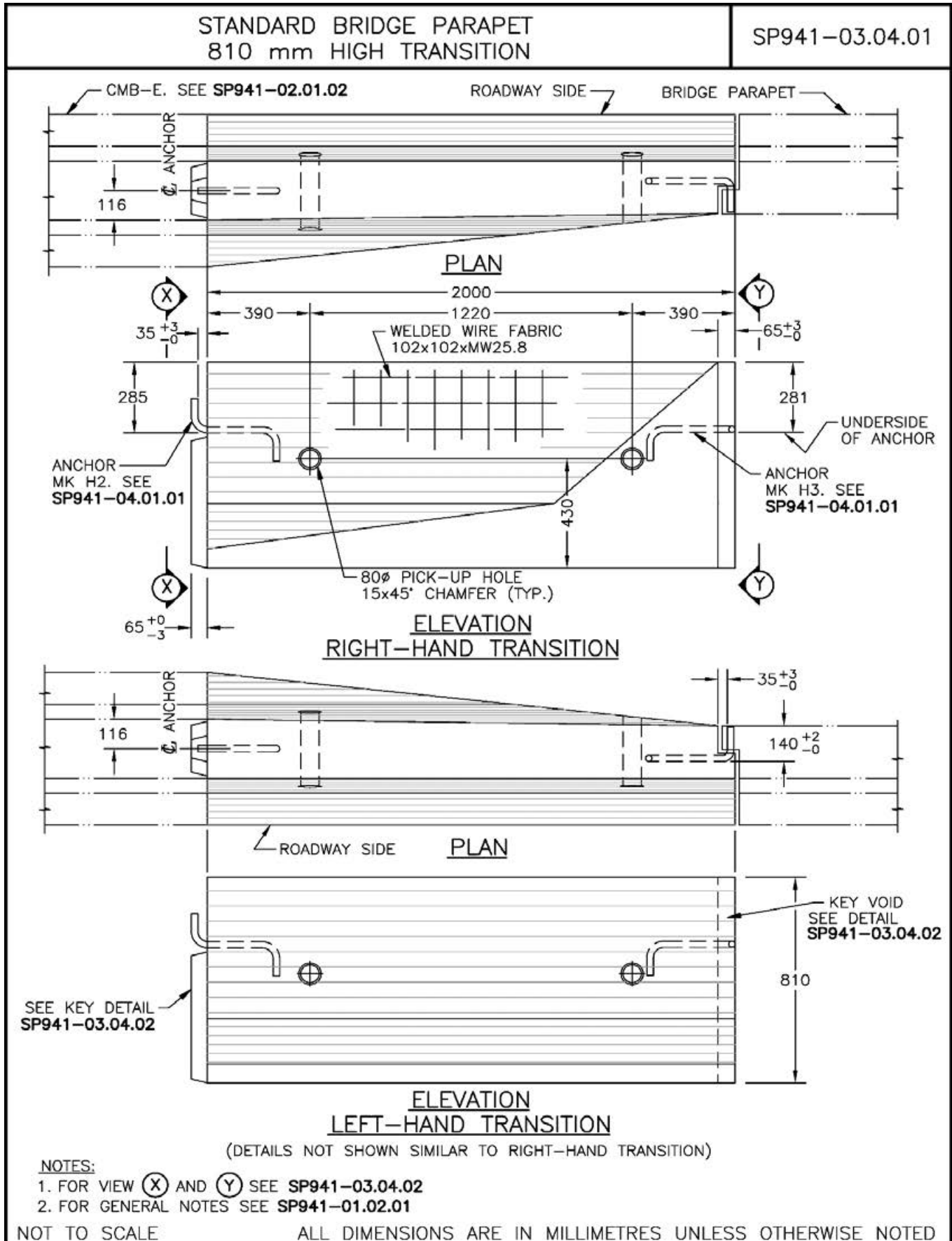
SECTION W

NOTES:

1. FOR LOCATION OF VIEW U SEE SP941-03.03.03.
2. FOR GENERAL NOTES SEE SP941-01.02.01
3. FOR DETAILS OF ANCHORS SEE SP941-04.01.01.

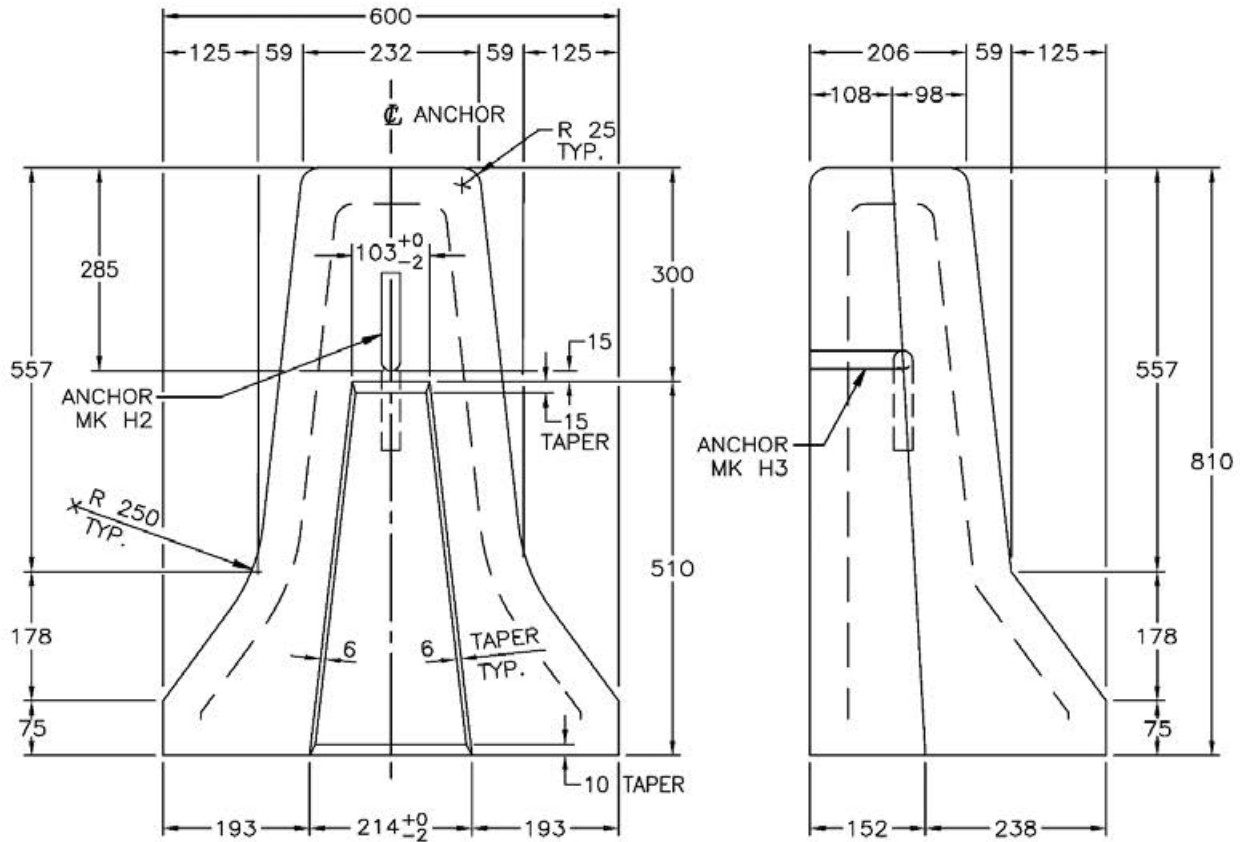
NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED



STANDARD BRIDGE PARAPET  
810 mm HIGH TRANSITION – DETAILS

SP941-03.04.02

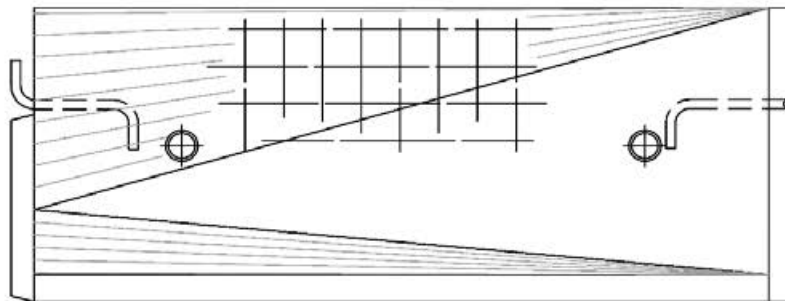


VIEW (X)

RIGHT HAND TRANSITION SHOWN  
LEFT HAND TRANSITION SIMILAR

VIEW (Y)

RIGHT HAND TRANSITION SHOWN  
LEFT HAND TRANSITION OPP. HAND



ACCEPTABLE ALTERNATE SIDE CONFIGURATION

RIGHT HAND TRANSITION ELEVATION SHOWN  
LEFT HAND TRANSITION ELEVATION OPPOSITE HAND

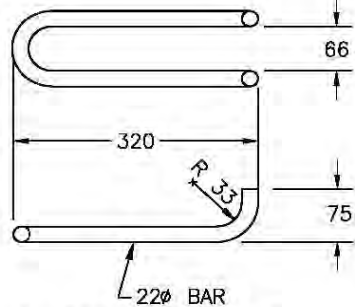
NOTES:

1. FOR LOCATION OF VIEW (X) AND (Y) SEE SP941-03.04.01
2. FOR GENERAL NOTES SEE SP941-01.02.01

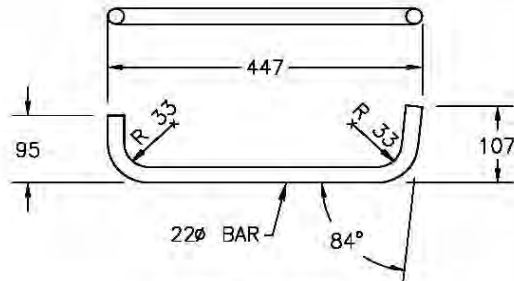
NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

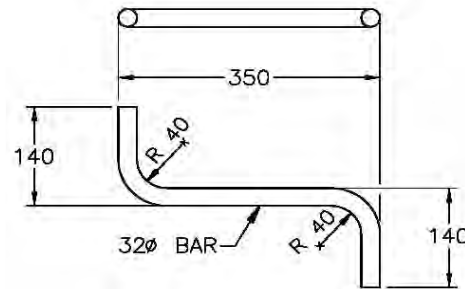
NO POST BARRIER ANCHORING HARDWARE	SP941-04.01.01
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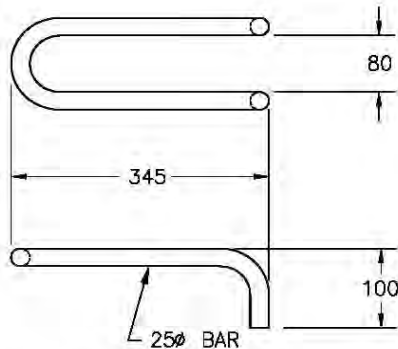
**ANCHOR MK E1**



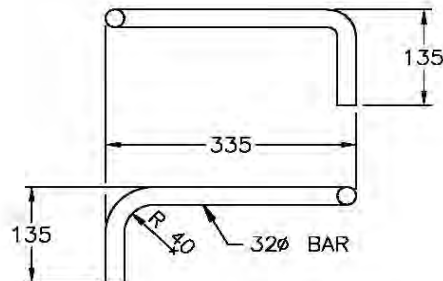
**ANCHOR MK H1**



**ANCHOR MK H2**



**ANCHOR MK E2**



**ANCHOR MK H3**

**NOTES:**

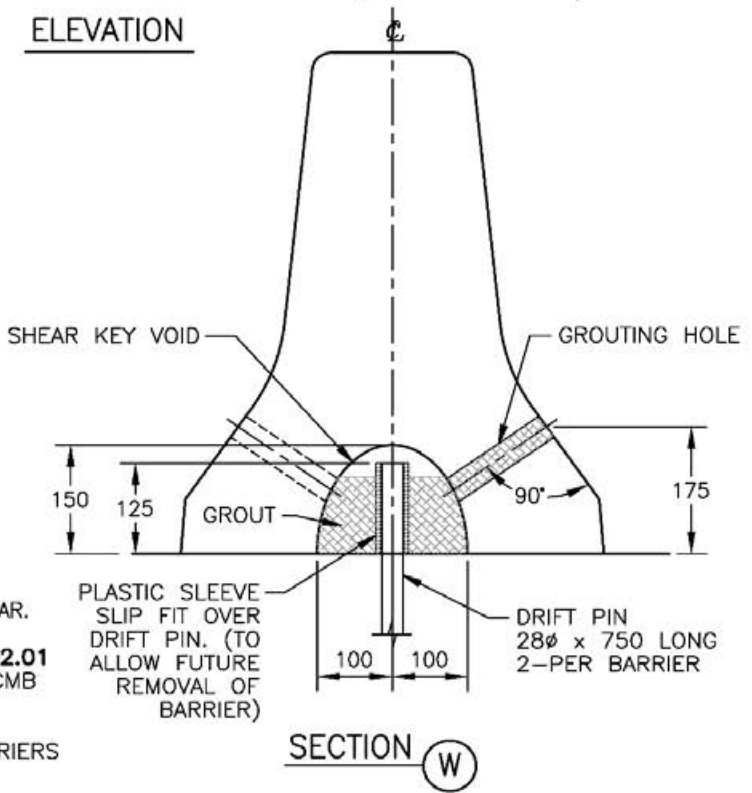
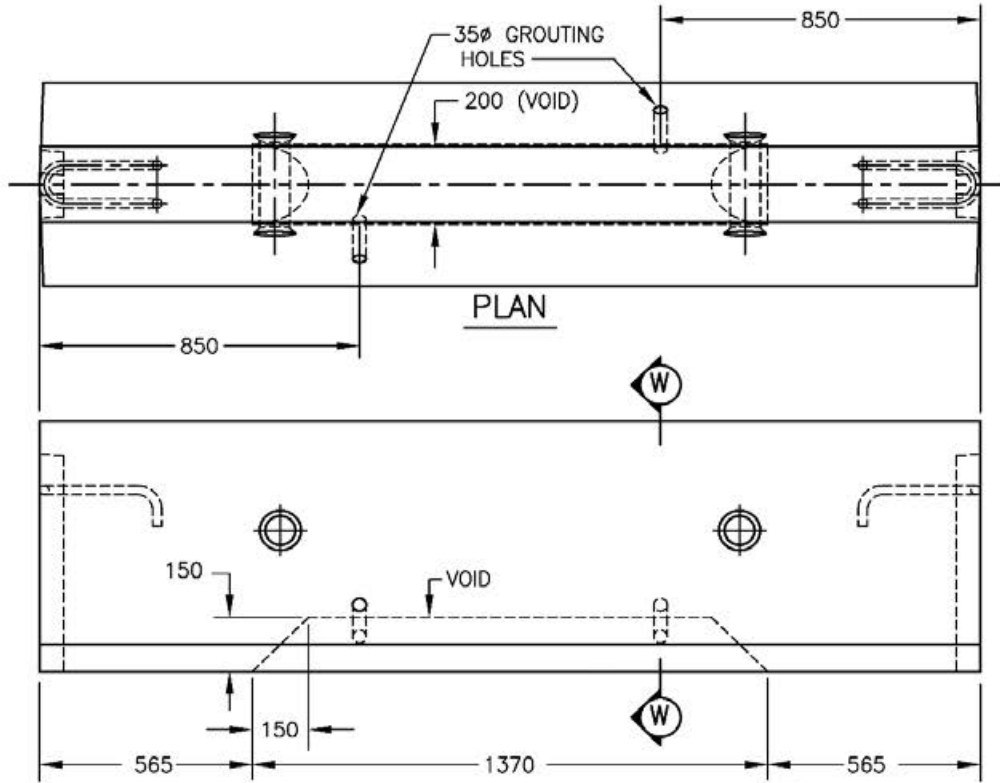
1. STEEL FOR ANCHORS TO CONFORM TO CSA SPECIFICATION CAN3-G40.21M.
2. PRIOR TO DELIVERY, EXPOSED SURFACES OF CONNECTIONS SHALL BE PREPARED FOR AND GIVEN A HEAVY APPLICATION OF ZINC RICH COATING SELECTED FROM THE MINISTRY'S RECOGNIZED PRODUCTS LIST..

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

PRECAST CONCRETE ROADSIDE AND MEDIAN BARRIERS  
SHEAR KEY VOID DETAILS

SP941-04.02.01



NOTES:

1. 690 HIGH CRB AS SHOWN. 810 HIGH CMB SIMILAR.
2. FOR DETAILS OF 690 CRB SEE SP941-01.02.01 & SP941-01.02.02. FOR DETAILS OF 810 CMB SEE SP941-02.01.01 & SP941-02.01.02.
3. DRAINAGE SLOTS ARE NOT ALLOWED IN BARRIERS WHEN SHEAR KEYS ARE REQUIRED.

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

## SECTION 942

### PRECAST CONCRETE INTERLOCKING MODULAR BLOCKS

**942.01 Scope** – This Section covers the quality and manufacture of precast concrete interlocking modular blocks (Interlocking Blocks) made using wet-cast concrete supplied for Ministry use.

This standard specification covers only Interlocking Blocks that have the following nominal dimensions:

- Full-sized blocks: 750 mm height x 750 mm depth x 1500 mm long.
- Half sized blocks: 750 mm height x 750 mm depth x 750 mm long.
- Compatible corner blocks and other partial sized or special purpose blocks for use with the full-sized blocks

Requirements for other block sizes, types and proprietary systems will be specified in the Contract.

Interlocking Blocks shall be supplied in the sizes and types as required by purchase order or Contract/Drawing requirements, and shall comply with this Section unless otherwise specified by the Contract or Purchase Order.

**942.02 Definition of Precast Concrete Interlocking Modular Blocks (“Interlocking Blocks”)** – Precast monolithic concrete blocks with interlocking shear keys of specified dimensions made from wet-cast concrete for use in the construction of an engineered gravity retaining wall or an engineered mechanically stabilized earth (MSE) wall.

#### MATERIALS

**942.10 Provision of Interlocking Blocks** – Interlocking Blocks shall be manufactured to comply with the design of a proprietary product listed on the Ministry’s [Recognized Products List](#) (RPL).

The Recognized Product List is available on-line at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/recognized-products-list>

**942.11 Details of Interlocking Blocks** – All block edges, except the shear key and corresponding socket, shall have a  $40 \pm 20$  mm chamfer.

Dimension tolerances shall be  $\pm 15$  mm.

All Interlocking Blocks require the following identification information to be cast into the end of each block, in a manner, size and depth to be permanently legible:

- manufacturer’s name or trademark,
- date of manufacture, and

- form number.

**942.12 Shear Keys** – Interlocking Blocks shall have engineered interlocking shear keys with no more than 12 mm of design clearance around the shear key. The shear keys shall be cast integrally with the block and shall provide shear strength across the interface between courses of the Interlocking Blocks.

The shear key shall be designed to allow interlocking

- in a linear installation in running bond and stack bond layouts, and
- at ninety degrees (90°) corners

The interface shear strength between the courses of Interlocking Blocks and the shear key strength shall be adequate to resist earth pressure forces of ten metres (10 m) in height. Engineered documentation and test results that demonstrate the interface shear strength and shear key strength shall be submitted to the Ministry Representative for compliance review upon request.

Bench style and wall top course Interlocking Blocks shall have a flat top surface (i.e. without shear keys) with recessed galvanized lifting loops.

**942.13 Lifting Loop Strands** – Interlocking Blocks shall have galvanized steel lifting loops engineered by a professional engineer registered with the Association of Professional Engineers and Geoscientists of BC, and be designed so that the block can be lifted and positioned using only a standard hook or clevis.

Lifting loops shall be fabricated from 12.5 mm or 16 mm nominal diameter 7-wire zinc coated steel wire strand. Zinc coated 7-wire strand shall be in accordance with ASTM A475 or CSA G12 Class A zinc coating.

Lifting loops shall be anchored and embedded sufficiently into the block to safely enable lifting and handling of the blocks.

Lift points shall be designed and installed directly above the centre of mass of the block and in a manner that will allow them to remain in place and not interfere with full concrete-on-concrete bearing when blocks are stacked on top of each other.

Installation shall not require the lift points to be removed.

#### 942.14 Concrete Quality

All concrete material and work shall be in accordance with SS 211 except as modified by this SS 942.

Material shall be new or virgin and contain no Recycled Concrete Aggregate Material (RCAM).



Concrete shall meet the requirements of Table 942-A.

**Table 942-A: Concrete Mix Requirements**

Property	Requirement
Minimum 28 day compressive strength	32 MPa
Air Content	5% to 7%
Nominal Maximum Size of Coarse Aggregate	28 mm
Maximum Plasticized Slump	80 ± 20 mm
Maximum water/cementitious materials ratio by weight	0.40
Minimum cement content	320 kg/m <sup>3</sup>

**942.15 Finished Surface of Concrete** – Concrete for Interlocking Blocks shall be poured monolithically, with no cold joints. (i.e. continuously poured until the concrete is level with the top edge of the form.)

All surfaces shall have a smooth finish conforming to CSA A23.4 Section 26.2.3 “Standard Grade” with a uniform finish. There shall be no pronounced texture and fins shall be removed. There shall be no open pockets or distortions in excess of 12 mm.

Project-specific architectural finishes or types of the exposed face shall be as specified in the Contract.

Consistency of the concrete finish for the Interlocking Blocks for the project shall be maintained by using the same concrete mix and the same type of form oil.

Interlocking Blocks shall be sound and free of cracks or other defects that interfere with the proper placement of the block. Interlocking Blocks having cracks or spalling that are continuous through any solid element of the block shall be rejected regardless of the width or length.

All sharp or protruding surfaces of the Interlocking Blocks by careful rubbing or grinding.

**942.15.01 Defects** – Structurally defective or damaged Interlocking Blocks, as well as those with defects outside the limits specified in SS 941.15.01(a) shall be cause for rejection.

(a) **Repair of Limited Defects** – Subject to the approval of the Ministry Representative, non-structural defects, within the limits identified below, may be repaired:

- Surface defects where their total area is not in excess of 2% of the exposed surface area of the unit.

- Open pockets not greater than 6 mm in diameter and not more in number than twenty (20) in any 300 mm x 300 mm area.

(b) **Repair Products** – Approved repairs shall be done using approved patching materials from the [Recognized Products List](#) for patching of isolated small holes, cavities and similar self-confining defects of the Interlocking Blocks in order to restore the durability of the block.

The patching material shall provide a reasonable colour match to the cured dry Interlocking Block, be well tooled in, be finished flush and smooth, and cured adequately, using water or a curing compound.

**942.16 MSE Walls** – All connections between the MSE wall soil reinforcement elements and the Interlocking Blocks shall be in accordance with the Ministry’s Supplement to CSA S6, and the design shall be prepared by a professional engineer registered with the Association of Professional Engineers and Geoscientists of BC.

Modifications to the Interlocking Blocks for the soil reinforcement connections shall comply with the engineered connection design details.

**942.17 Quality Control Requirements for Interlocking Blocks** – The manufacturer of the Interlocking Blocks shall have a Quality Control Plan in place in order to ensure and document compliance with the Contract requirements. This plan shall be submitted to the Contractor and the Ministry Representative for compliance review upon request.

Manufacturers failing to meet the Contract requirements shall take immediate remedial steps to become compliant.

In addition to the quality control requirements of SS 211, the Contractor shall extract a set of two 100 mm diameter by 200 mm long cores from one block prior to delivery to the Site.

The cores shall be taken in the middle of the block along the back face so that the block may still be used if specifications are met. The cored holes shall be patched and cured using approved materials from the [Recognized Products List](#).

For projects with more than 50 blocks, a minimum of one set of cores shall be extracted for every full or partial lot of 50 blocks supplied.

The Contractor shall ensure that the core test results are traceable to every other block cast from the same concrete batch and every other block in the 50-block lot. Only Blocks with traceable testing documentation will be accepted for use.

One of these cores will be tested for the compressive strength in accordance with CSA A23.2-14C and CSA A23.2-9C.

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## PRECAST CONCRETE INTERLOCKING MODULAR BLOCKS

The second core shall be tested for air void analysis in accordance with ASTM C457.

The evaluation of the results from the testing of the cores shall be in accordance with CSA A23.1.

The Ministry may reject the whole lot of blocks represented by the initial or subsequent core testing if the core tests fail to meet the Contract Specifications.

**942.18 Quality Assurance of Interlocking Blocks** – The Ministry Representative may elect to carry out Quality Assurance of the manufacturer's fabrication facility and processes and/or the Interlocking Blocks.

The manufacturer's facility and the Interlocking Blocks shall be accessible to the Ministry Representative for inspection, testing, quality assurance and quality audit purposes at all times during manufacturing and shipping of Interlocking Blocks.

All testing, material, and Quality Control records shall be made available to the Ministry Representative upon request.

The Contractor shall notify the Ministry Representative a minimum of fourteen (14) days in advance of the date the Interlocking Blocks are to be proposed to be shipped to allow the Ministry Representative an opportunity to inspect the Interlocking Blocks before delivery.

Patching and/or repair of defects may be inspected before shipment, or upon delivery, and the rejected unit(s) shall be replaced at no cost to the Ministry.

The Ministry Representative reserves the right to conduct any Quality Assurance testing deemed necessary to confirm Interlocking Blocks comply with the specifications before Interlocking Blocks are accepted for final payment.

The Ministry Representative reserves the right to reject any or all Interlocking Blocks based on visual and non-destructive methods.

### PAYMENT

**942.90 Payment** – Payment for INTERLOCKING BLOCKS shall be at the applicable Unit Prices for the Item(s) listed in the Schedule of Approximate Quantities and Unit Prices and shall be full compensation for everything furnished and done including, but not limited to, equipment, labour, quality control, supply of forms and all materials, placing, vibrating and curing air entrained concrete, stripping, finishing, patching and repairs, general clean-up and delivery of all Interlocking Blocks at Site.

Rejected Interlocking Blocks shall be replaced at the Contractor's expense including shipping charges and removal of rejected Interlocking Blocks from site and from constructed walls.

## SECTION 952

### CONTRACTOR SUPPLY ASPHALT AND PAVING MATERIALS FOR HIGHWAY USE

**952.01 Scope** – This Section describes the requirements for the different types and grades of asphalt and paving materials to be supplied by the Contractor for highway use as set out in the Special Provisions of the Contract.

The materials so described are generally classified as follows:

- Asphalt Cements
- Cutback Asphalts
- Asphalt Emulsions
- Tall Oil Pitch
- Emulsified Products

The term “Supplier” referred to in this Section shall mean the party or parties manufacturing and supplying the Contractor with materials covered under this section, but the Contractor remains responsible to the Ministry for the quality of the materials provided.

The Ministry’s Recognized Product List referenced herein may be found online at:

[https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/recognized-products-list/recognized\\_products\\_list.pdf?forcedownload=true](https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/recognized-products-list/recognized_products_list.pdf?forcedownload=true)

#### 952.02 Quality Control Requirements

**952.02.01 Quality Control Plan** – The Supplier shall develop and maintain a proven quality control plan in accordance with the provisions of this Section and the Special Provisions. The plan shall ensure that adequate inspection coverage is maintained throughout the entire process of manufacture and shipping. All supplies processed or manufactured within the Supplier's plant or procured from any other source shall receive sufficient inspection to ensure conformance specifications and evidence of such inspections may be provided to the Ministry Representative upon request.

Supplies not conforming to contractual requirements shall not be offered for highway use until the deviations have been authorized by the Ministry Representative.

It shall be a responsibility of the Contractor to ensure that all materials supplied satisfy the related Environmental and Health and Safety Regulations.

Product discharged directly into tank cars or tank trucks from "in line blending" facilities will be sampled as required to ensure uniformity and to satisfy quality requirements.

**952.02.02 Quality Control Procedure** – The Supplier may be required to furnish the Contractor with an outline of the quality control procedures detailing the method of implementing the requirements of this Specification. This outline shall include the following operations:

- sampling and testing
- storage and handling
- shipping
- recording and reporting.

**952.02.03 Technical Requirements** – The Contractor shall ensure that the Supplier provides the following:

(a) **Batching and Batch Analysis:** Each batch of product covered by this Section shall be given a batch number and be sampled and tested in accordance with the applicable specification.

The batch analysis must show the specification requirements for the product tested, test method employed, and the pertinent test results, as listed in Appendix 952-A.

The batch analysis shall also include:

- Details of the raw materials and their dosages if engineered vegetable oils are used as modifiers; and
- a written declaration that none of the substances listed in SS 952.05(f) have been added.

The batch analysis shall be certified by an appropriately qualified and authorized representative of the Supplier.

The certified batch analysis shall be dispatched to the Contractor with the first load of material delivered. Provided the batch from which shipments are drawn remains the same and provided that the batch number is shown on the Bill of Lading, no further batch analysis will be required for subsequent remaining shipments. If, during the course of delivery, it is necessary to draw material from a different batch or batches of product, the analysis of the replacement batch shall be sent out with the first load of material from each and every replacement batch.

When certified batch results are not yet available, the Contractor may elect, at its own risk, to use the uncertified material. If the material is subsequently determined to be non-compliant with the specifications or certified batch results are not provided, remediation of any Work using such material will be to the Contractor’s account.

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**CONTRACTOR SUPPLY ASPHALT AND PAVING MATERIALS FOR HIGHWAY USE**

(b) **Viscosity Chart (Absolute)** shall include the initial load and for each subsequent batch. If in-line blending is utilized, a new viscosity chart shall be issued should any change in viscosity occur.

**952.03 Sampling and Testing** – The Supplier shall retain adequate sampling equipment, employ satisfactory sampling procedures, and maintain the sampling program and records. The Contractor shall obtain samples for quality assurance.

The Ministry has developed Technical Bulletin GM19001 Liquid Asphalt Sampling and Testing for the Ministry's Quality Audit, which may assist the Contractor in establishing its own quality assurance procedures. This Technical Bulletin is available at:

<https://www2.gov.bc.ca/gov/content/transportation/transpo-rtation-infrastructure/engineering-standards-guidelines/technical-bulletins/geotechnical-materials>

Test methods for asphalt and paving materials shall conform to the standard AASHTO tests listed in Table 952-A or ASTM tests listed in Table 952-B, supplemented by such special tests as may be described elsewhere to cover special or experimental type materials.

On request by the Ministry Representative, the Contractor shall provide samples, from the Supplier, of the product in quantities, not less than 4 L, as may be required for independent testing purposes.

**952.04 Delivery of Asphalt and Paving Materials** – The Contractor must ensure the Supplier delivers asphalt and paving materials in good condition, of uniformity of product, for any special storage requirements and at correct temperature to the specified delivery point

Adequate records of delivery shall be kept, and every bill of lading must show:

- Type of product
- Batch number
- Mass
- Relative density at 15°C
- P.G. or Pen Specification (information)

Trucks shall be equipped with a submerged sampling valve system installed generally as shown on SS Drawing SP952-01 for each compartment in which asphalt material is to be carried out.

Delivery temperature of the shipment shall meet the viscosity requirement shown in Table 952-C.

Asphalt Emulsions and emulsified products shall be kept at temperatures above 5°C.

**952.05 Asphalt Cement** – Asphalt cements shall be subject to the following conditions:

- (a) all supplied asphalt cement shall be Group A;
- (b) shall be products prepared by the refining of petroleum oils;
- (c) shall be homogeneous, free from water, and shall not foam when heated to 175°C;
- (d) shall conform to either the Pen Grade requirements specified in Table 952-D or the Performance Grade (PG) the requirements specified in Table 952-E, Table 952-F (for Polymer Modified Asphalt only) and Table 952-G;
- (e) shall not:
  - (i) be air blown or catalytically oxidized in any way,
  - (ii) contain any air blown or catalytically oxidized residues, or
  - (iii) include residues caused by artificial distillation of coal, coal tar, or paraffin.

**Table 952-A: Standard Test Methods - AASHTO**

<u>AASHTO TEST DESIGNATION</u>	<u>TITLE OF TEST:</u> Standard Method of Test for...
<u>M 320</u>	<u>Standard Specification for Performance-Graded Asphalt Binder</u>
<u>R 29</u>	<u>Standard Practice for Grading or Verifying the Performance Grade (PG) of an Asphalt Binder</u>
<u>T 44</u>	<u>Solubility of Bituminous Materials</u>
<u>T 48</u>	<u>Flash Point of Asphalt Binder by Cleveland Open Cup</u>
<u>T 240</u>	<u>Effect of Heat and Air on a Moving Film of Asphalt Binder (Rolling Thin-Film Oven Test)</u>
<u>T 313</u>	<u>Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)</u>
<u>T 315</u>	<u>Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)</u>
<u>T 316</u>	<u>Viscosity Determination of Asphalt Binder Using Rotational Viscometer</u>
<u>T 350</u>	<u>Multiple Stress Creep Recovery (MSCR) Test of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)</u>

**Table 952-B: Standard Test Methods - ASTM**

<u>ASTM TEST DESIGNATION</u>	<u>TITLE OF TEST; Standard Test Method for...</u>
<u>D5</u>	<u>Penetration of Bituminous Materials</u>
<u>D13</u>	<u>Ductility of Asphalt Materials</u>
<u>D36</u>	<u>Softening Point of Bitumen (Ring-and-Ball Apparatus)</u>
<u>D70</u>	<u>Density of Semi-Solid Asphalt Binder (Pycnometer Method)</u>
<u>D92</u>	<u>Flash and Fire Points by Cleveland Open Cup Tester</u>
<u>D95</u>	<u>Water in Petroleum Products and Bituminous Materials by Distillation</u>
<u>D113</u>	<u>Ductility of Asphalt Materials</u>
<u>D139</u>	<u>Float Test for Bituminous Materials</u>
<u>D243</u>	<u>Residue of Specified Penetration</u>
<u>D244</u>	<u>Standard Test Methods and Practices for Emulsified Asphalts</u>
<u>D402</u>	<u>Distillation of Cutback Asphalt</u>
<u>D803</u>	<u>Testing Tall Oil</u>
<u>D1310</u>	<u>Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus</u>
<u>D1754</u>	<u>Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)</u>
<u>D2042</u>	<u>Solubility of Asphalt Materials in Trichloroethylene</u>
<u>D2170</u>	<u>Kinematic Viscosity of Asphalts</u>
<u>D2171</u>	<u>Viscosity of Asphalts by Vacuum Capillary Viscometer</u>
<u>D7496</u>	<u>Viscosity of Emulsified Asphalt by Saybolt Furol Viscometer</u>

**Table 952-C: Viscosity Requirements for Shipment Delivery Temperature**

<u>CLASS OF MATERIAL</u>	<u>KINEMATIC VISCOSITY (mm<sup>2</sup>/s)</u>
Cutback Asphalt for Surface Spraying	100 – 200
Cutback Asphalt and Asphalt Cement for Plant Mixing	100 – 500
Tall Oil Pitch	20 – 40

**Note:** In no case shall asphalt materials or Tall Oil Pitch be received at a viscosity outside the specified viscosity range.

(f) shall not be modified using any of the following additives (although trace amounts in the source asphalt cement are permitted):

- (i) polyphosphoric acid,
- (ii) atactic polypropylene; carbon black; polyisobutylene; polyisoprene; natural rubber; alkaline bases; insoluble particulates or fibres; heavy metals, including salts of iron, copper, manganese and/or cobalt; silicates; styrene-butadiene rubber (random copolymer latex); synthetic waxes (paraffin waxes, naphthenic waxes);
- (iii) synthetic and saturated oils (including but not limited to the following: vegetable oils or modified vegetable oils; (paraffin oils, polyalphaolefins (PAO), lube oils, and re-refined lube oils.);
- (iv) waste oils (including but not limited to the following: cracked residues, re-refined high vacuum distillate oils; tall oils, vacuum tower asphalt extenders; waste cooking oils, waste engine oils, waste engine oil residues).

(g) may be modified using engineered vegetable oils; and  
 (h) The asphalt cement Supplier shall also declare in writing on the certified batch analysis provided under SS 952.02.03(a):

- (i) if engineered vegetable oils are used as modifiers, the raw materials used and their dosages; and
- (ii) that they have not added any of the substances listed in SS 952.05(f) above.

Upon request, the Contractor shall forward a 4 L sample of the product to the Ministry Representative.

**NOTE:** Values for penetration and viscosity are point values only. Intermediate values shall be obtained by interpolation between the tabulated values on a straight line basis. Minimum viscosity at 60°C for other penetrations can be read from the corresponding straight line on SS Drawing SP952-02.

**952.06 Cutback Asphalts** – Cutback asphalts shall consist essentially of petroleum derivatives and shall be substantially free from water and other impurities.

Cutback asphalts shall be of the type and grade described in Table 952-H to Table 952-K.

**952.07 Asphalt Emulsions** – Asphalt materials in the form of aqueous emulsions shall be of:

- Anionic Type
- Cationic Type
- High Float Type

**SECTION 952**

**CONTRACTOR SUPPLY ASPHALT AND PAVING MATERIALS FOR HIGHWAY USE**

**952.08 Anionic Type Emulsion for Road Purposes –** Anionic type of emulsion requirements are as follows:

- The asphalt emulsion shall be homogeneous.
- It shall show no separation of asphalt after thorough mixing within 30 days (crack filler 20 days) after delivery, provided separation has not been caused by freezing.
- The emulsion shall conform to the requirements listed in Table 952-L.

**952.09 Cationic Type Emulsions for Road Purposes –** Cationic type emulsions shall conform to the requirements listed in Table 952-M and shall be uniform throughout.

**952.10 High Float Emulsified Asphalt Storage stability –** High float emulsified asphalt shall show no separation of asphalt within 30 days after delivery and shall be homogeneous after thorough mixing. The emulsion shall conform to the requirements listed in Table 952-N.

**952.11 Tall Oil Pitch (TOP) –** Tall oil pitch, co-product of the pulp and paper industry is a residual fraction from the crude tall oil vacuum distillation process. It shall be a dark brown resinous and viscous material insoluble in water but miscible with asphalt. TOP is typically used by the Ministry

as an asphalt extender, recycling, and anti-stripping agent. Where required, TOP will be added to asphalt cement in a ratio defined by the mix design, usually between 5%–10%. The composition and properties of TOP depends on the origin and type of trees from which it is derived and the extraction technology. Only TOP products listed in the Ministry’s Recognized Product List shall be permitted for use on Ministry paving projects.

The TOP shall conform to the requirements listed in Table 952-O and Table 952-P.

**952.12 Emulsified Products –** Emulsified products consist of emulsified Tall Oil Pitch and proprietary asphalt-based emulsions. The emulsified products are typically used by the Ministry, in paving operations, as prime coats and tack coats and replace organic solvent-based cutback asphalts for environmental reasons. Only products listed in the Ministry’s Recognized Product List shall be permitted for use on the Ministry paving projects. Each batch of the product delivered to the job site shall be accompanied by the written statement from the Supplier confirming that the product formulation complies with the original, previously approved formulation. Emulsified Tall Oil Pitch and asphalt-based emulsified products shall conform to the requirements listed in Table 952-Q and Table 952-R.

**Table 952-D: Penetration Grades of Group A Asphalt Cement**

REQUIREMENTS	PENETRATION GRADE ASPHALT CEMENT								ASTM TEST METHOD
	80 – 100		120 – 150		150 – 200		200 – 300		
	Min	Max	Min	Max	Min	Max	Min	Max	
Penetration at 25°C 100 g and 5 s, 0.1 mm	80	100	120	150	150	200	200	300	D5
<u>Minimum Viscosity at 60°C, Pa·s</u>	<u>150</u>	<u>115</u>	<u>91</u>	<u>70</u>	<u>70</u>	<u>50</u>	<u>50</u>	<u>31</u>	<u>D2171</u>
Flash Point, °C Cleveland Open Cup	230	---	220		220	---	175	---	D92
Thin Film Oven Test (TFOT) % Loss in Mass	---	0.80		0.85	---	1.3	---	1.5	D1754
Penetration of Residue at 25°C 100 g, 5 s, 0.1 mm, % of Original Penetration	55	---	47		50	---	45	---	D5, after TFOT.
Solubility in Trichloroethylene % by Mass	99.5	---	99.5		99.5	---	99.5	---	D2042
Ductility, 25°C 5 cm/min, cm	100	---			100	---	---	---	D113
Ductility, 15°C 5 cm/min, cm	---	---			---	---	100	---	D113

**Table 952-E: Performance Grades of Asphalt Cement**

PERFORMANCE GRADE ASPHALT CEMENT	PG 64-YY	PG 58-YY	PG 52-YY	AASHTO TEST METHOD
Min Low Temperature PG-YY	-22	-28	-34	M 320, Table 1
Requirements for Minimum Pavement Design Temperature °C PG-YY may be as specified in Special Provisions				R 29
Solubility in TCE min. %wt.	99.0	99.0	99.0	T 44
Flash, min. °C	230	230	230	T 48
DSRo,  G* /sin δ, min, kPa @ T°C	1.00 @ 64	1.00 @ 58	1.00 @ 52	T 315
Mass Change RTFOT, max ± %wt.	1.00	1.00	1.00	T 240
DSRr,  G* /sin δ, min, kPa @ T°C	2.20 @ 64	2.20 @ 58	2.20 @ 52	T 315
DSRp,  G* /sin δ, max, kPa @ T°C	5000 @ 25	5000 @ 19	5000 @ 13	T 315
BBR, m-value, min, @ T°C	0.300 @ -12	0.300 @ -18	0.300 @ -24	T 313
BBR, S, max, MPa @ T°C	300 @ 12	300 @ -18	300 @ -24	T 313
Dynamic Viscosity, max, Pa·s	3.00	3.00	3.00	T 316

**Table 952-F: Polymer Modified Asphalt Viscoelastic Properties**

Polymer Modified Asphalt PG Grade	Minimum R <sub>3.2@58°C</sub> per AASHTO T 350*
<u>58-24</u> <u>64-28</u>	<u>25%</u>
<u>58-37, 58-40</u> <u>64-34</u> <u>70-28</u>	<u>40%</u>
<u>64-37</u> <u>76-28</u>	<u>55%</u>

\* AASHTO T 350: Multiple Stress Creep Recovery (MSCR) Test of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)

**Table 952-G: Pen/Performance Grade Equivalence**

	PEN Grade (As specified in Table 952-D)			
	80/100A	120/150A	150/200A	200/300A
<b>Equivalent Performance Grade – PG</b> As specified in Table 952-E Min. Pavement design Temperature °C	PG 64-22	PG 58-28	PG 58-28	PG 52-34

**Table 952-H: Slow Curing Cutback Asphalt**

REQUIREMENTS	GRADE					
	SC – 70		SC – 250		SC – 3000	
	Min	Max	Min	Max	Min	Max
Flash Point, °C	65	---	80	---	105	---
Kinematic Viscosity at 60°C, mm <sup>2</sup> /s	70	140	250	500	3 000	6 000
Residue from Distillation to 360°C, volume % by difference	70	90	80	94	95	---
Distillation Residue, Kinematic Viscosity at 60°C, mm <sup>2</sup> /s	400	7 000	800	10 000	4 000	35 000
<b>ASPHALT RESIDUE:</b>						
Residue of 100 Penetration, % by Mass	50	---	60	---	80	---
Ductility of 100 Penetration residue at 25°C, cm	100	---	100	---	100	---
Solubility in Trichloroethylene % by mass	99.0	---	99.0	---	99.0	---
Water, % by Mass or Volume	---	0.5	---	0.5	---	0.5

**Table 952-I: Medium Curing Cutback Asphalt**

REQUIREMENTS	GRADE			
	MC – 30		MC – 250	
	Min.	Max.	Min.	Max.
Flash Point, °C	38	---	65	---
Kinematic Viscosity at 60°C, mm <sup>2</sup> /s	30	60	250	500
Distillation Test, % of Total Distillate to 360°C: to 225°C	---	25	---	10
Distillation Test, % of Total Distillate to 360°C: to 260°C	40	70	15	55
Distillation Test, % of Total Distillate to 360°C: to 315°C	75	93	60	87
Residue from Distillation to 360°C, volume % by difference	50	---	67	---
<b>PROPERTIES OF RESIDUE FROM DISTILLATION:</b>				
Penetration at 25°C, 100 g, 5 s, 0.1 mm	120	250	120	250
Ductility at 25°C, cm	100	---	100	---
Solubility in Trichloroethylene, % by mass	99.0	---	99.0	---
Water, %	---	0.2	---	0.2



**Table 952-J: Rapid Curing Cutback Asphalt**

REQUIREMENTS	GRADE					
	RC – 30		RC – 70		RC – 250	
	Min	Max	Min	Max	Min	Max
Flash Point, °C	---	---	---	---	27	---
Kinematic Viscosity at 60°C, mm <sup>2</sup> /s	30	60	70	140	250	500
Distillation Test, % of Total Distillate to 360°C: to 190°C	15	---	10	---	---	---
Distillation Test, % of Total Distillate to 360°C: to 225°C	55	---	50	---	35	---
Distillation Test, % of Total Distillate to 360°C: to 260°C	75	---	70	---	60	---
Distillation Test, % of Total Distillate to 360°C: to 315°C	90	---	85	---	80	---
Residue from Distillation to 360°C, volume % by difference	50	---	55	---	65	---
<b>TESTS ON RESIDUE FROM DISTILLATION:</b>						
Penetration at 25°C, 100 g, 5 s, 0.1 mm	80	120	80	120	80	120
Ductility at 25°C, cm	100	---	100	---	100	---
Solubility in Trichloroethylene, % by mass	99.0	---	99.0	---	99.0	---
Water, %	---	0.2	---	0.2	---	0.2

**Note:** The material shall not foam when heated to the spraying and mixing temperature range recommended by the Canadian General Standards Board

**Table 952-K: Cutback Asphalt Primer RM20**

REQUIREMENTS	Min.	Max.
Kinematic Viscosity at 60°C, mm <sup>2</sup> /s	20	35
Distillation Test, % of Total Distillate to 360°C: to 190°C	---	60
Distillation Test, % of Total Distillate to 360°C: to 225°C	40	---
Distillation Test, % of Total Distillate to 360°C: to 260°C	70	---
Distillation Test, % of Total Distillate to 360°C: to 315°C	85	---
Residue from Distillation to 360°C, volume % by difference	50	---
<b>TEST ON RESIDUE FROM DISTILLATION:</b>		
Penetration at 25°C, 100 g, 5 s, 0.1 mm	80	200
Ductility at 25°C, cm	100	---
Solubility in Trichloroethylene % by mass	99.0	---
Water, %	---	0.2

**Table 952-L: Requirements for Anionic Type Emulsions**

REQUIREMENT	TYPE OF EMULSION									
	RS – 1		RS – 2		MS – 2		SS – 1		CRACK FILLER	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Saybolt Furol Viscosity, at 25°C <sub>2</sub> Furol seconds	20	100	---	---	100	---	20	100	50	200
Saybolt Furol Viscosity, at 50°C <sub>2</sub> Furol seconds	---	---	75	300	---	---	---	---	---	---
Residue by Distillation, %	57	---	62	---	62	---	57	---	65	75
Settlement, 1 Day, %	---	1.5	---	1.5	---	1.5	---	1.5	---	1.5
Demulsibility: 50 mL of 0.1 N CaCl <sub>2</sub> , %	---	---	---	---	---	30	---	---	---	---
Demulsibility: 35 mL of 0.02 N CaCl <sub>2</sub> , %	60	---	60	---	---	---	---	---	30	---
Sieve Test, % Retained on 1 mm	---	0.10	---	0.10	---	0.10	---	0.10	---	0.10
Cement Mixing Test, %	---	---	---	---	---	---	---	2.0	---	---
<b>TESTS ON RESIDUE:</b>										
Penetration at 25°C, 100 g, 5 s	100	200	100	200	100	200	100	200	60	100
Solubility in Trichloroethylene, %	97.5	---	97.5	---	97.5	---	97.5	---	97.5	---
Ductility at 25°C, cm	60	---	60	---	60	---	60	---	60	---

**Table 952-M: Requirements for Cationic Type Emulsions**

REQUIREMENT	TYPE OF EMULSION			
	CRS – 1K		CRS – 2K	
	Min	Max	Min	Max
Saybolt Furol Viscosity at 50°C, Furol seconds	30	125	174	400
% Residue by Distillation	62	---	68	---
Settlement 1 Day, %	---	1.5	---	1.5
Sieve Test, % Retained on 1 mm Mesh	---	0.1	---	0.1
Oil Portion of Distillate, % of Total Volume	0	3	0	3
Particle Charge	POSITIVE		POSITIVE	
<b>TESTS ON RESIDUE</b>				
Penetration at 25°C, 100 g, 5 s	100	250	100	150
Solubility in Trichloroethylene, % by mass	97.5	---	97.5	---
Ductility at 25°C, cm	60	---	65	---

Table 952-N: Requirements for High Float Emulsified Asphalts

REQUIREMENT	GRADE														
	HF-100S		HF-150P HF -100P		HF-150S		HF-250S		HF-350S		HF-500M		HF-1000M		
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Residue by Distillation, % By Mass	62	---	64		62	---	62	---	65	---	65	---	65	---	
Oil Distillate, % By Volume	1	4	0.5	4	1	4	1	6	1.5	6	1	6	1	7	
Saybolt Furol Viscosity, @ 50°C, Furol seconds	35	150	35	120	35	150	35	150	75	400	50	---	50	---	
Sieve Test, % Retained on 1 mm Sieve	---	0.1	---	---	---	0.1	---	0.1	---	0.1	---	0.1	---	0.1	
Coating Test, %	90	---			90	---	90	---	---	---	---	---	---	---	
Settlement, 1 Day, % By Mass	---	1.5	---	---	---	1.5	---	1.5	---	1.5	---	1.5	---	1.5	
Demulsibility: 50 mL 5.55 g/L CaCl <sub>2</sub> , % By Mass	75	---	75		75	---	---	---	---	---	---	---	---	---	
Workability @ 10°C	---	---	---	---	---	---	---	---	---	---	---	---	Pass	---	
<b>TESTS ON RESIDUE</b>															
Penetration at 25°C, 100 g, 5 s	*	*	**	**	**	**	**	**	**	**	**	---	---	---	---
Viscosity at 60°C, Pa·s												8	20	2	8
Float Test at 60°C, s	120 0	---	120 0		120 0	---	120 0	---	120 0	---	120 0	---	120 0	---	
Solubility in Trichloroethylene, %	97.5	---			97.5	---	97.5	---	97.5	---	97.5	---	97.5	---	

\* See Drawing SP952-02

\*\* See Drawing SP952-03 or Drawing SP952-05

Note For HF-150P, penetration tests shall be conducted on residue which has been distilled to 201°C ± 5°C

**Table 952-O: Tall Oil Pitch Viscosity and Penetration Data**

REQUIREMENTS	Min.	Max.
<b>Results on Original Sample</b>		
Absolute Viscosity, 60°C, Pa·s	1	2
Kinematic Viscosity, 135°C, mm <sup>2</sup> /s	25	35
Penetration, 4°C/100g, 5 sec, 0.1 mm	150	250
<b>Results after Thin Film Oven</b>		
Loss in weight, %	---	0.65
Absolute Viscosity, 60°C, Pa·s	---	3
Kinematic Viscosity, 135°C, mm <sup>2</sup> /s	---	60
Penetration, 4°C, 100 g, 5 sec, 0.1 mm	75	---

**Table 952-P: Tall Oil Pitch Data**

REQUIREMENTS	ASTM TEST METHOD	Min.	Max.
Softening Point, °C	<u>D36</u>	---	35
Flash Point, Cleveland Open Cup, °C	<u>D92</u>	250	---
Fire Point, Cleveland Open Cup, °C	<u>D92</u>	275	---
Boiling Point, °C		320	---
Specific Gravity		0.94	0.98
Vapour Pressure, mm Hg		---	1
pH		3.75	4.25
Wood Extractive, %		98	---
Ash, %	<u>D803</u>	---	0.8
Moisture, %	<u>D803</u>	---	0.1
Fatty Acids, %		7	9
Resin Acids, %		5	7
Unsaponifiables, %		39	44
Neutrals, %		42	46
Acid Number		20	30

**Table 952-Q: Emulsified Tall Oil Pitch**

REQUIREMENTS	Min.	Max.
Viscosity, <u>Saybolt Furol</u> , 25°C, <u>Furol seconds</u>	10	30
Residue by Distillation, % by weight	40	---
Oil Distillate, % by volume	---	0.1
Settlement 24 hrs, %	---	1.5
pH	6	8
Particle Charge	Negative	
Miscibility with Water	Pass	
Specific Gravity, 20°C	Approx. 1.0	
Boiling Point, °C	100	
Freezing Point, °C	0	
Vapour Pressure, mm Hg	20	
Odour and Appearance – distinctive resinous odour, light yellow colour		
<b>TEST ON RESIDUE</b> – Shall conform to the requirements for Tall Oil Pitch listed in <u>Table 952-O</u>		

**Table 952-R: Emulsified Products**

REQUIREMENTS	Min.	Max.
Viscosity, <u>Saybolt Furol</u> , 25°C, <u>Furol seconds</u>	10	60
Residue by Distillation, % by weight	40	---
Oil Distillate, % by Volume	---	5
Settlement 24 hrs, %	Pass	
Miscibility with Water	Pass	
<b>TEST ON RESIDUE</b>		
Penetration, 25°C, 100 g, 5 sec, 0.1 mm	40	200

APPENDIX 952-A

The following data is required from the Supplier.

**PEN GRADED ASPHALT CEMENTS****Grade and Type (when required)****A. Original Asphalt**

Anti-stripping agents (if any) – provide product name and dosage rate.

Density @ 15°C, kg/L

- Viscosity @ 135°C
- Viscosity @ 60°C
- Penetration @ 25°C, 100 g/5 s
- Solubility in Trichloroethylene
- Ductility @ 25°C
- Flash Point C.O.C.
- % Retained Penetration after T.F.O.T. @ 25°C

**B. Residue After T.F.O.T. (when Type A required)**

- Penetration @ 25°C
- Penetration @ 10°C
- Penetration @ 4°C

*NOTE: Viscosity – Temperature chart also required for each batch.*

**PERFORMANCE GRADED CEMENTS****A. Original Asphalt**

Anti-stripping agents (if any) – provide product name and dosage rate.

- Density @ 15°C, kg/L
- Viscosity @ 135°C
- Solubility in Trichloroethylene
- Flash Point
- Stiffness, DSRo
- Mass Change
- Stiffness, DSRr
- Stiffness, DSRp
- BBR m-value
- BBR Stiffness.

**CUTBACK ASPHALTS****A. Cutback Asphalts as Supplied**

- Flash Point, T.O.C. (C.O.C. above 79°C)
- Density @ 15°C, g/cm<sup>3</sup>
- Viscosity @ 60°C, mm<sup>2</sup>/s
- Distillate, % by volume of Total
  - Distillate to 360°C
  - Distillate to 190°C
  - Distillate to 225°C
  - Distillate to 260°C
  - Distillate to 315°C
- Residue from Distillation to 360°C
- Volume % by Difference

**B. Properties of Residue**

- Penetration @ 25°C
- Ductility @ 25°C
- Solubility in Trichloroethylene, %

**C. Residue of 100 Penetration by Mass**

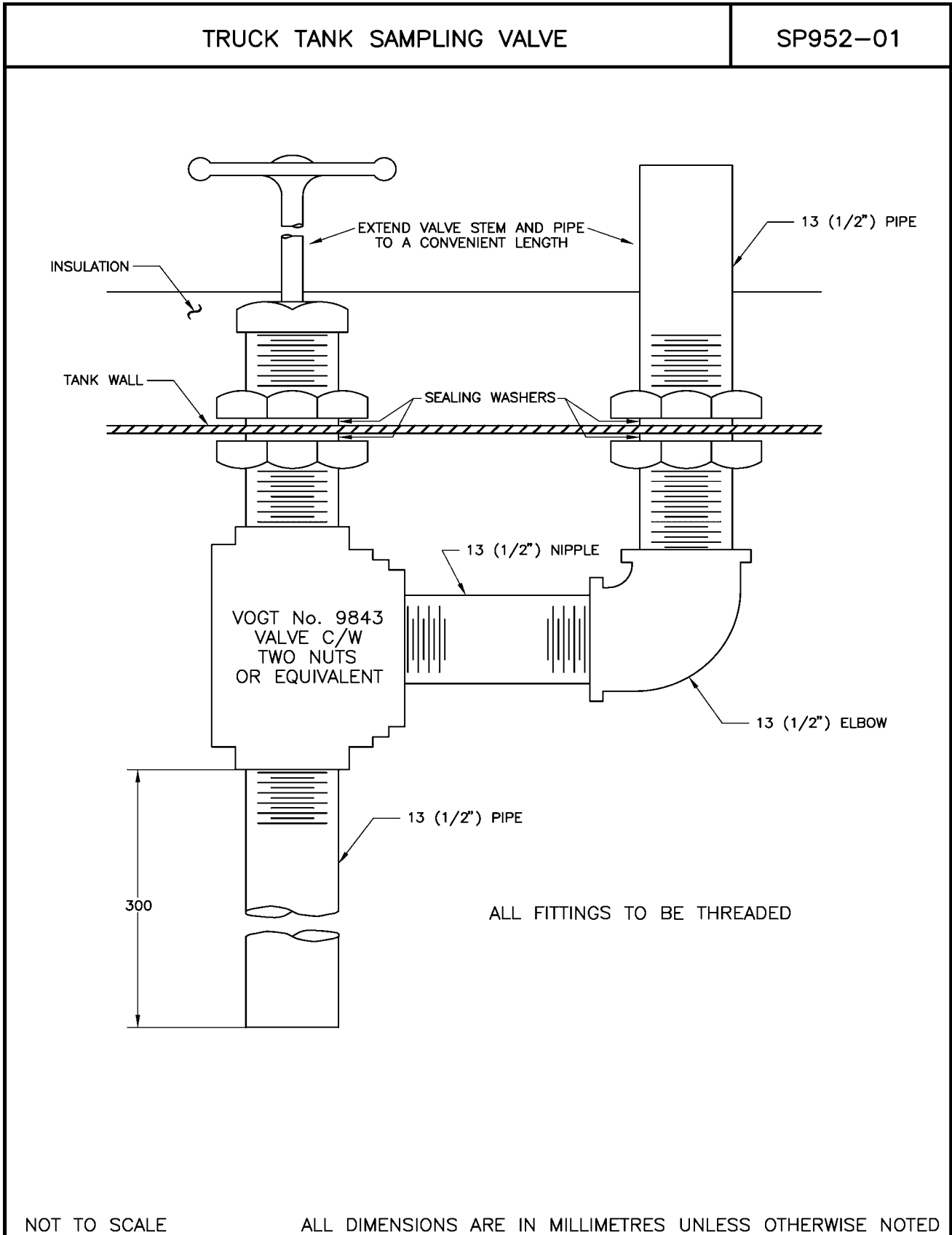
- Ductility of 100 Penetration at 25°C, cm

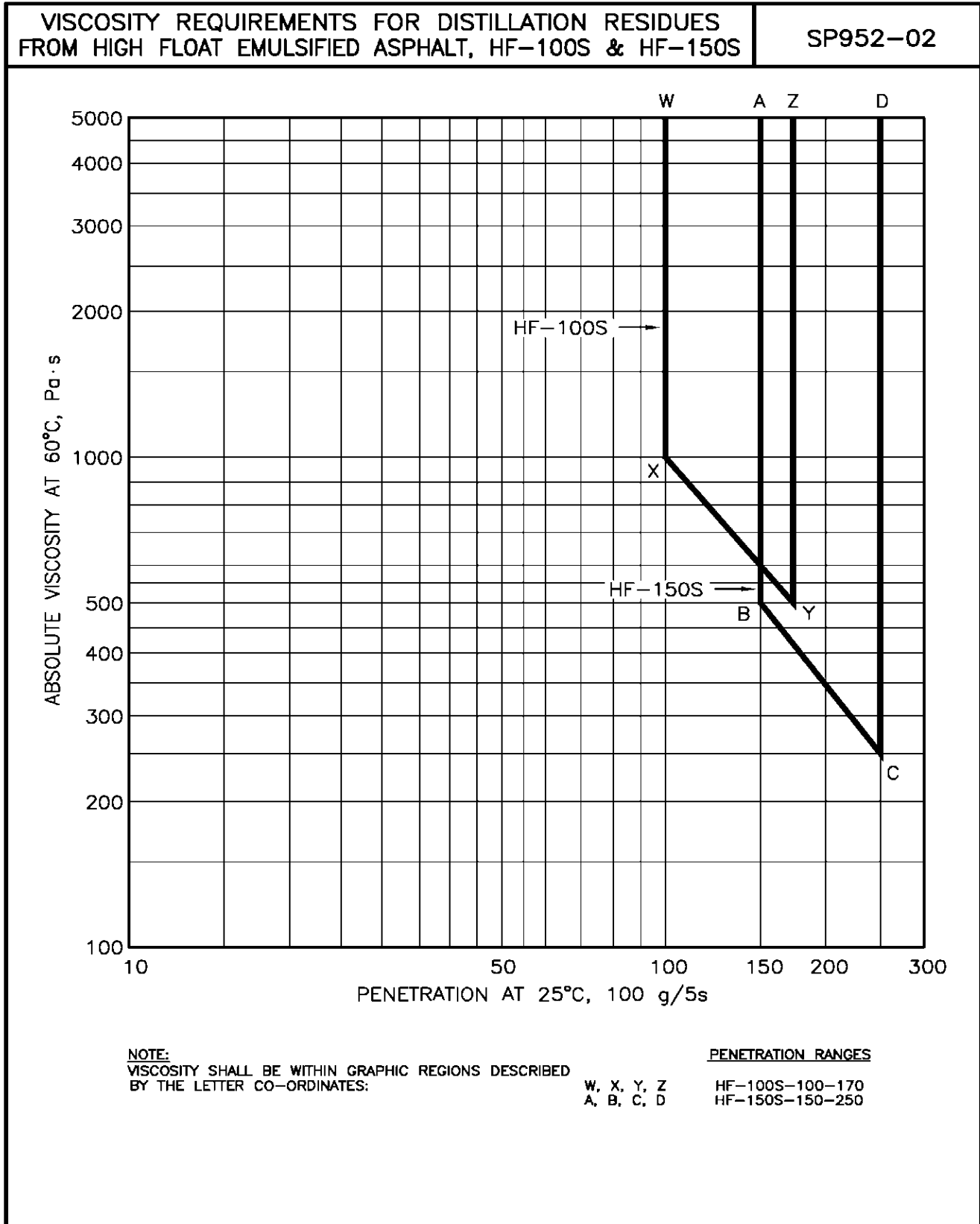
**EMULSIONS****A. Original Emulsion**

- Saybolt Furol Viscosity @ 25°C
- Saybolt Furol Viscosity @ 50°C
- % Residue by Distillation
- Settlement in 5 Days, %
- Oil Portion of Disillate
- % to Total Volume

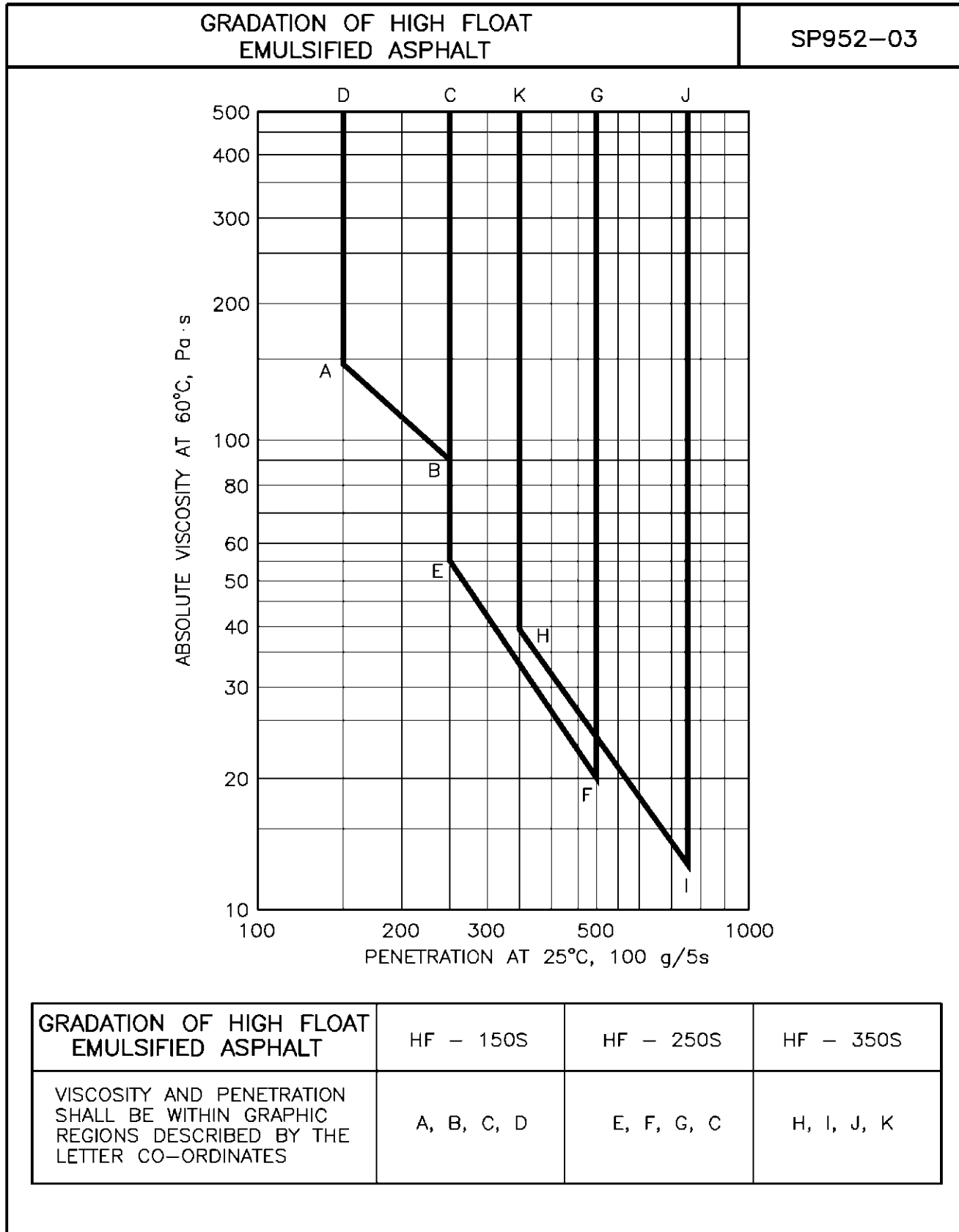
**B. Tests on Residue**

- Float Test @ 60°C, s
- Penetration @ 25°C, 100 g/5 s
- Ductility @ 25°C

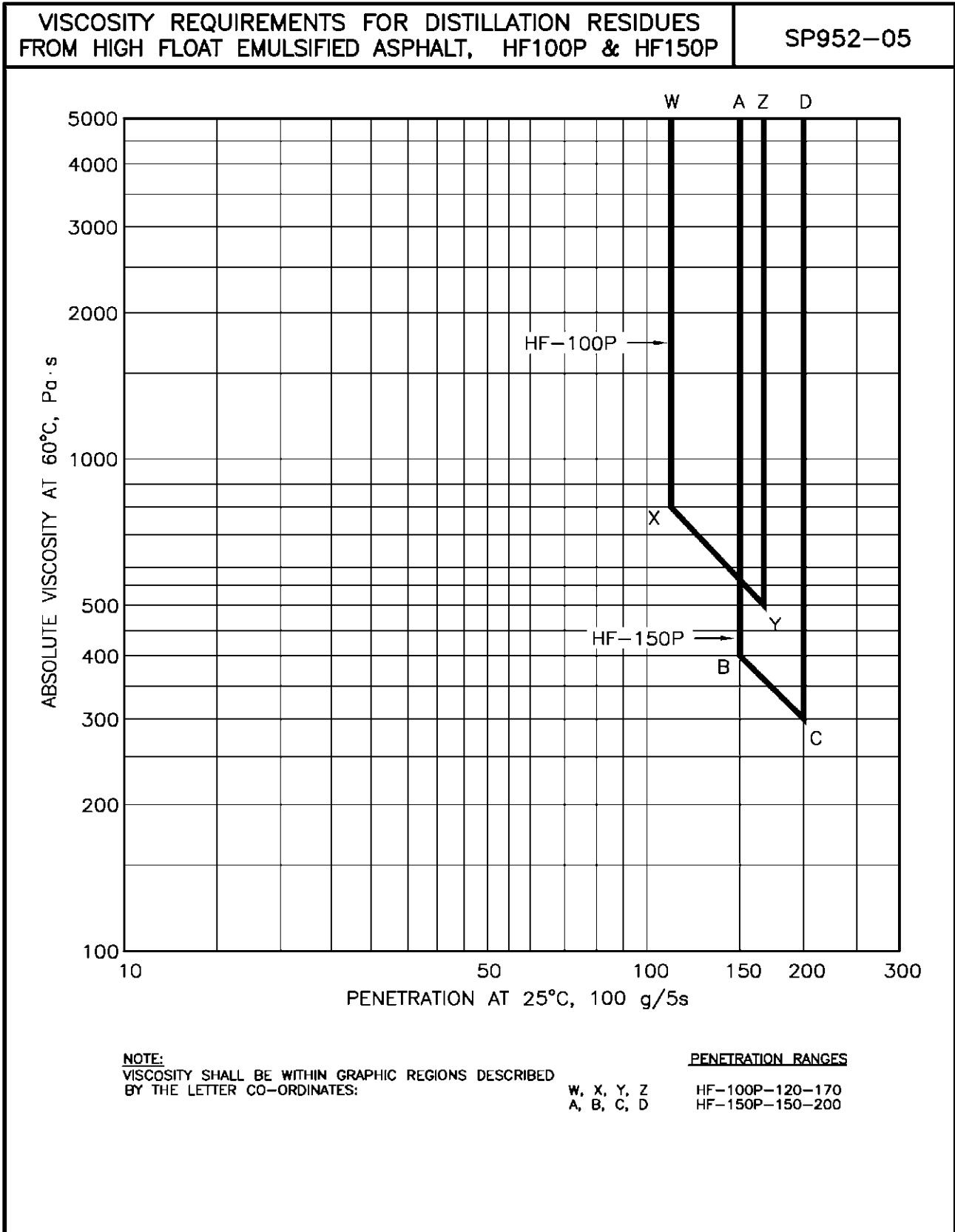








SP952-04  
INTENTIONALLY DELETED.



## SECTION 991

### CALCIUM CHLORIDE AND SODIUM CHLORIDE

**991.01 Calcium Chloride** – Calcium chloride, for highway purposes, shall conform to ASTM D98. It shall be supplied as:

- Type I Regular (77%) bulk (flake) or sacked; or
- as liquid at 35% solution concentration,

as specified in the Contract or purchase order.

**991.02 Sodium Chloride** – Sodium chloride, for highway purposes, shall conform to ASTM D632 but it shall be supplied within the gradation shown in Table 991-A.

**991.03 Chemical Contamination of Road Salt** – When applied as specified, the de-icing chemicals shall not contain substances that exceed the current environmental guidelines, Provincial or Federal, and shall not cause harm to flora and fauna.

*Note: ASTM specifications are available through:*  
<https://www.astm.org/Standard/standards-and-publications.html>

**Table 991-A: Gradation for Sodium Chloride**

Screen Size (mm)	% Passing
12.0 (1/2")	100
9.00 (3/8")	90 – 100
4.75 (#4)	35 – 85
2.40 (#8)	15 – 55
1.20 (#16)	5 – 30
0.600 (#30)	0 – 10