

## **PURPOSE**

The purpose of this policy is to outline the minimum standards and requirements the City will accept in the submissions of designs, drawings, and data for engineering work(s) and services regulated under Subdivision, Development & Servicing Bylaw No. 7900.

## **POLICY SCOPE**

This policy applies to all submissions of engineering designs, drawings, and data submitted related to works and services regulated under Subdivision, Development & Servicing Bylaw No. 7900. The City Engineer or designate will review each submission for conformance.

## **BACKGROUND**

This policy replaces Council Policy 265: Engineering Drawing Submission Requirements.

## **PROGRAM GUIDELINE**

The Engineering Data Submissions (EDS) Committee will regularly review and assess submission requirements and forward recommendations for updates to the General Manager, Infrastructure.

## **ENGINEERING DRAWING SUBMISSION REQUIREMENTS**

### **A. GENERAL**

Drawings may combine various services on one plan but must be clear, readable and agreed upon by the City Engineer or designate prior to the acceptance of Issued for Construction drawings. Refer to the table below for requirements.

<b>Drawing Submission Options</b>			
	<b>Combining Services</b>	<b>Color</b>	<b>Greyscale</b>
<b>Preliminary Designs</b>	Yes	Yes	Yes
<b>Detail Designs</b>	Yes	Yes	Yes
<b>Issued for Construction</b>	Yes	Yes	Yes
<b>Record Drawing</b>	No	Yes	Yes

### **B. DRAWING STANDARDS**

Drawings shall clearly show the existing, proposed and to be abandoned locations of all utilities using offsets from property lines or boundaries of rights-of-way.

Dimensioning and "offset measurements" required by this policy may be minimized on the construction drawings. However detailed field measurements are required on the record drawings, for City records, in accordance with this policy.

Elevations shall be relative to geodetic datum. The horizontal coordinates shall be referenced to the UTM NAD 83 coordinate system. A minimum of one (1) reference benchmark with elevation shall be shown on each design drawing.

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Chainage shall increase from left to right and from bottom to top on a drawing. North should be at the top or right side of a drawing. North arrow should be placed on the drawing as to not obstruct the design elements.

Where a City of Kelowna standard drawing exists, it shall be sufficient to refer to the appropriate drawing by reference number and date of issue. Where a standard drawing does not exist, or is unsuitable for a particular case, detail drawings shall be provided.

All drawings shall be signed and sealed by an appropriate Professional registered in British Columbia.

### **Sheet Sizes**

Drawing shall be submitted using the following standard sheet sizes (outside dimensions):

- ANSI D 558.8 mm x 863.6 mm (22" x 34")
- ANSI B 279.4 mm x 431.8 mm (11" x 17")

All drawing submissions must be produced using ANSI D paper size, unless mutually agreed otherwise. ANSI B paper size to be utilized as a fully scalable half-size plot (field reviews).

### **Title Block**

The City of Kelowna standard title block shall be used for all drawings. The title shall describe the contents of the drawing (e.g. key plan, road, etc.) and shall clearly indicate the location of the works by road name(s). Do not include developer name or legal descriptions in title area.

### **Scales**

The following scales shall normally be used:

Location Plans:	1:2500; 1:5000; 1:10000
Composite Plans:	1:500
Details:	1:100; 1:75, 1:50; 1:20; 1:10
Plan/Profile:	Horizontal 1:500, 1:250, or 1:200 Vertical 1:100, 1:50, 1:25, 1:20
Cross-Sections:	Horizontal 1:100 Vertical 1:50, 1:20, 1:10

### **Dimension, Units and Text**

All Dimension must be shown in metric and maintain an accuracy of minimum of 2 decimals places. All text shall be Leroy font and maintain a ratio of 1:10 between the text height and printed line thickness.

- Minimum printed text height is 1.5mm
- Maximum printed text height is 5mm
- Standard text height is 2mm

### **Legend**

The legend shall be contained on the City's standard sheet size.

### **Media Submissions**

Drawings shall be submitted using the following media types:

- Preliminary or design drawings – electronic (PDF)
- Record drawings – electronic (PDF)
- Record drawings – AutoCAD drawing format and all digital files (i.e. AutoCAD)

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Digital files submitted to the City of Kelowna must be in a current AutoCAD drawing file format. The information may be supplied on a USB flash drive or other method. The submission must include all files required to create the project. Any AutoCAD objects used to create the drawing must remain intact and may not be exploded or modified.

### **Drawing and Plotting Appearance**

The City's Civil3D template can be downloaded from the City's website. The template is based on AutoCAD conventions and plotted drawing appearance, including a title block. All drawing submission must follow the layering, symbology and line types as contained in the template.

### **The following information must be included on all drawings;**

#### ***Plan View:***

- Offset of pipelines from property lines.
- The infrastructure diameter and material of pipe. (e.g. WAT 250mm PVC DR 25)
- Offset of service connections from nearest property line.
- The locations of manholes, clean-outs and services relating to property lines.
- Information on any curves or deflections, if applicable, to pipe design.
- Easements; existing and/or required. Reference applicable plan number on the drawing.
- Future works as required.
- The extent of work required of the City of Kelowna to make the connection(s) to existing live mains.
- The location of hydrants, valves, end of the main, services and other appurtenances tied to the nearest property line.
- Note the location of any abandoned infrastructure.

#### ***Profile View:***

- Surface profiles (existing and design, if applicable) over proposed main.
- Infrastructure length, diameter, material and grade of pipe (e.g. WAT 84 m – 200 mm PVC DR 25 @ 1.15%).
- Profiles of invert and crown of pipes.
- Percent grades to two decimal places.
- Bedding, backfill and surface restoration requirements.
- Location, diameter, material, and invert elevation of all crossing utilities (existing and abandoned).
- Profile only of any existing, proposed, or abandoned infrastructure.
- Storm, sanitary sewers, water, and culverts.

## **C. REQUIRED DRAWINGS**

Each set of drawings shall include the following drawings and shall be presented in the same order:

### **Cover Sheet**

The cover sheet shall note the consultant's name and phone number, a description of the project, the City project number, legal description of the lands involved, a site location plan and a drawing index of all the drawings provided in the submission. The following statement must be contained on the cover sheet and discrepancies or deviations are to be noted if present;

*"The Professional of Record responsible for the design confirms that the drawing set provided complies with City of Kelowna Bylaw 7900, the Engineering Drawing Submission Requirements Policy, and the Approved Products List Policy. Any discrepancies or deviations are noted below:"*

### **Legend and General Notes**

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The legend and note sheet shall contain the project legend and general project notes any specific notes must be contained on the appropriate drawing.

### **Composite Plan**

The composite plan shall show the area being served with lot numbers, and all active and proposed Works and Services. Geodetic survey monuments will be shown.

### **Removal Plan**

The removal plan shall show any infrastructure or objects that will be removed during the proposed Works and Services.

### **Road Drawings (Plan/Profile)**

Both plan and profile stationing must be tied to a property line or road boundary. Drawings shall show width of road, road structure, width of shoulders and the offset of curb from property line.

Chainages of the BC and EC of horizontal curves shall be shown together with the delta angle, centreline radius, tangent length, and centreline arc length. Curb radii are not required if the centreline radius and road width are shown, except on curb returns at intersections and at the end of cul-de-sacs.

The percent grade to two (2) decimal places shall be shown on the profile, together with the following information on vertical curves:

- The chainage and elevations of B.C., E.C. and P.I.
- The external value, e.
- The length of vertical curve.
- The chainage and elevation of the low spot of sag curves.
- K value of vertical curvature (crest on sag).

Profiles are to show all relevant surface features including:

- Existing ground elevation along the centreline of proposed roadway and/or the edge of existing asphalt.
- Existing curbs, gutters and sidewalks.
- Elevation of private driveways, doorways, and sidewalks at property line, and any other relevant information.
- The designed gutter and/or centreline grade.

On super-elevated curves and crossfall sections, the drawings shall show a profile of each gutter with pertinent gutter elevations either on the profile or in tabular form. At all intersections, the drawing shall show a profile of each curb return with pertinent gutter elevations.

The profile shall be shown at true centreline length and projected above to the plan in as close a relationship as possible. The plan shall show the location of catch basins (using road chainage) and catch basin leads.

### **Water Drawings (Plan/Profile)**

The top half of a Plan/Profile sheet shall show the Plan view, and shall show the legal layout, with legal descriptions of all properties, the location of all sidewalks, catch basins, underground utilities such as sewer, storm, water, telephone, television, fibre, power, manholes, valves, hydrants, and all survey monuments

Drawings shall also show existing dwellings, fences, trees, hedges, unusual ground features, existing roads and driveways including the type such as asphalt, concrete or gravel.

Baselines and proposed works are to be referenced to legal corner(s) on each sheet. Dimensions of road allowances are to be shown on each sheet.

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**Plan View:**

The following information shall be shown on the PLAN VIEW:

- Information as detailed under "General" and "Drawing Standards".
- The location of hydrants, valves, end of the main, services and other appurtenances dimensioned from the nearest property line.
- Size, type, make & model of pipes, valves and fittings. This information can be placed on drawing as note or as a table.

**Profile View:**

The following information shall be shown on the PROFILE VIEW:

- Information as detailed under "General" and "Drawing Standards".
- Invert elevations of fittings or other appurtenances.

**Storm Sewer and Sanitary Sewer Drawings (Plan/Profile)**

Infrastructure must be separated, refer to Section A.

The top half of a Plan/Profile sheet shall show the Plan view, and shall show the legal layout, with legal descriptions of all properties, the location of all sidewalks, catch basins, underground utilities such as sewer, water, telephone, television, power, manholes, valves, hydrants, and all survey monuments, etc.

Drawings shall also show existing dwellings, fences, trees, hedges, unusual ground features, existing roads and driveways including the type such as asphalt, concrete or gravel.

Baselines and proposed works are to be referenced to legal corner(s) on each sheet. Dimensions of road allowances are to be shown on each sheet.

The drawings shall show the structural details of all manholes and chambers, etc. not covered by standard drawings. Where the sanitary sewers and storm drains or other utilities are to be installed in a common trench, a typical cross-section showing vertical and horizontal distances between pipes and classes of pipe and bedding shall be shown.

**Plan View:**

The following information shall be shown on the PLAN VIEW:

- Information as detailed under "General" and "Drawing Standards".
- Unique Manhole identification numbers.
- For pipes servicing lots, inverts of connections at property line. Inverts to be "boxed in" for easy identification and dimensions from nearest property line.
- For pipes servicing lots, basement elevations on each house.
- For sanitary sewer, where service connections are required, location of existing septic tanks.
- For storm drainage, features such as ditches, culverts, streams, channels, etc.
- Size, type, make & model of pipes, valves, and fittings. This information can be placed on drawing as note or as a table for information to servicemen and to confirm parts are on the Approved Products List.
- For pipes servicing lots, basement elevations on each house.
- A table including catch basin information, coordinates and rim elevations.

**Profile View:**

The following information shall be shown on the PROFILE:

- Information as detailed under "General" and "Drawing Standards".
- Invert elevations at both inlet and outlet of manholes.

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- Designation of manhole stationing.
- Unique manhole identification number.
- For pipes servicing lots, basements elevation with symbols.
- For pipes servicing lots, service connection symbols for invert elevation at the property line.
- Rim elevations of proposed or adjusted manholes, as required.

### **Lot Grading Plan**

Plan shall note:

- The pre-development contour lines. This topography shall extend a minimum 30.0 m outside the development site;
- all existing corner lot elevations (un-circled);
- all proposed corner lot elevations (circled);
- The proposed building envelope with the Minimum Basement Elevation (MBE) noted;
- The slope of the lot (directional arrow), noting a minimum 1% grade on the lots;
- The minor (5 year return) storm sewer system with the flows noted per section and the accumulated flows from all upstream sections. Provision must be made for upstream development potential where applicable;
- The major (100 year return) system. The Consultant shall note wherever the major system is not in the pipe or the roadway, showing the routing and flows for the 100 year return storm;
- All swales proposed to affect the submitted Storm Water Management Plan;
- Indicate how the development proposal will affect adjacent lands. Attempts should be made to "meet" existing elevations along the development boundary;
- A legend noting all items proposed in the Storm Water Management Plan. Applicable "General Notes" should also be included.

### **Storm Water Management Plan (SWMP)**

Plan shall note:

- Site and surrounding area (400 m minimum outside development) showing roads and major features (1:2500 scale). A small location plan of the watershed is also to be included.
- Contours of existing ground (1.0 m intervals where slope <20%, 2.0 m >20%) for the site and surrounding area mentioned above.
- Major flood routing (1:100 year); show as arrows and indicate if in pipe or on surface show an "open" arrow for surface routes and the same arrow "shaded" for routes in pipes).
- Detention pond details, if applicable.
- Area, in hectares, of development and the total area of drainage basin.
- Directional arrows of flow within the site and on surrounding areas.
- Sub-catchment boundaries, coefficients and areas.
- Pipe system including size, grade, and minor and major flows (a table may be utilized).
- The subject development is to be highlighted.

### **Erosion and Sediment Control Plan**

This plan is to detail methods and procedures that will be used to prevent or minimize soil displacement and transport of sediment from the Development site. This is to include methods to prevent or minimize soil transport onto adjacent properties or onto existing roads adjacent to the site (i.e. tracking from vehicles). Preventative methods of soil displacement on the site are to be detailed. The drawing shall show the following:

- Existing contours of the site at an interval sufficient to determine drainage patterns.
- Final contours if the existing contours are significantly changed.
- Final drainage patterns/boundaries.

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- Existing vegetation such as significant trees, shrubs, grass, and unique vegetation.
- Limits of clearing and grading.
- Erosion and sediment control measures (temporary and permanent) including locations, names and details, in accordance with "Best Management Practices for Erosion and Sediment Control – Upland Works, City of Kelowna" and "Land Development Guidelines for the Protection of Aquatic Habitat – DFO + BCMOE".
- Storm Drainage systems including drain inlets, outlets, pipes, and other permanent drainage facilities (swales, waterways, etc.).

The plan must have a narrative section describing the land, the disturbing activity and details of the methods used for controlling erosion and sedimentation. Include a description of the procedures for construction and maintenance of the control measures. Note the persons involved in maintenance and provide a maintenance schedule that is to be followed.

### **Street Lighting Plans**

Shall be a plan view (1:500) of the street lighting proposal. There shall be General Notes included on the Plan noting reference(s) to the Municipal Standards and Specifications and the appropriate design criteria. Generally, street lights shall be located at all intersections and within 1.0 m of the side property lines. Any street lighting plan(s) should be accompanied with the photometric calculations. All designs must be signed and sealed by a Professional Engineer qualified to do street light calculations.

### **Traffic Signal (Control Devices) Plans**

Traffic signal designs are highly specialized and will therefore be prepared, signed and sealed by a Professional Engineer qualified in this area of expertise.

Traffic signals will be designed in general accordance with Sections 402.6 of the Ministry of Transportation Electrical and Traffic Engineering Manual. Contrary to this manual the City uses NEMA phase designations as opposed to the Ministry movement designations. Traffic signal designs will also conform to the British Columbia Motor Vehicle Act and the Manual of Uniform Traffic Control Devices for Canada.

Traffic signal timing/coordination plans will typically be provided by the City. In the case where this work is to be provided by the Developer; a qualified traffic Professional Engineer with PTOE certification is retained by the Developer.

The following information shall be shown on the PLAN VIEW:

- Information as detailed under "General" and Drawing Standards".
- The plan will be at a scale of 1:200 with north arrow oriented at 0 degrees.
- Existing and proposed civil information including roadway, sidewalks, letdowns, underground utilities, signing and road markings.
- The designed signal including pole locations, controller location, conduits (power and communications), junction boxes, wiring/cabling, point of electrical service and any other information required by the City.
- General notes.
- Existing signal equipment to be retained and/or removed.
- City colour code chart.
- Pole coordinate table.
- Signal display schematic.
- Intersection illuminance table.
- Loop detector coordinate table (if applicable).
- Image sensor table (if applicable)
- References to Supplementary Standard Drawings.
- A table to provide pole coordinates and top of base elevation.

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The following information shall be shown on the ELEVATION VIEW:

- Information as detailed under “General” and Drawing Standards”.
- The plan will be at a scale of 1:75.
- Elevation and description for each signal pole including corresponding concrete base type, signal displays, luminaire, pushbuttons, signs and image sensor (if applicable).
- Pre-approved product list for applicable equipment to be supplied.
- References to Supplementary Standard Drawings.

### **Street Signs and Road Markings Plans**

Provide a plan which clearly shows existing and proposed traffic road markings and signage. All details will be to MUTCD standards (Manual of Uniform Traffic Control Devices for Canada prepared by the National Committee on Uniform Traffic Control) unless otherwise accepted by the City. Additional reference to the Ministry of Transportation and Highways – Manual of Standard Traffic Signs and Pavement Markings may be used when specific signs are required that are not denoted in the MUTCD. The plan will be at a scale of 1:500.

The following information shall be shown on the Plan:

- Information as detailed under “General” and “Drawing Standards”.
- Existing and proposed roadway, sidewalks, letdowns, signing and road markings.
- Existing signing and road markings to be retained and/or removed.
- The designed road markings.
- The designed signing including overhead signs mounted on pole structures.
- The sign offset and method of installation as denoted on Supplementary Standard Drawings.

### **Traffic Control Plan**

Detailed routes for traffic including vehicle, cyclist and pedestrians, construction traffic and Traffic Control on existing roads affected by construction shall be prepared and implemented in accordance with the current Traffic Control Manual for Work on Roadways, the Manual of Uniform Traffic Control Devices for Canada, all City of Kelowna Bylaws that pertain to Traffic Control and all WorkSafeBC regulations.

### **Construction Details**

Show all proposals for construction which are not covered or specifically detailed in the City Standards and Specifications. Where there is a City Standard, it is expected to refer to the Drawing Number. It is not necessary to include or provide work(s) for which there is a Standard Drawing.

### **Electrical, Gas and Communication Utilities**

Per appropriate authority (individual utilities may provide separate drawings).

### **Road Cross-Section Plans**

Shall be scaled at 1:100 horizontal and 1:50 vertical and shall note the existing ground elevation, the proposed elevations of the road centreline, the curb and gutter (or road edge) and property lines. Cross-sections are required at 20.0 m intervals. The City Engineer may waive or reduce the number of sections required where the information is not beneficial. Additional sections may be required or requested where excessive cuts or fills are involved.

## **D. DRAWING SUBMISSIONS**

The first complete design submission shall consist of:

- One complete electronic set (PDF);

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- Soils report (to verify road structure design) (Soils reports shall be required on all new road construction design) in accordance with Subdivision, Development & Servicing Bylaw;
- Utility calculations for water, sanitary, storm sewer to confirm that designed is in accordance with Subdivision, Development & Servicing Bylaw;
- Owner/consulting engineering confirmation letter;
- Quality Control and Assurance Plans for:
  - Design;
  - Construction; and
  - Record-keeping all in accordance with Schedule 3 of the Subdivision, Development & Servicing Bylaw.

Subsequent design submissions requiring changes to the previous submission shall consist of:

- One complete electronic set (PDF);
- A complete construction cost estimate;
- All submissions subsequent to first submission shall have highlighted with yellow any changes made by the Design Engineer which are in addition to "Red Line" changes required by the City;
- Items "Red Lined" must be addressed by the Design Engineer. Failure to do so will result in submissions being returned.

The Issued for Construction submission shall consist of:

- One complete sealed electronic set (PDF).
- A complete construction cost estimate.
- Electronic digital AutoCAD files.

**E. CONSTRUCTION ESTIMATE**

The construction cost estimate shall be broken down in a format as approved by the City Engineer or designate and follow MMCD Specification convention. These items and costs will be reviewed and amended where or if necessary.

**F. RECORD DRAWINGS AND SERVICE INFORMATION**

Record drawings, new and decommissioned service connection cards, hydrant data sheets, and construction estimate must be submitted to the City Engineer or designate. Record drawings shall include relevant construction and design information, including incorporation of all material design changes made during construction. Notes shall be modified to reflect actual construction. Any existing infrastructure that has been abandoned in place must remain on the drawing and be labeled accordingly. Any infrastructure removed during construction must be deleted from the record drawings.

AutoCAD data that is forwarded to the City by the Consultant must conform to the requirements and formats set out herein. The AutoCAD data submission must be same file that was used to generate the approved design. Failure to comply will result in work being returned to the Consultant for correction at the Consultant’s expense.

Service connection cards, Service disconnect cards, and hydrant data sheets in the format provided by the City are to be forwarded to the City Engineer or designate at the time of submission of the record drawings. The service records shall clearly detail the location of all services. If connections are skewed to the property line, the connection shall be located at the main by showing the distances from property lines as well as located at the property line. The hydrant data sheets must be supplied for each hydrant and include fire flow data to confirm that they meet Bylaw 7900.

The following procedures shall be followed in the submission of "Record" drawings for municipal acceptance:

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- Record drawings and service information must be submitted within 90 days of the issuance of substantial completion.
- Sealed record drawings and all information noted within Section F. One marked-up set of the record prints may be returned to the Consultant for revisions.
- Drawings must be signed and sealed by an appropriate professional registered in British Columbia. The drawings must contain the following declaration as recommended in the EGBC [Guide to the Standard for the Authentication of Documents](#) (5.3.2.3.8.9):
  - “The seal and signature of the undersigned on this drawing certifies that the design information contained in these drawings accurately reflects the original design and the material design changes made during construction that were brought to the undersigned’s attention. These drawings are intended to incorporate addenda, change orders, and other material design changes, but not necessarily all site instructions.”
- If as-constructed information provided by others has been incorporated into the sealed record drawing, the following additional disclaimer, as recommended in the EGBC Guide, is acceptable. Record drawings may not contain any additional disclaimers:
  - “The undersigned does not warrant or guarantee, nor accept any responsibility for, the accuracy or completeness of the as-constructed information supplied by others contained in these drawings, but does, by sealing and signing, certify that the as-constructed information, if accurate and complete, provides an as-constructed system which substantially complies in all material respects with the original design intent.”

Record drawings shall include the following drawings:

- All drawings contained in the Issued for Construction set, with the following exceptions:
  - Removal Plan,
  - Erosion and Sediment Control Plan,
  - Traffic Control Plan, and
  - Road Cross-Sections

The Professional Engineer shall also submit the "Assurance of Professional Field Inspection and Compliance Form"

Final inventory sheets of infrastructure installed in format as provided by the City Engineer or designate.

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