CITY OF NANAIMO

MANUAL OF ENGINEERING STANDARDS & SPECIFICATIONS

CITY OF NANAIMO
THE HARBOUR CITY

Edition No. 15
(REVISED JUNE 2026)

ENGINEERING STANDARDS & SPECIFICATIONS
INTRODUCTION

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INTRODUCTION

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0.01 INTRODUCTION

.1 This Manual of Engineering Standards & Specifications (MoESS), also referenced as Schedule A in the *Subdivision and Development Servicing Bylaw*, reflects the design requirements, material specifications, and installation requirements for Municipal Works constructed in the City of Nanaimo. For a list of acceptable products for installation within the City of Nanaimo, refer to the City of Nanaimo Approved Products List []. *(REVISED JUNE 2026)*

.2 This Manual is intended for use by City Engineering, Public Works, Parks and Recreation Department employees; Qualified Professionals, working for the City of Nanaimo; private developers and others doing work in the City. *(REVISED JUNE 2026)*

(a) The majority of Manual users are registrants governed by the *Professional Governance Act* (PGA) along with their respective professional regulatory bodies, who are working with a Professional of Record. *(REVISED JUNE 2026)*

.3 The Manual is divided into fourteen (14) sections.

(a) Section 1 covers General Drafting Requirements and provides standards for design drawings, record drawings, certification of installed works and design in statutory rights-of-way, etc. *(REVISED JUNE 2026)*

(b) Section 2 covers the General Definitions and References for the manual, followed by General Requirements covered in Section 3.

(c) Section 4 covers excavation, trenching and backfill as it applies to the installation of underground utilities such as water, sanitary sewer and storm sewer lines, and private utilities installed within statutory rights-of-way and road right-of-way. *(REVISED JUNE 2026)*

(d) Sections 5, 6 and 7 deal with standards for water, sanitary sewer, storm sewer.

(e) Section 8 deals with standards for transportation infrastructure. Section 9 covers standards for the roadway structure, the aggregates and granular materials required. Section 10 deals with standards for roadway lighting and traffic signals.

(f) Sections 11 and 12 deal with information on requirements for cast in place concrete works as well as asphaltic concrete paving.

(g) Section 13 deals with surface treatments, for use in road rights-of-way.

(h) Section 14 covers standards for landscaping in City streets, including required maintenance.

.4 The sections on water, sanitary sewer, storm sewer, transportation, roadway lighting and traffic signals are divided into three basic parts under the following sub-headings:

(a) Design Criteria.
(b) Specifications.
(c) Installation.

.5 Individually, these sub-headings have a numbering sequence common to each section. Each sub-section or sub-heading has a block of numbers reserved and applied to it.

.6 The numbers which have been reserved for each sub-section and which would be preceded by the applicable section number are as follows:

(a)	Design Criteria	.00 to .19
(b)	Specifications	.20 to .39
(c)	Installation	.40 to .69

.7 With this method of numbering, the numbering sequence is not continuous from sub-section to sub-section. Some sub-sections do not use all the numbers allotted to them.

0.02 APPLICATION OF THE STANDARDS

.1 The Manual of Engineering Standards & Specifications (MoESS) applies to City of Nanaimo capital projects, works within statutory rights-of-way and dedicated road rights-of-way and works taken over by the City of Nanaimo related to private development. ***(REVISED JUNE 2026)***

(a) In the context of subdivisions, this document is Schedule A in the *Subdivision and Development Servicing Bylaw*, the associated Works must be in compliance with the bylaw. ***(REVISED JUNE 2026)***

(b) In other applications, there are sections of the Manual where the contracts, designs and construction of the works within the scope of the Manual are to comply with the intent of the Manual and be in conformance to the Design, Specification and Installation Requirements. ***(REVISED JUNE 2026)***

(c) Non-conformance from the requirements of the Manual must be documented and requires approval from the City Engineer. ***(REVISED JUNE 2026)***

(d) Portions of the MoESS may apply to private property infrastructure where it is a requirement of a service being provided by the City such as, but not limited to, the requirement for cross connection control, standards for private fire hydrant installation, and stormwater management infrastructure. ***(REVISED JUNE 2026)***

.2 Where "approval" is required by this Manual, such approval shall mean written approval granted by the City Engineer unless otherwise specified. All submissions requesting approval by the City Engineer shall be prepared and submitted by the Professional of Record and shall include all applicable drawings, specifications, calculations, product information and other supporting documentation. Review or approval by the City Engineer shall not relieve the Contractor, the Consultant or the Professional Engineer of responsibility for the accuracy, completeness, coordination, or compliance with this Manual of the design, design drawings or the Works.***(REVISED JUNE 2026)***

.3 For the definition of terms used within the Manual, refer to Section 2.01 – Defined Terms []. ***(REVISED JUNE 2026)***

.4 For the list of products acceptable for the design within the scope of the Manual, please refer to the City of Nanaimo Approved Products List. ***(REVISED JUNE 2026)***

(a) The Approved Product List does not imply automatic approval as a product substitution for a contract specified product. Product substitution is subject to the approval by the City Engineer. ***(REVISED JUNE 2026)***

.5 Where the users of this Manual have any doubt as to the meaning or interpretation of any part of the Manual, they are advised to contact Engineering Department (MoESS@nanaimo.ca). ***(REVISED JUNE 2026)***

.6 Reference documents that commonly apply to Works are located as reference resources accessible on the public website that is periodically updated. ***(REVISED JUNE 2026)***

.7 For proposed works not covered by the requirements of the Manual, supplementary specifications, product information or other supporting documentation are to be submitted by the Professional of Record for approval by the City Engineer. ***(REVISED JUNE 2026)***

0.03 REQUESTS FOR CHANGES TO THE STANDARDS

ENGINEERING STANDARDS & SPECIFICATIONS
INTRODUCTION

.1 Suggestions for changes to the Manual of Engineering Standards & Specifications are welcomed and are to be directed to the Engineering Department (MoESS@nanaimo.ca). ***(REVISED JUNE 2026)***

.2 Requests for change are to include the number of the section and clause for which a change is requested; suggested new wording and an explanation of the reason for the requested change. ***(REVISED JUNE 2026)***

.3 Requests for change are to include red lined mark-ups of the written specifications or standard drawings that are relevant to the suggested change. ***(REVISED JUNE 2026)***

.4 Changes are considered at the next update of the Manual, following due process. ***(REVISED JUNE 2026)***

0.04 AMENDMENTS TO STANDARDS

.1 The Manual of Engineering Standards & Specifications are reviewed on a regular basis and amendments issued accordingly. ***(REVISED JUNE 2026)***

.2 Amendments and clarifications are published to the City of Nanaimo's website. ***(REVISED JUNE 2026)***

.3 For the use of the copy holder, an Amendment Record Sheet has been included at the back of the Manual.

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DESIGN DRAWING STANDARDS

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Ornamental Street Lighting Traffic Control Signals, Hydro, Phone, Gas and Cablevision Fibre Optics (Commercial and Private)	1.07 [↓]
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SECTION 1 – GENERAL DRAFTING REQUIREMENTS
DESIGN DRAWING STANDARDS

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SECTION 1 – GENERAL DRAFTING REQUIREMENTS
DESIGN DRAWING STANDARDS

DESIGN DRAWINGS STANDARDS

1.01 GENERAL REQUIREMENTS

.1 A complete set of construction drawings consists of separate drawings, of some or all, of the following as determined by the City Engineer: ***(REVISED JUNE 2026)***

(a) Site plan and key plan
(b) Plan and profile for roadways, drainage and storm sewers ***(REVISED JUNE 2026)***
(c) Plan and profile for sanitary sewers and watermains
(d) Plan and profile for sanitary and storm sewers for common trench designs
(e) Plan of proposed street lighting, hydro, telephone, cablevision and gas
(f) Plan of proposed signage and pavement markings
(g) Plan of proposed landscaping and irrigation
(h) Plan of proposed sanitary sewer tributary area plan
(i) Plan of proposed storm sewer tributary area plan
(j) Tree Management Plan
(k) Additional plans showing the proposed site grading plan, stormwater management plan
(l) Additional plans showing any special details and cross sections

.2 Maximum drawing size is Arch D (24 in x 36 in; 610 mm x 915 mm). ***(REVISED JUNE 2026)***

.3 All drawings must be metric. Drawing scales and scale bars are to be shown on all drawings. ***(REVISED JUNE 2026)***

.4 The drawings are neat and legible, with adequate clearance margins between the drawing information and the title block border. Notes and text describe the proposed work in sufficient detail to facilitate construction. Limits of construction and match lines are clearly marked on the drawing. ***(REVISED JUNE 2026)***

.5 North arrow must be shown for every plan on a drawing, and located at the upper left or right of the corresponding plan. ***(REVISED JUNE 2026)***

.6 All text to be vertical upper case lettering. The minimum height of lettering for proposed work is 2.5-mm and for existing structures is 1.80-mm. Avoid overlaps of annotation elements such as symbols, dimensions and text. ***(REVISED JUNE 2026)***

.7 Construction notes are to be boxed and located around the perimeter of the drawing, tagged to the drawing feature. ***(REVISED JUNE 2026)***

.8 All elevations shown on drawings must be metric geodetic datum. The source and location of the datum must be clearly noted on each drawing in the general notes. Refer to Section 1.42 - Coordinate System [→]. *(REVISED JUNE 2026)*

.9 The drawing title block includes the following information: *(REVISED JUNE 2026)*

(a) Project Name
(b) Project Location
(c) Drawing Title
(d) Consulting Company Name or Logo
(e) City of Nanaimo Logo
(f) Drawing Scale and scale bar *(REVISED JUNE 2026)*
(g) City of Nanaimo Engineering File Number
(h) BP Number, DP Number and SUB Number
(i) City of Nanaimo Drawing Number
(j) Revision
(k) Professional of Record Authentication (Name, Seal, Signature and Date) *(REVISED JUNE 2026)*
(l) Firms Permit to Practice number *(REVISED JUNE 2026)*

.10 Standard details, such as manholes, catch basins, hydrants, and similar appurtenances, that comply with the City Standard Drawings, are annotated with the applicable drawing numbers. Standard symbols for the various utilities, as shown on Standard Drawing No.'s G-4 to G-4I [], and Standard Drawing No. G-3 - Standard Materials and Hatch Patterns [], are to be used and may be shown in a legend on the drawings. *(REVISED JUNE 2026)*

.11 All drawings must bear the authentication of the Professional of Record responsible for the design. *(REVISED JUNE 2026)*

.12 Numerical values shown on the Construction drawings are to be shown to two (2) decimal places unless accuracy warrants otherwise. *(REVISED JUNE 2026)*

1.02 SITE PLAN AND KEY PLAN

.1 The Site Plan of the construction works scale is 1:1000 or larger. *(REVISED JUNE 2026)*

.2 The Site Plan includes but is not limited to the following: *(REVISED JUNE 2026)*

(a) existing watercourses
(b) pavement, curbs
(c) ditches, culverts, storm sewers, manholes, temporary cleanouts, inlet/outlet structures and catch basins
(d) sanitary sewers, manholes, temporary cleanouts
(e) watermains, valves, hydrants, PRV stations, air valves, flushouts
(f) all pertinent property, right-of-way and easement lines

(g) road allowance and easement dimensions
(h) lot numbers and existing legal plan numbers
(i) street addresses
(j) one metre contour lines for slopes greater than 10% existing and proposed
(k) power and telephone and street light poles
(l) plan and profile drawings reference numbers
(m) gas mains, underground hydro, telephone, street lights and cable and their related appurtenances
(n) survey control monuments
(o) routing of all major storm flow including the 1:100 AEP (1% AEP) storm event *(REVISED JUNE 2026)*

.3 A Key Plan to a small scale, (e.g., 1:10,000), showing the location of the works in relation to major streets, is positioned in the upper right-hand section of the drawing sheet. *(REVISED JUNE 2026)*

.4 A drawing index includes the drawings titles, sheet numbers, and the City drawing number. *(REVISED JUNE 2026)*

.5 The following notes are shown on either the site plan or the first drawing of the set: *(REVISED JUNE 2026)*

(a) "All work and materials are as described in the City of Nanaimo manual of 'Engineering Standards & Specifications' or as otherwise approved by the City Engineer." *(REVISED JUNE 2026)*
(b) "Connection to, or alteration of, existing City-owned utilities, requires authorization by the City Engineer."
(c) "A 'Permit to Install Works Within Streets, Lanes and City Property Areas', will be required where construction is to be undertaken in City of Nanaimo right-of-ways and/or on City of Nanaimo owned utilities or properties."
(d) "Upon approval of the permit the City of Nanaimo's Engineering Construction Branch must be notified forty-eight (48) hours prior to commencement of work." *(REVISED JUNE 2026)*
(e) "Contractor is to comply with all applicable Ministry of Forests, Ministry of Land, Water, and Resource Stewardship and Fisheries and Oceans Canada requirements at all times during construction. *(REVISED JUNE 2026)*

1.03 PLAN AND PROFILE DRAWINGS - GENERAL

Each Plan and Profile drawing shows, but not be limited to, the following information: ***(REVISED JUNE 2026)***

.1 Drawings are to be to the following scales unless otherwise approved: ***(REVISED JUNE 2026)***

Horizontal -	1:250 for all drawings except; 1:500 for single utility drawings only
Vertical -	1:50 for drawings with plan view scale of 1:250 1:100 for drawings with plan view scale of 1:500
Note: In areas of steep slope, the standard 5x vertical can be reduced to 2.5x exaggeration for clarity. ***(REVISED JUNE 2026)***	

.2 All cadastral information including property, right-of-way and easement lines and dimensions, is shown in sufficient detail to relate design to surrounding and adjacent properties. This information is included on all drawing submissions. ***(REVISED JUNE 2026)***

.3 Legal descriptions and civic addresses of existing properties.

.4 Road dedication allowance dimensions. ***(REVISED JUNE 2026)***

.5 Existing pavement, curbs, sidewalks, ditches, driveways, lanes, retaining walls, buildings, trees and shrubs within the right-of-way. Note significant trees on and within 5 metres of the right-of-way.

.6 All existing underground and surface utilities and services are to be labeled with (material type and elevation) including but not limited to the following: ***(REVISED JUNE 2026)***

(a) sanitary sewers, storm sewers, watermains and appurtenances
(b) street light poles, conduit and appurtenances
(c) hydro poles and underground wiring ducts and appurtenances
(d) telephone poles, underground wiring ducts and appurtenances and fibre optic cables
(e) gas mains and appurtenances
(f) cable television ducts and appurtenances
(g) traffic control devices, poles, conduits, signs and painting
(h) irrigation systems

.7 All relevant topographic information. For slopes greater than 10 percent, one (1) metre contour lines are required. ***(REVISED JUNE 2026)***

.8 Right-of-way and/or roadway centerline stationing are metric standards (0+000) at 20 metre intervals and related geometrically to legal property lines or survey monuments. Stationing runs left to right where possible and upstream on gravity pipes. *(REVISED JUNE 2026)*

.9 Plan and Profile drawings must be drawn with the profile on the bottom of the drawing sheet and be lined up under the plan. Utility and roadway stationing, inverts, diameter, material type, class and grade information must be located across the bottom of the profile. *(REVISED JUNE 2026)*

.10 Profile elevations are to be placed at both sides of the profile. Split profiles must show elevations on both sides of the break. The number of split profile views are to be limited to two per drawing sheet, only when necessary. This applies to all drawings. *(REVISED JUNE 2026)*

1.04 ROADS

In addition to Section 1.03 [→], the following information is required: *(REVISED JUNE 2026)*

.1 All proposed works, complete with existing elevation tie-in points and offsets from roadway centerline, including: pavement, curbs, sidewalks and poles. *(REVISED JUNE 2026)*

.2 Stations of the beginning of curve (BC) and end of curve (EC) of roadway centerline and curb return horizontal curves together with the curve information including delta angle, radius, tangent length and arc length. *(REVISED JUNE 2026)*

.3 Details of intersections with spot elevations at all critical points including grades and elevations of curb returns.

.4 Catch basin rim elevations and locations related to roadway centerline stationing. *(REVISED JUNE 2026)*

.5 Existing ground profile and finished pavement profile along the pavement centerline with elevations at 20 metre intervals.

.6 Crossfall or crown information with gutter elevations at change points.

.7 Proposed roadway centerline grade. *(REVISED JUNE 2026)*

.8 Stations and elevations of beginning of vertical curve (BVC), end of vertical curve (EVC) and vertical point of intersection (VPI). *(REVISED JUNE 2026)*

.9 Vertical curve information including the radius, length of curve and sag or crest K value.

.10 Elevations along the vertical curve at ten (10) metre intervals.

.11 Elevation and station of low and high spots of vertical curves.

.12 Where the slope of existing ground is greater than 10% across the right-of-way, cross-sections are to be shown at intervals not exceeding twenty (20) metres. ***(REVISED JUNE 2026)***

.13 Where there is an elevation difference of more than 1.2 m from the design roadway centerline to a suitable building site on the adjacent parcel, driveway grades and profile are to be shown the drawings. ***(REVISED JUNE 2026)***

.14 Where only a half road is being constructed, the full width design cross-sections is required to ensure the design suits the future development of adjacent properties. ***(REVISED JUNE 2026)***

.15 Typical street cross-section shows the right-of-way width, proposed roadway design structure, pavement width, sidewalks, curbs, underground utilities, hydro, power and street light poles, hydrants and their related offsets. ***(REVISED JUNE 2026)***

.16 Additional design details as required.

1.05 STORM AND SANITARY SEWERS

In addition to Section 1.03 [→], the following information is required: ***(REVISED JUNE 2026)***

.1 Include common trench designs on the same construction drawing.

.2 All proposed storm and sanitary works including manholes, drop pipes, temporary cleanouts, catch basins, inlet/outlet structures, pipe work, ditches, culverts, inspection chambers, services and wyes, complete with offsets for mains, rim elevations, stations related to the roadway centerline, and pipe inverts at manholes and pipe grad breaks. ***(REVISED JUNE 2026)***

.3 Existing ground profile and finished ground profile along the centerline of the proposed sewer.

.4 Distance between manholes with proposed grade of pipe.

.5 Stations and elevations of the BC, and EC of all horizontal curves with the curve information including radius and arc length.

.6 Stations and elevations of the BVC, EVC, and VPI of all vertical curves with the curve information including the length of vertical and maximum pipe deflection. Elevations along vertical curves at the (10) metre intervals.

.7 Existing and proposed pipe crossings to be shown in profile and to include pipe size, type and invert. (example: EX 200 dia. AC WTR; INV:101.11)

.8 For proposed service connections, the offset location referenced to property line and invert elevation at the property line. Offset distance to include prefix "S" for sanitary and "D" for storm, (i.e. S 2.4m or D 3.0m). Reference Standard Drawing No. T-7, Section 4.0 []. Service inverts are to be in a table. ***(REVISED JUNE 2026)***

.9 Location of existing buildings on properties served by storm and sanitary sewers.

.10 Basement elevations for existing buildings.

.11 For storm, the profile shows the hydraulic grade line for the minor system and major system, and minimum elevation for habitable area. The plan view shows the overland flow path, if applicable. ***(REVISED JUNE 2026)***

.12 The design flow and Annual Exceedance Probability (AEP) are to be noted on each storm drawing. ***(REVISED JUNE 2026)***

.13 Material, type, size, inverts and flow direction to be shown for all proposed and existing culverts.

.14 Additional design details as required.

1.06 WATERWORKS

In addition to Section 1.03 [→], the following information is required: ***(REVISED JUNE 2026)***

.1 For new construction, all proposed waterworks attributes including size, type and class of pipe, hydrants, valves, joint restraints, fittings and all related appurtenances with offsets and stationing related to roadway centerline. For all rehabilitation, all proposed waterworks as stated above, are shown with offsets and stationing related to the centerline of pipe alignment. ***(REVISED JUNE 2026)***

.2 Locations of proposed service connections including an offset distance from an iron pin or lot corner. Offset distance to include the prefix "W", (i.e. W 1.2 m).

.3 Existing ground profile and finished ground profile, and invert profile along the centerline of the proposed watermain.

.4 All other pertinent service crossings to be shown in profile (e.g., sewer mains, gas mains, etc.).

.5 Extent of work required in making the connection to existing watermains.

.6 If the proposed watermain alignment or profile varies from the roadway centerline, the following details are provided: ***(REVISED JUNE 2026)***

(a) stations of the BC and EC of horizontal curves together with curve information including delta angle, radius, tangent length and arc length.

(b) stations and elevations of the BVC, EVC, AND VPI of vertical curves together with curve information including curve length and maximum pipe deflection required.

(c) elevations along vertical curves at (10) metre intervals.

(d) proposed grades.

.7 Pipes requiring joint restraints are to be shaded, labeled and dimensioned from adjacent fitting showing the length of pipe requiring restraint. ***(REVISED JUNE 2026)***

.8 Additional design details as required.

1.07 ORNAMENTAL STREET LIGHTING, TRAFFIC CONTROL SIGNALS, HYDRO, PHONE, GAS AND CABLEVISION FIBRE OPTICS (COMMERCIAL AND PRIVATE)

.1 In addition to Section 1.03 [→], the following information is included for the plan view: ***(REVISED JUNE 2026)***

(a) pole, conduit and appurtenances locations with offsets and stationing related to roadway centerline. ***(REVISED JUNE 2026)***

(b) size, type, class of conduits.

(c) schematics of wiring details for street lights and traffic signals.

(d) details of detector loops, the location of the power source and all other wiring circuits on traffic signals.

.2 Street lights are to be numbered and pertinent information, (i.e. wattage, lamp type, pole height and location including coordinates as per Section 1.42 - Coordinate System [→]) are to be shown as per Standard Drawing No. G-7 []. ***(REVISED JUNE 2026)***

.3 The plan scales are 1:1000, 1:500, or 1:250. ***(REVISED JUNE 2026)***

.4 Traffic signal drawings generally conform to Section 10.02 - Traffic Signals []. ***(REVISED JUNE 2026)***

1.08 SIGNAGE AND PAVEMENT MARKINGS

.1 A separate plan is prepared in all cases for signage and pavement markings. This plan details all eradications, alterations, additions and new regulatory and advisory signage and line painting. The design conforms to the ***Manual of Standard Traffic Signs and Pavement Markings*** or the ***Manual on Uniform Traffic Control Devices*** (MUTCD). The following items are shown: ***(REVISED JUNE 2026)***

(a) Lane widths, median radii and taper ratios.

(b) Dimensioned location and type of new or relocated signs.

(c) Completed Traffic Sign Table as per Standard Drawing No. G-7 [].

.2 The plan scales are 1:500 or 1:250. ***(REVISED JUNE 2026)***

.3 For drawing clarity, show curb locations only. Do not show utilities, legal information or addresses.

1.09 DETAIL SHEETS

.1 Where there is not a sufficient room on the plan and profile drawings, design details for the particular drawing may be provided on a separate sheet.

.2 Scale is determined by the designer to suit the design detail, and included for each detail. ***(REVISED JUNE 2026)***

.3 Where street cross-sections are required they may be provided on a separate sheet. ***(REVISED JUNE 2026)***

1.10 CROSS-SECTIONS

.1 Cross-section scale is 1:100 horizontal to 1:20 vertical (5:1 vertical exaggeration) or 1:100 horizontal to 1:50 vertical (2:1 vertical exaggeration) in steep slope situations. ***(REVISED JUNE 2026)***

.2 Starting at the lower left hand corner of the drawing sheet, cross-sections are to be placed up the sheet in order of increasing stationing. Grid elevations are to be shown at the left hand side of each cross-section and stationing are to be shown above each cross-section. Provide adequate space between cross-sections to ensure clarity. ***(REVISED JUNE 2026)***

.3 Cross-sections include: ***(REVISED JUNE 2026)***

(a) Design street cross-section within the right-of-way. ***(REVISED JUNE 2026)***

(b) Existing ground cross-section extending into the adjacent properties as required.

1.11 LANDSCAPE AND IRRIGATION PLAN PREPARATION

.1 All landscape related construction drawings and inspections required under this Section must be undertaken by a Landscape Architect registered with the British Columbia Society of Landscape Architects (BCSLA). ***(REVISED JUNE 2026)***

.2 The landscape architect must coordinate the landscape design within the street right-of-way with existing or proposed landscape on private property fronting the road, so as avoid over planting or conflicts with sight distance, existing trees or buildings. ***(REVISED JUNE 2026)***

.3 In addition to Section 1.03 [→], the following information is to be included: ***(REVISED JUNE 2026)***

(a) Sight distance triangles at intersections.

(b) Proposed slopes steeper than 3:1 to be indicated with slope direction arrow and slope ratio, contours and/or top and bottom of slope lines and elevations.

(c) Proposed tree locations showing trunk center and approximate canopy spread at 15 years age.

(d) Location of all shrub, groundcover beds, grass areas and replacement trees required as per the *Management and Protection of Trees Bylaw*.

(e) Extent of proposed decorative paving and/or street furnishings.

(f) Plant labels and an associated plant list which indicates quantity, scientific name, common name, plant size, condition (e.g. container or B&B), spacing, and comments.

(g) Identify any replacement trees required as per the *Management and Protection of Trees Bylaw*.

.4 A typical right-of-way cross section drawing indicating the relationship of all plantings overhead, above-ground and below-ground utilities, and pavement and other structures are to be referenced and shown on the landscape plan or, if there is insufficient room, on a details and cross-section sheet. ***(REVISED JUNE 2026)***

.5 Typical tree, shrub and groundcover cross section planting details shall be referenced to specific City of Nanaimo standard details in Section 14.0 [], or if alternate details are proposed, these shall be included on the landscape construction drawings. ***(REVISED JUNE 2026)***

.6 Irrigation plans are to be produced, using the same base information, which shows: ***(REVISED JUNE 2026)***

(a) Location of all heads, emitter devices and driplines; lateral and mainline pipe locations and sizes; sleeves, valve sizes and locations; and location of backflow prevention device and water service connection;

(b) An irrigation equipment legend, and schedule of hydraulic data in metric to include flow and precipitation rate for each valve zone; and

(c) Water service/backflow prevention connection detail, valve and head installation details including all equipment, fittings and related valve boxes, by reference to City standard details in Section 14.0 [] or if an alternative is proposed, by details shown on the landscape construction drawings. ***(REVISED JUNE 2026)***

1.11A TREE MANAGEMENT PLAN

.1 All Tree Management Plan drawings are to be prepared in consultation with a qualified arborist.

.2 The following information are to be shown on the Tree Management Plan: ***(REVISED JUNE 2026)***

(a) Existing and proposed works and legal property lines, right-of-way, easement and covenant areas.

(b) Existing trees (including trees within 5 m of right-of-way and/or property lines.

(c) Trees to be protected and trees to be removed.

(d) Location and details of tree protection fencing as per Section 3.27 [].

(e) Table itemizing tree removal and replacement requirement as per the *Management and Protection of Trees Bylaw* including size and species.

(f) Summary of tree removal, tree bylaw replacement requirements, proposed tree replacement sand/or contribution toward tree replacement as per the *Management and Protection of Trees Bylaw*.

(g) Legend to identify trees to be removed, trees to be retained and the tree replacements.

1.12 STORMWATER MANAGEMENT

.1 Refer to Section 1.03 [→] for the general required information.

.2 Refer to Section 7.01.6(b) [] for the information required on the Stormwater Management Plans. ***(REVISED JUNE 2026)***

1.13 CERTIFICATION OF WORKS

.3 A certification of design conforming to Appendix G1 [] authenticated by a Professional of Record must be submitted with the design drawings. ***(REVISED JUNE 2026)***

OTHER GENERAL REQUIREMENTS

1.14 -NOT USED-

1.15 -NOT USED-

1.16 SURVEY CONTROL MONUMENTS

.1 Survey control monuments must be installed in accordance with ***Specifications for Control Surveys*** as prepared by the Province of British Columbia Ministry of Forests. The brass plugs are to be accurately drilled by a registered British Columbia Land Surveyor, by City forces, as development growth requires. ***(REVISED JUNE 2026)***

SECTION 1 – GENERAL DRAFTING REQUIREMENTS
RECORD DRAWING STANDARDS

RECORD DRAWING STANDARDS

1.20 GENERAL REQUIREMENTS

.1 Drawings include all information as specified elsewhere for the construction drawings, but are to be corrected upon completion of construction to note all works removed or abandoned during construction. ***(REVISED JUNE 2026)***

.2 Removed utilities are removed and not to be shown on the record drawings. Abandoned utilities are to be displayed and labeled as abandoned on the record drawings. ***(REVISED JUNE 2026)***

.3 Line work for all constructed works shown on the drawings retains the thicker line density. Proposed construction for future phases of the project are not shown on the record drawings. ***(REVISED JUNE 2026)***

.4 All dimensions, elevations and inverts shown must reflect the post construction conditions of the site and all references to 'Proposed' are to be removed. The revision table within the title block is to be completed indicating the drawings are the record drawings. ***(REVISED JUNE 2026)***

.5 The record drawing must reflect the true elevation and location of all constructed features in both the plan and profile views. It is not acceptable to only revise the elevation or dimension labels. ***(REVISED JUNE 2026)***

.6 The City administers a Geographic Information System (GIS) to manage location and attribute data related to underground utilities, roadways, pedestrian facilities, traffic signage and street lighting. The GIS data is primarily derived from post construction record drawings. To ensure accuracy and completeness, the following information needs to be clearly labeled or identified on the record drawing: ***(REVISED JUNE 2026)***

(a) The location and elevation of all existing utilities and services encountered in the construction operation.

(b) The location and invert elevation at property line of all individual service connections, and the wye chainage, at the main for all constructed and existing works.

(c) A note on each drawing describing the type of trench material (sand, gravel, clay, hard pan etc.) encountered during construction and the location and profile of all rock.

(d) A detail for each tie in point to existing utilities and locations where the restrainers are installed.

(e) The In-Service Date blocks for all post construction infrastructure are to be included on the record drawings, with In-Service date filled in. Refer to Standard Drawing No. G-4I []. ***(REVISED JUNE 2026)***

(f) Sanitary Sewer System Plan includes: *(REVISED JUNE 2026)*

(i) Length, diameter, material and grade of sanitary mains and service connections *(REVISED JUNE 2026)*

(ii) Identification of forcemains

(iii) Flow direction arrows

(iv) Service lateral inspection chamber locations c/w invert elevation

(v) Identification of water tight or locking manhole covers

Sanitary Sewer System Profile includes: *(REVISED JUNE 2026)*

(vi) Upstream and downstream manhole rim and invert elevations *(REVISED JUNE 2026)*

(vii) Identification of drop manhole structures *(REVISED JUNE 2026)*

(g) Stormwater System Plan includes: *(REVISED JUNE 2026)*

(i) Diameter and material of storm mains, service connections, catch basin leads and culverts

(ii) Flow direction arrows

(iii) Service lateral inspection chamber locations c/w invert elevation

(iv) Identification of perforated 'French' drains

(v) Identification of catch basin type as per Section 7.0 Stormwater Management []

(vi) Identification of inlet/outlet material and type as per Section 7.0 Stormwater Management []

Stormwater System Profile includes: *(REVISED JUNE 2026)*

(vii) Length, diameter, material and grade of storm mains

(viii) Pipe inlet and outlet invert elevations at manholes

(ix) Upstream and downstream manhole rim and invert elevations

(x) Invert elevations of inlet and outlet structures

(h) Water Distribution System Plan includes: *(REVISED JUNE 2026)*

(i) Diameter and material of watermains and service connections

(ii) Water meter type

(iii) Identification of flushouts as above-ground or below-grade

(iv) Identification of firelines

Water Distribution System Profile includes: *(REVISED JUNE 2026)*

(v) Diameter and material of watermains

(vi) Invert elevations at pipe tie-in and hydrant locations

(i) Fibre Optic Utility Plan includes: *(REVISED JUNE 2026)*

(i) Conduct size and type

(ii) Access type

(j) Streets, Street Lighting, Traffic Signs and Markings Plan includes: *(REVISED JUNE 2026)*

(i) Street classification as per Section 8.0 Transportation []. *(REVISED JUNE 2026)*

(ii) Sidewalk material and width

(iii) Crosswalk design type

(iv) Street Light Table as per Standard Drawing G-7 [] that shall include wattage, lamp type, pole height, pole type, luminaire type, luminaire make.

(v) Traffic Sign Table as per Standard Drawing G-7 [] that shall include UTCD number as per the Transportation Association of Canada's ***Manual of Uniform Traffic Control Devices for Canada***.

(vi) Street marking material and MUTCD number as per the Transportation Association of Canada's ***Manual of Uniform Traffic Control Devices for Canada***

(vii) Pole type

(viii) Junction Boxes – specify the type. Street lighting junction boxes are to be further differentiated as box, cabinet, or pole fitting. *(REVISED JUNE 2026)*

(k) Landscape and Irrigation Plan includes: *(REVISED JUNE 2026)*

(i) Diameter and material or irrigation main, valve locations and all lateral and sprinkler heads

(ii) Manufacturer's name, the model name and the catalogue number for all controllers

(iii) The as-planted location, species and size of all trees

(iv) The as-planted location, species, size and quantity of shrubs and ground cover shown in a plant list

1.21 RECORD DRAWING SUBMISSION

.1 The record drawings must be authenticated by the Professional of Record. The submission includes: (*REVISED JUNE 2026)*

(a) A pdf version of both the drawing set and individual sheets. *(REVISED JUNE 2026)*

(b) A 3 mil mylar print of the drawing set. *(REVISED JUNE 2026)*

(c) A digital copy of the completed record drawing, as per Section 1.22 [→]. *(REVISED JUNE 2026)*

.2 The following documents are to be submitted with the record drawing submission: *(REVISED JUNE 2026)*

(a) Appendix E, Substantial Completion Statistics Record [].

(b) A completed City Service Sheet, in accordance with Appendix F1 [] or Appendix F2 [], are to be submitted for each lot showing the as constructed location of all service connections. *(REVISED JUNE 2026)*

(c) Approved and registered statutory right-of-way drawings, if required.

(d) All required testing results including an interpretation and summary of the results by a Professional of Record. *(REVISED JUNE 2026)*

(e) A copy of the final inspection deficiency list.

(f) Certification of the works that includes the following: *(REVISED JUNE 2026)*

(i) A Certification of Installed Works conforming to Appendix G2 [] and authenticated by a Professional of Record *(REVISED JUNE 2026)*

(ii) A Certification of Street Light Installation conforming to Appendix G3 [] and authenticated by a Professional of Record - a Professional Electrical Engineer. *(REVISED JUNE 2026)*

(iii) A Province of British Columbia Electrical Inspectors certification of the street lighting

(iv) A Certification of Landscape Installation conforming to Appendix G4 [] and signed and sealed by the Landscape Architect.

(g) A Water Meter Information Sheet in accordance with Appendix F3 [] for all developer installed water meters and detector check valves.

(h) Revised storm drainage calculations, if required, to reflect changes during the storm sewer construction.

(i) Revised sanitary sewer calculations, if required, to reflect changes during the sanitary sewer construction.

(j) Revised street light calculations, if required, to reflect changes during the street light installation.

(k) Operating and maintenance manuals and product information, if required, for sanitary sewer pump stations, water booster pumps, pressure reducing stations, traffic signal controllers, irrigation controllers and other products.

1.22 DIGITAL SUBMISSION OF RECORD DRAWINGS

.1 A copy of the record drawing data, as per Section 1.20 General Requirements [→], is submitted in the most current version of AutoCAD or Civil 3D (C3D). Refer to Section 1.40.6 [→]. No formats prior to 2013 are accepted. *(REVISED JUNE 2026)*

.2 All as constructed features are to be surveyed and survey points imported into the digital drawing. *(REVISED JUNE 2026)*

.3 The digital drawing contains all works removed or abandoned during construction. The following layers are used: *(REVISED JUNE 2026)*

(a) V-UTIL-NGAS-A Gas Infrastructure *(REVISED JUNE 2026)*

(b) V-SSWR-A Sanitary Infrastructure *(REVISED JUNE 2026)*

(c) V-STRM-A Storm Infrastructure *(REVISED JUNE 2026)*

(d) V-WATR-A Water Infrastructure *(REVISED JUNE 2026)*

(e) C-ROAD-CURB-D Curbs *(REVISED JUNE 2026)*

(f) C-ROAD-ASPH-D Edges of Pavement *(REVISED JUNE 2026)*

(g) C-ROAD-MRKG-D Paintlines *(REVISED JUNE 2026)*

(h) C-SSWR-D Sanitary Infrastructure *(REVISED JUNE 2026)*

(i) C-ROAD-SIGN-D Signs *(REVISED JUNE 2026)*

(j) C-STRM-D Storm Infrastructure *(REVISED JUNE 2026)*

(k) C-ROAD-SWLK-D Sidewalks *(REVISED JUNE 2026)*

(l) C-WATR-D Water Infrastructure *(REVISED JUNE 2026)*

.4 Refer to the MoESS CAD Standards and Section 1.40 Computer Aided Drafting Standards Overview [→] for direction.

SECTION 1 – GENERAL DRAFTING REQUIREMENTS
CAD STANDARDS

1.40 COMPUTER AIDED DRAFTING STANDARDS OVERVIEW *(REVISED JUNE 2026)*

.1 All infrastructure and land development engineering drawings for projects completed in the City must use the City CAD standard. *(REVISED JUNE 2026)*

.2 The use of a consistent standard is required for the following reasons:

(a) Consistency in the appearance of engineering drawing to facilitate design reviews and construction.

(b) Consistency in the internal drawing structure to facilitate data hand off and usability.

(c) Consistency in the appearance and internal drawing structure to facilitate post construction record drawing submissions.

(d) Consistency in the digital format for automated data collection and import into the City GIS.

.3 Standards were developed for use in C3D. All City standard files and drawings are based on the 2018 version or newer of AutoDesk software. The CAD standard incorporates both AutoCAD standardized elements and C3D standardized elements. C3D is the model based design tool adopted by the City. *(REVISED JUNE 2026)*

.4 For the most current City Drawing Template version, refer to the City website or contact the Engineering Projects Division. *(REVISED JUNE 2026)*

.5 The City considers C3D as the industry standard software application for the design of civil infrastructure projects and the production of engineering drawings. C3D pipe networks allow designers to input physical properties for sanitary, storm, and watermain models.

.6 The City encourages the submission of C3D files. The object based program includes design components such as points, surfaces, alignments, profiles, corridors, pipe networks and sections that are drawing objects with "intelligence". With software such as FME, these objects can be converted with attributes intact and imported to the City GIS At some point in the future, the City may require all submissions to be C3D files to take advantage of the attribute opportunities within the C3D and automate the CAD to GIS conversion.

1.41 TEMPLATE DRAWINGS

.1 City drawing template, (AutoCAD file extension. dwt) is available to engineering and survey consultants for the creation of survey and design drawings. In addition to the drawing template, a pipe catalog is available which adheres to the common pipe materials and sizes approved by the City. This catalog may be utilized with the City template through the "SetNetworkCatalog" command within the C3D software. *(REVISED JUNE 2026)*

(a) C3D Template.

(b) C3D Pipe Catalog.

.2 Template drawings contain standard layer definitions and scale-dependent paper space layout definitions with standard title blocks, text styles and dimension styles.

1.42 COORDINATE SYSTEM *(REVISED JUNE 2026)*

.1 All drawings must be based on a ground coordinate system that is related to the Universal Transverse Mercator (UTM) Projection that is tied to the City's integrated survey monument network. To convert the published North American Datum 1983 NAD83 (Zone 10) grid coordinates of City monuments to the required ground coordinate system suitable for topographic ground surveys, and eventual record drawings, grid coordinates are multiplied by the city wide calculated combined scale factor of 1.00035012254, about coordinate base (0,0). All digital drawing files submitted to the City must use this common ground coordinate system within the borders of Nanaimo. *(REVISED JUNE 2026)*

.2 The cadastral and other digital files from the City's GIS, are provided in NAD83 (Zone 10) grid coordinates. To shift to the above mentioned ground coordinate system in CAD, all horizontal features must be scaled by 1.00035012254, about coordinate base (0,0). *(REVISED JUNE 2026)*

.3 The vertical datum is the Canadian Vertical Datum of CVD28BC. The integrated survey monument and published elevation used plus the approximate location of the monument (i.e. street intersection or address location) is to be indicated on each record sheet.

.4 All drawings submitted to the City must use ground level coordinates. To convert to UTM NAD83 (CSRS) coordinates, multiply by combined scale factor of 0.99965.

1.43 LAYER NAMING CONVENTIONS

.1 In the event that new layers are required, create the layer name using the standard City layer naming convention and notify the City. *(REVISED JUNE 2026)*

.2 The City incorporates the National CAD Standards V6 for layer naming conventions. All new layers created are to comply with these standards. *(REVISED JUNE 2026)*

(a) Dd-MAJR-MINR-minr-S *(REVISED JUNE 2026)*

(i) D – Discipline Designator Level 1 *(REVISED JUNE 2026)*

(ii) d – Discipline Designator Level 2 (Optional) *(REVISED JUNE 2026)*

(iii) MAJR – Major group *(REVISED JUNE 2026)*

(iv) MINR – Minor group *(REVISED JUNE 2026)*

(v) Minr – Secondary minor group (optional) *(REVISED JUNE 2026)*

(vi) S – Status (optional) *(REVISED JUNE 2026)*

.3 Refer to Standard Drawings G-1 to G1B [] for the list of standard layer names and properties, (linetypes, colours, pen weights) used in the City design drawings.

1.44 STANDARD SYMBOLS AND ABBREVIATIONS

SECTION 1 – GENERAL DRAFTING REQUIREMENTS
CAD STANDARDS

.1 Applicants or developers must use the City approved standard symbols and abbreviations for the preparation of the design drawings. ***(REVISED JUNE 2026)***

.2 The standard abbreviations for both existing and proposed conditions are shown on Standard Drawing G-2 [].

.3 The standard symbols for both existing and proposed conditions are shown in Standard Drawings G-4A to G-4I [].

.4 Standard materials and their representative AutoCAD hatch patterns are shown in Drawing G-3 [].

LAYER LIST			
Name	Description	Colour	Linetype
0	*	white	Continuous
-NPLT	SCRATCH LAYER - NO PRINT	35	Continuous
C-ALGN-*	ALIGNMENT - A NEW LAYER WILL BE FORMED FOR EACH ALIGNMENT	yellow	Continuous
C-ALGN-STAT-*	ALIGNMENT STATION LABELS	yellow	Continuous
C-ANNO-DETL	DETAILS	white	Continuous
C-ANNO-DETL-TEXT	DETAILS NOTES AND ANNOTATION	green	Continuous
C-ANNO-MASK	WIPEOUT	white	Continuous
C-ANNO-RECD	CONSTRUCTION NOTES	yellow	Continuous
C-ANNO-REDL	RED LINE MARKUP	red	Continuous
C-ANNO-TBLE	PROPOSED TABLE	8	Continuous
C-ANNO-TBLE-GRID	PROPOSED TABLE - GRID	253	Continuous
C-ANNO-TBLE-LINE	PROPOSED TABLE - LINES	red	Continuous
C-ANNO-TBLE-TEXT	PROPOSED TABLE - TEXT	yellow	Continuous
C-ANNO-TEXT	PROPOSED CONSTRUCTION NOTES AND LEADER LINES	yellow	Continuous
C-ANNO-TEXT-F	FUTURE TEXT	56	Continuous
C-BLDG	PROPOSED BUILDINGS AND STRUCTURES	214	Continuous
C-CORR	PROPOSED CORRIDOR	white	Continuous
C-CORR-ASSM	PROPOSED CORRIDOR ASSEMBLY	white	Continuous
C-CORR-CUT	PROPOSED CORRIDOR - SHOWN IN CUT	237,38,2	Continuous
C-CORR-FILL	PROPOSED CORRIDOR - SHOWN IN FILL	53,237,2	Continuous
C-CORR-INTS	PROPOSED CORRIDOR - INTERSECTION	white	Continuous
C-PROF	PROFILE VIEW	white	Continuous
C-PROP-LINE	PROPOSED LEGAL PROPERTY LINES	yellow	PHANTOM2
C-PROP-LINE-F	FUTURE LEGAL PROPERTY LINE	56	BORDER2
C-PROP-ROW~	PROPOSED LEGAL RIGHT OF WAY AND ROAD WIDENINGS	yellow	DASHED
C-PROP-ROW~-F	FUTURE LEGAL RIGHT-OF-WAY, EASEMENTS	56	DASHED2
C-PROP-TEXT	PROPOSED LEGAL TEXT	yellow	Continuous
C-PROP-TEXT-F	FUTURE LEGAL TEXT	56	Continuous
C-REFR-IMGE	ORTHO PHOTO AND IMAGES	white	Continuous
C-REFR-XREF	XREFS ATTACHED TO DRAWING	white	Continuous
C-ROAD-ASPH	PROPOSED EDGE OF PAVEMENT	110	Continuous
C-ROAD-ASPH-D	REMOVED EDGE OF ASPHALT	201	CoN-EP
C-ROAD-CNTR	PROPOSED ROAD CENTRE LINE (IF DIFFERENT FROM ALIGNMENT)	yellow	CENTER
C-ROAD-CURB-ASPH	PROPOSED ASPHALT CURB	110	Continuous
C-ROAD-CURB-CONC	PROPOSED CONCRETE CURB	110	Continuous
C-ROAD-CURB-D	REMOVED CURBS	201	Continuous
C-ROAD-CURB-GUTR	PROPOSED CONCRETE GUTTER	110	Continuous
C-ROAD-DIMS	PROPOSED ROAD DIMENSIONS	yellow	Continuous
C-ROAD-F	FUTURE ROAD (ADD -CAT3 LAYER IF DESIRED)	56	DASHEDX2
C-ROAD-GRVL	PROPOSED ROAD SHOULDER	red	Continuous
C-ROAD-HTCH	PROPOSED ROAD SHADING FOR PAVING	254	Continuous
C-ROAD-LABL	PROPOSED ROAD ELEVATIONS	yellow	Continuous
C-ROAD-LITE	PROPOSED STREETLIGHTS, SIGNALS AND DUCTS	yellow	Continuous
C-ROAD-LITE-TRAF	PROPOSED ROAD TRAFFIC CONTROL (LOOPS, CONDUITS, etc)	yellow	Continuous
C-ROAD-MRKG	PROPOSED TRAFFIC PAINT MARKINGS	191	Continuous
C-ROAD-MRKG-D	REMOVED PAINTLINES	201	Continuous
C-ROAD-PROF	PROPOSED ROAD - PROFILE	yellow	Continuous
C-ROAD-SECT	PROPOSED ROAD SECTION	white	Continuous
C-ROAD-SIGN	PROPOSED ROAD SIGN	yellow	Continuous
C-ROAD-SIGN-D	REMOVED SIGNS	201	Continuous
C-ROAD-SWLK	PROPOSED SIDEWALKS	40	Continuous
C-ROAD-SWLK-D	REMOVED SIDEWALK	201	Continuous
C-ROAD-SWLK-F	FUTURE SIDEWALK	56	HIDDEN2
C-ROAD-TEXT	PROPOSED ROAD TEXT	white	Continuous
C-SECT	SECTION	white	Continuous
C-SECT-SAMP	SECTION SAMPLE LINES AND TEXT	red	Continuous
C-SECT-VIEW	PROPOSED CROSS SECTION VIEW	white	Continuous
C-SITE-F	FUTURE SITE OBJECTS	56	PHANTOM2
C-SITE-FURN	PROPOSED STREET FURNITURE (BENCHES, PLANTERS....)	red	Continuous
C-SITE-WALL	PROPOSED WALL	230	Continuous
C-SSWR	PROPOSED SANITARY SEWER MAINS	11	Continuous
C-SSWR-D	REMOVED SANITARY	201	CoN-Sanitary
C-SSWR-PROF	PROPOSED SANITARY SEWER AND SERVICES - PROFILE	11	Continuous
C-SSWR-SRVC	PROPOSED SANITARY SEWER SERVICES	11	Continuous
C-SSWR-STRC	PROPOSED SANITARY SEWER STRUCTURES (MANHOLES, COs...)	11	Continuous
C-STRM	PROPOSED STORM DRAIN MAINS	93	Continuous
C-STRM-ANLZ-DROP	WATERDROP ANALYSIS - NO PRINT	140	Continuous
C-STRM-CBAS	PROPOSED CATCHBASINS	93	Continuous

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 1 DWG\20250224 SECTION 1 DWGS\G-1

6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

STANDARD LAYER NAMES
SHEET 1 OF 3

Scale:	NTS
Created:	NOV 2015
Rev Date:	JUNE 2026
Dwg No:	G-1

LAYER LIST			
Name	Description	Colour	Linetype
C-STRM-CULV	PROPOSED STORM DRAIN CULVERTS	93	Continuous
C-STRM-D	REMOVED STORM	201	CoN-Storm
C-STRM-DTCH	PROPOSED DITCHLINE	red	CoN-DitchNew
C-STRM-PROF	PROPOSED STORM DRAIN AND SERVICES - PROFILE	93	Continuous
C-STRM-SRVC	PROPOSED STORM DRAIN SERVICES	93	Continuous
C-STRM-STRC	PROPOSED STORM DRAIN STRUCTURES (MANHOLES, CBs....)	93	Continuous
C-TINN-*	SURFACE - A NEW LAYER WILL BE CREATED FOR EACH SURFACE	40	Continuous
C-TINN-BNDY	SURFACE BOUNDARIES (No Plot)	24	Continuous
C-TINN-BRKL	SURFACE BREAKLINES	54	Continuous
C-TINN-FG	PROPOSED FINISHED GROUND	white	Continuous
C-TOPO-GRAD	Topography: grading	94	Continuous
C-TOPO-GRAD-CUT~	Topography: grading cut material	red	Continuous
C-TOPO-GRAD-FILL	Topography: grading fill material	94	Continuous
C-TOPO-LABL	CONTOUR LINES - LABEL	magenta	Continuous
C-TOPO-MAJR	CONTOUR LINES - MAJOR	yellow	Continuous
C-TOPO-MINR	CONTOUR LINES - MINOR	red	Continuous
C-TOPO-PROF	PROPOSED GRADING LINES-PROFILE	white	Continuous
C-TOPO-VEGE	PROPOSED STREET LANDSCAPING	114	Continuous
C-UTIL-COMM	PROPOSED UNDERGROUND COMM LINES	231	BORDER2
C-UTIL-COMM-PROF	PROPOSED UNDERGROUND COMM LINES - PROFILE	231	Continuous
C-UTIL-FIBR	PROPOSED UNDERGROUND FIBRE OPTIC CABLE/DUCT	231	BORDER2
C-UTIL-NGAS	PROPOSED GAS MAIN AND SERVICES	231	BORDER2
C-UTIL-NGAS-PROF	PROPOSED GAS MAIN AND SERVICES - PROFILE	231	Continuous
C-UTIL-POWR	PROPOSED UNDERGROUND ELECTRICAL	231	BORDER2
C-UTIL-TELS	PROPOSED UNDERGROUND TELUS	231	BORDER2
C-WATR	PROPOSED WATERMAINS	161	Continuous
C-WATR-D	REMOVED WATER	201	CoN-Water
C-WATR-PROF	PROPOSED WATERMAIN AND SERVICES - PROFILE	161	Continuous
C-WATR-SRVC	PROPOSED WATER SERVICES	161	Continuous
C-WATR-STRC	PROPOSED WATER STRUCTURES (AIRVALVES, FLUSHOUT....)	161	Continuous
Defpoints	Defpoints	white	Continuous
G-ANNO-LOGO-1	CITY OF NANAIMO LOGO	152	Continuous
G-ANNO-LOGO-2	CITY OF NANAIMO LOGO	white	Continuous
G-ANNO-LOGO-3	CITY OF NANAIMO LOGO	140	Continuous
G-ANNO-TBLK	TITLE BLOCK LAYER	white	Continuous
G-ANNO-VPRT	VIEWPORT LAYER - NO PRINT	247	Continuous
V-ANNO-TEXT	EXISTING NOTES	yellow	Continuous
V-BLDG	EXISTING BUILDING	173	Continuous
V-CTRL	SURVEY MONUMENTS, OIP, OIB, ETC. BLOCKS	white	Continuous
V-CTRL-TRAV	EXISTING SURVEY TRAVERSE PNTS	green	Continuous
V-CTRL-TRAV-LINE	EXISTING SURVEY TRAVERSE LINES	green	Continuous
V-NODE	EXISTING WATER, STORM & SEWER INVERTS, FLR. ELEVS (INFO LAYER)	240	Continuous
V-NODE-COMM	SURVEYED COMM POINTS	210	Continuous
V-NODE-LOCT	SURVEYED LOCATED UTILITY	21	Continuous
V-NODE-LOCT-NPLT	BLOCKS FOR LOCATES TO DRAW IN PROFILE - NO PRINT	35	Continuous
V-NODE-NGAS	SURVEYED GAS POINTS	240	Continuous
V-NODE-POWR	SURVEYED ELECTRICAL POINTS	210	Continuous
V-NODE-PROP	SURVEYED LEGAL POINTS	red	Continuous
V-NODE-SSWR	SURVEYED SANITARY POINTS	22	Continuous
V-NODE-STRM	SURVEYED STORM POINTS	100	Continuous
V-NODE-WATR	SURVEYED WATER POINTS	150	Continuous
V-PROP	EXISTING LEGAL	red	Continuous
V-PROP-LINE	EXISTING LEGAL PROPERTY LINE	252	Continuous
V-PROP-ROW~	EXISTING LEGAL EASEMENT AND RIGHT OF WAY LINES	red	DASHED
V-PROP-TEXT	EXISTING LEGAL TEXT	red	Continuous
V-PVMT	EXISTING EDGE OF PAVEMENT	cyan	CoN-EP
V-PVMT-CONC	EXISTING EDGE OF CONCRETE	cyan	Continuous
V-PVMT-GRVL	EXISTING GRAVEL	cyan	Continuous
V-RAIL	EXISTING RAILWAY	cyan	Continuous
V-ROAD	EXISTING LEGAL ROAD RIGHT OF WAY LINES	13	Continuous
V-ROAD-CURB-ASPH	EXISTING ASPHALT CURB	cyan	Continuous
V-ROAD-CURB-CONC	EXISTING CONCRETE CURB	cyan	Continuous
V-ROAD-CURB-GUTR	EXISTING CONCRETE CURB AND GUTTER	cyan	Continuous
V-ROAD-GRVL	EXISTING SHOULDER	cyan	Continuous
V-ROAD-LITE	EXISTING STREET LIGHTS AND SIGNALS	210	CoN-StreetliteDuct
V-ROAD-LITE-PROF	EXISTING STREET LIGHTS AND SIGNALS - PROFILE	210	DASHDOT2
V-ROAD-LITE-TRAF	EXISTING TRAFFIC CONTROL (LOOPS, CONDUITS, etc)	cyan	Continuous
V-ROAD-MRKG	EXISTING TRAFFIC PAINT MARKINGS	151	Continuous

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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

STANDARD LAYER NAMES
SHEET 2 OF 3

Scale:	NTS
Created:	NOV 2015
Rev Date:	JUNE 2026
Dwg No:	G-1A

LAYER LIST			
Name	Description	Colour	Linetype
V-ROAD-TEXT	EXISTING ROAD NAMES	12	Continuous
V-SSWR	EXISTING SANITARY SEWER MAINS	22	CoN-Sanitary
V-SSWR-A	ABANDONED SANITARY	8	CoN-Sanitary
V-SSWR-LABL	EXISTING SANITARY SEWER PIPE FLOW DIRECTION	22	Continuous
V-SSWR-PROF	EXISTING SANITARY SEWER AND SERVICES - PROFILE	22	Continuous
V-SSWR-SRVC	EXISTING SANITARY SEWER SERVICES	22	DASHED
V-SSWR-STRC	EXISTING SANITARY SEWER STRUCTURES	22	Continuous
V-STRM	EXISTING STORM DRAIN MAIN	100	CoN-Storm
V-STRM-A	ABANDONED STORM	8	CoN-Storm
V-STRM-CULV	EXISTING STORM CULVERTS	100	CoN-Storm
V-STRM-DTCH	EXISTING STORM DITCHES	100	DOT2
V-STRM-DTCH	EXISTING DITCH	cyan	CoN-DitchEx
V-STRM-HWAL	EXISTING HEADWALL	cyan	Continuous
V-STRM-LABL	EXISTING STORM PIPE FLOW DIRECTION	100	Continuous
V-STRM-PROF	EXISTING STORM DRAIN AND SERVICES - PROFILE	100	Continuous
V-STRM-SRVC	EXISTING STORM DRAIN SERVICES	100	DASHED
V-STRM-STRC	EXISTING STORM STRUCTURES	100	Continuous
V-SURV	EXISTING SURVEY PNTS	red	Continuous
V-SURV-LAYO	CONSTRUCTION LAYOUT LINES	red	Continuous
V-SURV-LAYO-PNTS	CONSTRUCTION LAYOUT POINTS	yellow	Continuous
V-TINN- *	EXISTING SURFACE (SEDIMENT, STRIPPED, ETC.)	red	Continuous
V-TINN-BRKL	EXISTING TOPOGRAPHY - FEATURE LINES	94	Continuous
V-TINN-EG	EXISITNG GROUND SURFACE	115	Continuous
V-TINN-PROF	EXISTING GROUND - PROFILE	red	HIDDEN2
V-TOPO	EXISTING TOPOGRAPHY NOT LISTED BELOW	cyan	Continuous
V-TOPO-BARR	EXISTING NO POST BARRIER	cyan	Continuous
V-TOPO-BOTB	EXISTING BOTTOM OF BANK	cyan	CoN-BotBank
V-TOPO-BUSH	EXISTING HEDGE LINE	cyan	CoN-Hedge
V-TOPO-FENC	EXISTING FENCE	cyan	CoN-Fence
V-TOPO-ROCK	EXISTING ROCK OR RIP RAP	cyan	Continuous
V-TOPO-TOPB	EXISTING TOP OF BANK	cyan	CoN-TopBank
V-TOPO-TREE	EXISTING TREE	green	Continuous
V-TOPO-TREE-LABL	EXISTING TREE LINE	cyan	CoN-TreeLine
V-TOPO-TREE-LINE	EXISTING TREE TEXT	green	Continuous
V-TOPO-VEGE	EXISTING LANDSCAPING	cyan	Continuous
V-TOPO-WALL	EXISTING WALL	cyan	Continuous
V-TOPO-WBDY	EX-WATERBODY	142	Continuous
V-TOPO-WWAY	EX-WATERCOURSE	142	Continuous
V-UTIL-COMM	EXISTING UNDERGROUND COMMUNICATIONS	210	CoN-Communication
V-UTIL-COMM-PROF	EXISTING UNDERGROUND COMMUNICATIONS - PROFILE	210	Continuous
V-UTIL-FIBR	EXISTING UNDERGROUND FIBRE OPTIC A	240	CoN-FibreOptic
V-UTIL-FIBR-PROF	EXISTING UNDERGROUND FIBRE OPTIC - PROFILE	240	Continuous
V-UTIL-NGAS	EXISTING GAS MAIN AND SERVICES	240	CoN-Gas
V-UTIL-NGAS-A	ABANDONED GAS	8	CoN-Gas
V-UTIL-NGAS-PROF	EXISTING GAS MAIN AND SERVICES - PROFILE	240	HIDDEN
V-UTIL-POWR	EXISTING UNDERGROUND ELECTRICAL	210	CoN-Hydro
V-UTIL-POWR-OVHD	EXISTING ELECTRICAL OVERHEAD LINES	210	CoN-OverheadHydro
V-UTIL-POWR-PROF	EXISTING UNDERGROUND ELECTRICAL AND SERVICES - PROFILE	210	DASHDOT2
V-UTIL-TELS	EXISTING UNDERGROUND TELUS	210	CoN-TelephoneLine
V-UTIL-TELS-PROF	EXISTING UNDERGROUND TELUS - PROFILE	210	Continuous
V-WATR	EXISTING WATERMAINS	150	CoN-Water
V-WATR-A	ABANDONED WATER	8	CoN-Water
V-WATR-PROF	EXISTING WATERMAINS AND SERVICES - PROFILE	150	Continuous
V-WATR-SRVC	EXISTING WATER SERVICES	150	DASHED
V-WATR-STRC	EXISTING WATERMAIN STRUCTURES	150	Continuous

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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

STANDARD LAYER NAMES
SHEET 3 OF 3

Scale:	NTS
Created:	NOV 2015
Rev Date:	JUNE 2026
Dwg No:	G-1B

STANDARD ABBREVIATIONS

PIPE MATERIAL ABBREVIATIONS

AC	ASBESTOS CONCRETE
CMP	CORRUGATED METAL PIPE
CI	CAST IRON
CP	CONCRETE PIPE
CU	COPPER
DI	DUCTILE IRON
HDPE	HIGH DENSITY POLYETHYLENE
PVC	POLYVINYL CHLORIDE
RC	REINFORCED CONCRETE
ST	STEEL
VC	VITRIFIED CLAY

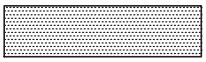
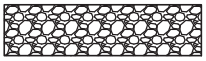
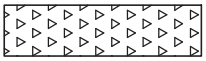
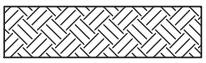
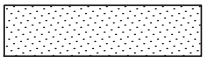
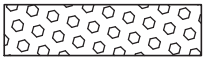
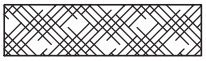
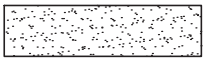
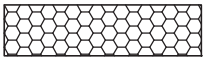
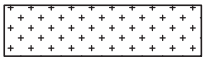
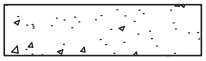
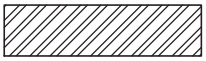
PIPING ABBREVIATIONS

COMPR	COMPRESSION FITTING
F	FLANGE
FIPT	FEMALE IRON PIPE THREAD
H	HUB
MIPT	MALE PIPE PIPE THREAD

GENERAL ABBREVIATIONS

ASP	ASPHALT
CONC	CONCRETE
NTS	NOT TO SCALE
REQ'D	REQUIRED
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE

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SYMBOL	MATERIAL	AutoCAD PATTERN
	PROPOSED ASPHALT PAVEMENT	DOTS
	EXISTING ASPHALT PAVEMENT	NO HATCH
	GRANULAR BASE	GRAVEL
	GRANULAR SUB-BASE	TRIANG
	UNDISTURBED EXISTING GROUND	EARTH
	GRANULAR PIPE BEDDING	DOTS
	IMPORTED GRANULAR BACKFILL	HEX
	APPROVED NATIVE BACKFILL	HOUND
	PIT RUN SAND	AR-SAND
	DRAIN ROCK	HONEY
	IMPORTED TOP SOIL	CROSS
	CONCRETE	AR-CONC
	METAL	ANSI 32

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2.24.2025

CITY OF NANAIMO
THE HARBOUR CITY

STANDARD MATERIALS
AND HATCH PATTERNS

Scale:	NTS
Created:	NOV 2015
Rev Date:	NOV 2016
Dwg No:	G-3

Existing Topographical Features

Layers

LAYER	Description	Colour	Linetype
V-BLDG	Existing Building	173	
V-PVMT-CONC	Existing Edge of Concrete	Cyan	
V-PVMT-GRVL	Existing Gravel	Cyan	
V-RAIL	Existing Railway	Cyan	
V-STRM-DTCH	Existing Ditch	Cyan	
V-STRM-HWAL	Existing Headwall	Cyan	
V-TINN-*	Existing Ground - Surface	Red	
V-TINN-BRKL	Existing Feature Line	94	
V-TINN-PROF	Existing Ground in Profile	Red	
V-TOPO	Existing Topo not listed elsewhere	Cyan	
V-TOPO-BOTB	Existing Bottom of Bank	Cyan	
V-TOPO-BUSH	Existing Hedge	Cyan	
V-TOPO-FENC	Existing Fence	Cyan	
V-TOPO-ROCK	Existing Rock	Cyan	
V-TOPO-TOPB	Existing Top of Bank	Cyan	
V-TOPO-TREE	Existing Tree	Green	
V-TOPO-TREE-LINE	Existing Tree Line	Cyan	
V-TOPO-VEGE	Existing Landscaping	Cyan	
V-TOPO-WALL	Existing Wall	Cyan	
V-TOPO-WBDY	Existing Waterbody	142	
V-TOPO-WWAY	Existing Watercourse	142	

Point Descriptions and Styles

Point Style	Field Code	Point Style	Label Style	Block Name	Layer
BOL	bol	Bollard	Con-Label	EX-BOL	V-TOPO
BH	bh	Borehole	Con-Label	EX-BH	V-TOPO
GATE	gp	Post	Con-Label	EX-POST	V-TOPO
LAMP	lamp	Lamp	Con-Label	EX-LAMP	V-TOPO
MW	mw	Monitor Well	Con-Label	EX-MW	V-TOPO
POST	post	Post	Con-Label	EX-POST	V-TOPO
PIL LAMP	pil	Pillar Lamp	Con-Label	EX-PIL-LAMP	V-TOPO
PILLAR	pi	Pillar	Con-Label	EX-PIL	V-TOPO
	sh	Shrub	Con-No Desc	EX-SHRUB	V-TOPO
*	tr	Tree	Con-No Desc	EX-TREE	V-TOPO-TREE
*	tr2	Tree2	Con-No Desc	EX-TREE2	V-TOPO-TREE
*	tr3	Tree3	Con-No Desc	EX-TREE3	V-TOPO-TREE
*	tr2	Tree4	Con-No Desc	EX-TREE4	V-TOPO-TREE

For Survey codes that do not display a symbol, see Dwg No G-8

* Survey codes allows for scaling of symbol, see Dwg No G-8

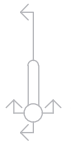
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Existing Roadway Features (including Traffic Control)

Layers

LAYER	Description	Colour	Linetype
V-PVMT	Existing Edge of Pavement	Cyan	
V-ROAD-CURB-ASPH	Existing Asphalt Curb	Cyan	
V-ROAD-CURB-CONC	Existing Concrete Curb	Cyan	
V-ROAD-CURB-GUTR	Existing Concrete Curb & Gutter	Cyan	
V-ROAD-GRVL	Existing Shoulder	Cyan	
V-ROAD-LITE	Existing Streetlight Ducts	210	E E
V-ROAD-LITE-PROF	Existing Streetlight - Profile	210	
V-ROAD-LITE-TRAF	Existing Traffic Control (Loops, Conduits, etc)	Cyan	
V-ROAD-MRKG	Existing Traffic Paint Markings	151	
V-ROAD-TEXT	Existing Road Names	12	
V-TOPO-BARR	Existing No Post Barrier	Cyan	

Point Descriptions and Styles

Point Style	Field Code	Point Style	Label Style	Block Name	Layer
	ls	Lamp Standard	Con-Label	EX-LS	V-TOPO
	sign	Sign	Con-Label	EX-SIGN	V-TOPO
	sign2	Sign2	Con-Label	EX-SIGN2	V-TOPO
	ts	Traffic Signal	Con-Label	EX-TSP1	V-ROAD-LITE-TRAF
	ts2	Traffic Signal2	Con-Label	EX-TSP2	V-ROAD-LITE-TRAF
	tsb	Junction Box	Con-Label	EX-JB	V-ROAD-LITE-TRAF

For Survey codes that do not display a Symbol, see Dwg No G-8

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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

STANDARD SYMBOLS
SHEET 2 OF 10

Scale:	NTS
Created:	NOV 2015
Rev Date:	JUNE 2026
Dwg No:	G-4A

Existing Legal Features

Layers

LAYER	Description	Colour	Linetype
V-CTRL	Existing Monuments, OIPs, etc	Red	———
V-NODE-PROP	Existing Legal Pnts	Red	———
V-PROP	Existing Legal Property	Red	———
V-PROP-LINE	Existing Legal Property Lines	252	———
V-PROP-ROW~	Existing Legal Easements and Right of Way Lines	Red	— — — — — — —
V-PROP-TEXT	Existing Legal Text	Red	———
V-ROAD	Existing Legal Road ROW's	13	———

Point Descriptions and Styles

Point Style	Field Code	Point Style	Label Style	Block Name	Layer
MON	mon*	Monument	Con-Label	mon	V-CTRL
ocm	ocm*	Trav Hub	Con-Label	EX-TRAVHUB	V-NODE-PROP
OIB	oib	OIP	Con-Label	oip	V-CTRL
OIP	oip	OIP	Con-Label	oip	V-CTRL
OLP	olp	OIP	Con-Label	oip	V-CTRL
85 100.000 th	th*	Trav Hub	Nanaimo-Pt-Elev-Desc	oip	V-CTRL-TRAV

For Survey codes that do not display a Symbol, see Dwg No G-8

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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

STANDARD SYMBOLS
SHEET 3 OF 10

Scale:	NTS
Created:	NOV 2015
Rev Date:	JUNE 2026
Dwg No:	G-4B

Existing Infrastructure Features (Sanitary, Storm and Water)

Layers

LAYER	Description	Colour	Linetype
V-NODE-SSWR	Surveyed Sanitary Points	22	
V-NODE-STRM	Surveyed Storm Points	100	
V-NODE-WATR	Surveyed Water Points	150	
V-SSWR	Existing Sanitary Sewer Mains	22	S S FM FM
V-SSWR-A	Abandoned Sanitary	8	S S
V-SSWR-LABL	Existing San Pipe Flow Direction	22	
V-SSWR-PROF	Existing Sanitary Sewer - Profile	22	
V-SSWR-SRVC	Existing Sanitary Sewer Services	22	
V-SSWR-STRC	Existing San Sewer Structures	22	
V-STRM	Existing Storm Drain Mains	100	D D
V-STRM-A	Abandoned Storm	8	D D
V-STRM-CULV	Existing Storm Culverts	100	D D
V-STRM-DTCH	Existing Storm Ditches	100	
V-STRM-LABL	Existing Storm Pipe Flow Direction	100	
V-STRM-PROF	Existing Storm Drain - Profile	100	
V-STRM-SRVC	Existing Storm Drain Services	100	
V-STRM-STRC	Existing Storm Structures	100	
V-WATR	Existing Watermains	150	W W
V-WATR-A	Abandoned Water	8	W W
V-WATR-PROF	Existing Watermains - Profile	150	
V-WATR-SRVC	Existing Water Services	150	
V-WATR-STRC	Existing Water Structures	150	

Point Descriptions and Styles

Point Style	Field Code	Point Style	Label Style	Block Name	Layer
CB	cb	Catch Basin	Con-Label	EX-CB	V-NODE-STRM
CBG	cb Gutter	Catch Basin	Con-Label	EX-CBG	V-NODE-STRM
CBMH	cbmh	Manhole	Con-Label	EX-CB	V-NODE-STRM
CBR	cbr Round	Catch Basin	Con-Label	EX-CBR	V-NODE-STRM
	inv	Invert	Con-No Desc	EX-INV	V-NODE-STRM
DCO	sdco	Cleanout	Con-Label	EX-CO	V-NODE-STRM
DIC	sdic Chamber	Inspection	Con-Label	EX-IC	V-NODE-STRM
DMH	sdmh	Manhole	Con-Label	EX-MH	V-NODE-STRM
SCO	ssco	Cleanout	Con-Label	EX-CO	V-NODE-SSWR
SIC	ssic	Manhole	Con-Label	EX-MH	V-NODE-SSWR
SMH	ssmh	Manhole	Con-Label	EX-MH	V-NODE-SSWR

See next sheet for Existing Watermain

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Existing Infrastructure Features (Sanitary, Storm and Water)

Point Descriptions and Styles

Point Style	Field Code	Point Style	Label Style	Block Name	Layer
AV	av	Air Valve	Con-No Desc	EX-AV	V-NODE-WATR
FH	fh	Hydrant	Con-Label	EX-FH	V-NODE-WATR
IRR	irg Round	Junction Box	Con-Label	EX-JB	V-NODE-WATR
FO	stdp	Flushout	Con-Label	EX-FO	V-NODE-WATR
VENT	vent	Vent	Con-Label	EX-VENT	V-NODE-WATR
WM	wme	Water Meter	Con-Label	EX-WME	V-NODE-WATR
WMH	wmh	Manhole	Con-Label	EX-MH	V-NODE-WATR
WV	wv	Water Valve	Con-Label	EX-WGV	V-NODE-WATR

Existing Blocks displayed in GIS drawing or not displayed in Survey Points

Block	Block Name	Description
	EX-CAP	Existing Cap
	EX-Cathodic	Existing Cathodic Protection Station
	EX-DCB	Existing Double Catch Basin
	EX-DrainValve	Existing Drain Valve
	EX-HWALL	Existing Headwall Structure
	EX-PP-Lease	Existing PowerPole with Lease Light
	EX-PigLoader	Existing Pig Loader
P	EX-PUMP	Existing Water Pump
	EX-PumpStation	Existing Sanitary Pump Station
	EX-Red	Existing Reducer
SRV	EX-SRV	Existing Surge Relief Valve
SP	EX-StandPipe	Existing Standpipe for Fire Fighting
	EX-SurgeRelief	Existing Surge Relief Tank
M	EX-WatChamber	Existing Watermeter Chamber
NC	EX-WGV-NC	Existing Water Gate Valve, Normally Closed
PRV	EX-WPRV	Existing Water Pressure Reducing Station
	EX-WV-BFLY	Existing Water Butterfly Valve
	EX-WV-CHK	Existing Water Check Valve

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Existing Utilities (Hydro, Telephone, Cable, Gas, Fibre Optic)

Layers

LAYER	Description	Colour	Linetype
V-NODE-COMM	Surveyed Communication Pnts	210	
V-NODE-POWR	Surveyed Electrical Pnts	210	
V-NODE-NGAS	Surveyed Gas Pnts	240	
V-UTIL-COMM	Existing Underground Communications	210	C C
V-UTIL-COMM-PROF	Existing Underground Communications - Profile	210	
V-UTIL-FIBR	Existing Underground Fibre Optic	240	F/O F/O
V-UTIL-FIBR-PROF	Existing Underground Fibre Optic	240	
V-UTIL-NGAS	Existing Underground Gas	240	G G
V-UTIL-NGAS-A	Abandoned Gas	8	G G
V-UTIL-NGAS-PROF	Existing Underground Gas-Profile	240	
V-UTIL-POWR	Existing Underground Hydro	210	H H
V-UTIL-POWR-PROF	Existing Underground Hydro - Profile	210	
V-UTIL-POWR-OVHD	Existing Overhead Lines	210	O/H O/H
V-UTIL-TELS	Existing Underground Telus	210	T T
V-UTIL-TELS-PROF	Existing Underground Telus-Profile	210	

Point Descriptions and Styles

Point Style	Field Code	Point Style	Label Style	Block Name	Layer
A	a	Anchor	Con-Label	EX-ANCH	V-NODE-COMM
AP	ap	Anchor Pole	Con-Label	EX-ANCH	V-NODE-COMM
BCHMH	bchmh	Manhole	Con-Label	EX-MH	V-NODE-COMM
EB	eb	Junction Box	Con-Label	EX-JB	V-NODE-POWR
GAS	gv	Gas Valve	Con-Label	EX-WGV	V-NODE-NGAS
JB	jb	Junction Box	Con-Label	EX-JB	V-NODE-POWR
JBR	jbr	Junction Box Round	Con-Label	EX-JBR	V-NODE-POWR
PP	pp	Power Pole	Con-Label	EX-PP	V-NODE-COMM
TELBOX	telbox	Junction Box	Con-Label	EX-JB	V-NODE-COMM
TELMH	Telus Manhole	Manhole	Con-Label	EX-MH	V-NODE-COMM

For Survey codes that do not display a Symbol, see Dwg No G-8

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Proposed Topographical Features

Layers

LAYER	Description	Colour	Linetype
C-BLDG	Proposed Building and Structures	214	
C-SITE-WALL	Proposed Wall	230	
C-STRM-DTCH	Proposed Ditchline	Red	
C-TINN-FG	Proposed Finished Grade	Red	
C-TINN-BRKL	Proposed Surface Breaklines	94	
C-TOPO-GRAD	Proposed Grading	White	
C-TOPO-GRAD-CUT~	Proposed Grading Cut	Red	
C-TOPO-GRAD-FILL	Proposed Grading Fill	94	
C-TOPO-PROF	Proposed Grading - Profile	White	

Proposed Legal Features

Layers

LAYER	Description	Colour	Linetype
C-PROP-LINE	Proposed Property Line	Yellow	
C-PROP-ROW~	Proposed Right of Ways and Easements	Yellow	
C-PROP-TEXT	Proposed Legal Text	Yellow	

Future Features

Layers

LAYER	Description	Colour	Linetype
C-ANNO-TEXT-F	Future Text (add CAT 3)	56	
C-PROP-LINE-F	Future Legal Property Line	56	
C-PROP-ROW~-F	Future Right of Ways, Easements	56	
C-PROP-TEXT-F	Future Legal Text	56	
C-ROAD-F	Future Road	56	
C-ROAD-SWLK-F	Future Sidewalk	56	
C-SITE-F	Future Site Objects	56	

Blocks for Traffic Paint Markings

These Blocks are dynamic with Existing and Proposed States

	ARROWL	ARROWR	ARROWS	ARROWSL	ARROWSR	BIKE	BIKE-DETECT	BIKE-LANE	BIKE-SHAREPATH	BIKE-SHARROW
Existing										
Proposed										

Proposed Roadway Features (including Traffic Control)

Layers

LAYER	Description	Colour	Linetype
C-ALGN-*	Proposed Alignment	Yellow	
C-ROAD-ASPH	Proposed Edge of Pavement	110	
C-ROAD-CNTR	Proposed Road Centreline	Yellow	
C-ROAD-CURB-ASPH	Proposed Asphalt Curb	110	
C-ROAD-CURB-CONC	Proposed Concrete Curb	110	
C-ROAD-CURB-GUTR	Proposed Concrete Curb & Gutter	110	
C-ROAD-DIMS	Proposed Road Dimensions	Yellow	
C-ROAD-GRVL	Proposed Road Shoulder	Red	
C-ROAD-HTCH	Proposed Asphalt Hatching	254	
C-ROAD-LABL	Proposed Road Grading Text	Yellow	
C-ROAD-LITE	Proposed Streetlights and Ducts	White	
C-ROAD-LITE-TRAF	Proposed Traffic Control (Loops, Conduits, etc)	Cyan	
C-ROAD-MRKG	Proposed Traffic Paint Markings	191	
C-TOPO-PLNT	Proposed Roadway Landscaping	114	
C-ROAD-PROF	Proposed Road-Profile	Yellow	
C-ROAD-SIGN	Proposed Road Sign	Yellow	
C-ROAD-SWLK	Proposed Sidewalk	40	
C-ROAD-TEXT	Proposed Road Text	White	
C-SITE-FURN	Proposed Street Furniture	Red	

Blocks for Proposed Roadway Features (including Traffic Control)

Block	Block Name	Description
	PR-BOLLARD	Proposed Bollard
	PR-LS	Proposed Lamp Standard
	PR-SIGN	Proposed Sign, 1 sided
	PR-SIGN2	Proposed Sign, 2 sided
	PR-TSP-1	Proposed Traffic Signal Pole with Arm
	PR-TSP-2	Proposed Traffic Signal Pole without Arm

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Proposed Infrastructure Features (Sanitary, Storm and Water)

Layers

LAYER	Description	Colour	Linetype
C-SSWR	Proposed Sanitary Sewer Mains	11	
C-SSWR-PROF	Proposed Sanitary Sewer-Profile	11	
C-SSWR-SRVC	Proposed San Sewer Services	11	
C-SSWR-STRC	Proposed San Sewer Structures	11	
C-STRM	Proposed Storm Mains	93	
C-STRM-CBAS	Proposed Catch Basin	93	
C-STRM-CULV	Proposed Storm Culverts	93	
C-STRM-PROF	Proposed Storm Sewer-Profile	93	
C-STRM-SRVC	Proposed Storm Sewer Services	93	
C-STRM-STRC	Proposed Storm Sewer Structures	93	
C-WATR	Proposed Watermains	161	
C-WATR-PROF	Proposed Water-Profile	93	
C-WATR-SRVC	Proposed Water Services	93	
C-WATR-STRC	Proposed Water Structures	93	

Blocks for Proposed Infrastructure Features (Sanitary, Storm and Water)

Block	Block Name	Description	Block	Block Name	Description
	PR-5	5° Bend, Pipe Fitting		PR-DCB	Double Catch Basin
	PR-11	11.25° Bend, Pipe Fitting		PR-FH	Fire Hydrant
	PR-22	22.5° Bend, Pipe Fitting	FO	PR-FLO	Flush-out
	PR-45	45° Bend, Pipe Fitting		PR-HWALL	Headwall Structure
	PR-90	90° Bend, Pipe Fitting		PR-IC	Inspection Chamber (Service Box)
	PR-CROSS	Cross, Pipe Fitting		PR-MH	Manhole
	PR-CUP	Coupling, Pipe Fitting		PR-RED	Reducer, Pipe Fitting
	PR-TEE	Tee, Pipe Fitting	SRV	PR-SRV	Surge Relief Valve
	PR-VERT	Vertical Bend Shown in Plan		PR-WV-CHK	Check Valve
	THRUSTBLOCK			PR-WGV	Water Valve, Gate
AV	PR-AIR	Air Valve	NC	PR-WGV-NC	Water Valve, Normally Closed
	PR-CAP	Cap, Pipe Fitting		PR-WM	Water meter only, Residential
	PR-CB	Catch Basin, Rectangular		PR-WServBox	Water Meter Service Box only
	PR-CBG	Catch Basin at Curb, Rectangular		PR-WMWBOX	Water Meter and Service Box
	PR-CBR	Catch Basin Manhole or Round	PRV	PR-WPRV	Pressure Reducing Valve
	PR-CO	Clean-out			

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Proposed Utilities (Hydro, Telephone, Cable, Gas, Fibre Optic)

Layers

LAYER	Description	Colour	Linetype
C-UTIL-COMM	Proposed Underground Communications	230	
C-UTIL-COMM-PROF	Proposed Underground Communications - Profile	230	
C-UTIL-FIBR	Proposed Underground Fibre Optics	230	
C-UTIL-NGAS	Proposed Underground Gas	230	
C-UTIL-NGAS-PROF	Proposed Underground Gas - Profile	230	
C-UTIL-POWR	Proposed Underground Hydro	230	
C-UTIL-TELS	Proposed Underground Telephone	230	

Blocks for Proposed Utilities and Miscellaneous

Block	Block Name	Description	Block	Block Name	Description
	PR-ANCH	Anchor for Utility Pole			
	PR-JB	Electrical Junction Box, Square			
	PR-JBR	Electrical Junction Box, Round			
	PR-PP	Utility Pole			
	PR-PIL	Pilaster, Pillar			
	TESTHOLE	Test Pit, Bore Hole			

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POLE TYPE - FIELDS
COG - Cobra / Galvanized
COP - Cobra / Painted
HCP - Heritage Cobra / Painted
HPP - Heritage Post top / Painted
MSP - Marine Style / Painted
POG - Post top / Galvanized
POT - Post top / Painted

FUSE TYPE - FIELDS
Gould Shawmut model OTM 10A
Buss model BAN-10, 10A

	POLE					LUMINAIRE					COORDINATES	
POLE ID	WATTAGE	LAMP TYPE	HEIGHT	TYPE	INSTALL DATE	FUSE TYPE	TYPE	MAKE	COLOUR TEMP (k)	INSTALL DATE	WIRING COVER INSTALL DATE	NORTHING	EASTING

LAMP TYPE - FIELDS
HPS - High Pressure Sodium
I - Incandescent
L - LED
MH - Metal Halide
MV - Mercury Vapour

LUMINAIRE TYPE - FIELDS
DGC - Drop Glass / Cobra
FGC - Flat Glass / Cobra
GLO - Globe
HER - Heritage
LAN - Lantern
MSP - Marine Style
TOP - Top Hat

STREET LIGHT TABLE TO APPEAR ON STREET LIGHT OR ROAD DRAWINGS

SIGN SCHEDULE

SIGN	QTY	LOCATION
 WA-36L	4	• 1 - NW CORNER VANCOUVER/TOWNSITE • 2 - SW CORNER TOWNSITE/VANCOUVER • 1 - SOUTHEND OF BUST RAMP
 WC-19 & WC-19S	1	STA 1+145
 BACK TO BACK  RB-4L RB-4R	2	STA 0+065 STA 1+011
  RB-91 & WB-36L	1	NW CORNER OF TOWNSITE/VANCOUVER

TRAFFIC SIGN TABLE TO APPEAR ON TRAFFIC SIGNAGE AND PAINT MARKING DRAWINGS

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STREET LIGHT TABLE AND TRAFFIC SIGN TABLE

Scale:	NTS
Created:	NOV 2015
Rev Date:	NOV 2019
Dwg No:	G-7

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FIELD CODE	DESCRIPTION	STYLE	POINT LABEL STYLE	FORMAT (label)	LAYER	LINKED BLOCK
a	Anchor	Anchor	CoN-Label	A	V-NODE-COMM	EX-ANCH
abm	Abutment	<default>	<default>	$*	V-SURV	<default>
ac	Asphalt Curb	<default>	<default>	$*	V-SURV	<default>
ap	Anchor Pole	Anchor Pole	CoN-Label	AP	V-NODE-COMM	EX-AP
av	Air Valve	Air Valve	CoN-No Desc	$*	V-NODE-WATR	EX-AV
bb	Bottom of Bank	<default>	<default>	$*	V-SURV	<default>
bchmh	BCHydro Manhole	Manhole	CoN-Label	BCHMH	V-NODE-COMM	EX-MH
bh	Borehole	Borehole	CoN-Label	BH	V-TOPO	EX-BH
bldg	Building Corner (commercial)	<default>	<default>	$*	V-SURV	<default>
bol	Bollard	Bollard	CoN-Label	BOL	V-TOPO	EX-BOL
br	Bridge	<default>	<default>	$*	V-SURV	<default>
c	Concrete	<default>	<default>	$*	V-SURV	<default>
cb	Catch Basin	Catch Basin	CoN-Label	CB	V-NODE-STRM	EX-CB
cbg	Catch Basin Gutter	Catch Basin Gutter	CoN-Label	CBG	V-NODE-STRM	EX-CBG
cbmh	Catch Basin Manhole	Manhole	CoN-Label	CBMH	V-NODE-STRM	EX-MH
cbr	Catch Basin Round	Catch Basin Round	CoN-Label	CBR	V-NODE-STRM	EX-CBR
cc	Concrete Curb	<default>	<default>	$*	V-SURV	<default>
ccg	Concrete Curb Gutter	<default>	<default>	$*	V-SURV	<default>
d	Ditch	<default>	<default>	$*	V-SURV	<default>
dck	Bridge Deck	<default>	<default>	$*	V-SURV	<default>
dyl	Double Yellow Line	<default>	<default>	$*	V-SURV	<default>
eb	Electric Box	Junction Box	CoN-Label	EB	V-NODE-POWR	EX-JB
ec	Edge of Concrete	<default>	<default>	$*	V-SURV	<default>
egr	Edge of Gravel	<default>	<default>	$*	V-SURV	<default>
ep	Edge of Pavement	<default>	<default>	$*	V-SURV	<default>
ew	Edge of Water	<default>	<default>	$*	V-SURV	<default>
fe	Fence	<default>	<default>	$*	V-SURV	<default>
fh	Fire Hydrant	Hydrant	CoN-Label	FH	V-NODE-WATR	EX-FH
g	Gas	<default>	<default>	$*	V-NODE-NGAS	<default>
gas *	Gas (appurtenance)	<default>	<default>	$*	V-NODE-NGAS	<default>
gp	Gate Post	Post	CoN-Label	GATE	V-TOPO	EX-POST
gr	Guard Rail	<default>	<default>	$*	V-SURV	<default>
grvl	Gravel	<default>	<default>	$*	V-SURV	<default>
gv	Gas Valve	Gas Valve	CoN-Label	GAS	V-NODE-NGAS	EX-WGV
hc	House Corner	<default>	<default>	$*	V-SURV	<default>
he	Hedge	<default>	<default>	$*	V-SURV	<default>
hw	Headwall	<default>	<default>	$*	V-SURV	<default>
hwm	Highwater Mark	<default>	<default>	$*	V-SURV	<default>

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SURVEY CODE DESCRIPTIONS
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CITY OF NANAIMO SURVEY CODES & DESCRIPTION KEY SETS

FIELD CODE	DESCRIPTION	STYLE	POINT LABEL STYLE	FORMAT (label)	LAYER	LINKED BLOCK
inv	Invert	Invert	CoN-No Desc	$*	V-NODE-STRM	EX-INV
irg	Irrigation Valve or Box	Junction Box Round	CoN-Label	IRR	V-NODE-WATR	EX-JBR
jb	Junction Box	Junction Box	CoN-Label	JB	V-NODE-POWR	EX-JB
jbr	Junction Box Round	Junction Box Round	CoN-Label	JBR	V-NODE-POWR	EX-JBR
ksk	Electrical Kiosk (corner)	<default>	<default>	$*	V-SURV	<default>
lamp	Lamp	Lamp	CoN-Label	LAMP	V-TOPO	EX-LAMP
lndscp	Landscaping	<default>	<default>	$*	V-SURV	<default>
loc*	Locate of pipe or utility	<default>	<default>	$*	V-NODE-LOCT	<default>
ls	Light Standard	Lamp Standard	CoN-Label	LS	V-TOPO	EX-LAMP
mb	Mailbox	<default>	<default>	$*	V-SURV	<default>
mfe	Minimum Floor Elevation	<default>	<default>	$*	V-SURV	<default>
mon*	Monument	Monument	CoN-Label	$*	V-CTRL	mon
mw	Monitor Well	Monitor Well	CoN-Label	MW	V-TOPO	EX-MW
np	No Post Barries	<default>	<default>	$*	V-SURV	<default>
ocm*	Old Control Monument	Trav Hub	CoN-Label	$*	V-NODE-PROP	EX-TRAVHUB
oib	Old Iron Bar	OIP	CoN-Label	OIB	V-CTRL	oip
oip	Old Iron Pin	OIP	CoN-Label	OIP	V-CTRL	oip
olp	Old Lead Plug	OIP	CoN-Label	OLP	V-CTRL	oip
p	Pavement Shot	<default>	<default>	$*	V-SURV	<default>
path	Edge of Path	<default>	<default>	$*	V-SURV	<default>
pb	Park Bench	<default>	<default>	$*	V-SURV	<default>
pi	Pillar (no lamp)	Pillar	CoN-Label	PILLAR	V-TOPO	EX-PIL
pil	Pillar with Lamp	Pillar Lamp	CoN-Label	PIL LAMP	V-TOPO	EX-PIL-LAMP
pnb	Present Natural Boundary	<default>	<default>	$*	V-NODE-PROP	<default>
post	Post	Post	CoN-Label	POST	V-TOPO	EX-POST
pp	Power Pole	Power Pole	CoN-Label	PP	V-NODE-COMM	EX-PP
rck	Rock	<default>	<default>	$*	V-SURV	<default>
rr	Rip Rap	<default>	<default>	$*	V-SURV	<default>
sb	Stop Bar	<default>	<default>	$*	V-SURV	<default>
sdco	Storm CleanOut	Cleanout	CoN-Label	DCO	V-NODE-STRM	EX-CO
sdic	Storm Inspection Chamber	Inspection Chamber	CoN-Label	DIC	V-NODE-STRM	EX-IC
sdmh	Storm Manhole	Manhole	CoN-Label	DMH	V-NODE-STRM	EX-MH
sdr	Shoulder	<default>	<default>	$*	V-SURV	<default>
sh	Shrub	Shrub	CoN-No Desc	SHRUB	V-TOPO	EX-SHRUB
sign	Sign	Sign	CoN-Label	SIGN	V-TOPO	EX-SIGN
sign2	Sign 2 sided	Sign2	CoN-Label	SIGN	V-TOPO	EX-SIGN2

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SURVEY CODE DESCRIPTIONS
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CITY OF NANAIMO SURVEY CODES & DESCRIPTION KEY SETS						
FIELD CODE	DESCRIPTION	STYLE	POINT LABEL STYLE	FORMAT (label)	LAYER	LINKED BLOCK
ssco	Sanitary CleanOut	Cleanout	CoN-Label	SCO	V-NODE-SSWR	EX-CO
ssic	Sanitary Inspection Chamber	Inspection Chamber	CoN-Label	SIC	V-NODE-SSWR	EX-IC
ssmh	Sanitary Manhole	Manhole	CoN-Label	SMH	V-NODE-SSWR	EX-MH
stdp	Standpipe	Flushout	CoN-No Desc	$*	V-NODE-WATR	EX-FLO
str	Stairs	<default>	<default>	$*	V-SURV	<default>
sw	Swale	<default>	<default>	$*	V-SURV	<default>
t	Topo Shot	<default>	<default>	$*	V-SURV	<default>
tb	Top of Bank	<default>	<default>	$*	V-SURV	<default>
telbox	Telus Box	Junction Box	CoN-Label	TELBOX	V-NODE-COMM	<default>
telmh	Telus Manhole	Manhole	CoN-Label	TELMH	V-NODE-COMM	EX-MH
th*	Traverse Hub	Trav Hub	Nanaimo Pt-El-Desc	$*	V-CTRL-TRAV	EX-TRAVHUB
toe	Toe of Slope	<default>	<default>	$*	V-SURV	<default>
tor	Top of Rail	<default>	<default>	$*	V-SURV	<default>
tr	Tree	Tree	CoN-No Desc	$1m%%c $2 Tree	V-TOPO-TREE	EX-TREE
tr2	2 Tree Close Together	Tree2	CoN-No Desc	$1m%%c $2 Tree2	V-TOPO-TREE	EX-TREE2
tr3	3 Tree Close Together	Tree3	CoN-No Desc	$1m%%c $2 Tree3	V-TOPO-TREE	EX-TREE3
tr4	4 Tree Close Together	Tree4	CoN-No Desc	$1m%%c $2 Tree4	V-TOPO-TREE	EX-TREE4
trdrip	Tree Dripline	<default>	<default>	$*	V-SURV	<default>
trl	Treeline	<default>	<default>	$*	V-SURV	<default>
ts	Traffic Signal with arm	Traffic Signal	CoN-Label	TS	V-ROAD-LITE-TRAF	EX-TSP1
ts2	Traffic Signal without arm	Traffic Signal2	CoN-Label	TS	V-ROAD-LITE-TRAF	EX-TSP2
tsb	Traffic Signal Box	Junction Box	CoN-Label	TSB	V-ROAD-LITE-TRAF	EX-JB
vac*	Vactor location	<default>	<default>	$*	V-NODE-LOCT	
vent	Vent (Air Valve)	Vent	CoN-Label	VENT	V-NODE-WATR	EX-VENT
wb	Wall Bottom	<default>	<default>	$*	V-SURV	<default>
wc	Wood Curb	<default>	<default>	$*	V-SURV	<default>
wl	White Line	<default>	<default>	$*	V-SURV	<default>
wme	Water Meter	Water Meter	CoN-Label	WM	V-NODE-WATR	EX-WME
wmh	Water Manhole	Manhole	CoN-Label	WMH	V-NODE-WATR	EX-MH
wt	Wall Top	<default>	<default>	$*	V-SURV	<default>
wv	Water Valve	Water Valve	CoN-Label	WV	V-NODE-WATR	EX-WGV
xw	Cross Walk	<default>	<default>	$*	V-SURV	<default>
yl	Yellow Line	<default>	<default>	$*	V-SURV	<default>

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SURVEY CODE DESCRIPTIONS
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Created: NOV 2015
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SECTION 2 – GENERAL DEFINITIONS AND REFERENCES

	SECTION NO.
Defined Terms	2.01
Convention For Units and Conversions	2.02

SECTION 2 – GENERAL DEFINITIONS AND REFERENCES

2.01 DEFINED TERMS *(REVISED JUNE 2026)*

Unless otherwise defined, a word or expression has the meaning assigned to it in the *Local Government Act, Community Charter*, *Interpretation Act, Water Sustainability Act, and Motor Vehicle Act.* Where no definition can be found in this document, the definition provided in the *Subdivision and Development Standards Bylaw* and the *Zoning Bylaw* will apply. *(REVISED JUNE 2026)*

.1 "ANNUAL EXCEEDANCE PROBABILITY (AEP)" is expressed as a ratio or percentage and indicates the probability of a specific event occurring within a given year. This term replaces 'recurrence interval' or 'return period', which can be misleading. For example, a '1-in-100-year event' is often misunderstood as an event that happens only once every 100 years. Statistically, a 1% AEP (1:100 AEP) event has a 1% probability of occurring in any given year and a 67% probability of occurring at least once within a 100-year period. *(REVISED JUNE 2026)*

.2 "APPROVAL" shall mean written approval granted by the City Engineer unless otherwise specified. *(REVISED JUNE 2026)*

.3 "CITY" means the City of Nanaimo. *(REVISED JUNE 2026)*

.4 "CONTRACTOR" means the company named in the Contract Agreement. *(REVISED JUNE 2026)*

.5 "CITY ENGINEER" means the Director of Engineering. *(REVISED JUNE 2026)*

.6 "ENGINEER" or "DESIGN ENGINEER" see Professional of Record. *(REVISED JUNE 2026)*

.7 "INSPECTOR" means a person or company authorized by the City Engineer or by the Owner to inspect the work or any part of it. *(REVISED JUNE 2026)*

.8 "OWNER" means the City of Nanaimo. *(REVISED JUNE 2026)*

.9 "OVERLAND FLOW PATH" means a surface water route that forms when heavy rainfall or snowmelt overwhelms the capacity of the drainage works and flows on the surface following existing topography. *(REVISED JUNE 2026)*

.10 "PROPERTY OWNER" has the same meaning as the *Land Title Act*. *(REVISED JUNE 2026)*

.11 "PROFESSIONAL OF RECORD" means the Professional responsible for a specific portion of the project plans. Engineer of Record is included within this term. The Professional is an individual who is a practicing professional registrant as defined in Engineers and Geoscientists BC's Bylaws. *(REVISED JUNE 2026)*

2.02 CONVENTION FOR UNITS AND CONVERSIONS *(REVISED JUNE 2026)*

.1 All static and dynamic units on drawings and specifications are International System of Units (SIU), conforming to Can-3-Z234.2-73, the International System of Units (S.I.) and Can/CSAS234.1, Metric Practice Guide. *(REVISED JUNE 2026)*

.2 The SIU accepted for the purpose of these standards, together with conversion factors relating them to equivalent imperial units are tabulated as follows: *(REVISED JUNE 2026)*

ITEM	BASIC SI UNIT	(SIU) ABBREVIATION	EQUIVALENT IMPERIAL UNIT (EIU)	CONVERSION FACTOR (CF) (CF X EIU = SIU)
Length	metre	m	foot	0.3048
Length	millimeter	mm	inch	25.4
Area	square metre	m^2	square foot	0.0929
Area	square metre	m^2	square yard	0.836
Volume	cubic metre	m^3	cubic foot	0.0283
Volume	cubic metre	m^3	cubic yard	0.765
Volume	litre	L	imperial gallon	4.546
Mass	kilogram	kg	pound	0.454
Mass	tonne	t	ton (short)	0.907
Density	kilogram per cubic metre	kg/m^3	pound per cubic inch	27,680.0
Temperature	degree Celsius	C	degree Fahrenheit	(F-32) x 5/9 = C

ITEM	BASIC SI UNIT	(SIU) ABBREVIATION	EQUIVALENT IMPERIAL UNIT (EIU)	CONVERSION FACTOR (CF) (CF X EIU = SIU)
Force	newton	N	pound force	4.448
Pressure*	kilopascal	kPa	pound per sq. inch or psi	6.8948
Pressure*	kilopascal	kPa	inch water column	0.2491
Pressure, stress (concrete)	megapascal	MPa	pound per sq. inch or psi	0.0069
Volume flow	litre per second	L/s	imperial gallon per minute	0.07758
Volume flow	cubic metre per second	m^3/s	cubic feet per second	0.0283
Volume flow	litre per second	L/s	cubic feet per second	28.316
Power	kilowatt	kW	horsepower (electric)	0.746
Energy	joule	J	British Thermal Unit	1055.06
Illuminance	lux	lux	footcandles	10.76391
Frequency	hertz	Hz	Cycles per second	1.0

*As used in these standards, pressure shall mean gauge pressure unless otherwise noted

Standard Sieve Sizes

EIU	SI	EIU	SI	EIU	SI
4"	100 mm	1-1/2"	37.5 mm	3/8"	9.5 mm
3"	75 mm	1"	25 mm	1/4"	6.3 mm
2-1/2"	63 mm	3/4"	19 mm		
2"	50 mm	1/2"	12.5 mm		
#4	4.75 mm	#20	0.85 mm	#60	0.25 mm
#8	2.36 mm	#30	0.6 mm	#80	0.18 mm
#10	2 mm	#40	0.425 mm	#100	0.15 mm
#16	1.18 mm	#50	0.3 mm	#200	0.075 mm

Standard Pipe Sizes

EIU	SI	EIU	SI	EIU	SI
1/2"	12.5 mm	4”	100 mm	15”	375 mm
3/4"	19.0 mm	6”	150 mm	18”	450 mm
1”	25.0 mm	8”	200 mm	21”	525 mm
1-1/2”	37.5 mm	10”	250 mm	24”	600 mm
2”	50.0 mm	12”	300 mm	42”	1050 mm
2-1/2”	65.0 mm				

Concrete Strengths

EIU	SI
2200 psi	15 MPa
2500 psi	18 MPa
2900 psi	20 MPa
3700 psi	25 MPa
4500 psi	30 MPa
5000 psi	36 MPa

Reinforcing Steel

Comparison of Imperial and Metric Sizes
(Note: % difference based on area of bars in in^2)

IMPERIAL BAR			METRIC BAR			
SIZE	AREA in^2	AREA mm^2	SIZE	AREA in^2	AREA mm^2	METRIC BAR IS
#3	.11	71	10M	.16	100	45% L
#4	.20	129	10M	.16	100	20% S
#4	.20	129	15M	.31	200	55% L
#5	.31	200	15M	.31	200	SAME
#6	.44	284	20M	.47	300	6.8% L
#7	.60	387	20M	.47	300	22% S
#7	.60	387	25M	.78	500	30% L
#8	.79	510	25M	.78	500	1.3% S
#9	1.00	645	30M	1.09	700	9% L
#10	1.27	819	30M	1.09	700	14% S
#10	1.27	819	35M	1.55	1000	22% L
#11	1.56	1006	35M	1.55	1000	0.6% S
#14	2.25	1452	45M	2.33	1500	3.5% L
#18	4.00	2581	55M	3.88	2500	3.0% S
L = LARGER						
S = SMALLER						

SECTION 3 – GENERAL REQUIREMENTS
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Quick Links: Section 3.0 Drawings [] TOC [↑]

SECTION 3 – GENERAL REQUIREMENTS
STANDARD SPECIFICATIONS

3.01 TEMPORARY CONSTRUCTION FACILITIES

.1 Access Road:

(a) Temporary roads are to be constructed as required for access to the working areas. Access to temporary roads from public roadways require prior written approval from the City. ***(REVISED JUNE 2026)***

(b) Adequate drainage system in the form of ditches, culverts, or other conduits are to be installed to drain these access roads. During the construction of access roads, existing drainage works, whether natural or constructed, must not pose a hazard to properties outside the work area or harm the watercourse environment. Expect that restoration to original condition will be required upon completion of works. Unless specified otherwise, these facilities should be restored to their original condition as much as possible upon completion of the work. ***(REVISED JUNE 2026)***

(c) Site access requires erosion and sediment control measures as per existing bylaws, such as *Storm Sewer Regulation and Fee Bylaw and Development Approval Information Bylaw*. ***(REVISED JUNE 2026)***

.2 Sanitary Facilities:

(a) Clean, sanitary latrine accommodations are to be provided by the Contractor and located and maintained such that they are not offensive to any property owner or member of the public. Workers will use these facilities. ***(REVISED JUNE 2026)***

(b) These facilities are to be removed by the Contractor at the conclusion of the Works or when instructed to do so by the City Engineer. ***(REVISED JUNE 2026)***

3.02 OPERATING MANUALS

.1 For installations which include mechanical and electrical equipment or machinery having wearing parts and requiring periodical repair and adjustment, all special tools, wrenches and accessories required for removing work parts, making adjustments and carrying out maintenance must be supplied. These include all gauges, indicators and lubricating devices necessary for the proper operation of the equipment shall be furnished. ***(REVISED JUNE 2026)***

.2 With each piece of equipment, 4 sets of operating manuals and as constructed shop drawings shall be supplied. The manuals give the manufacturer's recommended maintenance schedules with the grades of lubricants required and instructions as to how the equipment may be take apart for periodic inspection and replacement. ***(REVISED JUNE 2026)***

3.03 EXPLOSIVES

.1 The General method of storage, handling, use and character of all explosives must comply to the Accident Prevention Regulations covering explosives, pursuant to the *Occupational Health and Safety Regulation Part 21: Blasting Operations and Explosives Act and Regulation* of British Columbia and must conform to local police requirements. ***(REVISED JUNE 2026)***

.2 Explosives must be kept only in registered premises, which have been licensed under the *Explosives Act* (Canada). ***(REVISED JUNE 2026)***

3.04 SITE MAINTENANCE AND CLEANUP

.1 The working areas are to be maintained in an orderly manner and not be encumbered with equipment, materials or debris. ***(REVISED JUNE 2026)***

.2 Cleanup is a continuing process from the start of the work to final acceptance of the project. The Contractor will, at all times, and without further order, keep property, on which work is in progress free from accumulations of waste materials or rubbish caused by employees or by the work. Accumulations of waste materials which might constitute a fire hazard is prohibited. Spillage from the Contractor's hauling vehicles on travelled public roadway or private roads shall be promptly cleaned up. On completion of construction, the Contractor shall remove all temporary structures, rubbish and waste materials resulting for their operations. ***(REVISED JUNE 2026)***

3.05 TIMING OF INSTALLATION

.1 The Contractor will schedule the work in a manner such that disruption of normal traffic and inconvenience to residents in the working area is kept to a minimum. Testing of pipe and cleanup of the site shall be completed no later than 30 days following commencement of construction on any street block. ***(REVISED JUNE 2026)***

.2 Departure from scheduling, as specified above, will be permitted only with the written consent of the City to a request made by the Contractor. ***(REVISED JUNE 2026)***

3.06 WORK WITHIN ROAD RIGHTS-OF-WAY

.1 All work within road rights-of-way must conform with, but not be limited to, the following requirements: ***(REVISED JUNE 2026)***

(a) Surface runoff is to be prevented from seeping into trenches.

(b) Excavation across entrances, whether private or commercial, shall be backfilled and thoroughly compacted, within two hours unless otherwise approved in writing by the tenant or property owner.

(c) Open cut excavation shall not be left open overnight or on weekends unless there are workers on duty and there is authorization by letter from the City. ***(REVISED JUNE 2026)***

(d) Adequate signs, barriers, flares, etc., to ensure the safety of the public, workers and traffic, are to be provided at all times. Lights and flares are to be in good working order at all times and are to be checked daily. Lights that are not operational shall be removed from the worksite. ***(REVISED JUNE 2026)***

(e) Existing drainage courses and culverts are to be preserved and maintained as required.

(f) If the City, at any time, deems it necessary, a representative from City forces, will be stationed at the work site to ensure that no damage is done to existing services. ***(REVISED JUNE 2026)***

SECTION 3 – GENERAL REQUIREMENTS
EXISTING STRUCTURES AND UTILITY WORKS

3.20 LOCATION OF STRUCTURES

.1 Prior to commencing any excavation the Contractor is responsible for exposing existing surface and underground structures that may affect the work or may be damaged during construction. ***(REVISED JUNE 2026)***

.2 Drawings or descriptions, verbal or otherwise, of existing structures or their location that are given to the Contractor are intended only as an aid to the location of these structures. Measurements and location of the existing underground structures shown on the drawings are no guaranteed to be accurate and must be verified by the Contractor prior to proceeding with construction.

3.21 PROTECTION, ADJUSTMENT AND SALVAGE OF STRUCTURES

.1 Unless removal is approved by the City Engineer, underground and surface structures encountered during construction must be protected from damage. If damage occurs as a result of construction activities, the Contractor is responsible for repairing or replacing the affected structures at their own expense to a condition at least equivalent to that which existed prior to construction. ***(REVISED JUNE 2026)***

3.22 EMERGENCY SITUATIONS

.1 In emergency situations resulting from the construction operation, where life or property is endangered, the Contractor must immediately take whatever action is required to eliminate the danger and also notify the appropriate authorities of the situation. ***(REVISED JUNE 2026)***

.2 In the specific case of a water or sewer break, the contractor must immediately notify the Public Works Department at 250-758-5222. ***(REVISED JUNE 2026)***

.3 During periods when the Contractor's personnel are not on the job (after hours and weekends) at least one of the three Contractor's representatives in Nanaimo shall be available by phone contact. The names, addresses and phone numbers of the three Contractor's representatives shall be filed with the City Engineer prior to commencement of construction and this list shall be updated by the Contractor as is necessary. ***(REVISED JUNE 2026)***

3.23 ACCESS MAINTAINED

.1 Existing hydrants, valve or manhole covers, valve boxes, curb stop boxes, fire or police call boxes, and all other utility controls, warning systems, and appurtenances thereof must remain clear of obstructions and accessible at all times during construction. The Contractor is required to provide bridges, walks, or other temporary facilities, as may be necessary, to ensure these controls or warning systems remain fully accessible and usable in their normal manner at all times during construction.***(REVISED JUNE 2026)***

3.24 CURTAILMENT OF UTILITY SERVICE

.1 Where existing utilities such as water, sanitary sewer, storm sewer, electricity, telephone, and gas are serving the public, work shall be planned and executed such that there is no curtailment of service provided by these utilities without prior receipt of approval of the authority having jurisdiction for provision and maintenance of these utilities. The Contractor shall obtain the above approvals from the authority having jurisdiction. If approval for such disruption of utility service is not granted, the Contractor may be able to establish temporary facilities to provide continuous utility service during the course of construction. Such temporary facilities must only be implemented after receiving the approval of the utility authority and all costs relating to the establishment of temporary services are to be borne by the Contractor. ***(REVISED JUNE 2026)***

.2 After receiving approval of the authority having jurisdiction, if the Contractor is to temporarily close off an existing utility, they must notify individual users of the utility at least forty-eight (48) hours prior to the time of shut-off, unless otherwise approved by the City Engineer. The notification is in the form of a hand delivered letter with the contractors contact information. ***(REVISED JUNE 2026)***

3.25 SUPPORT OF STRUCTURES

.1 Existing structures other than pipes must be protected against damage from settlement by means of support or compaction of backfill as required. Support shall remain in place following backfill of excavations. ***(REVISED JUNE 2026)***

.2 Backfill which is placed under or adjacent to existing structures which have been undermined during excavation shall be compacted in a manner which will prevent damage of the structure from settlement. Such backfill shall be of approved granular material suitable for compaction.

.3 For support of existing piping, other than asbestos cement or cast iron piping, refer to Standard Drawing No. T-11 [] in Section 4.0 – Excavation, Trenching and Backfill.

.4 Where excavations for works cross underneath existing asbestos cement or cast iron piping the existing pipe shall be replace by the Contractor with PVC pipe approved by the City Engineer or supported with a concrete grade beam refer to Standard Drawing No. T-11 [], Section 4.0 – Excavation, Trenching and Backfill as determined by the City Engineer. ***(REVISED JUNE 2026)***

3.26 DRAINAGE SYSTEMS *(REVISED JUNE 2026)*

.1 Existing culverts, enclosed drains, flumes and ditches, and other drainage works affected by the work but left in place, will be kept clear of excavated material at all times during construction. When it is necessary to temporarily remove an existing drainage works, the Contractor will install suitable temporary ditches or other approved means of handling the drainage during construction. Refer to Temporary Construction Facilities – Section 3.01 [→]. *(REVISED JUNE 2026)*

.2 Culverts and drain pipes will be replaced as per design at the time of trench backfilling, in accordance with this manual. *(REVISED JUNE 2026)*

.3 Discharging chlorinated water is prohibited into the storm drainage system without prior approval from the City Engineer. *(REVISED JUNE 2026)*

.4 Prior to, and during construction, the Contractor is responsible for erosion and sediment control measures as per existing bylaws, such as *Storm Sewer Regulation and Fee Bylaw* and *Development Approval Information Bylaw*. *(REVISED JUNE 2026)*

3.27 TREE PROTECTION

.1 Tree protection fencing is to be installed around all areas where trees are to be retained, as per the Tree Protection Area Plan. Refer to Standard Drawing No. TP-1 []. *(REVISED JUNE 2026)*

.2 Excavation is not to occur within the Tree Protection Area without direction and supervision from a qualified project arborist. After excavation outside of the Tree Protection Area has occurred, all exposed roots over 25 mm in diameter must be cleanly cut. *(REVISED JUNE 2026)*

.3 The operation of equipment, placing of fill, debris or any other construction related materials within the Tree Protection Area is prohibited.

3.60 CONTROL OF PUBLIC TRAFFIC – GENERAL

.1 The following general principles shall be maintained when performing works, construction or maintenance work, upon Right-of-Way and thereby affecting use of Municipal facilities. *(REVISED JUNE 2026)*

(a) All control of public traffic will be carried out in accordance with the ***BC 2020 Traffic Management Manual for Work on Roadways***, current edition and as amended. *(REVISED JUNE 2026)*

(b) All control of public traffic will be carried out in accordance with WorkSafeBC regulations.

(c) Make adequate provision to accommodate normal traffic along streets and highways immediately adjacent to or crossing the works so as to cause minimum inconvenience to the general public whilst maintaining the required level of safety. *(REVISED JUNE 2026)*

(d) Emergency vehicles utilizing warning devices (sirens, horns, lights) must be given immediate access through the site at all times. *(REVISED JUNE 2026)*

(e) Regional District of Nanaimo Transit and other forms of public transit are given priority over regular vehicles, such that they are not unnecessarily delayed. Co-ordination with transit authorities is the responsibility of the Contractor. *(REVISED JUNE 2026)*

(f) Regardless of the condition/width of existing facilities, accommodation is to be made for all forms of travel, including, but not limited to, pedestrians, cyclists, wheelchairs and mobility scooters, and users who are visually impaired.

(g) Provide and maintain reasonable roadway access and egress to properties fronting along, or in the vicinity of, the work. *(REVISED JUNE 2026)*

(h) The length of the worksite is proportional to the Works a contractor expects to complete in any one shift. *(REVISED JUNE 2026)*

(i) Unless otherwise accepted by the City, all regular forms of traffic must be reinstated to as near normal as possible when Works are not in progress. *(REVISED JUNE 2026)*

.2 Contractors shall prepare Traffic Management Plan(s) encompassing all activities on the Municipal rights-of-way.

(a) Traffic Management Plans must be submitted to the City for review. *(REVISED JUNE 2026)*

(b) Traffic Management Plans will be reviewed within ten (10) working days and either accepted or returned with a request for re-submission.

(c) Re-submissions will be reviewed within ten (10) working days from the date of resubmission.

(d) No works shall occur before the Traffic Management Plan has been accepted by the City.

(i) Acceptance of the Traffic Management Plan, by the City, does not imply any responsibility or liability for the completeness or correctness of the Traffic Management Plan. *(REVISED JUNE 2026)*

(e) The City, as part of the Traffic Management Plan, may require traffic disruptions to be limited to specific hours.

.3 The minimum level of Traffic Management Plan required for any works within the Municipal right-of-way (local roadways, lanes, pathways, parks and other Municipal facilities) include, but not be limited to, the following: *(REVISED JUNE 2026)*

(a) Description of the works and all impacted rights-of-way. *(REVISED JUNE 2026)*

(b) Name of the Contractor; Traffic Control Personnel/Subcontractor; Contractor's Traffic Manager.

(c) Provide 24 hour emergency contact information. *(REVISED JUNE 2026)*

(d) Note the location(s) of worksite identification signs. These signs shall have the name and phone number of the contractor and identify the project. *(REVISED JUNE 2026)*

(e) Note the location of safety equipment, muster station(s) and any other site facilities.

(f) Note locations of equipment/materials laydown/storage areas are for both working and non-working hours.

(g) Identify the figures used from the ***BC 2020 Traffic Management Manual for Work on Roadways.*** *(REVISED JUNE 2026)*

(h) Identify the expected truck movements to/from and through the site.

(i) Identify how the following street users will be accommodated: *(REVISED JUNE 2026)*

(i) Pedestrians
(ii) Visually Impaired
(iii) Persons with Mobility Issues
(iv) Cyclists
(v) Transit
(vi) Heavy Trucks
(vii) Vehicles

.4 For all arterial streets, collector streets and any local streets which have special requirements identified by the City, the following items are required in addition to the above: *(REVISED JUNE 2026)*

(a) Be prepared by a Qualified Registered Professional, and in accordance with the ***BC 2020 Traffic Management Manual for Work on Roadways***, current edition and as amended. *(REVISED JUNE 2026)*

(b) Be prepared using editable computer program, relatively to scale, and submitted in digital PDF 11x17 format.

(c) Include an accurate street configuration with street names, north arrow marker, speed limit and proposed extents of the relevant work item. ***(REVISED JUNE 2026)***

(d) Indicate placement marker and distance of signs; sign images and sign number; delineators, cones, barricades, etc; position of dedicated TCP's; and any traffic control equipment including Flashing Arrow Boards (FAB) and High Level Warning Devices (HLWD); symbols should match those within Chapter 4 and 5 of the ***BC 2020 Traffic Management Manual for Work on Roadways.*** ***(REVISED JUNE 2026)***

(e) Identify lanes to be obstructed, along with taper lengths and widths of lanes.

(f) Identify impacts to driveways, bus stops, parking, pedestrian and cyclist traffic. Include measures to facilitate and maintain access.

(g) Identify any road closures or detours.

.5 It is expected that the site superintendent designate, in charge of traffic control, will have the plan and/or copies of the relevant traffic control figures onsite available for review, at all times, for Works occurring within the right-of-way. It is understood that traffic control operations may require adjustment to site specific conditions; however, significant changes should be submitted to the City for acceptance. ***(REVISED JUNE 2026)***

.6 The City reserves the right to issue a Shut Down Notice for works within the City right-of-way at any time. Work within the right-of-way is not resume until a revised Traffic Management Plan has been submitted and accepted. Conditions for a City-based Shut Down Notice are if:***(REVISED JUNE 2026)***

(a) The Contractor's traffic set-up on site differs significantly from the accepted Traffic Management Plan.

(b) A copy of the accepted Traffic Management Plan and/or figures cannot be supplied. ***(REVISED JUNE 2026)***

(c) Emergency services or Regional District of Nanaimo Transit cannot be accommodated.

.7 Road Closures and Detours:

(a) Road closures and detours require approval of the City Engineer and may not be granted.

(b) A road closure must accommodate emergency traffic at all times unless otherwise approved by the City Engineer.

(c) At a minimum, local traffic must be reinstated at the end of every shift for Road Closures. ***(REVISED JUNE 2026)***

(d) Where practical, detours will avoid diverting traffic from a major or collector street to a local street. ***(REVISED JUNE 2026)***

(e) Where detours are to be installed, directional signage must be installed for length of the detour in both directions. ***(REVISED JUNE 2026)***

(f) Where detours or roadway closures are permitted, the Contractor will notify emergency services (fire, police and ambulance), as well as the Regional District of Nanaimo Transit, if the closure is on a bus route. ***(REVISED JUNE 2026)***

(g) Where detours are to be in place for longer than five days, the Contractor is to submit a pre-construction photo survey prior to implementing the detour. At the end of construction, the contractor is to complete a final inspection of the detour route and rectify any damage at the contractor's cost, in the opinion of the City Inspector, that was not evident prior to the detour implementation. ***(REVISED JUNE 2026)***

(h) Where roadway closures/detours affect private residences or businesses, the contractor shall provide written notice five (5) days in advance to all property owners and business owners affected by the closure or detours. A draft of the written notice needs to be accepted by the City prior to distribution. . ***(REVISED JUNE 2026)***

SECTION 3 – GENERAL REQUIREMENTS
GEOTECHNICAL ASSESSMENT AND REPORTING

3.70 GEOTECHNICAL ASSESSMENT AND REPORTING

.1 The design process for new roadway and underground utilities shall be supported by geotechnical engineering assessment and input. The scope of geotechnical assessment and engineering input is commensurate with the nature of the project, the complexity of ground conditions, and project specific performance requirements identified by the City Engineer and Professional of Record. The assessment and reporting will comply to the most recent version of the City's ***Guidelines for Geotechnical Reports***. In the absence of project specific design criteria provided by the City, the geotechnical assessment shall consider a functional design life under normal loading conditions of 100 years for new or upgraded underground utilities or road base, and 20 years for pavement design. ***(REVISED JUNE 2026)***

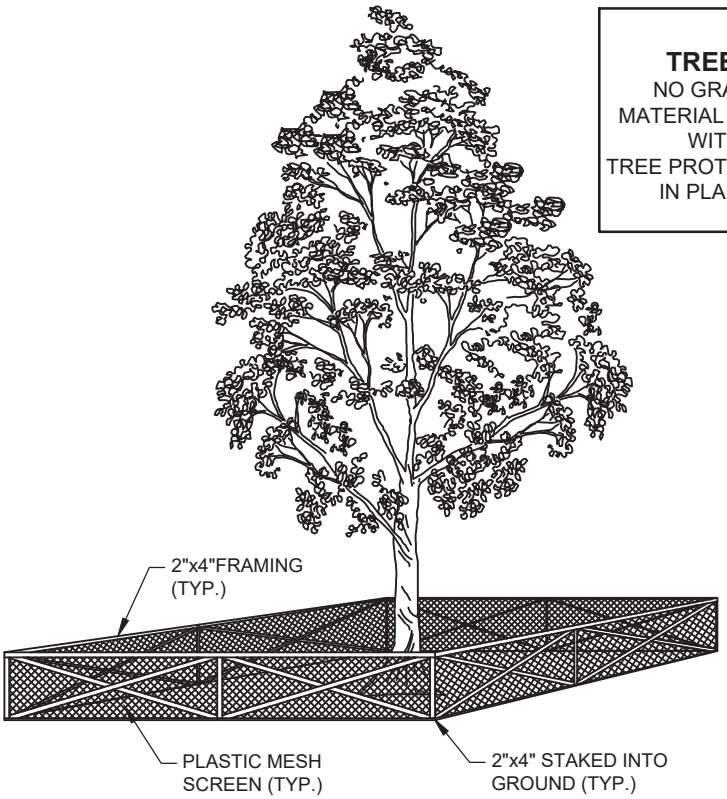
.2 Standard reporting expectations for projects involving new roadway and underground utilities include an assessment of geohazards; the characterization of soil and groundwater conditions pertinent to the project; subgrade conditions relative to the City's standard pavement sections and pipe bedding requirements, and trench backfill including the re-use potential of native backfill. Where appropriate, reporting includes construction recommendations related to site preparation, excavation, temporary trench stability, requirements for shoring, dewatering, and erosion and siltation control. ***(REVISED JUNE 2026)***

.3 Seismic considerations and performance must be consistent with the latest version of the City's ***Seismic Design Guidelines for Water, Sewer Utilities, and Roads***. ***(REVISED JUNE 2026)***

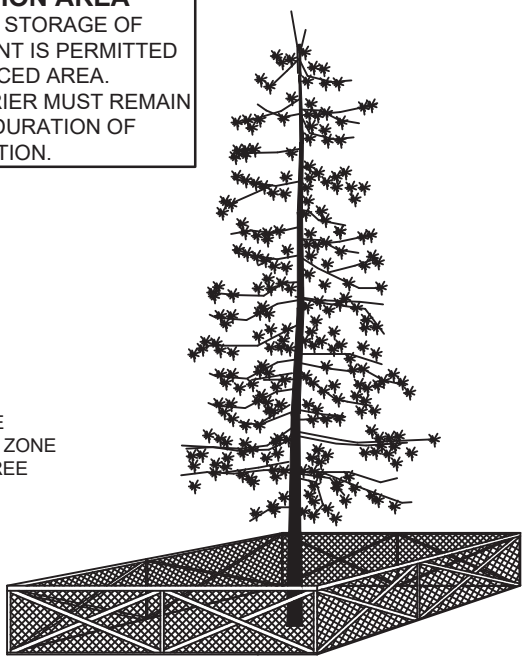
.4 The City expects geotechnical engineering, analysis, design and field reviews to conform with standard industry practice, including pertinent Professional Practice Guidelines and Advisories issued by the Engineers and Geoscientists of BC. ***(REVISED JUNE 2026)***

SIGNAGE TO BE POSTED ON EACH TREE PROTECTION BARRIER (WEATHER PROOF, 11"x17" MINIMUM SIZE)

NO ENTRY
TREE PROTECTION AREA
NO GRADE CHANGE, STORAGE OF MATERIAL OR EQUIPMENT IS PERMITTED WITHIN THIS FENCED AREA.
TREE PROTECTION BARRIER MUST REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION.



SIZE OF TREE PROTECTION ZONE BASED ON TREE DIAMETER



TREE PROTECTION FENCING:

PRIOR TO CONSTRUCTION TAKING PLACE ON THE SITE A PROTECTION FENCE (SEE SPECIFICATIONS BELOW) SHALL BE INSTALLED ON THE SITE ACCORDING TO THE LAYOUT ON THE DRAWING ALONG THE EXISTING GRADE. PRIOR TO THE INSTALLATION OF THIS FENCE, THE LAYOUT SHOULD BE REVIEWED BY THE CITY ENGINEER. THE ENGINEER WILL INSTRUCT THE CONTRACTOR AND ALL SUBCONTRACTORS ON THE IMPORTANCE OF FOLLOWING THESE TREE PROTECTION MEASURES. THE CONTRACTOR AND ALL SUBCONTRACTORS WILL BE REQUIRED TO SIGN OFF THEIR CONCURRENCE OF THIS PLAN.

1. HEIGHT OF FENCE TO BE 1.2m (4').
2. 2"X4" S TO BE USED FOR VERTICAL POSTS, TOP AND BOTTOM RAILS AND CROSS BRACING (IN AN "X"); ROUND UN-TREATED VERTICAL POSTS MAY BE USED WITH A MINIMUM DIAMETER OF 9cm.
3. SPACING BETWEEN VERTICAL POSTS TO BE NO FURTHER APART THAN 3.7m (12') ON CENTRE.
4. STRUCTURE MUST BE STURDY WITH VERTICAL POSTS DRIVEN FIRMLY INTO THE GROUND.
5. CONTINUOUS PLASTIC MESH SCREENING (E.G. ORANGE SNOW FENCING).
6. SIGNS ENTITLED "TREE PROTECTION AREA" TO BE POSTED ON FENCE EVERY 15m.
7. LOCATION OF FENCE AS SHOWN ON PLAN.

MINIMUM PROTECTION REQUIRED AROUND TREE			
TRUNK DIAMETER (cm)	DISTANCE FROM TRUNK (m)	TRUNK DIAMETER (cm)	DISTANCE FROM TRUNK (m)
20	1.2	50	3.0
25	1.5	55	3.3
30	1.8	60	3.6
35	2.1	75	4.5
40	2.4	90	5.0
45	2.7	100	6.0

CITY OF NANAIMO
THE HARBOUR CITY

TREE PROTECTION FENCING

Scale:	NTS
Created:	FEB 2019
Rev Date:	JUNE 2026
Dwg No:	TP-1

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 3 DWG\TP-1
3.25.2026

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SECTION 4 –EXCAVATION, TRENCHING AND BACKFILL
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SECTION 4 – EXCAVATION, TRENCHING AND BACKFILL SPECIFICATIONS AND INSTALLATION *(REVISED JUNE 2026)*

4.01 SCOPE

.1 This specification refers to excavation, trenching, and backfill and all work pertaining thereto. Only those aggregates and granular materials approved by the City Engineer will be accepted for installation.

.2 Utility trenches shall be excavated only as far in advance of the pipe laying operation as safety, traffic, and weather conditions permit. Caution shall be exercised with respect to structures, piping, or other obstacles that may exist within the working area and due consideration given to the protection and support of such properties and structures. *(REVISED JUNE 2026)*

4.02 TESTING

.1 For testing requirements, refer to Section 9.21 [].

4.03 -NOT USED-

4.04 PRECUTTING PAVED SURFACES

.1 When trenching along or across a paved surface, pavement shall first be sawn or cut by methods approved by the City Engineer in straight lines parallel to the trench centerline. The total cut width of pavement shall not be greater than the specified maximum trench width at the ground surface shown on the drawings. Concrete curbs and sidewalks shall be sawn at existing joints. *(REVISED JUNE 2026)*

.2 Where the existing pavement is in poor condition, it may be cut by hand, mechanical means, or trenching equipment, following approval from the City Engineer. *(REVISED JUNE 2026)*

.3 When asphalt cutting around a manhole is required to repair the manhole frame and cover, it shall be done in accordance with Standard Drawing No. T-4B [].

.4 Pavement that has been cut and removed to permit trenching shall be disposed of as waste material and shall not be placed in the trench backfill.

.5 Pavement Restoration shall be done in accordance with Section 4.29 – Pavement Restoration [→].

4.05 SITE PREPARATION

.1 Remove all brush, weeds, grasses and accumulated debris from the trench width and working area.

.2 For trenchwork in existing lawns, carefully cut and remove sod prior to excavation. *(REVISED JUNE 2026)*

.3 For trenchwork in landscaped statutory rights-of-way, carefully removed fences, shrubs, small trees and other items for replacement after backfilling is completed. *(REVISED JUNE 2026)*

.4 For trenchwork in landscaped boulevards, the Contractor shall provide 14 days' notice to all property owners for the removal of all fences, shrubs, small trees or other structures or plantings within the road rights-of-way that the property owner wishes to retain. Plantings and structures listed above, not be removed by the property owner upon expiration of the 14 day notice, shall be removed and disposed of by the Contractor.

.5 Remove all topsoil within the trench width and where required in the working area, and stockpile for replacement at locations approved by the City Engineer. Stumps, boulders and other deleterious material shall be removed from the topsoil and disposed of as specified in Section 4.11 – Disposal of Excavated Material [→]. Do not handle topsoil while it is wet or frozen. *(REVISED JUNE 2026)*

.6 Cut pavement, sidewalks and curbs in accordance with Section 4.04 – Precutting Paved Surfaces.

.7 Provide temporary drainage control to protect construction area and adjacent properties. Provide erosion and siltation controls to protect natural watercourse or existing storm drainage systems. *(REVISED JUNE 2026)*

4.06 TRENCH ALIGNMENT AND DEPTH

.1 The trench shall be excavated so that the pipe can be laid to the established alignment and depth with allowance made for specified trench wall clearances and bedding as required.

.2 Prior to, or at the commencement of construction, the Contractor shall check existing mains for line and elevation at the point of connection. If they are different than what is shown on the construction drawings, the Contractor shall immediately report the difference to the Professional of Record and cease construction pending direction from the Professional of Record. *(REVISED JUNE 2026)*

4.07 TRENCH EXCAVATION

.1 Trench excavation shall be classified as common or rock excavation.

.2 Trenches shall be excavated to the section and dimensions as shown on the drawings. Trench stability and safety procedures shall conform to WorkSafeBC *Regulations*.

.3 Large rock, boulders, and large stones shall be removed to provide a clearance of at least 150 mm around all sides of pipe, fittings and appurtenances.

.4 In road rights -of-way, the trench width shall be kept to a minimum and the trench width be such that at least one-way traffic can be maintained at all times unless otherwise approved by the City Engineer.

.5 To prevent damage to existing utilities, excavate the last 300 mm above the utility by hand.

.6 If, in the opinion of the Professional of Record, trench width exceeds the maximum allowable for pipe support, the Contractor may be required to provide a higher class of bedding, a pipe with a higher strength class or concrete encasement at no extra cost to the owner. *(REVISED JUNE 2026)*

.7 Excavation for manholes shall be dimensions which will permit assembly of the sections in accordance with these specifications.

.8 Excavate trenches only as far in advance of pipe laying operation as safety, traffic and weather conditions permit. In no case shall open trenches exceed 30 m.

.9 All excavations left unattended shall be adequately protected with approved fencing and barricades and with flashing lights where required.

4.07A COMMON EXCAVATION

.1 Common excavation is the excavation and removal of all material encountered which is not classified as rock.

.2 All material classified as common excavation shall be removed, to the design subgrade cross-section, or as otherwise established by the Professional of Record. *(REVISED JUNE 2026)*

.3 Material which, in the opinion of the City Engineer, is not suitable for use as earth fill or rock fill, or not required for the works as shown on the construction drawings, shall be disposed of as specified in Section 4.11 – Disposal of Excavated Material [→]. *(REVISED JUNE 2026)*

.4 Material which is suitable for earth fill or rock fill shall be placed and compacted in those areas requiring filling to the design subgrade cross-section, as per Section 9.26 [].

4.07B ROCK EXCAVATION

.1 Rock excavation is:

(a) The removal of detached masses of rock including single boulders, and pieces of concrete or masonry having individual volumes in excess of one cubic metre, or solid rock which requires drilling and blasting or breaking with a power-operated tool for its removal.

(b) Removal of soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, or previously blasted or broken stone in rock fills or elsewhere with individual volumes less than one cubic metre, or boulders or pieced of fractured rock which do not occur naturally within the excavated volume but fall into the excavation from the adjacent area, shall not be classified as rock excavation. Hardpan (glacial till) shall not be classified as rock excavation.

(c) Overbreak, is that portion of solid rock which is excavated, displaced or loosened outside the limits used to calculate the volume of rock excavation and will be classified as unauthorized overexcavation.

.2 Rock excavation for trenches:

(a) Where rock is encountered in the trench or pit, the method of removal shall be agreed with the City Engineer before its removal. *(REVISED JUNE 2026)*

(b) When blasting is required during excavation, the Contractor must exercise extreme care and must not damage existing pipelines, other utilities, or private property. Blasting must be done by experienced persons, qualified for the work. Compliance with regulations regarding the use and storage of explosives is the responsibility of the Contractor. The Contractor is responsible for any accidents or injury, loss and/or damage that might occur as a result of blasting. *(REVISED JUNE 2026)*

(c) Overbreak shall be removed as approved by the City Engineer and replaced with approved granular material, placed and compacted as specified herein at no additional cost to the Owner. *(REVISED JUNE 2026)*

(d) Rock excavation shall be carried out to the design subgrade cross-section. No points or pinnacles of rock shall be left protruding above the rock cut cross-section. Subgrade rock shall be shattered at least 300 mm below the subgrade.

(e) In rock cuts, care shall be exercised to ensure no damage is caused to the supporting rock below the roadway. Damage so caused, shall be repaired to a condition approved by the City Engineer at no additional cost to the Owner. *(REVISED JUNE 2026)*

4.08 -NOT USED-

4.09 HAND EXCAVATION

.1 Mechanical trenching and backfilling equipment shall be used except where by so doing, damage to trees, buildings, sidewalks, curbs, piping, or other existing structures or obstacles above or below ground cannot be avoided. Trenches shall be hand excavated and backfilled where such obstacles prevent the use of mechanical equipment. *(REVISED JUNE 2026)*

.2 Authorized hand excavation shall be restricted to trench excavation in statutory rights-of-way and only in those locations which, in the opinion of the Professional of Record, necessitate hand excavation methods. *(REVISED JUNE 2026)*

.3 The following and similar circumstances shall not be considered as authorized hand excavation:

(a) Crossing of existing structures and utility works;

(b) Where lighter or smaller mechanical equipment could be used;

(c) Where, by the use of close sheeting, timber support, equipment pads, or other facilities, mechanical equipment could be used; or

(d) Where the presence of timbering, sheeting, well pointing equipment, or other Contractor placed obstacles restrict the use of mechanical equipment.

4.09A AUTHORIZED OVEREXCAVATION

.1 Authorized overexcavation is that excavation requested by the City Engineer as a result of unsuitable foundation conditions not resulting from the Contractor's operation. *(REVISED JUNE 2026)*

.2 Authorized overexcavation shall be replaced with earth fill, rock fill, approved granular material, sub base material or base course as approved by the City Engineer. Replacement fill shall be placed as specified elsewhere herein. *(REVISED JUNE 2026)*

4.09B UNAUTHORIZED OVEREXCAVATION

.1 Unauthorized overexcavation is that excavation required as a result of the Contractor's operation as determined by the City Engineer. *(REVISED JUNE 2026)*

.2 Replacement of unauthorized excavation shall be as specified in Section 4.09A.2 – Authorized Overexcavation and shall be at no additional cost to the Owner.

4.10 STOCKPILING OF EXCAVATED TRENCH MATERIAL

.1 Common excavation approved by the City Engineer for reuse as approved granular backfill, may be stockpiled along the trench in accordance with WorkSafeBC regulations and provided the working space is adequate for this purpose and provided that by doing the backfill material does not spill onto private properties adjacent to the line of the trench thereby disturbing fenced, buildings, shrubs, lawns, or other items of value. *(REVISED JUNE 2026)*

.2 Stockpiling of excavated material along the trench shall not unduly restrict cross traffic at roadway intersections. Material shall be cleared from roadway intersections and provision made for use of the cross street by traffic as soon as possible after excavation has taken place. Pedestrian traffic to individual properties shall be maintained at all times and timber bridges shall be provided where it is necessary to cross open trenches. Roadways, driveways, and drainage facilities shall not be blocked unnecessarily. The spoil pile shall be located such that hindrance to local traffic is minimal. *(REVISED JUNE 2026)*

.3 In order that excavated material may be stockpiled along the trench, the roadway may be temporarily closed to traffic with the permission of the City and providing that adequate detour traffic routes can be established to move traffic around the construction area, and providing also that street entrances to driveways are not blocked from vehicular traffic for periods in excess of one day. One lane shall be kept open at all times for emergency vehicles unless otherwise approved by the City Engineer. *(REVISED JUNE 2026)*

.4 Where excavated material cannot be stockpiled along the trench in compliance with the above restrictions, it shall be trucked to locations where backfilling is taking place or trucked to stockpile for return to the trench at the time of backfilling. Alternatively, subject to approval of the City Engineer, excavated material may be wasted and replaced with approved material at the time of backfilling. *(REVISED JUNE 2026)*

.5 The Contractor shall retain sufficient approved granular backfill material for the backfilling of the trench. Surplus approved granular backfill material shall be taken to and used at other locations within the project site suitable for material placement.

.6 The Contractor shall take all measures required to protect approved granular backfill from contamination, segregation and weather.

4.11 DISPOSAL OF EXCAVATED MATERIAL

.1 Surplus of waste excavated material shall be removed from the trench area during the excavation or backfilling operations and shall not be left along the trench following the completion of backfilling the trench.

.2 Surplus excavated material which is not required for the works, as shown on the drawings or specified elsewhere herein, shall be disposed of at the sites obtained by the Contractor. Waste material shall not be dumped on private property without the written permission of the property owner and a fill permit obtained from the City. *(REVISED JUNE 2026)*

.3 The Contractor shall exercise particular care to avoid spillage on paved roadways over which excavated material is hauled, and any such spillage shall be cleaned up promptly by sweeping.

.4 Failure to immediately begin cleanup of spillage from roadways when required by the City Inspector will result in the Contractor being charged all costs accrued by the City to do the cleanup work. *(REVISED JUNE 2026)*

.5 Care shall also be exercised to avoid spreading the excavated material over a wide area and rutting or otherwise damaging unnecessarily adjacent property when side casting of excavated material is permitted.

4.12 BRACING AND SHEETING

.1 Trenches shall be excavated, sheeted and braced in accordance with WorkSafeBC regulations or as may be necessary to protect life, property, and structures adjacent to the work, the work itself, or to maintain trench widths within the specified limits. Trench sheeting and bracing shall be located no closer than 150 mm to the widest section of any installed pipe.

.2 Whenever possible, vertical trench timber or sheeting shall be placed so that it does not extend below the springline of the pipe being installed. When it is necessary to place sheeting or timber below the pipe springline, as in the case of overexcavation for trench bottom stabilization, sheeting shall be raised in 600 mm lifts and all backfill placed below the level of the pipe springline shall be thoroughly compacted on each lift to fill the void left by the raised sheeting.

.3 Trench sheeting and bracing shall be removed, except in situations where the removal of trench sheeting and bracing will result in damage to adjacent structures. When sheeting and bracing is left in place, it shall be cut off above springline.

.4 Where sheeting or timber is removed from a trench in which backfill is to be compacted, it shall be removed in a manner which permits compaction of the backfill in the manner specified.

.5 WorkSafeBC approved cages may also be used in place of sheeting.

4.13 DEWATERING

.1 During construction, ground and surface water shall be controlled to the extent that excavation and pipe installation can proceed in the specified manner and such that the trench bottom is not disturbed to the detriment of the pipe installation. Trench water shall not be permitted to enter the pipe being installed unless approved by the Professional of Record. *(REVISED JUNE 2026)*

.2 Pumps, well points, or other equipment shall be employed to keep excavations free of water. Caution shall be exercised to make sure that the foundation problems with existing structures and works under construction do not result from the selected method of dewatering excavations.

.3 Discharge from pumps, well points, or other dewatering equipment shall be located and controlled such that loss, damage, nuisance, or injury does not result.

.4 The Contractor shall be responsible for any claims or actions resulting from the dewatering operation.

4.14 TRENCH BOTTOM CONDITIONS

.1 Trenches shall be maintained such that pipe can be installed without allowing water, muck, silt, gravel, or other foreign material into the pipe. Material remaining in the trench bottom on completion of machine excavating which has been disturbed or softened by workmen or trench water shall be removed before bedding material is placed. The trench bottom shall be firm and capable of supporting the pipe to be installed.

.2 When, in the opinion of the Qualified Registered Professional, the material in the trench bottom is found to be unstable or otherwise unsuitable for pipe support or the support of appurtenant structures, the Qualified Registered Professional shall direct the Contractor to utilize the most suitable of the following stabilization methods: *(REVISED JUNE 2026)*

(a) Overexcavate to suitable subgrade and backfill with base gravel and compact to 95% Modified Proctor Density (ASTM D1557). Use of approved granular material, subbase gravel, drain rock or bedding material shall be approved by the Professional of Record. *(REVISED JUNE 2026)*

(b) Use of concrete bedding as directed by the Professional of Record. *(REVISED JUNE 2026)*

(c) Other methods as proposed by the Professional of Record and approved by the City Engineer. *(REVISED JUNE 2026)*

4.15 AUGERING

.1 Augering shall be performed with hand- or power-operating equipment, if approved by the City Engineer. *(REVISED JUNE 2026)*

.2 Auger holes shall terminate in open trench.

.3 Augering shall be performed such that undermining or displacement of the roadway structure does not result and the completed auger hole is not more than 50 mm larger in diameter than the maximum outside diameter of the casing pipe or pipe to be augured.

.4 The augured hole shall be to the correct line and grade. If an obstruction is encountered that will cause deviation from the correct line and grade, a new hole shall be augured.

4.16 CASING PIPES

.1 Casing pipes shall be as shown in the construction drawings and shall be laid to the grade alignment shown.

.2 The same bedding and backfill criteria shall be used for casing pipe as required for the main piping.

.3 All pipe joints within the pipe casing shall be fully restrained with approved mechanical restrainers and shall be approved by the City Engineer. *(REVISED JUNE 2026)*

4.17 BEDDING WITHIN PIPE ZONE

.1 Bedding materials shall be granular in nature, free of organic material, silt or clay, and shall conform to the following gradation limits when tested in accordance with ASTM C136/C136M:

Gradation Limits (Percent by Weight Passing)		
Sieve Designation	**Type 1**	**Type 2**
19.00 mm	100	90-100
12.50 mm		65-85
9.50 mm	85-100	50-75
4.75 mm	70-100	25-50
2.36 mm		10-35
1.18 mm	20-65	
0.85 mm		5-20
0.60 mm	0-45	
0.425 mm		0-15
0.18 mm		0-8
0.15 mm	0-10	
0.075 mm	0-5	0-5

.2 Type 1 is the standard acceptable bedding material. Type 2 shall be used where specified by the Professional of Record. *(REVISED JUNE 2026)*

.3 Other acceptable bedding materials, for use only where shown on the construction drawings or as approved by the City Engineer, are clear crush or pea gravel. *(REVISED JUNE 2026)*

.4 The bedding material shall cover the full width of the trench bottom and have a minimum depth of 100 mm on completion of compaction. In rock excavation, the minimum depth of bedding below the pipe shall be 150 mm after completion of compaction.

.5 Bedding material shall be compacted in maximum 150 mm lifts to 95% of Modified Proctor Density (ASTM D1557).

.6 Bedding material shall be placed in such a manner that the pipe is evenly supported throughout its length by the pipe bedding material.

.7 Placement and compaction of the bedding material shall not damage or displace the pipe.

.8 Bedding material shall be leveled across the full width of the trench to an elevation of 300 mm above the crown of the pipe.

4.18 TRENCH DAMS

.1 Trench dams shall be constructed on all utility main lines where grades are ten percent (10%) or greater, or when indicated on the construction drawings.

.2 All trench dams on utility mains shall be constructed in accordance with Standard Drawing No. T-8 []. Trench dams on storm sewer gravity mains as per Standard Drawing No. T-8A [] requires approval by the City Engineer.

.3 All trench dam drain pipes shall be capped at the highest end of the run.

.4 Trench dam spacing shall be as follows:

Sanitary and storm gravity sewers		Watermains and forcemains	
Slope	**Maximum spacing**	**Slope**	**Maximum spacing**
10% - 15%	30 m	10% - 29%	10 m (upon approval of City Engineer)
15% - 20%	25 m		
20% - 35%	20 m		
35% - 50%	15 m	30% - Over	See Section 4.18.5
50% - Over	10 m		

.5 Where the slope of the watermain is 30% or greater, a geotechnical study shall be submitted to assess slope stability. Geotechnical studies shall be completed in accordance with the "***Guidelines for Legislated Landslide Assessments for Proposed Residential Development in British Columbia***" published by EGBC. Additionally, the City Engineer may request a geotechnical study regardless of the pipe grade if the stability of the adjacent slope is in question.

.6 If approved by the City Engineer, concrete trench dams may be constructed of wetted sandbag sacks filled with wet pre-mixed concrete for areas inaccessible by construction equipment. Sacked concrete shall be laid in courses such that joints in succeeding courses are staggered. Courses shall be a minimum of nine (9) per vertical metre and shall be placed around the pipe and keyed into the trench walls to form a water tight dam. *(REVISED JUNE 2026)*

.7 Relief drains shall be installed on all trench dams to an acceptable watercourse or storm sewer system.

4.19 BACKFILL AND COMPACTION

.1 Backfill material shall be:

(a) Road Sub Base as per Section 9.30 – Road Sub-Base Gravel Course [].

(b) Road Base as per Section 9.31 – Road Base Gravel Course [].

(c) Approved Granular Material as per Section 9.29 – Approved Granular Backfill [].

(d) Recycled Aggregate Material (RAM) as per Section 9.32 – Recycled Aggregate Material [].

(e) Controlled Density Fill as per Section 4.24 – Controlled Density Fill [→].

.2 General:

(a) Placement and compaction of backfill material shall not damage or displace the pipe.

(b) Remove shoring or cages in such a manner as to allow proper compaction and to prevent trench walls from collapsing.

(c) Place backfill in lifts of maximum of 300 mm (200 mm for Approved Granular Backfill) in loose thickness.

(d) Crushed, granular, imported materials shall be used for backfill unless native soils are suitable and approved by the Professional of Record, and are specified on the construction drawings. *(REVISED JUNE 2026)*

(e) Deficiencies in the quantities of approved granular backfill material which are the result of the Contractor's operation shall be replaced with imported granular fill at no additional cost to the Owner.

(f) Trenches shall be backfilled to a depth to allow for surface restoration in accordance with Section 4.27 – Surface Restoration [→].

.3 Travelled Surfaces: *(REVISED JUNE 2026)*

(a) Travelled surfaces are roadways, lanes, driveways, road shoulders, sidewalks, walkways or other surfaces on which vehicular or pedestrian traffic normally travels. The ultimate extent of the travelled surface must be considered. *(REVISED JUNE 2026)*

(b) Under no circumstances shall a trench in a travelled area be left in a hazardous condition. *(REVISED JUNE 2026)*

(c) Trenches in travelled surfaces shall be backfilled with material specified in Section 4.19 [→]. RAM and Approved Granular Material requires specific approval by the City Engineer, and may only be used up to the bottom of the sub-base layer. *(REVISED JUNE 2026)*

(d) All backfill materials shall be compacted to 95% Modified Proctor Density (ASTM D1557), and field tested in accordance with ASTM D6938.

.4 Untravelled Surfaces: *(REVISED JUNE 2026)*

(a) Untravelled surfaces are all other surfaces not classified as travelled surfaces. *(REVISED JUNE 2026)*

(b) Untravelled surfaces shall be backfilled with approved excavated backfill or material specified in Section 4.19.1 [→] and compacted to 90% Modified Proctor Density (ASTM D1577).

4.20 -NOT USED-

4.21 CONCRETE

.1 Concrete for pipe base, encasement or backfill shall have a minimum compressive strength of 32MPa at twenty-eight (28) days and be in accordance with Section 11.31 – Concrete [].

.2 Backfill material shall not be placed over the concrete until the concrete has obtained its initial set but in no case shall time be less than one hour.

4.22 -NOT USED-

4.22A -NOT USED-

4.23 -NOT USED-

4.24 CONTROLLED DENSITY FILL

.1 All materials and methods shall conform to CAN/CSA A23.1 and A23.2.

.2 Materials:

(a) Portland cement: Type 10 to CAN/CSA A3000, for winter conditions Type 30 may be used.

(b) Fly Ash: Type F to CAN/CSA A23.5.

(c) Water: To CAN/CSA A23.1.

(d) Aggregate: To CAN/CSA A23.1.

(e) Air entraining admixture: To CAN3 – A266.2.

(f) Chemical admixtures: To CAN3 – A266.2. Use of admixtures to accelerate or retard curing as directed by the Professional of Record. *(REVISED JUNE 2026)*

.3 Mix Design:

(a) Compressive strength: 0.5MPa at twenty-eight (28) days.

(b) Cement content: 25kg per m^3.

(c) Slump: 150 – 200 mm.

(d) Air entertainment: 4 – 6%.

.4 Formwork:

(a) Formwork, if required, shall conform to CSA S269.3.

.5 Placement:

(a) Provide the City Engineer with twenty-four (24) hours' notice prior to placing controlled density backfill. *(REVISED JUNE 2026)*

(b) Segregation of the material during placement shall not be permitted. Pumping of controlled density fill is permitted if approved by the City Engineer. *(REVISED JUNE 2026)*

(c) Internal vibrators or other methods of consolidation may be used to ensure undercut areas of pavement are fully supported.

(d) When using controlled density fill to bed and surround the pipe, material shall be placed so as not to damage or displace the pipe.

(e) Begin placement of controlled density fill at the high end of sloping trenches.

(f) Do not place load on the controlled density backfill until approved by the Professional of Record. *(REVISED JUNE 2026)*

(g) Steel road plates or other approved means of supporting traffic shall be used until surface restoration can proceed.

4.25 -NOT USED-

4.26 -NOT USED- *(REVISED JUNE 2026Moved to Section 9.0)*

4.27 SURFACE RESTORATION

.1 General:

(a) Surface restoration shall be completed immediately following the backfilling operation.

(b) Restore all disturbed surfaces to a condition equal to or better than the condition that existed prior to construction to the satisfaction of the City Engineer unless otherwise specified. *(REVISED JUNE 2026)*

(c) Repair any damage to adjacent lands or improvements.

(d) Damage to paved surfaces shall be seal coated, patched or replaced in an approved manner to the satisfaction of the City Engineer. *(REVISED JUNE 2026)*

(e) Damage to graveled surfaces shall be restored by scarifying, re-grading, and compacting the surface, or if required, re-gravelling the surface with base gravel or approved equivalent to the satisfaction of the City Engineer. *(REVISED JUNE 2026)*

.2 Travelled Surfaces:

(a) Restoration of travelled surfaces shall conform to the following minimum requirements, or shall match the existing road structure, whichever is greater, unless otherwise noted on the construction drawings.

Location	Sub-Base	Base	Surface Treatment *(REVISED JUNE 2026)*
Gravel Shoulders	300 mm	50 mm	-
Asphalt Roads (Existing)			Refer to Section 9.02.1 []
Asphalt Roads (With CDF)	CDF	100 mm	75 mm Asphalt
Gravel Driveways	-	100 mm	-
Asphalt Driveways	-	100 mm	50 mm Asphalt
Concrete Driveways			Refer to Standard Drawings in Section 8.0 []
Concrete Sidewalks & Walkways			Refer to Standard Drawings in Section 8.0 []
Asphalt Paths & Walkways			Refer to Standard Drawings in Section 8.0 []

(b) Place sub-base and base in 300 mm lifts (unless otherwise specified) and compact to 95% modified Proctor Density (ASTM D1557). Field compaction testing to be conducted in accordance with ASTM D6938 and at the frequencies referred to in Section 9.21 [].

(c) Restore asphalt road surfaces in accordance with Section 4.29 – Pavement Restoration [→].

(d) Concrete shall be in accordance with Section 8.0 – Transportation [] and Section 11.0 – Cast In Place Concrete Works [].

.3 Ditches:

(a) Reshape ditches to the original lines, grades and sections as existed prior to construction unless otherwise shown on the construction drawings.

(b) Restore ditch with a minimum of 300 mm of approved granular material, or other material specified of the Professional of Record where stability of ditch slopes and bottom cannot be maintained. *(REVISED JUNE 2026)*

(c) Compact to 95% Modified Proctor Density (ASTM D1557).

.4 Boulevards, Statutory Rights-of-Way and Private Property:

Surface restoration in untravelled boulevard areas shall be limited to the replacement of topsoil, grass, gravel, rock chips or bark mulch (subject to drainage conditions) unless otherwise stated in the construction drawings or contact documents.

(a) Surface restoration shall be a minimum depth of 100 mm, or to meet pre-construction conditions, whichever is greater, unless otherwise noted on the construction drawings.

(b) Restore unimproved areas with materials equivalent to the surface conditions prior to construction.

(c) Restore gardens with materials approved by the City Engineer including topsoil, bark mulch, rock chips or other materials required to match pre-construction conditions. *(REVISED JUNE 2026)*

(d) Restore lawns with sod removed prior to construction, otherwise restore lawn with topsoil approved by the City Engineer and seed or sod to match existing lawn. *(REVISED JUNE 2026)*

(e) Restore gravel surfaces with equivalent granular materials.

(f) Restore driveways in accordance with Section 4.27.2 [→].

(g) Restore landscaped areas in accordance with Section 4.27.5 [→].

(h) Surface restoration in statutory rights-of-way shall also be in accordance with the rights-of-way condition sheet. *(REVISED JUNE 2026)*

(i) Prior to acceptance of the work, the Contractor shall obtain and submit, in duplicate to the City Engineer, a written release from each property owner, where works were constructed or damaged, certifying that the property owner is satisfied with the completed works. *(REVISED JUNE 2026)*

.5 Landscaped Areas:

(a) Topsoil, shrubs, small trees, fences and other items removed prior to, or during construction shall be replaced to the satisfaction of the property owner.

(b) Replacement shrubs, trees and plants shall be planted at a suitable time of the year in accordance with good horticultural practice to provide a maximum assurance of survival.

(c) During the maintenance period, any trees, shrubs or plants which show signs of dying as a result of the Contractor's operation shall be replaced with new plantings of a similar variety, age and size at no extra cost to the owner.

4.28 FINAL CUTTING PAVED SURFACES

.1 All final pavement cuts shall be sawn in accordance with Section 4.29 – Pavement Restoration [→].

.2 All final cuts shall be a minimum of 300 mm from the trench wall.

.3 All longitudinal pavement cuts in roadway shall lie outside a vehicle wheel path, unless otherwise directed by the City Engineer. *(REVISED JUNE 2026)*

.4 If the edge of the trench is within 1 m of the edge of the roadway, curb, or gutter, the Contractor is required to remove and replace the asphalt to the edge of pavement. *(REVISED JUNE 2026)*

4.29 PAVEMENT RESTORATION

.1 All permanent restorations will require a minimum 75 mm asphalt thickness and shall be constructed in accordance with Standard Drawing No. T-4A [] or as approved by the City Engineer. *(REVISED JUNE 2026)*

.2 All pavement restorations where asphalt cutting around a manhole is required, shall be done in accordance with Standard Drawing No. T-4B [].

.3 All excavations in travelled paved areas shall be patched on the same day as the excavation with a temporary or permanent patch, or with approved steel plates, unless otherwise directed by the City Engineer. *(REVISED JUNE 2026)*

.4 Temporary Pavement Patching:

(a) All temporary patching and steel road plates shall be installed and maintained to ensure safe and smooth conditions.

(b) Temporary patching shall consist of cold or hot mix asphaltic concrete as approved by the City Engineer and placed to a minimum compacted thickness of 50 mm. Refer to Section 4.29.5(a) for the maximum time allowable prior to permanent asphaltic concrete restoration. If the temporary cold mix is raveling, the Contractor has five calendar (5) days to provide a suitable remediation plan. Failure to provide the plan may result in City forces completing the work and recovering the costs. *(REVISED JUNE 2026)*

(c) On Local roads, with specific approval by the City Engineer, compacted granular material as specified in Section 4.19 [→] may be used as temporary restoration for a maximum 5 day period as per the contract documents.

(d) Use of steel road plates shall require approval from the City Engineer and shall only be used where the specifications or drawings require the trench to be left open (i.e. to allow curing of concrete or controlled density fill). Steel plates shall be rated to meet traffic loading requirements. *(REVISED JUNE 2026)*

.5 Permanent Asphaltic Concrete Pavement Patching:

(a) Install the permanent pavement patch within 15 calendar days of excavation, unless an extension is approved by the City Engineer. *(REVISED JUNE 2026)*

(b) Remove and dispose of all broken, cracked, damaged or temporary pavement as well as paved areas showing settlement. All edges are to be saw cut or milled.

(c) All pavement outside the allowable trench width, as shown on Standard Drawing No. T-1 [] that is damaged as a result of the Contractor's operation shall be removed; all backfill beneath the damaged pavement re-compacted; and the pavement reinstated in accordance with these specifications at no additional cost to the Owner.

(d) If required, re-cut existing pavement so that the location and alignment of the patch is in accordance with Section 4.28 – Final Cutting Paved Surfaces [→], and so that the pavement edge is a minimum of 300 mm from the trench wall.

(e) Excavate patch, as required, to ensure placement of the specified thickness of road base. Road base material and placement shall be in accordance with Section 9.0 – Aggregate and Granular Material [].

(f) Pavement edges shall be thoroughly cleaned. Tack coat, in accordance with Section 12.27 [], and Section 12.45 [], must be applied to completely cover all pavement edges. *(REVISED JUNE 2026)*

(g) Minimum compacted pavement thickness shall be equal to the existing pavement thickness or 75 mm, whichever is greater.

(h) Material and placement of pavement shall be in accordance with Section 12.0 – Asphaltic Concrete Paving []. Attention must be given to the atmospheric temperature in accordance with Section 12.47.1 []. *(REVISED JUNE 2026)*

(i) Finished permanent pavement patch must be free from bumps, depressions or other irregularities and must be within 6 mm of the design grade and cross-section, but not uniformly high or low, when measured with a 3.0 m straight edge in any direction. Acceptance is in accordance with Asphaltic Concrete Acceptance Requirements - Section 12.51.1 []. *(REVISED JUNE 2026)*

(j) The Contractor shall maintain all pavement patches in complete repair during the warranty period. Should a dangerous situation arise, the pavement patch shall be repaired immediately upon notification by the City Engineer, unless otherwise approved by the City Engineer. *(REVISED JUNE 2026)*

(k) The City recognizes there are times when a gravel surface on an existing road must be capped prior to the seasonal pavement plant shutdown, but atmospheric temperature in accordance with Section 12.47.1 [] cannot be met. The City Engineer may accept the installation of this 50 mm base lift of asphalt under the following conditions: *(REVISED JUNE 2026)*

  (i) The base lift is tested and meets the specified density standards accordance with Asphaltic Concrete Acceptance Requirements - Section 12.51.4 [] *(REVISED JUNE 2026)*

  (ii) If the base lift does not meet the specified density standards, and a remediation strategy is submitted by a Qualified Registered Professional for review and approval by the City Engineer. *(REVISED JUNE 2026)*

    1. One remediation attempt may be approved the following season prior to the installation of a minimum 35 mm surface lift. *(REVISED JUNE 2026)*

2. If the remediation attempt is not successful, subsequent remediation attempts will not be approved, and the base lift will be required to be removed and replaced. *(REVISED JUNE 2026)*

4.30 TRENCH SETTLEMENT DURING GUARANTEE PERIOD

.1 The Contractor shall replace materials and rectify all failures that occur as a result of settlement of trench backfill or collapse of trench walls during the guarantee period.

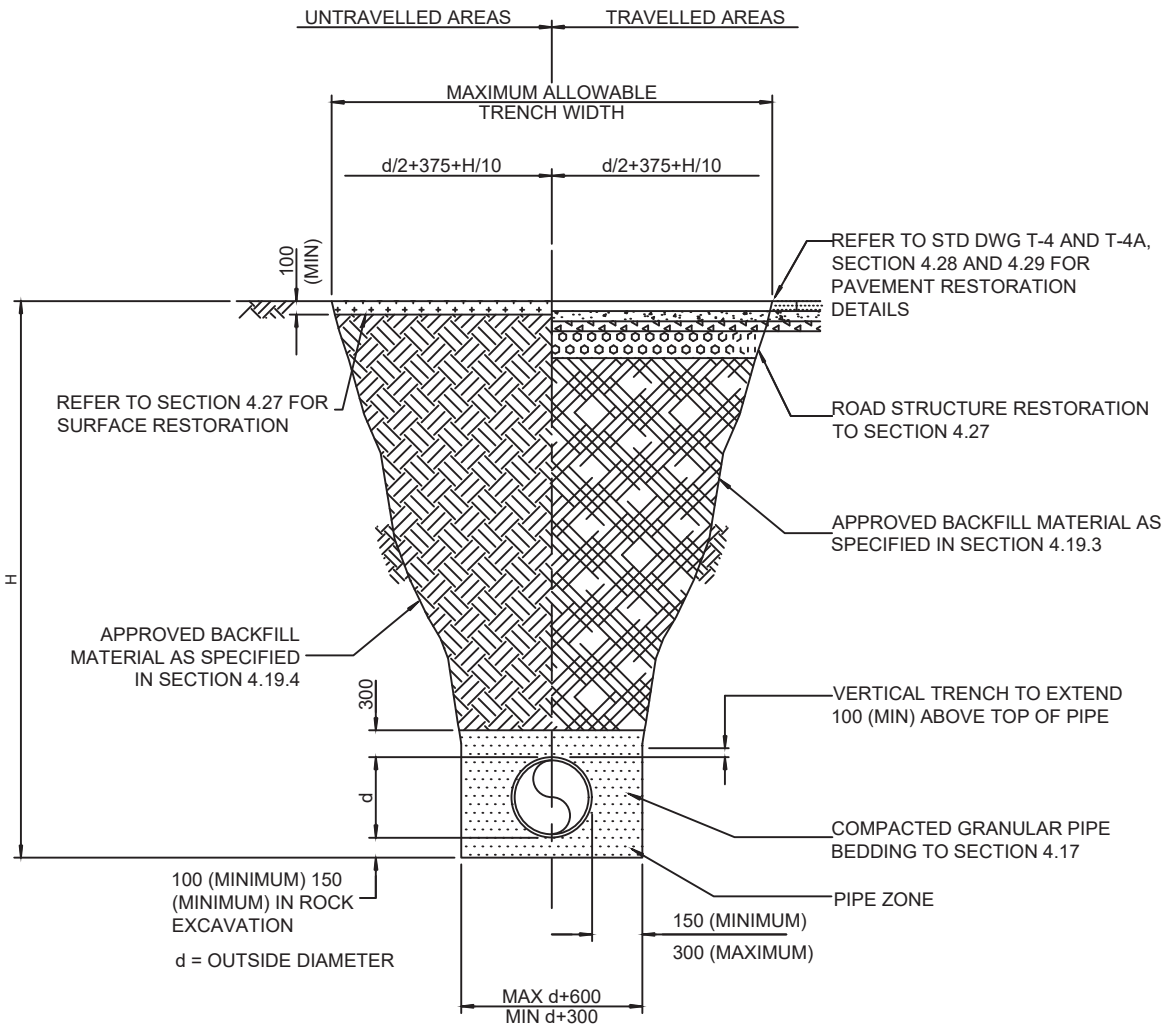
.2 Trenches in which backfill settles shall be refilled with the specified backfill material, and paved surfaces that are adjacent to trenches or on trench backfill, which fail during this period, shall be replaced or repaired in an approved manner.

4.31 PRIVATE UTILITES IN CITY RIGHTS-OF-WAY

.1 Private utilities within City road rights-of-way generally shall follow the alignments shown on Standard Drawings No. T-9 [] and T-10 []. *(REVISED JUNE 2026)*

.2 All private utilities shall be traceable electronically.

.3 Installation of private utilities shall require prior approval by the City Engineer.



NOTES:

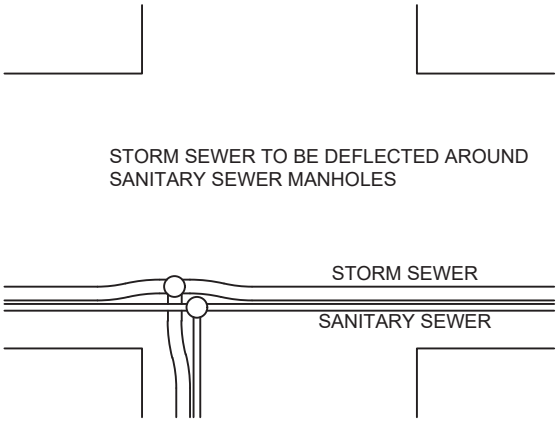
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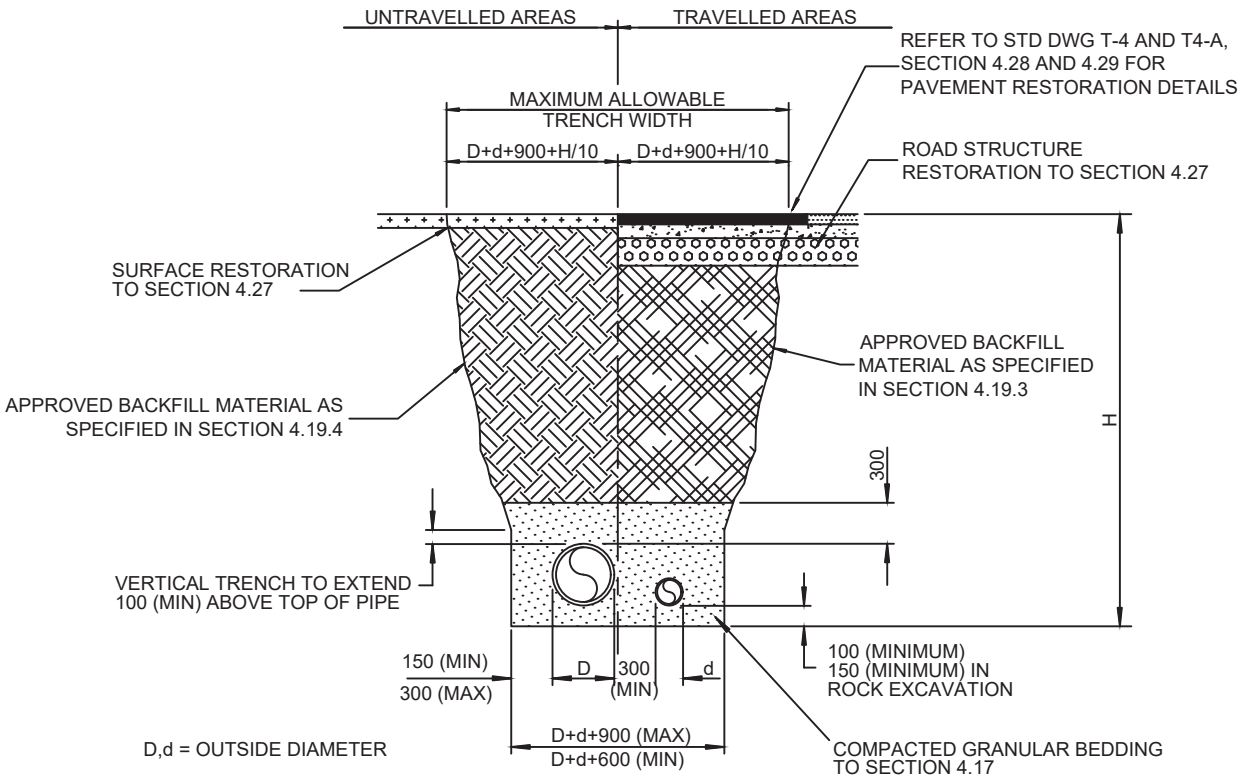
CITY OF NANAIMO
THE HARBOUR CITY

TRENCH DETAILS

Scale:	NTS
Created:	OCT 2012
Rev Date:	MAY 2020
Dwg No:	T-1

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6.19.2026





NOTES:

1. REFER TO STANDARD DRAWING T-1 FOR ADDITIONAL TRENCH DETAILS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

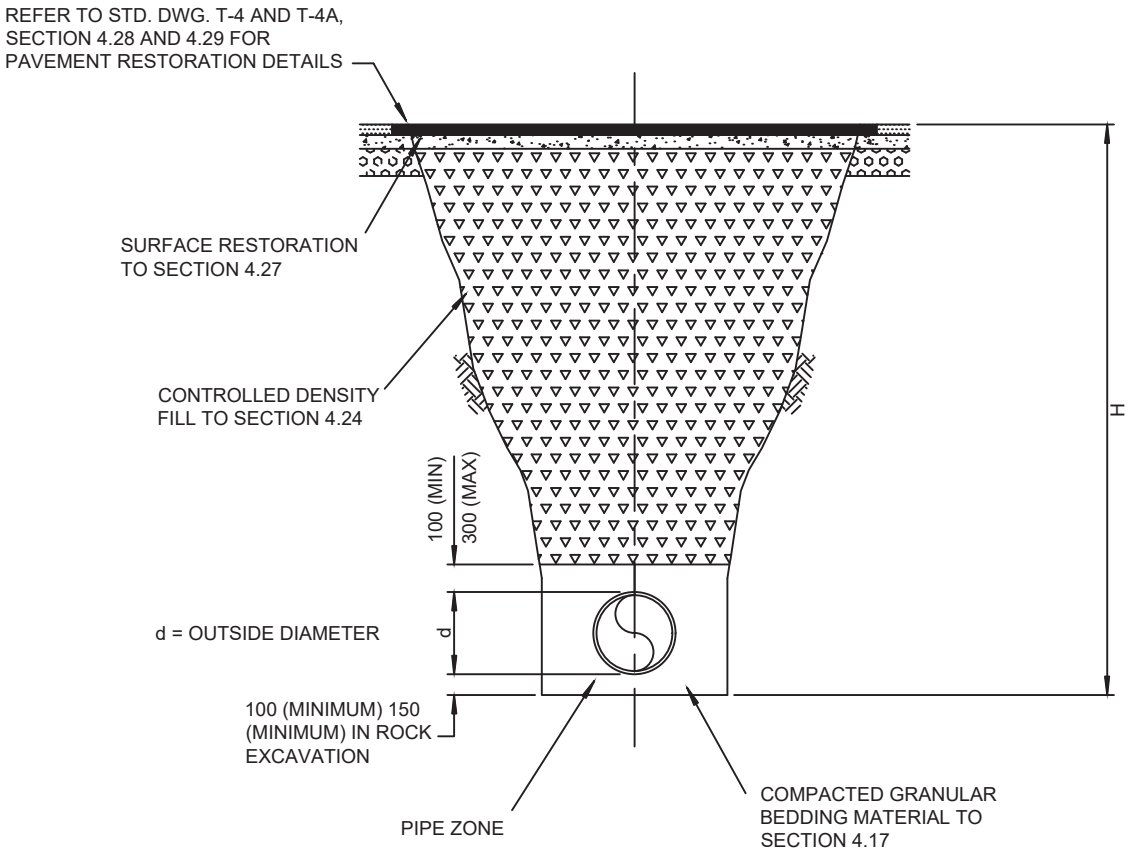
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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

SANITARY & STORM SEWER
IN COMMON TRENCH

Scale:	NTS
Created:	OCT 2012
Rev Date:	MAY 2020
Dwg No:	T-2



NOTES:

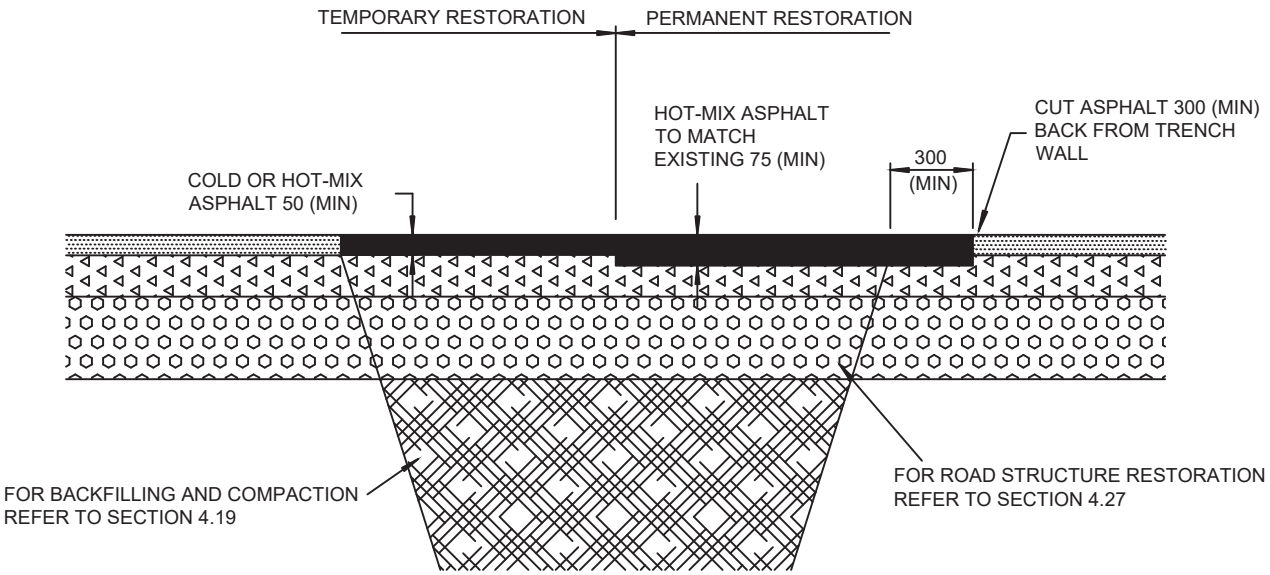
1. REFER TO STANDARD DRAWING T-1 FOR ADDITIONAL TRENCH DIMENSIONS AND DETAILS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

CITY OF NANAIMO
THE HARBOUR CITY

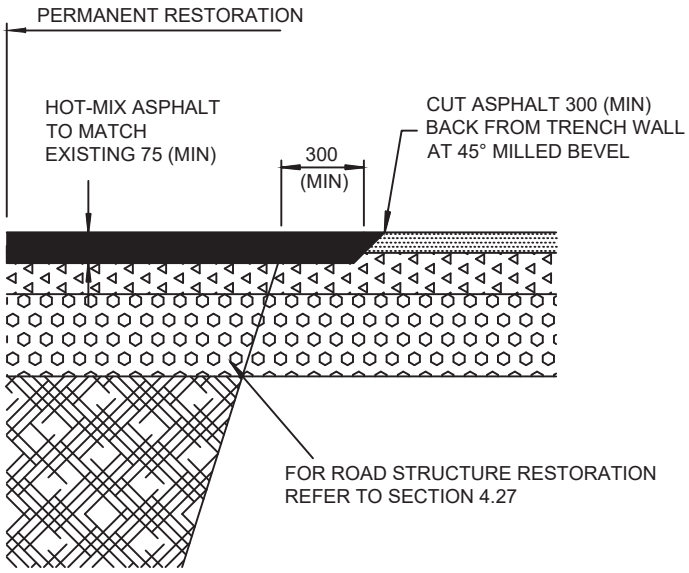
CONTROLLED DENSITY FILL
IN PAVED SURFACE AREA

Scale:	NTS
Created:	MAY 1996
Rev Date:	NOV 2016
Dwg No:	T-3

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6.19.2026



ALTERNATIVE 1 - STRAIGHT CUT



ALTERNATIVE 2 - BEVEL CUT

NOTES:

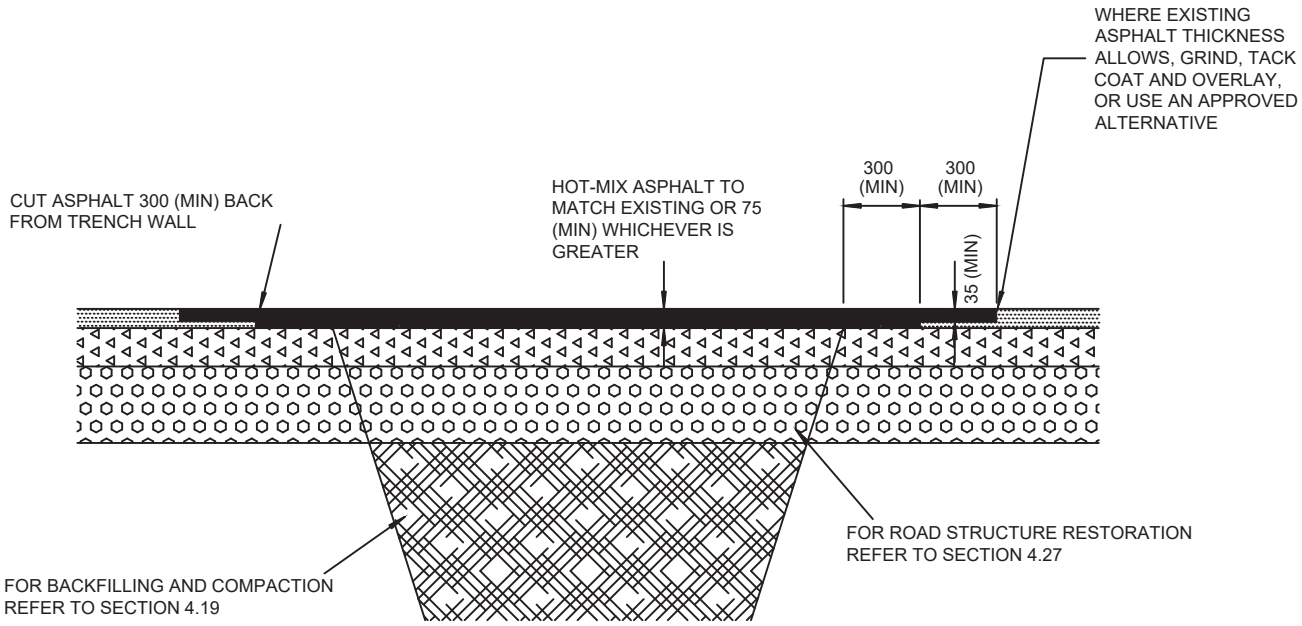
1. REFER TO STANDARD DRAWING T-1 FOR ADDITIONAL TRENCH DIMENSIONS AND DETAILS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

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3.26.2026

CITY OF NANAIMO
THE HARBOUR CITY

PAVEMENT RESTORATION TYPE 1
(ASPHALT THICKNESS < 75mm)

Scale:	NTS
Created:	APR 2016
Rev Date:	MAY 2020
Dwg No:	T-4



PERMANENT RESTORATION

NOTES:

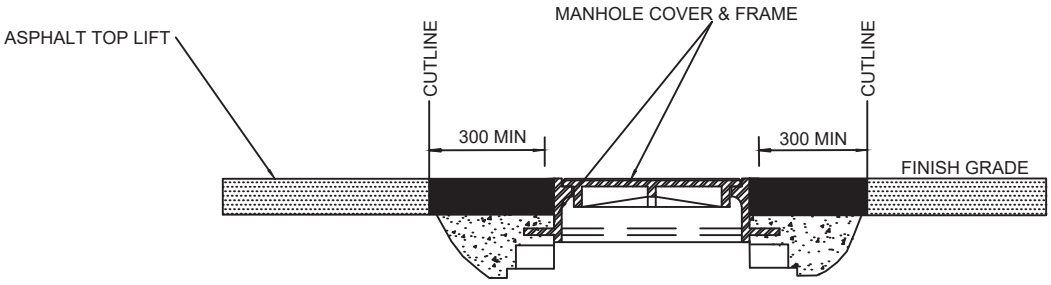
1. REFER TO STANDARD DRAWING T-1 FOR ADDITIONAL TRENCH DIMENSIONS AND DETAILS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

CITY OF NANAIMO
THE HARBOUR CITY

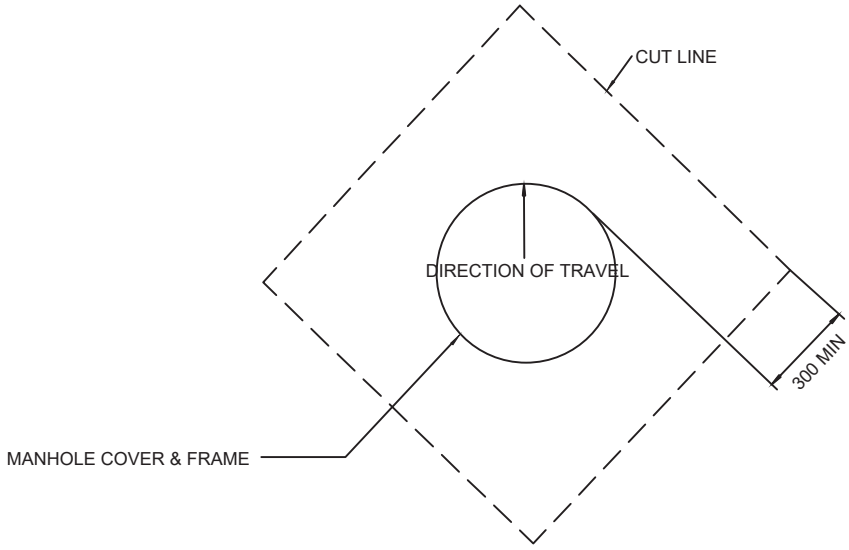
PAVEMENT RESTORATION TYPE 2
(75mm MINIMUM THICKNESS)

Scale:	NTS
Created:	OCT 2012
Rev Date:	JUNE 2026
Dwg No:	T-4A

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3.26.2026



CONCRETE ENCASEMENT
SUPPORT DETAIL



SQUARE CUT PLAN VIEW

NOTES:

1. COVER MANHOLE WITH BUILDING PAPER AND CONSTRUCTION ASPHALT CONCRETE BASE COURSE AND WEARING COURSES.
2. SAW CUT SQUARE EXCAVATING AROUND MANHOLE 300mm MIN FROM MANHOLE FRAME.
3. RAISE MANHOLE COVER AND FRAME TO FINISH GRADE.
4. APPLY TACK COAT TO EDGES OF EXISTING PAVEMENT BEFORE INSTALLING PATCH.
5. FINISH JOINT WITH ASPHALT SEAL AND SAND.
6. REFER TO STANDARD DRAWINGS AS PER RELEVANT SECTIONS 5, 6, OR 7 FOR OTHER MANHOLE REQUIREMENTS.
7. ONLY PRODUCTS APPROVED BY THE CITY ENGINEER AND LISTED IN THE CITY OF NANAIMO APPROVED PRODUCT LIST WILL BE ACCEPTED FOR INSTALLATION.
8. REFER TO STANDARD DRAWING T-1 FOR ADDITIONAL TRENCH DIMENSIONS AND DETAILS.
9. ALL DIMENSIONS IN MILLIMETERS UNLESS SHOWN OTHERWISE.
10. PAVEMENT RESTORATION AREAS OF NEW ASPHALT (5 YEARS OR LESS) WILL REQUIRE FULL LANE WIDTH ASPHALT REPLACEMENT AND UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

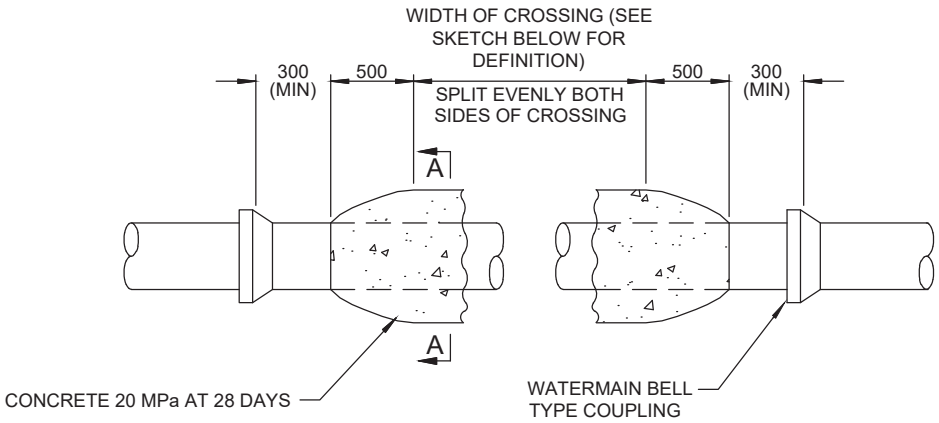
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3.26.2026

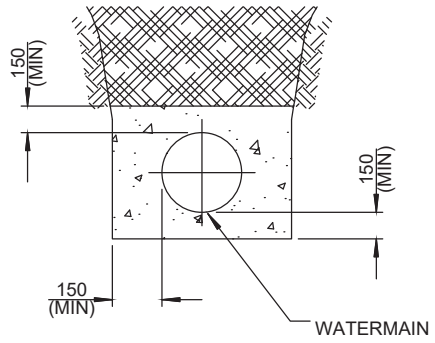
CITY OF NANAIMO
THE HARBOUR CITY

PAVEMENT RESTORATION
ASPHALT CUTTING FOR A MANHOLE

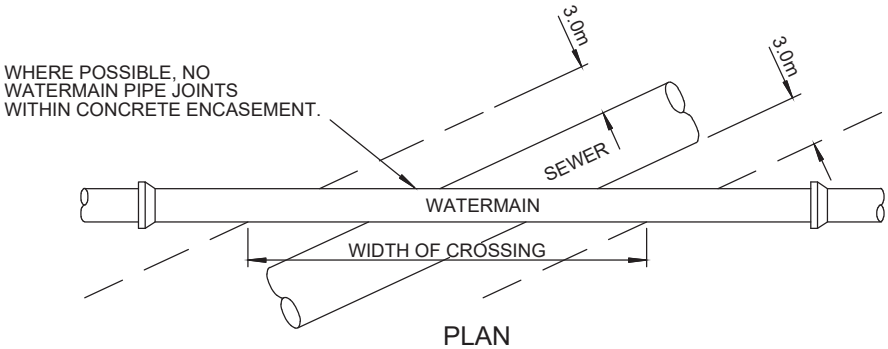
Scale:	NTS
Created:	NOV 2012
Rev Date:	JUNE 2026
Dwg No:	T-4B



ELEVATION



SECTION A-A



PLAN

NOTES:

1. WHERE WATER AND SEWER SEPARATION OFFSETS CANNOT MEET SECTION 5.10.3, APPLY PROTECTION MEASURES REQUIRED TO OBTAIN PROVINCIAL PERMIT APPROVAL (SEE SECTION 5.10.4).
2. FOR PIPE PROTECTION WITH CONCRETE REFER TO STANDARD DRAWING T-6.
3. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

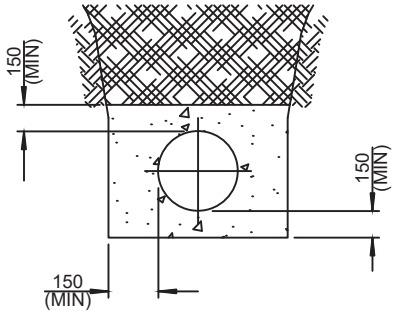
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3.26.2026

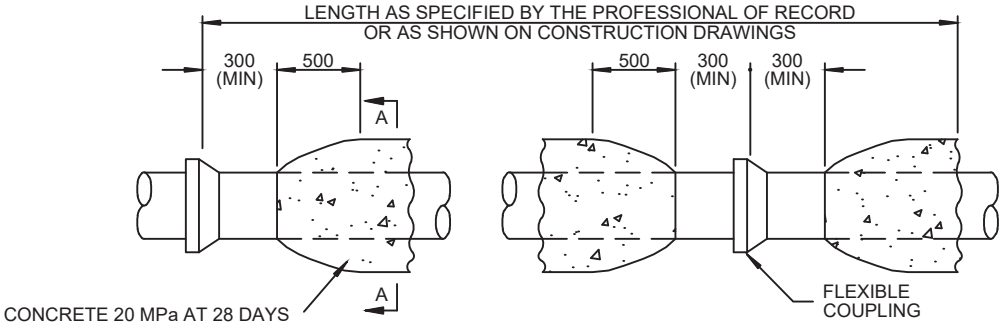
CITY OF NANAIMO
THE HARBOUR CITY

CONCRETE ENCASEMENT FOR WATERMAIN \ SEWER SEPARATION

Scale:	NTS
Created:	OCT 1993
Rev Date:	JUNE 2026
Dwg No:	T-5

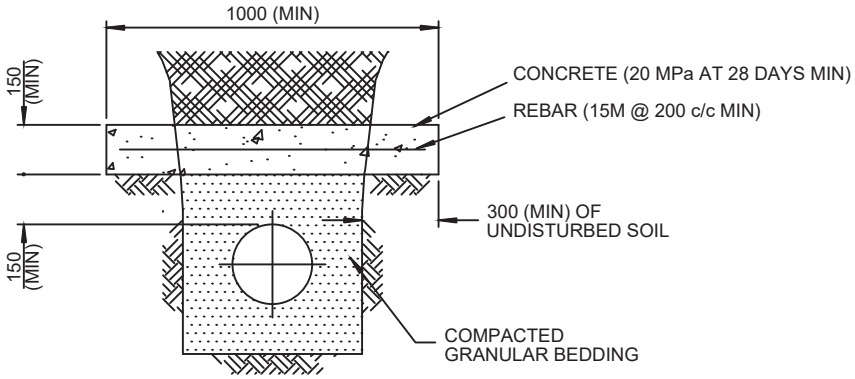


SECTION A-A



ELEVATION

ALTERNATIVE 1 - ENCASEMENT



ALTERNATIVE 2 - PROTECTIVE SLAB

NOTES:

1. THE REQUIREMENT FOR CONCRETE PIPE PROTECTION SHALL BE DETERMINED BY THE PROFESSIONAL OF RECORD. DIMENSIONS SHOWN ARE MINIMUM REQUIREMENTS AND SHALL BE MODIFIED TO SUIT PIPE LOADING CONDITIONS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

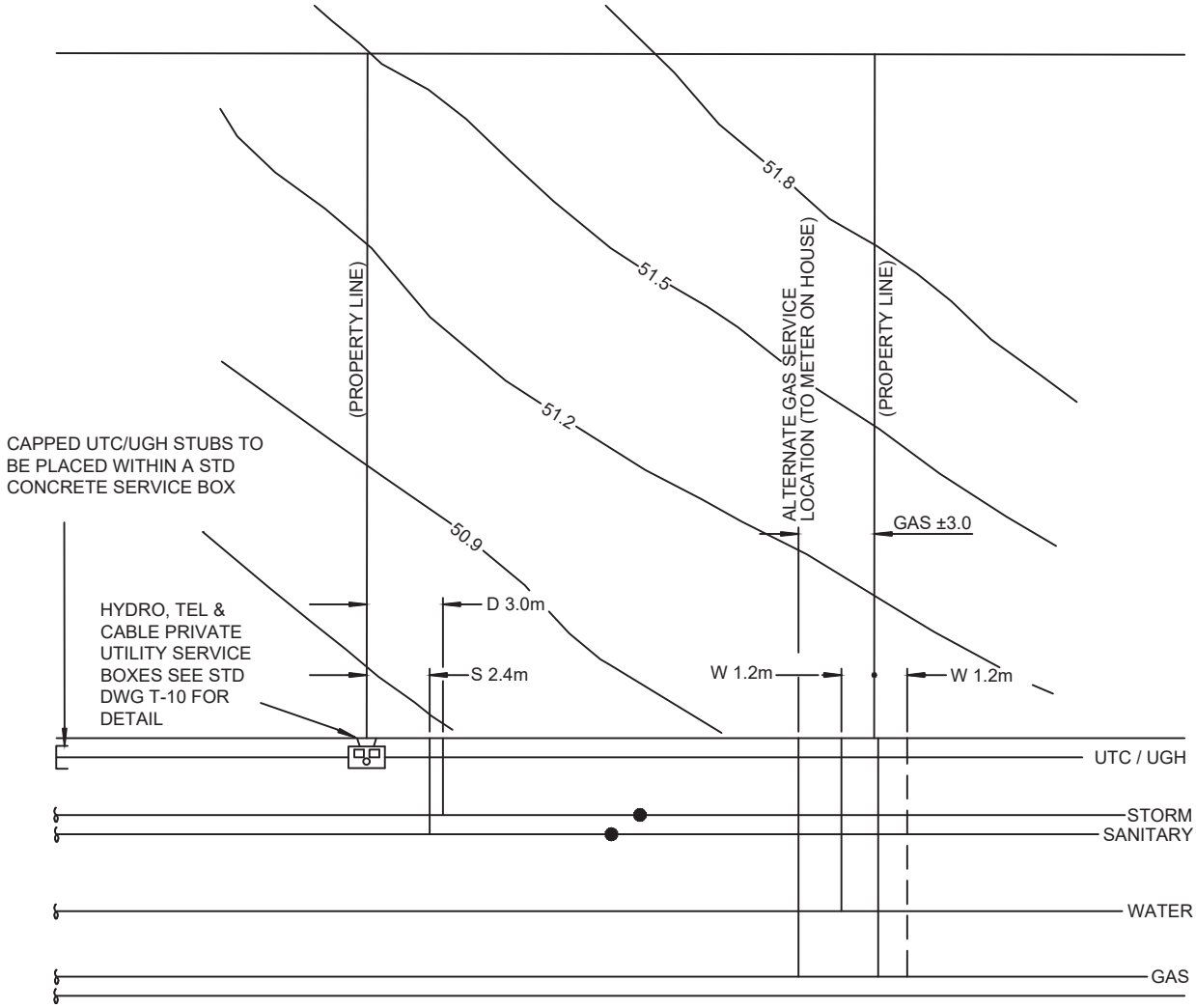
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CITY OF NANAIMO
THE HARBOUR CITY

PIPE PROTECTION
WITH CONCRETE

Scale:	NTS
Created:	OCT 1993
Rev Date:	JUNE 2026
Dwg No:	T-6

3.26.2026



NOTES:

1. SANITARY AND STORM SEWER SERVICES TO BE INSTALLED ON THE LOWER SIDE OF THE LOT, AND WHERE POSSIBLE, SHALL BE FROM THE THE FRONT PROPERTY LINE.
2. POLE RESERVE, IF REQUIRED, TO BE AT ALTERNATE LOT CORNER TO WATER SERVICES.
3. GAS SERVICES SHALL BE 1.0m MINIMUM SEPARATION FROM SANITARY, STORM AND WATER UTILITIES.
4. ALL DIMENSIONS IN METERS UNLESS OTHERWISE SHOWN.
5. CAPPED UTH/UGH STUBS MUST BE PLACED WITHIN A STANDARD CONCRETE SERVICE BOX.
6. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.

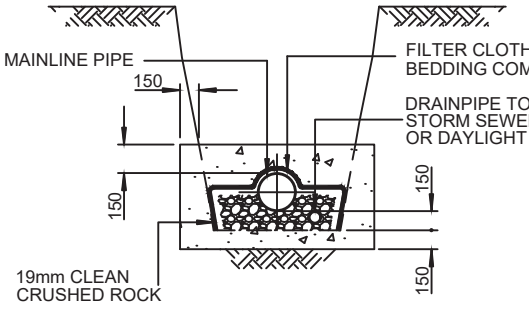
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3.26.2026

CITY OF NANAIMO
THE HARBOUR CITY

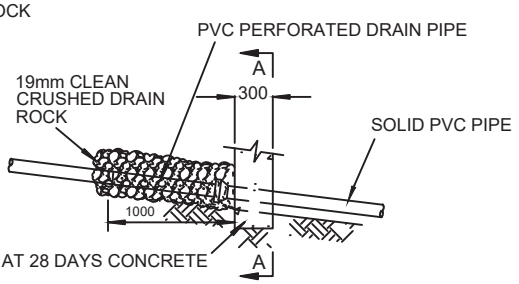
TYPICAL LOCATION OF SERVICE CONNECTIONS TO RESIDENTIAL VACANT LOTS

Scale:	NTS
Created:	OCT 2012
Rev Date:	JUNE 2026
Dwg No:	T-7



SECTION A-A

DETAIL OF DRAIN PIPE

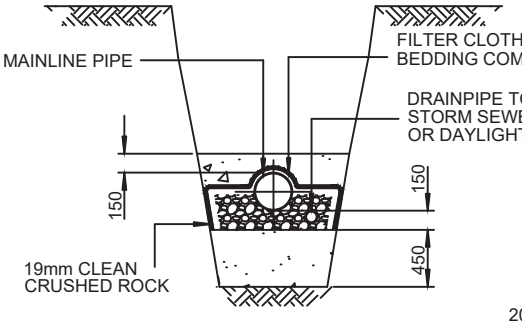


PROFILE

ALTERNATIVE 1

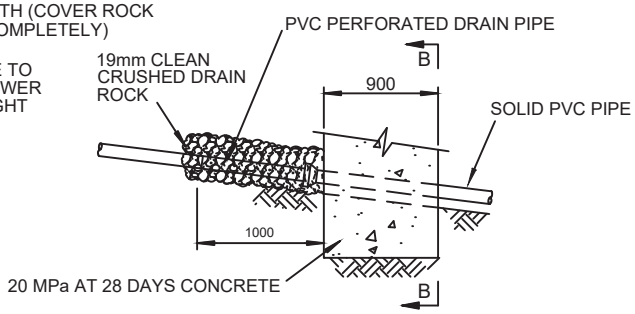
FOR USE IN TILLS AND OTHER STABLE, WELL COMPACTED NATIVE MATERIALS.

NOTE: MAINLINE PIPE & FILTER CLOTH NOT SHOWN FOR CLARITY.



SECTION B-B

DETAIL OF DRAIN PIPE



PROFILE

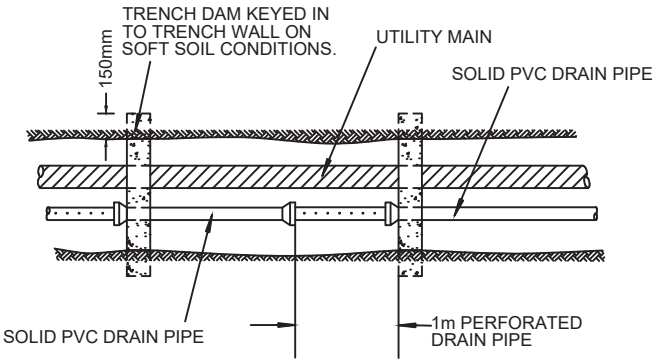
ALTERNATIVE 2

FOR USE IN CLEAN GRAVELS, SANDS AND OTHER LOOSE, PERMEABLE NATIVE MATERIALS.

NOTE: MAINLINE PIPE & FILTER CLOTH NOT SHOWN FOR CLARITY.

NOTES:

1. IF APPROVED BY THE ENGINEER, IN AREAS INACCESSIBLE BY CONSTRUCTION EQUIPMENT, WET, PRE-MIXED CONCRETE FILLED SANDBAGS MAY BE USED.
2. REFER TO SECTION 4.18 FOR TRENCH DAM SPACING.
3. PROVIDE TRENCH DRAINAGE TO AN ACCEPTABLE WATERCOURSE OR STORM COLLECTION SYSTEM FROM EVERY TRENCH DAM. HIGHEST END OF THE TRENCH DAM DRAIN PIPE SHALL BE CAPPED.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
5. ALL DRAIN PIPE TO BE SDR 35 PVC.



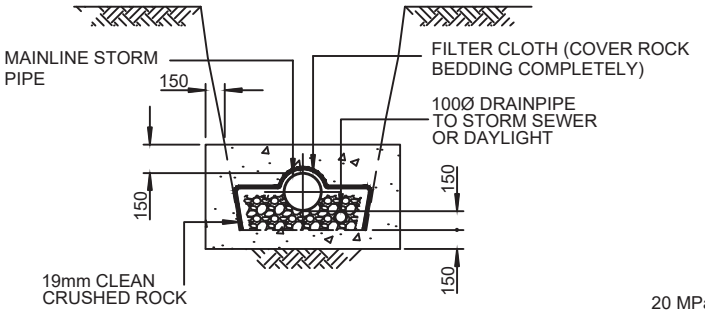
TYPE 1-PLAN VIEW

CITY OF NANAIMO
THE HARBOUR CITY

TRENCH DAMS - TYPE 1
FOR ALL UTILITY MAINS

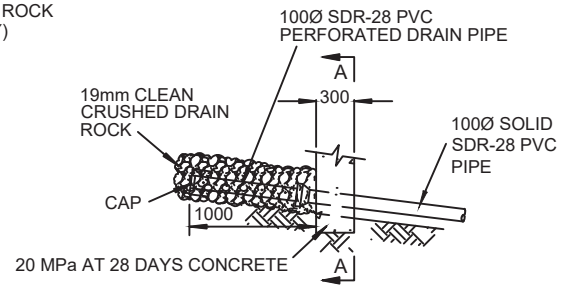
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Rev Date:	JUNE 2026
Dwg No:	T-8

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3.26.2026



SECTION A-A

DETAIL OF DRAIN PIPE

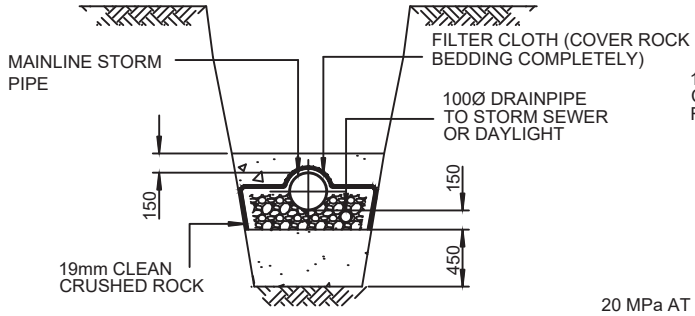


PROFILE

ALTERNATIVE 1

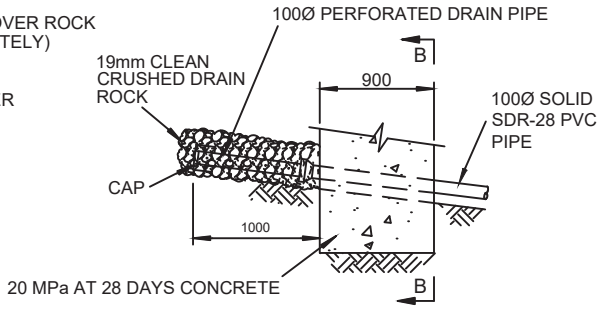
FOR USE IN TILLS AND OTHER STABLE, WELL COMPACTED NATIVE MATERIALS.

NOTE: MAINLINE PIPE & FILTER CLOTH NOT SHOWN FOR CLARITY.



SECTION B-B

DETAIL OF DRAIN PIPE



PROFILE

ALTERNATIVE 2

FOR USE IN CLEAN GRAVELS, SANDS AND OTHER LOOSE, PERMEABLE NATIVE MATERIALS.

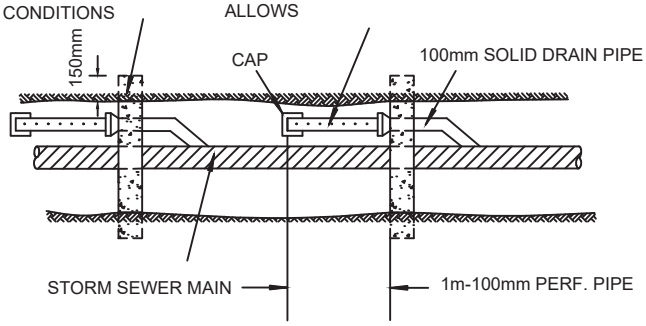
NOTE: MAINLINE PIPE & FILTER CLOTH NOT SHOWN FOR CLARITY.

NOTES:

1. IF APPROVED BY THE ENGINEER, IN AREAS INACCESSIBLE BY CONSTRUCTION EQUIPMENT, WET, PRE-MIXED CONCRETE FILLED SANDBAGS MAY BE USED.
2. REFER TO SECTION 4.18 FOR TRENCH DAM SPACING.
3. PROVIDE TRENCH DRAINAGE TO AN ACCEPTABLE WATERCOURSE OR STORM COLLECTION SYSTEM FROM EVERY TRENCH DAM. HIGHEST END OF THE TRENCH DAM DRAIN PIPE SHALL BE CAPPED.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
5. ALL DRAIN PIPE TO BE SDR-28 PVC.

TRENCH DAM KEYED IN TO TRENCH WALL ON SOFT SOIL CONDITIONS

100mm PERFORATED DRAIN PIPE MAY BE TIED INTO STORM MAIN WHEN GRADE ALLOWS



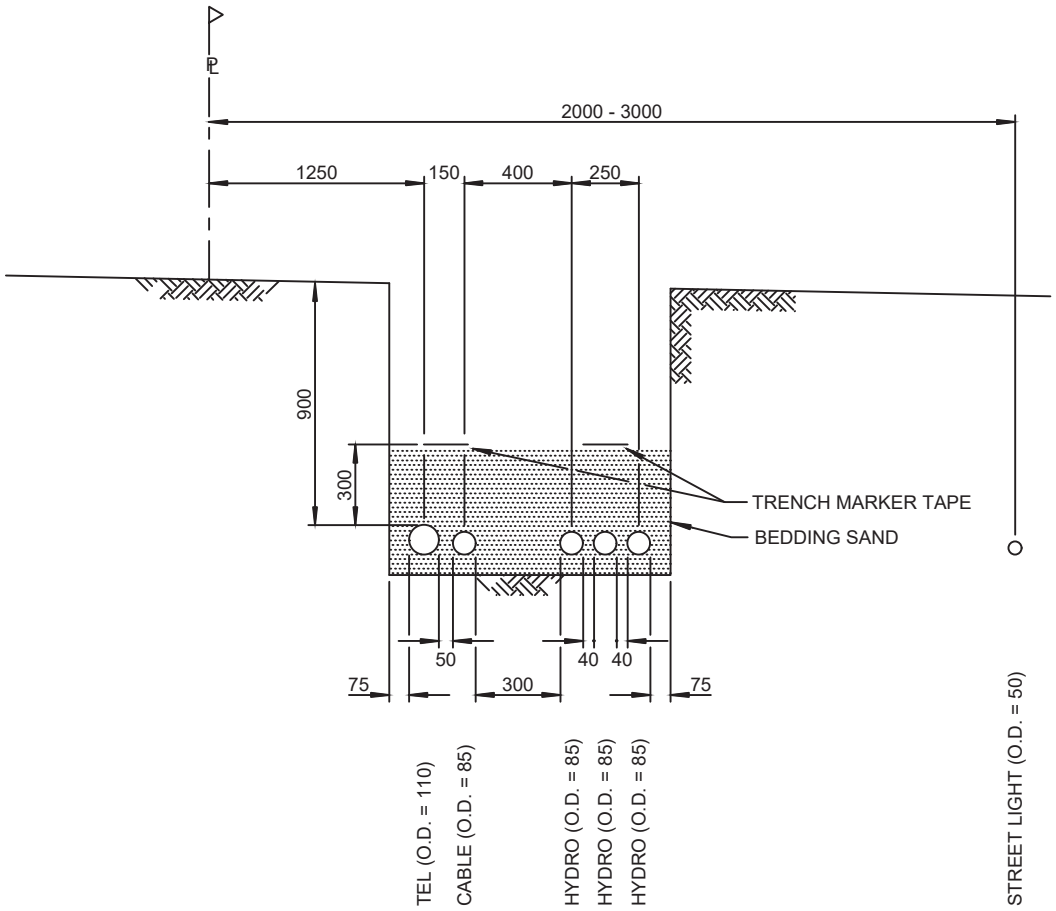
TYPE 2-PLAN VIEW

CITY OF NANAIMO
THE HARBOUR CITY

TRENCH DAMS - TYPE 2
OPTIONAL FOR STORM
SEWER MAINS

Scale:	NTS
Created:	OCT 2012
Rev Date:	JUNE 2026
Dwg No:	T-8A

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6.19.2026



NOTE:

1. DIMENSIONS ARE SUGGESTIONS ONLY, DETAILS ARE TO BE DETERMINED BY PRIVATE UTILITY.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
3. REFER TO UTILITY CONSTRUCTION DRAWINGS FOR DUCT SIZE AND OTHER CONSTRUCTION REQUIREMENTS.
4. ALL UTILITIES SHALL BE TRACEABLE ELECTRONICALLY.

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5.12.2026

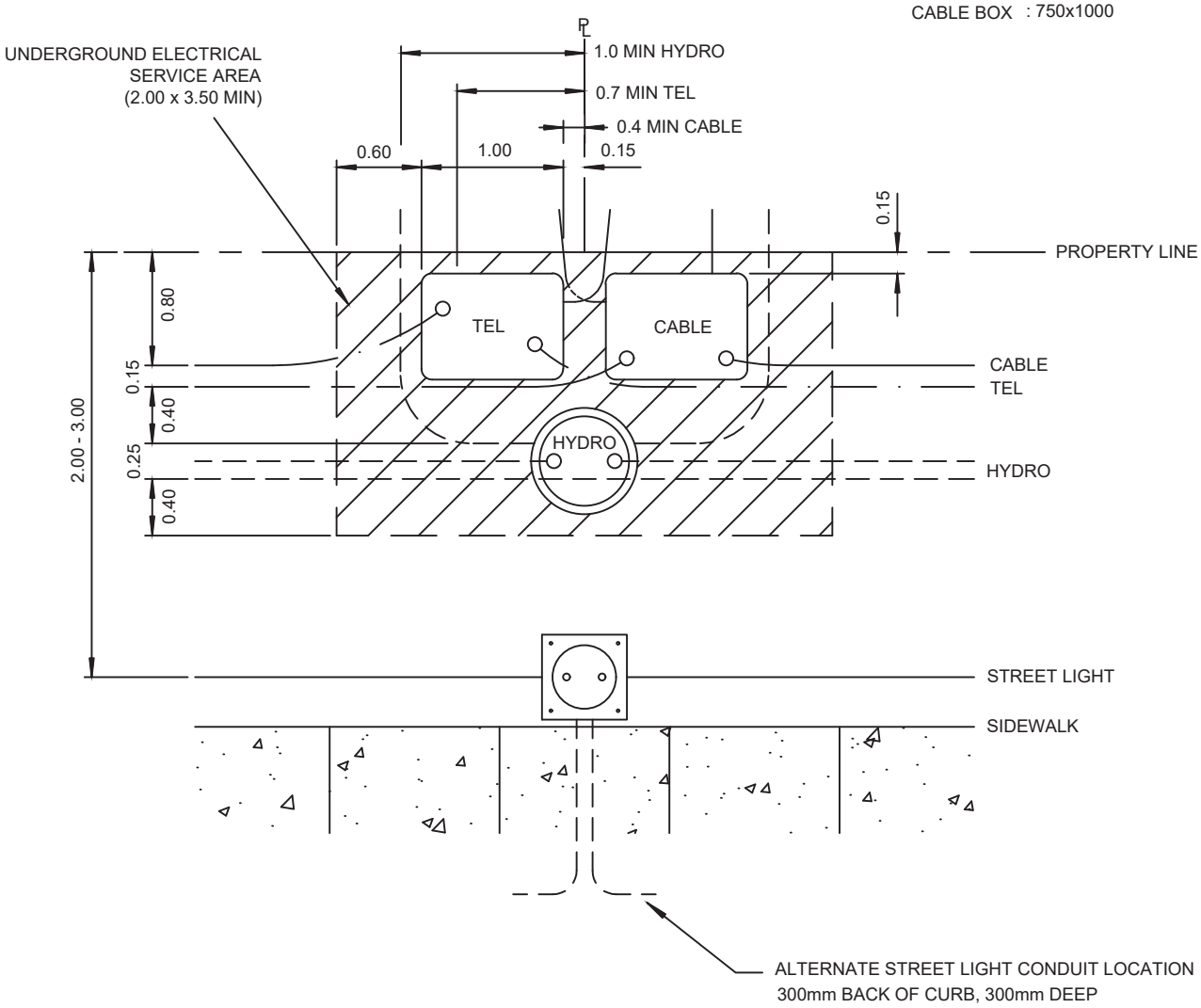
CITY OF NANAIMO
THE HARBOUR CITY

PRIVATE UTILITIES
UNDERGROUND ELECTRICAL
COMMON TRENCH DETAIL

Scale:	NTS
Created:	MAY 2001
Rev Date:	MAY 2020
Dwg No:	T-9

APPROXIMATE DIMENSIONS (mm)

HYDRO BOX : 750Ø
TEL BOX : 750x1000
CABLE BOX : 750x1000



NOTES:

1. REFER TO SECTION 8 FOR STREET LIGHT AND SIDEWALK OFFSETS.
2. REFER TO SECTION 5.07.7 FOR HYDRANT OFFSETS.
3. SERVICE BOXES SHALL HAVE MINIMUM SEPARATION OF 300mm.
4. REFER TO UTILITY CONSTRUCTION DRAWINGS FOR FURTHER DETAILS.
5. ALL UTILITIES SHALL BE TRACEABLE ELECTRONICALLY.
6. DIMENSIONS ARE SUGGESTIONS ONLY, DETAILS TO BE DETERMINED BY PRIVATE UTILITY.
7. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

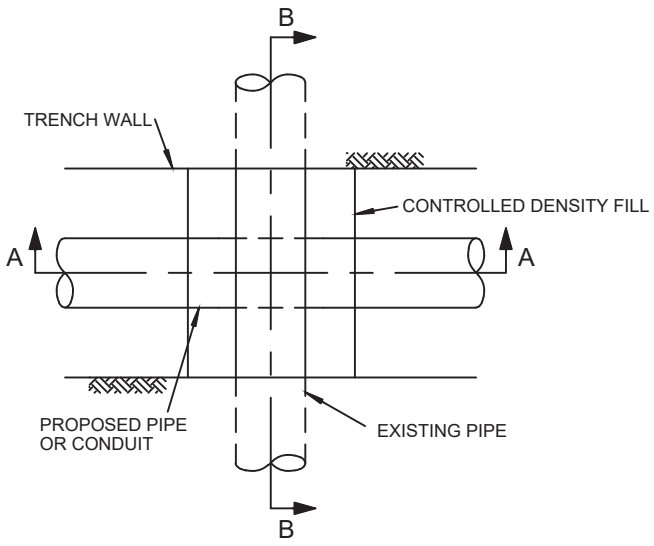
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3.26.2026

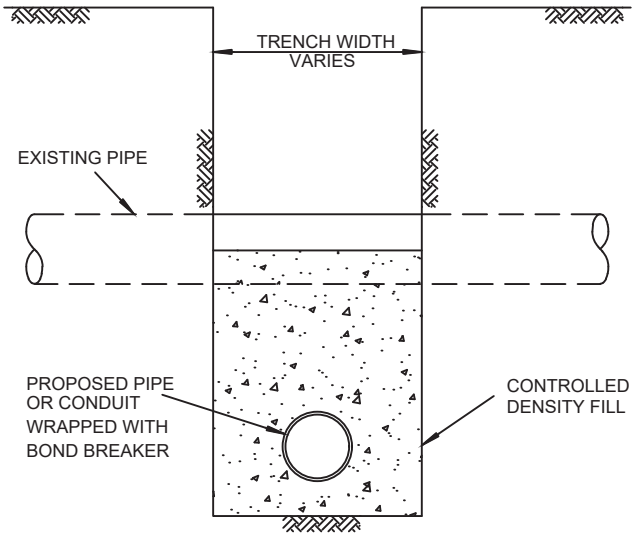
CITY OF NANAIMO
THE HARBOUR CITY

PRIVATE UTILITIES
UNDERGROUND ELECTRICAL
TYPICAL SERVICE BOX LOCATION

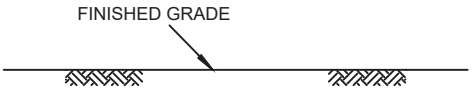
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Dwg No:	T-10

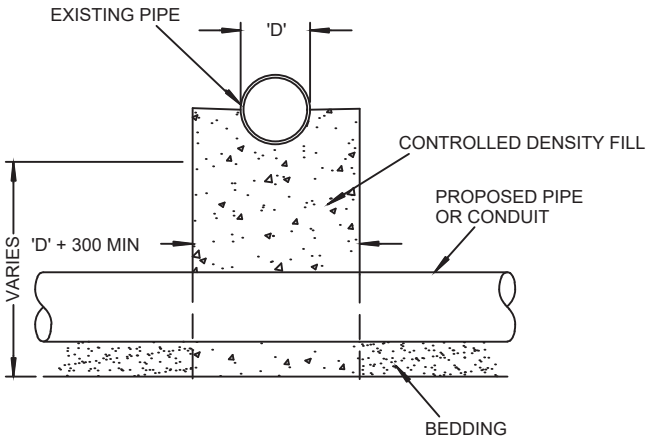


PLAN



SECTION B-B





SECTION A-A

NOTES:

1. ALL DIMENSION IN MILLIMETERS UNLESS SHOWN OTHERWISE.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. CONTROLLED DENSITY FILL AS PER SECTION 4.24.

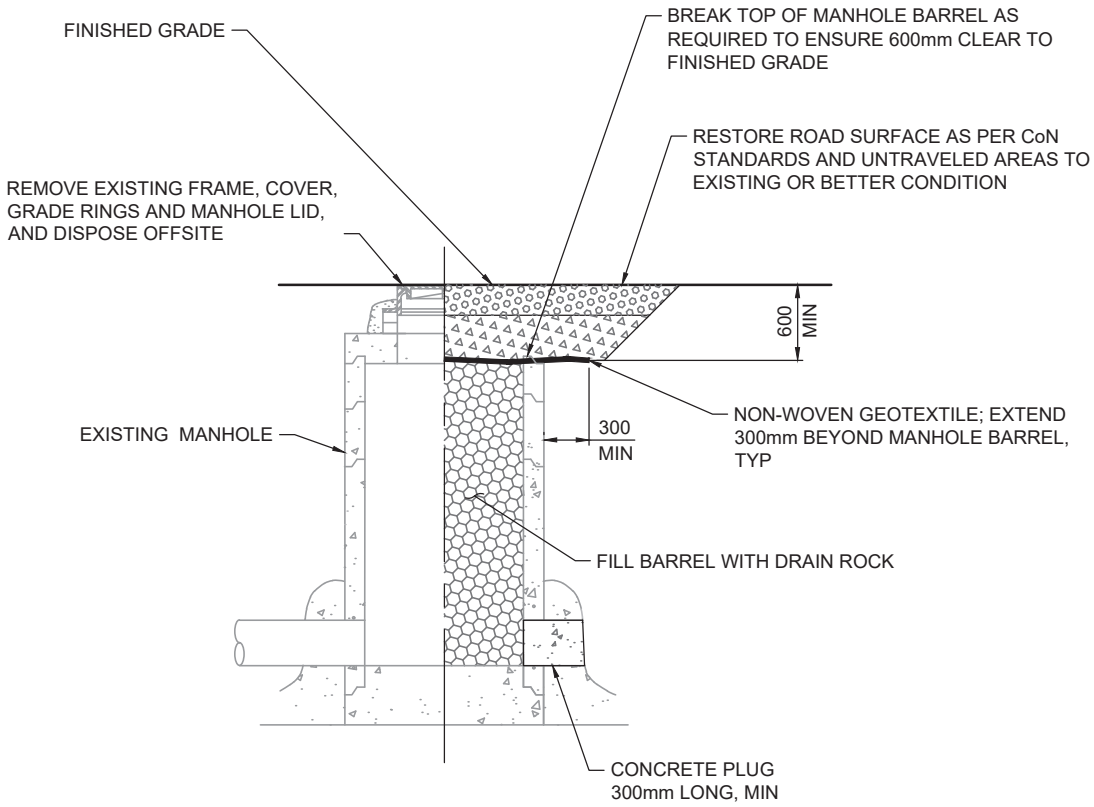
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3.26.2026

CITY OF NANAIMO
THE HARBOUR CITY

DETAIL OF SUPPORT FOR
EXISTING UTILITIES

Scale:	NTS
Created:	MAY 1998
Rev Date:	JUNE 2026
Dwg No:	T-11



ABANDON EXISTING MANHOLE DETAIL

NOTES:

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHER WISE SHOWN.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. CONCRETE AS PER SECTION 4.21 AND SECTION 11.31.
4. LANDSCAPING AS PER SECTION 14.0.
5. REFER TO STD. DWG. T-4 AND T-4A, SECTION 4.28 AND 4.29 FOR PAVEMENT RESTORATION DETAILS.
6. PAVED ROADWAY STRUCTURE AS PER SECTION 9.0 BASED ON STREET CLASSIFICATION.

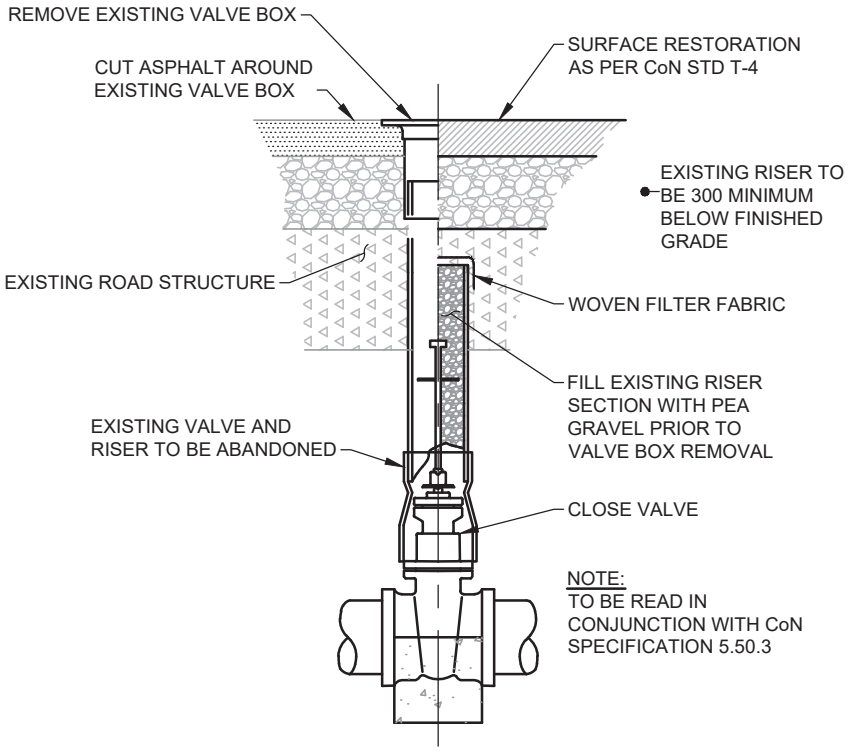
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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

ABANDON EXISTING MANHOLE DETAIL

Scale:	NTS
Created:	FEB 2018
Rev Date:	JUNE 2026
Dwg No:	T-12



ABANDON VALVE DETAIL

NOTES:

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHER WISE SHOWN.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. CONCRETE AS PER SECTION 4.21 AND SECTION 11.31.
4. LANDSCAPING AS PER SECTION 14.0.
5. REFER TO STD. DWG. T-4 AND T-4A, SECTION 4.28 AND 4.29 FOR PAVEMENT RESTORATION DETAILS.
6. PAVED ROADWAY STRUCTURE AS PER SECTION 9.0 BASED ON STREET CLASSIFICATION.

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4.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

ABANDON VALVE DETAIL

Scale:	NTS
Created:	FEB 2018
Rev Date:	JUNE 2026
Dwg No:	T-13

SECTION 5 – WATER DISTRIBUTION SYSTEM
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Hydraulic Network	5.04 [↓]
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Quick Links: Section 5.0 Drawings [] TOC [↑]

SECTION 5 – WATER DISTRIBUTION SYSTEM
CONTENTS

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Water Service Connections	5.30 [↓]
Pressure Reducing Stations	5.31 [↓]
Flange Adapters and Joint Restraints	5.32 [↓]
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Meter Chambers	5.34 [↓]
-Not Used-	5.35

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Water Service Connection and Water Meter Installation Schematic *(NEW JUNE 2026)*	W-0	[]
25mm Water Service Connection *(REVISED JUNE 2026)*	W-1	[]
38mm and 50mm Water Service Connection *(NEW JUNE 2026)*	W-1A	[]
38mm and 50mm Water Meter *(NEW JUNE 2026)*	W-1B	[]
Above Grade Flushout complete with Thrust Block and Optional Restrained Method *(REVISED JUNE 2026)*	W-2A	[]
Below Grade Flushout complete with Thrust Block and Optional Restrained Method *(REVISED JUNE 2026)*	W-2B	[]
Air Release Valve Assembly and Chamber for 150Ø – 300Ø Main *(REVISED JUNE 2026)*	W-4	[]
Hydrant Connection *(REVISED JUNE 2026 [↓])*	W-5	[]
Hydrant Access Ditch Crossing Detail *(REVISED JUNE 2026 [↓])*	W-7	[]
Thrust Block Details *(REVISED JUNE 2026)*	W-8	[]
Valve Boxes in Unpaved Areas *(REVISED JUNE 2026)*	W-9	[]
Meter or DCVA Backflow Prevention Assembly Chamber Precast Vault *(REVISED JUNE 2026)*	W-11	[]
Meter Chamber Precast Circular Manhole *(REVISED JUNE 2026)*	W-11A	[]
Water Meter Radio Read Bracket *(REVISED JUNE 2026)*	W-12	[]

Quick Links: Section 5.0 Drawings [] TOC [↑]

SECTION 5 – WATER DISTRIBUTION SYSTEM
CONTENTS

STANDARD DRAWINGS	DWG. NO.	
Fire or Domestic Water Meter – Piping Layout (75Ø – 250Ø) *(REVISED JUNE 2026)*	W-13	[]
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Detector Check Fire Line Service – Piping Layout (100Ø dia.– 250Ø dia.)	W-15	[]
Gate Valve and Valve Nut Extension *(REVISED JUNE 2026)*	W-16	[]
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Manhole Frame and Cover *(REPLACED JUNE 2026)*	W-19	[]
Utility Chamber – Manhole Frame, Ring and Cover *(REVISED JUNE 2026)*	W-20	[]
Watertight Manhole Frame and Cover *(REVISED JUNE 2026)*	W-21	[]

SECTION 5 – WATER DISTRIBUTION SYSTEM DESIGN CRITERIA

5.01 SCOPE

.1 Waterworks design shall follow accepted engineering principles, the Provincial Ministry of Health requirements, the Fire Underwriters Survey Guidelines and the following design criteria: ***(REVISED JUNE 2026)***

5.01A WATER DEMAND

.1 The water distribution system shall be designed according to the following minimum demands:

(a) Residential:

(i)	Average daily per capita	455 L
(ii)	Maximum daily per capita	1135 L
(iii)	Maximum peak per capita	1820 L

(b) Commercial and Industrial:

(i) Commercial and other non-residential water demands are normally included in the per capita design consumptions for the overall Community. Heavy industrial, industry parks, and shopping centers must be accounted for separately in any proposed development which includes such zoning.

(c) Fire:

(i) Watermains servicing fire hydrants shall be sized to provide Fire Flows in accordance with the recommendations of the Fire Underwriters Survey publication 'Water Supply for Public Fire Protection'. Calculations supporting the theoretical fire flow available are to be submitted with the design drawings. ***(REVISED JUNE 2026)***

(ii) Fire flow requirements for a development with a sprinklered building under the *Building Code* shall be determined in accordance with the water supply requirements in National Fire Protection Association (NFPA) 13. Where applicable, the maximum allowable reduction to the calculated fire flow shall not exceed fifty percent (50%), as determined using the methodology prescribed in Appendix H3 – Fire Flow Calculation Sheet. All Fire Underwriters Survey (FUS) calculations must be completed in accordance with the procedures and format specified in Appendix H3. ***(REVISED JUNE 2026)***

(iii) All fire hydrants shall be installed on a looped water system unless otherwise approved by the City Engineer. Water distribution systems shall also be designed to ensure that fire flow, as required by the Insurers' Advisory Organization (IAO), is available for the required duration.

(iv) Design for fire flows shall consider present available flow and anticipated ultimate available fire flow from the City water system. ***(REVISED JUNE 2026)***

(v) New water distribution piping shall be capable of delivering the required flows with a minimum of 85 L/s during Maximum Day Demand, a residual pressure at all flowing hydrant(s) is 150 kPa (22 psi) and no other point in system less than 35 kPa (5 psi). The hydrant fire flow for new piping shall be the value in Table W-1 "Hydrant Fire Flows by Land Use Zone" for all properties served by the new piping. ***(REVISED JUNE 2026)***

(vi) For new developments, a balance of pipe size, water quality and existing fire flows at the main will be considered. If the fire flow requirements, as calculated above, cannot be supplied by the existing water distribution system at time of development, available fire flows shall be reviewed with the City Engineer. The applicant will be required to either upgrade portion of the system at their own cost or modify the proposed development to match existing fire flows at the main. ***(REVISED JUNE 2026)***

.2 TABLE W-1: HYDRANT FIRE FLOWS BY LAND USE ZONE

LAND USE ZONE (BYLAW 4500)			Hydrant Flows at main (L/s)
R1-3		Single Dwelling Residential ***(REVISED JUNE 2026)***	85
R4		Two Unit Residential (not sprinklered) ***(REVISED JUNE 2026)***	150
R5		Three & Four Unit Residential (***REVISED JUNE 2026)***	110
R6		Low Density Residential ***(REVISED JUNE 2026)***	130
R7		Row House Residential ((s) for larger buildings)	130
R8		Medium Density Residential	240
R9	*	High Density (High Rise) Residential	300
R10		Steep Slope Residential (SFD / (s) for Multi)	85 / 175
R11		Recreational Vehicle Park	120
R12		Mobile Home Park Residential	120
R13		Old City Duplex Residential	180
R14		Old City Low Density (Four plex) Residential	115
R15		Old City Medium Density Residential	140
AR1		Semi-Rural ***(REVISED JUNE 2026)***	75
AR2		Urban Reserve	75
COR1		Residential Corridor	230
COR2	*	Mixed Use Corridor	300
COR3	*	Community Corridor	300
CC1		Local Service Centre	105
CC2		Neighbourhood Centre	200
CC3	*	City Commercial Centre	300
CC4	*	North Nanaimo Urban Centre	300

LAND USE ZONE (BYLAW 4500)			Hydrant Flows at main (L/s)
CC5		Hospital Urban Centre	240
CC6		Commercial Recreation Centre (s)	----
DT1		Core ((s) for high rise)	230
DT2		Fitzwilliam	300
DT3	*	Wallace	300
DT4		Terminal Avenue	210
DT5		Chapel ((s) for high rise)	240
DT6	*	Port Place ((s) for high rise)	300
DT7		Quennell Square	225
DT8		Old City Mixed Use	140
DT9		Old City Central	150
DT10		Old City Infill Business Commercial	170
DT11		Old City Infill Service Commercial	170
DT12		Gateway	215
PRC1/2/3		Parks, Recreation and Culture One, Two, Three (s)	----
I1		Highway Industrial	225
I2	*	Light Industrial	300
I3	*	High Tech Industrial	300
I4	*	Industrial	300
CS1/2/3		Community Service One, Two, Three (s)	----
W1		Waterfront	85
W2	*	Harbour Waterfront	300
W3		Newcastle Waterfront	285
W4	*	Industrial Waterfront	300
CD1 – CD6		Comprehensive Development	----

Land uses marked * require limitation to 300 L/s
Land uses marked (s), and all high rises require site specific calculations

5.02 WATER PRESSURE

.1 Minimum design distribution pressure in all areas at peak hour demand 300 kPa (44 psi) based on design low reservoir level. With the combination of maximum daily demand and the specified fire flow, the minimum residual water pressure at all flowing hydrant(s) is 150 kPa (22 psi) and no other point in the system less than 35 kPa (5 psi). Where these minimum design pressures cannot be maintained due to an increase in elevation or distance from the point of connection, a booster pump station and/or emergency storage shall be provided as part of the distribution system.

.2 The maximum allowable distribution line pressure is 860 kPa (125 psi) static, except where individual connections are permitted directly from trunk mains and where special precautions are taken. Otherwise, where distribution pressures will exceed 860 kPa (125 psi) static due to a drop in elevation, a pressure reducing station shall be installed as part of the distribution system. Where distribution pressures exceed 550 kPa (80 psi), occupants of existing houses in the area shall be advised to install individual pressure reducing valves.

5.02A VELOCITY

.1 The maximum desirable velocity at maximum peak hour flow shall not exceed 2.0 m/s.

.2 The maximum desirable velocity during fire flow conditions *plus* the maximum day rate shall not exceed 3.5 m/s.

5.03 DESIGN POPULATION

.1 Design populations used in calculating water demands shall be computed in accordance with the City's population predictions or with the planned development in the area to be served, whichever is larger. In the absence of detailed design population information, the following minimum design population densities shall be used.

Land Use	Population Density
Single Residential Dwelling ***(REVISED JUNE 2026)***	36 persons per hectare
Low Density multi-unit	48 persons per hectare
High density multi-unit	120 persons per hectare
Industrial & Commercial	36 persons per hectare
Industrial & Commercial (high users like brewery or fish hatchery) ***(REVISED JUNE 2026)***	TBD ***(REVISED JUNE 2026)***

5.04 HYDRAULIC NETWORK

.1 Depending on the complexity and extent of the proposed distribution system, the City may require, for new developments, a hydraulic network analysis diagram showing maximum design flows and pressures. If this information is required, it shall be stated at the time of the feasibility review and shall be submitted by the applicant with the detailed design application. The hydraulic network shall be designed to distribute the maximum design flows in accordance with Section 5.02 – Water Pressure [→] and Section 5.02A – Velocity [→].

.2 Field testing of design flows and existing network capacity may be required by the City Engineer.

5.05 WATER DISTRIBUTION PIPING

.1 The general requirements for the distribution piping are as follows:

(a) Numerous trunk lines and secondary feeders shall be installed throughout the system. Mains must be adequate to deliver consumption and fire flow demands for the area served, and should be spaced not more than 1000 m apart and looped. For extensions to the distribution network, all water distribution piping shall be looped. When looping is not feasible, temporary or permanent dead ends shall be approved by the City Engineer. ***(REVISED JUNE 2026)***

(b) Pipes on a grid system in residential areas shall be a minimum of 200 mm diameter, except that 150 mm diameter may be allowed for short interconnecting streets, or short dead ends not over 100 m long. Where dead ends or poor grids are likely to last over two years, greater pipe diameters may be required and shall be evaluated for peak hour and fire flow requirements and minimum pipe size to the fire hydrant shall be 200 mm diameter. ***(REVISED JUNE 2026)***

(c) Lines furnishing domestic supply only, and not serving hydrants, may be 100 mm in diameter.

(d) Where a watermain ends in a dead-end or a valve is normally closed, a fire hydrant or flushout shall be provided for flushing purposes. ***(REVISED JUNE 2026)***

(e) All pipes shall be designed for the maximum pressures and earth loading to which the pipe will be exposed.

(i) For PVC, the minimum Dimension Ratio shall be DR18. If design warrants, a thicker wall thickness may be required.

(ii) For HDPE (PE4710) the minimum Dimension Ratio shall be DR11. If design warrants, a thicker wall thickness may be required.

(f) Design criteria for any watermain piping 350 mm or greater in diameter requires City Engineer approval. ***(REVISED JUNE 2026)***

5.05A EXTERNAL PIPE/FITTING CORROSION REPORT

.1 At the request of the City Engineer a pipe corrosion report shall be prepared by the Professional of Record, at the Applicant's expense, on prevention of corrosion of ductile iron, copper, grey iron and/or steel pipe and fittings used for construction of the infrastructure. ***(REVISED JUNE 2026)***

.2 The corrosion report shall be subject to an engineering analysis of the potential of external pipe corrosion due to graphitization, pitting corrosion, galvanic corrosion, microbiologically influenced corrosion, corrosion due to dissimilar electrolytes and/or stray current corrosion. The report shall outline the construction methods to provide maximum corrosion protection requirements based on the latest best management practices.

.3 A geotechnical report may also be required for sites with adverse soil conditions, contaminated soil, groundwater, or other such conditions which, in the opinion of the City Engineer, require special attention.

.4 All recommendations provided in the report shall become requirements for design and subsequent construction.

5.05B CORROSION PROTECTION REQUIRED FOR BURIED METALS

.1 Design and construction shall provide for external corrosion protection of all buried metals, pipe fittings and restraints. As a minimum, corrosion protection shall be with a petrolatum based wax and tape coating system approved for potable water per AWWA C217.

.2 At the request of the City Engineer, other corrosion protection systems may be required.

5.06 SERVICE CONNECTIONS

.1 The Professional of Record will show the arrangement for water service connections on the design drawings and consider the following: ***(REVISED JUNE 2026)***

(a) Water service connection locations shall be coordinated with gas, cable, hydro and telephone utilities to avoid any conflict with their installations at the property lines of lots. ***(REVISED JUNE 2026)***

(b) The typical location of Service Connections to Residential Vacant Lots is shown on Standard Drawing No. T-7 []. ***(REVISED JUNE 2026)***

(c) The typical schematic for water service connection and location of meter assembly are shown on Standard Drawing No. W-0 []. ***(REVISED JUNE 2026)***

.2 The requirements for Backflow Prevention Assemblies are in accordance with the City's Cross Connection Control Program Specifications outlined in Section 5.0 - Water Distribution System, Cross Connection Control, unless approved otherwise by the City Engineer. ***(REVISED JUNE 2026)***

.3 Each lot shall be serviced by one water service connection. ***(REVISED JUNE 2026)***

(a) If the site development requires sprinklers or a fire line, the Professional of Record will provide calculations on the minimum service size for combined domestic and fire suppression requirements. ***(REVISED JUNE 2026)***

(b) Domestic and fire services shall be separated for lines 100 mm diameter or greater. Combined lines greater than 100 mm diameter may be considered with the approval of the City Engineer. ***(REVISED JUNE 2026)***

(c) The domestic water meter shall be downstream from the separation point with the fire line. ***(REVISED JUNE 2026)***

.4 All water services and fire lines must be metered. ***(REVISED JUNE 2026)***

(a) The Water Meter Sizing Calculation Sheet in Appendix H4 [] is used for sizing water meters. ***(REVISED JUNE 2026)***

(b) Fire lines require a detector meter as per Standard Drawing W-15 [] alternate location requires approval from the City Engineer.

.5 Water services 50 mm diameter and less: ***(REVISED JUNE 2026)***

(a) Single residential minimum service connection from the watermain to the curb stop is 25 mm diameter polyethylene service tubing. Refer to Standard Drawing No. W-1 []. ***(REVISED JUNE 2026)***

(b) Multi-unit residential minimum service connection is 50 mm diameter polyethylene service tubing. Refer to Standard Drawing No. W-1A []. ***(REVISED JUNE 2026)***

(c) All components shall be the same size as the service connection pipe to which they are connected. ***(REVISED JUNE 2026)***

.6 Water services greater than 50 mm diameter: ***(REVISED JUNE 2026)***

(a) A gate valve complete with valve box shall be provided at the watermain tee. ***(REVISED JUNE 2026)***

(b) The water meter shall be typically located in a water meter chamber. Water meters may be located in the Mechanical Room subject to the approval of the City Engineer. ***(REVISED JUNE 2026)***

.7 If an existing service is being permanently abandoned, the water service line shall be abandoned and disconnected at the watermain ***(REVISED JUNE 2026)***

5.07 HYDRANTS

.1 The minimum hydrant connection diameter size shall be 200 mm. ***(REVISED JUNE 2026)***

(a) The minimum depth of cover shall be 1.20 m.

(b) Drain outlets shall be provided.

.2 Hydrants shall be constructed as per Standard Drawing No.W-5 – Hydrant Connection []. The bottom flange of the hydrant shall be located between 150 mm to 200 mm above final grade. ***(REVISED JUNE 2026)***

.3 Hydrant spacing shall be the most conservative of the following:

(a) *B.C. Building Code* requirements for sprinkler systems and the Fire Underwriters Survey Guide.

(b) The maximum spacing of hydrants shall be 90 m. ***(REVISED JUNE 2026)***

.4 Two gate valves shall be provided at a watermain tee servicing a hydrant assembly:

(a) A hub x flange (HxF) gate valve on the line to the fire hydrant. The gate valve shall be a flange connection at the watermain tee. This flanged gate valve shall service the hydrant line only. Hydrant bowls shall be a bell end pipe connection to the hydrant line and shall not be flanged. (***REVISED JUNE 2026)***

(b) A hub x flange (HxF) gate valve inline with the watermain. The gate valve shall be a flange connection at the watermain tee. The location of this valve shall be on the uphill side of the watermain.

.5 Hydrant access crossings shall be provided for hydrant installations adjacent to open ditches as per Standard Drawing No. W-7 [].

.6 Hydrant locations are shown on design drawings and the Professional of Record must consider the following minimum offsets in the placement of hydrants: ***(REVISED JUNE 2026)***

(a) unobstructed clearance and clear level stable surface, with minimum 2 m on all three sides with outlets and 1 m on the side without an outlet, ***(REVISED JUNE 2026)***

(b) is 5 m from parking, ***(REVISED JUNE 2026)***

(c) is 2 m from vehicular travel lane, ***(REVISED JUNE 2026)***

(d) is 2 m from trees, and ***(REVISED JUNE 2026)***

(e) is 1 m from the property line. ***(REVISED JUNE 2026)***

.7 The maximum design flow per hydrant shall be 100 L/s. Where greater flows are required, additional hydrants shall be provided within a distance approved by the Fire Department.

.8 Preferably, hydrants shall be located on low points in the pipe system in conjunction with hydrant spacing for fire control.

5.08 VALVES

.1 In general, valves shall be located as follows:

(a) In intersections either in a cluster at the pipe intersection or at projected property lines to avoid conflicts with curbs, gutters and sidewalks. Normally,4 valves will be required at an “X” intersection of mains, and 3 valves at a “T” intersection of mains.

(b) Distance between valves shall not be more than 150m.

.2 Unless otherwise permitted, valves shall be the same size and class as the pipe in which they are installed. Resilient seat gate valves shall be used up to and including 300 mm diameter valves may be rubber seated butterfly valves if approved by the City Engineer. ***(REVISED JUNE 2026)***

.3 Thrust blocking or other restraints shall be provided on valves.

.4 Use of butterfly valves requires approval by the City Engineer. Butterfly valves shall not be direct buried. Chambers shall be provided for all butterfly valves.

5.09 THRUST BLOCKS AND JOINT RESTRAINTS

.1 Provide concrete thrust/reaction blocks or restraints on all tees, bends, (>5 degrees), valves, caps and fittings. For pipes equal to or less than 300 mm nominal diameter, refer to Standard Drawing No. W-8 for the minimum thrust/reaction block dimensions. Thrust/reaction and restraint calculations shall be completed by the Professional of Record and details shall be shown on the design drawings in the following cases: ***(REVISED JUNE 2026)***

(a) For sizes larger than 300 mm diameter ***(REVISED JUNE 2026)***

(b) Where pressures exceed 1035 kPa (150 psi).

(c) Where allowable soil bearing is less than 96 kPa (14 psi).

(d) Where vertical thrust/reaction blocking is required.

(e) Where joint restraints are used.

.2 For sizes 300 mm diameter and larger, restraint fittings must be mechanical joints. ***(REVISED JUNE 2026)***

.3 Thrust calculations for joint restraints shall be done in accordance with the manufacturer's specifications. The type of joint restraint and length of pipe to be restrained shall be clearly indicated on the design drawings. All tie rod and joint restraints shall be protected with an approved petrolatum protection coating meeting AWWA Standards.

.4 Tie rods and joint restrains shall be provided, as a minimum for the following locations:

(a) Hydrants
(b) Flush-outs
(c) Temporary caps
(d) Fittings or pipes larger than 300 mm
(e) Carrier pipe in casings
(f) Connections to valves outside PRVs and other chambers
(g) Any other location required by the Professional of Record or City Engineer.
(REVISED JUNE 2026)

5.10 WATERMAIN LOCATION, DEPTH AND GRADE

.1 The minimum depth of cover shall be 1.20 m unless otherwise permitted by the City Engineer. Minimum cover over watermain pipe crossings under ditches shall be 0.5 m.

.2 Unless otherwise approved by the City Engineer, tolerances for pipe alignment and grade shall be:

(a) Alignment ±50 mm
(b) Grade ±25 mm

.3 Watermains shall be located not less than 3.0 m clear distance horizontally and 0.45 m clear distance vertically from all sewer lines, unless otherwise permitted by the City Engineer and the Provincial Ministry of Health regulations. Normal watermain offsets are shown in the standard drawings for roadways in Section 8.0 – Transportation []. *(REVISED JUNE 2026)*

.4 If pipe alignment is not feasible as a means of establishing required separations due to conflict with existing services, crossings shall be arranged such that the crossover occurs on nominal pipe length centers and all joints within 3 m of the crossing shall be secured with concrete encasement (as per Standard Drawing No. T-5), petrolatum tape, shrink wrap or approved equivalent in accordance with the Ministry of Health permit requirements.

.5 Watermains shall be designed with a rising grade (minimum 0.1%) wherever possible, to minimize high points in the main. Where a high point is unavoidable, an air release valve shall be installed in accordance with Section 5.14 [→].

.6 For trench dam design, refer to Section 4.18 – Trench Dams [] .

5.10A UTILITIES IN PRIVATE LANDS

The following shall be considered in the design of utilities crossing private lands:

.1 The design of utilities shall avoid crossing private lands as much as possible.

.2 Utilities following property boundaries across private lands shall generally be offset a minimum 2.0 m from the property boundary.

.3 Appurtenances such as valves, etc. shall not be located on property boundaries.

.4 Utilities shall not cross private parcels in such a manner that they render the property unusable. Special consideration must be given to ensure the location of the utility crossing minimizes the limitations on the future use of the property.

.5 Fire line and fire hydrants within private property are subject to Fire Protection and Life Safety Regulation Bylaw No. 7108 and the design is to be reviewed by the City. ***(REVISED JUNE 2026)***

.6 For minimum widths of statutory right-of-way and working widths refer to Appendix D []. ***(REVISED JUNE 2026)***

.7 For a sample statutory right-of-way condition sheet, refer to Appendix C [], Standard Drawing No. RW-2. ***(REVISED JUNE 2026)***

.8 For an Easement Release and Inspection Form Following the Construction of the Utility, refer to Appendix C []. ***(REVISED JUNE 2026)***

5.11 PRESSURE REDUCING STATIONS

.1 A pressure reducing station shall be required where the static pressure in the proposed distribution system will exceed 860 kPa (125 psi). In general, the pressure reducing station shall be located at the elevation where the static pressure initially exceeds 860 kPa (125 psi).

.2 General requirements for pressure reducing stations shall be as follows:

(a) A downstream surge of relief shall be provided to release pressure in the event of a failure of the pressure reducing valve(s). The surge relief valve may be incorporated into the pressure reducing station or may be located at some other suitable location within the distribution system. The surge relief valve shall drain to an adequate storm drainage facility as per Standard Drawing W-18 [], and as approved by the City Engineer. Upstream surge relief valves shall be provided as required. ***(REVISED JUNE 2026)***

(b) Pressure reducing valves shall be sized to provide adequate pressure control through all ranges of design flows. If necessary, two or more pressure reducing valves of varying sizes shall be provided in one station. Pressure reducing valves shall be equipped with valve stem position indicators. ***(REVISED JUNE 2026)***

(c) Each pressure reducing and surge relief valve shall be provided with isolating valves and shall be installed so that individual components may be easily removed for repair or replacement. ***(REVISED JUNE 2026)***

(d) The pressure reducing station equipment shall be enclosed in an above ground kiosk. Underground vaults may be considered with the approval of the City Engineer. If approved, the pressure reducing station equipment shall be enclosed in a watertight reinforced concrete vault designed to CS600 loading with a standard manhole cover or other opening large enough to remove the largest single piece of equipment in the station. Station floors shall be sloped at 2.0% towards a floor drain assembly in accordance with Section 5.16 – Floor Drain Assembly Chamber Design [→]. ***(REVISED JUNE 2026)***

(e) Pressure gauges complete with snubbers and isolating valves shall be installed to register both upstream and downstream pressure. Gauges shall be mounted so they may be read from the manhole access lid without entering the chamber. ***(REVISED JUNE 2026)***

(f) Adequate strainers shall be supplied on the water used for controlling the regulating valves and on the main intake. ***(REVISED JUNE 2026)***

(g) Pressure reducing stations shall be located outside of the travelled portion of any street and must be vented to promote air circulation. ***(REVISED JUNE 2026)***

(h) Inside walls, floors and ceilings of stations to be painted with a white water soluble cement base paint manufactured for the purpose of sealing concrete. ***(REVISED JUNE 2026)***

(i) Exterior wall below grade shall be black damp-proofed (tar coated) to prevent leakage. ***(REVISED JUNE 2026)***

5.12 -NOT USED-

5.13 METER CHAMBERS/VAULTS AND BOXES

.1 All meters must be contained in an approved chamber or meter box normally located in: ***(REVISED JUNE 2026)***

(a) The street right-of-way at the property line for single unit lots. Refer to Standard Drawing No. W-1 []. ***(REVISED JUNE 2026)***

(b) In a statutory right-of-way on private property for services 50 mm or greater in diameter, the water meter, the box or chamber shall be as close to property line as possible. ***(REVISED JUNE 2026)***

(c) Only if (a) or (b) are not suitable locations, an alternative location will be considered, subject to the approval of the City Engineer. ***(REVISED JUNE 2026)***

(d) Larger strata developments are to have a single domestic water meter with a privately owned watermain. A City owned watermain with individually metered units may be considered for small strata developments with the approval of the City Engineer. *(REVISED JUNE 2026)*

.2 Water meter boxes for services 50 mm diameter and less: *(REVISED JUNE 2026)*:

(a) Single residential, with service connection of 25 mm diameter, as per Standard Drawing No. W-1 []. *(REVISED JUNE 2026)*

(b) Multi-unit residential, minimum service connection of 50 mm diameter, as per Standard Drawing No. W-1B []. *(REVISED JUNE 2026)*

.3 General requirements for water meter chambers for services 75mm and greater are as follows:

(a) A minimum of 600 mm clearance must be provided between the walls and the meter including associated piping.
(b) The minimum headroom for workers in water meter chambers must be 1.2m.
(c) The meter shall be protected against freezing, mechanical damage and tampering.
(d) Isolation valves must be provided on both sides of meters.
(e) Valves for fire line services must be in accordance with NFPA regulations. *(REVISED JUNE 2026)*
(f) A valved bypass must be provided. *(REVISED JUNE 2026)*
  (i) Valves are to be installed in approved valve boxes outside the chamber. *(REVISED JUNE 2026)*
  (ii) Bypass valves installed within the chamber are to be approved by the City Engineer. *(REVISED JUNE 2026)*
(g) The meter chamber may be designed as a precast concrete vault as per Standard Drawing No. W-11 [] designed with CS600 static loading. *(REVISED JUNE 2026)*
(h) Lids for chamber/vault are to be aluminum. *(REVISED JUNE 2026)*
(i) Chamber/vault must be designed with access openings suitable for removing valves and equipment. *(REVISED JUNE 2026)*
(j) Chamber/vault surface shall be level and flush with the surrounding ground surface which shall be sloped away from the chamber with at least 0.5 m buffer around the chamber for unobstructed access around the chamber. *(REVISED JUNE 2026)*
(k) An adequate floor drain assembly shall be provided and designed as per Section 5.16 – Floor Drain Assembly Chamber Design [→]. *(REVISED JUNE 2026)*

(l) A safe permanent access ladder must meet the WorkSafeBC requirements for fixed ladders. ***(REVISED JUNE 2026)***
(m) Exterior walls below grade shall be watertight.
(n) Interior surfaces of chambers for meters 75mm diameter and greater to be painted with white, waterproof masonry wall coating that penetrates and seals pores in masonry surface. ***(REVISED JUNE 2026)***
(o) Manhole water meter chambers with manhole lids are only permitted if approved by the City Engineer, then designed as per Standard Drawing No. W-11A []. ***(REVISED JUNE 2026)***

.4 For combination fire service and domestic meters, the bypass shall be sized for the largest flow rate. In the absence of the flow rate, the bypass shall be the same diameter as the service. ***(REVISED JUNE 2026)***

.5 The City has a Cross Connection Control program that requires all new developments to install Premise Isolation. The Premise Isolation will be privately owned. Refer to CSA B64.10, *BC Building Code* and appropriate City bylaws. ***(REVISED JUNE 2026)***

5.13A BACKFLOW PREVENTION ASSEMBLIES CHAMBERS / CONTAINMENT STRUCTURES

.1 Unless otherwise approved by the City Engineer, all new developments and revisions to existing properties shall install Premise Isolation in accordance with the Specifications under Section 5.70 - Water Distribution System, Cross Connection Control [→]. The Property Owner subject to Premise Isolation shall be the owner of all Backflow Prevention Assemblies, Associated Chambers/Containment Structures and associated appurtenances. ***(REVISED JUNE 2026)***

(a) Backflow Prevention Assemblies shall be installed in accordance with Section 5.77 - Installation Standards for Backflow Prevention Assemblies for Premises Isolation [→].
(i) Services including residential services greater than 50 mm diameter shall have a Backflow Prevention Assembly installed immediately after the service meter. ***(REVISED JUNE 2026)***

5.14 AIR VALVES

.1 Combination air valves shall be provided at all high points of the watermain or where a closed valve creates a high point. (i.e. closed valve to isolate pressure zone) and located off the travelled portion of the road.

.2 Combination air valves shall be a minimum of 25 mm diameter. ***(REVISED JUNE 2026)***

.3 For mains 300 mm diameter and larger, the air valve type, (combination, release or vacuum) and size shall be determined by the Professional of Record and the details shall be on the design drawings. ***(REVISED JUNE 2026)***

.4 Combination air valve chambers shall be drained to ensure that the chamber does not flood.

.5 Combination air valves shall be vented to an appropriate above-grade location to eliminate potential cross-connection in a flooded or contaminated chamber.

5.15 FLUSHOUTS

.1 Flushouts shall be provided at the ends of all dead-end mains whether permanent or temporary.

.2 On all watermains greater than 350 mm diameter, flushouts shall be installed at the lowest points in the watermain network. (***REVISED JUNE 2026)***

.3 Above-ground flushouts shall only be installed in areas where high ground water tables prohibit the installation of below-grade flushouts.

.4 Flushouts shall be located 2.0 m (minimum) from the edge of present and future vehicular travelled areas and shall not be constructed closer than 0.6 m from front property line. ***(REVISED JUNE 2026)***

.5 Where practical, and with the approval of the City Engineer, hydrants may also be used in a secondary role as a flushout

.6 No flushout shall be connected to a sewer.

5.16 FLOOR DRAIN CHAMBER ASSEMBLY

.1 Chambers are to be designed to include a drain to a storm drainage system. The drain shall either be: ***(REVISED JUNE 2026)***

(a) Connected to the storm drainage system via gravity, or ***(REVISED JUNE 2026)***

(b) Connected to the storm drainage system via pump. Pumps shall be as per the City's Approved Products List or as approved by the City Engineer. ***(REVISED JUNE 2026)***

(c) The drainage system is designed in accordance with Section 7.0 – Stormwater Management with adequate capacity to keep the chamber dry at all times. ***(REVISED JUNE 2026)***

.2 If a connection to the storm drainage system is not available, alternative solutions require the approval of the City Engineer. ***(REVISED JUNE 2026)***

.3 Floor drain systems shall provide no risk of flooding of the chamber.

.4 Sumps shall be provided at the low point of the meter chamber for all floor drain assemblies.

SECTION 5 – WATER DISTRIBUTION SYSTEM SPECIFICATIONS

5.20 SCOPE

.1 This specification refers to pressure pipe and appurtenant fittings for water distribution piping and water service connections. Only those products approved by the City Engineer and listed in the City's Approved Products List [] will be accepted for installation.

5.21 MATERIALS TESTING

.1 The Professional of Record shall arrange for a certified materials testing firm to carry out tests to determine whether the applicable standards and specifications have been met. Where initial testing indicates inadequacies, additional testing shall be required. ***(REVISED JUNE 2026)***

5.22 WATERMAIN PIPE

The sizes and types of pipe to be used shall be shown on the drawings.

.1 Ductile Iron Pipe

(a) Standard Specifications:

(i) Ductile iron pipe shall conform to AWWA C151 and AWWA C150.

(b) Supplementary Data:

(i) Unless otherwise specified on the construction drawings, all pipe shall have a minimum pipe class as follows:

Pipe Size	Class
75 – 300	350
350 – 500	250

(ii) An affidavit of compliance with the standard specifications and supplementary data shall be submitted from the supplier.

(iii) All pipe supplied shall bear the underwriter's label.

(iv) Joints shall be a mechanical type conforming to AWWA C11 or shall be rubber gasket, bell and spigot, Tyton joint, or as approved.

(v) The class or nominal thickness, net weight without lining, and casting period shall be clearly marked on each length of pipe. Additionally, the manufacturer's mark, country where cast, year in which the pipe was produced, and the letters “DI” or Ductile” shall be cast or stamped on that pipe.

(c) Protective Coatings:

(i) Ductile iron pipe shall be cement-lined conforming to AWWA C104.

(ii) A cathodic protection system shall be provided where warranted by soil conditions. ***(REVISED JUNE 2026)***

(iii) Polyethylene Encasement to AWWA C105 where warranted by soil conditions.

(iv) Petrolatum Corrosion Protection system shall be installed to AWWA C217 where warranted by soil conditions.

.2 Steel Pipe

(a) Standard Specifications:

(i) Steel pipe, fittings and specials, shall conform to the following standard specifications:

(ii) AWWA C200 – Standard for Steel Water Pipe 150 mm and larger ASTM A36

(iii) AWWA C205 – Standard for Cement – Mortar Protective Lining and Coating for Steel Water Pipe 4 in. (100 mm) and Larger-Shop Applied

(iv) AWWA C206 – Field Welding of Steel Water Pipe

(v) AWWA C207 – Standard for Steel Pipe Flanges for Waterworks Service Sizes 4 in. through 144 in. (100 mm through 3,600 mm)

(vi) AWWA C208 – Standard for dimensions for Steel Water Pipe fittings.

(vii) AWWA C606 – Standard for Grooved and Shouldered Joints

(b) Steel pipe may be allowed in limited circumstances. Subject to pre-approval, the City Engineer will provide detailed specifications and requirements on a strict site by site basis.

.3 Polyvinyl Chloride (PVC) Pipe:

(a) Standard Specifications:

(i) 100 to 350 mm diameter PVC pressure pipe for water: ***(REVISED JUNE 2026)***

1. Pipe shall conform to AWWA C900, certified to CSA B137.3 and shall be cast-iron pipe equivalent outside diameter (CIOD).
2. Pipe DR shall be:
   a. DR 18 with pressure rating of 1620 kPa (235 psi), or
   b. DR14 with pressure rating of 2100 kPa (305 psi), or as otherwise approved.

(b) Supplementary Data:

(i) An affidavit of compliance with the standard specifications and supplementary data shall be submitted from the supplier. All pipe shall be ULC Listed. Joints for PVC pipe shall have a mechanical seal formed by a preformed rubber gasket in a bell or coupling. It is mandatory that the push-on integrally thickened bell and spigot type conform to ASTM D3139 Clause 6.2 with single elastomeric gasket to ASTM F477. Couplings shall be of a class and strength equivalent to the pipe.

(ii) All PVC water pipe shall be blue in colour.

.4 High Density Polyethylene (HDPE) Pipe

(a) Standard Specifications:

(i) HDPE pipe to be used for watermains are subject to approval by the City Engineer. ***(REVISED JUNE 2026)***

(ii) Projects in which HDPE pipe is proposed shall be accompanied by complete HDPE specifications for approval.

(iii) HDPE pressure pipe shall conform to AWWA C906 (Standard for Polyethylene Pressure Pipe & Fittings, 100 mm through 1575 mm for Water Distribution and Transmission) and shall:

1. be PE grade 4710 at a minimum DR11 with a pressure class of 1375 kPa (200 psi);
2. meet ASTM D3350, and ***(REVISED JUNE 2026)***
3. installed with electrofusion fittings and/or conventional (butt) fusion fittings.
    a. Joints shall be fused in strict accordance with manufacturer's instructions meeting ASTM D3261.
    b. Compatible mechanical joint fittings and valves without special adapters may be considered under approval by the City Engineer.
4. Be certified to NSF 61 and clearly marked by the manufacturer with a permanent colour marking designation for the entire length of pipe meeting AWPA Uniform Colour Code Blue for potable water.

(b) Fittings:

(i) Fabricated HDPE mitered fittings shall meet AWWA C906.

(ii) Molded HDPE fittings shall meet ASTM 3261.

(iii) Fittings shall be as recommended by the manufacturer for the PE grade and pressure rating of the pipe with no downrating of pipe pressure.

(c) Supplementary Data:

(i) An affidavit of compliance with the standard specifications shall be submitted from the supplier. All pipe and fittings shall bear the underwriters label.

5.23 WATERMAIN FITTINGS

.1 All fittings for ductile iron and PVC pipe shall be:

(a) Asphalt coated ductile iron compact fittings manufactured to AWWA C153, designed for a minimum working pressure of 2415 kPa (350 psi), and cement mortar lined to AWWA C104.

(b) Asphalt coated ductile iron fittings manufactured to AWWA C110, designed for a minimum working pressure of 2415 kPa (350 psi) and cement mortar lined to AWWA C104.

.2 The design pressure rating of all fittings shall meet or exceed the pressure class of the pipes they are connected to.

.3 Single rubber gasket for push-on bell and spigot type joint and/or mechanical pipe joints to ANSI/AWWA C111/21.11 (Tyton). All push-on joint hubs to be equipped with tie rod lugs.

.4 Flanged joints on fittings shall be flat faced conforming in dimension and drilling to ANSA B16.1.

.5 Ends shall be flanged or belled to suit pipe ends.

.6 Thrust blocks or joint restraints shall be provided as shown in the drawings.

.7 In areas where the static pressure exceeds 1380 kPa (200 psi), fittings shall be as approved by the City Engineer.

5.24 WATERMAIN VALVES

.1 Unless otherwise approved by the City Engineer, valves conforming to the following specifications shall be installed in the distribution system:

(a) Resilient Wedge Gate Valves:

(i) Valves shall conform to the latest revision of AWWA C509 and AWWA C515 Resilient Seated Gate valves and shall be Underwriters Laboratories (UL) listed and Factory Mutual Approved (FM approved). ***(REVISED JUNE 2026)***

(ii) Valves shall be non-rising stem, open left (counter-clockwise) and have a 50 mm square operating nut.

(iii) The wedge shall be ductile or cast iron completely encapsulated with urethane rubber.

(iv) The rubber shall be permanently bonded to the wedge and meet ASTM D429 for test for rubber metal bond.

(v) Stems for non-rising assemblies shall be cast bronze with integral collars or stainless steel in full compliance with AWWA. The non-rising stem stuffing box shall be the O-ring seal type with two rings located above the thrust collar; the two rings shall be replaceable with the valve fully open and subjected to full rated working pressure.

(vi) There shall be two low torque thrust washers located above and below the stem collar. The stem nut shall be made of solid bronze. There shall be a smooth unobstructed waterway free of all pockets, cavities and depressions in the seat area.

(vii) The body and bonnet shall be coated with fusion bonded epoxy both interior and exterior meeting AWWA C550. Each valve shall have the manufacturer's name, pressure rating and the year of manufacture cast on the body. Prior to shipment, each valve shall be tested by hydrostatic pressure equal to twice the specified working pressure.

(viii) Every valve will have a positive stop to prevent distortion to the wedge.

(ix) Valve operating nuts greater than 1.2 m below finished grade require a valve nut extension rod complete with valve riser guide. Valve nut extension rods shall be a minimum 600 mm below finished grade. Refer to Standard Drawing No. W-16 [].

(x) Single rubber gasket for push-on bell and spigot type joint and/or mechanical pipe joints to ANSI/AWWA C111/21.11 (Tyton). All push-on joint hubs to be equipped with tie rod lugs. Valves shall have flange connection to fittings.

(xi) Valves larger than 400 mm shall be complete with bypass gate valve. Subject to approval by the City Engineer, a butterfly valve conforming to ANSI/AWWA C504 in a chamber complete with bypass may be used.

(b) Rubber Sealed Butterfly Valves:

(i) Butterfly valves for water service shall be short body flanged type or wafer body type conforming to AWWA C504, suitable for a maximum non-shock shut-off pressure of 1035 kPa (150 psi). Valve construction shall be as follows, or as approved.

1. Body material shall be ductile.
2. Disc material shall be ductile or cast iron.
3. Valve seats shall be of new natural or synthetic rubber.
4. Valve shaft material shall be 18-8 stainless steel type 304 or 316. Shaft shall be pinned to the disc. Shaft sizing shall be in accordance with AWWA C504.

5. Body shall be complete with shaft bushing and location lugs for flange bolts.
6. Valve operators shall be worm gear type totally enclosed and waterproofed and equipped with adjustable stops. All valves shall be equipped with a standard 50 mm square operating nut and the operator shall be located on the side of the valve with the spindle in a vertical position.
7. Valve shall be designed for the extreme maximum flows for both opening and closing.
8. Valve ends shall suit the pipe.
9. Valves shall open to the left (counter-clockwise).
10. Shaft seals shall be of the o-ring type.

(ii) A reinforced concrete chamber (designed to meet CS600 loading requirements) shall be provided for each butterfly valve as shown on the drawings. Valves shall not be direct buried.

5.25 WATERMAIN VALVE BOXES.

.1 Where valves are located in the roadway, valve boxes shall be cast iron and telescoping so that surface loads are not transmitted to the valve body or pipeline. A minimum of 450 mm of adjustment shall be available on all valve boxes. PVC valve hoods shall be used on all 200 mm and larger underground valve installations.

.2 Valve box lids shall have a non-rocking fit and extend 75 mm into the valve box from the lid seat as shown on Standard Drawing W-16 [].

.3 Minimum requirements for valve box risers in travelled and untravelled areas shall be DR18 pipe. ***(REVISED JUNE 2026)***

5.26 WATERMAIN VALVE MARKERS

.1 Valve markers are required to indicate the locations of the valves.

.2 Where valve boxes are located outside the paved portion of a road, these markers shall be constructed of 50 mm steel pipe panted blue and set in a concrete base. They shall extend one 1.0 m above the ground surface. The markers shall be located at a safe and reasonable location determined by the Professional of Record opposite the valve and the distance to the valve is to be painted in black figures on a flattened upper portion of the marker. ***(REVISED JUNE 2026)***

.3 Where valve boxes are located in the paved portion of the road, valve tag markers shall be installed in a nearby reasonable location.

5.27 HYDRANTS

.1 Installed fire hydrants shall meet the following specifications:

(a) Hydrants shall be compression type complying fully with AWWA standard C502 for dry barrel hydrants.

(b) Hydrants shall be clockwise opening and have a standard pentagonal operating nut with a circle diameter of 44.5 mm.

(c) The hydrant line shall be 150 mm diameter and made of the same material as the watermain. The hydrant shall have a bell and a preformed rubber gasket suitable for connection to the pipe being used. ***(REVISED JUNE 2026)***

(d) Hydrants shall have two nominal 65 mm diameter hose outlets without independent cut-off. The 65 mm diameter hose outlets shall conform to the B.C. Fire Hose Thread Standards, nominal 65 mm I.P., 75 mm O.D. male, 8 threads per 25 mmm tapering from 75.72 mm minimum O.D. to 82.63 mm maximum O.D. There shall also be one nominal 100 mm diameter (120 mm O.D.) pumper outlet. Pump nozzle shall be 100 mm STORZ type connection. ***(REVISED JUNE 2026)***

(e) Hydrant bodies shall be painted with red rust paint above the bury line. Hydrant ports and bonnets shall be painted with a base coat of aluminum rust paint and a top coat of bright yellow rust paint.

(f) Self-draining with drain outlet provided.

(g) Depth or bury shall be as required to provide the specified minimum cover on the connecting pipe and the required position of the hydrant flange relative to the finished ground elevation.

(h) For new installations, fire hydrant extensions will require approval from the City Engineer.

(i) Subject to approval of the City Engineer, hydrant flow test on all new hydrants, in accordance with NFPA 291, may be required. ***(REVISED JUNE 2026)***

.2 Tie Rods and Nuts:

(a) Tie rods to be continuous threaded, quenched and tempered alloyed steel to ASTM A354, Grade BC. To be zinc plated to ASTM B766. Tie rod sized to be minimum 19 mm diameter or greater as shown on the Contract Drawings. ***(REVISED JUNE 2026)***

(b) Nuts and internally threaded couplings to be heavy hex finish to ASTM A563. Washers to be flat hardened steel to ASTM F436. All to be zinc plated to ASTM B633 or cadmium plated to ASTM B766.

(c) All tie rods, nuts and washers shall be coated with approved petrolatum corrosion protection.

.3 Hydrant Access Crossings:

(a) Culvert headwalls shall be as specified in Section 7.35B – Culvert Headwalls [].

(b) Culverts shall be as specified in Section 7.35A – Culverts [].

(c) Gravel surfacing shall be as specified in Section 9.31 – Road Base Gravel Course [].

5.28 FLUSHOUT

.1 All piping and fittings shall be 65 mm diameter iron pipe thread, galvanized steel pipe. ***(REVISED JUNE 2026)***

.2 Shut-off valves shall be a 65 mm cast iron gate valve meeting all specifications for watermain valves. (***REVISED JUNE 2026)***

.3 Vertical section of flushout above ground shall be supported by a 100 x 100 mm cedar post, painted white with a red top and extending 1.20 m above finished grade.

.4 Above ground flushout bodies shall be painted with red rust paint above the grade line. Flushout caps shall be painted with a base coat of aluminum rust paint and a top coat of bright yellow rust paint.

.5 The valve box shall be cast iron and telescoping so that surface loads are not transmitted to the valve body or piping. A minimum of 300 mm of adjustment shall be available. The 65 mm diameter fire hose connection and cap shall meet standard B.C. Fire Hose Thread Requirements. ***(REVISED JUNE 2026)***

.6 Below grade flushouts shall conform to Standard Drawing No. W-2B [].

5.29 AIR VALVES AND FITTINGS

.1 All air valves shall be combination air release valves meeting AWWA C512. Bushings, reducers and unions to be used in the valve connection shall be brass manufactured to ASTM B62. Nipples shall be standard brass and threaded at both ends.

.2 Service valves for use in air valve assemblies shall have screw ends and shall be brass or bronze. All packing shall have each ring cut to fit, with staggered joints. Continuous (spiraled) packing shall not be used. Gate valves 100 mm or less in diameter shall be wedge disc type with non-rising stem, hand wheel and stuffing box glands, as specified for 1380 kPa (200 psi) water (860 kPa (125 psi) steam) service. ***(REVISED JUNE 2026)***

.3 All air valves shall have two 12 mm ball-type drain valves as shown on Standard Drawing No. W-4 [].

.4 Air valves for watermains greater than 300 mm diameter shall be as approved by the City Engineer. ***(REVISED JUNE 2026)***

5.30 WATER SERVICE CONNECTIONS

.1 Service Up to and including 50 mm Diameter:

(a) Services up to and including 50 mm diameter (2 inch) shall be either Class 200 polyethylene or crosslinked polyethene (PEXa) piping. ***(REVISED JUNE 2026)***

(b) Tubing shall be:

(i) Class 200 polyethylene tubing to AWWA C901, CSA B137.1 and NSF 61 complete with manufacturer recommended stainless steel insert required to stiffen pipe. ***(REVISED JUNE 2026)***

(ii) Crosslinked polyethylene manufactured using the high-pressure peroxide method of crosslinking. Pipe shall conform to AWWA C904, ASTM F876, CSA B137.5, NSF/ANSI 14 and NSF/ANSI 61 complete with manufacturer recommended stainless steel or plastic inserts to stiffen pipe. Piping shall have a co-extruded UV Shield made from UV-resistant polyethylene, color blue. Pipe to have minimum recommended UV exposure time of 12 months when tested in accordance with ASTM F2657 and evaluated in accordance with ASTM F876. ***(REVISED JUNE 2026)***

(iii) Service piping shall be compatible with AWWA C800 valves and fittings. ***(REVISED JUNE 2026)***

(iv) Tubing shall be installed complete with color coded (APWA Uniform Colour Code Blue for potable water) warning tape placed one foot above the tube in the trench. ***(REVISED JUNE 2026)***

(c) Tracer wire shall be installed with all polyethylene service tubing and shall be:

(i) Certified as tracer wire for direct burial and APWA Uniform Colour Code Blue for potable water ***(REVISED JUNE 2026)***

(ii) Affixed to the tube every 1.0 m with electrical tape and placed in the same orientation along the side of the tube and not wrapped around the tube. For PEXa piping, nylon ties shall be used instead of tape. ***(REVISED JUNE 2026)***

(iii) One end of the tracer wire terminated to a grounding anode approved by the tracer wire manufacturer, the other end terminated in the meter box with a coiled pigtail,

(iv) Inspection and testing by the Professional of Record with City Engineer upon completion of the service. Inspection and testing required by conductivity test and locate prior to approval. ***(REVISED JUNE 2026))***

.2 Corporation Stops:

(a) Corporation stops shall be full port, no lead bronze conforming to ASTM B62, AWWA C800 with AWWA standard male threaded inlet (MIP) and compression outlet for copper tubing size (CTS). *(REVISED JUNE 2026)*

(b) Shut-off head shall be solid tee head type.

.3 Curb Stops:

(a) Curb stops shall be full port, no lead bronze conforming to ASTM B62, AWWA C800 with compression inlet and AWWA standard female threaded outlet (FIP).

(b) Shut-off head shall be solid tee head type.

(c) Stop and drain type curb stops are prohibited.

.4 Service Fitting:

(a) Service fittings shall be full port, no lead bronze conforming to ASTM B62, AWWA C800.

(b) Service fittings may be compression, MIP, FIP, specifically excluding flairs.

.5 Service Connections 75 mm Diameter or Greater:

(a) Shall be minimum 75 mm diameter, full restrained, and as specified for watermain pipe. *(REVISED JUNE 2026)*

(b) Watermain connection shall be with an inline tee complete with a flange connected gate valve leading to the service. *(REVISED JUNE 2026)*

(c) The service shall be fully restrained from the watermain tee to the meter chamber, and through the meter chamber to the Backflow Prevention Assembly. *(REVISED JUNE 2026)*

.6 Meter Service Setters, Boxes, Box Extensions and Lids: *(REVISED JUNE 2026)*

(a) Service boxes for 25 mm diameter water service connections, meter setter and meter are contained in a concrete meter box with interior dimensions of 500 mm x 300 mm complete with cast iron traffic cover marked "Water". These will be typically installed as per W-1 []. *(REVISED JUNE 2026)*

(b) Service boxes for a 50 mm diameter water service connection that requires a 38 mm diameter or 50 mm diameter water meter and meter setter are contained in a concrete meter box with interior dimension of 555 mm x 860 mm concrete meter boxes complete with steel traffic covers marked "Water". These will be typically installed as per W-1B []. The upstream curb stop is located in the street right of way as per W-1A. *(REVISED JUNE 2026)*

(c) Provisions for a meter setter are required for all new installations. *(REVISED JUNE 2026)*

(i) A 25 mm diameter water service connection can be reduced inside the meter box to a 19 mm meter setter. *(REVISED JUNE 2026)*

(ii) The 50 mm water service connection can be reduced after the curb stop to meet the current residential unit requirements. *(REVISED JUNE 2026)*

(d) Service boxes or chambers for water services greater than 50 mm diameter shall be specified as per Section 5.34 – Meter Chambers [→]. *(REVISED JUNE 2026)*

(e) Meter box lid must be suitable for mounting of a “radio pit read” register unit. *(REVISED JUNE 2026)*

.7 Pipe Saddles: *REVISED JUNE 2026*

(a) Tapping threads to be tapered to AWWA C800.

(b) Saddles shall be compliant with NSF61.

(c) Gasket shall be styrene butadiene rubber (SBR) to ASTM D2000 specifications or other approved gasket material. The Professional of Record shall specify the appropriate gasket material. *(REVISED JUNE 2026)*

(d) Saddle for ductile iron pipe:

(i) Saddles for 50 mm diameter and less services to have a ductile iron body to ASTM A536. *(REVISED JUNE 2026)*

(ii) Anti-corrosive coating to AWWA C219, AWWA C210, or AWWA C213.

(iii) Two high strength low alloy steel straps to AWWA C111, or Type 304 stainless steel U-bolt straps, with minimum width per strap of 50 mm.

(e) Saddles for PVC pipe:

(i) To provide full support around circumference of pipe, saddles with lugs or U-bolt straps that may gouge or deform the pipe are not allowed.

(ii) Saddles for 50 mm diameter and less services shall be: *(REVISED JUNE 2026)*

1. Bronze body to ASTM B62 and two stainless steel straps to ANSI T304 with minimum width per strap of 50 mm.

2. All-stainless steel broadband saddle to ANSI T304; for services less than 38 mm diameter, saddle must be a minimum of 125 mm wide and have double bolts; for services 38 mm to 50 mm, saddle must be a minimum of 190 mm wide and have double bolts. Saddles to come with donut style gasket and stainless steel shell must be minimum 18 gauge thickness. All stainless steel to be fully passivated to ASTM A240. *(REVISED JUNE 2026)*

(f) Pipe saddles shall be installed on all pipe at service junctions up to and including 50 mm diameter service tube. *(REVISED JUNE 2026)*

.8 Meters:

(a) Meters shall be compatible with “Sensus Radio Read” automated meter reading and billing system. Meters installed in meter chambers shall be equipped with a Radio Read Pit Lid register mounted on a bracket as per Standard Drawing No. W-12 []. *(REVISED JUNE 2026)*

(b) All meters shall be equipped with encoder type remote – registers and provide at least 8 digit visual and encoded registration.

(c) For single residential servicing, meters shall be 19 mm minimum positive displacement meters. *(REVISED JUNE 2026)*

(d) For two unit residential servicing, meters shall be minimum 25 mm positive displacement meters. *(REVISED JUNE 2026)*

(e) All meters larger than 25 mm require approval from the City Engineer. *(REVISED JUNE 2026)*

(f) All meters 75 mm and greater shall be equipped with a test port or test tee and be plumbed with the appropriate isolation valves and bypass to facilitate in-situ testing of the meter.

(g) All meters used for a fire line service shall be UL listed and FM approved.

(h) The meter chamber may be designed as a precast concrete vault as per Standard Drawing No. W-11 [] designed with CS600 static loading. *(REVISED JUNE 2026)*

.9 Backflow Prevention Assemblies:

(a) Section 5.70 – Water Distribution System, Cross Connection Control.

.10 Pipe in Chambers:

(a) All pipe 50 mm diameter up to and including 75 mm diameter shall be corrosion resistant material. Only compression or threaded joints shall be permitted. *(REVISED JUNE 2026)*

(b) All pipe greater than 75 mm diameter shall be Schedule 10 Stainless Steel with flanged, treaded or compression joints. *(REVISED JUNE 2026)*

.11 Gate Valves Domestic Service:

(a) Gate valves shall be as per Section 5.24 [→].

.12 Gate Valves Fire Line Service:

(a) All valves shall be in conformance with NFPA regulations and shall be UL listed and FM approved.

(b) Resilient wedge valves shall be in conformance with Section 5.24 – Watermain Valves [→].

(c) Valves installed in chambers shall be of the indicating type as approved by the City Engineer.

5.31 PRESSURE REDUCING STATIONS

.1 Valves:

(a) Pressure reducing (PR) valves shall be hydraulically operated, pilot controlled diaphragm-type globe or angle valves.

(b) The meter chamber may be designed as a precast concrete vault as per Standard Drawing No. W-11 [] designed with CS600 static loading. ***(REVISED JUNE 2026)***

(c) The main valve shall be stainless steel.

(d) The valve stem on 50 mm and larger valves shall be guided at both ends.

(e) All repairs shall be possible without removing valve from watermain. ***(REVISED JUNE 2026)***

(f) All wetted surfaces on main valve shall be coated with an epoxy protective coating.

(g) All piloting shall be rigid stainless steel tubing with compression fittings. ***(REVISED JUNE 2026)***

(h) All PR valves shall have a position indicator. ***(REVISED JUNE 2026)***

(i) All PR valves shall have Y strainers or basket strainers installed upstream of the main valve and upstream of the control pilot. ***(REVISED JUNE 2026)***

(j) All PR valves shall have speed controls between the pilot and main valve body. ***(REVISED JUNE 2026)***

(k) All PR valves use for fire line service shall be UL Listed and FM approved. ***(REVISED JUNE 2026)***

.2 Gauges, pressure snubbers, isolation valves for gauges:

(a) All pressure gauges shall have a 90 mm minimum dial size with a 6.5 mm NPT bottom connection.

(b) All gauges shall be installed with a piston-type snubber.

(c) All gauges shall be installed with a stainless steel ball valve for isolation. ***(REVISED JUNE 2026)***

(d) All gauges in pressure reducing chambers shall be mounted so they can be read from the manhole lid access.

(e) Small diameter piping up to 60 mm shall be stainless steel. ***(REVISED JUNE 2026)***

(f) Piping over 75 mm shall be flanged stainless steel pipe. ***(REVISED JUNE 2026)***

5.32 FLANGE ADAPTERS AND JOINT RESTRAINTS

.1 Flange adaptors and joint restraints shall conform to AWWA C219 and be UL listed and/or FM approved. Flanged joints shall conform to AWWA C110 and ANSI B16.1, Class 125.

.2 Flange adapters and joint restraints shall be ductile iron conforming to ASTM A536 with an anti-corrosion coating on the interior and exterior rings conforming to AWWA C219.

.3 Bolts and nuts shall be high strength steel low allow steel conforming to AWWA C111, or stainless steel conforming to ASTM F593 and F594. Rolled threads, fit and dimensions shall be AWWA C111.

.4 Tie rods shall be continuous threaded, quenched and allowed steel conforming to ASTM A345, Grade BC and hot-dipped galvanized in accordance with ASTM A153. Coarse threads shall have Class 2A tolerance before galvanizing.

.5 Compression gaskets shall conform to AWWA C219.

.6 Flange adapters and joint restraints shall be designed to be suitable for the type pipe for which they are installed.

5.33 FLOOR DRAIN ASSEMBLIES

.1 Pipe and fittings for gravity connections shall conform to Section 7.22A – Piping, Fittings and Services, clause 7.22A.5 [].

.2 Pipe and fittings for 19 mm to 100 mm diameter sump pump connections shall conform to Section 5.30 – Water Service Connections [→]. ***(REVISED JUNE 2026)***

.3 Service junctions at the storm main, where permitted, shall conform to Section 7.23 – Service Junctions [].

.4 Sump drainer assemblies, if required, shall consist of backflow preventer, ejector pump, foot valve, strainer and float assembly connected to the watermain with a saddle and corporation stop conforming to Section 5.30 – Water Service Connections [→].

.5 Sumps shall have minimum dimensions of 300 x 300 x 150 mm.

.6 Perimeter drains shall consist of:

(a) 100 mm diameter PVC certified to CSA B182.1. Includes drain rock and geotextile wrap. ***(REVISED JUNE 2026)***

5.34 METER CHAMBERS

.1 Precast Manhole Sections:

(a) Unless otherwise approved, all manholes sections shall be precast reinforced concrete conforming to ASTM C478.

(b) All precast sections shall be complete with ladder rungs.

(c) O-ring rubber gaskets shall conform to ASTM C443.

.2 Precast Manhole Bases:

(a) Precast manhole bases shall be reinforced concrete in accordance with ASTM C76 Class III or better.

.3 Manhole Tops:

(a) Manhole tops shall be flat slab, precast concrete. Tops shall be reinforced to meet CS600 loading requirements. Precast tops shall conform to ASTM C478 with approved offset opening for frame and cover.

.4 Manhole Covers and Frames:

(a) Covers and frames shall be cast iron and certified to meet CS600 loading requirements with the bearing faces of the cover to be frame machined for a non-rocking fit.

(b) Standard manhole frame and cover shall conform to Standard Drawing No. W-19 – Manhole Frame and Cover [].

(c) Utility chamber manhole frame and cover shall conform to Standard Drawing No. W-20 – Utility Chamber, Manhole, Frame, Ring and Cover.

(d) A watertight manhole frame and cover, if required, shall conform to Standard Drawing No. W-21 – Watertight Manhole Frame and Cover [].

(e) Covers located in statutory rights-of-way shall be permanently embossed with the additional wording “DO NOT COVER”.

(f) Refer to Section 5.58 [→] for frame and cover installation.

.5 Manhole Steps:

(a) Steps shall conform to ASTM C478 for manhole steps and ladders and shall be a 19 mm diameter aluminum alloy conforming to CSA S157. ***(REVISED JUNE 2026)***

(b) All steps shall be complete with approved polyethylene anchor insulating sleeves and installed in 25 mm to 26 mm diameter precast or drilled holes in a manhole section. ***(REVISED JUNE 2026)***

(c) Refer to Section 5.58 [→] for manhole steps installation.

.6 Concrete:

(a) All concrete work for cast in place manhole bases shall conform to Section 11.0 – Cast In Place Concrete Works [].

.7 Precast Concrete Grade Ring:

(a) A precast concrete grade ring conforming to ASTM C478 shall be used.

.8 Radio Read Meter Bracket *(REVISED JUNE 2026)*

(a) Radio read meter bracket shall conform to Standard Drawing No. W-12 []. *(REVISED JUNE 2026)*

5.35 -NOT USED-

5.40 TRENCH EXCAVATION, BEDDING AND BACKFILL

.1 Refer to Section 4.0 – Excavation, Trenching and Backfill [] for installation requirements.

5.41 PIPE ALIGNMENT

.1 The pipe shall be laid on line and grade in accordance with the construction drawings. Each pipe shall be checked for line and grade as it is installed. Methods to maintain pipe alignment and grade shall be approved by the City Engineer. ***(REVISED JUNE 2026)***

.2 The following methods shall be used when a watermain is to be installed on a curve to maintain a constant offset within the road allowance: (***REVISED JUNE 2026)***

(a) Deflection of Joint as per Section 5.46 – Deflection [→].

(i) For: Ductile Iron Pipe, as per AWWA C600/82

(ii) For: PVC Pipe, as specified in the Uni-Bell Handbook of PVC Pipe

(b) Manufactured 5 degree PVC bends. ***(REVISED JUNE 2026)***

(c) Arching or bending of the pipe is not permitted.

.3 Refer to Section 5.10 – Watermain Location, Depth and Grade [→] for design criteria.

5.42 PIPE CUTTING

.1 Pipe cutting shall be done in the manner recommended by the pipe manufacturer employing tools designed for this purpose.

.2 Cutting of asbestos cement pipe shall conform to WorkSafeBC requirements. ***(REVISED JUNE 2026)***

5.43 PIPE INSTALLATION

.1 Pipe shall be installed in strict accordance with the manufacturer's recommended practice.

.2 Pipe shall be checked before being lowered into the trench to ensure that no foreign material, manufacturer's defects, or cracks exist that might prevent the proper jointing of the pipe or its operation.

.3 The open end of the pipe in the trench shall be suitably covered to prevent entrance of trench water and other material during periods when pipe is not being installed.

.4 Precautions shall be taken to ensure that displacement of the pipe in the trench does not occur through soil displacement or floatation due to the presence of trench water. Pipe that has been displaced shall be removed from the trench and re-laid.

5.44 JOINTS AT RIGID STRUCTURES

.1 A flexible joint shall be provided at locations where the pipe is held in fixed position by a rigid support or structure. The distance from the support or structure shall depend on the diameter and type of pipe being installed and shall be in accordance with the pipe manufacturer's recommended practice. The purpose of the flexible joint is to prevent pipe failure due to uneven support under the pipe. Approved flexible joints include rubber gasket bell and spigot connections and dresser couplings.

5.45 HORIZONTAL AND VERTICAL CURVES

.1 Pipe on horizontal and vertical curves shall be laid true to the curve of the radius shown on the drawings and in accordance with field line and grades for each curve supplied by the Professional of Record. Variations in vertical curves and grades within the allowable joint deflection may be allowed where approved by the City Engineer. ***(REVISED JUNE 2026)***

5.46 DEFLECTION

.1 Unless otherwise specified, the amount of pipe deflection at joints and couplings shall not exceed the limit as specified by the manufacturer.

5.47 PIPE RESTRAINT

.1 All fittings shall be restrained either by concrete thrust blocks as per Standard Drawing W-8 [] or joint restraints as indicated on the construction drawings, as directed by the City Engineer. ***(REVISED JUNE 2026)***

.2 Concrete thrust blocking shall be placed between undisturbed ground and the fitting to be anchored. The area of thrust block bearing on pipe and on ground shall be as shown on the Standard Drawings or as otherwise indicated on the construction drawings. Concrete shall be so placed that pipe and fitting joints are accessible for repair. Bolts on flanged fittings shall not be encased in concrete. A polyethylene plastic barrier shall be provided between all fittings and concrete for thrust blocking. Concrete specification shall be as per Section 11.0 – Cast In Place Concrete Works [].

.3 Joint restraints shall be installed in accordance with the manufacturer's specifications. The length of pipe to be restrained shall be as shown on the construction drawings.

5.48 FITTINGS

.1 Fittings shall be installed at the locations shown on the drawings or as directed by the Professional of Record. Fittings shall be flanged to valves unless otherwise directed by the City Engineer. *(REVISED JUNE 2026)*

5.49 CONNECTIONS TO EXISTING PIPING

.1 All connections to existing piping services, and appurtenances shall be made by the City forces unless otherwise approved by the City Engineer. *(REVISED JUNE 2026)*

.2 All connections to existing piping and services shall utilize a manufactured rubber gasket bell and spigot joint or dresser coupling designed for types of pipes to be connected.

5.50 VALVES

.1 All valves shall be set plumb directly on the centreline of the pipe and installed in accordance with Standard Drawing No. W-16 [].

.2 Valve boxes in unpaved areas shall have a 1.0 m wide, 50 mm thick asphalt apron around the valve box.

.3 Abandoned Valve Box Removal:

(a) Cut asphalt around valve box. Remove valve extension, mud and debris from valve riser box prior to filling with pea gravel. Valve box shall not be pulled prior to filling with pea gravel.

(b) Existing riser pipe must be minimum 300 mm below final grade. Riser pipe shall be cut down where necessary so that the existing riser pipe is a minimum 300 mm below finished grade.

(c) The minimum 300 mm grade difference shall be backfilled with 25 mm crush gravel and compacted to City standards. Temporary cold mix asphalt to be used where necessary. *(REVISED JUNE 2026)*

5.51 VALVES MARKERS

.1 All valve markers shall be installed in accordance with Standard Drawing No. W-9 [].

5.52 HYDRANTS

.1 All hydrants shall be installed in accordance with Standard Drawing No. W-5 [].

.2 Hydrant Installation:

(a) Hydrants shall be installed at the locations shown on the construction drawings and as specified in Section 5.07 – Hydrants, clause 5.07.6 [→].

(b) Hydrant installation shall be in general accordance with AWWA manual M17.

(c) Tie rods shall be in accordance with Section 5.27 – Hydrants, clause 5.27.2 [→].

(d) Hydrants shall be set plumb and such that the pumper nozzle faces, and is at right angles to, the road centreline unless otherwise directed by the City Engineer.

(e) Hydrants shall be set with the ground flange 150 – 200 mm above finished ground or sidewalk surface unless otherwise directed by the City Engineer.

(f) Care shall be taken in installing the connection pipe from the watermain to the hydrant to ensure that the hydrant is set at the specified level. ***(REVISED JUNE 2026)***

(g) Drain rock shall be placed as shown on the Standard Drawing for a hydrant connection to a level above the hydrant drain openings. The drain rock shall be covered with filter cloth before backfilling to prevent plugging up of the drainage pit.

(h) After installation, hydrants shall be covered with firmly secured black plastic bag until they are put into service.

.3 Hydrant Thrust Blocking:

(a) Hydrant Thrust Blocking shall only be used in situations where installation of tie rods is not acceptable as determined by the Professional of Record in consultation with the City Engineer. Approval by the City Engineer is required. ***(REVISED JUNE 2026)***

(b) Care shall be taken to ensure that concrete for thrust blocking does not interfere with the operation of flange bolts and nuts or prevent proper operation of hydrant drains.

(c) Thrust block bearing areas shall be as shown on the drawings.

.4 Hydrant Access Crossings:

(a) Culverted hydrant access crossings shall be constructed as shown on the Standard Drawings.

(b) Culvert headwalls shall be constructed in accordance with Section 7.66 – Culvert Headwalls [].

(c) Culverts shall be constructed in accordance with Section 7.65 – Culvert Installation [].

(d) Gravel surfacing shall be constructed in accordance with Section 9.47 – Placing and Compacting Aggregates [].

5.53 FLUSHOUT INSTALLATION

.1 All flushouts shall be installed in accordance with Standard Drawing No.'s W-2A [] and W-2B [] and located as directed by the Professional of Record in consultation with the City Engineer. ***(REVISED JUNE 2026)***

.2 Flushouts shall be set plumb.

.3 Care shall be taken in installing the piping, drain hole, and drain rock to ensure that the flushout will drain when the 65 mm diameter gate valve is closed. ***(REVISED JUNE 2026)***

5.54 AIR VALVE INSTALLATION

.1 All air valves shall be installed in accordance with Standard Drawing No. W-4 [] and located as directed by the Professional of Record in consultation with the City Engineer. ***(REVISED JUNE 2026)***

5.55 FLOOR DRAIN ASSEMBLY INSTALLATION

.1 Drain assemblies shall be installed as shown on the construction drawings.

.2 Drain assembly connections to storm sewer mains, where approved by the City Engineer, shall be in accordance with Section 7.61 – Service Connection Installation [].

5.56 WATER SERVICES CONNECTION INSTALLATION

.1 All 25mm diameter water service connections shall be installed in accordance with Standard Drawing No. W-1 [] and all manufacturers' recommendations. ***(REVISED JUNE 2026)***

.2 All water service connections greater than 75 mm diameter shall be installed as shown on the drawings. ***(REVISED JUNE 2026)***

.3 Location of Water Service Connections:

(a) Install service connections to the locations as shown on the drawings. ***(REVISED JUNE 2026)***

(b) Water service connections to each individual property shall have their own independent connection to the watermain.

.4 Water Service Connection Installation:

(a) Trenches shall be excavated where possible so that the pipe can be installed at right angles to, and in a direct line from, the watermain pipe to the terminus of the service. (*REVISED JUNE 2026)*

(b) The trench shall be excavated to provide a minimum cover of 1.2 m over the service connection pipe and raised as shown on Standard Drawing No. W-1 [] for services up to and including 50 mm diameter in size. *(REVISED JUNE 2026)*

(c) In rock, the trench is to be extended 3.0 m into the property to facilitate future extension of the service connection.

(d) The trench bottom shall be graded to form a continuous support along the service pipe. All rocks or projections within 150 mm of the service tubing shall be removed.

(e) When a service box is to be installed in a driveway, a 150 mm wide x 150 mm deep concrete apron shall be installed around the concrete service box in addition to the 25 mm minus crush gravel base structure.

(f) For services up to and including 50 mm diameter, the pipe shall be connected to the corporation stop and a gooseneck formed as shown on the on Standard Drawing No. W-1 and W1-B []. *(REVISED JUNE 2026)*

(g) A gate valve complete with valve box shall be provided at the watermain on all services over 50 mm diameter. (*REVISED JUNE 2026)*

(h) After installation, water service connection locations shall be marked with a 50 mm x 100 mm pressure treated wood marker take painted blue and located at the terminus of the water service next to the service box. The stake shall extend from a point approximately 600 mm above ground to 600 mm below ground except in locations where the extension of the stake above ground surface would be hazardous, in which case the stake shall be place at a location satisfactory to the Professional of Record and City Engineer. *(REVISED JUNE 2026)*

.5 Tapping Main Pipe:

(a) Taps shall be made in the watermain pipe by workers using tools in good repair with the proper adapters for the size of main being tapped. Pipe shall be tapped while under internal water pressure unless otherwise approved by the Professional of Record and City Engineer. The minimum distance of a tapping shall be 1.0 m from a pipe end or joint, or 2.0 m from a pipe end equipped with a flushout and a minimum of 1.0 m from an adjacent tapping unless a greater distance is specified by the pipe manufacturer. *(REVISED JUNE 2026)*

(b) Service connections tapped to 100 mm diameter watermain (all diameter) shall have approved pipe saddles for hot tapping. (*REVISED JUNE 2026)*

.6 Curb Stop, Meter Setter and Service Box Installation: *(REVISED JUNE 2026)*

(a) The curb stop shall be installed as shown on the drawings or in the locations directed by the Professional of Record and City Engineer. *(REVISED JUNE 2026)*

(b) The service box shall be installed plumb with the center of the top of the lid 25 mm above finished grade in untravelled areas and 0 – 6 mm below finished grade in travelled areas as shown on Standard Drawing No. W-1 [].

(c) Provisions for a meter setter are required for all new installations. *(REVISED JUNE 2026)*

(i) A 25 mm diameter water service connection can be reduced inside the box to a 19 mm meter setter for a 19 mm meter. The meter setter is installed by applicant. The meter will be installed by City forces. *(REVISED JUNE 2026)*

(ii) A 50 mm diameter water service connection may be reduced inside the meter box to a setter that meets the current residential unit requirements as determined by the Professional of Record. The installation of the box, meter setter and meter size must be confirmed by a Professional of Record. *(REVISED JUNE 2026)*

.7 Abandoned of Service Connections: *(REVISED JUNE 2026)*

(a) A permanently abandoned service connection, less than 50 mm diameter, are disconnected at the closed corporation stop at watermain. This requires excavation at the watermain. Refer to Section 5.06 – Service Connections for Design Criteria [→]. *(REVISED JUNE 2026)*

(b) All disconnections to existing piping services, and appurtenances are made by the City forces unless otherwise approved by the City Engineer. *(REVISED JUNE 2026)*

(c) For services greater than 50 mm diameter, a permanently abandoned service connection are disconnected at the closed valve, a pressure cap restrained to the closed valve, and the abandoned service line plugged at both ends. The length of remaining pipe between the valve and pressure cap shall be minimized. Refer to Section 5.50 - Abandoned Valve Box Removal [→] and Section 5.47 – Pipe Restraint [→]. *(REVISED JUNE 2026)*

(d) Remove the meter assembly. Refer to Refer to Section 4.0 – Excavation, Trenching and Backfill [] for specifications and surface restoration requirements. *(REVISED JUNE 2026)*

.8 When an existing watermain is abandoned, the pipe is cut and ends plugged or capped. The location will be recorded as per Section 1.20.2 [] and Section 1.22.3 []. *(REVISED JUNE 2026)*

.9 When a valve is abandoned, a cap is installed on the valve and restrained as per Section 5.09.4 [→] and wrapped with petrolatum tape, shrink wrap or approved equivalent. The riser pipe and nelson box will be removed as Standard Drawing T-13 []. The location will be recorded as per Section 1.20.2 [] and Section 1.22.3 [].
(REVISED JUNE 2026)

5.57 WATER METERS

.1 Water meters shall be installed by City forces unless otherwise approved by the City Engineer. *(REVISED JUNE 2026)*

.2 Install meters in accordance with the manufacturer's recommendations.

5.58 METER CHAMBERS

.1 All meter chambers shall be constructed in accordance with Standard Drawing No. W-11 [] unless otherwise shown on the construction drawings.

.2 The floor drain system shall be installed in accordance with Section 5.55 – Floor Drain Assembly Installation [→].

.3 Install valves, fittings and meters according to manufacturer's recommendations at the locations shown on the construction drawings.

.4 Support valves, fittings and meters by means of steel pipe supports.

.5 Install radio read meter bracket between the first and second ladder rung in accordance with Standard Drawing No. W-12 []. *(REVISED JUNE 2026)*

.6 If required by the City Engineer, meter chambers shall be tested for leakage after the installation of equipment by filling the chamber to the underside of the roof slab with water. The test duration shall be a minimum of three hours. No leakage will be allowed. *(REVISED JUNE 2026)*

.7 Precast Manhole Sections:

(a) Precast manhole barrel sections shall be placed plumb.

(b) Joints between the top riser and the cover slab shall be made watertight with cement mortar. Prior to placing sections, the mating faces shall be thoroughly soaked with water and a layer of cement mortar shall be spread on the lower face. After sections are placed, excess mortar which has been squeezed out shall be removed and the joint made flush inside and out.

(c) Joints between precast manhole barrels must utilize O-ring gaskets and shall conform to the manufacturer's specifications. The inside surface of the precast barrel at the O-ring joints shall be filled with cement grout to a smooth finish.

(d) Damaged O-ring manhole joints require removal and replacement of damaged manhole section. Mortar patching of damaged area if approved by the City Engineer, shall require the removal of the O-ring gasket and installation as per Section 5.58.7(b) [→]. ***(REVISED JUNE 2026)***

(e) Refer to Section 5.34 [→] for precast manhole section specifications.

.8 Manhole Concrete Bases:

(a) All water shall be removed from the excavation prior to placing base concrete. The base shall be constructed such that the first section of a precast section can be set plumb with uniform bearing throughout its full circumference.

(b) If material in the bottom of the trench is unsuitable for support, the bottom shall be over excavated to firm base as determined by the Qualified Registered Professional and backfilled to the required grade with thoroughly compacted base gravel as specified for trench bottom stabilization under the applicable item included in Section 4.0 – Excavation, Trenching and Backfill []. ***(REVISED JUNE 2026)***

(c) Where over excavation and backfill with base gravel is not practical, special structural support shall be provided as specified for trench bottom stabilization under the applicable item included in Section 4.0 – Excavation, Trenching and Backfill [].

(d) Concrete manhole bases shall be constructed as shown on the drawings.

(e) Refer to Section 5.34 [→] for precast manhole bases section specifications.

.9 Precast Manhole Bases:

(a) Installation of precast manhole bases shall conform to Section 5.58.8 [→].

(b) Precast manhole bases shall be placed on 150 mm thick base of 40 mm drain rock.

(c) Use of precast concrete bases requires approval by the City Engineer.

.10 Concrete

(a) Cast In Place Concrete work shall conform to Section 11.0 – Cast In Place Concrete Works [].

.11 Frames and Covers

(a) Frames shall be set on precast concrete grade rings to bring the cast iron manhole frame up to grade as shown on the Standard Drawings. Contractor to install a minimum of two (2) 62.5 mm thick concrete grade rings to a maximum of four (4) 62.5 mm thick grade rings. The concrete grade rings shall be laid in common bond with raked mortar joints and shall be mortared inside and outside the manhole.

(i) Fine grade elevation adjustments of frames shall be done with a minimum of 3, steel only, shims equally spaced.

(b) Manhole covers shall be installed:

(i) for unpaved areas, covers shall have a 1.5 m x 1.5 m, 50 mm thick asphalt apron. Covers shall be set flush with the asphalt surround.

(ii) for paved areas, covers shall be flush with finished pavement grade with a maximum allowed variance of 6 mm lower than the finished pavement grade. Covers shall not protrude above the finished pavement.

(c) Steel manhole riser rings shall be used in easements only.

(d) Refer to Section 5.34 [→] for manhole covers and frames specifications.

.12 Manhole Steps

(a) Manhole steps shall be installed in manhole sections by the manufacturer unless the circumstance dictates otherwise, in which case approval must be received from the City Engineer. ***(REVISED JUNE 2026)***

(b) The distance from the top of the chamber manhole to the first manhole step shall conform to WorkSafeBC requirements.

(c) Refer to Section 5.34 [→] for manhole step specifications.

5.59 -NOT USED-

5.60 PRESSURE REDUCING STATIONS

.1 Pressure reducing stations shall be installed in accordance with the construction drawings and supplementary specifications.

5.61 PRESSURE AND LEAKAGE TESTING

.1 Pressure and leakage tests shall be performed on all installed pipes, hydrants, valves, fittings and service connections.

.2 Pressure and leakage tests can be commenced upon completion of all underground utility installation. Prior to testing, concrete thrust blocking shall be sufficiently cured to restrain fittings, valves and hydrants.

.3 Testing procedures shall be submitted to the City Engineer for approval prior to commencement of testing.

.4 Hydrant line valves and service corporation stops shall be fully opened during the test. As a preliminary step, the entire system may be pressure and leakage tested at one. Pressure and leakage tests shall be carried out between valved sections of the installation such that every valve in the system is tested for leakage in the shut-off position. (*REVISED JUNE 2026)*

.5 Pressure and leakage testing shall be conducted in the presence of Professional of Record and City Inspector. *(REVISED JUNE 2026)*

.6 Pressure and leakage tests for ductile iron piping shall be in accordance with AWWA C600.

.7 Testing of welded steel piping shall be in accordance with AWWA C206. No leakage shall be allowed.

.8 Pressure and leakage tests for PVC pipe shall be performed in the following manner:

(a) Fill the section to be tested slowly with water and expel all air from the section.

(b) If air relief valves are not required at the high points of the test section, the pipe shall be tapped to release all air and approved plugs inserted upon completion of testing.

(c) Pump water into the test section until the static pressure reaches 1035 kPa (150 psi) or 1.5 times the average system operating pressure at the point of test, whichever is greater.

(d) Maintain the test pressure in the pipe to ± 70 kPa (10 psi) throughout the duration of the test by the addition of a measured quantity of water. The duration of the test shall be a minimum of one hour.

(e) The quantity of water required to maintain the test pressure shall be considered to be the leakage.

(f) The allowable leakage shall be determined from the following formula: *(REVISED JUNE 2026)*

$$L = \frac{S \times D \times \sqrt{P}}{715{,}317}$$

in which L = allowable leakage (liters/hour)
S = length of the test section, in meters
D = nominal diameter of the pipe run in mm
P = average test pressure during the leakage test in kPa

(g) Should testing disclose leakage above the maximum allowable leakage, the contractor shall locate and repair or replace the defect and retest the section until test results are satisfactory.

(h) A copy of the leakage and test pressure report shall be forwarded to the City Inspector.

(i) Prior to accepting the work, all valves shall be checked to ensure they fully open.

5.62 FLUSHING, CHLORINATION AND BACTERIAL SAMPLING

.1 Prior to chlorination, all piping and appurtenances shall be flushed with a minimum velocity of 1.0 m/s. Dispose of flushing water only to drainage works capable of carrying the flows. When flushing the watermain into a sanitary sewer, the downstream capacity shall be reviewed with City Inspector. *(REVISED JUNE 2026)*

.2 The Professional of Record shall arrange, undertake and ensure the following activities, including but not limited to: *(REVISED JUNE 2026)*

(a) all piping and appurtenances are flushed, chlorinated, flushed of chlorinated water and tested for bacteria according to the latest edition of AWWA C651.

(b) On completion of chlorination, the entire piping system shall be thoroughly flushed and filled with potable water prior to bacterial sampling.

(c) Flushing chlorination and bacterial sampling shall be conducted in the presence of the Professional of Record and City Inspector. *(REVISED JUNE 2026)*

.3 Chlorinated water shall be disposed of in a way that will not cause harm or damage to vegetation or aquatic life in bodies of water or water courses. Points of discharge are to be approved by the Professional of Record in consultation with the City Engineer. *(REVISED JUNE 2026)*

5.63 NOTIFICATION TO CITY ENGINEER – SYSTEM TESTS AND FINAL CONNECTION

.1 The City Engineer and the City Inspector shall be given 48 hours written notice in advance of all system tests and pipe chlorination by the Contractor. *(REVISED JUNE 2026)*

.2 On new water systems no physical connection (tie-in) to the public system shall be made until the new system passes:

(a) flushing,

(b) pressure testing,

(c) disinfection,

(d) satisfactory bacterial testing results by an accredited certified lab.

.3 Upon satisfactory passing, the Professional of Record shall submit copies of all of the above noted test results to the City Engineer with their written recommendation on connection to the Public Water Supply. *(REVISED JUNE 2026)*

.4 The City Engineer will review the provided test results and recommendation from the Professional of Record and if acceptable may grant Approval to Connect to the Public Water Supply. Under no circumstances shall a connection to the Public Water Supply be undertaken without an Approval to Connect issued by the City Engineer. *(REVISED JUNE 2026)*

.5 Once Approval to Connect is granted, the time to connect (tie-in) to the Public Water Supply shall be no greater than 7 calendar days, otherwise bacterial testing results will be invalid and will need to be redone. The short spool pieces, fittings and couplers required to complete the connection shall be cleaned and disinfected to AWWA standards. All final connections (tie-ins) shall be reviewed by the Professional of Record. Once final tie-in is complete and the system is in operation, the tie-in shall be reviewed by the Professional of Record for water leaks prior to backfilling and covering up. *(REVISED JUNE 2026)*

.6 Tie-in and connection shall be conducted in the presence of the Professional of Record and the City Inspector. *(REVISED JUNE 2026)*

.7 Final Connections:

(a) If Connection is 1 pipe length or less (6 m or less) spray or swab disinfect all parts just prior to connection.

(b) If connection is greater than 1 pipe length (plus 6 m), the pipe must be set up above ground, disinfected and bacterial samples taken as described in AWWA C651 Section 5.0. Ends of pipe must be sealed watertight until installed.

SECTION 5 – WATER DISTRIBUTION SYSTEM
CROSS CONNECTION CONTROL

5.70 LEGAL AUTHORITY

.1 Legal Authority for the City Cross Connection Control Program is provided by the City *Bylaw No. 7249 – A Bylaw Respecting Cross Connection Control* and the *Section 2.6.2*, *National Plumbing Code of Canada* (NPC) which requires potable water to be protected from contamination. ***(REVISED JUNE 2026)***

.2 This Cross Connection Control Program is:

(a) In compliance with the Island Health Authorities Permit to Operate a Water System as provided under the *Drinking Water Protection Act, Part 2, Section 8.0*, and ***(REVISED JUNE 2026)***

(b) Follows recommended practices of the most current editions of AWWA Canadian Cross Connection Control Manual and CSA B64.10 & B64.10.1.

.3 Section 5.70 – Water Distribution System Cross Connection Control shall govern the public water supply for Premises Isolation of private property and parcels. Private property and parcels shall be governed under the *National Plumbing Code of Canada* (NPC). ***(REVISED JUNE 2026)***

5.71 PROPERTY OWNER'S RESPONSIBILITY ***(REVISED JUNE 2026)***

.1 The Property Owner of a property subject to Premise Isolation shall be the Property Owner of all Backflow Prevention Assemblies, associated chambers, vaults, containment structures such as mechanical rooms and associated appurtenances. ***(REVISED JUNE 2026)***

(a) For testable Backflow Prevention Assemblies, testing, maintenance and repairs shall be required at specified intervals and documented on the forms and tags provided by the City's Cross Connection Control Coordinator. ***(REVISED JUNE 2026)***

.2 All tests, repairs, overhauls, replacements and plumbing system improvements shall be at the expense of the Property Owner of the Backflow Prevention Assemblies. Reports on all testing, maintenance and repairs shall be documented on the specified forms and tags provided by the City. ***(REVISED JUNE 2026)***

(a) Tags shall be placed on Backflow Prevention Assemblies with associated forms submitted to the Cross Connection Control Coordinator.

(b) When the installation of a Backflow Prevention Assembly for Premises Isolation creates a closed piping system, the Property Owner is required to assess the plumbing system to protect against an increase of pressure due to thermal expansion. ***(REVISED JUNE 2026)***

.3 Chambers, vaults and other containment structures such as a mechanical room housing the Backflow Prevention Assembly and associated appurtenances for Premises Isolation shall be located on the Property Owner's land. ***(REVISED JUNE 2026)***

(a) For residential services, check valves (Dual Check Valve – DuC) installed integrally with a water meter/meter setter shall be maintained and serviced by the residential property owner. ***(REVISED JUNE 2026)***

5.72 ACCEPTABLE BACKFLOW PREVENTERS

.1 For the purpose of Premise Isolation, three CSA categories of Backflow Prevention Assemblies are acceptable.

(a) CSA B64.4:

(i) This includes the Reduced Pressure Principle (RP Backflow Prevention Assembly). For specialized service such as for fire supply, a Reduced Pressure Principle Detector (RPD) or RPF may be required.

(b) CSA B64.5:

(i) This includes the Double Check Valve Assembly (DCVA). For specialized service such as for fire supply, a Double Check Detector Assembly (DCDA) or DCVAF may be required.

(c) CSA B64.6:

(i) This includes the Dual Check Valve (DuC). A Dual Check Valve for Fire protection service (DuCF) may be required. ***(REVISED JUNE 2026).***

5.73 HAZARD CATEGORY

.1 There are three classifications of connection hazard. Classification shall be to CSA B64.10 as follows:

(a) **Minor** – nuisance to the water supply that results in a reduction in only the aesthetic quality of the water. This would include water that might have been heated or cooled and connections that cannot create a danger to health.

(b) **Moderate** – any minor hazard connection that has a low probability of being a severe hazard. This includes, but is not limited to, connections involving water where the aesthetic qualities of the water have been reduced and, under certain conditions can create a danger to health.

(c) **Severe** – any type of cross connection or potential cross connection involving water that has additives or substances that, under any concentration, can create a danger to health.

5.74 DEVICES REQUIRED FOR PREMISES ISOLATION

.1 Premises Isolation shall be provided by installation of a Backflow Prevention Assembly on the service line connection between the property/parcel and City Water Distribution System. The Backflow Prevention Assembly installed, as service line protection, ensures water of questionable quality cannot leave a property and enter the City Water Distribution System. ***(REVISED JUNE 2026)***

.2 Premises Isolation for a property shall be required in all cases even if the plumbing system on the property complies with the *National Plumbing Code of Canada*. ***(REVISED JUNE 2026)***

.3 Backflow protection shall provide Premises Isolation at one of the three hazard categories, as follows:

(a) Dual Check Valve (DuC) Backflow Prevention Assembly for properties with minor hazard classification. Also includes DuCF.

(b) Double Check Valve (DCVA) Backflow Prevention Assembly for properties with moderate hazard classification. Also includes Double Check Valve Assembly for Fire protection (DCVAF) and Double Check Detector Assembly (DCDA). ***(REVISED JUNE 2026)***

(c) Reduced Pressure Principle (RP) Backflow Prevention Assembly for properties with a severe hazard classification. Also includes RPF and RPD.

.4 For fire protection, Backflow Prevention Assemblies shall be DuCF, DCVAF and RPF. Each Backflow Prevention Assembly shall be UL/ULC listed and FM approved.

5.75 PROPERTIES, HAZARD CLASSIFICATION AND PREMISES ISOLATION REQUIRED

.1 All properties require Premises Isolation with an approved Backflow Prevention Assembly on the service line(s) leading to and supplying a property. Subject to review by the Cross Connection Control Coordinator for appropriate hazard classification and required Backflow Prevention Assembly, Premises Isolation shall be required for the following properties.

(a) **Minor** Hazard **Classification -** Dual Check Valve (DuC) Backflow Prevention Assembly required.

(i) Two Unit Housing with shared service ***(REVISED JUNE 2026)***

(ii) Residential Premises

(iii) Townhouse (shared services)

(b) **Minor/Moderate** Hazard **Classification -** Double Check Valve (DCVA) Backflow Prevention Assembly required.

(i) Church

(c) **Moderate** Hazard **Classification -** Double Check Valve (DCVA) Backflow Prevention Assembly required. ***(REVISED JUNE 2026)***

(i) Airport
(ii) Apartment Building
(iii) Arena
(iv) Auto Dealership
(v) Campsite
(vi) Grocer
(vii) Hair Salon
(viii) Dental Office
(ix) Hotel
(x) Fuel Dispensing Facility
(xi) Kennel
(xii) College
(xiii) Medical Clinic (non-surgical)
(xiv) Laundry (commercial, coin-operated)
(xv) Manufacturing Plant (not specified)
(xvi) Mobile Home Park
(xvii) Multi-Service Interconnected Facility Multi-Tenant Single-Service Facility
(xviii) Nursing Home
(xix) Office Building
(xx) Motel
(xxi) Penitentiary
(xxii) Restaurant
(xxiii) School (elementary, junior high and senior high)
(xxiv) Shopping Mall
(xxv) Swimming Pool Facility
(xxvi) Water Park

(d) **Moderate/Severe** – Reduced Pressure Principle (RP) Backflow Prevention Assembly required. ***(REVISED JUNE 2026)***

(i) Animal Feed Lot
(ii) Animal Stock Yard
(iii) Commercial Premises
(iv) Farm
(v) Fire Station
(vi) Industrial and Institutional Premises
(vii) Golf Course
(viii) Funeral Home
(ix) Marina (pleasure boat)
(x) University
(xi) Veterinary Clinic
(xii) Waste Disposal Plant

(e) **Severe** Hazard **Classification** – Reduced Pressure Principle (RP) Backflow Prevention Assembly required. *(REVISED JUNE 2026)*

(i) Aquaculture Farm
(ii) Aquarium (public)
(iii) Asphalt Plant
(iv) Auto Body Shop
(v) Automotive Repair Shop
(vi) Beverage Processing Plant (includes distillery and brewery)
(vii) Blood Clinic Severe
(viii) Campsite with RV Hook-Ups or Dump-Stations
(ix) Carwash
(x) Chemical Plant
(xi) Concrete Plant
(xii) Dental Surgery Facility
(xiii) Dock and Marine Facility
(xiv) Dry Cleaning Plant
(xv) Dye Plant
(xvi) Exhibition Ground
(xvii) Film Processing Facility
(xviii) Fish Farms or Hatchery
(xix) Food Processing Plant
(xx) Funeral Home
(xxi) Garbage Transfer Facility
(xxii) Hospital
(xxiii) Laboratory
(xxiv) Laundry (commercial)
(xxv) Meat Packing Plant
(xxvi) Medical Clinic (surgical)
(xxvii) Milk Processing Plant
(xxviii) Mining Facility
(xxix) Mortuary or Morgue
(xxx) Motorcycle Repair Facility
(xxxi) Oil Refinery
(xxxii) Paint Manufacturing Plant
(xxxiii) Petroleum Processing or Storage Facility
(xxxiv) Pharmaceutical Manufacturing Facility
(xxxv) Photo Processing Facility
(xxxvi) Plants Using Radioactive Material
(xxxvii) Plastic Manufacturing Plant
(xxxviii) Plating Shop and Plant
(xxxix) Poultry Farm
(xl) Power Generating Facility
(xli) Premises where access is prohibited or restricted
(xlii) Printing Plant
(xliii) Pulp and or Paper Plant
(xliv) Radiator Shop
(xlv) Recycling Facility
(xlvi) Refinery, Petroleum Processing
(xlvii) Rendering Facility
(xlviii) Research Building
(xlix) Sewage Dump Station
(l) Sewage Treatment Plant
(li) Steam Plant
(lii) Steel Manufacturing Plant
(liii) Trackside Facility for Trains
(liv) Wastewater Facility
(lv) Wastewater Pump Station
(lvi) Wastewater Treatment Plant
(lvii) Water Filling Station
(lviii) Water Treatment Plant
(lix) Water Treatment Pump Station
(lx) Zoo

(f) Irrespective of the previous list of properties, the Cross Connection Control Coordinator shall complete a survey of the property/parcel for hazard classification and shall specify the appropriate Backflow Prevention Assembly required for Premise Isolation.

5.76 TESTING, MAINTENANCE AND REPORTING

.1 Testable Backflow Prevention Assemblies:

(a) The following Backflow Prevention Assemblies are testable.

(i) DCVA, DCDA and DCVAF backflow prevention assemblies; and

(ii) RP, RPD and RPF backflow prevention assemblies.

.2 Tester Certification and Testing Requirements:

(a) British Columbia Water and Waste Association (BCWWA) certified backflow assembly testers shall test backflow prevention assemblies within the City Water Distribution System. The tester is responsible for the accurate documentation, correct assessment of each assembly tested, device tagging and test form submission to the Cross Connection Control Coordinator. ***(REVISED JUNE 2026)***

(b) Testers shall have an active BCWWA backflow assembly tester certificate and are required to test Backflow Prevention Assemblies in accordance with CSA B64.10.1.

.3 Frequency of Field Testing and Maintenance:

(a) To ensure satisfactory operation, a Backflow Prevention Assembly shall be field tested in accordance with the applicable requirements specified for each Backflow Prevention Assembly in accordance with CSA B64.10.1 at the following times:

(i) Upon installation;

(ii) After a backflow incident;

(iii) After alteration of the supply pipe upstream of a Backflow Prevention Assembly;

(iv) When cleaned, repaired, or overhauled;

(v) When relocated;

(vi) Annually; and

(vii) As required by the Cross Connection Control Coordinator.

.4 Reporting:

(a) Test results shall be reported on the forms provided by the Cross Connection Control Coordinator appropriate for the type of Backflow Prevention Assembly and procedure. The tester shall complete the:

(i) Backflow Prevention Assembly test and inspection report and submit the completed form back to the Cross Connection Control Coordinator, and

(ii) Backflow Prevention Assembly test tag and affix the tag to the device.

(b) The form and tag shall be fully completed and accurate.

(c) Fire departments and fire alarm companies shall be notified when a fire protection service is to be shut down for field testing.

(d) The main Backflow Prevention Assembly and, if equipped, an equivalent bypass Backflow Prevention Assembly shall be tested at the same time.

(e) A detector type Backflow Prevention Assembly shall have the watermain and bypass Backflow Prevention Assemblies tested at the same time. ***(REVISED JUNE 2026)***

5.77 INSTALLATION STANDARDS FOR BACKFLOW PREVENTION ASSEMBLIES FOR PREMISES ISOLATION

.1 Location of Backflow Prevention Assemblies:

(a) The location of Backflow Prevention Assemblies providing Premises Isolation shall be immediately after the water meter within the property line of a property or within a building (mechanical room) before any branching off. To facilitate inspection, field testing and maintenance, Backflow Prevention Assemblies shall be installed in accessible locations to facilitate maintenance and testing, but preferably not a confined space. A Backflow Prevention Assembly may be installed in an insulated above ground enclosure that complies with ASSE 1060 requirements. Class 1 freeze protection and complete with manufacturer installed heater for wet/damp locations.

(i) For dedicated fire service lines with no meter connection, Premises Isolation shall be immediately within the property line of a property or within a building (mechanical room) before any branching off. Backflow Prevention Assembly shall be detector type.

(b) Air gaps, backflow preventers, or vacuum breakers with vents to atmosphere shall not be installed in a corrosive or polluted environment.

(c) DuC Backflow Prevention Assemblies for residential service are normally part of the water meter/setter installation and shall be contained in the same pit as the water meter.

(d) DCVA Backflow Prevention Assemblies may be installed in a dry, below grade chamber, if equipped with a drain to daylight or sump pump. All test cocks on the device shall be capped and watertight.

(e) RP Backflow Prevention Assemblies shall not be installed in a below grade pit, vault or chamber.

(f) Relief ports shall not be directly connected to a drain. Adequate drainage, as recommended by the manufacturer, shall be provided for discharge from relief ports.

(i) A connection to the relief port of a RP Backflow Prevention Assembly shall be made using the manufacturer's drain connection fitting. The pipe from the outlet of the drain connection fitting shall:

1. Be at least equal in size to that of the drain connection fitting;
2. Be rigid;
3. Slope downward from the Backflow Prevention Assembly; and

4. Terminate with an indirect connection (air break) above a floor drain, sump, or other safe location.

.2 Mounting Clearance and Orientation:

(a) Backflow Prevention Assemblies shall be installed at a convenient height for testing, maintenance and proper operation. Mounting clearances shall be as per the City Specifications and Standard Detail Drawings, manufacturer's recommended clearances or the following clearances, whichever are greater. ***(REVISED JUNE 2026)***

(i) Height above floor or platforms as measured to the center of a device:

1. Minimum vertical clearance from floor or platform: 750 mm.
2. For a RP minimum vertical clearance from bottom of relief valve to floor shall be 300 mm.
3. Maximum vertical clearance from floor or platform: 1500 mm.

(ii) Minimum workspace clearance to the nearest wall or obstruction:

1. Above the device: 300 mm.
2. In front of the device: 750 mm.
3. Behind the device: 20 mm.

(b) Backflow Prevention Assemblies shall be installed in the orientation in which they have been tested and approved, showing compliance with the applicable Standard of the CSA B64 Series.

.3 Bypass:

(a) Bypass around a Backflow Prevention Assembly shall be prohibited unless the bypass is fitted with equivalent piping and an equivalent Backflow Prevention Assembly.

.4 Shut-off Valves and Test Cocks:

(a) Each testable Backflow Prevention Assembly shall be complete with approved shut-off valves and test cocks with resilient seats providing a drip-tight shut-off.

(b) All valves shall be indicating.

.5 In-line Strainers:

(a) In-line strainers shall be installed before the water meter with Backflow Prevention Assemblies installed after the water meter, fire protection systems are an exception.

(i) A fire protection system shall not have a strainer installed anywhere upstream of the Backflow Prevention Assembly.

5.78 FIRE PROTECTON SYSTEMS

.1 Premise Isolation with listed devices shall be required for all service connections to fire protection systems. The municipal water supply shall be protected against backflow caused by back siphonage or back pressure.

.2 Devices installed in fire protection systems, as required by the *Fire Code*, should be maintained and tested in accordance with the requirements of the *Fire Code* Standards.

.3 Classes of Fire Protection Systems:

(a) **Class 1 System** – a fire protection system that has direct connections only from public watermains, has no pumps, tanks, or reservoirs, and has all sprinkler drains discharging to atmosphere, dry wells, or other safe outlets.

(b) **Class 2 System** – a fire protection system that is the same as a Class 1 system, but also includes a booster pump in the connection from the municipal water supply system.

(c) **Class 3 System** – a fire protection system that has direct connections from the municipal potable water supply system, elevated storage tanks (either open or closed), fire pumps talking suction from above-ground covered reservoirs or tanks, and pressure tanks. In Class 3 systems, storage facilities are only filled from, or connected to, the municipal potable water supply system, and the water in the tanks is maintained in a potable condition. Class 3 systems resemble Class 1 systems in all other respects.

(d) **Class 4 System** – a fire protection system that has direct connections from the municipal potable water supply system (similar to Class 1 and Class 2 systems) and an auxiliary water supply dedicated to fire department use and available to the premises, such as an auxiliary supply located within 500 m of the pumper connection.

(e) **Class 5 System** – a fire protection system that has direct connections from the municipal potable water supply system and that is also interconnected with an auxiliary water supply.

(f) **Class 6 System** – a fire protection system that is a combined industrial and fire protection system and is supplied from the municipal potable water supply system only, with or without gravity storage or pump suction tanks.

(g) **Residential "partial flow through" System** – a fire protection system in which flow (during non-functioning periods of the fire system) only occurs through the main header to a water closet located at the farthest point of the system.

.4 Acceptable Premises Isolation:

(a) Class 1 System with materials acceptable for use in potable water systems and no antifreeze or additives – DCVAF or RPF.

(b) Class 2 System with materials acceptable for use in potable water systems and no antifreeze or additives – DCAF or RPF.

(c) Class 1 and Class 2 Systems with materials not acceptable for use in a potable water system or antifreeze or additives – RPF.

(d) Class 3, Class 4, Class 5 and Class 6 Systems – RPF.

(e) Residential "partial flow through" system with materials acceptable for use in potable water systems and no antifreeze or additives – DuCF, DCVAF, RPF.

.5 Fire Protection Service:

(a) A detector type Backflow Prevention Assembly shall be required when no water meter is installed up-stream of the detector type Backflow Prevention Assembly.

.6 Retrofitting Older Fire Protection Systems:

(a) A comprehensive evaluation by a Qualified Registered Professional, (such as a professional engineer) shall be undertaken. This qualified person shall ensure adequate flow and pressure through the device(s) to meet fire protection needs, and to address the thermal expansion issues associated with installing Backflow Prevention Assemblies. ***(REVISED JUNE 2026)***

5.79 DISTRIBUTION SYSTEM PROTECTION

.1 Any outlet used on a permanent or temporary basis to dispense potable water from the City Water Distribution System to water hauling equipment shall be protected against backflow caused by back siphonage or back pressure with an RP Backflow Prevention Assembly. ***(REVISED JUNE 2026)***

.2 For Permanent Connections:

(a) Reservoirs and storage tanks: A screened air-gap separation is recommended on overflow pipes.

(b) Air release, vacuum, combination valves: A screened air-gap separation is recommended on air-discharge outlet pipes. The valve air opening must be properly vented above the ground and provided with an insect screen on the vent. Ideally the valves should be installed above ground and protected from freezing.

(c) Fire hydrants and other appurtenances with underground drain ports: Eliminate all underground drain connections, wherever possible. For dry barrel fire hydrants, no recommended protection is presently available.

.3 For Temporary Connections:

(a) Supply of water for filling or disinfecting new mains, etc.: A RP Backflow Prevention Assembly shall be required.

(b) Supply of water for construction sites, filling tanks, etc.: A RP Backflow Prevention Assembly shall be required.

(c) Supply of water for sewer flushing:

(i) The use of water directly from hydrants/standpipes is prohibited for sewer flushing. All sewer flushing water shall be provided from tanker trucks.

5.80 USE OF FIRE HYDRANTS AND STANDPIPES

.1 No hydrant or standpipe may be operated or used for the purpose of accessing water without a Hydrant or Temporary Use Permit issued by the Cross Connection Control Coordinator.

(a) A water meter complete with a RP Backflow Prevention Assembly in a secured portable container shall be provided by the City. ***(REVISED JUNE 2026)***

5.81 IRRIGATION SYSTEMS

.1 Annual testing and documentation shall be required and is the responsibility of the Owner of the irrigation system.

.2 All irrigation systems (including residential systems) installed shall be subject to:

(a) Periodic review by the Cross Connection Control Coordinator.

(b) CSA B64.10/B64.10.1

(c) AWWA Canadian Cross Connection Control Manual, and

(d) The *National Plumbing Code of Canada*. ***(REVISED JUNE 2026)***

.3 Any outlet used to dispense potable water from the City Water Distribution System to supply an in-ground irrigation system shall be protected against backflow caused by back siphoning with the following: ***(REVISED JUNE 2026)***

(a) For systems without injection of chemicals:

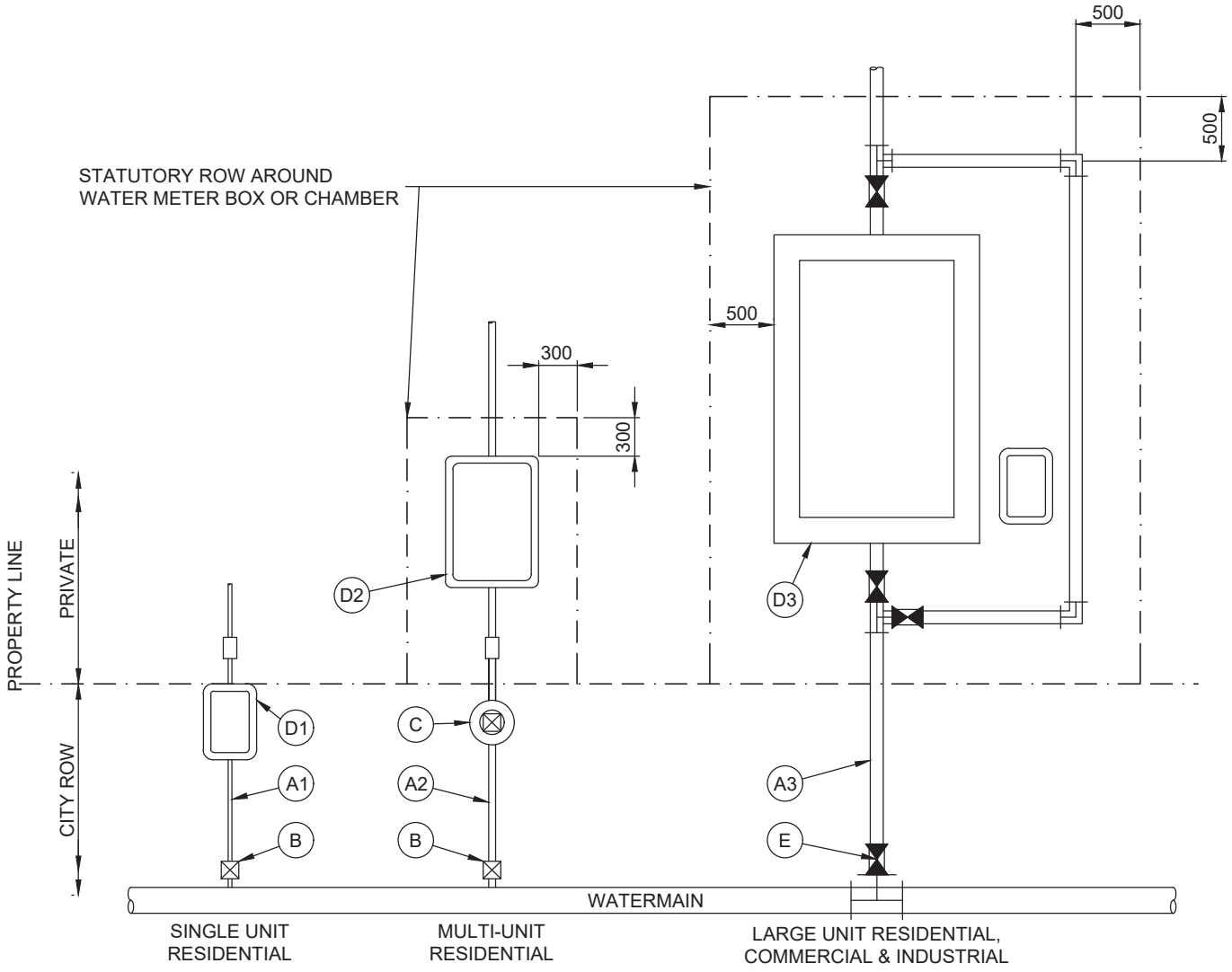
(i) A DCVA Backflow Prevention Assembly installed upstream of the irrigation system shut-off or other control valves.

1. For 19 mm to 50 mm diameter Irrigation Mains a DCVA Backflow Prevention Assembly shall typically be installed in a below grade box in accordance with Section 14.0 Standard Drawing No. I-1 . All test cocks on the device shall be capped and watertight.
2. A DCVA Backflow Prevention Assembly may also be installed in an insulated above ground enclosure that complies with ASSE 1060 requirements, Class 2 frost protection.

(b) For any system with injection of chemicals:

(i) A RP Backflow Prevention Assembly shall be installed upstream of the irrigation system shut-off valves.

1. A RP Backflow Prevention Assembly shall be installed in an insulated above ground enclosure that complies with ASSE 1060 requirements, Class 2 frost protection.



NOTE:
THIS DRAWING IS FOR WATER SERVICE LINES AND METERS ONLY.
NOT FOR FIRE LINE OR WATER SERVICES COMBINED WITH FIRE LINE

ITEM	DESCRIPTION	CLAUSES & STANDARD DRAWING
A1	25mm WATER SERVICE	SECTION 5.06; 5.13; 5.30; 5.56 DRAWING W-1
A2	38mm & 50mm WATER SERVICE	SECTION 5.06; 5.13; 5.30; 5.56 DRAWING W-1A
A3	75mm & GREATER WATER SERVICE	SECTION 5.06; 5.13; 5.30; 5.56
B	CORPORATION STOP & SERVICE SADDLE	SECTION 5.30.2 DRAWING W-1; W-1A
C	CURB STOP IN RISER PIPE	SECTION 5.30.3 DRAWING W-1A
D1	19mm & 25mm WATER METER IN BOX	SECTION 5.13; 5.56 5.57 DRAWING W-1
D2	38mm & 50mm WATER METER IN BOX	SECTION 5.13; 5.56 5.57 DRAWING W-1B
D3	75mm & GREATER METER IN CHAMBER	SECTION 5.13; 5.58 DRAWING W-13; W-15
E	GATE VALVE IN RISER PIPE	SECTION 5.13; 5.58 DRAWING W-16; W-16A

NOTE:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 5.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

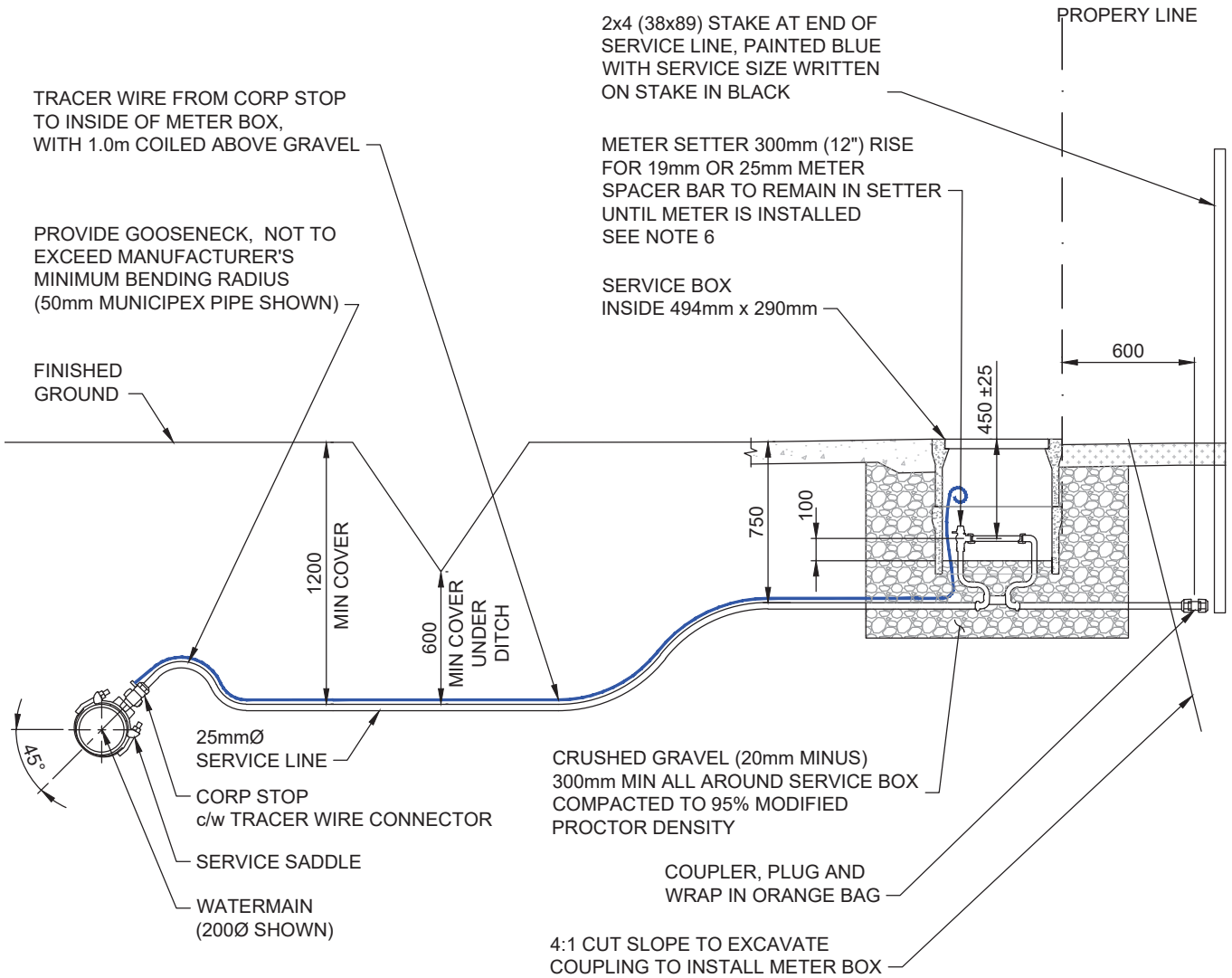
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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

WATER SERVICE CONNECTION
AND WATER METER
INSTALLATION SCHEMATICS

Scale:	NTS
Created:	JUNE 2026
Rev Date:	JUNE 2026
Dwg No:	W-0



NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 5.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. NOMINAL TRENCH WIDTH FOR SERVICE CONNECTION TO BE 600mm.
4. WHEN SERVICE BOX IS WITHIN A CONCRETE DRIVEWAY, CONCRETE ADJACENT TO THE SERVICE BOX MUST BE A MINIMUM OF 150mm THICK FOR A MINIMUM DISTANCE OF 150mm AROUND THE OUTSIDE EDGES OF THE SERVICE BOX.
5. WHEN SERVICE BOX IS INTALLED IN LANDSCAPE AREAS, BOX TO BE SET 25mm ABOVE FINISHED GRADE.
6. WATER METER TO BE INSTALLED BY CITY FORCES WHEN PROPERTY IS DEVELOPED.
7. TRACER WIRE AS PER SECTION 5.30.1
8. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

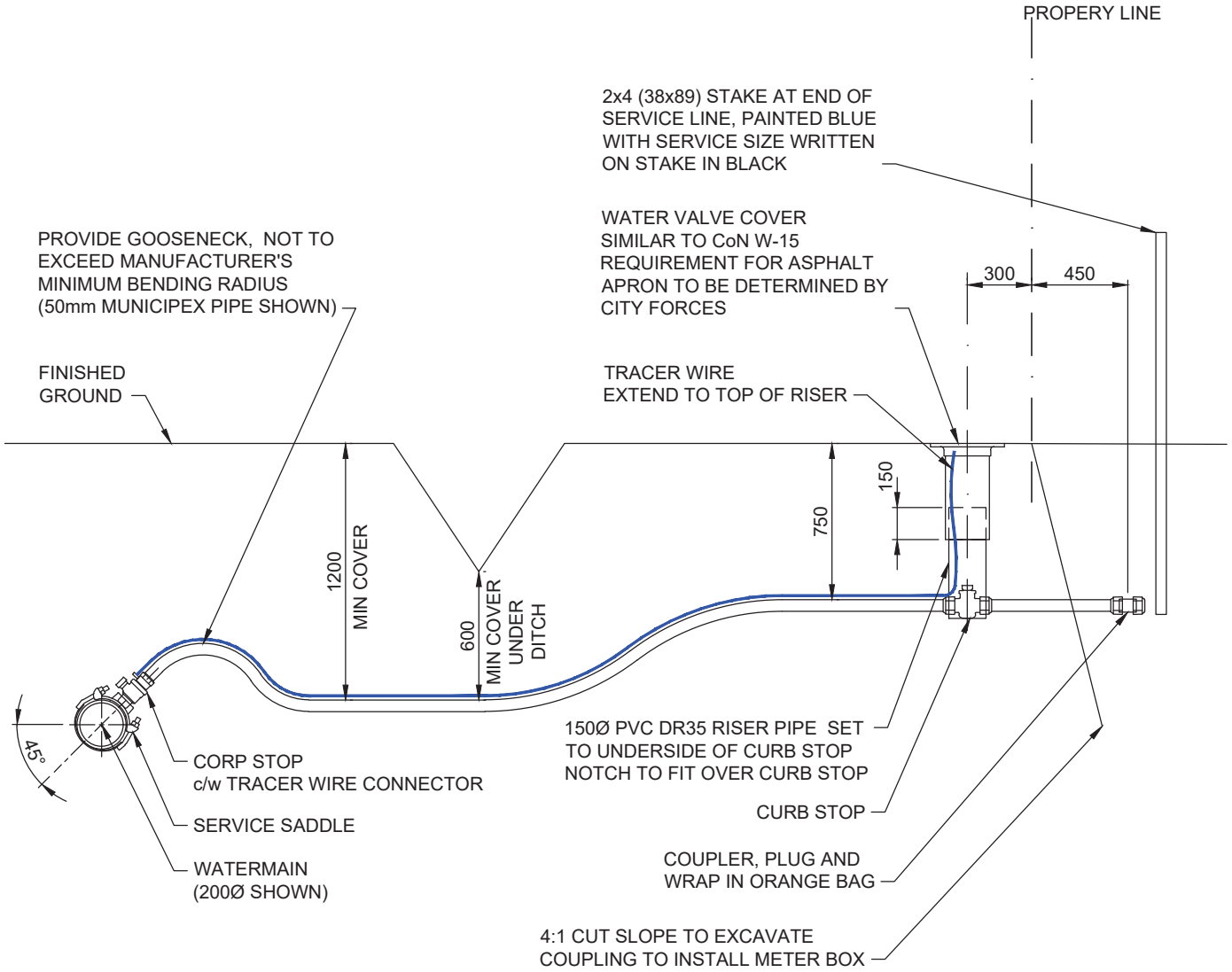
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5.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

25mm WATER SERVICE CONNECTION

Scale:	NTS
Created:	JUNE 2026
Rev Date:	JUNE 2026
Dwg No:	W-1



NOTES:

1. THIS DRAWING MUST BE IN ACCORDANCE WITH SECTION 5.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. NOMINAL TRENCH WIDTH FOR SERVICE CONNECTION TO BE 600mm.
4. TRACER WIRE AS PER SECTION 5.30.1
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

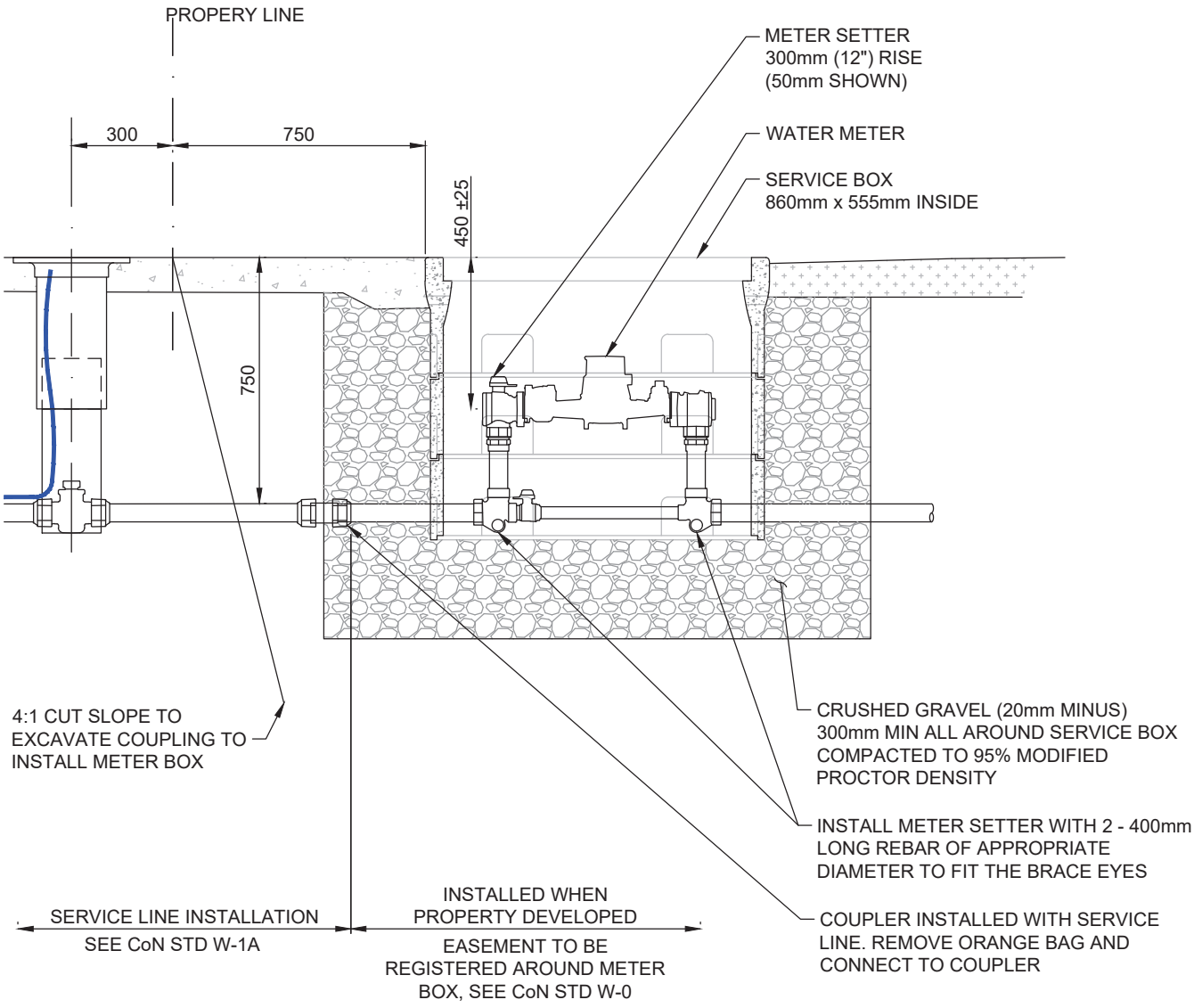
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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

38mm AND 50mm WATER SERVICE CONNECTION

Scale:	NTS
Created:	JUNE 2026
Rev Date:	JUNE 2026
Dwg No:	W-1A



NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 5.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. NOMINAL TRENCH WIDTH FOR SERVICE CONNECTION TO BE 600mm.
4. WHEN SERVICE BOX IS WITHIN A CONCRETE DRIVEWAY, CONCRETE ADJACENT TO THE SERVICE BOX MUST BE A MINIMUM OF 150mm THICK FOR A MINIMUM DISTANCE OF 150mm AROUND THE OUTSIDE EDGES OF THE SERVICE BOX.
5. WHEN SERVICE BOX IS INTALLED IN LANDSCAPE AREAS, BOX TO BE SET 25mm ABOVE FINISHED GRADE.
6. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

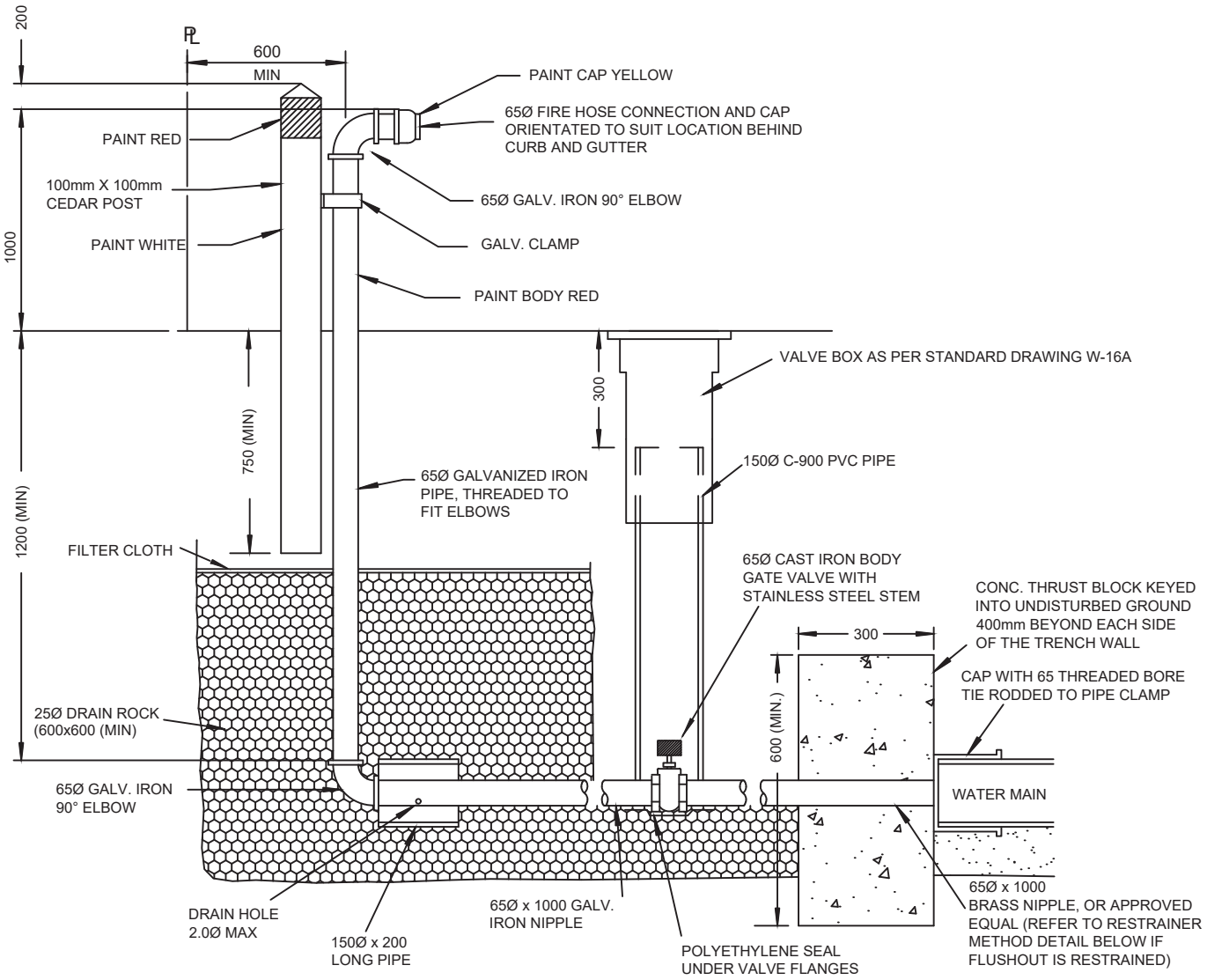
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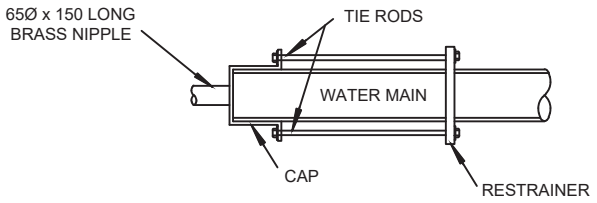
CITY OF NANAIMO
THE HARBOUR CITY

38mm AND 50mm WATER METER

Scale:	NTS
Created:	JUNE 2026
Rev Date:	JUNE 2026
Dwg No:	W-1B



THRUST BLOCK METHOD



RESTRAINER METHOD

NOTES:

1. NOMINAL TRENCH WIDTH FOR FLUSHOUT IS 600mm VALVE BOX NOT TO CONFLICT WITH CURB AND GUTTER CURB AND GUTTER NOT SHOWN.
2. 150Ø x 200 PIPE TO BE PLACED AROUND PIPE AT DRAIN HOLE TO PREVENT EROSION.
3. ABOVE GROUND FLUSHOUT TO BE RESTRAINED AS PER THRUST BLOCK OR RESTRAINER METHOD AT THE DISCRETION OF THE ENGINEER.
4. WHEN RESTRAINER METHOD IS USED, RESTRAIN AS PER MANUFACTURER'S RECOMMENDATIONS.
5. ONLY PRODUCTS APPROVED BY CITY ENGINEER AND LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

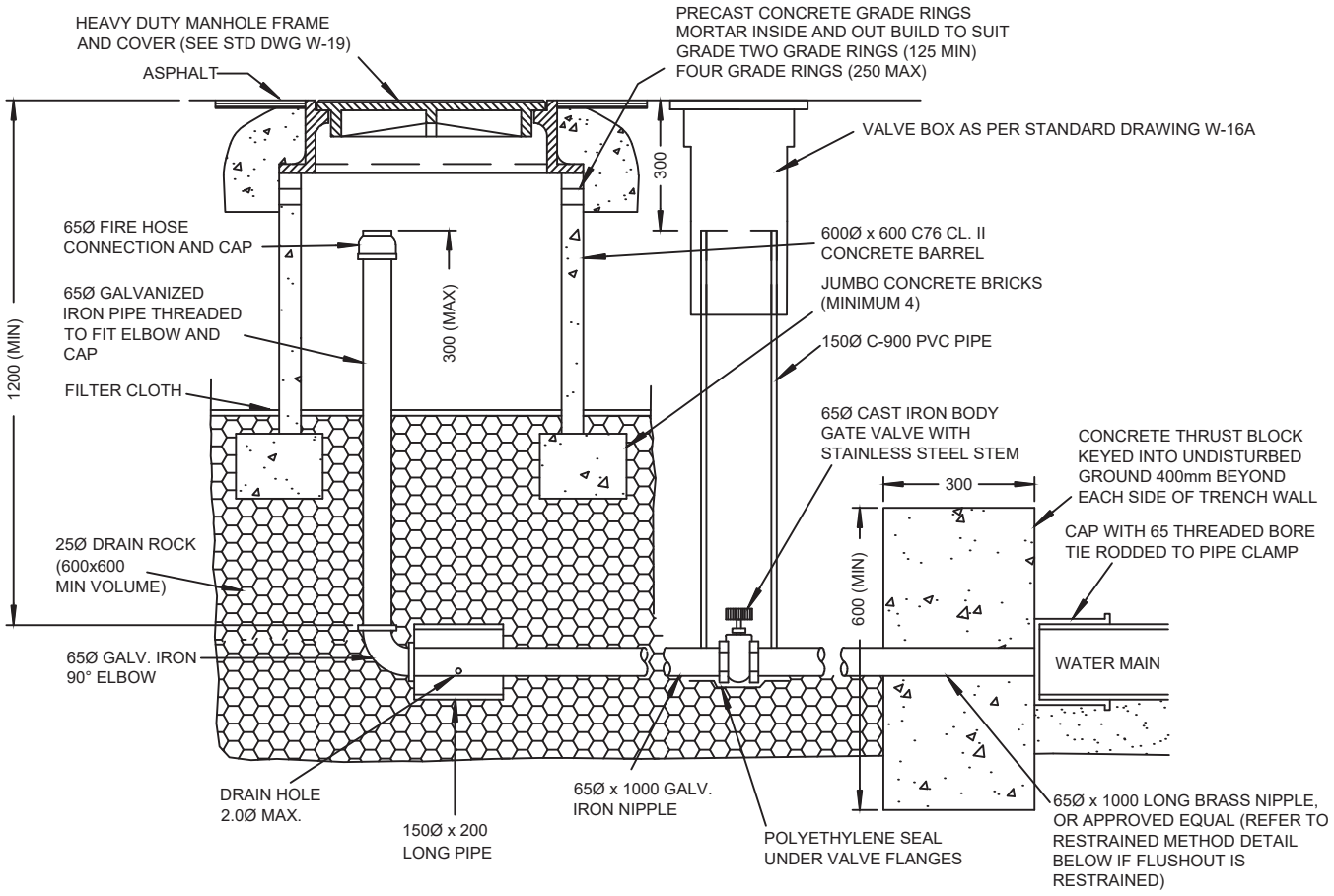
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4.28.2026

CITY OF NANAIMO
THE HARBOUR CITY

ABOVE GROUND FLUSHOUT C/W THRUST BLOCK AND OPTIONAL RETRAINED METHOD

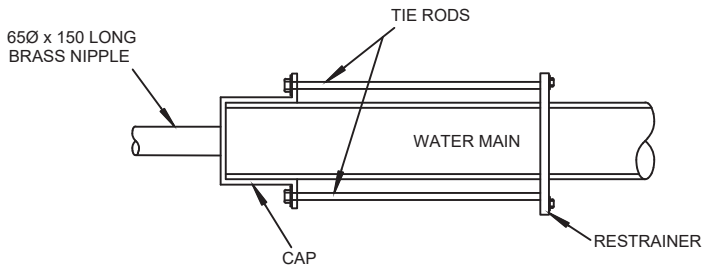
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Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	W-2A



THRUST BLOCK METHOD

NOTES:

1. NOMINAL TRENCH WIDTH FOR FLUSHOUT IS 600mm VALVE BOX NOT CONFLICT WITH CURB AND GUTTER CURB AND GUTTER NOT SHOWN.
2. LETTERING ON MANHOLE COVER SHALL REFER TO "CITY OF NANAIMO WATERWORKS" LETTERING SHALL BE 25 FLATTENED FACE GOTHIC LETTERING WITH FACE OF LETTERS RAISED TO THE SAME ELEVATION AS THE TOP OF THE RIBS.
3. NOT TO BE USED IN AREAS WHERE WATER TABLE COULD BE ABOVE FIRE HOSE CONNECTION.
4. SURROUNDING GRADE TO DRAIN AWAY FROM COVER.
5. 150Ø x 200 PIPE TO BE PLACED AROUND PIPE AT DRAIN HOLE TO PREVENT EROSION.
6. FLUSHOUTS LOCATED ON GRAVEL ROADS OR SHOULDERS REQUIRE A 1.5m X 1.5m HOT MIX ASPHALT APRON, 50mm THICK.
7. BELOW GRADE FLUSHOUT TO BE RESTRAINED AS PER THRUST BLOCK OR RESTRAINER AS DESIGNED BY PROFESSIONAL OF RECORD. CONCRETE AS PER SECTION 11.0.
8. WHEN RESTRAINER METHOD IS USED, RESTRAIN AS PER MANUFACTURER'S RECOMMENDATIONS.
9. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY OF ENGINEER.
10. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.



RESTRAINER METHOD

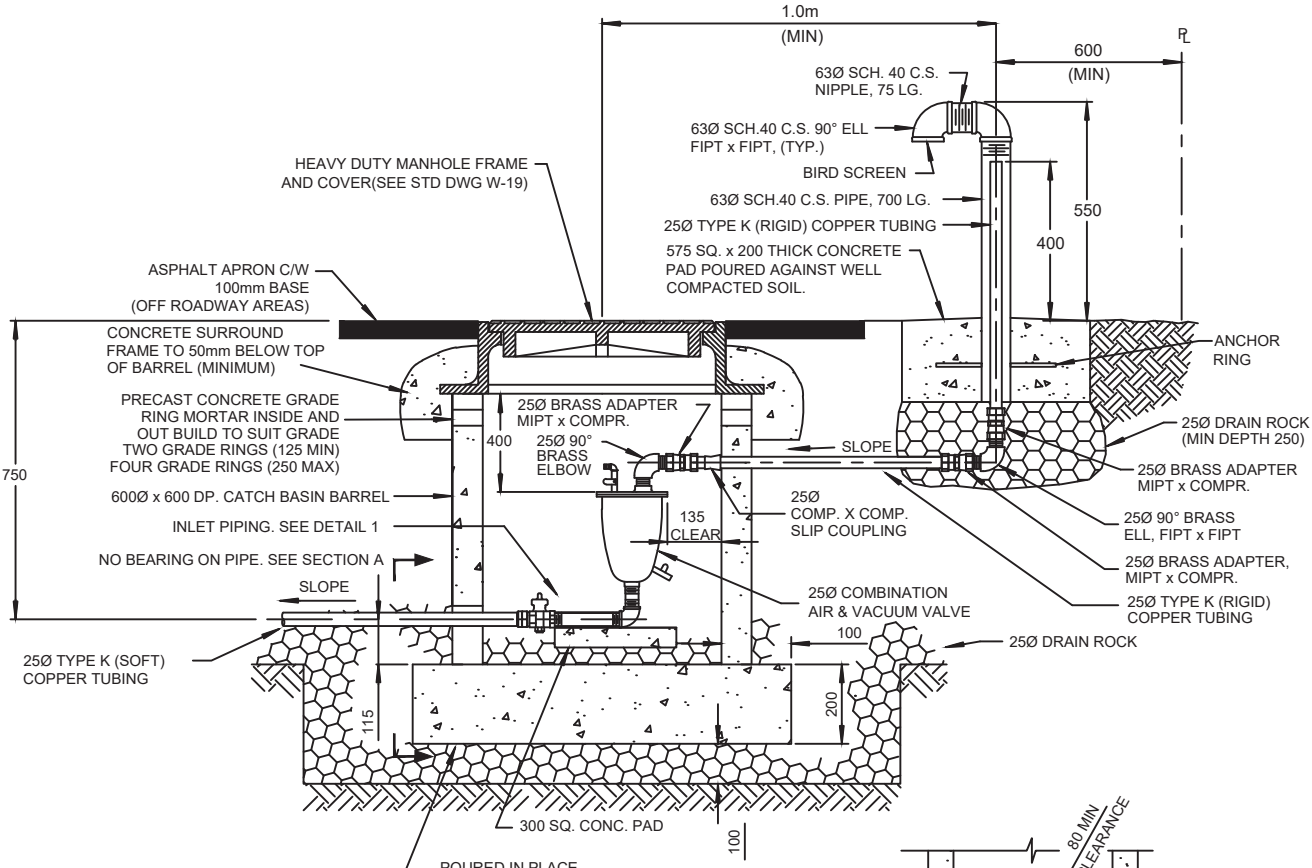
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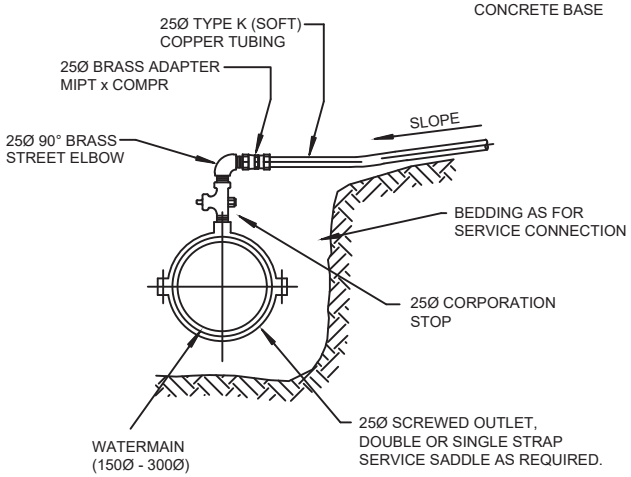
4.28.2026

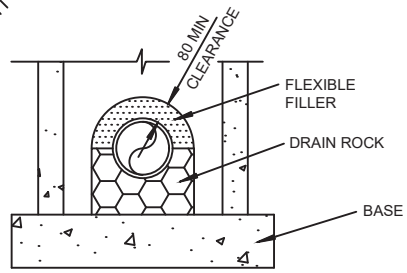
CITY OF NANAIMO
THE HARBOUR CITY

BELOW GROUND FLUSHOUT C/W
THRUST BLOCK AND OPTIONAL
RESTRAINED METHOD

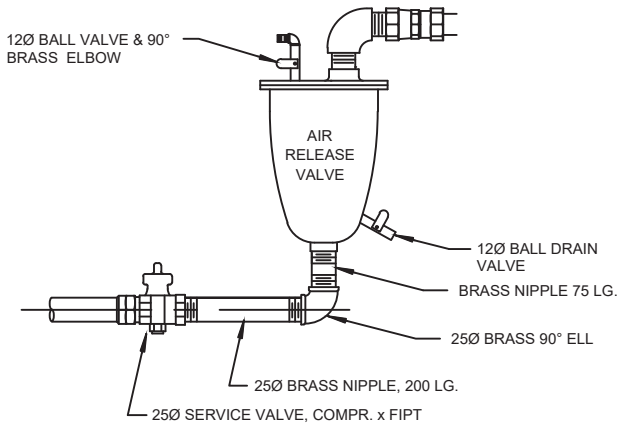
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Created:	NOV 2009
Rev Date:	JUNE 2026
Dwg No:	W-2B







SECTION A



DETAIL 1

NOTES:

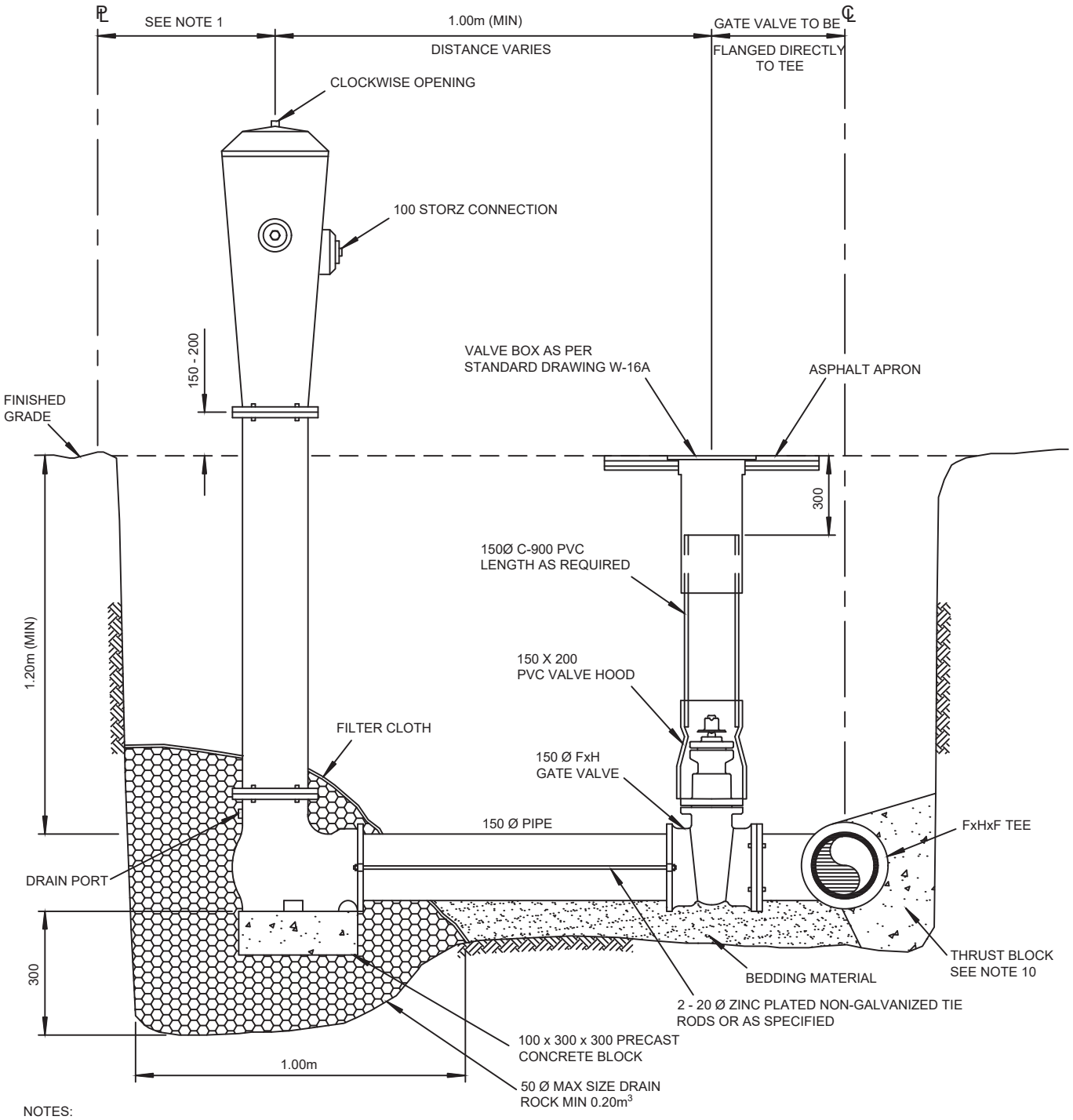
1. CHAMBERS LOCATED ON GRAVEL ROADS OR SHOULDERS REQUIRE A 1.5m x 1.5m HOT MIX ASPHALT APRON, 50 THICK.
2. PLACE FILTER CLOTH OVER DRAIN ROCK PRIOR TO BACKFILL.
3. ABOVE GROUND VENT PIPING TO BE PAINTED FOREST GREEN.
4. PRECAST CATCH BASIN BARREL SHALL BE AN ACCEPTABLE ALTERNATIVE TO MANHOLE BARREL AND POURED IN PLACE BASE.
5. ONLY PRODUCTS LISTED IN APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER.
6. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
7. CONCRETE AS PER SECTION 11.0.

CITY OF NANAIMO
THE HARBOUR CITY

AIR RELEASE VALVE ASSEMBLY AND CHAMBER FOR 150Ø - 300Ø MAIN

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	W-4

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4.28.2026



NOTES:

1. FOR HYDRANT LOCATIONS REFER TO DESIGN DRAWINGS. THE PROFESSIONAL OF RECORD MUST CONSIDER THE MINIMUM OFFSETS IN SECTION 5.07.6.
2. HOSE AND PUMPER NOZZLE MUST FACE FIRE TRUCK ACCESS.
3. HYDRANT FLANGES SHALL BE SET 150 - 200mm ABOVE A POINT 2% UP FROM THE TOP OF THE CURB OR FROM THE TOP OF THE EDGE OF THE ASPHALT WHERE THERE IS NO CURB UNLESS OTHERWISE DIRECTED BY THE CITY ENGINEER.
4. VALVE BOXES LOCATED OUTSIDE PAVED AREAS, AS PER STANDARD DRAWING W-9.
5. FOR VALVE NUT EXTENSION REQUIREMENTS REFER TO STANDARD DRAWING W-16.
6. ONLY PRODUCTS LISTED IN THE CITY CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER.
7. OUT OF SERVICE HYDRANTS SHALL BE BAGGED AS PER SECTION 5.52.2(h).
8. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.
9. CONCRETE AS PER SECTION 11.0.
10. FOR THRUST BLOCK ON WATERMAIN, REFER TO DESIGN CRITERIA IN SECTION 5.09 AND STANDARD DRAWING W-8.

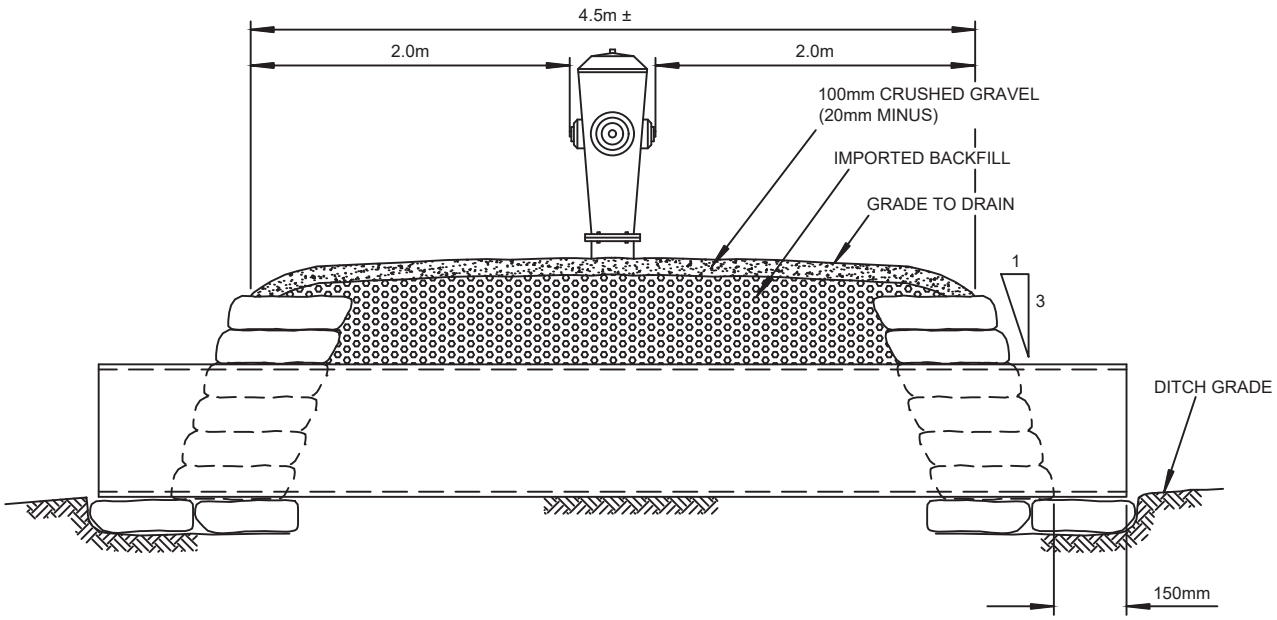
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CITY OF NANAIMO
THE HARBOUR CITY

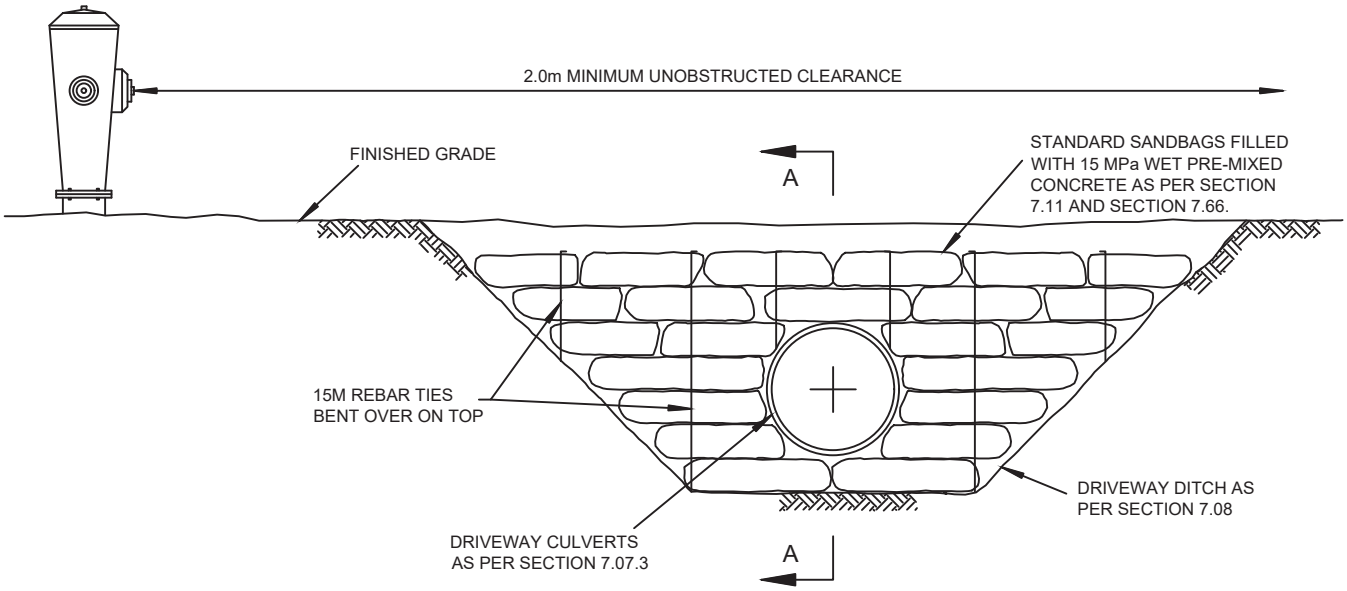
HYDRANT CONNECTION

Scale:	NTS
Created:	NOV 2009
Rev Date:	JUNE 2026
Dwg No:	W-5

4.28.2026



SECTION A-A



ELEVATION

NOTES:

1. IF THE HORIZONTAL DIRECTION OF FLOW AT CULVERT INLETS AND OUTLETS EXCEEDS 30°, THE THE SANDBAG BULKHEADS REQUIRE CURVED WING WALLS TO FUNNEL THE FLOW.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER.

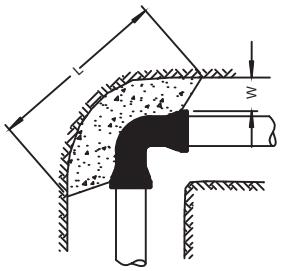
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4.28.2026

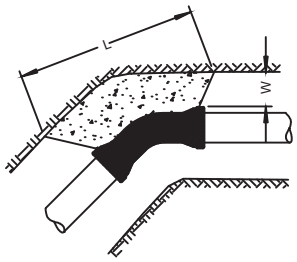
CITY OF NANAIMO
THE HARBOUR CITY

HYDRANT ACCESS - DITCH
CROSSING DETAIL

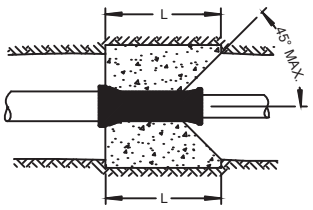
Scale:	NTS
Created:	MAY 1999
Rev Date:	JUNE 2026
Dwg No:	W-7



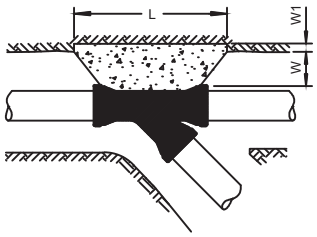
HORIZONTAL 90° BEND



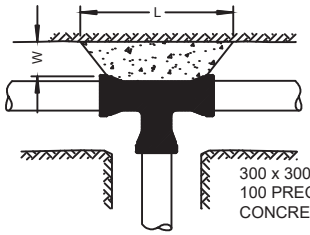
HORIZONTAL 45° BEND



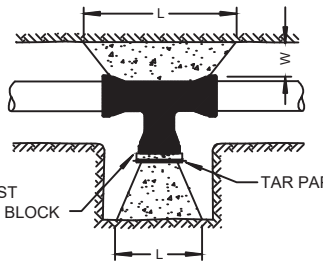
REDUCER



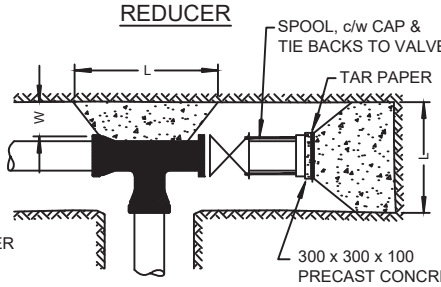
WYE



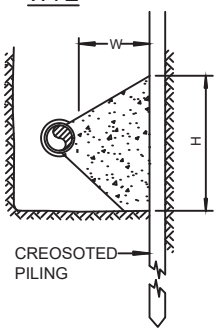
TEE

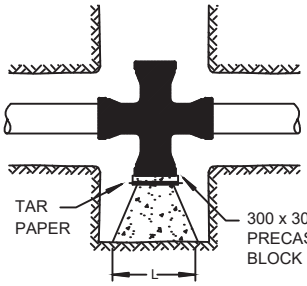


TEE WITH PLUG



TEE WITH VALVE





CROSS WITH PLUG

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONS APPLY TO THE LARGER DIAMETER END OF THE FITTING.
3. CONCRETE AS PER SECTION 11.0.
4. CONCRETE MINIMUM COMPRESSIVE STRENGTH SHALL BE 20MPa @ 28DAYS.
5. WHERE GROUND CANNOT BE EXCAVATED TO FREE STANDING UNDISTURBED SOIL, SMALL PLANK SHEET PILING SHALL BE DRIVEN TO PROVIDE UNDISTURBED THRUST AREA. PILING TO BE DRIVEN PRIOR TO EXCAVATING FOR THRUST BLOCK. PILING SHOULD BE USED ONLY BELOW THE PERMANENT WATER TABLE.
6. REFER TO DESIGN CRITERIA IN SECTION 5.09.

MINIMUM THRUST AREAS FOR FITTINGS AT 1034 kPA PRESSURE AND FOR SOILS WITH MIN. BEARING OF 96kPA
(NOT TO BE USED FOR SOFT CLAY, MUCK, PEAT, etc.)

TYPE OF FITTING	FITTING SIZE	OUTSIDE OF FITTING TO BEARING FACE	LENGTH	HEIGHT	TYPE OF FITTING	FITTING SIZE	OUTSIDE OF FITTING TO BEARING FACE	RECESS IN TRENCH	LENGTH	HEIGHT
	D	W	L	H		D	W	W	L	H
90° BEND	150	300	900	450	CROSS	150	300		600	450
	200	350	1050	600		200	350		750	600
	250	375	1450	750		250	375		1000	750
	300	400	1650	900		300	400		1200	900
45° BEND	150	300	450	450	45° WYE	150	300	300	450	450
	200	350	600	600		200	350	400	600	600
	250	375	750	750		250	375	500	750	750
	300	400	900	900		300	400	600	900	900
11 1/4° BEND 22 1/2° BEND	150	300	450	225	* REDUCER	150	300	150	450	450
	200	350	600	300		200	350	200	600	600
	250	375	835	450		250	375	250	750	750
	300	400	900	450		300	400	300	900	900
TEE	150	300	600	450	CAPS AND PLUGS (IF NOT BOLTED)	150	300		450	450
	200	350	750	600		200	350		600	600
	250	375	1000	750		250	375		750	750
	300	400	1200	900		300	400		900	900

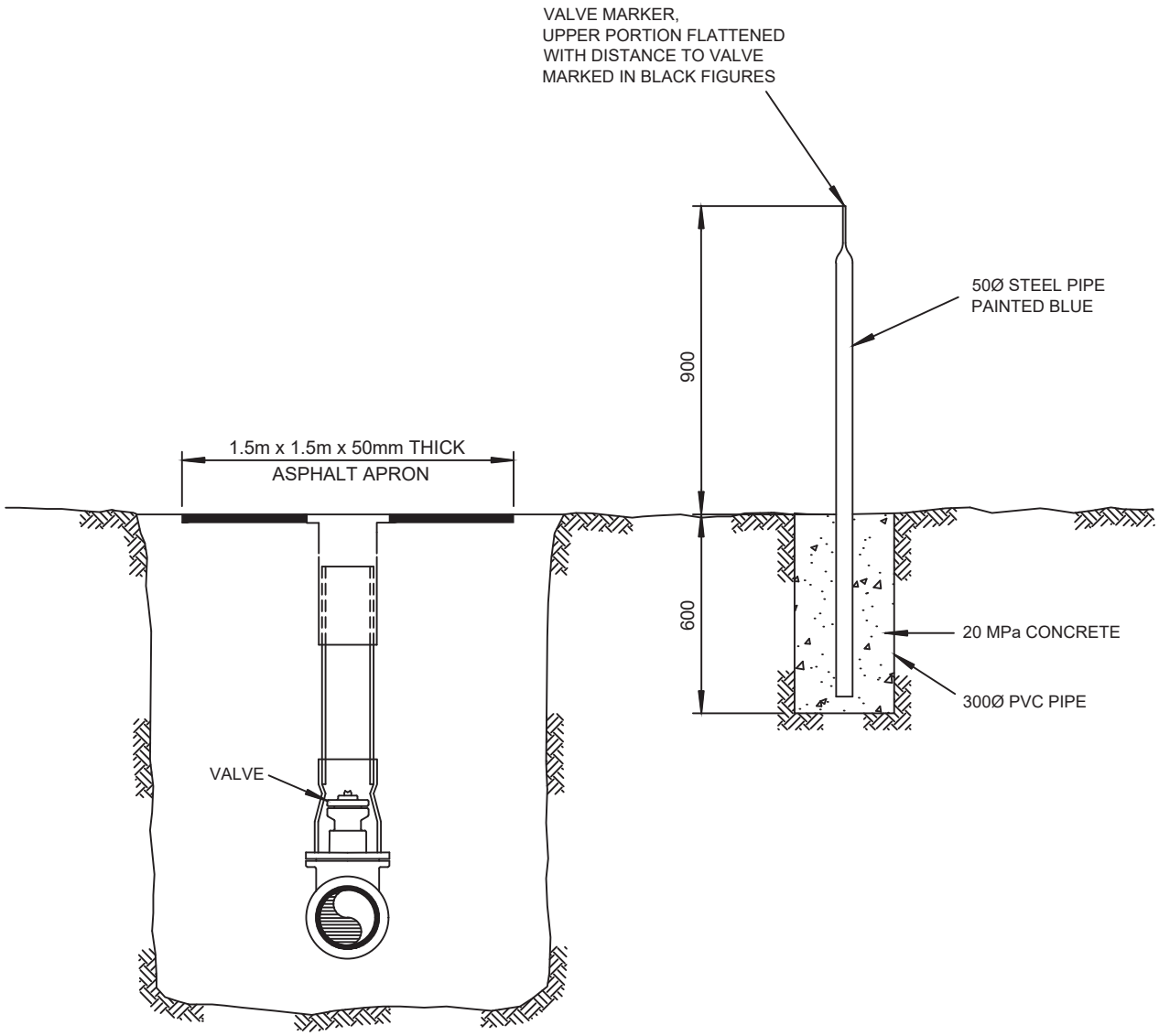
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4.28.2026

CITY OF NANAIMO
THE HARBOUR CITY

THRUST BLOCK DETAILS

Scale:	NTS
Created:	MAY 2006
Rev Date:	JUNE 2026
Dwg No:	W-8



NOTES:

1. FOR USE ONLY WHERE VALVE BOXES ARE LOCATED OUTSIDE THE PORTION OF A STREET.
2. THE VALVE MARKER SHALL BE LOCATED ON SITE BY THE PROFESSIONAL OF RECORD, WITH THE FLATTENED END AND MARKED DISTANCE FACING THE VALVE BOX.
3. VALVE BOXES IN UNPAVED AREAS REQUIRE A 1.5m x 1.5m HOTMIX ASPHALT APRON, 50mm THICK.
4. FOR VALVE NUT EXTENSION REQUIREMENTS REFER TO STANDARD DRAWING NO. W-16.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
6. CONCRETE AS PER SECTION 11.0.

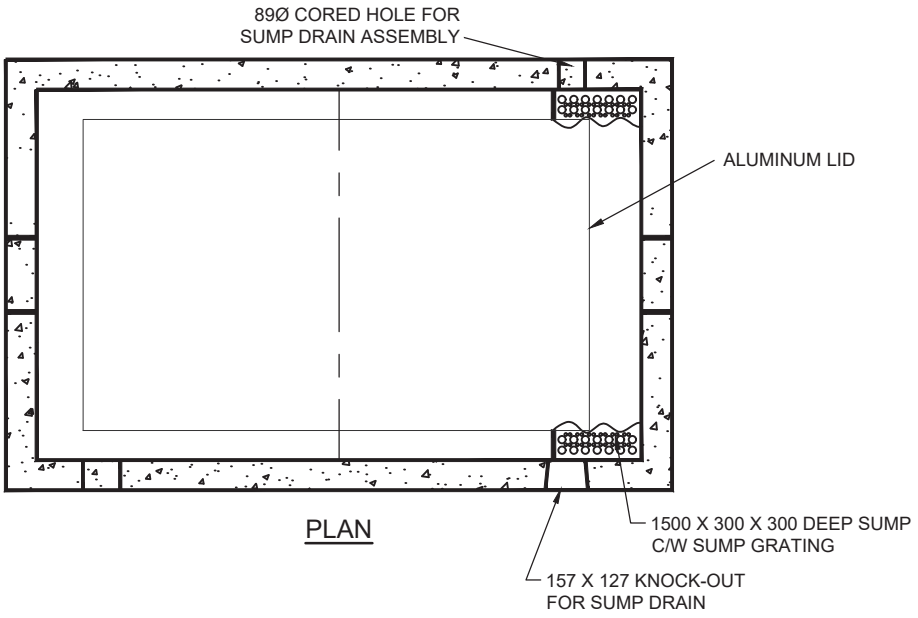
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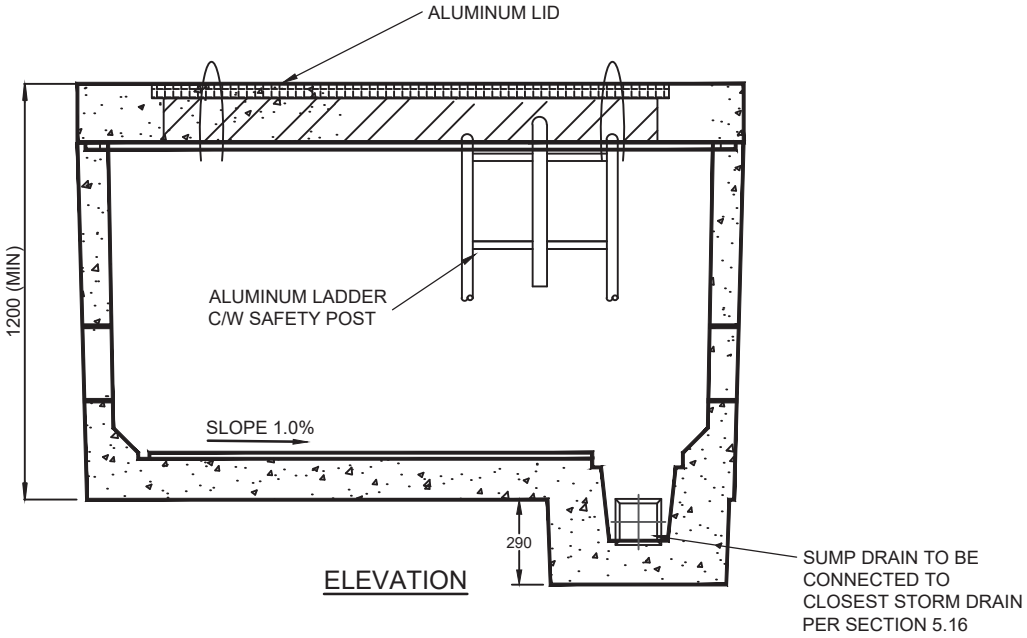
CITY OF NANAIMO
THE HARBOUR CITY

VALVE BOXES IN UNPAVED AREAS

Scale:	NTS
Created:	NOV 2009
Rev Date:	JUNE 2026
Dwg No:	W-9

4.28.2026





NOTES:

1. THE DESIGN IS DONE BY A PROFESSIONAL OF RECORD WHO CAN USE THIS STANDARD DRAWING ONLY AS A GUIDE. DETAIL DESIGN SHALL CONSIDER EXISTING SITE AND SOIL CONDITIONS AND INCLUDE STEEL REINFORCEMENT.
2. CONCRETE AND REINFORCING STEEL AS PER SECTION 11.0.
3. DESIGN VAULT TO WITHSTAND CS600 STATIC LOADING.
4. SIZE VAULT TO PROVIDE MINIMUM CLEARANCES AS PER SECTION 5.13.
5. CHAMBERS LOCATED ON GRAVEL ROADS OR SHOULDERS REQUIRE A 1.5m X 1.5m HOT MIX ASPHALT PERIMETER APRON, 50mm THICK, AS PER SECTION 5.58.
6. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER.
7. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
8. MINIMUM 200mm CLEAR DISTANCE FROM FLANGE OR BOLTED CONNECTION TO THE INSIDE WALL.
9. A DOUBLE CHECK VALVE ASSEMBLY (DCVA) BACKFLOW PREVENTION ASSEMBLY SHALL BE A SPECIAL CASE. THE PRECAST VAULT SHALL BE A MINIMUM OF 2000mm L X 1200mm W. DEPENDENT UPON THE DCVA MANUFACTURED CLEARANCE AND ORIENTATION A LARGER VAULT MAY BE REQUIRED.
10. SUBJECT TO APPROVAL BY THE CITY ENGINEER A METER AND BACKFLOW PREVENTION ASSEMBLY MAY BE INSTALLED IN A MECHANICAL ROOM.
11. ALUMINUM ACCESS LADDER MUST MEET THE WORKSAFE BC REQUIREMENTS FOR FIXED LADDERS.

MINIMUM INTERNAL DIMENSION FOR THE PRECAST VAULT METER CHAMBER

DOMESTIC/ FIRE METER	LENGTH	WIDTH
100-150Ø	2000	1200
150-250Ø	2600	1200
DCVA	SEE NOTE 9	

*FIRE RATED METERS TYPICALLY REQUIRE LARGER CHAMBERS.

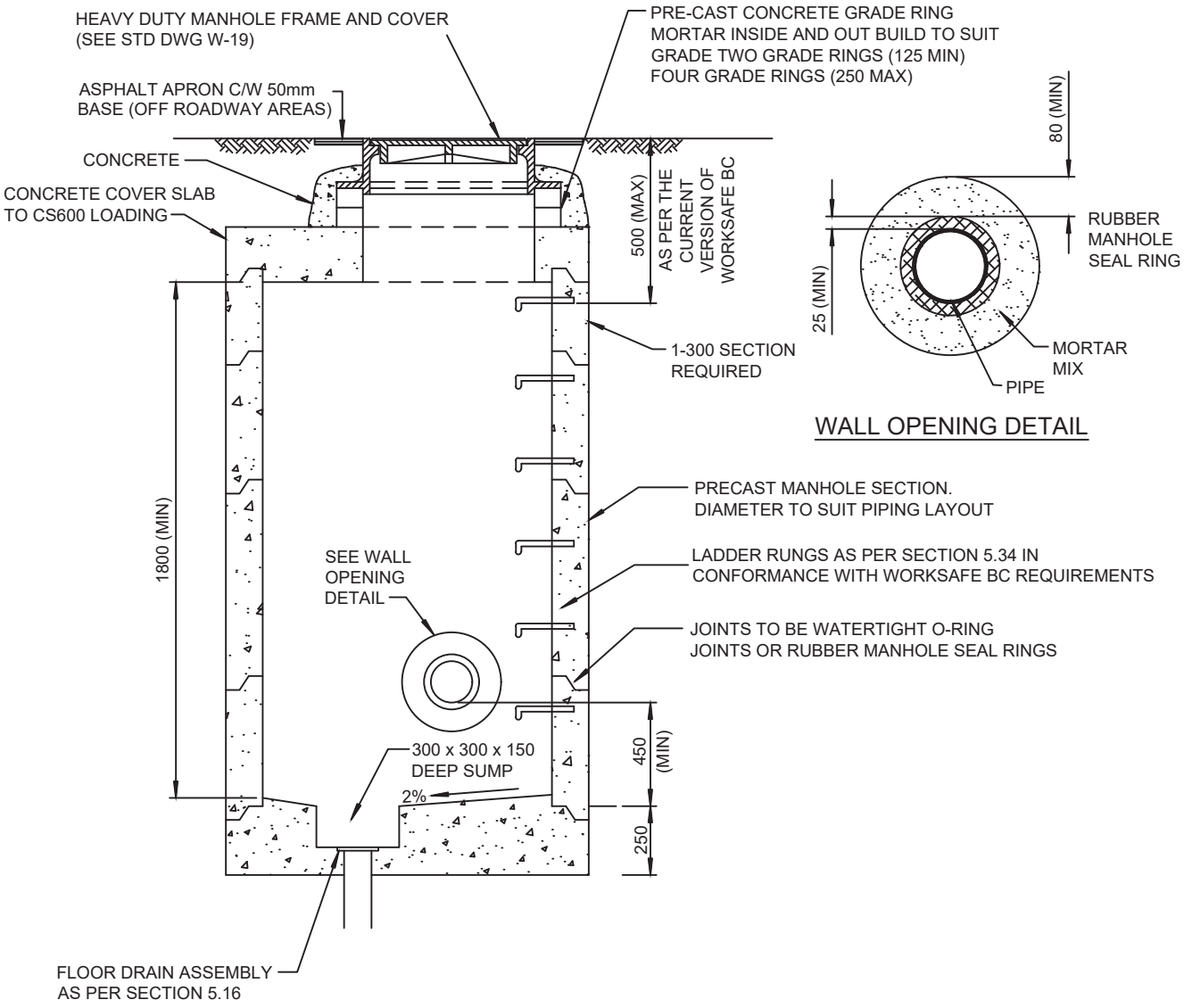
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4.28.2026

CITY OF NANAIMO
THE HARBOUR CITY

METER / DCVA BACKFLOW PREVENTION ASSEMBLY PRECAST VAULT

Scale:	NTS
Created:	MAY 2012
Rev Date:	JUNE 2026
Dwg No:	W-11



NOTES:

1. CHAMBERS LOCATED IN UNPAVED AREAS REQUIRE 1.5m X 1.5m GRAVEL OR PAVED SURFACE AROUND COVER. PROJECT COVER 0mm IN PAVEMENT OR 25mm IN UNPAVED AREAS.
2. CHAMBER MANHOLES LOCATED IN UNPAVED AREAS REQUIRE A 1.5m X 1.5m, 50mm THICK HOT MIX ASPHALT APRON.
3. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
5. MINIMUM 200mm CLEAR DISTANCE FROM FLANGE OR BOLTED CONNECTION TO THE INSIDE WALL.
6. WATERTIGHT MANHOLE FRAME AND COVER WHEN SPECIFICALLY APPROVED BY THE PROFESSIONAL OF RECORD.
7. CONCRETE AS PER SECTION 11.0.

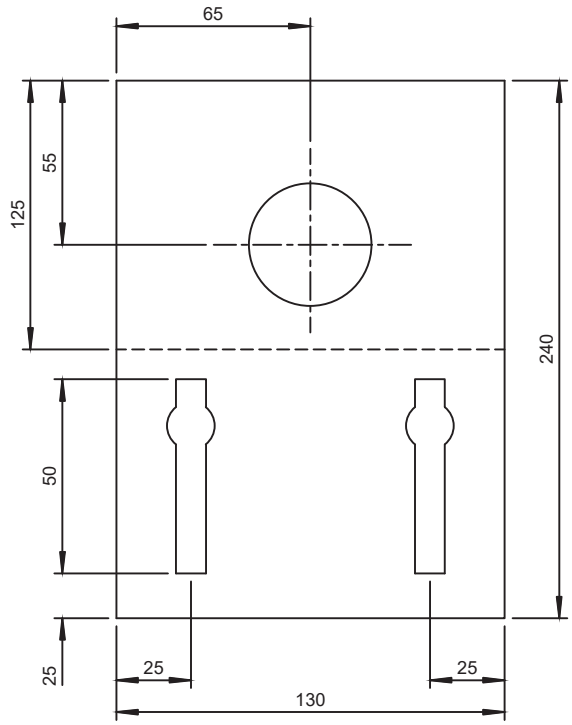
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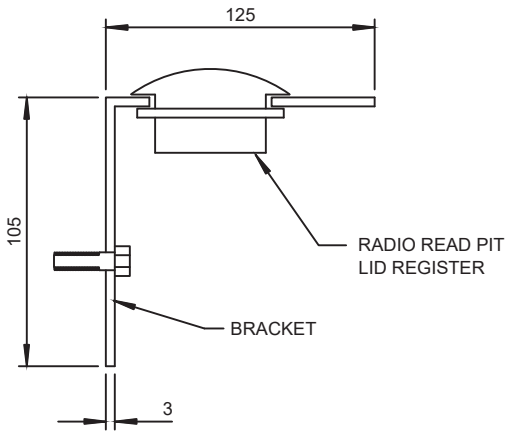
4.28.2026

CITY OF NANAIMO
THE HARBOUR CITY

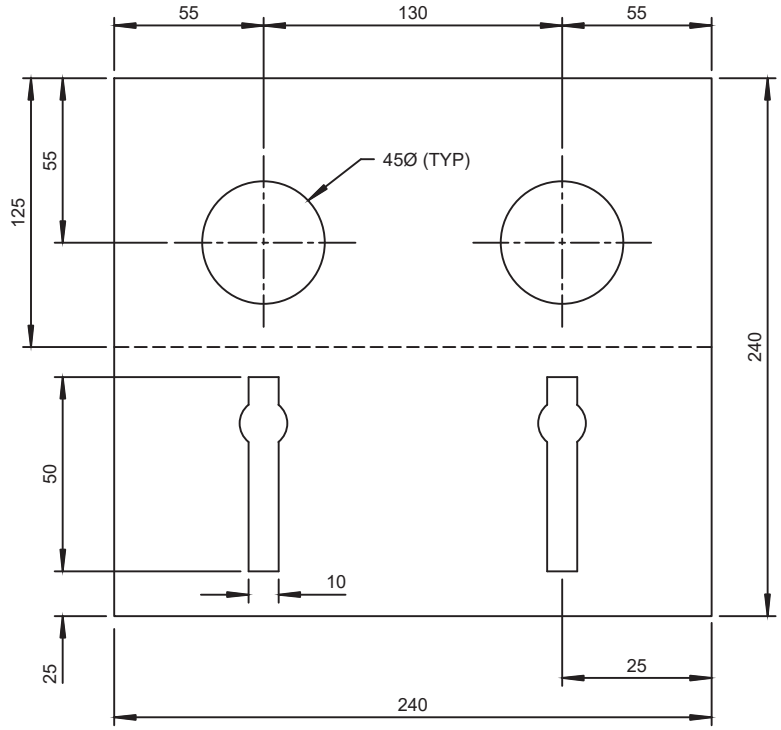
METER CHAMBER
PRECAST CIRCULAR
MANHOLE

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	W-11A





SINGLE METER BRACKET



DOUBLE METER BRACKET

NOTES:

1. BRACKETS TO BE CONSTRUCTED OUT OF 3mm ALUMINUM PLATE.
2. BRACKETS TO BE MOUNTED WITH TWO 6mm STAINLESS STEEL BOLTS WITH LEAD ANCHORS.
3. IN PRECAST MANHOLE METER CHAMBERS THE BRACKET SHALL BE MOUNTED BETWEEN THE FIRST AND SECOND LADDER RUNG.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
5. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.

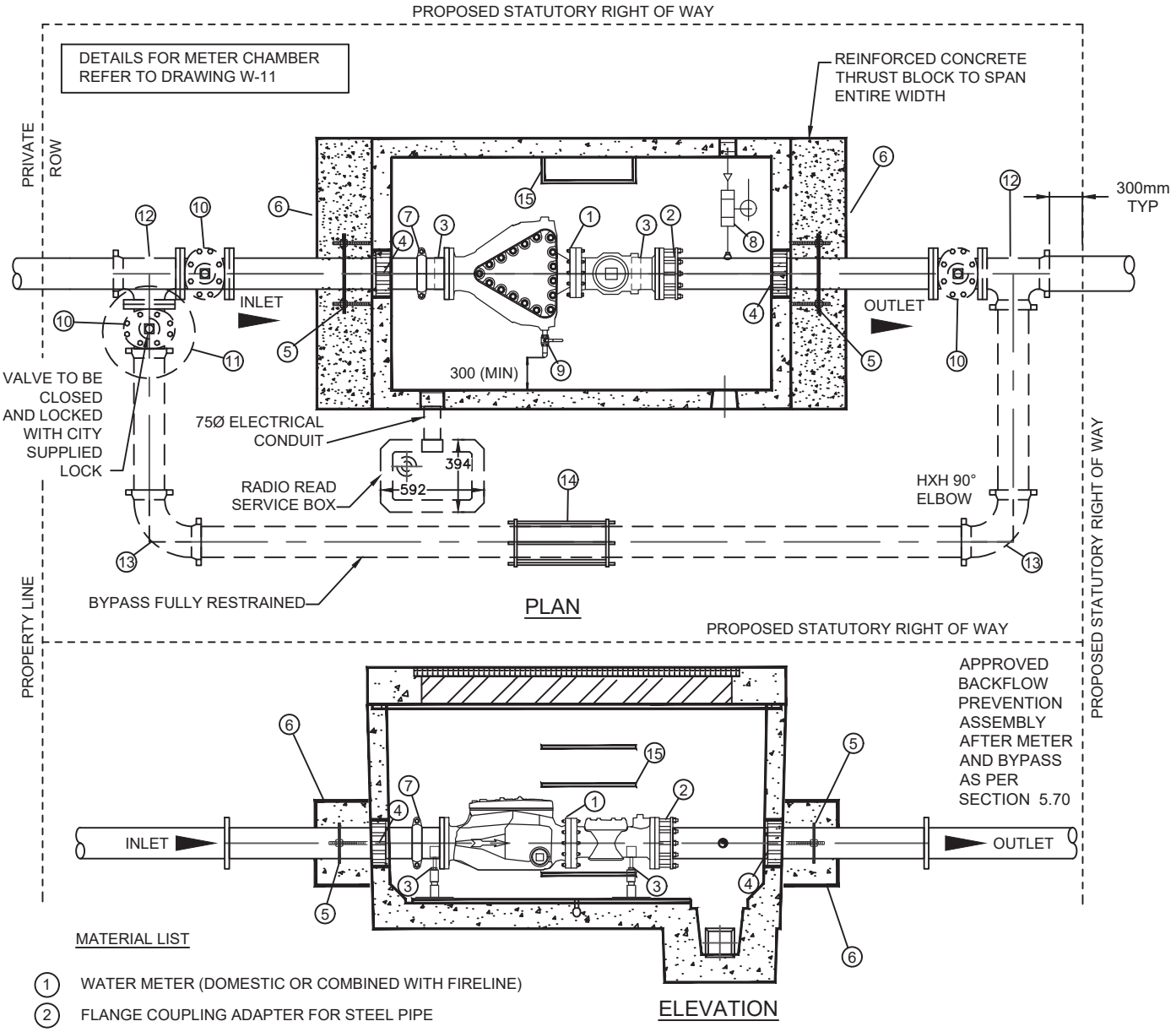
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4.28.2026

CITY OF NANAIMO
THE HARBOUR CITY

WATER METER TOUCH READ BRACKET

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	W-12



MATERIAL LIST

1. WATER METER (DOMESTIC OR COMBINED WITH FIRELINE)
2. FLANGE COUPLING ADAPTER FOR STEEL PIPE
3. GALVANIZED STEEL ADJUSTABLE PIPE SUPPORT
4. PIPE SEAL ASSEMBLY
5. THRUST-SEAL PLATE C/W BOLTS
6. REINFORCED CONCRETE THRUST BLOCK TO SPAN ENTIRE WIDTH
7. COUPLING
8. SUMP JET (OPTIONAL)
9. STRAINER DRAIN ASSEMBLY
10. GATE VALVE
11. VALVE BOX C/W LOCKING LID
12. TEE
13. 90° ELBOW
14. COUPLING
15. LADDER

NOTES:

1. THRUST BLOCKING TO BE INSTALLED AS REQUIRED.
2. METER ASSEMBLY TO BE SUPPORTED BY STEEL PIPE SUPPORTS AS REQUIRED.
3. FABRICATED STEEL PIPE AND FITTING TO BE SCHEDULE 40 SANDBLASTED, EPOXY LINED, AND COATED TO AWWA C-210 & ANSI/NSF-61 SPECIFICATION.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER. ONLY UL LISTED/FM APPROVED PRODUCTS SHALL BE APPROVED FOR FIRELINE SERVICE.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
6. PROVIDE APPROVED BACKFLOW PREVENTION ASSEMBLY AFTER THE METER AND BYPASS ACCORDING TO CITY OF NANAIMO CROSS CONNECTION CONTROL BYLAW AND AS PER SECTION 5.70.
7. CONCRETE AS PER SECTION 11.0.

CITY OF NANAIMO
THE HARBOUR CITY

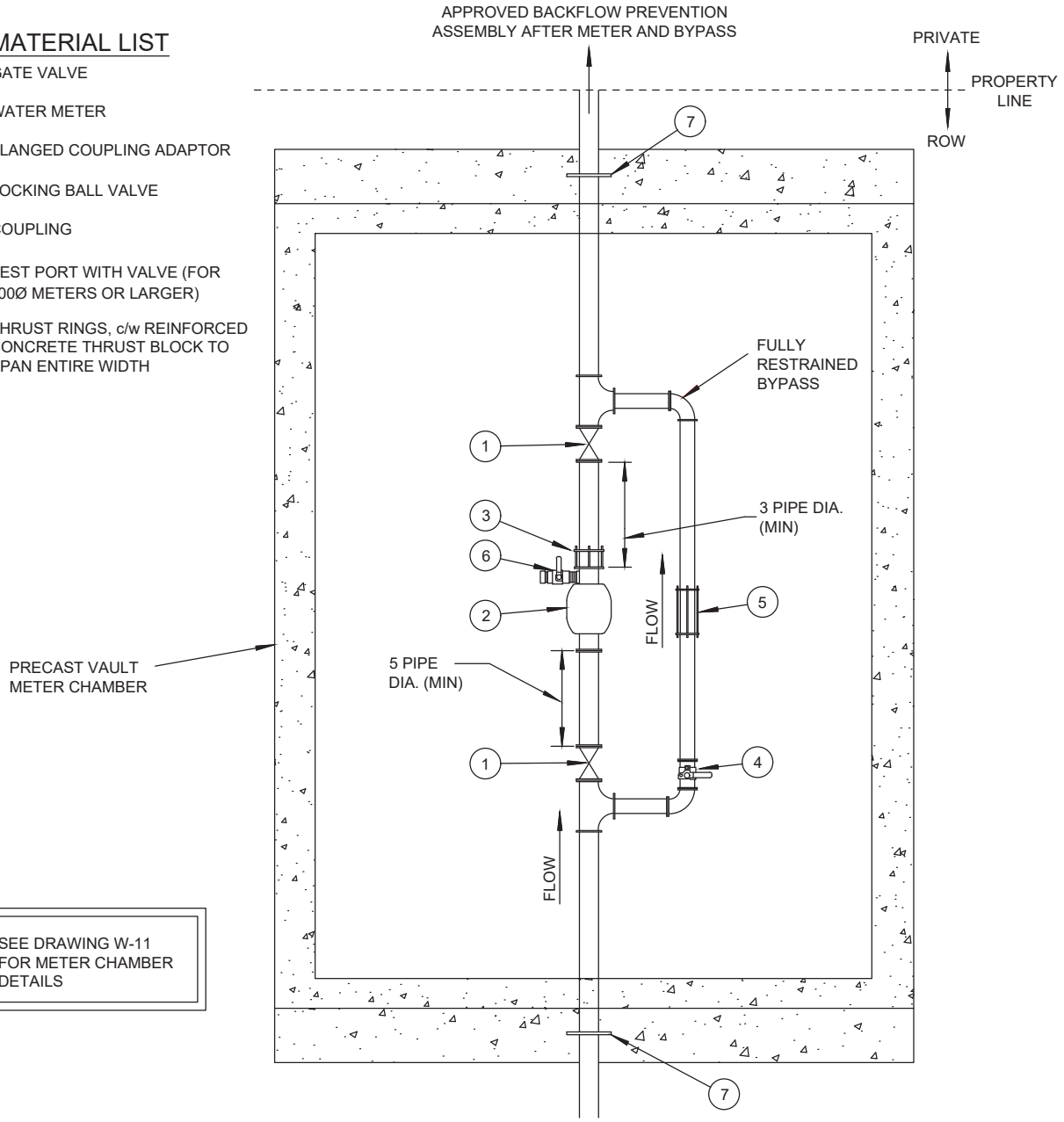
FIRE OR DOMESTIC WATER METER
PIPING LAYOUT (75Ø - 250Ø)

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	W-13

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5.5.2026

MATERIAL LIST

1. GATE VALVE
2. WATER METER
3. FLANGED COUPLING ADAPTOR
4. LOCKING BALL VALVE
5. COUPLING
6. TEST PORT WITH VALVE (FOR 100Ø METERS OR LARGER)
7. THRUST RINGS, c/w REINFORCED CONCRETE THRUST BLOCK TO SPAN ENTIRE WIDTH



SEE DRAWING W-11 FOR METER CHAMBER DETAILS

NOTES:

1. METER ASSEMBLY TO BE SUPPORTED BY STEEL PIPE SUPPORTS AS REQUIRED.
2. THRUST BLOCKING TO BE INSTALLED AS REQUIRED.
3. METER BY-PASS MAY BE INSTALLED OUTSIDE THE CHAMBER. VALVES OUTSIDE THE CHAMBER SHALL BE D.I. GATE VALVES AS PER SECTION 5.24.
4. ONLY PRODUCTS APPROVED BY THE CITY ENGINEER AND LISTED IN THE CITY OF NANAIMO APPROVED PRODUCT LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
6. PROVIDE APPROVED BACKFLOW PREVENTION ASSEMBLY AFTER THE METER AND BYPASS ACCORDING TO CITY OF NANAIMO CROSS CONNECTION CONTROL BYLAW.

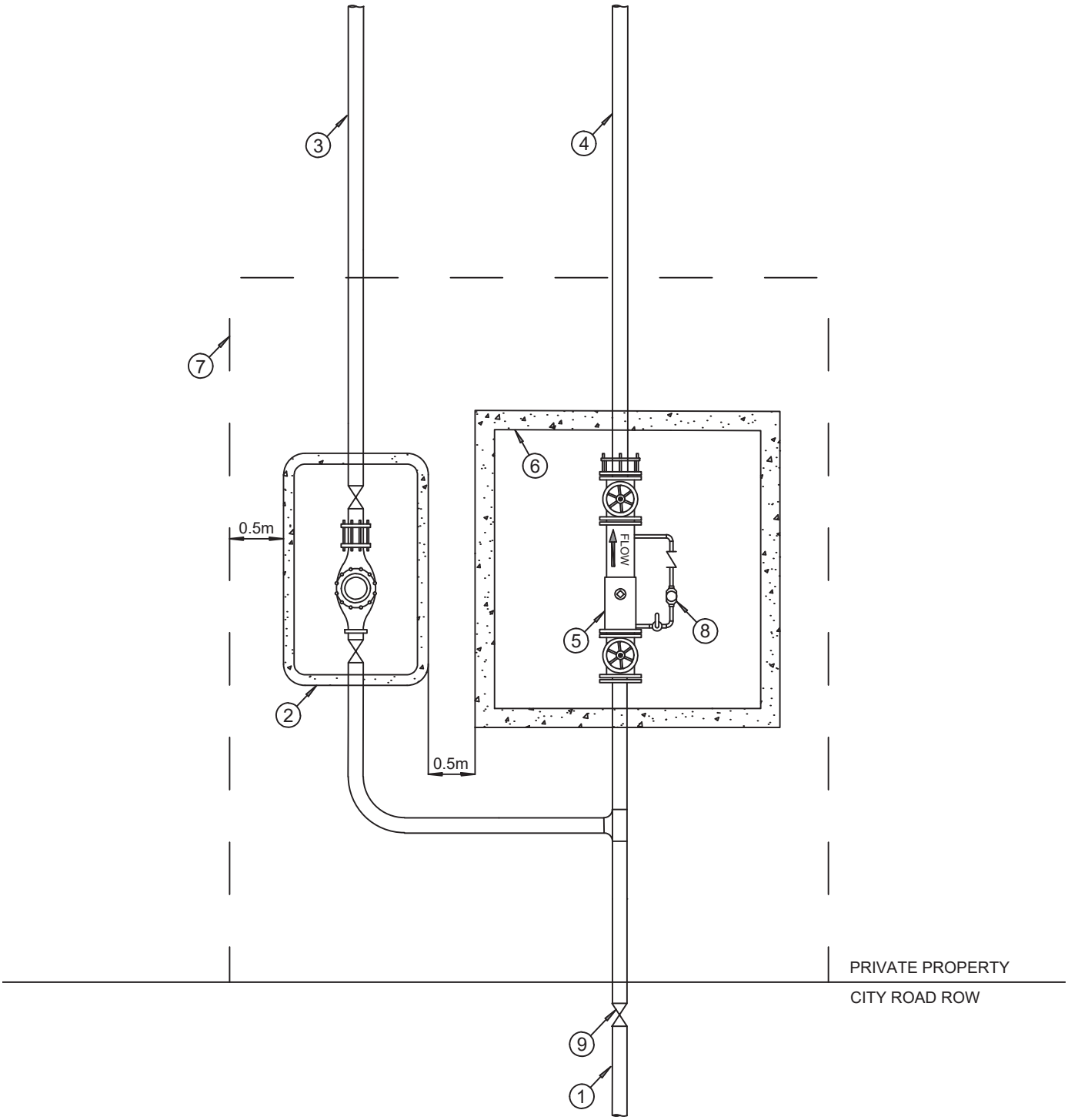
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3.6.2020

CITY OF NANAIMO
THE HARBOUR CITY

DOMESTIC WATER METER
PIPING LAYOUT (75Ø - 250Ø)

Scale:	NTS
Created:	MAY 2012
Rev Date:	JUNE 2026
Dwg No:	W-14



NOTES:

1. WATER SERVICE.
2. WATER METER, SEE DWG W-1 or W-1B.
3. DOMESTIC WATER SERVICE.
4. FIRE WATER SERVICE.
5. DOUBLE CHECK DETECTOR ASSEMBLY.
6. DOUBLE CHECK DETECTOR ASSEMBLE CHAMBER.
7. STATUTORY RIGHT-OF-WAY.
8. RADIO READ WATER METER.
9. CURB STOP, c/w RISER.

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5.25.2026

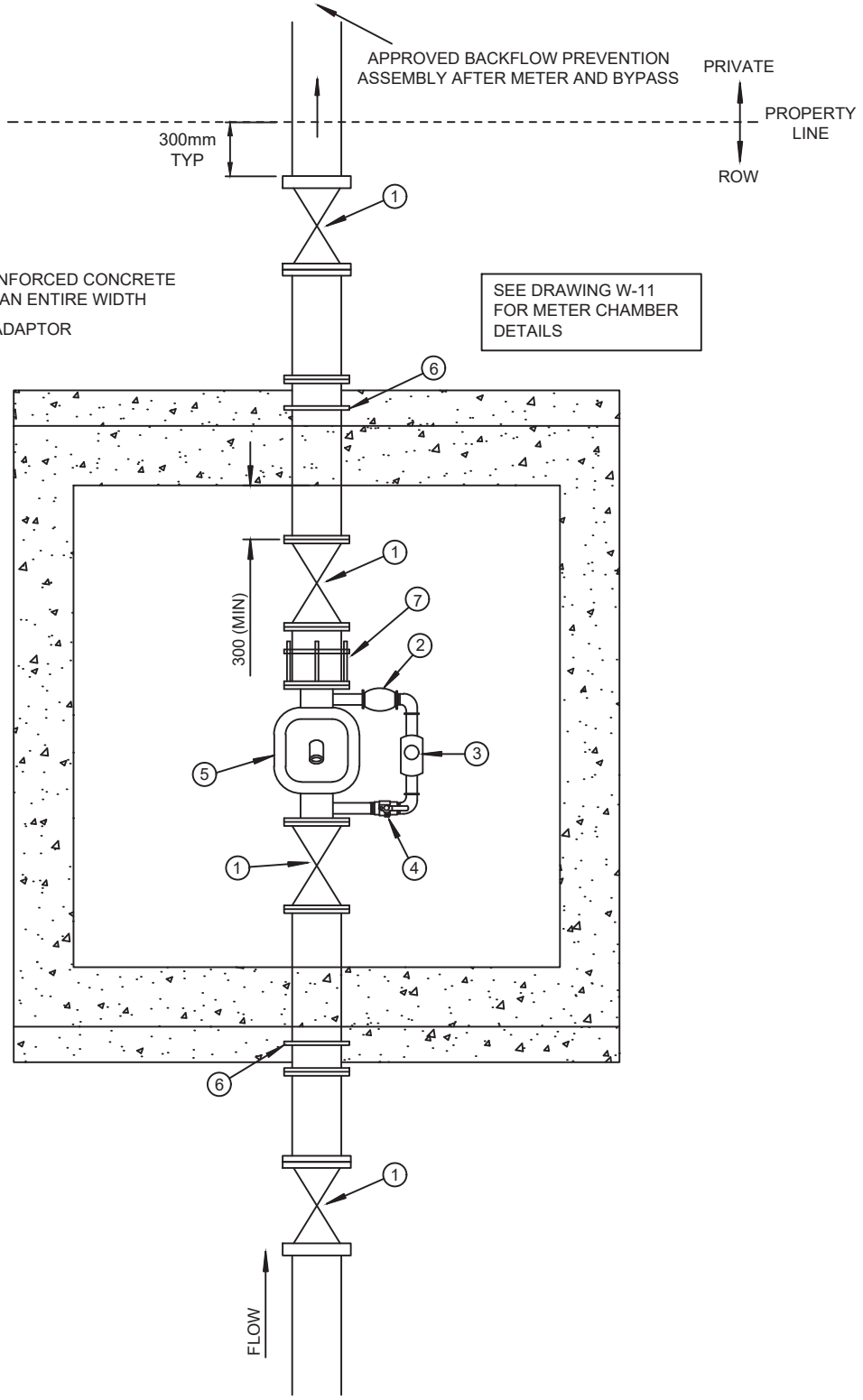
CITY OF NANAIMO
THE HARBOUR CITY

25mm TO 50mm WATER SERVICE WITH FIRE LINE

Scale:	NTS
Created:	JULY 2025
Rev Date:	JUNE 2026
Dwg No:	W-14A

MATERIAL LIST

1. GATE VALVE (OS&Y)
2. CHECK VALVE
3. BY-PASS METER
4. LOCKING BALL VALVE
5. DETECTOR CHECK
6. THRUST RING, c/w REINFORCED CONCRETE THRUST BLOCK TO SPAN ENTIRE WIDTH
7. FLANGED COUPLING ADAPTOR



NOTES:

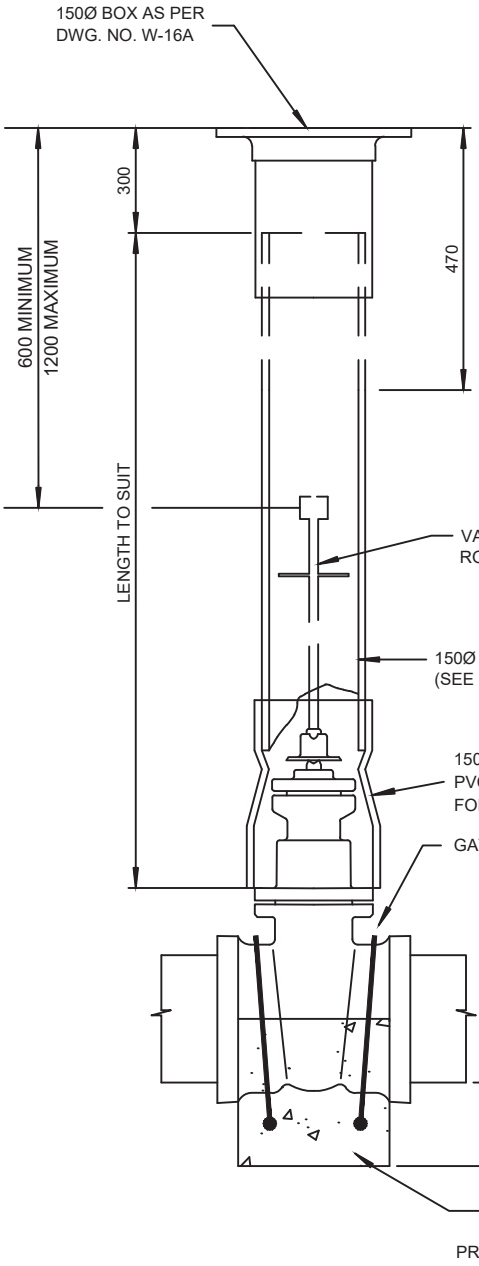
1. METER ASSEMBLY TO BE SUPPORTED BY STEEL PIPE SUPPORTS AS REQUIRED.
2. THRUST BLOCKING TO BE INSTALLED AS REQUIRED. REFER TO DESIGN CRITERIA IN SECTION 5.09 AND STANDARD DRAWING W-8.
3. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCT LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER. ONLY UL/FM LISTED PRODUCTS SHALL BE APPROVED FOR FIRE LINE SERVICE.
4. PROVIDE APPROVED BACKFLOW PREVENTION ASSEMBLY AFTER THE METER AND BYPASS ACCORDING TO CITY OF NANAIMO CROSS CONNECTION CONTROL BYLAW.
5. SUBJECT TO APPROVAL BY THE CITY ENGINEER A METER AND BACKFLOW PREVENTION ASSEMBLY MAY BE INSTALLED IN A MECHANICAL ROOM.

CITY OF NANAIMO
THE HARBOUR CITY

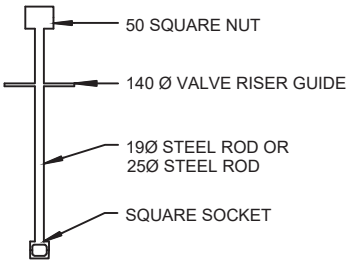
DETECTOR CHECK FIRE LINE SERVICE
PIPING LAYOUT (100Ø - 250Ø)

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	W-15

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4.28.2026

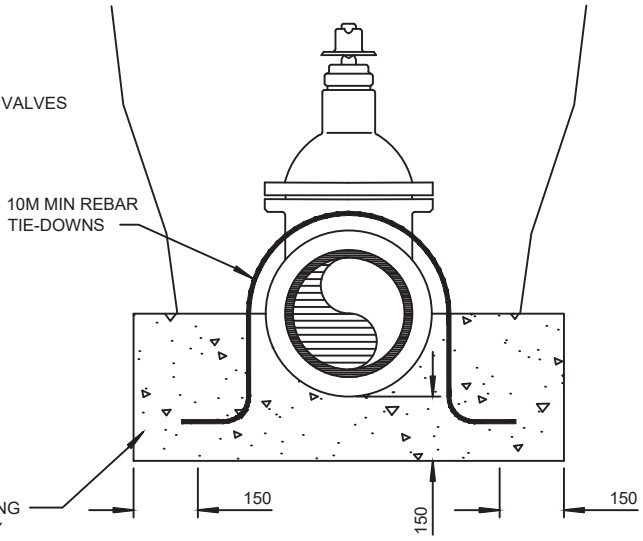


ASSEMBLY WITH CONCRETE FOOTING



VALVE EXTENSION ROD

EXTENSION RODS REQUIRED WHEN BURY DEPTH EXCEEDS 1200 FROM TOP OF VALVE TO GROUND LEVEL. TOP OF EXTENSION ROD NUT SHALL BE 600 MINIMUM AND 1200 MAXIMUM TO GROUND LEVEL.



SECTION OF CONCRETE FOOTING

NOTES:

1. VALVE RISER PIPE IN TRAVELED AREAS SHALL BE 150Ø DR-18 PVC AND IN UNTRAVELED AREAS SHALL BE 150Ø DR-35 PVC AT THE DISCRETION OF THE ENGINEER.
2. VALVE BOX AS PER STANDARD DRAWING NO. W-16A.
3. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
5. NO TIE-DOWNS REQUIRED IF VALVE FLANGED TO RESTRAINED TEE.
6. CONCRETE AS PER SECTION 11.0.

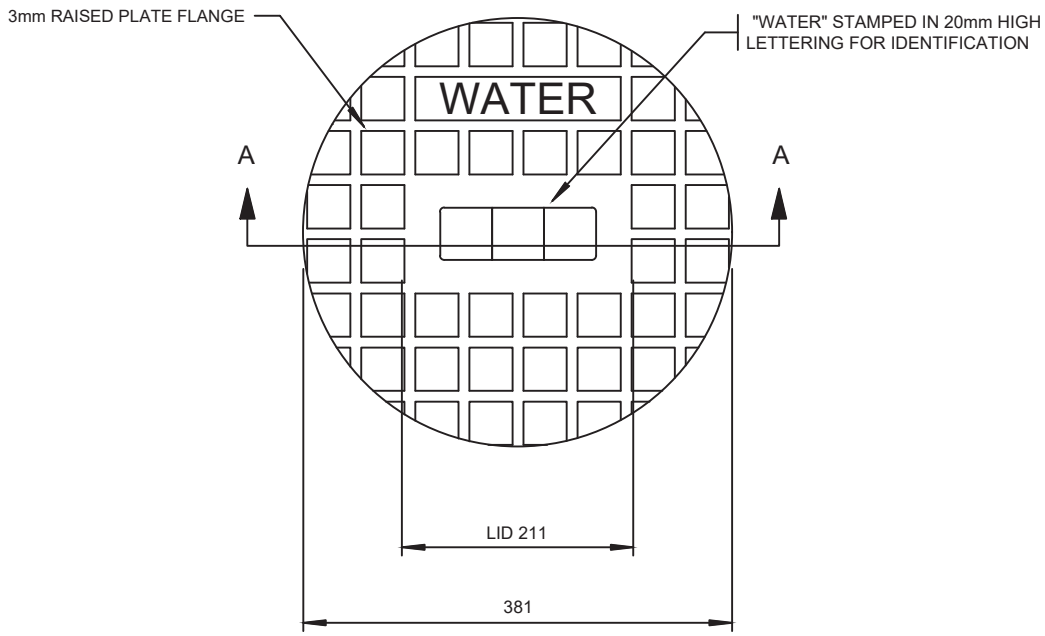
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CITY OF NANAIMO
THE HARBOUR CITY

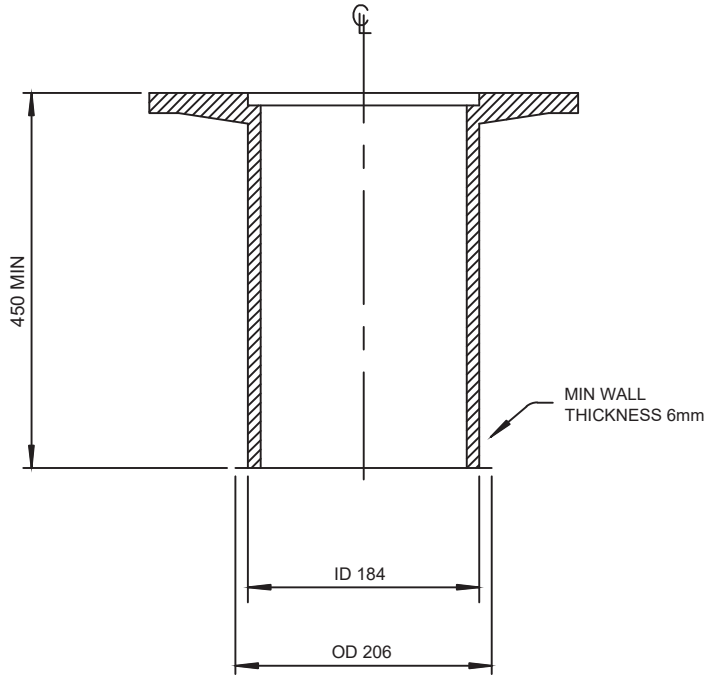
GATE VALVE & VALVE NUT EXTENSIONS

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Rev Date:	JUNE 2026
Dwg No:	W-16

4.28.2026



PLAN



SECTION A - A

NOTES:

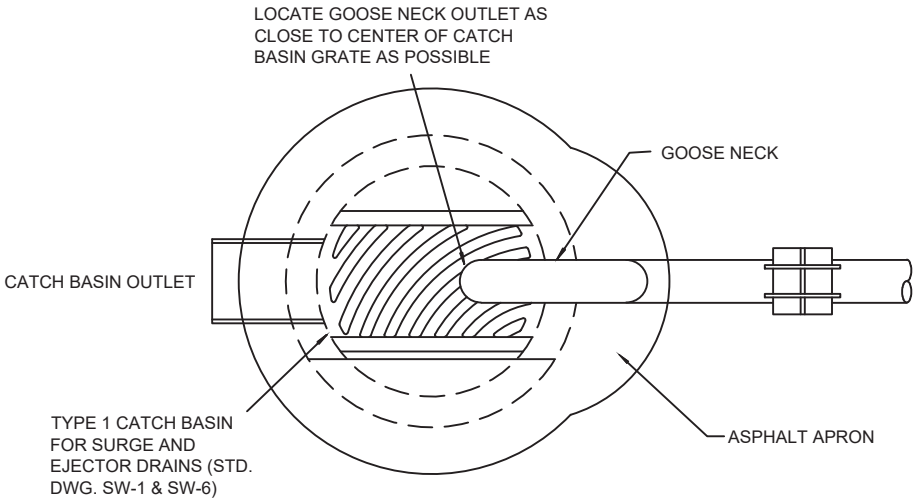
1. FINISH COATING TO BE BITUMINOUS DIP.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCT LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

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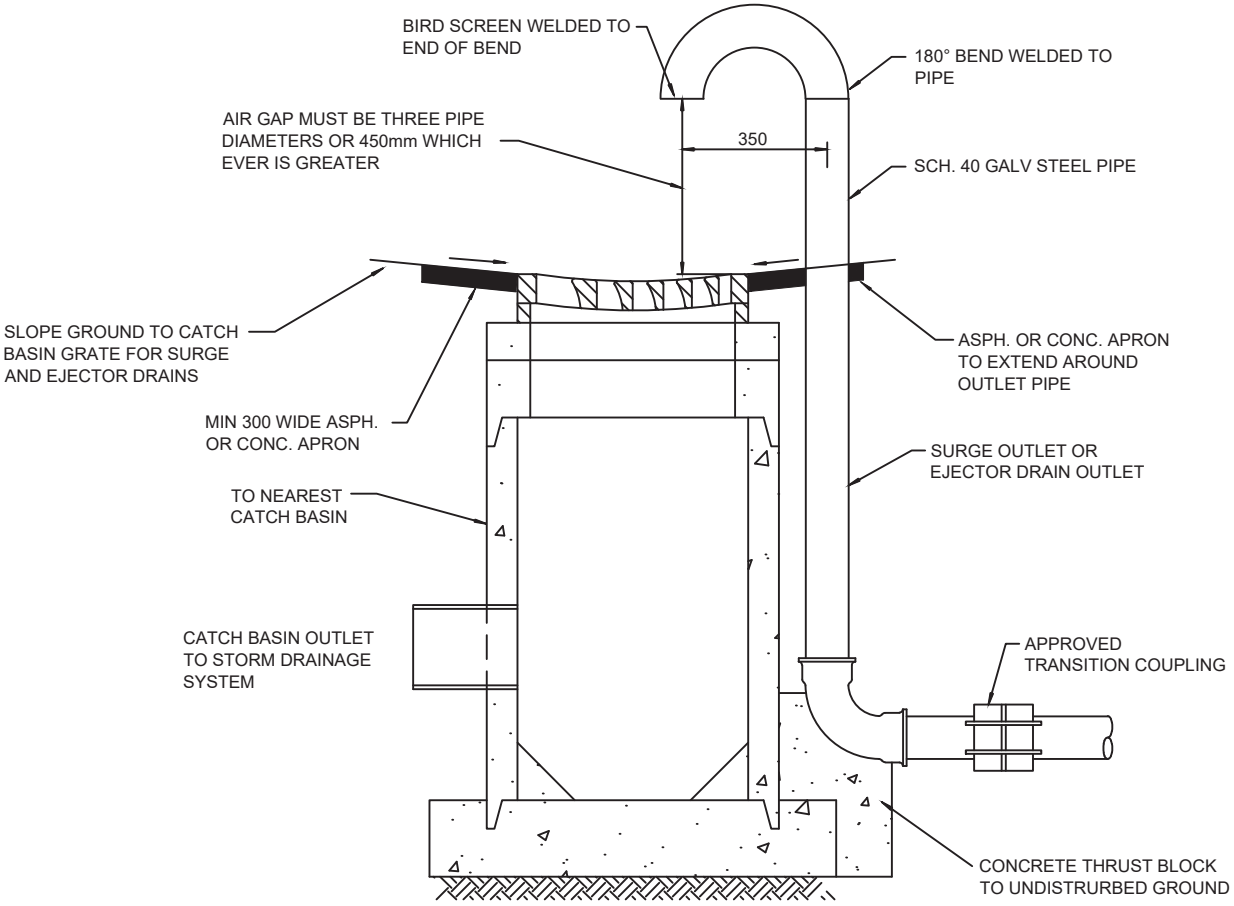
CITY OF NANAIMO
THE HARBOUR CITY

MR TYPE WATER VALVE BOX

Scale:	NTS
Created:	NOV 2009
Rev Date:	JUNE 2026
Dwg No:	W-16A



PLAN VIEW



SIDE VIEW

NOTES:

1. CONCRETE NO POST BARRIER PROTECTION REQUIRED FOR VENTS WITHIN 4.0m OF ROADWAY.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION OR APPROVED BY CITY ENGINEER.
3. ALL DIMENSION IN MILLIMETERS UNLESS OTHERWISE SHOWN.
4. CONCRETE AS PER SECTION 11.0.

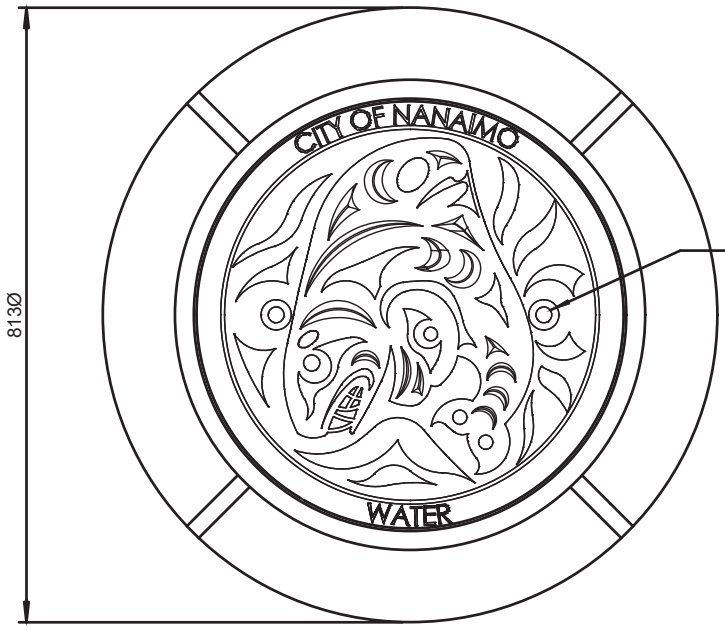
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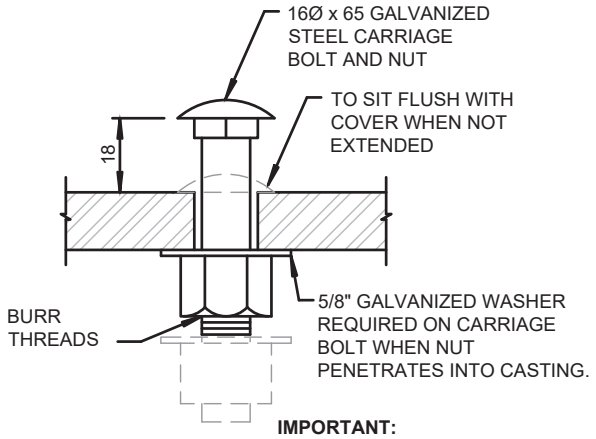
CITY OF NANAIMO
THE HARBOUR CITY

GOOSE NECK FOR PRESSURE REDUCING STATION DRAIN

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Rev Date:	JUNE 2026
Dwg No:	W-18

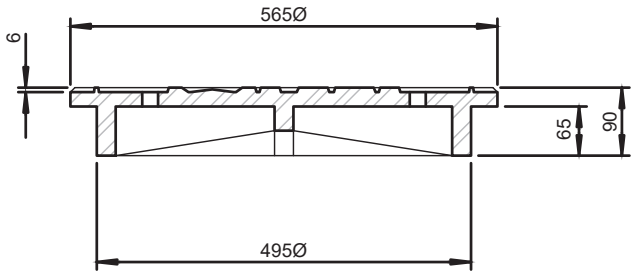


PLAN

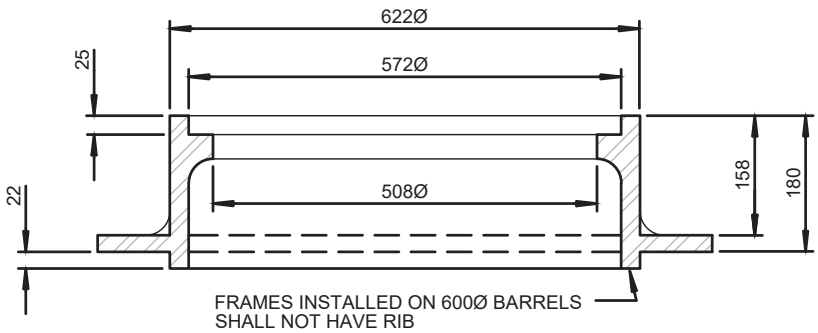


IMPORTANT:
CARRIAGE BOLT TO EXTEND EXACTLY 18mm ABOVE CASTING.

CARRIAGE BOLT DETAIL



COVER



FRAME

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 5.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED TO MEET CS-600 LOADING.
3. ALL BEARING SURFACES BETWEEN FRAME, COVER AND RISER RINGS SHALL BE MACHINED FOR NON-ROCKING FIT IN ALL POSITIONS. ALLOW 1.5mm RAISED FACE IN CASTINGS FOR MACHINING.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETRES UNLESS NOTED OTHERWISE.
6. REFERRING TO "CITY OF NANAIMO WATER" LETTERING SHALL BE 25 FLATTENED FACE GOTHIC WITH FACE OF LETTERS RAISED TO THE SAME LEVELS AS THE TOP OF THE RIBS.

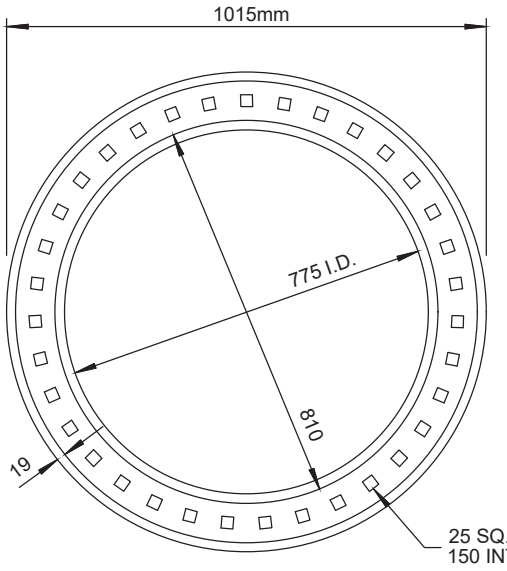
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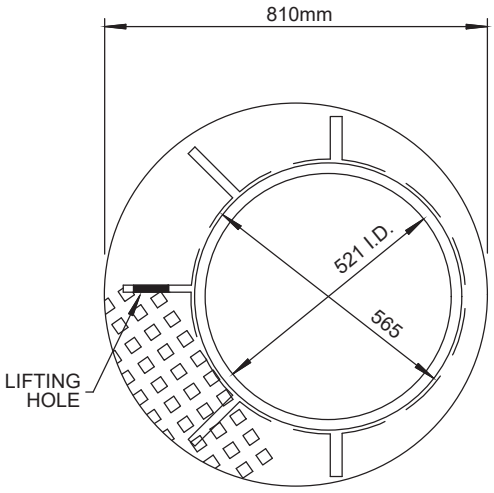
CITY OF NANAIMO
THE HARBOUR CITY

WATER MANHOLE COVER & FRAME
SNUNEYMUXW ORCA BY JOEL GOOD

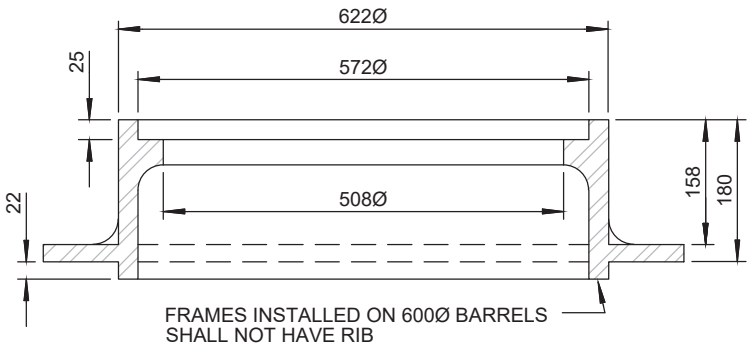
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Rev Date:	JUNE 2026
Dwg No:	W-19



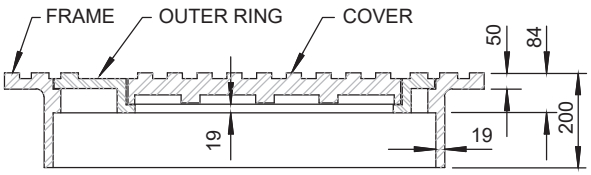
PLAN OF FRAME



PLAN OF OUTER RING



FRAME



SECTION OF FRAME, RING AND COVER

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 5.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED TO MEET CS-600 LOADING.
3. THIS MANHOLE FRAME AND COVER IS TO BE USED FOR ACCESS TO UNDERGROUND UTILITY CHAMBERS, INCLUDING PUMPS STATIONS AND PRVs, WHERE A LARGER ACCESS DIAMETER IS REQUIRED.
4. FOR COVER LETTERING AND BOLTING REQUIREMENTS REFER TO STD. DWG. W-19 OR W-21.
5. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
6. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

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4.28.2026

CITY OF NANAIMO
THE HARBOUR CITY

UTILITY CHAMBER MANHOLE
FRAME, RING AND COVER

Scale:	NTS
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	W-20

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SECTION 6 – SANITARY SEWER SYSTEM
DESIGN CRITERIA

6.01 SCOPE

.1 All design and construction of sanitary sewers shall conform in general to these criteria and to the standard drawings and construction specifications. Changes and non-conformance are to be approved by the City Engineer. The following criteria shall be used in preparing construction drawings. ***(REVISED JUNE 2026)***

.2 This manual is used in accordance with the Defined Terms in to Section 2.01 []. ***(REVISED JUNE 2026)***

6.01A SEWAGE FLOWS

.1 Sanitary sewer systems shall be designed to accommodate peak sewage flows with an allowance for inflow and infiltration. The discharge of storm water into the sanitary sewer system will not be allowed.

.2 Design contributory populations shall be computed in accordance with the City of Nanaimo population predictions or with the planned development in the tributary area based on the Official Community Plan, whichever is the larger.

.3 In the absence of detailed design population information, the following minimum design population densities shall be used:

AREAS	POPULATION DENSITY
Residential Dwellings ***(REVISED JUNE 2026)***	2.8 ppu or 36 pph
Low Density Multiple Unit Dwellings	1.7 ppu or 48 pph
High Density Multiple Unit Dwellings	1.7ppu or 120 pph
Industrial equivalent of	36 pph See Note 1 for exceptions. ***(REVISED JUNE 2026)***
Commercial equivalent of	90 pph (incl. parking)
Institutional equivalent of	50 pph (incl. parking, but not green space).

pph = persons per hectare
ppu = persons per unit
Note 1: Industrial uses, such as breweries, car washes, fish hatcheries and others that have higher water consumption and sewage discharge shall not use the standard population density value of 36 persons per hectare. Instead, the Professional of Record shall submit sewage discharge calculations based on the actual based on the proposed land use and operational requirements of each individual parcel. ***(REVISED JUNE 2026)***

.4 Peak sewage flow shall be established by multiplying an average dry weather flow (ADWF) rate of 230 litres per capita per day by a peaking factor (PF) to obtain peak dry weather flow (PDWF). The peaking factor shall be based on the Harmon formula:

$$PF = 1 + 14/(4+P^{0.5})$$

Where:
PF is peaking factor
P is the design contributory population, in thousands.
Where the service population exceeds 100, a sanitary sewer model approved by the City Engineer shall be used.

.5 Peak Inflow and Infiltration (I&I):

(a) Peak inflow and infiltration (I&I) shall be calculated based on a minimum rate of 25,000 litres per hectare of design tributary area per day, or at rates approved by the City Engineer for the general tributary area, for I&I from a 1:25 AEP, 24 hour event. ***(REVISED JUNE 2026)***

.6 Design sewage rates of flow shall be computed by adding peak sewage flow to peak inflow and infiltration.

.7 Sanitary sewage design calculations, for areas with an equivalent population less than 100, shall be prepared in a format in accordance with Appendix H1 – Sanitary Sewer Flow Analysis – Calculation Sheet []. Calculations for areas with an equivalent population exceeding 100 shall be modeled using the City's Sewer Model. ***(REVISED JUNE 2026)***

6.02 SEWAGE CHARACTERISTICS

.1 Sewage quality criteria shall be as follows:

Sewage Quantity Average Dry Weather Flow (ADWF) in the ***(REVISED JUNE 2026)***

Direct Service Area	Constituent	Normal Average	Maximum Short Duration
less than 50,000 L/d	BOD (Biological Oxygen Demand) 5 day 20°C	1000 mg/L	2000 mg/L
	TSS (Total Suspended Solids)	800 mg/L	2000 mg/L
	pH	4 – 10.5	3.5 – 11
	Temperature	79°C	95°C
50,000 to 450,000 L/d	BOD (Biological Oxygen Demand) 5 day 20°C	400 mg/L	1000 mg/L
	TSS (Total Suspended Solids)	300 mg/L	1000 mg/L
	pH	5 – 9.5	4 – 10.5
	Temperature	66°C	80°C
Over 450,000 L/d	BOD (Biological Oxygen Demand) 5 day 20°C	200 mg/L	500 mg/L
	TSS (Total Suspended Solids)	200 mg/L	500 mg/L
	pH	5.5 – 9.0	5 – 9.5
	Temperature	54°C	65°C

.2 Regulations governing the quality of wastes acceptable for admission to Regional District of Nanaimo facilities shall be followed.

.3 For industrial and commercial developments, flow sampling and pre-treatment may be required prior to discharge to City of Nanaimo facilities.

6.03 HYDRAULICS

.1 No gravity sewer shall be less than 200 mm in diameter, except that in residential areas 150 mm diameter may be approved by the City Engineer in the final section of a gravity sewer, providing the pipe has the required capacity and extension in the future, is precluded by physical barriers or there is existing alternate pick-up of adjacent areas. Unless otherwise approved by the City Engineer downstream pipe diameter shall be greater than or equal to upstream pipe diameter.

.2 Except under special circumstances, gravity sewers shall be designed to achieve a minimum daily self-cleansing velocity of 0.75 m/s.

.3 A Mannings roughness co-efficient of 0.013 shall be used for design of gravity sewers and service connections.

.4 Design of gravity sewers to flow at less than 70% of diameter. ***(REVISED JUNE 2026)***

.5 For new developments, existing sanitary sewer mains that front the proposed development or are located within areas of proposed roadworks shall be replaced if either of the following conditions is met: ***(REVISED JUNE 2026)***

(a) The calculated flow exceeds 50% of the pipe's full diameter capacity, or ***(REVISED JUNE 2026)***

(b) The existing pipe does not meet the minimum diameter requirements specified in 6.03.1. ***(REVISED JUNE 2026)***

.6 Applicants are required to assess downstream sewer capacity as part of the design process. If the present Peak Wet Weather Flow (PWWF) with 1:5 Annual Exceedance Probability (20% AEP) rain, including the flows from the proposed development exceeds 0.85 of the hydraulic capacity of the pipe (Q full) in any downstream segment, upsizing of the affected sewer infrastructure will be required to meet the Peak Design Sewage rates per Section 6.01A [→]. ***(REVISED JUNE 2026)***

.7 Service connections shall be 100 mm in diameter minimum for residential developments up to four units in accordance with design flows and available grades. Service connections for industrial, institutional, commercial and multi-unit residential larger than four units shall be minimum 150 mm diameter in accordance with design flows and available grades. Existing service connections to lots may be used subject to the approval of the City Engineer. The City Engineer will only consider services that meet the following conditions: ***(REVISED JUNE 2026)***

(a) the pipe material is PVC, or HDPE ***(REVISED JUNE 2026)***

(b) the hydraulic capacity of the service has been confirmed, and is at least as large as upstream ***(REVISED JUNE 2026)***

(c) the condition of the service has inspected with CCTV and is free from defects ***(REVISED JUNE 2026)***

.8 Water and sewer services in a common trench shall be in accordance with the requirements of the Ministry of Health. ***(REVISED JUNE 2026)***

.9 Minimum grade of gravity sewers are as required to obtain the minimum velocity of 0.75 m/s, except for terminal sewers which are to be as follows: ***(REVISED JUNE 2026)***

(a) Sewers servicing less than 10 houses 1.0% minimum grade

(b) Sewers servicing less than 25 houses 0.6% minimum grade

6.04 PIPING

.1 Depths:

(a) Depths of all gravity sewer mains and service connections shall be such that all basements in the area the sewer is intended to serve can be drained by gravity. Where properties cannot be serviced by a gravity connection, an explanation of the reasons shall be submitted to the City Engineer for approval. Pump stations from individual properties, shall have a gravity connection from the property line to the main sewer pipe.

(b) Minimum cover on gravity sewers shall be 1.5 m in travelled roadway and 1.0 m in untravelled areas. Unless otherwise approved by the City Engineer, the maximum cover depth over gravity sewers is 4.5 m. ***(REVISED JUNE 2026)***

(c) Minimum cover on service connections shall be 750 mm from finished grade.

(d) Where minimum cover cannot be provided, an explanation of the reasons and pipe loading calculations shall be submitted with the proposed method of pipe protection to the City Engineer for approval. Design services shall meet the minimum building elevation based on the lot topography in order to avoid excessively deep service inspection assemblies.

.2 Deflected Sewers:

(a) Horizontal curves on sewers require approval from the City Engineer.

(b) Horizontal curves will be considered where the configuration of the property lines requires curvature for a constant offset and where the design velocity exceeds 1 m per second.

(c) Curvature will be achieved through joint deflection only, bending of the pipe barrel will not be permitted. Joint deflections shall not exceed 50% of the manufacturer's maximum recommended joint deflection. Radius of curvature shall be uniform throughout the curves.

(d) Vertical curves may be approved by the City Engineer where excessive depths or rock cuts are to be avoided or where energy dissipation is required.

(e) Only one vertical and/or horizontal curve shall be permitted between manholes.

.3 Location of Sewers:

(a) Wherever possible, sewers shall be located on the high side of the street centre line where only the high side is served by the sewers and on the low side of the street where both sides are served by the sewers. Normal sanitary sewer main offsets are shown in the standard drawings for roadways. Wherever possible, the sewer shall be located on the opposite side of the street centreline from the watermain and at a constant offset from the property line.

(b) Sanitary sewers and service connections shall be located not less than 3.0 m horizontally and 0.45 m vertically distant from all water pipes, unless otherwise approved by the Regional Health Authority. ***(REVISED JUNE 2026)***.

(c) Sanitary sewer mains may be installed in a common trench with storm sewers provided the minimum outside pipe separation is 300 mm.

(d) All lots shall be provided with a sanitary sewer service connection unless otherwise approved by the City Engineer. Service connections shall be located to the offsets as shown on Section 4.0 Standard Drawing No. T-7 []. ***(REVISED JUNE 2026)***

.3A Utilities in Private Lands:

The following shall be considered in the design of utilities crossing private lands:

(a) The design of utilities shall avoid crossing private lands as much as possible. Low pressure sewer systems with a downstream connection to a gravity or pressure sewer in the public street fronting the property are preferred in place of gravity sewers crossing private lands. ***(REVISED JUNE 2026)***

(b) Utilities following property boundaries across private lands shall generally be offset a minimum 2.0 m from the property boundary.

(c) Appurtenances such as manholes, valves, etc., shall not be located on property boundaries.

(d) Utilities shall not cross private parcels in such a manner that they render the property unusable. Special consideration must be given to ensure the location of the utility crossing minimizes the limitations on the future use of the property.

(e) For minimum widths of statutory right-of-way and working widths refer to Appendix D [].

(f) For a sample statutory right-of-way condition sheet, refer to Appendix C [], Standard Drawing No. RW-2.

(g) For an Easement Release and Inspection Form Following the Construction of the Utility, refer to Appendix C [].

.4 Service Connection Lengths, Grade and Alignment:

(a) The maximum length of a sanitary sewer service connection as measured horizontally between the sanitary sewer and the property line shall be 15 m. The service alignment will be perpendicular to the main. Sanitary Sewer services longer than 15 m shall require approval by the City Engineer. All inspection assemblies required for service connections in excess of 15 m in length shall be shown on the design drawings. ***(REVISED JUNE 2026)***

(b) Service connections shall be designed at a grade of not less than two percent (2%) unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

.4A Number of Service Connections per Lot:

(a) Each lot shall be serviced by one only service connection for sanitary sewer.

.5 Selection of Pipe Material and Class:

(a) For determination of pipe material and class, the Professional of Record shall consider earth and live loading, depth of bury, soil conditions and design life of the installation. Pipe selection requires approval by the City Engineer. ***(REVISED JUNE 2026)***

(b) High Density Polyethylene (HDPE) pipe (Smooth Profile) is for special applications and shall only be considered in special situations where other types of pipe are not suitable.

6.04A MANHOLES

.1 Distances between manholes shall not exceed 120 m, unless otherwise approved by the City Engineer.

.2 Manholes shall be located at grade and alignment changes, at pipe size changes, at the upstream end of all gravity sewers, and at the junctions of all gravity sewers.

.3 Cleanouts shall not be used. Where there is development phasing or servicing required for lands beyond, a stub complete with a watertight cap must be provided. ***(REVISED JUNE 2026)***

.4 Minimum Drop in Invert Elevations Across Manholes:

Alignment Change	Minimum Drop Across Manhole
Straight run	No drop required
Deflections up to 45 degrees	30 mm
Deflections 45 to 90 degrees	60 mm

(a) Where the difference in elevation between incoming and outgoing sewers exceeds 600 mm, standard drops for pipe sizes 375 mm or less shall be used as shown in the Standard Drawings. Differences in elevation between 150 mm and 600 mm shall be avoided where possible. Inside drops into a diameter manhole may be permitted if approved by the City Engineer, only under exceptional circumstances. The inside drop manhole shall accommodate the incoming sewer without compromising workings space with the manhole. ***(REVISED JUNE 2026)***

.5 Precast manhole barrels shall be sized according to nominal inside pipe diameter and depth as detailed below:

Quick Links: Section 6.0 Drawings [] TOC [↑]

Pipe Size (Nominal)	Depth of Manhole (Top of Cover to Inv.)	Barrel Size (Inside Dia.)
150 – 375 mm	0 - 5.9 m	1050 mm
150 – 375 mm	6.0 - 9.0 m	1200 mm
150 – 600 mm	9.0 m or greater	1500 mm
400 – 600 mm	0.0 - 8.9 m	1200 mm
675 – 1050 mm	All Depths	1500 mm

.6 Where cast in place type manholes are proposed, design and construction details shall be submitted to the City Engineer for approval.

.7 Manholes shall be located to avoid and conflict with curb and gutter or sidewalks.

.8 A watertight manhole frame and cover shall be required for all sewer manholes located in areas where flooding can occur or in areas subject to vandalism (i.e. Parks, undeveloped rights-of-way, etc.).

.9 On trunk mains, as identified by City Engineer, manholes shall be designed to accommodate surcharging and shall include sealed lids fastened to the manhole. ***(REVISED JUNE 2026)***

6.05 PUMPING STATIONS

.1 This section applies to all municipal owned and operated sanitary sewer pumping stations. Properties serviced by individual sewer pumps shall be connected to the municipal sewer system by a gravity service connection from the property line to the municipal sewer system. Non-municipal owned sewer pumps shall conform to the Regional Health Authority requirements and the City of Nanaimo Building Bylaws. ***(REVISED JUNE 2026)***

.2 Sanitary sewer pumping stations shall be permitted only at locations where gravity connections from an existing or proposed trunk sewer, as identified by the City Engineer, cannot be provided. Pump stations require approval from the City Engineer. The extent of the works and technical specifications shall be determined on a site specific basis at the discretion of the City Engineer. ***(REVISED JUNE 2026)***

.3 Provisions for odour control are to be considered as part of pump station and force main design.

6.06 FORCE MAINS

.1 All force mains shall be designed for a 1 m/s minimum velocity. If the sewage detention time at the minimum design ADWF, exceeds 12 hours, special consideration must be given for odour control.

Quick Links: Section 6.0 Drawings [] TOC [↑]

.2 Force mains shall be designed without high points unless otherwise approved by the City Engineer. If approved, an air-relief valve shall be provided at high points in the line.

.3 The top of the force main shall be below the hydraulic grade line at minimum pumping rate.

.4 Force mains shall be designed using a Hazen Williams roughness coefficient of 140 for PVC and HDPE pipe with minor losses accounted for separately with all fittings and valves.

6.06A LOW PRESSURE SEWERS

.1 General:

(a) The City may consider low pressure sanitary sewer systems for areas which are beyond the reaches of the City gravity sewer system and not large enough to provide economic justification for a community sewage pump station, or where soil conditions or topography are not suitable for a gravity sewer system. A low pressure sanitary sewer system consists of on-site, privately owned and operated sewage pump unit with discharge pipes connected to either an inspection chamber at property, or City owned gravity sewer, or a City owned and operated low pressure sewage force main.

(b) Systems in which private pump units discharge into a public gravity sewer or force main from a public community sewage pump station are not classified as low pressure sanitary sewer systems. Where specifically indicated herein, some of the items included in this Low Pressure Sewers section are applicable to such other pumped systems.

(c) Pump unit details design and all ancillary components designed within the private property shall be certified by the Professional of Record, and the intent of this Section is to provide design guidelines to the Professional of Record.
(REVISED JUNE 2026)

.2 Restrictive Covenant:

(a) The land title for each legal lot served by a private pump unit located on the subject lot shall include a restrictive covenant, filed by the property owner, requiring the property owner to install a pump unit and service connection pipe to the City service box. The required format of the restrictive covenant will be provided by the City at the Building Permit stage.

(b) The ownership and the responsibility for the operation and maintenance of the pump chamber and the service pipe on private property is that of the property owner. Ownership and responsibility for the operation and maintenance of the service box and service pipe on City property or right-of-way is that of the City.

(c) The portion of service connection pipe and service box to be located on public property or right-of-way will be completed by the City at the Bylaw Rate for this type of service.

.3 Codes and Standards:

Low pressure sewer systems and the components therefore will be designed and constructed in conformance with the following codes and standards:

(a) Canadian and British Columbia *Electrical Code*.

(b) British Columbia *Public Health Act* and *Sewage System Regulation*.

(c) *National Plumbing Code*. ***(REVISED JUNE 2026)***

(d) City of Nanaimo *Manual of Engineering Standards & Specifications*.

(e) WorkSafeBC Regulations.

.4 System Layout:

(a) The preliminary layout of a proposed low pressure sewer system should be approved by the Professional of Record before detailed design proceeds. ***(REVISED JUNE 2026)***

.5 Preliminary Design:

(a) The following information is required as part of the preliminary design submission:

(i) Plan of the entire area to be served by the proposed system, including adjacent lands that cannot be serviced by a gravity sewer system or community sewerage pump station;

(ii) Topographic plan;

(iii) Report on soil conditions;

(iv) Preliminary layout;

(v) Area development sequence and timetable, and

(vi) Pump unit power requirements.

.6 Detailed Design:

(a) At the detailed design stage, the following information will be submitted to the City Engineer for review and approval: ***(REVISED JUNE 2026)***

(i) Hydraulic Grade Line (HGL) for the City force main;

(ii) Location and elevation of each pump unit, valve chamber and service connection;

(iii) Pump head and capacity requirements, plus recommended manufacturer and model, pump curve, and power requirements;

(iv) Pump chamber diameter, depth, operation levels and configuration (simplex or duplex);

(v) Location and direction of flow of each lateral, branch and main, plus details of the system discharge point. Sewer system should be designed to minimize the length of runs and avoid abrupt changes in direction;

(vi) Location and elevation of system high points, where high points are unavoidable;

(vii) Maintenance flushing volumes and frequency for each run;

(viii) Qualifications of supplier of pump unit package as indicated under pump unit general requirements, and;

(ix) Sample of Operation and Maintenance manual to be provided with pump unit.

.7 System Hydraulic Design:

(a) System hydraulic design will include complete hydraulic data for each section of the City force main including flows, heads, velocities and maximum retention times. Submission of this information will include a table showing all of the data for each anticipated stage of the system development.

.8 Design Flows and Hydraulics:

(a) Design flows for sizing pressure sewers, including Service Connections and City Force Mains, will be determined on the basis of the velocity and head criteria as summarized in these guidelines, and using one of the following procedures, depending upon the land use.

(b) Single Residential Areas. *(REVISED JUNE 2026)*

(i) For single residential areas, estimate the number of pump units operating simultaneously as provided in Table: Low Pressure Pumps Operating Simultaneously. *(REVISED JUNE 2026)*

Table: Low Pressure Pumps Operating Simultaneously

Number of Single Residential Pumps Connected *(REVISED JUNE 2026)*	Number of Pumps Operating Simultaneously
1	1
2 to 3	2
4 to 9	3
10 to 18	4
19 to 30	5
31 to 50	6
51 to 80	7
81 to 113	8
114 to 149	9

(c) Multi-Unit Residential, Non-Residential and Mixed Areas: *(REVISED JUNE 2026)*

(i) The following formula may be used for any development in which pump capacities exceed those for single residences. For the upstream end of the system, where there are only one or two connections, assume the connected pumps are operating. Other approved hydraulic calculations may also be acceptable if approved by the City. ***(REVISED JUNE 2026)***

$Q_{design} = CP+F$

Where:

Q = Design flow in liters per second (L/s)
C = Coefficient based on land-use and peaking factor; standard value = 0.008.
P = Population or equivalent
F = Factor based on minimum flows; standard value = 2.10

.9 Hydraulic Calculations:

(a) Criteria for hydraulic design calculations include the following:

(b) Pipe flow formula: Hazen Williams, with friction coefficient C=130.

(c) Minimum velocity: V = 0.6 m/s; and

(d) Maximum operating head (total dynamic head, TDH): compatible with pumps and not to exceed 35 m (343 kPa) unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

(e) System test pressures will be 2.0 times the maximum operating head and not less than 700 kPa.

.10 Pipe:

(a) Minimum pipe sizes are as follows:

(i) From pump unit to City low pressure force main: 38 mm ID; and

(ii) City low pressure sewage force main: 50 mm Iron Pipe Size (IPS). Internal diameters will vary based on pipe wall thickness; the actual internal pipe diameter is to be used for hydraulic calculations.

(b) Low pressure force mains shall be installed at a minimum depth of cover of 0.9 m when located within the City street right-of-way and 0.45 m on private property. The maximum depth shall not exceed 3.0 m unless approved by the City Engineer. ***(REVISED JUNE 2026)***

(c) All joints on the force main shall be compatible with pipe material and fittings, and complete with appropriate thrust restraints.

(d) The segment of force main between pump unit and City force main will include 150 mm wide Detectable Warning Tape placed above the Force Main at a depth of 150 mm below the ground surface.

.11 Cleanout and Pig Launching Manholes:

(a) Cleanout and pig launching manholes are required on low pressure force mains at ends and at a maximum 300 m spacing. Details of the cleanouts are shown on the Standard Drawing No. S-18 [].

.12 Air Valves:

(a) Sewage air release valves may be required at system high points and major changes in grade (10% or greater) if approved by the City Engineer. Details of air valve assemblies are shown on the Standard Drawings. ***(REVISED JUNE 2026)***

.13 Discharge:

(a) Location and detail of low pressure sewer force main discharge need approval by the City Engineer. Submerged outlets are not acceptable. Discharge details are shown on the Standard Drawings. ***(REVISED JUNE 2026)***

(b) Refer to Standard Drawing No. S-17 [].

(c) Refer to Standard Drawing No. S-19 [].

.14 Service Connections:

(a) Service connections to the City force main will include integral wye fittings oriented in the direction of flow.

(b) Each service connection will include a valve chamber located on City property at the property line. Details of the valve chamber and fittings are shown on the Standard Drawings. Check valves will be bronze or stainless steel, full-ported, wye body ball check valves. ***(REVISED JUNE 2026)***

(c) Refer to Standard Drawing No. S-16 [].

.15 Pump Unit Requirements:

(a) Pumps for low pressure systems will be submersible grinder pumps capable of discharging the design flow at the maximum operating head. Pump design flow will be the greater of PDWF or the flow required to achieve the minimum flow velocity.

(b) General requirements include the following:

(i) Pump unit package design, including the service connection, shall be authenticated by the Professional of Record. ***(REVISED JUNE 2026)***

(ii) All pump and control equipment will be certified by CSA, or an equivalent certification agency approved by the Professional of Record. ***(REVISED JUNE 2026)***

(iii) Pump unit specifications are subject to approval by the City Engineer. ***(REVISED JUNE 2026)***

(iv) A building permit is required for a pump unit.

(v) Duplex (two pump) units are required for multi-unit residential and non-residential properties. ***(REVISED JUNE 2026)***

(vi) The pump unit will be installed outside of the building in a location convenient for maintenance. The control/alarm panel will be located in close proximity to the chamber either outside or inside the building.

(vii) Detailed, concise manufacturer's operating and maintenance instructions will be submitted to the City as part of the permitting application process. A copy of these instructions will be fastened to the inside of the control panel door.

(viii) Pump unit suppliers will have documented experience and ability in design, supply and servicing of pump unit packages, including pump(s), chamber, piping and controls.

(c) Grinder pumps will be either centrifugal or semi-positive displacement pumps. The grinder assembly will consist of hardened steel components designed to grind sewage solids into fine particles, which can pass easily through 32 mm diameter pump and piping passages. The electrical and control cable(s) from the pump shall have a minimum 30 m whip length.

(d) Pump units discharging through 100 mm diameter or larger service connections into 150 mm diameter or larger low pressure force mains or gravity sewers may be solids-handling submersible centrifugal pumps.

(e) Pump curves will be “steep” within the design operating range, where total head is below the maximum operating head, such that the reduction of capacity with increasing head does not exceed 0.03 l/s/m.

(f) Pumps will be manufactured using durable, non-corrosive metallic components.

.16 Pump Chamber Details:

(a) Criteria for pump chamber design will include the following:

(i) Material and Construction: Fibreglass reinforced polyester (FRP) or high density polyethylene (HDPE) with smooth interior, bottom shaped to avoid solids build-up, walls and bottom or sufficient thickness or with exterior corrugations to withstand soil pressure, and base to include flange for concrete collar to prevent floatation;

(ii) Chamber lid and connections (inlet, discharge, ventilation and electrical) will be factory installed and watertight. The lid will have structural capacity sufficient of the expected design load and will provide access to the full diameter of the tan;

(iii) A minimum chamber diameter of 750 mm is required to provide for convenient operating and maintenance access;

(iv) Depth to accommodate inlet and discharge pipe elevations and to provide sufficient operating and storage volumes;

(v) Chamber volume between pump on and off level to be based on pup cycle times between 5 and 30 minutes, with preference for normal operating depth ranging from 150 mm to 200 mm. A typical operating volume for a single residential unit is 200 litres; and ***(REVISED JUNE 2026)***

(vi) Chamber volume for emergency storage (above normal pump on level) may be required based on review by the Professional of Record. Subject to approval by the City Engineer, emergency storage or standby power may be required. ***(REVISED JUNE 2026)***

.17 Piping Details:

(a) Piping design criteria for the inside of the pump chamber is as follows:

(i) Pump chamber piping will be designed to accommodate easy pump removal and replacement. Unless an approved equivalent system is provided, pump chambers 1050 mm in diameter or greater, or with a depth of 1.8 m or greater, are to include a pump liftout coupling and slide rail system.

(ii) Pump discharge piping is to include full ported check valve and ball valve. Where a slide rail system is not provided, a union is to be installed before the two valves, with the union, a check valve, and ball valve installed in that sequence in the direction of flow.

(iii) An anti-siphon valve is required where a pump is located higher than any part of the low pressure system.

.18 Pump Chamber Ventilation:

(a) Each pump chamber is to include a vent pipe meeting the requirements of the *National Plumbing Code of Canada*, and installed in accordance with the *National Plumbing Code of Canada*. ***(REVISED JUNE 2026)***

(b) Unless otherwise approved by the Professional of Record the vent discharge is to be installed with a minimum of 450 mm cover below ground level, at a positive slope draining towards the pump chamber, to the building wall. At the building exterior, the vent should extend at least 1.8 m above ground, anchored to the building, and not within 3.0 m of doors or windows. ***(REVISED JUNE 2026)***

(c) If approved by the Professional of Record, the vent discharge may be located either on the building exterior wall or attached to a post in a secure location if the pump chamber is remote from the building. ***(REVISED JUNE 2026)***

.19 Electrical:

(a) All materials and installation are to comply with the *BC Electrical Code* and City requirements.

(b) Power supply will be from the building served by the pump unit. The following nominal service voltages will be acceptable:

(i) For residential installation: 120/208 V or 120/240 V, single-phase, and

(ii) For industrial/commercial installations: as above, or 120/208 V, or 347/600 V, thee-phase.

(c) Wiring from the building to the pump chamber will be underground and continuous, with no splices, whereby the installed length of wiring (horizontal plus vertical grade difference) between the control cabinet pump shall be less than the minimum whip length required for the pump.

(d) Where a building electrical system includes emergency standby power, the pump unit power supply shall be connected to the emergency power.

.20 Pump Chamber Classification:

(a) Pump chambers for single and two unit residential service are not considered to be “hazardous locations” for electrical code purposes. ***(REVISED JUNE 2026)***

(b) Pump chambers for multi-unit residential and non-residential service are considered as Hazardous, Class 1 locations. Material and installation requirements for these locations are further classified as either Zone 1 or Zone 2, depending upon the standard of ventilation, as follows: ***(REVISED JUNE 2026)***

(i) Zone 1: No mechanical (forced air) ventilation:
1. Motors must be “explosion-proof”;
2. Motors must have over-temperature protection, and
3. Float switches must have “intrinsic safe barriers”.
4. Zone 2: “Adequate” (forced air) ventilation:
5. 3 – phase submersible motors must remain fully submerged;

(ii) Single-phase submersible motors must remain fully submerged if they have no spark-producing devices. If they have spark-producing devices, these motors must be “explosion-proof”, and
1. Float switches must have “intrinsic safe barriers”.

.21 Controls:

(a) Pump controls will automatically start and stop the pump(s) and provide a high-level alarm.

(b) Level switches will be either pressure switches, if approved by the Professional of Record, or float switches. ***(REVISED JUNE 2026)***

(c) Power and control wiring will be continuous from the pump unit and level switches to junction boxes located above grade on the exterior of the building. Where the pump chamber is classified as hazardous, a conduit seal will be provided between the junction box and the control cabinet.

(d) Subject to approval by the City Engineer, or Building Inspector, the control cabinet will be installed in one of the following locations: ***(REVISED JUNE 2026)***

(i) On an exterior building wall closest to the pump chamber;

(ii) Inside The building near an outside door which is close to the pump chamber; or

(iii) On a post adjacent to the pump chamber if the chamber is located 25 m or more away from the building.

(e) If located outdoors, the control cabinet will be lockable and weatherproof (EEMAC Type 3) and made from non-corrosive materials. Junction boxes will be non-corrosive Type 4x, or NEMA 4 painted steel enclosure.

(f) The control panel shall include the following features:

(i) Control voltage limited to maximum 120 VAC;

(ii) “Power on” light;

(iii) Float switch indication lights;

(iv) Green “pump on” light;

(v) Red “motor overload” light;

(vi) Manual reset of fault conditions;

(vii) High level alarm light (“red” and buzzer);

(viii) Pump disconnect switch;

(ix) Motor starter;
(x) Hand-Off-Auto (HOA) selector switch;
(xi) Control transformer, if required to suit voltage;
(xii) Automatic alternator for multiple pump units;
(xiii) Control fuse;
(xiv) Terminal strip, and;
(xv) Form “C” (SPD) alarm contact, rated minimum 3A, 120 VAC, wired to a set of isolated Terminal blocks.

(g) The alarm circuit will include an alarm light and signal/buzzer with a test/silence switch. If the control cabinet is mounted outside, the alarm light will be located outside and the alarm signal will be transmitted to an alarm box installed inside the building.

(h) In non-residential and multi-unit residential installations, a remote alarm using telephone auto-dialer or other suitable technology should be considered. ***(REVISED JUNE 2026)***

6.07 SIPHONS

.1 Where a siphon (i.e., inverted sewer, depressed sewer) is required to carry flow under an obstruction such as a stream, the following criteria shall be applied to the design:

(a) All siphons shall be multiple-pipe structures.
(b) A cleansing velocity of 0.6 to 0.9 m/s shall be reached at least once a day in the primary pipe even during the first years of operation.
(c) The total system shall be sized to accommodate the ultimate design peak flow.
(d) A 1200 mm diameter manhole shall be provided on both ends of the siphon.
(e) Each manhole on the siphon shall be provided with a suitable vent.
(f) There shall be no high points in the siphon between manholes.
(g) There shall be no acute bends in the siphon.
(h) There shall be no change of pipe diameter between manholes.
(i) The primary pipe shall be minimum 200 mm in diameter wherever possible.
(j) All siphons shall have a separate debris sump manhole upstream of the siphon. The debris sump shall be designed to allow easy access for maintenance and cleaning and shall be suitably vented.

SECTION 6 – SANITARY SEWER SYSTEM SPECIFICATIONS

6.20 SCOPE

.1 This specification refers to gravity sewer pipe and appurtenant fittings for sanitary sewers. Only those products approved by the City Engineer and listed in the City of Nanaimo Approved Products List [] will be accepted for installation.

.2 Refer to Section 4.0 – Excavation, Trenching and Backfill [] for related specifications.

6.21 MATERIALS TESTING

.1 If, in the opinion of the City Engineer, testing is required, the Professional of Record will arrange for a testing firm to carry out tests to determine whether the applicable standards and specifications have been met. Where initial testing indicates inadequacies, additional testing may be required by the Professional of Record. ***(REVISED JUNE 2026)***

.2 The Contractor as directed by the Professional of Record or City Engineer shall supply specimens or samples for testing. ***(REVISED JUNE 2026)***

.3 The types of tests listed below may be required by the City Engineer unless in the opinion of the City Engineer other testing is required. ***(REVISED JUNE 2026)***

.4 Joints for sanitary sewer main pipe and fittings and service connection pipe and fittings shall be capable of meeting the following exfiltration tests. The City Engineer may require that these tests be carried out by the Contractor or his supplier prior to acceptance of pipe on the project. ***(REVISED JUNE 2026)***

(a) Pipes in Proper Alignment:
Not fewer than 3, or more than 5, pipes selected from stock by the City Engineer shall be assembled according to standard installation instructions issued by the manufacturer. With ends bulkheaded and restrained against internal pressure, the section shall be subjected to 70 kPa internal hydrostatic pressure. Pressure shall be maintained for a period of 24 hours. There shall be no leakage at the joints. ***(REVISED JUNE 2026)***

(b) Pipes in Maximum Deflected Position:
At least 2 of the joints of the assembly shall be deflected to a maximum amount recommended by the manufacturer. 35 kPa internal hydrostatic pressure shall then be applied to the test section and maintained for a period of 24 hours. Joints shall show no leakage.

(c) Pipes in Maximum Lateral Misalignment:
The test section shall be supported on blocks or otherwise so that one of the pipes is suspended freely between adjacent pipes and bears only on the jointing material. The suspended pipe shall then be loaded on the bell or coupling by a load equal to one-third of the ultimate 3-edge bearing strength required by the applicable ASTM specification, except that pipe having a laying length of more than 1.2 m shall be loaded no more than the amount computed for a 1.2 m length. While under this load, stressed joints shall show no leakage under 35 kPa internal hydrostatic pressure.

6.22 PIPING, FITTINGS AND SERVICES

.1 The sizes and types of pipe to be used are shown on the drawings.

.2 Concrete Pipe:

(a) Non-reinforced concrete pipe and fittings shall conform to ASTM C14M, Class 3, to a maximum diameter of 600 mm and shall be designed with flexible rubber gasket joints conforming to ASTM C443M.

(b) Reinforced circular concrete pipe and fittings shall conform to ASTM C76M, Class III or higher, for all pipe greater than 600 mm diameter and shall be designed with flexible rubber gasket joints conforming to ASTM C443M.

(c) Pipe with chips, cracks, porous concrete or any other defects which impair joint sealing or durability will not be accepted.

.3 Polyvinyl Chloride (PVC) Pipe (Smooth Profile):

(a) Pipe and fittings up to 675 mm diameter shall be DR35. Pipe and fittings shall have a minimum pipe stiffness of 320 kPa at 5.0% deflection when tested in accordance with ASTM D2412.

(b) Pipe and fittings shall be manufactured to the following specifications:

(i) 100 mm – 375 mm diameter to ASTM D3034 and CSA B182.2 ***(REVISED JUNE 2026)***

(ii) 450 mm – 675 mm diameter to ASTM F679 and CSA B182.2 ***(REVISED JUNE 2026)***

(c) Pipe and fittings shall include integral bell and spigot ends with stiffened wall section and a formed groove for a rubber gasket conforming to ASTM F477.

(d) All PVC sanitary gravity main pipes shall be green in colour.

.4 Ductile Iron Pipe:

(a) Pipe and fittings shall conform to ASTM A746 or as approved by the City Engineer.

.5 Polyvinyl Chloride (PVC) Service Pipe:

(a) All sanitary service inspection assemblies shall be white in colour.

(b) Sanitary service connections of 100 mm diameter shall be DR28 and conform to CSA B182.1. Pipe and fittings shall have elastomeric seal joints, locked in gasket and integral bell joint features.

(c) Sanitary service connections greater than 100 mm diameter shall be as specified for PVC (smooth profile) mainline pipe.

.6 High Density Polyethylene (HDPE) Pipe (Smooth Profile):

(a) Pipe shall conform to AWWA C906. All pipes to be certified by Canadian Standards Association – CSA B137.1.

(b) Minimum acceptance pipe class shall be DR26 with hydrostatic design stress of 10 MPa.

(c) All pipe shall bear the pipe series and manufacturer's name.

(d) Fabricated HDPE mitred fittings shall conform to AWWA C906 and certified by Canadian Standards Association – CSA B137.1. Moulded HDPE fittings shall conform to ASTM D3261 suitable for pressure rating specified and fusion to main pipe. Pipe deflected up to manufacturer's recommended minimum radius may be used in place of fabricated miter bends and to form the required vertical and horizontal curves. Polyethylene fittings shall have a pressure rating at least equal to that of the pipe being joined.

6.22A FORCE MAINS

.1 The sizes and types of pipes to be used are shown on the drawings.

.2 Ductile Iron Pipe:

(a) Pipe shall conform to AWWA C150 and C151 and shall be cement mortar lined in accordance with AWWA C104.

(b) Joints shall be a mechanical type conforming to AWWA C111 or shall be rubber gasket, bell and spigot tyton joint.

.3 Polyvinyl Chloride (PVC) Pressure Pipe:

(a) Pipe shall be ULC approved and have cast iron pipe equivalent outside diameter.

(b) Pipe shall be manufactured and certified to the following specifications:

(i) 100 mm – 900 mm diameter to AWWA C900 and CSA B137.3 ***(REVISED JUNE 2026)***

(c) Pipe shall be compatible with mechanical and push-on joint fittings and valves without the use of special adapters.

(d) Pipe shall include push-on integrally thickened bell and spigot type joints conforming to ASTM D3139 with single elastomeric gasket conforming to ASTM F477.

(e) All PVC sanitary force main pipe shall be white in colour.

.4 High Density Polyethylene (HDPE) – Smooth Profile:

(a) High Density Polyethylene (HDPE) pipe shall conform to Section 6.22.6 [→], except that the minimum acceptable pipe class shall be DR21.

6.22B LOW PRESSURE SEWERS

.1 Low pressure sewers are to follow the specifications identified for force mains as per Section 6.22A – Force Mains [→].

6.23 JOINTS

.1 Sanitary sewer main pipe and fittings and service connections pipe and fittings shall be jointed with a rubber gasket or other preformed, factory-manufactured gasket or approved material designed for use with the specified pipe. Solvent connected joints and fittings will not be permitted.

.2 High Density Polyethylene (HDPE) Pipe (Smooth Profile) Joints:

(a) Joints shall be by thermal butt-fusion and constructed in accordance with the manufacturer's specifications.

(b) Flange joints shall be used to join long sections of butt-jointed pipe or as shown on the construction drawings.

(c) Flanges for polyethylene pipe shall be slip-on type installed in conjunction with stub ends supplied by the pipe manufacturer. The flanges shall be Class 150 meeting ANSI B16.5 drilling dimensions. Flanges shall be carbon steel.

(d) All flanged joints shall be separated by a full face neoprene gasket bonded to one of the flange faces. Neoprene for flange gaskets shall be 3 mm thick with holes drilled for flange bolts and size equal to flange diameter.

(e) Flanged joints and flange bolts shall be stainless steel, complete with isolation washers.

(f) Refer to Section 6.46 [→] for fitting and joint installation.

6.24 SERVICE CONNECTION JUNCTIONS

.1 Concrete Pipe (non-reinforced and reinforced):

(a) Service connections shall be manufactured using a sanded PVC male end stub pipe with integral bell.

(b) Stub orientation shall be at 45° to the centreline of the mainline pipe for pipe diameter less than 1050 mm (between 1 o'clock and 2 o'clock or 10 o'clock and 11 o'clock orientation).

(c) Stub orientation may be at 90° to the centreline of the mainline pipe for pipe diameters of 1050 mm or larger (at 3 o'clock and 9 o'clock orientation).

(d) Field break-in and mortar patch joints shall not be used unless approved by the City Engineer. Refer to Section 6.48 [→] for service connection junction installation.

.2 PVC Pipe (Smooth Profile):

(a) Service connections to PVC mainline pipe shall be made with extrusion molded PVC or fabricated PVC fittings manufactured to ASTM D3034, CSA B182.1 and CSA B182.2.

(b) The use of saddles instead of manufactured wye fittings shall require approval by the City Engineer. Refer to Section 6.48 [→] for service connection junction installation. Where pipe saddles have been installed without written approval, the City will require removal and reinstatement with an acceptable installation. ***(REVISED JUNE 2026)***

(c) For connections more than two pipe sizes smaller than the mainline, prefabricated service saddle connections may be approved.

.3 PVC Pipe (Ribbed Profile):

(a) Ribbed pipe shall only be used if repairing an existing ribbed pipe section.

(i) Service connections to ribbed PVC mainline pipe shall be made with extrusion molded or fabricated PVC fittings manufactured to ASTM D3034, CSA B182.1 and CSA B182.2.

(b) For connections more than two pipe sizes smaller than the mainline, prefabricated service saddle connections may be approved.

.4 High Density Polyethylene (HDPE) Pipe (Smooth Profile):

(a) Service connections to HDPE mainline pipe shall be made with manufactured fittings, electro-fused, or heat welded to the main. Mechanical connections, if used, shall be water-tight.

(b) Refer to Section 6.48 [→] for service connection junction installation.

.5 High Density Polyethylene (HDPE) Pipe (Open Profile):

(a) Service connections to HDPE mainline pipe shall be made with extrusion molded or fabricated fittings manufactured to CSA B182.1, B182.2 and B182.4.

(b) For service connections more than two pipe sizes smaller than the mainline, prefabricated service saddle connections may be approved.

(c) Refer to Section 6.48 [→] for service connection junction installation.

6.25 PRECAST MANHOLE SECTIONS

.1 Unless otherwise approved, all manhole sections shall be precast reinforced concrete in accordance with ASTM C478.

.2 All precast sections shall be complete with ladder rungs.

.3 O-ring rubber gaskets shall conform to ASTM C443.

.4 Refer to Section 6.51 [→] for precast manhole sections installation.

6.25A PRECAST MANHOLE BASES

.1 Precast manhole bases shall be reinforced concrete in accordance with ASTM C478.

.2 All dimensions, specifications and installations shall conform to the requirements for cast in place manhole bases in accordance with Section 6.49 – Cast In Place Manhole Concrete Bases [→], Section 6.49A – Precast Manhole Bases [→] and the Standard Drawings.

.3 Pipe alignment, grade and invert elevations in the precast manhole bases shall conform to the construction drawings.

6.26 MANHOLE TOPS

.1 Manhole tops shall be flat slab, precast concrete. Tops shall be reinforced to meet H-20 loading conditions. Precast tops shall conform to ASTM C478 with approved offset opening for frame and cover.

6.27 MANHOLE COVERS AND FRAMES

.1 Covers and frames shall be cast iron and certified to meet H-20 loading requirements with the bearing faces of the cover to be frame machined for a non-rocking fit.

.2 Standard manhole frame and cover shall conform to Standard Drawing No. S-9 – Sanitary Manhole Cover and Frame [].

.3 Utility chamber manhole frame and cover shall conform to Standard Drawing No. S-10 [].

.4 A watertight manhole frame and cover, if required shall conform to Standard Drawing No. S-15 – Watertight Sanitary Manhole Frame and Cover [].

.5 Covers located in statutory rights-of-way shall be permanently embossed with the additional wording “DO NOT COVER”. ***(REVISED JUNE 2026)***

.6 Refer to Section 6.53 [→] for frames and covers installation.

6.28 MANHOLE RUNGS ***(REVISED JUNE 2026)***

.1 Rungs shall conform to ASTM C478 for manhole steps and ladders and shall be: ***(REVISED JUNE 2026)***

(a) 19 mm diameter aluminum allow conforming to CSA S157.

.2 Refer to Section 6.54 [→] for manhole rungs installation. ***(REVISED JUNE 2026)***

6.29 -NOT USED-

6.30 CONCRETE

.1 Concrete for cast in place manhole bases shall conform to Section 11.0 – Cast In Place Concrete Works.

6.31 PRECAST CONCRETE GRADE RING

.1 Precast concrete grade rings conforming to ASTM C478 shall be used.

.2 For roadways with steep grades, concrete grade rings are to be used in conjunction with an adjustable manhole frame assembly. ***(REVISED JUNE 2026)***

6.32 TEMPORARY CLEANOUT FRAMES AND COVERS

.1 Temporary cleanout structures may only be used if approved by the City Engineer where there is development phasing. ***(REVISED JUNE 2026)***

.2 Temporary cleanout frames and covers shall be as specified for sanitary manhole frames and covers.

6.33 PIPE AND FITTINGS FOR DROP MANHOLE STRUCTURES

.1 Pipe and fittings for drop manhole structures shall be as specified under Section 6.22 – Piping, Fittings and Services [→] and Section 6.23 – Joints [→].

.2 Refer to Section 6.55 [→] for drop manhole structure installation.

6.34 -NOT USED-

6.35 MANHOLE AND TEMPORARY CLEANOUT LID MARKERS

.1 Markers are required, where manhole and temporary cleanout lids are not located within developed road rights-of-way or residential properties, to indicate the location of the manholes and temporary cleanouts. These markers shall be constructed of 50 mm galvanized steel pipe painted with a minimum of two coats of yellow exterior duty paint applied in accordance with the manufacturer's recommendations and set in a concrete base. The markers shall extend one (1) metre above the ground surface. The markers shall be located on site at a location determined by the City Engineer opposite the manhole or temporary cleanout lid and the distance to the lid is to be marked in black figures on a flattened upper portion of the marker. See Standard Drawing No. S-14 []. ***(REVISED JUNE 2026)***

6.36 SERVICE BOXES

.1 Service boxes for single sanitary sewer services shall be 300 x 500 mm concrete boxes complete with cast iron traffic cover marked “Sewer” and concrete extension sections as required.

.2 Service boxes for twin sanitary sewer services shall be 425 x 750 mm concrete boxes complete with steel traffic cover marked “Sewer” and concrete extension sections as required.

6.37 PUMPING STATIONS

.1 The specifications shall be determined on a site specific basis, if approved by the City Engineer. ***(REVISED JUNE 2026)***

SECTION 6 – SANITARY SEWER SYSTEM INSTALLATION

6.40 TRENCH EXCAVATION, BEDDING AND BACKFILL

.1 Refer to Section 4.0 – Excavation, Trenching and Backfill [] for installation requirements.

6.40A PIPE ALIGNMENT AND GRADE

.1 The pipe shall be laid on the alignment and grade in accordance with the construction drawings. Methods to maintain pipe alignment and grade, if approved by the City Engineer. Each pipe shall be check for line and grade as it is installed. ***(REVISED JUNE 2026)***

.2 Tolerances for pipe alignment and grade shall be, unless approved by the City Engineer: ***(REVISED JUNE 2026)***

Alignment = ± 50 mm
Grade = ± 10 mm

6.41 PIPE CUTTING

.1 Pipe cutting shall be done in the manner recommended by the pipe manufacturer employing tools designed for this purpose.

6.42 PIPE INSTALLATION

.1 Pipe shall be installed in strict accordance with the manufacturer's recommended practice.

.2 Pipe shall be checked before being lowered into the trench to ensure that no foreign material, manufacturer's defects, or cracks exist that might prevent the proper jointing of the pipe or its operation.

.3 The open end of the pipe in the trench shall be suitably covered to prevent entrance of trench water and other material during periods when pipe is not being installed.

.4 Precautions shall be taken to ensure that displacement of the pipe in the trench does not occur through soil displacement or floatation due to the presence of trench water. Pipe that has been displaced shall be removed from the trench and re-laid. ***(REVISED JUNE 2026)***

.5 Lifting holes in concrete pipe shall be plugged with prefabricated plugs in non-shrink grout, or other plugs recommended by the pipe manufacturer.

.6 The contractor shall use methods for installing pipe in an auger hole or casing pipe as described on the construction drawings.

6.42A FORCE MAIN INSTALLATION

.1 Force mains shall be installed according to installation requirements in Section 6.42 – Pipe Installation [→].

.2 Thrust blocking to be installed in accordance with Section 5.47 – Pipe Restraint [].

6.42B LOW PRESSURE SEWERS INSTALLATION

.1 Low pressure sewers shall be installed according to requirements in Section 6.42 – Pipe Installation [→].

6.43 JOINTS AT RIGID STRUCTURES

.1 A flexible joint shall be provided at locations where the pipe is held in fixed position by a rigid support or structure. The distance from the support or structure shall depend on the diameter and type of pipe being installed and shall be in accordance with the pipe manufacturer's recommended practice. The purpose of the flexible joint is to prevent pipe failure due to uneven support under the pipe. Approved flexible joints include rubber gasket bell and spigot connections and couplings.

6.44 HORIZONTAL AND VERTICAL CURVES

.1 Pipe on horizontal and vertical curves shall be laid true to the curve of the radius shown on the drawings. For acceptable curvature, refer to Section 6.04.2 [→]. Horizontal and vertical curves are only permitted where approved by the City Engineer.

6.45 DEFLECTION

.1 The amount of pipe deflection at joints and couplings shall be the limit as specified in Section 6.04.2 [→].

6.46 FITTINGS AND JOINTS

.1 Fittings shall be installed at the locations shown on the construction drawings or as directed by the City Engineer. Fittings shall be installed in accordance with the manufacturer's specifications. ***(REVISED JUNE 2026)***

.2 High Density Polyethylene (HDPE) Pipe (Smooth Profile):

(a) Pipe shall be joined by the thermal butt fusion method.

(b) The contractor shall make arrangements to have the pipe jointing carried out by the pipe manufacturer or certified personnel, familiar with the jointing technique, using equipment and techniques specifically designed for the pipe diameter and material being jointed.

(c) Where required, flanged joints shall be used for connecting long pipe sections.

(d) The joint shall consist of a polyethylene stub end butt fused to the end of pipe and a carbon steel slip-on flange.

(e) Refer to Section 6.23 [→] for joint specifications.

.3 Sewage Force Mains:

(a) Install thrust blocking in accordance with Section 5.47 – Pipe Restraint [].

6.47 CONNECTIONS TO EXISTING PIPING AND APPURTENANCES

.1 All connections to existing piping, services, and appurtenances shall be made by City forces unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

.2 All connections to existing piping and services shall utilize a manufactured rubber gasket bell and spigot joint or coupling designed for the types of pipes to be connected.

.3 The use of field joints or rubber repair couplings shall require the approval of the Engineer.

.4 Rubber repair couplings must have 4 stainless steel clamps with stainless steel anti shear band encased in concrete. Only those products approved by the City Engineer will be accepted for installation.

.5 Slip coupler shall be used on PVC pipes. Rubber repair couplings are not to be used on PVC pipes.

6.48 SERVICE CONNECTION JUNCTIONS

.1 Locations of service connection junctions to the sewer shall be installed as shown on the construction drawings or as directed by the City Engineer during construction.

.2 Where service connections are not constructed in conjunction with the mains, fittings shall be provided with approved caps or plugs and markers as specified in Section 6.59 – Service Connection Installation, clause 6.59.3(i) [→]. Caps or plugs for sanitary sewers shall be watertight and suitably blocked to withstand test pressures. ***(REVISED JUNE 2026)***

.3 Concrete Pipe (Reinforced and Non-reinforced):

(a) Field break-in and mortar patch joints shall not be used unless approved by the City Engineer. If approved, the following shall apply:

(i) Service connections shall be manufactured using a sanded PVC male end stub pipe with integral bell.

(ii) Break into the pipe by coring to within 40 mm of outside diameter of the service stub. All exposed reinforcing steel shall be removed.

(iii) Insert the stub into the core ensuring that no portion of the service stub protrudes past the inside of the concrete pipe wall, and the stub length shall be equivalent to the thickness of the concrete pipe wall and the length of the stub's integral bell.

(iv) Prepare non-shrink, fast setting cementitious grout with a 3:1 sand/cement mix to a “dry pack” consistency. Pack grout tightly into the void between the stub and the pipe and mound around the stub for lateral support.

(v) Hand finish interior and exterior grout surfaces to a smooth finish.

(vi) In order to prevent damage to the field joint, allow sufficient time for grout to develop strength prior to installation of connecting pipe or backfilling.

(vii) Installation shall be reviewed by the Professional of Record prior to backfilling. ***(REVISED JUNE 2026)***

(b) Refer to Section 6.24 [→] for service junction specifications.

.4 PVC Pipe (smooth profile):

(a) Service saddle connections shall not be used unless approved by the City Engineer.

(b) If approved, installation of service saddle connections shall conform to the following:

(i) Drill hole into mainline pipe to the exact dimension of the new connection.

(ii) The use of saddles instead of manufactured wye fittings shall require approval by the City Engineer. Saddles shall be cast iron with alignment rings complete with stainless steel bands.

(iii) Attach service saddle in accordance with the manufacturer's specifications.

(c) Refer to Section 6.24 [→] for service junction specifications.

.5 PVC Pipe (ribbed profile):

(a) Installation of service saddle connections shall conform to Section 6.48.4 [→].

.6 High Density Polyethylene (HDPE) Pipe (Smooth Profile):

(a) Service connections to mainline pipe using manufactured fittings shall be in strict accordance with manufacturer's instructions.

(b) Connection of HDPE service junctions to non-pressurized PVC service pipe shall be with flexible couplings. Flexible couplings shall be manufactured from elastomeric PVC, and be held in place with series 300 stainless steel worm gear clamps.

(c) Refer to Section 6.24 [→] for service junction specifications.

.7 High Density Polyethylene (HDPE) Pipe (Open Profile):

(a) Installation of service saddle connections shall conform to Section 6.48.4.

(b) Refer to Section 6.24 [→] for service junction specifications.

6.49 CAST IN PLACE MANHOLE CONCRETE BASES

.1 All water shall be removed from the excavation prior to placing base concrete. The base shall be constructed such that the first section of a precast section can be set plumb with uniform bearing throughout its full circumference.

.2 If material in the bottom of the trench is unsuitable for support, the bottom shall be over excavated to firm base as determined by the Professional of Record and backfilled to the required grade with thoroughly compacted base gravel as specified for trench bottom stabilization under the applicable item included in Section 4.0 – Excavation, Trenching and Backfill []. ***(REVISED JUNE 2026)***

.3 Where over excavation and backfill with base gravel is not practical, special structural support shall be provided as specified for trench bottom stabilization under the applicable item included in Section 4.0 – Excavation, Trenching and Backfill [].

.4 Concrete manhole bases shall be constructed as shown on the drawings. Pipes and fittings through the manhole shall be supported on concrete blocks and the concrete base poured around the pipe to a depth of at least 150 mm below the bottom of the pipe and up to the springline of the pipe. Install rubber manhole adapter rings on all plastic pipe installed in the manhole base.

.5 Invert elevations of pipes at the manhole shall be checked by the Contractor prior to and following placement of base concrete around the pipe to ensure that all pipes are installed at the design elevation.

.6 Variations in manhole inverts from established grade or elevation shall be corrected.

.7 Manhole channeling shall be constructed as shown on Standard Drawing No. S--1 [] or as shown on the construction drawings. Channeling shall be constructed to have a minimum 0.3 m straight section before the change in direction within the manhole.

.8 The channels in the base of manholes shall be shaped and finished to provide smooth passage for the sewage in order to minimize head losses and deposits at bends and at junctions of channels.

.9 Channels shall be accurately formed. The practice of forming channels roughly to shape and finishing with cement mortar will not be permitted. The channels shall be steel trowel finished.

.10 Benching in manholes shall be sloped to drain. While the concrete cures, the concrete benching shall be given at broom finish to produce a non-skid surface.

6.49A PRECAST MANHOLE BASES

.1 Installation of precast manhole bases shall conform to Section 6.49 – Cast In Place Manhole Concrete Bases [→].

.2 Precast manhole bases shall be placed on 150 mm thick base of 38 mm drainrock.

.3 Plastic and concrete pipes installed in the precast manhole base shall utilize rubber manhole adapter rings to seal the connection.

.4 Refer to Section 6.25A [→] for precast manhole bases specifications.

6.50 -NOT USED-

6.51 PRECAST MANHOLE SECTIONS

.1 Precast manhole barrel sections shall be placed plumb.

.2 Joints between the top riser and the cover slab shall be made watertight with cement mortar. Prior to placing sections, the mating faces shall be thoroughly soaked with water and a layer of cement mortar shall be spread on the lower face. After sections are placed, excess mortar which has been squeezed out shall be removed and the joint made flush inside and out.

.3 Joints between precast manhole barrels must utilize O-ring gaskets and shall conform to the manufacturer's specifications. The inside surface of the precast barrel at the O-ring joints shall be filled with cement grout to a smooth finish.

.4 Damaged O-ring manhole joints require removal and replacement of damaged manhole section. Mortar patching of damaged area shall require the removal of the O-ring gasket and installation as per Section 6.51.2 [→], unless approved by the City Engineer. ***(REVISED JUNE 2026)***

.5 Refer to Section 6.25 [→] for precast manhole sections specifications.

6.52 CONCRETE

.1 Cast In Place concrete works shall conform to Section 11.0 – Cast In Place Concrete Works [].***(REVISED JUNE 2026)***

6.53 FRAMES AND COVERS

.1 Frames shall be set on precast concrete grade rings to bring the cast iron manhole frame up to grade as shown on the Standard Drawings. Contractor to install concrete grade rings to a minimum of 50 mm thick and to a maximum of 100 mm thick. The concrete grade rings shall be laid in common bond with raked mortar joints and shall be mortared inside and outside of the manhole.

(a) Fine grade elevation adjustments of frames shall be done with adjustable height manhole frame, or a minimum of 3 steel shims equally spaced.

.2 Manhole covers shall be installed:

(a) for unpaved areas, covers shall have a 1.5 m x 1.5 m, 50 mm thick asphalt apron. Covers shall be set flush with the asphalt surround.

(b) for paved areas, covers shall be flush with pavement grade with a maximum allowed variance of 6 mm when measured with a 3 m straight edge in any direction. For capital projects and where asphalt is less than five years old, full lane patching is required for adjustment or replacement of manholes. ***(REVISED JUNE 2026)***

.3 Steel manhole riser rings shall be used in easements only.

.4 The inside surface of the manhole frame shall be painted yellow with an enamel rust paint in accordance with the manufacturer's specifications.

.5 Refer to Section 6.27 [→] for manhole covers and frames specifications.

6.54 MANHOLE RUNGS *(REVISED JUNE 2026)*

.1 Manhole rungs shall be installed in manhole sections by the manufacturer, unless approved by the City Engineer. *(REVISED JUNE 2026)*

.2 The distance from the top of the manhole cover, to the first manhole step, shall conform to WorkSafeBC requirements. *(REVISED JUNE 2026)*

.3 All rungs shall be complete with approved polyethylene anchor insulating sleeves and installed in 25 mm to 26 mm diameter precast or drilled holes in a manhole section. *(REVISED JUNE 2026)*

.4 Refer to Section 6.28 [→] for manhole rung specifications. *(REVISED JUNE 2026)*

6.55 DROP MANHOLE STRUCTURES

.1 Drop manhole structures shall be constructed as shown on Standard Drawing No S-3 [].

6.56 STUBS

.1 Blind stub sections for connection of future sewers and service connections to the manholes shall be installed where shown on the construction drawings and as directed by the City Engineer. Stubs shall be as long as the vertical depth from finish grade to the invert of each stub. Each stub shall be plugged with a removable, watertight plug as shown on the construction drawings. Where stubs are installed, the bottom of the manhole shall be channeled to the stub entrance. *(REVISED JUNE 2026)*

6.57 TEMPORARY CLEANOUTS

.1 Temporary cleanouts shall be constructed as shown on Standard Drawing No S-12 [].

6.58 -NOT USED-

6.58A PUMPING STATIONS

.1 Pump stations shall be constructed in accordance with the approved construction drawings. The installation requirements shall be determined on a site specific basis at the discretion of the City Engineer.

6.59 SERVICE CONNECTIONS INSTALLATION

.1 Location of Service Connections:

(a) Service connections are to be installed at the locations and depths as specified in the approved plans. For new connections, where the depth of the service connection exceeds 2 m, the service shall be extended into the property the same distance as the depth of the service, up to a maximum distance of 4 m. This shall be done during the installation of the service connection from the main to the property. ***(REVISED JUNE 2026)***

(b) At no time shall two or more sanitary services be coupled into one lead crossing the street or right-of-way. Each service shall have its own independent connection into the main sewer.

.2 Grade and Alignment of Service Connections:

(a) Trenches shall be excavated so that pipe can be installed in a direct line from the service connection fitting at the sewer or from a manhole to the terminus of the service. Service pipe shall be installed at a uniform grade between the terminus at the property line and the junction fitting (or upper end of a service drop) at the sewer.

.3 Sanitary Sewer Service Connection Installation:

(a) Pipe shall be installed in strict accordance with the manufacturer's recommended practice.

(b) Pipe shall be checked before being lowered into the trench to ensure that no foreign material, manufacturer's defects, or cracks exist that might prevent the proper jointing of the pipe or its operation.

(c) The Contractor shall use methods for installing pipe in an auger hole or casing pipe as described in Section 4.0 – Excavation, Trenching and Backfill.

(d) The trench shall be excavated to provide a minimum cover of 0.75 m over the service connection pipe at property line.

(e) In rock, the trench is to be extended 3 m into the property to facilitate future extension of the service connection.

(f) The trench bottom shall be graded to form a continuous support along the service pipe. All rocks or projections which might prove detrimental to the pipe shall be removed.

(g) Joints shall be made using the specified couplings. Glued joints shall not be made.

(h) Approved watertight caps suitably supported by sandbags to prevent leakage shall be installed on sewer services at the terminus of each service.

(i) A 38 mm x 89 mm pressure treated wood marker stake shall be placed at the service terminus as shown on the drawings to facilitate future location of the service pipe. This stake shall extend from a point approximately 600 mm above ground to the cap except in locations where the extension of the stake above ground surface would prove hazardous, in which case the stake shall be cut off flush with the ground surface. The stake shall be marked in an approved manner to show the depth of the service pipe invert below the top of the stake. The stake shall be unpainted to visually identify the sanitary sewer service connections. The Professional of Record will record the invert elevation of the service connection assembly prior to placement of the cap by the Contractor. ***(REVISED JUNE 2026)***

(j) Inspection assemblies shall be installed as shown on the Standard Drawings.

.4 The service box shall be installed plumb with the lid 25 mm above finished grade in unpaved areas, and 0 – 6 mm below finished grade in paved areas.

.5 Riser Service Connections:

(a) Riser service connections shall be installed as shown on Standard Drawing No.'s S-5 [] or S-7 [] in locations shown on the construction drawings.

6.60 CLEANING AND FLUSHING

.1 The pipes shall be cleaned upon completion of the sewer pipe installation and within one month prior to the end of the maintenance period to the acceptance by the Professional of Record and the City Inspector. Cleaning shall be completed by power flushing with water to remove all foreign matter. ***(REVISED JUNE 2026)***

.2 Ensure that snow chains are installed at the downstream manhole so that no foreign material passes beyond downstream manhole. Flow through the system shall remain unimpeded at all times while snow chains are installed.

.3 Begin cleaning from the upstream pipe in the system and proceed downstream. Under no circumstances is the pipe cleaning process to proceed downstream until all contributing upstream pipes have been successfully cleaned and approved by the Professional of Record, or the City Inspector. ***(REVISED JUNE 2026)***

.4 Manholes shall be cleaned after the upstream section of pipe has been successfully cleaned and approved by the Professional of Record, or the City Inspector. ***(REVISED JUNE 2026)***

.5 Pipes shall be cleaned in the direction of the flow and shall not be flushed in a backflush direction unless approved by the City Engineer, by the City Inspector. ***(REVISED JUNE 2026)***

.6 Under no circumstances shall debris pass beyond the downstream manhole. Active vactoring shall remove all debris at the snow chains installed at the downstream manhole.

.7 Dispose of debris at approved dump site such as the Regional District of Nanaimo's landfill or alternatively, approved by City Engineer. ***(REVISED JUNE 2026)***

.8 Decanting of liquid waste accumulated during debris removal is permitted at a controlled release rate, to a maximum of 8 litres per second, at a location approved by the City Engineer. ***(REVISED JUNE 2026)***

.9 Timeframe between cleaning and video inspection of pipeline shall not exceed 24 hours unless approved by the City Engineer.

6.61 NOTIFICATION TO CITY OF NANAIMO

.1 The City of Nanaimo shall be given 48 hours' notice of all tests.

6.62 LEAKAGE TESTING OF GRAVITY SEWERS

.1 Leakage tests shall be performed by the Contractor on all sanitary sewers and sewer service connections, manholes and appurtenances.

.2 Type of Test:

(a) Tests on gravity sewers and manholes shall be either exfiltration of infiltration water tests as directed by the City Engineer. Manholes shall be tested separately from gravity sewers. ***(REVISED JUNE 2026)***

(b) In lieu of leakage testing with water, the City Engineer may permit testing with low pressure compressed air. ***(REVISED JUNE 2026)***

(c) Testing shall only be carried out after all underground works is complete, including hydro/tel/cable. ***(REVISED JUNE 2026)***

(d) Copies of all test results must be forwarded to the City of Nanaimo Inspector.

.3 Testing Equipment:

(a) The Contractor shall furnish all necessary testing equipment, including suitable removable watertight plugs and test balls, and shall perform the tests in a manner satisfactory to the City Engineer. Testing equipment must provide readily observable and reasonably accurate measurements of leakage under the specified conditions. The Contractor must comply with all WorkSafeBC regulations covering the use of air testing and ensure that safe working practices are used in the application of the test. ***(REVISED JUNE 2026)***

.4 Water Exfiltration Test:

(a) On an exfiltration test, the test section shall be sealed at its lower extremity by means of a watertight plug. The test section shall be filled with water to the greater of, the maximum hydraulic grade line of the pipe, or such that a minimum hydrostatic head of 600 mm is placed on the pipe at its upper extremity. The head of the water on the pipe shall be taken as the distance from the top of the pipe being tested to water surface at the point of measurement. The test pressure shall be maintained above the 600 mm minimum head for a period of not less than one hour, and unless excess exfiltration requires further testing, not greater than 8 hours. Pressures in excess of 3 m water head are not recommended. Damage resulting to pipe as a result of testing shall be repaired by the Contractor at no cost to the owner.

(b) Manholes shall be tested independent of the sewer pipe for leakage by filling the chamber to the underside of the roof slab with water. The test duration shall be a minimum of three hours. No leakage shall be permitted in manholes.

(c) In areas where the groundwater table is above the sewer invert level, the test shall be increased by a height equal to the distance from the sewer invert level to the water table elevations.

(d) Exfiltration test sections shall normally have a manhole at both extremities. If, however, sewer grades are such that a test section cannot be terminated at a manhole without placing excess pressure on the pipe or joints, apparatus shall be provided to enable testing without having manholes at the upper and lower ends of a test section.

(e) Gravity sewers, service connections and appurtenant structures thereon shall be constructed such that leakage, as evidenced by exfiltration tests, is less than that calculated using the following formula:

$$\text{Allowable leakage in litres} = \frac{H\ D\ L}{5200}$$

Where

H = duration of test in hours,

D = inside diameter of the pipe in millimetres, and

L = length of pipe in the test section in metres

(f) The above leakage limit will constitute the total maximum allowable leakage of any test section of gravity sewer. Where service connections exist along the test section, the allowable leakage from service pipe calculated by the used of the formula in Section 6.62.4 (e) [→] will be added to that of the main sewer to arrive at the total allowable leakage unless the elevation of the service connection pipe is greater than the maximum water elevation. No additional leakage allowance will be made for the manholes existing along the test section.

(g) The maximum allowable leakage for an exfiltration test will be that calculated by the formula in Section 6.62.4 (e) [→] regardless of the test head of water employed. Where a section of sewer is found to have leakage exceeding the allowable limit, replacement or repairs shall be made to reduce the amount or leakage to or below the allowable limit. Repaired sections shall be retested until they meet the allowable limit.

(h) All point sources of leakage exceeding 1.2 litres per minute (from poor joints, improper connections, etc.) shall be made watertight by the Contractor to the acceptance by the City Engineer. ***(REVISED JUNE 2026)***

(i) The Contractor shall dispose of the water used for testing in a manner approved by the City Engineer. ***(REVISED JUNE 2026)***

.5 Water Infiltration Tests:

(a) In areas of high groundwater table, the Contractor shall, if instructed by the City Engineer, measure the amount of infiltration into the sewer over a period of 8 hours. The infiltration rate shall not exceed the leakage as calculated for exfiltration testing. ***(REVISED JUNE 2026)***

.6 Air Test:

(a) Air test shall not be used with concrete sewers.

(b) On an air test, the section to be tested shall be plugged at each end and all service laterals, stubs and fittings properly capped or plugged.

(c) Air shall be supplied to the test section slowly, filling the line to a constant pressure of 24.0 kilopascal (kPa). The air pressure inside the pipe shall not exceed 28 kPa except in the case where the groundwater level is above the sewer line being tested. In the event of the groundwater level being above the invert, the air test pressure must be increased by 1.0 kPa for each 100 mm of groundwater above the invert.

(d) The air supply is throttled to maintain the internal pressure above 20 kPa for a minimum of 5 minutes to stabilize the temperature in the pipe. After stabilization, the air pressure is adjusted to 24.0 kPa and the air supply shut off or disconnected. Timing commences and the time required for the line pressure to drop to 20.5 kPa is noted.

(e) If the time required to drop from 24.0 kPa to 20.5 kPa is greater than allowable, the test section shall have passed. ***(REVISED JUNE 2026)***

(f) For the air test the minimum time allowable is calculated from the following tables:

Time Requirements for Air Testing (Millimetres)	Min	Sec.
100	2	32
150	3	50
200	5	6
250	6	22
300	7	39
375	9	35
450	11	34
525	13	30
600	15	24

(g) Where multi pipe sizes are to undergo the air test, the average size shall be used.

6.63 TESTING OF FORCE MAINS

.1 Sewage force mains shall be tested in accordance with Section 5.61 – Pressure and Leakage Testing [].

6.64 VIDEO INSPECTING MAINS AND SERVICE CONNECTIONS

.1 All pipe video inspection including methods of cleaning, equipment and rates of camera travel, shall be in accordance with the UK Water Research Centre's (WRc), Sewage Rehabilitation Manual, most current edition.

.2 The Contractor shall arrange for a video inspection upon completion of the sewer pipe installation and within one month prior to the end of the maintenance period to the acceptance by the City Engineer and the City Inspector. ***(REVISED JUNE 2026)***

.3 For gravity sewers and service connections, the Contractor shall arrange for video inspection to check alignment, grade, and condition of the main sewer pipe including service connection leads. Where a new sewer pipe crosses an existing sewer pipe, the Contractor shall also arrange for a video inspection of the existing sewer pipe at the location of the crossing.

(a) Illumination depth of field shall be no less than 3 joints for standard joint and spigot pipe types to allow for pipe deflection assessments (9 m). No dark/opaque circle shall be visible in the middle of this depth of field viewing area.

(b) Eliminate steaming and fogging encountered during the inspection survey by introducing forced air flow by means of fan.

(c) Camera lens to remain free of grease or other deleterious matter to ensure optimal clarity.

(d) Pan and tilt view of each service connection (junction) such that the camera looks down the centreline of the service, pause for a minimum of five (5) seconds and note the condition of the joint and/or pipe/service interface.

(e) Camera guides (Skids) shall not be visible at either side of the pipe during normal camera travel or during Pan & Tilt operation. Configuration of camera/guides shall be altered to alleviate this problem.

(f) CCTV push camera work shall be video captured (complete with skids for centering) from the main wye pulling back to entrance point to avoid an invert only view.

(g) A winch line shall be provided to support camera travel in steep, slippery or relined pipe sections.

(h) Position camera lens centrally in the pipeline with a positioning tolerance of ±10% off the vertical centreline axis of the pipeline. For elliptical pipe the camera to be positioned 2/3 the height of the pipe measured from the invert.

(i) Position camera lens looking along the longitudinal axis of pipeline except when viewing service connections or panning defects.

(j) Instantaneous travelling speed of the camera in the pipeline to be as follows:

(i) 0.10 m/s for pipeline of diameter less than 200 mm.

(ii) 0.15 m/s for diameters 200 mm and larger but not exceeding 310 mm: and

(iii) 0.20 m/s for diameters exceeding 310 mm.

.4 The inspection shall include the preparation of:

(a) an HDSD 32 GB Class 10 regular card. Picture size: NTSC

(b) 640x480 pixels, aspect ratio 4:3, 29.97 frames per second @ 8 megabits per second capture rate. Individual MPEG4 video files shall not exceed 1.7 GB in size.

(c) a Microsoft Access database CD of the Header and Observation codes as specified by City Engineer.

(d) a pipe condition assessment paper report.

(e) All submitted to the City Engineer. ***(REVISED JUNE 2026)***

.5 The Professional of Record shall review the pipe condition report and provide certification that the condition of the installed pipe is accurately recorded and the pipe installation meets the City of Nanaimo Standards and Specifications. ***(REVISED JUNE 2026)***

.6 The pipe condition report and certification shall become the property of the City of Nanaimo.

.7 Variations in line or grade of pipe, from that established by the Professional of Record prior to installation, and any jointing, pipe cleaning, or other deficiencies discovered during the inspection, shall be rectified. Reinspection of the pipe may be required by the City Engineer at the Contractor's expense. ***(REVISED JUNE 2026)***

.8 During this test, manhole construction and invert elevations shall be checked and any variations from the established grade, drawings, or specifications, shall be rectified.

.9 Video inspection and pipe condition coding shall be undertaken only by personnel with current Canadian certification by a City approved testing agency. ***(REVISED JUNE 2026)***

6.65 SMOKE TESTING

.1 The Professional of Record shall arrange for smoke testing of all installed gravity sanitary mains in the presence of the City Inspector. ***(REVISED JUNE 2026)***

.2 The Professional of Record shall provide as-built service location information to the City Inspector prior to smoke testing. ***(REVISED JUNE 2026)***

.3 Cross-connections noted during the smoke testing shall be corrected and the as-built service location information revised.

6.66 TESTING OF PUMPING STATIONS

.1 Wet well chambers shall be tested for exfiltration by filling the chamber to the underside of the roof slab with water. The test duration shall be a minimum of three hours. No leakage shall be permitted.

.2 In areas of high groundwater tables, the Professional of Record may require an infiltration test. No leakage shall be permitted. ***(REVISED JUNE 2026)***

.3 Pumping stations shall be tested using water. Station shall be tested through its operating range to confirm float operation, pumps, controls, alarms, backup power, manual operation and operation with the City's portable power unit. ***(REVISED JUNE 2026)***

.4 A noise level test shall be required to confirm pumping station and standby power are within specified acceptable limits.

6.67 PIPE VIDEO AND MANHOLE CONDITION REPORT FORMAT

.1 Reference plans shall accompany reports with manholes labeled and inspected sections highlighted. Manhole and pipe numbering shall conform to the construction drawings, or if available, City pipe and manhole numbers. Reports shall be submitted in both digital and hardcopy formats. ***(REVISED JUNE 2026)***

.2 All sewer defects shall be photographed and included with the report and referenced by numbers accordingly.

.3 The video pipe condition rating report format shall be in accordance with the UK Water Research Centre's (WRc), *Sewerage Rehabilitation Manual*, most current edition.

(a) Structural defects shall be properly weighted with the appropriate scores assigned to them as shown in the following table:

WRc GRADING SYSTEM		
DEFECT CODE NO.	**TYPE OF DEFECTS**	**POINT SCORES**
1	Open Joints	1 to 2
2	Displaced Joints	1 to 2
3	Cracks	10 to 40
4	Fracture	40 to 80
5	Broken	80
6	Hole	80 to 165
7	Collapsed	165
8	Spalling	5 to 120
9	Wear	5 to 120
10	Deformation	20 to 165

(b) Every video inspected sewer will be assigned a composite grade based on the sum of its defect point scores, as per the following table:

WRc – SEWER RATING COMPOSITE GRADE

COMPOSITE GRADE	PEAK SCORE RANGE (SUM OF THE SCORES FROM THE ABOVE TABLE)	TYPICAL DEFECT DESCRIPTION
1 (least defective)	1 to 9	No observable structural defects
2	10 to 39	Circumferential crack. Moderate joint defects, i.e. open joint (medium) or joint displaced (medium), spalling slight and wear slight.
3	40 to 79	Fracture with deformation <5%. Longitudinal cracking or multiple cracking. Minor loss of level. More severe joint defects, i.e. open joint (large) or joint displaced (large). Spalling medium. Wear medium.
4	80 to 164	Broken, deformation up to 10% and broken fracture with deformation 5 - 10%. Multiple fractures. Serious loss of level. Spalling large. Wear large.
5 (most defective)	165+	Already collapsed. Deformation >10% and broken. Extensive areas of fabric missing. Fracture with deformation >10%.

(c) The following additional information shall be included for each sewer section as the CCTV Title Page:

(i) Date of survey.
(ii) Contractor Project Index No. (i.e. Tape No. V2-1234)
(iii) Survey No.
(iv) Start MH No.
(v) Finish MH No.
(vi) Line ID No.
(vii) Direction of Camera Travel.
(viii) Street Location (Road Name or RW No.).
(ix) Distance from manhole rim to pipe invert.
(x) Length of Capture.
(xi) Total of Captured CCTV.

(xii) Current weather information.

.4 All pipe video inspections shall include an annotated map with the following information:

(a) Manhole and catch basin locations with labels.

(b) City of Nanaimo drawing numbers.

(c) Manhole ID numbers (as per the City of Nanaimo GIS numbering system).

(d) Catch basin ID numbers (as per the City of Nanaimo GIS numbering system).

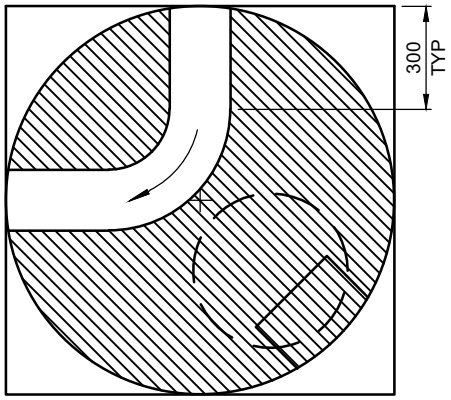
.5 Computer database file to contain identical survey report information as the printed report exclusive of photographs. Index numbers and distance of survey information shall numerically increase. For an individual survey, whether the information is sorted by index or distance, the result will be in the same order.

.6 All pipe video inspection operators shall be thoroughly trained with current Canadian certification by a City approved testing agency. ***(REVISED JUNE 2026)***

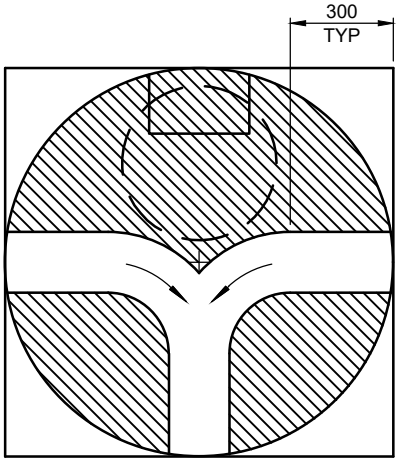
.7 Manhole video inspection is not required. Manholes shall be rate as per the following table and form part of the video inspection report.

MANHOLE RATING SYSTEM

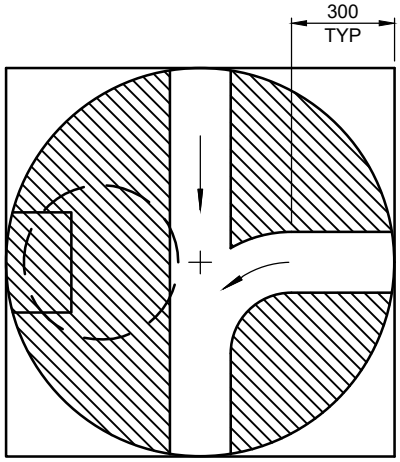
INTERNAL CONDITION GRADE	TYPICAL DEFECT DESCRIPTION
1 (least defective)	-no observable structural defects -no observable signs on infiltration
2	-minor cracks, chips, spalling. -signs of minor staining, but no infiltration
3	-fractures, medium spalling, defective pipe/MH joints -some staining, mineral build-up and seeding infiltration. Possible infiltration through manhole cover.
4	-broken manhole wall, channel or riser assembly, multiple fractures, medium wear -moderate staining, mineral build-up and running infiltration -infiltration through manhole cover -manhole frame and cover cracks or broken
5 (most defective)	-failure in manhole wall, channel or riser assembly, multiple fractures with deformation, large wear -heavy staining, mineral build-up and gushing infiltration -surface ponding and infiltration through manhole cover -manhole frame and cover cracks or broken



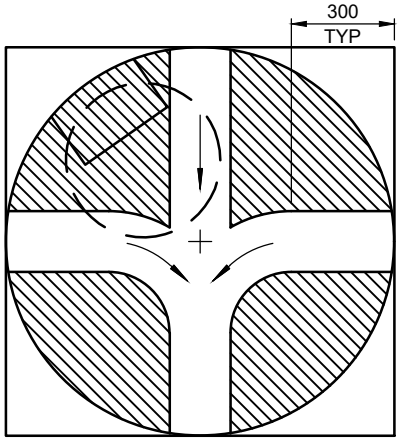
1. RIGHT ANGLE BEND



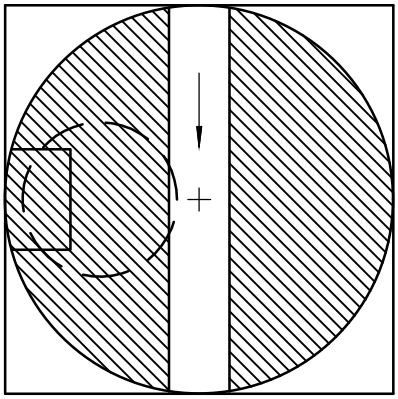
2. TEE CONNECTION



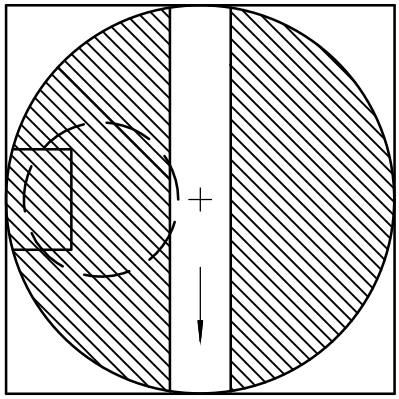
3. THREE WAY JUNCTION



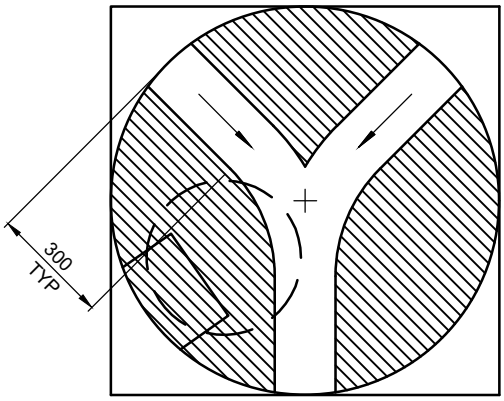
4. FOUR WAY JUNCTION



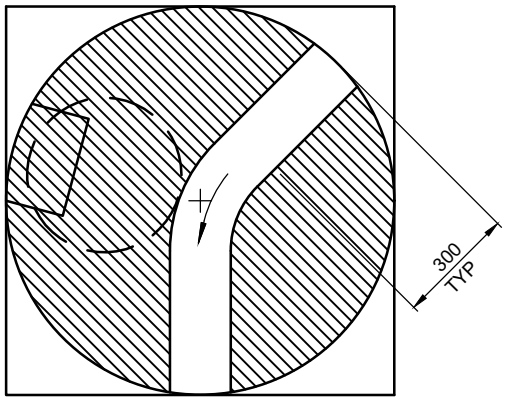
5. STRAIGHT THROUGH



6. DEAD END



7. WYE CONNECTION



8. 45° BEND

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR MANHOLE CHANNELING, REFER TO SECTION 6.49.
3. ALL CHANNELS SHALL BE FINISHED WITH A STEEL TROWEL. BENCHING (HATCHED AREAS), SHALL BE BROOM FINISHED.
4. MANHOLE COVER AND RUNG LOCATIONS SHALL BE AS SHOWN, UNLESS NOTED OTHERWISE.
5. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
6. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

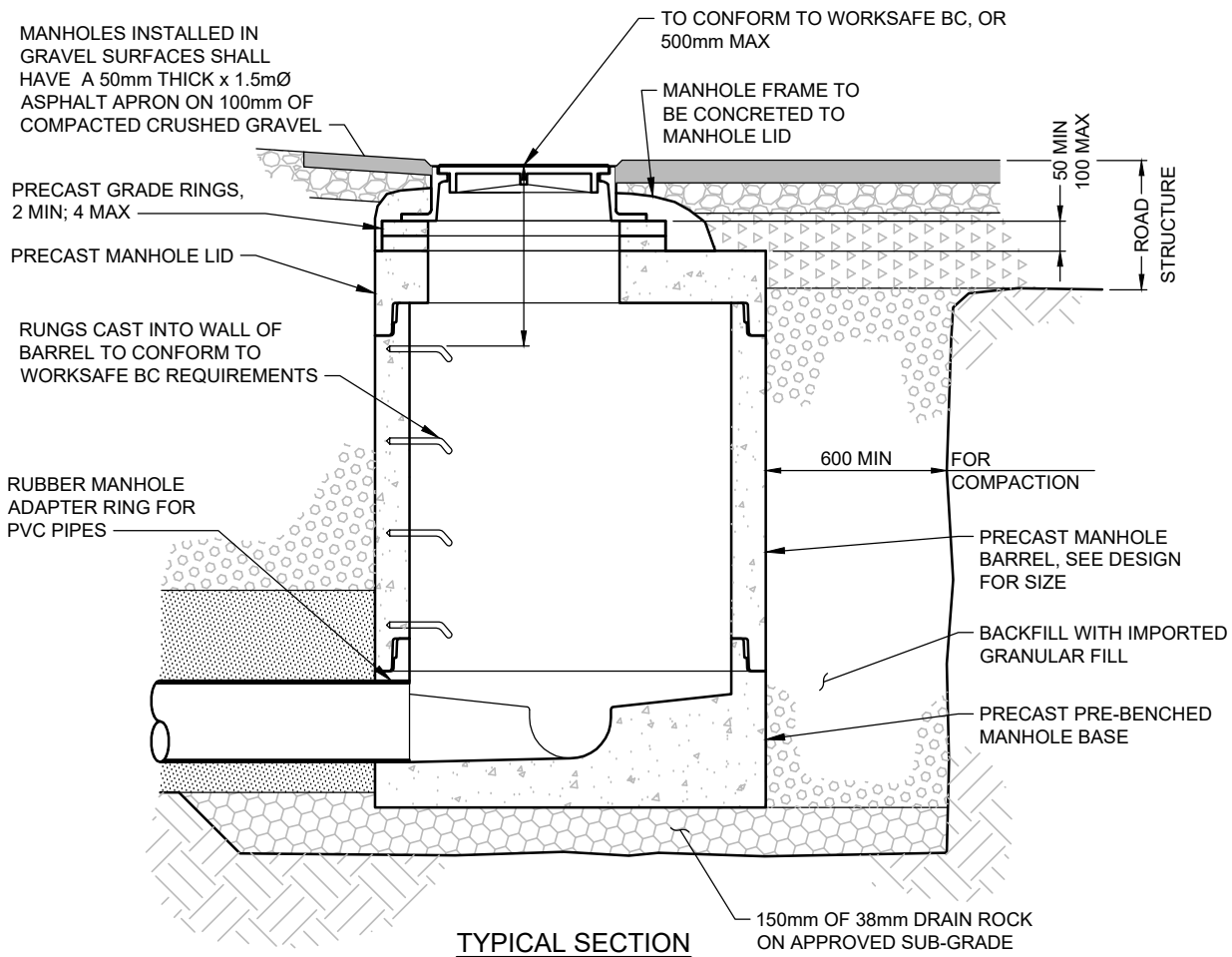
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CITY OF NANAIMO
THE HARBOUR CITY

SANITARY MANHOLE BENCHING DETAILS

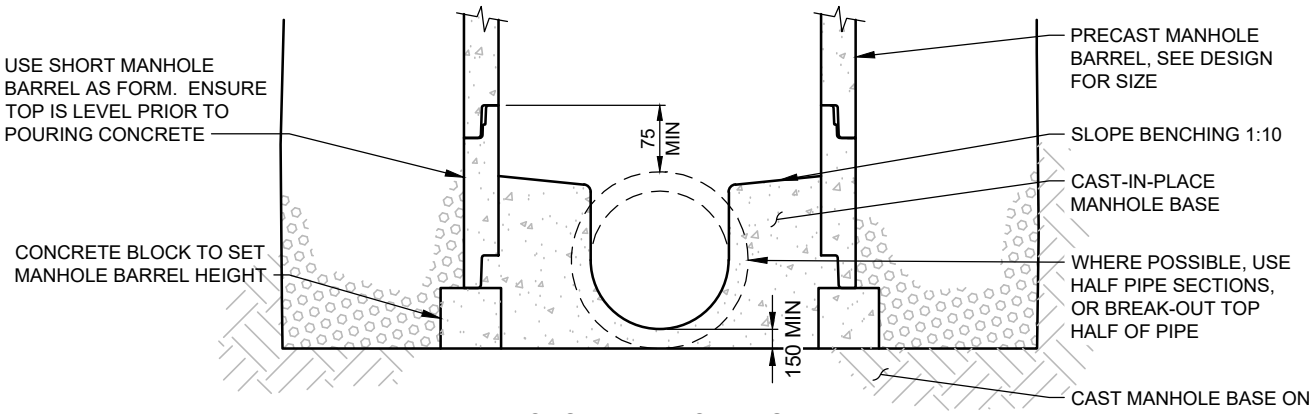
Scale:	NTS
Created:	MAY 2012
Rev Date:	NOV 2016
Dwg No:	S-1

4.1.2026



TYPICAL SECTION

1:25



CAST-IN-PLACE BASE

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR MANHOLE BENCHING, SEE STD DWG S-1.
3. FOR COVER LETTERING AND BOLTING REQUIREMENTS, REFER TO STD. DWG. S-9 OR S-15. FOR FRAME AND RING, REFER TO STD. DWG. S-10.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.
6. LOW PROFILE FRAMES NOT PERMITTED IN ROADS UNLESS APPROVED BY CITY ENGINEER.
7. CASTING TO BE SET FLUSH WITH TRAVELLED SURFACE SUCH THAT THERE ARE NO IRREGULARITIES GREATER THAN 6mm WHEN CHECKED WITH A 3m STRAIGHT EDGE IN ANY DIRECTION.

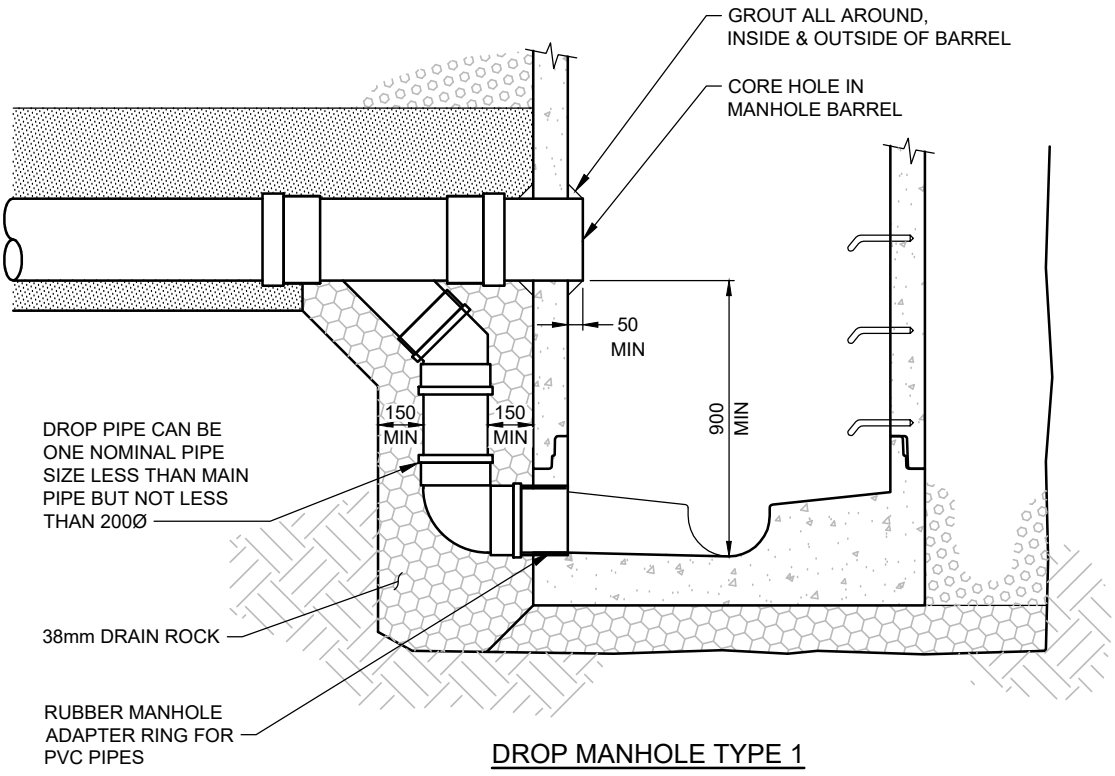
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CITY OF NANAIMO
THE HARBOUR CITY

SANITARY MANHOLE

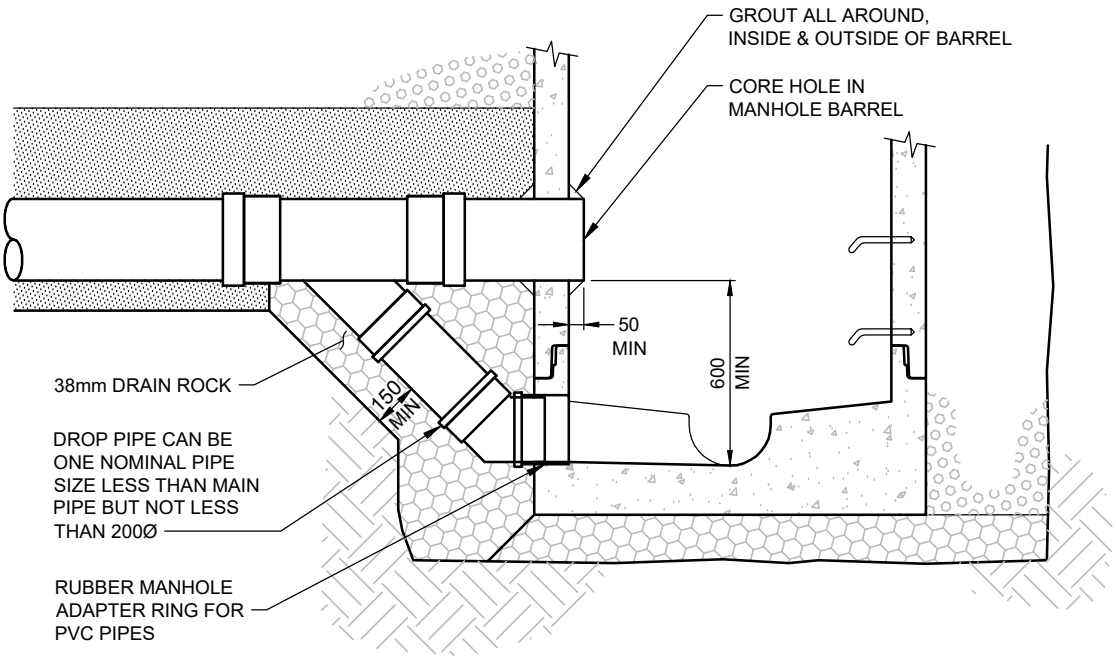
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Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	S-2

4.1.2026



DROP MANHOLE TYPE 1

1:25



DROP MANHOLE TYPE 2

1:25

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR MANHOLE DETAILS, SEE STD DWG S-2.
3. FOR MANHOLE BENCHING, SEE STD DWG S-1.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

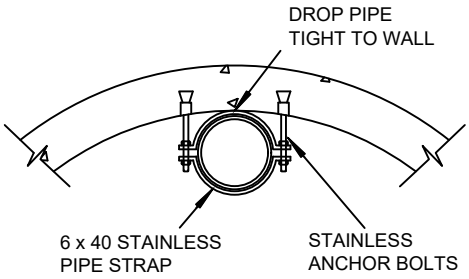
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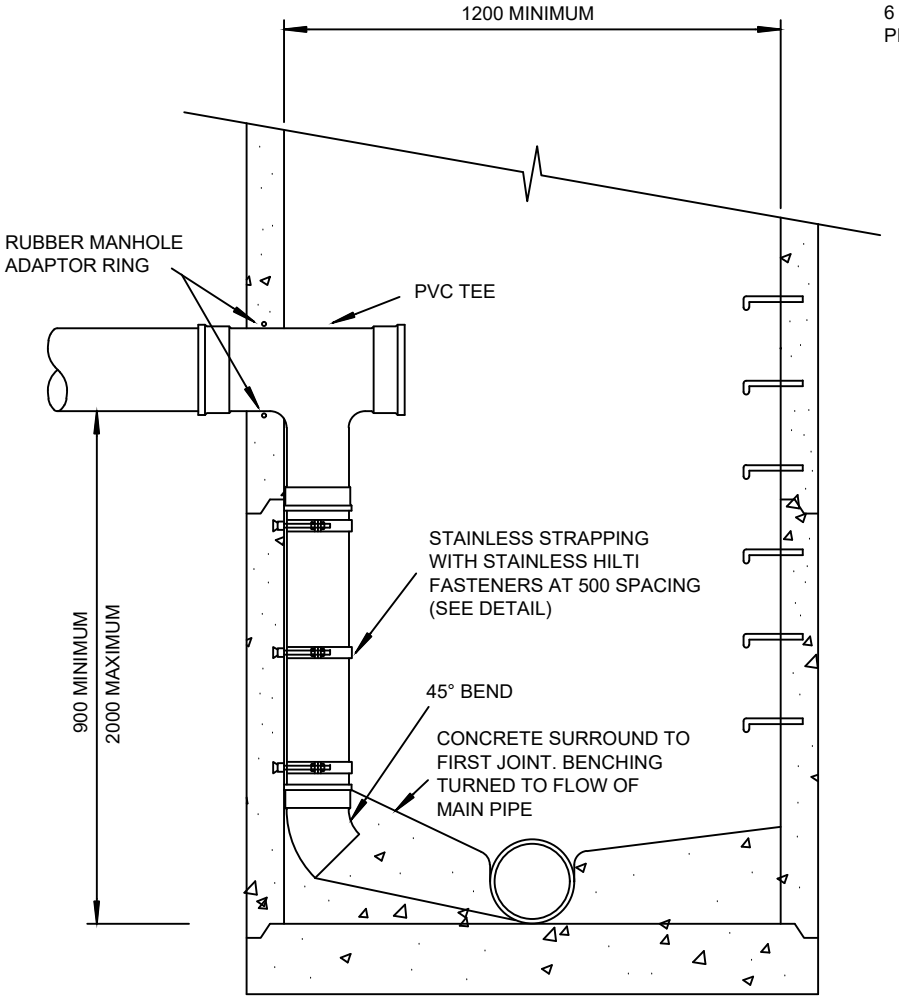
CITY OF NANAIMO
THE HARBOUR CITY

SANITARY DROP MANHOLE

Scale:	1:25
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	S-3



BRACKET DETAIL



DROP MANHOLE - TYPE III

NOTES:

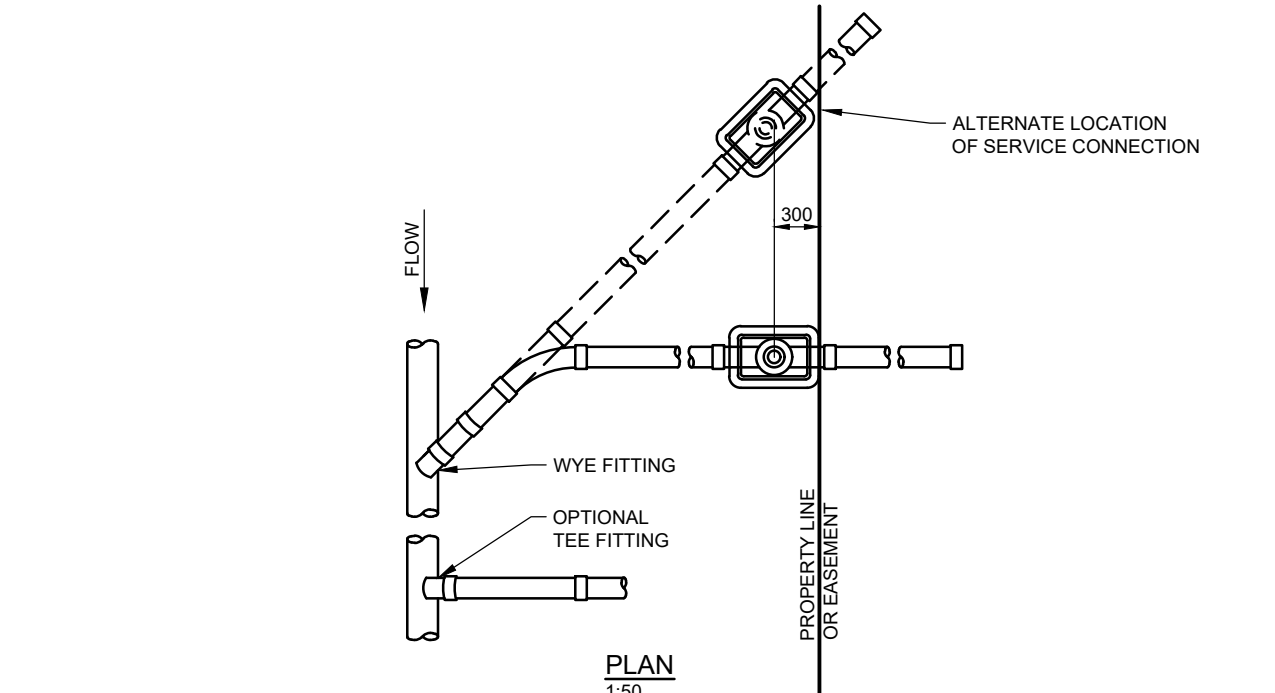
1. INSIDE DROP TO BE USED ONLY WHERE PERMITTED BY THE CITY ENGINEER.
2. MAXIMUM SIZE OF DROP PIPE TO BE 150Ø DR28 PVC.
3. THIS DRAWING SHOWS INSIDE DROP ONLY. SEE DRAWING S-2 FOR ALL OTHER DETAILS PERTAINING TO MANHOLE REQUIREMENTS.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS SHOWN OTHERWISE
5. ALL MOUNTING & BRACKET HARDWARE, (STRAPS & BOLTS) SHALL BE STAINLESS STEEL
6. DROP PIPE SHALL BE TIGHT TO THE INSIDE FACE OF THE MANHOLE BARREL.

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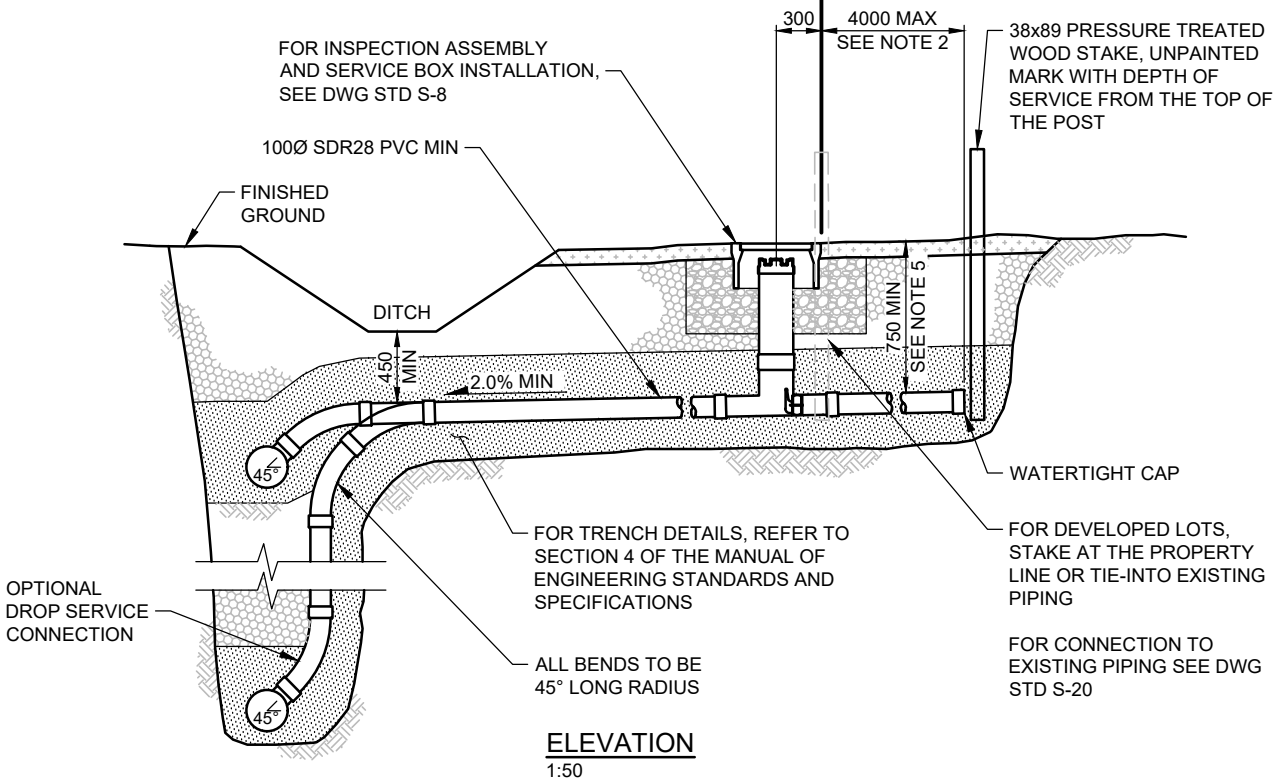
CITY OF NANAIMO
THE HARBOUR CITY

INSIDE DROP MANHOLE
DETAIL FOR 200Ø SEWERS

Scale:	NTS
Created:	MAY 2012
Rev Date:	NOV 2016
Dwg No:	S-3A



PLAN
1:50



ELEVATION
1:50

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. WHERE DEPTH OF SERVICE AT PROPERTY LINE IS GREATER THAN 2.0m, EXTEND THE SERVICE PAST THE PROPERTY LINE EQUAL TO ITS DEPTH, TO MAXIMUM OF 4.0m.
3. WHERE SERVICE IS INSTALLED IN ROCK, THE TRENCH IS TO EXTEND 3.0m PAST THE PROPERTY LINE.
4. SANITARY SEWER INSPECTION ASSEMBLY, INCLUDING PROPERTY SIDE STUB TO BE WHITE.
5. SERVICE PIPE DEPTH TO BE INSTALLED TO PROVIDE SUFFICIENT DEPTH TO SERVICE THE BASEMENT PLUMBING BY GRAVITY IN ACCORDANCE WITH THE NATIONAL PLUMBING CODE. MINIMUM COVER OF SERVICE PIPE AT PROPERTY LINE TO BE 0.75m.
6. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
7. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

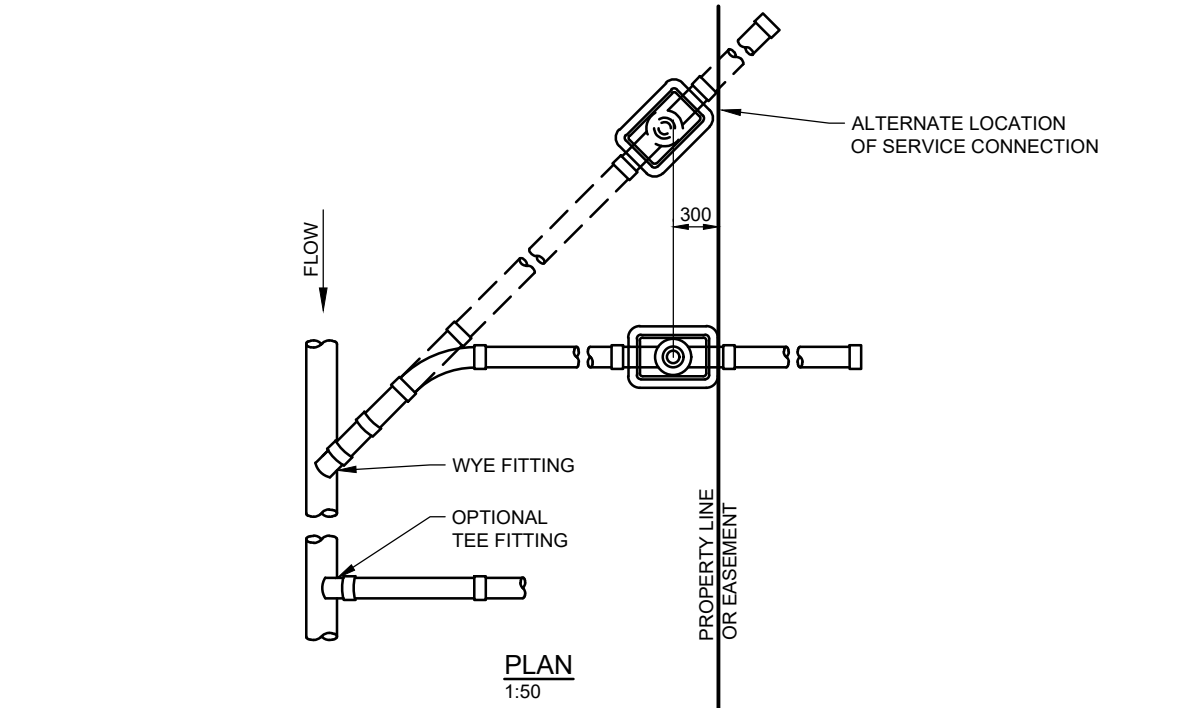
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CITY OF NANAIMO
THE HARBOUR CITY

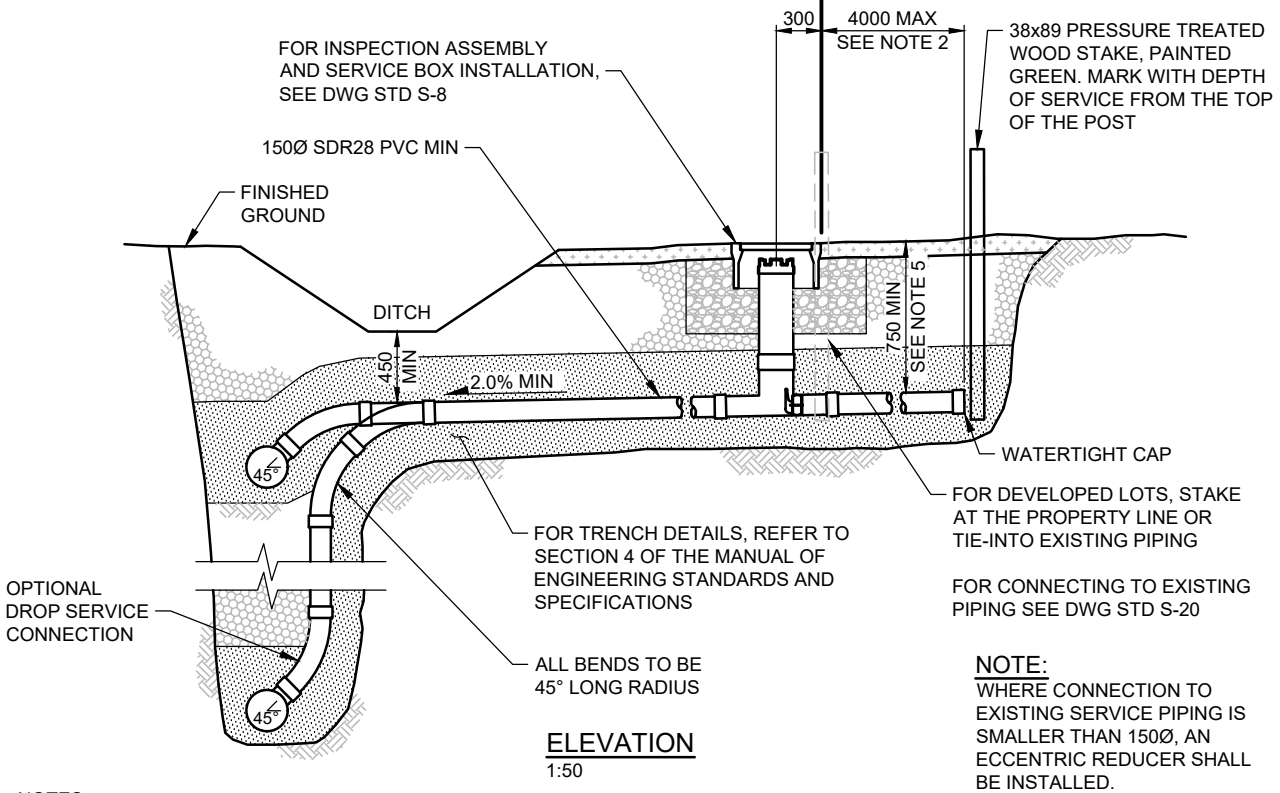
GENERAL SANITARY SERVICE CONNECTION DETAIL
RISER AND NON-RISER TYPES

Scale:	1:50
Created:	MAR 2015
Rev Date:	JUNE 2026
Dwg No:	S-5

4.1.2026



PLAN
1:50



ELEVATION
1:50

NOTE:
WHERE CONNECTION TO EXISTING SERVICE PIPING IS SMALLER THAN 150Ø, AN ECCENTRIC REDUCER SHALL BE INSTALLED.

NOTES:

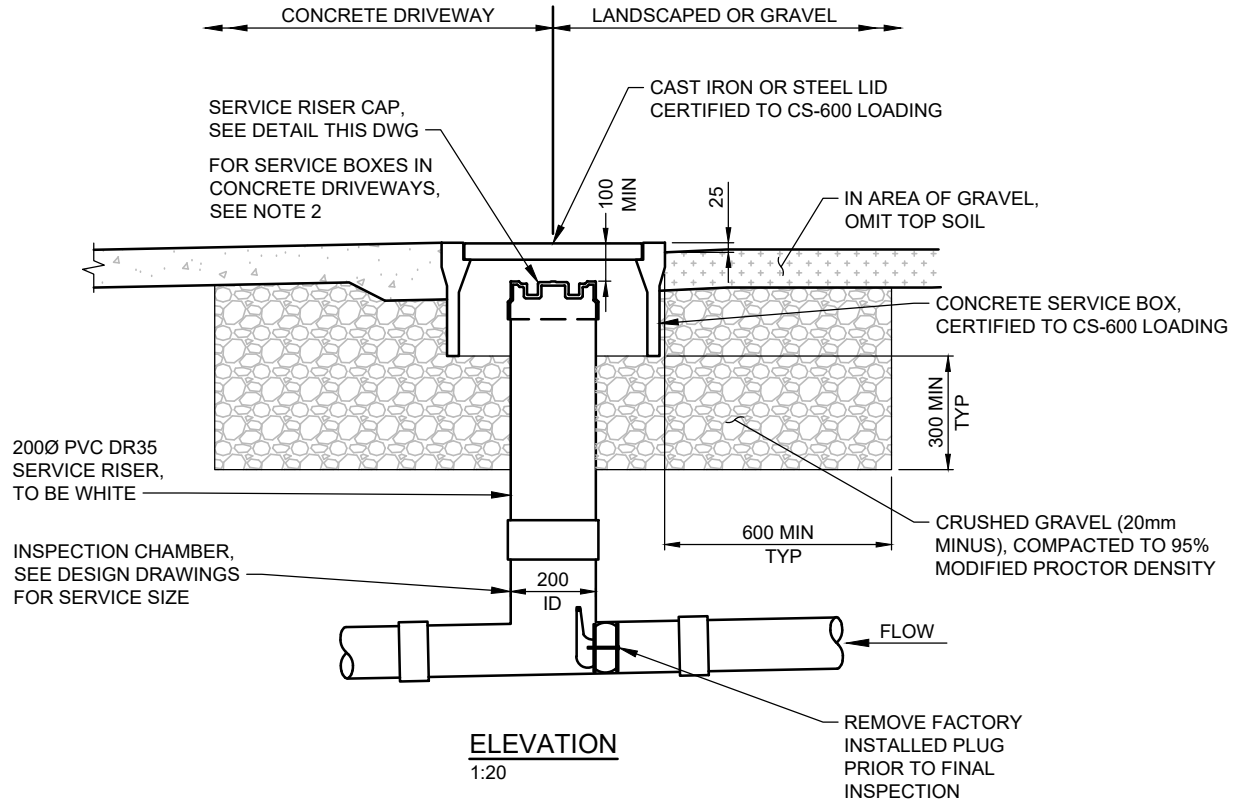
1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. WHERE DEPTH OF SERVICE AT PROPERTY LINE IS GREATER THAN 2.0m, EXTEND THE SERVICE PAST THE PROPERTY LINE EQUAL TO ITS DEPTH, TO A MAXIMUM OF 4.0m.
3. WHERE SERVICE IS INSTALLED IN ROCK, THE TRENCH IS TO EXTEND 3.0m PAST THE PROPERTY LINE.
4. SANITARY SEWER INSPECTION ASSEMBLY, INCLUDING PROPERTY SIDE STUB TO BE WHITE.
5. SERVICE PIPE DEPTH TO BE INSTALLED TO PROVIDE SUFFICIENT DEPTH TO SERVICE THE BASEMENT PLUMBING BY GRAVITY IN ACCORDANCE WITH THE BC PLUMBING CODE. MINIMUM COVER OF SERVICE PIPE AT PROPERTY LINE TO BE 0.75m.
6. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
7. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

CITY OF NANAIMO
THE HARBOUR CITY

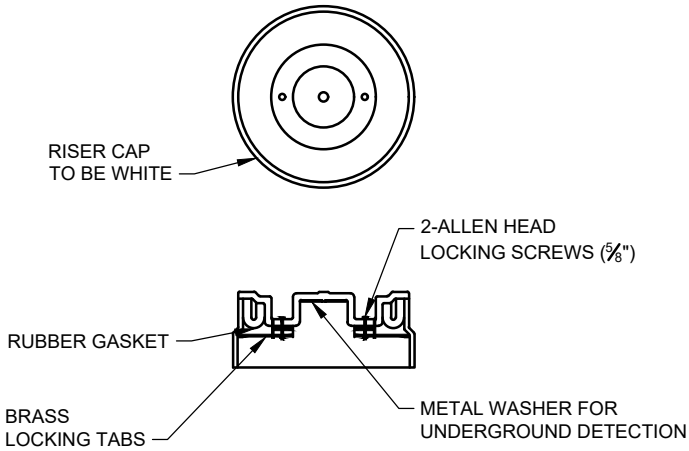
COMMERCIAL AREAS SANITARY
SERVICE CONNECTION DETAILS
RISER AND NON-RISER TYPES

Scale:	1:50
Created:	MAR 2016
Rev Date:	MAY 2020
Dwg No:	S-7

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4.1.2026



ELEVATION
1:20



RISER CAP DETAIL
NTS

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. WHEN SERVICE BOX IS WITHIN A CONCRETE DRIVEWAY, CONCRETE ADJACENT TO THE SERVICE BOX MUST BE A MINIMUM OF 150mm THICK FOR A MINIMUM DISTANCE OF 150mm AROUND THE OUTSIDE EDGES OF THE SERVICE BOX.
3. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
4. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

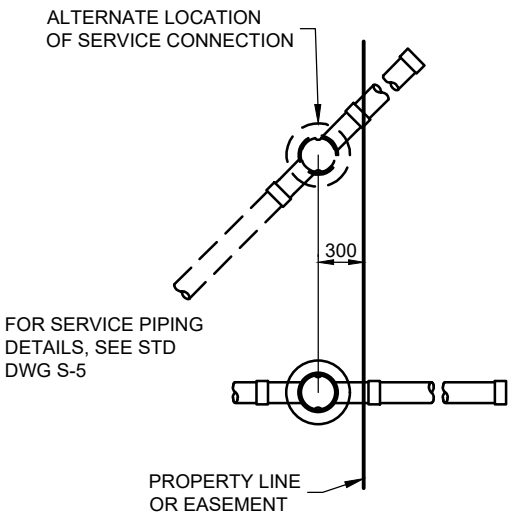
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4.1.2026

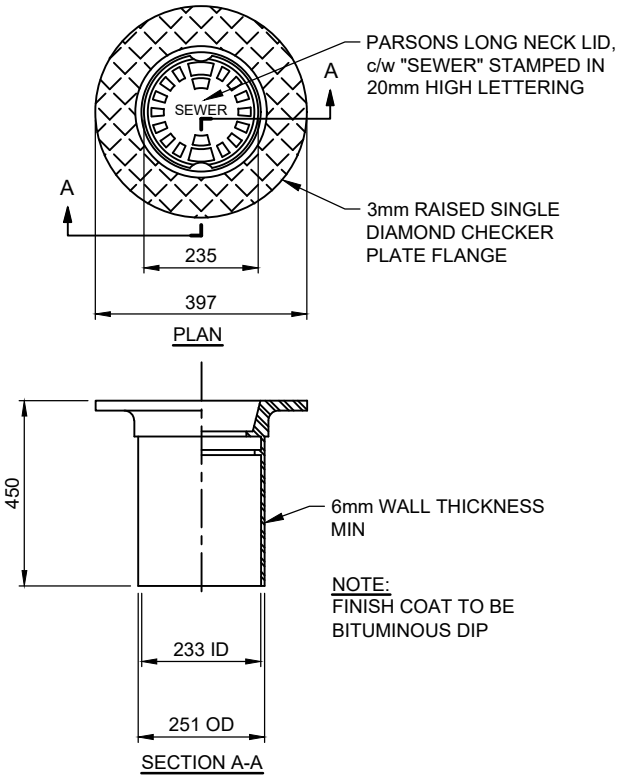
CITY OF NANAIMO
THE HARBOUR CITY

SANITARY SERVICE BOX AND
INSPECTION ASSEMBLY INSTALLATION

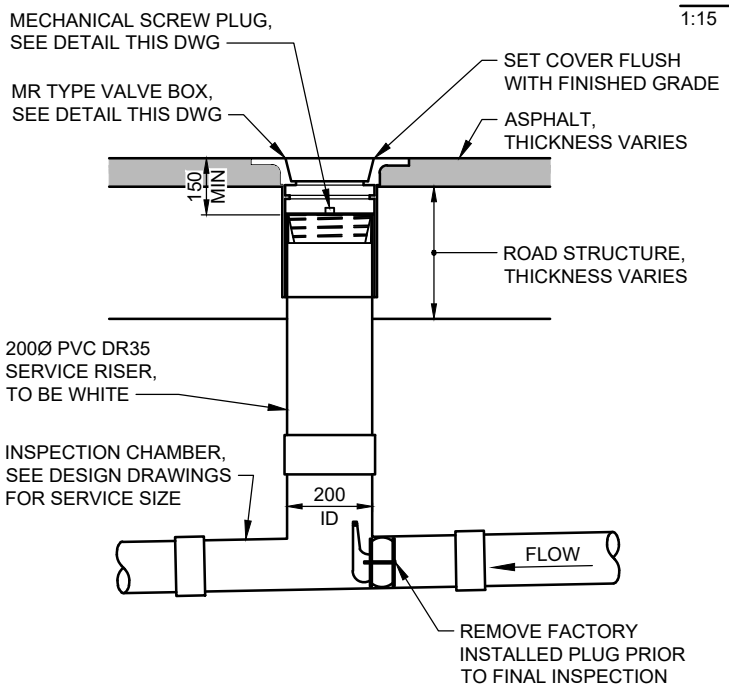
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Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	S-8



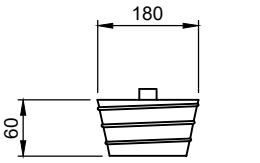
PLAN - VALVE BOX LOCATIONS
NTS



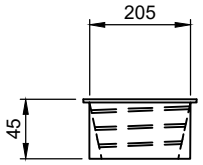
MR STYLE VALVE BOX
1:15



INSPECTION ASSEMBLY ELEVATION
1:20



RIGID PLASTIC PLUG



RUBBER SEALING COLLAR

MECHANICAL SCREW PLUGS
1:10

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

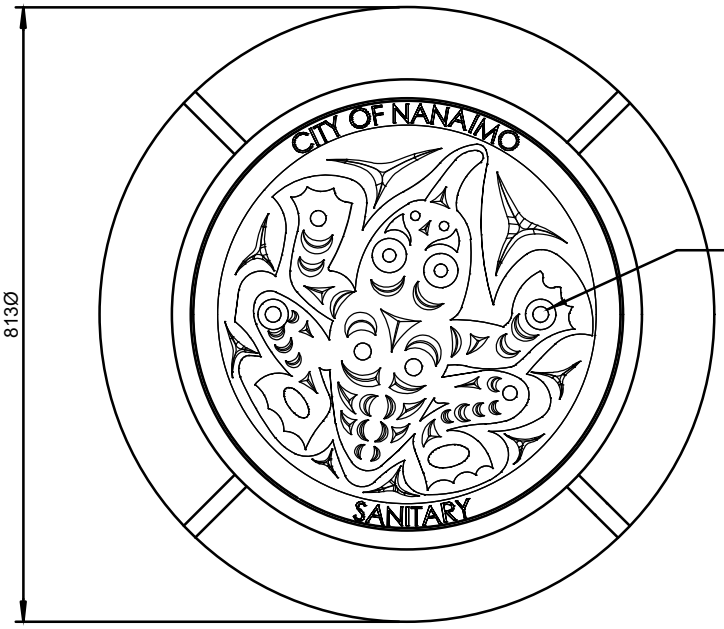
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4.1.2026

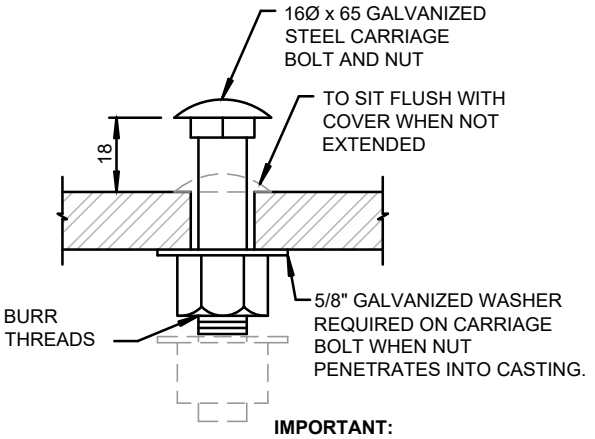
CITY OF NANAIMO
THE HARBOUR CITY

SANITARY SERVICE BOX AND INSPECTION ASSEMBLY
INSTALLATION IN PAVED LANES AND ROADWAYS

Scale:	AS NOTED
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	S-8A

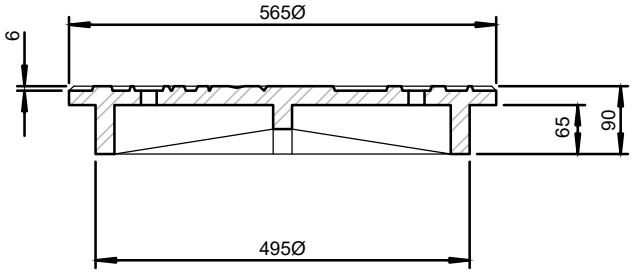


PLAN

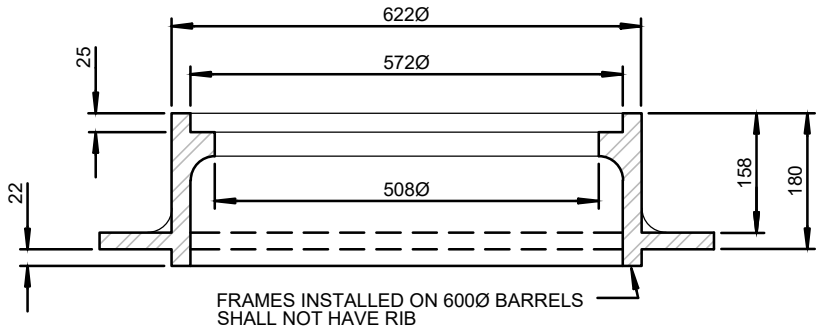


IMPORTANT:
CARRIAGE BOLT TO EXTEND EXACTLY 18mm ABOVE CASTING.

CARRIAGE BOLT DETAIL



COVER



FRAME

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED TO MEET CS-600 LOADING.
3. ALL BEARING SURFACES BETWEEN FRAME, COVER AND RISER RINGS SHALL BE MACHINED FOR NON-ROCKING FIT IN ALL POSITIONS. ALLOW 1.5mm RAISED FACE IN CASTINGS FOR MACHINING.
4. PAINT THE INSIDE SURFACE OF THE MANHOLE FRAME IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION WITH ENAMEL RUST PAINT. COLOUR TO BE YELLOW.
5. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
6. ALL DIMENSIONS ARE MILLIMETRES UNLESS NOTED OTHERWISE.
7. REFERRING TO "CITY OF NANAIMO SANITARY", LETTERING SHALL BE 25 FLATTENED FACE GOTHIC WITH FACE OF LETTERS RAISED TO THE SAME LEVELS AS THE TOP OF THE RIBS.

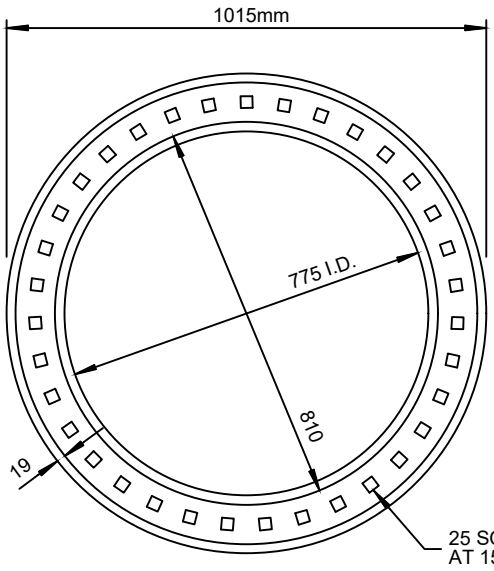
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4.22.2026

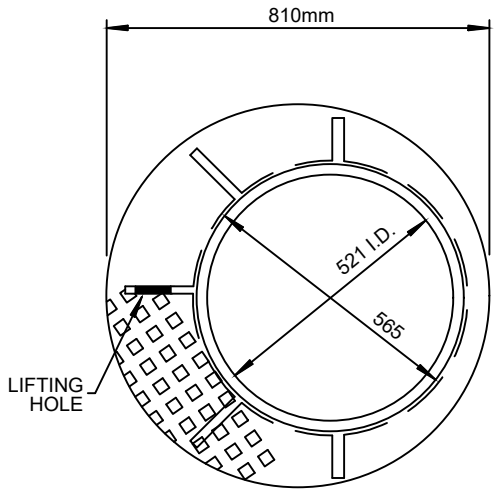
CITY OF NANAIMO
THE HARBOUR CITY

SANITARY MANHOLE FRAME & COVER
SNUNEYMUXW FROG BY JOEL GOOD

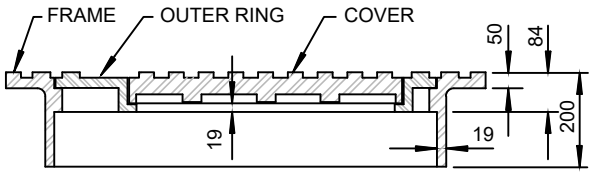
Scale:	NTS
Created:	JULY 2023
Rev Date:	JUNE 2026
Dwg No:	S-9



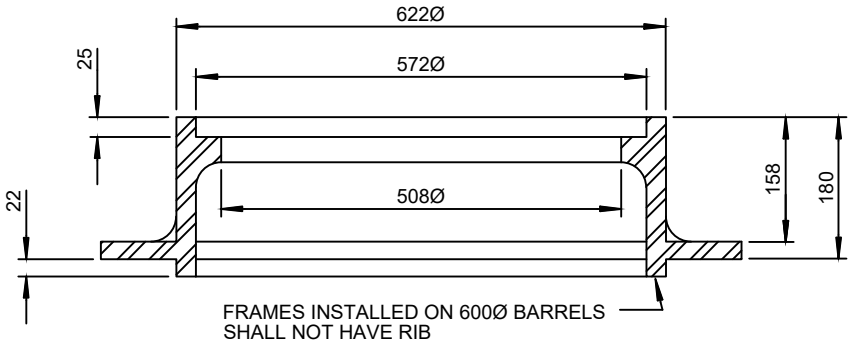
PLAN OF FRAME



PLAN OF OUTER RING



SECTION OF FRAME, RING
AND COVER



FRAME

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED TO MEET CS-600 LOADING.
3. FOR COVER LETTERING AND BOLTING REQUIREMENTS REFER TO STD. DWG. S-9 OR S-15.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

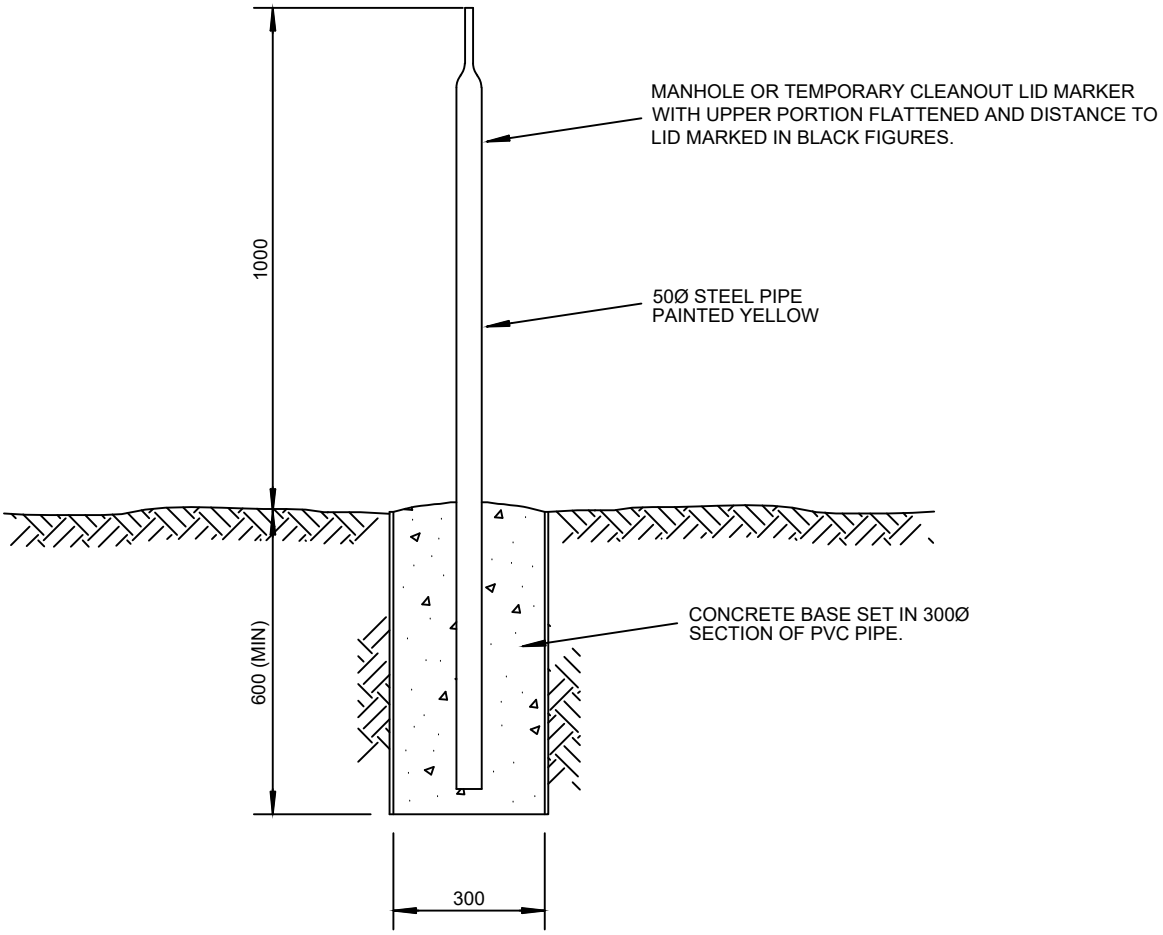
G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 20262026 DRAWING SECTIONS\SECTION 6 DWGS-10

4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

UTILITY CHAMBER SANITARY MANHOLE
FRAME AND RING

Scale:	NTS
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	S-10



NOTES:

1. FOR USE ONLY WHERE MANHOLE OR TEMPORARY CLEANOUT LIDS ARE LOCATED OUTSIDE THE PAVED PORTION OF A STREET.
2. THE MARKER SHALL BE LOCATED ON SITE BY THE ENGINEER WITH THE FLATTENED END AND MARKED DISTANCE FACING THE LID.
3. ALL DIMENSIONS IN MILLIMETERS UNLESS SHOWN OTHERWISE.

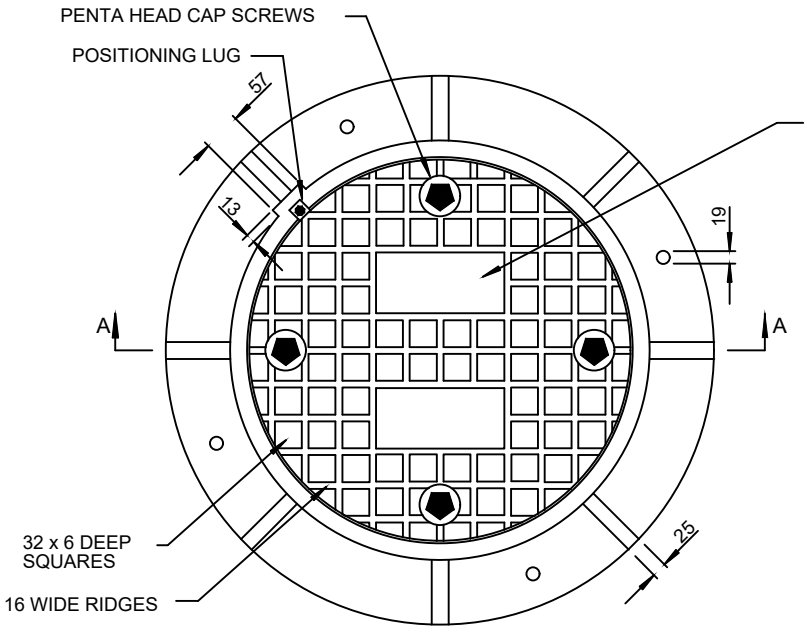
CITY OF NANAIMO
THE HARBOUR CITY

SANITARY MANHOLE AND TEMPORARY CLEANOUT LID MARKER

Scale:	NTS
Created:	JUNE 2013
Rev Date:	NOV 2016
Dwg No:	S-14

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 6 DWGS\S-14
4.1.2026

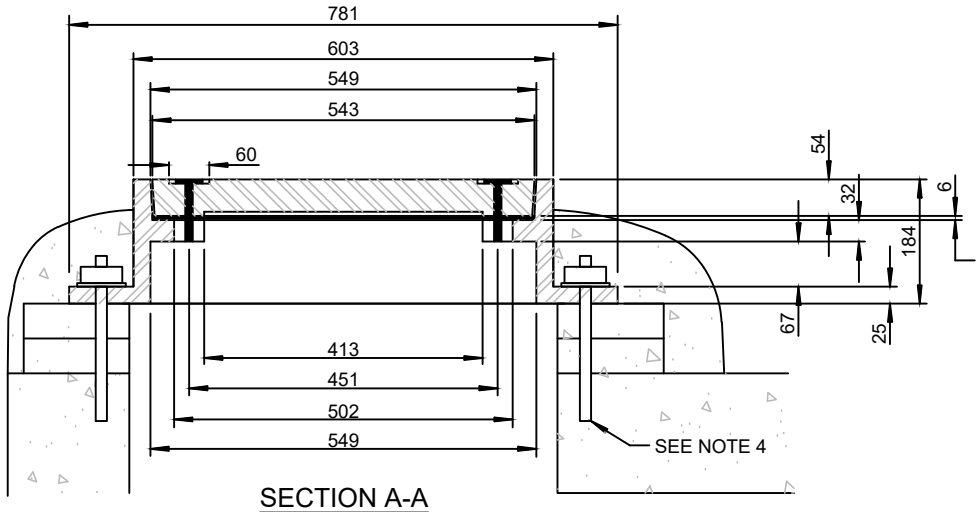
APPLICATION: UNITS ARE FOR USE IN AREAS WHERE FLOODING OR HIGH TIDES ARE POSSIBLE. THIS UNIT SHALL HAVE A POSITIONING LUG IN COVER FOR EASY REPLACEMENT OF CAP SCREWS AND SHALL BE EQUIPPED WITH FOUR ONLY 19Ø HOLES IN FRAME FOR ANCHOR BOLTS AS SHOWN.



PLAN

WEIGHT OF UNIT SHOWN IS
FRAME = 113.4 kg
COVER = 56.7 kg

FURNISHED WITH:
A) FOUR 13x57 PENTA HEAD STAINLESS STEEL CAP SCREWS TO DISCOURAGE VANDALISM.
B) A 6mm THICK NEOPRENE GASKET FULLY ENCOMPASSING BOLT HOLES.
C) METAL SURFACES BETWEEN FRAME AND COVER MACHINED TO ENSURE NON ROCKING FIT IN ALL POSITIONS. ALLOW 1.5 RAISED FACE IN CASTING FOR MACHINING.
D) MANUFACTURE BOLT HOLES TO PERMIT INTERCHANGING OF COVERS BETWEEN FRAME UNITS.



SECTION A-A

DIA. OF COVER ------ 543
THICKNESS OF COVER -- 54
DIA. OF FRAME ------ 781
DEPTH OF FRAME -----184

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 6.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED TO MEET CS-600 LOADING.
3. PAINT THE INSIDE SURFACE OF THE MANHOLE FRAME IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION WITH ENAMEL RUST PAINT. COLOUR TO BE YELLOW.
4. FRAME SHALL BE SET IN MORTAR AND BOLTED TO THE MANHOLE SLAB WITH 19Ø STAINLESS STEEL BOLTS, WASHERS AND NUTS.
5. THIS DRAWING TO BE READ IN ACCORDANCE WITH DRAWING S-2.
6. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
7. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

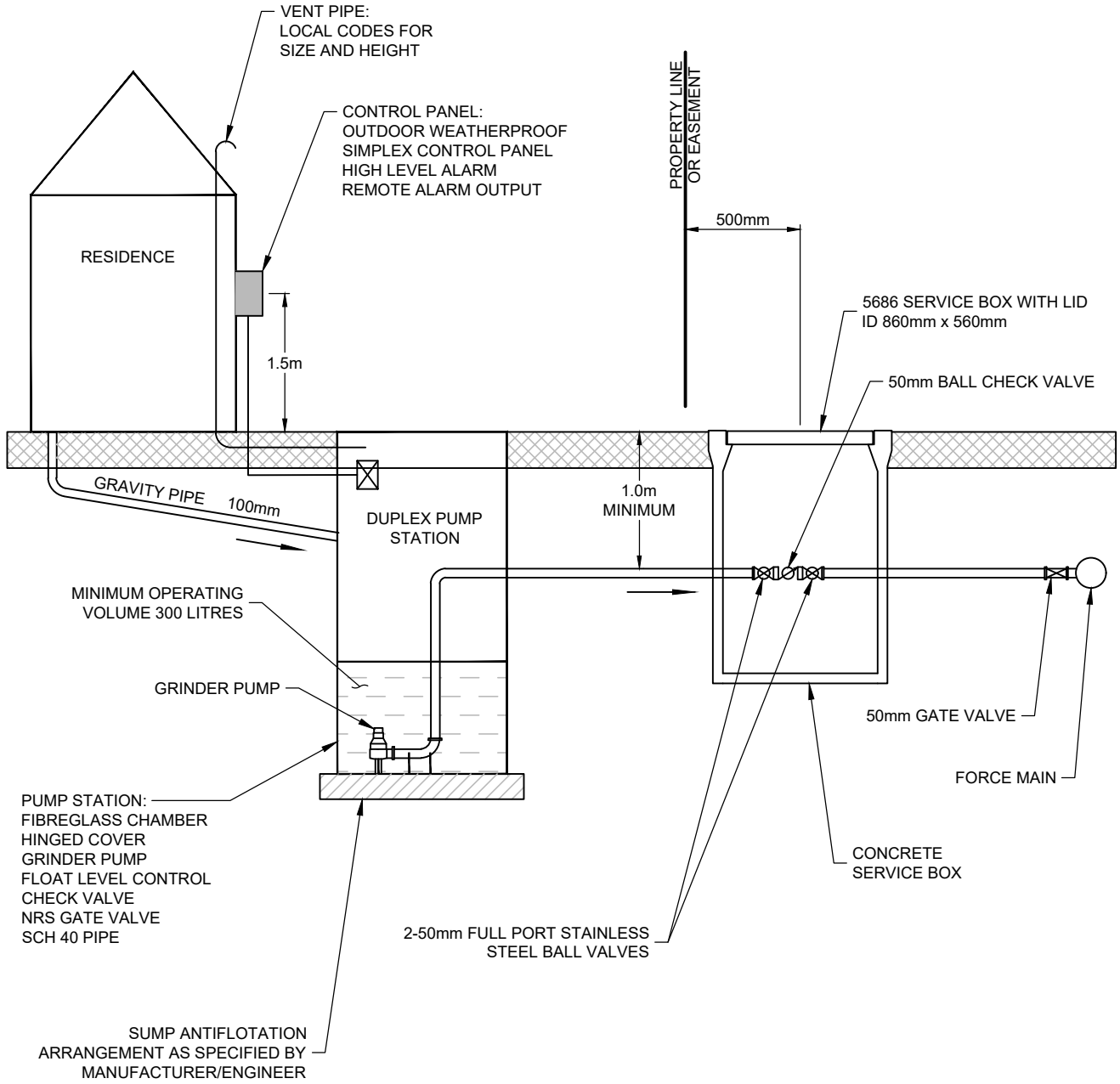
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4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

WATERTIGHT SANITARY MANHOLE
FRAME AND COVER

Scale:	NTS
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	S-15



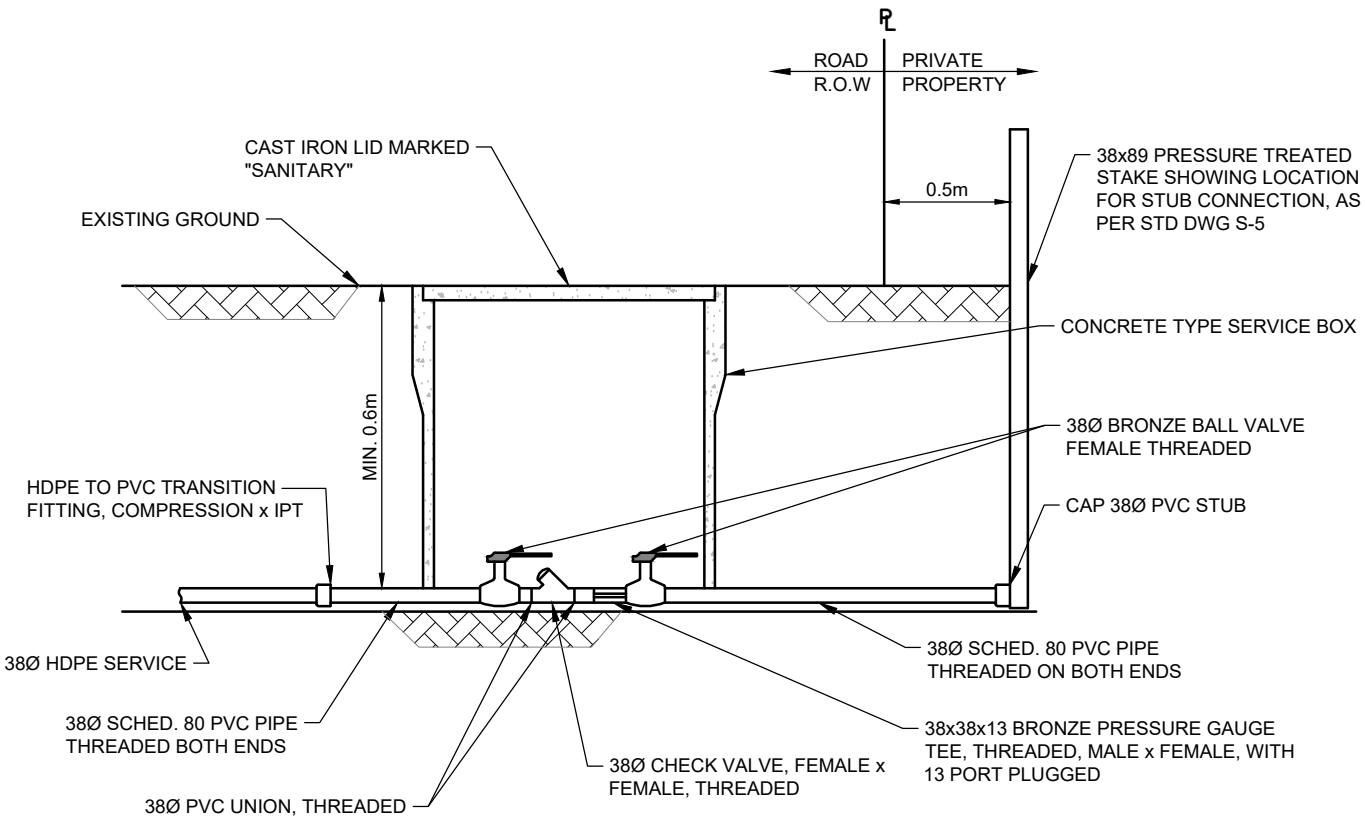
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4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

LOW PRESSURE SEWER
SERVICE CONNECTION

Scale:	NTS
Created:	AUG 2019
Rev Date:	MAY 2020
Dwg No:	S-16



ELEVATION
NTS

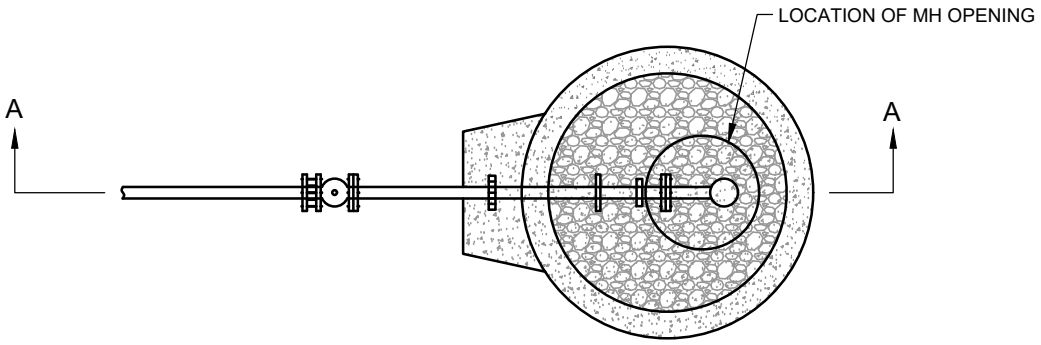
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4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

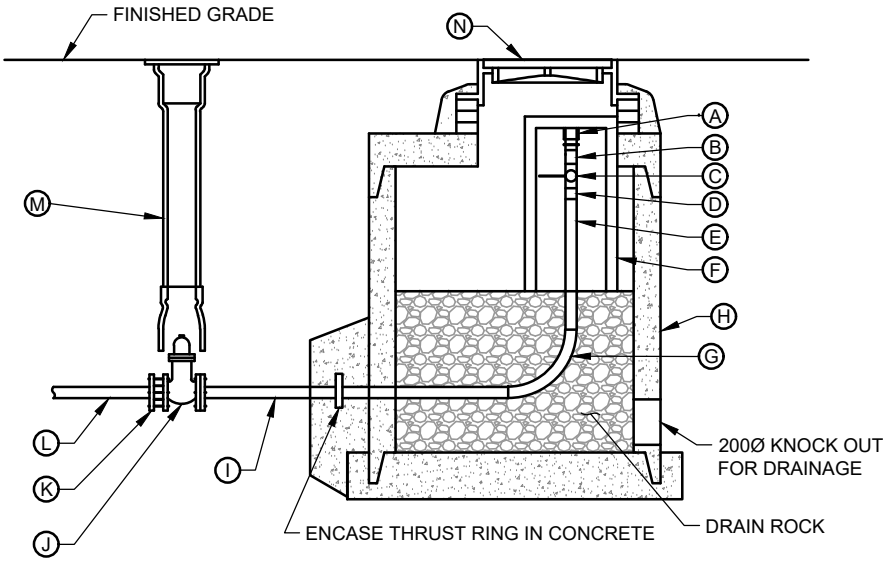
LOW PRESSURE SEWER
SERVICE BOX

Scale:	NTS
Created:	NOV 2019
Rev Date:	MAY 2020
Dwg No:	S-17



PLAN VIEW

LPS END OF LINE FLUSHOUT MH LIST OF MATERIALS	
ITEM	DESCRIPTION
A	65Ø FIRE HOSE CONNECTION PER C.O.N. SPECIFICATIONS
B	65X50 REDUCER, MALE x MALE IPT
C	50Ø BRONZE BALL VALVE, FEMALE x FEMALE IPT
D	50Ø PVC SCHED. 80 ADAPTER, MALE x MALE IPT
E	50Ø S.S, PIPE, THREADED TO FIT BEND AND PVC ADAPTER
F	50mm THICK HIGH DENSITY STYROFOAM INSULATION
G	50Ø S.S, LONG RADIUS 90° BEND, IPTxIPT
H	1050Ø MANHOLE TO C.O.N. SPECIFICATIONS
I	50Ø S.S. SPOOL PIECE c/w 100Ø x 13mm THRUST RING, FxIPT
J	50Ø BALL VALVE, FxF
K	50Ø HDPE STUB END WITH METAL BACKING FLANGE
L	50Ø HDPE DR11 PIPE
M	150x200 VALVE HOOD, 150Ø PVC RISER & 150Ø MR VALVE BOX
N	HEAVY DUTY MH FRAME AND COVER AS PER C.O.N. STD. DWG. No. S-9



SECTION A
NTS

NOTES:

1. S.S. = STAINLESS STEEL TYPE 316 SCHEDULE 40.
2. FIRE HOSE EQUIPMENT CONNECTION TO BE DIRECTLY ACCESSIBLE THROUGH MANHOLE ACCESS.

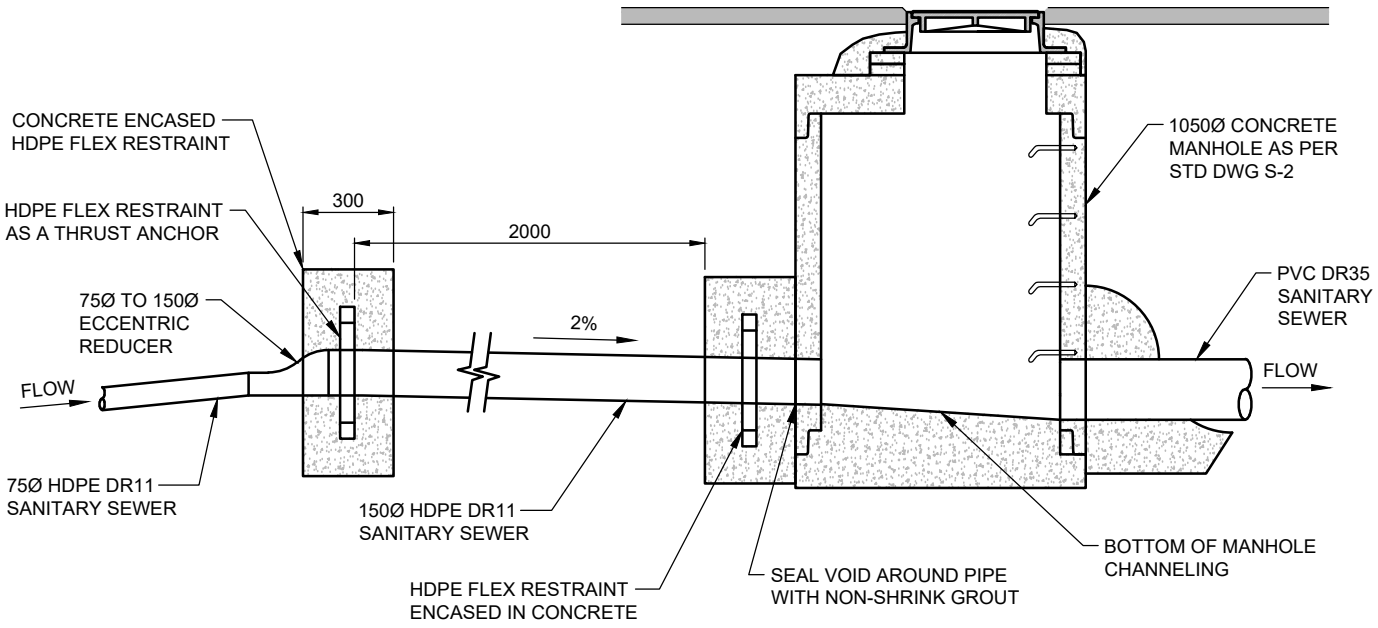
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4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

LOW PRESSURE SEWER
FLUSHOUT MANHOLE

Scale:	NTS
Created:	NOV 2019
Rev Date:	MAY 2020
Dwg No:	S-18



SCALE: NTS

NOTES:

1. REFER TO STD DWG S-2 FOR GENERAL NOTES AND CONCRETE REQUIREMENTS.
2. ALL HDPE JOINTS TO BE HEAT BUTT FUSED.

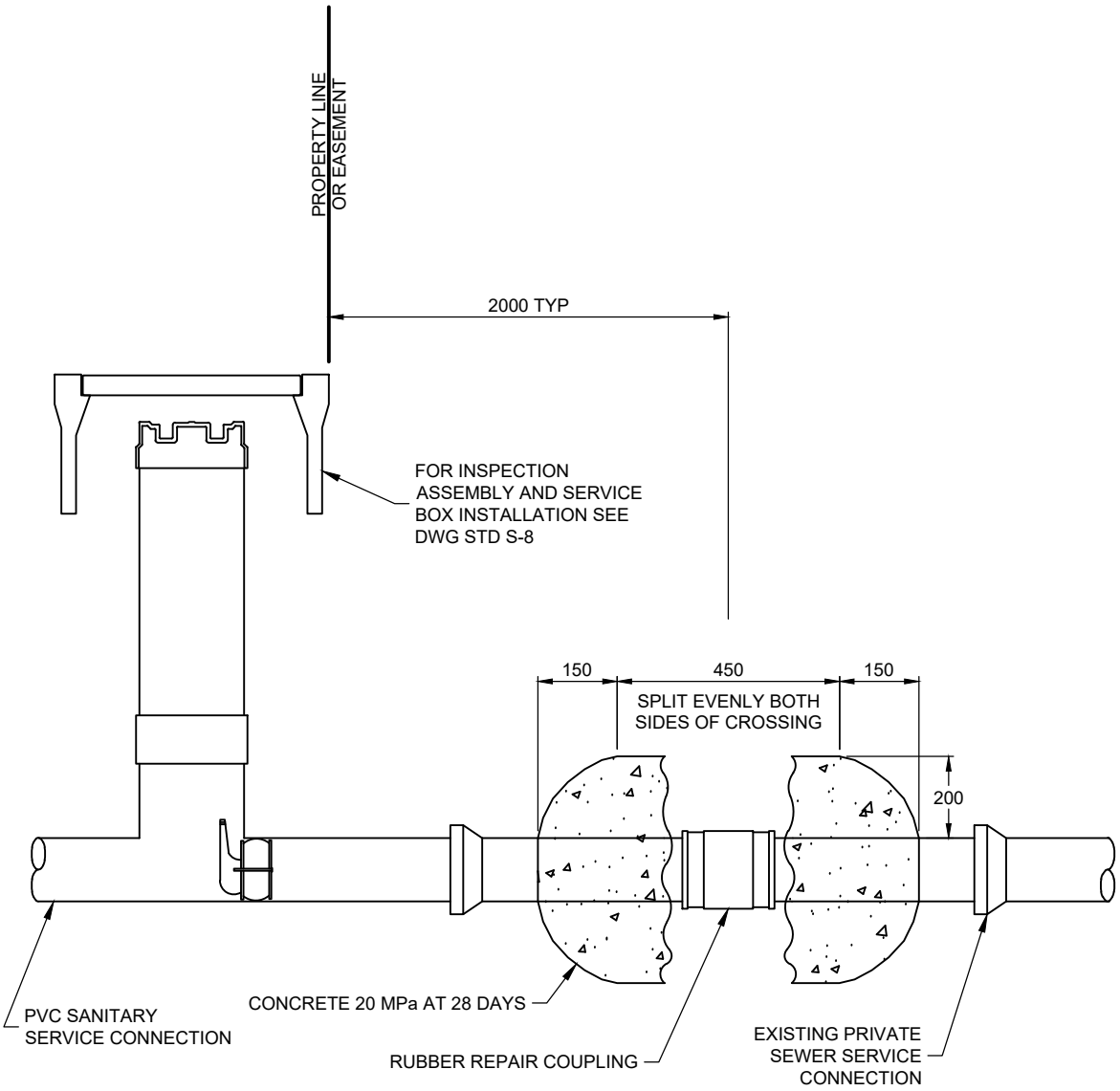
G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 6 DWGS\S-19

4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

LOW PRESSURE SEWER
TO GRAVITY MANHOLE

Scale:	NTS
Created:	NOV 2019
Rev Date:	MAY 2020
Dwg No:	S-19



ELEVATION

NOTES:

1. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
3. SPIGOTS IF PRESENT SHALL BE REMOVED BEFORE COUPLING IS INSTALLED.

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 20262026 DRAWING SECTIONS\SECTION 6 DWGS\S-20

4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

CONCRETE ENCASEMENT FOR
CONNECTIONS TO EXISTING
SEWER SERVICE CONNECTIONS

Scale:	NTS
Created:	AUG 2019
Rev Date:	MAY 2020
Dwg No:	S-20

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Major System	7.05 [↓]
Pipe Design Details	7.06 [↓]
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Open Channels (within private property and easements)	7.10 [↓]
Inlet and Outlet Structures	7.11 [↓]
Storage Facilities	7.12 [↓]
Rainwater Best Management Practices	7.13 [↓]
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Service Junctions	7.23 [↓]
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Precast Manhole Bases	7.25B [↓]
Manhole Tops	7.25C [↓]
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Manhole Ladder Rungs ***(REVISED JUNE 2026)***	7.25E [↓]
Concrete	7.26 [↓]
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Quick Links: Section 7.0 Drawings [] TOC [↑]

SECTION 7 – STORMWATER MANAGEMENT
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Inlet and Outlet Structures	7.32 [↓]
Energy Dissipater Outlet Structures	7.33 [↓]
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Culverts	7.35A [↓]
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Pipe Installation	7.42 [↓]
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Cast In Place Manhole Concrete Bases	7.49 [↓]
-Not Used-	7.50
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Precast Manhole Bases	7.52 [↓]
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Manhole Ladder Rungs ***(REVISED JUNE 2026)***	7.55 [↓]
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-Not Used-	7.59
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Quick Links: Section 7.0 Drawings [] TOC [↑]

SECTION 7 – STORMWATER MANAGEMENT
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STANDARD DRAWINGS	DWG. NO.
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Small Lawn Basin on Private Property	SW-5 []
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SECTION 7 – STORMWATER MANAGEMENT
CONTENTS

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SECTION 7 – STORMWATER MANAGEMENT DESIGN CRITERIA

7.01 INTRODUCTION

.1 Scope:

(a) Stormwater management is the term traditionally used when referring to managing rainfall runoff based on using design storms and sizing drainage facilities. Rainwater management refers to rainfall runoff source control for frequently occurring events. In this section, the term stormwater management is used and is intended to include the scope of rainwater management. ***(REVISED JUNE 2026)***

(b) For Defined Terms refer to Section 2.01 []. ***(REVISED JUNE 2026)***

.2 Objectives:

(a) Overall – To provide flood protection, drainage, and minimize impacts on the environment. Achieve a balance between protecting property from flood hazards and protecting the environment in terms of both water quality and quantity. ***(REVISED JUNE 2026)***

(b) Major System – To safely convey the 1:100 Annual Exceedance Probability (AEP) or (1% AEP) storm event runoff with overland flow path and piped flow to suitable receiving bodies. ***(REVISED JUNE 2026)***

(c) Minor System – To safely contain the 1:5 AEP (20% AEP) storm runoff within the minor system. ***(REVISED JUNE 2026)***

(d) Rainwater Management Best Management Practices (BMP) – To mimic the conditions of a naturalized undeveloped land by reducing impervious area, retaining trees and tree canopy, and infiltrating frequent rain events. ***(REVISED JUNE 2026)***

(e) Downstream Environmental Protection – To ensure that the quality and quantity of flows do not adversely affect the groundwater or receiving waters (streams, creeks, ditches, lakes, wetlands, ocean). ***(REVISED JUNE 2026)***

(f) Protection of Environmentally Sensitive Areas (ESAs) – To protect ESAs, including leave strip areas from development impacts. Prioritize avoidance of negative impacts, restoration, and enhancement of Environmentally Sensitive Areas. ***(REVISED JUNE 2026)***

(g) Consideration for the Blue and Green Network of parks, watercourse, water bodies, greenways, and urban tree canopy to enhance habitat connectivity and ecosystem. ***(REVISED JUNE 2026)***

.3 City Authority and Bylaws: ***(REVISED JUNE 2026)***

(a) This manual should be used in accordance with the most recent version of other City policies and bylaws including, but not limited to: ***(REVISED JUNE 2026)***

(i) *Subdivision and Development Standards Bylaw* ***(REVISED JUNE 2026)***

(ii) *City Plan Official Community Plan* ***(REVISED JUNE 2026)***

(iii) Stormwater Management. Council Policy. ***(REVISED JUNE 2026)***

(iv) Ditch/Swale. Council Policy. ***(REVISED JUNE 2026)***

.4 Other Applicable Government Initiatives:

(a) In addition, this manual should be used in accordance with other commonly applicable government acts, regulations, policies, guidelines and documents. including, but not necessarily limited to the following: ***(REVISED JUNE 2026)***

(i) Federal *Fisheries Act*

(ii) *Riparian Areas Protection Act* and *Riparian Areas Protection Regulation* ***(REVISED JUNE 2026)***

(iii) *Water Sustainability Act* and *Water Sustainability Regulation* ***(REVISED JUNE 2026)***

(iv) Fish-Stream Crossing Guidebook, Ministry of Forests, Lands and Natural Resource Operations, Ministry of Environment ***(REVISED JUNE 2026)***

(v) Stormwater Planning: A Guidebook for British Columbia, Ministry of Water, Land and Air Protection ***(REVISED JUNE 2026)***

(vi) Requirements and Best Management Practices for Making Changes in and About a Stream in British Columbia, Government of British Columbia. ***(REVISED JUNE 2026)***

.5 Previous Design Criteria: ***(REVISED JUNE 2026)***

(a) The City's utility systems have been constructed over many years using design criteria and practices that were in place at the time. ***(REVISED JUNE 2026)***

(b) The current criteria is to be used when designing all new infrastructure and when assessing the adequacy of existing systems. ***(REVISED JUNE 2026)***

(c) When evaluating existing infrastructure and watercourses, where the existing system does not meet current criteria, the Professional of Record will provide a risk assessment and professional recommendations for consideration by the City Engineer. These will be evaluated on a case-by-case basis and upgraded as resources permit or by the developer if triggered by the proposed development. ***(REVISED JUNE 2026)***

(d) Pre-development is defined as a natural state: ***(REVISED JUNE 2026_redesignated)***

(i) Structures, parking areas, and manmade surfaces are not considered to be pre-development. ***(REVISED JUNE 2026)***

(ii) A forested area should be assumed. ***(REVISED JUNE 2026)***

(iii) However, if there is evidence that the lands natural state was something other than forested, such as a meadow or rock outcrop, the Qualified Registered Professional is responsible to document such evidence and submit to the City Engineer for approval.

(e) Post-development is the proposed development. ***(REVISED JUNE 2026)***

.6 Development Requirements (Responsibilities and Reporting): ***(REVISED JUNE 2026)***

(a) Applicants and their agent, a Professional of Record, are responsible for designing stormwater systems that align with the objectives in Section 7.01.2 [→]. ***(REVISED JUNE 2026)***

(b) Drainage works design must comply with Section 7.02 [→] - Summary of Stormwater and Environmental Protection Design Criteria and associated sections in this Manual.

(c) Construction activities must manage and minimize the impact to connected watercourses as set out in the Storm *Sewer Regulation and Fee Bylaw No. 7351* .

(d) The Professional of Record is responsible for ensuring all applicable guidelines, standards, bylaws, and other regulations and policies are met.

(e) Stormwater Management Plan shall be prepared for subdivision, multi-unit residential, commercial, industrial, and institutional developments, or as otherwise required by *Development* Approval *Information Bylaw No. 7346*. Submit as a report that includes: ***(REVISED JUNE 2026)***

i. A watershed location plan(s) showing: ***(NEW JUNE 2026)***

1. The watershed boundary and major system components, including labeled watercourses and Environmentally Sensitive Area (ESA) leave strips. Road network with key road names. ***(NEW JUNE 2026)***
2. Topography with low points marked, overland flow paths, and drainage routes. ***(NEW JUNE 2026)***
3. Identify outlet boundary conditions for the proposed development. Indicate the water level elevations at the outlet for the 20% AEP and the 1% AEP to establish the starting elevation of the downstream Hydraulic Grade Line (HGL). In some cases, the downstream water level elevation may be set by flood plain elevations typically associated with the 1:200 AEP (0.5% AEP) or an ocean tide level. ***(NEW JUNE 2026)***
4. At key junctions in the watershed, show the cumulative tributary areas, and if available the 1% AEP peak discharge. ***(NEW JUNE 2026)***
5. Prepare scaled plans using the City Geographical Information System (GIS) resources and the coordinate system in Section 1.42 []. List additional resources used for the base plan. ***(NEW JUNE 2026)***

ii. A tributary catchment area plan(s) based on boundary conditions from the watershed location plan, with these additional details:***(REVISED JUNE 2026)***

1. Drainage works for minor system and major system, with references to City GIS pipe and manhole ID numbers. ***(REVISED JUNE 2026)***
2. Existing topography and proposed grading contours for post-development, when available. ***(REVISED JUNE 2026)***
3. Street names and lot numbers. ***(REVISED JUNE 2026)***
4. A summary table of pipe and open channel analysis. ***(REVISED JUNE 2026)***

iii. A detailed plan of the proposed development, based on base plan from the tributary area, that includes: ***(REVISED JUNE 2026)***

1. Pre-development and post-development topography. ***(REVISED JUNE 2026)***
2. Sub-catchment areas to proposed drainage works. ***(REVISED JUNE 2026)***
3. Mitigative measures (retention, detention, water quality). ***(REVISED JUNE 2026)***
4. Label proposed areas, manholes, pipes and appurtenances in a logical way. ***(REVISED JUNE 2026)***
5. Overland flow routes clearly identified. ***(REVISED JUNE 2026)***
6. A summary table of pipe and open channel analysis. ***(REVISED JUNE 2026)***

iv. Methodology for analysis explaining the chosen hydrological and hydraulic and associated report presentation requirements, as per Section 7.03 Stormwater Runoff [→]. ***(REVISED JUNE 2026)***

v. Summary tables for the plans provides the following key design information: ***(REVISED JUNE 2026)***

1. Total and sub catchment areas.
2. Percent imperviousness values of the catchments. (***REVISED JUNE 2026)***
3. Hydraulic and Hydrologic design calculations for the pipe network, using either the Rational Method and Manning's Equation or computer modeling, to the plan limit boundary conditions as defined in Section 7.01.6 e (i) 3. ***(REVISED JUNE 2026)***
4. Clearly identify non-conforming conditions. These include, but are not limited to, minor system drainage works that exceed capacity during the 20% AEP event, as per Section 7.04 [→], and surcharge of the HGL in the major system and flooding as per Section 7.05 [→]. ***(REVISED JUNE 2026)***

vi. Water Quality - details on provisions address water quality leaving the site and entering the drainage system as per Section 7.14 [→], using the criteria in Section 7.02 [→]. ***(REVISED JUNE 2026)***

vii. Capture with Retention - details on provisions to address volume control as per Section 7.02 [→], through Rainwater Best Management Practices (BMP) as outlined in Section 7.13 [→]. ***(REVISED JUNE 2026)***

viii. Runoff Rate Control - details for peak discharge control as per Section 7.03.6 [→] and including design calculations for storage facilities including the required storage volume, design size and flow control considerations as per Section 7.12 [→]. ***(REVISED JUNE 2026)***

ix. Non-conforming conditions require approval by the City Engineer, as per Section 7.01.5(c) [→]. ***(NEW JUNE 2026)***

x. For systems which include works or facilities which require ongoing maintenance, a detailed operation and maintenance plan is required. ***(REVISED JUNE 2026)***

xi. Detailed design drawings, as per Section 1.05 [], for the proposed minor and major systems and rainwater management measures. The drawings should show the routing of flows and hydraulic grade lines under both the 1:5 AEP (20% AEP) and 1:100 AEP (1% AEP) design conditions. ***(REVISED JUNE 2026)***

xii. All Stormwater Management Plans, reports and drawings that are relied upon are to be authenticated by a Qualified Registered Professional licensed in British Columbia. ***(REVISED JUNE 2026)***

7.02 SUMMARY OF STORMWATER AND ENVIRONMENTAL PROTECTION DESIGN CRITERIA ***(REVISED JUNE 2026)***

.1 This section provides a summary of the design criteria to be used for the planning and design of stormwater management infrastructure. The planning and design for stormwater management infrastructure must meet the following criteria:

(a) A minor system conveyance capacity using the 1:5 AEP (20% AEP) rainfall event in Section 7.03.3 [→] and identified in Section 7.04 [→]. ***(REVISED JUNE 2026)***

(b) A major system conveyance capacity using the 1:100 AEP (1% AEP) rainfall event in Section 7.03.3 [→] and identified in Section 7.05 [→]. ***(REVISED JUNE 2026)***

(c) For areas draining to watercourses, provide rainwater capture with retention. This minimizes erosion, protects aquatic habitat and water quality. Depending on the habitat conditions, such as fish and wildlife, there may be other authorities having jurisdiction. Runoff rate control may be required to protect downstream infrastructure and natural assets. ***(REVISED JUNE 2026)***

(d) For areas draining directly to the ocean rainwater, capture with retention may not be required. However, runoff rate control may be required to protect downstream infrastructure. ***(REVISED JUNE 2026)***

(e) Capture with retention through Rainwater Best Management Practices (BMPs) to provide volume reduction and opportunities for infiltration, evaporation, reuse, or other approved method, as outlined in Section 7.13 [→]. ***(REVISED JUNE 2026)***

i. The target is to capture 31 mm of rainfall depth from impervious areas. In Nanaimo, 31 mm of rainfall represents the 85th percentile for rainfall events less than 24 hours duration. ***(REVISED JUNE 2026)***

ii. This captured water should drawdown from the BMP and recover within 12 to 36 hours to restore storage capacity. ***(NEW JUNE 2026)***

iii. If the site conditions do not permit infiltration or a constrained system is needed, then the maximum release rate permitted is 0.25 L/s/ha. ***(REVISED JUNE 2026_moved)***

(f) Provide water quality treatment for 36 mm of rainfall, which is 90% of the average annual rainfall onto impervious surfaces exposed to vehicle traffic as described in Section 7.14 – Water Quality [→]. The treatment performance is to remove 80% of Total Suspended Solids over 50 µm particle size. ***(REVISED JUNE 2026)***

(g) Control runoff rate using strategies like detention in storage facilities as per Section 7.12 [→], with the calculations for storage as per Section 7.03.6 [→]. ***(REVISED JUNE 2026)***

(h) Protect the downstream receiving watercourse from erosion. If the watercourse is located in an environmentally sensitive area (ESA) or is vulnerable to erosion, the City Engineer may require additional investigation to assess both the immediate connection point and potential downstream impacts, as per Section 7.01.5(c) [→]. ***(REVISED JUNE 2026)***

(i) Account for climate change in stormwater management designs as described in Section 7.15 - Climate Change [→].

7.03 STORMWATER RUNOFF

.1 Scope:

This section describes the rationale, methodology and parameters for determining the hydrologic variables such as stormwater runoff volume and rates in the design of drainage flow conveyance and storage facilities.

.2 Catchment and Impervious Areas: ***(REVISED JUNE 2026)***

(a) Drainage catchments are governed by topography of the land and drainage works or watercourses that intercepts and conveys runoff. Drainage areas can refer to nested hydrologic units: ***(NEW JUNE 2026)***

i. Watersheds are the largest units, ranging from short creeks draining to the ocean, to systems of creeks, lakes, wetlands, and rivers. Watershed boundaries can be obtained from City GIS; however, the Professional of Record should verify boundaries. ***(NEW JUNE 2026)***

ii. Tributary catchment areas are upstream areas draining into a junction or confluence of drainage works or watercourses. ***(NEW JUNE 2026)***

iii. The drainage area for a proposed development may be within one or more tributary areas or even watersheds. Post-development design may alter drainage boundaries, and these changes should be considered in the design and analysis. ***(NEW JUNE 2026)***

iv. During extreme events such as flooding, drainage catchment boundaries may shift. ***(NEW JUNE 2026)***

(b) The impervious area is a key driver in stormwater runoff. Depending on the calculation method, it may be embedded within another parameter, such as the runoff coefficient in the Rational Method; or represented explicitly as in most hydrograph models. For larger drainage catchments, impervious area is often approximated using land use designations. ***(NEW JUNE 2026)***

i. Analysis of the existing storm system typically considers current impervious surfaces such as buildings, roads, and parking areas. These can be estimated using recent orthophotos. ***(NEW JUNE 2026)***

ii. Analysis for replacement will generally use ultimate land use and references the current Official Community Plan Bylaw No. 6500 and applicable Regional District Community Plans for areas outside the City. ***(NEW JUNE 2026)***

iii. Post- development site analysis uses the impervious area specified in the design, rather than zoning-based approximations. Pre- development conditions are assumed to reflect very low impervious conditions (treed), even if the development site is currently developed, as per Section 7.01.5(d) [→]. ***(NEW JUNE 2026)***

.3 Rainfall Data: ***(REVISED JUNE 2026)***

(a) IDF Curves:
Intensity-Duration-Frequency data has been compiled into the IDF Curves shown on Standard Drawing No. SW-25 [] for the applicable design annual exceedance probability (AEP) rainfall. The updated IDF curve takes climate change into account to planning horizon Year 2100. ***(REVISED JUNE 2026)***

(b) Rainfall Gauges:
The City has several rainfall gauges with historical rainfall data. This rainfall data is available for reference if desired and can be provided by the City; however, it is up to the Qualified Registered Professionals to verify the quality of the data and use the data for hydrological calculation. ***(REVISED JUNE 2026)***

(c) Design Storms:
The City has used various design storm hyetographs in hydrograph-based watershed studies. For consistency, it may be advisable to use the same design storm applied in the watershed study if seeking comparable values. However, any selected option should reflect the Intensity-Duration-Frequency (IDF) curves that include climate change projections to the Year 2100. Alternatively, AES design storms for durations of 1-hour, 2-hour, 6-hour, 12-hour, and 24-hour are suitable options. ***(NEW JUNE 2026)***

.4 Time of Concentration:

(a) Time of Concentration
is the time required for stormwater runoff to travel from the most remote point of the drainage catchment area to the point of interest and having the greatest impact on downstream flows. ***(REVISED JUNE 2026)***

(b) Method:
There are several methods available to calculate time of concentration such as the Upland Method, Kinematic Wave Equation, Kirby Equation, Kirpich Equation, and others. The Qualified Registered Professional is responsible to determine and document the most appropriate method of calculating the time of concentration. Overland flow path times in undeveloped areas may be estimated using the Upland Method of Estimating Time of Concentration as shown on Standard Drawing No. SW-26 [] if the slope and land use of the area is known. ***(REVISED JUNE 2026)***

(c) Minimum and Maximum Time of Concentration:
The minimum time of concentration for all calculations is 5 minutes. The maximum time of concentration is 10 minutes for the overland flow component into the stormwater system in fully developed areas. Time of concentration with large areas of land which will remain undeveloped is determined by one of the above mentioned methods. ***(REVISED JUNE 2026)***

.5 Rational Method:

(a) Application:
The use of the Rational Method for final design calculations is to be limited to the design of minor or major systems where detention storage and/or other runoff controls do not exist or are not required, and where the catchment is not larger than 20 hectares.

(b) Formula:

$$Q = C\ I\ A\ X\ 2.78$$

Where:
Q = storm runoff flow in litres/second
C = the coefficient to runoff
I = the rainfall intensity in mm per hour
A = contributing catchment area in hectares

(c) Coefficient of Runoff (C):
The choice of coefficient of runoff "C" is based on ground slope, type of ground or surface cover, soil conditions, size of drainage area and the land use of the properties within the drainage catchment areas. The following table provides a range of coefficient for land use conditions: ***(REVISED JUNE 2026)***

TYPE OF DEVELOPMENT	COEFFICIENT OF RUNOFF
Industrial	0.80 to 1.00
Commercial Business Areas, Multi-Unit Residential ***(REVISED JUNE 2026)***	0.65 to 0.90
Single Unit Residential and Low Density Multi-Unit Residential ***(REVISED JUNE 2026)***	0.50 to 0.80
Rural Areas, Parks, Golf Courses	0.25 to 0.55
Dense Forest ***(REVISED JUNE 2026)***	0.05 to 0.15
Light Forest ***(REVISED JUNE 2026)***	0.15 to 0.25

(d) Presentation:
Where the rational formula is used for the storm sewer design calculations, in a format in accordance with Appendix H2, Stormwater Management Flow Analysis – Calculation Sheet must submitted. ***(REVISED JUNE 2026)***

.6 Computer Simulation Methodology – Hydrograph-Based: ***(REVISED JUNE 2026)***

(a) Application:
For all stormwater calculations which include detention storage or other runoff controls and/or catchment greater than 20 hectares, a computer simulation model must be used. The model results should be calibrated and must be used for design and sizing of all pipes and storage facilities. ***(REVISED JUNE 2026)***

(b) Stormwater Modeling Software:
The City supports the use of any interface that supports the SWMM modeling engine for the creation of hydrologic and hydraulic computer models. The use of the other types of software requires the prior approval of the City Engineer. ***(REVISED JUNE 2026)***

(c) Hydrology Methods:
There are several hydrology methods available in modeling software. Infiltration methods such as Green Ampt or Horton's are encouraged for modeling urban watersheds; however, these methods require site specific information regarding the geotechnical conditions.

(d) Storage Analysis:
Comprehensive analysis of the storage should be completed by the Qualified Registered Professional including a review of all storm durations up to the 24 hour event to determine the governing storm duration. In the future, the City may require continuous modeling be completed for storage analysis. ***(REVISED JUNE 2026)***

(e) Procedure:
An analysis of the post-development conditions is to be done at key points of the major and minor system for various durations of the design return period storms. This process will identify the most critical event to be used when designing the system. It should be noted that the storm duration which generates a critical event for the conveyance system may be different than the storm duration which generates a critical event for the storage facility.

(f) Presentation:
A report is required to document the design rationale used to develop the model. The report is to be included in the Stormwater Management Plan. At a minimum, the report includes the following: ***(REVISED JUNE 2026)***

i. An executive summary.
ii. Type and version of the modeling software used.
iii. All hydraulic and hydrologic parameters and assumptions.
iv. Design storms used and/or continuous modeling data used.
v. Summary of peak flows for each element of the system for both the major system and minor system in a table. ***(REVISED JUNE 2026)***
vi. At storage or flow control facilities, the summary incoming and outgoing hydrographs and the stage discharge curve. ***(REVISED JUNE 2026)***
vii. Post- development hydrograph at the point where the flows leave the system being modeled and where the flows leave the proposed development.
viii. Pre- development major system and minor system calculations. ***(REVISED JUNE 2026)***
ix. Comparison of pre- and post- development flows and hydrographs at the point where the flows leave the proposed development.
x. Recommendations.
xi. Tables showing existing and future pipe information.
xii. Drawings showing hydraulic grade line (HGL) for design scenarios. ***(REVISED JUNE 2026)***
xiii. A digital copy of the model files.

.7 Runoff Rate Control: *(REVISED JUNE 2026)*

(a) Design Rainfall Events (AEPs) Inputs: *(NEW JUNE 2026)*

i. 1:2 AEP (50%) and 1:5 AEP (20%) for flow control device design (Section 7.03.3 [→]) *(NEW JUNE 2026)*

ii. 1:100 AEP (1%) for overflow sizing *(NEW JUNE 2026)*

(b) Methodology is to compare pre-development and post-development hydrographs to evaluate: *(NEW JUNE 2026)*

i. Peak flow rate *(NEW JUNE 2026)*

ii. Duration of peak flow *(NEW JUNE 2026)*

iii. Additional runoff volume *(NEW JUNE 2026)*

(c) Criteria *(NEW JUNE 2026)*

i. Post-development peak flow must not exceed pre-development peak flow *(NEW JUNE 2026)*

ii. Peak flow duration must be representative of pre-development conditions *(NEW JUNE 2026)*

iii. Additional runoff volume (difference between hydrographs) must be managed *(NEW JUNE 2026)*

(d) Outputs / Solutions *(NEW JUNE 2026)*

i. Storage facilities (Section 7.12 [→]) *(NEW JUNE 2026)*

ii. Rainwater BMPs (Section 7.13 [→]) *(NEW JUNE 2026)*

7.04 MINOR SYSTEM

.1 Components and Conveyance: *(REVISED JUNE 2026)*

(a) The minor system must be designed to convey the runoff from the 1:5 AEP (20% AEP) rainfall, as per Section 7.03.3 [→]. The minor system includes all drainage works that convey, detain, divert, and intercept the runoff including pipes, catch basins, manholes, swales, ditches, driveway culverts and other appurtenances. *(REVISED JUNE 2026)*

.2 Location:

(a) The minor system is typically located in road right-of-way. *(REVISED JUNE 2026)*

(b) Where the minor system is located in private property, the utility corridor must be preserved by statutory right-of-way and/or restrictive covenants for ease of access to repair or maintain the system. *(REVISED JUNE 2026)*

.3 Surcharge and Hydraulic Grade Line (HGL): *(NEW JUNE 2026)*

(a) Storm sewer pipes must be designed so that hydraulic grade line (HGL) is within the pipe during a 20% AEP rainfall event. The design must account for the HGL elevation at the connection into the existing storm system. *(NEW JUNE 2026)*

(b) Driveway culverts are designed initially assuming inlet control and sized with the headwater below the crown of the pipe and otherwise meet the criteria in Section 7.07 [→]. ***(NEW JUNE 2026)***

(c) Ditches may function as part of both the minor and major drainage systems and must be evaluated under both rainfall runoff conditions. A key design constraint is ensuring proper hydraulic interaction with culverts and service connections. Design for the 20% AEP rainfall does not permit surcharge in these connected systems. Ditches are designed as open channels and meet the design parameters in Section 7.08 [→]. The hydraulic grade line (HGL) corresponds to the water surface elevation during the design storm and should be contained within the channel. Design must also account for clogging risk by providing adequate inlet capacity, maintenance access, and, where applicable, redundancy to prevent localized flooding. ***(NEW JUNE 2026)***

(d) Swales may function as part of both the minor and major drainage systems and be evaluated under both rainfall runoff conditions. A primary performance target is containing and directing overland flow paths. Swales are designed as open channels and meet the minimum design parameters in Section 7.09 [→]. The hydraulic grade line (HGL) corresponding to the water surface elevation which should be contained within the channel. ***(NEW JUNE 2026)***

(e) Surcharging of storm sewer pipes and driveway culverts is permitted during a rainfall event greater than 20% to 1% AEP rainfall event, provided that the design complies with the performance requirements of the major system outlined in Section 7.05 [→]. ***(NEW JUNE 2026)***

(f) Non-conformance requires an assessment and approval by the City Engineer, as per Section 7.01.5(c) [→]. ***(NEW JUNE 2026)***

7.05 MAJOR SYSTEM

.1 Components and Conveyance: ***(REVISED JUNE 2026)***

(a) The major system shall be designed to safely convey the runoff from the 1:100 AEP (1% AEP) rainfall, as per Section 7.03.3 [→]. Sources of runoff include outflows from the minor system, overland flows, storage facilities, lakes, wetlands and watercourses. The major system includes all drainage work, but is not limited to road crossing culverts, swales, ditches, roadways, overland flow paths, and watercourses. ***(REVISED JUNE 2026)***

.2 Location of Overland Flow Paths: ***(REVISED JUNE 2026)***

(a) Generally, the major system overland flow paths are conveyed in public road right-of-way and adequate watercourses. Where adequate overland flow paths cannot be established, pipes and ditch culverts of the minor system may be increased to convey the major flows, subject to approval of the City Engineer. If the runoff from major flows is conveyed in a piped system, an alternate overland flow path shall be provided to ensure redundancy in the case of blockages or rainfall events that exceed the system capacity. ***(REVISED JUNE 2026)***

(b) When the major flow may be conveyed by a public roadway, the street must be designed to provide sufficient hydraulic capacity to handle the major flow. Planning for street layout, roadway grades and the drainage system must be coordinated to ensure the street functions as part of the major drainage system. ***(REVISED JUNE 2026)***

(c) When an overland flow path crosses private property, the flow route must be protected and preserved by restrictive covenants and/or statutory right-of-way to ensure access to repair or maintain the system. ***(REVISED JUNE 2026)***

(d) Overland flow paths through private property must be designed to minimize property damage and endangerment to public safety and have a suitable erosion protection. ***(REVISED JUNE 2026)***

(e) If no safe overland flow path exists, the Professional of Record shall notify the City Engineer and provide a risk assessment and recommendations as per Section 7.01.5(c) [→]. ***(REVISED JUNE 2026)***.

(f) Where surcharge from the minor system results in major system flow on the roadway, additional catch basins may be required to ensure the flow can be recaptured by the minor system, as per Section 7.06.12 [→]. ***(REVISED JUNE 2026)***

.3 Discharge to Existing Watercourses:

(a) The discharge to an existing watercourse must be designed in a way that protects the watercourse from erosion, as per Section 7.02 [→]. Typically, flow velocities exceeding 1.5 m/s require an energy dissipater to reduce flow velocity to an acceptable rate. For design refer to Section 7.11 [→], and for specifications refer to Section 7.33 [→]. ***(REVISED JUNE 2026)***

.4 Flooding:

(a) The major system routing may allow minor inconvenience, such as localized flooding of streets and green spaces (parks, boulevard, landscaped areas, naturally vegetated areas, etc.). However, major damage, such as damage to dwellings, significant erosion of private property, or damage to public facilities shall not occur as a result of the major storm. The Professional of Record must document non-conforming conditions as per Section 7.01.5(c) [→]. ***(REVISED JUNE 2026)***

(b) Full width cross-sections are to be provided showing the depth of the major flow along public streets, private property, ditches, and watercourses at typical and critical areas of the overland flow path. ***(REVISED JUNE 2026)***

(c) The major system shall be designed such that all habitable portions of buildings including basements are a minimum 0.3 m above the major flow hydraulic grade line. If buildings or service connections are found to be non-conforming, the Professional of Record must notify the City Engineer and may be required to provide a risk assessment and recommendations as per Section 7.01.5(c) [→]. ***(REVISED JUNE 2026)***

(d) Existing buildings constructed to a previous standard may not have this protection from the major system. As a result, if a lot is redeveloped, the new minimum habitable floor elevation on that lot may not be the same as previous minimum habitable floor elevation.

(e) The grading for new developments must ensure that the slope of the ground around structures has positive drainage away from structures.

.5 Roadway:

(a) Where the roadway functions as part of the major system, the following criteria must be considered: ***(REVISED JUNE 2026)***

i. For local streets, the maximum depth at the crown of the roadway is to be 50 mm. ***(REVISED JUNE 2026)***

ii. For mobility arterial, mobility collector, urban arterial and urban collector streets, a minimum of 3.0 m width of the roadway must be free from flooding. ***(REVISED JUNE 2026)***

iii. Care should be taken when designing intersections of roadway which are used to convey the major storm so that flows can pass over the cross street. ***(REVISED JUNE 2026)***

iv. Care should be taken when designing the grading at roadway curves and at locations where major flow path turns at intersections or at tee intersections. ***(REVISED JUNE 2026)***

v. Cul-de-sacs which are down slope from the street will not be accepted as part of the major system, unless approved by the City Engineer.

vi. Care should be taken when designing driveways which are downslope from streets which form part of the major system. ***(REVISED JUNE 2026)***

(b) The hydraulic capacity of a street section to convey water can be calculated by the Manning Equation, subject to the above conditions for major flows in a roadway. ***(REVISED JUNE 2026)***

.6 Surcharge and 1:100 AEP Hydraulic Grade Line (HGL): ***(NEW JUNE 2026)***

(a) Road crossing culverts are to be designed and sized so that the headwater remains below the road elevation for runoff from a 1:100 AEP (1% AEP) rainfall event. Where the headwater exceeds the diameter of the pipe, the surcharged condition must meet the criteria in Section 7.05.4. Culverts must also meet the criteria in Section 7.07 [→]. ***(NEW JUNE 2026)***

(b) Ditches function as part of the major drainage systems. A key design constraint is ensuring proper hydraulic interaction with culverts and service connections under major system flow conditions. Ditches are designed as open channels and must meet the design parameters in Section 7.08 [→]. The HGL will likely submerge minor system components such as driveway culverts; this is acceptable provided major system criteria are satisfied. Maintain a freeboard of 0.3 m for structures described in Section 7.05.5. Non-conformance with the design criteria must be reported to the City Engineer in accordance with Section 7.01.5(c) [→]. ***(NEW JUNE 2026)***

(c) Where stormwater storage facilities, culverts, or ditches are hydraulically connected to building service connections or other sensitive infrastructure, the risk assessment and professional recommendations, as per Section 7.01.5(c) [→], may include backwater prevention measures, such as backwater valves, which are subject to approval by the City Engineer. ***(NEW JUNE 2026)***

(d) Swales function as part of the major drainage systems. A primary performance target is containing and directing overland flow paths. Swales are designed as open channels and meet the minimum design parameters in Section 7.09 [→]. The hydraulic grade line (HGL) corresponding to the water surface elevation should be contained within the channel. Swales typically are not hydraulically connected to service connections; however, this must be verified by the Professional of Record. ***(NEW JUNE 2026)***

(e) Where the roadway functions as part of the major system and conveys major flows, the hydraulic grade line (HGL) must be evaluated against roadway criteria in Section 7.05.5 [→] to ensure compliance with allowable depths and widths. ***(NEW JUNE 2026)***

(f) Surcharging of storm sewer pipes and driveway culverts is permitted during a rainfall event where the hydraulic grade line (HGL) exceeds the minor system capacity for events greater than the 20% AEP up to the 1% AEP rainfall event. ***(NEW JUNE 2026)***

(g) Non-conformance requires an assessment and approval by the City Engineer, as per Section 7.01.5(c) [→]. ***(NEW JUNE 2026)***

7.06 PIPE DESIGN DETAILS

.1 Grades and Velocity of Stormwater in Pipes and Service Connections:

(a) The minimum design velocity for pipes must be 1.0 m/s. ***(REVISED JUNE 2026)***

(b) Where the pipe discharge velocity exceeds 1.5 m/s into an open ditch or watercourse, provision must be made for the installation of an energy dissipater to reduce flow velocity to the acceptable rate. For specifications, refer to Section 7.33 [→]. ***(REVISED JUNE 2026)***

(c) There are no maximum allowable velocities; however, where velocity exceeds 3.0 m/s or grades exceed 10%, the need for scour protection must be examined and anchor blocks are required as per Standard Drawing No. T-8 [] and Standard Drawing No. T-8A []. ***(REVISED JUNE 2026)***

(d) All 100 mm diameter service connections are to have a minimum grade of 2%.

.2 Pipe and Service Connection Sizes:

(a) Minimum pipe diameters must be 250 mm. In residential areas, 200 mm diameter pipe may be approved by the City Engineer for the final section of a lateral sewer if:

i. the pipe has the required capacity; and

ii. future extension is not possible due to physical barriers or there is an existing alternate drainage connection for adjacent areas. ***(REVISED JUNE 2026)***

(b) Unless otherwise approved by the City Engineer, downstream pipe diameter are to be greater than or equal to upstream pipe diameter. ***(REVISED JUNE 2026)***

(c) Residential service connections are a 100 mm diameter, or larger as required by site conditions. ***(REVISED JUNE 2026)***

(d) Commercial and Industrial service connections are a 150 mm diameter, or larger as required by site conditions. ***(REVISED JUNE 2026)***

(e) Service connections servicing lawn basins are a150 mm diameter, or larger as required by site conditions. ***(REVISED JUNE 2026)***

.3 Selection of Pipe Material and Class:

(a) The Professional of Record will consider earth and live loading, soil conditions, and design life of the installation for determining pipe material and class. Pipe materials and brands must be per the City's Approved Products List []. ***(REVISED JUNE 2026)***

.4 Pipe Friction Factors:

(a) Storm sewers are to be designed using the Manning Formula. The minimum 'n' value is 0.013 for all approved pipes. ***(REVISED JUNE 2026)***

.5 Pipe and Service Connection Depths:

(a) Minimum Cover:

i. Storm sewers are to have 1.5 m of cover in right-of-way. ***(REVISED JUNE 2026)***

ii. Storm sewers are to have 1.0 m of cover in untravelled areas.

iii. Service connections are to have 0.75 m of cover.

iv. Where minimum cover cannot be provided, an explanation of the reasons and pipe loading calculations must be submitted with the proposed method of pipe protection to the City Engineer for approval. ***(REVISED JUNE 2026)***

(b) Where practical, service connections must be deep enough for gravity flow from the lowest elevation of each lot serviced. Where it is not practical, or where servicing the low elevation of the lots would require utilities in private lands, the development must be graded to prevent overland flow from impacting neighboring structures. ***(REVISED JUNE 2026)***

(c) All existing foundation drains must be connected. For vacant lots, service connections must be deep enough to allow gravity flow from foundation drains for future building(s) constructed to the minimum basement floor elevation, as determined by the Professional of Record. ***(REVISED JUNE 2026)***

(d) Storm water sewers must be deep enough so that service connections for surface and foundation drainage from all lots in the upstream drainage catchment can drain to the storm -water system by gravity. ***(REVISED JUNE 2026)***

.6 Curved Pipes:

(a) Horizontal curves on sewers require approval from the City Engineer.

(b) Horizontal curves will be considered where the configuration of the property lines requires curvature for a constant offset and where the design velocity exceeds 1 m/s.

(c) Vertical curves may be approved by the City Engineer where excessive depths or rock cuts are to be avoided or where energy dissipation is required.

(d) Curvature will be achieved through joint deflection only, bending of the pipe barrel will not be permitted. Joint deflections must not exceed 50% of the manufacturer's maximum recommended joint deflection. Radius of curvature must be uniform throughout the curves.

(e) Only one vertical or horizontal curve is permitted between manholes.

.7 Location of Stormwater Mains and Service Connections:

(a) Stormwater mains offsets from all watermains must be in accordance with Section 5.10.3 or apply protective measures as per Section 5.10.4 and Standard Drawing T-5 []. Typical storm sewer main offsets are shown in the standard drawings for roadways in Section 8.0. ***(REVISED JUNE 2026)***

(b) If there is a significant elevation difference between the lots on opposite sides of the street, if possible, storm sewers are to be located on the low side of the street where both sides are served by the sewer. If only the high side of the street is serviced by the storm sewer, storm sewers are to be located on the high side of the street.

(c) All lots must be provided with a storm sewer service connection, unless otherwise approved by the City Engineer. Service connections are to be located to the offsets as shown on Standard Drawing No. T-7 [].

(d) Storm sewer mains may be installed in a common trench with sanitary sewers provided the minimum outside pipe separation is 300 mm.

.8 Utilities in Private Lands:

(a) The following must be considered in the design of utilities crossing private lands:

i. The design of utilities must avoid crossing private lands. Utilities in private lands require the approval of the City Engineer. Approval will only be granted where it is shown that all other options have been exhausted.

ii. Utilities following property boundaries across private lands must be offset a minimum 2.0 m from the property boundary. ***(REVISED JUNE 2026)***

iii. Appurtenances such as manholes, valves, etc., must be located entirely on one property, they cannot be located on property boundaries.

iv. Utilities cannot cross private parcels in such a manner that they render the property unusable. Special consideration must be given to ensure the location of the utility crossing minimizes the limitations on the future use of the property.

(b) For a sample statutory right-of-way condition sheet, refer to Appendix C, Standard Drawing No. RW-2.

(c) For an Easement Release and Inspection Form Following the Construction of the Utility, refer to Appendix C.

(d) For minimum widths of statutory right-of-way and working widths, refer to Appendix D.

.9 Service Connection Lengths:

(a) The maximum length of a storm sewer service connection measured horizontally between the storm sewer and the property line is 15 m. Storm sewer services longer than 15 m require approval by the City Engineer. The service alignment will be perpendicular to the main. All inspection assemblies required for service connections in excess of 15 m in length must be shown on the design drawings. ***(REVISED JUNE 2026)***

(b) For industrial, commercial, and multi- unit residential servicing, and/or where oil interceptors are required, manholes must be provided where the service connects with the main or at the property line regardless of the size of the service. ***(REVISED JUNE 2026)***

(c) All services 250 mm in diameter or larger require manholes where the service connects with the main or at the property line. In the case of closely spaced services, every other service manhole is to be located on the service line close to the property line. ***(REVISED JUNE 2026)***

.10 Number of Service Connections per Lot:

(a) Each lot must be serviced by one only service connection for storm drainage. Where the size of the lot or the topography makes one service connection impractical, additional service connections may be allowed subject to the approval of the City Engineer.

.11 Manholes:

(a) Distances between manholes must not exceed 120 m unless otherwise approved by the City Engineer. For pipes larger than 600 mm in diameter, manhole spacing may be increased to 180 m.

(b) Manholes must be located at grade and alignment changes, at lateral size changes, at the upstream end of all lateral sewers, and either at the junctions of all lateral sewers with the main or at property line for services 250 mm and larger.

(c) Cleanouts may only be used, if approved by the City Engineer, at the upstream end of lateral sewers in a temporary situation during a phased development where the future phase of the development will remove the cleanout.

(d) Outside drops must be provided for pipe sizes 375 mm or less where the difference in elevation between incoming and outgoing sewers exceed 600 mm. Drops less than 600 mm in elevation must be accommodated by manhole benching. Precast manhole barrels must be sized according to normal inside pipe diameter and depth as detailed below:

Minimum		
Pipe Size (Normal)	**Depth of Manhole (Top of Cover to Invert)**	**Barrel Size (Inside Dia.)**
150 – 375 mm	0 – 5.9 m	1050 mm
150 – 375 mm	6.0 – 9.0 m	1200 mm
150 – 600 mm	9.0 m or greater	1500 mm
400 – 600 mm	0.0 – 8.9 m	1200 mm
675 – 750 mm	All Depths	1350 mm
900 – 1050 mm	All Depths	1500 mm
Minimum barrel sizes are to be increased for manholes within multiple large pipes.		

(e) Where cast in place manholes are proposed, all design and construction details, require approval from the City Engineer. ***(REVISED JUNE 2026)***

(f) Manholes must be designed to incorporate a minimum pipe invert elevation difference or at least 25 mm, in addition to the normal grade of the storm sewer, wherever a horizontal deflection exceeding 45 degrees occurs. Smaller pipe sizes are to be crown to crown with larger pipe sizes when entering manholes. For super critical flows or large pipes (>600 mm diameter), the hydraulic losses through manholes must be calculated and the corresponding drop in inverts across the manhole must be included in the design where appropriate.

(g) Manholes are to be located to avoid any conflict with curb and gutter or sidewalks.

(h) A watertight manhole frame and cover are required for all sewer manholes where flooding can occur or in areas subject to vandalism (i.e. parks, undeveloped right-of-ways, etc.).

.12 Catch Basins:

(a) Catch basins are to be provided at regular intervals along streets, at street intersections, and at all low points in the street.

(b) Catch basins located in streets must be spaced to collect a maximum of 450 m² of pavement drainage where grades do not exceed 5%. On grades over 5% the maximum area collected can be reduced to 300 m².

(c) Double catch basins are required at all low points in roadways and downhill cul-de-sacs except where located along non-mountable curb which provides for installation of a single curb inlet, refer to the curb inlet standard drawing. ***(REVISED JUNE 2026)***

(d) Location requirements for the different catch basin types must conform to the following: ***(REVISED JUNE 2026)***

i. Curb inlet catch basins are to be used in locations along non-mountable curbed streets at all low points or in other areas where additional inlet capacity is required. ***(REVISED JUNE 2026)***

ii. Boulevard catch basins are to be used in boulevards and easements outside of the paved roadway. ***(REVISED JUNE 2026)***

iii. Lawn basins may be used for locations on private property where drainage is required to be contained and prevented from flowing onto other properties, unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

iv. Shallow catch basins may be used in locations where it is not possible to provide a catch basin with a stump.

(e) Where the street roadway functions as part of the major system, catch basins must be provided in sufficient number and at appropriate locations to ensure that major storm runoff from the overland flow path can enter the storm system. The inlet capacity of the catch basins is to be reviewed by the Professional of Record and approved by the City Engineer. ***(NEW JUNE 2026)***

(f) Catch Basin Leads:

i. Single basin leads have a minimum diameter of 200 mm.

ii. Double basin leads have a minimum diameter of 250 mm.

iii. Lawn basin leads have a minimum diameter of 150 mm.

iv. Leads over 30 m have a minimum diameter of 250 mm.

v. Double catch basin leads must be joined using a wye fitting before connecting to the main. (*REVISED JUNE 2026)*

vi. The desired grade for a catch basin leads is 2%. Where it is impractical to obtain 2%, a catch basin lead with a 1% grade is acceptable.

.13 Surcharge and Hydraulic Grade Line (HGL): *(REVISED JUNE 2026)*

(a) Compliance limits for the Hydraulic Grade Line (HGL) are specified in Section 7.04 – Minor System [→], while HGL, surcharge, and flooding criteria are outlined in Section 7.05 – Major System [→]. *(REVISED JUNE 2026)*

.14 Trench Dams:

(a) Where there is any possibility of groundwater concentration to other utility trenches, storm sewer connections and trench dams are as per Section 4.18 – Trench Dams. *(REVISED JUNE 2026)*

.15 Subsurface Drains:

(a) Subsurface drains will be used where a geotechnical evaluation shows a high groundwater table or an area which significant cuts into the existing ground may create the potential for a saturated condition. Subsurface drains located adjacent to roadways will be extended well below the roadway base. The material for subsurface drains will be clear round drain rock in an envelope of approved filter material. A minimum 150 mm PVC perforated pipe will be placed at the bottom of the trench. *(REVISED JUNE 2026)*

7.07 CULVERTS

.1 General:

(a) Generally, culverts must be sized to suit the drainage area and cannot be smaller than upstream culverts without prior approval of the City Engineer.

(b) Inlet and outlet structures must be appropriately designed with energy dissipation, scour protection, erosion control and overflow protection as needed. For additional design criteria, Section 7.11 - Inlet and Outlet Structures [→]. For specifications, refer to Section 7.32 [→] and Section 7.33 [→]. *(REVISED JUNE 2026)*

.2 Road Crossing Culverts: ***(REVISED JUNE 2026)***

(a) Road crossing culverts are part of the minor system and major system, refer to Section 7.04 [→] and Section 7.05 [→].***(REVISED JUNE 2026)***

(b) Road crossing culverts must be minimum 450 mm diameter regardless of hydraulic capacity. ***(REVISED JUNE 2026)***

(c) Road crossing culverts for watercourses that are, or may reasonably be expected to become, fish bearing, are designed to provide fish passage. Designs are to incorporate baffles and embedded fish gravel substrate (see Section 9.0) and, where practicable, utilize open-bottom culverts as the preferred option. ***(REVISED JUNE 2026)***

.3 Driveway Culverts:

(a) Driveway culverts are designed as part of the minor system as per Section 7.04 [→]. ***(REVISED JUNE 2026)***

(b) Driveway culverts must be minimum 300 mm diameter regardless of hydraulic capacity. ***(REVISED JUNE 2026)***

7.08 DITCHES (WITHIN ROAD RIGHT-OF-WAY)

.1 Ditches are used in road allowances right-of-way where there is no curb and gutter to direct minor flows as per Section 7.04 [→] and major flows as per Section 7.05 [→] ***(REVISED JUNE 2026)***

.2 Ditches are to be designed to promote groundwater infiltration. ***(REVISED JUNE 2026)***

.3 Ditches adjacent to travelled roadways must not exceed 1.9 m in depth. ***(REVISED JUNE 2026)***

.4 Ditches are to be trapezoidal in shape having maximum side slopes of 1.5H:1V and a minimum bottom width of 450 mm.

.5 The minimum grade of a ditch must be 0.5%. ***(REVISED JUNE 2026)***

.6 The maximum velocity in an unlined ditch is limited to 1.5 m/s. Higher velocities may be permitted where soil conditions are suitable or where erosion protection has been provided. Excessive velocities should be avoided by using a piped system instead of ditches.

.7 On steep slopes, grade control structures may be required.

7.09 SWALES (WITHIN ROAD RIGHT-OF-WAY) ***(REVISED JUNE 2026)***

.1 Swales are to be used in right-of-way where there is no curb and gutter to direct minor and major flows towards watercourses or the nearest piped system or on private property in conjunction with lot grading to protect properties from overland sheet flow. ***(REVISED JUNE 2026)***

.2 Swales are to be designed to promote groundwater infiltration. ***(REVISED JUNE 2026)***

.3 Swales have a minimum depth of 150 mm, and a minimum width of 1.5 m. ***(REVISED JUNE 2026)***

.4 The minimum grade of a swale must be 1.0%. ***(REVISED JUNE 2026)***

.5 Swales should not be used where the velocity exceeds 1.5 m/s or on an excessively steep slope. ***(REVISED JUNE 2026)***

7.10 OPEN CHANNELS (WITHIN PRIVATE PROPERTY AND EASEMENTS)

.1 The design of open channels as part of the major system or minor system are restricted to the following maximum velocities: ***(REVISED JUNE 2026)***

(a) Unlined channel: 1.5 m/s

(b) Suitably lined channel: 3 m/s

.2 If the mean velocity exceeds that permissible for the particular kind of soil or greater than 1.5 m/s, the channel must be suitably lined to protect it from erosion. ***(REVISED JUNE 2026)***

.3 The maximum depth of flow cannot exceed 300 mm with a freeboard of 150 mm. ***(REVISED JUNE 2026)***

.4 Side slopes on designed channels cannot exceed 3H:1V. ***(REVISED JUNE 2026)***

.5 Open channels are to be designed, where possible, to promote infiltration. ***(REVISED JUNE 2026)***

7.11 INLET AND OUTLET STRUCTURES

.1 Inlet and outlet structures are required on all storm sewer pipes and culverts. Headwater requirements as per criteria in Section 7.04 – Minor System [→] and Section 7.05 – Major System [→]. ***(REVISED JUNE 2026)***

.2 A trash rack is required as a part of all inlet structures to storm sewer pipes. Trash racks may be required on culverts at the discretion of the City Engineer. ***(REVISED JUNE 2026)***

.3 Trash rack hydraulic and structural design must allow for passage of design flows with 50% blockage of the trash rack with debris. ***(REVISED JUNE 2026)***

.4 A safety grillage is required as part of an outlet structure from storm sewer pipes greater than 450 mm in diameter or 3.0 m in length. Safety grillages may be required on culverts at the discretion of the City Engineer.

.5 Pipe leaving inlet structures, where the inlet elevation significantly higher than the storm sewer, are to have a maximum grade of 5% for minimum 2.0 m. After the 2.0 m, the pipe grade can be adjusted with a vertical curve to attain design depth. ***(REVISED JUNE 2026)***

.6 Cast in place concrete inlet and outlet structures must be designed by a structural professional engineer to suit the specific site and soil conditions. Standard drawings are to be used as a guide for specific design criteria. Approved prefabricated inlet and outlet structures may be used. The Professional of Record must ensure the structures are designed to suit the existing site and soil conditions. ***(REVISED JUNE 2026)***

.7 Sandbag headwalls cannot be used except for driveway crossings or hydrant access crossing.

.8 Outlets for storm systems where velocities may cause erosion in the receiving channel must include a method to dissipate the energy, designed by a Professional of Record. For specifications, refer to Section 7.33 [→]. ***(REVISED JUNE 2026)***

.9 All inlet and outlet structures must include provisions for safe maintenance access and must conform to WorkSafeBC requirements ***(REVISED JUNE 2026)***

7.12 STORAGE FACILITIES

.1 General:

(a) The design of permanent storage facilities forming part of the minor system are an integral part of the overall drainage basin plan. ***(REVISED JUNE 2026)***

(b) The design of permanent storage facilities must consider safety and economical maintenance of operations. Storage facilities should also, where possible, be designed as multiuse facilities that include recreational, environmental and aesthetic aspects. ***(REVISED JUNE 2026)***

(c) Storage facilities are to accommodate the entire future developed tributary area. ***(REVISED JUNE 2026)***

(d) Depending on the site specific characteristics, a combination of storage and other groundwater recharge facilities may be appropriate to effectively reduce the runoff from development sites. ***(REVISED JUNE 2026)***

.2 Ownership:

(a) Residential: ***(REVISED JUNE 2026)***
Large storage facilities servicing residential developments will be owned and maintained by the City. Storage facilities constructed as part of a Bare Land Strata residential development will be owned and operated by the Strata Corporation. ***(REVISED JUNE 2026)***

(b) Multi- Unit Residential, Commercial, Industrial, and Institutional: ***(REVISED JUNE 2026)***
Storage facilities required as part of a multi- unit, commercial, industrial, or institutional development will be owned and operated privately. Facilities may be underground or above ground including roof top or parking lots. ***(REVISED JUNE 2026)***

.3 Storage Facility Options:

(a) Constructed Wetland:
Constructed wetlands can be incorporated into the drainage system as a means to not only control runoff but to introduce habitat for wildlife and add a bio-filtration element to the facility that improves water quality. The use of constructed wetlands is strongly encouraged.

(b) Wet Pond:
A wet pond is a method where rainwater runoff is collected and stored for a significant amount of time. The water in the active storage portion of the pond is usually released after the storm has ended, while a permanent pool is maintained during dry periods. These may form a recreational or aesthetic facility centered on a permanent pool of water.

(c) Dry Pond:
Dry ponds are used as temporary water storage after a significant rainfall event. They are typically controlled so that frequent low flows are not detained in the dry pond. As the pond is dry for the majority of the time, dry ponds can be landscaped in a way that they can be used for other purposes.

(d) Underground Storage:
A variety of methods are available for storing rainwater underground to control flows. Underground storage that incorporates other functions is encouraged; storage tank for water re-use (landscape irrigation), groundwater recharge, and infiltration are possible options.

(e) Other Methods:
There are a variety of other ways to store rainwater onsite including rooftop storage, parking lot storage, infiltration swales, rain gardens and many others. The City is open to innovative ways to store and infiltrate rainwater subject to the approval of the City Engineer. ***(REVISED JUNE 2026)***

.4 General Design Guidelines:

(a) Storage facilities are site specific and require a geotechnical evaluation to address the groundwater table interaction, and the permeability and stability of the existing soils. ***(REVISED JUNE 2026)***

(b) Maximum grade for a dry detention pond are to be 4H:1V. ***(REVISED JUNE 2026)***

(c) Maximum grade for a wet detention pond are to be 7H:1V from the normal water level to a depth of 0.4 m; steeper side slopes may be considered with a risk assessment and mitigation. ***(REVISED JUNE 2026)***

(d) Storage facilities must be designed to accommodate the design storage volume. The crest of the surrounding berm must be at least 300 mm higher than the maximum water level expected during the 1% AEP overflow condition. ***(REVISED JUNE 2026)***

(e) Where practical, sub-surface drains are preferred to ensure that the storage facility can be completely drained. Where subsurface drains cannot be installed, the pond must be designed so that mobile pumping equipment may be installed and used to drain the pond. ***(REVISED JUNE 2026)***

(f) All existing and future foundation drains must drain by gravity to the storage facility inlet pipe above the design storage level. ***(REVISED JUNE 2026)***

(g) An overflow spillway must be provided to handle potential peak runoff from the major storm or a blockage to the outlet. Discharge must be to the major system downstream flow path, see Section 7.05 [→]. ***(REVISED JUNE 2026)***

(h) An 8.0 m buffer zone is to be provided along the top of wet ponds, dry ponds, and constructed wetlands with a minimum building set-back of 15 m from the top of the storage facility. To be verified by a Qualified Registered Professional, especially when there is connectivity to Environmental Sensitive Areas. ***(REVISED JUNE 2026)***.

(i) An access of at least 3.0 m wide is to be provided to all storage facilities for maintenance purposes. The access design must accommodate motor vehicles unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

(j) Storage facilities are to be appropriately landscaped and protected from erosion. ***(REVISED JUNE 2026)***

(k) The outlet control for storage facilities are to be designed for safe access and maintenance with a lock to prevent vandalism. ***(REVISED JUNE 2026)***

(l) The pond design will include a sediment removal process for control of heavy solids which may be washed to the pond during the construction period associated with the development of the contributing basin. Sediment basins will be provided at all inlet locations for continued use after completion of the subdivision development.

.5 Temporary Storage Facilities:

(a) Where land development occurs in advance of completed drainage basin facilities, temporary storage facilities may be utilized on an individual basis as approved by the City Engineer.

(b) The design of temporary storage facilities are to consider the following: ***(REVISED JUNE 2026)***

i. The temporary storage facility meets or exceeds the requirements of this section for permanent storage facilities unless otherwise noted.

ii. All storm drainage systems discharging to the temporary storage facility can be connected to the permanent drainage works when completed and the temporary facility is abandoned.

.6 Storage Facility Outlets:

(a) The outlet of the storage facility should be designed to control the outflow as calculated based on Runoff Rate Control in Section 7.03.7. ***(REVISED JUNE 2026)***

(b) The outlet structure for a storage pond must discharge to a point downstream which has the ability to safely and adequately accommodate the maximum discharge. ***(REVISED JUNE 2026)***

(c) Outlet structures must be freeflow and ungated. Controls such as orifices and weirs are the preferred method of controlling the outflow. Manual controls such as gates, valves, or stop logs are discouraged. A valve will be permitted in the drain of a storage pond. ***(REVISED JUNE 2026)***

(d) Outlet structures are to conform to Section 7.11 [→]. ***(REVISED JUNE 2026)***

(e) For outlets that are not submerged, a lattice type cover over the inlet end of the outlet is preferred. A limiting velocity of 1.0 m/s is required for the design of the lattice.

(f) Outlets must be designed to all appropriate WorkSafeBC requirements for entry and exit. ***(REVISED JUNE 2026)***

(g) Outlet structure must be designed to allow safe access for cleaning of the inlet side during peak runoff. ***(REVISED JUNE 2026)***

7.13 RAINWATER BEST MANAGEMENT PRACTICES

.1 Introduction:

The development of previously vegetated land significantly changes the hydrological characteristics of the land by removing vegetation, changing the topography of the land, increasing impervious surfaces, and changing drainage paths. Traditionally, the increases in stormwater runoff created by this development have been mitigated through detention storage to control peak runoff and by increasing the hydraulic capacity of the drainage system. Recently, there has been progress toward considering more than just the hydraulic aspects of rainwater runoff and include aspects that can mimic the natural hydrologic process, protect watershed health, and improve water quality. Some of the rainwater best management practices described in this section are an attempt to mimic the natural characteristics of a watershed. Many of them promote infiltration of rainwater into the ground and provide groundwater recharge benefits in addition to rainwater runoff control. Rainwater best management practices (BMP) may also be called rainwater BMPs, stormwater source controls, low impact development BMPs, or rainwater management methods. ***(REVISED JUNE 2026)***

The use of rainwater best management practices is required wherever technically feasible for new developments and re-developments which outlet into a watercourse. For developments that do not drain into a watercourse, but discharge directly into pipes, ditches, or overland flow paths which discharge directly into the ocean, rainwater best management practices may not be required for runoff volume control, but for water quality enhancement only. ***(REVISED JUNE 2026)***

.2 Types of Rainwater Best Management Practices:

The following are brief descriptions of various rainwater best management practices which can be applied:

(a) Infiltration Swales:

An infiltration swale is designed to accept flows from small areas of impervious surface and allow it to infiltrate into the soils below. The swale also allows larger flows to be conveyed to the minor or major drainage system and provides water quality treatment.

(b) Rain Gardens:

Rain gardens are designed to have an aesthetically pleasing appeal in addition to providing water quality treatment and infiltration into the ground. The plantings are carefully selected based on the expected soil moisture conditions. Generally, rain gardens have a drain rock reservoir and a perforated drain system to collect excess water.

(c) Absorbent Landscaping:

The majority of the City's undeveloped land contains landscapes which soak up the rainfall. Applying absorbent landscaping to development sites is an attempt to mimic this natural landscape. The minimum thickness for absorbent landscaping is 300 mm. ***(REVISED JUNE 2026)***

(d) Green Roof:

A green roof includes a layer of growing media which supports vegetation. The application of green roofs can significantly reduce the runoff increase caused by new building construction. Green roofs must be designed with the structural considerations of the building and must comply with the *BC Building Code*.

(e) Infiltration Trenches:

An infiltration trench allows rainwater runoff to soak away into the ground. Infiltration trenches are best suited for runoff which does not require treatment, such as roof runoff. For areas where runoff requires treatment, consider pairing an infiltration trench with a rain garden.

(f) Soak-Away Manholes:

Soak-away manholes are similar to infiltration trenches; they allow the rainwater runoff to infiltrate into the soil through perforations in the manhole. Soak-away manholes are best suited for runoff which does not require treatment. For areas where runoff requires treatment, consider pairing a soak-away manhole with a feature which provides an aspect of treatment, such as a rain garden or infiltration swale.

(g) Pervious Paving: ***(REVISED JUNE 2026)***

Pervious paving allows rainfall to penetrate into the underlying soils through the paving. Care should be taken when designing pervious pavers to ensure materials used do not require special maintenance. Pervious paving should generally be restricted to low traffic areas. Where possible, other best management practices, such as rain gardens or infiltration swales are preferred to pervious paving as less maintenance is required and additional treatment benefits are realized. ***(REVISED JUNE 2026)***

(h) Deep Groundwater Recharge:
Deep groundwater recharge involves directly injecting stormwater into underground aquifers. Generally, injected stormwater must be treated to a high level for water quality prior to injection. Design for this practice may be highly complex and require specialist expertise and approval by the City Engineer.

(i) Retention:
Retention of rainwater runoff involves storage and release of rainwater at very low rates, to mimic natural groundwater interflow rates. ***(REVISED JUNE 2026)***

(j) Other Methods:
The BMPs listed above are some of the more common approaches to managing rainwater runoff in ways that mimic natural systems. Other methods may be accepted with approval by the City Engineer.

.3 Application:

(a) Refer to Section 7.02 for the Summary of Stormwater and Environmental Protection Design Criteria

(b) Residential: ***(REVISED JUNE 2026)***
Recent densification of residential zoning increases impervious coverage from roofs and driveways, resulting in higher runoff volumes to the storm system. For residential lots, the most practical rainwater best management practices (BMPs) include absorbent landscaping, pervious driveways and patios, and raingardens for localized infiltration. Where site constraints limit infiltration options, subsurface storage tanks with controlled release may be considered, subject to approval by the City Engineer. ***(REVISED JUNE 2026)***

(c) Multi-Unit Residential, Commercial, Industrial, and Institutional: ***(REVISED JUNE 2026)***
The use of rainwater best management practices to infiltrate and retain rainwater is required for multi- unit, commercial, industrial, and institutional developments in order to preserve the natural hydrologic condition as much as possible. ***(REVISED JUNE 2026)***

(d) Steep Slope Development:
Steep slope development, in Development Permit Area (DPA 6) and adjacent to Hazardous Slope (DPA 2) may not be suitable for some rainwater best management practices. Developments in these areas will require specific attention to methods of retention and detention so that post development stormwater management targets can be met. ***(REVISED JUNE 2026)***

(e) Areas which are underlain by shallow coal mines and Development Permit Area (DPA 4) may not be suitable for some rainwater best management practices. Developments in these areas will require specific attention to methods of retention and detention so that post development stormwater management targets can be met. ***(REVISED JUNE 2026)***

.4 Design:

(a) Detailed methodology for the design of rainwater best management practices can be found in Metro Vancouver's "Stormwater Source Control Design Guidelines 2023". An overview of some of the design considerations are listed below.

(b) Sizing Methods:
There are several ways to size and design rainwater best management practices. Programs capable of continuous modeling will be in accordance with Section 7.03.6(b) [→]. The Professional of Record (or Qualified Registered Professional) must document the chosen approach and clearly demonstrate that the design meets the performance targets in Section 7.02 [→].

(c) Soil Hydraulic Conductivity:
Hydraulic Conductivity rates are to be determined by a Qualified Registered Professional and be supported by site soil conductivity testing. ***(REVISED JUNE 2026***

Rainwater infiltration and groundwater recharge facilities are still encouraged on sites with moderate or low soil hydraulic conductivity, even when the facility cannot accommodate the full target infiltration volume. Retention type facilities may be investigated to make up the difference.

(d) Groundwater:
Seasonal groundwater levels are to be assessed when considering rainwater infiltration and groundwater recharge. ***(REVISED JUNE 2026)***

(e) Bedrock:
Rainwater infiltration and groundwater recharge facilities may not be practical in areas where there is bedrock close to the surface. It should be noted that certain types of bedrock are highly pervious (i.e. fractured sandstone) and suitable for infiltration. ***(REVISED JUNE 2026)***

(f) Drinking Water Wells:
The design of groundwater recharge facilities must be separated from drinking water wells and comply with all applicable provincial requirements for groundwater protection and minimum separation distances between wells and septic systems. ***(REVISED JUNE 2026)***

(g) Water Quality:
Water infiltrated into the ground must be uncontaminated. Sites that present a high risk of groundwater contamination must provide appropriate pre-treatment and spill control. Examples of these sites include: ***(REVISED JUNE 2026)***

i. Automobile Service Yards, and

ii. Industrial Chemical Storage Facilities.

(h) Contaminated Soils:
Sites with contaminated soils must be reviewed by a Qualified Registered Professional for suitability for rainwater infiltration into the ground. ***(REVISED JUNE 2026)***

(i) Steep Slopes and Unstable Soils:
Sites containing steep slopes, near steep slopes, or unstable soils must be reviewed by a Qualified Registered Professional for suitability for rainwater infiltration and groundwater recharge facilities, but generally these facilities are prohibited in such conditions as they can saturate soils and can exacerbate slope instability. Designers should refer to the City's Development Permit Areas (DPA), DPA 3 and DPA 5, for areas where there may be concerns for surface water control and/or subsurface infiltration. It is important that infiltrated water does not seep out of down slope areas, impacting other properties. If there is a reason for concern with the suitability of proposed on-site infiltration facilities, the City Engineer may request a peer review by a Qualified Registered Professional, with specific expertise in hydrogeology. ***(REVISED JUNE 2026)***

(j) Overflows:
Rainwater best management practices must be designed with an overflow into the minor or major drainage system. ***(REVISED JUNE 2026)***

(k) Maintenance:
The design must minimize the maintenance required in order for the facilities to properly operate. Regular maintenance which is required must be identified in the Stormwater Management Plan. ***(REVISED JUNE 2026)***

(l) Sediment Loads:
All rainwater management best practices, other than green roofs, must be designed in such a way that there is a simple procedure for removing sediment which does not require confined entry. Specific attention is needed during the construction period. Infiltration facilities are to be designed in a way which prevents sediment from entering the facility and plugging the water-soil interface. ***(REVISED JUNE 2026)***

7.14 WATER QUALITY

.1 Introduction:

(a) All stormwater management systems must be designed in a way that prevents harmful materials from entering the natural watercourses. Methods of controlling the water quality must be outlined in the Stormwater Management Plan Report. ***(REVISED JUNE 2026)***

.2 Treatment:

(a) High Risk Sites:
Sites which present a high risk of groundwater or receiving water contamination must provide appropriate treatment prior to water entering the stormwater system. Examples of these sites include: ***(REVISED JUNE 2026)***

i. Automobile Service Yards, and

ii. Industrial Chemical Storage Facilities.

These uses may require covered areas to separate them from stormwater contact and may require discharge to the sanitary sewer.

(b) Parking Areas:
All uncovered parking areas greater than 100 m² in size require treatment to remove oil, total suspended solids (TSS), and other contaminants. Remove 80% TSS over 50 µm particle size. Treatment can be achieved by draining the parking area to rainwater best management practices or by installing a mechanical method for removing the contaminants. Where possible, treatment using rainwater best management practices is preferred as they provide additional rainwater management benefits at the same time as water quality treatment. ***(REVISED JUNE 2026)***

(c) Design Requirements for Water Quality Treatment:
On sites where water quality treatment is required, including when mechanical treatment is selected (such as an oil water separator), the facilities must be designed to treat 90% of the total volume of stormwater runoff for a typical year which is equivalent to 36 mm of rainfall per square metre of impervious area. Maintenance manuals are to be provided for all mechanical treatment facilities. ***(REVISED JUNE 2026)***

(d) Sediment:
All stormwater management systems must be designed to minimize sediment discharges both during and after construction. Excess sediment is harmful to both the downstream aquatic environment and the functionality of conveyance and infiltration facilities. The systems must be designed with awareness of possible sediment sources and methods of intercepting and removing sediment before it clogs infrastructure and harms the downstream environment. ***(REVISED JUNE 2026)***

(e) Water Quality:
Treated water must meet ***British Columbia Approved Water Quality Guidelines*** as set out by the British Columbia Ministry of Environment and Climate Change Strategy. ***(REVISED JUNE 2026)***

7.15 CLIMATE CHANGE

.1 Rainfall Patterns:

(a) The City recognizes that climate change is altering historical rainfall patterns in Nanaimo. Rainfall is a key parameter in the design of storm systems. These changes introduce uncertainty in long-term infrastructure and development planning, which is addressed through a risk-based approach. ***(REVISED JUNE 2026)***

(b) Mitigation of rainfall uncertainty due to climate change is based on guidance from the Association of Professional Engineering and Geoscientists of BC [1] and current down scaled climate model projections from the Pacific Climate Impacts Consortium[2] Risk management is implemented through engineering design and stormwater management for frequent (minor rainfall) and extreme (major rainfall) events. The updates are reflected in the Intensity-Duration-Frequency (IDF) curves derived from rain gauge data, which have been updated to account for Climate Change to Year 2100 as shown in Standard Drawing No. SW-25 . Refer to Section 7.03.3 [→]. ***(REVISED JUNE 2026)***

7.20 SCOPE

.1 This specification refers to gravity sewer pipe and appurtenant fittings for storm sewers. Only those products approved by the City Engineer and listed in the City's Approved Products List [] will be accepted for installation. ***(REVISED JUNE 2026)***

.2 Refer to Section 4.0 - Excavation, Trenching and Backfill [] for related specifications.

7.21 MATERIALS TESTING

.1 If, in the opinion of the City Engineer, testing is required, the Professional of Record will arrange for a testing firm to carry out tests to determine whether the applicable standards and specifications have been met. Where initial testing indicates inadequacies, additional testing may be required by the Professional of Record. ***(REVISED JUNE 2026)***

.2 The Contractor, as directed by the Professional of Record, must supply specimens or samples for testing. ***(REVISED JUNE 2026)***

.3 The types of tests listed below may be required by the City Engineer unless in the opinion of the City Engineer other testing is required. ***(REVISED JUNE 2026)***

.4 Joints for storm sewer main pipe and fittings and service connection pipe and fittings must be capable of meeting the following exfiltration tests. The Professional of Record may require that these tests be carried out by the Contractor or their supplier prior to acceptance of pipe on the project. ***(REVISED JUNE 2026)***

(a) Pipes in Proper Alignment:

Not fewer than 3 or more than 5 pipes selected from stock by the Professional of Record are to be assembled according to standard installation instructions issued by the manufacturer. With ends bulkheaded and restrained against internal pressure, the section is subjected to 70 kPa hydrostatic pressure. Pressure must be maintained for a period of 24 hours. There must be no leakage at the joints. ***(REVISED JUNE 2026)***

(b) Pipes in Maximum Deflected Position:

At least 2 joints of the assembly are to be deflected to the maximum amount recommended by the manufacturer. 35 kPa internal hydrostatic pressure is then applied to the test section and maintained for a period of 24 hours. There must be no leakage at the joints. ***(REVISED JUNE 2026)***

(c) Pipes in Maximum Lateral Misalignment:

The test section is to be supported on blocks or otherwise so that one of the pipes is suspended freely between adjacent pipes and bears only on the jointing material. The suspended pipe is then loaded on the bell or coupling by a load equal to one-third of the ultimate 3-edge bearing strength required by the applicable ASTM specification, except that a pipe with a laying length of more than 1.2 m must be loaded no more than the amount computed for a 1.2 m length. There must be no leakage at the stressed joint while under this load of 35 kPa internal hydrostatic pressure. ***(REVISED JUNE 2026)***

7.22A PIPING, FITTINGS AND SERVICES

.1 The size and type of pipe to be used are shown on the drawings.

.2 Concrete Pipe:

(a) Non-reinforced concrete pipe and fittings must conform to ASTM C14M Class 3 to a maximum diameter of 600 mm and designed with flexible rubber gaskets joints conforming to ASTM C443M. ***(REVISED JUNE 2026)***

(b) Reinforced circular concrete pipe and fittings must conform to ASTM C76M Class III or higher for all pipe greater than 600 mm diameter and are to be designed with flexible rubber gasket joints conforming to ASTM C443M. ***(REVISED JUNE 2026)***

(c) Pipe with chips, cracks, porous concrete, or any other defects which impair joint sealing or durability will not be accepted.

.3 Polyvinyl Chloride (PVC) Pipe (Smooth Profile):

(a) Pipe and fittings up to 675 mm diameter must be DR35. Pipe and fittings must have a minimum pipe stiffness of 320 kPa at 5.0% deflection when tested in accordance with ASTM D2412. ***(REVISED JUNE 2026)***

(b) Pipe and fittings must be manufactured to the following specifications: ***(REVISED JUNE 2026)***100 mm – 375 mm diameter to ASTM D3034 and CSA B182.2
450 mm – 675 mm diameter to ASTM F679 and CSA B182.2

(c) Pipe and fittings must include integral bell and spigot ends with stiffened wall section and a formed groove for a rubber gasket conforming to ASTM F477. ***(REVISED JUNE 2026)***

(d) All PVC storm pipe must be green in colour. ***(REVISED JUNE 2026)***

.4 Ductile Iron Pipe:

(a) Pipe and fittings must conform to ASTM A746 or as approved by the City Engineer. ***(REVISED JUNE 2026)***

.5 Polyvinyl Chloride (PVC) Service Pipe:

(a) All storm service inspection assemblies must be green in colour. ***(REVISED JUNE 2026)***

(b) Storm service connections of 100 mm diameter must be DR28 and conform to CSA B182.1. Pipe and fittings must have elastomeric seal joints, locked in gasket, and integral bell joint features. ***(REVISED JUNE 2026)***

(c) Storm service connections greater than 100 mm diameter are to be as specified for PVC (smooth profile) mainline pipe. ***(REVISED JUNE 2026)***

.6 High Density Polyethylene (HDPE) Pipe (Smooth Profile):

(a) Pipe must conform to AWWA C906. All pipes are to be certified by Canadian Standards Association – CSA B137.1. ***(REVISED JUNE 2026)***

(b) Minimum acceptable pipe class is DR26 with a hydrostatic design stress rating of 10 MPa. ***(REVISED JUNE 2026)***

(c) All pipe supplied must bear the pipe series designation and manufacturer's name. ***(REVISED JUNE 2026)***

(d) Fabricated HDPE mitred fittings must conform to AWWA C906 and certified by Canadian Standards Association – CSA B137.1. Mounded HDPE fittings to ASTM D3261 suitable for pressure rating specified and fusion to main pipe. Pipe deflection up to manufacturer's recommended minimum radius may be used in place of fabricated mitre bends and to form the required vertical and horizontal curves. Polyethylene fittings must have a pressure rating at least equal to that of the pipe being joined. ***(REVISED JUNE 2026)***

7.22B JOINTS

.1 Storm sewer main pipe and fittings and service connection pipe and fittings must be jointed with a rubber gasket or other pre-formed, factory-manufactured gasket or approved material, designed for use with the specified pipe. Solvent connected joints and fittings are not permitted. ***(REVISED JUNE 2026)***

.2 High Density Polyethylene (HDPE) Pipe (Smooth Profile) Joints:

(a) Joints must be by thermal butt-fusion constructed in accordance with the manufacturer's specifications. ***(REVISED JUNE 2026)***

(b) Flange joints can be used to join long sections of butt-jointed pipe or as shown on the construction drawings. ***(REVISED JUNE 2026)***

(c) Flanges for polyethylene pipe must be slip-on type installed in conjunction with stub ends supplied by the pipe manufacturer. The flanges must be Class 150 meeting ANSI B16.5 drilling dimensions. Flanges must be carbon steel. ***(REVISED JUNE 2026)***

(d) All flanged joints must be separated by a neoprene gasket bonded to one of the flange faces. Neoprene for flange gaskets are to be 3 mm thick with holes drilled for flange bolts and size equal to flange diameter. ***(REVISED JUNE 2026)***

(e) Bolts and nuts for flanges must be stainless steel complete with isolation washers. ***(REVISED JUNE 2026)***

(f) Refer to Section 7.46 - Fitting and Joint [→] installation. ***(REVISED JUNE 2026)***

7.23 SERVICE JUNCTIONS

.1 Concrete Pipe (non-reinforced and reinforced):

(a) Service connections must be manufactured using a sanded PVC male end stub pipe with integral bell. ***(REVISED JUNE 2026)***

(b) Stub orientation may be at 45˚ or 90˚ to the centerline of the mainline pipe (either at 9 o'clock to 11 o'clock, or at 10 o'clock to 3 o'clock).

(c) Field break-in and mortar patch joints are not permitted unless approved by the City Engineer. Refer to Section 7.48 - Service Connection Junction [→] installation. ***(REVISED JUNE 2026)***

.2 PVC Pipe (Smooth Profile):

(a) Service connections to PVC mainline pipe must be made with extrusion molded PVC or fabricated PVC fittings manufactured to ASTM D3034, CSA B182.1 and CSA B182.2. ***(REVISED JUNE 2026)***

(b) The use of saddles instead of manufactured wye fittings requires approval by the City Engineer. Where pipe saddles have been installed without approval, the City will require removal and reinstatement with an acceptable installation. ***(REVISED JUNE 2026)***

(c) Refer to Section 7.48 - Service Connection Junction [→] installation. ***(REVISED JUNE 2026)***

.3 PVC Pipe (Ribbed Profile):

(a) Ribbed pipe is only permitted when repairing an existing ribbed pipe section. ***(REVISED JUNE 2026)***

(b) Service connections to PVC mainline pipe must made with extrusion molded or fabricated PVC fittings manufactured to ASTM D3034, CSA B182.1 and CSA B182.2. ***(REVISED JUNE 2026)***

(c) For connections more than two pipe sizes smaller than the mainline, prefabricated service saddle connections may be approved.

(d) Refer to Section 7.48 - Service Connection Junction [→] installation. ***(REVISED JUNE 2026)***

.4 High Density Polyethylene (HDPE) Pipe (Smooth Profile):

(a) Service connections to HDPE mainline pipe must be made with manufactured fittings, electro-fused or heat-welded to the mainline pipe. Mechanical connections, if used, must be water-tight. ***(REVISED JUNE 2026)***

(b) Refer to Section 7.48 - Service Connection Junction [→] installation. ***(REVISED JUNE 2026)***

.5 High Density Polyethylene (HDPE) Pipe (Open Profile):

(a) Service connections to HDPE mainline pipe must be made with extrusion molded or fabricated fittings manufactured to CSA B182.1, B182.2 and B182.4. ***(REVISED JUNE 2026)***

(b) For service connections more than two pipe sizes smaller than the mainline, prefabricated service saddle connections may be approved.

(c) Refer to Section 7.48 - Service Connection Junction [→] installation. ***(REVISED JUNE 2026)***

7.24 PERFORATED DRAINS

.1 The granular material for perforated drains must be a clear round drain rock with 100% passing 40 mm and 0% passing 10 mm screens. ***(REVISED JUNE 2026)***

.2 Piping must be a minimum 150 mm diameter DR28 PVC perforated pipe with a minimum of 50 perforations 5 mm in diameter per linear metre of pipe for all pipe sizes. ***(REVISED JUNE 2026)***

.3 Perforations must be located in the bottom half of the pipe only. ***(REVISED JUNE 2026)***

.4 Filter fabric must be non-woven polyester fabric conforming to: ***(REVISED JUNE 2026)***

Tensile Strength (ASTM 1682)	250	N (minimum)
Bursting Strength (ASTM D-751)	865	kPa (minimum)
Permeability	$2x10^{-2}$	cm/s

7.25A PRECAST MANHOLE SECTIONS

.1 Unless otherwise approved, all manholes sections must be precast reinforced concrete conforming to ASTM C478. ***(REVISED JUNE 2026)***

.2 All precast sections must be complete with ladder rungs. ***(REVISED JUNE 2026)***

.3 0-ring rubber gaskets must conform to ASTM C443. ***(REVISED JUNE 2026)***

.4 Refer to Section 7.51 - Precast Manhole Sections [→] installation. ***(REVISED JUNE 2026)***

7.25B PRECAST MANHOLE BASES

.1 Precast manhole bases must be reinforced concrete in accordance with ASTM C478. ***(REVISED JUNE 2026)***

.2 All dimensions, specifications, and installations must conform to the requirements for cast in place manhole bases in accordance with Section 7.49 - Cast In Place Manhole Concrete Bases [→], Section 7.52 - Precast Manhole Bases [→] and the Standard Drawings. ***(REVISED JUNE 2026)***

.3 Pipe alignment, grade, and invert elevations in the precast manhole bases must conform to the construction drawings. ***(REVISED JUNE 2026)***

7.25C MANHOLE TOPS

.1 Manhole tops must be flat slab, precast concrete. Tops must be reinforced to meet CS600 loading requirements. Precast tops must conform to ASTM C478 with approved offset opening for frame and cover. ***(REVISED JUNE 2026)***

7.25D MANHOLE COVERS AND FRAMES

.1 Covers and frames must be cast iron and certified to meet CS600 loading requirements with the bearing faces of the cover to be frame machined for non-rocking fit. ***(REVISED JUNE 2026)***

.2 Patterns, dimensions and weights are to be in accordance with the Standard Drawings. Covers must have "CITY OF NANAIMO STORM DRAIN" permanently embossed on the covers. ***(REVISED JUNE 2026)***

.3 Standard manhole frame and cover are to conform to Standard Drawing No. SW-16 – Storm Manhole Cover [].***(REVISED JUNE 2026)***

.4 Utility chamber manhole frame and cover are to conform to Standard Drawing No. SW-17 – Utility Chamber Storm Manhole Frame, Ring and Cover []. ***(REVISED JUNE 2026)***

.5 A watertight manhole frame and cover, if required, are to conform to Standard Drawing No. SW-18 – Watertight Storm Manhole Frame and Cover []. ***(REVISED JUNE 2026)***

.6 Covers located in statutory right-of-way must be permanently embossed with the additional wording "DO NOT COVER". ***(REVISED JUNE 2026)***

.7 Refer to Section 7.54 - Frame and Cover [→] installation. ***(REVISED JUNE 2026)***

7.25E MANHOLE LADDER RUNGS ***(REVISED JUNE 2026)***

.1 Rungs must conform to ASTM C478 for concrete manhole rungs and ladders and must be a 19 mm diameter aluminum alloy conforming to CSA S157. ***(REVISED JUNE 2026)***

.2 Refer to Section 7.55 - Manhole Ladder Rungs [→] installation. ***(REVISED JUNE 2026)***

7.26 CONCRETE

.1 Concrete for cast in place are to conform to Section 11.0 - Cast In Place Concrete Works []. ***(REVISED JUNE 2026)***

7.27 PRECAST CONCRETE GRADE RINGS

.1 Precast concrete grade rings must conform to ASTM C478. ***(REVISED JUNE 2026)***

.2 For streets with steep grades, sloped concrete grade rings are to be used in conjunction with an adjustable manhole frame assembly. ***(REVISED JUNE 2026)***

7.28 TEMPORARY CLEANOUT FRAMES AND COVERS

.1 Temporary cleanout structures may only be used if approved by the City Engineer where there is development phasing. ***(REVISED JUNE 2026)***

7.29 PIPE AND FITTINGS FOR DROP MANHOLE STRUCTURES

.1 Pipe and fittings for drop manhole structures are specified under Section 7.22A - Piping, Fittings and Services [→] and Section 7.22B – Joints [→]. ***(REVISED JUNE 2026)***

.2 Refer to Section 7.56 for drop manhole structures [→] installation.

7.30 -NOT USED-

7.31A PRECAST CATCH BASIN BARRELS AND LEADS

.1 Catch basins barrels must be 600 mm or 750 mm diameter as noted on the standard drawings and must be reinforced concrete conforming to ASTM C478, Class III. ***(REVISED JUNE 2026)***

.2 Catch basin leads are to be of the same material as the main piping and used the same type of joints, gaskets, and fittings. ***(REVISED JUNE 2026)***

.3 Catch basin lead minimum sizes and desired grade as per Section 7.06.12 [→]. ***(REVISED JUNE 2026)***

7.31B CATCH BASIN CASTINGS

.1 Catch basin frame and grating are to be in accordance with Standard Drawings: ***(REVISED JUNE 2026)***

(a) SW-6 - Catch Basin Frame and Grate []
(b) SW-7 - Adjustable Catch Basin Frame and Hood []
(c) SW-8 - Boulevard Catch Basin Frame and Grate []

7.32 INLET AND OUTLET STRUCTURES

.1 Concrete inlet and outlet structures must be precast unless approved by the City Engineer. ***(REVISED JUNE 2026)***

.2 Cast in place concrete are to conform to Section 11.0 - Cast In Place Concrete Works []. ***(REVISED JUNE 2026)***

.3 The trash rack are to be pre-fabricated to match the pre-fabricated inlet or outlet structure. Custom built trash racks must be constructed with 20 mm diameter hot dipped galvanized bar. ***(REVISED JUNE 2026)***

7.33 ENERGY DISSIPATOR OUTLET STRUCTURES

.1 Energy dissipators must be pre-cast concrete integral to the outlet structure, unless approved by the City Engineer. The design must reduce runoff velocities to less than 1.5 m/s and disperse runoff evenly. ***(REVISED JUNE 2026)***

7.34 INLET AND OUTLET PROTECTIVE FENCING AND HANDRAILS

.1 Unless otherwise specified, protective fencing, and handrails including posts, pipe rails, and hardware are to be hot dip galvanized steel. Mesh must be 50 mm wire mesh, 9 gauge, hot dip galvanized, or plastic coated. ***(REVISED JUNE 2026)***

7.35A CULVERTS

.1 Concrete pipe are to conform to Section 7.22A - Piping, Fittings and Services, clause 7.22A.2 [→]. ***(REVISED JUNE 2026)***

.2 PVC pipe are to conform to Section 7.22A - Piping, Fittings and Services, clause 7.22A.3 [→]. ***(REVISED JUNE 2026)***

.3 Ribbed PVC pipe is permitted only for driveway culverts and must conform to CSA B1800. ***(REVISED JUNE 2026)***

7.35B CULVERT HEADWALLS

.1 Sacks are to be 0.25 kg burlap with approximate inside dimensions of 350 x 900 mm as measured when the sack is laid flat. ***(REVISED JUNE 2026)***

.2 All cast in place concrete are to conform to Section 11.0 - Cast In Place Concrete Works []. ***(REVISED JUNE 2026)***

.3 Reinforcing bars must be 15M intermediate grade steel conforming to CSA G30.18, Grade 400. ***(REVISED JUNE 2026)***

.4 Composite material headwalls may be used for culvert headwalls at the discretion and on approval of the City Engineer.

7.36A RIPRAP

.1 Riprap must be hard, dense, durable quarry stone, free from seams, cracks, or other structural defects, with a specific gravity of not less than 2.65. ***(REVISED JUNE 2026)***

.2 The gradation of rock sizes (mass in kg) for each class of riprap is to conform to the following table: ***(REVISED JUNE 2026)***

Class of Riprap (kg)	Nominal Thickness of Riprap (mm)	Rock Gradation (Percentage Larger than given rock mass, kg)			Approximate Average Dimension of Rock (mm)
		85%	50%	15%	
10	350	1.0	10	30	200
25	450	2.5	25	75	300
50	550	5.0	50	150	350
100	700	10	100	300	450
250	1000	25	250	750	600
500	1200	50	500	1500	800
1000	1500	100	1000	3000	1000
2000	2000	200	2000	6000	1200
4000	2500	400	4000 ***(REVISED JUNE 2026)***	12000	1500

Example: For Class 50 Riprap

85% of riprap stones are greater than 5.0 kg.
50% of riprap stones are greater than 50 kg.
15% of riprap stones are greater than 150 kg.

Based on Province of British Columbia Ministry of Transportation and Infrastructure. (2020). *Standard specifications for* highway *construction: Volume 1*. Table 205-C: Gradation and Intermediate Dimension of Rock by Class of Riprap ***(REVISED JUNE 2026)***

7.36B MANHOLE AND TEMPORARY CLEANOUT LID MARKERS

.1 Markers are required, where manhole and temporary cleanout lids are not located within developed right-of-way or residential properties, to indicate the location of the manholes and temporary cleanouts. These markers must be constructed of 50 mm galvanized steel pipe painted with a minimum of two coats of yellow exterior duty paint applied in accordance with the manufacturer's recommendations and set in a concrete base. The markers are to extend 1.0 m above the ground surface. The markers are to be located on site at a location, determined by the City Engineer, opposite the manhole or temporary cleanout lid and the distance to the lid is to be marked in black figures on a flattened upper portion of the marker. See Standard Drawing No. SW-20 – Storm Manhole and Temporary Cleanout Marker []. ***(REVISED JUNE 2026)***

7.37 SERVICE BOXES

.1 Service boxes for single storm sewer services are to be 300 mm x 500 mm concrete boxes complete with cast iron traffic cover marked “Storm” and concrete extension sections as required. ***(REVISED JUNE 2026)***

.2 Service boxes for twin storm sewer services are to be 425 mm x 750 mm concrete boxes complete with steel traffic cover marked “Storm” and concrete extension sections as required. ***(REVISED JUNE 2026)***

7.40 TRENCH EXCAVATION, BEDDING AND BACKFILL

.1 Refer to Section 4.0 - Excavation, Trenching and Backfill [] for installation requirements.

7.40A PIPE ALIGNMENT AND GRADE

.1 The pipe must be laid on the alignment and grade in accordance with the construction drawings. Each pipe must be checked for line and grade during installation. Methods used to maintain pipe alignment and grade must be approved by the Profession of Record. ***(REVISED JUNE 2026)***

.2 Unless otherwise directed by the Engineer, tolerances for pipe alignment and grade must be: ***(REVISED JUNE 2026)***

Alignment	=	± 50 mm
Grade	=	± 10 mm

7.41 PIPE CUTTING

.1 Pipe cutting are to be done in the manner recommended by the pipe manufacturer employing tools designed for this purpose. ***(REVISED JUNE 2026)***

7.42 PIPE INSTALLATION

.1 Pipe must be installed in strict accordance with the manufacturer's recommended practice. Joint gaskets are required unless stated otherwise by the Professional of Record. ***(REVISED JUNE 2026)***

.2 Pipe must be checked before being lowered into the trench to ensure that no foreign material, manufacturer's defects, or cracks exist that might prevent the proper jointing of the pipe or its operation. ***(REVISED JUNE 2026)***

.3 The open end of the pipe in the trench must be suitably covered to prevent entrance of trench water and other material during periods when pipe is not being installed. ***(REVISED JUNE 2026)***

.4 Precautions are to be taken to ensure that displacement of the pipe in the trench does not occur through soil displacement or floatation due to the presence of trench water. Pipe that has been displaced must be removed from the trench and re-laid. ***(REVISED JUNE 2026)***

.5 Lifting holes in concrete pipe are to be plugged with prefabricated plugs in non-shrink grout, or other plugs recommended by the pipe manufacturer. ***(REVISED JUNE 2026)***

7.43 JOINTS AT RIGID STRUCTURES

.1 A flexible joint must be provided at locations where the pipe is held in a fixed position by a rigid support or structure. The distance from the support or structure depends on the diameter and type of pipe being installed and must be in accordance with the pipe manufacturer's recommended practice. The purpose of the flexible joint is to prevent pipe failure due to uneven support under the pipe. Approved flexible joints include rubber gasket bell and spigot connections and dresser couplings. ***(REVISED JUNE 2026)***

7.44 HORIZONTAL AND VERTICAL CURVES

.1 Pipe on horizontal and vertical curves must be laid true to the radius of the curve shown on the drawings. Variations in vertical curves and grades are permitted only within the allowable joint deflection specified in Section 7.06.6 [→], unless approved by the City Engineer. ***(REVISED JUNE 2026)***

7.45 DEFLECTION

.1 The amount of pipe deflection at joints and couplings must be the limit as specified in Section 7.06.6 [→]. ***(REVISED JUNE 2026)***

7.46 FITTINGS AND JOINTS

.1 Fittings are to be installed at the locations shown on the construction drawings or as directed by the Professional of Record. Fittings must be installed in accordance with the manufacturer's specifications. ***(REVISED JUNE 2026)***

.2 High Density Polyethylene (HDPE) Pipe (Smooth Profile):

(a) Pipes must be joined using the thermal butt fusion method. ***(REVISED JUNE 2026)***

(b) The contractor must make arrangements to have the pipe jointing be carried out by the pipe manufacturer or certified personnel familiar with the jointing technique, using equipment and methods specifically designed for the pipe diameter and material. ***(REVISED JUNE 2026)***

(c) Where required, flanged joints must be used to connect long pipe sections. ***(REVISED JUNE 2026)***

(i) Each joint must consist of a polyethylene stub end butt-fused to the end of pipe and a carbon steel slip-on flange. ***(REVISED JUNE 2026)***

(ii) Flanged joints and flange bolts must be stainless steeland include isolation washers. ***(REVISED JUNE 2026)***

(d) Refer to Section 7.22B [→] for Joint Specifications.

7.47 CONNECTIONS TO EXISTING PIPING AND APPURTENANCES

.1 All connections to existing piping, services, and appurtenances will made by City forces unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

.2 All connections to existing piping and services must utilize a manufactured rubber gasket bell and spigot joint or dresser coupling designed for the types of pipes to be connected. For connections to existing service connections refer to Standard Drawing No. SW-27 – Concrete Encasement for Connections to Existing Storm Services []. ***(REVISED JUNE 2026)***

.3 The use of field joints or rubber repair couplings require the approval of the City Engineer. ***(REVISED JUNE 2026)***

.4 Rubber repair couplings must have 4 stainless steel clamps complete with stainless steel clamps complete with stainless steel anti shear band. Only those products approved by the City Engineer will be accepted for installation.

.5 Slip couplers must be used on PVC pipes. Rubber repair couplings are not permitted on PVC pipes. ***(REVISED JUNE 2026)***

7.48 SERVICE CONNECTION JUNCTIONS

.1 Service connection junctions are to be installed at the locations shown on the construction drawings or as directed by the Professional of Record during construction. ***(REVISED JUNE 2026)***

.2 Where service connections are not installed with the main, install fittings to accommodate the future service connections and cap or plug the fittings. Install markers as per Section 7.61 – Service Connection Installation [→]. ***(REVISED JUNE 2026)***

.3 Concrete Pipe (Reinforced and Non-reinforced):

(a) Field break-in and mortar patch joints are not be used unless approved by the City Engineer. If approved, the following will apply: ***(REVISED JUNE 2026)***

(i) Service connections must be manufactured using a sanded PVC male end stub pipe with integral bell. ***(REVISED JUNE 2026)***

(ii) Break into the pipe by coring to within 40 mm of the outside diameter of the service stub. All exposed reinforcing steel must be removed. ***(REVISED JUNE 2026)***

(iii) Insert the stub into the core ensuring that no portion of the service stub protrudes past the inside of the concrete pipe wall, and the stub length is to be equivalent to the thickness of the concrete pipe wall and length of the stub's integral bell. ***(REVISED JUNE 2026)***

(iv) Prepare non-shrink, fast setting cementitious grout with a 3:1 sand/cement mix to a “dry pack” consistency. Pack grout tightly into the void between the stub and the pipe and mound around the stub for lateral support.

(v) Hand finish interior and exterior grout surfaces to a smooth finish.

(vi) In order to prevent damage to the field joint, allow sufficient time for grout to develop strength prior to installation of connecting pipe and backfilling.

(vii) Installation must be inspected by the Professional of Record prior to backfilling. ***(REVISED JUNE 2026)***

(b) Refer to Section 7.23 - Service Junction [→] specifications. ***(REVISED JUNE 2026)***

.4 PVC Pipe (Smooth Profile):

(a) Service saddle connections cannot be used unless approved by the City Engineer. ***(REVISED JUNE 2026)***

(b) If approved, installation of service saddle connections must conform to the following: ***(REVISED JUNE 2026)***

(i) Drill hole into main line pipe to the exact outside diameter of the new connection.

(ii) The use of saddles instead of manufactured wye fittings requires approval by the City Engineer. Saddles must be rigid PVC material complete with rubber seating gasket. Saddles are to be attached to pipe with stainless steel banding straps. ***(REVISED JUNE 2026)***

(iii) Attach service saddle in accordance to the manufacturer's specifications.

(c) Refer to Section 7.23 - Service Junction [→] specifications. ***(REVISED JUNE 2026)***

.5 PVC Pipe (Ribbed Profile):

(a) Installation of service saddle connections are to conform to Section 7.48.4 [→]. ***(REVISED JUNE 2026)***

(b) Refer to Section 7.23 - Service Junction [→] specifications.

.6 High Density Polyethylene (HDPE) Pipe (Smooth Profile):

(a) Service connections to mainline pipe using manufactured fittings must be in strict accordance with manufacturer's instructions. ***(REVISED JUNE 2026)***

(b) Connection of HDPE service junctions to non-pressurized PVC service pipe must be made with flexible couplings. Flexible couplings must be manufactured from elastomeric PVC and be held in place with series 300 stainless steel worm gear clamps. ***(REVISED JUNE 2026)***

(c) Refer to Section 7.23 - Service Junction [→] specifications.

.7 High Density Polyethylene (HDPE) Pipe (Open Profile):

(a) Installation of service saddle connections are to conform to Section 7.48.4 [→]. ***(REVISED JUNE 2026)***

(b) Refer to 7.23 - Service Junction [→] specifications.

7.49 CAST IN PLACE MANHOLE CONCRETE BASES

.1 All water is to be removed from the excavation prior to placing base concrete. The base must be constructed such that the first section of a precast section can be set plumb with uniform bearing throughout its full circumference. ***(REVISED JUNE 2026)***

.2 If material in the bottom of the trench is unsuitable for support, the bottom may be overexcavated to firm base as determined by the Professional of Record and backfilled to the required grade with thoroughly compacted base gravel as specified for trench bottom stabilization under the applicable section included in Section 4.0 - Excavation, Trenching and Backfill []. ***(REVISED JUNE 2026)***

.3 Where overexcavation and backfill with base gravel is not practical, special structure support are to be provided as specified for trench bottom stabilization under the applicable section included in Section 4.0 - Excavation, Trenching and Backfill []. ***(REVISED JUNE 2026)***

.4 Concrete manhole bases must be constructed as shown on the drawings. Pipes and fittings through the manhole must be supported on concrete blocks and the concrete base poured around the pipe to a depth of at least 150 mm below the bottom of the pipe and up to the springline of the pipe. Install rubber manhole adaptor rings on all plastic pipe installed in the manhole base. ***(REVISED JUNE 2026)***

.5 Invert elevations of pipes at the manhole must be checked by the Contractor prior to and following placement of base concrete around the pipe to ensure that all pipes are installed at the designed elevation. ***(REVISED JUNE 2026)***

.6 Variations in manhole inverts from established grade or elevations must be corrected. ***(REVISED JUNE 2026)***

.7 Manhole channeling must be constructed as shown on Standard Drawings or as shown on the construction drawings. Channeling must be constructed to have a minimum 0.3 m straight section before the change in direction within the manhole. ***(REVISED JUNE 2026)***

.8 The channels in the base of manholes must be shaped and finished to provide smooth passage for the stormwater in order to minimize head losses and deposits at bends and at junctions of channels. ***(REVISED JUNE 2026)***

.9 Channels must be accurately formed. The practice of forming channels roughly to shape and finishing with cement mortar will not be permitted. The channels are to be steel trowel finished. ***(REVISED JUNE 2026)***

.10 Benching in manholes must be sloped to drain. Broom finish to produce a non-skid surface. ***(REVISED JUNE 2026)***

SECTION 7 – STORMWATER MANAGEMENT INSTALLATION

7.50 -NOT USED-

7.51 PRECAST MANHOLE SECTIONS

.1 Precast manhole barrel sections must be placed plumb. ***(REVISED JUNE 2026)***

.2 Joints between the top riser and the cover slab must be made watertight with cement mortar. Prior to placing sections, the mating face are to be thoroughly soaked with water and a layer of cement mortar spread on the lower face. After sections are placed, excess mortar is removed and the joint made flush inside and out. ***(REVISED JUNE 2026)***

.3 Joints between precast manhole barrels must utilize o-ring gaskets and conform to the manufacturer's specifications. The inside surface of the precast barrel at the o-ring joints must be filled with cement grout to a smooth finish. ***(REVISED JUNE 2026)***

.4 Damaged o-ring manhole joints require removal and replacement of damaged manhole section. Mortar patching of damaged area, if approved by the Qualified Registered Professional, requires removal of the o-ring gasket and installation as per Section 7.51.2 [→]. ***(REVISED JUNE 2026)***

.5 Refer to Section 7.25A - Precast Manhole Section [→] specifications. ***(REVISED JUNE 2026)***

7.52 PRECAST MANHOLE BASES

.1 Installation of precast manhole bases are to conform to Section 7.49 - Cast In Place Manhole Concrete Bases [→]. ***(REVISED JUNE 2026)***

.2 Precast manhole bases must be placed on 150 mm thick base of 38 mm drain rock. ***(REVISED JUNE 2026)***

.3 Plastic and concrete pipes installed in the precast manhole base must utilize rubber manhole adaptor rings to seal the connection. ***(REVISED JUNE 2026)***

.4 Refer to 7.25B -Precast Manhole Section [→] specifications.

7.53 CONCRETE

.1 Cast in place concrete are to conform to Section 11.0 - Cast In Place Concrete Works []. ***(REVISED JUNE 2026)***

7.54 FRAMES AND COVERS

.1 Frames must be set on precast concrete grade rings to bring the cast iron manhole frame up to grade elevation shown on construction drawings. Contractor to install concrete grade rings to a minimum of 50 mm thick and to a maximum of 100 mm thick. The concrete grade rings must be laid in common bond with racked mortar joints and mortared inside and outside of the manhole. ***(REVISED JUNE 2026)***

(a) Fine grade elevation adjustments of frames are to be done with a minimum of 3, steel only, shims equally spaced. ***(REVISED JUNE 2026)***

.2 Manhole covers must be installed:

(a) for unpaved areas: Covers are to have a 1.5 m x 1.5 m, 50 mm thick asphalt apron. Covers must be set flush with the asphalt surround. ***(REVISED JUNE 2026)***

(b) for paved areas: Covers must be flush with pavement grade with a maximum allowed variance of 6 mm lower than finished pavement. Covers must not protrude above finished pavement. ***(REVISED JUNE 2026)***

(c) covers installed outside of the tolerances listed above require approval by the City Engineer. ***(REVISED JUNE 2026)***

.3 Steel manhole riser rings are permitted in easements only. ***(REVISED JUNE 2026***

.4 The inside surface of the manhole frame are to be painted green with an enamel rust paint in accordance with the manufacturer's specifications. ***(REVISED JUNE 2026***

.5 Refer to Section 7.25D [→] for Manhole Covers and Frames Specifications.

7.55 MANHOLE LADDER RUNG ***(REVISED JUNE 2026)***

.1 Manhole ladder rungs are to be installed in manhole sections by the manufacturer unless circumstance dictates otherwise in which case approval must be received from the City Engineer. ***(REVISED JUNE 2026)***

.2 The distance from the top of the manhole cover to the first manhole rung, must conform to WorkSafeBC requirements. ***(REVISED JUNE 2026)***

.3 All rungs must be complete with approved polyethylene anchor insulating sleeves and installed in 25 mm to 26 mm diameter precast or drilled holes in a manhole section. ***(REVISED JUNE 2026)***

.4 Refer to Section 7.25E [→] for manhole rungs specifications. ***(REVISED JUNE 2026)***

7.56 DROP MANHOLE STRUCTURES

.1 Manhole drop structures must be constructed as shown on Standard Drawing No. SW-14 - Storm Drop Manhole []. ***(REVISED JUNE 2026)***

7.57 STUBS

.1 Blind stub sections for connection of future sewers and service connections to the manholes must be installed where shown on the construction drawings and as directed by the Professional of Record. Stubs are to be as long as the vertical depth from finish grade to the invert of each stub. Each stub must be plugged with a removable, watertight plug as shown on the construction drawings. Where stubs are installed, the bottom of the manhole must be channelled to the stub entrance. ***(REVISED JUNE 2026)***

7.58 – NOT USED- ***(REVISED JUNE 2026)***

7.59 - NOT USED-

7.60 PRECAST CATCH BASIN BARRELS AND LEADS

.1 Catch basins must be installed in accordance with the Standard Drawings. ***(REVISED JUNE 2026)***

.2 Catch basin leads must be installed to allow passage of video cameras and flushing equipment. Installation of mitred may be allowed to avoid pipe conflicts or insufficient bury. Mitre bends cannot exceed 45˚ and there must be a minimum 1.0 m separation between mitre bend hubs. ***(REVISED JUNE 2026)***

.3 Catch basin leads taken into manholes must be benched in the same manner as main line piping. ***(REVISED JUNE 2026)***

.4 Catch basin grates are to be set 20 mm below the gutter line. The concrete gutter and asphalt are to be shaped to form a dish around the inlet. ***(REVISED JUNE 2026)***

.5 Construction and finishing of catch basins are to be the same as for manholes as described in Section 7.54 - Frames and Covers [→]. ***(REVISED JUNE 2026)***

.6 Catch basin leads are to protrude 50 mm into the catch basin barrel and must be grouted inside and outside of the barrel in accordance with the Standard Drawings. ***(REVISED JUNE 2026)***

.7 There must be a 400 mm minimum clearance between the outside of the catch basin barrel and the trench wall to allow for compaction. ***(REVISED JUNE 2026)***

.8 Curb inlet catch basins are to be installed to be rigid once installed and the inlet hood remain flush with the top of the curb.

7.61 SERVICE CONNECTION INSTALLATION

.1 Location of Service Connections:

(a) Service connections are to be installed at the locations and depths as specified by the Professional of Record. Where the depth of the service connection exceeds 2.0 m, the service must be extended into the property the same distance as the depth of the service, up to a maximum distance of 4.0 m. This must be done during the installation of the service connection from the main to the property. ***(REVISED JUNE 2026)***

(b) At no time are two or more storm services be coupled into one lead crossing the street or right-of-way. Each service must have its own independent connection into the main sewer. ***(REVISED JUNE 2026)***

.2 Grade and Alignment of Service Connections:

(a) Trenches must be excavated so the pipe can be installed in a direct line from the service connection fitting at the sewer or from a manhole to the terminus of the service. Service connections must be installed at grade of not less than 2% unless otherwise directed by the Engineer. Service pipe must be installed at a uniform grade between the terminus at the property line and the junction fitting at the sewer or upper end of a service drop. ***(REVISED JUNE 2026)***

.3 Storm Sewer Service Connection Installation:

(a) Pipe must be installed in strict accordance with the manufacturer's recommended practice. ***(REVISED JUNE 2026)***

(b) Pipe must be checked before being lowered into the trench to ensure that no foreign material, manufacturer's defects, or cracks exist that might prevent the proper jointing of the pipe or its operation. ***(REVISED JUNE 2026)***

(c) The Contractor must use methods for installing pipe in an auger hole or casing pipe as shown on the construction drawings. ***(REVISED JUNE 2026)***

(d) The trench must be excavated to provide a minimum cover of 0.75 m over the service connection pipe at property line. ***(REVISED JUNE 2026)***

(e) In rock, the trench is to be extended three 3.0 m into the property to facilitate future extension of the service connection.

(f) The trench bottom must be graded to form a continuous support along the service pipe. All rocks or projections which might prove detrimental to the pipe must be removed. ***(REVISED JUNE 2026)***

(g) Joints must be made using the specified couplings. No glued joints. ***(REVISED JUNE 2026)***

(h) At the terminus of each sewer service approved watertight caps suitably supported by sandbags are to be installed to prevent leakage. ***(REVISED JUNE 2026)***

(i) A 38 mm x 89 mm pressure treated wood marker stake must be placed at the service terminus as shown on the drawings to facilitate future location of the service pipe. This stake must extend in locations where the extension of the stake above ground surface would prove hazardous, in which case the stake must be cut off flush with the ground surface. The stake must be marked in an approved manner to show the depth of the service pipe invert below the top of the stake. The stakes must be painted green to visually identify the storm sewer service connections. The Professional of Record will take invert elevations of the service connection assembly prior to placement of the cap by the Contractor. ***(REVISED JUNE 2026)***

(j) Inspection assemblies must be installed as shown on the standard drawings. ***(REVISED JUNE 2026)***

(k) The service box must be installed plumb with the lid 25 mm above finished grade in unpaved areas and 0 - 6 mm below finished grade in paved areas. ***(REVISED JUNE 2026)***

.4 Riser Service Connections:

(a) Riser service connections must be installed as shown on Standard Drawings No. SW-21 - General Storm Service Connection Detail, Riser and Non Riser Types [] or Standard Drawing No. SW-22 - Commercial Areas Storm Service Connection Detail, Riser and Non Riser Types [] in locations shown on the construction drawings. ***(REVISED JUNE 2026)***

7.62 NOTIFICATION TO THE CITY OF NANAIMO

.1 The City Works Inspector must be given 48 hours notice of all tests. ***(REVISED JUNE 2026)***

7.62A CLEANING AND FLUSHING

.1 The pipes must be cleaned upon completion of the sewer pipe installation and one month prior to the end of the maintenance period to the satisfaction of the Professional of Record and the Inspector. Cleaning must be completed by power flushing with water to remove all foreign matter. ***(REVISED JUNE 2026)***

.2 Ensure that snow chains are installed at the downstream manhole so that no foreign material passes beyond downstream manhole. Flow through the system must remain unimpeded at all times while snow chains are installed. ***(REVISED JUNE 2026)***

.3 Begin cleaning from the upstream pipe in the system and proceed downstream. Under no circumstances is the pipe cleaning process to proceed downstream until all contributing upstream pipes have been successfully cleaned and approved by the Professional of Record, the Inspector, or by the City CCTV contract administrator. ***(REVISED JUNE 2026)***

.4 Manholes must be cleaned after the upstream section of pipe has been successfully cleaned and approved by the Professional of Record, the Inspector, or by the City CCTV contract administrator. ***(REVISED JUNE 2026)***

.5 Pipes must be cleaned in the direction of flow and cannot be flushed in a backflush direction unless approved by the Professional of Record, by the Inspector, or by the City CCTV contract administrator. ***(REVISED JUNE 2026)***

.6 Under no circumstances must debris pass beyond the downstream manhole. Active vactoring must remove all debris at the snow chains installed at the downstream manhole.

.7 Dispose of the debris at approved dump site such as the Regional District of Nanaimo's landfill or by the CCTV contract administrator's approved alternative. ***(REVISED JUNE 2026)***

.8 Decanting of liquid waste accumulated during debris removal is permitted at a controlled release rate, to a maximum of 8 L/s, at a location approved by the City CCTV contract administrator. ***(REVISED JUNE 2026)***

.9 Timeframe between cleaning and video inspection of pipeline cannot exceed 24 hours unless approved by the City Engineer. ***(REVISED JUNE 2026)***

.10 Ensure all environmental mitigation is in accordance Provincial and Federal Regulations. ***(REVISED JUNE 2026)***

7.63 VIDEO INSPECTING MAINS

.1 All pipe video inspection including methods of cleaning, equipment and rates of camera travel, are to be in accordance with the UK Water Research Centre's (WRc), Sewage Rehabilitation Manual, most current edition. ***(REVISED JUNE 2026)***

.2 The contractor must arrange for a video inspection upon completion of the sewer pipe installation and within one month prior to the end of the maintenance period to the satisfaction of the Professional of Record and the Inspector. ***(REVISED JUNE 2026)***

.3 For gravity sewers and service connections, the contractor must arrange for video inspection to check alignment, grade, and condition of the main sewer pipe including catch basin leads. Where a new sewer pipe crosses an existing sewer pipe, the contractor must also arrange for a video inspection of the existing sewer pipe at the location of the crossing. ***(REVISED JUNE 2026)***

(a) Illumination depth of field must be no less than 3 joints for standard joint and spigot pipe types to allow for pipe deflection assessments (9.0 m). No dark/opaque circle are to be visible in the middle of this depth of field viewing area. ***(REVISED JUNE 2026)***

(b) Eliminate steaming and fogging encountered during the inspection survey by introducing forced air flow by means of a fan.

(c) Camera lens to remain free of grease or other deleterious matter to ensure optimal clarity.

(d) Plan and tilt view each service connection (junction) such that the camera looks down the centerline of the service, pause for a minimum of five (5) seconds and note condition of the joint and/or pipe/service interface.

(e) Camera guides (Skids) should not be visible at either side of the pipe during normal camera travel or during Pan & Tilt operation. Configuration or camera/guides must be altered to alleviate this problem. ***(REVISED JUNE 2026)***

(f) CCTV push camera work must be video captured (complete with skids for centering) from the main wye pulling back to entrance point to avoid an invert only view. ***(REVISED JUNE 2026)***

(g) A winch line must be provided to support camera travel in steep, slippery, or relined pipe sections. ***(REVISED JUNE 2026)***

(h) Position camera lens centrally in the pipeline with a positioning tolerance of ±10% off the vertical centerline axis of the pipeline. For elliptical pipe the camera to be positioned 2/3 the height of pipe measured from the invert.

(i) Position camera lens looking along the longitudinal axis of pipeline except when viewing service connections or panning defects.

(j) Instantaneous travelling speed of the camera in the pipeline to be as follows:

(i) 0.1 m/s for pipeline of diameter less than 200 mm

(ii) 0.15 m/s for diameters 200 mm and larger but cannot exceeding 310 mm: and

(iii) 0.20 m/s for diameters exceeding 310 mm

.4 The inspection must include the preparation of: ***(REVISED JUNE 2026)***

(a) an HDSD 32 GB Class 10 regular card. Picture size: NTSC 640X480 pixels, aspect ratio 4:3, 29.97 frames per second @ 8 megabits per second capture rate. Individual MPEG4 video files cannot exceed 1.7GB in size. ***(REVISED JUNE 2026)***

(b) a Microsoft Access database CD of the Header and Observation codes as specified by the City. ***(REVISED JUNE 2026)***

(c) a pipe condition assessment paper report.

(d) All submitted to the Professional of Record. ***(REVISED JUNE 2026)***

.5 The Professional of Record must review the pipe condition report and provide certification that the condition of the installed pipe is accurately recorded and the pipe installation meets this manual . ***(REVISED JUNE 2026)***

.6 The pipe condition report and certification are the property of the City. ***(REVISED JUNE 2026)***

.7 Variations in line of grade of pipe, from that established by the Professional of Record prior to installation, and any jointing, pipe cleaning, or other deficiencies discovered during the inspection, must be rectified. Re-inspection of the pipe may be required by the Professional of Record at the Contractor's expense. ***(REVISED JUNE 2026)***

.8 During the test, manhole construction and invert elevations must be checked and any variations from the established grade, drawing, or specifications, must be rectified. ***(REVISED JUNE 2026)***

.9 Video inspection and pipe condition coding must be undertaken only by personnel with current Canadian certification by a City approved agency. ***(REVISED JUNE 2026)***

7.63A SMOKE TESTING

.1 The Professional of Record must arrange for smoke testing of all installed storm mains in the presence of the City Inspector. ***(REVISED JUNE 2026)***

.2 The Professional of Record must provide as-built service location information to the City Inspector prior to smoke testing. ***(REVISED JUNE 2026)***

.3 Cross-connections noted during the smoke testing must be corrected and the record drawing information revised. ***(REVISED JUNE 2026)***

7.64 DRAINAGE DITCH CONSTRUCTION

.1 Drainage ditches are to be excavated to the line and grade shown on the construction drawings or as otherwise determined by the Professional of Record. ***(REVISED JUNE 2026)***

7.65 CULVERT INSTALLATION

.1 Trenches for culvert installation must be excavated to the required depth and grade, then backfilled in accordance with the requirements for storm mainlines. ***(REVISED JUNE 2026)***

.2 Concrete Pipe:
(a) Install pipe in accordance with Section 7.42 - Pipe Installation [→].

.3 Polyvinyl Chloride (PVC) Pipe:
(a) Install pipe in accordance with Section 7.42 - Pipe Installation [→].

7.66 CULVERT HEADWALLS

.1 Culvert headwalls must be constructed as shown on the Standard Drawings. ***(REVISED JUNE 2026)***

.2 "Wet-mix" Sandbags:

(a) The sandbag sacks are to be wetted and filled with wet premixed concrete and folded at the top to retain the concrete at the time of placing.

(b) Immediately after being filled with concrete, sacks are to be placed and lightly tamped to conform with the slope, culvert pipe, and adjacent sacks in-place. ***(REVISED JUNE 2026)***

(c) Sacked concrete are to be laid in courses such that joints in succeeding courses are staggered. Courses are to be a minimum of ten per vertical metre. Dirt and debris are to be removed from the top of sacks before the next course is laid thereon. ***(REVISED JUNE 2026)***

(d) Prior to sacked concrete setting, courses of bags are to be tied by driving a 15M reinforcing bar vertically from top to bottom through each course so that displacement cannot occur after the final set of concrete. Top of reinforcing bar must be bent over on top. ***(REVISED JUNE 2026)***

.3 Headwalls must be protected from heavy rainfall and from contacting water for a period of at least 24 hours after placing. ***(REVISED JUNE 2026)***

.4 Composite culvert headwalls must be installed as per manufacturer's recommendations and Professional of Record approved design drawings. ***(REVISED JUNE 2026)***

7.67 PERFORATED DRAINS

.1 Excavate trench to the lines and grades as shown on the construction drawings.

.2 Place sufficient filter fabric in the trench to provide a minimum 300 mm overlap after the drain rock is placed.

.3 Place a 150 mm thick layer of drain rock and install the perforated pipe. Perforations must be installed on the bottom half of the pipe. ***(REVISED JUNE 2026)***

.4 Place drain rock to within 150 mm of finished surface and surround with filter fabric.

.5 Place remaining 150 mm of drain rock or, if specified, topsoil to finish grade. ***(REVISED JUNE 2026)***

.6 Install all manholes as per Section 7.0 - Stormwater Management.

7.68 INLET AND OUTLET STRUCTURES

.1 Inlet and outlet structures must be installed in accordance with Standard Drawings. ***(REVISED JUNE 2026)***

.2 Excavate to the lines and grades as shown on the construction drawings. If subgrade is unsuitable for support as determined by the Professional of Record, the bottom must be excavated and backfilled to the required grade with road base gravel compacted to 95% modified proctor or drain rock. ***(REVISED JUNE 2026)***

.3 Structure must be placed on a minimum of 100 mm (compacted thickness) of road base gravel compacted to 95% modified proctor. Where groundwater is present, drainrock may be substituted for road base gravel if approved by the Professional of Record. ***(REVISED JUNE 2026)***

.4 Cast in place concrete are to conform to Section 11.0 - Cast In Place Concrete Works []. ***(REVISED JUNE 2026)***

7.69 RIPRAP

.1 Areas to receive riprap must be trimmed to a uniform surface, to the grades shown on the drawings. Before rock placement commences, loose materials must be removed and minor pot holes and hollows filled in with select granular sub-base, well tamped in. ***(REVISED JUNE 2026)***

.2 Geotextile material and placement, where required, must be as shown on the drawings. ***(REVISED JUNE 2026)***

.3 At the toe of sloped riprap, larger rocks must be placed regularly enough to form a firm foundation, 50% thicker than the required nominal thickness. ***(REVISED JUNE 2026)***

.4 Other large rocks are to be regularly spaced. Smaller rocks are to be well positioned to form an interlocking, even surface. ***(REVISED JUNE 2026)***

7.70 PIPE VIDEO AND MANHOLE CONDITION REPORT FORMAT

.1 Reference plans must accompany reports with manholes labeled and inspected sections highlighted. Manhole and pipe numbering must conform to the construction drawings, or if available, City pipe and manhole numbers. Reports are to be submitted in both digital and hardcopy formats. ***(REVISED JUNE 2026)***

.2 All sewer defects must be photographed and included with the report and referenced by numbers accordingly. ***(REVISED JUNE 2026)***

.3 The video pipe condition rating report format are to be in accordance with the UK Water Research Centre's (WRc), Sewerage Rehabilitation Manual, most current edition. Structural defects must be properly weighted with the appropriate scores assigned to them as shown in the following table: ***(REVISED JUNE 2026)***

WRc GRADING SYSTEM		
DEFECT CODE NO.	TYPE OF DEFECTS	POINT SCORES
1	Open Joints	1 to 2
2	Displaced Joints	1 to 2
3	Cracks	10 to 40
4	Fracture	40 to 80
5	Broken	80
6	Hole	80 to 165
7	Collapsed	165
8	Spalling	5 to 120
9	Wear	5 to 120
10	Deformation	20 to 165

.4 Every video inspected sewer will be assigned a composite grade based on the sum of its defect point scores as per the following table:

WRc - SEWER RATING COMPOSITE GRADE

COMPOSITE GRADE	PEAK SCORE RANGE (SUM OF THE SCORES FROM THE ABOVE TABLE)	TYPICAL DEFECT DESCRIPTION
1 (least defective)	1 to 9	No observable structural defects
	10 to 39	Circumferential crack. Moderate joint defects, i.e. open joint (medium) or joint displaced (medium), spalling slight and wear slight.
3	40 to 79	Fracture with deformation <5%. Longitudinal cracking or multiple cracking. Minor loss of level. More severe joint defects, i.e. open joint (large) or joint displaced (large). Spalling medium. Wear medium.
4	80 to 164	Broken, deformation up to 10% and broken fracture with deformation 5 - 10%. Multiple fractures. Serious loss of level. Spalling large. Wear large.
5 (most defective)	165+	Already collapsed. Deformation >10% and broken. Extensive areas of fabric missing. Fracture with deformation >10%.

.5 The following additional information must be included for each sewer section as the CCTV Title Page: ***(REVISED JUNE 2026)***

(a) Date of survey.
(b) Contractor Project Index No. (i.e. Tape No. V2-1234)
(c) Survey No.
(d) Start MH No.
(e) Finish MH No.
(f) Line ID No.
(g) Direction of Camera Travel.
(h) Street Location (Street Name or RW No.). ***(REVISED JUNE 2026)***
(i) Distance from the manhole rim to pipe invert.
(j) Length of Capture.
(k) Total of Captured CCTV.
(l) Current weather information.

.6 All pipe video inspections must include an annotated map with the following information: ***(REVISED JUNE 2026)***

(a) Manhole and catch basin locations with labels.
(b) City of Nanaimo drawing numbers.
(c) Manhole I.D. numbers (as per the City GIS numbering system). ***(REVISED JUNE 2026)***
(d) Catch basin I.D. numbers (as per the City GIS numbering system). ***(REVISED JUNE 2026)***

.7 Computer database file to contain identical survey report information as the printed report exclusive of photographs. Index numbers and distance of survey information are numerically increase. For an individual survey, whether the information is sorted by index or distance, the result will be in the same order. ***(REVISED JUNE 2026)***

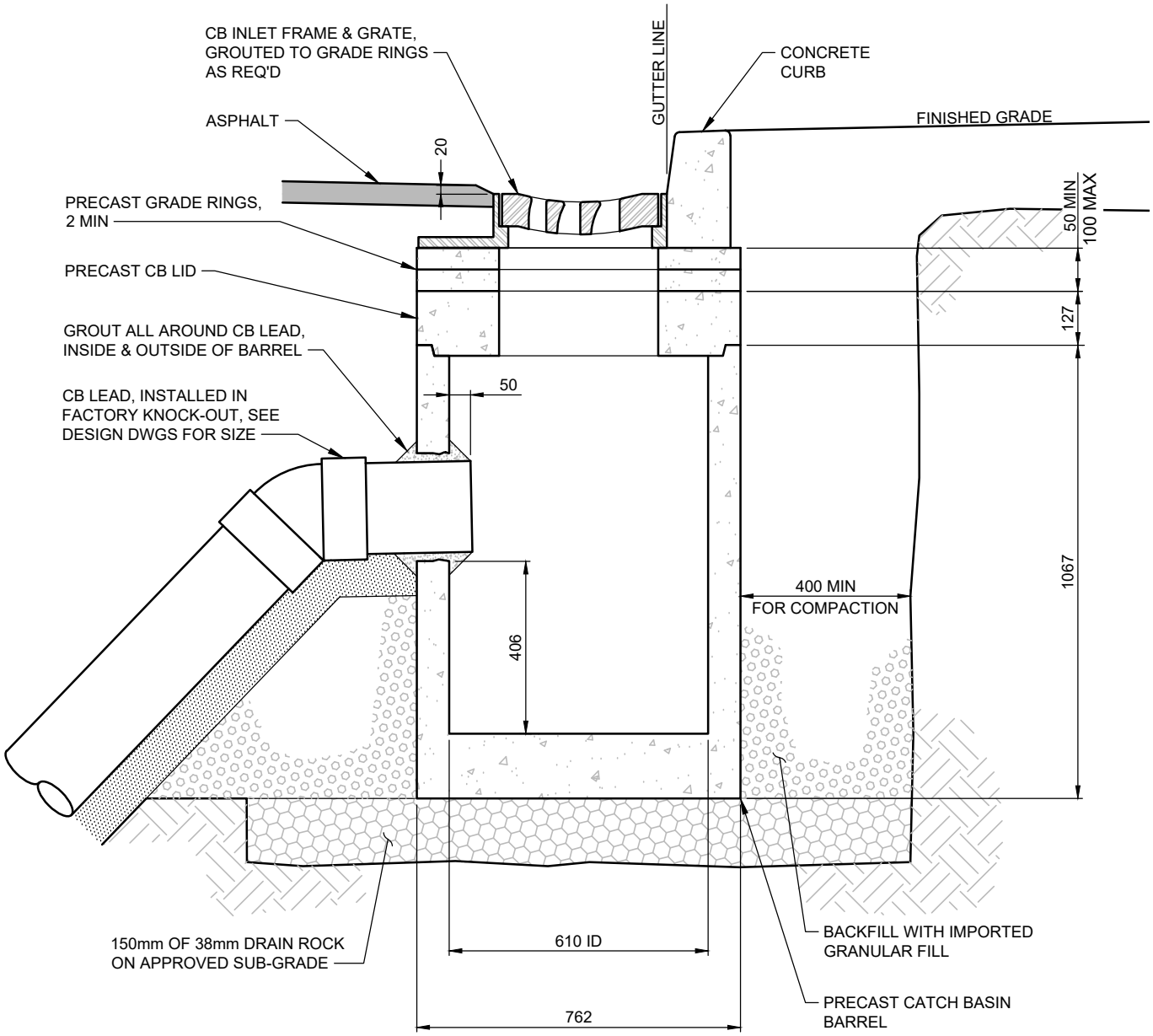
.8 All pipe video inspections operators must be thoroughly trained with current Canadian certification by a City approved agency. ***(REVISED JUNE 2026)***

.9 Manhole video inspection is not required. Manholes must be rated as per the following table, and form part of the video inspection report. ***(REVISED JUNE 2026)***

MANHOLE RATING SYSTEM ***(REVISED JUNE 2026)***

INTERNAL CONDITION GRADE	TYPICAL DEFECT DESCRIPTION
1 (least defective)	-No observable structural defects. -No observable signs of infiltration.
2	-Minor cracks, chips, spalling. -Signs of minor staining, but no infiltration.
3	-Fractures, medium spalling, defective pipe/MH joints.

	-Some staining, mineral build-up and seeding infiltration. Possible infiltration through manhole cover.
4	-Broken manhole wall, channel or riser assembly, multiple fractures, medium wear. -Moderate staining, mineral build-up and running infiltration. -Infiltration through manhole cover. -Manhole frame and cover cracks or broken.
5 (most defective)	-Failure in manhole wall, channel or riser assembly, multiple fractures with deformation, large wear. -Heavy staining, mineral build-up and gushing infiltration. -Surface ponding and infiltration through manhole cover. -Manhole frame and cover cracks or broken.



NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR FRAME & GRATE DETAILS, SEE STD DWG SW-6.
3. ALL JOINTS TO BE PRE-WETTED BEFORE MORTAR IS PLACED.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.
6. CATCH BASIN LID TO MEET CS-600 LOADING.

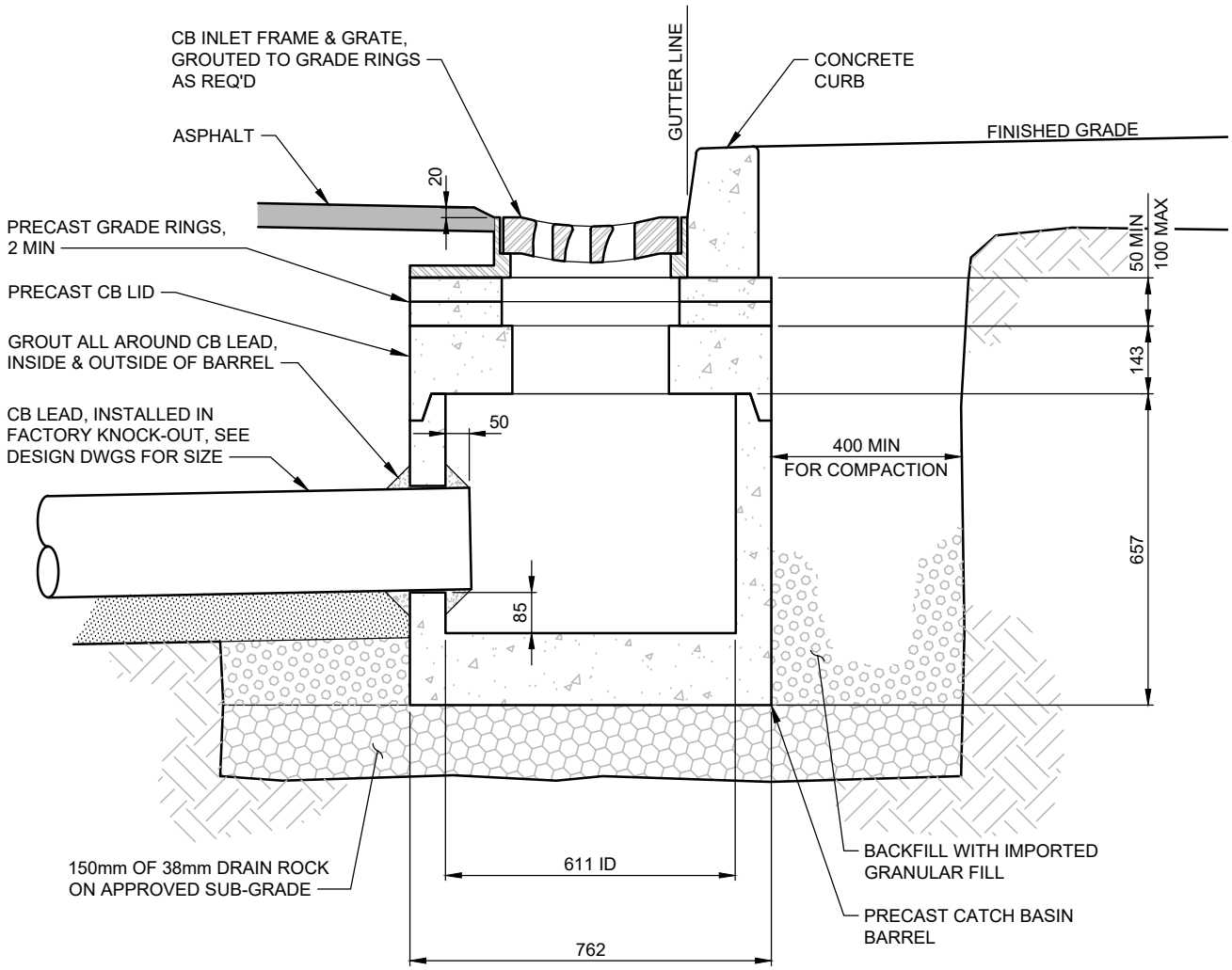
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4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

STANDARD CATCH BASIN

Scale:	1:15
Created:	JAN 2016
Rev Date:	NOV 2016
Dwg No:	SW-1



NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR FRAME & GRATE DETAILS, SEE STD DWG SW-6.
3. ALL JOINTS TO BE PRE-WETTED BEFORE MORTAR IS PLACED.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.
6. CATCH BASIN LID TO MEET CS-600 LOADING.

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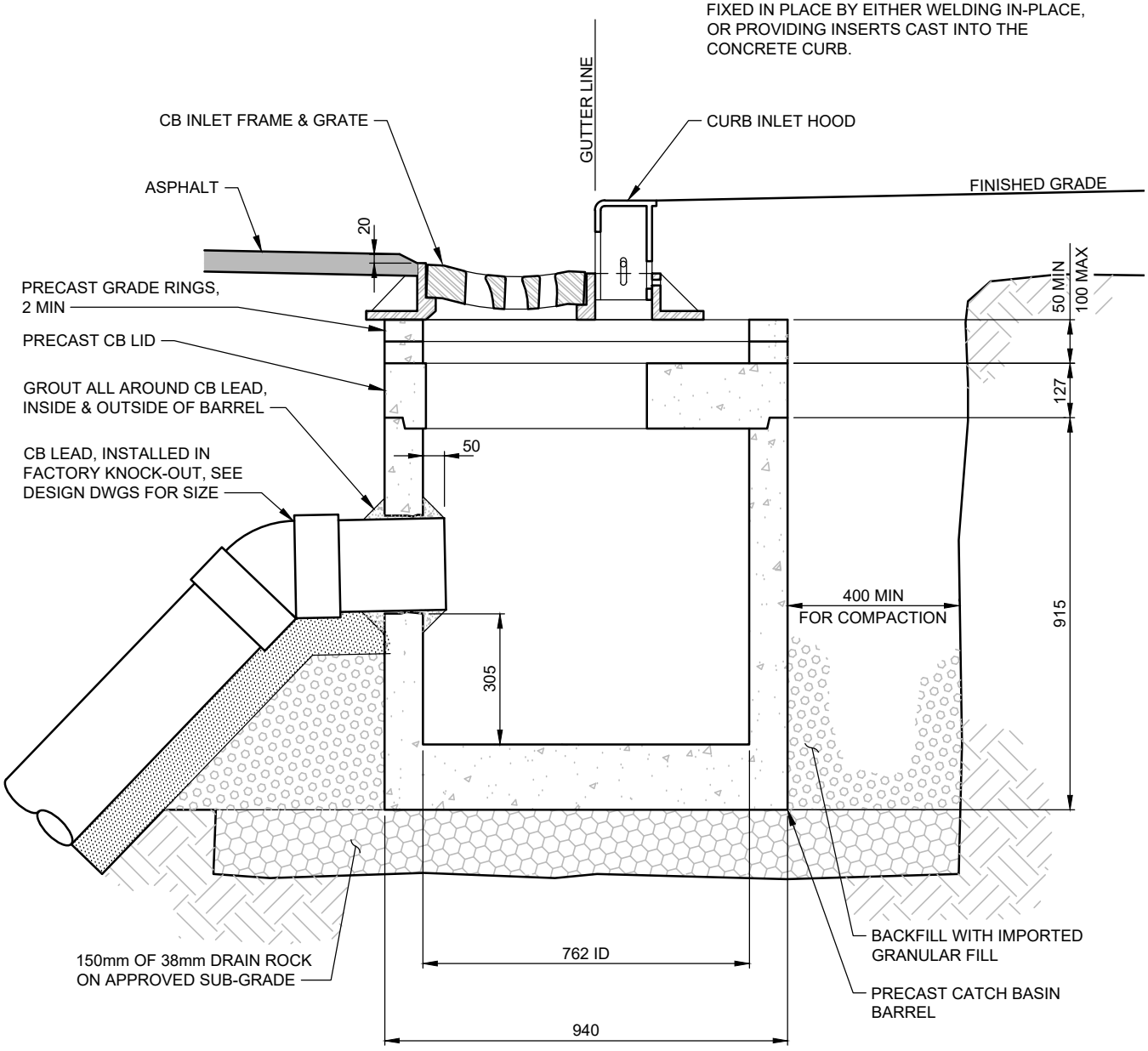
4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

SHALLOW CATCH BASIN

Scale:	1:15
Created:	JAN 2016
Rev Date:	NOV 2016
Dwg No:	SW-2

NOTE:
TOP OF HOOD TO BE FLUSH WITH TOP OF CURB. PRIOR TO CASTING THE CONCRETE CURB, THE CURB INLET HOOD IS TO BE PERMANENTLY FIXED IN PLACE BY EITHER WELDING IN-PLACE, OR PROVIDING INSERTS CAST INTO THE CONCRETE CURB.



NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR FRAME & HOOD DETAILS, SEE STD DWG SW-7.
3. ALL JOINTS TO BE PRE-WETTED BEFORE MORTAR IS PLACED.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.
6. CATCH BASIN LID TO MEET CS-600 LOADING.

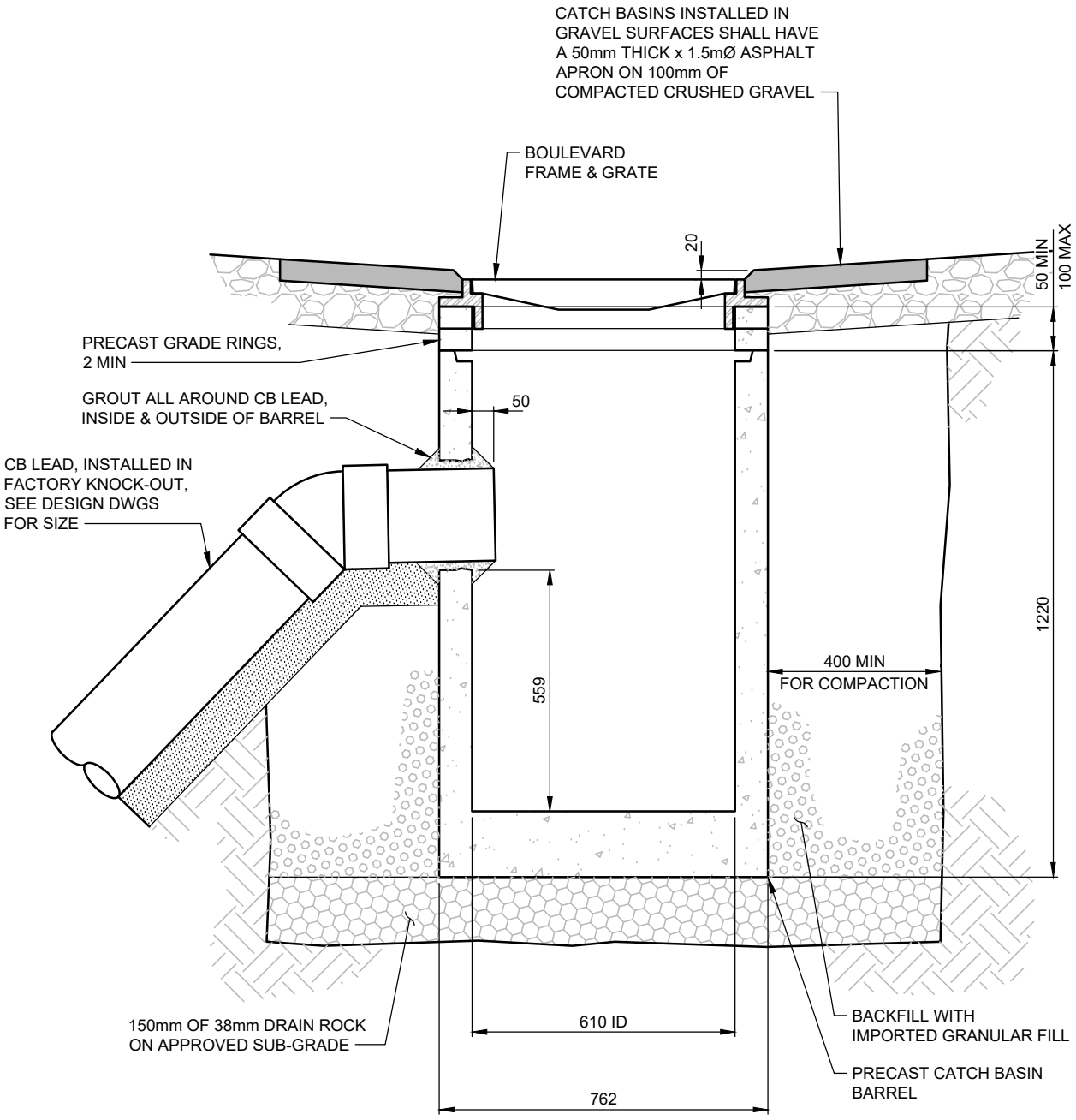
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4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

CURB INLET CATCH BASIN

Scale:	1:15
Created:	JAN 2016
Rev Date:	NOV 2016
Dwg No:	SW-3



NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR FRAME & GRATE DETAILS, SEE STD DWG SW-8.
3. ALL JOINTS TO BE PRE-WETTED BEFORE MORTAR IS PLACED.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

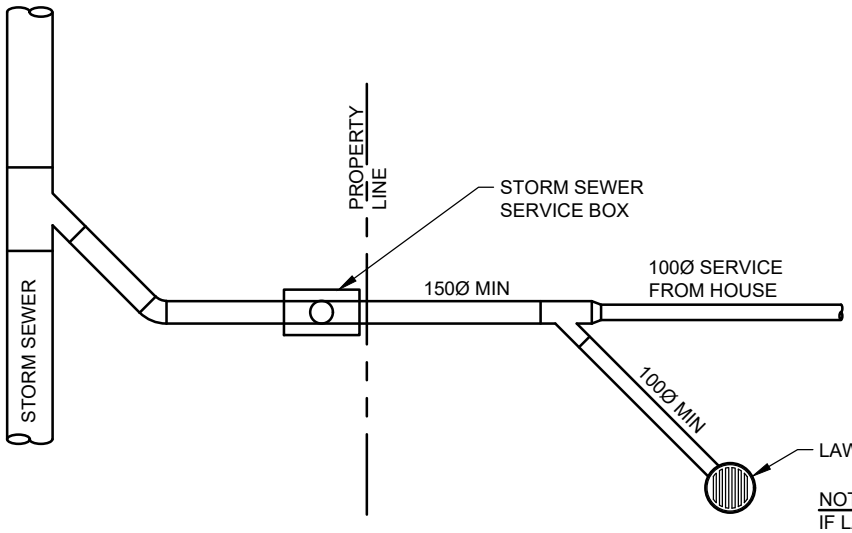
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4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

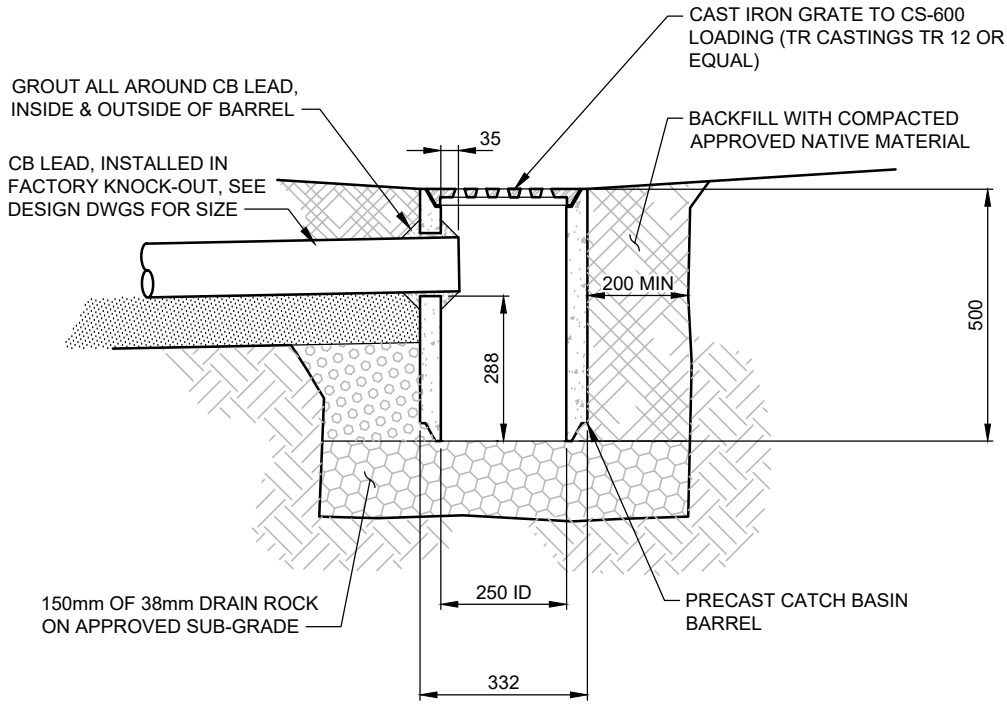
BOULEVARD CATCH BASIN

Scale:	1:15
Created:	JAN 2016
Rev Date:	NOV 2016
Dwg No:	SW-4



PLAN
NTS

NOTE:
IF LARGER LAWN BASIN (SW-4) IS REQ'D, THE CB LEAD TO BE 150Ø PVC TO SERVICE BOX.



ELEVATION
1:15

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

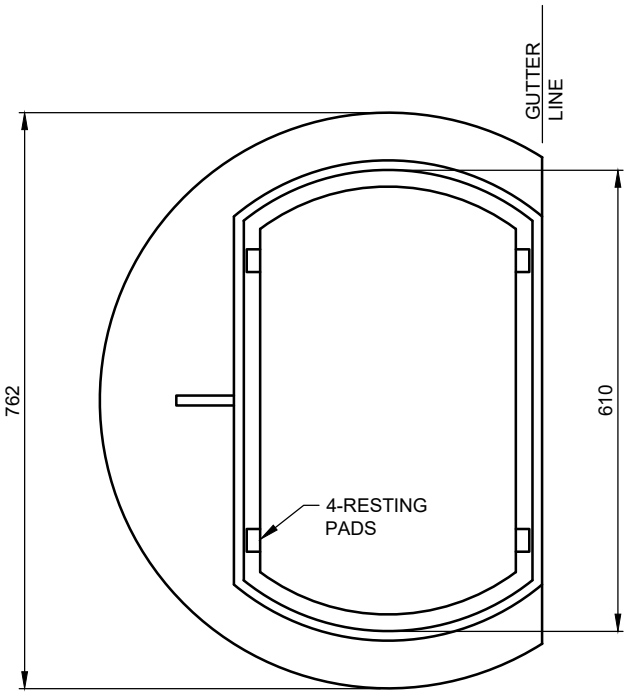
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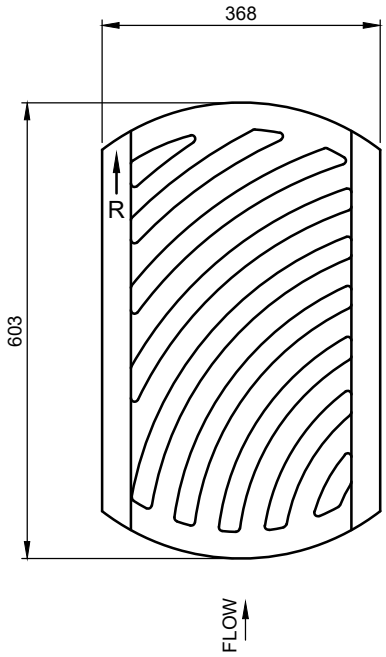
CITY OF NANAIMO
THE HARBOUR CITY

SMALL LAWN BASIN ON PRIVATE PROPERTY

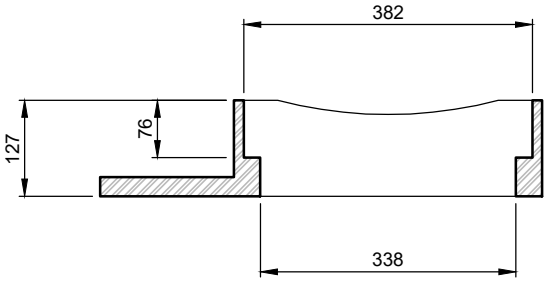
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Rev Date:	NOV 2016
Dwg No:	SW-5



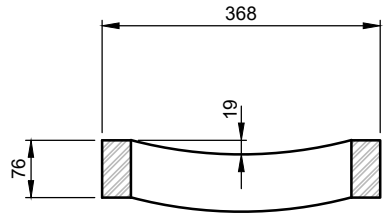
FRAME PLAN



GRATE PLAN



FRAME SECTION



GRATE SECTION

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED TO MEET CS-600 LOADING.
3. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
4. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

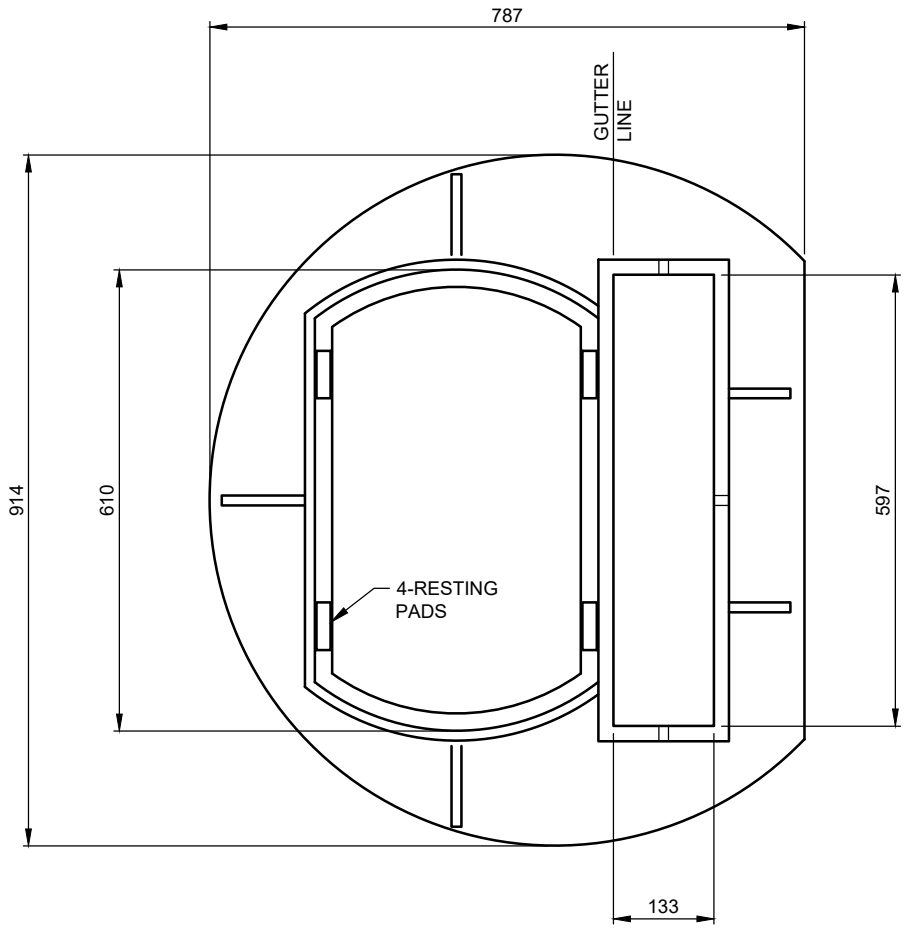
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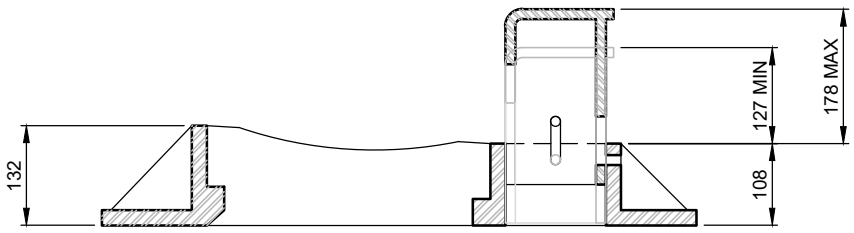
CITY OF NANAIMO
THE HARBOUR CITY

CATCH BASIN FRAME AND GRATE

Scale:	1:10
Created:	MAR 2016
Rev Date:	NOV 2016
Dwg No:	SW-6



FRAME PLAN



SECTION

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED TO MEET CS-600 LOADING.
3. FOR GRATE, SEE STD DWG SW-6.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

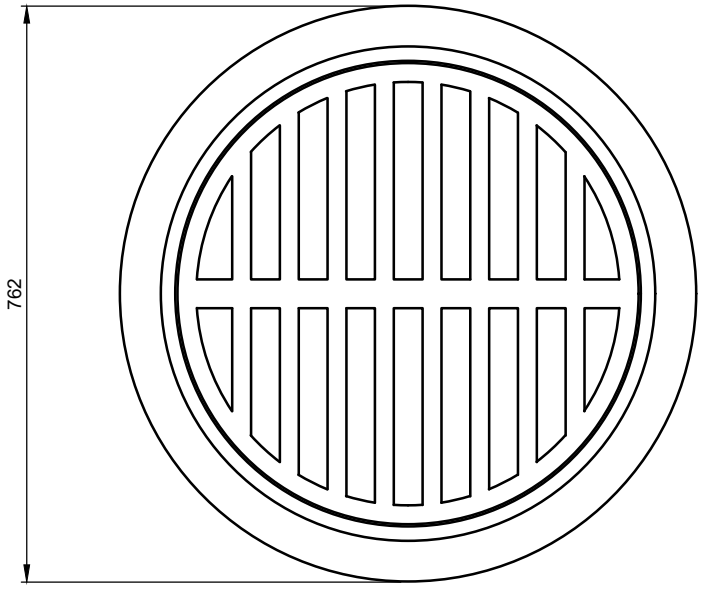
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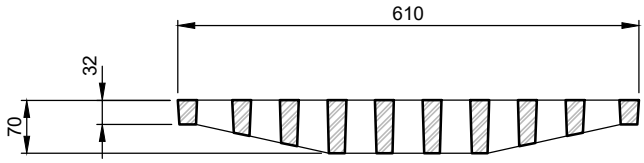
CITY OF NANAIMO
THE HARBOUR CITY

ADJUSTABLE CATCH BASIN
FRAME AND HOOD

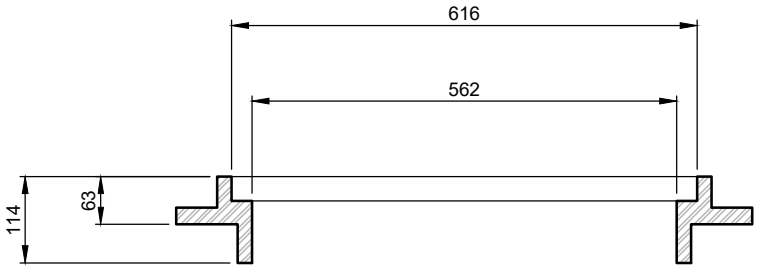
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Rev Date:	NOV 2016
Dwg No:	SW-7



FRAME AND GRATE PLAN



GRATE SECTION



FRAME SECTION

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ALL BEARING SURFACES BETWEEN FRAME, COVER AND RISER RINGS SHALL BE MACHINED FOR NON-ROCKING FIT IN ALL POSITIONS. ALLOW 1.5mm RAISED FACE IN CASTINGS FOR MACHINING.
3. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
4. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

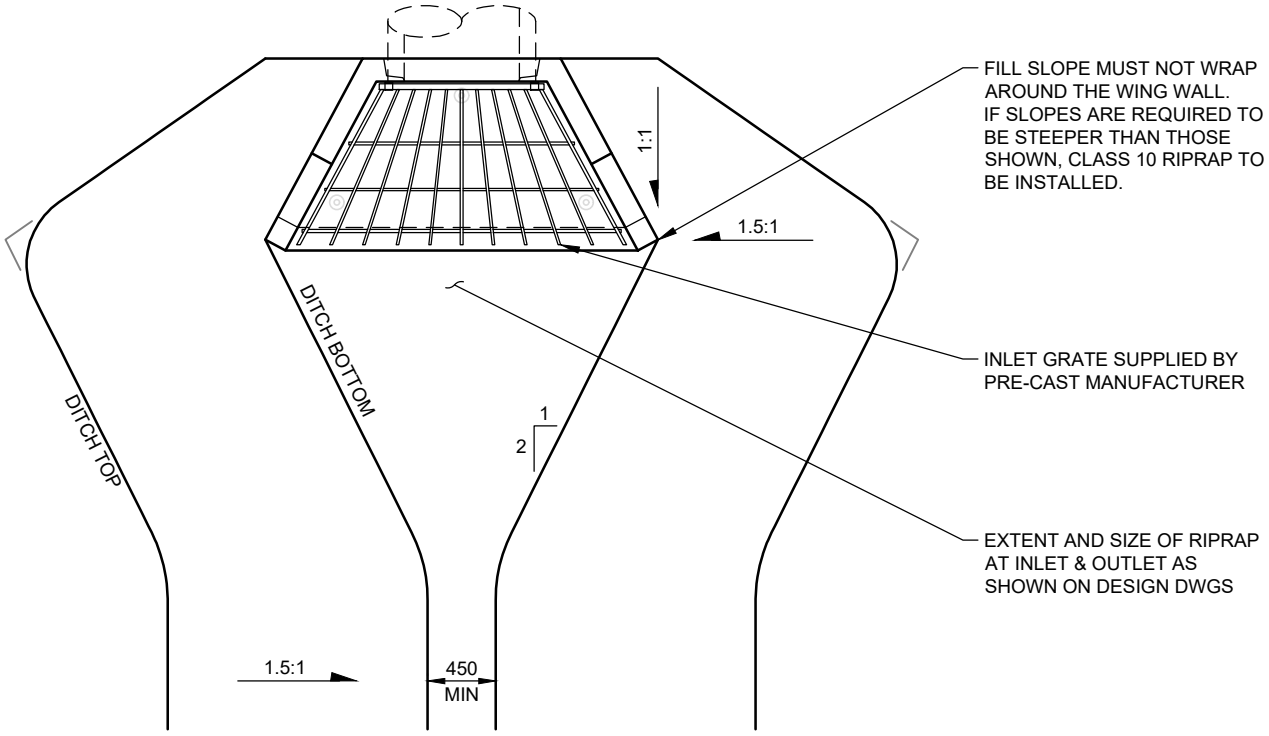
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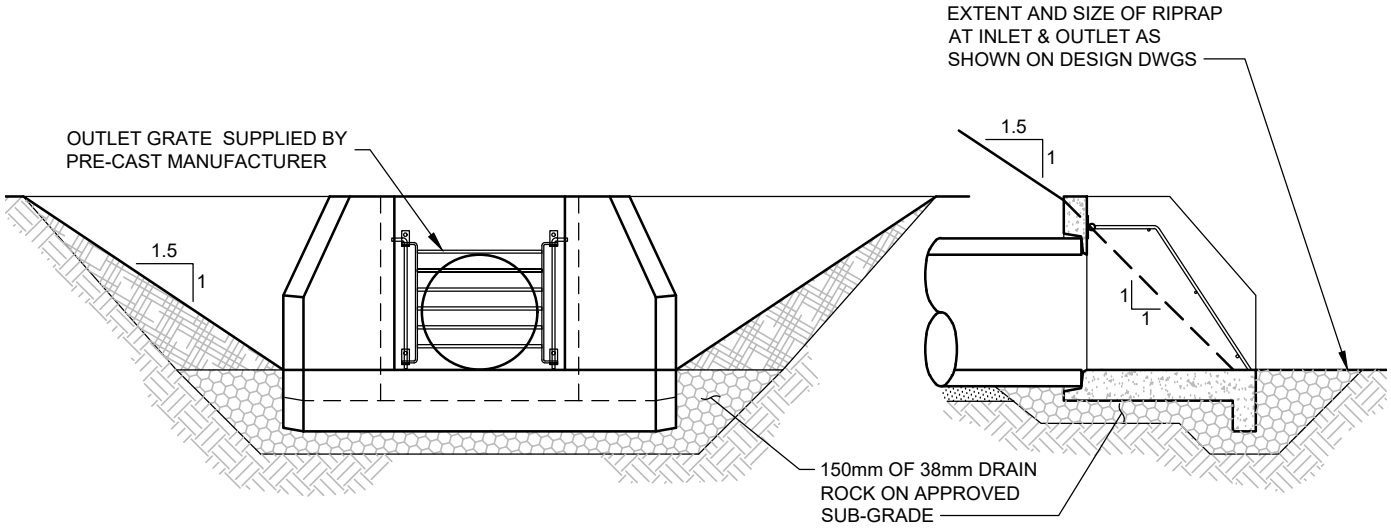
CITY OF NANAIMO
THE HARBOUR CITY

BOULEVARD CATCH BASIN
FRAME AND GRATE

Scale:	1:10
Created:	MAR 2016
Rev Date:	NOV 2016
Dwg No:	SW-8



PLAN (INLET SHOWN)
1:50



ELEVATION (OUTLET SHOWN)
1:50

SECTION
1:50

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. INLET AND OUTLET GRATES TO BE WELDED AND HOT-DIP GALVANIZED TO ASTM A123/A123M.
3. GRATES TO BE EASILY LIFTED TO ALLOW ACCESS TO THE PIPE FOR CLEARING OF DEBRIS.
4. GRATES TO BE DESIGNED IN ACCORDANCE WITH SECTION 7.11.
5. IF SPECIFIED ON DESIGN DRAWINGS, GUARD RAIL TO BE INSTALLED PER STD DWG SW-12.
6. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
7. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

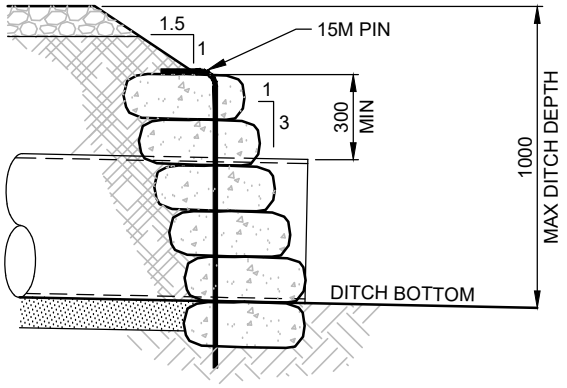
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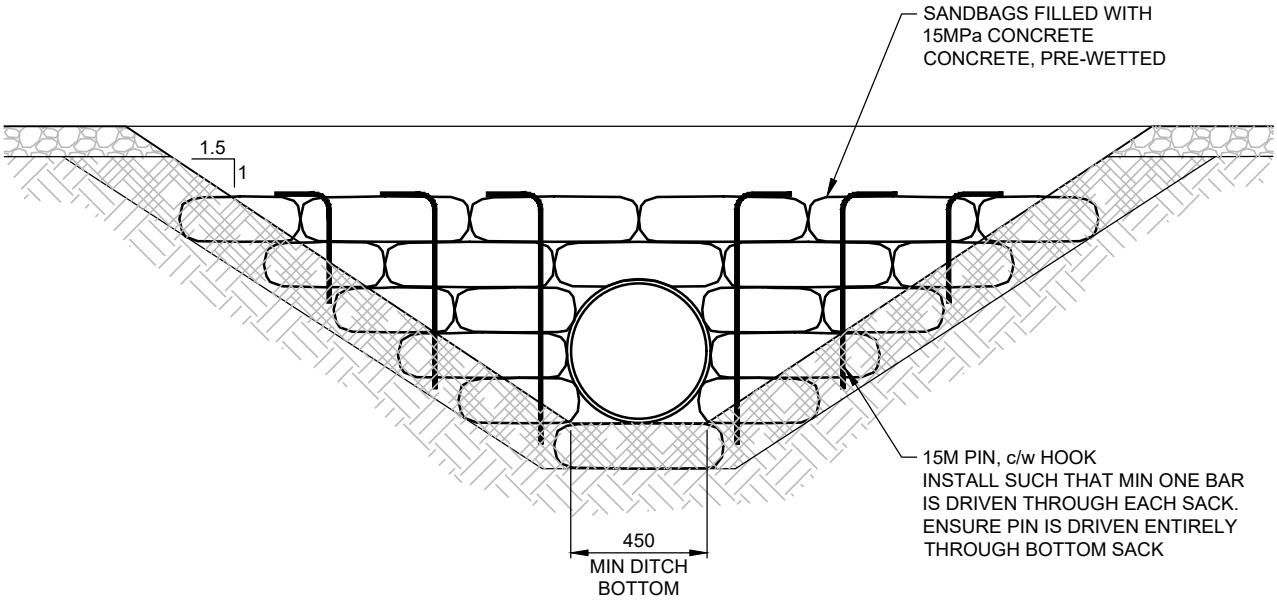
CITY OF NANAIMO
THE HARBOUR CITY

PRECAST CONCRETE HEADWALL

Scale:	1:50
Created:	FEB 2016
Rev Date:	NOV 2016
Dwg No:	SW-10



SECTION
1:25



ELEVATION
1:25

NOTES:

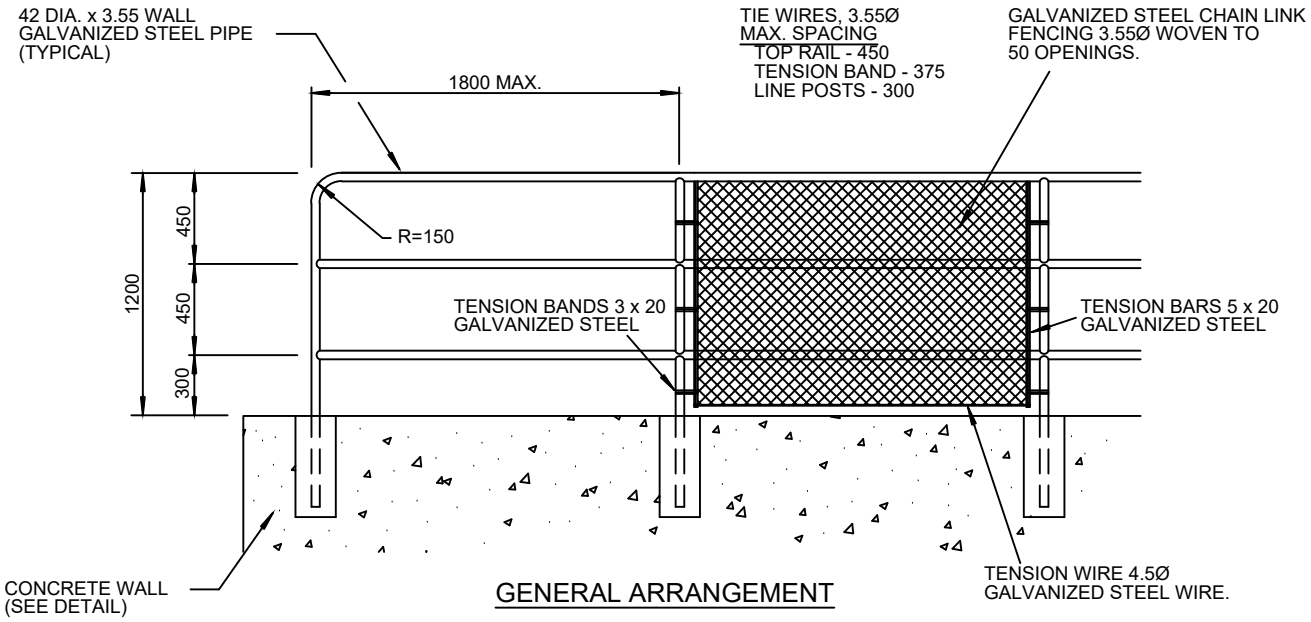
1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. THIS HEADWALL IS FOR DRIVEWAY CULVERTS AND HYDRANT ACCESS ONLY, UNLESS APPROVED BY CITY ENGINEER.
4. IF HORIZONTAL ANGLE BETWEEN THE DITCH FLOW AND CULVERT INLET OR OUTLET EXCEEDS 30°, THE HEADWALL WILL REQUIRE WING WALLS TO FUNNEL FLOW TO PREVENT EROSION TO WALLS OF THE DITCH. SEE DESIGN DRAWINGS FOR DETAILS
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

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6.19.2026

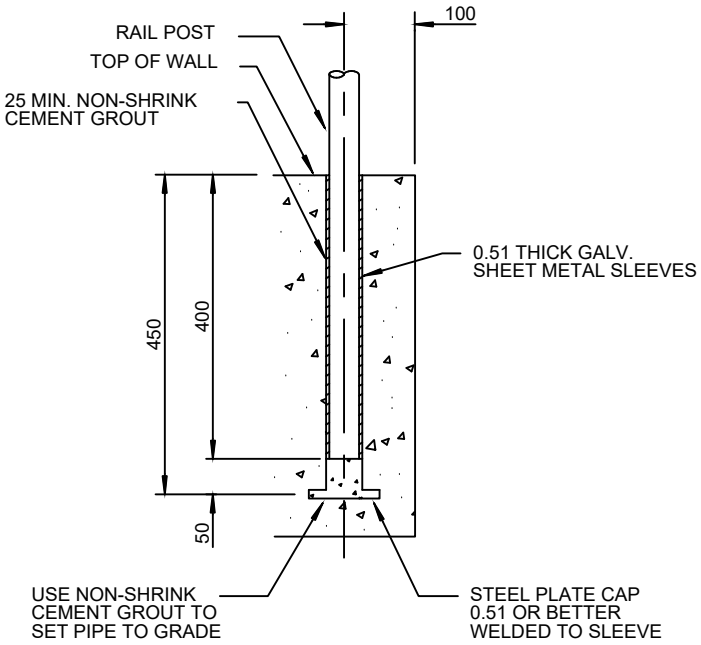
CITY OF NANAIMO
THE HARBOUR CITY

SANDBAG HEADWALL FOR
CULVERT INLETS AND OUTLETS

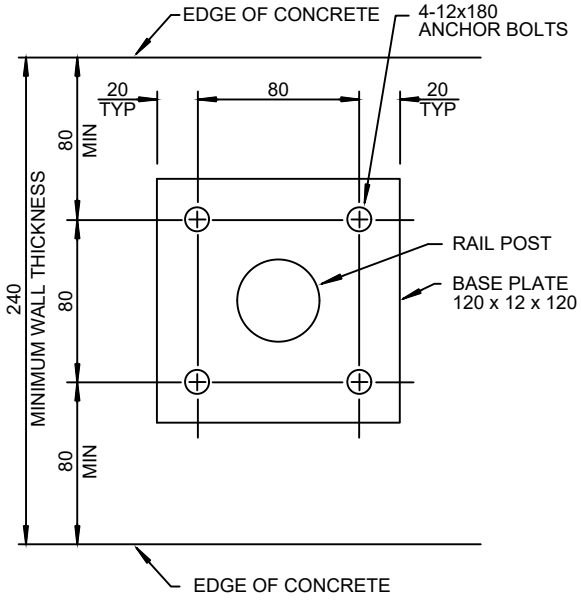
Scale:	1:25
Created:	FEB 2016
Rev Date:	NOV 2016
Dwg No:	SW-11



GENERAL ARRANGEMENT



EMBEDDED MOUNTING



ATTACHED MOUNTING

CONNECTION DETAILS

NOTES:

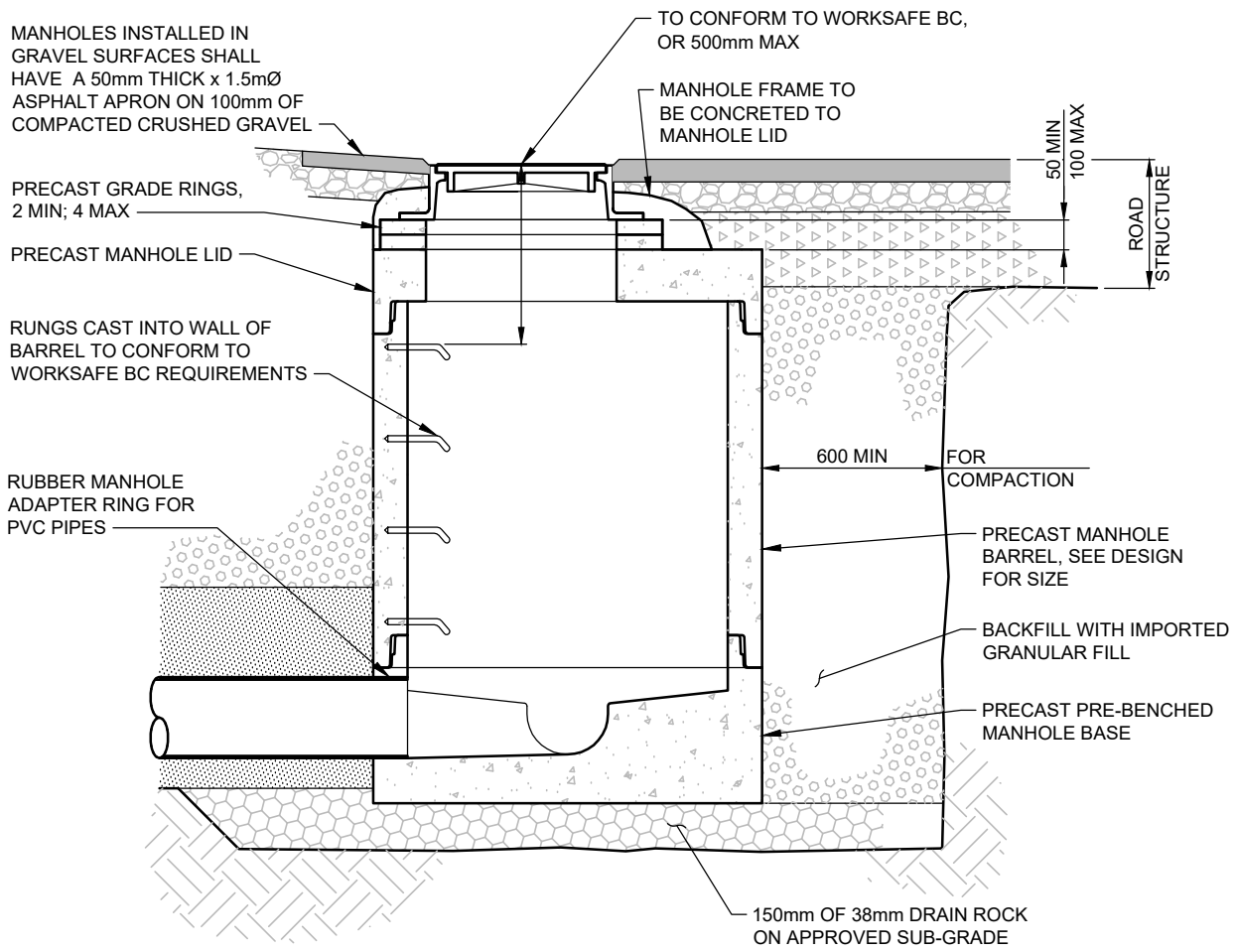
1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. ALL JOINTS MITRED, WELDED ALL AROUND AND GROUND SMOOTH.
4. INSTALLATION OF CHAINLINK FENCING AS REQUIRED BY THE CITY ENGINEER.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 7 DWG\SW-12
6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

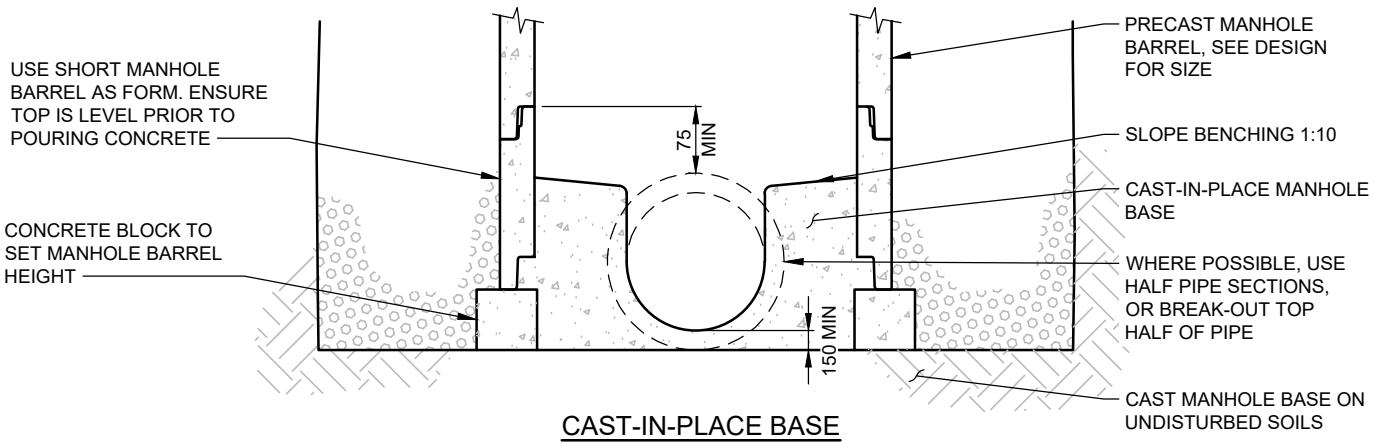
GUARD RAIL

Scale:	NTS
Created:	NOV 1997
Rev Date:	NOV 2016
Dwg No:	SW-12



TYPICAL SECTION

1:25



CAST-IN-PLACE BASE

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR MANHOLE BENCHING, SEE STD DWG SW-15.
3. FOR FRAME & COVER DETAILS, SEE STD DWG SW-16.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.
6. LOW PROFILE FRAMES NOT PERMITTED IN ROADS UNLESS APPROVED BY CITY ENGINEER.
7. CASTING TO BE SET FLUSH WITH TRAVELLED SURFACE SUCH THAT THERE ARE NO IRREGULARITIES GREATER THAN 6mm WHEN CHECKED WITH A 3m STRAIGHT EDGE IN ANY DIRECTION.

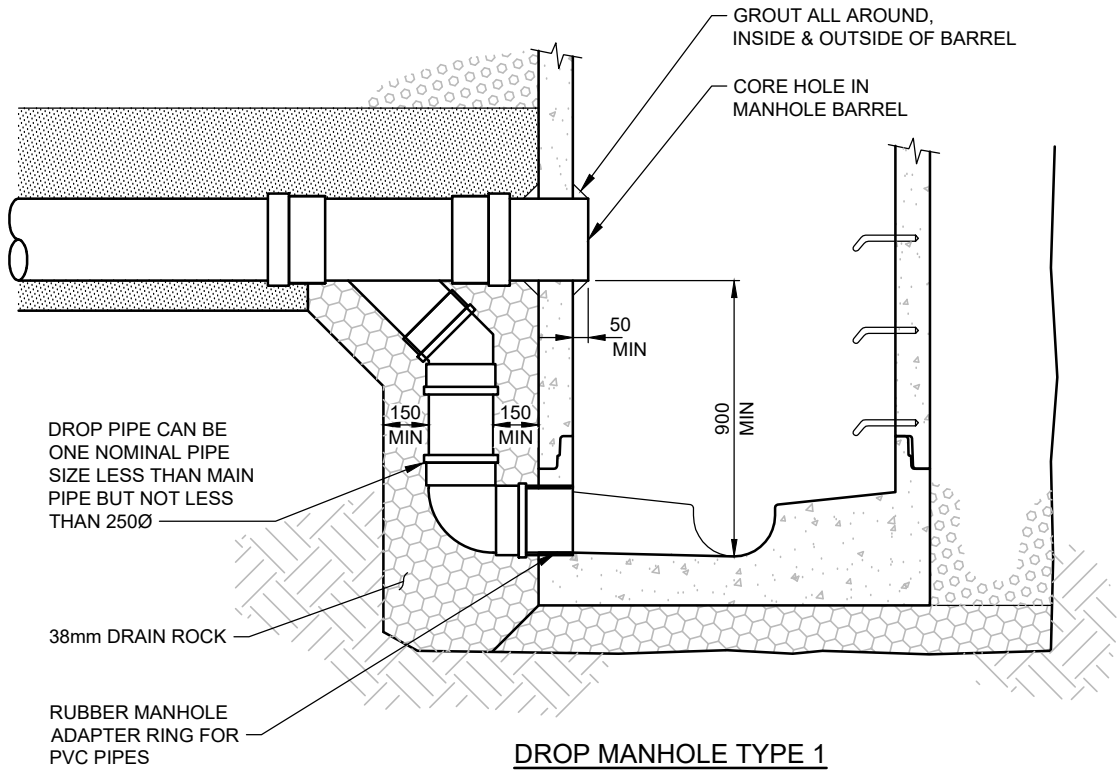
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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

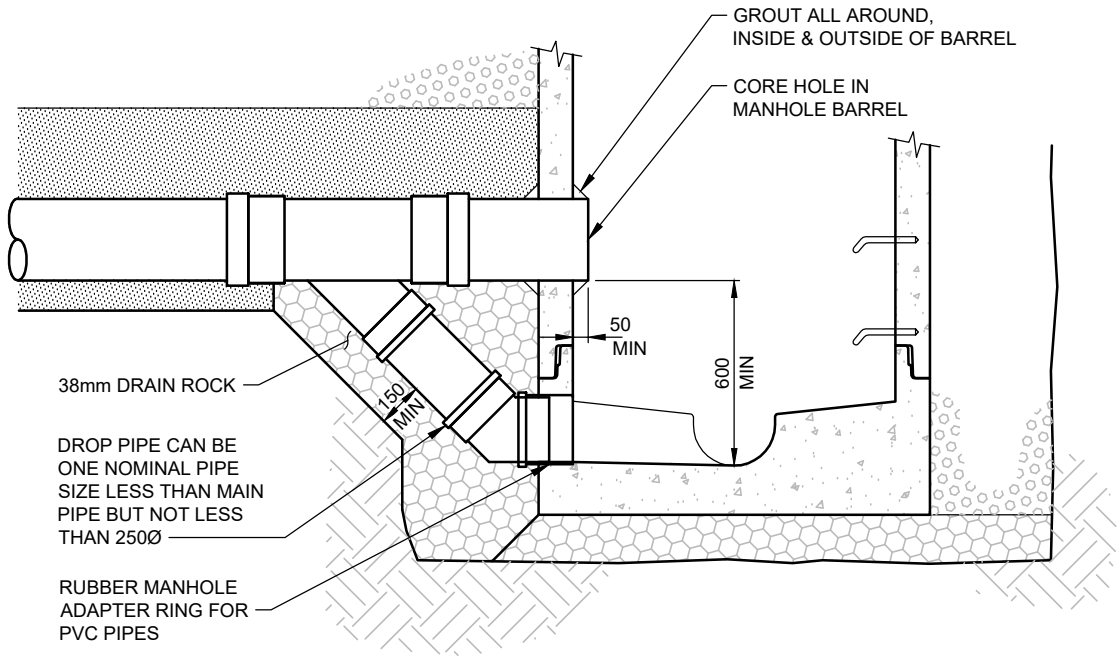
STORM MANHOLE

Scale:	1:25
Created:	FEB 2016
Rev Date:	MAY 2020
Dwg No:	SW-13



DROP MANHOLE TYPE 1

1:25



DROP MANHOLE TYPE 2

1:25

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR MANHOLE DETAILS, SEE STD DWG SW-13.
3. FOR MANHOLE BENCHING, SEE STD DWG SW-15.
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

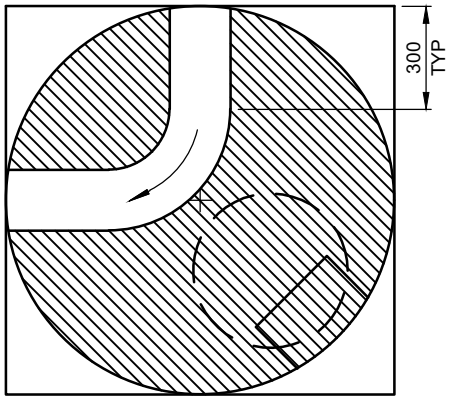
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6.19.2026

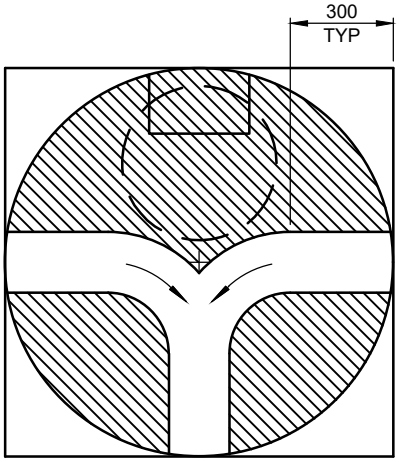
CITY OF NANAIMO
THE HARBOUR CITY

STORM DROP MANHOLE

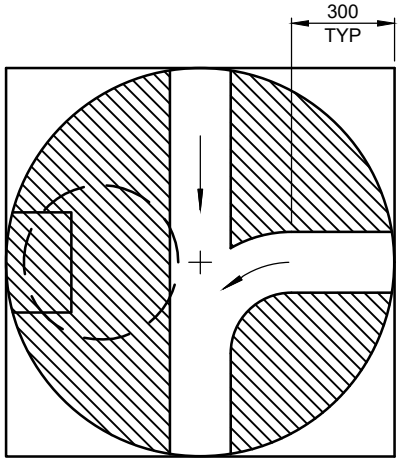
Scale:	1:25
Created:	FEB 2016
Rev Date:	JUNE 2026
Dwg No:	SW-14



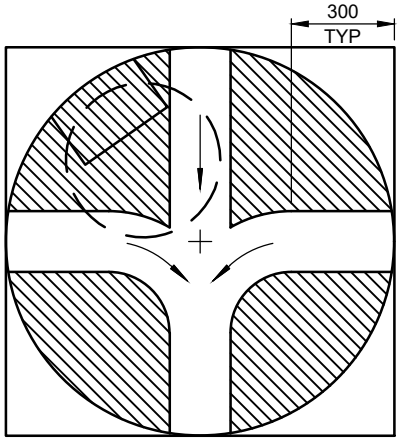
1. RIGHT ANGLE BEND



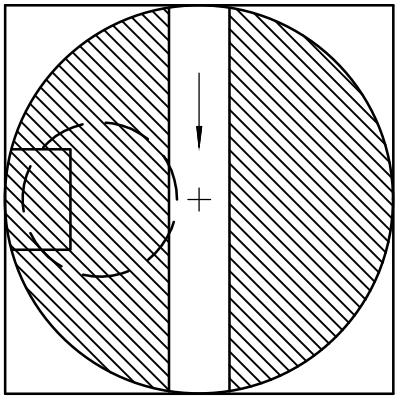
2. TEE CONNECTION



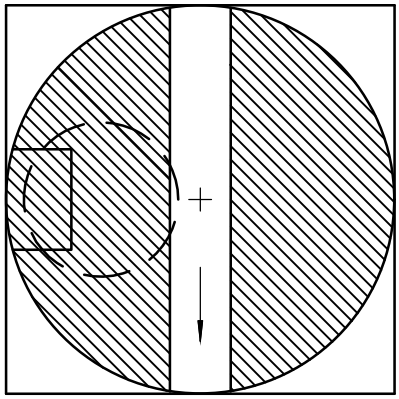
3. THREE WAY JUNCTION



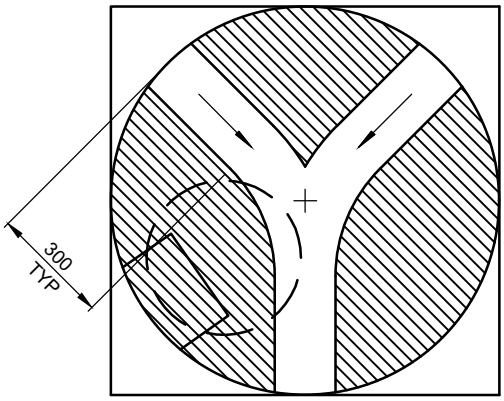
4. FOUR WAY JUNCTION



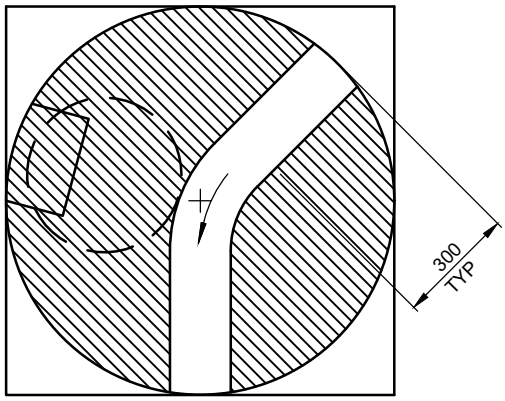
5. STRAIGHT THROUGH



6. DEAD END



7. WYE CONNECTION



8. 45° BEND

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR MANHOLE CHANNELING, REFER TO SECTION 7.49.
3. ALL CHANNELS SHALL BE FINISHED WITH A STEEL TROWEL. BENCHING (HATCHED AREAS), SHALL BE BROOM FINISHED.
4. MANHOLE COVER AND RUNG LOCATIONS SHALL BE AS SHOWN, UNLESS NOTED OTHERWISE.
5. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
6. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

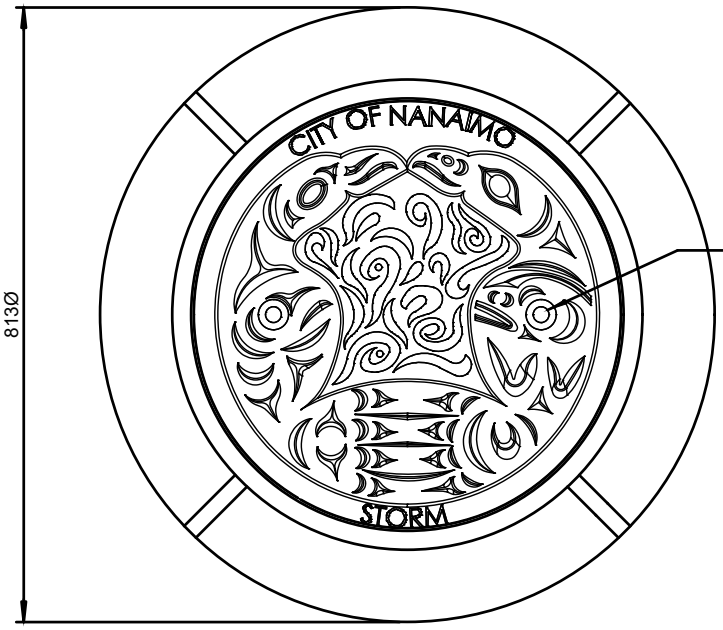
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4.1.2026

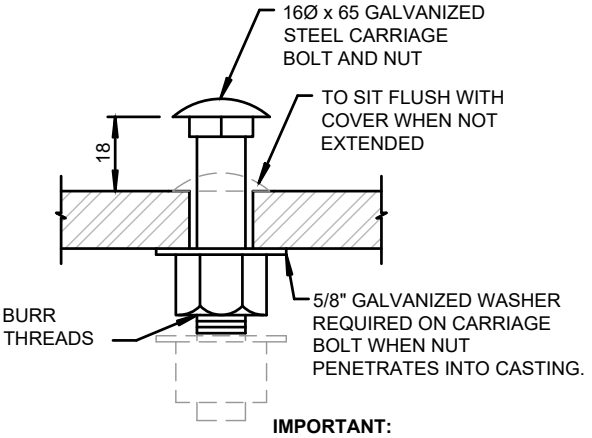
CITY OF NANAIMO
THE HARBOUR CITY

STORM MANHOLE BENCHING

Scale:	NTS
Created:	MAY 2012
Rev Date:	NOV 2016
Dwg No:	SW-15

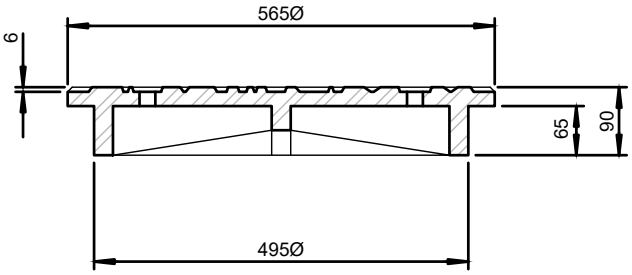


PLAN

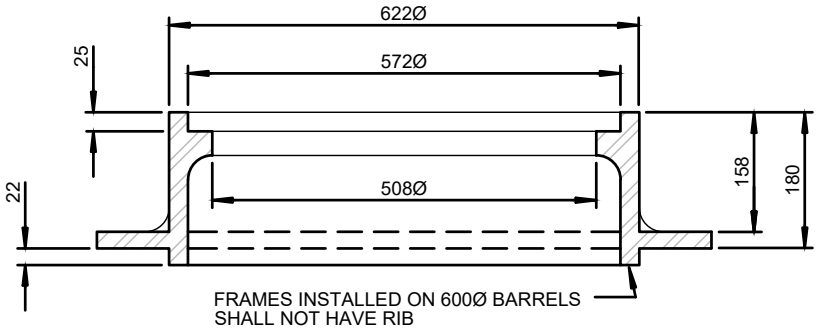


IMPORTANT:
CARRIAGE BOLT TO EXTEND EXACTLY 18mm ABOVE CASTING.

CARRIAGE BOLT DETAIL



COVER



FRAME

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED CS-600 LOADING.
3. ALL BEARING SURFACES BETWEEN FRAME, COVER AND RISER RINGS SHALL BE MACHINED FOR NON-ROCKING FIT IN ALL POSITIONS. ALLOW 1.5mm RAISED FACE IN CASTINGS FOR MACHINING.
4. PAINT THE INSIDE SURFACE OF THE MANHOLE FRAME IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION WITH ENAMEL RUST PAINT. COLOUR TO BE GREEN.
5. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS WILL BE ACCEPTED FOR THIS INSTALLATION.
6. ALL DIMENSIONS ARE MILLIMETRES UNLESS NOTED OTHERWISE.
7. REFERRING TO "CITY OF NANAIMO STORM" LETTERING SHALL BE 25 FLATTENED FACE GOTHIC WITH FACE OF LETTERS RAISED TO THE SAME LEVELS AS THE TOP OF THE RIBS.

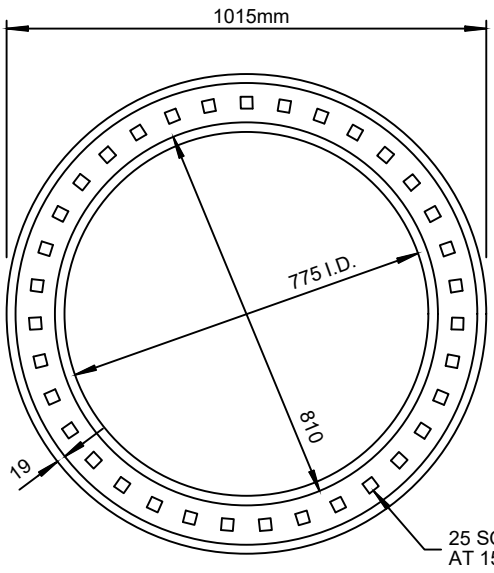
CITY OF NANAIMO
THE HARBOUR CITY

STORM MANHOLE FRAME & COVER
SNUNEYMUXW EAGLE BY JOEL GOOD

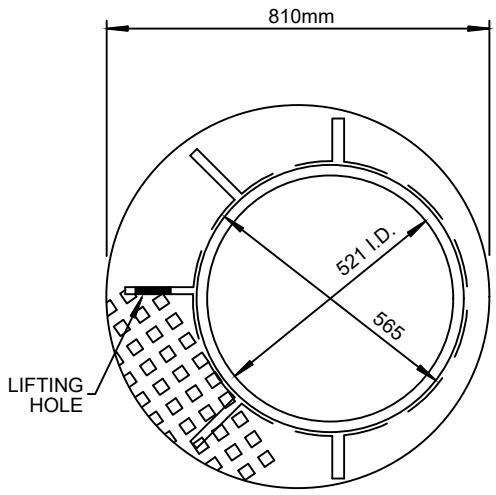
Scale:	NTS
Drawn:	JULY 2023
Rev Date:	JUNE 2026
Dwg No:	SW-16

4.22.2026

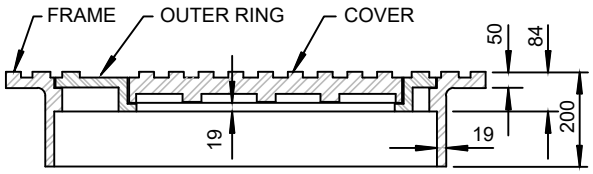
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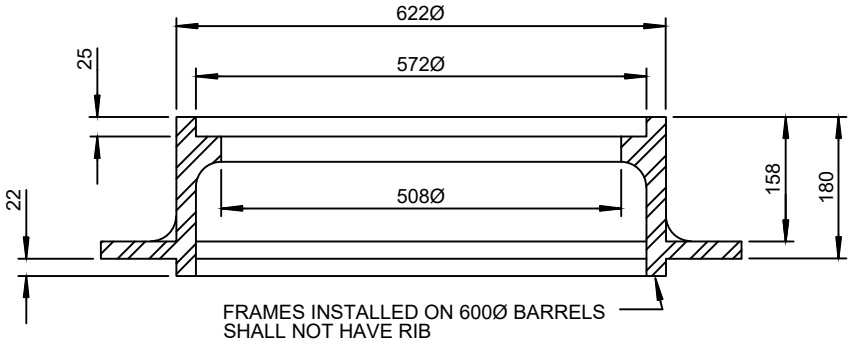
PLAN OF FRAME



PLAN OF OUTER RING



SECTION OF FRAME, RING
AND COVER



NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED TO MEET CS-600 LOADING.
3. FOR COVER LETTERING AND BOLTING REQUIREMENTS REFER TO STD. DWG. SW-16 OR SW-18 (WATERTIGHT COVER).
4. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
5. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 7 DWG\SW-17

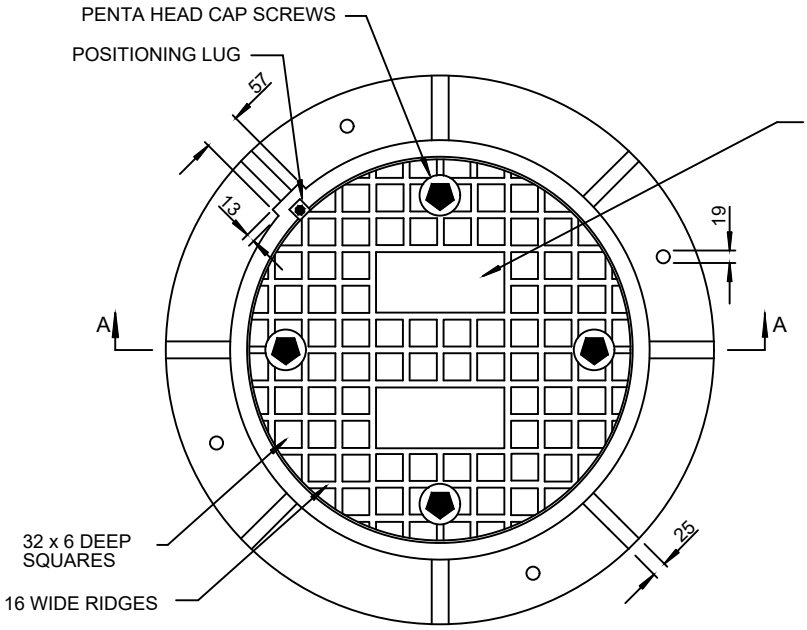
4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

UTILITY CHAMBER STORM MANHOLE
FRAME, RING AND COVER

Scale:	NTS
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	SW-17

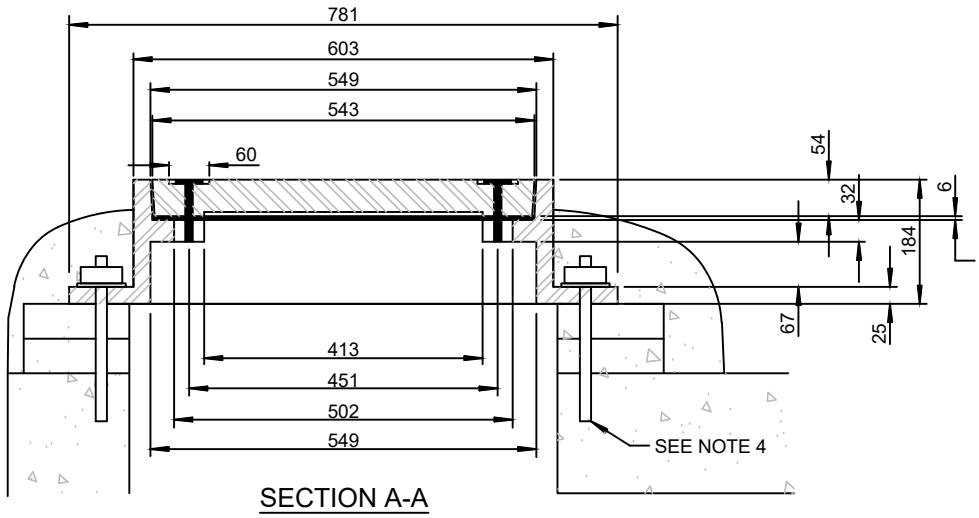
APPLICATION: UNITS ARE FOR USE IN AREAS WHERE FLOODING OR HIGH TIDES ARE POSSIBLE. THIS UNIT SHALL HAVE A POSITIONING LUG IN COVER FOR EASY REPLACEMENT OF CAP SCREWS AND SHALL BE EQUIPPED WITH FOUR ONLY 19Ø HOLES IN FRAME FOR ANCHOR BOLTS AS SHOWN.



PLAN

WEIGHT OF UNIT SHOWN IS
FRAME = 113.4 kg
COVER = 56.7 kg

FURNISHED WITH:
A) FOUR 13x57 PENTA HEAD STAINLESS STEEL CAP SCREWS TO DISCOURAGE VANDALISM.
B) A 6mm THICK NEOPRENE GASKET FULLY ENCOMPASSING BOLT HOLES.
C) METAL SURFACES BETWEEN FRAME AND COVER MACHINED TO ENSURE NON ROCKING FIT IN ALL POSITIONS. ALLOW 1.5 RAISED FACE IN CASTING FOR MACHINING.
D) MANUFACTURE BOLT HOLES TO PERMIT INTERCHANGING OF COVERS BETWEEN FRAME UNITS.



SECTION A-A

DIA. OF COVER ------ 543
THICKNESS OF COVER -- 54
DIA. OF FRAME ------ 781
DEPTH OF FRAME -----184

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. CASTINGS SHALL BE CERTIFIED TO MEET CS-600 LOADING.
3. PAINT THE INSIDE SURFACE OF THE MANHOLE FRAME IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION WITH ENAMEL RUST PAINT. COLOUR TO BE GREEN.
4. FRAME SHALL BE SET IN MORTAR AND BOLTED TO THE MANHOLE SLAB WITH 19Ø STAINLESS STEEL BOLTS, WASHERS AND NUTS.
5. THIS DRAWING TO BE READ IN ACCORDANCE WITH DRAWING SW-13.
6. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
7. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

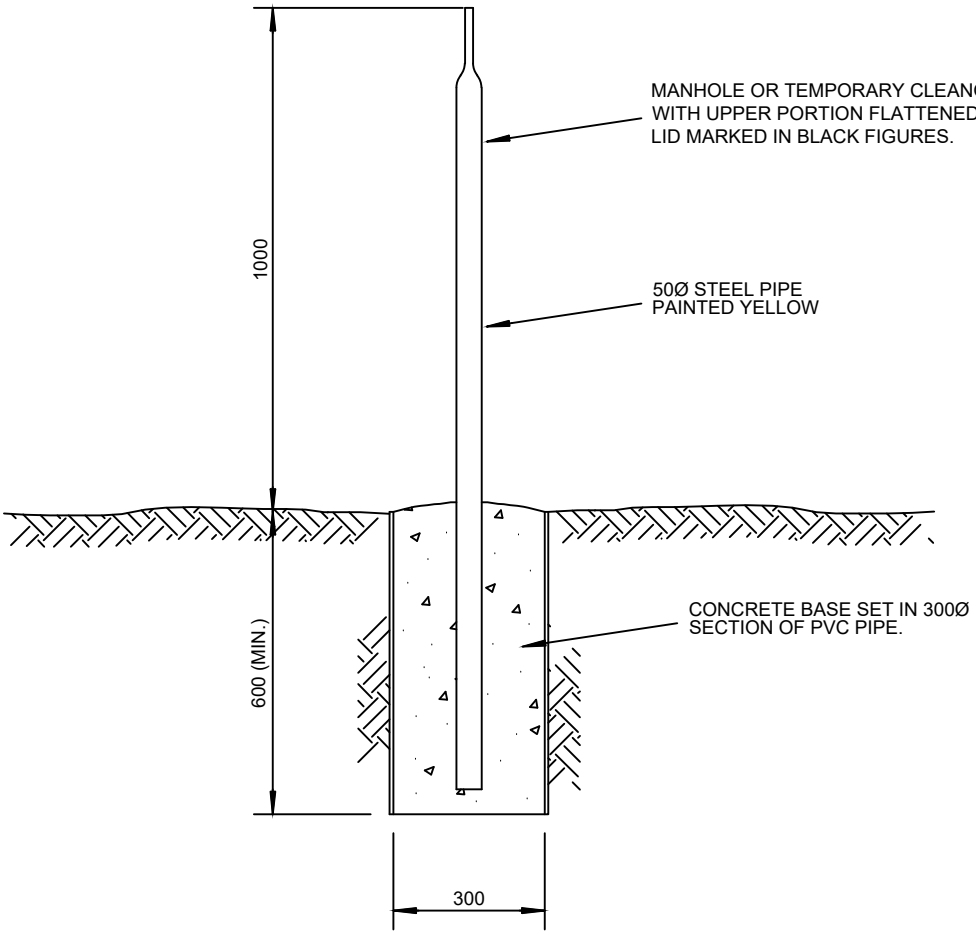
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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

WATERTIGHT STORM MANHOLE
FRAME AND COVER

Scale:	NTS
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	SW-18



NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. FOR USE ONLY WHERE MANHOLE OR TEMPORARY CLEANOUTS ARE LOCATED OUTSIDE THE PAVED PORTION OF THE STREET
3. THE MARKER SHALL BE LOCATED ON SITE BY THE ENGINEER WITH THE FLATTENED END AND MARKED DISTANCE FACING THE LID.
4. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

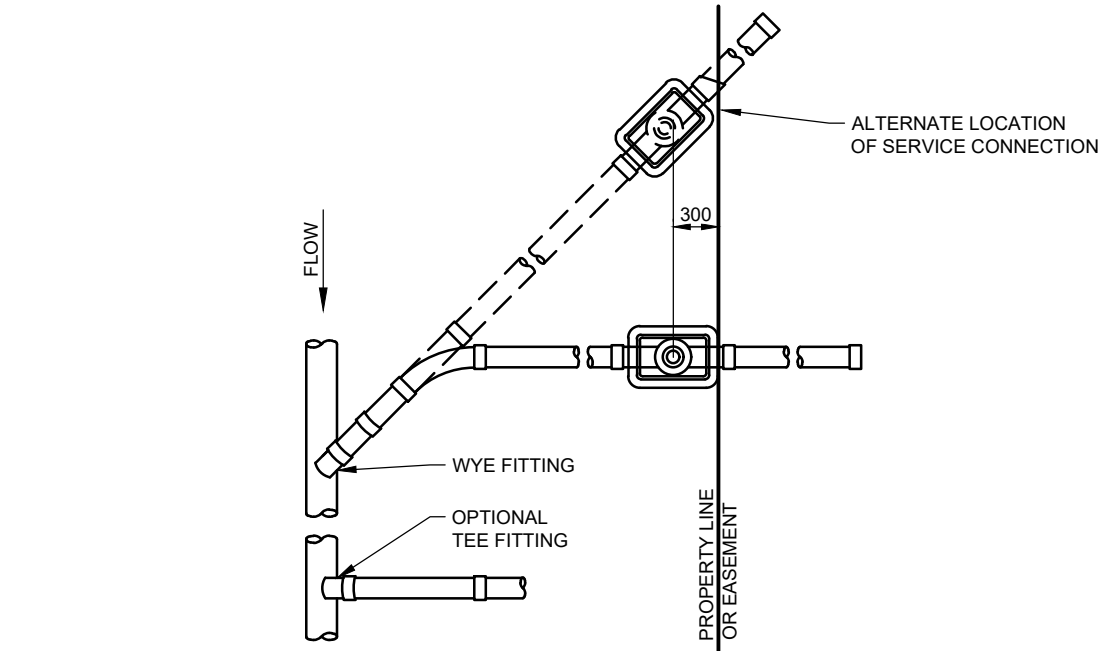
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6.19.2026

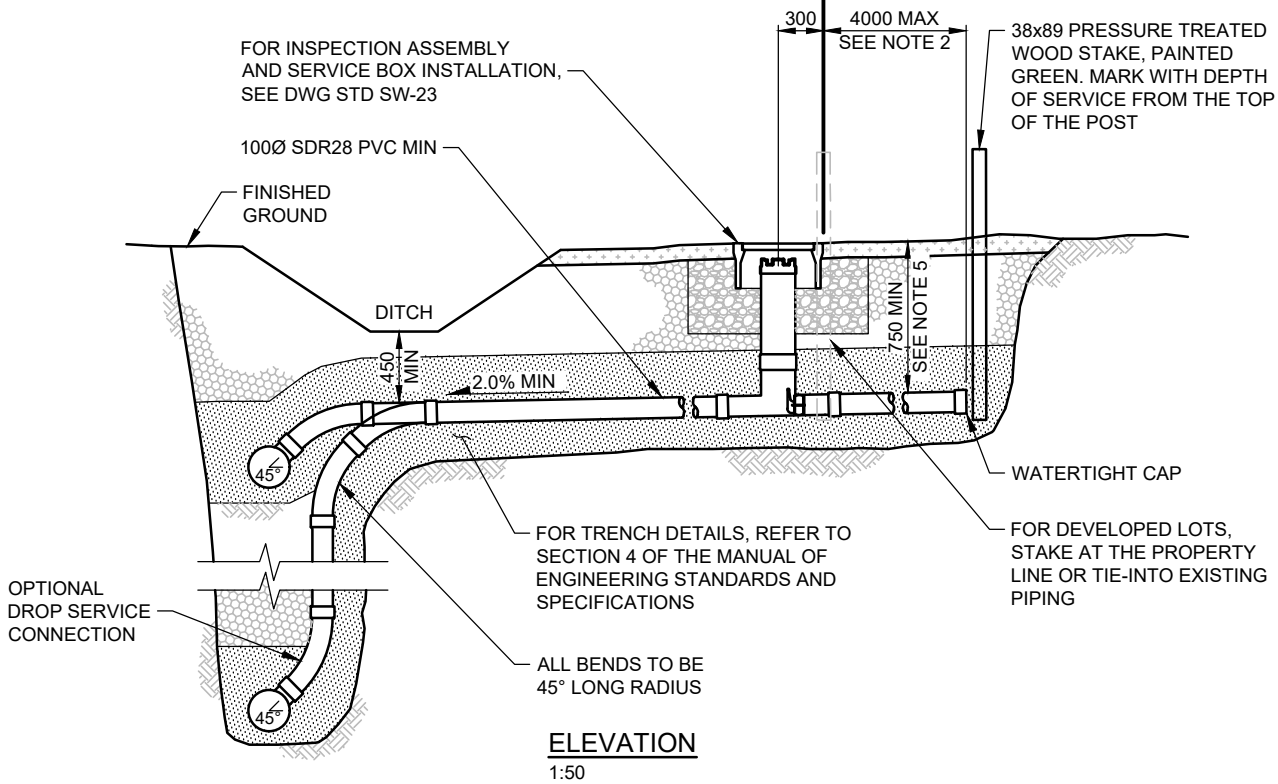
CITY OF NANAIMO
THE HARBOUR CITY

STORM MANHOLE AND
TEMPORARY CLEANOUT MARKER

Scale:	1:15
Created:	MAR 2016
Rev Date:	NOV 2016
Dwg No:	SW-20



PLAN
1:50



ELEVATION
1:50

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. WHERE DEPTH OF SERVICE AT PROPERTY LINE IS GREATER THAN 2.0m, EXTEND THE SERVICE PAST THE PROPERTY LINE EQUAL TO ITS DEPTH, TO A MAXIMUM OF 4.0m.
3. WHERE SERVICE IS INSTALLED IN ROCK, THE TRENCH IS TO EXTEND 3.0m PAST THE PROPERTY LINE.
4. STORM SEWER INSPECTION ASSEMBLY, INCLUDING PROPERTY SIDE STUB TO BE GREEN.
5. SERVICE PIPE DEPTH TO BE INSTALLED TO PROVIDE SUFFICIENT DEPTH TO SERVICE THE BASEMENT PLUMBING BY GRAVITY IN ACCORDANCE WITH THE BC PLUMBING CODE. MINIMUM COVER OF SERVICE PIPE AT PROPERTY LINE TO BE 0.75m.
6. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
7. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

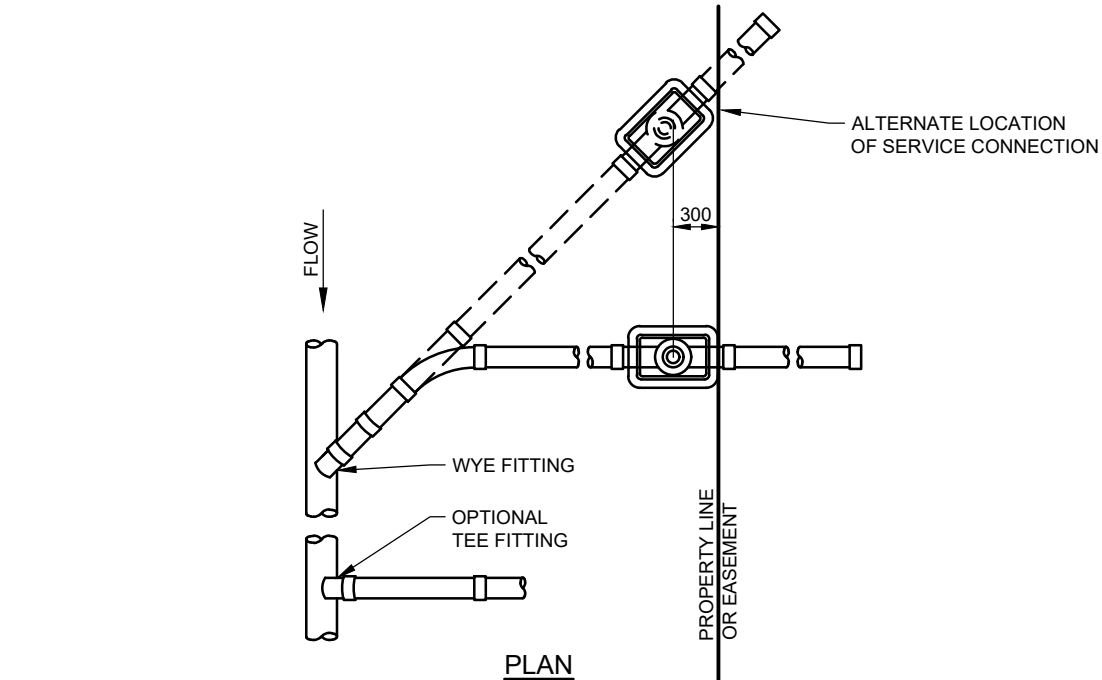
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CITY OF NANAIMO
THE HARBOUR CITY

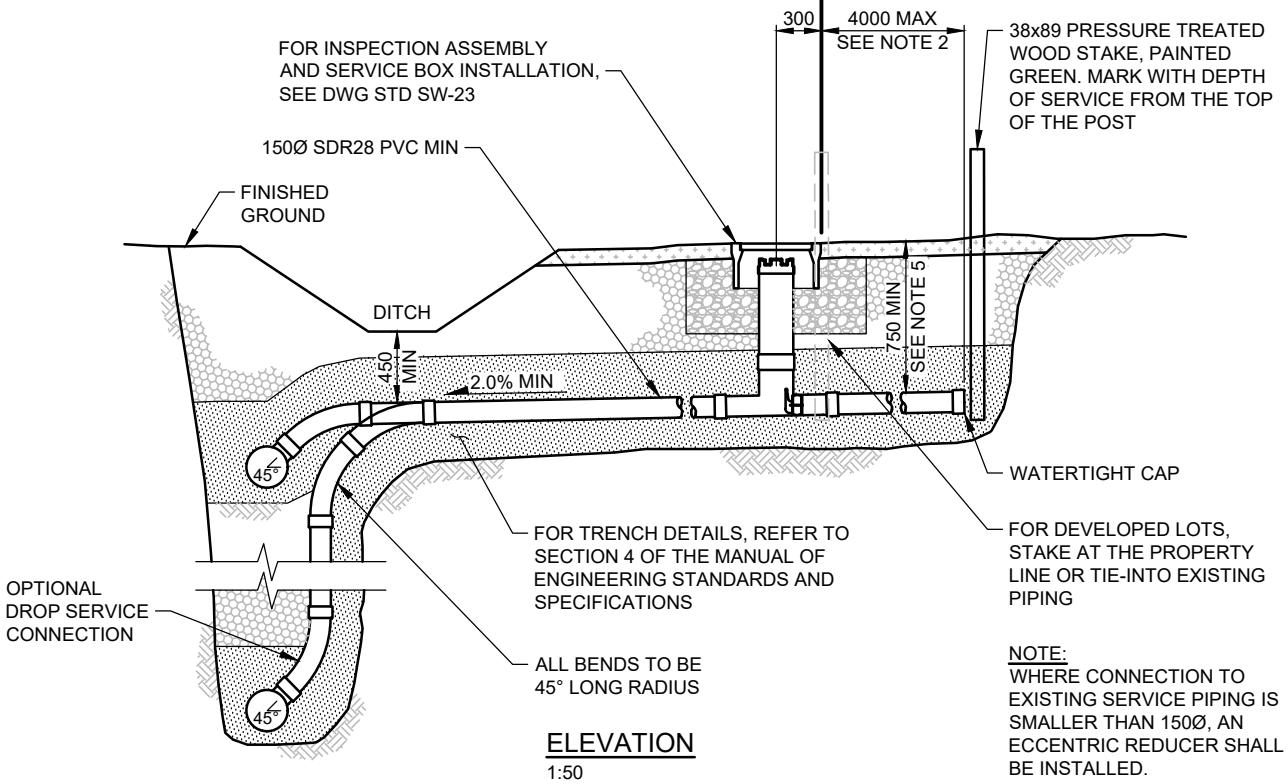
GENERAL STORM SERVICE CONNECTION DETAIL
RISER AND NON-RISER TYPES

Scale:	1:50
Created:	MAR 2016
Rev Date:	MAY 2020
Dwg No:	SW-21

6.19.2026



PLAN
1:50



ELEVATION
1:50

NOTE:
WHERE CONNECTION TO EXISTING SERVICE PIPING IS SMALLER THAN 150Ø, AN ECCENTRIC REDUCER SHALL BE INSTALLED.

NOTES:

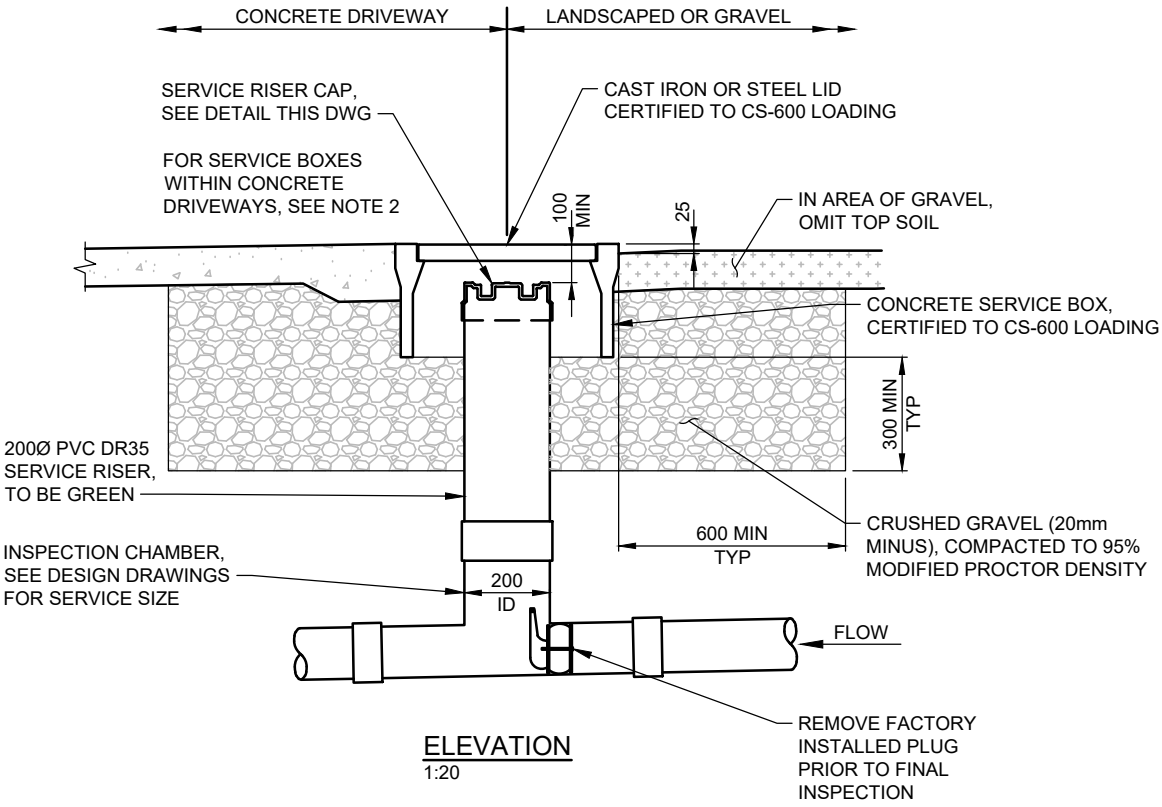
1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. WHERE DEPTH OF SERVICE AT PROPERTY LINE IS GREATER THAN 2.0m, EXTEND THE SERVICE PAST THE PROPERTY LINE EQUAL TO ITS DEPTH, TO A MAXIMUM OF 4.0m.
3. WHERE SERVICE IS INSTALLED IN ROCK, THE TRENCH IS TO EXTEND 3.0m PAST THE PROPERTY LINE.
4. STORM SEWER INSPECTION ASSEMBLY, INCLUDING PROPERTY SIDE STUB TO BE GREEN.
5. SERVICE PIPE DEPTH TO BE INSTALLED TO PROVIDE SUFFICIENT DEPTH TO SERVICE THE BASEMENT PLUMBING BY GRAVITY IN ACCORDANCE WITH THE BC PLUMBING CODE. MINIMUM COVER OF SERVICE PIPE AT PROPERTY LINE TO BE 0.75m.
6. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
7. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

CITY OF NANAIMO
THE HARBOUR CITY

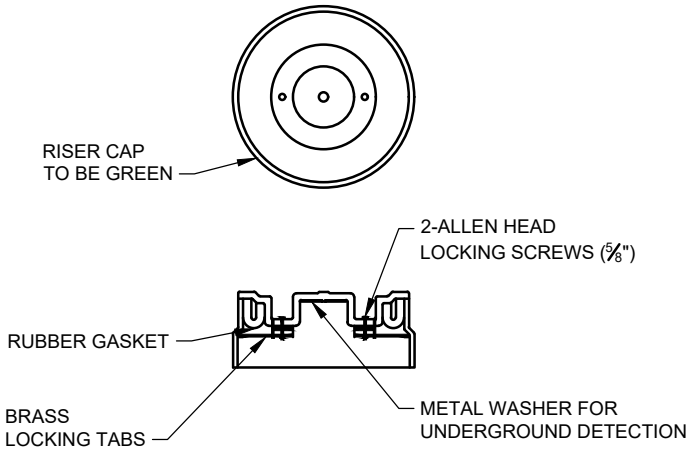
COMMERCIAL AREA STORM
SERVICE CONNECTION DETAIL
RISER AND NON-RISER TYPES

Scale:	1:50
Created:	MAR 2015
Rev Date:	MAY 2020
Dwg No:	SW-22

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6.19.2026



ELEVATION
1:20



RISER CAP DETAIL
NTS

NOTES:

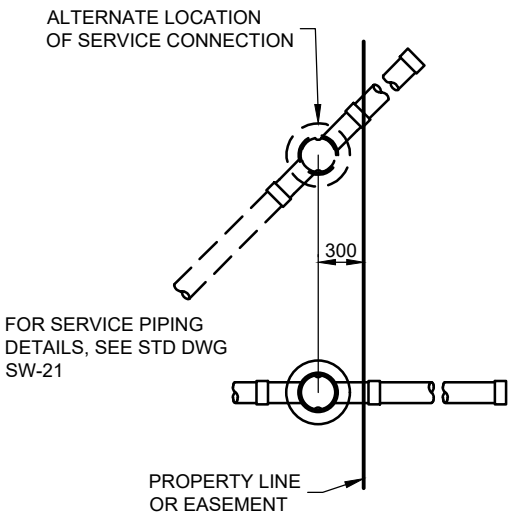
1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. WHEN SERVICE BOX IS WITHIN CONCRETE DRIVEWAY, CONCRETE ADJACENT TO THE SERVICE BOX MUST BE A MINIMUM OF 150mm THICK FOR A MINIMUM DISTANCE OF 150mm AROUND THE OUTSIDE EDGES OF THE SERVICE BOX.
3. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
4. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

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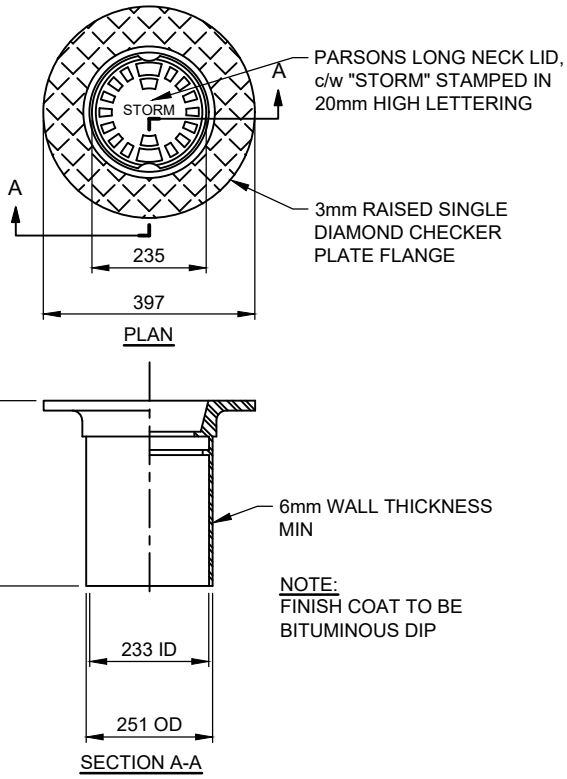
CITY OF NANAIMO
THE HARBOUR CITY

STORM SERVICE BOX AND INSPECTION ASSEMBLY INSTALLATION

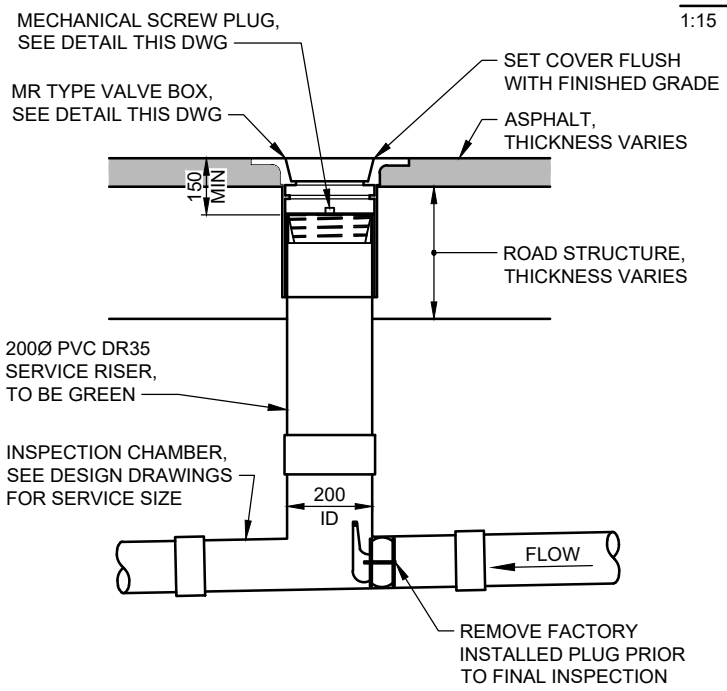
Scale:	1:20
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	SW-23



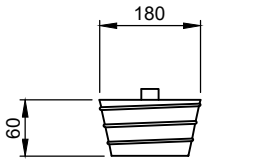
PLAN - VALVE BOX LOCATIONS
NTS



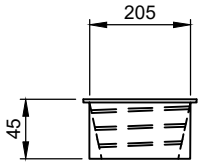
MR STYLE VALVE BOX
1:15



INSPECTION ASSEMBLY ELEVATION
1:20



RIGID PLASTIC PLUG



RUBBER SEALING COLLAR

MECHANICAL SCREW PLUGS
NTS

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
3. ALL DIMENSIONS ARE MILLIMETERS UNLESS NOTED OTHERWISE.

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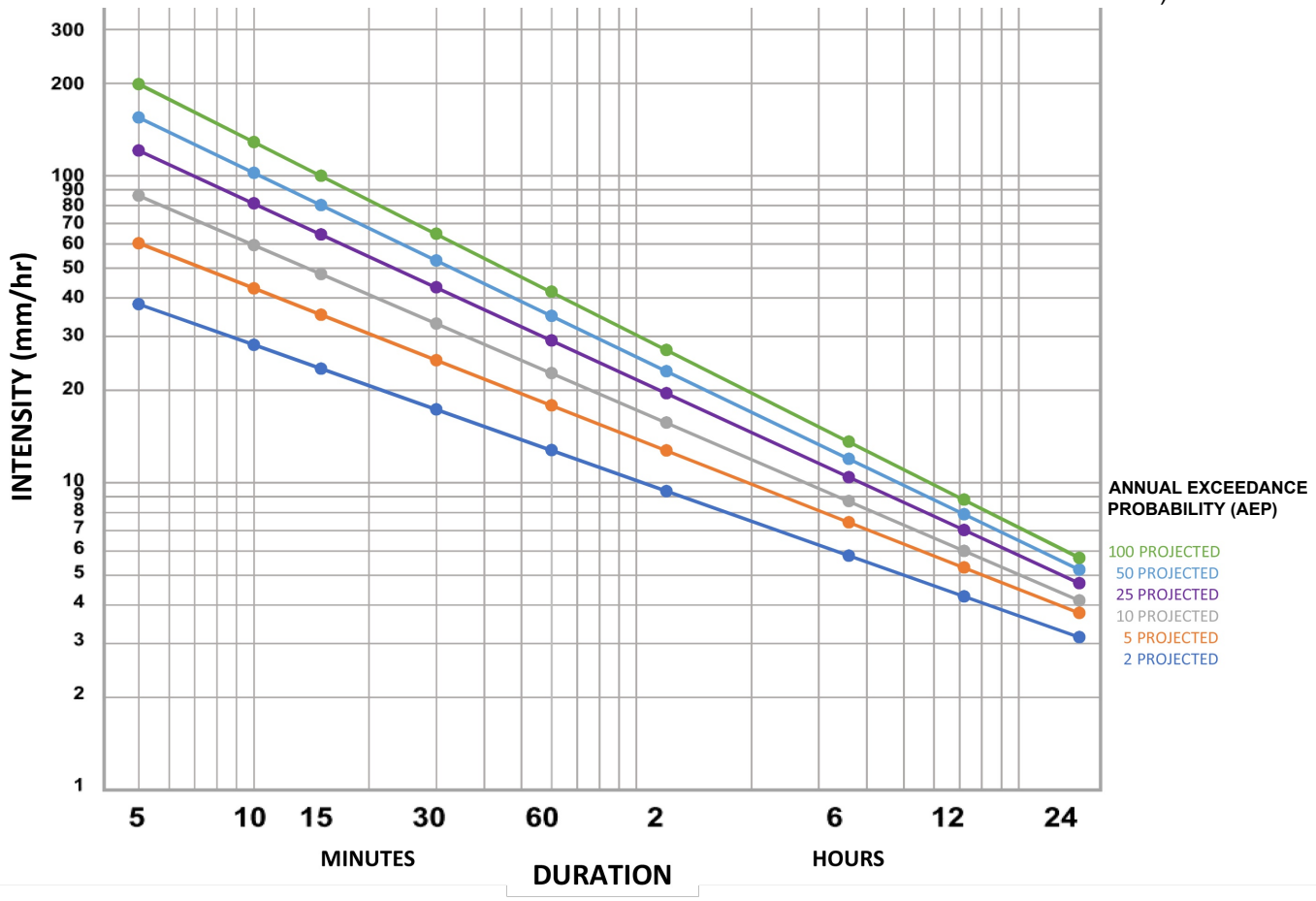
CITY OF NANAIMO
THE HARBOUR CITY

STORM SERVICE BOX AND INSPECTION ASSEMBLY
INSTALLATION IN PAVED LANES AND ROADWAYS

Scale:	AS NOTED
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	SW-24

SHORT DURATION RAINFALL INTENSITY-DURATION FREQUENCY DATA FOR NANAIMO

(BASED ON RECORDING RAIN GAUGE DATA FOR THE PERIOD 1980 - 2018 FROM CITY OF NANAIMO PUBLIC WORKS YARD AND ADJUSTED FOR CLIMATE CHANGE)



CURVE BEST-FIT PARAMETERS:

AEP	1:2	1:5	1:10	1:25	1:50	1:100
A	12.8	17.9	22.7	29.1	34.9	41.8
B	-0.441	-0.490	-0.536	-0.573	-0.599	-0.628

CURVES BASED ON FORMULA: $I=AxT^{B}$

where T = Time of Concentration (hr)
where I = Intensity (mm/hr)

NOTE:
Convert Time of Concentration to HOURS in above formula.

RAINFALL INTENSITIES, I (mm/hr):

	ANNUAL EXCEEDANCE PROBABILITY					
T	1:2	1:5	1:10	1:25	1:50	1:100
5 min	38.2	60.3	86.2	120.7	154.7	199.0
10 min	28.1	42.9	59.4	81.2	102.2	128.8
15 min	23.5	35.2	47.8	64.3	80.1	99.9
30 min	17.3	25.1	33.0	43.3	52.9	64.6
1 h	12.8	17.9	22.7	29.1	34.9	41.8
2 h	9.4	12.7	15.7	19.6	23.1	27.1
6 h	5.8	7.4	8.7	10.4	11.9	13.6
12 h	4.3	5.3	6.0	7.0	7.9	8.8
24 h	3.1	3.8	4.1	4.7	5.2	5.7

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. RETURN PERIOD IS NOW EXPRESSED AS ANNUAL EXCEEDANCE PROBABILITY (AEP), THE CHANCE OF AN EVENT OCCURRING IN ANY GIVEN YEAR. FOR EXAMPLE, A 1% AEP (1:100 AEP) IS THE 100-YEAR RETURN PERIOD, AND A 20% AEP (1:5 AEP) IS THE 5-YEAR RETURN PERIOD.

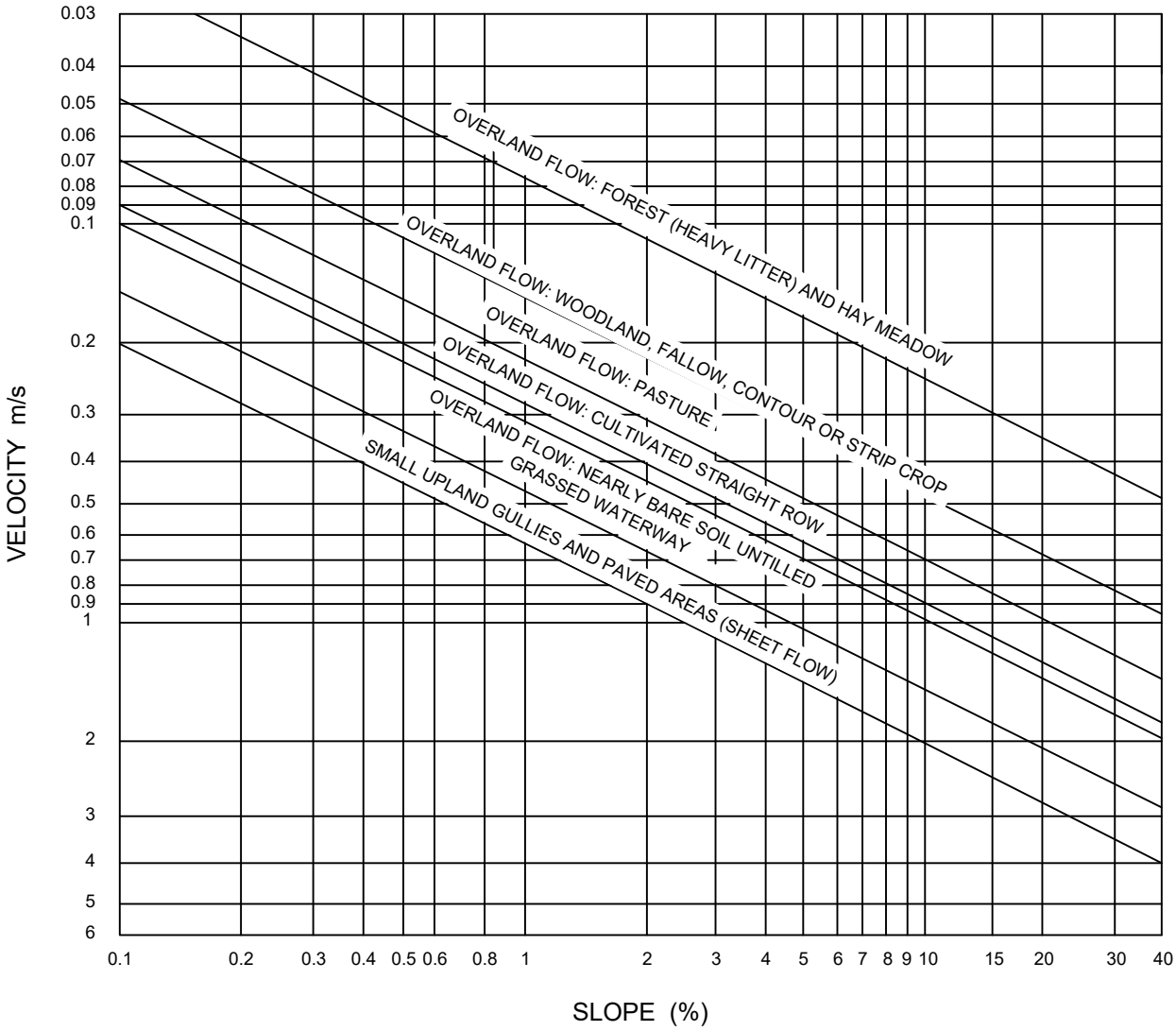
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6.19.2026

CITY OF NANAIMO
THE HARBOUR CITY

RAINFALL CURVES

Scale:	NTS
Created:	MAR 2016
Rev Date:	JUNE 2026
Dwg No:	SW-25



UPLAND METHOD FOR ESTIMATING TIME OF CONCENTRATION

NOTES:

1. THIS DRAWING SHALL BE USED IN ACCORDANCE WITH SECTION 7.0 OF THE MANUAL OF ENGINEERING STANDARDS AND SPECIFICATIONS, LATEST EDITION.
2. THIS TABLE IS LIMITED FOR USE IN DRAINAGE BASINS UP TO $10km^2$.
3. THIS TABLE DOES NOT MAKE ALLOWANCES FOR VARIATIONS IN SOIL TYPES AND MAY UNDERESTIMATE TIMES FOR PERMEABLE BASINS.

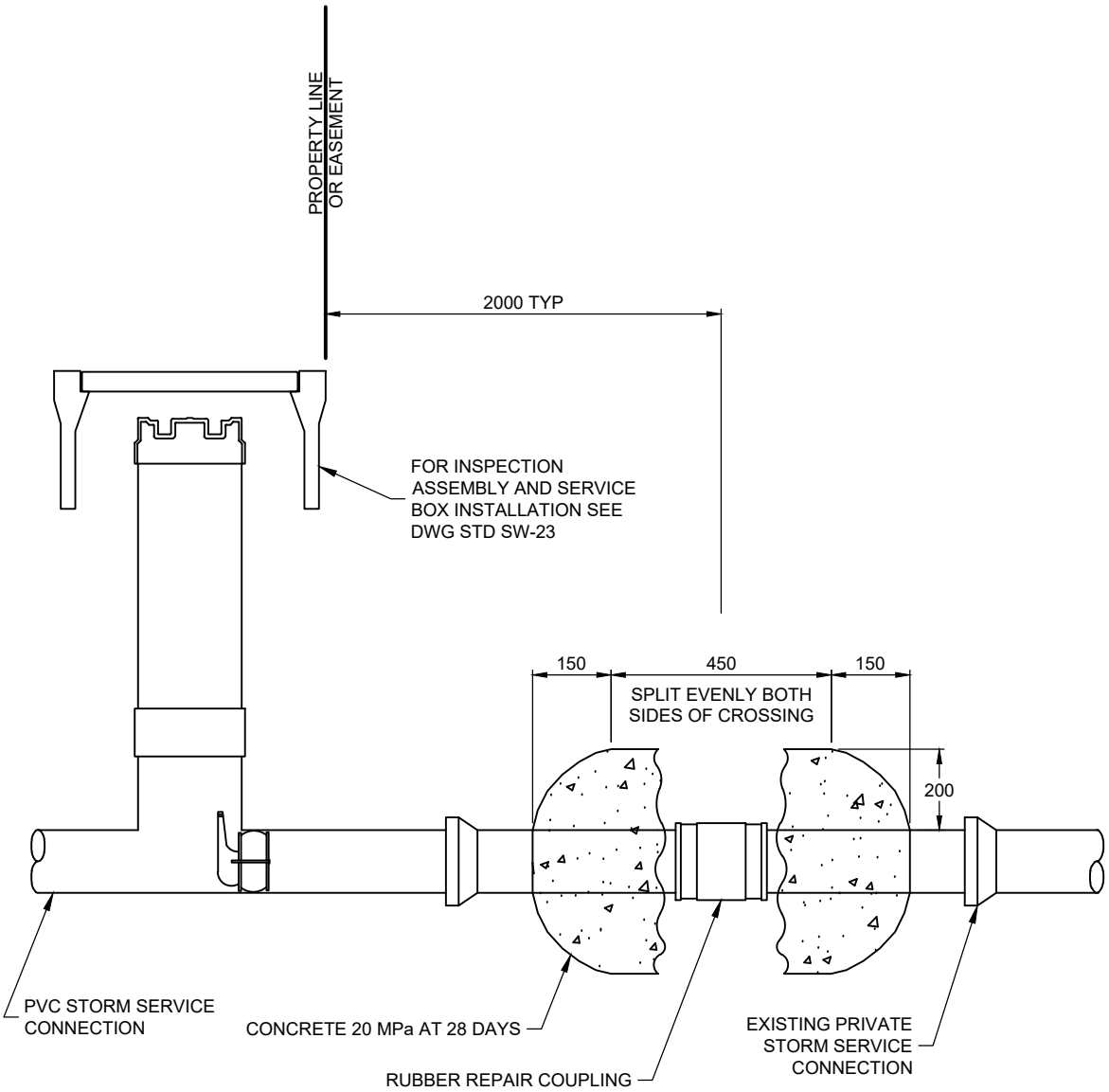
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4.1.2026

CITY OF NANAIMO
THE HARBOUR CITY

TIME OF CONCENTRATION TABLE

Scale:	NTS
Created:	NOV 2009
Rev Date:	NOV 2016
Dwg No:	SW-26



ELEVATION

NOTES:

1. ONLY PRODUCTS LISTED IN THE CITY OF NANAIMO APPROVED PRODUCTS LIST WILL BE ACCEPTED FOR INSTALLATION.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
3. SPIGOTS IF PRESENT SHALL BE REMOVED BEFORE COUPLING IS INSTALLED.

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CITY OF NANAIMO
THE HARBOUR CITY

CONCRETE ENCASEMENT FOR
CONNECTIONS TO EXISTING
STORM SERVICE CONNECTIONS

Scale:	NTS
Created:	AUG 2020
Rev Date:	MAY 2020
Dwg No:	SW-27

6.19.2026

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Street Type and Classifications	8.03 [↓]
Geometrics	8.04 [↓]
Intersections	8.05 [↓]
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Cycle Facilities *(REVISED JUNE 2026)*	8.11 [↓]
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Pavement Markings	8.18 [↓]
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Pavement Markings	8.44 [↓]
Traffic Signage *(Removed Ed 15)*	8.45 [↓]

STANDARD DRAWINGS *REVISED JUNE 2026*	DWG. NO.
Street Types and Cross Sections	
Mobility Arterial *(REVISED JUNE 2026)*	MA-XS1 []
Mobility Collector (Boulevards) *(REVISED JUNE 2026)*	MC-XS1 []
Mobility Collector (Parking) *(REVISED JUNE 2026)*	MC-XS2 []
Mobility Local *(REVISED JUNE 2026)*	ML-XS1 []
Urban Arterial *(REVISED JUNE 2026)*	UA-XS1 []
Urban Collector (Turn lane) *(REVISED JUNE 2026)*	UC-XS1 []
Urban Collector *(REVISED JUNE 2026)*	UC-XS2 []
Urban Local *(REVISED JUNE 2026)*	UL-XS1 []
Industrial Collector *(REVISED JUNE 2026)*	IC-XS1 []
Industrial Local *(REVISED JUNE 2026)*	IL-XS1 []
Rural Local *(REVISED JUNE 2026)*	RL-XS1 []
Lane *(REVISED JUNE 2026)*	L-XS1 []
Cul-de-Sac *(REVISED JUNE 2026)*	R-CDS []
Temporary Turnaround *(REVISED JUNE 2026)*	R-TT []
Intersections	
Protected *(REVISED JUNE 2026)*	R-PI []
Protected Roundabout *(REVISED JUNE 2026)*	R-PRI []
Raised Urban and Mobility Local *(REVISED JUNE 2026)*	R-RLI []
Industrial *(REVISED JUNE 2026)* *(duplicate)*	R-II []

Quick Links: Section 8.0 Drawings [] TOC [↑]

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Curbs	
Barrier Curb and Gutter *(REVISED JUNE 2026)*	CS-1 []
Drop Curb and Gutter *(REVISED JUNE 2026)*	CS-2 []
Rollover Curb and Gutter *(REVISED JUNE 2026)*	CS-3 []
Flat and Valley Gutter *(REVISED JUNE 2026)*	CS-4 []
Temporary Curb – Type 1 *(REVISED JUNE 2026)*	CS-5 []
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Raised Centre Median *(REVISED JUNE 2026)*	CS-7 []
Sidewalks	
Sidewalk Finishing Details *(REVISED JUNE 2026)*	CS-8 []
Curb Ramps	
Orientations *(REVISED JUNE 2026)*	CS-12 []
Type S – Separated *(REVISED JUNE 2026)*	CS-13 []
Type C – Constrained (Preferred) *(REVISED JUNE 2026)*	CS-14 []
Type C – Constrained *(REVISED JUNE 2026)*	CS-15 []
Type M – Mid-Block *(REVISED JUNE 2026)*	CS-16 []
Type B – Bikeway *(REVISED JUNE 2026)*	CS-17 []
Trails and Multi-Use Paths *(REVISED JUNE 2026)*	
Splitter Island	CS-20 []
Hard Surface *(REVISED JUNE 2026) (REVISED JUNE 2026)*	CS-21 []
Pedestrian Pathway *(New Ed 15)*	CS-21A []
Soft Surface *(REVISED JUNE 2026) (REVISED JUNE 2026)*	CS-22 []
Nature *(New Ed 15)*	CS-22A []
Boardwalk *(New Ed 15)*	CS-22B []
Transit Facilities	
Reinforced Bus Slab *(REVISED JUNE 2026)*	CS-23 []
Driveways and Crossings	

Quick Links: Section 8.0 Drawings [] TOC [↑]

SECTION 8 – TRANSPORTATION
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STANDARD DRAWINGS *REVISED JUNE 2026*	**DWG. NO.**
Grades *(REVISED JUNE 2026)*	CS-24 []
Typical Urban Collector *(REVISED JUNE 2026)*	CS-25 []
Typical Urban Local *(REVISED JUNE 2026)*	CS-26 []
Curb Extension *(REVISED JUNE 2026)*	CS-27 []
Raised Asphalt Crosswalk Pedestrians *(New Ed 15)*	CS-28A []
Raised Asphalt Crosswalk Multi-Use Pathway *(New Ed 15)*	CS-28B []
Speed Hump and Speed Bump Detail *(New Ed 15)*	CS-29 []
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Sidewalk Handrail *(REVISED JUNE 2026)*	CS-31 []
Handrail for Concrete Stairway *(REVISED JUNE 2026)*	CS-32 []
Concrete Stairway and Landing *(REVISED JUNE 2026)*	CS-33 []
Guardrail for Wooden Stairway *(REVISED JUNE 2026)*	CS-34 []
Wooden Stairway and Landing *(REVISED JUNE 2026)*	CS-35 []
Fences and Gates *(REVISED JUNE 2026)*	
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Round Steel Poles *(REVISED JUNE 2026)*	CS-40A []
Concrete Base for Round Steel Poles *(REVISED JUNE 2026)*	CS-40B[]
Perforated Steel Sign *(REVISED JUNE 2026)*	CS-41 []
Signs on Signal Pole or Luminaire Pole *(REVISED JUNE 2026)*	CS-42 []

SECTION 8 – TRANSPORTATION
DESIGN CRITERIA

8.01 INTRODUCTION

.1 Scope:

The City has adopted a Complete Street framework in an effort to create a more Complete Community and Complete Network and developed the ***Complete Street Design Guide***. This design philosophy prioritizes 'universal design' and the need for streets to be designed for all users, regardless of mode, age, or ability. This includes, but is not limited to, pedestrians, cyclists, transit riders, commercial vehicles and motorists. *(REVISED JUNE 2026)*

All transportation infrastructure shall be designed in accordance to the following design criteria. The construction shall be in accordance to the outlined specifications and installation requirements captured throughout all sections of the ***Manual of Engineering Standards & Specifications***. *(REVISED JUNE 2026)*

.2 Objectives:

The objectives of this section are to:

(a) Improve safety and comfort for all modes.

(b) Provide accessibility for people of all ages and abilities through 'Universal Design'. *(REVISED JUNE 2026)*

(c) Accommodate larger vehicles and turning radii where needed, to account for truck routes, transit routes and emergency vehicles.

(d) Improve travel time reliability on the street network for all modes, with emphasis on transit and goods movements.

(e) Incorporate 'smart infrastructure' opportunities to support emerging transportation technologies.

(f) Encourage attractive streetscapes that respond to surrounding land uses, providing opportunities for place-making, social interaction, and art.

(g) Improve local ecology through stormwater management and vegetation.

.3 City Initiatives:

This manual should be used in accordance with the most recent version of other City guidelines, policies, and bylaws including, but not limited to, the most recent versions of those listed below: *(REVISED JUNE 2026)*

(a) ***Official Community Plan***

(b) ***Nanaimo Transportation Master Plan***

(c) ***Nanaimo Complete Street Design Guide*** *(REVISED JUNE 2026)*

(d) ***Nanaimo Curbside Management Guide*** *(REVISED JUNE 2026)*

.4 Government Resources:

In addition, this manual should be used in accordance with other applicable government policies, guidelines, and documents, including but not necessarily limited to, the most recent versions of the following: ***(REVISED JUNE 2026)***

(a) Ministry of Transportation and Transit (MoTT): ***(REVISED JUNE 2026)***

(i) **B.C. Supplement to Transportation Association of Canada (TAC)** ***Geometric Design Guide for Canadian Roads*** ***(REVISED JUNE 2026)***

(ii) ***B.C. Community Road Safety Toolkit*** ***(REVISED JUNE 2026)***

(iii) ***British Columbia Active Transportation Design Guide*** ***(REVISED JUNE 2026)***

(b) BC Transit:

(i) ***Regional District of Nanaimo Transit Redevelopment Strategy*** ***(REVISED JUNE 2026)*** -

(ii) ***Infrastructure Design Summary*** ***(REVISED JUNE 2026)***

(iii) ***On-Street Infrastructure Design Guide*** ***(REVISED JUNE 2026)***

.5 Industry Resources: ***(REVISED JUNE 2026)***

In addition, this manual should be used in accordance with other applicable guidelines and documents, including but not necessarily limited to, the most recent versions of the following:

(a) Transportation Association of Canada (TAC):

(i) ***Geometric Design Guide for Canadian Roads***

(ii) ***Manual of Uniform Traffic Control Devices (MUTCD)*** ***(REVISED JUNE 2026)***

(iii) ***Pedestrian Crossing Control Guide*** ***(REVISED JUNE 2026)***

(iv) ***Bikeway Traffic Control Guidelines for Canada***

(v) ***Canadian Guide to Traffic Calming***

(b) Institute of Transportation Engineers (ITE) ***Transportation Planning Handbook***.

(c) National Association of City Transportation Officials (NACTO): ***(REVISED JUNE 2026)***

(i) ***Urban Street Design Guide***

(ii) ***Urban Bikeway Design Guide***

(iii) ***Transit Street Design Guide***

.6 Design Non-Conformance: *(REVISED JUNE 2026)*

The City mobility networks have been constructed over many years using design criteria and practices that were in place at the time. The current criteria and best practices are to be used when designing all new infrastructure. When retrofitting existing corridors, limitations will create challenges with design and compromises may be necessary. Existing pedestrian and cycling facilities will be evaluated on a case-by-case basis and upgraded as resources permit. When replacing existing infrastructure, should the existing system not meet current criteria, the Professional of Record will be responsible to ensure the design is appropriate, founded on solid engineering principles and practices, and approved by the City Engineer. *(REVISED JUNE 2026)*

.7 Development and Non-Conformance Requirements: *(REVISED JUNE 2026)*

(a) Responsibilities:

(i) It is the Professional of Record's responsibility to ensure that all applicable guidelines, standards, bylaws and other regulations and policies are strictly followed. *(REVISED JUNE 2026)*

(b) Reporting:

(i) The City may require various studies to be submitted to the City Engineer for approval. These could include, but are not limited to a:

(ii) Transportation Impact Assessment

(iii) Parking Study

(iv) Transportation Demand Management Plan

(v) Road Safety Audit

(vi) If design standards cannot be met due to the existing conditions, it shall be documented and a design non-conformance memo shall be submitted to the City Engineer for approval. *(REVISED JUNE 2026)*

8.02 DEFINITIONS *(REVISED JUNE 2026)*

.1 . For defined terms refer to Section 2.01 []. *(REVISED JUNE 2026)*

8.03 STREET TYPES AND CLASSIFICATIONS

.1 Mobility Streets:

(a) The Mobility classification includes specifically selected nodes and corridors where higher density development is present or expected. These streets focus on increased public space and accommodation of all modes, with an emphasis on sustainable transportation. *(REVISED JUNE 2026)*

(b) Mobility Local:

(i) Mobility Local Streets should be designed as a destination. The street design will encourage lower speeds where cycles can safely mix with motor vehicle traffic. Sidewalks and frontage zones can support seating and other pedestrian-oriented uses, helping to strengthen the relationship between the street and adjacent buildings while contributing to a vibrant public space. Intersections between Local Streets and Collector or Arterial Streets should be designed with continuous and raised crosswalks perpendicular to the Local Street to slow vehicles down. Where on-street parking is provided, it should be in a style that blurs the line between roadway and sidewalk, making the street more pedestrian friendly and encouraging slower speeds. Street trees are recommended at frequent spacing between parked vehicles. ***(REVISED JUNE 2026)***

(c) Mobility Collector:

(i) Mobility Collector Streets provide a connection for all modes between Mobility Local Streets and Mobility Arterial Streets. This classification is multi-functional providing land access, on-street parking where it supports adjacent land uses and typically accommodates higher volumes of traffic than a Local Street. These streets are expected to support a higher level of commercial activity. Sidewalks and frontage zones can help accommodate this activity by providing space for wider pedestrian areas, landscaping, street furniture, patios, seating, and other pedestrian-oriented uses that contribute to a comfortable and vibrant streetscape. Parking is provided in parking pockets which then provide space for landscaping or furniture or bicycle parking. Street trees are provided between the cycle track and sidewalk, helping to separate cycles from pedestrians on these streets. ***(REVISED JUNE 2026)***

(d) Mobility Arterial:

(ii) Mobility Arterial Streets carry traffic for all modes between the principal areas of traffic generation. Pedestrian activity on the street is expected to be lower relative to vehicular traffic. Mobility Arterial Streets shall be designed to minimize direct access to development with access provided by adjoining streets of lower classifications. Parking is prohibited on these streets. Their location within Urban Centres will generally mean that while they carry higher volumes, vehicle speeds should be lower than more suburban environments and less separation is required between opposing directions of traffic. Median islands are generally not present on these streets. Cycles are accommodated on cycle tracks between the sidewalk and boulevard. Intersections have protected facilities. ***(REVISED JUNE 2026)***

.2 Urban Streets:

(a) The Urban classification includes all areas outside of mobility hubs or industrial areas. It forms the majority of the City's streets and is typically associated with lower density development, single residential, or smaller scale commercial areas. ***(REVISED JUNE 2026)***

(b) These streets try to balance the needs of all modes, providing less pedestrian accommodation than streets classified in the Mobility category, while providing increased traffic capacity.

(c) Urban Local:

(i) Urban Local Streets primarily carry traffic with an origin and/or destination along its length. It is not intended to carry large volumes of traffic or through traffic other than to immediately adjoining streets. They are intended to be lower volume, slower streets where it is safe for cyclists to share the roadway with motor vehicle traffic. In some cases, they may be supplemented by measures to create neighbourhood bikeways. Travel Lane widths are designed to encourage slower vehicle speeds. On-street parking is provided in pocket parking adjacent to residential driveways where practical, and where it can be integrated with boulevards and street trees. Pedestrians take priority on such streets and intersections with collector or arterial streets should favour pedestrian priority through raised and continuous sidewalks to calm traffic as it enters the neighbourhood and reinforce a change in priorities. ***(REVISED JUNE 2026)***

(d) Urban Collector:

(i) Urban Collector Streets provide a connection for all modes between Urban Local Streets and Urban Arterial Streets. This classification is multi-functional, providing land access, some on-street parking where it supports adjacent land uses, and typically accommodates higher volumes of traffic than a Local Street. Direct access to developments should be provided from lower classification streets where available. Narrow roadway lane widths that still support bus and truck movements are recommended to manage vehicle speeds. Curb extensions at frequent intervals along the street add further friction, particularly where parking is underutilized and provide space for street trees. Cycle tracks between the sidewalk and parking/boulevard provide safety for cyclists. Intersections with other Collector Streets or Arterial Streets shall provide protected intersection designs for cyclists. Where on-street parking is provided, there must be a suitable door zone buffer between vehicles and the cycle track. Intersection corners may require the use of compound curves to accommodate the appropriate design vehicle. ***(REVISED JUNE 2026)***

(e) Urban Arterial:

(i) Urban Arterial Streets carry traffic for all modes between the principal areas of traffic generation. They are intended to carry large volumes of all transportation modes. Urban arterial streets shall be designed to minimize direct access to development with access provided by adjoining streets of lower classifications. Parking is prohibited on these streets. These streets may often feature multiple travel lanes, and, as such, the design vehicle and the control vehicle may differ. Like Collector Streets, cyclists are accommodated on a cycle track between wide boulevards and sidewalks, and intersection shall be designed as protected intersections. ***(REVISED JUNE 2026)***

.3 Industrial Streets:

(a) The Industrial classification includes specifically selected streets that serve industrial development. These streets focus on the accommodation of larger vehicles however, employees and customers still have to get to work in these locations and this can be done by sustainable modes, if designed appropriately. There will not be Industrial Arterial Streets, rather Industrial Collector Streets would connect to Urban or Mobility Arterial Streets or Provincial Highways. ***(REVISED JUNE 2026)***

(b) Industrial Local:

(i) Industrial Local Streets will provide direct access to industrial businesses. They will typically be used by employees, customers, and delivery vehicles. The street design features wider travel lanes and parking zones more suited to larger vehicles. Multi-use paths are separated from vehicles by a boulevard helping separate pedestrians and cyclists from large vehicles. ***(REVISED JUNE 2026)***

(c) Industrial Collector:

(i) Industrial Collector Streets provides a connection for all modes between Arterial Streets and Industrial Local Streets. This classification is multi-functional providing land access, on-street parking, and typically accommodates higher volumes of traffic than a Local Street. Cycle tracks are provided to provide employees with sustainable transportation choices. It is important that these be separated from the parking zone by a door zone. Sidewalks are provided adjacent to the cycle track, separated by a small buffer. ***(REVISED JUNE 2026)***

.4 Half Street Road Dedication and Construction:

(a) Half street construction shall be limited to situations where future development of surrounding properties will result in full road dedication and construction of the full street. ***(REVISED JUNE 2026)***

(b) All design parameters shall match those specified as per Section 8.04 [→] and associated standard drawings for Street Types and Cross Sections []. ***(REVISED JUNE 2026)***

(c) The road width requirements will be to construct the lesser of 1 m beyond the opposing back of curb, or 4.6 m past the centerline, unless otherwise determined by the City Engineer.

(d) Parking is not supported where ultimate weekday traffic volumes are anticipated to exceed 300 veh/day.

(e) Half street construction for lanes is not supported in new development. ***(REVISED JUNE 2026)***

(f) Drainage must be contained and conveyed to the storm system within the pavement surface. Open channel drainage may be considered along the interim roadway edge with additional dedication for a drainage swale. ***(REVISED JUNE 2026)***

(g) For half street roadways with no exit, a temporary turnaround must be designed and constructed, as per Standard Drawing No. R-TT. ***(REVISED JUNE 2026)***

(h) Parking must be restricted through signage where not accommodated.

.5 Cul-de-Sac:

(a) Use of cul-de-sacs shall be limited to situations where in the opinion of the City Engineer, there is no possibility of future roadway connection, such as abutting an environmentally sensitive area or topographic barrier. Abutting land with potential for further subdivision under the current zoning, will not be considered an impediment to future connections. ***(REVISED JUNE 2026)***

(b) Cul-de-sacs shall be limited to 90 m in length and shall be constructed to the applicable Urban Local Streets standard. ***(REVISED JUNE 2026)***

(c) Cul-de-sacs shall terminate with a 6 m wide road dedication suitable for use as a future pedestrian and cycling connection. ***(REVISED JUNE 2026)***

.6 Temporary Turn-a-Rounds:

(a) Temporary asphalt turn-a-rounds shall be required for all temporary dead-end streets and designed as per Standard Drawing No. R-TT [].

(b) Extent of works is to be determined on a site-specific basis and approved by the City Engineer.

.7 Other:

(a) Streets that do not conform to the above classifications, such as rural streets and lanes, shall be designed in collaboration with the City Engineer and in accordance with the cross-sections provided within the Standard Drawings. ***(REVISED JUNE 2026)***

8.04 GEOMETRICS

.1 Horizontal and vertical alignments including horizontal curvature, stopping sight distances, vertical curvature, and intersection geometry shall be based on the ***TAC Geometric Design Guide for Canadian Roads***.

.2 Dimensions:

(a) Dimensions are to be designed according to the requirements outlined in the Standard Drawings, unless otherwise approved by the City Engineer.

(b) Travel lane widths include gutter measurements, unless otherwise specified. ***(REVISED JUNE 2026)***

(c) Large variations in travel lane widths are to be avoided. Where extra width exists, priority is to be given to active transportation, boulevards, or medians. ***(REVISED JUNE 2026)***

(d) Where Urban Local Streets are constructed in a reduced road dedication right-of-way, in no case shall the pavement width be less than 6.6 m. ***(REVISED JUNE 2026)***

(e) Right-of-way widths: *(REVISED JUNE 2026)*

Street **Class**	**Minimum Right-of-Way Width (m)**	**STD. DWG. No.**
Mobility Arterial	30.0	MA-XS1
Mobility Collector	28.4	MC-XS1, MC-XS2
Mobility Local	20.0	ML-XS1
Urban Arterial	34.5	UA-XS1
Urban Collector	25.0 – 26.7	UC-XS1, UC-XS2
Urban Local	20.0	UL-XS1
Industrial Collector	25.0	IC-XS1
Industrial Local	22.0	IL-XS1
Rural Local	20.0	RL-XS1
Lane *(REVISED JUNE 2026)*	7.0	L-XS1

(f) In constrained corridors, with approval from the City Engineer, a statutory right-of-way may be utilized to achieve the required width needed to achieve the cross-sectional elements.

.3 Alignment and Curvature:

(a) Corner radii will be the minimum appropriate to accommodate the design and control vehicles approved by the City Engineer. Turning movement diagrams are to be submitted for all street intersections. *(REVISED JUNE 2026)*

(b) Corner radii will be the minimum appropriate to accommodate the design and control vehicles approved by the City Engineer.

(c) Smaller corner radii can be implemented on streets where there are multiple turn lanes. *(REVISED JUNE 2026)*

(d) Compound curves may be needed to accommodate turn movements into narrower receiving lanes.

(e) Intersections that require large turn radii for larger design vehicles, shall utilize mountable truck aprons to reduce the asphalt surface.

(f) Radius of curbs forming curb extensions and pocket parking per Standard Drawing No. CS-27 shall be a minimum 3.0 m concave or 5.0 m convex radius.

.4 Grades:

(a) Longitudinal:
All longitudinal grades shall meet the following criteria, unless approved by the City Engineer:

Classification	Minimum	Maximum
Gutter	0.5%	
Curb Return	1.0%	12%
Pedestrian Facilities	0.5%	12%
Residential driveway		20%
Lane	0.5%	12%
Local Street *(REVISED JUNE 2026)*		10%*
Collector/Arterial		8%**
Intersection		5%
Cul-de-sac *(REVISED JUNE 2026)*		5%
*The City Engineer may grant a relaxation up to 12% for sections of streets less than 100 m in length that have met all other geometric criteria and have identified a location for sanitation and recycling receptacles elsewhere. Further consideration for street grades will be considered for comprehensive land developments with challenging topography.		
**Under exceptional circumstances, the City Engineer may relax the maximum.		

(b) Vertical Curves at Intersections (K Values)

(i) Providing the minor intersecting street is marked as a STOP, the following K values must be used for the minor street, unless otherwise approved by the City Engineer:

Classification	Crest	Sag
Local	4	4*
Collector	6	6
*The minimum may be reduced to 2 where the speed limit is 30 km/h or less		

(c) Crown and Crossfall:

(i) All streets shall normally be a crown section. Crossfalls shall require prior approval from the City Engineer.

(ii) Pocket parking that utilizes a reverse crossfall must not exceed 4%.

(iii) Pedestrian and cycling crossfalls:

Minimum	1.0%
Recommended	2.0%
Maximum	4.0%*

*Pedestrian and cycling crossfall grades in excess of 4.0% shall only be permitted for short sections at driveway or lane crossings, subject to approval by the City Engineer.

(d) Earthwork:

(i) All earthwork shall meet the following cut/fill requirements:

Classification	Desirable	Maximum
Gravel	4H:1V	2H:1V
Earthwork	4H:1V	2H:1V
Rock		1H:4V

8.05 INTERSECTIONS

.1 Protected Intersection:

(a) Every intersection is site specific and detailed geometry will be approved by the City Engineer. The layout of a protected intersection shall use Standard Drawing No. R-PI [] as guidance.

(b) Cycle tracks will be offset sufficiently from the curb at the pedestrian crossing location to allow suitable space for a pedestrian sidewalk ramp between the curb and cycle track; 2.5 m is preferable. ***(REVISED JUNE 2026)***

(c) Corner protection islands with raised barrier curb will be provided unless otherwise approved by the City Engineer and only in constrained retrofit situations may exceptions be permitted.

(d) Space will be provided between the pedestrian sidewalk ramp and the cycle track ramp to accommodate placement of a signal pole. ***(REVISED JUNE 2026)***

(e) Crosswalk markings and elephant's feet markings on the roadway will be suitably offset from the intersection to permit the inclusion of the corner protection island in the design.

(f) Narrow pedestrian crossing markings (0.3 m width, 0.3 m gap) will be provided on the cycle track to indicate to cyclists that pedestrians have priority. ***(REVISED JUNE 2026)***

(g) A stop bar for cyclists will be provided where cyclists approach the roadway.

(h) Where the cycle track transition from or to the roadway, flat or valley curb will be used to smooth the transition. ***(REVISED JUNE 2026)***

(i) A Road Safety Audit is a mandatory requirement for any protected intersection designs.

.2 Roundabouts:

(a) Roundabouts and traffic circles are effective at providing traffic calming and improving traffic safety. Where a roundabout or traffic circle is equivalently warranted with a signalized or signed treatment, a roundabout or traffic circle will be preferred subject to review by the City Engineer. ***(REVISED JUNE 2026)***

(b) When a roundabout is required, the extent of the works shall be determined on a site-specific basis and approved by the City Engineer.

(c) The layout of a protected roundabout shall use Standard Drawing R-PRI []as guidance.

(d) A Road Safety Audit is a mandatory requirement for any roundabouts designed.

.3 Raised Local Intersections and Crosswalks: ***(REVISED JUNE 2026)***

(a) At intersections involving Urban and Mobility Local Streets, the cycle track and sidewalk grades will continue across the intersection without interruption. The intent is that vehicles cross the cyclist and pedestrian space rather than pedestrians and cyclists crossing the vehicle space. The layout of a protected intersection shall use Standard Drawing No. R-RLI [] as guidance***.*** ***(REVISED JUNE 2026)***

(b) Where pedestrian sidewalk ramps are provided, they will be separated from the local ramp by a barrier curb and bollards to reduce the likelihood of vehicles turning in the pedestrian ramp.

(c) At the transition to the crosswalk, flat or valley curb will be used to provide a smooth path for people in wheelchairs or mobility devices as per Standard Drawing No. CS-4 []. ***(REVISED JUNE 2026)***

(d) The ramp from the local street to the sidewalk will be 2.0 m in length, and the drainage requirements are to be approved by the City Engineer.

8.06 CURBS

.1 All streets shall require curb and gutter unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

.2 All curbs shall be non-mountable concrete barrier curbs, unless detailed in Standard Drawing No. CS-1 [] or otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

.3 Pocket parking delineation curb to be optional where there is no grade break between the abutting roadway lane and the pocket parking. Rollover or valley curb to be used as a grade break for drainage purposes as per the Standard Drawings ***(REVISED JUNE 2026)***

.4 Where intersecting streets have both mountable roll-over and non-mountable barrier curbs, non-mountable barrier curbs shall be required for the curb returns and along the tangent to the first driveway or lane crossing.

.5 Curbs within raised local street intersections, lane crossings, commercial driveways, or industrial driveways require an additional concrete footing or reinforcing steel as shown on Standard Drawing No. CS-2 []. ***(REVISED JUNE 2026)***

.6 Asphalt curbs only to be used to provide a transition from new concrete curbs to existing roadworks, if required.

8.07 MEDIANS AND ISLANDS

.1 Medians:

(a) Designs should first consider raised and planted medians.

(b) Centre medians for divided streets shall be designed as per Standard Drawing No. CS-7 []. ***(REVISED JUNE 2026)***

.2 Traffic Islands:

(a) Traffic Islands require approval from the City Engineer.

(b) Traffic Islands shall aim to provide continuous grade crossings. ***(REVISED JUNE 2026)***

8.08 BUFFERS

.1 Buffers are lateral spaces of contrasting colour and texture to separate one mode from another. ***(REVISED JUNE 2026)***

.2 Buffer widths shall be in accordance with the cross-sections found in the Standard Drawings.

.3 Alternative treatments may include painted gore areas, different material types, curbs, landscaping or other physical features if approved by the City Engineer. ***(REVISED JUNE 2026)***

8.09 FLEX & FRONTAGE ZONES

.1 The Flex Zone is a fixed width within the cross-section that remains flexible in nature, so that various competing requirements can be achieved.

(a) Landscaping and street trees.

(b) Transit stops and bus shelters.

(c) Bike and vehicle pocket parking.

(d) Furniture & planters.

(e) Utility boxes, cabinets, and hydrants.

(f) Power poles and streetlights.

(g) Stormwater management.

(h) Waste receptacle placement.

.2 The Frontage Zone is a fixed width within the cross-section that remains flexible in nature, to support active frontages within the streetscape.

(a) Wider sidewalks.

(b) Landscaping.

(c) Utility boxes, cabinets, and hydrants.

(d) Street furniture.

(e) Patio space.

.3 Cross-sectional elements between the curb and the property line may be modified to meet the needs of the corridor with approval from the City Engineer. ***(REVISED JUNE 2026)***

.4 In constrained corridors, with approval from the City Engineer, a statutory right-of-way may be utilized to achieve the required width needed to achieve the cross-sectional elements.

.5 Where a building frontage does not directly interact with the sidewalk, the frontage zone may be combined with the flex zone, with approval from the City Engineer, to provide additional width for landscaping, street furniture, utilities, or other curbside uses. Where applied, a consistent cross-section shall be maintained along the property extents.

.6 Flex and Frontage Zone features to be provided in accordance with the City's ***Complete Street Design Guide.*** ***(REVISED JUNE 2026)***

8.10 PEDESTRIAN FACILITIES

.1 Sidewalks and Walkways:

(a) Sidewalks, pedestrian pathway, pedestrian trail and walkways shall be generous, unobstructed, and accessible. They shall be designed to the requirements outlined in this section and ***TAC's Geometric Design Guide for Canadian Roads***, unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

(b) Sidewalks and pedestrian pathways adjacent to trees shall have structural soil composite or soil cells to achieve the soil volume required for trees in accordance with Section 14.0 – Landscape []. ***(REVISED JUNE 2026)***

(c) Hydro and/or telecommunications underground vaults shall not be located in the sidewalk unless approved by the City Engineer. ***(REVISED JUNE 2026)***

.2 Tactile Walking Surface indicators (TWSI):

(a) Attention TWSIs are to be arranged in a grid pattern, parallel to the main direction of travel. ***(REVISED JUNE 2026)***

(b) Attention TWSIs to be designed to cover the maximum amount of hazard by using a combination of TWSI standard lengths without physical modification or extension into the flares.

(c) Attention TWSIs should be used along tactile guidance paths to identify turns and other decision-making points.

(d) Guidance TWSIs should consist of a pattern of parallel, fat-topped, elongated bars that extend in the direction of travel.

.3 Crosswalks:

(a) Crosswalk locations shall be determined in accordance with the most current version of the ***TAC Pedestrian Crossing Control Guide*** or as required by the City Engineer.

(b) When sidewalks cross local streets, lanes, or high-volume accesses, designs will include raised and continuous sidewalks, as per Standard Drawing No. R-RLI []. ***(REVISED JUNE 2026)***

(c) Mid-block crosswalks on collector and arterials must be approved by the City Engineer. Where possible, medians shall be utilized to accommodate a two-stage protected at-grade crossing.

.4 Curb Ramps:

(a) Ramps shall be designed to the requirements outlined in this section and the Standard Drawings.

(b) Ramps should land users safely in the crosswalk and in the desired direction of travel, lining up with the ramp across the street.

(i) Score lines will be provided on the curb ramp directing visually impaired users to the appropriate opposing curb ramp.

(ii) Safety yellow TWSIs will be placed across the sidewalk or curb ramp where pedestrians will cross the conflict area with vehicles or cyclists on arterial, collector, or local streets.

(c) Ramp orientations are dependent on sidewalk variations, as per Standard Drawing No. CS-12 [].

(d) Catch basins are not permitted within curb ramps and will be located to intercept drainage upstream of the crosswalk. ***(REVISED JUNE 2026)***

(e) Constrained curb ramp details are only to be used where obstructions or geometry prevent the preferred design from being utilized.

.5 Termination and Transitions:

(a) Sidewalks, pedestrian pathway and pedestrian trail shall be terminated in a manner that is safe for pedestrians as follows: ***(REVISED JUNE 2026)***

(i) At the beginning of the curb return if construction of the intersection is not required.

(ii) At the end of the curb return if construction of the intersection is required.

(iii) At the end of the development phase or property line.

(iv) At other specified locations as required by the City Engineer.

(b) Extend and terminate sidewalks as required to allow wheelchair access to pedestrian pushbuttons.

(c) Transition sidewalk refers to all portions of concrete or asphalt placed as “fill-in” sidewalk between existing curbs and sidewalk, sidewalks and inset building walls, sidewalks, and paved parking area. Ensure transition sidewalks allow for egress and connectivity for wheelchair users to adjacent sidewalks and destinations. ***(REVISED JUNE 2026)***

(d) Transition sidewalk, pedestrian pathway, pedestrian trail or walkway shall be constructed at all locations designated by the Professional of Record and shall be edged and finished in a manner compatible with the adjacent facility and shall be to the satisfaction of the City Engineer. ***(REVISED JUNE 2026)***

8.11 CYCLE FACILITIES ***(REVISED TBC 2025)***

.1 Bike lanes and cycle tracks shall be designed in accordance with the street classification of the adjacent street, unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

.2 Crossings:

(a) Crossing locations shall be determined in accordance with the most current version of the ***TAC Geometric Design Guide for Canadian Roads*** or as required by the City Engineer.

(b) If a cycling facility on a collector or arterial street crosses a local street, raised and continuous cycle tracks should first be considered. ***(REVISED JUNE 2026)***

(c) If a fully separated intersection crossing is not achievable, coloured bike boxes or a shared crossing with elephant's feet should be considered.

.3 Hydro and/or telecommunications underground vaults are not permitted in the cycle track unless approved by the City Engineer. ***(REVISED JUNE 2026)***

8.12 TRAILS AND MULTI-USE FACILITY ***(REVISED JUNE 2026)***

.1 Hard surface facilities pavement widths shall be a minimum of 3.0 m. A minimum unobstructed width of 4.0 m is required where vertical obstructions exist. ***(REVISED JUNE 2026)***

.2 Trails and Multi-Use Pathway right-of-ways width shall be a minimum of 6.0 m unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

.3 To prevent vehicles from entering a multi-use facility, splitter islands, bollards, or barrier posts may be utilized.

8.13 TRANSIT FACILITIES

.1 Bus stops and bus pullout locations will be determined by the City Engineer and the Regional District of Nanaimo Transit.

.2 Transit stops and pullout configurations will adhere to the most current standards in ***BC Transit's Infrastructure Design Summary and On-Street Infrastructure Design Guide***. ***(REVISED JUNE 2026)***

.3 Reinforced bus slabs shall be designed as per Standard Drawing No. CS-23 [].

8.14 MOTOR VEHICLE FACILITIES

.1 Travel lane and pavement widths shall be designed to the requirements outlined in this section, the Standard Drawings, and ***TAC Geometric Design Guide***, unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026)***

.2 Parking:

(a) On-streets within mobility hubs or other high-density areas, on-street parking shall be provided within parking pockets between curb extensions.

.3 Driveways and Lanes: ***(REVISED JUNE 2026)***

(a) Driveways and lanes shall be designed in accordance with Standard Drawing No. CS-24 [], No. CS-25 [] and No. CS-26 []. ***(REVISED JUNE 2026)***

(b) A boulevard should be provided between the roadway and sidewalk, pathway, or cycle track to provide separation of users and to provide suitable space for a driveway or lane letdowns. ***(REVISED JUNE 2026)***

(c) The sidewalk, multi-use path, or cycle track are to remain at a level grade past the driveway or lanes. ***(REVISED JUNE 2026)***

(d) Driveways and lanes shall be located in accordance with the City *Crossing Control Bylaw*. ***(REVISED JUNE 2026)***

(e) Where a property has multiple frontages, access shall be provided on the lower classification street. ***(REVISED JUNE 2026)***

8.15 BOLLARDS

.1 To prevent vehicles from entering a pedestrian, cycling, or multi-use facility, the design may require bollards, splitter islands, or barrier posts.

.2 Decorative bollards are the preferred treatment if required curbside.

.3 Splitter Islands are the preferred treatment at the entrances of multi-use facilities and shall be designed in accordance with Standard Drawing No. CS-20 []. ***(REVISED JUNE 2026)***

.4 Barrier posts shall be designed in accordance with Standard Drawing No. CS-30 [] and should be placed no closer than 1.5 m apart, and must be installed in odd numbers (one, three or five) so that the centre post is positioned on the centerline of the pathway.

8.16 HANDRAILS AND STAIRWAYS

.1 Handrails:

(a) Any facility within 1.5 m of retaining walls or other vertical drops exceeding a slope of 1.5H:1V or height of 0.6 m shall require a handrail. Alternatively, a chain link fence may be installed, if approved by the City Engineer. ***(REVISED JUNE 2026)***

(b) Other unsafe areas, as determined by the City Engineer, may also require the installation of a handrail or chain link fence as per Standard Drawing No. CS-31 [].*(REVISED JUNE 2026)*

.2 Stairways:

(a) Where pedestrian use facilities approach grades that exceed 12%, stairways will be designed to suit adjacent topography, unless otherwise approved by the City Engineer. *(REVISED JUNE 2026)*

(b) Stairways will have a minimum of three stairs, and landings. *(REVISED JUNE 2026)*

(c) Landings at a 2% grade are required at the top and bottom of all stairways. Stairways shall have a maximum of 12 risers between landings.

(d) At stairs and landings, attention TWSIs should commence one tread depth back from the leading edge of the nosing at the top step and extend across the width of the stairs. *(REVISED JUNE 2026)*

(e) Concrete stairways shall be designed in accordance with Standard Drawing No.'s CS-32 [] and CS-33 [].

(f) Wooden stairways shall be designed in accordance with Standard Drawing No.'s CS-34 [] and CS-35 [].

8.17 FENCES AND GATES *(REVISED JUNE 2026)*

.1 Fences shall be designed in accordance with Standard Drawing No. CS-36 [] and No. CS-37 [], unless otherwise approved by the City Engineer.

.2 Park swing gates and concrete bases are a site-specific design by a Professional of Record and use Standard Drawing No. CS-38 []. *(New Ed 15)*

8.18 PAVEMENT MARKINGS

.1 The design and construction of all streets shall include the design and application of pavement markings in accordance with the most current standards contained in the ***MUTCD***. *(REVISED JUNE 2026)*

.2 When particular design criteria is not specified in the ***MUTCD***, the ***Manual of Standard Traffic Signs and Pavement Markings*** distributed by the Ministry of Transportation and Transit may be considered. *(REVISED JUNE 2026)*

.3 Green conflict paint applications to be evaluated by the City Engineer, but are to be used:

(a) At any intersection where a cycling facility crosses a collector or arterial street. *(REVISED JUNE 2026)*

(b) Where cycling facilities cross high-conflict driveways and lanes, or local roads as required by the City Engineer. *(REVISED JUNE 2026)*

(c) Where cycling facilities cross permissive left and right turn motor vehicle conflicts. *(REVISED JUNE 2026)*

(d) Where cycling facilities are bordered by dashed white lines, due to merging/turning motor vehicles. ***(REVISED JUNE 2026)***

(e) In bike boxes and two-stage turn boxes.

8.19 TRAFFIC SIGNAGE

.1 The design and construction of all streets shall include the design and installation of traffic signs (regulatory and warning) and traffic signals, in accordance with the most current standards contained in the ***MUTCD***. ***(REVISED JUNE 2026)***

.2 Round stock sign poles are the preferred pole type.

.3 Perforated steel sign poles shall be installed in soil and not set in concrete.

.4 Street name signs shall be provided at all intersections. Where possible, the street name sign shall be located above a traffic sign at one corner of the intersection.

.5 Address signage must be visible from the street. Where a common driveway accesses multiple properties or where homes are not visible from the street, address signs may be located within road right-of-way.

SECTION 8 – TRANSPORTATION SPECIFICATIONS

8.20 SCOPE

.1 All transportation infrastructure shall be constructed in accordance to the outlined specification requirements captured throughout all sections of the ***Manual of Engineering Standards & Specifications***.

.2 Only those products approved by the City Engineer and listed in the City Approved ***Products List*** [] will be accepted for installation. *(REVISED JUNE 2026)*

8.21 INTERSECTIONS

.1 Intersections that require truck aprons shall be constructed with concrete that is pigmented brick red and stamped using a brick pattern.

8.22 TACTILE WALKING SURFACE INDICATORS (TWSI) *(REVISED JUNE 2026)*

.1 Attention TWSIs Cast-in-place or recessed installations are the preferred installation method. Surface application are only considered if cast-in-place cannot be achieved.

(a) Surface retrofit applications are to be installed with beveled edges to decrease the likelihood of tripping and attached firmly to prevent edges from lifting.

(b) Preferred colour for attention TSWIs to be used on platforms, staircases, and curb ramps where pedestrians will cross paths with vehicles or cyclists, is safety yellow.

(c) Circular truncated domes installed on a walking surface should have the following measurements: *(REVISED JUNE 2026)*

(i) The height of the domes should be four to five millimetres.

(ii) The diameter of the top of the domes should be between 12 and 25 mm. *(REVISED JUNE 2026)*

(iii) The diameter of the lower base of the domes or cones should be 10 mm (+/- 1 mm) more than the diameter of the top. *(REVISED JUNE 2026)*

.2 Guidance TWSIs

(a) Safety yellow is used for guidance TWSIs. *(REVISED JUNE 2026)*

(b) Guidance TWSIs installed on a walking surface should have the following measurements: *(REVISED JUNE 2026)*

(i) The height of the bars should be four to five millimetres.

(ii) The top of the elongated bars should have a width between 17 and 30 mm.

(iii) The width of the base of the bars should be 10 mm (+/- 1 mm) wider than the top.

(iv) The top length of the bars should be at least 270 mm.

(v) If drainage is a concern, a space of 10 – 30 mm should be provided at the ends of the bars.

(vi) Where possible, ensure guidance TWSIs direct pedestrians to facilities with braille or auditory wayfinding messages. *(REVISED JUNE 2026)*

8.23 MEDIANS AND ISLANDS

.1 Medians and islands are to have concrete infill with a brushed finish, stamped finish, public art, or landscaping as directed by the City Engineer. ***(REVISED JUNE 2026)***

8.24 BUFFERS

.1 Buffers and curb-side landings are to utilize colour and/or texture to demarcate the separation of modes. This can be achieved through stamped concrete, coloured concrete, or concrete pavers. ***(REVISED JUNE 2026)***

8.25 PAVEMENT MARKINGS

.1 All yellow and white roadway lane markings shall be thermoplastic with a minimum thickness of 3 mm. ***(REVISED JUNE 2026)***

.2 Conflict paint or other area markings use materials on the Approved Products List or will be approved by the City Engineer. ***(REVISED JUNE 2026)***

8.26 TRAFFIC SIGNAGE

.1 Posts and Bases:

(a) Street name and traffic sign posts and anchors shall be roll formed from strip steel (structural quality) in accordance with ASTM A653, Grade 33.

.2 Fasteners:

(a) Non-corrosive metal fasteners shall be used for attaching all signs to their supports to avoid discolouration.

.3 Street Name Signs:

(a) Street name signs shall be double sided and constructed of 3 mm x 200 mm flat sign grade aluminum with rounded corners.

(b) Signs shall consist of diamond grade reflective sheeting with transparent blue Electro Cut vinyl. Letters shall be 150 mm Helvetica Med font and shall be upper and lower case. ***(REVISED JUNE 2026)***

(c) The abbreviations, St., Dr., Pl, Rd., etc., are to be the same height as the street name.

.4 Traffic Signs:

(a) Traffic sign shapes, colours, dimensions, symbols and wording shall be in accordance with the standards detailed in the most current *Motor Vehicle Act Regulations*.

(b) Illumination or reflectorization of signs shall also be in accordance with the standards detailed in the most current *Motor Vehicle Act*.

(c) Traffic signs shall be made on sheet aluminum with nominal thickness of 2 mm (0.081”) flat sheet tension leveled, on sign grade aluminum alloy 5052-H38, conforming to the requirements of ASTM B209M, Specifications for Aluminum and Aluminum-Alloy Sheet and Plate. ***(REVISED JUNE 2026)***

(d) Reflective sheeting shall be diamond grade. Signs for curbside regulatory signs shall be engineering grade and no more than 300 mm wide. ***(REVISED JUNE 2026)***

8.27 FENCES AND GATES ***(New Ed 15)***

.1 Park Gate shop drawings are required prior to fabrication for review and approval by the Professional of Record and are to be included with the documentation for the works. ***(New Ed 15)***

.2 Park Gate Steel Pipe and Plates: ***(New Ed 15)***

(a) Steel pipe to ASTM-A53, Grade B, standard weight, seamless, black. ***(New Ed 15)***

(b) Steel plate to CAN/CSA-G40.21 GRADE 300W. ***(New Ed 15)***

(c) Steel surfaces shall be blast cleaned in accordance with manufacturer's recommendations prior to painting. ***(New Ed 15)***

(d) Exposed steel surfaces shall be painted with a base coat of enamel rust paint and a topcoat of bright yellow enamel rust paint. ***(New Ed 15)***

.3 Park Gate concrete bases are CLASS F-1 and conform to Section 11.0 - Cast in Place Concrete Works []. ***(New Ed 15)***

SECTION 8 – TRANSPORTATION
INSTALLATION

8.40 SCOPE

.1 All transportation infrastructure shall be installed in accordance to the requirements captured throughout all sections of the ***Manual of Engineering Standards & Specifications***.

8.41 REMOVALS

.1 Removals shall be done in accordance with Section 4.0 – Excavation, Trenching and Backfill [] ***(REVISED JUNE 2026)***

.2 Existing asphalt pavement, sidewalk, curb and gutter shall be cut in a straight line parallel to the line of the proposed work.

.3 Existing concrete pavement, sidewalk, curb and gutter shall be removed by cutting the concrete at the nearest joint or other location designated by the City Engineer. ***(REVISED JUNE 2026)***

.4 The top surface of the remaining concrete section shall have a neat vertical face with a straight edge for a minimum of ¼ the depth of the section.

.5 All material removed shall be disposed of in accordance with the Regional District of Nanaimo (RDN) ***Construction Waste Best Practices Guide***. ***(REVISED JUNE 2026)***

8.42 BACKFILL AND GRADING

.1 Backfill and grading shall be done in accordance with Section 4.0 – Excavation, Trenching and Backfill []. ***(REVISED JUNE 2026)***

.2 The gravel road base adjacent to the curb shall be filled tight to the curb, graded, compacted, and left in a neat condition.

.3 The boulevard area adjacent to the curb or sidewalk shall be cleared of construction debris and raked clear of all rock exceeding 50 mm in its largest dimension.

.4 The boulevard area shall be backfilled to within 50 mm of the top of the curb for a minimum width as shown on the drawings, such that water does not undermine the curb installation. Backfill shall be compacted to 90% of Modified Proctor Density (ASTM D1557).

.5 Boulevards shall be graded and prepared suitable for placement of topsoil, or as otherwise directed by the City Engineer. ***(REVISED JUNE 2026)***

.6 Sod, plants, and trees to be installed as per Section 14.0 – Landscape [].

8.43 TACTILE WALKING SURFACE INDICATORS (TWSI) *(REVISED JUNE 2026)*

.1 TWSIs are to be installed in accordance with the manufacturer's specifications. *(REVISED JUNE 2026)*

8.44 PAVEMENT MARKINGS

.1 Layout of markings shall be as per the construction drawings or as per direction from the City Engineer.

.2 Thermoplastic shall be applied in accordance with the manufacturer's specifications. *(REVISED JUNE 2026)*

8.45 TRAFFIC SIGNAGE

.1 Posts and Bases:

(a) Sign post bases installed within concrete, shall be installed as per Standard Drawing No. CS-40B [].

(b) Sign post bases installed within soil, shall be installed as per Standard Drawing No.'s CS-40B [] or CS-41 [].

(c) Anchor posts shall be provided for sign base installations where native soils are unable to hold the sign rigidly in its proper and permanent position and to prevent it from swaying in the wind, from being turned, or otherwise displaced.

(d) Sign installation shall not impede on the clear zone of a pedestrian or cycling facility. A minimum 1.2 m must be accommodated on pedestrian facilities and 1.5 m on cycling or multi-use facilities, as per Section 8.11 [→] and Section 8.12 [→]. *(REVISED JUNE 2026)*

.2 Signs:

(a) All signs to conform to the most current standards in the ***MUTCD***.

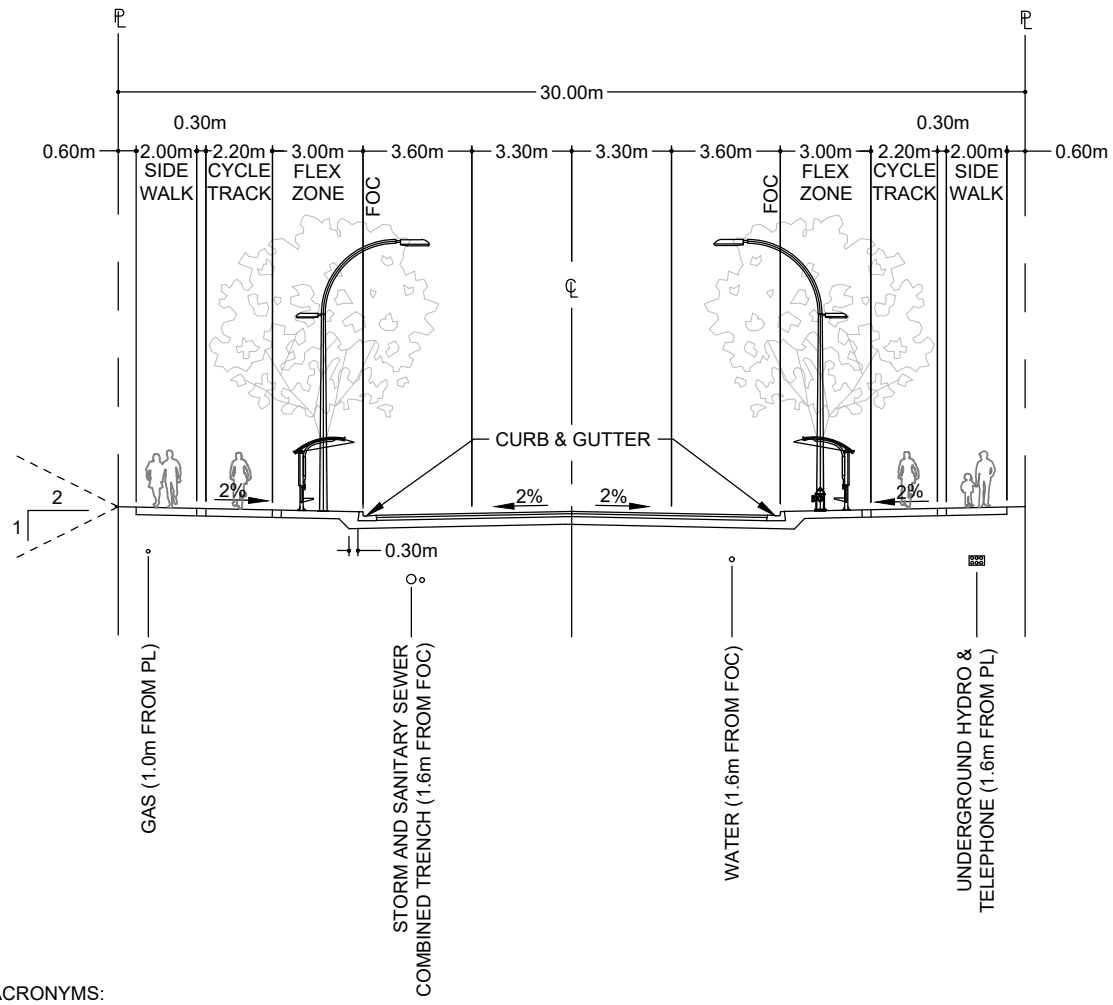
(b) Signs shall be installed as per the Standard Drawings.

(c) Street name and traffic signs shall be as per the construction drawings or as per direction from the City Engineer.

(d) All signs shall be mounted perpendicular to the direction of traffic, facing the direction of traffic they are intended to service, except in the case of No Parking and No Stopping signs.

(e) Reflectorized signs shall be placed at a slight angle away from approaching traffic.

(f) Unless otherwise specified, street signs shall be supplied by the City at the Applicant's expense. *(REVISED JUNE 2026)*



ACRONYMS:
PL IS PROPERTY LINE
FOC IS FACE OF CURB
CL IS CENTER LINE

NOTES:

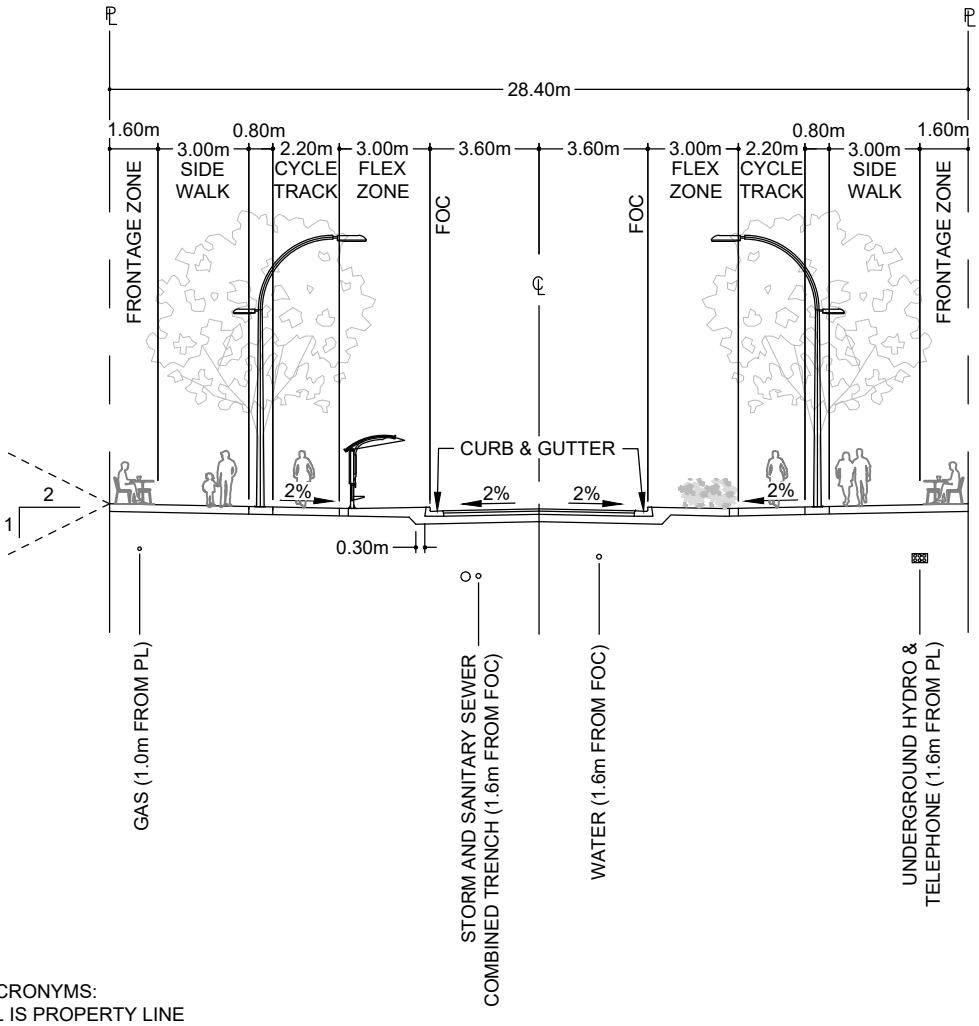
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2. BASE - 200mm AS PER SECTION 9.0.
3. SUB-BASE - 250mm AS PER SECTION 9.0.
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5. CENTER MEDIANS AS PER STANDARD DRAWING CS-7.
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9. STREET HAS CONTROLLED ACCESS. DRIVEWAY ACCESS UNDER APPROVAL FROM CITY ENGINEER.
10. CROSS-SECTIONS TO BE USED IN CONJUNCTION WITH CITY'S COMPLETE STREET DESIGN GUIDE.
11. STREETLIGHTS ARE DIAGRAPHIC. LIGHTING LEVELS AS PER SECTION 10.0.
12. LANDSCAPING AS PER SECTION 14.0.

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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
MOBILITY ARTERIAL

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	MA-XS1



ACRONYMS:
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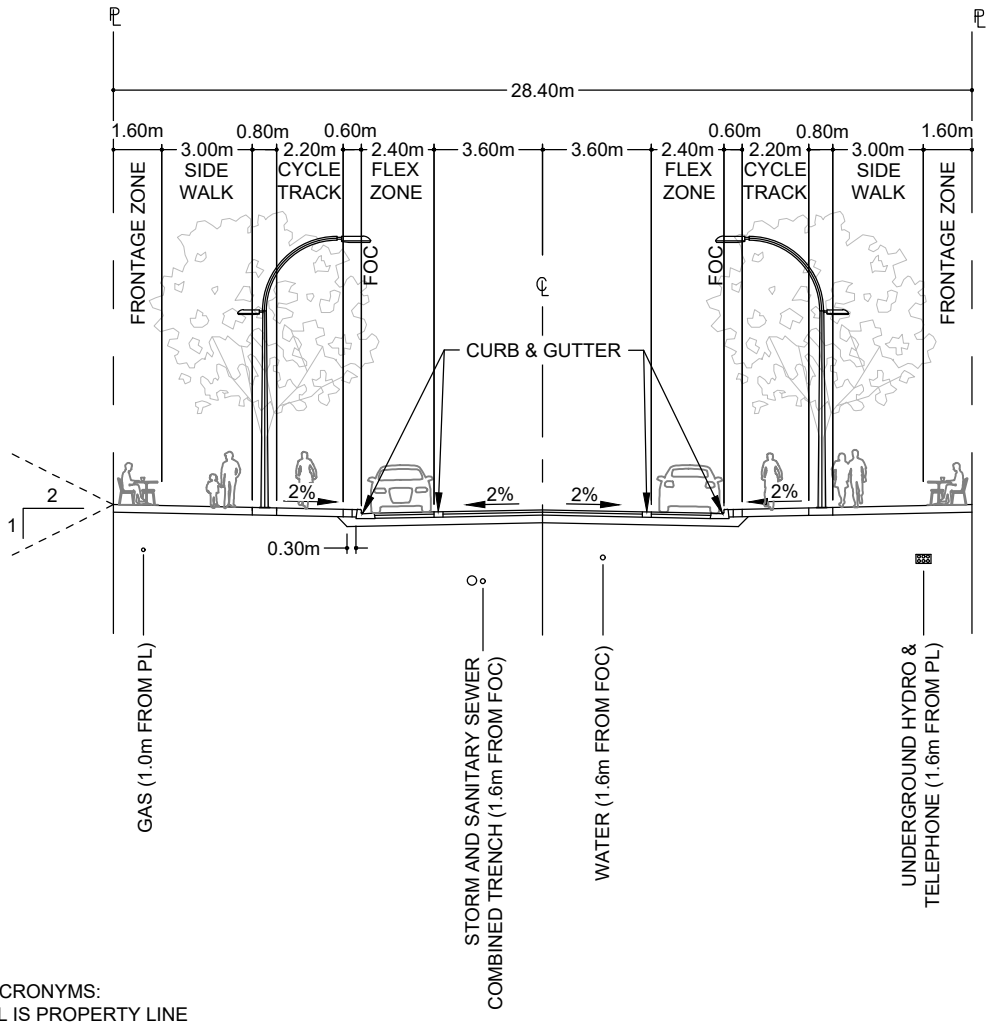
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6.26.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
MOBILITY COLLECTOR (BOULEVARDS)

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	MC-XS1



ACRONYMS:
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CL IS CENTER LINE

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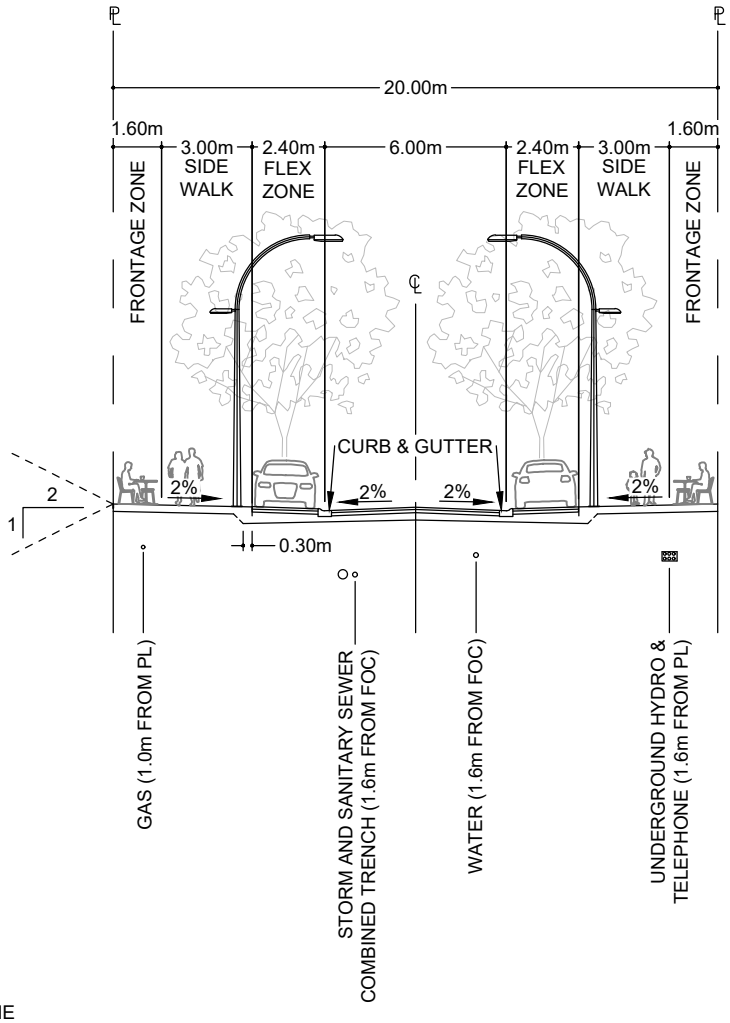
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6.26.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
MOBILITY COLLECTOR (PARKING)

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	MC-XS2



ACRONYMS:
PL IS PROPERTY LINE
FOC IS FACE OF CURB
CL IS CENTER LINE

NOTES:

1. PAVED SURFACE - 75mm ASPHALT (COMPACTED THICKNESS) AS PER SECTION 9.0 AND SECTION 12.0.
2. BASE - 100mm AS PER SECTION 9.0.
3. SUB-BASE - 250mm AS PER SECTION 9.0.
4. MOUNTABLE ROLLOVER CURB AND GUTTER AS PER STANDARD DRAWING CS-3. FLAT OR VALLEY CURB AND GUTTER PER STANDARD DRAWING CS-4.
5. POCKET PARKING DELINEATION CURB TO BE OPTIONAL UNLESS PARKING HAS BEEN DESIGNED WITH A REVERSE CROSSFALL. MOUNTABLE ROLLOVER OR VALLEY CURB TO BE USED AS GRADE BREAK FOR DRAINAGE PURPOSES.
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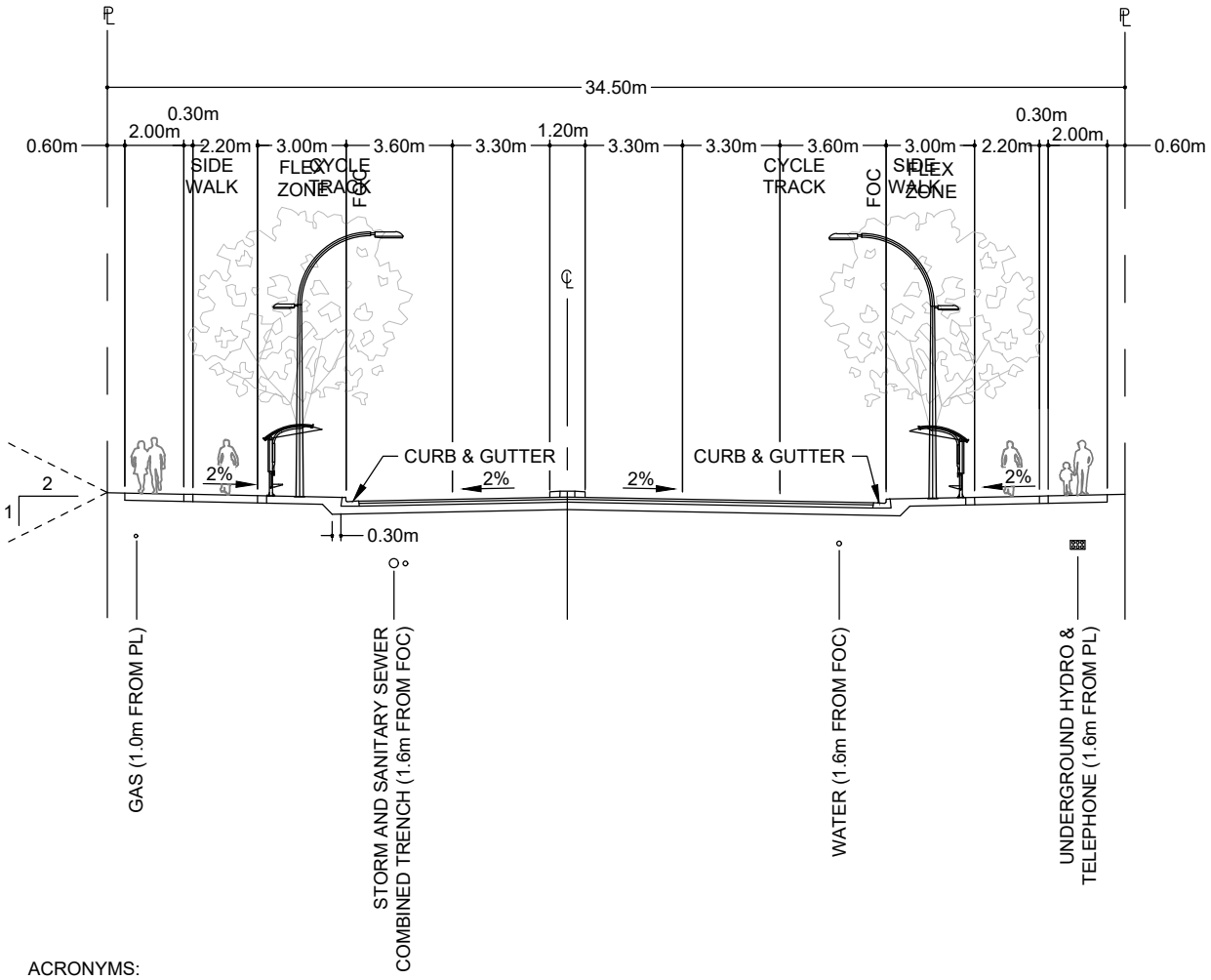
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CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
MOBILITY LOCAL

Scale:	NTS
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Rev Date:	JUNE 2026
Dwg No:	ML-XS1

6.26.2026



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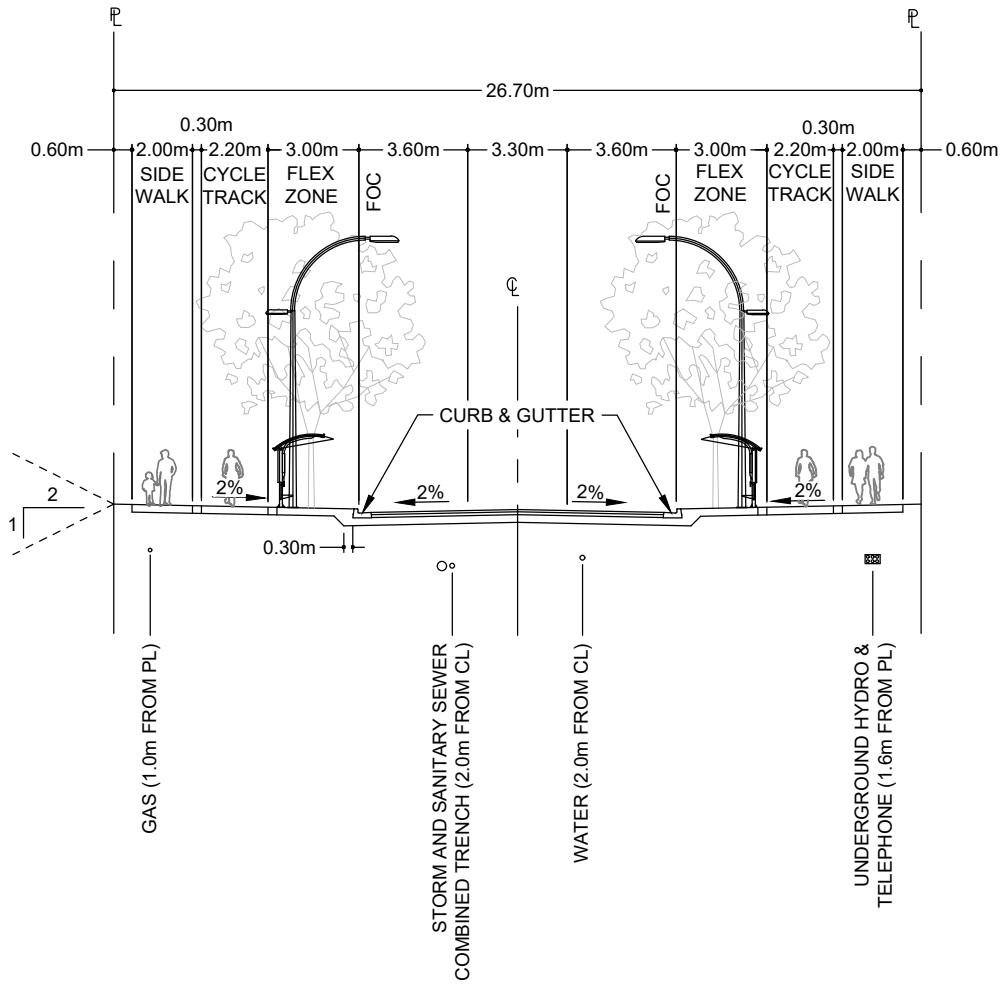
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
URBAN ARTERIAL

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	UA-XS1



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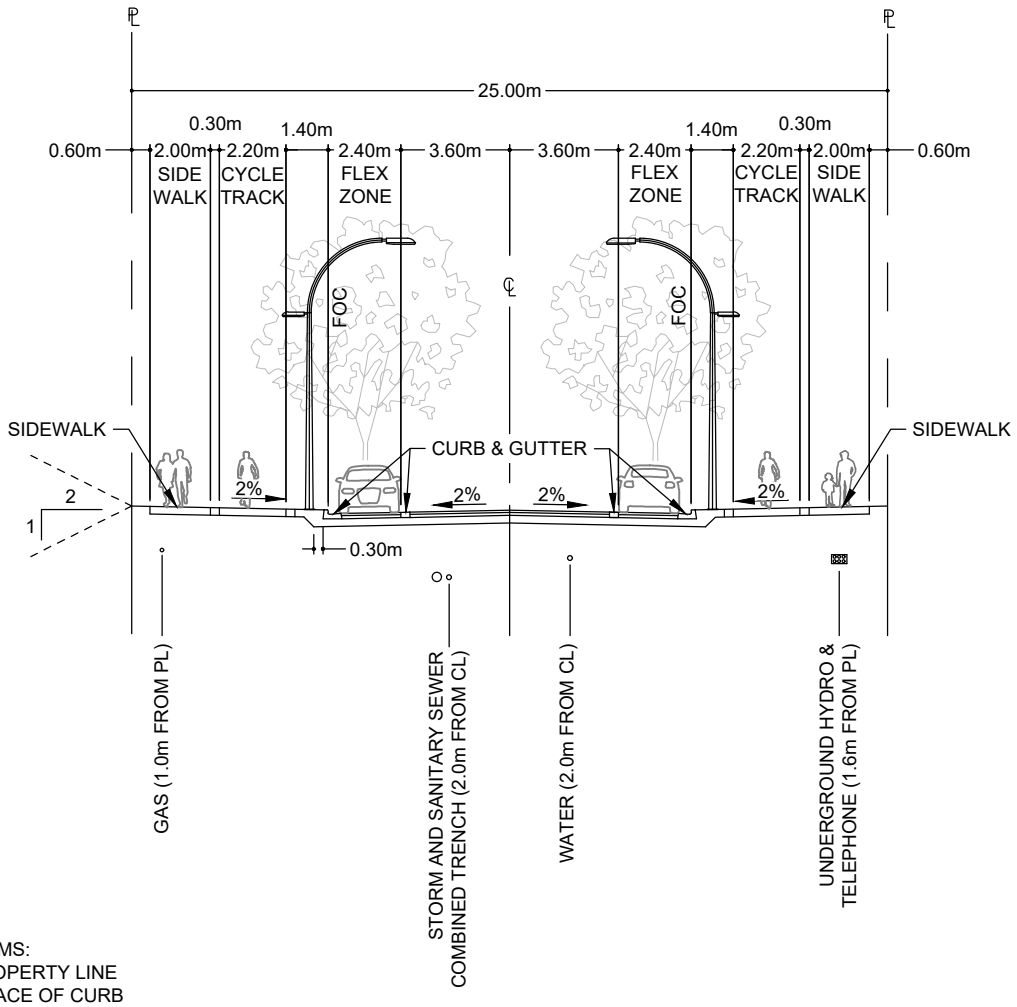
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
URBAN COLLECTOR (TURN LANE)

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	UC-XS1



ACRONYMS:
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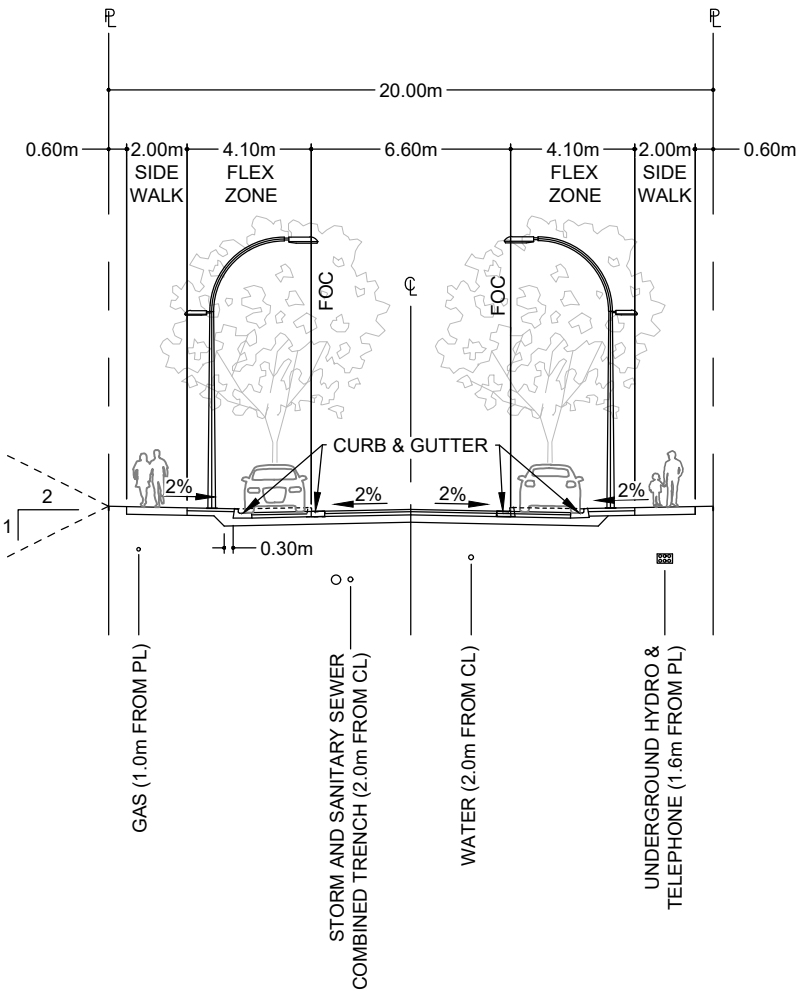
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4.8.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
URBAN COLLECTOR

Scale:	NTS
Created:	AUG 2019
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Dwg No:	UC-XS2



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11. LANDSCAPING AS PER SECTION 14.0.

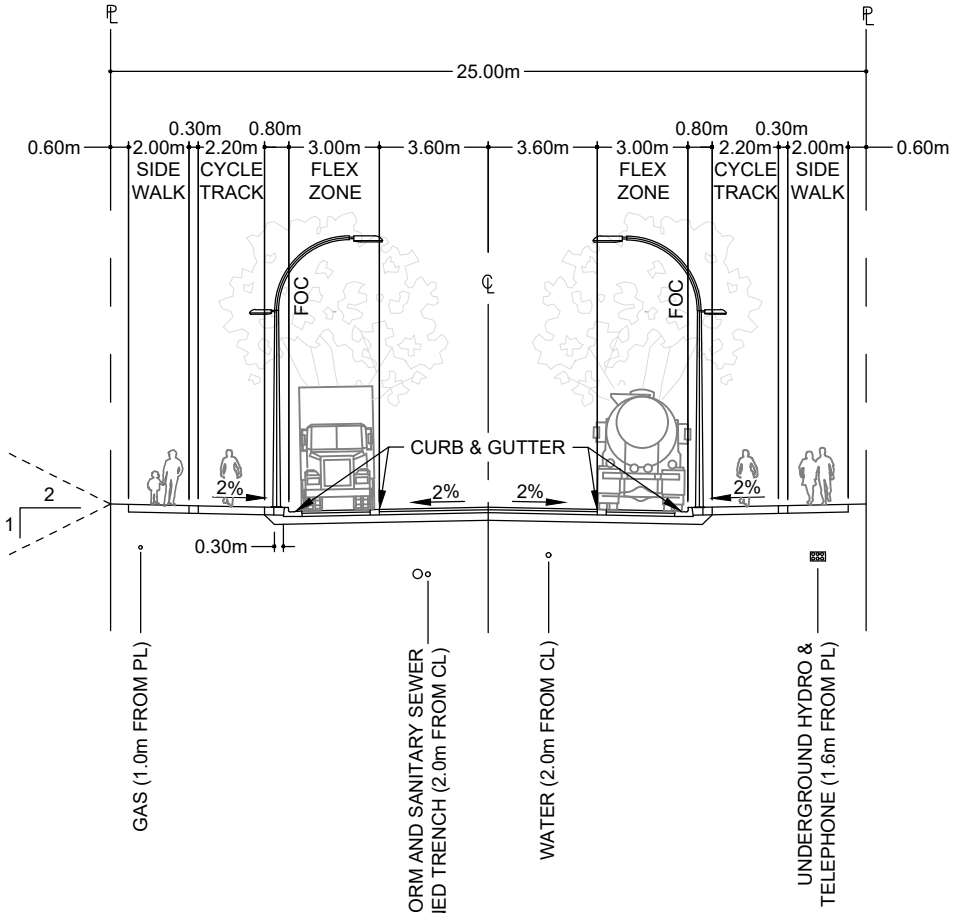
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CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
URBAN LOCAL

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	UL-XS1

6.22.2026



ACRONYMS:
PL IS PROPERTY LINE
FOC IS FACE OF CURB
CL IS CENTER LINE

NOTES:

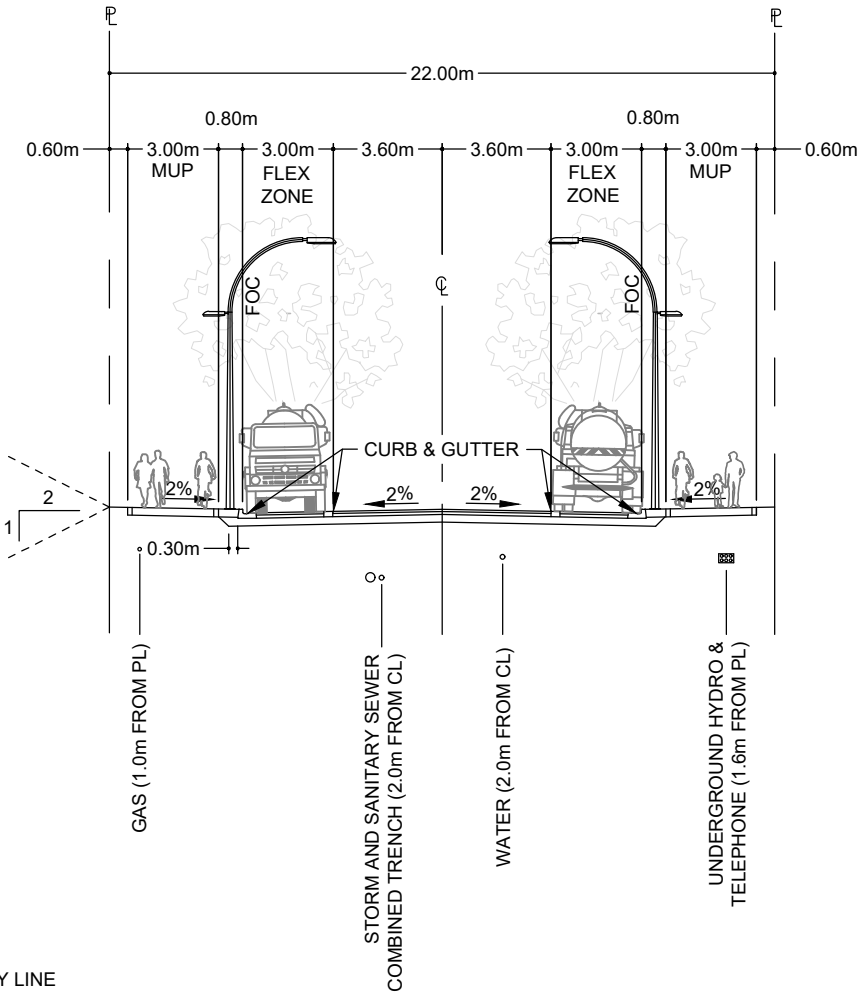
1. PAVED SURFACE - 100mm ASPHALT (COMPACTED THICKNESS) AS PER SECTION 9.0 AND SECTION 12.0.
2. BASE - 200mm AS PER SECTION 9.0.
3. SUB-BASE - 250mm AS PER SECTION 9.0.
4. BARRIER CURB AND GUTTER AS PER STANDARD DRAWING CS-1. FLAT AND VALLEY CURB AND GUTTER PER STANDARD DRAWING CS-4.
5. POCKET PARKING DELINEATION CURB TO BE OPTIONAL UNLESS PARKING HAS BEEN DESIGNED WITH A REVERSE CROSSFALL. MOUNTABLE ROLLOVER OR VALLEY CURB TO BE USED AS GRADE BREAK FOR DRAINAGE PURPOSES.
6. DEPTHS OF SURFACING AND BASE GRAVELS ARE MINIMUM.
7. FLEX ZONE TO BE UTILIZED FOR: LANDSCAPING, STREET TREES, POCKET PARKING, TRANSIT STOPS, BUS SHELTERS, BIKE PARKING, FURNITURE, UTILITY BOXES/CABINETS, HYDRANTS, POWER POLES, STREETLIGHTS, STORMWATER MANAGEMENT, OR WASTE RECEPTACLES.
8. BANDING/BUFFER ON EITHER SIDE OF THE CYCLE TRACK IS 0.3m STAMPED CONCRETE AS PER SECTION 13.0. WHERE VERTICAL SEPARATION IS PREFERRED, A CUSTOM MOUNTABLE MONOLITHIC CURB MAY BE PROPOSED. ALTERNATIVE TREATMENTS TO BE APPROVED BY THE CITY ENGINEER.
9. POCKET PARKING DOOR ZONES, OR OTHER HARD SURFACES TO USE COLOURED AND/OR STAMPED CONCRETE AS PER SECTION 13.0.
10. STREET HAS CONTROLLED ACCESS. DRIVEWAY ACCESS UNDER APPROVAL FROM CITY ENGINEER.
11. CROSS-SECTIONS TO BE USED IN CONJUNCTION WITH CITY'S COMPLETE STREET DESIGN GUIDE.
12. STREETLIGHTS ARE DIAGRAPHIC. LIGHTING LEVELS AS PER 10.0.
13. LANDSCAPING AS PER SECTION 14.0.

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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
INDUSTRIAL COLLECTOR

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	IC-XS1



ACRONYMS:
PL IS PROPERTY LINE
FOC IS FACE OF CURB
CL IS CENTER LINE
MUP IS MULTI-USE PATH

NOTES:

1. PAVED SURFACE - 100mm ASPHALT (COMPACTED THICKNESS) AS PER SECTION 9.0 AND SECTION 12.0.
2. BASE - 200mm AS PER SECTION 9.0.
3. SUB-BASE - 250mm AS PER SECTION 9.0.
4. BARRIER CURB AND GUTTER AS PER STANDARD DRAWING CS-1. MOUNTABLE CURB AND GUTTER AS PER STANDARD DRAWING CS-3. FLAT AND VALLEY CURB AND GUTTER PER STANDARD DRAWING CS-4.
5. POCKET PARKING DELINEATION CURB TO BE OPTIONAL UNLESS PARKING HAS BEEN DESIGNED WITH A REVERSE CROSSFALL. MOUNTABLE ROLLOVER OR VALLEY CURB TO BE USED AS GRADE BREAK FOR DRAINAGE PURPOSES.
6. DEPTHS OF SURFACING AND BASE GRAVELS ARE MINIMUM.
7. FLEX ZONE TO BE UTILIZED FOR: LANDSCAPING, STREET TREES, POCKET PARKING, TRANSIT STOPS, BUS SHELTERS, BIKE PARKING, FURNITURE, UTILITY BOXES/CABINETS, HYDRANTS, POWER POLES, STREETLIGHTS, STORMWATER MANAGEMENT, OR WASTE RECEPTACLES.
8. BANDING, BUFFERS, POCKET PARKING DOOR ZONES, OR OTHER HARD SURFACES TO USE COLOURED AND/OR STAMPED CONCRETE AS PER SECTION 13.0.
9. CROSS-SECTIONS TO BE USED IN CONJUNCTION WITH CITY'S COMPLETE STREET DESIGN GUIDE.
10. STREETLIGHTS ARE DIAGRAPHIC. LIGHTING LEVELS AS PER SECTION 10.0.
11. LANDSCAPING AS PER SECTION 14.0.

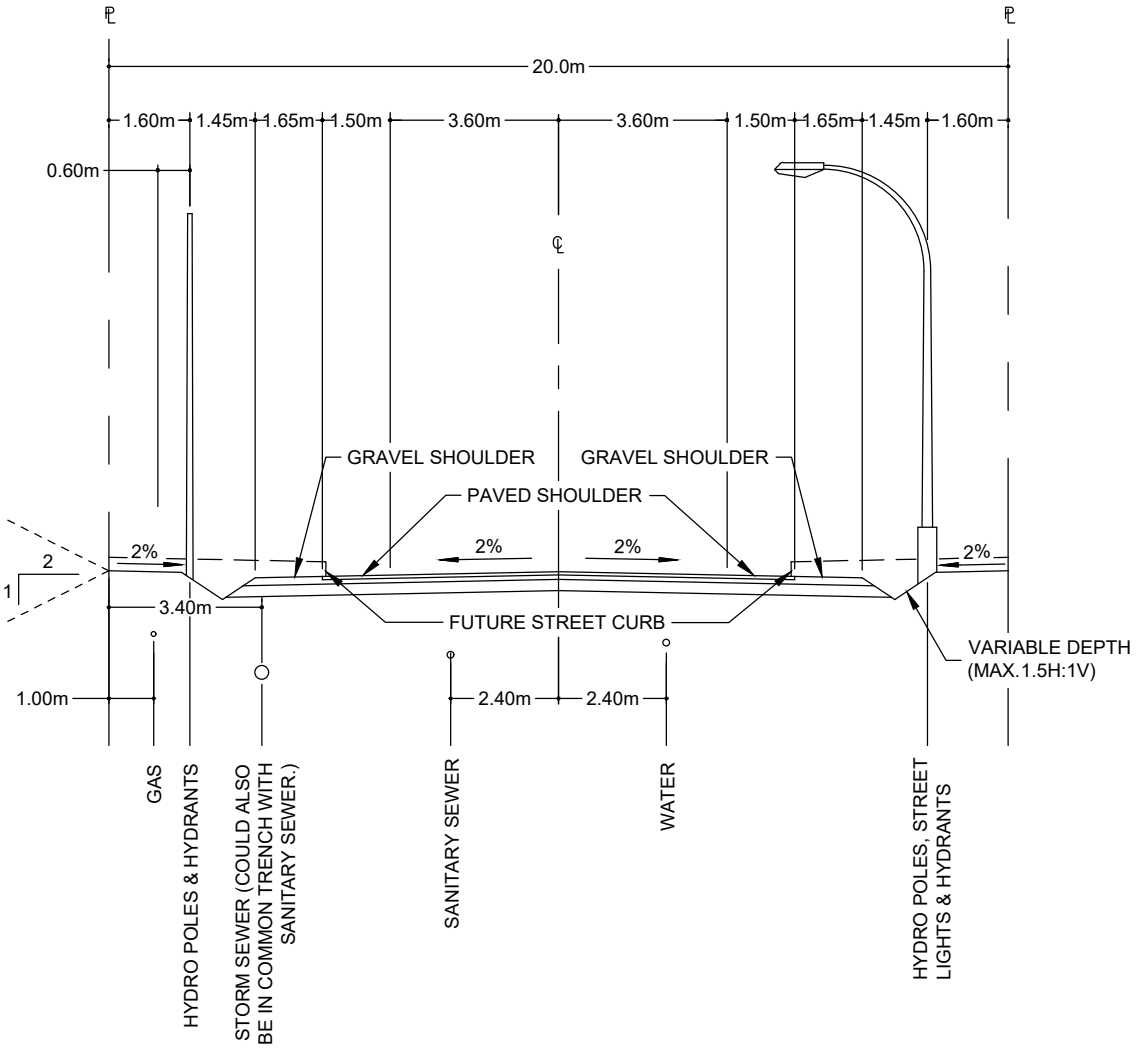
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
INDUSTRIAL LOCAL

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	IL-XS1



ACRONYMS:
PL IS PROPERTY LINE
CL IS CENTER LINE

NOTES:

1. PAVED SURFACE - 75mm ASPHALT (COMPACTED THICKNESS) AS PER SECTION 9.0 AND SECTION 12.0.
2. BASE - 100mm AS PER SECTION 9.0.
3. SUB-BASE - 250mm AS PER SECTION 9.0.
4. SHOULDER - CRUSHED GRAVEL AS PER SECTION 9.0.
5. DEPTHS OF SURFACING AND BASE GRAVELS ARE MINIMUM.
6. STREETLIGHTS ARE DIAGRAPHIC. LIGHTING LEVELS AS PER SECTION 10.0.
7. ACTIVE TRANSPORTATION REQUIREMENTS TO BE DETERMINED BY THE CITY ENGINEER.

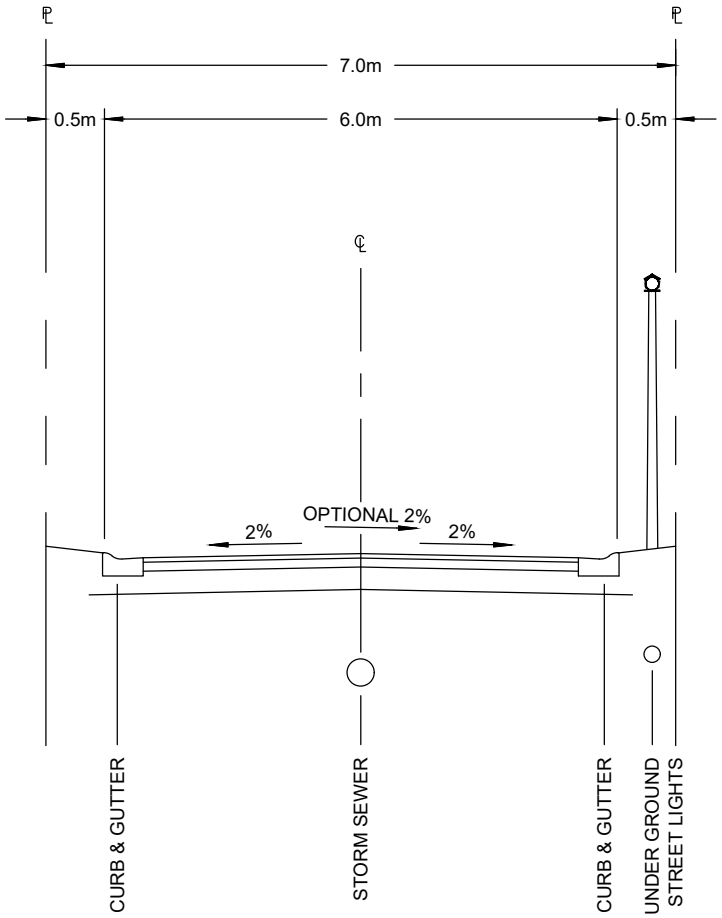
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4.9.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
RURAL LOCAL

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	RL-XS1



ACRONYMS:
PL IS PROPERTY LINE
CL IS CENTER LINE

NOTES:

1. PAVED SURFACE - 75mm ASPHALT (COMPACTED THICKNESS) AS PER SECTION 9.0 AND SECTION 12.0.
2. BASE - 100mm AS PER SECTION 9.0.
3. SUB-BASE - 250mm AS PER SECTION 9.0.
4. BARRIER CURB AND GUTTER AS PER STANDARD DRAWING CS-1. MOUNTABLE CURB AND GUTTER AS PER STANDARD DRAWING CS-3.
5. DEPTHS OF SURFACING AND BASE GRAVELS ARE MINIMUM.
6. STREETLIGHTS ARE DIAGRAPHIC. LIGHTING LEVELS AS PER SECTION 10.0.

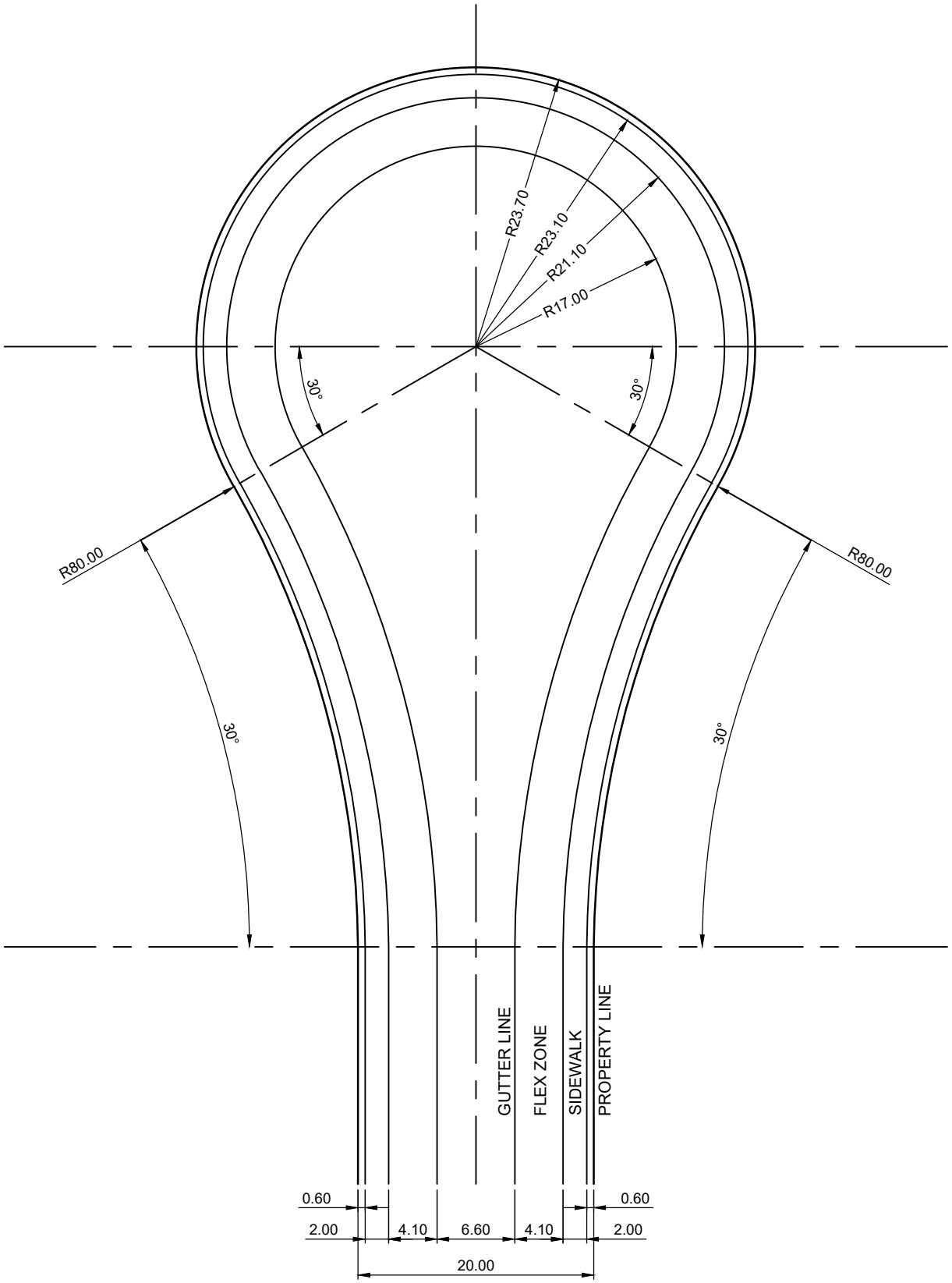
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
LANE

Scale:	NTS
Created:	NOV 2009
Rev Date:	JUNE 2026
Dwg No:	L-XS1



NOTE:

1. ALL DIMENSIONS SHOWN ARE MINIMUM.
2. ALL DIMENSIONS IN METRES UNLESS OTHERWISE SHOWN.
3. APPLIES TO NEW CUL-DE-SACS.

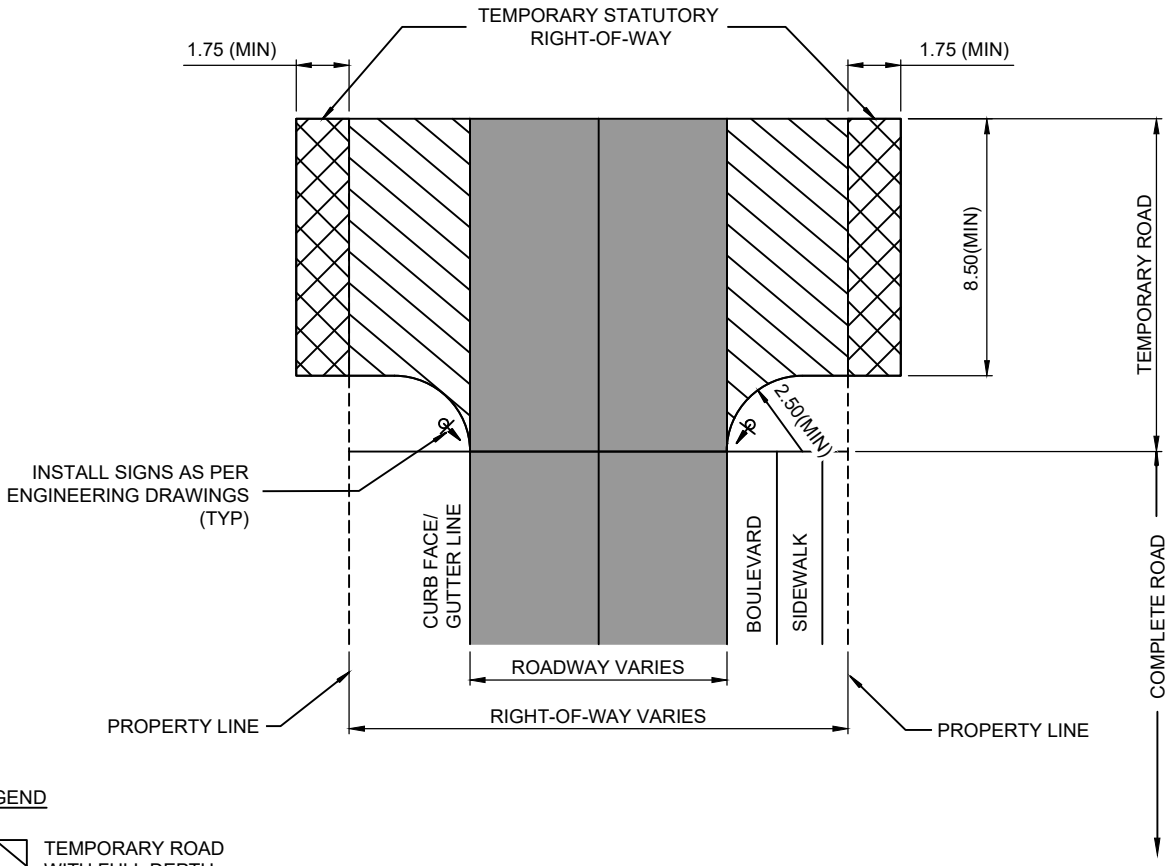
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4.9.2026

CITY OF NANAIMO
THE HARBOUR CITY

STREET TYPES & CROSS SECTIONS
CUL-DE-SAC

Scale:	NTS
Created:	MAY 2020
Rev Date:	JUNE 2026
Dwg No:	R-CDS



LEGEND

TEMPORARY ROAD WITH FULL DEPTH ROAD STRUCTURE

COMPLETE ROAD

TEMPORARY STATUTORY RIGHT-OF-WAY OR TEMPORARY ROAD DEDICATION, WILL BE RELEASED WHEN ROAD IS CONNECTED.

TEMPORARY TURNABOUT

NOTES:

1. STANDARD TEMPORARY TURNAROUND SHALL BE USED FOR LOCAL LOW VOLUME ROADS AND A TEMPORARY STATUTORY RIGHT-OF-WAY SHALL BE APPLIED UNTIL THE STREET IS CONNECTED. A TEMPORARY ROAD DEDICATION SHALL BE APPLIED UNTIL THE STREET IS CONNECTED WHEN SUITABLE.
2. PARKING IS NOT PERMITTED WITHIN THE TEMPORARY TURNAROUND, REGULATORY SIGNAGE SHALL BE INSTALLED.
3. ALL DIMENSIONS IN METRES UNLESS OTHERWISE SHOWN.
4. IF PROPERTY DOES NOT HAVE SUFFICIENT FIRE TRUCK ACCESS ON-SITE, THE DESIGN WILL REQUIRE FIRE DEPARTMENT APPROVAL.

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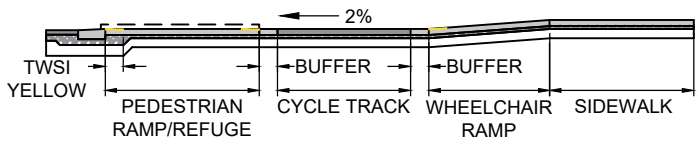
4.9.2026

CITY OF NANAIMO
THE HARBOUR CITY

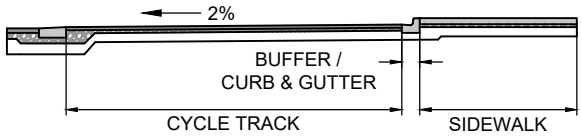
STREET TYPES & CROSS SECTIONS
TEMPORARY TURNAROUND

Scale:	NTS
Created:	OCT 2012
Rev Date:	JUNE 2026
Dwg No:	R-TT

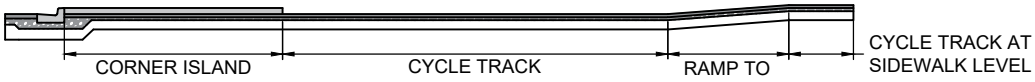
SECTION A-A

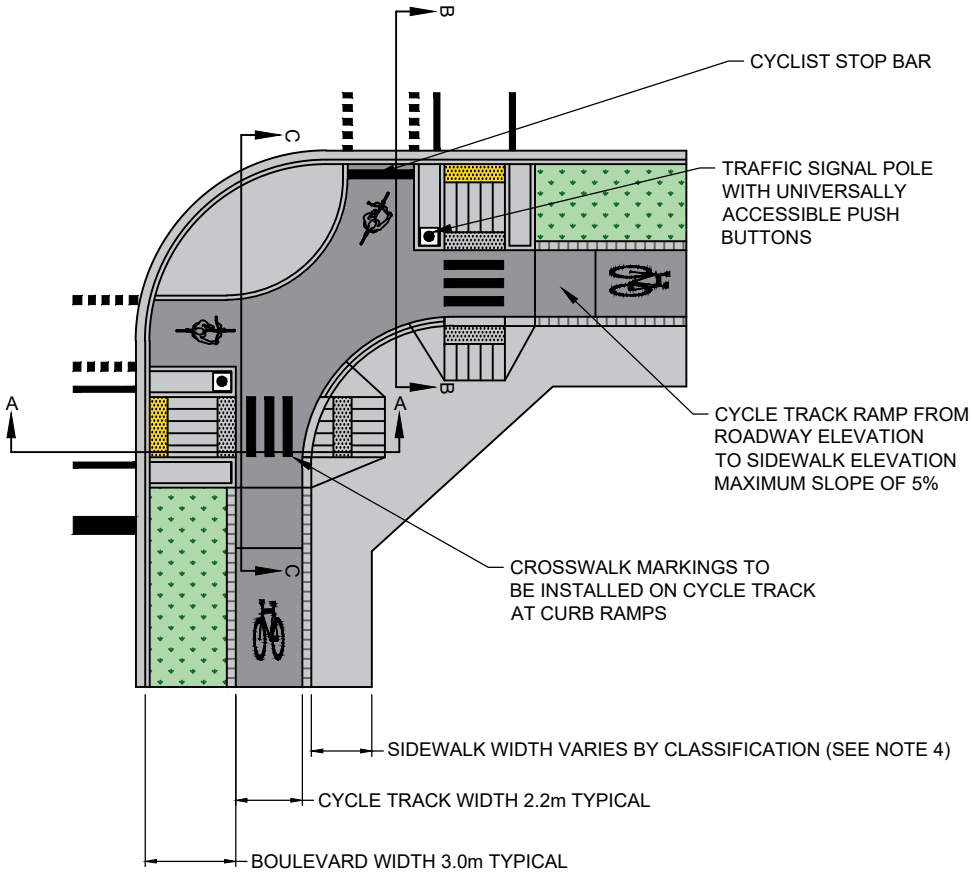


SECTION B-B



SECTION C-C





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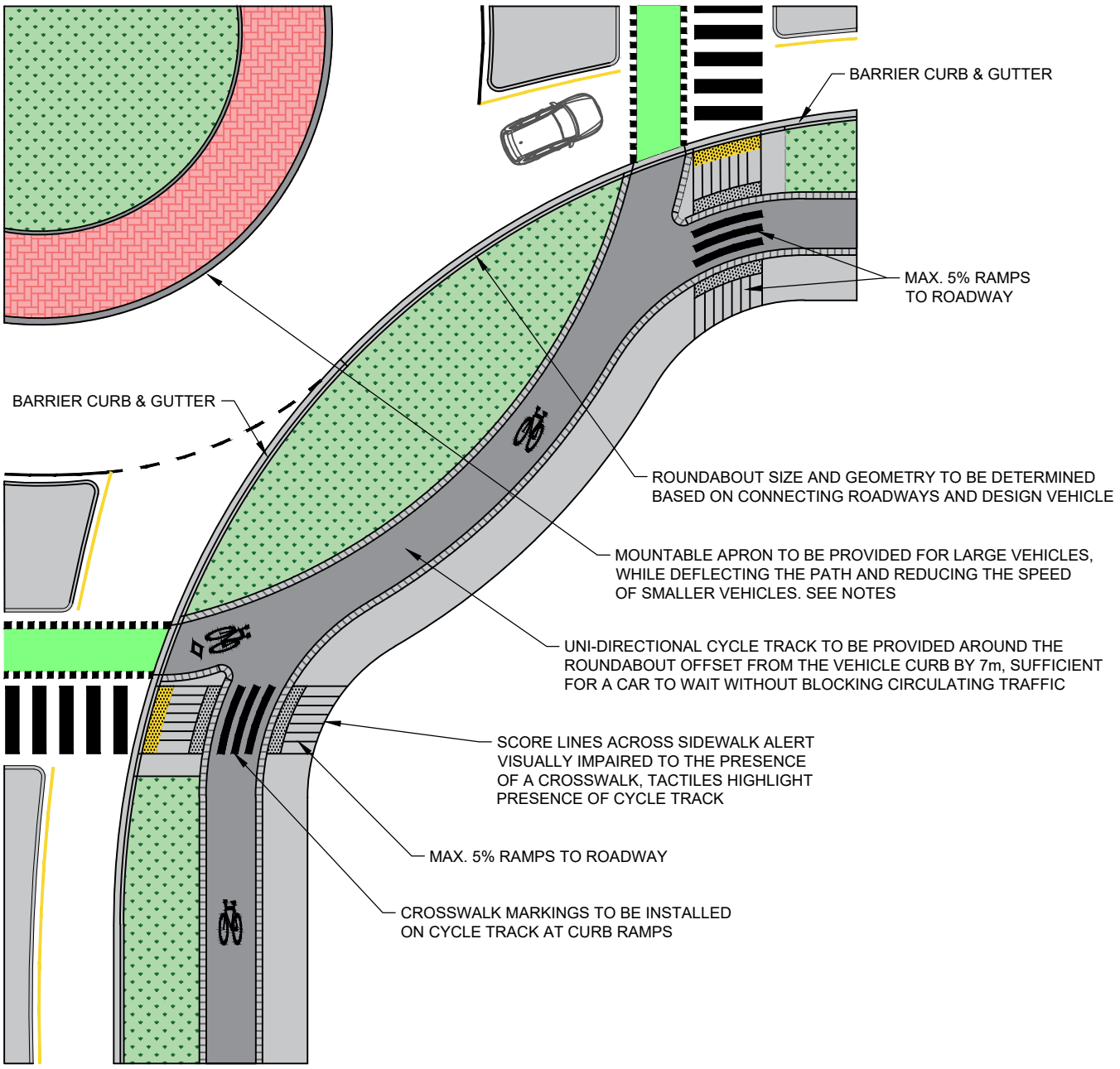
1. PROTECTED INTERSECTIONS REQUIRED AT ALL COLLECTOR AND ARTERIAL INTERSECTIONS WITH CYCLE TRACKS.
2. ON APPROACHES TO THE INTERSECTION, THE BOULEVARD IS 3.0m WHERE BUS STOPS OR PARKING POCKETS ARE PRESENT; NO LESS THAN 1.5m WHERE DRIVEWAYS ARE PRESENT; AND WHERE PARKING POCKETS ARE PRESENT, DISTANCE BETWEEN FACE OF CURB AND CYCLE TRACK MUST BE NO LESS THAN 0.6m TO PROVIDE A DOOR ZONE.
3. BANDING/BUFFER ON EITHER SIDE OF THE CYCLE TRACK SHALL BE 0.3m STAMPED CONCRETE WITH TRANSVERSE SCORE LINES AT 0.3m INTERVALS. WHERE PAVERS MAY BE PREFERRED FOR AESTHETIC REASONS, THEY SHALL BE SET IN CONCRETE TO AVOID MOVEMENT AS PER SECTION 13.0. WHERE VERTICAL SEPARATION IS PREFERRED, A CUSTOM MOUNTABLE MONOLITHIC CURB MAY BE PROPOSED. ALTERNATIVE TREATMENTS TO BE APPROVED BY THE CITY ENGINEER.
4. SIDEWALK WIDTH VARIES BY CLASSIFICATION, 2.0m MIN. FOR URBAN OR INDUSTRIAL STREETS, 4.0m MIN. FOR MOBILITY STREETS.
5. SCORE LINES AND TWSIs TO BE INSTALLED WHERE PEDESTRIANS WILL BE CROSSING PATHS WITH VEHICLES, AS PER SECTION 8.0.
6. PLACEMENT OF PUBLIC REALM AMENITIES MUST NOT IMPEDE SIGHT LINES.
7. INTERSECTION QUADRANTS ARE SCHEMATIC AND ARE TO BE USED IN CONJUNCTION WITH CITY'S COMPLETE STREET DESIGN GUIDE.

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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

INTERSECTIONS
PROTECTED

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	R-PI



NOTES:

1. ROUNDABOUT MAY BE USED IN PLACE OF A PROTECTED SIGNALIZED INTERSECTION WHERE SPACE PERMITS AND ITS DETERMINED TO OFFER BENEFITS OVER A SIGNALIZED INTERSECTION.
2. ON APPROACHES TO THE INTERSECTION, THE BOULEVARD IS 3.0m WHERE BUS STOPS OR PARKING POCKETS ARE PRESENT; NO LESS THAN 1.5m WHERE DRIVEWAYS ARE PRESENT; AND WHERE PARKING POCKETS ARE PRESENT, THE DISTANCE BETWEEN FACE OF CURB AND CYCLE TRACK MUST BE NO LESS THAN 0.6m TO PROVIDE A DOOR ZONE.
3. BANDING/BUFFER ON EITHER SIDE OF THE CYCLE TRACK WIDTH IS 0.3m STAMPED CONCRETE AS PER SECTION 13.0. WHERE PAVERS MAY BE PREFERRED FOR AESTHETIC REASONS, THEY SHALL BE SET IN CONCRETE TO AVOID MOVEMENT. WHERE VERTICAL SEPARATION IS PREFERRED, A CUSTOM MOUNTABLE MONOLITHIC CURB MAY BE PROPOSED. ALTERNATIVE TREATMENTS TO BE APPROVED BY THE CITY ENGINEER.
4. SCORE LINES AND TWSIs TO BE INSTALLED WHERE PEDESTRIANS WILL BE CROSSING PATHS WITH VEHICLES, AS PER SECTION 8.
5. PLACEMENT OF PUBLIC REALM AMENITIES MUST NOT IMPEDE SIGHT LINES.
6. INTERSECTION QUADRANTS ARE SCHEMATIC AND ARE TO BE USED IN CONJUNCTION WITH CITY'S COMPLETE STREET DESIGN GUIDE.
7. MOUNTABLE APRON CONCRETE THICKNESS AND SPECIFICATIONS TO BE SUBJECT TO TRAFFIC LOADING REQUIREMENTS AND DESIGNED BY A PROFESSIONAL OF RECORD. MOUNTABLE CURB AND GUTTER AS PER STANDARD DRAWING CS-3. CONCRETE AND REINFORCEMENT AS PER SECTION 11.0. THE COLOURED AND STAMPED CONCRETE AS PER SECTION 13.0.

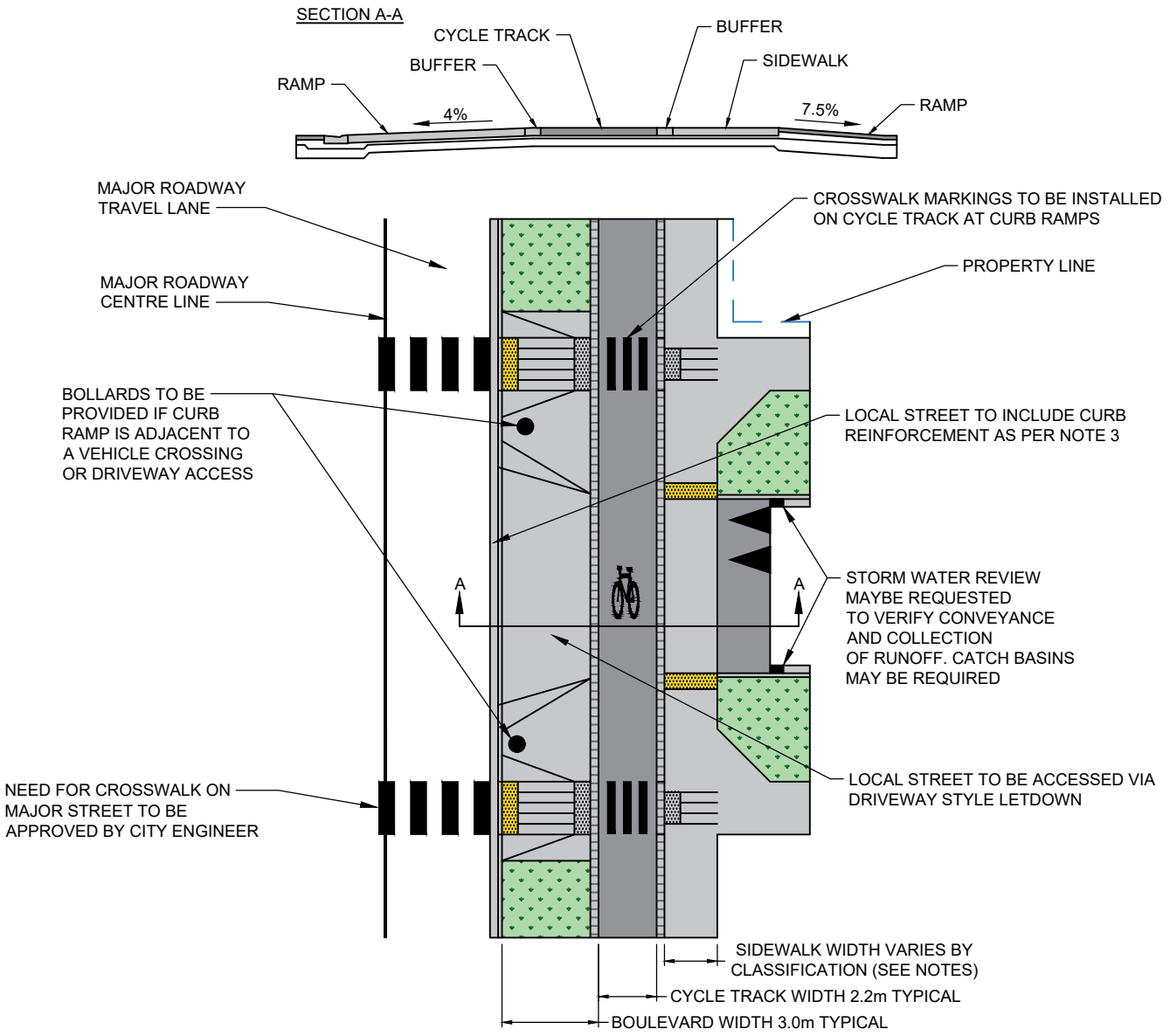
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CITY OF NANAIMO
THE HARBOUR CITY

INTERSECTIONS
PROTECTED ROUNDABOUT

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	R-PRI

6.22.2026



NOTES:

1. CYCLE TRACK AND SIDEWALK TO REMAIN AT LEVEL GRADE THROUGH INTERSECTION.
2. CONCRETE SURFACES TO BE A MINIMUM THICKNESS OF 100mm AND 150mm WHERE VEHICLE TRAFFIC IS ANTICIPATED. CONCRETE REQUIREMENT AS PER SECTION 11.0.
3. CONCRETE DROP CURB AND GUTTER TO HAVE REINFORCING BARS OR CONCRETE FOOTING AS PER STANDARD DRAWING CS-2.
4. WHERE LOCAL STREET IS ONLY PRESENT ON ONE SIDE OF THE STREET AND MAJOR STREET HAS CYCLE TRACK, PROVIDE CURB RAMP OPPOSITE LOCAL STREET TO PROVIDE ACCESS FROM THE LOCAL STREET TO THE OPPOSITE CYCLE TRACK.
5. BOULEVARD SHALL BE 3.0m WHERE BUS STOPS OR PARKING POCKETS ARE PRESENT. BOULEVARD SHALL BE NO LESS THAN 1.5m WHERE DRIVEWAYS ARE PRESENT.
6. WHERE PARKING POCKETS ARE PRESENT, DISTANCE BETWEEN FACE OF CURB AND BIKE PATH MUST BE NO LESS THAN 0.6m TO PROVIDE A DOOR ZONE.
7. BANDING/BUFFER ON EITHER SIDE OF THE CYCLE TRACK SHALL BE 0.3m STAMPED CONCRETE AS PER SECTION 13.0. WHERE PAVERS MAY BE PREFERRED FOR AESTHETIC REASONS, THEY SHALL BE SET IN CONCRETE TO AVOID MOVEMENT. WHERE VERTICAL SEPARATION IS PREFERRED, A CUSTOM MOUNTABLE MONOLITHIC CURB MAY BE PROPOSED. ALTERNATIVE TREATMENTS TO BE APPROVED BY THE CITY ENGINEER.
8. SIDEWALK WIDTH VARIES BY CLASSIFICATION, 2.0m MIN. FOR URBAN OR INDUSTRIAL STREETS, 4.0m MIN. FOR MOBILITY STREETS.
9. SCORE LINES AND TWSIs TO BE INSTALLED WHERE PEDESTRIANS WILL BE CROSSING PATHS WITH VEHICLES OR CYCLISTS.
10. PLACEMENT OF PUBLIC REALM AMENITIES MUST NOT IMPEDE SIGHT LINES.
11. INTERSECTION QUADRANTS TO BE USED IN CONJUNCTION WITH CITY'S COMPLETE STREET DESIGN GUIDE.

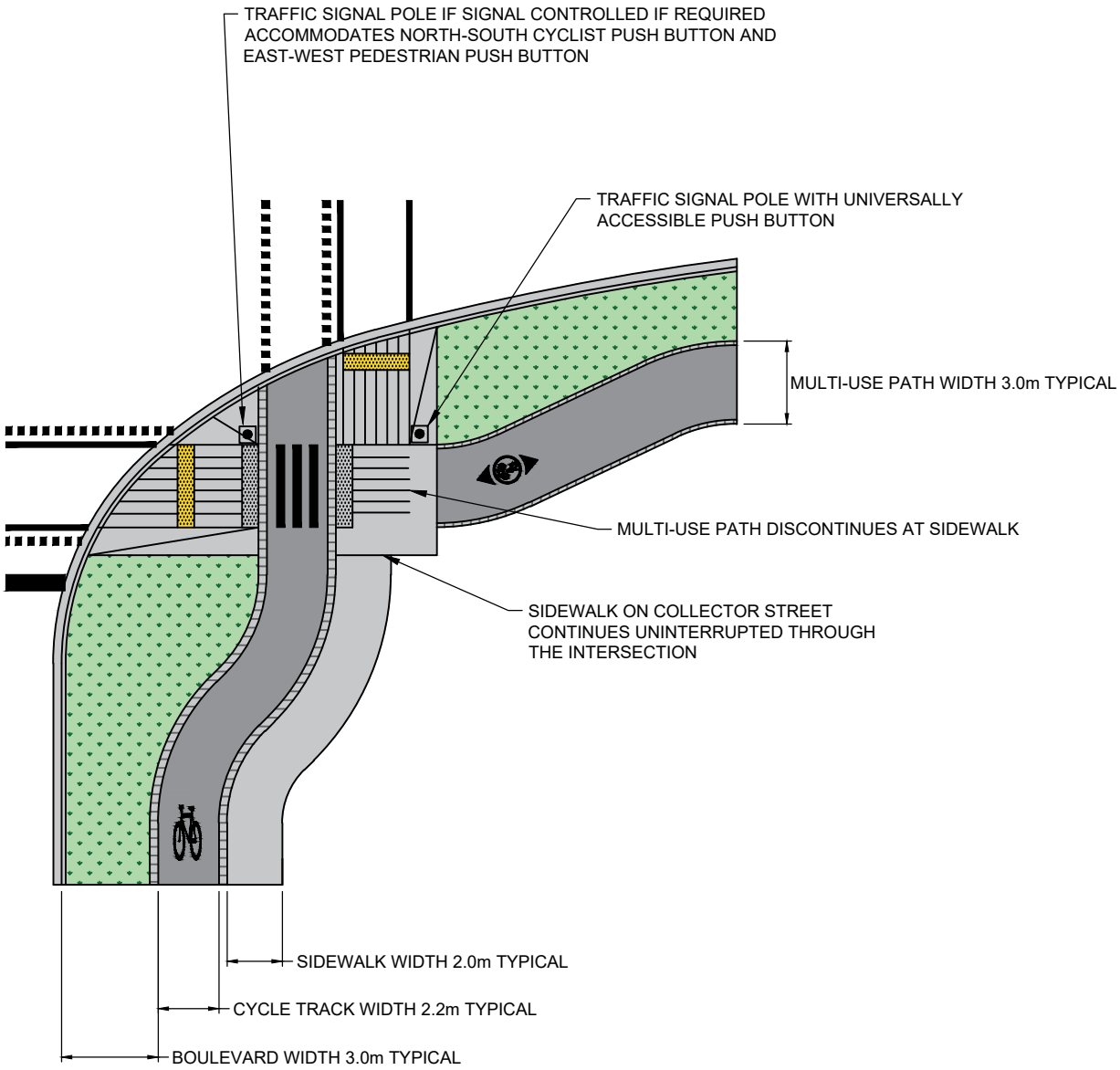
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4.9.2026

CITY OF NANAIMO
THE HARBOUR CITY

INTERSECTIONS
RAISED LOCAL

Scale:	NTS
Created:	AUG 2019
Rev Date:	JUNE 2026
Dwg No:	R-RLI



NOTES:

1. ON APPROACHES TO THE INTERSECTION, THE BOULEVARD IS 3.0m WHERE BUS STOPS OR PARKING POCKETS ARE PRESENT; NO LESS THAN 1.5m WHERE DRIVEWAYS ARE PRESENT; AND WHERE PARKING POCKETS ARE PRESENT, THE DISTANCE BETWEEN FACE OF CURB AND CYCLE TRACK MUST BE NO LESS THAN 0.6m TO PROVIDE A DOOR ZONE.
2. BANDING/BUFFER ON EITHER SIDE OF THE CYCLE TRACK SHALL BE 0.3m STAMPED CONCRETE AS PER SECTION 13.0. WHERE PAVERS MAY BE PREFERRED FOR AESTHETIC REASONS, THEY SHALL BE SET IN CONCRETE TO AVOID MOVEMENT. WHERE VERTICAL SEPARATION IS PREFERRED, A CUSTOM MOUNTABLE MONOLITHIC CURB MAY BE PROPOSED. ALTERNATIVE TREATMENTS TO BE APPROVED BY THE CITY ENGINEER.
3. MULTI-USE PATH ON INDUSTRIAL LOCAL STREET WILL FEATURE 0.3m STAMPED CONCRETE EDGES AS PER SECTION 13.0.
4. SCORE LINES AND TWSIs TO BE INSTALLED WHERE PEDESTRIANS WILL BE CROSSING PATHS WITH VEHICLES, AS PER SECTION 8.
5. PLACEMENT OF PUBLIC REALM AMENITIES MUST NOT IMPEDE SIGHT LINES.
6. INTERSECTION QUADRANTS TO BE USED IN CONJUNCTION WITH CITY'S COMPLETE STREET DESIGN GUIDE.

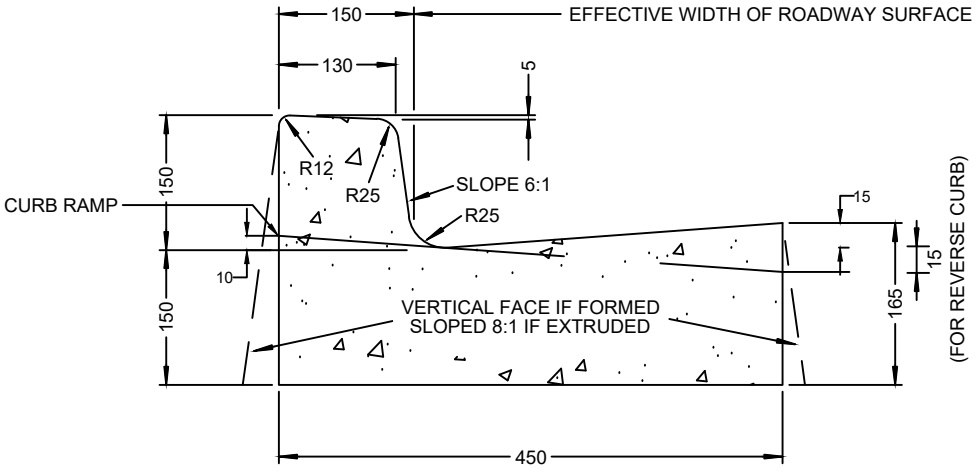
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CITY OF NANAIMO
THE HARBOUR CITY

INTERSECTIONS
INDUSTRIAL LOCAL

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	R-II

6.22.2026



BARRIER CURB AND GUTTER

NOTES:

1. BASE AND SUB-BASE REQUIREMENTS AS PER SECTION 9.0.
2. FOR CONCRETE REQUIREMENTS AS PER SECTION 11.0.
3. THE LENGTH OF TRANSITION FROM ONE TYPE OF CURB TO ANOTHER SHALL BE THE GREATEST OF:
   a) 50 x DIFFERENCE IN OVERALL CURB HEIGHTS.
   b) 25 x DIFFERENCE IN GUTTER WIDTHS.
   c) 2.0 METRES.
4. REVERSE CURB SHALL BE APPROVED BY CITY ENGINEER.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
6. LANDSCAPING AS PER SECTION 14.0.
7. PAVED ROADWAY SURFACE STRUCTURE AS PER SECTION 9.0 BASED ON STREET CLASSIFICATION.

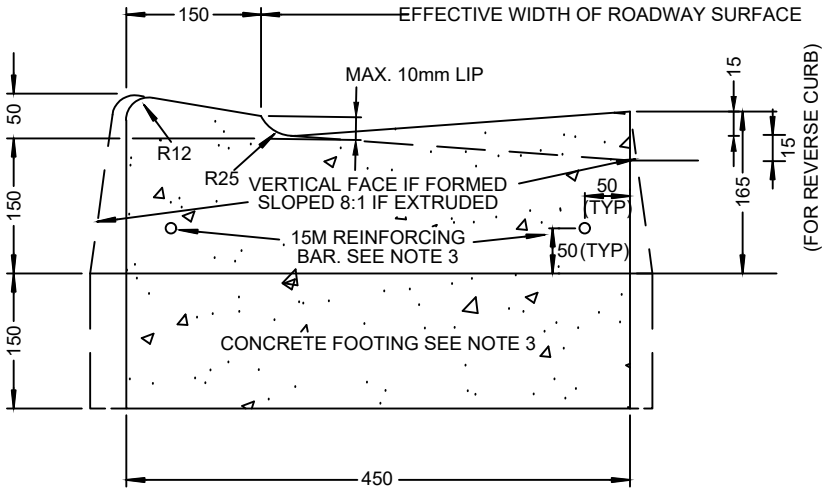
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

CURBS
BARRIER CURB AND GUTTER

Scale:	NTS
Created:	SEP 2012
Rev Date:	JUNE 2026
Dwg No:	CS-1



DROP CURB AND GUTTER

NOTES:

1. BASE AND SUB-BASE REQUIREMENTS AS PER SECTION 9.0.
2. CONCRETE REQUIREMENTS AS PER SECTION 11.0.
3. REINFORCING BARS OR CONCRETE FOOTING REQUIRED FOR ACCESSES TO LOCAL STREET, LANES, AND DRIVEWAYS FOR COMMERCIAL AND INDUSTRIAL.
4. REVERSE CURB SHALL BE APPROVED BY CITY ENGINEER.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

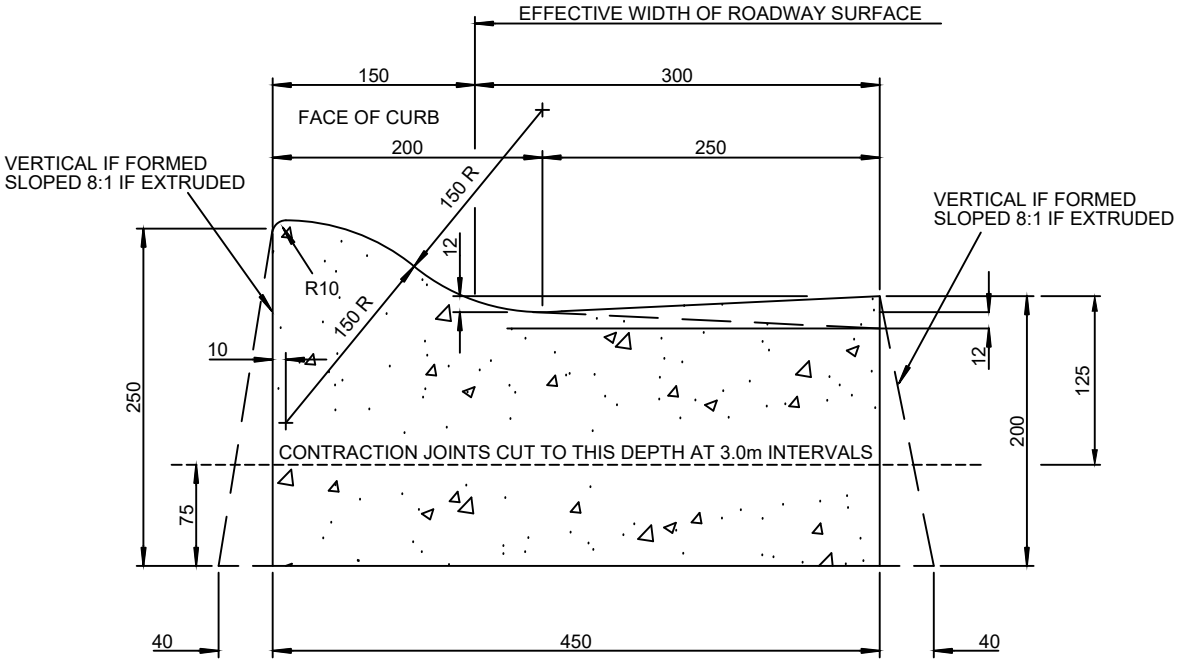
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

CURBS
DROP CURB AND GUTTER

Scale:	NTS
Created:	SEP 2012
Rev Date:	JUNE 2026
Dwg No:	CS-2



MOUNTABLE ROLLOVER CURB AND GUTTER

NOTES:

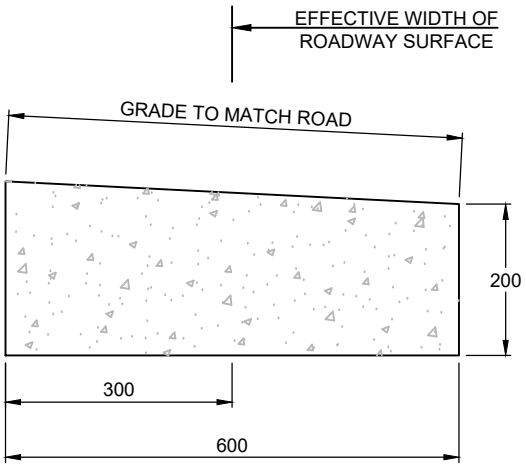
1. MOUNTABLE ROLLOVER CONCRETE CURBS SHALL BE USED WITHIN CUL-DE-SACS, POCKET PARKING, OR WHERE APPROVED BY CITY ENGINEER.
2. FOR BASE AND SUB-BASE REQUIREMENTS AS PER SECTION 9.0.
3. FOR CONCRETE REQUIREMENTS AS PER SECTION 11.0.
4. THE LENGTH OF TRANSITION FROM ONE TYPE OF CURB TO ANOTHER SHALL BE THE GREATEST OF:
   a) 50 x DIFFERENCE IN OVERALL CURB HEIGHTS.
   b) 25 x DIFFERENCE IN GUTTER WIDTHS.
   c) 2.0 METRES.
5. REVERSE CURB SHALL BE APPROVED BY CITY ENGINEER.
6. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

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6.22.2026

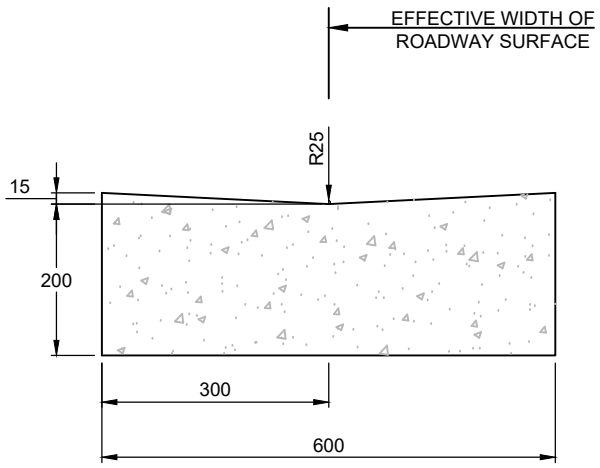
CITY OF NANAIMO
THE HARBOUR CITY

CURBS
MOUNTABLE ROLLOVER CURB AND GUTTER

Scale:	NTS
Created:	SEP 2012
Rev Date:	JUNE 2026
Dwg No:	CS-3



FLAT GUTTER



VALLEY GUTTER

NOTES:

1. BASE AND SUB-BASE REQUIREMENTS AS PER SECTION 9.0.
2. CONCRETE REQUIREMENTS AS PER SECTION 11.0.
3. AT LOCATIONS OTHER THAN PEDESTRIAN CURB RAMPS, THE LENGTH OF TRANSITION FROM ONE TYPE OF CURB TO ANOTHER SHALL BE THE GREATEST OF:
   a) 50 x DIFFERENCE IN OVERALL CURB HEIGHTS.
   b) 25 x DIFFERENCE IN GUTTER WIDTHS.
   c) 2.0 METRES.
4. MIDPOINT OF CURB SHALL ALIGN WITH THE UPSTREAM AND DOWN STREAM CURB FACES.
5. REINFORCEMENT BARS OR CONCRETE FOOTING REQUIRED FOR COMMERCIAL AND INDUSTRIAL APPLICATIONS.
6. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

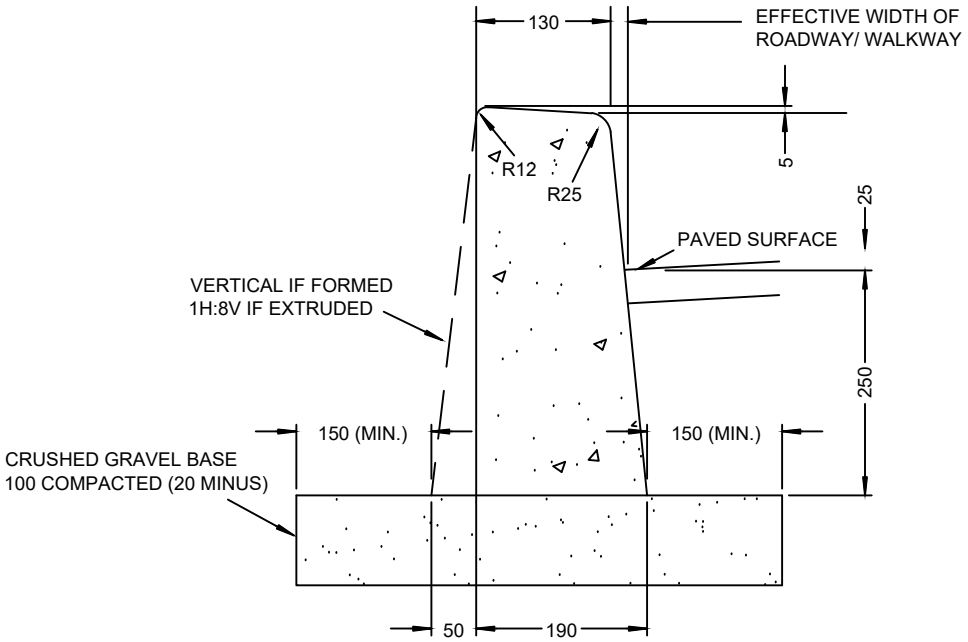
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CITY OF NANAIMO
THE HARBOUR CITY

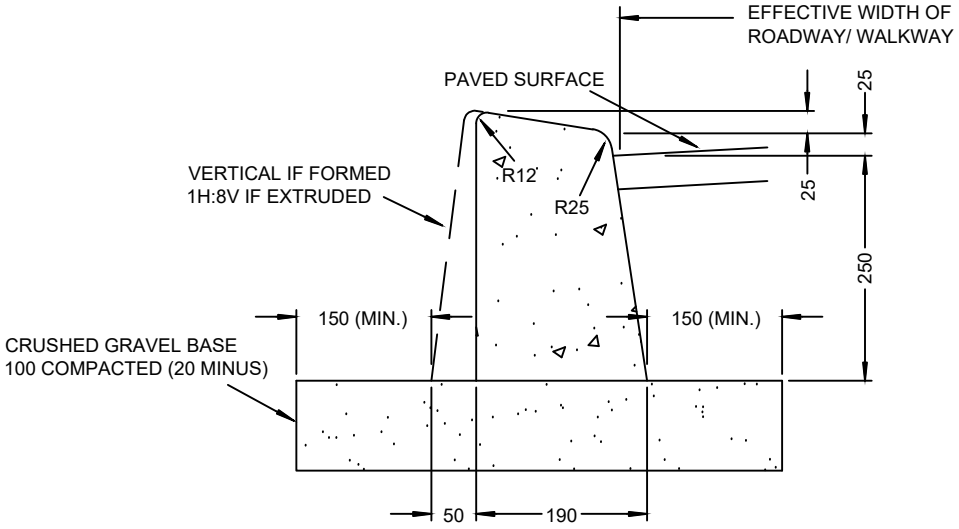
CURBS
FLAT AND VALLEY GUTTER

Scale:	NTS
Created:	NOV 2012
Rev Date:	JUNE 2026
Dwg No:	CS-4

4.10.2026



TEMPORARY CURB - TYPE 1 - BARRIER HEIGHT



TEMPORARY CURB - TYPE 1 - DROP SECTION

NOTES:

1. BASE AND SUB-BASE REQUIREMENTS AS PER SECTION 9.0.
2. FOR CONCRETE REQUIREMENTS AS PER SECTION 11.0.
3. THE LENGTH OF TRANSITION FROM ONE TYPE OF CURB TO ANOTHER SHALL BE THE GREATEST OF:
   a) 50 x DIFFERENCE IN OVERALL CURB HEIGHTS.
   b) 25 x DIFFERENCE IN GUTTER WIDTHS.
   c) 2.0 METRES.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
5. APPLICATION OF THIS STANDARD AT THE DISCRETION OF THE CITY ENGINEER.

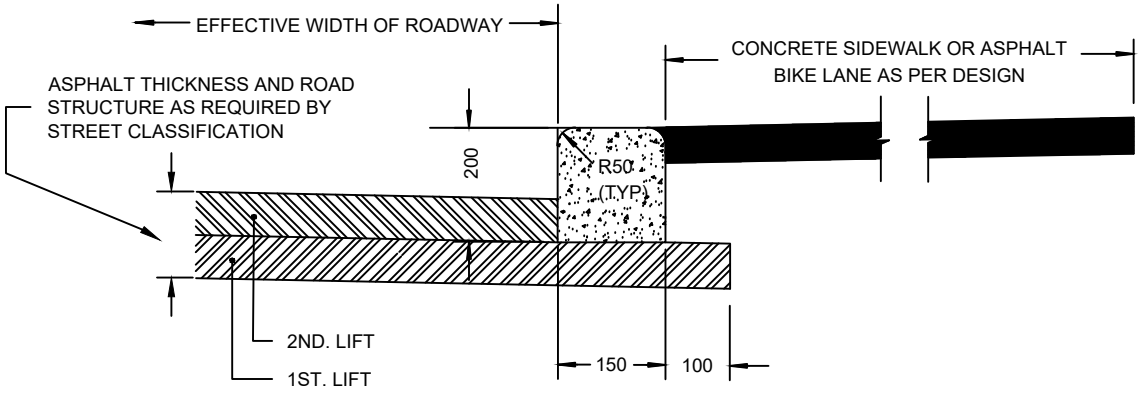
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CITY OF NANAIMO
THE HARBOUR CITY

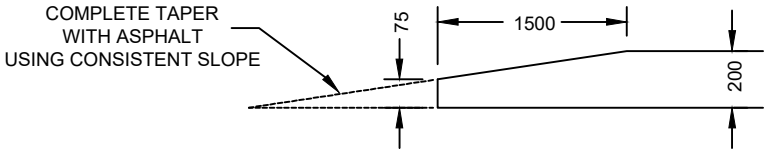
CURBS
TEMPORARY CURB - TYPE 1

Scale:	NTS
Created:	OCT 1993
Rev Date:	JUNE 2026
Dwg No:	CS-5

6.22.2026



TEMPORARY CURB - TYPE 2

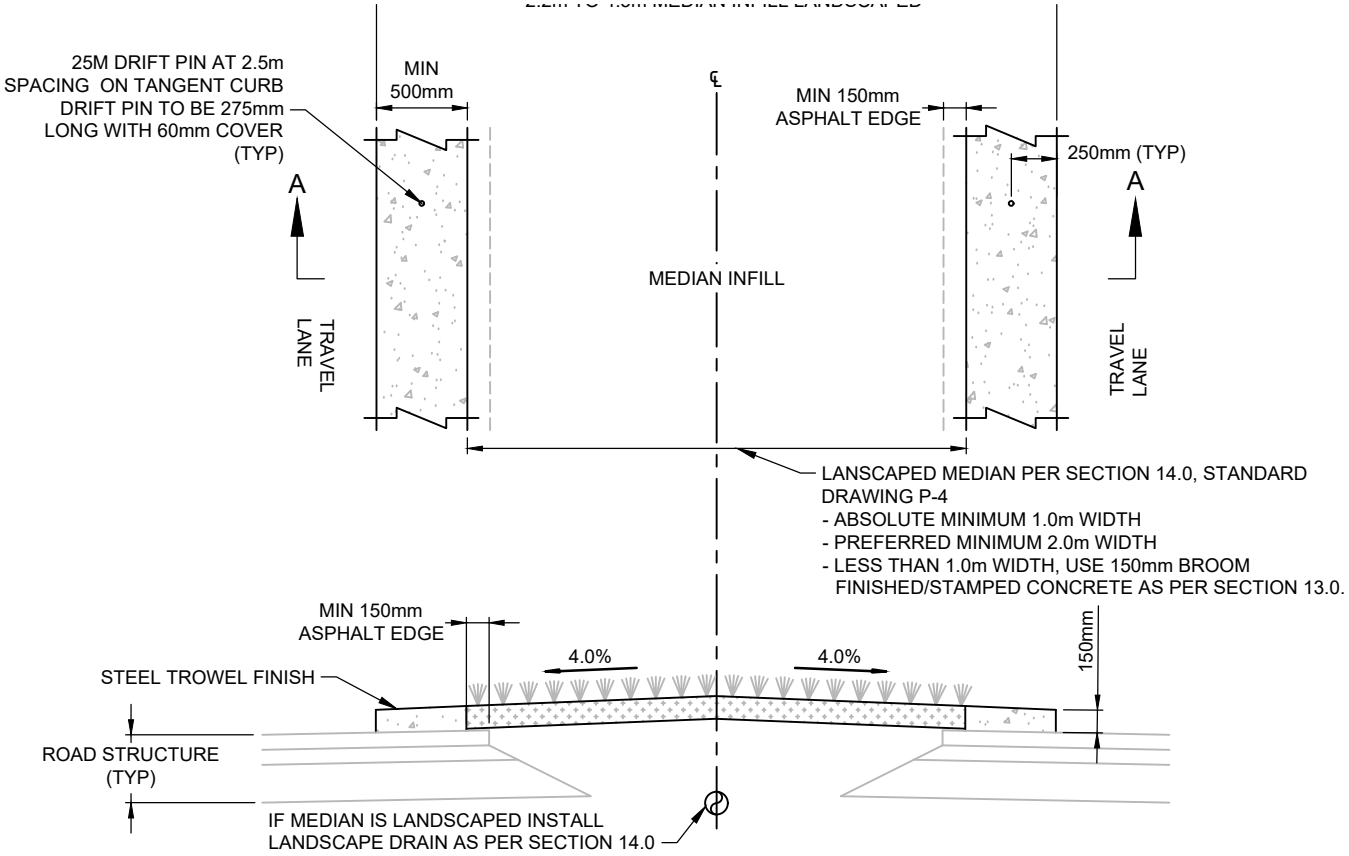


CURB RAMP DETAIL

NOTES:

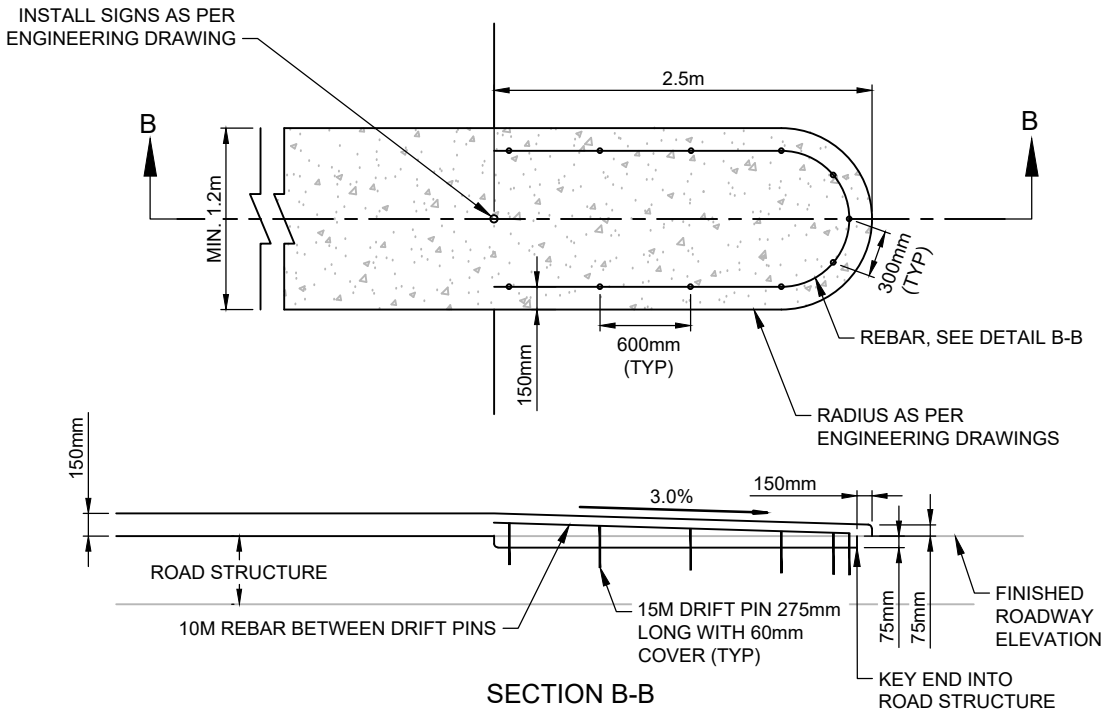
1. APPLICATION OF THIS STANDARD AT THE DISCRETION OF THE CITY ENGINEER.
2. PROVIDE 1500mm TAPER TO ZERO HEIGHT AT DROP LOCATIONS.
3. CURB HEIGHT 150mm IF INSTALLED ON FINAL LIFT AND 200mm IF INSTALLED ON BOTTOM LIFT.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

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SECTION A-A

TYPICAL MEDIAN DETAILS



SECTION B-B

TYPICAL MEDIAN END TREATMENT DETAILS

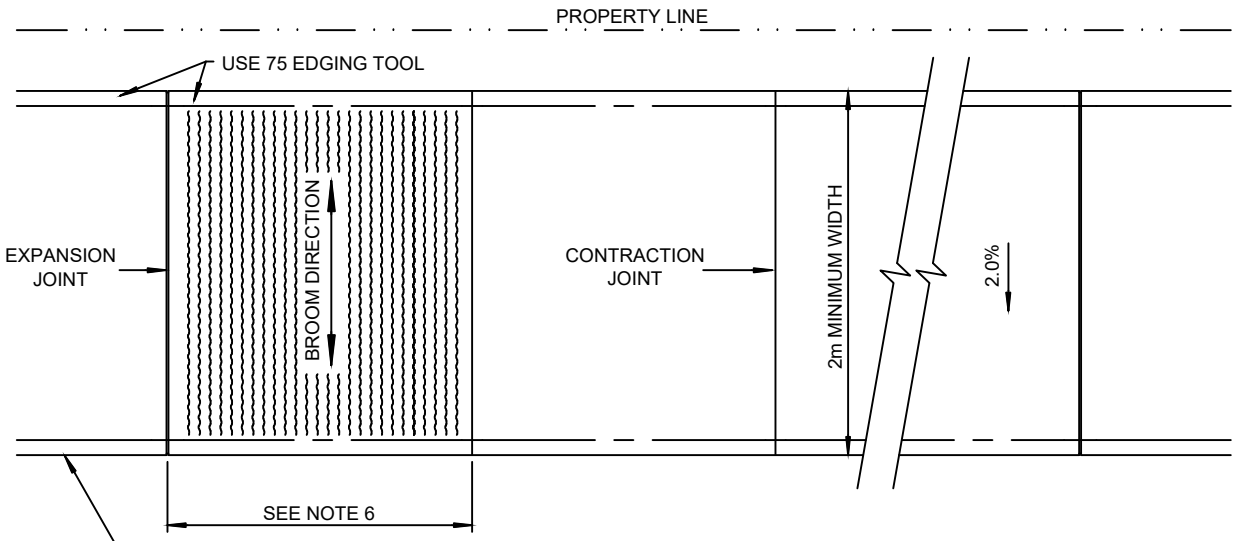
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6.22.2026

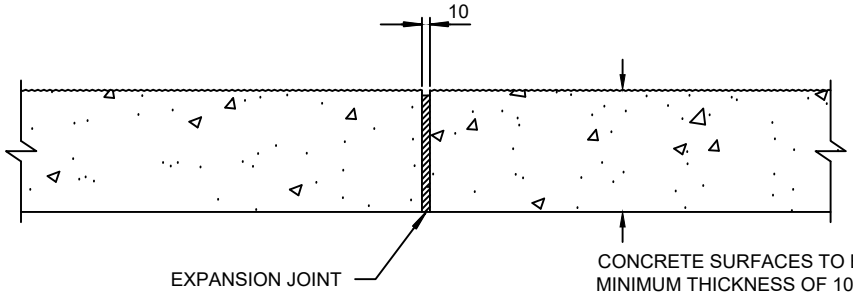
CITY OF NANAIMO
THE HARBOUR CITY

MEDIANS AND ISLANDS
RAISED CENTRE MEDIAN

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-7



CONTRACTION JOINT IF SIDEWALK IS POURED INTEGRALLY TO CURB. ISOLATION JOINT IF SIDEWALK IS POURED ADJACENT TO CURB. BOND BREAK COMPOUND MAY BE USED WHERE APPROVED BY THE PROFESSIONAL OF RECORD



NOTES:

1. DRIVEWAY CROSSING DETAIL AS PER STANDARD DRAWINGS CS-24, CS-25, & CS-26.
2. SIDEWALKS SHALL HAVE BROOMED FINISH.
3. CONCRETE DETAILS AS PER SECTION 11.0.
4. FOR BASE AND SUB-BASE REQUIREMENTS AS PER SECTION 9.0.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
6. JOINTS SHOULD BE OF EQUAL SPACING ALONG SIDEWALK TO BE AS CLOSE TO SQUARE AS POSSIBLE.

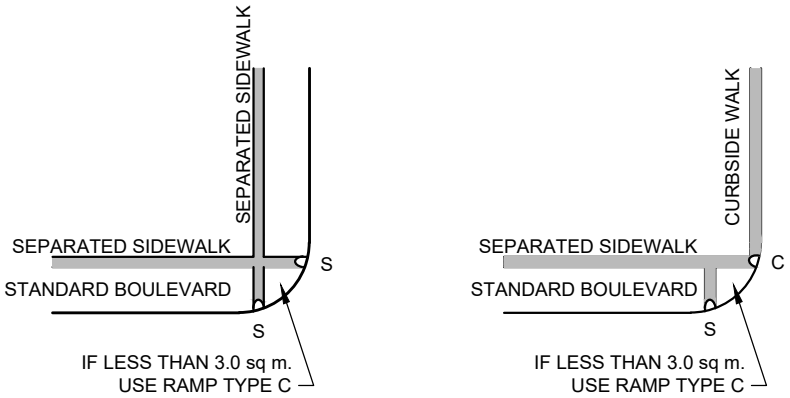
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6.22.2026

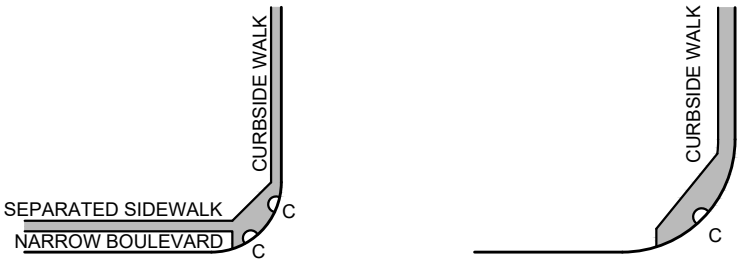
CITY OF NANAIMO
THE HARBOUR CITY

SIDEWALKS
SIDEWALK FINISHING DETAILS

Scale:	NTS
Created:	NOV 2012
Rev Date:	JUNE 2026
Dwg No:	CS-8



TYPE S - SEPARATED



TYPE C - CONSTRAINED



TYPE M - MID-BLOCK



TYPE B - BIKEWAY

NOTES:

1. CORNER CUT REQUIREMENTS DEPENDENT ON GEOMETRIC DESIGN AND SIGHT LINE REQUIREMENTS

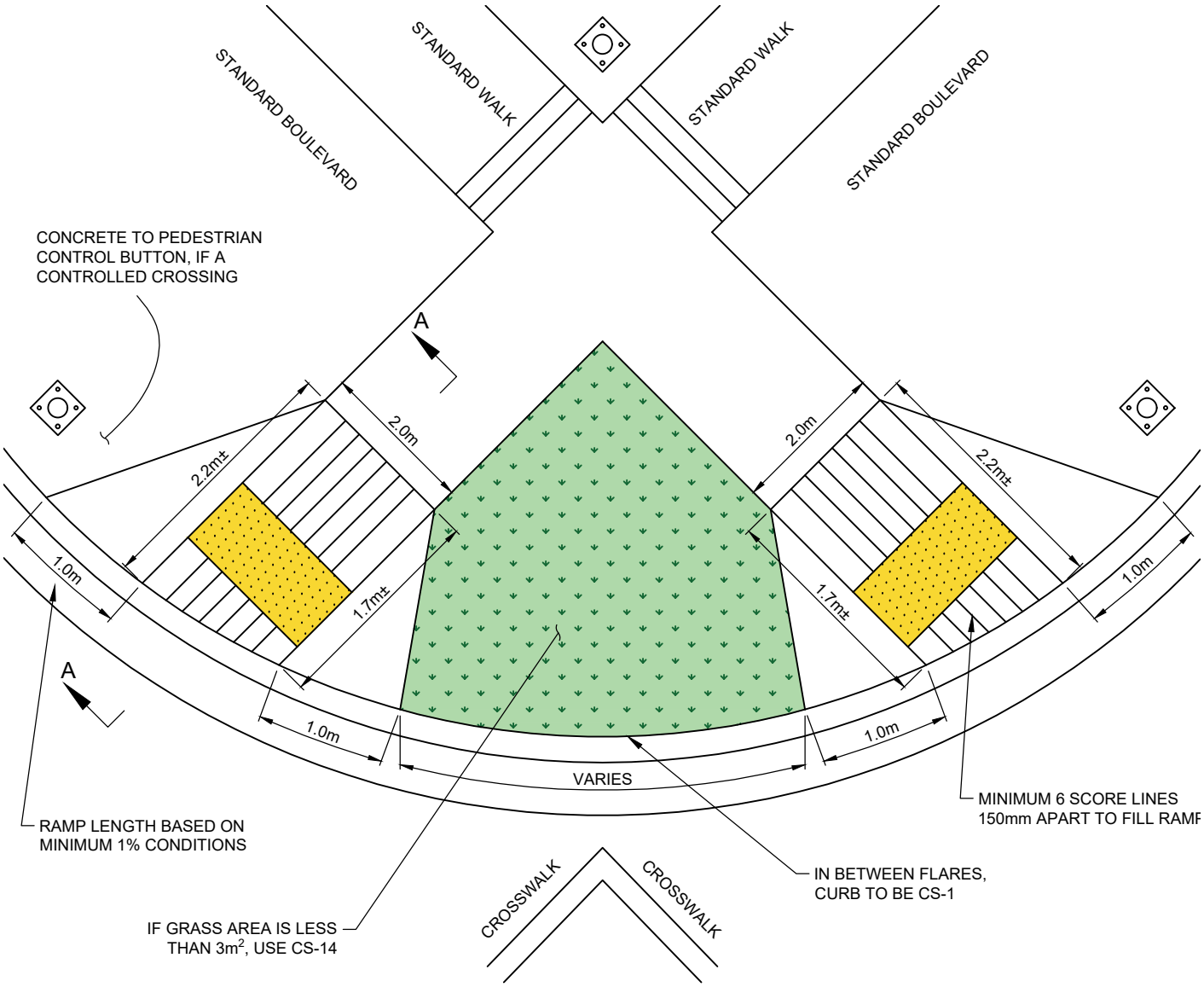
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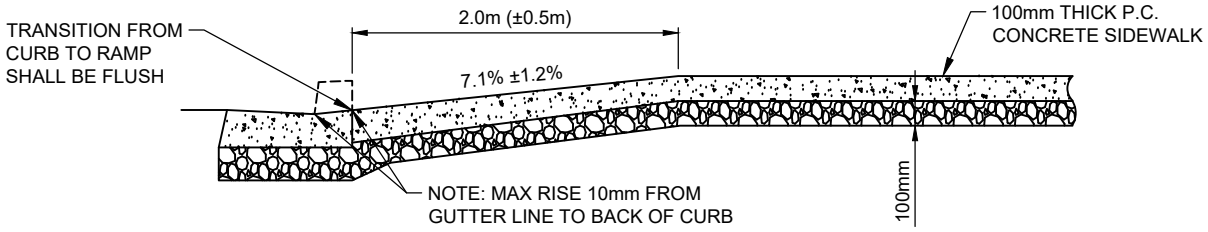
6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

CURB RAMPS
ORIENTATIONS

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-12





SECTION A-A

NOTES:

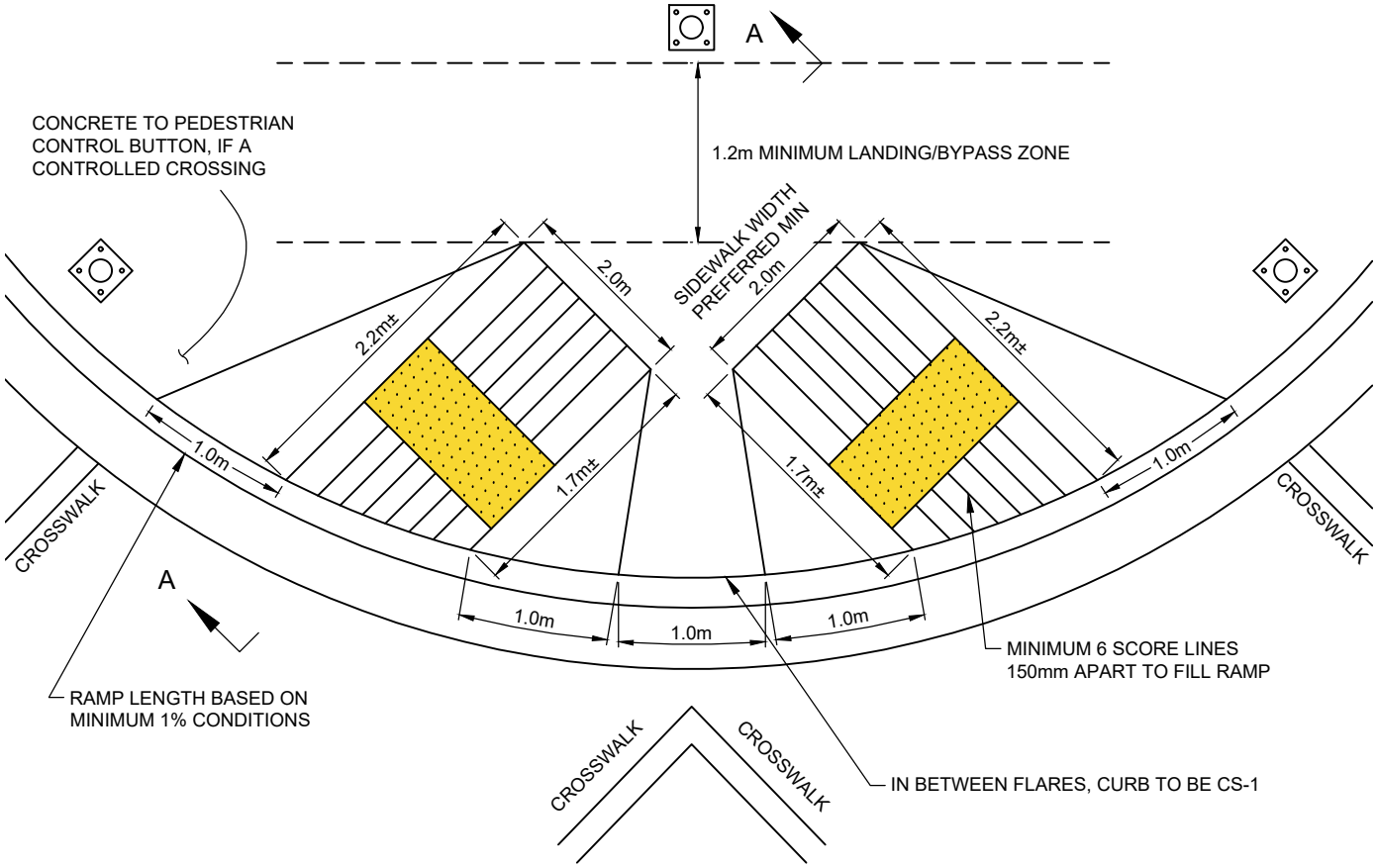
1. PEDESTRIAN SIDEWALK RAMP AND CURB RETURN AS PER DESIGN BY PROFESSIONAL OF RECORD.
2. TOOLED LINES ARE CENTERED IN THE CROSSWALK AND POINT IN DIRECTION OF THE RECEIVING CURB RAMP.
3. INTERCEPT DRAINAGE UPSTREAM OF CROSSWALK. CATCH BASINS ARE NOT PERMITTED IN CROSSWALK.
4. ALL TWSIs TO BE DESIGNED AND INSTALLED AS PER SECTION 8.0.
5. POLE LOCATIONS ARE DIAGRAPHIC. PEDESTRIAN SIGNALS AS PER SECTION 10.0. EXACT LOCATIONS TO BE DETERMINED BY PROFESSIONAL OF RECORD.
6. CONCRETE AS PER SECTION 11.0.
7. LANDSCAPING AS PER SECTION 14.0.

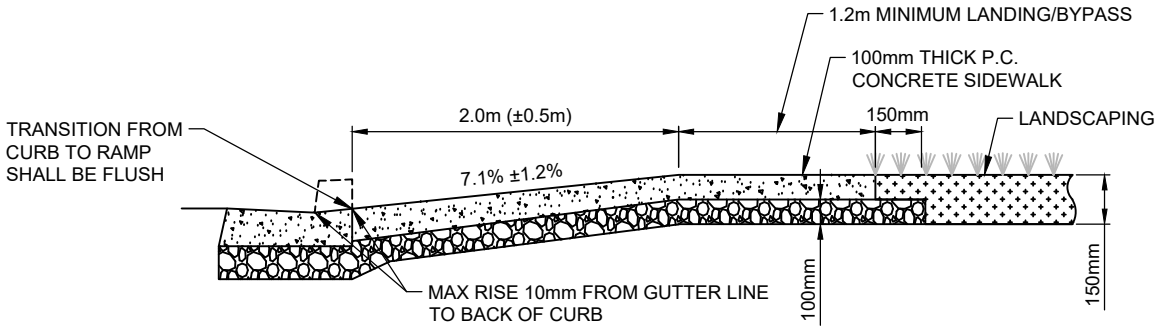
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

CURB RAMPS
TYPE S - SEPARATED

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-13





SECTION A-A

NOTES:

1. PEDESTRIAN SIDEWALK RAMP AND CURB RETURN AS PER DESIGN BY PROFESSIONAL OF RECORD.
2. TOOLED LINES ARE CENTERED IN THE CROSSWALK AND POINT IN DIRECTION OF THE RECEIVING CURB RAMP.
3. INTERCEPT DRAINAGE UPSTREAM OF CROSSWALK. CATCH BASINS ARE NOT PERMITTED IN CROSSWALK.
4. ALL TWSIs TO BE DESIGNED AND INSTALLED AS PER SECTION 8.0.
5. POLE LOCATIONS ARE DIAGRAPHIC. PEDESTRIAN SIGNALS AS PER SECTION 10.0. EXACT LOCATIONS TO BE DETERMINED BY PROFESSIONAL OF RECORD.
6. CONCRETE AS PER SECTION 11.0.
7. LANDSCAPING AS PER SECTION 14.0.

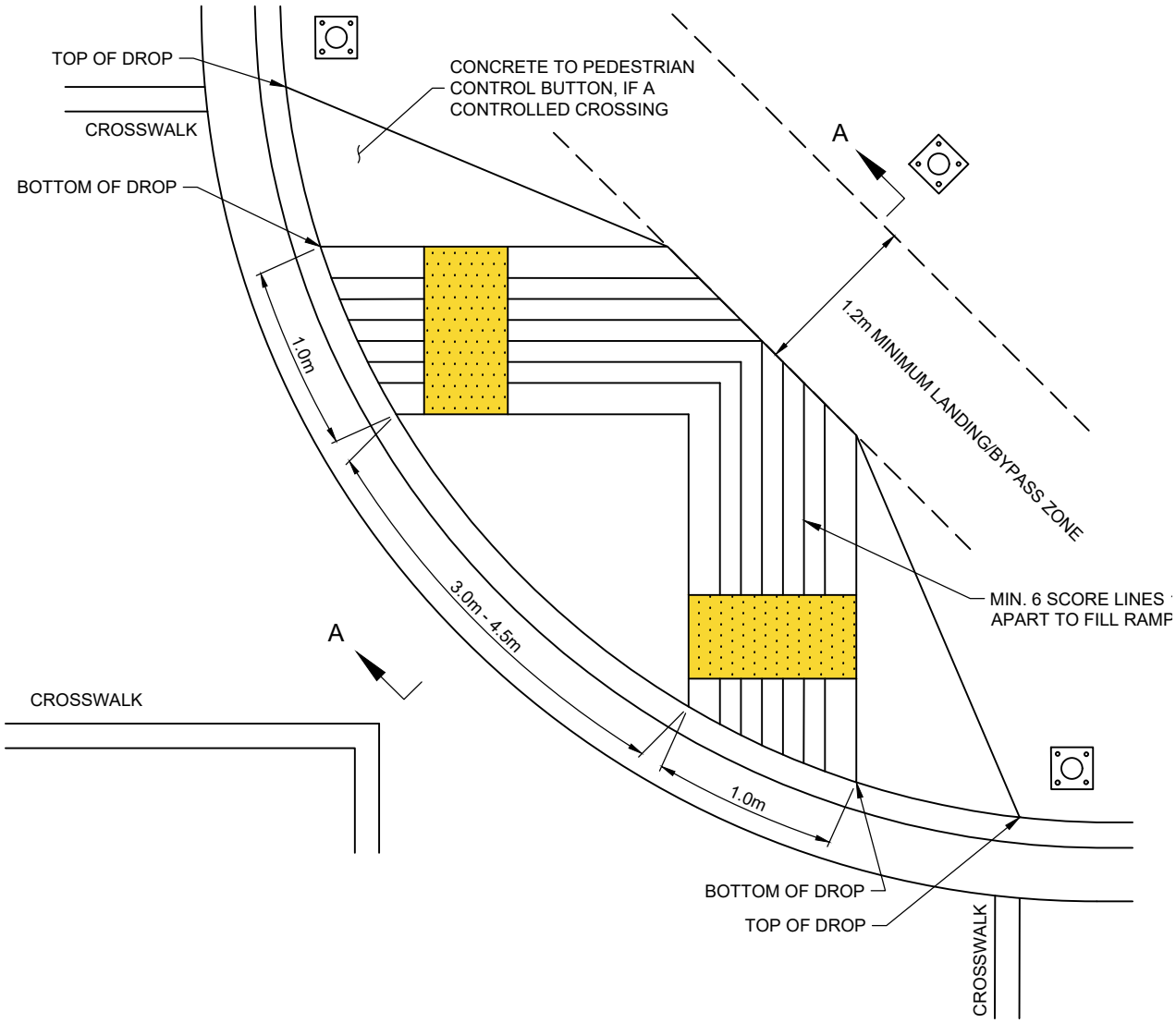
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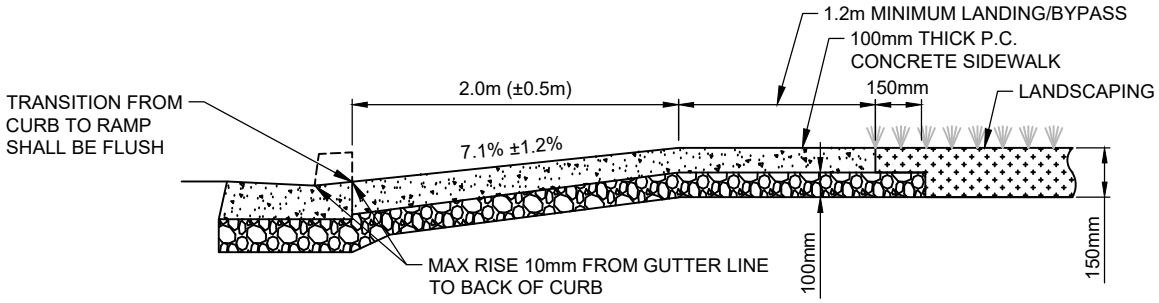
CITY OF NANAIMO
THE HARBOUR CITY

CURB RAMPS
TYPE C - CONSTRAINED (PREFERRED)

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-14

6.22.2026





SECTION A-A

NOTES:

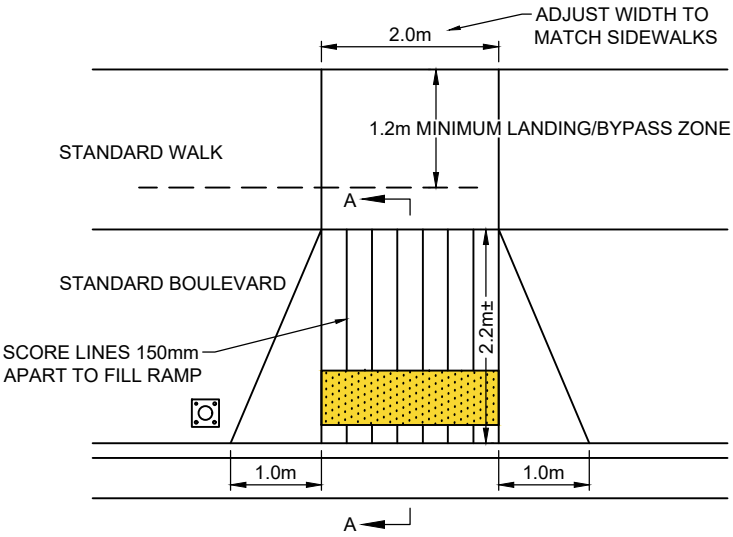
1. PEDESTRIAN SIDEWALK RAMP AND CURB RETURN AS PER DESIGN BY PROFESSIONAL OF RECORD.
2. TOOLED LINES ARE CENTERED IN THE CROSSWALK AND POINT IN DIRECTION OF THE RECEIVING CURB RAMP.
3. INTERCEPT DRAINAGE UPSTREAM OF CROSSWALK. CATCH BASINS ARE NOT PERMITTED IN CROSSWALK.
4. ALL TWSIs TO BE DESIGNED AND INSTALLED AS PER SECTION 8.0.
5. POLE LOCATIONS ARE DIAGRAPHIC. PEDESTRIAN SIGNALS AS PER SECTION 10.0. EXACT LOCATIONS TO BE DETERMINED BY PROFESSIONAL OF RECORD.
6. CONCRETE AS PER SECTION 11.0.
7. LANDSCAPING AS PER SECTION 14.0.

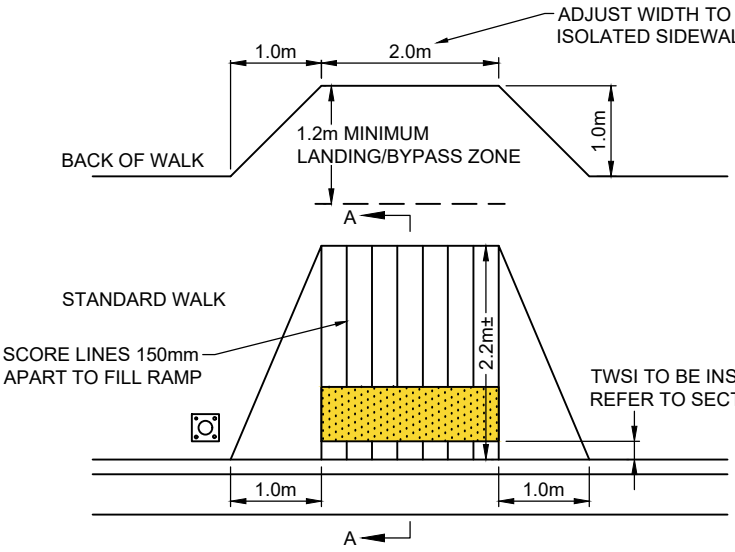
CITY OF NANAIMO
THE HARBOUR CITY

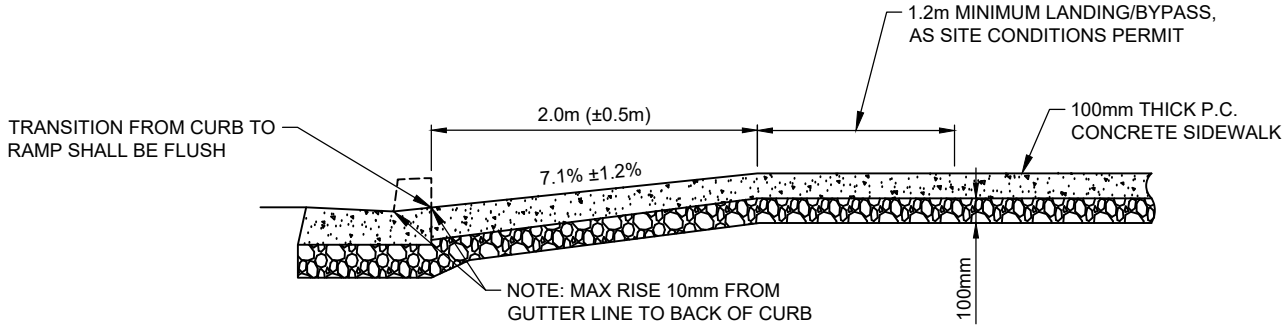
CURB RAMPS
TYPE C - CONSTRAINED

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-15

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6.22.2026







SECTION A-A

NOTES:

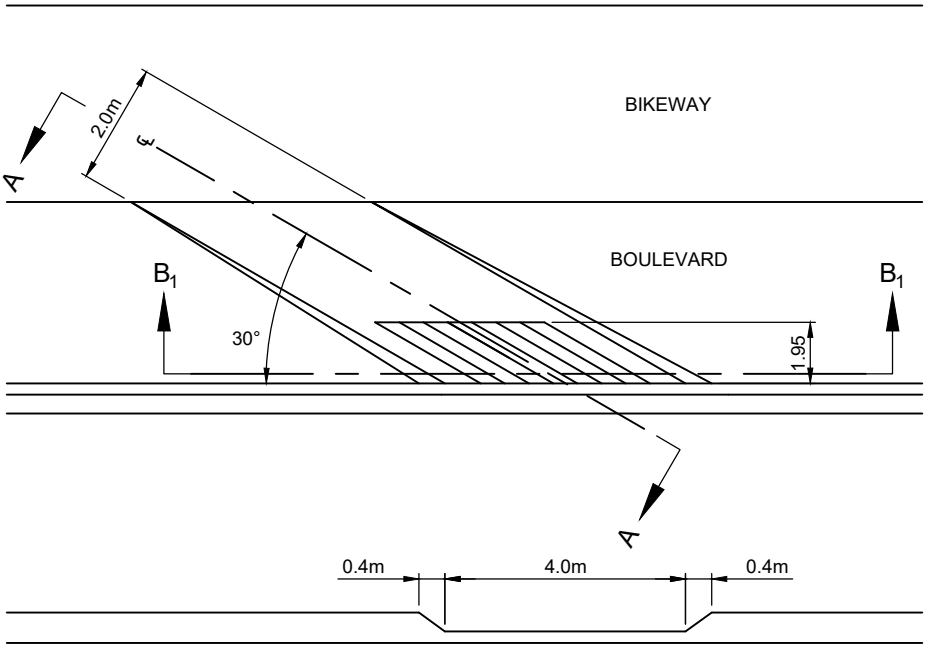
1. PEDESTRIAN SIDEWALK RAMP DIMENSIONS AS PER DESIGN BY PROFESSIONAL OF RECORD.
2. TOOLED LINES ARE CENTERED IN THE CROSSWALK AND POINT IN DIRECTION OF THE RECEIVING CURB RAMP.
3. INTERCEPT DRAINAGE UPSTREAM OF CROSSWALK. CATCH BASINS ARE NOT PERMITTED IN CROSSWALK.
4. ALL TWSIs TO BE DESIGNED AND INSTALLED AS PER SECTION 8.0.
5. POLE LOCATIONS ARE DIAGRAPHIC. PEDESTRIAN SIGNALS AS PER SECTION 10.0. EXACT LOCATIONS TO BE DETERMINED BY PROFESSIONAL OF RECORD.

CITY OF NANAIMO
THE HARBOUR CITY

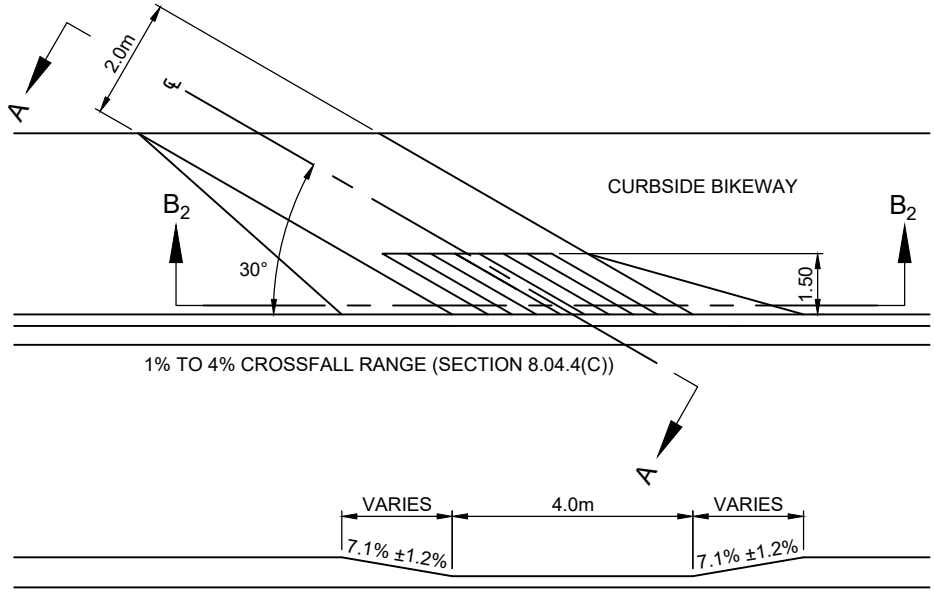
CURB RAMPS
TYPE M - MIDBLOCK

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-16

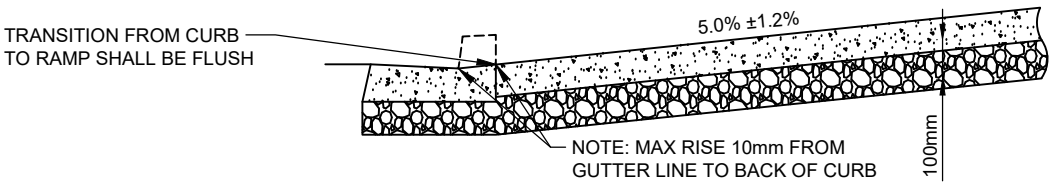
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6.22.2026



SECTION B_1-B_1



SECTION B_2-B_2



SECTION A-A

NOTES:

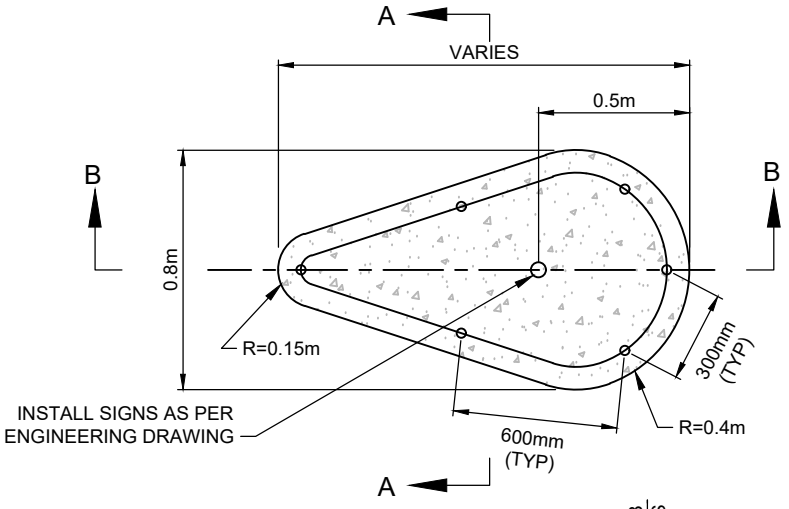
1. BIKEWAY SLIP RAMP DIMENSIONS SHALL BE DETERMINED BY THE PROFESSIONAL OF RECORD.
2. INTERCEPT DRAINAGE UPSTREAM OF CROSSWALK. CATCH BASINS ARE NOT PERMITTED IN CROSSWALK.

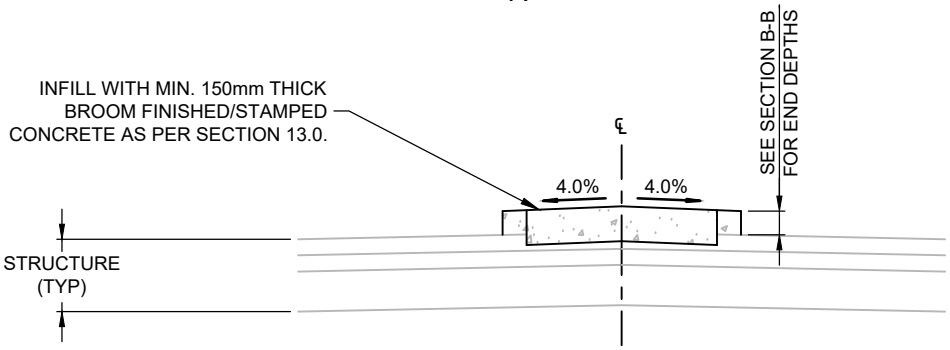
CITY OF NANAIMO
THE HARBOUR CITY

CURB RAMPS
TYPE B - BIKEWAY

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-17

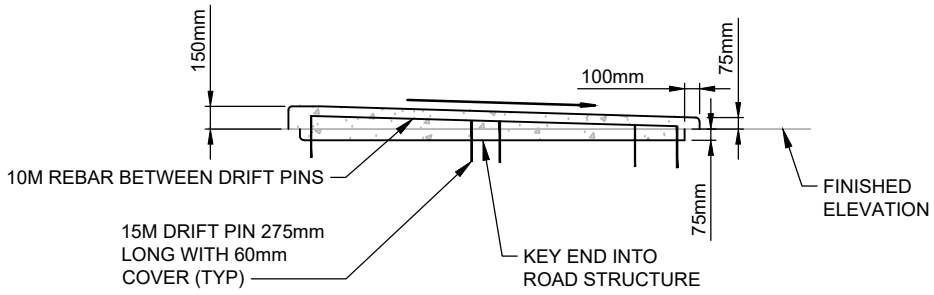
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4.10.2026





SECTION A-A

SPLITTER ISLAND DETAILS



SECTION B-B

SPLITTER ISLAND END TREATMENT DETAILS

NOTES:

1. CONCRETE AND REINFORCEMENT REQUIREMENTS AS PER SECTION 11.0.
2. CONCRETE SURFACE TREATMENT AS PER SECTION 13.0.
3. PAVED ROADWAY SURFACE PER SECTION 9.0 BASED ON STREET CLASSIFICATION. IN EXISTING CONDITIONS, THE DEPTHS NEED TO BE VERIFIED.
4. LENGTH MAY VARY DEPENDING ON LANE WIDTH, LANE ALIGNMENT AND OPERATING SPEEDS. TYPICALLY, THE TAPER LENGTH IS BETWEEN 10:1 TO 15:1.
5. THIS STANDARD MAY BE USED IN THE ROADWAY FOR TRAFFIC CALMING PURPOSE AT DIRECTIONS OF CITY ENGINEER. REFER TO ENGINEERING DRAWING FOR DIMENSIONS AND SITE SITE-SPECIFIC INSTALLATIONS.

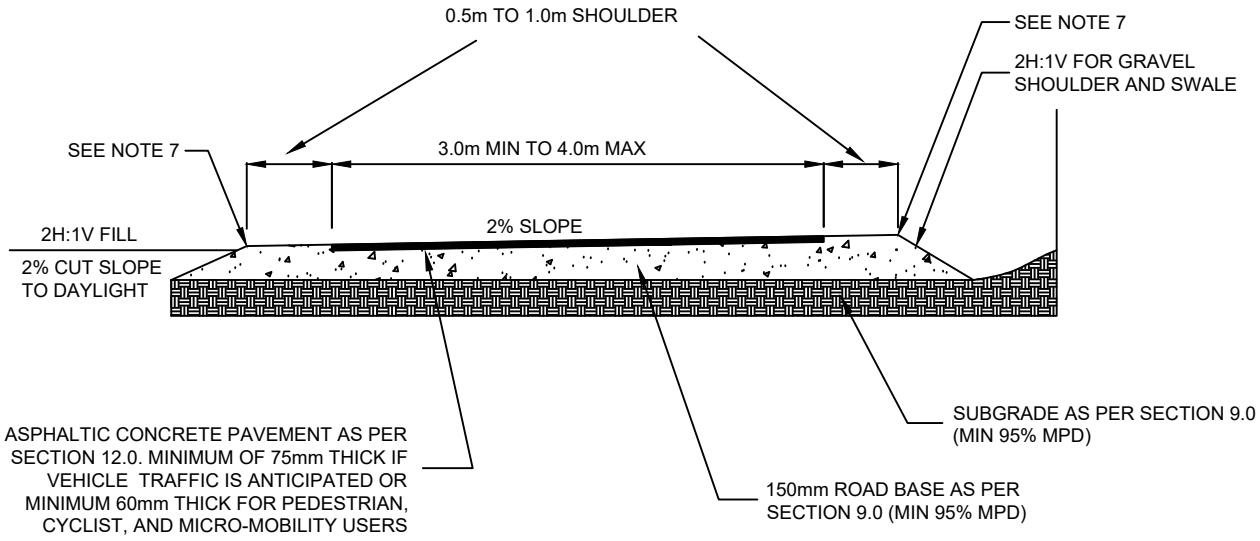
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CITY OF NANAIMO
THE HARBOUR CITY

TRAILS AND MULTI-USE PATHS
SPLITTER ISLAND

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-20

6.22.2026



NOTES:

1. VEGETATION CLEARANCE IS A MINIMUM VERTICAL CLEARANCE OF 3.0m AND A MINIMUM 1.0m HORIZONTAL CLEARANCE.
2. MAXIMUM LONGITUDINAL GRADES:
   - 3% SUSTAINED GRADE
   - 5% GRADE FOR DISTANCES 30m OR LESS
   - 10% GRADE FOR DISTANCES 15m OR LESS
   - STAIRS PERMITTED ONLY WITH APPROVAL FROM CITY ENGINEER.
3. MINIMIZE HORIZONTAL CURVES AND ENSURE ADEQUATE SITE LINES ON CORNERS FOR CYCLIST.
4. RESIDENTIAL BUFFER IS A MINIMUM OF 2.0m.
5. LIGHTING AS PER SECTION 10.0. LIGHTING REQUIREMENTS ARE TO BE DETERMINED BY A PROFESSIONAL OF RECORD.
6. HANDRAILS OR FENCING MAY BE NEEDED AS PER SECTION 8.0.
7. STORMWATER REVIEW MAYBE REQUESTED TO VERIFY CONVEYANCE AND COLLECTION OF RUNOFF. DESIGN AS PER SECTION 7.0.

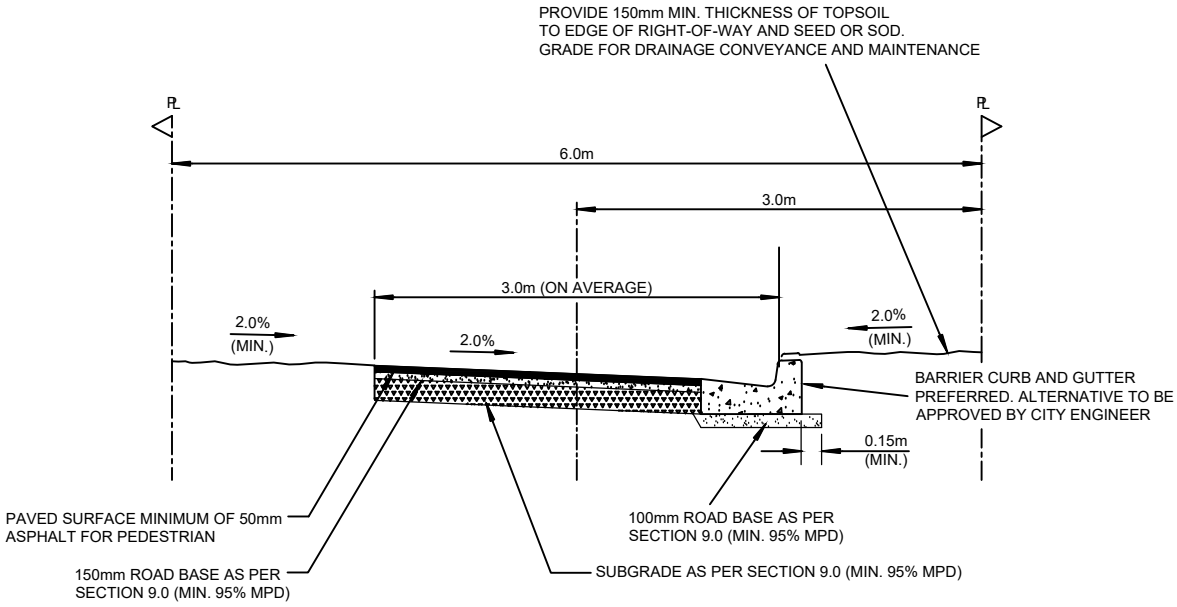
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CITY OF NANAIMO
THE HARBOUR CITY

TRAILS AND MULTI-USE PATHS
HARD SURFACE

Scale:	NTS
Created:	JUN 2012
Rev Date:	JUNE 2026
Dwg No:	CS-21

4.15.2026



NOTES:

1. WALKWAY SURFACE TREATMENT - TO MATCH PARK AND NEARBY TRAILS. TYPICALLY ASPHALT PAVED SURFACE.
2. WALKWAY SURFACE WIDTH IS 3.0m ON AVERAGE IN 6.0m RIGHT-OF-WAY.
3. WALKWAY SURFACE CROSS SLOPE OF 2%.
4. BARRIER CURB IS PREFERRED. THE OPTION FOR 2:1 CUT/FILL SLOPE FOR GRAVEL SHOULDERS AND SWALE, IS TO BE APPROVED BY CITY ENGINEER.
5. SHOULDERS/CLEAR ZONES IS A MINIMUM 0.5m WIDE TO A MAXIMUM 0.75m WIDE WITH LANDSCAPE OR BUFFER ZONE OF 1.25m.
6. VEGETATION CLEARANCE IS A MINIMUM VERTICAL CLEARANCE OF 2.5m AND A MINIMUM 0.5m HORIZONTAL CLEARANCE.
7. MAXIMUM LONGITUDINAL GRADES:
   a) 3% SUSTAINED GRADE.
   b) 5% GRADE FOR DISTANCES 30m OR LESS.
   c) 10% GRADE FOR DISTANCE 15m OR LESS.
8. ENSURE ADEQUATE SITE LINES ON CORNERS.
9. RESIDENTIAL BUFFER IS THE 1.25m LANDSCAPE/BUFFER ZONE.
10. CONCRETE AS PER SECTION 11.0.
11. LANDSCAPING AS PER SECTION 14.0.
12. ASPHALT CONCRETE PAVEMENT AS PER SECTION 12.0.
13. BARRIER CURB AND GUTTER AS PER STANDARD DRAWING CS-1.
14. HANDRAILS OR FENCING MAY BE NEEDED AS PER SECTION 8.0.
15. STORMWATER REVIEW MAYBE REQUESTED TO VERIFY CONVEYANCE AND COLLECTION OF RUNOFF. CATCH BASIN MAY BE REQUIRED.

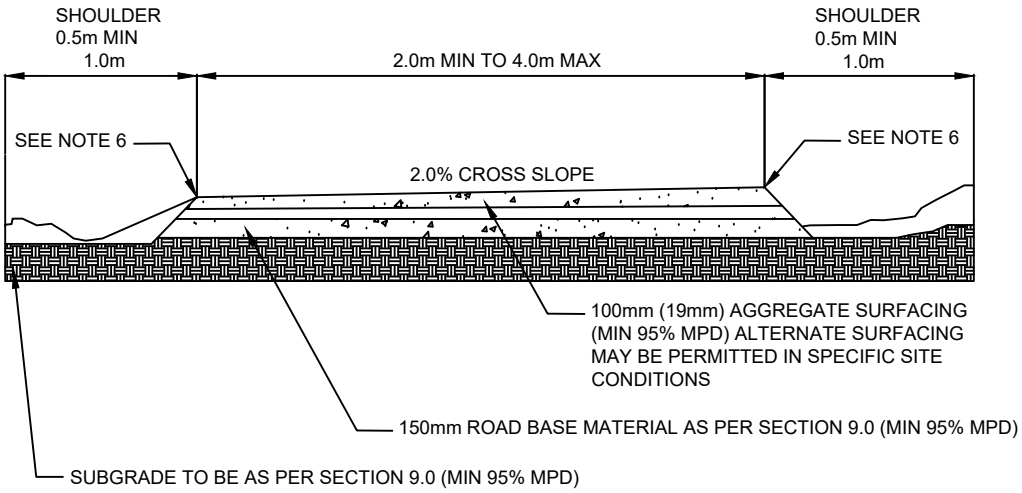
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4.23.2026

CITY OF NANAIMO
THE HARBOUR CITY

TRAILS AND MULTI-USE PATHS
PEDESTRIAN PATHWAY

Scale:	NTS
Created:	APR 2012
Rev Date:	JUNE 2026
Dwg No:	CS-21A



NOTES:

1. VEGETATION CLEARANCE SHALL BE A MINIMUM VERTICAL CLEARANCE OF 2.5m AND A MINIMUM 0.5m HORIZONTAL CLEARANCE.
2. MAXIMUM LONGITUDINAL GRADES:
   - 3% SUSTAINED GRADE
   - 5% GRADE FOR DISTANCES 30m OR LESS
   - 10% GRADE FOR DISTANCES 15m OR LESS
   - SOME STAIRS ALLOWED
3. ENSURE ADEQUATE SITE LINES ON CORNERS FOR CYCLIST.
4. RESIDENTIAL BUFFER IS A MINIMUM OF 2.0m.
5. LIGHTING AS PER SECTION 10.0 LIGHTING REQUIREMENTS ARE TO BE DETERMINED BY A PROFESSIONAL OF RECORD.
6. HANDRAILS OR FENCING MAY BE NEEDED AS PER SECTION 8.0.
7. STORMWATER REVIEW MAYBE REQUESTED TO VERIFY CONVEYANCE AND COLLECTION OF RUNOFF. DESIGN AS PER SECTION 7.0.

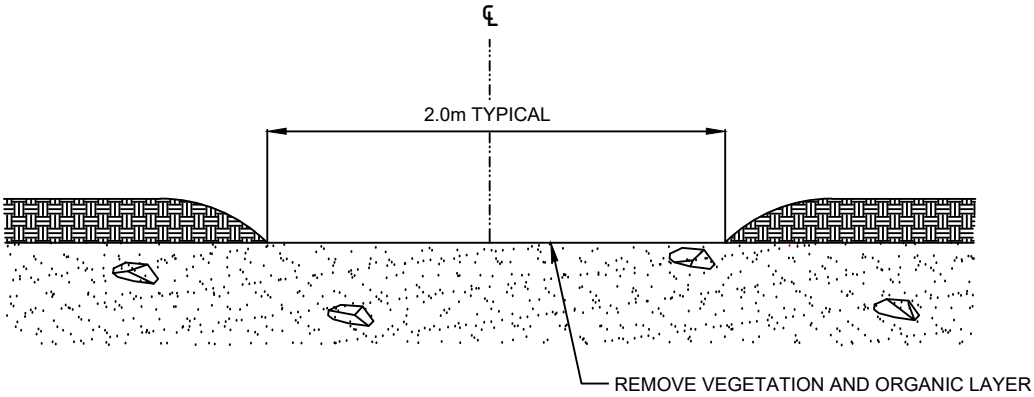
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4.15.2026

CITY OF NANAIMO
THE HARBOUR CITY

TRAILS AND MULTI-USE PATHS
SOFT SURFACE

Scale:	NTS
Created:	JUN 2012
Rev Date:	JUNE 2026
Dwg No:	CS-22



NOTES:

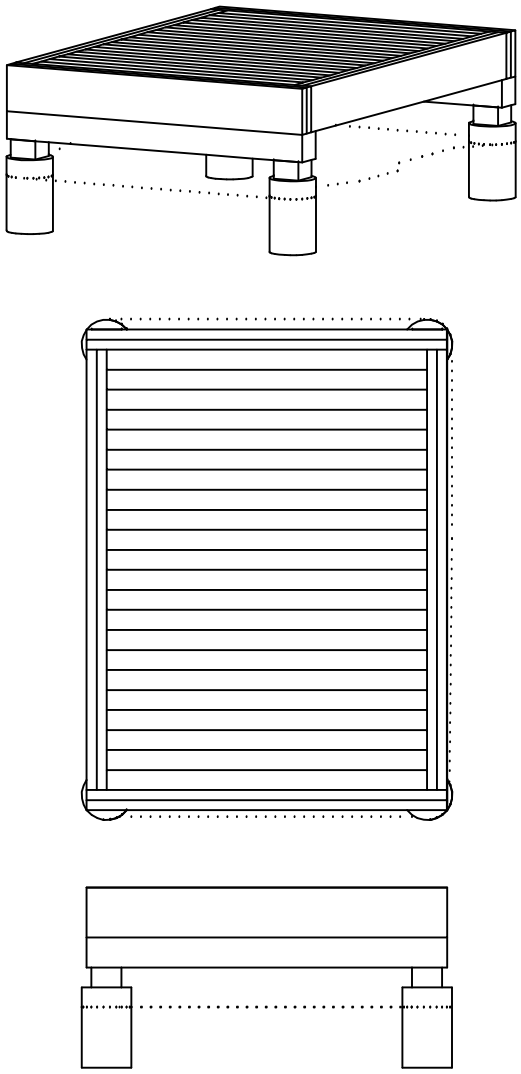
1. USE OF THE STANDARD IS SITE SPECIFIC AND REQUIRES APPROVAL BY THE CITY. IT IS A LOW IMPACT STANDARD FOR SPECIFIC LOCATIONS WHERE DIFFICULT TERRAIN AND/OR SENSITIVE FEATURES ARE PRESENT.
2. SURFACE IS NATIVE SOIL MIXED WITH CRUSH. MIX IS SITE SPECIFIC AND DESIGN MAY BE REQUESTED BY CITY ENGINEER.
3. VEGETATION CLEARANCE SHALL BE A MINIMUM VERTICAL CLEARANCE OF 2.5m AND A MINIMUM 0.5m HORIZONTAL CLEARANCE.
4. TRAIL LONGITUDINAL GRADES TO SUIT TERRAIN UP TO MAXIMUM 30% SLOPE. SOME STAIRS ALLOWED. BOARDWALK MAY BE REQUIRED IN SELECT AREAS.
5. ENSURE ADEQUATE SITE LINES ON CORNERS.
6. RESIDENTIAL BUFFER IS A MINIMUM OF 10.0m.
7. LIGHTING AS PER SECTION 10.0. LIGHTING REQUIREMENTS ARE TO BE DETERMINED BY A PROFESSIONAL OF RECORD.
8. HANDRAILS OR FENCING MAY BE NEEDED AS PER SECTION 8.0.
9. STORM WATER REVIEW MAYBE REQUESTED TO VERIFY CONVEYANCE AND COLLECTION OF RUNOFF. DESIGN AS PER SECTION 7.0.

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CITY OF NANAIMO
THE HARBOUR CITY

TRAILS AND MULTI-USE PATHS
NATURE

Scale:	NTS
Created:	MAY 2025
Rev Date:	JUNE 2026
Dwg No:	CS-22A



NOTES:

1. USE OF THE STANDARD IS SITE SPECIFIC AND REQUIRES APPROVAL BY THE CITY PARKS RECREATION AND CULTURE. IT IS A LOW IMPACT STANDARD FOR SPECIFIC LOCATIONS WHERE DIFFICULT TERRAIN AND/OR SENSITIVE FEATURES ARE PRESENT. STRUCTURE TO BE KEPT AS LOW TO THE GROUND AS POSSIBLE.
2. CONCRETE COLUMNS ARE 250 mm (10 in) DIAMETER EXTENDING 300 mm (12 in) INTO NATIVE GROUND, OR LEVELED AND SECURED PIER BLOCKS. GALVANIZED SADDLE EMBEDDED INTO CONCRETE AT BASE OF EACH POST OR SET INTO CONCRETE PIER BLOCKS.
3. POSTS ARE 150 x 150 mm (6 x 6 in) PRESSURE TREATED YELLOW CEDAR.
4. BEAMS ARE MINIMUM 150 x 150 mm (6 x 6 in) PRESSURE TREATED DIMENSION LUMBER. TYPICAL LENGTH IS 1800 mm (6 ft). LONGER SPANS MAY REQUIRE LARGER DIMENSIONAL LUMBER.
5. JOISTS ARE MINIMUM 50 x 200 mm (2 x 8 in) PRESSURE TREATED DIMENSION LUMBER. SPACED AT MINIMUM 400 mm (16 in) ON CENTER. TYPICAL LENGTH IS 2435mm (8 ft). LONGER SPANS MAY REQUIRE DIMENSIONAL LUMBER. CROSS BRACING MAYBE REQUIRED.
6. HEADERS ARE DOUBLE 50 mm x 250 mm (2 x 10 in) PRESSURE TREATED DIMENSION LUMBER.
7. DECKING IS PRESSURE TREATED DIMENSION LUMBER.
8. NO NAILS USE 75 mm (3 in) EXTERIOR SCREWS.
9. RAILINGS ARE REQUIRED WHEN ELEVATION DIFFERENCE FROM GROUND TO DECK HEIGHT ABOVE 0.6 m (2 ft).
10. FIBERGLASS OR METAL MATERIALS MAY BE CONSIDERED AS SUBSTITUTIONS IN CERTAIN LOCATIONS AND CONDITIONS.

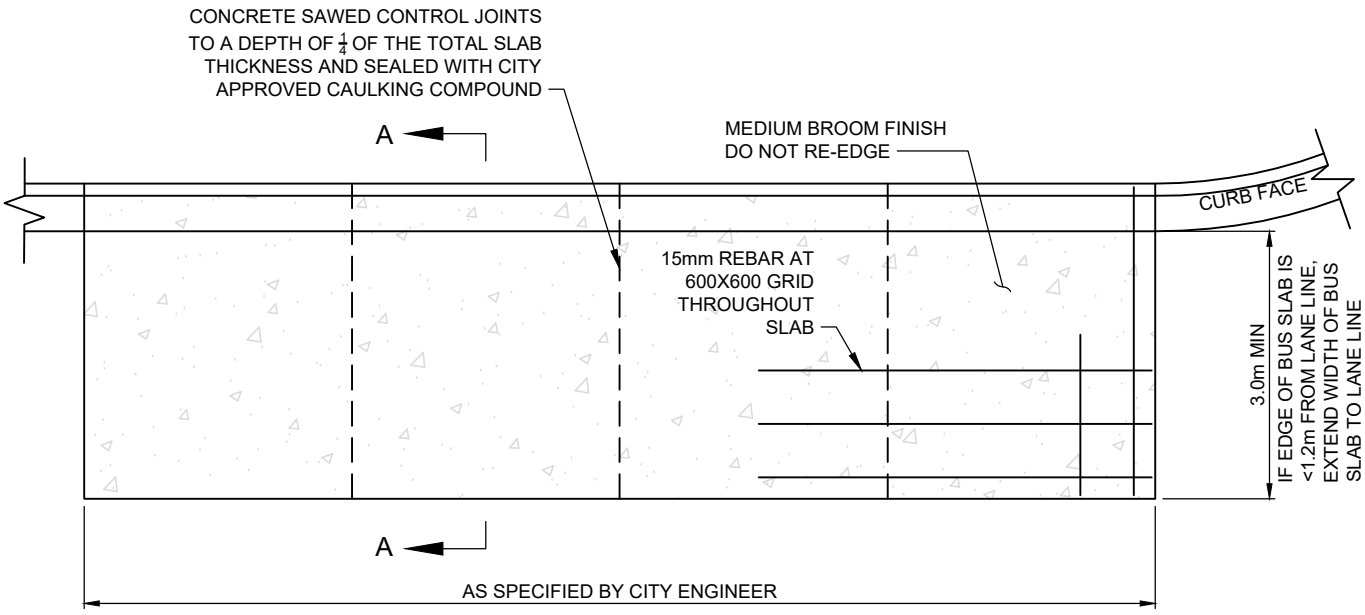
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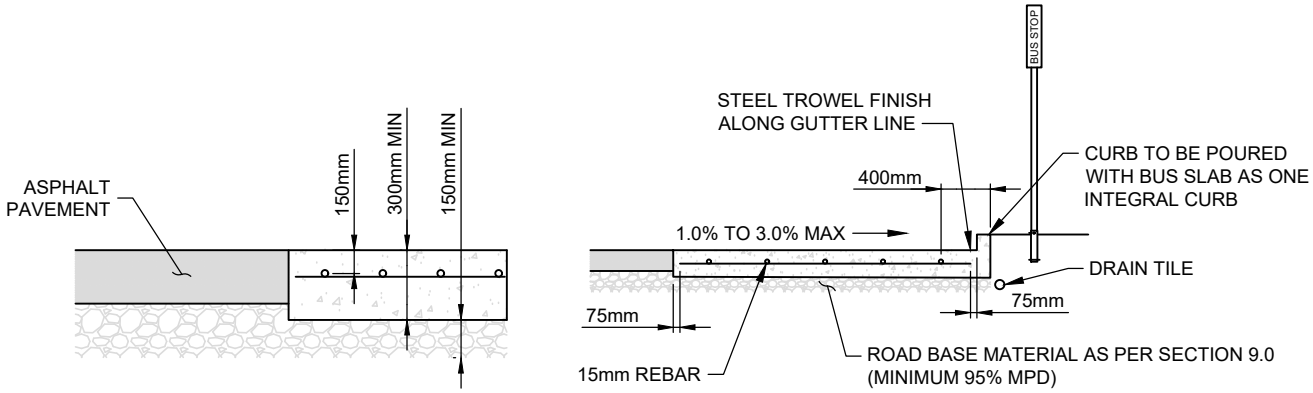
6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

TRAILS AND MULTI-USE PATHS
BOARDWALK

Scale:	NTS
Created:	MAY 2025
Rev Date:	JUNE 2026
Dwg No:	CS-22B





SECTION A-A

NOTES:

1. THE BUS SLAB SHOULD BE INSTALLED AS A CONTINUOUS POUR. IF THE BUS SLAB IS INSTALLED IN MORE THAN ONE, THEN THE EDGE OF THE POUR MUST BE KEYED OR REBAR INSERTS USED TO TIE BOTH PADS TOGETHER.
2. USE 15mm REBAR WITH MINIMUM 75mm COVER.
3. PLACE REBAR MAT AT 150mm BELOW TOP OF CONCRETE.
4. MILL AND RE-CONTOUR ASPHALT TO MATCH CONCRETE BUS SLAB CROSS FALL.

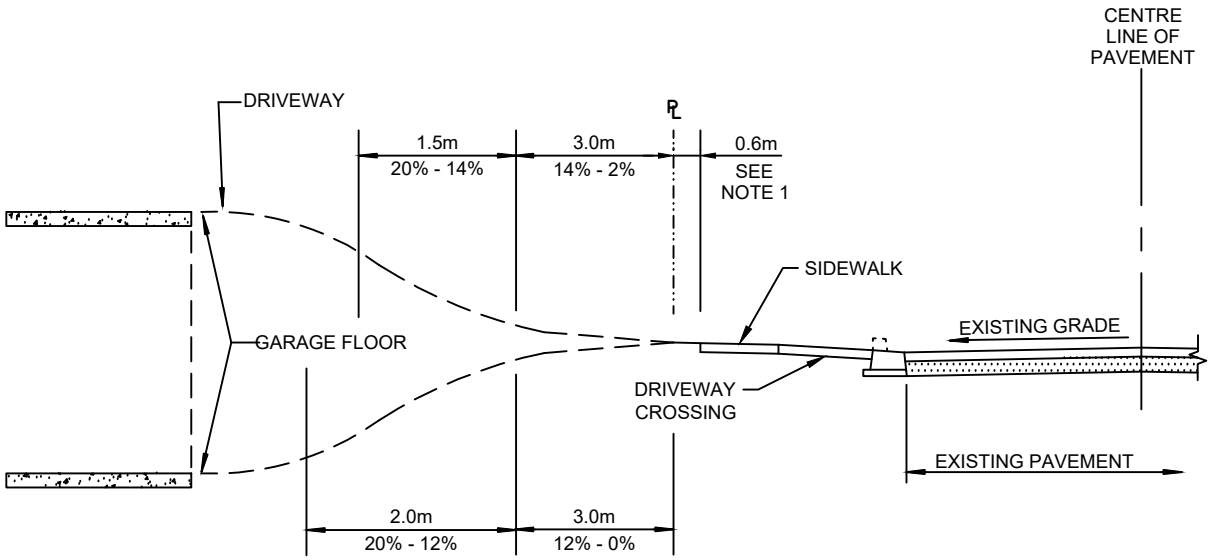
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6.22.2026

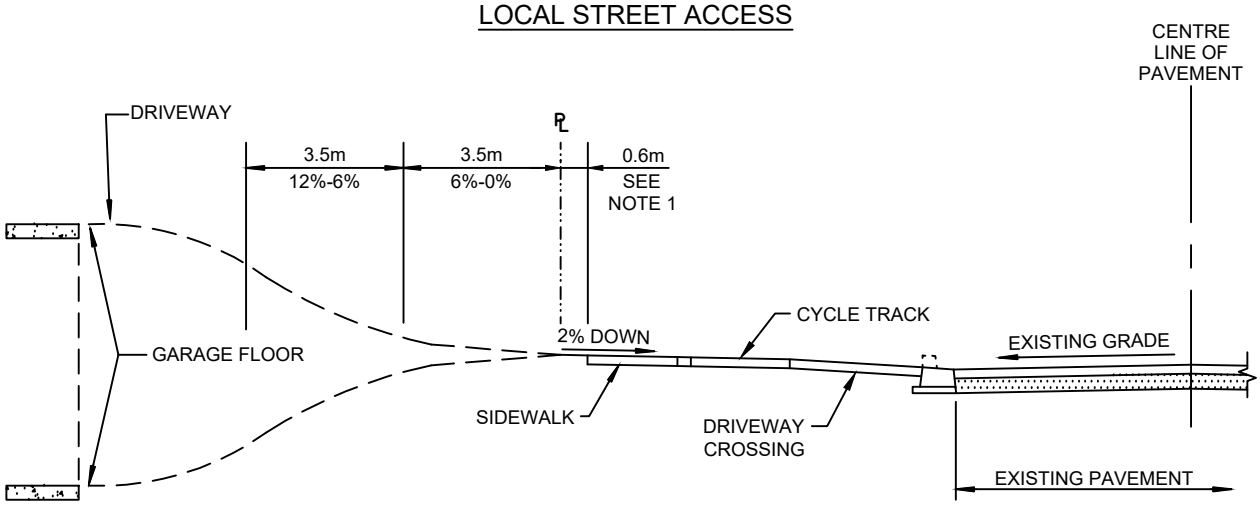
CITY OF NANAIMO
THE HARBOUR CITY

TRANSIT FACILITIES
REINFORCED BUS SLAB

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-23



LOCAL STREET ACCESS



COLLECTOR OR ARTERIAL STREET ACCESS

NOTES:

1. THE RISE OR FALL OF THE DRIVEWAY SHALL BEGIN BEHIND THE SIDEWALK TOWARDS THE PROPERTY.
2. SEE SECTION 8.04.4A FOR MAXIMUM SLOPES FOR DRIVEWAY EDGES AS PER SECTION 8.04.4A.
3. IN THE CASE OF SUBDIVISION WHERE A DRIVEWAY WILL PROVIDE ACCESS TO THREE OR MORE PARCELS, THE DRIVEWAY SHALL BE DESIGNED BY A PROFESSIONAL OF RECORD AS PER CITY OF NANAIMO GUIDELINES FOR THE APPROVAL, THE DESIGN AND THE CONSTRUCTION OF PRIVATELY OWNED COMMON ACCESS DRIVEWAYS.
4. PROPERTIES FRONTING ON COLLECTOR OR ARTERIAL STREETS SHOULD PROVIDE ACCESS ON THE LOWEST CLASSIFICATION OF STREET AVAILABLE.

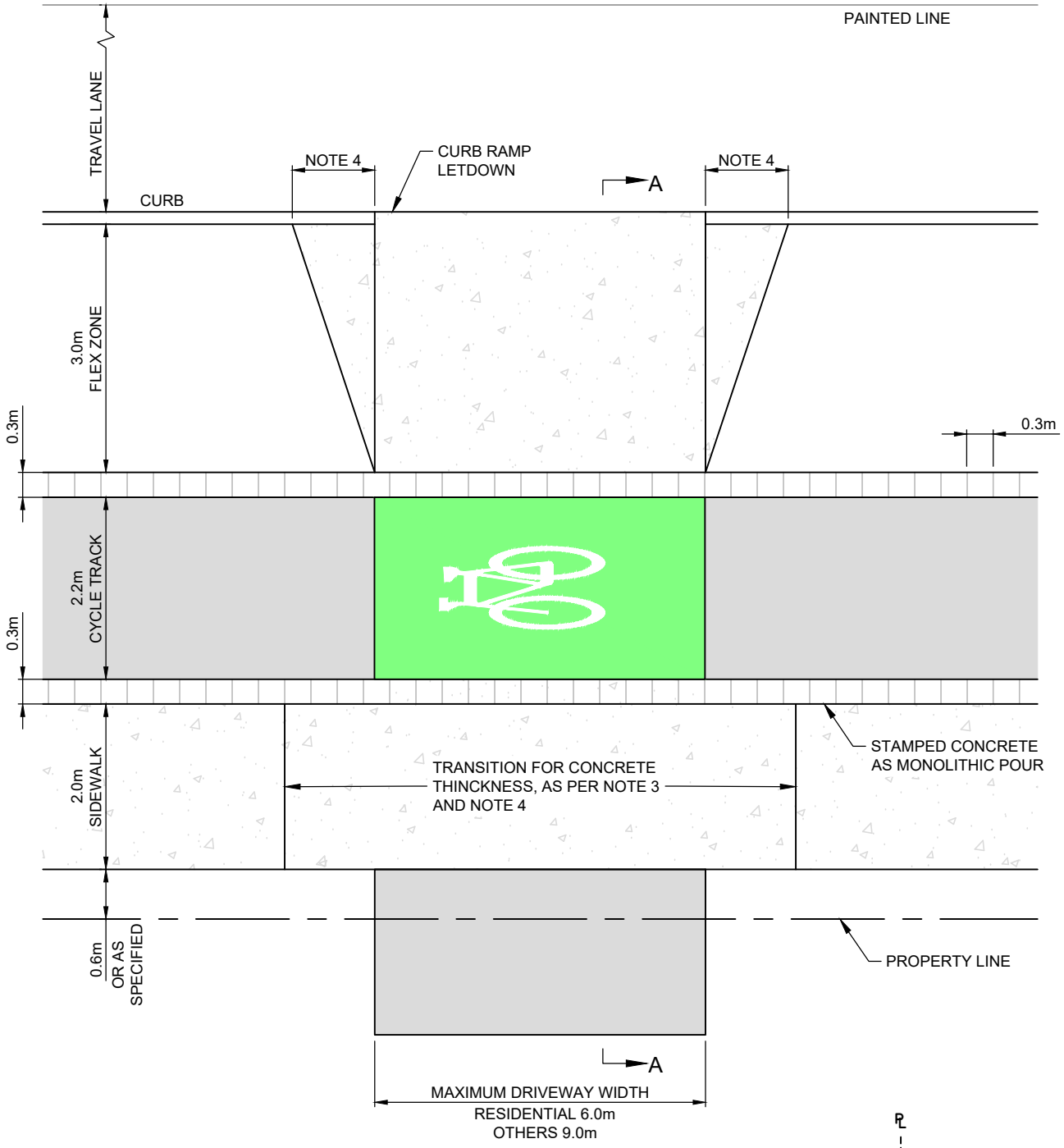
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CITY OF NANAIMO
THE HARBOUR CITY

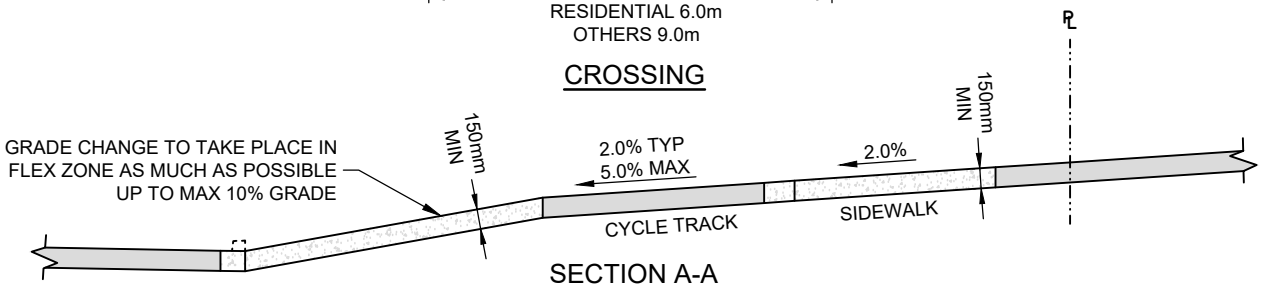
DRIVEWAYS AND CROSSINGS
GRADES

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	CS-24

6.22.2026



CROSSING



SECTION A-A

NOTES:

1. USE OF TWSI's TO BE DETERMINED BY PROFESSIONAL OF RECORD.
2. CONCRETE FINISHING DETAILS AS PER STANDARD DRAWING CS-8.
3. CONCRETE SURFACES TO BE A MINIMUM THICKNESS OF 100mm AND 150mm WHERE VEHICLE TRAFFIC IS ANTICIPATED.
4. FLARE WIDTH IS TYPICALLY 1m AND INCREASED TO 2m WHEN FLEX ZONE IS LESS THAN 1m.

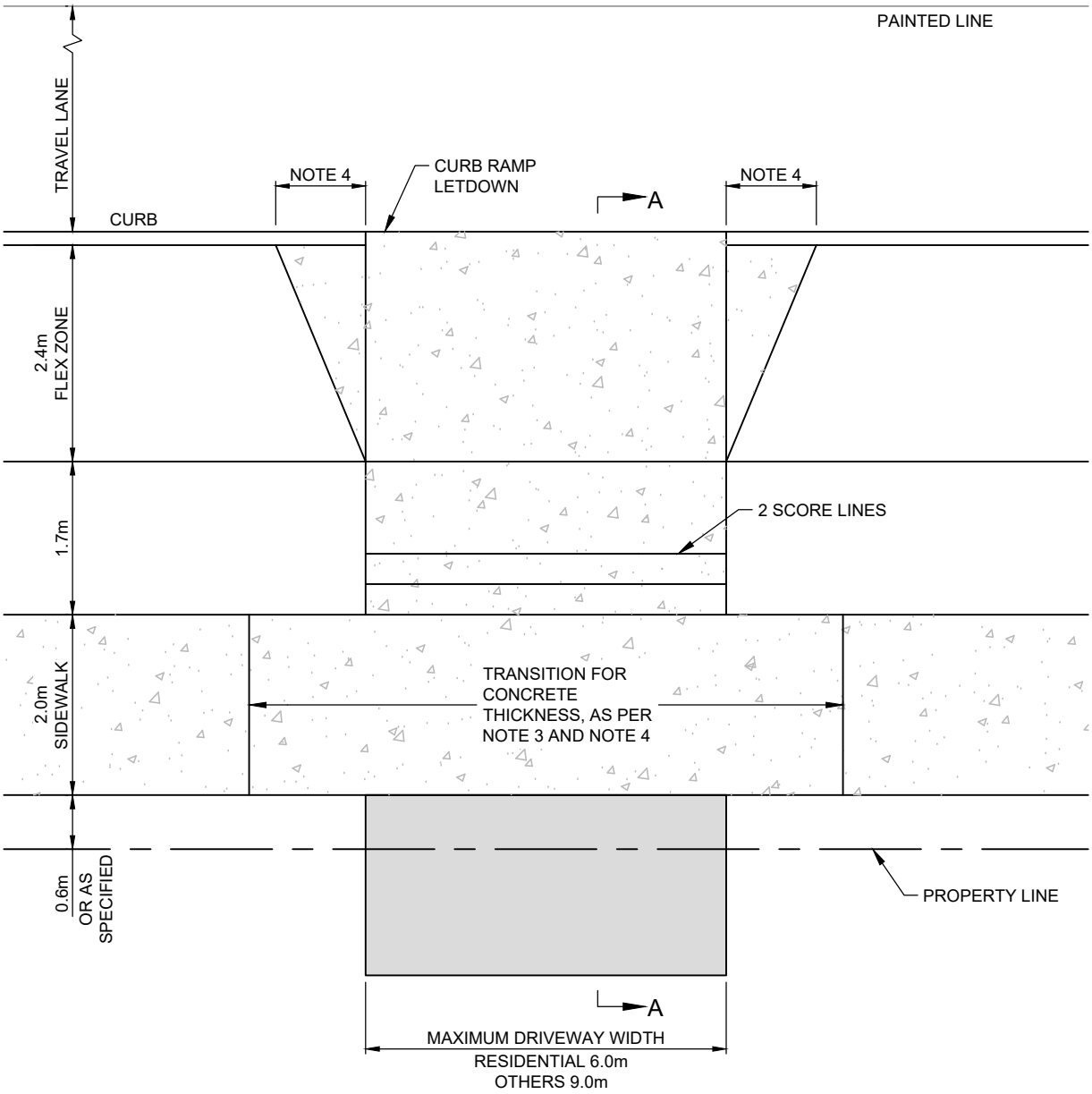
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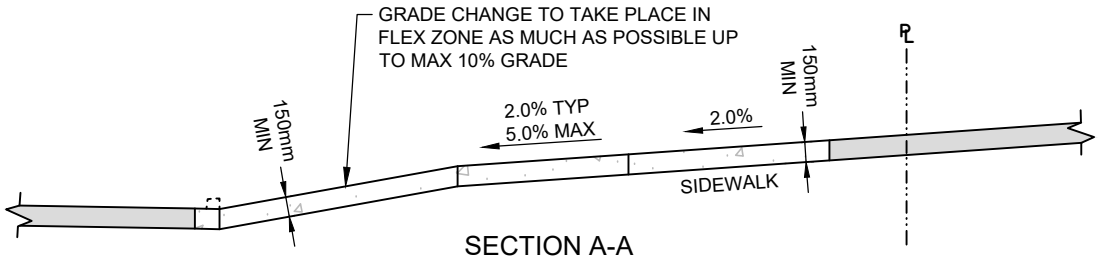
CITY OF NANAIMO
THE HARBOUR CITY

DRIVEWAYS AND CROSSINGS
TYPICAL URBAN COLLECTOR

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-25



CROSSING



SECTION A-A

NOTES:

1. USE OF TWSI's TO BE DETERMINED BY PROFESSIONAL OF RECORD.
2. CONCRETE FINISHING DETAILS AS PER STANDARD DRAWING CS-8.
3. CONCRETE SURFACES TO BE A MINIMUM THICKNESS OF 100mm AND 150mm WHERE VEHICLE TRAFFIC IS ANTICIPATED.
4. FLARE WIDTH IS TYPICALLY 1m AND INCREASED TO 2m WHEN FLEX ZONE IS LESS THAN 1m.

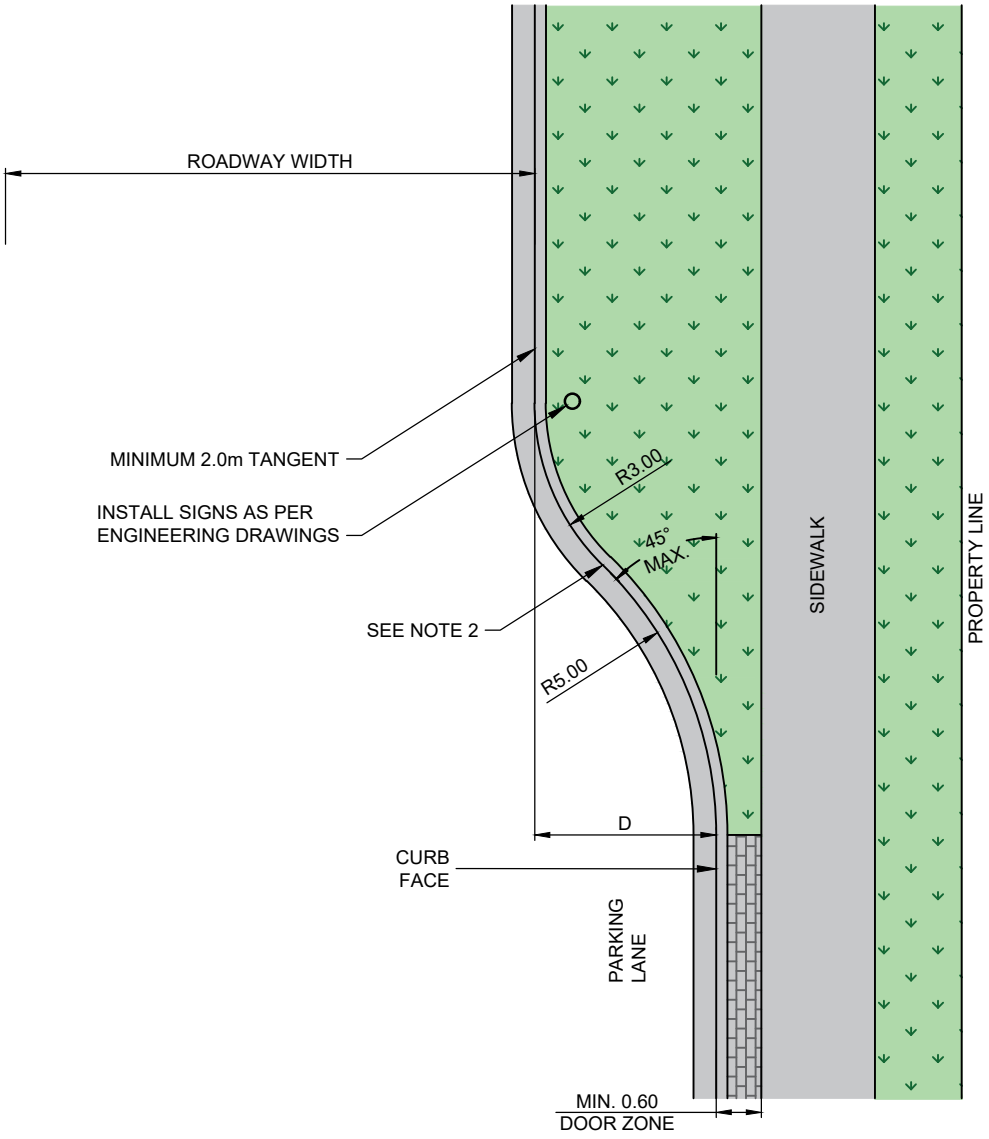
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

DRIVEWAYS AND CROSSINGS
TYPICAL URBAN LOCAL

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-26



NOTES:

1. "D"=DEPTH OF CURB EXTENSION SHOULD BE SIMILAR TO THE WIDTH OF THE PARKING LANE (TYPICALLY 2.4m RESIDENTIAL OR 3.0m INDUSTRIAL)
2. INCLUDE A TANGENT AT 45° TO THE CURB FACE BETWEEN RADII WHERE "D" IS GREATER THAN 2.4m.
3. BANDING, BUFFERS, OR POCKET PARKING DOOR ZONES TO USE COLOURED AND/OR STAMPED CONCRETE PER SECTION 13.0
4. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.

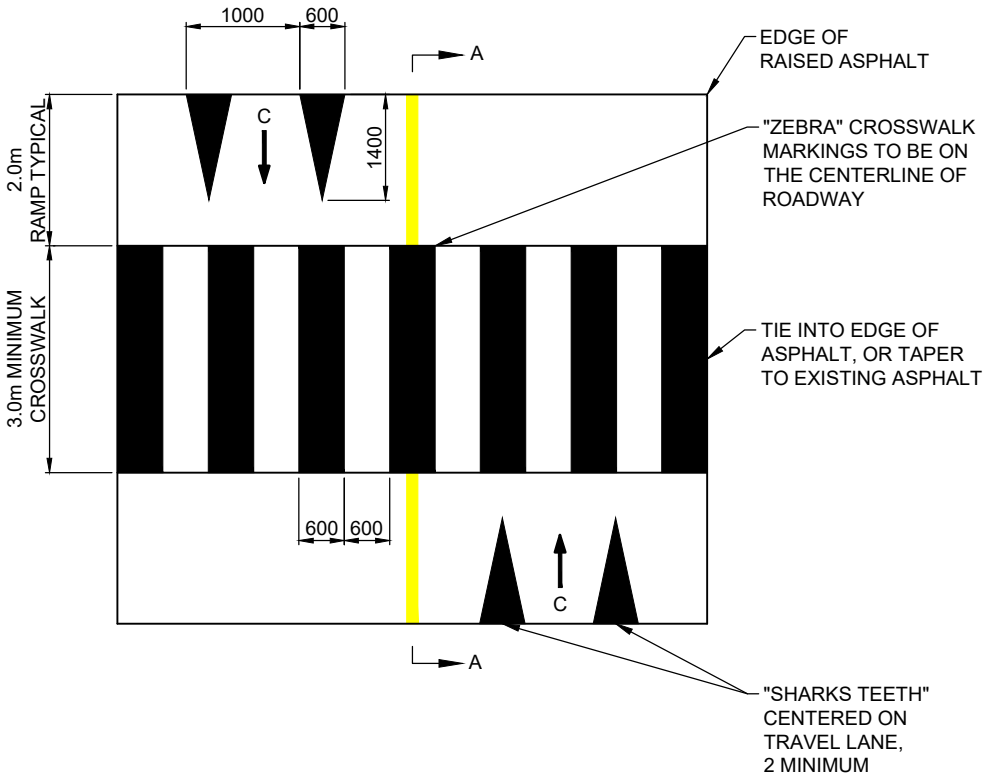
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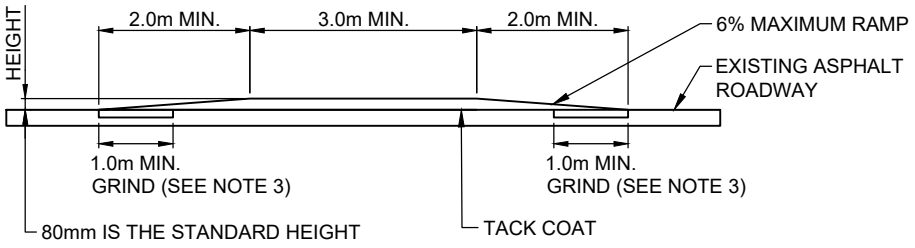
4.24.2026

CITY OF NANAIMO
THE HARBOUR CITY

DRIVEWAYS AND CROSSINGS
CURB EXTENSION

Scale:	NTS
Created:	APR 2012
Rev Date:	JUNE 2026
Dwg No:	CS-27





SECTION A-A

NOTE:

1. ASPHALTIC CONCRETE PAVEMENT AS PER SECTION 12.0.
2. PAVEMENT MARKINGS AS PER SECTION 8.0. ALL PAVEMENT MARKINGS ARE THERMOPLASTIC AS PER SECTION 8.0.
3. GRIND ASPHALT 40mm IF EXISTING ASPHALT THICKNESS IS 75mm OR GREATER, OTHERWISE SAW-CUT AND REMOVE EXISTING ASPHALT. GRIND FULL WIDTH OF ROADWAY.
4. WHERE SIDEWALKS DON'T EXIST, TAPER CROSSWALK ENDS TO WALKWAY GRADE AT MAX. 5% SLOPE.
5. STORMWATER REVIEW MAYBE REQUESTED TO VERIFY CONVEYANCE AND COLLECTION OF RUNOFF. CATCH BASINS MAY BE REQUIRED.

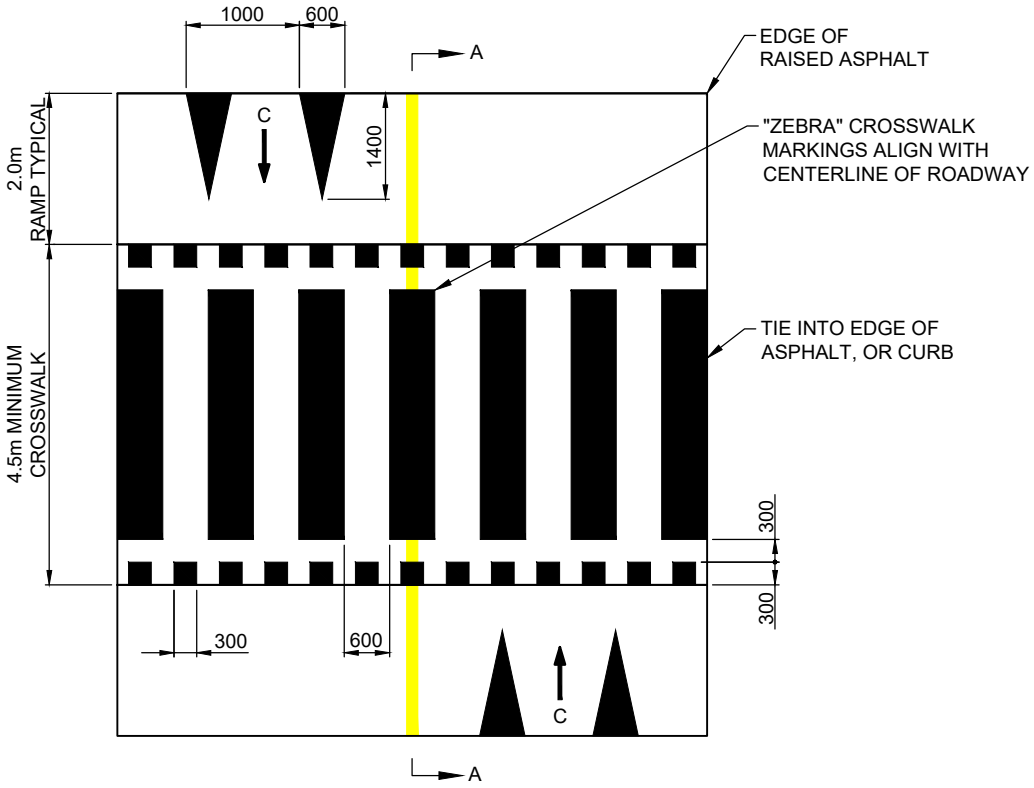
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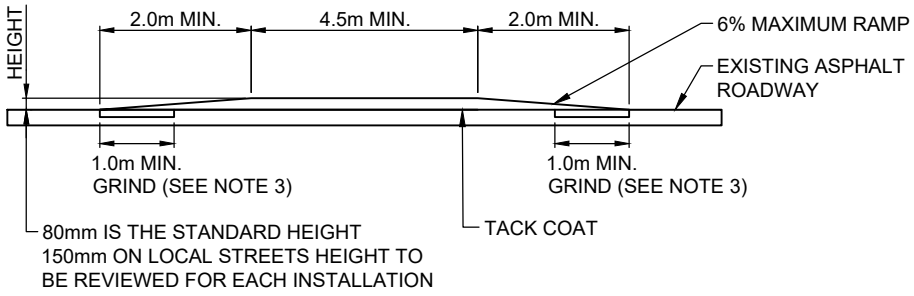
6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

DRIVEWAYS AND CROSSINGS RAISED
ASPHALT CROSSWALK PEDESTRIANS

Scale:	NTS
Created:	NOV 2023
Rev Date:	JUNE 2026
Dwg No:	CS-28A





SECTION A-A

NOTE:

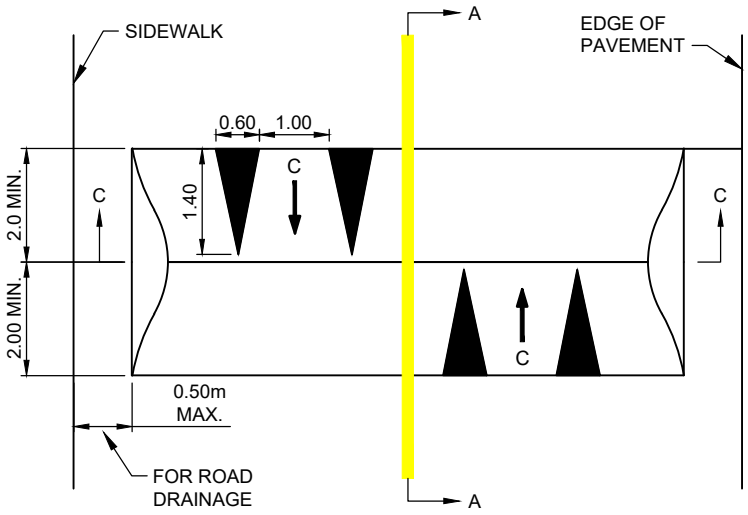
1. ASPHALTIC CONCRETE PAVEMENT AS PER SECTION 12.0.
2. PAVEMENT MARKINGS AS PER SECTION 8.0. ALL PAVEMENT MARKINGS ARE THERMOPLASTIC AS PER SECTION 8.0.
3. GRIND ASPHALT 40mm IF EXISTING ASPHALT THICKNESS IS 75mm OR GREATER, OTHERWISE SAW-CUT AND REMOVE EXISTING ASPHALT. GRIND FULL WIDTH OF ROADWAY.
4. WHERE SIDEWALKS DON'T EXIST, TAPER CROSSWALK ENDS TO WALKWAY GRADE AT MAX. 5% SLOPE.
5. STORMWATER REVIEW MAYBE REQUESTED TO VERIFY CONVEYANCE AND COLLECTION OF RUNOFF. CATCH BASINS MAY BE REQUIRED.

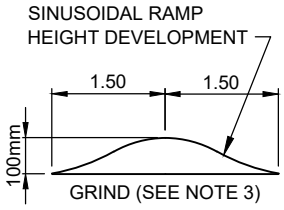
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CITY OF NANAIMO
THE HARBOUR CITY

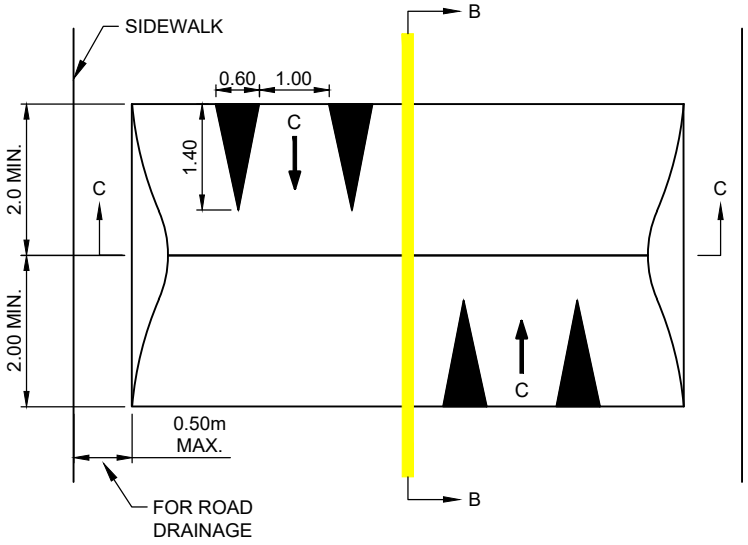
RAISED ASPHALT MULTI-USE CROSSWALK

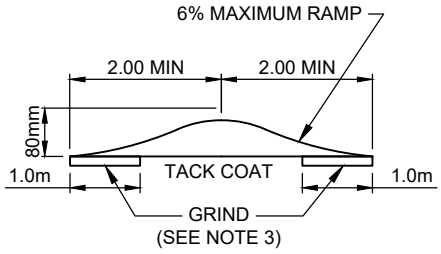
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Dwg No:	CS-28B



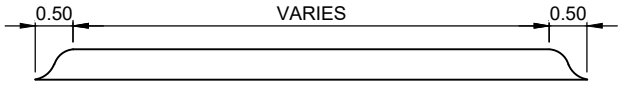


SECTION A-A





SECTION B-B



SECTION C-C

NOTES:

1. ASPHALT CONCRETE PAVEMENT AS PER SECTION 12.0.
2. PAVEMENT MARKINGS AS PER SECTION 8.0. ALL PAVEMENT MARKINGS ARE THERMOPLASTIC AS PER SECTION 8.0.
3. GRIND ASPHALT 40mm IF EXISTING ASPHALT THICKNESS IS 75mm OR GREATER, OTHERWISE SAW-CUT AND REMOVE EXISTING ASPHALT. GRIND FULL WIDTH OF ROADWAY.

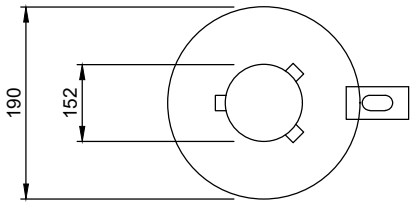
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CITY OF NANAIMO
THE HARBOUR CITY

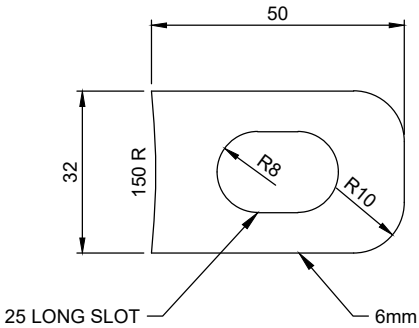
DRIVEWAYS AND CROSSINGS
SPEED HUMP AND SPEED BUMP DETAIL

Scale:	NTS
Created:	AUG 2022
Rev Date:	JUNE 2026
Dwg No:	CS-29

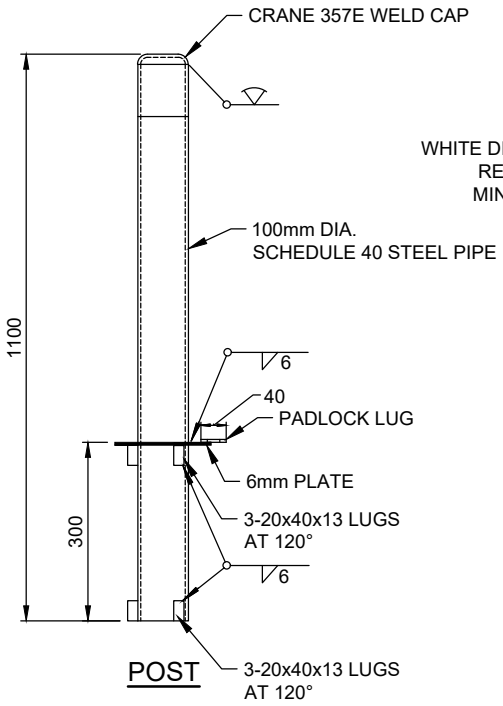
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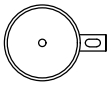
PLAN



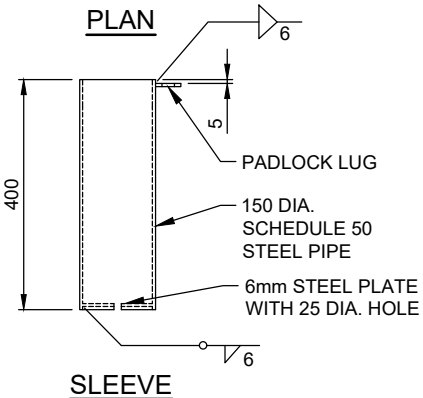
LUGS FOR PADLOCK



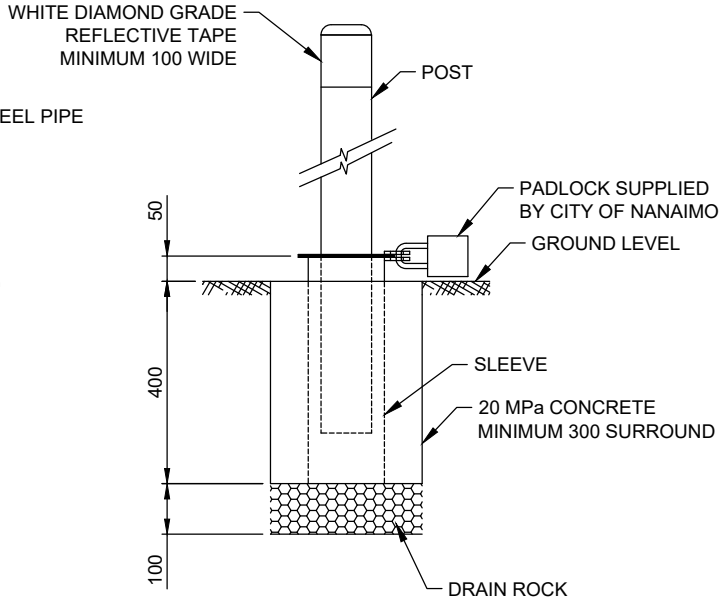
POST



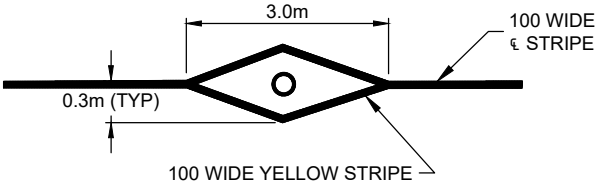
PLAN



SLEEVE



ASSEMBLY



CENTRE BARRIER POST

PAVEMENT MARKING

NOTES:

1. FOR USE ON MULTI-USE PATHWAYS, AND MULTI-USE TRAILS OR WHEN NECESSARY TO PREVENT VEHICLE ACCESS.
2. ALL STEEL TO BE BLACK POWDER COATED TO ASTM D7803.
3. PADLOCK TO BE INSTALLED IN THE DIRECTION OF THE TRAVEL AND NOT ON THE SIDE BLOCKING THE THROUGH ZONE.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

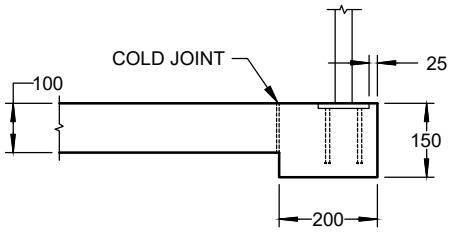
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6.22.2026

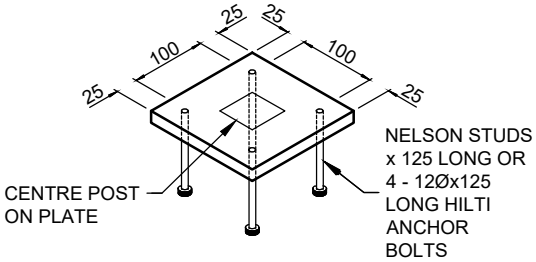
CITY OF NANAIMO
THE HARBOUR CITY

BOLLARDS
REMOVABLE BARRIER POST

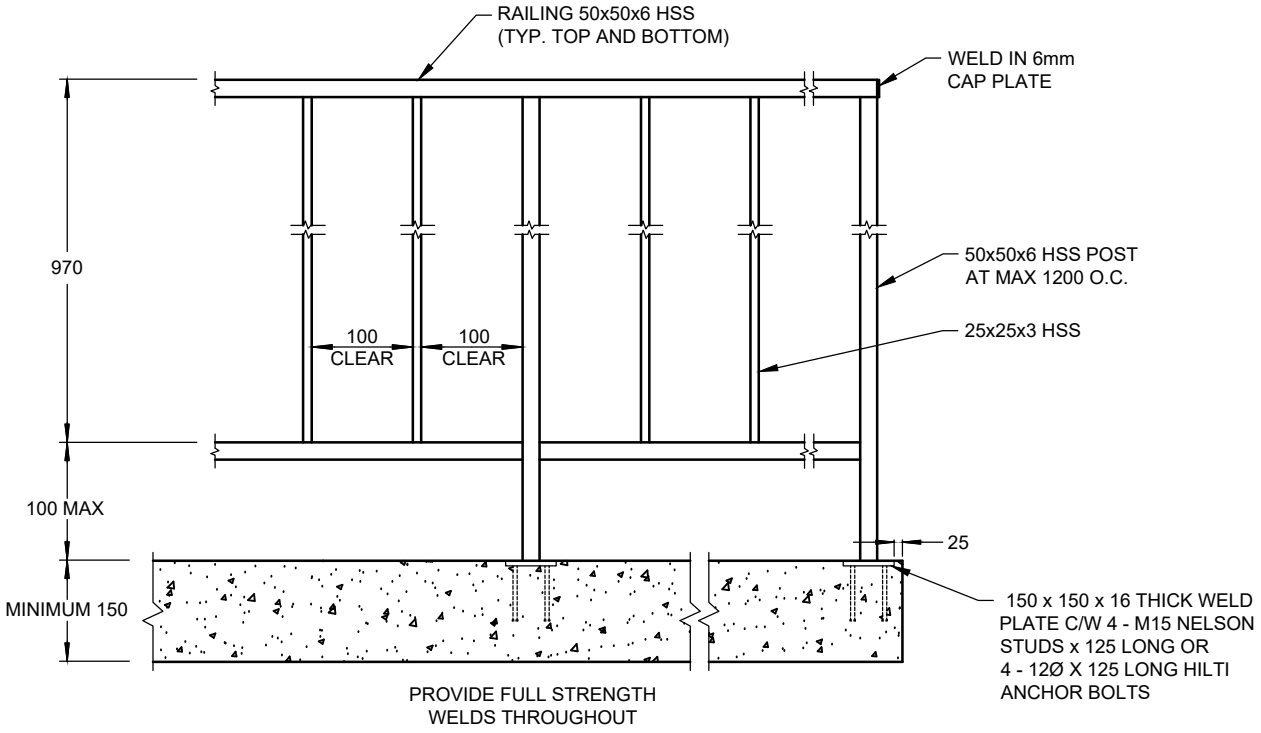
Scale:	NTS
Created:	MAY 2001
Rev Date:	JUNE 2026
Dwg No:	CS-30



DETAIL FOR LOCATIONS WITH 100mm THICK CONCRETE ADJACENT



DETAIL- WELD PLATE FOR RAILING POST



ELEVATION OF RAILING

NOTES:

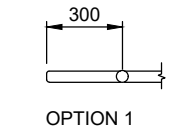
1. SUPPLY, FABRICATION, ERECTION, STRUCTURAL DESIGN AND DETAILING OF ALL MISCELLANEOUS STEEL ARE TO BE IN ACCORDANCE WITH CSA S16.
2. ALL WELDING IS TO CONFORM TO CSA W59 AND TO BE PERFORMED ONLY BY FABRICATION SHOPS APPROVED BY THE CANADIAN WELDING BUREAU TO CSA W47.1 FOR DIVISION 1 OR 2 REQUIREMENTS. PROVIDE FULL STRENGTH WELDS AND ALL WELDS ARE TO BE CONTINUOUS FOR THE LENGTH OF EACH JOINT. GRIND AND FILE WELDS SMOOTH AND FLUSH.
3. ALL STEEL IS TO CONFORM TO THE REQUIREMENTS OF THE FOLLOWING STANDARDS:
   a) ROLLED SECTIONS AND PLATE: CAN/CSA-G40.21, GRADE 300W.
   b) HSS SECTIONS: CAN/CSA-G40.21, GRADE 350W, CLASS C OR CLASS H.
   c) WELDING ELECTRODES: CSA W48 SERIES AND APPLICABLE AWS-A5 SERIES.
4. ALL STEEL TO BE BLACK POWDER COATED TO ASTM D7803.
5. DAMAGED SURFACES SHALL BE THOROUGHLY CLEANED AND PAINTED WITH 2 COATS OF ORGANIC ZINC RICH PAINT.
6. ALUMINUM MAY BE SUBSTITUTED IN PLACE OF STEEL AS AN ALTERNATE.
7. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
8. SHOP DRAWINGS TO BE APPROVED BY THE PROFESSIONAL OF RECORD.

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 8 DWG\CS-31
6.22.2026

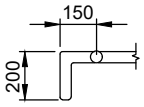
CITY OF NANAIMO
THE HARBOUR CITY

HANDRAILS AND STAIRWAYS
SIDEWALK HANDRAIL

Scale:	NTS
Created:	SEP 2012
Rev Date:	JUNE 2026
Dwg No:	CS-31



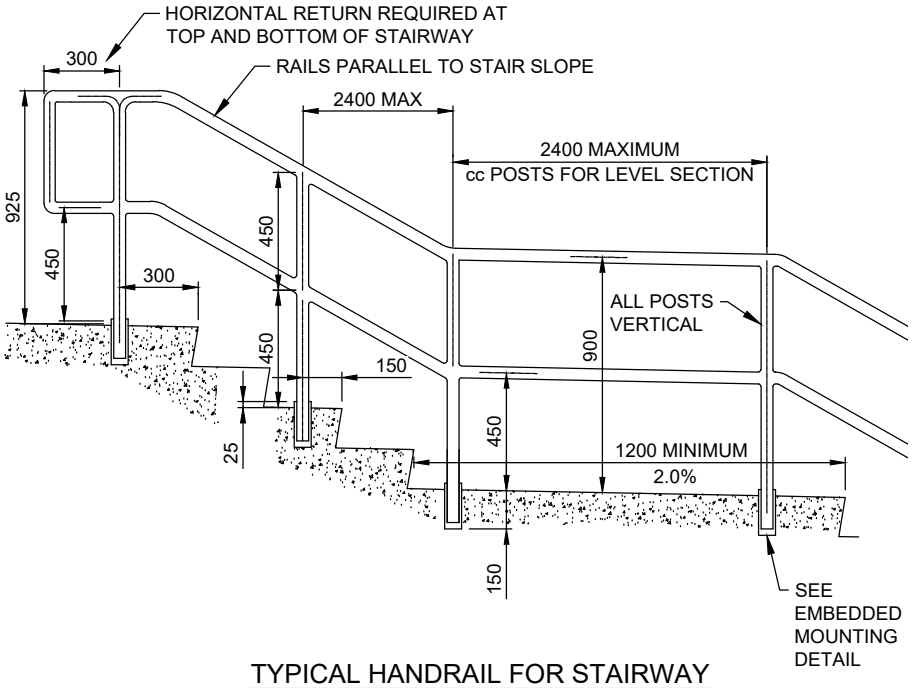
OPTION 1



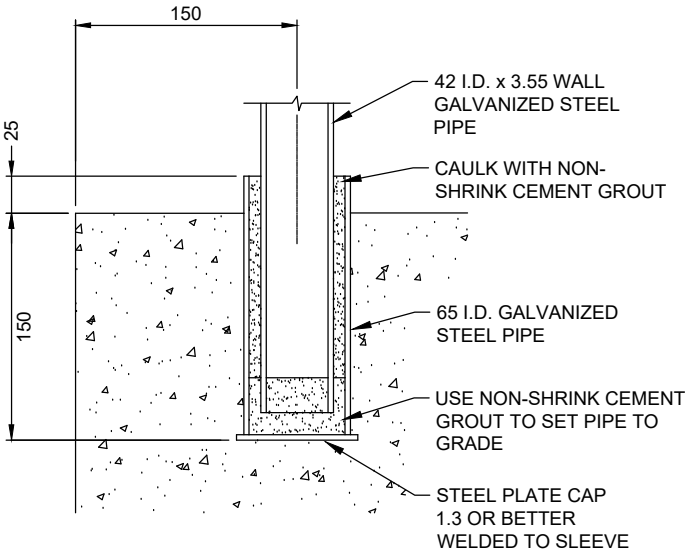
OPTION 2

NOTE:
OPTION 2 TO BE USED WHEN OPTION 1 CANNOT BE INSTALLED WITHOUT ENCROACHING ON PEDESTRIAN SIDEWALK OR WALKWAY.

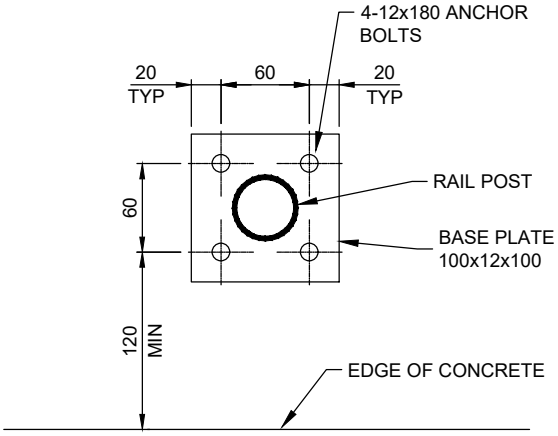
HANDRAIL END PLAN VIEW OPTIONS 1 & 2



TYPICAL HANDRAIL FOR STAIRWAY



EMBEDDED MOUNTING



ATTACHED MOUNTING

NOTES:

1. ALL HANDRAILS SHALL BE FABRICATED FROM 42 I.D. x 3.55 WALL STEEL PIPE.
2. ALL JOINTS SHALL BE MITRED, WELDED ALL AROUND AND FILED SMOOTH.
3. ALL BENDS SHALL BE SMOOTH CIRCULAR CURVES.
4. ALL COMPONENTS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION TO CSA - 6164.
5. ALL STEEL TO BE BLACK POWER COATED TO ASTM D7803.
6. HANDRAILS REQUIRED ON BOTH SIDES OF STAIRWAY.
7. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
8. SHOP DRAWINGS TO BE APPROVED BY THE PROFESSIONAL OF RECORD.

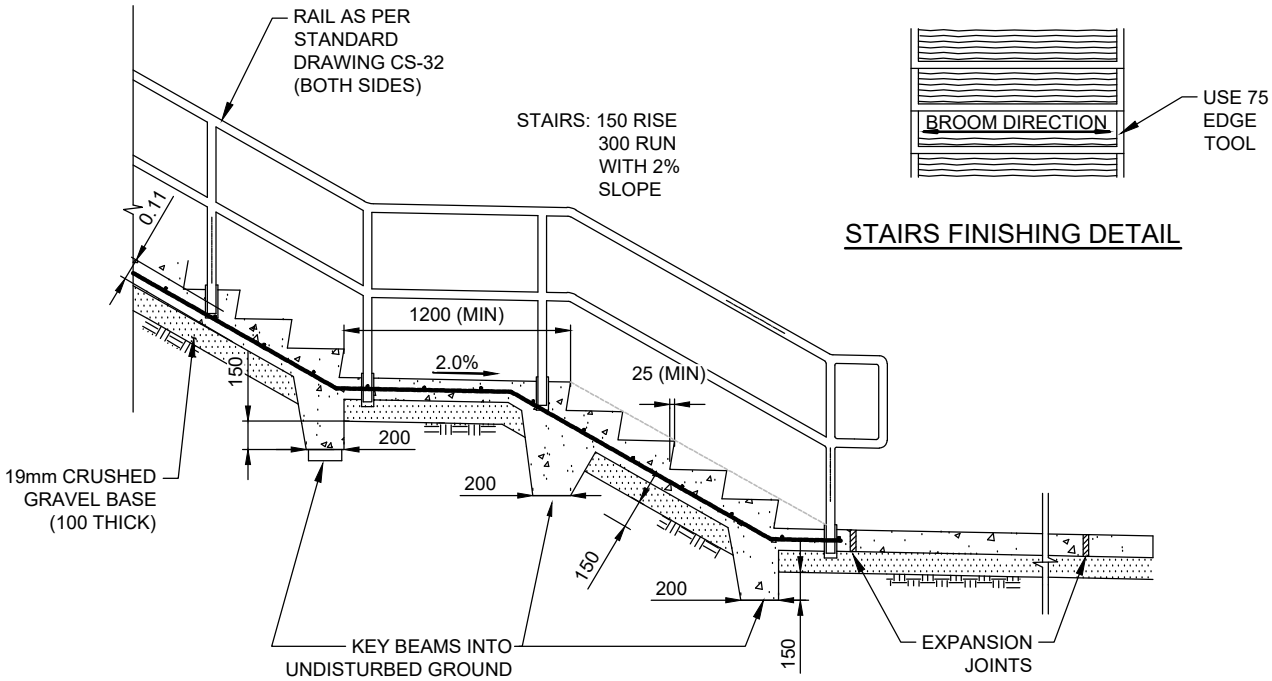
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4.17.2026

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THE HARBOUR CITY

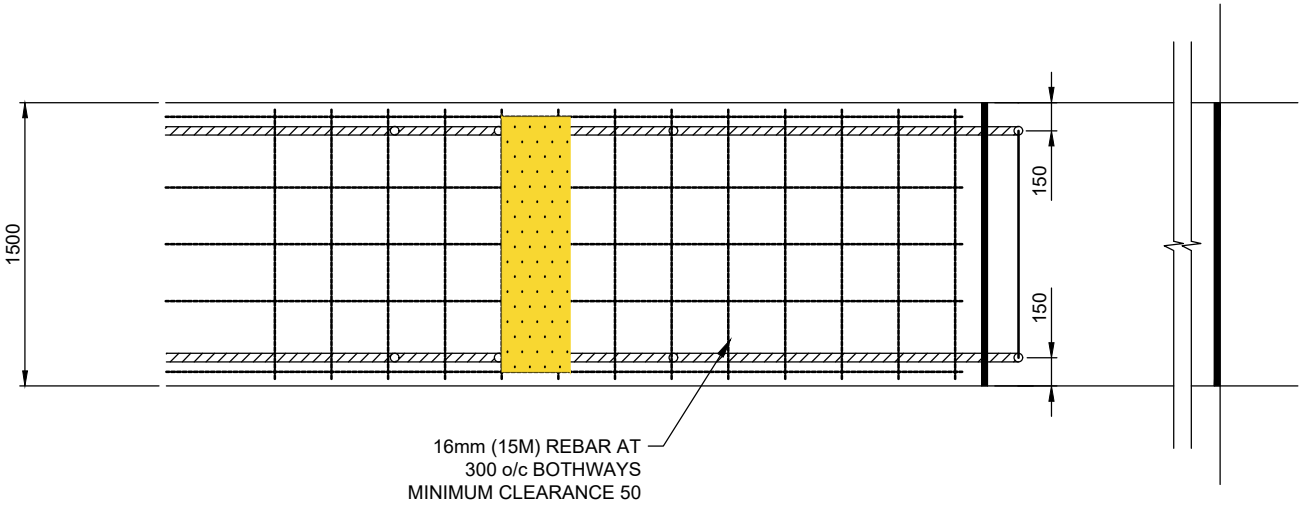
HANDRAILS AND STAIRWAYS
HANDRAIL FOR CONCRETE STAIRWAY

Scale:	NTS
Created:	NOV 2016
Rev Date:	JUNE 2026
Dwg No:	CS-32



STAIRS FINISHING DETAIL

CONCRETE STAIRWAY ELEVATION



CONCRETE STAIRWAY PLAN

NOTES:

1. DESIGN CRITERIA AS PER SECTION 8.16.
2. CONCRETE MIX DESIGN CRITERIA AS PER SECTION 11.0.
3. REINFORCING BARS TO CSA G30.18 GRADE 400.
4. HANDRAIL DETAILS AS PER STANDARD DRAWING CS-32.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
6. TWSIs TO BE INSTALLED AT EVERY STAIR LANDING AS PER SECTION 8.0.
7. LIGHTING LEVELS AS PER SECTION 10.0.
8. DESIGN DRAWINGS TO SUIT SITE CONDITIONS ARE BY PROFESSIONAL OF RECORD.

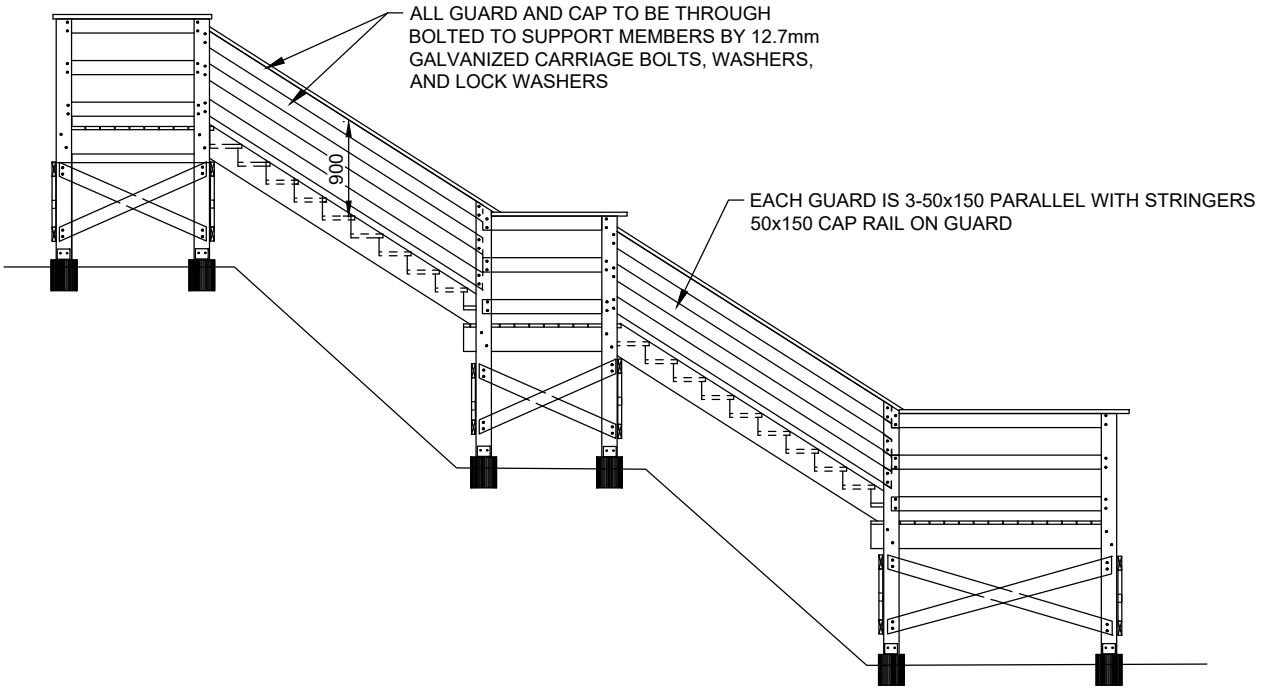
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4.24.2026

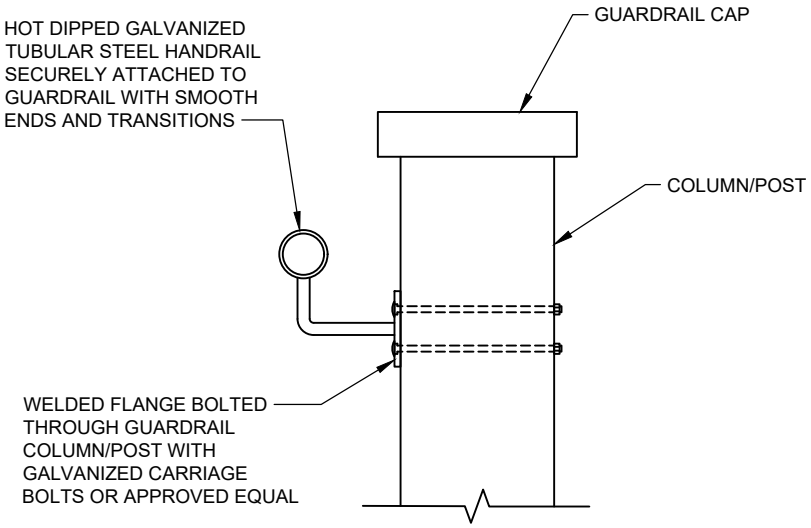
CITY OF NANAIMO
THE HARBOUR CITY

HANDRAILS AND STAIRWAYS
CONCRETE STAIRWAY AND LANDING

Scale:	NTS
Created:	NOV 2016
Rev Date:	JUNE 2026
Dwg No:	CS-33



WOODEN STAIRWAY ELEVATION



TYPICAL HANDRAIL SECTION

NOTES:

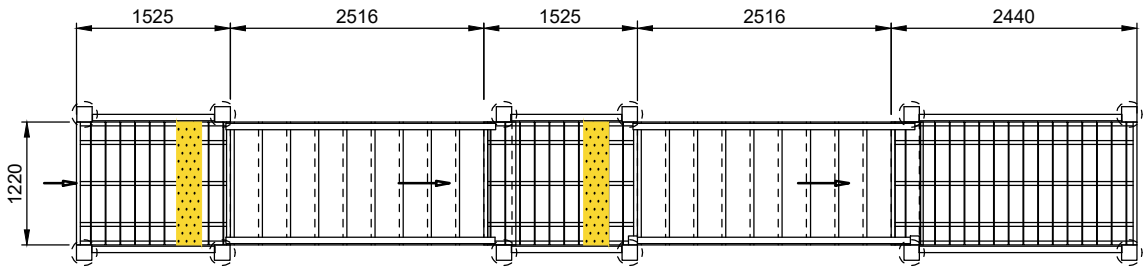
1. ALL TIMBER TO BE PRESSURE TREATED OR APPROVED EQUAL.
2. ALL GUARDRAILS TO BE CONSTRUCTED AS SHOWN.
3. GUARDRAILS REQUIRED ON BOTH SIDES OF STAIRWAY.
4. NO NAILS ON EXTERIOR DECK. SCREWS ONLY FOR ATTACHING CAP RAIL AND POSTS.
5. HANDRAILS TO BE INSTALLED ON STAIRS WITH MORE THAN THREE RISERS.
6. HANDRAILS MUST BE GRASPABLE 864mm (34 in) MIN - 1067mm (42 in) MAX. MEASURED VERTICALLY FROM STAIR NOSING LINE.
7. HANDRAILS TO BE HOT DIPPED GALVANIZED STEEL TUBULAR SECTION 48mm DIA x 3.55mm WALL OR APPROVED EQUAL.
8. STAIRWAY DETAILS AS PER STANDARD DRAWING CS-35.
9. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
10. DESIGN DRAWINGS FOR SITE CONDITIONS ARE BY PROFESSIONAL OF RECORD.

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4.17.2026

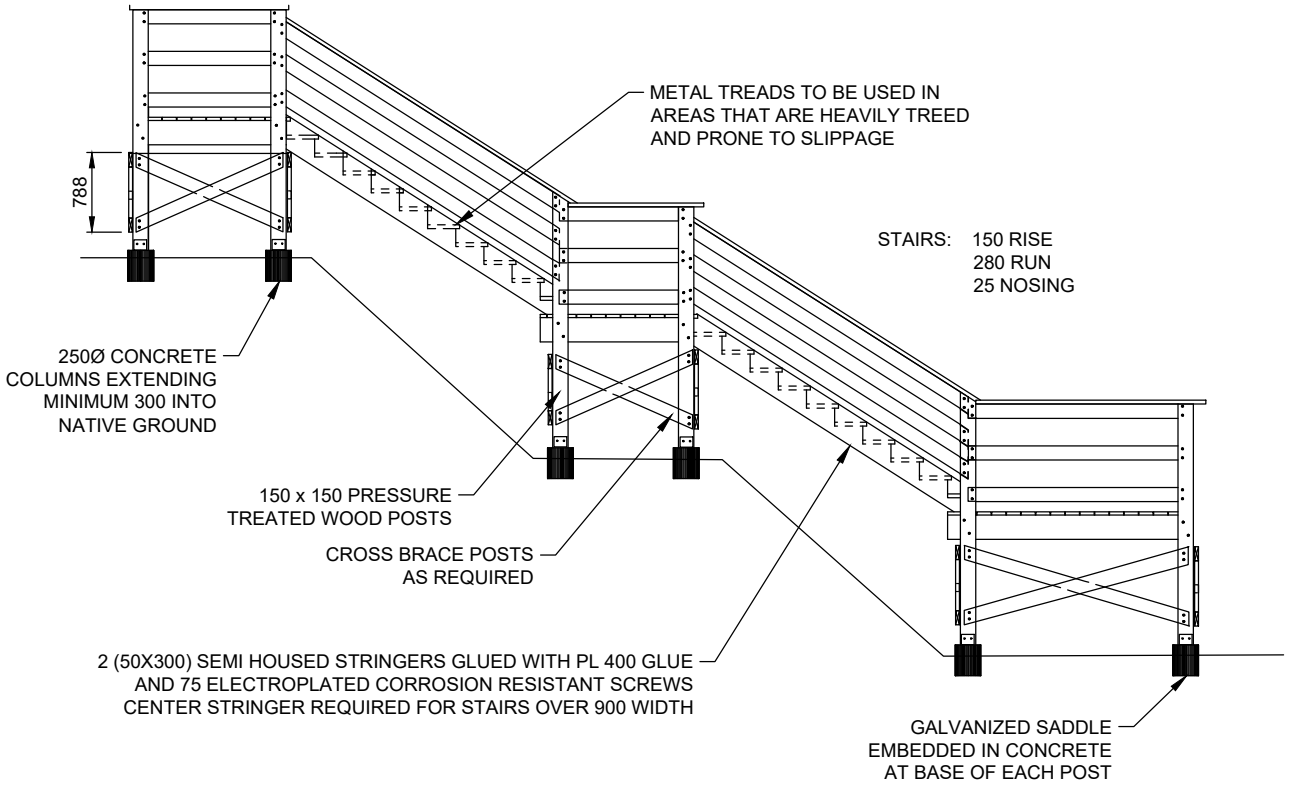
CITY OF NANAIMO
THE HARBOUR CITY

HANDRAILS AND STAIRWAYS
GUARDRAIL FOR WOODEN STAIRWAY

Scale:	NTS
Created:	NOV 2016
Rev Date:	JUNE 2026
Dwg No:	CS-34



WOODEN STAIRWAY PLAN



WOODEN STAIRWAY ELEVATION

NOTES:

1. ALL TIMBER TO BE PRESSURE TREATED OR APPROVED EQUAL.
2. VEGETATION CLEARANCE TO BE 0.5m MINIMUM HORIZONTAL AND 2.0m VERTICAL.
3. ENSURE ADEQUATE SIGHTLINES ON CORNERS.
4. RESIDENTIAL BUFFER TO BE 5.0m.
5. GUARDRAIL AND HANDRAIL DETAILS AS PER STANDARD DRAWING CS-34.
6. STRUCTURAL CERTIFICATION REQUIRED WITH STAIR DESIGN SUBMISSION AUTHENTICATED BY PROFESSIONAL OF RECORD.
7. TWSIs TO BE INSTALLED AS PER SECTION 8.
8. ENGINEERED ALTERNATIVES FOR STAIR FOOTINGS MAY BE APPROVED.
9. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
10. DESIGN DRAWINGS FOR SITE CONDITIONS ARE BY PROFESSIONAL OF RECORD.

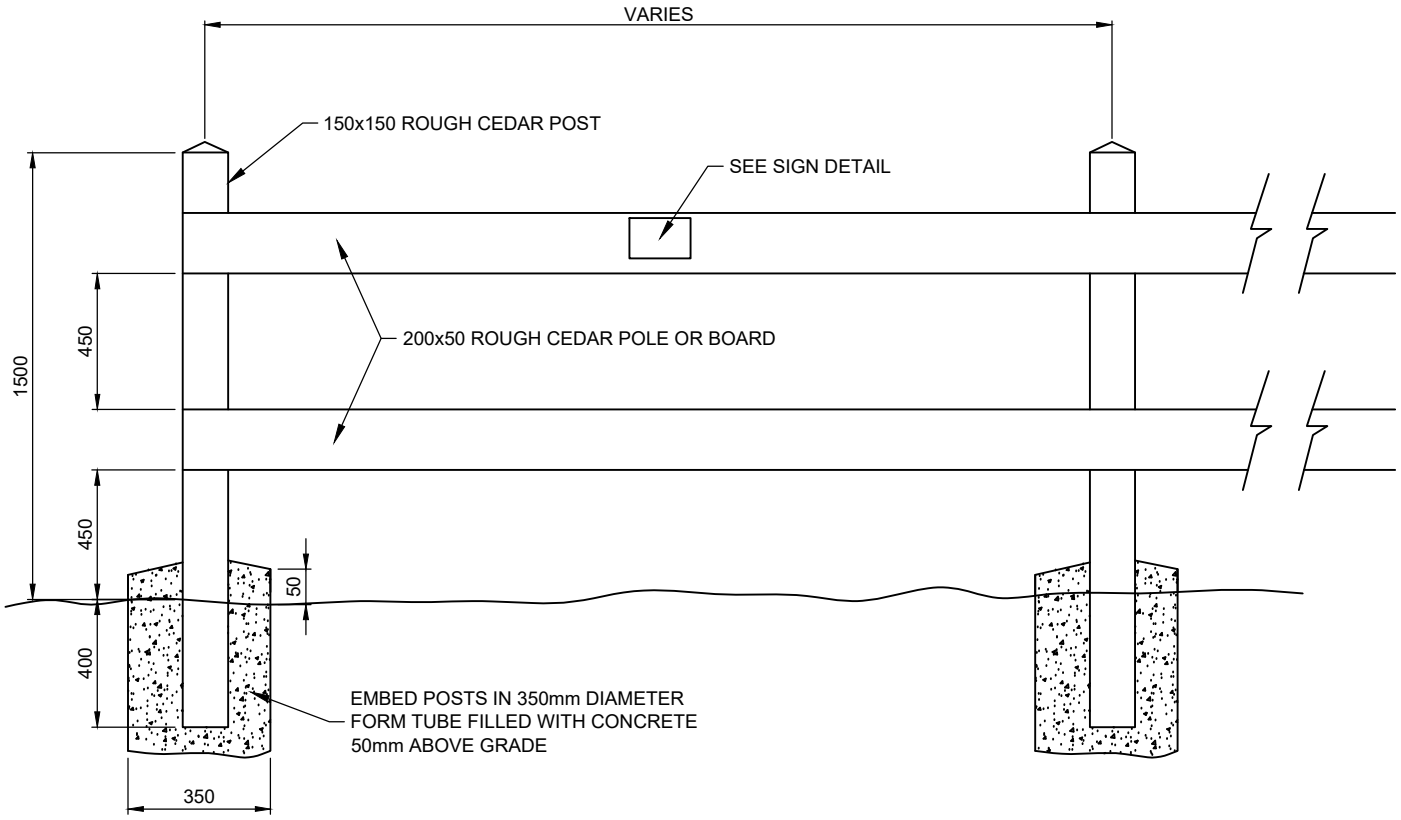
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CITY OF NANAIMO
THE HARBOUR CITY

HANDRAILS AND STAIRWAYS
WOODEN STAIRWAY AND LANDING

Scale:	NTS
Created:	NOV 2016
Rev Date:	JUNE 2026
Dwg No:	CS-35

6.22.2026



NOTES:

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. TO BE INSTALLED AT EDGE OF SLOPE, OFFSET 0.5m FROM EDGE OF PATHWAY
3. WHEN INSTALLED AS AN AQUATIC SETBACK FENCE, THE FOLLOWING MUST BE COMPLETED:
   a) TO BE INSTALLED AT THE EDGE OF ALL AQUATIC SETBACK BOUNDARIES TO ENSURE THE SETBACK IS DELINEATED.
   b) SIGN TO BE MOUNTED TO FENCE TO ENSURE THE SETBACK AREA IS PROTECTED.
   c) SIGN TO BE INSTALL AT THE REAR OF EVERY LOT BACKING ONTO THE SETBACK AREA OR AT A 30m SPACING.

Environmentally Protected Area

CITY OF NANAIMO
THE HARBOUR CITY

ENVIRONMENTALLY PROTECTED AREA SIGN

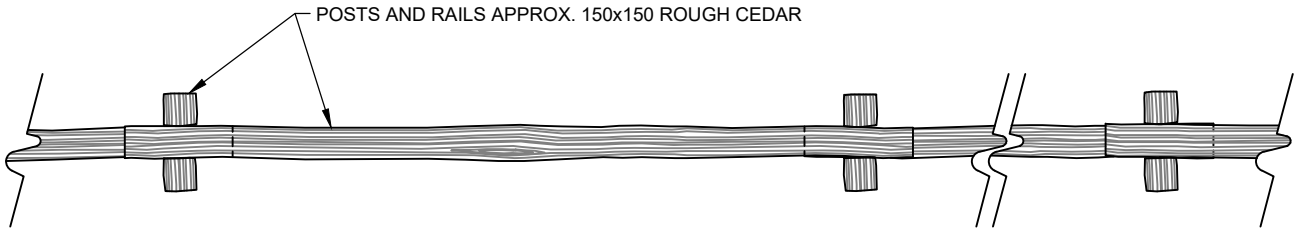
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4.17.2026

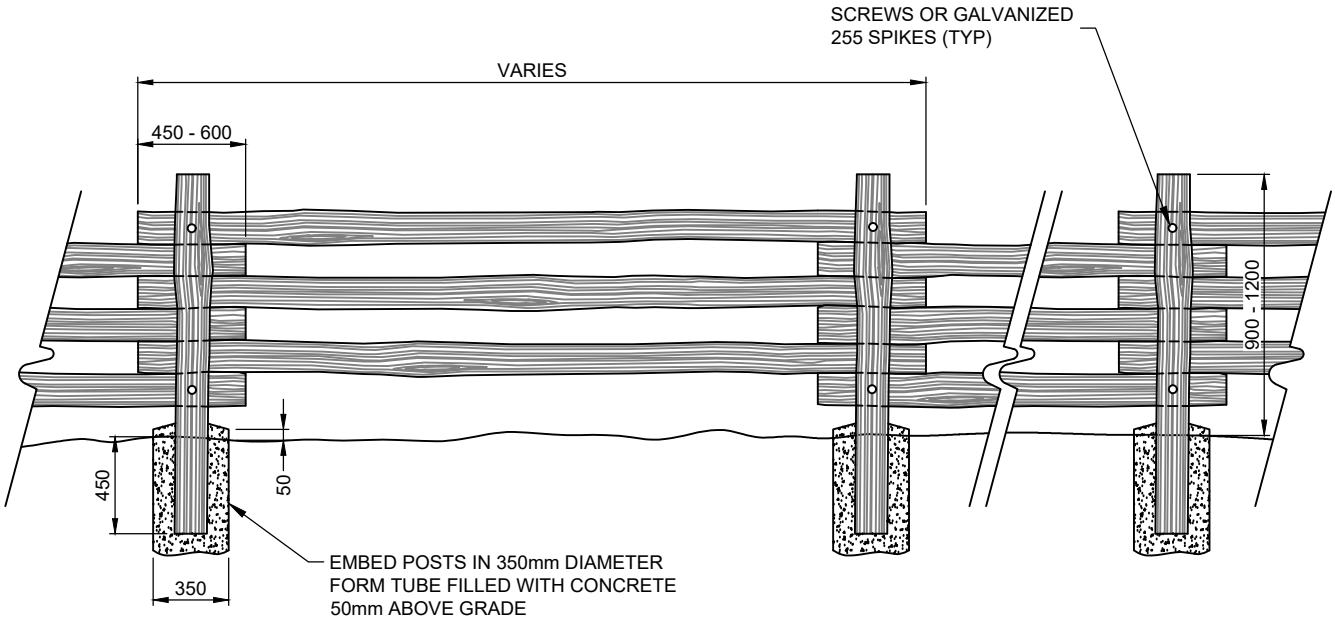
CITY OF NANAIMO
THE HARBOUR CITY

FENCES AND GATES
WOOD RAIL

Scale:	NTS
Created:	NOV 2012
Rev Date:	JUNE 2026
Dwg No:	CS-36



SPLIT RAIL FENCE PLAN



SPLIT RAIL FENCE ELEVATION

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. TOP OF POSTS TO BE SECURED TOGETHER WITH WIRE.
3. CONCRETE AS PER SECTION 11.0.

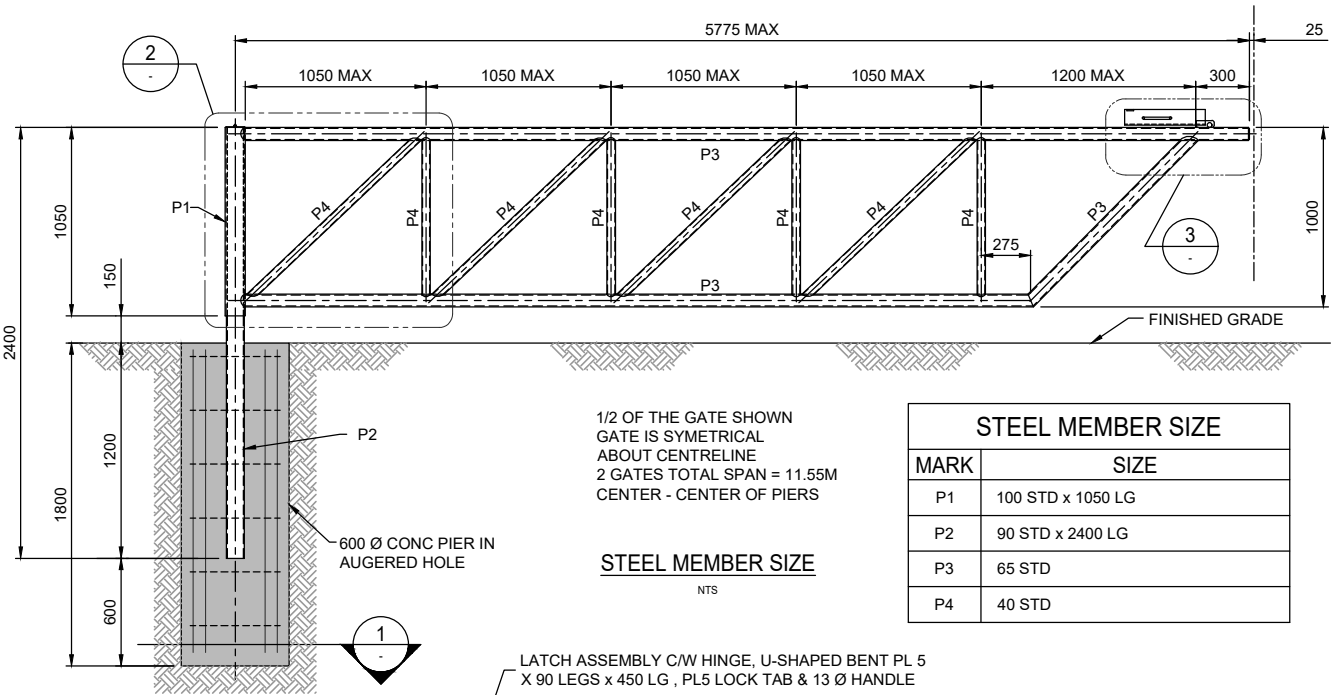
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4.17.2026

CITY OF NANAIMO
THE HARBOUR CITY

FENCES AND GATES
SPLIT RAIL

Scale:	NTS
Created:	DEC 2019
Rev Date:	JUNE 2026
Dwg No:	CS-37

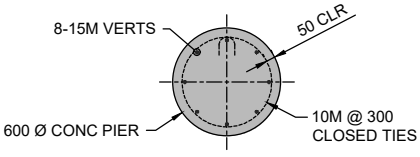


1/2 OF THE GATE SHOWN
GATE IS SYMETRICAL
ABOUT CENTRELINE
2 GATES TOTAL SPAN = 11.55M
CENTER - CENTER OF PIERS

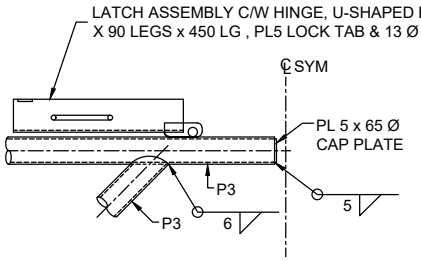
STEEL MEMBER SIZE

NTS

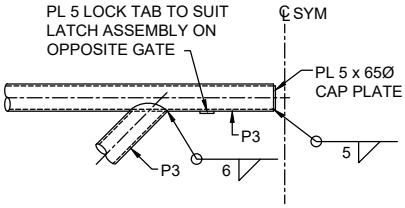
STEEL MEMBER SIZE	
MARK	SIZE
P1	100 STD x 1050 LG
P2	90 STD x 2400 LG
P3	65 STD
P4	40 STD



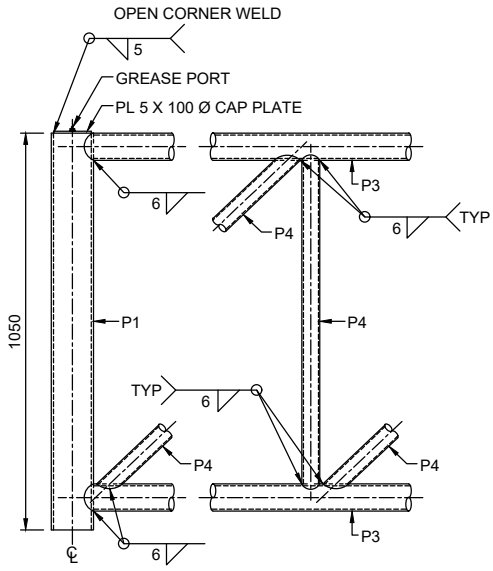
1 SECTION
NTS



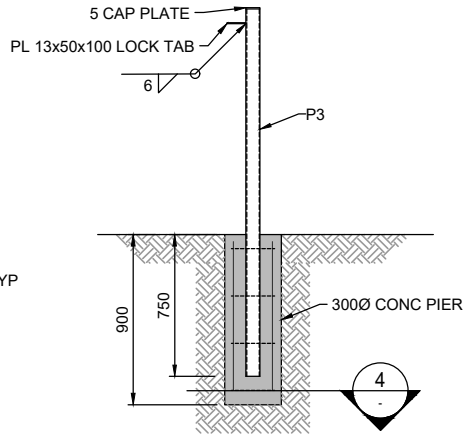
3a LATCH GATE DETAIL
NTS



3b NON-LATCH GATE DETAIL
NTS

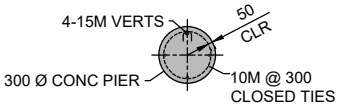


2 GATE DETAIL
NTS



GATE CATCH POST ELEVATION

NTS



4 SECTION
NTS

NOTES:

1. ALL DIMENSION IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. DESIGN AND REVIEW BY A PROFESSIONAL OF RECORD.
3. CONCRETE PIER IS CLASS F-1, PER SECTION 11.0.
4. STEEL PIPE TO ASTM-A53, GRADE B, STANDARD WEIGHT, SEAMLESS, BLACK.
5. STEEL PLATE TO CAN/CSA-G40.21 GRADE 300W.
6. STEEL SURFACES SHALL BE BLAST CLEANED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS PRIOR TO PAINTING.
7. EXPOSED STEEL SURFACES SHALL BE PAINTED WITH A BASE COAT OF BRIGHT YELLOW ENAMEL RUST PAINT.
8. GATE IS SHOWN WITH MAXIMUM SPAN. ADJUST DIMENSIONS TO SUIT SITE CONDITIONS BUT DO NOT EXCEED MAXIMUM MEMBER SPACING INDICATED ON THE ELEVATION.

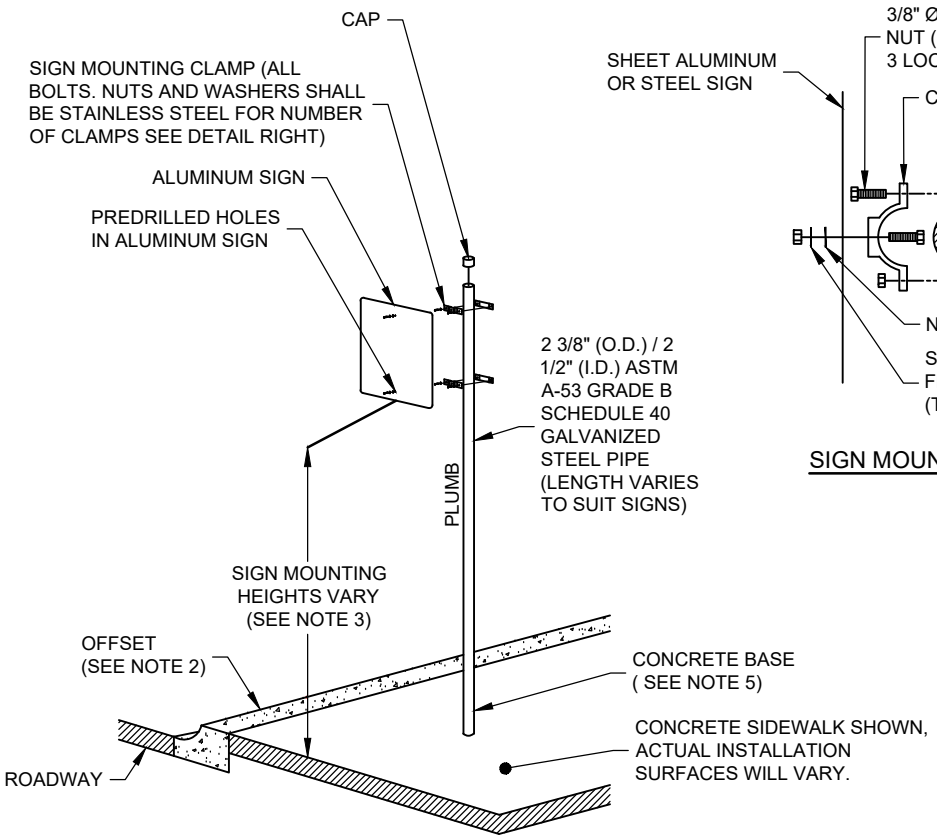
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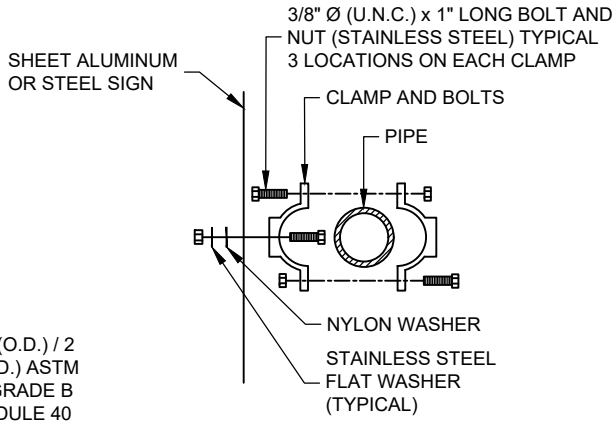
5.12.2026

CITY OF NANAIMO
THE HARBOUR CITY

FENCES AND GATES
PARK GATE

Scale:	NTS
Created:	MAY 2025
Rev Date:	JUNE 2026
Dwg No:	CS-38





SIGN MOUNTING DETAIL

SIGN HEIGHT	NUMBER OF CLAMPS
UP TO 750 HIGH	2
751 TO 1250 HIGH	3

MAXIMUM SIGN WIDTH
915

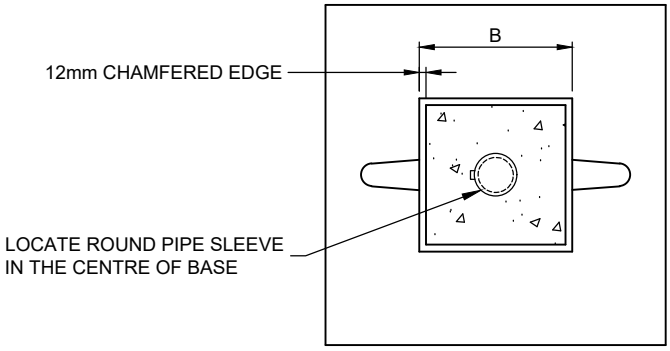
NOTES:
1. SIGN POSTS ARE TO BE ABSOLUTELY PLUMB.
2. SIGN TO BE INSTALLED SO THAT A MINIMUM OF 300mm CLEARANCE IS PROVIDED BETWEEN THE SIGN EDGE AND THE FACE OF CURB.
3. THE BOTTOM OF SIGN HEIGHT OF THE LOWEST SIGN SHALL BE AS FOLLOWS:
   a. 2.0m ABOVE THE FINISHED SURFACE, OR
   b. 2.1m ABOVE THE SIDEWALK OR WALKING SURFACE WHERE PEDESTRIAN TRAFFIC IS LIKELY, OR
   c. 2.5m ABOVE THE CYCLE PATH OR WALKING SURFACE WHERE CYCLING TRAFFIC IS LIKELY.
   d. EXCEPT FOR OBJECT MARKER SIGNS WHICH SHALL BE INSTALLED WITH THE BOTTOM OF SIGN 0.45m ABOVE THE FINISHED SURFACE.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. REFER TO STANDARD DRAWING CS-40B FOR CONCRETE BASE DETAILS. THE SPECIFICATIONS WILL DEPEND ON THE APPLICATION.

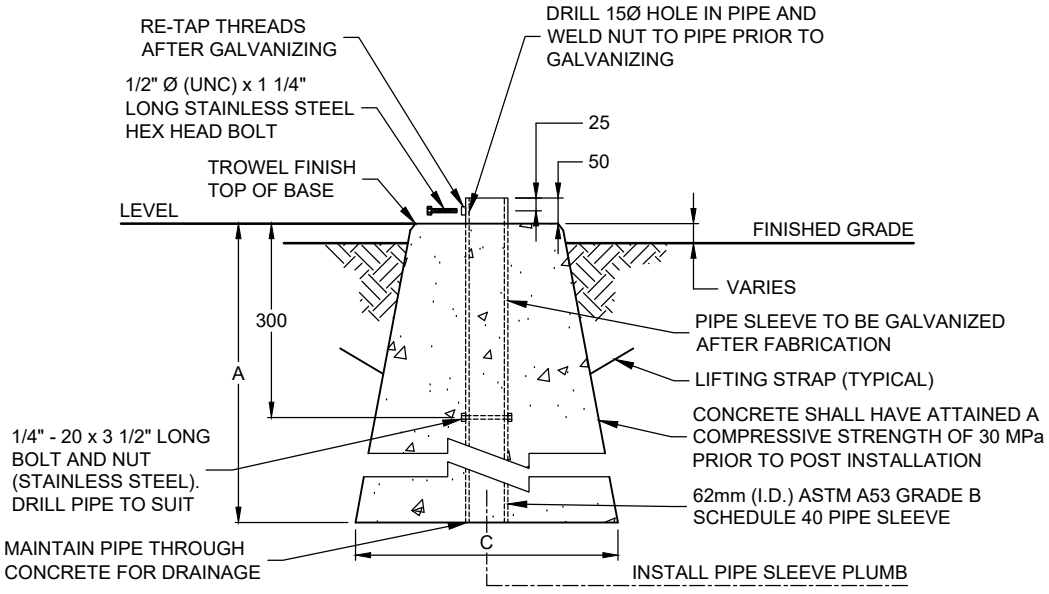
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

TRAFFIC SIGNAGE ROUND STEEL POLES

Scale:	NTS
Created:	DEC 2025
Rev Date:	JUNE 2026
Dwg No:	CS-40A





BASE TYPE	APPLICATION	APPLICATION MASS	VOLUME OF CONCRETE	A	B	C
a	SINGLE POST SIGNS IN PAVED ISLANDS OR CONCRETE SIDEWALKS	34 kg	0.015 m³	400	160	230
b	SINGLE OR TWO POST SIGNS IN GRAVEL SHOULDER UP TO 1.0 x 1.2m	166 kg	0.068 m³	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 m³	750	330	600

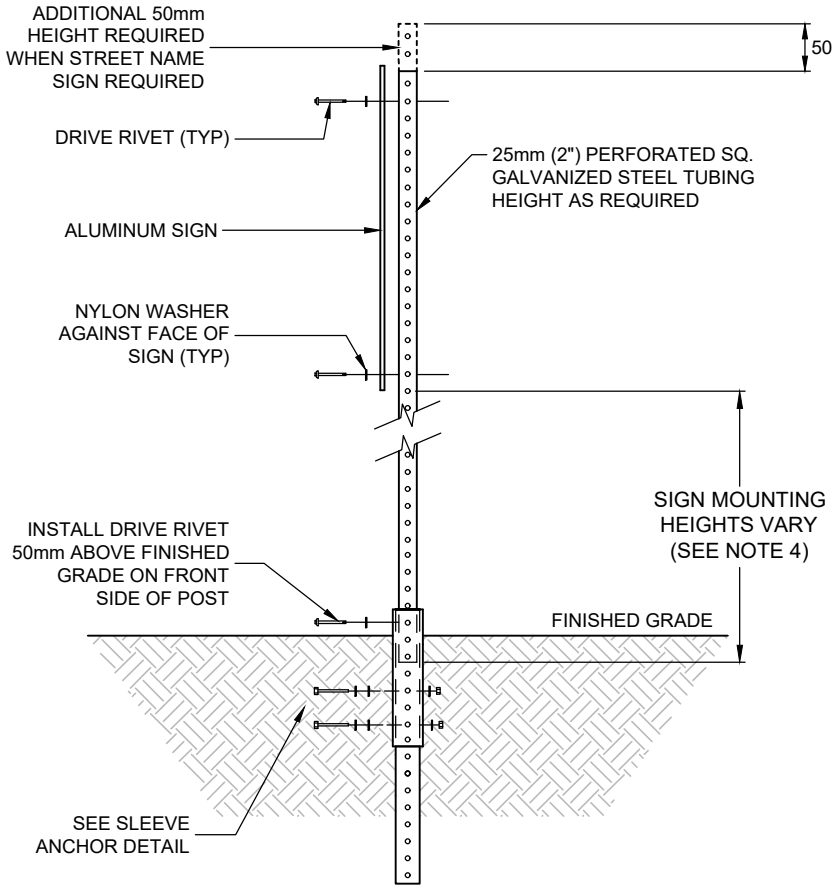
NOTES:
1. CAUTION MUST BE TAKEN TO ENSURE THAT NO CONCRETE OR DEBRIS GET INSIDE THE SLEEVE.
2. THE SLEEVE IS TO BE ABSOLUTELY PLUMB.
3. CYLINDRICAL BASES MAY BE USED WITH PRIOR WRITTEN PERMISSION FROM THE CITY AND MUST MEET MASS AND VOLUME REQUIREMENT SHOWN ABOVE.
4. FOR CAST IN PLACE CONCRETE AS PER SECTION 11.0.
5. REFER TO STANDARD DRAWING CS-40A FOR MINIMUM OFFSETS.
6. BASE SHALL BE INSTALLED 25mm ABOVE FINISHED GRADE EXCEPT WHEN INSTALLED IN SIDEWALK IT SHALL BE FLUSH WITH TOP OF SIDEWALK WITH NO CHAMFERED EDGE.
7. LANDSCAPING AS PER SECTION 14.0.

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5.19.2026

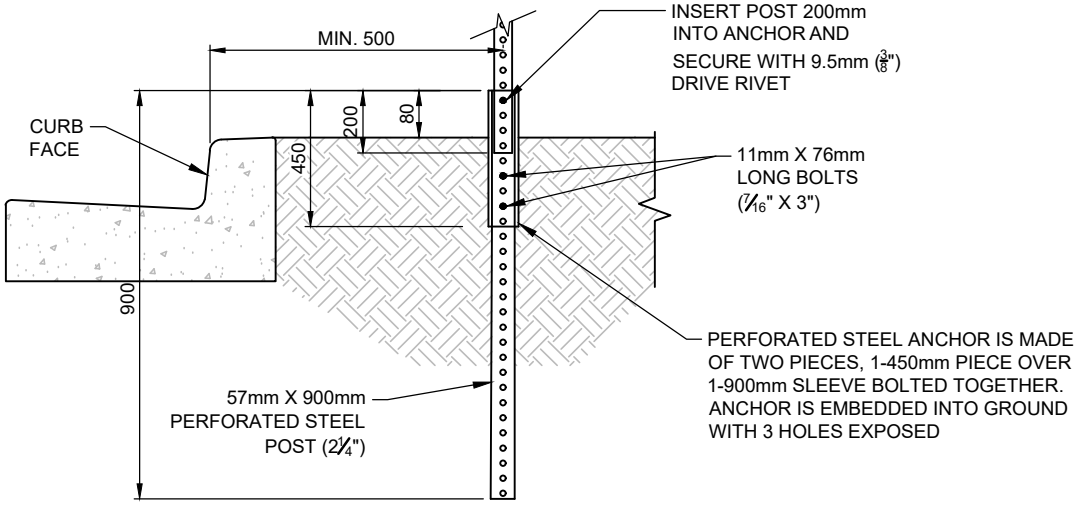
CITY OF NANAIMO
THE HARBOUR CITY

TRAFFIC SIGNAGE CONCRETE
BASE FOR ROUND STEEL POLE

Scale:	NTS
Created:	OCT 2019
Rev Date:	JUNE 2026
Dwg No:	CS-40B



PERFORATED STEEL SIGN POST

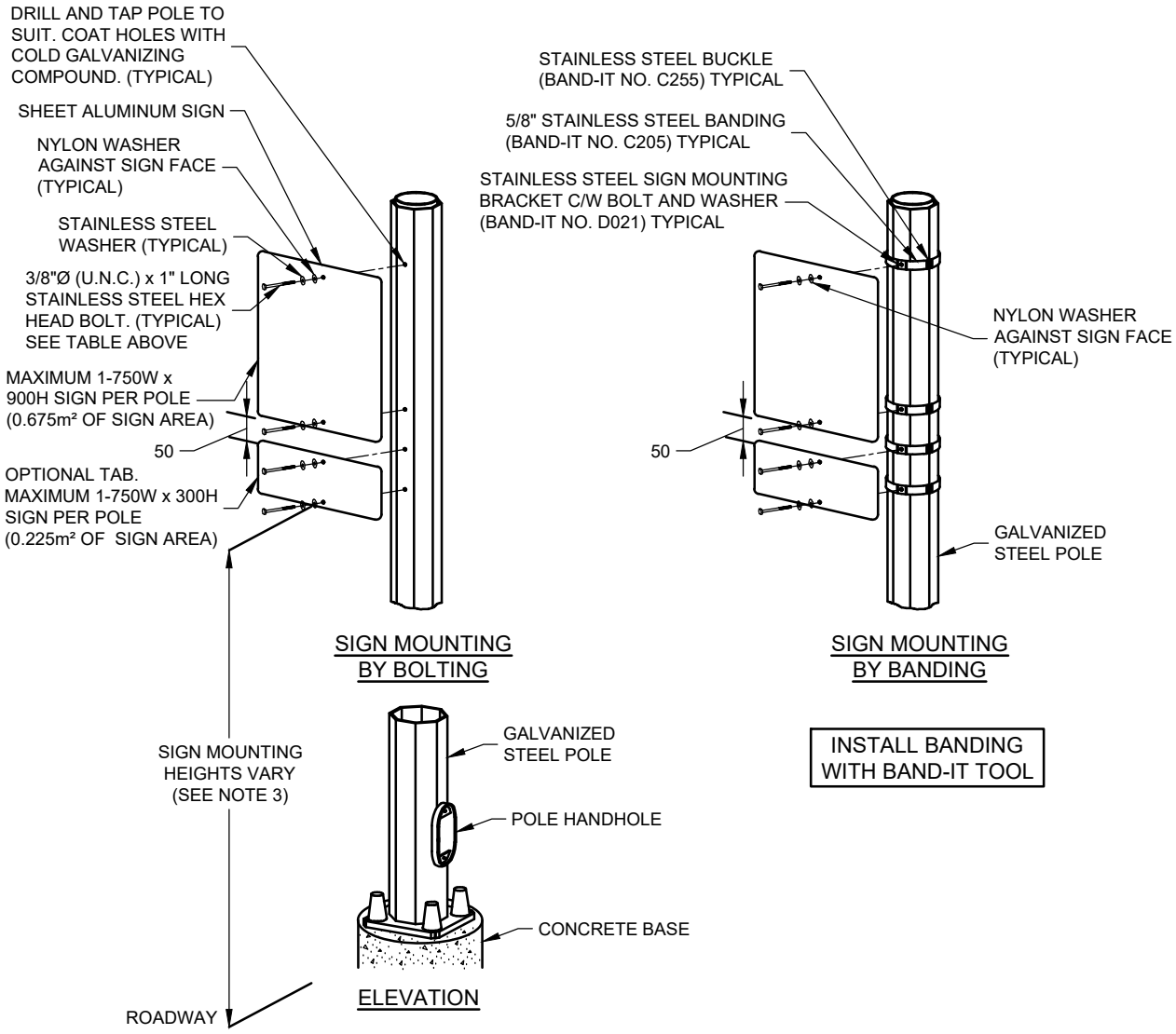


SLEEVE ANCHOR DETAIL

NOTES:

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. SIGN POSTS ARE TO BE ABSOLUTELY PLUMB.
3. SIGN POSTS TO BE INSTALLED MINIMUM 500mm FROM FACE OF CURB.
4. FOR TRAFFIC SIGN REQUIREMENTS, REFER TO CS-40A.
5. USE OF PERFORATED STEEL SIGN POST REQUIRES APPROVAL BY THE CITY ENGINEER.

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SIGN MOUNTING DETAIL

SIGN HEIGHT	NUMBER OF BOLTS
UP TO 750 HIGH	2
751 TO 1250 HIGH	3

MAXIMUM SIGN WIDTH
915

NOTES:

1. SEE STANDARD DRAWINGS IN SECTION 10.0 FOR SIGNAL POLE OR LUMINAIRE POLE DETAILS.
2. THE BOTTOM OF SIGN HEIGHT OF THE LOWEST SIGN SHALL BE AS FOLLOWS:
   a. 2.0m ABOVE THE FINISHED SURFACE, OR
   b. 2.1m ABOVE THE SIDEWALK OR WALKING SURFACE WHERE PEDESTRIAN TRAFFIC IS LIKELY, OR
   c. 2.5m ABOVE THE CYCLE PATH OR WALKING SURFACE WHERE CYCLING TRAFFIC IS LIKELY.
   d. EXCEPT FOR OBJECT MARKER SIGNS WHICH SHALL BE INSTALLED WITH THE BOTTOM OF SIGN 0.45m ABOVE THE FINISHED SURFACE.
3. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

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CITY OF NANAIMO
THE HARBOUR CITY

TRAFFIC SIGNAGE SIGNS ON SIGNAL POLE OR LUMINAIRE POLE

Scale:	NTS
Created:	DEC 2025
Rev Date:	JUNE 2026
Dwg No:	CS-42

5.14.2026

SECTION 9 – AGGREGATES AND GRANULAR MATERIAL
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SECTION 9 – AGGREGATES AND GRANULAR MATERIAL SPECIFICATION

9.01 SCOPE

.1 Aggregates and Granular Material section refers to the work that is unique to the specification and installation of aggregates.

.2 For design criteria not specified in this section, refer to Section 8.0 – Transportation [] or the most current version of the ***Geometric Design Guide for Canadian Roads***, distributed by the Transportation Association of Canada (TAC). All design criteria from the ***Geometric Design Guide for Canadian Roads*** must be approved by the City Engineer prior to design stage.

9.02 MINIMUM BASE AND PAVEMENT STRENGTHS

.1 The minimum standards for roadway pavement thickness for street classifications are shown in the table. Verification of existing road structure requires core sampling to confirm that the asphalt, base, and subbase layers each meet the minimum thickness in the standard. Nondestructive testing may be used to assess existing pavement and road structure through Benkelman Beam testing as outlined in the most current edition of the "***Pavement Design and Management Guide***", distributed by the Transportation Association of Canada. Test results are required *(REVISED JUNE 2026)*

	Cycle Tracks*	Multi-Use Paths	Local	Collector	Arterial *(REVISED JUNE 2026)*	Industrial *(REVISED JUNE 2026)*
Coarse Gravel Sub-base, compacted 75 mm minus	250 mm	250 mm	250 mm	250 mm	250 mm	250 mm
Crushed Gravel Base, compacted 20 mm minus	100 mm	150 mm	150 mm	150 mm	200 mm	200 mm
Hot plant-mix asphalt pavement, compacted	50 mm	60-75 mm**	75 mm	100 mm	125 mm	100 mm
Maximum Benkelman Beam deflection	1.5 mm	1.5 mm	1.5 mm	1.25 mm	0.75 mm	0.75 mm
Minimum compaction of sub-base and base gravel	95% modified proctor	95% modified proctor	95% modified proctor	95% modified proctor	95% modified proctor	95% modified proctor

*This standard applies only to cycle tracks constructed behind curb. Where bike lanes are painted on the roadway surface, the roadway structure shall govern. For cycle tracks at high volume crossings or commercial driveways, the MUP standard shall be used.
**Refer to Drawing CS.21.

.2 Where works are to be constructed in and/or adjacent to existing streets and existing roadways do not meet the minimum pavement requirements, the City may require its removal and replacement with new road and pavement structure to meet the current standard. *(REVISED JUNE 2026)*

SECTION 9 – AGGREGATES AND GRANULAR MATERIAL SPECIFICATION

9.20 SCOPE

.1 This specification refers to preparations and construction of the road subgrade, sub-base, and base course. Only those products approved by the City Engineer will be accepted for installation.

9.21 TESTING

.1 The Contractor will arrange for a testing firm to carry out tests to determine whether the applicable standards and specifications have been met. Where initial testing indicates non-compliance with the specifications, additional testing shall be required. All testing shall be completed at the Contractor's expense.

.2 The Contractor as directed by the Professional of Record shall supply specimens or samples for testing. ***(REVISED JUNE 2026)***

.3 The following tests are required at a minimum:

(a) Gradation determined by washed sieve analysis must be completed on the actual material (stock pile) to be incorporated into the work. The testing shall be conducted no more than one week before the arrival of material on the job site. Further testing is required for every additional 1000 tonnes, or if more than two weeks has passed since the last test, or if the material supplier or stockpile has changed. The two weeks may be extended for stockpiles on the job site or at a secure and controlled location. Testing to be in accordance with ASTM C136/C136M and ASTM C117.

(b) Determination of optimum moisture content and Modified Proctor Density (ASTM D1557) on all materials supplied to the project to be used for subgrade, sub-base and base course construction.

(c) Field moisture content and compaction determined by a minimum of one field density test of sub-base, and granular base per 500 m^2 for roads and per 50 lineal metres for sidewalks, will be performed as per ASTM D6938. All backfill materials in travelled areas to be compacted to a minimum 95% modified proctor density. ***(REVISED JUNE 2026)***

(d) Other aggregate property tests as per the requirements specified in Section 9.29 [→] to Section 9.32 [→].

(e) Other testing as required by the Professional of Record. ***(REVISED JUNE 2026)***

.4 Proof Rolling:

(a) Before proceeding further with the work, each finished layer of subgrade shall be proof rolled by receiving complete coverage using a single axle truck having an 8000 kg rear axle load and a tire pressure of 550 kPa. Should any areas of rutting or displacement result, they shall be excavated and refilled as specified in Section 4.09A Authorized Overexcavation []. If, in the opinion of the Professional of Record, the excavation is necessitated as a result of the Contractor's operations it will be classified as unauthorized excavation. Excavated and refilled areas shall be retested to confirm rutting and/or displacement has been eliminated. ***(REVISED JUNE 2026)***

(b) Intermediate tests will be conducted on the sub-base prior to placement of road base material, and on the road base immediately prior to paving. Results of the intermediate tests will be supplied to the Contractor as a quality control guide, but will not constitute acceptance or rejection of the work.

(c) It shall be the Contractor's responsibility to provide a single axle, dual wheel truck and driver for the tests. The truck shall be equipped with 250 x 500 mm, 12-ply tires inflated to a pressure of 550 kPa. The truck shall have an 8000 kg rear axle load distribution on both wheels.

(d) Where proof rolling is likely to damage works or access is limited, determination of moisture content and Modified Proctor Density on the re-molded subgrade, sub-base and base materials shall be performed as per Section 9.21 – Testing [→].

9.22 DESIGN SUBGRADE CROSS SECTION (*REVISED JUNE 2026)*

.1 Design subgrade cross section shall mean the surface of the finished subgrade upon which select granular sub-base material is to be placed.

9.23 OVERBURDEN

.1 Overburden shall mean the surface material which, in the opinion of the Professional of Record, is not suitable for classifying as topsoil or earth fill. ***(REVISED JUNE 2026)***

9.24 TOPSOIL

.1 Topsoil is surface material containing organic components and which, in the opinion of the Professional of Record, is suitable for landscaping. ***(REVISED JUNE 2026)***

9.25 STRIPPING

.1 Stripping is the excavation of topsoil and overburden including the stockpiling of topsoil at a location approved by the Professional of Record and disposal of overburden as specified in Section 4.11 – Disposal of Excavated Material []. ***(REVISED JUNE 2026)***

9.26 EARTH FILL

.1 Earth fill shall include all fills comprised of common excavation containing less than 15% by volume of rock larger than 150 mm in size, free of organic and deleterious matter and frozen earth lumps and shall be approved by the Professional of Record prior to placement. *(REVISED JUNE 2026)*

9.27 IMPORTED EARTH FILL

.1 Imported earth fill is defined as material imported from outside the project site to meet the specifications for earth fill.

9.28 ROCK FILL

.1 Rock fill shall include all fills comprised of material containing more than 85% by volume of rock larger than 150 mm in size, free of organic and deleterious matter. Rock fill shall not contain rocks greater than 600 mm in diameter and be approved by the Professional of Record prior to placement. *(REVISED JUNE 2026)*

9.29 APPROVED GRANULAR MATERIAL

.1 Granular Material may be used provided it meets the compaction requirement stated in Section 9.21 [→] and the following requirements: *(REVISED JUNE 2026)*

(a) Approved Granular Material shall conform to the following gradation when tested in accordance with ASTM C117 and ASTM C136/C136M.

US Standard Sieve Size	Gradation Limits (Percent by Weight Passing)
75 mm	100
50 mm	70 – 100
25 mm	50 – 100
4.75 mm	22 – 100
2.36 mm	10 – 85
0.075 mm	2 - 8

(b) To be used only up to the bottom of the sub-base layer. *(REVISED JUNE 2026)*

(c) Free of organics and foreign matter: maximum 0.5% by mass.

(d) To be placed in uniform lifts not exceeding 200 mm in loose thickness.

(e) Not to be used in inclement weather.

(f) In-situ moisture content to be within the range determined by the Modified Proctor Test (ASTM D1557), and verified by laboratory testing in accordance with ASTM D2216.

.2 Excavated granular material used as backfill, is permitted under the following conditions: *(REVISED JUNE 2026)*

(a) In untravelled areas, as directed by the Professional of Record. ***(REVISED JUNE 2026)***

(b) In travelled areas, when it meets the performance requirements in Section 9.29.1 and the testing requirements in Section 9.21 [→]. The Professional of Record must submit the test results to the City Engineer for approval. If approved for use, the material must be stockpiled and tested in accordance with Section 9.21 [→]. ***(REVISED JUNE 2026)***

.3 The conversion from tonnes to cubic metres compacted will be 2.43 tonnes/cubic metre. ***(REVISED JUNE 2026)***

9.30 ROAD SUB-BASE GRAVEL COURSE

.1 Road sub-base shall be of uniform quality, crushed to size as necessary and shall consist of sound, tough, durable, highly angular, 100% mechanically crushed fragments with two or more fractured faces having a rough surface texture. It shall be free from an excess of flat or elongated particles, wood, shells, coatings of clay or any other deleterious material. Sub-Base Gravel shall conform to the following limits when tested in accordance with ASTM C117 and ASTM C136/C136M:

US Standard Sieve Size	Gradation Limits (Percent by Weight Passing)
75 mm	100
25 mm	50 - 85
0.15 mm	0 - 15
0.075 mm	0 - 8

9.31 ROAD BASE GRAVEL COURSE

.1 Road Base shall be of uniform quality, crushed to size as necessary and shall consist of sound, tough, durable, highly angular, 100% mechanically crushed fragments. A minimum of 50% of the particles retained on the 4.75 mm (No. 4) sieve shall have at least one fractured face as determined by particle count. Soundness shall be tested in accordance with ASTM C88 using magnesium sulfate. Maximum weighted average losses for coarse aggregate shall be 20% and maximum losses for the fine aggregate shall be 25%. The sand equivalent when tested in accordance with ASTM D2419 shall not be less than 40. The LA Abrasion value when tested in accordance with ASTM C131/C131M shall have a maximum loss by mass of 25%. Road Base Gravel shall conform to the following limits when tested in accordance with ASTM C117 and ASTM C136/C136M:

US Standard Sieve Size	Gradation Limits (Percent by Weight Passing)
19 mm	100
12.5 mm	75 - 100
9.50 mm	60 - 90
4.75 mm	40 -70
2.36 mm	27 - 55
1.18 mm	16 - 42
0.600 mm	8 - 30
0.300 mm	5 - 20
0.075 mm	2 - 8

.2 The Contractor shall submit proposed base course gradation for the works, to be approved by City Engineer. Upon approval, this gradation curve shall become the project gradation. All samples of base course aggregate used on the project shall conform to the following requirements: ***(REVISED JUNE 2026)***

(a) Deviation between samples and the project gradation shall not exceed the following limits:

US Standard Sieve Size	Gradation Limits (Percent by Weight Passing)
Larger than 2.36 mm	±3.5%
1.18 mm - 2.36 mm	±3.5%
0.3 mm - 0.6 mm	±2%
0.075 mm - 0.15 mm	±1%

9.32 RECYCLED AGGREGATE MATERIAL (RAM)

.1 Aggregates containing recycled material may be utilized up to the bottom of the sub base layer if approved by the Professional of Record. In addition to meeting the requirements of this specification, recycled material should not reduce the quality of construction achievable with quarried materials. RAM shall consist only of aggregates, crushed Portland cement concrete or asphalt that is free of impurities. Other construction and demolition materials such as bricks and plaster are not acceptable. The use of any recycled material must be approved by the City Engineer prior to use. ***(REVISED JUNE 2026)***

.2 RAM shall conform to the requirements of Section 9.30 – Road Sub-Base Gravel Course [→] and Section 9.31 – Road Base Gravel Course [→], and have the following additional requirements:

(a) Maximum asphalt content 1.0%.

(b) Maximum percent asphalt coated aggregate not to exceed 20%.

(c) Percentage (%) Loss in LA Abrasion – Coarse Aggregate: Maximum 30.

(d) Soundness shall be tested in accordance with ASTM C88 using magnesium sulfate. Maximum weighted average losses for coarse aggregate shall be 20% and maximum losses for the fine aggregate shall be 25%.

(e) California Bearing Ration (CBR) – Minimum 50.

.3 RAM shall meet the following gradations:

(a) 75 mm Minus RAM gradation shall be in accordance with Section 9.30 – Road Sub-Base Gravel Course [→].

(b) 25 mm Minus RAM gradation shall be in accordance with Section 9.31 – Road Base Gravel Course [→].

9.33 CLEAR CRUSH

.1 19 mm fracture shall be of uniform quality, crushed to size as necessary and shall consist of sound, tough, durable, highly angular, 100% mechanically crushed fragments with two or more fractured faces having a rough surface texture. It shall be free from an excess of flat or elongated particles, wood, shells, coatings of clay or any other deleterious material. 19 mm fracture shall conform to the following limits when tested in accordance with ASTM C117 and C136/C136M:

US Standard Sieve Size	Gradation Limits (Percent by Weight Passing)
25 mm	100
19 mm	0 – 100
9.5 mm	0 – 5
4.75 mm	0

9.34 PEA GRAVEL

.1 Pea Gravel shall consist of round stone and shall conform to the following limits when tested in accordance with ASTM C117 and ASTM C136/C136M:

US Standard Sieve Size	Gradation Limits (Percent by Weight Passing)
9.5 mm	100
4.75 mm	50 – 100
2.36 mm	10 – 35
1.18 mm	5 – 15
0.600 mm	0 – 8
0.300 mm	0 – 5
0.150 mm	0 – 2
0.075 mm	0

SECTION 9 – AGGREGATES AND GRANULAR MATERIAL SPECIFICATION

9.35 FISH HABITAT GRAVEL *(REVISED JUNE 2026 Moved from Section 4.0)*

.1 Gravel shall be composed of inert, non-fractured smooth washed aggregate.

.2 Gradation:

Gradation Limits (Percent by Volume & Percent by Weight)		
US Standard Sieve Size	**Gradation Limits (Percent by Weight Passing)**	**Percent By Volume**
100 mm	100	0
75 mm	95	5
50 mm	80	15
37.5 mm	60	20
19 mm	25 - 30	30 - 35
9.5 mm	10 - 15	10 - 20
6.3 mm	0 - 15	0 - 5

9.40 STOCKPILING

.1 All aggregate materials shall be stockpiled prior to use at either the crushing site or such other location on the Works, to be approved by the City Engineer. Stockpile sites shall be cleared of all vegetation, trees, brush, rocks and other debris and covered with a uniform layer of pit run gravel prior to deposition of the material. ***(REVISED JUNE 2026)***

.2 Stockpiles shall be built up in layers not exceeding 1.0 m in thickness to a minimum height of 3 m in such a manner as to prevent any appreciable segregation. End dumping over the edge of the stockpile will not be permitted.

.3 Planks or protected runways for vehicles shall be provided as necessary to prevent contamination of the stockpile.

9.41 ROADWAY CONSTRUCTION CONDITIONS

.1 Construction shall not be undertaken during snow, heavy rain, freezing, or other unsuitable conditions. Aggregate shall not be placed upon a frozen, wet, muddy or rutted subgrade or sub-base surface, unless otherwise directed by the Professional of Record. ***(REVISED JUNE 2026)***

9.42 STRIPPING

.1 Prior to commencing excavation operation, those areas designated in the Plan shall be stripped of all overburden and topsoil. Overburden shall be disposed of as specified in Section 4.11 – Disposal of Excavated Material []. Topsoil shall be stockpiled at locations approved by the Professional of Record. Stumps, boulders, and other deleterious matter shall be removed from the topsoil and disposed of as specified in Section 4.11 – Disposal of Excavated Material []. ***(REVISED JUNE 2026)***

9.43 SUBGRADE PREPARATION

.1 In areas where, after stripping, a fill in excess of 150 mm is required to bring the finished subgrade to the design subgrade elevation, earth fill or rock fill shall be placed as specified elsewhere herein.

.2 In areas where after stripping, a cut or a fill of 150 mm or less is required to bring the finished subgrade to the design subgrade elevation, the subgrade shall be scarified to a minimum depth of 150 mm below the design subgrade elevation and all material windrowed to one side. The exposed surface shall then be compacted to 90% of Modified Proctor Density (ASTM D1557), the windrowed material moved, and the compaction repeated on the other side. Windrowed material shall then be brought to its optimum moisture content, shaped to line and grade, and compacted to 95% of Modified Proctor Density (ASTM D1557).

.3 At transitions between cut and fill areas, the subgrade in the cut area shall be scarified and recompacted as specified above to a depth of 150 mm for a distance of 20 m beyond the transition from a fill.

.4 The subgrade in cut areas shall be prepared 600 mm wider on each side than the required width of the finished base course. In fill areas, embankments shall be constructed to the required width of the finished base course as shown on the drawings with the specified side slopes. The finished subgrade shall be crowned and sloped as required to prevent ponding of water on the roadway.

.5 Soft or unstable subgrade material shall be excavated and replaced as specified in Section 4.09A – Authorized Overexcavation []. If, in the opinion of the Professional of Record, the overexcavation is necessitated as a result of the Contractor's operations, it will be classified as unauthorized overexcavation. ***(REVISED JUNE 2026)***

9.44 WATERING FOR COMPACTION AND DUST CONTROL

.1 The Contractor shall maintain suitable watering equipment on the site. Watering shall be performed as directed by the Professional of Record to control dust and to ensure optimum moisture conditions during compaction, determined by Modified Proctor Testing (ASTM D1557) for placement of all backfill materials. ***(REVISED JUNE 2026)***

.2 Water shall be supplied uniformly from a pressure type distributor equipped with suitable control apparatus and a spray bar and nozzles similar to those used on asphalt distributors. Splash plate type distributors or distributors with spray bars which discharge jets or water require approval by the City Engineer. ***(REVISED JUNE 2026)***

9.45 EARTH FILLS

.1 Earth fills shall be constructed in such a manner that they will be completely stable at all times during construction. Silts and clays shall not be used without proper aeration and drying. Placing of frozen material in fill areas will not be permitted.

.2 Earth fills not exceeding 600 mm (compacted thickness) shall be constructed in layers not exceeding 150 mm (uncompacted thickness). Each layer shall be compacted to 95% Modified Proctor Density (ASTM D1557).

.3 Earth fills exceeding 600 mm (compacted thickness) shall be constructed in layers not exceeding 200 mm (uncompacted thickness). Each layer shall be compacted to 95% Modified Proctor Density, except the top 600 mm (compacted thickness) which shall be constructed as per Section 9.45.2 [→].

.4 Where shown on the construction drawings, or as directed by the Professional of Record, the existing side slopes shall be scarified or terraced to ensure proper bond between existing and fill materials. Methods shall be approved by the Professional of Record prior to commencing work. ***(REVISED JUNE 2026)***

.5 Should any soft spots develop during the process of compaction, such areas shall be excavated and replaced as specified in Section 4.09A – Authorized Overexcavation []. If in the opinion of the Professional of Record, the excavation is necessitated as a result of the Contractor's operation, it will be classified as unauthorized overexcavation. ***(REVISED JUNE 2026)***

9.46 ROCK FILLS

.1 Rock fills shall be constructed in layers equal in thickness to the largest average size of the material, but not exceeding 600 mm. Material shall be placed and spread in such a manner that the larger rocks are well distributed and the intervening void spaces are filled with sufficient amounts of smaller rocks and fines to create a stable structure. Fill surface voids at the subgrade level to prevent migration of sub-base gravels into the rock fill.

9.47 PLACING AND COMPACTING AGGREGATES

.1 The subgrade shall be approved prior to placement of the sub-base course.

.2 All aggregates and granular materials shall be approved by the Professional of Record prior to being delivered to the project site. Approval shall require testing as per Section 9.21 – Testing [→]. ***(REVISED JUNE 2026)***

.3 Sub-base and base course shall be placed on the approved subgrade in those locations and to the compacted thicknesses and dimensions shown on the drawings or as otherwise directed by the Professional of Record. Testing shall be in accordance with Section 9.21 – Testing [→], clause 9.21 .4 – Proof Rolling and . ***(REVISED JUNE 2026)***

.4 Aggregates shall be placed in maximum 300 mm loose lifts unless otherwise specified and shall be spread in an approved manner such that the aggregate is neither segregated nor contaminated with foreign material. Segregated materials shall be remixed until uniform. The sub-base course shall be approved prior to placement of the base course.

.5 Immediately following spreading, aggregates shall be graded and compacted at optimum moisture content to 95% of Modified Proctor Density (ASTM D1557).

9.48 FINISHED GRADE

.1 The finished grade surface of the compacted subgrade shall be within 15 mm of the design grade and cross section, but not uniformly high or low, when measured with a 3.0 m straightedge parallel or perpendicular to the road centreline.

.2 The finished grade surface of the compacted sub-base course shall be within 15 mm of the design grade and cross section, but not uniformly high or low, when measured with a 3.0 m straightedge parallel or perpendicular to the road centreline.

.3 The finished grade surface of the compacted base course shall be within 10 mm of the design grade and cross section, but not uniformly high or low, when measured with a 3.0 m straightedge parallel or perpendicular to the road centreline.

9.49 CLEANUP

.1 Prior to completion of construction, all existing and newly constructed drainage ditches, waterways, and culverts shall be cleaned to restore their full effectiveness. Boulevards and all other areas affected by the construction operation shall be cleaned of all loose rock, boulders and the debris and in all respects prepared suitable for placement of topsoil or as otherwise directed by the Professional of Record. ***(REVISED JUNE 2026)***

9.50 BOULEVARD GRADING

.1 Boulevard areas and other areas within the road allowance or right-of-way shall be sloped, graded with 100 mm of topsoil and seeded with grass as shown on the drawings. The requirement for placement of topsoil and grass seeding shall be determined by the Professional of Record. As a general statement, topsoil placement and grass seeding is not required in boulevards fronting undeveloped lots. ***(REVISED JUNE 2026)***

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SECTION 10 – ROADWAY LIGHTING AND TRAFFIC SIGNALS DESIGN CRITERIA

10.01 ROADWAY LIGHTING

.1 Lighting Levels for Standard Roadways, Intersections, and Traffic Circles:

(a) Roadways, bikeways and pedestrian walkways shall be illuminated for nighttime safety and comfort of motorists, cyclists and pedestrians.

(b) Required roadway illuminance levels and uniformity ratios are listed in Table 1 below. Calculations shall be undertaken using the illuminance method in the most current edition of the ANSI/IESNA RP-8 – Roadway Lighting standard practices. Street classifications are described in Section 8.0 – Transportation []. ***(REVISED JUNE 2026)***

(c) Sidewalks, bike paths and multi-use paths are to be illuminated as indicated in Table 1. If the roadway lighting does not light pedestrian and cycling areas adequately, supplemental lighting poles or additions to the roadway lighting davit (mounted to the shaft or on a separate arm) may be required.

(d) Required sign illuminance levels and uniformity ratios shall be in accordance with the most current edition of the ANSI/IESNA RP-19 – Roadway Sign Lighting.

(e) The term 'conflict' refers to areas where vehicle-to-vehicle or vehicle-to-pedestrian conflicts may occur as defined in IESNA RP8.

(f) Illumination levels for intersecting roadways shall be the sum of the minimum averages of each roadway with the lowest minimum uniformity ratio from the intersecting roadways. This higher lighting zone shall be extended to include the conflicts resulting at crosswalks, sidewalks, bike paths, and multi-use paths. Intersections of roadway lanes with other roadway types are exempt from this requirement. ***(REVISED JUNE 2026)***

(g) The maintained average horizontal illuminance level, average to minimum uniformity ratios and roadway classification for each roadway shall be noted on the Design Drawings.

(h) Pedestrian Area Classification level shall be as directed by the City or as determined by the Engineer.

TABLE 1

Street Classification *(REVISED JUNE 2026)*	**Maintained (*) average horizontal illumination level to meet or exceed (lux)**			**Average to minimum uniformity ratio not to exceed**
	High Pedestrian Conflict Area	**Medium** Pedestrian Conflict Area	**Low** Pedestrian Conflict Area	
Arterial	18	14	14	3:1
Collector	12	9	6	3:1
Local	9	7	4	6:1
Sidewalks, Paths, Bike Facilities	10	5	4	6:1
Lane	4	4	4	6:1

(*) Maintained levels shall include a total Light Loss Factor (LLF) of 0.85 as discussed in Table 4.

.2 Lighting Levels for Roundabouts:

(a) Due to the unique geometry of roundabouts, these intersections involve additional lighting requirements and should be designed in accordance with the principles of Transportation Association of Canada ***Guide for the Design of Roadway Lighting***.

(b) Each approach to a roundabout shall be illuminated in accordance with Section 10.01.1 [→] for a distance of 80 m from the roundabout.

(c) The area within the intersection shall have a horizontal illuminance level and uniformity in accordance with Section 10.01.1 [→].

(d) Each crosswalk in the roundabout shall have a minimum vertical illuminance level for the direction of on-coming traffic that is equivalent to the minimum horizontal illuminance level for the intersection.

(e) Vertical illuminance may sometimes be more efficiently achieved with lower pole heights. As such, 7.6 m poles should be considered for these applications.

.3 Lighting Levels for Mid-Block Crosswalks:

(a) Mid-block crosswalks can present a higher risk to pedestrians than crosswalks at intersections as drivers may not expect pedestrians at these locations. As such, these crosswalks involve additional lighting requirements and should be designed in accordance with the principles Transportation Association of Canada ***Guide for the Design of Roadway Lighting***.

(b) The area within the crosswalk shall have a horizontal illuminance level and uniformity in accordance with Section 10.01.1 [→].

(c) The crosswalk shall have a minimum vertical illuminance level for the direction of on-coming traffic of 20 lux for low pedestrian conflict, 30 lux for medium pedestrian conflict, and 40 lux for high pedestrian conflict.

(d) Vertical illuminance may sometimes be more efficiently achieved with lower pole heights. As such, 7.6 m poles should be considered for these applications.

.4 Lighting Levels for Cul-De-Sacs:

(a) Due to the geometry of cul-de-sacs, maintaining minimum illuminance levels and uniformity commonly results in overlighting the area and excessive light pollution. Due to the reduced traffic and low travel speeds at cul-de-sacs, the requirements are relaxed at these locations.

(b) Lighting levels for a cul-de-sac shall be considered to be met with a single streetlight pole, with the same luminaire and height as the remainder of the street, placed within 5 m of the beginning of the cul-de-sac curve.

.5 Luminaire Pole Spacings:

(a) Spacing and location of poles shall be governed by roadway width, roadway configuration, intersecting property lines, luminaire photometrics, mounting heights and required illumination levels. In addition maintaining clearances to overhead BC Hydro power lines in accordance with the *Canadian Electrical Code,* WorkSafeBC*,* BC Hydro Standards, and the *BC Electrical Safety Act* shall also govern pole spacing. ***(REVISED JUNE 2026)***

(b) Generally, poles shall be arranged in a one sided or staggered spacing based on the street classifications listed in Table 2. In circumstances where overhead BC Hydro power lines are in conflict with streetlight poles, one sided spacings may be considered if the required illumination level and uniformity ratios can be achieved. Alternate pole spacings shall meet the approval of the City Engineer. ***(REVISED JUNE 2026)***

(c) Where possible locate poles on property lines to avoid driveway conflicts.

(d) Streetlight poles shall be offset as shown on the "Typical Cross Section Standard Drawings" in Section 8.0 – Transportation []

(e) Where the posted travel speed for the roadway exceeds 60km/h, poles should be placed outside of the Clear Zone. If absolutely necessary, poles located within the Clear Zone shall be equipped with frangible or breakaway bases in accordance with the Ministry of Transportation and Transit ***Electrical and Traffic Engineering Manual***. The Clear Zone shall be specified by the TAC ***Geometric Design Guide for Canadian Roads***, current edition, unless approved by the City Engineer. ***(REVISED JUNE 2026)***

TABLE 2

Street Classification *(REVISED JUNE 2026)*	**Pole Arrangement**
Arterial	Staggered or Opposite
Collector	Staggered
Local	One Sided
Lane	One Sided
Walkway	One Sided

.6 Luminaire types, Pole types and Lumen Outputs:

(a) Luminaire types, pole types and lumen outputs are as listed in Table 3.

(b) Where tying into an existing system or area luminaire types, wattages and mounting heights should match those previously installed except that LED luminaires shall be used where existing HPS luminaires are present.

(c) LED luminaires shall have a colour temperature of 3,000 K or 4,000 K. Refer to Table 3 to determine which colour temperature is required for specific street classifications. Note the following: *(REVISED JUNE 2026)*

(i) Intersections between two roadways with differing colour temperatures shall be lit with the higher of the colour temperatures. *(REVISED JUNE 2026)*

(ii) Sidewalk, Bike Path, Multi-Use Path, and Walkway colour temperature shall match corresponding roadway colour temperature. *(REVISED JUNE 2026)*

(iii) Colour temperature for Local roadway shall match surrounding fixtures where possible but default to 4,000 K when no existing LED fixtures are present. *(REVISED JUNE 2026)*

(d) The City may overrule this prescribed colour temperature selection procedure on a case-by-case basis based on specific neighborhood requirements. *(REVISED JUNE 2026)*

(e) Luminaire manufacturers, model numbers, wattages, distributions, voltage, Northing, Easting and elevation shall be noted on the Design Drawings. Refer to Section 1.0 Standard Drawing No. G7 [].

(f) Luminaires shall be listed on the City of Nanaimo Approved Product List [].

TABLE 3

Street Classification *(REVISED JUNE 2026)*	Colour Temp.	11.0 m High Davit Pole (*) with Flat Glass Luminaire	9.0 m High Davit Pole with Flat Glass Luminaire	7.5 m High (or Lower) Davit Pole (**) with Flat Glass Luminaire	4.5 m High Post Top Pole with Post Top Luminaire
Arterial	4,000K	15,500 to 18,000 lumens, LED	9,000 to 10,500 lumens, LED		-
Collector	4,000K	15,500 to 18,000 lumens, LED	9,000 to 10,500 lumens, LED		-
Local	3,000K/ 4,000K		6,000-7,300 lumens, LED	6,000-7,300 lumens, LED	3,500-4,700 lumens, LED
Sidewalks, Bike Paths, Multi-Use Paths, Walkways (Back light or separate 3.05 m pole)	3,000K/ 4000K		1,300-2,700 lumens, LED	1,300-2,700 lumens, LED	1,300-2,700 lumens, LED
Lane	3,000K				3,500-4,700 lumens, LED

(REVISED JUNE 2026)

(*) With the exception of 4 lane roadways, 11.0 m poles shall be avoided where possible and only be used with approval from the City Engineer. *(REVISED JUNE 2026)*

(**) For use to avoid conflicts with overhead powerlines or on local streets or lanes. In all cases the use of davit poles less than 9.0 m must meet the approval of the City Engineer. If a 6.7 m pole cannot be installed due to conflicts with overhead powerlines, then junction boxes may be installed in place of new street light poles (for future installation of poles) with prior approval from the City Engineer.

.7 Lighting Calculations:

(a) Lighting calculations are based on the illuminance methods described in *ANSI/IESNA RP-8* Roadway *Lighting*. Lighting calculations shall be done using a computer lighting program designed to carry out the required calculations and the luminaire manufacturers IES formatted photometric files. The IES photometric files for the City approved luminaires are available in electronic format, through the luminaire manufacturers.

(b) Grid spacing for walkways or bikeways shall be maximum 1 m.

(c) Lighting calculations shall be based on maintained levels using initial rated lamp lumens and the total light loss factor (LLF) of 0.79. Refer to *Table 4* for the factors included in the LLF. The LLF shall be considered as the total maintenance factor.

TABLE 4

Lamp Lumen Depreciation (LLD)[1]	Luminaire Dirt Depreciation (LDD)[1]	Luminaire Component Depreciation (LCD)[2]	Equipment Factor (EF)[3]	Total Light Loss Factor (LLF)
0.90	0.94	1.00	1.00	0.85

Notes

[1] Based on a 4 year maintenance cycle

[2] Degradation of the luminaire optics

[3] Effect of ambient temperature on the luminaire including the driver and light source factors

LLF = LLD x LDD x LCD x EF

(d) A PDF of the lighting calculations shall be submitted to the City along with the Design Drawings if requested. Refer to Section 1.07 Ornamental Street Lighting Traffic Control Signals, Hydro, Phone, Gas and Cablevision Fibre Optics (Commercial and Private) for design drawing requirements.

10.02 TRAFFIC SIGNALS

.1 Traffic signal controllers and cabinets and siren pre-emption equipment shall be supplied through the City of Nanaimo.

.2 For development projects requiring traffic signals the cost for the design and the supply of traffic signal systems including all related signs, structures, controllers, signal pre-emption and related equipment shall be borne by the Developer.

.3 Traffic signals shall be designed in general accordance with Sections 402.6 of the Ministry of Transportation and Transit ***Electrical and Traffic Engineering Manual***, except that the City of Nanaimo uses NEMA phase designations as opposed to the Ministry movement designations (i.e.; A1, A2, B1, etc.). ***(REVISED JUNE 2026)***

.4 Traffic signal designs shall also conform to the British Columbia Motor Vehicle Act and the Uniform Traffic Control Devices for Canada.

10.03 CONDUIT

.1 Conduits shall be parallel or perpendicular to the roadway, and routed to run in a direct line between adjacent poles or junction boxes. Street lighting conduits shall be run under sidewalks, unless otherwise noted.

.2 There shall be a maximum 2 - 90° bends in a conduit run. Where this cannot be avoided junction boxes shall be used as noted under Section 10.04 – Junction Boxes [→].

.3 Street lighting conduit shall be minimum 38 mm diameter.

10.04 JUNCTION BOXES

.1 Large round plastic junction boxes shall generally be used as follows:

(a) where the maximum number of 90° bends in a conduit run is exceeded.
(b) where branch conduit runs are required.
(c) in conduit runs over 100m.
(d) at service panels.
(e) at post mounted flashers.

.2 Rectangular plastic junction boxes shall be used in narrow traffic islands where a round box will not fit.

.3 Concrete junction boxes shall be used next to traffic signal controllers and in driveways only.

.4 Junction boxes in roadways should be avoided at all times. If absolutely required in a roadway, the junction box shall be a custom concrete box with an H20 dynamic rated riser and ductile iron manhole lid. Custom concrete junction boxes shall meet the approval of the City Engineer.

10.05 CONDUCTORS

.1 For the purpose of standardization and to accommodate future expansion, street lighting conductors shall be No. 4 AL RW90 and No. 6 AL RW90 bond. The use of alternate conductor sizes will require the approval of the City Engineer.

10.06 SERVICE EQUIPMENT

.1 The designer shall confirm service locations with BC Hydro.

.2 Street lighting systems are controlled with a lighting contactor and photocell. The photocell shall be located on the luminaire nearest the service panel.

.3 Service panels for street lighting systems shall have a 2P breaker (30 A for Local roadways, 60 A for all other roadways), contactor and photocell bypass switch and shall be mounted in a service base as shown on Standard Drawing No. E-10.1 [] and wired as shown on Standard Drawing No. E-10.2 and Standard Drawing No. E-10.3 []. ***(REVISED JUNE 2026)***

.4 Where possible traffic signal and street lighting systems shall be fed from the same service panel. The combination street lighting and traffic signal service panel shall have a metered 100 A – 2P main breaker, sub-breakers, contactor, photocell bypass switch and where required a flasher control unit. The service panel shall be mounted in a service base of on the side of the traffic controller. Refer to Standard Drawings No. E-10.1 [], E-10.3 [], E-10.4 [], and E-10.5 [] for details. ***(REVISED JUNE 2026)***

.5 All services shall be 120/240V single phase, 3 wire. Alternate service voltage must meet the approval of the City Engineer.

10.07 CONCRETE BASES

.1 The Professional of Record shall assess the existing soil conditions at the proposed concrete base installations to determine if modifications to the standard drawings are required. The Professional of Record shall report sub-standard soil conditions to the Electrical Engineer for integration into the electrical design. ***(REVISED JUNE 2026)***

.2 The Professional of Record shall submit for approval by the City Engineer, the design modifications to the standard drawings that are required to meet the existing soil conditions. ***(REVISED JUNE 2026)***

.3 Avoid running more than two conduits into a streetlight pole base. Where this situation cannot be avoided a junction box shall be used.

.4 When the selecting pole base locations search out proposed or existing utility locations to avoid conflicts.

10.08 -NOT USED-

SECTION 10 – ROADWAY LIGHTING AND TRAFFIC SIGNALS SPECIFICATIONS

10.20 SCOPE

.1 This specification refers to the materials for street lighting and traffic installations. Only those products approved by the City Engineer and listed on the City of Nanaimo Approved Product List [] will be accepted for installation. When the City of Nanaimo Approved Product List [] does not list a product, the Ministry of Transportation and Transit Recognized Product List shall be referenced. Only those products approved by the City Engineer will be accepted for an installation. ***(REVISED JUNE 2026)***

.2 All materials shall be new unless otherwise noted.

.3 All material shall meet or exceed the *Canadian Electrical Code* Requirements and Canadian Standards Association Standards, where applicable, and are subject to the approval of the Electrical Safety Branch Inspector prior to installation.

.4 All similar items of materials shall be of one type and from the same manufacturer.

.5 Unless otherwise noted, the following materials shall be supplied by the City of Nanaimo at the Developers expense:

(a) Traffic Controllers/Cabinets;
(b) Padlocks;
(c) Siren pre-emption systems; and
(d) Street light pole locking handhole covers.

10.21 CONDUIT

.1 Exposed Conduit:

(a) All exposed conduit shall be rigid steel unless otherwise noted on the Standard Drawings.
(b) Rigid steel conduit shall be hot-dipped galvanized and shall conform to CSA C22.2 No. 45.
(c) Rigid still conduit clamps and fitting shall be hot dip galvanized.
(d) All rigid conduit ends shall be reamed and all necessary bushings, locknuts, elbow and bends shall be provided.
(e) All joints shall be made with threaded couplers.

.2 Buried Conduit:

(a) Buried conduit couplings, adaptors, bends and fittings shall be rigid unplasticized PVC.
(b) Rigid PVC conduit shall conform to CSA C22.2 No. 211.2.
(c) Rigid PVC couplings, adaptors, bends and fittings shall conform to CSA C22.2 No. 85.
(d) Only factory conduit bends are acceptable.
(e) Conduit cement shall be CSA certified type.

(f) Each standard length of conduit, couplings, adaptors, bends and fittings shall bear a CSA certification label.

.3 Concrete for conduit encasement shall conform to Section 11.0 – Cast In Place Concrete Works []. Concrete encasement will only be required where specifically noted on the Contract Drawings or where directed by the City Engineer. ***(REVISED JUNE 2026)***

.4 In locations with concrete encasement is not required, bedding sand shall be used in accordance with Section 4.0 – Trench Excavation, Bedding and Backfill [].

10.22 TRENCH MARKER TAPE

.1 Trench marker tape shall be 150 mm wide yellow and shall be labelled “CAUTION – ELECTRICAL LINE BURIED BELOW”.

.2 Tape shall be minimum 3.5 mils thick heavy duty polyethylene material.

10.23 JUNCTION BOXES

.1 Large round and rectangular plastic junction boxes and lids shall be manufactured in accordance with the Ministry of Transportation and Transit ***Electrical and Traffic Engineering Manual***. ***(REVISED JUNE 2026)***

.2 Concrete junction boxes shall be in accordance with Standard Drawing No. E-3.2 [] and Standard Drawing E-3.3 [].

.3 Custom concrete junction boxes for roadways shall be installed as per the Contract Drawings.

.4 All junction boxes shall have galvanized steel lids.

10.24 CONCRETE BASES

.1 Concrete bases shall be in accordance with the Standard Drawings.

.2 Concrete bases shall be pre-cast. Poured in place concrete bases shall meet the approval of the City Engineer.

.3 Concrete for cast in place concrete bases shall conform to Section 11.0 – Cast In Place Concrete Works [].

.4 Top of concrete bases shall be troweled smooth and level with beveled edges. Top surface shall not vary by more than 3 mm in depth as measured across the widest surface.

.5 All concrete shall be fully vibrated.

.6 Anchor bolts shall be as shown on Standard Drawing No. E-1.9 [] to Standard Drawing No. E-1.11 []. Anchor bolts shall be manufactured in accordance with the Ministry of Transportation and Transit ***Electrical and Traffic Engineering Manual***. *(REVISED JUNE 2026)*

10.25 POLES AND RELATED EQUIPMENT

.1 Poles, arms, extensions, brackets and clamps shall be as shown on Standard Drawing No. E-5.1 [] to Standard Drawing No. E-5.19 [] and Standard Drawing E-5.21 []. This material shall be manufactured in accordance with the Ministry of Transportation and Transit ***Electrical and Traffic Engineering Manual***. The nominal height of a pole on a service base shall be 0.9 m shorter to allow for the height of the service base. *(REVISED JUNE 2026)*

.2 Service bases shall be designed to meet or exceed the capacity of the pole. Service bases shall meet or exceed the Ministry of Transportation and Transit material standards for the fabrication of poles as per the ***Electrical and Traffic Engineering Manual***. *(REVISED JUNE 2026)*

.3 Post top poles shall meet or exceed the Ministry of Transportation and Transit Material standards for the fabrication of poles as per the ***Electrical and Traffic Engineering Manual***. *(REVISED JUNE 2026)*

.4 All poles, arms, extensions, brackets, clamps and service bases shall be hot dip galvanized.

10.26 CONDUCTORS

.1 All underground wiring that is rated for 40 A and higher, shall be single conductor stranded aluminum with type RW90 XLPE insulation, unless otherwise noted on the Contract Drawings.

.2 Grounding system and connections shall remain copper. Bonding conductors will be aluminum if current carrying conductors are aluminum.

.3 All aluminum terminations shall use anti oxidation compound as required by the *Canadian Electrical Code*.

.4 Contractor to use copper/aluminum rated splice hardware for all connections from aluminum to copper wire.

.5 All wiring that is rated for less than 40 A shall be single conductor stranded copper with type RW90 XLPE insulation, unless otherwise noted on the Contract Drawings.

.6 Multi-conductor traffic signal cable shall be 19 conductor IMSA specification 19-1 (stranded copper) unless otherwise noted on the Contract Drawings.

.7 Color coding and gauges (AWG) shall be as noted on the Contract Drawings.

.8 Shielded detector loop cable shall be 2 conductor No. 16 stranded copper and shall meet California Type B Lead in Cable specifications or IMSA specification 50-2 (1984).

10.27 LOOP SEALANTS AND BACKEROD

.1 Loop sealants shall be hot tar.

.2 Backerod shall be foam material. Backerod shall be sized to hold down conductor in loop slot and to resist melting during the pouring of hot tar.

10.28 TRAFFIC AND PEDESTRIAN SIGNAL HEADS AND LAMPS

.1 Traffic and pedestrian signal heads and lamps including backboards and visors shall be manufactured in accordance with the Ministry of Transportation and Transit material standards as per the ***Electrical and Traffic Engineering Manual***. *(REVISED JUNE 2026)*

.2 Signal head layout, size and lamp requirements shall be as follows *(REVISED JUNE 2026)*:

Item	Lens	Required Diameter	Lamp
Primary Heads (Overhead mount)	Red Yellow Green Left Turn (Gr, Yell)	300 mm 300 mm 300 mm 300 mm	LED LED LED LED
Secondary Heads (Side mount)	Red Yellow Green Left Turn (Gr, Yell)	200 mm 200 mm 200 mm 300 mm	LED LED LED LED
Cyclist Heads (Side mount)	Red bicyclist Yellow bicyclist Green bicyclist	200 mm 200 mm 200 mm	LED LED LED
Pedestrian Heads	Combination Walk/Don't Walk Overlay Graphic	300mm square	LED
Pedestrian Countdown Display	Countdown Graphic	300mm square	LED

Notes:

1. All heads shall be mounted vertically.
2. All primary heads shall have backboards with fluorescent yellow reflective sheeting as per the Approved Product List [].

10.29 SIGNAL HEAD, SIGNAL DEVICE, AND SIGN MOUNTING HARDWARE

.1 Signal and sign mounting hardware shall be manufactured in accordance with the Ministry of Transportation and Transit material standards as per the ***Electrical and Traffic Engineering Manual***. *(REVISED JUNE 2026)*

10.30 TRAFFIC VIDEO DETECTION SYSTEM *(REVISED JUNE 2026)*

.1 Traffic detection cameras and associated electronics in the controller cabinet may be used for traffic detection at intersections. The City shall decide if traffic video detection shall be used for a given intersection and specify which specific system shall be used. ***(REVISED JUNE 2026)***

10.31 –NOT USED-

10.32 AUDIBLE SIGNALS

.1 Audible signals shall be manufactured in accordance with the Ministry of Transportation and Transit material standards as per the ***Electrical and Traffic Engineering Manual***. ***(REVISED JUNE 2026)***

10.33 CONNECTORS

.1 Aluminum conductor connections shall be spar-type (aluminum housing with hex lugs) with pre-filled anti-oxidation compound. ***(REVISED JUNE 2026)***

.2 Copper conductor connections shall be screw on type solderless connectors sized to suit conductor size with the exception of those used inside traffic controllers which shall be compression type spade connectors.

.3 Ground clamps shall be copper with bolt down compression connection.

10.34 CONDUCTOR TAGS

.1 Conductor tags in traffic controllers and pole handholes shall be sleeve type markers. Tags shall be designed so they can be snapped onto a conductor.

.2 Conductor tags in junction boxes shall be yellow and shall be a minimum of 60 mm x 50 mm x 0.5 mm thick. Tags shall be rigid and waterproof. Tags shall be supplied with a ty-rap to connect to bundle of conductors. Tags shall be designed to be permanently labelled with a black indelible pen.

10.35 FUSES AND FUSE HOLDERS

.1 Fuses shall be a 10 amp ferrule type to suit fuse holder.

.2 Fuse holders to be inline type with 2 'L' type rubber insulating boots.

10.36 GROUNDING ELECTRODES

.1 Grounding electrodes shall be ground rods or ground plates that conform to the *Canadian Electrical Code*.

.2 Grounding electrodes shall be fabricated from hot dipped galvanized steel**.**

.3 Ground rods shall have a hot forged point.

10.37 PEDESTRIAN PUSHBUTTONS

.1 Pedestrian pushbuttons shall have an integral sign with a raised walk symbol.

.2 Pushbutton unit shall be white with black tactile actuation hand walking symbol and directional arrow. Pushbutton symbols and arrows shall be available in both left and right hand directions.

.3 Pushbutton housing shall be designed to mount against a flat surface and shall be supplied with a rubber gasket for a watertight seal to the pole.

.4 Extend sidewalk to pushbutton (wheelchair accessible). ***(REVISED JUNE 2026)***

10.38 RECEPTACLES

.1 Receptacles shall be 15 A-120 V GFI corrosion resistant spec grade duplex mounted in cast F.S. box.

.2 Covers shall be equipped with spec grade in use covers and be rated for wet location as per *Canadian Electrical Code* requirements.

10.39 LUMINAIRES

.1 Roadway and sign luminaires shall be manufactured in accordance with the Ministry of Transportation and Highways Material Standards.

.2 Post top luminaires shall be:

(a) IES type 2 or type 3 distribution;
(b) Cast aluminum with a glass or polycarbonate refractor;
(c) Vandal resistant;
(d) Equipped with a knockout for photocell where required; and
(e) Powder paint finish.

10.40 SERVICE PANELS

.1 Service panels should be as follows:

(a) 30 A – 120/240 V street lighting, Local roadways only. ***(REVISED JUNE 2026)***
(b) 60 A – 120/240 V street lighting, all other roadways. ***(REVISED JUNE 2026)***
(c) 100 A – 120/240 V street lighting and traffic signal.

.2 Service wiring shall contain equipment show on Standard Drawing No. E-10.3 []to Standard Drawing No. E-10.4 [].

.3 Service panel enclosures shall be stainless steel or powder coated aluminum and shall be waterproof with an EEMAC 3 rating.

.4 Service panels shall be designed for long lift and easy maintenance.

10.41 POST MOUNTED FLASHER LUMINAIRES

.1 Post mounted flasher luminaires shall be manufactured in accordance with the Ministry of Transportation and Transit material standards as per the ***Electrical and Traffic Engineering Manual***. *(REVISED JUNE 2026)*

10.42 PHOTOCELL AND RECEPTACLE

.1 Photocells shall be manufactured in accordance with the Ministry of Transportation and Transit material standards as per the ***Electrical and Traffic Engineering Manual***. *(REVISED JUNE 2026)*

10.43 –NOT USED-

10.44 NUTS, BOLTS AND WASHERS

.1 Nuts, bolts and washers 3/8" Ø or smaller shall be type 18-8 or 316 stainless steel hex head.

.2 Nuts, bolts and washers larger than 3/8" Ø shall be as follows:

(a) Nuts to be galvanized SAE grade 2 heavy hex.

(b) Bolts to be galvanized SAE grade 5.

(c) Washers to be galvanized.

.3 Screws shall be stainless steel Robertson No. 10.

10.45 COLD GALVANIZING COMPOUND

.1 Cold galvanizing compound shall be spray type and shall contain a minimum of 93% zinc in the finished film.

10.46 –NOT USED-

10.47 TRAFFIC CONTROLLERS

.1 Traffic controllers shall be designed to operate signalized intersections.

.2 Traffic Controller Unit (CU) and assembly shall be Type-1 as per National Electrical Manufacturers Association (NEMA) ***Standards Publication No. TS-2***. CU and assembly shall be capable of a minimum 12 fully-actuated phases, and siren pre-emption in all directions.

.3 Malfunction Management Unit (MMU) shall be TS2-Type16 and shall be configured for the required signal phasing.

.4 The controller cabinet shall be base mount, size 6, made of sheet aluminum in accordance with Section 7 of NEMA Standards Publication ***No. TS2-1992, "Traffic Controller Assemblies."*** The controller cabinet shall be supplied complete with all mounting hardware and shall be fully wired for the required signal phasing. Cabinets shall be equipped with a GFI receptacle, a heater, a fan, thermostat controls, a light and a 40A-1P breaker for the power supply feeders. Cabinets shall be primed and finished inside and out with a finish coat of a polyester back enamel paint, Munsel 70 in color. A durable waterproof document pouch shall be located on the cabinet door, containing as built cabinet wiring diagrams and user manuals for the controller and all auxiliary equipment. The cabinet shall be equipped with a police door with key lock access for the following switches:

(a) Signals on/off switch.

(b) Flash/automatic switch.

(c) Manual/automatic switch.

(d) Extendible police cord to 2 metres.

.5 All auxiliary devices such as Bus Interface Units (BIU's), Cabinet Power Supply, load switches, flash switches, shall be NEMA ***TS-2 Standard.*** Detector modules shall be rack mount type.

.6 All traffic signal controller assemblies shall be shop tested prior to delivery and come with a minimum two year warranty on all parts and labor.

.7 The City will supply the Traffic Signal Cabinet, Controller, and other related equipment, unless specified in plans. The Traffic Signal Controller will be programmed and tested by the City prior to installation at the intersection. ***(REVISED JUNE 2026)***

.8 The controller cabinet shall include a UPS system to power the cabinet and all signals and be equipped with sufficient batteries for 6 hours of run time.

10.48 SIREN PRE-EMPTION SYSTEM

.1 Siren pre-emption systems shall be designed to provide exclusive right of way for police, fire, or ambulance vehicles in lieu of the regular sequence of phrases. Siren detectors mounted on the signal pole arms shall detect the sound of the siren send a signal to the traffic controller through a hard wire connection. Lights on digital detectors indicate direction of pre-emption to the drivers.

.2 A siren pre-emption system shall consist of sound-based detectors with indication lights, shielded cables and rack mount interface cards. Refer to Standard Drawing No. E-6.6 [].

.3 Sound-based detectors shall be supplied with suitable hardware to mount on signal pole arms.

.4 Rack mount interface cards shall be installed inside the traffic controller cabinet.

SECTION 10 – ROADWAY LIGHTING AND TRAFFIC SIGNALS INSTALLATION

10.60 CONTRACTOR QUALIFICATIONS

.1 All electrical work to be performed by Registered Electrical and Inspection Contractor under provisions of *British Columbia Safety Standards Act.*

10.61 PERMITS

.1 The Contractor shall obtain and pay for all permits, arrange for electrical inspections covering all work, pay all other fees and charges, and make all deposits that are in any way connected with the installation. The Contractor shall give all necessary notices to authorities having jurisdiction and shall be responsible for complying with all applicable public ordinances.

10.62 CODES AND REGULATIONS

.1 Electrical work shall conform to the latest edition of *Canadian Electrical Code*. In addition, any bulletins published by the Ministry of Housing and Municipal Affairs, Building and Safety Standards Branch, shall also apply. ***(REVISED JUNE 2026)***

.2 All work shall conform to all applicable regulations of WorkSafeBC and if required, a Notice of Project Form 52E49 must be submitted prior to commencing construction. The Contractor shall ensure compliance with the following sections:

(a) WorkSafeBC form 30M33 must be completed prior to working in the vicinity of overhead power lines.

(b) Notice of construction projects, WorkSafeBC *Occupational Health and Safety Regulations*. ***(REVISED JUNE 2026)***

.3 All work on BC Hydro infrastructure will be coordinated with BC Hydro and the City and paid for, in full, by the Applicant, upon invoicing by the City. ***(REVISED JUNE 2026)***

10.63 CERTIFICATE OF INSPECTION

.1 Prior to requesting final inspection the Contractor shall submit to the Professional of Record the Certificate of Inspection signed by the local Safety Officer of the British Columbia Safety Authority. ***(REVISED JUNE 2026)***

10.64 ELECTRICAL POWER SUPPLY

.1 Power shall be supplied from the BC Hydro secondary distribution system at location(s) shown on the Drawings.

.2 Prior to construction the Contractor shall confirm the exact service location(s) with BC Hydro.

.3 The Contractor shall arrange with BC Hydro for connection and disconnection of service, through BC Hydro Street Light Information Management System (SLIM) online at https://app.bchydro.com/ex/streetlight/. For sample forms of SLIM, refer to Appendix J []. All connections and disconnections to be made by BC Hydro.

SECTION 10 – ROADWAY LIGHTING AND TRAFFIC SIGNALS INSTALLATION

10.65 TRENCH EXCAVATION, BEDDING AND BACKFILL

.1 Refer to Section 4.0 – Trench Excavating, Bedding and Backfill []for installation requirements.

.2 Backfill in accordance with Section 4.19 – Backfill and Compaction [].

.3 Where soil conditions and/or foundations are unstable, the Contractor shall notify the Professional of Record in order that a special pole base design change can be considered. ***(REVISED JUNE 2026)***

10.66 CONCRETE BASES

.1 Concrete bases shall be installed as shown on Standard Drawing No. E-1.1 [] to Standard Drawing No. E-1.14 [] and Standard Drawing No. E-2.1 [] to Standard Drawing E-2.3 [].

.2 Minimize disturbance to surrounding soil when excavating.

.3 Concrete base installation tolerances to be as follows:

(a) Horizontal location to be within 150 mm of specified.

(b) Vertical elevation to be within 10 mm or specified.

(c) Top surface variation from level shall not exceed 3 mm.

(d) Top of base shall be a minimum of 25 mm proud of surrounding grade. The standard dimensions from grade to the top of base are shown in the Standard Drawings.

.4 Where poured in place are proposed the Contractor shall provide details of how they plan to carry out the work. In all cases wooden formwork shall be removed prior to poured in place backfilling bases. Where form tube foundations have been utilized, round tube forms may be buried.

.5 Concrete bases shall have a compressive strength of 30 MPa and all backfill shall be fully compacted prior to pole installation.

.6 No concrete base shall be installed closer than 3 m from a fire hydrant.

10.67 JUNCTION BOXES

.1 Install junction boxes in accordance with the Standard Drawings No. E-3.1 [] through to Standard Drawing No. E-3.4 [].

.2 Only concrete junction boxes shall be installed in driveways or other surfaces with low speed vehicle traffic.

.3 Custom concrete junction boxes shall only be installed where indicated on the Contract Drawings.

10.68 CONDUITS

.1 Underground conduits shall be installed in an open trench as shown on Standard Drawing No. E-4.1 [] and Standard Drawing No. E-4.2 [] unless otherwise noted on the Contract Drawings.

.2 Minimum cover over conduits shall be 600 mm, except that cover for street light conduits placed under concrete sidewalk may be reduced to 300 mm.

.3 Where shown on the contract drawings, install conduits under the pavement to elevations specified using a suitable trenchless technology. ***(REVISED JUNE 2026)***

.4 Empty conduits shall be provided with a nylon pull string and capped.

.5 Conduits laid near other underground infrastructure shall maintain the required minimum clearances.

.6 Crossing over of conduits shall be kept to a minimum.

.7 Where conduits are stubbed and capped for future connection, the contractor shall install an iron stake below grade to mark the location.

10.69 TRENCH MARKER TAPE

.1 Trench marker tape shall be installed above and directly over the conduit as shown on Standard Drawing No. E-4.1 [] and Standard Drawing No. E-4.2 [].

10.70 POLES

.1 Install poles and related equipment as shown on the Standard Drawings.

.2 Poles shall be erected plumb.

.3 Where minimum pole to powerline clearances as shown on Standard Drawing No. E5.20 [] cannot be maintained, advise the Professional of Record and defer further work pending instruction. ***(REVISED JUNE 2026)***

.4 Take all precautions necessary to ensure adequate protection of existing works and personnel during installation of poles.

.5 Install davit pole arms at right angles to the street centerline unless otherwise noted on the Contract Drawings.

.6 Confirm pushbutton and signal head locations prior to drilling and assembling poles.

.7 Field drilling of holes larger than 33 mm diameter is not allowed in type 1, 3, 6, 7, & L shafts, and all arms and extensions. Where larger holes are required, they shall be reinforced with a welded bushing prior to galvanizing.

.8 All poles and related hardware to be handled with care to prevent stress to components through bending or twisting. Use nylon slings to transport and erect components. Use of steel chains as slings are not permitted. The Contractor shall repair or replace any damage to the components through overstress, scratching or denting to the acceptance by the City Engineer. ***(REVISED JUNE 2026)***

.9 Tighten all nuts and bolts to 1/3 past snug tight. “Snug-tight” is tightness attained by a few impacts of an impact wrench or full effort of a person using a spud wrench.

.10 All scratches in poles and field drilled holes shall be coated with 2 coats of cold galvanizing compound.

.11 . Installation of the locking handhole covers is the contractor’sresponsibility. Refer to detail on Standard Drawing E-5.19 []. ***(REVISED JUNE 2026)***

.12 Poles shall be cleaned after erection.

10.71 TRAFFIC AND PEDESTRIAN SIGNAL HEADS

.1 Install traffic and pedestrian signal heads as shown on Standard Drawing No. E-6.1 [] to Standard Drawing No. E-6.5 [].

.2 Securely attach traffic and pedestrian signal heads and mounting hardware to the pole.

.3 Confirm final traffic and pedestrian signal head aiming on site with City Engineer. ***(REVISED JUNE 2026)***

.4 Completely cover all traffic and pedestrian signal heads, or turn the heads inward so they are not visible to traffic, from the time they are installed until system startup. ***(REVISED JUNE 2026)***

10.72 AUDIBLE SIGNALS

.1 Install audible signals as shown on Standard Drawing No. E-7.1 [].

.2 Aim, tune and adjust audible signal as per manufacturer's instructions.

.3 Wire each audible pedestrian signal through the pole and connect into the pedestrian signal head which controls the audible signal.

.4 Audible tones and decibel levels should meet the recommended tones as outlined in the Canadian National Institute for the Blind – CNIB Position for Accessible Pedestrian Signals in Canada.

10.73 PEDESTRIAN PUSHBUTTONS

.1 Install pedestrian pushbuttons as shown on Standard Drawing No. E-8.1 [].

.2 Securely attach pedestrian pushbuttons and signs to the pole.

.3 Completely cover pushbutton signs from time they are installed until system startup. ***(REVISED JUNE 2026)***

.4 Extend sidewalk to pushbutton (wheelchair accessible).

10.74 LUMINAIRES AND PHOTOCELLS

.1 Install luminaires and photocells in accordance with manufacturer's instructions.

.2 Luminaires shall be cleaned after pole erection and plumbing is complete.

.3 Securely attach the luminaire to the pole.

.4 Cobra head luminaires shall be installed such that the bottom face is parallel to the roadway surface. The head shall be rotated to match the roadway grade. ***(REVISED JUNE 2026)***

.5 Aim photocells north.

10.75 MEDIAN SIGNAGE AND POST MOUNTED FLASHERS

.1 Install median signage in accordance with the Ministry of Transportation and Transit material standards as per the ***Electrical and Traffic Engineering Manual***. ***(REVISED JUNE 2026)***

.2 Install post mounted flashers in accordance with the Ministry of Transportation and Transit material standards as per the ***Electrical and Traffic Engineering Manual***. ***(REVISED JUNE 2026)***

10.76 UNDERGROUND DIP SERVICE

.1 Install underground dip service as shown on Standard Drawing No. E-9.1 [].

10.77 SERVICE PANELS

.1 Service panels for street lighting shall be mounted in a service base. Service panels for intersections will be mounted on a nearby luminaire pole, or on a pole dedicated for the service panel. ***(REVISED JUNE 2026)***

.2 Wiring shall be in accordance with the Standard Drawing No. E-10.3 []to Standard Drawing No. E-10. 5 [].

.3 Service panels and the electrical equipment inside shall be protected against the entrance of dust, dirt, moisture, and mechanical damage during construction.

.4 Unused opening in the sheet steel panels shall be plugged with suitable corrosion resistant plugs.

.5 Securely attach service panels inside the service base. ***(REVISED JUNE 2026)***

10.78 WIRING

.1 Before pulling conductors through the conduit, the conduit shall be blown out with compressed air from both ends and then swabbed out to remove all stones, dirt, water and other foreign material from the conduit.

.2 No conductor shall be drawn into any raceway until all work of any nature that may cause damage to the conductor or its insulation has been completed. During pulling, the conductors shall be fed carefully into the raceway to prevent stretching, twisting, kinking or looping. Only talc or other CSA approved lubricants shall be used to assist in the pulling operations. Grease type lubricants shall not be permitted.

.3 Wiring to conform to requirement of the *Canadian Electrical Code*.

.4 Wiring shall be installed in pole handholes as shown on Standard Drawing No. E-12.1 [] and Standard Drawing No. E-12.2 [].

.5 With exception of detector loop conductor to shielded cable splices, all conductor splices shall be made in pole handholes. Splices of detector loop conductor to shielded cable shall be made in junction boxes. See Standard Drawing No. E-14.4 [] for detector loop splice details.

.6 Signal cable colour coding shall be as shown on the Contract Drawings.

.7 Shielded cables shall run with no splices from controller to the respective loop or device.

.8 Single conductor sizes and colours shall be as shown on the Contract Drawings.

.9 With the exception of detector loop cables, bundle and label conductors in junction boxes with tags specified in Section 10.34 – Conductor Tags, *clause 10.34.2* [→]. Labels shall be as follows:

(a) Street Lighting – STLTG.
(b) Photocell – PEC.
(c) Controller Power – CONT PWR.
(d) Signal Cable – SIGNAL CABLE No. 1, No. 2, ETC.
(e) Post Mounted Flasher – FLASH.
(f) Advance Warning Sign – AWS1, AWS2, ETC.

.10 Label conductor groupings in controllers and pole handholes with sleeve type markers as specified in Section 10.34 – Conductor Tags, clause 10.34.1 [→]. Labels shall be as follows: (***(REVISED JUNE 2026)***

(a) Street Lighting – STLTG.
(b) Photocell – PEC.
(c) Controller Power – CONT PWR.
(d) Signal Phase – Phase X or Ø X (where “X” indicated the phase number) ***(REVISED JUNE 2026)***
(e) Pedestrian Phase – P X (where “X” indicates the phase number). ***(REVISED JUNE 2026)***

(f) Detector Cable– L1, L2, ETC. ***(REVISED JUNE 2026)***

(g) Post Mounted Flasher – FLASH

(h) Advance Warning Sign – AWS1, AWS2, ETC.

.11 Wire each traffic signal and pedestrian signal head separately from base to pole. Run a separate neutral and bonding conductor from base of pole to each signal head or luminaire.

.12 Neatly arrange, bundle and ty-rap wiring in the traffic controller, junction boxes, vaults, pole handholes and service panels to the acceptance by the City Engineer. ***(REVISED JUNE 2026)***

.13 Secure conductor splices with the exception of detector loop to shielded cable with solderless type connectors. Where the number and/or size of conductors exceeds the capacity of the solderless connector use the split bolt connectors.

.14 Sealing of connections, with exception of detector loop to shielded cable splices, shall be performed using one of the following methods:

(a) Double dipping the connection in an approved liquid product as referenced in the City of Nanaimo's Approved Products List []. Dipping shall be performed strictly adhering to the Manufacturer's specification.

(b) Each conductor shall have a wrap of the self-holding tape conforming to products listed in the City of Nanaimo's Approved Products List [], then the complete splice shall be wrapped. PVC Tape shall then be applied to cover the complete splice.

.15 Seal detector loop to shielded cable splices in accordance with Standard Drawing No. E-14.4 [].

.16 If conductor connections require use of split bolts of similar style devices due to wire size, completely cover splice with tape then Duct Seal to form a ball over connection. Duct Seal shall be thick enough to prevent the sharp ends of the conductors and/or point 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.

.17 Bond all luminaires, signal heads, steel junction box lids and vault lids with a No. 12 Cu RW90 conductor.

.18 Bundle ty-rapped conductors every 75 mm and route neatly inside the controller. Tag the conductors at the terminal blocks. Wiring inside of controller shall generally consist of:

(a) Connection of the traffic controller power to the terminals supplied.

(b) Connection of all the traffic and pedestrian phases to the terminals supplied.

(c) Connection of the detector loops to the terminal supplied.

(d) Connection of the bond conductor.

.19 Make connections in traffic controller with insulated spade type crimp-on connectors.

.20 Flash-out and check all signal and pedestrian heads at the terminal block in controller cabinet prior to system start-up.

10.79 TRAFFIC CONTROLLER

.1 Install the traffic controller as shown on the Standard Drawings.

.2 The type of traffic controller shall be indicated on the Contract Drawings.

10.80 POLE MOUNTED RECEPTACLES

.1 Pole mounted receptacles shall be installed as shown on Standard Drawing No. E-13.1 [].

.2 Receptacles shall be installed to the elevation and orientation shown on the Contract Drawings.

10.81 DETECTION LOOPS *(REVISED JUNE 2026)*

.1 Detection loops shall be installed in accordance with Standard Drawing No. E-14.1 [] to Standard Drawing No. E-14.7 []. *(REVISED JUNE 2026)*

.2 Video detection shall be installed in accordance with Standard Drawing No. E-6.7 []. *(REVISED JUNE 2026)*

10.82 GROUNDING

.1 All grounding shall conform to the *Canadian Electrical Code* and latest Electrical Safety Branch Amendments.

.2 Connect all ground rods, plates, conductors, and galvanized steel conduits together. Connect only one wire to any one ground bushing.

.3 Bond rigid steel conduits.

10.83 COLD GALVANIZING COMPOUND

.1 Repair damage to the galvanized surfaces with cold galvanizing compound. Application of cold galvanizing compound shall conform to manufacturer's instructions and the following:

(a) Surface to 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) Surface shall be absolutely dry and ambient temperature shall be over 10°C.

(c) Apply uniform coats as thick as possible without causing runs on the finished surface.

10.84 OVERHEAD SIGNS

.1 Overhead street name signs mounted on signal poles shall be bolted to the arms in accordance with Standard Drawing No. E-15.1 [].

.2 Overhead regulatory and warning signs 750 mm X 750 mm or smaller shall be mounted on signal poles in accordance with Standard Drawing No. E-15.2 [] to Standard Drawing No. E-15.4 [].

.3 Extruded aluminum signs 1220 mm(H) X 2440 mm(W) such as advance warning signs or guide signs shall be mounted on sign poles in accordance with Standard Drawing No. E-15.5 [] to Standard Drawing No. E-15.14 [].

.4 Signs shall be securely attached to the pole.

.5 Temporary signs shall be plywood, unless otherwise noted.

10.85 TESTING AND COMMISSIONING

.1 The City designated staff shall carry out all adjustments and tests necessary to ensure that the entire electrical installation and all its equipment, material and components are in satisfactory physical condition and perform the intended function and operations. ***(REVISED JUNE 2026)***

.2 At the completion of the job, proper system operation shall be demonstrated to the Professional of Record and the City Engineer. ***(REVISED JUNE 2026)***

.3 Traffic signal startup shall be carried out as follows:

(a) Upon completion of the installation, prior to start-up, the Contractor shall advise the Professional of Record and the City Engineer to carry out their final inspection. After the final inspection is completed a written list of deficiencies will be sent to the contractor. ***(REVISED JUNE 2026)***

(b) All deficiencies noted during the final inspection shall be corrected andaccepted by the Professional of Record and the City Engineer prior to signal start-up. ***(REVISED JUNE 2026)***

(c) After the deficiencies are corrected (prior to the signal start-up) the Contractor shall put the signal into flash for a period of seven (7) days.

(d) The Contractor shall provide the City with the proposed signal start-up date and time. Upon approval from the City, the Contractor shall advise the Professional of Record and the controller manufacturer a minimum of 72 hours in advance of the approved start-up date and time. Where a siren pre-emption system is installed, the Contractor shall arrange to have the manufacturer test the operation of their system prior to start-up. ***(REVISED JUNE 2026)***

(e) The controller manufacturer's representative shall inspect all field wiring connections and controller operation on site prior to signal start-up.

(f) In the presence of the Professional of Record, the controller manufacturer and the City, the contractor shall put the signal into full operation. ***(REVISED JUNE 2026)***

(g) The Contractor shall supply all the necessary traffic control personnel required during the signal start-up. A minimum of 2 qualified flag persons are required.

(h) The signal start-up shall be done during non-peak traffic periods.

10.86 CLEANUP

.1 Any areas where work has been performed shall be restored to original condition, or better.

.2 Existing equipment designated as being removed shall be returned to the City of Nanaimo works yard or disposed off-site as noted on the Contract Drawings.

.3 The interior of enclosures, pole handholes and wiring areas shall be cleaned of dust, dirt and loose materials, vacuum-cleaned and all water and moisture removed.

.4 All fastening screw holes provided in enclosures shall have a fastening screw installed.

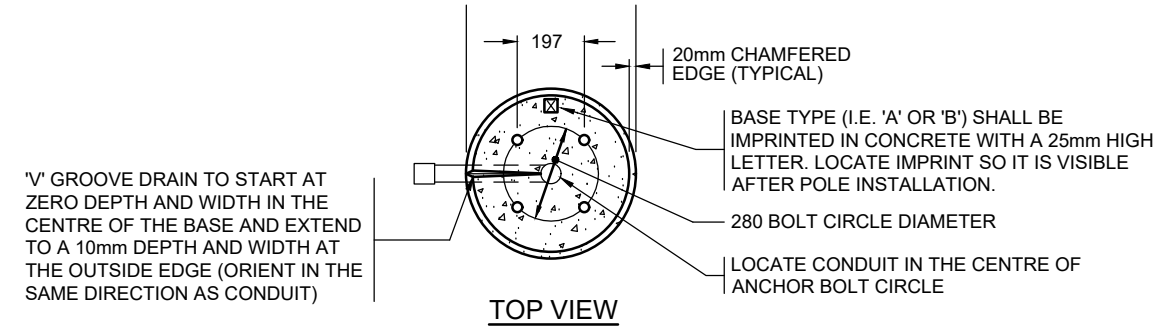
.5 Any spots where the galvanizing is damaged due to drilling, tapping, reaming, welding or surface damage during transportation and erection shall be refinished with cold galvanizing compound in accordance with Section 10.83 – Cold Galvanizing Compound [→].

BASE INDEX		
TYPE	DRAWING	POLE TYPES
A	E-1.2	TYPE 4 SIGNAL POST
B	E-1.2	TYPE 4A & 5 SIGNAL POST & 4.5m TO 7.5m POST TOP LUMINAIRE POLES
C	E-1.3 & E-1.4	7.5m, 9.0m & 11.0m DAVIT LUMINAIRE POLES
C1	E-1.3 & E-1.4	6.6m, 8.1m & 10.1m LUMINAIRE POLES & 3.1m, 5.1m & 6.6m POST TOP LUMINAIRE ON 0.9m HIGH SERVICE BASE
S2	E-1.7 & E-1.8	TYPE S POLE
L2	E-1.7 & E-1.8	TYPE L SIGNAL POLE

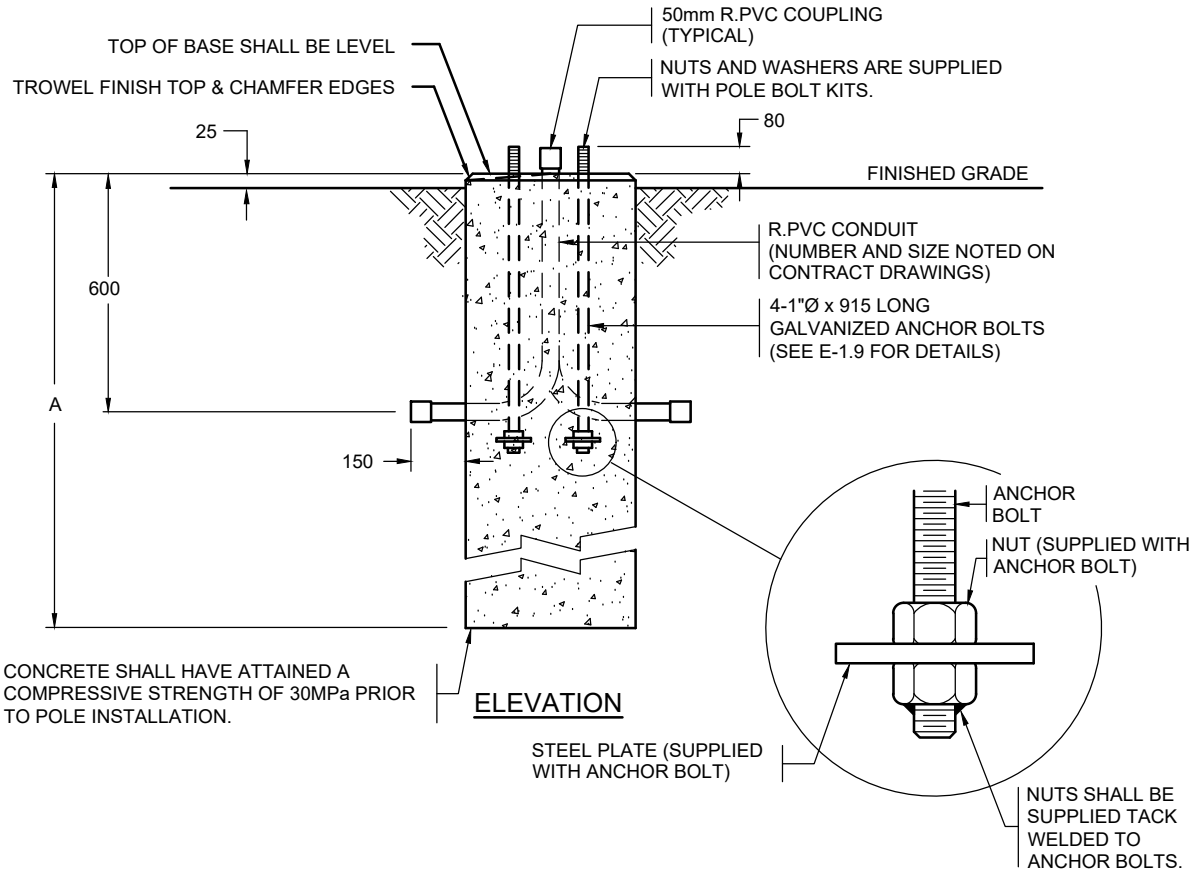
NOTES:

1. REFER TO SECTION 10 FOR SPECIFICATIONS

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 10 DWG\E-1.1



TOP VIEW



ELEVATION

BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	DIM A
A	TYPE 4 SIGNAL POST (2.5m)	600 kg	0.24 m3	1200
B	TYPE 4A SHAFTS & 4.5m TO 7.5m POST TOP LUMINAIRE POLES	760 kg	0.30 m3	1500

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. SEE DRAWINGS E-1.13 & E-1.14 FOR BACKFILL REQUIREMENTS.

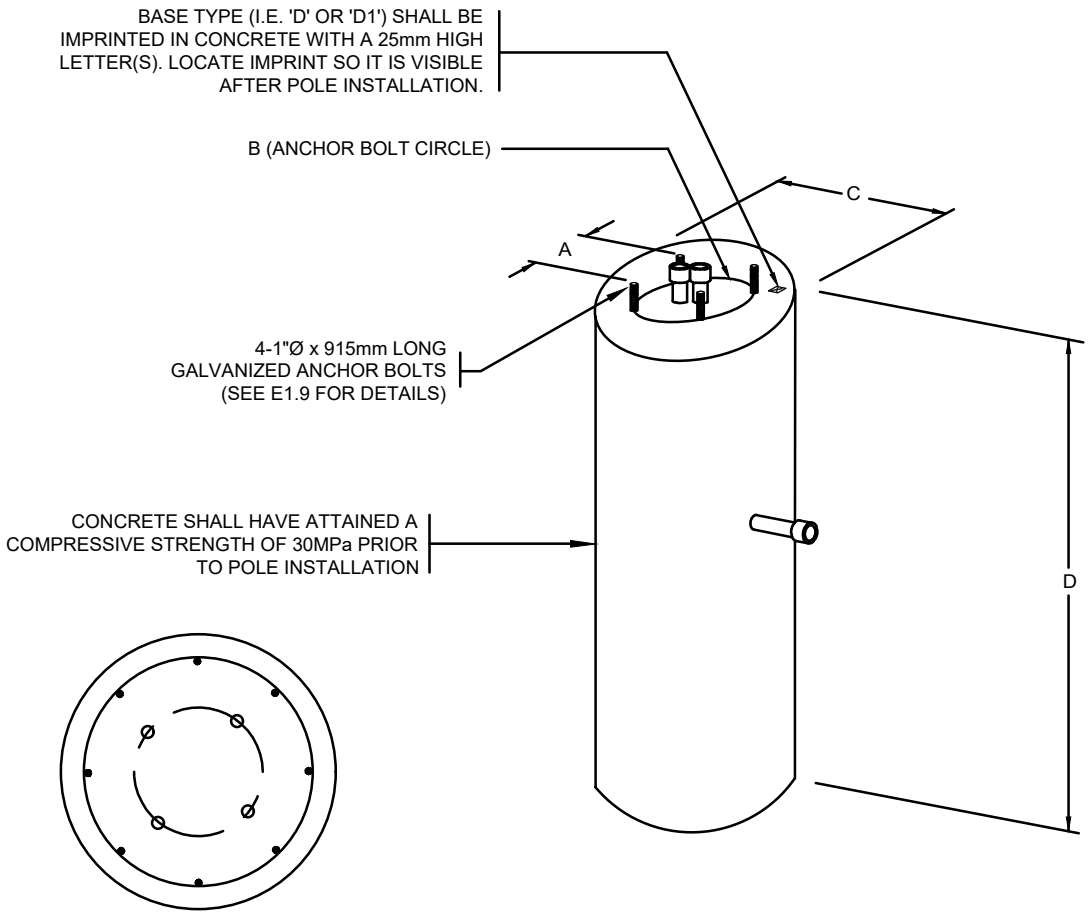
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

TYPE A & B FORM TUBE CONCRETE BASES

Scale:	NTS
Created:	MAY 2006
Rev Date:	MAY 2020
Dwg No:	E-1.2



PRECAST OR CAST IN PLACE CONCRETE BASES

BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C	D	REINFORCING
D	7.5m, SINGLE LUMINAIRE	2000 kg	0.39m3	197	250	500	2200	6-15M VERTS 10M SPIRAL @ 150
D1	9.1m, DOUBLE LUMINAIRE	2000 kg	0.62m3	269	380	600	2200	8-15M VERTS 10M SPIRAL @ 150

NOTES:

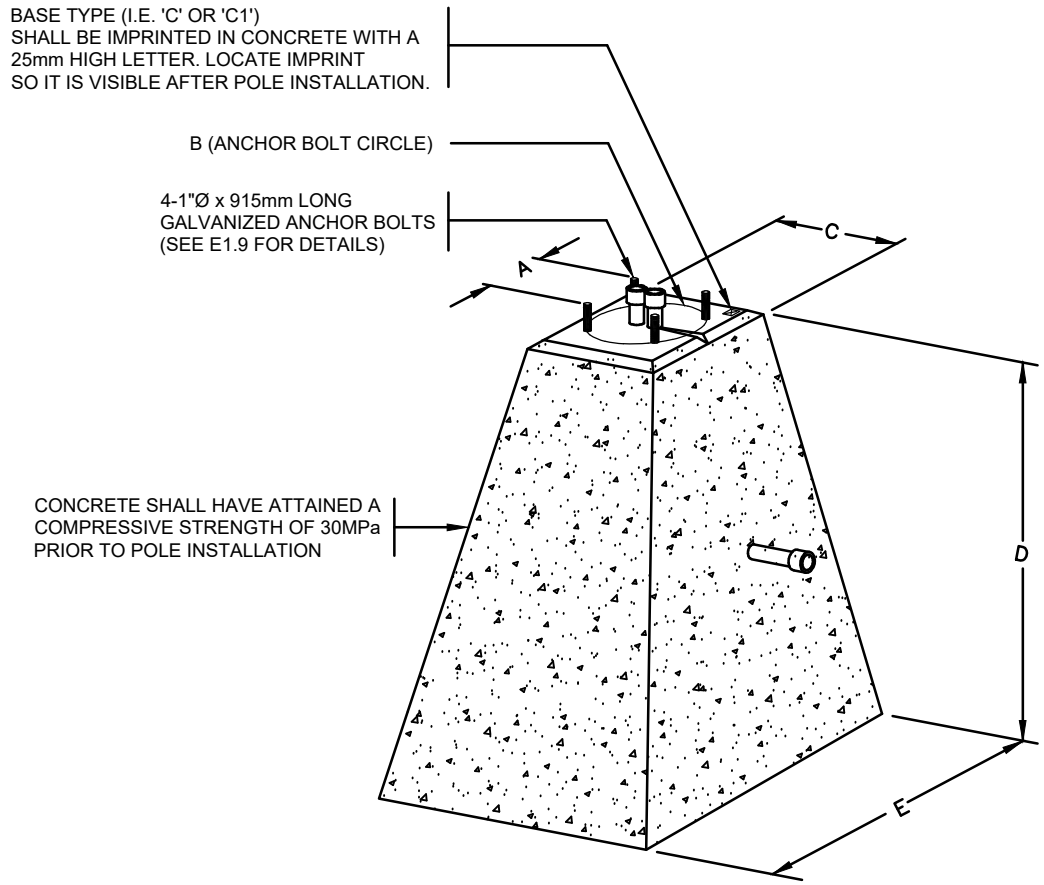
1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. SEE DRAWING E-1.4 FOR ADDITIONAL DETAILS.
4. SEE DRAWINGS E-1.13 & E-1.14 FOR BACKFILL REQUIREMENTS.
5. CLEAR COVER TO REINFORCING 50mm.

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 10 DWG\E-1.2A
6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

TYPE D & D1 FORM TUBE PRECAST OR CAST-IN-PLACE CONCRETE BASES

Scale:	NTS
Created:	NOV 2012
Rev Date:	MAY 2020
Dwg No:	E-1.2A



PRECAST CONCRETE BASES

BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C	D	E
C	7.5m, 9.0m & 11.0m DAVIT LUMINAIRE POLES	2000 kg	0.83m3	197	280	450	1500	1000
C1	6.6m, 8.1m & 10.1m DAVIT LUMINAIRE & 3.1m, 5.1m & 6.6m POST TOP LUMINAIRE ON 0.9m HIGH SERVICE BASE	2000 kg	0.83m3	269	380	450	1500	1000

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. SEE DRAWING E-1.4 & E-1.4A FOR ADDITIONAL DETAILS.
4. SEE DRAWING E-1.4A & E-1.14 FOR BACKFILL REQUIREMENTS.

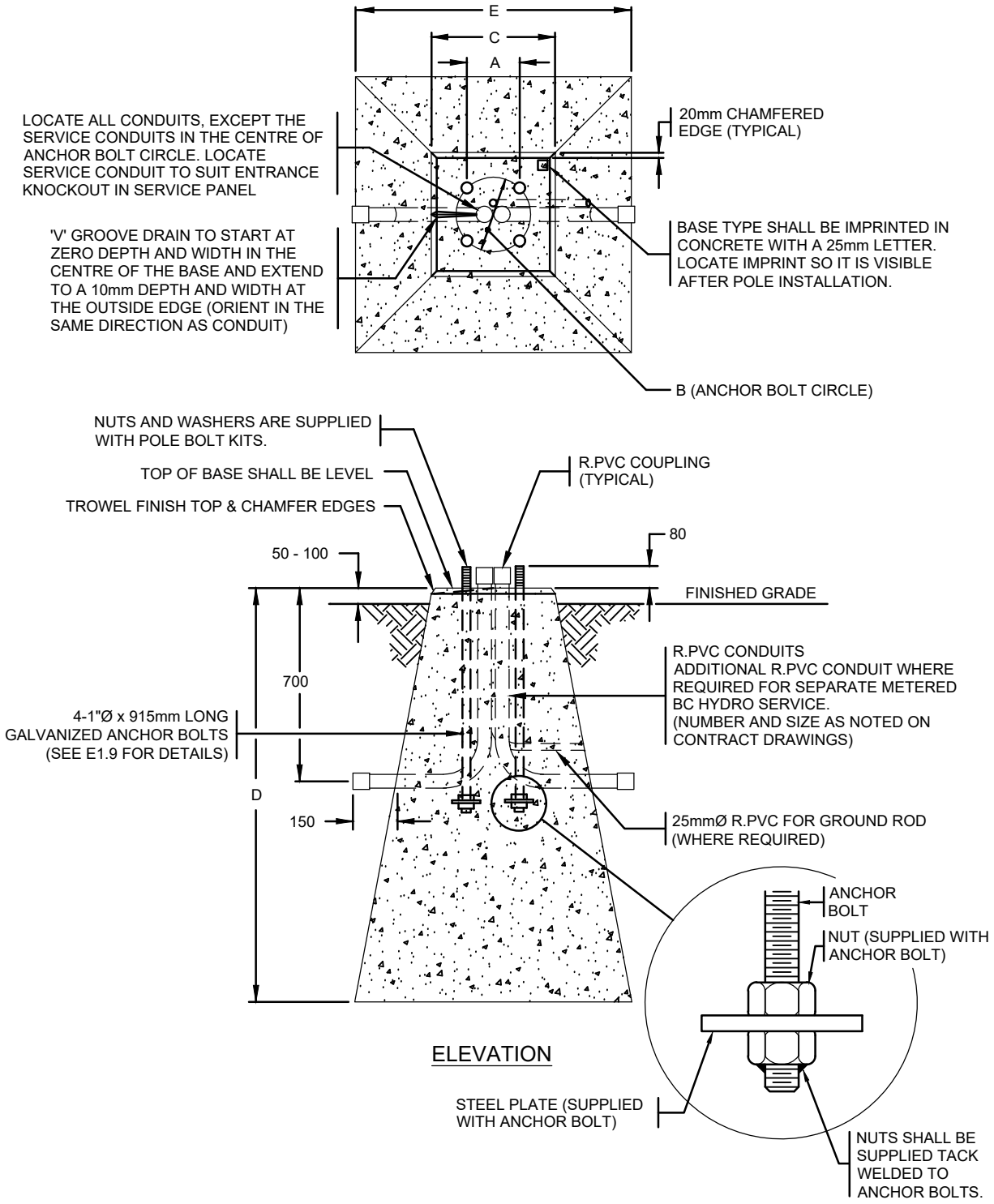
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

TYPE C & C1 TRAPEZOIDAL SHAPE CONCRETE BASES

Scale:	NTS
Created:	MAY 1999
Rev Date:	NOV 2016
Dwg No:	E-1.3



SEE DRAWING E-1.3 FOR NOTES AND ADDITIONAL DETAILS

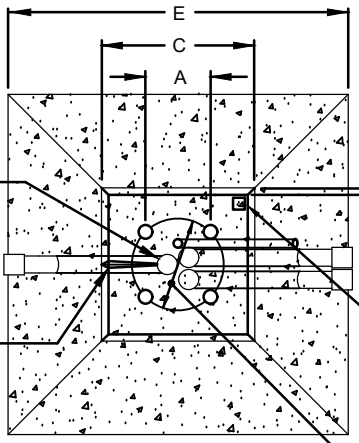
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4.17.2026

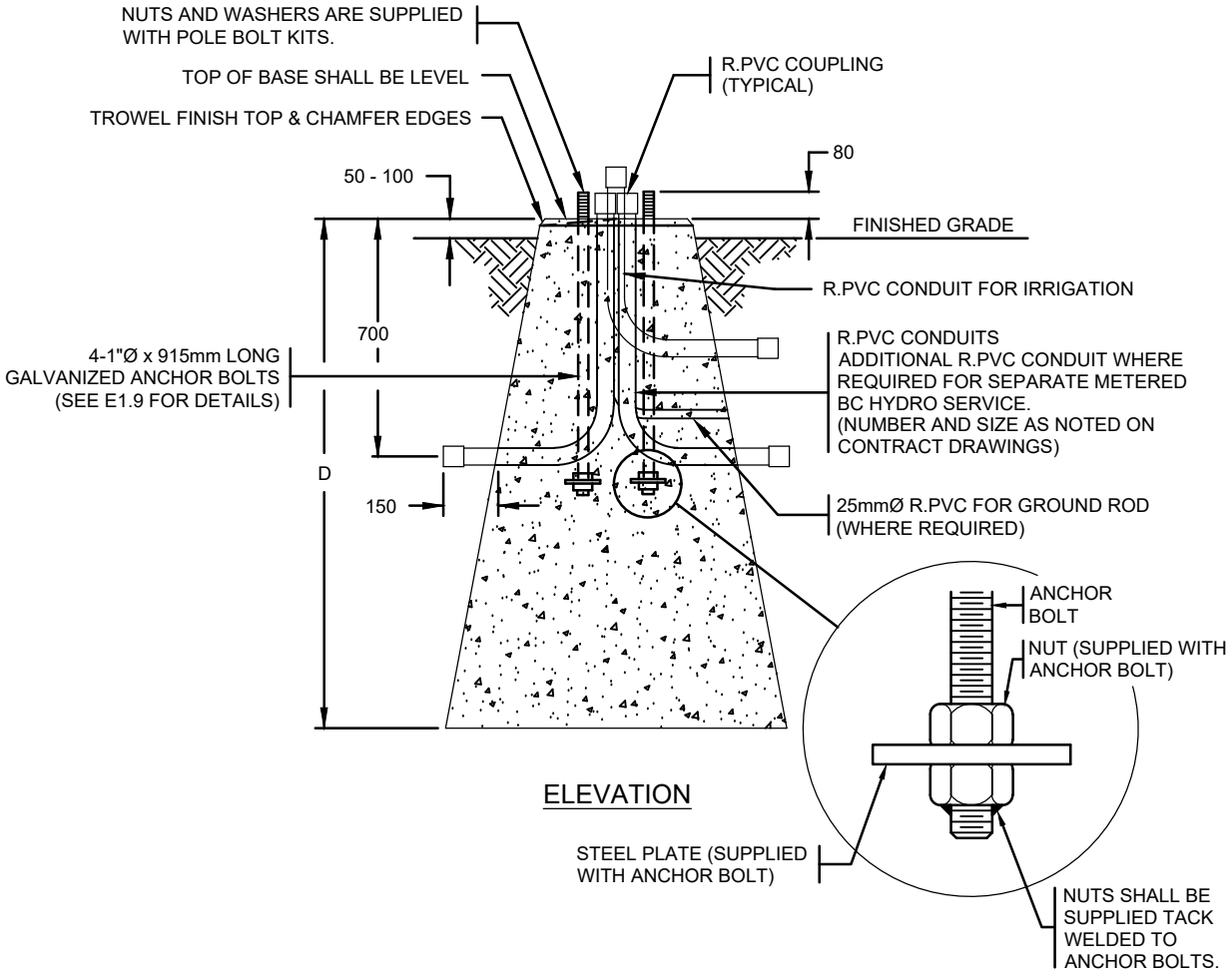
CITY OF NANAIMO
THE HARBOUR CITY

TYPE C & C1 TRAPEZOIDAL SHAPE CONCRETE BASES

Scale:	NTS
Created:	JUN 2013
Rev Date:	NOV 2016
Dwg No:	E-1.4



TOP VIEW



ELEVATION

SEE DRAWING E-1.3 FOR NOTES AND ADDITIONAL DETAILS

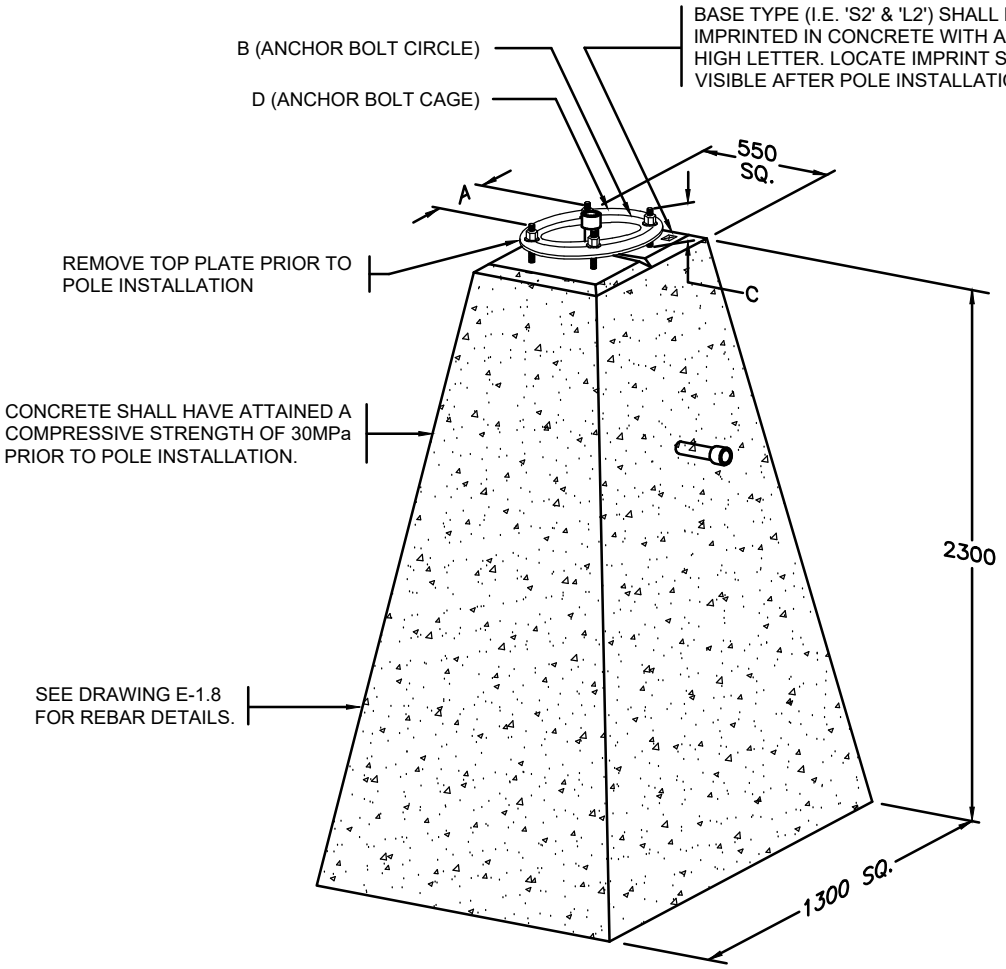
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

TYPE C & TYPE C1 TRAPEZOIDAL SHAPE CONCRETE BASES WITH IRRIGATION

Scale:	NTS
Created:	JUN 2013
Rev Date:	NOV 2019
Dwg No:	E-1.4A



PRECAST CONCRETE BASES

BASE TYPE	POLE TYPE	APPROXIMATE MASS	VOLUME OF CONCRETE	A	B	C	D (ANCHOR BOLTS)
S2	TYPE S POLE	5000 kg	2.0 m3	243	343	160	4-25 (1") Ø x 1220 (48") GALVANIZED GRADE 150 DYWIDAG PRE-ASSEMBLED IN A CAGE
L2	TYPE L POLES	5040 kg	2.0 m3	276	390	140	4-1 1/2"Ø x 1370 GALVANIZED ANCHOR BOLTS PRE-ASSEMBLED IN A CAGE

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. SEE DRAWING E-1.8 FOR ADDITIONAL DETAILS.
4. SEE DRAWINGS E-1.13 & E-1.14 FOR BACKFILL REQUIREMENTS.

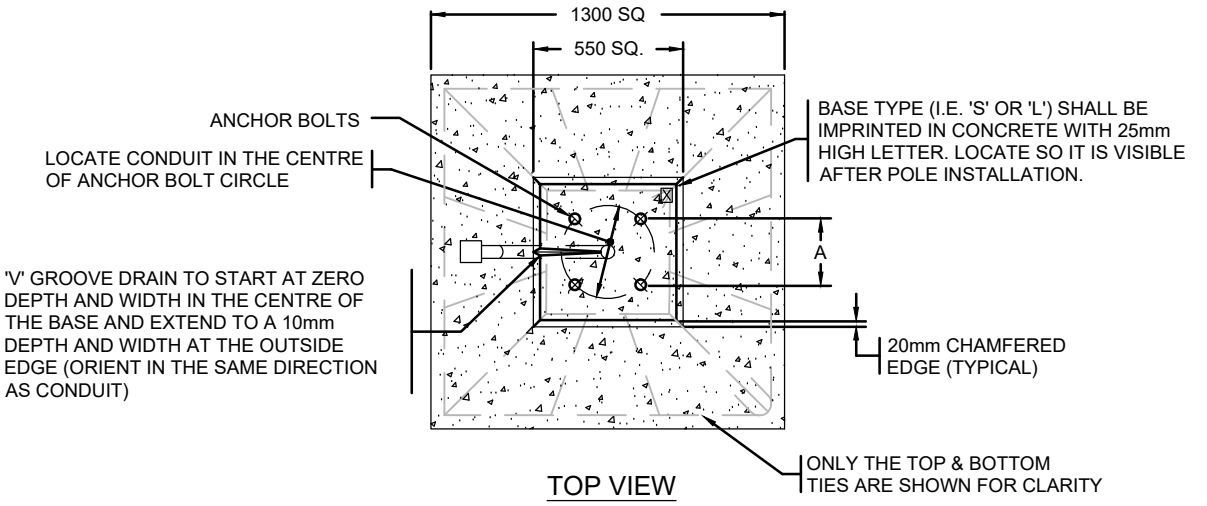
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6.22.2026

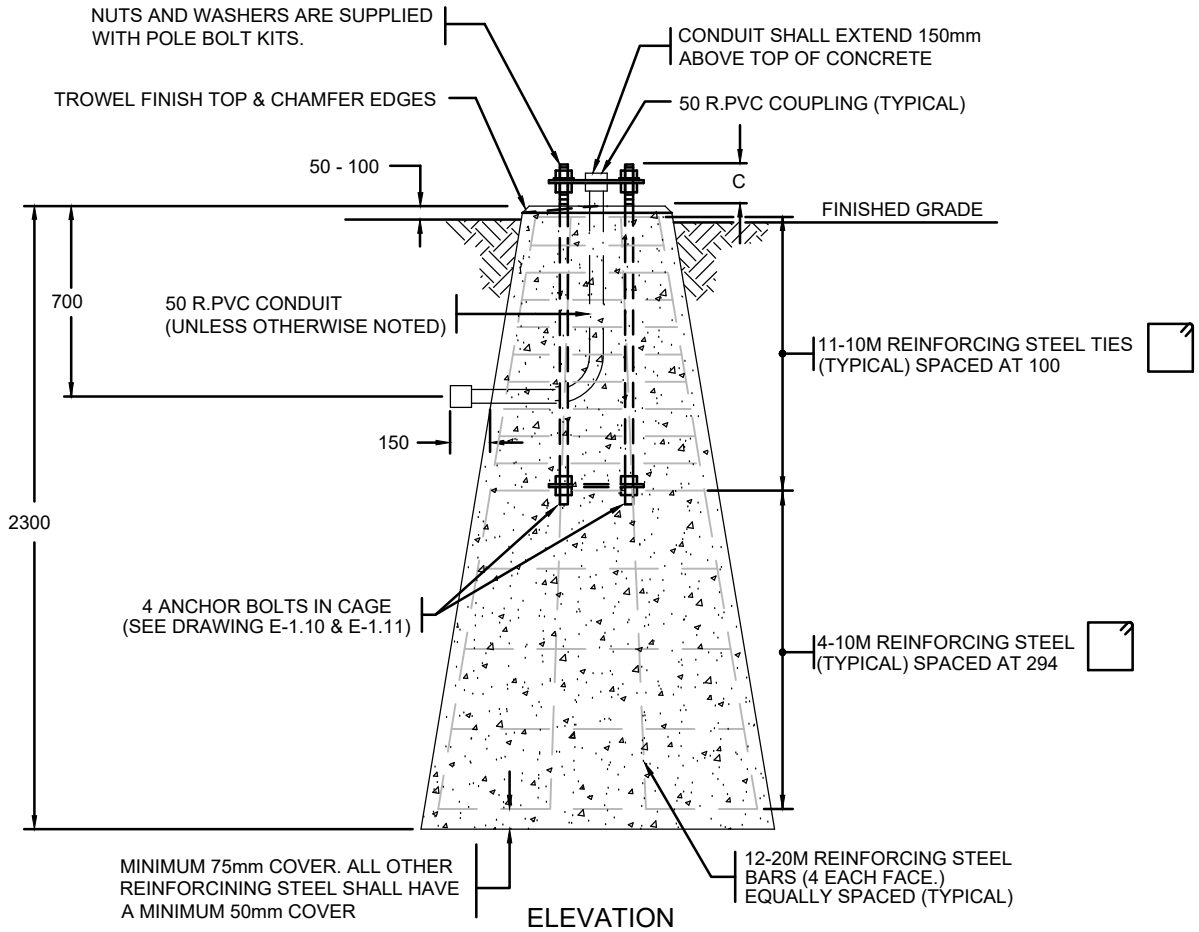
CITY OF NANAIMO
THE HARBOUR CITY

TYPE S2 & L2 TRAPEZOIDAL SHAPE CONCRETE BASES

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-1.7



TOP VIEW



ELEVATION

SEE DRAWING E-1.7 FOR NOTES AND ADDITIONAL DETAILS

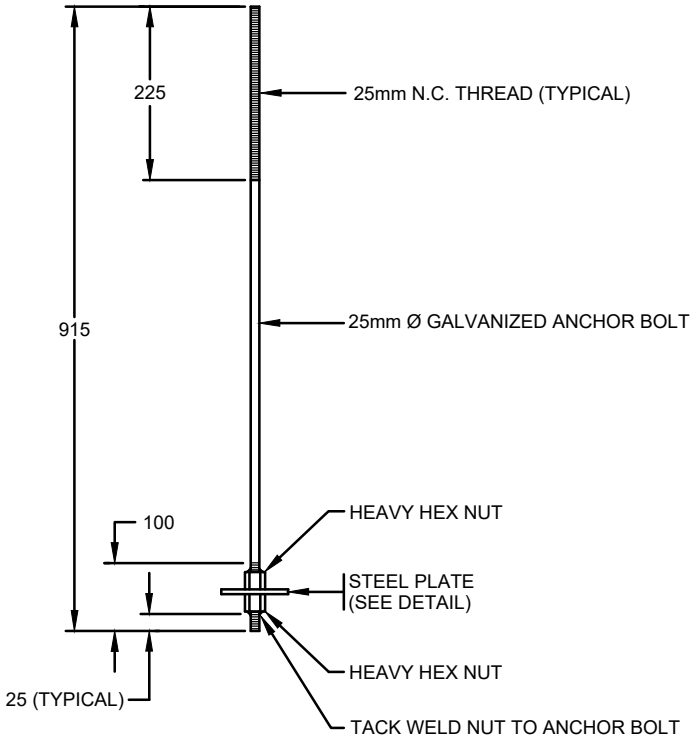
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

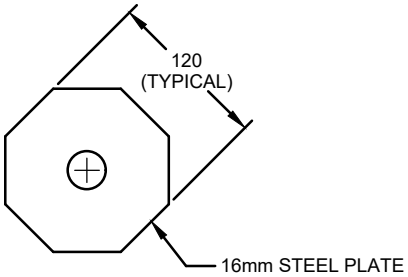
TYPE S2 & L2 TRAPEZOIDAL SHAPE CONCRETE BASES

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-1.8



ANCHOR BOLT
4 PER SET

APPROXIMATE MASS (PER SET)
21 kg



STEEL PLATE

NOTES:

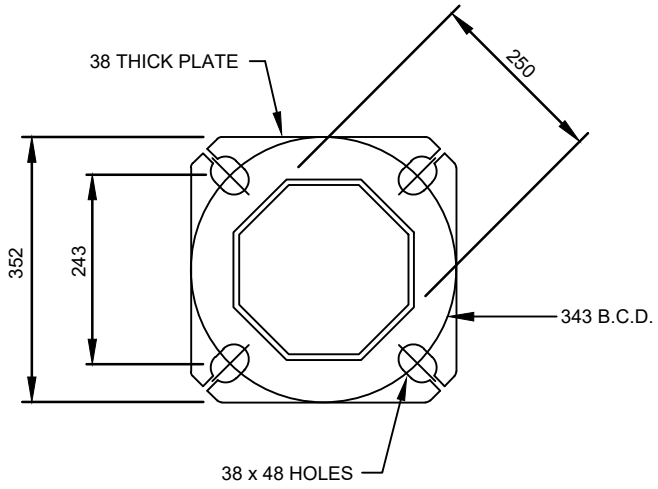
1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

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CITY OF NANAIMO
THE HARBOUR CITY

25mm DIAMETER ANCHOR BOLTS

Scale:	NTS
Created:	NOV 2009
Rev Date:	NOV 2009
Dwg No:	E-1.9



TYPE S POLE BASE PLATE

1:10

PARTS LIST FOR TYPE S SIGNAL POLE		
PART	MINISTRY STOCK NUMBER	MASS (kg)
TYPE [S] POLE SHAFT	SN3152	385
TYPE [5S] SIGNAL ARM - 5.0m	SN3150	104
TYPE [5.5S] SIGNAL ARM - 5.5m	SN3155	111
TYPE [6S] SIGNAL ARM - 6.0m	SN3160	118
TYPE [6.5S] SIGNAL ARM - 6.5m	SN3165	125
TYPE [7S] SIGNAL ARM - 7.0m	SN3170	132
TYPE [7.5S] SIGNAL ARM - 7.5m	SN3175	192
TYPE [8S] SIGNAL ARM - 8.0m	SN3180	204
TYPE [8.5S] SIGNAL ARM - 8.5m	SN3185	214
TYPE [9S] SIGNAL ARM - 9.0m	SN3190	224
TYPE [9.5S] SIGNAL ARM - 9.5m	SN3195	292
TYPE [10S] SIGNAL ARM - 10.0m	SN3100	306
TYPE [10.5S] SIGNAL ARM - 10.5m	SN3105	320
TYPE [11S] SIGNAL ARM - 11.0m	SN3110	340
TYPE [1.75L] LUMINAIRE ARM EXTENSION - 1.75m	SN2063	29
TYPE [0.25L] LUMINAIRE ARM EXTENSION - 0.25m	SN2064	10
TYPE [2A] LUMINAIRE ARM	SN1832	35
TYPE 1 FLANGE COVER PLATE [1 FCP]	SN1367	1.5
TYPE S FLANGE COVER PLATE [S FCP]	SN1368	3
TYPE 3 FLANGE COVER PLATE [3 FCP]	SN2084	4
POST TOP TENON [PTT]	SN1831	5

* [ ] I.D. LABEL ON POLE

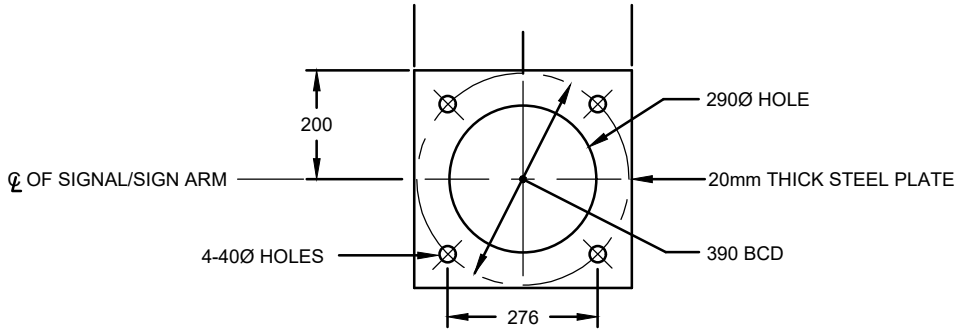
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6.22.2026

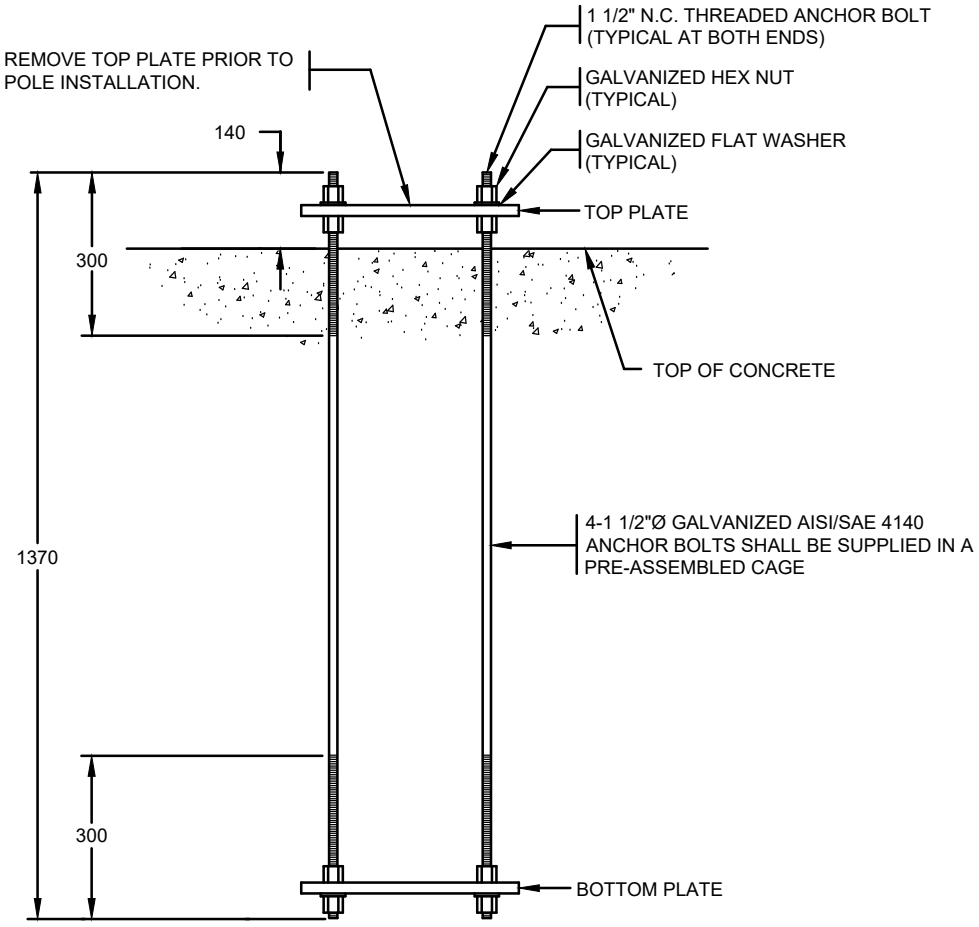
CITY OF NANAIMO
THE HARBOUR CITY

ANCHOR BOLT CAGE FOR TYPE S POLES

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2016
Dwg No:	E-1.10



TOP AND BOTTOM PLATES



ANCHOR BOLT CAGE

APPROXIMATE MASS
95 kg

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

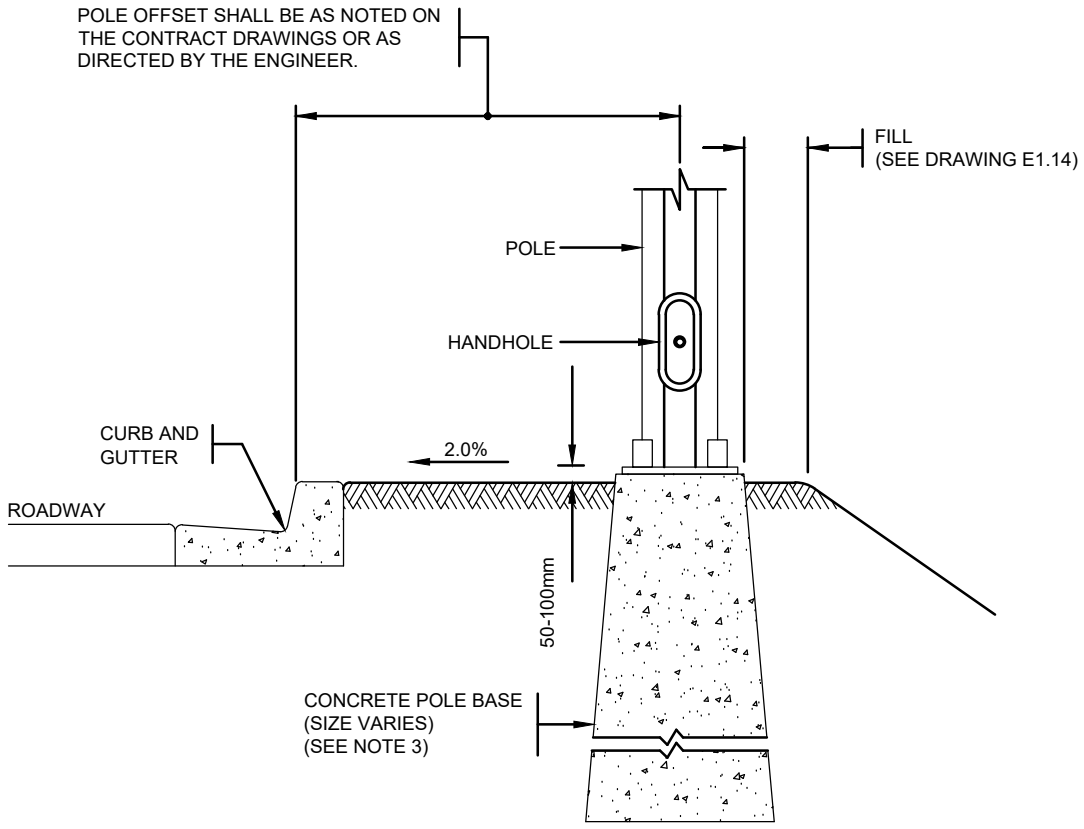
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

ANCHOR BOLT CAGE FOR TYPE L POLES

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-1.11



ELEVATION

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. CONCRETE BASE SHALL BE INSTALLED PARALLEL TO STREET CENTRELINE, NOT FACE OF CURB.

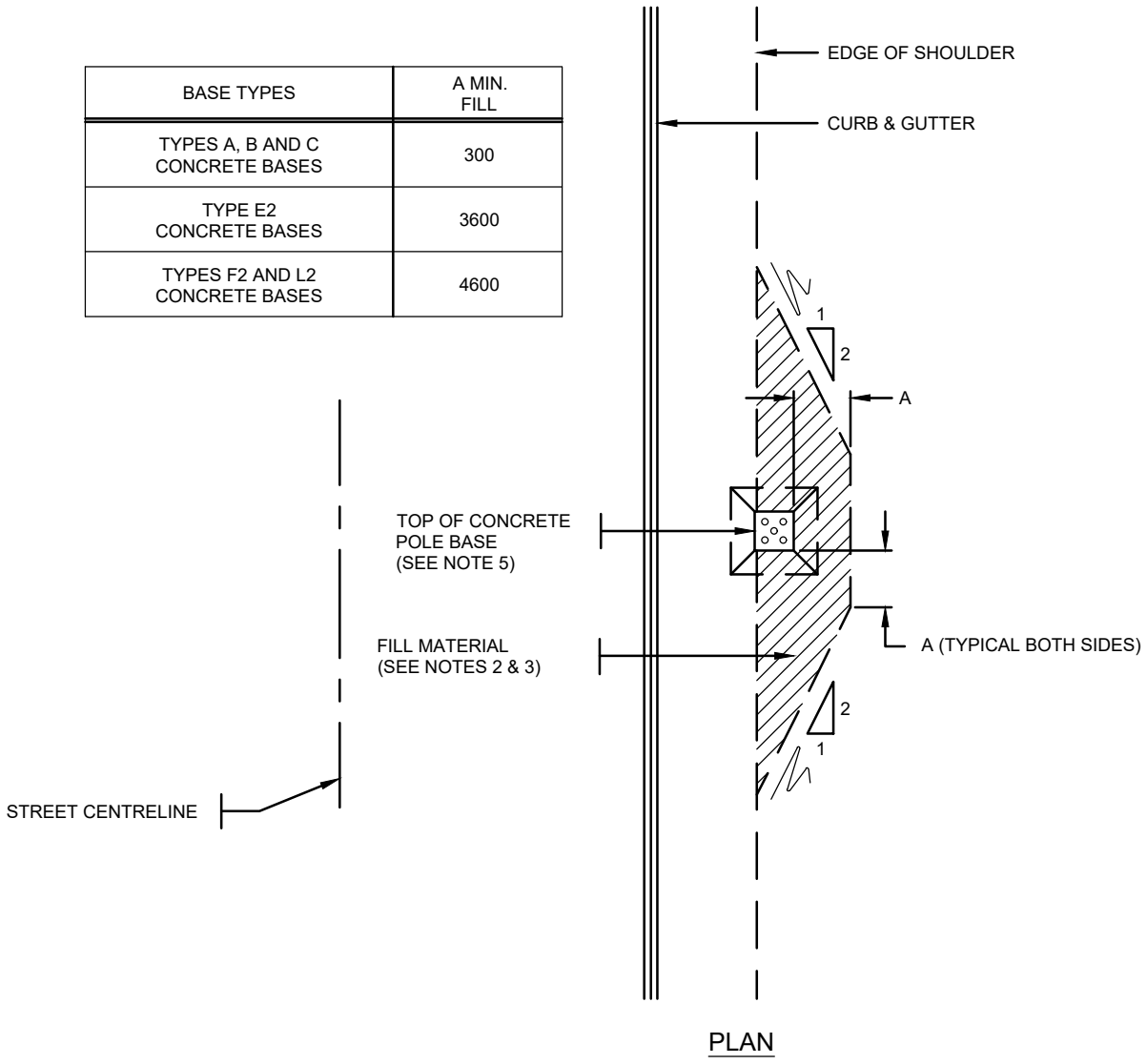
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

POLE BASE INSTALLATION DETAILS

Scale:	NTS
Created:	MAY 2013
Rev Date:	NOV 2019
Dwg No:	E-1.13

BASE TYPES	A MIN. FILL
TYPES A, B AND C CONCRETE BASES	300
TYPE E2 CONCRETE BASES	3600
TYPES F2 AND L2 CONCRETE BASES	4600



PLAN

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. FILL MATERIAL SHALL CONSIST OF CLEAN WELL GRADED GRANULAR SOIL HAVING A MAXIMUM FINES CONTENT OF 8% (SILT AND CLAY SIZE PARTICLES) AND A MAXIMUM AGGREGATE SIZE OF 100mm.
3. FILL MATERIAL SHALL BE SUPPLIED, INSTALLED AND FULLY COMPACTED IN ACCORDANCE WITH SECTION 4 FOR THE MINIMUM AREA ALL AROUND THE BASE AS SHOWN ABOVE.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
5. CONCRETE BASE SHALL BE INSTALLED PARALLEL TO STREET CENTRELINE, NOT FACE OF CURB.

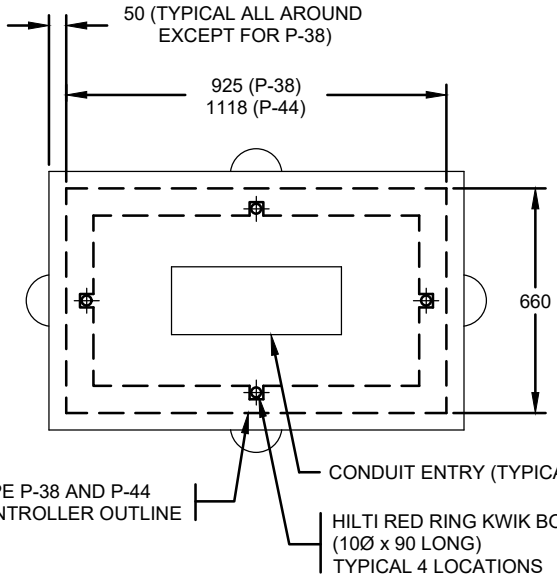
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CITY OF NANAIMO
THE HARBOUR CITY

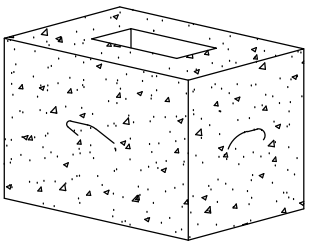
POLE BASE INSTALLATION DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2019
Dwg No:	E-1.14

6.22.2026

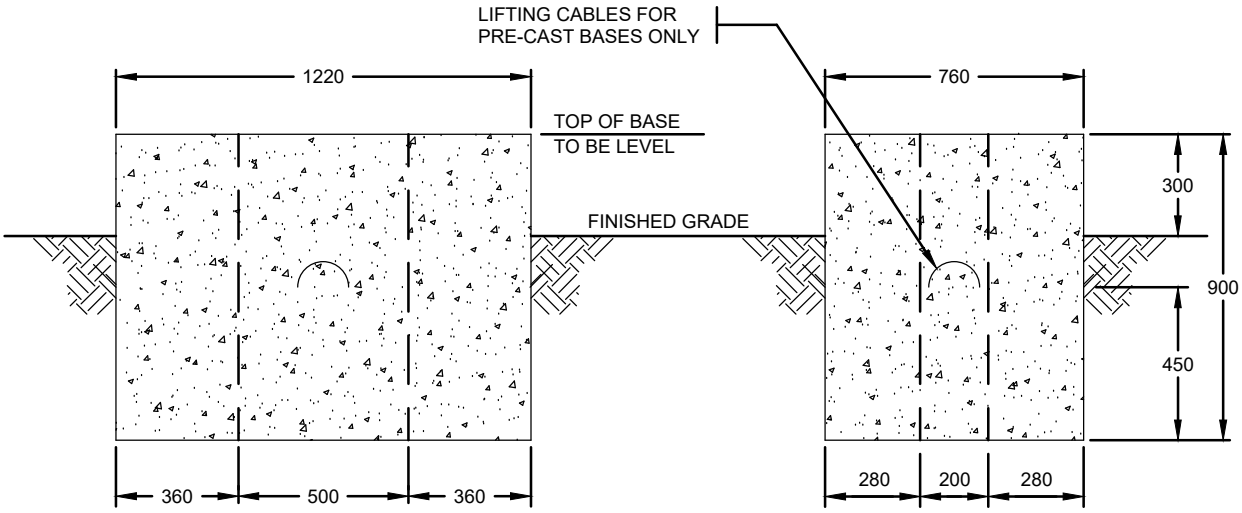


TOP VIEW



PICTORIAL VIEW

APPROXIMATE MASS
1861 kg



FRONT VIEW

SIDE VIEW

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. BASES TO BE PRE-CAST OR CAST-IN-PLACE

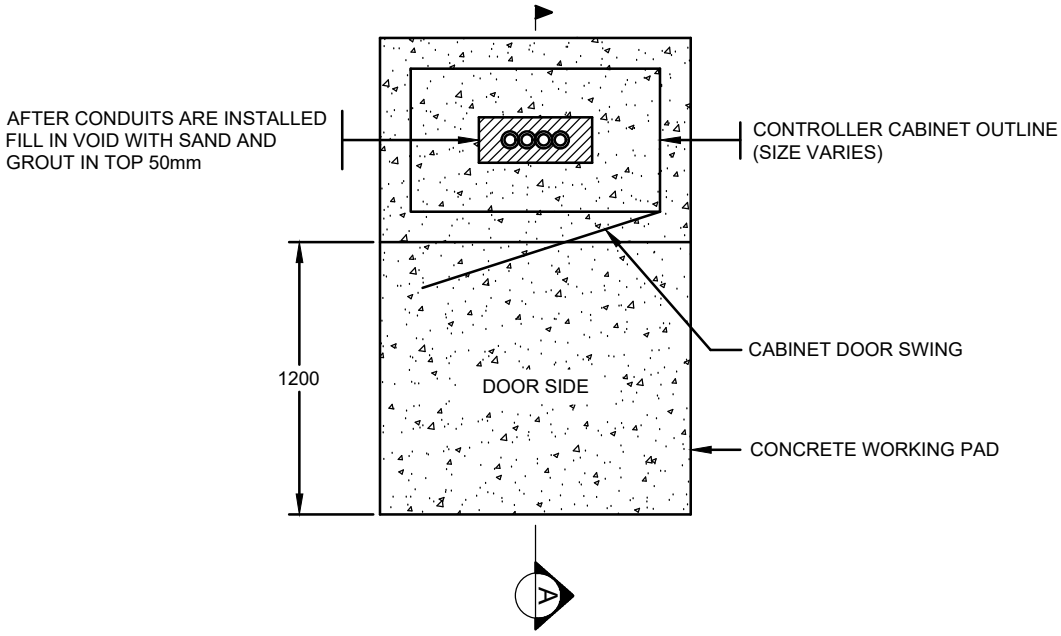
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4.21.2026

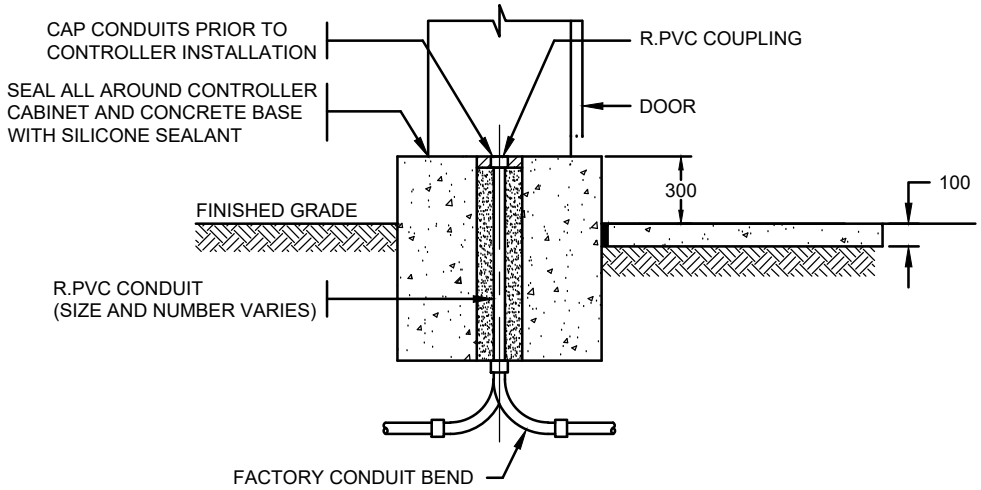
CITY OF NANAIMO
THE HARBOUR CITY

TYPE P (NEMA CABINET)
CONCRETE CONTROLLER BASE

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-2.2



TOP VIEW



SECTION A

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

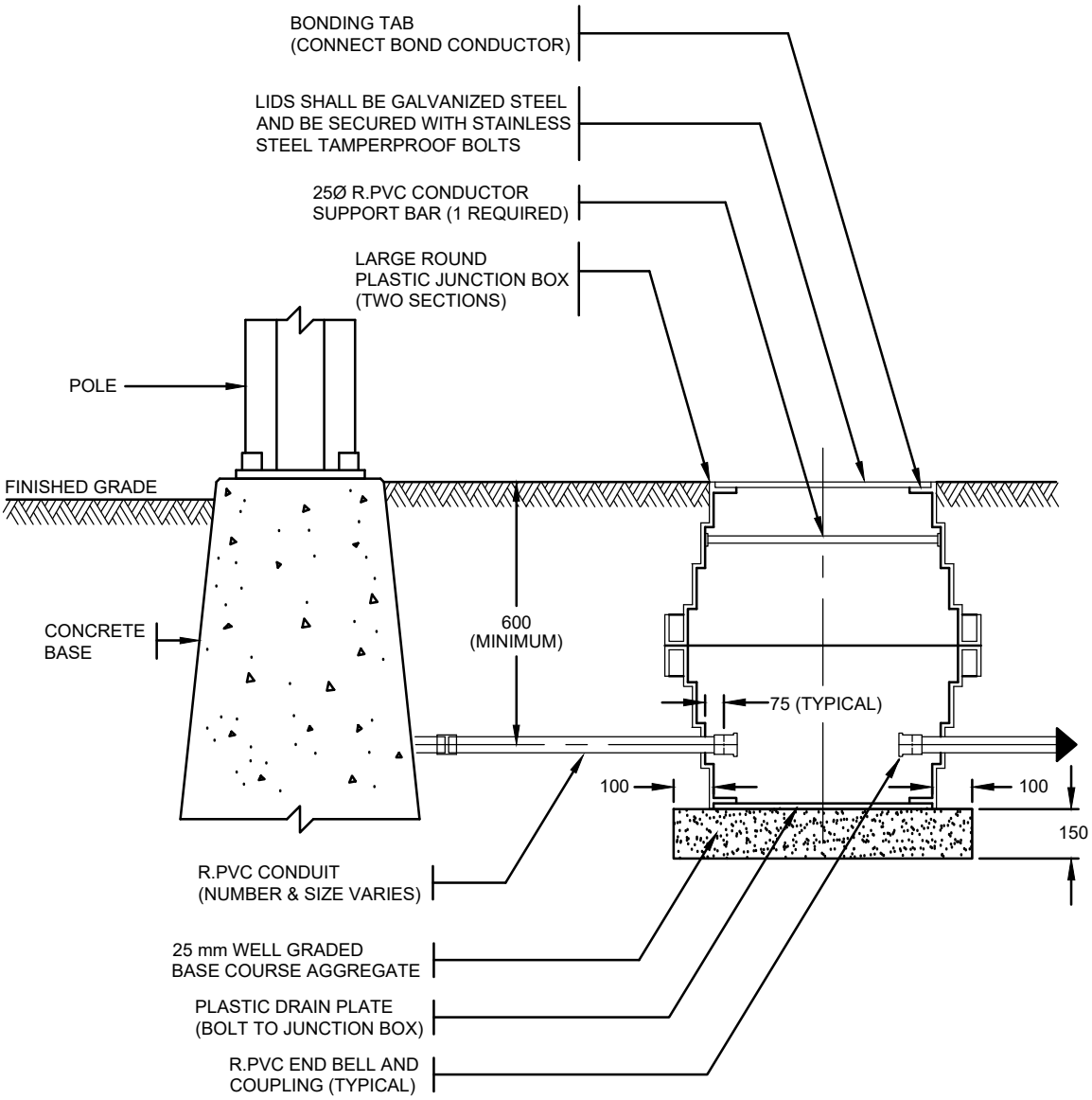
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

CONTROLLER INSTALLATION (FOR TYPE P CABINETS)

Scale:	NTS
Created:	MAY 2003
Rev Date:	MAY 2003
Dwg No:	E-2.3



NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. INSTALL LID ON PLASTIC JUNCTION BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. INSTALL TOP OF JUNCTION BOX FLUSH WITH FINISHED GRADE.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. CONCRETE JUNCTION BOX INSTALLATION SIMILAR.
6. NUMBER OF CONDUITS ENTERING JUNCTION BOX NOT TO EXCEED 10 (UNLESS OTHERWISE NOTED).

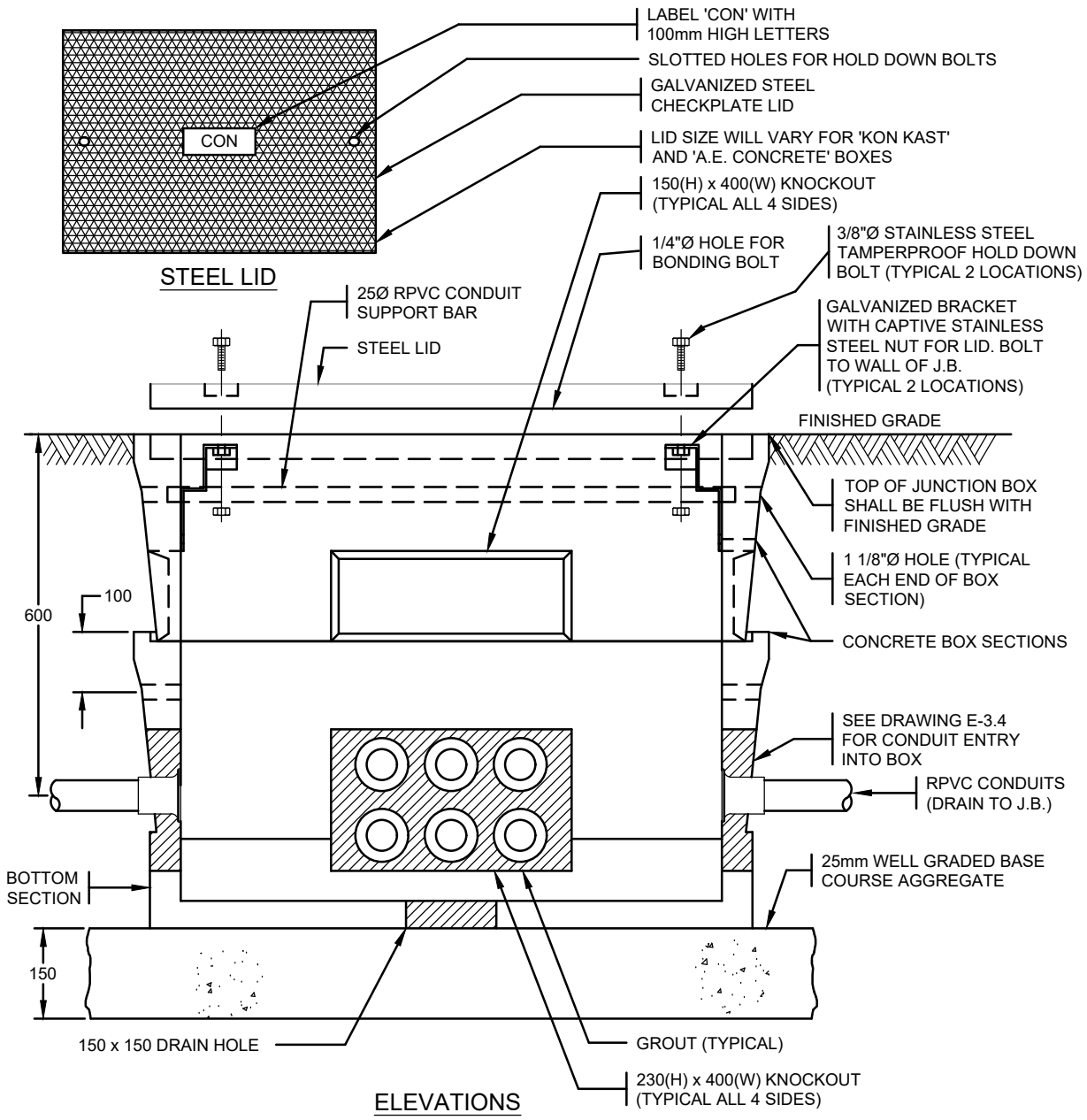
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

JUNCTION BOXES

Scale:	NTS
Created:	MAY 2003
Rev Date:	JUNE 2026
Dwg No:	E-3.1



STEEL LID

ELEVATIONS

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS
2. ONLY PRODUCTS WITHIN THE CITY OF NANAIMO'S APPROVED PRODUCTS LIST, AND APPROVED BY THE CITY ENGINEER SHALL BE USED.
3. JUNCTION BOX SHALL BE DESIGNED FOR 5000kg STATIC LOADING.
4. VAULTS SHALL BE PRE-CAST CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 35 MPa AT 28 DAYS.
5. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

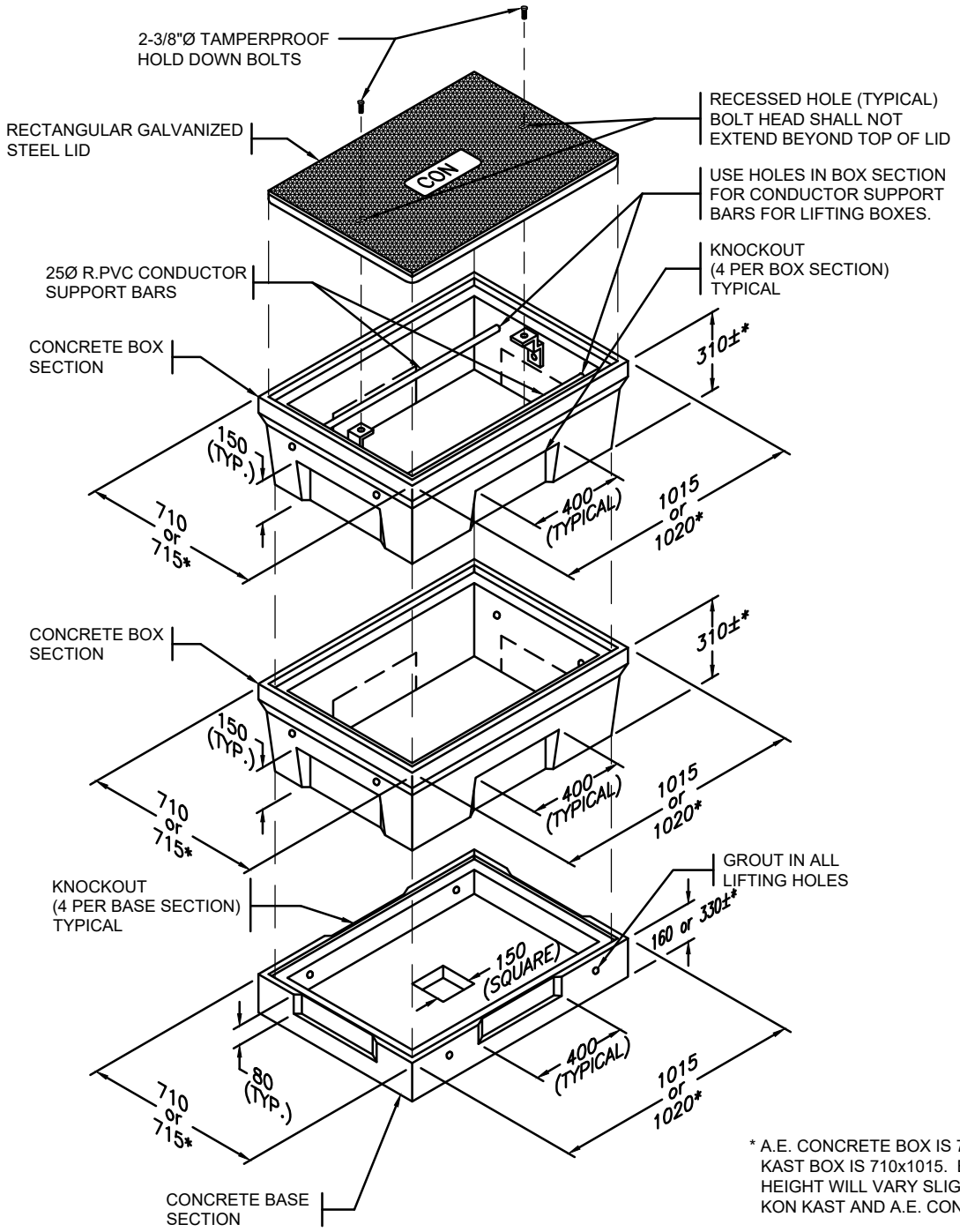
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CITY OF NANAIMO
THE HARBOUR CITY

CONCRETE JUNCTION BOX DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-3.2

4.21.2026



* A.E. CONCRETE BOX IS 715x1020. KON KAST BOX IS 710x1015. BOX SECTION HEIGHT WILL VARY SLIGHTLY BETWEEN KON KAST AND A.E. CONCRETE BOXES.

NOTE: THESE BOXES ARE NOT INTERCHANGEABLE.

SEE DRAWING E-3.2 FOR NOTES

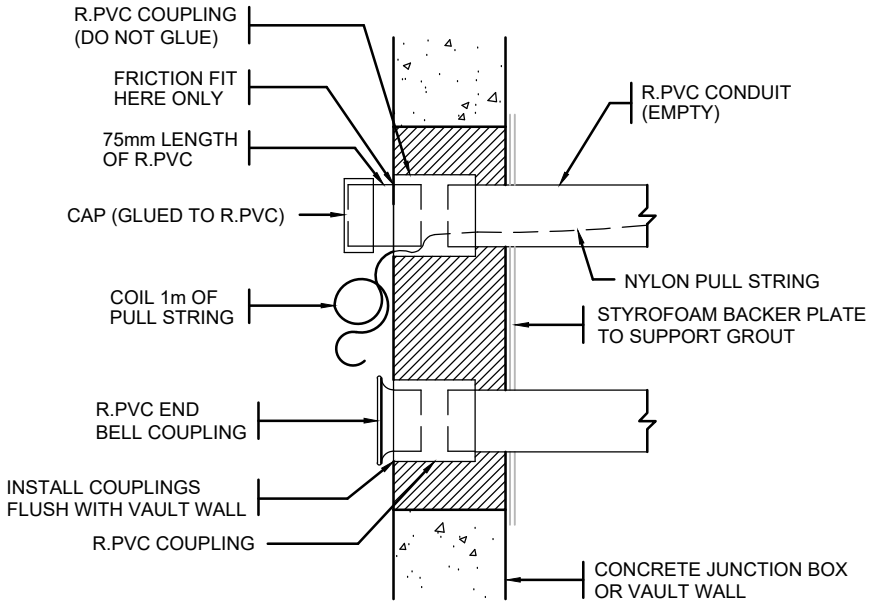
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CITY OF NANAIMO
THE HARBOUR CITY

CONCRETE JUNCTION BOX DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-3.3

6.22.2026



CONDUIT ENTRY TO VAULT OR CONCRETE JUNCTION BOX

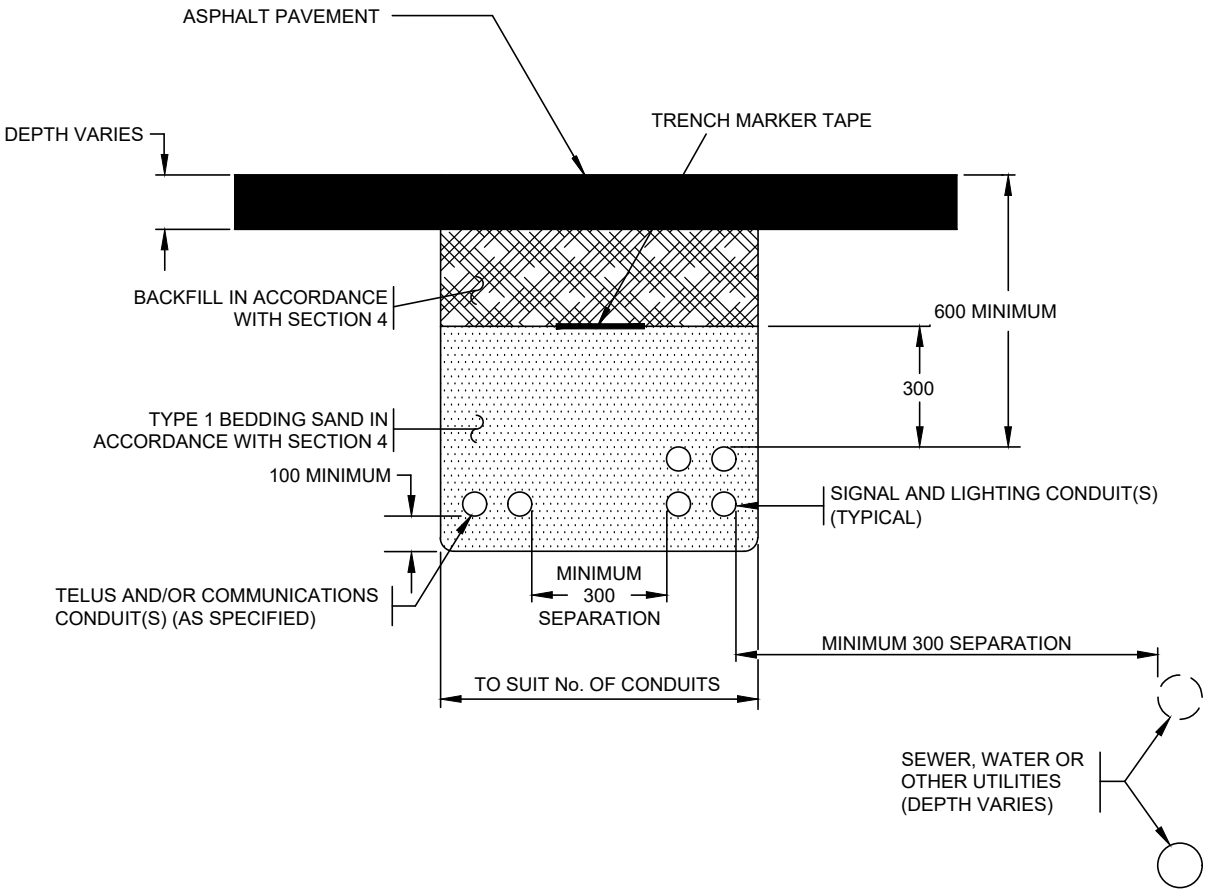
SEE DRAWINGS E-3.2 & E-3.3
FOR NOTES AND ADDITIONAL DETAILS.

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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

CONDUIT ENTRY INTO CONCRETE VAULT OR JUNCTION BOX

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-3.4



NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

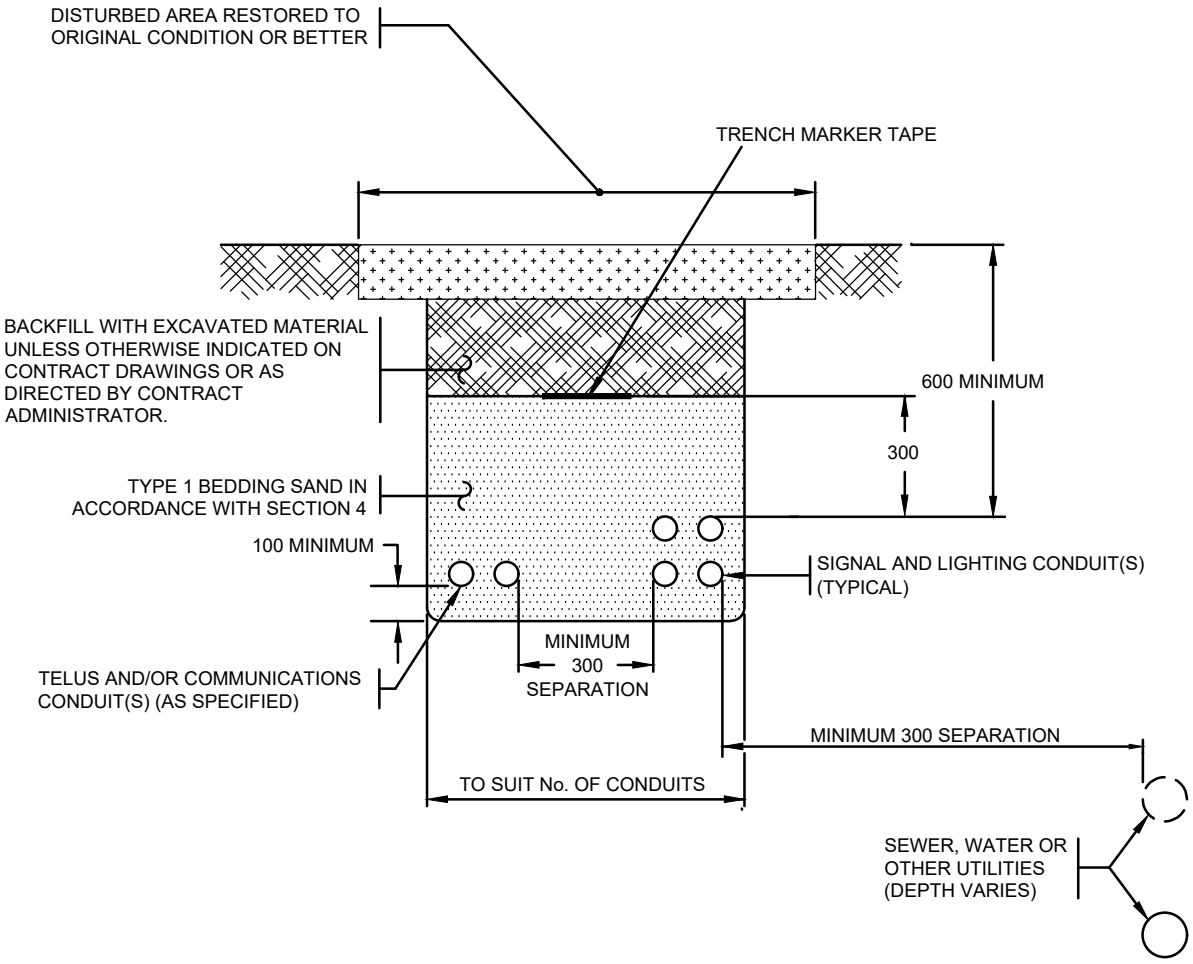
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

UNDERGROUND CONDUIT IN PAVED AREAS

Scale:	NTS
Created:	MAY 1999
Rev Date:	NOV 2019
Dwg No:	E-4.1



NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

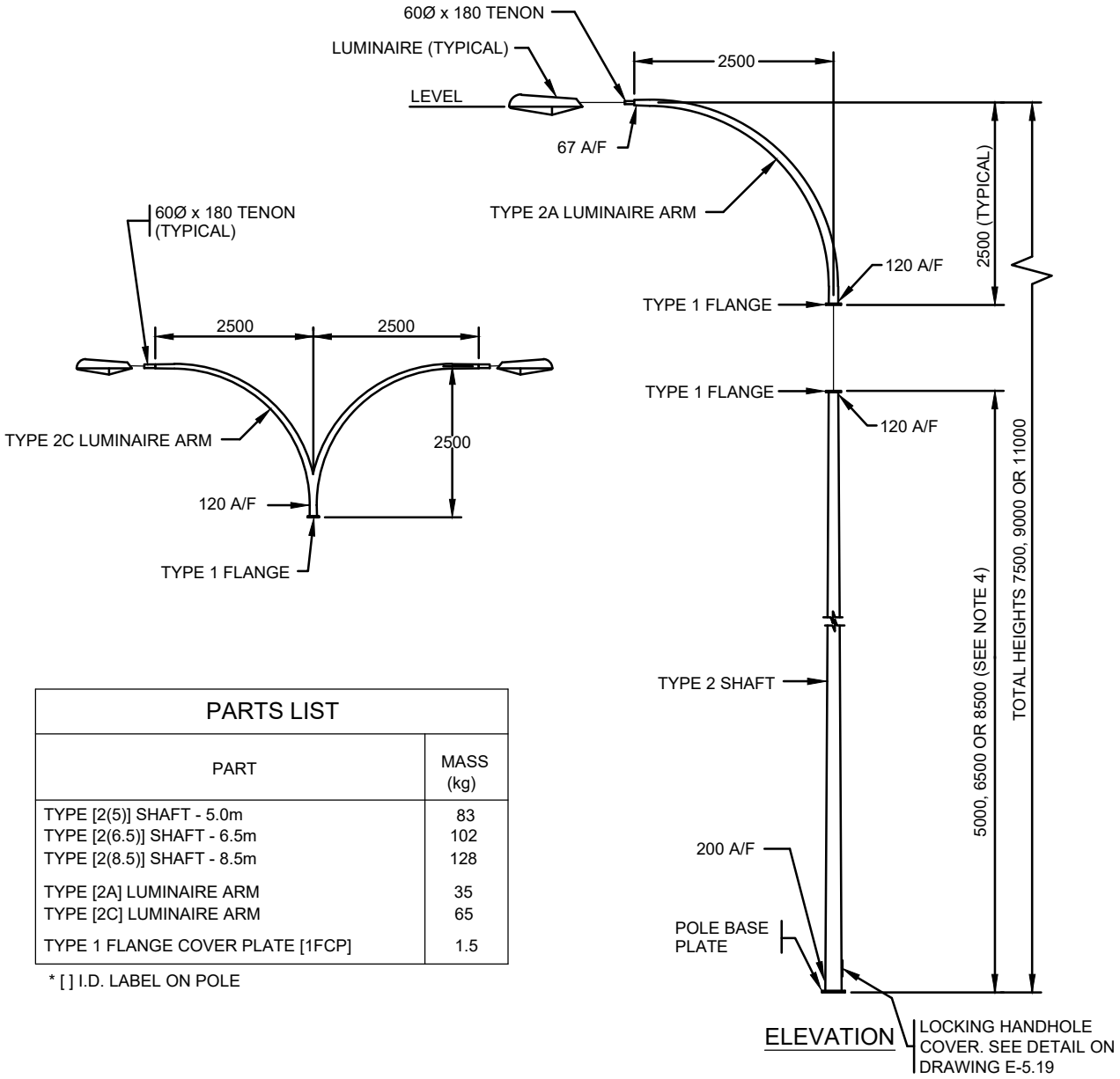
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

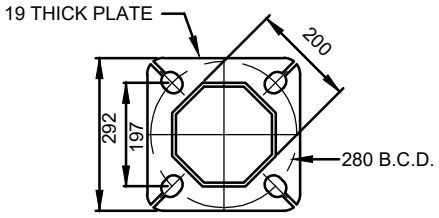
UNDERGROUND CONDUIT IN NON-PAVED AREAS

Scale:	NTS
Created:	MAY 1999
Rev Date:	NOV 2019
Dwg No:	E-4.2



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

* [ ] I.D. LABEL ON POLE



POLE BASE PLATE

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SEE DRAWING E-5.2 FOR TYPE 2 SHAFT, BOLT KITS AND POLE ASSEMBLY DETAILS.
3. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
4. POLE SHAFTS TO BE SUPPLIED 0.9m SHORTER WHERE BEING INSTALLED ON SERVICE BASE.

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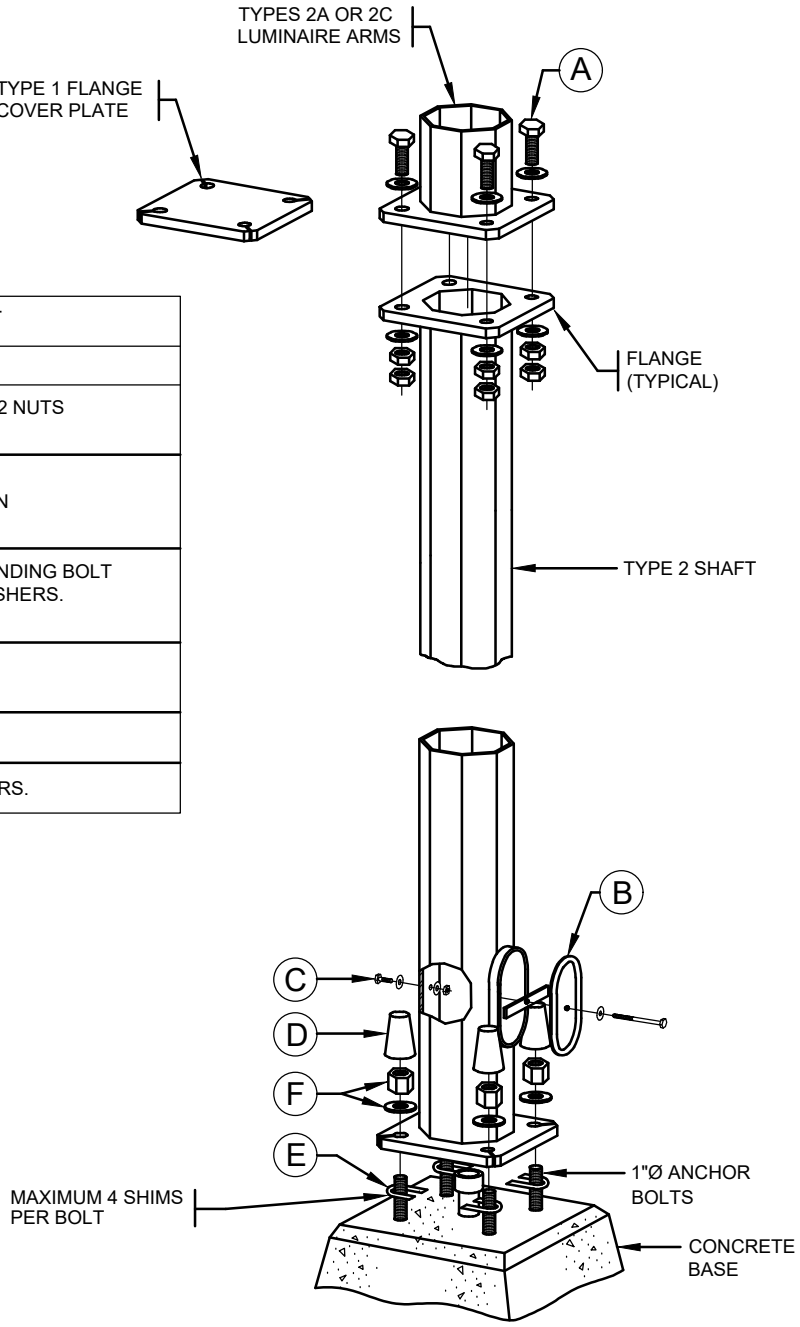
6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

LUMINARE POLE (HIGHWAYS TYPE 2 SHAFT)

Scale:	NTS
Created:	JAN 1998
Rev Date:	MAY 2020
Dwg No:	E-5.1

TYPE 2 SHAFT BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"Ø x 3" LONG BOLT, 2 NUTS AND 2 WASHERS.
B	1	LOCKING HANDHOLE COVER. SEE DETAIL ON DRAWING E-5.19
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:

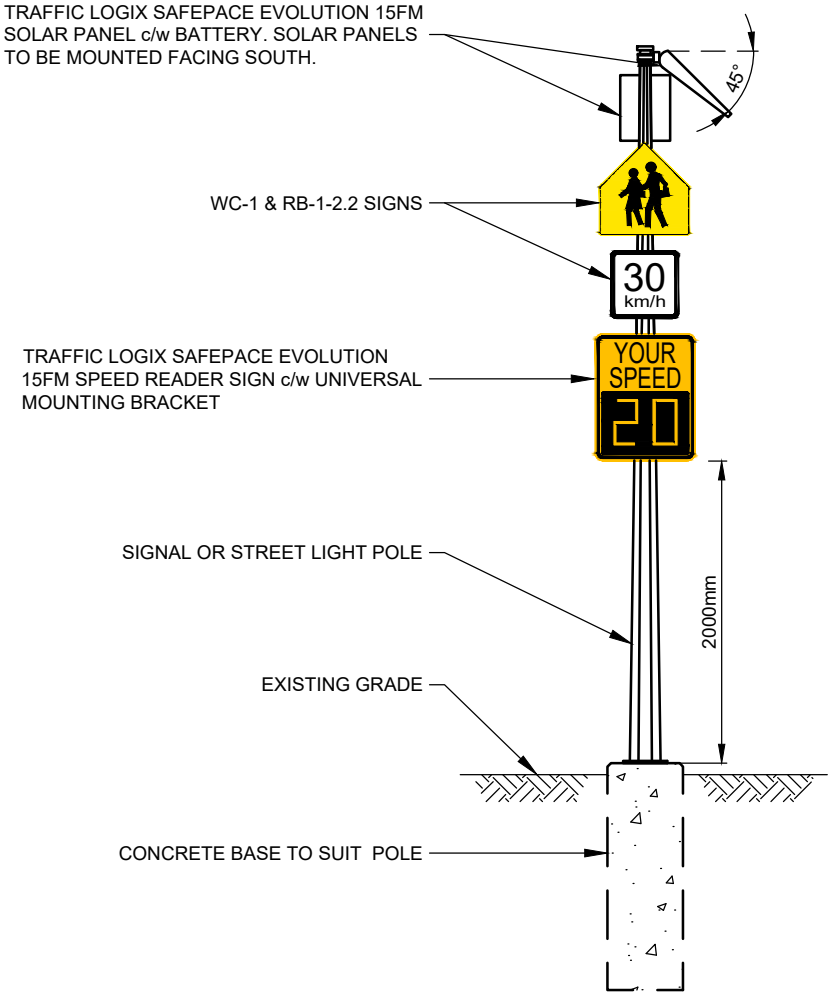
1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SHAFTS TO BE INSTALLED PLUMB.
3. ALL SHAFTS, ARMS AND EXTENSIONS TO BE SUPPLIED WITH A GALVANIZED FINISH, UNLESS OTHERWISE NOTED.
4. APPLY GREASE TO ANCHOR BOLT THREADS.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.

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CITY OF NANAIMO
THE HARBOUR CITY

LUMINARE POLE (HIGHWAYS TYPE 2 SHAFT)

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2019
Dwg No:	E-5.2



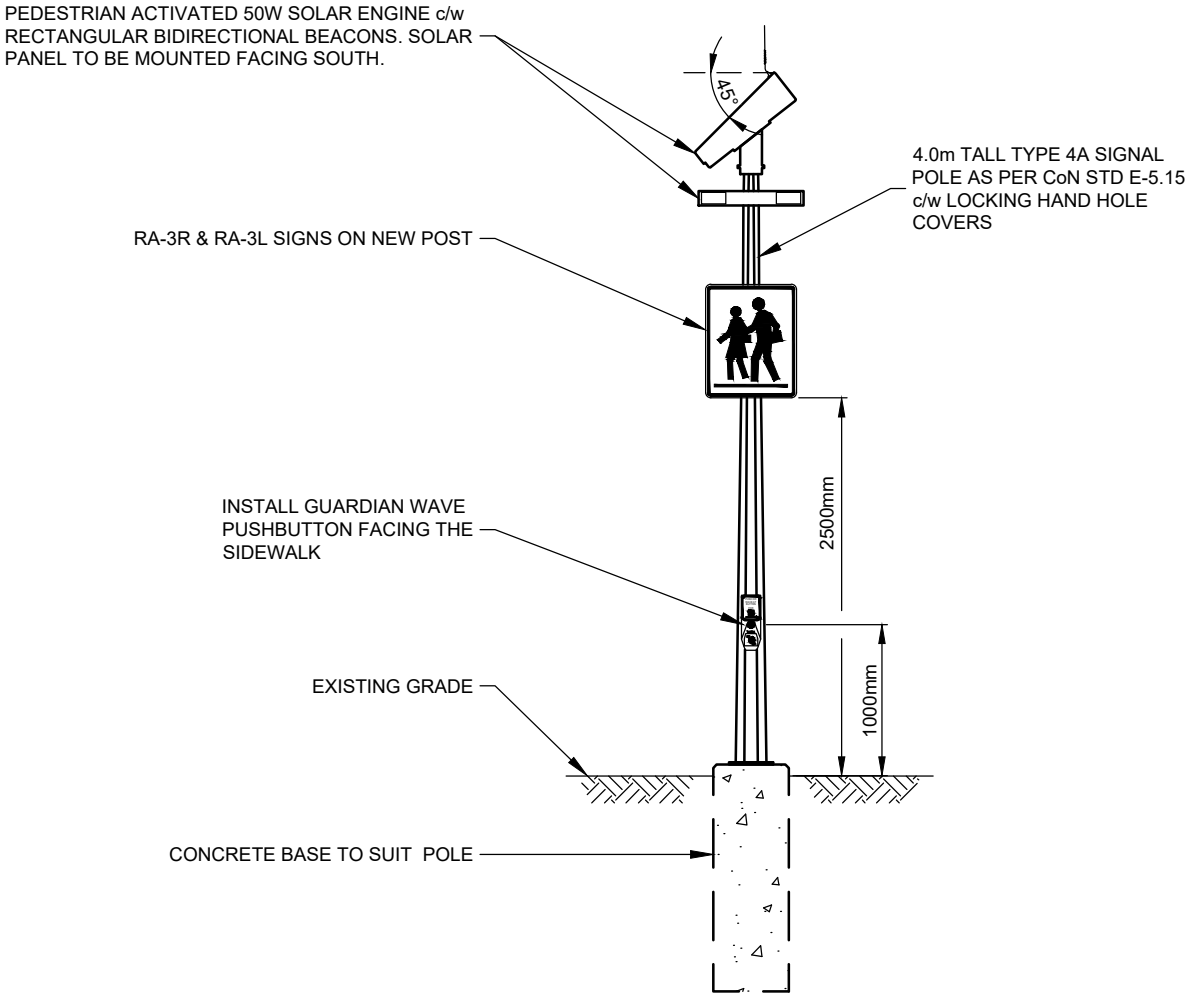
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

SPEED READER SIGN ON POST

Scale:	NTS
Created:	JAN 2024
Rev Date:	JUNE 2026
Dwg No:	E-5.3



NOTES:

1. POLE TO BE INSTALLED ON ONCOMING SIDE OF CROSSWALK WHERE POSSIBLE.

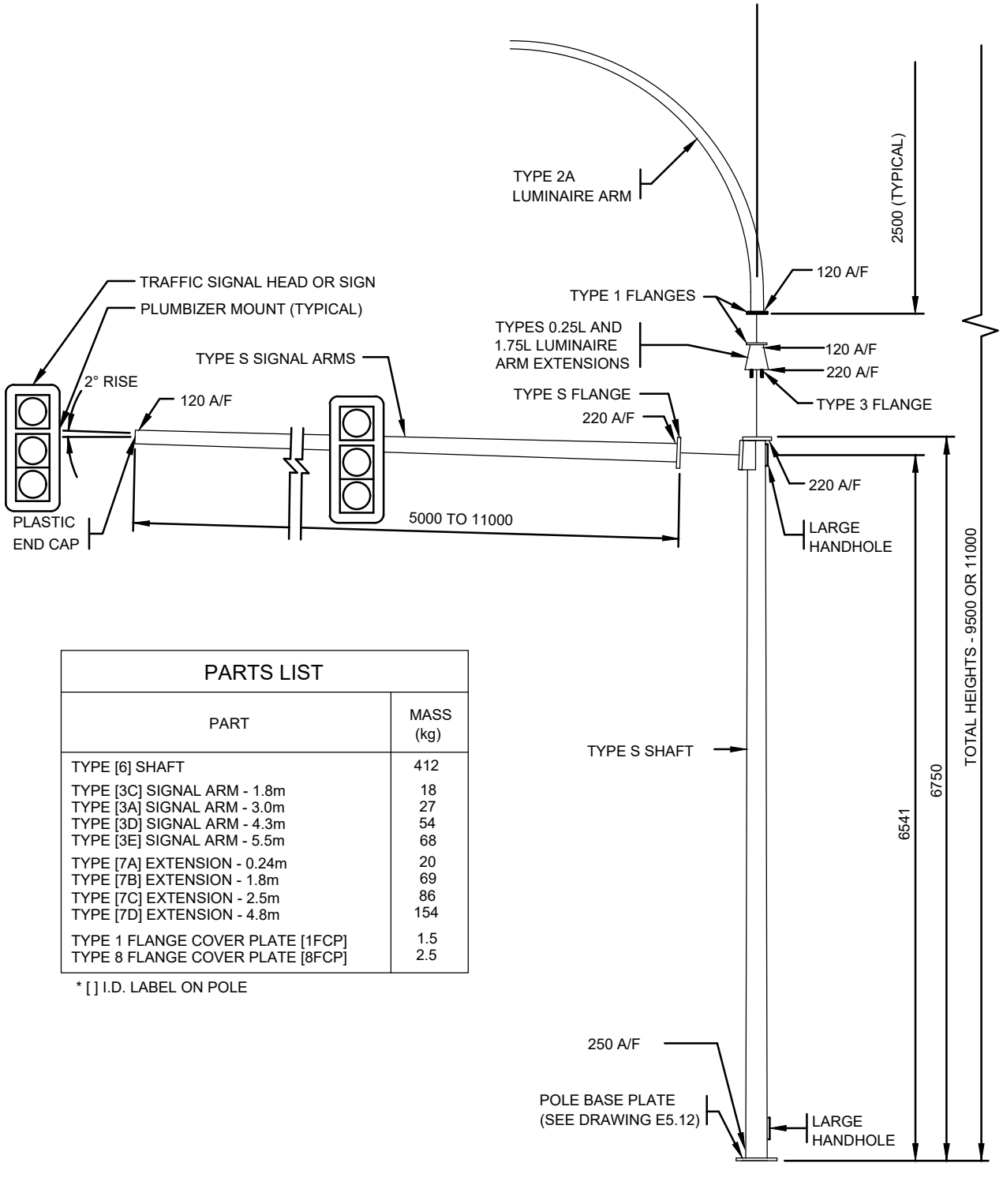
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4.29.2026

CITY OF NANAIMO
THE HARBOUR CITY

CROSS WALK FLASHER POST

Scale:	NTS
Created:	JAN 2024
Rev Date:	JUNE 2026
Dwg No:	E-5.4



PARTS LIST	
PART	MASS (kg)
TYPE [6] SHAFT	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 [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

NOTES:

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

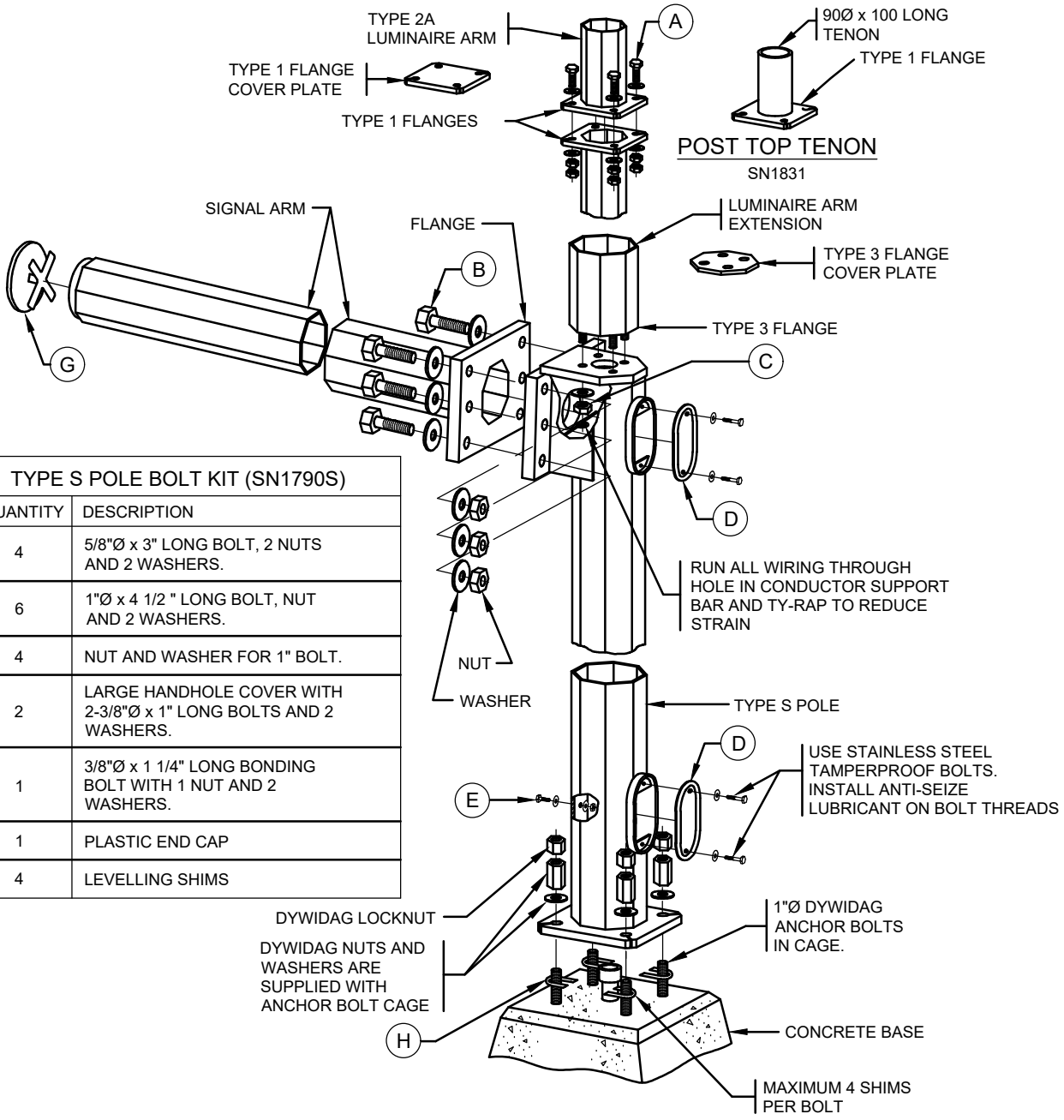
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

SIGNAL POLE (TYPE S SHAFT)
INSTALLATION DETAILS

Scale:	NTS
Created:	MAY 2013
Rev Date:	NOV 2016
Dwg No:	E-5.7



POLE ASSEMBLY DETAIL

TYPE S POLE BOLT KIT (SN1790S)		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"Ø x 3" LONG BOLT, 2 NUTS AND 2 WASHERS.
B	6	1"Ø x 4 1/2 " 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

NOTES:

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. SHAFTS TO BE INSTALLED PLUMB.
3. ALL SHAFTS, 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.

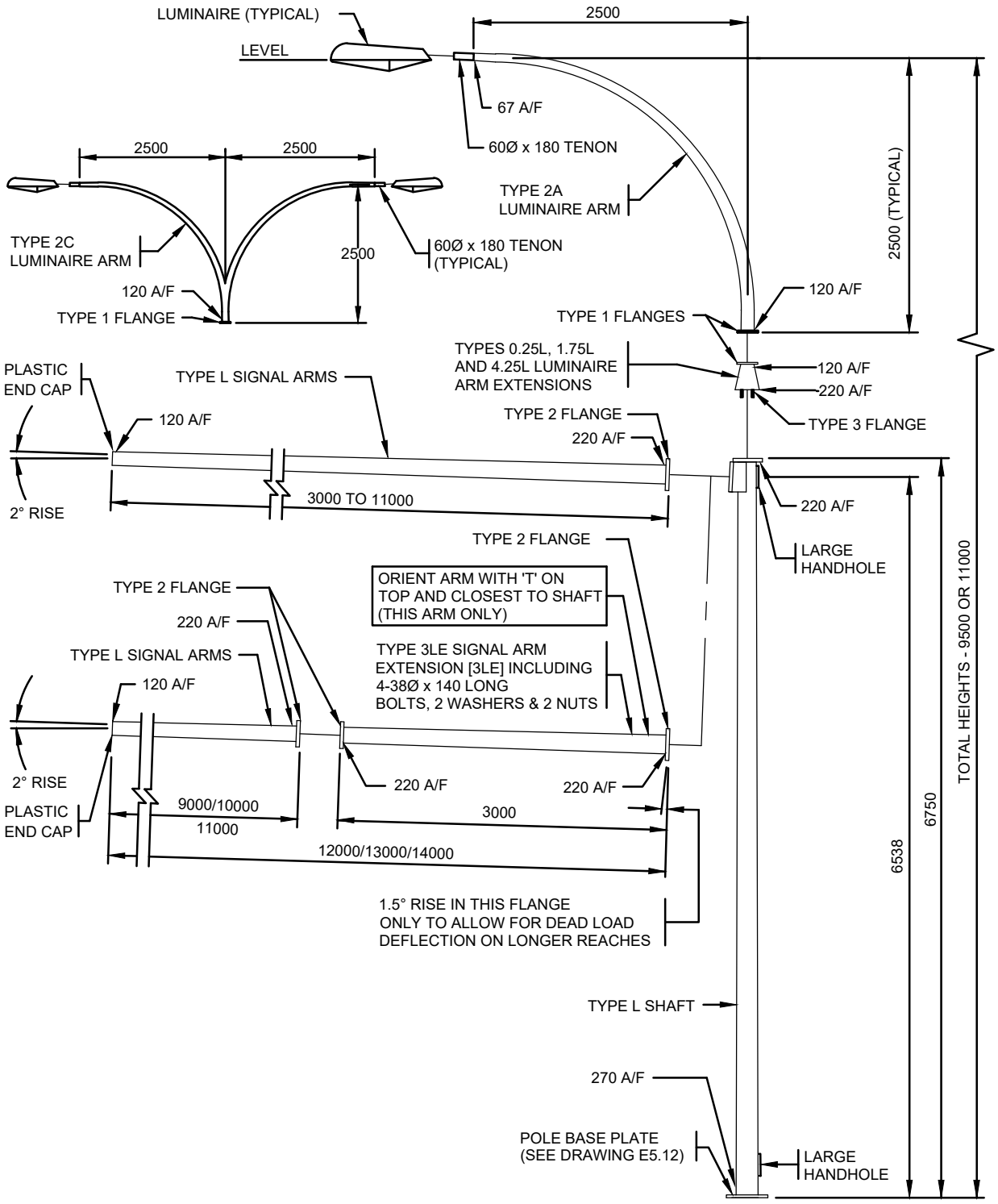
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

SIGNAL POLE (TYPE S SHAFT)
INSTALLATION DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-5.8



NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SEE DRAWING E-5.13 FOR BOLT KITS AND POLE ASSEMBLY DETAILS.
3. SEE DRAWING E-5.12 FOR BASE PLATE AND PARTS LIST.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

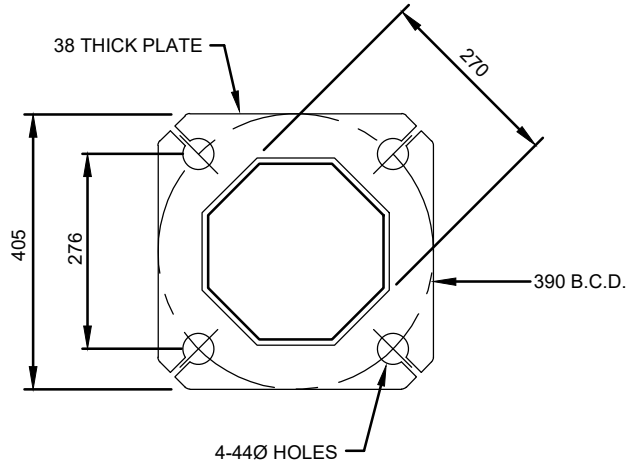
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

SIGNAL POLE (HIGHWAYS TYPE L SHAFT)

Scale:	NTS
Created:	MAY 2013
Rev Date:	MAY 2020
Dwg No:	E-5.11

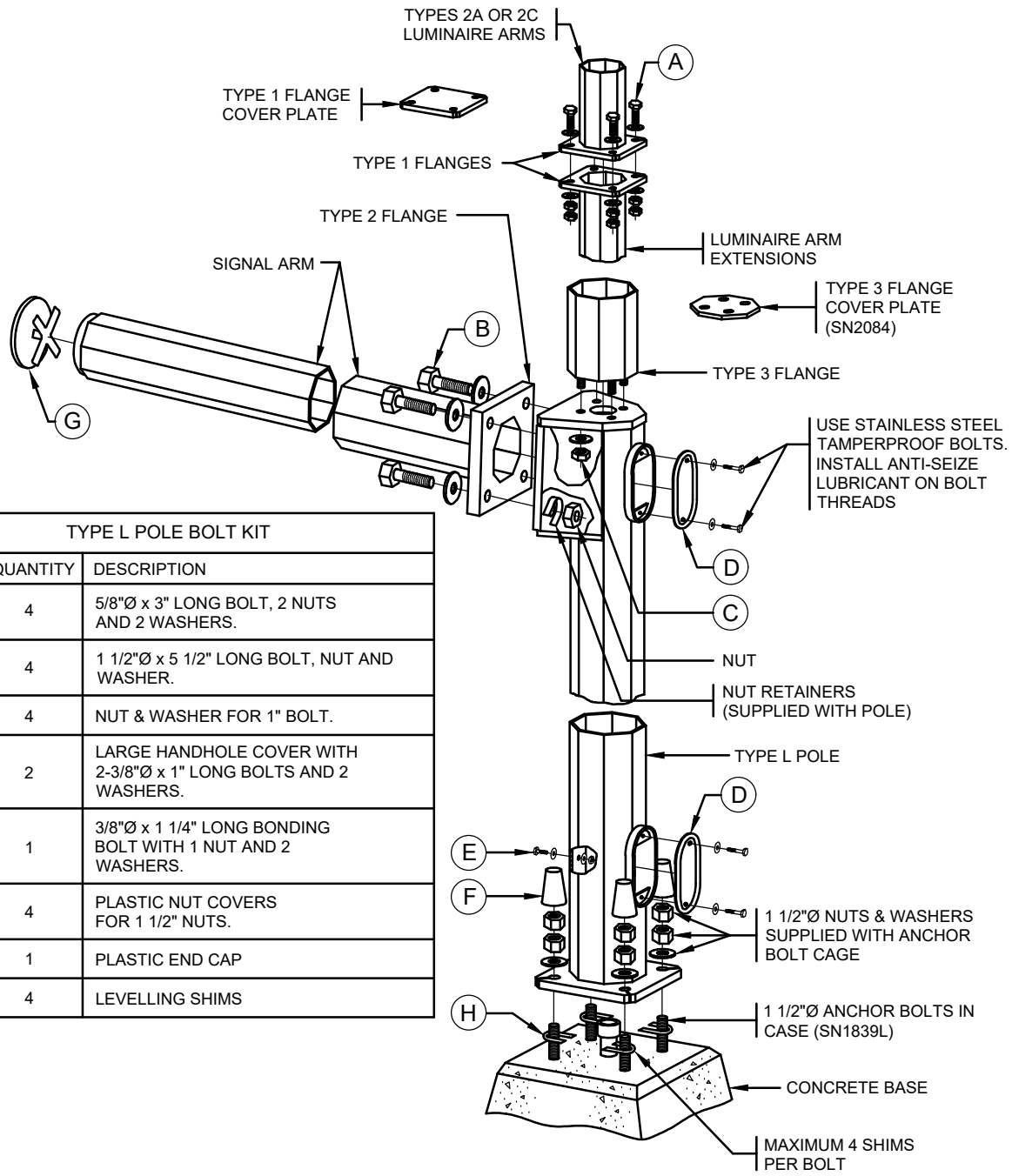


TYPE L POLE BASE PLATE

PARTS LIST FOR TYPE L SIGNAL POLE	
PART	MASS (kg)
TYPE [L] POLE SHAFT	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

* [ ] I.D. LABEL ON POLE

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TYPE L POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	4	5/8"Ø x 3" LONG BOLT, 2 NUTS AND 2 WASHERS.
B	4	1 1/2"Ø x 5 1/2" LONG BOLT, NUT AND WASHER.
C	4	NUT & 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.
F	4	PLASTIC NUT COVERS FOR 1 1/2" NUTS.
G	1	PLASTIC END CAP
H	4	LEVELLING SHIMS

POLE ASSEMBLY DETAIL

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SHAFTS TO BE INSTALLED PLUMB.
3. ALL SHAFTS, ARMS AND EXTENSIONS TO BE SUPPLIED WITH A GALVANIZED FINISH, UNLESS OTHERWISE NOTED.
4. APPLY GREASE TO ANCHOR BOLT THREADS.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.

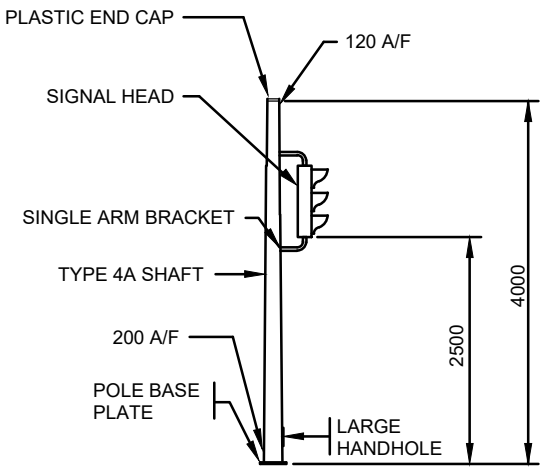
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4.21.2026

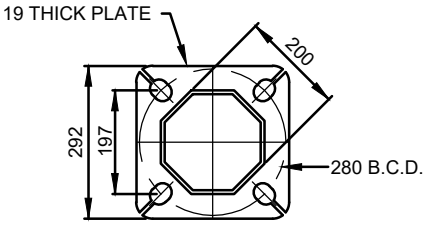
CITY OF NANAIMO
THE HARBOUR CITY

SIGNAL POLE (HIGHWAYS TYPE L SHAFT)

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-5.13



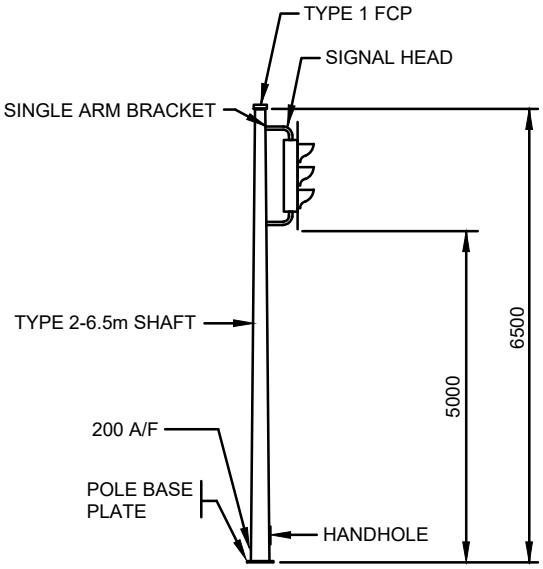
TYPE 4A SHAFT



POLE BASE PLATE

PARTS LIST	
PART	MASS (kg)
TYPE [2] SHAFT TYPE [4A] SHAFT	102 66

* [ ] I.D. LABEL ON POLE



TYPE 2-6.5m SHAFT

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SEE DRAWING E-5.15 FOR TYPE 4A SHAFT, BOLT KITS AND POLE ASSEMBLY DETAILS.
3. ALL DIMENSION IN MILLIMETERS UNLESS OTHERWISE NOTED.
4. POLE SHAFTS TO BE SUPPLIED 0.9m SHORTER WHERE BEING INSTALLED ON SERVICE BASE.

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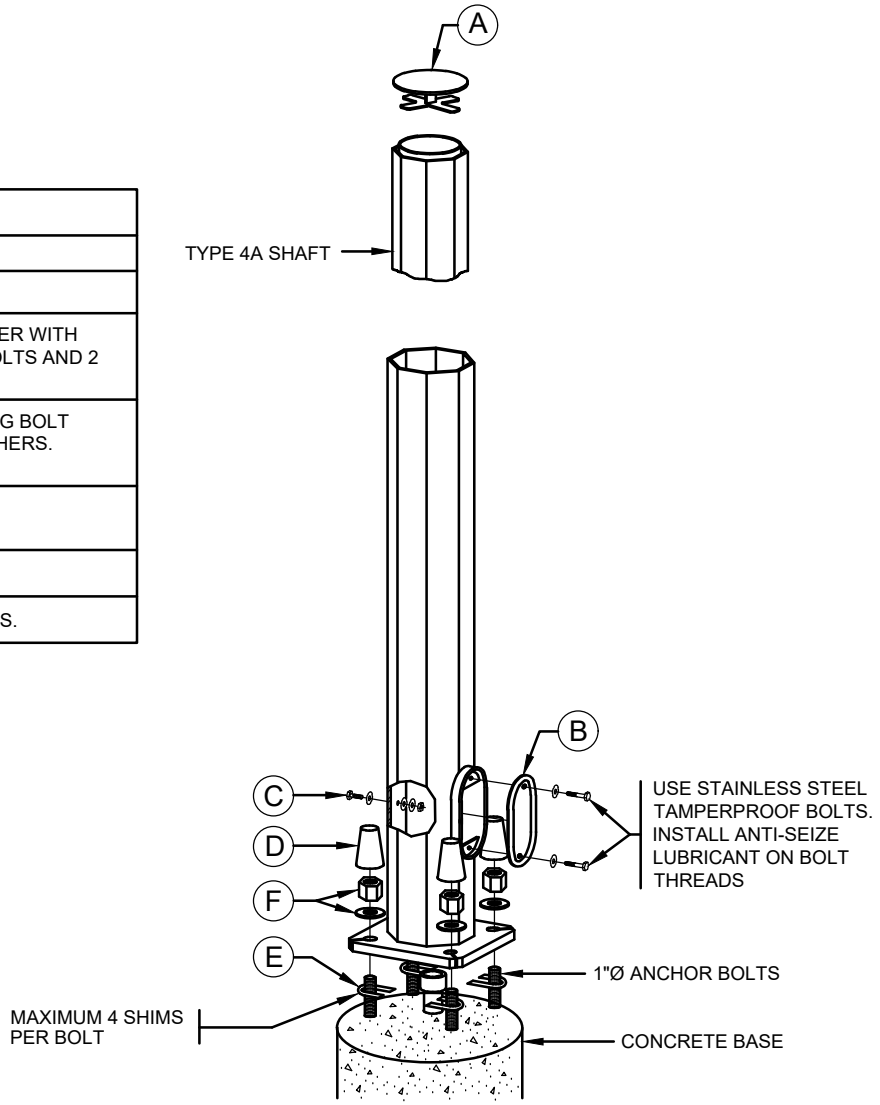
4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

SIGNAL POSTS
(HIGHWAYS TYPE
4A & 2-6.5m SHAFTS)

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-5.14

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



POLE ASSEMBLY DETAIL

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SHAFTS TO BE INSTALLED PLUMB.
3. ALL SHAFTS, ARMS AND EXTENSIONS TO BE SUPPLIED WITH A GALVANIZED FINISH, UNLESS OTHERWISE NOTED.
4. APPLY GREASE TO ANCHOR BOLT THREADS.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.

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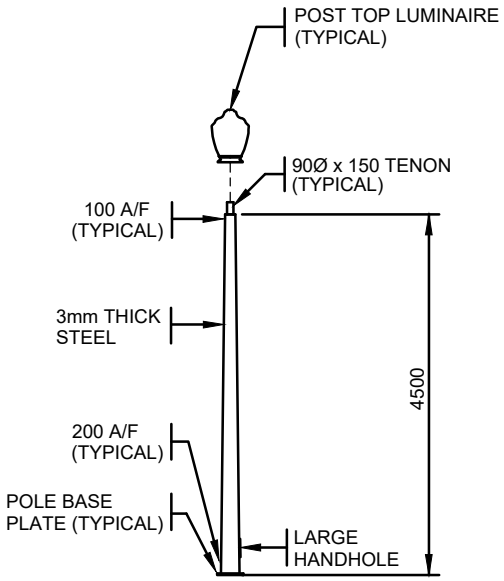
CITY OF NANAIMO
THE HARBOUR CITY

SIGNAL POSTS
(HIGHWAYS TYPE 4A &
2-6.5m SHAFTS)

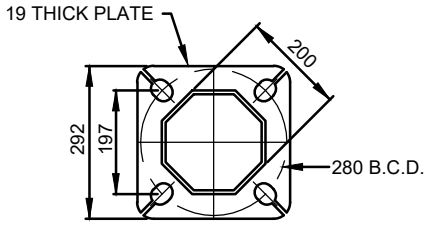
Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-5.15

6.22.2026

PARTS LIST	
PART	MASS (kg)
4.5m - POST TOP LUMINAIRE POLE	55



4.5m POLE



POLE BASE PLATE

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SEE DRAWING E-5.17 FOR BOLT KIT AND POLE ASSEMBLY DETAILS.
3. ALL DIMENSION IN MILLIMETERS UNLESS OTHERWISE NOTED.
4. POST TOP POLES TO BE SUPPLIED 0.9m SHORTER WHEN INSTALLED ON A SERVICE BASE.

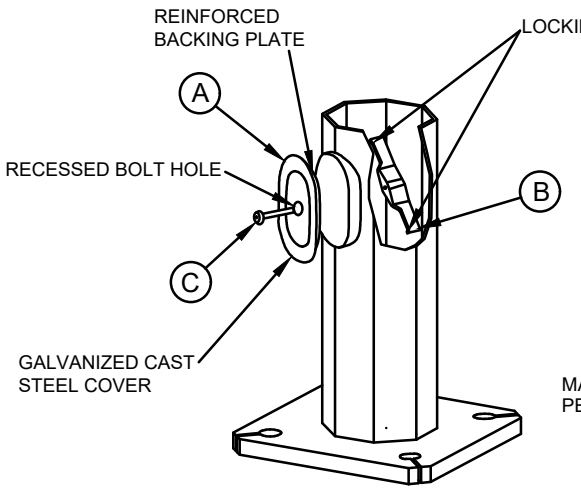
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CITY OF NANAIMO
THE HARBOUR CITY

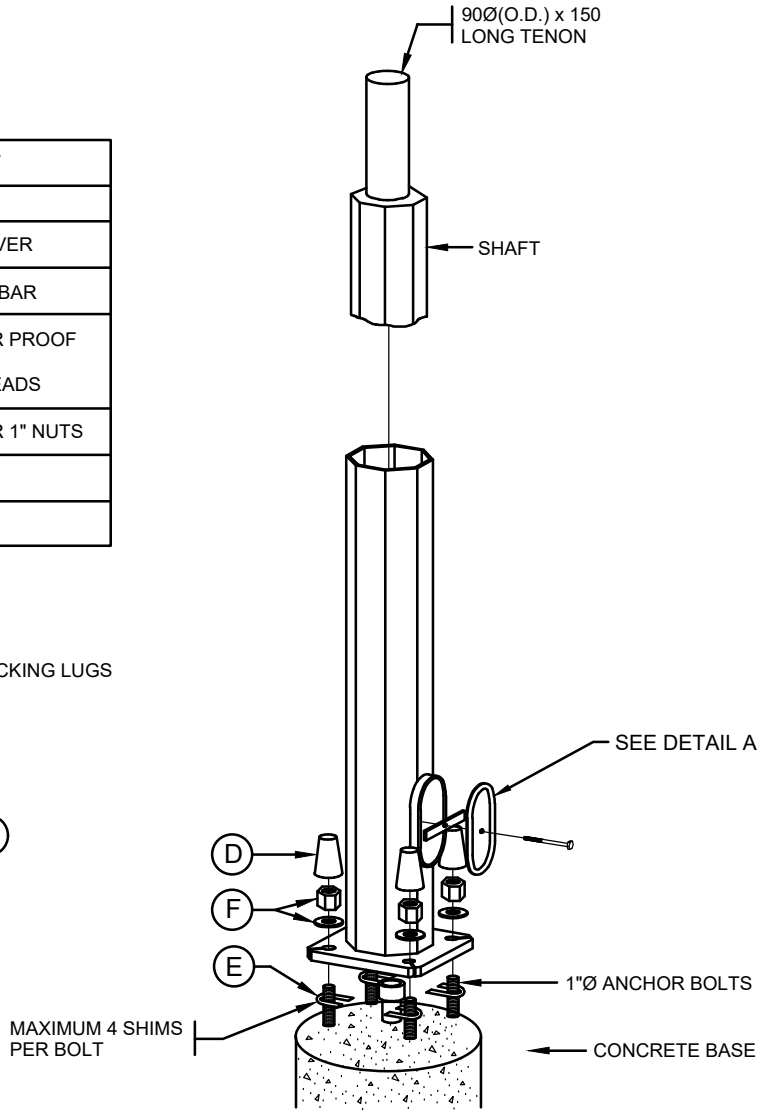
POST TOP LUMINAIRE POLES

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2019
Dwg No:	E-5.16

POST TOP POLE BOLT KIT		
ITEM	QUANTITY	DESCRIPTION
A	1	LOCKABLE HANDHOLE COVER
B	1	TAMPER PROOF BACKING BAR
C	1	STAINLESS STEEL TAMPER PROOF BOLT. INSTALL ANTI-SEIZE LUBRICANT ON BOLT THREADS
D	4	PLASTIC NUT COVERS FOR 1" NUTS
E	4	LEVELLING SHIMS
F	4	1"Ø NUTS AND WASHERS



DETAIL A

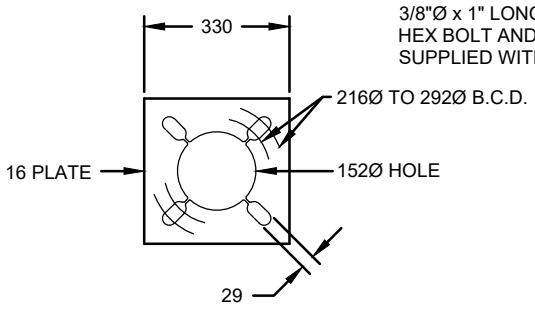


POLE ASSEMBLY DETAIL

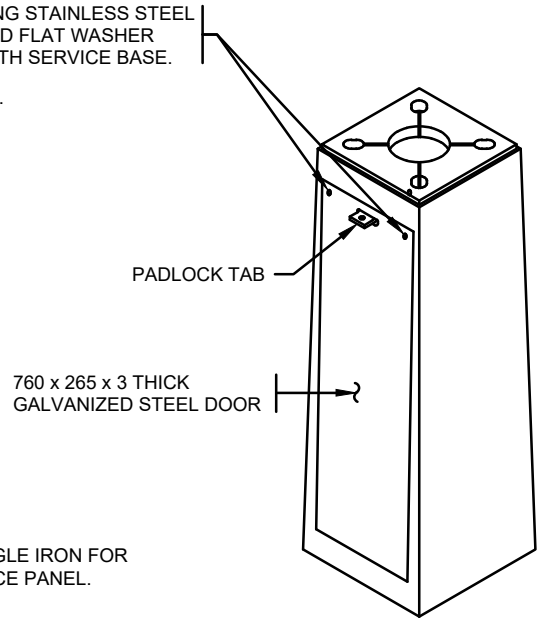
NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SHAFTS TO BE INSTALLED PLUMB.
3. ALL SHAFTS, ARMS AND EXTENSIONS TO BE SUPPLIED WITH A GALVANIZED FINISH, UNLESS OTHERWISE NOTED.
4. APPLY GREASE TO ANCHOR BOLT THREADS.
5. TOUCH UP ANY SCRATCHES IN GALVANIZED SURFACES WITH COLD GALVANIZING COMPOUND.

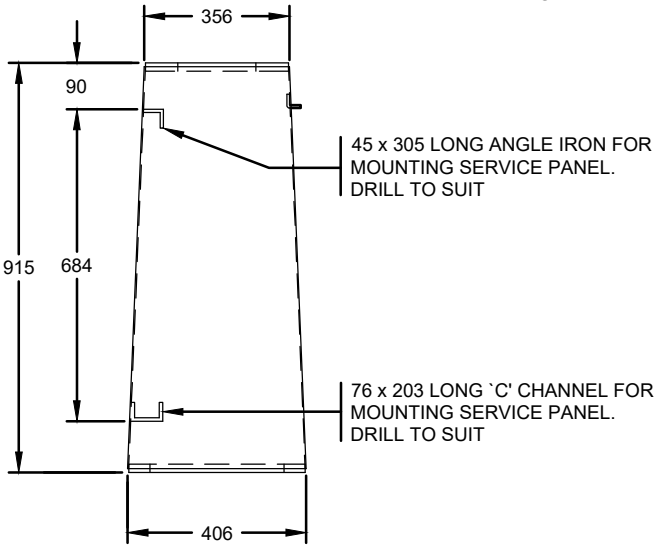
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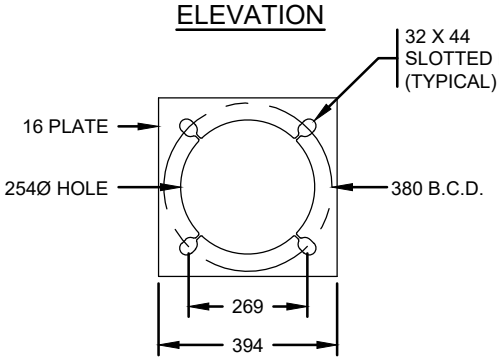
TOP VIEW



PICTORIAL VIEW



ELEVATION



BOTTOM VIEW

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SERVICE BASE TO BE USED WITH TYPE 2 SHAFTS AND POST TOP POLES ONLY.
3. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

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

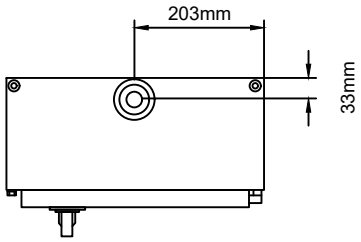
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6.22.2026

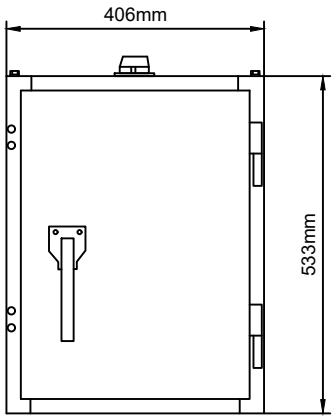
CITY OF NANAIMO
THE HARBOUR CITY

SERVICE BASE

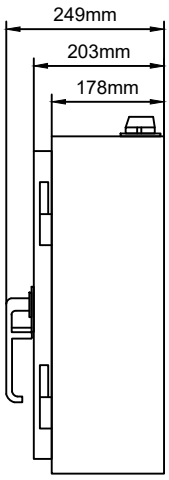
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Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-5.18



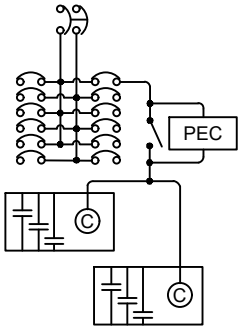
TOP VIEW



FRONT VIEW



SIDE VIEW



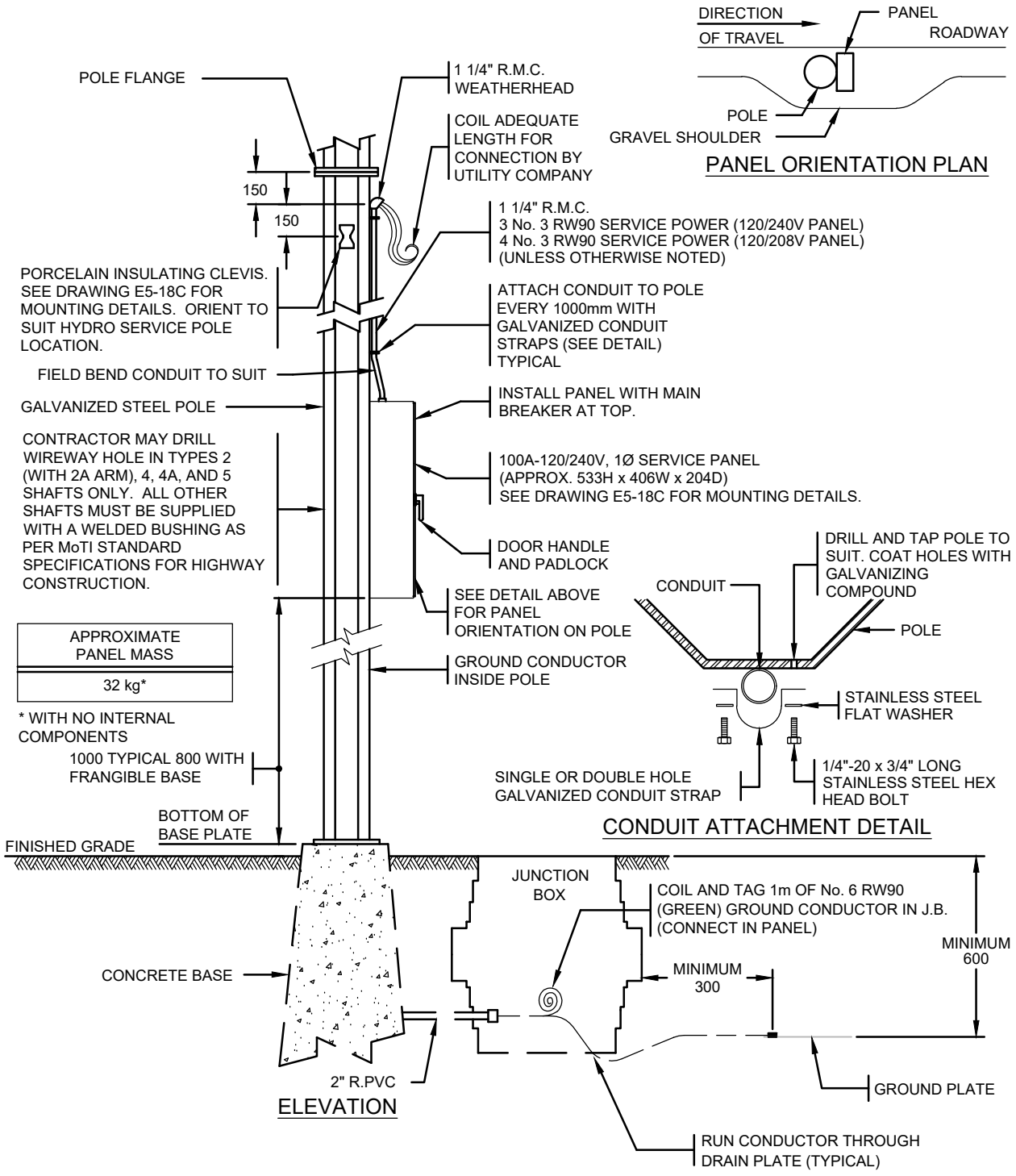
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

POLE MOUNTED SERVICE PANEL

Scale:	NTS
Created:	NOV 2012
Rev Date:	NOV 2012
Dwg No:	E-5.18A



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

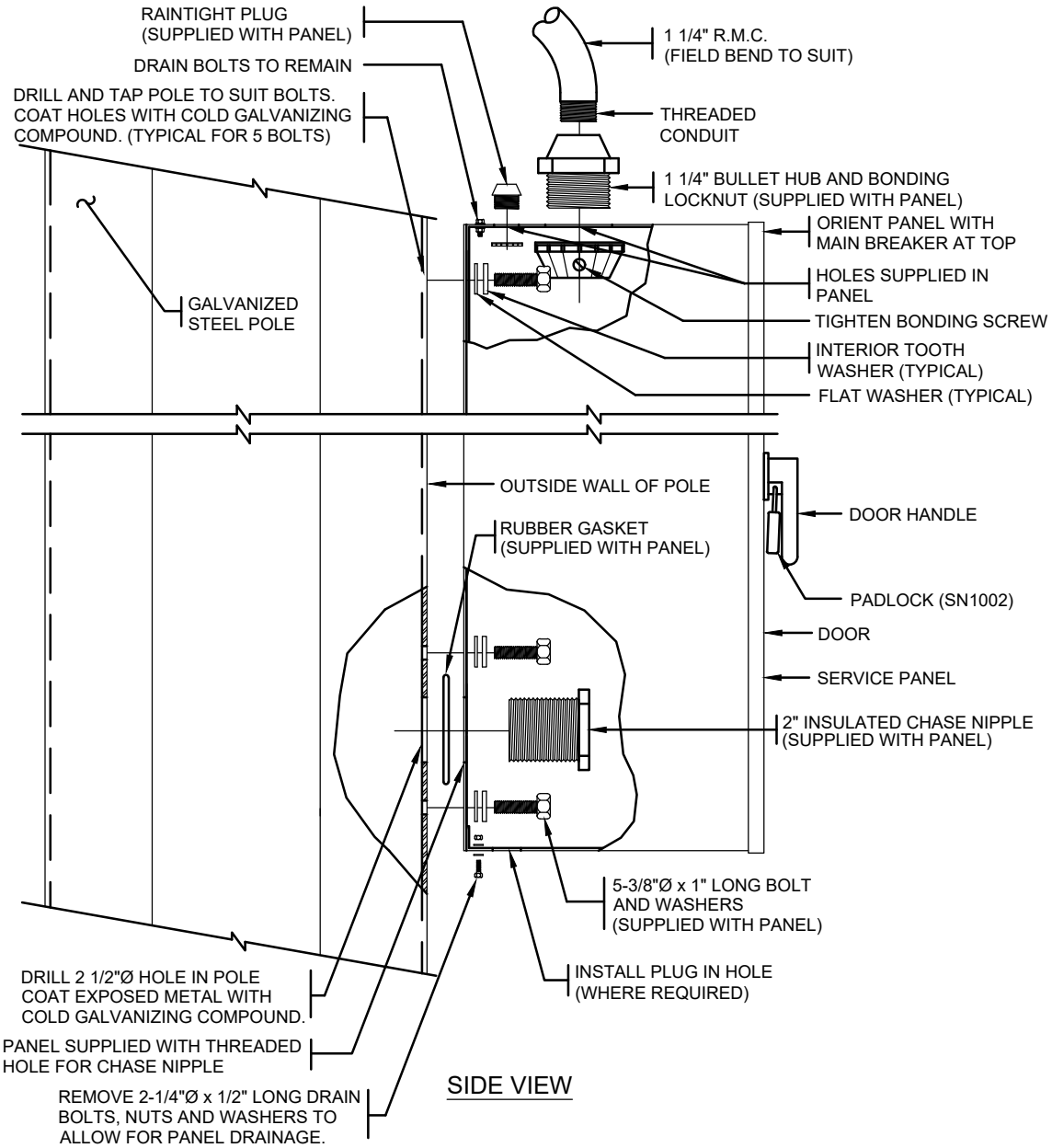
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

100A - OVERHEAD DROP SERVICE
(INSTALLATION DETAILS)

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-5.18B



SIDE VIEW

NOTES:

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

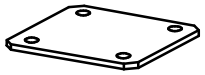
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4.21.2026

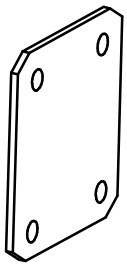
CITY OF NANAIMO
THE HARBOUR CITY

100A - OVERHEAD DROP SERVICE
(INSTALLATION DETAILS)

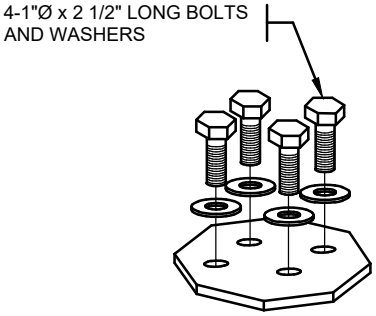
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Created:	NOV 2012
Rev Date:	NOV 2012
Dwg No:	E-5.18C



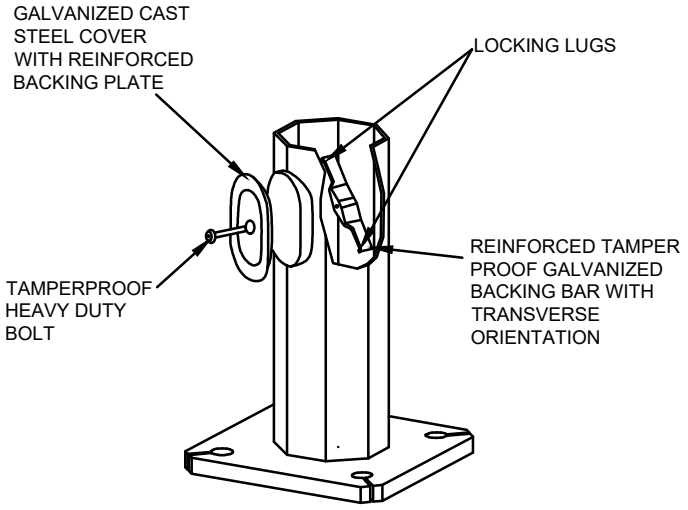
TYPE 1 FLANGE COVER PLATE



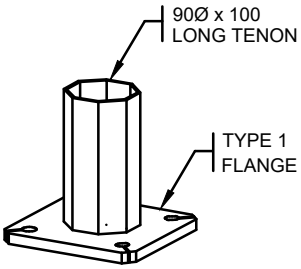
TYPE 2 FLANGE COVER PLATE



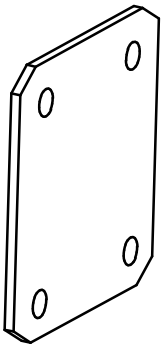
TYPE 3 FLANGE COVER PLATE



SECURITY 4 X 7 HANDHOLE COVER KIT



POST TOP TENON



TYPE 8 FLANGE COVER PLATE

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.

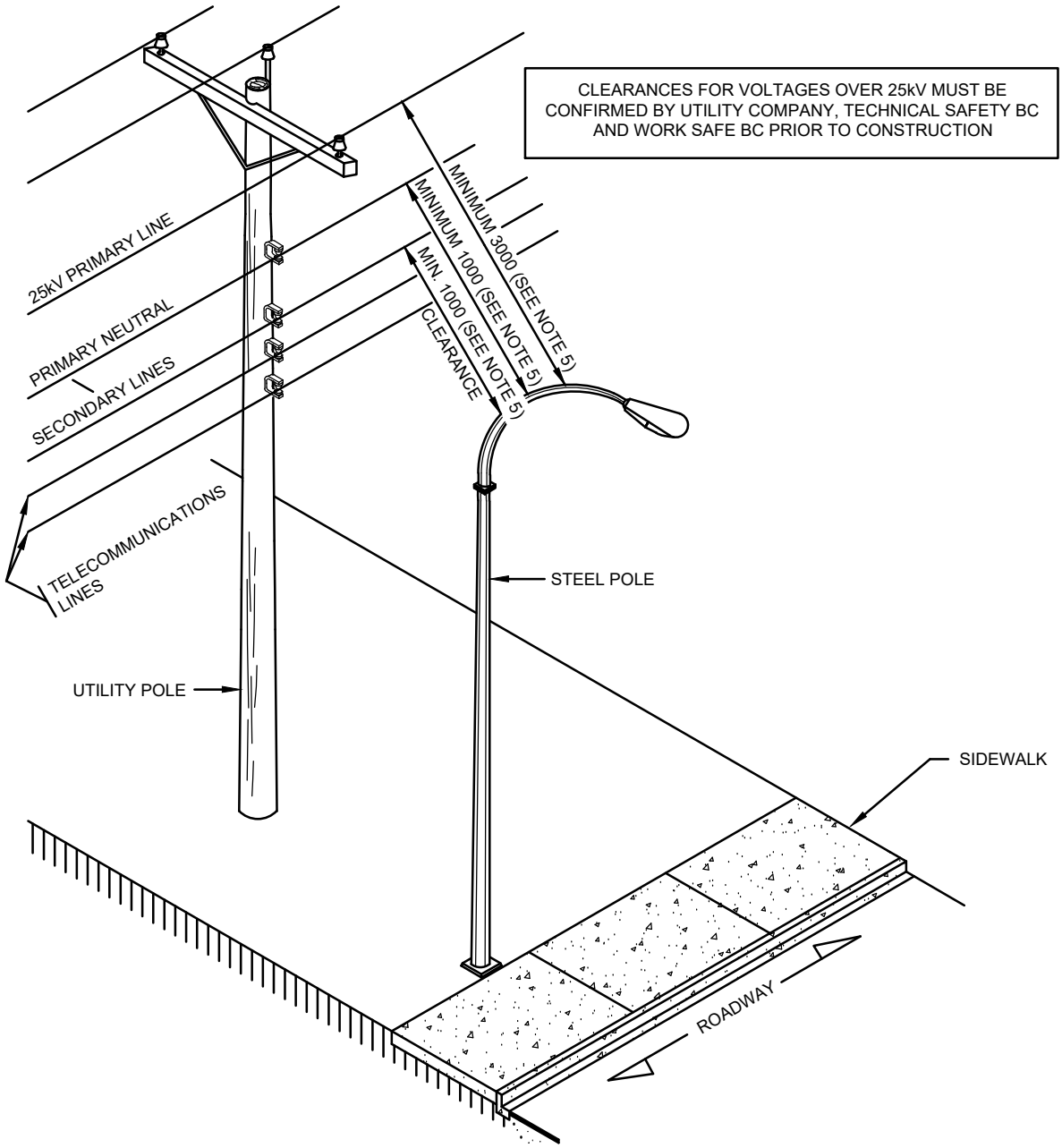
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

POLE ACCESSORIES (HIGHWAYS TYPE)

Scale:	NTS
Created:	NOV 2012
Rev Date:	NOV 2019
Dwg No:	E-5.19



NOTES:

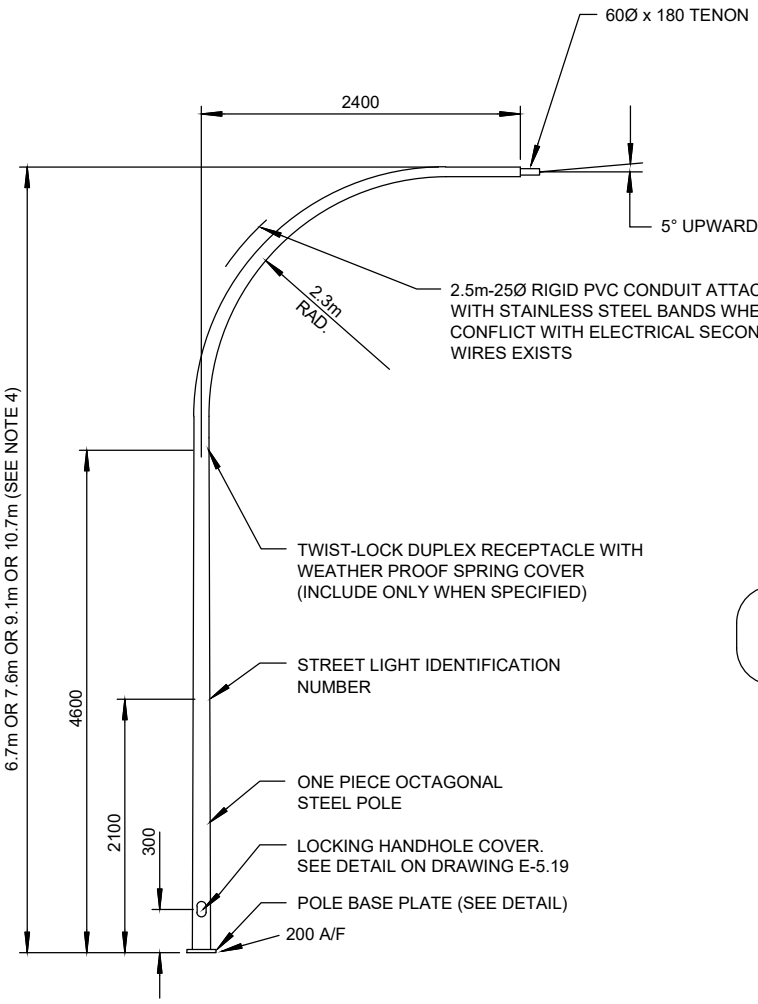
1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. CLEARANCES LISTED ABOVE ARE TO BE USED AS A GUIDELINE ONLY. EXACT REQUIRED CLEARANCES MAY VARY AND MUST BE CONFIRMED BY CONTRACTOR PRIOR TO CONSTRUCTION. AS PER THE REQUIREMENTS OF THE UTILITY COMPANY.
3. FOR CLEARANCES LESS THAN SHOWN, CONTRACTOR TO OBTAIN APPROVAL FROM UTILITY COMPANY AND WORKERS COMPENSATION BOARD PRIOR TO INSTALLATION.
4. CONTRACTOR SHALL COORDINATE WITH TELECOMMUNICATIONS UTILITIES TO INSTALL PLASTIC WEAR SHIELDS ON LINES THAT COME INTO CONTACT WITH POLES.
5. MINIMUM DISTANCE TO INCLUDE MAXIMUM SAG AND SWING.

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 10 DWG\E-5.20
4.21.2026

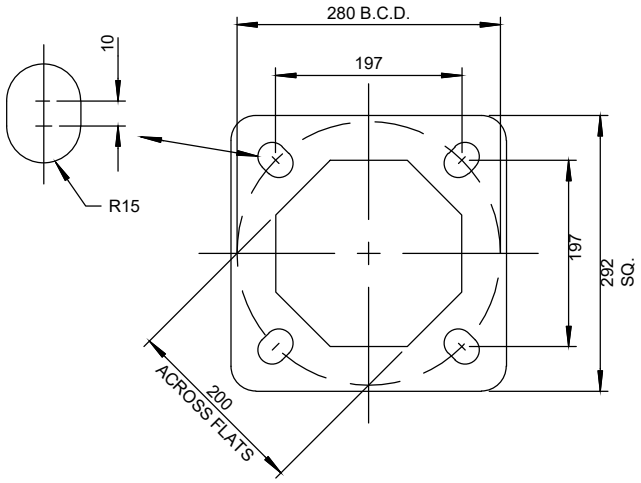
CITY OF NANAIMO
THE HARBOUR CITY

MINIMUM CLEARANCES TO OVERHEAD POWERLINES

Scale:	NTS
Created:	JAN 1998
Rev Date:	MAY 2020
Dwg No:	E-5.20



ELEVATION



POLE BASE PLATE

NOTES:

1. STRICT ADHERENCE TO CLEARANCES FROM HIGH VOLTAGE POWER AS SPECIFIED IN THE CANADIAN ELECTRICAL CODE IS REQUIRED
2. ALL DIMENSIONS IN MILLIMETERS UNLESS SHOWN OTHERWISE
3. POLE TO BE SUPPLIED 0.9m SHORTER WHERE BEING INSTALLED ON SERVICE BASE.
4. 6.7m AND 7.6m POLES REQUIRE APPROVAL FROM THE CITY ENGINEER.

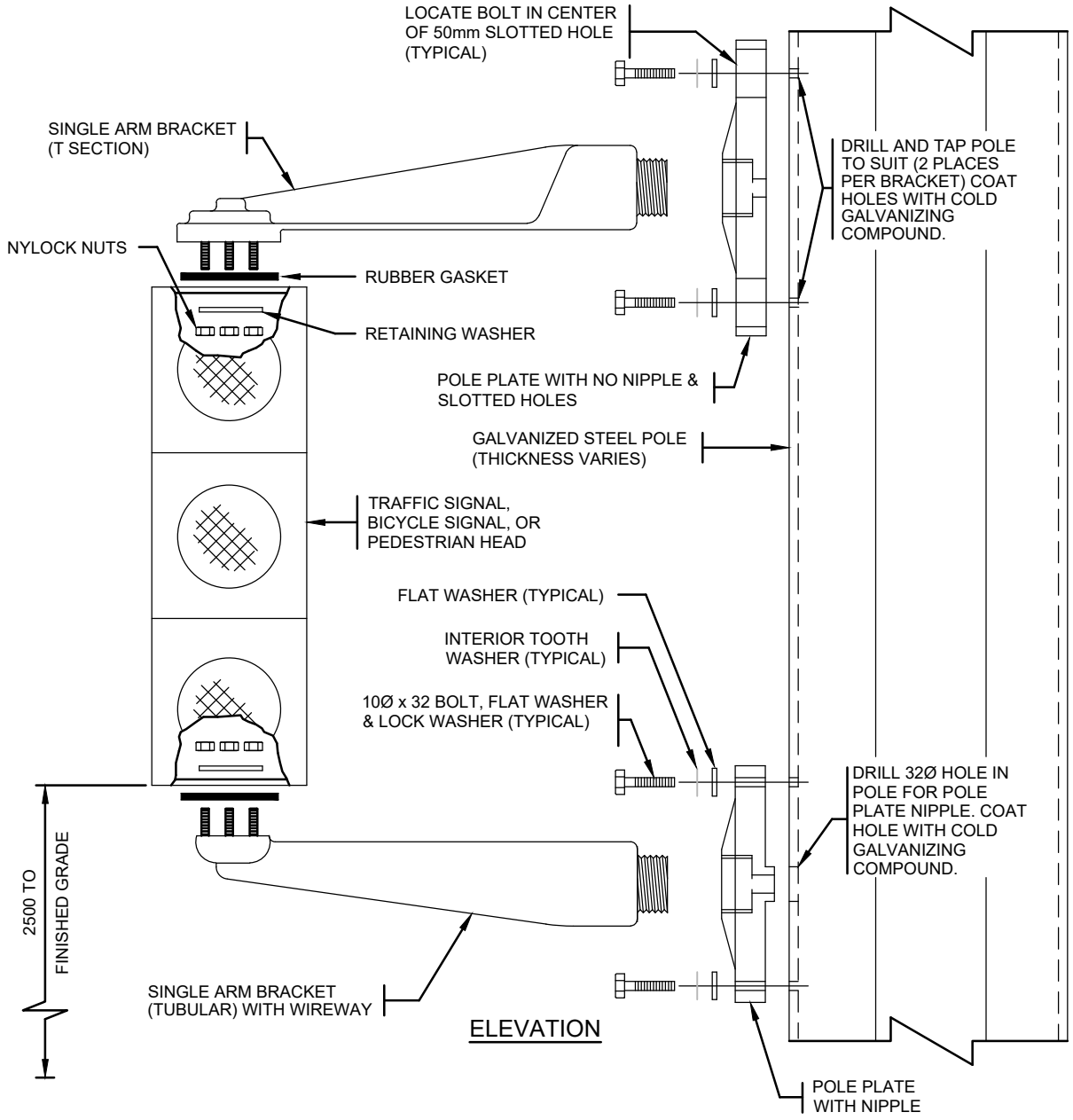
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

ONE PIECE LUMINAIRE POLE FOR SINGLE RESIDENTIAL ZONE

Scale:	NTS
Created:	JUL 1999
Rev Date:	JUNE 2026
Dwg No:	E-5.21



ELEVATION

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. AIM SIGNAL HEADS AS DIRECTED BY THE CITY ENGINEER.
3. WHERE 3 OR MORE SIDE MOUNT SIGNAL HEADS ARE REQUIRED ON POLE, LOCATE 3rd & 4th PEDESTRIAN HEAD ARM BRACKETS WITH WIREWAY & POLE PLATE WITH NIPPLE TO TOP OF HEAD TO AVOID EXCESSIVE DRILLING OF POLE IN ONE AREA.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

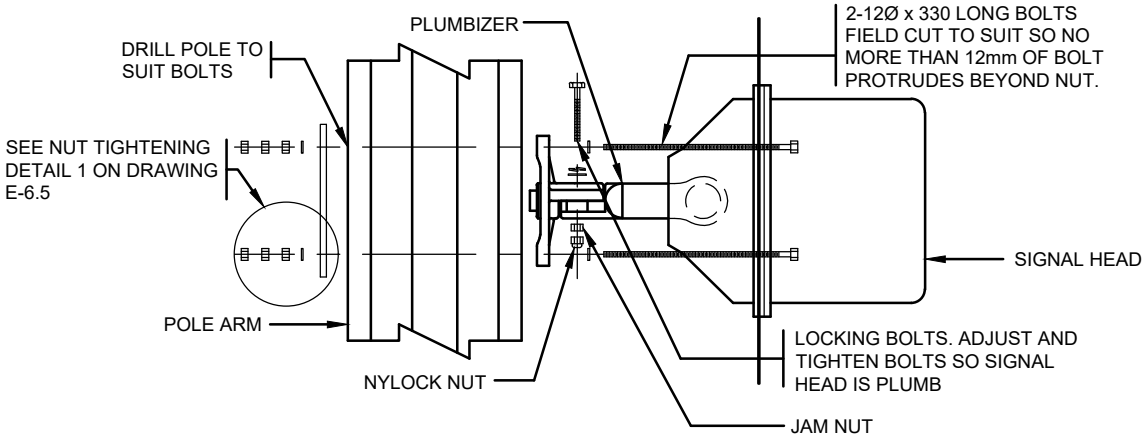
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6.22.2026

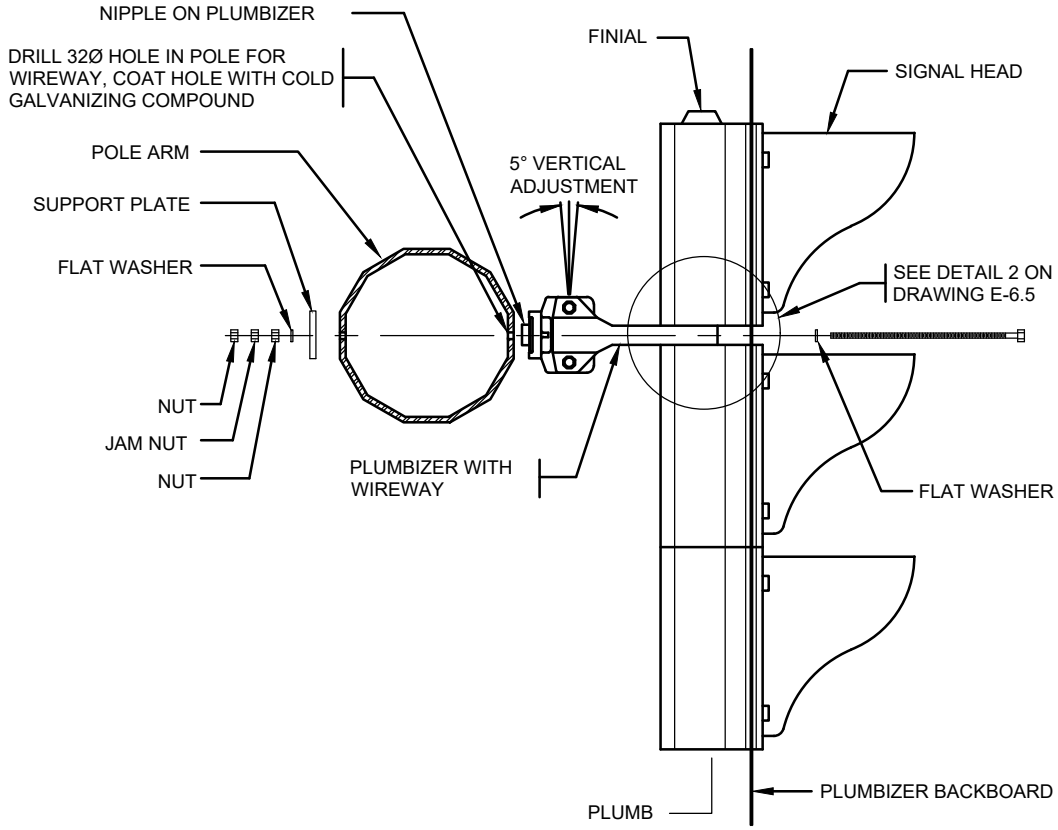
CITY OF NANAIMO
THE HARBOUR CITY

SIDE OF POLE SIGNAL HEAD MOUNTING

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-6.1



TOP VIEW



ELEVATION

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. AIM SIGNAL HEADS AS DIRECTED BY THE CITY ENGINEER.

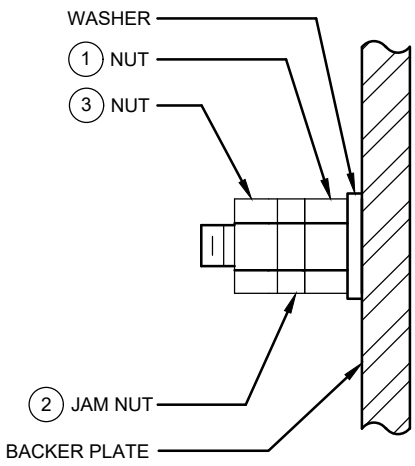
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

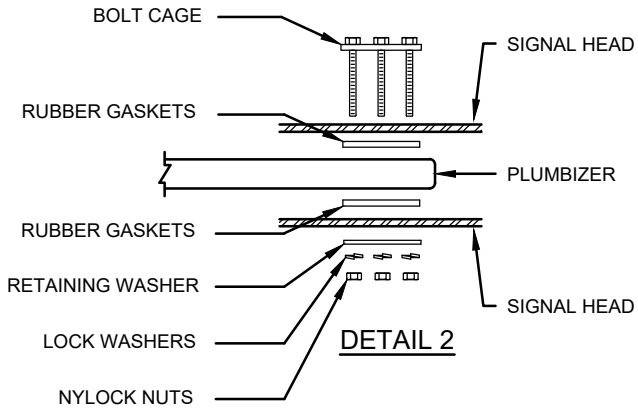
OVERHEAD SIGNAL HEAD MOUNTING WITH PLUMBIZER

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2016
Dwg No:	E-6.4



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

DETAIL 1



DETAIL 2

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. AIM SIGNAL HEADS AS DIRECTED BY THE CITY ENGINEER.

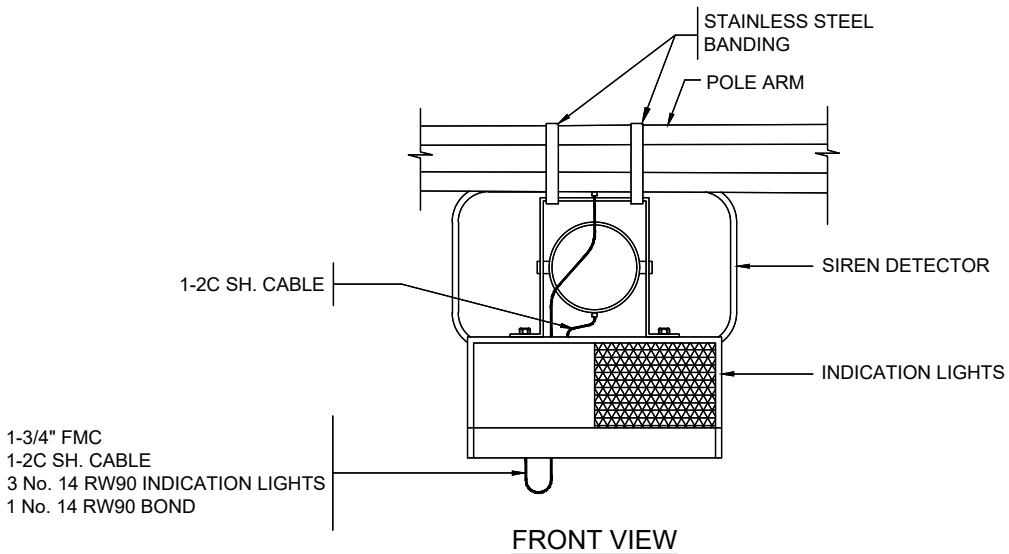
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4.21.2026

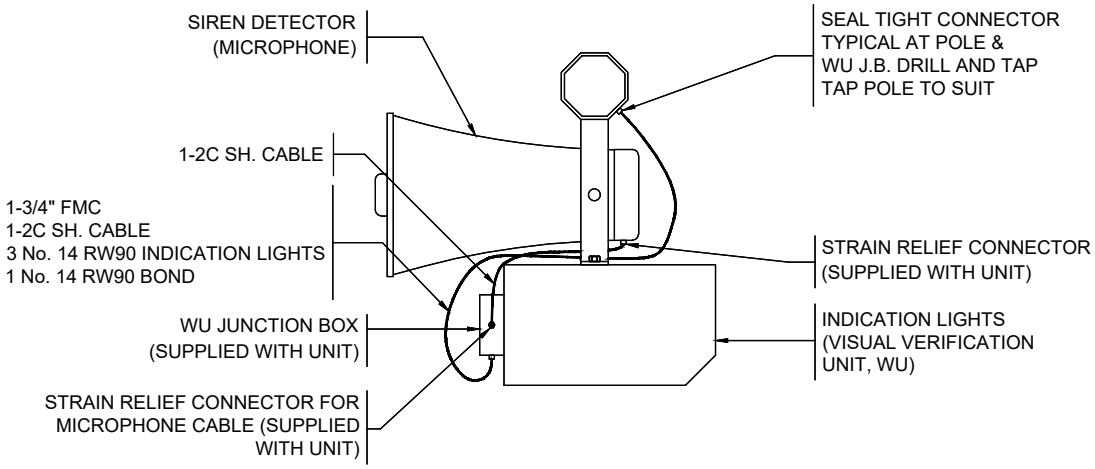
CITY OF NANAIMO
THE HARBOUR CITY

OVERHEAD SIGNAL HEAD MOUNTING WITH PLUMBIZER

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2016
Dwg No:	E-6.5



FRONT VIEW



SIDE VIEW

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. PRE-EMPTION UNIT IS TO BE SUPPLIED BY THE CITY OF NANAIMO AND INSTALLED BY THIS CONTRACTOR.
3. AIM, ADJUST SIREN PRE-EMPTION UNIT AS DIRECTED BY THE CITY ENGINEER.

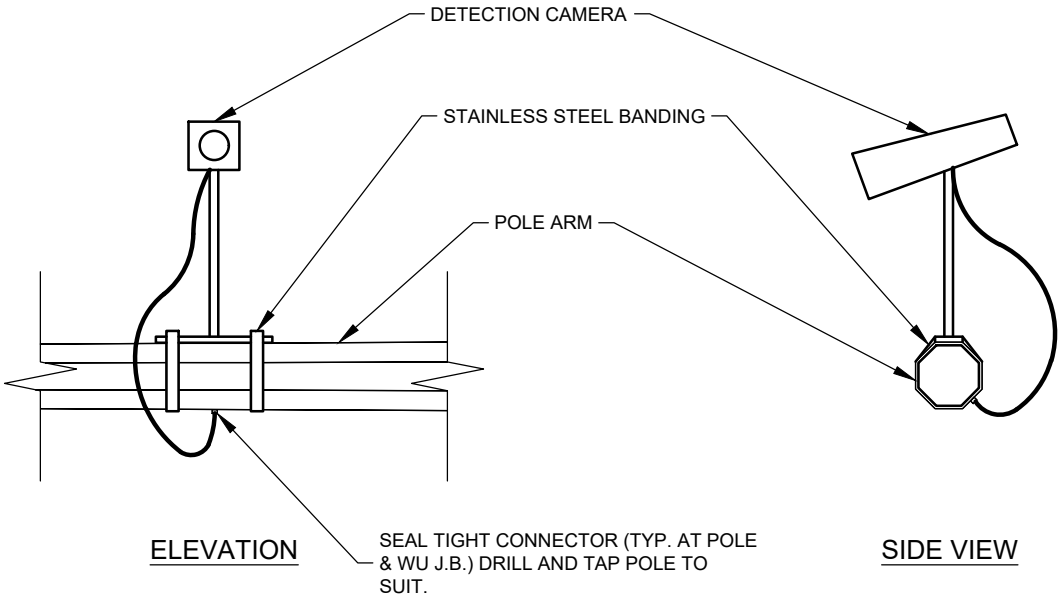
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CITY OF NANAIMO
THE HARBOUR CITY

EMERGENCY VEHICLE SIREN-ACTIVATED PRE-EMPTION UNIT

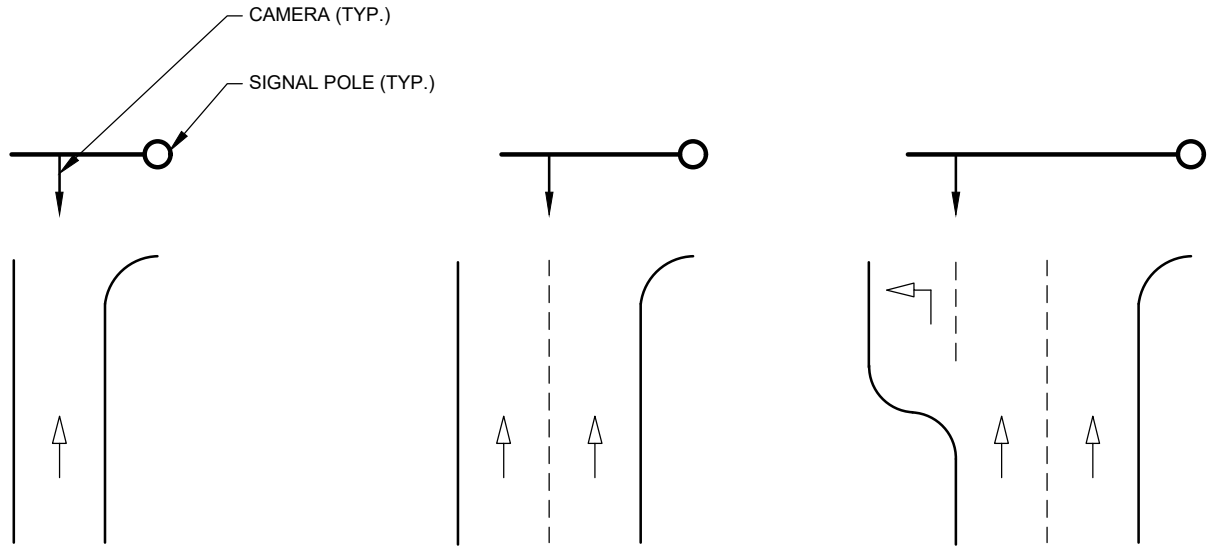
Scale:	NTS
Created:	MAY 2001
Rev Date:	NOV 2019
Dwg No:	E-6.6

6.22.2026



ELEVATION

SIDE VIEW



SINGLE LANE

DOUBLE LANE

DOUBLE LANE WITH LEFT TURN LANE

PLAN VIEW - CAMERA LOCATIONS

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. CAMERA MANUFACTURER / MODEL VARIES. INSTALL CAMERA AS PER MANUFACTURER'S REQUIREMENTS WITH STAINLESS STEEL HARDWARE.
3. AIM, ADJUST CAMERA AS DIRECTED BY THE CITY.
4. CITY TO PROVIDE PROGRAMMING FOR CAMERA DETECTION SYSTEM.

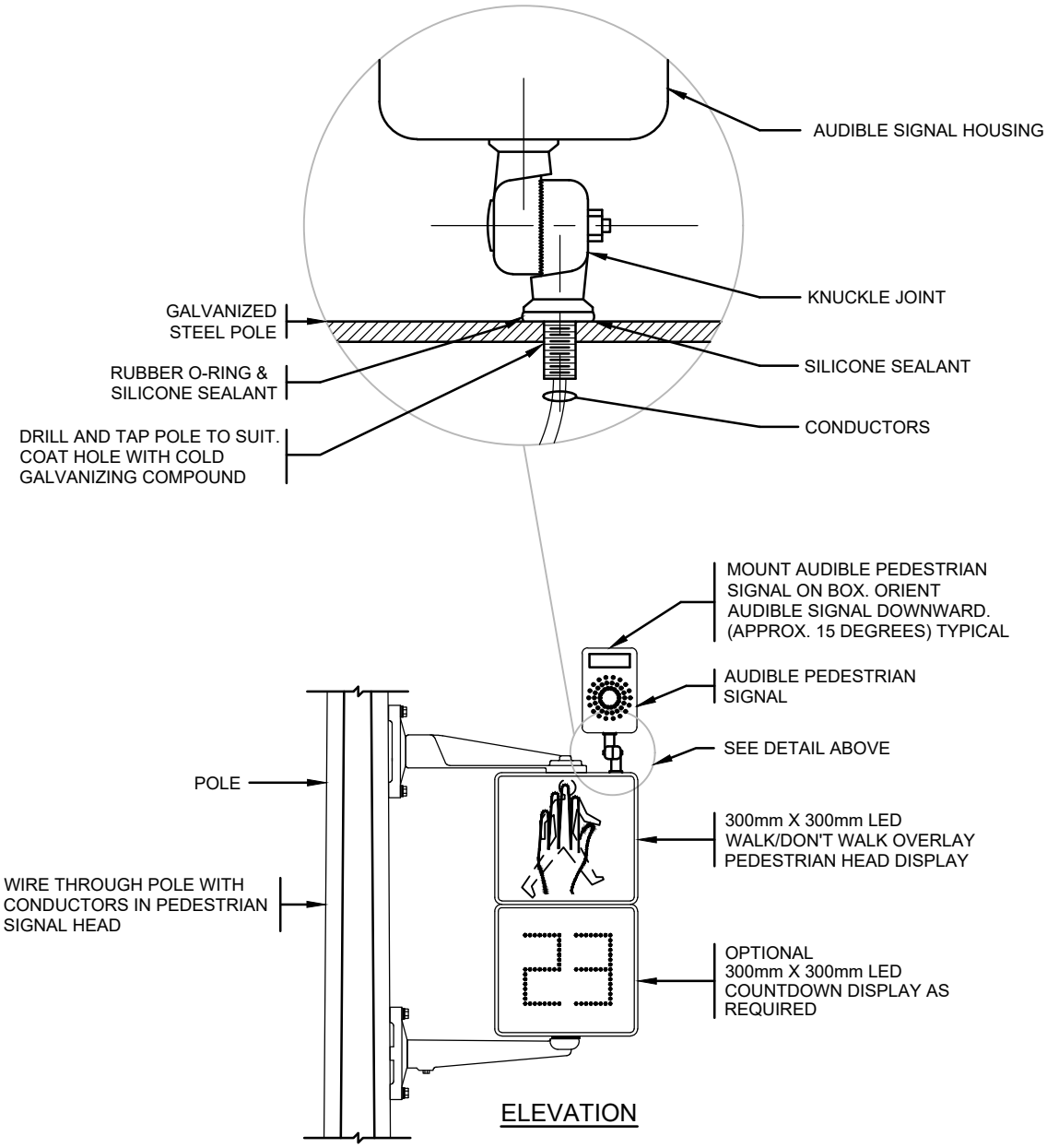
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4.29.2026

CITY OF NANAIMO
THE HARBOUR CITY

INTERSECTION TRAFFIC DETECTION CAMERA

Scale:	NTS
Created:	JAN 2024
Rev Date:	JUNE 2026
Dwg No:	E-6.7



ELEVATION

NOTES:

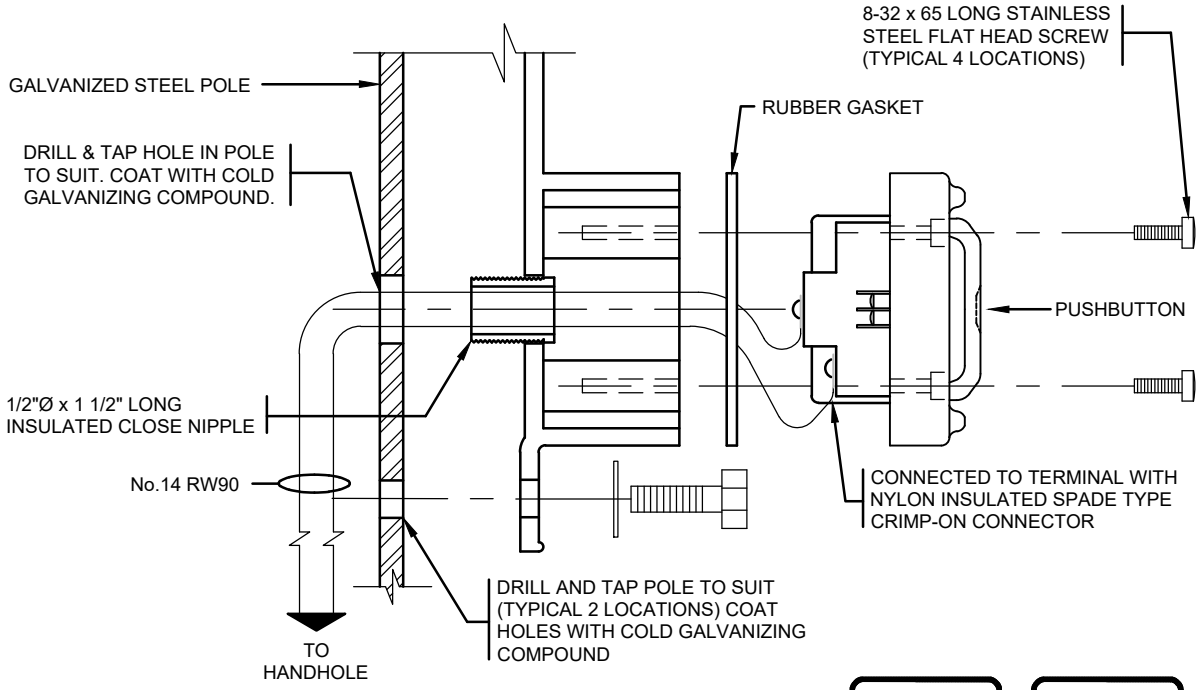
1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. AIM, ADJUST AND CONNECT AUDIBLE SIGNAL AS PER MANUFACTURERS INSTRUCTIONS TO SATISFACTION THE CITY ENGINEER.
3. AUDIBLE SIGNAL TO `CHIRP' FOR EAST TO WEST CROSSINGS & `CUCKOO' FOR NORTH TO SOUTH CROSSINGS. AT INTERSECTIONS WHERE NORTH/SOUTH AND EAST/WEST ARE NOT EASILY DEFINED CONTACT CITY ENGINEER FOR DIRECTION.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. ORDER AUDIBLE SIGNAL HEAD WITH MINIMUM 3.0m OF CONDUCTORS.

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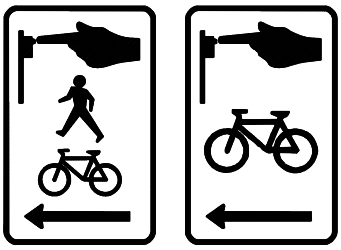
CITY OF NANAIMO
THE HARBOUR CITY

PEDESTRIAN & AUDIBLE SIGNALS

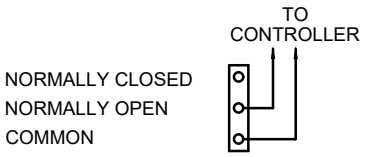
Scale:	NTS
Created:	AUG 2025
Rev Date:	JUNE 2026
Dwg No:	E-7.1



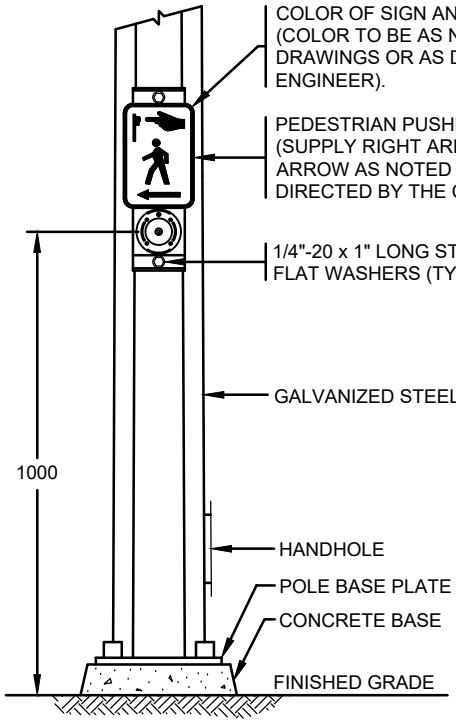
SIDE VIEW



ALTERNATE PEDESTRIAN PUSHBUTTON SIGNS



PEDESTRIAN PUSHBUTTON CONNECTIONS



ELEVATION

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. NO MORE THAN 2 PUSHBUTTONS TO BE INSTALLED ON EACH POLE, UNLESS OTHERWISE NOTED.
3. PUSHBUTTON TO HAVE NORMALLY OPEN CONTACTS.
4. CYCLIST PUSHBUTTON TO BE INSTALLED AS DIRECTED ON THE DRAWINGS OR BY THE CITY ENGINEER.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

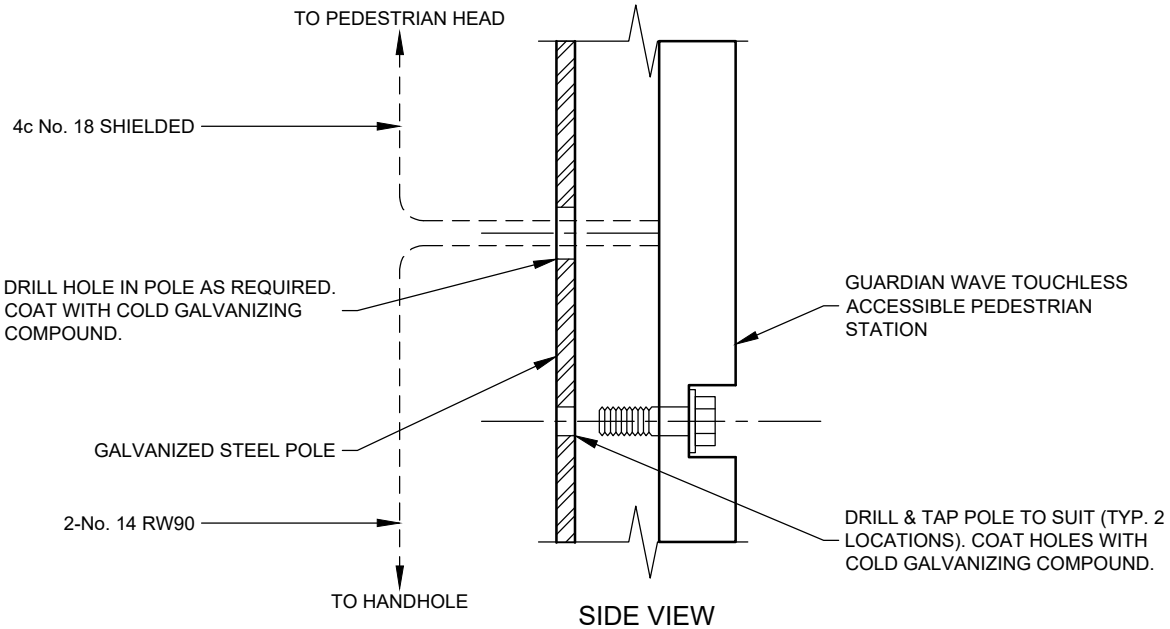
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

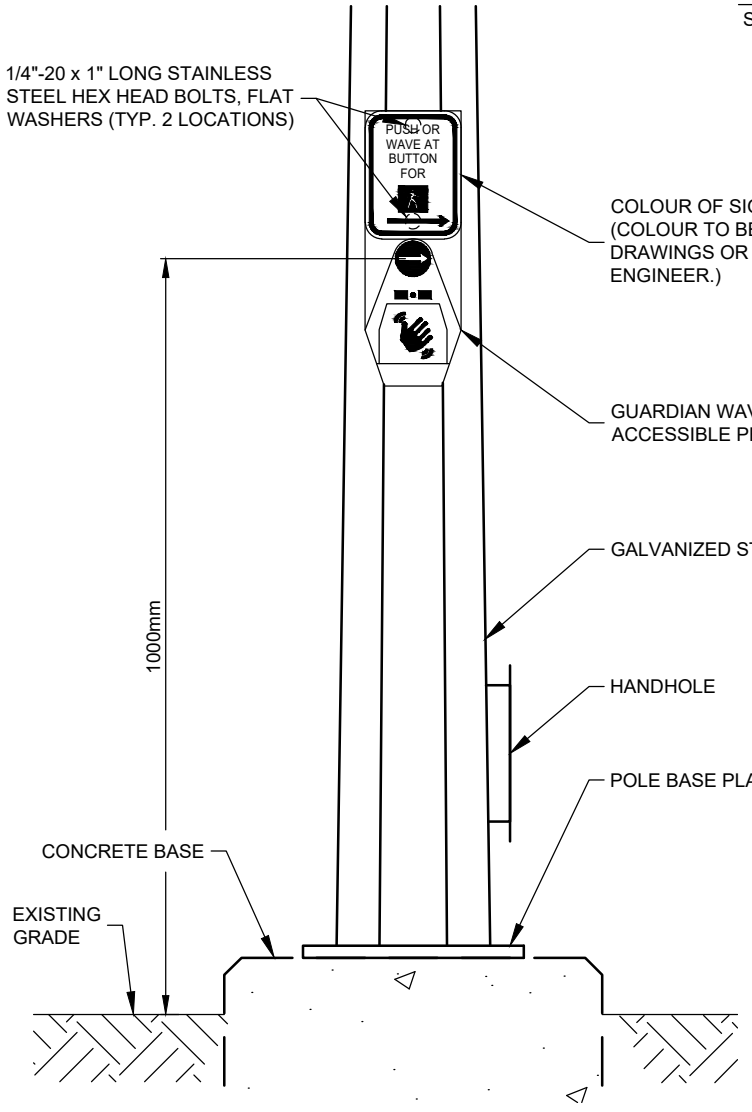
PEDESTRIAN PUSHBUTTON WITH INTEGRAL SIGN

Scale:	NTS
Created:	MAY 2001
Rev Date:	NOV 2016
Dwg No:	E-8.1



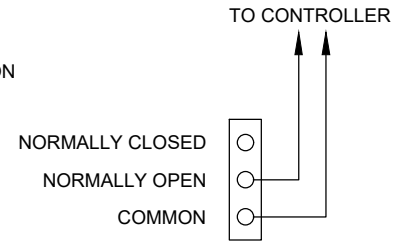
SIDE VIEW

SCALE: N.T.S.



ELEVATION

SCALE: 1:10



PEDESTRIAN PUSHBUTTON CONNECTIONS

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. NO MORE THAN 2 PUSHBUTTONS TO BE INSTALLED ON EACH POLE, UNLESS OTHERWISE NOTED.
3. PUSHBUTTON TO HAVE NORMALLY OPEN CONTACTS.
4. INSTALL POWER INTERFACE MODULE (PIM) IN PEDESTRIAN HEAD HOUSING AS PER MANUFACTURER'S INSTRUCTIONS.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
6. CITY TO PROVIDE PROGRAMMING FOR PUSHBUTTONS.

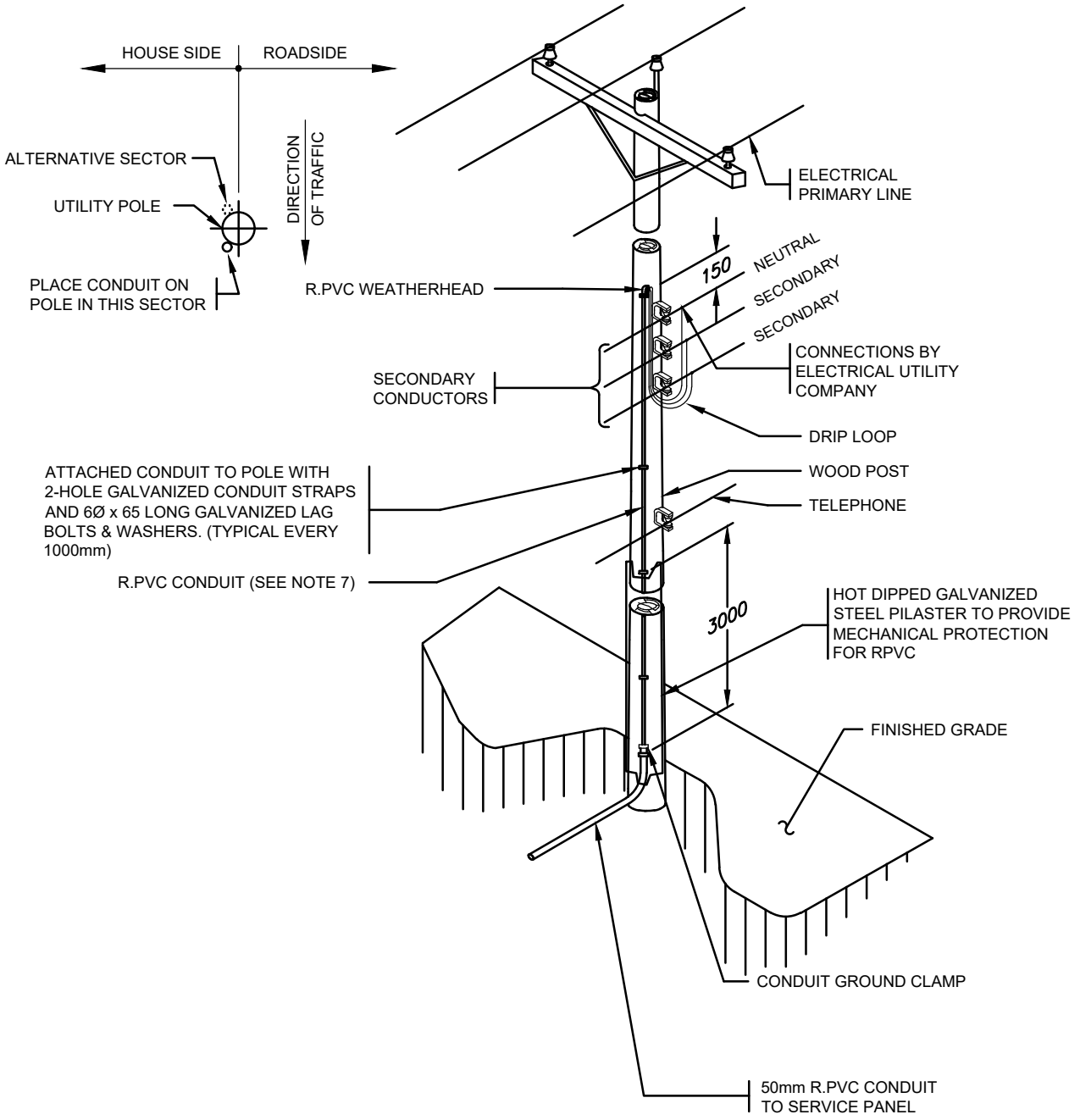
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4.29.2026

CITY OF NANAIMO
THE HARBOUR CITY

GUARDIAN WAVE PUSHBUTTON WITH INTEGRAL SIGN

Scale:	NTS
Created:	JAN 2024
Rev Date:	JUNE 2026
Dwg No:	E-8.2



NOTES:

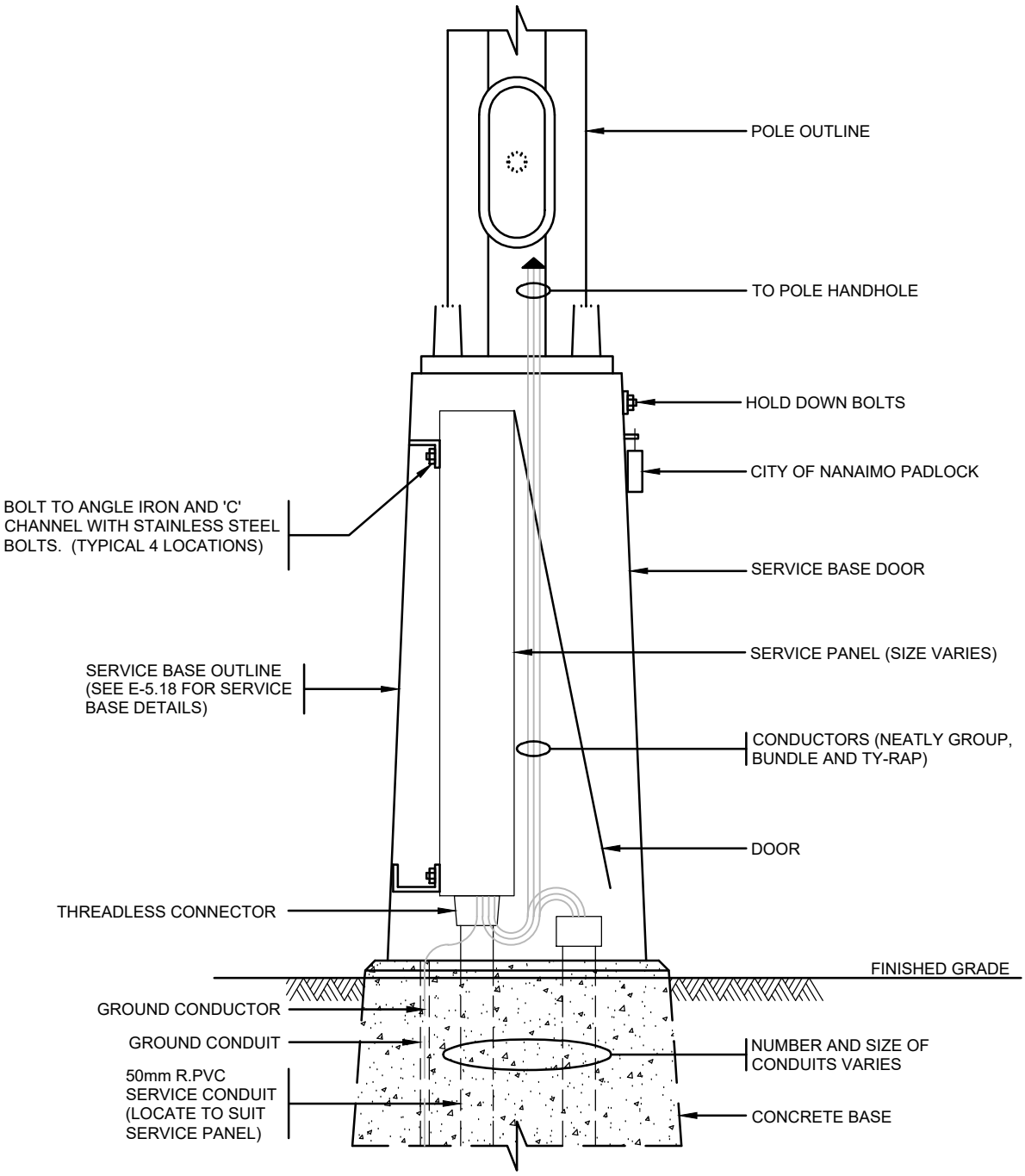
1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF SERVICE CONDUCTORS. CONNECTION BY ELECTRICAL UTILITY COMPANY UNLESS OTHERWISE NOTED.
3. CONTRACTOR TO OBTAIN PERMISSION FROM UTILITY COMPANY PRIOR TO INSTALLING CONDUIT ON THEIR POLE.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
5. SERVICE CONDUCTORS AS DETAILED ON CONTRACT DRAWINGS.
6. MOUNT CONDUIT ON CONCRETE POLE WITH 19mm STAINLESS STEEL BANDING.
7. CONDUIT UP POLE TO SUIT SERVICE CONDUCTORS (MINIMUM 30mmØ).

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 10 DWG\E-9.1

CITY OF NANAIMO
THE HARBOUR CITY

UNDERGROUND DIP SERVICE

Scale:	NTS
Created:	NOV 2012
Rev Date:	NOV 2016
Dwg No:	E-9.1



NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.

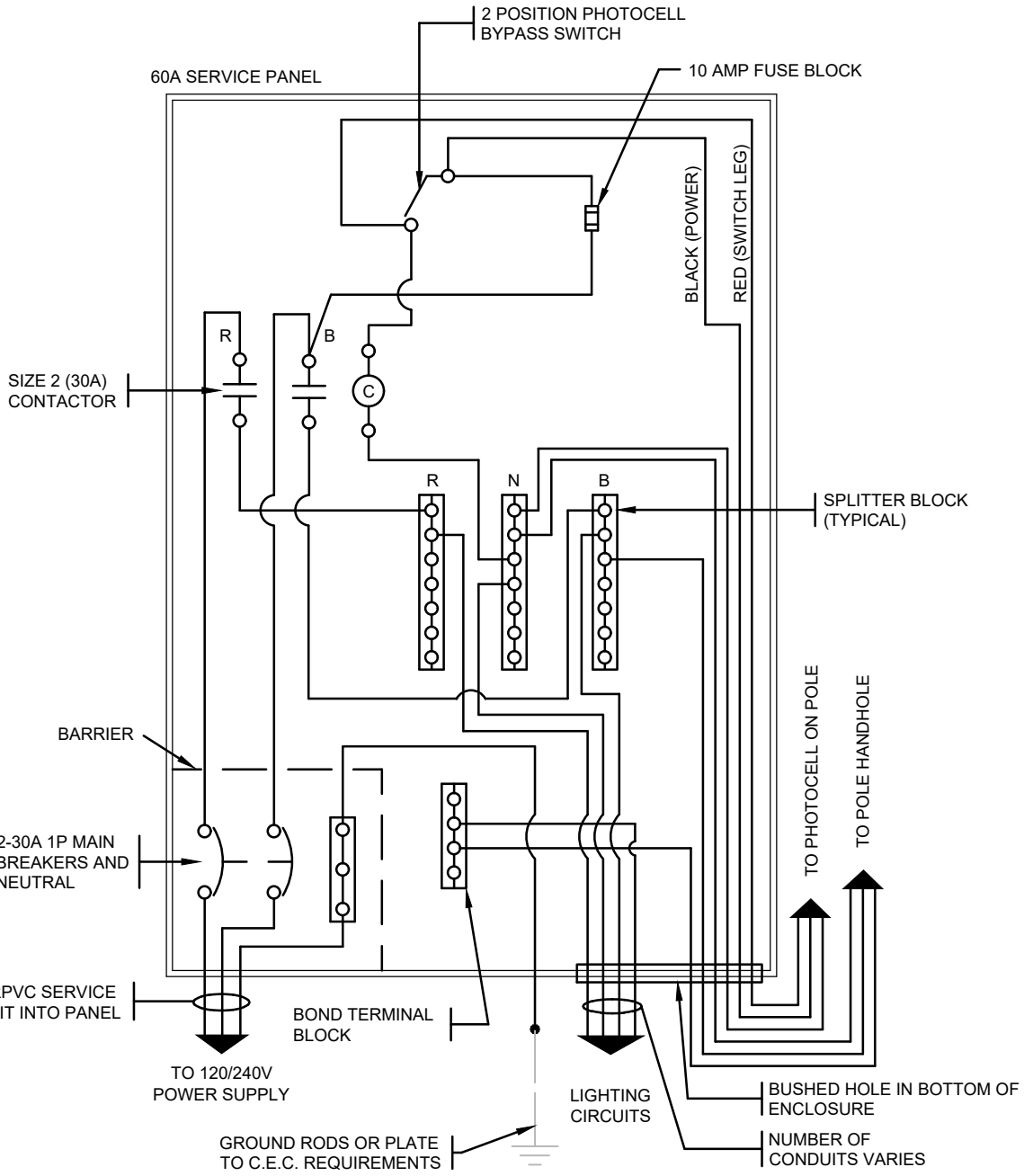
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CITY OF NANAIMO
THE HARBOUR CITY

SERVICE PANEL IN SERVICE BASE

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-10.1

6.22.2026



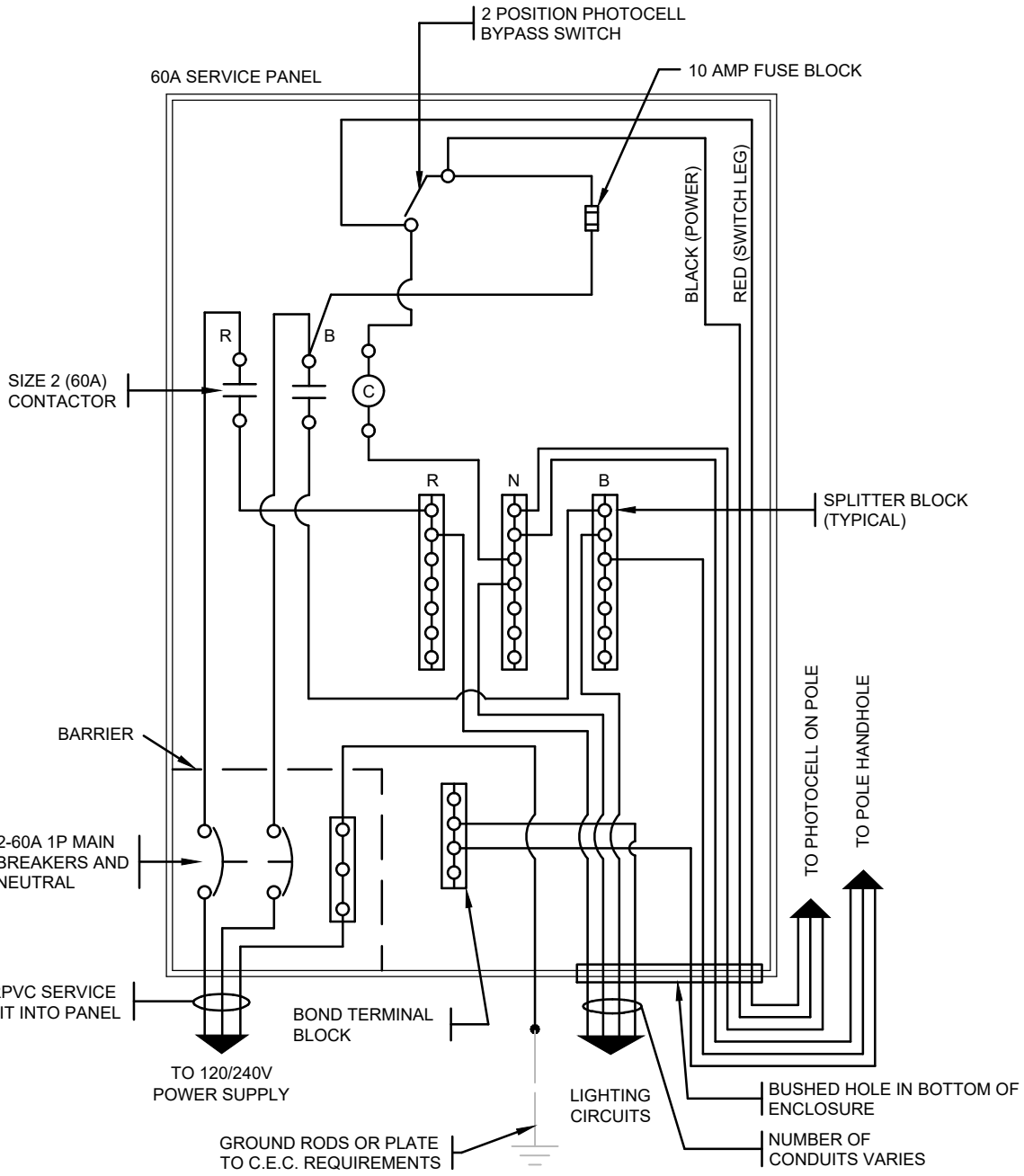
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4.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

TYPICAL 30A STREET LIGHTING WIRING DIAGRAM
(FOR USE IN SERVICE BASE)

Scale:	NTS
Created:	NOV 2012
Rev Date:	JUNE 2026
Dwg No:	E-10.2



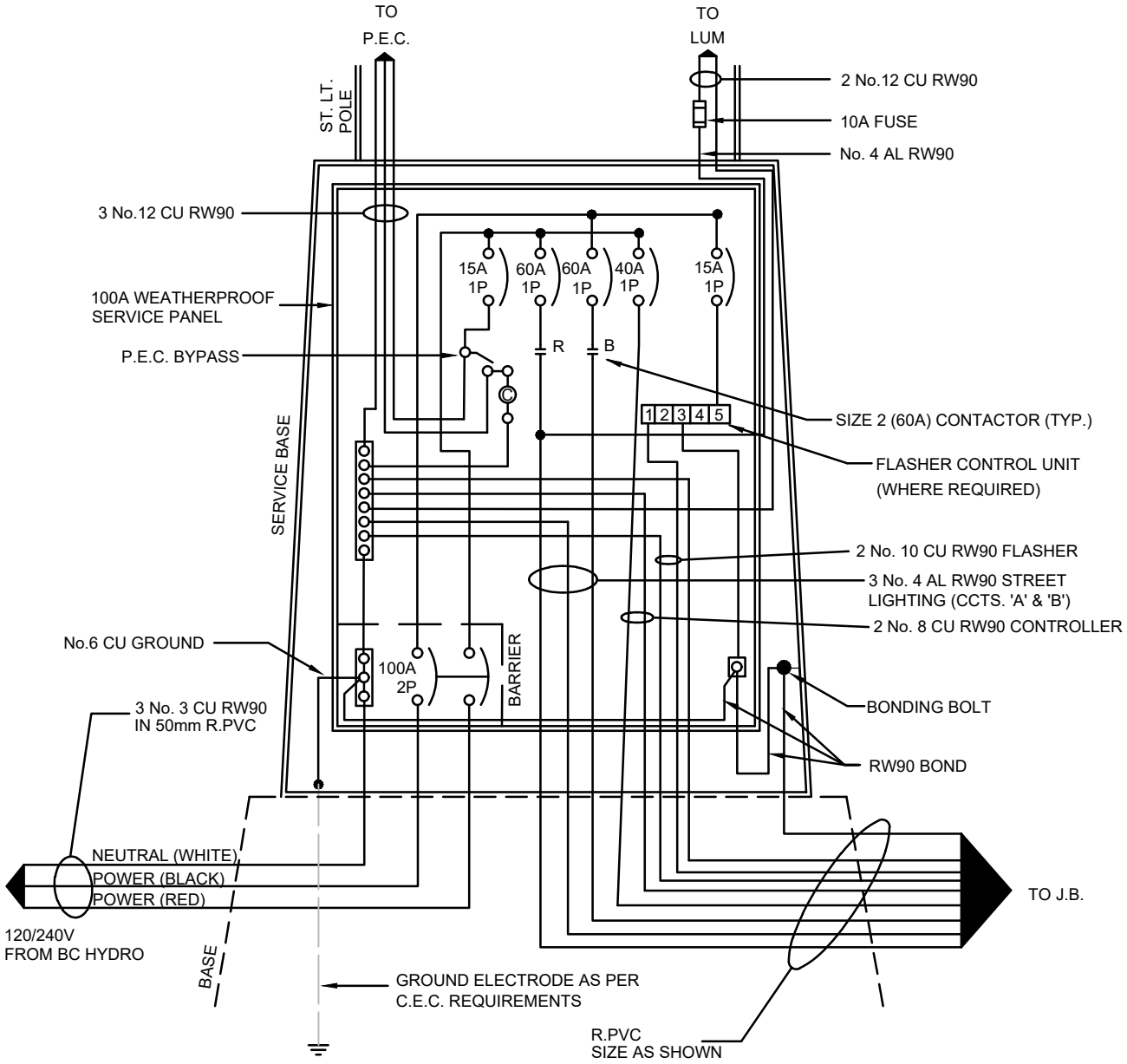
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

TYPICAL 60A STREET LIGHTING WIRING DIAGRAM (FOR USE IN SERVICE BASE)

Scale:	NTS
Created:	NOV 2012
Rev Date:	NOV 2012
Dwg No:	E-10.3



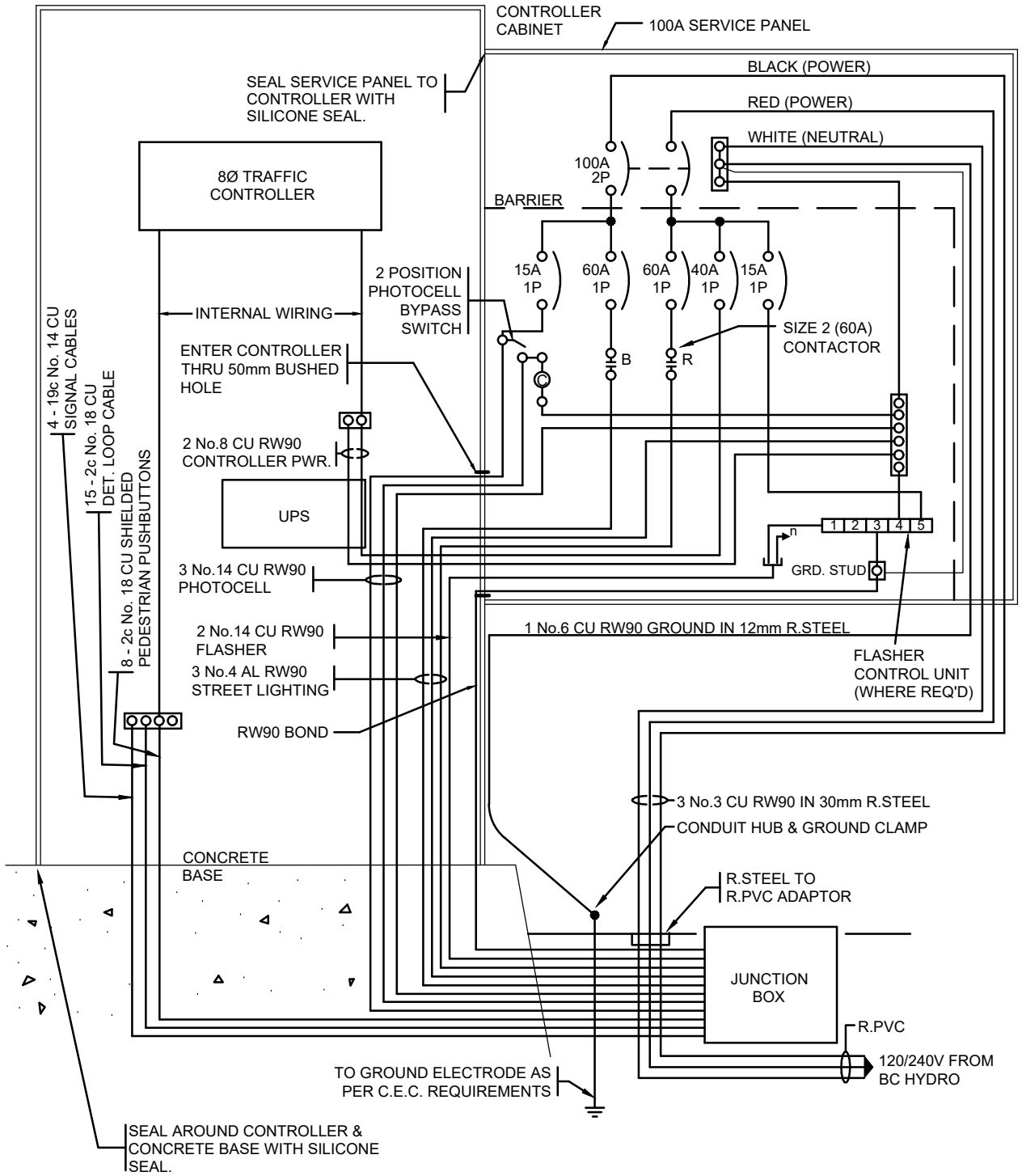
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

TYPICAL 100A TRAFFIC SIGNAL / STREET LIGHTING / WIRING DIAGRAM (FOR USE IN SERVICE BASE)

Scale:	NTS
Created:	NOV 2012
Rev Date:	JUNE 2026
Dwg No:	E-10.4



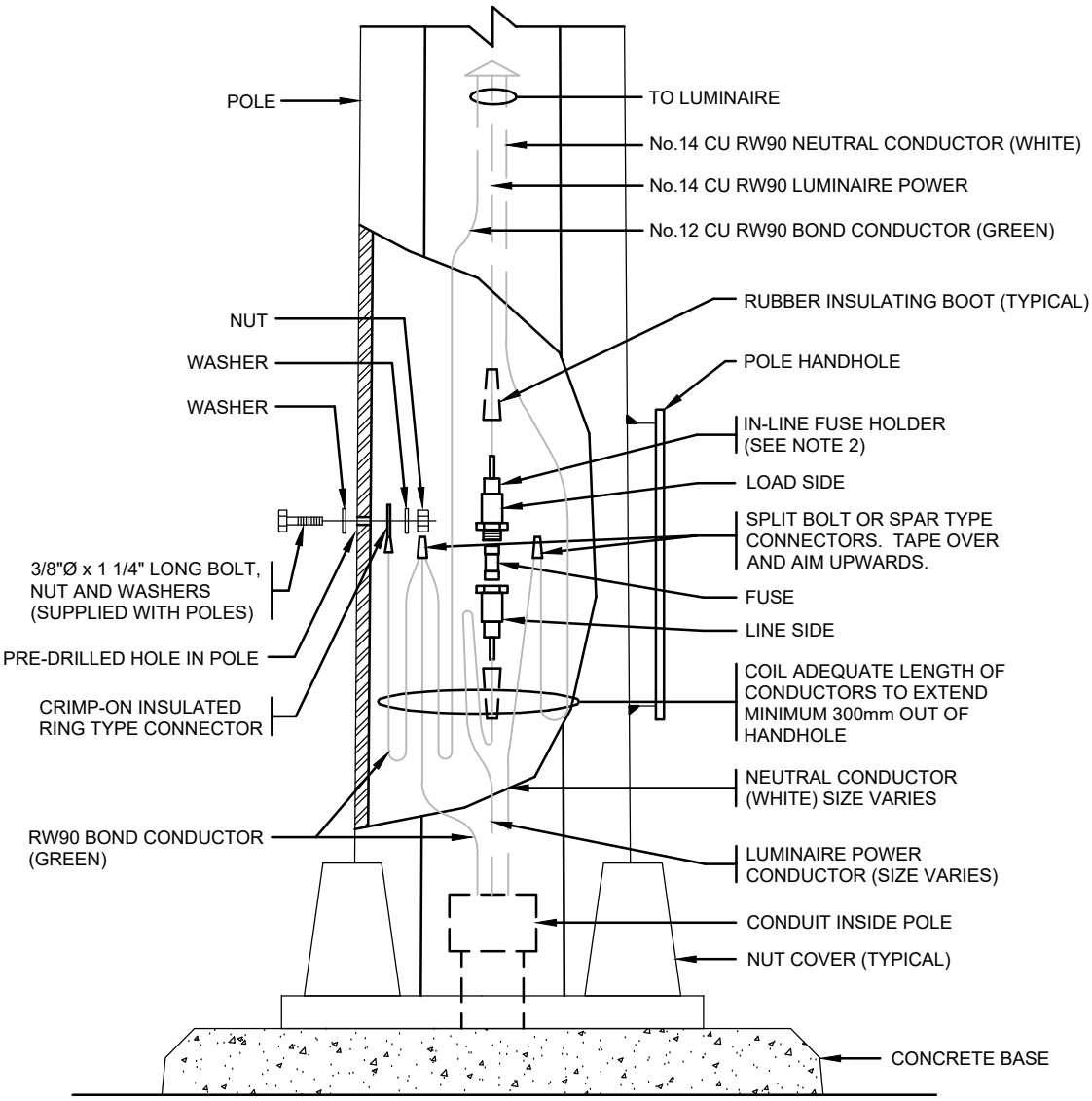
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

WIRING DIAGRAM

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-10.5



ELEVATION

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. FUSE INSTALLATION IN JUNCTION BOXES SIMILAR.

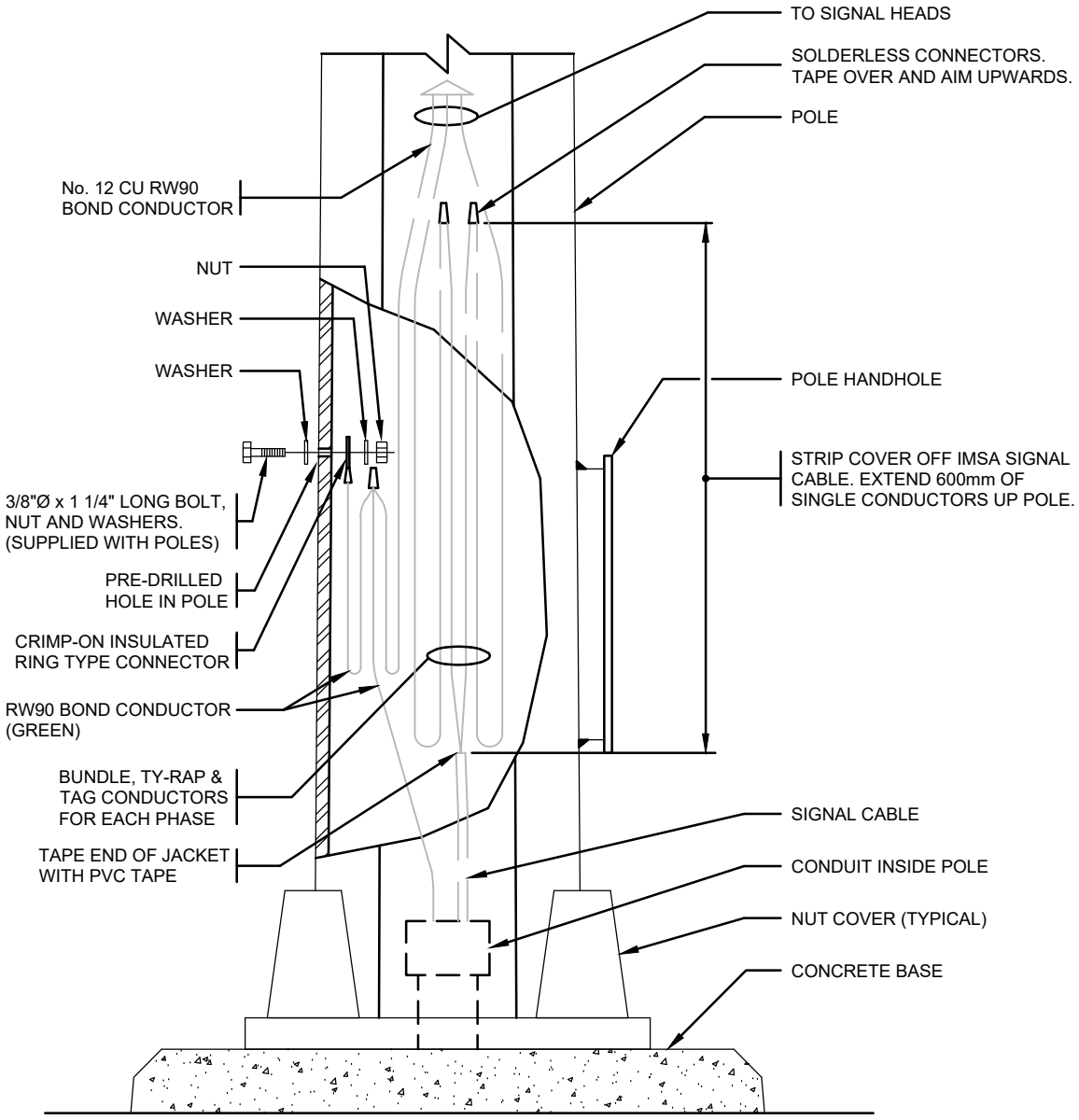
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CITY OF NANAIMO
THE HARBOUR CITY

LUMINAIRE WIRING IN POLE HANDHOLE

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-12.1

4.21.2026



ELEVATION

NOTES:

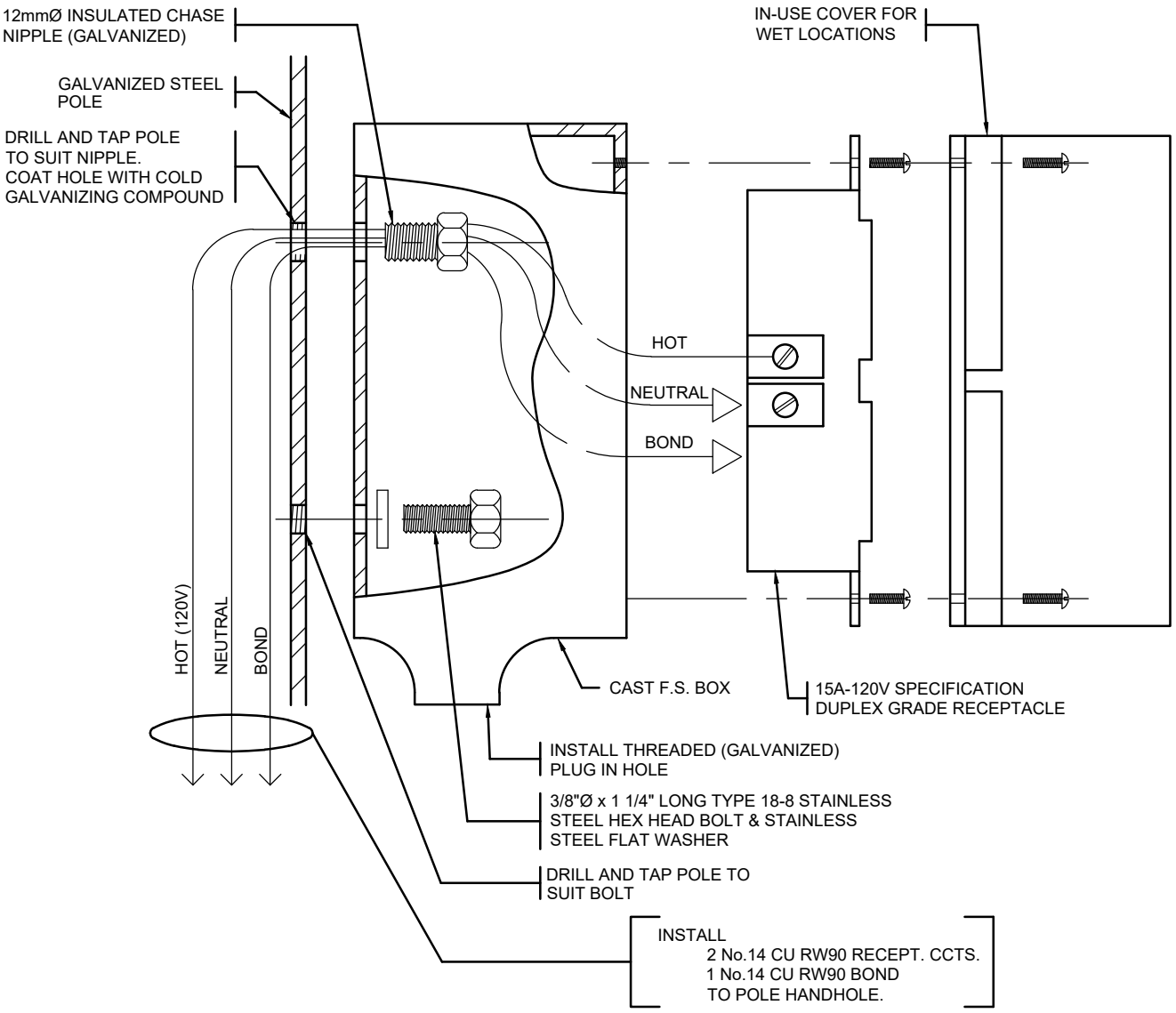
1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.

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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

SIGNAL CABLE WIRING IN POLE HANDHOLE

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	E-12.2



NOTES:

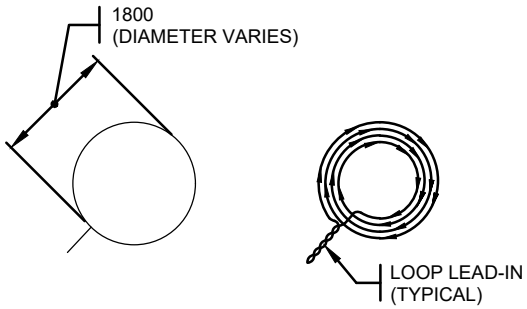
1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. RECEPTACLE MOUNTING HEIGHT AND ORIENTATION ON POLE TO BE NOTED ON CONTRACT DRAWING.
3. FUSE RECEPTACLE CIRCUITS, WITH A 10AMP FUSE, IN HANDHOLE AT BASE OF POLE AS PER DRAWING E12-1.
4. RECEPTACLES TO NOT BE INSTALLED ON POLES WITHIN 50m OF A SIGNALIZED INTERSECTION AND NOT UNDER ANY CIRCUMSTANCES TO BE INSTALLED ON TRAFFIC SIGNAL OR SIGN POLES.

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 10 DWG\E-13.1

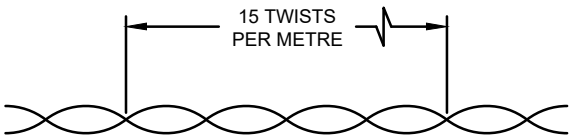
CITY OF NANAIMO
THE HARBOUR CITY

POLE MOUNTED RECEPTACLE

Scale:	NTS
Created:	JAN 1998
Rev Date:	MAY 2020
Dwg No:	E-13.1



ROUND LOOP



LOOP LEAD-IN CONDUCTORS

(TYPICAL FROM LOOP TO SHIELDED
CABLE SPLICE IN JUNCTION BOX)

NOTES:

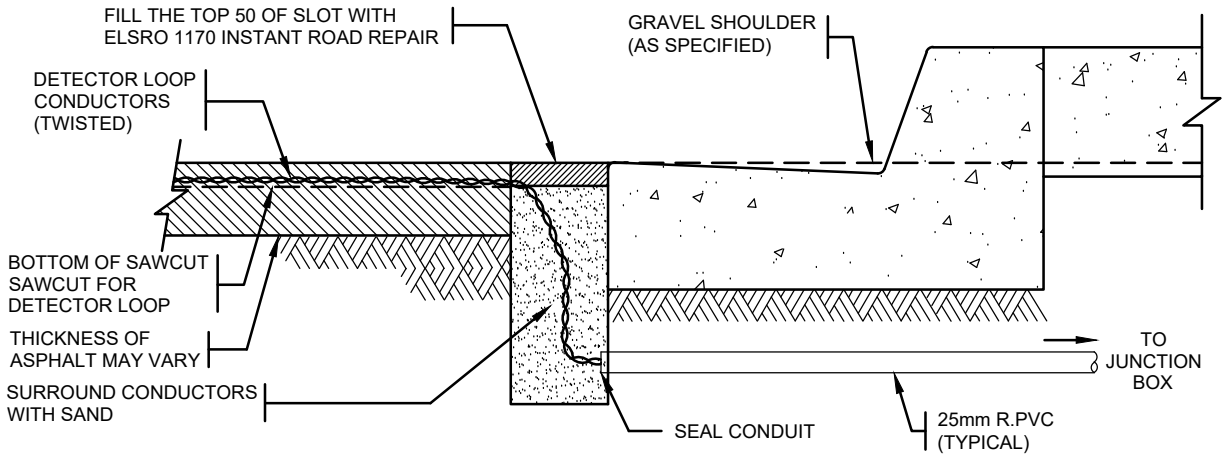
1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. LOOP INDUCTANCE TO BE EQUAL TO OR GREATER THAN SHIELDED CABLE INDUCTANCE. (A 2:1 RATIO IS PREFERABLE) SHIELDED CABLE INDUCTANCE IS 0.72 µH PER METER.

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4.21.2026

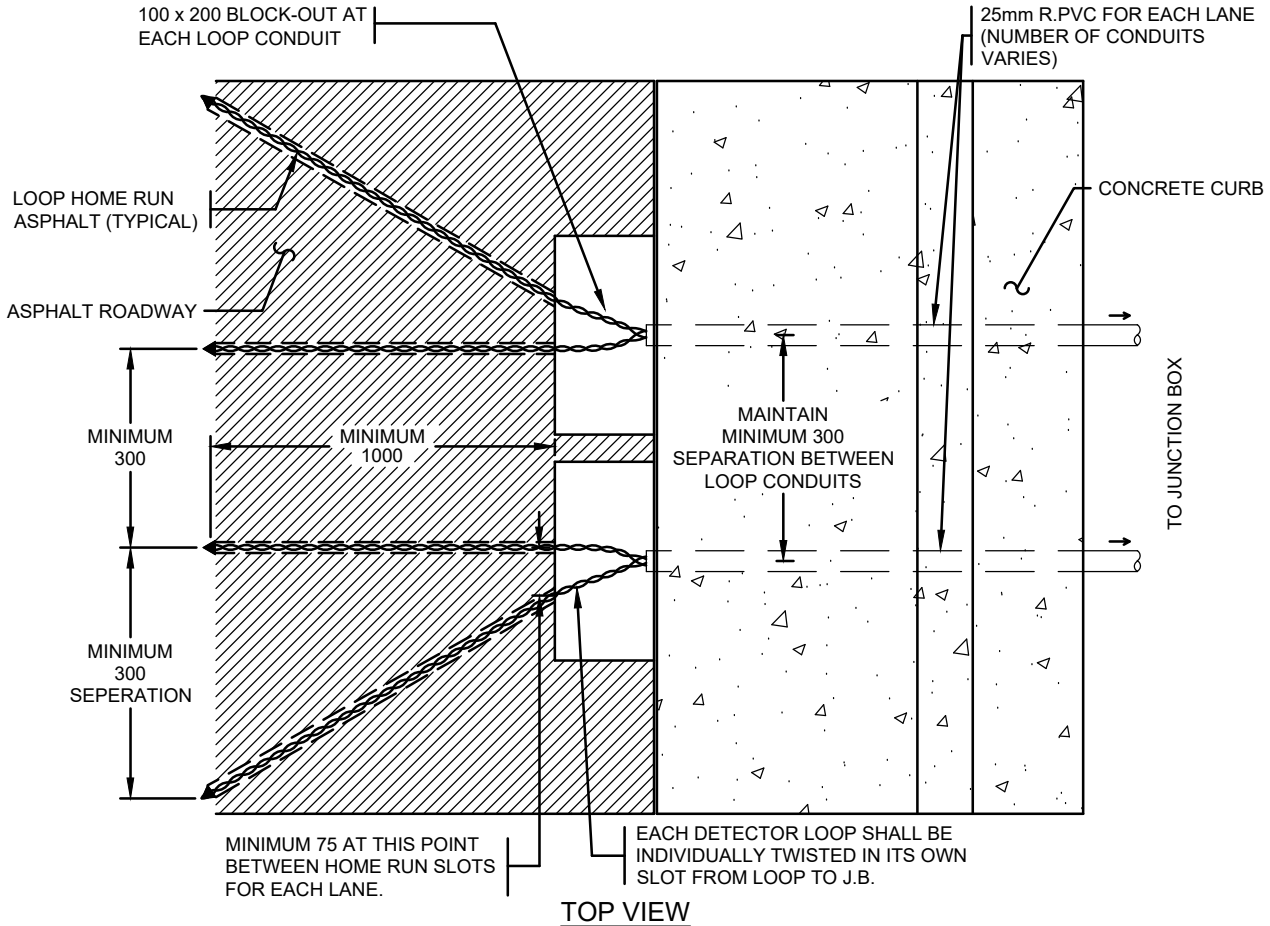
CITY OF NANAIMO
THE HARBOUR CITY

ROUND TRAFFIC SIGNAL DETECTOR LOOP

Scale:	N.T.S.
Created:	NOV. 2009
Rev Date:	MAY 2020
Dwg No:	E-14.1



ELEVATION



TOP VIEW

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

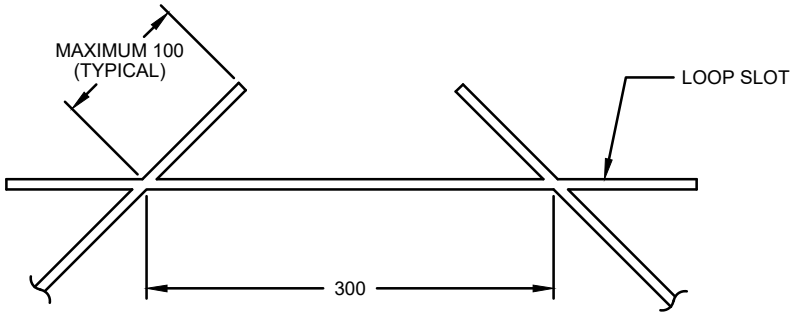
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4.21.2026

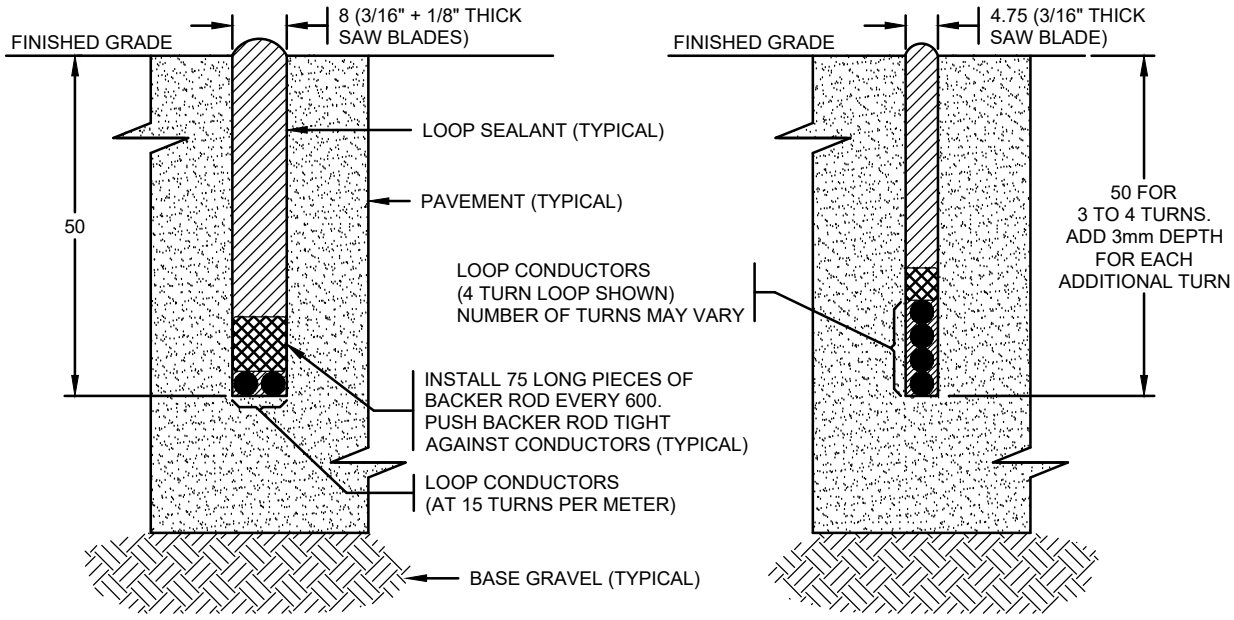
CITY OF NANAIMO
THE HARBOUR CITY

DETECTOR LOOPS RISER SERVICE CONNECTION

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-14.2



TYPICAL LOOP CORNER DETAIL



HOME RUN SLOT

LOOP SLOT

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. LOOP SLOT SEALANTS SHALL BE ELSRO HOT POUR CRACK FILLER No. 1190 OR B.P. BURFALT 16607 170, TYPE 2 OR APPROVED EQUAL.
4. BACKER RODS SHALL BE DETECTOR SYSTEMS BR-625 OR APPROVED ALTERNATE.
5. ONLY ONE LOOP SHALL BE INSTALLED IN EACH HOME RUN SLOT.

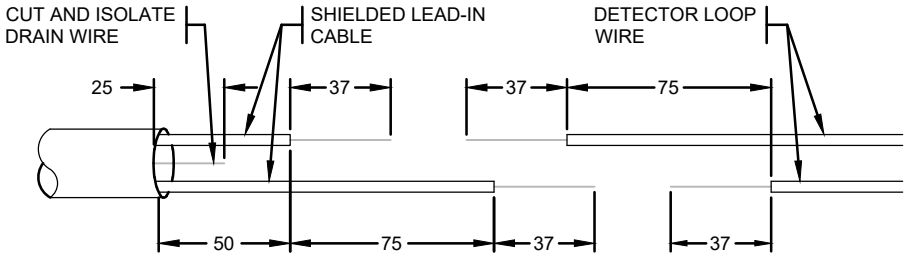
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

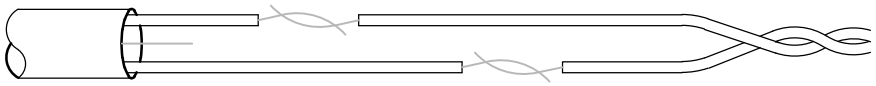
DETECTOR LOOPS RISER SERVICE CONNECTION

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-14.3

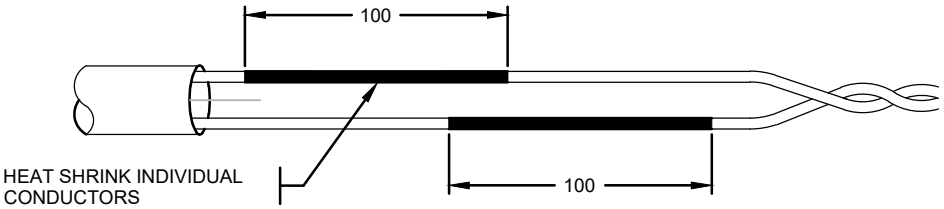
STEP 1. STRIP LOOP WIRES AND LEAD-IN CABLE AND SLIDE ON HEAT SHRINKS



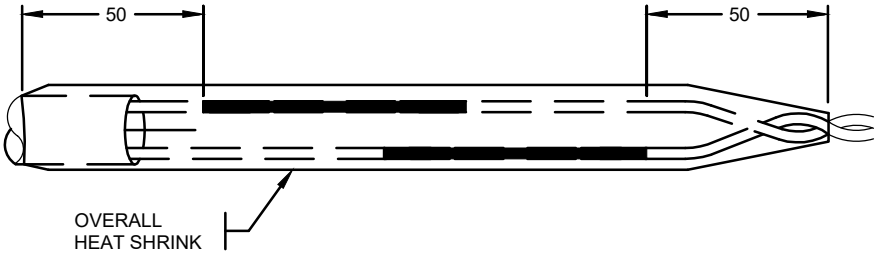
STEP 2. CONNECT AND SOLDER.
TWIST BARE CONDUCTORS TOGETHER AND SOLDER WITH 60/40 (TIN/LEAD) RESIN SOLDER.



STEP 3. INSULATE EACH SOLDER JOINT SEPARATELY



STEP 4. ENVIRONMENTALLY SEAL TOTAL SPLICE



NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. HEAT SHRINK SHALL BE PREMIER CLEAR-SEAL (6mm I.D. INDIVIDUAL CONDUCTORS & 10mm I.D. FOR OVERALL)

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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

DETECTOR LOOP TO SHIELDED CABLE SPLICES

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-14.4

STEP 1 LAYOUT DETECTOR LOOPS AND REVIEW LOCATIONS WITH THE ENGINEER PRIOR TO SAWCUTTING THE ROADWAY. THE GENERAL LAYOUT OF THE DETECTOR LOOPS IS INDICATED ON DRAWING E-14.7. 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 CITY ENGINEER. SEALANTS DO NOT ADHERE PROPERLY IN WET CONDITIONS. SHOULD THE CONTRACTOR BE ASKED IN WRITING BY THE ENGINEER 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 BY THE CITY ENGINEER.
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.

STEP 2 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 3 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 4 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 HOME RUN SLOTS ARE CUT.

STEP 5 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.

NOTES:

1. SEE DRAWING E-14.6 FOR CONTINUATION OF PROCEDURES AND RULES.

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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

DETECTOR LOOP PROCEDURES & RULES

Scale:	NTS
Created:	NOV 2009
Rev Date:	NOV 2009
Dwg No:	E-14.5

CONTINUED FROM DRAWING E-14.5

STEP 6 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 SWEPT 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.

STEP 7 THE SPLICES BETWEEN DETECTOR LOOP CONDUCTORS AND THE SHIELDED CABLE ARE TO BE SOLDERED AND SEALED WITH HEAT SHRINK IN ACCORDANCE WITH DRAWING E-14.4

STEP 8 REPEAT STEP 7 AT THE JUNCTION BOX OR VAULT NEAREST CONTROLLER.

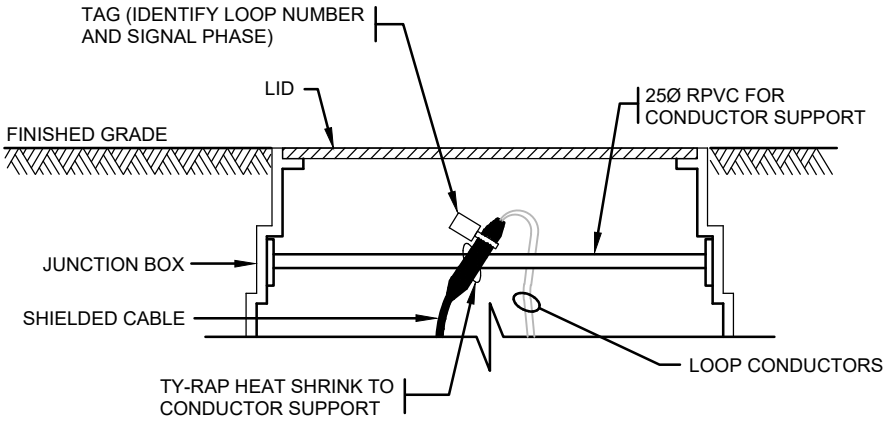
RULE 8

LOOP DETECTOR RESISTANCE TO GROUND SHALL BE GREATER THAN 1 MEGOHM, & LOOP INDUCTANCE SHALL BE WITHIN 25% OF THE VALUES SHOWN ON THE CONTRACT DRAWINGS.

STEP 9 TAG EACH LOOP CABLE AS INDICATED BELOW.

RULE 9

MAINTAIN THE MAXIMUM SEPARATION POSSIBLE IN THE JUNCTION BETWEEN THE LOOP CONDUCTORS AND POWER CONDUCTORS.



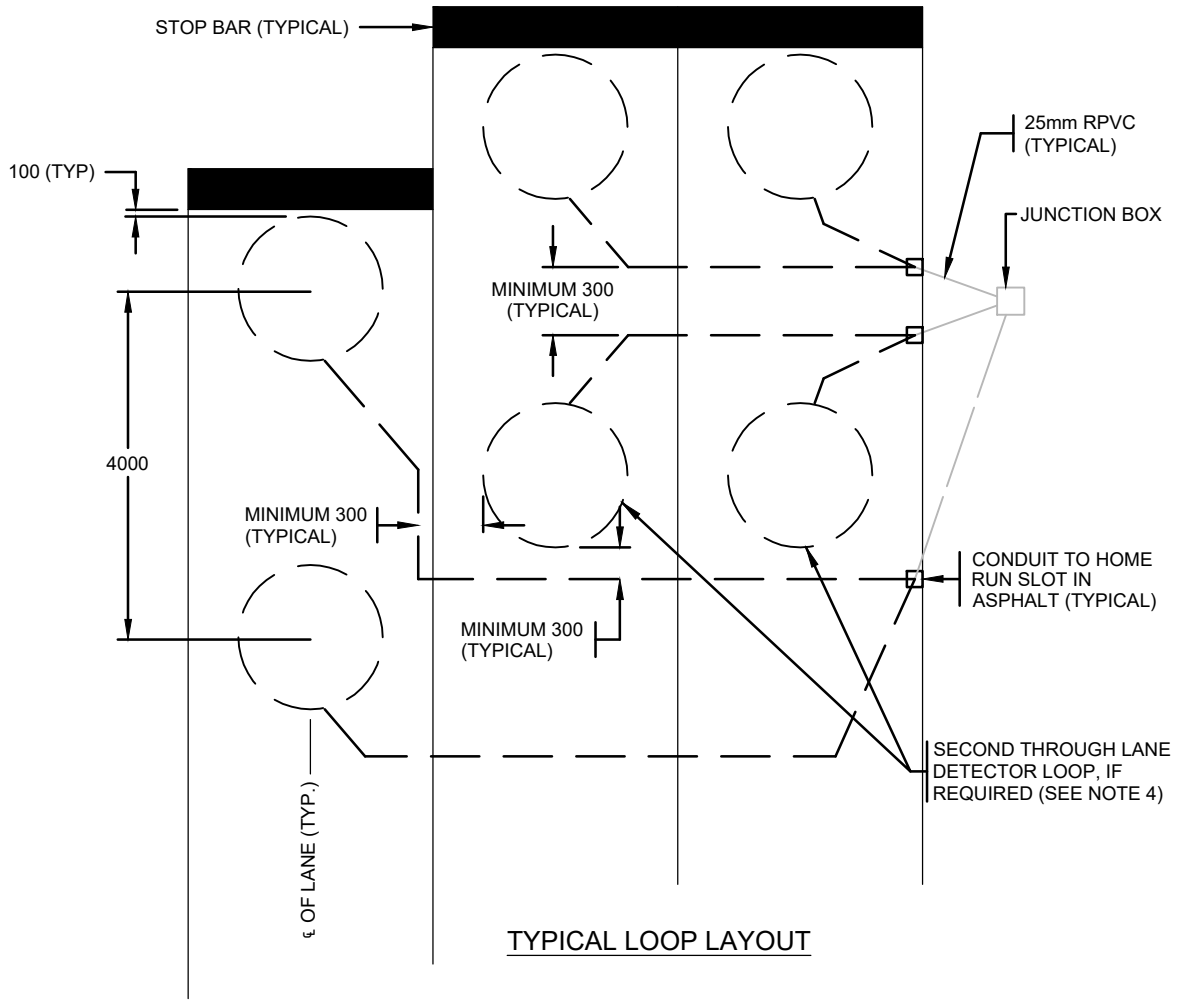
LOOP DETECTOR CONDUCTORS IN JUNCTION BOX

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4.21.2026

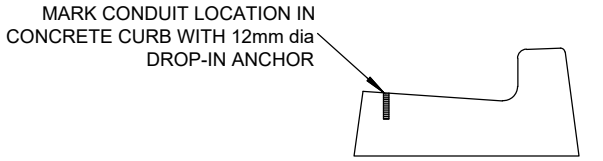
CITY OF NANAIMO
THE HARBOUR CITY

DETECTOR LOOP PROCEDURES & RULES (CONTINUED)

Scale:	NTS
Created:	NOV 2009
Rev Date:	NOV 2009
Dwg No:	E-14.6



TYPICAL LOOP LAYOUT



LOOP CROSSING AT CURB (DETAIL)

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. LOCATE LOOP CONDUITS IN ASPHALT TO SUIT LOOP LOCATIONS & MINIMIZE THE LENGTHS OF HOME RUN SLOTS IN THE ASPHALT.
4. NORMALLY NOT REQUIRED WHERE THROUGH PHASE IS RECALLED TO GREEN.

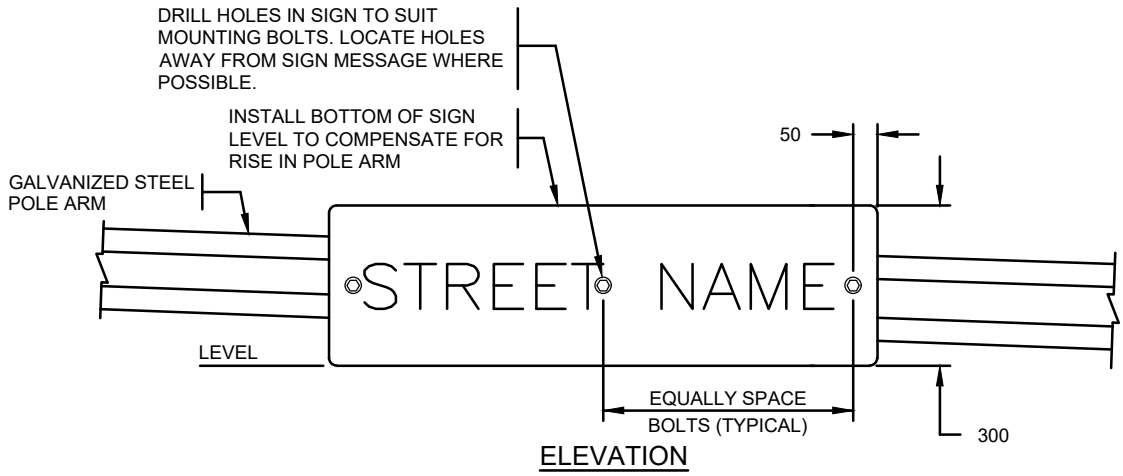
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

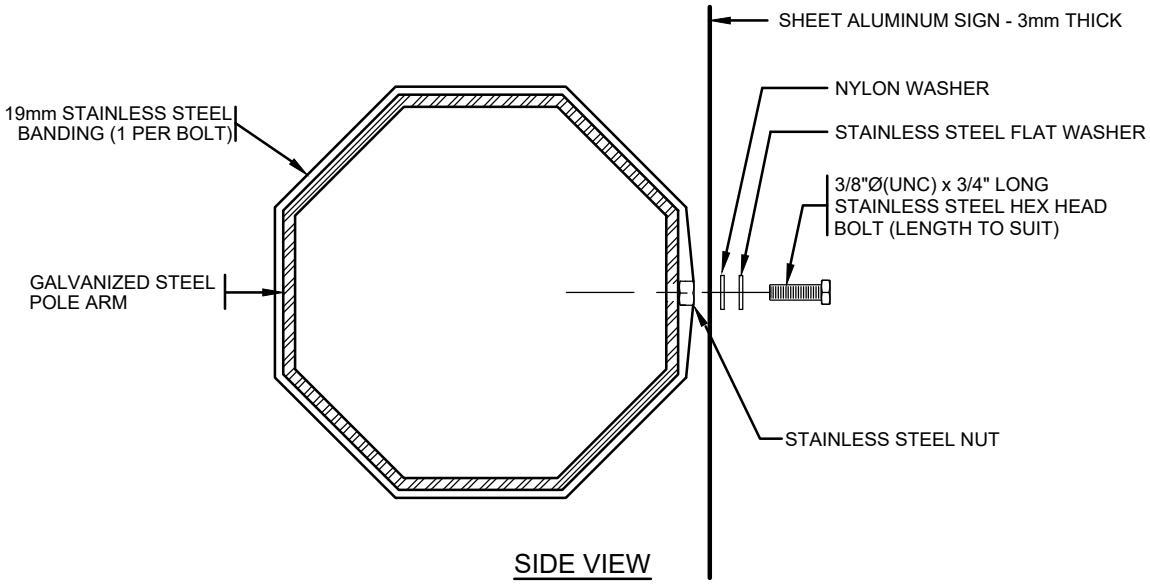
LAYOUT FOR ROUND TRAFFIC SIGNAL DETECTOR LOOPS

Scale:	NTS
Created:	NOV 2009
Rev Date:	JUNE 2026
Dwg No:	E-14.7



ELEVATION

SIGN WIDTH	NUMBER OF BOLTS
900 WIDE	3
1200 WIDE	4
1500 WIDE	5
1800 WIDE	6
2100 WIDE	7



SIDE VIEW

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. POSITION SIGN ON POLE ARM AS INDICATED ON THE PLANS OR AS DIRECTED BY THE CITY ENGINEER.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

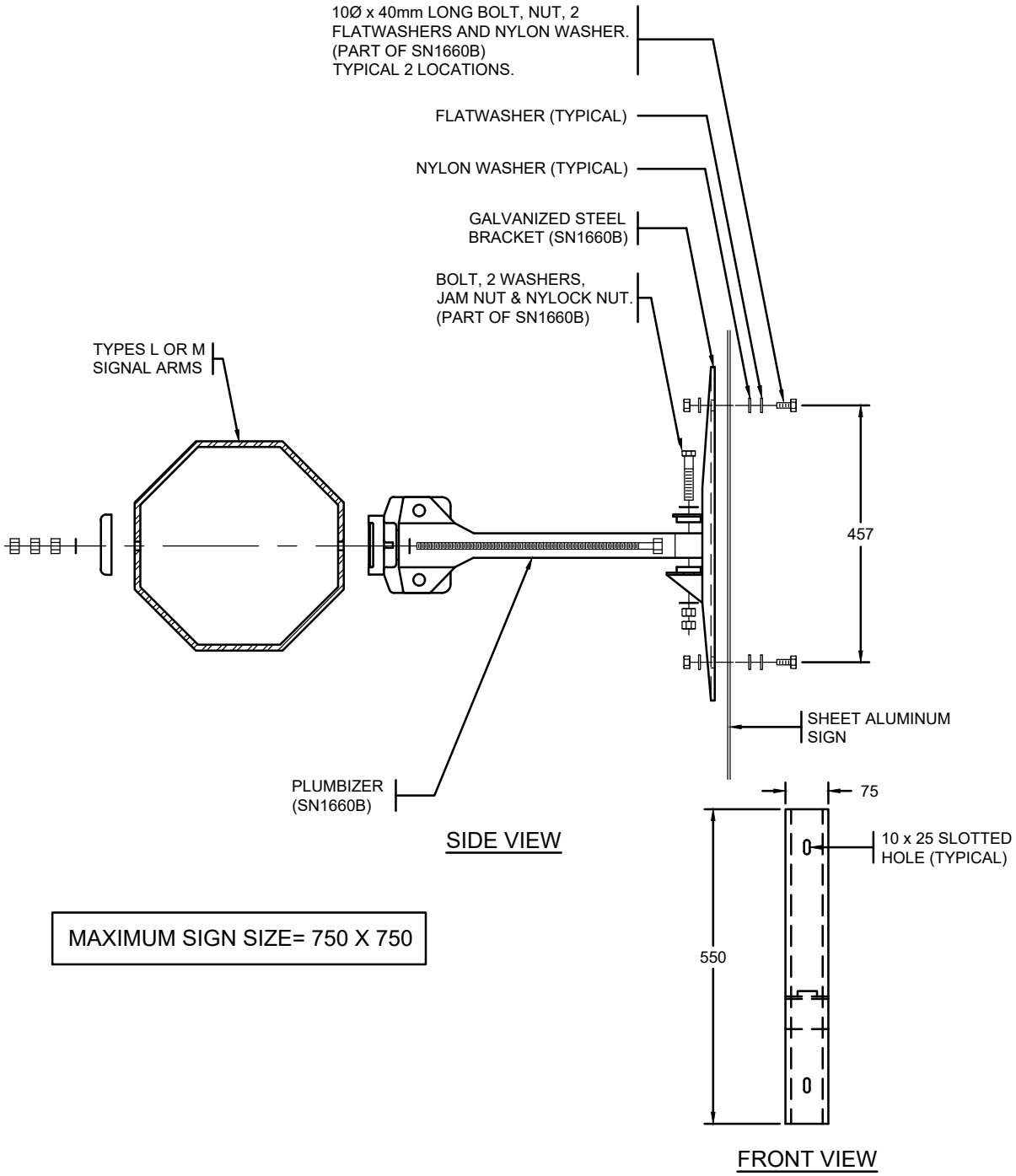
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

OVERHEAD STREET NAME SIGN INSTALLATION DETAILS (ON SIGNAL POLE)

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2016
Dwg No:	E-15.1



MAXIMUM SIGN SIZE= 750 X 750

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
3. AIM AS DIRECTED BY THE CITY ENGINEER.

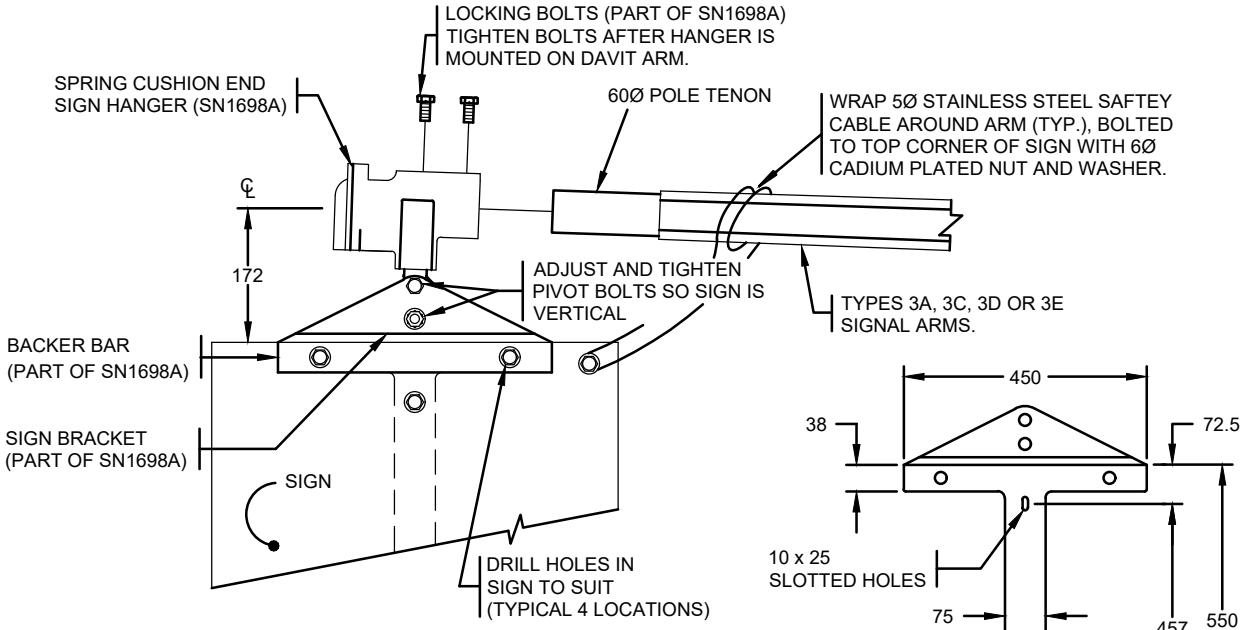
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4.21.2026

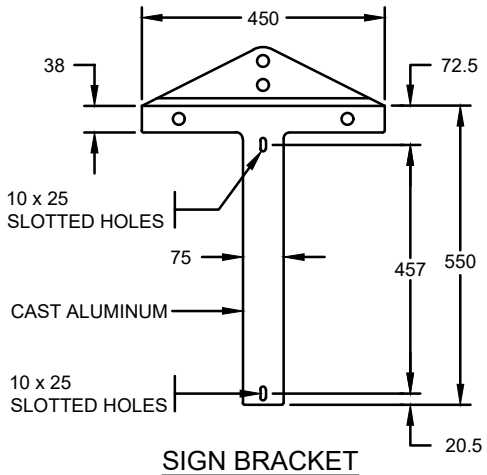
CITY OF NANAIMO
THE HARBOUR CITY

SMALL OVERHEAD SIGN INSTALLATION DETAILS
(TYPE L & M SIGNAL POST)

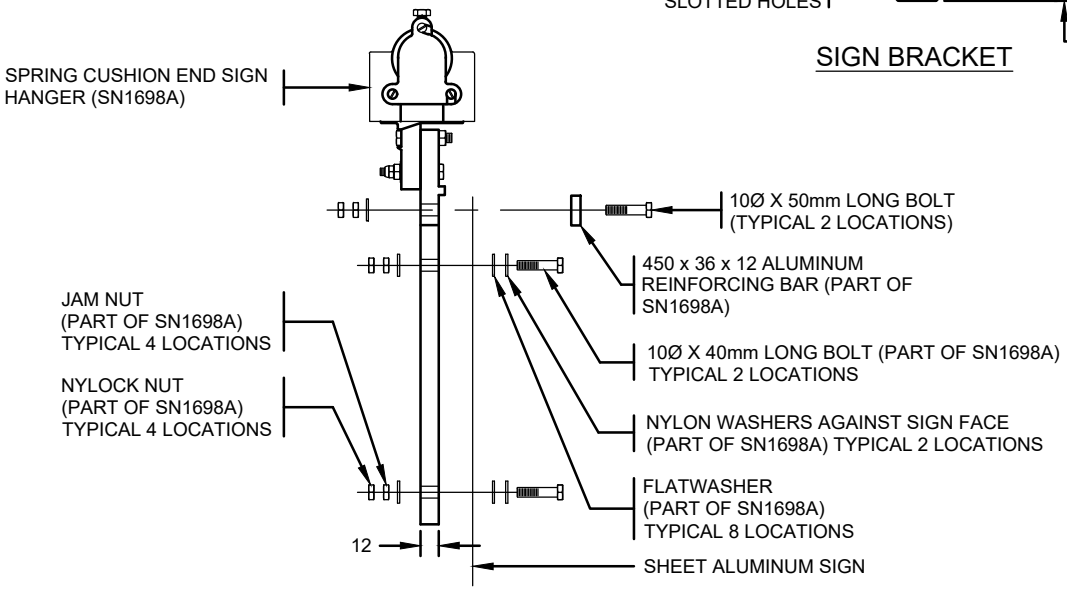
Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-15.2



ELEVATION



SIGN BRACKET



SIDE VIEW

MAXIMUM SIGN SIZE = 750 X 750

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. AIM SIGNS AS DIRECTED BY THE MINISTRY REPRESENTATIVE.
3. 'SN' DENOTES MINISTRY STOCK NUMBER.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

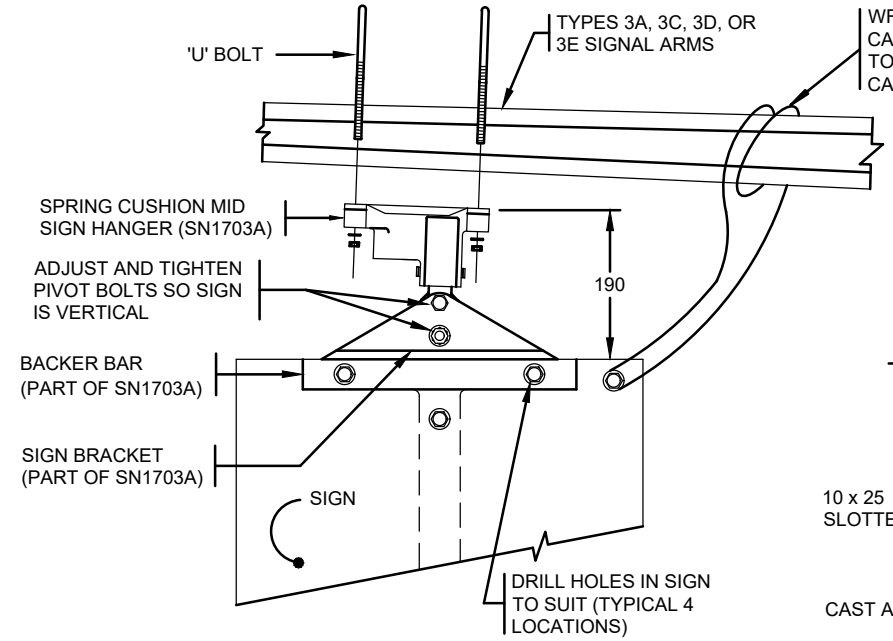
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

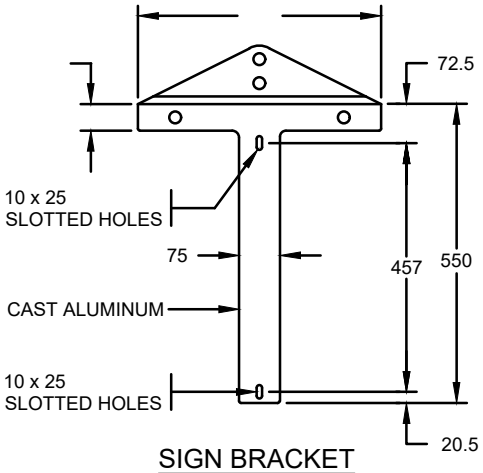
SMALL OVERHEAD SIGN INSTALLATION DETAILS
(TYPE 3 SIGNAL ARMS)

Scale:	NTS
Created:	MAY 1999
Rev Date:	MAY 1999
Dwg No:	E-15.3

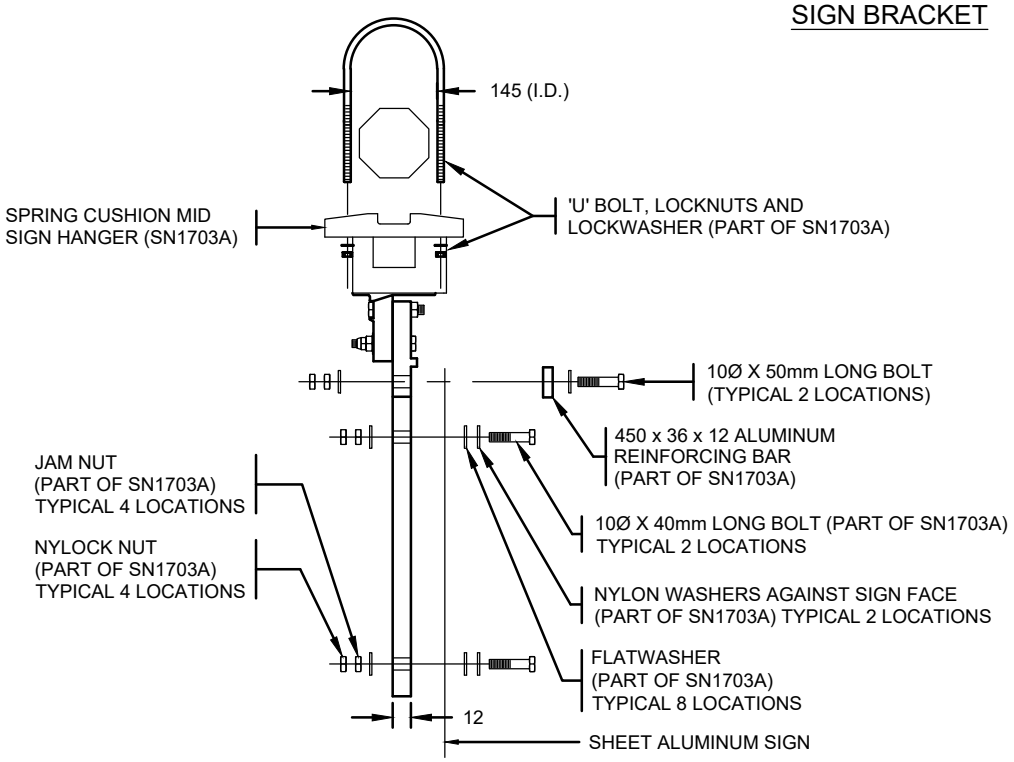


ELEVATION

MAXIMUM SIGN SIZE = 750 X 750



SIGN BRACKET



SIDE VIEW

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. AIM SIGNS AS DIRECTED BY THE CITY ENGINEER.
3. 'SN' DENOTES MINISTRY STOCK NUMBER.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

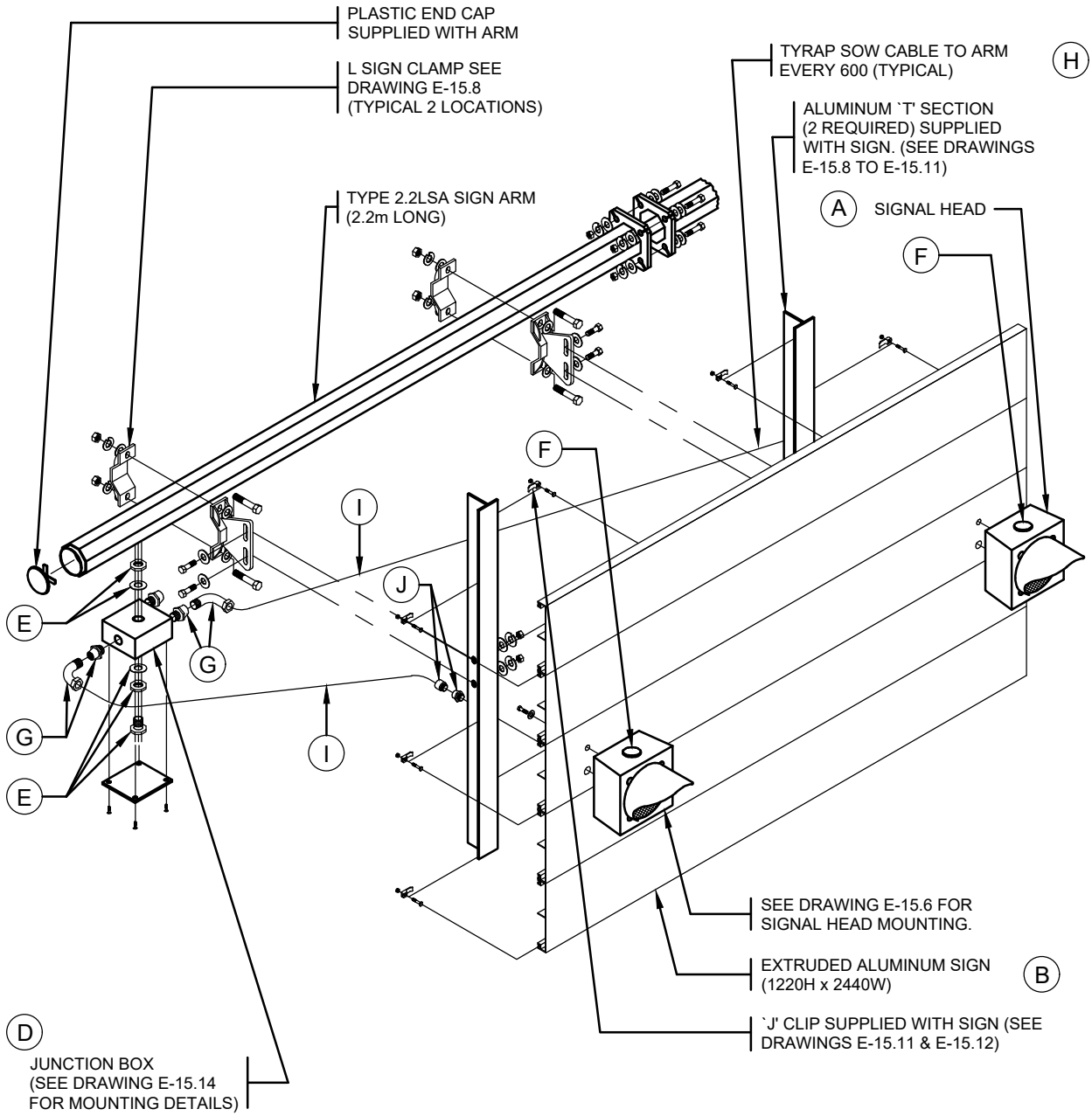
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

SMALL OVERHEAD SIGN INSTALLATION DETAILS
(TYPE 3 SIGNAL ARMS)

Scale:	NTS
Created:	MAY 1999
Rev Date:	MAY 1999
Dwg No:	E-15.4



SEE DRAWING E-15.8 FOR NOTES AND ADDITIONAL DETAILS

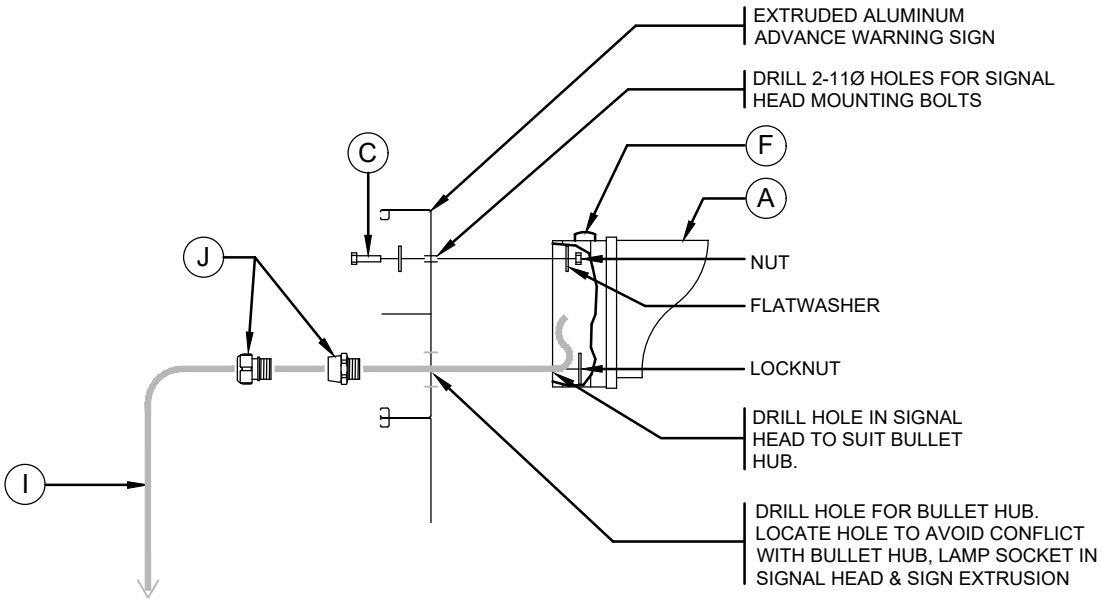
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4.21.2026

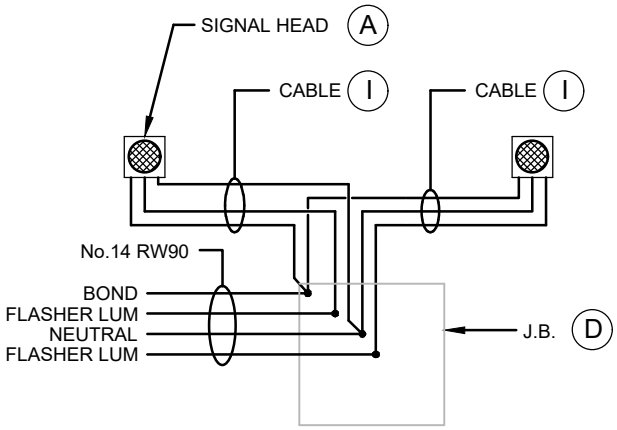
CITY OF NANAIMO
THE HARBOUR CITY

OVERHEAD EXTRUDED ALUMINUM ADVANCE WARNING SIGN ASSEMBLY DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2019
Dwg No:	E-15.5



SIGNAL HEAD MOUNTING DETAIL



WIRING DIAGRAM

SEE DRAWING E-15.8 FOR NOTES AND ADDITIONAL DETAILS

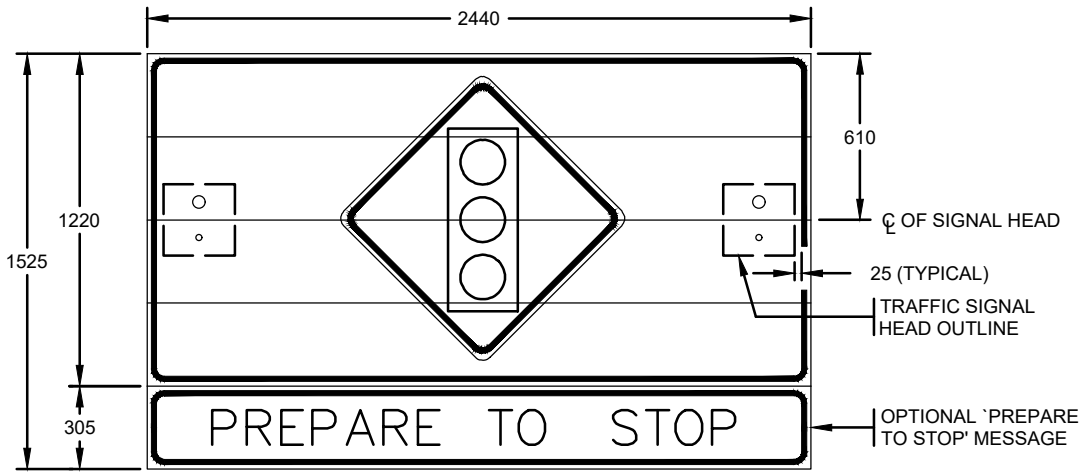
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

OVERHEAD EXTRUDED ALUMINUM ADVANCE WARNING SIGN INSTALLATION DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2019
Dwg No:	E-15.6



TRAFFIC SIGNAL ADVANCE WARNING SIGN

TRAFFIC SIGNAL ADVANCE WARNING SIGN KIT PARTS LIST	
ITEM	DESCRIPTION
A	200mm SIGNAL HEAD SECTION C/W YELLOW LENS, LAMP AND COWL VISOR
B	TRAFFIC SIGNAL EXTRUDED ALUMINUM ADVANCE WARNING SIGN COMPLETE WITH 3M DIAMOND GRADE REFLECTIVE SHEETING
C	10Ø x 25mm LONG STAINLESS STEEL HEX HEAD BOLT, NUT, 2 FLAT WASHERS AND 1 LOCKWASHER
D	150 x 150 x 100 PVC J.B.
E	INSULATED CHASE NIPPLE, 2 LOCKNUTS AND 2 FLAT WASHERS
F	FINIAL
G	12mm BULLET HUB AND 90° STRAIN RELIEF CONNECTOR AND LOCKNUT
H	LARGE TY-RAP
I	3c No. 14 S.O.W. CABLE
J	12mm BULLET HUB AND STRAIN RELIEF CONNECTOR AND LOCKNUT

SEE DRAWING E-15.8 FOR NOTES AND ADDITIONAL DETAILS

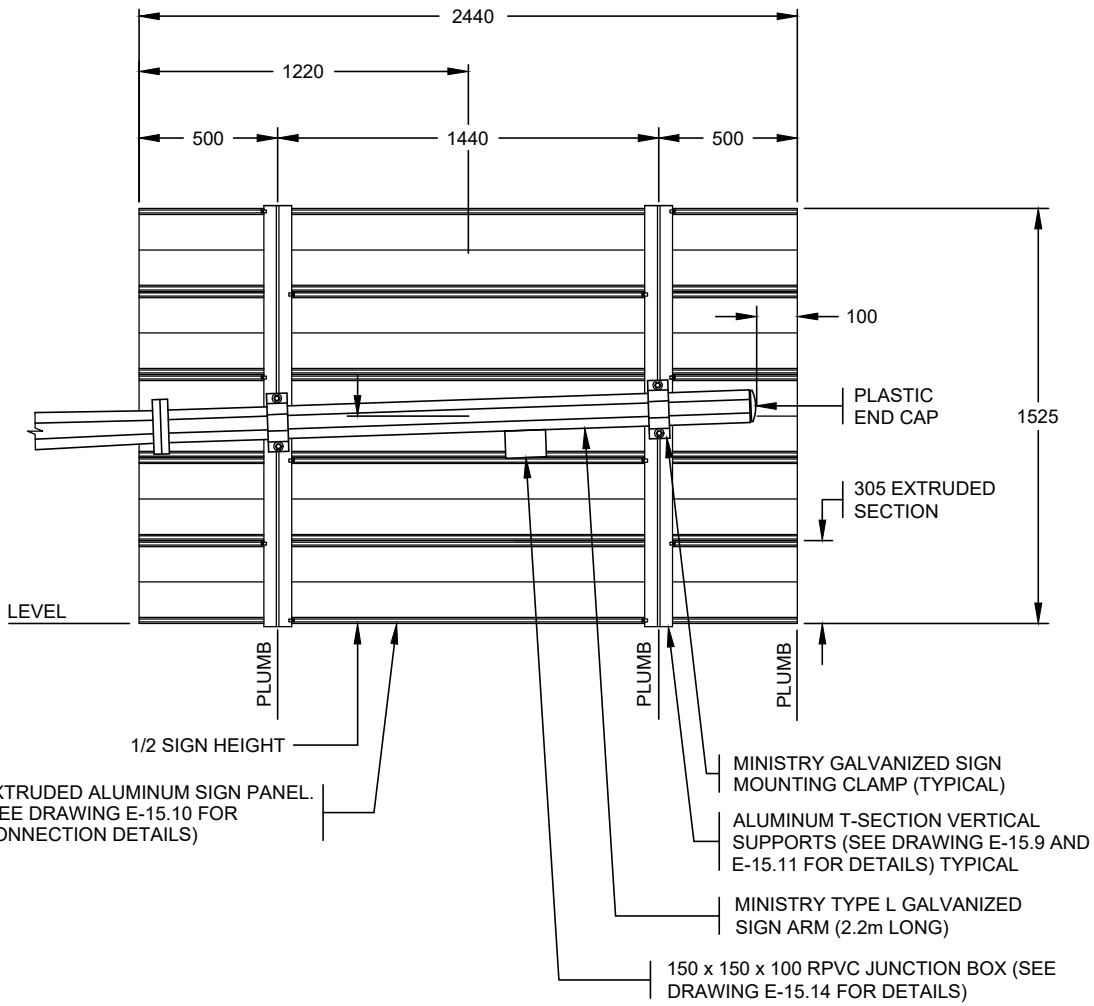
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CITY OF NANAIMO
THE HARBOUR CITY

OVERHEAD EXTRUDED ALUMINUM ADVANCE WARNING SIGN INSTALLATION DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2019
Dwg No:	E-15.7

4.21.2026



REAR ELEVATION

TOTAL MASS
EXTRUDED ALUMINUM SIGN = 48 kg

SEE DRAWING E-15.13 FOR SIGN LIGHTING DETAILS.

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. SEE DRAWING E-15.5 FOR SIGN ASSEMBLY DETAILS.
3. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

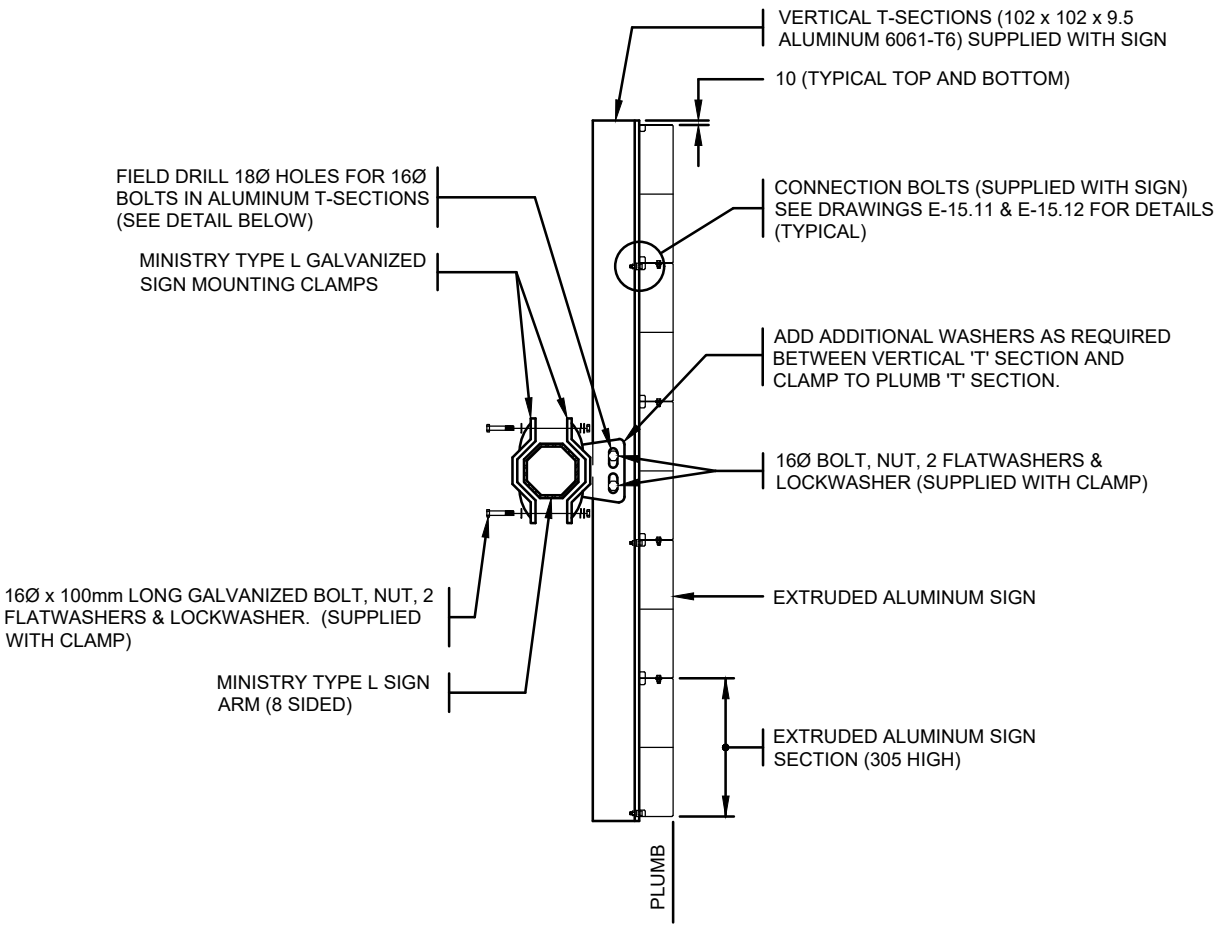
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

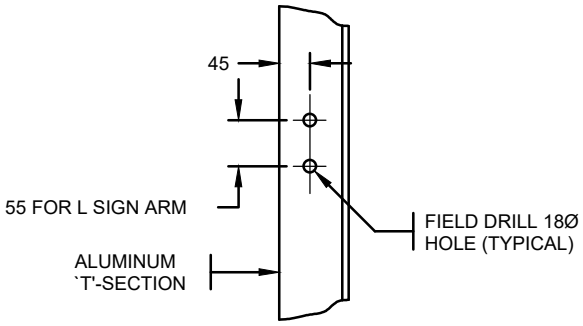
OVERHEAD EXTRUDED ALUMINUM ADVANCE WARNING SIGN INSTALLATION DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	NOV 2019
Dwg No:	E-15.8



SIGN BRACKET ASSEMBLY

SIDE VIEW



`T'-SECTION HOLE DETAIL

SEE DRAWING E-15.8 FOR NOTES AND ADDITIONAL DETAILS.

SIGN LIGHTING NOT SHOWN. SEE DRAWING E-15.13 FOR SIGN LIGHTING DETAILS.

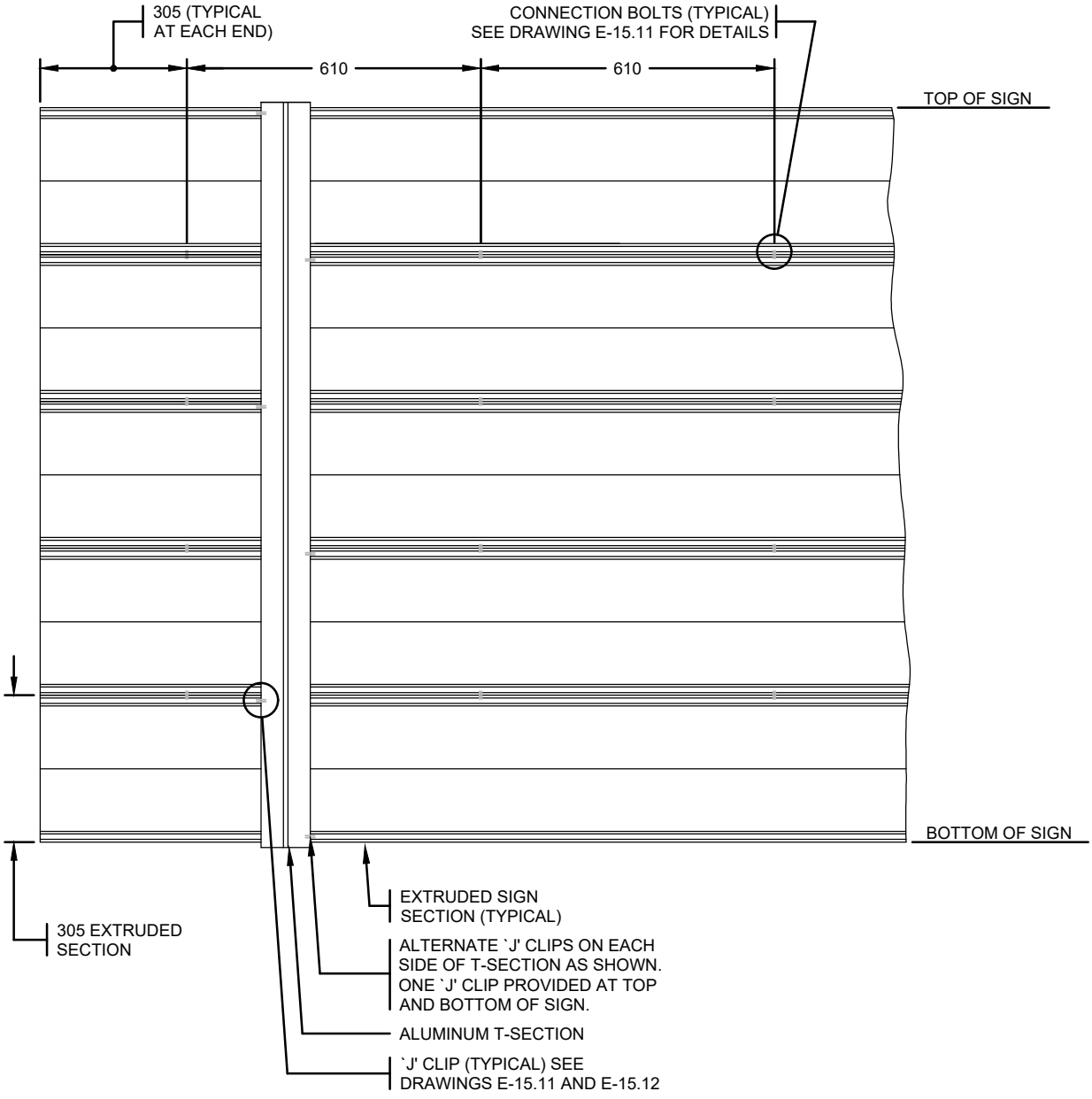
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CITY OF NANAIMO
THE HARBOUR CITY

OVERHEAD EXTRUDED ALUMINUM ADVANCE WARNING SIGN INSTALLATION DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-15.9

4.21.2026



REAR VIEW OF SIGN

SEE DRAWING E-15.8 FOR
NOTES AND ADDITIONAL DETAILS.

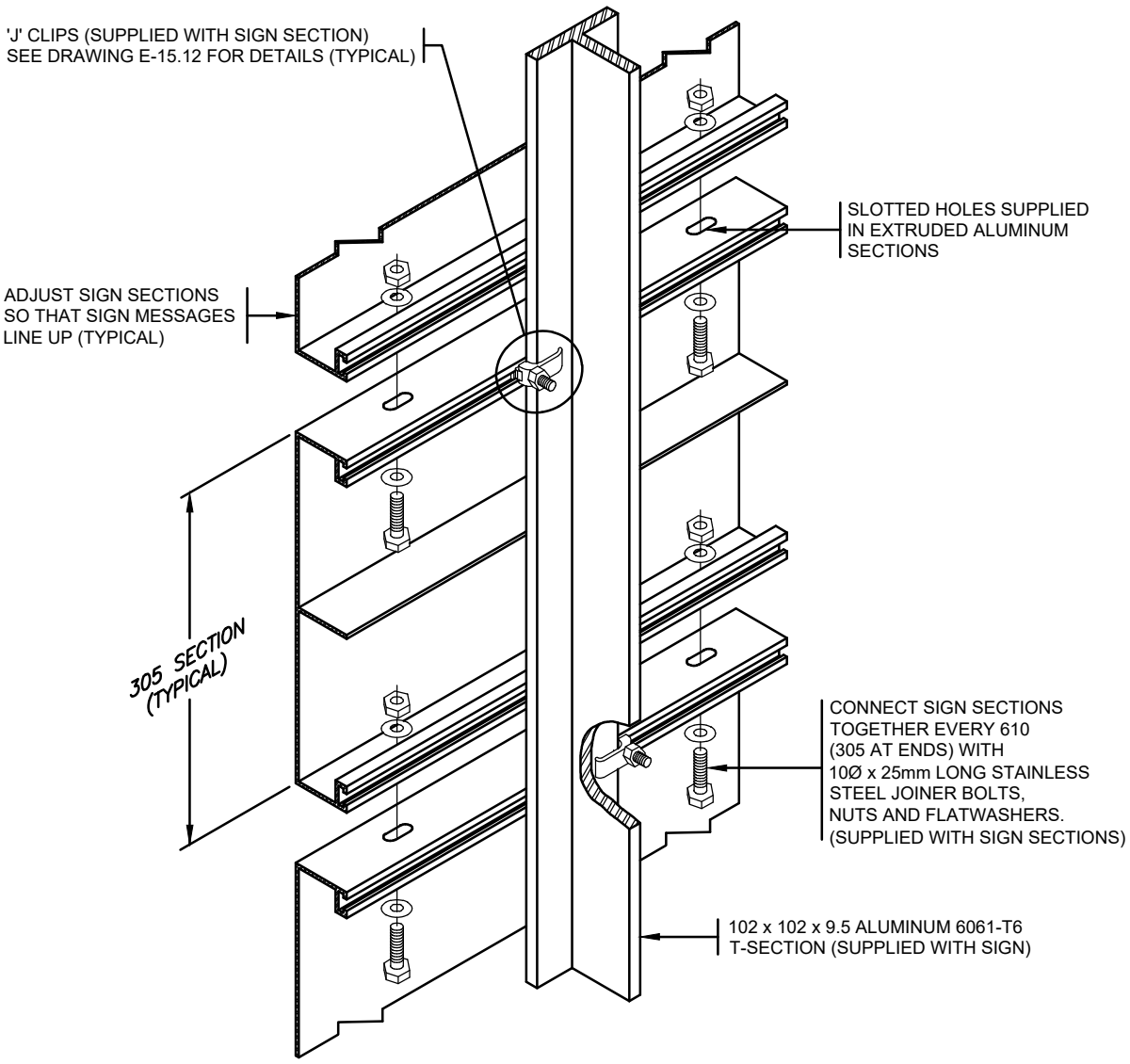
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

OVERHEAD EXTRUDED ALUMINUM ADVANCE
WARNING SIGN INSTALLATION DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-15.10



ASSEMBLY VIEW

TORQUE JOINER BOLTS AND 'J' CLIPS TO 19 ft. lbs.

SEE DRAWING E-15.8 FOR NOTES AND ADDITIONAL DETAILS.

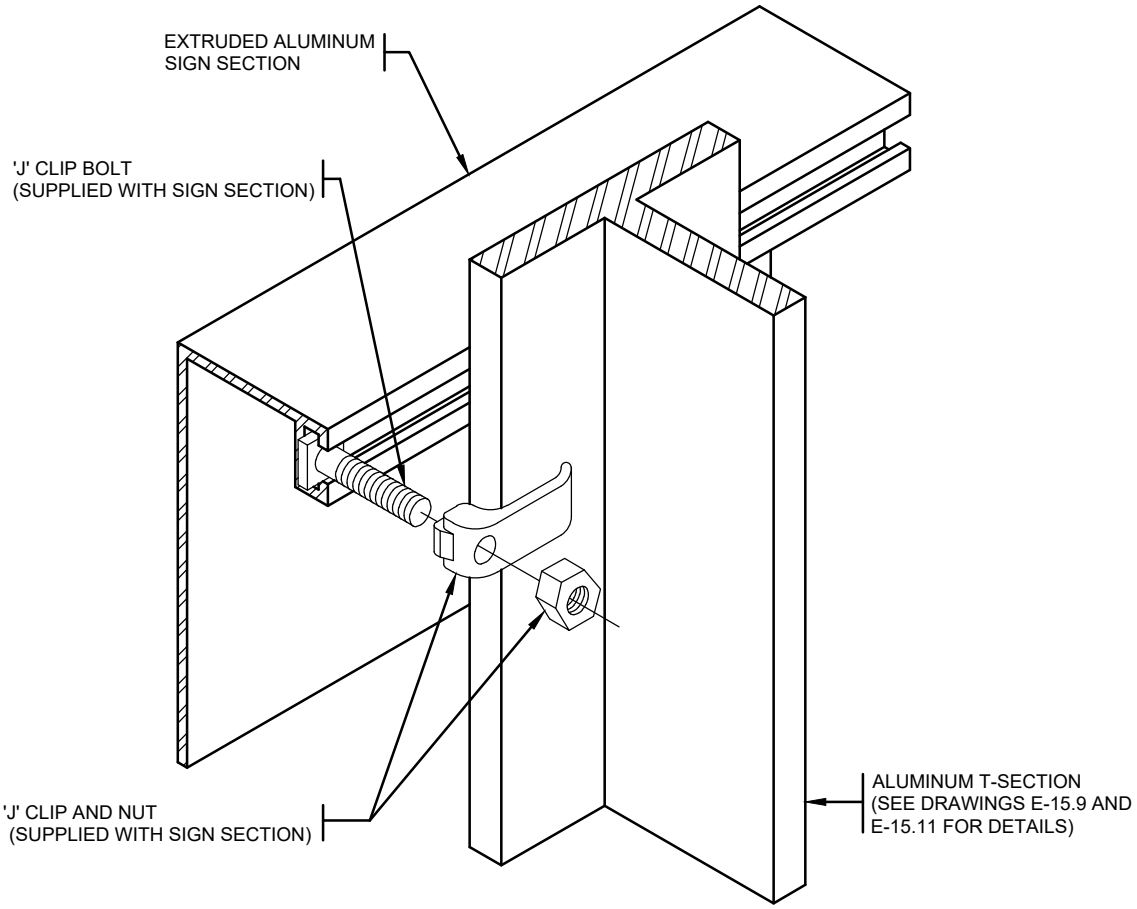
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

OVERHEAD EXTRUDED ALUMINUM SIGN ASSEMBLY DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-15.11



ASSEMBLY VIEW

TORQUE JOINER BOLTS AND
`J' CLIPS TO 19 ft. lbs.

SEE DRAWING E-15.8 FOR
NOTES AND ADDITIONAL DETAILS.

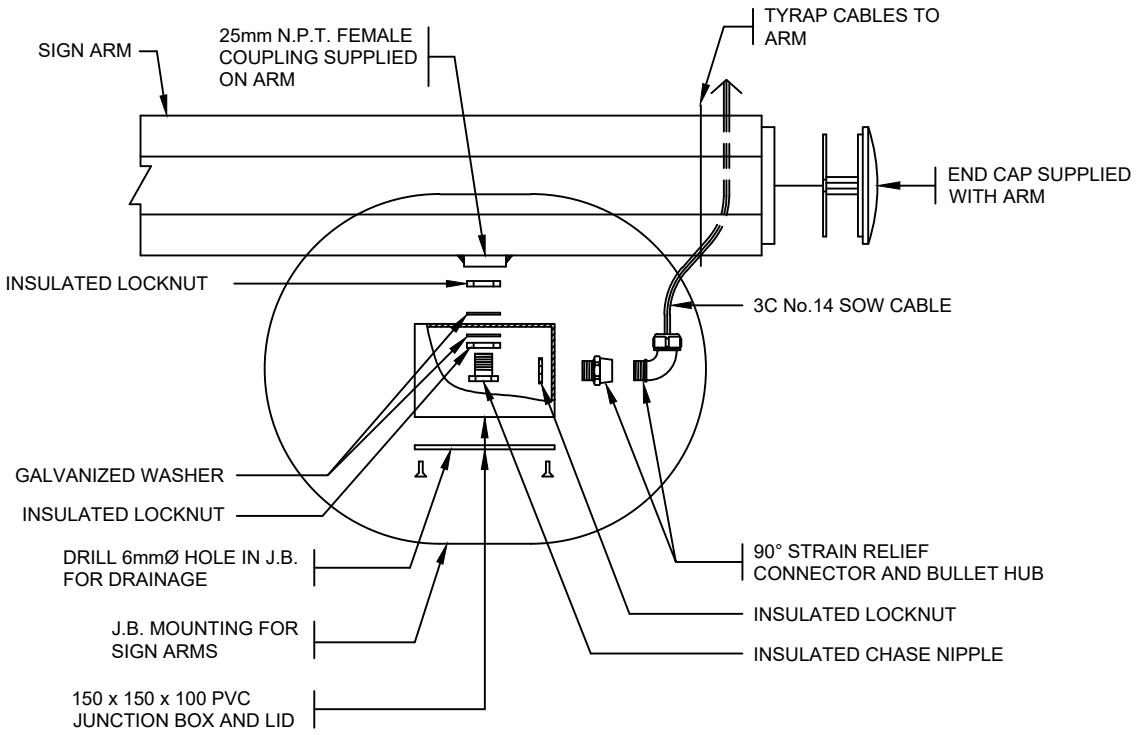
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4.21.2026

CITY OF NANAIMO
THE HARBOUR CITY

OVERHEAD EXTRUDED ALUMINUM SIGN
ASSEMBLY DETAILS

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-15.12



J.B. MOUNTING DETAIL

NOTES:

1. REFER TO CONTRACT DRAWINGS AND SECTION 10 FOR DETAILED SPECIFICATIONS.
2. ALL DIMENSIONS ARE IN MILLIMETerS UNLESS OTHERWISE NOTED.

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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

JUNCTION BOX INSTALLATION DETAILS ON SIGN ARMS

Scale:	NTS
Created:	JAN 1998
Rev Date:	JAN 1998
Dwg No:	E-15.14

SECTION 11 – CAST IN PLACE CONCRETE WORKS
CONTENTS

SPECIFICATIONS AND INSTALLATION *(REVISED JUNE 2026)*	SECTION NO.
Scope	11.20 [↓]
Related Sections	11.21 [↓]
References, Codes and Standards	11.22 [↓]
Submittals	11.23 [↓]
Materials	11.24 [↓]
Concrete Mixes	11.25 [↓]
Construction	11.26 [↓]
Formwork	11.27 [↓]
Hooks and Bends in Reinforcement	11.28 [↓]
Cleaning Reinforcement	11.29 [↓]
Placing Reinforcement	11.30 [↓]
Splices	11.31 [↓]
Cover for Reinforcement	11.32 [↓]
Concrete Joints	11.33 [↓]
Sleeves and Openings	11.34 [↓]
Embedded Items	11.35 [↓]
Mixing, Placing and Consolidating	11.36 [↓]
Surface Finishing	11.37 [↓]
Types of Finishes and Tolerances	11.38 [↓]
Surface Finishing	11.39 [↓]
Protection and Curing	11.40 [↓]

11.20 SCOPE

.1 This specification refers to reinforced and plain cast in place concrete works for the construction of pavements, sidewalks, curbs and gutters, manholes, catch basins, concrete works associated with the installation of watermains and sewers and other works incidental to municipal services construction.

.2 This specification shall not be used for structural facilities such as buildings, bridges or other structure requiring site specific structural design.

11.21 RELATED SECTIONS

.1 Section 4.0 – Excavation, Trenching and Backfill [].

.2 Section 8.0 – Transportation [], and Section 9.0 Aggregates and Granular Material. [], and Section 13.0 Surface Treatments []. *(REVISED JUNE 2026)*

.3 Section 2.0 – General Definitions And References []. *(REVISED JUNE 2026)*

11.22 REFERENCES, CODES AND STANDARDS

.1 All references to this Specifications, Standards and Codes shall refer to the latest adopted version, including all amendments.

.2 American Concrete Institute (ACI):

(a) ***ACI 306 R*** – Cold Weather Concreting.

(b) ***ACI 305 R*** – Hot Weather Concreting.

.3 American Society for Testing and Materials (ASTM):

(a) ***ASTM C260*** – Standard Specification for Air-Entraining Admixtures for Concrete.

(b) ***ASTM C309*** – Standard Specification for Liquid Membrane – Forming Compounds for Curing Concrete.

.4 Canadian Standards Association (CSA):

(a) ***CSA A23.1/A23.2:19*** – Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.

(b) ***CSA A283:19*** – Qualification code for concrete testing laboratories.

(c) ***CSA A3000-18*** – Cementitious Materials Compendium.

.5 Codes and Bylaws:

(a) Local codes and bylaws

(b) WorkSafeBC *Regulations*

(c) *National Building Code* (NBC)

(d) *British Columbia Building Code* (BCBC)

11.23 SUBMITTALS

.1 Mix Design:

(a) Provide certification by the City Engineer that the mix proportions will produce concrete of specified quality and yield and that strength will comply with this specification and ***CSA A23.1:19***. *(REVISED JUNE 2026)*

.2 Plant and Material Certification:

(a) Concrete suppliers shall submit certification of concrete production facilities in accordance with the British Columbia Ready Mixed Concrete Association (BCRMCA) audit check list.

11.24 MATERIALS

.1 Hydraulic cement: Type GU (general use) to ***CSA A3000-18***:

(a) Other types of cement shall only be permitted when approved by City Engineer. *(REVISED JUNE 2026)*

.2 Fly Ash: Type F to ***CSA A3000-18***.

.3 Water: to ***CSA A23.1:19***.

.4 Aggregates: to ***CSA A23.1:19, Table 12***:

(a) Coarse aggregate – combined grading of blended coarse aggregate to be within limits of Table 11 (Group 1).

(b) Nominal size of aggregate shall be 20 mm for concrete works and 14 mm for concrete patching.

(c) Fine aggregate – gradation to ***CSA A23.1:19, Table 10*** and be within limits of FA1.

.5 Admixtures:

(a) Air entraining admixture: to ***ASTM C260***.

(b) Chemical admixtures: to ***ASTM C494***. Set retarding and accelerating admixtures shall not be used unless approved by the Professional of Record. *(REVISED JUNE 2026)*

.6 Reinforcement:

(a) Reinforcement for concrete and methods of testing reinforcement shall conform to the requirements of ***CSA A23.1 Section 6.1 and CSA G30.18***.

.7 Forms:

(a) All forms shall conform to ***CSA A23.1:19, Section 6.5***.

(b) Form ties shall be metal and of the type such that no metal is left within 25 mm from the concrete surface when the forms are removed.

(c) Form release agent shall be approved by the Qualified Registered Professional prior to use and shall be a non-staining, mineral type, with chemically active release agents containing compounds that react with free time to produce water soluble soap. *(REVISED JUNE 2026)*

.8 Support, Chairs and Spacers:

(a) Reinforcement shall be accurately positioned, secured and supported using bar supports, side form spacers and internal spacers to ensure proper concrete cover and spacing within allowable tolerances before and during placing of concrete.

(b) All support of reinforcement shall conform to ***CSA A23.2:19, Section 6.6.7***.

.9 Premoulded Joint Filler:

(a) Premoulded joint fillers shall be bituminous impregnated fiber board in accordance with ***ASTM D1751***.

11.25 CONCRETE MIXES

.1 Mix design for exterior walls and columns shall conform to the requirements of ***CSA A23.1. Table 1 and Table 2 for Class F-2***. *(REVISED JUNE 2026)*

(a) Minimum compressive strength at 28 days: 25 MPa.

(b) Maximum water to cementing materials ratio (w/cm): 0.55.

(c) Air entrainment: 5% - 8%.

(d) Slump shall be consistent with the placement and consolidation methods, equipment, and site conditions.

.2 Mix design for concrete curbs and sidewalks shall conform to requirements of ***CSA A23.1. Table 1 and Table 2 for Class C-2***.

(a) Minimum compressive strength at 28 days: 32 MPa.

(b) Air entrainment: 5% - 8%.

(c) Slump shall be consistent with the placement and consolidation methods, equipment, and site conditions.

.3 Control density fill should comply with ***CSA A23.1:19***.

(a) Minimum compressive strength at 28 days: 0.5 MPa.

(b) Air entrainment: 4% - 7%.

(c) Slump shall be consistent with the placement and consolidation methods, equipment and site conditions.

.4 Mix design for concrete bases shall conform to requirements of ***CSA A23.1. Table 1 and Table 2 for Class F-1***. *(REVISED JUNE 2026)*

(a) Minimum compressive strength at 28 days: 30 MPa. *(REVISED JUNE 2026)*

(b) Maximum water to cementing materials ratio (w/cm): 0.5. *(REVISED JUNE 2026)*

(c) Air entrainment: 5% - 8%. *(REVISED JUNE 2026)*

(d) Slump shall be consistent with the placement and consolidation methods, equipment, and site conditions. *(REVISED JUNE 2026)*

.5 Mix design for grout shall be approved by the Professional of Record. Proprietary grout mixtures shall be used in accordance with the manufacturer's recommendations. *(REVISED JUNE 2026)*

11.26 CONSTRUCTION

.1 Install reinforced and plain concrete works, including surface tolerances, finishing and field quality control in accordance with ***CAN/CSA A23.1:19*** except where specifically stated otherwise.

.2 All concrete accessories shall be as indicated on the drawings or as approved in writing by the Professional of Record. *(REVISED JUNE 2026)*

.3 The City Engineer and Professional of Record shall be given 24 hours' notice in advance of placing concrete by the Contractor. *(REVISED JUNE 2026)*

.4 Concrete production and delivery shall be in accordance with ***CSA A23.1:19, Section 5.0***.

.5 Hot and cold weather concreting.

(a) When the ambient temperature is forecasted to be 27°C and raising, the requirements of ***CSA A23.3:19, Clause 7.8.3.3.***1 shall be followed. *(REVISED JUNE 2026)*

(b) During freezing weather, the requirements of ***CSA A23.3:19, Clause 7.8.3.3.2*** shall be followed. *(REVISED JUNE 2026)*

.6 Concrete Testing:

(a) The Professional of Record will arrange for a CCIL certified testing firm to carry out tests to determine whether the applicable standards and specifications have been met. Where initial testing indicates non-compliance with the specifications additional testing shall be required at the contractor's expense. *(REVISED JUNE 2026)*

(b) Concrete sampling, curing and testing shall comply with ***CSA A23.2***.

(c) Concrete sampling, curing and testing shall comply with ***CSA A23.2***.-compliance with the specifications additional testing shall Compressive Strength Test:

(i) Compressive strength shall be performed in conformance with ***CSA A23.2***.

(ii) One strength test shall consist of 3 – 100 mm x 200 mm cylinders; one tested at 7 days, 2 tested at 28 days.

(iii) At least one strength test shall be made from each 50 cubic metres of concrete placed, or 150 m of curb and/or sidewalk placed, with a minimum of one test for each pour of a specified concrete strength placed each day.

(iv) The average of all 28 day strength tests shall exceed the specified strength. When 3 or more tests of the same class of concrete are available, the average of any 3 consecutive tests shall be equal to or greater than the specified strength. No strength tests shall fall below 85% of the specified strength.

(v) Reporting shall follow the requirements of ***CSA A23.2 – 9C, clause 9*** Reporting.

(d) All concrete trucks shall supply a copy of the delivery slip to the Qualified Registered Professional containing the following information: *(REVISED JUNE 2026)*

(i) Minimum Compressive Strength
(ii) Maximum Slump
(iii) Air Content by Percent of Volume
(iv) Batch Time
(v) Maximum Size of Aggregate
(vi) List of Admixtures
(vii) Date
(viii) Name of Supplier

(e) Air content testing of plastic concrete shall be conducted in accordance with ***CSA A23.2-4C***. At least one air content test shall be made for each strength test.

(f) Slump of concrete shall be determined in accordance with ***CSA A23.2-5C***. At least one slump test shall be made for each strength test. The slump test is not required for machine extruded concrete using a no-slump mix design. *(REVISED JUNE 2026)*

.7 Inspection and testing by the City Engineer shall not relieve the contractor of their responsibility for quality control. *(REVISED JUNE 2026)*

.8 Concrete found to be in non-compliance with these specifications, shall be repaired or replaced by the Contractor at no additional cost to theCity. The Contractor shall submit to the City Engineer for approval, their proposed method to correct the noted deficiencies, prior to commencing the work. *(REVISED JUNE 2026)*

11.27 FORMWORK

.1 Forms shall be so constructed that the finished concrete will conform to the shape, dimensions and finish specified.

.2 Forms shall be constructed in conformance with *WorkSafeBC* regulations.

.3 Forms and falsework shall be built sufficiently strong and rigid to maintain correct alignment and elevation and retain concrete pressures without deflection. Forms shall be sufficiently tight to prevent leakage of concrete.

.4 Forms shall be treated with form release agent prior to placing of reinforcement.

.5 Forms for surfaces which are to receive a plaster finish shall not be treated with form release agent.

.6 Forms shall not be stripped until concrete has attained sufficient strength to support safely its own weight and all loads to which it may be subjected.

.7 Forms shall be removed without damaging the concrete.

11.28 HOOKS AND BENDS IN REINFORCEMENT

.1 Fabrication of hooks and bends in reinforcing steel shall be in accordance with ***CAN/CSA A23.1***.

.2 Bars shall be cold bent, unless otherwise approved by the Professional of Record. Bars that are partially embedded in concrete shall not be field bent unless shown on the drawings or approved by the Professional of Record. *(REVISED JUNE 2026)*

.3 Replace bars which develop cracks or splits.

11.29 CLEANING REINFORCEMENT

.1 Bars shall be free from loose rust, mud, oil or other bond-reducing coating.

.2 Bars shall, if necessary, be recleaned prior to resumption of pouring if concrete placing is delayed during the course of a pour.

.3 Touch up damaged parts and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

11.30 PLACING REINFORCEMENT

.1 Fabricate reinforcing steel in accordance with ***CAN/CSA A23.1, ANSA/ACI 315*** and 315R. Upon approval by the Professional of Record weld reinforcement in accordance with ***CSA W186***. *(REVISED JUNE 2026)*

.2 Reinforcement shall be placed accurately and securely supported by chairs, spacers and ties in accordance with the construction drawings.

11.31 SPLICES

.1 Bars shall be spliced only where shown on the construction drawings or as approved by the Professional of Record. Splicing shall be carried out in conformance with ***CAN/CSA A23.1***. *(REVISED JUNE 2026)*

.2 Welding of reinforcement, where approved by the Professional of Record, shall conform to ***CSA W186***. *(REVISED JUNE 2026)*

11.32 COVER FOR REINFORCEMENT

.1 Supports, chairs and spacers shall be provided to ensure the specified cover.

.2 A minimum of 75 mm of cover for reinforcement shall be provided for concrete placed against the ground.

.3 For surfaces to be exposed to the weather or in contact with the ground after removal of forms, the concrete cover shall be at least 50 mm.

.4 A minimum of 20 mm concrete cover shall be provided for surfaces not exposed to earth or weather:

11.33 CONCRETE JOINTS

.1 Construction Joints:

(a) Construction joints shall comply with the requirement of ***CSA A23.1:19, Clause 7.3.1***.

(b) Construction joints not shown on the drawings shall be approved by the Professional of Record prior to construction of formwork and placement of reinforcement. The interface between concrete pours is classified as construction joint if fresh concrete cannot be incorporated integrally by vibration with that previously placed. *(REVISED JUNE 2026)*

(c) Joints shall be perpendicular to main steel.

(d) Reinforcing steel and/or welded wire fabric shall be continuous across joints.

(e) Before placing new concrete on hardened concrete, forms shall be re-tightened, the surface of concrete adequately roughened, laitance removed and the surface saturated with water in advance of concreting.

(f) Joint preparation and installation of jointing materials shall be in accordance with the manufacturer's instructions.

(g) Furnish filler for each joint in a single piece for the depth and width required for the joint, unless approved by the Professional of Record. When more than one piece is approved for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening methods. *(REVISED JUNE 2026)*

.2 Curb and Sidewalk Expansion Joints:

(a) Transverse expansion joints for curb and gutter shall be formed at both sides of street and driveway crossings, at both ends of all curb returns, and both sides of catch basins 1.0 m from the centerline of the catch basin and at all other locations designated by the Professional of Record. *(REVISED JUNE 2026)*

(b) Transverse expansion joints for sidewalks shall be formed at both sides of street and driveway crossings, at both ends of curb returns, at both sides of manholes, 0.75 m from the centerline of the manhole and at all other locations designated by the Professional of Record. *(REVISED JUNE 2026)*

(c) Extend joint through full depth of concrete. Fill joint with expansion joint material.

.3 Curb and Sidewalk Contraction Joints:

(a) Contraction joints shall be constructed by cutting a groove through the surface of the concrete to a minimum of ½ of the depth of the concrete section at the point of cut.

(b) Contraction Joints shall be Constructed:

(i) For sidewalks up to 3.0 m wide, lateral control joints shall be spaced at intervals equal to the width of the sidewalk.

(ii) For sidewalks wider than 3.0 m, lateral control joints shall be spaced at 3.0 m intervals, as well as longitudinal control joints, located such that a 2.0 m corridor is maintained.

(c) Contraction Joints for Curbs shall be Constructed:

(i) For curbs separated from sidewalk, control joints shall be spaced at 3.0 m intervals.

(ii) For curbs abutting sidewalk, control joints shall be spaced to match the contraction joints in the adjacent sidewalk or multi-use pathway, with a minimum spacing of 2.0 m and maximum spacing of 4.0 m.

(d) Sidewalk slabs shall be uniform in size and cut square where possible.

.4 Curb and Sidewalk Isolation Joints:

(a) Isolation joints shall be fabricated around telephone poles, light poles, hydrants, manholes, and all other structures located in the concrete section by wrapping 6 mm thick preformed bituminous impregnated fiber board material around the structure.

(b) Longitudinal isolation joints shall be formed between sidewalk and existing curbing and where sidewalk is installed directly against a wall or other structure.

(c) Bond break compound may be used in lieu of the isolation joint between sidewalk and abutting curb where approved by the Professional of Record. *(REVISED JUNE 2026)*

11.34 SLEEVES AND OPENINGS

.1 Pipes, castings or conduits passing through walls or floors shall, wherever possible, be place in forms before pouring concrete. Boxes may be built into forms to make form openings for subsequent insertion of such items only with the City Engineer's approval.

.2 Continuous keyways shall be provided throughout the perimeter of the opening and shall be flared slightly to facilitate the escape of entrapped air during grouting.

11.35 EMBEDDED ITEMS

.1 Items that are to be embedded in concrete shall be properly set, held, leveled and aligned in forms.

.2 Anchor bolts or other inserts shall be accurately set, held, leveled and aligned using templates.

.3 Suitable nailing blocks, plugs, strips and other items required for attachment of architectural trim and finish shall be placed such that there is no visible distortion or defacement of the completed installation.

11.36 MIXING, PLACING AND CONSOLIDATING

.1 Prior to placing concrete, obtain approval of the Professional of Record for reinforcing material and placement. *(REVISED JUNE 2026)*

.2 Mixing, placing and compacting of concrete shall conform to ***CAN/CSA A23.1*** and to the approval of the Professional of Record. *(REVISED JUNE 2026)*

.3 Pumping of concrete shall require approval of the Professional of Record. *(REVISED JUNE 2026)*

.4 Placement and compacting of concrete shall not disturb reinforcement and inserts.

.5 Extruded concrete shall be free from waves or irregularities in line or grade and be sufficiently supported to ensure no deflection occurs.

.6 The Professional of Record shall maintain accurate records of poured concrete to indicate date, location of pour, quality, air temperature and test samples taken. *(REVISED JUNE 2026)*

11.37 SURFACE FINISHING

.1 Finishing of concrete shall follow the requirements of ***CSA A23.1:19, Clause 7.7***.

11.38 TYPES OF FINISHES AND TOLERANCES

.1 Float Finish:

Surfaces received a wood float finish shall be screeded in conformance with ***CAN/CSA A23.1*** and then the concrete surface shall be worked with a long-handled darby or float to remove high spots and ridges and to fill voids and hollows left in the concrete surface by screeding.

.2 Broom Finish:

After float finishing, surfaces to be broom-finished shall be slightly roughed by light brooming with a stiff brush or broom to a uniform non-skid surface to the satisfaction of the City Inspector. Finished surfaces shall be true in all planes within 8 mm in 3.0 m as determined by a 3.0 m straightedge placed anywhere on the concrete. ***(REVISED JUNE 2026)***

.3 Trowel Finish:

After float finishing, surfaces to be trowel-finished shall be power-trowelled and finally hand-trowelled once the surface has hardened sufficiently. Finished surfaces shall be true in all planes within 5 mm in 3.0 m as determined by a 3.0 m straightedge placed anywhere on the slab. The surface shall have a smooth, even, dense texture free from blemishes.

.4 Common Finish:

For a common finish formed surfaces shall have fins and protrusions exceeding 5 mm ground off. Honeycombed or defective concrete shall be removed to sound concrete, an approved bonding agent applied and patched with mortar of cement and sand mixed in the same proportions as the concrete patches. Damp burlap curing shall be applied. Tieholes shall be cut back 25 mm from the face and filled.

.5 Rubbed Finish:

(a) Forms shall be removed and any necessary patching completed as soon as possible after placement of the concrete without damage to the structure. The rubbed finish shall be undertaken when the surfaces are completed and accessible.

(b) The concrete surfaces shall be thoroughly saturated with water and maintained wet for at least one hour before finishing operations are begun. All free water on the surface shall be removed prior to the application of the finishing mortar.

(c) The mortar shall consist of one part cement and two parts sand (passing a 1.18 mm sieve) by volume. The mortar shall be preshrunk by mixing at least one hour before it is used and then remixed without the addition of water prior to its use.

(d) The sand and cement shall be the same materials as those used in the concrete.

(e) The mortar shall be rubbed thoroughly over sections of the prepared concrete surfaces with clean burlap pads or other suitable materials so that all surface voids are filled. While the application mortar is still plastic, the surfaces shall be rubbed with the sack pads using a mixture of mortar of the same proportions as previously specified, except that no mixing water shall be used. The final rubbing shall be performed in such a manner that the filled voids are left flush with the surface of the surrounding concrete.

(f) On exposed form surfaces, it may be necessary to blend white cement with the job cement to obtain a finish colour that will match the surrounding concrete surfaces. Trial batches of mortar should be made prior to application on the job surface to determine the correct mix proportions to be used.

11.39 SURFACE FINISHING

.1 Unformed surfaces not exposed to view shall receive a float finish.

.2 Unformed surfaces exposed to view, or receiving a floor covering, shall receive a trowel finish.

.3 Concrete curb and gutter shall have a steel trowel finish.

.4 Sidewalks shall receive a uniform broom finish.

.5 Formed surfaces not exposed to view shall receive a common finish.

.6 Formed surfaces exposed to view shall receive a rubbed finish.

.7 Surface finishing may be noted on the drawings or, if not clear, shall be as directed by the Professional of Record. *(REVISED JUNE 2026)*

.8 Refer to Section 13.0 Surface Treatments []. *(REVISED JUNE 2026)*

11.40 PROTECTION AND CURING

.1 Freshly placed concrete shall be protected from damage caused by weather, construction operations and vandalism. Where concrete shows evidence of damage or freezing, as determined by the Professional of Record, the entire section shall be removed and replaced at the Contractor's expense. *(REVISED JUNE 2026)*

.2 Concrete curing shall comply with the requirements of ***CSA A23.1:19, Section 7.8***. Curing requirements for the classes of exposure are given in ***Tables 2 and 19***.

.3 Curing methods shall comply with ***CSA A23.1:19, Clause 7.8.2.1***. *(REVISED JUNE 2026)*

.4 Moist curing shall commence immediately following the final set and shall continue uninterrupted for at least 7 days.

.5 Curing compounds shall not be used unless expressly approved by the Professional of Record. If approved, curing compound shall be spray applied, liquid type conforming to ***ASTM C309*** containing a fugitive dye or pigmented. *(REVISED JUNE 2026)*

.6 Do not place load on the new concrete until approved by the Professional of Record. *(REVISED JUNE 2026)*

SECTION 12 – ASPHALTIC CONCRETE PAVING
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SECTION 12 – ASPHALTIC CONCRETE PAVING SPECIFICATIONS

12.20 SCOPE

.1 This specification outlines the requirements for the production, placing and compaction of hot mix, hot laid asphalt concrete for pavement construction and other uses.

.2 For the definition of terms used within the Manual, refer to Section 2.01 – Defined Terms []. ***(REVISED JUNE 2026)***

.3 For the list of products acceptable for the design within the scope of the Manual, refer to the City of Nanaimo Approved Products List []. ***(REVISED JUNE 2026)***

12.21 SPECIAL MIXES

.1 For general purposes, such as asphalt pavement, the requirements of this specification, and the 19 mm aggregate gradation shall apply unless otherwise approved by the City Engineer. ***(REVISED JUNE 2026***)

.2 For special purposes, such as patching, the paving of shoulders, boulevards walkways and sidewalks, and the construction of curb, gutter or combination curb and gutter, the requirements of this specification, particularly in respect to the mix design aggregate requirements, and the level of testing, shall be subject to amendment by the Professional of Record. ***(REVISED JUNE 2026***)

12.22 -NOT USED-

12.23 AGGREGATE

.1 Aggregate for asphaltic concrete shall be composed of hard, angular, durable, crushed gravel free from silt or clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 The aggregate gradation shall fall within the following limits when tested in accordance with ***ASTM C136 and ASTM C117***.

Gradation Limits (% by Passing Weight)				
Size	**19 mm**	**12 mm**	**10 mm**	**12.5 mm Superpave**
19 mm	100	100	100	100
12.5 mm	70-100	90-100	100	90-100
9.5 mm	55-90	75-95	90-100	
4.75 mm	35-70	45-75	55-85	
2.36 mm	25-57	30-60	35-70	28-58
1.18 mm	18-45	20-45	25-55	
0.60 mm	13-34	15-35	15-40	
0.30 mm	8-26	6-20	8-25	
0.15 mm	5-17	4-15	5-18	
0.075 mm	2-8	2-10	2-10	2-10

.3 Recycled Asphalt Pavement (RAP):

(a) RAP is sourced for asphalt millings or excavated road mix. Suitable RAP shall not contain any other additives including, but not limited to, sulphur, crumb rubber, asphalt rubber, asbestos, produced sand, paving fabrics and reinforcement grids. Crush and screen so that 100% of the reclaimed asphalt pavement materials passes the 19 mm screen before mixing.

(b) RAP must be fed to the plant by separate feed systems capable of being sampled and metering at the design rate.

.4 All sample gradations shall fall within the gradation limits, and any deviations between the samples and the project gradation curve, based on the mix design, shall not exceed the following limits:

Sieve Size (mm)	Maximum Permissible Tolerance % by Weight Passing
4.75 - 19.0	± 4.5
1.18 - 2.36	± 4.0
0.60	± 3.5
0.30	± 3.0
0.15	± 2.0
0.075	± 1.0

.5 A minimum 75% of the material retained on a 4.75 sieve shall have at least 2 fractured faces. Percentages shall be determined by particle mass.

.6 Composition ***(REVISED JUNE 2026)***

(a) Deleterious material (clay lumps, soft shale, coal wood or mica) by weight shall not exceed 3% in the lower course nor 1.5% in the surface course.

(b) The maximum percentage of flat and elongated particles shall be 10% by mass for coarse aggregates.

(i) Flat particles are defined as those particles with a ratio of width to thickness greater than three (3).

(ii) Elongated particles are defined as those particles with a ratio of length to width greater than three (3).

.7 Aggregate deficient of material passing the 0.075 mm sieve shall have approved mineral filler added. Mineral filler shall be only material passing the 0.075 mm sieve and shall be finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic materials when tested in accordance with ***ASTM D4318***.

.8 The moisture content of the aggregate after leaving the drier and before mixing shall not be more than 0.5% by weight.

.9 The following tests may be required to confirm the gravel source is suitable for use in the production of aggregate for asphaltic concrete:

(a) Soundness of Aggregates to ***ASTM C88***

(i) Maximum loss by mass after 5 cycles with $MgSO_4$

1. Coarse aggregate = 15%
2. Fine aggregate = 18%

(b) Micro-Deval Abrasion to ***ASTM D6928***

(i) Maximum loss factor = 18%

(c) Sand equivalent to ***ASTM D2419***

(i) Minimum = 40

(d) Absorption of Aggregate to ***ASTM C127***

(i) Maximum absorption by mass = 2%

(e) Petrographic Examination to ***ASTM C295***.

.10 Additional Requirements for Superpave Aggregates:

(a) Aggregates for Superpave mixes shall have properties and the gradation limits as specified below and in accordance with the latest version of the Asphalt Institute's ***Superpave Series Publication – Superpave Mix Design*** *(current version)*. Changes and/or variation from these limits shall be outlined within the Contract Special Provisions.

(i) 90% fractured aggregate with a 12.5 mm nominal maximum size, including sufficient manufactured fines to provide fine aggregate angularity.

(ii) The aggregates must meet all the requirements for angularity, toughness deleterious materials, clay content, and flat and elongated particles.

(iii) Design ESAL's will be 10 – 30 million.

12.24 ASPHALT CEMENT

.1 Performance grade 64-22 or penetration grade 80-100 asphalt cement shall be in accordance with ***MOTI SS 952***. Asphalt cement shall be prepared from the refining of petroleum oils and be homogeneous, free from water and shall not foam when heated to 175°C. Vacuum Tower Asphalt Extender (VTAE) shall not be incorporated into the binder. ***REVISED JUNE 2026***

.2 The Contractor shall inform the Professional of Record of the name of their asphalt supplier and shall ensure that each load of asphalt is accompanied with a flow sheet showing compliance with the preceding requirements. Such flow sheets shall be submitted to the Professional of Record. ***(REVISED JUNE 2026)***

SECTION 12 – ASPHALTIC CONCRETE PAVING SPECIFICATIONS

12.25 ASPHALTIC CONCRETE MIX DESIGN CRITERIA

.1 Marshall Mixes:

(a) The asphalt mix design for pavements shall be carried out under Marshall design criteria using the designated equipment and procedures as contained in the Asphalt Institute's ***Mix Design Methods for Asphaltic Concrete MS-2***, latest edition.

(b) If requested by the Professional of Record, the Contractor shall supply an asphaltic concrete mix design conforming to the following specifications as based on the Marshall method of design ***Asphalt Institute Manual series No. 2 (MS-2)*** for approval: ***(REVISED JUNE 2026***)

		Local	Collector	Arterial	Special Mixes
(a)	Number of blows each face of test specimen	75	75	75	50
(b)	Minimum % voids in Mineral aggregate (VMA), based on Bulk SG				
	25 mm Aggregate	-	-	-	-
	19 mm Aggregate	13	13	13	13
	12 mm Aggregate	14	14	14	14
	10 mm Aggregate	16	16	16	16
(c)	% air voids in compacted mixture, surface and lower course	3-5	3-5	3-5	3-5
(d)	Minimum modified Marshall load, N @ 60°C	5000	7000	7000	4500
(e)	Flow index, (mm)	2-4	2-4	2-4	2-4
(f)	Minimum asphalt film thickness (µm)	8	8	8	
(g)	Minimum index of retained stability after immersion in water @ 60°C for 24 hours	75%	75%	75%	75%
(h)	Asphalt content in the mix shall be as specified in the mix design ±0.3%				

.2 Superpave Mixes:

(a) The Superpave asphalt mix design shall be carried out in accordance with the latest edition of the Asphalt Institute's ***Superpave Mix Design, Superpave Series No. 2*** (current version) and these Standard Specifications.

(b) If requested by the Professional of Record, the Contractor shall supply an asphaltic concrete mix design conforming to the following specification for approval: ***(REVISED JUNE 2026***)

CRITERIA PROPERTY OF LABORATORY COMPACTED PAVING MIXTURE	SUPERPAVE nominal 12.5 mm
For Design ESAL's = 10-30 million, at N_{Design} = 100 gyrations	
% voids in the Mineral Aggregate, minimum	14
Required density:	
% of Theoretical Maximum Specific Gravity in a Laboratory compacted mix:	
at N_{max} = 160 gyrations	98 maximum
at N_{Design} = 100 gyrations	95-97
at $N_{Initial}$ = 8 gyrations	89 maximum
% voids filled with Asphalt Cement	65-75
Dust to Binder ratio[1]	0.6-1.2

.3 Reclaimed Asphalt Product (RAP):

(a) The maximum RAP allowed in the asphalt mix shall be determined by the contribution of the RAP Asphalt Cement (AC) towards the total AC content in the mix by weight as per the percentages shall be 15%. Contractor shall notify the City Representative, 14 days in advance of Paving if RAP will be used in the project.

(b) The amount of the total AC replaced by the AC in the RAP will be calculated as follows:

$$\% \text{ AC Replacement} = (a \times b)/c$$

Where:

a = AC content of RAP

b = RAP percent in mixture by total weight of mix

c = Total percent AC content in mixture

[1] Consideration shall be given to increasing the dust to binder ratio to 0.8 – 1.6

12.26 JOB MIX AND PLANT CALIBRATION

.1 If requested by the Professional of Record, a job mix formula shall be provided by the Contractor and shall contain the following information: ***(REVISED JUNE 2026***)

(a) Sieve analysis of combined aggregate in mix.

(b) Aggregate size range in each bin separation to be used.

(c) Weight of aggregate to be used from each bin for one batch of mix.

(d) Weight of asphalt cement to be used for one batch of mix.

(e) Optimum mixing and compacting temperatures.

.2 If requested by the Engineer, a plant calibration for continuous mix plants shall be provided by the Contractor.

12.27 TACK COAT

.1 Bituminous tack coat shall be Grade SS-1 or SS-1h asphalt emulsion, in accordance with ***MOTI SS 952*** (or the latest ***AASHTO M140-13*** or the latest ***ASTM D977***) or as approved. Manufacturer's laboratory analysis of each tack coat shipment shall be submitted to the Professional of Record for approval. ***(REVISED JUNE 2026)***

SECTION 12 – ASPHALTIC CONCRETE PAVING INSTALLATION

12.40 RESPONSIBILITY FOR ALIGNMENT, GRADE AND BASE

.1 The Contractor shall examine the base, existing surface and tack coat to ensure they conform to the specifications, and the grade and alignment conform to the construction drawings, prior to commencing paving operations. The Contractor shall be satisfied that the base is properly prepared for the placement of asphaltic concrete and shall notify the Professional of Record of any observed deficiencies prior to paving. The Contractor's responsibility for pavement failures shall include those caused by base failure, misalignment or incorrect grade. ***(REVISED JUNE 2026***)

.2 Prior to delivery of the asphaltic concrete to the job site, the prepared base shall be cleaned of all loose or foreign material.

12.41 TRAFFIC CONTROL

.1 The Contractor shall be responsible for traffic control during all operations in accordance with Section 3.60 – Control of Public Traffic – General []. ***(REVISED JUNE 2026)***

.2 Traffic shall not be permitted on the finished pavement until it has cooled to atmospheric temperature.

12.42 CUTTING AND REMOVAL OF EXISTING PAVEMENT

.1 The Contractor shall cut, remove and dispose of existing pavement as directed by the Professional of Record. Pavement cutting shall be in accordance with Section 4.28 – Final Cutting Paved Surfaces []. ***(REVISED JUNE 2026***)

12.43 ADJUSTMENT OF SERVICES

.1 The Contractor shall adjust manholes, catch basins, valves, etc. to the proper finished grade at least 48 hours prior to paving in accordance with Section 6.53 – Frames and Covers and Section 6.54 – Manhole Rungs []. ***(REVISED JUNE 2026***)

12.44 TESTING

.1 The Professional of Record will arrange for a testing firm to carry out tests to determine whether the applicable standards and specifications have been met. Where initial testing indicates non compliance with the specification, additional testing shall be required at the Contractor's expense. ***(REVISED JUNE 2026***)

.2 The Contractor as directed by the Professional of Record shall supply specimens or samples for testing. ***(REVISED JUNE 2026***)

.3 The test programs listed below are the minimum testing requirements. The Professional of Record shall determine if additional testing is required. *(REVISED JUNE 2026*)

(a) Aggregates:

(i) One aggregate gradation test shall be carried out either for each 300 tonnes of production or a minimum of once per day (***ASTM C136 and ASTM C117***).

(ii) Additional testing as outline in Section 12.23 [→] as required by the Professional of Record. *(REVISED JUNE 2026*)

(b) Asphaltic Concrete:

(i) One Marshall test consisting of three briquettes for every three hundred tonnes of production, or a minimum of one test per day shall be performed to determine the following:

(ii) Marshall stability

(iii) Specific gravity

(iv) Air voids and voids in mineral aggregate (VMA)

(v) Flow index

(vi) Asphalt content extraction

(vii) Gradation of Asphalt aggregate

1. Testing shall use the 75 Blow Marshall test method. The 50 Blow Marshall test method may be used for walkways, sidewalks, driveways or other City Engineer approved locations.

(c) Compaction:

(i) Upon completion of the asphalt paving operation, one core from each 400 m^2 of pavement with a minimum of three (3) cores shall be obtained at locations determined by the Professional of Record for the purpose of determining the asphaltic concrete density in accordance with ***ASTM D2723***, and the asphaltic concrete thickness (see Section 12.51 – Asphaltic Concrete Acceptance Requirements [→]). *(REVISED JUNE 2026)*

(ii) Final compaction results shall be expressed as a percentage compacted density which is defined as follows:

$$\text{Percentage compacted density} = \frac{\text{Density of sample}}{\text{Marshall density}} \times 100$$

(iii) Test result data will be subjected to statistical analysis and the final compaction shall not be considered satisfactory unless the mean and the standard deviation of the test result data is in accordance with Section 12.51 – Asphaltic Concrete Acceptance Requirements [→].

(d) Other testing as may be required to confirm conformance of materials and workmanship to the specifications.

.4 The test programs outlined above are minimum requirements and may be modified by the Professional of Record. Full testing may be required during the first few days of paving to determine quality control and construction procedures. As paving progresses sufficient tests to maintain uniformity will be required. ***(REVISED JUNE 2026***)

.5 Inspection and testing by the Professional of Record shall not relieve the Contractor of their responsibility for quality control. ***(REVISED JUNE 2026)***

.6 Asphaltic concrete found to be in non-compliance with the specifications shall be repaired or replaced by the Contractor. The Contractor shall submit to the Professional of Record for approval, the proposed method to correct the noted deficiencies and work schedule, prior to commencing the work. ***(REVISED JUNE 2026***)

12.45 TACK COAT

.1 The existing asphaltic concrete surface shall be thoroughly cleaned by a power-driven sweeper immediately prior to applying the tack coat.

.2 Tack coat shall be applied to all existing asphaltic concrete which is to be overlaid. Tack coat shall be applied to the edge of existing asphaltic concrete, curbs and structures where these surfaces will be in contact with the new asphaltic concrete pavement.

.3 Tack coat must be applied only when the surface is dry and clean, and the air temperature is over 10°C. ***(REVISED JUNE 2026)***

.4 Tack coat shall not be diluted unless directed by the Professional of Record. ***(REVISED JUNE 2026***)

.5 Tack coat shall be uniformly applied with an approved pressure distributor at a rate of 0.25 litres per square metre. The temperature of the material shall be maintained between 32°C and 38°C.

.6 Traffic shall, where possible, be kept off tack coat areas. Where traffic has been allowed on the tack coat, these areas shall be thoroughly cleaned by a power-driven sweeper immediately prior to laying asphaltic concrete.

.7 No hot mix shall be placed upon the tack coat until it has dried to a proper condition of tackiness, as determined by the Professional of Record. ***(REVISED JUNE 2026***)

.8 Tack coat shall be placed only on the area being paved. Work shall be planned so that no more tack coat than is necessary for the days operation is placed on the surface.

.9 Any damage to persons, vehicles or private property during the application and curing of the tack coat is the Contractor's responsibility.

SECTION 12 – ASPHALTIC CONCRETE PAVING INSTALLATION

12.46 TRANSPORTATION OF HOT PLANT MIX

.1 Trucks used for the transport of hot mix shall be equipped with tarpaulins and, where required, with insulated boxes. Trucks shall not leak fuel, lubrication oils or hydraulic oil.

.2 Inside surface of truck boxes shall be free of all deleterious materials and lubricated with suitable thin soap, but excessive use of lubricant will not be permitted.

.3 The mixture shall be transported from the paving plant to the job site utilizing City designated truck routes where possible, and shall use local streets only to obtain local access. ***(REVISED JUNE 2026)***

.4 Loads shall be delivered continuously in covered trucks to provide a uniform, non-stop paving operation.

.5 Delivery of the mix shall be scheduled to permit completion of the paving operation in daylight hours unless otherwise approved by the Professional of Record. ***(REVISED JUNE 2026)***

12.47 PLACEMENT

.1 Surfaces onto which asphaltic concrete pavement is placed must be dry, above 5°C, and cleaned of all loose and foreign materials. Mixtures are normally not be laid when the atmospheric temperature is less than 5°C and falling. ***(REVISED JUNE 2026)***

(a) Bottom lift must be placed onto surfaces above 5°C and rising. ***(REVISED JUNE 2026)***

(b) Top lift must be placed onto surfaces above 10°C and rising. ***(REVISED JUNE 2026)***

.2 The mixture at time of placing shall be not less than 120°C or greater than 160°C or as required by the mix design and requires approval by the City Engineer.

.3 An approved, self-propelled mechanical paver shall be used to spread the mixture to the specified thickness. The paver speed shall be adjusted to correspond to the rate of delivery to provide a uniform, non-stop paving operation.

.4 The Contractor may use such methods as approved by the Professional of Record in narrow areas, irregular sections, intersections, turnouts or driveways, where it is impractical to spread with a paver. ***(REVISED JUNE 2026***)

.5 Minor inequalities in spreading and shaping the paved surface adjacent to existing structures such as manholes, catch basins or valves shall be performed to a condition satisfactory to the City Engineer.

12.48 COMPACTION

.1 Equipment:

(a) Unless otherwise directed by the Professional of Record, the Contractor shall furnish a minimum of two (2) self-propelled rollers to roll and compact the asphaltic concrete mixture. All rollers shall be in good condition and capable of reversing without backlash. *(REVISED JUNE 2026)*

.2 General:

(a) Compaction shall commence immediately after the bearing capacity of the asphalt mat is adequate to support compaction equipment without undesirable displacement or cracking.

(b) Maximum speed for initial rolling shall not exceed 5 km/hr, and subsequent rolling, 8 km/hr. Speeds shall be maintained at all times such that displacement of asphaltic concrete does not occur.

(c) During the rolling operation, roller wheels shall be kept moist with only enough water to avoid picking up material. Fuel oil, lubricating oil, or kerosene shall not be permitted as lubricants for the surface of the roller wheels.

(d) The line of rolling shall not be suddenly changed nor the direction of rolling suddenly reversed. Pronounced changes in direction shall be made on stable material.

(e) Heavy equipment including rollers shall not be permitted to stand on the finished surface.

(f) Where rolling causes displacement of material, loosen affected areas immediately with lutes or shovels and restore to original grade of loose material before re-rolling.

(g) Should the testing results or the Contractor's quality control indicate compaction requirements are not being met, the Contractor shall immediately modify their compaction procedure to satisfy the compaction requirements. *(REVISED JUNE 2026)*

.3 Breakdown Rolling:

Breakdown rolling shall immediately follow the rolling of transverse and longitudinal joint and edges. Rollers shall be operated as close to the paver as necessary to obtain adequate density without causing undue displacement. Initial rolling shall be performed by steel wheel rollers with the drive roll or wheel forward in the direction of paving. Rolling shall commence on the low side of the mat and progress to the high side.

.4 Secondary Rolling:

Secondary rolling shall follow the initial rolling as closely as possible, and shall be continuous until the mix has been thoroughly compacted.

.5 Finish Rolling:

Finish rolling shall be by steel wheel roller to remove all marks left by pneumatic rolling. Finish rolling shall be accomplished with the minimum number of passes required to produce a satisfactory surface.

12.49 JOINTS

.1 General:

(a) All transverse and longitudinal joints shall be painted with a thin tack coat immediately prior to paving. Application of tack coat to longitudinal joints may be omitted if the previously laid pavement has not cooled to less than 50°C.

(b) Transverse joints in succeeding courses shall be offset a minimum of 600 mm. In adjacent lanes they shall be offset a minimum of 3.0 m.

(c) Longitudinal joints in succeeding courses shall be offset 150 – 200 mm.

(d) Wherever possible, longitudinal joints shall be offset 100 mm from future traffic markings (paint lines).

(e) Work shall be sequenced to avoid the number of cold joints. ***(REVISED JUNE 2026)***

.2 Transverse Joints:

Transverse joints shall have a vertical face and shall be carefully constructed and thoroughly compacted to provide a smooth riding surface over the joint. Horizontal alignment of joints shall be straight-edged to ensure smoothness. Rolling of transverse joints shall be performed immediately after raking is completed.

.3 Longitudinal Joints:

Longitudinal joints shall have a vertical face and shall be rolled directly behind the paving operation. Joints shall be rolled by passing the roller on the previously compacted lane letting one wheel project 100 mm to 150 mm on the new lane. A minimum of 2 passes shall be required to thoroughly compact this narrow strip down to and even with the existing lane.

.4 Edges:

Pavement edges shall be rolled concurrently with the longitudinal joints and shall not be exposed more than 15 minutes before rolling. After longitudinal joints and edges have been compacted, longitudinal rolling shall start at the edge and progress to the centre of the pavement, overlapping at least one-half the width of the roller with each successive pass. On super-elevated curves, rolling shall begin on the low side and progress to the high side.

12.50 CLEANING

.1 The Contractor shall thoroughly remove from all culvert, catch basins, curbs, gutters and other structures such contamination by asphaltic or other materials as may have occurred during the performance of the work.

12.51 ASPHALTIC CONCRETE ACCEPTANCE REQUIREMENTS

.1 The finished grade surface must be free from bumps, depressions or other irregularities and must be within 6 mm of the design grade and cross-section, but not uniformly high or low, when measured with a 3.0 m straight edge in any direction. ***(REVISED JUNE 2026)***

.2 The finished elevation of the compacted asphaltic concrete shall be 0 - 6 mm above the finish elevation of structures, including but not limited to curbs, gutters, manhole lids, catch basins, valve boxes and survey monuments.

.3 The finished surface of the asphaltic concrete shall be homogenous, free from segregation and consistently uniform in surface texture.

.4 Asphaltic concrete shall be compacted to 97% mean compacted density when tested in accordance with Section 12.44 – Testing [→]. Maximum acceptable standard deviation of test data shall be 1.5%, with no individual test results less than 95% compacted density.

.5 Asphaltic concrete thickness, as measured in accordance with ***ASTM D3549***, shall not be less than the specified thickness for all test cores. ***(REVISED JUNE 2026)***

SECTION 13 – SURFACE TREATMENTS
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SECTION 13 – SURFACE TREATMENTS
DESIGN CRITERIA

13.01 SCOPE

.1 For the purpose of this specification the following definitions will apply:

(a) Alternative Surface Treatments refer to alternate hardscaping treatments that include, but are not limited to: concrete pavers, stamped concrete, and any other treatment deemed appropriate by the Professional of Record and approved by the City Engineer. ***(REVISED JUNE 2026)***

(b) Concrete pavers refer to concrete pre-manufactured for the purpose of hardscaping a lateral space.

(c) Stamped Concrete refers to concrete stamped once poured, to achieve a decorative appearance.

.2 All alternative surface treatments must be designed in accordance to the design criteria within this section, while also following the design criteria, specifications, and installation requirements captured throughout all sections of this manual. ***(REVISED JUNE 2026)***

.3 This manual is used in accordance with the Defined Terms in Section 2.01 []. ***(REVISED JUNE 2026)***

13.02 OBJECTIVES

.1 Alternative surface treatments are used within a street or park to add visual and artist interest to the public realm through colours, patterns, and textures. ***(REVISED JUNE 2026)***

.2 Applications include, but are not limited to:

(a) Pedestrian realm including, but not limited to, sidewalks, walkways, plazas, open spaces, and parklets.

(b) Vehicle surfaces including, but not limited to, mountable truck aprons and crosswalks.

(c) Buffers to provide visual and textural separation of travel modes.

(d) Universal and accessible design features including, but not limited to, Tactile Walking Surface Indicators (TWSIs). ***(REVISED JUNE 2026)***

.3 For any application where vehicular traffic is anticipated within road right-of-way concrete pavers are to be avoided and stamped concrete is to be used.

13.03 EDGE RESTRAINTS

.1 Edge restraints include: ***(REVISED JUNE 2026)***

(a) Concrete curbs, as per Section 8.0 – Transportation [].

(b) Concrete grade beams with a minimum width of 200 mm that conform to concrete specifications within Section 11.0 – Cast In Place Concrete Works [].

13.04 THICKNESS

.1 Concrete pavers have a minimum thickness of 60 mm, when used within the pedestrian realm absent of vehicular traffic. ***(REVISED JUNE 2026)***

.2 Stamped concrete is to meet the specified thicknesses outlined within the Section 8.0 – Transportation Standard Drawings [].

13.05 BASE AND SUB-BASE

.1 Sub-base beneath concrete pavers are crushed or pit-run aggregate compacted to a minimum thickness of 150 mm or as specified in Section 9.0 – Aggregates and Granular Materials []. ***(REVISED JUNE 2026)***

.2 Concrete paver bases are from one of the three categories: ***(REVISED JUNE 2026)***

(a) FLEXIBLE BASE - consists of compacted crushed stone, gravel, or coarse sand. Joint sand is used when laying concrete pavers on a Flexible Base. ***(REVISED JUNE 2026)***

(b) SEMI-RIGID BASE - consists of asphalt. Joint sand is used when laying concrete pavers on a Semi-Rigid Base. ***(REVISED JUNE 2026)***

(c) RIGID BASE - consists of a reinforced or unreinforced concrete slab on grade.

.3 All concrete pavers in the pedestrian realm are to be grouted in place.

13.06 PATTERNS

.1 All patterns or design features require prior approval by the City Engineer.

.2 Patterns for non-standard concrete pavers shall conform to the manufacturer's specifications.

.3 Truck aprons within the roadway are stamped concrete with a red brick pattern. ***(REVISED JUNE 2026)***

.4 Banding/buffer on either side of the cycle track is stamped concrete with transverse score lines at 0.3 m intervals. ***(REVISED JUNE 2026)***

13.07 UTILITY SURROUNDS

.1 Covers and grates are to be avoided in walking areas, but when they are necessary, they are installed flush with the surrounding surface and slip-resistant. ***(REVISED JUNE 2026)***

.2 The maximum opening on any grate or cover should be 13 mm, and if elongated, placed at right angles to the predominant direction of travel.

.3 Metal rims and covers up to 300 mm in diameter must have a minimum 150 mm thick concrete surround. ***(REVISED JUNE 2026)***

SECTION 13 – SURFACE TREATMENTS SPECIFICATIONS

13.20 SCOPE

.1 Only those products approved by the City Engineer will be accepted for installation.

.2 These specifications apply to, alternative surface treatments, in addition to the specifications as outlined within all sections of the MoESS, including:

(a) Section 4.0 – Excavation, Trenching, and Backfill [].

(b) Section 8.0 – Transportation []

(c) Section 9.0 – Aggregates and Granular Materials [].

(d) Section 11.0 – Cast In Place Concrete Works [].

(e) Section 12.0 – Asphaltic Concrete Paving [].

(f) Section 14.0 – Landscape. [].

13.21 CONCRETE PAVERS

.1 Concrete pavers refer to precast concrete units manufactured and supplied by a member of the Concrete Paver Institute. Concrete pavers must conform to the following requirements.

(a) Concrete pavers shall have an average compressive strength of 55 MPa (8000 psi), with no individual paver under 50 MPa (7250 psi) in accordance with ASTM C579 or CSA A231.1/A231.2.

(b) Concrete pavers shall have an average absorption of 5% with no paver having a greater absorption than 7% when tested in accordance with ASTM C140.

(c) Concrete pavers must be shown to be resistant to fifty (50) freeze-thaw cycles when tested in accordance with ASTM C67 or in accordance with CSA A231.1/A231.2.

13.22 BEDDING AND JOINT SANDS

.1 Sands to be used for concrete paving shall be clean, non-plastic and free from deleterious or foreign matter. Bedding and Joint Sands may be natural or manufactured from crushed rock. ***(REVISED JUNE 2026)***

.2 For Bedding Sand the material shall conform to ASTM C33 as follows:

Grading Requirements for Bedding Sand (ASTM C33)	
Sieve Size	**Percent Passing**
9.5 mm (3/8 in)	100
4.75 mm (No. 4)	95 to 100
2.36 mm (No. 8)	85 to 100
1.18 mm (No. 16)	50 to 85
0.600 mm (No. 30)	25 to 60
0.300 mm (No. 50)	10 to 30
0.150 mm (No. 100)	2 to 10

.3 For Joint Sand the material shall conform to ASTM C33 as follows:

Grading Requirements for Joint Sand (ASTM C144)	
Sieve Size	**Percent Passing**
4.75 mm (No. 4)	100
2.36 mm (No. 8)	95 to 100
1.18 mm (No. 16)	70 to 100
0.600 mm (No. 30)	40 to 75
0.300 mm (No. 50)	10 to 35
0.150 mm (No. 100)	2 to 15
0.075 mm (No. 200)	0

.4 Bedding Sand may be used as a replacement for Joint Sand, but Joint Sand shall not be used to replace Bedding Sand as a laying base.

.5 Geotextile used to prevent the migration of bedding sand shall meet the requirements as described in AASHTO M288 Class 2.

13.23 SUB-BASE

.1 Select granular Sub-base shall conform to Section 9.0 – Aggregates and Granular Materials [].

13.24 BASE MATERIALS

.1 Flexible Base:

(a) The minimum thickness of a compacted aggregate base is 100 mm. A compacted aggregate base shall have a 25 to 50 mm compacted sand setting bed placed between the base and the pavers.

.2 Semi-Rigid Base:

(a) For any paving application, semi-rigid bases consist of a minimum 100 mm thickness of asphalt base, with a 19 to 25 mm asphalt setting bed on top. Semi-Rigid bases may be installed using existing asphalt pavement at the base.

.3 Rigid Base:

(a) The setting bed shall be compacted sand approximately 13 mm thick.

(b) Rigid bases shall have a minimum thickness of 100 mm of concrete base. Rigid bases shall be used in areas of heavy traffic and where surface drainage is necessary. A rigid base shall have a 10 to 13 mm mortar setting bed to seat the concrete pavers.

SECTION 13 – SURFACE TREATMENTS
INSTALLATION

13.40 SCOPE

.1 These installation specifications apply to alternative surface treatments, in addition to the installation specifications as outlined within all sections of the MoESS.

13.41 EDGE RESTRAINTS

.1 Edge restraints shall be formed not extruded. Reinforcement shall be used as required.

.2 Edge restraints must be in place prior to laying concrete pavers.

.3 Edge restraints shall not be installed on top of bedding sand.

13.42 BEDDING SAND

.1 Bedding sand shall be spread evenly over the base course and screeded to plan thickness. Screeds shall be standard lumber, having minimum length as required by the edge restraints. Screeded sand shall not be disturbed.

.2 Depressions in the base course shall be filled with base course material and compacted.

.3 The maximum thickness of bedding sands shall not be exceeded.

13.43 CONCRETE PAVERS

.1 Concrete pavers, when used, must be laid in a smooth, uniformed manner, have a small chamfer edge 2 – 6 mm.

.2 Joints between concrete pavers shall be as per manufacturer's specifications and shall not exceed 5 mm.

.3 Gaps at the edge of the paved area shall be filled with cut or edge pavers.

.4 Pavers shall be cut using double bladed splitter or masonry saw to achieve a smooth cut. No pieces shall be smaller than 10 mm; smaller gaps shall be filled with sand. Adjust bond pattern at pavement edges such that cutting of edge pavers is minimized.

13.44 COMPACTION

.1 A low amplitude vibrator capable of 22 kN with 75-100 Hz frequency shall be used to vibrate and compact the concrete pavers into the bedding sand. Vibrators shall not be used within 1 m of an unrestrained edge of the concrete pavers.

.2 Joint sand shall be swept in between the concrete pavers during vibration.

.3 Mechanical - laying machines require prior approval of the City Engineer. ***(REVISED JUNE 2026)***

13.45 TOLERANCES

.1 Final surface elevation of concrete pavers shall be 3 to 6 mm above adjacent drainage inlets, concrete collars or channels.

.2 The final surface elevation shall not deviate more than 10 mm under a 3 m long straightedge.

.3 Ensure all joints are as flush as possible with a maximum tolerance of 6 mm, as per the latest *BC Building Access Handbook*. ***(REVISED JUNE 2026)***

13.46 MOISTURE PROTECTION

.1 Stockpiled material shall be covered with a waterproof covering to prevent exposure to rainfall.

.2 Concrete pavers shall not be installed during rainfall or over wet base and Sub-base materials.

13.47 CLEANUP

.1 At the end of each day, all work within 1 m of the laying face shall be left fully compacted and shall have sand filled joints.

.2 All excess sand shall be swept off the laid pavers.

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SECTION 14 – LANDSCAPE
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SECTION 14 – LANDSCAPE
DESIGN CRITERIA

14.01 SCOPE

.1 These landscape standards and specifications shall apply to all new parkland and trailways acquired through subdivision development as well as to all landscape areas within rights-of-way (R.O.W.) of roadways and utilities in the City of Nanaimo including: medians, soft landscape areas between the curbs and the right-of-way lines, and plantings in urban plaza and sidewalk areas. Safety for utility lines, drivers and pedestrians must be ensured when developing treed boulevards. ***(REVISED JUNE 2026)***

.2 The general design and construction of the landscape shall be in accordance with the standards set out in this section. All standards and specifications must be followed. Common Defined Terms used in the manual are in Section 2.01 []. Specific projects may warrant amendments to the standards herein but those amendments must be approved by the City Engineer. ***REVISED JUNE 2026)***

.3 During Pre-Construction Stage, the following must be completed and accepted:

(a) Submission of a landscape plan complete with restoration planting, tree locations and irrigation design by a Landscape Architect following the standards and specifications herein.

(b) Installation of landscaping may be completed with the exception of the trees once the plan is accepted and only if timing is appropriate for planting.

(c) Submission of a detailed maintenance plan which addresses maintenance requirements outlined in the Landscape Maintenance sub-section of Section 14 – Landscape.

.4 During Construction Stage the City Engineer must be notified of the following:

(a) Inspection of all pipe in ground (if required) to ensure it is exposed with bedding material prior to back fill.

(b) Inspection of the backflow prevention assembly and point of connection as per Standard Drawing I-1 if required before back fill.

(c) Inspections to ensure T-joint couplings and installed (if required) before back fill at the location where future trees will be planted.

(d) Inspection of the irrigation controller installed (if required).

(e) Completion of soil samples and testing to be done in accordance with Section 14.14 [→]. A copy of the report must be sent to the City Engineer prior to installation.

(f) Inspection of the seed, turf and plantings must be done by the City Engineer when installed by the Contractor. ***(REVISED JUNE 2026)***

.5 During Maintenance Stage, the following must be completed:

(a) Inspection of planted material immediately after planting;

(b) Follow accepted maintenance plan;

(c) Occur once per month from April to October;

(d) Watered on a regular basis during dry conditions;

(e) Weeding, invasive plant removal, pest and disease control, remedial pruning;

(f) Plant replacement as required, as per Section 14.0 - Landscape, sub-section of Landscape Maintenance.

.6 At the End of Maintenance Inspection Prior to Bond Release, the following must be completed:

(a) Final inspection of irrigation and all landscaping.

(b) Where a final inspection includes a parkland acquisition, the inspection shall ensure all requirements have been completed as per the request of the City Engineer.

(c) Testing of irrigation after installation. All lines are to be charged to ensure there are no breaks or leaks in the system.

(d) Final Record drawings must be provided to the City Engineer. Refer to Section 1.0 for the submission requirements. ***(REVISED JUNE 2026)***

(e) If not already installed, the City will install boulevard trees in planned locations when the majority of build out has occurred and maintain with irrigation, watering truck or adopt a tree program. ***(REVISED JUNE 2026)***

PLANTING

14.02 DRIVER VISIBILITY AND CLEARANCE

.1 Do not obstruct the line of vision at intersections within the triangular area bounded by the intersection of lot lines and a line joining each lot line 7 m from their intersection.

.2 The maximum mature maintained height for plant materials located within sight distance triangles at intersections shall be 300 mm above finish grade.

.3 Specify trees near approaches to left turn slots, driveways or pedestrian crosswalks which can be pruned up from the base to a minimum height of 1.5 m. Shrubs in these areas shall not exceed 300 mm in mature height.

.4 Locate trees a minimum of 1.0 m distance from the pavement or curb face, unless planted in accordance with Standard Drawing P-5 []or P-6 [].

.5 Tree branch clearances requirements are: 5 m over the travelled portion of roadway and 2.5 m over the sidewalk. ***(REVISED JUNE 2026)***

14.03 MINIMUM SETBACKS FOR TREES

.1 Setbacks for trees to objects shall be as follows:

TABLE 14-1

SETBACK TREES FROM	DISTANCE
Underground streetlight conduit or irrigation main	0.6 m
Other underground utilities	1.2 m
Lamp Standards	6.0 m
Steel and wooden utility poles	3.0 m
Driveways	2.0 m
Catch basins	2.0 m
Manholes, valves boxes, services	1.2 m
Sewer service boxes	1.5 m
Fire Hydrants	2.0 m
Street Intersection *(REVISED JUNE 2026)*	7.0 m
Curb Face	1.0 m
Sidewalk	0.85 m
Buildings – fastigiate (columnar) tree	2.0 m
Buildings – regular crown tree	3.0 - 5.0 m

14.04 MINIMUM LANDSCAPE AREA DIMENSIONS AND MAXIMUM GRADES

.1 The minimum width for grass boulevard shall be 1.0 m, 1.5 m or greater preferable. Maximum slope for lawns to be 3:1.

.2 The minimum width for shrub or ground cover beds shall be 0.6 m, 1.0 m or greater is preferred. Maximum slope for shrub or ground cover beds to be 2:1.

.3 The minimum width for a landscaped median shall be 2 m from curb face to curb face. This will allow for the minimum 1 m wide planting bed and 0.5 m wide splash aprons to be constructed in accordance with Standard Drawing No. P-4 [] and Standard Drawing No. CS-7 [].

.4 Median Islands narrower than 2 m from curb face to curb face shall be poured with a broomed or stamped finish in accordance with Standard Drawing No. CS-7 [].

.5 The minimum width of boulevards for tree planting shall be 1.85 m measured from face of curb.

14.05 PLANT MATERIAL SELECTION

.1 All plant materials shall meet the following criteria:

(a) Plants shall have the ability to withstand adverse conditions such as airborne pollutants, maximum sun exposure and reflected heat from pavements, high winds and abrasive forces, occasional snow loading and exposure to salt from roadway clearing operations, and limited root zone soil volumes. ***(REVISED JUNE 2026)***

(b) Plants shall be hardy to Zone 7 or colder.

(c) Plants shall be capable of reduced water demand following a minimum of two years establishment period.

(d) Plants shall have relatively low maintenance attributes including: fine to medium leaf size and canopy density; non-fruit bearing or having only berry-sized non-staining fruits; low susceptibility to disfiguring or fatal diseases and infestations; infrequent demands for pruning; fertilizing and other cultural requirements.

(e) Plants shall be of appropriate size and form at maturity to meet criteria in Section 14.02 – Driver Visibility and Clearance [→]. ***(REVISED JUNE 2026)***

.2 Lawns/Fine Grass, Rough Grass and Wildflowers:

(a) Sod shall be used on all lawn/fine grass areas. Seeding shall require approval of the City Engineer.

(b) Rough grass and wildflowers areas shall be seeded. Seeding method shall be noted on drawings.

(c) Areas to be seeded with grades greater than 4:1 and/or highly erodible soils shall be hydroseeded with a nurse crop seed mix, a hydraulically applied erosion control mulch, or erosion control blanket. Erosion control method to be noted on drawings.

.3 Trees shall be selected such that:

(a) Boulevard or 'street' trees shall be of at least two different genus, species and cultivar, alternately planted, within a given block. Median tree species may vary.

(b) Street trees species shall vary between intersecting streets.

.4 All streets trees shall meet the following criteria:

(a) Ability to withstand pruning for pedestrian, vehicle and/or building clearance without compromised to tree health or form.

(b) Absence of species/varietal characteristics of structural weakness, susceptibility to wind damage, or thin, easily damaged bark,

.5 Select street trees according to proposed site conditions either from: Table 14-2 or:

(a) An alternative source provided that the proposed trees meet the site criteria contained within the relevant Parts of Table 14-2 and all other criteria contained in this section.

(b) Obtain written approval from the City Engineer for tree selections not taken from Table 14-2.

TABLE 14-2

PART 1 – Trees For Directly Under Hydro Lines

Minimum allowable soil volume per tree 13.5 cu.m. with 1 m depth pit.

Selection criterion for alternative trees not listed in Part 1: Mature height not greater than 7.62 m.

SCIENTIFIC NAME	COMMON NAME
Albizia Julibrissin	Silk Tree
Acer ginnala	Amur Maple (tree form)
Acer platinoides 'Globosom'	Globe Norway Maple
Prunus yedoensis	Akebono Cherry
Cercis Canadensis 'Forest Pansy	Red Bud
Carpinus Caroliniana	Pink Perfection Cherry American Hornbeam
Cornus Eddie's White Wonder	Eddie's White Wonder Dogwood
Parrotia Persien	Persian Ironwood
Styrax Japonica	Japanese Snowbell

PART 2 – Trees for Beside Hydro Lines (Min. 2.75 m Lateral Distance from Nearest Line)

Minimum allowable soil volume per tree 13.5 cu.m. with 1 m depth pit.

Trees listed in Part 1 may also be used.

Selection criterion for alternative trees not listed in Part 2: Mature spread not greater than 5 m.

SCIENTIFIC NAME	COMMON NAME
Acer platanoides 'Columnare'	Columnar Norway Maple
Acer platanoides 'Crimson Sentry'	Crimson Sentry Norway maple
Acer rubrum 'Bowhall'	Bowhall Red Maple
Carpinus betulus 'Fastigiata'	Fastigiate Hornbeam
Ginkgo biloba 'Princeton Sentinel'	Princeton Sentinel Gingko
Fagus sylvatica 'Fastigiata' ('Dawyckii')	Fastigiate Beech
Prunus sargentii 'Columnaris'	Columnar Sargent's Cherry
Quercus robur 'Fastigiata'	Fastigiate English Oak
Tilia cordata 'Corzam'	Corinthian Linden

PART 3 -NOT USED-

PART 4 – Trees for Available Soil **Volumes of 20 cu.m. per Tree or More, 1 m pit Depth**

Trees listed in Parts 1-3 may also be used.

Selection criterion for alternative trees not listed in Part 3: Mature height no greater than 20 m.

SCIENTIFIC NAME	COMMON NAME
Acer rubrum cvs.	Red Maple cultivars
Quercus coccinea	Scarlet Oak
Quercus rubra	Red Oak
Tilia x euchlora	Crimean Linden
Robinia pseudoacacia	Black Locust
Robinia pseudoacacia cvs	Black Locust cultivars
Nyssa Sylvatica	Blackgum

PART 5 – Trees for Wide Boulevard or Wide Median Use Only

Trees listed in Parts 1-4 may also be used.

Trees in the Part require a minimum available root zone of 20 cu.m. per tree with a minimum width of 3.5 m.

SCIENTIFIC NAME	COMMON NAME
All non-dwarf coniferous spp.	
Fagus sylvatica (sp., & full size cultivars)	European beech
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera	Tulip tree
Platanus acerifolia	London Planetree
Ginkgo biloba	Ginkgo Tree
Zelkova serrata cv.	Japanese Zelkova
Quarcus robur	English Oak

14.05A RIPARIAN AND RESTORATION PLANT MATERIAL SIZE, SPACING AND LOCATION

.1 Minimum size and spacings for riparian and restoration replanting specifications for level 4, level 5 and level 6 areas shall be as follows:

VEGETATION TYPE	MINIMUM SIZE	MINIMUM SPACING
Native trees	2 gallon or 4 cm caliper	1 plant / 3 m on center
Native willows	Whips	1 plant / 1.5 m^2
Shrubs	1 gallon	1 plant / 0.75 – 0.5 m^2
Small shrubs and ground covers	1 gallon	1 plant / 0.5 m^2
Perennials	4 inch pot	1 plant / 0.5 m^2

14.06 STREET TREE SIZE, SPACING AND LOCATION

.1 Trees shall be minimum 5 cm caliper measured at 1.4 m above the rootball at the time of planting, and of uniform size if planted in a boulevard row.

.2 Minimum number of boulevard trees shall be calculated as follows:

TREE SIZE	SINGLE DWELLING RESIDENTIAL *(REVISED JUNE 2026)*
Medium Trees (± 10 – 20 mm ht.)	Greater of 1 per lot or 15 m
Small Trees (Under 10 m ht.	Greater of 1 per lot or 10 m

.3 Plantings of trees closer than 6 m on centre shall require the written approval of the City Engineer.

.4 Locate trees at least 1 m offset from the curb face.

.5 Locate trees fronting on single dwelling residential lots at the center of the lot frontage unless otherwise approved by the City Engineer. *(REVISED JUNE 2026)*

14.07 URBAN TREES IN PAVEMENT

.1 Select urban trees in pavement in accordance with Table 14-2.

.2 Select and site urban trees in pavement to eliminate long term above-ground and below-ground conflicts with utilities, buildings and structures, and pedestrian and vehicular traffic.

.3 Urban Trees in Pavement shall be referenced to City Standard Drawing P-5 [], P-6 [] or P-7 [], or when alternates are proposed, the drawings shall include project-specific tree planting details show, by plan and cross section: *(REVISED JUNE 2026)*

(a) Typical view of surrounding pavements, curbs, above and below ground utilities, light standards, and adjacent buildings and structures.

(b) Typical details of proposed rooting environment including tree pit dimensions, subgrade scarification, drainage structure if required, topsoil mix layers or 'horizons', root deflecting structure location and type if required, location and type of irrigation device and pipe, and soil surface treatment such as tree grate, porous pavement or other; and

(c) Typical above ground details such as staking, special appurtenances, pruning for headroom etc.

14.07A STRUCTURAL SOILS COMPOSITES

.1 Structural soils composites such as soil cells shall be used with the approval of the City Engineer.

IRRIGATION

14.08 GENERAL IRRIGATION DESIGN REQUIREMENTS

.1 Design irrigation in industry-standard metric units on standard metric sheets.

.2 Irrigation design requirements shall be identified by the Street Classification as per Section 8.0 – Transportation [] as summarized below: *(REVISED JUNE 2026)*

STREET TYPE *(REVISED JUNE 2026)*	IRRIGATION REQUIREMENTS
Locals	Watering truck for specified time period, followed by adopt-a-tree program, above ground donuts and bags around trees. Consider front yard trees and trees in boulevard.
Collectors Arterials	Supportive of irrigated landscaping with maintenance under property owner control. *(REVISED JUNE 2026)* Fully irrigated boulevards and/or medians attached to central control for the waterwise program.

.3 An automatic irrigation system is required where boulevard trees, shrubs and ground covers are to be irrigated.

.4 Each urban tree shall be irrigated with at least two visible 1.9 L/min (0.5 gallon per minute GPM) bubblers in accordance with the City Standard Drawing No. I10 []. *(REVISED JUNE 2026)*

.5 Irrigation systems shall be designed to supply water on a demand basis by employing a soil moisture probe to override the controller during periods of soil moisture.

.6 In grassed boulevards fronting institutional, commercial and residential uses with potential for heavy pedestrian traffic between the curb and the sidewalk, grass areas shall be irrigated. Low traffic grassed boulevards may be installed without irrigation, but manual watering for establishment and maintenance is required. The City Engineer's decision on irrigation requirements for grass areas shall be final.

14.09 IRRIGATION SERVICE CONNECTIONS

.1 Design service connections from City watermain to, and including, water meter chamber, to be in accordance with Section 5 - Water Distribution System []. ***(REVISED JUNE 2026)***

.2 Required backflow prevention in accordance with the City Standard Drawing No. I-1 [] and Section 5 – Water Distribution System, Cross Connection Control []. ***(REVISED JUNE 2026)***

.3 Measure static water pressure at or near the point of connection and include with irrigation system design.

14.10 IRRIGATION SYSTEM PARAMETERS

.1 Maximum design flow velocity to be 1.5 m/sec.

.2 Size pipes and valves for minimum friction loss.

.3 Specify all irrigation components from a coordinated manufacturer's line listed in the Approved Products List [].

.4 Design head-to-head coverage for turf and shrub areas.

.5 Design sprinkler circuits with matched precipitation heads. Do not mix heads with varied precipitation rates on the same circuit.

.6 Specify low flow heads for sloping areas.

.7 Where surface sprinklers are used, ensure unobstructed sprinkler coverage to tree bases from at least two sides.

.8 Every drip circuit shall be designed with a filter, pressure regulator, flush valve and air relief valve. The drip component manufacturer's instructions for installation and maintenance shall be included in the project specifications.

.9 Minimize overspray on paved surfaces.

SECTION 14 – LANDSCAPE SPECIFICATIONS

PLANTING

14.11 SUBSTITUTIONS

.1 Requests for substitutions in plant material species shall be submitted to the City Engineer, with proof of a plant search area that extends throughout BC wholesale nurseries, and may only be submitted after the Contract has been awarded to the successful bidder. ***(REVISED JUNE 2026)***

14.12 REFERENCE STANDARDS

.1 Unless otherwise specified, all planting, sodding, and seeding procedures to be in accordance with BCNTA/BCSLA *Landscape Standard* latest edition.

.2 Do all pruning to International Society of Arboriculture (ISA) *Best Management Practices Tree Pruning 2008*.

.3 Reference standards for landscape maintenance shall include project specifications and the most recently amended version of the following:

(a) BCNTA/BCSLA *Landscape Standard*

(b) International Society of Arboriculture Guide for Establishing Values of Trees and Other Plants, a Guide to Plant Appraisal and Best Management Practices.

(c) *Canadian Fertilizer Act*

(d) Canadian Fertilizer Quality Assurance Program

(e) Canadian Nursery and Landscape Association – Standards for Nursery Stock

(f) *Seeds Act*

(g) *Canadian Soil Conservation Act*

(h)

(h)*Bylaw No. 4695 – Nanaimo Tree Protection*

(i) *Bylaw No. 7102 – Pesticide Use*

(j) ANSIA300 Tree Care Operations – Tree, Shrub and other Woody Plant Maintenance – Standard Practices

(k) Field Guide to Noxious Weeds and other Selected Invasive Plants of British Columbia, Ministry of Agriculture and Lands.

(l) Guide to Weeds in BC and Seven Steps to Managing your Weeds, Weeds BC

(m) *Federal Pest Control Products Act*

(n) *Federal* Plant *Quarantine Act*

(o) *Federal Fisheries Act*

(p) Federal Migratory Bird Regulations

(q) *Federal Food and Drug Act*

(r) *Federal Pesticide Residue Compensation Act*

(s) *Provincial Integrated Pest Management Act*

(t) *Provincial* Plant *Protection Act*

(u) *Provincial Wildlife Act*

(v) *Federal and Provincial Weed Control Act*

(w) Handbook for Pesticide Applicators and Pesticide Dispensers, Ministry of Environment

(x) IPM Manual for Landscape Pests, Ministry of Environment

(y) Ministry of Environment, Pesticide Control Branch: 810 Blanshard Street, Victoria, BC, V8W 3E1

(z) WorkSafeBC: *Standard Practices for Pesticide Applicators*.

(aa) Ministry of Transportation and Transit: *Highway Maintenance Specifications*.

(bb) Invasive Plant Alerts, Ministry of Agriculture and Lands.

The intent of the supplemental documents is to provide additional information. Information provided in the supplemental documents does not replace or supersede the MoESS requirements.

14.13 PROTECTION

.1 Prevent damage to all existing curbs, sidewalks, pavement, utilities and structures, plants, trees etc. Refer to Section 3 – General Requirements for conditions affecting work around existing structures and utilities.

14.14 SOIL SAMPLES AND TESTING

.1 City Engineer's approval of topsoil, sub-soil and bulk organic amendments at source, or for re-use of on-site native soils, is required. A reference sample of topsoil taken from the same source pile as the analysis sample shall delivered to the City Engineer, accompanied by a memorandum of assurance from the Contractor that the soil so delivered shall be the soil used in the Contract. On-site soils used shall be tested before the landscape work is tendered to establish suitability. Copies of test results and required modification reports shall be included in the bid documents. ***(REVISED JUNE 2026)***

.2 All soils and bulk organic amendments supplied by the Contractor shall be tested by a soil testing laboratory agreed to by both the Contractor and the City Engineer, at the Contractor's expense. The Contractor shall arrange for such testing in a timely fashion to meet the requirements set out in Section 14.14.4 [→].

.3 Except where otherwise indicated in the drawings or specifications, the recommendations of the soil testing laboratory shall be the bases of requirements for soil amendments.

.4 The Contractor shall submit the soil analysis report to the City Engineer 48 hours prior to commencement of work.

.5 The submission for soil analysis shall include:

(a) Minimum 1 kg, sample of each: topsoil, native sub-soil intended for re-use, and bulk organic amendments.

(b) Project planting details and information regarding intended landscape applications for the soil.

.6 The soil analytical requirements shall include:

(a) pH
(b) lime requirement to achieve a pH of 6.5
(c) soluble salts or electrical conductivity (E.C.)
(d) % Sands + % Fines (Silt and Clay) + % Organic Matter = 100%
(e) % Total Nitrogen
(f) Available levels of phosphorus, potassium, calcium and magnesium.

.7 The laboratory analysis shall include recommendations for:

(a) Soil amendments to bring soil attributes to acceptable levels as outlined in this specification. Fertilizer applications, by category of plant type, to bring topsoil mix fertility to levels outlined in this specification.

14.15 TOPSOIL FOR GRASS AREAS

.1 Topsoil for lawn and fine grass areas shall be unamended topsoil.

.2 Topsoil for rough grass and wildflower areas shall be unamended topsoil or native subsoil.

14.16 UN-AMENDED TOPSOIL

.1 All supplied topsoil shall be fertile, friable natural loam containing minimum 4% organic matter for clay loams and 2% organic matter for sandy loams. When modified according to the recommendations of the soil testing laboratory, topsoil shall be capable of sustaining vigorous plant growth.

.2 Topsoil shall be free from any inclusions of sub-soil, lumps of clay, stones and roots over 50 mm diameter, toxic materials, crabgrass, couch grass, blackberry, morning glory, horsetail, or other noxious weeds and weed seeds.

.3 Unamended topsoil shall have a texture falling within the allowable ranges for percentage dry-weight mineral fraction:

Gravel	>2 mm & <75 mm	0-10%
Sand	>0.05 mm & <2 mm	50-70%
Silt	>0.002 mm & <0.05 mm	10-25%
Clay		0-15%

.4 Un-amended topsoil shall have the following chemical properties:

pH	5.5 - 7.0	
salinity	sat. extract conductivity	<3.0 millimhos/cm @ 25°C
boron	concentration in saturated extract	<1.0 ppm

14.17 SUB-SOIL

.1 Sub-soil shall be either:

(a) native subsoil, free of stones larger than 75 mm, and having the chemical and physical properties falling within the acceptable ranges specified in Section 14.16.3 [→] and Section 14.16.4 [→] for un-amended topsoil, or

(b) un-amended topsoil

.2 Native sub-soil not meeting the criteria specified in Section 14.17.1(a) [→] shall be removed from site and legally disposed of.

.3 Sub-soil shall be free of any toxic materials, pavements, construction debris, deleterious materials, (crabgrass, couch grass, blackberry, morning glory, horsetail, or other noxious weeds and weed seeds).

.4 On-site subsoil intended as a component of growing medium shall be protected against contamination from plants, plant parts, invasive and noxious species, insect plants, plant pathogenic organisms and other extraneous organic and non-organic materials and toxins. Refer to the following regulations:

(a) WorkSafeBC – *Occupation Health and Safety Regulations*

(b) BC Ministry of Environment Regulations

(c) *Canadian Environmental Protection Act*

(d) *Weed Control Act (Federal and Provincial)*

(e) BC Ministry of Agriculture and Lands Regulations

(f) Canadian Master Specifications, Construction Specifications Canada

(g) National Master Specifications, Construction Specifications Canada

.5 Submit sub-soil for testing as required in Section 14.14.1 [→].

14.17A GROWING MEDIUM PROPERTIES

.1 Growing medium properties are based on different levels of maintenance and irrigation in accordance to the British Columbia Landscaping Standard as follows:

(a) Properties of Growing Medium for Level 1 “Well Groomed” Area:

Level 1 areas: intensive, high standard of maintenance is anticipated after the end of the Construction Maintenance Period as specified within Section 14.87.4 [→]. Irrigation is recommended in all instances and is necessary in all areas, “on-slab” or under cover. The textural classification for these growing media by the Canadian System of Soil Classification is “Sand” to “Loamy Sand”. Plant selection, irrigation requirements and maintenance intensity should consistently respond to the exceptional nature of the growing medium.

Growing Medium Types:	*1L*	*1H*	*1P*
Applications:	Low traffic Lawn Areas Trees and Large Shrubs	High Traffic Lawn Areas	Planting Areas
Texture:	Percentage of Dry Weight of Total Growing Medium		
Coarse Gravel Larger than 19 mm Smaller than 40 mm	0 - 1%	0 - 1%	0 - 1%
All Gravel Larger than 2 mm Smaller than 40 mm	0 - 5%	0 - 5%	0 - 5%
Sand: Larger than 0.05 mm Smaller than 2 mm	50 - 70%	80 - 90%	50 - 70%
	Percentage of Dry Weight of Total Growing Medium Excluding Gravel		
Silt: Larger than 0.002 mm Smaller than 0.05 mm	10 - 25%	5 - 15%	10 - 25%
Clay: Smaller than 0.002 mm	0 - 20%	0 - 5%	0 - 20%
Clay and Silt Combined	Maximum 25%	Maximum 15%	Maximum 25%
Organic Content	3 - 10%	3 - 5%	10 - 20%
Acidity (pH)	6.0 - 7.0	6.0 - 7.0	5.5 - 6.5
Drainage	Percolation shall be such that no standing water is visible 60 minutes after at least 10 minutes of moderate to heavy rain or irrigation.		

(b) Properties of Growing Medium for Level 2 “Groomed and Level 3 “Moderate” Areas:

Level 2 and 3 areas: routine, high to moderate standard of maintenance is anticipated after the end of the Construction Maintenance Period as specified within Section 14.87.4 [→]. Automatic irrigation is recommended; however, such areas can be adequately irrigated through consistent use of manual irrigation equipment. The textural classification for these growing media by the Canadian System of Soil Classification is “Loamy Sand” to “Sandy Loam”. These growing media accommodate a wide selection of plants; they create a balance between good drainage and water retention and are suited to moderate, normal maintenance practices. “On-slab” areas should be treated as Level 1 areas, with corresponding increase in sand content and decrease in silts and clays.

Growing Medium Types:	**1L**	**1H**	**1P**
Applications:	Low traffic Lawn Areas Trees and Large Shrubs	High Traffic Lawn Areas	Planting Areas
Texture:	Percentage of Dry Weight of Total Growing Medium		
Coarse Gravel Larger than 19 mm Smaller than 40 mm	0 - 1%	0 - 1%	0 - 1%
All Gravel Larger than 2 mm Smaller than 40 mm	0 - 5%	0 - 5%	0 - 5%
	Percentage of Dry Weight of Total Growing Medium Excluding Gravel		
Sand: Larger than 0.05 mm Smaller than 2 mm	50 - 80%	70 - 90%	40 - 80%
Silt: Larger than 0.002 mm Smaller than 0.05 mm	10 - 25%	0 - 15%	10 - 25%
Clay: Smaller than 0.002 mm	0 - 25%	0 - 15%	0 - 25%
Clay and Silt Combined	Maximum 35%	Maximum 15%	Maximum 35%
Organic Content	3 - 10%	3 - 5%	10 - 20%
Acidity (pH)	6.0 - 7.0	6.0 - 7.0	4.5 - 6.5
Drainage	Percolation shall be such that no standing water is visible 60 minutes after at least 10 minutes of moderate to heavy rain or irrigation.		

(c) Properties of Growing Medium for Level 4 “Open Space/Play”, Level 5 Background and Natural Area”, and Level 6 “Service & Industrial” Areas:

Level 4, 5, and 6 areas: high standard of maintenance is neither anticipated nor required after the Construction Maintenance Period as specified within Section 14.87.4 [→]. Irrigation may be provided, but more frequently only temporary watering is done for establishment maintenance. The textural classification for this growing medium by the Canadian System of Soil Classification is “Sandy Loam” to “Loam”. These soils provide a quality growing medium, albeit with reduced percolation and resistance to compaction. These may be imported soils; however, existing soils may meet these requirements or it may be possible to amend them to meet the requirements. Plant selections must respond to the limitations of the growing medium and to modest maintenance expectations. If soil must be imported to augment existing topsoil (due to insufficient volumes on-site or damage to on-site topsoil by constructive activities), the imported growing medium should be similar to the on-site soil and should be mixed with it. Different soil types should not be layered. Where the growing medium has reduced percolation characteristics additional drainage measures may be required. ***(REVISED JUNE 2026)***

Growing Medium Types:	*3L*	*3H*
Applications:	All Lawn Areas, Trees & Large Shrubs	Planting Areas
Texture:	Percentage of Dry Weight of Total Growing Medium	
Coarse Gravel Larger than 19 mm Smaller than 40 mm	0 - 3%	0 - 3%
All Gravel Larger than 2 mm Smaller than 40 mm	0 - 10%	0 - 10%
	Percentage of Dry Weight of Total Growing Medium Excluding Gravel	
Sand: Larger than 0.05 mm Smaller than 2 mm	30 - 70%	30 - 70%
Silt: Larger than 0.002 mm Smaller than 0.05 mm	15 - 50%	15 - 50%
Clay: Smaller than 0.002 mm	15 - 30%	15 - 30%
Clay and Silt Combined	Maximum 60%	Maximum 60%
Organic Content	2 - 10%	5 - 20%
Acidity (pH)	6.0 - 7.0	4.5 - 7.0

14.18 'A HORIZON' SOIL MIX

.1 'A horizon' soil mix shall be topsoil amended as recommended by the soil testing lab to have the following properties, in addition to the physical and chemical properties of un-amended topsoil:

(a) Dry weight not to exceed 1350 kg/cu.m.

(b) Saturated weight not to exceed 1600 kg/cu.m.

(c) Total nitrogen to be between 0.2% & 0.6% by weight.

(d) Available phosphorus to be 20-250 ppm.

(e) Available potassium to be 50-1000 ppm.

(f) Percentage by dry weight of organic matter to be:

(i) 3-5 % for high traffic lawn areas

(ii) 3-10 % for low traffic lawn areas, trees and large shrubs

(iii) 10-20 % for planting areas

(iv) 5-20 % for natural areas

(g) Carbon to Nitrogen Ratio shall not exceed 40:1.

(h) Fertility (nitrogen, phosphorus and potassium) and pH may be modified either during mixing and screening, or after growing medium is placed.

(i) Salinity – the saturation extract conductivity shall not exceed 3.0 milliohms/cm at 25°C (77°F). If higher, it shall be leached with fresh water through irrigation or precipitation prior to planting.

(j) Boron – the concentration in the extract shall not exceed 1.0 ppm.

(k) Sodium – the sodium adsorption ratio (SAR) as calculated by analysis of the saturation extract shall not exceed 8.0.

.2 Stripping of topsoil shall commence only after the area has been cleared of all scrub, plant material, invasive and noxious plants and their reproductive parts, grass, stumps, rocks 100 mm (4 in) or greater, and other extraneous organic and non-organic materials and contaminants.

.3 Where testing shows topsoil suitable for use in its present condition or as a component of a growing medium, it shall be stockpiled where shown on the drawings or in areas designated for stockpiling as approved by the City Engineer and it must be protected from adverse weather conditions as well as other contaminants.

.4 Onsite topsoil used as a growing medium shall have an acidity range of pH 6.0-7.5 and shall contain a dry weight percentage of organic matter as referred to in Section 14.18.1(f) [→].

.5 Onsite topsoil shall have a salt conductivity of less than 3.0 milliohms/cm at 25°C (77°F). If higher, it shall be leached with clean water through irrigation or precipitation prior to planting.

.6 Death of plants during the first year that can be attributed to plant pathogenic organisms or toxic materials in the growing medium may be an indication that the growing medium did not meet this standard at the time of installation and may result in a requirement that the Contractor remove and replace affected plants and faulty growing medium at no additional cost to the Owner. ***(REVISED JUNE 2026)***

.7 Excessive weed and invasive plant growth in a growing medium during the first year may be an indication that unacceptable levels of invasive plant seeds or parts were present in the growing medium at the time of installation. Such a determination may result in a requirement that the Contractor remove all weeds and invasive plant roots and reduce the growth to acceptable levels at no additional cost to the Owner.

14.19 PEAT MOSS

.1 Soil Amendments shall be virtually free from sub-soil, sawdust, commercial wood products, stones, lumps, plants or their roots, building materials, invasive of noxious plants and their reproductive parts, non composted wood, wood waste, insect pests, plant pathogenic organisms, chemical pollutants or substances at levels toxic to plants, and other extraneous materials that detract from the desirable physical and chemical properties required for landscaping purposes.

.2 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 a pH value of not less than 3.5 and not greater than 6.5. It shall be brown in colour and medium to coarse shredded, particles 10 mm size or less.

(a) Salinity: the saturation extract conductivity <2.0 millimhos/cm @ 25°C.

(b) Nitrogen content shall be >0.8% based on dry weight.

14.20 MANURE

.1 Manure shall be well-rotted farm animal manure or mushroom manure, such that liquids have been eliminated, and the material is crumbly, free from weed seeds, rocks, sticks, and other deleterious material and contain not more than 40% by volume of sawdust, straw, or shavings.

(a) Manure shall be free of harmful chemicals, and shall have salt content that gives an electrical conductivity reading of between .5 and .6 mmhos/cm. ***(REVISED JUNE 2026)***

(b) Manure shall contain not less than 1.0% nitrogen based on dry weight.

(c) All particles in manure shall pass a 6.35 mm standard sieve.

(d) Manure shall be virtually free from weed and invasive plants and their seeds and reproductive parts, coliform, pathogens, rocks, sticks and rubble.

14.21 COMPOSTED LEAF OR WOOD WASTES

.1 Submit samples of composted wood waste or leaf mould for chemical analysis to soil testing lab for consideration for use as an organic amendment in the 'A horizon' topsoil mix.

.2 The total carbon to total nitrogen ratio in the composted leaf or wood waste shall not exceed 40:1.

.3 Uncomposted wood wastes or leaves shall not be present in the topsoil mix.

.4 Composted leaf of wood wastes must be virtually free from all viable weed and invasive plants and their seeds or other plant reproductive parts, coliform, pathogens and chemical or organic contaminates that may be detrimental to plant or animal health.

.5 Composted leaf or wood wastes must contain less than 0.5% by volume of contaminants such as rocks, plastic, metal or glass.

.6 Refer to Section 14.29 [→] for mulch specifications. ***(REVISED JUNE 2026)***

14.22 FERTILIZERS

.1 Fertilizers shall meet the requirements of the *Canada Fertilizer Act.*

.2 Types, formulations and rates of application of fertilizers and liming agents shall be as recommended by a laboratory soil specialist and based on test results of the growing medium.

.3 Fertilizers shall be in granular, pellet or prill and must be dry and free slowing and have a guaranteed N-P-K analysis and be in manufacturer's original packaging, stored in waterproof containers clearly marked with the name of the manufacturer, weight and analysis.

.4 Fertilizers shall be spread evenly over the placed growing medium with an appropriate mechanical spreader and incorporated into the grow medium.

.5 There should be a minimum of at least three (3) weeks separation between the application of lime and fertilizers.

.6 Lime may be added to the growing medium at the time of screening or cultivated into the top 100 mm (4 in) of growing medium after it is in place.

14.23 -NOT USED-

14.24 LIME

.1 Lime shall be applied as per soil analysis recommendations.

.2 Growing medium shall require not more than 0.5 kg/m^2 (0.10 lb/ft^2) of dolomite lime to reach the required pH level.

14.25 WATER

.1 Water for landscape installation shall be free from organic or chemical contaminants detrimental to healthy plant growth.

14.26 TREE, PLANT MATERIALS, RIPARIAN AND RESTORATION

.1 All plant materials shall meet or exceed the standards identified on the landscape construction drawings with respect to size, grading and quality.

.2 All riparian and restoration plant materials shall meet or exceed the minimum size and spacing design criteria as per Section 14.05 [→].

.3 Plants shall be characteristic of the genus, species and cultivar as indicated on the construction drawings and specified herein.

.4 All plants shall be nursery grown under similar climatic conditions to the project site. Plants shall not be pruned prior to delivery unless pre-approved by the City Engineer. Container stock shall have been established in the size of container specified for at least six (6) months prior to delivery. The roots shall not have grown beyond the limits of the container. ***(REVISED JUNE 2026)***

.5 It is the Contractor's responsibility to verify and comply with all regulations regarding the inter-regional movement of plant material, including nursery stock, within the Province of British Columbia. Imported plant materials must be accompanied by copies of the necessary permits and import licences required by Federal and Provincial regulations.

.6 Plants shall be properly proportioned; not weak, thin or elongated.

.7 Plants shall have normal, well-developed branches and vigorous, fibrous root systems. They shall be healthy and free from defects, decay, girdling roots, sunscald injuries, abrasions of the bark, and plant diseases, insect pests eggs, borers and all forms of infestation.

.8 Trees shall have straight stems unless uncharacteristic for the species/cultivar. Pruning wounds shall show healthy callous growth at the branch collar without bark tearing or fungal growth. Cambium tissue shall be moist and exhibit the correct colouration for the species. Plants exhibiting fungal staining shall be rejected.

.9 All plant materials shall conform to the measurements specified in the drawings except that plants larger than specified may be used if approved by the City Engineer. The use of such plants shall not increase the contract price. If larger plants are used, the ball of earth shall be increased in proportion to the size of the plant. All plants shall be measured when the branches are in their normal position. Height and spread dimensions specified, refer to the main body of the plant and not from branch tip to root base or from branch tip to branch tip. Where trees are measured by caliper (cal.), reference is made to the diameter of the trunk measured 300 mm above ground as the tree stands in the nursery. ***(REVISED JUNE 2026)***

.10 Native plants shall be propagated in nurseries and not harvested from wild sites, except where salvaged from an area where the native vegetation will be destroyed and authorization for harvest has been obtained. All collected native plants shall be held and maintained in a nursery until new roots have formed through the burlap or other suitable packing material, or in the case of containerized plants, until such time that the roots grow to fill and hold the soil within the container.

.11 Collected plants shall not be used without prior approval by the City Engineer. ***(REVISED JUNE 2026)***

.12 Balled and burlapped conifers and trees in excess of 3 m height must have been dug with a sufficiently large firm rootball to contain 75% of the fibrous and feeder root system. Rootballs shall be free of invasive weeds.

.13 All nursery grown plant materials shall conform to the most current versions of the Canadian Nursery Landscape Association/Canadian Standards for Nursery Stock and the BCNTA Standard for Container Grown Plants.

.14 A comprehensive pest management system should be developed to protect plants and trees which may have been weakened or stressed and made susceptible to disease and insect pressure due to disturbance during transportation, storage and planting.

.15 Rootballs and soil in containers shall be free of invasive and noxious plants.

14.27 SOD

.1 The quality and source of nursery sod shall comply with standards outlined in 'British Columbia Standard for Turfgrass Sod' published by Canadian Nursery Trades Association, and the B.C. Society of Landscape Architects, latest edition. Quality Grade shall be No. 2 Standard unless shown otherwise on the drawings. The turfgrass sod shall be grown from a seed mixture containing Kentucky Bluegrass (Poa pratense) or Turf-type perennial Ryegrass (Lolium perenne) and not less than 40% by weight of Creeping Red Fescue (Festuca rubra). At time of site delivery, the sod shall contain no more than 2% of other strains or species of grass or clovers, and no visible broadleaf weeds, and shall be of sufficient density that no surface soil is visible when mowed to a height of 38 mm.

.2 The source of the sod shall be pre-approved by the City Engineer. Source substitutions shall not be made without the written approval of the City Engineer.

14.28 GRASS AND WILDFLOWER SEED MIXTURES

.1 Grass seed mixture quality and source to comply with standards for lawns and grass outlined in the BCNTA/BCSLA *Landscape Standard* latest edition. Seed mixture are to be suited to the climate, terrain, establishment and maintenance conditions under which they are to grow. All seed mixtures are to meet the requirements of:

(a) *Seeds Act*

(b) *The Provincial Weed Control Act*

.2 Fine grass seed mixture quality grade shall be Certified Canada No. 1, or as specified No. 2 Standard. Seed mixture shall contain the following: Perennial Turf Type Ryegrass (Lolium perenne) and/or Kentucky Bluegrass (Poa pratense), and not less than 40% by weight of Creeping Red Fescue (Festuca rubra) and/or Chewings Fescue (Festuba rubra commutata).

.3 Rough grass seed mix shall contain the following: less than 10% by weight Kentucky Blue (Poa pratense) grass and/or Turf-type perennial Ryegrass (Lolium perenne), and not less than 50% by weight of Creeping Red Fescue (Festuca rubra) and/or Chewings Fescue (Festuca rubra commutata). ***(REVISED JUNE 2026)***

.4 The wildflower seed mix shall be such that it meets the requirements of the *Seeds Act* and be free of any invasive plant species or potentially invasive species.

.5 Nurse crop – Annual Rye grass (Lolium multiflorum).

.6 The following invasive species must be removed from all sites: ***(REVISED JUNE 2026)***

Invasive Species	
Common Name	Latin Name
Bamboo	Bambusa sp.
Burdock Species	Arctium lappa, A. minus
Butterfly bush	Buddleja davidii
Carpet Burweed	Soliva sessilis
Common Tansy	Tanacetum vulgare
Daphne/Spurge-Laurel	Daphne laureola
Dead-nettle Lamium	Lamiastrum gleubdolon
English Hawthorne	Crataegus monogyna
English Holly	Ilex aquafolium
English Ivy	Hedera helix
Eurasian Water-milfoil	Myriophyllum spicatum
Evergreen Blackberry	Rubus laciniatus
Garden/Yellow Loosestrife	Lysimachia vulgaris
Giant Hogweed	Heracleum mantegazzianum
Hairy Cat's Ear	Hypochaeris radicata
Himalayan Blackberry	Rubus armeniacus (discolour
Lamium	Aegopodium podagraria
Morning Glory	Convolvulus arvensis

Quick Links: Section 14.0 Drawings [] TOC [↑]

Invasive Species	
Common Name	Latin Name
Orchard grass	Dactylis glomerata
Periwinkle Species	Vinca major, Vinca minor
Policemen's Helmet/Himalayan Balsam	Impatiens glandulifera
Purple Loosestrife	Lythrum salicaria
Scotch Broom	Cytisus scoparius
St. John's Wort	Hypercium perforatum
Tansy	Tanacetum vulgare

.7 The following noxious species must be removed from all sites: ***(REVISED JUNE 2026)***

Noxious Species	
Common Name	Latin Name
Annual Sowthistle	Sonchus oleraceus
Bohemian Knotweed	Fallopia x bohemica
Bur Chervil	Anthriscus caucalis
Canada Thistle	Cirsium arvense
Common Crupina	Crupina vulgaris
Common Reed	Phragmites australis subsp. australis
Crupina	Crupina vularis
Dalmation Toadflax	Linaria dalmatica
Dense-flowered Cordgrass	Spartina densiflora
Diffuse Knapweed	Centaurea diffusa
Dodder	Cuscuta spp.
English Cordgrass	Spartina anglica
Flowering Rush	Butomus umbellatus
Garlic Mustard	Alliaria petiolata
Giant Hogweed	Heracleum mantegazzianum
Giant Knotweed	Fallopia sachalinensis
Giant Mannagrass / Reed Sweetgrass	Glyceria maxima
Giant Reed	Arundo donax
Gorse	Ulex europaeus
Himilayan Knotweed	Polygonum polystachyum
Hound's-tongue	Cynoglossum officinale
Japanese Knotweed	Fallopia japonica
Jimsonweed/Devil's Apple	Datura stramonium
Jointed Goatgrass	Aegilops cylindrica
Kudzu	Pueraria Montana
Leafy Spurge	Euphorbia esula
Milk Thistle	Silybum marianum

Noxious Species	
Common Name	Latin Name
North Africa Grass	Ventenata dubia
Orange Hawkweed	Hieracium aurantiacum
Perennial Sowthistle	Sonchus arvensis
Poison Hemlock	Conium Maculatum
Purple Loosestrife	Lythrum salicaria
Purple Nutsedge	Cyperus rotundus
Rush Skeletonweed	Chondrilla juncea
Russian Knapweed	Acroptilon repens
Saltmeadow Cordgrass	Spartina patens
Saltwater Cordgrass	Spartina patens
Scentless Chamomile	Matricaria maritima
Smooth Cordgrass	Spartina alterniflora
Spotted Knapweed	Centaurea maculosa
Tansy Ragwort	Senecio jacobaea
Velvetleaf	Abutilon theophrasti
Wild Chervil	Anthriscus sylvestris
Wild Oats	Avena fatua
Yellow Flag Iris	Iris pseudacorus
Yellow Nutsedge	Cyperus esculentus
Yellow Starthistle	Centaurea solstitialis
Yellow Toadflax	Linaria vulgaris

14.29 MULCH

.1 Bark mulch shall be 50 mm and minus Douglas Fir/Hemlock bark chips, dark brown in colour and shall be virtually free of invasive and noxious seeds and reproductive parts, soil, stones, salts or other harmful chemicals, or other extraneous matter that would prohibit seed germination or the healthy development of plant material.

.2 Other mulch materials shall only be used when indicated in the drawings.

.3 Do not store bark mulch on paved sidewalks.

.4 Mulch is not intended to replace vegetation as a sole ground cover, nor is it to be used as a growing medium in landscape applications.

14.30 PLANTING ACCESSORIES

.1 The following products shall only be installed when indicated in the construction drawings.

(a) TREE STAKES – shall be nominal 50 mm by 50 mm wood or 75 mm round pressure-treated wood, or equivalent to be pre-approved by the City Engineer.

(b) TENSIONING DEVICE – 19 mm wide flat woven polypropylene or nylon webbing.

(c) ROOT DEFLECTING BARRIER – 61 cm by 61 cm copolymer polypropylene of 2.16 mm thickness, 50% post consumer recycled plastic, with 12.7 mm raised moulded root directing ribs c/w anti lift tabs.

(d) TREE GRATES – must be cast iron, aluminum or bronze and the safety standards of the castings are to meet the requirements as per ASTM A48. Tree grates shall be square or round in shape. Tree grates must be installed in a proper perimeter frame with non-tamper attachments and must allow for incremental enlargement to accommodate the tree growth and to protect the tree from injury. Patterns can vary to pertain to the project or neighbourhood aesthetics; however, the opening dimensions of the decorative designs shall be less than 12 mm in width or diameter.

14.31 REPLACEMENTS

.1 All plant materials damaged or found not in a healthy satisfactory growing condition during the maintenance and guarantee period, or which, in any other way, do not meet the requirements of the specifications, shall be replaced at the Contractor's expense.

.2 All required plant material replacements shall be by identical species/cultivar and size to the original, as indicated in the drawings.

.3 Where identical replacements are not available, submit a written proposal to the City Engineer. Gain approval from the City Engineer prior to installation of the replacement plan materials.

.4 Replacement shall be made at the next appropriate season to a maximum of four (4) months from identification of the requirement for plant replacement.

.5 Replacement plants shall be maintained and guaranteed by the Contractor to the completion of the next full growing season, or the completion of the original maintenance and guarantee period, whichever is later.

14.31A STRUCTURAL SOILS COMPOSITES

.1 Structural soils shall be used with the approval of the City Engineer.

.2 Structural soils composites shall be composed of growing medium and clear crush granular components in accordance with the following recommended base ratio of materials. Ensure sufficient moisture (25% to 75% of field capacity) to provide a homogeneous mixture with consistent properties throughout the composite soil. Peat moss shall not be used in the preparation of structural soil.

.3 Soil Component Proportion By Weight:

Growing Medium	15% to 20% Dry Weight
Clear Crush	25 mm to 75 mm Clear Crush 80% to 85% Dry Weight
Hydrogel/Stabilizer*	0.01% to 0.02%

*Hydrogel/Stabilizer is applied as a soil tackifier to ensure even distribution and blending of the component materials. Refer to manufacturer specifications for appropriate mixing proportions.

.4 Growing medium properties for use as a component in structural soils shall conform to MoESS Section 14.18 'A Horizon' Soil Mix [→].

.5 Clear crush gravel properties for use as a component in structural soils shall conform to Section 9 – Aggregates and Granular Material [] specifications. Gravel gradation shall consist of 25 mm to 75 mm clear crush washed rock free of any foreign elements or materials. ***(REVISED JUNE 2026)***

IRRIGATION

14.32 SCOPE

.1 Irrigation work required includes supply of all materials, labor and equipment to install a complete and operational irrigation system as specified herein and as shown on the construction drawings including:

(a) Excavation, piping, valves, heads, , controller, and complete installation, testing maintenance, adjustment and guarantee of the system. ***(REVISED JUNE 2026)***

(b) Water supply connection and backflow prevention assembly including supply, excavation, installation, and testing in accordance to the *National Plumbing Code of Canada*. ***(REVISED JUNE 2026)***

(c) Backflow prevention assembly installation and testing in accordance to CSA B64.10 and CSA B64.10.1.

(d) 110 VAC and low voltage electrical wiring including supply, excavation and installation.

(e) Restoration of all existing landscape areas to condition prior to commencement of work on site, to the satisfaction of the City Engineer. ***(REVISED JUNE 2026)***

(f) Inspection must be completed by the City Engineer during and after installation, and before the bond is released.

.2 Only those products approved by the City Engineer and listed on the City of Nanaimo Approved Product List [] will be accepted for installation.

14.33 PERMITS AND FEES

.1 Obtain all permits and pay required fees to any governmental agency having jurisdiction over the work. Inspections required by local ordinances during the course of construction shall be arranged as required. On completion of the work, satisfactory evidence shall be furnished to the City Engineer to show that all work has been installed in accordance with the ordinances and code requirements, including certificates from the Electrical Inspector.

14.34 STANDARDS

.1 Work shall be in accordance with mechanical (plumbing) and electrical standards, codes and regulations including the following:

(a) The National Building Code of Canada and its supplements.

(b) Current C.S.A. and A.S.T.M. Specifications for assemblies, pipes and fittings, including:

(i)	Copper pipe:	ASTM B42
(ii)	PVC water pipe:	CSA B137.3 or ASTM D2241.
(iii)	PVC fittings:	ASTM D2466 or ASTM D2467

(iv) PVC solvent cement: ASTM D2564
(v) Backflow Prevention Assemblies: CSA B64.10 & B64.10.1.

(c) The *National Plumbing Code of Canada*. ***(REVISED JUNE 2026)***

.2 Irrigation installers shall have the following qualifications:
(a) Irrigation Technicians Level 2 Certification,
(b) Low Voltage Electrical Certification and
(c) Active BCWWA Cross Connection Control Tester Certification.

.3 All irrigation systems shall plan for future expansion. Sufficient wires, as requested by the City Engineer, shall be supplied at the time of installation from the controller to end of system where the potential for future expansion may exist.

14.35 ACCEPTABLE PRODUCTS

.1 Acceptable products shall be in new condition with the size, manufacturer and features shown in the design.

.2 If irrigation systems with products other than shown in the design are proposed, the Contractor shall undertake the following prior to commencing construction:
(a) Produce complete shop drawings showing the type and location of all heads and nozzle numbers, pipe location and sizes, and all part model numbers and specifications;
(b) Submit hydraulic calculation work sheets for the re-designed system to demonstrate that all parameters have been calculated;
(c) Submit the shop drawings in triplicate and gain the written approval of the Professional of Record. ***(REVISED JUNE 2026)***
(d) Drip line tubing will not be accepted. ***(REVISED JUNE 2026)***

14.36 IRRIGATION PLASTIC PIPING

.1 Plastic pipe shall be semi-rigid, extruded from PVC resin type 1 grade 2 normal impact in accordance with applicable codes and standards.

.2 All polyvinyl chloride (PVC) plastic pipe and fittings must be marked as to size and class and their pressure and strength rating must exceed that of one and one half times the working pressure of the system.

.3 All PVC pipe shall be schedule 40 PVC.

.4 Flow volumes and velocities shall always be considered to minimize head loss.

.5 Flow velocities shall not be permitted to exceed 1.52 m per second.

.6 Specified pipes shall be rated at 1.5 times maximum operating pressure.

14.37 IRRIGATION PLASTIC FITTINGS

.1 All plastic fittings shall be a minimum of schedule 40 PVC molded fittings.

14.38 SWING JOINT ASSEMBLIES

.1 Triple joint assemblies for all sprinklers shall consist of:
(a) 3 schedule 40 PVC street elbows (MIPT x FIPT)
(b) 1 schedule 80 PVC threaded nipple, length to suit (MIPT x MIPT)
(c) 1 schedule 40 PVC threaded tee (slip x slip x FIPT)

.2 Triple swing joint assemblies for quick coupler valves shall consist of:
(a) 1 schedule 40 PVC threaded tee
(b) 2 brass threaded nipples, length to suit (MIPT x MIPT)
(c) 2 brass threaded elbows (FIPT x FIPT)
(d) 1 brass threaded street elbow (MIPT x FIPT)
(e) 1 brass threaded riser, 100 mm (4 in) length, (MIPT x MIPT)

14.39 IRRIGATION METAL PIPE & FITTINGS

.1 All metal pipe shall be copper except in quick couple swing joint assemblies. All metal fittings shall be copper or brass, as shown in the Standard Drawings. ***(REVISED JUNE 2026)***

14.40 SOLVENT CEMENT

.1 Solvent cement and primer shall be a type recommended for the PVC pipe class, schedule, and maximum size.

.2 The Contractor shall ensure that the shelf life of the cement, as labeled by the manufacturer on the container, has not been exceeded.

14.41 SPRINKLER HEAD RISERS

.1 Where risers are not of the pop-up type, sprinkler head risers shall be schedule 80 PVC pipe. Pipe shall be cut in a standard pipe cutting tool with sharp cutters. Ream only to full diameter of pipe and clean all rough edges or burrs. Cut all threads accurately with sharp dies. Not more than three (3) full threads shall show beyond fittings when pipe is made up. Use Teflon tape on all PVC threaded connections.

14.42 IRRIGATION BEDDING MATERIAL

.1 Bedding within the pipe zone shall be in accordance with Section 4.17 – Bedding Within Pipe Zone, except that bedding material shall be well graded sand, with a minimum of 75 mm on all sides of the irrigation pipe.

14.43 SPRINKLER HEADS

.1 Sprinkler heads shall be as shown on irrigation construction plans. See legend and notes for correct model numbers and operating pressures.

.2 Sprinklers shall perform to manufacturer's specifications including diameter of throw and gallonage at specified pressures.

14.44 IRRIGATION VALVES

.1 Valves are to be as shown on irrigation construction plans and shall have the same size isolation gate valve. See legend and notes for correct model numbers.

14.45 IRRIGATION WATER SERVICE CONNECTIONS

.1 All materials for water service connection including saddle, pipe, valves, water meter and chamber to be in accordance with Section 5 - Water Distribution System [].

14.46 IRRIGATION CASING SLEEVES

.1 Irrigation casing sleeves under sidewalks, driveways and roadway paving and/or through walls, shall be installed prior to the construction of the paved surfaces and/or walls. Sleeves to be SDR 35 PVC pipe, size as indicated on the drawings, with ends capped and staked until such time as irrigation pipe is installed. ***(REVISED JUNE 2026)***

.2 The Contractor shall be responsible for locating all sleeves.

.3 Irrigation sleeving to be between 300 mm – 450 mm below finished grade.

14.47 CONTROLLERS

.1 Controller model numbers shall be as noted on the irrigation construction plans.

.2 Automatic controllers shall provide all necessary features for programming as is shown on the irrigation design plan. Controllers shall be encased in a sturdy metal, lockable, weatherproof mounting box and must be easily accessible for maintenance. All electrical controllers shall be CSA approved or be of a type approved by local electrical authorities.

.3 Refer to the City of Nanaimo Approved Product List [] for the controllers that are acceptable for installation.

14.48 MOUNTING LOCATION

.1 Controller mounting shall be as noted on the irrigation construction plan.

14.49 VALVE BOXES

.1 All in-line valves shall be grouped wherever possible and installed in plastic irrigation boxes with a solid lid marked “irrigation”. Plastic shall have a minimum tensile strength of 45 kPa as measured according to ASTM D 638 and shall be unaffected by moisture, light, corrosion and extreme temperatures. The valve box shall be sized to accommodate the number of valves grouped in the manifold with allowance for room to service the valves, minimum 75 mm clearance. The valve boxes are to be bolted. Quantity as required; see irrigation construction plan.

14.50 BACKFLOW PREVENTION ASSEMBLY

.1 A Backflow prevention assembly shall be supplied and installed where noted on the irrigation construction drawing. Such devices shall meet or exceed all local ordinances and requirements governing such a cross connection.

.2 A backflow prevention assembly shall be successfully tested in accordance with CSA B64.10.1 after:

(a) installation,
(b) backflow incident,
(c) alteration of the irrigation system,
(d) cleaned, repaired or overhauled,
(e) relocated,
(f) annually, or
(g) as required by the City Engineer.

.3 Testing and certification shall be by a certified BCWWA backflow assembly tester with an active certificate.

.4 Reports on all testing, maintenance and repairs shall be documented on the specified forms and tags by the backflow assembly tester. Tags shall be affixed to the assembly and form submitted to the City Engineer.

.5 Refer to the City of Nanaimo Approved Product List [] for the backflow prevention assemblies that are acceptable for installation.

14.51 24 VOLT CONTROL WIRING

.1 24-volt electric control lines from controller to automatic valves shall be CSA approved direct burial minimum (#14 AWG TWU-40) wire of a different colour than the 110-volt power to controllers.

.2 Splicing shall be made with waterproof wiring kits.

(a) All wiring to be installed and tested in accordance to the most current B.C. Electrical Code.

(b) All wiring shall be protected by being bundled and taped at 3 m intervals and installed beneath the irrigation line.

(c) All wire splices must be contained in a valve box.

(d) Sufficient extra wire shall be left in each valve box such that the splice may be lifted above grade. Wires shall be neatly coiled.

(e) White wire is only be used as the common wire and all other colours used shall be consistent from valve to controller.

14.52 POWER WIRING

.1 All 110-volt AC wiring shall be installed in accordance Section 10 Roadway Lighting and Traffic Signals [].

14.53 GATE VALVES

.1 Gate valves 50 mm or larger shall be in accordance with Section 5.24 –Watermain Valves []. Gate valves smaller than 50 mm in size shall be brass conforming to ASTM B62. ***(REVISED JUNE 2026)***

.2 Gate valves or approved quarter turn ball valves shall also be used in any case where a manual drain valve is required.

14.54 QUICK COUPLING VALVES

.1 Quick coupling valves, keys and valve boxes shall be as noted in the irrigation construction drawings.

.2 Internal parts to be removable and with adjustable flow control.

PLANTING

14.55 SCHEDULING AND CO-ORDINATION

.1 Topsoil shall not be handled in a wet or frozen condition or in any manner in which the soil structure is adversely affected.

.2 Plant trees, shrubs, and ground covers only during periods that are normal for such work as determined by local weather conditions, and when seasonal conditions are conductive to successful adaptation of plants to their new location.

14.56 SHIPPING, STORAGE AND ON-SITE HANDLING OF PLANT MATERIALS

.1 Co-ordinate shipping of plants and pre-planting preparation to minimize the time lapse between shipping and planting to ensure a maximum of (36) hours storage of plant material on-site.

.2 Cover any plants not in a state of dormancy to prevent desiccation during transit.

.3 During loading, transportation, off-loading, and planting, protect all trees against damage to stems and branches. Protect bark against chafing from chains, cables, equipment, or other trees by a wrapping of cardboard or burlap. Separate entangled tree branches without damage to branches.

.4 Plants with broken or abraded trunks or major branches will not be accepted. Prune damaged twigs to ISA pruning guidelines using secateurs.

.5 Unload and check all plants immediately upon arrival and water if necessary. Condition of plants should be documented by the Contractor.

.6 Immediately cover and protect bare root stock from damage to roots by frost, sun, and wind.

.7 Handle material supplied in pots and containers by the container only to reduce breakage of branches and leaves.

.8 Handle balled and burlapped plant materials with caution to maintain the firmness of the balls. No plants shall be used when the ball of earth surrounding the roots has been cracked or broken preparatory to or during the process of planting, or when the burlap, staves, and ropes required in connection with their transplanting have been removed.

.9 Do not lift trees supplied in wire baskets by the trunk.

.10 Keep plants in a moist condition at all times. Protect all plants against damage and/or drying out until they are planted on the site.

.11 During the growing season, store all plants in containers, balled & burlapped or wire basket in an upright position if not planted immediately and take care to provide enough space between plants such that light reaches all portions of the plant in order to avoid burning when planted out.

.12 Protect rootballs of balled and burlapped material by heeling in with material suitable to protect them from drying out (i.e., sawdust, peat moss, topsoil). Do not store containerized or balled & burlapped plants intended to be planted in the open in a building or in an area of low light intensity for a period exceeding 7 days. Keep all plants well-watered and protected from heat and frost.

.13 Plants shall be acclimatized or “hardened off” against the environmental conditions of their final planting location and shall not be taken directly from shade houses or greenhouses and planted in drastically different environment. Preparation for the new environment should include an appropriate period of storage in an intermediate environment, managing fertilizer applications to avoid excessively lush growth and provision of a graduated watering regime.

14.57 PRE-PLANTING INSPECTIONS

.1 Give 72 hours' notice to the City Engineer for an inspection of plant material at a single plant material assembly point. The City Engineer must give approval of plant material in advance of commencement of planting work.

.2 Acceptance of plant material by the City Engineer at its assembly point does not prevent rejection on-site prior to or after planting operation if, in the opinion of the City Engineer, the plant material has been damaged by the act or omission of the Contractor.

.3 Give 24 hours' prior notice to the City Engineer for each following required inspection:

(a) Prior to commencement of landscape work, give notice to the City Engineer and make the project landscape supervisor available for an on-site inspection of marked locations for planting and as-built conditions and site work by others. The City Engineer may alter the locations of plant materials in the field.

(b) After excavation of plant locations, but prior to placement of sub-soil and installation of plant material, give notice to the City Engineer for inspection of the subgrades.

.4 The City Engineer, at his discretion, may waive one or more of the pre-planting inspections, but this shall not impair the right to reject work or materials which have been damaged or in any way do not conform to the specifications.

14.58 EXCAVATION

.1 The location of all planting pits shall be staked by the Contractor and approved by the City Engineer prior to excavation.

.2 Tree pits, plantation beds and turf areas shall be tested for drainage by the following means: Dig a 250 mm deep by 250 mm wide hole at bottom of pit. Fill with water and allow to drain. Refill hole with water and time rate of fall of water. A rate of fall less than 25 mm (1 in) per hour indicates inadequate drainage for plant survival and shall be reported to the Qualified Registered Professional, prior to planting. No claim for poor drainage will be accepted after planted has taken place. ***(REVISED JUNE 2026)***

.3 Tree planting pits shall be excavated to the dimensions indicated in the drawings. Pit sides wherever possible shall be dug with sloping sides at a preferred angle of 45°, scarified to remove glazing and provide a roughened soil interface. A minimum of 300 mm depth scarified layer of native soil shall be created in the bottom of the tree pit by such means that the layer remains uncompacted prior to the subgrade inspection by the Qualified Registered Professional. Remove all stones larger than 75 mm. ***(REVISED JUNE 2026)***

.4 Stockpile excavated soil near tree pit for use, if deemed suitable by testing of the soil testing laboratory.

.5 Shrub beds shall be excavated to allow for a total of:

(a) 300 mm layer of un-amended topsoil

(b) 150 mm layer of 'A horizon' soil mix or as listed within Section 14.58.8 [→], whichever is the greater depth.

(c) 50 mm layer of bark mulch.

.6 Areas of ground covers shall be excavated to allow for a total of:

(a) 150 mm layer of un-amended topsoil.

(b) 150 mm layer of 'A horizon' soil mix or as listed within Section 14.58.8 [→], whichever is the greater depth.

(c) 50 mm layer of bark mulch.

.7 A minimum 150 mm depth scarified layer of native soil shall be created in the bottoms of shrub or groundcover planting pits by such means that the layer remains uncompacted prior to the subgrade inspection by the City Engineer.

.8 Minimum depths of growing medium shall be in accordance to the British Columbia Landscaping Standards as followed:

	A	B	C
Application	Over prepared subgrade which retains some existing topsoil (which retains the 'A horizon')*	Over prepared subgrade where the subsoil drains rapidly	Over structures or where the subsoil drains poorly
Low Traffic Lawn Areas:			
Irrigated	100 mm (4 in)	150 mm (6 in)	150 mm (6 in)
Not Irrigated	100 mm (4 in)	150 mm (6 in)	230 mm (9 in)
High Traffic Lawn Areas	100 mm (4 in)	150 mm (6 in)	
Planting Areas and Planters:			
Ground cover areas	150 mm (6 in)	300 mm (12 in)	230 mm (9 in)
Shall shrubs	300 mm (12 in)	450 mm (18 in)	300-500 mm (12-20 in)
Large shrubs	450 mm (18 in)	600 mm (24 in)	500-900 mm (20-36 in)
Tree Planting Areas:			
At each tree		1000 mm (40 in) deep for as large an area as 500-900 mm (20-36 in) possible around each tree. Recommended area 10 m^2 (108 ft^2) or greater. The soil volume should reflect the severity of compaction and grading at the planting site.	
*The combined depth of the existing topsoil and the new growing medium shall meet the minimum depth requirements shown in column B and C.			

14.59 TREE PLANTING

.1 The Contract shall examine the subgrade before planting, and shall report any conditions of defects on-site which may adversely affect the performance of this section of the work to the Professional of Record prior to placing topsoil mix.
(REVISED JUNE 2026)

.2 Root deflecting barrier shall only be installed when and as indicated on the construction drawings.

Quick Links: Section 14.0 Drawings [] TOC [↑]

.3 Soils to be placed in dry weather over relatively dry, approved, free-draining subgrade.

.4 Roughen bottom and sloping side surfaces of tree pit to remove glazing and provide a roughened soil interface prior to placement of tree and subsoil. Adjust elevation under where tree is to be placed so that the nursery soil line on the tree trunk will be 50 mm above finish grade to allow for settlement.

.5 Remove the wire basket before placement in planting pit. With the tree in the planting pit untie and remove burlap and cord from top 1/3 portion of a balled & burlapped rootball. Completely remove, with care, imperishable containers from container-grown or bag –grown trees.

.6 Prior to backfilling, the Contractor shall inspect the root system. Trees with the following defects shall be replaced at the Contractor's expense:

(a) Lack of root ball integrity,

(b) Broken or abraded structural or main roots,

(c) Presence of fungal mass or fruiting bodies and root discolouration,

(d) Poor root development with few fibrous roots, or

(e) Any other evidence of pathogenic or accidental injury.

.7 Unwrap and spread out encircling roots and tease out roots growing at the outside of the rootball.

.8 The tree shall be installed plumb and face to provide the best appearance toward the primary viewing location, as determined by the City Engineer.

.9 Place 2/3 depth of the sub-soil and water to remove air voids.

.10 If indicated in the construction drawings, and prior to completion of backfilling, place tree stakes, avoiding penetration of the root system. Stakes shall be driven plumb and to a sufficient depth in the subgrade that the portion exposed above finish grade equals 1 m height.

.11 Place remaining 1/3 of sub-soil lightly boot tamping to remove air voids. Roughen surface prior to placement of 'A horizon' soil mix.

.12 Place 150 mm depth unamended topsoil then thoroughly till in all amendments specified in the soil analysis report to form the 'A horizon'. The Contractor shall not machine cultivate the soil above the root zone of the tree.

.13 Ensure soil level does not exceed original nursery soil line. Form earth saucer to retain water over rootball and water in the tree.

.14 Secure tree to stakes with counter-tensioned, non-twisted loops of 19 mm polypropylene webbing stapled to the stakes, if required.

.15 Unless otherwise indicated in the construction drawings, place 75 mm bark mulch over soil surface.

.16 Tree grate installation shall be as per the manufacturer's specifications. Refer to Standard Drawing P-6.

14.60 RIPARIAN AND RESTORATION PLANTING

.1 Shrub beds shall be a total of:

(a) 300 mm layer of un-amended topsoil as specified in Section 14.16 [→]

(b) 150 mm layer of 'A horizon' soil mix as specified in Section 14.18 [→] or as listed within Section 14.58.8 [→], whichever is the greater depth.

(c) 50 mm layer of bark mulch.

.2 Areas of ground covers shall be a total of:

(a) 150 mm layer of un-amended topsoil as specified in Section 14.16 [→]

(b) 150 mm layer of 'A horizon' soil mix as specified in Section 14.18 [→] or as listed within Section 14.58.8 [→], whichever is the greater depth.

(c) 50 mm layer of bark mulch.

.3 Compact unamended topsoil in shrub and groundcover beds to no greater than 80% of corrected maximum dry density. Roughen surface prior to placement or 'A horizon' soil mix.

.4 For the 'A horizon' mix, place an additional 150 mm lift of unamended topsoil over soil depths indicated in Section 14.60.1 or .2 [→], then thoroughly till in all amendments specified in the soil analysis report. Lime, if required, may be added to the topsoil mix at the time of topsoil spreading. All other required fertilizers shall be added to the topsoil mix after it is in place. There should be at least one week between the time of applications of lime and other types of fertilizer. Fertilizer shall be spread with a suitable mechanical spreader and be fully incorporated into the topsoil mix to a minimum depth of 150 mm.

.5 Excavate individual pits in the placed topsoil mix for shrubs, to the same depth, and 1.5 times the width, of the container. Place shrubs to show the best side towards the primary viewpoint. Water shrubs in the pits prior to backfilling with the planting medium.

.6 Rake shrub and ground cover beds to a smooth surface prior to placement of 50 mm depth bark mulch layer.

.7 Plant ground covers through bark mulch layer into the 'A horizon' layer below. The Contractor shall not plant ground covers into the mulch layer without full root burial in the soil.

.8 Rake mulch layer to a smooth finish grade and water bed.

14.61 PRUNING

.1 Trees which, at the time of planting, require the removal of damaged or diseased branches larger than 12 mm diameter, that have broken leaders, or that have a damaged trunk, will be rejected by the City Engineer.

.2 Pruning shall be limited to the minimum necessary to remove dead or damaged secondary branches or twigs, or to provide safe headroom adjacent to streets and sidewalks. Pruning shall be done in such a manner as to preserve the natural character of the plant.

.3 For pruning cuts 12 mm diameter and smaller use clean sharp secateurs. The cut shall be perpendicular to the branch angle and located at the outside edge of the branch collar only, leaving no stub or bark tears.

.4 Pruning cuts larger than 12 mm shall be undertaken according to the current ISA Pruning Guidelines by a qualified person. The 3-cut method shall be employed using a clean sharp pruning saw.

14.62 CUTTING, SHIPPING, AND ON-SITE HANDLING OF SOD

.1 Sod shall be in pieces approximately 0.84 sq. m. in area with the soil portion having a minimum depth of 19 mm.

.2 Co-ordinate shipping of sod to minimize the time lapse between shipping and laying. Co-ordinate with soil placement accordingly.

.3 During transportation protect sod against drying.

.4 Sod shall be installed 24 hours after delivery and within 36 hours of harvesting. Keep sod moist and cool if in the event of any delay in laying. The supplier shall provide, upon request, a label or statement certifying the quality grade, location of sod source and species of grass in the sod and that the sod meets the specifications for the stated grade.

.5 During dry weather, water sod as necessary to ensure its vitality and prevent soil and root loss during handling.

.6 During wet weather allow sod to dry sufficiently to prevent tearing during lifted and handling.

.7 Roll or fold all sod prior to handling to avoid tearing or breakage.

.8 Sod shall have a fibrous root system strong enough that a standard sized section can support its own weight without damage or tearing when suspended vertically by holding up the upper two corners.

.9 Turfgrass sod shall not be harvested or transplanted when excessive moisture or dryness will result in damage to, or failure of the sod.

.10 The height of the grass in the sod at the time of harvesting shall be between 40 mm (1.15 in) and 60 mm (2.5 in), except where otherwise specified.

.11 Turfgrass sod shall be reasonable free from thatch. Up to 13 mm (0.5 in) of thatch (uncompressed) is acceptable. Commercial grade is exempt.

.12 Turfgrass sod shall be free from visible diseases, detrimental fungi and damaging nematodes and soil-born insects, to the extent that with proper installation methods and initial maintenance, new turf will not deteriorate due to such causes.

.13 All turfgrass sod shall be absolutely free from plants designated as noxious weeds, as per Section 14.28.7 [→]. Nursery turfgrass sod shall be free of broadleaf weeds, invasive species and undesirable grasses to the extent required for each quality grade. Field turfgrass sod shall not contain more than ten (10) weeds per 10 m^2 (100 ft^2).

.14 Sod shall not be dropped or dumped from vehicles.

.15 Sodded areas shall be protected with warning signs during rooting and the initial maintenance period.

14.63 SOD SCHEDULING AND WORKMANSHIP

.1 Keep site well drained.

.2 Do not lay sod during freezing temperatures or when the ground is frozen.

.3 Sod placed between May 15 and September 15 shall require installation of any automatic irrigation system.

.4 Clean up immediately soil or debris spilled onto pavement and dispose of deleterious materials.

14.64 LAYING OF SOD

.1 Excavate and/or fill and prepare subgrade to a sufficient depth below finish grade to accommodate 150 mm minimum topsoil plus the thickness of the sod. ***(REVISED JUNE 2026)***

.2 Scarify top 75 mm surface of subgrade to produce an even loose-textured surface free of stones larger than 75 mm. Remove and dispose of all roots and branches, and all plant parts of blackberry, horsetail, morning glory, Canada thistle or other noxious weeds. Remove and dispose of all paving materials, tar, building materials or other deleterious substances.

.3 The Contractor shall inform the City Engineer of any existing subgrade conditions which will adversely affect the work in this section. ***(REVISED JUNE 2026)***

.4 The finished subgrade shall be approved by the City Engineer prior to placement of topsoil. ***(REVISED JUNE 2026)***

.5 Topsoil shall not be placed when in a wet or frozen condition.

.6 Spread topsoil evenly over the approved subgrade to a minimum depth of 150 mm and compacted to maximum 85% modified dry density. ***(REVISED JUNE 2026)***

.7 Where the soil analysis indicates the addition of granulated lime it shall be incorporated into the soil at the depth and rate specified by the soil testing laboratory at least 3 weeks prior to the application of the fertilizer.

.8 A turf starter fertilizer, as specified by the soil testing laboratory, shall be incorporated into the soil, at the depth and rate specified, a minimum of 48 hours prior to the laying of sod.

.9 Immediately prior to sod placement, the finished topsoil grade shall be smooth, firm against footprints, with a fine loose-texture.

.10 Lay sod in rows, perpendicular to slope, smooth and even with adjacent areas and surfaces, and with joints staggered. Butt sections closely without overlapping or leaving open joints between pieces.

.11 Water immediately after sod laying to obtain moisture penetration through sod into top 100 mm (4 in) of topsoil mix.

.12 When sod and soil have dried sufficiently, to prevent damage, provide close contact between sod and soil by means of a 150 kg roller. Heavy rolling to correct irregularities in grade is not acceptable.

.13 Provide adequate marking of sodded areas with warning signs, to be removed by the Contractor when sodding work has given a Notice of Acceptance.

14.65 SODDING INSPECTIONS

.1 Give 24 hours prior notice to the City Engineer for each following required inspection:

(a) After excavation and preparation of the subgrade, but prior to placement of topsoil, give notice to the City Engineer for inspection of the subgrades.

(b) Notify the City Engineer when the sod is established for an inspection for acceptance.

14.66 SHIPPING, AND ON-SITE HANDLING OF SEED

.1 Deliver and store grass seed in original container showing:

(a) Analysis of seed mixture and % of pure seed.

(b) Year of production and date and location when tagged.

(c) Net Mass.

(d) Percentage germination.

(e) Name and address of distributor.

.2 All seeds to be stored in dry, weatherproof storage places and are to be protected from damage by heat, moisture, rodents or other causes until time of seeding.

14.67 SEEDING SCHEDULE AND WORKMANSHIP

.1 Seed grass and/or wildflower mix during early spring or after the 15th of August to within two weeks of freeze-up.

.2 Keep site well drained.

.3 Perform work under optimum field conditions. Do not undertake seeding operation under adverse conditions including moisture, temperature, wind or scheduling related work.

.4 Clean up immediately soil or debris spilled onto pavement and dispose of deleterious materials.

14.68 SEEDING

.1 Apply seed by Mechanical Dry Seeding method or Hydraulic Seeding method unless otherwise specified. Hand seeding shall only be carried out when site conditions preclude the above methods and must be approved by the City Engineer.

.2 Base application rates of fertilizers, seed mix, mulch and tackifier on analysis of season, climate, terrain, soil, and establishment and maintenance conditions affecting project.

14.69 MECHANICAL DRY SEEDING

.1 Excavate or fill and grade smooth subgrade to within 150 mm of finish grade in areas to be seeded with fine grass. Removed all deleterious and refuse materials. Place 150 mm depth topsoil and fine grade removing humps and hollows. Rough grass/wildflower areas shall be seeded on the native sub-soil graded for drainage, and free of surface rocks and all deleterious materials.

.2 Obtain Qualified Registered Professional's approval of topsoil grade and depth before starting seeding. ***(REVISED JUNE 2026)***

.3 Sow during calm weather (winds less than 6 mph) using equipment suitable for the area involved to the approval of the City Engineer. Sow half of the required seed in one direction and the remainder at right angles. Incorporate the seed into the soil a minimum depth of 6 mm simultaneously or within one half hour after seeding operation. Mix carefully with light chain harrow or wire rake and roll area immediately afterward with water ballast type lawn or agricultural type roller.

.4 Water with fine spray, avoiding washing out seed. Apply enough water to ensure penetration to a minimum of 50 mm (2 in).

.5 Re-seed at 2 week intervals where germination has failed.

14.70 HYDROSEEDING

.1 Do not hydroseed fine grass areas without pre-approval from the City Engineer.

.2 Thoroughly mix seed, fertilizer and hydraulic mulch in water slurry and distribute normally over surface area with approved hydraulic mulcher.

.3 Measure quantities of each material to be charged into hydraulic seeder/mulch tank accurately either by mass or by common accepted system of mass-calibrated volume measurements. Add materials to tank while it is being filled with water and in following sequence: seed, fertilizer, and where applicable, mulch. Thoroughly mix materials into homogeneous water slurry and distribute uniformly over surface area with hydraulic seeder/mulcher.

.4 Keep seeds for legumes in separate containers prior to seeding. If required, add legume seeds with standard product humus culture before mixing with grass/wildflower seed. Protect inoculated seed from exposure to sunlight for periods of over one-half hour. Use seed within eight hours from inoculation or to be re-inoculated.

.5 After charging, do not add water or other materials to mixture in hydraulic mulcher.

.6 Do not leave seed, fertilizer, mulch and water slurry in tank for more than 4 hours. Slurry left in tank over maximum time to not be used for seeding, dispose off-site.

14.71 HYDROSEEDING WITH MULCH

.1 Prepare area to be seeded. Seed wildflower/grasses and 25% of fibre mulch on the first pass, then seed the balance of mulch on the second pass.

14.72 EROSION CONTROL BLANKET

.1 Prepare area and seed.

.2 Apply blanket over designated areas in accordance with manufacturer's instructions.

.3 Anchor blanket in accordance with manufacturer's recommendations which are to be used as minimum standard to ensure that blanket is held down to maintain firm contact.

14.72A STRUCTURAL SOILS COMPOSITES

.1 Structural soils shall be used with the approval of the City Engineer.

SECTION 14 – LANDSCAPE INSTALLATION

IRRIGATION

14.73 EXISTING CONDITIONS

.1 Ensure that existing site features and improvement areas are disturbed as little as possible. Protect existing vegetation throughout installation and do not damage root systems. Return all areas to prior conditions immediately after irrigation installation and testing.

.2 Prior to excavation, the Contractor shall satisfy himself as to the finished grade elevations and density of compaction in existing lawn and planting areas, to ensure restoration of disturbed areas to grades and compaction matching existing.

.3 Existing sod removed to accommodate irrigation installation shall be preserved in a healthy condition and replace subsequent to installation and backfilling, or replaced with new sod.

.4 Notify City Engineer if trenching is required through paved areas. The Contractor shall saw-cut and remove paving to the width of the trench. Removal and replacement of paving to match existing shall be the responsibility of the Contractor. ***(REVISED JUNE 2026)***

.5 Where trenching for piping or wiring is required through paved roadway areas, provide 150 mm ID SDR 35 sleeve with minimum 600 mm depth cover. Extend sleeve minimum 300 mm into soft landscape areas.

14.74 DELIVERY AND STORAGE

.1 Shipping and handling and installation of materials shall be to manufacturer's recommended instructions, and best workmanship. 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.

14.75 WORKMANSHIP

.1 Lay out work as accurately as possible to the construction drawings. Install swing joints, offsets and all fittings to bring the pipe and heads to the locations shown.

.2 If shop drawings or field adjustments to the design are made, the Contractor shall be responsible for full and complete irrigation distribution, and coverage of all irrigated areas and to add any changes made to the as-built drawings.

14.76 EXCAVATION AND TRENCHING

.1 All trenching and backfilling to be in accordance with Section 4 – Trench Excavation, Trenching, and Backfill [], and in addition:

(a) Excavated materials shall be carefully place adjacent to the trench in separate piles to avoid contamination of topsoil and excavated materials.

(b) Perform all excavations as required for the installation of the work included under this section, including shoring or earth banks to prevent cave-ins. Restore all surfaces, existing underground installations, etc., damaged or cut as a result of the excavations to their original condition and in a manner approved by the City Engineer.

(c) Excavations through existing landscape areas shall be carried out such that adjacent areas are not contaminated with excavated materials. Backfilling and replacement of topsoil shall be performed in accordance with the specifications such that all existing planting areas are restored to their original condition.

(d) Trenches shall be made wide enough to allow a minimum of 50 mm between parallel pipelines. Trenches for pipelines shall be made of sufficient depths to provide the minimum cover from finish grade as follows:

(i) 45 mm minimum cover over main lines

(ii) 300 mm minimum cover over lateral lines to heads

(iii) 100 mm minimum over drip lines

.2 Maintain all warning signs, barricades and other safety devices in accordance with the Section 3 – General Requirements [].

14.77 WATER AND ELECTRICAL SERVICE CONNECTION

.1 Water Service Connection shall be in accordance with Section 5 – Water Distribution System [], and as shown on the construction drawings.

.2 Contractor shall have a qualified Electrician connect the controllers to the electrical supply.

14.78 PIPELINE ASSEMBLY AND INSTALLATION

.1 Do not drag pipe along ground whether single lengths or assembled sections. Damaged pipe shall be rejected and replaced by new pipe and couplings. ***(REVISED JUNE 2026)***

.2 Keep pipes clean at all times, blow out with compressed air or water on completion of assembly.

.3 Plastic pipe shall be laid on sand to a compacted depth of 75 mm. A further 75 mm depth of sand shall be placed over plastic pipe prior to backfilling.

.4 Plastic pipe and fittings shall be solvent welded using solvents and methods as recommended by manufacturer of the pipe, except where threaded connections are required. Pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture before applying solvent with a non-synthetic bristle brush. All PVC pipe shall be installed in accordance to Section 5.0 – Water Distribution System [].

.5 Pipe may be assembled and welded on the surface. Snake pipe slightly from side to side to allow for expansion and contraction. ***(REVISED JUNE 2026)***

.6 No irrigation line shall be installed so that it runs parallel and directly over another such line or utility.

.7 Leave minimum clearance 50 mm between irrigation lines laid in a common trench.

.8 Make all connections between plastic pipe and metal valves with threaded fittings using plastic male adapters.

(a) Screw fittings shall be carefully tightened with strap wrenches or by other means that do not mark the plastic pipe or plastic fittings.

(b) Pipe wrenches shall not be used on plastic fittings, unless the fittings are a type designed for use with a pipe wrench. Use teflon tape on all threaded fittings.

14.79 VALVES AND CONTROL WIRING

.1 Install valve boxes such that top of structure is at finished grade, accessible for maintenance, in accordance with Section 5 – Water Distribution System [].

.2 24-volt wiring of valves to controller shall be undertaken by a certified low energy systems tradesman.

.3 All 24-volt wiring shall be a different colour than the 110-volt power to controller and shall be buried a minimum of 300 mm as per the amended B.C. Electrical Code.

.4 Coil additional 600 mm length of each electrical wire within valve box as extra material.

.5 Splicing shall be minimized. Splices are to be made waterproof with the use of - waterproof wiring kits and installed in a valve box as per Standard Drawing No. I-1. ***(REVISED JUNE 2026)***

14.80 SPRINKLER HEADS

.1 Install all sprinklers according to manufacturer's specifications.

14.81 CLOSING OF PIPE AND FLUSHING LINES

.1 Cap or plug all openings as soon as lines have been installed to prevent the entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.

.2 Thoroughly flush out all water lines before installing heads, valves and other hydrants.

.3 Test in accordance with Section 14.83 – Backfill and Compacting [→].

.4 Upon completion of the testing, the Contractor shall complete assembly and adjust sprinkler heads for proper distribution.

14.82 HYDROSTATIC TESTS

.1 Request the presence of the City Engineer at least 48 hours in advance of testing.

.2 Testing to be accomplished at the expense of the Contractor and in the presence of the City Engineer.

.3 Center load piping with small amount of backfill to prevent arching or slipping under pressure.

.4 After welded plastic joints have cured at least 24 hours, fill test section with water and expel all air and cap risers for an additional 24 hours prior to testing. Contractor shall pre-test the circuits, and contact the City Engineer for a supervised test once the circuits to be demonstrated meet the test requirements. Contractor shall supply and temporarily install, until tests are approved, a pressure gauge and hose bib to each main and circuit to be tested. Tests to be conducted at 1.5 times the maximum operating pressure (continuous and static water pressure) in the presence of the City Engineer as follows: ***(REVISED JUNE 2026)***

(a) Main lines and sub-mains to be tested for 1 hour.

(b) Lateral lines to be tested for 15 minutes.

(c) Pressure loss on the pressure gauge shall not exceed 10% of the test pressure in the time period of the test.

.5 Repair leaks resulting from tests by cutting out and replacing pipe or fittings. Leaks shall not be repaired by patching. Maintain test pressure for a minimum of one hour after replacement of defective parts and re-inspect as per Section 14.83 – Backfill and Compacting, clause 14.83.4 [→].

.6 After approval by the City Engineer, backfill excavations, maintaining pressure in the lines. If there is any indication of a leak, the defective section shall be located and replaced. Flush out the system to remove dirt and then attach the sprinklers using a thread seal tape (PTFE tape).

14.83 BACKFILL COMPACTING

.1 After system is operating and required tests and inspection have been made, backfill excavations and trenches.

.2 All sprinkler head excavations shall be backfilled with sand or topsoil up to within 50 mm of finish grade.

.3 Trenches to be backfilled in accordance with Section 4 – Trench Excavation, Bedding, and Backfill [].

.4 Ensure that existing lawn and planting areas are disturbed as little as possible.

.5 Dress off all areas to finish grades.

14.84 CLEAN-UP

.1 Remove from the site all debris and surplus material resulting from work of this section.

14.85 BALANCING AND ADJUSTMENTS

.1 Balance and adjust all components of the system to achieve the most efficient system operation. Balancing and adjustment to include synchronization of controllers and soil moisture sensors, adjustments to pressure regulators, pressure relief valves, sprinkler heads and individual station adjustments on controllers.

.2 Lawn sprinkler heads shall be set flush with the final turf grade by shortening or lengthening the riser as required. During the maintenance period, return and adjust the heads as required to be flush with the final turf grade.

14.86 DRIP COMPONENTS

.1 Install according to the City specifications. ***(REVISED JUNE 2026)***

.2 Keep pipe ends and components absolutely clean during installation.

.3 Check and clean filter one week after system start-up. Check and clean filter monthly thereafter during the operating season of the maintenance period.

.4 Only acceptable drip systems must be built using Schedule 40 PVC and 1.9 L/min (0.5 gallon per minute GPM) bubblers. Any poly tube drip systems will not be accepted. ***(REVISED JUNE 2026)***

LANDSCAPE MAINTENANCE

14.87 SCOPE

.1 The area of maintenance operations will be all constructed or altered landscape areas in this Contract.

.2 Landscape maintenance operations shall meet the “Moderate” Maintenance Level in accordance with the BCNTA/BCSLA *Landscape Standard* latest edition , unless otherwise specified herein or subject to a separate agreement. ***(REVISED JUNE 2026)***

Moderate Maintenance Level Definition (from BCNTA/BCSLA *Landscape Standard*) ***(REVISED JUNE 2026)***	
Objectives	Main objective is a generally neat, moderately groomed appearance, with some tolerance for the effects of “wear and tear,” moderate traffic and natural processes.
Appearance Standard	Plants and lawns are healthy, lawns kept within accepted height range for type; invasive plants, with the exception of listed noxious weeks and debris are acceptable within limits between regular visits. Invasive and noxious weeds shall be eradicated. Seasonal plantings in good condition and attractive at appropriate seasons.
Typical Locations	• Most residential, commercial and institutional sites, especially those of medium to large size • Publicly visible portions of industrial sites • Areas for occasional recreational use • Areas viewed from a medium distance
Plant *Characteristics*	Areas may include some native or naturalized planting; this may be modified for appearance or moderately intensive use.
Traffic Activity Levels	Moderate traffic tolerated; minor deterioration due to traffic is acceptable. Maintenance may include adjustments in response to such “wear and tear”.
Maintenance Practices	Routine maintenance of moderate frequency and intensity, with regular monitoring to avoid serious deterioration.

.3 Litter control and garbage pick-up, other than construction clean-up during and after work performed in this Contract, will be supplied by others, or will be subject to a separate agreement.

.4 The maintenance period shall be from the time of planting until the end of the specified maintenance period (minimum two years) from the date of Notice of Acceptance of the landscape works or at the discretion of the City Engineer, or will be subject to a separate agreement.

.5 Maintenance operations for trees, shrubs and ground covers shall occur once per month from April to October, throughout the specified maintenance period and shall include:

(a) Watering, weeding, pest and disease control, remedial pruning;
(b) Plant replacements as required;
(c) Supplemental fertilization as specified by the soil testing laboratory;
(d) Spring and fall clean-up;
(e) Planting beds shall be maintained to be weed-free.

.6 Maintenance operations for sodded and seeded lawn/fine grass areas shall include: watering, mowing, weeding, topdressing and reseeding as required to meet conditions set out in 14.99, throughout the maintenance and guarantee period.

.7 Maintenance operations for rough grass, nurse crop, and wildflower areas shall include: mowing, weeding, topdressing and reseeding as required to meet conditions set out in 14.100 and 14.101, throughout the maintenance and guarantee period.

.8 Maintenance operations for irrigation system shall include: monitoring and adjustment of system, repair as necessary, and winterization and spring startup of the system.

.9 Maintenance operations should, where possible, follow ecologically sound practices such as:

(a) Integrated Pest Management (IPM)
(b) Plant Health Care (PHC)
(c) Composting
(d) Application of Organic Mulches

14.88 REFERENCE STANDARDS

.1 Refer to Section 14.12 [→] for reference standards for landscape maintenance.

14.89 QUALIFICATIONS AND WORKMANSHIP

.1 A qualified professional, for this Section, refers to any individual who is trained as and is certified and recognized, such as:

(a) Diploma in Horticulture
(b) Landscape Horticultural Journeyperson with a Certificate of Qualification by the Industry Training Authority of BC

(c) ISA Certified Arborist

.2 All landscape maintenance personnel shall be skilled in the tasks assigned to them.

.3 Supervisors for landscape crews shall be qualified professionals.

.4 Pesticide handling and application can only be done by those holding current certification within the comprehensive pest management system. ***(REVISED JUNE 2026)***

14.90 PROTECTION

.1 All existing and new plants, site services, curbs, paving, structures, finishes and all other features shall be protected against damage during the work, refer to Section 3.0 [] of these specifications.

.2 Appropriate measures shall be taken to ensure that no spillage of fuels, fertilizers, toxic construction materials, or other toxic wastes occur, and where use of such materials is necessary, to ensure that adequate containment facilities and clean-up equipment are utilized.

.3 No toxic or waste materials, fuels and fertilizers shall be stored adjacent to or dumped into water courses or any other water body either on or off the job site, or in a location where spillage could result in seepage into a watercourse.

.4 All toxic wastes and other material shall be disposed of in a manner acceptable to the Owner and in accordance with municipal, provincial and federal regulations.

.5 Appropriate measures shall be taken to ensure that wildlife protection is achieved in accordance with municipal, provincial and federal regulations.

14.91 HANDLING AND STORAGE OF CHEMICALS

.1 Chemicals used during the course of maintenance procedures shall be limited to those that are registered and meet all federal, provincial and regional/municipal regulations and bylaws.

.2 Application, disposal and handling of all chemicals including, but not limited to, herbicides, pesticides, fungicides, and insecticides shall comply to all applicable legislation and regulations, including, but not limited to, the most recent version of the federal *Pest Control Products Act*, *Fisheries Act* and *Food and Drugs Act*; and the provincial Integrated *Pest Management Act*, *Wildlife Act*, *Weed Control Act*, *Plant Protection Act* and *Waste Management Act*, the City's *Pesticide Use Bylaw 7102* as well as any municipal or regional district legislation. ***(REVISED JUNE 2026)***

14.92 VANDALISM

.1 The Contractor shall be responsible for all loss and damage whatsoever which may occur on or to the works, completed or otherwise, until such time as the entire works have been completed and the Notice of Acceptance has been issued.

14.93 END OF MAINTENANCE PERIOD

.1 Notify the City Engineer, 30 days in advance of the end of the maintenance period.

14.94 PRODUCTS AND MATERIALS

.1 Products and materials used in landscape maintenance operations shall meet the requirements of the specifications and referenced standards.

14.95 EQUIPMENT

.1 The Contractor shall supply all equipment, materials, and all other supplies necessary to maintain the Contract landscape area.

.2 Equipment shall be suited to the work at hand, and shall be in good condition. Mowers shall have clean, sharp blades. Safety devices shall be in place and functioning to WorkSafeBC requirements. ***(REVISED JUNE 2026)***

.3 Pruning equipment shall be kept sharp and sterile to prevent the spread of plant diseases.

.4 Equipment shall be such that the risk of spillage, inadvertent spraying or misdirection of oil, gasoline, fertilizer or other chemicals is minimized. ***(REVISED JUNE 2026)***

.5 Spray equipment shall be of a type which can be adjusted with respect to spray pattern and application rate. Do not use air blast, mist, or fog sprayers. Hose mounted sprayers shall be equipped with a check valve rated for the prevention of backflow, to be located within 1 m of the water source shut off valve.

14.96 WATER

.1 Water supply other than irrigation system will be the responsibility of the Contractor or subject to separate agreement.

.2 Base cost of this work on hand watering as required, and supplemental to the irrigation system if one is supplied, or in cases of breakdown.

.3 Supply all equipment such as pumps, hose, portable sprinklers, tank trucks, etc. if required for watering operations.

.4 Water used for landscape maintenance shall be free from organic or chemical contaminants detrimental to healthy plant growth.

14.97 SCHEDULING

.1 Schedule operations to the type of plant materials being maintained, the intensity and pattern of use of the site, and the seasonal weather patterns.

.2 Adjust maintenance frequency and intensity to the weather patterns of the particular year.

.3 Schedule watering operations to meet the following criteria:

(a) To provide water just prior to, or during early daylight hours for maximum plant uptake,

(b) To not impede the use of sidewalks or other paved areas during daylight hours, and

(c) In accordance with any watering restrictions in effect at the time.

14.98 TREES, SHRUBS AND GROUND COVERS

.1 The Contractor shall undertake the following maintenance operations, once per month, from April to October, for trees shrubs and ground covers for the duration of the maintenance period:

(a) Monitor all plants at least once per month during the growing season for pest and disease signs: to ensure prompt treatment, minimum damage, and to minimize treatment intensity. Where the application of a pesticide is warranted, notify the City Engineer prior to treatment.

(b) The Contractor shall be required to compensate the Owner for damage caused to non-target plants from the misapplication of herbicides.

(c) The Contractor shall immediately notify the City Engineer, of any major insect, fungal or other pathogenic infestation or disease which will adversely affect the health of the plant materials. If, in the opinion of the Engineer and the City Engineer, the condition cannot be remedied prior to Acceptance, the affected plant materials shall be replaced by the Contractor, at no cost to the Owner.

(d) Provide adequate water during the growing season to ensure healthy turgid growth. During the period from April 15 to September 15, the combined weekly total of natural precipitation and irrigation or water supplied by the Contractor shall not be less than the equivalent of 38 mm of precipitation. ***(REVISED JUNE 2026)***

(e) Maintain the mulched areas of shrub and ground cover beds, and at the bases of trees, in a clean, uncompacted, weed-free and grass-free condition. Ensure the total removal of all root parts of weeds. Do not mechanically cultivate over the root zone of any plant material.

(f) Maintain areas to be free of invasive and noxious species.

(g) Remove fallen leaves, twigs and trimmings in a timely fashion to prevent rot, damage to the surrounding landscape, impeded area drainage, or public inconvenience.

(h) Pruning shall only be undertaken in accordance with 14.61. Except as indicated below, or as recommended for a particular species in the technical horticultural literature, prune plant materials during the late autumn after leaf drop or in early spring prior to bud break. Prune trees of the following genus' in autumn only: Betula, Cladastris, Laburnum, Liriodendron, Magnolia. Prune shrubs which bloom on the previous year's grown, shortly after blooming.

(i) Do not fertilize trees planted in the spring until the following spring. Do not fertilize trees planted in the summer or fall until the following spring. Apply only a controlled release complete fertilizer, at the rate recommended by the soil testing laboratory.

(j) Fertilize shrub and ground cover beds with a complete slow release fertilizer in accordance with the recommendations of the soil testing laboratory.

(k) Trees which are staked shall be inspected periodically for state of repair, correct tensioning and for signs of stem abrasion or constriction. Unless otherwise instructed by the City Engineer, the stake shall be removed by the Contractor prior to, and as a condition of, final payment at the end of the maintenance period.

14.99 FINE GRASS AREAS

.1 Maintain fine grass areas to the 'Moderate' standard set out in the BCNTA/BCSLA *Landscape Standard* latest edition. ***(REVISED JUNE 2026)***

.2 Provide sufficient water to keep the sod root zone moist until firmly rooted.

.3 If area was seeded, keep soil moist during germination period and adequately water grassed areas until accepted by the City Engineer. Apply water to ensure moisture penetration 75 mm to 100 mm. Control water to prevent washouts. Seeded areas to be adequately protected with warning signs, temporary wire or twine fences, or other necessary means.

.4 Subsequent to rooting, program irrigation to provide alternate day watering for a total weekly precipitation rate of 38 mm during the growing season.

.5 Topdress and reseed areas which are dead or bare and keep moist until fully established. Use a seed mix that matched the varieties found in the sod or original seed mix.

.6 Weeding must be done when isolated small weed patches (no greater than 4 patches per 5 sq. m) have a width of 150 mm. Weeding (mechanical or chemical) shall kill or remove 90% of weeds or the process shall be repeated within the next two site visits.

.7 Mow at a time and frequency required to maintain the lawn at a height between 62 mm and 38 mm.

.8 Remove and dispose of clippings at each mowing.

.9 At each mowing, trim grass at interface with all non-turf elements such as curbs, pavement surfaces, walls, mulched areas beneath trees, and shrub beds. Do not allow the line of a string trimmer to come into contact with any plant material other than the sod.

.10 Using a sharp edging tool, vertically cut an edge at the perimeter of all shrub beds and mulched areas under trees, three times during the growing season.

.11 Fertilize sod in accordance with the recommendations of the soil testing laboratory at the specified interval and rate, and with the type of fertilizer appropriate to the stage of the growing season. Fertilize a minimum of twice during the growing season. ***(REVISED JUNE 2026)***

.12 Fertilizer shall be spread with a mechanical spreader that can be calibrated for an even application of fertilizer at a controlled rate.

14.100 ROUGH GRASS AND WILDFLOWER

.1 Mow rough grass once every thirty days. Mow to maximum height of 100 mm. Wildflower mixes to be mowed once in the spring to a height of 150 mm.

.2 Maintain areas to be free of invasive and noxious species.

.3 Refer to Section 14.28 [→] for specifications.

14.101 NURSE CROPS

.1 Mow crop once every 30 days. Mow to a maximum height of 150 mm.

.2 Cut crop prior to going to seed to ensure the annual species do not reseed.

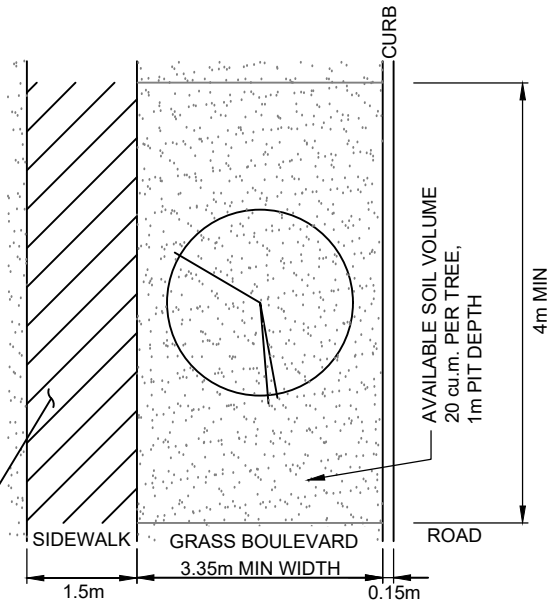
14.102 IRRIGATION SYSTEM

.1 Maintenance of the irrigation system shall include:

(a) Monitoring of the irrigation controller functioning and scheduling;
(b) Adjustment of risers and nozzles for the designed coverage;
(c) Monitoring and cleaning of drip filters and emitters;
(d) Repair or replacement of defective or damaged components; and
(e) Winterization of the system at the end of the growing season, and spring startup.

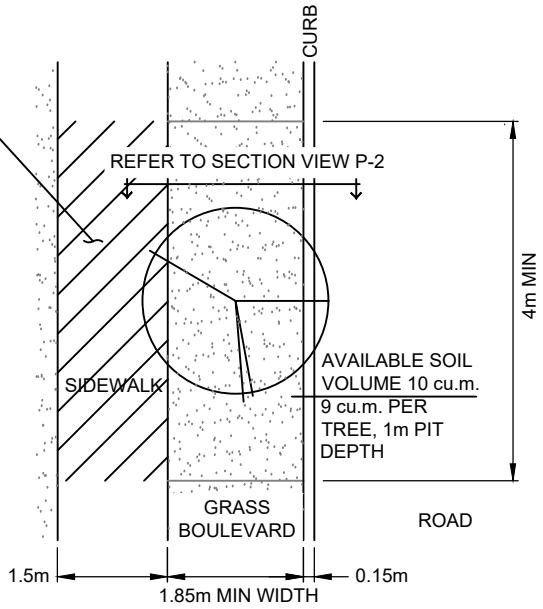
.2 Winterization shall include flushing, draining, and shut-off of all system components.

.3 Spring startup shall include backflow prevention assembly device field testing/documentation/tagging and submittal, filter cleaning, system charging, monitoring and adjustments.



TREE PLANTING WITH 20 cu.m ROOT ZONE
PLAN VIEW

STRUCTURED SOIL / SOIL
CELL UNDER SIDEWALK
OR HARD SURFACE



TREE PLANTING WITH 13.5± cu.m ROOT ZONE
PLAN VIEW

NOTES:

1. REFER TO SPECIFICATIONS CLAUSE 14.06 FOR STREET TREE SPACING, LOCATION, AND SIZE.
2. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.

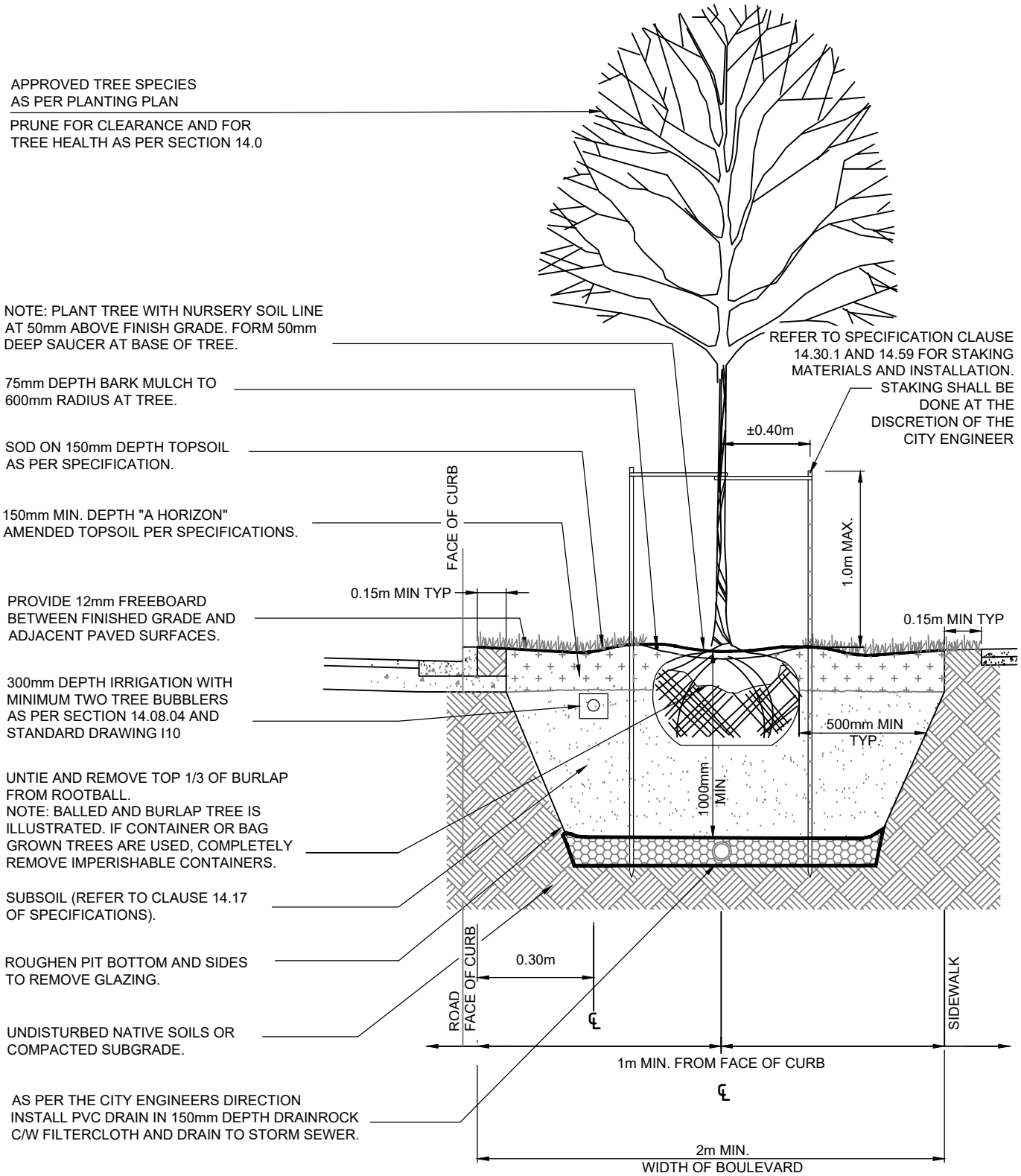
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4.7.2026

CITY OF NANAIMO
THE HARBOUR CITY

TREE PLANTING ROOT ZONE VOLUME

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	P-1



NOTES:

1. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.

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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

TREE PLANTING IN GRASS
BOULEVARD OR MEDIAN

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	P-2

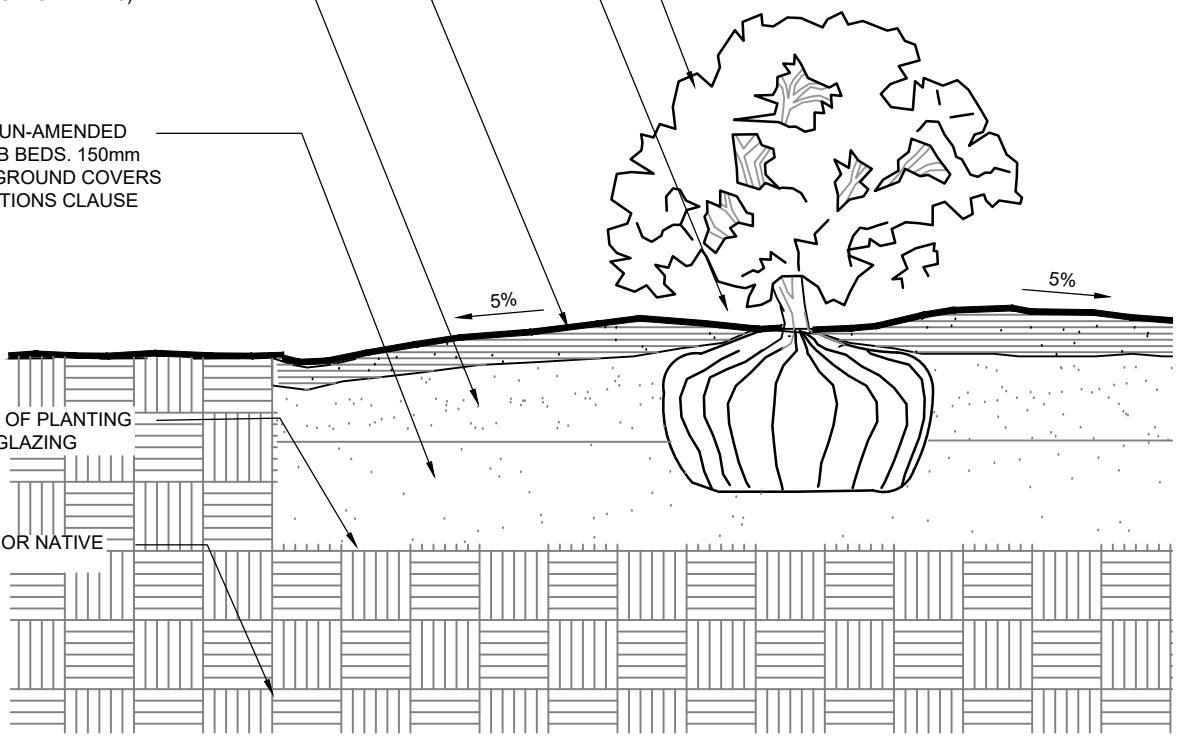
REMOVE DEAD, DAMAGED
OR WEAK GROWTH

FORM WATERING BASIN AT SHRUB BASE.
NOTE: ENSURE THE SOIL LEVEL DOES
NOT EXCEED THE ORIGINAL NURSERY
SOIL LINE AND THAT ROOTS ARE
COMPLETELY COVERED IN SOIL.

50mm DEPTH BARK MULCH.

150mm LAYER OF 'A HORIZON' SOIL MIX.
(SPECIFICATIONS CLAUSE 14.18)

300mm LAYER OF UN-AMENDED
TOPSOIL IN SHRUB BEDS. 150mm
LAYER DEPTH IN GROUND COVERS
BEDS. (SPECIFICATIONS CLAUSE
14.16)



SCARIFY BOTTOM OF PLANTING
BED TO REMOVE GLAZING

COMPACTED FILL OR NATIVE
MATERIAL

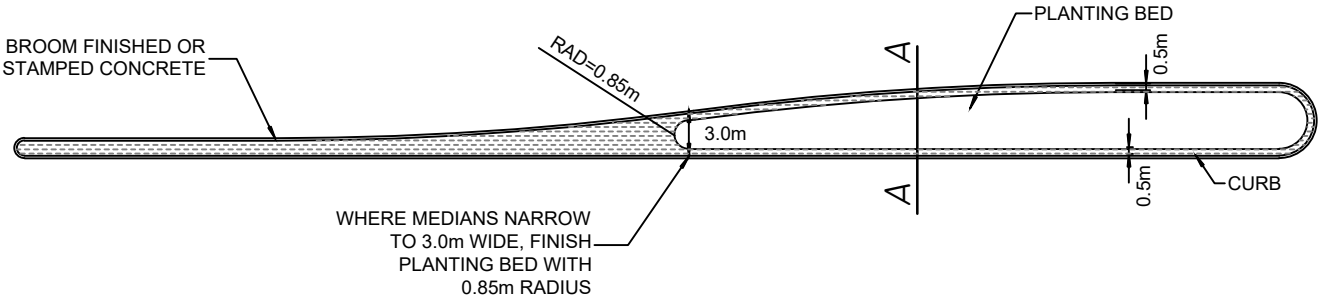
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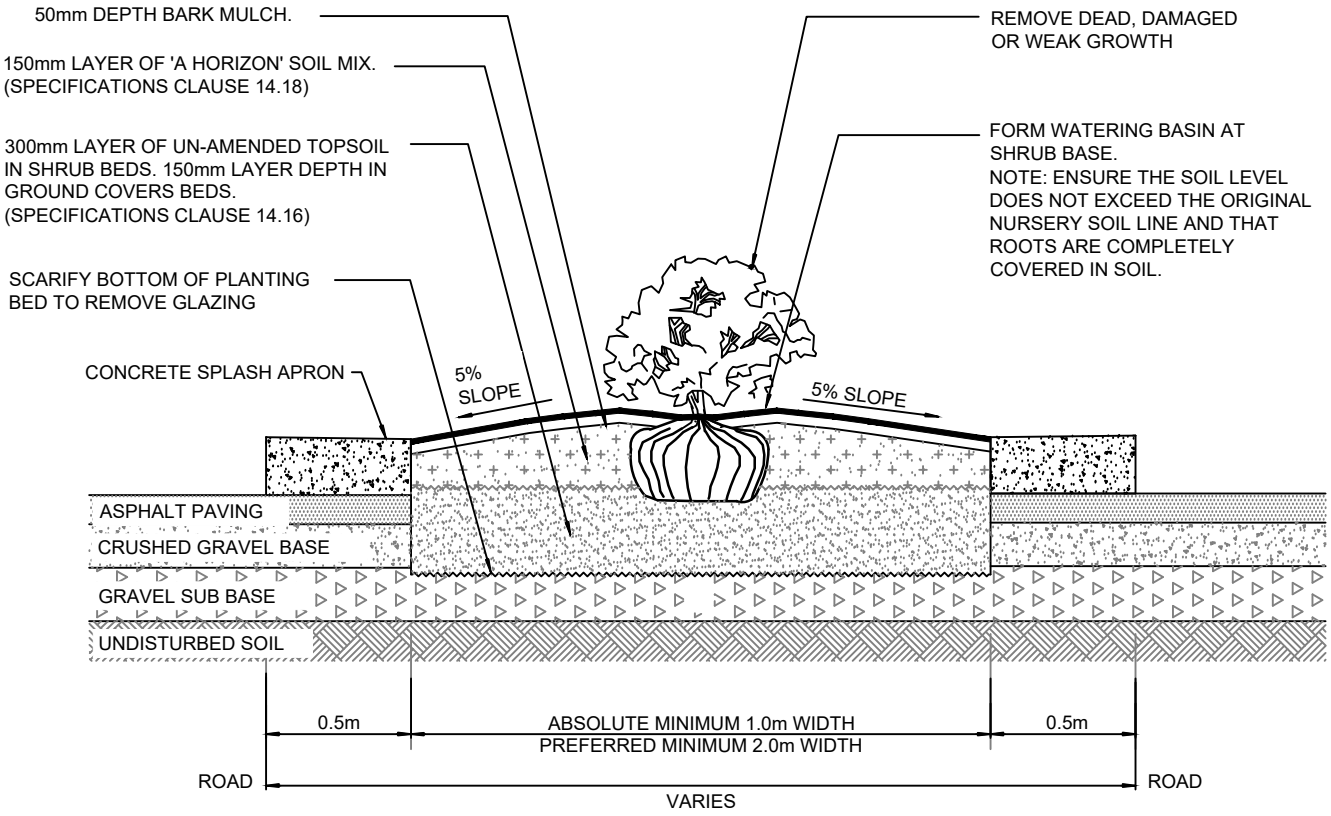
CITY OF NANAIMO
THE HARBOUR CITY

SHRUB PLANTING IN BED

Scale:	NTS
Created:	JAN 1998
Rev Date:	JUNE 2026
Dwg No:	P-3



PLAN VIEW



SECTION VIEW A

NOTES:

1. FOR CENTER MEDIAN DETAILS SEE SECTION 8, STD DWG CS-7.
2. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.
3. BASE AND SUB-BASE REQUIREMENTS AS PER SECTION 9.0.
4. CONCRETE REQUIREMENTS AS PER SECTION 11.0.

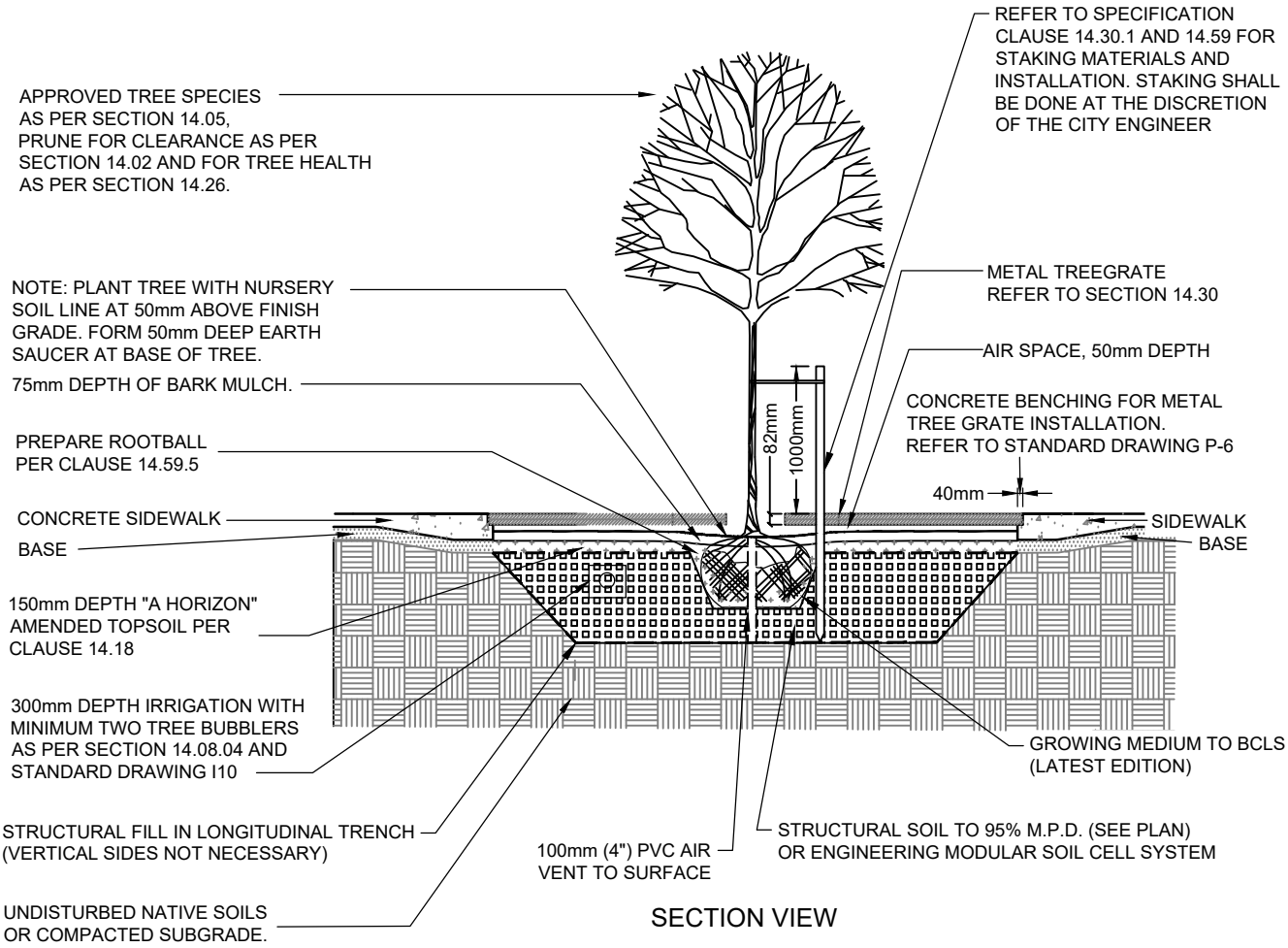
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

SHRUB PLANTING IN MEDIAN

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	P-4



SECTION VIEW

NOTES:

1. ALL WORK AND MATERIALS ARE TO BE AS DESCRIBED IN THE CITY OF NANAIMO MANUAL OF ENGINEERING STANDARDS & SPECIFICATIONS LATEST EDITION OR AS OTHERWISE APPROVED BY THE CITY ENGINEER.
2. REQUIRED VOLUME OF GROWING MEDIUM IS 10m³, TO A DEPTH OF 800mm FOR EACH TREE. REFER TO TABLE IN CLAUSE 14.58.8.
3. FINAL TREE LOCATIONS MAY BE VARIED IF CERTIFIED BY A LANDSCAPE ARCHITECT AND THE CITY OF NANAIMO.
4. IF POOR DRAINAGE CONDITIONS EXIST, PROVIDE POSITIVE SUB-SURFACE DRAINAGE AWAY FROM PLANTING EXCAVATION.
5. IRRIGATION REQUIRED TO CITY OF NANAIMO STANDARDS WHERE REQUIRED BY CITY ENGINEER.
6. SEE DRAWING P-2 FOR REQUIRED DETAILS AND WORKS.
7. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.
8. CURB AND SIDEWALK AS PER SECTION 8.0.
9. BASE AND SUB-BASE REQUIREMENTS AS PER SECTION 9.0.
10. CAST-IN PLACE CONCRETE REQUIREMENTS AS PER SECTION 11.0.

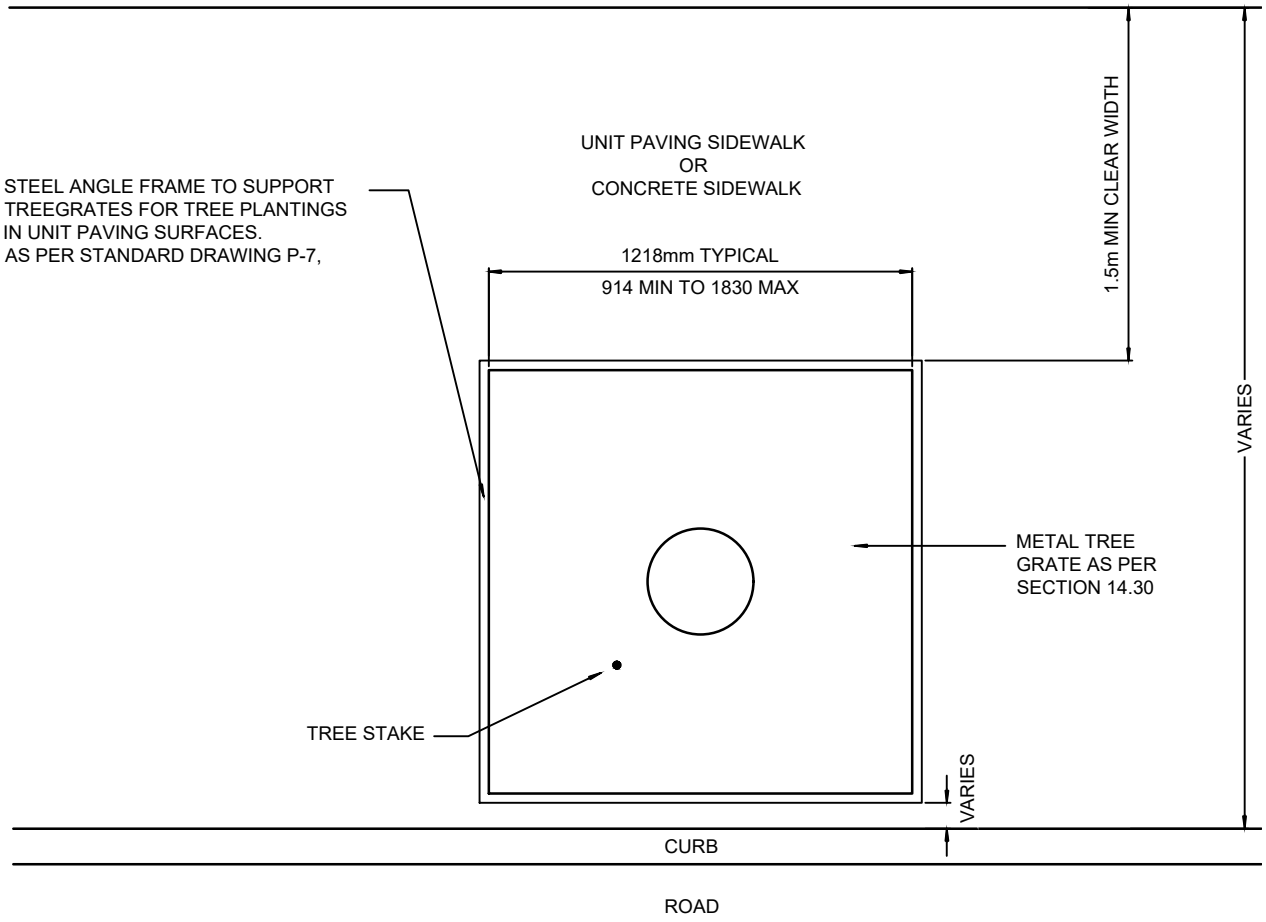
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CITY OF NANAIMO
THE HARBOUR CITY

TREE PLANTING IN CONCRETE SIDEWALK

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	P-5

4.7.2026



NOTE:

1. REFER TO SECTION 14.30 FOR SPECIFICATIONS AND 14.59 FOR INSTALLATIONS.
2. ALLOWABLE TREE GRATE SIZE SHALL BE 1219mm x 1219mm WITH A MINIMUM SIZE OF 914mm AND A MAXIMUM SIZE OF 1830mm.
3. INSTALL TREES TO MINIMIZE CONFLICTS WITH UTILITIES, BUILDING, STRUCTURES, PEDESTRIAN, AND VEHICULAR TRAFFIC.
4. INSTALL TREE STAKES AS PER CITY ENGINEERS DIRECTION. REFER TO SECTIONS 14.30 AND 14.59 FOR MATERIALS AND INSTALLATION SPECIFICATIONS.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.
6. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.
7. CURB AND SIDEWALK AS PER SECTION 8.0.

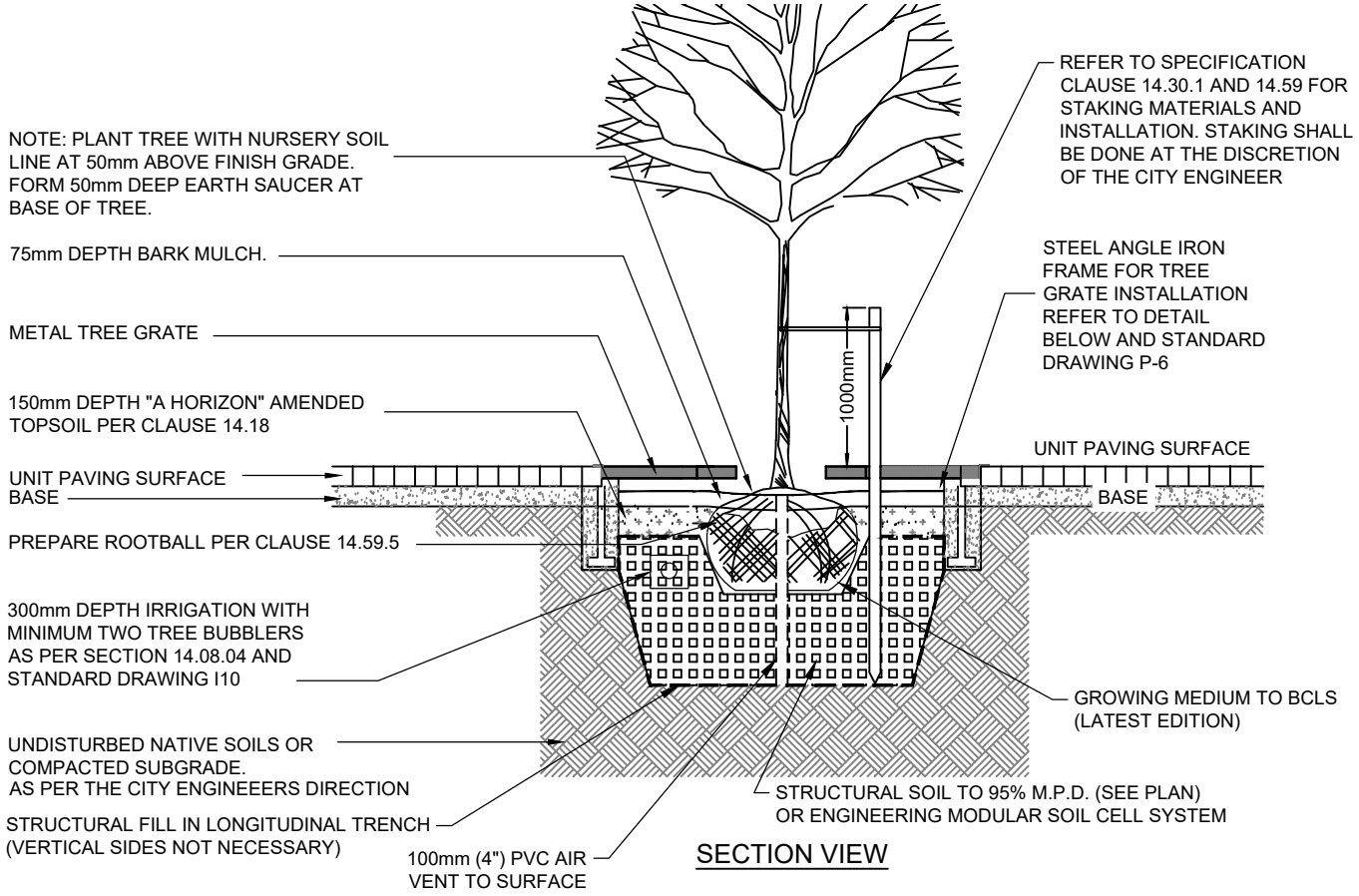
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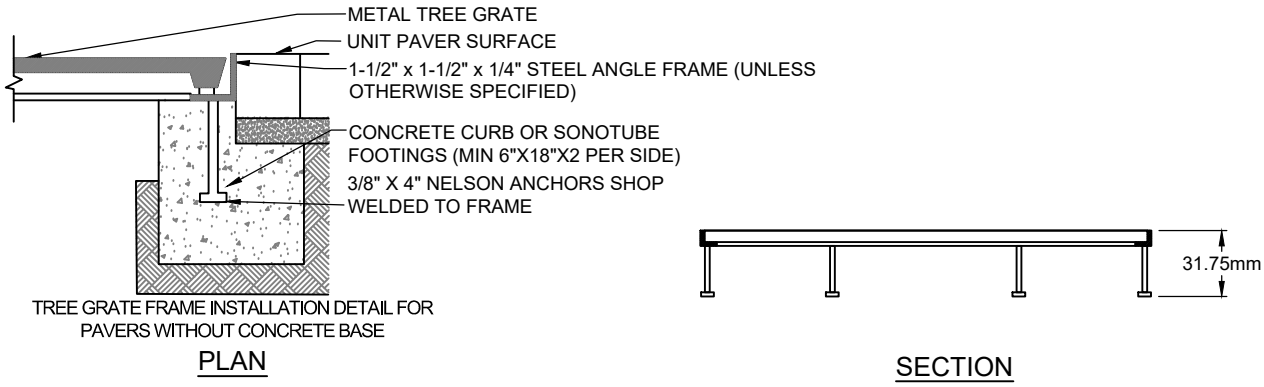
4.7.2026

CITY OF NANAIMO
THE HARBOUR CITY

TREE GRATE PLAN VIEW

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	P-6





TREE GRATE STEEL ANGLE IRON FRAME DETAIL

NOTES:

1. PRUNE APPROVED TREE SPECIES FOR CLEARANCE AND FOR TREE HEALTH AS PER SECTION 14.0.
2. TREE GRATE INSTALLATION SHALL BE AS PER THE MANUFACTURERS SPECIFICATION.
3. ALL WORK AND MATERIALS ARE TO BE AS DESCRIBED IN THE CITY OF NANAIMO MANUAL OF ENGINEERING STANDARDS & SPECIFICATIONS LATEST EDITION OR AS OTHERWISE APPROVED BY THE CITY ENGINEER.
4. REQUIRED VOLUME OF GROWING MEDIUM IS 10m³, TO A DEPTH OF 800mm FOR EACH TREE. REFER TO TABLE IN SECTION 14.58.8.
5. FINAL TREE LOCATIONS MAY BE VARIED IF CERTIFIED BY A LANDSCAPE ARCHITECT AND THE CITY OF NANAIMO.
6. IF POOR DRAINAGE CONDITIONS EXIST, PROVIDE POSITIVE SUB-SURFACE DRAINAGE AWAY FROM PLANTING EXCAVATION.
7. IRRIGATION REQUIRED TO CITY OF NANAIMO STANDARDS WHERE REQUIRED BY CITY ENGINEER.
8. SEE STANDARD DRAWING P-2 FOR REQUIRED DETAILS AND WORKS.
9. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.
10. BASE AND SUB-BASE REQUIREMENTS AS PER SECTION 9.0.
11. CAST-IN PLACE CONCRETE REQUIREMENTS AS PER SECTION 11.0.
12. CONCRETE SURFACE TREATMENT AS PER SECTION 13.0.

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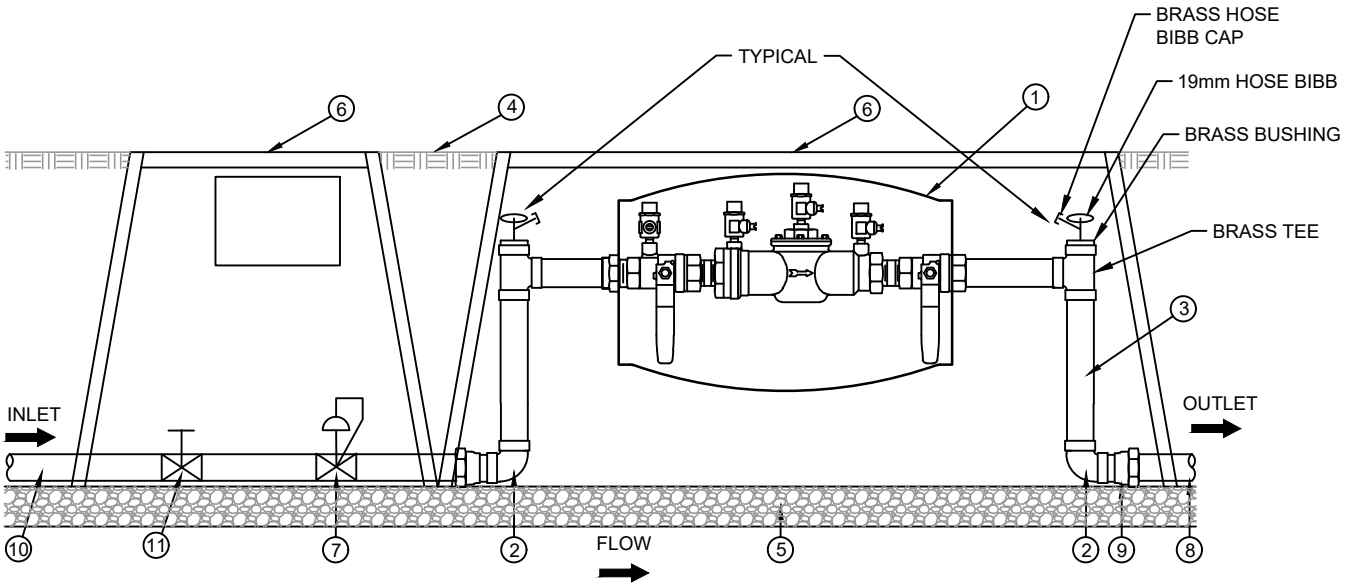
CITY OF NANAIMO
THE HARBOUR CITY

TREE PLANTING IN UNIT PAVING SURFACE

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	P-7

4.7.2026

1. DOUBLE CHECK VALVE ASSEMBLY (DCVA) BACK FLOW PREVENTER
2. BRASS 90° ELL (1 OF 2)
3. BRASS NIPPLE
4. FINISH GRADE
5. 50mm DEPTH 19mm MINUS GRAVEL
6. VALVE BOX C/W BOLTED LID
7. PRESSURE REDUCING VALVE (PRV) (SEE NOTE 7)
8. 19mm - 50mmØ SCHEDULE 40 PVC IRRIGATION MAIN (¾"-2"Ø)
9. SCHEDULE 40 PVC MALE ADAPTER
10. CLASS 200 POLYETHYLENE TUBING FROM CITY OF NANAIMO WATER METER AS PER SECTION 5.30
11. BRASS GATE VALVE



NOTES:

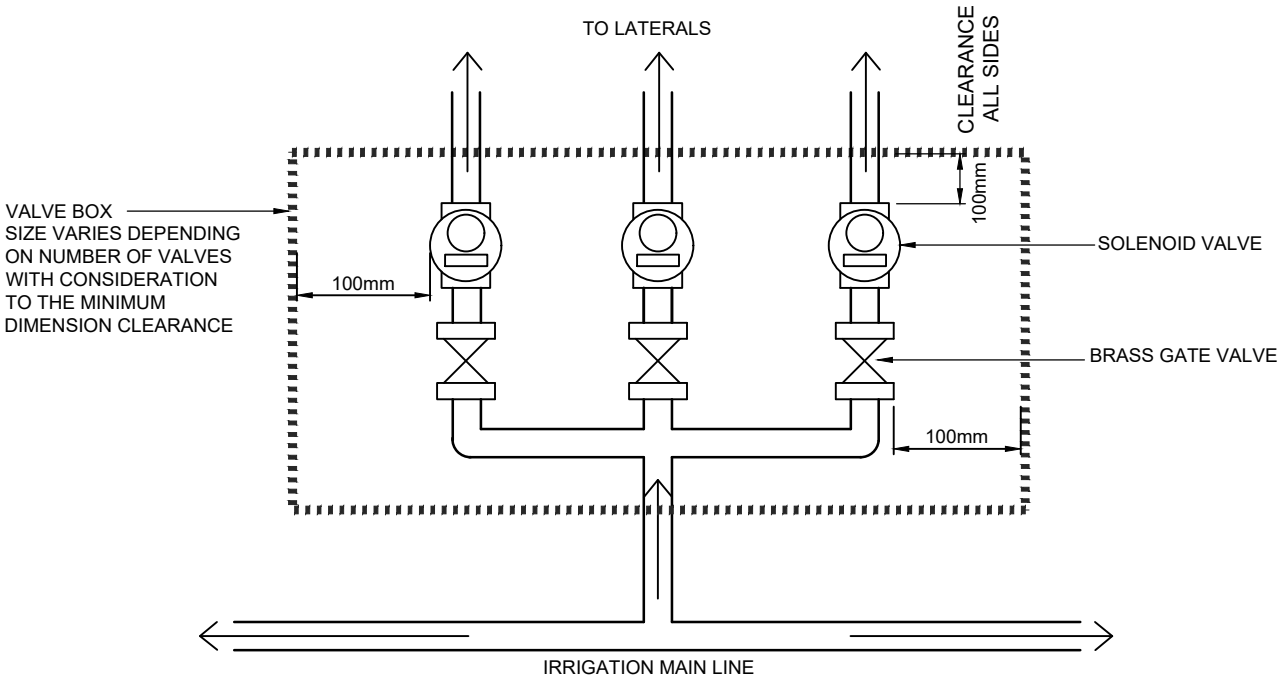
1. SUPPLY CONNECTION FROM MAIN TO WATER METER TO CITY OF NANAIMO ENGINEERING STANDARDS AND SPECIFICATIONS BY CITY FORCES AT OWNERS EXPENSE.
2. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.
3. AS PER SECTION 5 WATER SYSTEM CROSS CONNECTION CONTROL.
4. DOUBLE CHECK VALVE ASSEMBLY (DCVA) FOR SYSTEMS WITHOUT INJECTION OF CHEMICALS. IF CHEMICALS ARE USED A REDUCED PRESSURE (RP) ASSEMBLY SHALL BE REQUIRED.
5. SUBJECT TO APPROVAL BY THE CITY ENGINEER, AN ASSE 1060 CLASS 2 FROST PROTECTION ENCLOSURE MAY BE USED.
6. WHERE STATIC WATER PRESSURE MAY EXCEED 550 KPA (80 PSI), INSTALL A PRESSURE REDUCING VALVE (PRV).

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTIONS\SECTION 14 DWG\I-1
6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

19mm TO 50mm DIAMETER SERVICE
IRRIGATION BACKFLOW PREVENTER
AND POINT OF CONNECTION

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	I-1



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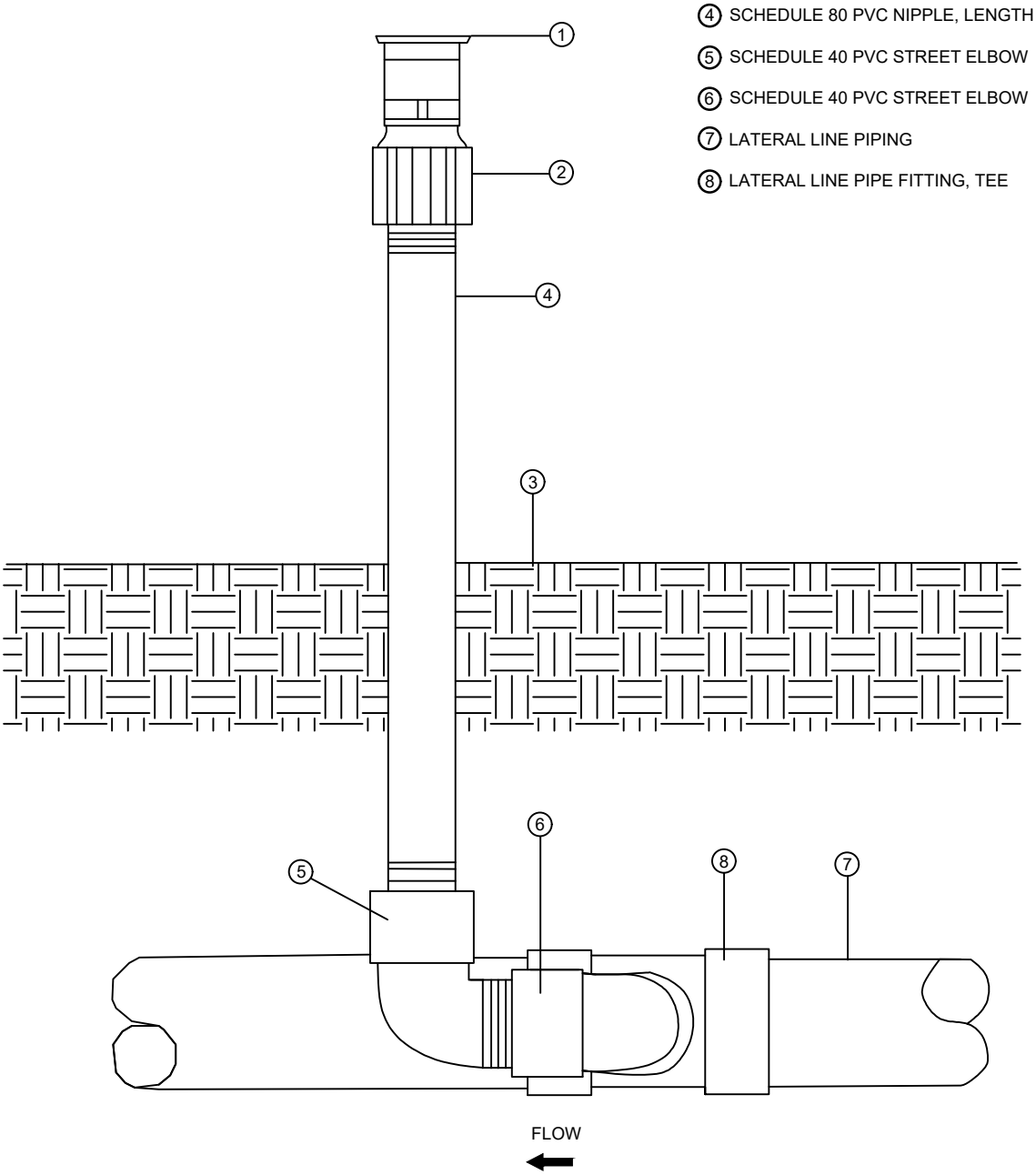
4.7.2026

CITY OF NANAIMO
THE HARBOUR CITY

VALVE BOX SCHEMATIC
PIPING CONFIGURATION
AT VALVE CLUSTER

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	I-3

1. SPRAY NOZZLE
2. SHRUB ADAPTER
3. FINISH GRADE
4. SCHEDULE 80 PVC NIPPLE, LENGTH TO SUIT, 300mm.
5. SCHEDULE 40 PVC STREET ELBOW
6. SCHEDULE 40 PVC STREET ELBOW
7. LATERAL LINE PIPING
8. LATERAL LINE PIPE FITTING, TEE



NOTES:

1. THREAD SEAL TAPE (PTFE TAPE) ALL THREADED JOINTS.
2. FOR DESIGN CRITERIA, SPECIFICATION AND INSTALLATION REFER TO SECTION 14.0 WRITTEN SPECIFICATIONS.
3. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.

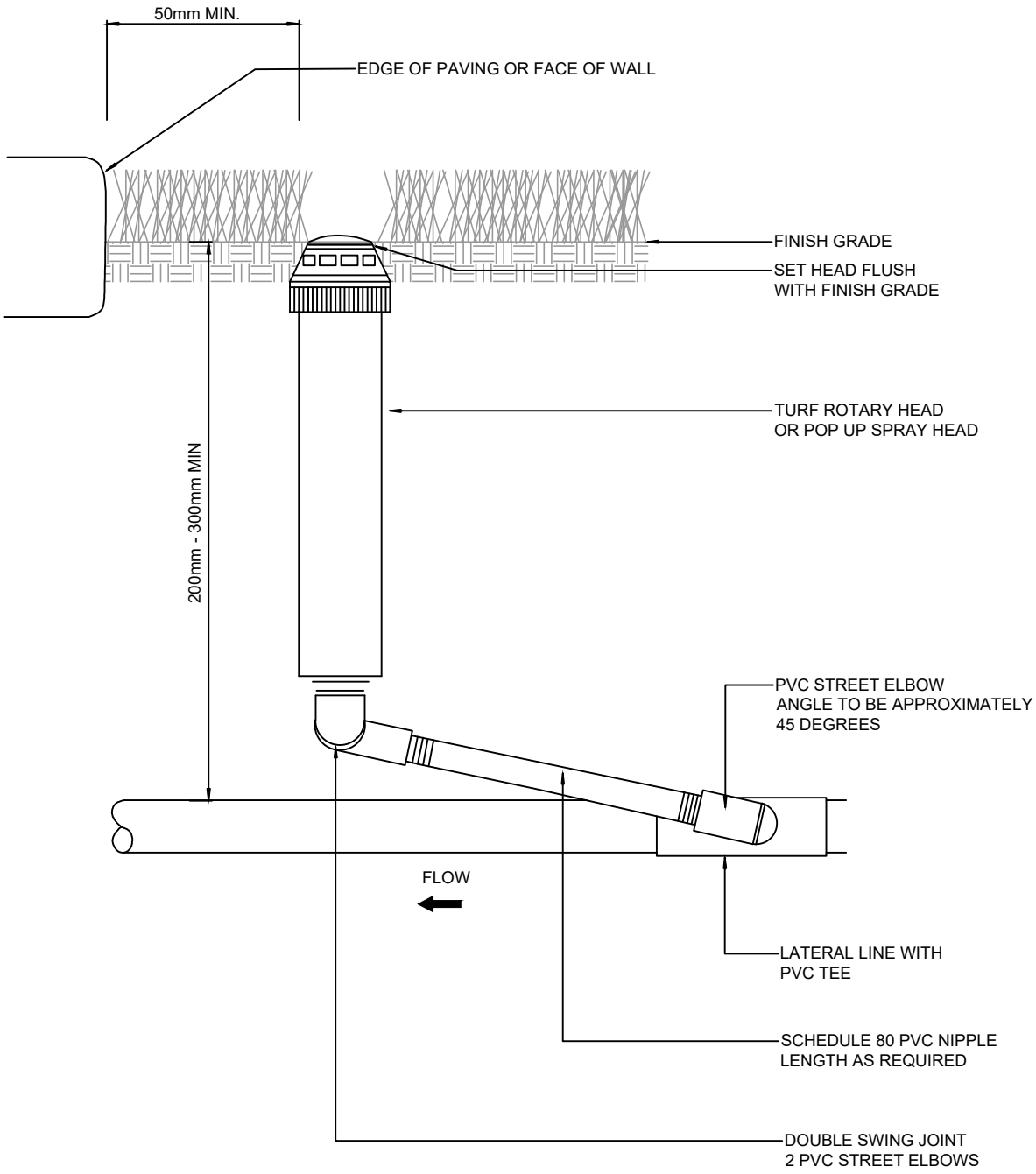
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6.22.2026

CITY OF NANAIMO
THE HARBOUR CITY

SHRUB RISER
SPRAY HEAD

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	I-4



NOTES:

1. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.
2. FOR DESIGN CRITERIA SPECIFICATIONS AND INSTALLATIONS REFER TO SECTION 14.0 WRITTEN SPECIFICATIONS.

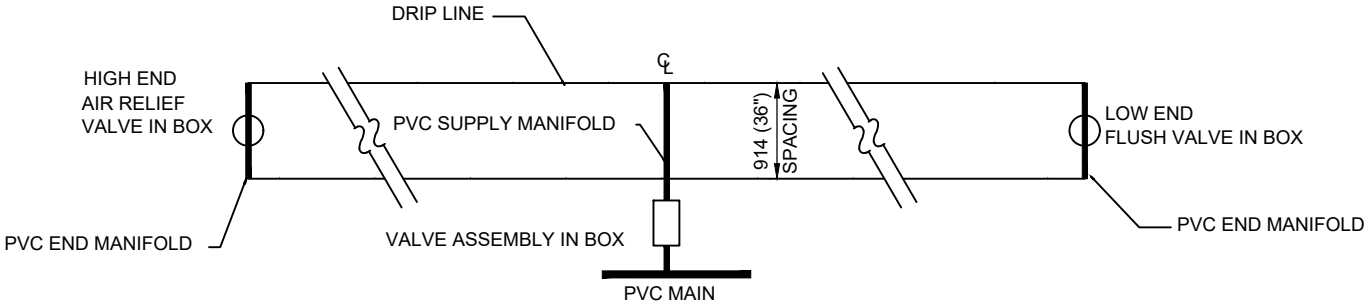
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6.22.2026

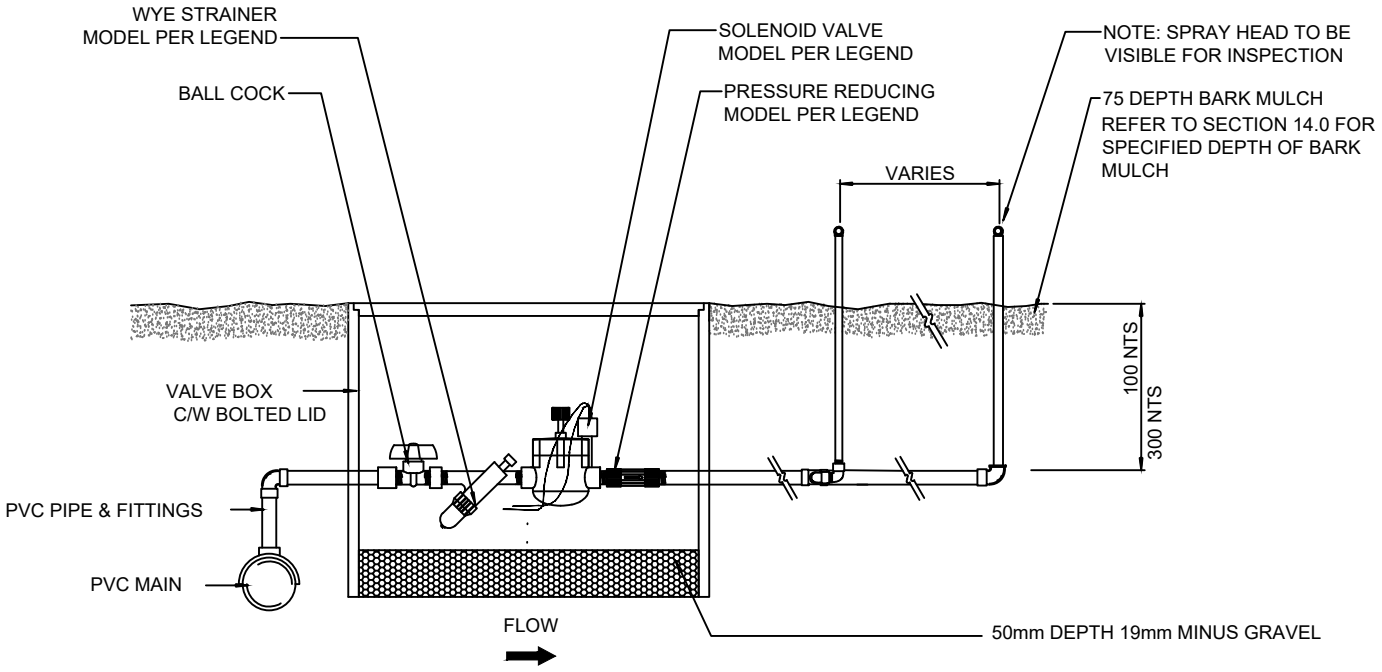
CITY OF NANAIMO
THE HARBOUR CITY

POPUP SPRAY HEAD
TURF ROTARY HEAD

Scale:	N.T.S.
Created:	SEPT 2012
Rev Date:	JUNE 2026
Dwg No:	I-5



DRIP CIRCUIT SCHEMATIC LAYOUT



TYPICAL DRIP VALVE ASSEMBLY AND MANIFOLD

NOTES:

1. FOR DESIGN CRITERIA, SPECIFICATIONS AND INSTALLATIONS REFER TO SECTION 14.0 WRITTEN SPECIFICATIONS.
2. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.

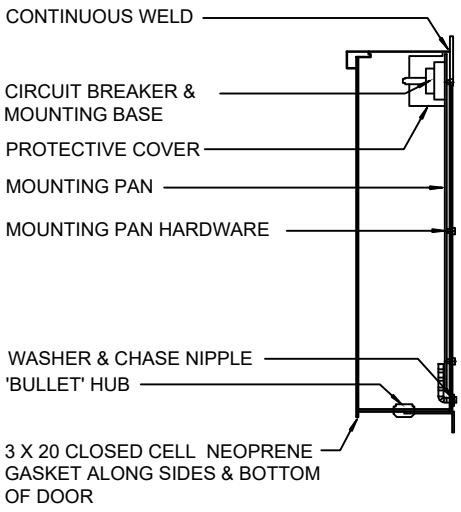
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CITY OF NANAIMO
THE HARBOUR CITY

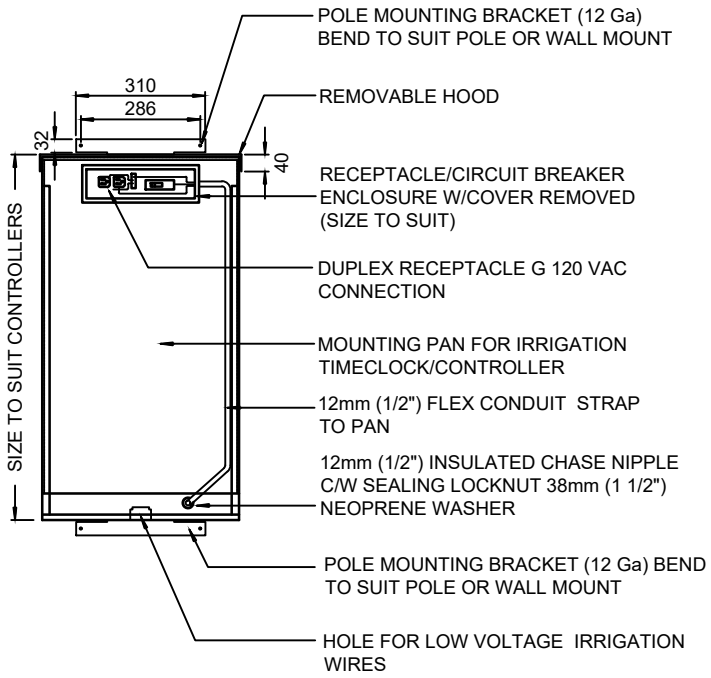
IN-LINE DRIP ASSEMBLY AND LAYOUT

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	I-6

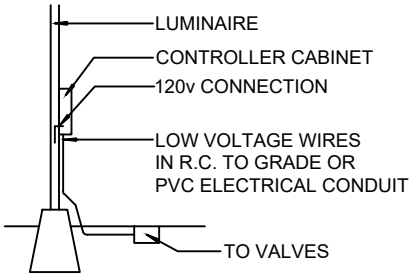
4.7.2026



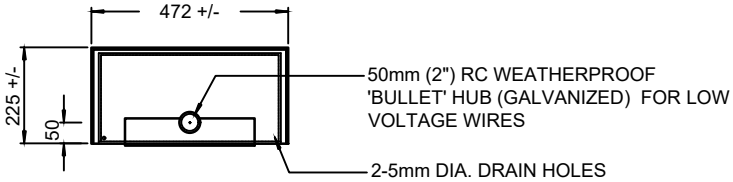
CROSS SECTION



FRONT VIEW WITH DOOR REMOVED



MOUNTING DETAIL



BOTTOM VIEW

NOTES:

1. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.
2. ENTIRE ENCLOSURE TO BE 16 GAUGE MILD STEEL OR ALUMINUM WITH THE EXCEPTION OF THE RECEPTACLE ENCLOSURE & MOUNTING PAN WHICH SHALL BE 14 GAUGE. STEEL FINISHED WITH GREY ENAMEL, ALUMINUM CLEAR ANODIZED. ALL SEAMS SHALL BE CONTINUOUSLY WELDED.
3. THE ENCLOSURE SHALL BE MANUFACTURED TO CONFORM TO C.S.A. ENCLOSURE 3 SPECIFICATIONS & SHALL BEAR APPROVAL FROM THE PROVINCIAL SAFETY BRANCH INSPECTOR.
4. ALL HARDWARE (SCREWS, NUTS, ETC.) SHALL BE STAINLESS STEEL.
5. DOOR TO BE FULLY GASKETTED & WITH PADLOCKING FACILITY.
6. THE PANEL SHALL BEAR THE MANUFACTURER & THE PROVINCIAL APPROVAL LABELS INSIDE THE PANEL.
7. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.

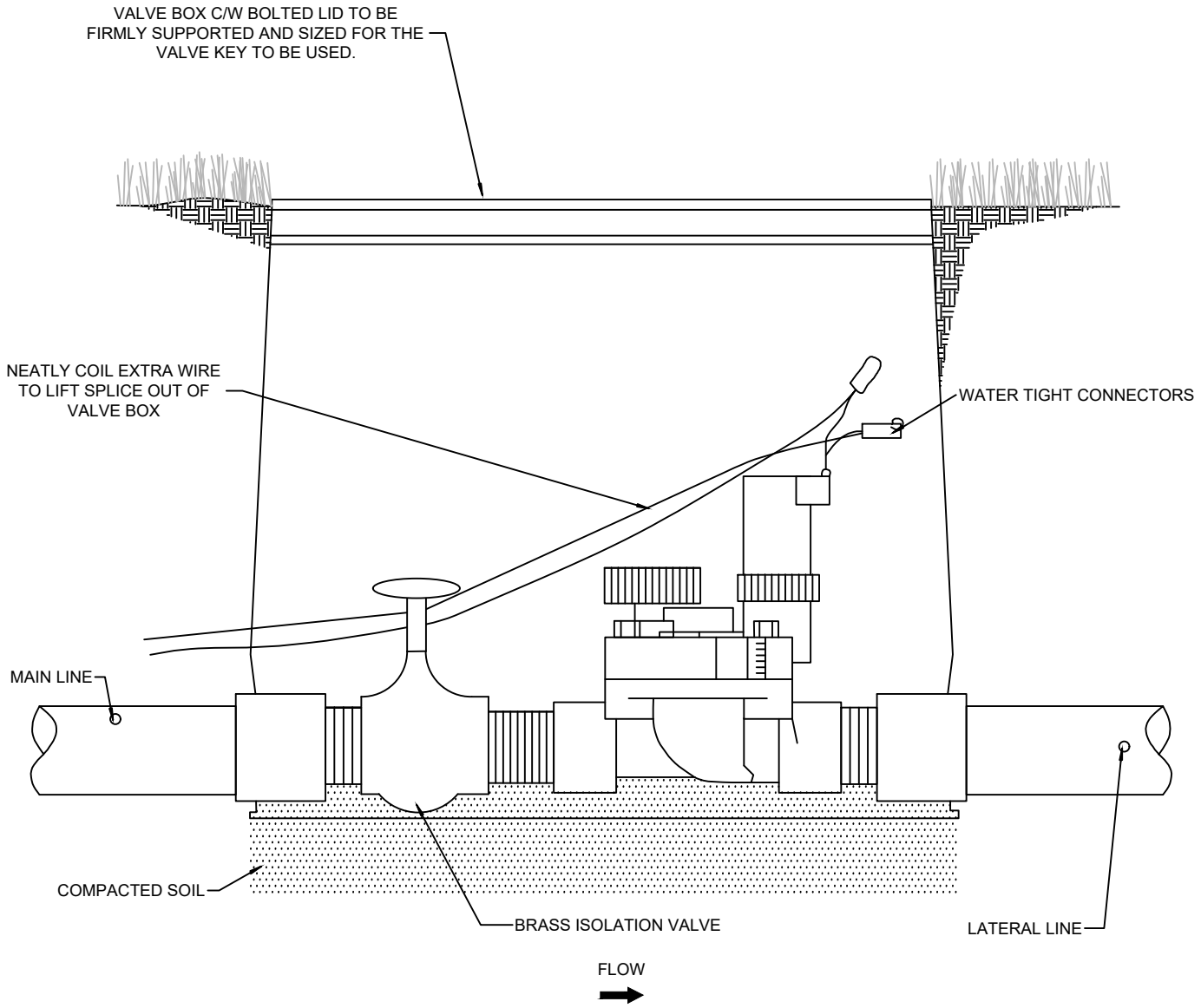
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4.7.2026

CITY OF NANAIMO
THE HARBOUR CITY

IRRIGATION CONTROLLER CABINET DETAILS

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	I-7



NOTES:

1. VALVE BOX TO BE INSTALLED FLUSH WITH FINISHED GRADE, AND IN A SHRUB AREA WHERE POSSIBLE.
2. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.

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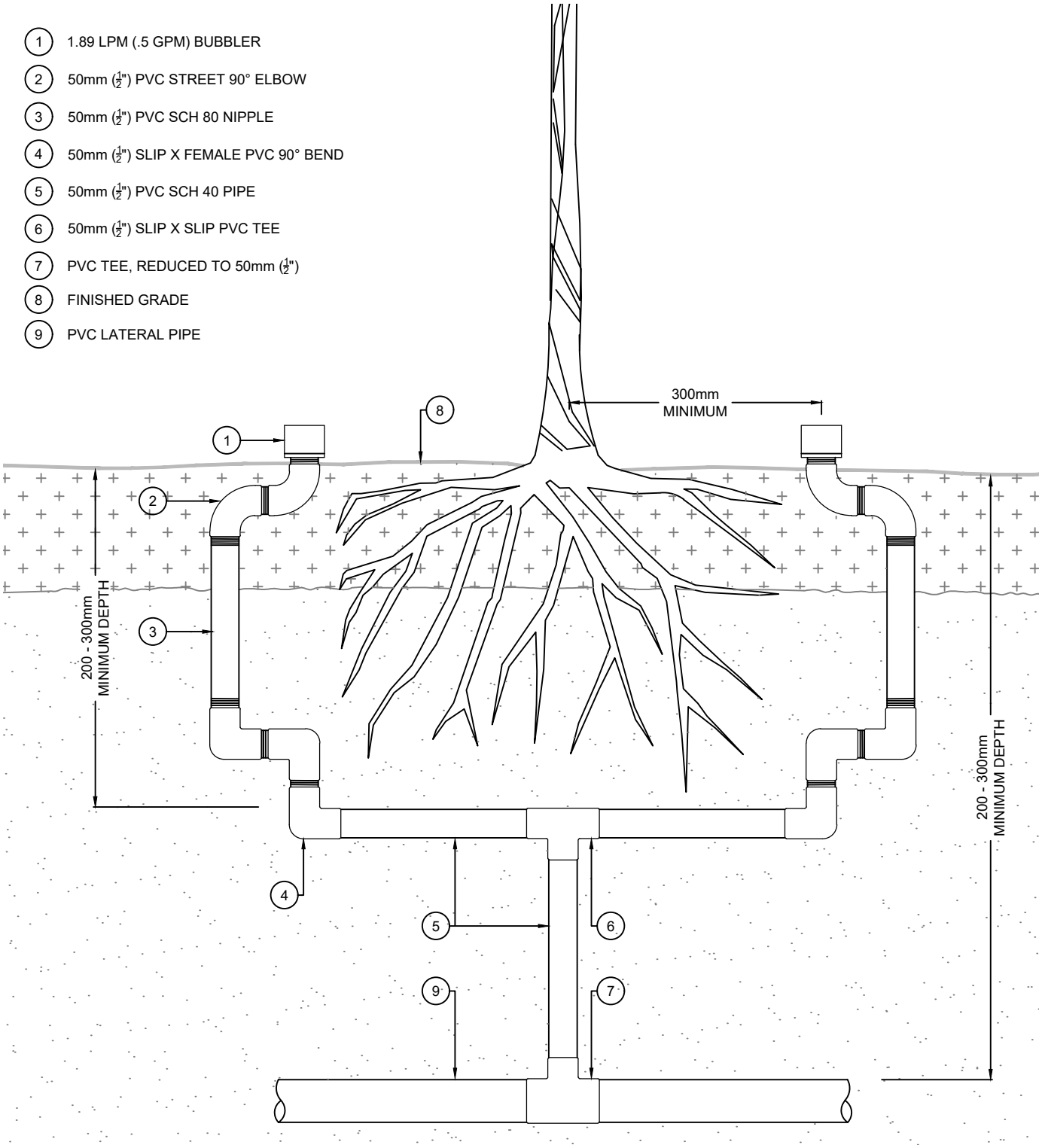
4.7.2026

CITY OF NANAIMO
THE HARBOUR CITY

ELECTRIC VALVE DETAIL

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	I-9

1. 1.89 LPM (.5 GPM) BUBBLER
2. 50mm (½") PVC STREET 90° ELBOW
3. 50mm (½") PVC SCH 80 NIPPLE
4. 50mm (½") SLIP X FEMALE PVC 90° BEND
5. 50mm (½") PVC SCH 40 PIPE
6. 50mm (½") SLIP X SLIP PVC TEE
7. PVC TEE, REDUCED TO 50mm (½")
8. FINISHED GRADE
9. PVC LATERAL PIPE



IRRIGATION BUBBLER SECTION

SCALE: 1:10

NOTES:

1. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.

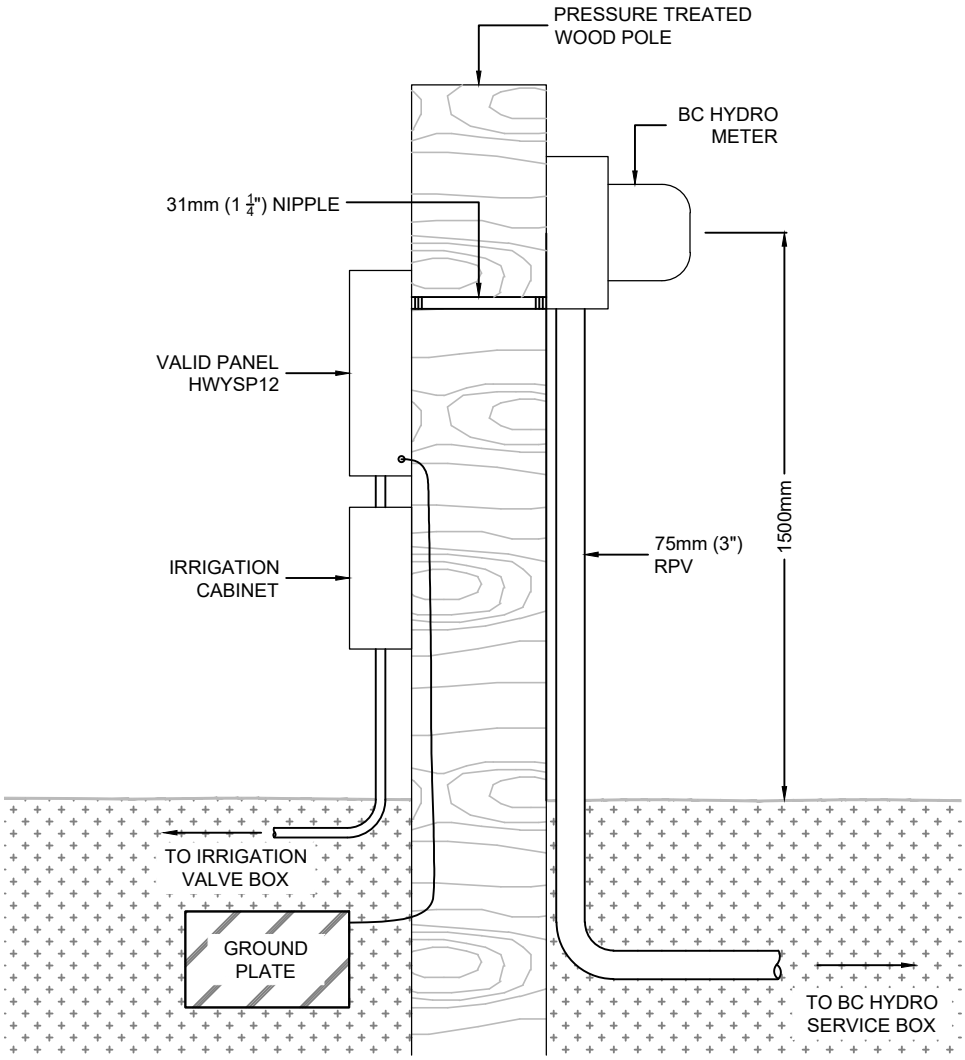
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4.7.2026

CITY OF NANAIMO
THE HARBOUR CITY

IRRIGATION BUBBLER

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	I-10



SECTION

SCALE: 1:20

NOTES:

1. ONLY PRODUCTS LISTED IN THE CITY'S APPROVED PRODUCTS LIST OR APPROVED BY THE CITY ENGINEER ARE ACCEPTED FOR INSTALLATION.
2. INSTALLATION SHALL BE DONE FOR DESIGNATED PARK LAND.

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOESS\EDITION NO15 APRIL 2026\2026 DRAWING SECTION\SECTION 14 DWG\I-11

4.7.2026

CITY OF NANAIMO
THE HARBOUR CITY

IRRIGATION UNDERGROUND
ELECTRICAL SERVICE WITH POLE

Scale:	NTS
Created:	MAY 2013
Rev Date:	JUNE 2026
Dwg No:	I-11

APPENDICE

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Revision Request Summary Sheet **APPENDIX A**
for the Manual of Engineering Standards and Specifications

Revision Request No.: _____
(filed by Engineering Services Technologist)

Date: _____

To: Engineering Services Technologist – City of Nanaimo

From: _____ **Department**: **(or company name)** _____

Phone No.: _____

Section Number / Drawing Reference: _____

Change Requested: _____

_____

_____

_____

_____

Reason for Change: _____

_____

_____

_____

_____

Signature: _____ **Date:** _____

Action:
(Eng Ser Tech) _____ **Date:** _____

Effective April 2023

CONDITION SHEET

REFERENCE: _____ DATE:_____

NAME:_____

ADDRESS:_____

The undersigned agrees to grant access to the property as mentioned herein for the purpose of a _____, subject to the following conditions for restoration.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

CITY OF NANAIMO
455 Wallace Street, Nanaimo, B.C., V9R 5J6

EASEMENT RELEASE AND INSPECTION FOLLOWING INSTALLATION OF UTILITY

Contractor:_____ Contract No.:_____

Owner's Name:_____ Easement Reference No.:_____

Mailing Address:_____

_____

Location:_____

_____

Legal Description:_____

_____

Manhole No.:_____ to Manhole No.:_____

Clean-up of easement is satisfactory and meets the requirements as set out in the easement condition form.

Date:_____ Property Owner:_____

Clean-up of easement is NOT satisfactory until the following work has been carried out:_____

_____

_____

_____

_____

Date:_____Property Owner:_____

Contractor's Agent:_____

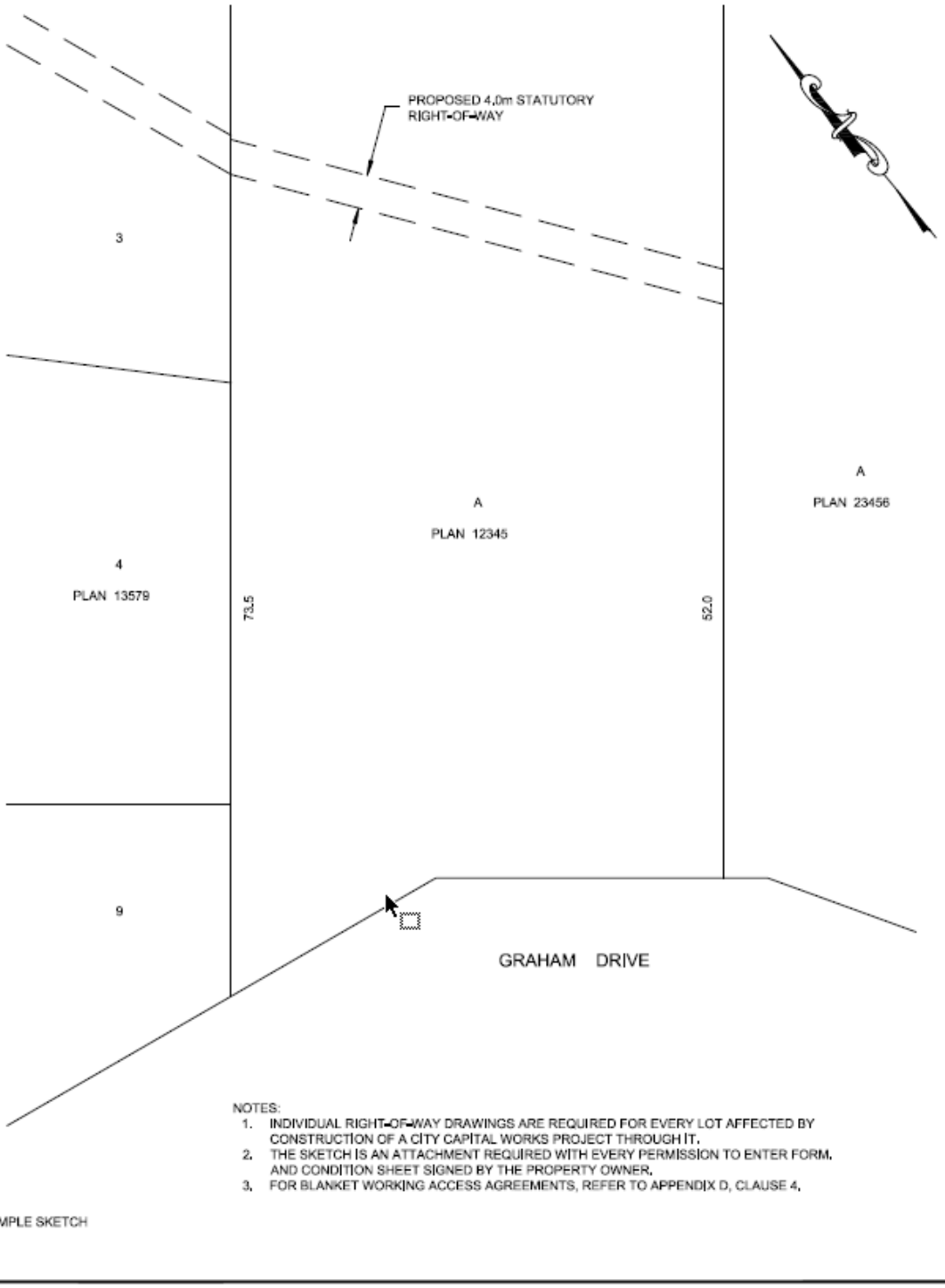
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Consulting Engineers' Approval and Recommendation:_____

_____

_____
Consulting Engineer

Effective April 2023



NOTES:
1. INDIVIDUAL RIGHT-OF-WAY DRAWINGS ARE REQUIRED FOR EVERY LOT AFFECTED BY CONSTRUCTION OF A CITY CAPITAL WORKS PROJECT THROUGH IT.
2. THE SKETCH IS AN ATTACHMENT REQUIRED WITH EVERY PERMISSION TO ENTER FORM, AND CONDITION SHEET SIGNED BY THE PROPERTY OWNER.
3. FOR BLANKET WORKING ACCESS AGREEMENTS, REFER TO APPENDIX D, CLAUSE 4.

SAMPLE SKETCH

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MODS\5TH EDITION NO 13 MAY 2020\2019-06-15 REDLINE INCORPORATION - WORKING\03030 DRAWING SECTION\5APPENDICES\RW-2

10.16.2019

CITY OF NANAIMO
THE HARBOUR CITY

PROPOSED RIGHT OF WAY

Scale:	N.T.S.
Created:	MAY 2013
Rev Date:	MAY 2020
Dwg No:	RW-2

MINIMUM REQUIRED STATUTORY RIGHT-OF-WAY AND TEMPORARY WORKING EASEMENT WIDTHS FOR UNDERGROUND SERVICES THROUGH PRIVATE PROPERTY

1. Where location of a municipal utility in a statutory right-of-way is permitted by the *City Engineer*, the right-of-way widths shall be as follows:

(a)	Single utility.	R.O.W. width =	Twice the depth from surface to the crown of the pipe rounded up to nearest half meter [4.0 m minimum width]
(b)	Two utilities within the same trench.	R.O.W. width =	Twice the depth from surface to the crown of the deeper pipe rounded up to the nearest half meter [5.0 m minimum width]
(c)	Two or more utilities adjacent to one another but in separate trenches.	R.O.W. width =	Cumulative widths for single services PLUS any difference to provide the required separation rounded up to nearest half meter [6 m minimum width]
(d)	The maximum depth shall be used to determine the R.O.W. width and the width shall be consistent throughout the length of the R.O.W.		
(e)	For pipes 900 mm or larger, add an additional 2.0 m to R.O.W. width.		
(f)	When the utility is within a Road allowance and the distance from the property line to the centre of the utility is less than half of the width indicated above for a single utility, the difference shall be provided as right-of-way on the adjacent property.		
(g)	Modified right-of-ways will be considered where supported by design and/or supplemental report(s).		

2. Rear and side yard utility right-of-ways are acceptable if appropriate access is provided to the utilities for maintenance and replacement by conventional open cut method.

3. In all cases, the width of rights-of-way shall be sufficient to permit an open excavation with side slopes and access for construction equipment in accordance with the WorkSafeBC regulations, without impacting on or endangering adjacent structures. The *Consultant* shall provide cross sections indicating the minimum safe distances to adjacent building footings based on a safe angle of repose from the limits of the excavation.

4. Blanket access agreements are required on private property for the purpose of moving construction equipment and materials onto the utility right-of-way.

5. Right-of-way locations shall be selected to avoid environmentally sensitive areas such as watercourses and wetlands.

SUBSTANTIAL COMPLETION STATISTICS RECORD
ASSETS FOR (FROM) DEVELOPMENT

DATE OF SUBMISSION: _____

FILE NO: _____

ASBUILT NO.: _____

ENG. CO: _____

LOCATION: _____

DATE OF CERTIFICATION: _____
(Same date as G2 Certification of Installed Works)

WATER ASSETS

ITEM	TYPE	DR	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
PIPE			L.M.			
FIRE HYDRANT			EACH			
FLUSHOUT			EACH			
PRESSURE REDUCING VALVE			EACH			
METER			EACH			
FITTINGS			EACH			
					WATER ASSETS TOTAL	

SANITARY SEWER ASSETS

ITEM	TYPE	DR	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
PIPE			L.M.			
MANHOLE			EACH			
TEMPORARY CLEANOUT			EACH			
DROP MANHOLE			EACH			
					SANITARY SEWER ASSETS TOTAL	

STORM SEWER ASSETS

ITEM	TYPE	DR	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
PIPE			L.M.			
MANHOLE			EACH			
TEMPORARY CLEANOUT			EACH			
CATCH BASIN			EACH			
STORM DETENTION			EACH			
					STORM SEWER ASSETS TOTAL	

TRANSPORTATION ASSETS

ITEM	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
50 mm Asphalt Road/Lane	L.M.			
75mm Asphalt Road	L.M.			
Asphalt Widening & Patching	S.M.			
Mountable Curb and Gutter	L.M.			
Non-mountable Curb or Curb and Gutter	L.M.			
Roundabouts	EACH			
Medians	EACH			
Traffic Calming – Circle	EACH			
Traffic Calming – Curb Extension	EACH			
Traffic Calming – Speed Hump	EACH			
Pedestrian Crossings	EACH			
Pedestrian Islands	EACH			
Pedestrian Sidewalk - Concrete	L.M.			
Pedestrian Sidewalk - Asphalt	L.M.			
Pedestrian 1.8m Wide Sidewalk - Asphalt	L.M.			
Walkway - Asphalt	L.M.			
Trail*	L.M.			
Trail*	L.M.			
Transit – Bus Shelters	EACH			
Transit – Pads	EACH			
Cycling Marked Bike Lane – Same as Road	L.M.			
Cycling Buffered Lane – Concrete Separator	L.M.			
Cycle Track Bike Lane	L.M.			
Streetlights**	EACH			
Traffic Signal	EACH			
			TRANSPORTATION ASSETS TOTAL	

Note the width of the trail and the material type.
****The cost per unit for streetlights or traffic signal includes supply of all materials and installation of electrical service equipment, concrete pole base, conduit, wiring, pole and lamp for each streetlight or traffic signal.***

LANDSCAPING & IRRIGATION ASSETS

ITEM	UNIT	QUANTITY	COST PER UNIT ($)	VALUE ($)
Street Trees	EACH			
∅Irrigation Piping	L.M.			
Irrigation Controller	EACH			
Top Soil	S.M.			
Sod/Seeding	S.M.			
Rock/Block Wall	L.M.			
Bio Swale	L.M.			
LANDSCAPING AND IRRIGATION ASSETS TOTAL				

STATISTIC SUMMARY

DATE OF SUBMISSION: _____

FILE NO: _____

ASBUILT NO.: _____

ENG. CO: _____

LOCATION: _____

DATE OF CERTIFICATION: _____
(Same date as G2 Certification of Installed Works)

ITEM	UNITS	QUANTITY	TOTAL VALUE ($)
WATERMAINS	L.M.		
SANITARY SEWERS	L.M.		
STORM SEWERS	L.M.		
STORM DETENTION	EACH		
ROADS/LANES	L.M.		
SIDEWALKS	L.M.		
WALKWAYS/TRAILWAYS	L.M.		
BIKE LANES	L.M.		
CURB AND GUTTER	L.M.		
FIRE HYDRANTS	EACH		
STREETLIGHTS	EACH		
LANDSCAPING/IRRIGATION	L.S.		
TRANSIT FACILITY	EACH		
		GRAND TOTAL VALUE OF ALL ASSETS	

CITY OF NANAIMO SERVICE SHEET
SINGLE FAMILY RESIDENTIAL LOT

APPENDIX F1

HOUSE NO:	STREET NAME:	
PLAN NO:	LOT NO:	FILE NO:

SHOW: 1) LOT. 2) STREET R/W NAME. 3) RIGHT OF WAYS IF ANY. 4) NORTH ARROW. 5) LOCATION OF ALL UTILITIES – IDENTIFIED & DIMENSIONED.

NOTE: "FROM LPL" = FROM LEFT PROPERTY LINE & "FROM RPL" = FROM RIGHT PROPERTY LINE

VACANT LOT		DEVELOPED LOT		CAPITAL PROJECT		L.I.P.		D.C.C.	

LOCATION	CONNECTED YES	CONNECTED NO	SIZE / MATERIAL
WATER:			
FIRE LINE:			
SANITARY SEWER:			
			INVERT EL.
STORM SEWER:			
			INVERT EL.

MINIMUM BASEMENT ELEVATION:
CERTIFIED ACCURATE BY:

COMMENTS:

SEAL / ENGINEER'S STAMP

Effective April 2023

CITY OF NANAIMO SERVICE SHEET
FOR ALL LOTS EXCLUDING SINGLE FAMILY

HOUSE NO:	STREET:		CARD NO:
PLAN NO:	LOT NO:	PERMIT NO:	FILE NO:

B.P.L.

L.P.L. R.P.L.

F.P.L.

SHOW THE FOLLOWING:
1) LOT 2) STREET NAME 3) R.O.W.(S) IF ANY 4)NORTH ARROW
5) LOCATION OF ALL UTILITIES (DIMENSIONED FROM CIVIC ADDRESS)

- ☐ NEW INSTALL
- ☐ CHANGE/UPDATE
- ☐ METER REMOVAL
- ☐ SERVICE CONNECTION
- ☐ SERVICE DISCONNECT
- ☐ METER REPLACEMENT

COMMENTS: _____

NOTE: "FROM LPL" = FROM LEFT PROPERTY LINE; "FROM R.P.L." = FROM RIGHT PROPERTY LINE;
"FROM FPL" = FROM FRONT PROPERTY LINE; "FROM B.P.L." = FROM BACK PROPERTY LINE;

☐VACANT LOT ☐DEVELOPED LOT ☐CAPITAL PROJECT ☐LOCAL IMPROVEMENT PROJECT ☐D.C.C.

SERVICE		LOCATION	NEW	EXIST	CONNECTED YES	CONNECTED NO	SIZE (mm)	MATERIAL
WATER	DOMESTIC		☐	☐	☐	☐		
	FIRE LINE		☐	☐	☐	☐		
	COMBINATION		☐	☐	☐	☐		
SANITARY			☐	☐	☐	☐		
		M.B.F.E.:	INVERT ELEVATION:					
STORM			☐	☐	☐	☐		
		M.B.F.E.:	INVERT ELEVATION:					

M.B.F.E. = Minimum Basement Floor Elevation NOTE: Inverts to Geodedic Datum

METERS		
NEW	REGISTER NO.	
	READING	
OLD	REGISTER NO.	
	READING	

COMPLETED BY: _____

DATE: _____

PLACE METER STICKER/STAMP IN BOX

SEAL / ENGINEER'S STAMP

Effective April 2023

TO: Finance Department
#_____
City of Nanaimo
411 Dunsmuir Street
Nanaimo, BC V9R 5E4

Building Permit or File

APPENDIX F3

Civic Address _____

BUILDING DEVELOPMENT WATER METER INFORMATION SHEET

TO BE USED ON BUILDING DEVELOPMENTS WHERE THE DETECTOR CHECK/METER CHAMBER IS DEVELOPER INSTALLED. COMPLETE FORM FOR EACH METER.

TO BE SUBMITTED UPON INSTALLATION OF WATER METER/DETECTOR CHECK.

1. Type of Water Meter: ❑ Domestic Meter ❑ Detector Check ❑ Combination Meter

2.(a) Date of Installation of Water Meter: _____

(b) Date of Installation of Detector Check, if applicable: _____

OR:

(c) Date of Installation of Combination Meter, if applicable: _____

3. Make and Model of meter installed:

Domestic _____ Register No. _____

Detector Check _____ Register No. _____

Combination _____ Register No. _____

4. Size of meter installed: Domestic: _____

Detector Check: _____

Combination: _____

5. Meter reading at date of installation: Domestic: _____

Detector Check: _____

Combination: _____

6. Reading type: Metric _____

7. Does reading contain decimal places: Yes _____ No _____

8. If reading contains decimal places, how many decimal places are there? _____

9. Location of meter/service: _____

(must be stated on this sheet)

_____ P.Eng.

_____
(Please Print Name)

_____
(Company Name

_____
(Address)

cc: Manager, Utilities, Public Works
Manager, Revenue Services, Finance

(REVISED MAY 2020)

Effective April 2023

CERTIFICATION OF DESIGN

I, _____, a Professional Engineer registered in the Province of British Columbia, hereby certify that the works, as herein set out on the attached drawings entitled

_____
_____
_____

have been designed in accordance with the City of Nanaimo's Engineering Standards and Specifications, and in accordance with good engineering practice where such design is not covered by the City's Engineering Standards and Specifications.

_____

I have been retained to provide design, field review, record drawings and final certification for this project by:_____

(Name of Client)

Phone:_____ Fax: _____

Address: _____

_____

I am satisfied that in the contractual mandate which exists between myself and my client, the terms of reference will permit me to conduct field reviews of the construction work which will allow me to authenticate the "Certification of Works" required by the City of Nanaimo, a sample copy of which is attached to this document and initialed by me.

In the event that my client releases me from this project, or in the event that I find the terms of reference do not permit me to render a level of review of the construction work which will allow me to put my name and authenticate the form of certification required by the City of Nanaimo, I will notify the City of Nanaimo within twenty-four (24) hours verbally and follow it up with written confirmation and clarification.

Signed this _____ day of _____ 20 _____.

_____ P. Eng.
(Signature)

I understand that the "CERTIFICATION OF WORKS" is to be completed in this format and submitted with the "record" drawings. _____

(Engineer)

SEAL / ENGINEER'S STAMP

_____
Engineer (Signature)

_____
Engineering Firm

_____
Permit to Practice Number

Effective April 2023

CERTIFICATION OF INSTALLED WORKS

NOTE: To be completed in this format and submitted with the "record" drawings

Location of the Construction Site and Works: (Legal Description)

_____

_____

all within the City of Nanaimo, British Columbia.

I, _____, a Registered Professional Engineer
(Reg. No. _____) in the Province of British Columbia, hereby certify:

1. THAT the following construction tests were carried out to confirm that construction met the specifications required:

   (a) _____

   (b) _____

   etc.

2. THAT I, or someone under my direction supervision, was able to conduct sufficient field reviews of the construction work sufficient to be able to confirm that: specifications in force and effect by the City of Nanaimo and in the applicable design drawings for the said Works were generally met during the Construction Period and that all materials incorporated into the Works that are regulated by the City's Approved Product List are materials noted at the time of installation, and

3. THAT the accompanying plans labeled:

   (i) _____

   (ii) _____

   (iii) _____

accurately record the materials, grades, inverts, offsets and dimensions of the constructed work.

DATED this _____ day of _____ 20 _____.
(Date Of Certification)

SEAL / ENGINEER'S STAMP

_____
Engineer (Signature)

_____
Engineering Firm

_____
Permit to Practice Number

Effective April 2023

CERTIFICATION OF STREET LIGHT INSTALLATION

Location of the Construction site and Works (Legal Description)

_____

_____

all within the City of Nanaimo, British Columbia.

I, _____, a Registered Professional Engineer
(Reg. No. _____), in the Province of British Columbia, hereby certify that:

1. I have received the final electrical inspection request and declaration for the street lighting installation from the electrical Field Safety Representative (copy attached).

2. All of the street lighting system is installed in accordance with all the specifications in force and effect by the Provincial Government and the City of Nanaimo as shown on the drawings and specifications authorized by me and submitted to the City of Nanaimo. The system is in working order and will be ready for use once it is connected to the B.C. Hydro and Power Authority's system.

3. THAT the accompanying plans labeled:
   (i) _____

   (ii) _____

   (iii) _____

accurately records the materials, grades, inverts, offsets and dimensions of the constructed work,

_____

_____

_____

_____

and the certified "record drawing" truly records the construction of all the street lighting required for the subject project.

DATED this _____ day of _____ 20 _____.
(Date of certification)

_____
Engineer (Signature)

_____
Engineering Firm

_____
Permit to Practice Number

SEAL / ENGINEER'S STAMP

Effective April 2023

CERTIFICATION OF LANDSCAPE INSTALLATION
NOTE: To be completed in this format and submitted with the "As-Built" drawings

Location of the Construction Site and Works: (Legal Description)

_____

_____

_____

_____

all within the City of Nanaimo, British Columbia.

I, _____, a Landscape Architect, and member in good standing of British Columbia Society of Landscape Architects, hereby certify

1. THAT the following construction tests were carried out to confirm that construction met the specifications required:

2. THAT I was able to monitor the construction and provide a level of supervision of the construction work sufficient to be able to confirm that the specifications in force and effect by the City of Nanaimo and in the applicable design drawings for the said Works were generally met during the Construction Period and

3. THAT the accompanying plans labeled:

   (i) _____

   (ii) _____

   (iii) _____

accurately record the materials, species, locations, offsets and dimensions of the constructed work.

DATED this _____ day of _____ 20_____.
(Date of certification)

_____
Landscape Architect (Signature)

_____
Landscape Architecture Firm

SEAL / LANDSCAPE ARCHITECT STAMP

Effective April 2023

CITY OF NANAIMO SANITARY SEWER FLOW ANALYSIS – CALCULATION SHEET

Project _____

ENGINEERING COMPANY _____
ADDRESS _____
ENGINEER _____

Seal/ Engineer's Stamp

Date: _____
Design By: _____
Sheet _____ **of** _____

Harmon Peaking Factor:
PF = 1 + 14/(4+P^1/2)

Mannings Formula:
V = (R^2/3 * S^½)/n
Q = V*A n = 0.013

										Sewage Flow		**Infiltration & Inflow**		**Total Flow**		**Pipe Data**			
Area No.	MH No. To MH No.	Location	Area (Hectares) A	Units or Lots	Density pp Ha	Equiv. Pop. (ca)	Cum. Equiv. Pop. (ca)	Average Flow (L/day)	Peaking Factor	Peak Flow (L/day)	Peak Flow (ML/day)	Infilt. (ML/day)	Cum. Infilt (ML/day)	Total Flow (ML/day)	Flow (L/s) Q	Pipe Size (mm) D	Pipe Slope (m/m) S	Pipe Capacity (L/s)	Velocity (m/s) V

Effective April 2023

CITY OF NANAIMO STORMWATER MANAGEMENT FLOW ANALYSIS – CALCULATION SHEET

PROJECT: _____

ENGINEERING COMPANY: _____
ADDRESS: _____
ENGINEER: _____

Rational Formula: Q = C x I x A x 2.78

SEAL / ENGINEER'S STAMP

Return Period: _____ Years

Date: _____

Design By: _____

Sheet _____ of _____

Mannings Formula

V = (R)2/3 x (S)1/2 / n

Q = V x A n = 0.013

MH To MH	Area (Ha) (A)	Coeff. (C)	Area x Coeff. (AC)	Accum. A x C	Time Of Concent (Mins)	Rainfall Intensity (mm/hr) (I)	Q (l/s)	Diam. (mm) (D)	Design Slope (%) (S)	Installed Slope (%)	Cap. (l/s)	Velocity (m/s) (V)	Length M.H. to M.H. (m)	Time of Flow-MH to MH (Mins)

Effective April 2023

APPENDIX H3

CITY OF NANAIMO FIRE FLOW CALCULATION SHEET

Based on: *Water Supply for Public Fire Protection, A Guide to Recommended Practice in Canada, 2020* , FUS

Project: _____

1. Type of Construction:

"C" Value	Type	Description	"C" Value	Type	Description
0.6	I	Fire-resistive	1	IV - C	Mass Timber
0.8	II	Non-combustible	0.9	IV - B	Mass Timber
1	III	Ordinary	0.8	IV - A	Mass Timber
1.5	IV - D	Mass Timber	1.5	V	Wood Frame

Construction Coefficient "C" : _____

Building Footprint: _____ m^2

Number of Floors/Storeys: _____

Total Effective Floor Area "A" : _____ m^2

Required Fire Flow Formula (RFF) : $RFF = 220C\sqrt{A}$ _____ lpm (a)

lpm = litres per minute

2. Occupancy & Contents Adjustment Factor See FUS Table 3:

Occupancy & Contents Adjustment Factor			
Non-Combustible	-25 %	Rapid Burning	25 %
Limited Combustible	-15 %	Free Burning	15 %
Combustible	0 %		

Factor: _____ x (a): _____ lpm (b)

(a) + (b): _____ lpm (c)

3. Automatic Sprinkler Adjustment Factor See FUS Table 4:

Type of System	Factor
NFPA 13, 13R, 13D and NFPA 25 (operated)	-30 %
Water supply & fire department hose rated	-10 %
Fully supervised	-10 %

Combined Total: _____ x (c) = _____ lpm (d)

(c) + (d): _____ lpm (e)

4. Exposure Adjustment Factor See FUS Table 5 and 6:

Building Side	Exposure Distance	Length m	Height m	No of Stories	L by H Factor	Construction Type	Exposure Factor
North							
South							
East							
West							
						Total:	

Exposure Factor (maximum of 75%): _____ (f)

(f) x (c): _____ lpm (g)

5. Required Fire Flow

(e) + (g): _____ lpm (h)

Wood Roof Adjustment Factor: _____ lpm (i)

REQUIRED FIRE FLOW (h) + (i): _____ lpm

_____ lps

6. Reservoir Storage Volume Calculation:

Required Duration of Fire Flow (**See FUS Table 1**): _____ hrs

Reservoir Storage Volume: _____ m^3

Calculations By: _____

Signature: _____

Date: _____

Engineer's Seal

Permit to Practice No. _____

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

For Non-Fire Service Meters

AWWA M22 Fixture Value Methodology

Page 1 of 2

General Information

Customer Name: _____ File No. _____

Address / Legal Description: _____ Building Permit No. _____

_____

Occupancy Type: Industrial ☐ Commercial ☐ Institutional ☐

Multifamily ☐ Agricultural ☐ Other ☐ _____

Is this a phased development? Yes ☐ No ☐

Calculations pertain to: Buildout ☐ Phase ☐ Phase No. _____

Step 1: Calculate Total Domestic Fixture Value

Fixture	Fixture Value (GPM @ 60 psi)		No. of Fixtures		Fixture Value
Bathtub	8	x		=	
Bedpan Washers	10	x		=	
Bidet	2	x		=	
Dental Unit	2	x		=	
Dishwasher	2	x		=	
Drinking Fountain - Public	2	x		=	
Hose Bibs (c/w 50 ft wash down):					
- 1/2 inch	5	x		=	
- 5/8 inch	9	x		=	
- 3/4 inch	12	x		=	
Kitchen Sink	2.2	x		=	
Lavatory	1.5	x		=	
Showerhead (Shower Only)	2.5	x		=	
Service Sink	4	x		=	
Toilet:					
- Flush Valve	35	x		=	
- Tank Type	4	x		=	
Urinal:					
- Pedestal Flush Valve	35	x		=	
- Wall Flush Valve	16	x		=	
Wash Sink (Each Set of Faucets)	4	x		=	
Washing Machine	6	x		=	

For single family residential properties, the meter size shall be 19 mm, unless the Applicant can demonstrate the need for a larger meter.

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

Page 2 of 2

Step 1 (cont.)

Fixture	Fixture Value (GPM @ 60 psi)		No. of Fixtures		Fixture Value
Other:					
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____
_____	_____	x	_____	=	_____

Total Domestic Fixture Value = _____ **GPM (A)**

Step 2: Calculate Probable Peak Domestic Demand

Refer to AWWA Manual M22, Sizing Water Service Lines and Meters, Figure 4-2 or 4-3

Probable Peak Domestic Demand = _____ **GPM (B)**

Step 3: Apply Pressure Adjustment Factor

City Water System Pressure (not to exceed 80 psi) = _____ psi

Pressure Factor from *Table 4 = _____ (C)

*AWWA Manual M22, Sizing Water Service Lines and Meters

Adjusted Peak Domestic Demand (B x C) = _____ **GPM (D)**

Step 4: Identify Irrigation Demand

Total Irrigation Demand = _____ **GPM (E)**

For irrigation demands greater than 35 GPM, a detailed irrigation plan shall be provided with appropriately designed zones.

Step 5: Calculate Total Peak Demand

Total Peak Demand (D + E) = _____ **GPM (F)**

Step 6: Select Water Meter

Water Meter Make / Model: = _____

Water Meter Size * = _____ inches

Water Service Connection Size = _____ inches

* Total Peak Demand (F) not to exceed 80% of Meter Rated Peak Instantaneous Flow
* Pressure Loss at Total Peak Demand (F) not to exceed 5 psi

Professional Certification

Seal

Name: _____

Company: _____

Date: _____

Comments: _____

For single family residential properties, the meter size shall be 19 mm, unless the Applicant can demonstrate the need for a larger meter.

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

For Non-Fire Service Meters

AWWA M22 Fixture Value Methodology

Example

Page 1 of 3

General Information

Customer Name:	Example		File No.	Example	
Address / Legal Description:	Example		Building Permit No.	Example	
	Example				
Occupancy Type:	Industrial		Commercial		Institutional	
	Multifamily	X	Agricultural		Other	
Is this a phased development?	Yes		No	X		
Calculations pertain to:	Buildout	X	Phase		Phase No.	

This meter sizing calculation is based on the AWWA M22 Fixture Value Methodology. Applicant's Engineers are expected to purchase and use the *AWWA Manual of Water Supply Practices M22 Sizing Water Service Lines and Meters* when completing this methodology.

This section includes general information about the customer and proposed development.

A 30 unit townhouse complex has been chosen as an example to demonstrate the use of this sizing methodology.

Step 1: Calculate Total Domestic Fixture Value

Fixture	Fixture Value (GPM @ 60 psi)		No. of Fixtures		Fixture Value
Bathtub	8	x	30	=	240
Bedpan Washers	10	x		=	
Bidet	2	x		=	
Dental Unit	2	x		=	
Dishwasher	2	x	30	=	60
Drinking Fountain - Public	2	x		=	
Hose Bibs (c/w 50 ft wash down):					
- 1/2 inch	5	x	30	=	150
- 5/8 inch	9	x		=	
- 3/4 inch	12	x		=	
Kitchen Sink	2.2	x	30	=	66
Lavatory	1.5	x	90	=	135
Showerhead (Shower Only)	2.5	x	30	=	75
Service Sink	4	x		=	
Toilet:					
- Flush Valve	35	x		=	
- Tank Type	4	x	90	=	360
Urinal:					
- Pedestal Flush Valve	35	x		=	
- Wall Flush Valve	16	x		=	
Wash Sink (Each Set of Faucets)	4	x	30	=	120
Washing Machine	6	x	30	=	180
Other:					
		x		=	
		x		=	
		x		=	
			Total Domestic Fixture Value	=	1386 **GPM (A)**

In this example, the following fixtures are identified for each of the 30 units in the proposed development:

- 1 bathtub
- 1 shower
- 3 toilets (tank type)
- 3 bathroom sinks
- 1 dishwasher
- 1 kitchen sink
- 1 washing machine
- 1 laundry sink
- 1 hose bib (1/2 inch)

These fixtures yield a Total Domestic Fixture Value of 1386 GPM.

Note: If a fixture is proposed that is not on the list then the peak flow value (fixture value) can be included on one of the blank lines under "Other" based on the manufacturer's information.

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

For Non-Fire Service Meters

AWWA M22 Fixture Value Methodology

Example

Page 2 of 3

Step 2: Calculate Probable Peak Domestic Demand

Refer to Figure 4-2 or 4-3

Probable Peak Domestic Demand = 65 GPM (B)

The AWWA Manual M22 includes two graphs (Figures 4-2 and 4-3) which provide a correlation between the Total Domestic Fixture Value and Probable Peak Domestic Demand for various development types.

For this example, Figure 4-3 applies since the Total Domestic Fixture Value is in the "high range". The "Apartments" curve indicates that a Total Domestic Fixture Value of 1386 GPM corresponds to a Probable Peak Domestic Demand of 65 GPM.

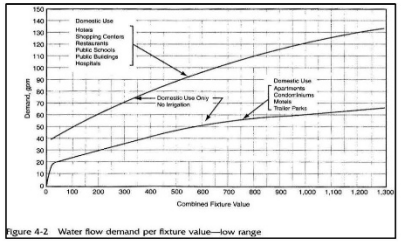


Figure 4-2 Water flow demand per fixture value—low range

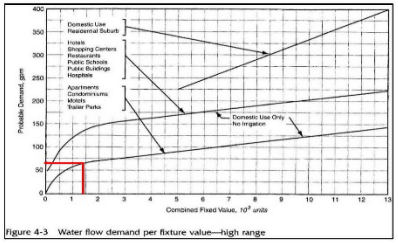


Figure 4-3 Water flow demand per fixture value—high range

Step 3: Apply Pressure Adjustment Factor

City Water System Pressure (not to exceed 80 psi) = 70 psi

Pressure Factor from Table 4-1 = 1.09 (C)

Adjusted Peak Domestic Demand (B x C) = 70.85 GPM (D)

The fixture values listed in Step 1 are based on a pressure of 60 psi. This step increases or decreases the peak demand based on the pressure at the outlet of the meter. Table 4-1 in the AWWA M22 Manual provides adjustment factors for various pressures.

For this example, the pressure downstream of the meter is identified as 70 psi. From Table 4-1, the pressure adjustment factor is 1.09 and the Adjusted Peak Domestic Demand is 70.85 GPM.

Note that for the purpose of this sizing methodology, the maximum pressure for which to apply an adjustment is 80 psi.

Table 4-1 Pressure adjustment factors*

Working Pressure at Meter Discharge (psi)	Average Flow from 50 ft of ⅝-in. Hose and Sprinkler (gpm)	Pressure Adjustment Factor
35	6.7	0.74
40	7.2	0.80
50	8.1	0.90
60	9.0	1.00
70	9.8	1.09
80	10.5	1.17
90	11.2	1.25
100	12.1	1.34

*derived from Table 4-1 and 4-2 of Manual M22 (1975).

NOTE: To convert psi to kPa: psi × 6.89476; to convert gpm to m³/hr: gpm × 0.227.

CITY OF NANAIMO
THE HARBOUR CITY

Water Meter Sizing Calculation Sheet

For Non-Fire Service Meters

AWWA M22 Fixture Value Methodology

Example

Page 3 of 3

Step 4: Identify Irrigation Demand

Total Irrigation Demand = 23.2 **GPM (E)**

For irrigation demands greater than 35 GPM, a detailed irrigation plan shall be provided with appropriately designed zones.

The Total Irrigation Demand is identified in this step. The AWWA Manual M22 provides guidance for calculating irrigation demands. However, the Applicant's Engineer may refer to an irrigation system design flow specified by the manufacturer or identified by the irrigation system designer.

For this example, an area of 2000 ft^2 is irrigated by a spray irrigation system. The AWWA M22 Manual indicates that for spray irrigation each "section" represents a flow of 1.16 GPM. A "section" is defined as 100 ft^2. So the calculation yields:

Total Irrigation Demand = 2000 ft^2 / 100 ft^2 = 20 sections x 1.16 GPM = 23.2 GPM

Step 5: Calculate Total Peak Demand

Total Peak Demand (D + E) = 94.05 **GPM (F)**

The Adjusted Peak Domestic Demand of 70.85 GPM from Step 3 is combined with the Total Irrigation Demand of 35 GPM from Step 4 to yield a Total Peak Demand of 105.85 GPM.

Step 6: Select Water Meter

Water Meter Make / Model: = Sensus OMNI C^2

Water Meter Size * = 1.5 inches

Water Service Connection Size = 2 inches

* Total Peak Demand (F) not to exceed 80% of Meter Rated Peak Instantaneous Flow
* Pressure Loss at Total Peak Demand (F) not to exceed 5 psi

The selected meter is a 1.5" Sensus OMNI C^2.

The manufacturer specified maximum intermittent flow rating for this meter is 200 GPM.
80% of 200 GPM = 160 GPM > 94.05 GPM

The manufacturer specified pressure loss for this meter (with strainer) at 94.05 GPM is approximately 4 psi (< 5 psi).

Professional Certification

Seal

Seal

Name: Example

Company: Example

Date: Example

Comments:

This section is for the Applicant's Engineer to certify the water meter sizing calculation.

The comments space is provided to explain any unique aspects of the development that impact the proposed meter sizing.



STOP
RA 1
600mm x 600mm



YIELD
RA 2
750mm x 750 x mm 750mm



SCHOOL CROSSWALK
RA 3L/R
600mm x 750mm



PEDESTRIAN CROSSWALK
RA 4L/R
600mm x 750mm



CROSS BUCK
RA 6
CROSS LENGTHS 1200 x 200mm



RAILWAY CROSSING SIGN
RA 6S
700mm X 450mm



ROUNDABOUT YIELD
RA 7
750mm x 750mm x 750mmm



MAXIMUM SPEED
RB 1
600mm x 750mm



NO TURN
RB-11 L/R
600mm X 600mm



TURN ONLY
RB-14 L/R
600mm x 600mm

NOTES:
1. THIS HANDBOOK IS FOR GENERAL REFERENCE ONLY.
2. REFER TO SECTION 9.14 STREET NAME AND TRAFFIC SIGNS.

G:\INFRASTRUCTURE PLANNING\STANDARDS & PRODUCTS\MOES\SECTION NO13 MAY 2020\2015-09-15 RED LINE INCORPORATION - WORKING\2020 DRAWING SECTION\SAPPENDICES\SHT-1

10.18.2019

CITY OF NANAIMO
THE HARBOUR CITY

CITY OF NANAIMO'S FIELD HANDBOOK
OF GENERAL SIGNS

Scale:	N.T.S.
Created:	JUNE 2013
Rev Date:	MAY 2020
Dwg No:	SHT-1



ONE WAY
RB 21
900mm x 300mm



DO NOT ENTER
RB 23
600mm x 600mm



KEEP RIGHT
RB 25
600mm x 750mm



TURN ONLY LANE
RB-41 L/R
600mm x 600mm



THRU OR TURN LANE
RB-42 L/R
600mm x 600mm



DOUBLE TURN ONLY
RB-46 L/R
600mm x 600mm



STRAIGHT OR DOUBLE TURN LANE
RB-47 L/R
600mm x 600mm



STOP LINE
RC-4 L/R
600mm x 750mm

NOTES:
1. THIS HANDBOOK IS FOR GENERAL REFERENCE ONLY.
2. REFER TO SECTION 9.14 STREET NAME AND TRAFFIC SIGNS.

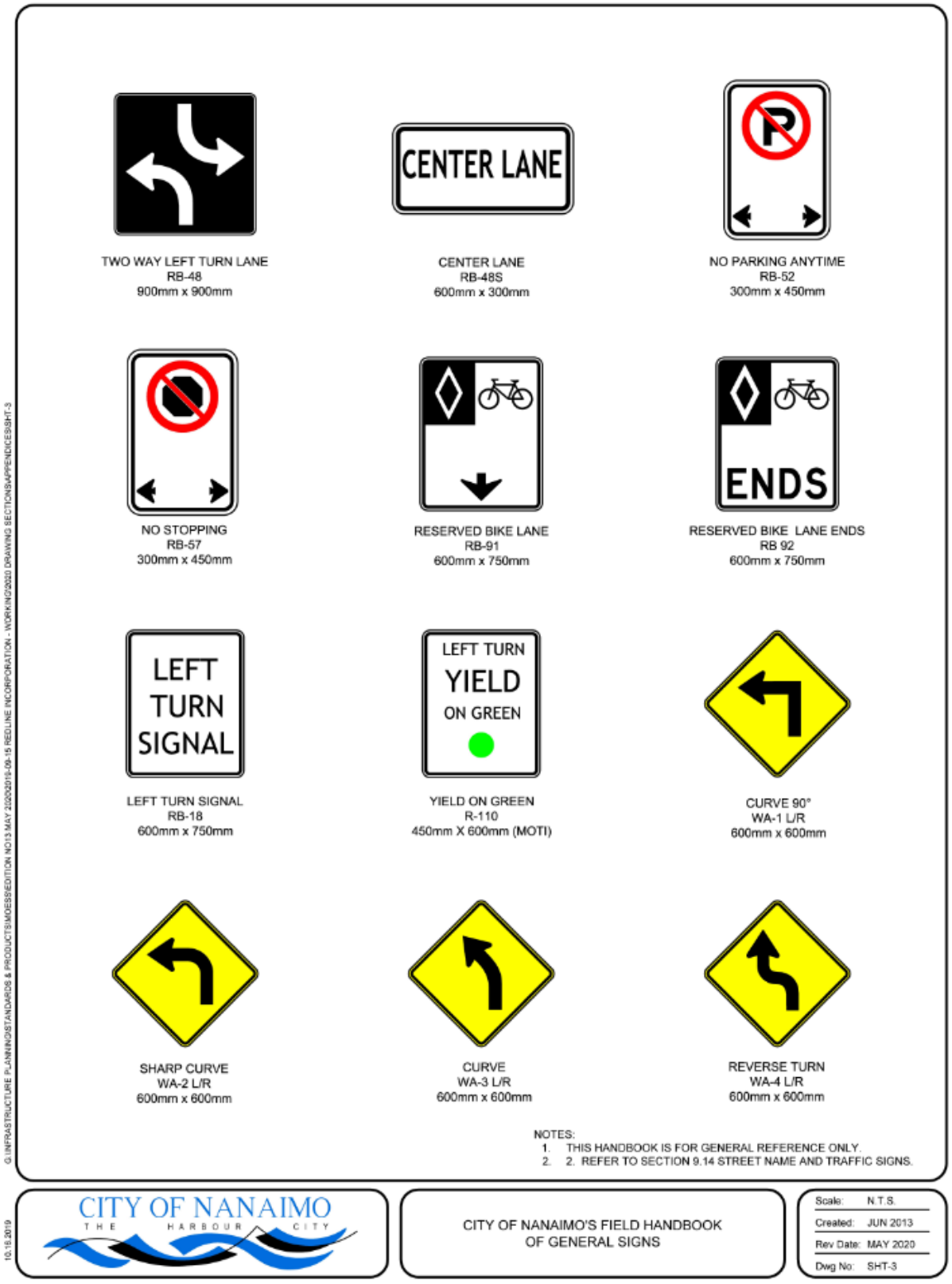
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10.16.2019

CITY OF NANAIMO
THE HARBOUR CITY

CITY OF NANAIMO'S FIELD HANDBOOK
OF GENERAL SIGNS

Scale:	N.T.S.
Created:	JUN 2013
Rev Date:	MAY 2020
Dwg No:	SHT-2



Effective April 2023



REVERSE CURVE
WA-5L/R
600mm x 600mm



WINDING ROAD
WA-6L/R
600mm x 600mm



CHECKERBOARD
WA-8B
750mm x 750mm



CHEVRON ALIGNMENT
WA-9
450mm x 600mm



CONCEALED INTERSECTION
WA-11
600mm x 600mm



ACUTE ANGLE CONCEALED INTERSECTION
WA-12L/R
600mm x 600mm



90 ANGLE CONCEALED INTERSECTION
WA-13L/R
600mm x 600mm



RAILWAY CROSSING STRAIGHT
WA-18
750mm x 750mm



RAILWAY CROSSING ANGLED
WA-18L/R
750mm x 750mm



LANE ENDS
WA-33L/R
750mm x 750mm



OBJECT MARKER
WA-36
450mm x 900mm

NOTES:
1. THIS HANDBOOK IS FOR GENERAL REFERENCE ONLY.
2. REFER TO SECTION 9.14 STREET NAME AND TRAFFIC SIGNS.

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10.16.2019

CITY OF NANAIMO
THE HARBOUR CITY

CITY OF NANAIMO'S FIELD HANDBOOK
OF GENERAL SIGNS

Scale:	N.T.S.
Created:	JUN 2013
Rev Date:	MAY 2020
Dwg No:	SHT-4



OBJECT MARKER
WA-36L
300mm x 900mm



ROUNDABOUT DIRECTION
WA-38
60mm x 1660mm



ROUNDABOUT AHEAD
WA-39
900mm x 900mm



NEIGHBOURHOOD SPEED HUMP
WA-50
600mm x 600mm



STOP AHEAD
WB-1
750mm x 750mm



YIELD AHEAD
WB-2
750mm x 750mm



SIGNAL AHEAD
WB-4
600mm x 600mm



BIKE LANE AHEAD
WB-10
750mm x 750mm



SCHOOL CROSSWALK AHEAD
WB-16L/R
600mm x 600mm



PEDESTRIAN CROSSWALK AHEAD
WC-2L/R
600mm x 600mm



PLAYGROUND AHEAD
WC-3R/L
600mm x 600mm



BICYCLE CROSSING AHEAD
WC-7
600mm x 600mm

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10.15.2019

CITY OF NANAIMO
THE HARBOUR CITY

CITY OF NANAIMO'S FIELD HANDBOOK
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Scale:	N.T.S.
Created:	JUN 2013
Rev Date:	MAY 2020
Dwg No:	SHT-5

Effective April 2023



FIRE TRUCK ENTRANCE
WC-17L/R
750mm x 750mm



BIKE PEDESTRIAN CROSSING AHEAD
WC-46L/R
600mm x 600mm



BIKES ON ROADWAY
WC-19
600mm x 600mm



CUL-DE SAC SIGN
ID-31
600mm x 600mm



PEDESTRIAN PUSHBUTTON SIGN
ID-21L/R
130mm x 200mm

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10.16.2019

CITY OF NANAIMO
THE HARBOUR CITY

CITY OF NANAIMO'S FIELD HANDBOOK
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Scale:	N.T.S.
Created:	JUN 2013
Rev Date:	MAY 2020
Dwg No:	SHT-6

SAMPLE - BC Hydro SLIM Connection Form – Ornamental Lights

Development Title:		Date:_____
Comments:		

Request:

Request Type**:**	
Reason Type:	
Lamp Type:	
Wattage:	
Lens Type:	
Request Details: *(# of lights, wattages, etc.)*	

Electrician:

Name:	
Company:	
Phone #:	
Permit #: ***provided by electrician*	

	SLIM ID#:_____

Effective April 2023