SECTION 1 – GENERAL DRAFTING REQUIREMENTS
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(REVISED MAY 2020)

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DESIGN DRAWINGS STANDARDS

1.01 GENERAL REQUIREMENTS

.1 A complete set of construction drawings shall consist of separate drawings of some or all of the following as determined by the City Engineer:

(a) Site plan and key plan
(b) Plan and profile for roads, drainage and storm sewers
(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 ***(REVISED MAY 2020)***
(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 shall be Arch D (24” x 36”; 610 mm x 915 mm).

.3 All drawings shall be metric. Drawing scales shall be shown on all drawings with scale bars shown for every unique plan.

.4 The drawings shall be neat and legible with adequate clearance margins between the drawing information and the title block border. Notes and text shall locate and describe the proposed work in sufficient detail to facilitate construction. Limits of construction and match lines shall be clearly marked on the drawing.

.5 North arrow shall be shown for every plan on a drawing, and shall be located at the upper left or right of the corresponding plan.

.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. Conflicts between linework, symbols, dimensioning or text shall not occur.

.7 Construction notes shall be boxed and located around the perimeter of the drawing, tagged to the drawing feature.

.8 All elevations shown on drawings shall be metric geodetic datum. The source and location of the datum shall be clearly noted on each drawing in the general notes. Refer to Section 1.42, Co-ordinate System.

.9 The drawing title block shall be completed with the following information:

(a) Project Name
(b) Project Location
(c) Drawing Title
(d) Consulting Company Name or Logo
(e) City of Nanaimo Logo
(f) Drawing Scale
(g) City of Nanaimo Engineering File Number
(h) BP Number, DP Number and SUB Number
(i) City of Nanaimo Drawing Number
(j) Revision
(k) Engineer's Name
(l) Engineer's Seal, Signature and Date

.10 Standard details such as manholes, catch basins, hydrants, etc., that are shown and described in the City of Nanaimo Standard Drawings need not be shown in detail on the drawings; the Standard Drawing No. shall be quoted on the plan for reference. 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, shall be used and may be shown in a legend on the drawings.

.11 All drawings shall bear the dated stamp/seal and signature of the professional engineer responsible for the design.

.12 Numerical values shown on the Construction drawings shall be shown to two (2) decimal places unless accuracy warrants otherwise.

1.02 SITE PLAN AND KEY PLAN

.1 The Site Plan of the construction works shall be to a scale of not less than 1:1000.

.2 The site plan shall include but is not limited to the following:

(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 100 year storm

.3 A Key Plan to a small sale, (e.g., 1:10000), showing the location of the works in relation to major streets, shall be provided in the upper right-hand section of the drawing sheet.

.4 A drawing index shall be provided and include the drawings titles, sheet numbers, and the City of Nanaimo drawing number.

.5 The following notes shall be shown on either the site plan or the first drawing of the set:

(a) "All work and materials are as described in the City of Nanaimo manual of 'Engineering Standards and Specifications' or as otherwise approved by the City Engineer."
(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 shall be notified forty-eight (48) hours prior to commencement of work."
(e) "Contractor is to comply with all applicable Ministry of Forests, Lands, Natural Resource Operations and Rural Development and Fisheries and Oceans Canada requirements at all times during construction.

1.03 PLAN AND PROFILE DRAWINGS - GENERAL

Each Plan and Profile drawings shall show but not be limited to the following information:

.1 Drawings shall be to the following scales unless otherwise approved:

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 shall be reduced to 2x exaggeration for clarity.

.2 All cadastral information including property, right-of-way and easement lines and dimensions in sufficient detail to relate design to surrounding and adjacent properties. To be included on all drawing submissions.

.3 Legal descriptions and civic addresses of existing properties.

.4 Road allowance dimensions.

.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 shall be labeled with (material type and elevation) including but not limited to the following:

(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) meter contour lines are required.

.8 Right-of-way and/or road centerline stationing shall be to metric standards (0+000) at 20 metre intervals and shall be related geometrically to legal property lines or survey monuments. Stationing shall run left to right where possible and upstream on gravity pipes.

.9 Plan and Profile drawings shall be drawn with the profile on the bottom of the drawing sheet and shall be lined up under the plan. Utility and road stationing, inverts, diameter, material type, class and grade information shall be located across the bottom of the profile.

.10 Profile elevations shall be placed at both sides of the profile. Split profiles must show elevations on both sides of the break.

1.04 ROADS

The following shall be shown in addition to the information required in section 1.03:

.1 All proposed roadworks, complete with existing elevation tie-in points and offsets from road centerline, including: pavement, curbs, sidewalks and poles.

.2 Stations of the BC & EC of road centerline and curb return horizontal curves together with the curve information including delta angle, radius, tangent length and arc length.

.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 road centerline stationing.

.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 road centerline grade.

.8 Stations and elevations of BVC, EVC, and VPI.

.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 shall be shown at intervals not exceeding twenty (20) metres.

.13 Where there is an elevation difference of more than 1.2 m from the design road centre line to a suitable building site on the adjacent parcel, driveway grades and profile shall be shown the drawings.

.14 Where only half road is being constructed, full width design cross-sections shall be provided as required to ensure the design suits the future development of adjacent properties.

.15 Typical road cross-section showing right-of-way width, proposed road design structure, pavement width, sidewalks, curbs, underground utilities, hydro, power and street light poles, hydrants and their related offsets.

.16 Additional design details as required.

1.05 STORM AND SANITARY SEWERS

The following shall be shown in addition to the information required in section 1.03:

.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 road centerline, and pipe inverts at manholes and pipe grad breaks.

.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 then (10) metre intervals.

.7 Existing and proposed pipe crossings to be shown in 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 shall be in a table.

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

.10 Basement elevations for existing buildings.

.11 Routing of all major storm flows including the 100 year storm with minimum basement floor elevations provided for properties with the potential to be affected by the major storm flows.

.12 The design flow rate and return period shall be noted on each storm drawing.

.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

The following shall be shown in addition to the information required in section 1.03:

.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 road centerline. For all rehabilitation all proposed waterworks as stated above shall be with offsets and stationing related to the centerline of pipe alignment.

.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 1.2m).

.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 road centerline, the following shall be provided:

(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 shall be shaded, labeled and dimensioned from adjacent fitting showing the length of pipe requiring restraint.

.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 The following information shall be shown in addition to the information required for the plan view in section 1.03:

(a) pole, conduit and appurtenances locations with offsets and stationing related to road centerline.
(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 shall be numbered and pertinent information, (i.e. wattage, lamp type, pole height and location including co-ordinates as per Section 1.42 - Co-ordinate System) shall be shown as per Standard Drawing No. G-7.

.3 The plan shall be to scale of 1:1000, 1:500, or 1:250.

.4 Traffic signal drawings shall generally conform to Section 10.02 - Traffic Signals.

1.08 SIGNAGE AND PAVEMENT MARKINGS

.1 A separate plan shall be prepared in all cases for signage and pavement markings. This plan shall detail all eradications, alterations, additions and new regulatory and advisory signage and line painting. The design shall conform to the Manual of Standard Traffic Signs and Pavement Markings by MoTI or the Manual on Uniform Traffic Control Devices (MUTCD) or City of Nanaimo Traffic and Highway Installation Guidelines. The following information shall be shown:

(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 shall be to a scale of 1:500 or 1:250.

.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 shall be determined by the designer to suit the design detail, and shall be included for each detail.

.3 Where road cross-sections are required they may be provided on a separate sheet.

1.10 CROSS-SECTIONS

.1 Cross-sections shall be to a scale of 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.

.2 Starting at the lower left hand corner of the drawing sheet, cross-sections shall be placed up the sheet in order of increasing stationing. Grid elevations shall be shown at the left hand side of each cross-section and stationing shall be shown above each cross-section. Adequate space shall be left between cross-sections so as to ensure clarity.

.3 Cross-sections shall include:

(a) Design road cross-section within the right-of-way.
(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 shall be undertaken by a Landscape Architect registered with the British Columbia Society of Landscape Architects (BCSLA).

.2 The landscape architect shall 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.

.3 The following information shall be shown in addition to the information required for the plan view in Section 1.03:

(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. ***(REVISED MAY 2020)***
(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. ***(REVISED MAY 2020)***

.4 A typical R.O.W. cross section drawing indicating the relationship of all plantings to overhead, above-ground and below-ground utilities, and pavement and other structures shall be referenced and shown on the landscape plan or, if there is insufficient room, on a details and cross-section sheet.

.5 Typical tree, shrub and groundcover cross section planting details shall be referenced to specific City of Nanaimo standard details Section 14.0, or if alternate details are proposed, these shall be included on the landscape construction drawings.

.6 An irrigation plan shall be produced, using the same base information, which shows:

(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 of Nanaimo standard details Section 14.0 or if an alternative is proposed, by details shown on the landscape construction drawings.

1.11A TREE MANAGEMENT PLAN ***(REVISED MAY 2020)***

.1 All Tree Management Plan drawings are to be prepared in consultation with a qualified arborist. ***(REVISED MAY 2020)***

.2 The following information shall be shown on the Tree Management Plan: ***(REVISED MAY 2020)***

(a) Existing and proposed works and legal property lines, right-of-way, easement and covenant areas. ***(REVISED MAY 2020)***
(b) Existing trees (including trees within 5 m of right-of-way and/or property lines. ***(REVISED MAY 2020)***
(c) Trees to be protected and trees to be removed. ***(REVISED MAY 2020)***
(d) Location and details of tree protection fencing as per Section 3.27. ***(REVISED MAY 2020)***
(e) Table itemizing tree removal and replacement requirement as per the Management and Protection of Trees Bylaw including size and species. ***(REVISED MAY 2020)***
(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. ***(REVISED MAY 2020)***
(g) Legend to identify trees to be removed, trees to be retained and the tree replacements. ***(REVISED MAY 2020)***

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 that shall be shown on Stormwater Management Plans.

1.13 CERTIFICATION OF WORKS

.1 A certification of design conforming to Appendix G1 and signed and sealed by a Professional Engineer shall be submitted with the design drawings.

OTHER GENERAL REQUIREMENTS

1.15 -NOT USED-

1.16 SURVEY CONTROL MONUMENTS

.1 Survey control monuments shall be installed in accordance with Specifications for Control Surveys as prepared by the Province of British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development. The brass plugs are to be accurately drilled by a registered British Columbia Land Surveyor, by City forces, as development growth requires.

RECORD DRAWING STANDARDS

1.20 GENERAL REQUIREMENTS

.1 Drawings shall include all information as specified elsewhere for the construction drawings, but shall be corrected upon completion of construction to note all works removed or abandoned during construction.

.2 Removed utilities shall not be shown on the record drawings. Abandoned utilities shall be displayed and labeled as abandoned on the record drawings.

.3 Line work for all constructed works shown on the drawings shall retain the thicker line density. Proposed construction for future phases of the project shall not be shown on the record drawings.

.4 All dimensions, elevations and inverts shown shall reflect the post construction conditions of the site and all references to 'Proposed' shall be removed. The revision table within the title block shall be completed indicating the drawings are the record drawings.

.5 The record drawing shall 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.

.6 The City of Nanaimo's Engineering and Public Works Department administers a Geographic Information System (GIS) to manage location and attribute data related to underground utilities, roads, 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 shall be clearly labeled or identified on the record drawing:

(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 block for all post construction infrastructure shall be included on the record drawings. Refer to Standard Drawing No. G-4I.

(f) Sanitary Sewer System Plan shall include:

(i) Diameter and material of sanitary mains and service connections
(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 shall include:

(vi) Length, diameter, material and grade of sanitary mains
(vii) Upstream and downstream manhole rim and invert elevations
(viii) Identification of drop manhole structures

(g) Stormwater System Plan shall include:

(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 shall include:

(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 shall include:

(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 shall include:

(v) Diameter and material of watermains
(vi) Invert elevations at pipe tie-in and hydrant locations

(i) Fibre Optic Utility Plan shall include:

(i) Conduct size and type
(ii) Access type

(j) Streets, Street Lighting, Traffic Signs and Markings Plan shall include:

(i) Road classification as per Section 8.0 Transportation. ***(REVISED MAY 2020)***
(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

(k) Landscape and Irrigation Plan shall include:

(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 shall be submitted on 3 mil mylar. Drawings must be sealed and signed by the Design Engineer. Three prints of the site plan shall be provided.

.2 The following information shall be submitted with the record drawing submission:

(a) Appendix E, Substantial Completion Statistics Record.
(b) A completed City of Nanaimo Service Sheet in accordance with Appendix F1 or Appendix F2 shall be submitted for each lot showing the as constructed location of all service connections.
(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 Engineer.
(e) A copy of the final inspection deficiency list.
(f) Certification of the works that include the following:

(i) A certification of Installed Works conforming to Appendix G2 and signed and sealed by a Professional Engineer
(ii) A Certification of Street Light Installation conforming to Appendix G3 and signed and sealed by a Professional Electrical Engineer
(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 shall be submitted in the most current version of AutoCAD or Civil 3D (C3D). Refer to Section 1.40.6. No formats prior to 2013 shall be accepted. ***(REVISED MAY 2020)***

.2 All as constructed features shall be surveyed and survey points imported into the digital drawing. ***(REVISED MAY 2020)***

.3 The digital drawing shall contain all works removed or abandoned during construction. The following layers shall be used:

(a) ABD-GAS Gas Infrastructure
(b) ABD-SAN Sanitary Infrastructure
(c) ABD-STM Storm Infrastructure
(d) ABD-WAT Water Infrastructure
(e) REMOVED-CURB Curbs
(f) REMOVED-EP Edges of Pavement
(g) REMOVED-PAINTLINE Paintlines
(h) REMOVED-SAN Sanitary Infrastructure ***(REVISED MAY 2020)***
(i) REMOVED-SIGN Signs ***(REVISED MAY 2020)***
(j) REMOVED-STM Storm Infrastructure
(k) REMOVED-SW Sidewalks
(l) REMOVED-WAT Water Infrastructure

.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

CAD STANDARDS

1.40 COMPUTER AIDED DRAFTING STANDARDS OVERVIEW

.1 All infrastructure and land development engineering drawings for projects completed in the City of Nanaimo shall use the City of Nanaimo CAD standard.

.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. ***(REVISED MAY 2020)***

.3 Standards were developed for use in C3D. All City of Nanaimo 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 of Nanaimo. ***(REVISED MAY 2020)***

.4 For the most current City of Nanaimo Drawing Template version, refer to the City of Nanaimo website or contact the Engineering Projects Division.

.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. ***(REVISED MAY 2020)***

.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. ***(REVISED MAY 2020)***

1.41 TEMPLATE DRAWINGS

.1 City of Nanaimo 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 MAY 2020)***

(a) C3D Template. ***(REVISED MAY 2020)***
(b) C3D Pipe Catalog. ***(REVISED MAY 2020)***

.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 CO-ORDINATE SYSTEM

.1 All drawings shall be based on a ground coordinate system that is related to the Universal Transverse Mercator (U.T.M.) Projection that is tied to City of Nanaimo's integrated survey monument network. To convert the published 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 of Nanaimo must use this common ground coordinate system within the borders of Nanaimo.

.2 If the consultant obtains cadastral and other digital files form the City's GIS, these will be 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).

.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 of Nanaimo 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 Layer naming conventions for existing and proposed conditions shall be adhered to. In the event that new layers are required, the consultant shall create the layer name using the standard City of Nanaimo layer naming convention and notify the project manager.

.2 The City of Nanaimo incorporates a categorized CAT layer naming convention used to represent existing and proposed conditions. The naming convention is as follows:

CAT1-CAT2-CAT3

(a) CAT1 represents the feature stage - e.g. EX (for existing), PR (for proposed), REM (for Removed) or ABD (for Abandoned).
(b) CAT2 is used to describe the major feature such as STM (storm), SAN (sanitary), WAT (water), RD (road), etc.
(c) CAT3 is an additional identifier such as TXT (text), PROF (profile), PNTS (points), etc.
(d) For clarity, each category is delimited by a dash. (eg. PR-WAT-TXT)

.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 of Nanaimo design drawings.

1.44 STANDARD SYMBOLS AND ABBREVIATIONS

.1 The City of Nanaimo requires that engineering and construction consultants use City of Nanaimo approved standard symbols and abbreviations for the preparation of the design drawings.

.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.