

Engineering Design Standards



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1.0 SCOPE OF THIS STANDARD

1.1 INTENT

The Standards are intended to provide information to Developers, engineering consultants and contractors who require knowledge of the standards governing the design and infrastructure within the Town of Banff.

Developers consulting the Standards with the intention of determining compliance, shall also familiarize themselves with the Town of Banff Land Use Bylaw, Water and Sewer Bylaws, Street and Public Place Use Bylaw and Street and Public Place Use Permit application form.

It is the responsibility of Developers to ensure that they are complying with the most recent version of all Standards, standards, documents and other requirements, including the most recent version of the Adopted Standards.

The Town of Banff reserves the right to vary the Standards to meet any site issue that may arise in order to update the Town's design Standards and protect public interest. As a result, site specific adaptations may be approved or required by the Town if determined necessary by the Town. All deviations from these specifications and approved construction drawings require the written approval of the Town.

For any questions regarding these standards please contact the Development Compliance Officer at Compliance.Officer@Banff.ca, or (403) 762-1219.

1.2 ADOPTED GUIDELINES

The Town of Banff hereby adopts the City of Calgary standards in force from time to time, specifically, "Design Guidelines for Subdivisions Servicing", "Design Guidelines for Development Site Servicing Plans", "Standard Specifications for Roads, Sewers and Waterworks Construction", "Standard Block Profile Specifications", "Storm Water Management Design Manual" and "City of Calgary Policy and Specifications Manual for Pre-Installed Street Crossing Ducts" in force and effect from time to time (the "Adopted Guidelines").

The Standards contain amendments, changes, additions and deletions to the Adopted Guidelines as they pertain to the Town of Banff. In the event of a conflict or inconsistency, the Standards shall take precedence over the above noted documents. Any reference to the City is to be taken to mean the Town of Banff. Any reference to the City of Calgary, City of Calgary Engineer, Office of the Environment, Materials & Research and Roads/Sewer/Waterworks Division shall be taken to mean the Town of Banff Engineering Department. Any reference to Parks/Recreation shall be taken to mean the Town of Banff Municipal Parks Department.

The Standards, as well as the City of Calgary standard specifications, form part of all contract documents for the installation of all new infrastructure and for maintenance work on all existing infrastructure within the Town of Banff.

2.0 DEFINITIONS

Agreement shall mean the written contract agreement, subdivision servicing agreement, development agreement or any other agreement or permit duly executed between the Developer and the Town which details the terms and conditions under which the Developer is to construct or install the Municipal Improvements.

Construction Completion Certificate (CCC) shall mean the certificate completed by the Developer's Engineer stating that all Municipal Improvements and materials have been constructed, installed and inspected in compliance with the Agreement, the Standards and the Director's instructions and that all defects and deficiencies in the Municipal Improvement and materials have been remedied by the Developer. The date of acceptance of the Construction Completion Certificate by the Town indicates the start of the Warranty Period.

Construction Drawings shall mean plans and specifications prepared and stamped by the Developer's Engineer covering design, construction and installation of all Municipal Improvements.

Contractor shall mean the individual, corporation or other entity which undertakes the construction of Municipal Improvements on behalf of the Developer. The Contractor shall supply materials and carry out the construction and installation in strict accordance with the Standards.

Developer shall mean the individual, corporation or other entity which proposes to install and construct the Municipal Improvements as defined in the Agreement, or as required by Town Bylaws.

Development means the land to be serviced, as determined by the Developer, approved by the Town and specifically illustrated by plan of subdivision.

Development Agreement shall mean the document prepared by the Town specifying legal, administrative, and technical requirements of the Developer.

Developer's Engineer shall mean a qualified Professional Licensee (Engineering) - P.L.(Eng.), Professional Technologist (Engineering) - P.Tech.(Eng) or a Professional Engineer – P.Eng. who is licensed to practice engineering in the Province of Alberta with membership with ASET or APEGA. The Developer's Engineer is appointed and engaged by the Developer to be responsible for the design and preparation of drawings and specifications, and for provision of engineering supervision during the construction of the Municipal Improvements for the Development.

Director shall mean the Town of Banff Engineering Services or Town of Banff Water Services Manager or any other Town of Banff authorized representative.

Final Acceptance Certificate (FAC) shall mean the certificate completed by the Developer's Engineer stating that all Municipal Improvements and materials have been constructed, installed and inspected in compliance with the Agreement, the Standards and Director's instructions and that all defects and deficiencies in the Municipal Improvement and materials have been remedied by the Developer. The date of acceptance of the Final Acceptance Certificate by the Town indicates the expiration of the Warranty Period.

Standards shall mean the most current edition at the time of the Development approval of the Town's Engineering Design Standards, and/or any supplementary specifications, requirements or drawings accepted by the Town.

Landscaping shall include the modification or enhancement of a site, as identified in the accepted Plans and other Plans prepared by the Developer or Developer's Engineer and accepted by the Town for the Development and includes:

- the growing or planting of any type of approved vegetation;

- the installation, construction or placement of inanimate material such as brick, stone, concrete, tile and wood, excluding monolithic concrete and asphalt; and
- the alteration of any grades or elevations of the surface of the site which is not done solely for purposes of drainage control.

Municipal Improvements shall mean all improvements, including oversized and shared infrastructure within, adjacent to and/or serving the Development as identified in the accepted Plans and other Plans prepared by the Developer or Developer's Engineer and accepted by the Town for the Development.

Town or Town of Banff shall mean the corporation of The Town of Banff in the Province of Alberta and/or the land lying within the corporate limits of the Town, as the context requires.

Warranty Period with respect to Municipal Improvements, shall mean:

- Warranty period of ONE (1) year for deep utility excavation work if compaction test records are provided;
- Warranty period of TWO (2) years for deep utility excavation work with no compaction test records;
- Warranty period of TWO (2) years for all other Municipal Improvements, including Landscaping.

3.0 UTILITY AND PIPELINE LOCATION NUMBERS

Prior to commencement of any work the Contractor is responsible for contacting the appropriate authorities to locate existing underground utilities and pipelines in or adjacent to the construction work area. The utility or pipeline agency must be contacted in advance and all utilities located by the relevant utility/agency prior to commencement of work.

3.1 FIELD LOCATION SERVICE CALLS

ATCO	Alberta One Call (1-800-242-3447)
Fortis	Alberta One Call (1-800-242-3447)
Telus	Alberta One Call (1-800-242-3447)
Shaw	403-716-6035
Town of Banff Operations	403-762-1240

It is the responsibility of the Developer to identify and contact any and all other utilities in the region not listed above.

3.2 STREET AND PUBLIC PLACE USE PERMITS

A Street and Public Place Use Permit must be obtained from the Town of Banff Engineering Department prior to any work in a street or public space. Applications shall follow the process defined on the Town of Banff web page Street Use Permit. For more information, contact the Town of Banff at 403-762-1210.

The following certificates will be required for any site servicing work:

- .1 Construction Completion Certificate:
 - .1 On completion of the excavation and permanent reinstatement, the Developer shall submit an application for a Construction Completion Certificate (CCC). The application for CCC shall be accompanied by:
 - a. Third party compaction test results.
 - b. Developer's Engineer's installation report including stamped record drawings.
 - c. Confirmation by the Developer's Engineer that utility connections (if applicable) were made in accordance with applicable standards.
 - .2 Upon receipt of the CCC application, the Town shall inspect, within five (5) working days (seasonal conditions permitting) the reinstatement and note any deficiencies.
 - .3 All work to rectify deficiencies shall be completed within 30 days, unless otherwise authorized by the Director.
 - .4 Excavation deposits will be held until the issuance of the applicable FAC.

- .5 If:
- .1 the CCC process is not initiated by the Developer within three (3) years of the completion of work; or
 - .2 the Developer does not request release of the excavation deposit within five (5) years of the day the Street and Public Place Use Permit is approved,

the excavation deposit will be forfeited to the Town and shall become the sole property of the Town to apply in its discretion.

- .2 Final Acceptance Certificate:
- .1 After the Warranty Period, the Applicant shall submit a Final Acceptance Application confirming that the excavation and reinstatement meets the Town of Banff Engineering Standards.
 - .2 Upon receipt of the FAC Application, the Town shall inspect the reinstatement within five (5) working days (seasonal conditions permitting) and note any deficiencies requiring correction. Deficiencies are to be corrected within thirty (30) days, otherwise, the Town reserves the right to have the work completed at the Developer's expense.
 - .3 Subject to the other provisions of the Standards and the excavation permit, once all deficiency work is complete the excavation deposit will be returned (if unused) to the Applicant.

3.3 EMERGENCY NUMBERS

Any contact causing damage MUST be reported to the appropriate emergency number immediately.

Watch for above ground structures such as utility pedestals, power lines and hydrants that are in roadways, lanes and private property. Any contact causing damage MUST be reported immediately.

Emergencies	911	24 Hour
ATCO Gas	1-800-511-3447	24 Hour
ATCO Pipelines	1-800-496-9380	24 Hour
Fortis	1-866-717-3113	24 Hour
Telus Communications	611	
Shaw Cable TV Ltd.	1-866-344-7429	24 Hour
Alta Link	1-866-667-3400	24 Hour Emergency
Fortis Alberta	310-9473	24 Hour
CP Rail – Railway Emergency	1-800-716-9132	24 Hour Emergency
Alberta Transportation	310-0000	
Parks Canada – Wildlife Reporting	403-762-1470	24 Hour

Parks Canada – Emergency	403-762-4506	24 Hour
Town of Banff Front Desk	403-762-1200	Daytime
Town of Banff Operations	403-762-1240	Daytime
Town of Banff Operations	403-996-2107	After Hours
Town of Banff Water Services	403-996-0424	After Hours

It is the responsibility of the Developer to contact all pertinent utility providers and/or mobilize an emergency response.

4.0 DESIGN STANDARDS AND PROCEDURES

The City of Calgary "Design Guidelines for Subdivisions Servicing", "Design Guidelines for Development Site Servicing Plans", "Standard Specifications for Roads, Sewers and Waterworks Construction", "Standard Block Profile Specifications" and "Storm Water Management Design Manual" in force (i.e., most current editions), shall be the Standards to which subdivision and Development will be designed and constructed except as modified as follows:

4.1 WATERMAINS

4.1.1 References

- .4 Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems;
- .5 ANSI/AWWA C651;
- .6 AWWA Manual M-17;
- .7 City of Calgary Design Guidelines for Subdivision Servicing;
- .8 City of Calgary Design Guidelines for Development Site Servicing Plans;
- .9 City of Calgary, Standard Specifications Waterworks Construction;
- .10 Town of Banff Water Bylaw (current edition)

4.1.2 General

- .1 Town of Banff Water Services must be contacted during normal work hours and at least two (2) days prior to any work on the Town of Banff water distribution system.
- .2 Water distribution facilities including water mains, valves, hydrants and service connections shall be provided by the Developer. Stamped engineering construction drawings showing detailed design of the necessary works shall be submitted to and approved by Director prior to commencement of construction. The stamped engineering drawings shall show alignment and sizes of pipes, material classifications, location and details of all fittings, valves and hydrants, service connections and all details as may be required.
- .3 The water distribution system shall be adequately sized to supply the peak hourly demands or the peak daily demands plus fire flows, whichever is greater. Fire flow requirements shall meet the Fire Prevention Bureau and Insurance Underwriters and Alberta Building Code requirements, whichever is more stringent. In addition, the Town may require a pressure distribution analysis. Water mains should be looped whenever possible.
- .4 Utility appurtenances (valves, fittings, meters, backflow devices, etc.), hydrants (including pumper connections and threads), and pipe shall conform to those currently accepted in the Town, subject always to the approval of the Town.

- .5 Copper pipe shall be used for water services sized 20-50mm installed on former fuel station properties or other potential risk locations as designated by the Town.
- .6 The Town shall be contacted and provided the opportunity to inspect all connections in accordance with Water Bylaw (current edition)
- .7 All connections are to be inspected by the Developer's Engineer prior to back filling.

4.1.3 Depth of Cover

- .1 From the crown of the water line to the final grade shall be 3.3m.
- .2 In areas with a continuously high groundwater table, mains may be installed with less cover where accepted by the Town. The minimum depth of bury in such areas shall be 0.3 m below the lowest groundwater level but not less than 1.8 m below the final surface grade, subject to Town approval.
- .3 All mains with less than 3.3m cover shall be insulated.

4.1.4 Insulation

- .1 For in-ground construction, insulation shall be extruded polystyrene to CAN/ULC S701, Type 4 classification. Approved products are Dow Chemical's HI-40 or HI-60 and Owens Corning Foamular 400 or 600, or as otherwise accepted by the Town.
- .2 Insulation design can be based on either the horizontal or inverted U design. See City of Calgary Standard Specifications Waterworks Construction Rigid Form Board Insulation Details 453.1044.001& 453.1045.001 or in accordance with the manufacturer's specifications.

4.1.5 Valves

- .1 If there is a benefit or an increased reliability of service, the Town may require additional valves other than those outlined by the City of Calgary specifications.
- .2 All valves shall turn counter-clockwise to open.
- .3 Valves in the distribution system shall be equipped with 50mm x 50mm operating nut and dust shield.
- .4 Valve type to be approved by the Town of Banff. Valves shall be installed with cathodic protection.

4.1.6 Hydrants

- .1 Hydrants shall be Clow Brigadier - McAvity (Clow Brigadier M-series) or Canada Valve Century. No other equals.
- .2 All hydrants to be ported to Town standards prior to installation and conform to the following:
 - a. 150 mm dry barrel with one 100 mm diameter "Storz" pumper connection and two 65 mm threaded hose connections.

- b. Threaded hose connections shall be 4 tpi conforming to the Alberta Mutual Aid (AMA) thread standard.
- .3 The exterior of the hydrant above and 300 mm below the grade line flange shall be coated in accordance with City of Calgary Standard Specifications (current year), section 505.01.00 (Type C coating) in the following colours:
 - a. Red, equal to C.I.L. #22370, Riley PM2506 or Approved Equal
 - b. Storz Pumper Port Cap – Black
 - c. Hose Port Caps – Red
 - d. Top - Red
- .4 All hydrants are to be separated from the distribution system by a mechanically restrained valve located 1.0 metre from the hydrant, unless otherwise approved by the Town. Configuration shall allow the hydrant to be removed for repair without shutting down the watermain it is connected to.
- .5 Hydrants must be free draining. The hydrant drains shall be plugged if the hydrants are being installed in high groundwater table areas. Non-draining hydrants shall have the top and one hose port cap painted red and one hose cap painted blue.
- .6 Hydrant flow tests shall be performed on all newly installed fire hydrants prior to it being put into service. Testing to be done in accordance with AWWA Manual M-17 (current edition) and the results shall be forwarded to the Town of Banff Water Services.

4.1.7 Hydrant Coverage

- .1 Hydrants shall be spaced so that the maximum distance from the hydrant shall not exceed 90 m radius in low-density residential areas or 60 m radius for institutional, commercial, industrial and high-density developments (measured along the street).

4.1.8 Backflow Prevention

- .1 Backflow prevention devices shall be installed where required in accordance with the National Plumbing Code of Canada and the Alberta Amendments to the National Plumbing Code.

4.1.9 Disinfection

- .1 Disinfection for injection and testing shall be as per the most recent edition of the ANSI/AWWA C651 Disinfecting Water Mains (current edition).

4.1.10 Bacteriological Test

- .1 Contractor is responsible for all Bacteriological testing.
- .2 Bacteriological testing shall be as per the most recent edition of the ANSI/AWWA C651.

4.1.11 Service Activation

- .1 Prior to activation, pressure tests, disinfection and a bacteriological test report, along with comprehensive site-specific installation photographs and an Engineer stamped record drawing, must be provided by the Developer's Engineer and verified by the Director.
- .2 The Town of Banff Water Services Department must be contacted during normal working hours and at least two (2) working days in advance to activate the water service.

4.1.12 Abandonment of Mains and Services

- .1 It is the responsibility of the Developer to remove all unused or abandoned water service connections and piping associated with the development.
- .2 For water services greater than 50mm, the service tees and/or hot tap saddles shall be removed from the main and replaced with straight pipe and approved repair couplers, unless otherwise directed by the Town.
- .3 For water services 50mm or less, the Town must be contacted to approve methodology and materials for abandonment.
- .4 Excavate and remove any abandoned curb stop.

4.2 SANITARY SEWER

4.2.1 References

- .1 Alberta Environment, Standard and Guidelines for Municipal Water, Wastewater and Storm Drainage Systems;
- .2 City of Calgary Design Guidelines for Subdivision Servicing;
- .3 City of Calgary Design Guidelines for Development Site Servicing Plans;
- .4 City of Calgary Standard Specifications Sewer Construction;
- .5 City of Calgary Wastewater Lift Station Design Guidelines;
- .6 Town of Banff Sewer Bylaw (current edition).

4.2.2 General

- .1 Sanitary sewer facilities, including gravity mains, pump stations and force mains, manholes, service connections and other related appurtenances shall be provided by the Developer. Stamped engineering construction drawings showing detailed design of the necessary works shall be submitted to and approved by Director prior to commencement of construction. The stamped engineering drawings shall show alignment and sizes of pipes, bedding material classifications, proposed grades, distance between manholes, manhole invert elevations, existing ground line, proposed final ground line, location of all services connections to the property line and all other such details as required.

- .2 The system shall be designed to not only to serve the area within the development, but, in the opinion of the Town, any area which is tributary to the system. Flow demand calculations shall be referenced on the drawings. Direction of flow shall also be shown on the drawings.
- .3 Interceptors must be installed and maintained as identified in the Town of Banff Sewer Bylaw (current version).
- .4 Sump Pit Drain Systems – developments must include an Interceptor structure designed to capture oil and grit prior to discharge to sanitary system. Sanitary treatment charge will apply to all connections made to the Town’s sanitary sewer system.
- .5 The Town shall be contacted and provided the opportunity to inspect all connections.
- .6 All connections are to be supervised and inspected by the Developer’s Engineer prior to back filling.

4.2.3 Depth of Cover

- .1 For gravity mains, the minimum cover from the crown of sewer to the final grade shall be 2.5m.
- .2 If the minimum cover cannot be maintained, insulation shall be required as per City of Calgary Rigid Insulation details or as designed by a professional engineer and accepted by the Town.
- .3 Force mains shall be treated as water mains with respect to minimum depth of cover. If the required cover cannot be maintained, insulation shall be required as per water mains.

4.2.4 Insulation

- .1 For in-ground construction, insulation shall be extruded polystyrene to CAN/ULC S701, Type 4 classification. Approved products are Dow Chemicals HI-40 or HI-60 and Owens Corning Foamular 400 or 600, or as otherwise accepted by the Town.
- .2 Insulation design can be based on either the horizontal or inverted U design. See City of Calgary Standard Specifications Waterworks Construction Rigid Form Board Insulation Details 453.1044.001 & 453.1045.001, or in accordance with the manufacturer’s specifications.

4.2.5 Pipe

- .1 Gravity sewer shall be polyvinyl chloride (PVC) with a minimum standard dimension ratio (SDR) of 35 or high-density polyethylene (HDPE) with a minimum standard dimension ratio DR 11. Clay tile, cast iron or concrete sewer pipe are not permitted.
- .2 In area of high groundwater, fused PVC or high-density polyethylene (HDPE) pipe may be considered by the Town.

4.2.6 Minimum Pipe Slope

- .1 The minimum pipe slope shall meet or exceed Alberta Environment Standards.

4.2.7 Manholes

- .1 Manhole covers shall be cast in accordance with the City of Calgary specifications, however they shall be cast to read Town of Banff Sewer

4.2.8 Abandonment of Sanitary Sewer Infrastructure

- .1 It is the responsibility of the Developer to remove all unused or abandoned sanitary sewer connections and piping associated with the development.

.2 Abandonment of Sewer Pipe

- a. All abandoned sewer shall be plugged and sealed as close to the existing (live) main as practical.
- b. Concrete and PVC pipe 200mm and smaller shall be sealed with manufactured mechanical type plug. Place low slump concrete overtop of the plug.
- c. Concrete and PVC pipe larger than 200mm and smaller than 575mm shall be sealed with manufactured mechanical type plug. For PVC pipe, coat the inner pipe with a layer of approved sewer pipe sealant to create a watertight barrier. For both concrete and PVC, place low slump concrete over top of the plug.
- d. The Town must be contacted to approve methodology and materials for abandonment of any other type of pipe.
- e. For saddle type lateral connections, when practical, the service saddle shall be removed and a mechanical repair clamp installed.
- f. In all instances, video inspection of the internal surface of the main pipe, showing detail of completed work, shall be provided to the Town.

.3 Abandonment of Manholes

- a. Plug all pipes at the manhole per 4.2.8.2 – Abandonment of Sewer Pipe
- b. Excavate and remove each manhole frame/lid, collar and slab top.
- c. Barrels may be left in place or removed to their base to the approval of the Town of Banff.
- d. Fill base with self-compacting aggregate.
- e. Seal the top of the abandoned manhole with low slump concrete

4.3 STORMWATER MANAGEMENT

4.3.1 References

- .1 Alberta Environment Standard and Guidelines for Municipal Water, Wastewater and Storm Drainage Systems;

- .2 Alberta Environmental Protection: Municipal Policies and Procedures Manual;
- .3 City of Calgary Stormwater Management Design Manual;
- .4 City of Calgary. Design Guidelines for Subdivision Servicing;
- .5 City of Calgary Design Guidelines for Development Site Servicing Plans;
- .6 City of Calgary Standard Specifications Sewer Construction;
- .7 Town of Banff Land Use Bylaw

4.3.2 General

- .1 Storm sewer facilities, including gravity mains, manholes, catch basins, culverts, inlet and outlet structures, lot drainage systems and other related appurtenances shall be provided by the Developer. Stamped engineering construction drawings showing detailed design of the necessary works shall be submitted to and approved by Director prior to commencement of construction. The stamped engineering drawings shall show alignment and sizes of pipes, bedding material classifications, proposed grades, distance between manholes, manhole invert elevations, existing ground line, proposed final ground line, location of all services connections to the property line and all other such details as required.
- .2 The system shall be designed to not only to serve the area within the Development, but, in the opinion of the Town, any area which is tributary to the system. Flow demand calculations shall be referenced on the Construction drawings. Direction of flow shall also be shown on the Construction drawings.
- .3 Stormwater treatment is a requirement of every development. Best Management Practices shall be used to reduce pollutant at the source and provide stormwater treatment as necessary.
- .4 Any stormwater system design shall strive to balance the following goals:
 - a. Comply with Alberta Environment, Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage and the City of Calgary's Stormwater Management Design Manual
 - b. Best Management Practices shall be used to reduce pollutants at the source and provide stormwater treatment as necessary.
 - c. Consider of all principles of sustainability
 - d. Minimize the potential risks to persons and property within the development boundaries
 - e. Minimize inconvenience caused by surface ponding and flooding
 - f. Identify trapped low areas and place caveats on affected lots
 - g. Minimize potential for downstream flooding and erosion
 - h. Conform to the relevant accepted Stormwater Management Master plan for the area
 - i. Reduce contaminant loading from urban storm drainage and industrial runoff discharges by the use of best management practices

- j. Design pre-treatment and infiltration facilities to operate under cold climate conditions and to be protected from damage due to frost
- k. Not pump stormwater unless it forms part of a progressive system for rainwater harvesting or as acceptable to the Director
- l. Grade lots in such a way that quantity and velocity of surface runoff is minimized, and infiltration and detention is maximized throughout the site (as is practical)
- m. Include acceptable stormwater management techniques that direct runoff to an acceptable drainage system for lots that are lower than adjacent roadways
- n. Direct runoff from an event that cannot be infiltrated to an appropriate stormwater system
- o. Keep runoff from pedestrian walkways as is practical
- p. Provide an overland flow outlet for major storm events that will minimize detrimental impacts to affected properties.

.5 Maintenance

- a. The Developer shall be responsible for providing the Town with maintenance records for all treatment facilities on private lands as well as those on right-of-ways (ROWs).
- b. The maintenance records shall detail the frequency for replacement of filters for all components that are meant to filter runoff and for all filter mediums. Records shall include a schedule for the removal of sediment and any other maintenance requirements to ensure the treatment facilities are functioning properly with maximum efficiency.
- c. A copy of the maintenance records shall be made available and submitted to the Town's Maintenance Inspector at Maintenance.Inspector@Banff.ca for review

.6 The Town shall be contacted and provided the opportunity to inspect all connections.

.7 All connections are to be inspected by the Developer's Engineer prior to back filling.

4.3.3 Depth of Cover

For gravity mains, the minimum cover from the crown of stormwater sewer to the final grade shall be 1.2m, unless otherwise approved by the Director.

4.3.4 Minimum Pipe Slope

.1 All storm sewers shall be designed and constructed to give mean velocities, when flowing full, of greater than 0.6 m/sec based on Manning's Formula. Flow velocities of 0.9 to 1.0 m/sec are recommended. When the flow velocity exceeds 3.0 m/sec, special consideration shall be given to the design of junctions and bends in the system.

.2 The minimum pipe slope shall meet or exceed Alberta Environment Standards.

4.3.5 Rainfall Intensity Duration Frequency (IDF) Curve

- .1 All storm sewer design for the Town of Banff shall be based on the City of Calgary IDF curve data from rainfall data taken from the Calgary International Airport.
- 4.3.6 Allowable Release Rate to Minor (Piped) Storm Sewer System
- .1 Greenfield site (previously undeveloped) – 69 L/s/ha
 - .2 Brownfield site – (previously developed) – use rational formula to determine current site runoff coefficient and calculate the 1:5-year flow rate.
 - .3 Provide onsite storage for flows greater than 1:5-year storm up to 1:100-year storm event. Stored volumes can be discharged at the 1:5-year flow rate.
 - .4 “Total Storm Capture and Treatment” as noted in the Land Use Bylaw shall mean a maximum allowable release rate of 69 L/s/ha. Stormwater resulting from events greater than 69 L/s/ha and up to and including a 1:100-year event are to be retained and managed on-site. Also see 4.3.2.3.
- 4.3.7 Infiltration Facilities
- .1 Where onsite stormwater infiltration facilities (drywells, rain gardens, etc.) are being proposed, the Developer shall provide the site specific hydraulic conductivity rate. The rate shall be based on tests performed using soils at or from the proposed infiltration site or on conservative values based on similar soils.
- 4.3.8 Manholes
- .1 Manhole covers shall be cast in accordance with the City of Calgary specifications, however they shall be cast to read Town of Banff Stormwater.
- 4.3.9 Catch Basins
- .1 Catch Basins will have a sump in the bottom of each unit
 - .2 Sump will be 600 in depth, measured from the invert of the lowest pipe to the interior base of catch basin.
- 4.3.10 Abandonment of Storm Sewer Infrastructure
- .1 It is the responsibility of the Developer to remove all unused or abandoned storm sewer connections resulting from the development.
 - .2 Abandonment of Storm Sewer Pipe
 - a. All abandoned storm sewer shall be plugged and sealed as close to the existing (live) main as practical.
 - b. Concrete and PVC pipe 200mm and smaller shall be sealed with manufactured mechanical type plug. Place low slump concrete overtop of the plug.
 - c. Concrete and PVC pipe larger than 200mm and smaller than 575mm shall be sealed with manufactured mechanical type plug. For PVC pipe, coat the inner pipe with a layer of approved sewer pipe sealant to create a watertight

barrier. For both concrete and PVC, place low slump concrete over top of the plug.

- d. The Town must be contacted to approve methodology and materials for abandonment of any other type of pipe.
- e. For saddle type lateral connections, when practical, the service saddle shall be removed and a mechanical repair clamp installed.
- f. In all instances, video inspection of the internal surface of the main pipe, showing detail of completed work, shall be provided to the Town.

.3 Abandonment of Manholes

- a. Plug all pipes at the manhole per 4.3.10.2 – Abandonment of Sewer Pipe
- b. Excavate and remove each manhole frame/lid, collar and slab top.
- c. Barrels may be left in place or removed to their base to the approval of the Town of Banff.
- d. Fill base with self-compacting aggregate.
- e. Seal the top of the abandon manhole with low slump concrete

.4 Abandonment of Catch Basins

- a. Plug all lead pipes at the existing (live) main
- b. Excavate and remove all catch basins and leads up to the plug

4.3.11 Dewatering

- .1 Weeping tile connections to the Town's storm sewer system are permitted only when the foundation footing and weeping tile elevation is not within one (1) meter of high groundwater level (based on annual high-water level in development area). Any parkade or foundation designed to be within or below the one-meter wet zone must be bath-tubbed / waterproofed accordingly.
- .2 Parkade sump drains, including parkade ramp trench drains, must be discharged through an Oil Grit Separator (OGS), or equivalent device, prior to discharge to the Town's sanitary sewer system.

4.4 TEMPORARY SITE DEWATERING

4.4.1 General

- .1 The Developer will need to apply for a Dewatering Permit (issued by the Town of Banff) if temporary dewatering is required during excavation for the Development. A Temporary Construction Dewatering plan is required as part of the application.
- .2 All requests for temporary dewatering will require water test results to be completed and submitted for review and approval by both the Town and Parks Canada prior to the start of any dewatering program.

- .3 When discharging off-site, the water must be sampled and quality tested in accordance with the Canadian Council of Ministers of the Environment (CCME) water quality guidelines and the most recent edition of the American Water Works Association Standard Methods for the Examination of Water and Wastewater. Be certain to use a laboratory that is capable of testing to the required levels.
- .4 If any parameters do not meet the Surface Water Quality Guidelines for use in Alberta, other disposal options must be explored and approved by the Director.

4.5 EROSION AND SEDIMENTATION CONTROL

4.5.1 References

- .1 City of Calgary Erosion and Sediment Control Guidelines
- .2 City of Calgary Standard Specification Erosion and Sediment Control

4.5.2 General

- .1 Anyone involved in ESC activities in the Town of Banff must follow current industry Best Management Practises and is encouraged to consult the City of Calgary's current Guidelines for Erosion and Sediment Control for detailed information on erosion and sediment control processes and practices.

4.5.3 Responsibilities

- .1 Erosion and sediment control is the responsibility of the Developer. It is not the responsibility of the Town to ensure that the ESC plan is appropriate for the level of work being proposed.
- .2 The Developer shall promptly correct, at his own expense, all defects, damages, and deficiencies in the erosion and sediment control measures, whether related to materials, workmanship, operation, vandalism, or otherwise.
- .3 The Developer shall maintain permanent erosion and sediment control measures until the Phase and / or project covered under a Development Agreement or Development Permit has received its last Final Acceptance Certificate.

4.5.4 Erosion and Sediment Control Plan and Report

- .1 All Developments are required to prepare and submit an Erosion and Sediment Control (ESC) Plan and Report to the Town. For sites less than 2.0 ha, a report is not required and set of drawings may be submitted for approval.
- .2 These documents must be prepared by a Professional Engineer or qualified Erosion and Sediment specialist and must be submitted to the Town for review and acceptance along with the Preliminary Engineering Drawings.
- .3 As drawings are utilized more often in the field than the report, it is important that they are easily understood by the contractor. ESC practices must be identified on the drawing legend and clearly marked on the drawings. Guidance on installation, inspection and maintenance must be included on the drawings and easy to understand.

4.5.5 Inspections and Maintenance

- .1 All ESC measures must be in place prior to commencing any stripping, grading, or construction.
- .2 The Developer is required to submit a statement signed by a Professional Engineer or qualified Erosion and Sediment specialist, confirming that all

necessary ESC measures are in place prior to construction. The Town may also require an on-site meeting to confirm whether additional ESC measures are required.

- .3 The Developer must ensure that the site is monitored on a weekly basis and at critical times when erosion or sediment releases could occur (i.e. significant snowmelt and heavy and/or prolonged rainfall events) to ensure that all ESC measures are maintained, repaired, and revised as necessary for the duration of construction (from the stripping and grading phase until the last FAC has been issued).
- .4 Documentation of the weekly inspections must be available to the Town upon request at any time.

4.5.6 Remediation

- .1 If good housekeeping practices are not followed, or if erosion and sediment control measures are not adequately monitored and maintained, the Town will provide to the Developer written notice to remedy the issue. If, after 24 hours, the Developer has not responded to make the necessary repairs, the Town may place a stop-work order on the development until the repairs have been completed. The Town reserves the right to complete any emergency repairs on the Developer's behalf should the Town feel, at its sole discretion, the repairs are inadequate.

4.6 EXCAVATION

4.6.1 References

- .1 City of Calgary, Roads Construction Standard Specification;
- .2 City of Calgary, Standard Specifications Waterworks Construction;
- .3 City of Calgary, Standard Specifications Sewer Construction

4.6.2 General

- .1 The Town reserves the right to not permit excavation work when the ground is frozen.
- .2 Backfill operations shall be inspected, tested and certified by a qualified Geotechnical consultant.
- .3 Native Subgrade material shall be used for backfill to minimize the potential for frost heaving. Imported granular materials shall not be used without Town approval with the exception of the Pipe Zone.
- .4 Soil Density and Moisture Content testing are required for all excavation backfill.
- .5 Soil Density and Moisture Content tests shall be taken for each 500mm of trench depth.

- .6 Tests shall be distributed so as to represent the entire area of the excavation.
- .7 Maximum spacing for tests shall be 75 meters.
- .8 The minimum compaction requirement shall be 97% Standard Proctor Density from pipe zone to finished subgrade.
- .9 All test results shall be provided with the application for Construction Completion Certificate.

4.7 COMMERCIAL REFUSE ENCLOSURES

Garbage enclosures need a development permit. For information please contact the Planning Department at 762-1215.

For Questions concerning garbage, please phone Public Works at 762-1240.

4.7.1 Commercial Developments

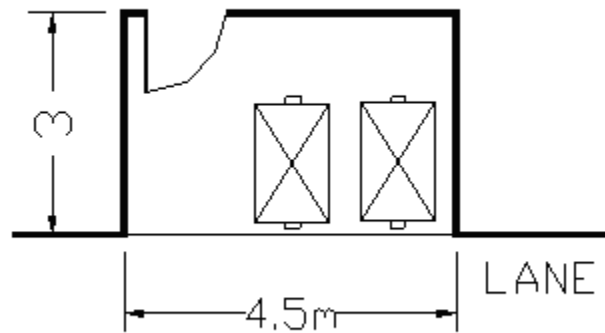
- .1 All commercial developments shall have garbage storage rooms integrated into the structure or stand-alone.
- .2 External containerized enclosures should not be used for any new commercial developments.
- .3 Provisions must be made to replace an existing containerized enclosure when a new development permit is submitted.
- .4 Garbage storage rooms should be constructed with durable, non-porous, cleanable materials.
- .5 Garbage storage rooms should have an internal ventilation system.
- .6 Garbage storage rooms must have proper drainage.
- .7 Garbage storage rooms in food and beverage establishments must have a grease trap as part of the drainage system.
- .8 Garbage storage rooms must have a hot water bib cock with a back flow preventer.

4.7.2 Garbage Storage Room Size/Configuration

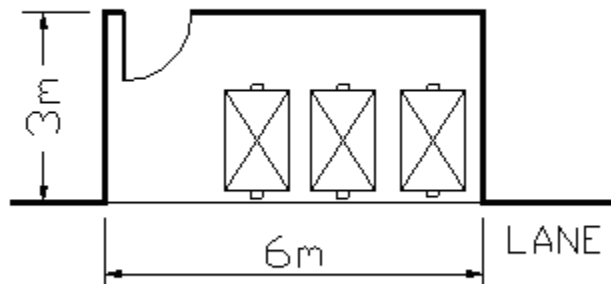
- .1 Minimum interior size for one bin shall be 13.5 square meters.
- .2 Each additional bin shall require 4.5 additional square meters.
- .3 The interior height of the garbage storage room shall be 3.0 meters.

- .4 Bins should be oriented so that they may be pulled directly into the lane or street. This is to provide easy access for back loading collection vehicles.
- .5 Bins should be stored immediately beside one another.

- *Two Bins:*



- *Three Bins:*



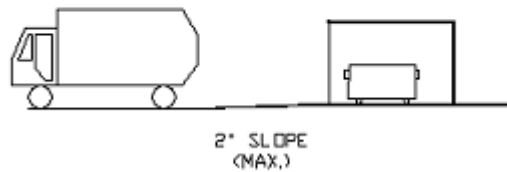
***NOTE:** The configuration will vary with each development. The suggested configurations are intended to be the most efficient in terms of space and for ease of collection.

4.7.3 Collection Areas and Concrete Floors

- .1 The maximum distance between a collection vehicle and the garbage storage room shall be 2m.

- .2 Collection areas should be flat. (Maximum slope from the rear of the enclosure shall be no more than 2.)
- .3 The size of the concrete collection area adjacent to the garbage storage room will vary with the size of the storage room.
- .4 The ramp area must be a non-porous, hard surface (concrete).
- .5 Interior storage rooms shall have a concrete floor.
- .6 Collection areas must be kept clear of refuse, snow, vehicles etc. with 'no parking' signage.
- .7 Roof design and snow fences should be considered to prohibit snow build up/dumping in the collection area. This area must be kept shovelled and cleaned.
- .8 The garbage storage room must not be below the level of the garbage collection area.
- .9 *Yes:*

COLLECTION AREA



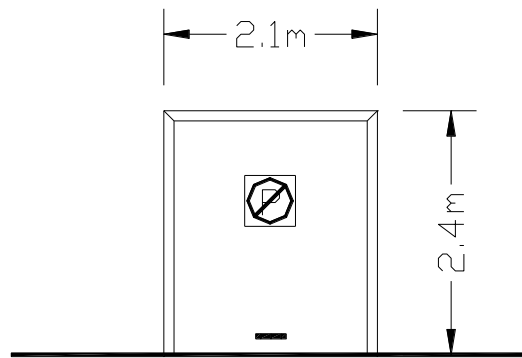
- .10 *No:*

COLLECTION AREA



4.7.4 Doors

- .1 Overhead doors are required for all garbage storage rooms.
- .2 Door openings should have a minimum 2.1 meter width.
- .3 Doors should be a minimum height of 2.4 meters.
- .4 An all-weather 'no parking' sign should be fixed to the front of the door/gate.



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4.8 ENGINEERING DRAWING STANDARDS

4.8.1 References

- .1 City of Calgary Design Guidelines for Subdivision Servicing;
- .1 City of Calgary Design Guidelines for Development Site Servicing Plans;
- .2 City of Calgary Standard Block Profile Specifications;

4.8.2 General

- .1 All Construction drawings shall be prepared under the supervision of and sealed by the Developer's Engineer registered in the Province of Alberta. Detailed Construction drawings shall be submitted to the Director for review and approval for all developments and shall include (unless otherwise approved)
 - a. Cover Page
 - b. Legal Plot Plan
 - c. Site Servicing Plan showing existing and proposed infrastructure

- d. Site Grading Plan
 - e. Sidewalk, Curb & Gutter, Roads & Walkway Plan
 - f. Stormwater Management Plan
 - g. Landscape Plan
 - h. Existing Site Survey Plan with Contours
 - i. Typical Detail and Sections Plan
- .2 All forms of submissions including drawings, letters, reports and any other documentation must be submitted in PDF or equal un-editable digital format.
 - .3 When hard copy drawings are required, drawings shall be to a suitable metric scale and sized Arch D (24x36inch). All drawings shall conform to the City of Calgary's Standard Block Profile Specifications or similar drawing format that is acceptable to the Town.
 - .4 Applications that are incomplete or found to not be in accordance with the requirements will be rejected.
 - .5 All revisions to existing applications for subdivisions or developments must include a letter prepared by the Developer's Engineer giving a description of the revisions.

END OF DOCUMENT
