



**CITY OF
SWIFT CURRENT**
where life makes sense

PART A

DESIGN AND DEVELOPMENT STANDARDS

OCTOBER 2020



PART A DESIGN AND DEVELOPMENT STANDARDS

TABLE OF CONTENTS

SECTION A1 – GENERAL REQUIREMENTS	38 PAGES
SECTION A2 – WATER DISTRIBUTION SYSTEM	9 PAGES
SECTION A3 – SANITARY SEWERAGE SYSTEM	7 PAGES
SECTION A4 – STORM DRAINAGE SYSTEM	18 PAGES
SECTION A5 – STREETS	17 PAGES
SECTION A6 – LANDSCAPING	20 PAGES



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PART A1

GENERAL REQUIREMENTS

OCTOBER 2020



1	REQUIREMENTS PRECEDING STANDARDS AND SPECIFICATIONS	3
2	APPLICATION OF THESE STANDARDS AND SPECIFICATIONS.....	3
3	DEFINITIONS	4
4	USE OF THESE STANDARDS AND SPECIFICATIONS	5
5	CHANGES FROM THE STANDARDS AND SPECIFICATIONS	5
6	CITY DEPARTMENT ROLES	6
7	ENGINEERING DESIGN REQUIREMENTS.....	7
8	DESIGN DRAWINGS	11
9	AS-BUILT DRAWINGS	19
10	CONSTRUCTION REQUIREMENTS	21
11	TYPICAL DEVELOPMENT FORMS.....	25

Abbreviations

The following abbreviations may be used in this document:

BC	-	Beginning of curve
BOW	-	Back of walk
BVC	-	Beginning of vertical Curve
CCC	-	Construction Completion Certificate
EC	-	End of Curve
EVC	-	End of vertical Curve
FAC	-	Final Acceptance Certificate
FOW	-	Face of walk
ha	-	Hectare
ID	-	Inside diameter
Kg	-	Kilogram
lcd	-	Litres per capita per day
m ²	-	meter squared
m ³	-	meter cubed
OC	-	On centre
OD	-	Outside diameter
PVI	-	Point of vertical intersection
l/s	-	Litres per second
m/s	-	Metres per second
kPa	-	kilopascal
MPa	-	megapascal
pH	-	measure of acidity or basicity of an aqueous solution
ACP	-	Asphaltic Concrete Pavement
ASBC	-	Asphalt Stabilized Base Course
SPD	-	Standard Proctor Density
CD	-	Compact Disc
DVD	-	Digital Video Disc
CCTV	-	Closed Circuit Television
ASB	-	Agricultural Service Board
PW	-	Public Works

Other abbreviations may be used or defined elsewhere in this document. Where undefined, an abbreviation shall carry a meaning consistent with industry standards. Ascertaining the meaning of a word or abbreviation in context is the responsibility of the Designer or Developer.

1 REQUIREMENTS PRECEDING STANDARDS AND SPECIFICATIONS

Addressing infrastructure design and construction on a site follows a process of review, discussions, and approvals leading to the actual work to occur on the site. Development starts with having the correct zoning, obtaining the necessary permits and approvals for development, and undertaking the necessary studies and technical evaluations needed to subdivide the land and pursue development or re-development on a site. The design guidelines and construction specifications are tied to any general land use and planning policies and standards that may influence the location of and design of physical improvements on a site.

Consultation with the Planning and Growth Development Department shall occur before undertaking any engineering and technical analysis of the site and development on the property. Once all the preceding activities have occurred and have been approved these Standards and Specifications are to be used for infrastructure design and construction.

2 APPLICATION OF THESE STANDARDS AND SPECIFICATIONS

The City Standards and Specifications in their entirety consist of the following sections:

- Part A – Design and Development Standards
- Part B – Construction Specifications
- Part C – Standards Drawings

This complete document has been prepared to guide designers, developers, and consultants by providing clear direction and expectations of the City of Swift Current (City) when developing, or performing work within the City. The document also provides standards and specifications for use by City departments and their contractors when engaging in infrastructure improvement projects. The objectives of the document are as follows:

- 2.1 To provide a consolidated statement of City policies and expectations regarding the standard of municipal improvements required.
- 2.2 To provide clear and consistent standards to Developers and Consultants regarding the design and servicing of infrastructure in the City.
- 2.3 To establish a series of consistent standards and specifications that the Developer, Consultant, and Contractor are to recognize and follow throughout the design and construction process.
- 2.4 To ensure that infrastructure built for the City meets community quality of life while being safe, functional, environmentally friendly, cost effective, and aesthetically pleasing.
- 2.5 To identify design and construction criteria that the City considers to be minimum standards.

- 2.6 To outline the various stages of planning and design, level of analyses required, and procedures to be followed to obtain approval of conceptual, preliminary, and detail design for developers and consultants for municipal improvement proposals.
- 2.7 To provide clarity for the developer on their obligations for restoration and/or improvements to City infrastructure that is directly/indirectly impacted by the development being considered.

3 DEFINITIONS

In these standards and specifications, unless the context otherwise indicates, the following words shall have the meaning hereinafter assigned to them.

“Applicant”/“Developer” shall mean a person who has applied for the subdivision, development or installation to serve an existing parcel of land, whether as the City or an agent for the City of the land included therein.

“Contractor” will mean any person, persons, or corporations that shall undertake the installation of Municipal Services on behalf of either the Applicant or the City.

“Developer’s Engineer” shall mean a qualified Professional Engineer registered and licensed to practice in the Province of Saskatchewan, who is appointed or engaged by the Developer to be responsible for the design and preparation of drawings and specifications and provision of engineering supervision during the construction of the municipal improvements for the development area.

“City” or “Engineer” or “Project Manager” means a representative of the City of Swift Current who is assigned authority to act on behalf of the City.

“Municipal Improvements” or “infrastructure” shall mean both underground and surface structures including, but not necessarily limited to, watermains, sewer systems, storm drainage systems, roadways, walkways, park areas, shallow utilities, signage, retaining walls, fencing, and other improvements as required by the City, all of which shall become the property of the City to operate and maintain.

“Prime Contractor” as defined by Occupational Health and Safety Act.

“Landscape Architect” refers to the consultant working on behalf of the developer and/or City for the preparation of landscape drawings. The Landscape Architect must be a member in good standing with the Saskatchewan Association of Landscape Architects.

“Servicing Agreements” refers to a legal agreement between Developers and the City of Swift Current which specifies financial obligations and terms and conditions for the construction of the municipal improvements necessary to services lands approved for development. Types of agreements are as follows:

- Servicing Agreement
- Deferred Servicing Agreement

4 USE OF THESE STANDARDS AND SPECIFICATIONS

- 4.1 Where a Developer is required to enter into a Servicing Agreement, any conditions in the agreement will supersede information contained in these design standards.
- 4.2 These design standards and construction specifications shall apply to the design and installation of municipal infrastructure within new and existing developments within the City of Swift Current.
- 4.3 These Standards and Specifications do not cover the design or installation of lighting, power, gas, telephone, and television services, but do include coordination with the various utility companies. The general location of such services must be approved by the City of Swift Current.
- 4.4 The Standard Drawings, as referred to in various sections, will form an integral part of these design guidelines and construction standards. Refer to the Standard Drawings in Part C.
- 4.5 No construction shall commence until all designs have been accepted by the City and the following has been submitted:
- Design drawings
 - Letters of Credit
 - Authority Contacts
 - Submittal requirements as set out in the specific standards sections.

5 CHANGES FROM THE STANDARDS AND SPECIFICATIONS

No departure from these design guidelines and construction standards will be permitted except with written approval of the City. A written "Change Request" to deviate from these standards and specifications shall be submitted to the City Project Manager for the specific project. The "Change Request" shall include the following information:

- Reason for the change request
 - Short and long term benefits associated with the change
 - Evidence indicating successful implementation in other municipalities.
- 5.1 The City reserves the right to request additional information on the proposed Change to the standards and specifications prior to approval.
- 5.2 Any contemplated changes must conform to any City Bylaws.

- 5.3 The City reserves the right to the final decision regarding interpretation on the intent of these standards and specifications and the acceptability of changes.
- 5.4 The City of Swift Current will provide written approval to indicate that the proposed change has been accepted or rejected. Written approval MUST be signed by two (2) City General Managers or specified delegates thereof in order to be considered accepted by the City of Swift Current.
- 5.5 The City reserves the right to require any specific situation to exceed the requirements of these standards and specifications if deemed necessary.

6 CITY DEPARTMENT ROLES

The following are the three main City Departments, although each department is dedicated to specific elements there are circumstances where departments will overlap. A meeting for specifics will need to be carried out to determine the project specific role for each.

Planning and Growth Development shall be the first point of contact for any prospective developer or persons wishing to develop land which will directly impact the City of Swift Current's infrastructure. Permits and agreements will be complete with Planning and Growth Development who will communicate and collaborate with other departments, such as emergency services, to ensure that all requirements are covered.

Infrastructure and Operations shall be responsible for the engineering review of prospective developments and how they tie into the City of Swift Current's infrastructure. Infrastructure and Operations will review and advise on the following aspects of the prospective development:

- Streets & Roads
- Watermain
- Sanitary Sewer
- Storm Sewer

During the course of construction representatives from the Infrastructure and Operations department will conduct site visits to verify that City specifications are being met. They will also be available to troubleshoot any existing problems that may arise with existing infrastructure.

Community Services shall be involved in and responsible for the review of all parks, playgrounds, trails, pathways, and associated facilities that will be taken over by the City after the project is complete.

7 ENGINEERING DESIGN REQUIREMENTS

7.1 GENERAL

- 7.1.1 The Applicant shall retain the services of a Professional Engineer, registered and licensed to practice in the Province of Saskatchewan, who shall be responsible for the design and preparation of drawings and specifications for all infrastructure (except lighting, telephone, natural gas, and power) to be constructed within and/or related to the proposed development area, as required, within the City of Swift Current.
- 7.1.2 All required municipal improvements shall be designed in accordance with accepted engineering practices and shall meet or exceed the City of Swift Current Design Standards and Construction Specifications as set out herein. If landscaping plans are deemed required by the City the landscape plans will be prepared and stamped by a Landscape Architect or a Professional Engineer as required by Provincial Legislation.
- 7.1.3 It is the Developer's obligation to provide all off-site infrastructure required to serve their development unless otherwise specified by the City.

7.2 REQUIREMENTS

- 7.2.1 For the installation of services or municipal infrastructure to serve an existing property, the applicant shall make application in writing on the appropriate form provided by the City. These applications do not necessarily require engineering design; however, the applicant must provide proof that the installation will conform to these design standards. If the City deems it necessary that the installation be monitored by a professional engineer, the applicant shall pay all costs for the monitoring.
- 7.2.2 The Design drawings must show all existing and proposed services. It shall be the responsibility of the Developer's Engineer to coordinate with the utility companies to establish the location of their existing and proposed services. All design drawings must be completed in accordance with Section 10 of these guidelines and specifications.
- 7.2.3 The Developer's Engineer shall be responsible for carrying out all surveys and investigations necessary to prepare the design. It shall further be the responsibility of the Developer's Engineer to identify the need for any easements or additional rights-of-way required. The plans and related documents shall be prepared by a qualified licensed Saskatchewan Land Surveyor at the Developer's expense.
- 7.2.4 The Developer's Engineer shall bring to the attention of the Applicant the need for any rights-of-way, outside the subdivision, that the Applicant will have to obtain. The Applicant shall provide proof of rights-of-way to the City prior to the installation of services on such properties. Rights-of-way shall be assigned in the name of the City or, as applicable, the utility company. The Applicant is to pay all costs associated with registering the right-of-way and fulfil all terms and conditions associated with establishing rights-of-way.

- 7.2.5 While the Developer's Engineer may arrange to have certain portions of the work carried out by other qualified persons, he shall remain responsible for the coordination of the work and certification of its quality and accuracy.

7.3 RIGHTS-OF-WAY AND EASEMENTS

- 7.3.1 Streets, lanes, and utility lots shall be designed to accommodate all deep and shallow utilities where possible. Every effort should be made by all utilities to do their work within the rights-of-way dedicated for these purposes and not acquire additional easements for utilities except along common side property lines and along rear property lines without lanes.
- 7.3.2 Other Dedications that have to be factored into any new subdivision or development shall be a municipal reserve, environmental reserve, green space, or park in accordance with the City's Subdivision Bylaw and Provincial Legislation.
- 7.3.3 Rights-of-way and/or easements will be provided for all utilities not located on streets, lanes, or utility lots, including rights-of-way for ditches or water courses accommodating surface runoff.
- 7.3.4 Where easements or rights-of-way are deemed necessary, they will be prepared by a registered Land Surveyor at the Applicant's expense.
- 7.3.5 Rights-of-way shall be registered in the name of the City or, as appropriate, in the name of the utility company. Ownership to be confirmed with the City.

7.4 ENVIRONMENTAL AND HISTORICAL STUDIES

- 7.4.1 In any subdivision development activity, the concern for environmental and culturally sensitive areas must be addressed by the Developer prior to or concurrent with the subdivision of land in order to undertake any development, and during any subsequent subdivision construction activity.
- 7.4.2 Environmental and significant area studies address issues such as wildlife management, sensitive ecological areas, sensitive rivers and creeks, agricultural concerns, noise pollution, light pollution, previous site contamination, sewage disposal, solid waste disposal, and others as necessary.
- 7.4.3 Historical and archaeological studies address issues such as heritage sites, tepee rings, and other such concerns shall be investigated by the Developer at their own expense.
- 7.4.4 Copies of all Correspondence and reports shall be submitted to the correct department at the City of Swift Current.

7.5 GEOTECHNICAL REPORT

- 7.5.1 As part of the Developer's design submission pursuant to a Servicing Agreement, the Developer shall submit a Geotechnical Engineering Report, prepared by a qualified Professional Geotechnical Engineer, that identifies and evaluates the subsurface ground characteristics of the subdivision development area.

- 7.5.2 Such report shall identify soil types and conditions, including frost susceptibility, soil stability, and water table elevations, as well as any potential difficulties that could be encountered during the construction of the municipal improvements.
- 7.5.3 At the requirement of the City, additional geotechnical information may be requested outlining recommended design and construction requirements and techniques that may have to be followed to satisfactorily develop the subdivision, particularly related to water and sewer main construction and roadway structures.
- 7.5.4 Slope Stability – The City of Swift Current requires a full slope stability analysis by a qualified Professional Geotechnical Engineer for slopes 15% or greater, and greater than 2.0 metres in vertical height. A full slope stability analysis is required for any slope greater than 10%, greater than 1.0 metre in vertical height, and with a water body at or near the toe of the slope. These areas can be considered as part of the development if a qualified professional Geotechnical Engineer can certify the stability of the slopes prior to, during, and after development. Slopes of greater than 15% can be considered as part of the development if the engineer can certify the stability of the slopes prior to, during, and after development. The City of Swift Current may require a full slope stability assessment by a qualified professional Geotechnical Engineer, for any slopes of less than 10% and greater than 5% where there are water bodies at or near the development area. The City requires a full slope stability analysis by a qualified professional Geotechnical Engineer for any major erosion area or area of previous slope failure.
- 7.5.5 Fill – Potential fill areas must be identified as part of the development process. Following development approval, all fill placement for roadway sub-grades and building foundations must have a record of compaction testing. Fill for building foundations must be compacted to a minimum of 98% Standard Proctor Density. For any foundation placed on fill, a soil bearing certificate must be presented.
- 7.6 SUBMISSION OF ENGINEERING DESIGN
- 7.6.1 Upon completion of the design drawings, the Developer’s Engineer will submit to the City two (2) complete sets of stamped and signed drawings and specifications of the proposed works.
- 7.6.2 Drawings shall be in accordance with the Design Drawings and As-built Drawings Sections of these General Requirements.
- 7.6.3 Preliminary design drawings do not need to be stamped by the Engineer.
- 7.6.4 In addition to the design drawings all supporting design documentation, including but not limited to the following, shall be submitted to the City:
- A copy of the Geotechnical Investigation report.
 - Water distribution analysis as specified in “Water Distribution Systems.”
 - A copy of the Contract Documents proposed for construction purposes.

- “Environment/Heritage” Reports outlined in Section 7.4 of these General Requirements.
- Calculations of sanitary and storm sewer capacity, as shown on the overall sewer and water plan, and pipe loading, where these services are to be installed.
- A print of the registerable plan of the subdivision (if not already supplied by the Applicant/Developer).

7.6.5 All proposed streets should be named on the drawings. All street names are to be approved by the City.

7.7 DESIGN REVIEW

7.7.1 All design drawings, specifications, and relevant data will be examined by the City.

7.7.2 Any revisions will be directed to the Developer and/or the Developer’s Engineer in the form of redline drawings or a list of comments. All comments from the City shall be considered for the final design of the development.

7.8 DESIGN APPROVAL

7.8.1 Upon completion of all revisions, the Developer’s Engineer shall submit four (4) complete sets of Contract Drawings and Specifications to the City.

7.8.2 When the design is approved, the City shall stamp “Approved by the City” with the initials of the approval official and the date of the action on the drawings. One set of the drawings shall be returned to the Developer’s Engineer, or a letter issued advising that the design is accepted and listing any conditions of acceptance.

7.8.3 No work will be commenced within any new parcel of land or any of the services to be provided by the Applicant until the City has examined and stamped the revised Contract Drawings.

7.9 SERVICING AGREEMENT

A Servicing Agreement will outline the Developer’s specific obligation to construct improvements to City Standards, identify scope of improvements, special development requirements, cost sharing, and performance security. A typical Servicing Agreement is included in Section 11 of these General Requirements.

7.9.1 The Developer, prior to registration of a subdivision with Saskatchewan Land Titles and prior to commencing construction, will be required to enter into a Servicing Agreement.

7.9.2 The Servicing Agreement will also identify the City’s obligations to review plans, inspect construction, and assume ownership and maintenance responsibilities after construction.

7.9.3 Preparation of the Servicing Agreement by Planning and Growth Development will typically be completed concurrently with Detailed Design Drawing review and approval of relevant reports (Geotechnical, Environmental, and/or Historical) prior to development.

- 7.9.4 The approved engineering drawings and applicable engineering documentation will become part of the Servicing Agreement.
- 7.9.5 The City will not execute the Servicing Agreement until all the required engineering detail has been received and approved.
- 7.9.6 No Development Permits or building permits will be issued until the subdivision plan is registered, all essential services have been provided as specified in the Servicing Agreement, and underground utility service as-built prints have been submitted and accepted by the City.

7.10 DEFERRED SERVICING AGREEMENT

Where there are no public mains (sewer, water, storm) adjacent to a proposed development, or the City deems it necessary on a specific development to delay the installation of services to a future date, then a separate Deferred Servicing Agreement shall be entered into between the City and Developer. A sample Deferred Servicing Agreement is included in Section 11 of these General Requirements.

8 DESIGN DRAWINGS

The following guidelines will govern the preparation of Engineering Drawings for all Municipal Developments. Drawings are necessary to a project to illustrate the extent and nature of the work to be done. The objectives of the drawings are the following:

- To control the physical outcome of the work.
- Provide an accurate estimate of the amount of work to be done and the cost associated with it.
- Provide a record of the work done.
- Ensure the design guidelines and construction standards are met.

8.1 DRAWING SIZE, MATERIAL

- 8.1.1 The Standard Drawing size 24" X 36" will be used. Paper size for lot servicing drawings shall be chosen on an individual's need. The designer must ensure the drawing size satisfies the work and is presented in a clear, legible format.
- 8.1.2 Originals will be prepared in ink on bond.

8.2 GENERAL REQUIREMENTS FOR ALL DRAWINGS

- 8.2.1 Elevations will be relative to the Geodetic datum. The reference bench marks and elevations will be shown on the design drawings.
- 8.2.2 A north arrow, the name of the subdivision and, where appropriate, phase as included in the Servicing Agreement, adjacent lots and plan numbers, street names, and the legal description of the parcel being subdivided will all be shown on the drawing. In general, the north arrows should be orientated toward the top of the plan.
- 8.2.3 All plans shall show the legal subdivision description including lot and block numbers.

- 8.2.4 Drawings shall be submitted for all phases of the project. All plan sets shall be bound along the left hand margin.
- 8.2.5 An Engineer's stamp and Permit to Practice stamp, signed by an Engineer registered in the Province of Saskatchewan, will be shown on the engineering drawings (not required for draft and preliminary design drawings).
- 8.2.6 Care shall be taken to ensure balanced distribution of detail throughout the drawing.
- 8.2.7 Dimensioning shall be in the metric system. Dimensioning of a drawing is extremely important and should be such that it will not be misinterpreted. Dimensions should be given from an iron pin, lot line, a centreline, or any other reference that can be readily established. Wherever possible, all dimensions shall be provided to a minimum of two (2) property lines.

8.3 SCALES

- 8.3.1 Urban Residential/Industrial and Rural Industrial drawings shall be prepared using the following scales:

Overall Plans	1:1000
Plan/Profile	Horizontal 1:500 Vertical 1:50
Cross-Sections	Horizontal 1:100 Vertical 1:50

- 8.3.2 Rural Residential drawings shall be prepared using the following scales:

Overall Plans	1:2000
Plan/Profile	Horizontal 1:1000 Vertical 1:100
Cross-Sections	Horizontal 1:1000 Vertical 1:100

- 8.3.3 Irrigation systems on landscape drawings shall be to a scale of 1:500.
- 8.3.4 Scale overall plans so drawing is clear, uncluttered, and text is legible.

8.4 DRAFTING STANDARDS

The following table details the line types. Pen thickness and text sizes required for the overall plans. Each item list below should be contained on their own individual layer in the electronic files. When additional items are required that are not listed a new layer shall be created and line weight, line type, Object Fill, and Text size are to be selected consistent with the type of item being shown and good drafting practices.

Item	Line Weight	Line Type	Object Fill & Shading	Text Size
General				
Project Boundary	1.00 mm	Dashed	n/a	n/a
Project Boundary Label	0.25 mm	Continuous	n/a	2.5 mm
Pan and Profile Label	0.50 mm	Continuous	n/a	4.5 mm
Drawing List	0.35 mm	Continuous	n/a	3.5 mm
General Notes	0.25 mm	Continuous	n/a	2.0 mm
Proposed Dimensions	0.18 mm	Continuous	n/a	2.0 mm
Legal and Planning				
Lot Block and Plan Lines	0.18 mm	Continuous	n/a	n/a
Street Names	0.50 mm	Continuous	n/a	3.5 mm
Block Numbers	0.25 mm	Continuous	n/a	5.0 mm
Lot Numbers	0.25 mm	Continuous	n/a	2.5 mm
UROW's	0.25 mm	Dashed	n/a	
Zoning Numbers	0.25 mm	Continuous	n/a	2.0 mm
Water				
Existing Water Lines and Appurtenances	0.25 mm	Dashdot	none	n/a
Existing Water Lines and Appurtenances Text, Dimension and Notation	0.18 mm	Continuous	n/a	2.0 mm
Proposed Water Lines and Appurtenances	0.50 mm	Dashdot	Solid	
Proposed Water Lines and Appurtenances Text, Dimension and Notation	0.18 mm	Continuous	Solid	2.0 mm
Sanitary Sewer				
Existing Sanitary Lines and Appurtenances	0.25 mm	Continuous	n/a	n/a
Existing Sanitary Lines and Appurtenances Text, Dimension and Notation	0.18 mm	Continuous	n/a	2.0 mm
Proposed Sanitary Lines and Appurtenances	0.50 mm	Continuous	Solid	
Proposed Sanitary Lines and Appurtenances Text, Dimension and Notation	0.18 mm	Continuous	Solid	2.0 mm
Storm Drainage				
Existing Storm Sewer Trunk Lines and Appurtenances	0.25 mm	Long Dash	none	n/a
Existing Storm Sewer Lines and Appurtenances	0.25 mm	Long Dash	none	n/a
Existing Catch Basin Leads	0.25 mm	Hidden2	none	n/a
Existing Catch Basins	0.25 mm	Long Dash	none	n/a

Proposed Storm Sewer Trunk Lines and Appurtenances	0.50 mm	Long Dash	solid	n/a
Proposed Storm Sewer Lines and Appurtenances	0.50 mm	Long Dash	solid	n/a
Proposed Catch Basin Leads	0.50 mm	Hidden2	none	na
Proposed Catch Basins	0.50 mm	Long Dash	solid	
Drainage Calculation Table	0.18 mm	Continuous	n/a	2.0 mm
Storm Symbols	0.25 mm	Continuous	n/a	n/a
Proposed Storm Drainage Text, Dimensioning and Notation	0.18 mm	Continuous	n/a	2.0mm
Drainage Zone Boundary	1.00 mm	Continuous	70 %	
Zone Number and Area	0.70 mm	Continuous	n/a	5.0 mm
Drainage Arrows	0.35 mm	Continuous	line	n/a
Trap Low Boundary	0.35 mm	Continuous	n/a	n/a
Trap Low Hatch	0.18 mm	Hatch	50 %	n/a
Trap Low Data	0.25 mm	Continuous	n/a	2.0 mm
Overland Flow Data	0.25 mm	Continuous	n/a	2.0 mm
Shallow Utilities				
Existing Gas	0.18 mm	Phantom	none	n/a
Proposed Gas	0.35 mm	Phantom	solid	n/a
Existing Electric	0.18 mm	Center	none	n/a
Proposed Electric	0.35 mm	Center	solid	n/a
Existing Telephone Cable	0.18 mm	Hidden	none	n/a
Proposed Telephone Cable	0.35 mm	Hidden	solid	n/a
Shallow Utility Line Label	0.18 mm	Continuous	n/a	2.0 mm
Roads				
Existing Sidewalk and Curb	0.25 mm	Continuous	n/a	n/a
Proposed Sidewalk and Curb	0.50 mm	Continuous	n/a	n/a
Road Grade Labels	0.18 mm	Continuous	n/a	2.0 mm
Catch Basin Label and Rim Elevation	0.18 mm	Continuous	n/a	2.0 mm
Sidewalk and Curb Description	0.18 mm	Continuous	n/a	2.0 mm
Corner and Bulb Radius	0.18 mm	Continuous	n/a	2.0 mm
Item	Line Weight	Line Type	Object Fill & Shading	Text Size
Road and RROW Widths	0.25 mm	Continuous	n/a	2.0 mm
Existing Bollards and Fencing	0.25 mm	Continuous	none	2.0 mm
Proposed Bollards and Fencing	0.25 mm	Continuous	solid	2.0 mm
Existing Mailboxes	0.25 mm	Continuous	none	2.0 mm
Proposed Mailboxes	0.25 mm	Continuous	solid	2.0 mm
Existing Bus Stops	0.25 mm	Continuous	n/a	2.0 mm

Proposed Bus Stops	0.25 mm	Continuous	n/a	2.0 mm
Existing Street Lights and Traffic Control Devices, Markings and Signs	0.25 mm	Continuous	none	2.0 mm
Proposed Street Lights and Traffic Control Devices, Markings and Signs	0.25 mm	Continuous	soild	2.0 mm
Survey Control Markers	0.25 mm	Continuous	n/a	2.0 mm
Proposed Spot Elevations	0.18 mm	Continuous	n/a	2.0 mm
Cross Sections				
Section Symbols	0.70 mm	Continuous	n/a	4.5 mm
Sections Labels	0.50 mm	Continuous	n/a	3.5 mm
Section Line Weights	0.25 mm	Continuous	n/a	n/a
Sections Hatch Line Weight	0.18 mm	Continuous	n/a	n/a
Sections Dimensions	0.18 mm	Continuous	n/a	2.0 mm
Sections Nodes and Leaders	0.18 mm	Continuous	n/a	2.0 mm
Grading				
Pre-development Original Ground Contours (2.0m Interval)	0.50 mm	Continuous	50 %	2.0 mm
Pre-development Original Ground Contours (0.5m Interval)	0.25 mm	Continuous	50 %	2.0mm
Lot Corner and Boundary Elevation	0.18 mm	Continuous	n/a	2.0mm
Building Envelope	0.18 mm	Dashed	30 %	n/a
Symbols	0.35 mm	Continuous	n/a	2.0 mm
Grading Text	0.18 mm	Continuous	n/a	2.0 mm
General Notes	0.25 mm	Continuous	n/a	2.0 mm
Lot Drainage Arrows	0.18 mm	Continuous		n/a
Existing Trail Alignments	0.25 mm	Continuous		2.0 mm
Proposed Trail Alignments	0.50 mm	Continuous		2.0 mm
Profiles				
Major Grid	0.35 mm	Continuous	50 %	n/a
Minor Gird	0.18 mm	Continuous	50 %	n/a
Elevation and Station Labels	0.50 mm	Continuous		
Original Ground Profile	0.25 mm	Continuous		
Lip of Gutter Profile	0.35 mm	Dashed		3.5 mm
Vertical Curve Dimensioning and Notes	0.25 mm	Continuous		2.5 mm
Road Alignments and Stationing	0.25 mm	Continuous		2.5 mm
Road Structure	0.25 mm	Continuous		2.5 mm
Hydraulic Grade Line	0.25 mm	Hidden		
Landscaping				
Irrigation Services	0.50 mm	Continuous		
Irrigation Mainline	0.50 mm	Continuous		
Irrigation Laterals	0.50 mm	Continuous		

Irrigation Heads	0.25 mm	Continuous		
Irrigation Contours	0.25 mm	Continuous		
Irrigation Conduits	0.25 mm	Continuous		
Irrigation Electric Zone Valves	0.25 mm	Continuous		

8.5 TITLE BLOCK

8.5.1 All drawings must clearly show the following in the title block:

- Developer's/City's Name.
- Developer's Engineer or consulting engineering name.
- Subdivision name, including staging and/or phasing.
- Drawing name, number, and issue date.
- Drawing scale, including horizontal and vertical axes.
- Space for dates and signature of the designer, draftsperson, reviewer or checker, and approving professional or principal.
- Space for professional stamps and permits.
- Space for revisions, including number, date, description, and approved signature.
- Legend and notes.

8.6 REQUIRED ENGINEERING DRAWINGS

The following plans will form a part of the design drawings set:

- 8.6.1 Cover Sheet: This will show the name of the subdivision, stage of development, location plan, City logo, and names of the Developer and Developer's Engineer. Space permitting, the index plan may be included here. A key plan of City of Swift Current, or a significant portion thereof, shall be included, illustrating the location of the development or project.
- 8.6.2 Index Plan: This plan will be prepared on a scale of 1:1000, or a reduction thereof to fit the standard size sheet, and will indicate that portion of the street that relates to a particular plan/profile sheet.
- 8.6.3 Grading Plan: This plan will be drawn to a scale of 1:1000 and will indicate finished lot corner elevations, grades and direction of flow, service locations, minimum finished grades, lowest top of footing, and sanitary service elevation at property line.
- 8.6.4 Road, Sidewalk, and Lanes Plan: This plan will be drawn to a scale of 1:1000 and will show all locations and widths of roads, lanes, sidewalks, walkways, trails, and right-of-way widths and alignment, as well as all proposed approaches, catch basins and fencing.
- 8.6.5 Storm Layout Plan: This plan will be drawn to a scale of 1:1000 and will indicate the alignment, location, size, type, grade, and length of all sanitary sewer including manholes and catch basins.

- 8.6.6 Water Layout Plan: This plan will be drawn to a scale of 1:1000 and will indicate alignment, location, size, and type of all watermains, including valves, ties, bends, hydrants, and plugs.
- 8.6.7 Overland Drainage Plan: This plan will be drawn to a scale of 1:1000 and will indicate contours at 0.5 m spacing. Areas of trapped lows will be shown shaded and direction of surface drainage with slopes shown along roadways will also be shown.
- Storm Drainage Plan: This plan will be drawn to a scale of 1:1000 and will indicate drainage areas (in Ha), including storm sewer and manholes. A table showing storm design calculations will also be included.
 - Detailed Plan/Profile drawings: Plan/Profile drawings shall be drawn to a scale of 1:500. The profile portion shall have a 10 times vertical exaggeration.

8.7 PLAN/PROFILE REQUIREMENTS

Generally, all underground services and surface improvement profiles are shown on the same drawing. The plan portion of the sheet shall be at the top, and the title blocks, revisions, legends, company stamps, and similar features will be placed along the bottom of the sheet.

The following information will be included on the detailed plan/profile drawings:

- 8.7.1 Requirements for Sanitary and Storm Sewer:
- The following information will be shown on the profile:
 - Size, type, class of pipe and class of bedding.
 - Length and percent grades between manholes.
 - Invert elevations at both inlet and outlet of manholes.
 - Rim elevations at finished grade.
 - The following information will be shown on the plan:
 - Tie location of manholes, cleanouts, and other appurtenances to property lines.
 - Pipe offsets from property line.
 - The following additional information will also be shown on an appropriate part of the drawing:
 - Manholes shall be numbered.
 - Where the sanitary sewer or water and storm drain are to be installed in a common trench, detail a typical cross-section showing distance between pipes, class of pipe and bedding.
- 8.7.2 Requirements for Water:
- Tie the location of hydrants and other appurtenances to the nearest property pin.
 - Show the offset of the main from the property line and locate the end of the main to the nearest property pin.

- Indicate extent of work required in making the connection to the existing water main.
- Indicate the size, type, class of pipe and bedding on the plan.

8.7.3 Requirements for Roads:

- Both plan and profile must be tied to a property pin, preferably near or at 0 + 000 chainage.
- Show the road width and the curb offsets measured from the property line to the curb face.
- Chainages of the BC and EC of horizontal curves will be shown together with the delta angle, radius, tangent length, and arc length for each curb.
- The percent grade, to two decimal places, shall be shown on the profile, together with the following information on vertical curves:
 - The chainage and elevations of BVC, EVC and PVI.
 - The external value, "e".
 - The length of vertical curve.
 - The elevation and chainage of the low spot of sag curves or the high spot of crest curves.
- Road profiles will show the Lip-of-Gutter elevations.
- The profile will be shown at true centreline length and projected above the plan in as close a relationship as possible.
- Locate catch basins (using road chainage) and show leads between the catch basin and manhole.
- Label limits of construction.

8.8 GRADING PLAN REQUIREMENTS

8.8.1 This plan will include:

- Invert and location of sewer and water services.
- Existing and proposed contours at 0.5 m intervals.
- Proposed finished lot corner elevations.
- Proposed finished lot elevations at grade break points.
- Standard detailed drawings shall govern the lot grading design, and critical swales elevations will be calculated as per the types shown.
- The grading plan will identify lots with weak subsoil conditions and have a notation indicating the requirement for a geotechnical engineer's footing design if applicable.

- The grading plan will identify all lots with areas of 1.0 m of fill or greater, with these lots shaded a different colour.

8.9 POWER, GAS, TELEPHONE AND CABLE UTILITY PLAN REQUIREMENTS

8.9.1 This plan will include:

- Street Light Locations as designed, or approved by the power utility.
- Dimension of all Easements.
- Location of pedestals, transformers, cabinets, and other hardware.
- Lot Numbers.

9 AS-BUILT DRAWINGS

These requirements pertain to the as-built drawings of the following services: Storm and sanitary sewers, watermains, roads, curbs, sidewalks, culverts and other miscellaneous permanent structures.

9.1 GENERAL

- 9.1.1 The as-built drawings shall be affixed with the stamp and seal of a Professional Engineer who, by signing, is certifying the information to be accurate and correct.
- 9.1.2 The as-built drawings will clearly show the locations of all services, curb cocks, valves, hydrants, and manholes, using right angle measurement from survey pins.
- 9.1.3 Red line as-built drawings are to be submitted for review, indicating changes.
- 9.1.4 Two complete sets of the as-built drawing prints are to be submitted to the City, within three months of the installation.
- 9.1.5 The as-built drawings referred to in this section will also be submitted to the City in digital format, as per the following requirements:
 - Must be compatible with the City version of AutoCAD.
 - Accompanied by a layer list and description.
 - Will conform to layering and symbol standards as established by the City or their consultant.
 - Include a signed 'PDF' format.
 - Be submitted on a media device specified by the City.
- 9.1.6 On as-built drawings submitted to the City, the following information will be included on each drawing:
 - Date of completion.
 - Name of the contractor.

- Date on which “as-built” details were added.

9.2 STORM AND SANITARY SEWER

9.2.1 The following information will be included for storm and sanitary sewer systems:

- Size, pipe material, pipe class, bedding, and location of mains.
- Location of manholes, cleanouts, and other appurtenances.
- Grades, lengths, inverts of mains, and rim elevation.
- Profile of pipe top and bottom.
- Corrected flow calculations.

9.3 WATER

9.3.1 The following information will be included for water systems:

- Size, type, and location of pipe.
- Location of valves, tees, hydrants, and other appurtenances.
- Profile of pipe top and invert.

9.4 ROAD, CURB, SIDEWALKS

9.4.1 The following information will be included for roads, curbs, and sidewalk:

- Location of curbs, sidewalks, and elevations of tops-of-curb or lip-of-gutter.
- Top-of-curb or lip-of-the gutter for each curb.
- End of curb, sidewalks, and pavement.
- Type of road structure on overall road plan and each plan profile.
- A typical cross-section referencing the above and representing all conditions.

9.5 WATER, SANITARY, AND STORM SERVICES CONNECTIONS

9.5.1 A table on each plan/profile drawing will be prepared giving the following information with respect to service connections:

- Lot number.
- Distance of service saddle from the downstream manholes.
- Invert elevation at the end of sanitary and storm service.

9.5.2 The service connection provided to each lot will be shown on the plan and the location triangulated to the property lot corners.

9.5.3 The typical location of the curb stop will be identified on each plan/profile, (i.e. 0.3 m F.O.W., 2.65 m B.O.W.) by means of a table chart.

9.6 MECHANICAL SYSTEMS

- 9.6.1 Where the subdivision includes mechanical systems, such as lift stations, the Developer will provide detailed drawings of the facility, as well as operation/maintenance manuals, including the make and model of all equipment, to the satisfaction of the City.

9.7 LANDSCAPING DRAWING REQUIREMENTS

- 9.7.1 A suitably scaled as-built drawing shall be provided upon completion. All components of the irrigation system shall be shown as installed, with clear measurements from an identifiable reference point to the location of the controller and its circuit breaker, master valve, zone control valves, main water connection, blow out connection, pump and its electrical connections, and any other similar features.

9.8 LOT DETAIL FORM

- 9.8.1 Prior to issuance of a Construction Completion Certificate for water, sanitary, and storm services, the Developer shall provide to the City the relevant Building Grade Form for each lot in the Development.

- 9.8.2 The following information shall be shown on the Lot Detail Form:

- Water, sanitary, and/or storm services location and inverts at property line or easement line.
- Power, telephone, and cable television service location if available.
- Sidewalk and boulevard width.
- Easements.
- Lot corner surface elevations.
- Landscape elevations at midpoint of house.
- Lot drainage pattern.
- Streetlights, hydrants, etc. where applicable.

- 9.8.3 This information shall be provided in the form as shown on the sample Lot Detail Form.

10 CONSTRUCTION REQUIREMENTS

10.1 CONSTRUCTION APPROVAL

- 10.1.1 Upon receipt of "Approved by the City" drawings and specifications, the Applicant may proceed to install municipal services subject to:

- Satisfactory execution of a Servicing Agreement pertaining to the development or subdivision.

- Obtaining all required approvals from Saskatchewan Ministry of Environment and any other applicable jurisdictions, through the Developer's Engineer, and a copy received by the City.
- A list of materials that are being installed or a copy of the construction contract and a construction schedule submitted to the City's engineering office.

10.1.2 A copy of all approved drawings and specifications will be maintained by the applicant at the construction site during the installation of services and be made readily available to City representatives.

10.1.3 Underground subdivision services will not be permitted to operate as part of existing Municipal services until the respective subdivision services have been inspected, tested by the Developer's Engineer, and the test results have been approved in writing by the City.

10.2 ENGINEERING SUPERVISION

10.2.1 The applicant shall retain the services of a "Developer's Engineer" who shall be responsible for the layout to ensure finished construction conforms to the lines and grades shown on the approved plans, for inspection and approval of all materials to be used, and for supervision of installation of all services that are the responsibility of the Applicant. The Developer's Engineer, or his authorized representative, shall be available at all times to visit the site during the installation of services.

10.2.2 The Developer's Engineer will be responsible for maintaining field surveys and recording of all "as-built" drawings.

10.2.3 In addition to supervision carried out by the Developer's Engineer, the City, or their agent, may periodically inspect any work being completed. The City will bring the use of any unacceptable materials or practices to the attention of the Contractor and/or the Developer's Engineer. If remedial action is not taken to the satisfaction of the City, they may order the work to cease until such time as the corrective action has been taken.

10.2.4 If the Developer's Engineer wishes to make any changes in the design, either before or during the execution of the work, he will first submit a marked print, showing proposed revisions, to the City. If approval is granted for revision, the original drawing will be immediately revised and new prints issued.

10.3 TESTING

10.3.1 It will be the responsibility of the Developer's Engineer to ensure that testing of all materials called for in the specifications is carried out by an accredited testing firm. Copies of all test results shall be forwarded to the City as soon as possible after completing the tests. The costs of the tests shall be borne by the Developer.

10.4 AS-BUILT DRAWINGS

- 10.4.1 Within four weeks of the Construction Completion Certificate of the underground improvements, the Developer's Engineer shall deliver to the City "as-built" prints indicating the service connections, tie-ins, invert charts on plan/profiles, and service invert elevations on lot grading plans. All as-built plans must also be submitted in digital format compatible with the City's latest version of AutoCAD.
- 10.4.2 Within two months of completion of roadway base course asphalt, the Developer's Engineer will deliver "as-built" drawings: one complete set of prints and digital copies (in the City's latest AutoCAD software version and signed 'PDF' format) to the City.

10.5 CONSTRUCTION COMPLETION CERTIFICATE AND MAINTENANCE PERIOD

- 10.5.1 When the Developer's Engineer is of the opinion that the Work is substantially performed (meaning the Work or a portion thereof is ready for use), he shall apply for a Construction Completion Certificate (CCC) and request an inspection of the Work.
- 10.5.2 The Developer shall apply for a Construction Completion Certificate for each group of improvements within each stage/phase of development. The main construction groups are as follows:
- Sanitary and storm sewers, and water distribution system, including service connections for water and sewer.
 - Sidewalks, curbs and gutters, catch basins, concrete walkways, paved roads, and paved and gravelled lanes.
 - Landscaping, including boulevards, uniform fencing, and subdivision signage.
- 10.5.3 The City shall be given seven (7) days' notice to attend CCC inspections.
- 10.5.4 No such application will be considered by the City unless it is requested in respect of all of the Development Area or one or more approved stages of development.
- 10.5.5 The City may issue a Construction Completion Certificate, issue a Conditional Construction Completion Certificate, or provide a list of deficiencies that must be corrected in order to obtain a Construction Completion Certificate. The details of the process will be outlined in the servicing agreement.
- 10.5.6 The Developer shall maintain all Municipal Improvements constructed pursuant to the servicing agreement to the standard to which they were constructed, reasonable wear and tear excepted, for the period commencing upon the issuance of a Construction Completion Certificate and continuing for the periods as stated in the table below:

Table for Maintenance Period

Underground Services and Utilities	24 months
Roads and Sidewalks	24 months
Fencing, grass, and sod for landscape areas	24 months

10.6 FINAL ACCEPTANCE CERTIFICATE

- 10.6.1 Upon completion of the Maintenance Period, the Developer’s Engineer shall apply for a Final Acceptance Certificate (FAC) and request a final acceptance inspection.
- 10.6.2 The City shall be given seven (7) days’ notice to attend FAC inspections.
- 10.6.3 An FAC will not be granted unless the following criteria are met:
- The new infrastructure has performed as designed and to the satisfaction of the City throughout the maintenance period.
 - All deficiencies identified in the CCC inspection are corrected.
 - All transverse cracking in the asphalt is sealed.
 - Evidence that landscape areas have been mowed, watered, and kept free of weeds to the satisfaction of the Community Services Department.
- 10.6.4 After final inspection and correction of all deficiencies thereof, a Final Acceptance Certificate will be issued by the City and that group of infrastructure will become the City’s to own and maintain.

10.7 EXISTING UTILITIES

- 10.7.1 Prior to connecting to existing utilities, the City’s Utilities Department shall be given a minimum of two (2) working days notification of the work being done.
- 10.7.2 Once operational, hydrants or main line valves shall only be operated by City staff.
- 10.7.3 No sanitary sewers will be used to discharge storm water.

10.8 ROAD CLOSURES AND CONSTRUCTION WITHIN ROAD RIGHTS-OF-WAY

- 10.8.1 In the event that a road must be partially or fully closed due to construction activity, the party causing this event will provide all detours, signs, flag persons, barricades, and other safety requirements necessary to provide for the orderly control of traffic around the construction area.
- 10.8.2 The City of Swift Current Infrastructure and Operations Department must receive a traffic accommodation plan ten (10) days prior to the proposed work.

10.9 SURVEY CONTROL SYSTEM

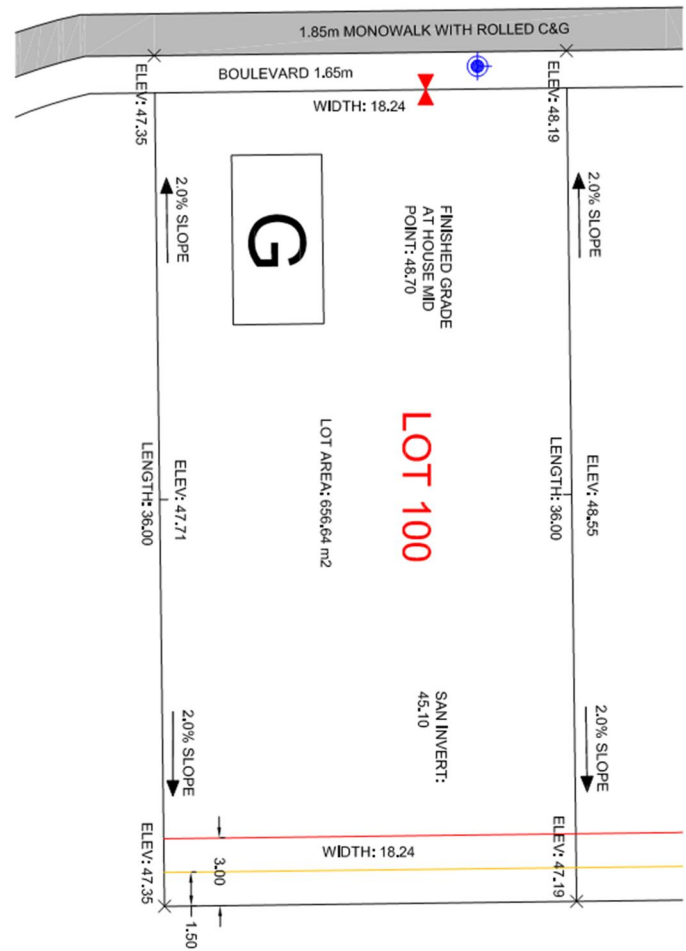
- 10.9.1 The Developer shall provide a survey control system within and adjacent to the subdivision. The survey control system shall consist of survey monuments of a design mutually acceptable to both the City, for community planning approval, and the Information Services Corporation (the Crown Corporation responsible for registries in Saskatchewan herein abbreviated "ISC").
- 10.9.2 The survey monuments (bench marks) shall be placed so as to be inter-visible between adjacent pairs and spaced approximately 300 metres apart. Measurements shall be made between monuments, and connection shall be made to existing geodetic monuments used by the City. The City and ISC shall be provided with the survey measurements for the survey control system.
- 10.9.3 The Developer shall undertake to preserve all existing and new monuments and, should it be necessary to destroy a monument, the Developer shall establish a new one in lieu thereof and provide the City and ISC with survey measurements for it.
- 10.9.4 Any legal pins disturbed or removed during construction must be replaced by the Developer prior to Final Acceptance by the City. The Developer shall supply a certificate from a registered legal survey that all lot and corner pins are intact.

11 TYPICAL DEVELOPMENT FORMS

The forms on the following pages can be used by the City and Developer where applicable. At the City's discretion, similar forms that include all required content and meet the intended purpose may be accepted.

11.1 LOT DETAIL FORM

STREET NAME



1.85m MONOWALK WITH ROLLED C&G

BOULEVARD 1.65m

WIDTH: 18.24

ELEV: 48.19

2.0% SLOPE

ELEV: 48.55

LENGTH: 36.00

FINISHED GRADE AT HOUSE MID POINT: 48.70

LOT 100

LOT AREA: 656.64 m²

SAN INVERT: 45.10

2.0% SLOPE

ELEV: 47.71

LENGTH: 36.00

2.0% SLOPE

ELEV: 47.35

ELEV: 47.19

WIDTH: 18.24

3.00

1.50

ELEV: 47.35

LEGEND


- G GARAGE LOCATION
- ▲ SERVICE
- HYDRANT
- X ELEVATION POINT
- PROPERTY LINE
- - - UTILITY EASEMENT
- - - GAS LOCATION
- ↘ 2.0% SLOPE DRAINAGE ARROW

NOTES:


- THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. HE SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
- ALL CURB STOPS ARE LOCATED ALONG FRONT PROPERTY LINE. CURB STOP LOCATIONS:
 - A) LOTS WITH FRONTAGES 14.0 m OR GREATER SERVICES ARE LOCATED 12.0 m FROM SIDE YARD NEAREST GARAGE
 - B) LOTS WITH FRONTAGES LESS THAN 14.0 m SERVICES ARE LOCATED 2.0 m FROM FROM SIDE YARD FURTHEST FROM GARAGE
- ELECTRIC IS LOCATED 1.5 m INTO LAINE FROM BACK PROPERTY LINE. GAS IS LOCATED 1.5 m INTO PROPERTY FROM BACK PROPERTY LINE. UTILITY EASEMENTS IS LOCATED 3.0 m INTO PROPERTY FROM BACK PROPERTY LINE.
- PROPERTY LINE SETBACKS IN ACCORDANCE WITH ZONING REQUIREMENTS.
- ADD 700,00m TO ALL ELEVATIONS TO OBTAIN GEODETIC.
- ALL ELEVATIONS BASED ON BENCHMARK #123

LOT NUMBER & CIVIC ADDRESS

ZONING: R1 RESIDENTIAL

 <p>CITY OF SWIFT CURRENT</p>	DRAWN BY: C.E.K.
	CHECKED BY: E.R.W.
<p>DEPARTMENT: MUNICIPAL INFRASTRUCTURE</p>	SCALE: 1:250
<p>TITLE: NAME OF DEVELOPMENT & TITLE OF DRAWING</p>	PLOT DATE: 1/1/2015

11.2 CCC AND FAC

 <p style="font-size: 1.2em; margin-top: 5px;">City of Swift Current</p>	<p style="font-size: 1.2em; margin: 0;">CONSTRUCTION COMPLETION - SAMPLE CERTIFICATE</p>
<p>Development Area: _____ Development Name: _____</p> <p>Developer: _____</p> <p>Contractor: _____</p> <p>Municipal Improvement: _____</p> <p>Location of Municipal Improvement referred to herein is as shown, outlined in red, on the plan on the reverse hereof, (Or see attached).</p> <p>Date of Application: _____</p> <p>PURSUANT TO THE DEVELOPMENT AGREEMENT, I _____ OF THE FIRM "DEVELOPER'S ENGINEERS", HEREBY CERTIFY THAT AS OF THE ABOVE DATE, THE SAID MUNICIPAL IMPROVEMENT IS COMPLETE AND CONSTRUCTED IN ACCORDANCE WITH THE SERVICING STANDARDS AS SET OUT IN THE DEVELOPMENT AGREEMENT, AND I HEREBY RECOMMEND THIS MUNICIPAL IMPROVEMENT FOR APPROVAL.</p> <p style="text-align: right;">Date: _____</p> <p>Project Engineer (seal) (Developer's Engineering Firm) _____</p> <p style="text-align: right;">Date: _____</p> <p>Signing Officer (Developer's Engineering Firm) _____</p> <p style="text-align: right;">Date: _____</p> <p>Authorized City Inspector</p> <p>Approved on (date): _____ City: _____</p> <p>Conditional Approval (date): _____ City: _____</p> <p>Conditions: (See attached report) _____</p> <p>Rejected on (date): _____ City: _____</p> <p>Reason for rejection: (See attached report) _____</p> <p>I HEREBY CERTIFY THAT THE ITEMS LISTED AS REASONS FOR CONDITIONAL APPROVAL OR FOR REJECTION HAVE BEEN CORRECTED.</p> <p style="text-align: center;">Project Engineer (Seal) (Developer's Engineering Firm) _____ Date: _____</p> <p>Approved: _____ Date: _____</p> <p style="text-align: center;">City</p> <p>Date Maintenance Period to Start: _____</p> <p>Date Maintenance Period to Expire: _____</p>	

 <p>City of Swift Current</p>	<p>FINAL ACCEPTANCE - SAMPLE CERTIFICATE</p>
<p>Development or Subdivision : _____ Permit or Subdivision # _____</p> <p>Developer: _____</p> <p>Contractor: _____</p> <p>Municipal Improvement: _____</p> <p>Location of Municipal Improvement referred to herein is as shown, outlined in red, on the plan on the reverse hereof, (Or see attached).</p> <p>Date of Application: _____</p> <p>Maintenance Expiry Date: _____</p> <p>PURSUANT TO THE DEVELOPMENT AGREEMENT, I _____ OF THE FIRM _____ "DEVELOPER'S ENGINEERS", HEREBY CERTIFY THAT AS OF THE ABOVE DATE, THE SAID MUNICIPAL IMPROVEMENT MEETS ALL REQUIREMENTS FOR FINAL ACCEPTANCE AS SPECIFIED IN THE DEVELOPMENT AGREEMENT AND I HEREBY RECOMMEND THIS MUNICIPAL IMPROVEMENT FOR FINAL ACCEPTANCE.</p> <p style="text-align: right;">Date: _____</p> <p>Project Engineer (Developer's Engineering Firm) _____</p> <p style="text-align: right;">Date: _____</p> <p>Signing Officer (Developer's Engineering Firm) _____</p> <p style="text-align: right;">Date: _____</p> <p>Authorized City</p> <p>Approved on (date): _____ City: _____</p> <p>Rejected on (date): _____ City: _____</p> <p>Reason for rejection: (See attached report) _____</p> <p>_____</p> <p>I HEREBY CERTIFY THAT THE ITEMS LISTED AS REASONS FOR REJECTION HAVE BEEN CORRECTED.</p> <p style="text-align: right;">Date: _____</p> <p style="text-align: center;">Project Engineer (Developer's Engineering Firm)</p> <p>Approved: _____ Date: _____</p> <p style="text-align: center;">City</p> <p>Date Maintenance Period to Start: _____</p>	

(hereinafter called the "Developers Engineer") to design and supervise the construction of all work to be carried out under this agreement. The Developer shall inform the City Project Manager of the Developers Engineer who is appointed by the Developer. The Developers Engineer shall be deemed to be an agent of the Developer. The Developer shall give the City at least three (3) days written notice should the Developer wish to change the Developers Engineer.

3.2 The Developers Engineer shall:

- Certify that all materials supplied and all work performed conforms in all respects to the City's specifications and designs, or is approved by the City in writing.
- Prepare, submit and certify Construction Completion and Final Acceptance Certificates.
- Certify the correction of all defects and deficiencies.
- Carry out inspections under this agreement.
- Prepare, review, certify, and submit the plans, specifications and schedules which the Developer is required to supply under this agreement.

4.0 CONSTRUCTION PLANS AND SPECIFICATIONS

Plans Approval - the Developer shall submit in duplicate to the City plans, specifications and design data which shall provide and properly set out all information required herein and in accordance with good engineering practice. Approval in writing shall be received from the City prior to the commencement of any construction.

The plans shall be in accordance with the requirements of the Design & Development Standards and the following shall be generally shown:

- The location, alignment and profile of any sanitary sewers, storm sewers and watermains,
- The alignment and specification of any roadways including, if required, curb, gutter and sidewalk.
- Service connection locations and sizes.
- An overall site grading and drainage plan showing property and roadway grading, catch basin locations and other pertinent information.
- The proposed alignment of the shallow utilities (electric, telephone, cable and gas).
- A landscaping plan if applicable.
- A phasing plan for the development of the lands.
- Any other information required by the City.

After examination by the City, one mark-up copy of the preliminary plans will be returned to the Developer or his representative showing any amendments the City may require.

Three copies of the final amended plan shall be supplied to the City prior to the authorization of any construction work.

5.0 INSPECTION PRIVILEGES

The Developer shall grant to the City or its duly accredited representatives free and uninterrupted access to any and all parts of the lands for the purposes of making inspections or taking samples of the materials being used in the construction. If the materials, design and installation work does not conform to the City's specification and standards the City Project Manager may immediately stop any work and order the removal of unsatisfactory work from the area.

6.0 TESTING

The Developer shall at no cost to the City furnish tests from an accredited testing company as follows:

- Standard Proctor Density tests of trenches, subgrade, base, and any areas that are to be filled.
- Density tests of all asphalt paving.
- Compressive strength test of all concrete.
- Samples of any materials proposed to be used or installed in the construction reasonably requested by the City.

Reports of these tests shall be furnished to the City on a regular basis.

7.0 AS BUILT DRAWINGS

Immediately upon the completion of the construction and installation the improvements the Developer shall deliver to the City for its approval, a complete set of all testing records and two (2) complete sets of prints of all design and construction drawings setting out the improvements constructed pursuant to this Agreement and showing the actual locations, descriptions and all "as-built" elevations referred to the City's data. All plans and information required by the City to be amended or revised shall be corrected by the Developer and re-submitted for final acceptance by the City. Upon final approval of the "as-built" plans, the Developer shall deliver to the City the original plans, plus a digital file containing the same plans in "AutoCad" format.

8.0 APPROVAL BY THE CITY

The approval of drawings and/or supporting documents given by the City or its representative does not relieve the Developer of this responsibility to ensure that all work pursuant to this agreement done or to be done by the Developer is in accordance with current practices and is technically acceptable, nor does it relieve him of the responsibility and obligation to remedy subsequently discovered omissions and discrepancies.

9.0 USE OF PUBLIC WAYS IN PERFORMANCE OF THE WORK

Developer's right to work - the City grants to the Developer the right, permission and power to use, break-up, dig, trench or excavate in the public highways, streets, roads, lanes and similar public places of the City, within or adjacent to the lands, and otherwise to do such work as may be necessary to lay, operate, maintain, repair, extend, re-lay and remove water and sewer mains forming part of the work of the Developer as may be necessary for the purposes of this Agreement, Provided:

- That the performance of such work shall adhere strictly to the requirements of the City;
- That the Developer shall do as little damage as possible in the performance of such work, and will cause as little obstruction to such public places as possible;
- That upon completion of such work the Developer shall restore all such public places to a condition and state of repair equivalent to that which prevailed prior to the performance of such work, and shall maintain such restored portions of such public places for a period of two (2) years after completion, ordinary wear and tear and third party damage excepted, and further that such restoration shall include the replacement and maintenance of grass, trees and shrubs as applicable. If grass, trees or shrubs die within this period the replacement shall be during the next planting season even if the season is beyond the two (2) year period.
- That the Developer shall indemnify and save harmless the City from and against all losses, costs, claims, suits or demands of any nature which may arise by reason of the negligence of the Developer in such public place.

10.0 COMPLIANCE WITH PROVINCIAL LEGISLATION, ETC.

The Developer shall, at all times, comply with all valid provincial legislation and regulations and municipal bylaws and regulations relating to the development of lands by the Developer.

11.0 SECURITIES

Prior to the commencement of construction of the permanent servicing, the Developer shall provide the City with an Irrevocable Letter of Credit (LOC) for 50% of the servicing cost of the site. The servicing included shall include, but not necessarily be limited to, sanitary sewer, storm sewer, water, natural gas, telephone, cable TV, roads, fencing and landscaping.

The City will release the Letter of Credit within Fifteen (15) days of the issuing of the Construction Completion Certificate. Where deficiencies have been identified to be rectified during the maintenance/warranty period a reduced LOC may be required.

Any irrevocable letter of credit provided pursuant to the Agreement shall be issued by a Chartered Bank in Canada or a Trust Company and in a form to be approved by the City, but in any event, shall contain the following terms and provisions:

- A statement that the irrevocable letter of credit is issued in favor of the City in consideration of the City entering this Agreement with the named customer of the issuing bank;
- An acknowledgment by the issuing bank that it has full knowledge of the terms, covenants and conditions of this Agreement.
- An acknowledgment by the issuing bank that it has full knowledge that the issuing of the irrevocable letter of credit is a condition precedent to the execution of this Agreement by the City;
- An acknowledgment by the issuing bank that the City shall be entitled to draw on the said irrevocable letter of credit in accordance with the provision of this Agreement and an undertaking by the issuing bank to promptly honor and pay draws made by the City.

12.0 MAINTENANCE

The Developer shall be responsible for the maintenance of all services installed under this agreement until such time that a Final Acceptance Certificate is issued. Upon issuance of a FAC the City will become responsible for all aspects of the infrastructure. Where the development is a bareland condominium, the condo association will take over all infrastructure ownership and responsibility.

13.0 GENERAL

The validity and interpretation of this Agreement, and each article and part thereof, shall be governed by the laws of the Province of Saskatchewan. If any term, covenant or condition of this Agreement or application thereof, to any things or circumstance shall to any extent to invalid or unenforceable, the remainder of the Agreement or application of such term, covenant or condition to any thing or circumstance other than those to which it is held as invalid or unenforceable shall not be affected thereby and each other term, covenant or condition of this Agreement, shall be valid and shall be enforced to the fullest extent permitted by law. In the event that any provision contained herein or the application or any provision conflicts with, contravenes, contradicts or is inconsistent with or gives rise to any conflict, contravention, contradiction or inconsistency with the terms, covenants, conditions, stipulations, provision or reservations of any Developer's Agreement or any other matter or thing arising out of the terms of this Agreement, then, the provisions of this Agreement shall prevail and wherever and whenever necessary or advisable the offending provisions of any Developers Agreement or other matter or thing shall be deemed amended so as to remove any such conflict, contravention, contradiction or any inconsistency, and made to correspond with the provision of this Agreement. Neither the City nor the Developer will initiate, or assist any other person or person in initiating, any Court Proceedings with a view to rendering this Agreement or any provision thereof null and void.

14.0 REGISTRATION OF A CAVEAT

The City shall have the right to register a caveat or an interest in the Land Titles Office pursuant to the current version of the Planning and Development Act.

15.0 NOTICES

Any notices to be given to the Developer hereunder may be mailed or delivered to the office of the Developer at:

And to the City either by mail or delivery to the:

City of Swift Current
177 - 1st Avenue North East
P.O. Box 340
Swift Current, Saskatchewan
S9H 2B1

IN WITNESS WHEREOF the Developer and City have caused to be hereunto affixed their respective Corporate Seals attested by their respective proper officials in that behalf, the day and year first above written.

CITY OF SWIFT CURRENT
177 - 1st Avenue North East
P.O. Box 340
Swift Current, Saskatchewan
S9H 2B1

Mayor

City Clerk

Developer

Developer

11.4 TYPICAL DEFERRED SERVICING AGREEMENT

THIS AGREEMENT dated the day of , A.D. 20 , is made
between:

- (1) **CITY OF SWIFT CURRENT**, a municipal corporation, in the Province of Saskatchewan (hereinafter referred to as "the City")

OF THE FIRST PART

- and - (2)

name,
individuals residing in the City of Swift Current (hereinafter referred to as "the Owner")

OF THE SECOND PART

DEFERRED SERVICES AGREEMENT

1. In this Agreement:

- (a) the "Land" means the lands described as follows:

EXCEPTING THEREOUT ALL MINES AND MINERALS

- (b) "Development" means any improvement or work including (but is not limited to) buildings, dwellings, structures, excavations or stockpiles on the Land at the time of execution of this Agreement.
- (c) "Surface Improvements" includes all surface works including (but is not limited to) carriageways, curbs, gutters, catch basins, sidewalks and street lighting.
- (d) "Underground Utilities" includes all subsurface works including (but is not limited to) water and sewer mains and all associated appurtenances.
- (e) "Usual Urban Services" includes (but is not limited to) public water and sewer services, road construction and maintenance, snow removal, waste collection and fire protection.

2. This Agreement is entered into by the Owner, as one of the conditions of approval of the subdivision of the Land.

3. The Owner shall bear the cost of constructing all Underground Utilities and Surface Improvements which relate to the Development which may include (but are not limited to) any site utility service connections and any driveways from the adjacent public carriageway.
4. The Owner shall bear the cost of maintaining all Underground Utilities and Surface Improvements on the Land.
5. The Owner shall not:
 - i) alter, redirect, block, or otherwise affect the natural drainage pattern, including storm water flow rates and volumes, on or adjacent to the Land; or
 - ii) fill or alter the existing grades on or adjacent to the Land,without the approval of the General Manager of Infrastructure and Operations.
6. Owner agrees to control on-site storm water to the satisfaction of the General Manager of Infrastructure and Operations so that such water does not flood or create a ponding or erosion problem on adjacent lands. In doing so, the Owner agrees to employ satisfactory on-site storm water management techniques to limit post- development storm water runoff to pre-development rates and volumes.
7. The City will not provide Usual Urban Services to or in the vicinity of the Land until their availability becomes economically feasible in the opinion of the General Manager of Infrastructure and Operations.
8. Private potable water systems required for the Development require Cypress Regional Health Authority approval for water quality. Private sanitary sewer facilities shall be in accordance with Saskatchewan Labour Standard of Practice guidelines for Sewage Systems and require a plumbing permit and associated inspection of the installation.
9. The Owner acknowledges that fire protection to the Development may be limited by the lack of Usual Urban Services and the distance of the Development from fire fighting facilities and Underground Utilities. The Owner agrees to indemnify and save the City harmless from and against all claims, demands, actions, or losses for personal injury or property damage to any persons or property on, or immediately proximate to, the Land arising out of or related to the provision of limited fire protection.
10. When Underground Utilities or Surface Improvements are made available to the Land, or in the opinion of the General Manager of Planning and Growth Development, should be installed by the City, the Owner shall:
 - (a) provide any utility easements, as required, at no cost to the City,
 - (b) pay to the City the cost normally attributable to an owner of land according to the requirements applicable to any person developing land in the City, at the rates established at the time, and

- (c) at its own expense, and with reasonable diligence, cause its sewer and water facilities to be connected to the municipal lines.
11. The Owner owns the Land and agrees that this Agreement shall constitute a charge against the Land for all sums payable or which may become payable to the City pursuant to the terms of this Agreement and the Owner encumbers the Land for the benefit of the City with such sums to be paid pursuant to the terms of this Agreement, and the City shall be entitled to file an interest against title to the Land to protect its interest in accordance with Section 172 (1) of the *Planning and Development Act*, 2007.
12. The covenants, terms and conditions contained in this Agreement are intended and shall be deemed to be covenants legally annexed to and running with the Land.
13. This Agreement shall be binding upon the Owner, its successors-in-title and assigns.
14. Where any of the Owners interest in the Land is assigned or transferred in any way prior to the City filing a Caveat protecting its interest under this Agreement, the Owner shall deliver to the City an Assumption Agreement acceptable to the City Solicitor, executed by the holder of the Owners interest and the Owner shall bear any cost associated with the registration of such Assumption Agreement.
15. Any notice, communication or request to be given to either party shall be in writing by registered mail, postage prepaid, or by personal delivery or by FAX addressed to such party at the following address:
- as to the City: General Manager of Infrastructure and Operations
 PO Box 340
 Swift Current, Sask
 S9H 3W1
 FAX NO. 306-778-2194
- as to the Owner: "Name"
- or at such other address as either party may from time to time advise the other in writing by notice. Any such notice, communication or request whenever mailed shall be deemed to have been received on the fourth (4th) business day next following the date it is so mailed or, if by FAX, the business day next following the date of transmission; provided that if normal mail, or FAX service is interrupted by strikes, slowdown or other cause, then any of the said services which have not been so interrupted shall be utilized or the notice, communication or request shall be personally delivered to ensure prompt receipt.
16. Should part of this Agreement be or become illegal or unenforceable, it will be considered severable from this Agreement and the remainder of this Agreement will remain in effect as though the illegal or unenforceable parts had not been included.



SIGNED ON BEHALF of the City this _____ day of _____, 20__.

THE CITY OF SWIFT CURRENT

MAYOR

“SEAL”

CITY CLERK

SIGNED ON BEHALF of the Owner/s this _____ day of _____, 20__.

Witness

“Name”

Witness

“Name”



**CITY OF
SWIFT CURRENT**
where life makes sense

PART A2

WATER DISTRIBUTION

OCTOBER 2020

1	GENERAL	2
2	DEFINITIONS	2
3	SUBMISSIONS AND APPROVALS	2
4	DESIGN REQUIREMENTS	2
4.1	HYDRAULIC ANALYSIS.....	2
4.2	FIRE FLOWS	3
4.3	WATER MAINS	4
4.4	HYDRANTS	5
4.5	VALVES	6
4.6	BACKFLOW PREVENTION AND CROSS CONNECTION.....	7
4.7	THRUST BLOCKS.....	7
4.8	SERVICES	8
4.9	CATHODIC PROTECTIONS	9
4.10	CONSTRUCTION	9
5	LIST OF DRAWINGS	10

1 GENERAL

The design of the water system shall conform to the *Saskatchewan Environment Code - Water Main Chapter, Waterworks Design Standard* and *Water Pipeline Design Guidelines*, latest editions, as published by the Saskatchewan Ministry of Environment and used as a companion to the applicable Acts, regulations, and other provincial publications and as amended by these Guidelines and Standard Details.

These Development and Design Standards shall be used in conjunction with the related City Construction Specifications.

2 DEFINITIONS

The following definitions are intended to be specific to the Water Distribution System Standards. For additional general definitions refer to Part A1 – General Requirements.

Hazen-Williams Formula: The Hazen-Williams equation is an empirical formula used to model the friction head loss of water flowing through pipe

Hydraulic Analysis: An Engineering analysis determining the water systems minimums to meet city, provincial, or federal requirements.

3 SUBMISSIONS AND APPROVALS

- 3.1.1 All Drawing plans and Engineering documents must be submitted to the City for approval. All design drawings will follow the requirements stated in the drawings section of the General Requirements.
- 3.1.2 All calculations, schematic diagrams, computer printouts, etc. shall be submitted together with the design plans.
- 3.1.3 The certificate from a qualified person stating that the water main design plan satisfies the requirements of the *Saskatchewan Environmental Code – Water Main Chapter* shall be submitted together with the design plans.

4 DESIGN REQUIREMENTS

All water infrastructure (pipelines, booster pumps, hydrants, and appurtenances) that is or will become City owned and operated shall be within and public right of way or easement.

4.1 HYDRAULIC ANALYSIS

- 4.1.1 PVC or HDPE Pipe shall be used and the value of “C” in the Hazen-Williams formula shall be 130 for all types of pipes.
- 4.1.2 Design velocity in pipes shall be a maximum of 1.5 m/s during peak hour flow conditions, and 2.5 m/s during maximum day plus fire flow conditions, and a minimum of 0.6 m/s.

- 4.1.3 The Developer's Engineer shall perform a hydraulic network analysis unless the City approves otherwise. The analysis shall be completed for the complete development area plus all surrounding areas that have the potential to be impacted by the development.
- 4.1.4 The Developer's Engineer shall identify the areas potentially impacted by the development and obtain approval from the City of the area to be analysed.
- 4.1.5 The minimum per capita consumption used for analysis shall be:
- | | | |
|----------------------|---|----------------------|
| Average Daily Demand | - | 415 lpcd |
| Maximum Daily Demand | - | 2.1 x Average Demand |
| Peak Hourly Demand | - | 3.2 x Average Demand |
- 4.1.6 The design population shall be the ultimate for the area under consideration for development or redevelopment
- 4.1.7 For non-residential developments, the minimum population used for design shall be:
- Commercial – 65 persons/ha
 - Institutional – 50 persons/ha
 - Industrial – 25 persons/ha
- 4.1.8 Mains shall be sized such that there will be a minimum residual pressure of 280 kPa (40 psi) at ground level at any location in the system.
- 4.1.9 Analysis shall be made for Maximum Demand plus Fire Flow. The residual pressure at any location at the ground level shall not be less than 140 kPa. (20 psi).
- 4.1.10 In areas of the water system where the pressure exceeds 700 kPa, all services shall be equipped with a pressure reducing valve on the house side of the meter. The lot grading plan shall show services requiring pressure valves.

4.2 FIRE FLOWS

- 4.2.1 Swift Current hydrants are fire flow tested in accordance with *NFPA 291 – Recommended Practice for Fire Flow Testing and Marking of Hydrants, latest edition* and labelled as shown in the following table:

Class	Flow	Label Colour
AA	5675 L/min	Light Blue
A	3785 -5675 L/min	Green
B	1900 – 3785 L/min	Orange
C	1900 L/min	Red

- 4.2.2 Fire flow requirements will vary by development and building type and should generally be calculated in accordance with the *Water Supply for Public Fire Protection* published by the *Fire Underwriters Survey*.
- 4.2.3 Fire flows shall be designed to meet the following minimum classes while maintaining a residual pressure at any location of 140 kPa (20 psi):

Development Type	Class
Single Family	C
Multi-family	B
Institutional	A
Commercial/Industrial	AA

- 4.2.4 Upon completion of the development all hydrants shall be tested in accordance with NFPA 291 – Recommended Practice For Fire Flow Testing and Marking of Hydrants, latest edition and labelled based on their flow

4.3 WATER MAINS

4.3.1 Location

- a. Mains shall be located in accordance with the Roadway Cross-Section Standard Drawings.
- b. Minimum 3.0 m horizontal centreline spacing shall be maintained between a water main and any sanitary or storm sewer main or manhole.
- c. Under unusual conditions where this horizontal separation cannot be maintained, the City may approve a lesser separation distance provided the water main invert is a minimum of 0.5m above the crown of the sewer pipe. Under no circumstances shall the horizontal separation be less than 1.0 m.
- d. Watermains shall cross above sewers wherever possible with a sufficient vertical separation to allow for proper bedding and support of the mains. The minimum clear vertical separation between water main and any sewer main is 0.3 m when the water main crosses above the sewer main. When water has to cross below the sewer, the vertical separation must be 0.6 m from sewer invert to watermain crown
- e. Where a watermain has to cross below a sewer, structural support of the sewer is required to prevent excessive joint deflection and settling. The length of the watermain should be centred at the point of crossing so that the joints are equidistant from the sewer.
- f. Where extreme conditions prevent either the horizontal or vertical separations from being obtained, the sewer shall be constructed of pipe and joint materials which are equivalent to water main standards.

4.3.2 Depth

- a. Mains shall be installed to provide a minimum depth of cover of 2.7 metres from the final finished surface to top of pipe. Maximum depth of cover shall be 3.2 m unless authorized in writing by the City.

4.3.3 Sizing

- a. The sizing of watermains shall be determined by the hydraulic network analysis.
- b. The minimum size of distribution mains shall be 200 mm diameter for residential, unless 150 mm mains are warranted to satisfy technical requirements. The minimum size of distribution mains shall be 200 mm diameter for commercial and industrial.

4.3.4 Looping and Dead Ends

- a. All water mains shall be looped where possible and dead ends minimized. Where a dead end system cannot be avoided, the maximum length of dead end water main shall be 150 m.
- b. Where dead ends are approved a fire hydrant, or other approved flushing device, shall be installed at the end of the main to avoid stagnation.
- c. In designing a feeder main, or a distribution main without services connecting at the high points, an air release valve or hydrant shall be placed at significant high points into the water main profile to allow purging of stale water or trapped air.

4.3.5 Design Considerations

- a. The maximum length of mains between interconnections shall be 150 m, unless otherwise determined by network modelling.
- b. The minimum requirement for pipe bedding shall be in accordance with the Standard Pipe Bedding Detail and Construction Specifications (Drawing C-100).
- c. Where bends are utilized, the long radius type or a combination of 22½ degree bends and straight pipe shall be used.
- d. Water main installation shall be in accordance with manufacturer's requirements and the Construction Specifications.

4.3.6 Water Main Disinfection

- a. All new water mains shall be disinfected and flushed before being out into service in accordance with the latest edition of AWWA Standard C651 for Disinfecting Water Mains.

4.4 HYDRANTS

4.4.1 The maximum allowable spacing between fire hydrants shall be in accordance with the latest edition of *Water Supply for Public Fire Protection*. The City's preferred maximum spacing shall be as follows:

- 150 m in all residential areas except R3;
- 90 m in R3 zones;

- 90 m in institutional/industrial/commercial areas.
- 4.4.2 Hydrant locations shall be such that the distance to any building shall be no greater than 90 meters for buildings.
- 4.4.3 For the case of multi-family and/or commercial buildings with standpipes, the unobstructed driving distances between hydrant and standpipe shall be in accordance with the *National Building Code (NBC)*.
- 4.4.4 Hydrants should be located on the same side of the street as the watermain to minimize the length of the hydrant branch. All hydrants shall be connected to a main with an independent 150mm branch line controlled by an independent 150 mm gate valve.
- 4.4.5 Hydrants on the distribution main will be installed at the projection of property lines, except:
- Where the hydrants are installed at the intersections, they shall be installed adjacent to the cut-off corners of the lot.
 - Where a hydrant and sanitary manhole fall on the same property line projection, the manhole will be moved a minimum of 5 metres away from a hydrant.
- 4.4.6 Hydrants shall be located to conform with curb and sidewalk design and shall be installed as follows:
- The center of the barrel is to be 2 m back of face-of-curb or 0.5 m back of walk. With rural cross-sections, install hydrants 1.0 m from property line.
 - The maximum distance from the face of the curb to the hydrant shall be 3.5 metres.
 - Shall be installed in accordance with the Standard Drawing and the Engineering Specifications outlined in these Documents.
 - A gate valve will be provided on each hydrant lead.
 - Cathodic protection to be installed as per typical details.
- 4.4.7 Hydrant types shall be as specified in the Construction Specifications.
- 4.4.8 Additional hydrants shall be installed at high value properties if deemed necessary by the City.

4.5 VALVES

- 4.5.1 All valve boxes located in streets shall be left flush with the base course asphalt. Immediately prior to the final lift of asphalt being placed, these valve boxes shall be raised to final grade.
- 4.5.2 Valves shall be the same size as the watermain.
- 4.5.3 Valves on the distribution mains will be installed:
- At the projection of a property line at intersections or in mid-block, for urban sections.

- With two (3) valves at a tee and three (4) valves at a cross, except in the case of a hydrant tee, where only the hydrant valve is required.
 - Generally valves shall be spaced between 150 m and 180 m depending on the area and type of development served.
 - Main valves should be located such that no more than twenty (20) single family lots and one (1) hydrant are involved in a shutdown during watermain repair or replacement. There should be no more than four (4) valves required to shut down any section of line.
- 4.5.4 Valves on hydrant branches are to be located according to standard line assignments and shall be spaced a minimum of 1.0 m from the hydrant body to allow for ease of operation.
- 4.5.5 Valves shall be required at each end of the distribution main when the main is contained within an easement.
- 4.5.6 Chambers or pits containing valves, blow offs, meters, or other water distribution appurtenances shall not be directly connected to a storm or sanitary sewer, nor shall blow-offs or air relief valves be directly connected to any sewer.
- 4.5.7 Valve casing shall consist of a PVC bonnet of sufficient size to fit over the valve, and an adjustable PVC top box with lid.
- 4.5.8 Valve cases shall be of suitable length for depth of bury specified for mains, with possible adjustment of 300 mm up or down from this length.
- 4.5.9 Valve casing extensions shall be cast iron suitable for use with the valve box to be installed.
- 4.5.10 All cast iron surfaces to have a bituminous coating for corrosion resistance.

4.6 BACKFLOW PREVENTION AND CROSS CONNECTION

- 4.6.1 Cross-connection is any point in a water pipeline where backflow can occur allowing the potential for contaminants to come into contact with water intended for domestic use.
- 4.6.2 Backflow and Cross Connections are defined and regulated by *“The Water and Wastewater Utility Bylaw”*; which prohibits a cross connection within the water system unless it has been approved by the City.
- 4.6.3 Where cross connection is approved by the City, backflow prevention within the pipe system shall be designed in accordance with Saskatchewan Environment’s *“Water Pipeline Design Guidelines, latest edition”*.
- 4.6.4 Backflow prevention for fire protection sprinkler systems shall be as specified by the NFPA and the sprinkler supplier.

4.7 THRUST BLOCKS

- 4.7.1 At all hydrants, plugs, tees, crosses, bends of more than 22 degrees, and all other points of concentrated thrust, provide reaction blocking (thrust blocks) to prevent movement. Place reaction blocking against solid undisturbed ground.

- 4.7.2 Details provided herein are intended to be general, and are based upon soil load values of 7300 kg/m² or more. Where soil will not provide this load value, provide additional bands and clamps, or provide more substantial reaction blocking, as required to take the anticipated reaction.
- 4.7.3 Place blocking to provide access to pipe and fittings for repairs or future extensions of the line.
- 4.7.4 Thrust blocks will be provided as per the Standard Drawing. Thrust blocking shall be Type 50 sulfate resistant concrete having a minimum compressive strength of 20 MPa at twenty-eight (28) days.
- 4.7.5 Pipe restraint devices shall be used separately or in conjunction with thrust blocks, where identified as being required, and shall be in accordance with the manufacturer's recommendation. All restraint devices shall be stainless steel or suitable, resistant to corrosion, to the satisfaction of the City.

4.8 SERVICES

- 4.8.1 The minimum size of service connections to a single-family dwelling shall be 20mm unless in an area specified as a Fire Protected Area in the "*Building Bylaw*".
- 4.8.2 For residential areas required by the "*Building Bylaw*" to have fire sprinkler systems 25mm water service connections shall be installed.
- 4.8.3 The maximum size of a commercial water service will be based on fire code requirements.
- 4.8.4 For water services sized 50 mm and smaller, the tapping shall be 45° to the horizontal position on the distribution main.
- 4.8.5 Water mains shall be tapped under pressure.
- 4.8.6 All water services to be direct tapped or utilize stainless steel service clamps.
- 4.8.7 Where the water service is 50 mm or smaller in size, the water and sanitary services shall be installed in a common trench 3 m offset by property line. The services shall be installed so that, when facing the lot being served, the water service is on the right of the sanitary service.
- 4.8.8 The minimum depth of cover over the water at the property line shall be 2.6m, as per the Standard Drawing.
- 4.8.9 Corporation main stops and curb stops shall be installed in accordance with the Standard Drawing. Material to be Mueller or approved equal.
- 4.8.10 MUNICIPEX or an approved equivalent pipe should be used for services where possible.
- 4.8.11 Where a copper service is permitted, the water service is to be goosenecked. Service shall be snaked in the trench to allow for thermal contraction.

- 4.8.12 Curb stops shall be installed at property lines and located 3 m from side yard furthest from garage, as shown on the Standard Drawing.
- 4.8.13 All services shall be laid on 75 mm of granular bedding, and the bedding material shall be placed up to springline of the pipe.
- 4.8.14 Painted blue stakes of 50 mm x 100 mm size shall be extended from the end of the service connections to a minimum of 0.70 m above the ground level for water, per the Standard Drawing.
- 4.8.15 The Developer's Engineer shall provide detailed as-built drawings for all installed service connections, with such drawings providing information related to pipe dimensions, invert elevations, depth of service lines, location of services relative to property line(s), manholes and/or watermain valves.

4.9 CATHODIC PROTECTIONS

- 4.9.1 Fittings and valves are to be wrapped with denso tape, or an approved equal.
- 4.9.2 All hydrants shall be cathodically protected with a 5.5 kg Zinc Anode, per standard drawing.
- 4.9.3 Zinc Anodes shall conform to ASTM B418-16a, Type II.
- 4.9.4 Lead Wires No. 10A WG/7, two metres long.
- 4.9.5 Wire shall be connected to fittings with a cadweld or bolt attached.
- 4.9.6 A minimum of three litres of water shall be poured on each Anode to initiate the Anode's operation.

4.10 CONSTRUCTION

- 4.10.1 Prior to commencement of work on construction of a water main a notification number from the minister shall be provided to the City.
- 4.10.2 Prior to commissioning a water main, the certificate from a qualified person stating that the constructed water main meets the requirements in the *Saskatchewan Environmental Code* shall be submitted to the City.

5 LIST OF DRAWINGS

- A-100 Typical Valve and Hydrant Detail
- A-101 Main Valve Casing Detail
- A-103 Blocking and Anchorage
- A-104 Vertical Bend Thrust Block Detail
- A-105 Typical Anode Installation at Valves, Iron Fittings and Hydrants
- A-108 Air Relief Valve and Flushing Chamber
- A-108A Blow-Off Valve
- A-109 Hydrant Access Location off Rural Road

- C-100 Trenching and Pipe Bedding Details
- C-101 Single and Double Service Layout
- C-101A Sewer and Water Service Locations
- C-102 Typical Water Service Connection
- C-105 Water Service Connection Manufactured Home

END OF SECTION



**CITY OF
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PART A3

SANITARY SEWER SYSTEM

OCTOBER 2020

1	GENERAL	2
2	DEFINITIONS	2
3	SUBMISSIONS AND APPROVALS	2
4	DESIGN REQUIREMENTS	2
4.1	CAPACITY ANALYSIS	2
4.2	SEWER MAINS	4
4.3	MANHOLES	4
4.4	CURVED SEWERS	5
4.5	LIFT STATIONS	5
4.6	SERVICES	6
4.7	CONSTRUCTION	7
5	LIST OF DRAWINGS	7

1 GENERAL

The design of the sanitary sewer system shall conform to the *Saskatchewan Environment Code – Sewage Main Chapter* and *Sewage Works Design Standard*, latest editions, as published by the Saskatchewan Ministry of Environment and used as a companion to the applicable Acts, regulations, and other provincial publications and as amended by these Guidelines and Standard Details.

These Development and Design Standards shall be used in conjunction with the related City Construction Specifications.

2 DEFINITIONS

The following definitions are intended to be specific to the Sanitary Sewage System Standards. For additional general definitions refer to Part A1 – General Requirements.

Manning’s Equation: Is a common equation that applies to flow in open channels, taking into account velocity, flow area, and slope.

Hydraulic Analysis: An Engineering analysis determining the water systems minimums to meet city, provincial, or federal requirements.

3 SUBMISSIONS AND APPROVALS

- 3.1.1 All Drawing plans and Engineering documents must be submitted to the City for approval. All design drawings will follow the requirements stated in the drawings section of the General Requirements.
- 3.1.2 All calculations, schematic diagrams, computer printouts, etc. shall be submitted together with the design plans.
- 3.1.3 The certificate from a qualified person stating that the water main design plan satisfies the requirements of the *Saskatchewan Environmental Code – Sewage Main Chapter* shall be submitted together with the design plans.

4 DESIGN REQUIREMENTS

All sanitary sewer infrastructure (pipes, lift stations, manholes, and appurtenances) that is or will become City owned and operated shall be within and public right of way or easement.

4.1 CAPACITY ANALYSIS

- 4.1.1 The sanitary sewer system shall be of sufficient capacity to carry peak flows plus infiltration.
- 4.1.2 Foundation weeping tile shall be tied into storm sewer where possible. Roof leaders and foundation drain connections shall not be connected for discharge into the sanitary sewer system in new developments.

4.1.3 Wastewater flow shall be derived using the following formula:

$$Q = \frac{FDMA + I}{K}$$

Where:

Q = wastewater flow (L/s)

F = average daily per capita water consumption

D = population density (persons/hectare)

M = Harmon Peaking Formula

A = area (ha)

K = constant (86,400 metric)

I = Infiltration (L/s)

4.1.4 The peak wastewater flow is established by multiplying the average daily flow with a peaking factor. The peaking factor is established by using the Harmon formula as follows:

$$M = 1 + \frac{14}{4 + \sqrt{P}}$$

Where:

P = population in thousands.

4.1.5 The following factors shall be used in design of sanitary sewerage systems for Residential Development:

Average Sewage Flow	-	380 liters per capita per day (where unknown)
Infiltration	-	0.20 L/s/ha

4.1.6 The following factors shall be used in design of sanitary sewerage systems for Commercial, Industrial, and Institutional Development:

Average Sewage Flow	-	Commercial: 40,000 L/ha/d
	-	Industrial: 20,000 L/ha/d
Peak Flow	-	3.0 x Average Flow
Infiltration	-	0.28 L/s/ha (24,000 L/ha/d)
Minimum Velocity	-	0.61 m/s

4.1.7 Population estimates for the purpose of system design shall be based upon the actual lot layout proposed for the development and a persons/dwelling estimate of not less than 3.5.

4.1.8 The City reserves the right to require additional system capacity to accommodate potential future subdividing of larger lots.

4.1.9 The minimum size for sanitary sewer mains shall be 200 mm diameter for residential and 250 mm for industrial/commercial areas.

4.1.10 Sanitary sewers may have to be oversized for future development if required by the City. Provision for this will be detailed in the Service Agreement for each specific development.

4.2 SEWER MAINS

4.2.1 Sewer mains shall not be less than 200mm inside diameter.

4.2.2 Pipe sizing shall be determined by using the Manning's Formula as follows:

$$Q = VA = A \frac{1}{K} R^{2/3} S^{1/2}$$

Where:

Q = wastewater flow (m³/s)

n = Manning's roughness coefficient (use 0.013)

R = Hydraulic Radius (cross section area of flow/wetted perimeter)

S = slope (m/m)

A = cross sectional area (m²)

4.2.3 Minimum pipe slopes shall be designed to maintain 0.60 m/s minimum velocity. The maximum flow velocity shall be 3.1m/s. Where velocities exceed this value, special engineering consideration shall be given to invert scouring and pipe anchoring.

4.2.4 Mains shall be installed to provide a minimum depth of 2.5 m (or equivalent with insulations) from top of pipe to final finished grade at the surface.

4.2.5 All sewer mains shall be installed with sufficient depth to provide a minimum 2.45 m depth of cover for the service connection at the property line.

4.2.6 Mains shall be located within the road right-of-way in accordance with the Roadway Cross-Section Standard Drawings.

4.2.7 Pipe bedding shall be provided for all mains in accordance with the Standard Drawings.

4.2.8 The following minimum pipe slopes must be used:

Minimum design slopes for sanitary sewer pipe

Sewer Diameter (mm)	Minimum Design Slope (%)
200	0.40
250	0.28
300	0.22
375	0.15
450	0.12
525	0.10
600	0.08

4.2.9 The minimum slope for curved sewers and dead-ends shall be 50% greater than the minimum slopes required for straight runs.

4.3 MANHOLES

4.3.1 Manholes shall be located at the end of each line, at all changes in pipe size, grade, or alignment, at all changes in direction except in the cases of curved sewers, and at the intersection of sanitary sewer mains.

- 4.3.2 Manholes in cul-de-sacs shall not be located in the gutter.
- 4.3.3 The distance between manholes cannot be greater than 120 m for sewers 300 mm diameter or less. The distance cannot be greater than 150 m for sewers over 300 mm.
- 4.3.4 The downstream invert in a manhole shall be a minimum of 30 mm lower than the lowest upstream invert. At a change in direction, the drop shall be at least 50 mm.
- 4.3.5 In the case that the downstream pipe is larger than upstream then obvert elevation of the lowest upstream pipe should be equal to, or higher than, the obvert of the downstream pipe.
- 4.3.6 Manholes shall be installed as shown on the Standard Drawings. Manhole bases shall be pre-cast slabs, concrete poured bases, vaults, or pre-cast tees. Pre-benched manholes shall be used when possible.
- 4.3.7 All manholes shall be 1200 mm inside diameter for all pipe 900 mm diameter and less. For pipe exceeding 900 mm diameter, manhole diameter shall be pipe diameter plus 600 mm, or a Tee-Riser shall be used, or use a special type of MH, same as tee-riser.
- 4.3.8 All joints shall be watertight.
- 4.3.9 An interior drop manhole shall be used where invert levels of inlet and outlet pipes differ by more than 1 m.
- 4.3.10 Any manhole over 3.0m deep needs Fall Restraint (Slide Anchor) and safety platforms are required for manholes 5.0 m or deeper.
- 4.3.11 Manholes, frames, and covers shall conform to construction specifications and Standard Drawings.
- 4.3.12 All manhole covers are to be clearly stamped "Sanitary Sewer".

4.4 CURVED SEWERS

Curved sewers will be permitted, with the following requirements:

- 4.4.1 The sewer shall be laid as a simple curve, with a radius equal to or greater than 90 m or the manufacturer's minimum recommended radius, whichever is larger.
- 4.4.2 Manholes shall be located at the beginning and end of the curve.
- 4.4.3 Manholes shall be located at intervals not greater than 90 m along the curve.
- 4.4.4 The main shall run parallel to the curb or street centreline.
- 4.4.5 The minimum grade for sewers on curve shall be 50% greater than the minimum grade required for straight runs of sewers.

4.5 LIFT STATIONS

Lift stations shall be designed in accordance with Saskatchewan Ministry of Environment Guidelines. Lift stations shall be duplex ITT Systems, with the following minimum standard items:

- 4.5.1 Must be designed to be consistent with the area requirements.

- 4.5.2 Logimatic duplex pump controller.
- 4.5.3 Interior lighting and exterior street lighting.
- 4.5.4 Dexon heater.
- 4.5.5 Milltronics level controller with float backups.
- 4.5.6 Automatic telephone alarm.
- 4.5.7 Breaker and plug to match the City's portable generator.
- 4.5.8 Flight Pumps or approved equivalent.

4.6 SERVICES

- 4.6.1 The minimum size of service connections to a single-family dwelling shall be 100 mm diameter.
- 4.6.2 The minimum grade on a 100 mm sewer service shall be 2.0% and on a 150 mm service shall be 1.0%.
- 4.6.3 Where bends are utilized, the long radius type or a combination of 22½ degree bends and straight pipe shall be used.
- 4.6.4 Service fittings shall be either in-line tees or service saddle, complete with gasket and stainless steel straps and nuts.
- 4.6.5 Services which are less than 150mm may be directly tapped into the main without a manhole using a service saddle. Where the service is unusually long or has a diameter of 150mm or more, a manhole is required.
- 4.6.6 The services shall be installed so that, when facing the lot being served, the water service is on the right of the sanitary service.
- 4.6.7 The minimum depth of cover over the water and sanitary services at the property line shall be 2.45 m, per the Standard Drawing.
- 4.6.8 Corporation main stops and curb stops shall be installed in accordance with locations specified in the Standard Drawings.
- 4.6.9 Sewer services shall be installed at property or easement lines as shown on the Standard Drawing and shall be properly capped or plugged to prevent the entry of earth, water or deleterious material into the pipe.
- 4.6.10 The Developer's Engineer shall provide detailed as-built drawings for all installed service connections, with such drawings providing information related to pipe dimensions, invert elevations, depth of service lines, location of services relative to property line(s), manholes, and/or watermain valves.

4.7 CONSTRUCTION

- 4.7.1 Prior to commencement of work on construction of a sanitary sewer main a notification number from the minister shall be provided to the City.
- 4.7.2 Prior to commissioning a sanitary sewer main, the certificate from a qualified person stating that the constructed sanitary sewer main meets the requirements of the *Saskatchewan Environmental Code* shall be submitted to the City.

5 LIST OF DRAWINGS

- B-100 Typical 5A Pre-Cast Manhole Detail
- B-101 Exterior Drop Manhole Detail
- B-102 Interior Drop Manhole Detail
- B-103 Pre-Benched Manhole Base
- B-106 Typical Perched Manhole for 600 – 1500mm diameter pipes
- B-107 T-Riser Manhole for Pipe Diameter 1200mm and Larger
- B-108 Manhole Safety Platform
- B-109 Trash Grate Inlet

- C-100 Pipe Bedding Details
- C-101 Single and Double Service Layout
- C-101A Sewer and Water Service Locations
- C-103 Typical Sanitary Service Connection
- C-104 Residential Sanitary Sewer Service Riser Connection
- C-106 Sanitary Service Connection Manufactured Home

END OF SECTION



**CITY OF
SWIFT CURRENT**
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PART A4

STORM DRAINAGE SYSTEM

OCTOBER 2020

1	GENERAL	2
2	DEFINITIONS	2
3	SUBMISSIONS AND APPROVALS	3
	3.1 MASTER DRAINAGE PLAN	3
	3.2 SITE DRAINAGE PLAN	4
4	DESIGN REQUIREMENTS	5
	4.1 CAPACITY ANALYSIS	5
	4.2 STORM MAINS	9
	4.3 MANHOLES	10
	4.4 CATCH BASINS	11
	4.5 OIL AND GRIT SEPERATORS	12
	4.6 CONNECTIONS TO STORM SEWERS	12
	4.7 CURVED SEWERS	12
	4.8 STORM WATER MANAGEMENT FACILITIES	13
	4.9 DRY DETENTION PONDS	13
	4.10 WET RETENTION PONDS	14
	4.11 EMERGENCY SPILL WAY PROVISIONS	16
	4.12 SAFETY PROVISIONS AT INLETS AND OUTLETS	16
	4.13 OUTFALLS	16
	4.14 LOT DRAINAGE	17
	4.15 DRAINAGE SWALES	17
	4.16 STORM CHANNELS	18
5	LIST OF DRAWINGS	18

1 GENERAL

Designing and accommodating storm drainage is essential to minimize property damage, flooding, safety in roadways, and impacts on other infrastructure. The majority of drainage in Swift Current makes its way to the Swift Current Creek through overland and underground infrastructure.

The design of the storm drainage system shall conform to “Stormwater Guidelines”, latest edition, as published by the Saskatchewan Ministry of Environment and used as a companion to the applicable Acts, regulations, and other provincial publications and as amended by these Guidelines and Standard Details.

These Development and Design Standards shall be used in conjunction with the related City Construction Specifications.

2 DEFINITIONS

The following definitions are intended to be specific to the Storm Water Distribution System Standards. For additional general definitions refer to Part A1 – General Requirements.

Hydraulic Analysis: An Engineering analysis determining the water systems minimums to meet provincial or federal requirements.

Minor System: A network of sewer pipes, inlets, and street gutters, which are designed to rapidly convey storm water runoff from minor rainfall events. For purposes of these standards, a minor rainfall event is defined as a storm having a 1 in 5 year return period.

Major System: A major system consists of overland flow routes, swales, watercourses, outfalls, and storage facilities that are planned as part of the urban infrastructure to convey runoff from major rainfall events. For the purposes of these standards, a major rainfall event is defined as a storm having a 1 in 100 year return period.

Manning’s Equation: Is a common equation that applies to flow in open channels, taking into account velocity, flow area and slope.

Rational Method: Method of estimating the peak runoff rates for the design of urban drainage systems.

Return Period: The return period of a rainfall event is the inverse of the statistical probability that a storm of a given size will occur in any given year based on historical data (i.e. 1 in 5yr return period = 20% chance of occurrence in any given year).

3 SUBMISSIONS AND APPROVALS

3.1 MASTER DRAINAGE PLAN

Where required by the City for larger scale developments, a Master Drainage Plan shall be prepared and used in developing and comparing alternatives, and to select the optimum storage and drainage solution for a development area. This Plan should provide, as a minimum, the following information:

- Detailed description of the development area, including proposed street layout, locations of parks, direction of overland flow, natural storage and drainage sub-catchment boundaries, etc.
- Identify and quantify the amount of upstream drainage entering onto the proposed development lands, including all points of entry.
- Identify the impact of the proposed development on the watershed.
- Identify all existing flow channels, drainage patterns or routes, and containment areas.
- Identify the point(s) of discharge from the lands, as well as the type and calculated capacity of the receiving drainage facility(s), whether natural, man-made, or a combination of both.
- Provide details of water quality enhancement facilities.
- Identify all licensing requirements as may be required by Saskatchewan Environment.
- Post-development hydrographs for the 5-year and 100-year events to be determined at key points in the system.
- Delineation of flood lines for the 100-year design storm for creeks or watercourses.
- Description and discussion of storage alternatives. All alternative storage and runoff control methods shall be reviewed and shall include, but not be limited to:
 - retention storage;
 - detention storage;
 - off-line stream storage;
 - channel storage;
 - on-line storage; and
 - wet ponds (retention storage) or dry ponds (detention storage).

In reviewing the alternatives, the optimum number and location of the stormwater facilities shall be determined, bearing in mind the total system.

- Detailed description of the selected alternatives.

3.2 SITE DRAINAGE PLAN

- 3.2.1 Drainage from a single residential site, up to six units may be directed off site and into the adjacent public right of way where there is an existing storm drainage system.
- 3.2.2 For development on a commercial, industrial, multi-family residential (over 6 units) property, or a subdivision, a detailed Site Drainage Plan shall be prepared, submitted, and approved prior to a development permit being issued by the City.
- 3.2.3 Site Drainage Plans shall be in accordance with any approved Master Drainage Plans for the applicable area.
- 3.2.4 Site Drainage Plans shall be designed in accordance with Section 4 - Design Requirements of these standards.
- 3.2.5 For development where there is not a current Master Drainage Plan a sub-basin storm drainage evaluation will be required at the discretion of the City. This evaluation may be completed by the City, or for larger developments will be required by the developer. All Site Drainage Plans shall conform to the sub-basin storm drainage evaluation.
- 3.2.6 The Rational Method may be used to calculate the Minor (1 in 5yr) and Major (1 in 100yr) rainfall events. All site plans will be checked based on the Rational Method of Design.
- 3.2.7 With the exception of residential development up to 6 units, a development site can discharge up to a 1 in 5 year rainfall event unless otherwise specified in a Master Drainage Plan, or sub-basin storm drainage evaluation.
- 3.2.8 The site drainage plan shall clearly identify the following items:
- 1 in 5 year peak flow rate
 - 1 in 100 year peak flow rate
 - Computation of site area
 - Finished grade elevations
 - Paved and unpaved areas (indicated by hatching or text)
 - Surface drainage patterns (arrows indicating direction of flow)
 - Catch basins with both top and invert elevations
 - Stormwater retention areas with calculations
 - The stormwater retention calculations may be represented in a chart and shall include the following:
 - 1 in 5yr and 1 in 100yr return period peak flow rates
 - Allowable discharge to main (1 in 5yr shown as Q1) and actual discharge to main from retention area (shown as Qa)
 - List of runoff coefficients used
 - Area breakdown (paved, gravel, landscaped, roof, etc)

- Roughness coefficient used (PVC = 0.011, concrete = 0.013)
 - Storage volume required and actual volume provided on site, including top and bottom elevations of retention feature
 - Intensity (mm/hr)
 - Size/type of ICD used, if necessary.
- 3.2.9 Sanitary sewer manholes and cleanouts that may be required on Commercial/Industrial properties are not to be located within the trapped low or detention/retention areas in order to prevent infiltration into the sanitary sewerage system.
- 3.2.10 All Drawing plans and Engineering documents will need to be submitted to the City for approval. All design drawings will follow the requirements stated in the drawings section of the General Requirements.

4 DESIGN REQUIREMENTS

4.1 CAPACITY ANALYSIS

For areas less than 65 ha,

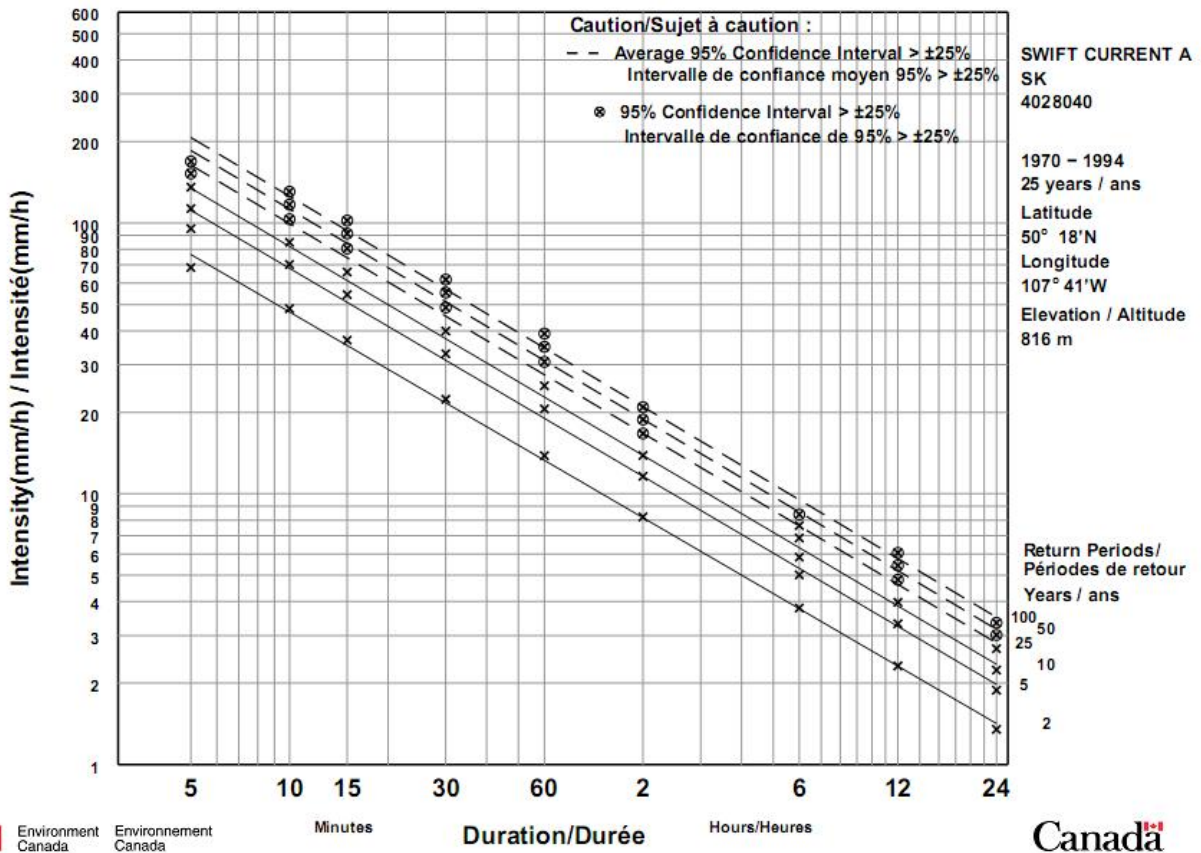
- 4.1.1 The *Rational Method* shall be used to design minor storm systems and the *Modified Rational Method* shall be used to design major storm systems.
- 4.1.2 The formula to be used for the Rational Method is as follows:
- $$Q = 2.78 CIA$$
- Where: Q = the design peak flow rate in litres per second
I = the intensity of rainfall in millimetres per hour, corresponding to the time of concentration (*Figure 4.1*)
A = the contributing area in hectares
C = the runoff coefficient
- 4.1.3 The Modified Rational Method will be used for the design of systems when the specified design has a return period greater than ten (10) years. This shall include the design over overland systems as well as on-site storage for site developments. The Modified Rational Method introduces a modifier which increases the runoff coefficient for larger events to accommodate for inaccuracy of the Rational Method when completing calculations on these events. The runoff coefficient in the formula shall be increased by the following factors to a maximum runoff coefficient of 1.0:
- 25 year add 10%
 - 50 year add 20%
 - 100 year add 25%

Intensity

4.1.4 Figure 4.1 (or the current version) can be used to determine the intensity of rainfall ("I" value) in the Rational Method formula.

Figure 4.1

Short Duration Rainfall Intensity–Duration–Frequency Data
Données sur l'intensité, la durée et la fréquence des chutes de pluie de courte durée



Note: Based on the Intensity-Duration-Frequency data for the Swift Current Airport.

- 4.1.5 For Minor Systems the 5 year return period in Figure 4.1 shall be used.
- 4.1.6 For Major Systems the 100 year return period in Figure 4.1 shall be used.
- 4.1.7 Alternatively, the intensity of rainfall ("I" value) may be manually calculated instead of using Figure 4.1 (Intensity-Duration-Frequency chart). The formula to be used when calculating rainfall intensity is:

$$I = A / (T_c + B)^C$$

Where: I = intensity (mm/hr)
 T_c = Time of Concentration in hours
 A, B, C = Parameters for the selected return period

The data in *Table 4.1* (from IDF curve data) shall be used for the A, B, C parameters when using the manual calculation method for rainfall intensity.

Table 4.1

Return Period	A	B	C
2	14.3	0.033	0.739
5	21.0	0.048	0.762
10	25.4	0.054	0.771
25	30.9	0.059	0.779
50	35.1	0.062	0.784
100	39.2	0.064	0.787

For example, the intensity of a 1 hour storm, using a 5 year return period for a minor system component, would be calculated as:

$$I = 21.0 / (1 + 0.048)^{0.762} = 20.3 \text{ mm/hr}$$

Time of Concentration

- 4.1.8 When completing rainfall intensity calculations for the purposes of the Master Drainage Plan, an event of twenty-four (24) hours shall be considered.
- 4.1.9 For Site Drainage design the duration of rainfall used to determine the intensity shall be equal to the time of concentration. The time of concentration is the time of the overland flow to the minor system inlet as well as the travel time in the minor system. The overland flow time in residential and commercial areas shall not exceed 10 minutes in duration. In industrial areas specific overland flow times shall be computed separately using an approved method. The time of travel within the minor system shall be computed based on the pipe velocity.
- 4.1.10 Inlet times for overland flow from a catchment area to entry points of the minor systems or overland conveyances shall be computed using the Kerby/Hathaway formula as follows:

$$t_i = 1.444 (L \times n / S^{0.5})^{0.467}$$

Where: t_i = Inlet time in minutes
 L = Distance of travel in meters
 n = Manning's roughness coefficient for sheet flow (dimensionless)
 S = Slope in m/m

- 4.1.11 Velocity calculations for the design of minor systems shall be completed using the Manning's equation as follows:

$$V = (1/n) S^{1/2} R^{2/3}$$

Where: V – Velocity in meters per second
 n – Manning's roughness coefficient (dimensionless)
 S – Slope in m/m
 R – The channel flow area divided by the wetted perimeter in meters

The travel time, in seconds, is then equal to the length of pipe in the minor system, in meters, divided by V.

- 4.1.12 The time of concentration shall be computed by the addition of the inlet time to the computed travel times in the minor system.

For example, if runoff flows over 80 m of grass ($n = 0.030$) on a 1% slope before entering a minor system, and then travels through 12 m of 300 mm diameter concrete pipe ($n = 0.013$) flowing half full ($R = 0.075$) on a 0.44% slope, the time of concentration would be the inlet time plus the travel time, calculated as follows:

$$t_i = 1.444 (80 \times 0.030 / 0.01^{0.5})^{0.467} = 6.4 \text{ minutes}$$

$$V = (1 / 0.013) \times 0.0044^{1/2} \times 0.075^{2/3} = 0.9 \text{ m/s}$$

$$t_t = 12 / 0.9 = 13.2 \text{ minutes}$$

$$T_c = 6.4 \text{ minutes} + 13.2 \text{ minutes} = 19.6 \text{ minutes}$$

This value would then be used to calculate the rainfall intensity as shown above.

Runoff Coefficient

- 4.1.13 The following runoff coefficients shall be used for the 1-in-5 year analysis:

Pavement	=	0.90
Parks	=	0.15
Residential	=	0.30
Industrial	=	0.70
Commercial	=	0.70
Multiple Family	=	0.70

Other coefficients generally used by the City may include:

Pervious surfaces	=	0.15
Impervious Surfaces	=	0.90
Landscaped Areas	=	0.30
Gravel Areas	=	0.70

- 4.1.14 The weighted average of runoff coefficients for a composite area shall be estimated from the following equation:

$$C = \frac{\sum (C_i \times A_i)}{\sum A_i}$$

Where the subscript "i" refers to individual areas and their respective runoff coefficients.

For example, for a 100 ha area which is 25% Residential, 15% Parks, and 60% Commercial, the runoff coefficient would be calculated as:

$$C = (0.30 \times 25 + 0.15 \times 15 + 0.70 \times 60) / 100 = 0.52$$

For areas greater than 65 ha:

- 4.1.15 Computer models shall be used to determine design flows and the sizing of systems that contain non-pipe stormwater management facilities (e.g. detention ponds) or systems that include a significant amount of undeveloped land.
- 4.1.16 The selection of an appropriate computer model shall be based on an understanding of the principles, assumptions, and limitations in relation to the system being designed.
- 4.1.17 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, computer printouts, and a design summary report.
- 4.1.18 The critical design rainfall hydrograph shall be selected. Both the AES Distribution (for long duration) and the Chicago Distribution (for short duration) will be evaluated.
- 4.1.19 The storm duration of an event is critical for the system being designed and shall be used to determine pipe sizes. The 5 year 4-hour Chicago Distribution event shall be selected. For systems involving storage design, both short duration and longer duration events such as the AES 24 hour event should be evaluated.

4.2 STORM MAINS

- 4.2.1 The minimum size of storm sewer mains shall be 300 mm diameter.
- 4.2.2 Pipe classes shall be determined to withstand subsequent superimposed loadings.
- 4.2.3 Various factors affecting the pipe class shall be taken into account, and pipe class shall be evaluated as per standard engineering practice.
- 4.2.4 The minimum velocity within a piped system shall be 0.70 m/s. Where greater velocities in excess of 3 m/s are attained, special provisions shall be made to protect against displacement by erosion or impact. Designs containing velocities in excess of 3 m/s shall require special provisions for invert scouring and pipe anchoring.
- 4.2.5 Pipe sizing shall be determined by utilizing the Manning's Formula, using an "N" value of 0.013. The minimum inside diameter for storm sewer pipe shall be 300 mm.
- 4.2.6 Storm sewer pipe shall be designed to convey the design flow when flowing full, with the hydraulic grade line at the pipe crown. All pipe crown elevations shall match at manhole junctions.
- 4.2.7 Surface water shall be intercepted with a sufficient number of catch basins such that the inlet capacity is sufficient to receive the design storm water flow. Catch basin capacity shall be considered, as shown on Table 5.3, where values are given for sag conditions and on slope conditions based upon inlet grate type.
- 4.2.8 Roadway ditches and swales will efficiently convey run-off through the storm drainage system. Roadway ditches and swales will not be used for stormwater detention or retention.
- 4.2.9 Mains shall be installed to provide a minimum depth to pipe obvert of 1.2 m below final finished grade.

- 4.2.10 Mains shall be installed in accordance with cross sectional drawings located in Standard Drawings.
- 4.2.11 Pipe bedding shall be provided for all mains in accordance with the Standard Drawings. A sample of the proposed bedding sand shall be submitted to the City for approval prior to the commencement of construction. All storm sewer mains shall have a minimum of 150 mm bedding under the pipe and 300 mm above the pipe.
- 4.2.12 *Table 4.2* lists the minimum slopes that must be used for various pipe sizes:

Table 4.2

Storm Sewer Size	Minimum Slope (%)	
	Concrete Pipe n = 0.013	PVC, PE Pipe n = 0.011
300mm	0.44	0.32
375mm	0.32	0.24
450mm	0.26	0.18
525mm	0.22	0.16
600mm	0.18	0.12
675mm	0.15	0.11
750mm	0.13	0.10
≥900mm	0.10	0.10

- 4.2.13 The design engineer should always keep in mind that fulfilling the requirements of minimum slope can ensure the minimum velocity, but the capacity of the sewer main will be reduced and may not carry the estimated quantity of run-off. Therefore the provision of high percentage of slope is always recommended to obtain maximum capacity (viable) for each size of sewer main.
- 4.2.14 The minimum slope for curved pipes and dead-end pipes shall be 50% greater than the minimum slopes required for straight runs.

4.3 MANHOLES

- 4.3.1 Transitions in size, grade, or direction of sewer pipes are to be accomplished by means of manholes except in the case of curved sewer. Manholes are also to be installed at the beginning and end of the curve for curved sewers and at the intersection of storm sewer mains.
- 4.3.2 The maximum distance between manholes for pipe sizes 200 mm – 375 mm is 120 m and for pipes 450 mm and larger is 150 m. In all cases, a manhole is required at the upper end of a sewer for maintenance purposes. Manhole spacing on storm sewers greater than 750 mm in diameter may exceed 150 m if approved by the City.
- 4.3.3 Benching in manholes shall be provided to minimize hydraulic losses. The downstream invert in a manhole shall be a minimum of 30 mm lower than the lowest upstream invert. At a change in direction, the drop shall be at least 60 mm. If an influent pipe diameter is

greater than 525 mm and the bend is greater than 45 degrees, or if the outflow pipe velocity exceeds 1.5 m/s, then minor losses shall be considered (see AISI, 1980).

- 4.3.4 If the difference in elevation in the inverts of an inlet pipe and the outlet pipe is greater than 600 mm then a drop structure shall be installed. Internal drop structures are permitted as long as a minimum 900 mm clear space is maintained from the inside wall to the tee of the drop structure and the vertical drop pipe may be sized one pipe size smaller than the influent pipe. Where a drop structure is required for 600 mm diameter and larger inlet pipe or flow velocities greater than 3.0 m/s are proposed, the drop structure shall be an exterior drop with energy dissipation devices in the manhole.
- 4.3.5 Every storm sewer shall have a manhole or manhole/catch basin at the upper end of the system for maintenance purposes.
- 4.3.6 Types of manholes, along with frames and covers to be used, shall conform to the storm sewer specifications which accompany these documents.

4.4 CATCH BASINS

- 4.4.1 Catch basin barrels along with frames and covers shall conform to storm sewer specifications outlined in these documents.
- 4.4.2 Catch basin manholes shall be used in place of a catch basin when the lead exceeds 30 m in length or where one catch basin discharges into another.
- 4.4.3 Catch basin leads:
- The minimum size of catch basin leads shall be 250 mm diameter with a minimum grade of 2.0%.
 - The minimum grade on a 300 mm catch basin lead shall be 1.0%.
 - Two catch basins may be connected in series. The catch basin lead connecting to the storm sewer manhole shall be 300 mm at a minimum slope of 1.0%.
 - The maximum length of a catch basin lead shall be 30 m.
 - If a lead of over 30 m in length is required, a catch basin manhole shall be installed at the upper end.
 - Catch basin leads shall have a minimum cover of 1.2 m to obvert.
 - All leads shall be connected to a main line manhole or a catch basin manhole.
- 4.4.4 Catch basins shall be “twinned” (two basins built side by side) and interconnected at points where there is a large trapped drainage catchment area, accumulation, or where a large amount of water after bypassing upstream catch basin which are situated on a very long steep street.
- 4.4.5 Inlet control devices (where required) must be shown on all drawings.
- 4.4.6 Catch basin spacing shall range from 90 m to 150 m depending on road slopes and configuration.

- 4.4.7 Closer spacing may be required for flat grades and at all corners where storm sewers exist, except in the case of a high corner (i.e. Drainage away from corner in both directions.)
- 4.4.8 The maximum length of drainage in lanes shall be 200 m. The length of drainage in a lane is to be minimized where possible. Where catch basins are located in lanes, it is necessary to compact utility trenches and pave 6 m in all directions from the catch basin, up to the property lines. Trap lows in lanes should be avoided when possible.
- 4.4.9 Catch basins at intersections are to be positioned at the low side of the corner grade at the BC and EC of the curb return.

4.5 OIL AND GRIT SEPERATORS

Oil and grit separators are underground detention structures that are designed to capture hydrocarbons and sediment. They replace conventional manholes in the storm water drainage system and are typically used in areas that have potential for discharge of hydrocarbons and/or polluted sediments.

- 4.5.1 A high flow-rate bypass oil/grit separator or approved equivalent pre-treatment system may be required to remove sediments and other pollutants from runoff. The City will evaluate the need for such pre-treatment devices on a case-by-case basis.
- 4.5.2 Most oil/grit separators are proprietary products. The Designer should contact the Infrastructure and Operations Department of the city to determine if a specific oil/grit separator type system is acceptable for the specific conditions of a site. If on-site detention is also required, such detention storage shall be provided upstream of the oil/grit separator. Manufacturers' guidelines are to be followed for any specific oil/grit separator. All sizing and design information shall be provided with the detailed engineering plans.

4.6 CONNECTIONS TO STORM SEWERS

Only catch basins and approved private storm services shall be connected to the City's storm sewer.

4.7 CURVED SEWERS

Curved sewers will be permitted, with the following restrictions:

- 4.7.1 The sewer shall be laid as a simple curve, with a radius equal to or greater than 90 m or the manufacturer's minimum recommended radius, whichever is larger.
- 4.7.2 Manholes shall be located at the beginning and end of the curve.
- 4.7.3 Manholes shall be located at intervals not greater than 90 m along the curve.
- 4.7.4 The main shall run parallel to the curb or street centerline.
- 4.7.5 The minimum grade for sewers on curve shall be 50% greater than the minimum grade required for straight runs of sewers.

4.8 STORM WATER MANAGEMENT FACILITIES

Storm Water Management Facilities consist of lakes, wet ponds, and dry detention ponds. These facilities are typically a part of the Major Storm Water System. The following characteristics apply to Storm Water Management Facilities:

- 4.8.1 The design of Storm Water Management Facilities shall conform to Best Management Practices.
- 4.8.2 The approximate location and size must be identified at the time of the Development Concept Plan, or Master Drainage Plan, to avoid conflicts with adjacent land uses.
- 4.8.3 The effects of 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 five-year storm event.
- 4.8.4 A sediment control plan is required as a part of the Storm Water Management Study to define measures that must be taken for the control of sediment into the pond and into the receiving stream.

4.9 DRY DETENTION PONDS

- 4.9.1 Dry pond (detention) storage is the storm water management method where the storm run-off is collected and the excess run-off is temporarily detained for a short period of time and released after the storm run-off from the contributing area has ended. Generally, low flows do not enter the pond.
- 4.9.2 The City should be contacted to provide input to the design of detention facilities from the concept stage through to detailed design and construction.
- 4.9.3 Dry ponds should have gentle side slopes and be aesthetically contoured and landscaped to provide an attractive feature for the subdivision.
- 4.9.4 Where possible, and as agreed by the City, they should be associated with municipal reserve areas to take advantage of the joint use ability of the facilities (e.g. extension of sport fields or passive park uses into the detention pond). Active park uses should not be located adjacent to the inlet/outlet facilities nor in areas that flood frequently (more than twice per year on average).
- 4.9.5 The following general design parameters should be considered for a dry pond in a residential subdivision:
 - Storage capacity for up to the 100-year storm event.
 - Detention time to be determined based on downstream capacity; recommended maximum detention time is twenty-four (24) hours.
 - 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).

- Maximum interior sideslopes of 5:1 (7:1 is recommended).
- Maximum exterior sideslopes of 3.5:1.
- Minimum freeboard of 0.6 m above 1:100 year high water level (a greater freeboard may be required if an emergency overflow route cannot be provided).
- Maximum 4:1 ratio of effective length to effective width measured at 1:100 year high water level.
- Dimensions must be acceptable to the City when the bottom of the pond is to be used for recreational facilities.
- Minimum lateral slope in the bottom of the pond of 1.0% (2.0% is preferred) and a minimum longitudinal slope of 0.5% (1.0% is preferred),
- Low flow bypass for flows from minor events to be provided.
- French drains are to be provided within pond bottom where water table is near pond bottom.
- Address all safety issues (particularly during operation).

4.10 WET RETENTION PONDS

- 4.10.1 Land that is adjacent to a lake that is subject to flooding, as per the design standard established, but is part of the development parcel, will carry easements to allow City forces right of access through the lands to the water's edge to carry out normal maintenance operations.
- 4.10.2 Public land that is permanently under water shall be designated Environmental Reserve, or as required by the City. Private land that is subject to flooding due to the operation of the lake shall carry a flooding easement up to the 1:100 year storm level.
- 4.10.3 The storage capacity shall be determined at the Master Drainage Plan stage along with the hydraulic performance criteria.
- 4.10.4 The annual volume exchange shall be twice per year.
- 4.10.5 Side slopes shall be designated as shown in the detail drawings.
- 4.10.6 The inlets and outlets are to be fully submerged at least one metre below normal water level to crown of pipe.
- 4.10.7 The lake bed is to be composed of impervious material.
- 4.10.8 No dead bay areas shall be permitted unless special circulatory provisions are made.
- 4.10.9 The first manhole in the minor system, the connecting or interconnecting pipe system, shall have an invert that is at or above the normal water level.
- 4.10.10 The lake design shall include an approved sedimentation removal process for control of heavy solids to the lake during the development of the basin.

- 4.10.11 A sedimentation measurement system may be required for control and recording of siltation during long term performance of the lake.
- 4.10.12 Soils investigation specific to the detention 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. 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.
- 4.10.13 The edge treatment or shore protection required shall be compatible with adjacent land use. The standard used shall meet the criteria of low maintenance, safety, and ease of access to the water edge. The recommended guideline is approved rip-rap rock material varying in size from 50 to 100 mm, for a thickness of 0.3 m and extending in a vertical distance of 0.6 m below and above the normal water level, and encased in Gabion baskets.
- 4.10.14 Lake design must provide for vehicular access for maintenance and emergency purposes.
- 4.10.15 Approved lighting shall be provided at the interface between the lake high water levels and any adjacent public lands.
- 4.10.16 Approved fencing will be required where necessary for safety purposes.
- 4.10.17 Approved signage shall be installed 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 Developer and approved by the City.
- 4.10.18 An approved fresh water well system is required to maintain the lake water levels during extended dry hot periods.
- 4.10.19 If approved, the Developer will be responsible for all construction costs in excess of the cost to construct the original dry pond facility. The Developer will also be required to establish maintenance of the pond.
- 4.10.20 Design of a wet pond is to be in accordance with the Saskatchewan Ministry of Environment publication entitled "Stormwater Guidelines". Some general design parameters to consider are:
- 2.0 ha minimum water surface area.
 - Maximum sideslopes of 7:1 between the high water level and 1.0 m below normal water level.
 - Minimum permanent pool depth of 2.0 m
 - Maximum 1:100 year storage depth of 1.5 m
 - Maximum water fluctuation for a 1:5 year storm event should not exceed 1.0 m.
 - Sediment forebays required at each inlet.
 - Hard edge treatment required along lake perimeter.

- Minimum freeboard depth of 0.6 m. House footings must be above freeboard elevation.
- Water recirculation and make-up system required.
- Provide access for maintenance and emergency equipment.
- Design of outlet control structure to be capable of maintaining permanent pool depth and capable of draining the permanent pool for maintenance purposes.

4.11 EMERGENCY SPILL WAY PROVISIONS

- 4.11.1 The feasibility of an emergency overflow spillway is to be evaluated for each storage facility (wet or dry) design, and, where feasible, such provisions are to be incorporated in the pond design.
- 4.11.2 As part of the pond design process, the probable frequency of operation of the spillway should be determined. Where it is not possible to provide an emergency spillway route, the design is to include an analysis of the impact of over-topping the pond and a significant freeboard above the 100-year level.
- 4.11.3 The functional requirements of the spillway, and the impact analysis for the absence of one, are to consider the possible consequences of blockage of the system outlet or overloading due to the run-off events, such that the storage capacity of the facility may be partially or completely unavailable at the beginning of a run-off event.

4.12 SAFETY PROVISIONS AT INLETS AND OUTLETS

- 4.12.1 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.
- 4.12.2 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 guard rails are to be provided to restrict access and reduce the hazard presented by the structure head and wingwalls.

4.13 OUTFALLS

- 4.13.1 Outfall structures shall be placed at the end of all storm sewers discharging to an open channel, watercourse, river, or other receiving water body such as a lake. The purpose of the structure is to reduce velocities and prevent erosion. All outfall structures must be approved by Saskatchewan Ministry of Environment. It is the responsibility of the Developer to obtain the necessary approvals and permits from the above mentioned Authorities.
- 4.13.2 The outfall structure may be a chute, spillway drop structures and energy dissipaters, stilling basin, or plunge pool with head wall. A cut off wall is required at the end of the outfall apron to prevent undermining of the structure.

- 4.13.3 Inverts of outfall pipes shall be at least 150 mm above the 5-year flood level in the receiving stream. Inverts of outfall pipes shall be above winter ice level, otherwise outfall pipes shall be submerged below the bottom of ice level. In addition, outfalls shall be located to avoid damage from moving ice during breakup.
- 4.13.4 If the downstream channel is relatively flat, the apron shall be 150 mm to 225 mm above the channel invert to prevent collection of debris on the apron.
- 4.13.5 Rip-rap and a filter layer shall be placed downstream of the outfall structure, where required to prevent erosion. Where erosion control or bank stability work must be done, preservation of watercourse aesthetics and wildlife habitat must be considered.
- 4.13.6 Weeping tile shall be placed under the structure to reduce any water pressure behind the head wall.
- 4.13.7 Grills or trash bars shall be placed over all storm sewer outlets to prevent access.
- 4.13.8 Railings shall be placed along the head wall and wingwalls of the outfall structure.
- 4.13.9 Outfalls shall be landscaped designed with low maintenance, to aesthetically blend in with surrounding areas.
- 4.13.10 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.

4.14 LOT DRAINAGE

- 4.14.1 The grading design shall complement the overall design of both the minor and major storm drainage system.
- 4.14.2 Where surface drainage swales direct run-off from one lot to the next, the necessary drainage easements shall be registered concurrently with the plan of subdivision.
- 4.14.3 A range of 2% to 4% slope shall be used for general property drainage.
- 4.14.4 The building grade should be in the range of 0.3 m to 1.0 m above curb.
- 4.14.5 Where extremes in elevation of adjoining lots require the construction of a retaining wall, it shall be indicated on the proposed grading plan.
- 4.14.6 In cases where the backyard slopes towards the building, provisions are required to keep the runoff at least 3.0 m away from the building, with the possibility of draining the surface water along the lot lines onto the streets.

4.15 DRAINAGE SWALES

- 4.15.1 Where drainage swales are provided on rear property lines in laneless subdivisions, the Developer shall provide an approved concrete drainage swale.
- 4.15.2 Where drainage from a group of lots is directed along one or more property lines an easement shall be registered on lots where the drainage is directed.

4.15.3 The slope for concrete swales shall be a minimum of 0.5% and a maximum of 6%.

4.15.4 The minimum slope for grassed swales or channels is 2%.

4.16 STORM CHANNELS

4.16.1 The Developer shall identify any proposed storm channels in the Concept Plan, or Master Drainage Plan. The routing and land requirements shall be identified on a plan and be designed to handle the 1:100 year return period.

5 LIST OF DRAWINGS

- B-100 Typical Pre-Cast Manhole Detail
- B-101 Exterior Drop Manhole Detail
- B-102 Interior Drop Manhole Detail
- B-103 Pre-Benched Manhole Base
- B-104 Catch Basin Manhole
- B-105 Catch Basin Typical – 900mm
- B-106 Typical Perched Manhole for 600 – 1500mm diameter pipes
- B-107 T-Riser Manhole for Pipe Diameter 1200mm and Larger
- B-108 Manhole Safety Platform
- B-109 Trash Grate Inlet
- B-110 Outfall Structure
- C-100 Pipe Bedding Details

END OF SECTION



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PART A5

STREETS

OCTOBER 2020

1	GENERAL	2
2	DEFINITIONS	2
3	SUBMISSIONS AND APPROVALS	3
	3.1 TRAFFIC IMPACT ASSESSMENT (TIA)	3
	3.2 TRANSPORTATION PLAN.....	4
	3.3 DETAILED DESIGN SUBMISSION	5
4	DESIGN REQUIREMENTS	5
	4.1 GENERAL	5
	4.2 CLASSIFICATION AND CONNECTIVITY	5
	4.3 SUMMARY CLASSIFICATION-DESIGN TABLES	6
	4.4 VERTICAL ALIGNMENT.....	8
	4.5 HORIZONTAL ALIGNMENT	8
	4.6 STREET INTERSECTIONS	9
	4.7 DRIVEWAYS AND LANES.....	9
	4.8 CURB AND GUTTER	10
	4.9 SIDEWALKS AND PATHS	10
	4.10 CULVERTS AND DITCHES	11
	4.11 ROAD SURFACES.....	12
	4.12 LANES.....	12
	4.13 EMERGENCY VEHICLE ACCESS	13
	4.14 VEHICLE TRACKING SOFTWARE (AUTOTURN)	13
	4.15 CONTROL DEVICES, STREET NAME SIGNS AND PAVEMENT MARKINGS	14
	4.16 STREETS CAPING.....	14
	4.17 NOISE ATTENUATION.....	15
	4.18 STREET LIGHTING.....	15
	4.19 PUBLIC PARKING LOTS	16
5	LIST OF DRAWINGS	16

1 GENERAL

1.1.1 This section covers the design of the roadway system including but not limited to streets, lanes, sidewalks, and pathways located within the road right of way. The designer must consider safety in the design of transportation facilities. At a minimum the following safety factors shall be considered in the design of the transportation system:

- Number and types of vehicles using the roadway.
- Accessibility of an area to emergency services.
- Spacing, type, intersection angle, and location of intersections and crosswalks.
- Sight distance (decision, stopping, etc.)
- Level of access from adjacent properties.
- Traffic calming requirements.
- Playground and school zone locations.
- Pedestrian facilities.
- Intersection offsets.
- Intersection control (uncontrolled, yield, stop, or traffic signal).
- Median treatment; and
- Traffic control device warrants.

1.1.2 Designers must also consider how the transportation system interacts with other components of the City's infrastructure.

2 DEFINITIONS

Cul-de-sac: means a minor residential dead-end street with one end open for traffic with a turnaround at the other end.

Intersection Corner Clearances: is the triangular area between intersecting streets or a street and driveway that is free of visual obstructions to provide a clear line of sight for motorists and pedestrians.

Lane: means a public highway intended primarily to provide access to the rear of abutting properties and does not include a road allowance, road, or street.

Private Driveway: as defined in the Traffic Bylaw, means every road intended for private use and not open to the public for the purpose of vehicular traffic.

Right of Way: means the area of land owned by the Crown or City, or where an easement exists for the benefit of the Crown or City for the purpose of any public street, access, utilities, or infrastructure.

Road: Synonymous with street.

Roadway: That portion of a street or highway which is improved, designed, or ordinarily used for vehicular travel.

Street: The whole and entire width of a right of way, highway, or road allowance intended to be used by vehicles and pedestrians shown as such on a Plan of Survey registered with Information Services Corporation. There are three main street classifications as follows:

Arterial Street: means a street or roadway designed to carry traffic from one district/neighborhood of the City to another. Full or partial control of access to abutting land uses shall be required where development warrants such action and where alternate access can be provided. Arterial streets are separated into Major and Minor Arterial Streets in accordance with Table 4.1 and 4.2.

Collector Street: means a street or roadway designed to intercept traffic between local and arterial streets, with direct access to abutting properties. Collector streets are separated into Residential and Commercial/Industrial Collector Streets in accordance with Table 4.1 and 4.2.

Local Street: means a street intended for providing street access to land uses abutting along its length. Local streets are separated by Residential and Commercial/Industrial Local Streets in accordance with Table 4.1 and 4.2.

Walkway: means a parcel of land primarily intended for pedestrian use by the public.

3 SUBMISSIONS AND APPROVALS

Depending on the nature of concept plan and/or the type of subdivision to occur, the City may require technical evaluations and/or studies be done by the property owner/developer prior to detailed design for the transportation/traffic component of the development. Possible requirements are as follows:

3.1 TRAFFIC IMPACT ASSESSMENT (TIA)

- The *Traffic Impact Assessment* (TIA) will be required of all applicants preparing a concept plan for review and action by the City. Depending on the scale or intensity of development the assessment can vary in complexity and detail at the discretion of the City in consultation with the applicant. The TIA typically includes the following detail:
 - Data collection for existing road network affected by the development (traffic counts).
 - Review of the *Official Community Plan* and *Transportation Master Plan* and other existing City studies that may have an impact on the development.
 - Projection of background traffic growth on existing road network.
 - Determine new trips generated by the proposed development based on the ITE Trip Generation Manual, Current Edition.

- Distribution of generated trips onto the existing road network.
- Combine trip generations from the new development with estimated future traffic volumes to determine the total traffic volumes at the new and existing impacted intersections at full build out and a 20 year horizon.
- Evaluate traffic operating conditions at various stages of development, full build out, and a 20 year horizon.
- Identify potential operational, safety, and capacity constraints.
- Determination of required intersection, roadway and access improvement required to provide acceptable level of service (LOS) and safety for the transportation network. Industry standard LOS thresholds are established in the Highway Capacity Manual (HCM), whereas generally LOS A has the best operating conditions and LOS F represents failure of an intersection movement. LOS D is typically considered the limit of acceptable operation due to excessive delays that occur beyond this level.
- Recommended access control policy, where applicable to the roadway types identified.

Where offsite improvements are warranted by the TIA as a result of the development, the *Servicing Agreement* shall define the obligations of the Developer. Development Levys from a combination of developments may be utilized for offsite improvements as determined by the City.

3.2 TRANSPORTATION PLAN

A Concept Plan proposal shall include a Transportation Plan that takes into consideration the Official Community Plan, Master Transportation Plan, and TIA for the relevant development. The proposed Transportation Plan forms a portion of the preliminary design work portion of a concept plan and shall include the following at a minimum:

- Right of ways, roads, and lanes, including widths for the development.
- Road classification.
- Transit routes.
- Locations of sidewalks, pathways, and bicycle routes.
- Recommendations identified in a TIA.
- Pedestrian Access.
- Illumination Recommendations.
- Preliminary intersection configurations and signalization requirements.
- Access control issues and development access points and connectivity to adjacent existing/future developments.
- Shared access and parking arrangements should be identified.

- “Traffic Calming” opportunities should be qualified at this time.
- Streetscapes should be qualified at this time (attached or detached walks, boulevard landscape, etc.) and developer obligations within adjacent streets.

3.3 DETAILED DESIGN SUBMISSION

Upon acceptance by the City of any requested Traffic Impact Assessment or Transportation Plan development proponents will be required to submit a detailed design plan for construction. The detailed design shall consist of the following:

- 3.3.1 Requirements as stated in Part A - General Requirements. The design drawings shall be a component of the overall detailed design drawing package where applicable.
- 3.3.2 All calculations, schematic diagrams, computer printouts, etc.

4 DESIGN REQUIREMENTS

4.1 GENERAL

Public and/or private streets shall be designed to accommodate design traffic flows for the proposed development. In specific cases the road may need to accommodate extensions to adjacent future development areas as determined in a Sector Plan, or Transportation Study.

Unless otherwise noted in these standards the roadway system shall be designed in accordance with *Transportation Association of Canada (TAC) Manual - Geometric Design Standards for Canadian Roads* latest edition.

4.2 CLASSIFICATION AND CONNECTIVITY

- 4.2.1 The street classification system used by the City considers land service and traffic characteristics including vehicle types, vehicular/traffic mix, and destinations. The following hierarchical categories are used:
 - Lanes
 - Local - Residential
 - Local - Commercial & Industrial
 - Collector - Residential
 - Collector - Industrial & Commercial
 - Arterial - Major
 - Arterial - Minor
- 4.2.2 Roadways within a proposed development shall reflect the progression of connectivity. Locals connect to collectors, and collectors connect to arterials. The Developer’s engineer is responsible for designating the appropriate classification of roadways in new developments, subject to City approval.

4.3 SUMMARY CLASSIFICATION-DESIGN TABLES

Street geometrics shall be in accordance with Tables 4.1 and 4.2, Standard Drawings and the specific sections of these standards that follow the tables. Daily traffic volumes and road speeds shown below are to be used in establishing road classification.

Classification	Traffic Volumes (vpd)	Design Speed ^a (km/h)	Street Width ^b (m)	Direct Access	Parking	Sidewalks
Lanes	Up to 500	n/a	6-10	Permitted	Restricted	n/a
Local - Residential	Up to 1,000	50	18.0	Permitted	Permitted	1 or 2 sides
Local – Commercial & Industrial	Up to 3,000	60	18.0	Permitted	Permitted	2 sides
Collector - Residential	Up to 8,000	60	22.0	Permitted	Permitted	Attached or Separate, 2 sides
Collector – Commercial & Industrial	Up to 12,000	60	22.0	Permitted	Permitted	Attached or Separate, 2 sides
Minor Arterial	5,000 – 20,000	50 - 70	30.0	Some Restrictions	Optional	Separate, 2 sides
Major Arterial	10,000 – 30,000	60 - 90	45.0	Restricted	Restricted	Separate, 2 sides

Notes for Table 4.1 and 4.2:

- a. Posted speed to be 10 km/h less than design speed.
- b. Land for noise attenuation will be in addition to the road right-of-way requirement.
- c. Additional travel lane width may be required to accommodate cyclists, e.g. on arterials the outside lanes may be 4.2 m wide.
- d. Rear lane (alley) access may be required on collectors.
- e. Any street in excess of the volumes in Table 4.1, shall be considered an Expressway or Freeway and be designed in accordance with TAC.

TABLE 4.2
SUMMARY OF MINIMUM DESIGN STANDARDS FOR STREETS

Classification	Pavement Widths (m)	Travel Lanes ^c	Parking Lanes	Minimum Radius of Curvature (m)	Minimum Intersection Spacing (m)	Minimum Corner Cuts at Intersections (m)	Lighting Poles and Other Obstructions	Maximum Gradients (%)	Maximum Super-elevation (m/m)
Lanes	6-8	n/a	n/a	60	60	3	n/a	7	.025
Local - Residential	11.0	2 @ 3.0 m	2 @ 2.5 m	90	45	4.5	As per Std. Dwg. D-101	7	.025
Local – Commercial & Industrial	12.5	2 @ 3.5m	2 @ 2.75m	90	60	6.0	As per Std. Dwg. D-102	7	.025
Collector - Residential	12.5	2 @ 3.5m	2 @ 2.75m	150	60	6.0	As per Std. Dwg. D-103	5	.025
Collector – Commercial & Industrial	13.0	2 @ 3.5 m	2 @ 3.0 m	150	60	10	As per Std. Dwg. D-104	5	.025 - .04
Minor Arterial	15.4	As per Std. Dwg. D-105	Restricted	90 – 190	200	10	As per Std. Dwg. D-105	5	.04 - .06
Major Arterial	15.4	As per Std. Dwg. D-106	Restricted	130 – 340	400	30	As per Std. Dwg. D-106	5	.04 - .06

4.4 VERTICAL ALIGNMENT

- 4.4.1 Minimum gutter grades around all curves and along all tangents shall not be less than 0.5%. Minimum gutter grades on curb returns and intersection corners shall be 1.0%.
- 4.4.2 Maximum gutter grades shall not exceed those defined by the Maximum Gradient column in Table 4.2.
- 4.4.3 All roadways shall be crowned or shall have a crossfall as shown on the applicable standard drawings. The standard crossfall rate is 2.0%.
- 4.4.4 The grades at intersections for all roadway classifications shall not exceed 2% for a minimum distance of twenty (20) metres, measured from the shoulder edge of the receiving road.
- 4.4.5 All vertical curves shall be designed to meet or exceed the minimum requirements shown in the following Table 4.3.

Table 4.3 – “K” VALUE

Design Speed (km/hr)	Crest	Sag*	Minimum Length (m)
50	7	6	50
60	15	10	60
70	22	15	70

- K = L/A
- L = length of vertical curve in metres
- A = algebraic difference in grades percent
- * = based on comfort control and assumes street lighting

- 4.4.6 The maximum superelevation is shown in Table 4.2.

4.5 HORIZONTAL ALIGNMENT

- 4.5.1 The minimum curve radius is relative to the Road Classification, the design speed, and the maximum superelevation (see Table 4.1 and 4.2).
- 4.5.2 All horizontal curves shall be designed to meet the minimum design requirements shown in Table 4.1 and 4.2.
- 4.5.3 For minimum edge of pavement radius for cul-de-sacs refer to Standard Drawing D-400.
- 4.5.4 Maximum cul-de-sac length shall be 150 m, unless an approved emergency access route is provided within the cul-de-sac and it is approved by Council.
- 4.5.5 Flares at intersecting roadways without a curb shall have the following minimum radius from shoulder to shoulder:
 - Residential access and local 10.0 metres
 - Residential collector 15.0 metres
 - Industrial local and collector 15.0 metres

4.6 STREET INTERSECTIONS

Street intersection design widely varies with the classification of intersecting streets, traffic volumes, vehicle types, and speeds. Intersections shall be designed in accordance with the factors within *The Geometric Design Guide for Canadian Roads* by TAC. Notwithstanding TAC, the following minimum requirements for intersection design are required.

- 4.6.1 Intersection Corner Clearances shall be in accordance with Standard Drawing D-1000.
- 4.6.2 Intersection spacing will depend on the classification of intersecting roads, but in no case shall centreline offsets be less than 45m.
- 4.6.3 Streets shall intersect at angles between 80° and 100°.
- 4.6.4 Intersections on curves should be avoided. Where an intersection must be placed on a curve the developers engineer shall provide calculations and drawings confirming that the sight distance and other intersection requirements of TAC can be achieved.
- 4.6.5 Curb ramps shall be constructed in accordance with Standard Drawing D-305.
- 4.6.6 Curb returns at residential local street intersections shall be a minimum radius of 8.0m at lip of gutter.
- 4.6.7 Curb returns at residential local street to collector street intersections shall be a minimum radius of 10.75 m at lip of gutter.
- 4.6.8 In industrial/commercial areas, the lip-of-gutter radius should be a minimum of 12.5 m to accommodate truck turning movements.

4.7 DRIVEWAYS AND LANES

This section outlines the requirements respecting the design and placement of driveways and lanes within new developments, or where existing developments propose to install new or alter existing driveways. The location requirements for driveways shall also apply to lanes.

- 4.7.1 Residential driveways shall have widths no larger than 60% of total lot frontage to a maximum of 11.0 m.
- 4.7.2 Commercial driveways shall have widths no larger than 12.0 m.
- 4.7.3 Industrial driveways shall have widths no larger than 15.0 m.
- 4.7.4 In accordance with TAC, increased widths for commercial and industrial driveways may be considered where multiple exit and entry lanes are employed, to the maximum width of 17.0 m.
- 4.7.5 Driveway width on pie lots shall be measured along the arc of the lot's frontage.
- 4.7.6 Driveways shall be located in accordance with the requirements shown in Standard Drawing D-306 and *"The Sidewalk Crossing Bylaw"*.
- 4.7.7 Corner clearances at the intersection of a driveway and an existing street shall be in accordance with Standard Drawing D-1000.

4.11 ROAD SURFACES

- 4.11.1 The City presently approves two (2) types of roadway surface finishes:
- Gravelled surface (rural roads where approved)
 - Asphaltic concrete (hot mix asphalt) pavement surface (A.C.P.)
- 4.11.2 Roadways in all subdivision developments shall be surfaced with asphaltic concrete pavement (hot mix asphalt).
- 4.11.3 Irrespective of the roadway surface finish approved by the City for a specific development, good roadway industry construction practices and techniques shall be employed at all times. Furthermore, roadway sub-grade and base construction shall be undertaken with the view that an asphaltic concrete pavement will ultimately be placed as the surface finish for the roadway.
- 4.11.4 Should a gravelled surface be approved, even for an interim period, the surface gravel shall be a minimum compacted layer of 75 mm depth of 20 mm crushed gravel. All approaches shall be similarly treated.
- 4.11.5 All roadways shall be paved with hot mix asphalt. A geotechnical report with recommended pavement designs shall be conducted by a Professional Engineer and submitted to the City for review.
- 4.11.6 Paved roadways shall be designed in accordance with the Asphalt Institute Method of pavement design, using minimum design loadings of 8,165 kg (18,000 pound) axle loads. The design parameters, such as traffic count, percentage of trucks, or California Bearing Ratio (CBR), are to be outlined to the City. The City reserves the right to request the Developer to engage an engineering agency to carry out tests, prior to paving, to confirm adequacy of design.
- 4.11.7 Minimum pavement structure requirements shall be as per typical details in City Construction Standards. An independent pavement design is required for all developments. Additional pavement structure strengths and/or materials may be required in areas with poor sub-grade materials, pending the results of the geotechnical investigation.
- 4.11.8 The final lift of asphaltic concrete shall be placed in the second year of the maintenance period, 60 days prior to Final Acceptance Certificate application.
- 4.11.9 Alternative pavement designs, such as soil cement base, may be considered. Approval of alternate pavement designs must be obtained in writing from the City prior to submission of design drawings.

4.12 LANES

- 4.12.1 Rear lanes (alleys) shall have a minimum surfaced width of 5.5 m within a 6.0 m right-of-way.
- 4.12.2 Rear lanes (alleys) shall have a minimum longitudinal grade of 0.7%. If gravel-surfaced, the lane shall be cross sloped to one side with a 3.0% slope, or have a centre swale with each

side having a 3.0% slope. If paved, the lane shall be cross sloped to one side at 2.0%, or have a centre swale with cross slopes of 2.0%.

- 4.12.3 Where rear lane traffic activity is expected to be high, such as for certain commercial developments, a wider surfaced width and right-of-way may be required as determined by the City.
- 4.12.4 Where rear lanes are to be used for primary access, a surface width consistent with typical street width for the intended traffic type shall be used. (i.e. local residential or local commercial/industrial).
- 4.12.5 A 3m fillet (corner cut) shall be placed at the corners of all alley intersections.

4.13 EMERGENCY VEHICLE ACCESS

- 4.13.1 If cul-de-sac roads exceeding 150m in length are approved by Council, an emergency vehicle access route shall be provided unless otherwise approved.
- 4.13.2 Where the emergency vehicle access is designated as a walkway, the walkway shall be designed in accordance with Standard Drawing D-910 and the following requirements apply:
 - The emergency access structure shall be a minimum of 6m wide to allow access by emergency vehicles, with T-bollards installed to limit pedestrian passage to 3m during regular pathway usage.
 - If planting and lighting is proposed in the emergency access/pathway right of way, a minimum 8m clearance is required where there are no obstructions to allow unimpeded access by emergency vehicles.
- 4.13.3 Removable T-bollards must be placed at each end of the walkway access, as shown in drawing D-910. The posts shall prevent non-emergency vehicle access while allowing access for emergency vehicles.

4.14 VEHICLE TRACKING SOFTWARE (AUTOTURN)

- 4.14.1 To ensure trucks and emergency vehicles are able to negotiate turning movements without encountering obstacles, AutoTURN or a similar vehicle tracking software shall be used in the design process. An AutoTURN plan shall be provided with travel around the site using all driving lanes. Travel paths should begin outside the site illustrating the turn onto the primary entry road/drive, manoeuvring around the site, and exiting the site.
- 4.14.2 The design vehicle shall be the Swift Current Fire Department's Ladder Truck, as shown in Standard Drawing D-1001.
- 4.14.3 Paths must illustrate the full vehicle swept path and must indicate a clear, unobstructed travel around the site without impact/collisions to buildings, curbs, landscaping, parking spaces, vehicles, tree overhangs, etc.
- 4.14.4 A minimum vehicle speed of 8 kph shall be used to determine vehicle turning envelopes for emergency vehicles.

- 4.14.5 Emergency vehicles shall be assumed to initiate a right turn from anywhere on the roadway and to manoeuvre right turns using the entire roadway. Vehicles shall maintain a minimum 300 mm offset from the face of curb.

4.15 CONTROL DEVICES, STREET NAME SIGNS AND PAVEMENT MARKINGS

- 4.15.1 Plans shall be provided to the City that depicts the locations and details of all traffic control devices (traffic signs and traffic signals), street name signs, and pavement markings.
- 4.15.2 All traffic control devices and pavement markings shall be designed and installed in accordance with the manual "Uniform Traffic Control Devices for Canada" as issued and revised from time to time by the Transportation Association of Canada (formerly RTAC).
- 4.15.3 Street signing shall be standard aluminium, white on green (unless otherwise approved by the City), with a minimum vertical dimension of 150 mm.
- 4.15.4 Sign supports and appurtenances to be capable of withstanding summation of following loads:
- Wind and ice loading specified to be consistent with anticipated loads in locality of installation. Refer to National Building Code of Canada and/or applicable provincial building code.
 - Dead load of signboards, sign supports, and appurtenances.
 - Ice load on one face of signboards and around surface of all structural members and appurtenances.
- 4.15.5 Structural deflections and vibration in accordance with American Association of State Highway and Transportation Officials (AASHTO), "Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals".
- 4.15.6 All signs shall utilize High Intensity reflectorized material to ASTM-D4956, Type III.
- 4.15.7 All sign posts shall be round galvanized steel, or PWF wood where specified by the City.
- 4.15.8 Along collector and arterial streets and intersections, pavement markings shall be of a "permanent" type, thermoplastic. Painted markings are acceptable elsewhere.
- 4.15.9 All traffic control signs shall be mounted to provide 2.0 m vertical clearance to the lowest portion of the sign, unless otherwise approved by the City.
- 4.15.10 All signs shall be mounted to provide a minimum of 0.3 m of horizontal clearance from back of curb or back of walk. Where there is no curb or walk within the right-of-way, the sign location is to be approved by the City.

4.16 STREETSCAPING

Streetscaping is defined as "The practice of applying aesthetic treatments to the street and its facilities, intended to enhance the quality of the roadway environment" in TAC. Streets are not just an area to convey traffic, rather they are a shared space with pedestrians and bicyclists, that functions to accommodate vehicular, non-motorized vehicles (e.g., bicycles) and pedestrian traffic in a safe and

friendly manner. A well designed streetscape promotes walking, which allows for more opportunity for social, physical, and recreation activity resulting in a better community to live.

The principles in the TAC *Geometric Design Guide for Canadian Roads* shall be used for designing Streetscapes in the City. Designers and Developers are encouraged to use additional creativity where possible when designing a new neighbourhood. Streetscape designs shall be submitted as part of the overall design package for the development. Sector plans and concept plans for smaller area development and redevelopment shall include the streetscape in their landscape design plans.

It is the Developer's obligation to design and construct not only the roadway, but the entire street in accordance with the city standards, specifications, and streetscape plans for the intended development including:

- Grading
- Topsoil
- Turf and Vegetation
- Natural areas & Xeriscaping
- Hardscape elements

4.17 NOISE ATTENUATION

- 4.17.1 Noise attenuation barriers shall be provided where traffic noise levels exceed or are expected to exceed 65 dB(A) L_{dn} (A-weighted day night average sound level).
- 4.17.2 Barriers may consist of noise walls or earthberms where space permits.
- 4.17.3 In the case of new residential developments located within 300 m of a major transportation route (may include major arterial roadways, freeways, railways, airports, etc.) or heavy industrial areas, a noise study may be required, at the City's discretion, to determine the need for noise attenuation barriers. The study shall consider a twenty year projection of future traffic volumes and related noise levels.
- 4.17.4 The developer shall be responsible for determining and providing the noise attenuation measures required to meet the noise level standard.

4.18 STREET LIGHTING

- 4.18.1 The City of Swift Current's Department of Light and Power provides street lighting for the City. Standards for industrial developments shall be determined by the City during the initial planning stages of the proposed development.
- 4.18.2 All street lighting cables in new subdivisions shall be installed underground. Additional street lights in neighbourhoods with overhead cabling may be installed overhead if approved by the City.
- 4.18.3 The Developer shall coordinate the location of street lights to ensure that they do not interfere with other utilities and driveways.

- 4.18.4 Where possible street lighting shall be directed downward toward the roadway and sidewalks without causing glare to adjacent uses.
- 4.18.5 Any capital contribution that the utility company may charge for installation of underground street lighting shall be paid by the Developer.

4.19 PUBLIC PARKING LOTS

- 4.19.1 All public use facilities shall include adequate on-site parking space for the intended use as required by the Zoning Bylaw, or through consultation with the City where not specified in the Zoning Bylaw.
- 4.19.2 On-site parking may not be required for public spaces if there is adequate off-site parking adjacent to the public use facility at the discretion of the City.
- 4.19.3 Parking stalls located at the end of a dead end parking lot shall include space for adequate manoeuvring from the parking stalls adjacent to the dead end. The developer shall provide a drawing based on vehicle turning radius software that shows vehicles will be able to enter and exit the end stall without difficulty.

5 LIST OF DRAWINGS

- D-100 Cross Section – Lanes
- D-101 Cross Section – Local Residential
- D-102 Cross Section – Local Commercial & Industrial
- D-103 Cross Section – Collector Residential
- D-104 Cross Section – Collector Industrial & Commercial
- D-105 Cross Section – Minor Arterial
- D-106 Cross Section – Major Arterial
- D-107 Cross Section – Rural Gravel Road
- D-108 Cross Section – Rural Country Residential Paved Road
- D-109 Overlays
- D-200 Rolled Curb and Gutter
- D-201 Standard Curb and Gutter
- D-202 Standard Reverse Curb and Gutter
- D-300 Rolled Monolithic Sidewalk
- D-301 Standard Monolithic Sidewalk
- D-302 Standard Reinforced C/G with Walk
- D-303 1.5 Separate Sidewalk
- D-303a Asphalt Pathway
- D-304 Standard Curb and Gutter Driveway Crossing
- D-305 Typical Monolithic Lane and Driveway Crossing
- D-306 Standard Driveway Locations
- D-307 Typical Rural Industrial Approaches

- D-308 Wheelchair/Bike ramp Locations
- D-309 Type A – Ramp Details at Center of Curb
- D-310 Type B – Ramp Details at both Curb Returns
- D-311 Type C – Ramp Details at Tangent
- D-400 Typical Cul-De-Sac
- D-500 Cross Section – Concrete Easement Swale
- D-501 Cross Section – Concrete Intersection Swale Crossing
- D-502 Concrete Sidewalk Swale
- D-600 Asphalt Speed Bump
- D-800 Typical Rip-Rap for Culvert Size 400 – 1200 mm Diameter
- D-801 Cross Section - Typical Culvert Installation
- D-900 Parallel, 30° and 45° Parking Lot Layouts
- D-901 60°, 75°, and 90° Parking Lot Layouts
- D-902 Parking Stall Painting
- D-903 Crosswalks
- D-910 “T” Bollard - Emergency Vehicle Access
- D-950 Rubber Asphalt Crack Filling
- D-951 Standard Paving Stone to Curb
- D-953 Concrete Step Detail
- D-954 Standard Steel Bollard
- D-955 Barrier Posts
- D-956 W-beam Guard Rail
- D-960 Street Sign Standard Placement
- D-1000 Corner Clearances
- D-1001 AUToturn Design Vehicle

END OF SECTION



**CITY OF
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PART A6

LANDSCAPING

OCTOBER 2020

1	GENERAL	2
2	DEFINITIONS	2
3	SUBMISSIONS AND APPROVALS	4
4	GENERAL DESIGN REQUIREMENTS	4
4.1	GENERAL	4
4.2	SUBGRADE	5
4.3	TOPSOIL	5
4.4	SEED AND SOD	6
4.5	IRRIGATION	6
4.6	VEGETATION.....	8
4.7	AMENITIES.....	10
4.8	PLAYGROUND FACILITIES	11
4.9	XERISCAPING	12
5	SITE SPECIFIC DESIGN REQUIREMENTS	12
5.1	GENERAL	12
5.2	BUFFER STRIPS.....	13
5.3	ENVIROMENTAL RESERVE.....	13
5.4	MUNICIPAL RESERVE	13
5.5	BOULEVARDS, MEDIANS AND FRONT YARDS.....	14
5.6	UTILITY CORRIDORS AND RIGHT OF WAYS.....	14
5.7	TRAIL AND PATHWAY SYSTEMS	15
5.8	STORM WATER MANAGEMENT FACILITIES.....	17
6	RECOMMENDED PLANT SPECIES	18
7	LIST OF DRAWINGS	20

1 GENERAL

- 1.1 Development of all public open space that is proposed within the City shall meet or exceed all landscaping requirements set out in the City of Swift Current's Design and Development Standards.
- 1.2 The Developer shall ensure that any recreational development proposed will not damage the natural environment. Protection and management of the natural or cultural environment is a primary concern, and recreational use is a secondary objective.
- 1.3 Any natural areas designated for preservation that are damaged during construction must be rehabilitated and re-vegetated to a condition that is equal to or better than pre-construction condition and to the satisfaction of the City of Swift Current. Replanting should be done with indigenous tree, shrub, and grass species in natural areas where existing vegetation has been disturbed or destroyed.

2 DEFINITIONS

Definitions contained within this section are intended to be specific to the Landscaping section of the Design and Development Standards. Additional definitions are located in Part A – General Requirements.

Buffer Strips: Means a strip of land separating two adjacent lands not less than 7.5 metres in width.

Environmental Reserve: Means a parcel of land consisting of:

- A ravine, coulee, swamp, natural drainage course, or creek bed.
- Land that is subject to flooding or is, in the opinion of approving authority, unstable.
- Land abutting the bed and shore of any lake, river, stream, or other body of water for the purpose of:
 - The prevention of pollution.
 - The preservation of the bank.
 - The protection of the land to be subdivided against flooding.

Landscaping: Means the modification and enhancement of a site through the use of any or all of the following elements:

- "soft landscaping" consisting of vegetation such as trees, shrubs, hedges, grass, and/or ground cover.
- "hard landscaping" consisting of non-vegetative materials such as decorative brick, stone, concrete, asphalt, tile, and/or wood.

Landscape Architect: The Landscape Architect who is stamping and signing the submitted landscape drawings must be a full member in good standing with the Saskatchewan Association of Landscape Architects (SALA). A Landscape Architectural Technologist or equally qualified individual may complete landscape design work or field work upon mutual agreement with the City.

Lot: Means a parcel of land in a subdivision, the plan of which has been filed or registered with Information Services Corporation of Saskatchewan.

Maintained Parks: Parks that require on-going maintenance such as grounds maintenance, tree maintenance, and trail maintenance.

Municipal Reserve: Means a parcel of land dedicated to the public use and owned by the City.

Open space: Means that part of a site not covered by buildings and which is not obstructed from the ground upward except by canopies.

Park, Active: Means an area designated to accommodate extremely competitive physical types of activities including football, softball, soccer, hockey, rugby, cricket, or track and field.

Park, Passive: Means an area designated to accommodate activities of a more sedate nature that involve visual, mental, and/or physical effort including bird watching, walking, jogging, cycling, picnicking, social gatherings, cross country skiing, canoeing, croquet, or horseshoe pitching.

Public Open Space: Any parcel of land or water which is set aside and managed by the Community Services Department for a diverse range of environmental, leisure, and recreational activities and opportunities. Generally parks, environmental reserves, and open spaces are used for either active or passive recreational activities; however they may also include areas which contain significant ecological, aesthetic, or cultural features and may be used for environmental protection.

Public Reserve: Means a parcel of land dedicated to the public use and owned by the Crown.

Site: Means a lot or large area of land developed or intended to be developed as one unit.

Turf Grass: A layer of matted earth, formed by either seeded grass or sod, also known as lawn.

Utility Right of Way: Means a registered utility parcel or registered easement on private land that allows the City and utility companies the right to access the utilities or services that are buried within the right of way.

Walkways: Means a parcel of land primarily intended for pedestrian use by the public.

Xeriscaping: Is attractive, sustainable, and water efficient landscaping based on sound horticultural practices. It incorporates careful planning and design of landscapes and various techniques such as the use of drought-tolerant plants, mulch, and efficient irrigation to retain moisture in the soil and to minimize the need for watering.

3 SUBMISSIONS AND APPROVALS

- 3.1 The Developer and Landscape Architect should arrange for an initial consultation meeting with the Community Services and Planning and Growth Development Departments before preparation of landscape drawings.
- 3.2 Drawing submissions shall be in accordance with the design drawing section of Part A - General Requirements.
- 3.3 Methods of establishment, maintenance, and irrigation of the proposed landscape design shall be outlined on the drawings, or where applicable in a separate document as determined in the initial consultation meeting.
- 3.4 When traffic will be disrupted due to landscape construction, the Developer shall provide a Traffic Accommodation Strategy that maintains temporary roadways and walkways for vehicular and pedestrian traffic to the satisfaction of the City.
- 3.5 No construction shall occur until the landscape design and drawings are approved by the City and a Servicing Agreement is executed where applicable.

4 GENERAL DESIGN REQUIREMENTS

4.1 GENERAL

- 4.1.1 All development proposals shall detail the intended methods of protecting the natural systems during construction. The design of the development should consider the protection of natural features during regular use of the development after construction. At no time shall encroachment into any natural area that has been set aside for preservation occur without the express written consent of the City of Swift Current.
- 4.1.2 All areas are to be properly graded, topsoil is to be supplied and spread, and turf grass established.
- 4.1.3 In areas where cut and fill is necessary, the earthwork shall be designed by a qualified engineer and done in a manner that is compatible with the natural land-form. Avoid unnatural, continuous slopes of the same gradient. Modulate contours and blend with the existing natural slopes.
- 4.1.4 Public lands shall not discharge surface runoff onto adjacent private lands and, wherever possible, should enhance the overall drainage of the area.
- 4.1.5 Use existing vegetation to screen development from viewpoints that occur at higher or lower elevations. Use existing slopes and topography to buffer views.
- 4.1.6 Restoration of any disturbed land to a condition equal to or better than pre-disturbance is the Developer's responsibility, and must be carried out to an approved City standard.

4.2 SUBGRADE

4.2.1 Sub-grade elevation shall be the final grade minus surfacing material depth, as follows:

Seeded areas:	150 mm below final design grade
Sodded areas:	150 mm below final design grade
Shrub beds:	450 mm below final design grade
Playground sites:	300 mm below final design grade
Gravelled areas:	225 mm below final design grade
Paved areas:	as per site specific design
Concrete sidewalks:	as per site specific design

4.2.2 Slopes along property line or perimeter of construction area where design contours must match existing elevations shall not exceed 4:1. Slopes in areas to be mowed shall not exceed 4:1. Make changes in grade natural. Blend slopes into level areas.

4.2.3 Drainage patterns that direct surface runoff onto roads and ditches must be approved by the Infrastructure and Operations Department. Existing drainage courses should be maintained and incorporated into the development wherever possible.

4.2.4 Grading may allow water to pond in natural areas only, where infiltration is desired; however, water should percolate within eight (8) hours of a rainfall. This will allow an area to recharge natural groundwater levels.

4.2.5 Drainage must be designed so that water is not retained on public walkways or trails.

4.3 TOPSOIL

Ensure that finished grade meets flush at surface structures and matches existing grades of project boundaries and property lines.

4.3.1 Active Parks and Municipal Reserves:

- Spread manufactured growing medium of one (1) part peat moss, one (1) part sand, and two (2) parts of topsoil evenly over entire area to obtain a minimum growing medium depth of 150 mm after settlement (sand is required only if soil conditions warrant).

4.3.2 All Other Open Space:

- Spread topsoil evenly over entire area to obtain a minimum depth after settlement as follows:

Seeded areas:	150 mm topsoil
Sodded areas:	150 mm topsoil
Shrub beds:	600 mm topsoil
Flower beds:	450 mm topsoil

4.4 SEED AND SOD

- 4.4.1 On sites where the application of a seed mix is appropriate, the seed mix must be approved by the City and applied to an acceptable standard.
- 4.4.2 The proposed seed mixture details and breakdown (certificates of analysis) must be submitted to the City to be approved by the Community Services Department prior to the purchase and application of the said mixture. On slopes 2:1 or greater, install an approved erosion control blanket over the seeded area.
- 4.4.3 Proposed sod type must be Certified No. 1 grade-cultivated turf grass sod, grown and sold in accordance with A.N.T.A. classifications, with strong fibrous root system and free of stones or burned or bare spots.

4.5 IRRIGATION

- 4.5.1 The objective of this section is to build irrigation systems that apply a consistent, even, measurable amount of water to the landscape over a period of time. The system design will consider water cost and conservation, long term durability and maintenance cost, safety issues, aesthetic issues, and site specific requirements. The relative importance of these considerations will vary from project to project, and require the attention of a qualified and experienced designer.
- 4.5.2 All irrigation work shall be done by a suitably experienced and qualified irrigation contractor having trained and competent personnel adequate for the scope of the work.
- 4.5.3 Ensure that there is compliance with the relevant codes and regulations both in the design and during the conduct of the work involved in the project.
- 4.5.4 Parks Water Service:
 - Each Active Park and Municipal Reserve site is to be provided with water and electrical service.
 - The Parks Water Service for irrigation shall be designed and installed in accordance with the City of Swift Current Construction Specifications and Drawings.
 - The Parks Water Service shall be of sufficient size to provide the flow required to meet the peak evaporation rate for the site and the peak crop water requirements of the proposed landscape within the allotted watering window.
 - A backflow prevention device shall be installed on each irrigation service. Provision shall be made at the point of connection for a combination master valve/water meter.
- 4.5.5 Watering Window:
 - The Watering Window shall be established based on the peak water demand for the site, scheduled sporting events, maintenance routines, the nature of the proposed site uses, the water requirements of the proposed plant material, and the soil characteristics of the site.

- The Watering Window shall not exceed eight (8) hours per watering day, and shall commence between the hours of 10 p.m. and 6 a.m. An irrigation watering schedule for peak periods shall be included in the irrigation design drawing.

4.5.6 Sprinklers:

- The maximum spacing shall be equal to 45% of the head to head spacing recommended by the manufacturer.
- The selection of pop-up or riser style sprinklers must consider safety, maintenance, risk of vandalism, and appearance on the site. Pop-up or riser height must consider the related plant material, its growth potential, interfering landscape features, and arrive at a solution which provides optimum coverage for as long as possible.
- All sprinklers must be suitably adjustable and located so as to keep the water within the landscaped area and minimize overthrow. Consult with the Community Services Department regarding type of sprinkler head before proceeding with design.

4.5.7 Pipe:

- The velocity of flow in any piping must not exceed 1.5 meters (5 feet) per second.
- Pipe routing must take site elevation changes into consideration to minimize low head drainage.
- Selection of the strength or flexibility of the pipe material and its installation criteria must consider site specific requirements such as frost, traffic, soil depth etc. and be in accordance with the construction specifications.
- Pipe sizing and routing must include pressure loss calculations to ensure that the required pressure will be delivered under all circumstances and that pressure variation within the lateral does not exceed 15%.

4.5.8 Zoning:

- All sprinklers grouped into a zone must have the same precipitation rates, matched through the arcs of coverage. The potential for low head drainage must be minimized for each zone.
- The areas of the landscape that have different water requirements must be identified and a determination made as to the significance of these differences and whether they require separate zoning. The type of plant material, its location on site (sun exposure and natural drainage), and varying soil and slope conditions must be considered.
- The pressure variation within each zone from the first to the last head must not exceed 15%.

4.5.9 Controls:

- Controllers must be C.S.A. approved. Moisture sensors or other 'rain off' devices are recommended for effective water management.

4.5.10 Pressure Control:

- Valves must meet the pressure and flow requirements of the zone being controlled.
- The design must include suitable regulation of the pressure throughout the irrigation system.
- The pressure at every head must be within the range recommended by the manufacturer of the head/nozzle combination being used.

4.5.11 Winterizing:

- The system design must make the water connection and all the system components safe from winter freezing damage.
- A suitable and convenient blow out point and connection is the most desirable method of purging the system of water.
- If mainline drain valves, which are not recommended, are used, there must be a suitable sump and drainage.

4.5.12 Low Volume/Micro Irrigation:

- Any low volume irrigation included in a system must be separately zoned.
- Filtration and pressure control as recommended by the manufacturer of the low volume devices must be provided together with suitable controller capabilities.

4.5.13 Control Wire:

- Control wire must be sized to the length of its run using the recommendations of the manufacturer of the zone control valves being wired.
- Control wire shall be color-coded and sequenced.

4.6 VEGETATION

4.6.1 With the exception of straight line boulevard tree planting or formal plantings in park areas, planting should be sensitive to the ecological patterns in the area and blend in with the existing vegetation.

4.6.2 Tree Locations and Quantity:

- Including city boulevards, trees shall be planted in the overall minimum ratio of sixty (60) trees per hectare of landscaped area provided.
- Deciduous trees overhanging pedestrian facilities are to have a minimum 2.0 meters branch height. Deciduous trees near intersections are to have a minimum branch height of 2.4 meters. Deciduous trees overhanging traffic lanes are to have a minimum branch height of 3.5 meters.
- A majority of the plant material shall be planted in clusters or natural groupings.

- Spacing of individual trees within clusters will vary depending on the mature spread (a maximum overlap of 30% of the mature spread is desirable). Spacing of clusters should vary, minimum 9.0 meters to maximum 30.5 meters.
- Coniferous trees must be planted a minimum of 8.0 meters from a collector or arterial road due to potential damage from salt spray. Deciduous trees may be planted up to 2.0 meters from the edge of any roadway. Deciduous trees planted in medians must be a minimum of 750 mm from back of concrete curbs.
- Tree planting should be strategically spaced to avoid blocking street light illumination levels, sight lines in the vicinity of intersections, pedestrian crossings, and traffic signs.
- Preservation of existing mature trees within the road right-of-way or within the front yard setback may fulfill all or a portion of the tree planting requirements depending on the size and quality of the existing trees when reviewed on-site by the City of Swift Current.

4.6.3 Tree Size and Species Mix:

- Tree Species required in this section are to be 30% coniferous and 70% deciduous unless demonstrated by the consultant or developer that the species mix should be different to successfully integrate the project with adjacent natural vegetation patterns.
- Use a variety of plant material, both coniferous and deciduous. Poplar planting should be minimized. The maximum poplar planting ratio shall be 15% of the total trees planted.
- Coniferous tree sizes at time of planting shall be as follows:
 - 25% - 1.5 meter height
 - 50% - 2.0 meter height
 - 25% - 2.5 meter height
- Deciduous tree sizes at time of planting shall be as follows:
 - 50% - 50 mm calliper
 - 50% - 85 mm calliper

4.6.4 Shrub Size And Species Mix:

- Shrub species required in this section are to be 40% coniferous and 60% deciduous unless demonstrated by the consultant or developer that the species mix should be different to successfully integrate the project with adjacent natural vegetation patterns.
- Coniferous & Deciduous shrub sizes at time of planting shall be as follows:
 - 50% - 2 gallon potted.
 - 50% - 5 gallon potted.

- 4.6.5 Existing plant material to be retained must be identified on plans by species, size, and exact location. Transplanting of existing vegetation is subject to the same conditions as that of planting nursery stock.
- 4.6.6 Wood mulch (all species except Fraxinus) should be applied to all tree wells and planting beds to aid in maintenance, to a depth of 150 mm.
- 4.6.7 Where xeriscaping is used, wood mulch or stone mulch shall be used in all planting beds and tree wells.
- 4.6.8 If trees are less than 3.5 meters from vertical elements, hard surfaces, or private property lines the trees must be placed in mulch beds.

4.7 AMENITIES

- 4.7.1 The objective of this Section is to provide designers and developers with a comprehensive amenity guideline to provide continuity throughout the City of Swift Current.
- 4.7.2 Signage for parks shall be complementary to the current signage and in scale with the pedestrian environment. Blend signage into the landscape and site development rather than allowing it to dominate with larger signs and taller poles.
- 4.7.3 Benches will be provided at the Developer's expense at a minimum as follows:
 - One (1) bench to be located at each pathway entrance and exit, and one (1) additional bench per kilometer of lineal pathway, and two (2) benches per play structure.
- 4.7.4 Trash receptacles will be provided and installed at the Developer's expense at a minimum as follows:
 - One (1) trash receptacle to be located at each pathway entrance and exit, and one (1) additional trash receptacle per kilometer of lineal pathway, and one (1) per play structure, and two (2) per ball diamond or soccer pitch.
- 4.7.5 The trash receptacle should accommodate a standard 75 litre receptacle that will hold a 66 cm x 91cm (26" x 36") plastic garbage bag. Haul-All trash receptacles are to be used at all trail heads.
- 4.7.6 Fencing proposals on arterial and collector roadways are to be reviewed and approved by the Infrastructure and Operations Department prior to construction. Fencing will be required around school areas, walkways, and utility lots in addition to arterial roadways, unless otherwise approved. All standard fences will be constructed on private property approximately 150 mm from the property line.
- 4.7.7 A post and chain fence system may be used in passive park areas to control access along roadways. See typical detail in City Construction Standards.
- 4.7.8 Maintenance access points to open space must be considered and coordinated with the Community Services Department, and the maximum distance between service vehicles or pedestrian access points should be 500 meters.

- 4.7.9 Site furnishings shall complement and enhance the natural setting. Details which are consistent with local materials, colour, and style should be utilized. All site furnishings are to be vandal resistant where possible.
- 4.7.10 Public open space site furnishings must be indicated on the final landscape plans and be provided by the Developer in accordance with the direction and approval of the Engineering Department.

4.8 PLAYGROUND FACILITIES

- 4.8.1 All playground installation must conform to *CAN/CSA-Z614-14 Children's Playspaces and Equipment*. All site plans, playground designs, construction material, playground suppliers, spray parks, and playground development must be approved by the Community Services Department. Community Services will determine the acceptability of materials and the extent of the playground development.
- 4.8.2 All playground development must include a low compact surface approved by the Parks Manager complete with a base structure suitable for the surface. A minimum of five (5) pieces of traditional equipment shall be installed within a single retained area.
- 4.8.3 Playgrounds shall be designed for inclusive play using universal design principles. Play areas should be laid out for integration of wheelchair accessible components to promote inclusive play. Tactile and auditory play experiences should also be provided for children with visual impairments.
- 4.8.4 Play elements of each play lot shall provide for the recreational requirements of the child as well as stimulate the senses and cognitive or motor development aspects of the child's learning process.
- 4.8.5 In addition to structural equipment, such as swings and platforms, open turf areas shall be provided. Protection from the elements and the provision of sunny and shaded areas shall be provided. Contouring and mounding of the larger sites shall be considered to provide for a varied play experience.
- 4.8.6 Seating areas for supervising adults (passive area) and durable trash receptacles shall be provided on all sites.
- 4.8.7 Play equipment shall be separated from walkways and turf areas. Equipment which promotes play by a large number of children at one time shall be located to minimize congestion around other equipment, entrance ways, or walkways.
- 4.8.8 Swings and other moving equipment shall be located towards the outside of the play lot to reduce conflicts with pedestrian movements.
- 4.8.9 Safety of the equipment users and minimizing liability of the City of Swift Current shall be a priority in the development of all play lot sites.
- 4.8.10 Protrusions (nuts, bolts, etc.) shall be minimized or adequately protected where protrusions are unavoidable. Vandal resistant hardware shall be utilized to prevent equipment tampering.

- 4.8.11 Playground sites shall be located on a well-drained area not conflicting with sports field play areas.

4.9 XERISCAPING

- 4.9.1 Xeriscaping is encouraged and may replace areas of turf if is suitable to the land use.

4.9.2 Soil Amendments:

- Good soil absorbs and retains water. Amend soils as required to provide adequate nutrients and water absorption for plants.

4.9.3 Planting:

- Xeriscaped areas shall be planted with native, adapted, or exotic varieties of plants that are considered drought tolerant for the natural climatic conditions of Swift Current.
- A minimum of 75% of the xeriscaped area shall be covered with drought tolerant plants at their mature size.
- Consider seasonal interest when selecting plant species. Also consider variations in height, colour, and texture.

4.9.4 Irrigation

- Only minimal irrigation should be required once plants have been established. If some irrigation is required, plan for it to be used efficiently by placing plants with similar water needs together.
- Use efficient drip, spray, or bubbler emitters for trees, shrubs, and ground covers and install rain shut-off devices.

4.9.5 Mulch

- A layer of bark or shredded wood chip mulch (75mm – 100mm depth) shall be provided above all xeriscaped areas to minimize weeds and to keep soil moist. Mulch should be applied over a landscape fabric. Use of black plastic is prohibited as it prevents water from reaching plant roots.
- Limit amounts of gravel or crushed stone in unplanted areas, as they increase heat retention and create sun glare.

5 SITE SPECIFIC DESIGN REQUIREMENTS

5.1 GENERAL

- 5.1.1 The sections that follow are intended to identify minimum requirements and criteria for development with specific types of public open space.
- 5.1.2 Design maintained parks to complement the natural areas when one occurs adjacent to the other.

5.2 BUFFER STRIPS

- 5.2.1 Buffer strips shall be in accordance with the Provincial Planning and Development Act and City Subdivision Bylaws.
- 5.2.2 Buffers should provide a transition between roadways, parks, and/or different adjacent land uses. Planting and grading in these areas should blend in with natural vegetation patterns and park planting.
- 5.2.3 Provide noise protection for residential areas from adjacent, incompatible land uses.
- 5.2.4 Provide mix of coniferous and deciduous planting of adequate height to provide visual screening of adjacent, incompatible land uses.

5.3 ENVIRONMENTAL RESERVE

- 5.3.1 Environmental Reserve dedication within a development shall be in accordance with the Provincial Planning and Development Act and City Subdivision Bylaw.
- 5.3.2 Ensure no construction of permanent structures, other than trails, storm ponds, and associated structural components or interpretive elements, in natural areas or environmental reserves within the flood zone.
- 5.3.3 Natural areas are an important component in the overall open space system. Activities in natural areas may include nature oriented outdoor recreation such as viewing and studying nature, bird and animal watching, hiking, and other trail uses.
 - Size varies depending on natural features being protected or other specific requirements.
 - Pedestrian access may be restricted to trails in areas of environmental sensitivity.
 - Provide sitting and picnic areas with benches, trash receptacles, and picnic tables.
- 5.3.4 All Environmental Reserves adjacent to residential areas must be fenced with post and chain installed on City property.

5.4 MUNICIPAL RESERVE

- 5.4.1 Municipal Reserve dedication within a development shall be in accordance with the Provincial Planning and Development Act and City Subdivision Bylaw.
- 5.4.2 Municipal Reserve contribution to linear parks should be a maximum of 10% of the gross land area of the neighbourhood.
- 5.4.3 All Municipal Reserve land is to be developed in accordance with the approved development plan, but to a minimum turf grass standard including grading, topsoil supply and spread, irrigation installation, and tree planting, except where designated to remain as a natural area.
- 5.4.4 All Municipal Reserve land is to be developed with an automated irrigation system installed for all turf grass areas.

- 5.4.5 All Municipal Reserves must have a standard curb along the property line to prevent vehicular access to the municipal reserve, except for designated access points for pedestrians and service vehicles.

5.5 BOULEVARDS, MEDIANS, AND FRONT YARDS

- 5.5.1 Boulevards and front yards form an important part of the open space system by providing visual relief between the roadways and other land uses.
- 5.5.2 Boulevards provided by the developer along all roadways shall be part of the public road right-of-way and not constitute a part of the Municipal Reserve dedication. Landscape islands in cul-de-sacs or medians are permitted only if treated in a low or no maintenance manner and approved by the Community Services Department. Islands and boulevards are not to be credited as municipal reserve dedication.
- 5.5.3 Boulevards and buffers should provide a transition between roadways, parks, and/or different adjacent land uses. Planting and grading in boulevards should blend in with natural vegetation patterns and park planting.
- 5.5.4 Boulevards and Buffers provide visual and noise protection for residential areas from major roads in conjunction with the City of Swift Current Engineering Department.
- 5.5.5 Use only deciduous trees in medians and plant in a single straight line. Deciduous and coniferous trees are allowed in boulevards. Deciduous and coniferous shrubs are allowed in residential boulevards that are not maintained by the City of Swift Current.
- 5.5.6 A minimum of 2 species of trees are to be used in individual boulevards to provide diversification, unless approved otherwise by the Community Services Department. Size of street trees to be a minimum of 85 mm calliper.
- 5.5.7 Islands in cul-de-sacs or medians must be landscaped with low or no maintenance materials approved by the Community Services Department.

5.6 UTILITY CORRIDORS AND RIGHT OF WAYS

- 5.6.1 Utility easements and rights-of-way may also function as an integral part of the open space system. These lands may be desirable as pedestrian links connecting open space areas.
- 5.6.2 Utility easements and rights-of-way will not be credited towards the Municipal Reserve dedication.
- 5.6.3 Minimize clearing widths for underground utility lines to mitigate unsightly cut lines through existing tree cover. Utilize the same trench or cleared right-of-way for more than one utility where possible. Allow natural re-growth to occur in right-of-way over deep utility lines. Blend utility easements into park areas in as natural a manner as possible.
- 5.6.4 Naturalize straight cut lines for utilities by replanting with trees and shrubs.
- 5.6.5 Tree planting for public road rights-of-way are to be approved in conjunction with the Infrastructure and Operations Department and Community Services Department to ensure proper sight clearances from roads, intersections, and clearance utilities.

- 5.6.6 Do not plant directly over utility lines or proposed utility line locations. Coordinate with the City's Infrastructure and Operations Department and applicable utility company to verify appropriate locations.

5.7 TRAIL AND PATHWAY SYSTEMS

- 5.7.1 Trails can be located in the Municipal Reserve. Trails may also be located through Environmental Reserve areas, building or environmental setbacks, utility easements, utility rights-of-way, road rights-of-way, and boulevards where approved. Small parcels of municipal reserve with low developable potential will be accepted as part of the municipal reserve dedication where these parcels are required to connect trails to the overall trail system.

5.7.2 Slope Requirements:

- Slopes less than 5% on trails and pathways are ideal. Slopes between 5% and 8.3% are considered ramps, and therefore shall require features in accordance with the building code (handrails, landings, etc). Anything over 8.3% is not considered accessible.
- Cross slopes on any pathway shall not exceed 2%.

5.7.3 Safety Requirements:

- Provide 1.0 meter clear of all obstacles on both sides, and 3.5 meters clear of obstacles overhead. Avoid locating trails over manholes. Ensure a 2.5 meter minimum clearance from park water services.
- Set-back pathways a minimum of 1.0 meter from face of curb and a minimum distance of 10 meters from residential property lines where possible.
- Safety railing shall be installed when a trail is within 2.0 meters of the top of a 2:1 slope or steeper, and the slope is greater than 1.0 meter in depth. Minimum railing height and design to meet current building code standards.

5.7.4 Trail Junctions:

- Where possible, ensure trails join at right angles. Provide widening of trails with radius of 4 meters where trails join other trails.

5.7.5 Trail Entrances:

- Extend trail to street curb in all cases. Ensure trail joins street at right angles and widens on both sides with radius of 4.0 meters.
- Provide a curb-cut and a standard removable steel bollard where access is to Environmental Reserve, Natural Area, or Regional Trail. Line up entrances for visual continuity where trail route crosses street. Ensure no catch basins located at entrance.

5.7.6 Sightlines

- Where possible, ensure no obstructions to visibility within 5.0 meters of junction with other trails and streets (trees, shrubs, utility boxes, fences, etc.)

5.7.7 Criteria for Bicycles:

- Ensure no catch basins located at entrance.
- Under 3%: Acceptable.
- 3% to 5%: Not longer than 200 meters.
- 5% to 8%: Not longer than 50 meters, keep bicycles and pedestrians separate, and avoid curves and constrictions.
- Over 10%: Re-route or provide stairs.

5.7.8 Stair Requirements:

- Where possible, avoid use within a trail network. Install a bicycle ramp along one side where stairs are unavoidable.

5.7.9 Access Barriers:

Removable bollards shall be located at access points to trails accessing streets, where vehicle access to the trail system should be controlled. Locate bollards as follows:

- Installed in centre of 3.0 meter trail
- Wooden, non-removable bollards on either side of 3.0 meter trail.
- Bollards are to be 150 mm x 150 mm pressure treated timber with a minimum height of 750 mm above trail surface.

5.7.10 Lighting may be required at trails and activity nodes, subject to the review and approval of the City of Swift Current.

5.7.11 Where a regional or local trail which is part of the City of Swift Current Structure Plans crosses through the parcel of land being developed, the Developer will be responsible for the cost of constructing such trails. Trail proposals shall be reviewed and approved by the Community Services Department. Trail layout should be designed to connect the residential areas with the park activity nodes and other centres such as schools, commercial areas, etc. Regional trails should not be within 5 metres of play area surfaces and links to the trail system from play structure sites should be established.

5.7.12 Conflicts between vehicular and pedestrian traffic should be minimized. Avoid sections on-street in order to maximize continuity of trail system. All trails should be barrier free wherever possible.

5.7.13 Trails developed in natural areas should be designed and sited to minimize physical and visible disturbance to landform or vegetation. Minimize damage to Environmental Reserve parcels by careful trail route selection, by sensitive use of retaining structures, and by grading side slopes to minimize disturbances.

- 5.7.14 The Developer is responsible for rehabilitation of areas disturbed by trails passing through natural areas.

5.8 STORM WATER MANAGEMENT FACILITIES

- 5.8.1 Park space is desirable adjacent to stormwater lakes, provided that the lake and associated grading is designed in conjunction with the park and appears as natural as possible.
- 5.8.2 Stormwater facilities (both wet and dry ponds) can also be utilized within the open space system.
- 5.8.3 Stormwater lakes shall be designated as a public utility and will not be credited towards the Municipal Reserve dedication.
- 5.8.4 Naturalize stormwater ponds, and re-graded or disturbed areas, with groupings of native trees and shrubs. Design proposed contours in a curvilinear form rather than a straight line form.

6 RECOMMENDED PLANT SPECIES

Plant Material for Manicured Parks

COMMON NAME	BOTANICAL NAME	COMMON NAME	BOTANICAL NAME
DECIDUOUS SHRUBS		DECIDUOUS TREES	
Tratarian Dogwood	Cornus alba	Silver Maple	Acer saccharinum
Silver Leaf Dogwood	Cornua alba 'Argenteo-marginata'	Ohio Buckeye	Aesculus glabra
Mottled Dogwood	Cornus alba 'Gouchaultii'	Cutleaf Weeping birch	Betula pendula 'Gracilis
Siberian Coral Dogwood	Cornus alba siberica	Toba Hawthorn	Crataegus mordenensis 'Toba
Golden Twig Dogwood	Cornus sericea 'Flaviramea'	Snowbird Hawthorn	Crataegus x mordenensis 'Snowbird'
Kelsey Dwarf Dogwood	Cornussericea 'Kelsey'	Russian Olive	Elaeagnus angustifolia
Hedge Cotoneaster	Cotoneaster acutifolia	Manchurian Ash	Fraxinus mandshurica
European Cotoneaster	Cotoneaster intergerrimus	Mancan Ash	Fraxinus mandshurica 'Mancana'
Waterton Mockorange	Philadelphus lweisii 'Waterton'	Black Ash	Fraxinus nigra
Annabelle Hydrangea	Hydrangea aborescens 'Annabelle'	Faligold Black Ash	Fraxinus nigra 'Fallgold'
Pee Gee Hydrangea	Hydrangea paniculata 'Grandiflora'	Foothills Green Ash	Fraxinus pennsylvanica Foothills'
Sweetberry Honeysuckle	Lonicera caerulea edulis	Prairiespire Green Ash	Fraxinus pennsylvanica Prairiespire'
Arnold Red Honeysuckle	Lonicera tatarica 'Arnold Red'	Honey Locust	Gleditsia tricanthos inermis
Clavey's Dwarf Honeysuckle	Lonicera xyloseoides 'Clavey's Dwarf'	Black Walnut	Juglans nigra
Ninebark	Physocarpus opulifolius	Siberian Columnar Crab	Malus baccata 'Columnaris'
Nanking Cherry	Prunus tomentosa	Rudolph Flowering Crab	Malus 'Rudolph'
Double Floweing Plum	Prunus trilobata 'Multiplex'	Strathmore Crab	Malus 'Strathmore'
Blue Fox Willow	Salix brachycarpa 'Blue Fox'	Thunderchild Crab	Malus 'Thunderchild'
Gold Plume Elder	Sambucus racemosa 'Plumosa Aurea'	Swedish Columnar Aspen	Populus tremula' Erecta
Bridalwreath Spirea	Spiraea x vanhouttei	Tower Poplar	Populus x canescens 'Tower
Goldflame Spirea	Spiraea x bumalda 'Goldflame'	Amur Cherry	Prunus maackii
Three-lobed Spirea	Spiraea trilobata	Mayday Tree	Prunus padus commutata
Dwarf Korean Lilac	Svrincia meveri 'Palabin'	Pincherry	Prunus pennsylvanica
Miss Kim Lilac	Syringa patula Miss Kim'	Schubert Chokecherry	Prunus virginiana 'Schubert'
Late Lilac	Syringa villosa	American Mountain Ash	Sorbus americana
		European Mountain Ash	Sorbus aucuparia
CONIFEROUS TREES		Pyramidal Mountain Ash	Sorbus aucuparia 'Fastigiata'
Columnar Colorado Spruce	Picea pungens Fastigiata'	Showy Mountain Ash	Sorbus decora
Blue Colorado Spruce	Picea pungens 'Glauca'	Ivory Silk Japanese Tree	Syringa reticulata 'Ivory Silk'
Ponderosa Pine	Pinus ponderosa	Lilac	Syringa sp.
Columnar Scots Pine	Pinus sylvestris 'Fastigiata	Little Leaf Linden	Tilia cordata
		Norlin Linden	Tilia cordata 'Roland'
CONIFEROUS SHRUBS		Dropmore Linden	Tilia x flavescens 'Dropmore'
Gold Coast Juniper	Juniperus chinensis 'Goldcoast'	D.E.D. Resistant Discovery	Ulmus davidiana var. japonica 'Discovery'
Blue Pfitzer Juniper	Juniperus chinensis 'Pfitzerana Glauca'	Elm	Ulmus
Medora Juniper	Junipreus scopulorum 'Medora'		
Moonglow Juniper	Juniperus scopulorum		
Wichita Blue Juniper	Juniperus scopulorum		
Dwarf Mugo Pine	Pinus mugo pumilo		
Holmstrup Cedar	Thuja occidentalis Holmstrup		
Wares Siberian Cedar	Thuja occidentalis 'Wareana		

Plant Material for Boulevards

COMMON NAME	BOTANICAL NAME	COMMON NAME	BOTANICAL NAME
CONIFEROUS TREES		CONIFEROUS SHRUBS	
Columnar Colorado Spruce	Picea pungens 'Fastigiata	Gold Coast Juniper	Juniperus chinensis 'Goldcoast'
Blue Colorado Spruce	Picea pungens 'Glauca'	Blue Pfitzer Juniper	Juniperus chinensis 'Pfitzerana Glauca'
Ponderosa Pine	Pinus ponderosa	Medora Juniper	Junipreus scopulorum 'Medora'
Columnar Scots Pine	Pinus sylvestris Fastigiata	Moonglow Juniper	Juniperus scopulorum 'Moonglow'
		Wichita Blue Juniper	Juniperus scopulorum 'Wichita Blue
DECIDUOUS TREES		Dwarf Mugo Pine	Pinus mugo pumilo
Silver Maple	Acer saccharinum	Holmstrup Cedar	Thuja occidentalis 'Holmstrup'

Ohio Buckeye	Aesculus glabra	Wares Siberian Cedar	Thuja occidentalis 'Wareana'
Toba Hawthorn	Crataegus mordenensis Toba		
Snowbird Hawthorn	Crataegus x mordenensis 'Snowbird'	DECIDUOUS SHRUBS	
Russian Olive	Elaeagnus angustifolia	Tratarian Dogwood	Cornus alba
Manchurian Ash	Fraxinus mandshurica	Silver Leaf Dogwood	Cornua alba 'Argenteo-marginata'
Mancan Ash	Fraxinus nigra	Mottled Dogwood	Cornus alba 'Gouchaultii'
Black Ash	Fraxinus nigra	Siberian Coral Dogwood	Cornus alba siberica
Fallgold Black Ash	Fraxinus nigra 'Fallgold'	Golden Twig Dogwood	Cornus sericea 'Flaviramea'
Foothills Green Ash	Fraxinus pennsylvanica 'Foothills'	Kelsey Dwarf Dogwood	Cornussericea 'Kelsey'
Prairiespire Green Ash	Fraxinus pennsylvanica Prairiespire	Hedge Cotoneaster	Cotoneaster acutifolia
Honey Locust	Gleditsia tricanthos inermis	European Cotoneaster	Cotoneaster intergerrimus
Black Walnut	Juglans nigra	Wateron Mockorange	Philadelphus lweisii 'Waterton'
Siberian Columnar Crab	Malus baccata Columnaris'	Annabelle Hydrangea	Hydrangea aborescens 'Annabelle'
Rudolph Flowering Crab	Malus 'Rudolph'	Pee Gee Hydrangea	Hydrangea paniculata 'Grandiflora'
Strathmore Crab	Malus 'Strathmore	Sweetberry Honeysuckle	Lonicera caerulea edulis
Thunderchild Crab	Malus 'Thunderchild	Arnold Red Honeysuckle	Lonicera tatarica 'Arnold Red'
Amur Cherry	Prunus maackii	Clavey's Dwarf Honeysuckle	Lonicera xyloseoides 'Clavey's Dwarf'
Mayday Tree	Prunus padus commutata	Ninebark	Physocarpus opulifolius
Pincherry	Prunus pennsylvanica	Nanking Cherry	Prunus tomentosa
Schubert Chokecherry	Prunus virginiana 'Schubert'	Double Floweing Plum	Prunus trilobata 'Multiplex'
American Mountain Ash	Sorbus americana	Blue Fox Willow	Salix brachycarpa 'Blue Fox'
European Mountain Ash	Sorbus aucuparia	Gold Plume Elder	Sambucus racemosa 'Plumosa Aurea'
Pyramidal Mountain Ash	Sorbus aucuparia 'Fastigiata	Bridalwreath Spirea	Spiraea x vanhouttei
Showy Mountain Ash	Sorbus decora	Goldflame Spirea	Spiraea x bumalda 'Goldflame'
Little Leaf Linden	Tilia cordata	Three-lobed Spirea	Spiraea trilobata
Norlin Linden	Tilia cordata 'Roland'	Dwarf Korean Lilac	Syringa meyeri 'Palabin'
Dropmore Linden	Tilia x flavescens 'Dropmore'	Miss Kim Lilac	Syringa patula 'Miss Kim'
D.E.D. Resistant Discovery	Ulmus davidiana var. japonica 'Discovery'	Late Lilac	Syringa villosa
Elm	Ulmus		

Plant Material for Medians

COMMON NAME	BOTANICAL NAME	COMMON NAME	BOTANICAL NAME
DECIDUOUS TREES		Mayday Tree	Prunus padus commutata
Toba Hawthorn	Crataegus mordenensis 'Toba'	Pincherry	Prunus pennsylvanica
Snowbird Hawthorn	Crataegus x mordenensis 'Snowbird'	Schubert Chokecherry	Prunus virginiana Schubert
Manchurian Ash	Fraxinus mandshurica	European Mountain Ash	Sorbus aucuparia
Honey Locust	Gleditsia tricanthos inermis	Pyramidal Mountain Ash	Sorbus aucuparia 'Fastigiata'
Siberian Columnar Crab	Malus baccata 'Columnaris'	Showy Mountain Ash	Sorbus decora
Rudolph Flowering Crab	Malus Rudolph'	Little Leaf Linden	Tilia cordata
Strathmore Crab	Malus 'Strathmore'	Norlin Linden	Tilia cordata 'Roland'
Thunderchild Crab	Malus 'Thunderchild'	Dropmore Linden	Tilia x flavescens 'Dropmore'
Amur Cherry	Prunus maackii		

The Swift Current area is characterized by a long growing season, low annual precipitation, temperature fluctuations, and Chinook winds. All these factors combine to limit the species of plants that will survive in this region. It is important to stress that plant maintenance and seasonal protection are necessary to ensure survival, even of plants that are hardy to this region.

7 LIST OF DRAWINGS

- E-001 Unmetered 120 Volt Connection for Irrigation Controller
- E-002 Unmetered U/G Electronic Service for Irrigation Controller (Typ.)
- E-003 Irrigation Water Service - Hardware Material Alignment
- E-004 Tree Support Method using Tree Stakes C/W Mulch
- E-005 Concrete Pad for Standard Irrigation Controller Cabinet
- E-006 Concrete Pad for Double Scorpio Irrigation Controller Cabinet
- E-007 Concrete Pad for Irrinet Irrigation Controller Cabinet
- E-008 Concrete Encased Support Post (Minimum Installation Guidelines)
- E-009 Irrigation Controller Cabinet
- E-010 Scorpio Cabinet Pedestal
- E-011 Vault Detail for Irrigation Valve System
- E-100 Tree Stand
- E-101 Wood Sign
- E-200 Landscaping – Boulevards and Medians
- E-201 Landscaping – Trees, Lighting and Sight Lines
- E-202 Xeriscaping – Vegetation Coverage

END OF SECTION