Engineering Design & Construction Guidelines

Contents of Manual

The EDCG is broken down into **3 general parts** with a final **Part 4** for appendices, references and definitions**:**

Part 1 - Development in Canmore

1.1 – Emergency Numbers – numbers to contact in case of Emergency

1.2 – Contractual Relationships – gives an overview of the roles and responsibilities of parties involved in the development process including Developer/Contractor/Consultant and the Town. Also included is a section outlining the level of service that is expected as it pertains to Field Services

1.3 – Local Issues – The Town of Canmore has three distinct local conditions that need to be understood by developers/contractors and consultants.

1.3.1 – Undermining – In the past, some areas of Town located on the West side of the Bow River Valley have been subject to underground and surface mining. As a result, surface subsidence has become a concern. A geotechnical review must be undertaken by the developer for these areas in accordance with the Province of Alberta Regulation AR 114/97. A map of these lands is included.

1.3.2 – Groundwater – Much of the Town of Canmore sits on an aquifer and has fluctuating groundwater levels. In order to ensure protection of habitable space, Building Floor Elevations & Parking Slab Elevations must adhere to the regulations set out in this section. Also included are guidelines for the allowable disposal of excess groundwater during construction

1.3.3 – Wellhead Protection Area - The Town of Canmore obtains a significant portion of its total municipal water supply from groundwater in the Bow River Valley aquifer beneath the Town. The Town has adopted a wellhead protection strategy to protect this water supply source. Development in the area upstream of and near to the wells is controlled by the Town and restricted to uses or activities that will not adversely affect the quality of the Groundwater

1.3.4 – Highway 742 - Selected streets in the Town have been designated as a Secondary Highway route under the joint jurisdiction of the Town and Alberta Transportation. The design and construction of Municipal Improvements and Developments on or adjacent to these streets require compliance with and approvals from Alberta Transportation in addition to those of the Town. It is the responsibility of the applicant to obtain these permits when undertaking Municipal Improvements in these areas. The existing Secondary Highway route is shown on the Figure OTH-07 attached. It should be noted that the routing of Highway 742 was changed in 2006.

Part 2 - Engineering Design and Construction Guidelines – Part 2 encompasses both the Design and Construction aspect of development in Canmore. The first section provides the overview of the importance of sustainability (balance of social, economical and environmental conditions for long term) when constructing in Canmore. The remaining sections, established in an order that mimics the timeline of construction, break down the units of construction in holistic fashion and give guidance from the conceptual stage through to the end of construction of the detailed design. Effort has been made to include all pertinent documentation that pertains to the particular unit of construction.

2.1 – Sustainability – Provides a summary of the sustainability concepts that are of importance when designing and constructing in Canmore

2.2 – Grading – New to these EDCG, this section establishes the importance of grading in accordance with good engineering practice and as it relates to drainage. Additional information has been outlined to give guidance to Single Family Dwellings and smaller developments

2.3 – Water – Combines both the design and construction aspects of previous guidelines, but also includes clarifying information regarding the servicing as noted in the bylaw.

2.4 – Sanitary - Combines both the design and construction aspects of previous guidelines with additional stipulation for construction and testing of the system that falls below the Ground Water Table

2.5 – Storm – A complete revamp of previous versions, this section integrates progressive Stormwater Management concepts, Best Management techniques as well as several progressive references

2.6 – Shallow Utilities and Alternate Energy – This sections addresses protocol as well as other pertinent information that will help ensure the full inclusion of shallow utilities into a development. Furthermore it will provide guidance to developers to encourage the use of alternative sources of energy such as solar and geothermal.

2.7 – Surface Works – A complete revamp of previous sections, this section encompasses all engineered surface materials used in a project. This section strives to eliminate unnecessary impermeable surfaces and provide progressive environmental choices for all surface works. Also included in this section is road classification and associated cross sections

2.8 – Landscaping – This section will make efforts to streamline the needs and desires of the Town with respect to the landscaping. Specific effort will be spent on pathway construction requirements as well as as-builts.

Part 3 – **Application Submission Requirements** - is divided into three sections as outlined below:

3.1 - Project Classification and Fee Schedule – clarifies the classification of projects and the associated fees.

3.2 – Engineering Drawing Submission Requirements – In addition to moving into the digital age by requiring digital submissions, this section breaks down the drawings and other submissions required. Of new but prime importance in these EDCG is the outline of the Construction Management Plan. This will be required of developments of all sizes.

3.3 – Review process – This outlines the review process and project Milestones that are used by the Town. These new Guidelines clearly outline what is required prior to a Construction Completion Certificate (CCC) inspection taking place. Efforts have been made to have the CCC application procedure mimic the construction process as outlined in Part 2.

Part 4 – **Appendices and References**

4.1 - This section will be include Appendices as required, and as referenced in Parts 1 - 3. In addition to the requirements of the Planning Department, additional studies taken on by the Engineering Department may affect a development in terms of Stormwater Management, Utility Servicing, Traffic Impact and Transportation, and long term aesthetic goals. All Developers must be current with the Towns long term vision that is outlined in these studies.

Scope of this Manual

These Engineering Design & Construction Guidelines are intended to provide information to developers, engineering consultants and contractors who require knowledge of the standards governing the design and construction of infrastructure within the Town of Canmore.

The Town of Canmore hereby adopts the latest version of the City of Calgary Standard Specifications for Roads, Sewer and Waterworks Construction, as well as the City of Calgary Policy and Specification Manual for Pre-Installed Street Crossing Ducts, 1997.

These Guidelines contain amendments, changes, additions and deletions to the above noted documents as they pertain to the Town of Canmore. This manual shall always take precedence over the above noted documents in the event of conflict. Any reference to the City shall be taken to mean the Town of Canmore. Any reference to the City of Calgary, City of Calgary Engineer, Office of the Environment, Materials & Research and Roads/Sewer/Waterworks Divisions shall be taken to mean the Town of Canmore's Engineering Department. Any reference to Parks/Recreation shall be taken to mean the Town of Canmore's Parks Department.

Included in the Guidelines are drawing requirements, shallow utility installation guidelines, design guidelines for streets, waterworks, and solid waste, construction standards for roads, sewer and waterworks.

These Guidelines as well as the latest version of the City of Calgary Standard Specifications, shall 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 Canmore.

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Kevin Van Vliet, M. Eng, P. Eng.
Manager of Engineering

Foreword

The Engineering Design Guidelines and Construction Guidelines (Guidelines) are intended to provide information to developers, engineering consultants and contractors who require knowledge of the standards governing the design and construction of infrastructure within the Town of Canmore. This version of the EDCG is a complete re-write of the previous versions. It is meant to combine the 2000/2004 Consultants Guidelines with both the Design and Construction sections of the 2005 Engineering Design Guidelines into one holistic document. The structure has been altered from past versions in effort to ameliorate the readability of the document.

In addition to bringing the standards up to date, progressive concepts such as sustainability and smart design have been inserted into the development process. The existing chapters have been refined and clarified, and new ones have been added to better reflect the aspects of construction that have been under represented in the past. A brief summation highlighting the mythology and main changes of each Part is included below. Where required, the individual sections will give further detail on the specifics of what changes/additions have been made. This will be included in the forward. The goal is to educate and instill the concept of sustainability into all design and construction decisions that occur. The new EDCG should streamline the development process in a more efficient manner both practically and administratively and attempt to remove the ambiguity that has plagued areas of development in the past.

Part 1 - Local issues (including **Well Head Protection, Goundwater, Undermining**) have been brought to the front of the document these are specific to Canmore and should be known at the outset of design and construction. There has been considerable growth in **Section 1.3.3 Wellhead Protection** with the majority of the information coming from the Land Use Bylaw which is currently under revision. In addition, there have been some refinements in **Section 1.2 – Contractual Relationships** which was constructed originally from Section 2 and 3 of the 2000/2004 Consultants Guidelines, but also from issues that arose from recent construction projects. Finally, the new route 742 has been updated to reflect the recent changes.

Part 2 - This section has the most significant changes in the document. It is laid out in a way that mimics the steps in the construction process. Effort has been made to insure that each of these steps address sustainability individually. Where applicable, each section has a foreword that details the specific changes form previous versions of the Guidelines. At the outset, a new "Sustainability" chapter has been introduced. This chapter serves to set the tone for Part 2 and outlines building practices that align with Canmore values. After that, a brand new section on Grading has been introduced to get a better handle on elevation data and how it relates to Groundwater. The emphasis here is meant to use responsible engineering elevations that compliment the Planning Department height restrictions. The Water and Sanitary chapters remain the main building blocks of underground infrastructure and have been organized for more clarity as well as accessibility for all levels of development. They include minor revisions, but for the most part have not changed. The Storm section has been completely redone with an emphasis on the Canmore Master Drainage Plan, LID measures and other progressive literature. While there is some duplication from previous versions, readers looking to distinguish between the old version should simply start 'fresh'. The Shallow Utilities section has also been expanded to include sub-headings of Alternate Energy. Although most are still at the "for future development" phase currently, they will be easily expanded as our knowledge grows. The Roads section from the older version of the EDG has been expanded to what the Town will be calling Surface Works with a particular emphasis on Pedestrian and Cycle movement.

Part 3 –This section is meant to encompass a complete overview of the Engineering administration of projects. Included are the Drawing Requirements section of the 2005 EDG, as well as the various Testing, Submittals and Forms of the 2000/2004 Consultants Guidelines. It is meant to give guidance to developers for the Engineering Development Process and what exactly is required from the Town during the life of the project and where those submittals fall in the construction timeline. It is also meant to encourage digital transmissions and insure submittals compliment the technologies and record management efforts of the Town.

Part 1 - Development in the Town of Canmore

1.1 Emergency Numbers

Emergency Service

If you accidentally damage the coating, scrape, sever or rupture any underground line, please call the appropriate emergency number immediately.

Watch for above ground structures such as utility pedestals, power lines and hydrants that are located in roadways, lanes and private property. If they are damaged please report the incident immediately.

ATCO Gas	1-800-511-3447	(24 hrs)
TransAlta Utilities Limited	678-5169	(24 hrs)
Telus Communications	611	
Shaw Cable TV Ltd.	1-800-442-8664	(24 hrs)
Alta Link – 24 Hour Emergency	1-866-667-3400	
Fortis Alberta - 24 Hour Customer Service	310-9473	
Monarch	1-800-400-9605	
CP Rail – Railway Emergency	1-800-716-9132	

Town of Canmore Main	678-1500	(daytime)
Town of Canmore Engineering Dept.	678-1599	(daytime)
Town of Canmore Emergency	678-1540	(after hours)

EPCOR Water Services	609-6400	(24 hrs)

It is the responsibility of the developer to contact all the pertinent utility companies prior to construction.

1.2 Contractual Relationships

1.2.1 **TOWN/DEVELOPER -** The Developer shall enter into an Agreement with the Town to complete the construction of a subdivision or other such development in accordance with the Standards & Guidelines. The Developer is and shall remain responsible to the Town for the full and proper performance of all obligations and Municipal Improvements under the Agreement. The Town may, as specified in the Agreement, stop the construction and installation of the Municipal Improvements. When, in the opinion of the Engineer, the work being performed requires full time inspection, or it can be shown that the work being done is not according to the applicable standards, the Town may issue a Stop Work Order to the Developer, with a copy of the Stop Work Order given to the Contractor to stop work on the Municipal Improvements. Any work on the Municipal Improvements completed while a Stop Work Order is in effect may be deemed to be unacceptable by the Engineer.

1.2.2 **DEVELOPER/CONSULTING ENGINEER** The Developer shall retain a Consulting Engineer to ensure the Municipal Improvements conform to or exceed the Standards & Guidelines. It is the responsibility of the Developer to inform the Engineer of the hiring of a Consulting Engineer and/or Landscape Architect. Upon hiring, the Developer (or the consulting engineer on behalf of the developer) shall complete and submit to the Engineer a "Notice of Engagement", of which a sample form is provided on Appendix C – Notice of Engagement

1.2.3 **DEVELOPER/CONTRACTOR -** The Developer shall enter into a contract with the Contractor, to complete the construction of a subdivision or other such development in accordance with the designs and specifications as approved and accepted by the Town. The Contractor is responsible to the Developer for the quality of the Municipal Improvements and for conformance with the Standards & Guidelines. The Developer and Contractor shall at all times comply with the terms and conditions of the Occupational Health and Safety Act.

1.2.4 **TOWN/CONSULTANT -** There is no direct contractual relationship between the Consultant and the Town in the development process. The Consultant's responsibilities for the duties as listed in Appendix A – Definitions under the heading Consulting Engineer. The Consultant will liaise with the Engineer as required, including but not limited to, commencement of construction, construction meetings and issuance of CCCs and FACs. As the Consultant is the representative of the Developer, the Engineer has the right to request the Developer, through the Consultant, to correct deficiencies as they are observed by the Engineer.

1.2.5 **TOWN/CONTRACTOR -** There is no direct contractual relationship between the Contractor and the Town. In the interests of expediency and clear lines of communication, any communication from the Engineer regarding the ongoing work will be communicated directly to the Consultant, unless as otherwise provided for in the Town/Developer relationship.

1.3 Local Issues

1.3.1 Undermining

- **General** - Surface and underground coalmines were developed on the South/West side of the Bow River Valley between Pigeon Mountain and the Town of Canmore from the 1880s to the 1970s. Coal was primarily extracted by underground mining, however, some surface exploration and mining also occurred. There is now substantial evidence of surface subsidence related to shallow workings of underground mines in some areas of the Town. Subsidence, surface features of past mining activity and the presence of coal seam outcrops all present potential concerns. Development of lands where these hazards are suspect are subject to an assessment of the safety of the area and the taking of any necessary remedial action. Assessment and remediation requirements have been issued by the Province of Alberta.
- **Alberta Regulation AR 114/97** designates the applicable lands (see Figures **Canmore Undermining Review Regulation Designated Land OTH- 1A & OTH-1B**) and sets out the requirements for an undermining review that a Developer must undertake. When the review has been completed satisfactorily, a "Compliance Review Certificate" will be issued and acknowledgment of receipt forwarded by the Province of Alberta to the Town of Canmore.
- **Subdivisions & Municipal Improvements on Designated Lands -** A subdivision Developer shall submit to the Town, together with any construction drawings required for a subdivision pursuant to these the Towns Standards and Guidelines, a plan showing the phasing (if any) and status of the undermining review for that subdivision. The plan shall be updated regularly as the status changes or when requested by the Town. A final plan shall be issued when all undermining reviews have been completed and Compliance Review Certificates accepted. Construction drawings and record drawings prepared for Municipal Improvements on Town-owned Lands pursuant to Part 2 of these Guidelines must indicate the location and description of each mitigation measure undertaken or required to be undertaken pursuant to the undermining review. The Developer may Commence Construction of roads, infrastructure and site clearing on Municipal Lands, subject to compliance with other regulatory requirements, prior to completion of the undermining review. However, the Town must be in receipt of written confirmation from Alberta Municipal Affairs that the "Compliance Review Certificate" has been accepted before the Town will accept a Construction Completion Certificate for any Municipal Improvement.
  - **Layout Plans** shall show the general location and description of the undermining mitigation measures. Street Block Profile Plans shall show the specific location, dimension, (referenced to an identifiable surface feature) and details of the undermining mitigation measures.
  - **Grading Plans** shall identify sites (lots or blocks) that require any additional undermining mitigation measures that are subject to the type of development or building that may be proposed for that site. See *Site Developments on Designated Lands*
- **Site Developments on Designated Lands -** Where any undermining review is conditional on additional undermining mitigation measures being undertaken or incorporated into a specific site development identified under the appropriate Subdivision Grading Plan, that is dependent on the type of development or building that may be proposed for that site, the site Developer shall submit to the Town, together with any construction drawings required for a site development pursuant to the Town's Standards and Guidelines, a certificate confirming that all such additional undermining mitigation measures have been incorporated into the design of the proposed development. A Developer may Commence Construction of the Development on the site, subject to compliance with other regulatory requirements, prior to completion of the additional undermining mitigation measures required by the undermining review. However, the Town must be in receipt of written confirmation from Alberta Municipal Affairs that the Compliance Review Certificate for the site has been accepted before the Town will accept an "Occupancy Certificate" for any building on that site.

1.3.2 Groundwater

- **General -** The central portion of Canmore (situated in the valley bottom) is underlain by coarse and pervious river gravels to a considerable depth. These gravels together with the nearby presence of the Bow River result in high groundwater levels that impact trench and foundation excavations as well as completed building foundations and underground utilities. The Town maintains and monitors a number of piezometers and staff gauges throughout the central area of Canmore. Ground and surface water levels are recorded regularly and analyzed for historic trends. Figures of the monitoring locations (**EDCG – OTH – 02 – Peizometer and Staff Gauge Location**) and sample level fluctuations (**EDCG – OTH – 03 – Typical ground water level fluctucation**) are attached. Additional data is being collected with the objective of creating a predictive model that will enable groundwater levels to be determined at any development site in the central area for various frequency intervals. This information will allow the Town and developers to improve the design, construction, operation and maintenance of municipal infrastructure, stormwater management systems and buildings with respect to the impact of high groundwater levels.
- **Building Floor Elevations -** The Town's Land Use Bylaw prohibits the building of habitable floor space below the maximum 1:100 year design groundwater elevation. These elevations, which include a 0.6m freeboard allowance, have been calculated from data provided by Alberta Environment for central area of the Town and are shown on the Figures **EDCG–OTH–04–1:100yr Design Groundwater Elevations**. In the case of data discrepancy between **EDCG–OTH–02–Peizometer and Staff Gauge Location**, **EDCG – OTH – 04 – 1:100yr Design Groundwater Elevations** and more recent peizometer data, the Engineer will determine whether the highest anticipated groundwater elevation shall be determined using the highest of elevation from Alberta Environment's 1:100 year design groundwater levels, data from Town historical records or by recent data from test wells or piezometers on site. All sanitary sewer and water service piping located in a subsurface mechanical room shall be sealed against infiltration of any groundwater and the water meter shall be situated above the 1:100 year ground water level unless the mechanical room is designed and constructed to withstand the infiltration of groundwater. All sanitary sewer and manholes located below the 1:100 yr groundwater elevation shall be tested for Infiltration/Exfiltration as outlined in the Sanitary section of these guidelines. The developer is responsible for all costs associated with the testing.
- **Underground Parking and Lowest Parking Slab elevation -** The Town's Municipal Development Plan, Part 4, Section 3.3.k, encourages the provision of underground parking where the design of the structure is certified capable of withstanding groundwater seepage. Parkade floor levels may be lower than the 1:100 year groundwater level where feasible but not lower than the 1:20 year groundwater level to avoid frequent nuisance flooding. However, the Town will have the final decision on what elevations will be used. The impact of periodic flooding shall be determined and evaluated by the Developer. In any case, the structure shall be designed to withstand all hydrostatic and hydrodynamic forces due to high groundwater conditions at the site.

- **Utility Installations and Foundation Excavations -** The installation of deep utilities and excavation for buildings in the central area of Canmore should whenever possible be scheduled for times when groundwater levels are at their lowest. This occurs between the late fall and early spring. When excavation into the water table cannot be avoided, disposal of groundwater from an excavation may be necessary. The Consulting Engineer shall prepare and submit plans for such proposals to the Town Engineer as part of the Construction Management Plan. Provided there is no detrimental impact to the aquifer, vegetation, adjacent property or structures, groundwater may be discharged to the following:
  - To a temporary on site infiltration basin specifically designed for that purpose based on the maximum discharge pumping rate and the soil infiltration rate. If the discharged water contains a high sediment load, a separate sedimentation basin or an additional allowance for the infiltration basin shall be provided.
  - To a naturally vegetated area of adequate size and with suitable soils. If the discharged water contains a high sediment load, a geotextile filter shall be installed at the discharge point to collect and contain the sediment; this shall be removed upon completion and any disturbed areas restored to an acceptable condition.
  - A natural watercourse or surface water body provided the discharge has first been treated and the quality of the discharged water is equal to or better than that of the receiving body, especially with respect to sediment and turbidity. The consultant (and in smaller cases the builder) is responsible to obtain additional approvals that may also be required from Public Land Services or Fish & Wildlife Services of the Province of Alberta.
- In all cases, the point of discharge shall be protected against erosion. If sediment laden or turbid discharge water finds its way into any surface water course, discharge shall cease immediately, sediment shall be removed and the area restored to its pre-existing condition. All groundwater disposal methods proposed on Municipal Lands or within the Town's Wellhead Capture Zone must be accepted by the Town Engineer prior to construction. The consultant (and in smaller cases the builder) is responsible to obtain additional approvals that may also be required from Public Land Services or Fish & Wildlife Services of the Province of Alberta.
- Trench or excavation groundwater may **not** be discharged to the sanitary sewer system. Discharge to a contained stormwater sewer system (system with a detention pond that does not discharge directly to a surface water body) or to a stormwater drywell may be considered where the water is of acceptable quality and such discharge has been authorized in writing by the Engineer.

1.3.3 Protection of Aquifer for Municipal Water Supply

- **General -** The Town of Canmore obtains a significant portion of it total municipal water supply from groundwater in the Bow River Valley aquifer beneath the Town. Existing production wells are located adjacent to Policeman's Creek near the intersection of Railway Avenue and Old Canmore Road. The Town has adopted a wellhead protection strategy made up of three control mechanisms to protect this water supply source. Development in the area upstream of and near to the wells is controlled by the Town and restricted to uses or activities that will not adversely affect the quality of the groundwater. See the Land Use By-law for additional details.

- **Control Mechanism #1 - Construction Activity Control -** Construction of Municipal Improvements on Municipal Lands, or other activities not regulated by the Land Use Bylaw and located within the ***Wellhead Capture Protection Zone (OTH-06)*** as defined by hydro-geological parameters, shall comply with these Standards & Guidelines and any other specific requirements deemed necessary by the Engineer for the protection of the Town's water supply source.

- **Control Mechanism #2 - Land Use Control -**The Town's Land Use Bylaw No. 09-99, Part G, establishes the ***Wellhead Protection Area - Land Use*** for the regulation of land uses and applies to all development sites wholly or partly within the boundary of the area. The limits of the ***Wellhead Protection Area- Land Use*** are shown in the Figure OTH-05 attached. Certain types of land uses are prohibited from the ***Wellhead Protection Area-Land Use***. Permitted or discretionary uses must conform to the performance criteria listed in the Bylaw and the Town may require a risk assessment report as part of a site development permit application. Refer to the Bylaw for additional details.

- **Control Mechanism #3 – Stormwater Disposal Control –** Stormwater treatment and disposal for areas within 500m of a water course (***500m Infiltration Zone- STM -04)***) shall be in accordance with the Town of Canmore Engineering Design and Construction Guidelines or Alberta Environment standards, which ever is the more stringent. Refer to the Storm section for additional details.

1.3.3.1 Technical requirements & Performance regulations for Wellhead Protection Area - The '***Wellhead Protection Area'*** is considered to be the extent of the areas of all three control mechanisms. The performance criteria utilized to determine permitted and discretionary land uses and to maintain current land uses are as follows:

a) All proposed developments:
- Shall prepare stormwater drainage plans to the satisfaction of the development authority which shows how surface water can be effectively managed as it passes over the site, including the identification, containment, appropriate disposal of contaminants found in surface water should they occur.

b) All new developments, where on-site collection and treatment are proposed:
- Shall ensure that the storm systems are constructed in conformance with the Town of Canmore Engineering Standards: 08(Z)2001

c) Uses that are proposed for development in the residential areas delineated in the wellhead protection:
- Shall demonstrate to the satisfaction of the development authority that excavations shall not expose the aquifer to any harmful degradation including the removal of overburden for extended periods of time and the creation of permanent pathways between the ground surface and the aquifer.

d) Uses that utilize pilings in development:
- Shall demonstrate to the satisfaction of the development authority that the pilings shall not degrade the aquifer including the development of permanent pathways between the ground surface and the aquifer.

e) Uses that are proposed for development in the commercial and industrial areas delineated in this protection area shall:
- Place all new petroleum storage tanks and all petroleum storage tank replacements above ground, shall ensure that all such tanks have secondary containment with dikes, impervious liners/equivalent, leak detection and/or monthly statistical inventory reconciliation analysis system and shall have an overfill or spill prevention system.
- Demonstrate to the satisfaction of the development authority that excavations shall not expose the aquifer to any harmful degradation including the removal of overburden for extended periods of time and the creation of permanent pathways between the ground surface and the aquifer.
- Ensure that all holes created by the removal of piles, foundations, drilling or any other similar activity shall be properly sealed in a manner to minimize seepage into the underlying aquifer.
- Prepare and implement monitoring programs to the satisfaction of Alberta Environmental Protection which are able to detect contamination of the aquifer.
- Prepare a materials handling management plan for hazardous and dangerous materials that are brought on site and which is in compliance with Canada Transportation of Dangerous Goods Act, including WHMIS and Alberta Environmental Protection and Enhancement Act.

f) Uses that involve compressed gas pipelines:

- Shall ensure that all pipeline plans meet the conservation and reclamation requirements of the Alberta Environmental Protection and Enhancement Act.
- Shall demonstrate to the satisfaction of the development authority that excavations shall not expose the aquifer to any harmful degradation including the removal of overburden for extended periods of time and the creation of permanent pathways between the ground surface and the aquifer.

g) Uses involving liquid petroleum and oil pipelines:

- Shall follow the same requirements as those listed for compressed gas pipelines.

h) Uses that involve pasture, dry land farming and passive and active recreational activities.

- Shall prepare and implement a pesticide and/or fertilizer management plan that complies with Alberta Environmental Protection and Enhancement Act AR 24/97 Section 5 and Public Health Act, Nuisance and General Sanitation Regulation AR 242/85.
- Shall store pesticides only in facilities that comply with Alberta's Safety Codes Act and environmental Enhancement and Protection Act Regulations 24/97.
- Shall have the application of pesticides done only by individuals holding a valid and applicable pesticide applicators certificate or by uncertified individuals working under the direct supervision of a provincially certified applicator.
- Shall have all new petroleum storage tanks and all petroleum storage tank replacements placed above ground, incorporating secondary containment with dikes, impervious liners/equivalent, leak detection and/or monthly statistical inventory reconciliation inventory system and each tank shall have an overfill or spill prevention system.

i) All current uses which involve the handling of biomedical wastes:

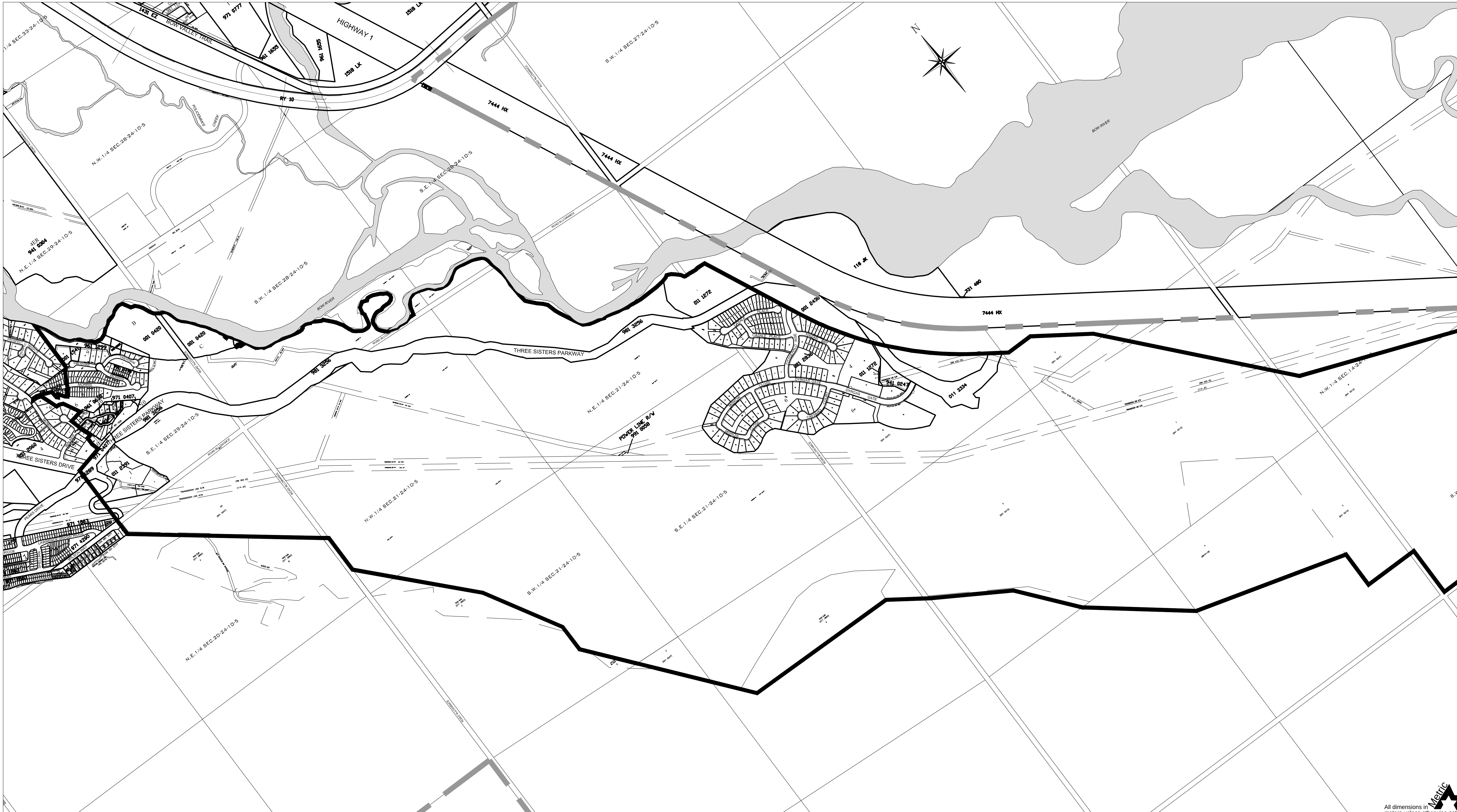
- Shall register with the Town of Canmore their existing management plans and ensure that the Town is apprised of any modifications.

j) All commercial kennels and veterinary clinics:

- Shall develop animal waste management plans and register these plans with the Town of Canmore and keep the Town apprised of any modifications.

Local Issues – Illustrations

- **Figure EDCG – OTH – 1A – Canmore Undermining Review Regulation Designated Land**
- **Figure EDCG – OTH – 1B – Canmore Undermining Review Regulation Designated Land**
- **Figure EDCG – OTH – 02 – Peizometer and Staff Gauge Location**
- **Figure EDCG – OTH – 03 – Typical Water Level Fluctuation**
- **Figure EDCG – OTH – 04 – 1:100yr Design Groundwater Elevations**
- **Figure EDCG – OTH – 05 – Wellhead Protection Area – Land Use**
- **Figure EDCG – OTH – 06 – Wellhead Capture Protection Zone**
- **Figure EDCG – OTH – 07 – Highway 742**

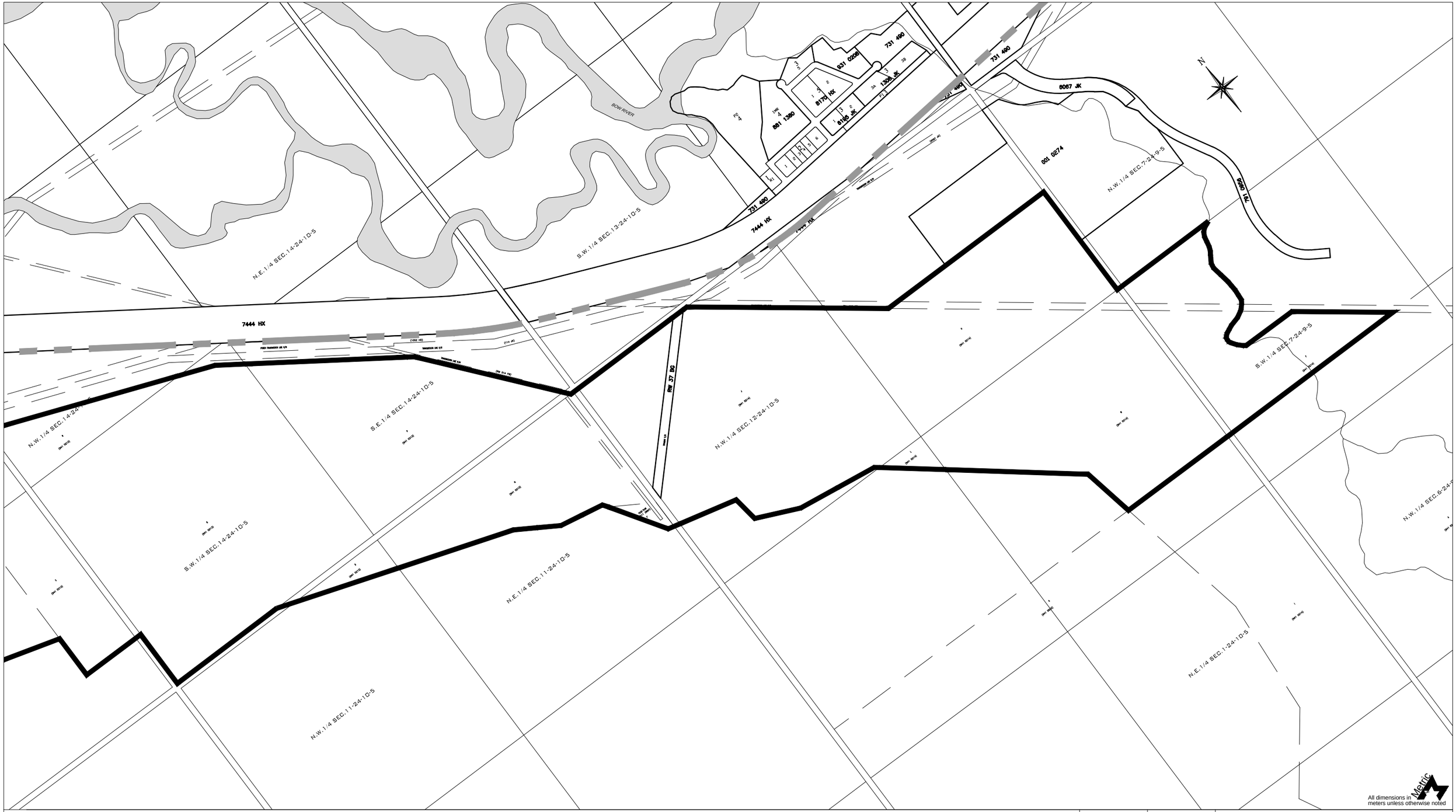


LEGEND:

Limit of Undermining zone
(Extrated from schedule 1 of regulation. See schedule 2 of the regulation for detailed legal description.)

Limit of Town Boundary

P.L.	Nov./02	Town of Canmore ENGINEERING DEPARTMENT
Not to Scale		Canmore Undermining Review Regulation Designated Land
APPROVED: MANAGER OF ENGINEERING TOWN OF CANMORE		SHEET NO: OTH-1A — FILE NO: OTH-1A



LEGEND:

Limit of Undermining zone
(Extrated from schedule 1 of regulation. See schedule 2 of the regulation for detailed legal description.)

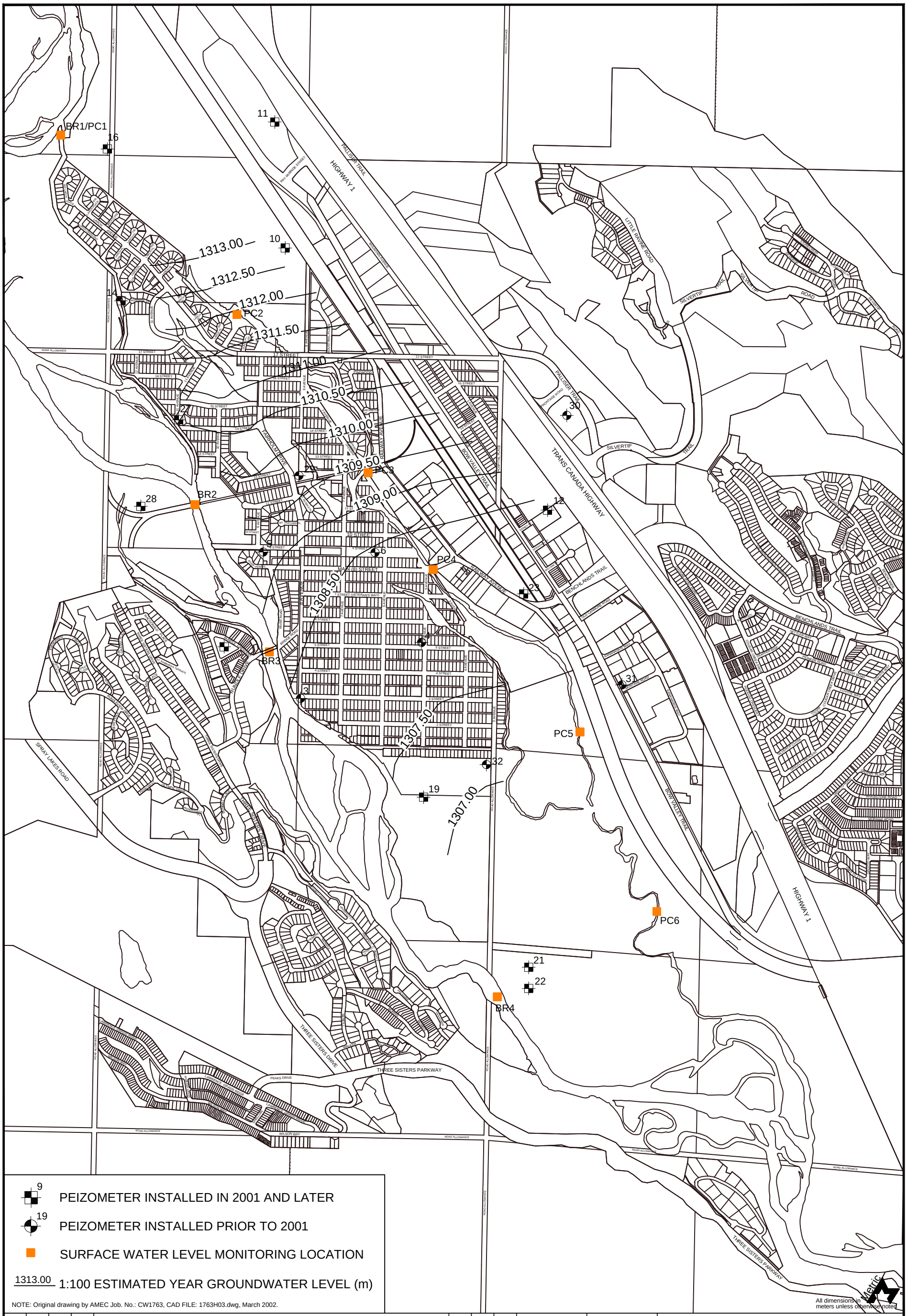
Limit of Town Boundary

P.L.	Nov./02
Not to Scale	
APPROVED:	
MANAGER OF ENGINEERING	
TOWN OF CANMORE	

Town of Canmore
ENGINEERING DEPARTMENT

Canmore Undermining Review Regulation Designated Land

SHEET NO:	FILE NO:
OTH-1B	OTH-1B



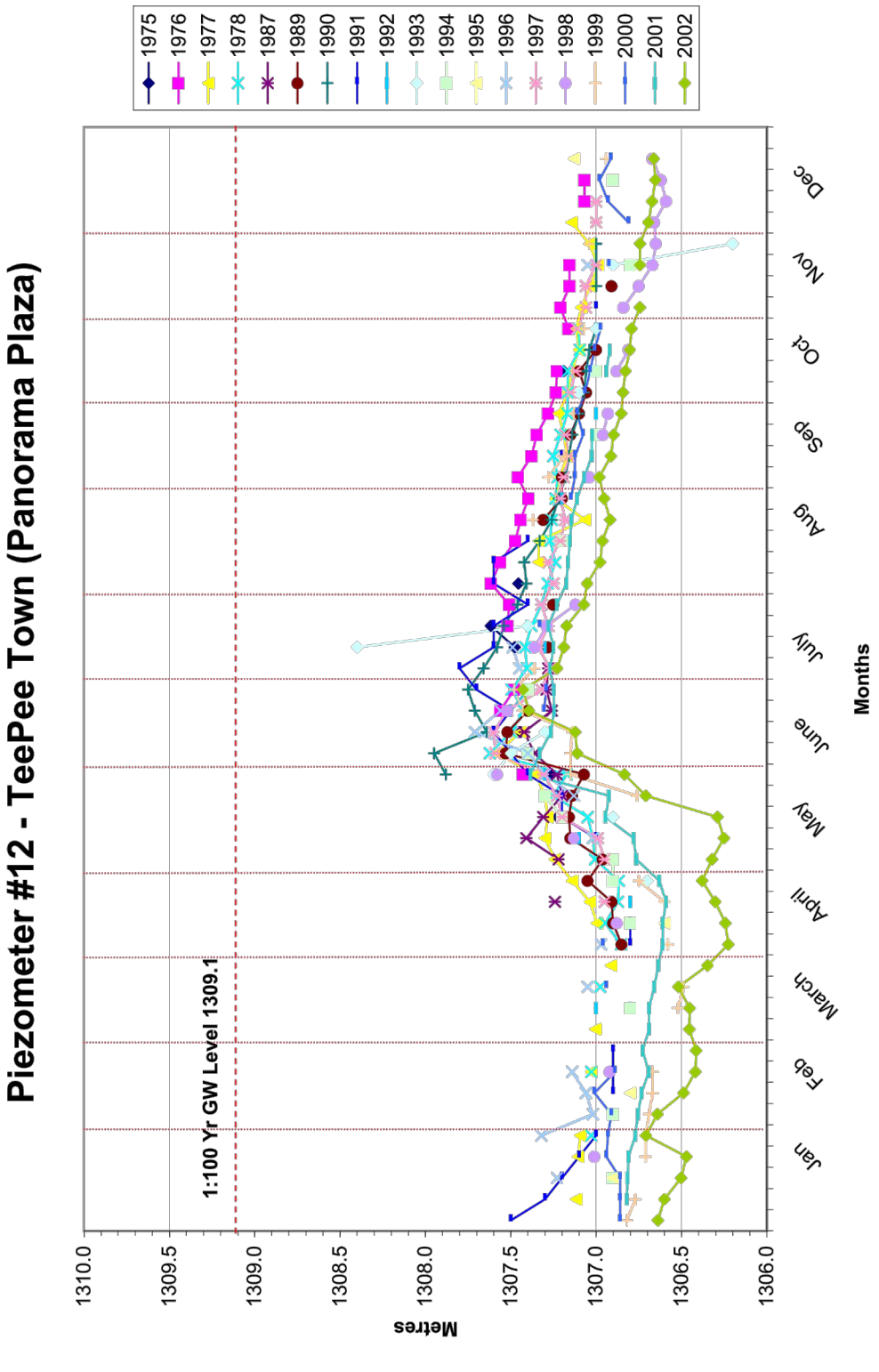
REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG

DRAWN: P.L. DATE: June/03
SCALE: 1: 15 000
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

PEIZOMETER AND STAFF GAGE LOCATION

SHEET NO: OTH-02
FILE NO: OTH-02



All dimensions in meters unless otherwise noted

Metric

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3							
2							
1							

DRAWN: S.K. Patel

DATE: May/2010

SCALE: NTS

APPROVED:

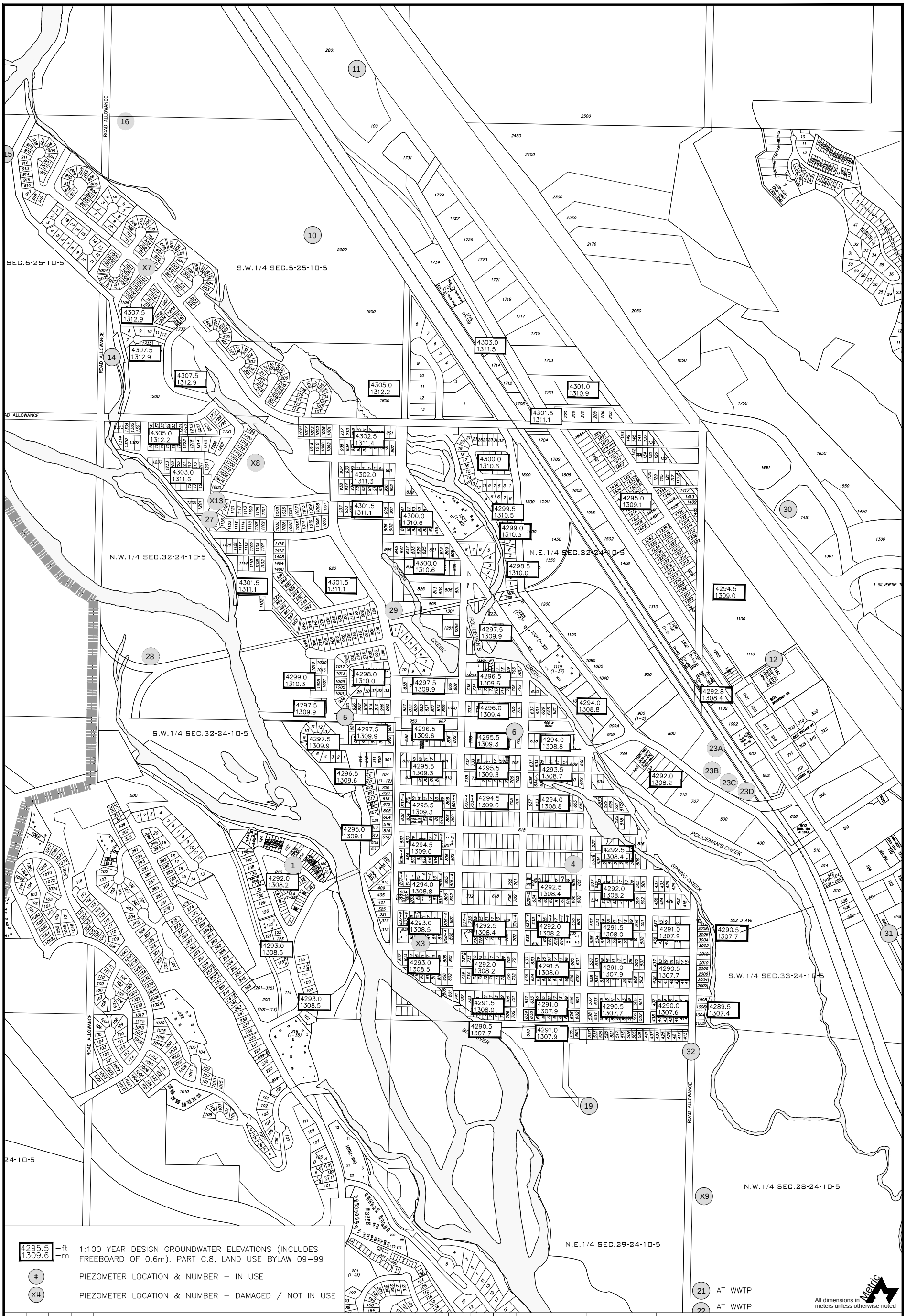
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

TYPICAL WATER LEVEL FLUCTUATION

SHEET NO.: OTH-03

FILE NO.: OTH-03



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DRAWN: P.L.
DATE: Dec./02
SCALE: Not to Scale
APPROVED:
MANAGER OF ENGINEERING
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1:100 YEAR DESIGN GROUNDWATER ELEVATIONS

SHEET NO: OTH-04
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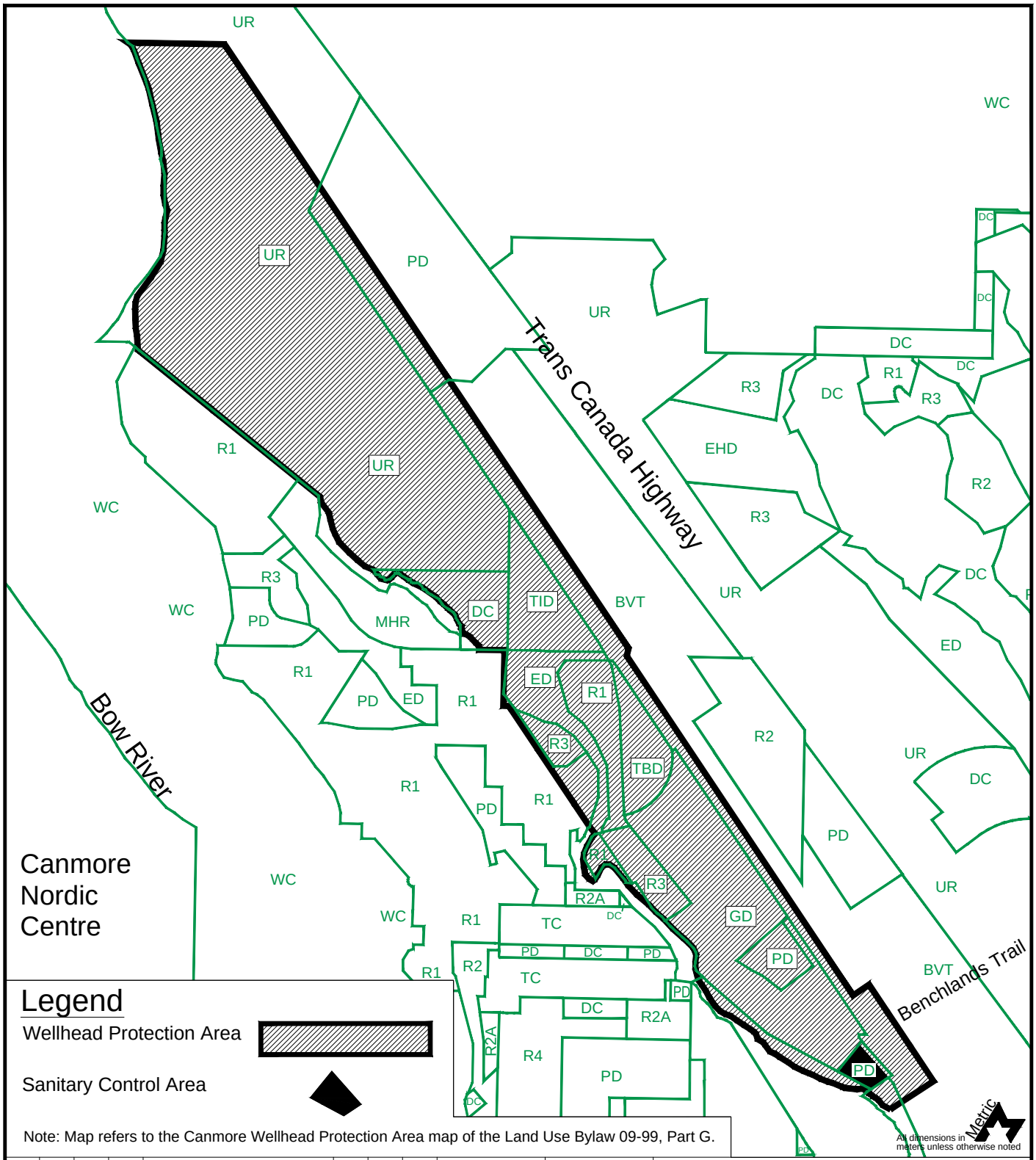

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DRAWN: K.B.
DATE: Sept/98
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

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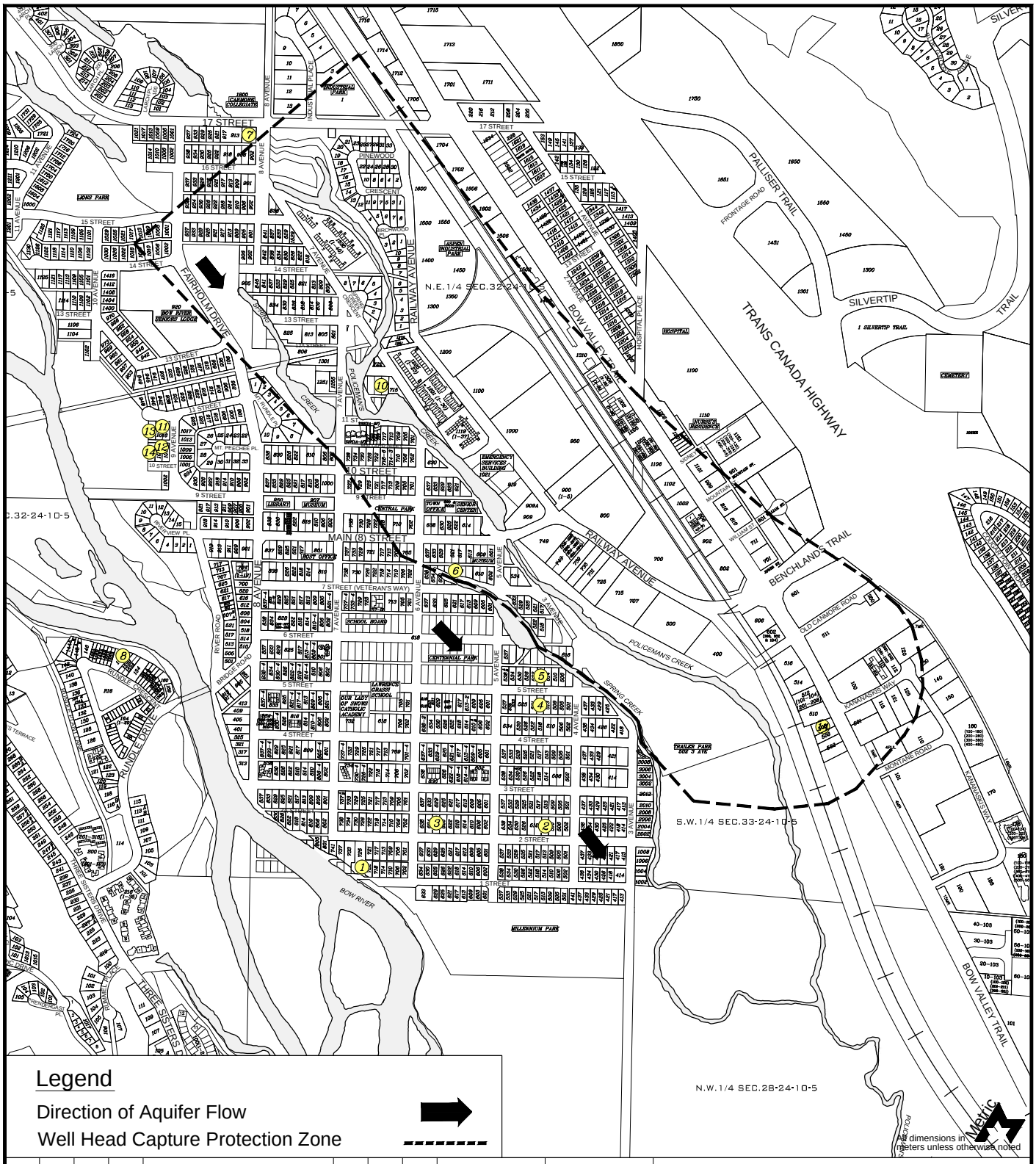
ENGINEERING DEPARTMENT

WELLHEAD PROTECTION AREA LAND USE

SHEET NO.: OTH-05
FILE NO.: OTH-05



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DRAWN: B.W.
DATE: Mar/02
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

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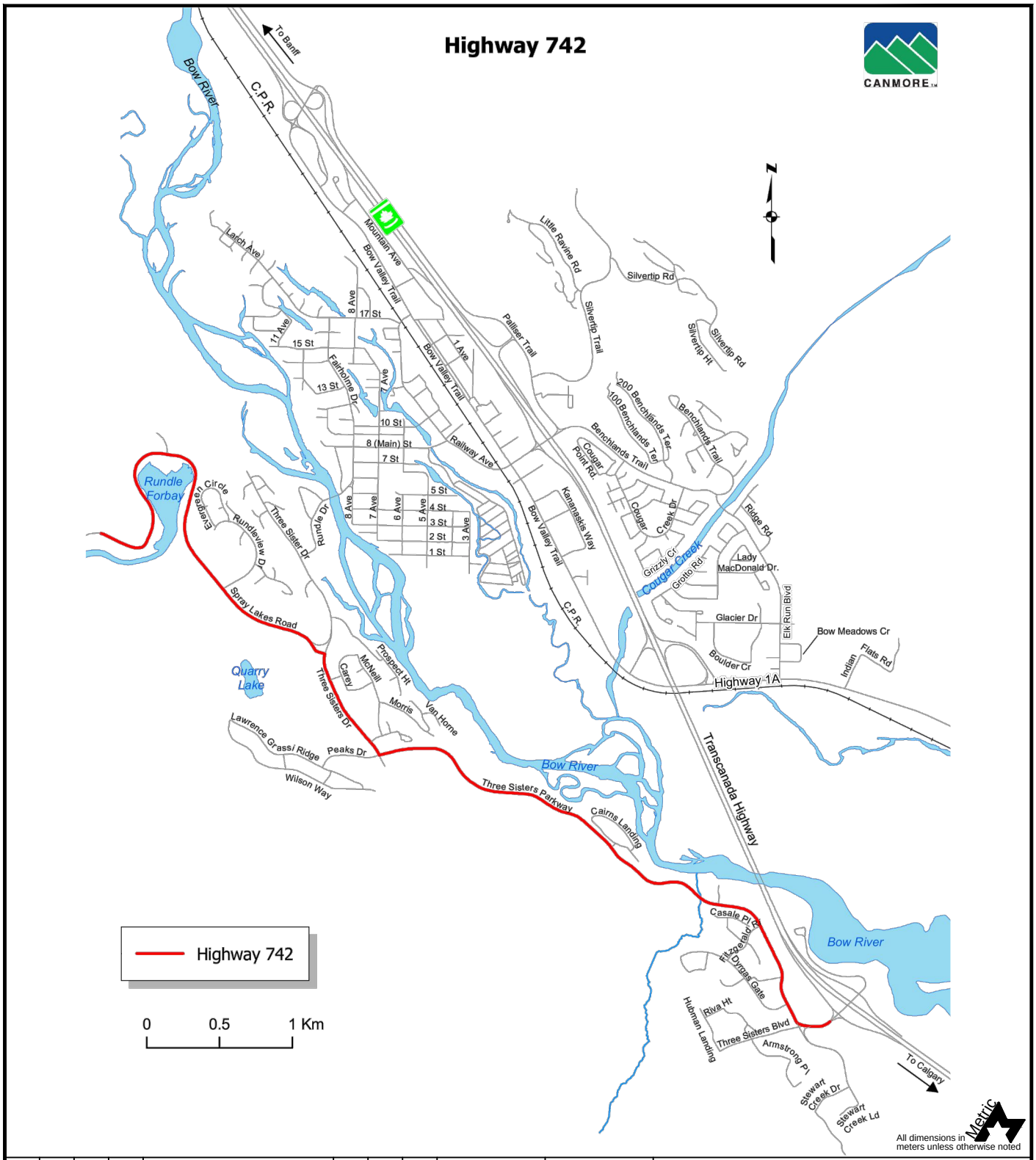
ENGINEERING DEPARTMENT

WELLHEAD CAPTURE PROTECTION ZONE

SHEET NO.: OTH-06
FILE NO.: OTH-06



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DRAWN: S.K. Patel
DATE: May/2010
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

HIGHWAY 742

SHEET NO.: OTH-07
FILE NO.: OTH07

Part 2 - Design & Construction Guidelines

2.1 Sustainability

Foreword

What the developer can expect with the addition of this section

- *Increased emphasis on the social implications of construction*
- *There will be more emphasis on the Re-use/recovery of materials from site*
- *Emphasis on the use of products with recycled content*
- *When developing in mountainous areas, the Town will be expecting developers use gravity for their sanitary and storm infrastructure systems*
- *Subdivisions will be required to dictate main floor elevations and minimum parkade elevations with their grading plans. Developers will be expected to abide by these numbers for their development. The thinking will be the same for the servicing.*
- *The Town will be placing more emphasis on Pedestrian and Cyclist mobility for both subdivision and development*
- *The Town will be expecting the maintenance component of all infrastructure (especially stormwater) to be fully addressed with the development application. Infrastructure that requires periodic maintenance will require literature that can be passed along to the condo board or the party that is tasked with maintenance*

Traditional vs Sustainable Design *- Canmore is dedicated to instilling sustainability initiatives thru development of land within the Town boundaries. In some occurrences, current development practices (including design and construction), use materials in a manner which is not sustainable and that is problematic for future generations. Development Teams are reminded that design and construction may need to be thought of and done differently than in the past. Furthermore, current thinking has the expectation from consultants that the Town must provide exact solutions for all sustainable engineering aspects of the project. This expectation has virtually eliminated innovation from Design Teams, as well as the harnessing of site specific conditions for the implementation of sustainable building practices. These guidelines are meant to support the need for progressive and innovative thinking from Design Teams. While the guidelines have minimum requirements, the Town encourages Development Teams to bring forward all design and construction initiatives that they feel embrace the concepts of sustainability.*

2.1.1 The **Triple Bottom Line Principle** of Sustainability shall be used for development in Canmore. The Social, Environmental and Economical facets must each be given equal weight and effort by Development Teams for all decisions, big and small, from the beginning to the end of the development project. With respect to municipal infrastructure, the following key aspects will be reviewed with respect to development applications:

- **Social** – examples include Cost of Construction concept – Disruption and impact on neighbors and homeowners through noise, traffic/transportation disruption, dust, project duration and implications of built infrastructure within the neighborhood
- **Environmental** – examples include Low Impact Development, Progressive Stormwater management, Erosion and Sediment Control, Smart Design of Infrastructure
- **Economical** – examples include Smart Infrastructure Design, minimal use of materials, optimal balance of capital and operating costs

2.1.2 The **Four Principles** of Sustainability (Reduce, Reuse, Recycle, Recover) must be applied to all aspects of the project, especially with regard to Energy, Materials and Time. If requested,

Development Teams will be required to provide rationalization that their choices for construction and placement of Infrastructure and Surface Works are the best use of Energy, Materials and Time, both for their project, as well as for future generations.

- **Reduce** – Development Teams are to use a minimalist approach when using plant manufactured materials products such as asphalt, concrete and all types of plastic infrastructure. This Principle is to be applied throughout all decisions for the life of the project. Development Teams are encouraged to suggest methods and means to minimize the use of plant manufactured materials, and should be motivated to think beyond conventional design.
- **Reuse** - Identify any and all material that may have some value and reuse it where possible, preferable in the local area. This concept should be applied not only to manufactured products, but to natural materials being removed from site.
- **Recycle** - All efforts should be made to use materials with recycled content, preferably from local and Canadian markets. Project waste should be recycled in accordance with the Town's Construction & Demolition Waste Management Policy.
- **Recover** – Industries are encouraged to recover material and energy loss thereby decreasing their ecological footprint. Industries should be encouraged to locate in close proximity to each other so that by-products of one industry may be utilized by another.

2.1.3 Smart Infrastructure Design – The Town and Developers shall use up to date, progressive and sustainable development and construction methods/techniques of development. Designers are encouraged to think creatively and harness any local or site specific advantage that could create greater levels of sustainability and to consider methods and techniques from areas outside of Canmore and Calgary. A large component of Smart Infrastructure Design is thinking ahead to reduce the need to alter infrastructure that has already been placed.

2.1.4 Layout of infrastructure – shall be such that gravity is the first choice when needing to harness energy for the functioning of all infrastructure systems. Pumps are generally discouraged (and at the very least minimized) where they will be needed in a long term capacity for the functioning of the servicing of the habitable space of the development.

- **Subdivisions** – legal lot lines shall be placed to compliment the infrastructure that has and will be placed at the subdivision stage. This should ensure that future development parcels shall require no alteration or addition of services to lots, because the placement of subdivision infrastructure interferes with the building footprint. Main Floor Elevations (lowest floor elevation of habitable space) as well as minimum Parkade Floor Elevation (PFE) will be required on the grading plan for all subdivisions. Deviation from this MFE or the PFE from the developer of the lot will require a Variance.
- **Developments –** shall use existing (providing it has been placed) servicing from the subdivision stage for their development. Altering the servicing shall require a variance as well as additional charges from the Town. It is up to the Developer of the development parcel to ensure the subdivision inverts will function adequately for their planned development.

2.1.5 Team Approach - The Town and Developers shall use a multidisciplinary team approach in the design of new infrastructure, at the earliest possible stages of development projects. Designers are responsible for their team to be able to address, carry out and implement sustainable initiatives for development projects. Areas of expertise may be required earlier in the process than has traditionally been the case. Designers are responsible to maintain communication with their infrastructure design teams to ensure progressive systems are implemented from conceptual planning through construction.

2.1.6 Prefabrication – the designer shall strive to use prefabricated methods as opposed to building infrastructure components in the field. Manholes, concrete works and any other components should be pre-assembled or pre built as much as practical to avoid construction in the field.

2.1.7 Transportation – Developers (particularly in large developments) shall give equal weight to Active Transportation (cycling, pedestrian and chariots/burly's) when designing transportation corridors. Cycling storage as well as winter trail maintenance must be addressed in the Subdivision or Development application.

2.1.8 Energy (<u>For discussion and future development</u>)

- The Town encourages subdivision design in such a way that renewable energy is used for 10% of the energy needs of the subdivision. Effort should be given to using infrastructure that relies on alternate energy (eg pedestrian cross walk signals powered by solar energy).

2.1.9 Materials <u>(For discussion and future development)</u>

- The Town encourages that asphalt used in the Town of Canmore to be 10% recycled by content
- The Town encourages that concrete flyash % by content be maximized as is prudent in sidewalks, curbs and Surface Works
- For large quantities of materials removed from site, the Town requests that the developer provide the Town with adequate warning with regard to the approximate type and amount of material that is expected to be removed. The Town shall have the option to have the developer ship to the Town yard or to a location within Town boundaries as opposed to having it removed from site.

2.1.10 Maintenance and Monitoring

- Components of all infrastructure systems, especially Stormwater filtration systems, need to be addressed by a Professional Engineer in terms of lifecycle costs and replacement as part of the Subdivision/DP Application.

2.2 Grading & Construction Commencement

Foreword - The Grading Section is new to the EDCG and has been brought on for two reasons:

i. *The first is to remind developers, engineers and contractors of the importance of Erosion and Sediment Control (ESC) when constructing in Canmore. The Town wants to re-affirm just how important ESC measures are to the Town. In recent discussions with the maintenance staff and the Public Works Department, the Engineering Department discovered unanimous consensus that silt and fines clogging our existing storm system is an enormous maintenance burden and is growing. It is essential that this philosophy is understood by all members of the development team and that it is maintained right through the landscaping warranty period*

ii. *The second reason is to incorporate more sustainable design practices within the projects being built in Canmore. Grading of the site, as well as the construction procedures used to achieve the desired grading, are directly related to the amount and effectiveness of stormwater infiltration and storage of the site, which this section and these Guidelines are trying to promote.*

What the developer can expect with the addition of this section

- *The Town will be looking for developers to minimize grading of lots*
- *The Town will be looking for placement of weeping tile and soakaway pits, especially on SFD and duplexes on design drawings and on site*
- *There will be more emphasis placed on the effect of the proposed grading on neighboring parcels*
- *The Town will be looking for a more comprehensive list of engineered elevations*

2.2.1 Required Reading

- Prior to applying for a development, the developer shall be familiar with the following documentation
  - Town of Canmore - Mountainous Terrain Guidelines
  - Development Grading Plan Policy (for subdivisions) – Council motion 248-2000
  - Land use Bylaw 09-99 – Part C – Section 20
  - Part 1, Section 1.3.1 – **Provincial regulation AR 114/97** regarding **Undermining**
  - Part 1, Section 1.3.2 – **Groundwater**

2.2.2 Design – General

High Groundwater and Undermining Conditions

- Developers should be familiar with the aspects of groundwater and undermining that are specific to Canmore as outlined in Part 1 of these Guidelines.
- Where Developments and Subdivisions exist in conditions of high groundwater, the Town reserves the right to ask for a geotechnical investigation to address specific issues of groundwater. Test hole logs with soil sulphate data for a period of 6 months may be required.

Minimize Grading

- Grading for all lots is to be kept to a minimum. Building types shall be chosen and built in such a way that accommodates the pre-development landscape as much as possible as opposed to altering the landscape to suit a type of building. Alterations to the natural topography should be minimized in conjunction with the Town's Mountainous Terrain Guidelines.

Lowest Top of Footing

- Lots with existing Development Grading Plans will most likely have a dictated Lowest Top of Footing elevation. When applications deviate from this, a Geotechnical Engineer will be required.

Field Testing

- For larger projects, and in addition to the requirements of the drawings, the Consulting Engineer shall:
  - Resolve all issues related to unexpected soil conditions that could affect construction or the development of the subdivision, inspect the sub-grade prior to placing any fill and conduct the appropriate testing on all fill placed.
  - Inspect the stripping and grading operation to certify that the Standards & Guidelines are complied with.
  - Provide all field test results to the Engineer.
  - During stripping and grading, the Consulting Engineer's on-site representative may be limited to survey crews and/or soils technicians as required in order to meet the Town's minimum requirements. The provision of spot inspections by the Consulting Engineer during stripping and grading shall be left up to the discretion of the Consulting Engineer.

Effect of Grading on neighboring parcels and Street ROW

- As per our Land Use by-law, developers are reminded that grading shall not direct stormwater runoff to neighboring private properties or onto Town sidewalks or onto a lane or street, except in accordance with an approved grading plan.
- Particular attention must be given to transitions to neighboring properties to ensure proposed grades transition smoothly with existing grades. Designers will be required to show the existing grades as per the Plot Plan on all submissions.
- When developing in the valley bottom, in most cases the Building Floor Elevation is dictated by **EDCG – Figure - OTH -04 1:100yr Design Elevations**. Developers should be mindful of neighboring grades that are not reflected on **OTH-04**, which is driven by groundwater elevations. In some cases, using this elevation without being mindful of neighboring grades can cause the proposed dwelling to fall in a low spot with respect to neighboring grades and eliminate the possibility of an escape route for a major event (**see EDCG – Grading - SKT 01 – Overland Escape Route)**. ***Developers are required to have their legal Plot Plan reflect elevations of neighboring parcels that will fall higher than their MFE.*** The Engineering Department reserves the right to dictate a higher "lowest floor elevation" should they feel that any proposed habitable space may be affected by runoff.

Grading and Stormwater

- Grading should be mindful of the Stormwater management of the site and all designers are encouraged to become familiar with the Stormwater Section of these Guidelines.
- Lots are to be graded in such a way that quantity and velocity of surface runoff is minimized, and that infiltration and detention is maximized throughout the site (as is practical)
- It should be noted that Grading is intrinsically related to Stormwater and Landscaping. Developers should address these three areas concurrently. As a general rule to distinguish Landscaping from Grading, designers are asked to consider the shape of the land to be the Grading, and the Landscaping to be the plantings themselves on top of that shaped land. In the case of the discrepancies, the Grading Plan will always govern over the landscaping plan.
- Grading of lots should follow the appropriate Development Grading Plan where available
- Where there is no Development Grading Plan (or in the case of a re-development), two general approaches to grading will be used:

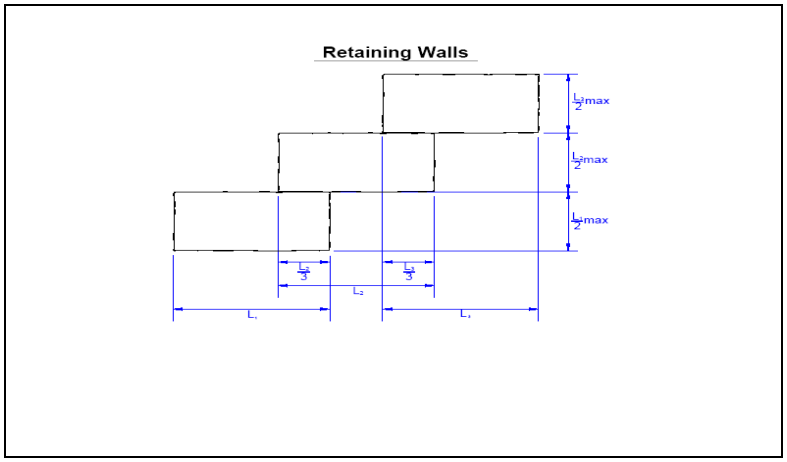
  Figure EDCG – Grading – SKT -02: General Grading – Lots in the Valley Bottom
  Figure EDCG – Grading – SKT -03: General Grading – Lots on a Slope

2.2.3 Specifics Issues

Retaining walls

- Retaining walls need to be detailed with regards to elevation. Numerical grades showing top and bottom of wall are required for retaining walls of all projects including Single Family Dwellings
- All retaining walls greater than 1m in height are required to be sealed by Professional Engineer and must include the following:
  - Wall backfill and drainage
  - Wall foundation and minimum embedment
  - For reinforced concrete/engineered product wall - calculations that demonstrate adequate bearing capacity, resistance to sliding and overturning and internal stability
  - For dry stacked boulders less than 2.5m in height – design must show wall inclination, typical rock dimensions top and bottom
- **Retaining walls that have less than 1/3 overlap as shown in the diagram below will not require an Engineer (see diagram below)**
- For dry stacked boulders more than 2.5m in height – the engineer must provide a review of the walls internal and global stability
- Walls with railings along the top, surcharge loads, sloping backfill or tiered construction may require additional details to demonstrate adequate construction

Figure 2.2.3 Sk-1



Window Wells and Sunken Entrances

- Window Wells and Sunken Entrances shall not be placed in Drainage Right of Ways
- Grading around sunken entrances and window wells shall ensure runoff be directed away from the wells
- Window wells and sunken entrances will require a drain that directs runoff trapped in the well to an appropriately sized seepage pit.
- See **Figure EDCG – Grading – SKT 04: Window Wells and Sunken Entrances**

Weeping Drain Tile

- **(Residential (R1 and R2) Developments** - Weeping tile is required for all developments, unless otherwise recommended by a geotechnical engineer based on a thorough investigation and analysis of local subsurface soil and groundwater conditions, and such recommendations are accepted by the Town Engineer.
- The investigation and analysis by the geotechnical engineer must consider the possibility of localized and intermittent springs resulting from intense rainstorms or snowmelt, or from preferential groundwater pathways including service pipe trenches and bedding materials.
- All lots requiring weeping tile must be shown in a distinctive manner using symbols and legend on the design drawings. Should weeping tile not be required as per direction of the geotechnical engineer, it can be omitted in the construction phase. **New to this version of the Guidelines, The Town of Canmore will be inspecting for weeping tile as part of the servicing inspections.**
- All weeping tile is to be daylighted to on site infiltration facilities or to a local drainage system as accepted by the Town Engineer.
- Elevation views of weeping tile showing specific elevations of inverts and bottom of soakaway pits will be required for all applications.
- Should piped storm systems be used, they shall take into account the contributions of weeping tile for sizing purposes. **All weeping tile connected to a storm system will need to be indicated on the application and be accepted by the Engineer**
- See **Figure EDCG – Grading - SKT-05: Weeping Tile**

Garage Drains

- All garage drains shall meet the requirements of the Alberta Building code and Alberta Environment regulations.
- The Engineer may require an oil grit separator to be placed in the garage. In this case, as a minimum, the following detail will be used. The developer may offer a variation of the design, but the function of the oil grit separator must remain the same. Final design will be subject to acceptance of the Engineer.
- See **Figure EDCG – Grading - SKT-06: Garage Drains**

Driveways

- Grading of lots must also accommodate a smooth transition from the front of the property to the street ROW. This is especially critical with driveways that access a sloped street. Retaining to accommodate access must be done on private property to allow the Town to modify the street within existing street grades.
- Driveway grades must adhere to the TAC manual or the latest version of Driveway Grades from the City of Calgary

2.2.4 Construction Commencement

- Typically, Stripping and Grading signal the commencement of construction. It is up to the Developer to ensure all necessary permits and approvals from other governing agencies are in place. It is absolutely essential that no construction, including stripping and grading, shall take place without a CMP that has been approved by the Town. This applies to all projects of all sizes except for renovations. Please refer to the Application Submission Requirements of these Guidelines. It is the responsibility of the developer to ensure that Erosion and Sediment Control measures are in place prior to construction commencement. It is essential that ESC measures are kept in place for the duration of the project including through the placement of landscaping.
- **Pre Construction Duties -** Prior to construction commencement, the Consulting Engineer as well as all members of the Development Team shall be completely familiar with “Standards and Guidelines” as referenced by Appendix A – Definitions, any pertinent approved Town

drawings, the pertinent Subdivision/Development Agreement and the Construction Management Plan.

- **Utility and Pipeline Locations** - Prior to the commencement of work, the Contractor is responsible for contacting the appropriate agencies to locate existing underground utilities and pipelines in or adjacent to the construction work site. The utility or pipeline agencies must be contacted two (2) working days prior to commencement of work. **Field Location Service Calls: Alberta One-Call 1-800-242-3447**
- **Excavation/Road Use Permits** must be obtained from the Town of Canmore Engineering Department prior to any excavation in existing public rights-of-way.

2.2.5 Grading Diagrams

- For independent development lots:
  EDCG – Grading – Figure 001 – Grading Plan Requirements
  Note: The information requested can be shown on a plan view, so long as it is legible

- For multiple lots created by subdivision
  EDCG – Grading – Figure 002 – Building Grade Plan –Minimum Requirements

- **Figure EDCG – Grading - SKT-01 – Overland Escape Route**
- **Figure EDCG – Grading - SKT-02 – Grading – Lots on the Valley Bottom**
- **Figure EDCG – Grading - SKT-03 – Grading – Lots on a Slope**
- **Figure EDCG – Grading - SKT-04 – Window Wells and Sunken Entrances**
- **Figure EDCG – Grading - SKT-05 – Weeping Drain Tile**
- **Figure EDCG – Grading - SKT-06 – Garage Drains**

Grading Plan Requirements

Item required	Size of Development		
	Small	Med & Large	Large Subdivision
Land Use	Required	Required	-
Lot #	Required	Required	N/A
Civic Address	Required	Required	N/A
Legal footprint of existing lot showing setbacks (to scale)	Required	Required	N/A
Legal footprint of proposed lots (to scale)	Required	N/A	Required
Legal footprint of proposed/existing ROW's (to scale)	Required	Required	Required
Area of Building Footprint	Required	Required	N/A
Area of Habital Building Space	Required	Required	N/A
Existing and proposed grades along property lines - min. every 5m	Required	Required	Required
Existing and proposed grades along building faces - min. every 5m	Required	Required	N/A
Average Lot Elevation - Pre Development	Required	Required	Required
Average Lot Elevation - Post Development (See Note 1)	Required	Required	Required
Main Floor Elevation (Note 2)	Required	Required	Required
Lowest Garage/Parkade Elevation (If applicable)	Required	Required	Required
100 yr Groundwater Elevation (see Note 4)	Required	Required	Required
Lowest Top of Footing	Required	Required	Required
Fill Bearing Certificate - Letter from Geotechnical Engineer	Required	Required	Required
Weeping Tile Required - Letter from Geotechnical Engineer	Required	Required	Required
Lowest Invert of Weeping Tile - at footing	Required	Required	N/A
Lowest Invert of Weeping Tile - at discharge	Required	Required	N/A
San Invert at PL (See note 3)	Required	Required	Required
San Invert at Building Face	Required	Required	N/A
Storm Invert at PL (See note 3)	Required	Required	Req. (if Appl)
Storm Invert at Building Face	Required	Required	N/A
Water Service - lot(s) preserviced (yes/no)	Yes/No	Yes/No	Yes/No
CC in place (yes/no)	Yes/No	Yes/No	Yes/No
Diameter of water service	Required	Required	Required
Groundwater contour elevations 0.5m elevations	No	No	Required

Note 1 - For building footprint, take elevation of underside of lowest slab
Note 2 - Main floor elevation will be dictated at subdividion stage, gravity servicing will be required for this elevation
Note 3 - Subdivisions will be required to provide inverts at PL for all lots, developments will be required to reference Subdivision plan
Note 4 - All plans (Arch, Civil and Legal), must be clear when specifiying the 100 yr GWL. The drawing referenced should be stated

Figure EDCG - Grading - 001

- Land use
- Lot #
- Civic address
- Street name

- 100yr groundwater elevation

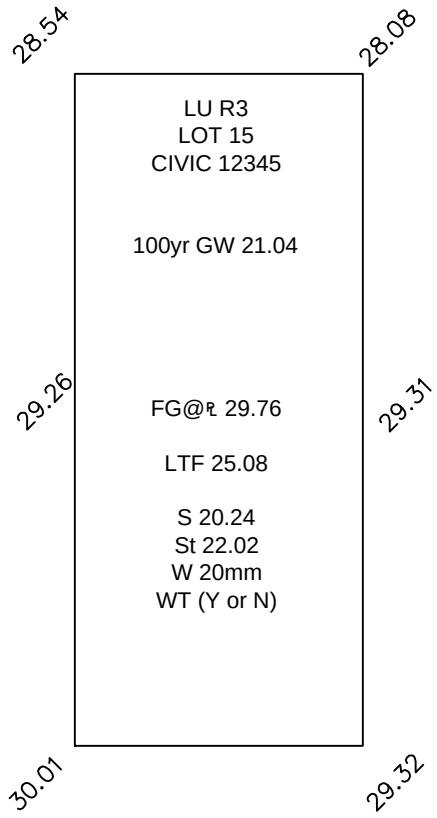
- Grades at corners of property and at midpoints where lengths greater than 10m

- Suggested front grade at at Property Line

- Lowest top of footing

- Sanitary invert at stub
- Storm invert at stub (if applicable)
- Diameter of water service
- Water service (coiled & boxed) (Y or N)

- Drainage features (berms, swale, etc)
- All test hole locations and other important information



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Note:
1. Lots requiring pressure reduction to be designated by adding P.R. immediately after the service size (i.e. W 20 mm P.R.).
2. Letter from Geotechnical Engineer will be required if weeping tile is not installed.
3. Fill bearing certificate required for all lots.
4. Developers are encouraged to add additional information where needed for guidance and clarity.

All dimensions in meters unless otherwise noted

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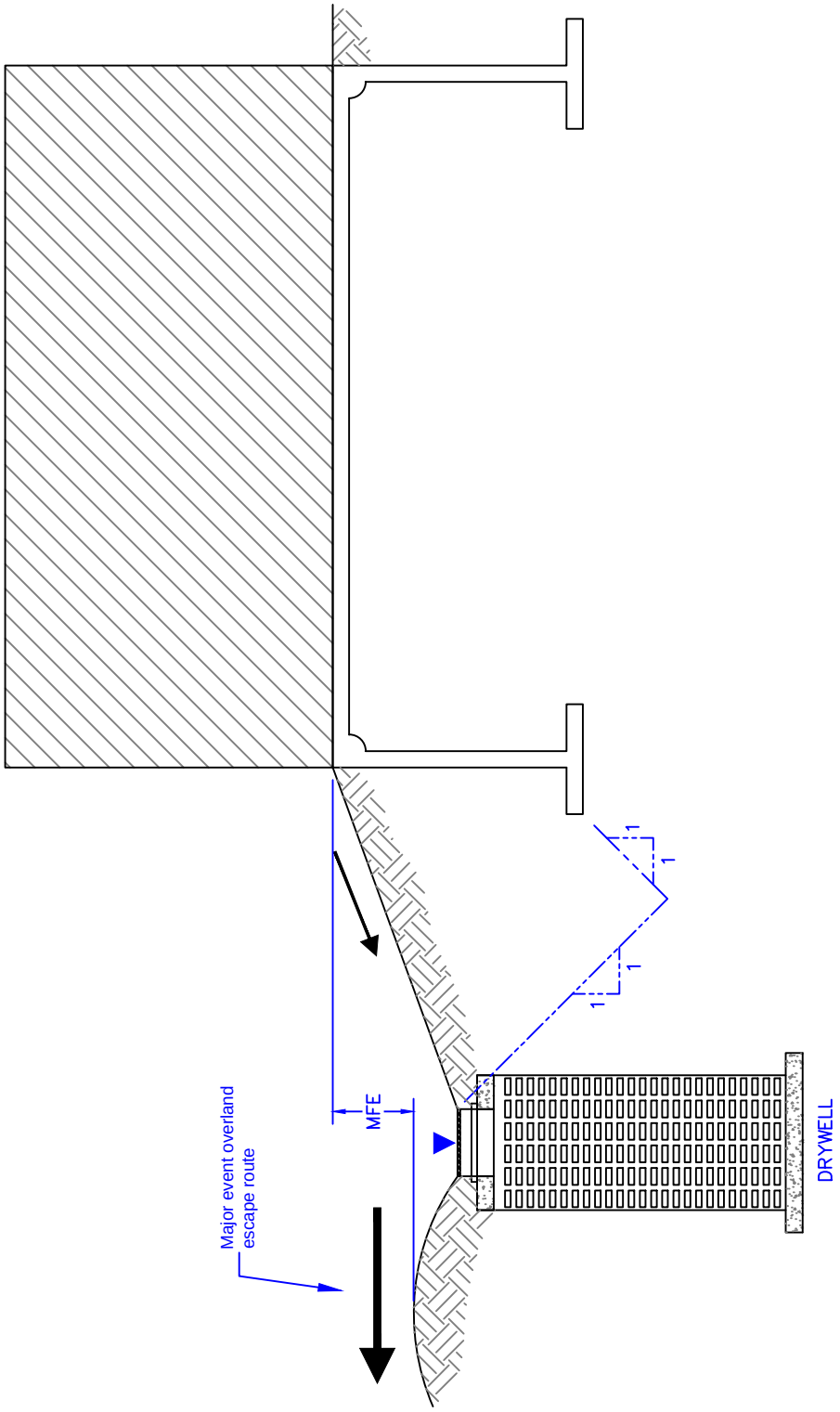
DRAWN: K.R. Bulek
DATE: Mar./98
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

BUILDING GRADE PLAN - MINIMUM REQUIREMENTS

SHEET NO.: EDCG - Grading - Figure 002
FILE NO.: 014



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DRAWN: S.K. Patel
DATE: May/2010
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

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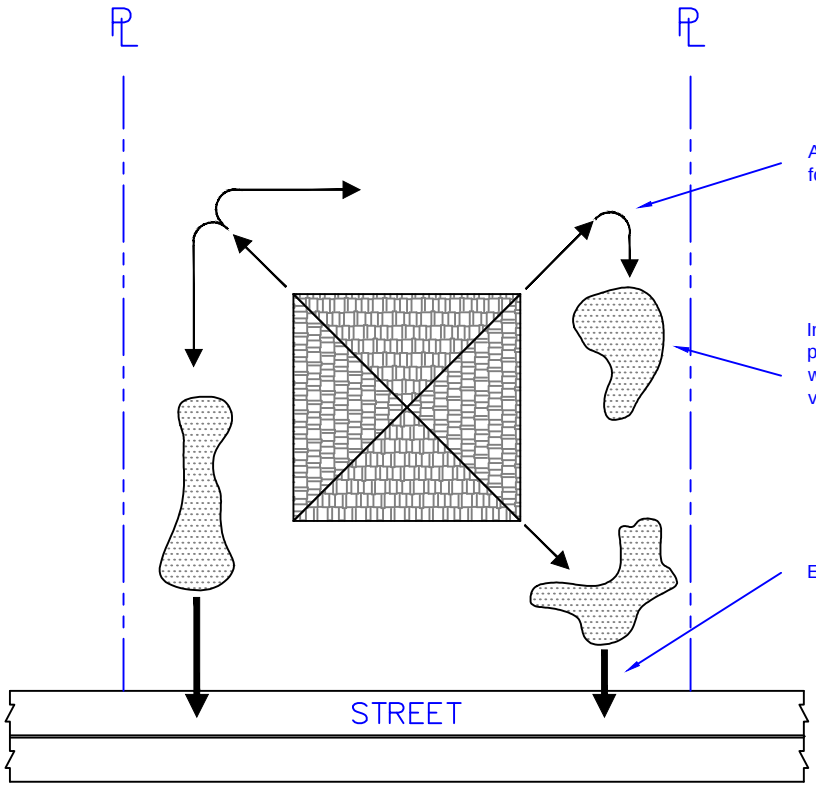
ENGINEERING DEPARTMENT

OVERLAND ESCAPE ROUTE

SHEET NO.: EDCG - Grading - SKT-01
FILE NO.: SK01



All overland drainage to be directed away from foundations

Infiltration gardens to catch smaller storms - to be placed prior to runoff reaching motor vehicle carriage way. Placement depends on practicality and existing vegetation that will remain.

(See stormwater section for details)

Emergency (major event) escape route

All dimensions in meters unless otherwise noted

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DRAWN: S.K. Patel

DATE: May/2010

SCALE: NTS

APPROVED:

MANAGER OF ENGINEERING
TOWN OF CANMORE

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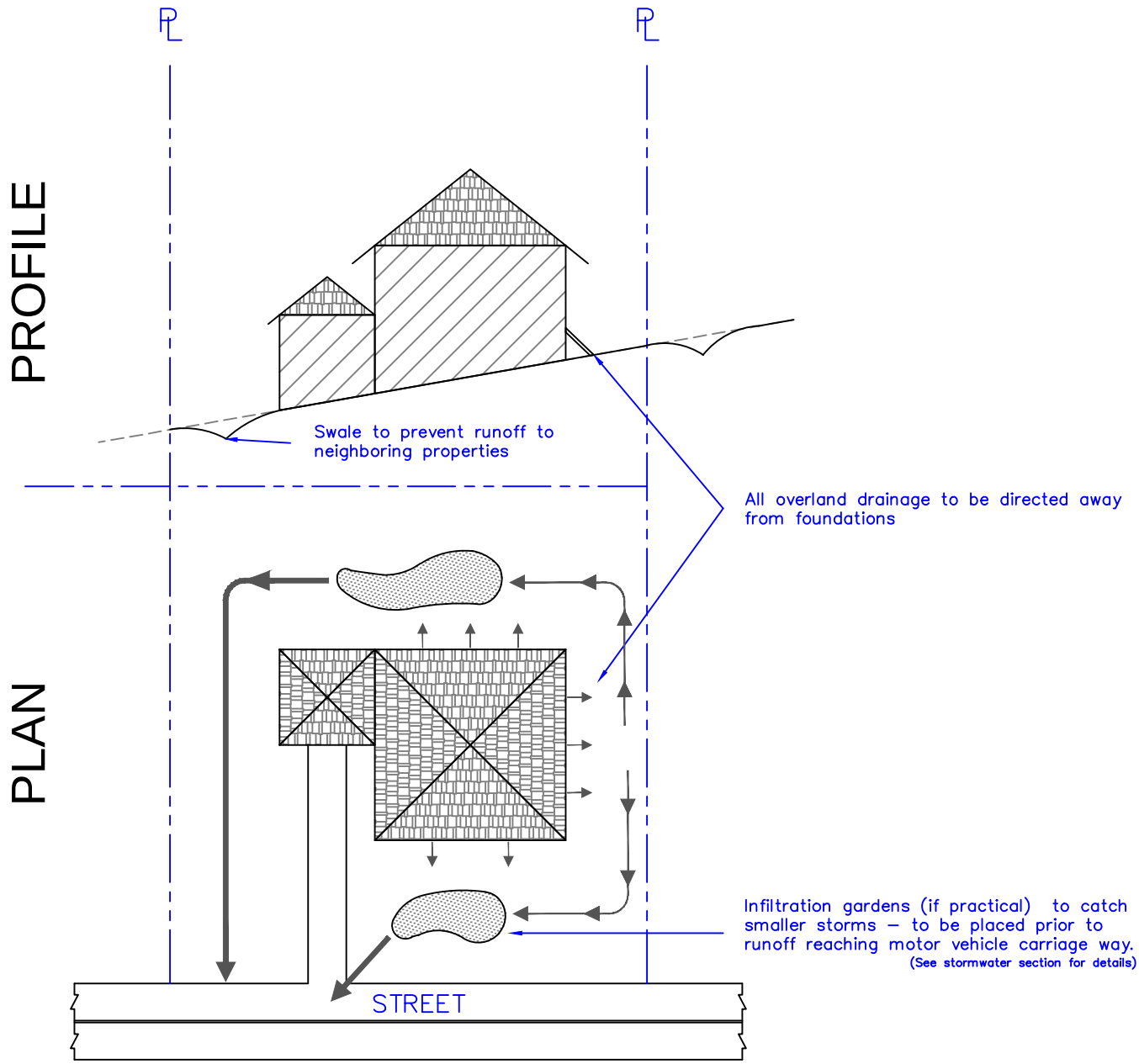
LOTS IN VALLEY BOTTOM: GENERAL GRADING

SHEET NO.: EDCG - Grading - SKT-02

FILE NO.: SK02



All dimensions in meters unless otherwise noted

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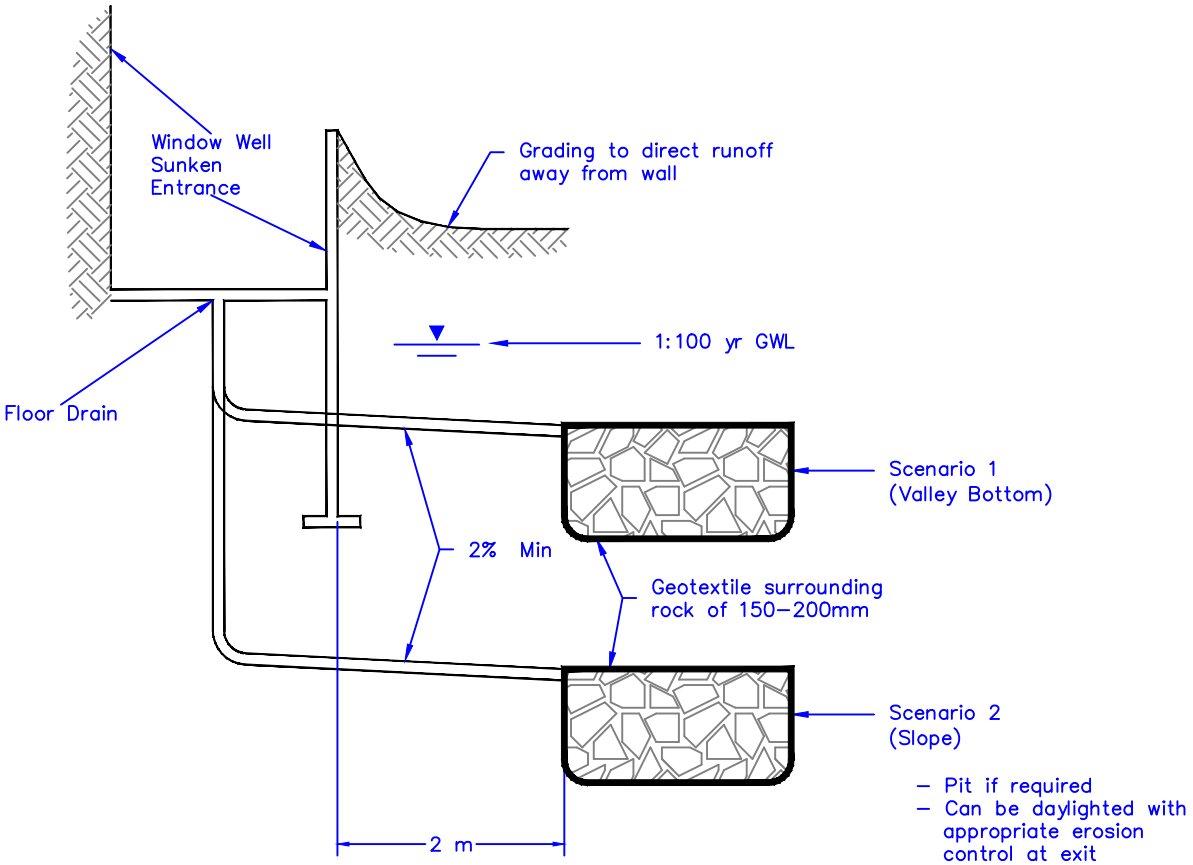
DRAWN: S.K. Patel
DATE: May/2010
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

LOTS ON SLOPE: GENERAL GRADING

SHEET NO.: EDCG Grading - SKT-03
FILE NO.: SK03



All dimensions in meters unless otherwise noted

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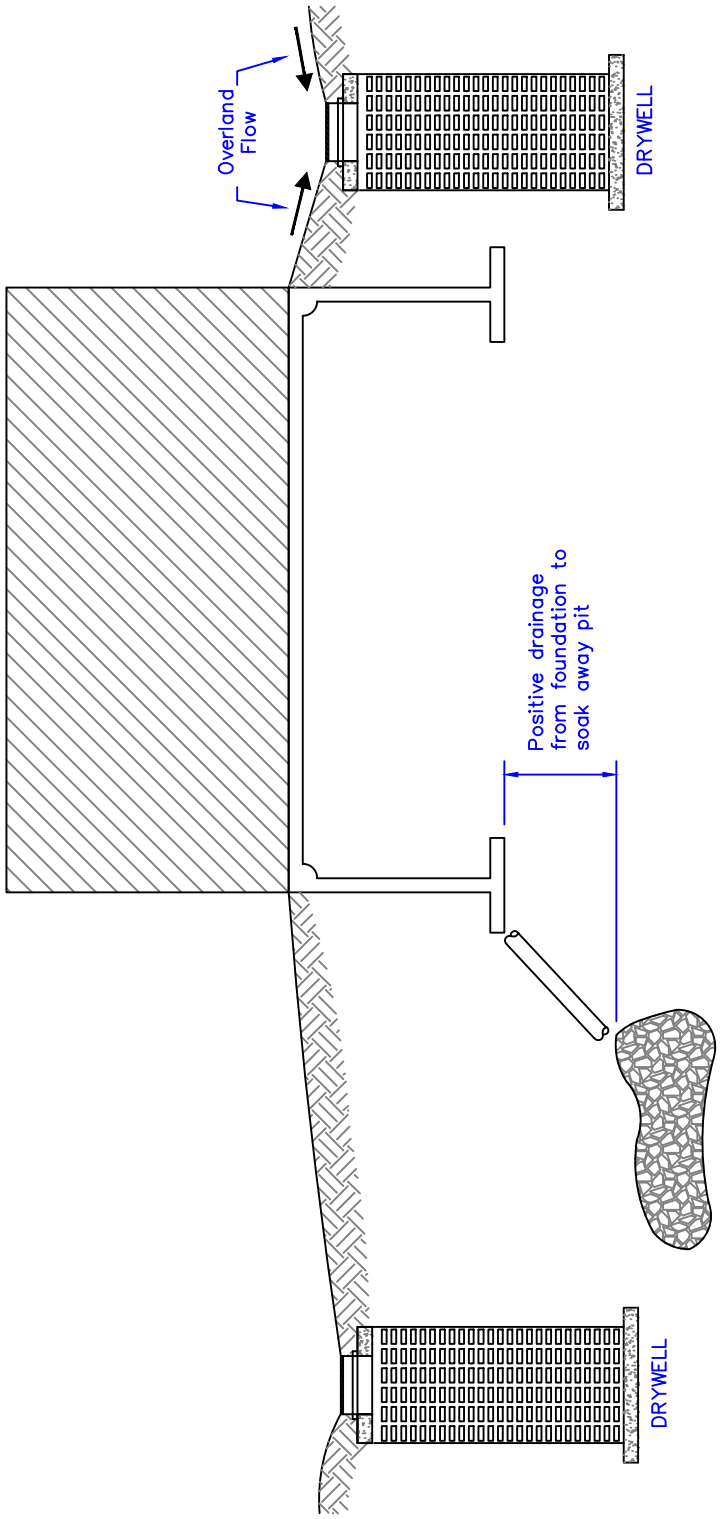
WINDOW WELLS & SUNKEN ENTRANCES

SHEET NO.: EDCG - GRADING - SKT-04
FILE NO.: SK04



All dimensions in meters unless otherwise noted

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TOWN OF CANMORE

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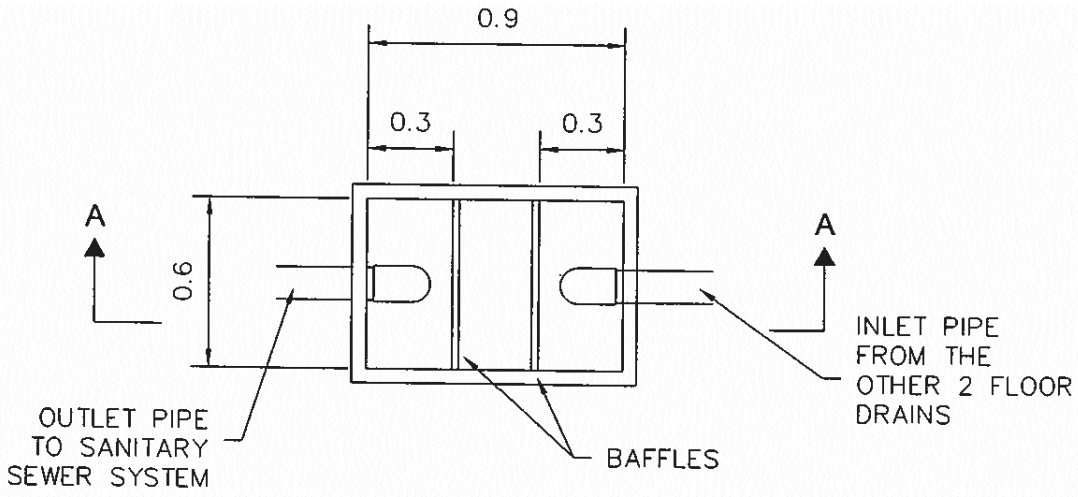
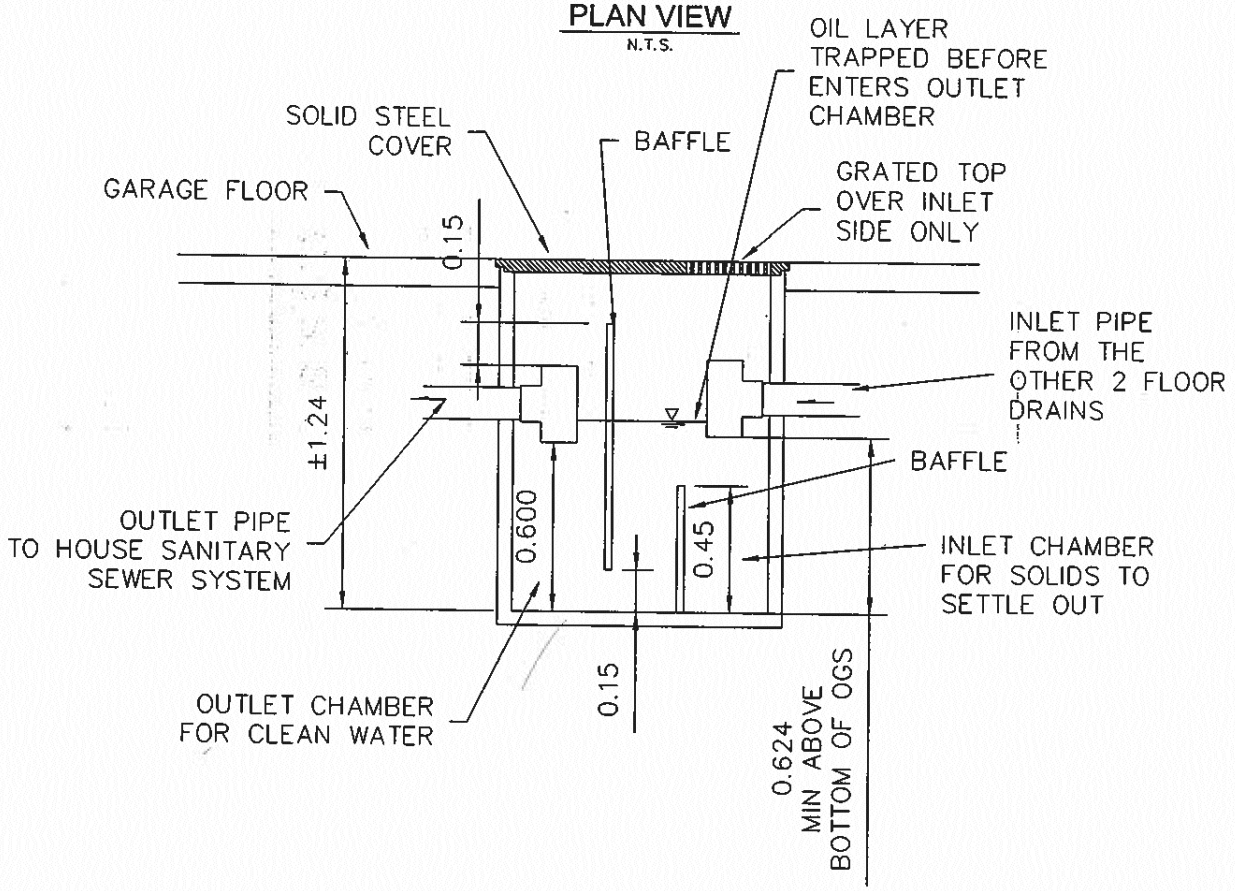
WEEPING DRAIN TILE

SHEET NO.: EDCG - Grading - SKT-05
FILE NO.: SK05



PLAN VIEW
N.T.S.



SECTION A-A
N.T.S.

SCALE: N.T.S. Metric
All dimensions in mm unless otherwise noted

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DATE: May/2010
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

Garage Drainage

SHEET NO.: EDCG - Grading - SKT-06
FILE NO.: SK06

2.3 Water System – Design and Construction

What the developer can expect with the recent changes associated with this section:

- *In-ground permanent irrigation shall accommodate rainwater harvesting as a source*
- *More vigilance on the part of the Town to ensure the installation of mains including compaction, backfill and field supervision is adequately addressed during construction*
- *The legal portion (easement, private vs public) of newly placed water mains shall need to be addressed at the DP stage. Legal documentation shall be denoted by survey as opposed to by description*
- *In subdivisions and developments that install new watermains, the CMP will need to address chlorination and de-chlorination*
- *The insulation detail for services has been modified to avoid the hiring of a professional Engineer for simple scenarios*
- *The pressure requirements have been adjusted to require more stringent testing*
- *There has also been some clarification in the section, particularly with respect to hydrants in high groundwater as well as separation requirements*

2.3.1 Required Reading- Any waterworks design not specifically reference by this document shall be designed in accordance with the latest edition of:

- Water Bylaw 2003-039
- Latest edition of the Town of Canmore Utility Master Plan
- City of Calgary Water Resources : Standard Specif. Waterworks Construction
- City of Calgary: Design Guidelines for Subdivision Servicing
- Alberta Environment Protection: Standard and Guidelines for Municipal Water, Wastewater and Storm Drainage Systems

Additional Reading

- City of Calgary: Design Guidelines for Development Permits; Development Site Servicing Plans and Waste & Recycling Services for Commercial/Industrial Applications

2.3.2 Sustainability

- In ground permanent irrigation systems shall function in such way to accommodate rain water harvesting as a water source

2.3.3 System Design Parameters

2.3.3.1 Demands and Peak Factors

- Water demands shall be determined in accordance with the latest edition of the Town's Utility Master Plan based on land use, density and unit consumption rates. Specific design rates and peak factors for residential, commercial, industrial or institutional developments or defined land use districts should follow minimum rates shown in the Utility Master Plans or other criteria applicable to specific developments in accordance with good engineering practice.
- The design scenarios shall include peak hour demands with minimum dynamic system pressures of 275 kPa (40 psi) or peak day demands plus fire flows with minimum dynamic system pressures of 140 kPa (20 psi).
- For areas of mixed land use, an average demand of 460 Lpcd may be used. The average demand rate of 460 Lpcd and peak hour factor of 5.0 are for the entire Town based on analysis of historical records. See the Utility Master Plans for more information (copies are available on the Town's website).
- For areas of mixed land use, average day demands shall be multiplied by 2.5 and 5.0 to calculate maximum day and peak hour demands respectively. For large industrial or

commercial developments, peak factors peculiar to the types of developments proposed shall be used.

- A peak hour factor of 5.0 shall be used for watermains in subdivisions with multiple land use zones and for water mains which loop through residential subdivisions that provided primary service to areas other multi-use areas. For mains entirely within low-density residential subdivisions, a variance may be considered to use a peak hour factor of 4.0.

2.3.3.2 Pressure Zones

- The distribution system must be designed with consideration given to various pressure zones within the subdivision. Pressure shall be maintained within a range of 276 to 620 kPa (40 to 90 psi). If the proposed subdivision is to be tied into the existing downtown distribution system, it must be designed so that the downtown pressure does not exceed 496 kPa (72 psi).
- See notes in the servicing section for pressure requirements of individual services

2.3.3.3 Fire Flows

- Pipes in the waterworks system and the private service shall be adequately sized and sufficient numbers of hydrants shall be installed to provide the minimum required fire flows at each location.
- Water to supply fire protection systems to meet Fire Prevention Bureau and Insurance Underwriters requirements
- The required fire flows for large residential, commercial or industrial developments shall be determined in conformance with the latest edition of the "**Fire Underwriters Survey Guide to Recommended Practice**". However, the required fire flows shall not be less than those specified for general land use categories or types of development indicated below:

  - Residential areas without multi-unit dwellings: 85 L/s
  - Residential areas with small to medium multi-unit residential dwellings: 120 L/s
  - Commercial, institutional, industrial areas with adequately separated buildings of 3 floors or less: 200 L/s
  - All high density areas with multiple, closely spaced or contiguous buildings of 3 floors or more, or where required by the Fire Chief or Engineer: 300 L/s

- Provision of fire protection by means of sprinkler heads, fire hydrants, outlets for hose racks, or some other manner requires application for a combined line or fire line
- Non-metered operation of one or more pipelines or classes of pipelines used for private fire protection requires approval of the Building Inspector
- Water meter is usually not required on fire line providing fire protection to multiple housing, apartments, industrial or commercial buildings; if meter is required by Town, then Town shall install meter

2.3.4 Design and Construction of Mains in Town Right of Way

2.3.4.1 General Notes

- Development (or re-development) of site served by a well is required to be put on municipal water supply if it is available.
- Any proposed water distribution system or part of a system shall be designed to serve the area within a subdivision development boundary as well as any area that is contiguous with the proposed system. Proposed extensions to the water distribution network shall be modeled by the Consulting Engineer or Epcor Water Services under various demand scenarios to determine the required water main sizes. The impact of all new major developments placing significant water demands on existing water supply, storage, transmission and distribution systems, and the need for any resulting off-site improvements, shall also be determined by network modeling. Existing network

operating conditions at the proposed connection nodes will be provided by the Town upon request by way of static pressures and existing hydrants

- Distribution mains shall be continuous (looped) whenever possible. Where a closed system is accepted (dead end), the maximum number of single dwelling units (R1 or R2) shall not exceed 45 on a permanent basis.
- No cross-connections allowed under any conditions (8BL15.1.1)
- Back flow prevention devices must be installed, inspected and tested as required by applicable regulations
- No obstruction or impediment to free and direct access to any service, water main, valve, curb stop, fire hydrant, water meter or other appurtenances on waterworks system
- No plastic pipe material to be used within 36 m of buried fuel storage tank or on redevelopment sites previously used as gas stations or petroleum storage depots (MSCiii.c.2)

2.3.4.2 Easements, Legal Requirements and Implications

- Distribution mains shall not be placed in easements unless accepted by the Town. The minimum easement width for an independent water main (or any main) is 9.0 m and 12.0 m for two utilities in the same easement with the main located near the centre.
- Services shall not be connected to a water main located in an easement.
- Sufficient valves shall be provided to permit isolation of the main in the easement without disruption of services outside the easement.
- Where a reduced easement may be accepted by a variance and where future maintenance of mains would be difficult due to proximity of foundations or other adjacent improvements, the Town may require the mains to be placed into a casing pipe or the foundations (or adjacent improvements) protected by some other method.
- Any landscaping improvements approved by the Town in excess of sod or pavement within a UR/W that may be disturbed by future maintenance operations will be replaced by sod, asphalt or broom finished conctrete to match adjacent areas.
- DP applications must include an overall legal plan showing what portions of the water system being built where the intention that it will function as a private system. A legal easement done by a surveyor and not by description will be required for return of securities.

2.3.4.3 Sizing of Mains

- Water mains must be consistent with those in adjacent subdivision so that continuity of main size is maintained between subdivisions. The maximum length of mains between ties permissible in residential development are as follows:
  150 mm dia. - 300 m; 200 mm dia. - 550 m; 250+ mm dia. - 760 m
- Minimum main sizes shall be 150 mm in a residential subdivision and 250 mm in an industrial or commercial subdivision. ***The Engineer may require that larger mains, without compensation to the Developer, be installed to service adjacent or future developments or as required when in the opinion of the Town the increase in size is required to hydraulically compensate for dead end mains or high-density developments***.
- Flush-outs will be required at the end of a dead-end watermain if there is no hydrant located at or near the end of the main. The flush-out shall be of sufficient size to provide 0.75 metres/second of velocity in the main, with the minimum size of a flush-out being 50 mm. See drawing WAT-07 for flush-out details. A park service may be accepted in lieu of a separate flush-out subject to acceptance by the Engineer.

2.3.4.4 Cover for Mains

- In **streets, lanes and easements** the minimum cover from the top of the water line shall be as follows:
  - 2.7m in clay (from the crown of the pipe to final grade)
  - 3.3m where soil is predominantly gravel
- In **Dead End mains**

- 3.0 m of cover from the crown of pipe to final grade
- 3.3 m where the strata is predominantly gravel.

- In areas with a continuously high groundwater table, water mains may be installed with less cover where accepted by the Engineer. The minimum depth of bury in such areas shall be 0.3 m below the lowest groundwater level but not less than 2.5 m below the final surface grade. All mains that do not meet this criteria shall have insulation designed by a Professional Engineer. This will be reviewed on a site by site basis.

2.3.4.5 Backfill Requirements for Mains

- Backfill requirements for deep utility services shall be in accordance to the latest edition of City of Calgary Standard specifications for waterworks. (See Drawing #56 from 2009 edition)
- In light of Canmore's groundwater, specific attention should be given to need for clay plugs. Frequency of clay plugs shall be as follows:
  - 4-7% slope – not more than 100m apart
  - Greater than 7% - not more than 50m apart.

2.3.4.6 Insulation for Mains

- Insulation used for in-ground construction shall be Dow Chemicals HI-40 or HI-60, or as otherwise accepted by the Town.
- Where required by the Town, pre-insulated piping systems incorporating a core pipe, polyurethane foam closed-cell insulation and outer jacket shall be used in place of sheet or granular insulation materials in the pipe zone. Pre-insulated piping systems shall be designed for each specific application in accordance with the manufacturer's recommendations.

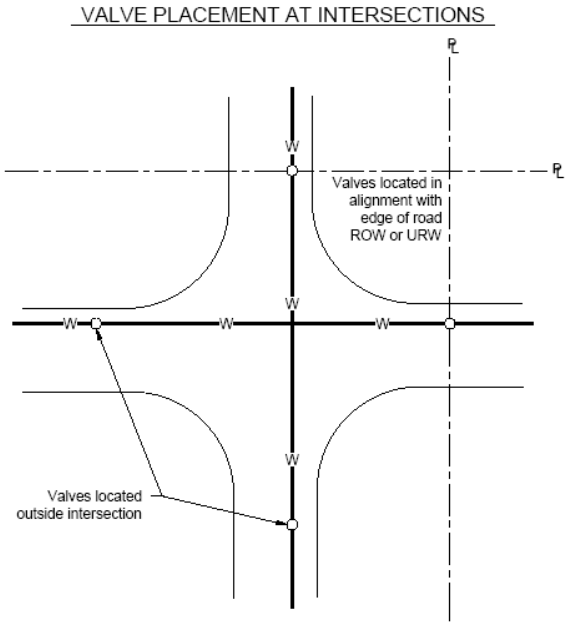
2.3.5 Distribution System - Components

2.3.5.1 Material for Piping

- Material, as well as the approval for materials used in the distribution system will ne as the latest version of the City of Calgary Water System Specifications

2.3.5.2 Isolation Valves

- Isolation Valves on distribution mains shall be located so that any section of the system can be isolated by the turning off of a maximum of three valves. This isolated section in a looped system may contain up to a maximum of 20 single-family services and a single hydrant. A minimum of three valves shall be installed at a tee intersection and a minimum of four valves shall be installed at a four-way intersection. Where required by the Engineer a valve shall be installed on each branch of an intersection.
- All valves of the distribution system shall be equipped with a 50 x 50 mm operating nut and shall turn counter clockwise (left) to open. Working pressure shall be 1380 kPa (200 psi) for valves 300 mm and smaller, and 1030 kPa (150 psi) for valves 400 mm and larger. The stem seal shall be of an o-ring or other pressure actuated seal design.
- Isolation vales required at intersections shall be placed outside the intersection itself to facilitate construction (see sketch)
- Private water systems located on a cul-de-sac must have an isolation valve on the Town side of entrance to private system.



2.3.5.3 Booster Pump Stations

- Design guidelines will be provided by the Town to streamline booster pump station designs. Each installation, however, will be reviewed by the Town on a site specific basis. Sizing calculations and detailed drawings shall be submitted for review and acceptance by the Town.
- Equipment and PLC/SCADA systems shall be designed in accordance with Town and EPCOR requirements. These standards change as new technologies emerge and as existing facilities in Canmore are upgraded. Contact the Engineering Department for current requirements at the planning stage of new projects.
- The following equipment shall be installed as a minimum, unless otherwise reviewed and accepted by the Town:

Pumps (potable water supply):	Peerless, Gould, Myers or Weir
Master Control Cabinets:	Allen-Bradley
Level Controls:	Milltronics
Program Logic Controllers:	Modicon, Allen-Bradley, ITT Flygt
Electrical - Relays/Transfer Switches, etc.:	Allen-Bradley
Variable Speed Drives:	Allen-Bradley

2.3.5.4 Pressure Reducing Valves (Stations)

Pressure Reducing Valves (Stations) shall maintain a constant downstream pressure regardless of varying inlet pressure. The Town Standard changes the City of Calgary Standard. All Town of Canmore Pressure Reducing Valves (Stations) shall be complete with and conform to the following minimum requirements:

Each station shall be complete with:

1. A tight monolithic structure. Where construction joints occur, water stops shall be incorporated. Each structure must also be insulated with spray-on urethane foam on all interior walls and ceiling (reinforced mesh required).
2. A floor drain and sump wherever practical.
3. All steel piping, painted blue. Piping and fittings within the PRV Station shall comply with the following:
    a) Coating. The Town specifies steel piping, painted blue. This specification is incomplete – it does not distinguish between pipe and fittings and it does not distinguish between internal lining and external coating materials. The intent is that

the piping is a prefabricated module including pipe, fitting and flanges, with fusion bonded epoxy internal lining and external coating according to City specification 504.02.01 Type A. The external coating for all piping shall also comply with City standard detail sheet #45, note #9, although note #9 may need some further clarification with respect to placing an alkyd metal primer and enamel over the fusion bonded epoxy.

b) The City standard detail sheet #45, note #4 specifies CI or DI flanged fittings and steel or DI pipe through the wall. The CI or DI fittings must have a fusion bonded epoxy internal lining and external coating according to City standard 503.02.12 and 504.02.01 Type A. The internal lining of the pipe through the wall is not specified but the external coating must comply with City standard detail sheet #45, note #9. The intent is that the internal lining and external coating of the pipe is the same as the fittings, although as stated above, note #9 may need some further clarification with respect to placing an alkyd metal primer and enamel over the fusion bonded epoxy.

c) The Town will accept either:
   - Prefabricated steel module complete with piping, fittings and flanges with internal lining and external coating of fusion bonded epoxy, or
   - DI flanged fittings and DI pipe with internal lining and external coating of fusion bonded epoxy.

   Notes:
   - the prefabricated module will require fewer flanges and be slightly more compact than a DI flanged fitting assembly.
   - For both alternatives the external coating should be blue in colour, either as pigmentation in the fusion-bonded epoxy (if available) or as an additional overcoat of compatible material.
   - In addition, the external coating of the pipe cast within the wall of the chamber must form a watertight seal with the concrete against groundwater infiltration. The coating in this area may be roughened or otherwise treated as recommended by the manufacturer. Alternatively, a waterstop flange can be welded around the outside of the pipe in the centre of the embedded section of pipe. This flange can be left uncoated to form a better bond with the concrete. Also, the exterior coating of the pipe outside of the wall of the chamber must be wrapped with tape or Yellow Jacket shrink sleeve.

4. A surge relief valve tied to the storm sewer or other suitable option to provide physical protection of downstream pressure settings.
5. In the event that a surge relief valve is not possible or practical, the station shall come complete with a downstream surge-arrester instead, to automatically close the valve if the downstream set pressure is exceeded.
6. If required, a pressure sustaining - pilot control to protect upstream pressures. An analysis of flow requirements for each pressure zone would be required to determine the need for this option.
7. “Y” screens to capture grit and debris on the pilot line.
8. Position indicators.
9. Liquid filled pressure gauges for both upstream and downstream.
10. Adequate pipe supports.
11. Pilot control isolating cocks for valves 75 mm or larger.
12. Isolating gate block valves to allow bypass and valve servicing.
13. Speed controls as determined by the valve supplier.
14. Domestic water supply valve bypass.
15. Epoxy Coated Valves
16. Detailed drawings of the proposed installation prior to tendering, sent to the Town for review and acceptance.
17. Valves and piping meeting all pressure requirements.
18. All operating pressures clearly marked in the station and in the operating/maintenance manuals supplied to the Town. This shall include an operating description of each installation, including location.
19. Inlet and outlet ventilation piping.

2.3.5.5 Hydrants

2.3.5.5.1 Type

- **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 top and caps painted red and be clearly marked with a disk labelled "Fire Service Only" installed on the hose port; the disk shall be installed when the hydrant is installed
- All hydrants shall be Mueller or McAvity (Clow Brigadier M-series) unless otherwise approved by the Engineer. All hydrants shall include:
  - 150 mm dry barrel with one 100 mm diameter "Storz" pumper connection and two 65 mm threaded hose connections.
  - Threaded hose connections shall be 4 tpi conforming to the Alberta Mutual Aid (AMA) thread standard.
  - 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, section 505.01.00 (Type C) in the following colours:
  - Red, equal to C.I.L. #22370, Riley PM2506 or Approved Equal
  - Black caps
  - Red top

2.3.5.5.2 Coverage

- Hydrants must be located such that proper hydrant coverage is provided for the entire subdivision, development or as required by EMS Services.
- Where possible, hydrants should be placed at intersections. Mid block hydrants should be avoided
- Hydrants shall be spaced so that the maximum distance from the hydrant, measured along the street, to allow complete coverage of any structure, shall not exceed 90 m in low-density residential areas or 60 m for institutional, commercial, industrial and high-density developments.

2.3.5.5.3 Placement of hydrants

- Hydrants are to be placed to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians.
- Hydrants in cul-de-sacs shall be located at the entrance of the cul-de-sac at minimum.
- The minimum distance from a hydrant to any driving surface or any structure shall be 2.0 m or 1 meter from back of curb. If a suitable location is unavailable, bollards shall be placed around the hydrant between the driving surface and the hydrant. Bollards shall be placed such that they do not block access to the pumper or hose ports. Trees planted in the vicinity of hydrants shall be located to maintain adequate clearance from the hydrant.
- The minimum distance of hydrant from a power pole, light standard or transformer shall be 3.0 m.

2.3.5.5.4 Easement Requirements for hydrants

- All hydrants and fire lines or combined lines supplying water for firefighting that are located on private property require either a) an easement or utility-right-of way dedicated to the Town, or b) a maintenance agreement executed jointly with the Town as determined by the Engineer. The minimum easement width for a fire line or combined line shall be 9.0 m with the line located near the centre of the easement. A variance to the width may be considered if the water line is insulated and installed at a shallower depth or if building foundations adjacent to the line extend below the depth of the line

2.3.5.5.5 Construction Requirements and Sign Off of Hydrants

- Newly installed hydrants on private and public property shall be functional and be put into service before construction of new buildings on the property proceeds beyond the foundation stage where such stages are constructed primarily of combustible materials.
- Newly installed and non-functioning hydrants shall be clearly marked with a cover bag labeled "Out of Service". Bags shall be a commercially available product manufactured from polyethylene or canvas for this specific purpose. Bags shall be installed when the hydrant is installed and shall not be removed until the watermain pressure test, hydrant flow test and bacteriological test have all been completed and accepted by the Town, and EPCOR has put the hydrant into service, unless accepted otherwise by the Engineer.
- A hydrant flow test shall be performed on all newly installed hydrants according to AWWA manual M-17 specifications. A copy of the results shall be forwarded both to the Engineering and Emergency Services Departments prior to putting the hydrants into service to the acceptance of the Construction Completion Certificate or Development Completion Certificate.
- All hydrant installations, whether new construction or the repair of existing, must be inspected by the Consulting Engineer prior to backfilling. The Consulting Engineer is responsible for final signoff of the hydrant.

2.3.5.5.6 Permission to use Hydrants for construction

- Prior to each hydrant usage, the user must contact the Manager of Emergency Services and the Engineering Department
- A meter must be obtained from Epcor Water Services prior to the use of the hydrant. The user shall follow the rules of use as established by Epcor, including payment of deposits and water usage charges.
- The hydrant user will only use the hydrant designated by Epcor Water Services. The user accepts responsibility for any and all damages caused by improper use of the designated hydrant during use of that hydrant.
- If it is determined by Epcor Water Services that the meter or hydrant has been tampered with for the purpose of fraudulent misrepresentation of usage during the use of the hydrant, then the deposit paid by the user shall be suspended from further hydrant use in addition to any fines or penalties levied pursuant to the non-permitted use.

2.3.6 Disinfection, Bacteria Test & Final Flushing of Water Mains

- The Contractor shall notify EPCOR at least 24 hours in advance of any proposed chlorination, bacteria testing and flushing operations to ensure there are no conflicts with system operation and maintenance and comply with any special procedures required by the EPCOR or the Town
- New watermains shall be disinfected, tested for bacteria and flushed as outlined below. The developer is responsible to ensure that the construction drawings include the following information: (This may be required at subdivision approval or DP stage).

a) Disinfection

- Methodology for injection and testing for chlorination:
  - Tests of chlorine concentration shall be taken at all test points at the start and end of the disinfection period.
  - The ***entire main***, valves, fittings, hydrants and service connections will be disinfected and flushed satisfactorily with a minimum flushing velocity of 0.75 m/s.
  - Test points shall include flush-outs, air release valves, PRV's, fire hydrants, and any other permanent or temporary taps
  - The drawings shall show the size and location of any additional special taps or connections that are required for adequate disinfection and flushing procedures.
  - Dead-end lines not ending at a hydrant, shall be fitted with a permanent flush-out
  - Chlorine concentrations shall be between 25 and 50 mg/L, with a minimum of 25 mg/l at the end of the 24 hour disinfection period.

b) Bacteria Test

- Samples for bacteriological testing shall be collected by the Contractor and be witnessed by the Consulting Engineer. Samples shall be submitted for analysis to the Provincial Laboratory for Public Health. Results shall be reported to the Engineer prior to occupancy.

c) Flushing

- Proposed method and location of disposal of flushing discharges and method of de-chlorination
  - All super-chlorinated water must be de-chlorinated. Super-chlorinated water must be neutralized to a concentration of 5.0mg/L of free chlorine or less PRIOR to discharge into the sanitary sewer system. Chlorinated water released to storm sewers or water courses shall not exceed 0.002 mg/L of free chlorine and requires all pertinent appovals from governing agencies. Suitable reagents for dechlorination include sodium metabisulfite, sodium thiosulfate or sodium sulfite
  - Timing and rate of flushing to be discussed with Epcor prior to any discharge to any piped system. The rate of disposal to a sanitary sewer shall not exceed the available capacity of the sewer or lift station. Disposal to a sanitary sewer may be restricted to low flow periods or to maximum rates established by the Engineer.
- Isolation valves shall be opened by EPCOR to put a watermain into service only after the watermain pressure test and bacteriological test have all been completed and accepted by the Town.

2.3.7 Pressure Testing of Watermains

- Pressure Testing Procedures for watermains in ROW shall be in accordance with the latest edition of the City of Calgary Waterworks Standard Specification

2.3.8 Servicing

2.3.8.1 General

- All lots stemming from subdivision are to be pre-serviced to the planned development lots. Developers wanting to use services other than those provided will require a Variance or permission from the Engineering Department
- One service per lot of suitable size with curb stop/isolation valve at or near the property line; more than one service for any lot may be authorized upon appropriate terms and conditions of EMS and the Engineering Department
- Services for separately titled properties may not cross under another unit, and must connect to main services located on common property
- For any re-development, should the connection from the curb stop to the main be deemed unsuitable and need to be replaced, the developer shall replace the service to the main without compensation from the Town
- All pre-servicing shall required the pre-installation of stainless steel insert for compression fittings (PEX applications)

2.3.8.2 Placement & Separation

- Services installed to existing buildings shall be along a line that will best suit the interior plumbing, or as required by the Engineer
- A water service expansion loop (“gooseneck”) shall be laid in the horizontal position.
- Service pipe 100 mm and larger passing through building floor slab or exterior foundation wall to be steel or ductile iron with approved coating (MSPiii.c.2)
- All water services must be installed complete with isolation valve, rod and stem and approved means of protection during construction and marker posts. The water service pipe must be plugged in a manner compatible with the service pipe to prevent ingress of foreign material and contamination of the service pipe and prevent discharge in case the service valve is opened. A pressure rated plug is required and will be required on the design drawings.
- 3m from power pole, light standard or transformer
- Separation Requirements for Services will be as follows:

Service pipes smaller than 50mm

3m from building foundation
2m from property line
0.3m from another deep utility line
2m from a shallow utility line
3m from power pole, light standard or transformer

Service pipes 50mm and larger

4m from building foundation
4m from property line
2m from another deep utility line
2m from a shallow utility line

2.3.8.3 Materials

I. Single Family Dwellings and Duplexes

- PEX (Cross-linked Polyethylene) pipe, sizes 20-50 mm, manufactured by Rehau (Municipex), Plasco, or approved equal, will be accepted for new water services and is the preference of the Town
- Should PEX not be available, service pipe up to and including 40 mm in diameter shall be Type K, soft copper conforming to ANSI/AWWA C800-89 Standard and ASTM B88. All copper pipe shall be third party certified (TPC).
- For 50 mm water service, the Town of Canmore allows only polyethylene pipe conforming to the ANSI/AWWA C800-89 Standard using compression type fittings with stainless steel inserts. The Town of Canmore does not allow 50 mm copper service pipe of any type.

II. Multi Unit Residential, Commercial and Institutional

- Blue Brute - ANSI/AWWA C900 Standard and ASTM B88

2.3.8.4 Insulation

- All services must be protected against freezing. Where the specified cover cannot be maintained, insulation of the service is required as shown on Sheet No. WAT-04. Otherwise with approval from the Engineer, the City of Calgary Drawing Sheets #62and #63 can be used.

2.3.8.5 Pressure Guidelines for Services

- The minimum water service size for residential lots is 20 mm. Where the static water pressure measured at the main is less than 345 kPa (50 psi), a 25 mm (minimum) service connection is required. Where the static water pressure measured at the main is greater that 550 kPa (80 psi) a pressure reducing valve will be required on the service adjacent to the water meter.
- Services with pressures above 620 kPa (90 psi) must have PRVs installed in the residence and notation shall be made on the servicing plan. Existing pressure zones in the Town are described in the Water Utility Master Plan. Pressure zone boundaries may be adjusted to incorporate new developments or to respond to operational issues. Contact the Engineering Department for current requirements at the planning stage of new project

2.3.8.6 Inspection of Services

I. Single Family Dwellings and Duplexes

- All service connections to the main must be inspected by the Town of Canmore's Engineering Department prior to backfilling. Both construction from the main to the curb stop and construction from the curb stop to the building must be inspected by the Town of Canmore's Engineering Department. Service installation must precede construction of the footing on new developments.

- For water services up to 25 mm - all on-site servicing up to the water meter must be inspected by the Town of Canmore. The contractor must arrange an inspection a minimum 24 hrs in advance with the Town of Canmore.
- Contractor are reminded that the water line must be one piece from the CC valve to the inside of the building
- The contractor is responsible to pressurize the water line from the CC to the end of pipe. All residential connections up to and including 50mm shall be pressure tested to 150 psi, or 1.5x line operating pressure, which ever is greater**.** The test pressure shall not exceed the Manufacturers recommended maximum test pressure. The contractor is responsible for providing Manufacturer's documentation on the product being installed.
- Following satisfactory testing, and prior to the water meter being installed, the builder must install a reduced flow-meter-spacer. This spacer may be obtained from the Town's building inspector. The spacer is installed in the water line at the point where the water meter will be installed and allows for testing of the system. The builder must install a wire for external reading device as per drawing WAT-01. As the final requirement of obtaining an Occupancy Certificate, contact Epcor Water Services to have the spacer removed and a water meter installed and the curb stop opened. Refer to the Town of Canmore Bylaw 39-2003, the "Water Bylaw", for details governing connections and operation of curb stops. See Town drawing WAT-01.

II. Multi Unit Residential & Commercial , Institutional and Industrial

- The Consulting Engineer engaged by the builder/property owner is responsible for inspections of the installation of all on-site/off-site servicing, including the pressure test on the water service from the CC to the end of the pipe that is long enough to reach and will eventually be hooked up to the water meter and for submission of test results to the Town of Canmore prior to application for a water meter.
- The Consulting Engineer is responsible to ensure that all pipe work is inspected prior to backfilling. The Construction Completion Certificate, Final Acceptance Certificate or Development Completion Certificate may not be accepted if inspection of new construction and/or maintenance work is not signed off by the Consulting Engineer.
- All commercial / industrial serviceconnections and multi-family (R3) sites greater than 50 mm shall be pressure tested to 150 psi, or 1.5x line operating pressure, which ever is greater. The test pressure shall not exceed the Manufacturers recommended maximum test pressure. The contractor is responsible for providing Manufacturer's documentation on the product being installed.

2.3.8.7 Service Connections to Existing Water Mains:

I. Single family and Duplexes

- Saddle connection
- All water service pipe must be continuous from main to curb stop and from the curb stop into the building with no couplings joining short lengths of pipe. Use of copper water pipe may not be suitable if the required length exceeds the maximum length available for copper pipe. In such a case, PEX or PE pipe should be used.

II. Multi Unit Residential, Commercial and Institutional

- a "cut in" connection - required for extensions to the distribution system or connections to a private system for on-site development. These are usually done at 90 degrees to the existing main. The Consultant is responsible for effective disinfection, including methodology of chlorination, for the existing line that is affected by the "cut-in". The methods of disinfection need to be approved by the Town and stated on the drawings. The Engineer may require a "hot tap" in situations where the main line is considered critical, and not suitable for a "cut in" connection.
- a "hot tap" connection is acceptable for a direct single hydrant lead, or for connections to a private system for on-site development. Unlike past versions of the Guidelines, the Town will accept hot-taps of pipes of the same size, so long as the Consultant is agreeable. The Consultant is responsible for inspections and final sign off.
- On pre-serviced sites (to the property line), isolation valves/curb stops must be operated by an authorized party in accordance with the Water Bylaw. Plumbers and other contractors

may not operate isolation valves/curb stops exceeding 25 mm (Town of Canmore Water Bylaw).

- On un-serviced sites, the utility contractor shall firstly install the services from the Town's mains to the property line, subject to issuance by the Town of an Excavation Permit for the work. The Consulting Engineer engaged by the developer/property owner is responsible for inspections of the installation of all off-site servicing, and submission of all required testing requirements. Following satisfactory installation of the off-site service, the line shall be flushed, and if necessary disinfected and tested, after which time the isolation valve/curb stop shall be closed. The isolation valve/curb stop shall not be opened until acceptance of the installation by the Town of Canmore after which an authorized party may open the curb stop upon request by the developer/property owner

2.3.8.8 Placement of Pre – Servicing from Subdivision

General

- Service connections shall be installed to 5.0 m inside the property line. All services shall be identified with a marker post. Posts shall be blue painted wood stakes of size 50 x 100 mm extending from the invert of the service connection to a minimum of 0.6 m above the ground level.

I. Flexible pre services (drawing WAT-06)

- The water service pipe must be extended to 5.0 metres into the property, with a coil of pipe of sufficient length to accommodate the maximum building envelope such that there are no joints or couplings between the curb stop and the water meter location inside the building placed in a wooden box installed at that point.
- The protective box shall be of sturdy plywood construction capable of providing protection to the water pipe.
- If the box is not at 3.3 meter depth, the box shall be insulated in accordance with the standards. Details of the box construction shall be shown on the Building Grade Plan or Site Servicing Plan prepared by the Consultant.
- The water service including the pipe coil shall be tested in accordance with the standards. Following a successful test, the water pipe shall be securely capped and the pipe coil placed into a protective box. The box shall be placed horizontally at the bottom of the trench at the end of the sewer service pipes and marked with a marker post.

II. Non - Flexible pre services (drawing WAT-05)

- For services of non-flexible material (150mm Blue Brute) the developer will install the per-servicing as shown in WAT-05

2.3.8.9 Termination of Existing Services

- All termination of existing services require a demolition permit and need to be witnessed by either the Town or Epcor Water Services
- Water service lines shall be terminated at the main line if;
  - An existing building is demolished and nothing is constructed on site, and/or
  - An existing building is demolished and a new building requiring different service sizes is erected.
  - On redevelopment of a site, where either the existing water service is not acceptable as deemed by the Town or Epcor Water Services, or the sanitary sewer is replaced to the main, the water service shall also be replaced. The existing service shall be terminated at the main, and a new tie-in installed (saddle or direct tap as applicable, c/w mainstop). An unacceptable water service would include a service that is not copper, PEX, or poly in the case of 50 mm lines.
  - The Town or Epcor Water Services deem the existing unacceptable due to damage or appearing to have restricted flow
  - Lots are being consolidated
- The water service shall be terminated as follows:
  - The service line shall be excavated back to the main line,
  - The service to be terminated shall be shut off at the main stop,
  - The service line is then to be cut 300 mm from the main line, & plugged with pressure rated plug both in the case of PEX & copper to prevent leakage.

- The main stop or saddle must be repaired or replaced if in poor condition
- In the event of a building being demolished and a new building being constructed on the same site, the existing service, if appropriately sized, may be used. This may only be done if:
  - the existing water service line on the private side of the service is removed and replaced unless deemed acceptable by the Town and Epcor Water Services
  - the existing curb stop is removed and replaced unless deemed acceptable by the Town or Epcor Water Services .

2.3.9 Metering

General

- As of 1 January 1995, the Town of Canmore requires a water meter to be installed on all residential, commercial and industrial services. If a water meter is not installed, an Occupancy Certificate will not be granted. Utility billing (water, wastewater, solid waste and recycling) is effective from the date the water meter is installed. Once the meter is installed, the water shall be turned on by a Town employee only. For installation or information, contact Epcor Water Services. The stipulations for metering are as follows:
  - For each legal land title: installation of one water meter is required
  - No branch line or tap between a water meter and the service (8BL3.2.4)
  - Subsidiary water meter may be provided on the downstream side of the Town's meter by customer for their own purposes; subsidiary water meter to have tag identifying it as a private water meter (8BL7.1.4)
  - All water services shall be connected to water meters
  - The Town of Canmore will determine the size, type and number of water meters to be supplied and installed for each customer (8BL7.1.3)

I. Metering - Single Family Dwellings and Duplexes

- For Single Family Dwellings, a single service and a single meter is required
- for up and down, back to front duplexes, one service only and one water meter for each unit;
- for side by side or semi detached duplexes, one service and one water meter for each side

II. Metering – Multi Family Residential

- multiple housing units consisting of three or more side by side units, one service only and one Water Meter per unit
- multiple housing units consisting of three or more clustered or stacked units, one Service and one Water Meter for each unit.
- Each unit must be metered individually
- All water meters must be installed at the header, where the service line enters the building.
- All water meters must be located in one common area.
- The builder must install one wire per meter for external reading device as per drawing WAT-01A.
- Water meters shall be placed and chosen in a way that requires the least amount if maintenance and are readily accessible.
- In residential multiplexes with 4 or more units, a minimum 1 common hose bibs will be required. It shall be metered. Placement of the hose bib shall accommodate contractors as well as residents.

III. Metering – Commercial, Institutional and Industrial

- Single unit commercial require a single service and single water meter
- For multiple side by side units in industrial and commercial buildings, one water meter per legal land title (8BL7.5.4)
- Each site will be unique with respect to flow requirements and water meter sizing. The sizing of the meter will affect the water and wastewater rates. Where a request for a specific meter size is not received, the Town reserves the right to choose the size of water meter to be installed. The builder must install a wire for external reading device.
- See Town drawings WAT-02A and WAT-02B.

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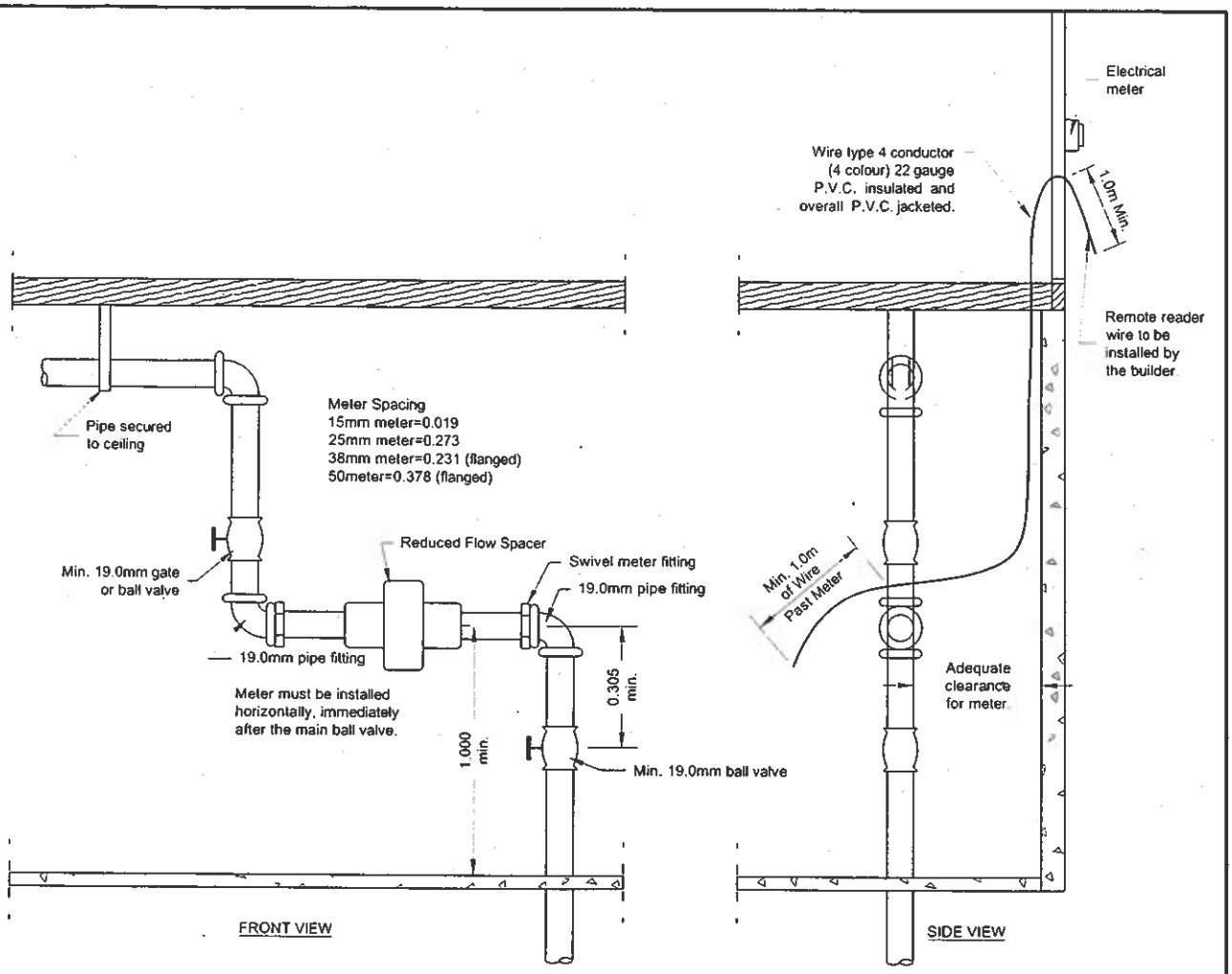
2.3.10 Park/Irrigation Service

- Park services shall be serviced with 50 mm polyethylene and Terminal City's Self Draining Standpipe/Valve or approved equivalent

2.3.11 Water Diagrams

- **Figure EDCG – Water – Wat-01- Residential Meter Installation (19mm Example)**
- **Figure EDCG – Water – Wat-01a Residential Multi-Unit Meter Installation (19mm Example)**
- **Figure EDCG – Water – Wat-02a – Commercial Water Meter Installation**
- **Figure EDCG – Water – Wat-02b – Commercial Water Meter Installation (38mm and up)**
- **Figure EDCG – Water – Wat-04- Box Insulation Requirements (services 150mm & smaller)**
- **Figure EDCG – Water – Wat-05- Service Connection Standard Detail – Non Flexible Pipe**
- **Figure EDCG – Water – Wat-06- Service Connection Standard Detail – Flexible Pipe**
- **Figure EDCG – Water – Wat-07- Typical 50mm Watermain Flush out**
- **Figure EDCG – Water – Wat-08- Hydrant Tie-Back Valve**



NOTE:

1) Meter must be situated in a permanently accessible location.
2) Swivel meter nuts and reduced flow spacer to be installed by builder with adequate clearance.
3) Water meter will be installed by Epcor as part of the occupancy certificate procedure.
4) Wiring of home for external meter reading device will be done by builder.

All dimensions in Metric meters unless otherwise noted

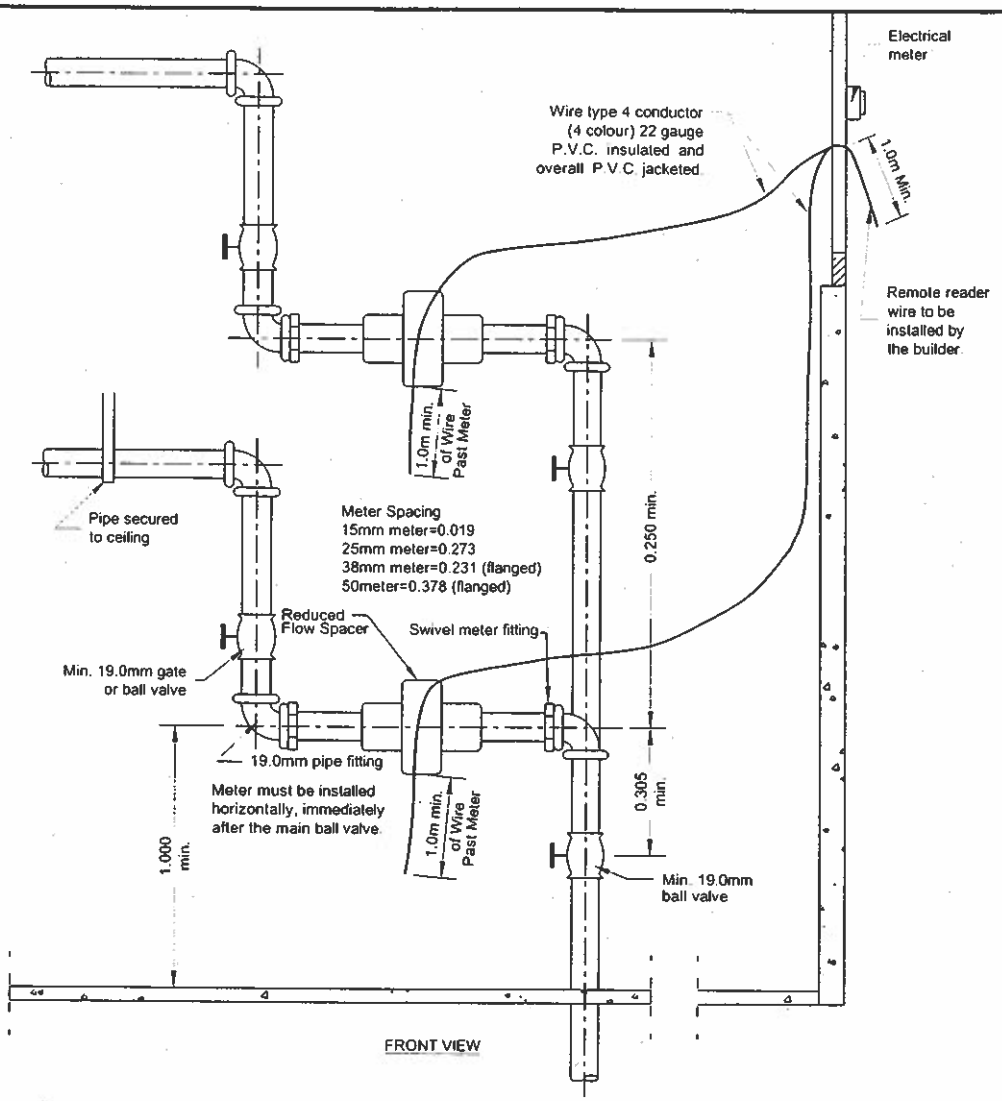
REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3	24	02	03	2003 Engineering Design Standards			
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: K.R. Bulek
DATE: Mar/98
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

RESIDENTIAL WATER METER INSTALLATION (19mm) EXAMPLE)

SHEET NO.: WAT-01
FILE NO.: 021



NOTE:

1) Meter must be situated in a permanently accessible location.
2) Swivel meter nuts and reduced flow spacer to be installed by builder with adequate clearance.
3) Water meter will be installed by Epcor as part of the occupancy certificate procedure.
4) Wiring of home for external meter reading device will be done by builder.

All dimensions in Metric meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3							
2							
1							

DRAWN: P.L. DATE: Feb/03

SCALE: NTS

APPROVED:

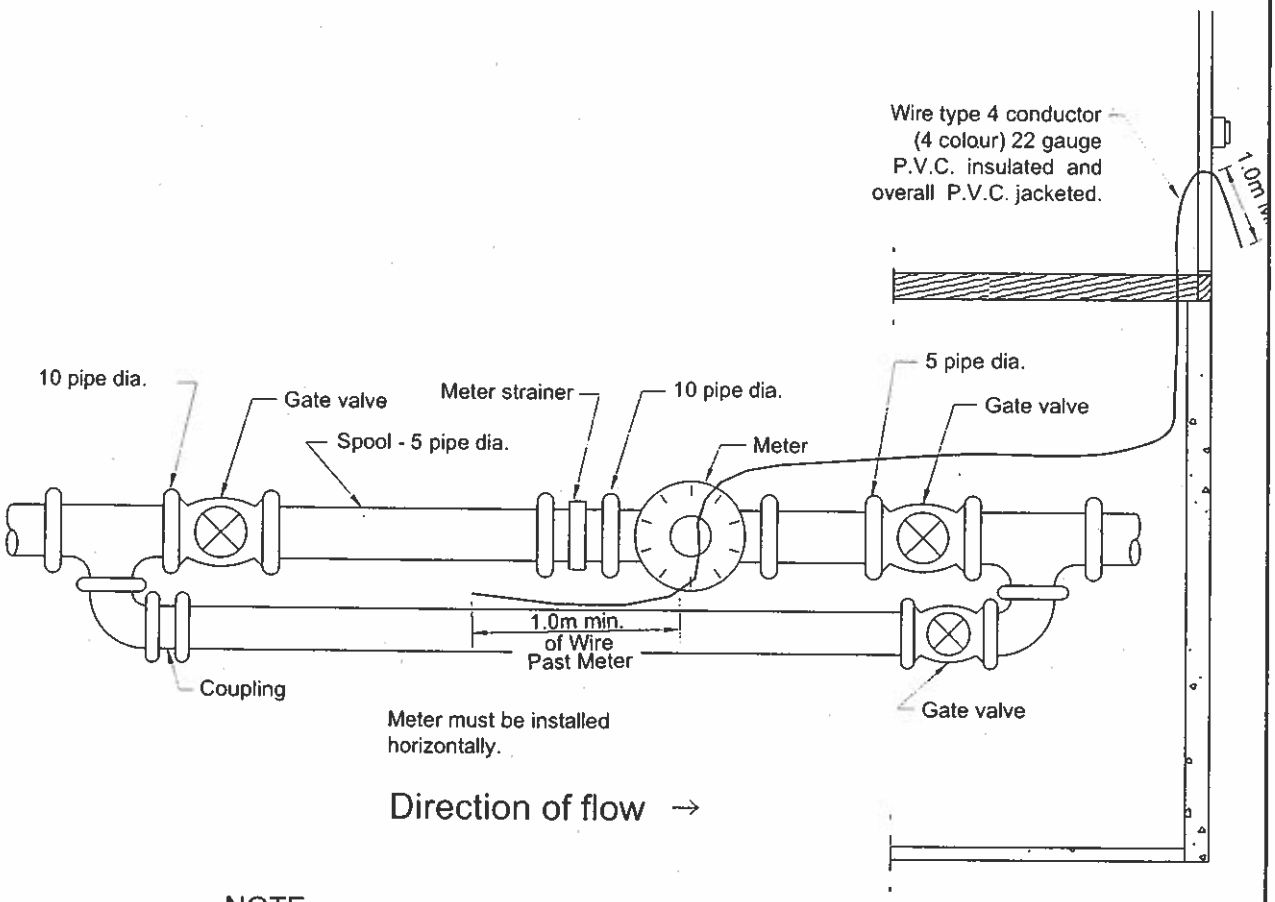
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

RESIDENTIAL MULTI-UNIT WATER METER INSTALLATION (19mm EXAMPLE)

SHEET NO.: WAT-01A

FILE NO.: 021A



NOTE:

1) Meter must be situated in a permanently accessible location.
2) Bypass required for all lines 38mm and larger.
3) Each commercial site is unique with respect to flow requirements and meter sizing. Please contact utility services at 609-4782 to discuss your metering requirements.
4) Wiring of meter for external meter reading device will be done by builder.

All dimensions in Metric meters unless otherwise noted

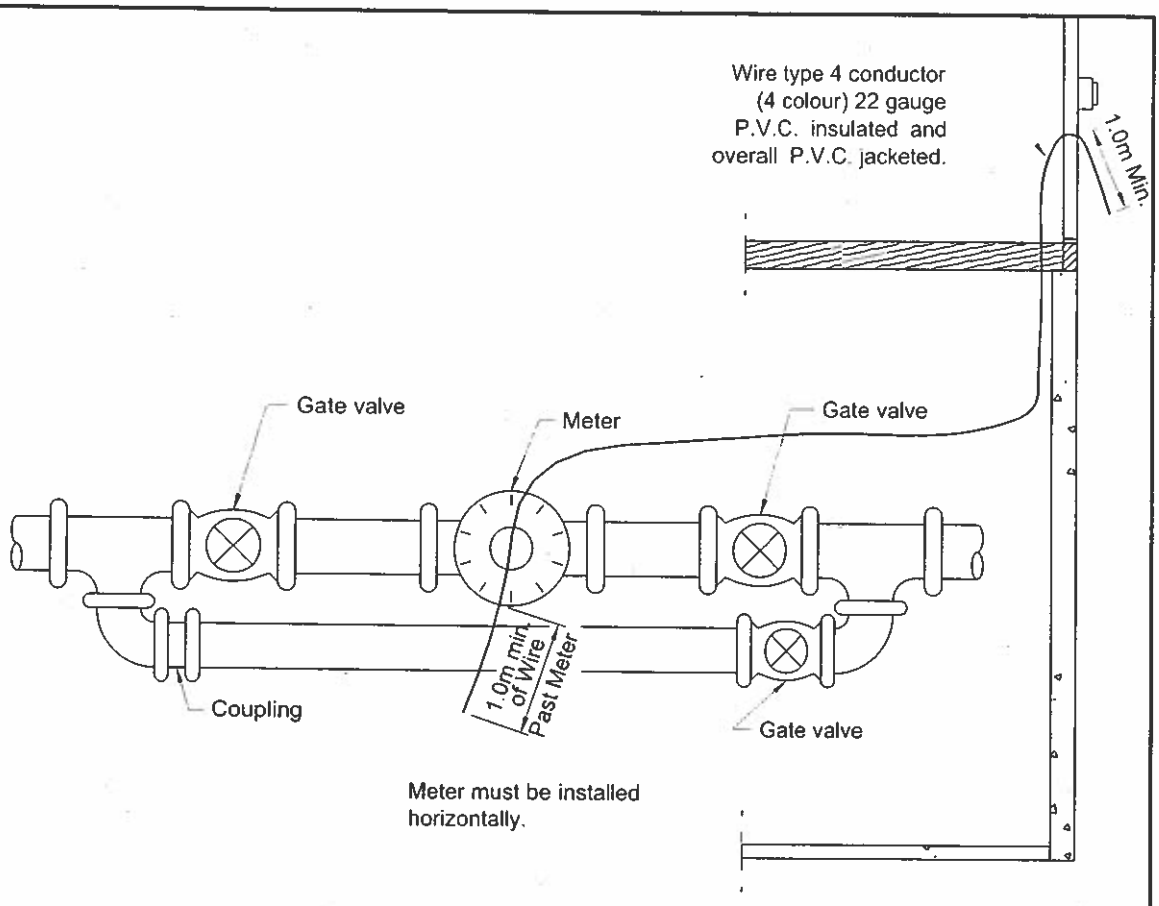
REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3	24	02	03	2003 Engineering Design Standards	PL	PL	DAB
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: K.R. Buled
DATE: Mar/98
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

COMMERCIAL WATER METER INSTALLATION

SHEET NO.: WAT-02A
FILE NO.: 022A



Direction of flow →

NOTE:

1) Meter must be situated in a permanently accessible location.
2) Bypass required for all lines 38mm and larger.
3) Each commercial site is unique with respect to flow requirements and meter sizing. Please contact utility services at 609-4782 to discuss your metering requirements.
4) Wiring of home for external meter reading device will be done by builder.

All dimensions in Metric meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3	24	02	03	2003 Engineering Design Standards	PL	PL	DAB
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

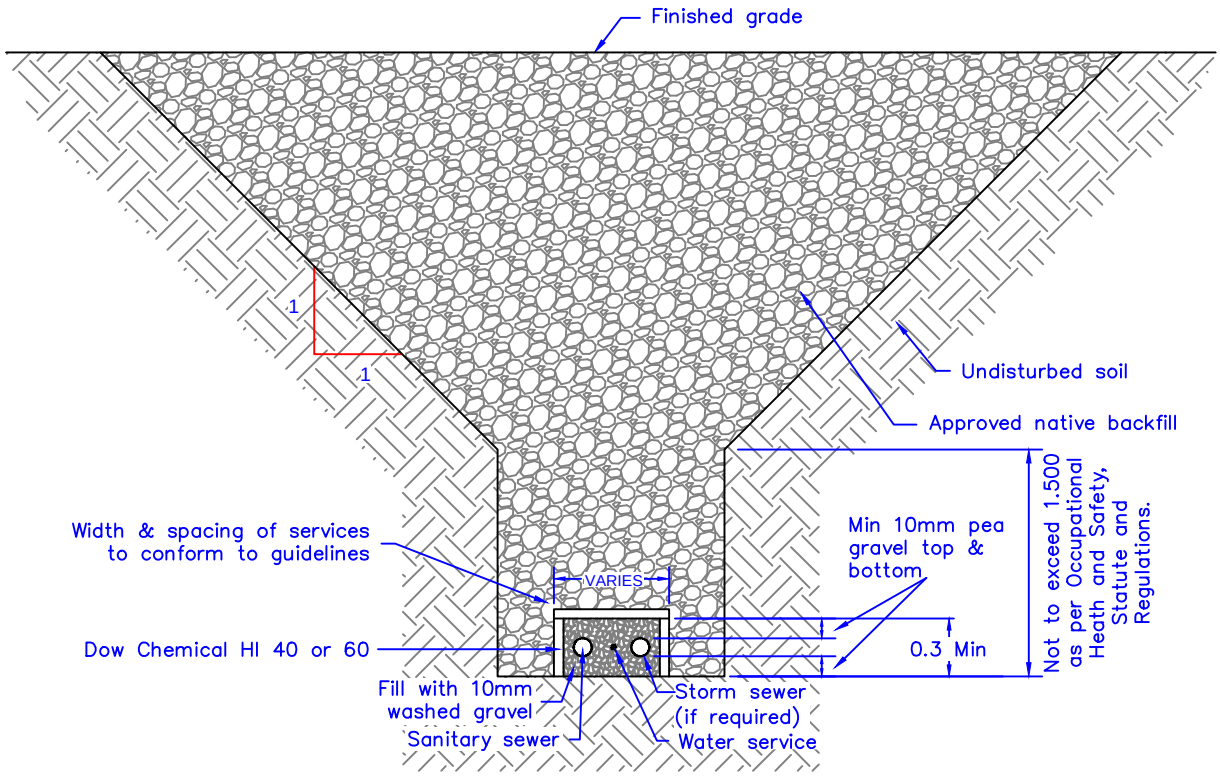
DRAWN: K.R. Bulek | DATE: Mar/98
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

COMMERCIAL WATER METER INSTALLATION

Positive Displacement Meter (38 mm and up)

SHEET NO.: WAT-02B
FILE NO.: 022B



Inverted U (Box Style)
(for 150 mm diameter pipe and smaller)
Services to be combined where possible

Gravity Sewer Services independent of other services to be insulated as follows:

Depth of Cover	Insulation Width (m)	Vertical Leg Height (m)	Insulation Thickness (mm)
1.00 - 1.49	1.8	0.6	100
1.50 - 1.99	1.2	0.6	75
2.00 - 2.49	0.6	0.6	50
Ó2.50	0	0	0

Combined Services: Water and Low Pressure Sewer to be insulated as follows:

Depth of Cover	Insulation Width (m)	Vertical Leg Height (m)	Insulation Thickness (mm)
1.00 - 1.49	3.6	0.6*	100
1.50 - 1.99	2.4	0.6*	75
2.00 - 2.49	1.8	0.6*	50
2.50 - 2.99	0.6	0.6*	50
3.00 - 3.29	0.6	0.6*	25
Ó3.30	0	0	0

* Note:
Combined Service Trenches shall be insulated to provide protection for the shallowest service, and vertical legs shall extend a minimum of 150mm below the deepest service

Notes:
1. For services larger than 150mm, site servicing plans and insulation details must be approved on a project specific basis.
2. Where the minimum frost protective covers cannot be achieved, the Town may allow an exemption if an engineer can demonstrate incorporation of appropriate special precautions in the selection of pipe, bedding and insulation material.

All dimensions in meters unless otherwise noted

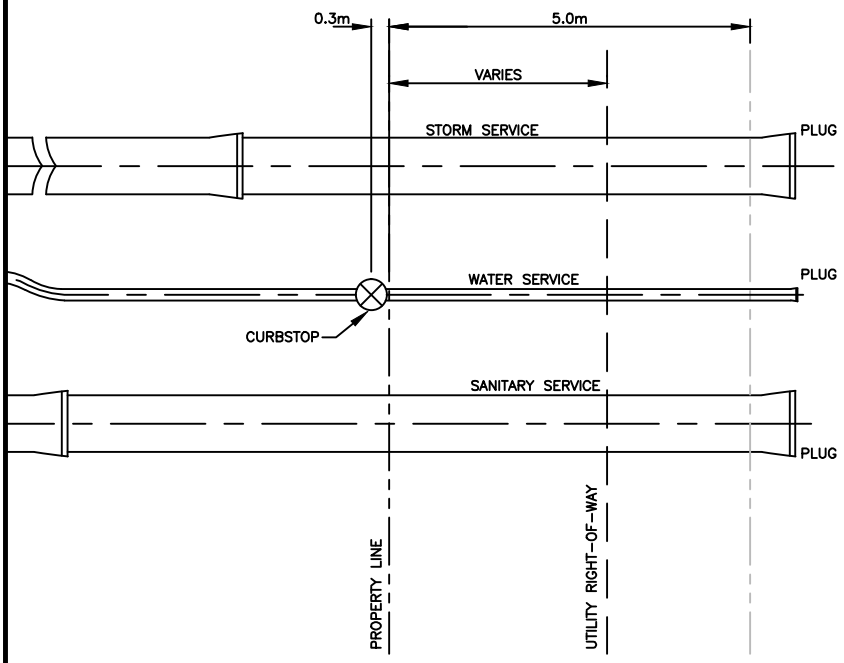
REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5	04	05	10	2010 Engineering Design Standards	SP		
4	02	12	04	2005 Engineering Design Standards	PL	OR	OR
3	08	04	03	2003 Engineering Design Standards	PL	PL	DAB
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: K.R. Bulek
DATE: Mar./98
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

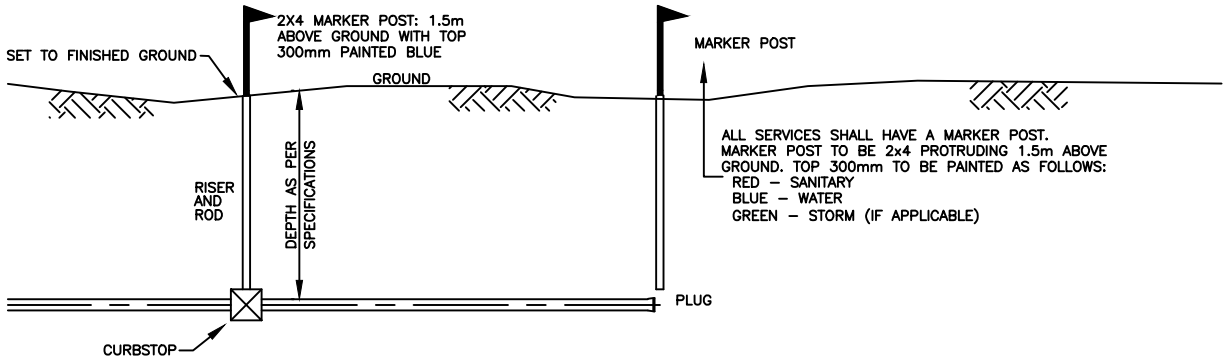
Town of Canmore
ENGINEERING DEPARTMENT

BOX INSULATION REQUIREMENTS:
SERVICES 150mm & SMALLER

SHEET NO.: EDCG - Water - WAT-04
FILE NO.: 024



PLAN VIEW



CROSS SECTION

NOTE:
1) REFER TO CITY OF CALGARY WATERWORKS FOR GENERAL DETAILS ON SERVICE INSTALLATION
2) FOR SERVICES NOT IN GRANULAR MATERIAL OR HIGH GROUNDWATER CONDITIONS

All dimensions in meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3							
2	03	05	10	Removed protective collar	SP	PN	PN
1	26	11	04	Added protective collar	PL	OR	OR

DRAWN: P.L. | DATE: Feb./03

SCALE: Not To Scale

APPROVED:

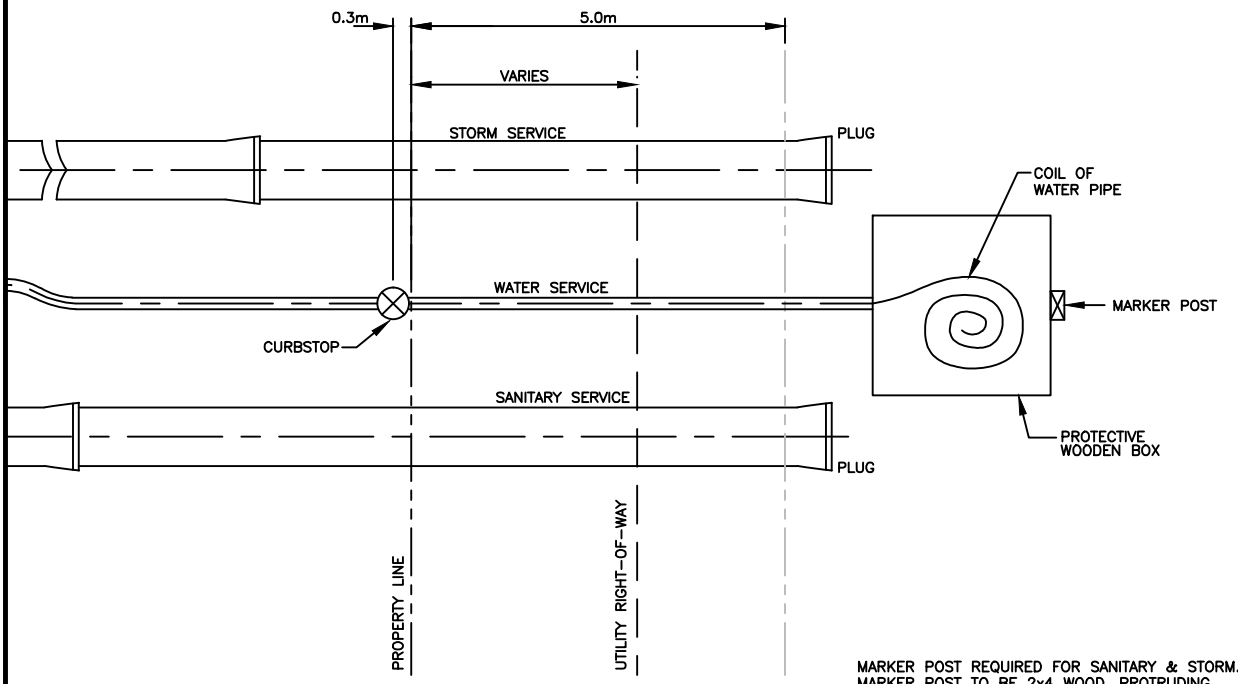
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

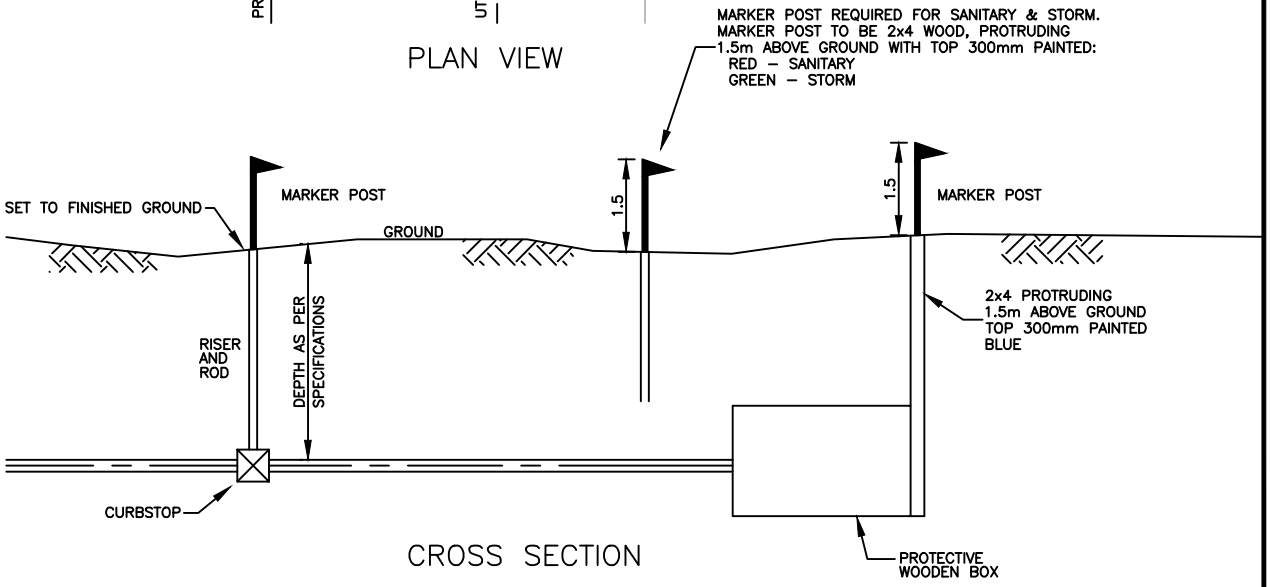
PRE-SERVICE CONNECTION DETAIL: NON-FLEXIBLE PIPE

SHEET NO.: EDCG - Water - WAT-05

FILE NO.: 109



PLAN VIEW



CROSS SECTION

NOTE:
1) REFER TO CITY OF CALGARY WATERWORKS DRAWING 23 FOR GENERAL DETAILS ON SERVICE INSTALLATION
2) FOR SERVICES IN GRANULAR MATERIAL OR HIGH GROUNDWATER CONDITIONS

All dimensions in Metric meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3							
2	03	05	10	Removed protective collar	SP	PN	PN
1	24	11	04	Added protective collar			

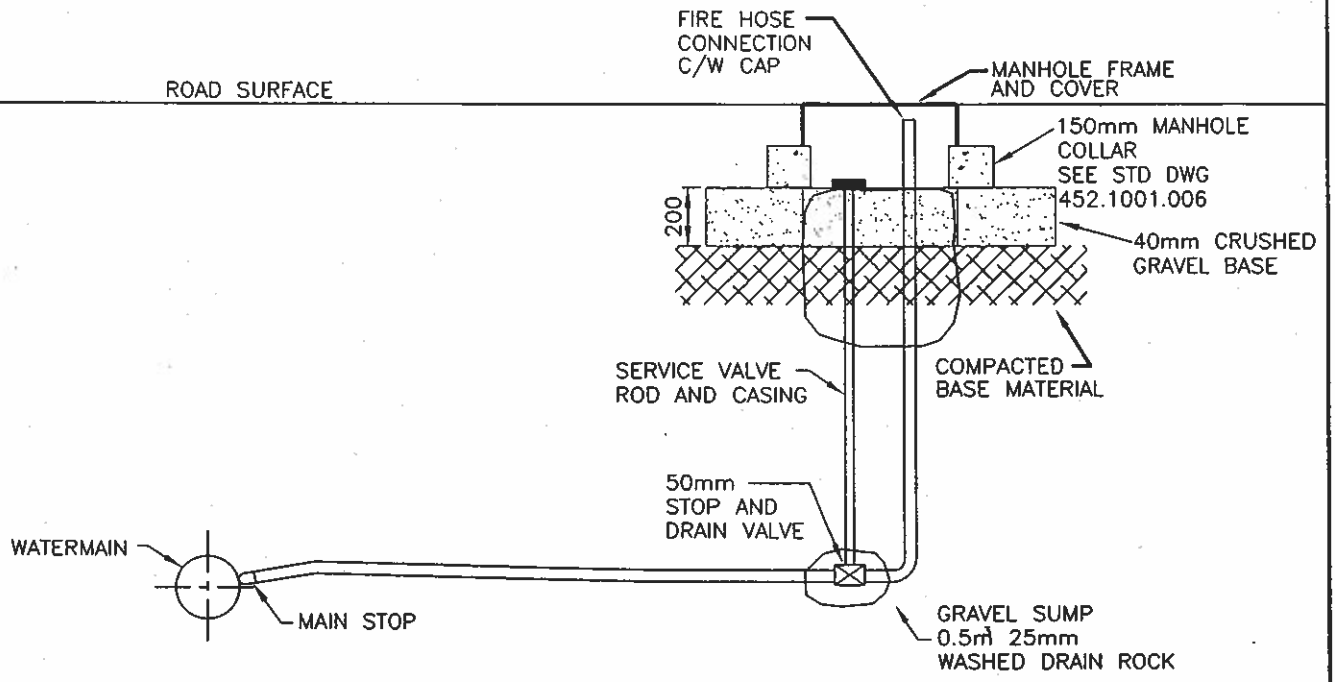
DRAWN: P.L.
DATE: Feb./03
SCALE: Not To Scale
APPROVED:

MANAGER OF ENGINEERING
TOWN OF CANMORE

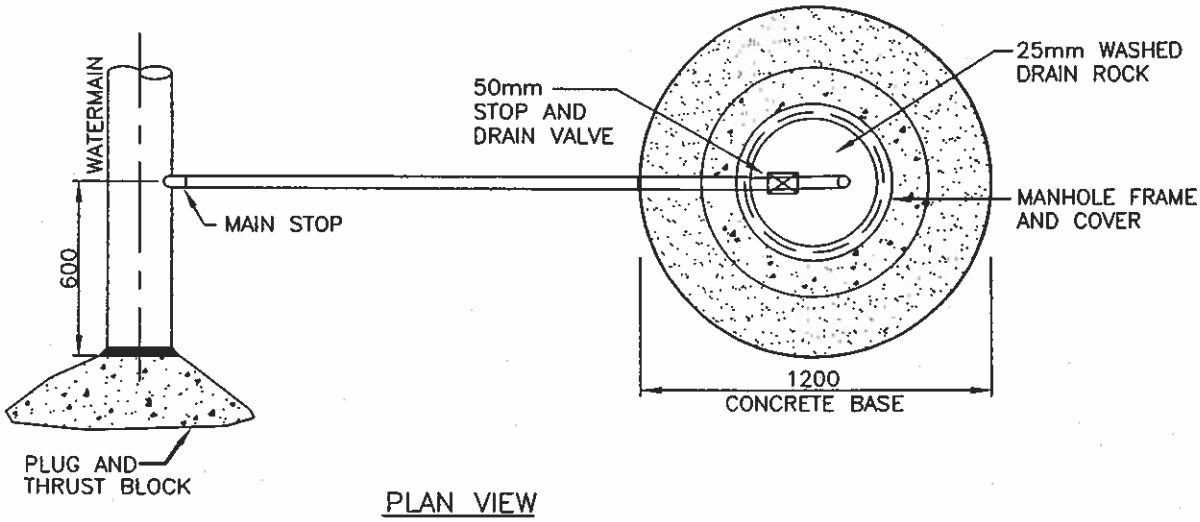
Town of Canmore
ENGINEERING DEPARTMENT

PRE-SERVICE CONNECTION DETAIL: FLEXIBLE PIPE

SHEET NO.: EDCG - Water - WAT-06
FILE NO.: 110



CROSS SECTION



PLAN VIEW

NOTES:

1. DETAILS OF LOCATION OF SHUT-OFF VALVE AND MANHOLE FRAME TO BE SHOWN ON PROJECT DRAWINGS.

All dimensions in Metric meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3							
2							
1							

DRAWN: P.L. DATE: Nov./04

SCALE: Not To Scale

APPROVED:

MANAGER OF ENGINEERING
TOWN OF CANMORE

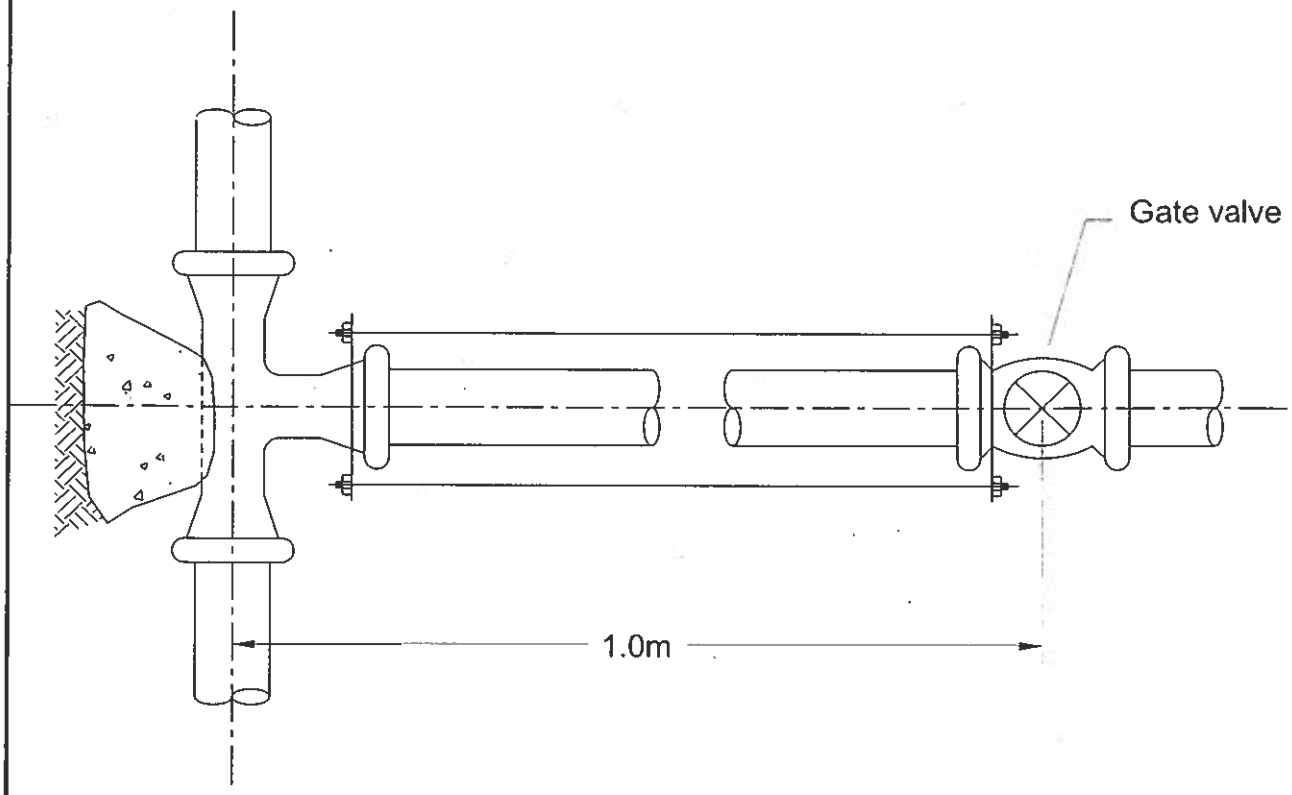
Town of Canmore
ENGINEERING DEPARTMENT

TYPICAL 50mm WATERMAIN FLUSH-OUT

SHEET NO.: WAT-07

FILE NO.: WAT-07

Modify City of Calgary drawing file no.: 453.1002.001
to include the following tie back detail for all hydrant valves:



NOTE:
1) Hydrant tee to be cast iron, ductile or approved equivalent.
2) Tie-back rods, washers and hexagonal nuts to be fabricated from high strenght, low alloy steel in accordance with ANSI/AWWA C111/A21.11

All dimensions in Metric meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
6							
5							
4							
3							
2							
1							

DRAWN: P.L. DATE: January 22/04
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

HYDRANT VALVE TIE-BACK

SHEET NO.: WAT-08
FILE NO.: 113

2.4 Sanitary

What the developer can expect with the recent changes associated with this section:

- *At the subdivision stage, there will be a greater desire to harness gravity for sanitary servicing. Inverts of lowest floor elevations will required at the subdivision stage and developers will be expected to use those services.*
- *More stringent testing of the mains will be required especially for those with inverts below the 1:100yr groundwater elevation where Infiltration/Exfiltration testing in accordance to ASTM D3212. In addition, WRc (or Town approved equivalent), testing will be required for all mains.*
- *As with the waterworks section, the Town will be more vigilant with respect to construction and installation of mains including compaction, backfill and field supervision to insure is adequately addressed during construction*

2.4.1 Required Reading

- Any waterworks design not specifically reference by this document shall be designed in accordance with the latest edition of:

- Sanitary Water Bylaw 43-96 amended from 35-94
- Latest edition of the Town of Canmore Utility Master Plan
- Latest Edition of City of Calgary - Standard Specif. Sewer Construction
- Latest Edition of City of Calgary: Design Guidelines for Subdivision Servicing
- Alberta Environment Protection: Standard and Guidelines for Municipal Water, Wastewater and Storm Drainage Systems

Additional Reading

- City of Calgary: Design Guidelines for Development Permits; Development Site Servicing Plans and Waste & Recycling Services for Commercial/Industrial Applications

2.4.2 Sustainability

- Designers are encouraged to seek out emerging technologies that embrace sustainability principles and reduce the load on the Town's sanitary system. Such initiatives will receive priority for Town approvals.

http://docksidegreen.com/index.php?option=com_frontpage&Itemid=1

2.4.3 Design

2.4.3.1 General

- Any sanitary system or part of a system shall be designed to serve not only the area within the subdivision development boundary, but, in the opinion of the Engineer, any area which is tributary to the system in accordance with the Utility Master Plan and pertinent documents from the Town of Canmore Planning Department.
- Sanitary systems shall be laid out such that all lots are serviced on the low side/corner of all proposed lots. Lots must be laid out in such a manner that gravity provides all the force, if not the majority of force required for conveyance.

2.4.3.2 Flows

- Specific Sewage Design Rates for residential, commercial, industrial or institutional developments or defined land use districts should follow minimum rates shown in the latest edition of the Utility Master Plans or other criteria applicable to specific developments in accordance with good engineering practice. The design peak flow shall be the total of residential, industrial or commercial, and infiltration flows. Since peak sewage flows may vary greatly with type and density of development, each case must be considered on an individual basis. Flow demand calculations must be referenced on the drawings. Direction of flow to be shown on the drawings.
  - **Residential –** 360Lpcd –(40 persons/developable ha min. for single family residential
  - **Commercial –** 17,000 L/ha/d
  - **Hotels –** 600L/unit/d

Peaking Formula and Factors – the following formula will be used to calculate peak sanitary flows: $((18+\sqrt{P}) / (4+\sqrt{P}))$ x average sewage flow (with P = tributary population in 1000's)

- **Residential Factor** – Harmon Formula determination (2.5 min)
- **Commercial Industrial** – 2.5
- **Hotels** – 5

- **Assumed Infiltration –** 10,000 L/ha/day
- **Capacities -** The capacity of any section of a sanitary line shall be arrived at on the basis of that portion of the line which has the least slope. Use the Manning formula for gravity flow in pipes.

2.4.4 Gravity & Force Main Design

Type

- **Mains** shall be PVC with a minimum SDR 35 unless otherwise accepted by the Municipal Engineer. Clay tile, cast iron or concrete sewer pipe are not permitted.

Sizing

- Minimum sizes of public sanitary mains are as follows:
  - Residential subdivision: 200 mm diameter minimum
  - Industrial subdivision: 250 mm diameter minimum

Slopes

- Minimum permissible slope for PVC pipes (n = 0.011) where the depth of flow will be 0.3 of the diameter or greater for average design flow. For limited service areas with low flows, where the depth of flow at minimum slope will be less than 0.3 diameter for the average design flow, the sewer main hydraulic design parameters and an assessment of the additional sewer maintenance required shall be submitted with the drawings to the Engineer.

Size	Minimum Slope
100 mm	2.00%
150 mm	1.00%
200 mm	0.60%
250 mm	0.30%
300 mm	0.24%
375 mm	0.18%
450 mm	0.14%
525 mm	0.12%
600 mm and over	0.10% or as required to provide a minimum velocity when flowing full of 0.75 m/sec

Cover

- **Gravity Mains** - Minimum cover from crown to finished grade shall be 2.50 m. In the event the required cover cannot be maintained, insulation, designed by a Professional Engineer, will be required.
- **Force mains -** shall be treated as water mains. In streets, lanes and easements the minimum cover from crown to the final grade shall be **2.7 m in clay or silty soils** and **3.3 m where the strata is predominantly gravel**. In the event the required cover cannot be maintained, insulation of the main or service will be considered but will be required to be designed by a Professional Engineer

Placement & Alignment

- Sewer main shall be laid as straight as possible. Curved sewers are discouraged. If a simple horizontal curve is required to conform to curved streets, curved sewers may be permitted provided it meets the manufacturers recommendation and with the following restrictions.
  - Increase minimum grades of sewers by 50 percent throughout curve section.
  - Modification to manhole spacing may be required where sewers are curved.
  - Maximum deflection of each pipe is not to exceed manufacturer's specifications.
- For all commercial and multi-unit residential sites where deep utility services are to be installed within predominantly clay or other relatively impermeable material such as bedrock, a clay plug shall be installed within the trench backfill adjacent to the site boundary. The clay

plug shall be as typically described in the latest City of Calgary Standard Specifications Sewer Construction

Manholes

- Transitions in size, grade or direction of sewer mains are to be accomplished by means of manholes. Standard, precast, pre-benched manholes shall be used where possible. Sewer inverts through manholes shall be benched to provide directional flow. Maximum distance between manholes is to be 120 m. In all cases, a manhole is required at the upper most end of a sewer for flushing and cleaning. The invert of services entering manholes shall be less than 760 mm above the outgoing invert. Services greater than 150mm will require a manhole where it ties into the main. If the drop is greater, an interior drop structure shall be provided. At manholes where changes in pipe diameter occur, keep crowns of pipe continuous to maintain same energy gradient. Where no change in pipe diameter occurs, allow a drop of 30 mm in a through manhole and 60 mm in the presence of a bend. If it is deemed by the Engineer that hazardous chemicals are contained within the site (i.e., gas stations, auto body shops, dry cleaners, etc.), then such industrial, commercial or institutional lots shall have inspection and test manholes installed at the property line.
- Shallow(150mm) manhole frames only and "Town of Canmore – Sanitary" solid covers or approved slotted covers shall be installed on all sanitary manholes for Municipal Improvements on Public Property.
- Shallow (150m) frames and unmarked solid or grated covers manufactured to "Standard" or "Country Style" specifications may be installed on sewer manholes or drywells on private installations.
- Mortar shall be placed between the top slab, collars and frame as shown on City of Calgary Detail Sheet 38. Mortar shall not be placed on the inside face of the collars.

Inspection

- Where inverts of a sanitary main fall below the 100yr ground water elevation, or where required by the engineer an inspection for Infiltration/Exfiltration limits must be undertaken prior to CCC. Refer to ASTM D3212 and the city of Calgary Standard for Sewer Construction 2009 part 403.13.03.
- A CCTV video inspection of all sanitary mains must be undertaken in accordance to Calgary Standard for Sewer Construction 2009 part 403.13.05 – with observations coded in accordance with WRc "Manual of Sewer Condition Classification" (or Town approved equal)

2.4.5 Low Pressure Sanitary (LPS) System - Mains

- Development areas in the Town which cannot be adequately or economically serviced by gravity sewer systems may be serviced by Low Pressure Sewer (LPS) Systems where approved by the Town. All LPS systems shall be engineered in accordance with applicable regulations, generally accepted design principles, and approved equipment manufacturer's recommendations. LPS mains shall be sized to suit the area and type of development to be services by the LPS System.

2.4.6 Lift Stations

- Lift stations are generally located along mains where needed to overcome gravity. These guidelines are primarily directed to streamline sanitary lift station designs. Each installation, however, will be reviewed by the Town on a site specific basis. Detailed drawings and completed calculations shall be submitted for review and acceptance by the Town Lift stations require the following equipment, as a minimum:
  - Electrical hoist
  - Heating/ventilation
  - Intermediate floor and clear access
  - Concrete or steel with cathodic protection
  - Interior lighting
  - Two pumps with alternate operation
  - 100 mm camlock connection on discharge piping for emergency bypass

- Separate check and isolation valves for each pump (ball type check valve, full ported eccentric isolation valve)
- Valve operators outside casing so no access required
- Amp meters on all motors over 5 HP
- Emergency power, preferably fuelled by natural gas
- Inlet flow monitoring (continuous) and pump hour meters
- Motion detection system (outside lighting)
- Pumps: Submersible, sewage: ITT Flygt
- Master Control Cabinets: Allen-Bradley
- Level Controls: Milltronics
- Program Logic Controllers: Modicon, Allen-Bradley, ITT Flygt
- Electrical - Relays/Transfer Switches, etc.: Allen-Bradley
- Variable Speed Drives: Allen-Bradley

- PLC/SCADA systems in accordance with the Town and EPCOR requirements. These standards change as new technologies emerge and as existing facilities in Canmore are upgraded. Contact the Engineering Department for current requirements at the planning stage of new projects.

2.4.7 Servicing – Gravity Services

2.4.7.1 Sizing - Gravity Services

- The pipe diameter and type of pipe for service leads shall be limited to the following sizes of PVC pipe shown:

SDR 28	100 and 150 mm
CSA B182.1M	`75 mm solid (weeping tile service only)
SDR 35	150, 200, 250, 300, 375 mm

- **Service Jointing Material** - All service lead joints shall be made watertight and root resistant with jointing materials supplied by the manufacturer. All jointing materials shall be approved by the Engineer prior to use. Approved jointing material for PVC service leads are as follows:

SDR 28	gasket supplied by the manufacturer
CSA B182.1M	CSA B182.1M solvent weld
SDR 35	gasket supplied by the manufacturer

2.4.7.2 Cover – Gravity Services

- Minimum cover from crown to finished grade shall be 2.50 m. In the event the required cover cannot be maintained, insulation will be required as per insulation detail WAT 04.

2.4.7.3 Placement & Alignment – Gravity Services

- A separation of 0.6m shall be maintained between individual services along mains.
- Sanitary services shall be placed minimum 2m off of neighboring property lines.
- Where practical, sanitary services shall be placed below foundation wall as opposed to boring through the wall.
- Bends in gravity services are discouraged. Designers are encouraged to provide straight gravity servicing wherever practical. Gravity servicing with bends will require a variance. A maximum of 2 x 22.5degree bends will be allowed only where it can be shown that a practical methodology for emergency cleanout is possible. Final alignment of the service will be decided by the Engineer.

2.4.7.4 Misc Notes – Gravity Services

- For all multi-family or commercial sites where sanitary service is to be installed within predominantly clay or other relatively impermeable material such as bedrock, a clay plug shall be installed within the trench backfill adjacent to the property line. The clay plug shall be as typically described in the City of Calgary Standard Specifications Sewer Construction.

2.4.8 Servicing – LPSS Services

2.4.8.1 General Notes & Application Procedure – LPSS Services

- Service connections to an existing LPS Systems shall comply with the design criteria developed for that system. The design criteria may be obtained upon written request from the Engineering Department. Applications for LPS System service connections shall be to the Engineering Department in accordance with Schedule "C" of By-law 35-96.

2.4.8.2 Sizing - LPSS Services

- **LPS Services** LPS service connections shall be minimum 38 mm CTS HDPE with a minimum pressure rating of 1100 kPa (160 psi) from the LPS main to the building connection.

2.4.8.3 Cover – LPSS Services

- Minimum cover from crown to finished grade shall be 2.50 m. In the event the required cover cannot be maintained, insulation will be required as per insulation detail WAT-04.

2.4.8.4 Placement and Alignment – LPSS Services

- A separation of 0.6m shall be maintained between individual services along mains.
- Sanitary services shall be placed minimum 2m off of neighboring property lines

2.4.8.5 Components – LPSS Services

- A compression joint curb stop and compression joint check valve shall be installed at the property line or edge of easement. The curb stop shall have an adjustable cast iron service box with stem similar to City of Calgary Standard Specifications, but with the top cap of the box painted green. The curb stop shall conform to Town of Canmore specifications for water service connections, with the exception that it will have " Sanitary" printed on the curb stop. The check valve shall be a Philmac swing check valve or Approved Equal.

2.4.8.6 Grinder Pumps – LPSS Services

- Collection sump manufactured from HDPE, FRP, sulfate-resisting concrete or other approved corrosion-resistant material. The sump shall be protected from freezing, be leak-proof and resist the infiltration of groundwater. The sump shall be sealed and vented in accordance with the Plumbing Code and Regulations. For a typical single family dwelling unit, the net pump out capacity of the collection sump (tank) should not exceed 500 L. The total pump out capacity of the sump shall be larger and include reserve storage capacity for power outages, etc. For homes with above average water consumption (i.e. due to installations of hot tubs, Jacuzzi's, swimming pools, etc.), or for multi-unit residential developments a professional designer should be consulted for proper sump sizing.
- Grinder pumps, designed for a low pressure system application, manufactured by Environment One, Hydromatic, Meyers or approved equivalent with a design capacity of 41 L/min at 27 m (11 USgpm at 90 ft) total dynamic head. The pump shall be capable of intermittent operation at pressures at least 25% above and 50% below the design rating. The pump shall be complete with controls to automatically start and stop the pump at pre-selected liquid levels in the sump.
- Discharge piping from the pump to the building service connection shall be minimum 38 mm CTS HDPE, or as recommended by the pump manufacturer, with a minimum pressure rating of 1100 kPa (160 psi). The discharge piping shall include unions or couplings that allow the pump to be disconnected for servicing or repair. The discharge piping shall also include a check valve, shutoff valve and pressure gauge within the building or access chamber adjacent to the sump.

2.4.9 Servicing - Existing Systems

- Upon redevelopment of previously serviced lots, where the sanitary service is not PVC in accordance with current standards, a new PVC service to the main shall be installed at the expense of the developer. The new service shall be on the same alignment as the existing service, and where practical, utilize the existing service tie-in at the main. Existing pre-formed junctions on the main shall be utilized, with a suitable transition fitting to suit. Slip cover and gasket are preferred over Furnco. Existing strap-on saddles shall be removed and replaced with new to suit the new PVC pipe. If replacement of the existing service along the original alignment and/or reuse of the existing junction is not practical, the old service must be terminated at the main at the expense of the developer. Road Use and Excavation Permits shall be obtained prior to work within the road right-of-way, and the Engineer shall be notified in advance of a request not to reuse an existing service tie-in at the main. Where an existing service is of an acceptable PVC material, a video of the service from the property line to the main shall be undertaken by the developer to ensure that the existing service is in good condition with no obvious defects including inadequate grade. The video shall be submitted to the Engineer for review, who will determine if the existing service may be reused. If not, a new service shall be installed at the developer's expense.

2.5 Storm

Forward – *It is important that designers and others treat these guidelines as a tool to assist them and not as a rulebook for stormwater management solutions. There are many site specific issues that affect development and stormwater management planning. Although the guidelines provide practical and specific guidance, there must be flexibility to account for site-specific conditions. Stormwater management solutions are location dependant and this must be recognized when applying the guidance provided in this document.*

What the developer can expect with the recent changes associated with this section:

- *The Town will be looking to incorporate Low Impact Development (LID) measures and Best Management Practices (BMP's) for stormwater treatment*
- *The Town will be placing much more emphasis on Erosion Sediment Control in the CMP and during the project*
- *The Town will be looking for more detail from smaller projects in terms of Stormwater management*
- *The Town will be looking for suggested maintenance plans to be prepared by the consulting engineer for major Stormwater works*

2.5.1 Required Reading

Any stormwater management design not specifically referenced by this document shall conform generally and be designed in accordance with the latest edition of:

- Town of Canmore: **CANMORE STORMWATER MASTER PLAN, 2005** (specifically T.M. 2.8 for small sites)
- City of Calgary: Stormwater Management Design Manual, Dec 2000
- Alberta Environmental Protection: **MUNICIPAL POLICIES & PROCEDURES MANUAL, 2001**
- Alberta Environment: **STANDARDS & GUIDELINES FOR MUNICIPAL WATERWORKS, WASTEWATER AND STORM DRAINAGE SYSTEMS, Jan 2006**

2.5.2 Referenced Reading (available on the website)

- SWM Ref1 - **Municipal Policies and Procedures**, Alberta Environment, Apr 2001
- SWM Ref2 – **Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems,** Alberta Environment, Dec 2006
- SWM Ref3 - **Land Development for the Protection of Fish Habitat** - Fisheries and Oceans Sep 1993
- SWM Ref4 – **LID National Manual**, Prince George County Maryland, Jun 1999
- SWM Ref5 –**Stormwater Management Design Manual**, City of Calgary, Dec 2000
- SWM Ref6a –NRC Guide to Sustainable Municipal Infrastructure - **Stormwater Management Planning**, 2004
- SWM Ref6b – NRC Guide to Sustainable Municipal Infrastructure **- Source & Onsite Controls for Municipal Drainage Systems**, 2004
- SWM Ref6c – NRC Guide to Sustainable Municipal Infrastructure **- Conveyance&End of Pipe Measures for Stormwater Control,** 2004
- SWM Ref7 - **Policy and Design Criteria Manual for Surface Water Management** - City of Chilliwack CM2H Hill, May 2002
- SWM Ref8 - **MMCD Green Design Guidelines Draf**t-Nov4_2005
- SWM Ref9 - **Effectiveness of Stormwater Source Control**_GVRD Dec 2002
- SWM Ref10 - **Sustainable Building Design Principles and Practices**_GVRD_2003

2.5.3 Sustainability

- Stormwater shall be treated as resource. As opposed to the traditional Capture, Detain and Release approach, Development Teams are encouraged to harvest, reuse, and re-infiltrate stormwater as evenly as is practical to the site.
- An **Integrated Planning and Design Approach** will be required for Stormwater Management. The Integrated Approach acknowledges expertise in environmental and land use planning, aquatic and terrestrial ecologies, water chemistry, in addition to the more traditional disciplines of municipal engineering and surface and sub surface water resources. This will require a higher degree of interdisciplinary interaction between land use planners, engineers, landscape architects and environmental scientists at the earliest stages of the project. Details of design that are normally give at BP stage or field fit, may be required at earlier stages of design.
- **Low Impact Development – LID** Storm management and techniques shall be used whenever prcatical, particularly reducing the imperviousness of the site. Please visit the following website for Low Impact Development Techniques - http://www.alidp.org/
- **Reduce Principle –** Developers are encouraged to use storm systems that reduce the amount of manufactured infrastructure required. Developers are encouraged to harness the slope of the land. The Town will be looking for infrastructure with recycled content where infrastructure is required. Where practical, natural materials and organics are to be used as filtering media.

2.5.4 Conceptual Planning

- **Hierarchical Approach -** Stormwater management planning for subdivisions and developments shall be based on a Hierarchical approach. This entails working from the watershed to the sub-watershed to the subdivision and finally down to the site level. The Hierarchical Approach acknowledges the linkage and interdependence of community planning to Stormwater Management Planning at all levels. This is particularly important when choosing legal boundaries. When subdividing large tracks of land, Development Teams are encouraged to seek out boundaries that compliment the existing hydrology and existing Stormwater aspect of the site. Legal boundary selection should compliment the existing or planned infrastructure.
- **Four (4) Aspects of Stormwater Systems need to be addressed:**
  - **Quantity –** in addition to reducing erosion implications, storm designs shall minimize the potential for downstream flooding and ponding. The complete spectrum of rainfall events will need to have been accounted for and it needs to be shown that smaller storms are kept on site as stipulated in this chapter.
  - **Quality –** Storm designs shall reduce contaminant loading from urban storm drainage to meet total suspended solids removal requirements of 85% of particle sizes equal to or greater than 75 microns. Water quality enhancements and/or treatment trains should be capable of removing most soluble pollutants, as well as fine grained particulate matter.
  - **Erosion and Sediment Control (ESC)** – All storm design shall incorporate ESC measures during construction as noted in the Construction Management Plan. ESC controls shall be in place prior to earthmoving, stripping, grading or other construction activity. Control measures shall be monitored regularly and repaired as necessary. Any build up of eroded material shall be removed immediately following rainfall, or snow melt in order to restore the capacity of the temporary facilities. Final storm design shall be such that downstream erosion is minimized. It is absolutely essential that developers ensure their contractor and trades are made aware of the concepts of Erosion and Sediment and Control. All Stormwater catchment inflow devices affected by construction are to be giving the best possible protection from erosion coming from the site during construction. This protection is required until the Town is satisfied that landscaping has taken root and sediment deposition is no longer considered harmful. These protection devices are to be maintained and cleaned as per manufacturer's recommendation or as needed. All ground cover that has been disturbed by construction that borders on hard surface of lower elevation that leads to an inflow device shall be lined with silt fences. Contractors are encouraged to regulate where dump trucks unload their sand/soil loads to staging areas that are not paved and leading to a drainage course.
  - **Hydrologic Cycle** - Stormwater Management shall be designed in accordance with the principles of the hydrologic cycle. Storm design shall try to mimic the original characteristics

of the site hydrology. Please note that in some literature, this aspect of Stormwater management is also known as Base Flow Maintenance.

2.5.5 Design

- Any storm system design shall:
  - Address all points from the "Sustainability" component of this section
  - Minimize the potential risks to health and property within the development boundaries
  - Minimize inconvenience caused by surface ponding and flooding
  - Minimize potential for downstream flooding and erosion
  - Conform generally to the Town Stormwater Master plan
  - Minimize the impacts on Surface Water and Groundwater resulting from sediment and erosion problems during and following construction
  - Reduce contaminant loading from Urban storm drainage and industrial runoff discharges by the use of detention storage or alternative treatment systems
  - Have pretreatment and infiltration facilities designed to operate under cold climate conditions and be protected from damage due to frost
  - Have permanent drainage system constructed on or adjacent to lot lines (for Subdivisions without lanes where drainage features are required)
  - Not pump stormwater unless it forms part of a progressive system for rainwater harvesting or as acceptable to the Engineer
  - Have lots graded in such a way that quantity and velocity of surface runoff is minimized, and that infiltration and detention is maximized throughout the site (as is practical)
  - Have lots lower than adjacent roadways include acceptable stormwater management techniques that direct runoff to an acceptable drainage system
  - Have runoff from an event that can not be infiltrated be directed to an appropriate stormwater system
  - Keep runoff from pedestrian walkways as is practical
  - strive to keep post development or offsite discharge within 10% of pre development condition (new developments)

- **Stormwater Management in High Groundwater Conditions** – In instances (developments and subdivisions) where high ground water exists, the Town reserves the right to ask for a geotechnical investigation to address specific issues of groundwater including highest anticipated water table, highest ground water level and lowest footing elevation for each lot.
- **Stormwater, Grading & Landscaping** - Developers must be aware of the relationship between Stormwater, Grading and Landscaping. These disciplines will be required to work together. Stormwater Management will dictate the Grading and Landscaping will be dictated by both of these. Development Teams are encouraged to bring these three disciplines together at the early stages of the project in accordance with the Integrated Planning and Design approach to ensure one cohesive design.

- **Runoff Coefficients -** The average coefficient shall be weighed according to the amount of each type of area tributary to a given inlet. Values of coefficients should be in accordance with standard values from the City of Calgary Stormwater Management Design Manual. The Town may direct that higher coefficients be used following review of development proposals.
- **Dual Drainage Concept** - For all sites, storm drainage shall be designed on the basis of minor and major systems.
- **The minor system** (roof leaders, gutters, lot drainage, and underground pipe systems (where used), on site infiltration, etc.) provides a basic level of service by conveying flows during minor storm events. In Canmore, the 1:5 yr event will be used for the minor system.
- **The major system**, (lot drainage, roads and gutters, storage facilities, etc.) conveys runoff from the extreme events in excess of the minor system capacity. In Canmore, the 1:100 year rainfall event will be used for design of the major event. Failure to plan for a major system often results in

unnecessary flood damage. Provision shall be made for overland drainage during frozen ground conditions or over-saturation of the infiltration zone.

- **Design of Small Sites – Valley Bottom** - Small (SFD and Duplexes) and Medium sized projects located on the valley bottom shall generally follow a "treatment, then infiltrate" approach to deal with their stormwater runoff. Design calculations will follow the steps as outlined in section T.M 2.8 of the Town of Canmore 2005 Stormwater Masterplan. Stormwater Detail STM-06 is to be used for infiltration of the site Stormwater runoff. In the case of Single Family and Duplexes with no development grading plan and covering more than 75% of the lot, Stormwater calculations and the design of Stormwater infrastructure (including foundation drains and weeping tile) will need to be submitted with a Development Application.
- Weeping tile design must be accounted for and shown on the drawings. **Installation of the weeping tile itself and the soakaway pit will form part of the infrastructure inspections by the Town (SFD and Duplexes) or by the Consulting Engineer responsible for the weeping tile design.**
- **Design of Large Sites -** For sites 2.0 ha and larger (or where required by the Engineer), an Overland Flow Analysis must be provided for all new subdivisions and for all re-development sites in Canmore larger than 2.0 ha or where required by the Engineer. The Town will require detailed computer modeling to be carried out to define the complete system, including depth of flow and velocity along the conveyance route, as well as their behavior of traplows and their interaction with storm sewers. Storm sewer runoff determination for all new areas shall be made using a Unit Area release rate approach.
- **Superpipe Storage –** Superpipe storage is generally discouraged in the Town of Canmore. However, with approval from the Town Engineer, storage tanks made from recycled materials can be used, including the following examples:
    - **Brentwood Industries Stormtank Storage Modules**
    - **Rain Tank System**
- **Treatment** Designers should consider treatment train approach using BMP's that best fit their site. It should be noted that BMP's are not at the point where they can be evaluated numerically. It is very hard to determine the comparative effectiveness of BMP's beyond generalities. As such, designers are encouraged to first accommodate the "First Choice Options" outlined by the Canmore Master Stormwater Plan and then accommodate a treatment Train approach to what methods are best suited for their site.
- **Infiltration**
    - Infiltration systems must address and show the 100yr ground water elevation, lowest parkade elevation, lowest floor elevation, lowest footing elevation and geotechnical infiltration rates. A profile view of the infiltration systems showing these elevations must be submitted with the development application.
    - Infiltration systems must be placed with a minimum of 0.6m clearance (from the lowest horizontal plane of the system) from the 100yr groundwater elevation as is practical.
    - In redevelopments, designers shall strive to re-infiltrate the first 25mm/day of runoff in the 1:5 year event.

Design parameters for infiltration facilities

- An infiltration rate of $8x10^{-4}$ m/s shall be used unless the site specific geotechnical testing shows otherwise.
- An infiltration rate based on a 24 hour sustained saturated conditions shall be used to calculate infiltration area requirements. The rate shall be based on in-situ tests performed at the proposed infiltration site, or on conservative values based on similar soils. A suitable reduction factor dependant on finished site conditions shall be applied to the infiltration rate to account for possible future sediment build up and clogging
- Where peak runoff rate is greater than the adjusted infiltration rate, buffer storage shall be provided
- Detention storage volume, where required for infiltration purposes, shall include only the drywell volume and effective porosity of the drain rock around the drywell that is located above the 1:100 groundwater table
- For infiltration tanks, the basin bottom area shall be used to calculate the required area
- For drywells, the side surface may also be used to calculate the required area
- Pretreatment BMP's shall be used to limit solids input to an infiltration system and to capture hydrocarbons. In the wellhead protection zone, additional treatment to remove pollutants may be required by the Town Engineer. These treatment processes may include vegetative filters, sumps, detention storage, OGS etc.
- Capability for inspection and maintenance (access ports and entrances) shall be provided for all infiltration facilities

Design parameters for detention facilities

Detailed proposals of detention/retention facilities must be submitted to the Town with the application. In addition, the following parameters will be used:

- Design discharge rate (storage capacity):
  - Pre-development 2 year (1:2) storm runoff rate (i.e., capture and treatment of the 1:2 year storm event based upon a storm of 12 hr. duration {25 mm depth over development area})
- Overflow spillway capacity:
  - Post-development 100 year (1:100) storm event.
- Emergency spillway capacity:
  - Post-development 100 year (1:100) storm event.
- Minimum ratio of effective length to effective width of 5:1.
- A pre-treatment sump for sediment removal.
- An armoured inlet and outlet structure.
- Discharge and conveyance of pond flows shall not cause erosion of natural or man-made drainage systems downstream.
- The top slopes shall be wide enough to provide a safe and stable work area able to accommodate maintenance vehicles and personnel.
- All interior surfaces of the pond shall be protected from erosion and, where possible, vegetated with suitable plant types to promote the removal of stormwater pollutants.
- The pond shall be signed at appropriate intervals advising of the maximum water depth, dangers of flash flooding, and prohibiting public use for consumption or bathing.
- Ponds shall have filtered outlets for low flow release that will drain the 1 in 2 year storm in a period of 48 hours. (Dry pond)
- Ponds with a discharge located within 500 m of any natural water course must incorporate an approved oil/grit separator (OGS) unit, or other water quality enhancement BMP acceptable to the Town, prior to discharge to the water course.

- **Outfalls** All stormwater runoff from subdivision and site development areas must be managed prior to discharge for both water quality and quantity control to minimize the adverse impact on the environment. Design of outfalls into any watercourse must be submitted for review and acceptance by the Town, Fisheries and Oceans Canada, and by Alberta Environment.
- **Culvert End Details** - Culvert inlet and outlet details shall typically be constructed per the Alberta Transportation and Utilities "Highway Geometric Design Guide 1995" (updated 1996) as detailed in figure C-4.7 Hand Laid Rock Riprap. The project engineer may request to delete installation of a clay seepage seal, subject to the Town's approval, if in the opinion of the engineer it would provide negligible benefit due to coarse granular native soils and intermittent flow. Rock supplied for riprap shall be local, hard, durable and angular in shape, resistant to weathering and water action, clean and shall meet the following Class 1 gradation:
    - 0% larger than 450 mm
    - 20 – 50% larger than 350 mm
    - 50 – 80% larger than 300 mm
    - 100% larger than 200 mm

2.5.6 Best Management Practices

- Stormwater Best Management Practices (BMPs) are methods of managing stormwater drainage for adequate conveyance and flood control and are economically acceptable to the community. BMPs are stormwater management methods that retain as much of the "natural" runoff characteristics and infiltration components of the undeveloped system as possible and reduce or prevent water quality degradation. BMP's are normally looked at as **5 Levels of Control**. All Stormwater systems shall address five (5) levels of Best Management Practices control**,** as noted below. It is generally accepted that the cost of these measures increases as they get farther from the source. As such, the order in which these BMP's should be addressed is the same order in which they are listed. In addition to the Canmore Stormwater Mater Plan, designers are encouraged to review the documents referenced in the Required Reading section of these guidelines for more detail regarding the detail of these controls. All BMP's require acceptance by the Town.

Five (5) Levels of Best Management Practices Control

- **Pollution Prevention** involves public education, awareness and participation, in addition to regulations, enforcement, and application of bylaws. Developers must have literature summarizing the specifics of the On site Stormwater Management system that is to be included with the purchase of the unit. This literature should be made available to the governing bodies that represent a conglomerate of units such as a condo boards. The literature should specify a recommended maintenance schedule along with a description of what type of inspections will be required.

- **Source Controls** are measures designed to minimize the generation of, and entry of pollutants into, stormwater run-off, with emphasis on non-structural and semi-structural measures applied at or near source.
    - Minimizing the sediment that is used in the winter
    - Minimizing pollutant content for salt/sediment used on ice
    - Catch basin cleaning
    - Use of environmentally friendly de-icing agents
    - **Run off separation** - Runoff that has not travelled across a vehicle carriage way will not require pretreatment and can be infiltrated directly into the ground

- **Lot level BMP's** are practices that reduce run-off volumes and/or treat stormwater before it reaches a municipal conveyance system. These controls can be either structural or non-structural in nature and applied at the individual lot level or on multiple lots that drain a small area. Typically, these techniques would be implemented on individual dwelling lots or for small commercial/industrial lots.
    - Reduced lot level grading
        - **SWM Ref#1 – T.M. 2.6 Page A7**
        - **SWM Ref#2 – Section 6.3.3.1 & Fig 6.1**
    - Directing roof leaders to yard ponding/soak away pits
        - **SWM Ref#1 – T.M. 2.6 Page A8**
        - **SWM Ref#2 – Section 6.3.3.2, 6.3.3.3 & Fig 6.2, 6.3 & 6.4**
    - Sump pumping foundation drains to ponding areas
        - **SWM Ref#1 – T.M. 2.6 Page A12**
        - **SWM Ref#2 – Section 6.3.3.4 & Fig 6.5**
    - Rain Barrels and Cisterns
        - **SWM Ref#1 – T.M. 2.6 Page A9**
    - Vegetated Roof Systems
        - **SWM Ref#1 – T.M. 2.6 Page A10**
    - Infiltration Trenches
        - **SWM Ref#1 – T.M. 2.6 Page A13**
        - **SWM Ref#2 – Section 6.3.5.4 & Fig 6.13**
    - Infiltration Basins
        - **SWM Ref#1 – T.M. 2.6 Page A14**
        - **SWM Ref#2 – Section 6.3.5.5 & Fig 6.14**
    - Dry Wells (see detail)
        - **SWM Ref#1 – T.M. 2.6 Page A15**
    - Filter Strips
        - **SWM Ref#1 – T.M. 2.6 Page A16**
        - **SWM Ref#2 – Section 6.3.5.6 & Fig 6.15**
    - Bioretention Filters
        - **SWM Ref#1 – T.M. 2.6 Page A17**
    - Sand Filters
        - **SWM Ref#1 – T.M. 2.6 Page A18**
        - **SWM Ref#2 – Section 6.3.5.7 & Fig 6.16, Fig 6.17**

- **Conveyance BMP's** are measures that mitigate the impacts of urbanization when conveying runoff such as promoting soil moisture replenishment, groundwater recharge and infiltration. Conveyance systems for both the minor and major systems shall be low energy overland flow where practical. Designers are reminded that runoff needs to be of good quality so as to not affect the groundwater. Stormwater conveyance systems transport drainage from developed areas through sewer or grassed swale systems.

    - **Specialized Canmore BMP** - Enhanced Filtration Grassed Swales
        - **SWM Ref#1 – T.M. 2.6 Page A20/A27 & Figure 2.6A**
        - **SWM Ref#2 – Section 6.3.4.3 & Fig 6.8, Fig 6.9**
    - Pervious Pipe Systems
        - **SWM Ref#1 – T.M. 2.6 Page A19**
        - **SWM Ref#2 – Section 6.3.5.7 & Fig 6.6**
    - Pervious Catchbasins
        - **SWM Ref#2 – Section 6.3.4.2 & Fig 6.7**
    - Wet Swales (linear Wetlands)
        - **SWM Ref#1 – T.M. 2.6 Page A21**

- **End of pipe BMP's** provide flow attenuation, major flow conveyance, and water quality enhancement of stormwater before discharge into a receiving water body. A number of end-of-pipe alternatives are available for application depending on the characteristics of the upstream catchment, and the regulations and requirements for water quality in the receiving waters. End-of-pipe practices that provide extended detention reduce the rate of stormwater discharge by storing the stormwater runoff temporarily and releasing it at a controlled rate. Water quality treatment is provided through enhanced settling and biological processes.

    - **Specialized Canmore BMP** – Below-grade (Vaulted) Treatment Trains
        - **SWM Ref#1 – T.M. 2.6 Page A29 & Figure 2.6C**
    - **Specialized Canmore BMP** – Wet ponds/Wetlands with filtration bays
        - **SWM Ref#1 – T.M. 2.6 Page A28 & Figure 2.6B**
    - Wet Ponds (shall be used prior to dry ponds)
        - **SWM Ref#1 – T.M. 2.6 Page A23**
        - **SWM Ref#2 – Section 6.3.5.1 & Fig 6.10**
    - Dry Ponds
        - **SWM Ref#1 – T.M. 2.6 Page A23**
        - **SWM Ref#2 – Section 6.3.5.2 & Fig 6.11**
    - Constructed Wetlands (shall be used prior to dry ponds)
        - **SWM Ref#1 – T.M. 2.6 Page A24**
        - **SWM Ref#2 – Section 6.3.5.3 & Fig 6.12**
    - Submerged Gravel Wetlands
        - **SWM Ref#1 – T.M. 2.6 Page A25**
    - Below Grade Water Quality Units
        - **SWM Ref#1 – T.M. 2.5 in its entirety, T.M. 2.6 Page A26**
        - **SWM Ref#2 – Section 6.3.5.8**

2.5.7 Piped Systems

- Storm sewers shall be designed as a separate sewer system. Effluent from sanitary sewers or any potentially contaminated drainage from industrial, agricultural, or commercial operations shall not be discharged to storm sewers. Contaminated drainage means the introduction of any foreign, undesirable physical, chemical or biological substance into the environment which results or is likely to result in deleterious effects.
- Storm sewer pipe shall be designed to convey the design flow when flowing full with the hydraulic grade-line at the pipe crown. Crown elevations should match at manhole junctions.
- Storm and runoff design parameters shall be obtained from the City of Calgary STORMWATER MANAGEMENT AND DESIGN MANUAL.
- The Manning formula shall be used for calculation of gravity flow in pipes. Assume pipes are flowing full to compute velocities and times of concentration.
- Friction coefficients of n = 0.013 for concrete pipes and n = 0.011 for PVC pipe shall be used, or as per the manufactures specifications, whichever is the more stringent.
- Storm sewer sizing shall allow for weeping tile contributions and rain water leaders, where necessary.
- **Pipe sizes** - Minimum size of public storm sewer is to be 300 mm, with the exception of 75 mm to 250 mm diameter lines installed for weeping drain tile building connections. Minimum size of public storm sewer in a commercial or industrial subdivision is to be 375 mm in order that the majority of service connections can be made without manholes. All industrial and commercial lots shall be serviced with storm sewers.
- **Pipe Material** – Mains shall be PVC with a minimum SDR 35 and made of 50% recycled content unless otherwise accepted by the Engineer. **IPEX Enviro-Tite™ is recommended.** Alternate products can be used with approval of the Engineer. Clay tile is not permitted. Mains larger than 1050 mm should be reinforced concrete pipe unless otherwise accepted by the Municipal Engineer.
- **Slopes** - Use slopes that will produce minimum velocities of 0.90 m/sec for storm sewers (flowing full) and 0.60 m/sec for weeping tile.
- **Cover** - The minimum cover from pipe crown to finish road grade is 1.20 m unless otherwise accepted by the Engineer.
- **Backfill -** The clay plug shall be as typically described in the latest version of the City of Calgary Standard Specifications Sewer Construction.
- **Alignment** - Sewer main shall be laid as straight as possible. If a simple horizontal curve is required to conform to curved street, curved sewers will be permitted with the following restrictions:
  - Increase minimum grades of sewers by 50 percent throughout curved section
  - Manholes shall be located at the beginning and end of the curve
  - Maximum deflection of each pipe is not to exceed manufacturer's specifications.
- **Maximum Velocity** - Maximum flow velocity should not exceed 6 m/sec except under exceptional conditions, as reviewed and accepted by the Town. If sewer flow velocities exceed 3 m/s, special consideration shall be given to prevent scouring.

- **Manholes** - The requirements for manholes on storm sewers are generally the same as for manholes on sanitary sewers. Maximum distance between manholes to be 120 m for the trunk lines 375 mm in diameter or less and 150 m for the trunk lines greater than 375 mm in diameter. In all cases, a manhole is required at the upper end of a sewer for maintenance purposes. When connecting laterals to large trunks, it may be advantageous to build a small manhole on the lateral immediately adjacent to the trunk with a direct connection from manhole to trunk.
- **Catch Basins** - Catch basin spacing and sizing shall be based on detailed computer modelling of the stormwater management system. Spacing, in general, is to range from 90 to 150 m, with closer spacing required for flat grades and at all corners where storm sewers exist except in the case of a high corner, i.e., drainage away from corner in both directions. All catch basin bodies shall be of either 600 mm or 900 mm pre-cast concrete sections. Catch basins shall be twinned (two basins built side by side) and interconnected at locations where there is a large trapped drainage catchment area accumulation, or where a large amount of water may accumulate after bypassing upstream catch basins, which are situated on a very long steep street. Catch basins of a custom design (super catch basins) may be required at points where typical configurations cannot meet the required interception rates. Single basins require 250 mm diameter leads, twinned basins require one common 300 mm diameter lead. All leads shall have minimum slope of 2 percent. Catch basins leads shall be connected to a manhole, not directly to the main. The Town may require calculations to be submitted for the number and location of catch basins. Storm sewer laterals extended to drain low lanes require a grated top manhole at the upper end of the lateral, plus a lane type catch basin as per Town's Guidelines. Catch basins placed in lanes, swales or ditches that do not have an ACP surface, shall not be benched and shall contain a sump of not less than 600 mm in depth.

2.5.8 Maintenance –

The developer will be responsible for providing the Town with a suggested maintenance schedule for all treatment facilities private works as well as those on ROW's. The maintenance schedule should suggest the frequency replacement of filters for all aspects that are meant to filter runoff and filter mediums, suggested schedule of removal of sediment and any other maintenance requirements to ensure the treatment facilities are functioning properly with maximum efficiency.

2.5.9 Monitoring –

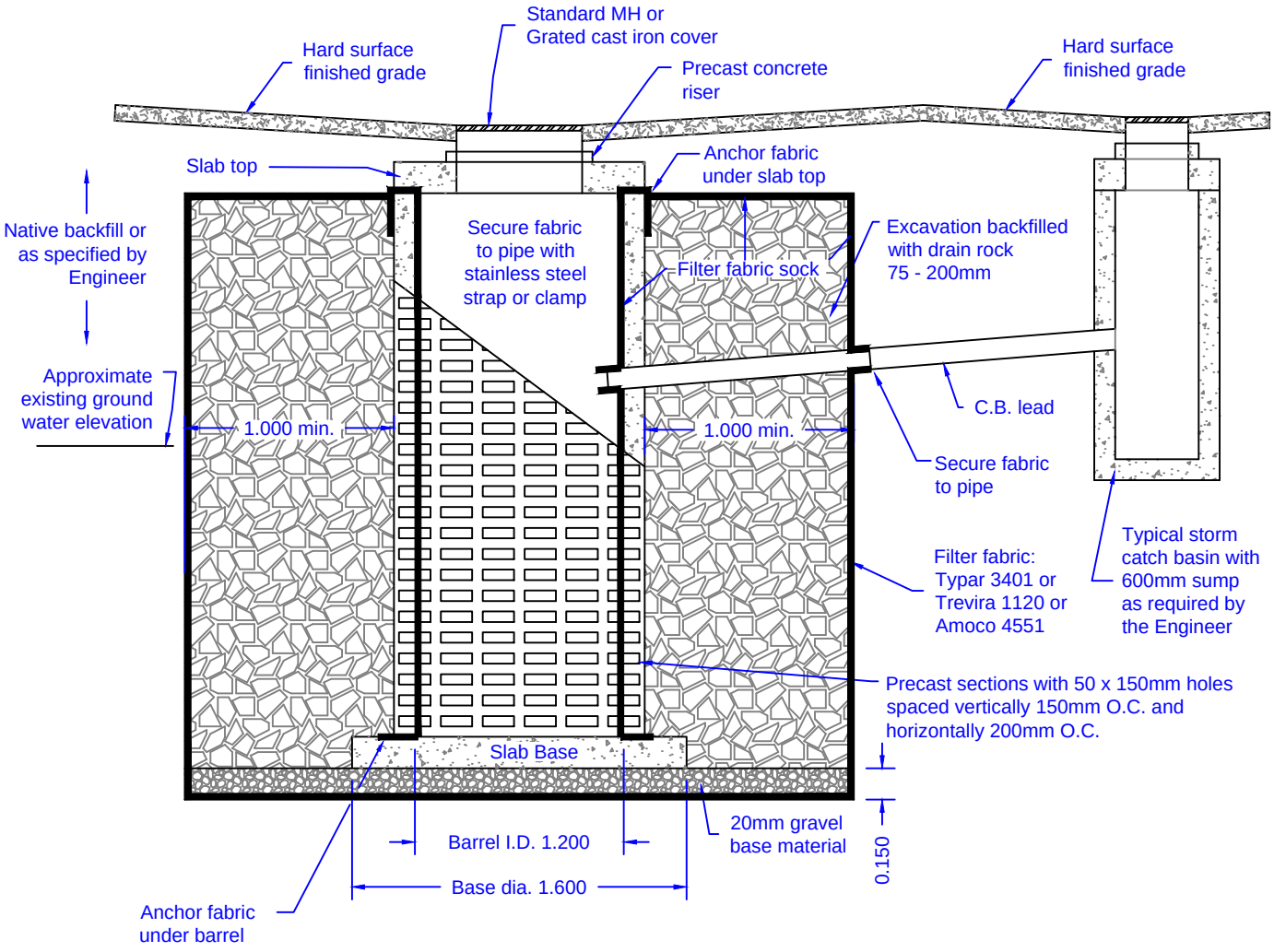
In accordance with progressive mandates concerning Stormwater Management, developers will be required to address the monitoring aspect of their projects. Included in the monitoring aspect is the proper functioning of runoff collection, specifically where the runoff travels across pedestrian walkways. Storm runoff should not cross pedestrian walkways.

2.5.10 Storm Diagrams

- **Figure EDCG – Storm – STM – 03 - Typical Drainage Well**
- **Figure EDCG – Storm – STM - 04 – Critical Infiltration Zone**
- **Figure EDCG – Storm – STM – 05 - Temporary Erosion and Sediment Control**
- **Figure EDCG – Storm – STM – 06 – Small Site Infiltration**

Notes:

1. Drywell is perforated, and may be used with or without catchbasin.
2. Drywell depth, drain rock diameter and perforated pipe length to be calculated for specific site runoff, native soil infiltration rate and groundwater elevation. Calculations to be submitted to Engineer for acceptance and applied to design drawings.
3. Filter fabric sock inside precast barrel to be anchored top and bottom between concrete slab and barrel units.
4. Fabric to be overlapped at seams and stitched together to prevent material and debris bypassing the fabric.



All dimensions in meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
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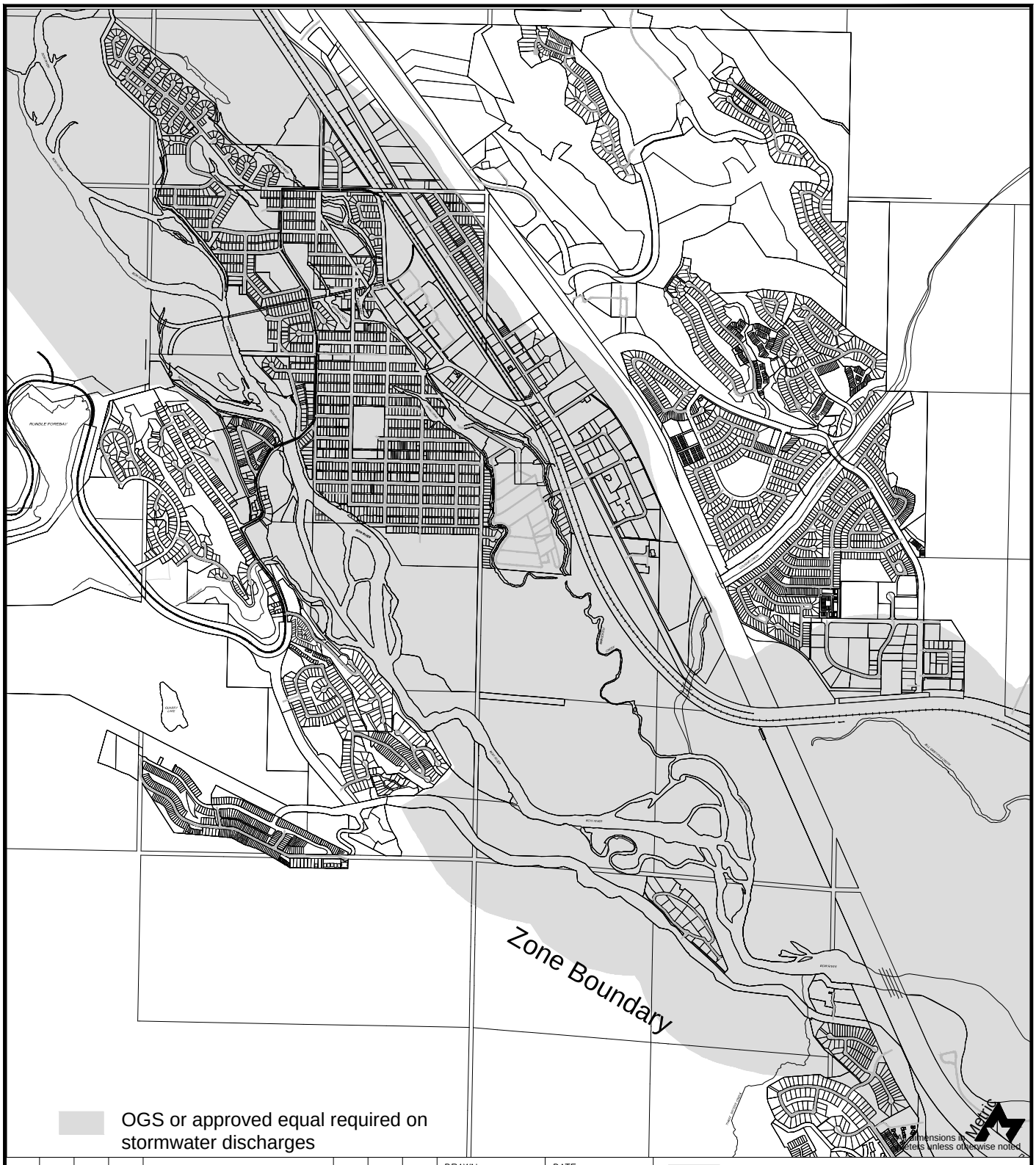
5							
4	13	04	10	2010 EDCG Standards	SP	PN	PN
3	30	11	04	2005 Engineering Design Standards	PL	OR	OR
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: K.R. Bulek
DATE: Mar./98
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

TYPICAL DRAINAGE WELL

SHEET NO.: STM-03
FILE NO.: 020



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1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: K.B. Bulek
DATE: April/01
SCALE: NTS
APPROVED:

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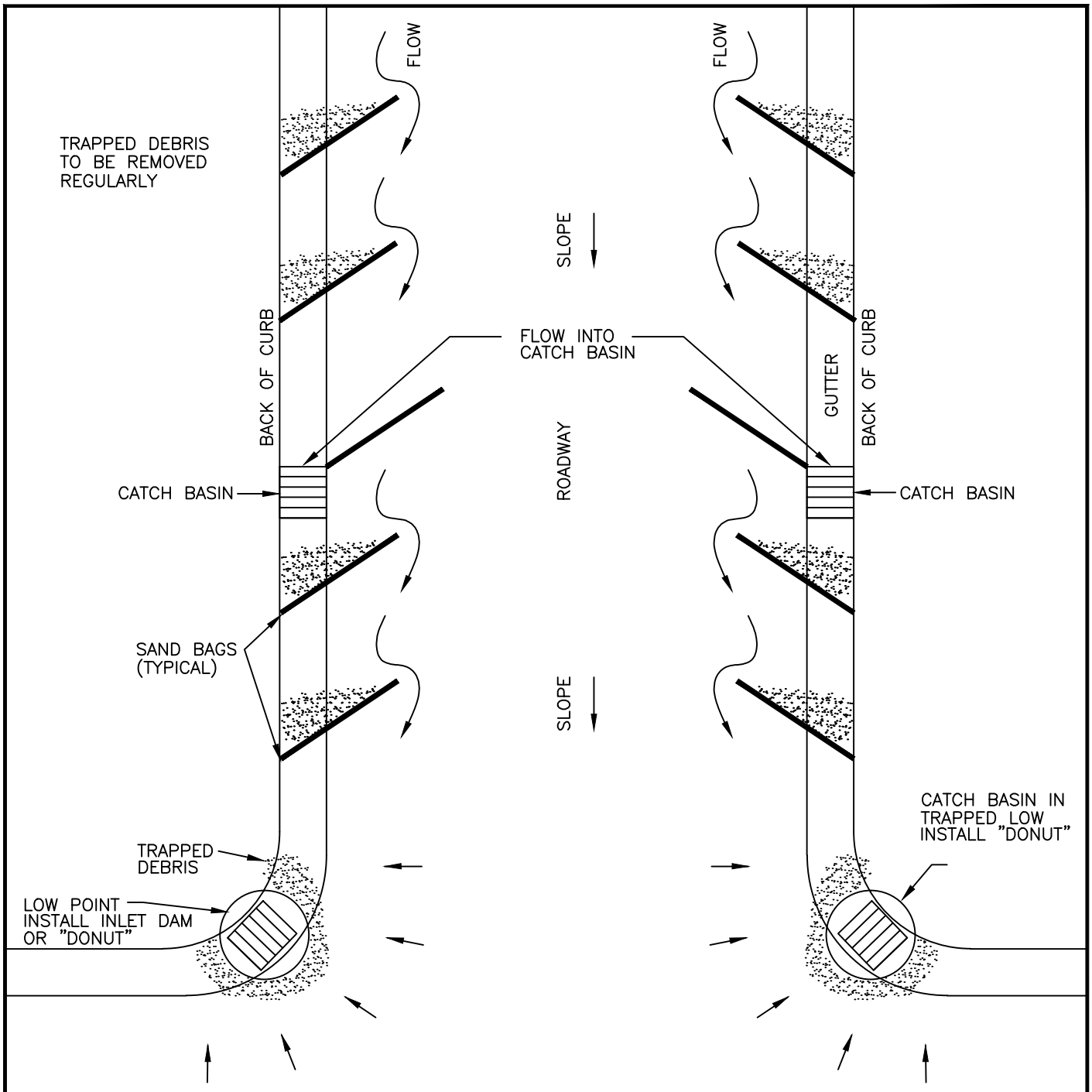
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

500m OGS Infiltration Zone

SHEET NO.: STM-04
FILE NO.: 108



NOTES:

1) SAND BAGS ARE MOST SUITABLE DURING CONSTRUCTION PERIOD, AND MAY NEED TO BE REPLACED WITH MORE ROBUST MEASURES SUCH AS ASPHALT DAMS TO DIRECT RUNOFF INTO INTERMEDIATE CATCH BASINS PRIOR TO CCC.

All dimensions in Metric meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
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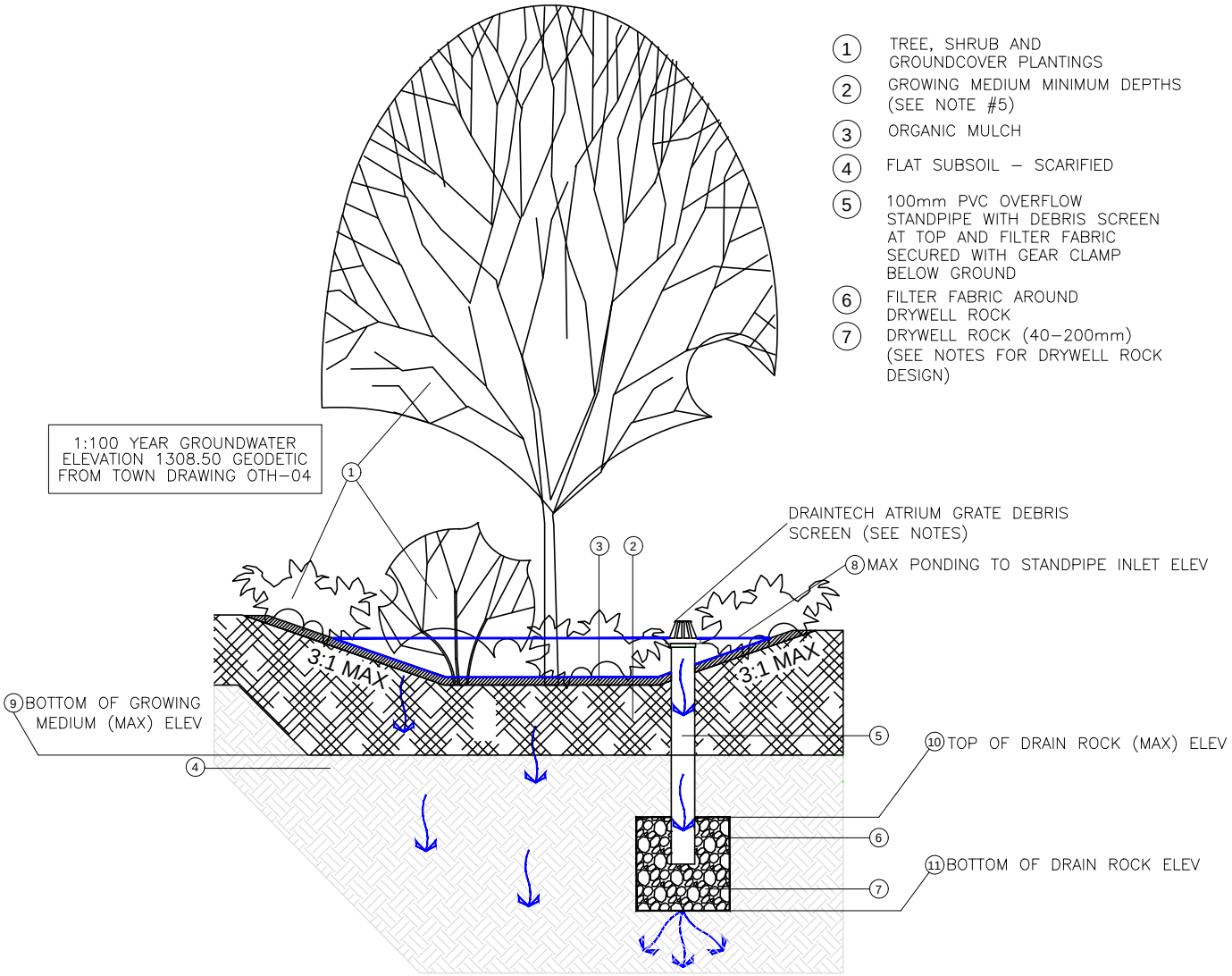
1	10	05	10	2010 EDCG Standards	SP	PN	PN

DRAWN: P.L.
DATE: Nov./04
SCALE: Not To Scale
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

TEMPORARY EROSION AND SEDIMENTARY CONTROL

SHEET NO.: STM-05
FILE NO.: STM-05



NOTES:

1. All stormwater runoff generated by the site needs to be disposed of on site.
2. Infiltration as shown on this detail shall always be the primary choice of runoff disposal, particularly for all low lying areas Canmore (Tee Pee Town, South Canmore, Rundle, Larch etc). Other areas where the geotechnical properties of the soil prevent infiltration will be handled on a case by case basis.
3. All efforts are to be made to separate roof and landscaping runoff from runoff that has traveled across a vehicle carriage way.
4. All land areas that slope towards the property or contribute runoff to the site are to be taken into account for drainage calculations.
5. Growing medium (shown in illustration as #2):
   a. 300 for all landscape and roof only runoff (1 driveway acceptable, but not desirable).
   b. 600 for all other runoff - vehicle carriage ways and multiple driveways.
6. Elevations are required for all individual rain gardens.

All dimensions in meters unless otherwise noted

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DRAWN: S.K. Patel
DATE: May/2010
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

RAIN GARDEN: FULL INFILTRATION (TYPICAL SECTION)

SHEET NO.: STM-06
FILE NO.: STM-06

2.6 Shallow Utilities and Alternative Energy

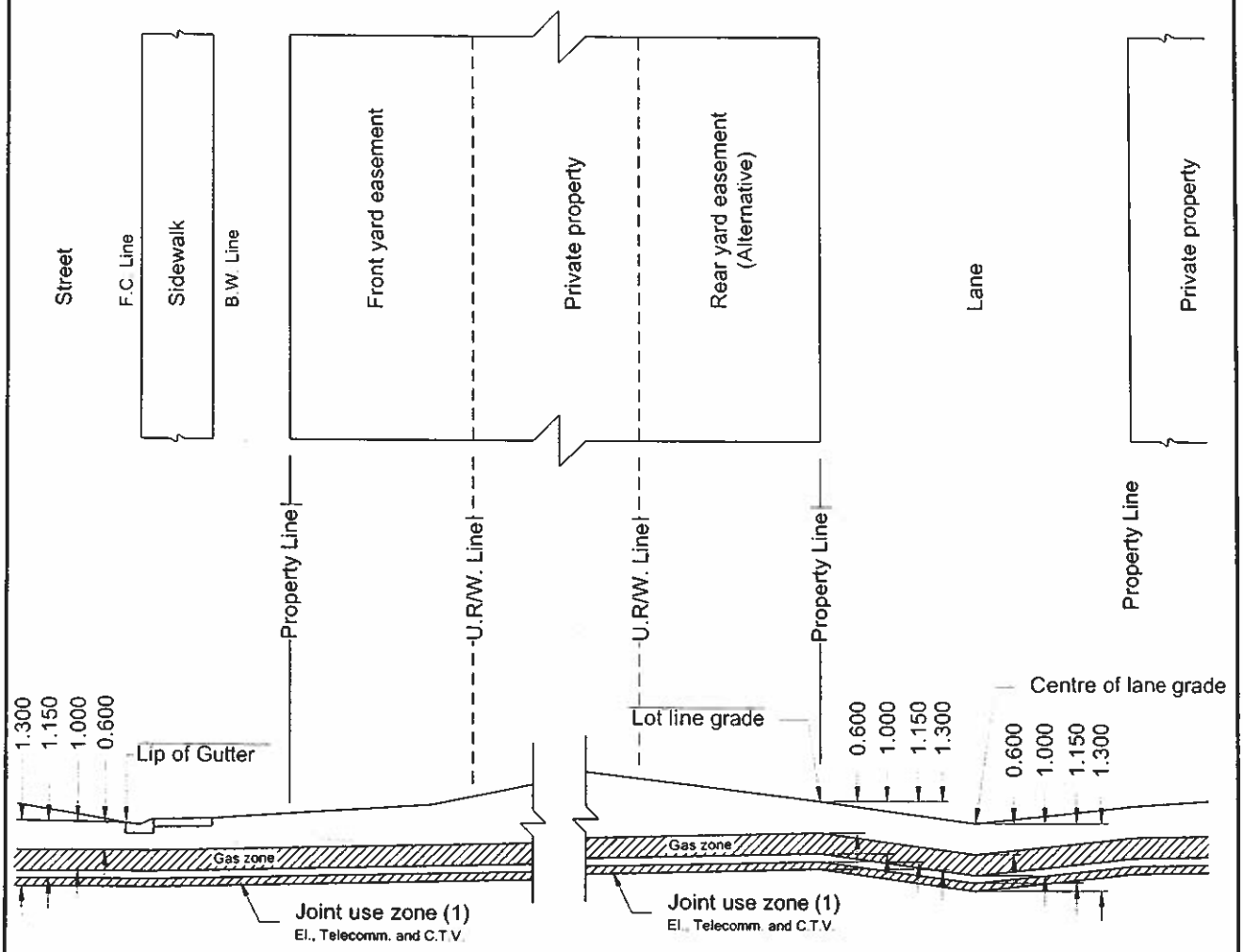
2.6.1 Shallow Utilities - General

- Where feasible and practical, developers are permitted to use shallow utility Right of Ways as pedestrian travel ways
- Shallow utilities include electrical distribution, street lighting, telecommunications, cable TV and natural gas services provided within the Town of Canmore.
- The layout and design of shallow utility facilities shall be provided in accordance with the engineering requirements of the respective service providers and be subject to review and acceptance by the Town.
- Utility service providers and developers shall endeavor at all times to use common trenching and to reduce the number of above ground utility boxes, transformers, etc., to mitigate the visual impact of their construction. Common facilities shall be used to the greatest extent possible.
- Duct crossings shall be provided for all shallow utilities under road surfaces, curbs and sidewalks. Duct crossings shall maintain a minimum horizontal separation of 2.0 m from watermain valve boxes, hydrants, manholes and catch basins. Duct crossings shall conform to current City of Calgary specifications for Pre-installed Road Crossing Ducts.
- Should it be required by the Engineer, developers will be required to set up a pre-application meeting with Shallow Utility companies and the Town prior to submittal of the Development Application.
- Standard depth zones for shallow utilities and standard placement of service pedestals and transformers are shown in Drawings SHU-01 and SHU-02 respectively.

2.6.2 Wind Energy – For future development

2.6.3 Solar Energy – For future development

2.6.4 Geothermal Energy – For future development



Note:

1. Gas Zone and Joint Use Zone are offset horizontally. See Street Design Drawings for Gas and Joint Use line assignments.

All dimensions in Metric meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
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5							
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3	04	04	02	2002 Engineering Design Standards	BDW	DAB	DAB
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1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: B.D.W | DATE: April/02

SCALE: NTS

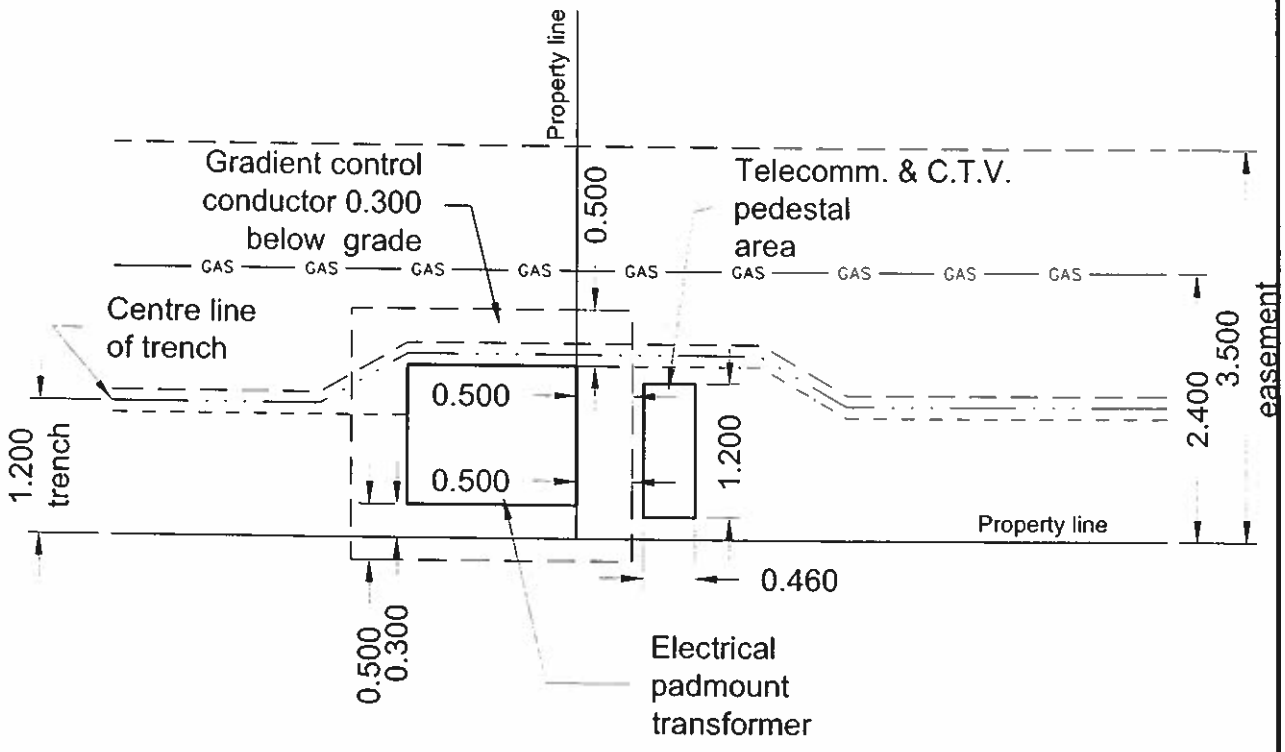
APPROVED:

MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

STANDARD DEPTH ZONES
FOR U/G JOINT USE INSTALLATION (RESIDENTIAL DISTRIBUTION)

SHEET NO.: SHU-01 | FILE NO.: 030



Note:

Street lighting poles, transformer boxes and other surface structures shall maintain a min. of 3.000 clearance from hydrant.

Electrical padmount = 1.168 x 1.016
Telephone pedestal = 0.330 x 0.406
C.T.V. pedestal = 0.330 x 0.406

All dimensions are in meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
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2	17	03	00	Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: K R Bulek
DATE: Mar/98
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

STANDARD PLACEMENT

SERVICE PEDESTAL AND TRANSFORMER
3.500 FRONT YARD R.O.W.

SHEET NO.: SHU-02
FILE NO.: 031

2.7 Surface Works

Foreword *– The surface works section is new to this version of the guidelines and is meant to provide comprehensive direction towards more sustainable development. Town of Canmore is committed to using materials sparingly in accordance with the Reduce Principle of Sustainability. This new section is meant to provide considerably more direction than that of the "Streets" section from previous versions. It is meant to address a more holistic approach to construction and construction products. Past versions of the EDG (Design& Construction sections) have only dealt with a very narrow scope of this new Surface Works section - mainly road Cross Sections, spacing of Infrastructure and categorizing of road types. Developers should also note that the Surface Works section will be a component of the CCC submission requirements as noted in Section 3.*

What the developer can expect with the recent changes associated with this section:

- *Grading (collection & directing) of stormwater without the use of curbing*
- *Concept of porosity introduced to hard surfaces on the site*
- *Sidewalk to be made more prominent with respect to driveways*
- *Emphasis on ped/cyclist travel*

2.7.1 Required Reading

- *Transportation Master Plan – Bunt & Associates, 2007*
- *Trails Master Plan – Town of Canmore, 2006*
- *D.A. Watt Functional Planning Study, Nov. 2005*
- *Downtown Enhancement Plan – Town of Canmore*

Additional Reading

- *Sustainable Suburbs Study – City Of Calgary, 1995*
- *New Street Design Standards – City of Calgary, 1997*
- *LEED Neighborhood Development – U.S. Green Building Council, 2007*
- *Manual for Streets, Department of Transport, UK*
- *Silvertip Traffic Studies - Appendix*
- *City of Calgary – Fire Access Study*

2.7.2 Sustainability

Reduce

Developers shall work to minimize the materials required for all surface works, especially inside developments lots in accordance with the Reduce principle of Sustainability. Architects using different materials for aesthetics shall be mindful of the amount of materials used. The Town will be looking for Smart Design, with responsible and non-excessive use of materials. Projects should aspire for the same function as traditional design, but with less manufactured material.

Materials

Developers are encouraged to work with materials that are available and import as little materials as is possible. Developers shall work to reuse materials that are being removed from site, particularly grading products and infrastructure less than 5 years old, as well as any products that can be recycled in a practical sense. Earth coming from grading operations should be used for road base, fill or landscaping works where possible. Concrete that is being removed from site (example - foundations of SFD being replaced by 4-plexes) should be re-used or recycled, ideally on site or nearby.

Recycled products

Developers shall continually look for ways to maximize the use of recycled products as opposed to virgin materials. Examples include RAP asphalt, and recycled concrete. Materials and methods used for construction should maximize the recycled content of all products available locally.

Asphalt

Developers shall investigate ways to reduce the amount of materials used for paving, particularly for non-intensive vehicle use, such as parking lots that may require only one lift of asphalt.

Concrete

With regard to encouraging flyash content in concrete (where it pertains to sidewalk, curb and gutter), developers shall adopt the following Public Works and Government Services Canada guideline:

"All concrete shall contain fly ash or ground, granulated blast furnace slag as partial replacement for cement unless it can be shown that the incorporation of these materials is technically and/or economically not feasible. The amount of cement replacement by fly ash or ground, granulated blast furnace slag will depend on the type of application (see attached Guidelines). The concrete so provided shall meet the workability, strength, durability and other performance requirements as specified."

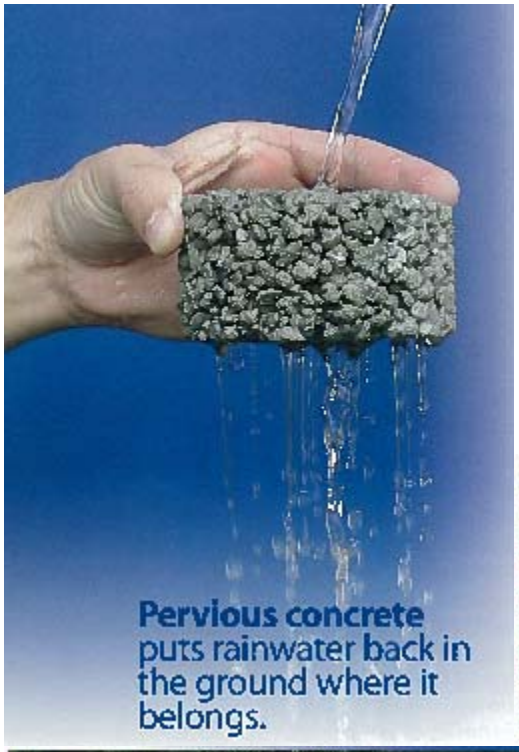
The Guidelines have been included as an Appendix.

Curbing and Borders

- Curbing in the ROW shall be designed to accommodate street cleaners – minimum radius 6m.
- Curbing shall be not inhibit pedestrians and cyclists and developers shall provide drops at pedestrian/cyclist desire lines
- Curbing shall not impede stormwater runoff from getting to stormwater treatment basins

Porous Surfaces

Developers shall continually look for ways to reduce imperviousness throughout the site, particularly where heavy machinery is not used for snow clearing such as walkways in developments. Where architects are looking to vary the aesthetics of the surface from simple broom finished concrete, porous alternatives (including paving stones) are encouraged. Products that are designed for porosity (pervious concretes and asphalts) are encouraged. www.perviouspavemet.org



2.7.3 Parking, Driveways & Access

Parking

- Subject to our Planning Department regulations, developers shall give allowance to alternate transportation and stormwater needs in all aspects of design and site layout. This is especially pertinent for parking.
- Roadside parking bordering new development must be detailed by way of intended signage on the Surface Works plan submitted with the development application.
- Development or re-development applications supplying parking as part of their requirements must ensure simple access for vehicles (maximum 3 point movement for entering and exiting). At a minimum, the dimensions must facilitate the TAC manuals dimensions for a "Passenger Vehicle".

Driveways & Access

- All access to lots must be approved by Engineering Department in accordance with the Streets and Roads bylaw
- At least one access route into a defined development must be less than 8%.
- Multiple dwelling units shall at all times strive to have minimal number at minimum width motor vehicle carriage ways in to the property.
- Development access along Bow Valley Trail shall conform to **D.A. Watt Functional Planning Study, Nov. 2005**
- Existing driveway drops affecting sidewalks that will no longer used are to be replaced with level sidewalks to match existing curb.
- Pedestrian driveway crossings shall be installed for each development lot in all new subdivisions and for all re-development sites. The location and layout of driveway crossings shall be submitted for review and acceptance by the Town
- Pedestrian driveway crossings should be made more prominent by extending the sidewalk material across driveway rather than extending the driveway material across the sidewalk.
- Pedestrian driveway crossings should be designed to improve pedestrian safety by minimizing the crossfall slope or by separating the sloped apron from the sidewalk as shown on sheet STR-09 and STR-10.
- The maximum slope on any crossing or transition surface on a sidewalk shall be 8% (a variance will be granted where a road centreline grade in excess of 8% has been accepted by the Town).

2.7.4 Transportation

Forward *- The Town of Canmore will be adopting a "feet-first" approach to transportation to make suburbs work as well for less costly forms of transportation – walking, transit and cycling – as they do now for vehicles. The priority to address transportation shall be viewed as shown in the diagram below.*

Pedestrian -----→ Cyclist -------→ Motor Vehicle

Improvements for alternative transportation modes such as bicycle and pedestrian facilities are recommended in the Town's 2001 Transportation Master Plan. Bicycle transportation facilities shall be provided in new development areas in accordance. These facilities may include separate pathways, dedicated bicycle lanes or wide curb lanes on collector and arterial streets, wide paved shoulders on rural roads, parking facilities in commercial areas and other facilities as required by the Town. Specific requirements shall be determined on a case-by-case basis in consultation with the Engineering Department.

Layout & Connectivity

General

- Safety is the primary consideration in the design of all intersections and street alignments
- The road pattern should coincide with the layout shown under the appropriate accepted plan. This will assure logical collector-street ties to adjacent subdivision areas. In the event that the adjacent street system has not been developed, interim access arrangements will have to be provided. The following criteria are to be incorporated in the subdivision layout of streets in addition to criteria outlined in STR-01
- Street layout should be built to accommodate an efficient transit system in the future. Infrastructure layout and ROW's should be placed to account for the space required for future transit stops
- Where the Planning Department has no regulations and visibility is an issue, a minimum standard corner cut of 4.5 m by 4.5 m shall be provided at all street intersections or stipulated by the Planning Dept. or EMS
- Intersection angles of less than 75° are unacceptable.
- Intersections on the inside of curves are undesirable and should be eliminated wherever possible.

Pedestrians and Cyclists

Foreword. *Cycling and walking in adverse weather conditions is a considerable hurdle when encouraging pedestrian cycling travel. A successful pedestrian/cycling network must make the experience enjoyable by mitigating hurdles associated with getting people out of their cars.*

- Street layout and residential footprints should encourage efficient and direct pedestrian and bicycle travel (also known as "desire lines") to existing & future travel ways and points of interest. An understanding of how an existing area functions in terms of place and movement will enable the proposed points of connection and linkage to be identified, both within and from the site, so that desire lines are achieved and maintained. This is especially important when traversing mountainous terrain
- Further to the direction of Planning & Development, in an effort to accommodate pedestrian travel efficiency and connectivity, longer rows of residential housing that traverse a slope shall provide a "break through point" not less than every 200m to accommodate pedestrians and cyclists
- Cul-de-sacs must provide a 3m ROW for pedestrian and cyclist through-fare. See STR-08 (please note only one thru-fare is required)
- Cycling transportation shall be laid out in an efficient manner with regard to topography and strive to maintain fluid flow. Abrupt T-junctions and turns, route that require several road crossings, as well as sudden changes of elevation (particularly if they are susceptible to ice build-up) should be avoided
- Routes for cyclists should not duplicate the space required for snow clearing in the winter months
- Utility appurtenances shall be located outside of bicycle lanes, wide curb lanes and paved shoulders provided for bicycle traffic whenever possible. Appurtenances within these areas shall be "bike-safe" models with top elevations set flush with or slightly below (4 mm maximum) the surrounding pavement surface.
- Curbing shall not impede or hinder smooth cycling flow. Curb drops along cycling routes will be required where applicable

Sidewalks and Multi Use Pathways

- Sidewalks and pathways shall conform to the latest edition of the Canmore Trails Master Plan, and the Town Open Space Guidelines and are subject to review by the Town
- Trails, pathways and sidewalks should be orientated and cross sloped in a way that takes advantage of the sun's rays to maximize the trails being dry with minimal maintenance. Developers are to pay particular attention to the areas of pedestrian/cycling routes that are shielded from the sun and will develop ice build up. Mitigation measures for proper drainage are to be put in place including raising the sub-base structure of the pathway
- Developers are encouraged to incorporate prominent vistas and highpoints along pedestrian/cycling routes
- In high–use areas, Multi-Use pathways should be raised and separated from neighboring motor vehicle carriage ways whenever possible. This is especially true at crossings.
- Multi-use pathways shall be constructed with a surface that is consistent with the Trails Master Plan
- Sidewalks shall be made of standard broom finish concrete
- Sidewalk and Multi-Use Pathway base shall comprise of 100mm of 3/4" crush as opposed to 50mm as specified in the City of Calgary specifications (see Landscaping Guidelines)

2.7.5 Transit – For Future Development

2.7.6 Road Classification and Design

Forward - *Developers are reminded that the road cross sections are for general guidance and the Town encourages Development Teams to incorporate Smart Design and sustainability initiatives even if they stray from our guidelines when they suit specific site conditions like topography. Such initiatives may include providing enhanced pedestrian facilities on only one side to take advantage of sun exposure or vistas, or a centerline that is offset from the center of ROW. Developers are encouraged to contact the Engineering Department prior to subdivision application.*

- Any road design not specifically referenced by this document shall be designed in accordance with the most recent versions of:
  - **By Law 17-92: Control and Regulation of Traffic, Parking, Streets and Sidewalks, and the conveyance of Loads with in the Town Limits**
  - **Transportation Association of Canada Geometric Design Guide for Canadian Roads (1999 Metric Edition)**
  - **Alberta Transportation and Utilities "Highway Geometric Design Guide 1995" (updated 1996)**.
- Specific design elements of for urban throughfares can be seen in diagram:
  - **EDCG - STR-01 – Design Elements.**
- Current road classification can be seen on diagram
  - **EDCG - STR-02 – Road Classification**

2.7.6.1 Lanes and Secondary Emergency Access Roads

Function

Lanes

- To provide direct access from residential properties to residential streets
- To provide emergency access from residential streets to residential properties

Secondary Emergency Access Roads

- To provide secondary emergency access routes to residential or other isolated development areas. These lanes or roads are connections between other roads and are used when the primary access is cut off during an emergency. They may also serve as alternative evacuation routes in case of major emergencies or natural disasters. They are usually closed to all except emergency traffic, but should allow for foot, bicycle or equestrian traffic.
- Secondary Emergency Access Roads are discouraged in favor of lanes or streets

Parking – is not allowed on any kind of lane

Pedestrian and Cycling Movement – no pedestrian and cycling measures are required

Access & Layout

Lanes

- To provide access to abutting residential properties only

Emergency Secondary Access Roads

- Access at grade with local or collector streets through gates at each end that are normally closed. Access from properties abutting an emergency lane or road is not permitted. Gate width to be as follows:
    - Secondary Emergency Road – 6 meters

Right of Way and Carriageway width

Lanes

- 6m Right of Way minimum
- Entire width must have all weather surface and acceptable load bearing conditions that are acceptable from the Town
- For long lanes, lay-bys may also be required.

Emergency Secondary Access Roads

- Right of Way = 9m for Emergency Secondary Access Road
- Widths of all weather surface with acceptable load bearing conditions acceptable to the Town are as follows:
    - Secondary Emergency Road – 6 meters
- **NOTE** - Lanes will be acceptable where sight lines are straight along the lane and one end is visible from the other end. Roads will be required where one end is not visible from the other. This distinction will be at the Fire Chief discretion

Restrictions

- Lane layout should also be checked for possible lane shortcuts, which could result in later requests for closure.
- Maximum lengths of lanes between exits to streets shall not exceed 350 m.
- Developers will be required to show the Town who will be performing the maintenance of the lanes or Secondary Emergency Access Roads long term. This will need to be acceptable to the Fire Chief.

2.7.6.2 Local Roads (Diagram - STR 03)

Function – Local streets provide direct access to abutting residential properties. They collect and distribute traffic from residential properties to higher standard roadways.

Parking

- On street parking is encouraged on both sides of the street. This is to mitigate the need for large parking areas in developments and to provide a buffer between vehicle traffic and pedestrian traffic.
- Gravel parking lanes are considered acceptable where stormwater managed on the surface and traffic volumes will be low

Cycling traffic – Cycling traffic will be share the road with vehicle traffic without the need for markings or separate lanes. The thought is that the local road traffic will be travelling at slow enough speeds and be sparse enough to easily accommodate the majority of cycling traffic until they reach the higher levels roads.

Sidewalk – As shown on figure STR 03 on both sides of local roads unless just cause can be shown why it should be omitted. Sidewalks can be substituted for an appropriate width asphalt pathway so long as it adheres to the Canmore Trails Master Plan. Sidewalk will need to be placed after shallow utilities have been installed.

Access & Layout

Local Residential Roads

- direct access is permitted to abutting residential properties, but not to commercial properties
- where existing layout permits, properties shall endeavor to use common lanes to access local roads as opposed to each having separate driveways abutting a local street
- Minimum acceptable intersection spacing is 60m between centerlines
- Cumulative length before feeding onto collectors shall be limited to 125 units
- Curb not necessary if sidewalk separated from roadway by rain garden, swale or ditch

Restrictions

- Gravel parking lanes are considered acceptable where stormwater is managed on the surface and traffic volumes will be very low
- Access design and conditions shall be appropriate to the designated use of the property to the satisfaction of the Town
- Offset intersections are acceptable on residential streets if the offset is 60.0 m or greater between centrelines.

Cul-de-sacs

- Maximum length of cul-de-sac streets to be 105m to the start of the bulb when there is no alternate access for emergency vehicle and 210m when there is alternate access that can accommodate a emergency vehicle
- Cul-de-sacs must provide pedestrian/cyclist through fare through the bulb as shown in STR -08

2.7.6.3 Collector (incl. Comm./Industrial) (Diagram STR – 04)

Function – collect and distribute traffic from residential areas and streets and to serve as secondary traffic generators, such as community business centers, parks, golf courses etc and traffic from neighborhood to neighborhood within the community. This standard will also include commercial and industrial sites.
Parking – On street parking is encouraged on both sides of the street. This is to mitigate the need for large parking areas in developments and to provide a buffer between vehicle traffic and pedestrian traffic.
Cycling traffic – Cycling traffic shall be accommodated where practical. Developers are encouraged to approach the Engineering Department with cycling friendly cross sections for Collector Roads
Sidewalk – As shown on STR-04 unless just cause can be shown why it should be omitted. Sidewalks can be substituted for an appropriate width asphalt pathway so long as it adheres to the Canmore Trails Master Plan.
Access & Layout

- Where possible, applicants shall endeavor to provide access from local roads or lanes as opposed to from Collector Roads. Applicants should discuss all proposed access from collector roads with the Engineering Department in the early stages of the project.
- Intersections at grade with controlled access to adjacent property
- Minimum acceptable intersection spacing is 100m between center lines
- Minimum spacing between back to back left turns – 220m
- direct access is permitted to industrial and commercial properties

Restrictions

- Standard regular curb is mandatory unless separated from roadway by rain garden, swale or ditch
- Gravel parking lane are considered acceptable where stormwater managed on surface, traffic volumes are low and road grade <2%

2.7.6.4 Arterial (Diagram STR - 05)

Function - to move large volumes of traffic. These roads serve the major traffic flows between the principle areas of traffic generation and connect to rural arterials and collectors. Arterial roads can be viewed as having two distinct settings in Canmore, depending on their location and what they serve.

Arterial connectors – Example - Three Sisters Parkway – rural design
Arterial "thru-town" – BVT near Tee-Pee town –

An 'arterial connector' joins neighborhoods and does not see the amount of foot traffic that an 'arterial thru-town' sees. As such, the arterial connector can be designed with more of rural x-section, in hopes of reducing the amount of material, especially curbing, required for construction.
Parking – Paved parking
Cycling Traffic – Cycling traffic will be a large part of the movement on Arterial roads and must be addressed as a primary mode of transportation. Allotment for cycling will be provided by way of an expanded roadside parking lane or dedicated 1.5m bicycle lane. Developers are encouraged to approach the Engineering Department with cycling friendly cross sections for Arterial Roads

Restrictions

- Must provide Bike Lanes both directions in such a way that it functions with the vehicle parking
- Curbs are required for the median (if divided)
- Vegetative boulevard and medians should be designed to accommodate a balance of trees, storm specific landscaping and bio filtration
- Undesirable to have local roads connect with arterial roads

2.7.6.5 Secondary Highway's, Access to the TCH and Rural Roads

These travel ways will be handled on a site by site basis.

2.7.7 Signage

- Signs for the purposes of traffic control and regulation shall conform to the Manual of Uniform Traffic Control Devices for Canada and Transportation Association of Canada guidelines. Street signs must adhere to Town Standards. Types and locations of traffic signs shall be subject to the review and acceptance of the Town. A typical street sign installation is shown on sheet STR-07. Typical pedestrian and crosswalk striping and signage is shown on sheet STR-11.
- Pavement markings shall conform to the Manual of Uniform Traffic Control Devices for Canada and shall be installed where required. Types and locations of pavement markings shall be subject to the review and acceptance of the Town.
- In the interest of public safety, the developer shall ensure that all regulatory traffic signage, signage as required by Town bylaws and pavement markings, as accepted by the Engineer, are in place in their permanent locations prior to the acceptance of the Construction Completion Certificate.
- Streets must be signed adequately to indicate parking and street names.

2.7.8 Street Lighting

- Roadway lighting shall be provided by the Developer for all new streets in accordance with the Requirements for the Design and Installation of Electrical Distribution Systems in Underground Residential Development (URD) manual issued by the local electrical service provider, or as specified by the Town.
- Specific streets designated by the Town as suburban connectors linking isolated development areas may be exempted from the requirement for roadway lighting noted above. However, intersections along such designated streets shall be provided with full, partial or delineation (sentry) lighting where required by the Town. Intersection lighting shall be determined by application of the warrant process outlined in the TAC manual on Illumination of Isolated Rural Intersections and good engineering judgement consistent with the Town policy that reduced illumination levels may be considered in areas deemed to be environmentally sensitive for wildlife. The Town of Canmore has the right to override the local electrical service provider in accordance with the Town policy for reduced illumination levels.
- Roadway illumination levels shall be determined through the classification (local, collector, arterial) and use (rural, residential, commercial/industrial) of particular roadways. The classification and use shall be determined by the Consulting Engineer and accepted by the Town before commencing a roadway lighting design.
- Roadway lighting design shall be in accordance with illumination levels from the American National Standard Practice for Roadway Lighting publication RP-8 issued by the Illuminating Engineering Society of North America (IESNA) as the minimum guideline in urban residential and commercial/industrial areas, or as otherwise accepted by the Town.
- Lighting design shall provide adequate vertical luminance at the roadway while reducing sky glow, glare, energy consumption and minimizing light trespass onto adjacent areas. Lighting levels shall be sufficient to address the safety and security needs of the development area and community. Variances for reduced illumination levels may be considered in areas deemed to be environmentally sensitive for wildlife. Requests for variances to IESNA illumination levels must be made at the subdivision application stage.
- For all local residential streets, Town policy directs that 70-watt luminaires be used and spaced using a design based on 100-watt luminaries.

- Street light poles and lighting fixtures for all streets in residential areas shall be decorative type, as follows:
    - square tapered steel decorative pole, 9.1 m, matte black finish, complete with post top tenon per Utilicorp item # 645-4130, or alternatively;
    - square tapered steel decorative pole, 8.4 m, and joint use steel base, both matte black finish, complete with post top tenon per Utilicorp item # 645-4030 and 645-4050;
    - shoe box style full cutoff decorative luminaire, matte black finish; HPS lamp, 120 volts, 70-100-150 watts per Utilicorp specifications.
    - Street light poles and lighting fixtures for all streets in commercial/industrial areas shall be standard type, as follows:
    - octagonal tapered steel pole, 9.1 or 13.1 m, galvanized, complete with 2.4 or 3.6 m davit per Utilicorp specification 645-02;
    - cobra head style full cutoff luminaire with drop lens, light grey finish; HPS lamp, 120 volts, 70-100-150-250 watts per Utilicorp specifications.
    - Alternative types of decorative poles and full cutoff or cutoff lighting fixtures conforming to Utilicorp specifications may be considered as a variance in new development areas, or in existing development areas to match existing infrastructure

2.7.9 Pedestrian Lighting

- Signalized pedestrian crossings shall be required at high traffic pedestrian crossings where there is high vehicle traffic or at the discretion of the Town.
- Power sources for Pedestrian crossing signals shall be “stand-alone” and solar powered where practical
- Swarco LaneLight complete with in-pavement LED light units or approved equal shall be used
- Should additional illumination lighting be required, the Town shall give preference to systems that are stand alone and solar powered where practical.
- Additional pedestrian lighting (pedestrian bridges, pathway delineation) shall be a combination of solar power and LED lighting as is practical.

2.7.10 Diagrams

- **Figure EDCG – Surface Works – STR – 01 – Design Elements for Urban Through Fares**
- **Figure EDCG – Surface Works – STR – 02 – Road Classification**
- **Figure EDCG – Surface Works – STR – 03 – Suggested Local Residential X-Section**
- **Figure EDCG – Surface Works – STR – 04 – Suggested Undivided Collector X-Section**
- **Figure EDCG – Surface Works – STR – 05 – Suggested Divided Arterial X-Section**
- **Figure EDCG – Surface Works – STR – 06 – Street Identification Sign**
- **Figure EDCG – Surface Works – STR – 07 – Typical Street Sign Installation**
- **Figure EDCG – Surface Works – STR – 08 – Typical cul-de-sac Design Requirements**
- **Figure EDCG – Surface Works – STR – 09 – Typical Driveway Options**
- **Figure EDCG – Surface Works – STR – 10 – Sidewalk Driveway Crossing**
- **Figure EDCG – Surface Works – STR – 11 – Typical Crosswalk Stripping & Signage**

ARTERIAL

UAU

Undivided

Town of Canmore Classifications:	No Parking	
Sheet No:		STR-09
RTAC Classifications:	UAU 50	UAU 60
Basic ROW Width (m)	30.00	30.00
Basic Pavement Width (m)	14.80	15.00
Travel Lane Width (m)	3.70	3.75
Parking Lane Width (m)	-	-
Curb and Gutter (m)	0.50	0.50
Median Width (m)	-	-
Minimum Radius (m)	90.00	120.00
Rate of Vertical Curvature - k	7	13
Maximum Superelevation - e (m/m)	0.06	0.06
Maximum Grade (%)	7.00**	6.00**
Minimum Stopping Distance - ssd (m)	63.00	85.00
Sidewalk Width (m)	1.50	1.50
Sidewalk Style	Separate	

UAD

Divided

Town of Canmore Classifications:	With Parking		No Parking		
Sheet No:			STR-08		
RTAC Classifications:	UAD 50	UAD 60	UAD 50	UAD 60	UAD 70
Basic ROW Width (m)	33.00	33.00	27.00	27.00	36.00
Basic Pavement Width (m)	2x10.00	2x10.00	2x7.00	2x10.00	2 x 7.40
Travel Lane Width (m)	3.50	3.50	3.50	3.50	3.70
Parking Lane Width (m)	3.00	3.00	-	-	
Curb and Gutter (m)	0.25	0.25	0.25	0.25	0.50
Median Width (m)	3.50	3.50	3.50	3.50	6.00
Minimum Radius (m)	90.00	120.00	90.00	120.00	170.00
Rate of Vertical Curvature - k	7	13	7	13	23
Maximum Superelevation - e (m/m)	0.06	0.08	0.06	0.08	0.08
Maximum Grade (%)	7.00**	6.00**	7.00**	6.00**	5.00**
Minimum Stopping Distance - ssd (m)	65.00	85.00	65.00	85.00	110.00
Sidewalk Width (m)	1.50	1.50	1.50	1.50	1.50
Sidewalk Style	Separate				

COLLECTOR

UCU

Undivided

Town of Canmore Classifications:	Parking One Side	Parking Both Sides	Parking Both Sides (Restriced During Peak Hrs.)
Sheet No:		STR-07	
RTAC Classifications:	UCU 50	UCU 50	UCU 50
Basic ROW Width (m)	19.00	21.00	23.50
Basic Pavement Width (m)	9.50	11.50	14.00
Travel Lane Width (m)	3.50	3.50	3.50
Parking Lane Width (m)	2.50	2.25	3.50
Curb and Gutter (m)	0.25	0.25	0.25
Median Width (m)	-	-	-
Minimum Radius (m)	90.00	90.00	90.00
Rate of Vertical Curvature - k	7	7	7
Maximum Superelevation - e (m/m)	0.04	0.04	0.04
Maximum Grade (%)	8.00*	8.00*	8.00*
Minimum Stopping Distance - ssd (m)	65.00	65.00	65.00
Sidewalk Width (m)	1.50	1.50	1.50
Sidewalk Style	Monolithic or Separate		Separate

UCD

Divided

	No Parking	Parking Both Sides
	UCD 50	UCD 50
	27.00	32.00
	2x7.00	2x9.50
	3.50	3.50
	2.50	2.50
	0.25	0.25
	3.50	3.50
	90.00	90.00
	7	7
	0.04	0.04
	8.00*	8.00*
	65.00	65.00
	1.50	1.50
	Separate	

LOCAL

ULU

	Residential	Commercial Industrial
	Parking Both Sides	No Parking
	STR-06	
	ULU 50	ULU 50
	15.00	17.00
	9.50	9.50
	2.50	4.75
	2.25	***-
	0.25	0.25
	-	-
	80.00	80.00
	7	7
	-	-
	8.00*	8.00*
	65.00	63.00
	1.50	1.50
	Monolithic	Separate

*An increase in maximum grade to 10.00% may be considered in certain areas
**An increase in maximum grade to 8.00% may be considered in certain areas
***Option for 2 driving lanes at 3.5m and 1 parking lane at 2.5m

All dimensions in meters unless otherwise noted

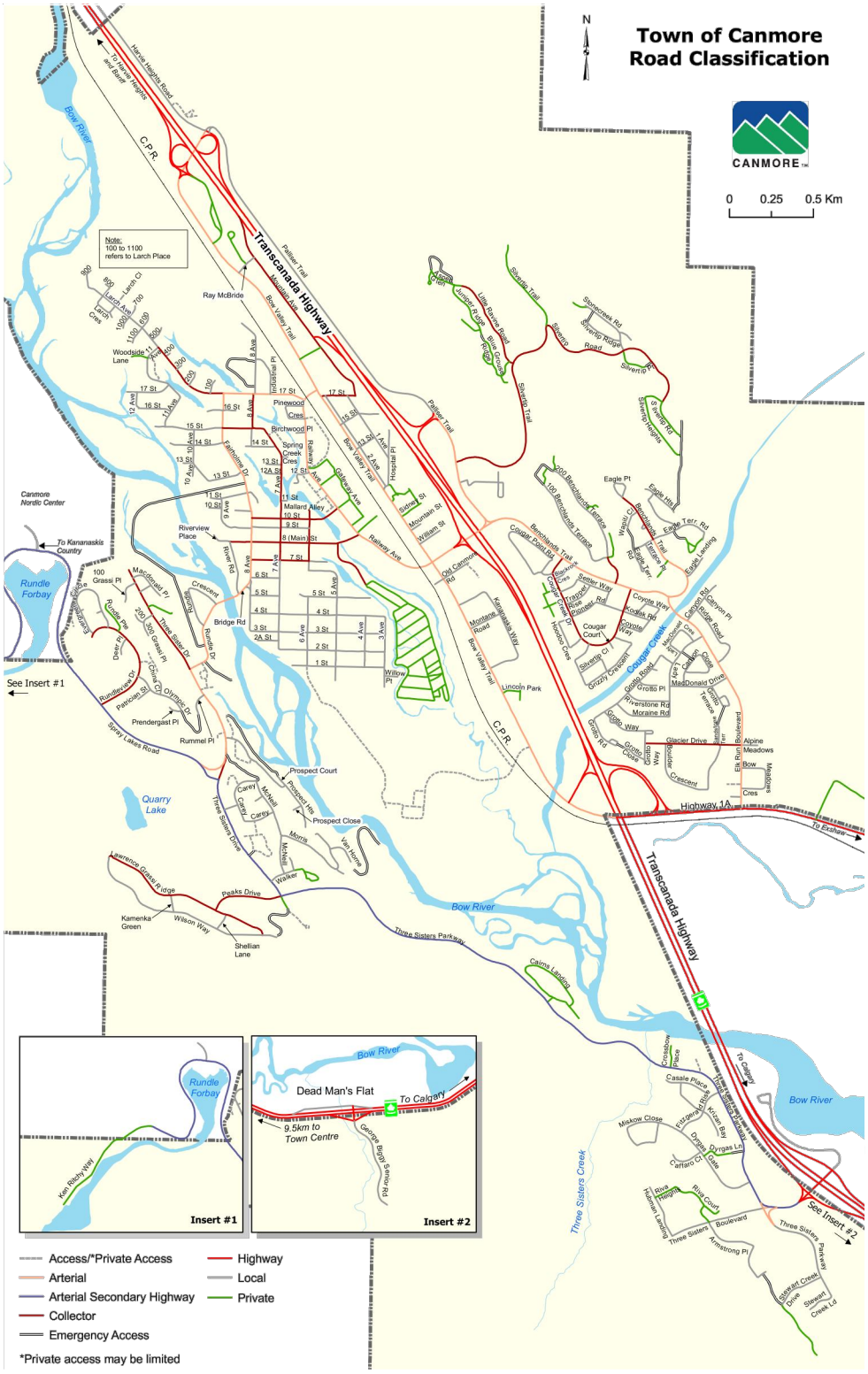
REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
4	10	05	10	2010 EDCG Standards	SP	PN	PN
3	10	05	01	2001 Engineering Design Standards	DMG	DAB	DAB
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: D.M.G.
DATE: May/01
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

DESIGN ELEMENTS FOR URBAN THOROUGHFARES

SHEET NO: EDCG - Surf. Works - STR-01
FILE NO: 013



REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
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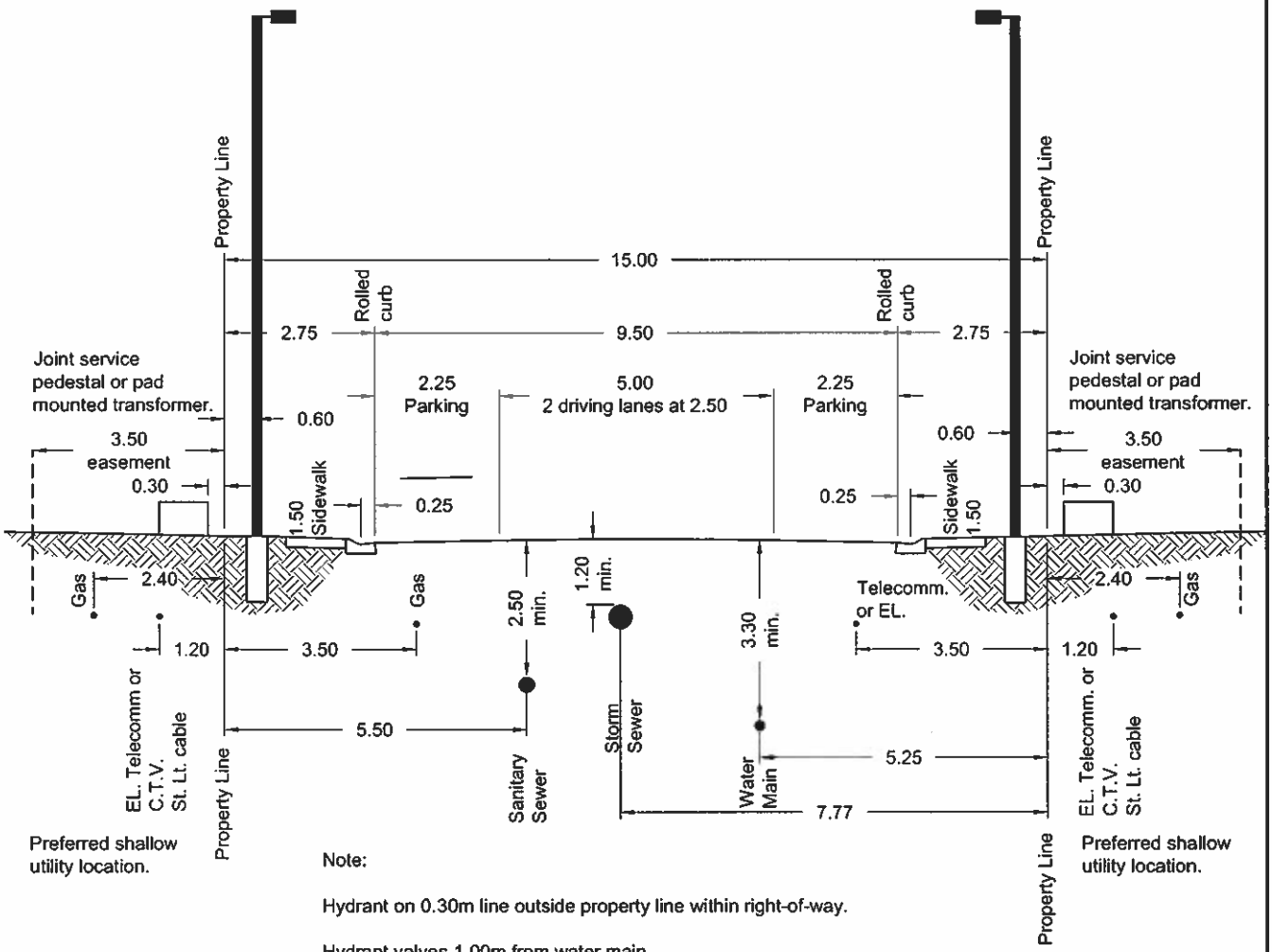
9							
8							
7							
6							
5							
4							
3							
2							
1							

DRAWN: S.K. Patel
DATE: May/2010
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

SURFACE WORKS: ROAD CLASSIFICATION

SHEET NO.: EDCG - Surf. Works - STR-02
FILE NO.: STR02



Note:

Hydrant on 0.30m line outside property line within right-of-way.

Hydrant valves 1.00m from water main.

Service valves 0.3m outside property line.

Power poles, street light poles, transformer boxes and all other surface structures shall maintain a minimum of 3.00m clearance from hydrant.

Street Light (St. Lt.) cable to be installed in easements only if water is serviced from the front.

All dimensions in Metric meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5	29	11	04	2005 Engineering Design Standards	PL	OR	OR
4	04	04	02	2002 Engineering Design Standards	BDW	DAB	DAB
3	15	05	01	2001 Engineering Design Standards	DMG	DAB	DAB
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: KRB | DATE: Mar./98

SCALE: NTS

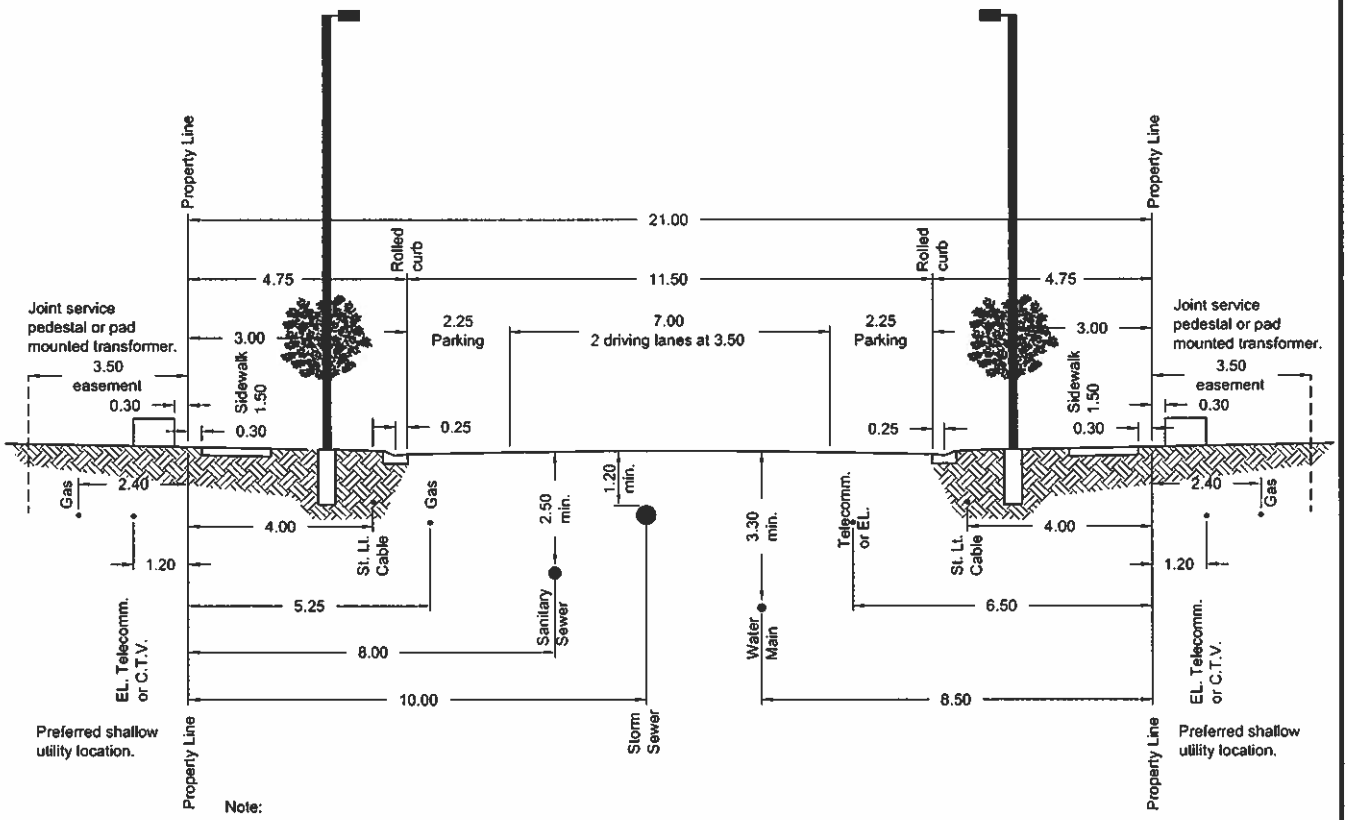
APPROVED:

MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

SUGGESTED LOCAL RESIDENTIAL (ULU 50) - PARKING BOTH SIDES

SHEET NO.: STR-03 | FILE NO.: 026



Note:

Hydrants on 2.70m line.

Hydrant valves 1.00m from water main.

Service valves 0.30m outside property line.

Power poles, street light poles, transformer boxes and all other surface structures shall maintain a minimum of 3.00m clearance from hydrant

Additional separation may be required between storm and sanitary sewers if excessive vertical difference occurs.

Water main will be installed on opposite side of the road from sanitary and storm lines.

Trees on 3.00m line.

All dimensions in meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5	29	11	04	2005 Engineering Design Standards	PL	OR	OR
4	04	04	02	2002 Engineering Design Standards	BDW	DAB	DAB
3	15	05	01	2001 Engineering Design Standards	DMG	DAB	DAB
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: KRB | DATE: Mar./98

SCALE: NTS

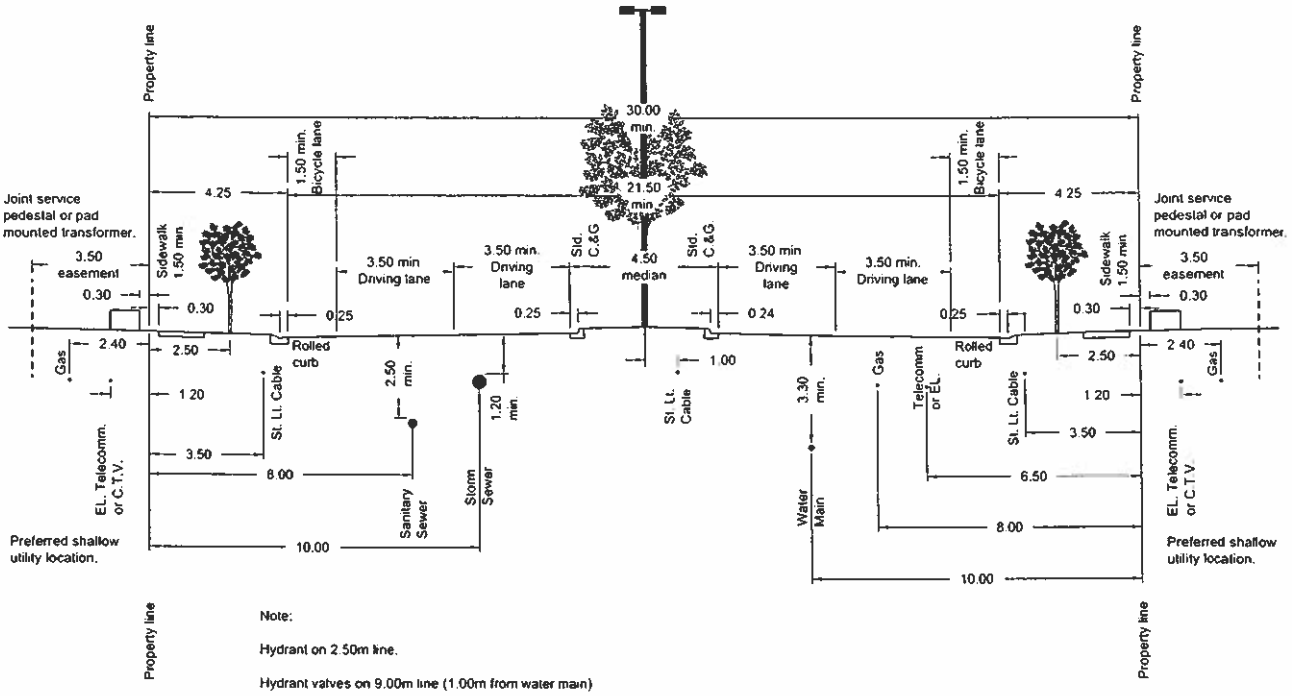
APPROVED:

MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

SUGGESTED UNDIVIDED COLLECTOR (UCU 50) - PARKING BOTH SIDES

SHEET NO.: STR-04 | FILE NO.: 027



Note:

Hydrant on 2.50m line.

Hydrant valves on 9.00m line (1.00m from water main)

Service valves on property line.

Power poles, street light poles, transformer boxes and all other surface structures shall maintain a minimum of 3.00m clearance from hydrant.

Additional separation may be required between storm and sanitary sewers if excessive vertical difference occurs.

Water main will be installed on opposite side of the road from sanitary and storm lines.

Street Light (St. Lt.) on 2.50m line or in centre median.

Street Light (St. Lt.) cable on 3.50m line when street light on 2.50m line.

Trees on 2.50m line in boulevard and on centreline in median.

Trees shall be shallow rooted deciduous species as per Landscaping Standards.

All dimensions in Metric meters unless otherwise noted

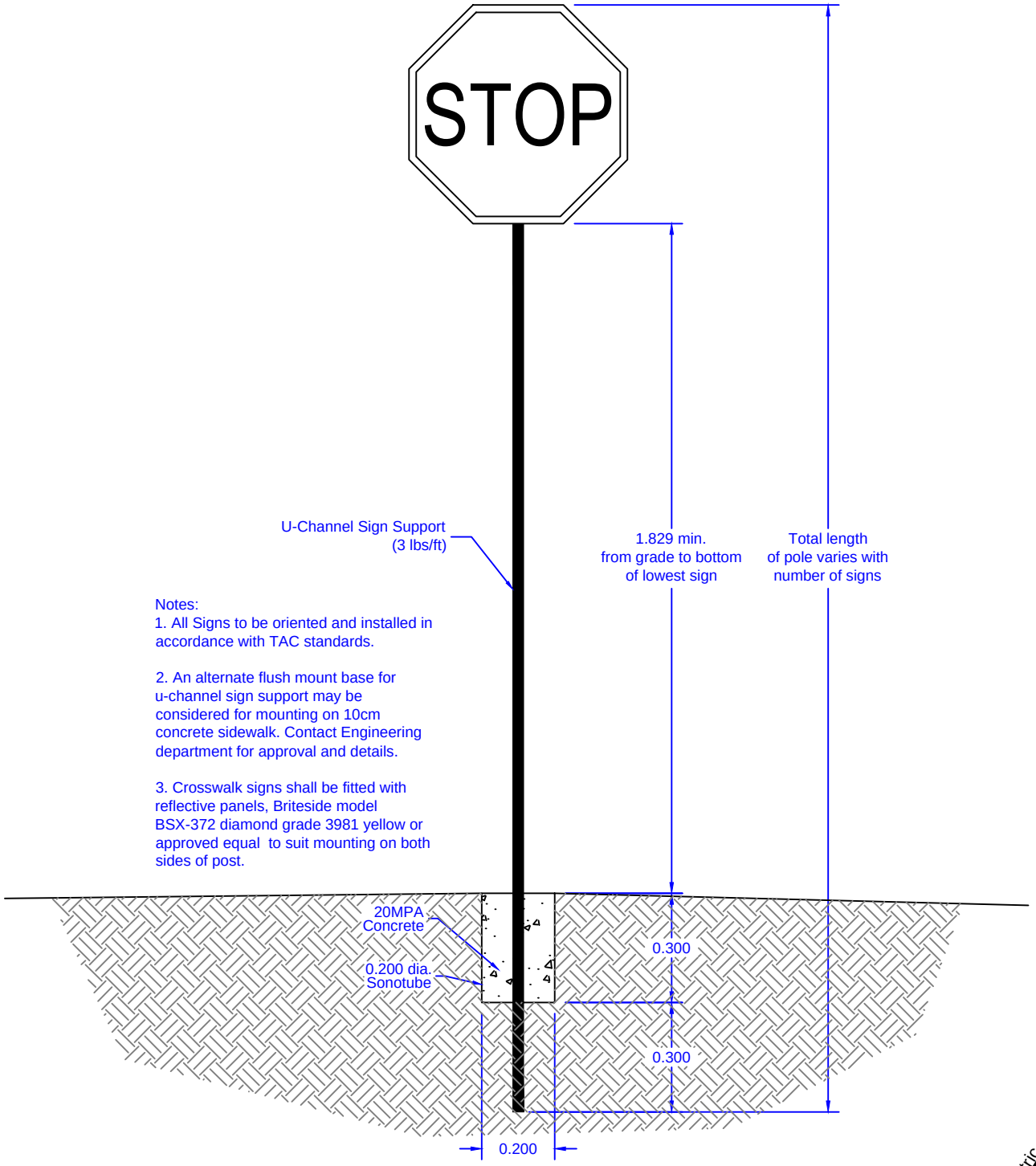
REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6	29	11	04	2005 Engineering Design Standards	PL	OR	OR
5	06	03	03	2003 Engineering Design Standards	PL	DAB	DAB
4	04	04	02	2002 Engineering Design Standards	BDW	DAB	DAB
3	15	05	01	2001 Engineering Design Standards	DMG	DAB	DAB
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: KRB
DATE: Mar./98
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

SUGGESTED DIVIDED ARTERIAL (UAD 50) - NO PARKING

SHEET NO.: STR-05
FILE NO.: 028



Notes:
1. All Signs to be oriented and installed in accordance with TAC standards.

2. An alternate flush mount base for u-channel sign support may be considered for mounting on 10cm concrete sidewalk. Contact Engineering department for approval and details.

3. Crosswalk signs shall be fitted with reflective panels, Briteside model BSX-372 diamond grade 3981 yellow or approved equal to suit mounting on both sides of post.

All dimensions in meters unless otherwise noted

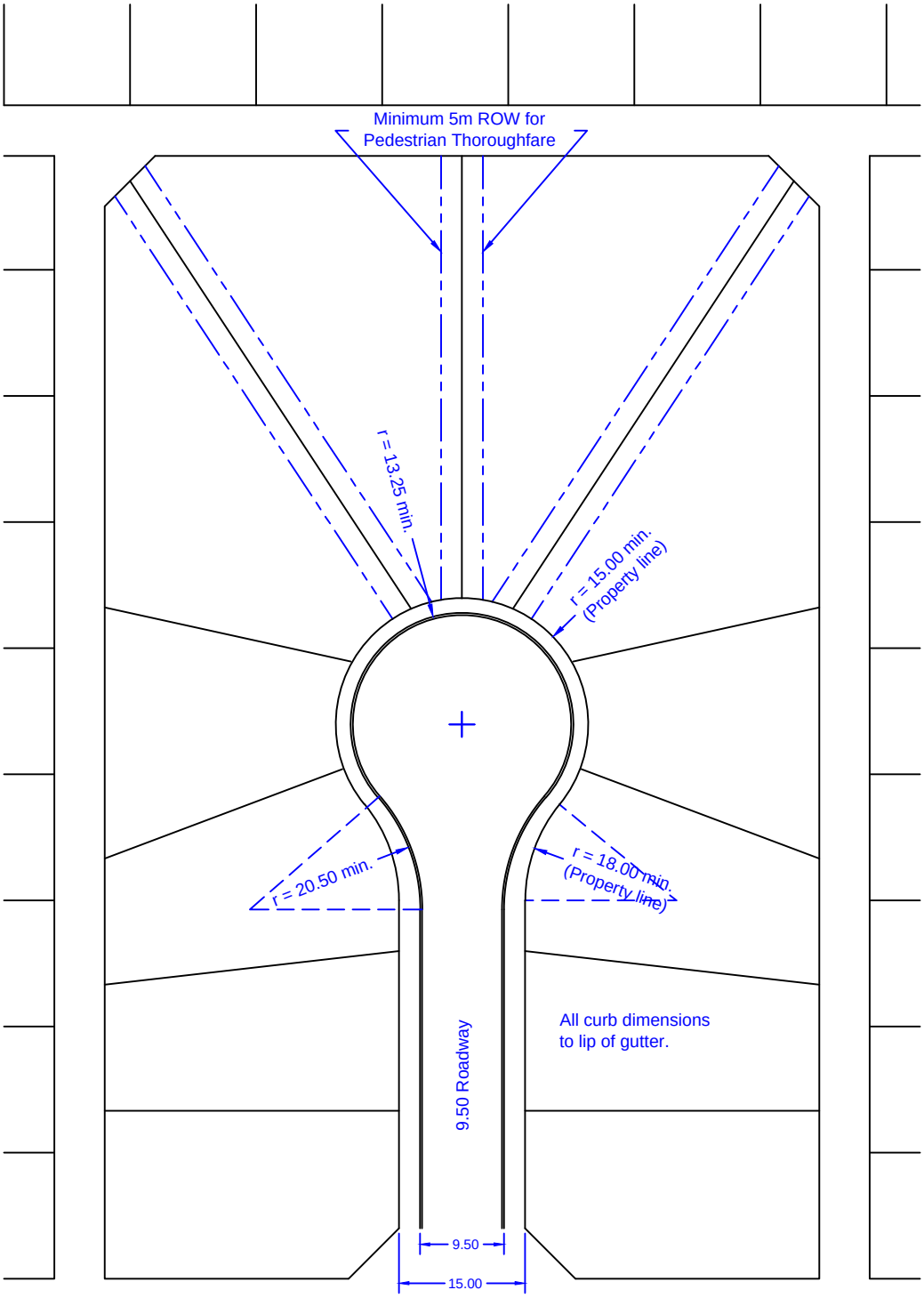
REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4	10	05	10	2010 EDCG Standards	SP	PN	PN
3	29	11	04	2005 Engineering Design Standards	PL	OR	OR
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: K.R. Bulek
DATE: Sept/97
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

TYPICAL STREET SIGN INSTALLATION

SHEET NO.: EDCG - Surf. Works - STR-07
FILE NO.: 032



All dimensions in meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4	10	05	10	2010 EDCG Standards	SP	PN	PN
3	27	01	04	2004 Engineering Design Standards			
2	17	03	00	2000 Engineering Design Standards	MAR	DAB	DAB
1	05	05	98	1998 Engineering Design Standards	KRB	KRB	DRJ

DRAWN: K.R. Bulek
DATE: Mar/98
SCALE: NTS
APPROVED:

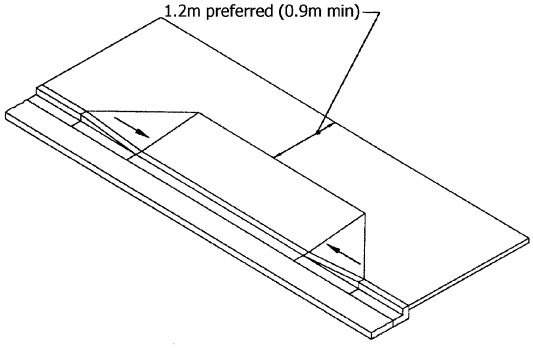
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

TYPICAL RESIDENTIAL CUL-DE-SAC DESIGN MINIMUM REQUIREMENTS

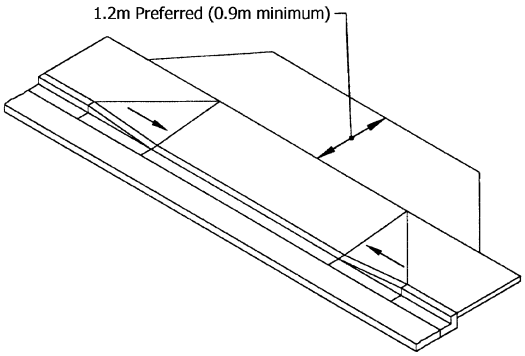
SHEET NO.: EDCG - Surf. Works - STR-08
FILE NO.: 015

Driveway With Wide Sidewalks

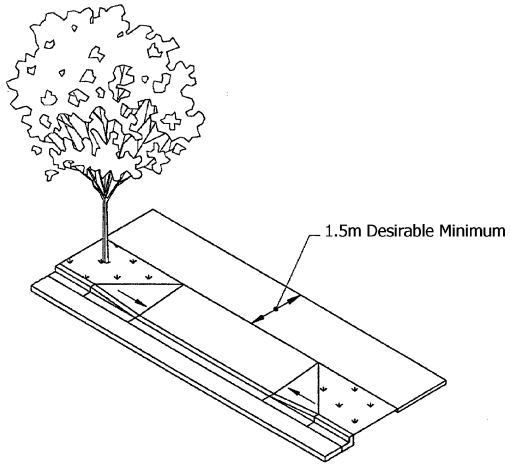


Wide sidewalks allow a 0.9 m (3 ft) wide path of travel behind the driveway cut.

Driveway With Sidewalk Behind

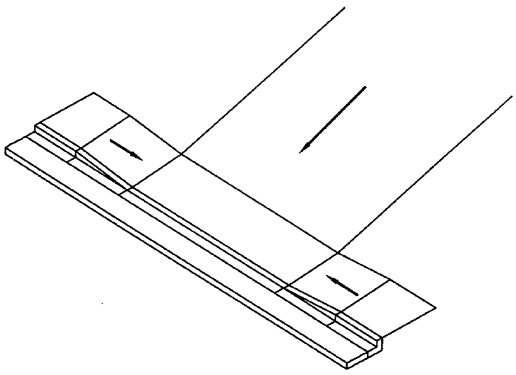


Driveway With Planting Strips



Planting strips allow the sidewalk to remain level and in a continuous direction.

Driveway With Dipped Sidewalk



All dimensions in meters unless otherwise noted

Metric

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3							
2							
1	10	05	10	2010 EDCG Standards	SP	PN	PN

DRAWN: P.L. | DATE: Dec/04

SCALE: NTS

APPROVED:

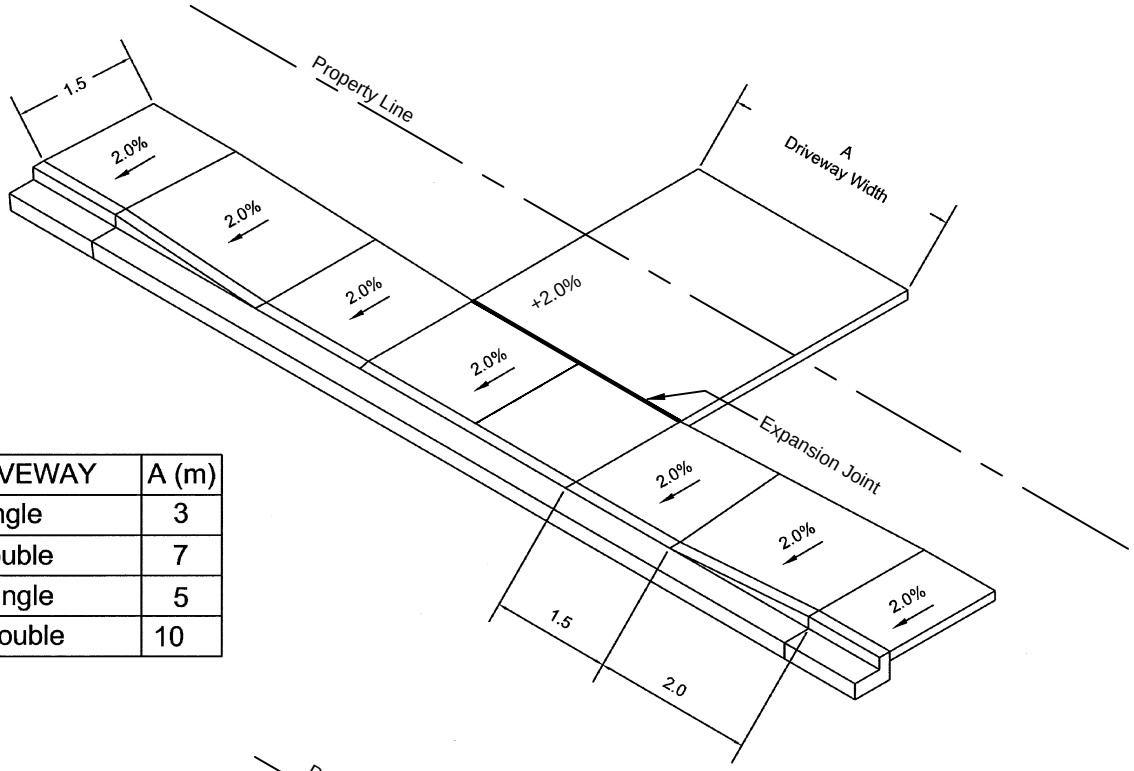
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

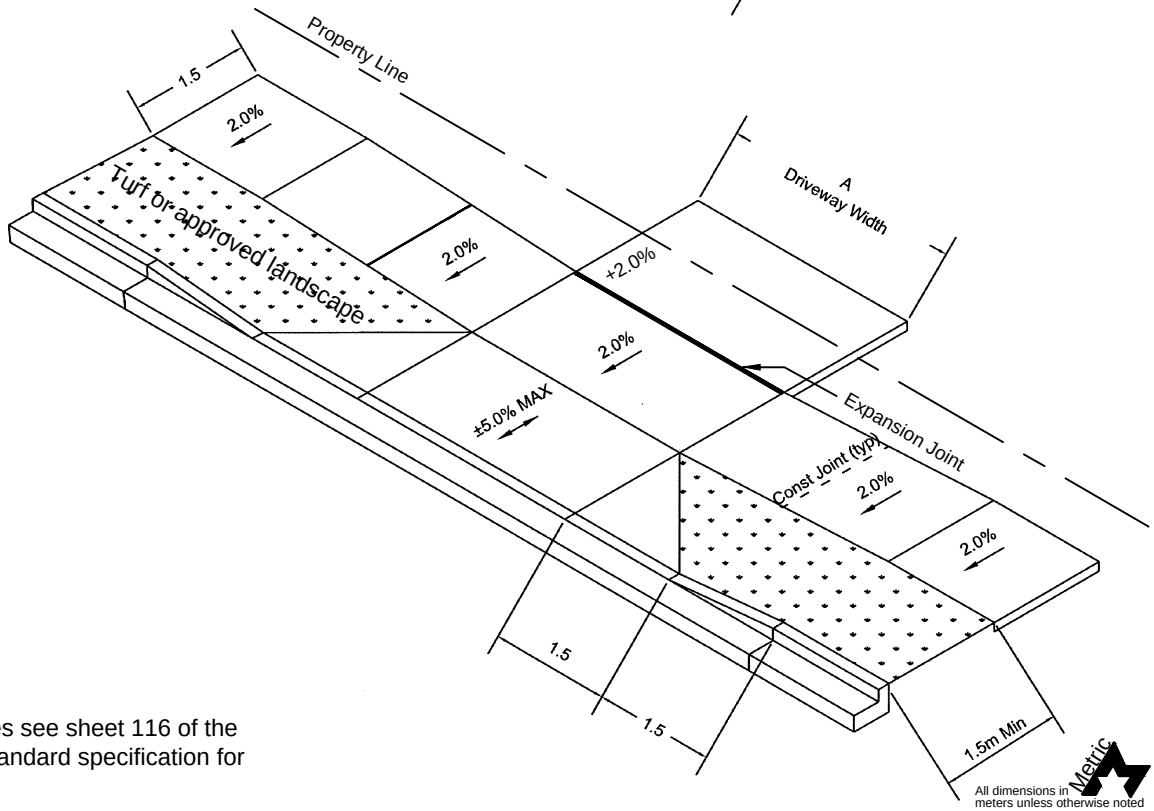
TYPICAL DRIVEWAY CROSSING OPTIONS

SHEET NO.: EDCG - Surf. Works - STR-09

FILE NO.: STR-09



TYPE OF DRIVEWAY	A (m)
Residential Single	3
Residential Double	7
Commercial Single	5
Commercial Double	10



Note:
For driveway grades see sheet 116 of the City of Calgary's standard specification for road construction.

All dimensions in meters unless otherwise noted

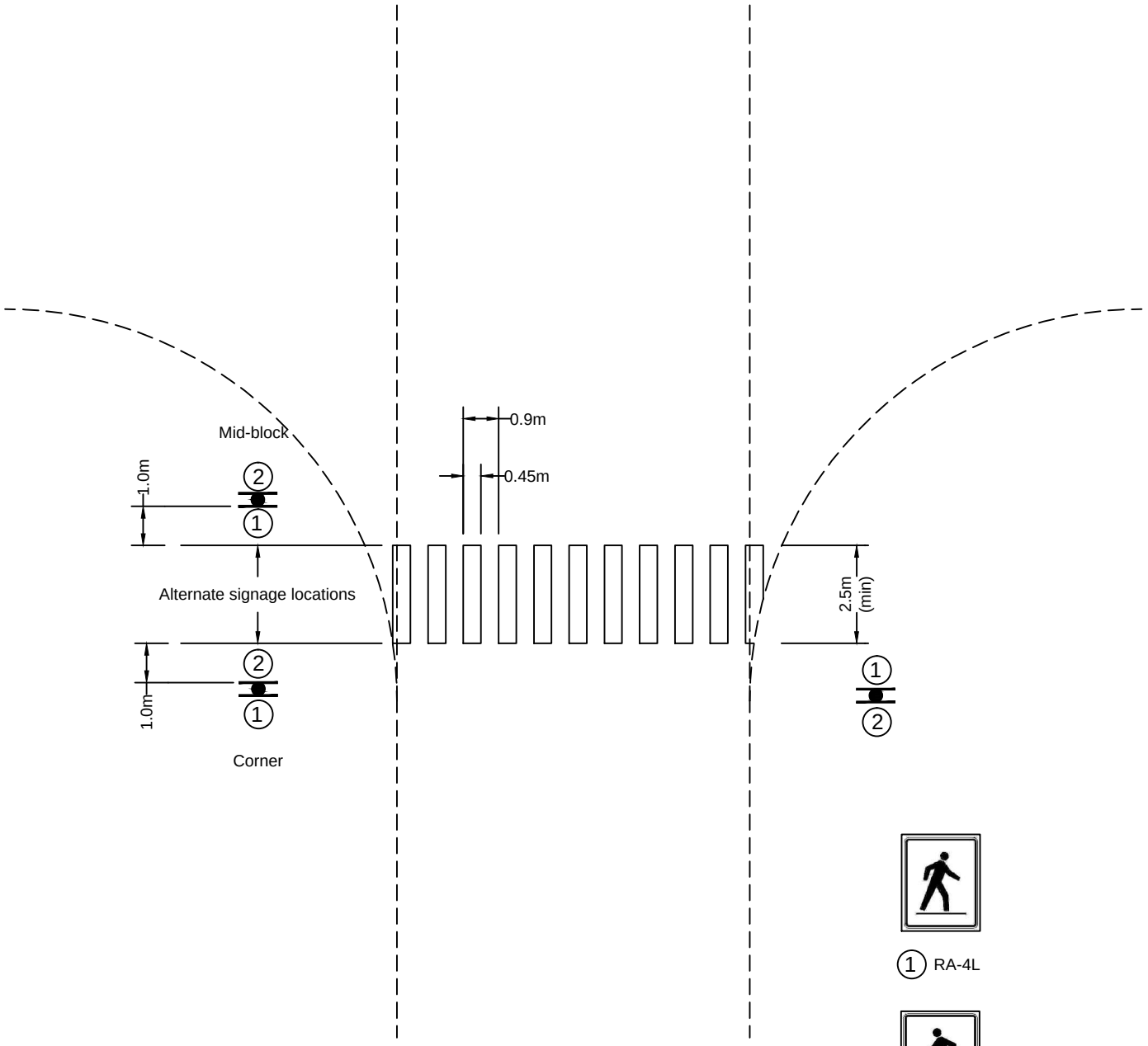
REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3							
2							
1	10	05	10	2010 EDCG Standards	SP	PN	PN

DRAWN: P.L.
DATE: Dec/04
SCALE: NTS
APPROVED:
MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

SIDEWALK DRIVEWAY CROSSING

SHEET NO.: EDCG - Surf. Works - STR-10
FILE NO.: STR-10



(1) RA-4L

(2) RA-4L

NOTE:
1) Paint coverage minimum 0.4 litres/m2.
2) Glass beads minimum 600 grams / litre.
3) Crosswalk signs shall be fitted with reflective panels, Briteside model BSX-372 diamond grade 3981 yellow or approved equal to suit mounting on both sides of post length = 1.72m.
4) Pedestrian crosswalk signs per manual of uniform traffic control devices for Canada. Not required for crosswalks at signalized intersections or stop signs.
5) All transverse pavement markings to be applied in paint on interim pavement (C.C.C stage) and reapplied in thermoplastic on full structure pavement (F.A.C. stage).
6) Crossing signage at mid block differs from corner as illustrated above. Both ends of crossing to be signed.

All dimensions in meters unless otherwise noted

REV	D	M	Y	DESCRIPTION	DPS	CHK	ENG
10							
9							
8							
7							
6							
5							
4							
3							
2							
1							

DRAWN: P.L. | DATE: Dec/04

SCALE: NTS

APPROVED:

MANAGER OF ENGINEERING
TOWN OF CANMORE

Town of Canmore
ENGINEERING DEPARTMENT

TYPICAL CROSSWALK STRIPING AND SIGNAGE

SHEET NO.: EDCG - Surf. Works - STR-11

FILE NO.: STR-11

Part 3 - Application Process & Submission Requirements

***Forward** – This section can be broken down into three areas:*
1 – Classification (Project Size and Fee Schedule)
2 – Application Review Process (by Milestones) & Additional Permits
3 – Submission Requirements

3.1 Classification (Project Size and Fee Schedule) – With the receipt of all applications, the Town will categorize the project into the classifications listed below. The size of the project will determine the fees as well as any specific Engineering requirements for the project. The categories and typical projects described below are general and subjective and the Town reserves the right to dictate which category the application will be given. The Town of Canmore reserves the right to determine the specific requirements for any development application. The Project Fee Schedule is included as an Appendix in Part 4.

3.1.1 Large Subdivisions – Project/New – this is predominantly for larger subdivisions of greater than 1.0 hectares. Subdivision in this section refers to a specific area of land characterized by the subdivision of larger parcels of land into smaller blocks, lots, reserves, roadways, rights-of-way, etc., and the installation of related Municipal Improvements on or adjacent to those lands to service developments on those lands.

3.1.2 Developments - Development in this section refers to buildings, structures or works located on one or more parcels of land in a new or existing subdivision and related Municipal Improvements on or adjacent to the parcel to be developed.

3.1.2.1 **Developments (Very Small) -** Renovations, Balconies Porches, Accessory Buildings (no new or altering of existing services).

Engineering Requirements: Although there is typically no engineering component involved in Very Small Developments, the Town reserves the right to have any project be reviewed by the Town Engineer, or ask for a consultant to be engaged should the Town feel as though specialized knowledge is required (e.g. large retaining walls, fuel storage tanks)

3.1.2.2 **Developments (Small) -** Single Family Dwellings, Duplex, Small industrial, institutional, commercial with a minimal engineering component, other serviced buildings under 200 m2. The Town reserves the right to ask any developer/builder to acquire the services of a Consulting Engineer if they feel specialized knowledge is required (e.g. large retaining walls, complex servicing). Small developments that fall within the criteria as outlined in the Storm Section will require a Consulting Engineer for their storm requirements.

Engineering Requirements: In addition to the requirements of the Town as mentioned above**,** small developments require that certain infrastructure inspections to be witnessed by the Town. 24hrs advance warning is required for inspections – call the Engineering Department at 678-1504.

Required Town Inspections include:

- adequate slope verification of water and sanitary lines
- placement of weeping tile
- water pressure test

Note : Contractors are asked to have the bedding and servicing in place but still exposed.

3.1.2.3 **Developments (Intermediate) –** Multi-Units (3 – 10 units), any structure that requires water service > 38mm, institutional/commercial, Mixed Use Commercial/Residential, small developments w unusual site conditions or utility servicing requirements (at the discretion of the Town)

Engineering Requirements: Intermediate projects require a Consulting Engineer and a letter of engagement as outlined in the Submission Requirements section outlined below.

3.1.2.4 **Developments (Large) –** Multiplexes > 10 Units, buildings with > 2000 Sq. m. floor area, Commercial/industrial/institutional generating more than 100 vehicle trips/hour (or at the discretion of the Town), Projects of unusual complexity (at the discretion of the Town), where significant variances to Town standards are required.

Engineering Requirements: Large projects require a Consulting Engineer and a letter of engagement as outlined in the Submission Requirements section outlined below.

3.2 Application Review Process

Development Permits are required for most developments and must be obtained from the Town of Canmore Planning and Development Department prior to commencing construction on a development project or municipal improvement such as roads, sewers, waterworks, driveways, landscaping, etc., associated with a development. Developers and Consultants should contact the Town of Canmore Engineering Department for an initial review of their subdivision or development proposals to determine any specific requirements that the Town may have. Detailed plans must be submitted for review and acceptance before a Development Permit will be issued. The milestones detailed below are meant to outline the engineering review process for subdivisions and developments. The process is built around milestones that constitute the timeline of development projects in the Town of Canmore. It is meant to work alongside the requirements of the Planning Department

Developers and Consultants are required to comply with relevant bylaws and revisions thereto that may include provisions and requirements in addition to those included in this Manual. Relevant bylaws of the Town include the following:

- Traffic, Street and Sidewalk Control Bylaw No. 17-92
- Building Permit Bylaw No. 1-96
- Regulating Blasting Explosives Bylaw No. 32-96
- Sewer Bylaw No. 35-94, Amendments Bylaw 26-2002
- Noise Control Bylaw No. 11-97
- Water Bylaw No. 39-2003
- Land Use Bylaw No. 09-99
- Business Registry Bylaw No. 10-96
- Protection of Municipal Improvements and Lands Bylaw No. 15-2001
- Amendment to Land Use Bylaw No. 36-96 re: Well Head Protection Zone

3.2.1 Milestone #1 - Development Permit (BP in the case of SFD and Duplexes) –

The Development Permit/Subdivison Approval is usually the first milestone of the review process for a typical development project. Typically, when the Development Permit/Subdivison Approval (BP in the case of SFD and duplexes) is released, the developer is free to start stripping and grading of the site and installing the deep utilities.

3.2.2 Milestone #2 - Building Permit – When the Building Permit is released, the developer is free to start the construction of the foundation and the building itself. On rare occasions, a Foundations Only Building Permit will be granted, however this is discouraged. A Foundations Only Building Permit will result in an additional review fee. The requirements of the building itself are typically governed by the Safety Codes Officer/Building Inspector. Any changes from the Development Permit in the civil or mechanical systems/drawings will need to be communicated to the Town by way of letter and an updated revision block on the drawings. In an effort to cut down on the time required for an Engineering review of the Building Permit application, the Town encourages the Consultant to provide the Town with a letter stating what changes have been made to the BP drawings from the DP drawings. This letter is to be included with the Building Permit submission.

3.2.3 Milestone #3 - Construction Completion Certificates (CCC's), Final Acceptance Certificates (FAC's), and the CCC-FAC Procedure

Note: This section is to provide clear guidance of the CCC-FAC procedure. The **CCC-FAC Procedure** is the process the Town uses to sign off on all construction works (referred to as Municipal Improvements) performed by others including Developments and Subdivisions.

Developers of both subdivisions and developments will be required to adhere to this process for successful project completion and return of securities.

CCC's - Categories & Classification

For both developments and subdivision, Engineering accepts CCC's in the categories listed below. The intent of the CCC's is to address all components of construction. A map accompanying the application detailing the extents of the works being applied for is mandatory.

- Underground Infrastructure - Water & water services (if applicable)
- Underground Infrastructure - Sanitary Sewer & sanitary services (if applicable)
- Underground Infrastructure - Storm Sewer & Storm sewer services (if applicable)
- Surface Works - Concrete – Curb, Gutter & Sidewalk
- Surface Works - Asphalt – parking lots, roads, recreational path
- Surface Grading - Overland Storm and Drainage, Grading
- Surface Grading - Landscaping
- Facilities (Storm Ponds, Lift Stations, Booster Pump Stations, Recreation Facilities)

Municipal Improvements categories are classified into two groups: On-Sites & Off-Sites. It is this classification that will determine if that particular Municipal Improvement will be subject to a warranty period. One CCC application for both On site and Off sites will suffice so long as both the works are complete and the accompanying map clearly shows the delineation of the On and Off sites.

On Site Municipal Improvements - CCC only (N/A for warranty period). These works that are not maintained or serviced by the Town after the obligations of the developer are met.

Off Site Municipal Improvements – CCC + 2yr warranty + FAC. These are works that the Town will own, operate and maintain when all the obligations of the developer are met

Note: Where a Utility Easement is required thru or on Private property and the infrastructure will be owned by the Town the Off Site Municipal Improvements process will be apply.

CCC's – Inspection

After a Municipal Improvement is completed, the Consulting Engineer shall, in the order shown:

1) Inspect the Municipal Improvement, record any deficiencies and advise the Contractor to repair any deficiencies.
2) Once the Contractor has repaired the deficiencies, carry out further inspection(s) until satisfied with the corrections.
3) Ensure all related outstanding field orders are resolved
4) Submit the CCC, as-built drawings and the required drawings for the Municipal Improvement for Town review and acceptance
5) If deficiencies are noted at the time of inspection, a list of those deficiencies shall be prepared by the Consulting Engineer and submitted to the Engineer for agreement. When the deficiencies have been corrected, the Consulting Engineer shall then, within a reasonable period of time, request a re-inspection of the deficient items with the Engineer. The engineer at their sole discretion can defer inspections of the deficiencies to the FAC inspection.

CCC's – Notes

- CCC's will not be accepted unless acceptable As-built drawings have also been provided to the Town
- Evaluation of the performance of the Municipal Improvements shall be at the sole discretion of the Engineer.

- Acceptance of CCCs by the Engineer indicates only acceptance of the certificates that the Consulting Engineer has issued. The Town accepts no responsibility for deficiencies, failures, incomplete work, errors, omissions, faulty materials, design failures or non-performance of the design.
- It is the responsibility of the Developer to ensure that the Municipal Improvements were constructed in accordance with the drawings accepted by the Engineer. Should failures occur in the Municipal Improvements as a result of deficiencies, failures, incomplete work, errors, omissions, faulty materials, design failures or non-performance of the design, then it is the responsibility of the Developer to correct or re-design the Municipal Improvements to obtain suitable performance and sign off accordingly.
- CCC/FAC Templates of the forms are included as Appendices

3.2.4 Milestone #4 – Occupancy –

When Occupancy is granted, potential tenants are allowed to occupy the premises. The developer typically applies for occupancy when the construction is very near to completion.

- For Small Developments, in addition to any Planning and Safety Codes requirements, occupancy is dependant on successful inspection of the servicing by the Town.
- For Intermediate and Large Developments, in addition to any Planning and Safety Codes requirements, Engineering requires that Construction Completion Certificates for Water and Sanitary (including Compaction, Water Pressure Test, Bacteria Test and Hydrant Flow test) must be submitted by the Consulting Engineer prior to the release of occupancy. **In addition and new to these Guidelines, infrastructure as-builts will be required prior to release of occupancy.**

Please note: Occupancy applies to developments and not to Subdivision, however, it should be noted that, in new Subdivisions, the Subdivision will need to have CCC approval of the underground infrastructure for Occupancy to be granted to the pertinent development lots.

3.2.5 Milestone #5 –Securities -

The grouping and application sequence of CCC's will be required to be detailed and recorded as a Schedule as part of the Development Agreement / Subdivision Servicing Agreement signed by developers. Developers are encouraged to group components together where efficient, but still effective. An example is provided below:

	CCC - Category	Estimated Construction Value	Reduction Factor	Required Securities	Reference
Required Categories	Underground Infrastructure	$4,000,000	25%	$1,000,000	Bond # ABC
	Surface Works	$3,000,000	25%	$750,000	Line of Credit XYZ
	Landscaping	$200,000	125%	$250,000	Line of Credit MNO
Extra Categories if required					
	Storm Pond	$2,000,000	25%	$500,000	Bond DEF
	Lift Station for future works	$3,000,000	25%	$750,000	Line of Credit ABC

These Guidelines will cede to any project specific stipulations as outlined in the Development Agreement/ Subdivision Servicing Agreement of that project. Upon a successful acceptance of the CCC's, the developer may apply to have his securities reduced, however the Town Engineer at his sole discretion, will dictate the amount to be held in security depending on the extent of the deficiencies.

- All underground infrastructure CCC's will need to be accepted to prior to release of any securities. The Town will review early release of securities on a case by case basis.
- Prior to release of securities, as-builts will need to be submitted to the Town of Canmore to the satisfaction of our GIS Department As-builts not conforming to our standards, syntax and format will not be accepted. No securities will be released until the as-builts have been approved.

- Typically, the securities will be reduced as follows:
  60% - for successful CCC application
  20% - for successful as-built submission
  20% - for successful FAC application

3.2.6 Milestone #6 - FAC a successful FAC inspection signifies the end of the 2 year warranty and where the Offsite works get turned over to the Town of Canmore. All deficiencies need to be rectified to the satisfaction of the Engineer prior to signing of the FAC. Generally, the FAC signifies the end of Engineering's involvement in the administration process.

3.3 Additional Permits Required

Excavation Permit

- All excavations within Town property, streets, roads, right-of-ways, easement, reserves and public lands require an Excavation Permit. An application for a permit must be made in writing on the Town's application form by the Owner or Contractor proposing the excavation. A location map or sketch of the proposed installation is required for all installations. **All Excavations Permits require backfill compaction testing results, as outlined in the Excavation Permit application form, to be submitted to the Town of Canmore**. Works are subject to a 1 year warranty and, as such, no securities will be released until the warranty period has expired. The Warranty period will start after the application of Hot Mix asphalt (if applicable) or final surface restoration. Compaction testing is required for return of securities.
- For re-developments that require a Development Permit (for example – a demolition of a single family dwelling in South Canmore to build a 4/5-plex) with underground works in the ROW, an Excavation Permit will be required. Unless specifically addressed in the Development Agreement/Subdivision Servicing Agreement, fees and a security deposit will be required as outlined on the Excavation Permit form. Fees and security will be payable when picking up the Excavation Permit. Adequate compaction results will be required for return of securities.
- For projects requiring a Development Permit but located in a new subdivision, an Excavation Permit will be required. This is the case even if the road of the subdivision has not been CCC'ed. Unless specifically addressed in the Development Agreement / Subdivision Servicing Agreement, fees and a security deposit will be required as outlined on the Excavation Permit form. Fees and security will be payable when picking up the Excavation Permit. Adequate compaction results will be required for return of securities.
- For SFD and duplexes that do not require a Development Permit, an Excavation Permit will be required. Fees and a security deposit will be required as outlined on the Excavation Permit form. Fees and security will be payable when picking up the Excavation Permit. Adequate compaction results will be required for return of securities.
- All shallow utility installation and repairs (with a related DP or not) will require fees and a deposit unless outlined otherwise in a current Franchise Agreement between the Town and the Utility provider. Shallow utilities with no Franchise Agreement (or equivalent) will require fees and deposit. Larger projects may require additional securities. Deposits will be refunded upon successful completion of the works and submittal of compaction results.
- The process that will be followed when reviewing an application for an excavation permit will be:
  - The applicant completes and submits the application form.
  - The application is reviewed by the Engineering Department and, if acceptable, a permit will be prepared. Issues identified during the review will be discussed with the applicant and must be fully resolved before preparation of the permit.
  - Unless otherwise addressed as part of a Development Permit, the applicable fees and securities will be required to be paid upon permit pick-up.
  - Upon written notice from the applicant that all work has been satisfactorily completed, and receipt by the Town of all required submissions, the Town will arrange for a site inspection of the work.
  - If the work has not been completed satisfactorily, the applicant will be notified and requested to rectify the deficiencies. If action is not taken promptly, then the applicant will be notified in writing to complete the work within 10 days, failing which the deposit will be forfeited and

if corrective work required to be undertaken by the Town exceeds the deposit, such additional costs will be billed to the applicant.

- A sample of an Excavation Permit can be found on the Town of Canmore website.

Road Use

- Any use or blockage of the road Right-of-Way, paths, Municipal Reserves or other Town land requires a Road-Use Permit. In addition to knowing what is transpiring on our roads to avoid conflicts for events and other Town activities, the Road Use Permit is forwarded to EMS to insure they can navigate safely and effectively on case of Emergency. There is no fee for a Road use permit. A sample of a Road Use Permit can be found on the Town of Canmore website.

Demolition Permit

- All dwellings that are scheduled to be demolished will require a Demolition Permit. Fees will be as outlined on the Demolition Application form.
- Proper termination of services will need to be witnessed by the Town. Standards for proper termination are included in the appropriate section of these guidelines.

Blasting Permit

- All drilling and blasting operations within the Town of Canmore must conform to Town By-law 32-96, the provisions of the Explosives Act (Canada), and the regulations made thereunder, and with the provisions of the Occupational Health and Safety Act - General Safety Regulation 448/83. In the event of conflict between any of these, the more stringent shall take precedence. As there is inherent danger with blasting activities, these applications will be handled on a case by case basis.

3.4 Variances

The Design Guidelines presented in this Manual outline a common approach to preparing information for review and indicate the minimum requirements acceptable to the Town. The guidelines are not intended to be rigid, but rather, to promote good engineering practice in conformance with acceptable codes and standards for the development of basic infrastructure of the Town. For unusual developments or complex designs, appropriate professional expertise and judgment should be used.

The Construction Standards presented in this Manual indicate the minimum standards acceptable to the Town. The intent of the standards is to ensure that construction materials and procedures exceed the minimum specifications and result in a quality product at reasonable life-cycle costs, including operations and maintenance considerations.

Notwithstanding the above, variances from these guidelines and standards may be considered by the Town where the Consultant demonstrates to the satisfaction of the Town that:

- there exists a good and sufficient cause for the variance; or
- the strict application of the guidelines or standards will result in an exceptional and unreasonable hardship; and
- the granting of the variance will not negatively impact public health and safety or the natural environment, create a public nuisance or burden, require additional public maintenance, cause additional public expense, or conflict with existing laws, bylaws and regulations.

All requests for variances must be made in writing to the Manager of Engineering stating the reason for the variance, providing clear reference to the item in question and detailed information about the proposed alternative. Supporting information shall include previous applications or installations, performance or test results and evaluations, and evidence that the proposed alternative is suitable for the intended application. Variances to engineering designs must be signed and sealed by a professional engineer.

A request may be rejected or accepted with or without conditions at the discretion of the Town. Acceptance of a variance in one instance does not necessarily imply acceptance in another instance and each case shall be considered separately. Variances must be accepted in writing before being incorporated into drawings or specifications submitted to the Town in support of subdivision, development or building permit applications.

Requests for minor variances will be processed by the Town as part of the normal subdivision or development application review process. However, the Town will charge for processing variance requests in accordance with the Engineering Fee Schedule and will pass on or recover from the applicant any third party costs are incurred by the Town in the review of any request for variance.

3.5 Submission Requirements

All forms of submissions including drawings, letters, reports and any other documentation must be submitted in PDF or equal un-editable digital format. Original applications must have all correspondence dated and submitted to the Towns FTP site. When hard copy drawings are required, drawings shall be to a suitable metric scale and sized A1 (591mm x 841mm). All drawings shall conform to the City of Calgary's Standard Block Profile Specifications. See the City of Calgary website for details. Applications that are incomplete or found to not be in accordance with the requirements will be rejected. All revisions to existing applications for subdivisions or developments must include a letter prepared by the Consulting Engineer giving a description of the revisions. Any variances proposed by a Developer or Consulting Engineer from the Town's Guidelines must be resolved with the Engineering Department prior to making an application if of a significant nature, or included in the application letter if of a minor nature.

3.5.1 **Notice of Engagement -** from the Consulting Engineer giving a description of the project and confirmation that all aspects of the design meet the requirements of the Town of Canmore and other authorities having jurisdiction. A sample form is provided in Part 4 as an Appendix.

- **Field Services** - Field Services are to be supplied by the consultant as needed for the purposes of ensuring that the Agreement, Standards & Guidelines, Town procedures and By- laws are being adhered to throughout the entirety of the Agreement and construction process. Field Services are to be carried out and are the responsibility of the Consulting Engineer for the Municipal Improvements (both on site and off site) that are not under the direct supervision and witnessed by the Engineer. Field services shall include the design, construction, supervision, inspection, testing, record keeping and all such activities as described herein. The Consulting Engineer is responsible to ensure that all field service staff and those under its supervision are trained in the use of the Town's Standards & Guidelines, procedures and Bylaws. It shall be up to the Consulting Engineer to decide the appropriate level of inspection required. The Engineer, at his/her sole discretion, shall evaluate whether or not the Consulting Engineer is providing sufficient inspection and supervision.
- **Level of Service** It is the responsibility of the Consulting Engineer to determine the level of service to be provided in order to adequately close out the project as stipulated in these guidelines. Considerations shall include a definition of the project, development of a work plan, budget and schedule, organization of the project team, implementation of the project, and project close-out. It shall also be the responsibility of the Consulting Engineer to employ professional, knowledgeable, qualified staff to provide the above services to adequately submit all required documentation/field submittals as stipulated in these Guidelines.

3.5.2 **Legal Plot Plan –** From an Alberta Land Surveyor showing all existing/proposed legal components/settings of the property. Developers are required to show the planned long term legal responsibilities of all Municipal Improvements in terms of ownership and maintenance obligations. A clear delineation of the extent of the intended responsibilities will be required.

3.5.3 **Architectural & Landscaping Plans** - For all developments and subdivisions that require an Engineering review, architectural and landscaping drawings must be provided digitally.

3.5.4 **Construction Management Plan** all developments and subdivision, even small ones, must submit a Site Specific Construction Management Plan that details the components of the construction including Erosion and Sediment Control Plan for the life of the project.

- **Erosion and Sediment Control** Location of silt fences and erosion matting must be shown schematically on a plan of the development area. All CB's on ROW (including outside the development area) that could potentially receive runoff from the development construction envelope must be identified and have erosion and sediment control measures put in place prior to stripping and grading. These measures must be kept clean to ensure their functionality. It is especially crucial that these erosion control measures be in place until the end of the project, including through the landscaping phase of the project.
- **Lay Down Areas** for both building and raw materials are to be shown on the plan. Stockpiling of fines shall not be done on asphalt surfaces that are upstream and uphill of storm runoff systems or carriage ways.
- **Pedestrian and Vehicle Traffic** - Vehicle (especially delivery and cement trucks) entrance and exiting must be shown on the plan. Temporary fencing and vehicle/pedestrian detours must be shown on the plan.
- **Schedule** The Construction Management Plan shall include of rough schedule (+/- 2 weeks for each major phase of construction) of planned construction indicating first expected occupancy for each phase. Developers are reminded to ensure courtesy for residents neighboring the site and to stick to the Town By-Laws regarding noise, work hours etc. Should a portion of construction need relaxation of these By-laws, the developer is responsible to apply to the Town and communicate to the affected residents in a reasonable time frame.
- **Site fingerprinting –** Development teams are to use site fingerprinting (minimal disturbance techniques) to reduce limits of clearing and grading to minimize impacts to the hydrologic cycle. They are to restrict ground disturbance by identifying the smallest possible area and clearly delineating it on site.

3.5.5 Site Grading/Overland Storm Drainage Plan

– The Grading/Overland Storm Drainage Plan will be used for both Planning and Engineering purposes and should be done based on elevations from the Plot Plan done by a surveyor. The Plan should be mindful of the requirements outlined in **Section 2.2 Grading** as well as **Section 2.5 –Stormwater Management.** The Grading/Overland Storm Drainage Plan is meant to show two main aspects of design:

- Elevations of earthworks – specifically those along property boundaries and building faces
- A representation of how overland storm drainage will behave in a storm event

Details of the Plan should adhere to the detail requirements **Section 2.2 – Grading,** as well as the storm design features listed below. SFD and Duplexes will require a Grading/Overland Storm Drainage plan.

SFD's/Duplexes

- Directional Flow Arrows based on finished grading for Minor Event
- Directional Flow Arrows based on finished grading for Major Event
- Areas outside the property lines, which drain into the development
- Low depression areas where ponding will occur
- Vegetative drainage features including berms and swales
- Location and details of weeping tile assembly and associated infiltration pit
- Finished grading of retaining wall (sufficient points to show slope)
- Constructed drainage features including CB's and piped system infrastructure

In addition to the requirements of SFD/Duplexes, larger projects will require more detail including:

- Construction details and location of all infiltration basins
- Any infiltration values used in the Storm calculations
- Storm specific landscaping that is part of stormwater treatment
- Drainage areas and coefficients of run-off
- The boundary of the high water levels for detention ponds
- Design calculations shall also be provided indicating design flows, slopes, velocities, capacities, pipe sizes and run-off coefficient

Sites with Building Grade Plan & Lowest Top of Footing Requirements

Typically, when a subdivision is created, the consulting engineer will create a Building Grade Plan (AKA Grade Slip, Development Grading Plan) for each development lot created. Developments in new subdivisions shall conform to the site servicing and grading requirements shown on the accepted Building Grade Plan for that subdivision.

Where a building is proposed with a footing elevation lower than the lowest top of footing elevation shown on the accepted Building Grade Plan, such proposal must be accompanied by a certified statement from a qualified Consulting Engineer addressing the proposed change. The statement should indicate that the proposed variance will have no adverse impact on the development or the servicing of that site, or alternatively, that all impacts and required mitigation have been provided in the proposed variance.

Additional documentation required at CCC submission

Note: All testing noted below shall be performed by an independent testing firm contracted by the Developer or Consulting Engineer. For SFD and duplexes, these will be required prior to release of the Excavation securities

i. Foundation Bearing Pressure (Compaction and Moisture Content)
ii. Letter from Geotechnical Engineer if weeping tile is not installed
iii. Compaction results as per requirements of Excavation Permit
iv. For footing elevations lower than that indicated on the Building Grade Plan, a letter from a consulting Engineer as outlined in the requirements above

Site Grading/Overland Storm Drainage – As-built Requirements

SFD/Duplexes (no as-builts submitted)

- A site inspection for Site Grading/Overland Storm Drainage will be done by Engineering in conjunction with the Planning Department landscaping inspection. The Engineering Department shall be looking for general conformance to the Drainage/Overland Storm Drainage plan that was submitted with the BP.

Med/Large Developments

- The consultant will be responsible to verify that the Site Grading/Overland Strom Drainage is performing as intended prior to application of the CCC. A CCC will be required for both On and Off Sites, with the On Sites not being subject to a warranty period.
- The as-builts themselves can be submitted with the Surface Works as-builts for the project. Grading should be shown to give the reader a general indication of slopes and low spots of the site.

3.5.6 Layout Plans – Utilities (Shallow & Deep)

This plan shall indicate all deep utilities ie. water, sanitary sewer and storm sewer. Direction of flow, alignments, locations to property line of mains as well as the type and size of mains is required. Related infrastructure pertaining to these utilities is also required (type of service, catch basins, manholes, hydrants, and appurtenances). A metric chainage must be shown. Design calculations for water main and service sizing, as well as sanitary design calculations must be referenced on the drawings. Finally, the developer is responsible to show the proposed placement of all proposed shallow utilities as well as associated street furniture. Pedestals, transformers or other shallow utility appurtenances must be shown with approximate dimensions. See Design Section for more detail regarding specific utility submission requirements.

Additional Documentation required at DP/BP submission

A plan showing the intentions of ownership and maintenance obligations (public vs. private snow clearing, maintenance of infrastructure)

Additional Documentation required at CCC submission

1. Watermain and hydrants

Pressure Test – to be sealed by a Professional Engineer for subdivisions where the individual services require a CC valve, the water pressure test will need to be taken against the CC valve.
Bacteria Test – to be done by an accredited laboratory
Hydrant Flow Test
Compaction results (bedding and backfill) for both Onsite and Offsite. Compaction results shall be taken in such a way to give a more than adequate representation of the area used for trenching

As-built requirements – Water (required at CCC)

Bends, T's and junctions of all Watermains
Facility Plans for mechanical infrastructure (PRV's, Booster Stations)

2. Sanitary & Underground Storm

- Pressure Test – to be sealed by a Professional Engineer – for all pipes that have inverts that fall below the 1:100 year flood level.
- Compaction results (bedding and backfill) for both onsite and offsite. Compaction results shall be taken in such a way to give a more than adequate representation of the area used for trenching
- CCTV Inspection. CCTV inspection are to be viewed and signed off by the Consulting Engineer. To be submitted on CD. The inspection itself is to include all newly placed mains that are 6" or larger, and should include works on both on and off sites.

As-built requirements - Sanitary (required at CCC)

Locations and inverts of manholes, location
Facility Plans for mechanical infrastructure (Lift Stations)

Notes:

1. The Town has a very specific numbering system for underground infrastructure. This allows our Master Plans to be kept up to date without putting undo hinderance on the Town to produce them. The syntax and formatting is especially critical to ensure a smooth insertion of information. Please contact the Town for further details.

3.5.7 Layout Plans – Surface Works -

This plan shall indicate all locations and measurements (widths and radii etc), type of material of roads, lanes, parking areas, sidewalks, walkways, curbs & gutters. Also required are street signage, traffic signage, pavement markings, animal proof waste containers and postal kiosks. Separate details may be required for corner detailing at intersections.

Surface Works - Additional Documentation required at DP/BP submission

A plan showing the intentions of ownership and maintenance obligations (public vs. private snow clearing, maintenance of infrastructure)

Surface Works - Additional Documentation required at CCC submission

- **Concrete -** Curb, Gutter and Sidewalks and other Concrete Surface Works.
  Concrete Strength Test Results: for concrete on both On Site & Off Site
  Strength results shall be taken in such a way to give a more than adequate representation of all concrete used for the site
- **Paving -** Roadways (1rst Lift) & Pathways
  Compaction results for sub-base and sub-grade – include pathways
  Gradation Tests for 1rst Lift asphalt
  Compaction Tests for 1rst lift asphalt

Surface Works – As-builts Requirements

- Centerline of roads (indicated by unbroken polyline)
- Centerline of pathways (indicated by unbroken polyline)
- Park Benches (block available on Town website)
- Picnic Tables (block available on Town website)
- Chain link fence (block available on Town website)
- Area of Off Site landscaping

Surface Works - Additional Documentation required at FAC submission

1. **Paving** – 2nd Lift – if required
   Gradation Tests for 2nd lift asphalt
   Compaction Tests for 2nd lift asphalt

3.5.8 **Stormwater Management Plan** Larger developments and subdivisions will require a thorough Stormwater Management Plan. This will need to be submitted in report style by a Professional Engineer who is experienced in the field of progressive Stormwater Management. The terms of reference for these reports will be determined by the Town of Canmore following an initial review of the proposed development. The designer is encouraged to communicate with the Town to ensure the report outlines issues of concern with the Town.

3.5.9 **Traffic Impact Assessment** The terms of reference for these reports will be determined by the Town of Canmore following an initial review of the proposed development. The designer is encouraged to communicate with the Town to insure the report outlines issues of concern with the Town.

3.5.10 **Aquifer Impact Assessment** - For projects located in the Wellhead Protection Area, an Aquifer Impact Report and Supplementary Information will be required in accordance with the Town of Canmore Land Use Bylaw. For projects in the wellhead protection area conforming to the Land Use Bylaw that will not penetrate the aquifer due to no below grade construction, a letter may be submitted by the consulting engineer stating that there will be no adverse impact on the aquifer

3.5.11 **Facility Plans –** All facilities will require As-built Drawings as well as any pertinent O&M manuals from the manufacturers. These are required as part of the CCC submission **(See Application Review Process)**

- **Lift Station, Pump House, PRV Chamber and Reservoirs** As-Built Drawings must include the following:
  - Description and location of the Facility
  - Electrical record drawings (schematic and PLC programming).
  - Mechanical record drawings (process piping, schematics, probe settings, etc.).
  - Equipment manufacturers' information.
- **Irrigation System Record Drawings**
  - Refer to the Town's Landscaping Standards, Section 7.2
- **Operations and Maintenance Manual (O&M) Manuals** - Where O&M manuals must be submitted to the Town for any Municipal Improvements constructed pursuant to an Agreement or these Guidelines, the manuals shall be prepared according to the minimum requirements outlined in this section. Other agreements with the Town for specific municipal improvements or capital projects may include more detailed requirements.
  - The O&M manual shall be an organized compilation of all operating and maintenance data pertaining to any facility installed by the Developer. A manual shall be a three-ring or similar type of binder with hard covers and spine, divider sheets with labeled tabs and envelopes for over-sized inserts. The binder shall be of heavy-duty construction, suitable for removing and inserting pages, and of adequate size for the material presented. The O&M manual may include more than one binder. All binders shall be clearly labeled with the date, name and location of the facility.

- Three (3) complete hard copy sets of the O&M Manuals shall be submitted to the Town prior to or together with the CCC. The Manuals shall be subject to review by the Municipal Engineer prior to acceptance by the Town. The O&M manual shall be an organized compilation of all operating and maintenance data pertaining to any facility installed by the Developer including, but not limited to the following:
  - List of names and contact details of firms involved in the design, construction and supply of equipment or services for the facility.
  - General description, application and operating conditions of the facility
  - Equipment manufacturer's detailed technical information including installation, operation and maintenance instructions, parts lists and component diagrams
  - Installation and performance test results.
  - Inspection compliance certificates
  - Warranties and guarantees

3.5.12 As Built Drawings

- Where record submittals must be submitted to the Town for any Municipal Improvements constructed pursuant to these Guidelines, or pursuant to an Agreement with the Town, they shall be prepared according to the minimum requirements outlined in this section.
- All record submittals shall be submitted to by the Town prior to acceptance of the Construction Completion Certificate (CCC) for the improvement.
- At the time of CCC submission, the Developer shall provide record submittals for all municipal improvements, including, the most recent construction drawings containing all approved changes, inspection reports, test results and O&M manuals. The contents of the record drawings shall be as noted above.
- Failure to comply with any of the above requirements may result in delays in the release of securities held by the Town.

Digital Requirements

Format

- Digital drawings must be provided in AutoCAD format on a CD-ROM A colour table (.ctb file) shall be provided for black and white printing. PDfs of Engineering drawings shall also be provided.

Projection

- Digital drawings must be in 3TM NAD83 with central meridian –114 in grid coordinates.

Title Block and Layering System

- A copy of the digital title blocks and layering system will be provided upon request.

Digital Layer Structure

Lines:

Linear features shall be represented by polylines, lwpolylines or arc entities. Segments representing a linear feature, such as a watermain, shall be joined and form a continuous line. The use of ellipses is not accepted.

Areas:

Area features shall be represented by closed polylines without any gaps.

Points:

Point features shall be represented by a block or a point. Points or blocks shall be snapped to linear features. For a complete list of features to be represented as blocks/points, refer to Town layering system.

Features

All point features such as hydrants, valves, catch basins, manholes, tees, bends, crosses, etc. shall be identified by a block under its appropriate layer. All lines shall be drawn from a node to the next node as one line under its appropriate layer. Lines shall be represented by line, polyline, lwpolyline or arc entities. The use of ellipses will not be accepted. For a list of point features, refer to the symbols used in the City of Calgary's Standard Block Profile Specifications.

Numbering of Manholes, Stormwater Facilities and Hydrants

A Developer's local numbering system (for manholes, stromwater facilities and hydrants) may be used on design drawings submitted in support of a permit application. However, record drawings shall indicate the Town's manhole numbering system for storm and sanitary sewers. The Developer shall request the Town to provide a list of the numbering sequence to be indicated on the record drawings prior to their preparation.

I. Manhole Numbering

The Town of Canmore has developed a manhole numbering system for all of the sanitary and storm manholes. This system uses an alphabetical prefix, followed by two numbers. Each number has a separate meaning.

For instance, the number S6122 on a sanitary manhole is derived as follows:

S	=	sanitary
6	=	located in Catchment Area 6
122	=	manhole number

The number ST6122 on a storm sewer manhole is derived as follows:

ST	=	storm
6	=	located in Catchment Area 6
122	=	manhole number

II. Stormwater Facilities Numbering

The Town of Canmore has developed a numbering system for all major components of it's stormwater management facilities. This system uses an alphabetical prefix followed by five digits. The alpha-characters indicate the type of component. The first two digits indicate the catchment area; the last three digits indicate the component number.

The alpha characters are:

CB	=	catch basin
DW	=	drywell
OGS	=	Oil and Grit Separator (New)
BS	=	basins
OL	=	outfalls

III. Hydrant Numbering

The Town of Canmore has developed a numbering system for all fire hydrants. This system uses an alphabetical prefix followed by three digits. The alpha character indicates a district in the Town. The three digits indicate the hydrant number.

Part 4 - Appendices

- **EDCG – Appendix A – Definitions**
- **EDCG – Appendix B – Master Fee Schedule**
- **EDCG – Appendix C – Notice of Engagement**
- **EDCG – Appendix D1 – CCC Template**
- **EDCG – Appendix D2 – FAC Template**

Appendix A – Definitions

For the purposes of this document the following definitions shall apply:

Agreement shall mean the written contract agreement, subdivision servicing agreement, development agreement or any other agreement 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.

Commencement of Construction or Commence Construction shall mean the date upon which the Developer commences the actual stripping and grading and/or the use of heavy equipment in the Development Area for purposes of servicing the Development Area, or such other date as may be agreed upon in writing by the Town and the Developer.

Construction Completion Certificate (CCC) shall mean the certificate issued by the Consulting Engineer, stating that all Municipal Improvements and materials have been constructed, installed and inspected in conformance with the Agreement and Standards & Guidelines, and that all defects and deficiencies in the Municipal Improvements and materials have been remedied by the Developer. The date of acceptance of the Construction Completion Certificate by the Town indicates commencement of the Warranty Period.

"CCC-FAC Procedure" means the completion of Municipal Improvements by the Developer as evidenced by the Construction Completion Certificate, maintenance and repair of said Municipal Improvements during the Warranty Period, and acceptance of the Municipal Improvements as evidenced by the Final Acceptance Certificate in accordance with this Agreement and the Town's Standard & Guidelines.

Consultant shall mean the person or persons retained by the Developer and shall include the services of a Consulting Engineer, landscape architect, land surveyor and land-use planner.

Consultant's Guidelines shall mean the most recent edition at the time of Commencement of Construction, of the Engineering Design and Construction Guidelines. The EDCG specify the minimum levels of Field Services that shall be provided by the Consultant during the course of the Municipal Improvements pursuant to the Agreement.

Consulting Engineer shall mean a Professional Engineer with a Permit to Practice granted by the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) and its duly accredited representatives, hired by the Developer and who is a member in good standing of APEGGA. The Consulting Engineer is responsible to the Developer for the design and inspection of the construction and installation of the Municipal Improvements pursuant to the Agreement by or at the expense of the Developer. The responsibilities of the Consulting Engineer include, but are not limited to:

preparation of designs and specifications
Field Services
More specifically, the Consulting Engineer's responsibilities include, but are not limited to:
project planning
obtaining permits and approvals
cost estimation and control
preparation of tender and contract documents
contract and construction management, co-ordination and review
quality control and assurance
developer representation
records management
maintenance period monitoring
determination of what levels, in excess of the minimums contained herein, are to be provided
Shall attend pre construction meetings

Contractor shall mean the individual or corporation hired by the Developer to supply, construct and/or install the Municipal Improvements pursuant to the Agreement by or at the expense of the Developer. The

Contractor shall supply materials and carry out the construction and installation in strict accordance with the Standards & Guidelines.

Developer shall mean the individual and/or corporation who proposes to install and construct the Municipal Improvements as defined in the Agreement as associated with permits or as required by the Town By-Laws. The Developer shall ensure that all materials supplied and the construction, installation and inspection of all of the Municipal Improvements conform in all respects to the Standards & Guidelines.

Development Area shall mean that portion of the lands legally described and delineated in the Agreement.

Engineer shall mean the Town of Canmore Manager of Engineering, his/her duly authorized representative or such other engineer as may from time to time be duly authorized and appointed in writing by the Town of Canmore.

Engineering Department shall mean the Town of Canmore Environmental Department.

Field Services shall mean the services required of the Consultant

Final Acceptance Certificate (FAC) shall mean the certificate issued by the Consulting Engineer stating that the Municipal Improvements and materials have been constructed, installed and inspected in conformance with the Agreement, the Standards & Guidelines and the Engineers instructions and that all defects and deficiencies in the Municipal Improvements 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.

Full-time Inspection shall mean the providing of a qualified on-site inspector during the course of the Municipal Improvements. See Field Services

"**Grading**" is the moving, altering, measuring and associated works of all earthworks needed for a project. Earthworks are meant to include, but not limited to, all soils, gravels, growing mediums, sand, rocks, sod and planting materials being brought into and leaving the site, as well as digging and excavating of the site itself (including off sites) and associated works of the project.

Guidelines shall mean the most recent edition at the time of Plan acceptance of the Town's Engineering Design Guidelines, the Town's Construction & Landscaping Standards, the Town's Open Space Development Guidelines and/or any supplementary specifications, requirements or drawings accepted by the Town.

Inspector shall mean Town of Canmore personnel, authorized by the Town to conduct site inspections.

Landscaping includes the modification or enhancement of a site, as per the Town's Landscaping Standards and Open Space Development Guidelines:

- by means of the growing or planting of any type of vegetation whatsoever;
- by means of the installation, construction or placement of inanimate materials such as brick, stone, concrete, tile and wood (excluding monolithic concrete and asphalt);
- by means of 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 the total construction and the carrying out and doing of all things, whether or a temporary or permanent nature, required and governed by the Agreement and Standards & Guidelines. Furthermore, it shall mean and include, within and without the Development Area, those services and facilities outlined as follows, as identified in the accepted Plans and other Plans prepared by the Developer or Consultant in accordance with the Guidelines, and accepted by the Town for the Development:

- All sanitary sewer mains, service connections, interceptors, sampling manholes, lift stations, force mains and appurtenances; and

- All drainage systems, including storm sewers, storm sewer connections, catch basins, interceptors, infiltration systems, storm retention ponds and associated works, all as and where required by the Town; and
- All water mains, including all fittings, valves, pressure reducers, pressure boosters and hydrants and looping as required by the Town, in order to safeguard and ensure the continuous and safe supply of water in the Development Area; and
- All concrete curbs, gutters, sidewalks, driveway crossings and aprons, and sub-grade preparation, sub-base, base and asphaltic or concrete pavement; and
- All lighting systems for streets, walkways, parking areas and municipal lands as and where required by the Town; and
- All traffic signs, traffic control signals, underground conduits, pavement markings, street signs, development identification signs, zoning signs, and directional signs, berming and noise attenuation devices all as and where required by the Town; and
- All walkway systems and landscaping on both private property and Municipal Lands which are to be constructed and installed to the satisfaction of the Town, and in accordance with the landscaping Plan to be submitted for the approval of the Town; and
- Such construction or development of streets and lanes as may be required by the Town; including, but in no manner limited to, a second or temporary access for vehicular traffic from the Development Area; and
- The restoration of all Municipal Lands to the Town's satisfaction which are disturbed or damaged in the course of the Developer's work; and
- The relocation, to the Town's satisfaction, of all existing utilities and Municipal Improvements as required by the Town as a result of the installation and construction of other utilities and Municipal Improvements pursuant to this Agreement; and
- Such uniform fencing, (noise attenuation, or screen) either permanent or temporary, of a standard and of a design satisfactory to the Town, all of which is to be constructed and located to the satisfaction of the Town; and
- All utilities including electricity and natural gas; such utilities to be provided to a standard and design to be approved by the appropriate utility company.

Plans shall mean plans and specifications prepared by the Consultant covering the design, construction and installation of all Municipal Improvements. All reference to approved plans as signed and dated by the Engineer.

Standards & Guidelines shall mean the most recent edition at the time of Commencement of Construction, of the following Town documents:
Municipal Development Plan, *Specifically Part 4*
Town Bylaws – *Specifically By-Law 9-99*
Mining the Future
Sustainability Matrix
The Natural Step
Engineering Design Guidelines
Construction Standards
Landscaping Standards
Open Space Development Guidelines
Mountainous Terrain Guidelines
and/or any supplementary specifications, requirements or drawings accepted by the Town.

Storm Specific Landscaping – landscaping that works in unison and as part of a storm system for filtration or other purposes.

Town or Town of Canmore shall mean the corporation of the Town of Canmore and/or the land lying within the corporate limits of the Town, as the context requires.

Warranty Period, shall mean:
a) a warranty period of TWO (2) years for all Municipal Improvements, excepting Landscaping;
b) a warranty and maintenance period of TWO (2) growing seasons for Landscaping.

Town of Canmore
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08	Engineering

Item Code	Description/Title	Unit Measure	2009 Fee	2010 Fee
1.00	**□u□di□isions □□s □er □□□□ Engineering Design Guidelines□Dr□□ings □ection □□□□**			
1.01	Project/Re-districting - Proposed Area Redevelopment Plan (minimum 3.0 hectares)	per/hectare	440.00	450.00
2.00	**□ite De□elo□□ ents □□ere D□□□s □re □e□uired □□s □er □□□□ Engineering Design Guidelines□Dr□□ings □ection □□□□**			
2.01	Project/Small - Layout Plans (Utilities & Surface)	Base Fee	430.00	440.00
2.02	Project/Intermediate - Layout Plans (Utilities & Surface)	Base Fee	1,700.00	1,750.00
2.03	Project/Large - Layout Plans (Utilities & Surface)	Base Fee	5,100.00	5,200.00
2.04	Project/Large - Stormwater Management Report	Base Fee	510.00	520.00
2.05	Project/Large - Traffic Impact Report	Base Fee	510.00	520.00
2.06	Project/Medium/Large - Wellhead Protection Area Impact Report	Base Fee	510.00	520.00
3.00	**Dr□□ing □e□ie□s □in □ddition to t□e □□o□e□**			
3.01	3rd Review (additional charge)	per/review	620.00	630.00
3.02	4th + Review (additional charge)	per/review	1,245.00	1,260.00
3.03	Record Drawings (additional charge for errors or omissions)	per/review	620.00	630.00
3.04	Request for Variance (additional charge for each variance to Subdivisions & Site Develo	per/review	130.00	130.00
4.00	**□ns□ections □in □ddition to t□e □□o□e□□□ □ter □□in □ressure □est □De□Co□ □Cert □Const Co□ □Cert □□in□l □cce□t Cert**			
4.01	3rd Inspection (additional charge)	per/inspect	1,130.00	1,130.00
4.02	4th + Inspections (additional charge)	per/inspect	1,700.00	1,700.00
4.03	Non-compliance Notice and Re-inspection (each occurrence)	per/inspect	110.00	110.00
4.04	Stop Work Order and Re-inspection (each occurrence)	per/inspect	275.00	280.00
5.00	**□ingle □□□ il□ □Du□le□ □□ldg □er□ it □□□lic□tion □e□ie□ & □er□icing □ns□ection □□ere no D□□□is □e□uired**			
5.01	Review and 1st Inspection	per/inspect	220.00	220.00
5.02	Each Additional Inspection/Failed Test	per/inspect	110.00	110.00
6.00	**□iscell□neous □er□ its**			
6.01	Excavation Permit Fee, Completion Inspection & Deposit Release (see note 4)	per/permit	555.00	555.00
6.02	Note 4 - Excavation Permit Fee Security Deposit	security fee	5,520.00	5,520.00
6.03	Blasting Permit Fee	per/permit	665.00	665.00
6.04	Excavation Permit Fee, Completion Inspection & Deposit Release (see note 4) if excavation has commenced before an Excavation Permit has been issued.	per/permit	1,100.00	1,100.00
6.05	Franchise Utilities Excavation Permit Fee, Completion Insp. & Deposit Release (see note	per/permit	per agreement	555.00
6.06	Note 4a - Excavation Permit Fee Security Deposit	security fee	per agreement	per agreement
6.07	Non-compliance Notice and Re-inspection (each occurrence)	per/inspect	110.00	110.00
6.08	Stop Work Order and Re-inspection (each occurrence)	per/inspect	280.00	280.00
7.00	**□iscell□neous □u□lic□tions & □te□s □or □□le**			
7.01	Consultant's Guidelines for Subdivisions & Developments - latest issue	per copy	16.00	16.00
7.02	Engineering Design Guidelines, Construction & Landscaping Standards - latest issue	per copy	52.00	52.00
7.03	2001 Transportation Master Plan	per copy	52.00	52.00
7.04	Utility Master Plans	per set	105.00	105.00
7.05	1998 Plans - Water, Sewer and Stormwater	per set	79.00	79.00
7.06	2003 Plans - Water and Sewer	per set	52.50	52.50
7.07	2003 Plan - Stormwater	per set	30.90	30.90
7.08	Public Tender Documents (for capital projects tendered pursuant to Purchasing Policy)	per copy	52.50	52.50
7.09	Civic Addressing and Road Network in Colour -Special order only**	per sheet	21.00	21.00
7.10	Civic Addressing Map in Black and White	per sheet	10.50	10.50
7.11	Legal Basemap – 2 Sheet in Black and White	per sheet	21.00	21.00
7.12	Land Use Bylaw map (Zoning) in Black and White	per sheet	15.50	15.50
7.13	Land Use Bylaw map (Zoning) in Colour – Special order only**	per sheet	27.00	27.00
7.14	Photocopies (black & white)	per sheet	0.52	0.52
8.00	**Digit□l □roducts □or □□le □icensing □gree□ ent □e□uired□**			
8.01	Contours 0.5m intervals (2008)	per file	110.00	110.00
8.02	750 x 1200 m Contours Tiles (2008)	per file	30.00	30.00
8.03	Edge of Pavement and Sidewalks	per file	110.00	110.00
8.04	Water System*	per file	110.00	110.00
8.05	Sanitary System*	per file	110.00	110.00
8.06	Storm System* (* 10% discount if water, sanitary and storm are purchased together)	per file	110.00	110.00
8.07	2003 Canmore Orthophoto (b/w) built-up area (MrSid)	overall	535.00	100.00
8.08	2003 Canmore Orthophoto Tile (b/w) 750 x 1200m (TIFF)	each	21.00	21.00
8.09	2008 Canmore Orthophoto (colour) built-up area (MrSid) 1:5000	overall	600.00	600.00

Town of Canmore
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8.10	2008 Canmore Orthophoto Tile (colour) 750 x 1200m (TIFF) 1:5000	each	30.00	30.00
8.11	Data Research and Processing, As-Built information incl PDF or CD if avail	per research fee	25.00	25.00
8.12	2009 Orthophoto 1:30,000 (colour) - Mr. Sid File	overall	200.00	200.00
8.13	Disk for Digital Products when requested (normal delivery will be via email attachment)	per disk	5.15	5.15
9.00	**□ □□□ing & □odelling □er□ices**			
9.01	Custom Mapping work - to be quoted	per hour	67.00 min	70.00 min
	END			

Appendix C – Letter of Engagements

(*date*)

Town of Canmore
Engineering Department
902 – 7th Avenue
Canmore, AB T1W 3K1

Attention: Kevin Van Vliet, M. Eng, P.Eng
Manager of Engineering

Re.: **Notice of Engagement - Consulting Engineering Services**
(*insert development name and stage*)

Dear Mr Van Vliet,

Please be advised that (*insert developers corporate name*) of (*insert developer's complete mailing address*) has retained the services of (*Consulting Engineer's name*) of (*insert Consulting Engineer's complete mailing address*) for the purposes of providing Services as defined in the Town of Canmore document entitled "***Engineering Design and Construction Guidelines***".

Sincerely,

ABC Developments (*insert developer's corporate name*)

John Doe (*insert signing authority's name*)
Director (*insert signing authority's title*)

cc. Planning Department

Town of Canmore

FINAL ACCEPTANCE CERTIFICATE

-INFRASTRUCTURE-

Subdivision:_____ **Submission Dated:_____**
Owner: Town of Canmore **SB or DP#:_____**
Contractor:_____ **Utility:_____**
Consulting Engineer:_____
Boundary of Area: (see attached map)

CONSULTING ENGINEER'S CERTIFICATE:

I, _____, Professional Engineer, of the firm of_____, Consulting Engineers, who are engaged by the Developer to design and inspect the construction and installation of Municipal Improvements do hereby certify that the Municipal Improvements within the area shown on the attached plan, have been constructed, installed and inspected, as far as can be practically ascertained, in conformance with the applicable Agreement, the Town of Canmore's Standards & Guidelines, accepted designs or as otherwise required by the Town of Canmore Engineer, and that all defects and deficiencies in work and materials have been reported to the Town of Canmore and have been remedied by the Developer.

I confirm that I have been empowered by the Developer to comply with and perform all of the Consulting Engineer's obligations and to provide all of the Field Services identified in the most recent edition of the Town of Canmore's "Consultant's Guidelines for Subdivisions and Developments".

Inspector: _____ _____
(Type name) **(Signature)**

Consulting Engineer: **Permit to Practice:**
(seal, signature and date)

REJECTION OF CONSULTING ENGINEER'S CERTIFICATE:

Date:_____ _____
TOWN OF CANMORE
Manager of Engineering

Reason:_____

FINAL ACCEPTANCE OF CONSULTING ENGINEER'S CERTIFICATE:

Date:_____ _____
TOWN OF CANMORE
Manager of Engineering

Town of Canmore

CONSTRUCTION COMPLETION CERTIFICATE

-INFRASTRUCTURE-

Project:_____ **Submission Dated:**_____
Owner: Town of Canmore **SB or DP #:**_____
Contractor:_____ **Utility:**_____
Consulting Engineer:_____
Boundary of Area: *(see attached map)*

CONSULTING ENGINEER'S CERTIFICATE:

I, _____, Professional Engineer, of the firm of _____, Consulting Engineers, who are engaged by the Developer to design and inspect the construction and installation of Municipal Improvements, do hereby certify that the Municipal Improvements within the area shown on the attached plan have been constructed, installed and inspected, as far as can be practically ascertained, in conformance with the applicable Agreement, the Town of Canmore's Standards & Guidelines, accepted designs or as otherwise required by the Town of Canmore Engineer, and that all defects and deficiencies in work and materials have been reported to the Town of Canmore and have been remedied by the Developer.

I confirm that I have been empowered by the Developer to comply with and perform all of the Consulting Engineer's obligations and to provide all of the Field Services identified in the most recent edition of the Town of Canmore's "Consultant's Guidelines for Subdivisions and Developments".

Inspector: _____ _____
(Type name) *(Signature)*

Consulting Engineer:
(seal, signature and date)

Permit to Practice:

REJECTION OF CONSULTING ENGINEER'S CERTIFICATE:

Date:_____ _____
TOWN OF CANMORE (Manager of Engineering)

Reason:_____

ACCEPTANCE OF CONSULTING ENGINEER'S CERTIFICATE:

Date:_____ _____
TOWN OF CANMORE (Manager of Engineering)

Earliest Warranty Period Expiry Date:_____