

2. Drawing Standards

The following standards apply to detailed design drawings submitted to the Town for review and to plan of record drawings for the completed municipal infrastructure.

2.1 General

- 2.1.1 Detailed design drawings shall provide a complete description of the existing and proposed infrastructure, provide sufficient information to construct the proposed infrastructure, and indicate any provisions for future extension of utilities and systems.
- 2.1.2 All drawings shall include the following:
 - a.) A suitable title which identifies the project;
 - b.) Drawing scale;
 - c.) North direction indicator;
 - d.) Date of issue; and
 - e.) Drawing number (a Town drawing number may be provided by the Town for Plan of Record preparation).
- 2.1.3 The title block must indicate the following information:
 - a.) Developer's name;
 - b.) Consultant's name;
 - c.) Subdivision name and stage number;
 - d.) Drawing name;
 - e.) Drawing number;
 - f.) Revision number;
 - g.) Drawing scales (horizontal and vertical) with scale bar;
 - h.) Table listing the name, signature, and signature date for the designer, drafter, checker, and approver;
 - i.) Table listing the revision number, date, description, designer, and approver for all drawing revisions;
 - j.) Table listing the dates for each of the various issues (i.e. preliminary, tender, construction, plan of record) of the drawing with the initials and date of the approver corresponding to each issue;
 - k.) Professional stamps and permits, as applicable; and
 - l.) A 10 cm wide by 1.5 cm tall space in the lower right hand corner of the drawing for the Town's drawing number.
- 2.1.4 Dimensions and measurements shall be in metric units.
- 2.1.5 All elevations shall be referenced to geodetic datum.
- 2.1.6 Lettering must clearly legible, 2 mm size or larger.
- 2.1.7 Drawings shall be standard A-1 size (594 mm by 841 mm).
- 2.1.8 Where drawing submissions to the Town are required, in addition to the specified number of hardcopies, also provide the Town with one (1) copy of the applicable drawings electronically in AutoCAD and PDF format.

2.2 Required Drawings

The following drawings are required and shall include the information specified:

2.2.1 Cover Sheet

- a.) The cover sheet shall identify the subdivision name and stage number and/or development name, Developer's name, Consultant's name, and the Town of Whitecourt.
- b.) A key plan of the Town of Whitecourt will be included and will clearly indicate the location of the overall development and identify the location of the subdivision stage.

2.2.2 Legend and Abbreviations Sheet

- a.) This drawing shall indicate and define all symbols and abbreviations used in the drawings. Alternatively, the Town may require use of legends on individual drawings, as applicable.

2.2.3 Index Plan

- a.) This plan drawing shall delineate the coverage of each plan/profile drawing covering the Subdivision/Development for the drawing set.

2.2.4 Legal Plan

- a.) This plan drawing shall illustrate all legal and easement information for the site.
- b.) The plan shall indicate the proposed land uses for the site.

2.2.5 Road and Walkway Overall Plan

- a.) This plan drawing shall illustrate the location of all road right-of-way, lanes, boulevards, sidewalks, trails, walkways, and emergency access.
- b.) Identify light duty and heavy duty pavement including but not limited to asphalt or concrete areas.
- c.) Provide cross-sections.
- d.) Identification of road right-of-way names or temporary designations.
- e.) Alignments of adjacent roads, lanes, boulevards, and walkways including identification by names or designations.
- f.) Alignments and locations of existing and proposed surface infrastructure including curb, gutter, sidewalk, sidewalk connectors, paraplegic ramps, and bus stop pads.
- g.) Location of any proposed postal boxes. Note that locations shall be coordinated with Canada Post and should be provided in locations that are accessible to the general public and do not interfere with the vehicular function of the roadway.
- h.) Signage and road marking plan identifying street names, regulatory signs, transit pad location, signs, details, sign placement, and any required temporary or permanent thermoplastic lane markings.
- i.) The location of potential future extensions shall be identified.

2.2.6 Overall Utility Plan

- a.) This plan shall indicate the alignment, diameter, slope, type, and material of all existing & proposed water, wastewater, and storm mains.
- b.) All valves, hydrants, manholes, catch basins, and other appurtenances shall be identified and labeled.
- c.) The location of potential future extensions shall be identified.

2.2.7 Stormwater Drainage Basin Overall Plan

- a.) This plan shall illustrate the stormwater drainage basin within which the overall development is located.
- b.) The limits of the drainage basin shall be clearly delineated.
- c.) The location and identification of the Subdivision/development shall be indicated.
- d.) The alignment of any existing or proposed trunk sewer mains within the drainage basin shall be shown, along with their respective pipe diameters.
- e.) Stormwater catchment areas shall be delineated within the development area.
- f.) Existing and proposed stormwater management facilities, ponding areas, and overflow areas within the drainage basin shall be located and identified.
- g.) Major drainage routes through the drainage basin, along with any receiving drainage courses, shall be illustrated and identified. The plan shall indicate the anticipated flow depths and velocities resulting from a 1:5-year rainfall event, and identify any ponding areas and overflow areas resulting from a 1:100-year rainfall event.
- h.) Where major system flows shall discharge or overflow into any watercourse, ravine, or environmental reserve, the rate and projected frequency of the flows shall be noted on the plan.
- i.) Show pre and post development flow calculations with confirmation on all high-density residential and non-residential developments that post development flows are being released to the Town system at pre-development rates.
- j.) The plan shall indicate the proposed finished grades of roadways and other surfaces within the Subdivision with arrows indicating direction of overland flow.
- k.) The plan shall indicate the intentions for the roof top drainage conveyance and downspout location design, where required.
- l.) The plans shall indicate:
 - i. Alignment, diameter, grade, pipe material, and direction of flow of all sewer mains; Location of all manholes, catch basins, and other appurtenances;
 - ii. Alignment, diameter, and direction of flow of all foundation drain discharge collection sewers with the location of cleanouts;
 - iii. Delineation, identification, and area of all local drainage areas contributing drainage to the proposed stormwater management system;
 - iv. Location of all stormwater management facilities including all applicable information regarding normal water levels, high water levels, storage volumes, freeboards, pond bottom elevations, side slopes, contributing basin size inlet and
 - v. Outlet elevations and locations, overflow elevations and locations;
 - vi. Location of potential future extensions;
 - vii. Notation indicating the lowest allowable building opening elevation for lots adjacent to stormwater management facilities; and
 - viii. Stage-volume and stage-area curves for all stormwater management facilities.
- m) Tables shall be provided summarizing design calculations for the stormwater management system and shall list the following information for each sewer main:
 - i. Sewer main identification number;
 - ii. Upstream and downstream manhole identification numbers;
 - iii. Upstream and downstream manhole rim and invert elevations; Incremental drainage area directly served by sewer main (ha);
 - iv. Cumulative drainage area served by sewer main (i.e. upstream sewer main drainage area plus incremental drainage area, in ha);
 - v. Runoff coefficient, C, for drainage area directly served by sewer main; Incremental drainage area multiplied by the runoff coefficient for drainage area directly served by sewer main;
 - vi. Cumulative total of runoff coefficient multiplied by drainage area (i.e. upstream sewer main calculation plus incremental calculation);
 - vii. Inlet time (min); Travel time (min);
 - viii. Rainfall intensity (mm/hr); Calculated design flow (m³/s); Pipe size (mm);
 - ix. Pipe grade (%); Pipe length (m);
 - x. Pipe capacity (m³/s); and
 - xi. Flow velocity (m/s).

Separate tables should be provided to describe interim and ultimate conditions where staging of the development will occur and impose distinct conditions on the proposed stormwater management system.

- n) Tables summarizing design calculations for the stormwater management system shall list the following information for each catch basin and lead:
 - i. Catch basin identification number; Street name;
 - ii. Frame type;
 - iii. Depth of flow (mm); Lead diameter (mm); Lead slope (%);
 - iv. Design flow rate (m³/s);
 - v. Catch basin capacity (m³/s); and
 - vi. Lead capacity (m³/s).

2.2.8 Wastewater Drainage Basin Overall Plan

- a.) This plan shall illustrate the wastewater drainage basin within which the overall development, defined by the Area Structure Plan, is located.
- b.) The limits of the drainage basin shall be clearly delineated.
- c.) The location and identification of the Subdivision shall be indicated.
- d.) The alignment of any existing or proposed trunk sewer mains within the drainage basin shall be shown, along with their respective pipe diameters.
- e.) Wastewater catchment areas shall be delineated within the Subdivision.
- f.) Information on underground pipeline systems including the following:
 - i. Alignment, diameter, grade, pipe material, and direction of flow of all sewer mains;
 - ii. Location of all manholes and other appurtenances;
 - iii. Delineation, identification, and area of all local drainage areas contributing drainage to the proposed wastewater collection system; and
 - iv. Location of potential future extensions.
- g.) Tables summarizing design calculations for the wastewater collection system shall list the following information for each sewer main:
 - i. Sewer main identification number;
 - ii. Upstream and downstream manhole identification numbers; upstream and downstream manhole rim and invert elevations; incremental number of lots directly served by sewer main;
 - iii. Cumulative area and/or number of lots served by sewer main (i.e. upstream area and/or number of lots served plus incremental area and/or number of lots);
 - iv. Population density per lot (capita/lot), or Peak Flow Per Ha;
 - v. Incremental area and/or population directly served by sewer main;
 - vi. Cumulative area and/or population served by sewer main (i.e. upstream area and/or population served plus incremental area and/or population);
 - vii. Peaking factor;
 - viii. Design flow rate (m³/s);
 - ix. Inflow rate (m³/s); Infiltration rate (m³/s); Design flow rate (m³/s); Pipe size (mm);
 - x. Pipe grade (%); Pipe length (m);
 - xi. Pipe capacity (m³/s); and
 - xii. Flow velocity (m/s).

Separate tables should be provided to describe interim and ultimate conditions where staging of the development will occur and impose distinct conditions on the proposed wastewater collection system.

2.2.9 Lot Grading Overall Plan

- a.) The plan shall include, at a minimum;
 - i. The existing surface contours starting at 10 metres outside the development boundary and throughout the site.
 - ii. The proposed finished grades.
 - iii. The anticipated/proposed building main floor elevation,
 - iv. Drainage basin boundaries, storage areas, ponding depths and overflow locations.
 - v. The proposed curb line grades.

- vi. Any existing floodplain elevations and boundaries, if applicable.
- b.) Provide existing spot elevations along development boundaries at property corners, grade breaks, and at 10 m intervals. These boundary elevations are to be maintained as part of the overall grading design plan.
- c.) This plan shall indicate the proposed finished surface elevations at lot corners, the proposed direction of flow of surface drainage on each lot.
- d.) The location of any benchmarks to be used in the construction of the project shall be identified.
- e.) Existing and proposed surface contours shown at 0.5 m intervals.
- f.) The geotechnical report should be referenced for builders to consult in the design/construction of building foundations, weeping tiles, and foundation drain discharge systems.
- g.) Notes should be included which indicate to builders the requirements with respect to roof leader discharges and foundation drainage, cross-referenced to the applicable detail for stormwater discharge piping.
- h.) The plan shall include typical three-dimensional details of the various lot grading types with a depiction of the structure(s), required slopes around the structure(s), and lot grades. Each lot on the plan shall be labeled to identify the applicable detail corresponding to the proposed lot grading type for that lot.
- i.) Lots requiring greater than 1.0 m of fill to meet the proposed grades should be clearly indicated on the plan.
- j.) Where the use of swales has been accepted by the Town, the plan shall indicate the locations, easement requirements, slopes, cross-sections, and construction details for the swales. Additional spot grades shall be provided at the midpoint of the swale and at the property line.
- k.) The plan must clearly convey any potential problems or restrictions with respect to building design and lot grading. Building foundation elevation restrictions for lots adjacent to a stormwater management facility is one example of this.
- l.) Any easements or restrictive covenants related to the stormwater management system must be shown and identified on the plan.
- m.) Where more than one sheet is required for the lot grading plan, each sheet shall include the typical details and notes which apply.
- n.) For rear lot and concrete swales, the channel capacity analysis is required to verify the conveyance of a 1:100-year storm event from the contributing area.

2.2.10 Water Distribution System

- a.) With respect to the water distribution system, this plan shall include the following:
 - i. Alignment, diameter, and material of all water mains;
 - ii. Location of all valves, hydrants, and other appurtenances;
 - iii. Calculation of pressures and flows including peak, average, and fire demand for the water distribution system.
 - iv. Location of potential future extensions; and
 - v. Identification of all bacteria sampling locations.

2.2.11 Shallow Utilities

- a.) This plan shall indicate the alignments for power, gas, and telecommunication lines.
- b.) The location of any surface features related to these utilities (i.e. light standards, transformers, boxes, etc.) must be clearly identified.
- c.) The location of any surface features which may conflict with the arrangement of these utilities (i.e. driveways, hydrants, curb valves, manholes, catch basins, street furniture, etc.) must be illustrated.
- d.) Applicable utility company approvals and associated easements/right of way locations, must be shown on the plan or otherwise accompany the drawing submission.
- e.) There are two typical shallow utility alignments that the Town will accept:
 - i. Power and telecommunication cables are installed in a joint trench within the road right of way and gas is installed in a single trench 3 within a 3.0m utility easement. Refer to Appendix A: Standard Engineering Drawings; or
 - ii. Gas, power, and telecommunication cables are installed in a joint trench within a 3.5m utility easement, with gas installed 2.7m into private property and power/telecommunications installed 1.0m-2.0m into private property. See Appendix G: 4 Party Franchise Utility Location Details.

2.2.12 Landscaping Plans

a.) Landscaping plans shall include the following:

- i. Land use parcel designation
- ii. Locations of driveways; Location of street furniture; Location of underground structures;
- iii. Location of curbs and boulevards; Location of public sidewalks; Location of private approaches; Location of parking areas;
- iv. Location of proposed retaining walls; Proposed location of boulevard trees;
- v. Planting schedules, including botanical and common name of all proposed plant material, total quantity of each plant on public and private property, height and/or spread of each shrub or perennial at the time of installation, minimum caliper size of each tree at the time of installation.
- vi. Notes regarding root ball type and size, tree branching heights for boulevard trees, special conditions, or unique installation criteria;
- vii. Identification of existing vegetation, trees and/or other natural features to remain in place and or relocated;
- viii. Outline of planting beds and tree wells, including the type and depth of mulch; Location of anticipated irrigation systems;
- ix. Details of hard and soft landscape installations;
- x. Identification of areas to be sodded and seeded, with the applicable seed mix specified;
- xi. Proposed mowed and non-mowed areas.
- xii. Location of proposed site amenities and fencing, with construction details and elevations;
- xiii. Location of trails with details, signage, and proposed drainage;
- xiv. Total measurements (in m²) of shrub beds, flower beds, islands, buffers, PULs, MRs, ERs, SWMFs, and parks;
- xv. Total measurements (in m²) of proposed seeded and sodded areas, and existing vegetation;
- xvi. Provide a breakdown of private and public landscaping;
- xvii. Any proposed entrance sign or feature detail; and
- xviii. Any other details that may relate to the final landscape design.

b.) The plan shall identify the following areas:

- i. Preservation Areas (ER)
Preservation areas are portions of parks, which are to remain in the natural condition.
- ii. Naturalization Zones
Naturalization zones are portions of parks, which are proposed for reclamation to as natural a state as possible. They include manicured areas and/or disturbed or partially disturbed natural areas.
- iii. Manicured Zones
Manicured areas are portions of parks that have defined 'special use areas'. They imply some development as identified in the minimum standards and maintenance that is relatively intense compared to preservation and naturalization areas. Manicured areas include areas where larger numbers of park users are anticipated; i.e. sports fields, playgrounds, community uses.
- iv. Existing Environmentally Sensitive Areas, Historical Areas, Wetlands, Vacant Farmsteads, existing water bodies and wildlife corridor.

- c.) This plan shall indicate the location of all street furniture including, but not necessarily limited to, signage (including identification of type), hydrants, bollards, light standards, power transformers, driveway approaches, telephone boxes, cable boxes, mail boxes, bus shelters, benches, garbage cans, manhole covers, valve covers, playgrounds, trails, trees, retaining walls, and fencing.
- d.) The plan shall include fencing details including elevation view.
- e.) The plan should also illustrate sight triangles for all intersections.
- f.) This plan shall be in accordance with the setbacks specified in these Municipal Engineering Standards and the Town's Land Use Bylaw
- g.) The landscaping plan shall be prepared, signed, and sealed by a landscape architect licensed to practice in the Province of Alberta by the Alberta Association of Landscape Architects.

2.2.13 Plan and Profile Drawings

Plan and profile drawings shall meet the following requirements:

- a.) General
 - i. Plan and profile drawings shall be drawn to a scale of 1:500 horizontal and 1:50 vertical;
 - ii. There must be a clear delineation between proposed and existing features; and
 - iii. The drawings must show the location and identification of existing and proposed survey markers in the area.
- b.) Road Right-of-Way Information
 - i. The following information must be included on the plan portion of the drawing: Legal subdivision information including block and lot numbering;
 - ii. Alignment of proposed road right-of-way or easement including name or temporary designation;
 - iii. Alignments of adjacent roads, walks, lanes, interim connections, utility rights-of-way, easements, and reserves including identification by name or ownership;
 - iv. Existing and proposed surface infrastructure including curb, gutter, sidewalk, sidewalk connectors, trails, paraplegic ramps, bus stop pads, boulevard area, etc.;
 - v. dimension of right of way width measured relative to adjacent property lines;
 - vi. dimensioned measurements of curb, gutter, sidewalk, and boulevard locations;
 - vii. horizontal curve data for the centreline of each roadway including chainages of the beginning-of-curve (BC), end-of-curve (EC), delta angle, radius, chord length, and arc length. The radius of curb returns must be indicated.
 - viii. Elevations, along the curb and gutter, of all changes in vertical alignment; and elevations of the BC and EC for all curb returns including the grades and chainage around the curve.

The following information must be included on the profile portion of the drawing: Existing ground profile along the centreline of the proposed roadway or utility;

 - ix. Proposed gutter line profile with grade expressed in percentage, accurate to two decimal places;
 - x. Vertical curve data including chainages and elevations for beginning-of-vertical-curve (BVC), end-of-vertical-curve (EVC), point-of-vertical-intersection (PVI), external value (e), length of curve, elevation and chainage of the low point of sag curves and high point of crest curves, and rate of gradient change (k value); and
 - xii. Gutter line grade at all intersecting proposed and existing roads.
- c.) Water Distribution System Information

The following information must be included on the plan portion of the drawing:

 - i. Horizontal alignment of proposed water mains with dimensioned measurements locating each from adjacent property lines;
 - ii. Diameter of water mains;
 - iii. Location of all related appurtenances including hydrants, tees, bends, crosses, valves (use different symbols for gate valves and butterfly valves), blow offs, and plugs;
 - iv. Location of all service connections and curb cock valves, with dimensioned measurements locating each individual service lateral from the property lot corner along with the service pipe invert elevation at the property line.

The following information must be included on the profile portion of the drawing:

- v. Vertical alignment of proposed water mains within the profile alignment;
- vi. Elevation, diameter, and utility type of existing and proposed utilities which cross or intersect the profile including dimensions between utility crossings;
- vii. Invert-of-pipe elevation at all tees, bends, crosses, plugs, and grade changes; Pipe diameter, pipe type, pipe class, and bedding class and station chainages;
- viii. Description of tie-in points of the proposed system to the existing system; and
- ix. Identification of areas requiring special construction methods such as trenchless installation methods, shored construction, insulation, casings, limited working space areas, etc.

d.) Wastewater Collection System and Stormwater Management System Information

The following information must be included on the plan portion of the drawing:

- i. Horizontal alignment of proposed sewer mains and foundation drain discharge collection sewers, with dimensioned measurements locating each from adjacent property lines;
- ii. Diameter and direction of flow of sewer mains and foundation drain discharge collection sewers;
- iii. Location of all related appurtenances including manholes, catch basins (including frame and cover type, elevation at gutter), plugs, cleanouts, inlet structures, and outlet structures;
- iv. Sequential identification numbering of all mains, manholes, and catch basins. The Town shall provide revised identification numbers for updating plan of record drawings;
- vi. Horizontal alignment, diameter, grade (in percentage, accurate to two decimal places), pipe type, pipe class, and length of all catch basin leads. Much of this information may be listed in table-format;
- vii. Radii of curved sewers; and
- viii. Location of all service connections with dimensioned measurements locating each individual service lateral from the property lot corner along with the service pipe invert elevation at the property line.

The following information must be included on the profile portion of the drawing:

- i. Vertical alignment of proposed sewer mains and foundation drain discharge collection sewers within the profile alignment;
- ii. Elevation, diameter, and utility type of existing and proposed utilities which cross or intersect the profile;
- iv. Diameter, grade (in percentage, accurate to two decimal places), pipe type, pipe class, bedding class, and length of sewer mains between each manhole;
- v. Invert elevation of all pipes at each manhole; Rim elevation at each manhole;
- vi. Calculated design flow rate, design flow velocity, and total flow capacity for each section of sewer main.
- vii. Description of tie-in points of the proposed system to the existing system;
- viii. Identification of areas requiring special construction methods such as trenchless installation methods, shored construction, casings, or limited working space areas;
- ix. Chainage of BC and EC, radii, and curve length for curved sewers;
- x. Identification of any unique manhole features including drop structures and safety platforms;
- xi. Locations of riser connections to the sewer mains.

2.2.14 Detail Drawings

- a.) Standard details and typical cross-sections must be included in the engineering drawings for each project.
- b.) Standard details and typical cross-section shall be in accordance with the Engineering Standard Drawings, attached in Appendix A of these Municipal Engineering Standards or otherwise approved by the Town of Whitecourt
- c.) Details and cross-sections shall be drawn to a scale that clearly portrays the required information with clarity and legibility.
- d.) Deviation from design standards may require additional detailed drawings.

2.2.15 Intersection Grading Plan

- a.) The plan shall include, at a minimum:
 - i) The curb return grades for all newly constructed curb returns.
 - ii) Elevations of catch basin rims.
 - iii) Intersection slopes to clearly indicate road transitions (i.e. crown/crossfall)