Town of Rocky Mountain House

DESIGN GUIDELINES

Version 2020




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PURPOSE

The Design Guidelines Manual provides information regarding the Town of Rocky Mountain House's (Town) standards governing the subdivision design, servicing standards, the design and construction approval process, and the as-constructed drawing submission requirements.

The primary focus of this document is to aid the Consulting Engineer in the preparation of Construction Drawings. It is the responsibility of the Consulting Engineer to ensure that the design conforms to these Guidelines and to notify the Town if any deviations from Town standards have been made.

The purpose of The Town's review of Construction Drawings is to ensure that the Development is designed and constructed in general conformance with Town standards, such that upon acceptance of the Development by The Town, the future public responsibilities for maintenance fall within normal and reasonable levels.

These Design Guidelines do not attempt to set rigid policies, but rather provides the Owner/Applicant with a guide outlining the Town's requirements. Where unusual or complicated design situations arise, good engineering judgement should prevail. The Town reserves the right to require a deviation from these Design Guidelines where conditions warrant same.

The Design Guidelines are predominately for use in new areas. Slight modifications may be required in older areas (i.e., soft conversions of the imperial line assignments, right-of-way restrictions, etc.).

These Design Guidelines will be reviewed periodically and updated as required.

1.0 DEFINITIONS

Unless the context requires otherwise:

Acceleration Lane means an auxiliary lane to enable a vehicle to increase speed and merge with through traffic.

Access Management means the application of roadway design and traffic operations to the location and design of access from the roadway adjacent to the land uses.

Applicant means a person applying for the approval of a subdivision, pursuant to the provision of the Municipal Government Act, as amended, or a person applying for development other than subdivision, whether as the Owner of the property proposed to be subdivided or developed or as agent for the Owner or their contractor.

Arterial Roadway means a roadway with the primary function of carrying all types of through traffic from one area to another and a secondary function of providing access to adjacent parcels of land.

Auxiliary Lane means a lane in addition to, and placed adjacent to, a through lane intended for a specific maneuver such as turning, merging, diverging, weaving and for slow vehicles.

Average Annual Daily Traffic (AADT) means the total volume of traffic passing a point or segment of a roadway, in both directions for one year, divided by the number of days in the year.

Boulevard means the strip of land paralleling the roadway between the curb lines or the lateral boundary lines of a roadway and the adjoining property or between curbs on median strips or islands, but does not include curbs, sidewalks, ditches or driveways.

Channelization means the separation and direction of traffic movements and pedestrians into defined paths at an at-grade intersection through the use of geometric features, pavement markings and traffic control devices.

Collector Roadway means a roadway on which traffic movement and access have similar importance and provides for traffic movements between arterial and local roadways and providing access to adjacent parcels of land.

Community Sewer System means a sanitary sewer, or a system of sewage disposal works which is owned, operated, and maintained by the Municipality.

Community Water System means a waterworks system, which is owned, operated and maintained by the Municipality.

Construction Completion Certificate means the certificate issued by the Town certifying the completion of the municipal improvements, or a portion thereof, once the municipal improvements have been constructed and installed by the Applicant to the satisfaction of the Municipality without defects or deficiencies.

Construction Drawings shall mean those Engineering Plans and Profiles prepared by the Consulting Engineer, showing the details of the installation of the various Municipal Improvements within the Development using standard engineering symbols and forms, and conforming to the Design Guidelines.

Construction Specifications shall be the documents prepared by the Consulting Engineer specifying the legal, administrative, and technical aspects of the Municipal Improvements, all of which shall conform to the minimum requirements as outlined in the Town's Design Guidelines.

Consulting Engineer shall mean a Professional Engineer who is an authorized officer of a Consulting Engineering firm, retained by the Owner/Applicant, who has designed the Municipal Improvements and/or supervised the installation of the same within the Development according to the approved plans and specifications.

Corporation Stop means a cock controlling the flow of water or gas from mains to individual consumers.

Council means the Council of the Town of Rocky Mountain House.

Cross-Slope means the average grade between the edges of a cross-section element.

Crosswalk means any part of a roadway specifically intended for pedestrian crossing, which may be so indicated by signs, lines, markings, or other devices.

Cul-de-sac means a local street that is connected to the remainder of the road network at only one point and that terminates in a vehicle-turning area.

Curb means a structure with a vertical or sloping face along the edge of a lane or shoulder which strengthens or protects the edge and clearly defines the edge.

Curb Drop means the transition length required to decrease the curb height to accommodate a driveway or sidewalk ramp.

Curb Return means the curved section of curb used at intersections or driveways to join tangent sections of curb.

Deceleration Lane means an auxiliary lane to enable a vehicle exiting from a roadway to reduce speed after it has left the through traffic lanes.

Design Speed means a speed selected that corresponds to the geometric features of the roadway design, which correlate to the maximum safe speed, when conditions are favourable.

Development shall be defined in accordance with Part 17 Section 616 of the Municipal Government Act, as amended.

Development Agreement shall be the document prepared by the Town specifying legal, administrative, and technical requirements of the Owner/Applicant for developing lands which shall become the responsibility of the Town.

Development Authority shall mean a development authority established pursuant to Part 17 Division 3 of the Municipal Government Act, as amended.

Development Permit shall be the document prepared by The Town specifying legal, administrative, and technical requirements of the Owner/Applicant for developing lands which shall not become the responsibility of the Town.

District means an area created by the current Town of Rocky Mountain House Land Use Bylaw, as amended, or as replaced from time to time both before and after the effective date of this document.

Drainage System means a system of works designed and constructed to control the flow of storm water and/or groundwater.

Expressway means a divided arterial roadway for through traffic with full or partial control of access and with some interchanges.

Final Acceptance Certificate means a written acceptance issued by the Town for the municipal improvement, or a portion thereof, upon the completion of any repairs for defects or deficiencies, and the expiration of the Maintenance period.

Freeway means a roadway limited to through traffic, with access only through interchanges.

Frontage means the length of a lot boundary which immediately adjoins a highway other than a lane or a walkway.

Gradient means the rate of rise or fall with respect to the horizontal distance.

Horizontal Alignment means the configuration of a roadway as seen in plan view.

Island means a defined area between traffic lanes for control of vehicle movements or for pedestrian refuge.

Land Use Bylaw means the current Land Use Bylaw of the Town of Rocky Mountain House as amended.

Lane means a part of the travelled way intended for the movement of a single line of vehicles.

Level One Landscaping means the work included in preparing the site to specified grades, placing and levelling topsoil, seeding to grass, and establishing turf; all in accordance with the Town's current Design Guidelines.

Level Two Landscaping means the work included in planting shrubs, trees, or other plant amenities, all in accordance with the Town's current Design Guidelines.

Level Three Landscaping means the work included in supplying and installing various non-vegetative park facilities and/or amenities (i.e., Trails, trail directional signs, playground equipment, bollards, post and cable fencing, site furnishings, etc.), all in accordance with the Town's current Design Guidelines.

Longitudinal Barrier means a barrier adjacent to the roadway whose primary function is to prevent penetration and to safely redirect an errant vehicle away from a roadside or median hazard. **Lot** shall be defined in accordance with Part 17 Section 616 of the Municipal Government Act, as amended.

Lot Depth means the average horizontal distance between the front and rear lot lines.

Lot Line, Front means the property line of a lot abutting a public roadway other than a lane. In the case of a corner lot, the front lot line is the shorter of the property lines abutting a public roadway, other than a lane.

Lot Line, Rear means either the property line of a lot which is furthest from and opposite the front lot line, or where there is no such property line, the point of intersection of any property lines other than a front lot line which is farthest from and opposite the front lot line.

Lot Line, Side means the property line of a lot other than front lot line or rear lot line.

Lot Width means the horizontal distance between side lot lines of the site measured at a distance from the front lot line equal to the minimum required front yard.

Median means a reserve area, including shoulders, between lanes carrying traffic in opposite directions.

Median Barrier means a longitudinal barrier used to prevent an errant vehicle from crossing the median into hazard.

Municipal Improvements shall mean all improvements within the Development, including, but not restricted to:

- paved roadways, including pavement marking;
- sidewalk, curb and gutter;
- paved or gravel lanes;
- water, sanitary, and storm sewer mains;
- water, sanitary, or storm service connections;
- shallow utilities, including electrical distribution (excluding service leads), street lighting, natural gas, telephone, and cable television;
- landscaped boulevards, medians, municipal reserves, and public utility lots;
- paved, concrete, and/or shale walkways;
    - park and recreation amenities (i.e. playground equipment, benches, etc.); and;
    - traffic control, street name, subdivision information (including updates) signs.

Municipality or Town means the Town of Rocky Mountain House or the area within the municipal boundaries thereof as the context may require.

Outer Separation means the area between the edge of the travel lanes of a roadway and the edge of the travel lanes of an adjacent, parallel roadway.

Parcel means the aggregate of the one or more areas of land described in a Certificate of Title or described in a Certificate of Title by reference to a plan filed or registered in a Land Titles Office.

Pathway means a path which follows routes independent of motor vehicle roadways, sidewalks and bike lanes, intended for use by pedestrians and other non-motorized modes of travel.

Professional Engineer means a person who is registered or duly licensed as such with the Association of Professional Engineers, Geologists, and Geophysicists of Alberta (APEGGA).

Public Lane (Alley) means a narrow minor street, usually without sidewalks, located at the rear of lots for vehicle access to garages or other parking spaces and which also serves as a utility right-of-way.

Right-of-Way means the area of land acquired for or devoted to the provision of a roadway.

Roadside means the area adjoining the outer edge of the roadway to the right-of-way limits.

Roadside Barrier means a longitudinal barrier used to shield roadside obstacles or non-traversable terrain features. It may occasionally be used to protect pedestrians from vehicle traffic.

Sidewalk means a travel way intended for pedestrian use, following an alignment generally parallel to that of the adjacent roadway.

Service Level means the standard of municipal services required for development of subdivisions under the provisions of this document.

Site means any combination of lots or titled areas for which application is made for a Development Permit.

Statutory Plan means a planning document as described in Part 17, Division 4 of the Municipal Government Act, as amended, including Intermunicipal Development Plans, Municipal Development Plans, Area Structure Plans, or Area Redevelopment Plans.

Statutory Right-of-Way means the landowner continues to own the land and has only given up defined rights on the portion of land used for the right-of-way or easement. The agreement defines all the rights and obligations of the holder of the easement or right-of-way and the restrictions that are placed upon the property subject to the agreement.

Subdivision means the division of land into two or more parcels by plan or apt descriptive words.

Subdivision Authority means any person duly authorized by the Municipal Council to act as Subdivision Authority Officer pursuant to the provisions of the Municipal Government Act, as amended.

Superelevation means the gradient measured at right angles to the centre line across the roadway from the inside to the outside edge of a curve.

Throat Length means the provision of sufficient unobstructed on-site driveway length to prevent stopped vehicles from blocking the path of entering vehicles or vehicles travelling along the circulation roadways on site.

Through Lane means the lane intended for through traffic movement.

Town shall mean the Corporation of The Town of Rocky Mountain House in the Province of Alberta.

Town Engineer shall mean the Director of Engineering & Operations or their authorized Representative.

Traffic Calming means the combination of mainly physical measures that reduce the vehicle speed and its associated negative effects, alter driver behaviour, and improve conditions for non-motorized street users.

Trail means a joint-use travel way intended for both pedestrian and cyclist use, following an alignment generally parallel to that of the adjacent roadway.

Vertical Alignment means the configuration of a roadway as seen in longitudinal section.

Warrant means a criterion that identifies a potential need for a transportation measure, such as traffic light, physical barrier, extra lane, street lighting or another requirement.

Watercourse means any natural or man-made drainage course or source of water, whether usually containing water or not, and includes any lake, river, creek, spring, ravine, swamp, gulch, or source of groundwater, whether enclosed in a conduit or not.

2.0 SUBDIVISION AND DEVELOPMENT REQUIREMENTS AND REGULATIONS

2.1 PURPOSE STATEMENT

No person shall subdivide or develop land in the Town except in compliance with the provisions of this document, the Land Use Bylaw, any applicable statutory plan, or the requirements of the Municipal Government Act, as amended. Compliance with the above documents or regulations does not remove obligations to conform with other municipal, provincial, or federal legislation, policies, or bylaws, or any caveats, covenants, or easements that may be attached to a site.

2.2 GENERAL REQUIREMENTS FOR DESIGN OF SUBDIVISIONS

No subdivision of land shall be approved which, in the opinion of the subdivision authority:

a. Is not suited to the configuration of land being subdivided,
b. Is not suited to the use to which it is intended,
c. Is not in conformance with the Land Use Bylaw,
d. Is not in conformance with any statutory plan adopted by the Town, or
e. Will make impracticable the future subdivision of the land within the proposed subdivision or of any adjacent land.

2.3 AREA, SHAPE AND DIMENSIONS OF LOTS

a. No subdivision shall be created in any district so that any lot created by the subdivision has an area in square metres or hectares or a width in metres less than those set out for the district in which it is located as set out in the current Town of Rocky Mountain House Land Use Bylaw, as amended.
b. The side lines of parcels to be created by the subdivision shall be as close as practicable at right angles or radial to street lines and the Subdivision Authority shall ensure that the parcels to be created are logical in shape and dimensioned for the intended use.
c. No panhandle parcels will be permitted as part of any decision of a tentative plan of subdivision by the Subdivision Authority.
d. The location of all public utility lots, utility rights-of-way, municipal reserve and environmental reserve parcels proposed under a tentative plan of subdivision shall be to the satisfaction of the Subdivision Authority.

3.0 PROVISIONS OF SERVICES IN SUBDIVISIONS AND DEVELOPMENTS

3.1 LEVEL OF SERVICE

Unless otherwise approved by the Subdivision Authority, all subdivisions and developments shall be provided with services as established by the current Town of Rocky Mountain House Land Use Bylaw, as amended, in accordance with the provisions of Schedule A of this document.

3.2 EXPENSE OF SERVICE TO BE BORNE BY THE OWNER/APPLICANT

The following expenses are to be borne solely by the Owner/Applicant:

a. All reasonable and justifiable charges or accounts rendered to the Town by Consulting Engineers that may be engaged by the Town from the time plans are submitted until final acceptance of all municipal improvements.
b. All reasonable and justifiable legal charges or accounts rendered to the Town by solicitors from the time of application for subdivision until final acceptance of all municipal improvements.
c. Cost of additional work performed or of work repaired or redone by reason of orders and direction by the Town's Engineer under the terms of the Development Agreement.
d. Cost of providing the security and insurance required to be provided by the Owner/Applicant under the terms of the Development Agreement.
e. Cost of preparation of an easement or utility right-of-way document(s) to be provided by the Owner/Applicant including cost of registration of the same.
f. Cost of land title registrations of the Development Agreement.

3.3 INDEMNITY AND INSURANCE

The Owner/Applicant shall indemnify and save harmless the Town from any and all losses, costs. The Owner/Applicant shall indemnify and save harmless the Town of damages, actions, causes of action, suits, claims and demands, resulting from anything done or omitted to be done by the Owner/Applicant in pursuance or purported pursuance of this Agreement.

The Owner/Applicant must provide and maintain, at the Owner/Applicant's expense, at all times until the Certificate of Final Acceptance is issued, Commercial General Liability Insurance coverage, covering premises and operations liability, contingency liability with respect to the operations of contractors and sub-contractors, completed operations liability, contractual liability and automobile liability for owned, non-owned and hired units.

The limits of liability must be not less than $2,000,000 for each occurrence for bodily injury, death and damage to property. Each policy must provide that it cannot be cancelled, lapsed, or materially altered without a minimum thirty (30) days notice in writing to the Town by registered mail, must name the Town and its officials and employees as an additional insured, and must contain a cross-liability clause.

The insurance coverage required to be provided by the Owner/Applicant may be embodied in a blanket insurance policy obtained by the Owner/Applicant. The Owner/Applicant must deliver a copy of each insurance policy to the Town prior to the commencement of Construction of the Works and Services. If the Owner/Applicant fails to obtain and maintain the said insurance or deliver the said policy or policies to the Town, the Town may but will not be obliged to obtain and maintain such insurance at the expense of the Owner/Applicant.

3.4 COMMUNITY MAILBOXES

The Consulting Engineer shall submit a copy of the current subdivision plan along with a request for mailbox locations to Canada Post.

Canada Post will determine the final location of community mailboxes based on various criteria, including the affect upon the ratepayer who is immediately adjacent to the scheduled community mailbox location.

Upon receipt of the mailbox location plan from Canada Post, the Consulting Engineer shall ensure that the community mailbox locations, wherever possible are:

a. Along the flankage (side yard) of corner lots midway between the front and rear property lines.

   Note: Current design standards for local roadways allow for a 1.0 m boulevard (back of walk to property line); however, the width of the concrete pad for the community mailbox is 1.2 m (back of walk to back of pad). The length of the pad parallel to the sidewalk will vary dep ending on the number of modules to be located at any location. The Owner/Applicant will be required to provide a 0.5 m easement along the sideyard of a lot at these locations to allow for the encroachment of the community mailbox onto private property. Canada Post will confirm the final location of the mailbox pad with the Owner/Applicant and/or property owner prior to installation.

b. Next to an open space or playground.
c. On the predominantly homecoming side of the street, so that people can pick up their mail on the way home without crossing the street.
d. On the Town boulevard, close to the sidewalk, to avoid creating grass areas that are difficult to cut.
e. Not along Town major thoroughfares, since no parking is allowed on these roads.
f. Not closer than 10 m from a hydrant.
g. Not on a utility easement or over a utility trench (deep or shallow).
h. Not too close to streetlight standards, street name poles or any raised utility boxes such as a transformer.
i. The location of the boxes shall not impede the pedestrian and vehicular sight distances.
j. Community mailboxes are normally installed within public road rights-of-way. Multiple unit developments, such as townhouses or condominiums, may have the community mailboxes installed within the boundaries of said private development lands. The Owner/Applicant must enter into a Delivery Services Agreement/License with Canada Post if this type of delivery is desired or required. The Owner/Applicant should contact Canada Post for further information.

The Consulting Engineer shall advise Canada Post of the acceptability of the locations or suggest a revised location for consideration by Canada Post.

The community mailbox locations must also be shown on all applicable drawings and sales brochures.

3.5 TRAFFIC IMPACT ASSESSMENT

Depending on the nature of the development, the surrounding neighbourhood and the adjacent transportation system, the Town may require that the Owner/Applicant submit a Traffic Impact Assessment in accordance with Schedule B Section 6.4, completed by a qualified Professional Engineer(s).

The cost for the preparation and submission of the Traffic Impact Assessment will be entirely borne by the Owner/Applicant.

3.6 OFFSITE UTILITIES IMPACT ANALYSIS

Depending on the nature of the development, the surrounding neighbourhood and the adjacent offsite utilities systems, the Town may require that the Owner/Applicant submit an Offsite Utilities Impact Analysis, completed by a qualified Professional Engineer(s). The Offsite Utilities Impact Analysis will discuss the impacts of the proposed development on the Town's water, sanitary and storm sewer systems.

The cost for the preparation and submission of the Offsite Utilities Impact Analysis will be entirely borne by the Owner/Applicant.

3.7 EXCESS OR EXTENDED CAPACITY

Pursuant to Section 651(1) of the Municipal Government Act, as amended, the Town may require that the Owner/Applicant provide excess or extended services to provide access to or service land other than the land being subdivided or developed.

3.8 COST OF EXCESS OR EXTENDED CAPACITY

Cost of excess capacity equals the cost of installing a system with excess capacity minus the cost of installing a system to service the proposed subdivision only or the minimum permitted for the size of line in the Town servicing standards, as amended, whichever is greater.

The determination of the cost of excess capacity shall be based on estimates prepared by a Professional Engineer representing the Owner/Applicant of the land being subdivided, agreed to by the Town's Engineer.

3.9 PAYMENT OF COST OF EXCESS CAPACITY

Where the Town requires the provision of excess capacity under Section 3.7, the cost of the excess capacity will be paid for by the Owner/Applicant of the land being subdivided.

3.10 COST RECOVERY BY AN OWNER/APPLICANT

Where the Owner/Applicant of land being subdivided pays for the cost of providing excess capacity, the Town may impose a charge on future subdivisions that would benefit from the excess capacity and shall compensate the Owner/Applicant all charges collected during the period beginning after the works or services were completed and ending on a date to be agreed upon by the Owner/Applicant and the Town. Failing agreement, the timeframe will be determined pursuant to the International Commercial Arbitration Act, but no charges are payable beyond ten (10) years from the date service is completed and a Final Acceptance Certificate is issued.

3.11 ENDEAVOUR TO ASSIST FOR EXCESS CAPACITY

The Town may, as a condition of an Owner/Applicant connecting to works and services where excess capacity has been provided, impose a charge on future subdivisions that would benefit from the excess capacity, which shall be calculated on a proportional basis. The proportion of costs to be imposed on an Owner/Applicant shall be derived on the basis of the capacity of the system to be utilized by the Owner/Applicant in relation to the total excess capacity provided.

In calculating the charge to be imposed on the Owner/Applicant who wishes to connect, interest calculated annually at the current Bank of Canada prime rate plus two percent (2%) shall be included in the total cost

of providing excess capacity. This shall be payable for the period commencing when the work or service providing the excess capacity was completed, up to the date that the connection is made.

3.12 OFF-SITE SERVICES

The Owner/Applicant shall be required to contribute towards the cost of upgrading or upsizing off-site roads and utilities.

3.13 RIGHT-OF-WAY AGREEMENT

Pursuant to Sections 648, 651 and 655 of the Municipal Government Act, as amended, where the provisions of this document require an Owner/Applicant to grant a utility or drainage right-of-way to the Town, the Owner/Applicant shall be required to enter into a development agreement and shall pay all associated costs.

3.14 SUBDIVISION ENDORSEMENT PRIOR TO COMPLETION OF WORKS AND SERVICES

Endorsement of a subdivision must be granted prior to the construction and installation of any and all works and services as prescribed in Schedules A to C hereto at the expense of the Owner/Applicant to serve said subdivision.

Construction and installation of the required works and services may begin prior to endorsement of the plan of subdivision where:

a. The Owner/Applicant provides a Letter of Credit to the Town in an amount representing Fifty Percent (50%) of the cost of installing and paying for all the works and services required as estimated by the Owner/Applicant's Engineer and approved by the Town's Engineer,
b. The Owner/Applicant has submitted Detailed Engineering Design Drawings, and
c. All plans and specifications have been approved by the Town.

3.15 SITE PREPARATION

a. The Owner/Applicant shall erect fencing and provide other measures satisfactory to the Town to ensure the stripping and grading does not encroach into Environmental Reserve land, where applicable.
b. The Owner/Applicant, at no expense to the Town, shall erect "Private Property" and "No Trespassing" signs on the perimeter of the lands, stating the Owner/Applicant's name and the telephone number of a representative.
c. The Owner/Applicant shall submit to the Town for approval, proposed access routes identifying streets for site preparation and general construction.
d. The Owner/Applicant shall be responsible for controlling restricted and noxious weeds and excessive vegetative growth within the Development Area.
e. No grading, filling, or excavation is permitted within existing utility and road rights-of-way, under any overhead utility lines, or over any underground utilities, unless prior written authorization has been obtained from the utility agencies concerned.
f. If, during stripping and grading operations or any other construction within the Development Area, the Owner/Applicant or any of their agents or contractors becomes aware of any contamination, the person discovering such contamination shall immediately report the contamination to Alberta Environment and Parks and the Town.

g. In the event the Owner/Applicant encroaches into the adjacent land during the stripping and grading operations, the Owner/Applicant, at its sole expense, shall rehabilitate the adjacent lands to the satisfaction of the adjacent landowners immediately after completion of the stripping and rough grading of the adjacent lands.
h. The Owner/Applicant, at its sole expense, and to the satisfaction of the Town's Engineer, shall rehabilitate in a timely manner any offsite areas or operations, storm water runoff, soil erosion, soil instability, sedimentation, dust or other problems which may arise from the stripping and grading. The Owner/Applicant shall employ the use of gravel pads to curb dirt, mud or other debris from being tracked out onto any streets located within and adjacent to the Development Area and reduce or stop activity when the site has excessive dust emissions.

3.16 DUST CONTROL

During construction of works and services, the Owner/Applicant shall be responsible for providing for and maintaining dust control at all times wherever:

a. The operation of any equipment causes dust that becomes a nuisance to property landowners and residents in the area; or,
b. Bare soil conditions are created in performing work.

Should the Owner/Applicant not implement dust control procedures as required or as directed by the Town's Engineer, the Town will undertake the dust control procedures and charge the Owner/Applicant to recover all costs incurred, including such things as engineering and administration costs, wages, equipment costs, etc.

3.17 CLEAN-UP

During construction of works and services within the subdivision or development, the Owner/Applicant shall be responsible for ensuring that the construction area shall be maintained free of accumulation of excess waste material and debris.

The disposal of waste materials and rubbish by burning or burial on the site will not be permitted. The disposal of volatile wastes such as mineral spirits, oil, gasoline or paint thinner into storm or sanitary sewer drains will not be permitted.

During and after construction of works and services, the Applicant shall be responsible for ensuring that all access streets into the subdivision or development are maintained free of accumulation of excess waste material and debris. The Town reserves the right to carry out the maintenance of such access streets and charge the cost of such work to the Owner/Applicant if the Owner/Applicant fails to restore the street(s) to normal levels within twelfth (12) hours of being notified by the Town.

3.18 CONSTRUCTION COMPLETION

Upon 100% completion of the works, the Consulting Engineer must schedule a field inspection with the Town's Engineer. Upon verification by the Town's Engineer that 100% Construction Completion of all works and service has been achieved, the Owner/Applicant must provide the Town with:

a. A confirmation of Professional Assurance,
b. Confirmation in writing from an Alberta Land Surveyor (A.L.S.) that all survey pins have been installed on the Parcel,

c. Record drawings of the Works and Services in the form specified in Schedule B,
d. All copies of required manuals, videos, construction photos, testing reports and results in the form specified in Schedule A and B, and
e. Completed Service Connection Reports.

Upon receipt of the above, the Town will issue the Construction Completion Certificate.

3.19 MAINTENANCE

Where the Owner/Applicant of land is required to construct and install works and services in accordance with the provisions of this Document, the Owner/Applicant shall be responsible to:

a. Provide the Town with a Letter of Credit for up to two (2) years to the value of 10% of the constructed works plus 200% of the value of Deficiencies as security against unsatisfactory operation and maintenance of the works and services during the maintenance periods specified in the Development Agreement. Identified deficiencies must be addressed in a timeline considered reasonable by the Town, and
b. Pay the Town the inspection fees as specified in the Development Agreement.

With reasonable notice, the Town may cash the Letter of Credit to address deficiencies that have not been appropriately remedied by the Owner/Applicant.

3.20 CERTIFICATE OF FINAL ACCEPTANCE

Upon the expiration of all Maintenance Periods, receipt from the Owner/Applicant of a Statutory Declaration and verification by the Town Engineer that all information, documents, agreements, covenants, and fees required from the Owner/Applicant and Design Engineer pursuant to this Document have been provided to the Town, the Town will:

a. Provide the Owner/Applicant with a Final Acceptance Certificate of all Works and Services, and
b. Release to the Owner/Applicant the balance of the Letter of Credit.

3.21 BUSINESS LICENSE

All contractors or other businesses undertaking works related to the requirements of this document must possess a valid business license from the Town.

ROCKY MOUNTAIN HOUSE

Where Adventure Begins!

Design Guidelines
Schedule A

Subdivision and Development

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1.0 GENERAL REQUIREMENTS AND APPLICANT RESPONSIBILITIES

Development of new areas requires comprehensive planning, and often land use redesignation and subdivision of land, in accordance with procedures and requirements set out in the Municipal Government Act, as amended, and the Subdivision and Development Regulation pursuant to that Act, as amended.

In the course of development, the following items may be required to be submitted to and approved by the Town:

- Area Structure Plan;
- Area Redevelopment Plan
- Land Use Bylaw Amendment;
- Outline Plan, Final Detailed Plans, and/or Specifications;
- Tentative Plan of Subdivision;
- Development Agreement;
- Plan of Subdivision for Endorsement;
- Development Permit; and/or
- Post Construction documentation.

2.0 NEIGHBOURHOOD SCALE STATUTORY PLANS

2.1 AREA STRUCTURE PLAN

If the area does not have an approved Area Structure Plan (ASP) in place, the Owner/Applicant is required to develop and provide one where deemed necessary by the Town and to their satisfaction.

The ASP outlines a vision and planning framework for the development, as well as specific servicing and phasing information. The ASP must be in conformance with the Town of Rocky Mountain House's Municipal Development Plan/Community Sustainability Plan.

The ASP must address the following specific items, in accordance with Section 633 of the Municipal Government Act, as amended:

a. The sequence of development proposed for the area,
b. The land uses proposed for the area, either generally or with respect to specific parts of the area;
c. The density of population proposed for the area either generally or with respect to specific parts of the area,
d. The general location of major transportation routes and public utilities, and
e. May contain any other matters, including matters relating to reserves, as the council considers necessary.

If the area has an approved ASP in place, any development applications with respect to the land must comply with that Plan. If the proposal does not comply, the Owner/Applicant is required to either apply to amend the Plan or adjust the development so that it complies with the ASP, in order for development to proceed. Any proposed amendment to an approved ASP must itself be approved by Council in accordance with the requirements of the Municipal Government Act, as amended.

2.2 AREA REDEVELOPMENT PLAN

In the review of any request for the redevelopment of existing neighbourhoods, the Town may either initiate, or require the creation of an Area Redevelopment Plan (ARP). The ARP must address the following specific items, in accordance with Section 635 of the Municipal Government Act, as amended:

a. The objectives of the plan and how they are proposed to be achieved,
b. The proposed land uses for the redevelopment area,
c. If a redevelopment levy is to be imposed, the reasons for imposing it,
d. Any proposals for the acquisition of land for any municipal use, school facilities, parks and recreation facilities or any other purposes the council considers necessary, and
e. May contain any other proposals that the council considers necessary.

2.3 SUPPORTING STUDIES

The majority of site assessment studies and reports should be undertaken through the ASP process. However, some additional supporting studies may be required to confirm conditions or information or provide more detailed analyses at such time as the Outline Plan is being prepared. The requirement of these studies will be determined by, and provided to the satisfaction of, the Town.

This section highlights various reports that may be required depending upon what the application is for and how it relates to existing Town infrastructure.

2.3.1 Environmental Site Assessment (ESA)

The Town is responsible to ensure that the land to be developed is suitable for the proposed land use (i.e., commercial, industrial, and residential). ESA are used to determine the environmental condition of the property and the site's suitability for the development proposed.

An ESA is required for any situation where contamination on or adjacent to the subject site poses a current or future environmental concern to the Public. The level of ESA required will vary depending on circumstance with each level building on the previous.

Phase 1 ESA

A Phase I ESA is a non-intrusive, historical evaluation of a site, intended to determine the potential of contamination on the site. A complete Phase I ESA is a requirement for all proposed developments at the Area Structure Planning stage. This is required to be prepared in accordance with accepted guidelines, practices, and procedures that include, but are not limited to:

- The Canadian Standards Association Publication titled "Phase 1 Environmental Site Assessment – Z768-01", and where applicable,
- The Alberta Environment and Parks publication No. T/573 titled "Phase I Environmental Site Assessment Guidelines for Upstream Oil and Gas Sites".

Phase 2 ESA

A Phase II ESA is an intrusive assessment intended to determine and characterize potential site contamination and to compare the concentrations of the contaminants to current relevant regulatory guidelines. This report shall be prepared in accordance with accepted guidelines, best practices, and procedures that include, but are not limited to:

- The Canadian Standards Association Publication titled "Phase II Environmental Site Assessment - Z769-00

Remediation Plan

The purpose of remediation is to mitigate site contamination. Once samples from a site meet the applicable guidelines the site is considered remediated. Where applicable, remediation certificates shall be applied for with the appropriate regulatory agency and submitted to the Town.

Risk Management Plan

Where site remediation is not possible a Risk Management Plan shall be developed and

implemented to protect the public from contaminants of concern. The plan will achieve this goal by managing exposure pathways to separate receptors from contaminants.

Triggers and Timing

A Phase I ESA report is required for an ASP approval, or if applicable, where environmental issues have not been considered in the past at subdivision, land use redesignation, or Development Permit application stage.

A Phase II ESA **is** required when:

a. The Phase 1 ESA indicates contamination exists,

b. There is a likelihood that contamination exists,
c. There is insufficient information to determine the likelihood of contamination existing on the site,
d. Historically the site contained or had an oil or gas operation / infrastructure,
e. Historically the site contained or had an environmentally hazardous operation / infrastructure (i.e., railway yard service area),
f. The site currently operates or contains environmentally hazardous materials (i.e., gas station),
g. The site contains high concentrations of substances which, due to the concentration, become harmful to the environment (i.e., salt storage),
h. The Phase I ESA indicates potential issues / impacts as a result of adjacent properties and to identify the impacts of the adjacent properties on the subject site, and/or
i. The Town has reason to suspect a potential issue relating to the site or adjacent sites.

If there is an identified need for a Phase II ESA, it will be required prior to a Clearing and Grading Permit being issued.

Remediation and / or Risk Management Plan are required when the Phase II ESA indicates that there is a requirement for remediation or risk management. The report(s) shall document:

a. How the site will be remediated and / or the risk managed to a level suitable for the intended development, and
b. Final confirmation testing and reporting will be required to verify remediation has taken place.

2.3.2 Geotechnical Report

The Owner/Applicant shall submit a Geotechnical Engineering Report prepared by a qualified Geotechnical Consulting Engineer, of sufficient detail to establish the suitability of the proposed subdivision for the type of development proposed in the Outline Plan.

The report shall evaluate soil characteristics and existing groundwater conditions and be based on test holes drilled at a maximum spacing of 150 m throughout the Development. The test holes are to be of sufficient depth to indicate soil conditions for utility construction.

In the event that the geotechnical investigation reveals areas of high-water table and/or unstable soils conditions, the report will recommend special techniques to ensure the stability of any of the proposed local improvements, which may be affected by these unstable conditions.

Report Requirements

Three copies of the report shall be submitted to the Town including the following information:

a. Test hole location plan and soil logs for each test hole,
b. Results of the tests noted above,
c. Water table contour map with seasonably adjusted water table shown at 0.50m intervals,
d. Recommendation on suitability of site for the proposed Development,
e. Comments on the soil bearing capacity, and
f. Recommendations with regard to trench excavation and backfill specifications, and road pavement structure requirements.

If required, slope stability and recommended setbacks from escarpments for various types of building foundations shall be submitted in a separate report.

Slope Stability Report Requirements

A Slope Stability Geotechnical Report is required for all sites where, in the opinion of the Town, slope stability is a concern. For development that borders an escarpment or embankment the Report should be provided as part of the ASP submissions. If a Report is not identified at the ASP, it may be required as part of the Servicing Study as more detail is available to land grading.

At a minimum, the scope of the report should provide:

a. Setback limits or development recommendations based on the recommended Factor of Safety. The minimum recommended setback shall be shown on the final development plan,
b. Establish a Factor of Safety with respect to the most probable adverse groundwater and loading conditions,
c. Top of embankment or escarpment,
d. Toe of slope (Note: Where the development at the toe of the slope is proposed, the report is to address the effect and extent of slope failure on the subject land and the adjacent properties and the protection of same*)*,
e. Erosion control and other mitigation measures (i.e., drainage works, grading, etc.) close to, along, and on the slopes crest, toe and face,
f. Appropriate recommendations pertaining to re-vegetation, dewatering, and slope reconfiguration (i.e., cutting, filling, re-grading, retaining walls, etc.),
g. Building location and foundation design, and
h. Utility and road infrastructure.

2.3.3 Transportation and Access

At the planning stage, the Applicant may be required to provide a Transportation Impact Assessment (TIA), which are typically required whenever a development has a significant impact on traffic operations on the adjacent transportation network.

The Town will determine if and to what level of detail a TIA will be at the time of the Area Structure Planning review process. The information, process, and data to be used for the study are detailed in Schedule B.

At a minimum, the ASP must address:

a. Evaluate the road access to the proposed development area;
b. Describe the road upgrades and intersection improvements that may be required to safely accommodate the increased traffic generated by the development; and
c. If required, right of way dedication for future widening or other improvements that will need to be accommodated as part of the proposed development.

2.3.4 Servicing Overview

At the planning stage, the Applicant may be required to provide a Servicing Overview, which are typically required whenever a development has a significant impact on the adjacent infrastructure networks.

The Town will determine if and to what level of detail a Servicing Overview will be at the time of the Area Structure Planning review process. The information, process, and data to be used for the study are detailed in Schedule B.

At a minimum, the ASP must address:

a. Water supply network, information on connections to the municipal system, and provisions for meeting fire flow requirements,
b. Sewage treatment network and information on connections to the municipal system;
c. Stormwater network that generally describes how stormwater runoff will be managed in the proposed development. The drainage system must ensure that post-development runoff to adjacent properties will be no greater than pre-development rates and include the necessary mitigation measures to protect existing downstream drainage systems and/or receiving water bodies. As a general consideration, a storm water pond site is to be contained within a public utility lot,
d. Describe the arrangements that will be made for the provision of shallow utilities, such as underground power, gas and telephone, and
e. Demonstrate how the design can accommodate for future connections to adjacent development areas, as applicable.

2.3.5 Oil and Gas Facilities

There are a number of active, suspended and abandoned oil and gas wells, including associated pipelines, compressor stations, etc., located in future development areas. The Alberta Energy

Regulator (AER) has established minimum development setbacks for the wells and pipelines. The setbacks are based on the content of the well or the product being conveyed in the pipeline. (i.e., sweet gas, sour gas (H_2S), etc.).

The Owner/Applicant is to review AER Directive 079 and Bulletin 2013-13, as updates and amended, in determining proposed setback distances. Specific setback distances will be imposed by the AER if an application is filed.

For initial Area Structure Planning purposes, the following will be required:

a. Drawing showing location and type of the well,
b. Drawing showing location of any pipelines, including right-of-way dimensions,
c. Copy of development approvals, including setbacks, issued by AER and the Licensee,
d. Illustration of the required setbacks, considering the following:
    - Active oil and gas well: ranging from 100m (assuming low level of sour gas) to 1.5km (assuming high level of sour gas).
    - Abandoned well: minimum setback of 5m from any overhead or underground structure. Access to well must be provided. Well is typically situated in a PUL upon final subdivision registration.
    - Abandoned pipeline: minimum setback is the edge of the pipeline right-of-way.
e. Copies of any reclamation certificates, and
f. Phase 1 Environmental Site Assessments (ESA) reports for the property.

2.3.6 Historical Resources

A historical resources impact assessment may be required by Alberta Culture and Tourism if the development is proposed in an area containing or having the potential for significant historic resources. The Town must be contacted to determine if an assessment is necessary. Where an assessment is required by provincial legislation, the investigation shall be undertaken to the satisfaction of the Town.

3.0 LAND USE BYLAW ALIGNMENT

If a proposed development on a site does not conform to the regulations for the site's current district under the Town's Land Use Bylaw, then an application for one of the following must be made:

a. If the proposed development is for a use and purpose not listed under the current district, and/or significantly deviates from the minimum requirements for site design (setbacks, height, etc.), then a Land Use Bylaw amendment application must be undertaken. This amendment shall utilize the most compatible District(s) from the Land Use Bylaw with respect to the proposed uses and/or site design regulations and shall conform to any proposed or existing Area Structure Plan for that area. A Land Use Bylaw amendment process may be undertaken in conjunction with an Area Structure Plan adoption or amendment process and must be approved by Council in accordance with the requirements of the Municipal Government Act, as amended. Depending on the nature of the change of land use districts, a Municipal Development Plan update may also be required.
b. If the proposed development is not in conformance with the minimum regulations for site design of the current district but meets the criteria to be qualified as a variance as outlined in the Town of Rocky Mountain House's Land Use Bylaw, as amended, then, at the discretion of the Development Authority, a variance may be granted pursuant to the aforementioned section. An application for the variance will be required at such time as Development Permit and Building Permit applications would typically be submitted.

4.0 OUTLINE PLAN

Following the approval of an Area Structure Plan but prior to the submission of a subdivision application and negotiation of a Development Agreement, the Owner/Applicant may be required to submit an Outline Plan. This may occur concurrently with any required applications to amend the Land Use Bylaw.

All materials and applications submitted as part of the Outline Plan (and any concurrent Land Use Amendment Applications) shall be reviewed by the Town. Any comments from the Town, or its delegated representative(s) shall be forwarded to the applicant for inclusion in an amended Outline Plan. Once the Outline Plan has been completed to the satisfaction of the Town, it will be approved by resolution of Council prior to commencement of detailed design.

The Outline Plan shall be prepared to support the proposed subdivision development and may require the following information, either to be submitted in conjunction with the Outline Plan, or referenced within the Outline Plan if such information has been provided to the Town as part of previous applications:

a. The Town's Municipal Development Plan and natural growth directions,
b. The policies in the Area Structure Plan, or other applicable statutory plan,
c. The Town's Design Guidelines,
d. Reference to the Servicing Studies outlined in Section 2.3. This may take the form of:
    - Direct reference to the existing study if it has been completed within the last three (3) years from the time of the application.
    - Updates to the existing study, as deemed necessary by the Town, if the existing study is greater than (3) years old or if the context of the proposed development has changed.
    - More detailed design information on the servicing requirements to reflect the proposed application (e.g. impact of connections to existing municipal networks and developments, easements and right-of-way for all required improvements, the inclusion of oversized services, etc.).
    - A new study if the existing one is greater than five (5) years old.
e. If the development is in proximity to the railway, then the Town may require an additional study that identifies how the proposal will address the railway noise, vibration, and safety accommodations,
f. A proposed total subdivision area, including lot dimensions and areas, dedicated reserves, and public rights-of-way,
g. Any proposed development phasing,
h. Total developable acreage calculations,
i. The applicable development densities, and
j. The total number of saleable lots.

5.0 SUBDIVISION PLAN

Following the final submission of an Outline Plan (or Area Structure Plan), an application for subdivision must be made to the Town's Subdivision Authority, to initiate consideration of a proposed tentative plan of subdivision, as per the requirements of the Subdivision and Development Regulation, as amended.

The application will be circulated, considered, and a decision will be made in compliance with Sections 653 and 654 of the Municipal Government Act, as amended. If approved, the development process will proceed. Appeal opportunities regarding an approved tentative plan of subdivision are outlined in Section 678 of the Municipal Government Act.

6.0 DEVELOPMENT AGREEMENT

As a condition of a tentative plan of subdivision that has been approved by the Subdivision Authority, the Owner/Applicant will be required to enter into a Development Agreement with the Town. All redevelopment and off-site levies, development conditions, and cost sharing shall be paid to the Town in accordance with the requirements of the Development Agreement.

6.1 GENERAL REQUIREMENTS

6.1.1 Default

a. Should the Owner/Applicant default in the performance of any obligation required under this Agreement, and where such default continues for a period of 30 days after the date upon which a notice in writing specifying such default has been mailed by the Town to the Owner/Applicant by prepaid post, the Town may draw on the full extent of the Irrevocable Letter of Credit or other such security provided by the Owner/Applicant.
b. The Town shall not be under any obligation to complete all or any of the work required to be performed by the Owner/Applicant pursuant to this Agreement.
c. The Owner/Applicant agrees that until all its obligations under this Agreement have been carried out to The Town's satisfaction, the acceptance of the Development by the Town may be withheld.

6.1.2 Obligations of the Owner/Applicant

a. The Owner/Applicant shall complete the construction and installation of all Municipal Improvements within two years of the date of the Development Agreement.
b. The Owner/Applicant shall ensure that all work is competently designed and the construction is diligently pursued, under the supervision of the Consulting Engineer.
c. The Owner/Applicant agrees to pay to the Town the Development Levies/Charges/Costs set out in the Development Agreement.

6.1.3 Obligations of the Town

a. The Town will review the Construction Drawings and Construction Specifications submitted by the Owner/Applicant and approve them or advise what amendments are required, without undue delay.
b. Where the Owner/Applicant has paid for Municipal Improvements in excess of its requirements, and where future development will utilize those Improvements, the Town will Endeavour to Assist the Owner/Applicant to collect the various sums.
c. Upon issuance of a Construction Completion Certificate by the Town's Engineer for Municipal Improvements, the Town will assume responsibility for their operation and normal maintenance.

6.2 DETAILED ENGINEERING DESIGN DRAWINGS

The Owner/Applicant shall engage:

a. A qualified Professional Engineer(s) to undertake all phases of engineering, including coordination of all subconsultants, design, construction inspection, and as-built recording for the proposed development. All plans are to be submitted in accordance with Schedule B.
b. A qualified professional architect(s) to undertake all phases of architecturally related work for the proposed development. All plans are to be submitted in accordance with Schedule B.

c. A qualified professional planner(s) and landscape architect(s) to undertake all phases of site planning and landscaping for the proposed development.
d. Provided the plans and specifications are prepared to the Town's satisfaction, the Town's Engineer will recommend for approval the plans and specifications for the Town's approval.
e. After approval of the plans and specifications by the Town, the Owner/Applicant's Consulting Engineer shall supervise and inspect all construction; obtain as-built data; and submit as-built plans in accordance with Schedule B.

6.3 RECORD DRAWING INFORMATION

The Owner/Applicant shall provide "Record Drawings" to the Town as per Schedule B. The record drawings shall show any changes made from the approved drawings and shall include the following information:

a. Underground Utilities
   - Location and size of all waterlines, fittings, valves and hydrants,
   - Location, size and grade of all sanitary and storm sewers including manhole and catch basin locations and inverts of all pipes into and out of manholes, and
   - Location, size and elevation of all water and sewer service connections at the property line.
b. Surface Improvements
   - Location, widths, grades and key elevations of all roads, curb and gutter, sidewalks, ditches, culverts and any additional major surface feature within the dedicated rights-of-way or easements.
c. Franchise Utilities
   - The Owner/Applicant shall ensure that all franchise utilities forward record drawings in both printed and digital AutoCAD and PDF formats, of any franchise utilities installed in the development.

6.4 OPERATIONS AND MAINTENANCE MANUALS

Not less than two (2) weeks prior to application for a Construction Completion Certificate, the Owner/Applicant shall submit four (4) copies of operating and maintenance manuals containing information required by the specifications to the Town's Engineer. All instructions in the manuals shall be in simple language to guide in the proper operation and maintenance of the installation.

The manuals shall be bound in a three-ring, hard covered, plastic jacketed binder. Contents shall be organized into applicable sections of work, parallel to specifications breakdown. The name of the facility is to be embossed onto the binder cover.

In addition to information called for in the specifications, include the following:

a. Title sheet, labeled "Operation and Maintenance Instructions", and containing project name and date,
b. List of contents,
c. Reviewed shop drawings of all equipment,
d. Record drawings of all mechanical, electrical, control and alarm installations,
e. Full description of entire mechanical, electrical, control and alarm system and operation,
f. Names, addresses and telephone numbers of all major Subcontractors and Suppliers,
g. Operating instructions for all equipment,
h. Maintenance instructions for all equipment, including frequency of maintenance tasks,

i. Equipment parts lists,
j. Emergency operating procedures, and
k. Certified head/capacity curves for pumps.

Each section shall be separated from the preceding section with a plasticized cardboard divider with a tab denoting contents of the section.

6.5 LEGAL SURVEY REQUIREMENTS

All legal survey control and elevations shall be tied into Alberta Survey Control Monuments. The Owner/Applicant shall be responsible to ensure that the survey control network is extended into the Development Area.

The Owner/Applicant shall employ a qualified Alberta Land Surveyor to install survey evidence (survey pins), prepare the necessary plans and acquire the necessary approvals as required by Alberta Infrastructure and/or Alberta Transportation and the Town to install the survey control network. Alberta Infrastructure and/or Alberta Transportation shall be provided with survey measurements to first and second order necessary to calculate coordinate values and elevations for these monuments.

The Owner/Applicant shall be responsible to preserve all existing and new monuments and if necessary, replace such monuments as may be destroyed, damaged or removed by the operation of the Owner/Applicant in carrying out the construction and installation of local improvements.

6.6 CONSTRUCTION REQUIREMENTS

The Owner/Applicant's Consulting Engineer shall provide full time inspection of all construction and provide sufficient tests to ensure that construction is in accordance with the Town's Design Standards.

The franchise holder or their agent shall install franchise utilities with the Owner/Applicant providing coordination of their installation.

Any of the services to be installed by the Owner/Applicant shall be installed in such a manner as to least interfere with existing services. Any additional costs incurred by the Town as a result of the installation of services by the Owner/Applicant shall be charged to the Owner/Applicant who will reimburse the Town promptly for such additional expenditures incurred.

Approval shall be obtained from the Town a minimum of forty-eight (48) hours prior to closing developed streets or shutting off existing utility service when required for construction.

In the event that a road must be partially or fully closed for a crossing or connection, the Owner/Applicant shall provide all detours, signs, flagmen, and/or barricades, in accordance with Roads and Transportation Association of Canada Standards, and shall submit a Traffic Accommodation Strategy that outlines how the road closures will be managed.

Developed roads shall be returned to their original condition after the installation of crossings or connections are complete. Where it is necessary to excavate along or across an existing road or lane (for a water or sewer main, gas main, telephone, cable, etc.), such excavations must be backfilled with compacted sand and/or gravel material and restored to pre-construction condition or better.

Approval shall be obtained from the Town Engineer to use the Town's water distribution system during construction. Access to the existing system shall be coordinated through Public Works once approved by the Town Engineer. The Town offers three options for contractors to access temporary water:

- Fire Hydrant Meter – the contractor will be required to bring the hydrant meter with the appropriate backflow prevention device to Public Works Office for inspection and to obtain a permit. Prior to choosing this option the contractor shall first determine that a hydrant is accessible to their site without having to cross major roads or intersections with the hoses or temporary water supply lines.
- Fill Station Located at the Town Water Treatment Plant - 5020 62 Street (available 24 hours per day). To access this option the contractor will need to visit the Town Administration Office to set up an account and obtain a PIN number.
- Temporary Water Meter Pit Installation - This option is typically used for construction sites where temporary water service will be required for an extended period of time and a temporary hydrant meter cannot be used due to the lack of hydrants in the area or the need for temporary water extending through the winter months. Contact the Town Engineer.

The first permanent valve from the existing water main to the new water main shall, in each case, be sealed closed and shall only be operated by the Town.

In the sewer system, the first new manhole upstream from the existing system shall, in each case, be plugged to prevent flows from entering the existing system. These manholes shall be constructed such as to prevent foreign materials (i.e., soils, debris, etc.) from entering the Town's existing system during construction, cleanup and testing procedures. Prior to commissioning, the manholes shall be completed to the same standard as others in the subdivision.

The Owner/Applicant shall protect and preserve existing vegetation, bodies of water and/or existing slopes when these have been designated for protection by the Town.

6.7 POST-CONSTRUCTION

Prior to final acceptance of the required works outlined in the Development Agreement by the Town, the following conditions and procedures shall be completed:

a. Prior to the start of the "Maintenance Period", all work must be completed, all deficiencies corrected, and a "Construction Completion Certificate" issued to the Owner/Applicant by the Town. The length of the Maintenance Period is established in the Development Agreement.
b. Record drawings and operating manuals, if applicable, shall be submitted to the Town's Engineer within sixty (60) days of issuance of the "Construction Completion Certificate" on each phase of the construction.
c. Following repair and replacement of any deficiencies found prior to the end of the Maintenance Period, the Town will issue a "Final Acceptance Certificate" of the work in writing to the Owner/Applicant, and thus assume actual ownership and responsibility for the public infrastructure of the subdivision.

7.0 ENDORSEMENT AND REGISTRATION OF PLAN OF SUBDIVISION

Following approval of the subdivision plan and signing of the Development Agreement by all parties, the Owner/Applicant must submit a legal plan provided by a registered land surveyor in the Province of Alberta, as per Section 657 of the Municipal Government Act, as amended, to the Town. The legal plan must be accompanied by documentation that identifies that all conditions of the approved subdivision have been met.

Following endorsement by the Town, the subdivision plan must then be registered by the Owner/Applicant with Alberta Land Titles.

8.0 DEVELOPMENT AND BUILDING PERMITS (SITE PLANNING)

Refer to the Town of Rocky Mountain House Land Use Bylaw, as amended, for requirements regarding development permits related to physical structures and uses of the land.

Refer to the Alberta Safety Codes Act, as amended, for requirements regarding building permits related to physical structures and their construction.

9.0 TOWN OF ROCKY MOUNTAIN HOUSE SUBDIVISION AND DEVELOPMENT PROCESS

Figure 9-1: Subdivision Process

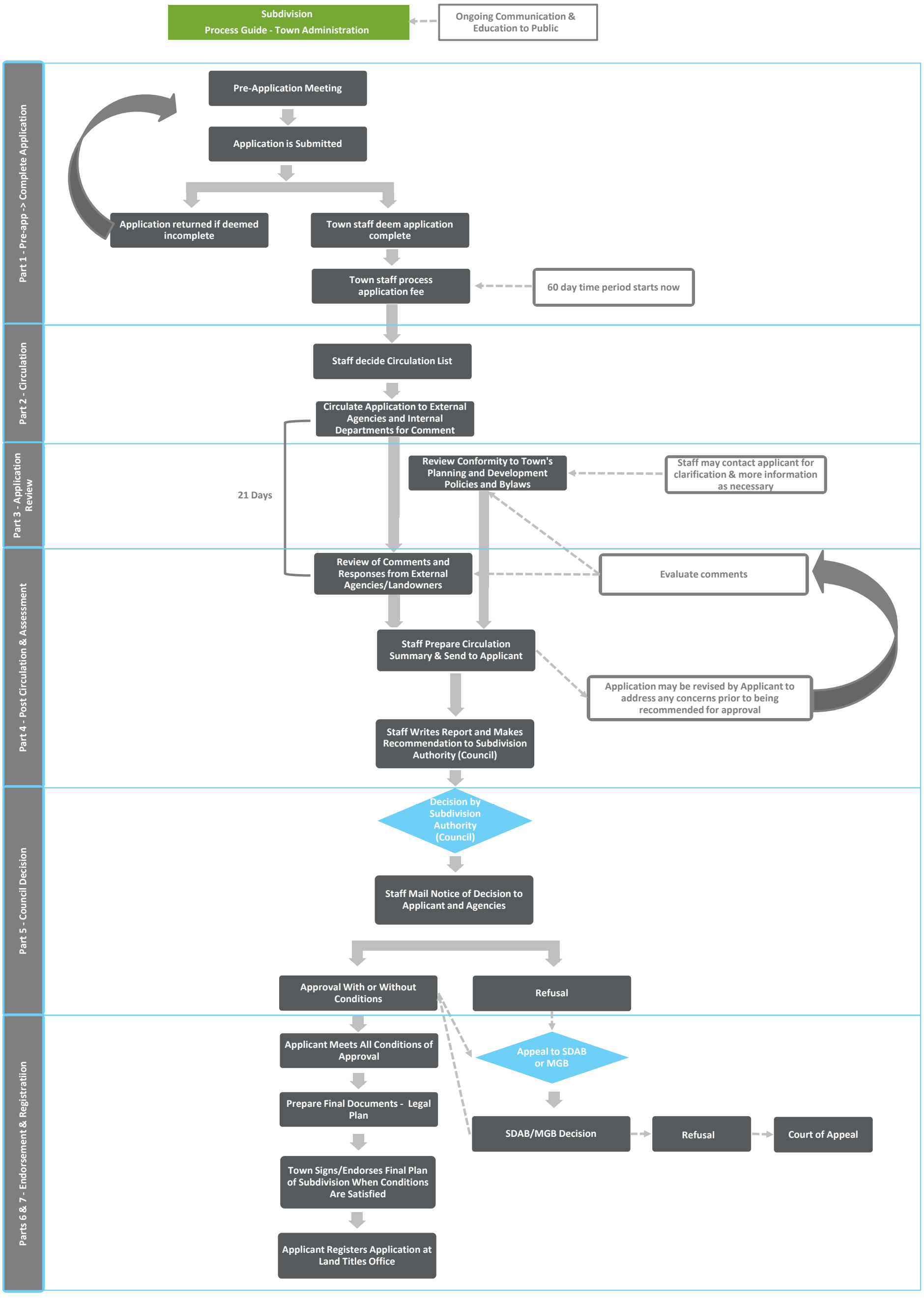
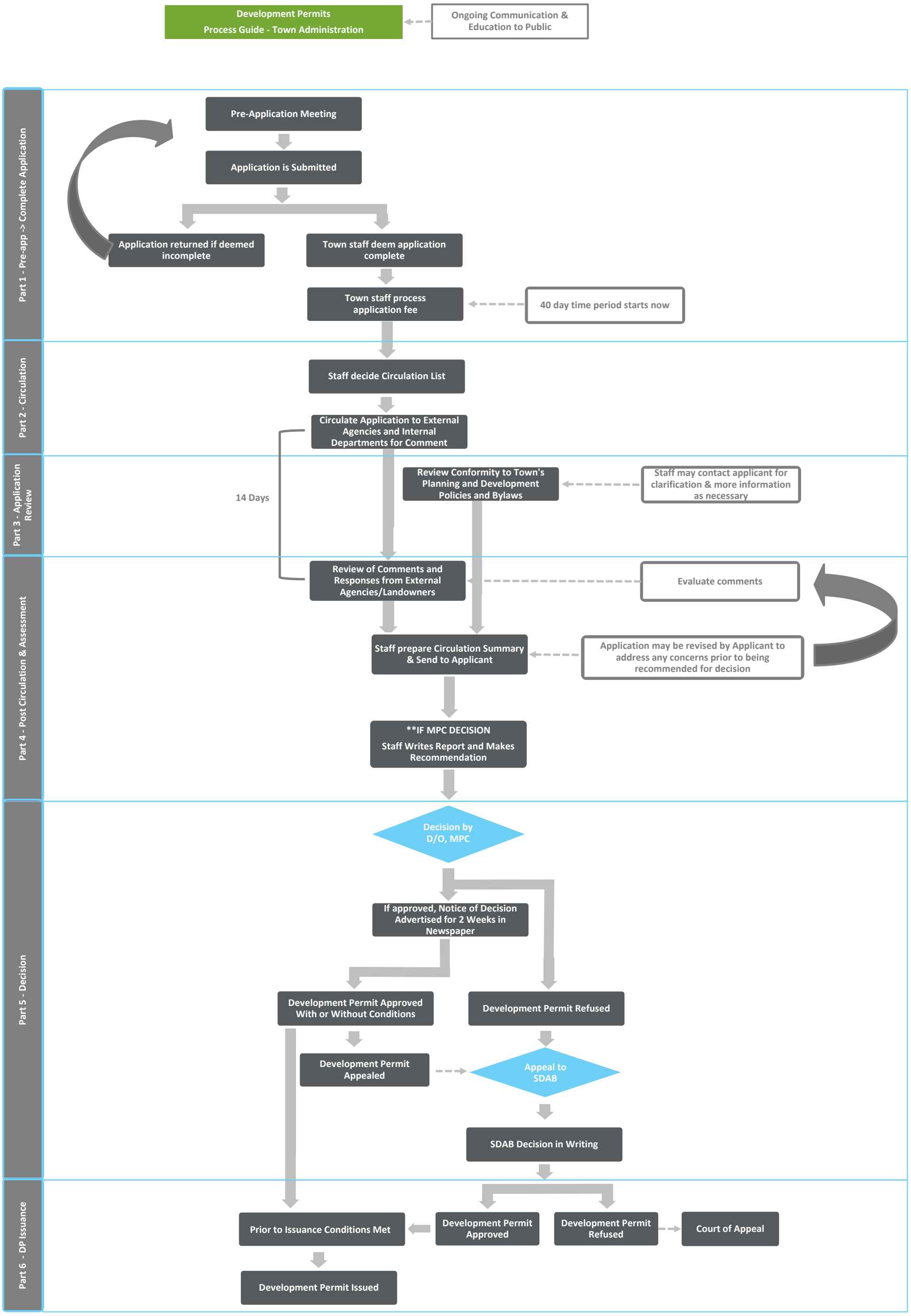


Figure 9-2: Development Permit Process



ROCKY MOUNTAIN HOUSE

Where Adventure Begins!

Design Guidelines
Schedule B

Engineering Design and Drawing

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1.0 GENERAL DESIGN CONSIDERATIONS

This Infrastructure Design Standards Document was prepared to provide a standardized set of guidelines to be adopted by the Town for those involved with design and construction of municipal infrastructure. Users of this manual shall note the following:

a. Alternative criteria relating to such things as field conditions, climate, development standards and development density have been included in this manual where practical.
b. Design criteria variations may be adopted from time to time in the form of Supplementary Design Guidelines which will supersede the guidelines contained in this manual.
c. The contents of this manual are intended to complement the Town's Standard Detailed Drawings.

This manual is not intended to be a substitute for sound engineering knowledge and experience. It is the Consulting Engineer's responsibility to exercise professional judgment on technical matters in the best interests of the Owner/Applicant and the public. Standards contained herein are provided to assist in making these judgments but shall not be used as a substitute. The standards do not, and cannot, cover all particular cases.

1.1 SUSTAINABILITY AND ASSET MANAGEMENT

Development of appropriate design standards for municipal infrastructure involves consideration of the principles of sustainability and asset management. These principles include the following:

a. Enhancement of quality of life,
b. Environmental protection,
c. Financial economies,
d. Preventative maintenance, and
e. Life-cycle costs.

A balanced approach to design of municipal infrastructure requires careful consideration all of the above principles.

1.2 INDEPENDENT UTILITIES

Independent utilities are those not normally supplied by municipal or regional authorities and are not included in these standards. Independent utilities include ATCO Gas, Fortis Alberta Inc., TELUS, Shaw Cable systems G.P.

Design of municipal infrastructure must include consideration of the above utilities. Design of these utilities is normally carried out by the utility owner or designed and coordinated by the Owner/Applicant's Consulting Engineer. All layouts and installations shall be subject to the approval of the Town of Rocky Mountain House.

In new urban developments, all wiring is generally to be underground.

Easements shall be registered on each individual lot prior to the sale of any lot in the development area.

1.3 UTILITY CORRIDOR

In planning development servicing, corridors may be required for routing of utility mains, secondary emergency accesses, trails, and major drainage outside of the lanes or roadway rights-of-way. The following items are to be considered as part of the neighbourhood design. Where a proposed utility corridor(s) is:

a. To cross a natural area, an alignment that minimizes the impact on the natural area is to be selected,
b. Used for access, trail, and/or major drainage, a Public Utility Lot should be provided. The Public Utility Lot is typically 7.0 m wide and may include a requirement for a 2.0 m easement on each side of the utility lot for a total right-of-way width of 11.0 m, and
c. Only required for the routing of utility mains, the utility corridor will be protected in an easement. The easement width shall be based on the proposed number of utilities and their depth of installation. This is to ensure an appropriate easement width is provided to allow for an open excavation with side slopes in accordance with the WCB regulations, with the trench excavation to be outside of the building envelope on the affected lots in the event the utility(s) is required to be removed or replaced as part of future maintenance. The width of the easement will be equal to the depth of the deepest utility, doubled (plus spacing between utilities) plus one metre (or pipe width if greater than one metre); the minimum easement width is 6.0 m.

The Consulting Engineer shall provide cross-sections indicating the minimum safe distances to adjacent building footings based on a safe angle of repose from the limits of the excavation.

Where a utility is located within a right-of-way, and valves, valve chambers, manholes or other appurtenances which require maintenance are located within the right-of-way; provide road access from a public road. The maintenance access must be sufficiently wide and structurally adequate to support the maintenance vehicles for which the access is intended.

For independent utilities, the Owner/Applicant shall provide either registered rights-of-way or registered easements in the name of the Town for the purpose of accommodating the utility services. Rights-of-way shall be sufficient width and satisfactory to the utility companies.

1.4 UTILITY SEPARATION

Requirements for separation of sanitary or storm sewers from water mains are as follows, unless otherwise indicated by the local public health authority.

1.4.1 Horizontal Separation

At least 3.0 m horizontal separation shall be maintained between a water main and either a sanitary sewer or storm sewer.

In special circumstances separation less than 3.0 m may be permitted provided that:

a. The sewer main and water main are installed in separate trenches and the water main invert is at least 0.5 m above the crown of the sanitary sewer or storm sewer and the joints are wrapped with heat shrink plastic (or similar).

b. The pipes are installed in the same trench with the water main located at one side on a bench of undisturbed soil at least 0.5 m above the crown of the sanitary sewer or the storm sewer and the joints of the water main are wrapped with heat shrink plastic (or similar).

1.4.2 Vertical Separation

Where a sanitary sewer or storm sewer mains crosses a water main, it is preferred that the sewer main crosses below the water main with a minimum clearance of 0.3 m. If the sewer main has to cross above the water main, a minimum clearance of 0.5 m shall be maintained. In both scenarios, centre the length of water main at the point of crossing so that the joints are equidistant from the sewer at 3,0 m. If it is not possible to centre the watermain or to maintain a minimum distance of 3.0m at the pipe crossing to the joints of the watermain, heat shrink wrap with plastic (or similar) the watermain joints within 3.0 m from the crossing point.

Where it is not possible to obtain the vertical separation indicated above, and subject to approval from the Town Engineer, the following details may be used:

a. The water pipe joints shall be wrapped as indicated above, or
b. The sewer shall be constructed of pressure pipe such as high density polyethylene (HDPE) or PVC with fused joints and pressure tested to assure it is watertight.

1.4.3 Sewers in Common Trench

Storm and sanitary sewers may be installed in a common trench, provided that the design has taken into account:

a. Interference with service connections,
b. Stability of the benched portion of the trench, and
c. Conflict with manholes and appurtenances.

The horizontal clearance between sewer pipes shall be no less than 1.0 m and the horizontal clearance between manholes shall be no less than 0.3 m.

1.5 TRENCHLESS TECHNOLOGIES

Installation or rehabilitation of pipelines by trenchless methods is frequently mandatory or desirable. Circumstances favouring trenchless installation include:

a. Installation or rehabilitation in heavily built-up areas,
b. Stream crossings,
c. Railway crossings, and
d. Highway crossings.

Available technologies include the following:

a. Slip-lining,
b. Cured-in-place pipe (CIPP),
c. Pipe bursting,
d. Horizontal directional drilling (HDD),
e. Microtunnelling, and
F. Pipe jacking.

1.6 PROVINCIAL LEGISLATION

1.6.1 General

The Province of Alberta publishes standards and guidelines for municipal water supply, wastewater, and storm water drainage systems. Alberta Environment and Parks (AE&P) govern these Acts, Regulations, Codes, and Guides that municipalities are required follow. The primary Acts that affect municipal utilities and development are:

- The Water Act, and
- The Environmental Protection and Enhancement Act (EPEA).

The Town is responsible to have its municipal water supply, wastewater, and storm water drainage systems designed to meet these Acts and amendments. As part of any development and/or construction project, other federal and provincial regulations will have additional requirements. Those Acts, Regulations, Codes, and Guides may be noted in the sections throughout this document that pertain primarily to the subject of the Section. The Town does not guarantee all Federal and Provincial Acts, Regulations, Codes and Guides will be listed in this document.

It is the Consulting Engineer's responsibility to be familiar with the latest versions of the Federal and Provincial Acts, Regulations, Codes, and Guidelines that relate to their project.

Excepting the submissions regarding "Notification of Extension…" and "Letter to amend…Storm Drainage Permit" the Town may not allow construction to proceed until confirmation of the required EPEA and/or Water Act approvals have been provided by Alberta Environment and Parks. This may affect the issuance of a "Clearing, Stripping and Grading Permit" and "Notice to Proceed" for a Development Agreement.

1.6.2 Water Act

Under the Water Act the following Codes of Practice, Policy's and Standards governing municipal works may be found:

a. Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems,
b. Wetlands Policy,
c. Codes of Practice (these have specific submission and approval requirements not included here):
    i. For Outfall Structures on Water Bodies,
    ii. For Watercourse Crossings, and
    iii. For Pipelines and Telecommunications Lines Crossing Water Bodies.

1.6.3 Wastewater and Storm Drainage Regulations 119/93

This regulation governs the construction and operation of storm drainage treatment facilities.

"Storm drainage treatment facility", as defined in the Regulations, means any structure or thing used for the physical, chemical or biological treatment of storm drainage, and includes any of the storage or management facilities that buffer the effects of the peak runoff.

Note: The Regulations do not apply to storm water treatment units installed upstream of a storm water storage facility as these units are included in the Code of Practice for Wastewater (Sanitary Sewer and Storm) Collection Systems.

Alberta Environment and Parks, Central Region, uses a questionnaire style form for new Storm Drainage Treatment Facility registration ("Application Form and Guide for Registration to Construct and Operate a Municipal Storm Drainage System").

The form and supporting documentation are to be completed by the Consultant and submitted to the Town Engineering Services Department for review and acceptance. The questionnaire is available on the Alberta Environment and Parks website.

1.6.4 Codes of Practice

The design and construction of water distribution systems, sanitary sewer collection systems and storm drainage systems is regulated by the following Codes of Practice:

a. Waterworks System Consisting Solely of a Waterworks Distribution System.

   The Environmental Protection and Enhancement Act, RSA 2000, c.E-12, as amended and the Environmental Protection and Enhancement (Miscellaneous) Regulation, AR 118/93, as amended.

b. Wastewater (Storm Drainage and Sewage) Systems Consisting Solely of a Wastewater Collection System.

   This above noted Code is made under the Environmental Protection and Enhancement Act, RSA 2000, c.E-12, as amended and the Wastewater and Storm Drainage Regulation, A.R. 119/93.

As specified in the above noted Codes, the Owner/Applicant shall submit a "Written Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System" for the water distribution systems, sanitary sewer collection systems and storm drainage systems.

1.7 CROSSING, PROXIMITY, GROUND DISTURBANCE AND/OR ENCROACHMENT AGREEMENTS

1.7.1 General

A Crossing, Proximity, Ground Disturbance and/or Encroachment Agreement may be required if the Owner/Applicant's proposed work includes crossings of and/or construction activity adjacent to the following:

a. Oil or gas pipelines,
b. Overhead or underground telecommunications lines,
c. Overhead or underground power lines,
d. Creeks and rivers,
e. Streets or highways,
f. Railways, and/or
g. Other registered rights of way.

1.7.2 Application Preparation and Submission

The Owner/Applicant shall be fully responsible for the preparation and submission of plans and application for a permit to the owners and/or proper authorities to obtain the necessary permission to enter upon, cross over, or construct under said facility or right-of-way.

The Owner/Applicant shall be responsible for the payment of all application fees, advertising costs, extra costs, damage claims, and/or insurance costs related to the noted agreements.

Applications shall be prepared as specified by the various approving agencies.

1.8 ROAD CLOSURES AND DETOURS

1.8.1 General

The Owner/Applicant must submit an application for a road closure or detour to the Town Engineer at least three weeks prior to the start of any work.

The Owner/Applicant will not be allowed to proceed with hauling across a roadway or the construction of any Municipal Improvement across a roadway until all approvals, if required, have been received.

The closure/detour must be advertised in the local paper at least 48 hours prior to the start of any work.

The Owner/Applicant shall prepare a Traffic Accommodation Plan to be submitted to the Engineer upon request. The Owner/Applicant shall use the Alberta Infrastructure and Transportation Traffic Accommodation Strategy Urban Supplement as a basis for this plan.

1.8.2 Application Preparation and Submission

The Owner/Applicant shall be fully responsible for the preparation and submission of plans and application for a road closure/detour to the Town Engineer to obtain the necessary permission to enter upon, cross over, or construct under said roadway.

The Owner/Applicant shall be responsible for the payment of all application fees, advertising costs, extra costs, damage claims, and/or insurance costs related to the noted Agreement.

The application shall be prepared as follows:

a. A covering letter requesting approval to close all or part of a roadway, and
b. Three copies of drawings (11" x 17" or 8 1/2" x 11") clearly marking in RED the location of the proposed crossing or detour.

1.9 OWNER/APPLICANT'S SUBDIVISION SIGNS

1.9.1 Detention Pond Warning Signs

Detention Pond Warning Signs shall be installed near the boundary of the detention pond site indicating where the public may obtain information related to the detention pond operation. The sign shall be similar in design to the sample "Detention Pond Warning Signs" included in the drawings.

Sign locations shall be shown on the engineering drawings.

1.9.2 Street Name Signs

Streets name signs shall conform to the Town's standards.

1.10 ENGINEERING SERVICES GUIDELINES

1.10.1 General

This section describes the engineering services to be provided by a Consulting Engineer relative to the construction, installation, and inspection of Municipal Improvements as listed in a Development Agreement for private development projects and in an Engineering Agreement for Town Projects.

The Consulting Engineer is expected to provide a professional level of inspection services culminating with the signing of the certification statement in the Construction Completion Certificate and Final Acceptance Certificate.

1.10.2 Consulting Engineer/Town Relationship

1.10.2.1 Private Developments

There is no direct contractual relationship between the Consulting Engineer and the Town for private development Projects. However, as the Consulting Engineer is the authorized representative of the Owner/Applicant, the Town Engineer has the right to request that the Owner/Applicant, through the Consulting Engineer, correct deficiencies as the Town Engineer observes them. It is understood and agreed that the Owner/Applicant is and shall remain responsible to the Town for full and proper performance of all obligations and Work included in the Development Agreement.

The Town Engineer may, as specified in the Development Agreement, stop the construction and installation of the Work.

Should the Owner/Applicant for any reason not fulfill the obligations of the Development Agreement, abandon the Project, not complete the works, or elect not to correct the deficiencies identified by the Town Engineer or the Consulting Engineer, the Consulting Engineer shall not be held responsible to complete the Project. In order to complete the obligations of the Development Agreement, the Town recognizes the advantages of using the same Consulting Engineer and may, at its option, give priority to the said Consulting Engineer where practical.

1.10.2.2 Town Developments/Projects

For Town Developments and Projects, there is a direct contractual relationship between the Consulting Engineer and the Town as defined in an Engineering Agreement.

Any directions to the Consulting Engineer shall be as specified in the Engineering Agreement. Any directions to the Contractor will be as specified in the Contract.

1.10.3 Documents and Schedules

The Consulting Engineer, prior to commencement of construction, shall be completely familiar with:

- The Town of Rocky Mountain House Design Guidelines
- The Town of Rocky Mountain House Developer's Handbook
- The Development Agreement for the Project
- The Engineering Agreement (for Town Projects)

The Consulting Engineer shall notify the Town Engineer when and where all work, construction, and maintenance on underground utilities, overland drainage facilities, parks, and other surface improvements are to be performed and shall advise the Town Engineer of all changes to the work schedule.

Notification by the Consulting Engineer shall be in writing to the Town Engineer at least 48 hours prior to commencing construction (re-notification is required after 48 hours of construction inactivity), excluding Saturdays, Sundays, and Holidays. The notification shall include the following information:

a. Name of Developer,
b. Subdivision Name and Phase Number,

c. Type of inspection (utility, subgrade, concrete structures, gravel placement, parks development, landscaping, etc.),
d. Start-up date and time, and
e. Contractor's name, Superintendent's name, and phone numbers.

1.10.4 Pre-Construction and Site Meetings

The Consulting Engineer shall schedule and attend a pre-construction site meeting with the Contractor(s) and the Town Engineer, which meeting shall address work progress, schedule, coordination items, safety issues as applicable, and shall maintain recorded minutes of this meeting.

The Consulting Engineer shall schedule regular site meetings with the Contractor and the Engineer as the work is in progress for the purpose of addressing ongoing coordination items as applicable and shall maintain recorded minutes of these meetings.

The Consulting Engineer shall supply the following documentation to the Engineer in a timely manner:

a. Minutes of the pre-construction site meeting,
b. Minutes of the site meetings,
c. A copy of the Contractor's proposed schedule, and
d. Copies of change orders as applicable.

1.10.5 Documentation

1.10.5.1 General

The Consulting Engineer shall prepare Construction Completion Certificates and Final Acceptance Certificates as required and have any maintenance deficiency items dealt with expeditiously.

Private Developments

Construction Completion and Final Acceptance Certificates for private developments are to be submitted as detailed in the Development Agreement. Copies of the Certificates are available from the Town.

Town Developments/Projects

Completion Certificates and Final Acceptance Certificates for Town developments and Projects are to be submitted. Copies of the Certificates are available from the Town.

Refer to Appendix A for the CCC and FAC documentation process overview.

1.10.5.2 Reporting of Deficiencies by the Engineer

Any deficiencies observed by the Town Engineer during construction are to be brought to the attention of the Developer and the Consulting Engineer as they are observed, in writing, as soon as possible. The Consulting Engineer will notify the Town Engineer with a minimum of 48 hours notice, excepting weekends and holidays, when the deficiency is to be corrected.

1.10.5.3 Materials Compliance

All materials supplied and installed shall comply in all respects to the Town of Rocky Mountain House Design Guidelines. The Contractor will not be permitted to install any material not approved by the Town Engineer.

1.10.5.4 Recommended Testing Frequencies

The following is a summary table of the recommended testing frequencies for all construction projects in the Town of Rocky Mountain House.

Table 1-1: Recommended Testing Frequencies

Test	Minimum Test Frequency
Backfill Soil	
Standard Proctor	1 per material type
Field Densities – Trench	2 tests per 600 mm of depth per 100 m of trench
Road Base/Subbase/Subgrade	
Standard Proctor/Sieve for Granular	1 per material type
Field Densities – Grading Fill	1 test per 250 m3
Field Densities – Subgrade	Preparation 1 test per 1000 m^2
Field Densities – Subbase	Preparation 1 test per 3000 m2
Field Densities – Base	Preparation 1 test per 1000 m2
Asphalt	
Field Marshall	1 test per 1000 tonne
Cores	1 core per 1000 tonne

1.10.6 Construction Inspection

Inspections shall be carried out by the Consulting Engineer to ensure conformance with Contract Specifications and Drawings.

The Consulting Engineer shall provide full time inspection of all construction and provide sufficient tests to ensure that construction is in accordance with the Town's Design Standards.

The Town Engineer shall be given a minimum of 48 hours notice when requesting a joint inspection with the Consulting Engineer and/or Contractor.

Failure to notify the Town Engineer may require all work to be exposed for an inspection at the Contractor's expense.

1.10.7 Post Construction Services

1.10.7.1 Activity Prior To Issuance of a Construction Completion Certificate

The Consulting Engineer shall inspect the Work with the Contractor, record any deficiencies, and advise the Contractor to repair any deficiencies. After the Contractor has repaired the deficiencies, the Consulting Engineer shall arrange for a joint inspection with the Contractor and the Town Engineer.

The Construction Completion Certificate application shall be accompanied by the following documentation:

Underground Utilities

a. Letter documenting completion of successful water pressure testing, leakage testing, flushing, and disinfections (copy of Bacteriological Water Sample Report to be submitted with Construction Completion Certificate), service connection reports (shall include pictures of the service saddles or tees for all three services (if applicable), main stop including horizontal gooseneck, curb stop, cleanouts, and insulation if installed),
b. As-constructed drawing signed and sealed by a professional engineer registered in the province of Alberta, and
c. Copy of video inspection log reporting deficiencies and corrective action taken.

Surface Improvements

a. As-constructed drawing signed and sealed by a professional engineer registered in the province of Alberta,
b. Test result for compaction (subgrade, sub-base, base and asphalt) and proof role reports, and
c. Documentation of any deficiencies.

1.10.7.2 Activity Subsequent to Issuance of a Construction Completion Certificate

The Consulting Engineer shall conduct periodic checks of the subdivision during the maintenance period and note any failures, settlements, or other deficiencies in the Work, as well as respond to any complaint" calls forwarded by the Town.

1.10.7.3 Activity Prior to Issuance of a Final Acceptance Certificate

Prior to the submission of the Final Acceptance Certificate, the Consulting Engineer and the Contractor shall conduct an inspection of the work, record, and repair all deficiencies.

Once all deficiencies have been corrected, the Consulting Engineer shall request a joint inspection with the Contractor and the Town Engineer of the works referred to in the Final Acceptance Certificate.

The Town Engineer shall prepare a list of the deficiencies, if further deficiencies are noted, and submit the list to the Consulting Engineer.

When the additional deficiencies have been corrected, the Consulting Engineer shall then, within a reasonable period of time, request from the Engineer, a re-inspection for only the inspection of deficient items.

2.0 CONSTRUCTION AND AS-CONSTRUCTED DRAWINGS STANDARDS

2.1 GENERAL REQUIREMENTS

This Document outlines the minimum standards and requirements for design and record drawing submissions for engineering work(s).

Where a standard drawing exists, it shall be sufficient to refer to the appropriate drawing by reference number and date of issue. Where a standard drawing does not exist, or is unsuitable for a particular case, detail drawings shall be prepared to accurately portray the various elements of the installation.

Where no standard is defined in this document for the preparation of a drawing to portray a particular service, structure, or other item, instructions and requirements may be obtained by discussion with The Town of Rocky Mountain House staff.

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

All drawings shall be signed and sealed by a Professional Engineer registered in the Province of Alberta.

Elevations shall be referred to geodetic datum. Horizontal coordinates shall be referenced to 3TM grid coordinate system NAD83.

2.2 ABBREVIATIONS

Table 2-1: Abbreviations

3TM	3-degree Transverse Mercator
NAD83	1983 North American Datum
FOC **GUT**	Face of Curb Gutter Line
EC	End of Curve
BC	Beginning of Curve
PI	Point of Intersection

2.3 DRAFTING STANDARDS

2.3.1 Sheet Layout

Drawing sheet layout(s) shall conform to and include the following:

a. Sheet size to be:
   - ANSI D 558.8 mm x 863.6 mm (22” x 34”), or
   - Arch D 609.6 mm x 914.4 mm (24” x 36”).

b. A north arrow shall be placed in the upper right corner of each plan view on the sheet. The drawing should be oriented such that north faces up or to the right side of the sheet as typical. Variations may occur where they make sense to do so,
c. A title block shall be placed along the right side or bottom of the drawing. The title block shall describe the contents of the drawing (i.e., Key plan, road, etc.) and shall clearly indicate the location of the works by road name(s) and/or legal description, and
d. Drawing scale, date, revision history block, and a detailed legend shall also be included on each sheet layout.

2.3.2 Dimensions and Units

The following conventions must be used:

a. Dimensions and units must be shown in SI metric units. No imperial units are permitted.
b. All distances, elevations, and coordinates shall be given in meters to accuracy of 3 decimal places.
c. Grades shall be given as a percentage to accuracy of 2 decimal places.
d. Areas shall be in square meters rounded to the nearest square meter.
e. All pipe sizes shall be given in millimeters as per ASTM specifications using:
    - 1" = 25mm
f. Existing imperial dimensions, except for pipe sizes, are to be soft converted using the factors:
    - 1 inch = 25.4 millimeters
    - 1 foot = 0.3048 meters

2.3.3 Lettering

Lettering is to be an engineering style font (i.e., Arial – True Type). Vertical lettering is to be used for existing information and slanted (italic) lettering for proposed information. Discretion is to be used in selection of lettering size and line weight. Plotted lettering size should be legible at the scale of the drawing.

2.3.3.1 Scales

The following scales are to be used for the preparation of the construction drawings. Exceptions will be noted for specific drawings.

a. A drawing scale of 1:1000 should be used for all plan drawings,
b. A drawing scale of 1:500 (h), 1:50 (v) should be used for all plan/profile drawings, and
c. Detailed drawings will be at a scale of 1:100, 1:250 or 1:500.

Note: Town Engineering or other departments may reject a drawing for use of a non-typical scale.

2.4 REQUIRED DRAWINGS

2.4.1 Cover Sheet (Title Page)

In addition to any other requirements presented in this document, the cover sheet shall show the following information:

a. Name of Development or Project,
b. Current Town of Rocky Mountain House Logo,
c. Names and/or logos of Owner/Applicant and Consulting Engineer,
d. Site location plan of Development or project with Project Boundary,

e. File numbers of approving authorities, (i.e., Development Permit or Subdivision Application number),
f. Submission date,
g. Stage, phase, and year of the project or development, and
h. Complete drawing index of all sheets belonging to the set.

Note: The standards defined in Sections 3.1 c), 3.1 d), and 3.3 do NOT apply to the cover sheet.

2.4.2 Key Plan(s)

In addition to any other requirements presented in this document, Key Plans shall show the following information:

a. Lot numbers, plan numbers, and road names of the subject Development and adjoining properties,
b. Cross reference of the drawings by outlining the area contained in each drawing and referencing that drawing by drawing number, and
c. General construction notes.

2.4.3 Legal Plan(s)

In addition to any other requirements presented in this document, Legal Plans shall show the following information:

a. Property Line work,
b. Lot and Block Numbers,
c. Lot dimensions,
d. Right-of-Way widths dimensioned,
e. Easement line work,
f. Easement dimension (and / or note for typical width), and
g. Roadway names.

2.4.4 Clearing, Stripping and Grading Plan(s)

In addition to any other requirements presented in this document, Clearing, Stripping and Grading Plans shall show the following information:

a. It is typical to have a separate clearing/stripping plan and a grading plan.
b. Identify the owners of all lands adjacent to or within the clearing, stripping and grading area.
c. Identify intended clearing, stripping and grading on adjacent lands, including details of edge conditions, back sloping requirements, and areas where topsoil is to be placed and/or seeded until natural conditions are restored.
d. Provide cross-sections, along adjacent lands, minimally at 200 m intervals and specifically where proposed ground and existing ground exceeds 300 mm difference in elevation change.
e. Provide cross-sections for temporary drainage swales showing basic dimension, longitudinal grades, and side slopes rates.
f. Show Phase boundaries: indicate the area expected to be developed during the current year and the type of soil stabilization proposed for areas to be developed in following years.
g. Any unusual site conditions (wells, structures, etc.) or contamination areas.
h. Existing utility rights of way (easements).

i. Existing survey control stations and markers.
j. Pre-Development contour lines. The topographic information shall extend a minimum 30.0m outside the Development site.
k. Proposed contours, slopes, grades, and spot elevations.
l. Test hole locations and original ground elevations at test hole location.
m. Identify natural features that are to be preserved and/or removed.
n. Details of topsoil stockpiles; include height, width, length and volumes.
o. Location of all existing (i.e., water, sanitary sewers, storm sewers, gas, electrical, etc.).
p. The means by which all storm water in and from the subject lands will be controlled and disposed of, including:
    i. How will the drainage from its natural route(s) be controlled?
    ii. What erosion and sediment control measures are to be installed?
q. Lot Grading Plans will show the following information:
    i. All existing corner lot elevations (un circled).
    ii. All proposed corner lot elevations and intermediate side yard elevations along property lines (circled).
    iii. The proposed building envelope with the minimum basement elevation (MBE) noted.
    iv. The slope of the lot (directional arrow), noting a minimum 1% grade on the lots.
r. Additional areas to note (particularly in existing developed locations):
    i. Work zone for equipment access.
    ii. Staging areas.
    iii. Storage areas.
s. Cut/Fill Plans:
    i. Show cut/fill design elevations and depth of cut or fill are required for all clearing and grading projects.
    ii. Recommended grid spacing is 15 m x 15 m, maximum grid is 20 m x 20 m. For more sensitive grading areas (i.e., sports field) a 10 m x10 m grid may be requested.
    iii. Areas with fills ≥ 1.0 metre are to be highlighted on the drawing(s).

2.4.5 Plan / Profile Drawings – General

In addition to any other requirements of this document, Plan/Profile drawings shall conform to the following:

a. Both plan and profile stationing must be tied to a property line or road boundary.
b. The profile shall be shown at true centerline length and projected below the plan in as close a horizontal relationship as possible.
c. The top half of a Plan/Profile sheet shall show the plan view and shall show the legal layout with legal descriptions of all properties, the location of all curbs, sidewalks, underground utilities such as water, sanitary and storm sewer, manholes, catch basins, culverts, valves, hydrants, shallow utilities such as gas, power, street lights, telephone, cable and all survey monuments, but not limited to the above.
d. Drawings shall also show existing dwellings, fences, trees, hedges, unusual ground features, existing roads and driveways including the type such as asphalt, concrete, or gravel.

e. Plan/Profile drawings for various services may be combined on one plan (must be clear and readable) in the following manner:
    i. Roads & Storm Drains
    ii. Sanitary Sewers & Water

2.4.6 Road Plan/Profile Drawings (may be combined with Storm Drains)

Road Plan views shall show the following information:

a. Street and/or Lane Name (i.e., Lane "A"), Carriageway widths (FOC to FOC), Sidewalk and/or curb type and width, Boulevard widths, and the offset of curb (FOC) from property line,
b. Chainages of the BC and EC of horizontal curves shall be shown together with the delta angle, centerline radius, tangent length, and centerline arc length. Curb radii are not required if the centerline radius and road width are shown, except on curb returns at intersections and at the end of cul-de-sacs,
c. Quarter point gutter elevations for cul-de-sac,
d. Catch basin rim elevations, and
e. Community Mailboxes.

Road Profile views shall show the following information:

a. Design gutter and/or centerline grade (%),
b. Vertical curve chainage and elevations of BC, EC and PI; the external value, e; the length of vertical curve; the chainage and elevation of the low spot of sag curves; and, K value of vertical curvature (crest on sag), and
c. Existing ground elevation along the centerline of proposed roadway and/or the edge of existing asphalt.

2.4.7 Water Plan/Profile Drawings (may be combined with Sanitary Sewer and Storm Mains)

Water Plan views shall show the following information:

a. Offset dimensions of pipelines from property lines,
b. Length and size of pipe,
c. Offset of connections from property lines,
d. Locations of manholes, hydrants, valves, services, end-of-main, or other appurtenances referenced to nearest property line,
e. Information on any curves or pipe deflections,
f. Easements (existing and/or required), and
g. Location and connection details for all valves and fittings.

Water Profile views shall show the following information:

a. Surface profiles (existing and design, if applicable) over proposed main,
b. Length, size, grade, type, and material of pipe,
c. Profiles of invert and crown of pipes,
d. Location, type and invert elevation of all crossing utilities,
e. Stationing of all valves, fittings and appurtences, and
f. Anchor block locations.

2.4.8 Storm Drains and Sanitary Sewer Plan/Profile Drawings

Storm & Sanitary Plan views shall show the following information:

a. The drawings shall show the structural details of all manholes and chambers, etc. not covered by standard drawings. Where the sanitary sewers and storm drains or other utilities are to be installed in a common trench, a typical cross-section showing vertical and horizontal distances between pipes and classes of pipe and bedding shall be shown,
b. Offset dimensions of pipelines from property lines,
c. The size of pipe,
d. Offset dimensions of connections from property lines (if applicable),
e. The locations of manholes, clean-outs and services relating to property lines,
f. Information on any curves or pipe deflections,
g. Easements (existing and/or required),
h. Future curb & gutter lines (if applicable),
i. Manhole identification numbers,
j. Inverts of service connections at property line (if applicable), and
k. For storm drainage, features such as ditches, culverts, streams, channels, etc.

Storm and Sanitary Profile views shall show the following information:

a. Surface profiles (existing and design, if applicable) over proposed main,
b. Length, size, grade, type, and material of pipe,
c. Profiles of invert and crown of pipes,
d. Location, type and invert elevation of all crossing utilities,
e. Invert elevations of manholes,
f. Alignment station of manhole,
g. Manhole identification number, and
h. Rim elevations of proposed or adjusted manholes.

2.4.9 Landscape Plan(s)

In addition to any other requirements presented in this document, Landscape plans shall show the following information:

a. Extent of proposed landscape works and services,
b. Existing and proposed property information, including lot lines, easements, legal descriptions, addresses and dimensions,
c. Existing and proposed contours, slopes, grades, and spot elevations for landscaped areas (if not already shown on grading plan),
d. Existing and proposed buildings, structures, roads, curbs, sidewalks, walls, fences, signs, site features and other appurtenances,
e. Existing vegetation proposed to be removed, relocated, or retained,
f. Areas of proposed preservation, naturalization, restoration, lawn, and landscaping, including soil types, depths and amendments,
g. Proposed plant species name (botanical and common), size and planting condition,
h. Existing and proposed irrigation system, and

i. Construction details and specifications as required.

2.4.10 Storm Water Management Plan (SWMP)

In addition to any other requirements presented in this document, Storm Water Management plans shall show the following information:

a. Site and surrounding area (400 m minimum outside Development) showing roads and major features. A small location plan of the watershed is also to be included,
b. Contours of existing ground (0.5 m intervals where slope <10%, 1.0 m >10%) for the site and surrounding area mentioned above,
c. Major flood routing (1:100 year); show as arrows and indicate if in pipe or on surface show an "open" arrow for surface routes and the same arrow "shaded" for routes in pipes),
d. Detention pond details, if applicable,
e. Area, in hectares, of Development and the total area of drainage basin,
f. Directional arrows of flow within the site and on surrounding areas,
g. Sub-catchment boundaries, coefficients, and areas,
h. Pipe system including size, grade, and minor and major flows (a table may be utilized), and
i. The subject Development is to be highlighted.

2.4.11 Erosion and Sediment Control Plan(s)

The Erosion and Sediment Control Plan is to detail methods and procedures that will be used to prevent or minimize soil displacement and transport of sediment from the Development site. This is to include methods to prevent or minimize soil transport onto adjacent properties or onto existing roads adjacent to the site (i.e. tracking from vehicles). Preventative methods of soil displacement on the site are to be detailed. In addition to any other requirements presented in this document, the drawing shall show the following:

a. Existing contours of the site at an interval sufficient to determine drainage patterns,
b. Final contours if the existing contours are significantly changed,
c. Final drainage patterns/boundaries,
d. Existing vegetation such as significant trees, shrubs, grass, and unique vegetation,
e. Limits of clearing and grading,
f. Erosion and sediment control measures (temporary and permanent) including locations, names and details, in accordance with "Land Development Guidelines for the Protection of Aquatic Habitat", and
g. Storm Drainage systems including drain inlets, outlets, pipes, and other permanent drainage facilities (swales, waterways, etc.).

The plan must have a narrative section describing the land, the disturbing activity and details of the methods used for controlling erosion and sedimentation. Include a description of the procedures for construction and maintenance of the control measures and note the persons involved in maintenance and provide a maintenance schedule that is to be followed. Where the land area to be subdivided is less than 10 hectares, this plan may be combined with the Stormwater Management Plan.

2.4.12 Water Distribution Disinfection and Flushing Drawing

a. Show lot and block numbers for all lots,

b. Show hydrants and hydrant identification numbers,
c. Show valves and valve identification numbers,
d. Show receiving sanitary sewer manholes and manhole identification numbers, and
e. Show proposed sequence of flushing, including valve opening and closing sequence.

Note: This drawing is a requirement of Contract Specifications – Section 33 11 17.

2.4.13 Street Lighting Plan(s)

A plan view of the street lighting shall be provided. There shall be General Notes included on the Plan noting reference(s) to the Municipal Standards and Specifications and the appropriate design criteria.

2.4.14 Street Sign, Paint Marking, and Traffic Control Device Plans

A drawing identifying signs, markings, and required control devices shall be provided.

a. Pavement Marking Drawing
    i. Show existing and proposed sidewalks including curb ramps, roadway medians. For this drawing, this information is to be shown in a lighter tone than the proposed markings,
    ii. Show existing trail and pathways on-site (not part of project) and/or 30 m beyond the Phase boundary at the proposed connection point(s). For this drawing, this information is to be shown in a lighter tone than the proposed markings,
    iii. Traffic Control Signs,
    iv. Pavement Markings including parking stalls, bike lanes, arrows, etc., as applicable to the project, and
    v. Street Name Identification Signs.
b. Subdivision Entrance Signs (features)
    i. The Entrance Feature is to be located within the Development and be shown on a location plan drawing,
    ii. The location of the Entrance Feature(s) shall be at the subdivision's primary access roadway. The proposed Entrance Feature is to be located on public property (i.e., road right-of-way, PUL, etc.),
    iii. Additional Entrance Features will not be permitted within the subdivision without the approval of the Town, and
    iv. Detailed Construction Drawings of the sign(s) are to be provided. These drawing will be used for the future maintenance and repair of the Entrance Signs.
c. Traffic Signal Drawing
    i. Show existing and proposed sidewalks including curb ramps, roadway medians. For this drawing, this information is to be shown in a lighter tone than the proposed Signal, cabling and infrastructure required for the Signal,
    ii. Show existing trail and pathways on-site (not part of project) and/or 30 m beyond the Phase boundary at the proposed connection point(s). For this drawing, this information is to be shown in a lighter tone than the proposed Signal, cabling and infrastructure required for the Signal,
    iii. Show all existing and proposed municipal improvements located within and/or adjacent to the site. For this drawing, any utility shown, deep mains and shallow utility, are to be shown

in a lighter tone than the proposed Signal, cabling and infrastructure required for the Signal, and

iv. Location of signal bases, signal structure dimensions and parts list, location of control box, cabling runs, dimensioned alignment, junction boxes, and timing plan & schematic.

2.4.15 Traffic Management Plan(s)

Detail routes for construction traffic and traffic controls for traffic on existing roads affected by construction.

2.4.16 Road Cross -section Plan(s)

Shall be typically scaled at 1:100 horizontal and 1:50 vertical and shall note the existing ground elevation, the proposed elevations of the road centerline, the curb and gutter (or road edge) and property lines. Cross-sections are required at 20.0 m intervals.

2.4.17 Construction Details

Show all proposals for construction which are not covered or specifically detailed in the Town of Rocky Mountain House Standards and Specifications. Where there is a Town of Rocky Mountain House Standard, it is expected to include the standard detailed drawing as part of the construction drawing set.

2.4.18 Electrical, Gas, and Communication Utilities

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

2.5 DRAWING SUBMISSIONS

2.5.1 Design Submissions

Submission to the Town of Rocky Mountain House shall include:

- Two (2) complete sets of full-size paper prints,
- Accompanied with electronic drawings in Portable Document Format (*.pdf) for all design drawings.

2.5.2 Building Grade Certificates/Building Permits

a. General

Prior to the issuance of a Construction Completion Certificate for service connections (water and sanitary), the Owner/Applicant shall provide to The Town the relevant Building Grade Certificates for each lot in the Development.

As outlined in the Development Agreement, Building Permits will not be released until all of the conditions outlined in the Development Agreement are met.

b. Building Grade Information

The following information shall be shown on the Building Grade Certificate:

i. Water and sanitary services location, inverts, and insulation, if required,
ii. Power, telephone, and cable television service location,
iii. Sidewalk and boulevard width,
iv. Utility rights of way (easements),
v. Lot corner surface elevations, and
vi. Landscape elevation at front and rear of house.

2.5.3 Record Drawings

Record Drawings must be submitted after the completion of the Works and Services. Record Drawings must be delivered in paper format for review and approval by the Town of Rocky Mountain House.

The Owner/Applicant shall submit to the Town a complete set of electronic drawings of the Subdivision or Development in accordance with this Section. The complete electronic set shall only be submitted after acceptance of the draft paper Record Drawings by the Approving Officer.

2.5.4 Electronic Drawings

The Owner/Applicant shall submit to the Town of Rocky Mountain House a complete set of electronic drawings of the Subdivision or Development in AutoCAD DWG format compatible with the current version of AutoCAD and Portable Document Format (*.pdf).

The electronic drawing shall be prepared in accordance with all requirements and conventions herein.

All external files associated with the electronic drawing (i.e., special fonts, line types, and/or images) shall also be supplied with the electronic drawing submission.

No drawing shall be submitted that contains any external references (xrefs). All externally referenced drawings shall be bound prior to submittal for each record drawing.

2.5.5 Digital Hard Copies

A digital hard copy is any digital file that is reproducible without the ability to modify the drawings contents or appearance.

Portable Document Format (*.pdf) is the preferred file type.

Drawing sets submitted as a digital hard copy shall be electronically sealed by the Owner/Applicant's Engineer.

2.5.6 Device/Document Settings for Plotting Portable Document Format (.pdf)*

Ensure all text is legible and the shading and hatching ordered so as not to block or hide other line work and/or text.

The following settings shall be used when plotting the drawings to Adobe Portable Document Format (*.pdf):

a. Paper size to be ANSI D 558.8 x 863.6 mm or Arch D 609.6 x 914.4 mm (24" x 36"),
b. Layout to be landscape, and
c. Graphic print quality to be no less than 600 dp.

3.0 WATER DISTRIBUTION

This section outlines the methodology and design criteria that apply to the design of the water distribution conveyance system. These guidelines are not intended to be a substitute for sound engineering knowledge and experience. Water distribution system designs shall be prepared under the direction of a Professional Engineer who has the appropriate experience and is registered with the Association of Professional Engineers and Geoscientists of Alberta (APEGA) and should be approved by the Town Engineers.

3.1 WATER DISTRIBUTION GENERAL PRINCIPLES AND OBJECTIVES

A water distribution system includes all piping, fixtures, and pumping/storage facilities required to safely deliver potable water from a treatment facility to residential, commercial and industrial users for the purposes of consumption and fire suppression. Systems must be designed to ensure:

- Water is disinfected and suitable for consumption,
- There is adequate volume and reliability of supply,
- Infrastructure is sized to meet projected future demand,
- Water is delivered at sufficient pressure under key demand conditions, and
- Here is sufficient protection against corrosion, freezing, and other forms of damage/deterioration.

The determination of design demand is an important component of system design. To size infrastructure and select an appropriate layout, it is necessary to consider the long-term service area and anticipated land use as well as the potential connection points and the available capacity. As the Town wishes to promote an orderly process of development, temporary servicing schemes and the construction of infrastructure through undeveloped areas (leapfrog development) are discouraged.

3.2 LIST OF DRAWINGS

1-01	Requirements Utility Trench Typical Section
1-02	Caged Trench for Pipe Installation Under Existing Roads
1-03	Trench Bedding Details
1-04	Trench Insulation Detail
1-05	Pipe Crossing Detail
2-01	Water Main Horizontal Bend Thrust Blocks
2-02	Water Main Vertical Bend Thrust Blocks
2-03	Type 'A' Sliding Type Valve Box
2-04	Standard Hydrant Detail
2-05	Valve Anchor Detail
2-06	Anode Location and Installation
2-07	Air Relief Valve & Flushing Chamber
4-01	Front Yard Service Locations
4-02	Residential Service Installation
4-03	Residential Service Installation Cross-section

4-04 Typical Lot Service Requirements

4-05 Front Service Locations

4-08 Parks Water Service

4-09 Service Box Detail for 25 mm Service Valves

3.3 METERING

With the exception of hydrants, blow-offs and blow-downs within public rights-of-way, provision shall be made for metering of all water connections. Large private fire protection systems shall have metered connections which include separate metering of domestic use.

3.4 DEMAND

According to water consumption records, use the following per capita demands:

a. Maximum Day Demand (MDD): 750 L/capita/day.
b. Peak Hour Demand (PHD): 1500 L/capita/day.

For non-residential developments, the minimum water consumption rate shall be equal to 0.2 litres per second per hectare. The applied peaking factor shall be $P_F = 10Q^{-0.45}$ to a maximum of 25 and a minimum of 2.5 where Q is in litres per second. In addition, water demand for large developments should be evaluated based on site specific service requirements as well as fire flow requirements.

The design population shall be the ultimate population in the area under consideration based on the approved Zoning By-Law requirements.

3.5 FIRE FLOWS

Fire flow requirements shall be in accordance with the most current edition of "Water Supply for Public Fire Protection – A Guide to Recommended Practice", published by Fire Underwriters Survey. If the minimum requirements cannot be met, the Owner/Applicant should apply fire underwriters survey recommendations.

Fire flows are also subject to the minimum requirements as per the following table.

Table 3-1: Minimum Fire Flow Requirements

Developments	**Minimum Fire Flow**
Single Family Residential	75L/s
Multi Family Residential	180 L/s
Commercial, Industrial and Institutional, High Value Properties, and High Density Residential	233 L/s

3.6 DESIGN FLOWS FOR WATER MAINS

Unless otherwise indicated by the Town, design flows shall be based on the ultimate population and fully developed land as anticipated in the Municipal Development Plan (MDP) and the proposed Land Use.

Equivalent populations for non-residential flows can be estimated using the established non-residential demands and the Maximum Day Demand per capita demand.

Total design flows (Q_{design}) are to be the greater of the following:

$Q_{design} = MDD + F$	Maximum Day Demand for the population or equivalent population plus the Fire Flow; or
$Q_{design} = PHD$	Peak Hour Demand for the population or equivalent population

3.7 PRESSURE

Where the maximum pressure exceeds 550 kPa (80 psi), service connections must be individually protected by pressure reducing valves located in the buildings being served.

Table 3-2:Water Distribution – Maximum/Minimum Pressure

Maximum Allowable Pressure in Distribution System	700 kPa (101 psi)
Maximum Allowable Pressure for Water Services	550 kPa (80 psi)
Minimum Peak Hour Pressure	300 kPa (43 psi)
Minimum Maximum Day + Fire Flow Pressure	150 kPa (22 psi)

Minor pressure losses through valves and fittings must be accounted for.

3.8 HYDRAULIC DESIGN

The Owner/Applicant shall perform a hydraulic network analysis using a method acceptable to the Town for all developments to ensure both domestic and fire flow requirements are met. A report outlining the results of the analysis shall be submitted to the Town with the subdivision design drawings.

Main line flow velocities should not exceed 1.5 m/s during peak hour flow conditions and 2.5 m/s during maximum day plus fire flow conditions.

The following Hazen-Williams Coefficient values shall be used in the design or evaluation of the water distribution system.

Table 3-3: Hazen-Williams Coefficient Values

Polyvinyl Chloride (PVC)	140
Ductile Iron (DI) or Cast Iron (CI)	80 to 100
HDPE	150

3.9 MINIMUM PIPE DIAMETER

Table 3-4: Minimum Pipe Diameters

Distribution Mains:	
Residential	150mm
Commercial	200mm
Industrial	200mm
Hydrant Connections	150mm
Service Connections:	
Residential	25mm
With Fire Sprinklers	50mm
Industrial	100mm

Where two hydrants are to be installed on an un-looped distribution main the minimum size of the main shall be 200 mm diameter.

Main sizes may be increased as considered necessary by the Town Engineer to accommodate for future development.

3.10 PIPE MATERIAL

Water pipes must meet the following specifications:

- Poly-vinyl Chloride (PVC) type CIOD (Cast Iron Outside Diameter),
- Meeting the specifications of AWWA C900-89 (100-300mm), AWWA C-905 (350-600mm), CAN3-B137.3-M86 latest version thereof,
- Must be CSA approved with a pressure rating of 1035 kPa (class 150),
- The Dimension Ratio (DR) shall be 18, and
- Jointing shall be gasketed bell-end and spigot conforming to AWWA C-11/ANSI A21.1 latest version thereof. Elastomeric gaskets shall conform to ASTM F477.

3.11 DEAD ENDS

Water mains must be looped wherever possible. Where dead ends are unavoidable, blow-off valves (minimum 50 mm diameter) shall be installed at the end of all dead end lines where practical, and approved by the Town Engineer. The Town do not allow hydrants to serve a secondary role as a blow-off, however may consider this on a temporary basis, only if approved by the Town Engineer.

Distribution mains shall be continuous (looped) wherever possible. No more than 30 dwelling units shall be permitted service on an un-looped (dead end) section of water main, for detached and semi-detached units.

Water demands in industrial, commercial, and high-density areas must be analysed to determine the grid and main sizes required.

For initial stages of large residential developments, the Town, at its sole discretion, may defer the second feed requirement, up to a maximum of 100 dwelling units. For proposals beyond 30 dwelling units on an un-looped main, fire flow testing must be conducted, as directed by the Regional Fire Chief, and analysis performed by the Consultant to show if the fire flow and consumption flows can be met for the proposed development. Other limiting factors that will be considered for the approval of more than 30 units on an un-looped water main are length of run, existing pipe size, age, material and condition.

3.12 MINIMUM DEPTH OF COVER

Water mains and services must be of sufficient depth to clear other underground utilities and prevent freezing. Soil type and groundwater levels shall be considered. Minimum depth of cover should be 2.7 m from finished design grade to the top of pipe.

Insulation is required for frost and mechanical protection in cases where minimum depths cannot be attained and should be approved by the Town Engineer.

3.13 GRADES FOR WATER MAINS

Grades shall be straight lines between defined deflection points. Elevations shall be recorded.

Where possible, the minimum grade of water mains shall be 0.1%. Grading shall be designed to minimize the number of high points.

When the slope equals or exceeds 20%, provide anchorage, joints restraints, trench dams and trench drainage. Provide geotechnical engineering report where appropriate.

3.14 VALVES

Main valves shall be located such that no more than 30 single family lots and one hydrant are involved in a shut down and a maximum of four valves are required to shut down any section of line. The design standard shall be two valves at a tee and three valves at a cross, unless approved otherwise by the Town Engineer. A valve and one length of pipe shall be installed at interim limits of construction.

All valves shall be provided with stainless steel nuts, bolts and washers.

Gate valves are required on mains smaller than 450 mm diameter, for larger lines, butterfly valves shall be used.

Combination air valves shall be installed at the summits of all mains of 200 mm diameter and larger, except as follows:

a. Where the difference in elevation between the summit and the valley is less then 600 mm,
b. Where it can be shown that air pockets will be carried by typical flows, or
c. Where active service connections are suitably located to dissipate entrapped air.

An air release valve or hydrant shall be placed at significant high points in the water main profile to allow for purging of stale water or air.

Typical air valve sizes, subject to design analysis, are as follows:

Table 3-5: Valve Sizes

Water Main Size	Valve Size
150 mm to 300 mm	25mm
350mm to 600mm	50mm

Air valves must be vented to an appropriate above-grade location to eliminate any potential of cross connection with runoff in a flooded or contaminated chamber.

Special consideration should be given to commercial and industrial areas. A plan for stubbing the service should be submitted to the Town for approval.

Valve boxes must be:

- Cast iron body, two section, bituminous coated.
- Norwood Foundry type A or equivalent adjustable for a 3.0 metre bury.
- Complete with extension spindle and 50 mm flange nut and cap.
- Must be of sufficient length to provide a vertical adjustment of +/- 300 mm. Extensions shall be cast iron suitable for use with valve boxes installed.

Refer to the following:

- Drawing 2-03 Type 'A' Sliding Type Valve Box.
- Drawing 2-05 Valve Anchor Detail.
- Drawing 2-07 Air Relief Valve & Flushing Chamber.

3.15 HYDRANTS

Hydrants shall be installed in all areas including private developments in locations and at spacing convenient for the Fire Department. Hydrants shall be located on the right-hand side of the street when entering dead ends or cul-de-sacs. Hydrants shall be located at a minimum bury depth of 2.7 m. A 2.0 m horizonal clearance between all deep utilities and hydrants must be maintained. A hydrant location plan shall be submitted to emergency services for approval.

General distribution of hydrants shall include spacing between hydrants measured in any direction along street frontage of:

- 150 m for residential protection.
- 90 m for commercial, institutional and industrial.
- Or as specified by Fire Underwriters Survey "Water Supply for Public Fire Protection", whichever is less.

Hydrants shall be located to conform to the sidewalk and/or the curb and gutter and driveway design s.

Table 3-6: Hydrant Locations

Residential	0.3 m clear back of monolithic sidewalk curb and gutter 1.5 m from face of curb where there is no sidewalk 1.5 m from face of curb if separate sidewalk curb and gutter
Commercial / Industrial	1.5 m from face of curb 1.5 m off property line if there is no curb

Hydrants shall be located on the projection of lot lines or at the beginning or end of curb returns with adjustments made so as not to conflict with catch basins.

In areas with "rural" roadway cross-sections, hydrants shall be located on special "pads" extending perpendicular to the roadway centre lines and a minimum of 3.0 m from the edge of the proposed road surface and be accessible from the roadway. The elevation of the "pads" shall be no more than 0.3 m below the crown of the road at that point. The "pads" shall have a minimum top width of 3.0 m, with side slopes of 4:1.

Hydrants type and manufacturers should meet the following specifications:

a. Conforming to AWWA C502.80
b. Fire Hydrant type - Clows McAvity Brigadier M67
c. Hydrants to be supplied with a minimum of one 300 mm intersection extension. The combined length of the lower barrel and the 300 mm shall provide at least a three (3) metre depth of bury for the main,
d. 150 mm inlet connection with compression type push-on rubber ring to suit the mater main pipe; Hydrants shall be supplied with break away type ground level flanges,
e. Hydrants shall have two 75 mm hose nozzles having a Major Thread O.D. of 75.87 mm (2.987"), conforming to the Alberta Mutual Aid Thread Standard of eight (8) threads per 25.4 mm and shall open in a counter clockwise direction,
f. Hydrants shall have a single 100 mm pumper nozzles having a Major Thread O.D. of 123.80 mm (4.874"), conforming to the WCUS / WCIU Thread Standard of six (6) threads per 25.4 mm and shall open in a counter clockwise direction,
g. All nozzle caps and operation nuts shall be square in shape,
h. Hydrant barrels are to be painted in Hi-Vis Yellow, Color Code (16-202). Code refers to the "General Paint Brand" and are to be industrial enamel for outside brush applications,
i. Nozzle covers are to be painted the same color as the hydrant barrel, and
j. Hydrants shall be equipped with a threaded drain, which shall not be plugged.

All flange nuts and bolts shall be type 304 stainless steel with hexagonal heads conforming to ASTM standards. Bolts and nuts shall be the size and length recommended by the valve and flange manufacturer.

Hydrants that are susceptible to vehicle damage shall be protected with bollards or similar devices as required by the Town.

3.16 CORROSION PROTECTION

A geotechnical corrosion analysis on the alignment of any proposed water main shall be conducted to determine the corrosiveness of the native soils. All hydrants and hydrant fittings, service connections, valves, fitting and metallic appurtenances shall have corrosion protection.

Where required by the Town Engineer, or as indicated by soils testing, all cast iron valves and fittings shall be cathodically protected as specified below.

New steel pipe shall be cathodically protected with high potential magnesium anodes. Cathodic protection shall be designed by a corrosion protection specialist to provide adequate protection for the pipeline and shall include surface test stations at each buried anode bed.

Connections to existing steel, cast iron and ductile iron pipe shall have at least two 7.7 kg (17 lb) high potential magnesium anodes installed at the point of connection.

Buried fittings and valves shall be cathodically protected with a 2.3 kg (5 lb) high potential magnesium anodes. Hydrants shall be cathodically protected with a 7.7 kg (17 lb) high potential magnesium anodes.

Exterior bolts for valves, hydrants and couplings shall be stainless steel 304 or approved equivalent.

Test stations shall be installed at the intervals specified by the corrosion protection specialist to provide the desired level of protection for the pipe and at the locations approved by the Town Engineer.

3.17 THRUST RESTRAINT

a. Concrete thrust blocking and/or adequate joint restraining devices complete with corrosion protection must be provided at bends, tees, wyes, reducers, plugs, caps, valves, hydrants and blow-offs.
b. The restraint system must take into account potential future excavations in the vicinity of the water main. Design calculations must be based on fitting type, water pressure and soil conditions as per the charts shown in the design drawings section.
c. Vertical thrust block shall be designed by the contractor and submitted to the Town Engineer for approval as needed.
d. Restraining devices for PVC pipe shall incorporate a series of machined serrations (not “as cast”) on the inside diameter to provide a positive restraint, exact fit, 360 degrees contact pad to pad feature and support of the pipe wall. Restraining devices shall be manufactured of high strength ductile iron, ASTM A536, Grade 65-45-12 for 50 mm through 600 mm sizes.
e. Bolts and connecting hardware shall be type 304 stainless steel conforming to ASTM standards.
f. All restraining devices for PVC pipe shall have a water working pressure rating equivalent to the full rated pressure of the PVC pipe on which they are installed, with a minimum 2:1 safety factor in any nominal pipe size.
g. All restraints must be compatible with 150 mm diameter cast iron pipe.

3.18 CHAMBERS

Chambers or manholes containing valves, blow-offs, meters or other appurtenances shall allow adequate room for maintenance, including headroom and side room. Access openings must be suitable for removing valves and equipment. The chamber is to be provided with a drain to a storm sewer or ditch, completed

with backflow prevention, to prevent flooding of the chamber. Rock pits may be considered subject to suitable soil and groundwater conditions. If required, a pumping system shall be provided for drainage.

Adequate venting shall be provided. The Town may require provision of forced ventilation, lighting, heating and dehumidification. Access and ventilation details must comply with WCB regulations.

Insulation to prevent freezing shall be provided where necessary.

3.19 SERVICE CONNECTIONS

a. Every legal lot and each unit of a residential duplex shall be provided with a separate service connection.
b. For residential services, minimum size for service connections should be 25 mm diameter for domestic requirements, with 30 m maximum length from the water main to the house.
c. For industrial and commercial users, a minimum size for service connections should be 25 mm diameter, however the service connections should be sized based on the required hydraulic conditions and design flows. Sizing calculations should be provided and approved by the Town Engineer.
d. For industrial requirements, service connections shall not be installed until the servicing requirements are known and a permit, approving the installation, is issued by the Town Engineer.
e. All service connections shall have provisions for metering.
f. A corporation stop is to be provided at the mains. Service saddles are to be used at all main connections as per manufacturer's recommendations. The corporation stop and standpipe shall be located 0.3 m from the property line, within the road right-of-way for street serviced areas.
g. Service pipes of type K copper shall conform to AWWA C800.
h. For the pipe sizes up to 50 mm diameter and under, pipes shall conform to AWWA C903-02 or CAN3-B137.1 Polyethylene municipal tubing, PE 3406 Series 160.
i. For pipe sizes 100 mm diameter or greater, PVC pipes (same as the watermains) shall be used.
j. Tracer wire (#14-1C AWG FT1 solid white with polyethylene insulation) shall be fastened to the Main Stop and continuously wrapped around the service pipe to the curb cock and terminate at the top of the service box.
k. All service lines shall be installed to provide a minimum depth of 2.7 m of cover (including "horizontal goose neck" or bend off the main).
l. Service saddles shall be all bronze or stainless steel and double strapped.
m. Each service shall have a shut-off with Type 304 stainless steel extension rods located within 300 mm of the property line on the public side. When a gas easement occurs adjacent to the property line the service shall be stubbed 300mm beyond easement limits. Each connection of 100 mm diameter or larger require an approved backflow prevention device at the property side of the shut-off.

Connection of water services to be installed as per Schedule C.

3.20 TRENCHING, BEDDING AND BACKFILLING

a. All trenching and backfilling shall be completed in strict accordance with Occupational Health and Safety Guidelines.

b. If unsuitable soil conditions are encountered, proper measures for dealing with the conditions shall be identified either on the design drawings or as a report to the Town Engineer prior to the construction.

a. Class "B" pipe bedding shall be utilized in suitable soil conditions. Washed rock shall be used if water table is above the pipe zone. Bedding sand shall have a minimum depth of 100 mm below the pipe and provide a minimum cover of 300 mm above the pipe.

b. The minimum trench width measured at the pipe spring line shall be equal to the pipe outside diameter plus 450 mm.

c. Excavated material shall be stockpiled at a safe distance from the edge of the trench.

d. Native backfill under existing or proposed roads or laneways shall be compacted to 98% standard proctor density from subgrade to 1.0 m from the subgrade or original ground, whichever is lower and 95% standard proctor density greater than 1.0 m from the subgrade or original ground, whichever is lower.

e. Backfill in all other areas shall be compacted to 98% standard proctor density.

3.21 ALIGNMENTS AND CORRIDORS

Where a water main crosses private land, right-of-way requirements are as indicated in Section 1.3. Clearance from sewers is as indicated in Section 1.4.

Water mains shall be located such that each property served has at least one side facing the water main.

On straight roads, water mains shall have straight alignments with uniform offsets between intersections. Curved alignments must be parallel to property lines. Design joint deflections shall be limited to half the maximum deflection specified by the pipe manufacturer. Locations of short lengths, or field cut pipes, must be recorded during construction.

Water mains shall be located 0.3 m and 0.5 m above and below sewers respectively and shall be located a minimum horizontal distance of 3.0 m o/c from any sewer line. Water mains shall be located 1.5 m from any catch basin and 1.8 m o/c from any gas line or as required by the utility company whichever is greater.

3.22 CLEANING AND PRELIMINARY FLUSHING

Before flushing and testing, ensure waterworks system is completely finished except tie-ins to existing water mains and services and make arrangements with the Town Engineer for scheduling of testing and disinfection of mains.

If required, isolation of existing water system will be performed by the Town. Do not operate any valves without the Town Engineer's authorization.

Remove foreign material from the pipe and related appurtenances by flushing with water. Main is to be flushed at water velocities as high as can be obtained from available water sources. Minimum velocity is to be 1.0 m/s and in accordance with AWWA C651. Flushing water is to be discharged to storm sewer, water courses or ditches that have sufficient capacity to carry flow. Flushing should continue at least until flow from most distant point has reached the discharge location and until the discharged water is clean and clear.

3.23 TESTING PROCEDURE

Upon completion of construction of any section, which shall be defined as that pipeline and appurtenances located between any two adjacent line valves, make section ready for testing.

The maximum length of distribution main test sections shall be 450 m. The maximum length of transmission main sections shall be 800 m.

Before pipe is filled with water, pipe bedding, concreting of all valves and fittings and backfilling shall be completed as required in this specification. Fill each section of pipe and allow to remain full of water for a period of at least 24 hours prior to commencement of any pressure tests. Submit pipeline to a test of 1.5 x working pressure applied at highest elevation in each section, with a minimum of 1,380 kPa applied at the lowest point of the test section. Ensure that test pressure does not exceed pipe or thrust restraint design pressures. Maximum allowable leakage rate at test pressure shall not exceed 1.25 litres per millimetre diameter of pipe per kilometre per 24 hour period. Minimum duration of test period is two hours. The pressure shall be maintained within 20 kPa of the specified test pressure throughout the test. Maximum test pressures should not exceed those specified in CSA B137.3 – Table 9.

Perform pressure and leakage testing of polyvinyl chloride (PVC) piping to AWWA M23 and AWWA C605. Compare against the allowable leakage calculated as follows:

PVC Pipe $L = NDP^{1/2}/128{,}225$ Where: L = allowable leakage, L/hr

Should any test disclose excessive leakage, repair or replace defect and retest section until specified testing requirements is achieved.

3.24 GENERAL DISINFECTION, FLUSHING, AND BACTERIOLOGICAL PROCEDURES

Disinfect, flush, and bacteriological test shall be in accordance with AWWA C651 and the following:

Disinfection and Flushing procedures shall be witnessed by the Consulting Engineer and a representative of the Town. Notify the Town representative at least 48 hours before the proposed date when disinfection will commence.

Do not use granular hypochlorite for disinfection of PVC pipe with solvent welded joints, due to explosive reaction potential.

Retain water containing not less than 25 mg/L free chlorine in water system for a period of at least 24 hours, in accordance with AWWA C651, Continuous Feed Method.

After completion of chlorination, flush chlorinated water from system, hydrants and services until chlorine concentration in remaining water is less than 0.3 mg/L. Water with a chlorine concentration greater than 1 mg/L shall not be discharged to a recognized water course without the approval of the Alberta Environment.

At a point not more than 3m downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will not have less than 25 mg/L free chlorine. To assure that this concentration is provided, measure the chlorine concentration at regular intervals as specified in AWWA C651.

Amount of chlorine required to produce 25 mg/L concentration in 30 m of pipe of various sizes is shown in the following table.

Table 3-7: Amount of Chlorine Required to Produce 25 mg/L Concentration in 30 m of Pipe

Pipe Size (mm)	100% Chlorine (kg)	1% Chlorine Solution (Litres)
100	0.006	0.61
150	0.014	1.36
200	0.024	2.46
250	0.039	3.86
300	0.054	5.45
400	0.098	9.85

After final flushing and before the new water main is connected to the distribution system, two consecutive sets of water samples taken at least 24 hours apart, shall be collected from the new main. Samples shall be taken at a minimum interval of 370m, plus one set from the end of the line and at least one set from each branch. Samples shall be tested at the Contractor's expense for total and fecal coliforms and background bacteria by a laboratory approved by the Town Engineer. Sampling and analysis shall be done in accordance with Standard Methods for the Examination of Water and Wastewater. The presence of total or fecal coliform bacteria and/or background bacteria greater than 200 CFU per 100 ml shall constitute a failed test.

Following successful bacteriological testing, the results of the bacteriological tests shall be delivered or faxed to the Town of Rocky Mountain House, stating that the water is free from contamination. Once satisfactory water quality and bacteriological test results have been confirmed, the Town will notify the Contractor to proceed. Contractor shall remove test and bleed out apparatus and shall backfill and complete any work required to commission the waterworks systems. Final connections to existing mains and services shall be swab disinfected with 1% - 5% chlorine in accordance with AWWA C651, Section 4.6. Disinfection and final connections shall be witnessed by the Consulting Engineer and a representative of the Town of Rocky Mountain House.

Contractor shall submit a written plan for approval by the Town Engineer 72 hours in advance of performing the work. All testing shall be done by the Contractor at his cost. All testing, disinfection, flushing, and water sampling shall be witnessed by the Town Engineer.

Where any section of system is provided with concrete thrust blocks, do not conduct tests until at least five days after placing concrete or two days if high early strength concrete is used.

4.0 SANITARY COLLECTION

This section outlines the methodology and design criteria that apply to the design of the sanitary sewage conveyance system. These guidelines are not intended to be a substitute for sound engineering knowledge and experience. Sanitary sewer system designs shall be prepared under the direction of a design professional who has the appropriate experience and is registered with the Association of Professional Engineers and Geoscientists of Alberta.

4.1 SANITARY COLLECTION GENERAL PRINCIPLES AND OBJECTIVES

Sanitary sewers are intended to convey wastewater only. This includes standard domestic plumbing fixtures, floor drains, approved industrial and commercial wastes and unavoidable infiltration. Sanitary sewer systems are intended to exclude stormwater, roof drains, foundation drains and groundwater.

All urban or suburban residential, commercial and industrial development shall be provided with sanitary sewer service.

Sanitary sewerage collects and conveys wastewater to treatment facilities for treatment. To accomplish this, new systems must be designed and constructed with reliable conveyance capacity and minimal potential for rainfall and groundwater inflows, such that system backup is limited to cases of unforeseeable blockage. To achieve this objective, new system extensions will be sized to flow at less than full and with reasonable allowances for extraneous inflows. It is recognized that these criteria provide a safety factor compared to previously constructed systems, which will flow full at the design flow rate.

To protect the functional integrity of the sanitary sewer system, extraneous inflows must be prevented or controlled to match the design criteria and performance expectations.

A prime consideration in the selection of alternatives for the sanitary servicing of new development areas must be minimization of the long-term cost to the public. Extension of sanitary servicing by means of gravity sewer systems to the maximum extent possible is preferred and the utilization of pumping systems will be permitted only when insurmountable constraints cannot be resolved otherwise.

The Town wishes to promote an orderly process of development with the objective of achieving permanent sanitary sewer system extensions in the most cost-effective manner. Hence,

a. The proliferation of temporary servicing schemes in lieu of permanent system extensions is discouraged, and
b. Extensions of systems and developments will be discouraged when they involve the construction of downstream connections through undeveloped areas (leapfrogging) solely for the purpose of advancing service extensions to upstream areas.

The design of the sanitary sewer system should conform to the Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta, as published by Alberta Environment Parks and as amended by these guidelines.

4.2 LIST OF DRAWINGS

1-01 Requirements Utility Trench Typical Section
1-02 Caged Trench for Pipe Installation Under Existing Roads
1-03 Trench Bedding Details
1-04 Trench Insulation Detail
1-05 Pipe Crossing Detail
4-01 Front Yard Service Locations
4-02 Residential Service Installation
4-03 Residential Service Installation Cross-section
4-04 Typical Lot Service Requirements
4-05 Front Service Locations
5-01 Standard 1200 mm Precast Manhole Assembly.
5-02 Precast Prebenched Base for 1200 mm Manhole Assembly
5-03 Manhole Inlet /Outlet Pipe Design Considerations
5-04 Service Connection Details for Sanitary Manholes in Cul-de-sac
5-05 1-S Precast Manhole Assembly
5-06 Large 1500-3000mm Manhole Assembly
5-07 External Drop Manhole
5-08 Internal Drop Manhole
5-09 Precast Slab Tops for 1200 mm Manholes
5-10 Sanitary and Storm Manhole Adjusting Collar
5-11 Manhole Safety Platform
5-26 Sanitary and Storm Manhole Frames
5-27 Sanitary Manhole Cover

4.3 DESIGN FLOW

The sanitary sewer system shall be of sufficient capacity to convey the peak dry weather flows plus extraneous infiltration and inflow (including future contributing areas).

Average Dry Weather Flows (ADWFs) for:

- Residential Contributions: Minimum average contribution of 380 L/capita/day.
- Commercial, Industrial and Institutional: Minimum average contribution of 0.2 liters per second per hectare (l/s/ha).

Average dry weather flows (ADWF) shall be based on specific data related to the development or zoning.

The Owner/Applicant should account for higher average flows if high water use facilities are being planned within the development i.e., food processing plant, large hotel, hospital, etc.

4.4 PEAKING FACTORS

The peaking factor (Pf) is the ratio of peak dry weather flow (PDWF) to the average dry weather flow (ADWF).

Table 4-1: Peaking Factors

Residential	Pf = Harmon's Peaking Factor = $1 + 14/(4 + P^{0.5})$ where P = the design contributing population in thousands
Commercial / Industrial	Pf = $10(Q_{AVG}^{-045})$, but not less than 2.5 or greater than 25

4.5 INFLOW AND INFILTRATION (I/I)

Design flow shall include an extraneous flow allowance to cover extraneous flows such as groundwater infiltration and system inflows.

A general allowance of 0.28 litres per second per hectare shall be applied to all residential areas to account for wet weather inflow to manholes not located in street sags and for infiltration into pipes and manholes.

A separate allowance of 0.4 litres per second per manhole shall be applied for inflows at manholes located within roadway sags or other low areas that may be flooded during major storm events. An effort should be made during the design stage to locate sanitary manholes away from sag locations. For planning purposes and downstream system design, the Owner/Applicant shall make a conservative estimate of the number of sag manholes that may be located in the future contributing area

Connection of foundation drains (weeping tile) to sanitary sewers is not permitted. Therefore, for new development areas, a specific allowance for foundation drains flow to the sanitary sewer system is not required.

4.6 TOTAL DESIGN FLOW FOR SANITARY SEWERS

The total design flow for the sanitary sewer is the sum of the peak dry weather flow, all (applicable) extraneous flows and all sanitary flow from future contributing areas.

$Q=ADWF*Pf + I/I$

Where: Q = design flow in m^3/s

ADWF = Average Dry Weather Flows

Pf = Peaking Factor

I/I = Inflow and infiltration allowance

Design population (P) shall be the ultimate population in the area being considered based on approved Zoning By-law requirements.

4.7 SIZING OF SANITARY SEWERS

4.7.1 Gravity Sewers

All sanitary sewers shall be sized using Manning's equation.

Table 4-2: Manning's Equation

$Q = \frac{AR^{0.667}S^{0.5}}{n}$	Where: Q = design flow in m^3/s A = cross-sectional area in m^2 R = hydraulic radius (area/wetted perimeter) in m S = slope of hydraulic grade line in m/m n = roughness coefficient	= 0.011 for PVC pipe = 0.011 for HDPE pipe = 0.013 for concrete pipe

Sanitary sewers are to be designed to carry the design flow at flow depth of 80% of the sewer diameter, which results in a flow rate approximately 86% of the sewer's full flow capacity.

$$\text{required flow sewer capacity} = \frac{\text{estimated total design peak flow rate}}{0.86}$$

The hydraulic capacity of a gravity sanitary sewer shall be based on such factors as projected in-service roughness coefficient, slope, pipe material, and actual in-service flows. Sewers larger than the minimum size required shall be chosen so that the minimum velocity at the peak flow is not less than 0.6m/s for self-cleaning purposes.

4.7.2 Sewage Force Mains

Use the Hazen-Williams formula in the following table.

Table 4-3: Hazen-Williams Formula

$Q = \frac{CD^{2.63}S^{0.54}}{278780}$	Where: Q = rate of flow in L/s D = internal pipe diameter in mm S = slope of hydraulic grade line in m/m C = friction coefficient	= 140 for PVC pipe = 80 to 100 for Ductile Iron (DI) or Cast Iron (CI) = 150 for HDPE

A "system-head" curve shall be provided for each force main. Supplementary information to be provided with the curves will include, but not limited to, population estimates, areas served, plan and profile of line, friction coefficients and line head losses.

4.8 MINIMUM FLOW VELOCITIES

Minimum full flow design velocities:

- Gravity sewers at 0.6 m/s.
- Force mains at 0.75 m/s.

4.9 MAXIMUM FLOW VELOCITIES

Maximum full flow design velocities for gravity sewers and force mains at 3.0 m/s.

4.10 ALIGNMENT

Sewers must maintain a minimum vertical separation of 0.3 m and 0.5 m when crossing below and above water mains, respectively. Sewers shall be located a minimum horizontal distance of 3.0 m o/c from any water main.

Wherever practical, straight alignments are preferred. Except as indicated for curved sewers, horizontal and vertical alignments shall be straight lines between manholes for gravity sewers, and between defined deflection points for force mains. Elevations are to be recorded.

Force main line and grade requirements are as indicated for water mains. Air release valves are required at high points.

4.11 MINIMUM PIPE DIAMETER

Table 4-4: Minimum Pipe Diameter

Residential	200 mm
Commercial/ Industrial/ Institutional	250 mm
Service Connections	150 mm
Sewage Force Mains	100 mm

Smaller pipe diameters will require special approval by the Town Engineer.

Pipe and fittings material shall be PVC pipe – ASTM D3034 SRD35 (maximum 600 mm diameter). Material selection for larger pipes shall be submitted for approvals to the Town of Rocky Mountain House.

Installation is to comply with manufacturers recommendations.

4.12 MINIMUM SANITARY PIPE GRADES

Minimum grades of gravity sewers are as required to obtain the minimum velocity of 0.60 m/s except for the upstream section of a residential sewer serving a design population of 25 or less in which case the minimum grade is 2.0%, unless otherwise approved by the Town.

Table 4-5: Minimum Slopes Permitted for Various Sewer Sizes

Sewer Size	Minimum Slope
200 mm	0.40%
250 mm	0.28%
300 mm	0.22%
375 mm	0.15%
450 mm	0.12%

525 mm or larger	0.10%

Force main grades are as indicated in Section 3.13.

4.13 CURVED SEWERS

Although it is recommended that storm sewers be laid with straight alignments between manholes, curved sewers will be permitted with the following restrictions:

a. The sewer shall be laid as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. Minimum radius shall not be less than 60 m,
b. Manholes shall be located at the beginning and end of curves, and at intervals not greater than 90 m along the curve unless approved otherwise by the Town Engineer. The curve shall run parallel to the street centre line. The minimum grade for sewers on curves shall be 50% greater than the minimum grade required for straight runs of sewer,
c. Joint deflection not to exceed 75% of maximum recommended by pipe manufacturer or minimum radius of 60 m; whichever is greater,
d. Joint locations to be recorded,
e. Curves shall run parallel to the curb or street center line, following the road alignment and within the road right-of-way, and
f. The minimum grade for sewers on curves shall be 50% greater than the minimum grades noted in Section 4.12.

Where straight sewers are not possible or practical, horizontal curves may be permitted using pipe joint deflections as follows:

- Minimum radius =60 m.
- Constant radius throughout curve.
- Joint deflection not to exceed 75% of maximum recommended by pipe manufacture.
- Minimum design velocity = 0.9 m/s.
- Continuous curves between manholes.

Manholes shall be located at the beginning and end of each curve and at intervals not greater than 90 m along the curve.

4.14 DEPTH

Sewers shall be of sufficient depth to:

a. Permit gravity service connections to building basements. Special considerations should be given when property elevations may be low with respect to surface elevation of the road right-of-way,
b. Prevent freezing,
c. Clear other underground utilities,
d. Prevent damage from surface loading,
e. Minimum depth of cover 2.7 m to top of pipe measured from finished design grade, and
f. Clearance from sewers is as indicated in Section 1.3 and 1.4.

In cases where design grade does not comply with the minimum depth of cover, pipes must be insulated to provide frost and mechanical protection. Final design is subject to approval by the Town Engineer.

4.15 PIPE STRENGTH

The strength of the pipe shall be sufficient to carry the loads due to trench backfill and due to wheel loads. The strength of pipe shall be calculated on the basis of the external loads, trench conditions, and class of bedding provided. Class B sand bedding is the minimum bedding requirement.

4.16 MANHOLES

4.16.1 Design Features

Standard 1200 mm diameter pre-cast manholes shall be used on mains 600 mm in diameter or less. Pre-cast manhole vaults, or an oversized manhole barrel shall be used on mains 675 mm in diameter or greater. "T-Riser" manholes may be used on mains 1200 mm in diameter and larger, providing there is no deflection in alignment or grade.

The maximum change in the direction of flow in any sanitary sewer manhole shall be 90°.

Safety grates shall be required in manholes deeper than 4.5 m, constructed in accordance with the Alberta Occupational Health and Safety Standards.

Manholes shall be installed with ladder rungs. Safety platforms shall be required in all manholes with a depth of 6.0 m (vertical distance from rim to invert) or greater. PVC mains shall be connected to manholes using either a manhole adaptor or an approved pre-benched manhole base.

The flow channel through manholes shall be made to conform in shape and slope to that of the sewer. The depth of the flow channel should be at least one-half the diameter of the downstream sewer.

Manhole bases may be cast-in-place or pre-cast complete with flow channel, benching, and pipe stubs.

4.16.2 Required Locations

Manholes are required at the following locations:

a. Every change of pipe size,
b. Every change in grade,
c. Every change in direction, expect as indicated in the Curved Sewers section,
d. Upstream and downstream ends of curved sewers,
e. Every pipe intersection except for 100 mm and 150 mm service connections,
f. Upstream end of every sewer line and cleanout,
g. Every future pipe intersection, and
h. 150 m maximum spacing.

Sanitary sewers are to be extended 1.5 m past the last house service lead, with the exception of sanitary mains in cul-de-sacs where service leads may be connected directly to the manhole provided that the lead enters the manhole less than 0.60 m above the invert of the main.

4.16.3 Hydraulic Details

To maintain a continuous energy gradient through manholes, the obvert (crown) elevation of the lowest upstream pipe shall be equal to, or higher than the obvert of the downstream pipe. Where a bend in pipe

alignment occurs in a manhole, the invert elevation of the downstream pipe shall be in accordance with the table below.

Table 4-6: Minimum Drop In Invert Elevations Across Manhole

Straight run	Continue slope of upstream or downstream sewer, whichever is greater
Deflections up to 45°	25 mm drop
Deflections 45° to 90°	50 mm drop

The maximum drop allowed across a manhole is 0.75 m. If the design of the sewer system is such that the difference in elevation between the manhole inlet and outlet exceeds 0.75 m, a manhole drop structure will be required. Drop manhole and ramp structures shall be avoided where possible by steep-ending inlet sewers.

Force main discharges shall be directed into the receiving manhole outflow pipe. Manhole benching shall be extended a minimum 200 mm above the force main crown. If a manhole drop cannot be avoided, an inside drop pipe is required.

4.17 TESTING OF SEWERS

In areas where the groundwater table rises up to the sewer pipe invert or higher, each section of sewer mains and service connections shall be tested for water tightness by an infiltration test. In all other situations, an exfiltration test may be required after review of the camera inspection report.

Maximum allowable leakage for an exfiltration test of a sewer pipe while subjected to a minimum 0.6 m hydrostatic head of water is 40 l/d/mm of diameter/km.

Tests shall be undertaken on each section of sewer main and the results recorded and shall be performed in the presence of the Town Engineer.

4.18 CAMERA

All sections of sewer shall be inspected with closed circuit television camera (CCTV) equipment. An inspection report, photos and DVD shall be submitted to the Town for their approval and records. CCTV shall be carried out at the Construction Completion Certificate (CCC) and within 60 days of the Final Acceptance Certificate (FAC).

4.19 Pipe Locations and Corridors

Sewers shall be located within the road right-of-way as shown Section 6.0.

Where a sewer crosses private land, right-of-way requirements are as indicated in Section 1.4 Utility Rights-Of-Way.

Clearance from water mains is as indicated in Section 1.4.

4.20 SERVICE CONNECTIONS

Every legal lot and each unit of a residential duplex shall be provided with a separate service connection.

Unless otherwise approved by the Town Engineer, connections are to serve all plumbing by gravity. Drawings to provide service invert at property line and minimum service elevation at building setback location.

All sanitary sewer service lines must have a 200 mm vertical inspection chamber complete with cast iron security cover at final lot grade located 300 mm of the property line on the public side. Inspection chambers are not required on residential connections where the service is less than 2.5 m long and connects to a manhole.

4.20.1 Size

Pipe size is to accommodate peak design flow. Minimum pipe size is 150 mm diameter.

4.20.2 Location and Depth

Connections to large lots are to be located at the lower portion of each lot. For residential developments, locate connections in accordance with detail drawings. Service connections shall not be located under driveways or walkways and shall maintain a minimum 1.0 m horizontal distance from any driveways or walkways.

Sanitary service obverts at property/easement line shall be set at an elevation of 2.7 m below finished grade and deep enough to be extended below the anticipated building footing elevation.

Where existing conditions dictate that the depth of bury be less than 2.7 m, the service is to be insulated. Any services less than 2.7 m must be approved by the Town Engineer.

The sanitary, water, and storm services shall be laid in a single trench. When facing the lot being serviced, the water service shall be laid along the centre of the service alignment, the sanitary service 0.30 m to the left of the water service, and the storm service 0.30 m to the right of the water service. The services shall intersect the property line at an angle as near to 90° as possible unless otherwise approved by the Town Engineer.

The service should extend typically 4.5m past the property line.

To aid in locating the service, temporary markers shall be installed at the end of the service stub. Vertical risers shall not be used unless otherwise approved by the Town Engineer. Instead, the service shall be installed on a continuous grade from the main to the service stub at property/easement line. A vertical long radius bend shall be installed immediately prior to the reduction fitting/plug to reduce the pipe slope to approximately 2%. Alternatively, the riser section may be placed at a 45° angle (1:1 slope), with the vertical long radius bend installed in an appropriate location between the main and the property/easement line.

No horizontal bends shall be allowed on sanitary service connections. A maximum of two vertical bends will be allowed: one at the main and one at the property/easement line.

4.20.3 Grade

Minimum grade from property line to sewer main is:

- 150 mm diameter pipe - 2.00 %
- Larger Sizes - Grade based on minimum velocity of 0.75 m/s

4.20.4 Connections

Sanitary sewer services to the main may be made as follows:

a. In-line tees, and/or
b. Inserta tees.

"Inserta Tees" shall not be used on mains having a nominal internal diameter of 200mm or less as the protrusion of stub into the main interferes with the operation of camera inspection equipment. Accordingly, all 200 mm sanitary sewer and storm sewer mains shall be PVC SDR 35 Pipe. This will also allow for the use of service saddles for future service connection installation.

Use standard wye fittings for connections to new mains. For connections to existing mains, use wye saddles or, if approved, insertable tees. The service connection centerline must not be below the sewer main centerline.

Service connections may be permitted into manholes if:

- The connection is not orientated against the flow in the main.
- Manhole hydraulic requirements are met.
- The lead enters the manhole less than 0.60 m above the invert of the main.

Control inspection manholes are required on all industrial and commercial connections or on a service connection larger than 150 mm diameter. Connections exceeding 30 m in length shall be treated as mains and must have a cleanout.

4.21 SANITARY PUMP STATIONS

The extension of sanitary servicing by use of sanitary pump stations shall be avoided where possible. Sanitary pump stations shall only be considered where physical constraints dictate. Sanitary servicing concepts in which a pump station is required shall be justified through the Area Structure Plan requirements for new development areas and be supported by the Sanitary Master Plan. Any use of sanitary pump stations must be designed by a Professional Engineer and submitted to the Town Engineer for approval. Preliminary design must be approved before detailed design proceeds.

Table 4-7: Minimum Preliminary Design Requirements

Description:	A brief description of the project and purpose
Justification:	The justification for the pump station
System Layout:	Select location(s) to minimize long-term total number of pump stations
Location:	Within PUL adjacent to road for accessibility
Capacity:	Dependent upon the development and catchment area - designs must consider short, intermediate, and long-term future flows. Designs must address: • design period

	• area serviced • population densities and ultimate total population • commercial and industrial contributing areas • projected minimum, average, and peak daily wet weather flow, related to: o anticipated development staging o average and peak dry-weather flow o infiltration and extraneous flow allowances o design flow rates proposed
Configuration:	Either wet well only or wet well/dry well configurations are acceptable. A building will be required at all sewerage pump station.

Other basic criteria including:

- Number, type, capacity and motor power of the proposed pumping units.
- Force main design basis.
- System head curves, including head computations for the pumping system.
- Sewage detention times in the wet well and force main under various operating conditions.
- Heating, ventilation, and air condition (HVAC) requirements.
- Electrical power and lighting requirements.
- Odour control measures.
- Environmental considerations and impacts.
- Staging provisions.
- Construction dewatering requirements.
- Access for construction and maintenance.
- Aesthetics, noise, and landscaping.
- Security against vandalism and theft.
- Flood elevations and station uplift design.
- Proximity of receiving sewers, water mains, natural gas, and power supply.
- Minimizing energy requirements.
- Types of controls to be PLC or relays, ultrasonic and float controls and SCADA connection or capability.
- Emergency backup power or emergency storage.
- Soils – subsurface investigations must be undertaken prior to site approval.
- Convenience of operation and maintenance.
- Safety for operators and public.
- Capital costs and operation and maintenance costs.
- Metal stations are not permitted.

In addition to meeting the requirements as laid out in this Section, the design and construction of sanitary pump stations must meet all the current requirements of other governmental authorities having jurisdiction, including:

- Alberta Environment.
- Alberta Occupational Health and Safety.
- Electrical Protection Branch-Alberta Municipal Affairs and Housing.
- Building Standards Branch-Alberta Municipal Affairs and Housing as laid out in the Alberta Building Code.

Engineering drawings for sanitary pump stations may have to be submitted to Alberta Environment and Parks for review as a condition of the Letter of Authorization for the project issued pursuant to the Alberta Environmental Protection and Enhancement Act. The issuance of a Letter of Acknowledgement by Alberta Environment and Parks may be deemed necessary by Alberta Environment and Parks before construction of the facility can begin. It shall be the responsibility of the Owner/Applicant and the engineering consultants to prepare and make all necessary submissions and applications to Alberta Environment and to satisfy any requirements as necessary to obtain that agency's approval for the sanitary pump station.

4.21.1 Pumps, Pipes and Valving Design Features

Pump stations shall be designed with a minimum of two pumps, capable of handling the peak wet weather flow with any one pump off line. A mixer shall be provided, or each pump equipped with an automatic flush valve.

Pump requirements are as follows:

- Capable of passing solids up to 75 mm in size - for small flows (<10 l/s) recessed.
- Impeller type pumps with 50 mm solids capability may be considered, subject to approval by the Town Engineer.
- Maximum motor speed of 1750 RPM – for small flows (<10 l/s) 3,500 RPM may be considered.
- Explosion proof.
- Submersible for wet well and totally enclosed fan cooled (TEFC) for dry well.
- 600 volt three-phase electrical power – lower voltage (208 volt, three-phase) may be considered depending upon service voltage available from the power company.
- Easily removed for maintenance.
- Able to operate alternately and independently of each other.
- Able to meet maximum flow condition with one pump in failure mode.
- Sized so that each motor and pump does not cycle more than six times in one hour under peak wet weather flow conditions.
- Operating conditions based on alternating all pump for equal runtime.

The minimum diameter for all pump suction and discharge piping shall be 100 mm nominal. Piping shall be sized such that flow velocity will not exceed 1.8 m/s in suction piping or 3.5 m/s in the discharge header within the pumping station. Flow velocities should not be less than 0.75 m/s, to maintain solids in suspension.

All process piping within sanitary sewer pumping stations shall be 316 stainless steel. All flange bolding in wet well areas shall be stainless steel. Buried pipe within the excavation shall be plastic pipe (HDPE or PVC), subject to approval by the Town Engineer.

The pressure rating for piping within the station shall suit the service requirement, however, the minimum rating shall be 900 kPa.

Check valves are required on each pump discharge. When vertical mounting, ball type is preferred.

Plug or ball valves are required on each pump discharge to permit isolation of each pumping unit and check valve removal.

Gate valves are required on influent line outside of the pump station.

Regardless of the type of emergency standby system provided, a riser pump-out pipe from the force main with quick connection capabilities and appropriate valving shall be provided for pumping stations to hook up portable pumps.

Equipment to be approved by a certification agency accredited by the Standards Council of Canada and have minimum 1- year guarantee on parts and labour. All equipment must be tested prior to acceptance.

Final selection of process and mechanical equipment shall be reviewed by the Town for approval in an effort to standardize equipment throughout the Town's facilities.

4.21.2 Wet Well Design Features

4.21.2.1 Size Considerations

Wet wells are to be of adequate size to suit equipment space, operator access requirements and active volume considerations.

To minimize dead storage volume, the depth from the "pump off" level to the floor of the wet well should be kept to an acceptable minimum. The required depth will be dictated by suction pipe inlet conditions, pump manufacturer's requirements for submergence or cooling, net positive suction head, priming requirements, and vortex control.

Wet well must be sized small enough to minimize total retention time, the time sewage is held in the wet well and any rising force main, and yet be large enough to control the frequency of pump starts. The maximum retention time in the wet well should not exceed 30 minutes for the design minimum flow rate anticipated when the contributing area is fully developed. Total retention time in the wet well and force main should be kept to a minimum (generally less than four hours) to avoid anaerobic fermentation and the resultant production of odorous, hazardous and corrosive gases.

Wet wells should be sized large enough to maximize pump life by decreasing the frequency of pump starts. The manufacturers' recommendations with regard to the allowable frequency of pump starts for the specific size and type of motor are to be satisfied.

Minimum wet well size is 2.4 m diameter.

4.21.2.2 Wet Well Shape and Benching

Wet wells are to be arranged and benched to limit dead spaces where solids can accumulate and to provide smooth, uniform, and unobstructed flow to the pump suction influence zones. Wet well floors should have a minimum slope of 1:1 to a hopper-type bottom. The horizontal area of the hopper bottom should be no larger than necessary for the proper installation of the pump or suction pipe.

4.21.2.3 Vortex Prevention

Suction elbows, baffle plates, vortex breakers, or drop tubes are to be provided, as required.

4.21.2.4 Corrosion Considerations

All bolts, nuts and other fasteners used in wet well areas are to be stainless steel and all supports, brackets, gratings, ladders, and other structures shall be corrosion resistant materials.

Aluminum doors or hatches are recommended for access to wet wells. Installation of electrical equipment and wiring within the wet well is to be avoided whenever it is not essential there.

Lifting chains in wet wells shall be nickel plated or galvanized and have a molybdenum-based corrosion protection coating.

4.21.2.5 Access Hatches Design Features

Pump station access hatches should be waterproof and provided with locks. Covers may be either aluminum or fiberglass. Fasteners should be 316 stainless steel. The access hatch should be located 300 mm above ground level.

4.21.2.6 Access Design Features

The station should be accessed by aluminum ladder. Ladder should be located to avoid interference with removal and installation of pumps. Ladder to be provided with ladder up extension and lock at least 1.0 m above station access hatch. Fibreglass grating platform to be provided above high water level for wet well access. Access, ladder and platform shall meet OH&S standards.

Access to be located above 200-year flood level or 1.0 m above highest recorded flood elevation.

4.21.3 Building Requirements

A building will be required at all pumping stations to house all electrical and control equipment.

All HVAC equipment and valves are to be housed in the building or a dry well. The building or dry well is to be completely isolated from the pumping station wet well and provision for access to the wet well shall only be from the outside, through doors or access hatches with suitable locking devices.

4.21.4 Collection Manhole

Only one sewer connection shall be provided into a wet well to convey sewage from the contributing collection system. If more than one sewer enters the site or is required to be connected to the pumping station, a collection manhole within the proximity of the pumping station as approved by the Town Engineer shall be provided as a junction point for all incoming sewers. Appropriate stubs are to be provided for future connections. Only a single connection is to be made from the collection manhole to the wet well of the pumping station.

4.21.5 Pressure Gauges

Taps with shutoff valves suitable for portable quick-connect pressure gauges are to be provided on each suction and discharge pipe at suitable locations.

Gauge taps shall be installed on the suction and discharge side of all dry well mounted pumps, on the discharge pipe from all wet well mounted pumps and on the main discharge to the force main. The gauge taps are required to permit the determination of the operating pressures of the pumps for comparison with

the pump curves and identification of any change in operating pressures indicative of an operational problem. Pump discharge gauge taps should be located between the pump discharge and the discharge check valve.

Gauges should be a compound pressure/vacuum type, equipped with a diaphragm seal which can be flushed and rodded without removal from the line and isolation valves. Gauges provided for the discharge should be liquid-filled with a maximum range of approximately twice the working pressure.

Pressure gauges complete with pressure transmitters shall be mounted on a nearby wall or floor mounted on a galvanized, steel stand, 1.2 metres above the floor and connected to the gauge taps with suitably pressure-rated hose.

4.21.6 Maintenance and Operational Provisions

4.21.6.1 Pump and Equipment Removal

Permanent hoist equipment and access hatches are to be provided to permit removal and replacement of any piece of station equipment requiring routine maintenance or replacement. Hoists and beams should, if possible, allow for placement of equipment onto service vehicles without double handling or use of mobile cranes.

As an alternative in specific cases, appropriate vehicle access and adequate access hatches may be provided to allow the use of exterior mobile cranes.

For wet well pump installations, the provision and arrangement of lifting equipment is to be such that the necessity for personnel to enter the wet well for removal of equipment is minimized.

4.21.6.2 Access Into Station Structures

Suitable and safe means of access shall be provided to all equipment requiring inspection or maintenance and to the wet well for inspection and cleaning.

Stairways and ladders, including fall arrest hoops and rest platforms shall comply with the requirements of Occupational Health and Safety. All stairs shall be of a non-skid type. Areas that are designated as confined spaces shall have a system of rescue made available. This shall include standard davit bases to be installed at access openings, as well as the provision for a straight line lifting rescue path out of confined spaces. Provision of fall protection for ladders exceeding 3.0 m is preferable to hoops.

Access into wet wells shall be from the outside and not through buildings or dry wells.

Doors and access hatches shall have suitable locking devices. All external access hatches shall be pad-lockable.

For all entry hatches, non-protruding extension ladders are to be provided, which must be located far enough away from the walls to be able to be pulled up through the access opening and extended to a height of at least 1.0 m above the roof. Guard rails are a requirement around the access openings. Chains are prohibited.

Access hatches covers for all roof openings to wet or dry wells must be sealed or have sufficient overhang to prevent rainwater inflow. Odour tight aluminum hatch covers should be used.

Floors and platforms shall be provided to allow access to all components to facilitate maintenance, repair, removal and replacement tasks. Such floors and platforms shall not obstruct access to any other component.

4.21.6.3 Ventilation

Forced mechanical ventilation is required at all wastewater facilities. Suitable equipment shall be installed to provide for continuous ventilation at a rate of six air changes per hour (at low water level) in each of the wet well and dry well areas. Completely separate systems are required for each well and there must be no interconnection between the wet well and dry well ventilation systems.

Fresh air, heated and thermostatically controlled, shall be forced into each area at a point 150 mm above the floor in dry wells and 150mm above the high water level in wet wells and exhausted at higher levels.

Subject to the approval of Alberta Environment and Parks and the Town Engineer, provisions for connection of portable ventilation equipment may be included as an alternative to continuous ventilation from the wet well only. The Owner/Applicant will supply details of the connection requirement on request.

Consideration should be given to provision of an automatic control to increase ventilation rates to 20 to 30 air changes per hour, interlocked to turn on with light switches or door switches, in addition to the continuous ventilation requirements.

Provision shall be made to detect and actuate an alarm if the ventilation system should fail. A local alarm indicator, noticeable prior to station entry but not to be noticeable to the public, is required. A volume controllable buzzer and red beacon on the inside of a building, visible as soon as the doors open, is acceptable. Provision shall be made for transmission of the alarm through the SCADA system.

Provision is to be made for ventilation of wet wells using portable ventilation equipment, in case of failure of the built-in system. This provision is to consist of a 200 mm diameter standpipe extending from inside the wet well to a flanged connection on the exterior of the facility. The end of the standpipe is to be located so as to permit discharge of air through the standpipe to a point 150 mm above the normal high operating level of the wet well.

4.21.7 Water Supply

A potable water supply with sufficient length of hose is to be provided for cleaning floors, equipment and pumps. There shall be no physical connection that might under any condition cause contamination of the potable water supply. Backflow prevention and cross-connection control must comply with current Provincial plumbing regulations. Backflow preventers shall be the reduced pressure principal type installed 1.0 m above grade. Pressure reducing valve shall be provided on the water supply as needed.

4.21.8 Site Requirements

4.21.8.1 Vehicle Access

A minimum 4.5 m wide gravel road is to be provided into the site, with extensions as appropriate to provide maintenance vehicle access to electrical transformers and for removal or delivery of other station equipment. Space should also be provided for parking of maintenance staff and service vehicles.

4.21.8.2 Fencing

Fencing requirements for all pumping stations shall be reviewed with the Town Engineer and will be considered on a case-by-case situation. If it has been determined by the Town Engineer that fencing is required, the fence shall have an opening gate for entry of vehicles and equipment. The gate shall be pad-lockable to prevent unauthorized entry. Fences shall typically be zinc coated industrial grade steel chain link security type, of 1.83 m overall height complete with three-strand barbed wire overhang. Architectural fences providing a similar level of security may be considered where dictated by aesthetic considerations. Fencing must be durable and maintenance free. All padlocks shall be supplied and keyed to the Town's master key system.

4.21.8.3 Site Grading

The pumping station site shall be adequately graded so that it drains freely away from the facility and no ponding of water will occur adjacent to buildings, entrances or around electrical transformers. Site elevations shall be established such that the facility is not subject to flooding due to runoff flows or ponding under any conditions of rainfall or runoff from snowmelt.

4.21.8.4 Landscaping and Aesthetic Considerations

At the minimum, pumping station sites shall be landscaped with grass or provided with a low maintenance ground cover material that effectively inhibits growth of weeds. Where the proximity to residential areas or other public land uses dictates a need for additional landscaping measures to conceal the facility, to make it blend into the surroundings or to enhance its appearance, these must be part of the facility design and construction. These measures may include appropriate planting of trees and shrubbery or architectural treatments of structures.

4.21.9 Operation and Maintenance Manual

As part of the responsibility for the design of a pumping station, the Consultant Engineer shall prepare and provide an Operation and Maintenance Manual for the facility.

Three complete printed copies of the manual are to be provided prior to the transfer of facility operation, as well as a version in electronic format.

The manual shall include complete equipment manufacturers' operation, maintenance, service and repair instructions and complete workshop manuals and parts lists for all mechanical and electrical equipment, including all control diagrams and schematics with wires individually numbered and identified. Each printed set shall be firmly bound in a hard-covered binder and include test results and calibration of all equipment from commissioning and testing conducted by Professional Engineers prior to application for a construction and completion certificate.

The manual shall include a description of the nature and function of the station as well as the following:

- Name and address and name of Owner/Applicant,
- Type of effluent,
- Location and size of contributing area in terms of the design number of lots and industrial and commercial effluent flows and gross storm drainage area,
- Statement of the control sequence identifying the controlled equipment and set point values including any equations or tables of values from which set points are derived,

including operation of backup facilities such as emergency generators and storage tanks,
- List all monitored quantities, statuses and alarms and their set point values, and
- Instrument calibration and device settings.

4.21.10 Electrical Power Supply

4.21.10.1 General Electrical Requirements

All electrical systems and wiring shall be in accordance with the latest requirements of the Canadian Electrical Code, Electrical Protection Branch, Alberta Department of Municipal Affairs and Housing amendments, and the local inspection authority.

Electrical equipment such as switchboards, panel boards, industrial control panels, meter socket enclosures, and motor control centres (MCC) that are likely to require examination, adjustment, servicing or maintenance while energized shall be field marked to warn persons of potential electric shock and arc flash hazards.

4.21.10.2 Power Supply

When required, provide underground primary duct with pull cord from the Utility Company switching cubicle to transformer pad primary. Maintain 3.0 m minimum clearance from all other underground services, pipes, manholes or buildings.

Provide for power service feeder from transformer secondary, underground to main power panel, unless specifically approved otherwise by the Town.

600 volt, three-phase, three-wire power service is preferred to all wastewater pumping facilities.

In order to accommodate for future capacity upgrade, the service entrance conduit(s) shall be sized to accommodate service conductors of double the required initial load or spare conduits of equal size.

A coordinated main service, standby power transfer and motor control center is preferred, apposed to loose wall mounted equipment.

Phase rotation shall be clockwise and shall be labeled accordingly.

Equipment to be approved by a certification agency accredited by the Standards Council of Canada and have minimum 1- year guarantee on parts and labour. All equipment must be tested prior to acceptance.

Final selection of electrical and instrumentation equipment shall be reviewed by the Town for approval in an effort to standardize equipment throughout the Town's facilities.

4.21.10.3 Main Panel Assembly

Where the main panel assembly is selected as a free standing modular unit such as a motor control centre (MCC), it shall be mounted on a raised concrete plinth.

MCC shall have shipping splits in groups of two, when required, such that they can pass through doors when the MCC is turned on its side.

If large transformers are installed in MCCs and they require tipping, consideration should be made for removal of the transformer.

Where the main panel assembly consists of wall-mounted equipment, all components shall be mounted on a painted one-piece, good-one-side, fir plywood backboard, securely attached to building wall. If the wall does not contain thermal insulation, insulation shall be provided between the backboard and the wall.

The main panel assembly shall be fabricated of steel and sized as noted in details on the drawings.

On power services at 200 Amp and below, the meter socket shall be located on the building exterior, unless otherwise agreed with the utility company. On power services over 200 Amp, when possible arrange for utility company metering at the transformer.

The main power disconnect shall be located on the interior of the building.

Exterior meter sockets shall be protected by a custom fabricated, heavy-gauge galvanized steel cage to reduce vandalism.

4.21.10.4 Grounding

Grounding system to consist of copper clad steel ground rods 20 mm diameter by 3000 mm long as a minimum and interconnecting ground conductor. All ground terminations shall be compression type. Provide additional grounding to building structure, motor starter for each pump, major mechanical equipment, building water main ahead of shut-off valve, and gas line.

4.21.10.5 Power Meters

- Main Power Supply Meters – Provision shall be made for a three-phase voltmeter, either displaying or with means of selecting A-B-C phases on the main power supply line.
- Pump Power Supply Meter – In each starter enclosure, an elapsed time meter and an ammeter on one phase shall be provided for each motor. The meters shall be installed on the covers of the respective motor's combination magnetic starters.

4.21.11 Telephone Service

Co-ordinate with the Town authorized representative, on an individual project basis, to determine if telephone service is required.

4.21.12 SCADA System

The Town SCADA system has three main components:

- Communications

  The Town of Rocky Mountain House maintains secure communication between facilities using a combination of private 900MHz radio, public internet, secure VPN tunnels, and hardware appliances that are purpose built for secure connections at each site (pfSense). Public Internet can be established via cellular or hard wired (coordinate with the Town to manage the account; preference is Telus for either cellular or hardline).

- Remote Control System

  The remote stations are based on Schneider Electrical controllers; the level of I/O would guide the selection of the hardware. In-use includes a variant of the SCADAPACK (FlowStation 110) and the M580 PLC. Standard is the M580 and X80 I/O operating on Unity Software. An M340 with X80 I/O

would be considered for systems considered to be 'small'. Coordinate with I/O cards currently held as spare when selecting density and voltage.

- Primary Collector/SCADA

  The site collector is located at the WTP, Wonderware Platform, operating on a warm-standby machine. The collector is to be updated for basic remote connections only; the station-station communications is to be completed through the main site PLC, with all alarming resident on the site PLC. The polling of remote stations is to be managed by the PLC, through a polling counter, reducing overall communication load, not limit collection on single comm failures, and maintain a resolution of at <30 seconds per out station for alarm annunciation and data trending. Communication over ModbusTCP.

4.21.13 Standby Systems

Stations should include automatic generator sets for standby power in case of power failure or, with approval, a transfer switch to connect to portable standby power. Provision for SCADA system to be included. Generator set enclosures should be weatherproof and include noise control. For small pump stations, emergency storage may be considered in place of standby power. Emergency storage is to be based on eight hours of average day flows plus infiltration.

4.21.14 Lighting

Adequate lighting shall be provided for the entire facility. Lights specifications shall meet the area classification.

For separate outdoor wet wells, lighting shall be arranged to be indirect (from outside of the well) and maintainable without entering the wet well whenever feasible. Corrosive effects make installation of lights inside sanitary wet wells undesirable. Install a ground fault protected receptacle nearby to permit the use of a portable trouble lamp.

Exterior lights shall be provided to illuminate all building entrance areas and outside equipment access locations.

4.21.15 Location of Electrical Equipment

All electrical and control equipment shall be located such that it cannot be flooded under any foreseeable circumstances.

Local safety disconnect switches shall be located above potential flood level.

Any disconnect switches located away from the pump locations shall be lockable.

Switchgear and combination magnetic motor starters shall be lockable and located adjacent to the control panel.

4.21.16 Receptacle Requirements

120-volt ground-fault-protected receptacles shall be provided, as necessary, for convenient power supplies throughout the facility, except the wet well.

Minimum receptacle requirements are as follows, on at least two separate circuits, each on their own circuits:

- one at the control panel; and
- one within the dry well (where applicable).

At least one outside of the building. External receptacles shall be under lockable weatherproof covers.

An additional 120-volt circuit shall be provided solely for the dry well sump pump.

4.21.17 Pump Station Control

Automatic control of pumps shall be performed using a Programmable Logic Controller (PLC) and level sensors/controllers and be connected to the Town SCADA system.

4.21.17.1 Control/ SCADA Panel – General Requirements

A control/SCADA Panel shall be provided for control and monitoring of pumps, gates, valves and other station equipment operation.

The panel must be located so that it cannot be flooded under any foreseeable circumstance.

Care must be taken when transmitting level changes over SCADA to limit the number of transmissions to a reasonable number to prevent communication system overload and excessive communication charges.

4.21.17.2 Pump Control Requirements

Provision shall be made to automatically alternate between at least two pumps in normal service. Controls shall also be provided such that if, with one pump operating, the sewage level in the wet well continues to rise, then the additional pump or pumps shall automatically start once the sewage level reaches a higher set point or points.

Where the electrical power service or standby power is not capable of supplying all pumps simultaneously, full operation shall be prevented by the use of electrical interlocks.

When pumps are operating on standby generator, inhibit retransfer back to utility power until pumps complete their pump down cycle.

4.21.17.3 Uninterruptible Power Supply (UPS)

Station should be provided with an Uninterruptible Power Supply (UPS) to serve alarms and controls.

4.21.18 Level Switch Controller/ Float Switches

4.21.18.1 Primary Level Control

Ultrasonic level sensor shall be the primary level sensing device, where applicable.

4.21.18.2 Secondary Level Control

- Float switches to be Flygt ENM-10, micro-switch design. Mercury type, float switches are not acceptable.
- A float switch shall be provided in the dry well for a flooding alarm, set at an appropriate elevation near the bottom of the well. Where a sump pit is incorporated, a float switch shall be installed within the sump pit.

- A float switch is to be provided in the wet well to serve as a backup to the ultrasonic High Water Level sensor in the event of a failure. The high level switch alarm shall be programmed in the PLC to energize one designated pump, if no pump was running.
- A float switch is to be provided in the wet well to serve as a backup to the ultrasonic Low Water Level sensor in the event of a failure.
- Where applicable a separate float switch shall be provided in the wet well suspended at an appropriate elevation to detect an overflow condition and activate an alarm.
- All float switches located in the wet well will require hazardous area isolating relay.
- Dry well float switches are to be directly connected to the PLC.
- All level sensor transducers and float switches shall be mounted so that they are easily removable and serviceable without entry into the wet well.
- All cables for the devices shall be factory sealed and shall be of sufficient length to reach the control panel or above grade junction box and PLC without any intermediate splices. Junction boxes must be installed outside wet wells and above and flood level.

4.21.19 Flow Meter

Force main flow meters are required in all pump stations unless otherwise approved. The flow meter shall be a magnetic flow meter with a remote secondary flow transmitter mounted in the control panel or on a wall near the control panel at an easily viewable and accessible location. Other types of flow meters may be considered if approved by the Town Engineer.

4.21.20 Heating and Ventilation

Design heating systems to minimize heating costs. Use high-efficiency furnaces or boilers and provide heat recovery units to recover waste heat from exhausted air. Design the entire facility for energy conservation.

Specify power connections to all mechanical heating and ventilation equipment. Specify disconnect switches where required and where not provided with the equipment. Verify all equipment sizes and power requirements with the Mechanical Consulting Engineer.

Specify conduit for all low-voltage control wiring. Co-ordinate exact locations and routing with the Mechanical Consulting Engineer.

Ensure that air supply fan is permanently energized to maintain continuous airflow in the dry well.

Specify a paddle type flow switch in the dry well air duct and connect to the PLC system. Mechanical Consulting Engineer shall select a location in duct that is free of air turbulence.

Provide interlock control circuitry between air exhaust fan and make-up-air unit where applicable.

Where electric heaters are required, units shall be sized to required BTU output and specified with internal thermostatic control, connected to the main power supply. Unit rating shall be adjusted to permit 'off-the-shelf' purchase.

For pump stations requiring wet well ventilation, there shall be an interlock between fans and motorized dampers to prevent the escape of odours when the fan is not running.

Ventilation and damper controls for generators and the building shall operate from a common, compatible voltage and signal.

The design of wet well ventilation systems shall be such that the fan motor and electrical wiring shall be external to the ventilation conduit/duct.

In accordance with Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater And Storm Drainage Systems, wet well ventilation shall be designed to provide continuous 6 air changes an hour or 30 air changes an hour during occupation. Provisions for portable ventilators in lieu of permanent ventilation may only be considered on an approval from Drainage Service. Intermittent ventilation of 30 air changes an hour is a generally preferred operating mode depending upon the size and type of the pump station. Coordinate with Drainage Services Operations for the preferred/required ventilation mode on each project.

4.21.21 Building Low Temperature

Specify a Johnston Controls Model A19BAC-1C, SPDT, -1 to 43°C range, mounted on a wall in the pump house, set at 5 degrees Celsius, and connect to the main control panel alarm circuit and the PLC.

Contact to the PLC to open on low temperature alarm.

Specify a plywood mounting back plate behind thermostat if wall is of concrete block construction.

4.21.22 Intrusion Alarm

Specify heavy-duty lever-operated switches (Allen-Bradley 802 T-D or equal) on exterior access hatches or exterior doors, connected to the alarm system and operated on 120 VAC, from the PLC.

4.21.23 Fire Alarm

Specify an American Sensors model ESA5011 ULC certified smoke detection device, operated at 120 VAC, from the UPS. Auxiliary relay output contact, connected to the PLC.

5.0 STORM DRAINAGE

This section outlines the methodology and design criteria that apply to the design of the storm drainage conveyance system. These standards are not intended to be a substitute for sound engineering knowledge and experience. Drainage designs shall be prepared under the direction of a design professional who has the appropriate experience and is registered with the Association of Professional Engineers, Geoscientists of Alberta (APEGA).

The following standards are intended to cover only minimum requirements. Drainage designs must conform to federal and provincial statutes and guidelines.

5.1 STORMWATER MANAGEMENT GENERAL PRINCIPLES AND OBJECTIVES

Stormwater management is a comprehensive approach to planning, design, implementation, and operation of stormwater drainage systems. The purpose of the stormwater management approach is to develop effective drainage systems that balance the objectives of maximizing drainage efficiency and minimizing adverse environmental impacts.

Stormwater management involves the planning and design necessary to mitigate the hydrological impacts of land development or land use changes. Adverse hydrological impacts include increased stormwater peak flows, erosion, sedimentation, flooding, reduced surface infiltration, reduced minimum groundwater levels and stream base flows, water quality deterioration and degradation of aquatic and wildlife habitats. Mitigation measures should be implemented to minimize these adverse impacts on the watershed by incorporating tools to mimic natural (pre-development) hydrology conditions.

These methods include but are not limited to the following:

- Appropriate Land Use Planning.
- Increase permeable surface by incorporating technologies such as green roofs and permeable paving.
- Lot grading and Landscaping to mimic the predevelopment conditions.
- Appropriate sizing and routing of the drainage conveyance system.
- Incorporating storage facilities and Best Management Practices (BMPs).
- Water quality control.
- Sediment control.
- Erosion protection.

Stormwater Management Plan requires approval from Alberta Environment, both under the Environmental Protection and Enhancement Act (EPEA) and the Water Act. It is the responsibility of the Owner/Applicant to get approval from Alberta Environment prior to construction.

The design of the storm sewer system should conform to the Trappers Creek Study published by UMA Engineering Ltd. in 2002 and the most recent version on the Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta, as published by Alberta Environment and Parks and as amended by these Standards Detailed stormwater management standards and guidelines are described in the Alberta Environment and Parks publication entitled “Stormwater Management Guidelines for The Province of Alberta”.

5.2 LIST OF DRAWINGS

1-01 Requirements Utility Trench Typical Section
1-02 Caged Trench for Pipe Installation Under Existing Roads
1-03 Trench Bedding Details
1-04 Trench Insulation Detail
1-05 Pipe Crossing Detail
4-01 Front Yard Service Locations
4-02 Residential Service Installation
4-03 Residential Service Installation Cross-section
4-04 Typical Lot Service Requirements
4-05 Front Service Locations
4-06 Lot Grading
4-07 Residential Building Grade Certificate
5-01 Standard 1200mm Precast Manhole Assembly
5-02 Precast Prebenched Base for 1200mm Manhole Assembly
5-03 Manhole Inlet /Outlet Pipe Design Considerations
5-05 1-S Precast Manhole Assembly
5-06 Large 1500 – 3000mm Manhole Assembly
5-07 External Drop Manhole
5-08 Internal Drop Manhole
5-09 Precast Slab Tops for 1200mm Manholes
5-10 Sanitary and Storm Manhole Adjusting Collar
5-11 Manhole Safety Platform
5-12 Precast Catch Basin Assembly
5-13 Twin Catch Basin / Catch Basin Manhole Assembly
5-14 Type K-1 Catch Basin and Catch Basin Manhole Top Section
5-15 Type K-3 Catch Basin and Catch Basin Manhole Top Section
5-16 Type K-4 Catch Basin and Catch Basin Manhole Top Section
5-17 Type K-6 Catch Basin and Catch Basin Manhole Top Section
5-18 Type SK-7 Catch Basin Manhole
5-19 Type DK-7 Catch Basin Manhole
5-20 Type F-51 Catch Basin Grate
5-21 Type F-51 Catch Basin Frame
5-22 Type F-33 Catch Basin Grate
5-23 Type F-33 Catch Basin Frame

5-24 Type K-7 & DK-7 Catch Basin Frame and Grate

5-25 Rip-Rap Culvert End Treatment

5-26 Sanitary and Storm Manhole Frames

5-27 Sanitary and Storm Manhole Cover

5.3 DUAL DRAINAGE CONCEPT

The storm drainage system shall be designed using a dual drainage concept consisting of a minor system and a major system.

5.3.1 The Minor System

The minor system, comprised of pipes, manholes, catch basins, stormwater storage facilities, and outfall structures, shall convey runoff from snowmelt and rainfall events to an adequate receiving stream, lake or pond without sustaining any surface ponding or excessive surface flows for events up to a 1:5 year return period.

In special circumstances, or to accommodate lower building elevations, the minor drainage system may be enlarged or supplemented to accommodate major flows. System details shall be included in the Stormwater Management Plan. Design considerations include:

a. Provision of adequate inlets to accommodate major flows,
b. The requirement for surface overflow routes at potential surface ponding locations, and
c. Design in accordance with minor drainage system guidelines.

5.3.2 The Major System

The major system comprises of the street system, stormwater storage facilities, parkland, and any other routes required to convey runoff during rainfall events up to a 1 in 100-year return period, to the receiving water body. The major system shall be evaluated in a manner sufficient to determine that no flooding that may cause significant property damage (i.e., flooding of buildings) occurs during the 100-year storm event.

In general, post-development release rates must be controlled so they do not exceed pre-development release rates based on a 1:5 year storm. This is achieved by providing storage for the difference between a 1:100 year storm based on post-development conditions and a 1:5 year storm based on the pre-development conditions over a 24 hour time period. Any stored water is permitted to be released at the pre-development release rate based on a 1:5 year storm, unless otherwise approved by the Town Engineer. For developments in areas that already contain a minor storm system, an onsite minor storm system should be installed and tie into the existing system.

For infill developments, and at the discretion of the Town Engineer, the Owner/Applicant shall provide calculations to show that the proposed new service's discharge will be within the capacity limits of the Town's storm system. This may require the Owner/Applicant to, in part, calculate a pre and post storm volume for the Town's system where the service is to be connected. If the on-site release rate is deemed excessive to the capacity of the existing Town system, the Owner/Applicant will be required to ensure on-site storm detention / release control.

The calculated allowable capacity of the service will likely be less than a 1:5 year, 4 hour storm discharge, but the allowable discharge shall not be greater than the 1:5 year, 4 hour storm discharge as calculated for new development areas.

5.4 STORMWATER MANAGEMENT PLAN

Unless otherwise indicated, a Stormwater Management Plan is required for all developments larger than 3.0 ha, except those in rural or agricultural areas where lots are larger than 0.4 ha. The Stormwater Management Plan shall be in accordance with federal and provincial guidelines and shall conform to the Watershed and/or Master Drainage Plan.

In the absence of such plans, the following approach shall be considered and discussed with the Town Engineer:

- Define design objectives and required information.
- Assessment of receiving waterbodies.
- Identify quality and environmental concerns.
- Selection of the appropriate type(s) of Best Management Practices (BMPs) and location.

The Stormwater Management Plan shall ensure that the adverse environmental and hydrological impacts of the development are minimized and shall:

a. Identify pre-development drainage basins and drainage patterns,
b. Provide details indicating how the proposed development relates to its adjacent neighbouring land,
c. Identify and quantify offsite drainage entering the proposed development,
d. Identify pre-development flows and pre-development point of discharge,
e. Identify all existing flow channels and major flow paths,
f. Identify the existing environmentally significant areas and resources within the proposed, development including environmental classifications and/or fish presence information, if available,
g. Identify the receiving waterbody(s) and its characteristics,
h. Identify the impact of the proposed development on the watershed,
i. Provide a conceptual lot grading plan that minimizes changes to existing topography,
j. Quantify post development flows (minor and major),
k. Provide conceptual sizing and layout of the minor and major conveyance system,
l. Identify the type, size and location of stormwater management facility(s),
m. Identify the required land size to accommodate the proposed stormwater management facility(s),
n. Provide details of water quality enhancement measures, such as proposed source control and/or quality treatment facilities, and other BMPs,
o. Provide details of hydraulic and hydrologic analyses,
p. Provide hydraulic grade line (HGL) elevations for both major and minor storm events for the proposed stormwater management facility(s),
q. Provide proposed minimum building elevations (MBE) and the relation to the 100-year HGL in the major flow paths,
r. Provide the conceptual sizing and location of the point of discharge and/or outfall,
s. Provide conceptual design of control structures,

t. Provide the erosion control mitigation measures,
u. Provide any other proposed mitigation measures, if appropriate,
v. Provide preliminary cost estimate,
W. Identify all licensing and federal and provincial approval requirements.

5.5 RUNOFF ANALYSIS

Storm drainage design shall be carried out using one or both of the following methods: rational method or rainfall-runoff computer models. Computer models shall be used to determine design flow conditions in sewer systems with drainage areas larger than 50 ha. The Rational Method can be used for sewer systems with drainage areas smaller than 50 ha.

5.6 RATIONAL METHOD

The Rational Method formula is: $Q = CAi/360$ Where:

Q = design peak flow in m^3/s

C = runoff coefficient

i = intensity of rainfall in mm per hour for a time equal to the time of concentration

A = area of contributing runoff surface (ha)

Rational Method design calculations are to be tabulated and submitted.

5.6.1 Runoff Coefficients

The following runoff coefficients are to be used in the Rational Method formula. Design values are subject to verification by the Consulting Engineer and approval by the Town Engineer.

Table 5-1: Runoff Coefficients for Rational Method formula

Land Use	Percent Impervious	Runoff Coefficient (C) 5 and 10-year Storm Events
Residential - Large/ Medium Lot Single Detached (RS1, RS2, RSE; Lots>0.49 ha)	20%	0.35
Residential - Small Lot Single Detached (RS3, RS4)	40%	0.50
Residential - Low/ Medium Density Multi-Family (RMC, RML, RMM)	65%	0.60
Residential – High Density Multi-Family (RMH, RMHC)	78%	0.70
Commercial (C1, C2, C3, C4)	90%	0.80
Light Industrial (IL)	80%	0.70

Medium/ Heavy Industrial (IM, IH)	90%	0.80
Institutional (PS)	80%	0.75
Parks/ Grasslands (PR)	20%	0.20
Cultivated Fields	30%	0.30
Woodlands/ Agricultural	5%	0.10

For zonings not shown in this table, the runoff coefficient "C" and the percentage of imperviousness "Imp%" shall be estimated by the Consulting Engineer.

When the Rational Method is used for land with multi-use and different surface types, the weighted average of the pervious and impervious area runoff coefficient shall be estimated using the following equation:

$$C = \frac{C_p A_p + C_i A_i}{A_p + A_i}$$

Where: C = runoff coefficient

Cp = pervious surface = 0.10

Ap = pervious area (ha)

Ci = impervious surface = 0.95

Ai = impervious area (ha)

For use of the Rational Method to determine peak runoff due to storms with return periods greater than a 1 :5 year and 1: 10 year events, the runoff coefficient shall be increased accordingly. The relevant modifiers to be used for various design events factors up to a maximum of C=0.95 are shown in the following table.

Table 5-2: Relevant Modifiers for Various Design Events Factors up to a Maximum of C=0.95

Design Return Period	Runoff Coefficient Modification
Greater then 1:5 year up to and including 1:25 year	multiply by 1.1
Greater then 1:25 year up to and including 1 :50 year	multiply by 1.2
Greater then 1:50 year up to and including 1 :100 year	multiply by 1.25

5.6.2 Rainfall Intensity Duration Frequency (IDF) Data

The following formulas define the Intensity-Duration-Frequency Curves (IDF Curves) developed by Atmospheric Environment Services of Environment Canada for the Town of Rocky Mountain House Airport.

Table 5-3: Intensity-Duration-Frequency Curves (IDF Curves) Formulas

Extrapolated IDF Formulas (1964 – 1990 Data)	
Frequency	**Average Intensity (mm/hr)**
2-year	$352.7 / (t + 4.94)^{0.72}$
5-year	$525.2 / (t + 3.74)^{0.73}$
10-year	$633.8 / (t + 3.31)^{0.73}$
25-year	$779.1 / (t + 3.03)^{0.74}$
50-year	$901.0 / (t + 2.98)^{0.74}$
100-year	$994.5 / (t + 2.79)^{0.74}$

t = time of concentration in minutes.

5.6.3 Time of Concentration

The time of concentration used to determine the rainfall intensity for the Rational Method is equal to the inlet time plus the time of travel in the sewer). The inlet time is the time taken for runoff from the furthest reach of the catchment to flow overland to the first inlet. The time of travel is the time taken for flow from the furthest inlet to reach the point of design based on full flow pipe velocities.

5.6.4 Inlet or Overland Flow Time (T_i)

Typical inlet times for urban areas should not exceed 10 minutes. The inlet time for larger areas can be calculated using the "Airport Method" as follows:

$$T_i = \frac{3.26(1.1-C)L^{0.5}}{S^{0.33}}$$

Where: T_i = inlet time (minutes)

C = runoff coefficient

L = overland distance (m), should not exceed 300 m

S = slope of travel path (%)

5.6.5 Travel Time (T_t)

The travel time is the time required for flow to travel within the conveyance system from the point of inflow to the design location.

In piped systems, travel time shall be determined based on the full flow pipe velocity in each pipe upstream of the design location.

$$T_t = \frac{L}{60\ V}$$

Where: Tt = travel time in (minutes)

L = pipe length in (m)

V = average velocity in (m/s)

5.7 RAINFALL-RUNOFF COMPUTER MODELS

Computer models shall be used to determine design flows and the sizing of systems that contain non-pipe stormwater management facilities (i.e., detention ponds) or systems that include a significant amount of undeveloped land.

When large parcels (quarter section or larger) are being developed and will connect to the existing stormwater facilities, the Professional Engineer shall prepare a stormwater model that simulates both major and minor systems. As a general rule, this model will have sub-basins no larger than 5 ha. The modelling shall be generated utilizing software that is input/output compatible with PCSWMM.

5.7.1 Modeling Procedures

Wherever possible, the computer model shall be calibrated. In all analyses, the parameters used, the drainage boundaries, the pipe network and its connectivity shall be clearly identified on an overall drawing and submitted to the Town along with computer model input and output and a design summary report. Sensitivity of the model predictions to variations of key parameters shall be tested and the findings used to develop realistic and conservative models.

5.7.2 Suggested Model Parameters

The value of runoff parameters used in the computer model, such as infiltration rates, evaporation rates, impervious and pervious roughness factors, and sufficient background information on the selection of these values shall be provided by the Owner/Applicant in the design brief.

5.7.3 Design Storm Events and Rainfall Data

The storm duration used for modelling simulations will depend on the type of system being analysed. Depending on basin characteristics and outlet rates, short duration storms (1 - 4 hours) will generally govern the design of the storm sewer systems and the longer duration storms (6 - 24 hours) will generally govern the design of detention ponds and major system components. Therefore, several design storms should be evaluated to determine the worst runoff result for the system being designed.

The design storm hyetograph for analysis of the minor and major conveyance systems shall be developed using the Chicago 4-hr distribution and the Huff 24-hr distribution, respectively, unless otherwise specified by the Town Engineer.

Historical, continuous rainfall data in one-hour increments, over the past 25 or more years, may be routed through the storm runoff model to provide statistical frequency analysis of various flow and storage characteristics of the catchment in question.

5.7.4 Submission of Modeling Results

Modeling results are to be submitted to the Town in a report containing the following information as a minimum:

a. Plans showing catchment and sub-catchment boundaries, slopes, soil conditions, land uses and storage facilities,
b. Name and version of modeling program(s),
c. Parameters and simulation assumptions,
d. Design storm details,
e. Pre-development and post development flow calculations, and

F. Hydraulic grade lines in the conveyance systems and storage facilities during minor and major storm events compared with minimum building elevations (MBE) to demonstrate flood protection.

5.8 DISCHARGE QUALITY

Discharge quality must meet Alberta Environment and Parks Standards and Guidelines. Runoff quality treatment shall be considered for flows up to 50% of the 2-year post-development peak flow or the 5-year pre-development peak flow, whichever is greater. Quality treatment facilities include, but are not limited to, oil/grit separators for service stations, silt traps, detention storage facilities, grassed swales and constructed wetlands. Designs are to comply with the requirements of the Town, regional, provincial and federal statutes and guidelines as noted above.

Treatment facilities shall include provisions for maintenance equipment access.

5.9 SITE AND LOT GRADING

Grading is to comply with the Alberta Building Code and the following:

a. A 10% grade (minimum slope) directed away from the foundation is required for a 2.0 m perimeter around the foundation or to the property line on all sides of the house, whichever is smaller. A grade of 2.0% from all points within the property to the property boundary is required to allow drainage to escape.
b. Drainage across adjacent lots should be avoided. If cross-lot drainage is unavoidable, a swale must be provided within an easement to divert runoff away from the lower lots.
c. Grade areas around buildings to direct the runoff away from foundations.
d. Where lots are lower than the adjacent roadways, direct road runoff away from buildings and driveways and into a municipal drainage system.
e. Set building elevations above the hydraulic grade line (HGL) of the major drainage system, see Minimum Building Elevations (MBE) guidelines.

The following will apply to back of lot drainage in laneless subdivisions:

a. For back-to-back lots, a concrete swale is to be constructed along the rear property lines within a Town easement to direct the drainage to a street. Concrete swales are to be constructed with continuous grade lines with a minimum 0.6% slope to convey rear lot drainage to a catch basin located in a street or utility right-of-way.
b. For lots backing onto a park or reserve area, a grass swale is to be provided within the park or reserve area adjacent to the rear lot line. Grass swales are to be constructed with continuous grade lines with a minimum 2.0% slope to convey rear lot drainage to a catch basin located in a street or utility right-of-way.

The flow from rear lot swales should not be allowed to cross a sidewalk in order to prevent ice build-up and dirt accumulation on the sidewalk. A catch basin may be required at back of walk to intercept these flows. Public Reserves and lands shall be graded to drain toward developed streets, lanes and/or the storm sewer drainage system.

In cases where the backyard slopes towards the building, provisions are required to keep the runoff at least 3.0 m away from the rear of the building with the possibility of draining the surface water along the lot lines

into the storm sewer drainage system. Lots shall be pre-graded to the designed grade or to a maximum of 300 mm below design grade.

Lot Grading plans submitted by the Owner/Applicant shall indicate the following information:

a. Existing contours and proposed corner grades showing drainage to roadway and not across adjacent property,
b. Minimum ground elevation at the building,
c. Inverts of sanitary, storm, and water services,
d. Location of water, sanitary sewer and storm sewer connections,
e. Direction of drainage showing lot grading away from buildings and onto public roadway,
f. Actual and proposed elevation of the top of the sidewalk at the corner of the property, and
g. The proposed and existing grades for the Public lands (reserves, buffers and boulevards).

5.10 PUBLIC UTILITY LOTS

The minimum longitudinal surface grade for a grassed Public Utility Lot in new subdivisions is 2.00%. Where a hard surface is to be used to convey the overland drainage the longitudinal grades may be reduced to 0.80% subject to the approval of the Engineer.

The boulevard is defined as from the back-of-walk or curb to the edge of the right-of-way and shall be graded to the curb at a minimum slope of 2.00% to provide positive drainage to the street.

Open/Green Spaces

No drainage is allowed to run from public open spaces or the right-of-way onto or through private property. If private property abuts a public open space or a right-of-way, a swale shall be provided on the public open space or right-of-way to direct drainage from the public open space or right-of-way and convey it to the storm sewer system.

5.11 SWALES

Drainage swales on municipal or private property shall be constructed prior to any development of subdivision lots. Complete swale construction shall be a prerequisite to the issuance of the construction completion certificate.

The minimum design slope for concrete swales on private property or on public property is 0.60%.

Drainage swales located within private property are to be constructed within a 2.0 m easement. Grass swales are to be constructed with a continuous grade line at 2.00% slope (minimum). Sod is the preferred method of finishing a grass swale that is located within an easement and over multiple properties. Erosion control measures are to be implemented and maintained until grass is established enough to ensure no significant ground rutting occurs.

5.12 MINIMUM BUILDING ELEVATIONS (MBE)

The MBE applies to the elevation of the lowest floor slab in a building (i.e., basement floor) or the underside of the floor joists where the lowest floor is constructed over a crawl space. Crawl space is defined as the space between a floor and the underlying ground having a maximum height of 1.2 m to the underside of the joists and not used for the storage of goods or equipment damageable by floodwaters.

The MBE is to be a minimum of 0.30 m above the major drainage system hydraulic gradeline (HGL).

For sites near a watercourse for which a floodplain elevation has been established, the MBE shall be set to 0.60 m above the 100-year instantaneous flood elevation.

5.13 STORM SEWER MAINS

Storm sewer mains shall be designed for gravity flow unless approved otherwise by the Town Engineer.

Sewer hydraulics shall be calculated using Manning's equation. For PVC and HDPE pipes, Manning's n value shall be 0.011. For concrete pipes, Manning's n value shall be 0.013.

Storm sewer pipes shall be sized to convey the design flow so that when flowing full, the hydraulic gradeline is at the pipe obvert.

5.14 STORM PIPE INLET

Stormwater pipe inlets and outfalls shall be constructed such that ground erosion is minimized. To meet this requirement, head walls, end walls, nursery sod, riprap blanket, gabions or other approved structures may be required in constructing the inlets and outfalls.

Inverts of outfall pipes shall be above the 5-year flood level in the receiving stream. Drop structures and energy dissipaters shall be used where necessary to prevent erosion. Trash bars shall be installed which will prevent entry or access.

Inlet/outlet structures in detention ponds are to be aesthetically blended into the landscape design, include adequate erosion protection, require low maintenance, and have trash bars to prevent access.

5.15 MINIMUM PIPE DIAMETER

Table 5-4: Minimum Pipe Diameter

Storm Sewers	300 mm
Culverts a. Crossing Roads b. Crossing Driveways	 600 mm 400 mm
Catch basin Leads	300 mm PVC DR35 or Concrete
Storm Service	100 mm

5.16 DITCH INLETS

Ditch inlets to storm sewers shall include safety grills for pipes larger than 400 mm diameter. A maximum clear bar spacing of 150 mm shall be used for gratings.

5.17 ALIGNMENT

Except as indicated for curved sewers, horizontal and vertical alignments are to be straight lines between manholes. Consistent alignments shall be used along the entire length of a street. Elevations are to be recorded.

Sewers must maintain a minimum vertical separation of 0.3 m and 0.5 m when crossing below and above water mains, respectively. Sewers shall be located a minimum horizontal distance of 3.0 m o/c from any water main.

5.18 LOCATIONS AND CORRIDORS

Storm sewers shall be located within roadways as shown on the Town of Rocky Mountain House standard detail drawings. Servicing from roadways is required unless a depth greater than 4.5 m would be required to provide gravity service. Rear yard sewers and pumped connections are to be avoided, and advance approval by the Town is required.

Where a storm sewer crosses private land, right-of-way requirements are as indicated in Section 1.3.

Clearance from water mains is as indicated in Section 1.4.

5.19 MINIMUM AND MAXIMUM GRADE

The slope of the storm sewers should be designed so that the minimum pipe velocity is 0.6 m/s when flowing full. Suggested minimum design slopes are indicated in the table below. For catch basin leads and service connections, minimum grades are as indicated in the following sections. Where steep grades result in velocities exceeding 3 m/s, appropriate measures shall be designed and implemented to prevent pipe bedding erosion and movement. Special consideration shall be given to the design of junctions and bends in the system.

Table 5-5: Minimum and Maximum Grade

Sewer Diameter	Minimum Design Slope
300 mm	0.22%
375 mm	0.15%
450 mm	0.12%
525 mm	0.10%
600mm and larger	0.10%

5.20 CURVED SEWERS

Although it is recommended that storm sewers be laid with straight alignments between manholes, curved sewers will be permitted with the following restrictions:

a. The sewer shall be laid as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. Minimum radius shall not be less than 60 m.
b. Manholes shall be located at the beginning and end of curves, and at intervals not greater than 90 m along the curve unless approved otherwise by the Town Engineer. The curve shall run parallel to the street centre line. The minimum grade for sewers on curves shall be 50% greater than the minimum grade required for straight runs of sewer.

c. Joint deflection not to exceed 75% of maximum recommended by pipe manufacturer or minimum radius of 60 m; whichever is greater.
d. Joint locations to be recorded.
e. Curves shall run parallel to the curb or street center line, following the road alignment and within the road right-of-way.
f. The minimum grade for sewers on curves shall be 50% greater than the minimum grades noted in Section 4.19 Minimum and Maximum Grade.

Subject to Town approval, sewers larger than 600 mm diameter may include deflections formed by mitred bends, with minimum 1.25 m straight sections and maximum 45° mitres.

5.21 PIPE DEPTH

Storm sewers shall be of sufficient depth to:

a. Permit gravity service to all tributary areas.
b. Prevent freezing – minimum cover depth of 1.2 m above the pipe obvert. Where existing conditions dictate that the depth of bury be less than 1.2 m, the main/service is to be insulated.
c. Clear other underground utilities. Clearance from sewers is as indicated in Section 1.3 and 1.4.
d. Prevent damage from surface loading.
e. Minimum cover without concrete encasement or detailed analysis if less than 1.0 m cover.
f. Maximum depth of cover 4.5 m except under special circumstances and with approval from the Town Engineer.

5.22 PIPE STRENGTH

The strength of the pipe shall be sufficient to carry the loads due to trench backfill and due to wheel loads. The strength of pipe shall be calculated on the basis of the external loads, trench conditions, and class of bedding provided. Class B sand bedding is the minimum bedding requirement.

5.23 PIPE JOINTS

Use watertight joints except where storm sewers are part of a subsurface collection/disposal system.

5.24 GROUNDWATER INFILTRATION

In low areas where groundwater concentration may cause surface ponding, reduced soil stability, or cause submergence of other utilities, screened and filtered manhole inlets or perforated and filtered sections of storm sewer pipe should be provided.

5.25 MANHOLE DESIGN FEATURES

a. Manholes shall be precast concrete and shall conform to the latest version of ASTM C478. All concrete shall be sulfate resistant.

Table 5-6: Manhole Sizing Based on Storm Pipe Diameter

Storm Sewer Pipes ≤ 600 mm	1200 mm Manhole
Storm Sewer Pipes > 600 mm and ≤ 1050 mm	1500 mm Manhole
Storm Sewer Pipes > 1050 mm	Requires specific design

b. Manholes shall be installed with ladder rungs. A safety platform shall be required in all manholes with a depth of 6.0 m (vertical distance from rim to invert) or greater.
c. Frames and covers shall be of cast iron and capable of withstanding H-20 loading. The words "Storm Sewer" shall be permanently embossed on the cover.
d. All joints shall be designed and constructed to be water tight using a bitumastic watertight sealant.
e. PVC mains shall be connected to manholes using either a manhole adaptor or an approved pre-benched manhole base.
f. The maximum change in the direction of flow in any storm sewer manhole shall be 90°.
g. The maximum drop allowed across a manhole is 0.6 m. If the design of the sewer system is such that the difference in elevation between the manhole inlet and outlet exceeds 0.6 m, a manhole drop structure as shown on the standard detail drawings will be required.
h. Safety grates shall be required in manholes deeper than 4.5 m, constructed in accordance with Alberta Occupational Health and Safety Standards.
i. When more than one internal drop structure is required in a manhole, the manhole shall be a minimum of 1800 mm diameter.
j. Storm sewers for weeping tile connections are to be extended 1.5 m past the last house service lead, with the exception of storm mains in cul-de-sacs where service leads may be connected directly to the end of the line manhole provided that the lead enters the manhole less than 0.60 m above the invert of the main.

5.26 MANHOLE LOCATIONS

Manholes are required at the following locations:

a. every change of pipe size
b. every change in grade
c. every change in direction, expect as indicated in the Curved Sewers section
d. upstream and downstream ends of curved sewers
e. every pipe intersection except for 100 mm service connections
f. upstream end of every sewer line and cleanout
g. every future pipe intersection
h. 150 m maximum spacing

5.27 MANHOLE HYDRAULIC DETAILS

To maintain a continuous energy gradient through manholes, the obvert (crown) elevation of the lowest upstream pipe shall be equal to or higher than the obvert of the downstream pipe. Where a bend in pipe alignment occurs in a manhole, the invert elevation of the downstream pipe shall be at least 50 mm below that of the lowest upstream pipe.

Table 5-7: Minimum Drop in Invert Elevation Across Manholes

Straight run	Continue slope of upstream or downstream sewer, whichever is greater
Deflections up to 45°	25 mm drop
Deflections 45° to 90°	50 mm drop

The flow channel through manholes shall be made to conform in shape and slope to that of the sewer. The depth of the flow channel should be at least one-half the diameter of the downstream sewer.

5.28 CATCH BASINS

Catch basins shall be of sufficient number, have sufficient inlet capacities and adequate catch basin leads to receive and convey the calculated stormwater flow.

Catch basin leads shall connect directly to a manhole. The length of catch basin leads shall not exceed 30 m. If it is required to extend a lead more than 30 m, a catch basin manhole shall be used.

A minimum lead size of 300mm shall be used for all leads including the following:

a. Twin catch basin required to drain an area shall consist of a catch basin and a catch basin manhole interconnected by means of 300 mm pipe.
b. The lead from the catch basin manhole to main line manhole shall be a 300 mm pipe.
c. Single catch basins require 300 mm leads as well.

Surface water should not be permitted to run a distance greater than 150 m in streets and in lanes without interception by a catch basin. Minimum grade of catch basin leads is 2.0%.

Catch basins shall be built with a 900 mm barrel. Catch basin manholes shall be built with a 1200 mm barrel. Catch basins and catch basin manholes shall be built with sumps. The type of inlet assembly to be used for catch basins and catch basin manholes shall be as follows:

a. Type K-1 (i.e., Norwood F-51) catch basin assembly is to be used in conjunction with standard curb and gutter, and standard monolithic sidewalk construction,
b. Type K-3 (i.e., Norwood F-53) catch basin assembly is to be used in conjunction with lane construction,
c. Type K-4 (i.e., Norwood F-33) catch basin is to be used in conjunction with rolled monolithic sidewalk construction,
d. Type K-6 (i.e., Norwood F-39) catch basin assemblies may be used to drain landscape areas and swales,
e. Type SK-7 catch basin is to be used in conjunction with rolled monolithic sidewalk construction, and
f. Type SK-7 and Type DK-7 catch basin assemblies are to be used for expressways and arterial roadways.

Table 5-8: Design Capacity

Norwood Model	Sump Condition *	Continuous Slope **	
		Capture	Overflow
F-51 (with side inlet)	190	30	95
F-51 (grate only)	155	35	85
F-39	80	15	40
F-49	105	20	50

* based on 100 mm depth of ponding
** based on 50 mm depth on 1% slope

Catch basins are required at regular intervals along roadways, at intersections and at low points. Catch basins at street intersections shall normally be located at beginning or end of the curb return. Catch basins are not to be located within the limits of a curb ramp.

Lawn basins are required on boulevards and private properties where necessary to prevent ponding or flooding of sidewalks, boulevards, driveways, buildings and yards.

Catch basin spacing is to provide sufficient inlet capacity to collect the entire minor flow or major flow, if required, into the pipe system.

Other spacing requirements include:

a. Prevent overflow to driveways, boulevards, sidewalks, and private property, and
b. Avoid interference with crosswalks.

5.29 SERVICE CONNECTIONS

Storm service connections are only permitted for sump pump and perimeter drain connections and are subject to approval by the Town Engineer.

Effluent from sanitary sewers or surface drainage from industrial, agricultural, or commercial operations that may be contaminated shall not be discharged to the storm sewer. Connections from roof leaders shall not be made to the storm sewer system.

Roof drainage, regardless of land-use, shall discharge to grassed or pervious areas. Where direct drainage to grassed areas becomes impractical (i.e., central business district) the following options are available, subject to approval by the Town Engineer:

a. Roof leaders may be connected to private storm sewers which minimally will have a control / inspection manhole at property line, prior to connecting to the Town system, and
b. If the private system is also picking up drainage from a parking lot, an oil / grit separator is to be incorporated into the private system prior to the inspection manhole.

5.29.1 Size

Where required, the minimum diameter of storm service connections is 100 mm.

5.29.2 Location and Depth

Connections to large lots are to be located at the lower portion of each lot. For residential developments, locate connections in accordance with detail drawings. Service connections shall not be located under driveways or walkways and shall maintain a minimum 1.0 m horizontal distance from any driveways or walkways.

Storm service obverts at property/easement line shall be preferably set at the same elevation as the Sanitary sewer service, with an elevation of 2.7 m below finished grade and deep enough to connect the sump pump and perimeter drain.

The sanitary, water, and storm services shall be laid in a single trench. When facing the lot being serviced, the water service shall be laid along the centre of the service alignment, the sanitary service 0.30 m to the left of the water service, and the storm service 0.30 m to the right of the water service. The services shall intersect the property line at an angle as near to 90° as possible unless otherwise approved by the Town Engineer.

The service should extend typically 4.5m past the property line.

To aid in locating the service, temporary markers shall be installed at the end of the service stub. Vertical risers shall not be used unless otherwise approved by the Town Engineer. No horizontal bends shall be allowed on storm service connections. A maximum of two vertical bends will be allowed: one at the main and one at the property/easement line.

5.29.3 Grade

Minimum grade from property line to sewer main is:

- 100 mm diameter pipe - 2.00 %

5.30 SURFACE FLOW ROUTING AND PATHS

All surface flows shall have specially designed routes that are preserved and protected by rights-of-way and are accessible for maintenance. The grading of streets and the layout of the major drainage system shall be assessed, relative to the following guidelines, during the 100-year storm event:

a. Maximum flow depth on roadways to be 150 mm where a roadway is used as a major flow path, the road grades are to be designed to accommodate and control the flow at intersections.
b. Flooding is not permitted on private property except in flow channels in municipal rights-of-way.
c. Overflow routes are required at all sags and low points in roadways and other surface flow routes.
d. Major flood routes are required at down-slope cul-de-sacs.
a. No building shall be inundated at its ground line.
b. Continuity of the overland flow routes between adjacent developments shall be maintained.
c. The depth of water at curb side should be less than 400 mm for all roadways. Depths greater than 300 mm are not preferred.
d. On arterial roads, during a major storm event, the design is to consider:

i. One lane of traffic (each direction) is not to have ponding and / or overland flow depths exceeding 200 mm, and
ii. Where overland flow crosses the road, the depth of flow should not exceed, 100 mm.

e. On collector roads, during a major storm event, the design is to consider:
i. One lane of traffic is not to have ponding and / or overland flow depths exceeding 250 mm, and
ii. Where overland flow crosses the road, the depth of flow should not exceed 150 mm.

f. The velocities and depths of flow in the major drainage system shall not exceed the values in the following table.

Table 5-9: Velocities and Depths of Flow

Depth of Flow (m)	Maximum Water Velocity (m/s)
0.80	0.5
0.32	1.0
0.21	2.0
0.09	3.0

g. Storage should be implemented to offset peak flows where necessary to keep water velocities and depths below those noted above.
h. The Owner/Applicant shall recommend a building elevation to the lot purchaser that is above trapped low ponding elevations and designed to drain surface runoff to the street or lane/utility right-of-way.

5.31 SURFACE FLOW CAPACITY

Flow capacity of road surfaces and swales can be calculated using the Manning formula. Typical values of the Manning Roughness Coefficient “n” are:

a. 0.018 for paved roadway,
b. 0.03 for grassed boulevards and swales,
c. 0.04 to 0.10 for irregular or treed channels, and
d. 0.013 for concrete swale.

Design detail shall include consideration of flow velocities and the potential requirement for erosion control measures.

5.32 ROAD DITCHES

The design criteria for road ditches are:

a. A Manning’s n of 0.03 shall be used for computing flows in grassed ditches.
b. Road ditches shall be designed to handle the peak runoff of 1:100 year (Chicago Distribution) storm. The peak 1:100 year water level must be contained within the road ditch. No flooding of the road surface or adjacent property should occur during the 1:100 year storm.

c. The minimum road ditch slope shall be 0.75% - the Town may approve an exemption from these criteria if suitable justification is provided by the Owner/Applicant.
d. For ditch slopes equal or greater than 2%, ditch check dams shall be provided to protect the ditch against erosion.
e. Ditch side slopes shall not be steeper than 3:1.
f. The maximum 1:100 year flow velocity within a grassed road ditch shall be 1.0 m/s - for higher flow velocities, erosion control must be provided in the ditch.

5.33 CULVERTS

Culverts located in natural watercourses or road crossings shall be designed to convey the 1:100 year flow or greater.

Aquatic habitat protection requirements must be considered for culverts in natural channels. Approvals are required under the Alberta Water Act and the Federal Fisheries Act.

Culverts and bridge design should consider backwater effects over a range of flows. The design of a hydraulic structure requires assessment of both its nominal design "capacity" and its performance during the 100-year storm event as well as the 100-year ice level and break up.

Inlet and outlet structures are required for all major system culverts. Design considerations are to include inlet control and outlet control conditions, energy dissipation and erosion control.

Culverts and channels under bridges for arterial and collector roads are to be designed to convey the 1:100 year peak flow.

The minimum diameter for culverts crossing driveways shall be 400 mm. For culverts crossing roads, the minimum diameter shall be 600 mm. The ratio of headwater above the culvert obvert (HW/D) shall be 1.2. The minimum freeboard shall be 500 mm.

In areas with “rural” roadway cross-sections, culvert invert elevation shall be a minimum of 300 mm below the road structure and have a minimum cover of 300 mm of road structure above.

5.34 WATERCOURSES

Watercourses and floodplains are to be preserved to sustain habitat for aquatic and other wildlife as well as to convey storm runoff.

Consulting Engineers must consider the federal, provincial and municipal laws, regulations and guidelines noted above and must obtain comments and approvals from the appropriate agencies.

5.35 STORMWATER MANAGEMENT FACILITIES

5.35.1 General

The use of stormwater management facilities may be required to reduce peak flow rates to downstream sewer systems and/or watercourses, or to provide a temporary receiving area for peak major drainage flows. Stormwater management facilities shall be in compliance with Alberta Environment and Parks publication entitled “Stormwater Management Guidelines for The Province of Alberta”.

Their approximate location and size must be identified at the time of the Subdivision Outline Plan approval to avoid conflicts with adjacent land uses. The effects of the maximum pond water levels shall be considered

in the design of the minor system and lot grading. If possible, the crown elevations of the pipes in the first manhole upstream of a pond shall be at or above the maximum pond level during the 5-year storm event.

Stormwater management facilities in residential settings should have gentle side slopes and be aesthetically contoured and landscaped to provide an attractive feature for the subdivision.

As stated in "Stormwater Management Guidelines for The Province of Alberta", dry ponds are discouraged due to their limited ability to improve water quality. Dry ponds may be applied where topographical or planning constraints exist that limit the land available for wet ponds. Drainage areas greater than 5 ha are generally recommended for dry ponds. The use of dry ponds for combined water quantity and quality control is discouraged without the use of sediment forebays that include a permanent pool.

A dry pond's limited effectiveness in removing soluble contaminants is an important factor in considering its application. For example, in low-density residential areas where soluble nutrients from fertilizers and pesticides are a concern, dry ponds in isolation may not be appropriate.

5.35.2 Geotechnical Considerations

Soils investigations specific to the stormwater management facility shall be undertaken to determine the soil's permeability and salinity (or other potential contaminants), and the height of the groundwater table. Where the facility is sited above a shallow aquifer the potential for groundwater contamination must be minimized. In the case of a dry detention facility, where the pond bottom is below the water table, weeping tile systems may be required to keep the pond bottom dry enough to support grass growth and maintenance equipment traffic.

5.35.3 Signage for Safety

The design of stormwater management facilities shall include adequate provisions for the installation of signage to warn of anticipated water level fluctuations, with demarcation of maximum water levels to be expected for design conditions. Warning signs will be designed by the Owner/Applicant and approved by the Town Engineer.

5.35.4 Vehicle Access for Maintenance

A combination of pathway and reinforced turf shall be designed to provide pond access for maintenance vehicles to reach the pond's inlet/outlet structure, inlet pipes and/or treatment unit as well as providing a working area.

The access road is to be the most direct route between the road/lane and the storm structure.

The access design and working area are to be site specific and approved by the Town Engineer subject to the following conditions:

a. Base structure equal or greater than a lane (consideration may be given to the base being in a wet condition),
b. Reinforced turf product acceptable for turf growth and ease of maintenance,
c. Minimum access width of 4.5 meters,
d. Working area of up to 500 m^2 at inlet structures,
e. Turf reinforcement product to be installed per manufacturer's instructions,
f. Pond slope along access may require adjustment to meet typical road grade requirements, and

g. A minimum centreline radius of 10.25 m to be provided on curved portions of the vehicle access road including any potions of a pathway that may be used.

5.35.5 Parking Lot Storage

Ponding is allowed in parking lots to store runoff. Ponding is to be located in remote areas of the parking lot, or in grass medians. Maximum ponding depth shall not exceed 300 mm.

Detailed lot grading design is required to ensure proper drainage, pedestrian safety and convenience, and major flow paths for storms exceeding the design frequency.

Control structures shall be in accordance with current technologies as outlined in Land Development Guidelines for the Protection of Aquatic Habitat (Canada), Stormwater Management Guidelines for the Province of Alberta and related documents.

5.35.6 Underground Storage

Underground storage facilities include tanks and oversized pipes with outlet controls and may be on-line or off-line. Cross-sections and inlet and outlet locations shall be designed to minimize maintenance requirements.

Traffic loads and groundwater pressure should be considered in the structural design of these facilities. Maintenance access provisions are required.

5.35.7 Dry Detention Ponds

Dry detention ponds are storage areas designed to temporarily detain excess runoff and limit the peak outflow rate to the maximum allowable discharge rate. Designs that propose containment of runoff due to events more frequent than 1:2 years are to include special provisions to facilitate clean up i.e., provide base structure to allow for maintenance equipment. Dry ponds may accommodate recreational uses.

All inlet and outlet structures associated with dry ponds shall have grates provided over their openings to restrict access and prevent entry into the sewers by unauthorized persons. A maximum clear bar space of 150 mm shall be used for gratings.

Grated outlet structures are to be designed with a hydraulic capacity of at least twice the required capacity to allow for possible plugging. Further, the velocity of the flow passing through the grating should not exceed 1.0 m/sec. Appropriate fencing and guardrails are to be provided to restrict access and reduce the hazard presented by the structure head and wingwalls. The following general design parameters should be considered for a dry pond in a residential subdivision:

a. Storage capacity for up to the 100-year storm event,
b. Detention time to be determined based on downstream capacity, recommended maximum detention time is 24 hours,
c. Maximum active retention storage depth of 1.5 m. The maximum water level should be below adjacent house basement footings (a greater freeboard may be required if an emergency overflow route cannot be provided),
d. Minimum freeboard of 0.6 m above 1:100 year high water levels,
e. Provision of an emergency overland flow route. If an emergency overland route cannot be provided, the minimum freeboard shall be raised to the higher water level generated by the 1:100 year storm under a plugged outlet scenario,

f. Maximum interior side slopes of 5:1, (7:1 is preferred),
g. Minimum ratio of effective length to effective width of 4:1 to 5:1 measured at 100-year high water level. If this cannot be met, length, width and depth dimensions must be acceptable to the Town Engineer, particularly when the bottom of the pond is to be used for recreation facilities,
h. Minimum longitudinal slope in the bottom of the pond of 1.0% (2.0% is preferred) and minimum lateral slope of 2.0%,
i. Low flow bypass for flows from minor events to be provided,
j. French drains adjacent to inlet/outlet structures, where slopes are less than 1.0%. Address all safety issues (particularly during operation), and
k. Address all safety issues (particularly during operation).

5.35.8 Wet Retention Ponds

A reliable source of runoff or groundwater discharge must be available to maintain the permanent pool of a wet pond. As such, wet ponds are generally considered for drainage areas greater than 5 ha. Because of a wet pond's ability to reduce soluble pollutants, it is generally applicable to residential, commercial, or industrial areas where nutrient loadings may be expected to be relatively high. Wet ponds may not be appropriate, or may require specialized design, where receiving water temperatures are a concern.

Wet ponds are probably the most common end-of-pipe management facility for the control of peak runoff discharges and the enhancement of water quality. Wet ponds are very effective in controlling runoff and improving water quality when proper design considerations are made for those two objectives.

Wet ponds have been cited as providing the most reliable end-of-pipe Best Management Practices (BMP) in terms of water quality treatment. This reliability is attributed to a number of factors including:

a. Performance does not depend on soil characteristics.
b. Permanent pool prevents re-suspension.
c. Permanent pool minimizes blockage of outlet.
d. Promotes biological removal of pollutants.
e. Permanent pool provides extended settling.

Wet ponds have a moderate to high capacity to remove most urban pollutants depending on how large the volume of the permanent pool is in relation to the runoff produced from the contributing drainage area. The establishment of vegetative zones in and around a wet pond can enhance its pollutant removal capability.

The purpose of wet ponds is to temporarily store stormwater runoff in order to promote the settlement of runoff pollutants and to attenuate peak flows to reduce potential downstream impacts, flooding and erosion.

Design details, unless indicated otherwise and other than discharge rates, shall be in accordance with current technologies as outlined in the Land Development Guidelines for Protection of Aquatic Habitat (Canada), and Stormwater Management Guidelines for the Province of Alberta and related documents.

The general design criteria for wet ponds are:

a. Minimum water surface area of 2.0 ha (smaller ponds will be evaluated on a case-by-case basis and will require approval by the Town Engineer).
b. Maximum side slopes above the active zone of 4:1 to 5:1.
c. Maximum interior side slopes in active storage zone of 5:1 to 7:1.

d. Detention time of 24 hours.
e. Length to width ratio shall be from 4:1 to 5:1.
f. Minimum permanent pool depth of 2.0 m
g. Maximum permanent pool depth of 3.0 m.
h. Permanent pool sized to store the volume of runoff from a 25-mm storm over the contributing area
i. The maximum water level should be below adjacent house basement footings
j. Maximum active detention storage depth of 2.0 m.
k. Inlets and outlets are to be fully submerged, with the crown of the pipe at least 1.0 m below normal water level.
l. Inlet and outlet pipe inverts are to be a minimum 100 mm above the lake bottom.

When a choice is necessary between using one large pond as an alternative to two or more smaller facilities, one of which would have an area of less than 2 ha at normal water level, then one pond is to be used. This is to discourage proliferation of large numbers of small ponds and higher maintenance costs.

The inlet and outlet shall be distanced as far as possible from each other to avoid hydraulic short-circuiting.

Where no emergency outflow is provided, a free board of 500 mm above the high water level and below the minimum basement elevation shall be provided.

5.35.9 Water Quality

The following is an excerpt from the Wastewater and Storm Drainage Regulations published by Alberta Environment:

Storm outfalls without due consideration for water quality will not be allowed. Stormwater management techniques to improve water quality shall be included to affect a minimum of 85% removal of sediments of particle size 75 microns or greater. Additional quality measures shall be required, based on site-specific conditions.

Based on the preceding statement, the Owner/Applicant shall incorporate stormwater treatment measures (i.e. installation of stormwater treatment units) in the design of any stormwater storage facility.

5.35.10 Outlet Controls

Outlet controls for storage facilities may be designed using the standard orifice and weir equations:

Orifice Equation:

$Q = CA(2gh)^{0.5}$ Where: Q = release rate (m^3/s)

C = orifice coefficient (0.62 for sharp or square edge)

A = area of orifice (m^2)

g = gravitational acceleration (9.81 m/s2)

h = net head on orifice (m)

Weir Equation:

$Q = CLH^{1.5}$ Where: Q = release rate (m^3/s)

C = weir coefficient

L = effective length of weir crest (m)

H = net head on weir crest (m)

Large storage facilities are to include provisions for discharges at rates greater than the design release rate. Rapid drawdown of the water level may be necessary for emergency purposes or to restore the available storage to accommodate subsequent storm events.

Provisions to accommodate higher discharges will involve oversizing the fixed openings and sewers connected to the control structure. Adjustable mechanisms such as slide gates or removable orifice plates can be used to regulate design release rates. The extent of the oversizing will depend on the capacity of the downstream drainage system.

Design of inlet and outlet structures is to include consideration of energy dissipation and erosion control. Safety grates are required over all inlet and outlet openings 500 mm or larger. Locks for access hatches are required.

Grated outlet structures are to be designed with a hydraulic capacity of at least twice the required capacity to allow for possible plugging. Further, the arrangement of the structures and the location to the grating shall be such that the velocity of the flow passing through the grating will not exceed 1.0 m/s.

5.35.11 Mechanical Treatment Units and Oil and Grit Separators

It is the responsibility of the Owner/Applicant to meet established quality guidelines. If site discharge does not satisfy the criteria outlined by Alberta Environment (reference section 3.0), the Owner/Applicant may pursue the implementation of mechanical treatment units and/or oil and grit separators. Design details to be provided by supplier of proprietary system or by Consulting Engineer of equivalent and should be stamped by a Professional Engineer.

The Town also reserves the right to request additional treatment if stormwater discharge is deemed unacceptable.

5.35.12 Erosion and Sediment Control

Erosion and sediment control measures are required for land development activities such as clearing, grading, road construction, excavation and stockpiling of excavation and backfill materials.

Measures such as detention ponds should be incorporated in new developments to prevent any increase in the amount of erosion and downstream flooding to existing receiving streams. Where erosion control or bank stability work must be done, preservation of watercourse aesthetics and wildlife habitat must be considered.

Design details to be in accordance with current technologies as outlined in Surface Water Quality Guidelines for Alberta and related documents.

Drainage pump station guidelines are not included in this manual.

Where drainage pumping is required, the Consulting Engineer must review the design concept and proposed guidelines with the Town Engineer, submit a pre-design report and obtain approval before proceeding with the design.

6.0 TRANSPORTATION

This section outlines the methodology and design criteria that apply to the design of transportation related systems. These guidelines are not intended to be a substitute for sound engineering knowledge and experience. Transportation system designs shall be prepared under the direction of a Professional Engineer who has the appropriate experience and is registered with the Association of Professional Engineers and Geoscientists of Alberta.

6.1 Transportation Design General Principles and Objectives

It is the Consulting Engineer's responsibility to exercise professional judgment on technical matters in the best interests of the Town and the public. Standards contained herein are provided to assist in making these judgments but shall not be used as a substitute; these standards do not cover all specific project related cases.

These standards are based on general site conditions, prevailing and predicted vehicle dimensions and performance, driver behaviour and performance, and current technologies. Consulting Engineers are advised to use the latest edition or updates of these standards.

The following standard and guideline publications were referred to for the preparation of these transportation design standards and the most current versions should be used for reference:

- Geometric Design Guide for Canadian Roads, Transportation Association of Canada (TAC), 1999
- Urban Supplement to the Geometric Design Guide for Canadian Roads, TAC, 1995
- Pavement Design and Management Guide, TAC
- Manual of Uniform Traffic Control Devices for Canada (MUTCD), TAC, 2008
- Canadian Guide to Neighbourhood Traffic Calming, TAC, 1998
- Design vehicle dimensions for use in geometric design, TAC, 1999
- Metric Curve Tables, TAC, 1999
- Town of Rocky Mountain House and Regional bylaws
- Alberta Municipal Government Act
- Alberta Motor Vehicle Act
- Alberta Transportation Manual of Standard Signs and Pavement Markings

The Town does not rely exclusively on any one of the above-noted references. The Town shall approve the final design based on a combination of the references above and the design standards contained herein. The standards contained in this section are required minimum standards; wherever possible, higher standards should be used. In cases of discrepancies between these standards and the above noted references, these standards will govern; however, the Town is the final approving authority.

6.2 List of Drawings

6-01	Roadway Classifications
6-02	Urban Arterial Undivided Cross-sections
6-03	Urban Arterial Divided Cross-sections
6-04	Urban Residential Collector Cross-sections
6-05	Urban Commercial & Industrial Collector Cross-sections

6.3 TRAFFIC IMPACT ASSESSMENT (TIA)

6.3.1 Purpose

The Traffic Impact Assessment (TIA) is intended to adequately assess the impacts of any development proposal on the existing and planned transportation system, including pedestrian and bicycle mobility, and vehicle traffic.

6.3.2 Study Requirements

A TIA is required for any proposed site plan or subdivision plan which would be expected to generate 100 or more vehicle trips during the peak hour of the traffic generator or the peak hour of adjacent streets, or over 750 trips in an average day.

Under special circumstances, at the Town's discretion or for developments which are projected to either impede general traffic flow, add potential traffic safety concerns, or significantly alter the number of pedestrians or cyclist users, a TIA may still be required even if the vehicle trips generated do not meet the threshold indicated.

A TIA may also be required, at the discretion of the Town if:

a. High traffic volumes on surrounding roadways affect movement to and from the proposed development,
b. There is a lack of existing left turn lanes on the adjacent roadway at the proposed access,
c. There is inadequate sight distance at access points,
d. There is close proximity of the proposed access points to other existing accesses or intersections, and/or
e. A development includes a drive-through operation.

6.3.3 Coordination with the Town

Professional Engineers preparing TIAs shall discuss proposed development projects with the Town Engineer to identify special circumstances. Issues to be discussed include, without limitation, definition of the study area, relevant subarea plans, level of service objectives, maximum design volume objectives, methods for projecting build-out volumes, background traffic conditions, trip generation rates, directional distribution of traffic, modal share, and trip assignment. These terms of reference for the TIA shall be approved by the Town prior to study preparation.

6.3.4 TIA Guideline

The following is a guideline outlining the basic contents of a TIA. For additional information on traffic impact assessment refer to the ITE Transportation Impact Analysis for Site Development and the Alberta Transportation Traffic Impact Assessment Guidelines. The content, structure and focus may be adjusted in coordination with the Town on a case-by-case basis for the lifetime of these designs standards and unless the Town specifies otherwise, the long-term horizon year will be 20-years from the completion of the project.

Background

- Description of proposed development,
- Description of study area, and study intersections,
- Location of proposed access points,
- Identification of peak hours and whether weekends will be used in the impact analysis, and
- Identification of study horizon years typically includes existing/opening day, and a short- and long-term horizon year.

Base Traffic Conditions

- Description of existing roadway network and intersections adjacent to site and at access points,

- Traffic volume counts during peak-impact hours, and
- Description of existing pedestrian and cycling infrastructure in the vicinity of the site.

Site Traffic Generation:

- Development of trip generation rates used and the source of these rates,
- Traffic generated during peak impact hours, and
- Discuss potential generation of pedestrian and cyclist trips, if applicable.

Site Traffic Distribution:

- Method used to distribute traffic,
- Figure(s) or table(s) showing estimated traffic movements by direction, and
- Methods used for traffic assignment and assumptions for assignment of traffic to network.

Non-Site Traffic Projections:

- Determine forecast traffic volumes for proposed study horizon years (include data to substantiate how the forecasted traffic volumes were determined),
- Identification of other proposed development in the study area whose future generated traffic volumes should be added to the forecasted traffic volumes, and
- Assemble off-site traffic volumes to include background growth and any applicable area development to determine the future horizon traffic volumes.

Traffic Assignments:

- Assignment of peak-period traffic to intersections and access points,
- Figures for existing peak impact hours traffic, site traffic and total traffic volumes,
- Complete intersection and corridor performance analysis for peak impact hour, and
- Identify roadway classification.

Review of Site Plan:

- Internal reservoir at access points,
- General or detailed parking layout (whichever applies),
- Pedestrian and cyclist accessibility strategy through the proposed development,
- If applicable, loading dock locations and access, including design vehicle, with design vehicle turning template, and
- Identify recommended improvements to the site plan.

Discussion of Future Traffic Conditions and Mitigation Measures:

- Identify recommended improvements to the study area roadway network including access point(s), intersection(s) and corridor(s),
- Discuss mitigation measures for every significant impact identified,
- Discuss implications for other developments in area, and
- Discuss mobility of future pedestrian and cyclists in direct area and opportunities for improvement.

6.4 ROADWAY CLASSIFICATION

A roadway classification system establishes a hierarchy of roadways that provides for the gradation in function from access to mobility. The characteristics of roadway classifications described in these standards are generally in accordance with the TAC roadway classification system. Roadways within the network are first characterized as rural or urban and then further classified based on factors such as land use, service function, intersection spacing, traffic volume, traffic flow characteristics, running speed, vehicle type and connection to other roadways. The design guidelines presented in this section correspond to the following roadway classifications.

Public Lane (Alley): A narrow minor street, usually without sidewalks, located at the rear of lots for vehicle access to garages or other parking spaces and which also serves as a utility right-of-way.

Local Roadway: A roadway with the primary function of providing land access to residential, commercial, or industrial land uses. Movement is incidental and primarily to connect to/from collector roadways. Traffic calming measures are encouraged on local roadways to reduce volumes and speeds and discourage short-cutting. A local roadway may connect with other local roadways, collectors, and alleys.

Parallel parking is permitted on local roadways.

Collector Roadway: A roadway on which traffic movement and property access (residential, commercial, or industrial) have similar importance. Sub-groups of minor and major collectors provide for varying degrees of access control, pedestrian/cycling treatments and intersection spacing/treatments applicable to various mobility conditions. Collector roadways provide for movements between local and arterial roadways.

Parallel parking may be allowed on collector roadways. Single family residential driveways are not permitted on collectors.

Arterial Roadway: A roadway primarily intended to provide high levels of service for through traffic. Rigid access control and sound access design are essential to preserve its function and ensure safety. Also, sub-groups of minor and major arterials provide for varying degrees of access control, pedestrian/cycling treatments and intersection spacing/treatments applicable to various mobility conditions. Major arterials roadways typically link major development areas including central business district (CBD), large industrial areas, and large shopping districts. Minor arterials typically interconnect residential, shopping, employment and recreational activity areas. Arterials will connect to other arterials, highways, and collectors but not local roadways. Arterial roadways can be subdivided into two categories:

- Undivided arterials carry up to 12,000 vehicles per day.
- Divided arterials carry more than 12,000 vehicles per day.

At the direction of the Town, a divided arterial may be required where the road geometry, grades, curvature or other safety concerns warrant the inclusion of median separation.

On-street parking is not permitted on arterial roadways.

6.4.1 Minimum Requirements

All Town roadways shall be designed in conformance with the most current edition of the Geometric Design Guide for Canadian Roads by TAC. The design standards outlined in this section are minimum design standards for the Town, and all roadway designs shall meet or exceed these standards. Under special

circumstances, the Town Engineer may approve standards to be applied to roadway design that may exceed the minimum standards in this section based on functional requirements of the roadway; however, Consulting Engineers always need to ensure safe and efficient operation of the roadway.

Tables 6-1 and Table 6-2 below outline the standard roadway classifications.

Table 6-1: Urban Roadway Classifications:

Roadway Designation	TAC Design Classification	Average Traffic Volume (vpd)	Design Speed (km/h)
Arterial Minor	UAU70	5000-12000	70
Arterial Major	UAD90	12000-30000	90
Collector Residential	UCU60	<8000	60
Collector Commercial / Industrial	UCU60	1000-12000	60
Local Residential	ULU60	<1000	60
Local Commercial / Industrial	ULU60	<3000	60
Public Lane Residential	ULU30	<500	30
Public Lane Commercial	ULU30	<1000	30

Table 6-2: Rural Roadway Classifications:

Roadway Designation	TAC Design Classification	Average Traffic Volume (vpd)	Design Speed (km/h)
Arterial	RAU70	<12000	70
Collector	RCU60	<5000	60
Local	RLU60	<1000	60

6.4.2 Design Speed and Posted Speed

Selection of the most appropriate design speed should be made on the basis of the intended service function and needs of expected users. All users including motorists, pedestrians, and cyclists should be taken into consideration while selecting the design speed for a given roadway. The selected design speed shall be logical with respect to the character of terrain, anticipated operating speed, adjacent land use, and roadway classification system. Differences in design speed from one segment to another should not be more than 20 km/h.

The posted speed is a speed limitation, consciously introduced for reasons of safety and economy, traffic control, and government regulatory policies. Consequently, the selection of posted speed is a traffic operations consideration rather then a geometric design element.

The Professional Engineer is required to provide written recommendations and/or confirmation of the posted speed for all arterial and collector roadways within their project limits.

The following minimum design speeds, must be provided for both vertical and horizontal alignment, unless otherwise approved by the Town Engineer:

Table 6-3: Minimum Design Speeds

Roadway Class	Design Speed	Posted Speed
Arterial (Minor)	70 kph	60 kph
Arterial (Major)	90 kph	80 kph
Collector	60 kph	50 kph
Local	60 kph	50 kph
Public Lane (Alley)	30 kph	20 kph

6.4.3 Design Vehicle

Selection of design vehicle is completed by examining vehicle classifications (i.e. passenger car, single unit vehicles, emergency vehicles, bus, tractor-trailer unit etc.), vehicle characteristics (i.e. size, length, turning radii of vehicle) and local roadway conditions (i.e. local, collector, arterial roadways). Generally, emergency vehicles are considered as the minimum design vehicle for local residential roadways. For residential collectors, single unit trucks should be considered as design vehicle. Industrial collectors should use tractor-trailer truck combination such as WB-19 for design vehicles. For arterial roadways and roadways within commercial areas, the minimum turning paths of tractor-trailer truck (WB-19) should be considered as the design vehicle. Refer to Drawing 6-16 HSU and WB Design Vehicles and Chapter 1.2 of the Geometric Design Guide for Canadian Roads, TAC for specific characteristics of vehicles operating in Canada.

6.4.4 Horizontal Alignment

Roadway curvatures shall meet the minimum specifications shown below. For additional horizontal alignment parameters refer to the most current edition of the Geometric Design Guide for Canadian Roads, TAC.

Table 6-4: Horizontal Design Criteria

Horizontal Design Criteria	Local Roadway	Collector Roadway	Arterial Roadway (Minor)	Arterial Roadway (Major)

Design Speed	60 kph	60 kph	70 kph	90 kph
Minimum Curve Radii (m)				
Normal Crown e_{max} = -0.02m/m	115	250	N/A	N/A
Reverse Crown e_{max} = 0.02m/m	N/A	185	290	530
Superelevated e_{max} = 0.04m/m	N/A	130	200	380
Minimum Tangent Length (m)	30	60	60	60

6.4.4.1 Superelevation

As a vehicle travels around a circular curve at a constant speed it experiences radial acceleration which acts towards the centre of the circle. The centripetal force providing this radial acceleration is the lateral friction between the vehicle tires and the roadway surface. If the roadway is superelevated, the lateral friction is supplemented by a component of the force of gravity, due to the weight of the vehicle.

The maximum rate of superelevation that can be applied in road design is controlled by a number of factors:

- Climatic conditions (frequency of snow and icing),
- Terrain (flat, rolling or mountainous),
- Type of environment (rural or urban), and
- Frequency of slow-moving vehicles.
- Maintenance.

Normal maximum values used in Canada are 0.04 m/m, 0.06 m/m and 0.08 m/m depending on environment and the degree of surface icing that is likely to occur. In rural areas, higher values of maximum superelevation may be used in more favorable conditions, whereas in areas where surface icing occurs, lower values should be applied. Superelevation is normally rotated about the centre line of the median, however other rotation points can be used if the Engineer feels it is necessary and the ride-ability of the end product would be better. Reference TAC for superelevation requirements based on roadway classification and site-specific design parameters.

6.4.5 Vertical Alignment

The function of a vertical curve is to provide a smooth transition between adjacent grades. Vertical curves are required where the algebraic difference in grade (A) is greater than 1.5%.

The length of a vertical curve is defined by: L=KA

Where "K" is the coefficient representing the rate of change in the grade, and

"A" is the algebraic difference between grades.

Crest vertical curves are not required if "L" is less than the following values:

Local Roadway L < 20 m

Collector Roadway L < 30 m

Arterial Roadway L < 40 m

Expressway Roadway L < 50 m

Sag vertical curves are not required for any roadway if L is less than 15 m. Roadway vertical alignments shall meet the minimum specifications shown in Table 6-5 below. For additional vertical design parameters refer to the most current edition of the Geometric Design Guide for Canadian Roads, TAC.

Table 6-5: Vertical Design Criteria

Vertical Design Criteria	Local Roadway	Collector Roadway	Arterial Roadway (Minor)	Arterial Roadway (Major)
Design Speed	60 kph	60 kph	70 kph	90 kph
Minimum Gradient	0.50%	0.50%	0.50%	0.50%
Maximum Gradient	6%	6%	5%	5%
Crest Curve, min. K	10	10	16	32
Sag Curve, min. K (Headlight Control / Comfort Control)	15 / 8	15 / 8	20 /10	30 /15
Stopping Sight Distance	85 m	85 m	111 m	169 m

A variance to the maximum allowable gradients outlined above may be considered where existing topography or man-made constraints restrict the ability to meet these desired design limitations. Any adjustments must be approved by the Town Engineer to ensure impact of exceeding the maximum grades on safety has been considered.

6.4.6 Longitudinal Surface Grades

6.4.6.1 Roadways

The minimum longitudinal surface grade for all road classifications is 0.5%. For curved roadways, cul-de-sacs, and expanded bulb corners, centre line grades should be increased to provide a minimum gutter grade of 0.50%. It is desirable to use slightly steeper grades where possible.

6.4.6.2 Lanes and Public Utility Lots

The minimum longitudinal surface grade for gravel lanes, paved lanes, and public utility lots in new subdivisions is 0.8%. Grades <0.8% are acceptable in older subdivisions where a grade ≥ 0.8% cannot be established due to adjacent development restrictions (i.e. existing concrete or paved driveways, garages, etc.). Grades <0.50% are not to be used unless the lane is paved or they are approved by the Town Engineer.

The vertical alignment of alleys adjacent and parallel to collector or arterial roadways shall be designed in conjunction with the grades on the adjacent roadways. The minimum longitudinal grade for alleys is 0.8%.

A standard cul-de-sac is required to terminate a public lane (alley), as shown in Drawing 6-14 Local Residential Cul-de-Sac and Drawing 6-15 Local Industrial Cul-de-Sac.

6.4.6.3 Sidewalks and Trails

The vertical alignment of sidewalks should generally follow the vertical grades of the associated roadways. Walkways and trails should be integrated with the associated horizontal alignment, drainage and berm construction. Since the sidewalks and trails are used as self-contained drainage corridors, they should be designed to facilitate positive drainage flow. The normal longitudinal grade of all sidewalks and trails is recommended at 0.7% and the minimum permitted grade is 0.5%.

6.5 CROSS-SECTION ELEMENTS

The urban cross-section normally consists of the travel lanes, curb and gutter or shoulder (semi urban or rural), storage lanes (i.e., left turn, right turn), parking lanes, separators (i.e., medians, outer separators) and provisions for pedestrians and cyclists (i.e., walkways, trails, bicycle paths / lanes). The minimum requirements for cross-section elements for different roadway classifications are described in the following sections.

Alleys should be centred on the alley right-of-way wherever possible. A 3.0 m fillet shall be constructed at the intersection corners of all alley intersections. The length of an alley from the nearest street cannot exceed 150 m. The lane layout should not encourage shortcutting between roadways.

6.5.1 Roadway Rights-Of-Way and Travel Lane Widths

Rights-of-way shall be of adequate width to accommodate the carriageway, sidewalks, bikeways, boulevards, underground utilities, street lighting, etc. in an acceptable manner. Easements will be as required. Right-of-way and lane widths may be amended by mutual agreement. The minimum requirements are indicated below.

Travel lane widths shall be in accordance to the most current edition of the Geometric Design Guide for Canadian Roads, TAC. Recommended travel lane widths for each roadway class are shown in Table 6-6 below and are measured from the lip of gutter (pavement edge). Road width is measured from face of curb to face of curb (gutter line). In retrofit situations, TAC also contemplates reduction of these values under sound engineering judgement in regard to safety, traffic operation, speed and capacity.

Table 6-6: Urban Roadway Geometry

Urban Roadway Class	Right-of-Way Width (m)	Road Width (m)	Travel Lane Width (m)	Parking Lane Width (m)	Curb and Gutter Type	Gutter Width (mm)	Sidewalk Type	Sidewalk Width (m)	Sidewalk Location	Boulevard Trees	Typical Cross-Section Details Drawing No.
Arterial											
Minor (Undivided)	30.0	15.8	3.7	N/A	Straight Face	500	Separate Concrete Sidewalk	2.5*	Both sides	Both sides	6-02
Major (Undivided)	48.0	15.8	3.7	N/A	Straight Face	500	Separate Concrete Sidewalk	2.5*	Both sides	Both sides	6-02
Major (Divided)	60.0	16.8	3.7	N/A	Straight Face	500	Separate Concrete Sidewalk	2.5*	Both sides	Both sides	6-03
Collector											
Residential Minor	20.0	12	3.5	2.25	Rolled Face	250	Monolithic Concrete Sidewalk	1.5 / 2.5	Both sides	One side	6-04
Residential Major	24.0	12	3.5	2.25	Straight Face	250	Separate Concrete Sidewalk	1.5 / 2.5	Both sides	Both sides	6-04
Commercial	24.0	13.5	3.7	2.8	Straight Face	250	Monolithic Concrete Sidewalk	2.5*	Both sides	no	6-05

Urban Roadway Class	Right-of-Way Width (m)	Road Width (m)	Travel Lane Width (m)	Parking Lane Width (m)	Curb and Gutter Type	Gutter Width (mm)	Sidewalk Type	Sidewalk Width (m)	Sidewalk Location	Boulevard Trees	Typical Cross-Section Details Drawing No.
Industrial / Service Road	22.0	13.5	3.7	2.8	Straight Face	250	Separate Concrete Sidewalk	1.5**	No / One side	no	6-05
Local											
Residential Minor	15.0	10.0	2.75	2.0	Rolled Face	250	Monolithic Concrete Sidewalk	1.5	Both sides	no	6-06
Residential Major	20.0	10	2.75	2.0	Rolled Face	250	Separate Concrete Sidewalk	1.5	Both sides	Both sides	6-06
Commercial	22.0	12.5	3.5	2.5	Straight Face	250	Monolithic Concrete Sidewalk	2.5*	Both sides	no	6-07
Industrial	20.0	12.5	3.5	2.5	Straight Face	250	no**	-**	no	no	6-07
Public Lane (Alley)											
Residential	6.0	4.8	2.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6-08
Commercial/ Industrial	8.0	6.0	3.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6-08

*Refer to section 6.5.4 for further context
**Sidewalk type and/or width will be determined at the Town's discretion

Table 6-7: Rural Roadway Geometry

Rural Roadway Class	Right-of-Way Width (m)	Road Width (m)	Travel Lane Width (m)	Shoulder / Parking Lane Width (m)	Sidewalk Type	Sidewalk Width (m)	Sidewalk Location	Typical Cross-Section Details Drawing No.
Arterial								
Minor	32.0	12.0	3.5	2.5	Separate Concrete Sidewalk	2.5*	One side	6-09
Major	48.0	15.8	3.7	N/A	Separate Concrete Sidewalk	2.5*	One side	6-09
Collector								
Residential	26.0	13.0	3.5	3.0	Separate Concrete Sidewalk	1.5	One side	6-10
Residential Semi-Urban	26.0	13.5	3.5	3.0	Monolithic Concrete Sidewalk	1.5	Both sides	6-10
Commercial/ Industrial	30.0	14.4	3.7	3.5	Separate Concrete Sidewalk	-**	No	6-11
Commercial / Industrial Semi-Urban	30.0	14.4	3.7	3.5	Separate Concrete Sidewalk	1.5	Once side	6-11
Local								
Residential	24.0	8.0	4.0	-	Separate Concrete Sidewalk	1.5	One side	6-12
Residential Semi-Urban	24.0	8.0	4.0	-	Separate Concrete Sidewalk	1.5	Both sides	6-12
Commercial / Industrial	28.0	12.0	3.5	2.5	Separate Concrete Sidewalk	1.5	One side	6-13

Rural Roadway Class	Right-of-Way Width (m)	Road Width (m)	Travel Lane Width (m)	Shoulder / Parking Lane Width (m)	Sidewalk Type	Sidewalk Width (m)	Sidewalk Location	Typical Cross-Section Details Drawing No.
Commercial / Industrial Semi-Urban	28.0	12.0	3.5	2.5	Separate Concrete Sidewalk	1.5	Both sides	6-13

*Refer to section 6.5.4 for further context.
**Sidewalk type and/or width will be determined at the Town's discretion

6.5.2 Cross-Slope Requirements

The cross-slope for paved roadways in urban areas is generally 2% towards the outside pavement edges, as shown in the typical cross-section figures. Cross-slope requirements for various cross-section elements are:

Table 6-8: Cross-Section Elements

Cross-Section Elements	Recommended Cross-Slope	Minimum Cross-Slope
Roadway	2% - 2.5%	2%
Gutter	10% - 12%	10%
Sidewalk/ Trail	2%	2%
Border/ Boulevard (landscaped)	2% - 4%	2%
Shoulder	2% - 5%	2%

A variance to the cross-slopes outlined above may be considered where existing geographical or man-made constraints restrict the ability to meet these desired design limitations.

Normally, on superelevated sections, the cross-slope of the shoulder on the low side is normally the same as that of the adjacent travelled lane. However, for the high end, the shoulder should either be superelevated to match with the adjacent travelled lane or sloped away from the travelled lane based on the site-specific requirements.

In retrofit situations or at critical locations (such as driveways), the cross-slope of any cross-section element may be altered to meet existing control elevations. Use of sound engineering judgment and adoption of best practices are recommended in dealing with such site-specific critical situations. Refer to typical cross-sections shall be referred to confirm the direction of the cross-slope for each element.

6.5.3 Curb & Gutter

All Town roadways shall have standard curb and gutter used on arterial roadway medians, industrial and commercial roadways, adjacent to school and park areas, and along major residential collector roadways unless otherwise required or approved by the Town Engineer.

Reverse gutters may only be used where the road cross-slopes away from the curb for median curbs. Where the pavement cross-section directs drainage away from the boulevard, standard gutters should be used to maintain gutter flow from snow melt and minor storm events.

Standard curb without gutter may be used for medians and islands where the pavement cross-section directs drainage away from the median or island curb along its full length.

Refer to Schedule C, Transportation Details, for requirements, design, and specifications for each type of curb and gutter.

6.5.4 Sidewalks and Trails

The location of sidewalks is determined by the roadway class. See Table 6-7 and Table 6-8 for sidewalk requirement along urban and rural roadways. Refer to the Town Trail Master Plan for the location and continuation of the Town trail system. For trails adjacent to Arterial road, the 2.5 m wide concrete trail may be replaced by a 2.5 m wide asphalt trail, if approved by the Town Engineer. Monolithic sidewalks along arterial and major collector roadways should be avoided whenever possible and will only be permitted at the discretion of the Town Engineer.

Sidewalks wider than 1.5 m may be required on a case-by-case basis at the discretion of the Town Engineer. In the area of hospitals and nursing homes, the minimum sidewalk widths should be increased to 2.5 m to accommodate persons in wheelchairs. In commercial areas, widths of 2.5m or more are common to allow for higher pedestrian volume, the opening of car doors at the curb, street hardware, lateral clearances to buildings and store front window shopping.

Where sidewalks and trails cross or are located within an existing major utility or pipeline right-of-way, the Owner/Applicant will be responsible to obtain proper written permission/agreement with the appropriate authority prior to construction. The Owner/Applicant may be asked to produce a copy of a plan approved by the appropriate authority permitting construction of the walkway within the utility or pipeline corridor.

Where a sidewalk is to be constructed on only one side of a roadway, the sidewalk shall be on the side of the road that contains the larger number of fronting lots. If the number of fronting lots is equal, then ease of sidewalk connection to existing or other sidewalks and/or walkways shall govern.

Refer to Schedule C, Section 6.0 Transportation Details for requirements, design and specifications for each type of sidewalk or trail.

6.5.5 Concrete Curb Ramps

Concrete curb ramps, generally located at intersection locations or terminating locations of sidewalks or trails shall conform to the design and specifications as detailed in Schedule C, Transportation Details.

Curb ramps shall be installed wherever a sidewalk or trail encounters a curb. Curb ramps shall be located so that they are aligned perpendicular to the intended path of travel and lined up with the sidewalk for visual continuity. Curb ramps are to be installed with an allowable grade between 5% and 8%.

6.5.6 Medians and Outer Separations

A median is that portion of roadway which physically separates the vehicular travel lanes of traffic in opposing directions. Median design widths and auxiliary information related to unique design applications shall conform to the most current edition of the Geometric Design Guide for Canadian Roads, TAC Chapter 2.2.5. Refer to Schedule C, Section 6.0 Transportation Details for general requirements, design and specifications for proposed concrete and landscaped median applications:

In general, the surface treatment for medians shall be as follows:

a. Narrow medians and outer separations, 2.0 m or less in width, are normally hard surfaced due to the difficulty in maintaining narrow strips of grass. Concrete are typically used to surface the narrow median or outer separation areas.

b. For medians and outer separations approximately 2.0m to 4.5m in width, grass is typically the most common surface treatment. Where these cross-section elements are wider than 4.5 m, the use of shrubs and trees, together with grass are common landscape treatments.
c. For arterial roadways no trees shall be planted in the median area when the median width is less than 6.0 m. For divided collector and local roadways no trees shall be planted in the median area when the median width is less than 5.0 m. Landscaping of the medians and boulevards will be the responsibility of the Owner/Applicant and shall be constructed in accordance with Section 7.0.

The outer separation is the portion of an arterial roadway which physically separates the outside travel lanes of a roadway from an adjacent service roadway or a collector roadway. Outer separation may accommodate lighting poles, a barrier, or fence when;

a. Typical width of an outer separation is 7.5 m provided that clear zone requirements are met.
b. When a two-way frontage road is provided, a driver on the main road often contends with approaching traffic on the right (opposing frontage road traffic) as well as opposing mainline traffic on the left. Therefore, the frontage road separation should be sufficiently wide to minimize the effects of approaching traffic, particularly headlight glare at night along non-illuminated sections.
c. On urban arterials, outer separation widths in the range of 4.5 m to 6.0 m are typical.
d. The recommended minimum outer separation width on roadways with curb and gutter in an urban environment, beyond the influence of intersections, is 3.0 m.

6.5.7 Longitudinal Traffic Barriers

Traffic barriers are protective devices that are placed between traffic and a potential hazard off the roadway, with the intention of reducing the severity of a collision when an errant vehicle leaves the travelled portion of the roadway.

Longitudinal barriers function primarily by redirecting errant vehicles, they have applications within the median of a divided highway as well as adjacent to the roadside of a divided or undivided highway.

Longitudinal barriers are generally used in these applications:

a. Roadside barriers that are installed adjacent to the right or left edge or a roadway. Their primary purpose is to prevent a vehicle leaving the roadway from striking fixed obstacles such as sign posts or bridge piers, or terrain features such as trees or rock outcrops, or from encountering a steep slope, when these features are to be more hazardous than the barrier itself.
b. Median barriers are installed in the median of a divided highway to prevent vehicles from crossing the median and encountering oncoming traffic.

Barriers are installed on the basis of warrant analysis. Traditionally, these warrants have been based on a subjective analysis of certain roadside elements or conditions within the clear zone. If the consequence of a vehicle running off the road and striking a barrier are believed to be less serious than the consequences if no barrier existed, than the barrier is considered warranted.

The Geometric Design Guide for Canadian Roads, TAC Chapter 3.1 provides further information on Traffic Barriers.

6.6 INTERSECTIONS

Geometric design of all intersections shall be in accordance with the most current version of the Geometric Design Guide for Canadian Roads, TAC Chapter 2.3. Intersections should be analyzed considering safety, efficiency and capacity of the roadway network. The designs shall ensure that pedestrian and bicycle vehicular concerns are addressed. An intersection analysis procedure should be followed and submitted with the overall design of the roadway network.

6.6.1 Intersection Spacing

Intersection spacing is mainly governed by the functional classification of the roadway so that roadways with the highest function will have the least number (greatest spacing) of intersection. The following spacing is recommended in accordance with TAC. Variations to this recommendation shall be submitted to and approved by the Town Engineer.

Table 6-9: Intersection Spacing

Type of Roadway	Minimum Spacing (Unsignalized Intersections)	Minimum Spacing (Signalized Intersections)
Arterial	200 m	400m
Collector	60 m	120 m
Local	60 m (for four legged intersections) 40m (adjacent intersections are three legged)	N/A

6.6.2 Angle of Intersection

All Town roadways shall intersect at, or nearly at right angle (90°). A maximum variation (+/- 20° degrees) may be considered under special circumstances (see Chapter 2.3 of the most current edition of the Geometric Design Guide for Canadian Roads, TAC), and shall be approved by the Town Engineer.

6.6.3 Intersection Sight Distances

Intersection sight distances shall meet minimum recommendations as per the most current edition of the Geometric Design Guide for Canadian Roads, TAC Chapter 2.3.

Intersection sight distance is defined as the sight distance available from a point where vehicles are required to stop on the intersecting road, while drivers are looking left and right along the major roadway, before entering the intersection. The intersection sight distance is adequate when it allows the design vehicles to safely make all the maneuvers that are permitted by the layout (left turns, right turns, through moves) without significantly affecting vehicles travelling on the main roadway.

The Geometric Design Guide for Canadian Roads, TAC section 2.3.3 provides figures and tables necessary to calculate sight distances.

6.6.4 Grades and Cross-Slopes

At a major/minor roadway intersection the profile of the major roadway is not normally adjusted significantly to match those of the minor cross roadway. It is normally the gradient on the intersecting minor roadway that is adjusted through the introduction of suitable grades and vertical curves prior to the intersection, in such a way as to not reduce sight distances.

Where two major roadways (or two roadways of equal classification) intersect, the profiles of each are often adjusted in an approximately equal manner through the intersection area.

Significant grade changes are not desirable within and near intersections which could affect the control and operation of a vehicle passing through the intersection at the expected operating speed.

The grades of intersecting roadways in the area of the intersection should be as flat as possible to accommodate:

a. Storage space for stopped vehicles,
b. Desirable sight distance, and
c. Accelerating and stopping distance.

Combined vertical and horizontal alignments, including approaching grades and intersection cross-slopes shall be designed in accordance with the most current edition of the Geometric Design Guide for Canadian Roads, TAC, Chapter 2.3.

6.6.5 Property Line Corner Cut-off

The following table outlines the minimum property line corner cut-offs required at the intersections of specific roadway types, in order to allow adequate sight distance and sufficient room for corner radii to accommodate design vehicles. These are considered minimum requirements and the Professional Engineer is responsible for ensuring the design corner cut-offs allow for adequate sight distance and room to accommodate turning vehicles.

Table 6-10: Property Line Corner Cut-off

	Property Line Corner Cut-off (m)			
Roadway Designation	**Arterial**	**Collector**	**Local**	**Lanes**
Arterial	30X30	10X10	N/A	N/A
Collector	10X10	5X5	5X5	0
Local	N/A	5X5	5X5	0
Lanes	N/A	0	0	5X5

6.6.6 Corner Radii

The following table outlines the minimum corner radii required at the intersections of specific roadway types, in order to allow adequate movement of design vehicles. These are considered minimum requirements and

the Professional Engineer is responsible for ensuring the corner radii are appropriate for the specific situation.

Table 6-11: Corner Radii

	Corner Radii (m)		
Roadway Designation	**Arterial**	**Collector**	**Local**
Arterial	Varies	15.0	N/A
Collector	15.0	8.0	8.0
Local	N/A	8.0	8.0

6.7 ACCESS MANAGEMENT

The following are basic recommendations for access control key to the functional classification of the roadway. Access management concepts and techniques shall be applied in accordance with the most current edition of the Geometric Design Guide for Canadian Roads, TAC Chapter 3.2.

6.7.1 Two-Way Access (Full Movement)

A full movement access is the most prevalent type of access requested and may be associated with a median break on divided roadways. Full movement access should be limited along divided arterial roadways which primary function is to provide high level of service for through traffic.

In special cases where access must be provided along arterial roadways, and right in/right out is insufficient, a left-in movement may be allowed while restricting the left-out (3/4 movement). The left-out movement is typically the most difficult one to make because of conflicting traffic flows. Provision of a full movement access, and associated median break, which reduces the length of an existing left turn bay, should only be considered if it is demonstrated that future intersection operation is not degraded by shortening the existing left turn bay.

6.7.2 Two-Way Directional Access (Right-In/ Right-Out)

This type of access is used to prevent cross traffic and left turns into and out of a site along an undivided roadway, or to provide a high standard of site ingress/egress. Typical applications of this access type are high intensity multiple-use commercial sites.

Right-in/right-out accesses are most appropriate on collector and arterial roadways where through traffic is trying to be facilitated. Accesses for high traffic generators are of a particular concern because a full movement access tends to operate much like a roadway intersection.

In the proximity of a major intersection, where left turn bays are present, a right-in/right-out type access should be positioned in advance (upstream) of the bay taper for the left turn storage area. This allows drivers exiting a reasonable opportunity to cross through lanes to reach the left turn lane. (See Figure U.K.5 in the Urban Supplement, TAC, 1995).

6.7.3 Access Location

The table below shows the recommended minimum clearances and spacing of driveways or public lanes along a roadway with operating speed of 50 km/h, as per the Geometric Design Guide for Canadian Roads, TAC. Higher spacing standards may be required for higher speeds as warranted by traffic conditions. Minimum spacing from roadways shall be measured from the back of curb of the cross road to the nearest (leading) back of curb of the access throat. Minimum spacing between accesses shall be measured at the property line (between throat edges).

Table 6-12: Minimum Access Spacing

Reference Location (measured to edge of access)	**Minimum Spacing (m)**			
	Single Family Residential	**Other Residential**	**Commercial**	**Industrial**
Arterial Roadways				
a. From Property Line	Permitted only when no other access is available	5.0	5.0	5.0
b. From street corner (traffic signals at cross road)		70	70	70
c. From street corner (stop control at cross road)		25	25	25
d. Between accesses		20-25	29	32
Collector Roadways				
a. From Property Line	Permitted only when no other access is available	3.0	4.5	9.0
b. From street corner (traffic signals at cross road)		55	55	55
c. From street corner (stop control at cross road)		25	25	25
d. Between accesses		10	12	21
Local Roadways				
e. From Property Line	3.0	3.0	4.5	9.0
f. From street corner (traffic signals at cross road)	15	15	15	15
g. From street corner (stop control at cross road)	15	15	15	15
h. Between accesses	7	10	12	21

For 'Reference Location' diagram, refer to Figures 3.2.8.2 and 3.2.9.3 of Geometric Design Guide for Canadian Roads, TAC and Figure U.K.2.6 of the Urban Supplement to the Geometric Design Guide for Canadian Roads, TAC (current editions should be referenced).

It is to be noted that the minimum distance from the intersecting roadway to an access is more critical on an undivided roadway due to effects of left turning traffic into the site.

6.7.4 Access Width

Driveway access width shall be in accordance with most current edition of the Geometric Design Guide for Canadian Roads, TAC Chapter 3.2 or the Urban Supplement to the Geometric Design Standards for Canadian Roads Manual, TAC. Typical driveway width dimensions are:

Table 6-13: Driveway Width

Access Type	Residential (m)	Multi-family / Commercial	Industrial (m)
One-way	3.0 – 4.3	4.5 – 7.5	5.0 – 9.0
Two-way	3.0 – 7.3	7.2[1] – 12.0[2]	9.0 – 15.0[3]

Notes:

[1] Two-way access for passenger vehicles;

[2] Two-way access for delivery vehicles (cube vans); and

[3] Two-way access for large trucks and semi-trucks.

6.7.5 Acceleration and Deceleration Lanes

Acceleration and deceleration lanes or auxiliary lanes may be required along major roadways for development access to and from the site to safely accommodate turning traffic and to minimize disruption to through traffic flows on the main roadway. Warrant for installation of auxiliary lanes will be at the discretion of the Town Engineer. Basic warrants for an auxiliary lane are:

a. Along arterial roadways, and
b. If existing or projected traffic volume along the main roadway is 30,000 vehicles per day or 600 vehicles per hour per lane.

The widths of both acceleration and deceleration lanes should be the same as the adjacent through lane or 0.2m less, but not less than 3.3m.

An auxiliary lane should have sufficient length to enable a driver to make the necessary change between the speed of operation on the road and the speed on the turning roadway in a collision free and comfortable manner.

The length is based on three factors in combination:

a. The running speed on the through lanes, this is the speed at which drivers manoeuvre into the deceleration lane or merge with the through traffic after leaving an acceleration lane,

b. The control speed of the ramp, this is the speed at which drivers drive the controlling ramp curve, and
c. The manner of decelerating or accelerating, this is the manner of which the drivers decelerate or accelerate on the auxiliary lane.

Design for auxiliary lanes is to be in accordance with the most current edition of the Geometric Design Guide for Canadian Roads, TAC section 2.3. Refer also to the Urban Supplement to the Geometric Design Standards for Canadian Roads Manual, TAC, Section U.D.9.

6.7.6 Access Throat Length

Adequate driveway storage capacity or throat length for both inbound and outbound vehicles to facilitate safe, unobstructed, and efficient traffic circulation and movements from the adjacent roadway and within the development shall be provided, except for single-family or duplex residential driveways on local streets. The clear throat length is measure from the end of the driveway curb return radii to the point of first conflict on-site. The storage length is dependent on a number of factors including land use, development size, roadway classification, etc. Refer to the most current edition of the Geometric Design Guide for Canadian Roads, TAC section 3.2.9, for general guidelines for recommended throat length. For higher traffic generating developments a detailed traffic analysis should be completed to determine the appropriate throat length.

6.7.7 Emergency Access

Primary Access Requirements: The primary access is considered to be the principal access to a site used by occupants of a development on a daily basis. Primary access to all industrial, commercial, and residential developments shall provide adequate emergency vehicle access. Adequate emergency access is a minimum 6.0 m wide unobstructed fire apparatus access roadway with 4.5 m driving surface. An unobstructed vertical clearance of 5.0 m is required. All applicable standards as set forth in the NFPA 1141: Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas, the Alberta Fire Code (2006), and the Alberta Building Code (2006) must be met.

Emergency Access Route or Secondary Access Street Requirements: When adequate emergency access is not available from a public street (primary access route), an applicant for construction approval shall construct an emergency access route or a secondary access street in accordance to the Alberta Fire Code (2006) and the NFPA 1141: Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas.

Parking Restriction on Emergency Access Routes: Curb side parking shall be restricted on emergency access routes (public or private roadways) to provide adequate unobstructed fire apparatus access .

Table 6-14: Roadway Carriageway Width

Roadway Carriageway Width[1] (m)	Parking Restrictions
6.0	No parking of any kind. No-parking signs shall be posted on both sides of the access route
7.5	Parking will be permitted on one side of the access route. No-parking signs shall be posted on one side
9.0	Parking shall be permitted on both sides of the access route
One-way access route	One-way access routes are to be a minimum of 6 m wide with no parking. No-parking signs shall be posted on both sides of the access road.

Note: [1] Roadway carriageway width measurement does not include the curb and gutter.

Sidewalks Designated for Emergency Access: Where a sidewalk is designated as an emergency access route by the Town, the following requirements apply:

a. The sidewalk shall be centred on the right-of-way (straight alignment) and constructed with a minimum of 150 mm thick concrete. The sidewalk width shall be a minimum of 3.5 m to allow access by emergency vehicle,
b. If planting is proposed for the right-of-way a minimum 4.0 m clearance must be provided to allow access by emergency vehicles,
c. T-bollards must be placed at each end of the walkway access, as shown within the Landscaping Section drawings. The posts shall prevent non-emergency vehicle access while allowing access for maintenance equipment,
d. Standard curbs at the approaches to the sidewalks or walkways are adequate; drop curbs are not required,
e. Sidewalk lighting standards and other furniture must be located so that they would, in the opinion of the Town Engineer, not obstruct emergency vehicle access, and
f. The normal gradient for emergency access walkways shall be 0.7% and the minimum gradient shall be 0.5%.

6.8 TRAFFIC CALMING

Implementation of traffic calming measures will be determined on a case-by-case basis. Any proposed traffic calming measures must be identified and approved as part of a Neighbourhood Area Structure Plan or appropriate approval process.

The design of traffic calming measures should consider key factors, including but not limited to:

- Weather, particularly winter conditions
- Topography
- Existing roadway classification and design standards (i.e., traffic volumes, roadway widths, operating speed, etc.)

- Drainage
- Existing utilities
- On-street parking conditions
- Access / driveway locations near intersections
- Truck, service and emergency vehicle requirements
- Designated cycling routes
- Construction and maintenance requirements

The Canadian Institute of Transportation Engineers (CITE) Guide to Neighbourhood Traffic Calming provide guidelines for planning, design, and implementation of traffic calming measures on Canadian roadways.

6.9 COMPLETE STREETS

Complete streets are defined as streets that provide safe, accessible, and convenient access for all transportation modes including pedestrians, bicyclists and motorists users – of all ages and ability levels.

The Owner/Applicant shall make all reasonable provisions for the accommodation of bicycles and pedestrians users in the planning, design, and construction of new roadways, major reconstruction or maintenance projects, except where pedestrians and/or bicyclists services are prohibited by law from using a given facility or where unsafe or impractical.

6.10 LIGHTING

Roadway lighting refers to lighting of roadways, lanes, sidewalks, walkways and trails. Lighting is generally required in all urban and suburban areas. In other areas, lighting requirements are in accordance with the warrants as indicated in the more current edition of the Guide for the Design of Roadway Lighting, TAC Chapter 3.3 and 3.4.

Roadway lighting designs shall be prepared under the direction of a lighting design professional with the appropriate experience and credentials and is registered with the Association of Professional Engineers and Geoscientists of Alberta.

The lighting design and other utilities must be shown on the construction plan submitted for Town approval and conform to the design standards and specifications of Fortis Alberta. Contact the Town Engineer or Fortis Alberta for further information.

6.11 TRAFFIC CONTROL

The design and application of traffic control devices including signage, pavement markings and traffic signals shall be in accordance with the most current edition of the Manual of Uniform Traffic Control Devices for Canada (MUTCD), TAC, and the Alberta Traffic Safety Act, as appropriate.

If signage and pavement markings are required for the proposed development, the Owner/Applicant will be responsible for providing the design and ensuring they are completed by a Professional Engineer with appropriate credentials. The Owner/Applicant shall submit the detailed signage and pavement markings plans for approval by the Town Engineer in conjunction with the detailed engineering drawings for all other municipal improvements in the development area. The Owner/Applicant is also responsible for the installation of the signage and pavement markings in conjunction with any improvements required to Town infrastructure as a result of the development.

The requirements for stop control should be based on MUTCD (Manual of Uniform Traffic Control Devices) warrants, and traffic signals should be confirmed using the most current version of the TAC traffic signals warrant guidelines (Canadian Traffic Signal Warrant Matrix Procedure). Signalization may be required if there are any of the following situations:

- Collision concerns,
- Abnormal left turn volumes,
- Pedestrian hazards,
- Insufficient sight distance,
- Delay problems, or
- Undesirable gaps.

In coordination with the Town, the Owner/Applicant is responsible for the cost and installation of traffic signals that are a direct result of the traffic generated by the development.

The MUTCD provides guidelines for the design and implementation of various pavement markings on roadways. Refer to Schedule C, Section 6.0 Transportation Details for general pavement markings.

6.12 PAVEMENT DESIGN

The first submission of engineering drawings shall be accompanied by a geotechnical report, complete with borehole logs. The report shall specify the roadway structures required and all assumptions used in the roadway structure design, including California Bearing Ratio (CBR) values, design traffic loading and pavement design life. Typically, all the roadways within Town limits, regardless of their classification, shall be designed considering a minimum 20-year life span, unless otherwise directed by the Town Engineer. In the case of staged construction, the life span for a given roadway shall be considered after the final stage of paving.

The mix design shall be provided by a qualified laboratory following the Marshall Method of Mix Design as set out in the latest edition of the Asphalt Institute Manual Series No. 2 (MS-2) and submitted to the Town for approval.

No changes to the approved mix design shall be made without written approval from the Town Engineer. The Town may seek advice from an independent consultant for the suitability of the mix design for a given roadway.

The minimum pavement structure permitted for each road classification is outlined further in Table 6-15: Minimum Pavement Structures. These pavement structures are founded on a prepared subgrade having a California Bearing Ratio (CBR) of at least 4.0 in a soaked condition, the granular base having a CBR of at least 80, and the granular subbase having a CBR of at least 20. These conditions are considered representative of the typical level of subgrade support for the site during spring thaw when the subgrade soils will exist in a weakened condition. Where weaker soils are found to exist, an increase in the pavement structure will be required.

Based on experience, the level of subgrade support available after site grading and intermixing of surficial soils is expected to be equivalent to a soaked CBR value in the order of 2 to 5. Subgrade support at this level will be slightly below the design levels. In areas where the water levels are close to the existing surface grades, there will be the potential for groundwater to be pumped up into the subgrade soils by surface

vibrations from construction traffic. This rise in groundwater and subgrade moisture content will be accompanied by a significant loss of strength in the subgrade soils.

Typical local practice for road base construction for sensitive subgrades is to thicken the granular sub-base layer of the pavement section (i.e., construct a working platform of free draining course gravel). Placement of this thickened granular subbase will support construction traffic and will improve the level of subgrade support for the design pavement section. The required thickness of the sub-base gravel will vary across the site depending on actual subgrade conditions.

A geotechnical firm should be contacted to determine acceptable depths of granular subbase required to provide the required support. Cement stabilization will only be accepted on a case-by-case basis as approved by the Town Engineer.

Construction procedures should be designed to minimize disturbance to the sensitive subgrades and to protect the integrity of the granular working mats. If the subgrade has failed during construction, the weakened material may have to be subcut and replaced with an approved fill material on top of a filter fabric. Required granular thickness, initial lift thickness and the need for any special construction procedures are best determined based on observations at the time of construction.

For new development areas, asphalt installation shall be constructed in a staged approach. The final lift of asphaltic concrete pavement shall be placed at a minimum of ten (10) months spanning one winter seasons following base course, as part of the completion of the Warranty Period. Placement of the final Lift of asphalt concrete pavement shall be between June 15 and September 15, unless approved otherwise by the Town Engineer. The interim pavement structure must be adequate to handle the traffic loading during this interim period. This includes construction activity and municipal operations. For capital projects or urban rehabilitation projects, where cuts into the new asphalt mat are not anticipated to be required to accommodate services or new utilities, the final lift may be applied immediately following the base course. The interim interface between base course and an existing road structure shall be tapered over a distance of 0.5 m. This taper is to be ground out immediately before applying final lift. Manhole frames and covers are to be adjusted to match the asphalt surface between the base course and final lift.

Typically, the maximum depth of a single lift of asphalt shall be 75 mm. The minimum initial depth shall be 50 mm. The minimum depth of successive lifts or final overlay shall be 40 mm.

Design parameters such as traffic count, percentage of trucks, etc., are to be provided to the Town. The Town reserves the right to request the Owner/Applicant to engage a geotechnical engineering agency to carry out CBR tests on the subgrade prior to paving, to confirm adequacy of the design.

Table 6-15: Minimum Pavement Structures

Minimum Pavement Structures					
Road Classification	**20-year ESAL Design (80 KN axles)**	**Asphaltic Concrete Depth (mm)**	**Granular Base Depth (mm)**	**Granular Subbase Depth (mm)**	**Total Depth (mm)**
Divided Arterial & Intersections	$> 4 \times 10^6$	A traffic analysis is required to verify design traffic volumes and pavement structures are to be determined accordingly (includes reconstruction / upgrade projects)			
Undivided Arterial	4×10^6	100 + 40*	200	350	675
Industrial Collector	2×10^6	100 + 40*	200	300	600
Residential Collector	1×10^6	75 + 40*	150	300	540
Industrial Local	8×10^5	90 + 40*	150	300	540
Residential Local	9×10^4	65 + 40*	100	250	450
Paved Lanes	1×10^3	50	200	-	250

*Unless otherwise recommended by a Geotechnical Engineer, the proposed asphalt thickness listed above shall be followed.

7.0 LANDSCAPING

This section outlines the methodology and design criteria that apply to the design of landscaping in the Town. These guidelines are not intended to be a substitute for sound landscape architectural knowledge and experience.

7.1 GENERAL

The Owner/Applicant is responsible for the design and construction of landscape developments in accordance with the minimum landscape development guidelines indicated to the satisfaction of the Town. The Town Engineer at their discretion, may consider alternatives to or relaxations of the Guidelines when the Owner or their agent, or the Contractor or their agent, provides a written submission identifying the reasons for special considerations.

The areas to be landscaped are identified in the following documents:

- Approved Outline Plan,
- Servicing Study, and
- Development Agreement.

Detailed landscape drawings shall be prepared for each phase of Development in accordance with the conceptual landscape plans prepared as part of the approved Outline Plan. The plans shall incorporate design information for the following landscape features:

- Level One Landscaping,
- Level Two Landscaping, and
- Level Three Landscaping.

7.2 LIST OF DRAWINGS

8-01	Typical Tree Planting
8-02	Tree Slope Planting
8-03	Tree Trench Planting
8-04	Typical Shrub Planting
8-05	Shrub Slope Planting
8-06	Past and Cable Fence
8-07	Standard Chain Link Fence
8-08	Standard Pedestrian Chain Link Fence Gate
8-09	1800mm Wood Screen Fence
8-10	Fixed and Knockdown Bollards
8-11	Asphalt Pathway (Trail)
8-12	Granular Pathway (Trail)

7.3 PARK CLASSIFICATIONS

Parklets (MR's)

Parklets are classified as Municipal Reserves and are less than 0.5 acres.

Linear Parks (MR's)

Linear Parks are classified as Municipal Reserves that are narrow corridors ranging in width from 5 m to 10 m and have a minimum length of two times the width.

Neighbourhood Parks (MR's)

Neighbourhood Parks (i.e., Tot lots/ Playgrounds, open space, ornamental parks, etc.) are classified as Municipal Reserves and range in size from 0.5 to 4.9 acres.

Community Parks (MR's)

Community Parks (i.e., Tot lots/ Playgrounds, open space, school grounds, community space, outdoor recreation facilities, etc.) are classified as Municipal Reserves and range in size from 3.6 to 9.2 acres.

Refer to Appendix B Park Classifications for the minimum amenities and planting requirements for the above park classifications.

7.4 LEVEL ONE LANDSCAPING

7.4.1 General

Level One Landscaping refers to work included in preparing the site to specified grades, placing and leveling topsoil, seeding of grass, and established turf; all in accordance with the Town's current Design Guidelines.

The Owner/Applicant is required to provide Level One Landscaping for all public open space areas, municipal reserves, linear parks, natural environments, boulevards, medians, utility lots, buffer areas, roadway berms, walkways, etc., as specified by the Town Engineer.

For arterial roadway right of ways, Level One Landscaping of medians and boulevards shall be completed at the time of roadway construction. The adjacent Owners shall supplement the Level One Landscaping by providing Level Two Landscaping as required by the Town. Refer to Section 6.0 for additional information.

On collector and local roadways, the Owner/Applicant shall be responsible for Level One Landscaping of boulevards and medians. Refer to Section 6.0 for additional information.

The Owner/Applicant shall provide Level One Landscaping for all boulevards located between the curb and separate sidewalk. The property owner is responsible for landscape area located between back of walk and the property line.

Medians exceeding 2.0m width will require Level One Landscaping and shall be capped with concrete where the median width is less than 2.0m. A 1.5m depressed curb shall be utilized when a median exceeds a width of 3.0m to allow mower access. Refer to Section 6.0 for additional information.

7.4.2 Site Preparation & Grading

The Town requires a minimum of seven (7) days notice when work is to commence on site. This notice must be given prior to arrival on site and communicated what work is to be undertaken. Grading plans shall

be approved by the Town prior to commencement of work. Permits shall be obtained as needed and remain on site for inspector review.

All locates of underground utilities, protection of survey control monuments, and existing monuments shall be undertaken by the Owner/ Applicants prior to commencement of work.

Existing plant material shall be protected unless approved for removal by the Town Engineer. All existing plant material to remain shall require temporary fencing installed around the perimeter of the trees dripline unless otherwise directed by the Town Engineer. All construction activities to stay outside of temporary fence.

Plant material that has been approved for removal shall be completely removed from site and disposed at an approved location by the Town. This includes all roots, stumps and tree debris from removal activities.

Sub-grade shall be designed to provide a minimum 2% gradient across all landscape areas, unless otherwise stated on approved landscape drawings, and directed away from structures. If a minimum of 2% cannot be maintained it must be reviewed by the Towns Engineer.

Rough grade fill shall be free of harmful materials and shall accommodate topsoil placement for all vegetated types.

7.4.3 Topsoil

Topsoil shall be placed in areas that will receive plant material, seed and sod. Rough grade shall be verified prior to placement of topsoil for vegetated areas.

All topsoil shall be screened and free of rocks and foreign material exceeding 50mm diameter. Rock in topsoil that is 50mm and under shall not exceed 20% of the topsoil volume.

For vegetated purposes the topsoil shall be tested for N, P, K, Mg, soluble salt content and pH value. Costs associated with soil testing shall be at the Owner/Applicants expense. The Town requires soil test results within seven (7) days prior to expected delivery to site.

Recommended soil composition:

Organic Matter:	5-10%
Clay:	30%
Sand:	35%
Silt:	35%
Acidity Range (pH):	6.0 – 7.8

Electrical conductivity of max. 1.5 ohms per cm2

Free of toxic materials

Any deficiencies noted in the topsoil test results shall be rectified at the Owners cost by the appropriate application of fertilizers and additives.

When organic matter is required to meet topsoil specification, peat moss shall be added in the field and thoroughly mixed with cultivation equipment. Peat moss shall meet the following specifications:

a. Free of toxic material, live plants, live roots, seeds,

b. Delivered in a pulverized condition,
c. Approved prior to mixing with the topsoil, and
d. A pH level between 4.5 to 6.0.

Topsoil shall be placed at minimum depths as follows:

- 200mm for seed and sodded areas.
- 300mm for perennials and ornamental grasses.
- 600mm for shrubs beds.

Topsoil for seeded areas shall be installed to finished grade, ensure positive drainage and shall be flush with adjacent surfaces. Topsoil for sod areas shall be placed 25 mm below finished grade adjacent other site structures and surfaces such as manholes and walkways to allow positive drainage. Finished grade shall be smooth for seeding and/or sodding.

7.4.4 Seed

Seed mixes shall be pre-approved for seed application by the Town prior to installation. It is recommended that seed be installed between May 1st and September 30th. Seed that fails to germinate shall be re-seeded at the Owners expense until germination has taken place to the satisfaction of the Town Engineer.

All seed mixes shall be Certified Canada No. 1 mixture, free of disease, weed seeds or foreign matter, minimum germination of 75%, minimum purity of 97% and conforming to the mixes below or approved equal. All seed must meet the requirements for the Seed Act and all lawn seed must comply with federal and provincial seed laws. A germination test and/or weed seed analysis may be requested if deemed necessary.

Bags of seed mixture shall be tagged and labelled with the following information:

- Name of supplier.
- Contents.
- Date bagged and location.
- Year of seed production. (seed must be installed within 1 year of being bagged)

Seed Mixes are outlined below. Alternative seed mixes will be considered and require written approval from the Town Engineer prior to installation.

Parks Lawn Mix

30%	Creeping Red Fescue
30%	Fiesta 4 Perennial Ryegrass
15%	Mercury Kentucky Bluegrass
15%	SR2100 Kentucky Bluegrass
10%	Mustang Tall Grass

Mechanical Application = 4lbs per 92.9m²

Direct/ Broadcasting Application = 5.5lbs per 92.9m²

Naturalization Seed Mix

30%	Mountain Bromegrass

25% Fringed Bromegrass – coated
25% Awned Wheatgrass
5% Tufted Hairgrass
5% Rocky Mountain Fescue
4% Sloughgrass
2% Junegrass
2% Fowl Bluegrass
2% Ticklegrass

Mechanical Application = 65lbs per acre

Hydroseeding Application = 110lbs per acre

Wet seed mixes for Low Impact Development (LID), storm water management facilities, and natural environments shall be proposed by the Landscape Architect and submitted to the Town Engineer for review and approval.

Seed mixes that are not outlined above shall be submitted to the Town for review and approval.

Hydroseeding shall be used in areas where slopes exceed 3:1. The hydro-seeder must be capable of thoroughly mixing water, grass seed, fertilizer and pulverised wood fiber. Mechanical and hand-cast method are acceptable for slopes less than 3:1.

Seed shall be watered after installation to encourage germination. Water shall be free of contaminants that would deter germination or growth.

When fertilizers are used, it shall be applied to meet the Canada's Fertilizer Act and Fertilizer Regulations. All fertilizers shall be standard commercial brands, packed in appropriate containers that are clearly marked indicating the manufacturer, weight, analysis and shall be stored in a protected and dry area when on site.

Once seed is installed, it is the Owner/Applicant's responsibility to ensure that seed is properly maintained until time of acceptance by the Town of Rocky Mountain House. (i.e., watering, fertilizer, weeding).

The Owner/Applicant is responsible for the installation and maintenance of barriers and signage to warn traffic from entering seeded area until time of final acceptance.

7.4.5 Sod

It is recommended that sod be installed between May 1st and September 30th. Sod that fails to establish shall be removed and reinstalled at the Owners expense until establishment has taken place to the satisfaction of the Town Engineer.

Sod shall be certified No. 1 cultivated turf grass sod. Sod shall be grown and sold in accordance with the classification of the Nursery Sod Growers Association of Alberta and Western Turfgrass Association Standards. It is required that all sod be healthy and strong, have a fibrous root system, must be free from stones, show no signs of decay and/or bare spots, free from weeds, free from undesirable native grasses and foreign debris. Sod shall have uniform mixture of the industry standard mix as per Sod Growers Association of Alberta latest manual or approved equal. Cut sod by approved methods in accordance with recommendations of the Canadian Nursery Landscape Association (CNLA).

Sod mix to be Kentucky Bluegrass sod or approved equal.

Where slopes exceed 3:1, sod shall be pegged 25 per 10 m² to encourage establishment and deter migration. Pegs shall be installed flush with the ground.

Sod shall be watered after installation to encourage establishment. Water shall be free of contaminants that would deter establishment or growth.

When fertilizers are used, it shall be applied to meet the Canada's Fertilizer Act and Fertilizer Regulations. All fertilizers shall be standard commercial brands, packed in appropriate containers that are clearly marked indicating the manufacturer, weight, analysis and shall be stored in a protected and dry area when on site.

Once sod is installed it is the Owner or their agents' responsibility to ensure that sod is properly maintained until time of acceptance by the Town. (i.e., watering, rolling, fertilizer, weeding).

The Owner/Applicant is responsible for the installation and maintenance of barriers and signage to warn traffic from entering the sodded area until time of final acceptance.

7.4.6 Maintenance

Maintenance and warranty will commence once Construction Completion Certificate (CCC) has been achieved. Maintenance and warranty period are two (2) years and until issuance of a Final Acceptance Certificate (FAC).

A maintenance log shall be submitted at the end of each season until time of Final Acceptance and shall outline the following:

- Fertilizer logs.
- Weed logs.
- Spring clean up.
- Mowing (excluding non-maintained turf).
- Watering.

Warranty and Maintenance items include but are not limited to the following:

- Mow turf to a height of 5 – 15cm, do not scalp turf or leave grass clippings on hard surfaces.
- Top dress and seed bare patches. In locations where large sections of sod have died, top dress and seed is not acceptable. These areas shall be replaced with sod.
- Ensure turf is free of weeds.
- Apply Fertilizer evenly (only in Spring). Fertilize turf so that there is no burning of turf grass. 48-hour public notice is required prior to application.

7.5 LEVEL TWO LANDSCAPING

7.5.1 General

Level Two Landscaping refers to work such as planting shrubs, trees, or other plant amenities, all in accordance with the Town's current Design Guidelines.

The Owner/Applicant is required to provide Level Two Landscaping for all public open space areas, municipal reserves, linear parks, natural environments, boulevards, medians, utility lots, buffer areas, roadway berms, walkways, etc., as specified by the Town Engineer.

Level Two Landscaping may be provided in the medians of arterial, collector and local roadways as long as it meets the guidelines outline in section 6.0.

Trees may be planted in boulevards 2.0 m width and greater. Boulevards less than shall be reviewed and may require special parameters as directed by the Town Engineer (i.e., tree trenching). Refer to Drawing 8-03 Tree Trench Planting.

7.5.2 Plant Material

Plant material shall meet the standards outlined in the horticultural standards of nursery stock of the "Canadian Nursery Trades Association". It is required that all plants are grown in Alberta, unless otherwise deemed appropriate, and must be first grade quality and structurally sound, disease, injury and insect free and shall have a fibrous root system. Substitution of plant material is not permitted unless approved by the Town Engineer.

At time of installation, trees and shrubs to conform to the following minimum size:

- Large variety deciduous trees 60mm caliper
- Small variety deciduous trees 50mm caliper
- Large variety coniferous trees 3.0m height
- Small variety coniferous trees 2.0m height
- Deciduous shrubs 600mm height
- Coniferous shrubs 600mm spread

If sizes proposed do not meet the above parameters, they must be approved by the Town Engineer prior to installation.

Newly planted trees shall not exceed fifteen percent (15%) for any genus within boulevard and medians to avoid monoculture.

Plantings within boulevards and medians shall consider the following:

- growth habitat,
- size,
- disease resistance,
- hardiness zone, and;
- maintenance.

Plantings within parks, open space and natural areas shall consider the following:

- variety of species,
- appropriate aesthetics,
- hardiness zone, disease resistance,
- rate of growth,
- growth habit, and;
- ratio of trees, shrubs, and perennials

Hardiness Zone within Rocky Mountain House is zone 3. Tree, shrub, and groundcovers shall be selected to suit hardiness zone.

List of acceptable trees and shrubs can be found in Appendix C.

Poplars and Willow trees are prohibited in boulevards and medians. Plantings proposed that are not outlined in Appendix C will require approval from the Town Engineer prior to installation.

7.5.3 Tree Setbacks and Spacing

The following table outlines tree setbacks from deep and shallow utilities, utility hardware and signage.

Table 7-1: Tree Setbacks from Deep and Shallow Utilities, Utility Hardware and Signage

Utility, Utility Hardware & Signage	Deciduous Setback (Minimum)	Coniferous Setback (Minimum)	Poplar (Minimum)
Deep Utilities			
Water	2.5 m	3.0 m	4.0 m
Sanitary	2.5 m	3.0m	4.0 m
Storm	2.5 m	3.0m	4.0 m
Shallow Utilities			
Gas	2.0 m	2.0m	2.0 m
Power	1.5 m	2.0 m	2.0 m
Telephone	1.5 m	2.0 m	2.0 m
Cable Telephone	1.5 m	2.0 m	2.0 m
Utility Hardware & Signage			
Light Poles	4.0 m	4.0 m	5.0 m
Fire Hydrants	3.5 m	3.5 m	4.0 m
Valves (Service Valves)	3.5 m	3.5 m	10.0 m
Manholes	5.0 m	5.0 m	10.0 m
Catch Basins	5.0 m	5.0 m	10.0 m
Transformers	3.5 m	3.5 m	10.0 m
Pedestals	3.5 m	3.5 m	10.0 m
Other Utility Equipment	5.0 m	5.0 m	10.0 m

Stop Signs (Local & Collector roads)	5.0 m	5.0 m	10.0 m
Yield Signs	3.5 m	3.5 m	4.0 m

Notes:

- Poplars excluding Trembling Aspen and Swedish Columnar Aspen.
- Minimum setbacks can be reviewed and adjusted by Town based on species of trees.
- Trees are prohibited under overhead utility lines. Setback requirements will be determined by the Utility Authority.
- Utility Authority to determine plant requirements within a utility right away.

The following table outlines tree setbacks from structures and surfaces, boulevards and medians, parks and open space, and private properties.

Table 7-2: Tree Setbacks from Structures and Surfaces, Boulevards and Medians, Parks and Open Space, and Private Properties.

Walkways & Roads, Parks & Open Space, Private Property	**Deciduous Setback (Minimum)**	**Coniferous Setback (Minimum)**	**Poplar (Minimum)**
Walkways & Roads			
Face of Curb (Roads & Medians)	1.5 m	1.5m	10.0
Face of Curb (without Sidewalk)	2.0 m	2.0 m	10.0m
Street Corners	12.0 m	12.0m	15.0m
Edge of Residential Driveways	1.5 m	1.5m	10.0 m
Edge of Commercial Driveways	4.0 m	4.0m	10.0 m
Edge of Walkway	1.0 m	1.0 m	10.0 m
Median Bullnose	7.5 m	7.5m	not prohibited
Parks & Open Space			
Structures	2.0 m	½ maximum spread	5.0 m

Hard Surfaces	2.0 m	½ maximum spread	5.0 m
Sports Fields	½ maximum spread from 6.0 m buffer	½ maximum spread from 6.0 m buffer	10.0 m
Private Property			
Fencing	2.5 m	2.5 m	10.0 m

Notes:

- Poplars excluding Trembling Aspen and Swedish Columnar Aspen.
- Minimum setbacks can be reviewed and adjusted by Town based on species of trees.
- Trees are not allowed within sight line triangle at an intersection or driveway.

The following table outlines tree spacing for boulevard and median planting.

Table 7-3: Tree Spacing for Boulevard and Median Planting

Species	Spacing (Minimum)
Brandon Elm *(Ulmus americana 'Brandon')*	10.0 m
Patmore Elm *(Ulmus americana 'Patmore')*	10.0 m
Siberian Elm *(Ulmus pumila)*	10.0 m
Tuxedo White Ash *(Fraxinus americana 'Durgar')*	10.0 m
Calypso White Ash *(Fraxinus americana 'Calypso')*	10.0 m
Silver Cloud Maple *(Acer saccharinum 'Silver Cloud')*	10.0 m
Bur Oak *(Quercus macrocarpa)*	8.0 m
Foothills Green Ash *(Fraxinus pennsylvanica 'Heuver')*	8.0 m
Dropmore Linden *(Tilia americana 'Dropmore')*	8.0 m
True North Linden *(Tilia americana 'Duros)*	8.0 m
Midnight Schubert Chokecherry *(Prunus virginiana 'Midnight')*	8.0 m
Patmore Green Ash *(Fraxinus pennsylvanica 'Patmore')*	8.0 m
Ivory Silk Tree Lilac *(Syringa reticulata 'Ivory Silk')*	5.0 m

Thunderchild Crabapple *(Malus x 'Thunderchild')*	5.0 m
Spring Snow Flowering Crabapple *(Malus x 'Spring Snow')*	5.0 m
Prairie Spire Green Ash *(Fraxinus pennsylvanica 'Patmore')*	8.0 m
Swedish Columnar Aspen *(Populus tremula 'Erecta')*	2.0 m

Notes:

- Minimum setbacks can be reviewed and adjusted by Town based on species of trees.

All measurements for tree setbacks and spacing shall be taken horizontally from the centre of the tree to the structure, utility and/or adjacent tree.

Shrubs and groundcovers proposed at intersections and within medians shall not exceed 600mm height at maturity.

Plant beds shall be spaced a minimum 2.0 m away from each other to allow for maintenance activities. Where plant beds are not proposed, a 2.0 m wide sod mow strip shall be provided along all trails, structures and fences flanking public lands.

No more than 30% of trees in a park shall be Poplar.

Trees less than 2.0 m away from structures, hard surface or property lines shall be placed in mulch beds.

Best practices shall be utilized when spacing trees and shrubs and guidelines outlined in the Canadian Standards of Nursery Stock shall be adhered to. Shrubs shall be mass planted and grouped in beds.

7.5.4 Planting Requirements

It is recommended that planting takes place between May 1st to September 15th and planting installation avoided on days where temperatures exceed 30 degrees Celsius.

Trees and shrubs planted in the medians and boulevards, an excavation to the following dimensions is required to accommodate the root zone/planting area:

- Trees: 2.0m wide x 2.0m long x 600m deep (or minimum depth of root ball, whichever is greater).
- Shrubs: 1.0m wide x 1.0m long x 600mm deep.

The excavated areas shall be backfilled with topsoil and prepared for tree and shrub planting.

Burlapped trees shall be dug to conserve most fibrous roots. It is required that container grown trees be sourced locally and grown in container for a minimum of 2 years with thriving and fully developed roots. Refer to Drawing 8-01 for Typical Tree Planting and Drawing 8-02 Tree Slope Planting.

Bare root shrubs shall be dug to conserve fibrous roots with root size meeting standards outlined in the Canadian Nursery Trades Association. It is required that container grown shrubs be sourced locally and grown in a container for a minimum of 2 years with thriving and fully developed roots. Refer to Drawing 8-04 for Typical Shrub Planting and Drawing 8-05 Shrub Slope Planting.

Deciduous trees planted within boulevard and median and adjacent walkways must maintain at a minimum a branch height of 1.8m at time of planting and 2.5 m at time of maturity. All trees must have true form to ensure sightlines are not obstructed.

Thorny planting is to be avoided in boulevards and adjacent pathways (trails).

Within Municipal Reserves trees shall be planted at a minimum of 75 trees per hectare. Shrubs are considered an acceptable substitute at a rate of five shrubs equal one tree.

Where possible (i.e., parks, open space, and naturalized settings), trees should be grouped in plant beds. Where this cannot be accommodated (i.e., boulevards), trees are to receive at minimum a 1.0 m diameter ring of mulch at base of tree.

Plant beds and mulch rings at base of trees shall receive 100 mm depth wood chip mulch. If a substitute mulch is proposed, it will require approval from the Town Engineer.

Mulched plant beds should be avoided in areas where it could be easily washed into storm infrastructure. Sufficient distance should be maintained to prevent clogging of storm systems. The following must be maintained:

- Berms – limit to flattened tops or benches along side of berm or in locations where mulch migration is obstructed.
- Storm ponds (wet & dry ponds) – mulch is only to be used above high-water level.
- Drainage Swales – wood mulch is prohibited.

Filter fabric and edger are prohibited in all plant beds due to long term maintenance.

When fertilizers are used, it shall be applied to meet the Canada's Fertilizer Act and Fertilizer Regulations. All fertilizers shall be standard commercial brands, packed in appropriate containers that are clearly marked indicating the manufacturer, weight, analysis and shall be stored in a protected and dry area when on site.

Planting shall be watered after installation to encourage establishment. Water shall be free of contaminants that would deter establishment or growth.

7.5.5 Maintenance

Maintenance and warranty will commence once Construction Completion Certificate (CCC) has been achieved. Maintenance and warranty period are 2 years and until issuance of a Final Acceptance Certificate (FAC).

At time of FAC, if more than 10% of trees require replacement, it will be at the Town Engineer's discretion if an additional year of maintenance is required.

A maintenance log shall be submitted at the end of each season until time of Final Acceptance and shall outline the following:

- Fertilizer logs
- Weed logs
- Spring clean up
- Mowing
- Trimming/ pruning

- Watering

Warranty and Maintenance items include but are not limited to the following:

- Water plant material to maintain soil moisture for ideal plant material growth.
- Apply Fertilizer evenly (only in Spring). 48-hour public notice is required prior to application.
- Apply appropriate agents when required to control insects and disease. Receive approval from the Town prior to application.
- Remove dead, broken or hazardous branches from plant material.
- Tree wells and plant beds to be free of weeds.
- Replace dead trees or shrubs.

7.6 LEVEL THREE LANDSCAPING

7.6.1 General

Level Three Landscaping refers to the work included in supplying and installing various park facilities and/or amenities (i.e., pathways (trails), playground equipment, bollards, fencing, site furnishings, outdoor sports facilities, etc.) outside of Level One and Level Two landscaping; in accordance with The Town's current Design Guidelines.

The Owner/Applicant is required to supply and install Level Three facilities and amenities in various locations throughout the Development, as identified in the approved Outline Plan. Some of the standard Level Three Landscaping facilities and/or amenities to be provided are as follows:

a. Fencing,
b. Bollards,
c. Paved and granular pathways (trails),
d. Site furnishings (i.e., garbage receptacles, benches, etc.),
e. Tot lots and playground structures, and/or
f. Outdoor sports facilities.

7.6.2 Fencing

The following outlines fencing types and acceptable locations for installation. Any design that deviates from the below requires approval from the Town Engineer.

The Owner shall be responsible for, and at their own expense, correcting any defects or deficiency in the finished work until Final Acceptance has been achieved.

7.6.2.1 Post and Cable Fence

Post and Cable Fence provided at the following locations:

- Separating a public roadway from a lane or Public Utility Lot.
- Separating a lane from a park or other open space.
- Separating a parking lot from a park or other open space.
- Locations specified by the Town Engineer.

Post and Cable Fence to be constructed in accordance with Drawing 8-06.

Post and Cable Fence shall conform to the following standards:

- Materials are to be weather resistant.
- All clamps and 8 m wire cable rope shall be galvanized to CSA G164.
- Timber posts shall be pressure treated in accordance with CAN/CSA-080 Series.
- Ground shall be level when fence is installed. Fence shall be installed with a consistent elevation or slope and shall follow ground contours smoothly.

7.6.2.2 Chain Link Fence

Chain Link Fencing provided at the following locations:

- Flankage or rear of lots that are adjacent to parks, public utility lots (PULs), and rights-of-way (ROWs).
- Locations specified by the Town Engineer.

Standard Chain Link Fence to be constructed in accordance with Drawing 8-07.

Chain Link Fencing shall conform to the following standards:

a. Ground shall be level at time of fence installation. Fence shall be installed so that it accommodates finished elevation and shall have a consistent elevation or slope.
b. Chain link fence mesh shall be 50mm above finished grade. If not achieved, it shall be adjusted at Owners expense.
c. The following outlines pipe material based on 1500 mm to 1800 mm height chain link fence.

Table 7-4:Pipe Material Based on 1500 mm to 1800 mm Height Chain Link Fence

Post Type	Outside Diameter (mm)	Min. Weight Per Metre	Min. Wall Thickness
Line Post	60	5.43	3.91
Terminal Post	90	11.30	5.49
Top Rail	45	4.05	3.68
Brace	45	4.05	3.68
Gate Post	90	11.30	5.49

Note: If the Owner/Applicant proposes a height that's not outlined above, shop drawings shall be submitted to the Town for approval prior to installation.

d. Posts shall be capped and made of galvanized steel or aluminum.
e. Line posts support fencing at points where fabric is continuous. All line posts are to have post tops. All post tops shall be galvanized steel or aluminum.
f. Terminal posts, which are end posts, corner posts, straining posts, and gate posts, are to accommodate fencing fabric where it is discontinuous and attached to posts by tension bars and tension bands.
g. Top rails (horizontal pipes) supporting the top selvage of fabric. Top posts shall be continuous and loop through post tops of line posts.
h. Pipe material used for fencing shall be hot-dipped, zinc-coated, butt-welded, Schedule 40 seamless steel pipe fabricated in conformance with ASTM A120. Zinc coating shall be not less than 0.61 kg

per square metre of total surface area. The use of tubing, conduit, or open seam material will not be permitted.

i. Fence fabric to be 3.7 mm galvanized Chain link with 50 x 50 mm mesh.
j. Tension bars, tension bands, fittings, and post tops shall be coated in zinc for corrosion-resistance. Parameters for zinc coating include:
    a. shall be not less than 0.61 kg/m2 of surface area and,
    b. shall be applied by hot-dip in conformance with ASTM A123.
k. Tension wire shall be 4.8mm diameter minimum, single stranded, electro-galvanized wire that can withstand 6 dips in conformance with ASTM A239. Tension wire strength shall be equal to specified wire for chain link fabric and shall have a corrosion protection system equal to specified fabric.
l. Where an alignment is greater than 20 degrees a corner post shall be installed for stability.
m. The Owner/ Applicant shall apply for Final Acceptance Certificate once fence is installed. As built survey of fence line is required with application to confirm fence was built to final design grades.

7.6.2.3 Chain Link Gate

Chain Link Gate provided at the following locations:

- Pedestrian Chain Link Gate may be installed on residential lots which back onto a public park and municipal reserve at the discretion of the Town Engineer.
- Location specified by the Town Engineer.

Standard Pedestrian Chain Link Fence Gate to be constructed in accordance with Drawing 8-08.

Chain Link Gate shall conform to the following standards:

a. Gates shall be installed at the midpoint of a lot and are permitted to open 90 degrees in both directions.
b. Gate latches shall be suitable for padlock that can be operated from either side of the gate.
c. Steel pipe shall conform to ASTM A120-77 and shall frame the gate. Outside frame shall be 45 mm O.D. pipe. Welding shall not take place until pipe is galvanized.
d. Fabric shall be 3.7 mm galvanized chain link with 50 x 50 mm mesh.
e. Shop drawings of gates along with related appurtenances shall be submitted to the Town for approval prior to construction.

7.6.2.4 Wood Screen Fence

Wood Screen Fence provided at the following locations:

- Adjacent Collector roads, parks and playfields, public utility lots (PULs), rights-of-ways (ROWs), School Sites, Multi Family Sites, Neighbourhood Commercial Sites and Institutional Sites.
- At other location specified by the Town Engineer.

Wood Screen Fence to be constructed in accordance with Drawing 8-09.

Wood Screen Fencing shall conform to the following standards:

a. Materials are to be weather resistant.
b. Ground shall be level at time of fence installation. Fence shall be installed so that it accommodates finished elevation and shall have a consistent elevation or slope.

c. Wood screen fence panels shall be 50mm above finished grade. If not achieved, it shall be adjusted at Owners expense.
d. All lumber shall conform to the following standards:
    a. Shall be graded by an agency certified by the Canadian Lumber Standards Administrative Board. All lumber must be marked with a recognized visible grade stamp.
    b. Dimension Board Lumber Graded in accordance with National Lumber Grades Authority (NLGA) Standard Grading Rules for Canadian Lumber and to CSA 0141-1970 with a maximum 19% moisture content at time of installation and rough sawn to sizes noted on the drawings.
    c. All wood fence material shall be pressure treated lodgepole pine, fir, hemlock, spruce, or approved alternative and stained or painted (2 coats).
    d. Cracked and/or damaged timber panels or posts are unacceptable and will require replacement at Owners expense. Panel heights shall be consistent. Any differing heights between one panel to the next due to grade change shall be taken up at fence post between panels.
e. Nails and Spikes shall be used in accordance with Alberta Building Code. Spiral nails and fasteners shall be used except indicated otherwise and shall be hot dip galvanized finished steel for all exposed exterior work.
f. Hot dip galvanized sheet steel finish to CSA G164-1955 (R1972) shall be used for all bolt, nut, washer, screw and pin type fasteners.
g. The Owner shall apply for Final Acceptance Certificate once fence is installed. As built survey of fence line is required with application to confirm fence was built to final design grades.

7.6.3 Bollards

Bollards are placed on public lands to prevent unauthorized vehicles use and to allow pedestrian, maintenance vehicle and/or emergency vehicle access.

Location of bollards will be as follows unless otherwise approved by the Town Engineer:

- Bollards will be required at the end of a pathway (trail) within a Public Utility Lot when it intersects with another pathway linkage.
- Bollards will be required at each end of a walkway that extends the entire length of a Public Utility Lot. Front yard bollards shall be located at building setback while the rear bollards should be located on the easement line unless approved otherwise.
- Bollards are required when a pathway (trail) entrance is on a street.

Bollards to be constructed in accordance with the Drawing 8-10.The Owner shall be responsible for, and at their own expense, correcting any defects or deficiency in the finished work until Final Acceptance has been achieved.

Maintenance and warranty will commence once Construction Completion Certificate (CCC) has been achieved. Maintenance and warranty period are 2 years and until issuance of a Final Acceptance Certificate (FAC).

7.6.4 Site Furnishings

Details for park furniture shall be approved by the Town Engineer.

Furniture such as benches, picnic tables and waste receptacles provided on public land must be appropriately located and approved by the Town.

Benches and picnic tables placed on public lands shall conform to the Town's standard product. For information on bench and picnic table type and colour code, contact Engineering and Operations.

Bench and picnic table colours are as follows:

- Picnic Table and bench at playground (tot lot) to be blue.
- Picnic Tables and bench within park to be green.

Dual Haul-All containers shall be used within parks accommodating both waste and recycling. Symbols shall be provided on Haul-All to distinguish between waste and recyclables.

Site furniture minimum setback distances are as outlined below. Measurements shall be taken from the front face edge of the amenity.

- Benches and picnic tables shall be placed a minimum 1.0m from back of walkway (pathway).
- Waste Receptacles shall be placed a minimum 450mm from walkway (pathway) and a minimum 5.0m from a bench. If this can not be achieved proposed setback shall be approved by the Town Engineer.
- Waste receptacles and benches shall be installed every 0.5 km to 1 km stretch of trail or as indicated by Towns Engineer.

Site amenities shall be placed on a concrete pad. The concrete pad must maintain a minimum 150mm edge around amenity to allow ease of maintenance activities. Where inground mount is proposed it shall be approved by the Towns Engineer.

The Owner shall be responsible for, and at their own expense, correcting any defects or deficiency in the finished work until Final Acceptance has been achieved.

Maintenance and warranty will commence once Construction Completion Certificate (CCC) has been achieved. Maintenance and warranty period are two (2) years and until issuance of a Final Acceptance Certificate (FAC).

7.6.5 Pathways (Trails)

The following specifies acceptable pathway (trail) locations, minimum widths, allowable surface types and pathway standards. If a design deviates from what is outlined below, it requires approval from the Town Engineer.

7.6.5.1 Asphalt Pathway (Trail)

Asphalt Pathway shall be a minimum width of 2.5 m – 3.0 m, acceptable in the following applications:

- Naturalized setting (i.e., tree stands, surrounding wetlands, storm water management facilities).
- Parks and open space.
- Municipal Reserves.

- PUL's and easements.

Asphalt pathway to be constructed in accordance with Drawing 8-11.

7.6.5.2 Granular Pathway (Trail)

Granular pathways shall be a minimum width of 1.5 m – 2.5 m acceptable in the following applications:

- Naturalized setting (i.e., tree stands, surrounding wetlands, storm water management facilities).
- Municipal Reserve (requires approval from Town).

Granular pathway to be constructed in accordance with Drawing 8-12.

7.6.5.3 Concrete Pathway (Trail)

Concrete Pathway shall be minimum width of 2.5 m acceptable in the following application:

- Neighbourhood boulevards.

7.6.5.4 Pathways (Trails) General Requirements

Pathways shall be designed to go around parking lots and not through. Access shall be provided from the parking lot to the pathway.

Pathways shall adhere to the following setbacks and clearances:

- A minimum of 1.0m clearance must be maintained from all obstacles on either side of the pathway excluding waste receptacles.
- A minimum 3.0 m clearance shall be maintained from all obstacles overhead.
- Visibility must be left unobstructed within 5.0m of an intersection of any other pathways and streets (i.e., trees, shrubs, utility boxes, fences, etc.)

An asphalt wheelchair ramp with a depressed concrete curb shall be utilized where a pathway connects to a street. A concrete ramp will be required where the pathway intersects an existing concrete walkway. Catch basins shall not be installed within or at the entrance of a pathway causing obstructed accessibility.

Entrances shall line up where the pathway route crosses the street. If this cannot be achieved, alignment must be approved by the Town's Engineer.

Pathways within a storm water management facility shall not be installed below the freeboard level. If this can not be accommodated, surface material and/or location of pathway shall be dictated by the Town Engineer.

Lighting may be required depending on the park setting (i.e., public park and playground).

When a planting bed or native tree stand is less than 1.5 m away from a pathway a root barrier at 600mm depth is required.

Signage such as, directional and cautionary, will be required at the discretion of the Town Engineer.

Standard grades for trails are as follows:

- Maximum longitudinal grades:
    - Over 8% = provide stairs or realign pathway to accommodate slope

  - 5% - 8% = no longer than 9.0m stretch before a 1.5 m – 3.0 m landing is required
- Maximum cross slope:
  - Over 2% = unacceptable
  - 2% - 1% = acceptable
  - 1%< = not desirable and requires approval from the Town Engineer

The Owner shall be responsible for, and at their own expense, correcting any defects or deficiency in the finished work until Final Acceptance has been achieved.

Maintenance and warranty will commence once Construction Completion Certificate (CCC) has been achieved. Maintenance and warranty period are 2 years and until issuance of a Final Acceptance Certificate (FAC).

7.6.6 Playgrounds (Tot Lots)

All new and upgraded playgrounds shall conform to the latest CSA standards, Children's playspaces and equipment standards. Playground equipment shall accommodate different age groups as defined by the latest CSA Standards.

Playground equipment shall be innovative, evoke imagination, provide diversity, be inclusive and provide learning experiences.

Additional playground standards required by the Town include the following:

a. Manufacturer documentation and reference material must be submitted to the Town for drawing review,
b. To accommodate heavy usage all swing sets shall be heavy duty as per the Children's playspaces and equipment standards, latest edition,
c. Plastic slides are encouraged, and metal slides will only be considered based on location,
d. Sand is an unacceptable safety surface material,
e. Safety surface must be a minimum depth of 300mm (settled),
f. Playground encroachment zones shall be designed so that they are within the safety surface area,
g. Acceptable playground edgers include plastic, rubber and concrete,
h. All edgers and safety surfaces are to allow drainage out of the playground. Pooling water is not acceptable,
i. A fence at a minimum height of 1.2m is required when a playground is adjacent a roadway,
j. Playgrounds shall be designed with wheelchair accessibility in mind, and
k. Playground signage to include the following:
   i. Specified age group
   ii. Owner's safety contact number is required during maintenance period. Once FAC is achieved signage will be changed to a Town of Rocky Mountain House contact number.

The following outlines what the Owner/Applicant shall provide at minimum for playgrounds in addition to the above:

a. A site grading plan showing any berms, etc.,
b. Level One and Level Two landscaping if site can accommodate (outside of playground edger and fall zones), and,

c. The following Level Three landscaping facilities and amenities will be considered based on site appropriateness and will require approval by the Town Engineer
    i. One pedestal park bench
    ii. One pedestal picnic table
    iii. One garbage receptacle
    iv. 2.5 m Asphalt Pathway
d. Items listed above must be installed outside of playground edger and fall zones.

Construction fence along with signage stating “Keep Out” are required until playground construction is accepted.

Playground equipment shall be obtained from an approved playground manufacturer or their sales representative.

The Owner shall be responsible for, and at their own expense, correcting any defects or deficiency in the finished work until Final Acceptance has been achieved.

Maintenance and warranty will commence once Construction Completion Certificate (CCC) has been achieved. Maintenance and warranty period are two (2) years and until issuance of a Final Acceptance Certificate (FAC).

7.6.7 Outdoor Sports Facilities

Outdoor sports facility types and locations will be determined by the Town based on the user needs and inventory. The following outlines sports facility standards at a minimum. The Owner/ Applicant shall work with a Landscape Architect to determine sizes, slopes and other outdoor sports facility design requirements.

The Owner/Applicant is required to submit sports facility design, details and technical specifications stamped by a registered Landscape Architect to the Town for review and approval.

7.6.7.1 Soccer Field

- Preferred orientation is north and south direction.
- Goal posts are required and need to be installed to achieve CCC.
- Longitudinal slope is recommended at 0.1% to 0.2%.
- A 1% cross-slope will be considered and is not recommended longitudinally.
- Both crowned or slanted in one direction at a 1% slope will be considered.
- Both seed and sod are allowable surfaces. Both seed and sod mixes shall be submitted to the Town for approval. It will be up to the Owner/Applicant to provide temporary fence and warning signs around the facility until turf establishment.
- Field size to conform to the current sport association standard and/or local requirements.

7.6.7.2 Football Field

- Preferred orientation is north and south direction.
- Goal posts are required and need to be installed to achieve CCC.
- Longitudinal slope is recommended at 0.1% to 0.2%.

- Both seed and sod are allowable surfaces. Both seed and sod mixes shall be submitted to the Town Engineer for approval. It will be up to the Owner/Applicant to provide temporary fence and warning signs around the facility until turf establishment.
- Field size to conform to the current sport association standard and/or local requirements.

7.6.7.3 Ball Field

- Preferred orientation is north and south direction.
- Longitudinal slope is recommended at 1.5%.
- Backstop and players benches are required and need to be installed to achieve CCC.
- Field size to conform to the current sport association standard and/or local requirements.

7.6.7.4 Outdoor Sports Facility General Requirements

A 6.0m safety setback is required around the perimeter of all sports fields. Turf is the only acceptable material within the safety setback area. All other elements such as, vertical elements or hard surfacing, are not acceptable.

Sub-base installation must be inspected by a representative of the Town prior to topsoil installation. Topsoil samples must be obtained and submitted to the Town Engineer for approval and adhere to soil standards as outlined in section 7.4.

Proposed seed mixes along with seed lot tags for all sports fields must be submitted to the Town Engineer for approval prior to installation.

The Owner shall be responsible for, and at their own expense, correcting any defects or deficiency in the finished work until Final Acceptance has been achieved.

Maintenance and warranty will commence once Construction Completion Certificate (CCC) has been achieved. Maintenance and warranty period are two (2) years and until issuance of a Final Acceptance Certificate (FAC).

7.7 CONSTRUCTION COMPLETION CERTIFICATE AND FINAL ACCEPTANCE CERTIFICATE PROCESS

At time of CCC, the Owner/Applicant shall submit the following information to the Town to request an inspection:

- Approved drawings highlighting features to be reviewed and inspected, and
- Pre-inspection report showing deficiencies that have been rectified prior to CCC inspection.

At time of FAC, the Owner/Applicant shall submit the following information to the Town to request an inspection:

- Approved drawings highlighting features to be reviewed and inspected,
- Pre-inspection report showing deficiencies that have been rectified prior to FAC inspection,
- Record Drawings in both CAD and PDF format, and
- Maintenance Logs including weed and fertilizer logs (includes seed, sod and plant material).

Once inspection has been conducted by the Town the Owner/Applicant shall submit the inspection report to the Town to ensure there are no discrepancies.

Once inspection report is approved, the contractor will have two (2) weeks from date of inspection report acceptance to complete all deficiencies. If deficiencies are not rectified within this timeframe, the site will be subject to re-inspection.

7.8 LANDSCAPE DRAWING REQUIREMENTS

7.8.1 Concept Plan

Conceptual plans provide both visual and written representation of the intended use and function of the landscape within a development. Construction details are not required for a conceptual plan however the Owner/Applicant will ensure that the plan communicates the intended use of the space.

Concept plan for all municipal reserves, berms, parks, open space, boulevards, medians, utility lots and buffers shall be submitted at a scale of 1:500 at the Outline Plan stage. The plans shall provide:

a. Rendered plans showing the intended use of the space and its relationship to surrounding land uses,
b. Existing vegetation, topography, encumbrances and utilities,
c. Adjacent land uses and roads,
d. Proposed layout of park, school and recreation facilities including playgrounds, outdoor sports facilities, buildings, pathways (trails) etc.,
e. Conceptual tree and shrub planting, and
f. Site amenities and overhead structures.

7.8.2 Detailed Construction Drawings

Detailed plans shall be prepared for construction at a scale of 1:500 indicating:

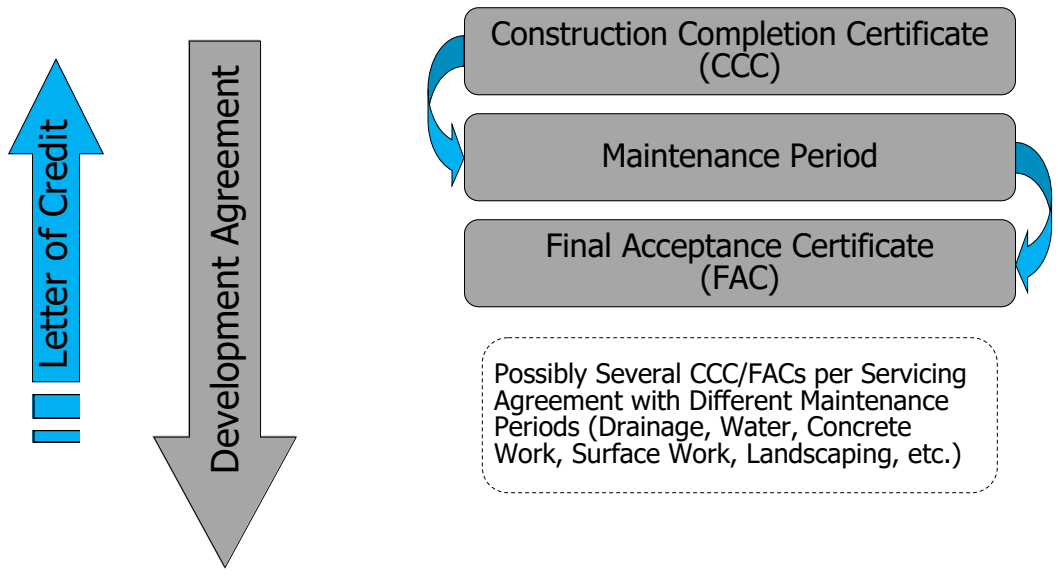
a. Existing pathway (trail) connections on site and/or 30m beyond the project boundary (shown in lighter tone than landscape),
b. Existing vegetation and significant topography to be retained (shown in lighter tone than landscape),
c. Existing and proposed utilities and easements including storm sewer and catch basins for site drainage (shown in lighter tone than landscape),
d. Existing and proposed sidewalks, including ramps and roadway median (shown in lighter tone),
e. Existing structures and site furnishings to be retained (shown in lighter tone),
f. Existing land-uses adjacent to the project boundary (shown in lighter tone),
g. Level One Landscaping, such as:
    i. Detailed grading plan showing drainage patterns, the tie-in grading on adjacent lands uses and existing site elevations,
    ii. Contour intervals on grading plans shall be shown at 0.5 m to 1.0 m. Intervals shall be determined based on site and plan appropriateness,
    iii. Specified topsoil depths, and
    iv. Detailed seed and/or sod areas.
h. Level Two Landscaping, such as:
    i. Specific site location for all proposed plantings, and

ii. Detailed plant species name (botanical and common), size, quantity and planting conditions which shall be indicated on a plant list and referenced to the specific plant location.

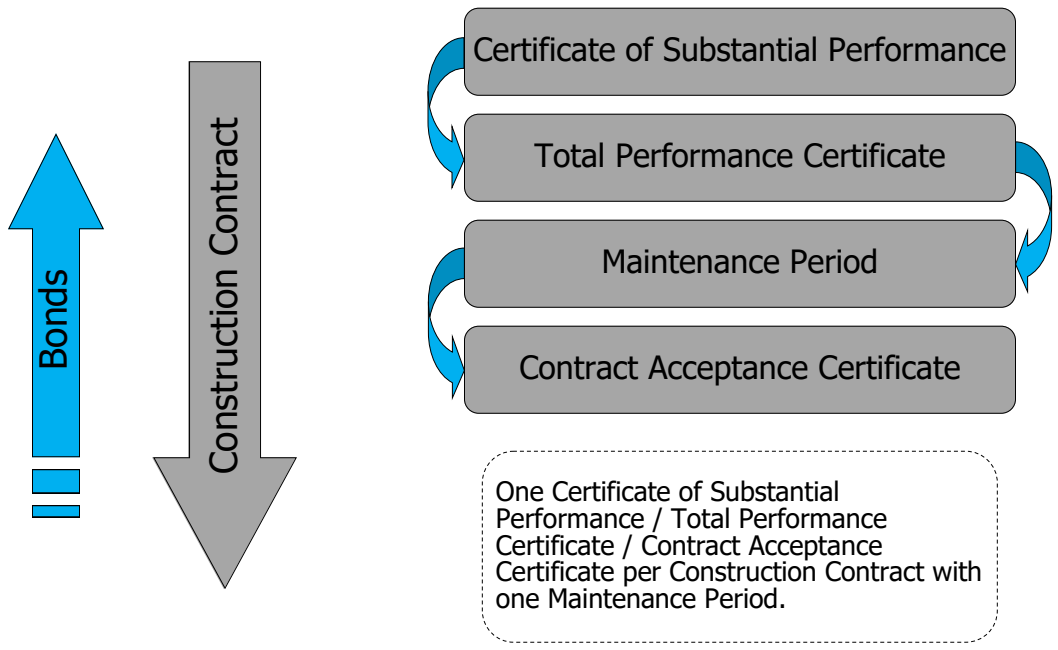
i. Level Three Landscaping, such as:
   i. Detailed design and specifications for all pathways (trails), plazas and seating nodes,
   ii. Detailed design of site amenities and playgrounds structures indicating manufacturer and model number and safety surface areas,
   iii. Detailed design of outdoor sports facilities (i.e., soccer fields, football fields, ball fields, etc.), and
   iv. Detailed design of fencing (i.e., post and cable, chain link, wood screen, etc.).

APPENDIX A
CCC/FAC DOCUMENTATION PROCESS OVERVIEW

Municipal Government

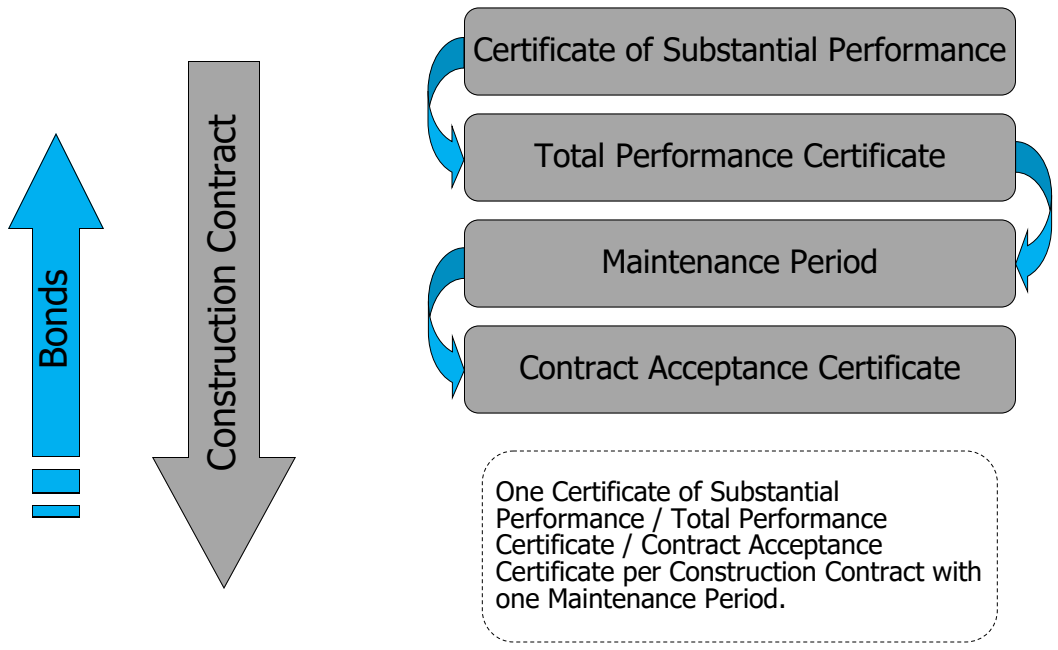


Developer



Contractor

Municipal Government



Contractor

APPENDIX B
PARK CLASSIFICATIONS

Parklets (MR's)

Parklets are classified as Municipal Reserves and are less than 0.5 acres. The following table outlines the minimum amenities and planting required in this type of park classification.

Table B- 1: Minimum Amenities and Planting for Parklets (MR's)

Amenity/Planting	Minimum Quantity Required	Maximum Quantity Allowed	Notes
Site Preparation	Entire Site	Entire Site	As per specifications
Final Grading/ Seeding	Entire Site	Entire Site	As per specifications
Tree Planting	15 trees/1 acre	30 trees/ 1 acre	Approved species
Shrub Planting	25 m²/ 1 acre	75 m²/1 acre	Approved species
Benches	1 per site	5 per site	
Picnic Tables	1 per site	1 per site	
Waste Receptacles	1 per site	2 per site	Adjacent walkways/ away from benches
Fencing	As required	As required	
Pathway (Trail)	1.5 m Granular Pathway	2.5 m Asphalt Pathway	As per specifications and RMH Standards

Linear Parks (MR's)

Linear Parks are classified as Municipal Reserves that are narrow corridors ranging in width from 5 m to 10 m and have a minimum length of two times the width. The following table outlines the minimum amenities and planting required in this type of park classification.

Table B- 2: Minimum Amenities and Planting for Linear Parks (MR's)

Amenity/Planting	Minimum Quantity Required	Maximum Quantity Allowed	Notes
Site Preparation	Entire Site	Entire Site	As per specifications
Final Grading/ Seeding	Entire Site	Entire Site	As per specifications
Tree Planting	15 trees/1 acre	30 trees/ 1 acre	Approved species
Shrub Planting	25 m²/ 1 acre	75m²/1 acre	Approved species

Benches	2 per site	5 per site	
Waste Receptacles	1 per site	2 per site	Adjacent walkways/ away from benches
Fencing	As required	As required	
Pathway (Trail)	1.5 m Granular Pathway	2.5 m Asphalt Pathway	As per specifications and RMH Standards

Neighbourhood Parks (MR's)

Neighbourhood Parks (i.e., Tot lots/ Playgrounds, open space, ornamental parks, etc.) are classified as Municipal Reserves and range in size from 0.5 to 4.9 acres. The following table outlines the minimum amenities and planting required in this type of park classification.

Table B- 3: Minimum Amenities and Planting for Neighbourhood Parks (MR's)

Amenity/Planting	Minimum Quantity Required	Maximum Quantity Allowed	Notes
Site Preparation	Entire Site	Entire Site	As per specifications
Final Grading/ Seeding	Entire Site	Entire Site	As per specifications
Tree Planting	15 trees/1 acre	30 trees/ 1 acre	Approved species
Shrub Planting	25 m²/ 1 acre	75 m²/1 acre	Approved species
Benches	1 per site	5 per site	
Picnic Tables	1 per site	2 per site	
Waste Receptacles	1 per site	2 per site	Adjacent walkways/ away from benches
Fencing	As required	As required	
Tot lots/ Playgrounds	If suitable	If suitable	Shall suit community needs
Pathway (Trail)	1.5 m Granular Pathway	2.5 m Asphalt Pathway	As per specifications and RMH Standards
Tennis Court (2 courts max.)/ Basketball Court (1 court max.)	If suitable	If suitable	
Park Signage	1 per site	1 per site	As per specifications

Community Parks (MR's)

Community Parks (i.e., Tot lots/ Playgrounds, open space, school grounds, community space, outdoor recreation facilities, etc.) are classified as Municipal Reserves and range in size from 3.6 to 9.2 acres. The following table outlines the minimum amenities and planting required in this type of park classification.

Table B- 4: Minimum Amenities and Planting for Community Parks (MR's)

Amenity/Planting	Minimum Quantity Required	Maximum Quantity Allowed	Notes
Site Preparation	Entire Site	Entire Site	As per specifications
Final Grading/ Seeding	Entire Site	Entire Site	As per specifications
Tree Planting	10 trees/1 acre	20 trees/ 1 acre	Approved species
Shrub Planting	25 m²/ 1 acre	75m²/1 acre	Approved species
Benches	1 per site	5 per site	
Picnic Tables	1 per site	2 per site	
Waste Receptacles	1 per site	2 per site	Adjacent walkways/ away from benches
Fencing	As required	As required	
Tot lots	If suitable	If suitable	Shall suit community needs
Pathway (Trail)	As required	2.5m Asphalt Pathway	As per specifications and RMH Standards
Tennis Court (2 courts max.)/ Basketball Court (1 court max.)	If suitable	If suitable	Amenities provided to meet RMH standards
Soccer Field	If suitable	If suitable	Amenities provided to meet RMH standards
Football Field	If suitable	If suitable	Amenities provided to meet RMH standards
Baseball Field	If suitable	If suitable	Amenities provided to meet RMH standards
Park Signage	1 per site	1 per site	As per specifications

APPENDIX C
RECOMMENDED TREE AND SHRUB LIST

RECOMMENDED TREE AND SHRUB LIST

Table C- 1: Recommended Tree and Shrub List

Common Name	Botanical Name	Application
Deciduous Trees		
Manitoba Maple	*Acer negundo*	Parks, Xeriscaping
Sensation Maple	*Acer negundo 'Sensation'*	Boulevards, Parks
Silver Cloud Maple	*Acer saccharinum 'Silver Cloud'*	Boulevards, Parks
Tatar or Tatarian Maple	*Acer Tataricum*	Boulevards, Parks
Ohio Buckeye	*Aesulus glabra*	Parks, Storm Ponds
Snowbird Hawthorn	*Crataegus x mordenensis 'Snowbird'*	Parks
Toba Hawthorne	*Crataegus x mordenensis 'Toba'*	Parks
Russian Olive	*Elaeagnus angustifolia*	Parks, Xeriscaping
Calypso White Ash	*Fraxinus americana 'Calypso'*	Boulevards, Parks
Tuxedo White Ash	*Fraxinus americana 'Durgar'*	Boulevards, Parks
Manchurian Ash	Fraxinus mandshurica	Parks, Xeriscaping
Foothills Green Ash	*Fraxinus pennsylvanica 'Heuver'*	Boulevards, Parks, Xeriscaping
Patmore Green Ash	*Fraxinus pennsylvanica 'Patmore'*	Boulevards, Parks, Xeriscaping
Prairie Spire Green Ash	*Fraxinus pennsylvanica 'Rugby'*	Boulevards, Parks, Xeriscaping
Kelsey Crabapple	*Malus x adstringens 'Kelsey'*	Parks
Royalty Crabapple	*Malus x adstringens 'Royalty'*	Parks
Spring Snow Flowering Crabapple	*Malus x 'Spring Snow'*	Boulevards, Parks
Thunderchild Crabapple	*Malus x 'Thunderchild'*	Boulevards, Parks
Pin Cherry	*Prunus pensylvanica*	Parks
Trembling Aspen	*Populus tremuloides*	Parks, Xeriscaping
Swedish Columnar Aspen	*Populus tremula 'Erecta'*	Boulevards, Parks, Xeriscaping
Midnight Schubert Chokecherry	*Prunus virginiana 'Midnight'*	Boulevards, Parks
Bur Oak	*Quercus macrocarpa*	Boulevards, Parks, Xeriscaping
Golden Willow	*Salix alba 'Vitellina'*	Parks, Xeriscaping
Laurel Leaf Willow	*Salix pentandra*	Parks, Xeriscaping
American Mountain Ash	*Sorbus americana*	Parks
Pyramidal Mountain Ash	*Sorbus aucuparia 'Fastigiata'*	Parks
Showy Mountain Ash	*Sorbus decora*	Parks
Ivory Silk Tree Lilac	*Syringa reticulata 'Ivory Silk'*	Boulevards, Parks
Dropmore Linden	*Tilia americana 'Dropmore'*	Boulevards, Parks
Little Leaf Linden	*Tilia americana 'Duros'*	Parks
Brandon Elm	*Ulmus americana 'Brandon'*	Boulevards, Parks
Patmore Elm	*Ulmus americana 'Patmore'*	Boulevards, Parks
Siberian Elm	*Ulmus pumila*	Boulevards, Parks

Coniferous Trees		
Siberian Larch	*Larix sibirica*	Parks
Tamarack	*Larix laricina*	Parks
White Spruce	*Picea glauca*	Parks, Xeriscaping
Black Hills Spruce	*Picea glauca var. densata*	Parks, Xeriscaping
Black Spruce	*Picea mariana*	Parks, Xeriscaping
Columnar Colorado Spruce	*Picea pungens 'Fastigiata'*	Parks, Xeriscaping
Colorado Green Spruce	*Picea pungens*	Parks, Xeriscaping
Colorado Blue Spruce	*Picea pungens var. glauca*	Parks, Xeriscaping
Swiss Stone Pine	*Pinus cembra*	Parks, Xeriscaping
Lodgepole Pine	*Pinus contorta var. latifolia*	Parks, Xeriscaping
Ponderosa Pine	*Pinus ponderosa*	Parks
Scots Pine	*Pinus sylvestris*	Parks, Xeriscaping
Douglas Fir	*Pseudotsuga menziesii*	Parks
Deciduous Shrubs		
Saskatoon	*Amelanchier alnifolia*	Parks, Storm Ponds
Common Caragana	*Caragana arborescens*	Parks, Storm Ponds, Xeriscaping
Ivory Halo Dogwood	*Cornus alba 'Bailhalo'*	Parks, Neighbourhoods, Storm Ponds
Bud's Yellow Dogwood	*Cornus alba 'Buds Yellow'*	Parks, Storm Ponds
Golden Prairie Fire Dogwood	*Cornus alba 'Prairie Fire'*	Parks, Neighbourhoods, Storm Ponds
Red Osier Dogwood	*Cornus sericea*	Parks, Storm Ponds, Xeriscaping
Arctic Fire Dogwood	*Cornus stolonifera 'Farrow'*	Parks, Neighbourhoods, Storm Ponds
Cotoneaster	*Cotoneaster acutifolia*	Parks, Storm Ponds, Xeriscaping
Silverberry	*Elaeagnus angustifolia*	Parks, Storm Ponds, Xeriscaping
Turkestan Burning Bush	*Euonymus nana 'Turkestanica'*	Parks, Neighbourhoods
Sea Buckthorn	*Hippophae rhamnoides*	Parks, Storm Ponds
Dart's Golden Ninebark	*Physocarpus opulifolius 'Darts Gold'*	Parks, Neighbourhoods
Diablo Ninebark	*Physocarpus opulifolius 'Monlo'*	Parks, Neighbourhoods
Abbotswood Potentilla	*Potentilla fruticosa 'Abbotswood'*	Parks, Neighbourhoods, Storm Ponds, Xeriscaping
Gold Drop Potentilla	*Potentilla fruticosa 'Farreri'*	Parks, Neighbourhoods, Storm Ponds, Xeriscaping

Pink Beauty Potentilla	*Potentilla fruticosa 'Pink Beauty'*	Parks, Neighbourhoods, Storm Ponds, Xeriscaping
Red Ace Potentilla	*Potentilla fruticosa 'Red Ace'*	Parks, Neighbourhoods, Storm Ponds, Xeriscaping
Mango Tango Potentilla	*Potentilla fruticosa 'Uman'*	Parks, Neighbourhoods, Storm Ponds, Xeriscaping
Western Sandcherry	*Prunus sinensis*	Parks, Xeriscaping
Western Chokecherry	*Prunus virginiana 'Melancarpa'*	Parks
Alpine Currant	*Ribes alpinum*	Parks, Neighbourhoods, Xeriscaping
Golden Flowering Currant	*Ribes aureum*	Parks, Neighbourhoods, Xeriscaping
Gooseberry	*Ribes hirtellum*	Parks
Blue Fox Willow	*Salix brachycarpa 'Blue Fox'*	Parks, Storm Ponds, Xeriscaping
Coyote Willow	*Salix exigua*	Parks, Storm Ponds, Xeriscaping
Yellow Twig Willow	*Salix lutea*	Parks, Storm Ponds
Dwarf Arctic Willow	*Salix purpurea 'Nana'*	Parks, Storm Ponds
Silver Buffaloberry	*Shepherdia argentea*	Parks, Storm Ponds, Xeriscaping
Goldflame Spirea	*Spiraea x bumalda 'Goldflame'*	Parks, Neighbourhoods
Goldmound Spirea	*Spiraea japonica 'Goldmound'*	Parks, Neighbourhoods
Snowberry	*Symphoricarpos albus*	Parks, Neighbourhoods
Dwarf Korean Lilac	*Syringa meyeri 'Palibin'*	Parks, Neighbourhoods
Minuet Canada Preston Lilac	*Syringa x prestoniae 'Miss Canada'*	Parks, Neighbourhoods
Common Lilac	*Syringa vulgaris*	Parks, Neighbourhoods
Nannyberry	*Viburnum lentago*	Parks
Coniferous Shrubs		
Blue Chip Juniper	*Juniperus horizontalis 'Blue Chip'*	Parks, Neighbourhoods, Xeriscaping
Hughes Juniper	*Juniperus horizontalis 'Hughes'*	Parks, Neighbourhoods, Xeriscaping
Arcadia Juniper	*Juniperus sabina 'Arcadia'*	Parks, Neighbourhoods, Xeriscaping
Calgary Carpet Juniper	*Juniperus sabina 'Calgary Carpet'*	Parks, Neighbourhoods, Xeriscaping
Savin Juniper	*Juniperus sabina*	Parks, Neighbourhoods, Xeriscaping
Little Gem Norway Spruce	*Picea albies 'Little Gem'*	Parks
Dwarf Mugo Pine	*Pinus mugo 'Pumilio'*	Parks, Neighbourhoods, Xeriscaping
Mugo Pine	*Pinus mugo 'Mughus'*	Parks, Xeriscaping

Notes:

- Species proposed that are not listed above will be considered if they are deemed appropriate for the application and growing zone.
- All species noted for xeriscaping shall be planted in appropriate areas conducive to site and user needs.

ROCKY MOUNTAIN HOUSE
Where Adventure Begins!

Design Guidelines
Schedule C
Drawing Details

TRENCH DETAILS

1-01 Requirements Utility Trench Typical Section

1-02 Caged Trench for Pipe Installation Under Existing Roads

1-03 Trench Bedding Details

1-04 Trench Insulation Detail

1-05 Pipe Crossing Detail

WATER DETAILS

2-01 Water Main Horizontal Bend Thrust Blocks

2-02 Water Main Vertical Bend Thrust Blocks

2-03 Type 'A' Sliding Type Valve Box

2-04 Standard Hydrant Detail

2-05 Valve Anchor Detail

2-06 Anode Location and Installation

2-07 Air Relief Valve & Flushing Chamber

SERVICE DETAILS

4-01 Front Yard Service Locations

4-02 Residential Service Installation

4-03 Residential Service Installation Cross-section

4-04 Typical Lot Service Requirements

4-05 Front Service Locations

4-06 Lot Grading

4-07 New Residential Building Grade Certificate

4-08 Parks Water Service

4-09 Service Box Detail for 26 mm Service Valves

MANHOLES AND CATCHBASINS DETAILS

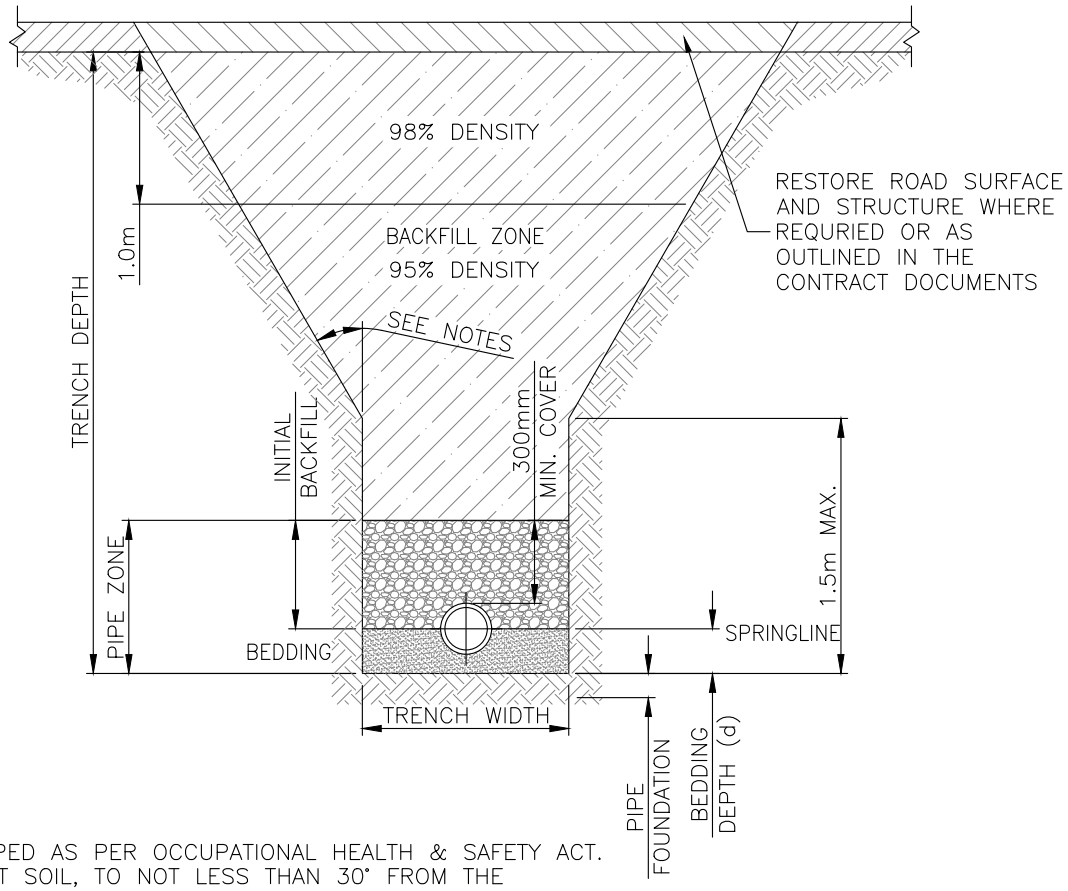
5-01 Standard 1200 mm Ø.

5-02 Precast Prebenched Base for 1200 mm Ø Manhole Assembly

5-03 Manhole Inlet /Outlet Pipe Design Considerations

TRANSPORTATION DETAILS

LANDSCAPING DETAILS



NOTES:

TRENCH EXCAVATION

- TRENCH TO BE SLOPED AS PER OCCUPATIONAL HEALTH & SAFETY ACT.
- IN HARD & COMPACT SOIL, TO NOT LESS THAN 30° FROM THE VERTICAL.
- IN OTHER SOILS TO NOT LESS THAN 45° FROM THE VERTICAL.

BACKFILL ZONE

- COMPACT BACKFILL MATERIALS TO MINIMUM 95% MAXIMUM DRY DENSITY OF THE STANDARD PROCTOR REPRESENTING THE SOIL PLACED TO WITHIN 1.0m OF THE TOP OF SUBGRADE ELEVATION.
- COMPACT BACKFILL MATERIALS IN THE UPPER 1.0m OF THE TRENCH BACKFILL ZONE TO MINIMUM 98% MAXIMUM DRY DENSITY OF THE STANDARD PROCTOR REPRESENTING THE SOIL PLACED.
- USE SUITABLE SITE MATERIAL OR IMPORTED MATERIAL FOR BACKFILL.
- MATERIAL SHALL BE PLACED IN A MAXIMUM OF 200mm LAYERS.

PIPE ZONE

INITIAL BACKFILL

- COMPACTION DENSITY SHALL BE MINIMUM 100% OF MAXIMUM DRY DENSITY OF THE STANDARD PROCTOR REPRESENTING THE SOIL PLACED.
- USE MATERIAL SHOWN IN DRAWING "1-03".
- PLACE IN 150mm LAYERS AND COMPACT BOTH SIDES SIMULTANEOUSLY.

PIPE BEDDING

- COMPACTION DENSITY SHALL BE MINIMUM 100% OF MAXIMUM DRY DENSITY OF THE STANDARD PROCTOR REPRESENTING THE SOIL PLACED.
- USE MATERIAL SHOWN IN DRAWING "1-03" UNLESS PIPE FOUNDATION IS UNSUITABLE.
- IF UNSUITABLE PIPE FOUNDATION IS ENCOUNTERED, USE 40mm SCREENED ROCK FOR THE BEDDING TO A MINIMUM DEPTH OF 400mm BELOW THE PIPE AND UP TO THE SPRINGLINE OF THE PIPE. USE FILTER FABRIC TO SEPARATE SUBGRADE MATERIAL AND BEDDING MATERIAL.

TRENCH WIDTH	
FLEXIBLE (PVC) PIPE AS PER PVC HANDBOOK	
NOMINAL PIPE DIA. (mm)	MIN. TRENCH WIDTH (mm)
200	700
300	800
400	900
500	950
600 & larger	O.D. x 1.5
MAX. TRENCH WIDTH (mm)	
350 & larger	O.D. x 2.5
RIGID (CONCRETE) PIPE AS PER CONCRETE HANDBOOK	
MIN. TRENCH WIDTH = O.D. + 600mm MAXIMUM TRENCH WIDTH AS SPECIFIED BY THE ENGINEER.	
O.D. = OUTSIDE DIAMETER (mm)	

File Name: 1-01-TRENCHING.dwg

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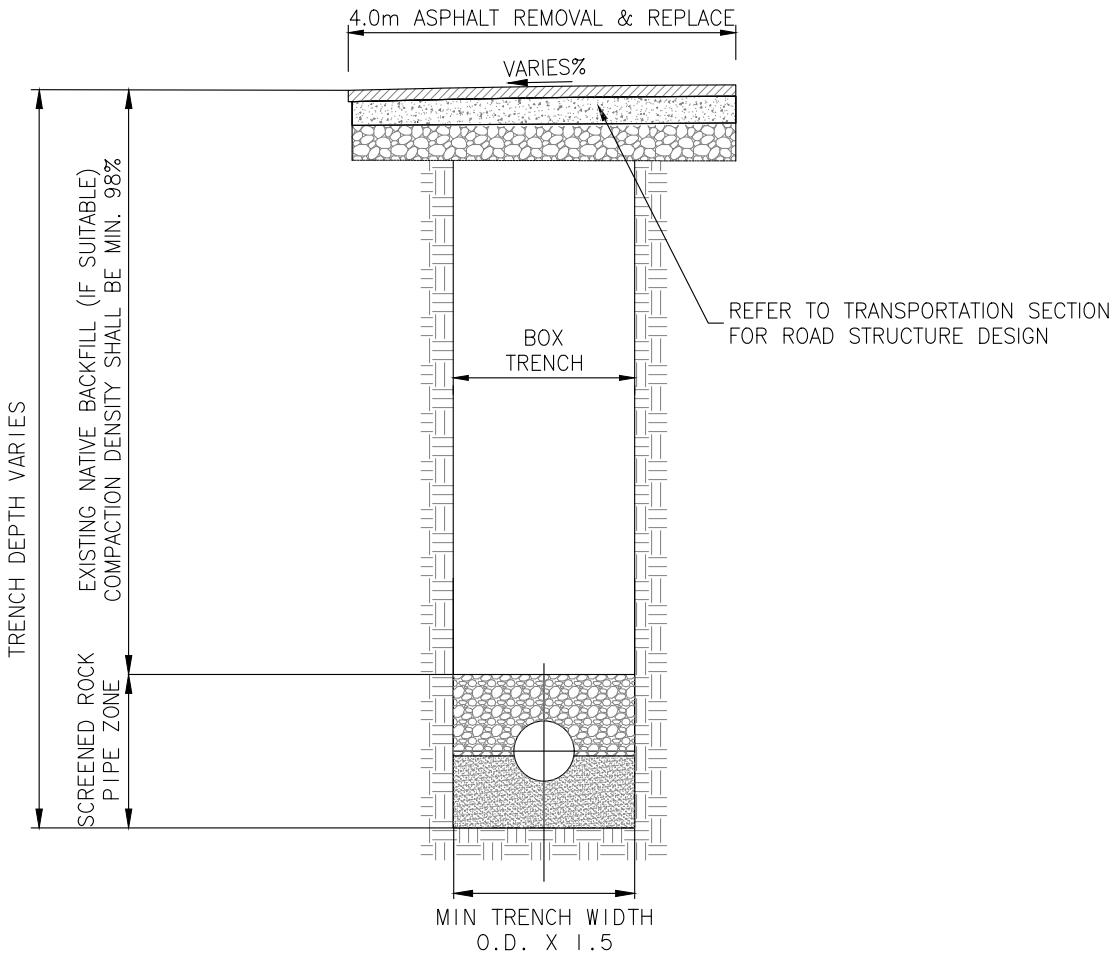
TOWN OF ROCKY MOUNTIAN HOUSE

DESIGN GUIDELINE DRAWINGS
Trench Excavation & Backfill

UTILITY TRENCH REQUIREMENTS TYPICAL SECTION

DRAWING NO. 1-01

REVISION NO. 0



File Name: 1-02-CAGED TRENCH UNDER ROAD.dwg

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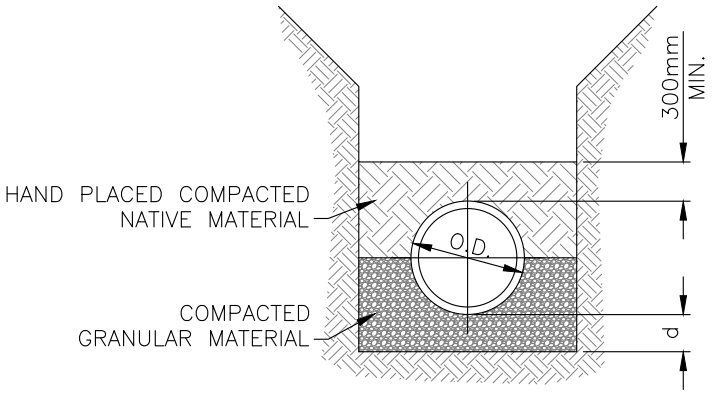
TOWN OF ROCKY MOUNTIAN HOUSE

DESIGN GUIDELINE DRAWINGS
Trench Excavation & Backfill

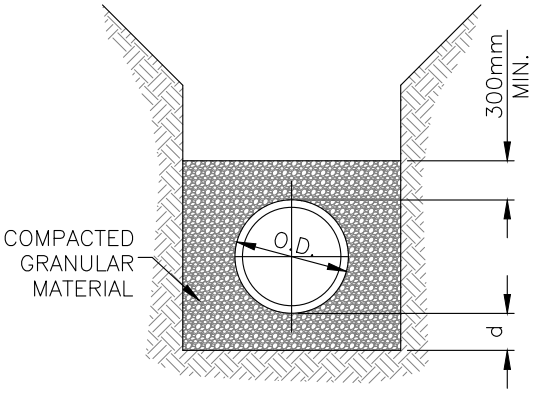
CAGED TRENCH FOR PIPE INSTALLATION UNDER EXISTING ROADS

DRAWING NO.
1-02

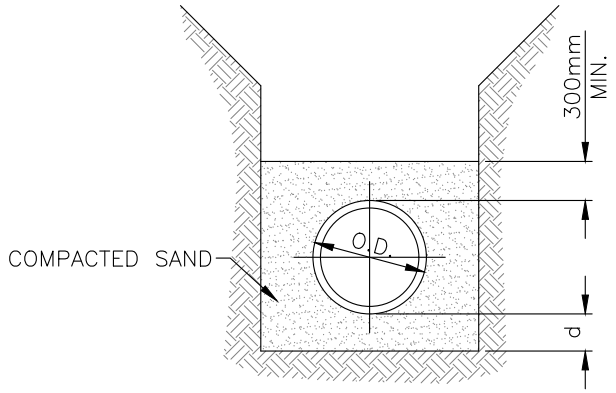
REVISION NO. 0



GRANULAR FOUNDATION



GRANULAR SURROUND



SAND SURROUND

NOTES:

- SUBGRADE SHOULD BE EXCAVATED OR OVER EXCAVATED SO A UNIFORM FOUNDATION MAY BE PROVIDED, FREE OF PROTRUDING ROCKS.
- FOR AREAS WITH UNSUITABLE SOIL CONDITIONS, SPECIAL BEDDING AND PIPE FOUNDATION DESIGNS ARE REQUIRED FROM THE VERTICAL.
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
- COMPACT FULL WIDTH OF BED TO DENSITY OF 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
- PLACE MATERIAL BY HAND UNDER, AROUND AND OVER PIPE UNTIL 300mm OF COVER IS PROVIDED. DUMPING MATERIAL DIRECTLY ON PIPE IS NOT PERMITTED.

LEGEND:

W – TRENCH WIDTH FOR CONCRETE PIPE
- MINIMUM – O.D. + 450mm
- MAXIMUM – O.D. + 750mm

O.D. – OUTSIDE PIPE DIAMETER

d – BEDDING DEPTH BELOW PIPE

DEPTH OF MATERIAL BELOW PIPE	
Pipe Diameter O.D. (mm)	Bedding Depth d (min.)
675 or SMALLER	75
750 to 1500	100
1650 or LARGER	150

File Name: 1-03-TRENCH BEDDING DETAILS.dwg

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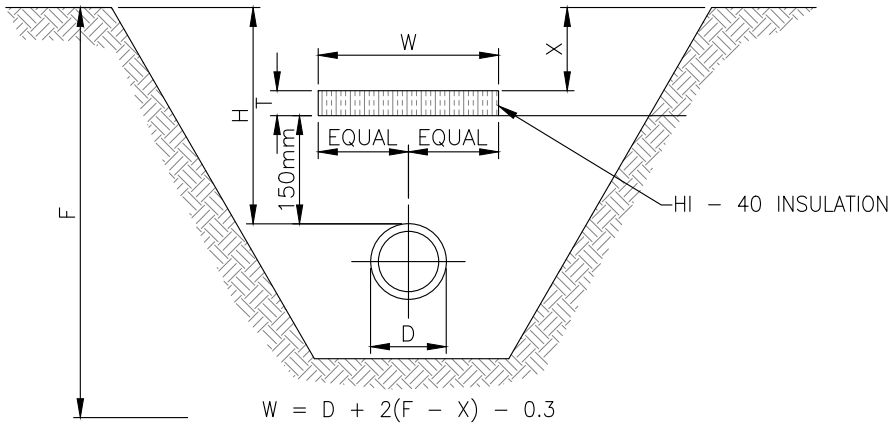
TOWN OF ROCKY MOUNTIAN HOUSE

DESIGN GUIDELINE DRAWINGS
Trench Excavation & Backfill

TRENCH BEDDING DETAILS

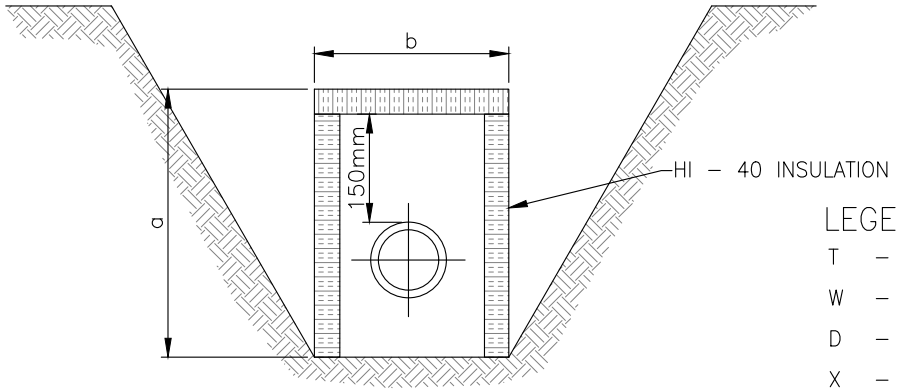
DRAWING NO. 1-03

REVISION NO. 0



$W = D + 2(F - X) - 0.3$

HORIZONTAL LAYER



$W = 2a + b$

INVERTED U

LEGEND:

- T – INSULATION THICKNESS (mm)
- W – INSULATION WIDTH (m)
- D – PIPE OUTSIDE DIAMENTER (M)
- X – INSULATION DEPTH (m)
- F – ESTIMATED FROST DEPTH (2.70m)

DEPTH FROM FINISHED GRADE TO THE TOP OF INSULATION "X" (METERS)			0 to 1	1 to 1.25	1.25 to 1.50	1.50 to 1.80	1.80 to 2.10	2.10 to 2.40	2.40 to 2.70	2.70 to 3.00	GREATER THAN 3.00
INSULATION THICKNESS "T" (mm)	MAINS IN LANES OR EASEMENTS	GRAVEL	N/A	125	100	75	50	25	0	0	0
		CLAY	N/A	100	75	50	25	0	0	0	0
	MAINS IN STREETS	GRAVEL	N/A	150	125	100	75	50	25	0	0
		CLAY	N/A	125	100	75	50	25	0	0	0
	DEAD END MAINS IN STREETS	GRAVEL	N/A	175	150	125	100	75	50	25	0
		CLAY	N/A	150	125	100	75	50	25	0	0
	DEAD END MAINS IN LANES	GRAVEL	N/A	150	125	100	75	50	25	0	0
		CLAY	N/A	125	100	75	50	25	0	0	0

File Name: 1–04–TRENCH INSULATION.dwg

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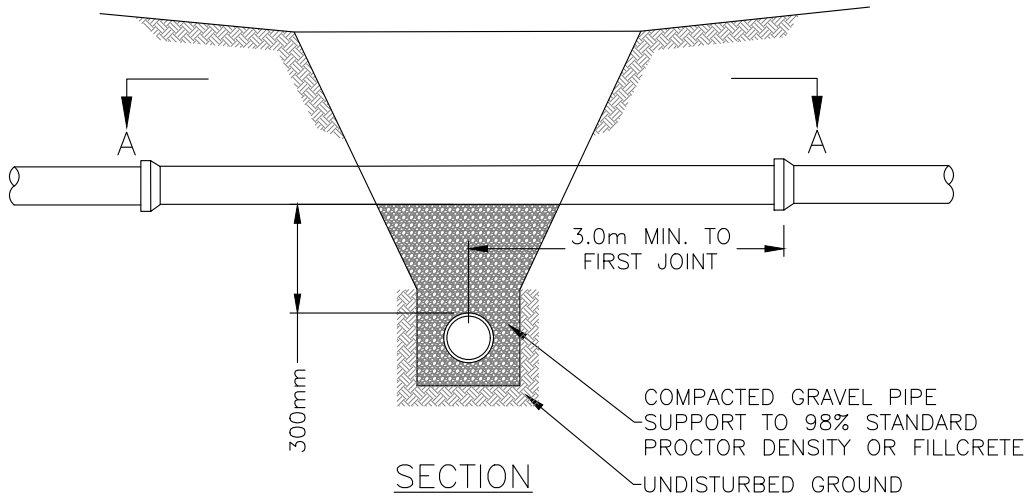
TOWN OF ROCKY MOUNTIAN HOUSE

DESIGN GUIDELINE DRAWINGS
Trench Excavation & Backfill

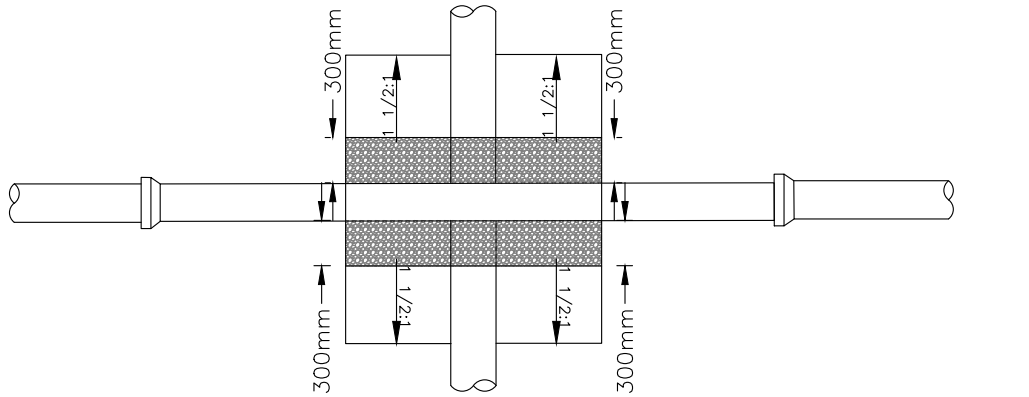
TRENCH INSULATION DETAILS

DRAWING NO. 1-04

REVISION NO. 0



SECTION



SECTION A–A

NOTES:

- MINIMUM 300mm VERTICAL SEPARATION BETWEEN PIPES, AND IF SEWER PIPE IS ABOVE A WATERMAIN, MAINTAIN A MINIMUM 500mm VERTICAL SEPARATION.
- VERTICAL PIPE SEPARATION LESS THAN 300MM TO BE APPROVED BY THE TOWN ENGINEER
- CONTRACTOR MAY USE SANDBAGS FILLED WITH CEMENT–SAND (1:5) OR FILECRETE TO STACK BETWEEN PIPS. SANDBAGS ONLY TO BE USED FOR SEPARATIONS SMALLER THAN 450mm
- HEAT SHRINK WRAP ALL WATER MAIN JOINTS WHERE 3.0 M HORIZONTAL SEPARATION CAN NOT BE ACHIEVED FROM THE CROSSING POINT. REFER TO ENGINEERING DESIGN GUIDELINES

File Name: 1–05–PIPE CROSSING.dwg

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TOWN OF ROCKY MOUNTIAN HOUSE

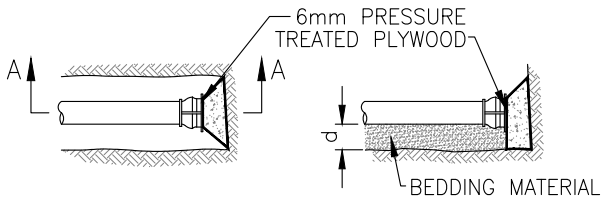
DESIGN GUIDELINE DRAWINGS
Trench Excavation & Backfill

PIPE CROSSING DETAIL

DRAWING NO.
1-05

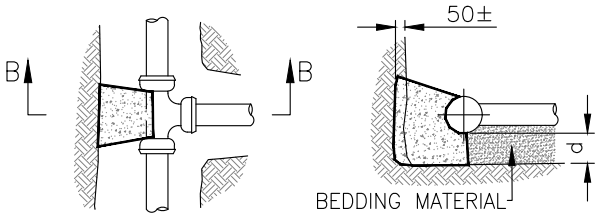
REVISION NO. 0

1. DEAD END MAIN



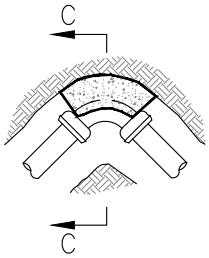
SECTION 'A – A'

2. TEE

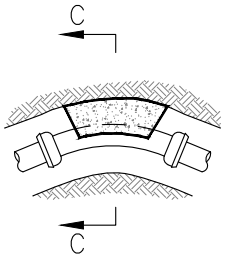


SECTION 'B – B'

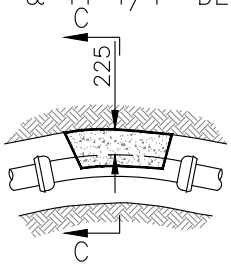
3. 90 DEGREE BEND

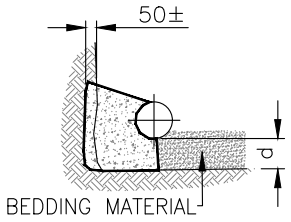


4. 45 DEGREE BEND



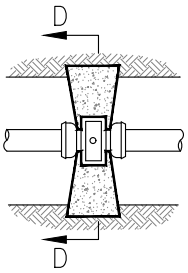
5. 22 1/2 DEGREE BEND & 11 1/4 DEGREE BEND



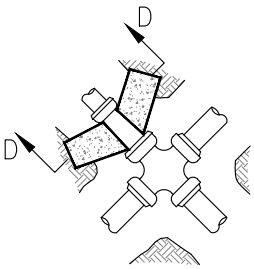


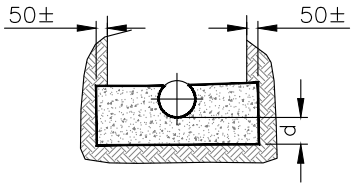
SECTION 'C – C'

6. VALVE



7. REDUCER





SECTION 'D – D'

HOIZONTAL THRUST BLOCK BEARING AREA MINIMUM CONCRETE AREA IN CONTACT WITH UNDISTURBED SOIL (sq. m)							
FITTING	SIZE OF MAIN (mm)						
	150	200	250	300	350	400	500
Dead End Main & Tee	0.35	0.62	0.97	1.40	1.91	2.49	3.90
11 1/4 Degree Bend	0.07	0.12	0.20	0.28	0.38	0.50	0.78
22 1/2 Degree Bend	0.14	0.24	0.38	0.55	0.75	0.97	1.52
45 Degree Bend	0.27	0.48	0.75	1.07	1.46	1.91	2.98
90 Degree Bend	0.50	0.88	1.38	1.98	2.70	3.53	5.51
Valve & Reducer	0.35	0.62	0.97	1.40	1.91	2.49	3.90

NOTES:

- BEARING AREA CALCULATED USING THE FOLLOWING:
  (a) HYDRAULIC PRESSURE 1380 kPa..
  (b) SOIL BEARING CAPACITY 72 kPa..
- CONCRETE STRENGTH TO BE 25 MPa @ 28 DAYS.
- CONCRETE TO BE CLEAR OF BELLS & PIPE.
- PLACE 6 ml POLYETHYLENE BETWEEN CONCRETE AND PIPE.
- SEE DWG. 1–03 FOR "d" DEPTH.
- BOLD LINE REPRESENTS THE BEARING SURFACE.

File Name: 2–01–HORIZONTAL THRUST BLOCK.dwg

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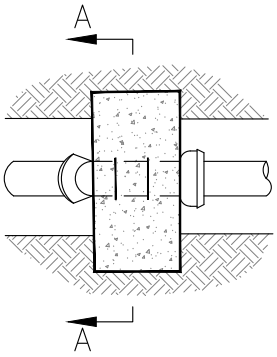
TOWN OF ROCKY MOUNTAIN HOUSE

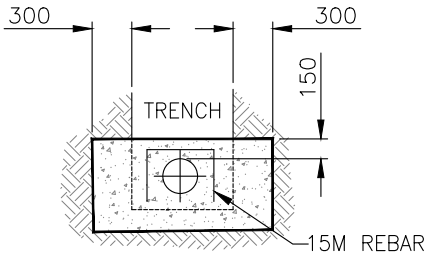
DESIGN GUIDELINE DRAWINGS
Water Design

WATER MAIN HORIZONTAL BEND THRUST BLOCKS

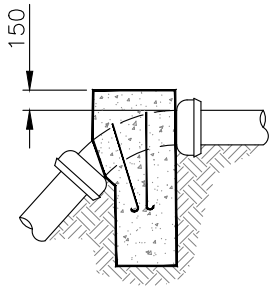
DRAWING NO. 2-01

REVISION NO. 0



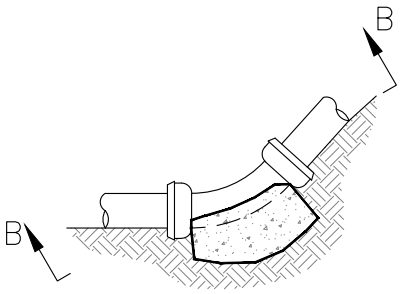


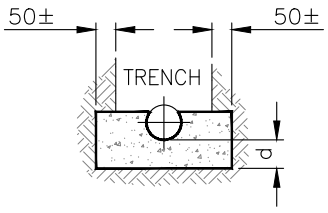
SECTION A–A



VERTICAL DEAD WEIGHT THRUST BLOCK							
VOLUME OF CONCRETE (m^3)							
FITTING	SIZE OF MAIN (mm)						
	150	200	250	300	350	400	500
11 1/4 Degree Bend	0.2	0.4	0.6	0.9	1.2	1.6	2.4
22 1/2 Degree Bend	0.4	0.8	1.2	1.7	2.3		
45 Degree Bend	0.8	1.5	2.3				
90 Degree Bend							

SPECIFIC DESIGN REQ'D. BY ENGINEER





SECTION B–B

THRUST BLOCK BEARING AREA							
MINIMUM CONCRETE AREA IN CONTACT WITH UNDISTURBED SOIL (sq. m)							
FITTING	SIZE OF MAIN (mm)						
	150	200	250	300	350	400	500
11 1/4 Degree Bend	0.07	0.12	0.20	0.28	0.38	0.50	0.78
22 1/2 Degree Bend	0.14	0.24	0.38	0.55	0.75		
45 Degree Bend	0.27	0.48	0.75				
90 Degree Bend							

SPECIFIC DESIGN REQ'D. BY ENGINEER

NOTES:

- BEARING AREA CALCULATED USING THE FOLLOWING:
  - (a) HYDRAULIC PRESSURE 1380 kPa.
  - (b) SOIL BEARING CAPACITY 72 kPa.
- CONCRETE STRENGTH TO BE 25 MPa @ 28 DAYS.
- CONCRETE TO BE CLEAR OF BELLS & PIPE.
- PLACE 6 ml POLYETHYLENE BETWEEN CONCRETE AND PIPE.
- SEE DWG. 1–03 FOR "d" DEPTH.
- BOLD LINE REPRESENTS THE BEARING SURFACE.

File Name: 2–02–VERTICAL THRUST BLOCK.dwg

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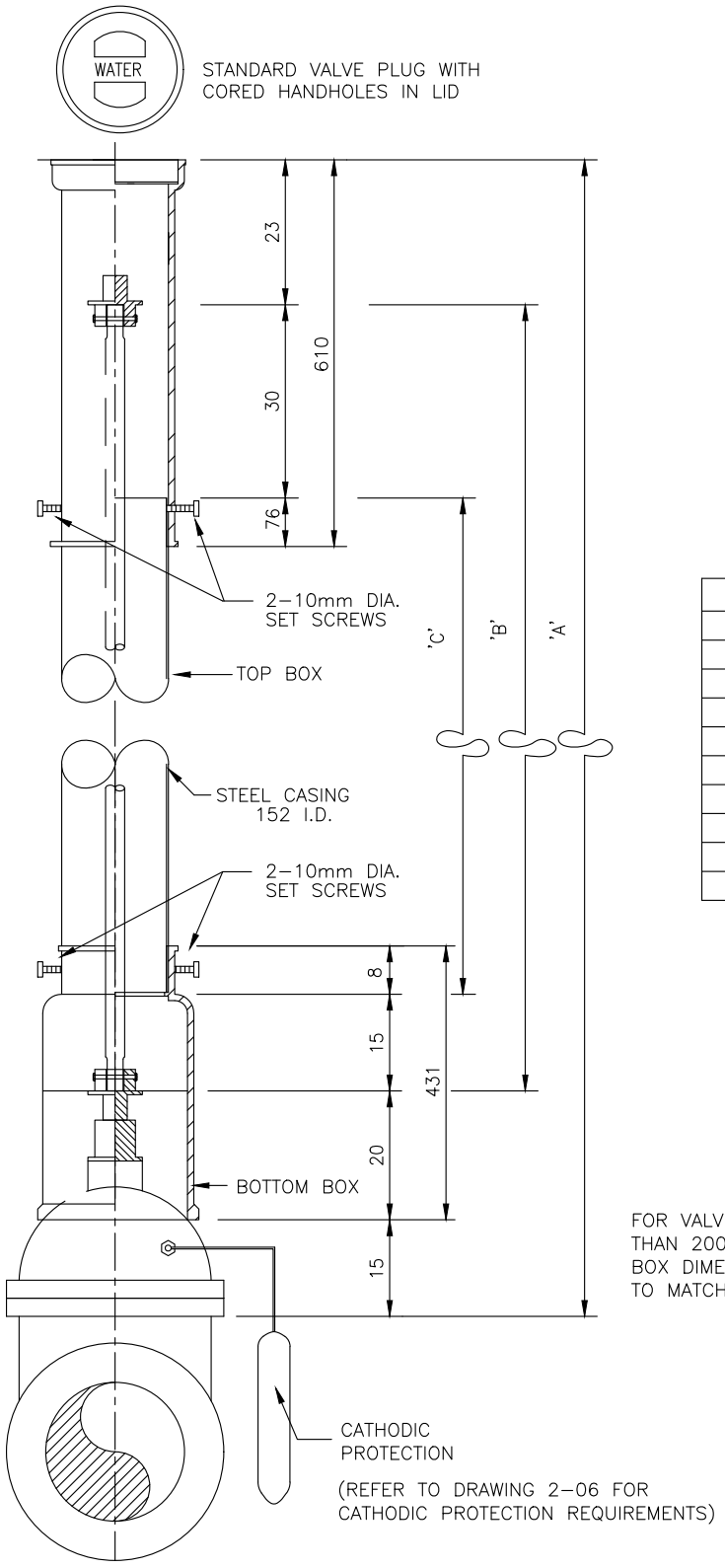
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Water Design

WATER MAIN VERTICAL BEND THRUST BLOCKS

DRAWING NO. 2-02

REVISION NO. 0



A	B	C
BURY	ROD	CASING
8'–0"	6'–3"	4'–9"
8'–6"	6'–9"	5'–3"
9'–0"	7'–3"	5'–9"
9'–6"	7'–9"	6'–3"
10'–0"	8'–3"	6'–9"
10'–6"	8'–9"	7'–3"
11'–0"	9'–3"	7'–9"
11'–6"	9'–9"	8'–3"
12'–0"	10'–3"	8'–9"

File Name: 2–03–TYPE A SLIDING TYPE VALVE BOX.dwg

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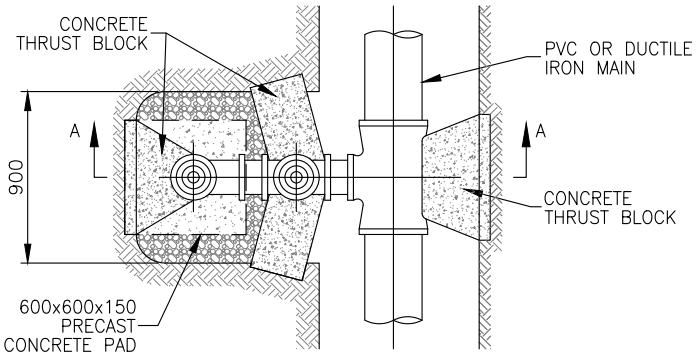
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Water Design

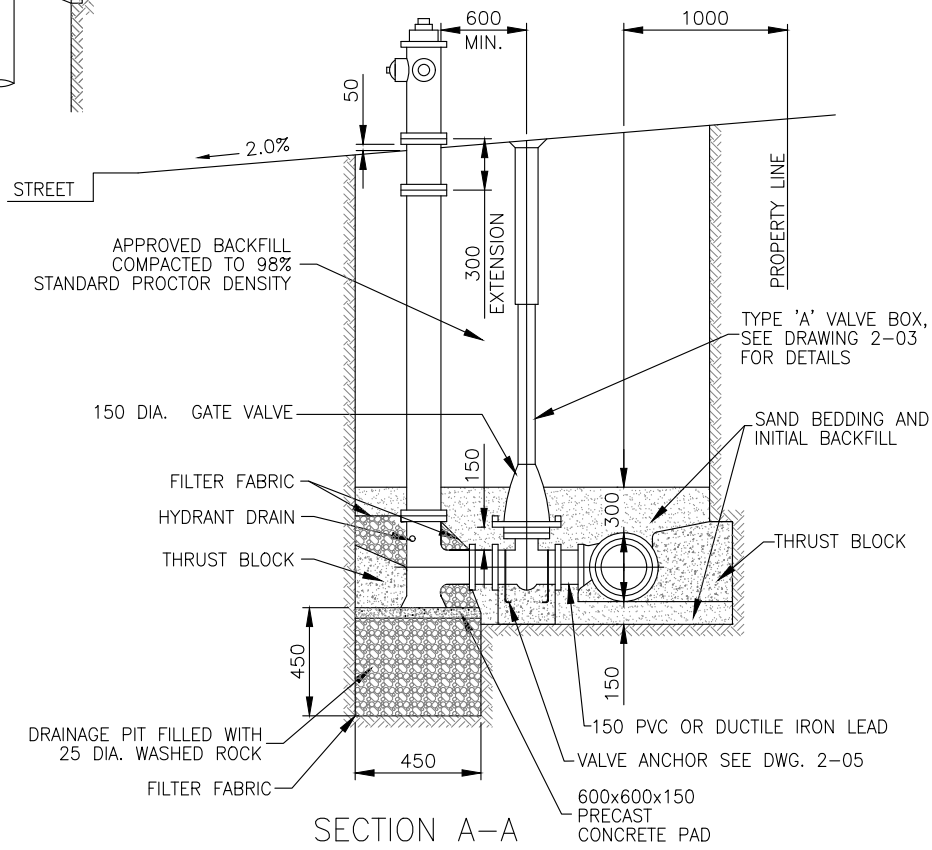
TYPE 'A' SLIDING TYPE VALVE BOX

DRAWING NO.
2-03

REVISION NO. 0



PLAN



SECTION A-A

NOTE:

1. THE OUTSIDE OF THE HYDRANT ABOVE THE FINISHED GROUND LINE SHALL BE COATED WITH TWO COATS OF PAINT OF A DURABLE AND WEATHERPROOF COMPOSITION, COLOR AS FOLLOWS: HI-VIS YELLOW COLOR CODE (16-202), REFERRING TO A GENERAL PAINT BRAND, AND IS TO BE INDUSTRIAL ENAMEL FOR OUTSIDE BRUSH APPLICATION CODE REFERS TO GENERAL PAINT BRAND, ARE TO BE INDUSTRIAL ENAMEL FOR OUTSIDE BRUSH APPLICATION.
2. THE HYDRANT SHALL BE PLACED ON A 600mm X 600mm X 150mm REINFORCED SULFATE RESISTANT CONCRETE PAD IN AREAS WITH SOFT MATERIAL, OR OVER EXCAVATION.
3. THE END OF THE DITCH AT THE REAR OF THE HYDRANT SHALL BE FILLED WITH CONCRETE TO THE LEVEL OF THE TOP OF PIPE, AND CLEAR OF HYDRANT'S DRAIN HOLE TO ANCHOR THE HYDRANT.
4. THE EXTERIOR OF THE HYDRANTS BARREL BELOW THE GRADE FLANGE & INCLUDING ANY SPLIT RING & SLIP-BREAK AWAY FLANGE SHALL BE COATED IN ACCORDANCE WITH THE SPECIFICATIONS.
5. ENSURE THE VALVE LOCATION DOES NOT FALL WITHIN THE SIDEWALK OR C&G. ALTERNATE LOCATIONS SHALL BE:
   - 1.0m FROM FACE OF CURB ON HYDRANT LEAD ALIGNMENT WITH THE HYDRANT TO THE NEAREST BEND OR TEE IN ROADWAY, OR
   - LOCATED IN LANDSCAPED BOULEVARD
6. A PIT FOR DRAINAGE 900mm WIDE x 450mm LONG x 450mm DEEP SHALL BE DUG AT THE FOOT OF THE HYDRANT AND FILLED WITH 25mm DIA. WASHED ROCK.
7. THE SPACE AROUND THE BARREL AND 150mm ABOVE THE HYDRANT DRAIN SHALL ALSO BE FILLED WITH WASHED ROCK.
8. FILTER FABRIC SHALL BE WRAPPED AROUND THE WASHED ROCK TO PREVENT THE VOIDS FROM BEING FILLED WITH CLAY OR SAND.
9. CONCRETE SHALL BE POURED CLEAR OF ALL FLANGES, JOINTS AND HYDRANT DRAIN.
10. THRUST BLOCKS SHALL BE POURED AGAINST GROUND WITH A MINIMUM SOIL BEARING OF 72kPa. IF THIS BEARING DOES NOT EXIST, SPECIAL DESIGNS ARE REQUIRED.
11. REFER TO DRAWING 2-01 AND 2-02 FOR THRUST BLOCK GEOMETRY.
12. REFER TO DRAWING 2-06 FOR CATHODIC PROTECTION REQUIREMENTS.

File Name: 2-04-STANDARD HYDRANT DETAIL.dwg

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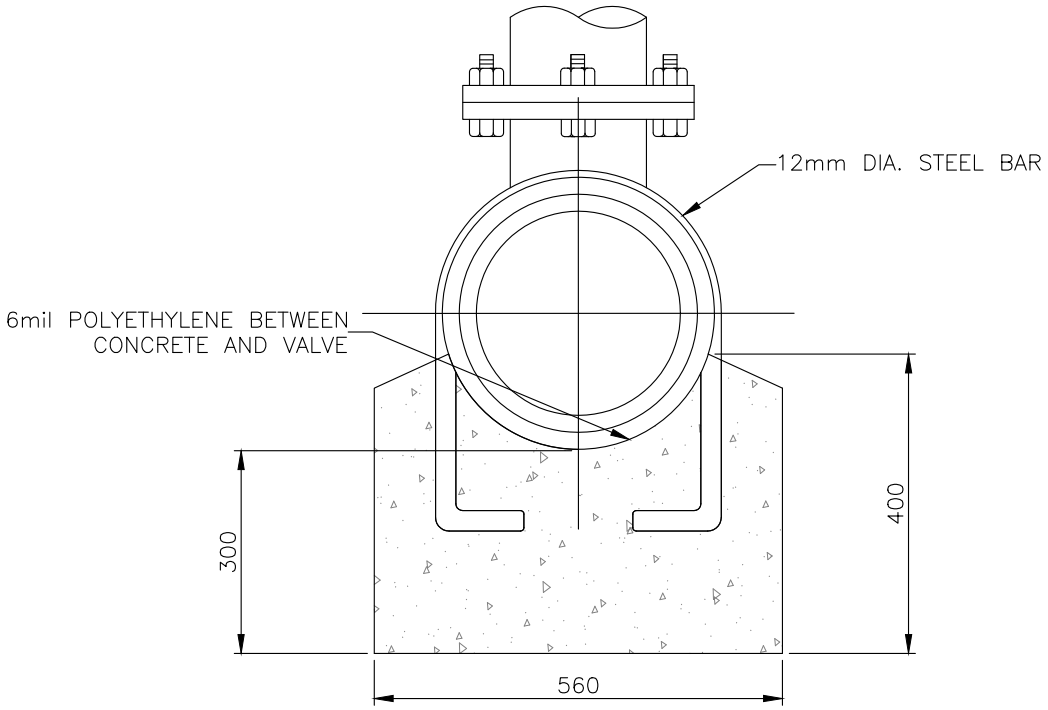
TOWN OF ROCKY MOUNTAIN HOUSE

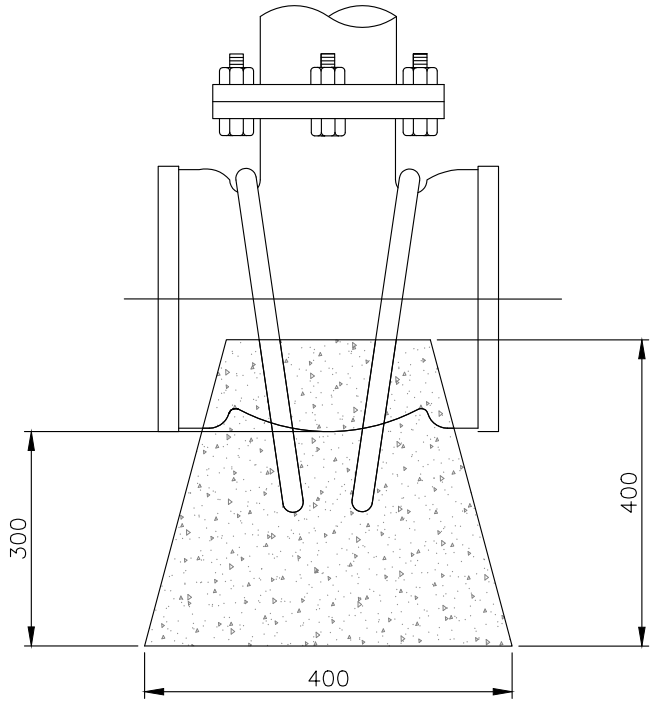
DESIGN GUIDELINE DRAWINGS
Water Design

STANDARD HYDRANT DETAIL

DRAWING NO.
2-04

REVISION NO. 0





NOTE:

- CONCRETE SHALL BE 25 MPa AT 28 DAYS, AND TYPE HS.
- REFER TO DRAWING 2-06 FOR CATHODIC PROTECTION REQUIREMENTS.

File Name: 2-05-VALVE ANCHOR DETAIL.dwg

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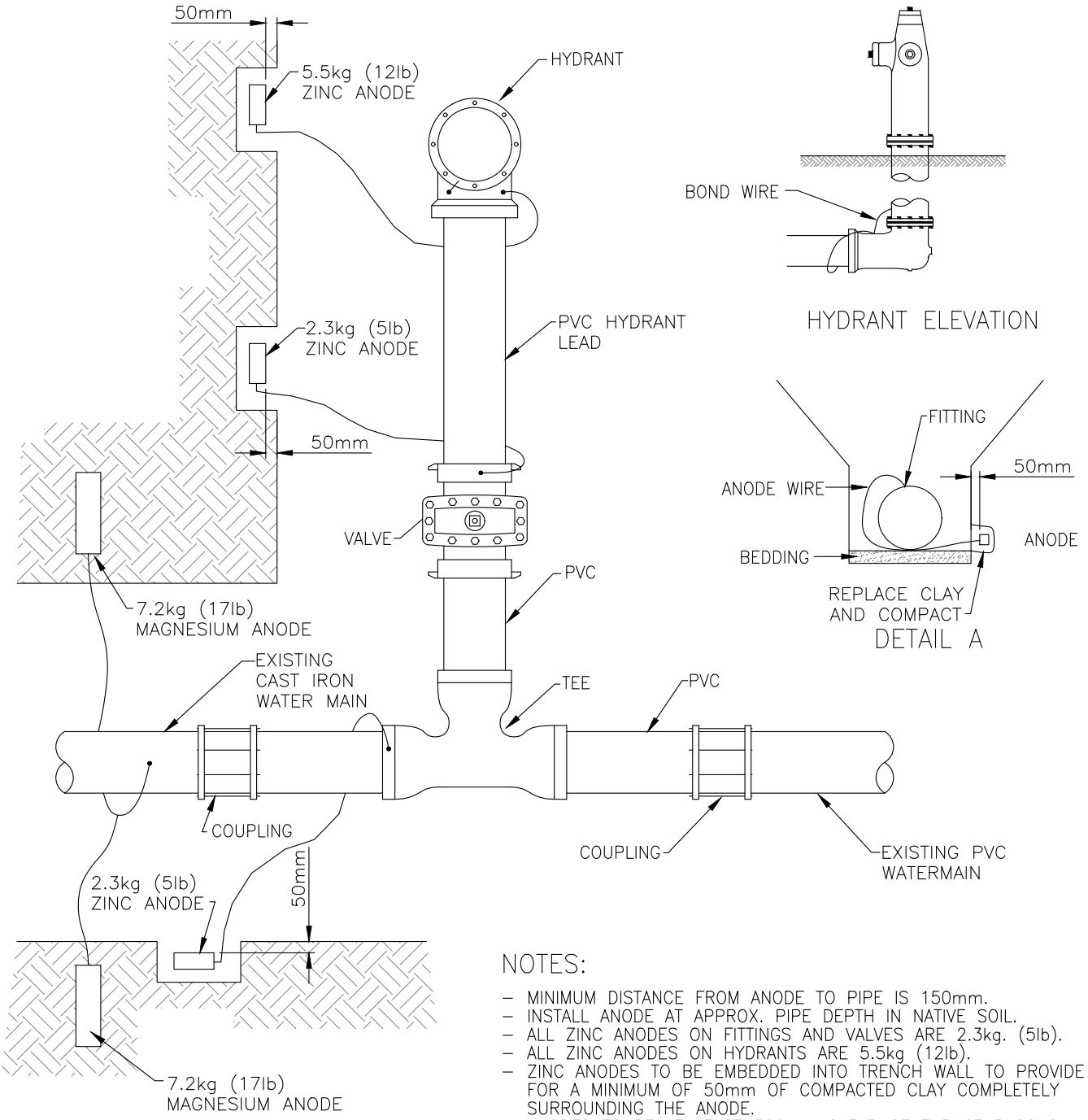
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Water Design

VALVE ANCHOR DETAIL

DRAWING NO. 2-05

REVISION NO. 0



NOTES:

- MINIMUM DISTANCE FROM ANODE TO PIPE IS 150mm.
- INSTALL ANODE AT APPROX. PIPE DEPTH IN NATIVE SOIL.
- ALL ZINC ANODES ON FITTINGS AND VALVES ARE 2.3kg. (5lb).
- ALL ZINC ANODES ON HYDRANTS ARE 5.5kg (12lb).
- ZINC ANODES TO BE EMBEDDED INTO TRENCH WALL TO PROVIDE FOR A MINIMUM OF 50mm OF COMPACTED CLAY COMPLETELY SURROUNDING THE ANODE.
- ANODES TO BE AT LEAST 300mm CLEAR OF THRUST BLOCKS.

File Name: 2-06-ANODE LOCATION & INSTALLATION.dwg

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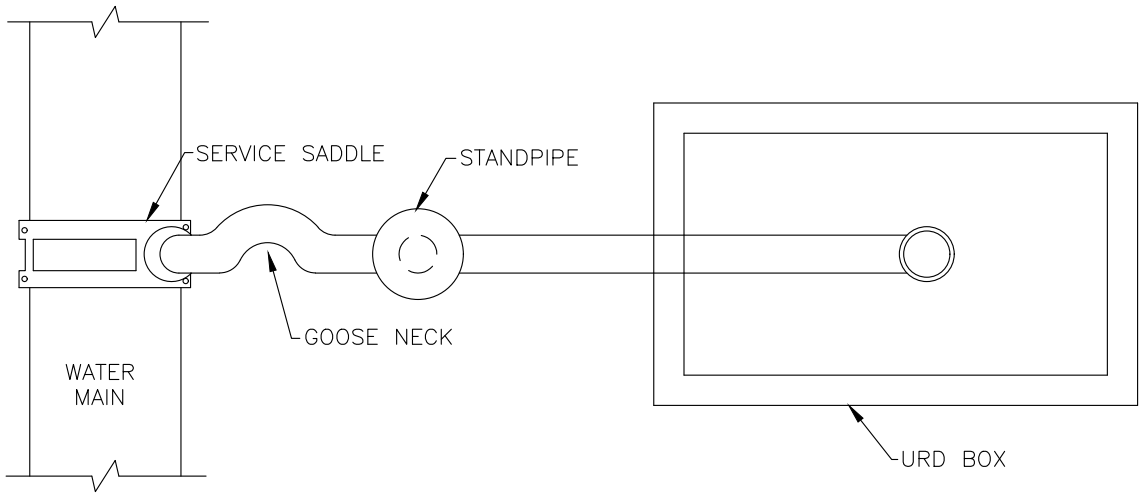
TOWN OF ROCKY MOUNTAIN HOUSE

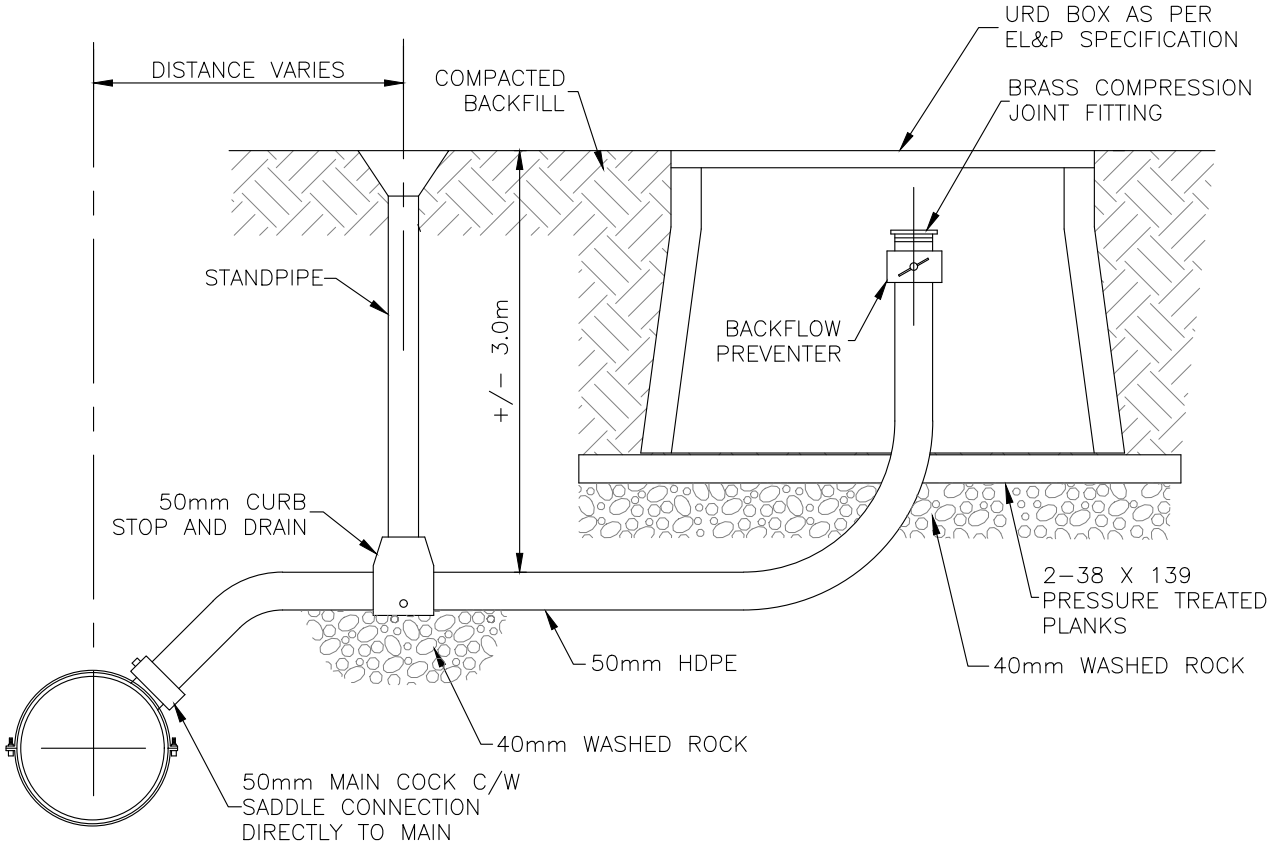
DESIGN GUIDELINE DRAWINGS
Water Design

ANODE LOCATION AND INSTALLATION

DRAWING NO.
2-06

REVISION NO. 0





NOTE:
- LOAD-BEARING URD BOXES SHALL HAVE CAST IRON COVERS CAPABLE OF WITHSTANDING H-20 LOADING.
- IF IN THE ROAD, TO BE PLACED IN A CONCRETE MANHOLE.

File Name: 2-07-AIR RELIEF VALVE.dwg

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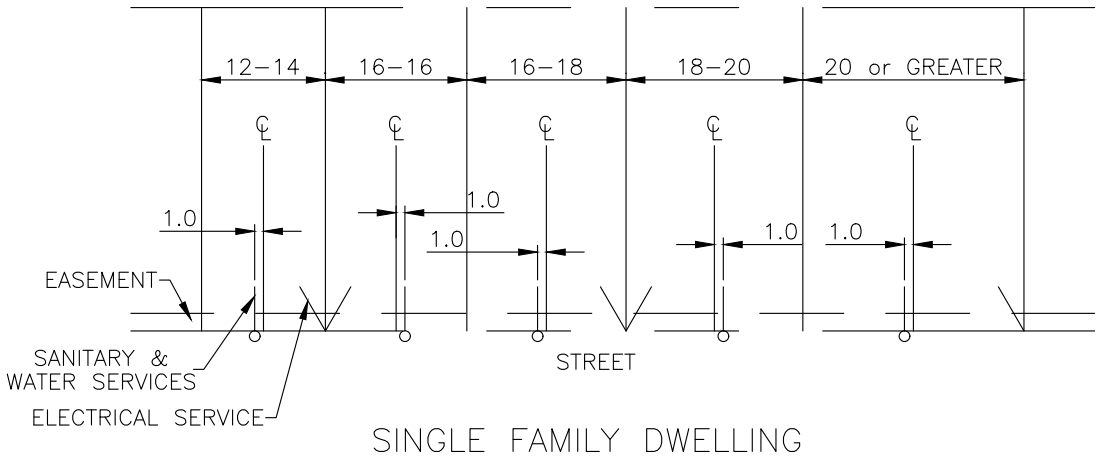
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Water Design

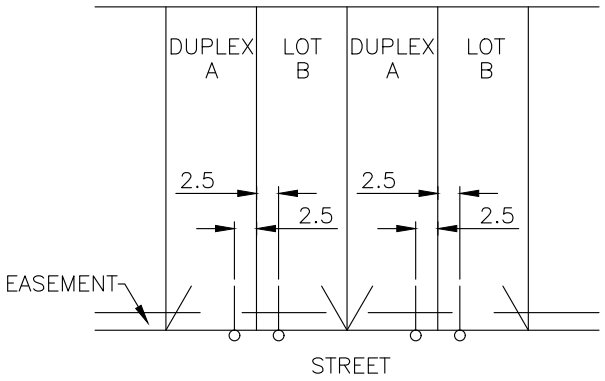
AIR RELIEF VALVE & FLUSHING CHAMBER

DRAWING NO.
2-07

REVISION NO. 0



SINGLE FAMILY DWELLING



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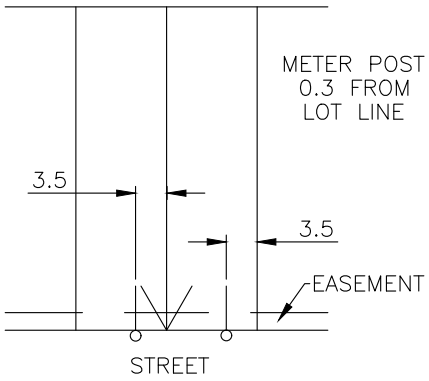
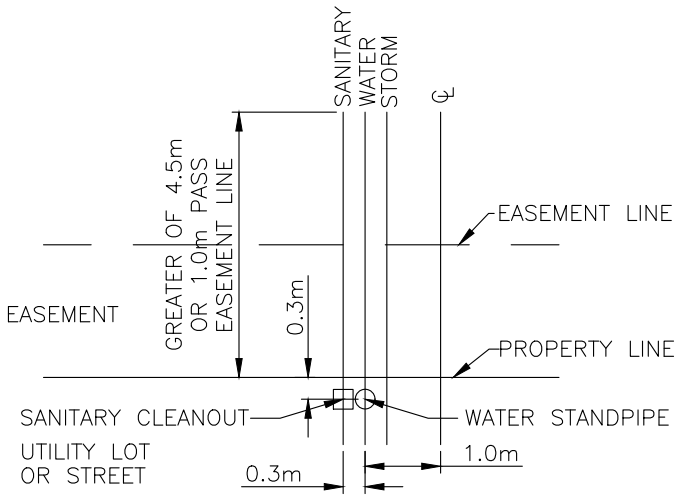


MANUFACTURED HOME



SERVICE DETAIL

LEGEND

—o— SANITARY SEWER, STORM SEWER & WATER SERVICE

——— ELECTRICAL SERVICE

NOTES:

- STANDPIPE & CURB STOP TO BE LOCATED 0.30m FROM PROPERTY LINE.
- MINIMUM CLEARANCE FROM EDGE OF EL&P TRANSFORMER TO CENTRE OF WATER SHALL BE 3.30m.
- SERVICE TO INCLUDE CLEAN–OUT.
- EASEMENT WIDTH AS REQUIRED.
- MOVE AWAY FROM CL/DRIVEWAY FOR CC INSTALL.
- ALL DEEP UTILITY SERVICE TO MAINTAIN MIN. 1.0m CLEARANCE FROM DRIVEWAY & WALKWAY TO THE RESIDENCE. ANY DEVIATIONS NEED TO BE IDENTIFIED FOR APPROVAL BY THE TOWN ENGINEER.
- CLEAN–OUT FOR SANITARY SEWER TO BE INSTALLED AS PER DETAIL 4–03.

File Name: 4–01–FRONT YARD SERVICE LOCATIONS.dwg

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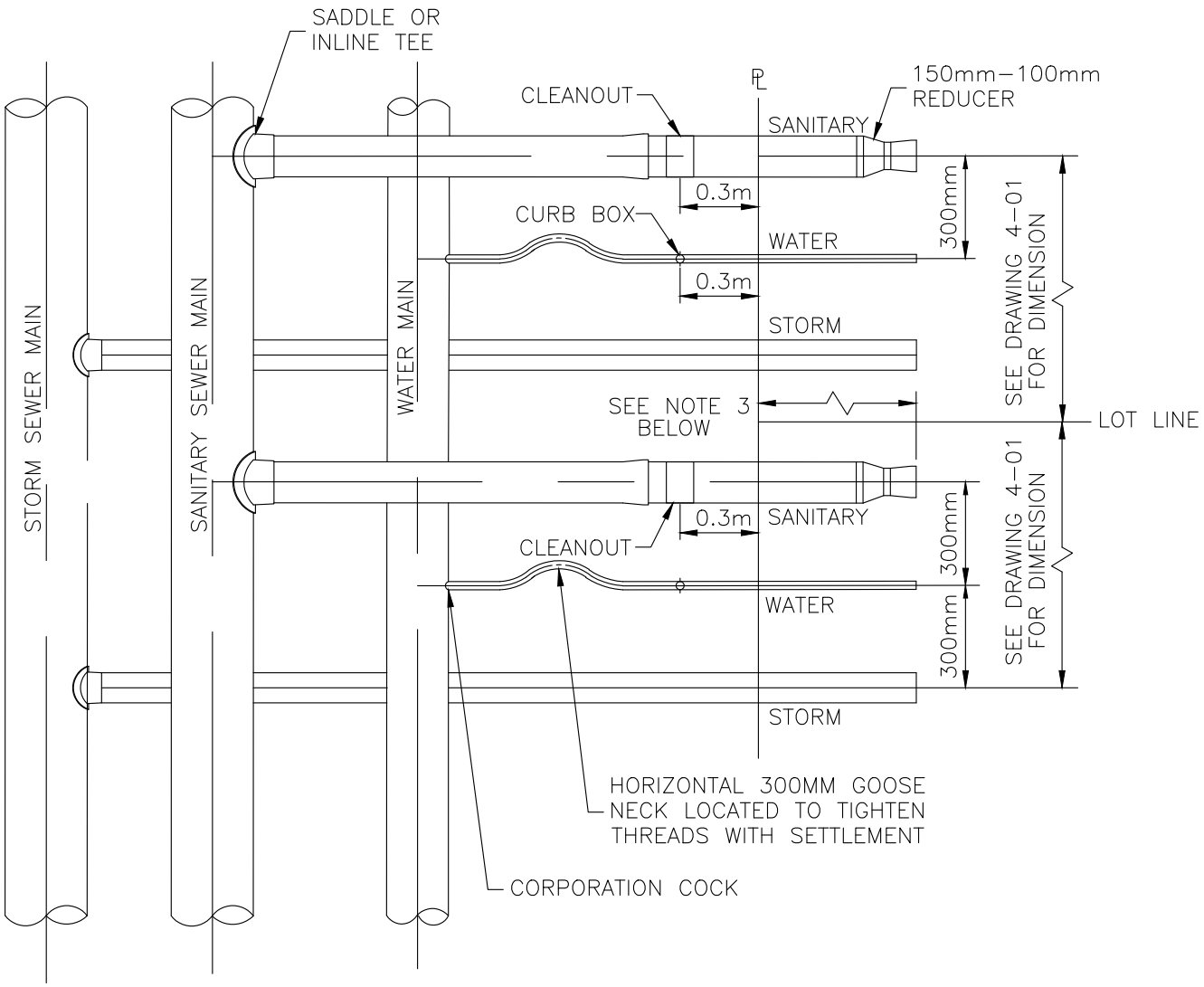
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Service Connections

FRONT YARD SERVICE LOCATIONS

DRAWING NO. 4-01

REVISION NO. 0



NOTES:

1. VIEWING THE TRENCH FROM THE LOT, THE WATER SERVICE IS TO THE LEFT OF THE SANITARY SEWER SERVICE AND ALIGNED 1.0m FROM THE CENTERLINE OF THE LOT.
2. SEWER SERVICES MUST TERMINATE WITH A BELL END AND AN APPROVED PLUG SHALL BE PLACED INSIDE THE BELL END.
3. THE SERVICES SHALL TERMINATE 4.5m ONTO PROPERTY OR 1.0m PAST THE EASEMENT LINE, WHICH EVER IS GREATER.
4. ANY SERVICES UNDER DRIVEWAY NEED APPROVAL OF TOWN ENGINEER.
5. MIN. 1m CLEARANCE FROM DRIVEWAY & WALKWAY TO THE RESIDENCE.
6. SERVICE LEAD PIPE SIZES: SANITARY – 150mm
   WATER – 25mm
   STORM – 100mm

File Name: 4–02–RESIDENTIAL SERVICE INSTALLATION.dwg

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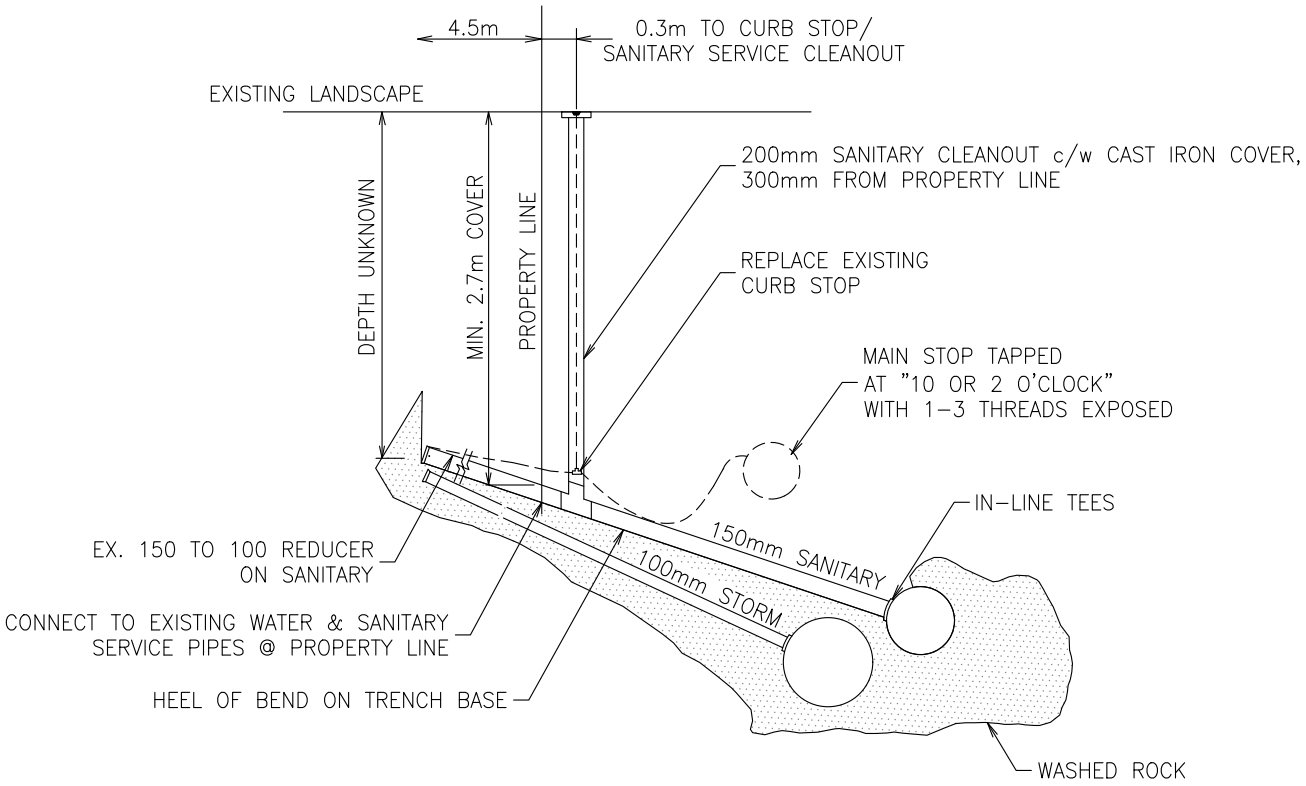
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Service Connections

RESIDENTIAL SERVICE INSTALLATION

DRAWING NO. 4-02

REVISION NO. 0



NOTES:

- MIN. SEWER GRADE 2.0%.
- MIN. 2.7m COVER OVER PIPE AT PROPERTY LINE
- 300mm GOOSENECK IN WATER SERVICE REQUIRED AT EACH SEWER CROSSING.
- WATER SERVICE SHALL BE ONE CONTINUOUS PIECE FROM CORPORATION COCK TO CURB STOP.
- WHERE MAINS ARE DEEP, CONSTRUCT SERVICE AT APPROX. 45° GRADE UNTIL 2-5% CAN BE MAINTAINED TO STUB, INSTALL LONG RADIUS BEND AT GRADE TRANSITION.
- MAIN STOP TAPS SHALL BE A MINIMUM OF 600mm APART & NO LESS THAN 300mm TO A COUPLING OR COLLAR.
- MARKER AT END OF SERVICE TO EXTEND TO LOWEST INVERT.
- CAPS TO BE INSERTED AT ENDS OF ALL SERVICE STUBS
- WHEN FACING PROPERTY THE SANITARY SERVICE SHALL BE TO THE LEFT OF THE WATER SERVICE
- ADJACENT SERVICES SHALL BE NO CLOSER THAN 2.0m AND BE TO THE RIGHT OF THE WATER SERVICE WHEN VIEWING THE TRENCH FROM THE LOT.

File Name: 4-03-SERVICE CROSS SECTIONS.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
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RESIDENTIAL SERVICE INSTALLATION CROSS SECTION

DRAWING NO.
4-03

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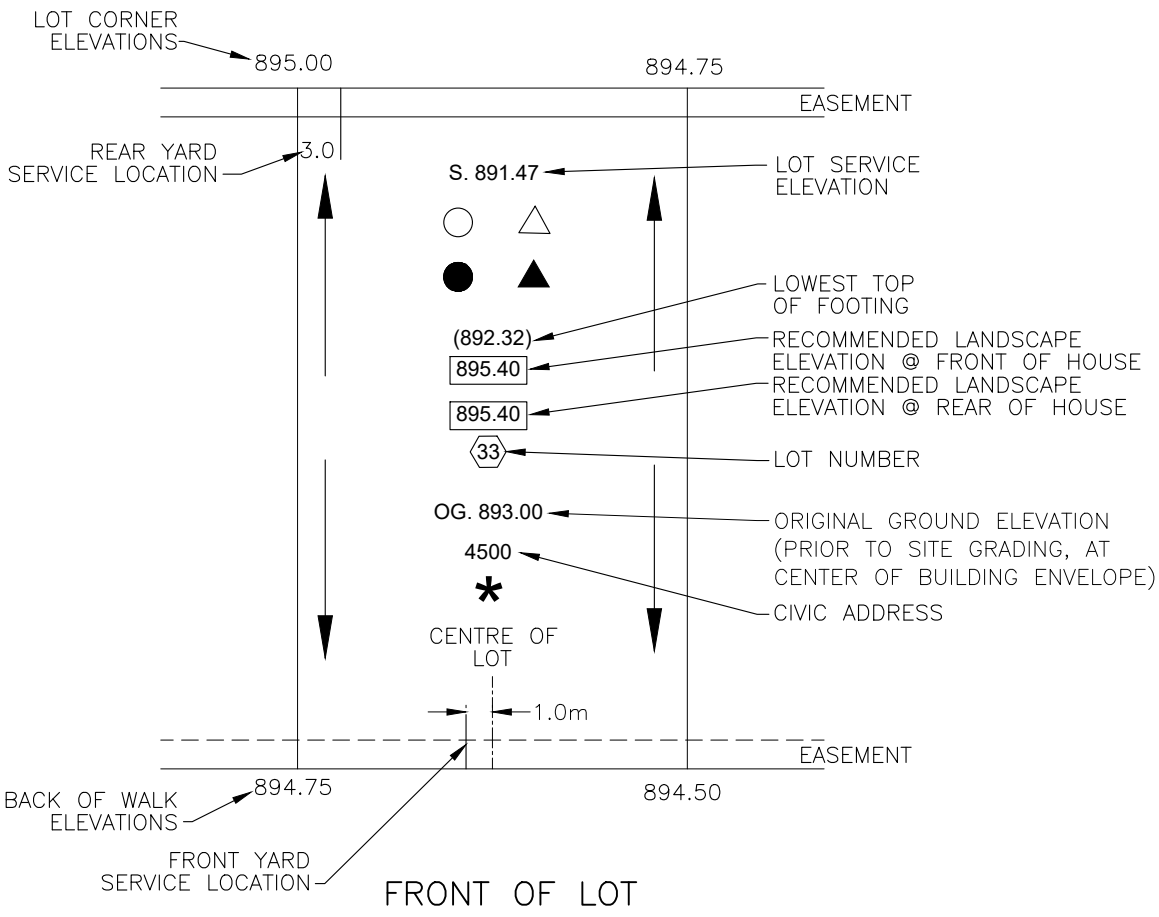

LEGEND

- ○ SINGLE WATER & SANITARY SERVICE
- ● DUAL WATER & SANITARY SERVICE
- △ SINGLE WATER, SANITARY & STORM SERVICE
- ▲ DUAL WATER, SANITARY & STORM SERVICE
- ← DRAINAGE PATTERN
- * DEPTH OF FILL EXCEEDS 1.2m (BEARING CERTIFICATE REQUIRED)

NOTES:

- EASEMENT WIDTHS VARY
- SERVICE LOCATION DIMENSIONS VARY. SEE DRAWING 4-01.

File Name: 4-04- LOT SERVICE REQUIREMENTS.dwg

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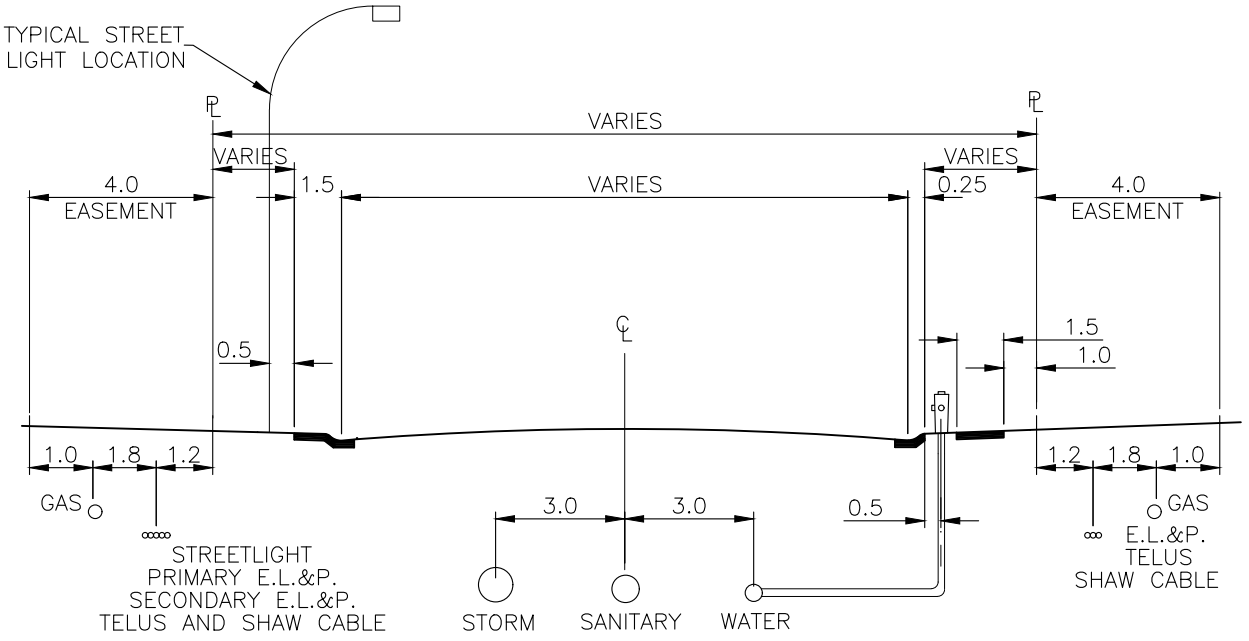
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Service Connections

TYPICAL LOT SERVICE REQUIREMENTS

DRAWING NO. 4-04

REVISION NO. 0



NOTE:

– DEFLECT CABLE ALIGNMENTS AT HYDRANT

TYPICAL ROAD SECTION

File Name: 4–05–FRONT SERVICE LOCATIONS.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
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FRONT SERVICE LOCATIONS

DRAWING NO.
4-05

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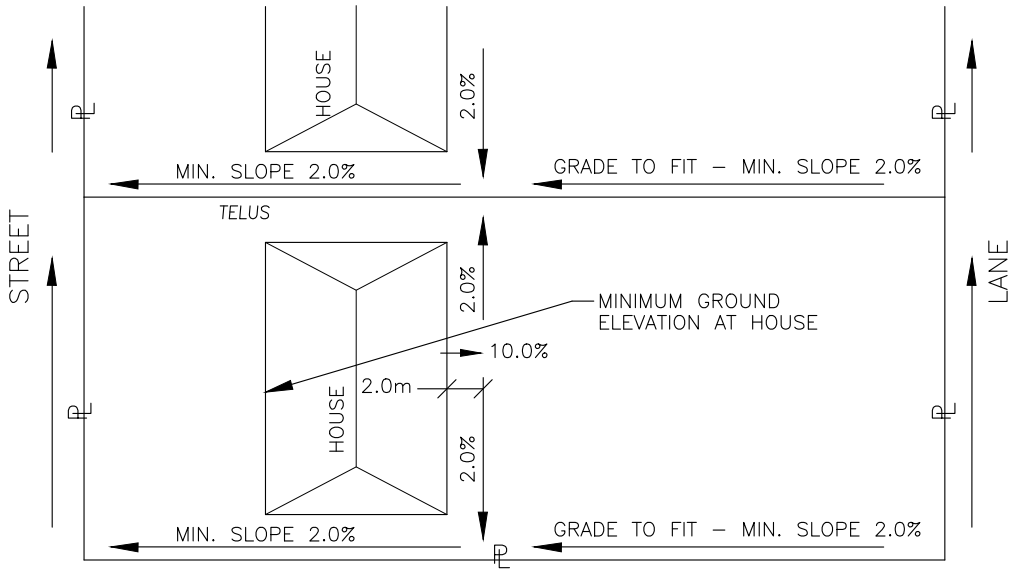
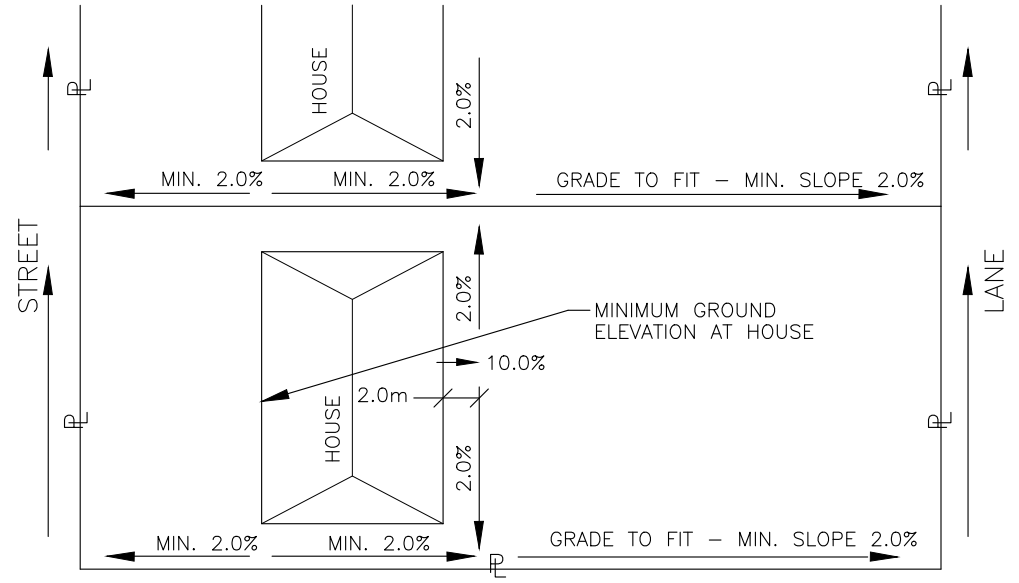


LOT GRADING - BACK TO FRONT DRAINAGE
N.T.S.



LOT GRADING - FRONT TO BACK DRAINAGE
N.T.S.

LOT TYPES

L - LEVEL LOT
LB - LEVEL LOT (BACK TO FRONT DRAINAGE)
W - FULL WALKOUT BASEMENT
WS - SPLIT LEVEL WALKOUT BASEMENT
(T) - TRANSITION LOT

NOTE:
HOUSE BUILDERS TO PAY SPECIAL ATTENTION TO FOUNDATION DESIGN. THE FOUNDATION ON THE LOW SIDE OF THE LOT MAY REQUIRE CONSTRUCTION OF A "PONY WALL"

File Name: 4-06-LOT GRADING.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

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LOT GRADING

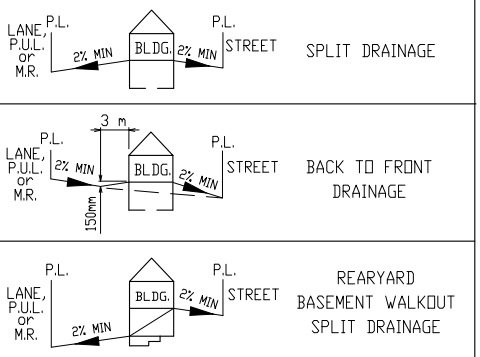
DRAWING NO. 4-06

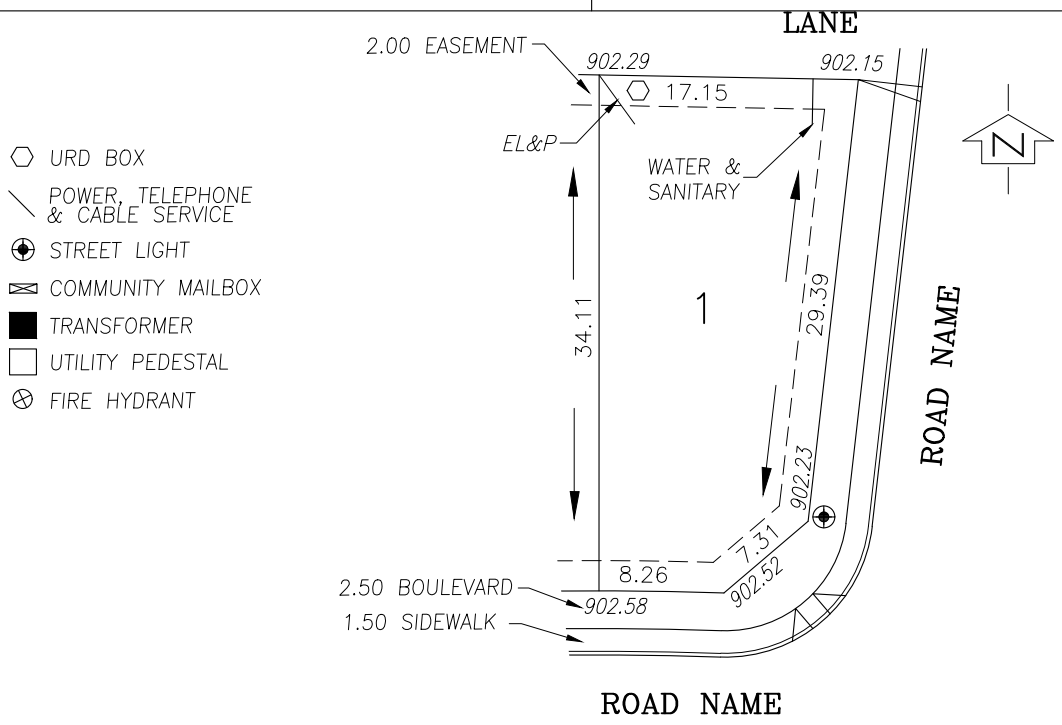
REVISION NO. 0

BUILDING GRADE CERTIFICATE

Town of Rocky Mountain House
Issued by: No. 2002-000

1. WHEN EXCAVATING IN A RIGHT OF WAY (EASEMENT), CHECK FOR UTILITIES.
2. STANDING AT THE WATER SHUTOFF AND FACING THE BUILDING, THE SANITARY SERVICE (PAINTED GREEN) IS ON THE LEFT SIDE OF THE WATER SERVICE.
3. ALL DIMENSIONS ARE IN METRES AND DECIMALS THEREOF. THE ELEVATIONS ARE IN METRES ABOVE GOEDETIC MEAN SEA LEVEL.
4. ELEVATIONS NOTED ON THE CERTIFICATE ARE WITHIN 100mm OF ACTUAL.
5. THE BUILDER MUST CONSTRUCT WITHIN 100mm OF THE DESIGN LANDSCAPE ELEVATION & ILLUSTRATED DRAINAGE PATTERNS UNLESS OTHERWISE APPROVED BY THE DEVELOPMENT OFFICER.
6. IF THE INFORMATION ON THIS CERTIFICATE HAS BEEN PREPARED BY A PRIVATE DEVELOPER OR THEIR AGENT, THE TOWN OF ROCKY MOUNTAIN HOUSE ACCEPTS NO RESPONSIBILITY FOR ITS ACCURACY.





POWER SERVICE LOCATION IS 1.0m FROM BACKYARD LOTLINE SANITARY
& WATER SERVICE LOCATION IS 3.0m FROM SIDEYARD LOTLINE

TOP OF FOOTING:
MAX. DEPTH BELOW AVERAGE SIDEWALK = 2.43
LOWEST ELEVATION = 900.12

AS-BUILT SEWER INVERT ELEVATIONS:
SANITARY AT RIGHT OF WAY LINE = 899.28

CIVIC ADDRESS: _____
LOT: _____ BLOCK: _____ PLAN No.: _____
DEVELOPER: _____ SCALE: 1:500
DRAWN BY: _____ DATE: _____
APPROVED BY: _____ DATE: _____
RECEIVED BY: _____ DATE: _____

DESIGN LANDSCAPE ELEVATIONS
ELEV. AT FRONT OF HOUSE = 902.88
ELEV. AT REAR OF HOUSE = 902.88

I CERTIFY THAT THE FINAL LANDSCAPE GRADE WILL BE (FRONT) _____
(REAR) _____
SIGNATURE OF OWNER OR REPRESENTATIVE _____

File Name: 4-07-RESIDENTIAL BUILDING GRADE CERTIFICATE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Service Connections

RESIDENTIAL BUILDING GRADE CERTIFICATE

DRAWING NO. 4-07

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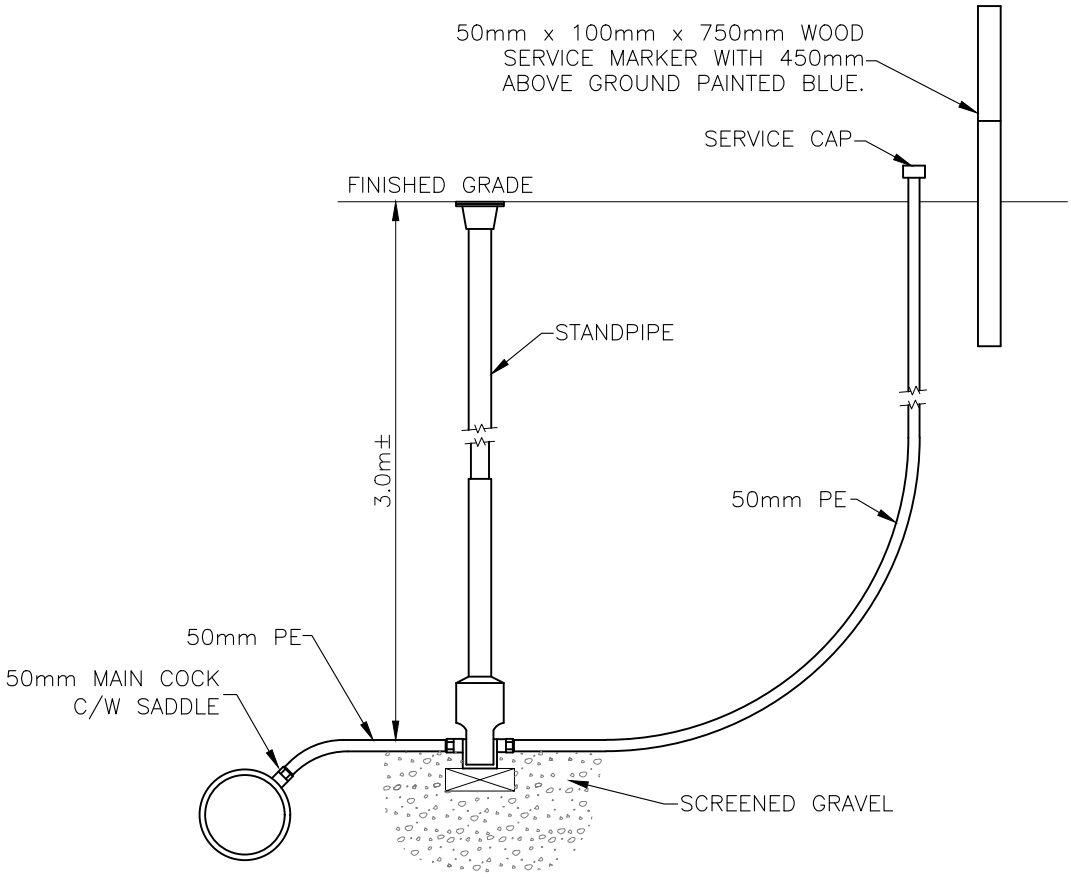
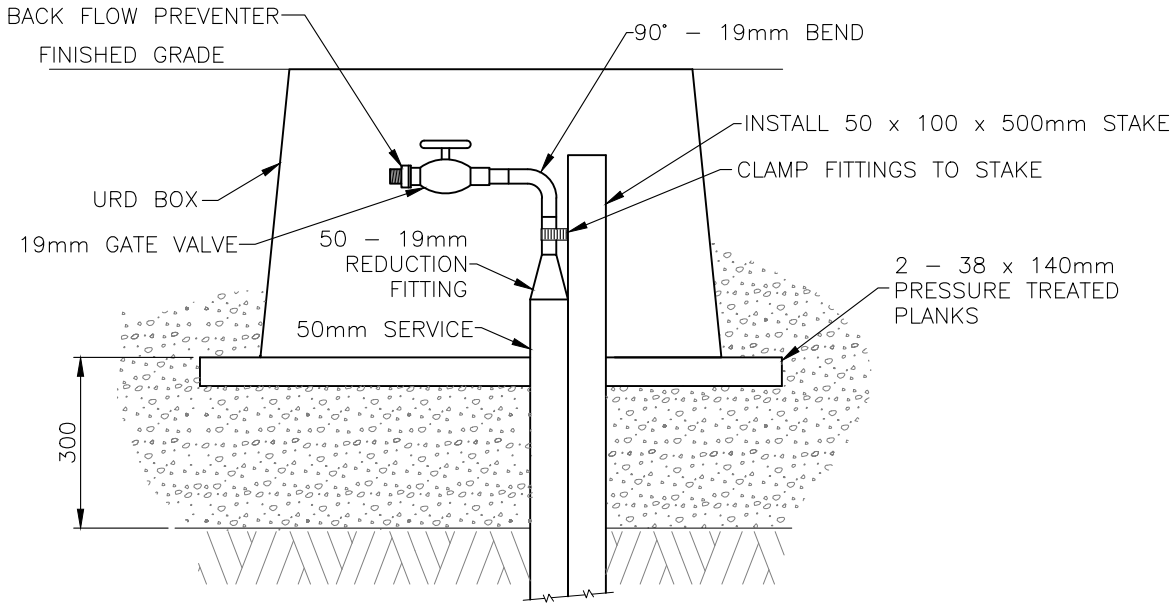


PARKS SERVICE – STAGE 1



PARKS SERVICE – STAGE 2

File Name: 4–08–PARKS WATER SERVICE.dwg

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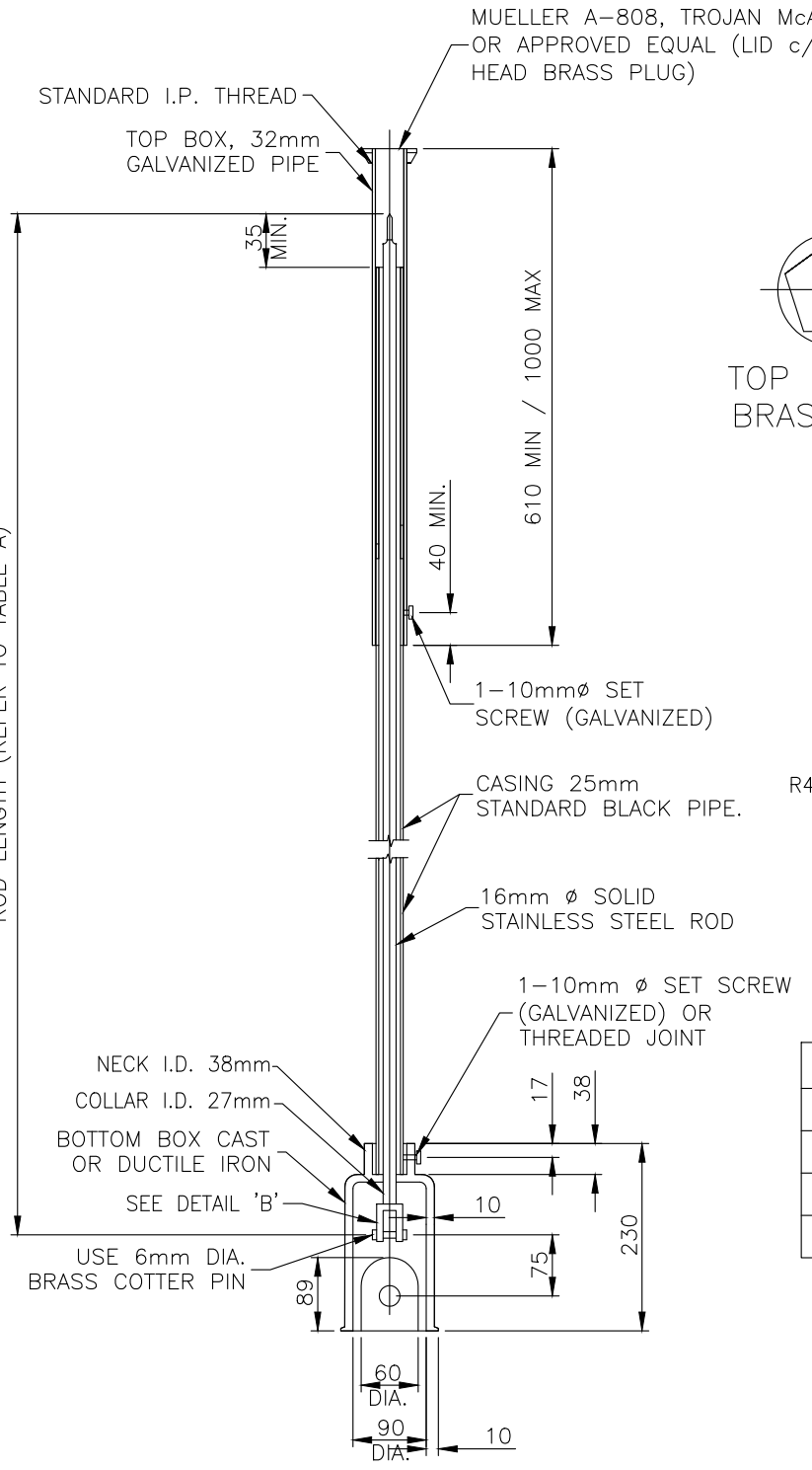
TOWN OF ROCKY MOUNTAIN HOUSE

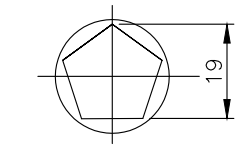
DESIGN GUIDELINE DRAWINGS
Service Connections

PARKS WATER SERVICE

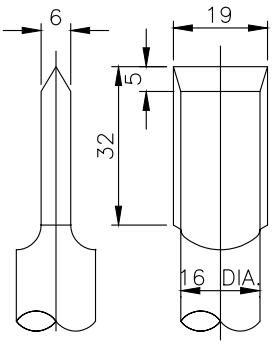
DRAWING NO. 4-08

REVISION NO. 0

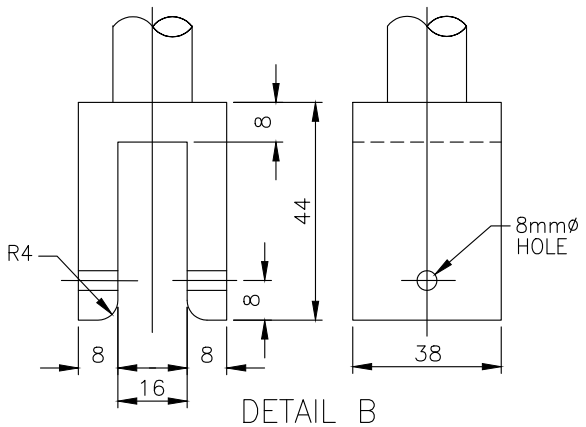




TOP VIEW OF BRASS PLUG



DETAIL A



DETAIL B

DEPTH OF COVER	ROD LENGTH	CASING LENGTH
2.4m	2.15m	2.00m
2.7m	2.45m	2.30m
3.0m	2.75m	2.60m
3.3m	3.05m	2.90m

TABLE 'A'

NOTES:

– THE ROD, THE EXTERIOR OF THE CASING AND THE EXTERIOR AND INTERIOR OF THE BOTTOM BOX SHALL BE FACTORY COATED IN ACCORDANCE WITH THESE SPECIFICATIONS.

File Name: 4–09–SERVICE BOX.dwg

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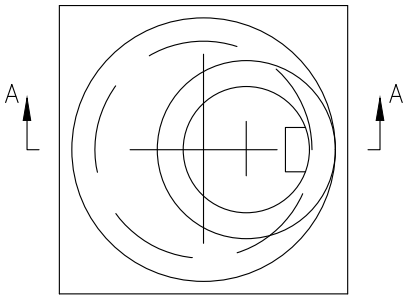
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Service Connections

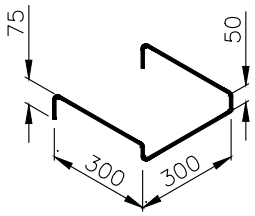
SERVICE BOX DETAIL FOR 25MM SERVICE VALVES

DRAWING NO. 4-09

REVISION NO. 0



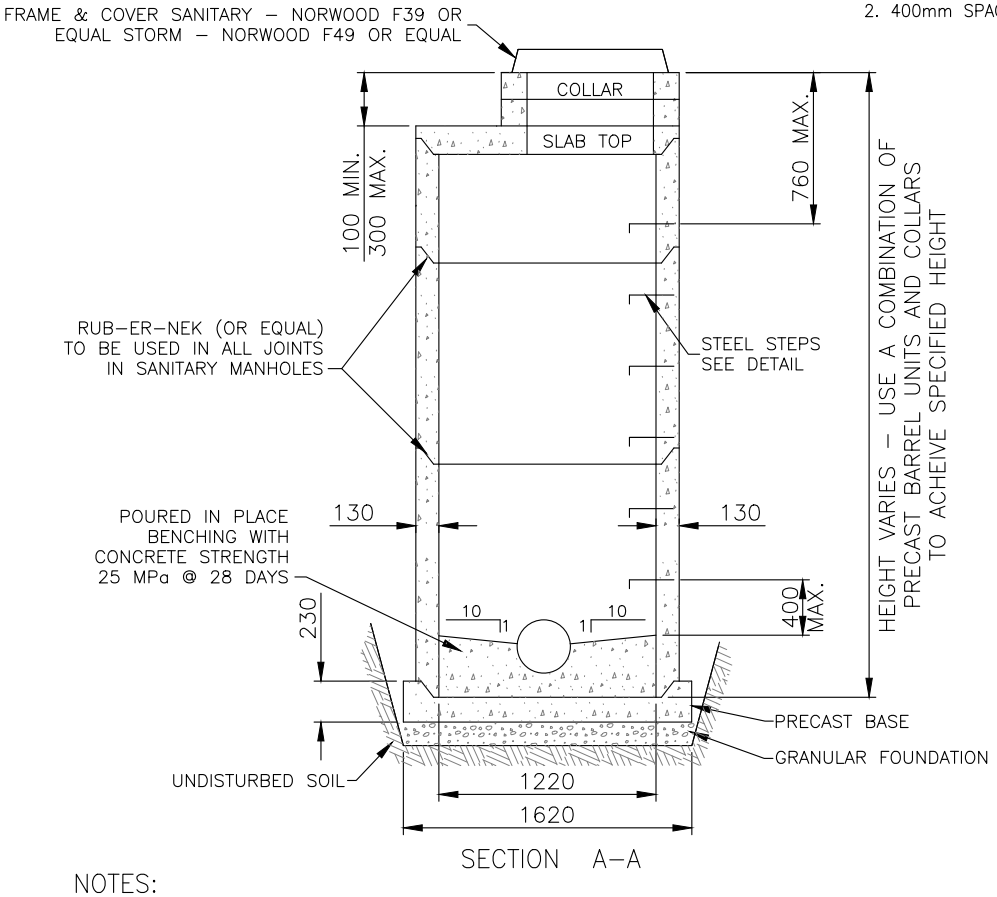
PLAN



NOTE:

1. MANHOLE STEPS TO BE MSU 20mmø ALUMINUM TUBING c/w 3mm LOW DENSITY POLYETHYLENE COATING OR APPROVED EQUAL.
2. 400mm SPACING (TYP)

DETAIL



SECTION A–A

NOTES:

1. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
2. CAST–IN–PLACE CONCRETE TO BE 25 MPa AT 28 DAYS, & TYPE HS.
3. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON–SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
4. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
5. COMPACT BACKFILL AROUND MANHOLES TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY. CHANNELING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. PRE–BENCHED MANHOLE BASES MUST BE USED WHEREVER POSSIBLE WITH PRECORED CONNECTION HOLES AND WATER TIGHT DURASEAL OR GLOC JOINTS OR APPROVED EQUAL.
7. IF PRECAST CONCRETE BASES ARE UNAVOIDABLE, THICKNESS AND REINFORCEMENT MUST BE DESIGNED FOR THE SPECIFIC MANHOLE DEPTH AND SOIL CONDITIONS.
8. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND BETWEEN RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED WITH NON–SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN NOT BE ACHIEVED.
9. PROVIDE MANHOLE WRAPPING, STRAPPING AND CONICAL TOPS (ALL PREVIOUS STANDARD TO BE DISCUSSED WITH TOWN ENGINEER TO USE)

File Name: 5–01–1200mm MANHOLE.dwg

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No.	Revision

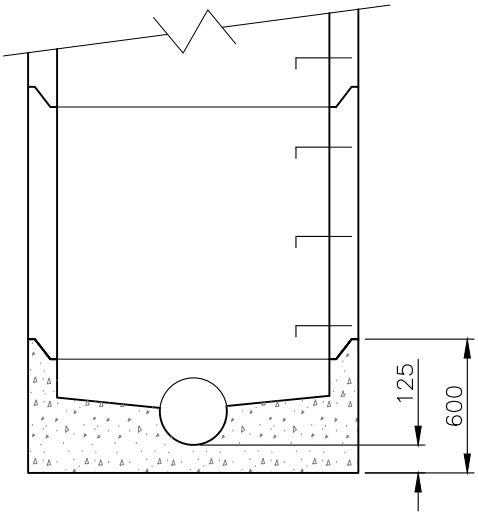
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

STANDARD 1200MM PRECAST MANHOLE ASSEMBLY

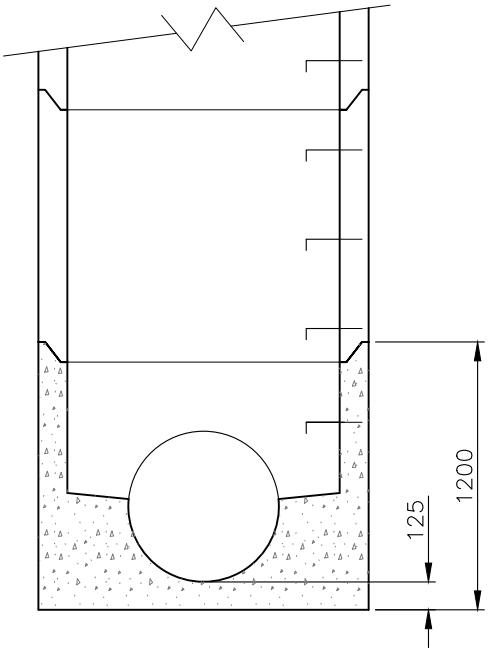
DRAWING NO.
5-01

REVISION NO. 0



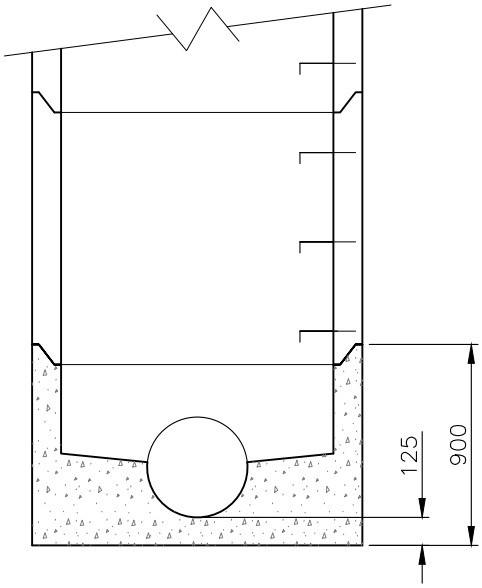
FOR ALL TYPES OF P.V.C. PIPE
SIZES 150mm to 300mm

600 PREBENCH



FOR ALL TYPES OF PIPE
SIZES 525mm to 675mm

1200 PREBENCH



FOR ALL TYPES OF PIPE
SIZES 375mm to 450mm

900 PREBENCH

File Name: 5-02-1200mm PRECAST MANHOLE BASE.dwg

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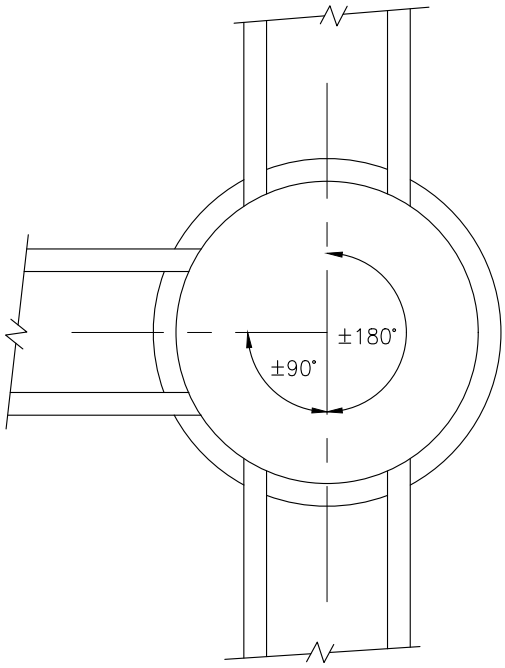
TOWN OF ROCKY MOUNTAIN HOUSE

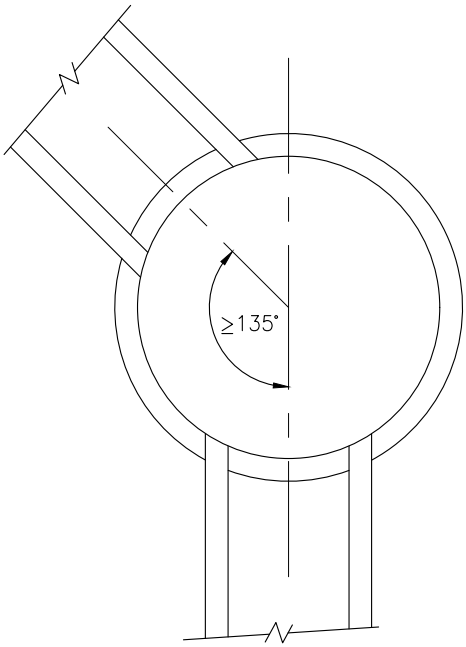
DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

PRECAST PREBENCHED BASE FOR 1200MM MANHOLE ASSEMBLY

DRAWING NO.
5-02

REVISION NO. 0





MANHOLE NOMINAL INSIDE DIAMETER	INLET / OUTLET PIPE SIZE		
	DEFLECTION ANGLE		
	±90°	≥135°	±180°
1200	600mm CONC. (765mm MAX.O.D.)	675mm CONC.	750mm CONC. (765mm PVC) (940mm MAX.O.D.)
1500	750mm CONC. (940mm MAX.O.D.)	750 & 900mm CONC.	900mm CONC. (1120mm MAX.O.D.)
1800	900mm CONC. (1120mm MAX.O.D.)	1050mm CONC.	1200mm CONC. (1475mm MAX.O.D.)
2100	1050mm CONC. (1335mm MAX.O.D.)		1500mm CONC. (1828mm MAX.O.D.)
2400	1200mm CONC. (1475mm MAX.O.D.)		1800mm CONC. (2184mm MAX.O.D.)
3000	1500mm CONC. (1828mm MAX.O.D.)		2100mm CONC. (2540mm MAX.O.D.)

NOTES:
1. STANDARD DROPS ACROSS MANHOLES ARE AS FOLLOWS:
   - UP TO 45° DEFLECTION = 25mm DROP
   - 45° TO 90° DEFLECTION = 50mm DROP
2. MAXIMUM 0.75m DROP ACROSS ANY MANHOLE. REFER TO DROP MANHOLE DETAILS 5-06 & 5-07 FOR DROPS OVER 0.75m.

File Name: 5-03-MH INLET OUTLET PIPE DESIGN.dwg

Rev. By: MPT	Rev. Date: 2021-01-14
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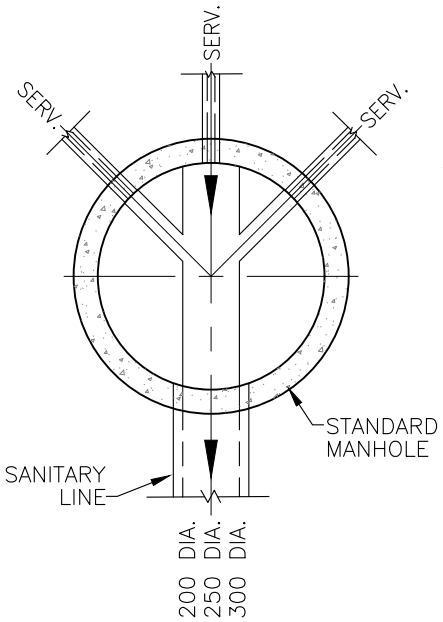
TOWN OF ROCKY MOUNTAIN HOUSE

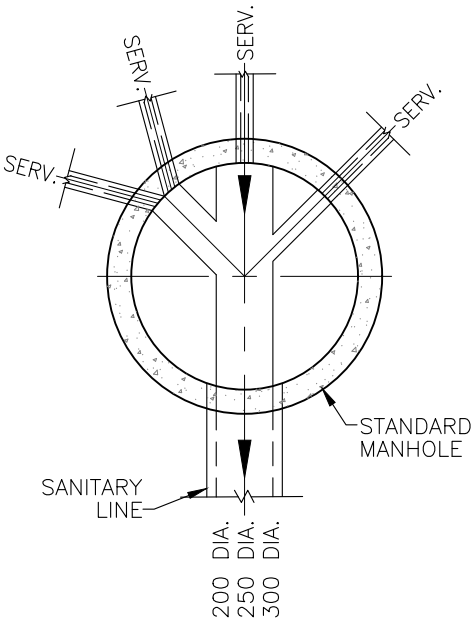
DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

MANHOLE INLET OUTLET PIPE DESIGN CONSIDERATIONS

DRAWING NO.
5-03
REVISION NO. 0



ALTERNATE 1



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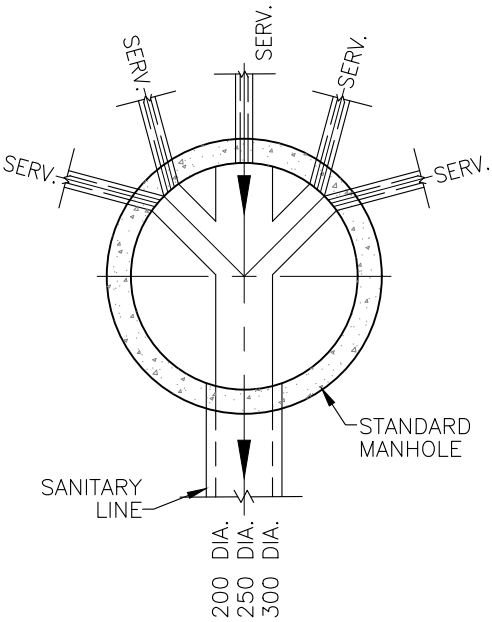
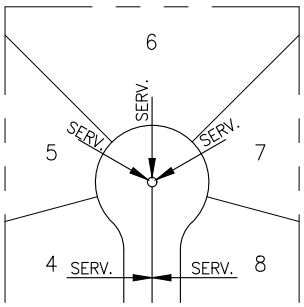
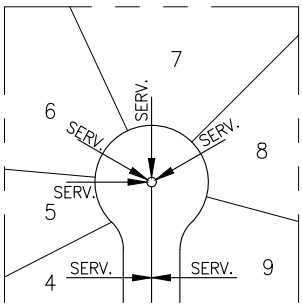


TYPICAL



ALTERNATE 1



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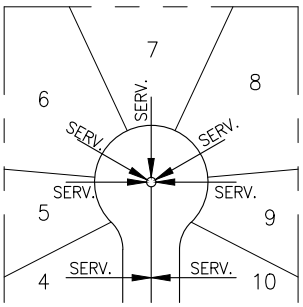

TYPICAL

NOTES:

- IN THE CASE OF MORE THAN 5 CONNECTIONS INTO A MANHOLE, A DETAILED DRAWING SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL.
- SANITARY MAIN TO GO STRAIGHT THROUGH MANHOLE WITH HALF PIPE TO OPPOSITE WALL
- MAXIMUM HEIGHT OF INLET 300mm ABOVE INVERT OF OUTLET
- HALF PIPE BENCHING TO ACCOMMODATE BRANCH CONNECTIONS
- SERVICE CONNECTIONS INTO BARREL TO BE MACHINE CORED

File Name: 5-04-SAN SERVICE CONN IN CUL-DE-SAC.dwg

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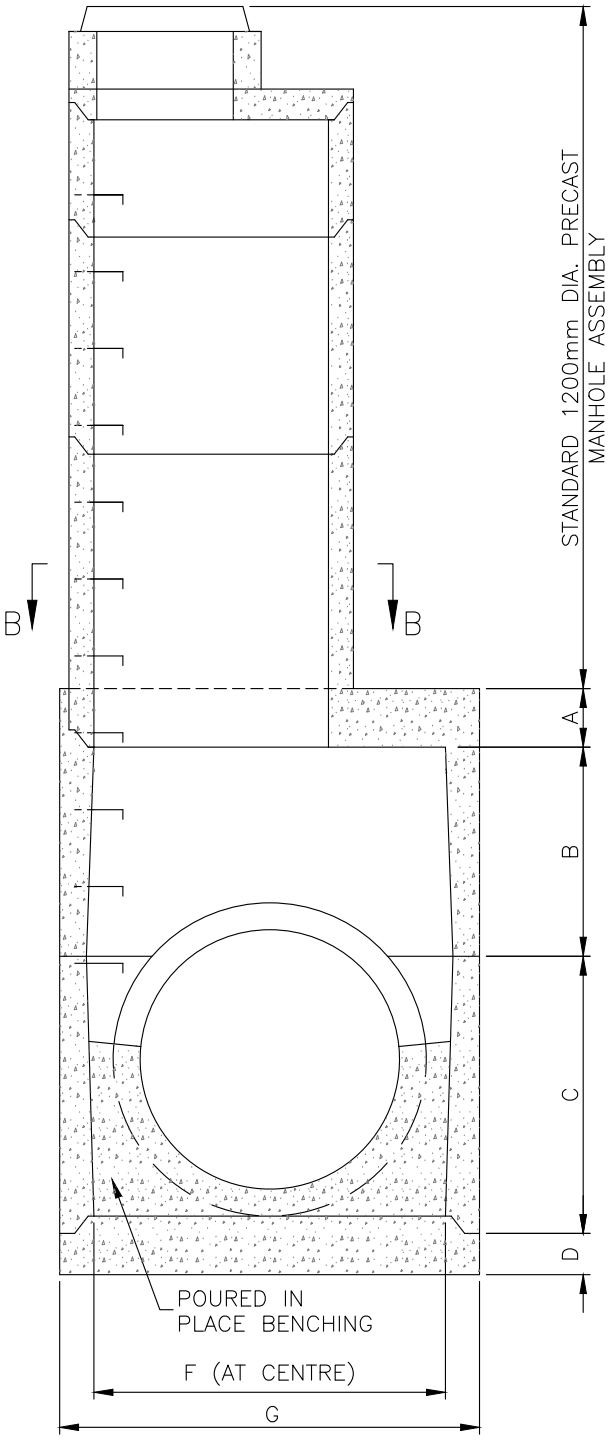
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

SERVICE CONNECTION DETAILS FOR SANITARY MANHOLES IN CUL-DE-SAC

DRAWING NO.
5-04

REVISION NO. 0

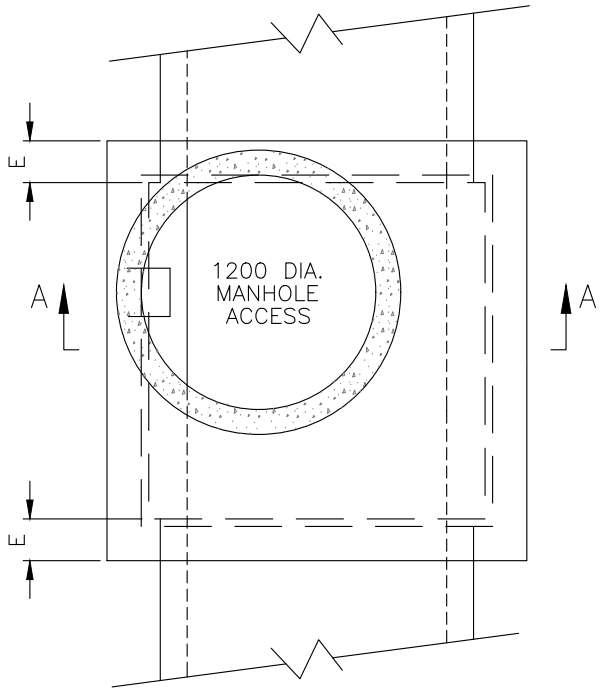


SECTION A–A

DIMENSIONS (mm)					
LOCATION	1.2x1.2	1.5x1.5	1.8x1.8	2.4x2.4	2.8x2.8
A	175	175	200	250	250
B	1010	1010	1000	1200	1400
C	1010	1010	1025	1200	1400
D	200	200	200	250	250
E	190	190	200	275	275
F	1200	1500	1930	2400	2800
G	1500	1800	2230	2860	3260

NOTES:

- FOR LAFARGE PRECAST VAULT OR EQUAL.
- DIMENSIONS SHOWN PROVIDED BY LAFARGE.



SECTION B–B

File Name: 5–05–PRECAST MANHOLE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

1-S PRECAST MANHOLE ASSEMBLY

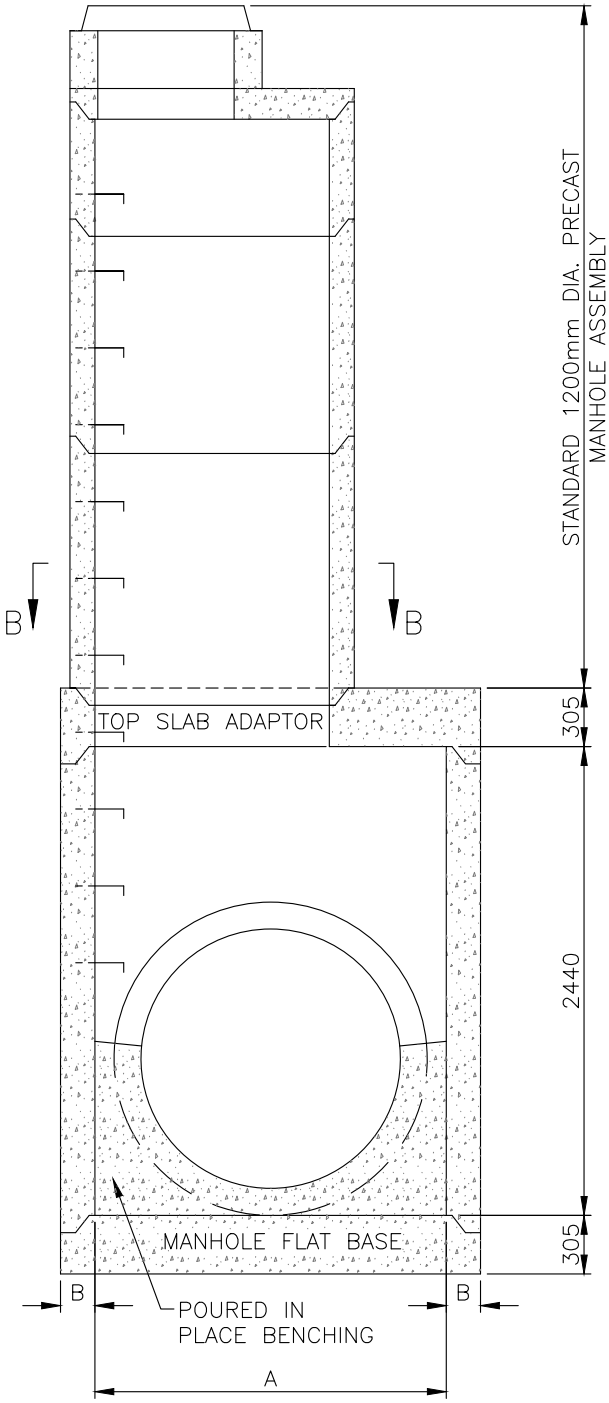
DRAWING NO.
5-05

REVISION NO. 0

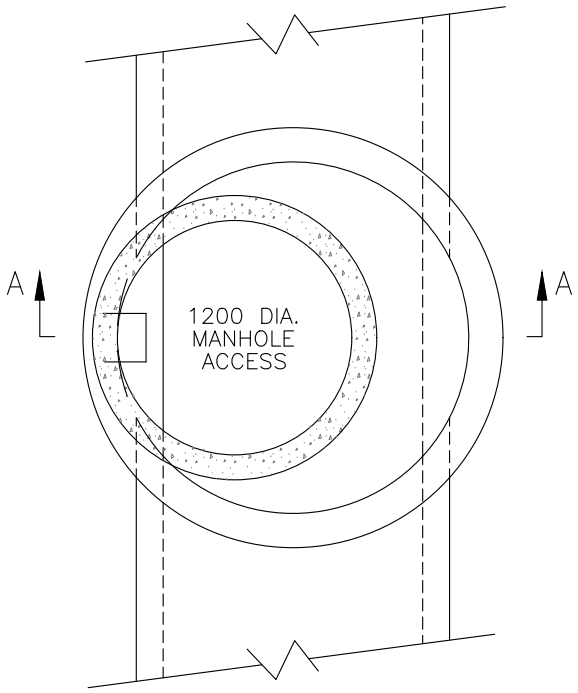
DIMENSIONS (mm)	
A	B
INSIDE DIAMETER	WALL THICKNESS
1372	140
1524	155
1676	165
1829	178
2134	203
2438	229
3048	254

NOTES:

- FOR LAFARGE PRECAST VAULT OR EQUAL.
- DIMENSIONS SHOWN PROVIDED BY LAFARGE



SECTION A–A



SECTION B–B

File Name: 5–06–1500–3000mm MANHOLE.dwg

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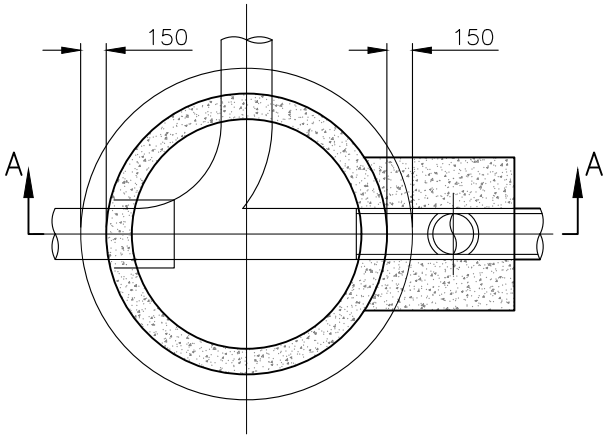
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

LARGE 1500-3000MM MANHOLE ASSEMBLY

DRAWING NO.
5-06

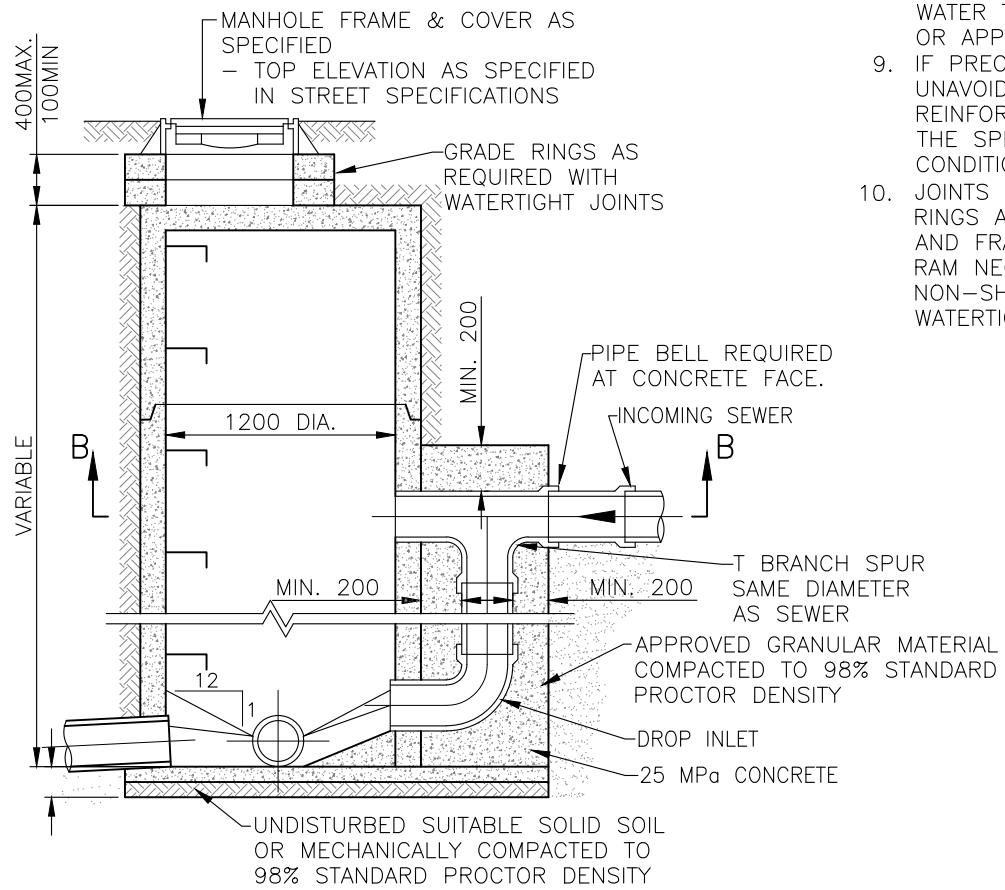
REVISION NO. 0



SECTION B–B

NOTES:

1. STEPS TO BE SPACED AT 400mm MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE 300mm MAX. ABOVE BENCHING.
2. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
3. CAST–IN–PLACE CONCRETE TO BE 25 MPa AT 28 DAYS.
4. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON–SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
5. CHANNELLING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. COMPACT BACKFILL AROUND MANHOLES TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
7. FOR MANHOLES EXCEEDING 6.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.
8. PRE–BENCHED MANHOLE BASES MUST BE USED WHEREVER POSSIBLE WITH PRECORED CONNECTION HOLES AND WATER TIGHT DURASEAL OR G–LOC JOINTS OR APPROVED EQUAL.
9. IF PRECAST CONCRETE BASES ARE UNAVOIDABLE, THICKNESS AND REINFORCEMENT MUST BE DESIGNED FOR THE SPECIFIC MANHOLE DEPTH AND SOIL CONDITIONS.
10. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND BETWEEN RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED WITH NON–SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN BE ACHIEVED.



SECTION A–A

File Name: 5–07–EXTERIOR DROP MANHOLE.DWG

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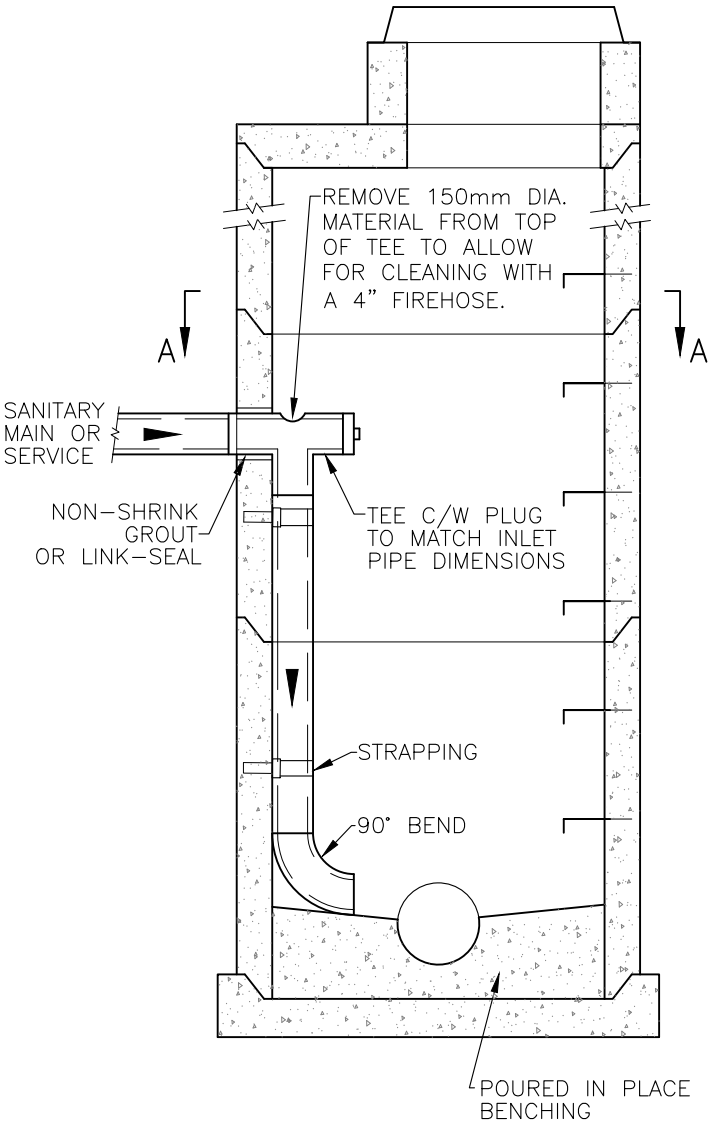
TOWN OF ROCKY MOUNTAIN HOUSE

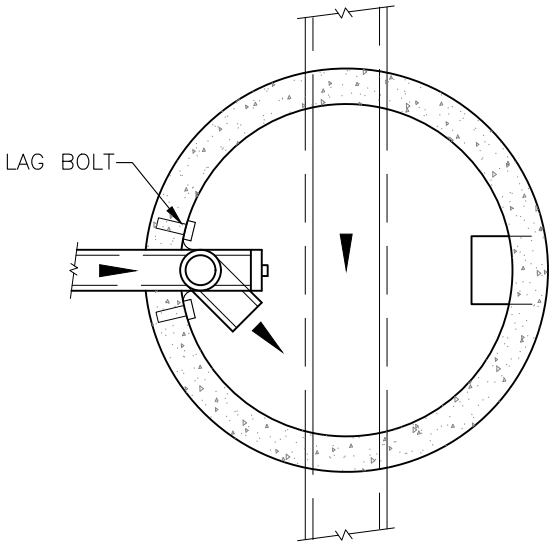
DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

EXTERNAL DROP MANHOLE

DRAWING NO.
5-07

REVISION NO. 0





SECTION A-A

NOTES:

- LAG BOLTS AND STRAPPING ARE TO BE INSTALLED IMMEDIATELY BELOW THE TEE AND A CONTINUAL 1000mm VERTICAL SPACING TO THE BASE.
- DIAMETER SIZE AND TYPE OF VERTICAL PIPE TO MATCH INLET PIPE.

File Name: 5-08-INTERIOR DROP MANHOLE.dwg

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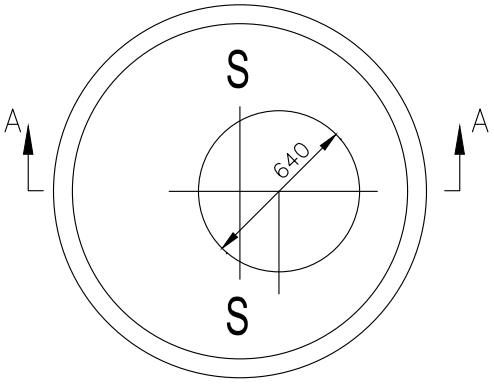
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

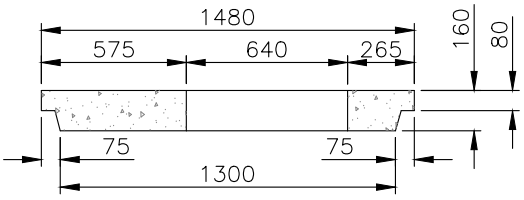
INTERNAL DROP MANHOLE

DRAWING NO. 5-08

REVISION NO. 0



PLAN

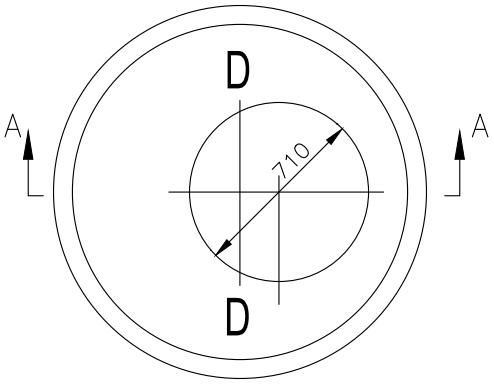


SECTION

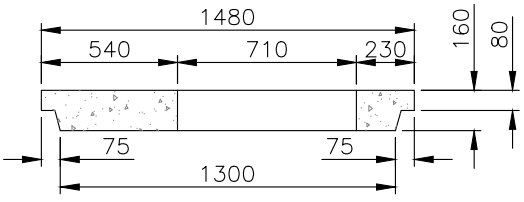
SANITARY MANHOLE

NOTES:

IMPRINT "S" ON SANITARY SLAB TOP AND "D" ON STORM SLAB TOP.



PLAN



SECTION

STORM MANHOLE

File Name: 5-09-1200mm PRECAST SLAB TOP.dwg

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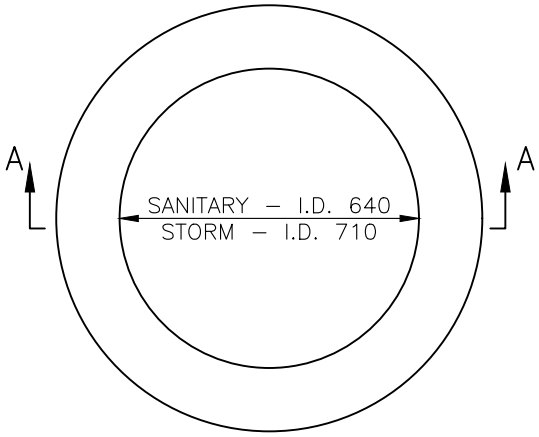
TOWN OF ROCKY MOUNTAIN HOUSE

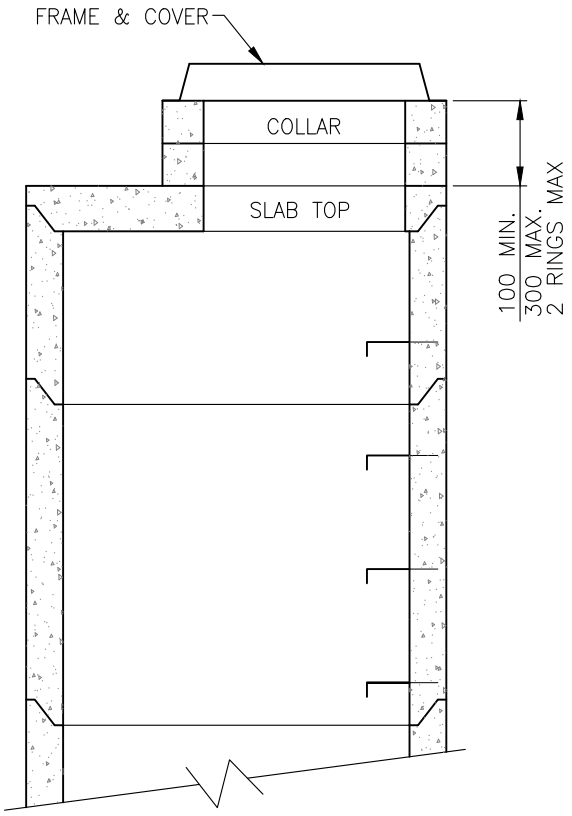
DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

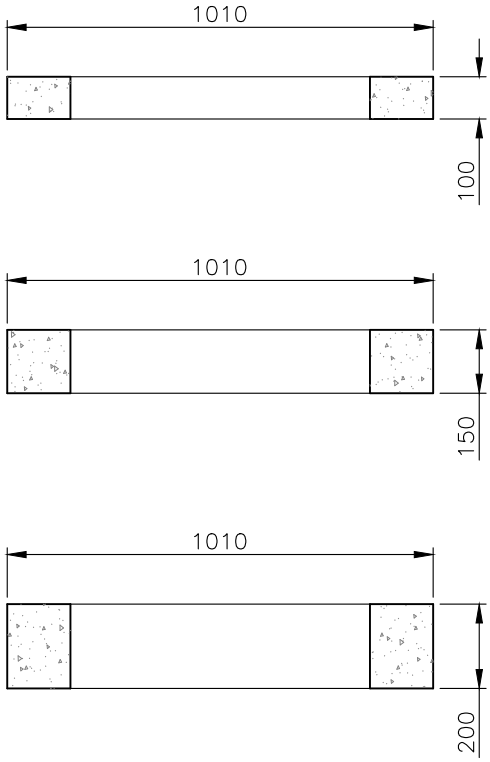
PRECAST SLAB TOPS FOR 1200MM MANHOLES

DRAWING NO.
5-09

REVISION NO. 0







NOTES:

IMPRINT "S" ON SANITARY COLLARS
AND "D" ON STORM COLLARS

SECTIONS A–A

File Name: 5–10–MANHOLE ADJUSTING COLLAR.dwg

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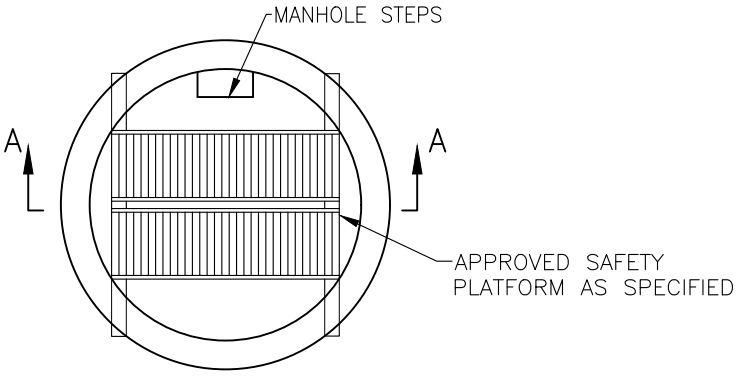
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

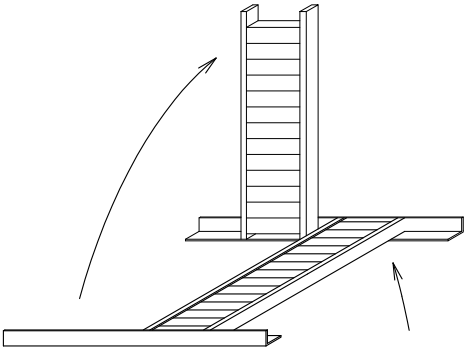
SANITARY AND STORM MANHOLE ADJUSTING COLLAR

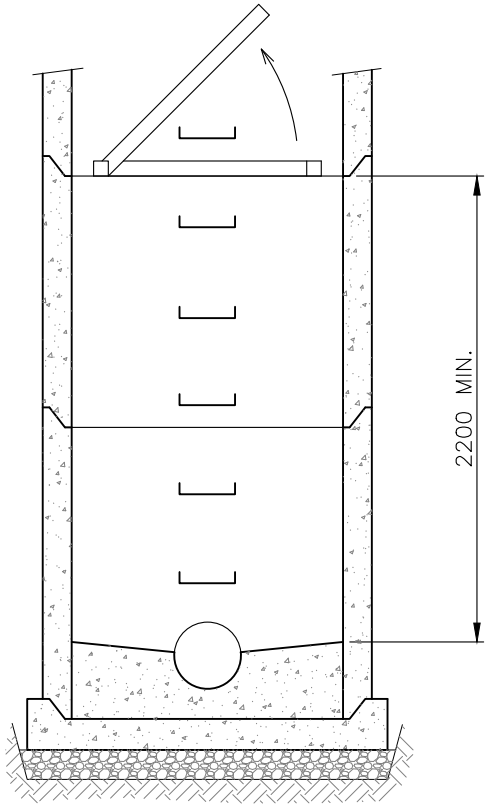
DRAWING NO.
5-10

REVISION NO. 0



PLAN VIEW





SECTION A–A

NOTES:

- PLATFORM TO BE INSTALLED IN ALL MANHOLES OVER 6.0m IN DEPTH, MEASURED FROM RIM TO INVERT ELEVATION.
- MAXIMUM SPACING BETWEEN PLATFORMS TO BE 6.0m.
- TO BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- PLATFORM TO BE ALUMINUM OR STAINLESS STEEL, TYPES 304 AND 316.

File Name: 5–11–MANHOLE SAFETY PLATFORM.dwg

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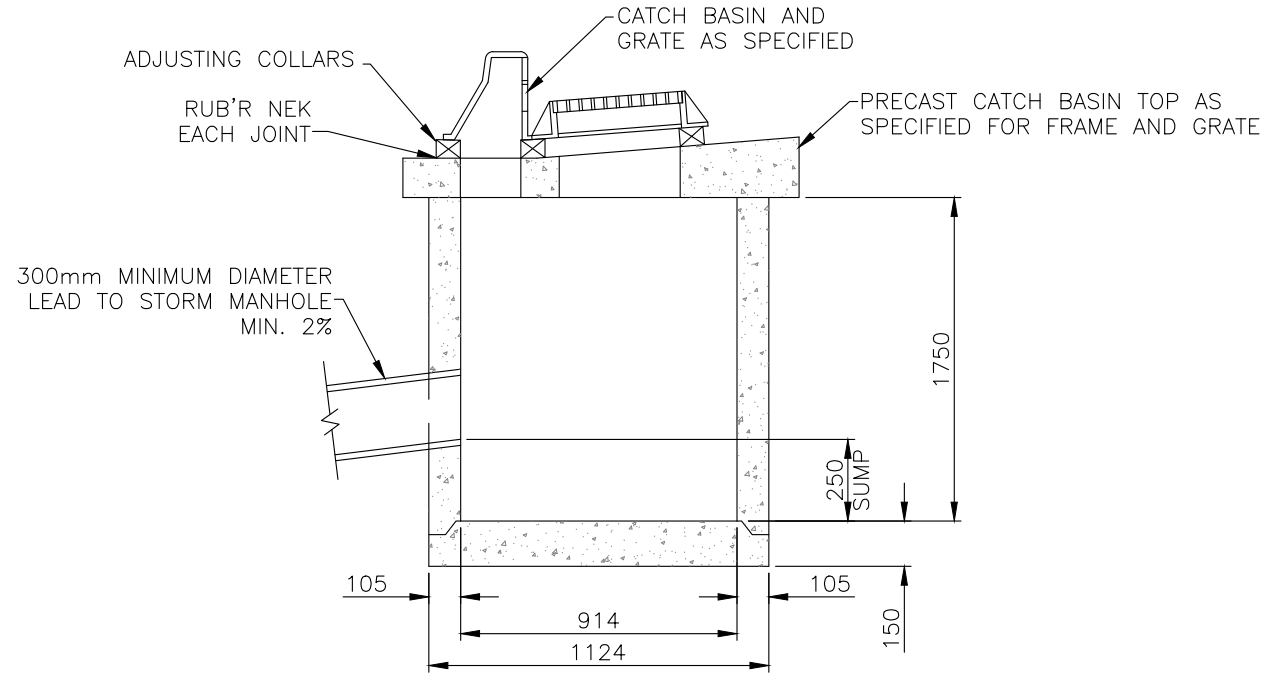
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

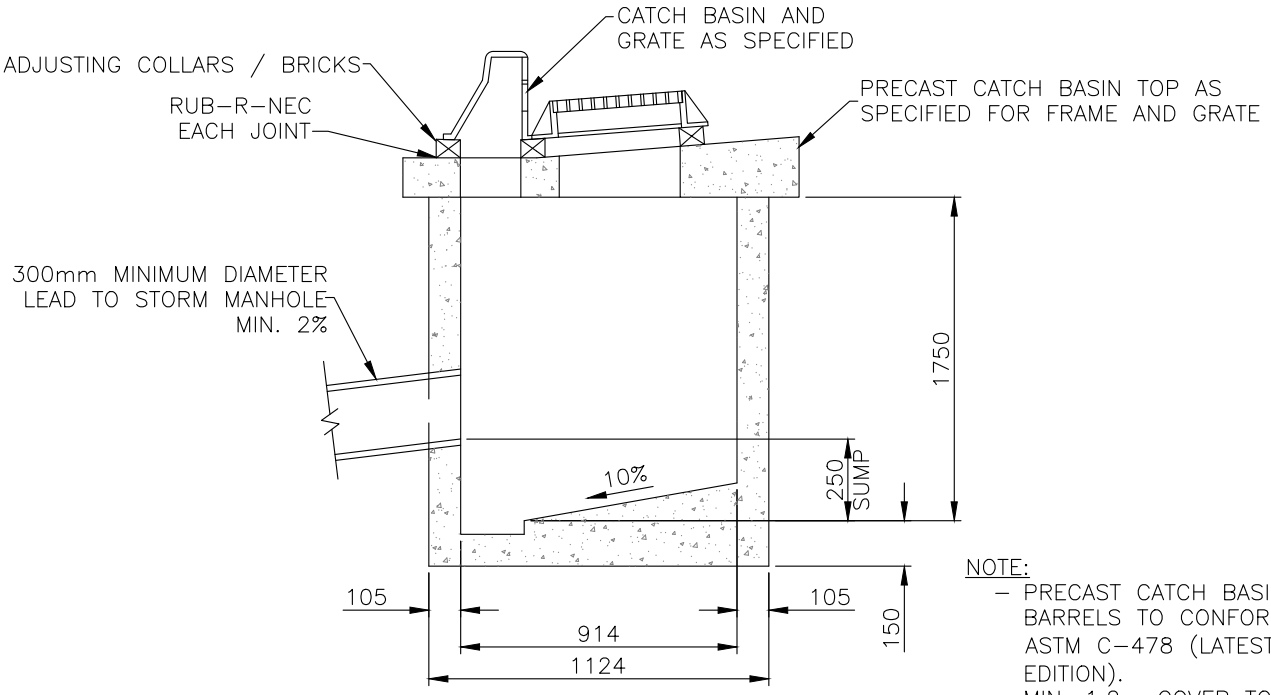
MANHOLE SAFETY PLATFORM

DRAWING NO.
5-11

REVISION NO. 0



SEPARATE BASE CATCHBASIN



MONOLITHIC BASE CATCHBASIN

NOTE:
- PRECAST CATCH BASIN BARRELS TO CONFORM TO ASTM C-478 (LATEST EDITION).
- MIN. 1.2m COVER TO OBVERT OF ALL PIPES.

File Name: 5-12-PRECAST CATCH BASIN.dwg

Rev. By: MPT	Rev. Date: 2021-01-14
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No.	Revision

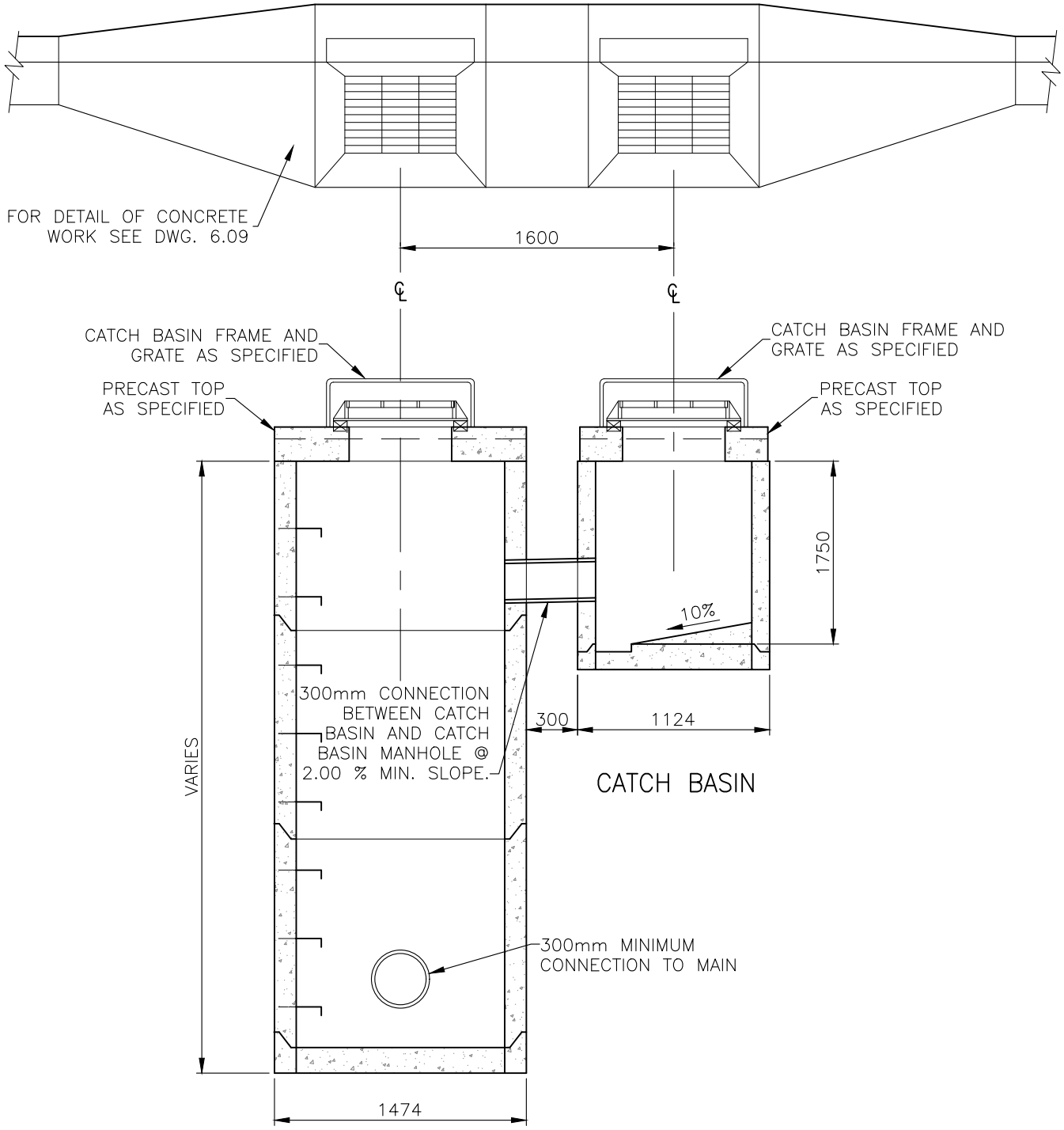
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

PRECAST CATCHBASIN ASSEMBLY

DRAWING NO.
5-12

REVISION NO. 0



File Name: 5-13-TWIN CB AND CBMH.dwg

Rev. By: MPT	Rev. Date: 2021-01-14
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No.	Revision

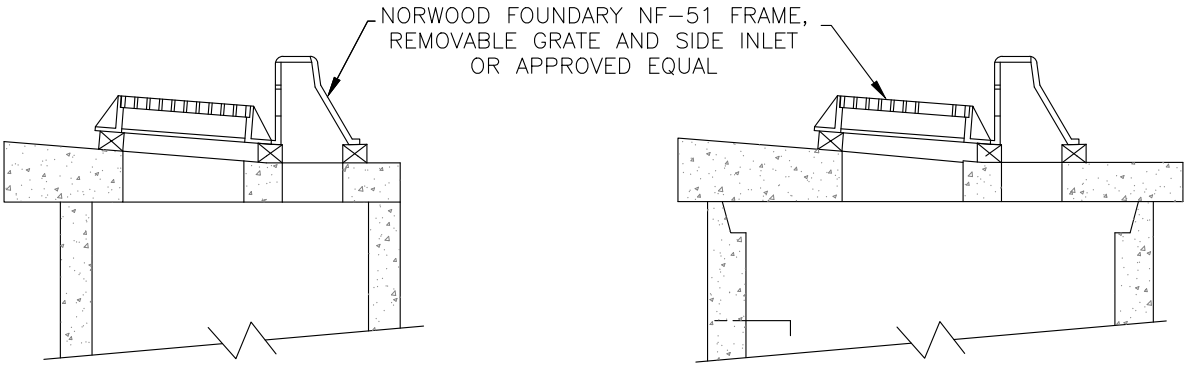
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

TWIN CATCH BASIN-CATCH BASIN MANHOLE ASSEMBLY

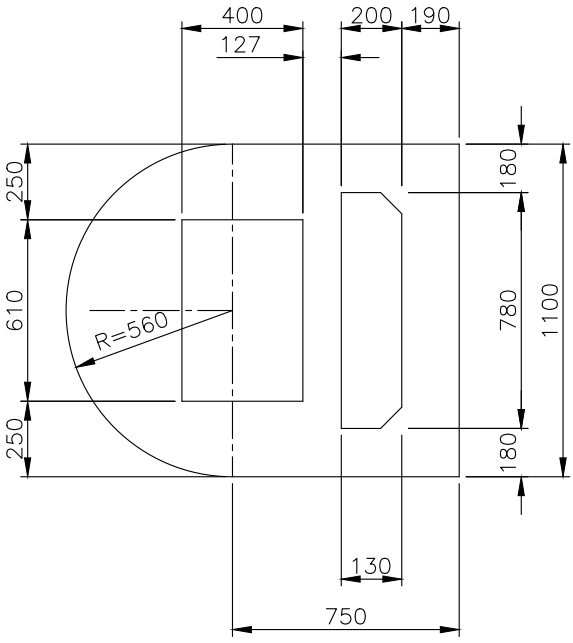
DRAWING NO. 5-13

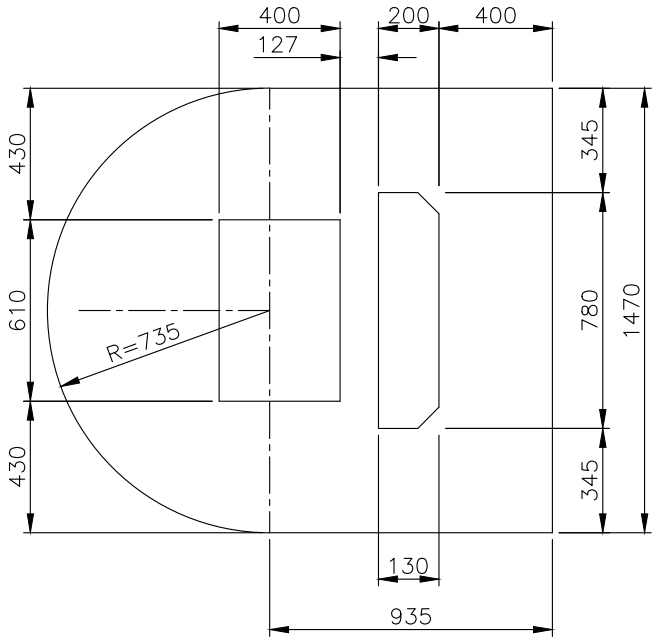
REVISION NO. 0

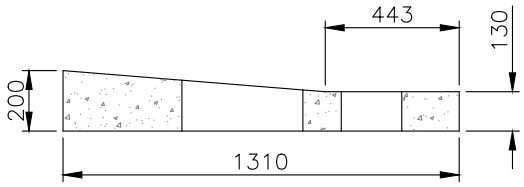


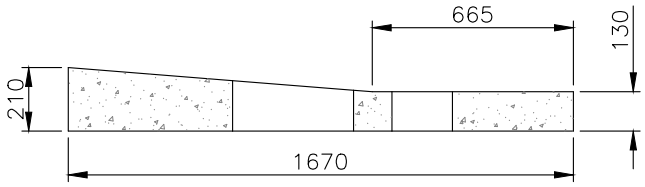
K1 CATCH BASIN

K1 CATCH BASIN MANHOLE









PRECAST K-1 TOP FOR NF-51 CB FRAME, GRATE, AND SIDE INLET

PRECAST K-1 TOP FOR NF-51 CBMH FRAME, GRATE, AND SIDE INLET

File Name: 5-14-TYPE K-1 CB AND CBMH TOP SECTION.dwg

Rev. By: MPT	Rev. Date: 2021-01-14
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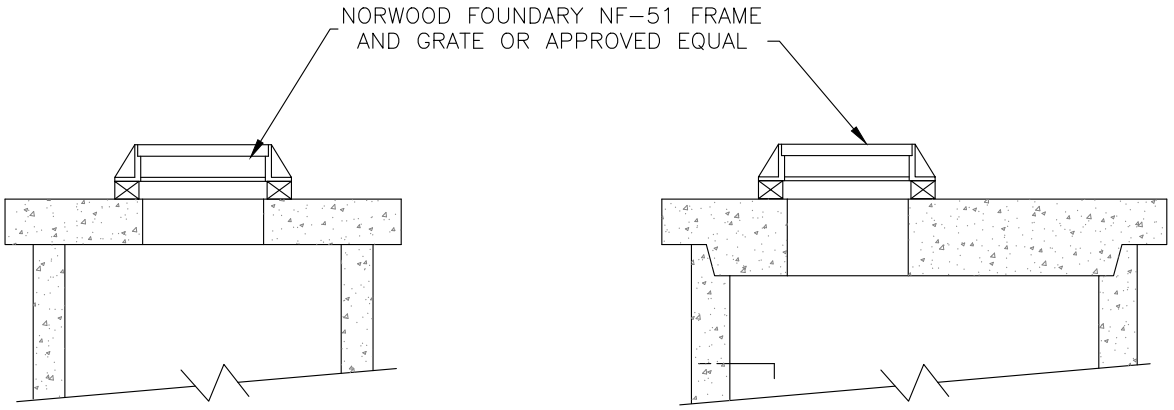
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

TYPE K-1 CATCH BASIN AND CATCH BASIN MANHOLE TOP SECTION

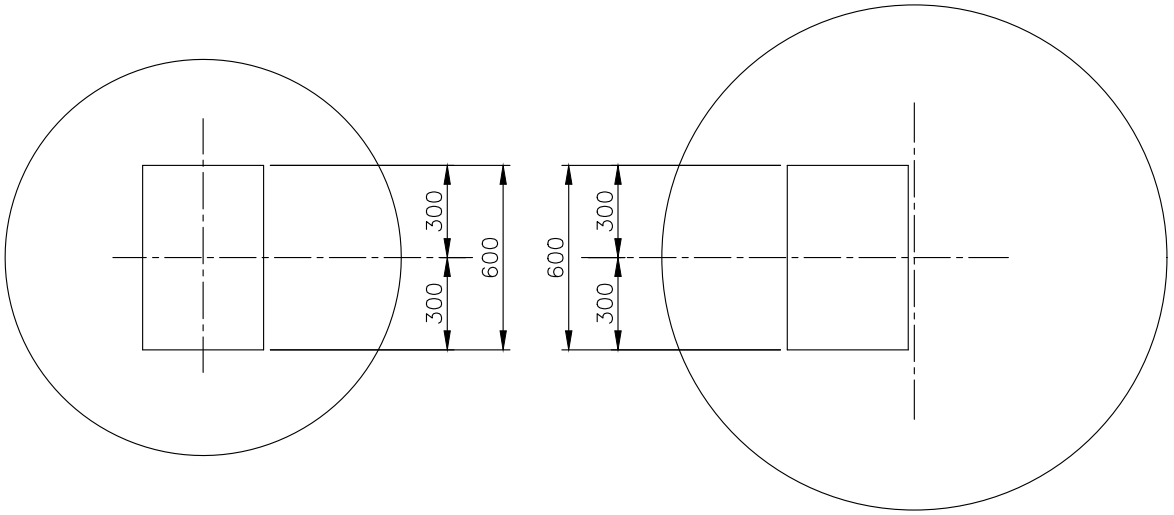
DRAWING NO. 5-14

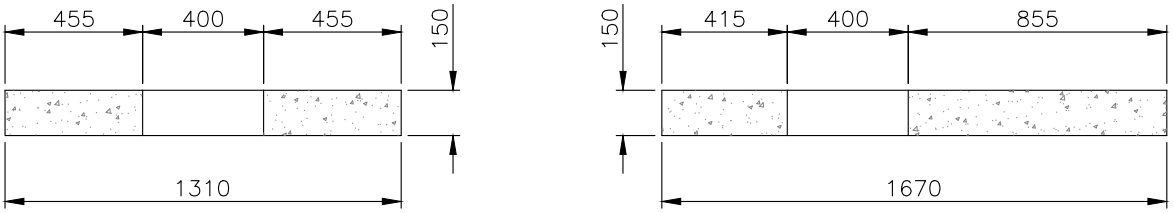
REVISION NO. 0



K-3 CATCH BASIN

K-3 CATCH BASIN MANHOLE





PRECAST K-3 CATCH BASIN TOP
FOR NF-51 CB FRAME AND GRATE

PRECAST K-3 CATCH BASIN MANHOLE
TOP FOR NF-51 CB FRAME AND GRATE

File Name: 5-15-TYPE K-3 CB AND CBMH TOP SECTION.dwg

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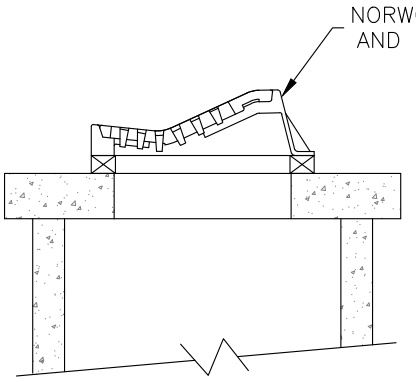
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

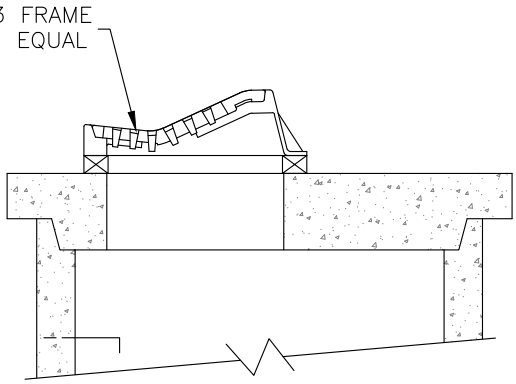
TYPE K-3 CATCH BASIN AND CATCH BASIN MANHOLE TOP SECTION

DRAWING NO.
5-15

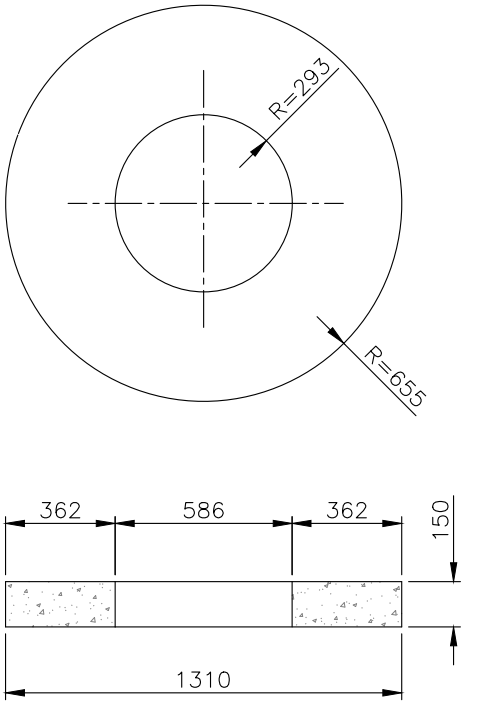
REVISION NO. 0



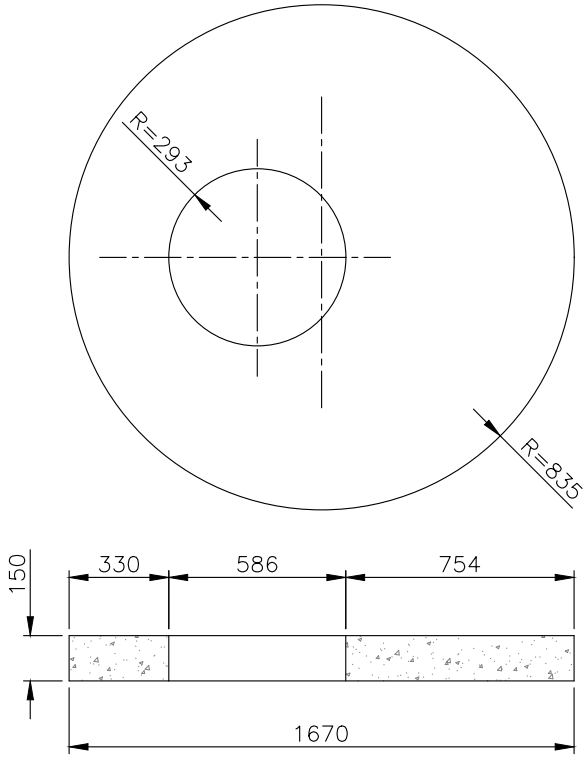
K–4 CATCH BASIN



K–4 CATCH BASIN MANHOLE



PRECAST K–4 CATCH BASIN TOP
FOR NF33 CB FRAME AND GRATE



PRECAST K–4 CATCH BASIN MANHOLE
TOP FOR NF33 CBMH FRAME AND GRATE

File Name: 5–16–TYPE K–4 CB AND CBMH TOP SECTION.dwg

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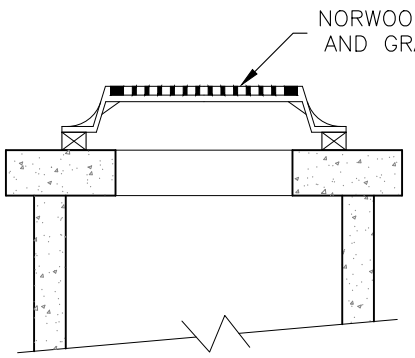
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

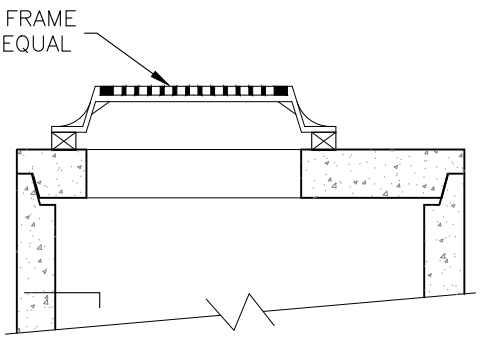
TYPE K-4 CATCH BASIN AND CATCH BASIN MANHOLE TOP SECTION

DRAWING NO.
5-16

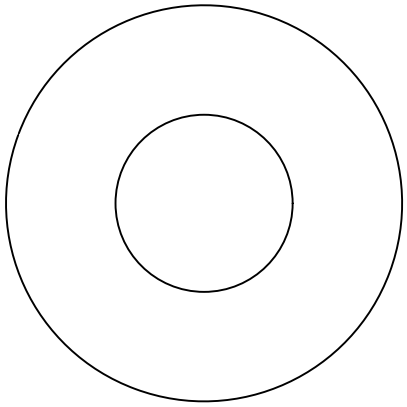
REVISION NO. 0

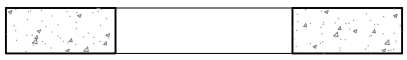


K–6 CATCH BASIN

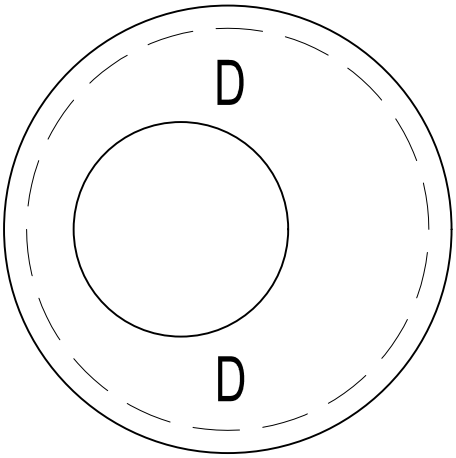


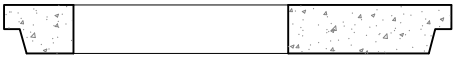
K–6 CATCH BASIN MANHOLE





PRECAST K–6 CATCH BASIN TOP FOR NF49 FRAME AND GRATE





PRECAST K–6 STORM MANHOLE TOP FOR NF49 FRAME AND GRATE (AS PER DWG. 5.08)

File Name: 5–17–TYPE K–6 CB AND CBMH TOP SECTION.dwg

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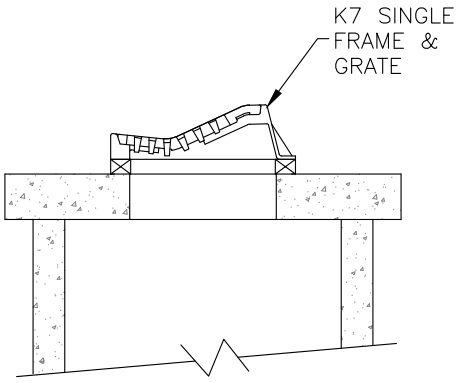
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

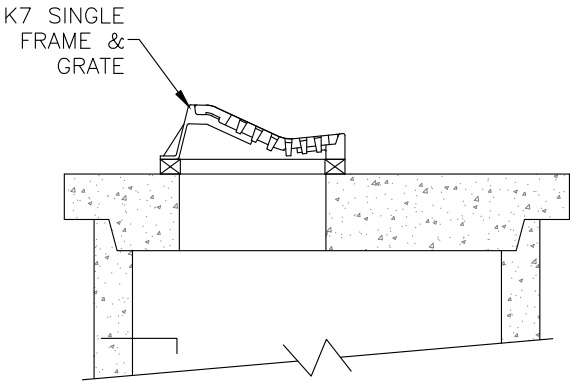
TYPE K-6 CATCH BASIN AND CATCH BASIN MANHOLE TOP SECTION

DRAWING NO. 5-17

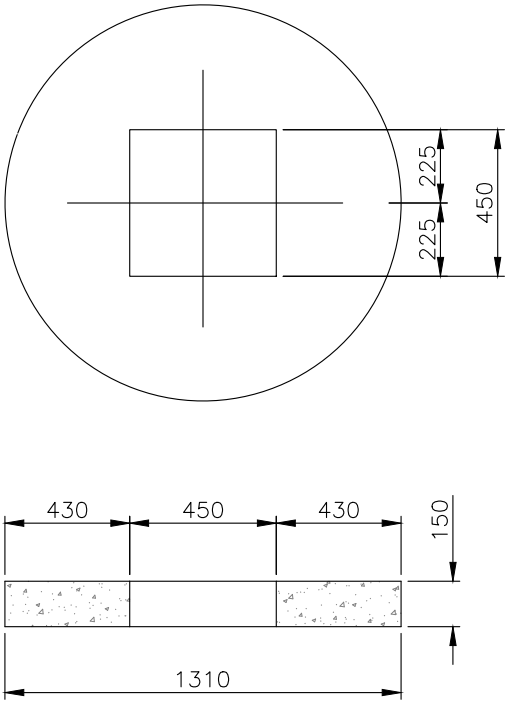
REVISION NO. 0



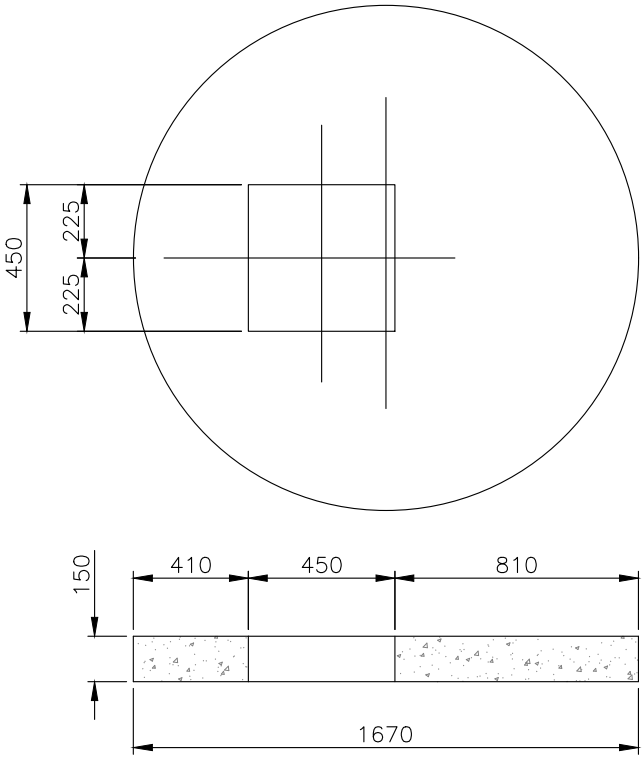
SK–7 CATCH BASIN



SK–7 CATCH BASIN MANHOLE



PRECAST SK–7 CATCH BASIN TOP
FOR SK–7 CB FRAME AND GRATE



PRECAST SK–7 CATCH BASIN MANHOLE
TOP FOR SK–7 CBMH FRAME AND GRATE

File Name: 5–18–TYPE SK–7 CATCH BASIN MANHOLE.dwg

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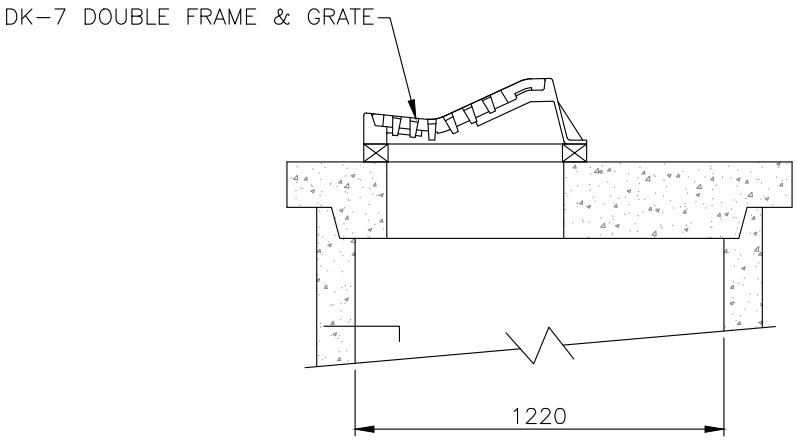
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

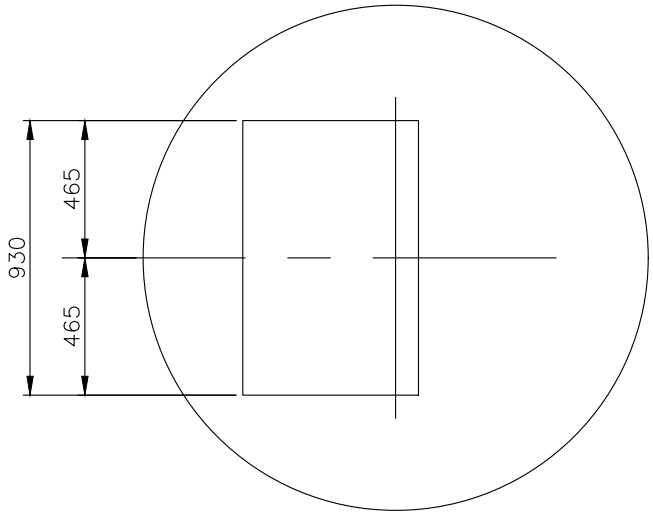
TYPE SK-7 CATCH BASIN MANHOLE

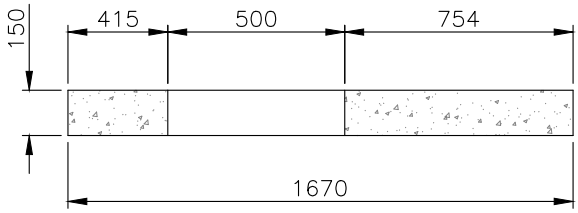
DRAWING NO.
5-18

REVISION NO. 0



DK–7 CATCH BASIN MANHOLE





PRECAST DK–7 CATCH BASIN MANHOLE
TOP FOR DK–7 DOUBLE FRAME AND GRATE

File Name: 5–19–TYPE DK–7 CATCH BASIN MANHOLE.dwg

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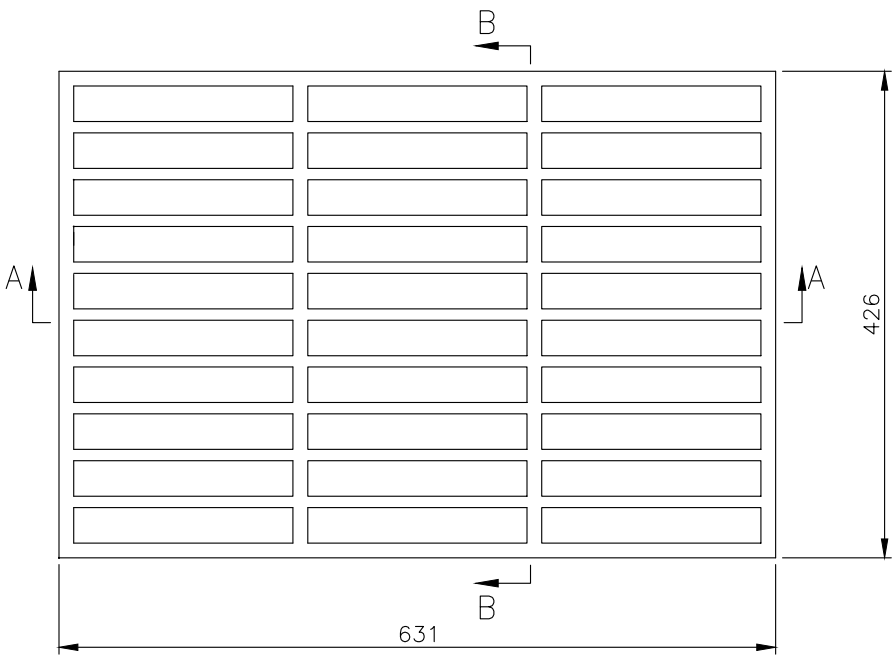
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

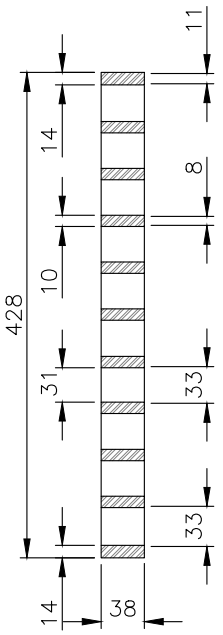
TYPE DK-7 CATCH BASIN MANHOLE

DRAWING NO.
5-19

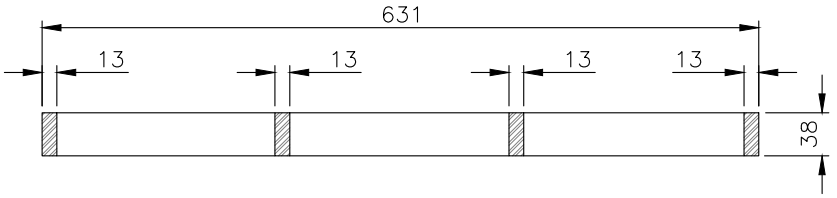
REVISION NO. 0



PLAN



SECTION B–B



SECTION A–A

MATERIAL SPECIFICATIONS:

- NORWOOD F–51 GRATE OR EQUAL
- CAST STEEL TO CONFORM TO GRADE 60–90
  A.S.T.M. A48 CLASS 20 OR DUCTILE IRON TO CONFORM TO A.S.T.M. A455
- MASS 24KG ±5%
- HOT DIPPED IN ASPHALT

File Name: 5–20–TYPE F–51 CATCH BASIN GRATE.dwg

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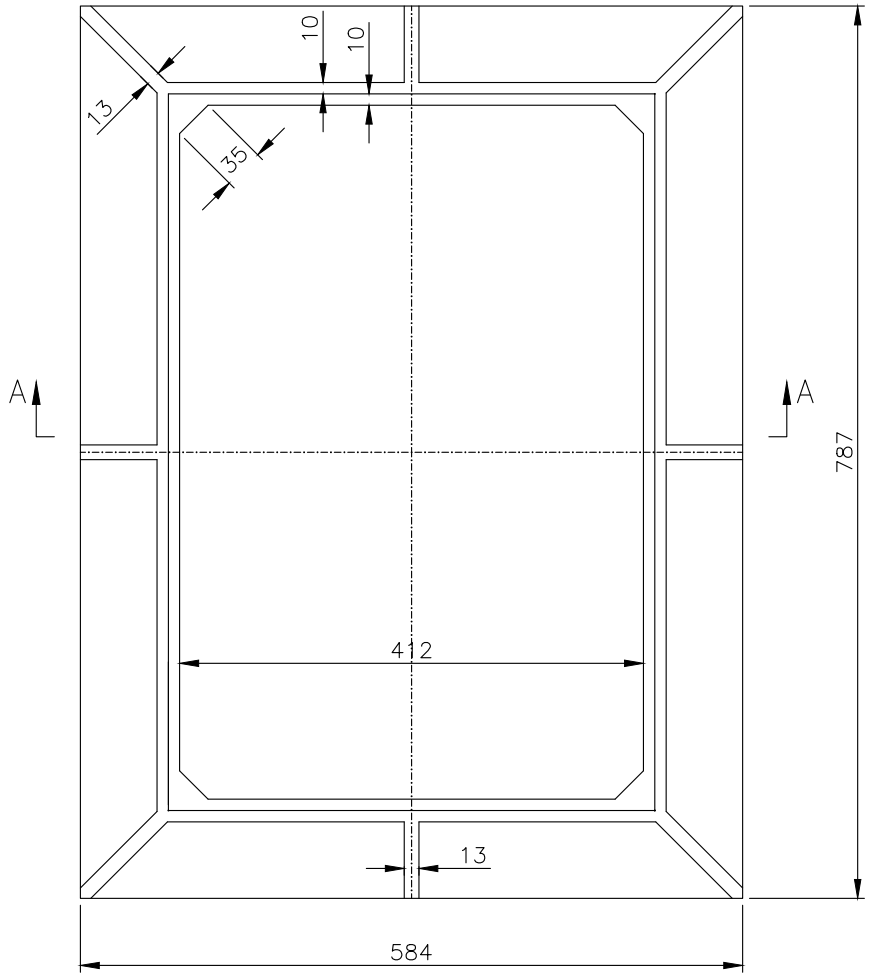
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

TYPE F-51 CATCH BASIN GRATE

DRAWING NO.
5-20

REVISION NO. 0



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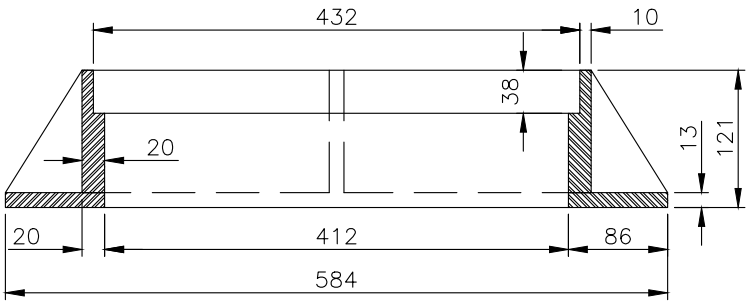

SECTION A–A

MATERIAL SPECIFICATIONS:

- NORWOOD F–51 – FRAME OR EQUAL
- HOT DIPPED IN ASPHALT
- GREY CAST IRON TO CONFORM TO ASTM A48 CLASS 20
- MASS = 57KG

File Name: 5–21–TYPE F–51 CATCH BASIN FRAME.dwg

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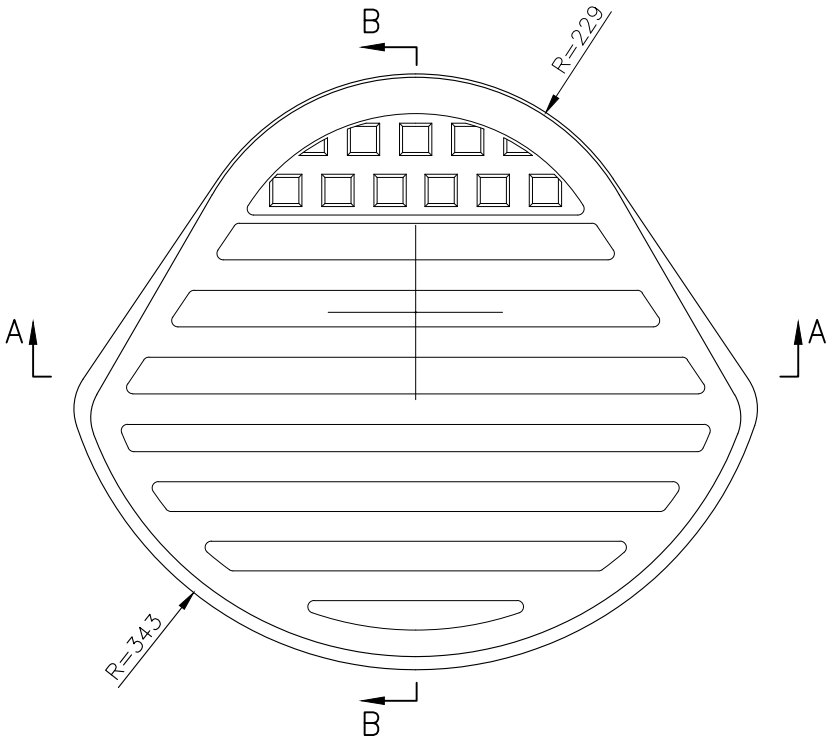
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

TYPE F-51 CATCH BASIN FRAME

DRAWING NO. 5-21

REVISION NO. 0



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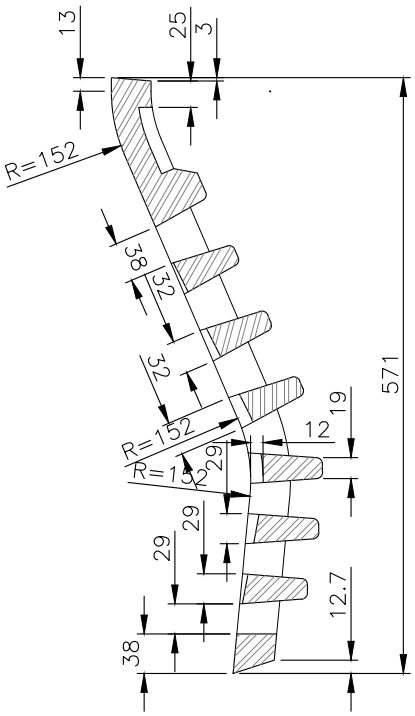
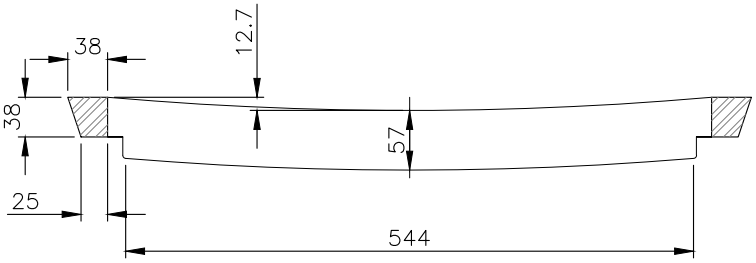


SECTION B–B



SECTION A–A

MATERIAL SPECIFICATIONS:

- NORWOOD F33 OR EQUAL
- CAST STEEL TO CONFORM TO GRADE 60–90 A.S.T.M. A48 CLASS 20 OR DUCTILE IRON TO CONFORM TO A.S.T.M. A455
- HOT DIPPED IN ASPHALT

File Name: 5–22–TYPE F–33 CB GRATE.dwg

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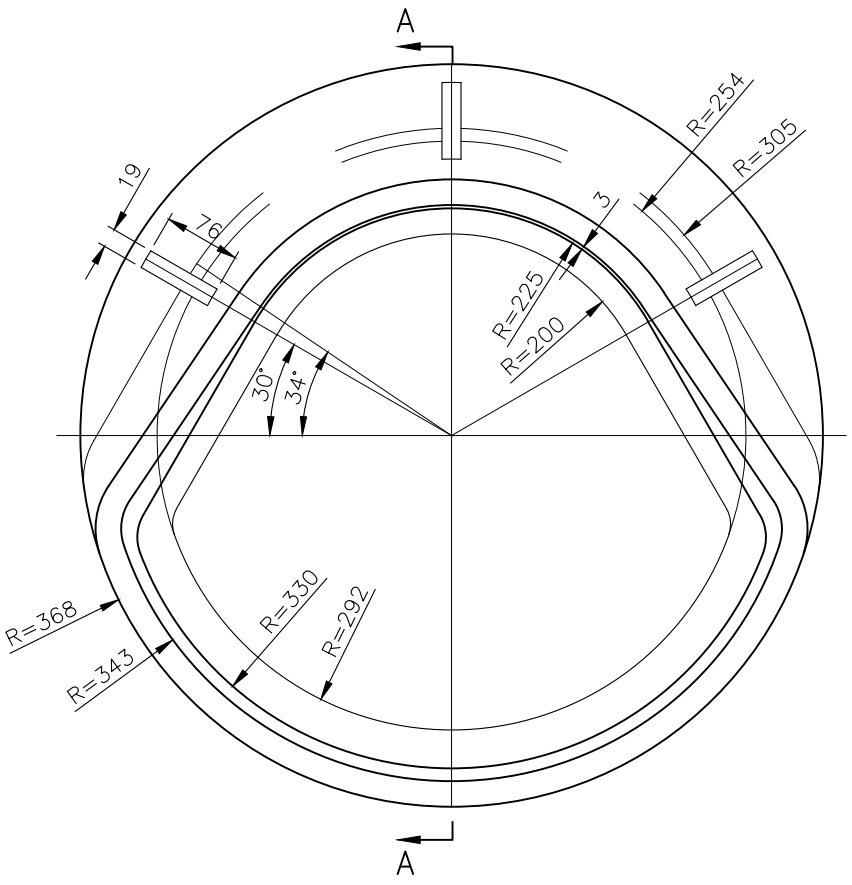
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

TYPE F-33 CATCH BASIN GRATE

DRAWING NO. 5-22

REVISION NO. 0



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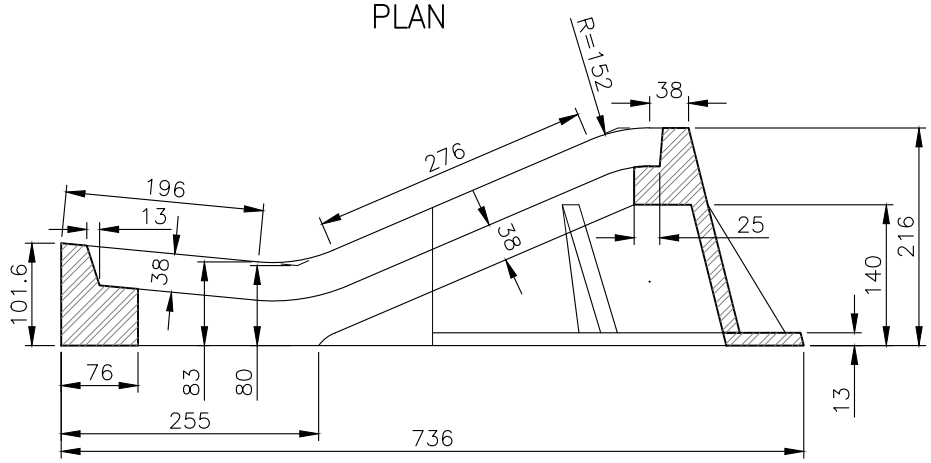

SECTION A–A

MATERIAL SPECIFICATIONS:

- GREY CAST IRON TO CONFORM TO CLASS 20 ASTM A48 (LATEST EDITION)
- MASS = 98KG

File Name: 5–23–TYPE F–33 CB FRAME.dwg

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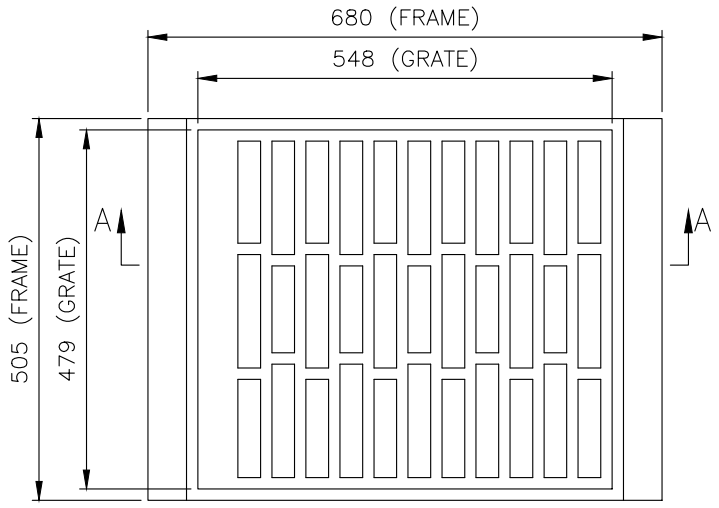
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

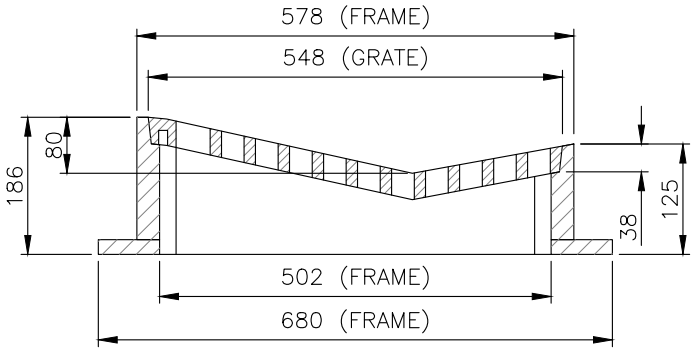
TYPE F-33 CATCH BASIN FRAME

DRAWING NO. 5-23

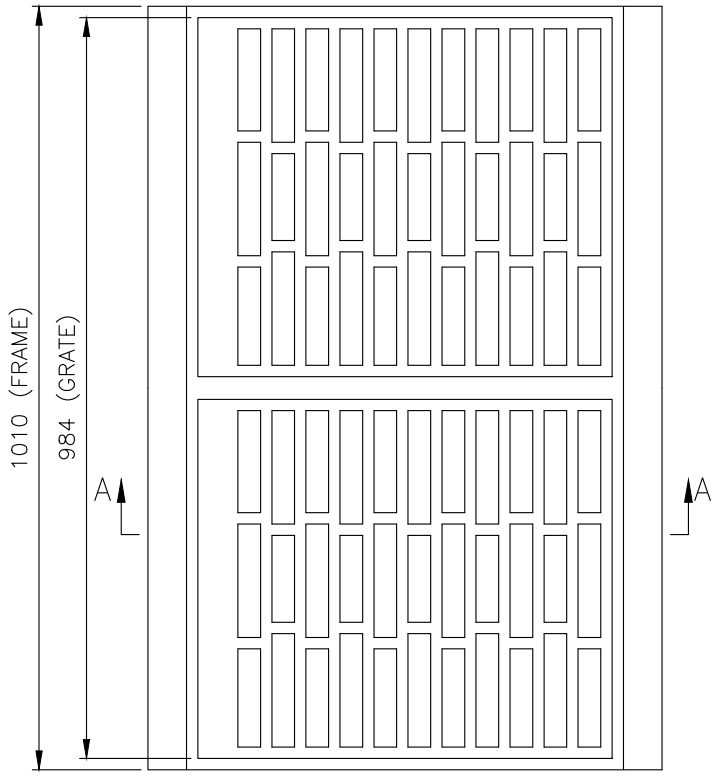
REVISION NO. 0



SINGLE FRAME & GRATE PLAN



SECTION A–A



DOUBLE FRAME & GRATE PLAN

MATERIAL SPECIFICATIONS:

1. FRAME: GREY CAST IRON TO CONFORM TO CLASS 258 A.S.T.M. A48 (LATEST EDITION)
   GRATE: DUCTILE IRON TO CONFORM TO A.S.T.M. A536 (LATEST EDITION) GRADE 80–55–06
2. THE CASTINGS SHALL BE TRUE TO PATTERN AND FREE FROM CRACKS, GAS HOLES, FLAWS AND EXCESSIVE SHRINKAGE.
3. SURFACES OF THE CASTINGS SHALL BE FREE FROM BURNT ON SAND AND SHALL BE REASONABLY SMOOTH.
4. RUBBERS, RISERS, FINS AND OTHER CAST ON PIECES SHALL BE REMOVED.
5. IN OTHER RESPECT THE CASTINGS SHALL CONFORM TO WHATEVER POINTS MAY BE AGREED UPON BETWEEN THE MANUFACTURER AND THE TOWN ENGINEER.
6. UPON REQUEST OF THE TOWN ENGINEER THE MANUFACTURER SHALL BE PREPARED TO CERTIFY THAT HIS PRODUCT CONFORMS TO THE REQUIREMENTS OF A.S.T.M. DESIGNATION A–48 (CAST IRON) OR A.S.T.M. A–536 (DUCTILE IRON) & AASHTO M306–10.

File Name: 5–24–TYPE K–7 CB FRAME & GRATE.dwg

Rev. By: MPT	Rev. Date: 2021–01–14
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No.	Revision

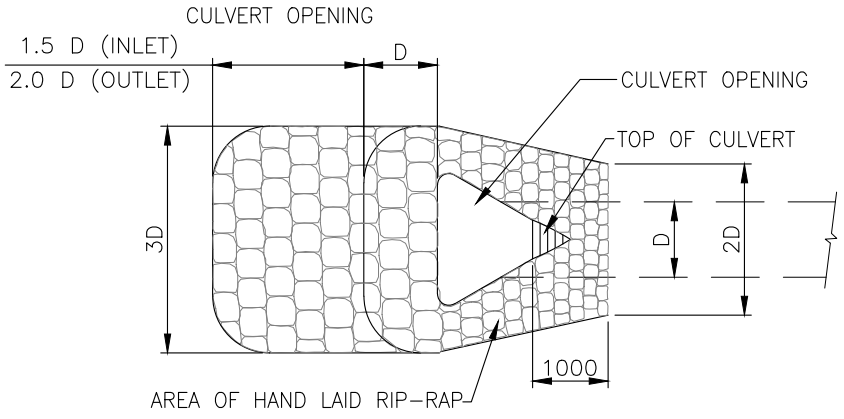
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

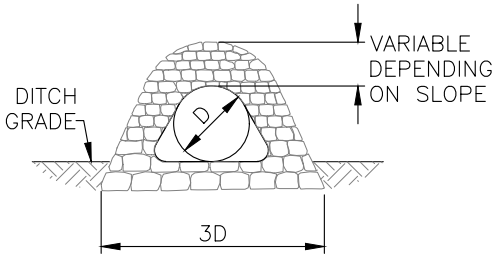
TYPE K-7 & DK-7 CATCH BASIN FRAME AND GRATE

DRAWING NO.
5-24

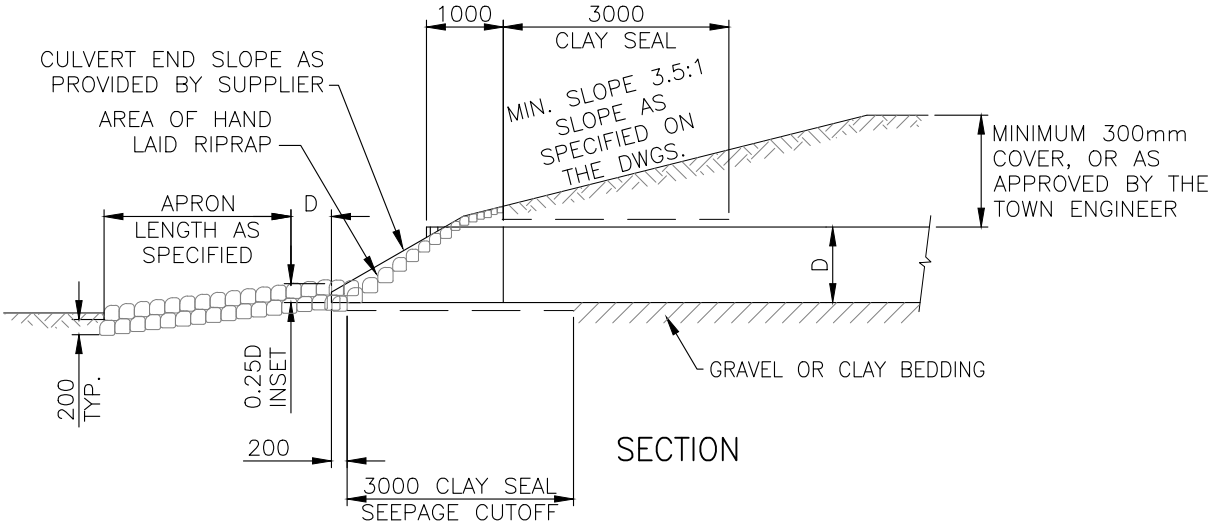
REVISION NO. 0



PLAN VIEW



ELEVATION



SECTION

NOTES:

- PLACE ROCKS AND BOULDERS AS SPECIFIED
- A CLAY SEAL IS TO BE PLACED AT BOTH ENDS OF THE CULVERT FOR A LENGTH OF 2.0m TO CUT OFF SEEPAGE. THE CLAY SEAL SHALL EXTEND FROM THE BOTTOM OF THE EXCAVATION TO 300mm ABOVE THE CROWN OF THE PIPE, & FOR THE FULL WIDTH OF THE EXCAVATION.
- WHERE APRONS ARE REQUIRED DUE TO HIGH VELOCITY FLOW OR EROSION PRONE SOIL, TYPICALLY THE MINIMUM INLET APRON IS 1.5 X DIAMETER LONG WHILE THE MINIMUM OUTLET APRON (WHERE WATER VELOCITY IS HIGHER) IS 2.0m LONG.

ESTIMATED RIP-RAP SURFACE AREAS (BASED ON A 4:1 SIDESLOPE)

PIPE DIAMETER (mm)	AREA OF ONE END EXCLUDING APRON (sq. m)	AREA OF ONE END INCLUDING INLET APRON (sq. m)	AREA OF ONE END INCLUDING OUTLET APRON (sq. m)
400	1	1.5	2
500	2	3	4
600	3	5	6
700	4	6	7
800	5	8	9
900	6	10	11
1000	7	12	13
1100	9	14	16
1200	10	16	19
1400	13	22	25

File Name: 5-25-CULVERT RIP-RAP.dwg

Rev. By: MPT	Rev. Date: 2021-01-14
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No.	Revision

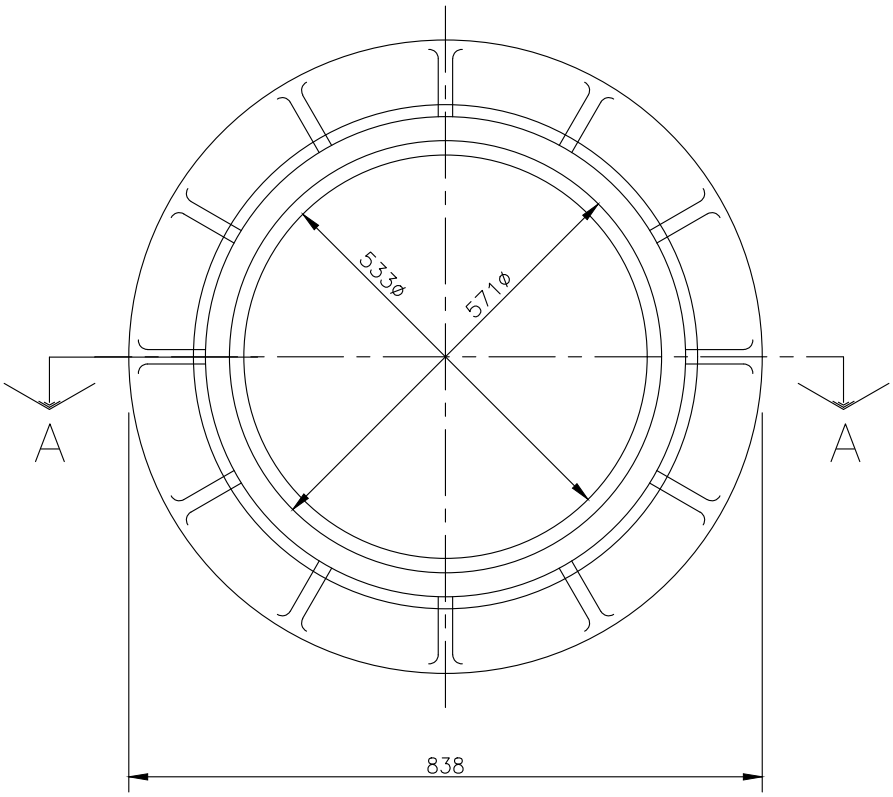
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

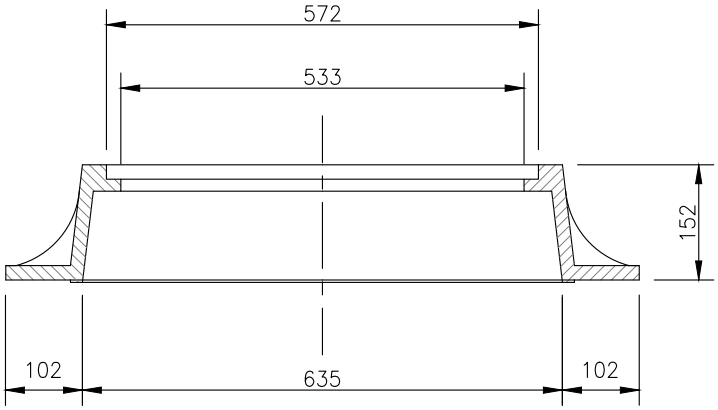
RIP-RAP CULVERT END TREATMENT

DRAWING NO.
5-25

REVISION NO. 0



PLAN



SECTION A–A

File Name: 5–26–SANITARY AND STORM MH FRAME.dwg

Rev. By: MPT	Rev. Date: 2021–01–14
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No.	Revision

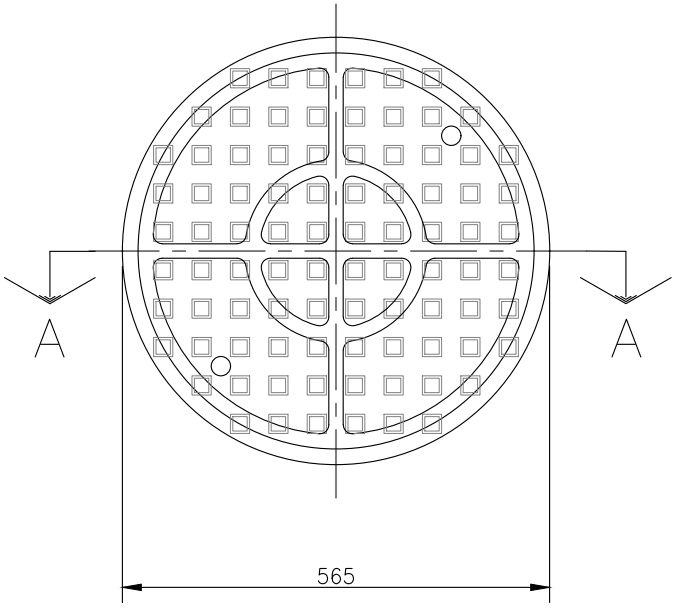
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

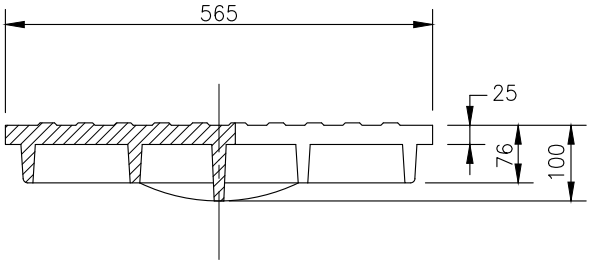
SANITARY AND STORM MANHOLE FRAMES

DRAWING NO. 5-26

REVISION NO. 0



PLAN



SECTION A–A

File Name: 5–27–SANITARY MANHOLE COVER.dwg

Rev. By: MPT	Rev. Date: 2021–01–14
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No.	Revision

TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Manholes & Catch Basins

SANITARY AND STORM MANHOLE COVERS

DRAWING NO.
5-27

REVISION NO. 0

LEGEND

- FREEWAY
- EXPRESSWAY
- MAJOR ARTERIAL
- MINOR ARTERIAL
- COLLECTOR
- LOCAL
- PUBLIC LANE
- SIGNALIZED INTERSECTION
- CUL-DE-SAC

File Name: 6-01-ROADWAY CLASSIFICATIONS.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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No.	Revision

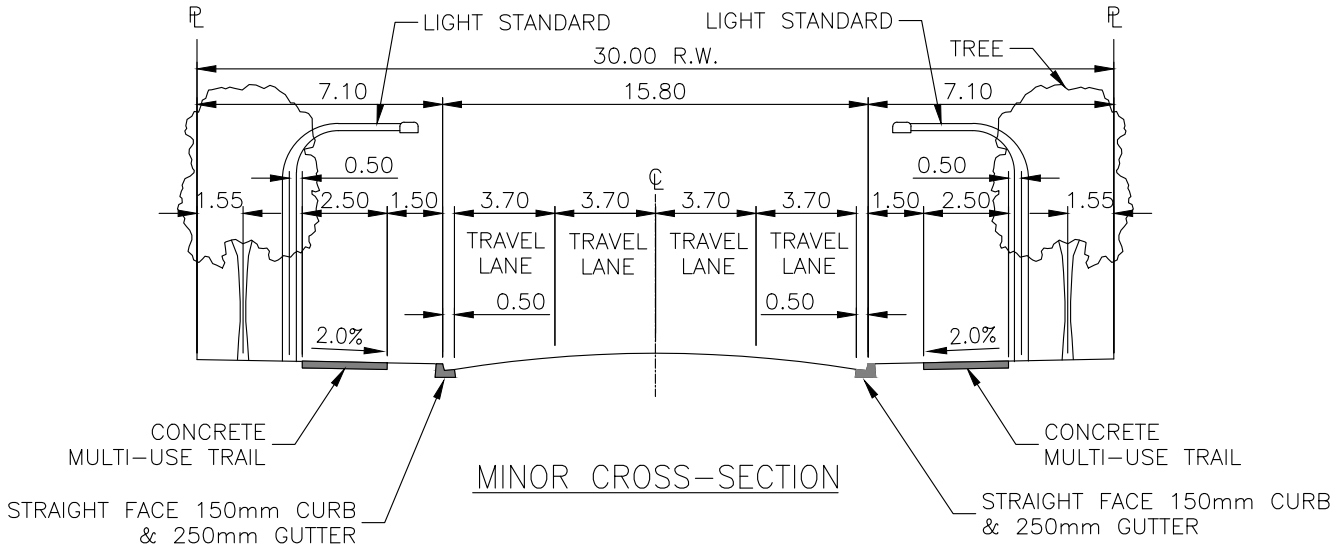
TOWN OF ROCKY MOUNTAIN HOUSE

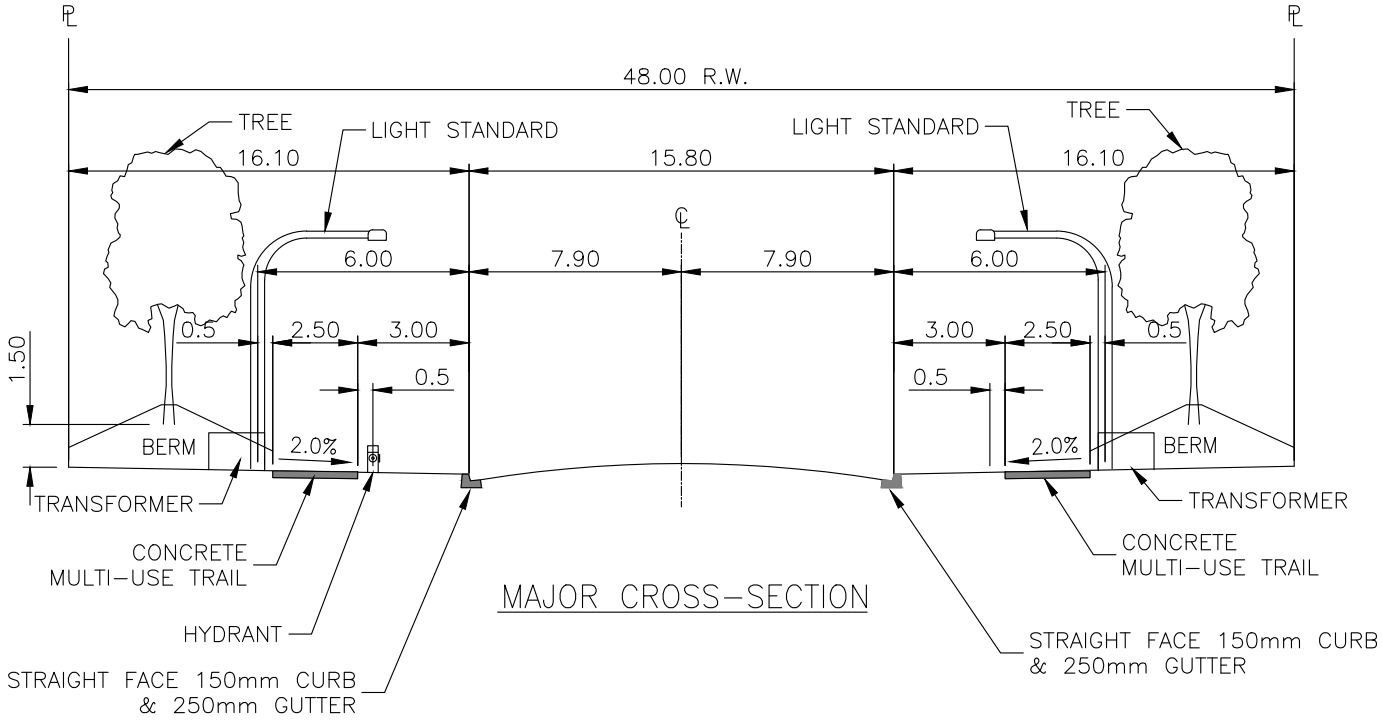
DESIGN GUIDELINE DRAWINGS
Transportation Design

ROADWAY CLASSIFICATION

DRAWING NO.
6-01

REVISION NO. 0





NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6–02–URBAN ARTERIAL.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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No.	Revision

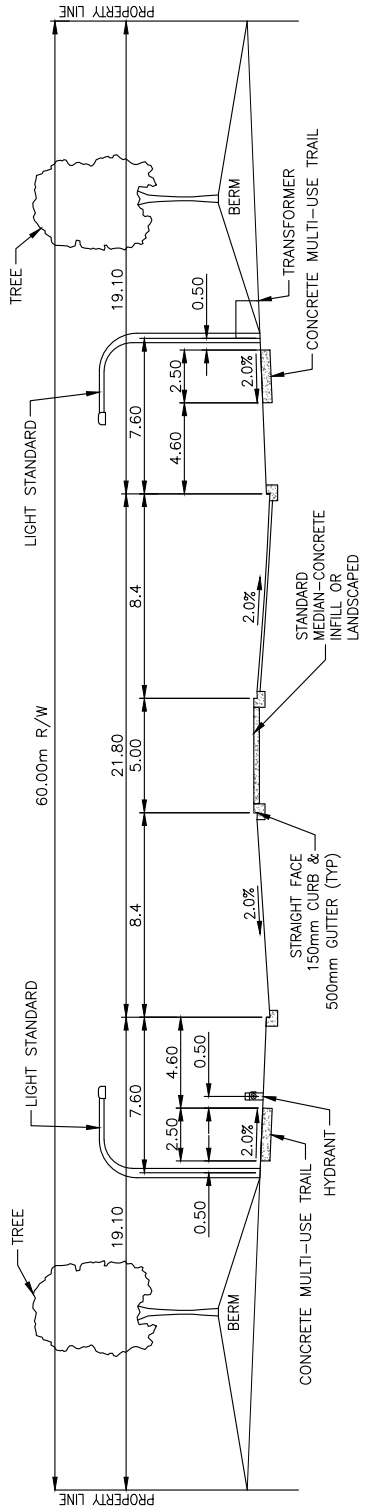
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

URBAN ARTERIAL UNDIVIDED CROSS-SECTIONS

DRAWING NO. 6-02

REVISION NO. 0



DIVIDED ARTERIAL ROADWAY

NOTES:
- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6-03-URBAN ARTERIAL DIVIDED CROSS-SECTION.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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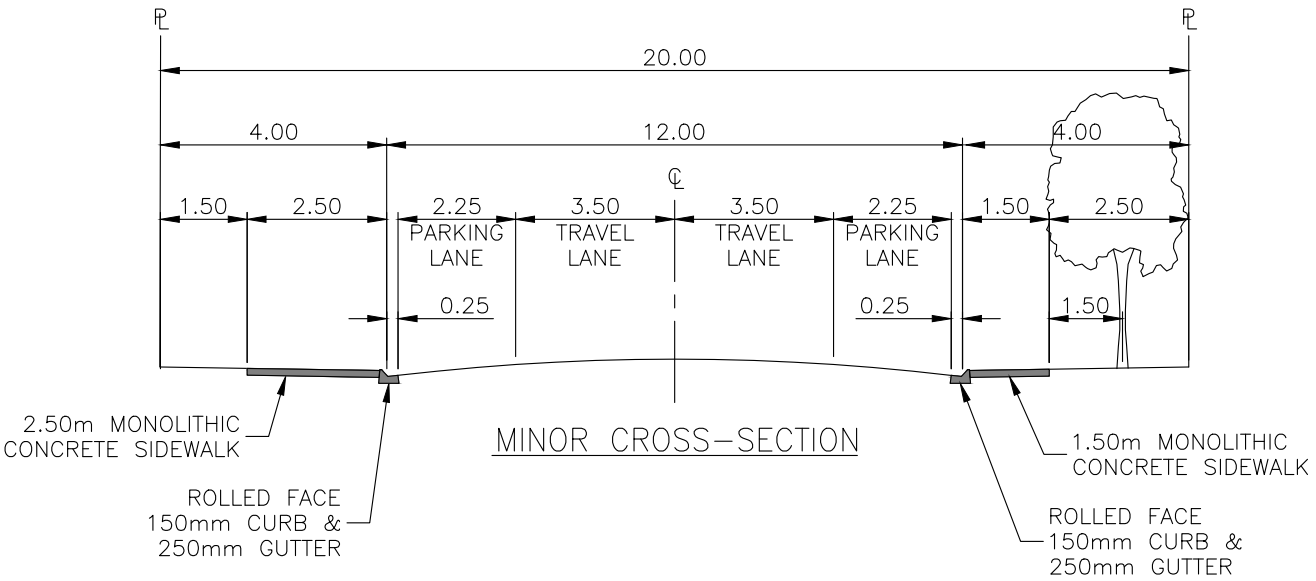
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

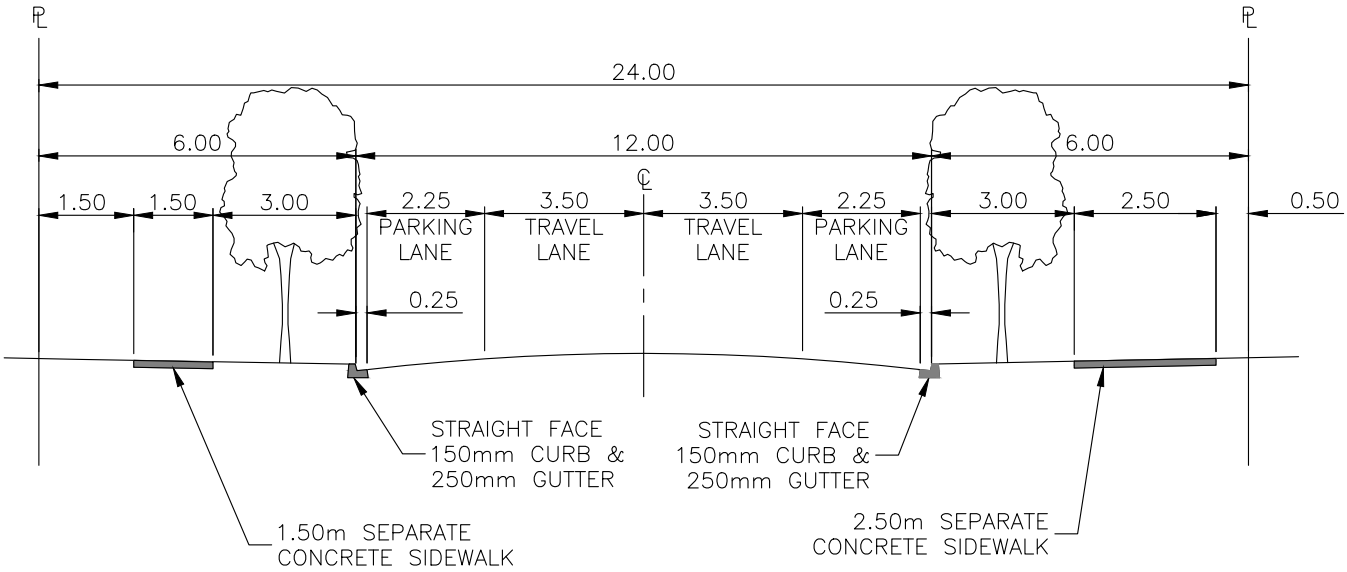
URBAN ARTERIAL DIVIDED CROSS-SECTIONS

DRAWING NO.
6-03

REVISION NO. 0



MINOR CROSS-SECTION



MAJOR CROSS-SECTION

NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6-04-URBAN COLLECTOR CROSS-SECTIONS.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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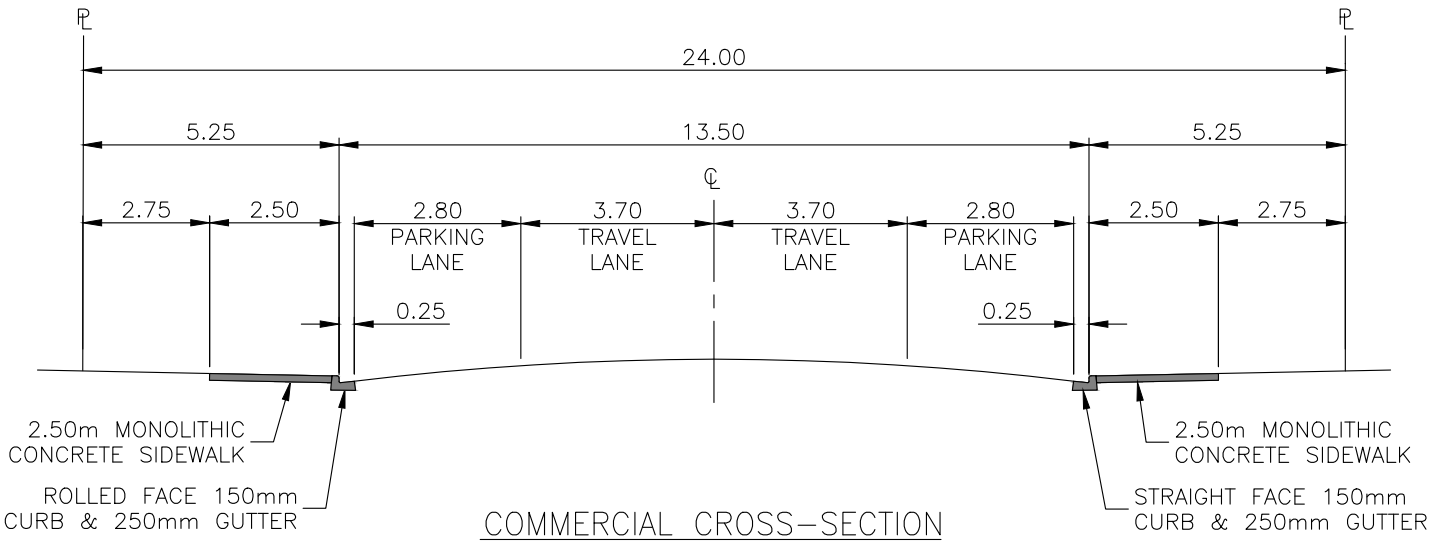
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

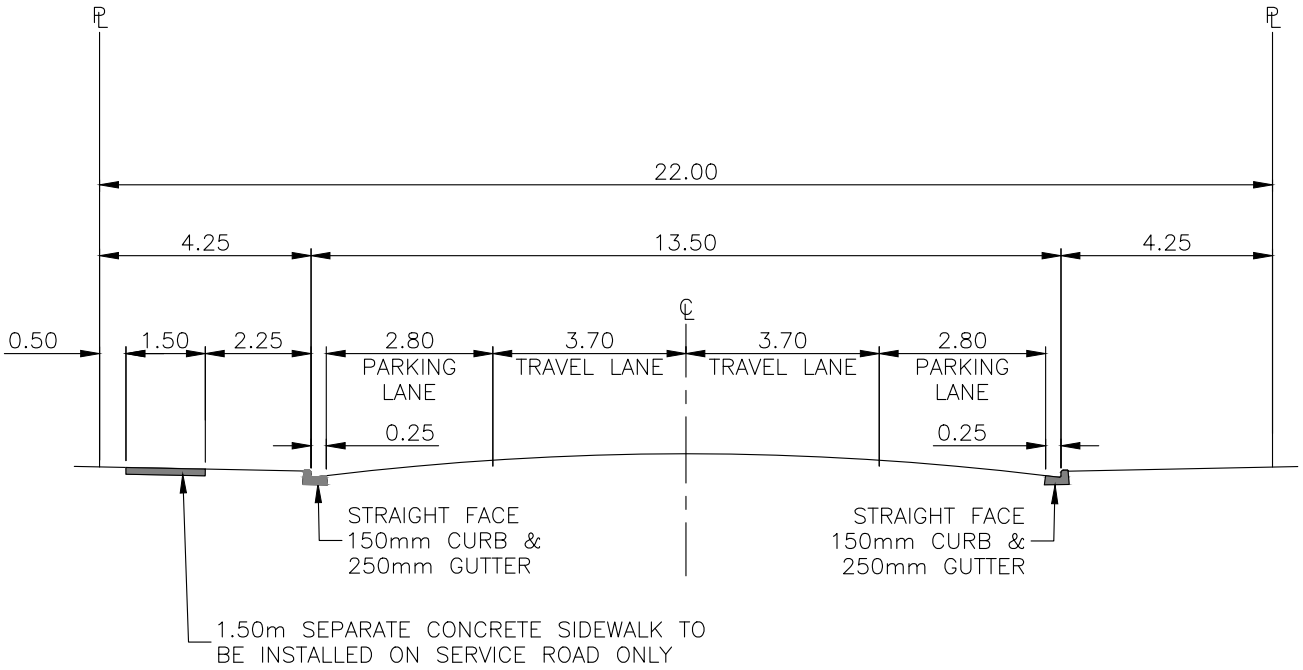
URBAN RESIDENTIAL COLLECTOR CROSS-SECTIONS

DRAWING NO. 6-04

REVISION NO. 0



COMMERCIAL CROSS–SECTION



INDUSTRIAL/SERVICE ROAD CROSS–SECTION

NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6–05–URBAN COMMERCIAL INDUSTRIAL COLLECTOR CROSS–SECTIONS.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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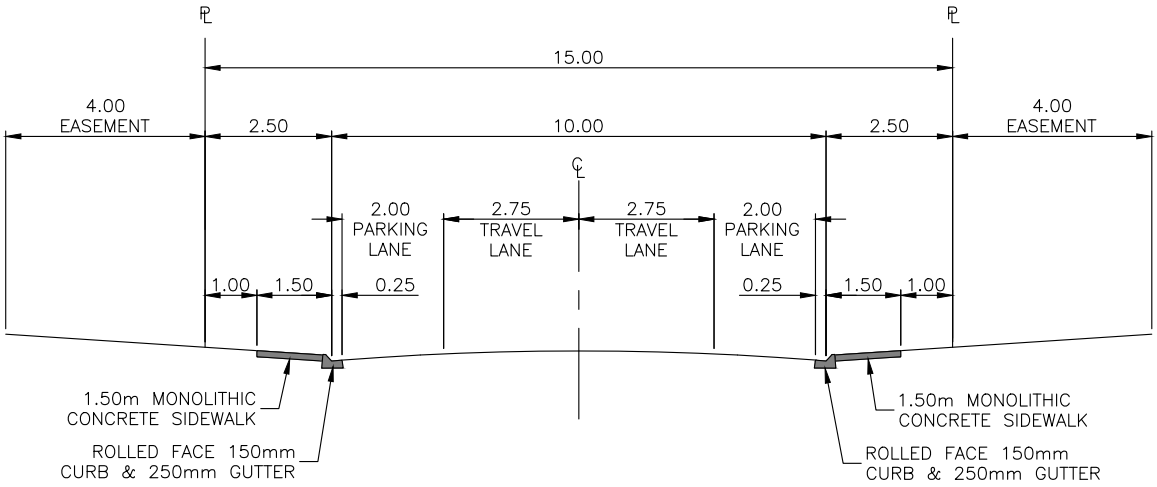
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

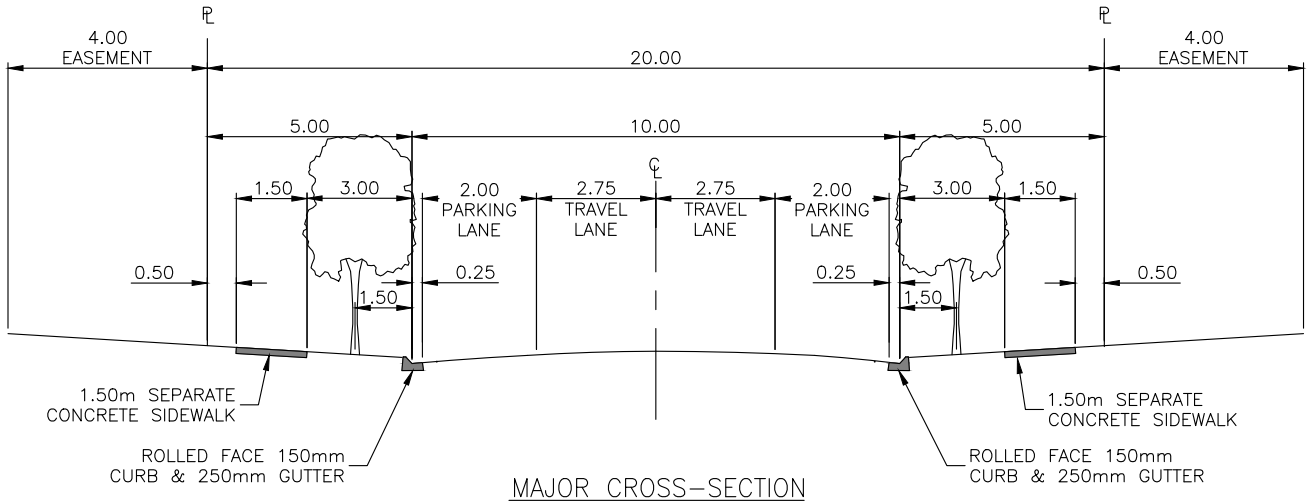
URBAN COMMERCIAL & INDUSTRIAL COLLECTOR CROSS-SECTIONS

DRAWING NO. 6-05

REVISION NO. 0



MINOR CROSS–SECTION



MAJOR CROSS–SECTION

NOTES:
- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6–06–URBAN RESIDENTIAL LOCAL CROSS–SECTIONS.dwg

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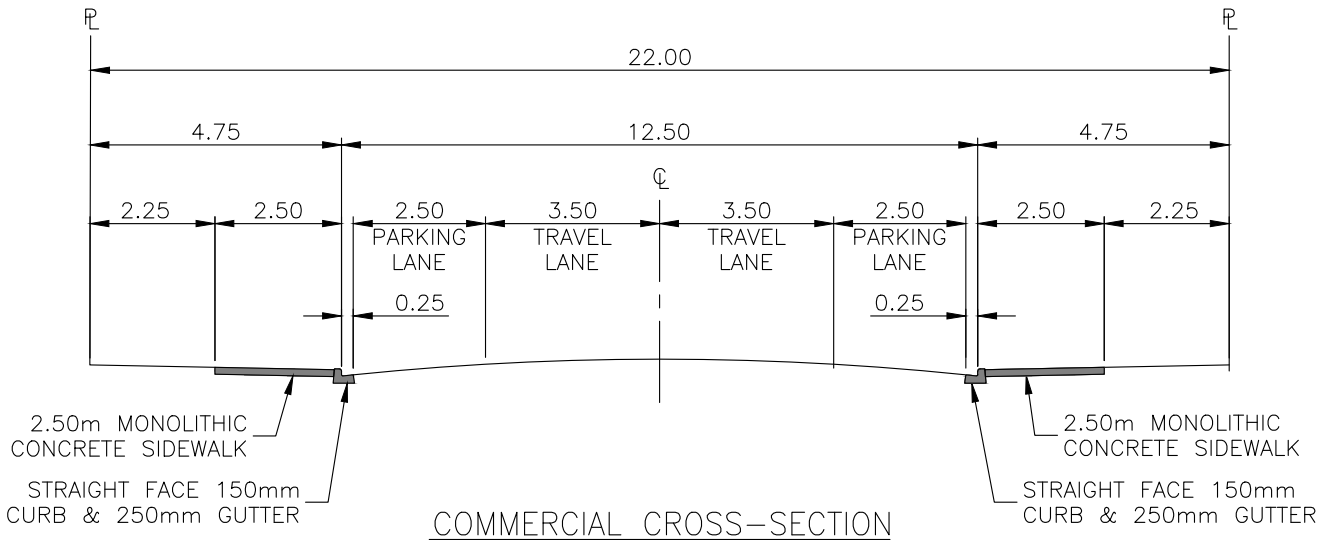
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

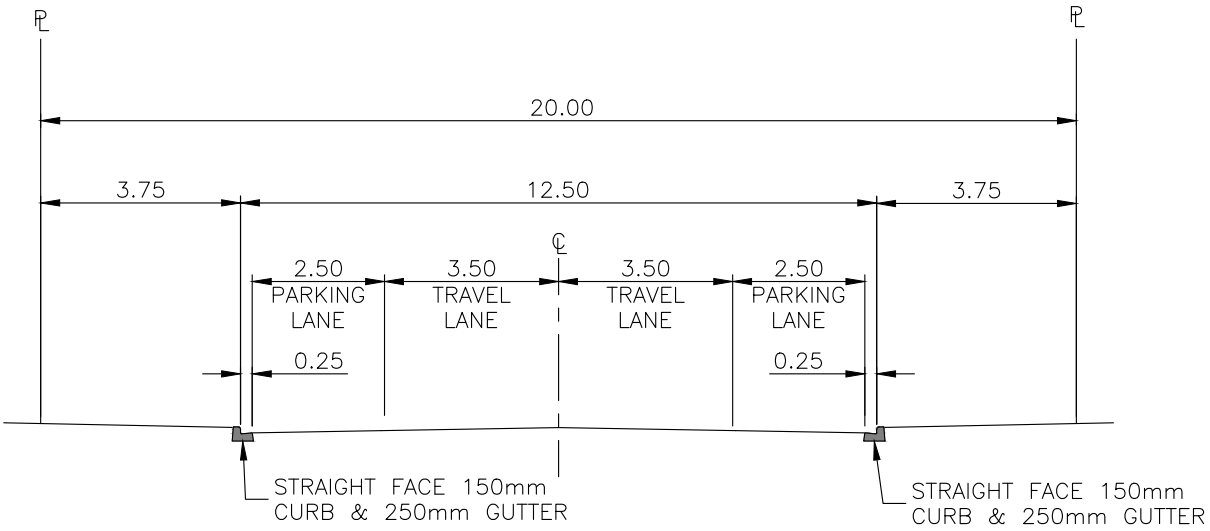
URBAN RESIDENTIAL LOCAL CROSS-SECTIONS

DRAWING NO. 6-06

REVISION NO. 0



COMMERCIAL CROSS–SECTION



INDUSTRIAL CROSS–SECTION

NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6–07–URBAN COMMERCIAL INDUSTRIAL LOCAL CROSS–SECTIONS.dwg

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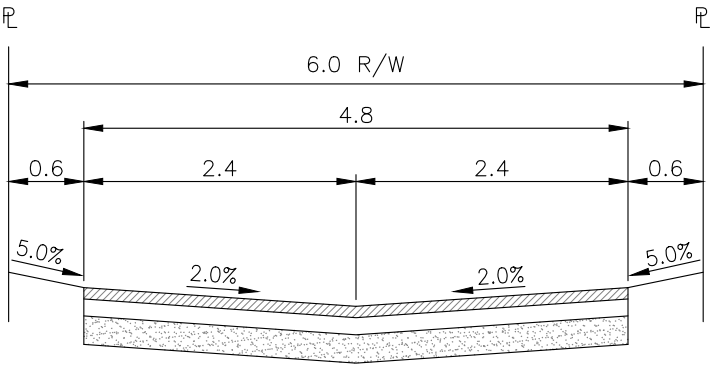
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

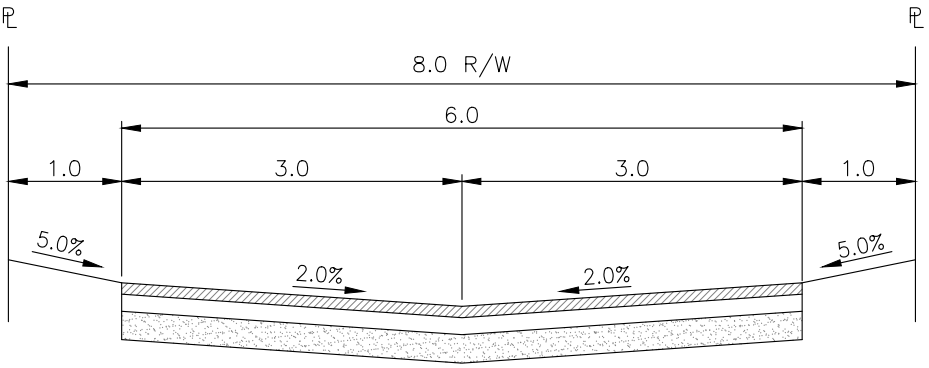
URBAN COMMERCIAL & INDUSTRIAL LOCAL CROSS-SECTIONS

DRAWING NO. 6-07

REVISION NO. 0



RESIDENTIAL



COMMERCIAL/ INDUSTRIAL

ALL DIMENSIONS IN METERS
UNLESS OTHERWISE NOTED

File Name: 6-08-PUBLIC LANE-RESIDENTIAL AND COMMERCIAL.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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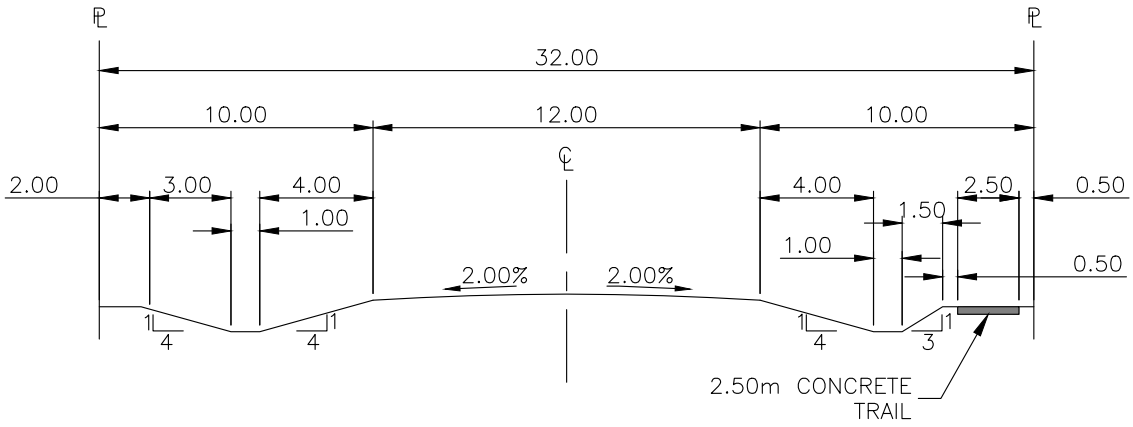
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

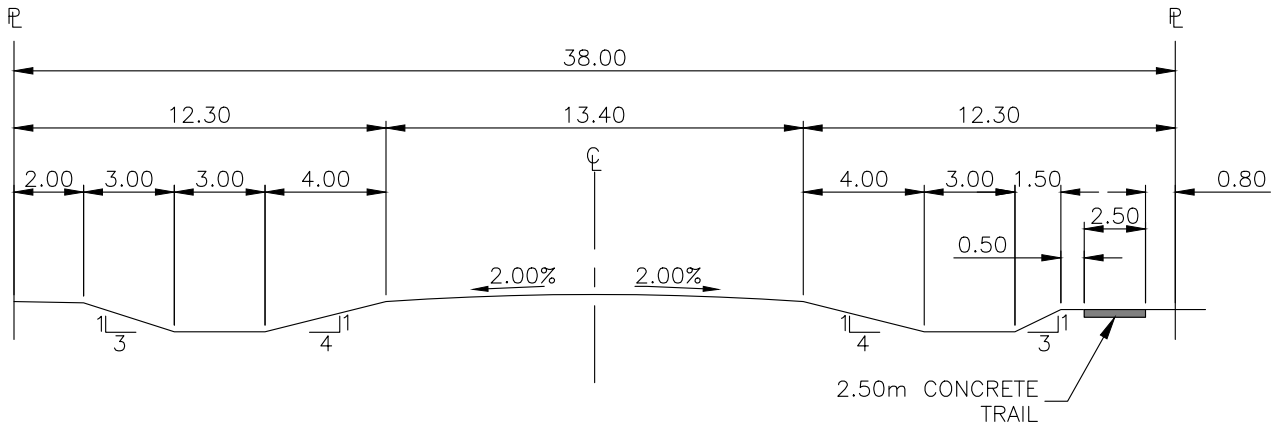
PUBLIC LANE CROSS-SECTIONS

DRAWING NO.
6-08

REVISION NO. 0



MINOR CROSS–SECTION



MAJOR CROSS–SECTION

NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6–09–RURAL ARTERIAL CROSS–SECTION.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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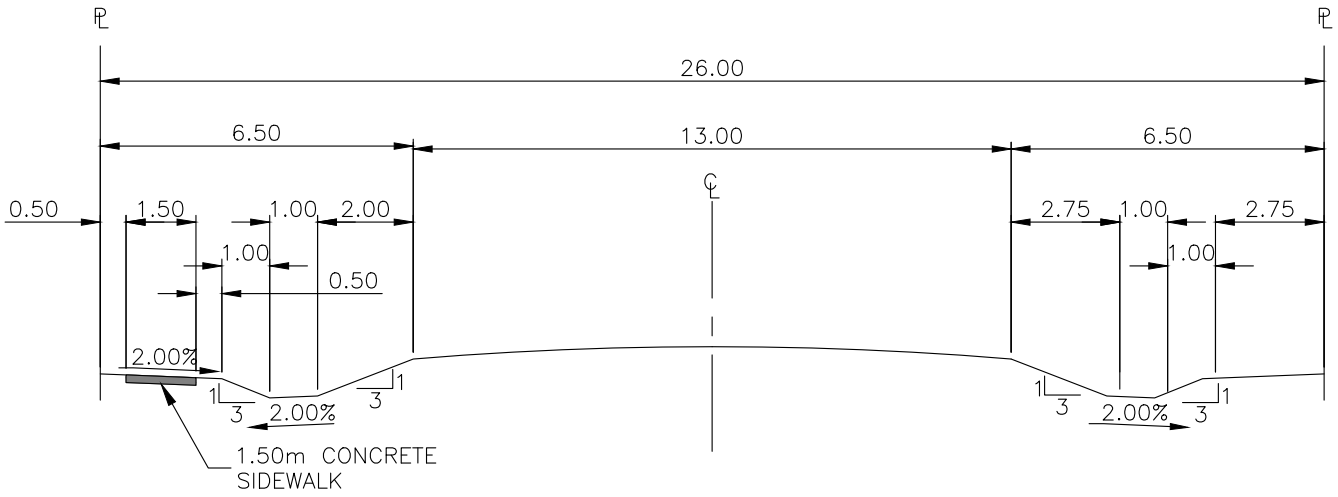
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

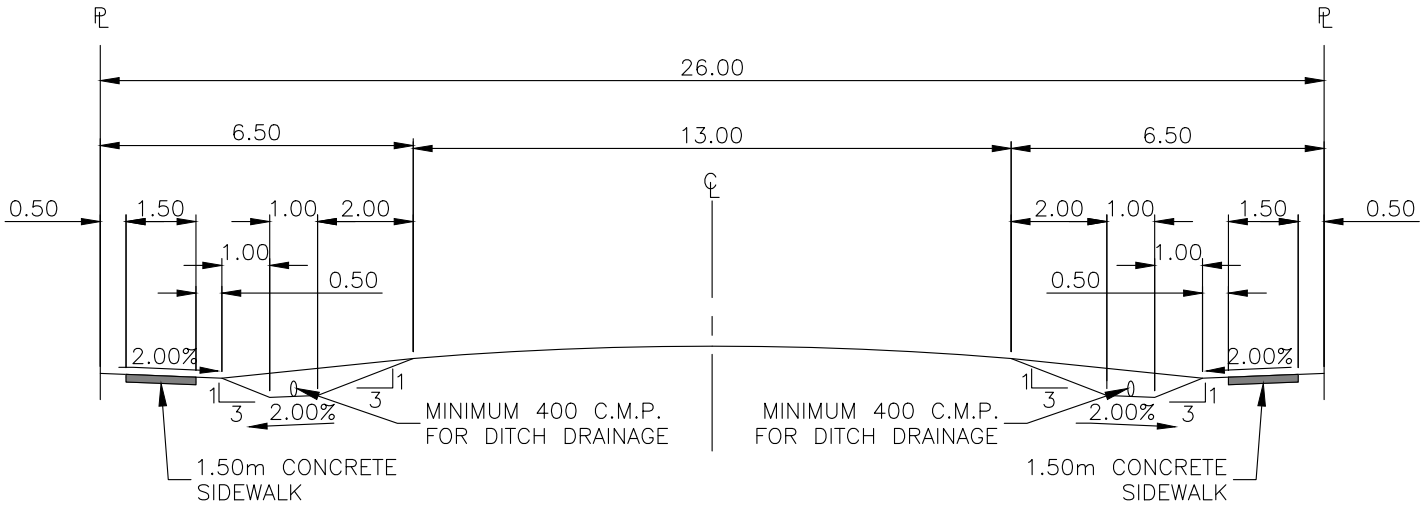
RURAL ARTERIAL CROSS-SECTION

DRAWING NO. 6-09

REVISION NO. 0



RURAL CROSS–SECTION



SEMI–URBAN CROSS–SECTION

NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6–10–RESIDENTIAL COLLECTOR CROSS–SECTION.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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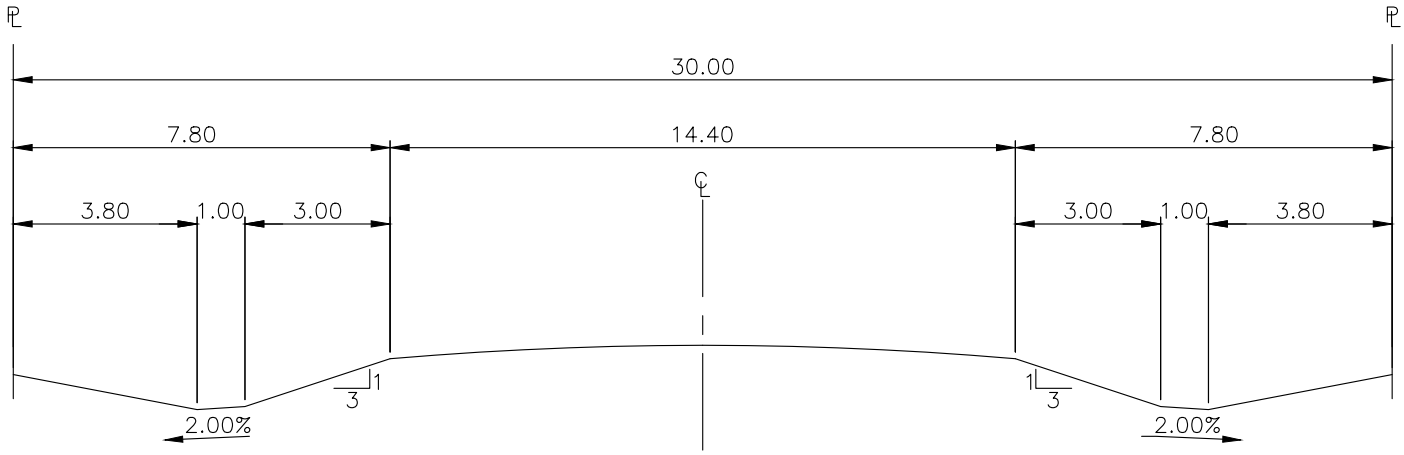
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

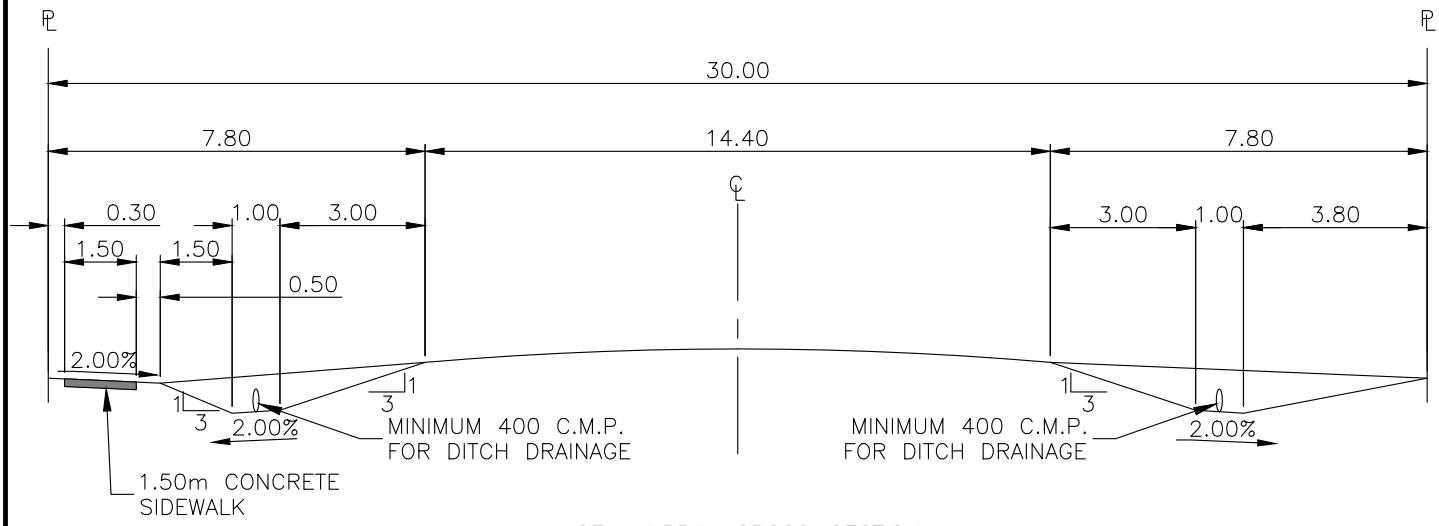
RESIDENTIAL COLLECTOR CROSS-SECTIONS

DRAWING NO.
6-10

REVISION NO. 0



RURAL CROSS–SECTION



SEMI–URBAN CROSS–SECTION

NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6–11–COMMERCIAL INDUSTRIAL COLLECTOR CROSS–SECTIONS.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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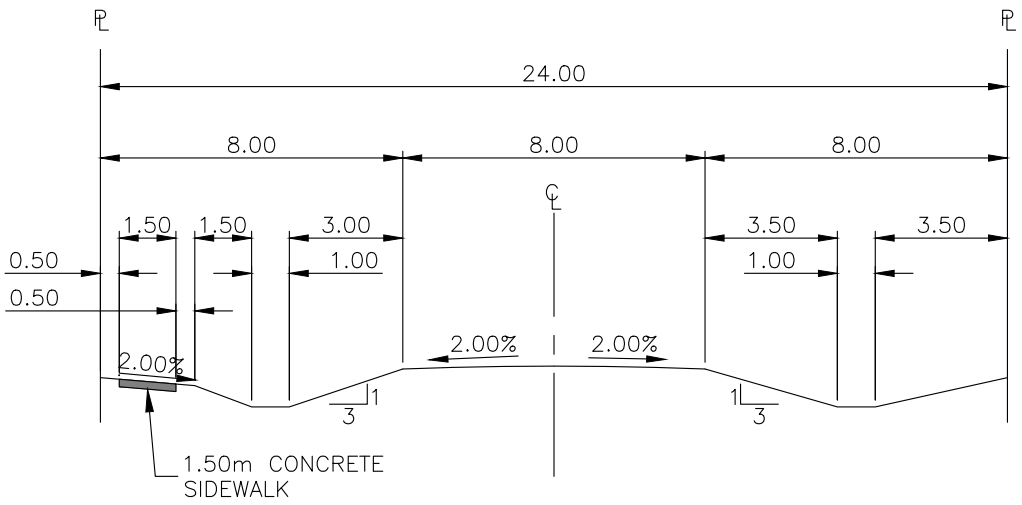
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

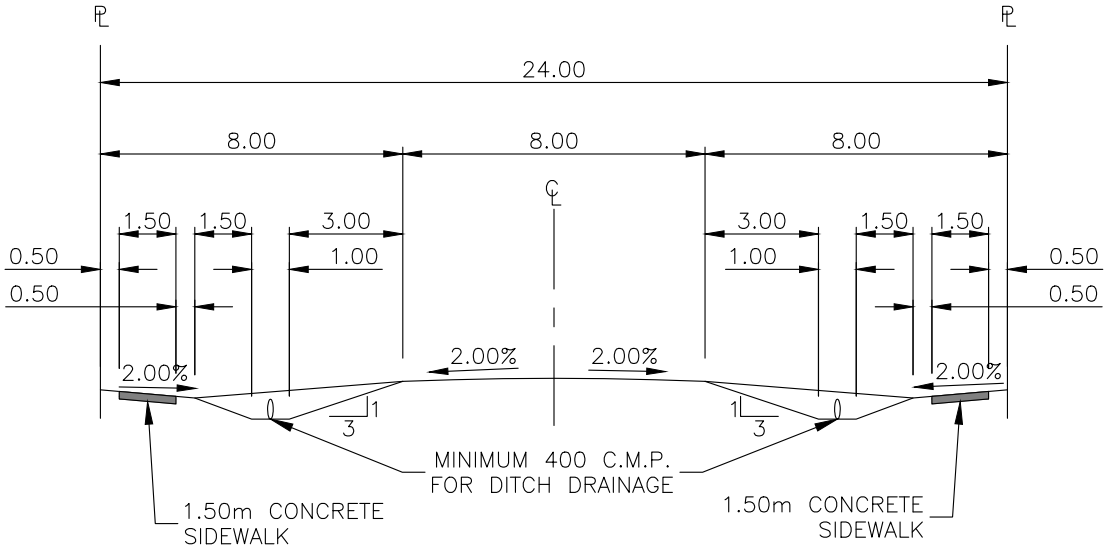
COMMERCIAL INDUSTRIAL COLLECTOR CROSS-SECTIONS

DRAWING NO. 6-11

REVISION NO. 0



RURAL CROSS–SECTION



SEMI–URBAN CROSS–SECTION

NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6–12–RESIDENTIAL LOCAL CROSS SECTION.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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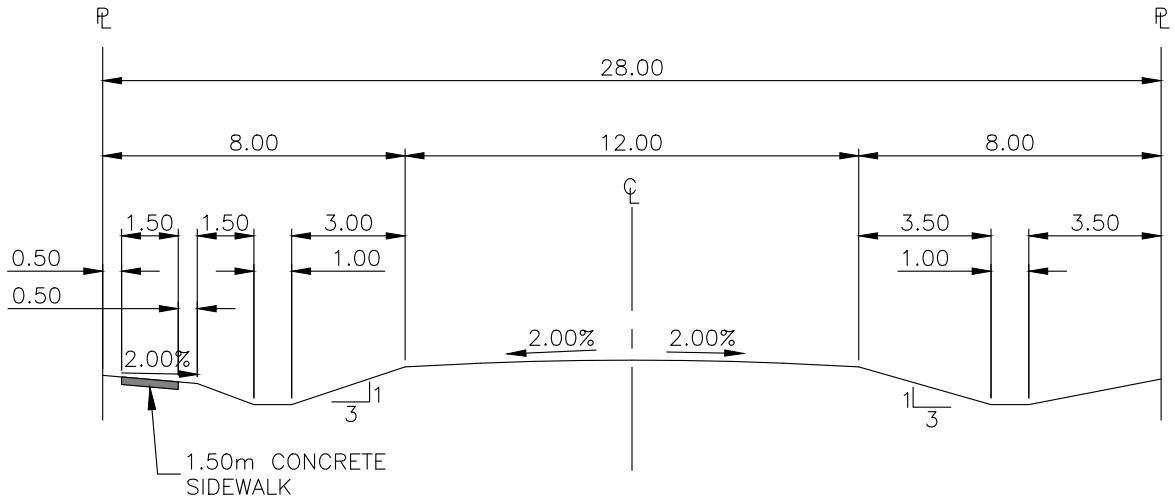
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

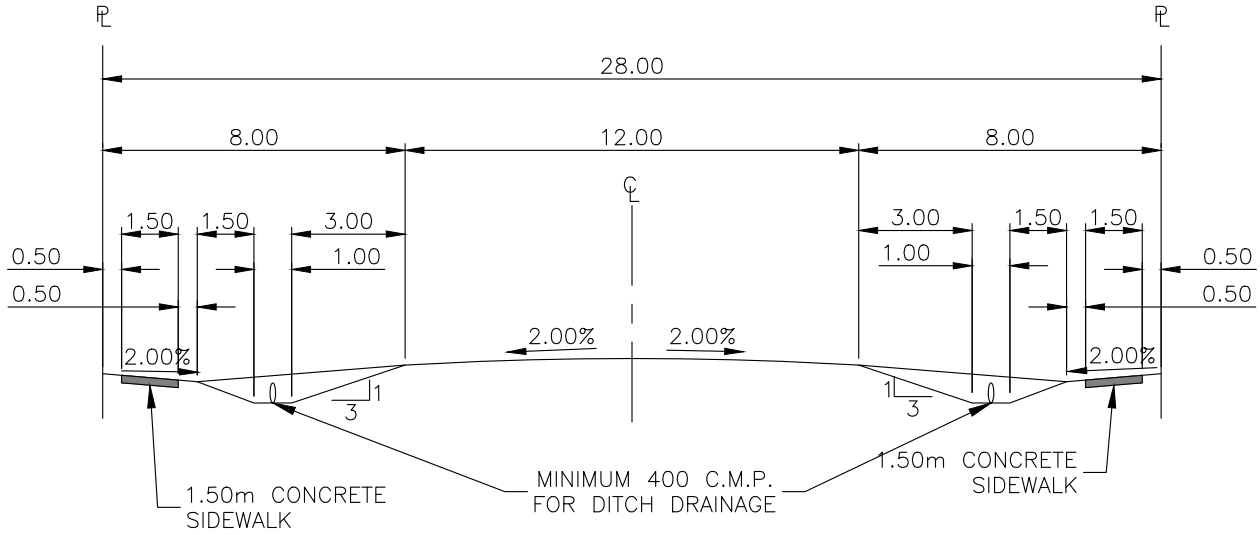
RESIDENTIAL LOCAL CROSS-SECTIONS

DRAWING NO. 6-12

REVISION NO. 0



RURAL CROSS–SECTION



SEMI–URBAN CROSS–SECTION

NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REFER TO ENGINEERING DESIGN STANDARDS (SECTION 6) FOR RECOMMENDED TRAVEL LANE WIDTHS
- POWER POLES, STREETLIGHT POLES, TRANSFORMER BOXES, AND ALL OTHER STRUCTURES SHALL MAINTAIN A MIN. OF 3.00M CLEARANCE FOR HYDRANT AND SERVICES

File Name: 6–13–COMMERCIAL INDUSTRIAL LOCAL CROSS SECTION.dwg

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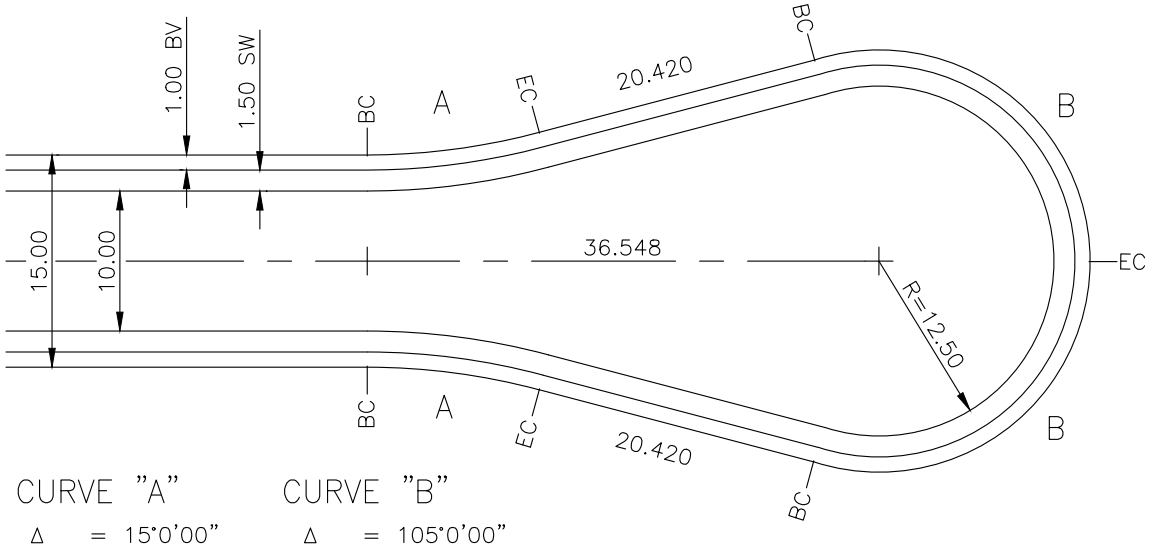
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

COMMERCIAL INDUSTRIAL LOCAL CROSS SECTIONS

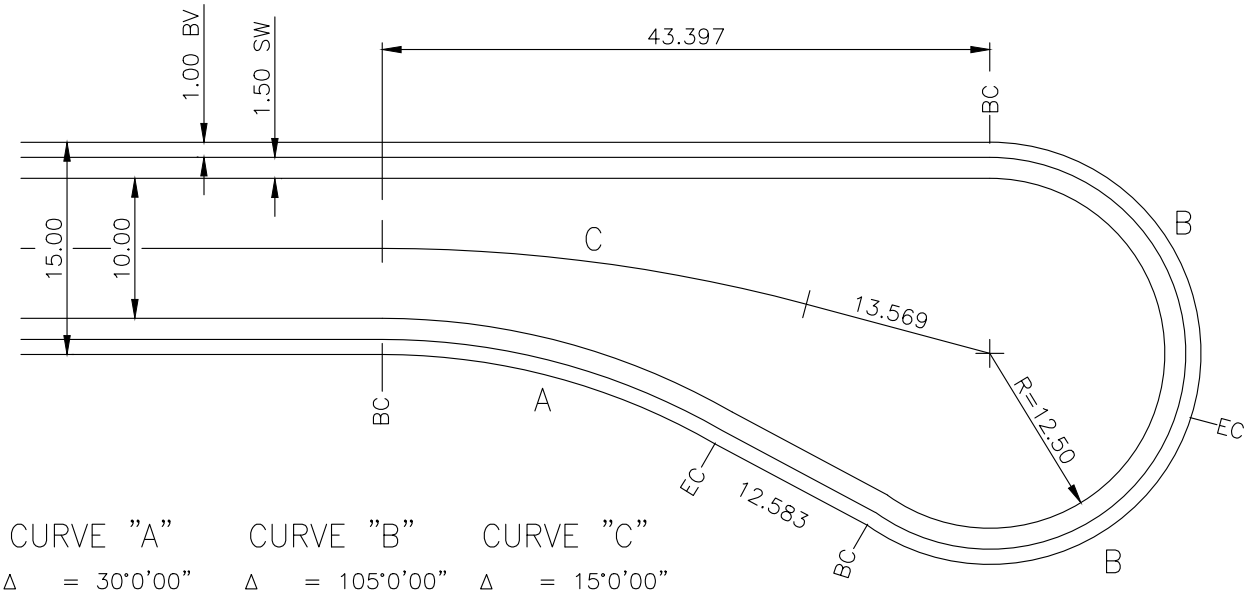
DRAWING NO. 6-13

REVISION NO. 0



CURVE "A"
Δ = 15°0'00"
R = 50.000
ARC = 13.090
TAN = 6.583
(at property line)

CURVE "B"
Δ = 105°0'00"
R = 15.000
ARC = 27.489
TAN = 19.548
(at property line)



CURVE "A"
Δ = 30°0'00"
R = 50.000
ARC = 26.180
TAN = 13.398
(at property line)

CURVE "B"
Δ = 105°0'00"
R = 15.000
ARC = 27.489
TAN = 19.548
(at property line)

CURVE "C"
Δ = 15°0'00"
R = 117.033
ARC = 30.640
TAN = 15.408

ALL DIMENSIONS IN METERS
UNLESS OTHERWISE NOTED

File Name: 6-14-LOCAL RESIDENTIAL CUL-DE-SAC.dwg

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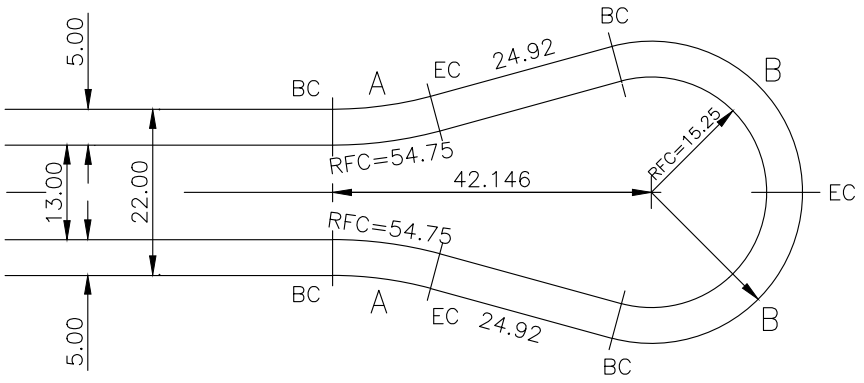
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

LOCAL RESIDENTIAL CUL-DE-SAC

DRAWING NO.
6-14

REVISION NO. 0

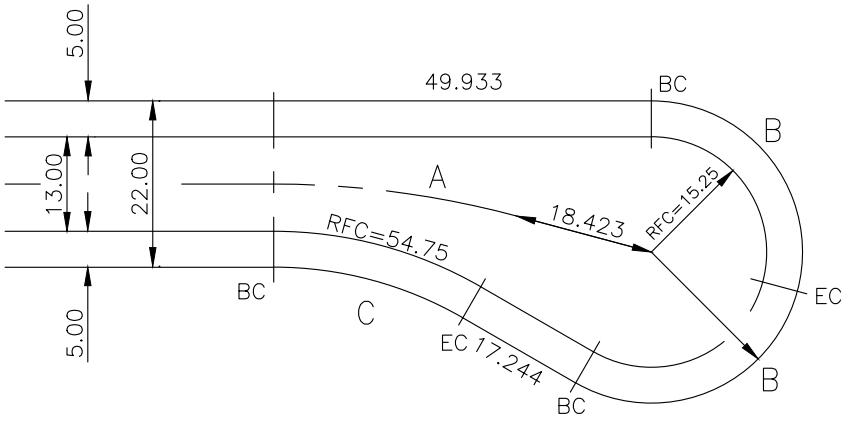


CURVE "A"

Δ = 15°0'00"
R = 50.000
ARC = 13.090
TAN = 6.583
(at property line)

CURVE "B"

Δ = 105°0'00"
R = 20.000
ARC = 36.652
TAN = 26.065
(at property line)



CURVE "A"

Δ = 15°0'00"
R = 124.153
ARC = 32.503
TAN = 16.345

CURVE "B"

Δ = 105°0'00"
R = 20.000
ARC = 36.652
TAN = 26.065
(at property line)

CURVE "C"

Δ = 30°0'00"
R = 50.000
ARC = 26.180
TAN = 13.397
(at property line)

ALL DIMENSIONS IN METERS
UNLESS OTHERWISE NOTED

File Name: 6-15-LOCAL INDUSTRIAL CUL-DE-SAC.dwg

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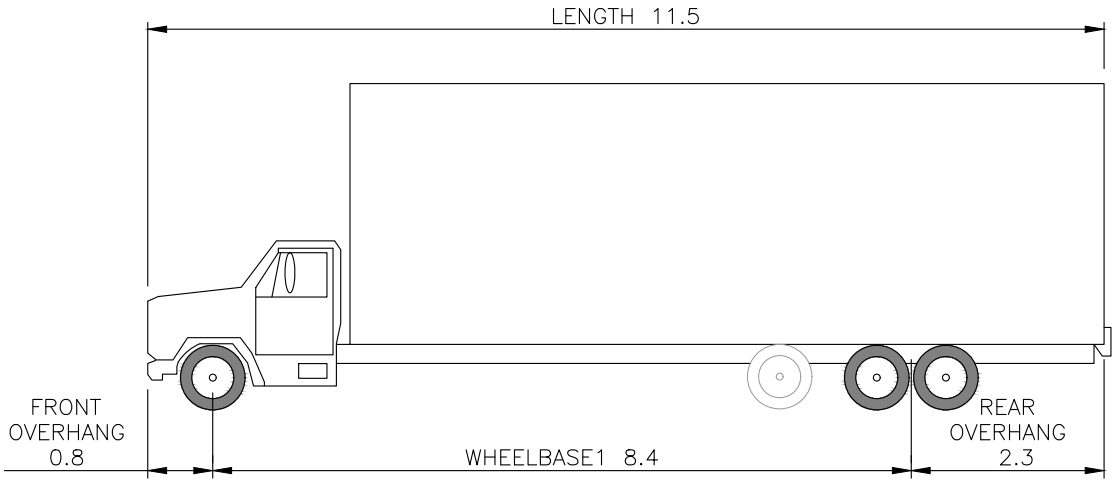
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

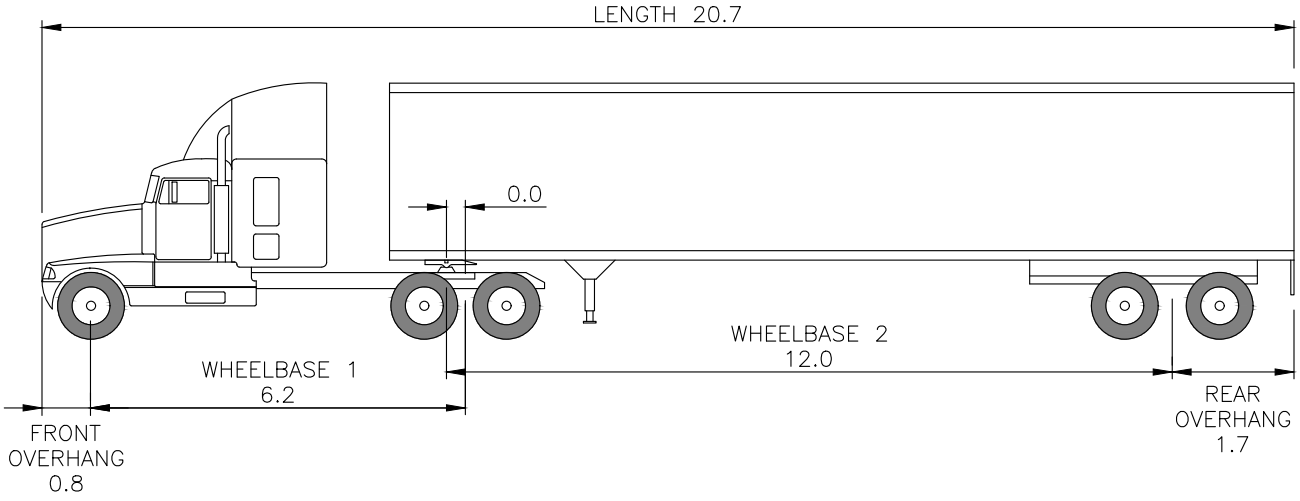
LOCAL INDUSTRIAL CUL-DE-SAC

DRAWING NO.
6-15

REVISION NO. 0



HEAVY SINGLE–UNIT (HSU) TRUCK DIMENSIONS



WB–19 TRACTOR–SEMITRAILER DIMENSIONS

NOTE:

– FIFTH WHEEL OFFSET SET TO ZERO TO YIELD THE MAXIMUM SWEPT PATH IN A TURN.

ALL DIMENSIONS IN METERS
UNLESS OTHERWISE NOTED

File Name: 6–16–HSU AND WB DESIGN VEHICLES.dwg

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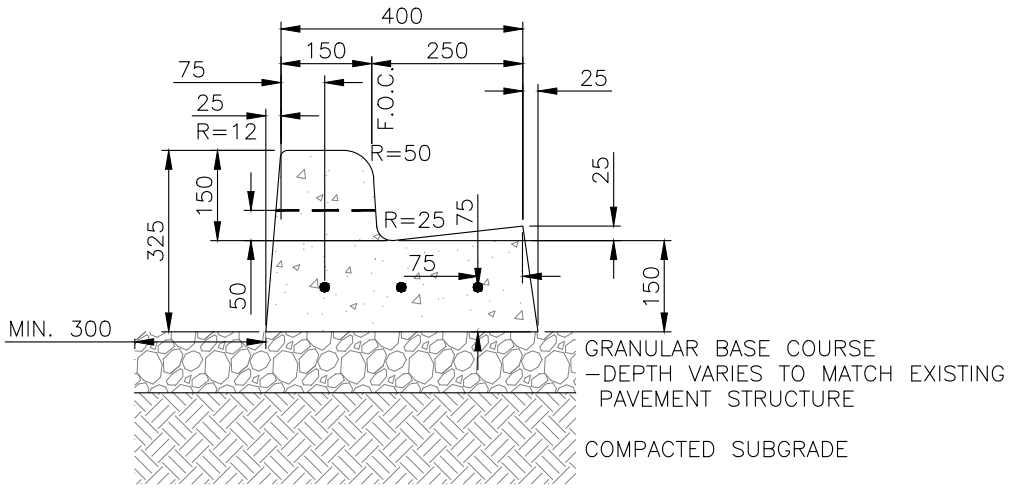
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

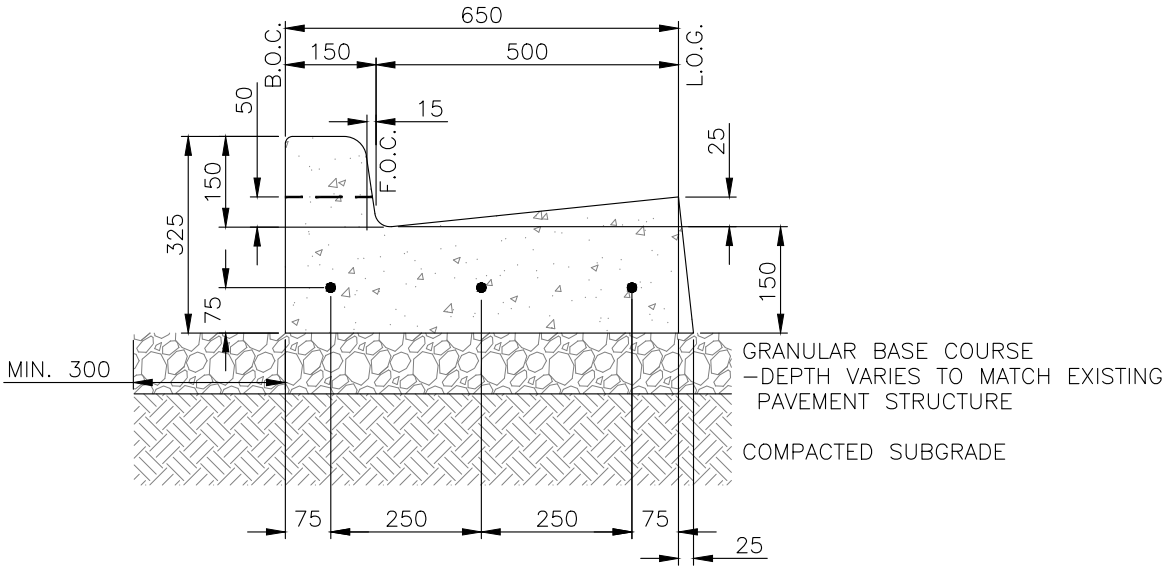
HSU AND WB DESIGN VEHICLES

DRAWING NO. 6-16

REVISION NO. 0



250mm STANDARD CURB & GUTTER AND CROSSINGS



500mm STANDARD CURB & GUTTER AND CROSSINGS

NOTES:

- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
- 3–10M REINFORCING BARS AT ALL COMMERCIAL, INDUSTRIAL, LANES, AND APARTMENT DRIVEWAYS
- CONCRETE TO BE TYPE HS, 32 MPa COMPRESSIVE STRENGTH AT 28 DAYS
- COMPACT TO 100% SPMDD
- REFER TO TABLE 6.15 MINIMUM PAVEMENT STRUCTURE FOR ROAD STRUCTURE BELOW CURB AND GUTTER

File Name: 6–17–250_500 STANDARD C&G.dwg

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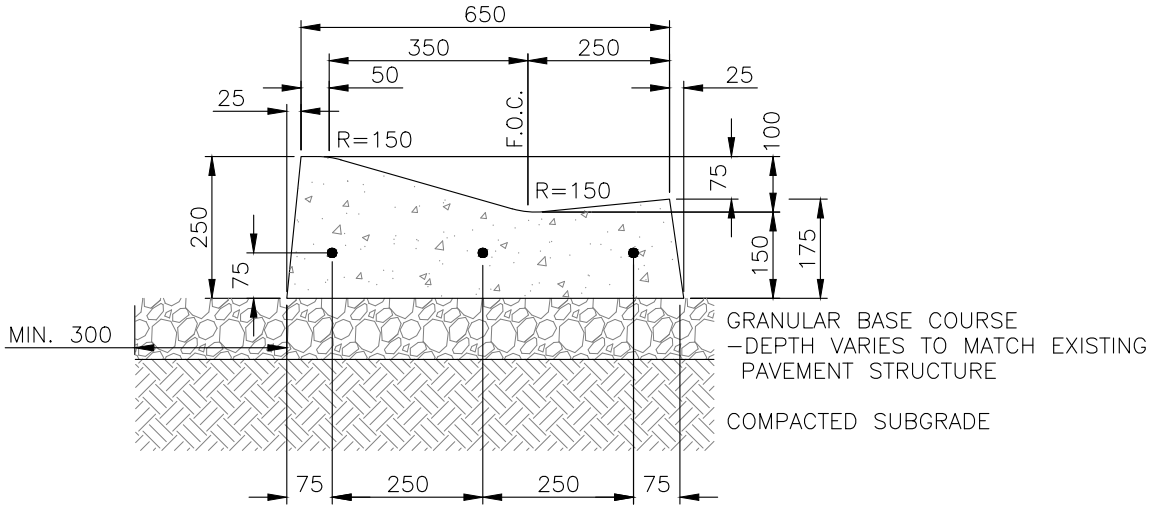
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

250/500mm STANDARD CURB & GUTTER

DRAWING NO. 6-17

REVISION NO. 0



250mm ROLLED CURB AND GUTTER

NOTES:

- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
- 3–10M REINFORCING BARS AT ALL COMMERCIAL, INDUSTRIAL, LANES, AND APARTMENT DRIVEWAYS
- CONCRETE TO BE TYPE HS, 32 MPa COMPRESSIVE STRENGTH AT 28 DAYS
- COMPACT TO 100% SPMDD

File Name: 6–18–250 ROLLED C&G.dwg

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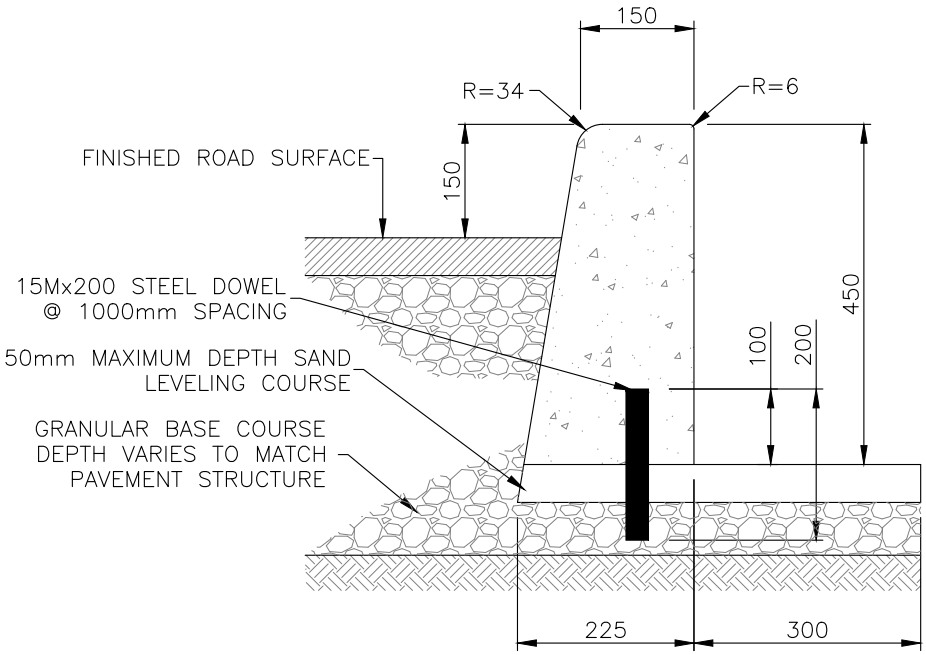
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

250mm ROLLED CURB & GUTTER

DRAWING NO. 6-18

REVISION NO. 0



NOTES:

– ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

File Name: 6–19–PINNED CURB.dwg

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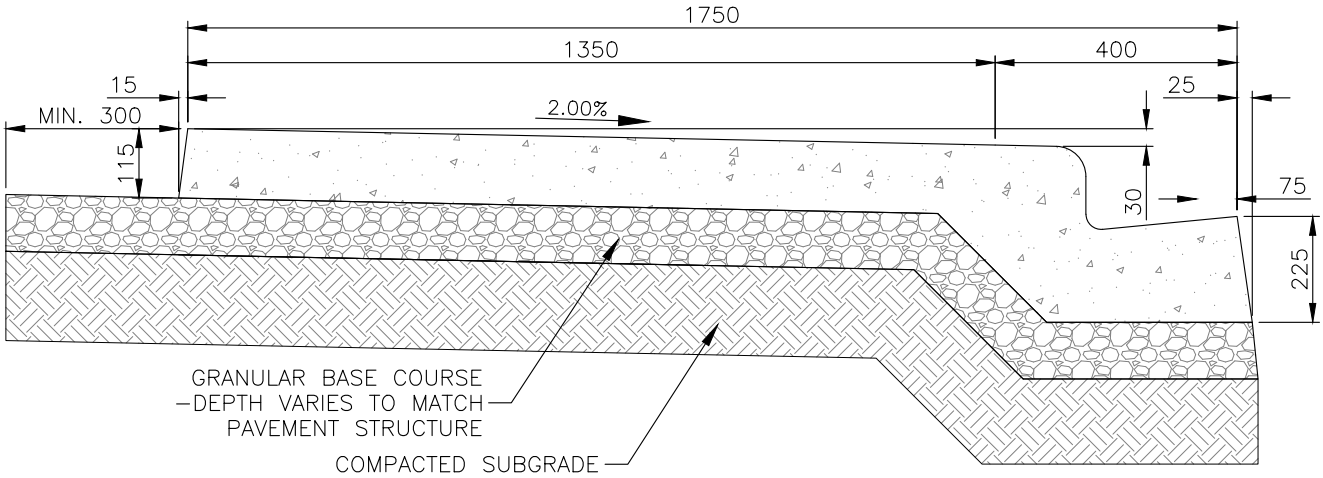
TOWN OF ROCKY MOUNTAIN HOUSE

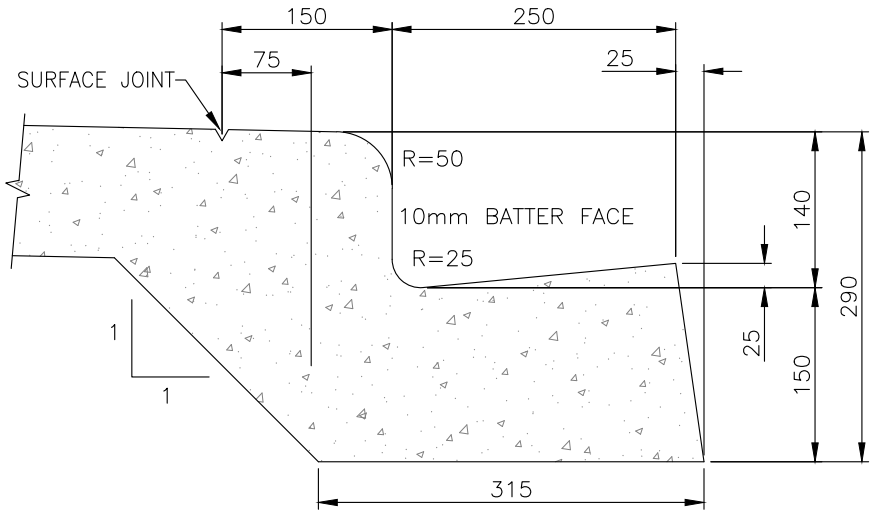
DESIGN GUIDELINE DRAWINGS
Transportation Design

PINNED CONCRETE CURB

DRAWING NO. 6-19

REVISION NO. 0





NOTE:

- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
- CONCRETE TO BE TYPE HS, 32 MPa COMPRESSIVE STRENGTH AT 28 DAYS
- COMPACT TO 100% SPMDD
- CONCRETE DEPTH TO BE MINIMUM 180mm AT COMMERCIAL, INDUSTRIAL, LANES AND APARTMENT BUILDING DRIVEWAYS
- REFER TO MONOLITHIC SIDEWALK CROSSING DETAIL 6–25

File Name: 6–20–1.5m STANDARD MONOWALK.dwg

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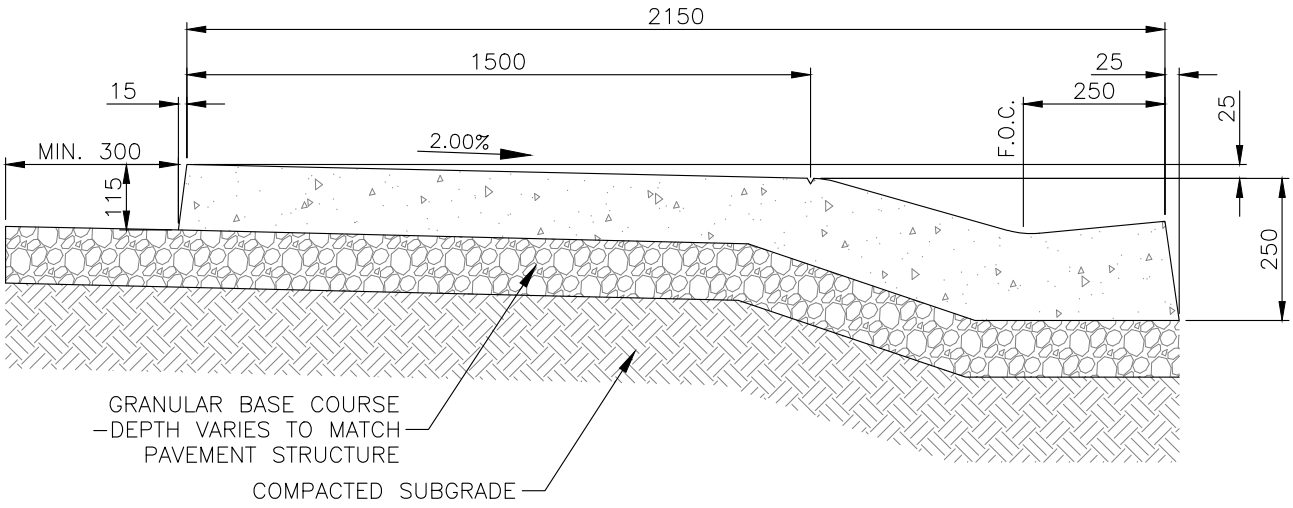
TOWN OF ROCKY MOUNTAIN HOUSE

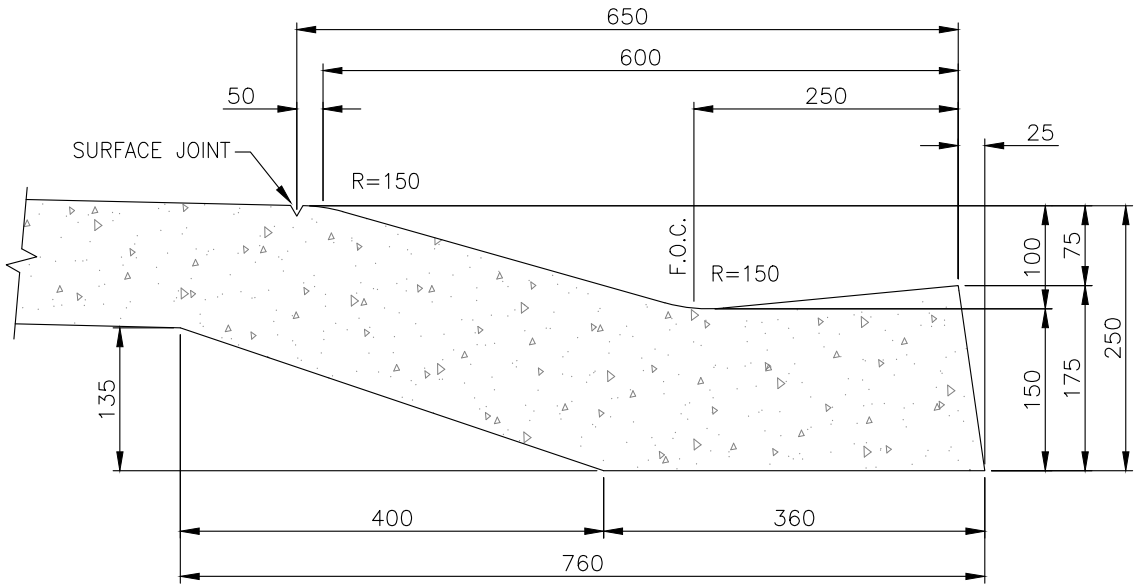
DESIGN GUIDELINE DRAWINGS
Transportation Design

1.5m STANDARD MONOWALK

DRAWING NO.
6-20

REVISION NO. 0





NOTE:

- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
- CONCRETE TO BE TYPE HS, 32 MPa COMPRESSIVE STRENGTH AT 28 DAYS
- COMPACT TO 100% SPMDD
- CONCRETE DEPTH TO BE MINIMUM 180mm AT COMMERCIAL, INDUSTRIAL, LANES AND APARTMENT BUILDING DRIVEWAYS
- REFER TO MONOLITHIC SIDEWALK CROSSING DETAIL 6–25

File Name: 6–21–1.5m ROLLED MONOWALK.dwg

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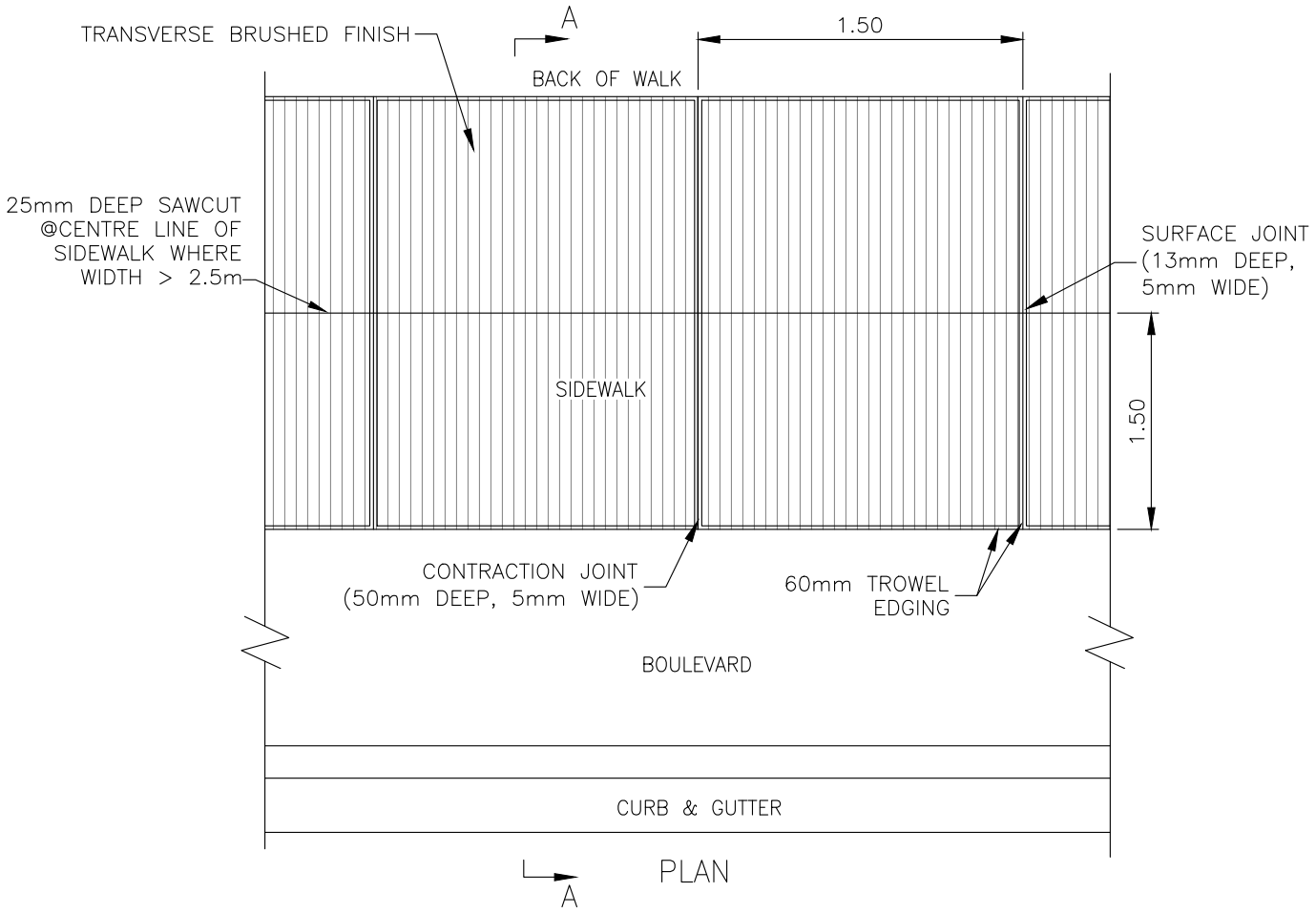
TOWN OF ROCKY MOUNTAIN HOUSE

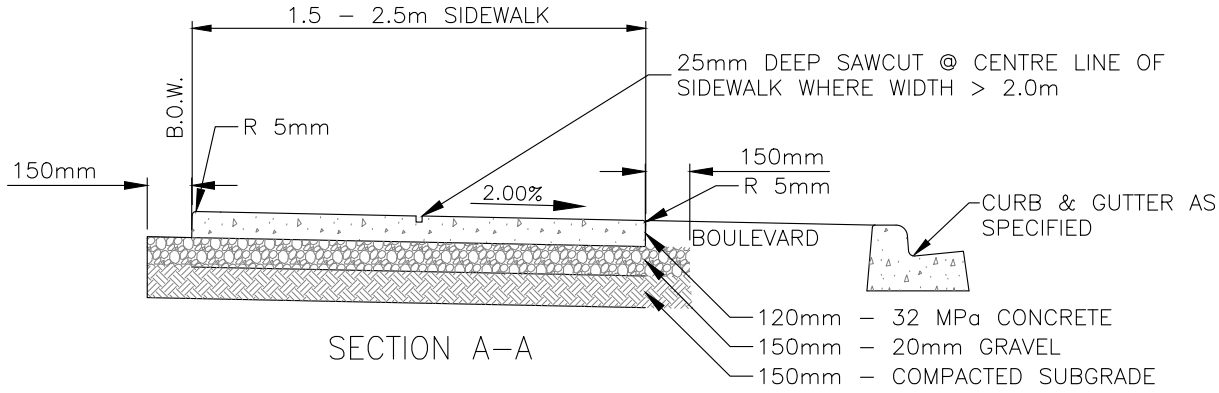
DESIGN GUIDELINE DRAWINGS
Transportation Design

1.5m ROLLED MONOWALK

DRAWING NO. 6-21

REVISION NO. 0





NOTE:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- 3–10M REINFORCING BARS AT ALL COMMERCIAL, INDUSTRIAL, LANES, AND APARTMENT DRIVEWAYS
- CONCRETE TO BE TYPE HS, 32MPa COMPRESSIVE STRENGTH AT 28 DAYS
- ELEVATION OF FRONT OF SIDEWALK TO BE SET AT A MINIMUM SLOPE OF 2.00%.
- SPECIFICATIONS ARE TO MINIMUM STANDARDS. CONSIDERATION MUST BE GIVEN TO ADDRESS ACTUAL SOIL CONDITIONS AND ASSESS THE NEED FOR GRAVEL BASE, THICKER SLAB, REINFORCEMENT OR SUB–DRAINAGE SYSTEM
- REFER TO 6–26 FOR SEPARATE SIDEWALK CROSSINGS

File Name: 6–22–SEPERATE SIDEWALK.dwg

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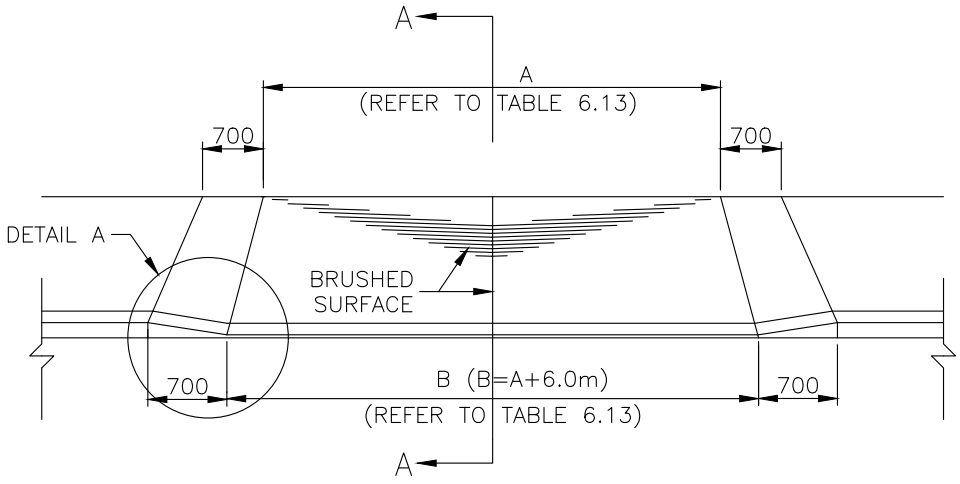
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

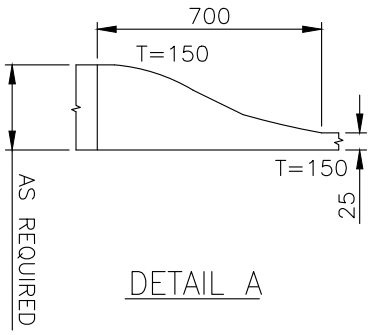
SEPARATE SIDEWALK

DRAWING NO. 6-22

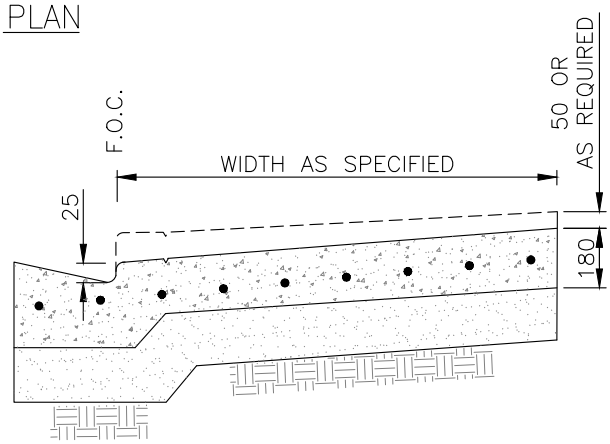
REVISION NO. 0



PLAN



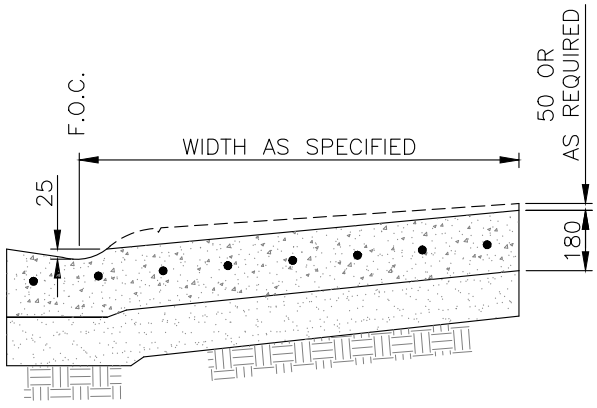
DETAIL A



SECTION A–A – STRAIGHT FACE

NOTE:

- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
- 10M REINFORCING BARS AT 300mm O.C. AT ALL COMMERCIAL, INDUSTRIAL, LANES, AND APARTMENT DRIVEWAYS
- CONCRETE TO BE TYPE HS, 32 MPa COMPRESSIVE STRENGTH AT 28 DAYS
- COMPACT TO 100% SPMDD
- REFER TO TABLE 6.13 FOR DRIVEWAY DIMENSIONS 'A' & 'B'



SECTION A–A – ROLL FACE

File Name: 6–23–TYP MONOWALK CROSSING.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
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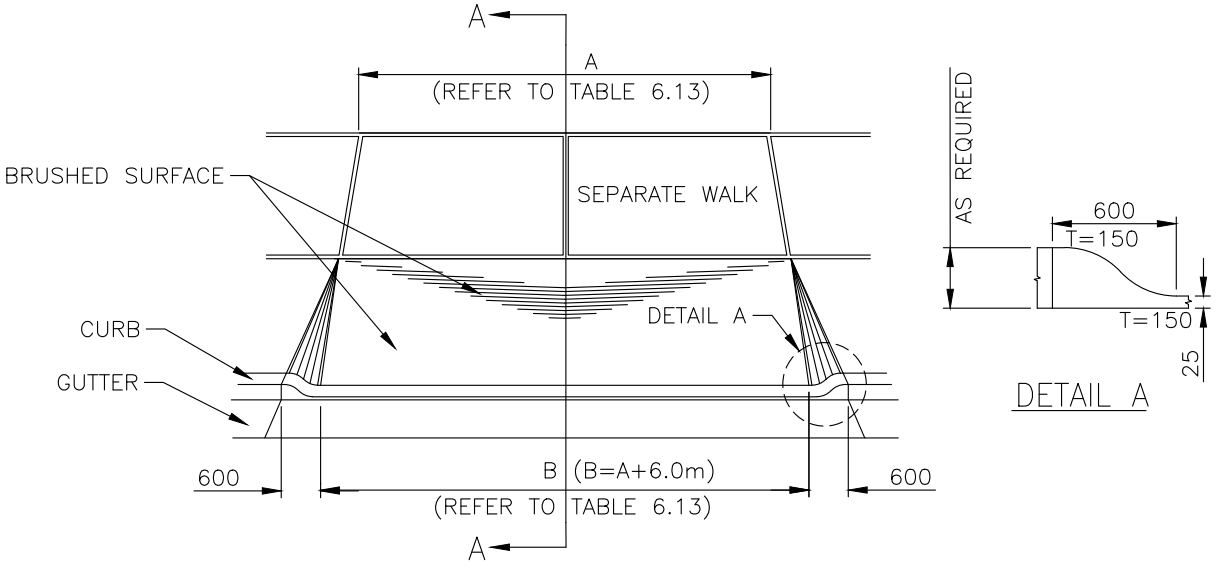
TYP MONOWALK CROSSING

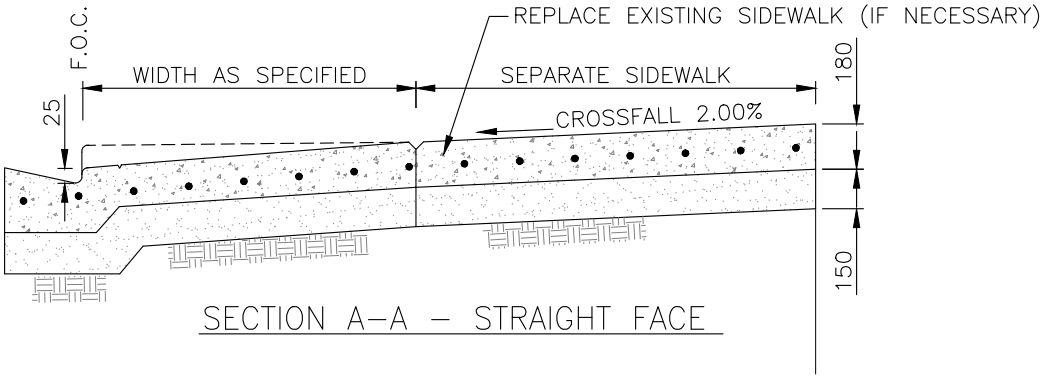
DRAWING NO.
6-23

REVISION NO. 0

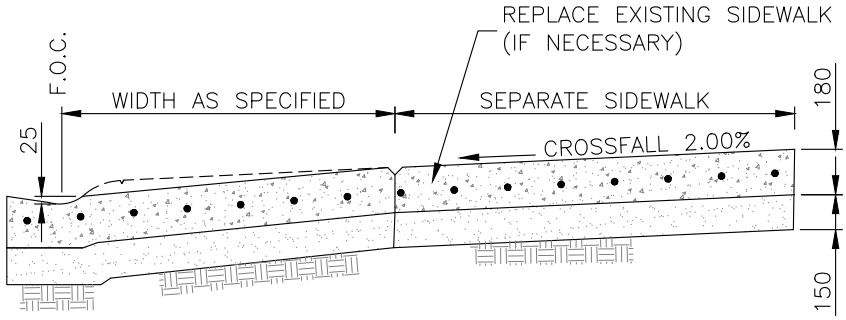


PLAN

DETAIL A



SECTION A–A – STRAIGHT FACE



SECTION A–A – ROLL FACE

NOTE:

- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
- 10M REINFORCING BARS AT 300mm O.C. AT ALL COMMERCIAL, INDUSTRIAL, LANES, AND APARTMENT DRIVEWAYS
- CONCRETE TO BE TYPE HS, 32 MPa COMPRESSIVE STRENGTH AT 28 DAYS
- COMPACT TO 100% SPMDD
- REFER TO TABLE 6.13 FOR DRIVEWAY DIMENSIONS 'A' & 'B'

File Name: 6–24–TYP SEPARATE CROSSING.dwg

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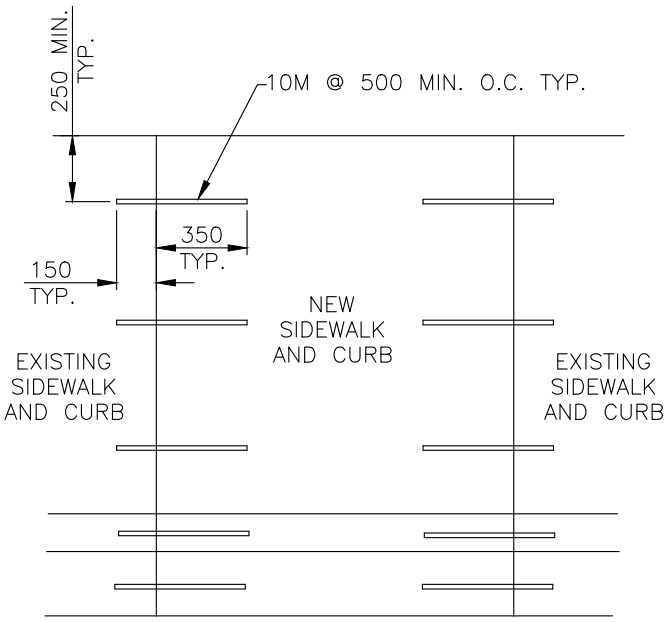
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

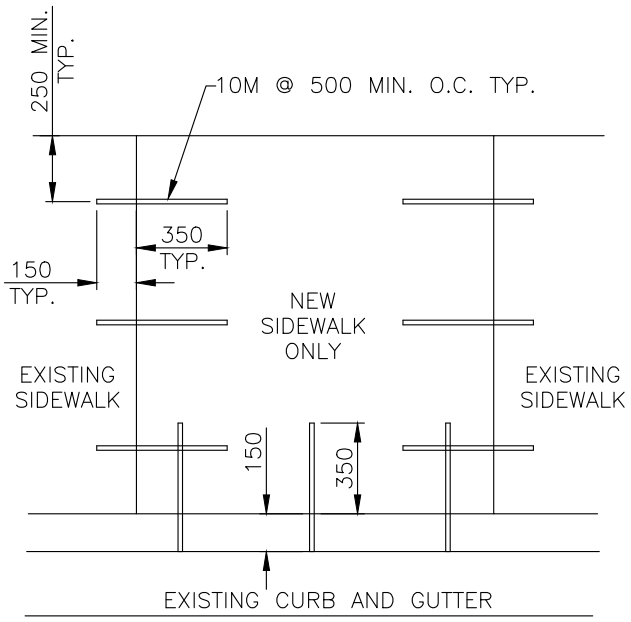
TYP SEPARATE CROSSING

DRAWING NO. 6-24

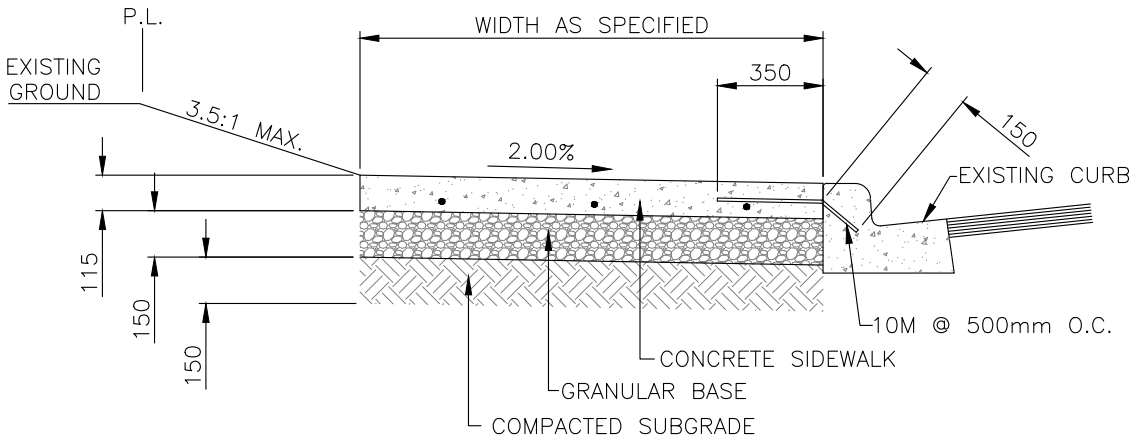
REVISION NO. 0



SIDEWALK AND
CURB – GUTTER TIE–IN



SIDEWALK TIE–IN ONLY



NOTES:

- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
- CONCRETE TO BE TYPE HS, 32 MPa COMPRESSIVE STRENGTH AT 28 DAYS
- CONCRETE THICKNESS TO BE 180mm FOR COMMERCIAL SIDEWALK CROSSING
- 50mm MINIMUM CONCRETE COVER OVER OR UNDER REINFORCING.
- COMPACT TO 100% SPMDD

File Name: 6–27–DOWELLING DETAIL FOR SIDEWALK REPLACEMENT.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
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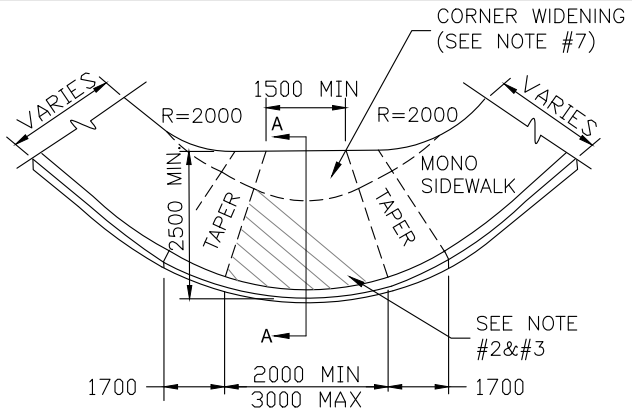
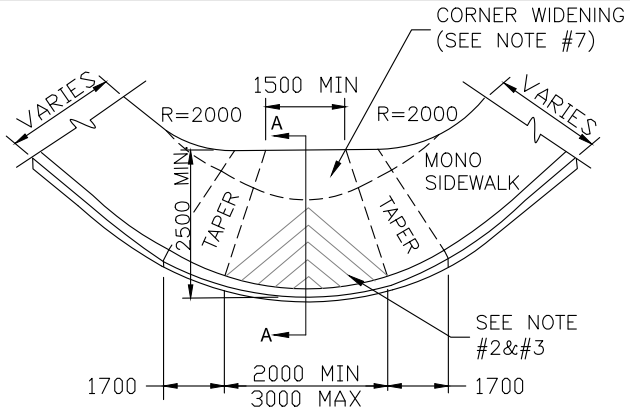
DOWELING DETAIL FOR SIDEWALK REPLACEMENT

DRAWING NO.
6-27

REVISION NO. 0



TYPICAL A1 (ONE DIRECTION)
N.T.S.



TYPICAL A2 (TWO DIRECTIONS)
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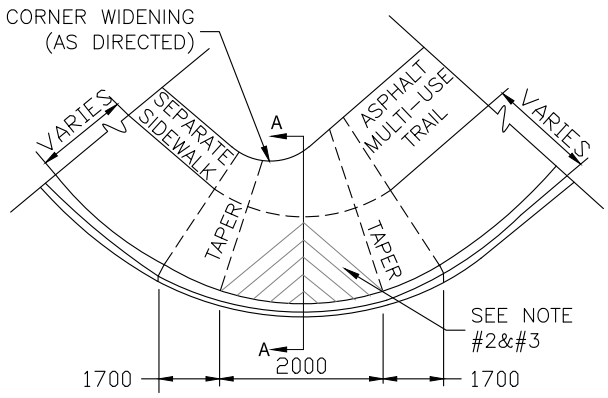

TYPE B1
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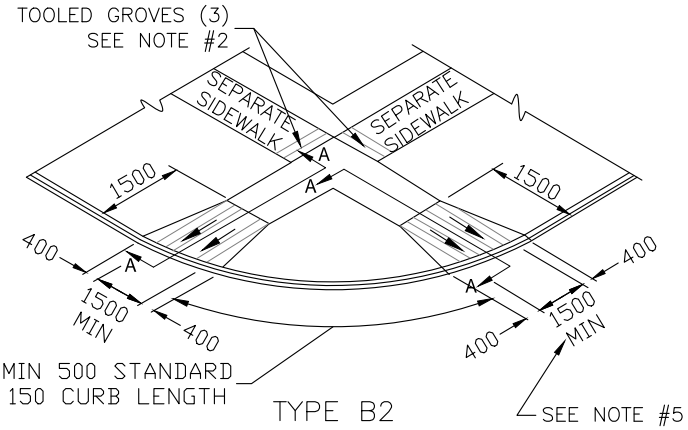

TYPE B2
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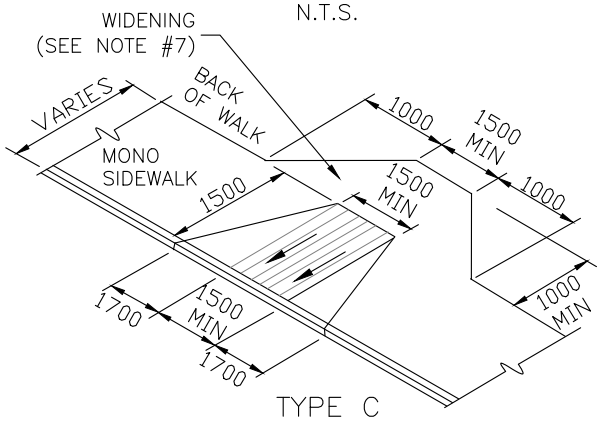
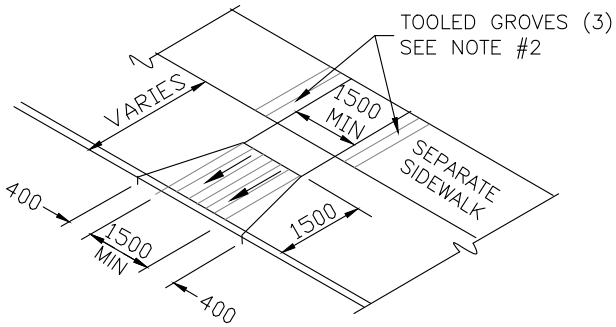


TYPE C
N.T.S.



TYPE D
N.T.S.

NOTES:

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. TOOLED GROOVES 5mm WIDE X 10mm DEEP, BROOM FINISH. GROOVE SPACING 150mm O.C. ADJACENT TO CURB.
3. GROOVES TO BE IN DIRECTION OF TRAVEL.
4. WHEN REQUIRED, TRANSITION FROM STRAIGHT FACE CURB TO ROLLED FACE CURB AT CURB RAMP.
5. CURBS AND RAMPS TO BE POURED MONOLITHICALLY.
6. WIDTH OF RAMP MUST EQUAL WIDTH OF WALK (MIN 1.5m. MAX 3.0m) EXCEPT "TYPE A"
7. PROVIDE 1.0m WIDENING (AT 2.0% X-FALL) FROM BACK OF CURB RAMP (TYPES A & C) WHERE ROAD RIGHT OF WAY ALLOWS.
8. CONCRETE TO BE TYPE HS, 32 MPa COMPRESSIVE STRENGTH AT 28 DAYS.
9. IF ASPHALT TOPLIFT IS DEFERRED, PLACE ASPHALT RAMP FOR THE WIDTH OF CURB RAMP, AND EXTENDING MINIMUM 1M INTO ROAD.

File Name: 6-26-TYPICAL CONCRETE CURB RAMPS.dwg

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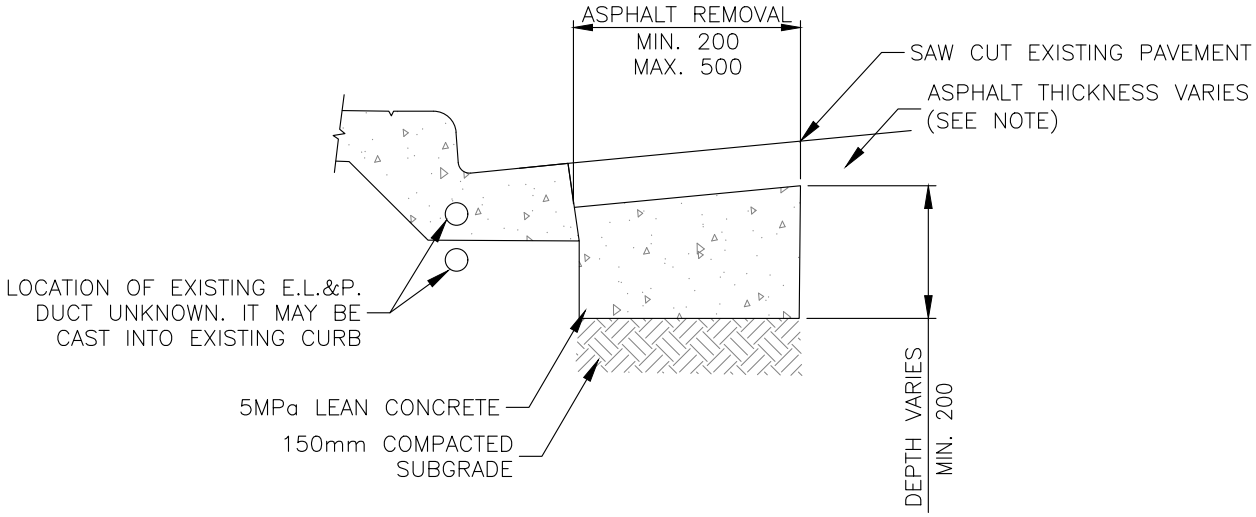
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

TYPICAL CONCRETE CURB RAMPS

DRAWING NO.
6-26

REVISION NO. 0



NOTE:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED
- REMOVE ASPHALT, BASE COURSE AND RE-COMPACT SUBGRADE.
- BACKFILL AREA BETWEEN UP OF GUTTER AND EDGE OF ASPHALT WITH LEAN CONCRETE SLURRY MIX.
- PLACE SLURRY MIX TO MATCH UNDERSIDE OF THE EXISTING ASPHALT OR TO A MAXIMUM DEPTH OF 75mm BELOW THE LIP OF GUTTER.

File Name: 6-27-PAVEMENT REMOVAL & REPLACEMENT ADJACENT TO EX CURB.dwg

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DESIGN GUIDELINE DRAWINGS
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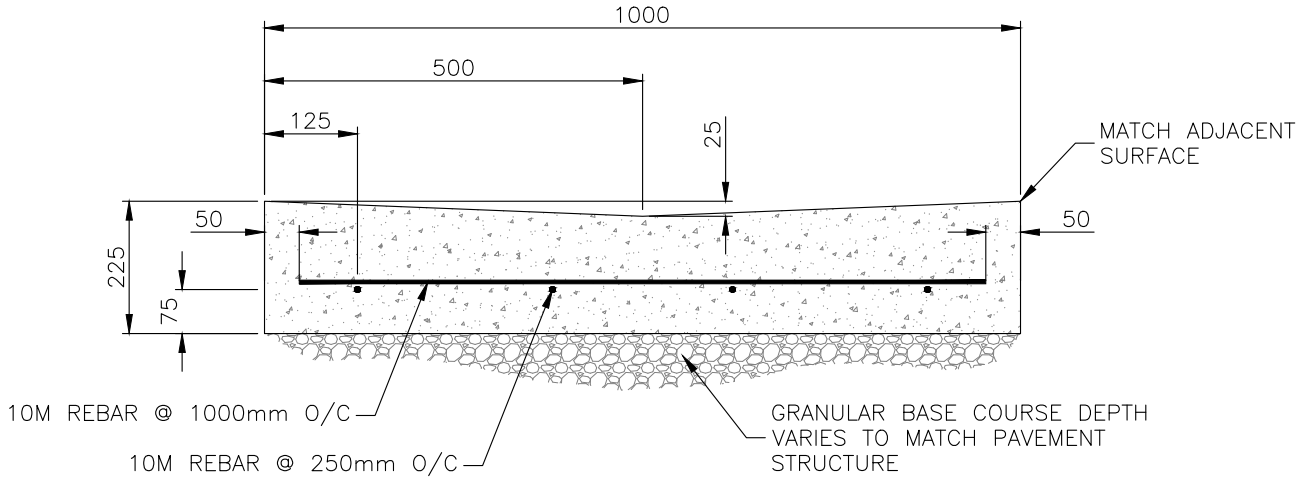
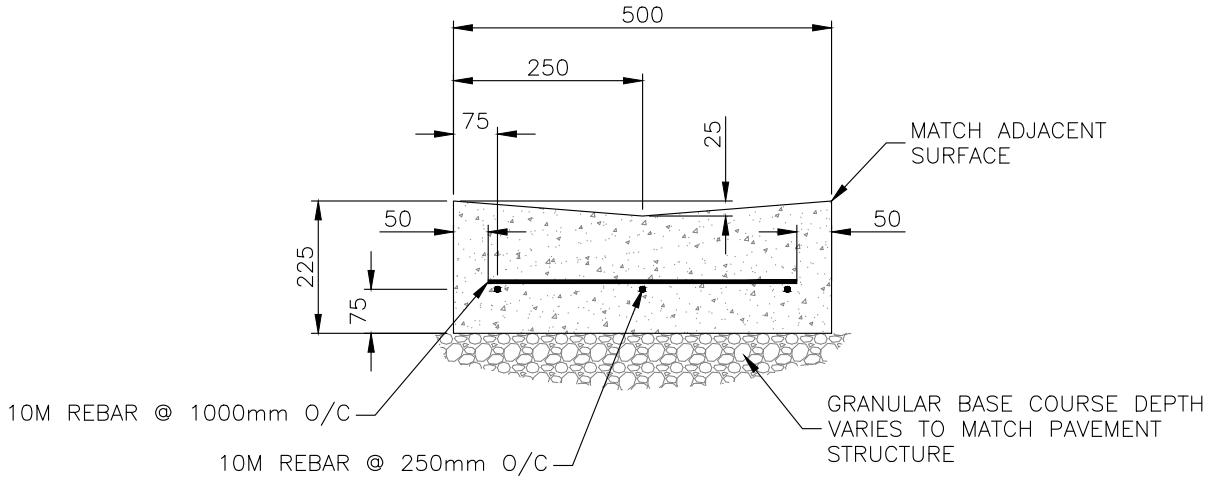
PAVEMENT REMOVAL & REPLACEMENT ADJACENT TO EX CURB

DRAWING NO.
6-27

REVISION NO. 0



1000mm SWALE (USE AT HIGHWAY INTERSECTIONS)



500mm SWALE

NOTES:

- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
- C/L SWALE TO MATCH GUTTER ELEVATION AT UPSTREAM AND DOWNSTREAM END,
- SWALE EDGE TO MATCH LOG ELEVATION ON UPSTREAM AND DOWNSTREAM END
- EXPANSION JOINTS TO BE CONSTRUCTED AT ENDS OF SWALE WHERE SWALE ABUTS GUTTERS.
- CONTRACTION JOINTS 50mm DEEP AND 5mm WIDE TO BE CONSTRUCTED 3m ON CONTRES ALONG SWALE.
- CROWN OF ROAD TO BE TAPERED, STARTING 15m FROM SWALE TO PROVIDE SMOOTH VEHICULAR CROSSING OF SWALE.
- CONCRETE TO BE TYPE HS, 32MPa COMPRESSIVE STRENGTH AT 28 DAYS.

File Name: 6-28-HANDFORMED CONCRETE SWALE.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

HANDFORMED CONCRETE SWALE

DRAWING NO. 6-28

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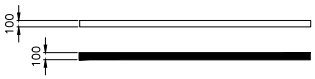
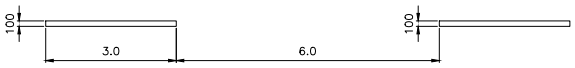
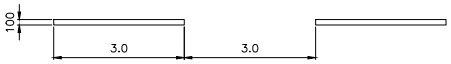
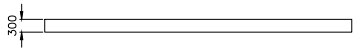
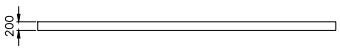
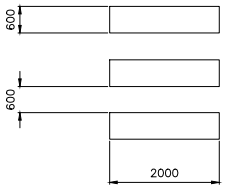
NAME	DIMENSIONS	USE OF LINES
SOLID		–EDGELINES (WHITE OR YELLOW) –DIRECTIONAL DIVIDING LINES (YELLOW) –LANE LINES PROHIBITING LANE CHANGES (WHITE)
BROKEN		–DIRECTIONAL DIVIDING LINES (YELLOW) –LANE LINES (WHITE)
SIMULTANEOUS SOLID AND BROKEN		–DIRECTIONAL DIVIDING LINES (YELLOW)
DOUBLE SOLID		–DIRECTIONAL DIVIDING LINES (YELLOW)
DASHED		–CONTINUITY LINES FOR TURN BAYS AND LANE DROPS (WHITE)
DASHED		–BUS BAYS (WHITE)
DASHED		–GUIDING LINES FOR INTERSECTION MOVEMENTS (YELLOW OR WHITE DEPENDING ON DIRECTIONS)
STOP		–INTERSECTION STOPLINES (WHITE)
CROSSWALK		–CROSSWALK LINES (WHITE)
ZEBRA CROSSWALK		–MINIMUM 2.5m

NOTES:

- THESE TYPICAL DIMENSIONS ARE GENERAL IN NATURE. REFER TO DETAILED ENGINEERING PLANS OR DIRECTION FROM THE ENGINEER FOR PROJECT SPECIFIC APPLICATIONS.
- REFER TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA (MUTCD) TAC. CURRENT EDITION FOR MORE INFORMATION AND GUIDANCE.

File Name: 6–29–PAVEMENT MARKING TYPES & WIDTH.dwg

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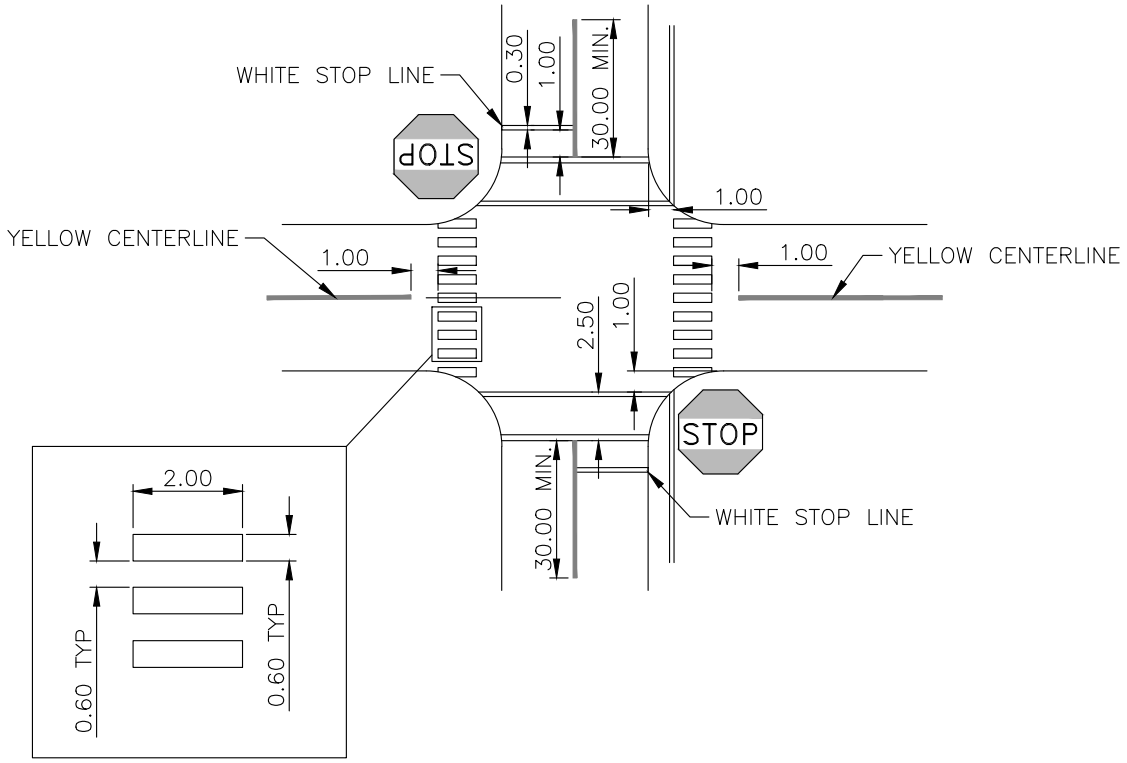
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

PAVEMENT MARKING TYPES & WIDTH

DRAWING NO. 6-29

REVISION NO. 0



NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.
- THESE TYPICAL DIMENSIONS ARE GENERAL IN NATURE. REFER TO DETAILED ENGINEERING PLANS OR DIRECTION FROM THE ENGINEER FOR PROJECT SPECIFIC APPLICATIONS.
- REFER TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA (MUTCD) TAC. CURRENT EDITION FOR MORE INFORMATION AND GUIDANCE.

File Name: 6-30-INTERSECTION PAVEMENT MARKINGS.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Transportation Design

INTERSECTION PAVEMENT MARKINGS

DRAWING NO.
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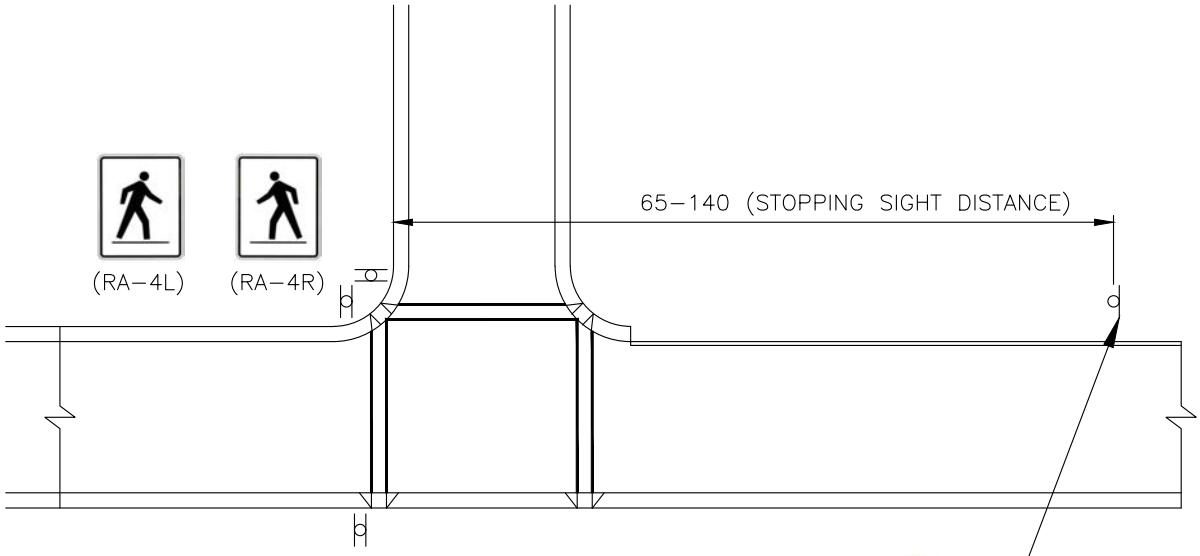

NOTES:

- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.
- RA–4 SIGN PLACEMENT PRIORITY:
  - MOUNT RA–4R JUST IN ADVANCE OF THE RAMP FOR THE NEAREST LANE OF APPROACHING MOTORISTS, WITH RA–4L FACING THE OPPOSITE DIRECTION.
  - MOUNT RA–4R JUST AFTER THE RAMP WHEN REQUIRED TO MINIMIZE OFFSET AND IMPROVE VISIBILITY, WITH RA–4L FACING THE OPPOSITE DIRECTION.

- WC–2 SIGN AND AHEAD TAB PLACEMENT:
  - MOUNT AT STOPPING SIGHT DISTANCE FROM THE NEAREST CROSSWALK LINE, IF THE RA–4 SIGNS ARE NOT VISIBLE AT THAT DISTANCE.
    - HEIGHT:
      LOWEST SIGN SHOULD BE AT LEAST 2.0m HIGH. 2.0m TO 3.0m IS THE IDEAL SIGN HEIGHT.

    - OFFSET:
      LATERAL PLACEMENT SHOULD BE 0.3m TO 2.0m FROM FACE OF CURB.

  - IN THE CASE OF A CENTER MEDIAN:
    MOUNT RA–4L AT CENTER OF MEDIAN FACING NORTH FOR SOUTHBOUND MOTORISTS.

File Name: 6–31–PEDESTRIAN CROSSWALK WARNING SIGN PLACEMENT.dwg

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DESIGN GUIDELINE DRAWINGS
Transportation Design

PEDESTRIAN CROSSWALK WARNING SIGN PLACEMENT

DRAWING NO. 6-31

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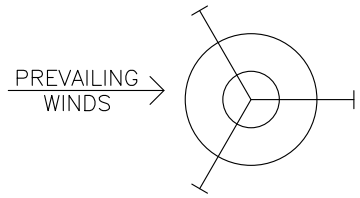
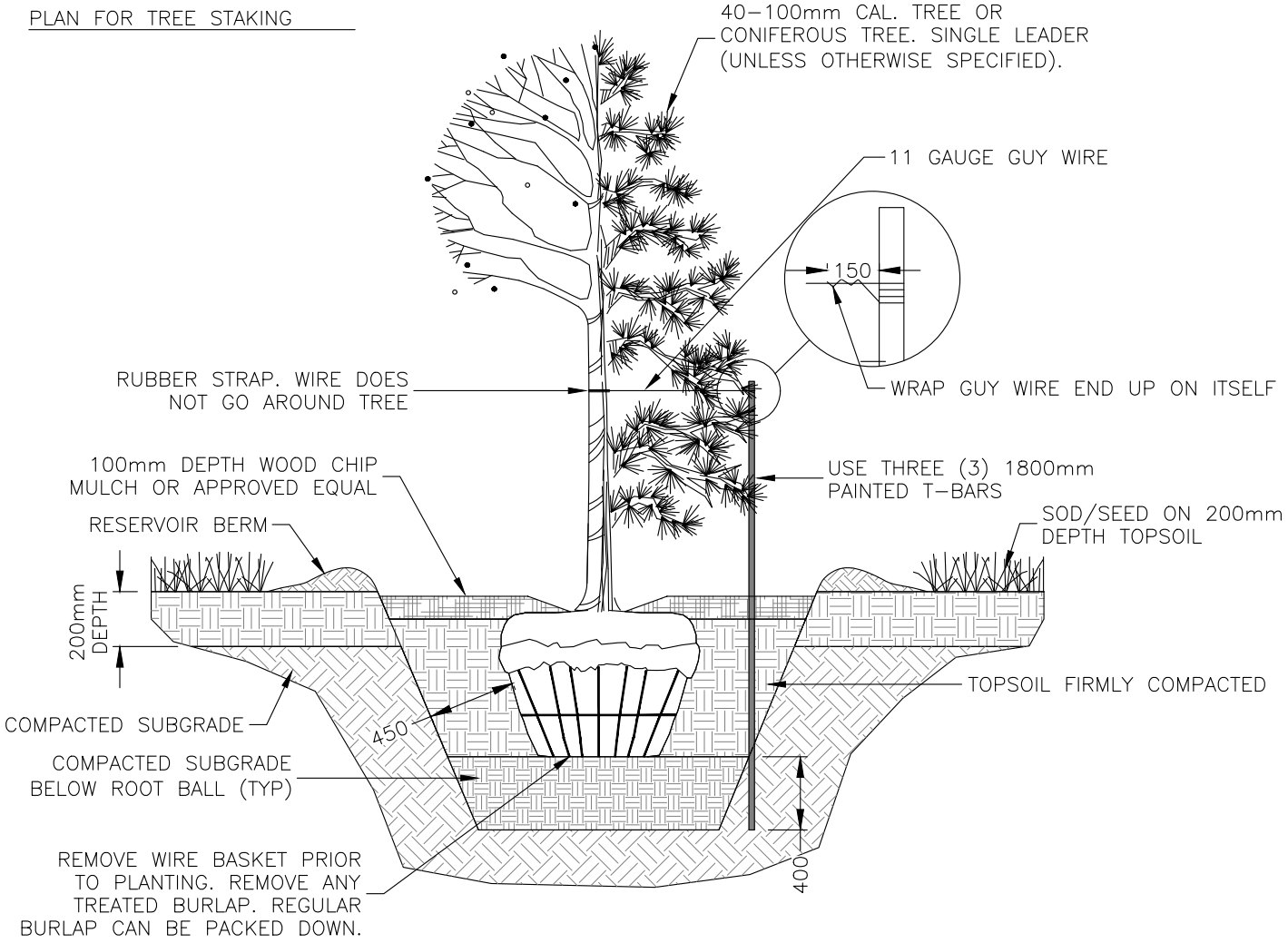


PLAN FOR TREE STAKING



NOTES:

1. EDGE OF BED TO BE STAKED & APPROVED BY TOWN ENGINEER
2. DO NOT ALLOW AIR POCKETS TO FORM WHEN BACK FILLING
3. TREES TO BE PLANTED 75–100mm BELOW GROUND LEVEL
4. PLACE ROOT BALL ON COMPACTED OR UNDISTURBED SUBGRADE
5. MULCH TO BE 50mm AWAY FROM ROOT FLARE/TRUNK. EXTEND TO THE EDGE OF THE DRIP LINE OR 1000mm
6. ON SITES OF EXTREME COMPACTION SCARIFYING IS RECOMMENDED
7. PRUNE DEAD BRANCHES TO MAINTAIN NATURAL FORM OF TREE – DO NOT PRUNE HEAVILY AT PLANTING
8. IF STAKING, STAKE BEYOND EDGE OF ROOT BALL. BARS SHOULD BE HAMMERED DOWN INTO SOLID FOOTING AT LEAST 400mm INTO SUB–SOIL BASE)
9. USE RUBBER STRAPS AT END OF ALL GUY WIRES TO PROTECT THE TREE AT POINT OF CONTACT

File Name: 8–01–TYPICAL TREE PLANTING.dwg

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TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Landscaping Design

TYPICAL TREE PLANTING

DRAWING NO.
8-01

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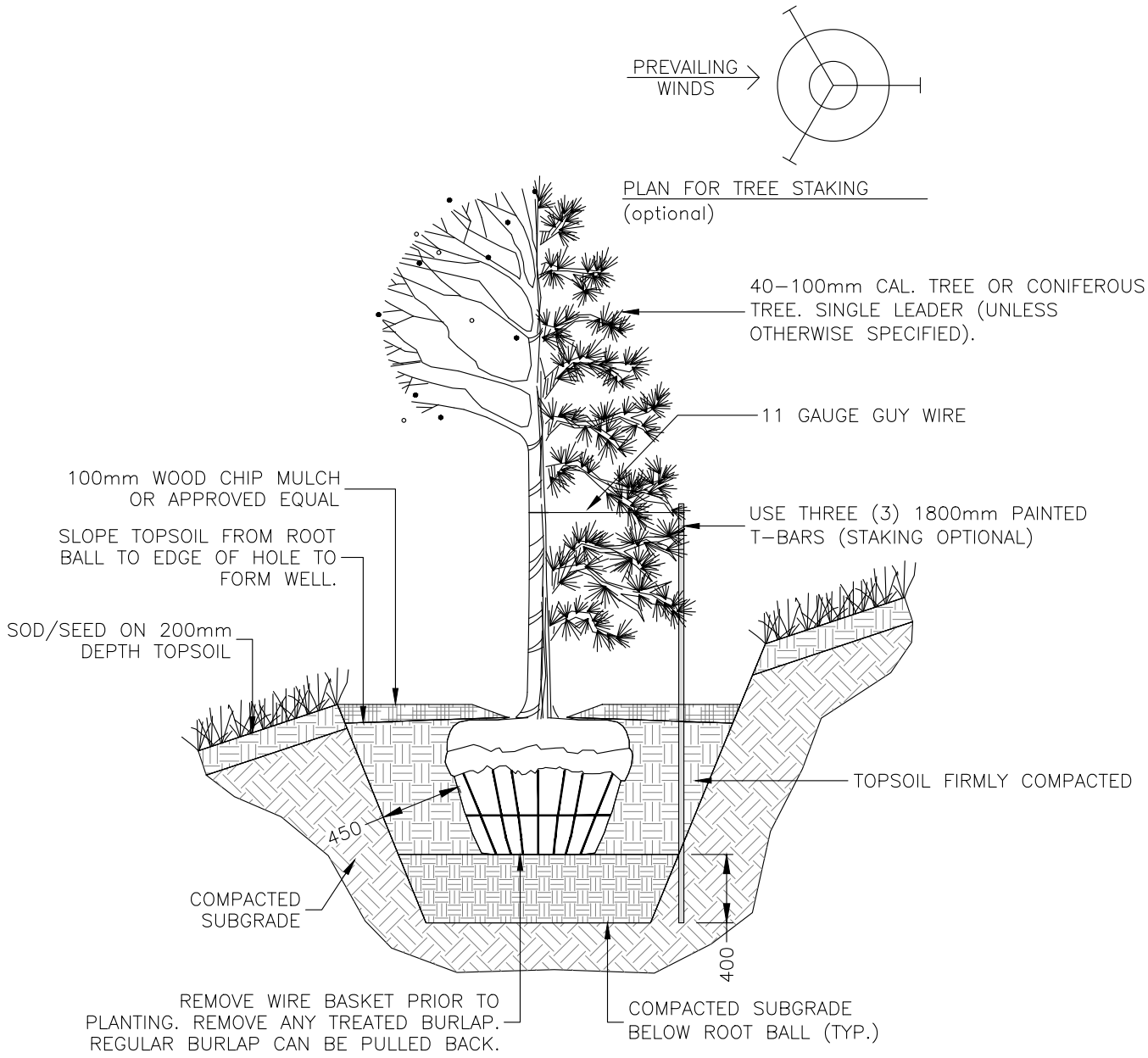

NOTES:

1. EDGE OF BED TO BE STAKED & APPROVED BY TOWN ENGINEER
2. DO NOT ALLOW AIR POCKETS TO FORM WHEN BACK FILLING
3. MULCH TO BE 50mm AWAY FROM ROOT FLARE/TRUNK. EXTEND TO THE EDGE OF THE DRIP LINE OR 1000mm
4. ON SITES OF EXTREME COMPACTION SCARIFYING IS RECOMMENDED
5. PRUNE DEAD BRANCHES TO MAINTAIN NATURAL FORM OF TREE – DO NOT PRUNE HEAVILY AT PLANTING
6. STAKE BEYOND EDGE OF ROOT BALL
7. TREE SHOULD BE PLANTED 75–100mm BELOW GROUND LEVEL
8. BARS SHOULD BE HAMMERED DOWN INTO SOLID FOOTING (AT LEAST 400mm INTO SUB–SOIL BASE)
9. USE RUBBER STRAPS AT END OF ALL GUY WIRES TO PROTECT THE TREE AT POINT OF CONTACT

File Name: 8–02–TREE SLOPE PLANTING.dwg

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DESIGN GUIDELINE DRAWINGS
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TREE SLOPE PLANTING

DRAWING NO. 8-02

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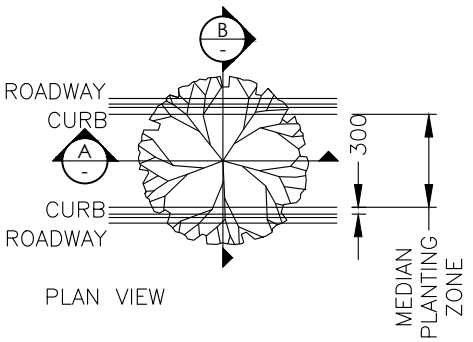
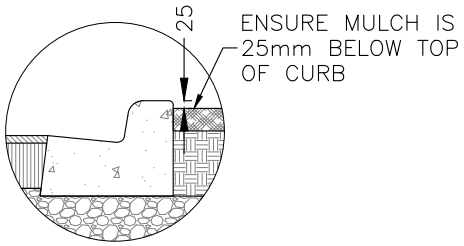
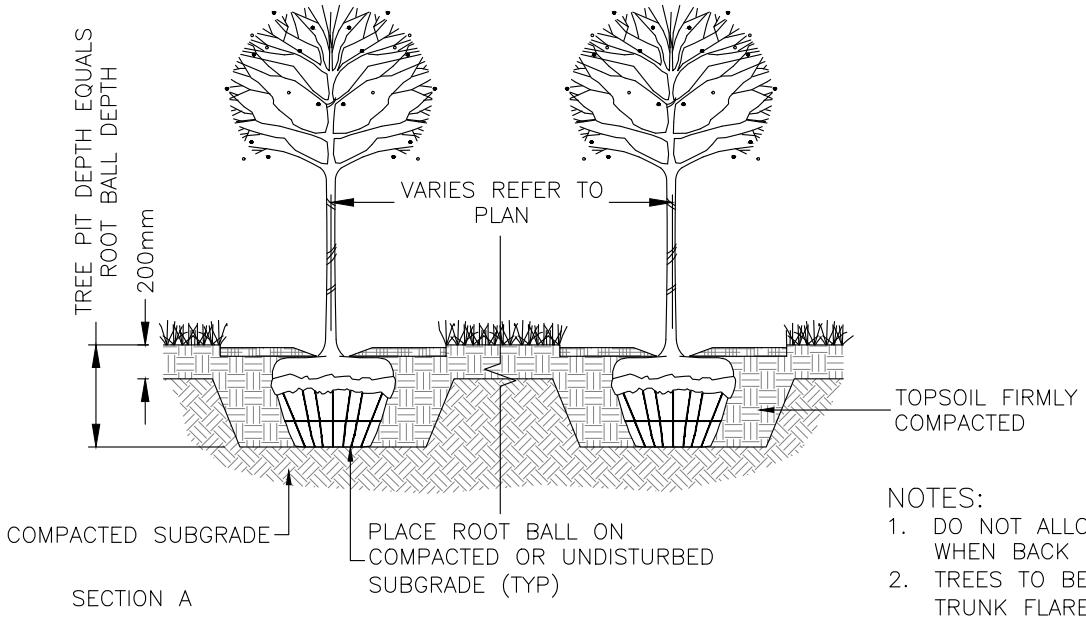


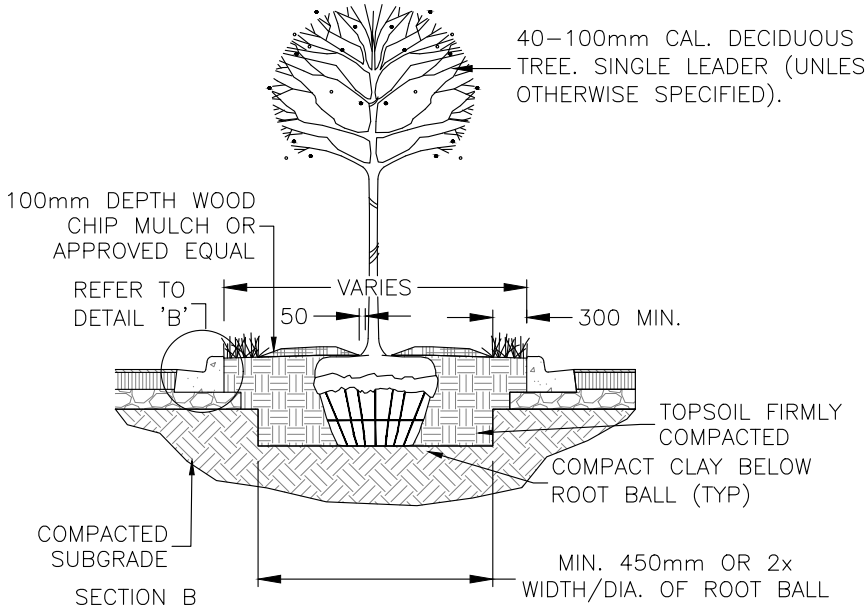
PLAN VIEW



DETAIL 'B'



SECTION A



SECTION B

NOTES:

1. DO NOT ALLOW AIR POCKETS TO FORM WHEN BACK FILLING
2. TREES TO BE PLANTED AT GRADE W/ TRUNK FLARE VISIBLE (NO MORE THAN 25mm ABOVE GRADE)
3. IF TREE IS IN WIRE BASKET, CUT & REMOVE. IF TREE IS IN TREATED BURLAP, CUT & REMOVE. IF TREE IS IN REGULAR BURLAP, PEEL BACK.
4. MULCH TO BE 50mm AWAY FROM ROOT FLARE/TRUNK
5. ON SITES OF EXTREME COMPACTION SCARIFYING IS RECOMMENDED
6. PRUNE DEAD BRANCHES TO MAINTAIN NATURAL FORM OF TREE – DO NOT PRUNE HEAVILY AT PLANTING
7. CROWN MEDIAN TO ENSURE POSITIVE DRAINAGE
8. DEPTH OF LOAM MIN. 150mm TO OPTIMUM OF 300mm. TREE SPADE OPTION IF DEPTH IS 300mm
9. STAKING, IF REQUIRED – REFER TO TYPICAL TREE PLANTING DETAIL 8–01 IN ROCKY MOUNTAIN HOUSE DESIGN GUIDELINES (CURRENT ADDITION). REMOVE STAKING ONE YEAR AFTER INSTALLATION.

File Name: 8–03–TREE TRENCH PLANTING.dwg

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DESIGN GUIDELINE DRAWINGS
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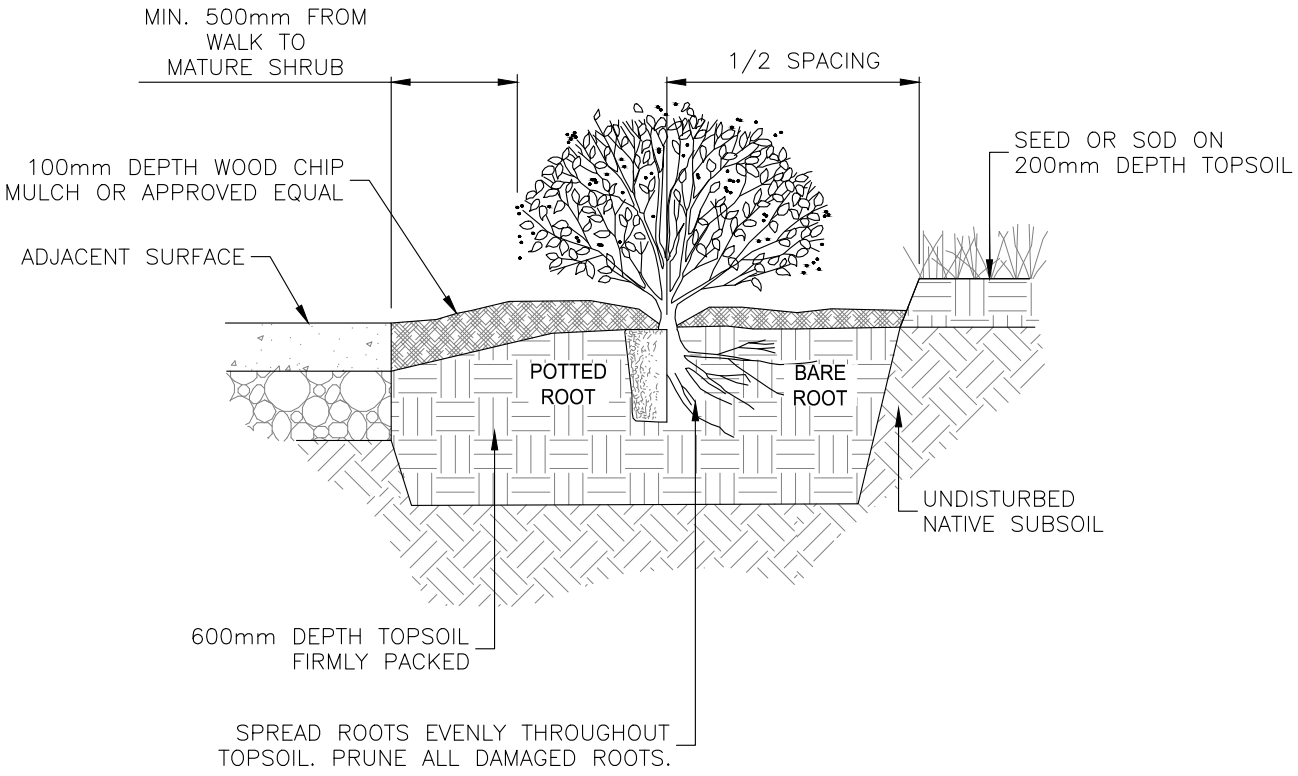
TREE TRENCH PLANTING

DRAWING NO. 8-03

REVISION NO. 0



File Name: 8-04-TYPICAL SHRUB PLANTING.dwg

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TYPICAL SHRUB PLANTING

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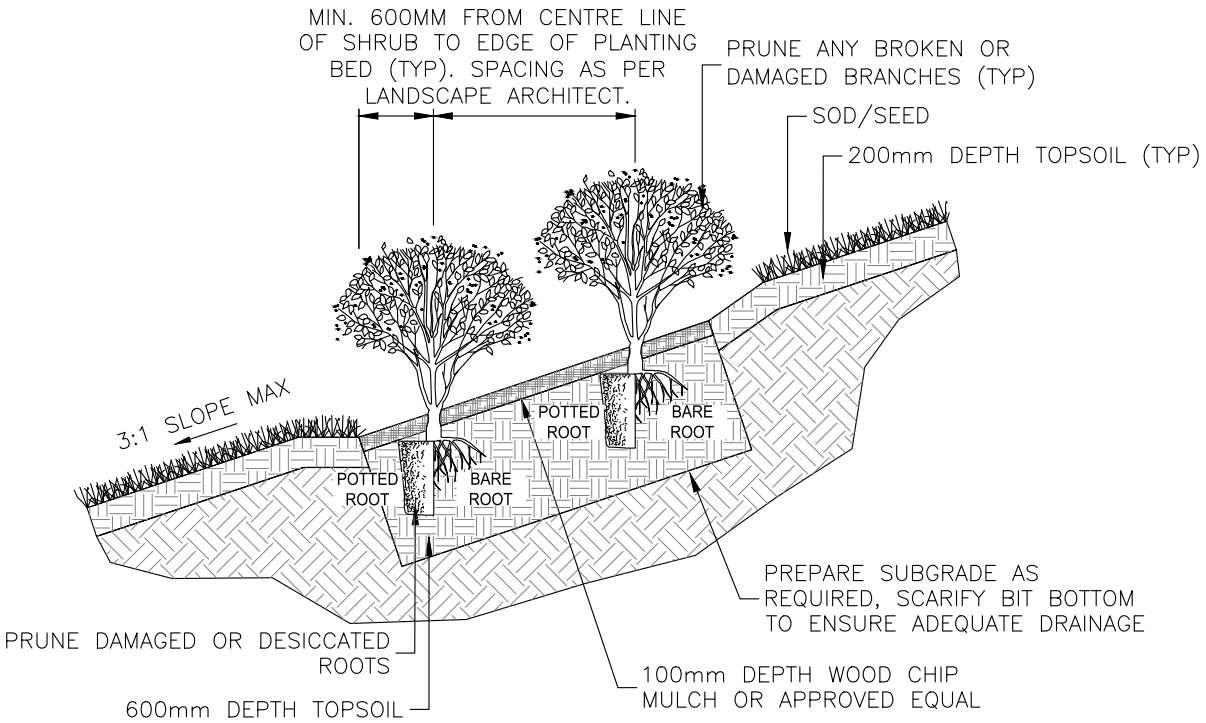
NOTE:
– ENSURE THERE IS A 100mm DIA. CLEARANCE OF MULCH FROM SHRUB BASE



File Name: 8-05-SHRUB SLOPE PLANTING.dwg

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DESIGN GUIDELINE DRAWINGS
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SHRUB SLOPE PLANTING

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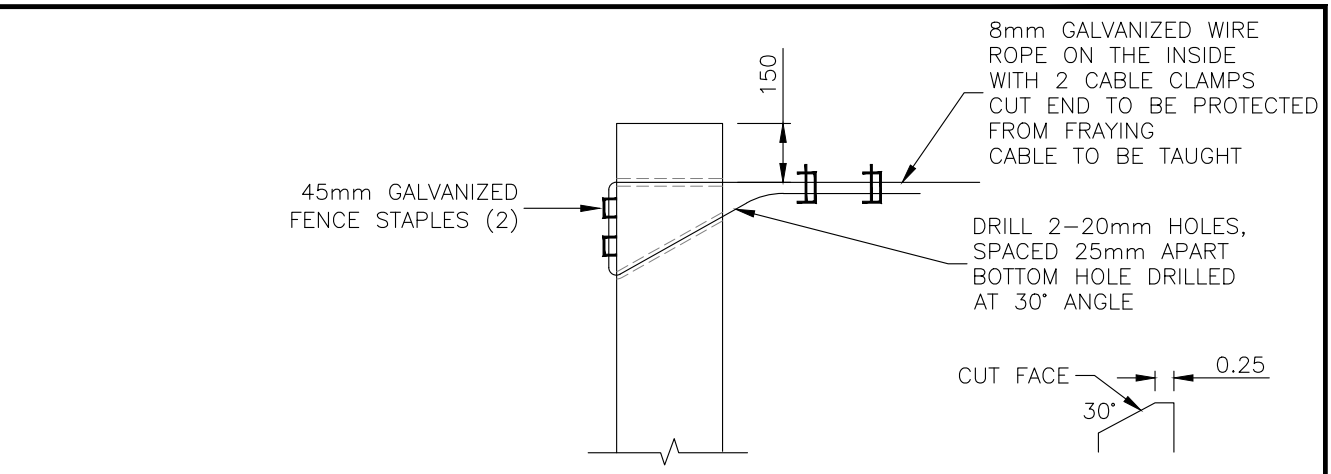
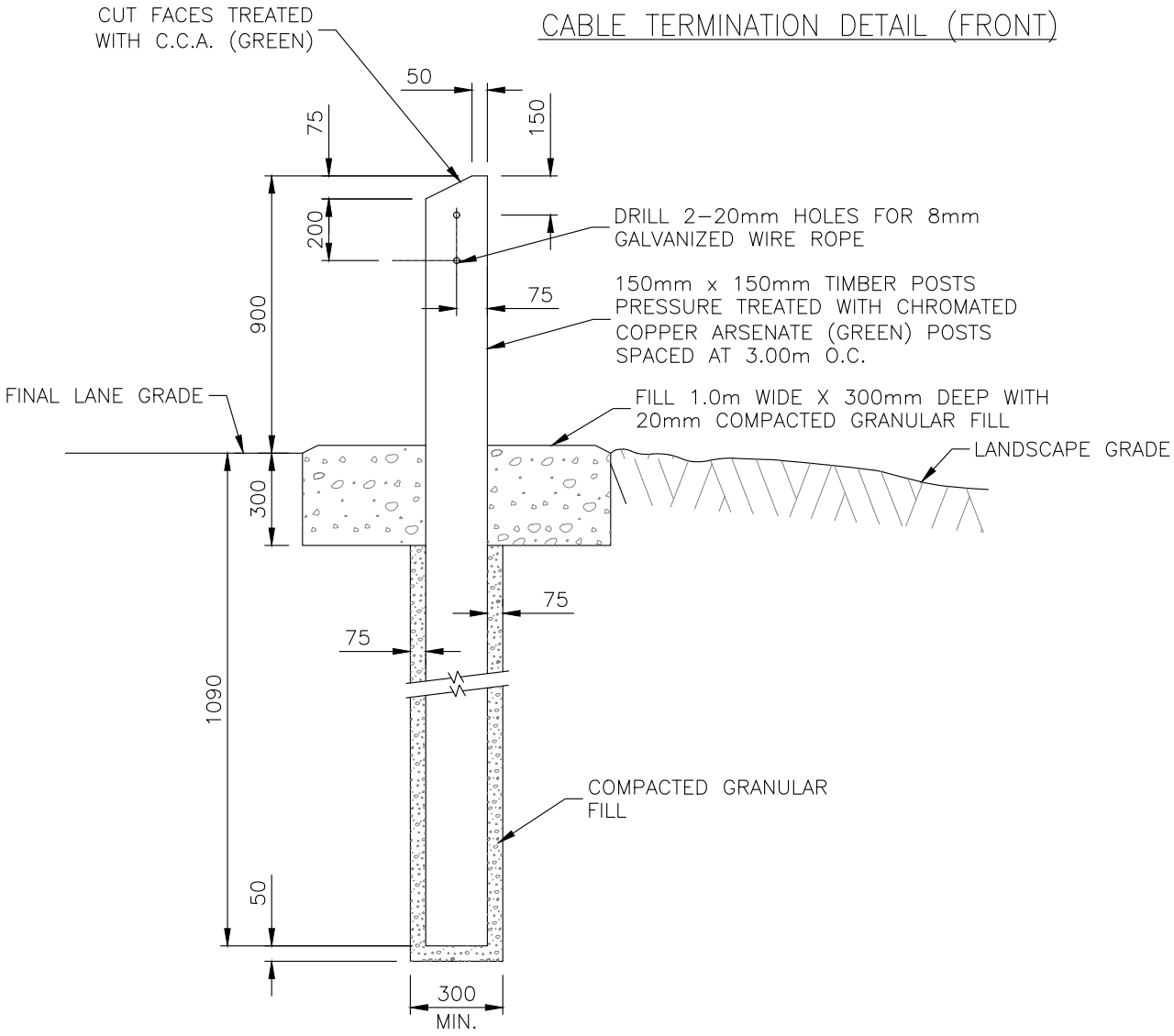


CABLE TERMINATION DETAIL (FRONT)



File Name: 8–06–POST AND CABLE FENCE.dwg

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DESIGN GUIDELINE DRAWINGS
Landscaping Design

POST AND CABLE FENCE

DRAWING NO. 8-06

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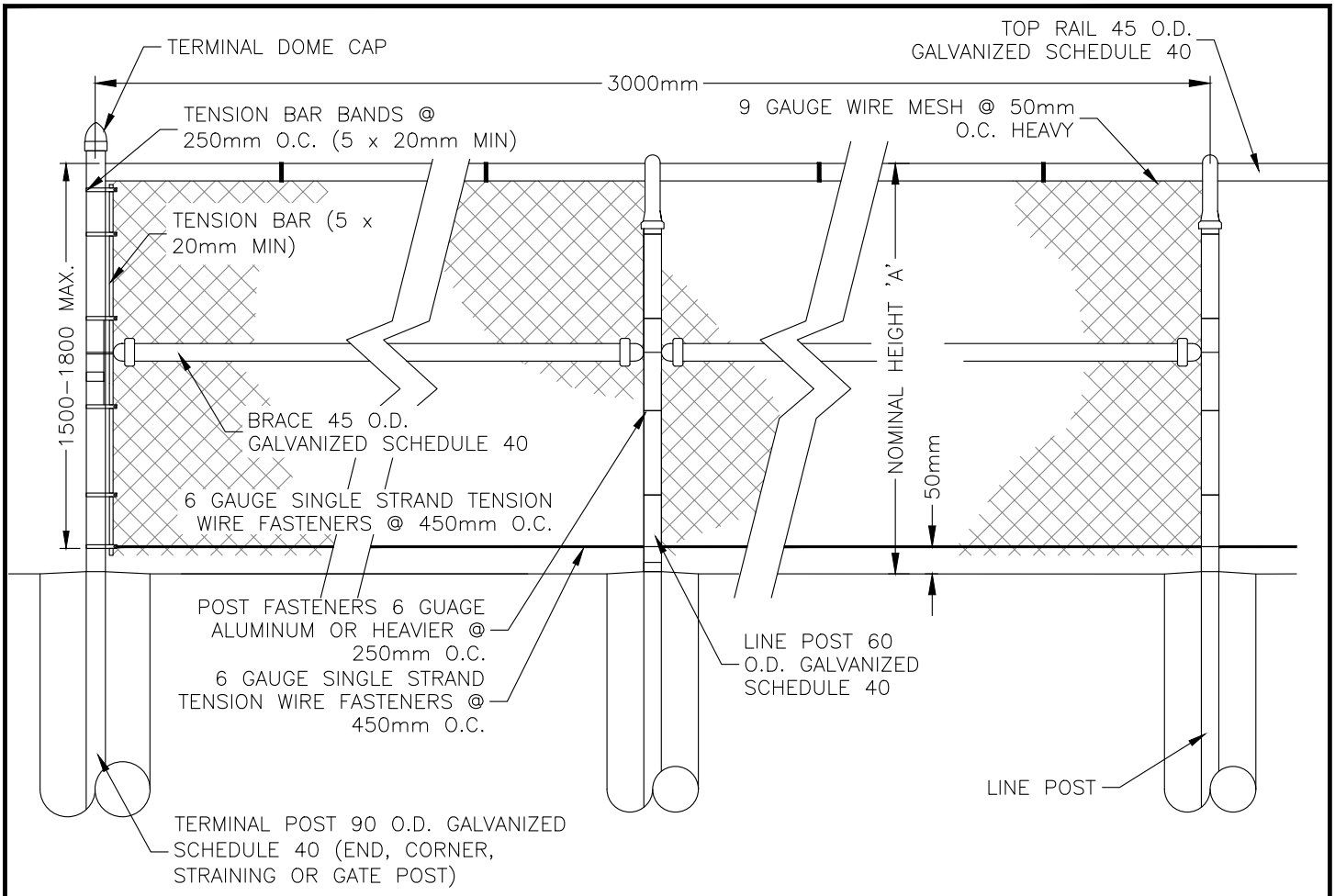
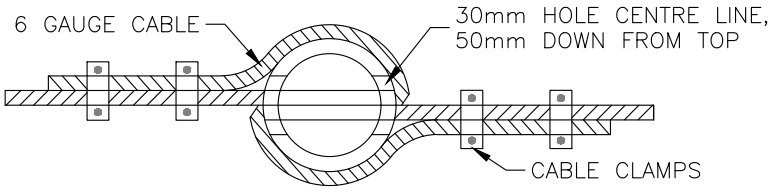
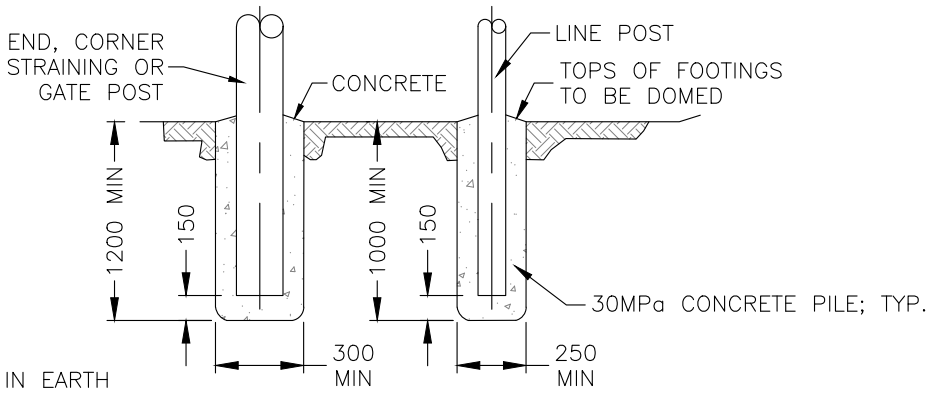




CORNER AND STRAINING POST



File Name: 8–07–STANDARD CHAIN LINK FENCE.dwg

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DESIGN GUIDELINE DRAWINGS
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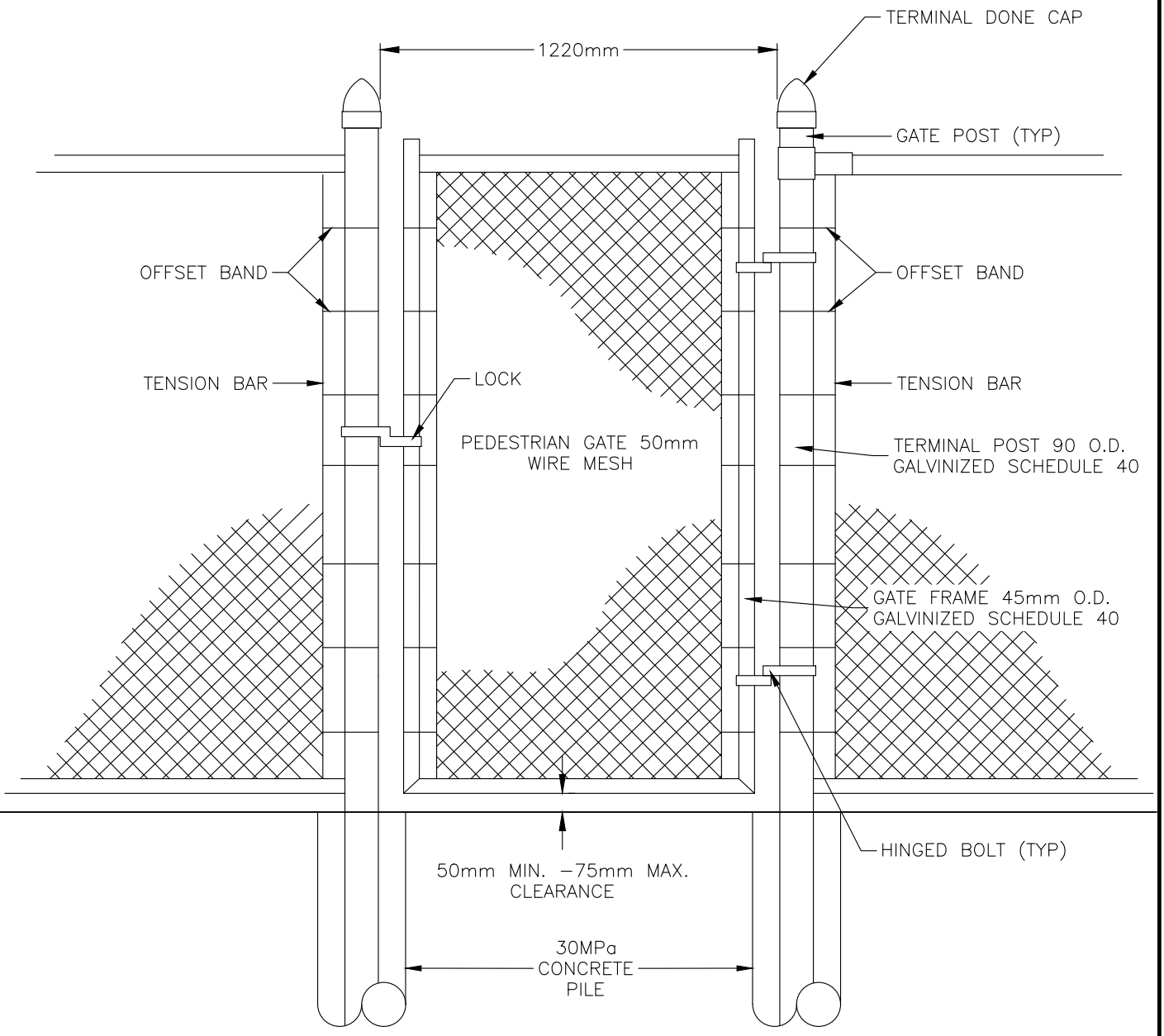
STANDARD CHAIN LINK FENCE

DRAWING NO. 8-07

REVISION NO. 0



NOTE:
1. FOOTINGS & POST SIZES AS PER STANDARD CHAIN LINK FENCE DETAIL

File Name: 8–08–STANDARD PEDESTRIAN CHAIN LINK FENCE GATE.dwg

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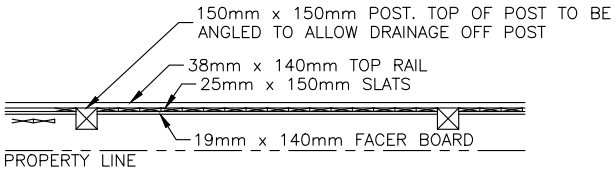
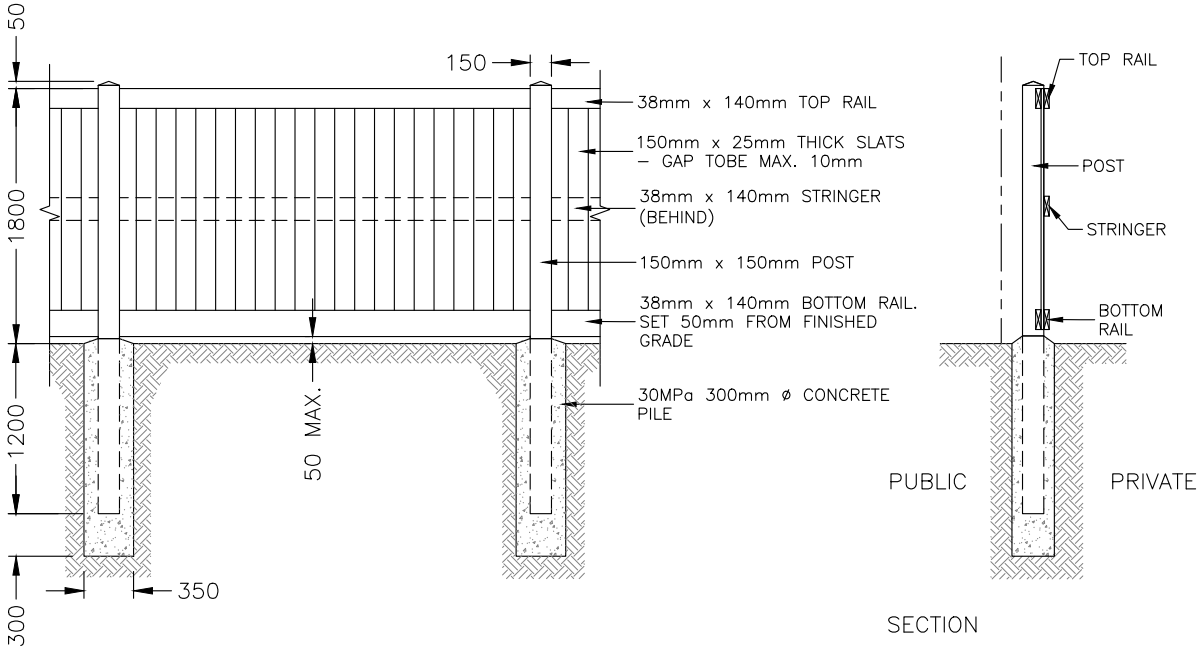
STANDARD PEDESTRIAN CHAIN LINK FENCE GATE

DRAWING NO.
8-08

REVISION NO. 0

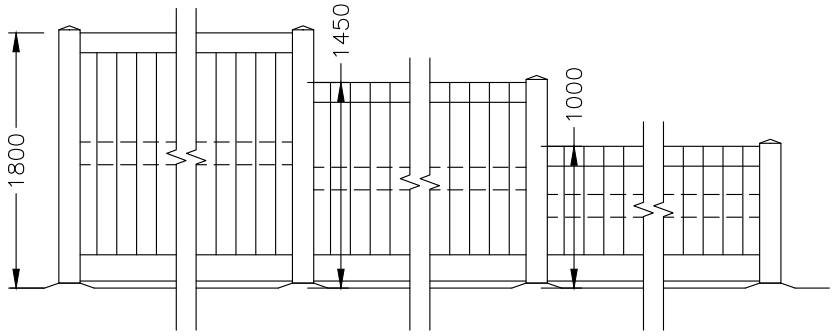


PLAN



ELEVATION

SECTION



STEP DOWN ELEVATION

NOTES:

1. ALL NAILS TO BE 60mm SPIRAL GALVANIZED. USE AS REQUIRED TO ENSURE SECURE ASSEMBLY
2. WOOD USED MAY BE LODGEPOLE PINE, FIR, HEMLOCK OR SPRUCE. DEPENDANT ON AVAILABILITY AT TIME OF CONSTRUCTION
3. ALL STAIN AND COLOUR TO BE DETERMINED BY LANDSCAPE ARCHITECT. APPLY 2 COATS AND STAIN ALL FOUR SIDES OF BOARDS PRIOR TO CONSTRUCTION
4. POSTS SHALL BE LOCATED AT LOT CORNERS W/ INTERMEDIATE POSTS EVENLY SPACED 2500mm ON CENTER
5. FENCE SHALL BE 150mm INSIDE PRIVATE PROPERTY LINE
6. ALL WOOD MEMBERS TO BE PRESSURE TREATED OR APPROVED EQUAL
7. ALL DIMENSIONS IN MILLIMETERS

File Name: 8-09-1800 WOOD SCREEN FENCE.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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No.	Revision

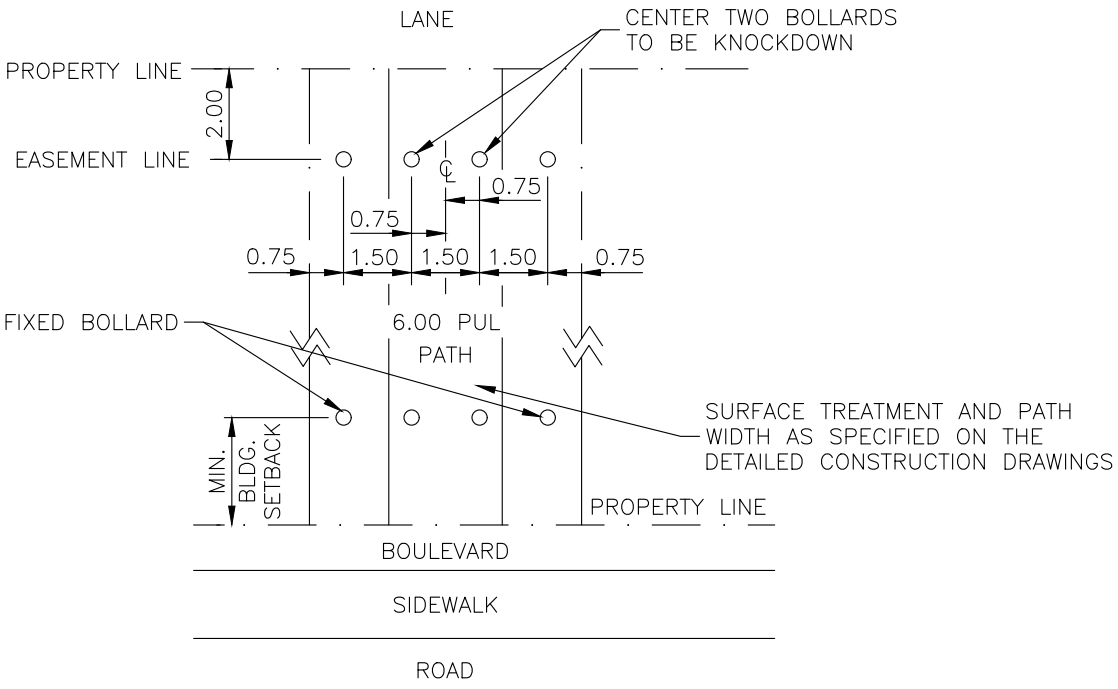
TOWN OF ROCKY MOUNTAIN HOUSE

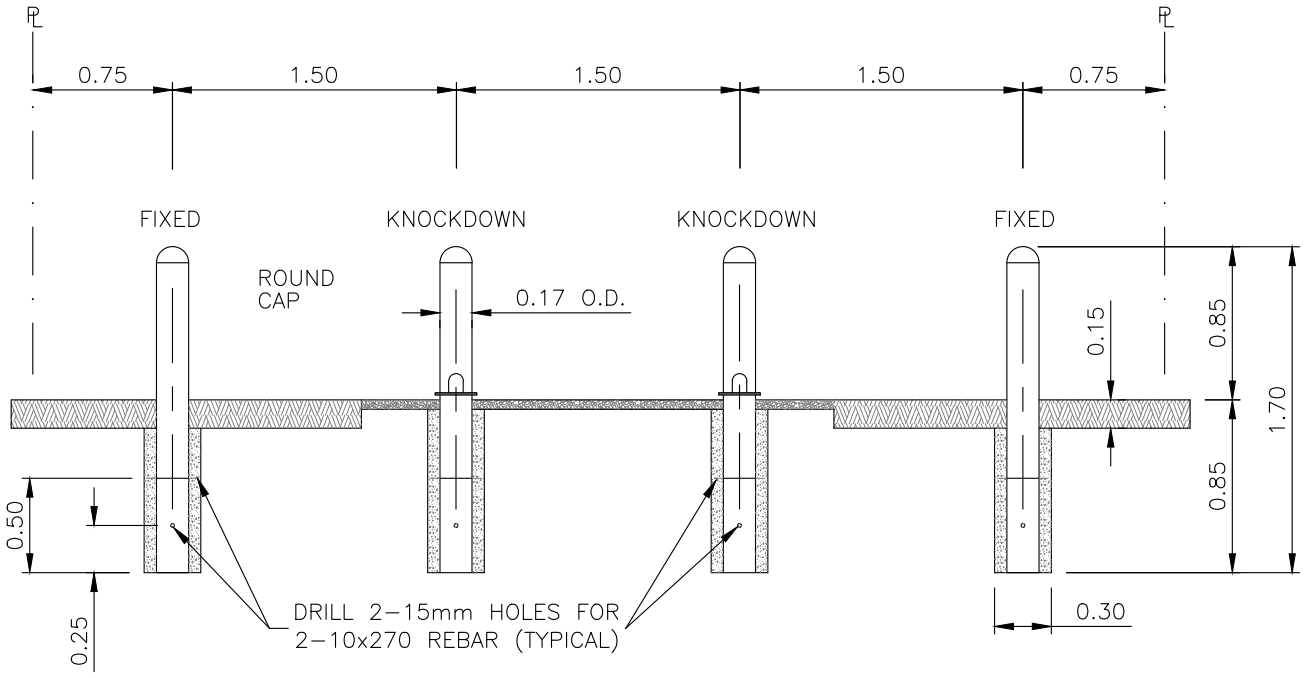
DESIGN GUIDELINE DRAWINGS
Landscaping Design

1800 WOOD SCREEN FENCE

DRAWING NO. 8-09

REVISION NO. 0





File Name: 8–10–FIXED AND KNOCKDOWN BOLLARDS.dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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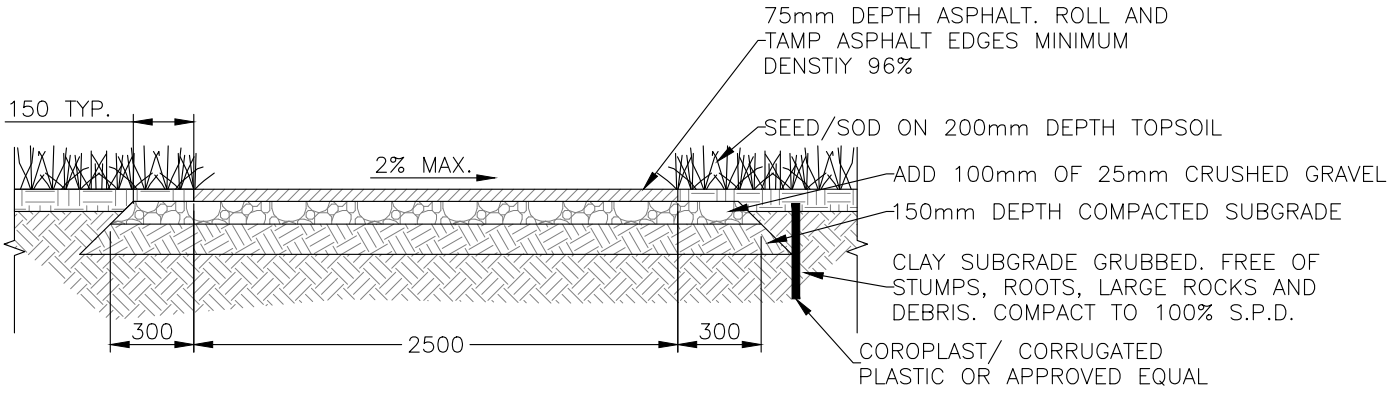
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Landscaping Design

FIXED AND KNOCKDOWN BOLLARDS

DRAWING NO. 8-10

REVISION NO. 0



NOTES:

1. DIMENSIONS OF ASPHALT PATHWAY (TRAIL) AS PER LANDSCAPE DRAWINGS
2. ASPHALT SURFACE SHALL BE FLUSH WITH ADJACENT GRADES
3. DRAINAGE OFF ASPHALT SHALL COMPLY WITH THE SITE DRAINAGE PLAN
4. WHEN TREES, SHRUBS AND/OR GROUNDCOVERS ARE WITHIN 1.5m OF ASPHALT PATHWAY A ROOT BARRIER AT 600mm DEPTH IS REQUIRED
5. ALL DIMENSIONS IN MILLIMETERS

File Name: 8-11-ASPHALT PATHWAY (TRAIL).dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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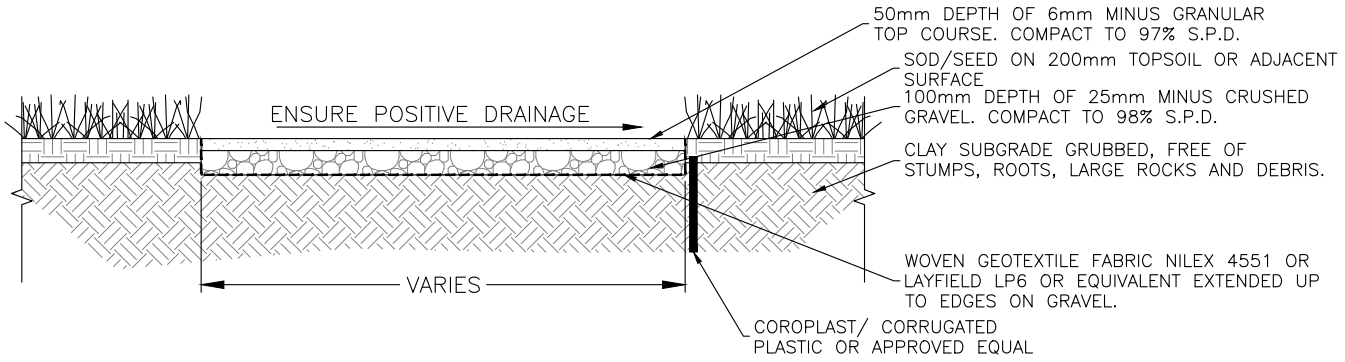
TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Landscaping Design

ASPHALT PATHWAY (TRAIL)

DRAWING NO. 8-11

REVISION NO. 0



NOTES:

1. DIMENSIONS OF GRANULAR PATHWAY (TRAIL) AS PER LANDSCAPE DRAWINGS
2. GRANULAR SURFACE SHALL BE FLUSH WITH ADJACENT GRADES
3. DRAINAGE OFF GRANULAR SURFACE SHALL COMPLY WITH THE SITE DRAINAGE PLAN
4. WHEN TREES, SHRUBS AND OR GROUNDCOVERS ARE WITHIN 1.5m OF GRAVEL PATHWAY A ROOT BARRIER AT 600mm DEPTH IS REQUIRED
5. ALL DIMENSIONS IN MILLIMETERS

File Name: 8-12-GRANULAR PATHWAY (TRAIL).dwg

Rev. By: MPT	Rev. Date: 2021/01/14
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No.	Revision

TOWN OF ROCKY MOUNTAIN HOUSE

DESIGN GUIDELINE DRAWINGS
Landscaping Design

GRANULAR PATHWAY (TRAIL)

DRAWING NO. 8-12

REVISION NO. 0