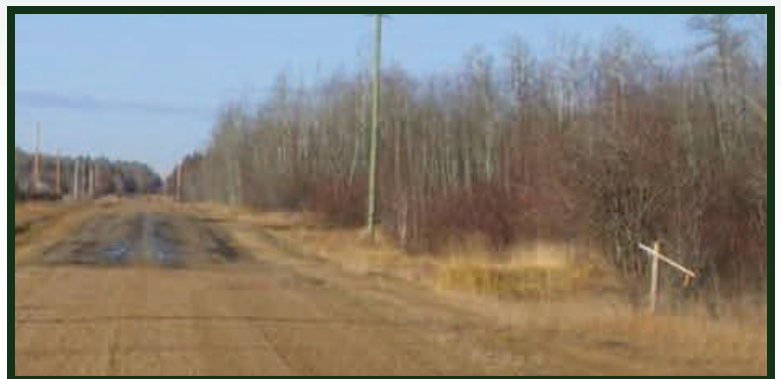
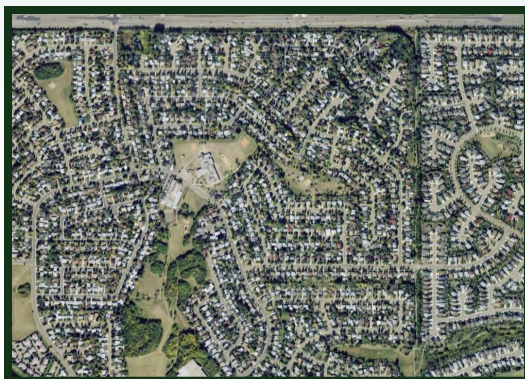
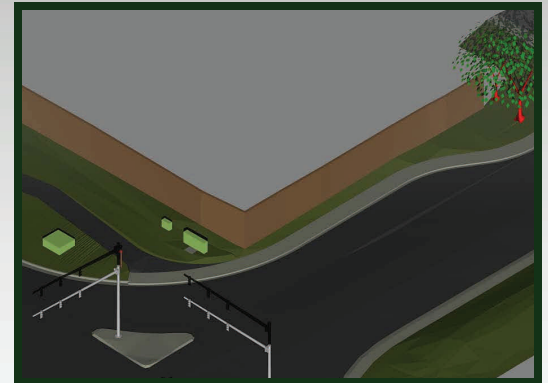




## DESIGN AND CONSTRUCTION STANDARDS

September 2019



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Foreword

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## FOREWORD

The document is an amalgamation of five documents comprised of: Engineering Servicing Standards, Urban Standards (2005), Rural Standards (2007), Open Space Development Standards (2006), Strathcona County Standard Documents (2008) and Computer Aided Drafting Standards. Its objective is to ensure that all work in Strathcona County is constructed to a consistent standard.

The new document is applicable to both Strathcona County contracts and private development projects and is intended to provide information to Developers, Engineering and Geo-Technical Consultants, Contractors, Utility Companies, and Strathcona County departments regarding standards guiding the design, preparation, and submission of plans and specifications for construction of roads, water distribution systems, low-pressure sanitary sewer systems, stormwater management facilities, open space, trails and landscaping in Strathcona County.

Unless otherwise stated in these Standards, all design criteria, materials, installation and testing shall be in accordance with the most recent editions of the following:

Alberta Environment, Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems

Alberta Highway Design Guide

Alberta Private Sewage Systems Standards of Practice (1999)

Biophysical Assessment Policy SER-009-032

Bikeway Traffic Control Guidelines for Canada

Canada Oceans Act

Canada Wildlife Act

Canadian Council of Ministers for the Environment (CCME)

Guidelines for Compost Quality (2005)

Canadian Environmental Assessment Act

Canadian Soccer Association Long Term Player Development Wellness to World Cup

Canadian Standards for Nursery Stock

CSA-Z614 Children's Playspaces and Equipment Standard

Environmental Protection and Enhancement Act

Fisheries Act

Historic Resource Act

Migratory Bird Convention Act

Municipal Government Act

Municipal Safety Codes

National Parks Act

Navigable Waters Protection Act

Plumbing Code

Provincial Wetlands Conservation Legislation and Policy

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Strathcona County Capital Cost Recovery for Rural Water Servicing Policy  
TAC Highway Lighting Design Guide  
TAC Uniform Traffic Control Devices for Canadian Roads  
Transportation Association of Canada (TAC) Geometric Design Guidelines  
Tree Conservation During Development Policy SER-009-034  
Tree Management Policy SER-009-035  
Water Act  
Wetlands Conservation Policy SER-009-036  
Wildlife Act

The document, as well as the latest editions of the documents listed above, form part of the requirements for the design and construction of any project with Strathcona County.

In general, if there is any conflict between these Design and Construction Standards, the highest standard or requirement shall prevail, per decision by the Infrastructure and Planning Services (IPS) Standards Committee.

It is the Developer's or their engineering consultant's responsibility to obtain, at their cost, copies of the above documents from the appropriate authorities.

Please note that updates to the standards are made available on our website at [www.strathcona.ab.ca](http://www.strathcona.ab.ca) and are not mailed or otherwise communicated.

## ACKNOWLEDGEMENTS

Strathcona County would like to take this opportunity to cordially thank and acknowledge all those who contributed their time and effort towards the input and review process.

We would especially like to thank the following:

Alberta Roadbuilders and Heavy Construction Association

ATCO

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Planning and Development Services Department

Recreation, Parks and Culture Department

Shaw

Telus

Transit Department

Transportation and Agriculture Services Department

Transportation Planning and Engineering Department

Urban Development Institute

Utilities Department

We would like to thank Scott Sillers and Jim McNeill for the use of their photos on the cover pages.

This book, or parts thereof,  
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## 1.0 INTENT OF THIS DOCUMENT

This master document contains all of Strathcona County's Engineering Standards. Volume 1 contains Design Standards and Volume 2 contains the Construction Specifications. Refer to the Tables of Contents for more details on the Sections contained within each Volume.

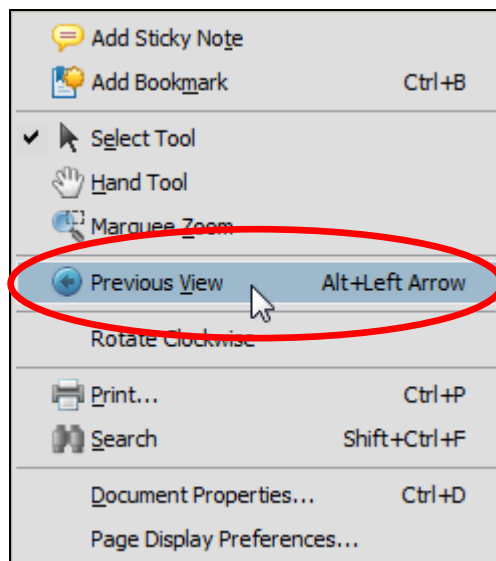
## 2.0 USE OF THIS DOCUMENT

**2.1 Navigation:** Use the bookmarks on the left in the PDF and the links in the Table of Contents and in the document to navigate through the PDF.

- Links are indicated by blue, underlined text. When you hover the cursor over a link its symbol changes into a hand as shown below. Click the mouse button to select the link. The PDF displays the document page or drawing associated with the link.

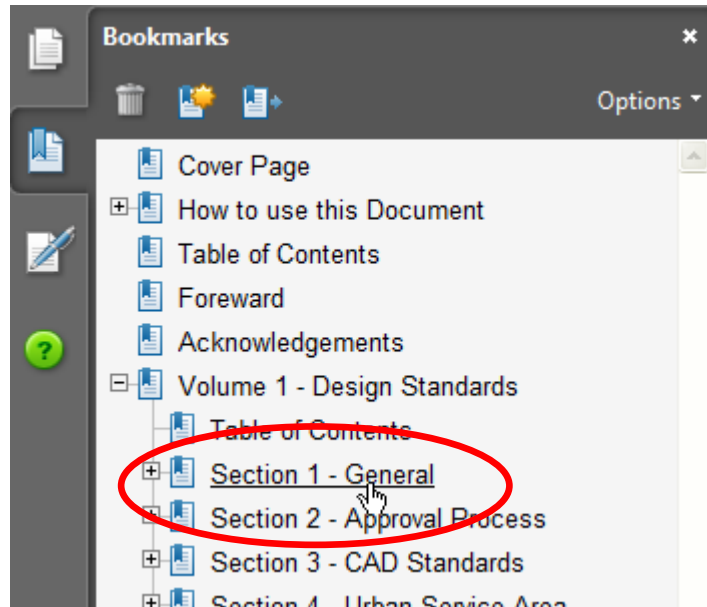
Traffic calming on collector roadways is required and can be accommodated as outlined in [STANDARD DRAWING 41108](#) and [41109](#). This cross-sectional drawing may be proposed in ASP Design Brief reports.

- Right-click and select Previous View to return to the previously viewed page.





- 2.2 **Bookmarks:** Bookmarks are displayed on the left side of the PDF and can be used to quickly navigate through the document. Select a bookmark to display the related document.



- 2.3 **Table of Contents:** Use the Table of Contents to navigate to specific areas throughout the document.

### **Volume 1 - Design Standards**

#### **Volume 1 Table of Contents**

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**Section 3** CAD Standards

**Section 4** Urban Service Area Standards

- 2.4 **Links:** Select the link to go to a specific page or drawing in a Table of Contents or to a cross-reference within a document.

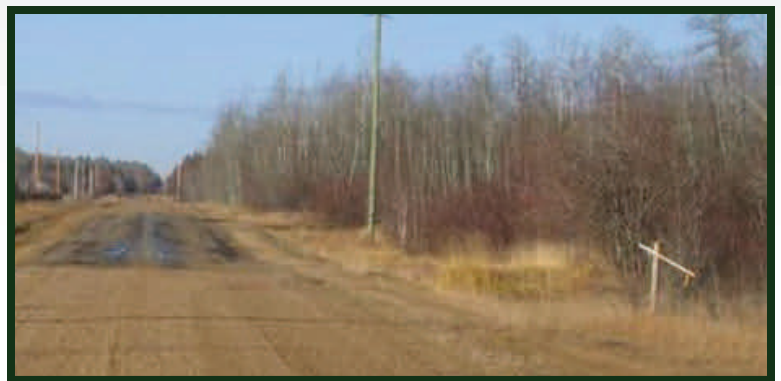
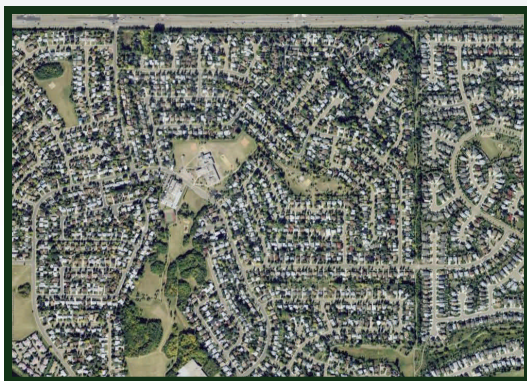
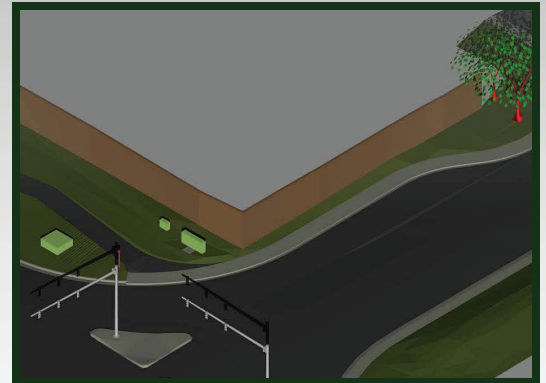
Standard corner cutoffs in accordance with [TABLE 4-5](#) shall be used at all intersections unless in the opinion of the Manager, Engineering and Environmental Planning department circumstances dictate more

- 2.5 **Blank Pages:** Blank pages have been included in this document so that pages, such as the cover pages, print on the correct sides when the document is printed double-sided.



# DESIGN AND CONSTRUCTION STANDARDS

September 2019



**Volume 1**  
**Design Standards**

 **STRATHCONA**  
COUNTY

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on the correct sides when the document is printed double-sided.

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**Section 9            Pipeline and Utility Crossings****Section 10           CCC & FAC Process**

- 1.0            General
- 2.0            CCC – Requirements
- 3.0            FAC – Requirements

## 1.1 INTENT OF THESE DESIGN STANDARDS

This document has been prepared to assist Developers and their Representatives, Contractors, and Strathcona County internal departments in completing the design and construction of municipal infrastructure in accordance with the requirements of Strathcona County. It is intended to address the following:

- 1.1.1 To encourage compliance of all proposals and detailed designs with statutory planning and development approvals as well as Strathcona County bylaws and policies.
- 1.1.2 To ensure consistency of municipal infrastructure construction, development or conservation of open space as projects progress from concept through planning, design, construction, and maintenance, thus ensuring consistency and quality in the standard of municipal infrastructure and open space developments provided throughout Strathcona County.
- 1.1.3 To identify Strathcona County's preference when there are alternative technical options available to address a particular development issue.
- 1.1.4 To outline for Developers, Developer's Representative/Contract Managers and Strathcona County the various stages of planning and design and levels of review required to be followed to obtain acceptance of conceptual, preliminary and final design construction drawings.

## 1.2 USE OF THESE DESIGN STANDARDS

- 1.2.1 Periodically the Infrastructure & Planning Services Standards Committee will amend the Standards and issue a formal addendum to all holders of the Standards who are registered with Strathcona County.
- 1.2.2 Nothing in these Standards relieves either Strathcona County, the Developer, or the Developer's Representative/Contract Manager from the obligations contained within the Development Agreement or as outlined by the Provincial regulating Authority.
- 1.2.3 These Standards are considered the minimum requirement and where variation may achieve a better technical, environmental and economical solution, a proposal should be presented for acceptance to the IPS Standards Committee. The Developer's Representative is encouraged to continuously seek new and better solutions.
- 1.2.4 Where the County or Developer wishes to revise or deviate from these Standards, the onus shall be upon the Contract Manager or Developer's Representative to justify the proposal and resolve any concerns to the satisfaction of Strathcona County. Proposed changes shall be the subject of a report and/or a concept design that the Developer shall have prepared and submitted to Strathcona County for review through the variance application process, noting that all Developer submissions shall be via an application to the Planning & Development Services department. As part of the variance submission, the County or Developer shall complete and include the form located in [VOL. 1 SEC. 8, DESIGN AND CONSTRUCTION UPDATE – SUGGESTIONS](#) and a fee may apply.

- 1.2.5 When using these Standards and Specifications, the Developer and the Developer's Representative remain fully responsible for the design and construction of all improvements according to best construction practices that address the specific needs and site conditions of their project. Without limiting that broad and general obligation, these Standards and Specifications shall be the minimum requirement. The Developer's Representative/Contract Manager must be satisfied with the applicability of the design criteria in these Standards to the project at hand and apply more stringent criteria where appropriate.
- 1.2.6 These Standards have been established based on an assessment of current and future needs and the knowledge available to the date of their preparation.
- 1.2.7 Strathcona County recognizes this document may require review and re-evaluation from time to time based on new technologies and improved knowledge. While these situations may often be addressed on a case by case basis, establishment of new standards may be necessary to ensure that the issues are addressed consistently for future applications. In consideration, Strathcona County reserves the right to alter or revise the Standards as deemed necessary. When such changes are required, Strathcona County will give reasonable notice to all registered owners first, of any proposed changes.
- 1.2.8 Where these Standards refer to Bylaws, Policies, Acts, Regulations and Standards, this shall mean the most recent edition or amendments of the referenced document.
- 1.2.9 Where, due to amendment of statutory requirements, conflicts or inconsistencies with these Standards arise, the Developer's Representative shall refer the issue to Strathcona County for clarification and decision by the IPS Standards Committee.
- 1.2.10 Strathcona County reserves the right to the final decision regarding the interpretation of the intent of the design and the acceptability of the changes from the Standards proposed by the Developer. Strathcona County shall remain flexible and open minded to new or innovative solutions.

### 1.3 ABBREVIATIONS

#### General

ACP	Area Concept Plan
APEGA	The Association of Professional Engineers and Geoscientists of Alberta
ASET	The Association of Science and Engineering Technology Professionals of Alberta
ASP	Area Structure Plan
ASTM	American Society for Testing and Materials
CCC	Construction Completion Certificate
CE	Conservation Easement
CIAC	Contribution in Aide of Construction
CPTED	Crime Prevention through Environmental Design
CR	Country Residential
CRPA	Country Residential Policy Area



CSA	Canadian Standards Association
DA	Development Agreement
EDB	Engineering Design Brief
EIA	Environmental Impact Assessment
EPEA	Environmental Protection and Enhancement Act
ER	Environmental Reserve
ERE	Environmental Reserve Easement
ESC	Erosion and Sediment Control
FAC	Final Acceptance Certificate
GIS	Geographic Information System
IPS	Infrastructure & Planning Services
LID	Low Impact Development
LUB	Land Use Bylaw
MDP	Municipal Development Plan
MGA	Municipal Government Act
MOA	Memorandum of Agreement
MR	Municipal Reserve
NAWMP	North American Waterfowl Management Plan
OHS	Occupational Health and Safety
PCC	Project Completion Certificate
PL	Property Line
PLEA	Prioritized Landscape Ecology Assessment of Strathcona County
PUL	Public Utility Lot
ROW	Right-of-way
ROWCAP	Right-of-way Construction Activity Permit
RUA	Road Use Agreement
SP	Subdivision Plan

#### Utility

CB	Catch Basin
CBMH	Catch Basin Manhole
CMP	Corrugated Metal Pipe
CSP	Corrugated Steel Pipe
HDPE	High Density Polyethylene
HNA	Hydraulic Network Analysis
HWL	High Water Level
MH	Manhole
NWL	Normal Water Level
PCCP	Pre-stressed Concrete Cylinder Pipe
PE	Polyethylene
PVC	Polyvinyl Chloride
ST	Steel
SWMF	Stormwater Management Facility
TVS	Tapping Valve Sleeve
ULAP	Utility Line Assignment Permit
URW	Utility Right-of-way

VCT            Vitrified Clay Tile

Transportation

AADT            Average Annual Daily Traffic  
AC                Asphaltic Concrete  
BC/EC            Begin Curves/End Curves  
BTOC            Back Top of Curb  
BVC               Beginning of Vertical Curve  
CL                Centreline  
EVC               End of Vertical Curve  
FOC               Face of Curb  
ITMP              Integrated Transportation Master Plan  
LOG               Lip of Gutter  
NIA                Noise Impact Assessment  
PI                  Point of Intersection  
PIA                Parking Impact Assessment  
RF                  Rolled Face Curb  
SF                  Straight Face Curb  
TIA                Traffic Impact Assessment  
TOC                Top of Curb  
TSB                Transportation System Bylaw  
TSSP              Traffic Safety Strategic Plan  
VPD                Vehicles per Day

## 1.4            DEFINITIONS

- 1.4.1            Area Concept Plan (ACP): A comprehensive planning policy framework and generalized future land use concept that guides subsequent development plans. ACPs are used to guide the preparation of detailed ASPs undertaken by the Developer, promote orderly development within the area encompassed by the plan boundaries, and provide guidance to Administration and Council in reviewing future zoning, subdivision, and development proposals.
- 1.4.2            Area Structure Plan (ASP): ASPs, once approved by Strathcona County Council into Bylaw, become statutory documents. They provide a framework for future subdivision and development at the neighbourhood level, including proposed land uses, population densities and conceptual locations of major roadways, essential services and stormwater management facilities and any additional requirements outlined by Council.
- 1.4.3            Bio-swale: A bio-swale is a broad, shallow, earthen channel vegetated with erosion resistant and flood tolerant vegetation, and underlain by an engineered soil mixture, either with or without an underdrain system, designed specifically to infiltrate, treat and attenuate stormwater runoff for a specified water volume during minor and major rain events.

- 1.4.4      Community Park: Community parks shall be a minimum of 4.0 ha and may focus on active recreation (sports fields, courts, tracks) as well as have areas for uses such as informal play, community gardens, spray parks, toboggan hills, playgrounds, or picnic facilities including gazebos and shelters.
- 1.4.5      Conservation: Pursuant to the Environmental Protection and Enhancement Act, the planning, management, and implementation of an activity with the objective of protecting the essential physical, chemical, and biological characteristics of the environment against degradation.
- 1.4.6      Conservation Easement (CE): An agreement registered against title whereby a landowner grants to the County (or other government, government agency, or non-profit society with conservation objectives satisfactory to the County) provisions for the protection, conservation and enhancement of the environment including the protection, conservation and enhancement of biological diversity and natural scenic, agricultural or aesthetic values. A conservation agreement may provide for recreational use, open space use, environmental education use, and research and scientific studies of natural ecosystems.
- 1.4.7      Construction Completion: When the entire construction work has been performed to the requirements of the Development Agreement or Construction Contract.
- 1.4.8      Construction Completion Certificate (CCC): The signed and dated document issued by Strathcona County for the accepted completion of municipal improvements, or a portion thereof. These improvements must be constructed and installed in accordance with all provisions of the Development Agreement or Construction Contract and to the satisfaction of Strathcona County.
- 1.4.9      Construction Contract: The legal agreement between a Contractor or Developer and Strathcona County which specifies the financial obligations and the terms and conditions for the construction and warranty of municipal improvements and/or maintenance.
- 1.4.10     Contract Manager: The person(s) or entity responsible for negotiating and ensuring compliance with the construction contract/development agreement, and agreeing to and documenting any changes to the same. A Contract Manager is required when Strathcona County is both the Owner and the Developer on a project.
- 1.4.11     Contribution in Aide of Construction (CIAC): Funds collected from the Developer(s) to pay for infrastructure construction that is outside of the Levy Bylaw. The County and the Developer(s) enter into an agreement where some or all of the cost of particular infrastructure construction is funded by the Developer(s). The most common reason for CIAC is to pay for site-specific infrastructure that only particular Developer(s) benefit from, or to pay for infrastructure outside of the Levy Bylaw (may involve provincial infrastructure such as a highway access, or infrastructure that was specifically covered by separate agreements, such as in the Heartland Area).

- 1.4.12 Country Residential Policy Area (CRPA): This policy area has been adopted under the Municipal Government Act to provide additional guidance for planning of residential development outside of the Urban Services Area. The policy area has incorporated provisions of restricting parcel density, size and servicing requirements. Also referred to as “County Residential.”
- 1.4.13 Crime Prevention through Environmental Design (CPTED): The built environment shall be designed to minimise both the opportunity for crime and the fear of crime through preventative design options.
- 1.4.14 Design & Construction Standards: The manual used to provide information, set guidelines and establish requirements for Developers, Engineering Consultants, Utility Companies and County departments, regarding standards governing design, preparation and submission of plans and specifications for construction of municipal improvements within Strathcona County.
- 1.4.15 Developer’s Representative/Consultant: The person(s) acting on behalf of the Developer.
- 1.4.16 Developer/Owner: An entity or person that develops private or public lands in Strathcona County.
- 1.4.17 Development Agreement (DA): The legal agreement between a Developer and Strathcona County which specifies the financial obligations and the terms and conditions for the construction and warranty of municipal improvements necessary to service lands approved for development as defined under the Municipal Government Act.
- 1.4.18 Development Permit: Approves the use of a site, as well as the size and location of any buildings or structures. Development Permit approvals must be obtained for new construction, renovations, businesses, and changes of use to existing buildings.
- 1.4.19 Easement: An area of land owned by another where there is an interest in the land that entitles its holder to a specific purpose.
- 1.4.20 Ecological Functions: Natural cycling of nutrients and water dictated by a high degree of biodiversity. Sustainable ecological functions require the existence of at least parts of the natural habitat of the area.
- 1.4.21 Ecological Landscape: A heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout.
- 1.4.22 Ecosystem: All of the organisms in a given place interacting with their nonliving environment.
- 1.4.23 Engineering Design Brief (EDB): A written document that clearly establishes the desired result of a design, including the problem and proposed solution, but does not necessarily focus on aesthetic aspects.

- 1.4.24     Environment Impact Assessment (EIA): An assessment of the detrimental and beneficial impact upon the environment by an activity of development on all or any of water quality, air quality, land use, water use, aquatic ecology and terrestrial ecology.
- 1.4.25     Environmental Reserve (ER): As defined in the Municipal Government Act.
- 1.4.26     Environmental Reserve Easement (ERE): As defined in the Municipal Government Act.
- 1.4.27     Environmental Site Assessment: Most often associated with property transactions. The Environmental Site Assessment process is set out in the Environmental Protection and Enhancement Act under Part 2, Division 1.
- 1.4.28     Environmentally Sensitive Areas: Recognition of an area which contains an ecosystem whose natural characteristics and processes should be conserved due to physical, biological, social or aesthetic quality features that are important resources.
- 1.4.29     Environmentally Significant Area: Areas that are important to the long term maintenance of biological diversity, physical landscape features and/or other natural processes.
- 1.4.30     Erosion and Sediment Control (ESC): Measures taken to control erosion and sedimentation on construction sites.
- 1.4.31     Final Acceptance: When the entire work has been performed to the requirements of the Development Agreement or Construction Contract.
- 1.4.32     Final Acceptance Certificate (FAC): The signed and dated document issued by Strathcona County upon Final Acceptance of the work, with the purpose of transferring full responsibility of the municipal improvement to the County.
- 1.4.33     Hydraulic Network Analysis (HNA): An engineering analysis of the potable water system to ensure that the proposed development(s) adhere to minimum design standards and criteria.
- 1.4.34     Integrated Transportation Master Plan (ITMP): A County plan which establishes a vision and direction to guide policy and decision making related to the County's transportation network over the next 30 and more years. The plan also provides guidance for development of transportation infrastructure facilities and the framework for identifying appropriate funding sources (i.e. capital budgets).
- 1.4.35     IPS Standards Committee: Committee appointed by the Infrastructure & Planning Services division to process, review, and respond to variance applications. May also be referred to as "Variance Committee" or "Variance Technical Committee."
- 1.4.36     Land Reclamation: The process of returning the land to a state fit for some future use or ideally to historic conditions. This includes the stabilization, contouring, maintenance, conditioning, reconstruction and revegetation of the surface of land.

- 1.4.37 Land Use Bylaw (LUB 8-2001 AND AMENDMENTS THERETO): This Bylaw regulates the use, conservation, and development of land, habitat, buildings, and signs in pursuit of the objectives of Strathcona County's statutory plans. These objectives are to maintain and enhance the quality of life by providing opportunities to attain individual and community aspirations; to conserve and enhance the environmental quality in Strathcona County; and to foster planned, efficient, economical and beneficial development that provides a diversity of choice, lifestyle, and environment.
- 1.4.38 Landscaping: The physical enhancement of a site and/or conservation or modification of the natural features of a site, through the placement or addition of any or a combination of the following:
- (i) Soft landscaping elements such as trees, shrubs, plants, lawns and ornamental plantings;
  - (ii) Decorative surfacing such as bricks, pavers, shale, crushed rock, concrete and asphalt, in the form of patios, walkways and paths; and
  - (iii) Architectural elements (fencing, walls, sculptures, benches, receptacles, playgrounds, etc.)
- 1.4.39 Licensed Engineer: A Licensed Engineer in the context of these Standards shall mean a Professional Engineer, Professional Licensee in (Engineering) or a Professional Technologist (Engineering) accredited by APEGA and/or ASET to practice Civil Engineering in Alberta and in accordance with the Engineering and Geoscience Professions Act.
- 1.4.40 Low Impact Development (LID): A decentralized planning and engineering approach to manage stormwater runoff which emphasizes conservation and use of on-site features to protect water quality. This approach implements watershed designs through infiltration, filtering, storing, evaporating and detaining runoff close to its source to replicate the pre-development hydrologic scheme.
- 1.4.41 Maintenance Period: The guarantee period between issuance of a CCC and an FAC as specified in the Development Agreement or Construction Contract, where the Developer or Contractor remains responsible for any repair or replacement of the municipal improvement, either in whole or any portion thereof, where such repair or replacement is required as determined by the County.
- 1.4.42 Memorandum of Agreement (MOA): A written document describing a cooperative relationship between two parties wishing to work together on a project or to meet an agreed upon objective. An MOA serves as a legal document and describes the terms and details of the partnership agreement.
- 1.4.43 Municipal Development Plan (MDP 1-2007 AND AMENDMENTS THERETO): The MDP, under the provincial Municipal Government Act, establishes land use and development objectives and policies for an entire municipality.

- 1.4.44      Municipal Improvements: Municipal improvements shall include all infrastructure, services or facilities listed in the Development Agreement or Construction Contract.
- 1.4.45      Municipal Reserve (MR): As defined in the Municipal Government Act.
- 1.4.46      Naturalization: Establishing native plants in previously disturbed areas with the intent to create sustainable open spaces that promote biodiversity. Naturalized landscapes in urban areas also control weeds and pests such as mosquitos and invasive plants like smooth brome.
- 1.4.47      Naturalized Areas: An area developed as a natural looking landscape using plants that are native to the region.
- 1.4.48      Neighbourhood Park: Neighbourhood park shall be a minimum of 0.8 ha (2 ac) in size and focus on the neighbourhood and passive activities. Elements may include unstructured active play, open areas for informal play or sports fields, community gardens, playgrounds, or picnic facilities including gazebos and shelters. These parks will be centrally located within neighbourhoods and may be included adjacent to community halls or schools.
- 1.4.49      Noise Attenuation: Mitigation, typically berms and/or fencing, that is required for residential developments to achieve a 24 hour noise level below the maximum specified requirement as defined in the most recent version of the Strathcona County Traffic Noise Policy SER-009-027.
- 1.4.50      Noise Impact Assessment (NIA): A study of the effects of traffic noise on residential developments adjacent to major transportation corridors and railways and measure required to reduce noise levels to below maximum standard.
- 1.4.51      Open Space: Public lands that provide social and environmental benefit and may include outdoor infrastructure that provides an identity or sense of place for the community. Open space may include, but is not limited to, landscaped areas, natural areas, active and passive recreational areas and outdoor community gathering spaces.
- 1.4.52      Parking Impact Assessment (PIA): Analysis of a development, taking into account factors such as location, type and size of the development and surrounding areas, to determine the minimum amount of required parking spaces, including the consideration of designated visitor parking, barrier free (disabled) parking, loading areas, and bicycle areas.
- 1.4.53      Priority Habitat: Priority habitat units are those which have the potential to maintain and/or restore essential ecological function to the landscape. Ranking of a habitat determines the feasibility of maintaining a particular habitat with the pressures of increased development. Factors include connectivity, fragmentation species diversity, recreation potential and sustainability.



- 1.4.54 Prioritized Landscape Ecology Assessment of Strathcona County (PLEA): Document developed in 1997 that identified priority wildlife habitats and considered their active conservation and/or restoration into the County's planning process such that conflicts between land development and land conservation can be minimized or avoided.
- 1.4.55 Project Completion Certificate (PCC): The signed and dated document issued by Strathcona County for the accepted completion of on-site/private owned improvements once they have been constructed and installed in accordance with all provisions of the Development Permit, and once they have been inspected and documented in the form of Record Drawings which have been accepted by Strathcona County.
- 1.4.56 Public Utility Lot (PUL): The land required to be dedicated to the County for public utilities or surface drainage requirements.
- 1.4.57 Rain Garden: A planted depression typically located near buildings downspouts or impervious areas where stormwater is redirected. Depressed areas receive increased amounts of moisture, where attenuation and groundwater recharge is the primary function through a series of soil or gravel layers beneath the surface plantings.
- 1.4.58 Reclamation: As defined in the Environmental Protection and Enhancement Act.
- 1.4.59 Record Drawings: The "as constructed" or "as built" plans, drawings, and/or records, in the form of full size paper copy, full size PDF copy and AutoCAD digital records in a format acceptable to the County.
- 1.4.60 Regional / Countywide Park: The intent of the regional park is to serve the entire county and may include a primary attraction and be designed for year round use. Regional parks shall be located on a major roadway for accessibility and may be adjacent to commercial and/or other public services amenities. Regional and countywide parks shall be designed with a variety of amenities for a wide range of age groups. Uses may include off-leash dog parks, spray parks, skate parks, sports fields, cross-country ski/snowshoe trails or public art.
- 1.4.61 Right-of-way (ROW): A legal plan of survey that has been filed or registered at the Land Titles Office that defines the boundary of right-of-way limits for the purposes of identifying municipal road, access and utilities.
- 1.4.62 Right-of-way Construction Activity Permit (ROWCAP): A permit required when construction work occurs within a County-owned right-of-way.
- 1.4.63 Road Use Agreement (RUA): An agreement made with Strathcona County when a commercial vehicle is exceeding the posted axle weight on a divisible load or making more than five trips on the same road/route while under the posted axle weights.

- 1.4.64 Stormwater Management Facility (SWMF): An area of land designed to collect and retain stormwater runoff for the purpose of flood prevention and/or improving water quality prior to release back into natural waterways. These may include dry ponds, wet ponds (lakes), constructed wetlands or a combination or hybrid of any of them.
- 1.4.65 Strathcona County: The Municipal Corporation of Strathcona County. May also be referred to as "County."
- 1.4.66 Sustainable Rural Roads Master Plan: A County document which guides the way rural roads are maintained and rehabilitated, focusing on maintaining existing service levels, rural road reconstruction projects and remaining within County budgetary limits.
- 1.4.67 Traffic Safety Strategic Plan (TSSP) 2020: Identifies priorities and programs for maintaining and improving traffic safety on County roads. The objective of the TSSP 2020 is to serve as an internal guiding document for the County's decision-making processes related to traffic safety through the year 2020.
- 1.4.68 Trails Strategy: Document that identifies the goal of providing trail access for most urban and rural residents. The Trails Strategy is to be used as a conceptual guideline for both urban and rural areas.
- 1.4.69 Traffic Impact Assessment (TIA): A study prepared by a Licenced Engineer to analyze the impact of traffic generated by a new development on the surrounding transportation system.
- 1.4.70 Transit Stop Standards: The document that defines the placement and design of transit stops in Strathcona County.
- 1.4.71 Transportation System Bylaw (TSB): A bylaw for classification of the Strathcona County roadway network in the Urban Service Area and the Rural Service Area.
- 1.4.72 Tree Stand: Tree stand refers to a unit of forest classification generally based on the type and age of the dominant tree vegetation (i.e., 80-year aspen stand).
- 1.4.73 Undeveloped Open Space: Open space that may include natural areas, utility lots and stormwater management facilities. Uses may include connections between amenities, wildlife corridors, and may also include opportunities for outdoor recreation.
- 1.4.74 Undisturbed Area: A naturally occurring or established area where natural, human or agricultural disturbances have not significantly altered the landform or its natural function.
- 1.4.75 Universal Accessibility: The built environment shall be designed to be useable by all people, to the greatest extent possible. Design should be barrier free and accommodate a wide range of user abilities.

- 1.4.76      Utility Line Assignment Permit (ULAP): Permit required to be submitted in conjunction with applications for essential servicing for shallow utilities within Strathcona County. The permit application outlines the construction details required for the proposed works.
- 1.4.77      Utility Right-of-way (URW): An area of land owned by another where there is interest in the land by a municipality or utility company for development of access, utility infrastructure and/or surface drainage. Similar to an easement, a URW entitles its holder to a specific purpose.
- 1.4.78      Watercourse: As defined and amended by the Environmental Protection and Enhancement Act: the bed and shore of a river, stream, lake, creek, lagoon, swamp, marsh or other natural body of water; or a canal, ditch, reservoir or other artificial surface feature made by humans, whether it contains or conveys water continuously or intermittently.
- 1.4.79      Wetland: Land where the water table is at, near, or above the land surface, or which is saturated for a long enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic ("water-loving") vegetation, and various kinds of biological activity which are adapted to the wet environment.
- 1.4.80      Wetland Policy (Federal): The Federal Policy on Wetland Conservation (1991 and 1996) compliments the goals of the North American Waterfowl Management Plan (NAWMP), federal policies on water conservation and fish habitat conservation and the International Ramsar Convention. The objective of the policy is to "promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future".
- 1.4.81      Wetland Policy (Provincial): The Alberta Wetland Policy provides the strategic direction and tools required to make informed management decisions in the long-term interest of Albertans. The policy will minimize the loss and degradation of wetlands, while allowing for continued growth and economic development in the province. The goal of the Alberta Wetland Policy is to conserve, restore, protect, and manage Alberta's wetlands to sustain the benefits they provide to the environment, society, and economy.

## 2.1 GENERAL RESPONSIBILITIES

- 2.1.1 The Developer/Owner will be responsible for complying with the requirements outlined in these Standards and all other applicable legislation, regulations, codes, standards, agreements, permits, and licenses. Additional information may be requested by the Land Development Engineering branch/Planning & Development Services department, as deemed necessary.
- 2.1.2 Strathcona County will, on request, supply all available information on existing utilities including available capacities, locations, restrictions and limitations (fee may apply). However the applicant must confirm the information provided in the field, as Strathcona County does not guarantee the accuracy or completeness of any information provided.
- 2.1.3 It is the Developer/Owner's responsibility to ensure that their Consultants and Contractors are familiar with the [VOL. 1 SEC. 9, PIPELINE AND UTILITY CROSSINGS](#) document produced by the Edmonton Area Pipeline and Utility Operators' Committee (EAPUOC). This document, entitled "GUIDELINES FOR WORKING NEAR BURIED FACILITIES" is available in its entirety from EAPUOC.
- The Developer/Owner shall, as a minimum, include the most recent version of the GROUND DISTURBER RESPONSIBILITIES and the FACILITY OWNER RESPONSIBILITIES.
- 2.1.4 The Developer/Owner shall meet with Strathcona County at the conceptual stage of the design process to ensure that all parties have an understanding of the design elements, timing, County concerns, standards and confirm the level of public input required prior to finalizing design.
- 2.1.5 The Developer/Owner shall coordinate a construction start up meeting with the County and the Developer/Owner's representative, contractor(s) and consultant(s) and any other affected stakeholder prior to construction. The objective of the construction start up meeting is to ensure there is a clear understanding of Strathcona County's requirements, any special considerations for the site, to establish a construction start date and agree on the progress schedule, and outline the subsequent inspection and coordination requirements and process for obtaining all required completion certificates.
- 2.1.6 The Developer/Owner shall inspect existing natural landscape features or those to be conserved, throughout development.
- 2.1.7 The Developer/Owner is responsible for location verification of all existing underground utilities, and is required to contact Strathcona County Utilities for specifically water, wastewater and stormwater infrastructure locates.
- 2.1.8 The Developer/Owner shall ensure the protection of the development area by installation of barricades, fencing, and signs as required for safety of the public, while ensuring no interference with existing utility infrastructure.

- 2.1.9 The Developer/Owner shall ensure that they have obtained a ROWCAP as well as other associated permits and agreements prior to construction of any project that affects Strathcona County infrastructure.
- 2.1.10 The Developer/Owner shall design, install, inspect and maintain all required ESC measures for the duration of the project and until the establishment of the surface landscaping.
- 2.1.11 For any changes during construction, the Developer/Owner shall submit three (3) copies of the affected drawings showing the proposed changes in red, for review and written acceptance by the County prior to implementation.
- 2.1.12 The Developer/Owner shall be responsible for the coordination of all inspection documentation during the construction and maintenance periods in accordance with this document.
- 2.1.13 The Developer/Owner shall verify that construction is complete prior to requesting a CCC inspection.
- 2.1.14 The Developer/Owner shall ensure the CCC/FAC process is followed in accordance with the Design & Construction Standards and the Development Agreement/Permit and Construction Contract. This process includes completion of an infrastructure summary for compliance with Tangible Capital Asset reporting requirements.
- 2.1.15 Upon construction completion of the work, Strathcona County requires that the Developer/Owner submit Record Drawings (three (3) complete full size paper drawing sets along with PDF and digital AutoCAD file versions) drawings in addition to a Licensed Engineer's certification that states: "(Engineer's name) has inspected the work laid out in (Reference to legal title, approval design drawings, reports, etc.) and certifies that the work has been constructed and will function as described."
- All as-constructed elevations and associated gradients are to be confirmed by field survey, noting company, survey personnel and date of survey. Any deviations from the approved elevations are to be noted and assessed by the Licensed Engineer for functionality with original grading design intent.
- The Record Drawings and certification must be stamped, signed and dated by a Licensed Engineer.
- 2.1.16 All Landscape Plans shall be stamped, signed and dated by a registered Landscape Architect who is a member in good standing with the Alberta Association of Landscape Architects.
- 2.2 ENGINEERING DESIGN BRIEF (IN CONJUNCTION WITH AREA STRUCTURE PLANS)**
- 2.2.1 Three (3) copies of the Engineering Design Brief (EDB) must be submitted as part of an ASP application, and must include at minimum, the following information:

- 2.2.1.1 Identification of any man made features such as highways, railways, major power lines, high pressure oil/gas pipeline and wellsites which may affect developable areas.
- 2.2.1.2 Identification of Municipal Reserves (MR), Environmental Reserves (ER), and Conservation Easements (CE) to ensure provision of location, planning and balancing of municipal reserves requirements within the total land dedication requirements.
- 2.2.1.3 A staging plan and discussion regarding any interim utility servicing, stormwater management, access or intersection proposals.
- 2.2.1.4 Overall road layout of local roads, minor and major collector roads, intersections with arterial roads, road ROW widths, and cross-sections.
- 2.2.1.5 A Transportation Impact Analysis (TIA) for all developments that result in more than 100 peak hour trips. The TIA is required to detail: trip generation rates; morning and afternoon peak turning volumes at all collector/collector intersections, arterial road access points, and any other surrounding intersections/road segments that may be impacted by the development; projected daily volumes; and proposed traffic control strategy and/or traffic control modifications for the aforementioned locations that will be required to accommodate the development traffic.
- 2.2.1.6 Overall conceptual plans identifying general alignments of the water, sanitary and storm sewer mains, overall surface grading design and major drainage routes together with a discussion.
- 2.2.1.7 A Hydraulic Network Analysis (HNA) shall be completed in accordance with the design criteria found in [VOL. 1 SEC. 4.3, WATER DISTRIBUTION SYSTEM](#). The HNA must include an analysis of the average day, maximum day, and peak hour demand scenarios, as well as a fire flow scenario. The HNA must address potential staging of the infrastructure and include an analysis of both interim and ultimate servicing conditions
- 2.2.1.8 A wastewater system evaluation shall be completed in accordance with the design criteria found in [VOL. 1 SEC. 4.2, SANITARY SEWER SYSTEMS](#). The evaluation must address the available capacity in the downstream receiving systems, clearly delineate the proposed drainage basins, address potential staging of the infrastructure and include an analysis of both interim and ultimate servicing conditions.
- 2.2.1.9 A stormwater management analysis shall be completed in conformance with an approved master drainage plan or watershed study for the total drainage basin(s) in which the ASP is located. The analysis must examine the existing storm basin(s), identify any issues or constraints, examine pre- and post-development conditions, and recommend the location of stormwater management facilities, storage volumes and allowable discharge rates.

The proposed stormwater management scheme must include: an overall plan depicting the storage facility location, its drainage basin, and the downstream receiving stream; supporting detailed hydrology and hydraulic calculations for the facility and including an analysis of the capacity of the downstream receiving channel; preliminary facility cross-section and details of inlets and outfall control structure; description of stormwater quality improvement methods to be incorporated and erosion and sedimentation control works proposed.

If the implementation of the scheme is to be staged, the staging method should be presented. Upon acceptance by Strathcona County, this information will need to be submitted by the Developer's Consultant to Alberta Environment and Parks for Water Act approval.

- 2.2.1.10 A topographical map with 0.5m contour intervals is to be included.
- 2.2.1.11 A Noise Impact Assessment (NIA) using a noise prediction model acceptable to Strathcona County. The assessment must address and present and future noise levels, and identify measures required to adequately maintain noise to within Strathcona County's standard.
- 2.2.1.12 The results of a Geotechnical/Hydrogeological Investigation completed by a qualified geotechnical engineering firm. At this stage, the level of detail of this investigation should be to an extent sufficient to allow the Engineer to generally assess the site's geotechnical/hydrogeological conditions and their effect on the development and whether or not any contamination exists. The report should outline their findings and any general recommendations as well as address the following:
- (i) Identify areas of high water tables.
  - (ii) Identify conditions that will require special design considerations.
  - (iii) Identify the limits of any potential site contamination and outline the process for site remediation to be completed.
  - (iv) Soil alkalinity (sulphate levels) and resistivity test results and recommendations regarding concrete to be used and corrosion protection.
  - (v) Identify any previously disturbed soil locations (i.e. abandoned water/sewer trenches, borrow pits, etc.).
  - (vi) Identify any conditions that will have special operation and/or maintenance implications.
  - (vii) Top of bank setbacks adjacent to Creeks or ravines to address slope stability requirements.
  - (viii) Suitability of existing soils for proposed SWMF locations and any associated design constraints and/or special construction requirements (i.e. stability of side slopes, linear requirements, water seepage, etc.).

The Developer may choose to complete the detailed Geotechnical/Hydrogeological Investigation (as outlined under [SUBSECTION 2.3.1.3 OF THIS SECTION](#)) at the ASP stage.

- 2.2.1.13 If a Creek or major water course runs adjacent to or crosses the site, the 1:100 year floodplain must be identified along with confirmation that it is outside of any proposed development areas.



2.2.1.14 In the event that the Design & Construction Standards or Provincial requirements are amended prior to commencement of construction within the ASP, the Developer may be required to update a portion or all of the EDB in order to align with the changes, to the satisfaction of Strathcona County.

2.2.2 The Developer/Owner will arrange and negotiate any and all easements across private lands, private utility crossing agreements and other similar agreements which may be needed with land owners in the area.

Strathcona County will only become involved if a mutually agreeable solution cannot be reached through negotiation between the parties involved and the viability of an approved subdivision is jeopardized. Note: A Development Agreement must be in place before any action can be taken by Strathcona County.

## 2.3 ENGINEERING REQUIREMENTS FOR SUBDIVISION APPLICATION

2.3.1 The following information must be submitted as part of the subdivision application for each stage of development within an ASP:

2.3.1.1 A covering letter indicating the subject and purpose of the application, an estimated construction starting date, and tentative project schedule and completion date. Attached to the covering letter shall be a:

- (i) [VOL.1 SEC.8, FORMS – ACCEPTANCE OF DETAILED ENGINEERING AND LANDSCAPE DRAWINGS – APPLICATION](#) which must be stamped and signed by a Licensed Engineer as well as by a Landscape Architect.
- (ii) [VOL.1 SEC.8, FORMS – EXTENSION TO A WATERWORKS, WASTEWATER OR STORM DRAINAGE SYSTEM – NOTIFICATION](#) which must be stamped and signed by a Licensed Engineer. This application is required for submittal by Strathcona County to Alberta Environment and Parks under EPEA.

2.3.1.2 Seven (7) complete paper sets of the engineering drawings. Sets which do not contain the required drawings as outlined in [VOL. 1 SEC. 3, CAD STANDARDS](#) will not be accepted for processing.

2.3.1.3 Three (3) paper copies and one (1) PDF format of a Geotechnical/Hydrogeological Report presenting the results of a field investigation completed by a Licensed (geotechnical) Engineer. Unless completed with the EDB, the level of detail of this investigation, analysis, and report is more extensive and shall address the following:

- (i) Estimate weeping tile flow rates.
- (ii) Provide detailed recommendations for design and construction of roadways, pavement structure designs, deep and shallow utilities, site grading, stormwater management facilities, and buildings.
- (iii) Provide recommendations for private septic systems in accordance with Provincial regulations, where applicable, based upon existing ground water table and soil conditions outlined within the report.
- (iv) Include an overall plan illustrating developable and undevelopable areas.

- (v) Clearly identify the limits of any site contamination and provide detailed site remediation to be completed.
- 2.3.1.4 Developer shall by letter, verify the proposed stage of development compiled with previous reports and the accepted EDB. The status of associated subdivision approval processes and any variances are to be clearly listed and potential impact defined.
- 2.3.1.5 Additional technical detail required to satisfy the conditions of subdivision approval.
- 2.3.1.6 A lump sum cost estimate for each itemized portion of proposed Underground Improvements and Aboveground Improvements will be required.
- 2.3.1.7 Copies of all letters of application for all applicable approvals, permits, licenses, or agreement from Provincial, Federal or private agencies.
- 2.3.1.8 Copies of the formal approvals, permits, licenses and/or agreements must be received by the Developer/Owner before construction commencement.
- 2.3.2 Upon acceptance of the proposed servicing schemes by Strathcona County, this information will need to be submitted by the Developer's Consultant to Alberta Environment and Parks for Water Act Approval.
- 2.3.3 The Developer's Consultant must also make an application to Alberta Environment and Parks under EPEA for the registration or authorization of any proposed SWMF. The County will provide a letter of support for the Developer's application upon request from their Consultant.
- 2.3.4 Engineering drawings shall be submitted a minimum of eight (8) weeks before the proposed start-up date of construction.
- 2.3.5 Upon acceptance of the engineering drawings by Strathcona County the Developer/Owner shall within two (2) weeks submit a digital (AutoCAD) copy of the accepted engineering drawings to the County.
- 2.3.6 The Developer/Owner shall ensure that copies of all formal and up to date approvals, permits and licenses are available onsite at all times when construction activities are taking place.

## 2.4 SINGLE-LOT COMMERCIAL, INDUSTRIAL, AND MULTI-FAMILY DEVELOPMENTS (DEVELOPMENT PERMIT APPLICATIONS)

2.4.1 Along with the requirements as set out within the Land Use Bylaw, and other sections of this document which refer to municipal infrastructure, this section shall guide Developer/Owners and their consultants in the preparation of on-site engineering drawings and the subsequent authorization for construction process to facilitate Project Completion and the release of securities at the end of the project. The Owner should be aware that all on-site systems require routine maintenance to ensure proper operation. It is the responsibility of the Owner to ensure their infrastructure is installed and maintained as required by the manufacturer and/or as per good engineering and housekeeping practices.

2.4.2 The applicant will be required to submit a detailed letter of intent to explain the overall proposed development and describe the anticipated on-site operations (indoor and outdoor), including the hours of operation and number of employees, along with transportation details including details of largest expected (design) vehicle; estimated daily and peak hour traffic (all passenger vehicle and truck traffic).

2.4.3 Five (5) complete sets of metric, full sized/scaled (minimum 1:1000 scale) detailed engineering drawings are required to be submitted for any single-lot Commercial/Industrial/Multi-Family Developments is required as part of a Development Permit application. All engineering drawings are to be stamped, signed, and dated by a Professional Engineer, Professional Licensee in (Engineering) or a Professional Technologist (Engineering) accredited by ASET and/or APEGA to practice Civil Engineering.

2.4.4 The coordinated engineering drawing package must include the following plans and information:

### 2.4.4.1 Site Plan

- (i) North arrow, municipal address and legal land description (i.e. Lot, Block, and Plan or ¼ Section)
- (ii) Property lines and dimensions
- (iii) Adjacent roadways (including curbs, boulevards, street furniture etc.)
- (iv) Dimensions of proposed buildings and setbacks to property lines (front, rear and side yard dimensions)
- (v) Rights-of-ways and easements, if any
- (vi) Proposed parking and loading areas (including dimensions of typical parking spaces, drive isles, queuing lane(s), bicycle parking, etc.)
- (vii) Proposed Turning Templates, if applicable
- (viii) Proposed hard surface pavement and gravel surface structure details
- (ix) Proposed accesses to the site (including dimensions of width, radius and distance from intersection/other accesses and closest property line)
- (x) Proposed landscaping areas and details
- (xi) Proposed outdoor storage areas, if any
- (xii) Proposed and existing fences
- (xiii) Floor Area Ratio (FAR)/ Site Coverage

- (xiv) Lighting, location, height of light standards, fixture detail, illumination levels and wattage

#### 2.4.4.2 Overall Utility Plan

- (i) Show and label the type, size, slope and location of all existing municipal utility infrastructure adjacent to the site including any service connections to the property
- (ii) Show and label the type, size, slope and location of all existing utility infrastructure within the site (if applicable) and identify what is to remain or to be abandoned. Utility abandonment requirements/ specifications to be defined on the plan
- (iii) Location of all proposed onsite or offsite utility services (water, storm and sanitary) including pipe sizes, lengths and slopes, and both rim and invert elevations for all manholes and catch basins
- (iv) Proposed location of all shallow utilities (telephone, cable, power and gas) including locations of transformers, pedestals and other appurtenances
- (v) Include information on minimum vertical separations at pipe crossings which may be less than 0.5m from outside diameter of pipes
- (vi) Identify the sanitary sampling manhole which is required at the service connection to the site for all commercial and industrial uses
- (vii) Proposed location of hydrants and valves along with a note on the plans stating "All private fire hydrants are to be painted red in colour with black port caps."
- (viii) If the building is required to be sprinklered, show and label 125mm diameter Storz connection location(s) on the building. Storz connection must be located at a maximum of 45 metres away from an adjacent onsite/offsite fire hydrant. Fire flow and water network analysis calculations must also be submitted once available.
- (ix) Identify any oil/grit separator on the drawings and include summarized maintenance requirements for the proposed stormwater quality control measure
- (x) Location and details of any onsite stormwater management facilities including inlet and outlet pipes, discharge control structure complete with orifice details and sizing calculations, and outfall if applicable
- (xi) Where proposed utilities cross County road right-of-way, provide the method(s) of trenchless construction and indicate open pit excavation locations on the drawing. Type and length of casings to also be identified if applicable.
- (xii) Include list of construction material and installation specifications (i.e. pipes, fittings, methods of testing, bedding, compaction methods, etc.) in accordance with Strathcona County's Design & Construction Standards.
- (xiii) Include construction details for all proposed infrastructure (i.e. trenching/backfilling, manhole, catchbasin, watermain TVS connection, hydrant, valve, thrust blocks, orifice, etc.). Alternatively a separate plan can be provided to contain the details.
- (xiv) Include the following general notes to the site servicing plan as applicable:
  - Strathcona County prohibits any stormwater or groundwater sources being directed into the sanitary sewer system.
  - Strathcona County prohibits any direct potable water being discharged into the storm or sanitary sewer system without de-chlorination.

- Provision for a remote water meter reading device must be coordinated with the County's Utilities department, please contact (780-467-7785) to coordinate location and requirement details.
- Inspections of municipal utility connections (water, wastewater, and storm sewer) to existing main lines must be performed by Strathcona County, Planning & Development Services department, prior to backfilling. Please contact Planning & Development Services (780-410-6505) to coordinate all inspections, a minimum of 48 hours (business day) notice is required. The method of connection, materials, compaction, and other design and construction requirements shall be in accordance with the Strathcona County Design & Construction Standards.

2.4.4.3 Before designing on-site fire protection systems, a hydrant flow test must be conducted on a nearby hydrant to determine the flows available from the Strathcona County water system. The on-site system must then be designed based on this existing condition information. The Strathcona County Utilities department must be contacted before this testing is done and coordinated with them.

2.4.4.4 The Strathcona County Fire Marshall must be contacted to determine on-site hydrant requirements. Fire flow and water network analysis calculations must be submitted.

2.4.4.5 Site Grading Plan

- (i) Existing contours complete with labels
- (ii) Existing sidewalk, curb and gutter, and/or edge of pavement elevations for the adjacent roadway(s)
- (iii) Proposed finish grade elevations that include:
  - Building main floor, bottom of footing and adjacent finished ground around the perimeter of the building
  - Along the property line at all lot corners and all high/low points (noting that elevations should match the approved subdivision lot grading plan if one exists, alternatively should match existing contours)
  - Hard surface areas at top and bottom of curbs, high and low points, grade breaks, access curb returns and other relevant locations
  - Bottom (invert) and top of ditches or swales at regular intervals or at any changes in slope
  - Major ponding spill over and overall site spill over location(s)
- (iv) Proposed slopes (as a percentage); between provided elevation points listed above, in landscaped areas, along access curb returns, access centerline from highpoint to concrete swale and for ditches/swales
- (v) Proposed location of all catch basins and manholes with their associated rim elevations
- (vi) Limits of any on-site stormwater management retention/ponding areas including ponding elevation at both the maximum and design depths

- (vii) Location of existing and/or proposed retaining walls including top and bottom of wall elevations noting that any retaining walls over 1.0m will also require a structural engineering design detail to be included
- (viii) Define major overland drainage flow paths within the site and site spillover location(s) using larger directional flow arrows
- (ix) Identify existing and proposed ditches, swales and culverts within and/or adjacent to the site. Provide a cross-section detail for proposed ditches/swales. Also include culvert invert elevations, material, size, length, slope, capacities and end treatment details.
- (x) Location and details of any adjacent stormwater management facilities including water level elevations (i.e. NWL, HWL and freeboard)

#### 2.4.4.6 Stormwater Management Plan

- (i) Limits of onsite stormwater management retention/ponding area(s), including maximum ponding elevation, catch basin rim elevation and associated design depth of ponding and maximum depth of ponding (maximum ponding depth within accessible areas to be limited to 300 mm). For most commercial, industrial or multi-family development, onsite stormwater storage is required for the 1:25 year event where the lot is already serviced by a municipal stormwater management facility. Where no municipal stormwater management facility exists, the development will be required to accommodate 1:100 year event storage. You are required to confirm specific site requirements with Strathcona County prior to design.
- (ii) Identify all catchment boundaries for each retention/ponding location and indicate the catchment area in hectares
- (iii) Show all major overland flow paths within the site and the site spill over location
- (iv) Stormwater management calculations including runoff calculations for any applicable storm design event, required and provided storage volumes calculations and orifice sizing and maximum discharge calculations, noting that calculations shall be based on the ultimate development plan including any future building or parking additions.
- (v) Identify the maximum allowable stormwater discharge rate from the site into the adjacent storm system or natural drainage course. Plans must also indicate how the release rate was determined.
- (vi) Location, details and cross-sections of any dedicated stormwater management facilities including inlet pipes, outlet pipes and any stormwater discharge control structure and outfall details, if applicable.
- (vii) Calculations showing the depth, velocity and flow in the overflow swale for events exceeding the 1:25 year event may also be required.

Each site will be unique in its stormwater management and how it complements and interacts with the existing system. Strathcona County may request additional information than what is presented in this document.

- 2.4.4.7 Erosion and Sediment Control (ESC) Plan
- (i) Required for sites over 2.0 Ha. Strathcona County may, at its discretion, require an ESC Plans for sites smaller than 2.0 Ha if deemed appropriate due to unique site characteristics or proximity to a water body or environmentally sensitive areas
  - (ii) Existing ground contours elevations within and around the proposed development
  - (iii) Limits of proposed stripping and grading area(s)
  - (iv) Stockpile locations complete with approximate dimensions, height, side slopes and volumes
  - (v) Proposed grading elevations and direction of surface drainage complete with slopes (percentage)
  - (vi) Proposed temporary gravel access pad to reduce mud tracking
  - (vii) Contractor pump-out and dewatering locations to be identified complete with appropriate ESC measures
  - (viii) All proposed ESC control measures complete with locations and limits
  - (ix) Offsite and onsite surface water management including contractor pump-out and dewatering locations are to be identified complete with appropriate ESC measures
  - (x) Construction details for proposed ESC measures
  - (xi) Decommissioning details and timing for proposed ESC measures
  - (xii) General notes on the drawing identifying the frequency of required ESC inspections, inspection and maintenance record keeping requirements, emergency contact person and contact information and other good housekeeping requirements (i.e. street cleaning, dust suppression etc.)
- 2.4.4.8 Landscape Plan
- (i) Existing and proposed plant material (include planting list identifying common and scientific plant names, quantity, size and additional remarks or conditions to be considered at planting)
  - (ii) Plant material labels
  - (iii) Minimum planting requirements and total proposed quantities of trees and shrubs (quantities can be displayed in a table or list form).
  - (iv) Show and label all swales and ensure that floatable material is not permitted within flow routes
  - (v) Alignment of all deep and shallow underground utilities and associated surface appurtenances
  - (vi) Include list of minimum utility setbacks as per [VOL. 1 SEC. 6, OPEN SPACE STANDARDS, SUB-SECTION 6.4.2.1](#)
  - (vii) Existing and proposed fencing type, location and detail(s)
  - (viii) Location of signage
  - (ix) Details for all landscape elements (fence, bollards, benches, trash receptacles, tree planting, and shrub planting details, etc.)
  - (x) Note indicating that the site must be maintained free of noxious and nuisance weeds at all times
  - (xi) Note on plan that the landscaping (topsoil, sod or seed) is to include the area from the private property line to the road edge

- (xii) Detailed landscape plans are to be stamped, signed, and dated by a Landscape Architect who is a full member, in good standing, of the Alberta Association of Landscape Architects
- 2.4.5 For any service requests which are not part of an associated Development Permit, the applicant must contact Planning & Development Services and arrange to prepare a water, sanitary and storm sewer service application and a non-refundable fee or levy may apply. A plan will be required to present the design of the service connections and utility lines in accordance with Strathcona County requirements. A sanitary sewer sampling manhole and water shutoff valve will be required at the property line.
- 2.4.6 For any access modifications or requests which are not part of an associated Development Permit, the applicant must contact Transportation & Agricultural Services and submit an access application with a non-refundable fee and a deposit where applicable. A plan may be required to present the design of the access structure, geometry and location.
- 2.4.7 Developments that generate in excess of 100 peak hour trips will be required to submit a Transportation Impact Assessment (TIA). See [SUB-SECTION 2.2.1.5 OF THIS SECTION](#).
- 2.4.8 Developments that may generate excessive noise adjacent to existing residential areas may be required to submit a Noise Impact Assessment (NIA). The NIA will determine potential effects to nearby residents and measures that may be required by the developer to maintain noise levels to Strathcona County standard.
- 2.4.9 Developer may be required to pay offsite levies as specified in the most recent Offsite Development Levies Bylaw, which may be amended from time to time.
- 2.4.10 Developer may be subject to Contribution In Aid of Construction (CIAC) for any improvements to County infrastructure that will be required as part of the development.
- 2.4.11 Securities:
  - 2.4.11.1 A cost estimate will be required for each itemized Underground and Aboveground Improvements.
  - 2.4.11.2 The applicant will be required to submit a security deposit or letter of credit as per the Land Use Bylaw for the assurance of utility servicing, stormwater management and surface drainage.
  - 2.4.11.3 Once construction has been completed, a site inspection with Strathcona County is required. Once record drawings are accepted, and any site deficiencies rectified, the Project Completion Certificate will be issued by the County and the security deposit for the assurance of onsite utility servicing and surface drainage may be released.



- 2.4.12 Enforcement:
- 2.4.12.1 The development and/or building permit will not be issued until the engineering plans have been accepted by Strathcona County.
- 2.4.12.2 Onsite construction may not commence until the development and/or building permit has been issued, and the engineering plans have been formally accepted by Strathcona County.
- 2.4.12.3 Once the engineering plans have been accepted and prior to construction, we require a copy of the construction schedule be submitted, along with a 48-hour notice of pre-construction, to the attention of the Planning & Development Services department.
- 2.4.12.4 In case of design changes during construction, submit three (3) copies of the affected drawings showing the proposed changes in red for review and acceptance prior to implementation.

## 2.5 CAPITAL WORK PROJECTS

- 2.5.1 The following will be submitted as part of the application for detailed engineering design approval for capital work projects:
- 2.5.1.1 A covering letter indicating the subject and purpose of the application, an estimated construction starting date, tentative project schedule and completion date. Attached to the covering letter shall be a:
- (i) [VOL.1 SEC.8, FORMS – ACCEPTANCE OF DETAILED ENGINEERING AND LANDSCAPE DRAWINGS – APPLICATION](#) which must be stamped and signed by a Licensed Engineer as well as by a Landscape Architect.
  - (ii) [VOL.1 SEC.8, FORMS – EXTENSION TO A WATERWORKS, WASTEWATER OR STORM DRAINAGE SYSTEM – NOTIFICATION](#) which must be stamped and signed by a Licensed Engineer. This application is required for submittal by Strathcona County to Alberta Environment.
- 2.5.1.2 Seven (7) complete paper sets of the engineering drawings. Sets which do not contain the required drawings as outlined in [VOL. 1 SEC. 3, CAD STANDARDS](#) will not be accepted for processing.
- 2.5.1.3 Three (3) paper copies and one (1) PDF format of a Geotechnical/ Hydrogeological Report presenting the results of a field investigation completed by a qualified geotechnical engineering firm. At this stage, the level of detail of this investigation, analysis, and report should be much more extensive than at the ASP stage and address the following:
- (i) Identify areas of high groundwater tables and estimate weeping tile flow rates.
  - (ii) Identify conditions that will require special design considerations.
  - (iii) Provide detailed recommendations for design and construction of roadways, pavement structure designs, deep and shallow utilities, site grading, storm water management facilities and buildings.
  - (iv) Clearly identify the limits of any site contamination and outline the site remediation to be completed.

- 
- (v) Soil alkalinity (sulphate levels) and resistivity test results and recommendations regarding concrete to be used and corrosion protection.
  - (vi) Identify any previously disturbed soil locations (i.e., abandoned water/sewer trenches, borrow pits, etc.).
  - (vii) Identify any conditions that will have special operation and/or maintenance implications.
- 2.5.1.4 Copies of all letters of application for all applicable approvals, permits, licenses, or agreement from Provincial, Federal or private agencies.
- 2.5.1.5 Copies of the formal approvals, permits, licenses or agreements must be received before construction commencement.

### **3.1 INTRODUCTION**

#### **3.1.1 Computer Aided Design (CAD)**

For the purpose of this document Computer Aided Design (CAD) Standards are defined as guidelines, standard operating procedures and rules used in the production, maintenance and delivery of CAD data and/or drawings in the electronic environment.

### **3.2 PROJECT DELIVERY**

#### **3.2.1 Project Start-Up**

This Project Delivery section covers how a project comes to Strathcona County. All aspects of how this is done will be covered. Any projects done in Strathcona County must use the standards contained herein.

#### **3.2.2 Project Software**

Strathcona County will not supply or accept version formats that are no longer supported by AutoDesk®. This is further defined as the current version, plus 3 previous versions. For example; if the current release is version 2012, we accept 2012, 2011, 2010, and 2009 format files.

#### **3.2.3 Project Files**

During life cycle of a project, Strathcona County requires the digital plans to be submitted twice. First, when the paper copies have been approved for construction, the digital plans must be submitted before the drawings are released. The second time is for the As-built drawings. There will be an FTP site where drawing files will be placed for Transmit Files where internet access is possible.

The following people can give you access to the FTP site:

FTP	=	<a href="ftp.strathcona.ca">ftp.strathcona.ca</a>
Project	=	Project Manager (use their contact information)
Drawing	=	<a href="mailto:PlanSubmission@strathcona.ca">PlanSubmission@strathcona.ca</a>
CAD	=	Manager ( <a href="mailto:CAD.Manager@strathcona.ca">CAD.Manager@strathcona.ca</a> )

After file has uploaded, e-mail the designated contact person with the following information:

- Project Location:
- Name:

Here are some things not to do:

- No files are to be presented as an executable (.EXE extension).
- The files should not be protected by a password except in the case of compressed files transmitted via the FTP site.
- The files should not contain an electronic signature.
- The drawing should not contain hyperlinks.

As a last resort, compact disks (CDs) may be delivered to the designated contact person.

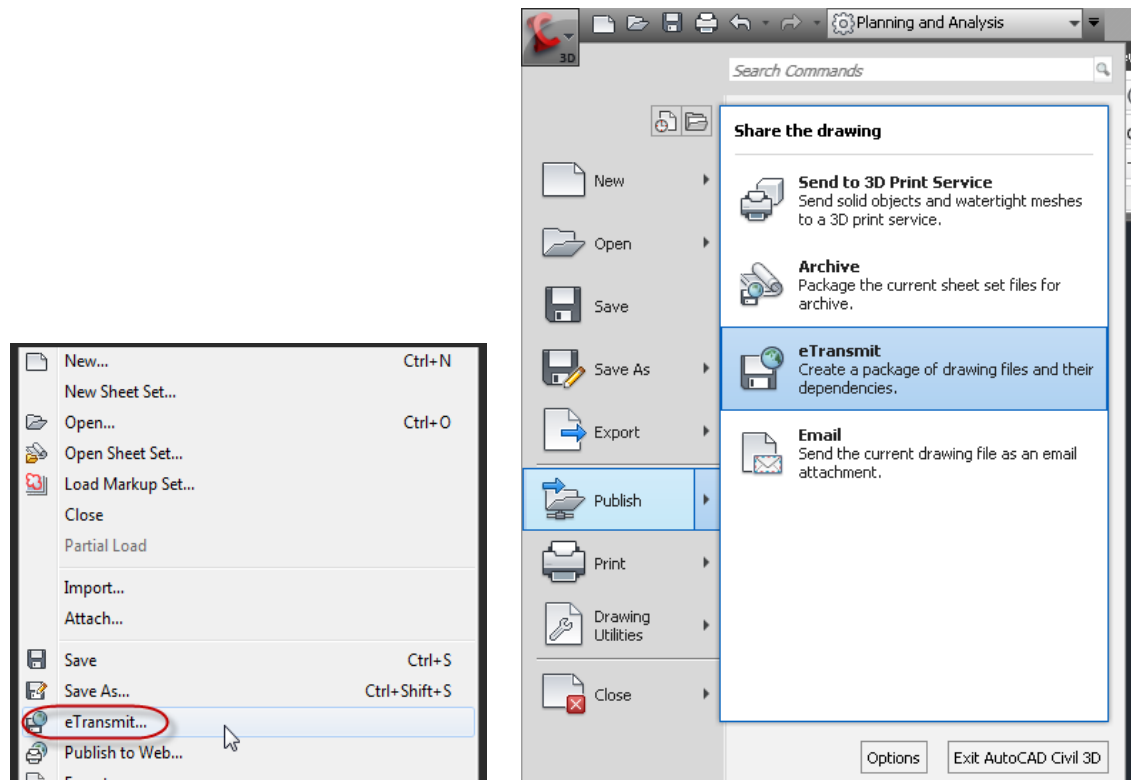
#### 3.2.3.1 eTransmit Command

If you are using the AutoCAD® or AutoCAD® Civil 3D® software, please use the eTransmit command.

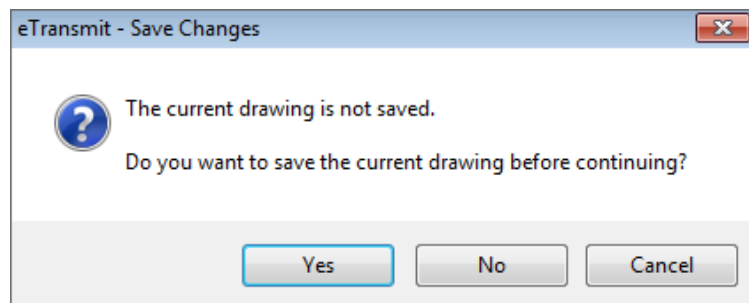
Creating an eTransmit allows you to gather all information required to send a set of drawings to someone else, including xrefs, image files, the AutoCAD Civil 3D software's data shortcuts, fonts, .CTB files and printer .PC3 files. You can also use eTransmit to archive a set of drawings, bind multiple drawings with xrefs and purge multiple drawings.

#### 3.2.3.2 eTransmit Procedure

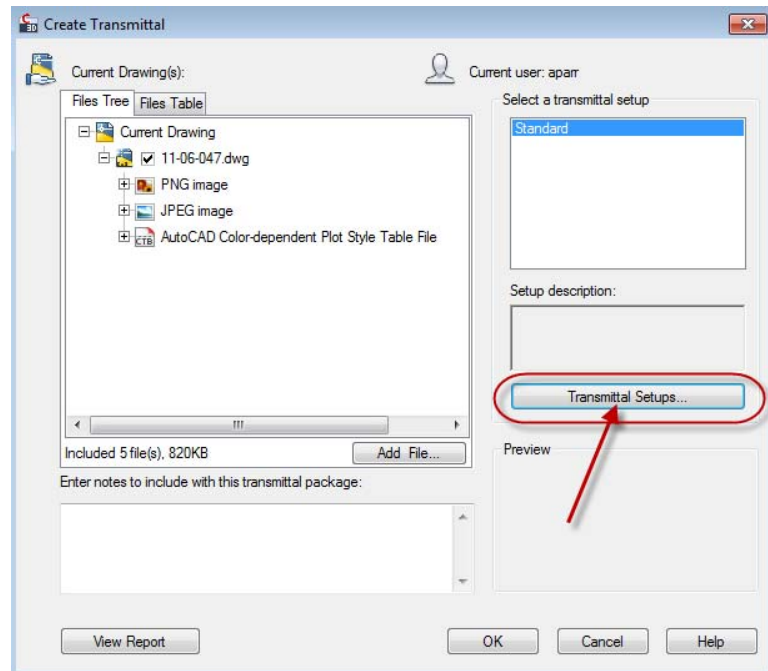
- (i) To use the eTransmit functionality within the AutoCAD or AutoCAD Civil 3D software, you need to open the drawing that you want to send and save then it.
- (ii) You can launch the eTransmit command by expanding the File menu and selecting eTransmit.
  - You could also type eTransmit in the AutoCAD software's Command Line.
  - You can also launch it by expanding the Application Menu, expanding the Publish flyout, and selecting eTransmit.



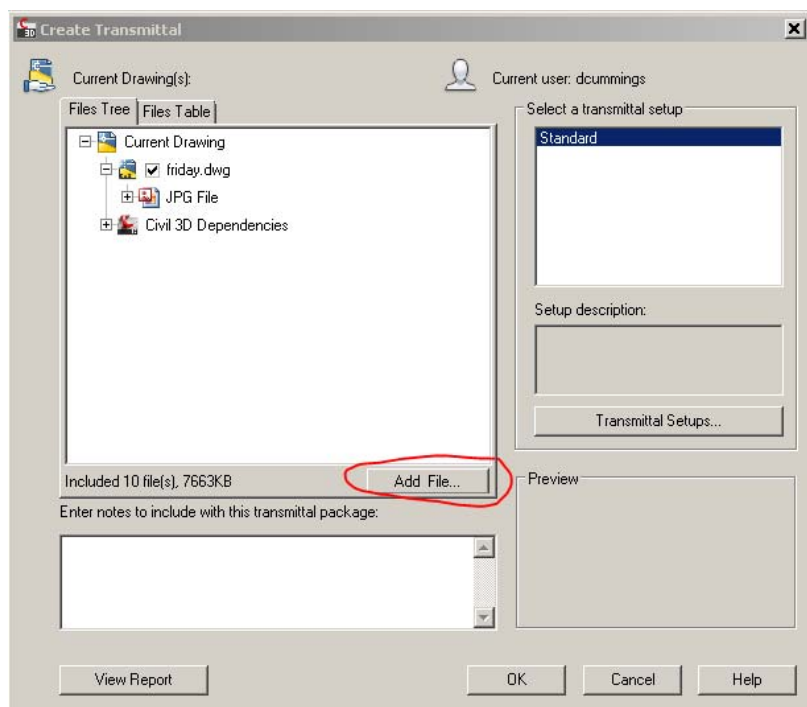
- (iii) If the drawing was not been saved after it was opened, the AutoCAD software displays the following message:



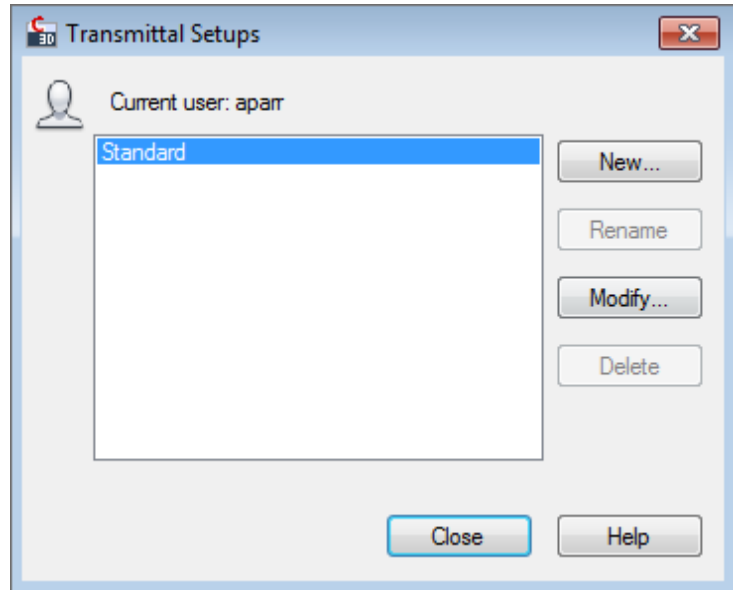
- (iv) Once the drawing has been saved, the Create Transmittal dialog box opens. Click the Transmittal Setups... button.



- Note: If more than one drawing is going to be sent (which is typical), you can use the Add File button to select multiple .DWG™ files. All reference files will automatically be added to the package.



- (v) In the Transmittal Setups dialog box, you can create new settings or modify the existing settings (called Standard). Click the Modify... button if you want to modify the existing Standard setup.



- (vi) In the Modify Transmittal Setup dialog box, set the following settings:
- Transmittal package type: Set to Zip (\*.ZIP). The \*.EXE file should not be selected because most anti-virus programs will not allow these files to be sent.
  - File format: Set to Keep existing drawing file formats.
  - Maintain visual fidelity for annotative objects check box: Select this option to specify whether drawings are saved with their visual fidelity for annotative objects.
    - Annotative objects might have multiple scale representations.
    - If the check box is selected, any annotative objects are decomposed and any scale representations are saved to separate layers. These are named based on their original layer and appended with a number.

- Transmittal file folder: Specifies the location in which the transmittal package is going to be created. It lists the last nine locations in which transmittal packages were created.
  - To specify a new location, click the Browse button (on the right) and navigate to the required location.
  - If this field is not changed, the transmittal file is created in the folder containing the first specified drawing file. In a sheet set context, the transmittal file is created in the folder containing the sheet set data (.DST) file.
- Transmittal file name: Specifies the method of naming the transmittal package and displays the default file name for the transmittal package. (This option is not available if the transmittal package type is set to Folder.)
- Path options: Includes options for organizing the files and folders that are included in the transmittal package.
  - Select the Use organized folder structure option to duplicate the folder structure for the files being transmitted.
  - Select the root folder that is the top-level folder within the hierarchical folder tree of the project being sent.
- Actions:
  - Set default plotter to 'none': Select the check box to ensure that your printer/plotter settings are not relevant to the recipient.
  - Bind external references: Select the check box and select the Insert option.
  - Purge drawings: Select the check box. (The purge is done in silent mode; you will not receive any notifications when purged items in the drawings have been removed.)
- Include options:
  - Include fonts: Select the check box.
  - Include textures from materials: Select the check box.



- Include files from data links: Select the check box.
  - Include photometric web files: Select the check box.
  - Transmittal setup description: Enter a description that will be displayed in the Create Transmittal dialog box below the list of transmittal file setups. You can select any transmittal setup in the list to display its description.
- (vii) Click the OK button to close the Modify Transmittal Setup dialog box. Click the Close button to close the Transmittal Setups dialog box and return to the Create Transmittal dialog box.
- (viii) You can add notes at the bottom of the dialog box before clicking the OK button and creating the ZIP file at the specified location. You can go to that location in Windows Explorer, and double-click on the .ZIP file and see all of the files that it contains. You could also double-click on the \*.TXT file to read any notes and display the file structure.

### **3.2.4 Project Prints and Mark-Ups**

This process will remain the same.

## **3.3 COMPUTER AIDED DRAFTING STANDARDS**

The Computer Aided Drafting Standards section contains General Standards in which format, projection, blocks, layers and other general standards will be covered.

Strathcona County will supply a Drawing Template, which can be downloaded from the Strathcona County website.

### **3.3.1 Template**

The units will be set in metric, which means 1 unit = 1 metre.

Note: Strathcona County recognizes the difference between Engineering and Architectural drawings.

Strathcona County will only accept the following paper sizes:

B size (reductions) = 279mm x 431 mm (11" x 17")

D size = 609mm x 914mm (22"x34")

### **3.3.2 Data Specifications**

Projection	3 degree transverse Mercator (3 TM)
Origin	0, 0, 0 will be the standard origin for all digital spatial data.
Datums	Vertical – North American Datum of 1983 (NAD83) CGVD 28 Horizontal – NAD83 (Adopted)
Coordinates System	Easting and northing will be used to coordinate the location reference.
Spheroid	WGS84
Local Projections	For projects requiring strict ground measurements, a local projection will be provided by Strathcona County.
External Reference	(XREF's) will only be allowed if a transmit is used to transfer the drawing.
Raster Images	When separate raster images are included in a drawing, all related files containing images and information on coordinates, rotation angles, scaling, etc.(.TFW, .JGW, .SID, etc.) are to be provided.

### **3.3.3 Text Fonts**

Slanted lettering will be used for existing information.

Vertical lettering will be used for proposed information.

Vertical and Red (when printed on paper) lettering will be used for as-built information.

### **3.3.4 Text Style Standards**

All drawings using text styles must be created using the AutoCAD software's standard @shx or TTF font files (Simplex, Romans, etc.).

Text style heights must be set to Ø (not fixed) so they can be changed to suit different scaling requirements.

### **3.3.5 Naming Text Styles**

Naming text styles should have the following information in the name, usage and font name as shown in the following examples:

Notes_Romans	Text style with Romans used for notes.
Title_Arial	Text style with Arial used for titles.
TB-Title_Arial	Text style with Arial used for Title Block titles.

(See the Table for the rest of the examples.)

### **3.3.6 Text Height**

Standard text heights use the following:

Notes	2.0 mm
Detail_Header	7.5 mm
Dimensions	2.0 mm
Title Block header	4.5 mm
Annotations	2.0 m

The heights shown are 1:1 or finished Paper heights. The AutoCAD software's Annotative Scaling, or the AutoCAD Civil 3D software's labels, will exaggerate the heights for each viewport zoom level or scale. If neither is used, please scale the text heights by multiplying the finished plot scale by the heights listed above.

Example: 2.0 mm x 1000 scale = 2000 text height

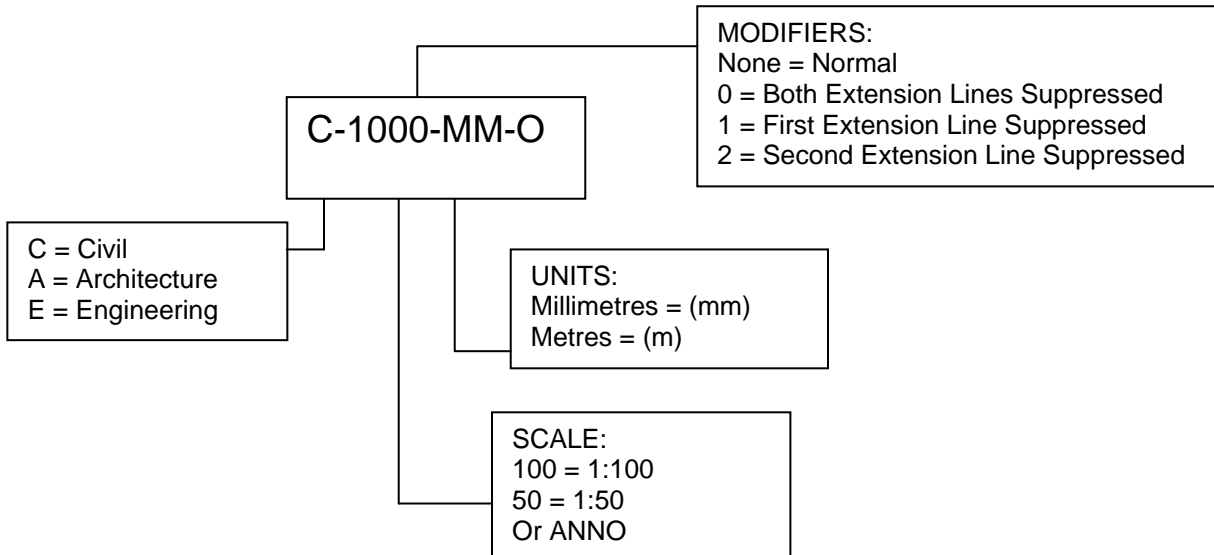
### **3.3.7 Dimension Style Standards**

Dimensioning entities must be done in model space and arrowheads must be used for dimension terminators.

### **3.3.8 Dimension Style Name**

The use of dimension styles should be uniform throughout every project drawing set. You must not override properties and the dimensions must be associative.

The format for creating dimension styles names is as follows:



Examples:

C\_1000\_mm\_0 Civil 1:1000 units (mm) normal  
C\_500\_m\_1 Civil 1:500 metres first extended on lines suppressed

If the Dim style uses the AutoCAD software's Annotative Scaling, use ANNO as the second value in the naming convention. Annotative Scaling allows the dimension style to work at all of the scales automatically.

For more information on Annotative Scale, use the following link:

<http://docs.autodesk.com/ACD/2010/ENU/AutoCAD%202010%20User%20Documentation/index.html?url=WS1a9193826455f5ff1bb1a0510dab2fb04a-7f64.htm,topicNumber=d0e109710>

### 3.3.9 Linetype Standards

Strathcona County will supply the LIN and SHX Files, which can be downloaded from the Strathcona County website. You can use LTSCALE and PSLTSCALE to control linetypes in a drawing.

The LTSCALE variable sets the global linetype scale factor. The PSLTSCALE controls the linetype appearance in Paper Space. ([see Section 3.7](#)).

### **3.3.10 Layer Naming Convention**

Strathcona County has a layering naming convention that must be adhered to. This is a basic tool for organizing and managing graphic information. The layers have been broken down into group, features and description.

### **3.3.11 Layer Structure**

The layer structure has been set up so that it is easy to transfer data into our Geographic Information System (G.I.S.).

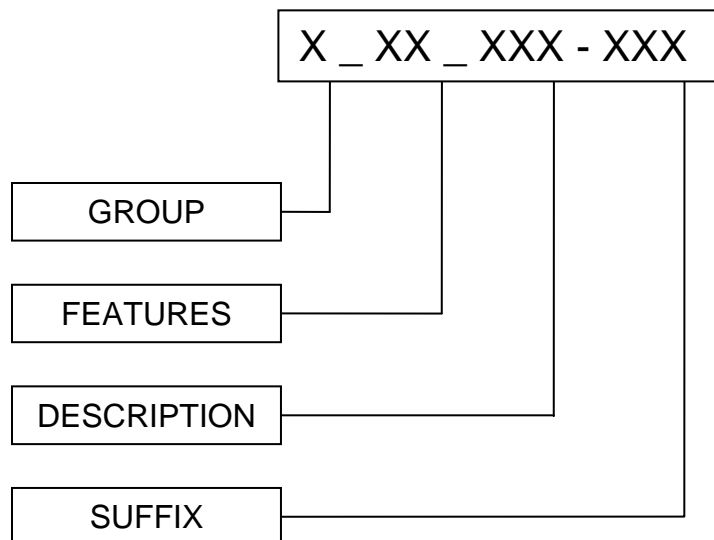
Group Field:            **X\_xx\_xxx**

The Group field is used to identify common types of drawing information.

Features Field:        **x\_XX\_xxx**

The Features field is used to subdivide the classifications created by the Group field to identify each layer more precisely.

Description Field:    **x\_xx\_XXX**

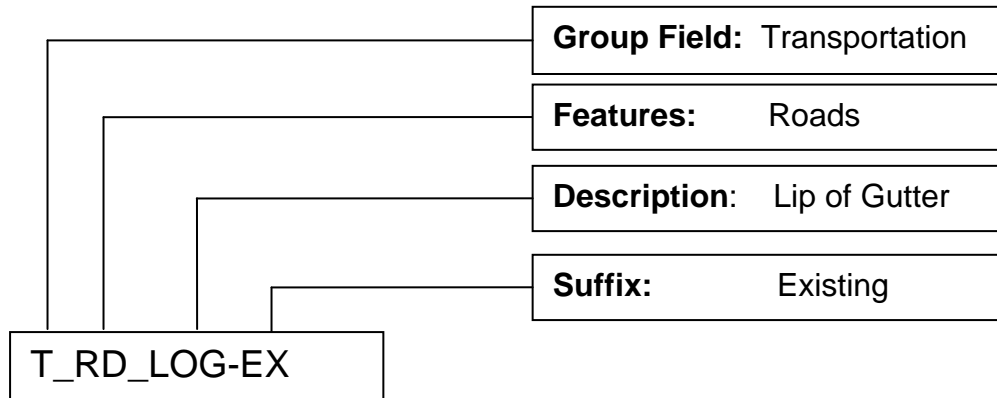


The Description field is used to identify the object materials.

Suffix Field:            **x\_xx\_xxx-XXX**

The Suffix field is used to identify the status of the objects.

Here is an example of the layer structure:



([See Section 3.7](#) for the standard layer list, which has a description of the full format.)

### 3.3.12 Layer Colors and Pen Weights

All objects shall have color and linetype set to “B-Layer”. Strathcona County has created a color-dependent plot style, which can be downloaded from Strathcona County’s website.

Here are some suggested line weight settings:

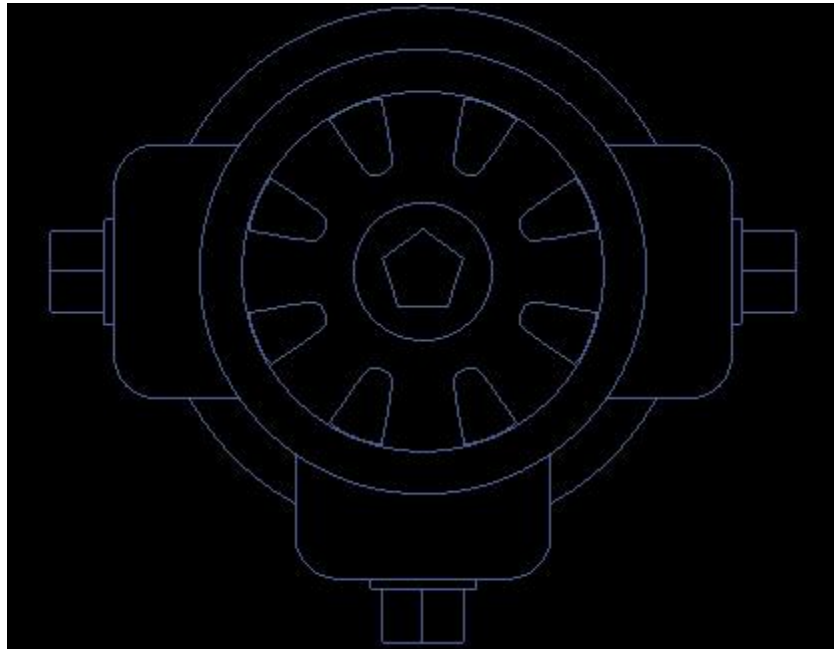
Extra Thin	0.100 (mm)
<u>Example:</u>	Centre Lines Grid Lines
Thin	0.15 to 0.25 mm
Medium	0.30 to 0.50 mm
Thick	0.60 to 0.70 mm
Extra Thick	0.75 to 1.00 mm

([See Section 3.7](#) for more information on Pen Weights.)

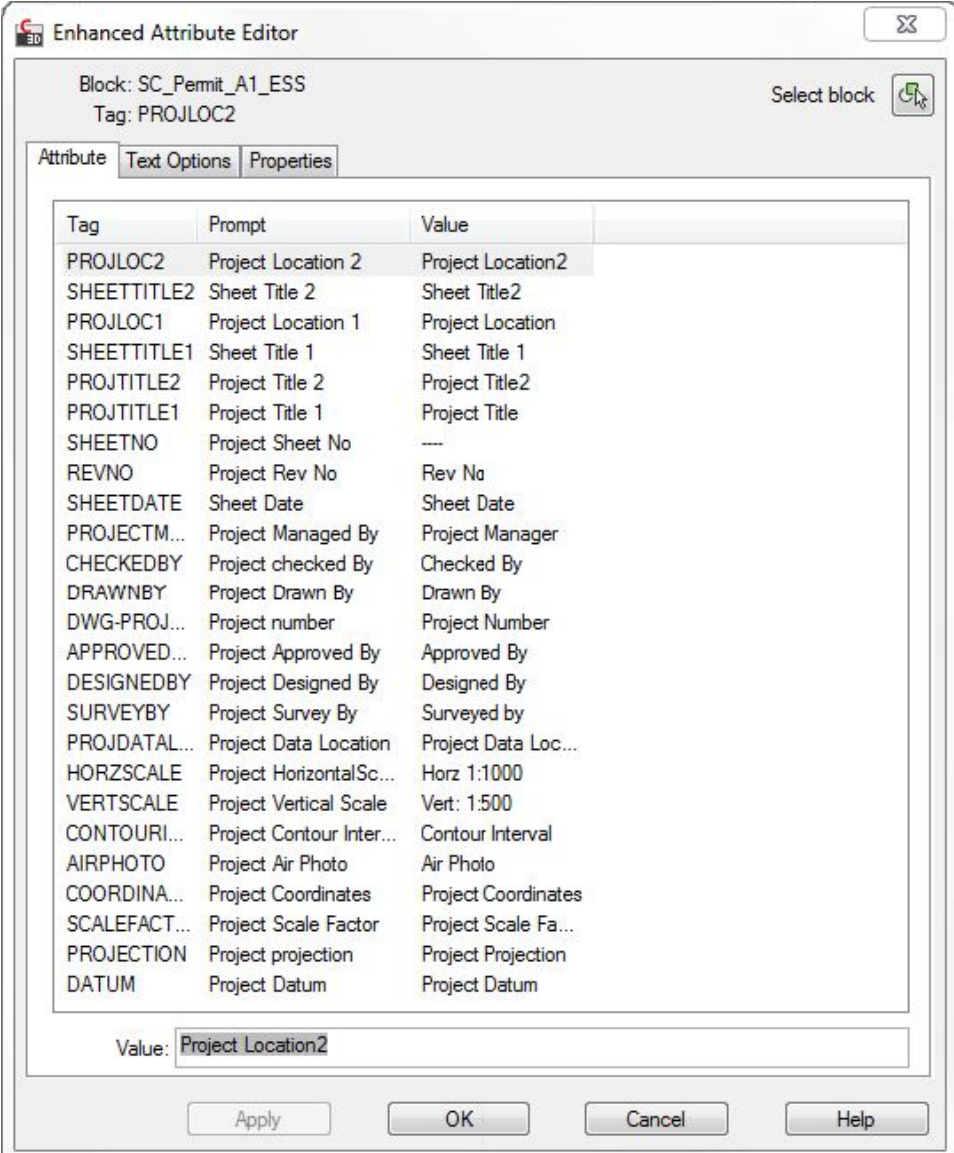
### 3.3.13 Block Standards

Blocks in the AutoCAD software are used to graphically represent objects in the CAD environment. Within a block there are different layers with different properties. There are many ways to create blocks, which can be used in distinct ways.

For example, this O fire hydrant symbol shows the top view, but when the same symbol is viewed in 3D orbit looks like a real fire hydrant. This is called a multi-view block.



Another example of a type of block is the title block. It uses enhanced attributes to fill its values. When the text is edited by only selecting one value it will opens a table allowing you to edit the text.



Enhanced Attribute Editor

Block: SC\_Permit\_A1\_ESS  
Tag: PROJLOC2

Select block

Attribute | Text Options | Properties

Tag	Prompt	Value
PROJLOC2	Project Location 2	Project Location2
SHEETTITLE2	Sheet Title 2	Sheet Title2
PROJLOC1	Project Location 1	Project Location
SHEETTITLE1	Sheet Title 1	Sheet Title 1
PROJTITLE2	Project Title 2	Project Title2
PROJTITLE1	Project Title 1	Project Title
SHEETNO	Project Sheet No	---
REVNO	Project Rev No	Rev No
SHEETDATE	Sheet Date	Sheet Date
PROJECTM...	Project Managed By	Project Manager
CHECKEDBY	Project checked By	Checked By
DRAWNBY	Project Drawn By	Drawn By
DWG-PROJ...	Project number	Project Number
APPROVED...	Project Approved By	Approved By
DESIGNEDBY	Project Designed By	Designed By
SURVEYBY	Project Survey By	Surveyed by
PROJDATAL...	Project Data Location	Project Data Loc...
HORZSCALE	Project HorizontalSc...	Horz 1:1000
VERTSCALE	Project Vertical Scale	Vert: 1:500
CONTOURI...	Project Contour Inter...	Contour Interval
AIRPHOTO	Project Air Photo	Air Photo
COORDINA...	Project Coordinates	Project Coordinates
SCALEFACT...	Project Scale Factor	Project Scale Fa...
PROJECTION	Project projection	Project Projection
DATUM	Project Datum	Project Datum

Value: Project Location2

Apply OK Cancel Help

Strathcona County has taken this approach so that all blocks will be drawn on the proper layers. This is done to control the block using layer properties. The block should not be exploded.

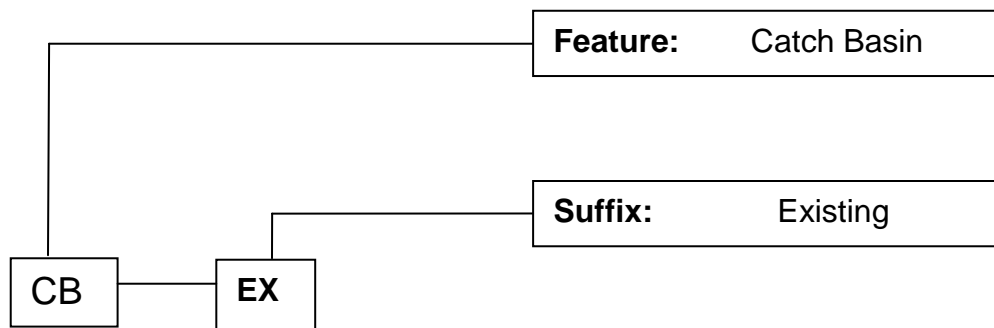


### 3.3.14 Block Library

Strathcona County has provided the Block Library [in Section 3.8](#) of this document. To get the digital file go to the Strathcona County website and download.

### 3.3.15 Block Naming

The block naming is simple. It is the name of the object with a suffix, such as in the following example:



### 3.3.16 Title Blocks

All Title Blocks will be supplied by Strathcona County and must be used for all projects submitted to Strathcona County.

See the examples in [Section 3.6](#) and download them from the Strathcona County website.

## 3.4 REQUIRED DRAWINGS

A complete set of construction drawings shall consist of separate drawings per the order index below (all that apply):

Index No.	Item Drawing	Classification No. Assigned
3.4.1	Front Cover	200
3.4.2	Drawing Index	201
3.4.3	General Legend	202
3.4.4	Land Acquisition or Legal Plan	203
3.4.5	Land Use	204
3.4.6	Lot Grading Plan	205

3.4.7	Lot Fill Plan	206
3.4.8	Road Overall (Road Information)	207
3.4.9	Neighbourhood Servicing Storm Plan	208
3.4.10	Design Table – Neighbourhood Servicing Storm Plan	209
3.4.11	Neighbourhood Servicing Sanitary Plan	210
3.4.12	Design Table – Neighbourhood Servicing Sanitary Plan	211
3.4.13	Neighbourhood Servicing Water Plan	212
3.4.14	Design Table – Neighbourhood Servicing Water Plan	213
3.4.15	Utilities Overall	214
3.4.16	Overall Pond Detail	215
3.4.17	Erosion and Sediment Control Plan	216
3.4.18	Power	217.01
	Telephone	217.02
	Shaw Cable	217.03
	Fibre Optic	217.04
3.4.19	Gas	218
3.4.20	Street Light Illumination	219
3.4.21	Traffic Signals/Pedestrian Crossings	220
3.4.22	Street Furniture and Pavement Markings	221
3.4.23	Plan Profiles	222
3.4.24	Roundabouts and Intersections	223
3.4.25	Road and Other Sections	224
3.4.26	Noise Attenuation Cross-Sections	225
3.4.27	Landscape	226
3.4.28	Entrance Features	227
3.4.29	Engineering Servicing Standard Details	228
3.4.30	Developable Areas	229
3.4.31	Removals – Depends on Project Size	230
3.4.32	Utility Drawing (Existing vs. New)	231
3.4.33	Pavement Markings/Signage	232
3.4.34	Utilities Crossing/Railway/Capital Region Sewer Line	233
3.4.35	One Open to Project Specific Not Otherwise Classified	235

### **3.4.1 Front Cover (200)**

- 3.4.1.1 This shall show the name of the subdivision, stage of development, and names of the Developer, Consulting Engineer, Landscape Architect and Strathcona County.

3.4.1.2 A Key Plan of Sherwood Park shall be included depicting the location of the overall development.

3.4.1.3 Identifying the stage of development to which the drawings apply.

### **3.4.2 Drawing Index Plan (201)**

3.4.2.1 A Key Plan to a small scale (i.e., 1:10,000), showing the location of the works in relation to major streets.

3.4.2.2 A drawing index table shall be provided and include the drawing titles and sheet numbers.

3.4.2.3 Plan and profile drawing reference and sheet numbers.

### **3.4.3 General Legend (202)**

3.4.3.1 This plan shall indicate and define all symbols and abbreviations used in the remainder of the engineering drawings.

3.4.3.2 Alternatively the County Engineer may grant approval to show legends on individual drawings as required.

### **3.4.4 Land Acquisition or Legal Plan (203)**

#### **3.4.4.1 Land Acquisition**

- Where the proposed construction of capital works is over private lands and requires a right-of-way, a separate land acquisition drawing will be prepared for every lot affected.
- The sketch is an attachment required with every "permission to enter" form and condition sheet signed by the owner.
- The drawing will be on an 11x17 or 8½x11 sheet of paper at a scale no less than 1:500 for small projects (in-house projects). An A1-sheet type will be used for development and road projects.
- The drawing shall include the legal lot information, parcel/lot numbers, adjoining properties and street names, and a north arrow.
- The civic address and registered owners will be listed in the bottom right corner above the title block.

- The plan will show the area of the proposed new right-of-way and of the total lot area through which the right-of-way will go.
- A dimension perpendicular to the adjacent lot line and any other dimensions required to clarify the extent of the proposed right-of-way will be shown.

**3.4.4.2 Legal Plan**

- Legal Plan is to the standards of Land Titles and Alberta Land Surveyors Consolidated Policies and Procedures manual for the submission of digital plans of surveys for registration.
- Proposed and existing monument with label. (Note: no monuments shall be destroyed during construction).

**3.4.5 Land Use (204)**

3.4.5.1 Add table with all indicated land use.

3.4.5.2 Scale of drawing.

**3.4.6 Lot Grading Plan (205)**

The plan shall highlight the following:

- 3.4.6.1 The proposed finished lot corner elevations, the proposed finished ground grade at key, the direction of flow of surface drainage on the lot, proposed curb alignments, and sanitary sewer and sump pump discharge line connection inverts at the properly line.
- 3.4.6.2 Lots requiring 1.0 metres or more of fill material.
- 3.4.6.3 Bench marks used in the construction of the project.
- 3.4.6.4 Existing contours at a 0.5 metre interval shown in a screened format.
- 3.4.6.5 Notes for builders drawing attention to foundation, weeping tile, and sump pump design considerations and cross-referencing the Geotechnical/Hydrogeological Report.

- 3.4.6.6 The direction of the overland major drainage system with heavy arrows, ponding areas and flow depths resulting from a 1:100 year storm.
- 3.4.6.7 Notes dealing with the roof leader discharge and extension requirements, the requirement for sump pumps in all houses and cross-referencing the applicable detail for the discharge piping.
- 3.4.6.8 Typical three dimensional detail drawings of the lot grading types depicting the house, required slopes around the house and lot grades. Each lot should be labelled to identify the detail applicable for it.
- 3.4.6.9 Localized low areas showing the maximum extent of ponding and maximum depth in metres.
- 3.4.6.10 Details of intersections with spot elevations at all critical points including grades and elevations of curb returns.

**3.4.7 Lot Fill Plan (206)**

- 3.4.7.1 The Lot Fill Plan of the construction works shall be to a scale of not less than 1:1,000.
- 3.4.7.2 The Lot Fill Plan will be included.
- 3.4.7.3 The following existing and proposed information shall be shown on the Lot Fill Plan:
  - Existing watercourses;
  - Pavement, curbs;
  - Ditches, culverts, storm sewers, manholes, cleanouts, inlet/outlet structures and Sanitary sewers, manholes, air relief valves, valves and cleanouts;
  - Water mains, valves, hydrants, pressure reducing valves (prv's), air relief valves, flushouts;
  - All pertinent property, right-of-way and easement lines;
  - Road allowance and easement dimensions;
  - Lot numbers and existing legal plan numbers;
  - One metre contour lines for slopes greater than 10% existing and proposed;
  - Power and telephone and street light poles;
  - Plan and profile drawing reference numbers;

- Gas mains, underground hydro, telephone, street lights and cable and their related appurtenances;
- Survey control monuments; and
- The limits of the project.

**3.4.8 Road Overall (Road Information) (207)**

- 3.4.8.1 All proposed road works, complete with offsets from road centreline, including: pavement, curbs, sidewalks and bus stops.
- 3.4.8.2 Stations of the BC and EC of road centreline and curb return horizontal curves together with the curve information, including delta angle, radius, tangent length, and arc length.
- 3.4.8.3 Where only a half road is being constructed, full width design cross-sections shall be provided as required to ensure the design suits the future development of adjacent properties.
- 3.4.8.4 Additional design details as required.

**3.4.9 Neighbourhood Servicing Storm Plan (208)**

The following existing and proposed information shall be shown on the Neighbourhood Servicing Storm Plan:

- 3.4.9.1 Existing watercourses.
- 3.4.9.2 Ditches, culverts, storm sewers, manholes, cleanouts, inlet/outlet structures and catch basins.
- 3.4.9.3 All pertinent property, right-of-way and easement lines.
- 3.4.9.4 Road allowance and easement dimensions.
- 3.4.9.5 Routing of all major storm flows including the 1:100 year storm.
- 3.4.9.6 The limits of the project.

- 3.4.9.7 All storm lines with identification written atop each line showing pipe size, diameter (in millimetres) and slope in %.
- 3.4.9.8 All manhole numbers shall be shown. These numbers must use the same numbering system used by Strathcona County when shown on as-built drawings but need not be used for construction drawings.

### **3.4.10 Design Table – Neighbourhood Servicing Storm Plan (209)**

The following general information shall be shown on the Storm design table:

- 3.4.10.1 Mannings n.
- 3.4.10.2 Time of concentration used Tc.
- 3.4.10.3 What design storm event is used and what intensity/duration/frequency data was used.
- 3.4.10.4 Depth of flow.
- 3.4.10.5 Various runoff coefficients used for parks, multi-family and residential.

The following specific information shall be shown on the Storm design table:

- 3.4.10.6 Upstream and downstream manholes.
- 3.4.10.7 Drainage Area (in hectares).
- 3.4.10.8 Runoff coefficient.
- 3.4.10.9 Runoff coefficient x drainage area (accumulated).
- 3.4.10.10 Time of concentration (accumulated).
- 3.4.10.11 Rainfall intensity for the above time of concentration.
- 3.4.10.12 Design flow in cubic metres/second.
- 3.4.10.13 Pipe capacity in cubic metres/second.

3.4.10.14 Velocity in metres/second.

3.4.10.15 Pipe diameter in millimetres.

3.4.10.16 Pipe slope in %.

3.4.10.17 Pipe length in metres.

The tables may be fit onto the page in as many sections as will still allow clear legibility of the print.

### **3.4.11 Neighbourhood Servicing Sanitary Plan (210)**

The following existing and proposed information shall be shown on the Neighbourhood Servicing Sanitary Plan:

3.4.11.1 All pertinent property, right-of-way and easement lines.

3.4.11.2 Road allowance and easement dimensions.

3.4.11.3 The limits of the project.

3.4.11.4 All sanitary lines with identification written atop each line showing pipe size, diameter (in millimetres) and slope in %.

3.4.11.5 All manhole numbers shall be shown. These numbers must use the numbering system used by Strathcona County when shown on as-built drawings but need not be used for construction drawings.

### **3.4.12 Design Table – Neighbourhood Servicing Sanitary Plan (211)**

The following general information shall be shown on the Storm design table:

3.4.12.1 Mannings n.

3.4.12.2 Per capita flow in litres/capita/day.

3.4.12.3 Minimum Peaking Factor.

3.4.12.4 Allowable Infiltration and inflow allowance in litres/sec/hectare.



The following specific information shall be shown on the Storm design table:

- 3.4.12.5 Number of lots.
- 3.4.12.6 Total population.
- 3.4.12.7 Peaking factor.
- 3.4.12.8 Population density.
- 3.4.12.9 Area in hectares (accumulated).
- 3.4.12.10 I/I allowance in litres/second.
- 3.4.12.11 Design flow in cubic metres/second.
- 3.4.12.12 Pipe capacity in cubic metres/second.
- 3.4.12.13 Velocity in metres/second.
- 3.4.12.14 Pipe diameter in millimetres.
- 3.4.12.15 Pipe slope in %.
- 3.4.12.16 Pipe Length in metres.

The tables may be fit onto the page in as many sections as will still allow clear legibility of the print.

### **3.4.13 Neighbourhood Service Water Plan (212)**

The following existing and proposed information shall be shown on the Neighbourhood Servicing Water Plan:

- 3.4.13.1 All pertinent property, right-of-way and easement lines.
- 3.4.13.2 Road allowance and easement dimensions.
- 3.4.13.3 The limits of the project.
- 3.4.13.4 All water lines with identification written atop each line showing pipe size, diameter (in millimetres), and type of pipe.

- 3.4.13.5 All hydrants and valves are to shown. The hydrants shall have the appropriate fire service radius drawn atop indicating the area of coverage.

**3.4.14 Design Table – Neighbourhood Service Water Plan (213)**

The following information shall be shown:

- 3.4.14.1 Lot number, block number, distance from lot line to CC, distance from face of curb to cc and water sewer elevation at easement.
- 3.4.14.2 The same information shall also be provided for the sump pump collector line.
- 3.4.14.3 A column shall indicate the distance from the nearest manhole to the T-Wye location.

**3.4.15 Utilities Overall (214)**

The following existing and proposed information shall be shown on the Utilities Overall Plan:

- 3.4.15.1 All pertinent property, right-of-way and easement lines.
- 3.4.15.2 Road allowance and easement dimensions.
- 3.4.15.3 The limits of the project.
- 3.4.15.4 All water, sanitary and storm lines with identification written atop each line showing.

**3.4.16 Overall Pond Detail (215)**

The following information shall be shown:

- 3.4.16.1 Inlet and outlet details.
- 3.4.16.2 Pond data chart showing elevation, volume, depth, length of shoreline, and surface area for 1:5, 1:25 and 1:100 events.

- 3.4.16.3 A section of the pond showing sideslopes, High and Normal water levels as well as any bank treatment required.
- 3.4.16.4 A stage versus storage graph and a stage versus discharge graph.
- 3.4.16.5 A plan view showing any silt ponds/sedimentation bays, access routes to these sites, all storm pipe locations and sizes entering the pond as well as any erosion protection

**3.4.17 Erosion and Sediment Control (ESC) Plan (216)**

An ESC Plan and report is required for activity affecting over 2 hectares of land. Sites of 0.4 to 2 hectares of land may require a plan depending on local conditions. The applicant should consult Strathcona County (780-464-8101) to clarify if these conditions warrant a report and plan. Sites under 0.4 ha require good housekeeping practices only.

A proper ESC plan shall include the following:

- 3.4.17.1 Existing topography and proposed grading details.
- 3.4.17.2 Controls and Practises for minimizing impacts of erosion and sedimentation (both temporary and permanent controls).
- 3.4.17.3 A **time schedule** of proposed construction activity and erosion and sediment control implementation.
- 3.4.17.4 **Inspection** and **maintenance** requirements.

For Strathcona County requirements these plans shall include the following:

- 3.4.17.5 Overall limits of construction and disturbance.
- 3.4.17.6 Temporary hauling roads and borrow sites, including existing and final contours.
- 3.4.17.7 Individual erosion control methods clearly identified (silt fences, straw wattles, temporary ditch checks, etc.).

3.4.17.8 A seed mixture table with seed type and % by weight.  
A time schedule for the general contractor to complete showing when the following will be constructed:

- Temporary construction exits.
- Temporary control measures.
- Sediment control basins.
- Strip and stockpile topsoil.
- Rough grade.
- Storm facilities.
- Site construction.
- Permanent control structures.
- Foundation/building construction.
- Finish grading.
- Landscaping/seed/final stabilization.

A General Note: Section shall show how often the erosion control measures will be inspected. Maintenance logs will be maintained and available for the County and owner.

A proper ESC report shall include the following:

3.4.17.9 An introductory section.

3.4.17.10 Site and Project description.

3.4.17.11 Soil loss estimates.

3.4.17.12 Erosion and Sediment Control practices (temporary).

3.4.17.13 Erosion and Sediment Control Practices (permanent).

3.4.17.14 Inspection and maintenance.

3.4.17.15 Document Control and Signatures.

**3.4.18 Power (217.01), Telephone (217.02), Shaw Cable (217.03) and Fibre Optic (217.04)**

3.4.18.1 For cabled service providers (Fortis/Telus/Shaw) a single submission is required. These drawings should show the following:

- Pole, conduit and appurtenances locations with offsets and stationing related to road centreline.

- Size, type, class of conduits.
- Schematics of wiring details for street lights and traffic signals; and
- Details of detector loops and all other wiring circuits on traffic signals.
- Pedestal and transformer locations as well as easement sizes.

3.4.18.2 Street lights shall be numbered and pertinent information (i.e., wattage, lamp type, pole height and location).

3.4.18.3 The plan shall be to a scale of 1:1,000 or 1:500.

**3.4.19 Gas (218)**

For natural gas service a detail drawing shall be attached by the service provider (ATCO) showing all crossing locations, pipe sizes, operating pressures and distance from lot lines.

**3.4.20 Street Light Illumination (219)**

Information forthcoming.

**3.4.21 Traffic Signals/Pedestrian Crossings (220)**

The following information shall be shown:

3.4.21.1 Therefore, 1:250 scale plan of the traffic signal/pedestrian crossing design that identifies:

- The placement of the traffic control and power disconnect cabinets.
- The location and alignment of traffic signal poles. The appropriate number and spacing of the traffic signal heads shall be indicated for each pole. All other traffic signal related hardware attached to the pole shall also be identified (i.e., street signs, cameras, street lights, etc.).

- Conduit runs between traffic signal related features. Each conduit run shall be numbered by a unique identifying number. Indication of where the power feed for the traffic signals is coming from shall be shown. Conduit may or may not be installed for this feature. Necessary junction box locations shall also be shown as part of the conduit run.
- Vehicle detection zones, either by video or by other means.
- The dimensions, lengths and colour of proposed lane or curb markings, medians and crosswalks.
- Placement of traffic control signs that are not mounted on traffic signal poles.

3.4.21.2 Various traffic signal/pedestrian crossing related schedules and tables that identify specific features of the design schedules and tables included shall be:

- Traffic Control Cabinet: Hardware components installed within the cabinet shall be identified. If a fibre optic line is connected to the cabinet, the tube and strand colours shall be identified.
- Power Disconnect Cabinet: Features of the cabinet shall be identified.
- Conductor Assignment Schedule: Traffic signal cable going to each pole shall be identified. The purpose of each conductor of a cable running to a pole shall be marked accordingly.
- Pole Schedule: Each pole shall be identified. For each pole, the type of pole structure, including shaft height, mast arm length and streetlight extension features if installed shall be listed. Components of the required pole base shall also be listed. If streetlight extensions are installed, specifics of the luminaries installed shall be listed.
- Phase Sequencing Diagram.
- Conduit and Cable Schedule: This schedule shall identify the number, type and size of conduit installed to each feature of the traffic signal/pedestrian crossing installation. The schedule shall also identify the purpose of each cable to each pole and which conduit runs the cable is installed in.

- Conduit Diagram: A cross-sectional view of each conduit run shall be shown to clarify information provided in the conduit and cable schedule.
- Vehicle Head Schedule: Characteristics of each signal head shall be identified.
- Pedestrian Equipment: If installed as part of the design, characteristics of each pedestrian signal hardware feature shall be identified.
- Junction Box Schedule: The size and type of junction box material shall be identified.
- Detection Zones: Characteristics of each detection zone shall be identified.

### **3.4.22 Street Furniture and Pavement Markings (221)**

#### **3.4.22.1 Street Furniture**

- This 1:1,000 scale plan shall indicate the location of all street furniture and shall be used to identify and avoid conflicts between these features and future driveways.
- A scale of 1:500 may be used for the plan if required for clarity.
- All traffic sign locations and the sign to be installed at each location.
- All surface infrastructure and other features, such as hydrants, light poles, power transformers, telephone and cable boxes, supermail boxes, bus shelters or benches, manhole covers and curb cocks.
- Sight triangles as required.
- Permitted driveway locations on each lot with a standard detail showing the allowable offset from the property line. A clearance of less than 1.5 metres between edge of driveway and any surface obstruction shall require special approval, which should be sought prior to completion of the plans.
- Need to Add: Signs, street lights, entrance features, bus stops.

**3.4.23 Pavement Markings**

3.4.23.1 A separate plan shall be prepared in all cases for road surface works. This plan shall detail all eradications, alterations, additions and new regulatory and advisory signage and line painting. The design shall conform to MUTCDC and Strathcona County Traffic and Highway Installation Guidelines. The following information shall be shown:

- Dimensions, lengths and colour of proposed lane or curb markings, medians and crosswalks;
- Lane widths, median radii and taper ratios;
- Dimensioned location and type of new or relocated signs. Type of new, removed or relocated signs, including a sign inventory table.

3.4.23.2 The plan shall be scale of 1:1,000 or 1:500.

3.4.23.3 For drawing clarity, show curbs locations only. Do not show utilities, legal information or addresses.

**3.4.24 Plan Profiles (222)**

Each base plan and profile shall show but not be limited to the following information:

3.4.24.1 All cadastral information including property, right-of-way and easement lines and dimensions in sufficient detail to relate design to surrounding and adjacent properties. To be included on all drawing submissions.

3.4.24.2 Legal description and civic addresses of existing properties.

3.4.24.3 Road allowance dimensions.

3.4.24.4 Existing pavement, curbs, sidewalks, ditches, driveways, lanes, retaining walls, buildings, trees and shrubs within the right-of-way. Note significant trees on and within 5 metres of the right-of-way.



- 3.4.24.5 All existing underground and surface utilities and services (with offsets, elevations, size, age and material type and as-built references) including but not limited to the following:
- Sanitary sewers, storm sewers, water mains and appurtenances;
  - Street light poles, conduit and appurtenances;
  - Hydro poles and underground wiring ducts and appurtenances;
  - Telephone poles, underground wiring ducts and appurtenances and fibre optic cables;
  - Gas mains and appurtenances;
  - Cable television ducts and appurtenances;
  - Traffic control devices, poles, conduits, signs and painting;
  - Irrigation systems; and
  - Other fibre optic services.
- 3.4.24.6 All relevant topographic information. For slopes greater than 10 percent, 1 metre contour lines are required.
- 3.4.24.7 Right-of-way and/or road centreline stationing shall be to metric standards (0+000) at 20 metre intervals and shall be related geometrically to legal property lines or survey monuments. Stationing shall run left to right where possible and upstream on gravity pipes.
- 3.4.24.8 Where possible, plan views shall be horizontal across the drawing sheet, and shall be aligned vertically by centreline stationing with the profile view below.
- 3.4.24.9 Profile elevations shall be placed at both sides of the profile. Split profiles must show elevations on both sides of the break.
- 3.4.24.10 Attribute tables will accompany each utility identifying attributes for existing and new work. These attributes will include diameters, materials, types, nodes, ownership, elevations, depths and coordinate values where necessary.
- 3.4.24.11 Catch basin rim elevations and stations related to road centreline chainage. To include lead locations to main, lead diameters and material in a table.

- 3.4.24.12 Existing ground profile and finished pavement profile along the pavement centreline with elevations at 20 metre intervals.
- 3.4.24.13 Crossfall or crown information with gutter elevations at change points.
- 3.4.24.14 Proposed road centreline grade.
- 3.4.24.15 Stations and elevations of BVC, EVC and VPI.
- 3.4.24.16 Vertical curve information including the length of curve and sag or crest K value, where K equals the length of the vertical curve in metres divided by the algebraic difference in grades in percent.
- 3.4.24.17 Elevations along the vertical curve at 10 metre intervals.
- 3.4.24.18 Elevations and station of low and high spots of vertical curves.
- 3.4.24.19 Where the slope of existing ground is greater than 10% across the right-of-way, cross-sections shall be shown at intervals not exceeding 20 metres.
- 3.4.24.20 Where there is an elevation difference of more than 1.2 metres from the design road centreline to a suitable building site on the adjacent parcel, driveway grades and profiles shall be shown on the drawings.

**3.4.25 Roundabouts and Intersections (223)**

- 3.4.25.1 Roundabouts
  - Plan with grades
  - Dimensions
  - Design vehicle
  - Design characteristics
- 3.4.25.2 Intersections
  - Grades
  - Chainage
  - Sign location

**3.4.26 Road and Other Sections (224)**

- 3.4.26.1 Where there is not sufficient room on the plan and profile drawings, design details for the particular drawing may be provided on a separate sheet.
- 3.4.26.2 Scales shall be determined by the designer to suit the design detail, and shall be included on the detail drawing.
- 3.4.26.3 Where road cross-sections are required they may be provided on a separate sheet.
- 3.4.26.4 Cross-sections shall be to a scale of 1:250 (H) to 1:50 (V) unless otherwise approved.
- 3.4.26.5 Starting at the lower left hand corner of the drawing sheet, cross-sections shall be placed up the sheet in order of increasing stationing. Grid elevations shall be shown at the left hand side of each cross-section and stationing shall be shown above each cross-section. Adequate space shall be left between cross-sections so as to ensure clarity.
- 3.4.26.6 Cross-sections shall include:
  - Design road cross-section within the right-of-way; and
  - Existing ground cross-section extending into the adjacent properties as required.
- 3.4.26.7 Typical road cross-section showing right-of-way width, proposed road design structure, pavement width, sidewalks, curbs, underground utilities, hydro, power and street light poles, hydrants and their related offsets.

**3.4.27 Noise Attenuation Cross-Sections (225)**

- 3.4.27.1 Overall development plan shall be provided showing:
  - Proposed attenuation method (fence, berm, restricted development pocket, or a combination of the above);
  - Receiver and corresponding cross-section locations.
- 3.4.27.2 The following information is to be included on the noise attenuation cross-sections:
  - Ground and road elevations;
  - Receiver height and location;

- Berm/fence height and location as applicable;
- Receiver-to-barrier and receiver-to-source distances.

3.4.27.3 All noise attenuation cross-sections must be supported by the County's Noise Prediction Model outputs.

3.4.27.4 If attenuation through restricted development pocket is selected, the noise attenuation setback must be clearly labelled on the Developable Areas Plan and its depth is to be dimensioned on the plan.

### **3.4.28 Landscape (226)**

Plans are to be drawn to a recommended scale of 1:500 and shall include the following information:

3.4.28.1 Background information must have the following shown:

- (i) Legal Subdivision which includes:
  - Parcels, easements, ROWs, etc.
  - Labels, parcels, easements, ROWs, etc. (include civic address).
- (ii) Infrastructure which includes:
  - All surface infrastructure (i.e., hydrants, light poles, power transformers, etc.).
  - All underground infrastructure (i.e., TV, cable, power, etc.).

3.4.28.2 Design information must have the following shown:

- (i) Common and botanical plant names:
  - size, quantity, conditions, installation specifications, location of trees, shrubs and grasses;
  - area size to be sodded and seeded with seed mix specified measured in m<sup>2</sup>;
  - trail length and numbers of signs associated with trail, number of t-bollards, furnishing to be included and any other amenities.

- (ii) Features:
  - location of trails and walkways including surface type, trail sign types and location, t-bollard type and location, waste receptacle and bench locations;
  - location of planting and spacing;
  - no mow and natural areas to remain to be identified;
  - landscape amenities, back stops, goal post, player retaining wall, benches, buildings, parking, playgrounds and any other amenities or features;
  - fence location, construction details (which includes all anchoring, foundation and piling details), cross-section, and elevation.
  - entry feature location(s);
  - bridge, bridge, boardwalk, and lookout location(s), construction details (which includes all, anchoring, foundation and piling details), cross section, and elevation.
- (iii) Irrigation plan should show:
  - location of all heads, emitter devices and drip lines; lateral and mainline pipe locations and sizes; sleeves; valve sizes and locations; and location of backflow prevention device and water service connection;
  - an irrigation equipment legend, and schedule of hydraulic data in metric to include flow and precipitation rate for each valve zone; and
  - water service/backflow prevention connection detail, valve and head installation details including all equipment fittings and related valve boxes, by reference to [Volume 2, Section 7](#), or if an alternative is proposed, by details shown on the landscape construction drawings.
- (iv) Elevations:
  - to be shown at top and toe of berm locations, swale, corners and centre of sport fields, corners of retained plan areas and ditches.

**3.4.29 Entrance Features (227)**

- 3.4.29.1 Entrance features shall include: planting with sight lines shown, front view, cross section, materials (height and width), construction details (which includes all signage, anchoring, foundation and piling details) and elevations.

**3.4.30 Engineering Servicing Standard Details (228)**

- 3.4.30.1 Maximum of A8 per sheet and not scalable in the field.

**3.4.31 Developable Areas (229)**

The plan shall show the following for each lot.

- 3.4.31.1 Recommended developable areas.
- 3.4.31.2 Developable areas.
- 3.4.31.3 Noise attenuation setback (if applicable) clearly dimensioned on the drawing.

**3.4.32 Removals – Depends on Project Size (230)**

- 3.4.32.1 Should show what is being removed or relocated. The design should also be shown.

**3.4.33 Utilities Drawing (Existing vs. New) (231)**

- 3.4.33.1 This plan is used to have discussion with Utility Companies so they can see what is going to happen.

**3.4.34 Pavement Markings/Signage (232)**

- 3.4.34.1 Existing Utility Company's marking/signage will be in grey color while the new and design will be in dark color.

**3.4.35 Utilities Crossing/Railway/Capital Region Sewer Line (233)**

- For utility crossings.
- Cross-sections.
- Depth of utilities.

### **3.4.36 One Open to Project Specific Not Otherwise Classified (235)**

3.4.36.1 Information forthcoming.

### **3.4.37 Classifications**

3.4.37.1 Individually these classifications have a numbering sequence common to each section. Each sub-section or sub-heading has a block of numbers reserved and applied to it.

3.4.37.2 The numbers which have been reserved for each sub-section and which would be preceded by the applicable section number are as follows:

Example: Plan Profiles      217.00 to 217.99  
   i.e., 217.01  
   217.03  
   217.03

3.4.37.3 With this method of numbering, the numbering sequence is not continuous from sub-section to sub-section. Some sub-sections do not use all the numbers allotted to them.

3.4.37.4 Below is a table showing the different classifications that Strathcona County has established for engineering submission.

<b>TABLE E-1</b>	
<b>Urban Subdivision Plan Required Drawings</b>	
<b>Drawing Number (to be determined)</b>	<b>Drawing Title</b>
Say.....200	Front Cover
201	Drawing Index
202	General Legend
203	Land Acquisition or Legal Plan
204	Land Use
205	Lot Grading Plan
206	Lot Fill Plan
207	Road Overall (Road Information)
208	Neighbourhood Servicing Storm Plan

209	Design Table – Neighbourhood Servicing Storm Plan
210	Neighbourhood Servicing Sanitary Plan
211	Design Table - Neighbourhood Servicing Sanitary Plan
212	Neighbourhood Servicing Water Plan
213	Design Table - Neighbourhood Servicing Water Plan
214	Utilities Overall
215	Overall Pond Detail
216	Erosion and Sediment Control (ESC) Plan
217.01	Power
217.02	Telephone
217.03	Shaw Cable
217.04	Fibre Optic
218	Gas
219	Street Light Illumination
220	Traffic Signals/Pedestrian Crossings
221	Street Furniture and Pavement Markings
222	Plan Profiles
223	Roundabouts and Intersections
224	Road and Other Sections
225	Noise Attenuation Cross-sections
226	Landscape
227	Entrance Features
228	Engineering Servicing Standard Details
<b>Multi-Family Site Required Drawings</b>	
200	Front Cover
201	General Legend
202	Drawing Index
205	Lot Grading Plan
214	Utilities Overall
224	Road and Other Sections
226	Landscape
227	Entrance Features
228	Engineering Servicing Standard Details
<b>Commercial/Industrial Subdivision Required Drawings</b>	
200	Front Cover



201	General Legend
202	Drawing Index
203	Land Acquisition or Legal Plan
204	Land Use
205	Lot Grading Plan
206	Lot Fill Plan
207	Road Overall (Road Information)
208	Neighbourhood Servicing Storm Plan
209	Design Table – Neighbourhood Servicing Storm Plan
210	Neighbourhood Servicing Sanitary Plan
211	Design Table - Neighbourhood Servicing Sanitary Plan
212	Neighbourhood Servicing Water Plan
213	Design Table - Neighbourhood Servicing Water Plan
214	Utilities Overall
215	Overall Pond Detail
216	Erosion and Sediment Control (ESC) Plan
217.01	Power
217.02	Telephone
217.03	Shaw Cable
217.04	Fibre Optic
218	Gas
219	Street Light Illumination
220	Traffic Signals/Pedestrian Crossings
221	Street Furniture and Pavement Markings
222	Plan Profiles
223	Roundabouts and Intersections
224	Road and Other Sections
226	Landscape
227	Entrance Features
228	Engineering Servicing Standard Details
<b>Commercial/Industrial Single Lot Required Drawings</b>	
200	Front Cover
201	General Legend
202	Drawing Index
205	Lot Grading Plan

214	Utilities Overall
226	Landscape
227	Entrance Features
228	Engineering Servicing Standard Details
<b>Rural – Country Residential Subdivision Required Drawings</b>	
200	Front Cover
201	General Legend
202	Drawing Index
203	Land Acquisition or Legal Plan
204	Land Use
205	Lot Grading Plan
206	Lot Fill Plan
207	Road Overall (Road Information)
214	Utilities Overall
215	Overall Pond Detail
216	Erosion and Sediment Control Plan
217.01	Power
217.02	Telephone
217.03	Shaw Cable
217.04	Fibre Optic
218	Gas
219	Street Light Illumination
221	Street Furniture and Pavement Markings
222	Plan Profiles
223	Roundabouts and Intersections
224	Road and Other Sections
225	Noise Attenuation Cross-sections
226	Landscape
227	Entrance Features
228	Engineering Servicing Standard Details
229	Developable Areas
<b>Road Projects Required Drawings</b>	
200	Front Cover
201	General Legend
202	Drawing Index

220	Traffic Signals/Pedestrian Crossings
224	Road and Other Sections
225	Noise Attenuation Cross-sections
226	Landscape
227	Entrance Features
228	Engineering Servicing Standard Details
230	Removals – Depends on Project Size
231	Utility Drawing (Existing vs. New)
232	Pavement Markings/Signage
233	Utilities Crossing/Railway/Capital Region Sewer Line
<b>Parking Lot Required Drawings</b>	
200	Front Cover
201	General Legend
202	Drawing Index
205	Lot Grading Plan
214	Utilities Overall
220	Street Light Illumination
221	Street Furniture and Pavement Marking
226	Landscape
227	Entrance Features
228	Engineering Servicing Standard Details
<b>Extra Classification No. if Required</b>	
235	One Open to Project Specific Not Otherwise Classified

### 3.5 DRAWINGS OF RECORD

**All electronic As-Built submissions shall be created using the AutoCAD software's eTransmit command, [see Section 3.2.3](#).**

**3.5.1** Drawings shall include all information as specified elsewhere for the construction drawings, but shall be corrected upon completion of construction to note all works removed during construction. As an alternative, this information shall be retained in the digital file on layer (CAT1-removed) but not displayed on the final print. Note abandoned services and reflect As-Built conditions for permanent records.

- 3.5.2** All dimensions shown shall reflect the As-Built conditions of the construction and all reference to “Proposed” shall be removed. As-Built drawings shall be to scale in accordance with the As-Built dimensions shown. The Revision Table shall be completed indicating the drawings are As-Built.
- 3.5.3** All As-Built features shall be surveyed and survey points imported into the digital drawing. The As-Built drawing shall reflect the true elevation and location of all constructed features in both the plan and profile views. The elevations that have changed must be in **red** and printed in **red** so it is easier to see the changes. Tolerance for moving features in drawings will be >0.5 metres (i.e., manholes installed less than 0.5 metres from design location do not need to be shifted on the digital as-built/drawings).
- 3.5.4** The As-Built drawings shall be submitted on 3 mil Mylar so that they can be reproduced to provide clear and legible prints. [See Section 3.2.2.](#)
- 3.5.5** Line work for all constructed works shown on the drawings shall retain the thicker line density (as for proposed works) for ease of determining the extent of works covered by the drawings. Proposed construction for future phases of the project shall not be shown on the As-Built drawings.
- 3.5.6** All As-Built drawings shall also include the following information:
- The location and elevation of all existing utilities and services encountered in the construction operation;
  - The location and invert elevation at property line of all individual service connections, and the wye chainage, at the main for all constructed and existing works; and
  - A note on each drawing describing the type of trench material (sand, gravel, clay, hard pan, etc.) encountered during construction and the location and profile of all rock.

The following information shall be submitted with the As-Built drawings:

- 3.5.7** Irrigation As-Built documents shall include the following information:
- Revisions made during construction affecting the main line pipe, controller and valve locations, and all laterals and sprinkler heads;
  - Approved substitutions including size, material and manufacturer's name and model name and catalogue number; and
  - Written irrigation operating and maintenance manuals.

**3.5.8** Planting As-Built documents shall include the following information:

- The as-planted location, species and size of all trees, and all changes in species, size and quantity of shrubs and groundcover in an updated plant list on the construction drawings.

**3.5.9** As-built Electronic “GIS” files shall also be created if AutoCAD® Map or AutoCAD Civil 3D software files are used.

Using the AutoCAD Map 3D or AutoCAD Civil 3D software, compile a single “Overall site” drawing that includes all As-Built project data, and is set to the proper Coordinate system, then proceed as follows:

**3.5.10** If using the AutoCAD Civil 3D software:

Update all of the AutoCAD Civil 3D software’s objects to reflect As-built conditions. This includes Finished surfaces, corridors (based on As-built field elevations) and pipe networks (As-built rims, inverts, etc.).

Use the Export Civil Objects to SDF command. This creates an SDF file with the same name as the drawing.



Export Civil Objects to SDF

Submit the .SDF file along with the record drawings.

**3.5.11** If using the AutoCAD Map 3D software:

Create Object Data tables for pipes and structures. Note that if you download and insert this Block with the Explode option selected, the tables will be created for you.

Create four Object Data Tables. Include 1 for pipes, structures, alignment (street centerlines) and parcels using the following fields (field names are based on automated routine available in the AutoCAD Civil 3D software).

- Object Data Table 1 – Pipes:
  - Type a quote from the document or the summary of an interesting point. You can position the text box anywhere in the document. Use the Drawing Tools tab to change the formatting of the pull quote text box.

**Define Object Data**

Table: Pipes New Table...

**Object Data Fields**

- Autogenerated\_SDF\_ID
- Name
- NetworkName
- InsideDiameter
- OutsideDiameter
- Length
- Slope
- StartInvert
- EndInvert
- StructureStart
- StructureEnd
- PartSizeName

**Field Definition**

Field Name:

Data Type:

Description:

Autogenerated\_SDF\_ID = Generic number ex. 1, 2, 3, 4, etc  
 Name = Pipe Name/number ex. "San pipe 1"  
 NetworkName = Name of system: ex: "Sanitary"  
 InsideDiameter = As-Built Pipe Size  
 OutsideDiameter = As-Built Pipe size + Wall thickness (if not known, leave blank)  
 Length = As-Built Length of Pipe  
 Slope = As-Built Slope Of Pipe  
 StartInvert = As-Built Invert at start of Pipe (high end)  
 EndInvert = As-Built Invert at start of Pipe (high end)  
 StructureStart = As-Built Upstream Structure number/name  
 StructureEnd = As-Built Downstream Structure number/name  
 PartSizeName = Leave blank

- Object Data Table 2 – Structures:

**Define Object Data**

Table:

Object Data Fields

- Autogenerated\_SDF\_ID
- Name
- NetworkName
- RimElevation
- PartSizeName

Field Definition

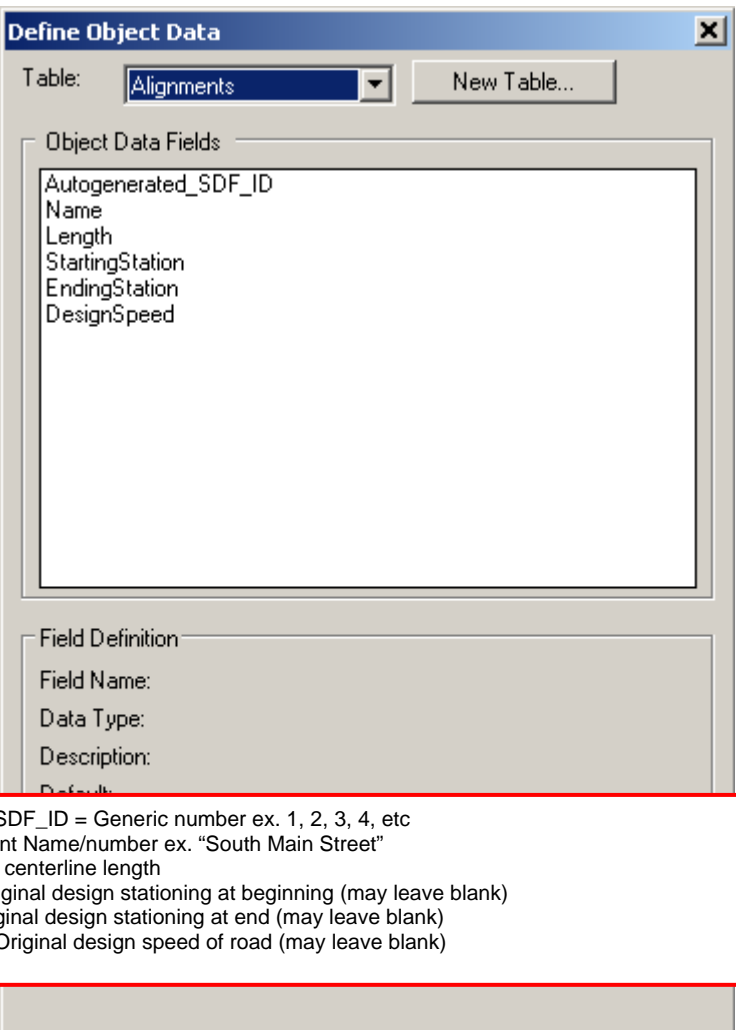
Field Name:

Data Type:

Description:

Autogenerated\_SDF\_ID = Generic number ex. 1, 2, 3, 4, etc  
Name = Structure Name/number ex. "ST MH 345"  
NetworkName = Name of system: ex: "Sanitary"  
RimElevation = As-Built Rim elevation  
PartSizeName = Leave blank

- Object Data Table 3 – Alignments:



**Define Object Data**

Table: Alignments New Table...

Object Data Fields

- Autogenerated\_SDF\_ID
- Name
- Length
- StartingStation
- EndingStation
- DesignSpeed

Field Definition

Field Name:

Data Type:

Description:

Default:

Autogenerated\_SDF\_ID = Generic number ex. 1, 2, 3, 4, etc  
 Name = Alignment Name/number ex. "South Main Street"  
 Length = Overall centerline length  
 StartStation = original design stationing at beginning (may leave blank)  
 EndStation = original design stationing at end (may leave blank)  
 DesignSpeed = Original design speed of road (may leave blank)



- Object Data Table 4 – Parcels:

**Define Object Data**

Table: **Parcels** New Table...

Object Data Fields

- Autogenerated\_SDF\_ID
- Name
- Area
- Perimeter

Autogenerated\_SDF\_ID = Generic number ex. 1, 2, 3, 4, etc  
 Name = Parcel number from plans or new tax id (if known)  
 Area = New parcel area in sq. meters  
 Perimeter = New parcel perimeter in Meters

Field Definition

Field Name:  
 Data Type:  
 Description:  
 Default:

Modify... Rename... Delete

Close Help

For Pipes: Link the Pipes object data table to all line work that represents pipe centerlines and then add data using the Properties Window.

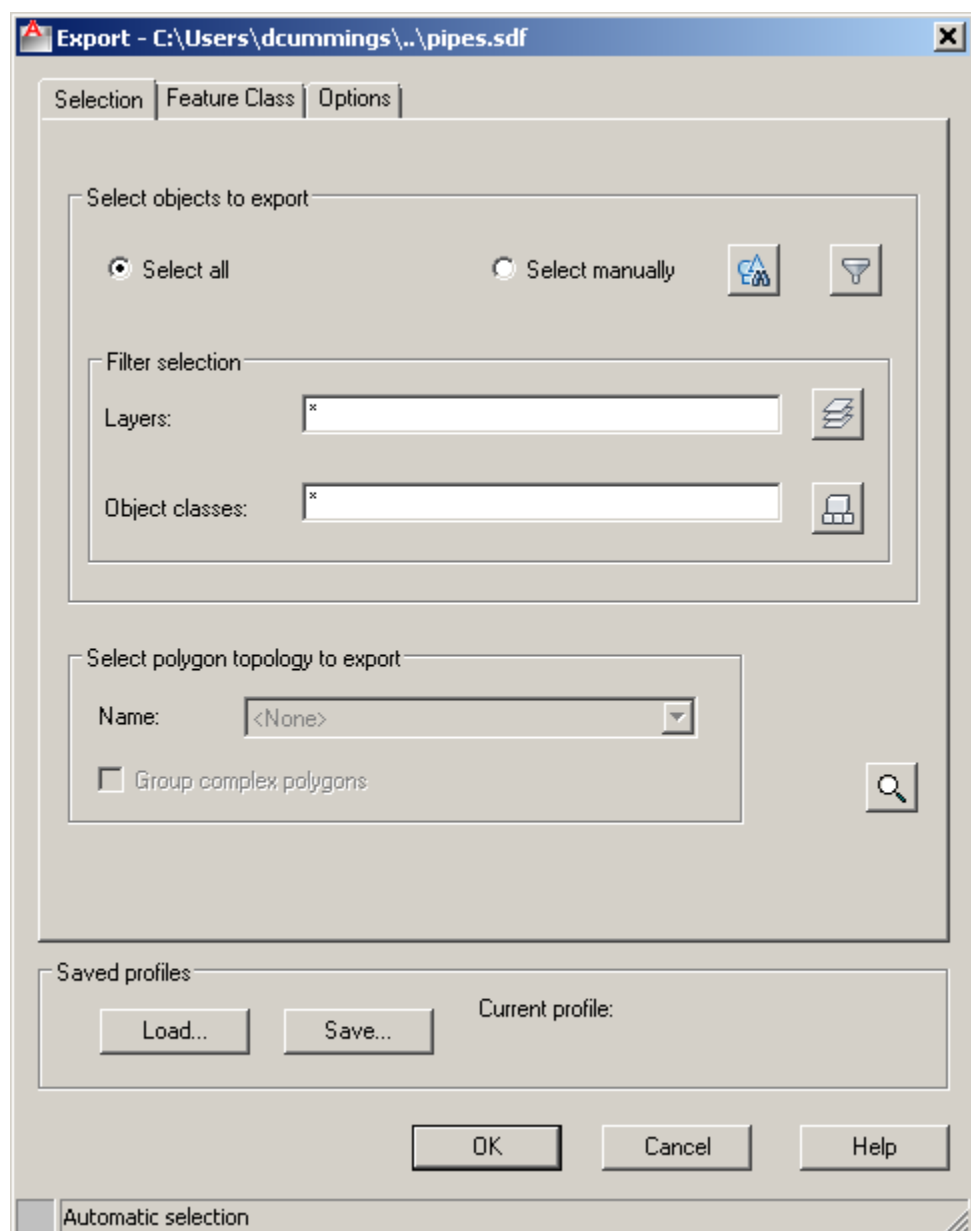
For Structures: Link the Structures object data table to all of the AutoCAD software's blocks (or points) that represent Structures (i.e., manholes, catch basins, etc.), and then add data using the Properties Window.

For Alignments: Link the Alignments object data table to all line work that represents new street centerlines and then add data using the Properties Window.

For Parcels: Link the Parcels object data table to all closed polylines that represent the new Parcel and then add data using the Properties Window.

After adding data to object data, use the MapExport command to export an .SDF file.

In the Selection tab, select the objects to export (use manual select or Layer filters). Select all pipes, structures, parcels and alignments.



In the Feature Class tab, select the Create multiple classes based on drawing object option. Expand the Drawing object to use drop-down list and select Object Data. Leave all of the options checked in the data windows list, and leave the Show schema names unchecked.

Export - C:\Users\dcummings\...\pipes.sdf

Selection Feature Class Options

Choose how to organize the selected drawing objects

Object to Feature Class Mapping

☐ Create a single class from all selected objects

☒ Create multiple classes based on a drawing object

Drawing object to use: Object Data

Select Attributes ...

Drawing Object	Feature Class	Geometry
<input checked="" type="checkbox"/> Alignments	Alignments	Point+Line+Polygon
<input checked="" type="checkbox"/> Parcels	Parcels	Point+Line+Polygon
<input checked="" type="checkbox"/> Pipes	Pipes	Point+Line+Polygon
<input checked="" type="checkbox"/> Structures	Structures	Point+Line+Polygon
<input checked="" type="checkbox"/> "Non-classified"	Non-classified	Point+Line+Polygon

☐ Show schema names

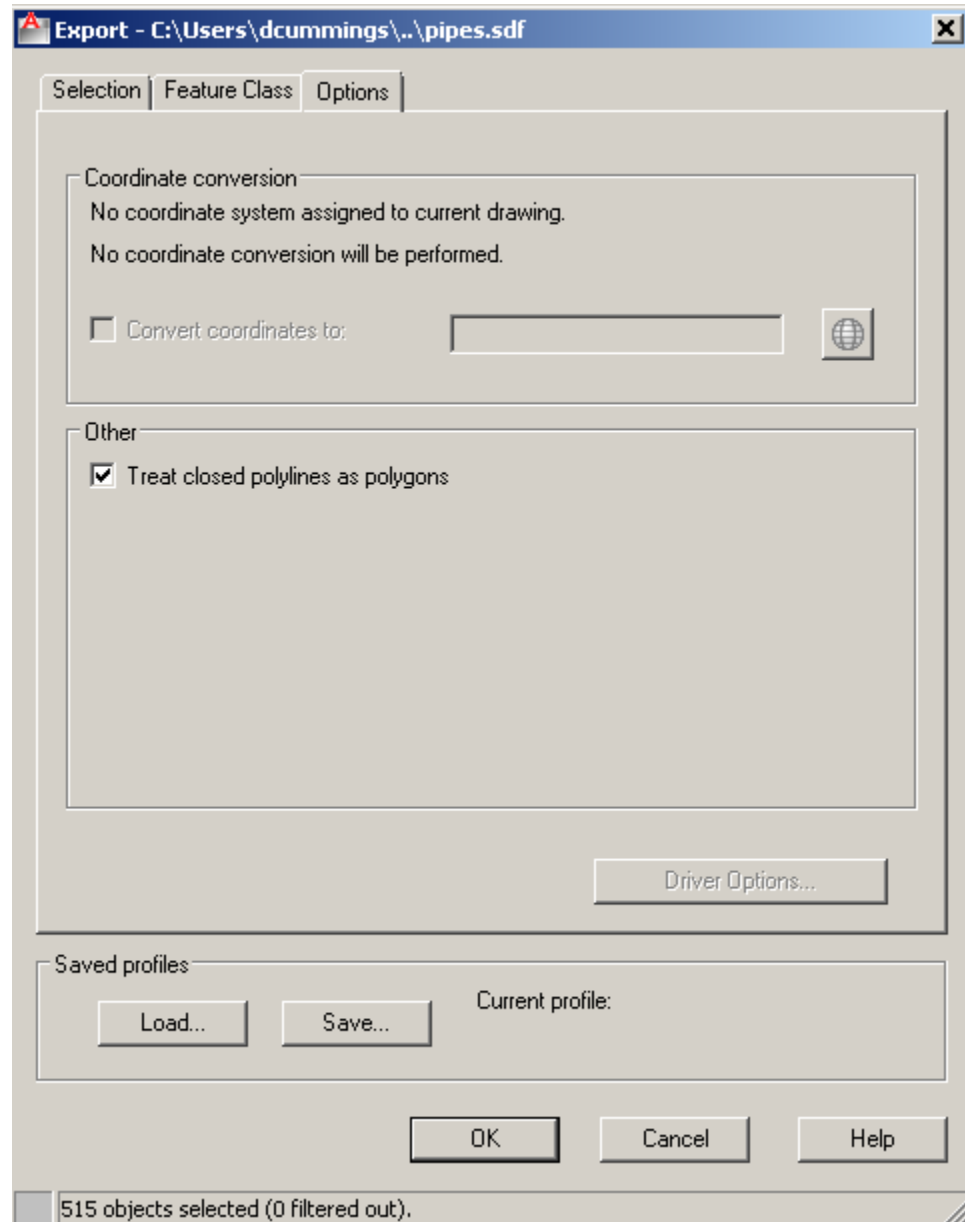
Saved profiles

Load... Save... Current profile:

OK Cancel Help

515 objects selected (0 filtered out).

In the Options tab, leave the Convert coordinates to option unchecked. Select the Treat closed polylines as polygons option.



**3.6 TITLEBLOCKS:** Information forthcoming

**3.7 LAYERS:** Information forthcoming

**3.8 BLOCKS:** Information forthcoming

**4.1 ROADS****4.1.1 General**

- 4.1.1.1 The Developer and the Developer's Consultant are responsible to ensure that the infrastructure is designed and constructed to achieve design life and safety expectations consistent with good design, safety, and construction practices.
- 4.1.1.2 The classification and designation of roadway, sidewalk, and trail sections shall be determined at the ASP stage of planning. The roadway, sidewalk, trail, utility, traffic and road ROW requirements must be determined and established by the Developer or Developer's Consultant and approved by the County.
- 4.1.1.3 Where the Developer's proposals include railway or high-pressure pipeline crossings, or trails within utility ROWs, the Developer shall be fully responsible for the preparation and submission of plans to the owners or proper approving authorities and obtaining the necessary permission to enter upon, cross over, or engage in construction upon any gas or oil transmission lines or railways. The Developer shall bear the full responsibility for any works, extra costs, damage claims, or insurance costs related to any of the above-mentioned crossings.
- 4.1.1.4 The design and construction of arterial roadways shall be carried out by Strathcona County or agents of Strathcona County. The Developer shall submit arterial roadway connection preliminary design plans for review and approval by the Transportation Planning & Engineering Department when a development connects to or impacts an existing and/or proposed arterial road. Approval of such plan is required prior to the approval of the subdivision plans.
- 4.1.1.5 Where a Developer's proposals include construction on Provincial Lands, the Developer shall be fully responsible for the preparation and submission of plans to the Province and to Strathcona County, and shall ensure the necessary Ministerial consent for such construction is obtained.

**4.1.2 Design Standards and References**

- 4.1.2.1 The basis for geometric design utilized within these design standards is primarily derived from the following reference material. For specifics to aspects within these standards refer to the most recent version of the following references:
- (i) Geometric Design Guide for Canadian Roads, TAC;
  - (ii) Urban Supplement to the Geometric Design Guide for Canadian Roads, TAC;
  - (iii) Design vehicle dimensions for use in geometric design, TAC;
  - (iv) A Policy on Geometric Design of Highways and Streets, AASHTO;
  - (v) Canadian Guide to Neighbourhood Traffic Calming, TAC;
  - (vi) Canadian Roundabout Design Guide, TAC;
  - (vii) Roundabouts: An Informational Guide Second Edition, U.S. Department of Transportation, Federal Highway Administration, Publication No. NCHRP-672;
  - (viii) Access Management Manual, TRB; and/or
  - (ix) Highway Geometric Design Guide, Alberta Transportation.

4.1.2.2 For any discrepancies between the above noted references and these standards, the higher value or the more stringent standard shall take precedence. Strathcona County does not rely exclusively on any of the above-noted references, therefore the developer or consultant and Strathcona County shall use sound engineering practices and judgement when carrying out or approving the design of roadways.

4.1.2.3 A summary of the roadway classifications and geometric design properties, including traffic volume, design/posted speeds, minimum intersection/access spacing, and horizontal/vertical design properties, has been provided at the end of this section in [TABLE 4-7](#).

### 4.1.3 Classification

4.1.3.1 Road classification and designation shall generally be in accordance with the classification system outlined in the most recent versions of the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads and the TAC Urban Supplement to the Geometric Design Guide for Canadian Roads.

4.1.3.2 Individual street classification is to be based on functional use as shown in [TABLE 4-1](#) and verified by the Strathcona County Representative.

**TABLE 4-1**

Road Classification	Traffic Volume (vpd)	Primary Function	Standard Drawing Number(s) *1
<b>LOCAL</b>			
Lane (Paved)	< 500	Land Access	<a href="#">41101</a>
Residential Cul-de-sac	< 500		<a href="#">41106</a> , <a href="#">41108</a>
Residential	< 1,000		<a href="#">41102</a> , <a href="#">41103</a> , <a href="#">41104</a> , <a href="#">41105</a> , <a href="#">41108</a>
Industrial/Business Commercial	< 3,000		<a href="#">41107</a> , <a href="#">41108</a>
<b>COLLECTOR</b>			
Minor Residential	1,000-2,500	Traffic Movement and Land Access	<a href="#">41109</a> , <a href="#">41110</a> , <a href="#">41111</a>
Major Residential	2,500-6,000		<a href="#">41112</a> , <a href="#">41113</a> , <a href="#">41114</a> , <a href="#">41115</a> , <a href="#">41118</a>
Industrial/Business Commercial	3,000-10,000		<a href="#">41116</a> , <a href="#">41117</a> , <a href="#">41118</a>
Divided	5,000-15,000		<a href="#">41119</a> , <a href="#">41120</a> , <a href="#">41121</a>
<b>ARTERIAL</b>			
Minor Divided	< 30,000	Traffic Movement (Limited Land Access)	<a href="#">41122</a>
Major Divided	≥ 30,000		<a href="#">41123</a>

**NOTES:**

\*1 Check Standard Drawings for minimum ROW requirements. Final ROW shall depend on requirement for noise abatement.

4.1.3.3 The divided collector cross-section is intended primarily for mixed use zones with a significant proportion of industrial, commercial, or other uses that generate higher traffic volumes and turn movements at access points, where parking is accommodated primarily off-street. It may also be used in residential zones with high traffic volumes and rear access lots, or for enhanced curb appeal. When compared with a typical undivided collector, the divided collector cross-section:

- (i) Provides more guidance to drivers on multiple through lanes,

- (ii) Allows for a more robust access management strategy,
- (iii) Offers an enhanced aesthetic appeal with plantings in the median, and
- (iv) Provides a possible opportunity for pedestrian refuge in the median.

#### 4.1.4 General Geometric Design Guidelines

- 4.1.4.1 Straight or near straight local residential roads shall have a maximum unimpeded length of 215 m. Traffic calming measures are required for straight or near straight lengths in excess of 215 m.
- 4.1.4.2 Long, continuous collector roads, in excess of 1,000 m, should be avoided wherever possible.
- 4.1.4.3 Neighbourhood plans are to be designed such that traffic volumes are in accordance with those found on [TABLE 4-1](#). Exceptions may be made within 200 m of an intersection with an arterial road, where volumes could increase by up to 50%, provided that the design will accommodate the increased volumes and associated turning movements.
- 4.1.4.4 The use of traffic calming methods for new residential development will be considered normal practice.

#### 4.1.5 Intersection Design

- 4.1.5.1 For use within these Standards, intersections are the junction of two public roadways. Junction of a private driveway/road to a public road is discussed in [SUB-SECTIONS 4.1.6](#) and [4.1.7 OF THIS SECTION](#).
- 4.1.5.2 The minimum centreline-to-centreline spacing of intersections shall be as follows:
  - (i) 400 m on arterial roadways;
  - (ii) 200 m on divided (non-residential) collector roadways; and
  - (iii) 60 m on undivided collector and local roadways.

The closest intersection to an arterial roadway on a collector roadway shall be measured from the lip-of-gutter of the outside through lane on the arterial roadway to the centreline of the intersecting roadway, as shown on [STANDARD DRAWING 41005](#), and shall comply with the following minimum spacing requirements:

- (iv) 200 m on divided (non-residential) collector roadways; and
- (v) 110 m on undivided collector roadways.

Under special circumstances and where traffic volumes or existing conditions make the above spacing inappropriate, and also when supported by a TIA (Traffic Impact Assessment), the IPS Standards Committee may permit a variance provided network geometric compatibility, operational efficiency and safety aspects are not compromised.

- 4.1.5.3 The minimum angle of the intersection of two roadways shall be 75°.

- 4.1.5.4 The traffic control proposed at all collector-collector intersections shall be reviewed to provide a traffic control method that will be self-enforcing and reduce traffic operational speeds to less than 50 km/hr. A Level of Service (LOS) analysis shall be conducted for each collector-collector intersection as part of the Traffic Impact Assessment (TIA) to compare all possible intersection treatments, including roundabouts, and identify the most appropriate option.
- 4.1.5.5 Roundabouts shall be considered as a viable intersection treatment for all roadway classifications (primarily for collector-collector intersections), especially where a greater degree of traffic control and traffic safety is required. The Developer shall conduct an evaluation of and provide recommendation for the most appropriate intersection treatment, which should include consideration for roadway design, economic analysis, capacity analysis, and traffic safety analysis.
- 4.1.5.6 Acceptance of intersection design shall be subject to review of the applicable sight distances, stopping sight distance, and other safety considerations for the specific geometric details and intersection control type being proposed. Tapering of berms at intersections may be required to provide for the necessary sight distances. Acceptance shall be granted on a case by case basis.
- 4.1.5.7 The Developer shall provide confirmation that sight distances, and horizontal and vertical visibility constraints, at all intersections meet or exceed the applicable minimum requirements.
- 4.1.5.8 Minimum sight distances must be maintained at all intersections, in accordance with [STANDARD DRAWINGS 41008](#), [41009](#), and [41010](#).
- 4.1.5.9 The Developer shall provide an additional 3.7 m ROW widening for acceleration and deceleration lanes at intersections on arterial roads, as shown on [STANDARD DRAWINGS 41122](#) and [41123](#). For minimum bay and taper lengths, see [STANDARD DRAWING 41011](#). The Developer must also provide additional ROW for any site specific accesses and/or turn lane(s).
- 4.1.5.10 Standard corner cutoffs in accordance with [TABLE 4-2](#) shall be used at all intersections unless, in the opinion of the IPS Standards Committee, circumstances dictate more stringent requirements. Developer subdivision entrance signage may be located on additional dedicated ROW located behind the minimum cut off specified.



**TABLE 4-2**

Main Road	Intersecting Road	Cutoff Requirements * <sup>1</sup>
Arterial	Arterial	15 m x 15 m corner * <sup>2</sup>
Arterial	Collector	See <a href="#">STANDARD DRAWINGS 41003</a> and <a href="#">41004</a> .
Arterial	Major Collector	8 m x 15 m corner * <sup>2</sup>
Arterial	Minor Collector	8 m x 15 m corner * <sup>2</sup>
Major Collector	Major Collector	10 m corner
Major Collector	Minor Collector	6 m corner
Minor Collector	Minor Collector	6 m corner
Minor Collector	Local	6 m corner
Local	Local	6 m corner
Local	Lane	None
Commercial Access	Arterial	6 m corner

**NOTES:**

ROW at intersections shall depend on final intersection configuration requirements.

\*<sup>1</sup> ROW for roundabouts shall depend on the ultimate inscribed circle diameter, sidewalk/trail alignments, and any applicable boulevard requirements.

\*<sup>2</sup> In addition to 3.7 m auxiliary lane widening, in accordance with [SUB-SECTION 4.1.5.9 OF THIS SECTION](#).

## 4.1.6 Access Management on Divided Roadways

- 4.1.6.1 The primary objective of access management on divided roadways is to balance the efficient movement of traffic with safe and orderly land access, while maintaining consistency with the functional and operational requirements of the roadway and the access needs of the adjacent lands.
- 4.1.6.2 In general, no single-lot property shall have direct driveway access to a divided roadway. A single-lot property is generally identified as a smaller lot that only has a single use (typically residential, but also commercial, industrial, or mixed use).
- 4.1.6.3 To provide broad public access to the area, and when supported by a TIA approved by the County, a private (not County-owned) all-directional large-format-site driveway may be considered for high-density commercial, industrial, or mixed-use developments comprised of one or more lots, buildings and/or uses.
- 4.1.6.4 The junction of an approved all-directional large-format-site driveway and a public roadway will be classified as an "intersection" and therefore subject to the requirements as outlined in [SUB-SECTION 4.1.5 OF THIS SECTION](#).
- 4.1.6.5 When supported by a TIA, a right-in/right-out (RI/RO) large-format-site driveway may also be considered for high-density commercial sites. RI/RO large-format-site driveways shall meet the following minimum spacing:
- (i) Major arterial: 130 m
  - (ii) Minor arterial: 100 m
  - (iii) Divided (non-residential) collector: 75 m

Major arterials are defined as roadways having any one of the following characteristics: six-lane cross-section, projected daily traffic volume in excess of 30,000 vpd, posted speed of 70 km/hr or more, or designation as a regional connector.

4.1.6.6 Spacing for RI/RO large-format-site driveways shall be measured between curb-returns or intersection channelization bullet-noses, as applicable.

4.1.6.7 Right-out large-format-site driveways will be not permitted within the left-turn bay and taper zone of a downstream intersection.

#### **4.1.7 Access Management on Undivided Roadways**

4.1.7.1 All single-lot property driveways shall be directed to local roadways or undivided collector roadways.

4.1.7.2 A single-lot property is permitted only one driveway. Industrial or multi-family lots (complexes with five or more dwelling units) with frontages in excess of 90 m may be permitted two driveways, subject to spacing requirements and County approval.

4.1.7.3 Large-format-sites may be permitted more than one large-format-site driveway when supported by a TIA, subject to spacing requirements and County approval. A large-format-site driveway is a private driveway providing broad public access to an area of land comprised of one or more lots generally having multiple buildings and uses.

4.1.7.4 Driveway access for corner lots shall be from the street of lesser traffic.

4.1.7.5 No driveways, or any portion thereof, shall be permitted access to a roadway through a curb return area.

4.1.7.6 Driveways must not be within the "area of influence" of any intersection. As per AASHTO, the "area of influence" (or functional area) of an intersection includes upstream and downstream auxiliary lanes and their associated channelization, as well as the combination of any applicable perception-reaction distances, manoeuvre distances, and queue-storage distances. For more information on calculating the "area of influence" of an intersection, refer to the most recent version of the TRB's *Access Management Manual*.

4.1.7.7 Driveways shall be located directly opposite existing driveways wherever possible.

4.1.7.8 Driveways shall be constructed to provide a minimum clearance of 1.5 m from any structure including hydrants, light standards, service pedestals, curb cocks and transformers in accordance with the Street Hardware Plan.

- 4.1.7.9 No residential driveways shall be permitted direct access onto those major collector roadways or portions thereof which have a projected traffic volume of 4,000 vpd or greater, or onto major collector roads within 110 m of an arterial roadway. Trip generation rates used to generate the projected volume shall be based on a minimum of 12 trips per dwelling per day external to the subdivision for low-density single-family residential lots. For all other lot types, refer to the most recent version of the Institute of Transportation Engineers (ITE) Trip Generation Manual. The County may review and request, on a case-by-case basis, that an alternate rate be used.
- 4.1.7.10 Non-residential (industrial/business commercial) driveways on collector roadways shall be located a minimum of 60 m from the lip-of-gutter of the outside through lane of an arterial roadway to the centreline of the driveway, or otherwise beyond the “area of influence” of the intersection, whichever is greater.
- 4.1.7.11 In addition to any other spacing requirements mentioned in these Standards, driveways on undivided roadways shall comply with the following spacing requirements (larger spacing may be required depending on traffic conditions, or as requested by the County):

**ON LOCAL ROADWAYS**

- (i) Single-family residential: 1.0 m minimum between driveways, measured edge-to-edge, except around cul-de-sac bulbs where smaller spacing will be accepted. For narrow lots where space is limited, smaller spacing must be reviewed and approved by the County. Driveways should be positioned to maximize spacing from the curb return. Under no circumstances shall any portion of the driveway be permitted within a curb return.
- (ii) Non-residential or multi-family: 3.0 m between driveways if parking will *not* be allowed on the road, 6.0 m minimum between driveways if parking *will* be allowed on the road, measured between ends of curb returns/flares. 60.0 m minimum from intersections, measured centreline-to-centreline.
- (iii) Large-format-site: 60.0 m minimum between driveways and from intersections, measured centreline-to-centreline.

**ON COLLECTOR ROADWAYS**

- (iv) Single-family residential: 1.0 m minimum between driveways, measured edge-to-edge. 30.0 m minimum from intersections, measured centreline-to-centreline.
- (v) Non-residential or multi-family: 45.0 m minimum between driveways, measured centreline-to-centreline. 60.0 m minimum from intersections, measured centreline-to-centreline.
- (vi) Large-format-site: 60.0 m minimum between driveways and from intersections, measured centreline-to-centreline.

**4.1.8 Cross-sections**

- 4.1.8.1 Road cross sections for each road classification will be as per the applicable Standard Drawing listed in [TABLE 4-1](#).
- 4.1.8.2 Traffic calming on collector roadways is required and can be accommodated as outlined in [STANDARD DRAWINGS 41109, 41110, 41112, 41113, 41114](#) and [41115](#). This cross-sectional drawing may be proposed in ASP Design Brief reports.

#### 4.1.9 Vertical Alignment

- 4.1.9.1 Minimum and maximum roadway grade is based on road classification, and shall be in accordance with the values found in [TABLE 4-3](#).
- 4.1.9.2 The minimum grade shall be  $\pm 0.6\%$  along all gutters, and  $\pm 1.0\%$  around curb returns and all curves with a radius of 30 m or less. Any tangent section less than 15 m in length shall have a minimum grade of  $\pm 1.0\%$ .
- 4.1.9.3 Any road intersecting with a collector or an arterial roadway shall approach at an upgrade of 0.6% to 2.0% or a downgrade of 0.6% to 1.0% for a minimum of 30 m from the curb return of the intersection. The maximum grade for 30 m away from the curb return of any other intersection is  $\pm 2.0\%$ .
- 4.1.9.4 All roads shall be crowned or have a cross-fall as shown on the applicable Standard Drawings listed in [TABLE 4-1](#).
- 4.1.9.5 All vertical curves shall be designed to meet the minimum requirements as shown in [TABLE 4-3](#).

**TABLE 4-3**

Road Classification	Minimum Grade (± %)	Maximum Grade (± %)	Minimum Curve Length (m)	Minimum K Value *1	
				Crest Curve	Sag Curve
<u>LOCAL</u>					
Lane (Paved)	0.8	6.0	N/A	N/A	N/A
Residential Cul-de-sac	1.0	6.0	30	8	7
Residential	0.6	6.0	30	8	7
Industrial/Business Commercial	0.6	6.0	30	8	7
<u>COLLECTOR</u>					
Minor Residential	0.6	6.0	50	8	7
Major Residential	0.6	6.0	50	8	7
Industrial/Business Commercial	0.6	6.0	50	8	7
Divided	0.6	6.0	60	14	10
<u>ARTERIAL</u>					
Minor Divided	0.6	5.0	70	22	15
Major Divided	0.6	5.0	80	35	20

**NOTES:**

<sup>\*1</sup> K = L/A where L = Length of Vertical Curve in Meters (m) A = Algebraic Difference in Grade in Percent

- 4.1.9.6 For vertical curves in a sag location, a minimum gradient of 0.6% must be maintained along the gutter line.
- 4.1.9.7 Vertical curves are not required where the algebraic difference of the grades is less than 1.5.

#### 4.1.10 Horizontal Alignment

- 4.1.10.1 The minimum degree of curvature of the centreline of the carriage way is dependent on the road classification and its design speed.
- 4.1.10.2 All horizontal curves and tangents shall be designed to meet the minimum design requirements as shown in [TABLE 4-4](#).

**TABLE 4-4**

Road Classification	Minimum Curve Radius (m)	Maximum Superelevation (m/m) * <sup>1</sup>	Minimum Tangent Length (m)
<b>LOCAL</b>			
Lane (Paved)	N/A	N/A	N/A
Residential Cul-de-sac	90	N/A	30
Residential	90	N/A	30
Industrial/Business Commercial	90	N/A	30
<b>COLLECTOR</b>			
Minor Residential	90	N/A	60
Major Residential	130	N/A	60
Industrial/Business Commercial	130	N/A	60
Divided	160	N/A	60
<b>ARTERIAL</b>			
Minor Divided	450	0.06	60
Major Divided	500	0.06	60

**NOTES:**

\*<sup>1</sup> See TAC Table 2.1.2.6 (p. 2.1.2.13) for super-elevation requirements on arterial roads.

#### 4.1.11 Cul-de-Sacs

- 4.1.11.1 The normal maximum length of a cul-de-sac is 120 m from the street curb line to the start of the bulb. Cul-de-sacs in excess of 120 m and less than 170 m will require an additional hydrant. Water main looping will be required as outlined in [VOL. 1 SEC. 4.3, WATER DISTRIBUTION SYSTEM, SUB-SECTIONS 4.3.1](#) and [4.3.2](#). Where cul-de-sacs in excess of 170 m are proposed, provision must be made for a 6.0 m wide PUL for emergency vehicle access and water service looping. PULs for emergency vehicle access shall be developed in accordance with [STANDARD DRAWING 41126](#).
- 4.1.11.2 Cul-de-sacs shall not exceed a 6.0% grade. If cul-de-sacs cannot be graded to drain towards the intersection then an outlet for the overland flow must be provided by way of a PUL.
- 4.1.11.3 Cul-de-sac road surface is to be crowned except the bulb portion, which may be crossfall.
- 4.1.11.4 The minimum radius of cul-de-sac bulbs is 14.0 m to face of curb (refer to [STANDARD DRAWINGS 41012](#) and [41013](#)).
- 4.1.11.5 Cul-de-sac islands shall be designed such that minimum lane width and design vehicle turning movements and parking can be met, along with the accommodation of utilities, street furniture, and planting. Refer to [STANDARD DRAWINGS 41012](#) and [41013](#).

- 4.1.11.6 Ensure that cul-de-sac islands are constructed with curb and gutter around the perimeter. Standard curb and gutter or reverse curb and gutter, or a combination of the two, shall be used (see [STANDARD DRAWING 41210](#)). Where required, islands shall contain catch basins and a sub-surface drainage system draining to the catch basin.
- 4.1.11.7 Cul-de-sac islands shall be landscaped in accordance with [VOL. 1 SEC. 6, OPEN SPACE STANDARDS](#).
- 4.1.11.8 No parking shall be permitted around the outside of the cul-de-sac bulbs. Parking shall be permitted around the island. The Developer shall erect standard RB-51 "No Parking" signs and RB-53 "Parking" signs as part of the development requirements. Refer to [STANDARD DRAWINGS 41012](#) and [41013](#).
- 4.1.12 Survey Control Markers and Legal Pins**
- 4.1.12.1 Existing Control
- The Developer or their Consultant shall make every effort to protect existing markers. Markers which are destroyed or disturbed shall be replaced by the Developer at his sole expense.
- 4.1.12.2 Survey Control Density
- Additional markers shall be provided by the Developer at a maximum spacing of 500 m with a minimum of two other markers in clear view subsequent to development.
- 4.1.12.3 Legal Posts
- Legal posts shall be placed subsequent to the installation of all utilities.
- All legal posts in the subdivision area shall be located within 60 days prior to application for Final Acceptance of the surface improvements.
- The Developer shall instruct the legal surveying consultant to replace any missing or disturbed posts as required by the Strathcona County Representative. All costs are to be borne by the Developer.
- 4.1.13 Roadway Structure Requirements**
- 4.1.13.1 A geotechnical report for the proposed project shall be submitted to the Strathcona County Representative for review as part of the overall submission.
- 4.1.13.2 The geotechnical report must include specific recommendations for pavement structure construction based on in-situ conditions and projected traffic volume. The stronger of the 20-year structure recommended by the Geotechnical Consultant and the structure shown in [TABLE 4-5](#) shall be used.

- 4.1.13.3 [TABLE 4-5](#) indicates the minimum thicknesses of Superpave Gyratory Compactor (SGC) granular and asphalt concrete materials required for each road classification. Note that a minimum cement stabilized subgrade preparation of 150 mm with a minimum of 10 kg/m<sup>2</sup> of cement is required in every case. The subgrade and base gravel must be compacted to 100% Standard Proctor Density. Refer to [VOL. 2 SEC. 311, SGC HOT-MIX ASPHALT CONCRETE](#) for more information in regard to the SGC mixes, including submission, testing, and reporting protocols

**TABLE 4-5**

Road Classification	Minimum SGC Hot-Mix Asphalt Concrete Pavement Structure (mm)		
	GBC * <sup>1</sup>	Base (Lower / Upper)	Surface
<b>LOCAL</b>			
Lane (Paved)	200	75 10mm-LT / 40 10mm-LT	N/A * <sup>2</sup>
Residential Cul-de-sac	200	75 10mm-LT	40 10mm-LT
Residential	200	75 10mm-LT	40 10mm-LT
Industrial/Business Commercial	250	75 20mm-B / 40 10mm-LT	40 10mm-HT
<b>COLLECTOR</b>			
Minor Residential	250	75 10mm-LT	50 10mm-LT
Major Residential	250	75 20mm-B / 40 10mm-LT	40 10mm-HT
Industrial/Business Commercial	350	100 20mm-B / 75 10mm-HT	50 10mm-HT
Divided	300	85 20mm-B / 40 10mm-HT	50 10mm-HT
<b>ARTERIAL</b>			
New Minor Divided	350	100 20mm-B / 75 10mm-HT	50 10mm-HT
New Major Divided	350	100 20mm-B / 75 10mm-HT	50 10mm-HT

**NOTES:**

\*<sup>1</sup> 20 mm Granular Base Course (GBC) to be used for all roads.

\*<sup>2</sup> Lanes are typically paved to full structure during first-stage paving and do not require a final lift/overlay.

- 4.1.13.4 Under special circumstances, the County may allow equivalent mixes of granular and hot-mix asphaltic concrete materials, as shown in [TABLE 4-6](#). Note that a minimum cement stabilized subgrade preparation of 150 mm with a minimum of 10 kg/m<sup>2</sup> of cement is required in every case. The subgrade and base gravel must be compacted to 100% Standard Proctor Density. Refer to [VOL. 2 SEC. 301, HOT-MIX ASPHALTIC CONCRETE PAVING](#) for more information in regard to the mixes, including submission, testing, and reporting protocols.

**TABLE 4-6**

Road Classification	Minimum Pavement Structure (mm)		
	GBC <sup>*1</sup>	Base (Lower / Upper)	Surface
<b>LOCAL</b>			
Lane (Paved)	200	75 / 40 ACR or ACO 75 ACR	N/A <sup>*2</sup> 40 ACR or ACO
Residential Cul-de-sac	200	75 ACR	40 ACR or ACO
Residential	200	75 ACB / 40 ACR	40 ACO
Industrial/Business Commercial	250		
<b>COLLECTOR</b>			
Minor Residential	250	75 ACR or ACO	50 ACO
Major Residential	250	75 ACB / 40 ACR	40 ACO
Industrial/Business Commercial	350	100 ACB / 75 ACO	50 ACO
Divided	300	85 ACB / 40 ACO	50 ACO
<b>ARTERIAL</b>			
New Minor Divided	350	100 ACB / 75 ACO	50 ACO
New Major Divided	350	100 ACB / 75 ACO	50 ACO

**NOTES:**
<sup>\*1</sup> 20 mm Granular Base Course (GBC) to be used for all roads.

<sup>\*2</sup> Lanes are typically paved to full structure during first-stage paving and do not require a final lift/overlay.

- 4.1.13.5 Provision for drainage of granular material shall be by means of Mebra Wick Drain #7407, Layfield LP8WD Horizontal Wick Drain or accepted equivalent, between catch basins and storm sewer manholes in all sag locations. The wick drain or equivalent shall be placed parallel to the curb in the lowest layer of the granular material in accordance with [STANDARD DRAWINGS 41101, 41108, 41111, 41118 and 41121](#), and connected to the nearest catch basin or storm manhole in accordance with [STANDARD DRAWING 44004](#).
- 4.1.13.6 The subgrade of all roadways shall be cement stabilized to the specification as outlined in [VOL. 2 SEC. 404, CEMENT STABILIZED SUBGRADE](#). Areas that have been stabilized with more than 10 kg of cement are to be clearly displayed on the as-built drawings.
- 4.1.13.7 Alternative pavement designs, along with supporting material, be submitted to the IPS Standards Committee for review and approval prior to construction. All designs must incorporate a drained gravel base.
- 4.1.13.8 A phased pavement construction is required where specified (except for lanes). The surface course shall be constructed not more than six months prior to FAC of surface improvements. Minimum pavement structure shall be in accordance with [TABLE 4-5](#). Maximum lift thicknesses are specified in [VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING](#) and [VOL. 2 SEC. 311, SGC HOT-MIX ASPHALT CONCRETE PAVING](#).
- 4.1.13.9 When tying in to a previous phase, a minimum 0.75 m width shall be ground out of the old phase and a 1.5 m Type 8502 or approved alternate glass grid shall be placed to tie the new and old pavement together at the joint.



- 4.1.13.10 The FAC for the road structure on a phased paving project (excluding surface course asphalt) shall be issued, subject to all deficiencies being rectified, after both of the following time periods have passed:
- (i) Following completion of surface course asphalt, typically two years after the CCC for the road structure (excluding surface course asphalt) was issued; and
  - (ii) One year after the FAC for underground improvements was issued.

If a pavement structure other than the one specified in [TABLE 4-5](#) or [TABLE 4-6](#) is authorized by the County, the time periods mentioned above may be extended by one year. Note that prior approval must be obtained from the County for alternative pavement structures.

Where surface course asphalt is completed as a separate project, such as for capital projects, the FAC for the road structure (excluding surface course asphalt) will be issued two years after the CCC for the road structure (excluding surface course asphalt). The FAC for surface course asphalt will be issued two years after the CCC for surface course asphalt.

- 4.1.13.11 If an interim or temporary entrance is necessary to provide access to a new subdivision, cul-de-sac or other residential street, the pavement structure must be designed to accommodate the projected traffic for the life of the facility.

#### 4.1.14 Pavement Markings

- 4.1.14.1 Pavement markings must be completed in accordance with [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).

#### 4.1.15 Sidewalks and Walkways

- 4.1.15.1 Multi-use asphalt trails shall be a minimum width of 3.0 m and shall be constructed in accordance with [STANDARD DRAWING 61401](#). Asphalt trails shall be constructed on all arterial roadways, and may be used on any other roadway.
- 4.1.15.2 Separate sidewalks shall be a minimum width of 1.5 m and shall be constructed in accordance with [STANDARD DRAWING 41214](#). Separate sidewalks shall be constructed on all major collector and industrial/business commercial roadways, and may be used on local residential or minor collector roadways.
- 4.1.15.3 Monolithic 1.5 m sidewalk and gutter with mountable curb for use on local residential roadways shall be constructed in accordance with [STANDARD DRAWING 41215](#) or [41216](#).
- 4.1.15.4 Monolithic 1.5 m sidewalk and gutter with straight face curb for use on minor collector roadways shall be constructed in accordance with [STANDARD DRAWING 41217](#).

- 4.1.15.5 All streets shall have pedestrian facilities (sidewalk and/or trail) in accordance with the applicable Standard Drawing(s) listed in [TABLE 4-1](#). On cul-de-sac bulbs, sidewalks shall terminate near the start of the cul-de-sac bulb if no PUL walkway is planned/proposed, in accordance with [STANDARD DRAWING 41013](#). If a PUL with a walkway connecting to the cul-de-sac bulb is present, the cul-de-sac sidewalk shall continue around the bulb, in accordance with [STANDARD DRAWING 41012](#).
- 4.1.15.6 Sidewalk ramps are to be used at all curbed intersections and shall be constructed monolithically or securely dowelled, and in accordance with [STANDARD DRAWINGS 41001](#), [41201](#), and [41202](#). Catch basins shall not be located within the ramp area or within 0.5 m of the flare (measured from the widest point of the flare to the centre of the catch basin), as noted on [STANDARD DRAWINGS 41201](#) and [41202](#).
- 4.1.15.7 All sidewalks shall be imprinted with the Contractor's stamp showing company name and year of construction. Frequency of stamps shall be one per residential block or every 200 m, whichever is less.
- 4.1.15.8 Sidewalks shall be imprinted with a "CC" to identify all Curb Cock locations and a "W" to identify Water Valve locations.
- 4.1.15.9 All concrete structures are to be adequately reinforced. All structures require a minimum compressive strength of concrete at 28 days of 30 MPa. Ensure compliance with [VOL. 2 SEC. 402, CONCRETE CURB, CURB & GUTTER, SIDEWALK, SLABS, AND ROAD BASE](#). Cured-in-place samples must be provided when requested.
- 4.1.15.10 The pouring of concrete in cold weather conditions must have prior approval from the Strathcona County Representative. Approval requests must include mix design, additives and hoarding details.
- 4.1.15.11 The design of the subdivision should consider pedestrian needs and allow for walkways through cul-de-sacs and other appropriate locations.
- 4.1.16 Concrete Curb and Gutter**
- 4.1.16.1 Concrete curb and gutter shall be constructed on all streets in accordance with [STANDARD DRAWINGS 41207](#), [41208](#), [41210](#), [41211](#), [41212](#), [41215](#), [41216](#), and [41217](#).
- 4.1.16.2 Straight face curb and gutter shall be used on all collector (minor and major) and arterial roads. All roads fronting parks, PULs, and walkways shall also require straight face curb and gutter unless another means of preventing vehicular access onto these public lands is provided.
- 4.1.16.3 Curb returns on residential street intersections shall be constructed with a minimum radius of 10.0 m. There shall be a transition to a straight face curb cross-section 1.0 m prior to the beginning of the curb return and a reverse transition 1.0 m after the end of the curb return at intersecting roadways. A 1.0 m transition into the curb return may be accepted to accommodate catch basin locations.

- 4.1.16.4 Curb returns in industrial/commercial areas shall be constructed with a minimum radius of 15.0 m to accommodate truck turning movements.
- 4.1.16.5 All concrete structures are to be adequately reinforced. All structures require a minimum compressive strength of concrete at 28 days of 30 MPa. Ensure compliance with [VOL. 2 SEC. 402, CONCRETE CURB, CURB & GUTTER, SIDEWALK, SLABS, AND ROAD BASE](#). Cured in place samples must be provided when requested.
- 4.1.16.6 Local residential streets will be permitted to utilize low-profile curb, provided the drainage analysis is conducted based on the correct curb height (refer to [STANDARD DRAWINGS 41103](#) and [41105](#)).
- 4.1.17 Transit Stop Pads**
- 4.1.17.1 Transit stop pads shall be constructed in accordance with [STANDARD DRAWINGS 41221](#) and [41222](#).
- 4.1.18 Berming, Fencing and Landscaping**
- 4.1.18.1 Berms shall have maximum side slopes of 4:1, a top width of 1.0 m and be topsoiled and sodded/seeded. Berm tops shall be centred on the property line. Where berm design provides for less than 6.5 m from toe of berm to lip of gutter additional land must be dedicated for the ROW.
- 4.1.18.2 Consistent noise attenuation fencing shall be required on all residential lots that back or flank onto arterial roads. Berming and fencing shall be required to separate residential developments from high volume arterial traffic. Roadways through residential areas which require berming and adjacent fencing include all arterial roads as well as adjacent highways (refer to the most recent version of the Transportation System Bylaw for a list of arterial roadways). Fencing shall be placed 150 mm inside the property line.
- 4.1.18.3 Residential development adjacent to the roadways outlined in [SUB-SECTION 4.1.18.2](#) of this section requires a Noise Impact Assessment (NIA) to be submitted during the development approval process. The NIA must address present and future noise levels and identify measures required to adequately maintain noise levels outlined in the most recent version of the Strathcona County Traffic Noise Policy SER-009-027, or as amended or replaced from time to time.

The Developer will be required to address noise levels based on transportation facilities operating at capacity as planned by Strathcona County or other agencies or forecast in the latest version of the Strathcona County Integrated Transportation Master Plan.

- 4.1.18.4 Fencing required along parks, schools and other public open space shall be in accordance with the [VOL. 1 SEC. 6, OPEN SPACE STANDARDS](#). Fencing shall be constructed on private property a minimum 150 mm from the property line. Fencing that is adjacent to a neighbouring driveway must not create a sight line obstruction for drivers or pedestrians once installed. Refer to [VOL. 1 SEC. 6, OPEN SPACE STANDARDS](#) for more detailed fence construction information.
- 4.1.18.5 Fencing proposals are to be reviewed for acceptance by the Planning & Development Services department prior to construction. Construction of fencing may not start until an acceptable plan has been provided and written acceptance granted.
- 4.1.18.6 In landscaped areas, the subgrade preparation, topsoil, seeding and/or sodding requirements must conform to the applicable sections of [VOL. 2, CONSTRUCTION SPECIFICATIONS](#).
- 4.1.19 Utility Trenches**
- 4.1.19.1 In all new subdivisions it shall be the Developer's responsibility to ensure that utility trenches are adequately compacted. Within the road carriage way, including trails and walkways, 98% Standard Proctor Density shall be required; 95% Standard Proctor Density in all other areas. In existing subdivisions, the utility companies shall be responsible to ensure adequate compaction in utility trenches for any new installations or modification of existing lines.
- 4.1.19.2 The Developer's Consultant is to coordinate locations of shallow utility crossings of roadways with the respective utility company. All shallow utilities are to be contained in conduit of appropriate size and number for all roadway crossings.
- 4.1.20 Traffic Control and Street Name Signs**
- 4.1.20.1 Diamond grade or approved equivalent reflective material is required for the lettering and background for all signage, except the black components of a sign.
- 4.1.20.2 Street name signs at intersections shall consist of white lettering on a green metal plate, installed on the opposite side of the road from any regulatory signage. Lettering sizes shall be as follows:
- (i) At arterial intersections: LED backlit 200 mm (8") on a 450 mm (18") blade.
  - (ii) Along arterial roadways: 250 mm (10") on a 300 mm (12") blade.
  - (iii) Along major collector roadways: 250 mm (10") on a 300 mm (12") blade.
  - (iv) Along minor collector and local roadways: 100 mm (4") on a 150 mm (6") blade.
- 4.1.20.3 100 mm (4") white address numbering on a green metal plate will be required on all cul-de-sacs in addition to the street name signage.
- 4.1.20.4 Developers may be permitted to install additional decorative street name signage or signage support when adequate maintenance funding provisions have been approved by the Planning & Development Services Department.

- 4.1.20.5 At intersections where future signals are warranted but not yet installed, the Developer is responsible for installing any and all temporary street name blades.

#### 4.1.21 Roadway Lighting

- 4.1.21.1 The illumination of roadways in the Sherwood Park Urban Service Area shall be designed to the following criteria:
- (i) Arterial roads: Transportation Association of Canada Guide for the Design of Roadway Lighting.
  - (ii) Collector roads: Transportation Association of Canada Guide for the Design of Roadway Lighting.
  - (iii) Local roads: Illuminating Engineering Society of North America, Roadway Lighting, RP-8-00.
  - (iv) In accordance with the Strathcona County Light Efficient Community Policy SER-009-038 and any amendments thereto.
- 4.1.21.2 Intersections will be designed to the higher roadway criteria. Decorative lighting poles proposed by the Developer shall be readily available in the Edmonton area.
- 4.1.21.3 The illumination of intersections of all roadways in the Rural Service Area shall be designed to the TAC *Illumination of Isolated Rural Intersections* criteria.
- 4.1.21.4 Configuration of street lighting and all associated shallow utility infrastructure must be installed according to the appropriate [STANDARD DRAWING\(S\)](#).

#### 4.1.22 Temporary Roads and Turnarounds

- 4.1.22.1 When it has been determined by the Planning & Development Services department that a temporary road is required in a new subdivision, the road shall be built in accordance with plans approved by the County, with all costs thereof borne by the Developer.
- 4.1.22.2 A temporary road between a proposed subdivision and an existing local or collector road which is required as a point of access shall be constructed to one of the following standards:
- (i) When the residents of the proposed subdivision will use the temporary road, it shall be constructed to the completed paving stage of a roadway. A temporary road constructed through or flanking a single family lot shall have screen fencing provided to buffer the adjacent development, and a sign indicating the temporary nature of the road shall be erected.
  - (ii) When the temporary road will be used only by construction traffic and will be taken out of service before residential occupancy of the subdivision following the construction of permanent access points, the road shall be constructed to the interim gravel stage without curbs and gutters. When the temporary road crosses the curbs, gutters and sidewalks of adjoining roads, provision shall be made to permit regular vehicle movement across the curbs.

- (iii) Where a road terminates at mid-block and has no provision for egress, a temporary circular turnaround shall be constructed to the interim gravel structure prior to opening the roadway to public access. If the turnaround is to be used by transit, or for an extended period of time, it may be required, at the discretion of the County, to be paved to an asphalt hard surface standard prior to opening the roadway.
- (iv) The temporary turnaround shall be designed with a minimum 12m radius on a local/collector roadway (without transit) or a 17m radius on a collector/arterial roadway (with transit). A temporary turnaround is not required where the roadway termination is easily visible from the adjacent intersection (maximum 30 m from the intersection) or where the roadway does not provide direct access to adjacent lands.

4.1.22.3 Temporary roadways shall be shown on detailed engineering drawings showing vertical and horizontal alignments, drainage details and typical cross sections.

**TABLE 4-7: ROAD CLASSIFICATION AND GEOMETRIC DESIGN SUMMARY**

Road Classification	Primary Function	Traffic Volume (vpd)	Design Speed (km/hr)	Posted Speed Limit (km/hr)	Minimum Intersection Spacing (m) <sup>*1</sup>	Minimum Spacing Between Driveways (m) <sup>*3</sup>	Road Width Curb Face to Curb Face (m)	ROW Width (m) <sup>*7</sup>	Minimum Horizontal Curve Radius (m)	Maximum Super-elevation (m/m)	Minimum Tangent Length (m)	Minimum / Maximum Grade (±%)	Minimum Vertical Curve Length (m)	Minimum K Value		Transit Busses	Pedestrian Facilities <sup>*9</sup>	Standard Drawing Number(s)
														Crest Curve	Sag Curve			
LOCAL																		
Lane (Paved)	Land Access	< 500	30	30	60	1.0	5.8	6.0	N/A	N/A	N/A	0.8 / 6.0	N/A	N/A	N/A	No	No	<a href="#">41101</a>
Residential Cul-de-sac		< 500	50	50	60	1.0	9.0	18.0	90	N/A	30	1.0 / 6.0	30	8	7	No	SW	<a href="#">41012</a> , <a href="#">41013</a> , <a href="#">41106</a> , <a href="#">41108</a>
Residential		< 1,000	50	50	60	1.0 (SF), 3.0 (NR/MF), 60 (LF)	9.5 <sup>*4</sup>	18.0	90	N/A	30	0.6 / 6.0	30	8	7	No	SW	<a href="#">41102</a> , <a href="#">41103</a> , <a href="#">41104</a> , <a href="#">41105</a> , <a href="#">41108</a>
Industrial/Business Commercial		< 3,000	50	50	60	3.0 (NR), 60 (LF)	11.5	20.0	90	N/A	30	0.6 / 6.0	30	8	7	No	SW	<a href="#">41107</a> , <a href="#">41108</a>
COLLECTOR																		
Minor Residential	Traffic Movement and Land Access	1,000-2,500	50	50	60 <sup>*2</sup>	1.0 (SF), 45 (NR/MF), 60 (LF)	11.5	20.0	90	N/A	60	0.6 / 6.0	50	8	7	No	SW	<a href="#">41109</a> , <a href="#">41110</a> , <a href="#">41111</a>
Major Residential		2,500-6,000	50	50	60 <sup>*2</sup>	1.0 (SF), 45 (NR/MF), 60 (LF)	13.5 <sup>*5</sup>	24.0	130	N/A	60	0.6 / 6.0	50	8	7	Yes	SW	<a href="#">41112</a> , <a href="#">41113</a> , <a href="#">41114</a> , <a href="#">41115</a> , <a href="#">41118</a>
Industrial/Business Commercial		3,000-10,000	50	50	60 <sup>*2</sup>	45 (NR), 60 (LF)	13.5	24.0	130	N/A	60	0.6 / 6.0	50	8	7	Yes	SW/T	<a href="#">41116</a> , <a href="#">41117</a> , <a href="#">41118</a>
Divided Collector <sup>*10</sup>		5,000-15,000	60	50	200	75 (RI/RO)	20.3	31.0	160	N/A	60	0.6 / 6.0	60	14	10	Yes	SW & T	<a href="#">41119</a> , <a href="#">41120</a> , <a href="#">41121</a>
ARTERIAL																		
Minor Divided Arterial	Traffic Movement (Limited Land Access)	< 30,000	70	60	400	100 (RI/RO)	2 - 8.4 <sup>*6</sup>	50.0	450	0.06	60	0.6 / 5.0	70	22	15	Yes	T	<a href="#">41122</a>
Major Divided Arterial		≥ 30,000	80	70	400	130 (RI/RO)	2 - 12.1 <sup>*6</sup>	50.0 <sup>*8</sup>	500	0.06	60	0.6 / 5.0	80	35	20	Yes	T	<a href="#">41123</a>

**NOTES:**

- <sup>\*1</sup> Measured centerline-to-centerline, unless otherwise stated.
- <sup>\*2</sup> Minimum spacing from the centerline of a collector roadway to the lip-of-gutter of the outside through lane of an arterial roadway is 110 m, as shown on [STANDARD DRAWING 41005](#).
- <sup>\*3</sup> Reference of measure varies, and some scenarios require larger spacing. Refer to [SUB-SECTIONS 4.1.6](#) and [4.1.7 OF THIS SECTION](#) for more details. SF = Single Family; NR/MF = Non-Residential/Multi-Family; LF = Large Format.
- <sup>\*4</sup> Pavement width on crescents with an overall maximum of 50 units (or 600 vpd) can be reduced from 9.5 m to 9.0 m.
- <sup>\*5</sup> An 11.5 m pavement width centered in the ROW will be acceptable for major residential collector roadways provided that lots do not front on to the roadway (including lots with back lanes) and "No Parking" signs are provided. The ROW width shall remain at 24.0 m to accommodate easier transitions. Major residential collector roadways with lots fronting will be required to maintain a 13.5 m pavement width to accommodate parking.
- <sup>\*6</sup> Total road width shall include an additional 4.5 m median.
- <sup>\*7</sup> ROW at intersections shall be dependent upon final intersection configuration requirements.
- <sup>\*8</sup> Final ROW shall be dependent upon the requirement for noise abatement.
- <sup>\*9</sup> A sidewalk (SW) or trail (T) is required as indicated on both sides of all roadways, except for local industrial/business commercial. No facilities are provided on local lane. Refer to the applicable Standard Drawing(s) for more detailed information.
- <sup>\*10</sup> Refer to [SUB-SECTION 4.1.3.3 OF THIS SECTION](#) for more details.

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on the correct sides when the document is printed double-sided.



## 4.2 WASTEWATER COLLECTION SYSTEM

### 4.2.1 System Design

The wastewater collection system shall be designed with sufficient capacity to carry peak flows plus an allowance for inflow and infiltration. The system shall be designed using the following *minimum* criteria:

#### 4.2.1.1 Residential Population Density

- (i) 3.5 persons / lot

Strathcona County may consider lower population densities for multi-family land uses through a formal variance request.

#### 4.2.1.2 Average Wastewater Generation

- (i) Residential: 300 L/person/day.
- (ii) Commercial / Industrial: 18,000 L/hectare/day

As commercial / industrial flows vary greatly, the above rate shall be used for preliminary planning purposes, however; each application shall be reviewed on a case-by-case basis.

#### 4.2.1.3 Peaking Factor

- (i) Residential: The greater of 2 or  $2.6 \times P^{(-0.1)}$  with provision for an additional 24% more design capacity in new pipes that have a diameter of 375 mm or greater, where P = the design population in thousands.
- (ii) Commercial / Industrial: Each case may be considered on an individual basis, however; for planning purposes  $10 \times Q^{-0.45}$  (min 2.5, max 25) shall be used.

#### 4.2.1.4 Inflow and Infiltration (I/I) Allowance

- (i) A general infiltration allowance of 0.28 L/sec/gross ha shall be added to the base wastewater flow.
- (ii) In addition, a separate allowance of 0.4 L/sec shall be added for each manhole located in a street sag with some degree of water inflow control in place.

#### 4.2.1.5 Manning's Roughness Coefficient

- (i)  $n = 0.013$

#### 4.2.1.6 Required Sewer Capacity

- (i) Estimated Design Flow / 0.86

#### 4.2.1.7 Flow Velocity

- (i) Minimum: 0.6 m/s
- (ii) Maximum: 3.0 m/s

## 4.2.1.8 Pipe Slope

- (i) Minimum slopes according to pipe diameter shall be as follows:

Size	Slope %
200 mm	0.40 (except first segment)
250 mm	0.28
300 mm	0.22
375 mm & larger	0.15

- (ii) Minimum slopes shall be increased by 50% on all curves.  
(iii) Minimum slope of the first segment of pipe (most upstream) shall be 1%.

## 4.2.1.9 Weeping Tiles (Foundation Drains)

- (i) For any development (residential, commercial, industrial, etc.), weeping tiles, roof leaders (downspouts) and similar appurtenances that handle storm water or ground water are not permitted to discharge into wastewater system.

## 4.2.1.10 Wastewater Mains

- (i) In residential, commercial and industrial subdivisions, wastewater mains shall be installed as depicted on [STANDARD DRAWINGS 41102, 41103, 41104, 41105, 41107, 41109, 41110, 41112, 41113, 41114, 41115, 41116, 41117, 41119](#) and [41120](#). A reduction from 3 m to 2.5 m separation between water and wastewater mains may be considered at the discretion of the IPS (Variance) Standards Committee.
- (ii) Minimum pipe diameters shall be as follows:
- Residential: 200 mm
  - Commercial / Industrial: 250 mm
- (iii) Whenever possible, water mains shall cross above wastewater sewers. Minimum vertical separation between watermain and sewer crossings shall be as follows:
- 0.5 m under normal conditions from invert to crown to allow for proper bedding and structural support of water and sewer mains.
  - If the minimum separation cannot be met, bridging options will be considered through consultation with the County (i.e. casing, metal plates, etc...).
  - Where it is necessary to cross below the sewer, the water main shall be protected by providing the following:
    1. The same vertical separation requirements as indicated above;
    2. Structural support of the sewer to prevent excessive joint deflection and settling; and
    3. Centering the length of both the watermain and sewer at the point of crossing so that the joints are equidistant from the crossing location.
- (iv) Minimum depth of cover for wastewater mains shall be 2.75 m from finished grade to top of pipe.
- (v) Curved wastewater mains shall be permitted with the following restrictions:
- The curve shall run parallel to the curb or street centreline.
  - The minimum grade for wastewater mains on a curve shall be 50% greater than the minimum grade required for a straight run.

- Manholes shall be located at the beginning and end of each curve. Joint deflection shall not exceed pipe manufacturers' specifications.

#### 4.2.1.11 Manholes

- (i) Manholes are not to be placed in sags or depressions. Where this is unavoidable, provision must be made to seal the manhole lid from surface runoff (inflow).
- (ii) All manholes shall be a minimum of 1200 mm inside diameter.
- (iii) The maximum distance between manholes shall be 150 m. Lesser distance is encouraged for maintenance purposes.
- (iv) Manholes are required at all transitions in size, grade, direction, at junctions, and at the ends of mains.
- (v) At manholes where size changes occur, the crown (obvert) of the incoming main(s) shall be designed to match or be higher than the outgoing main.
- (vi) Based on pipe diameter, change in flow direction shall not exceed the following:
  - Smaller than 600 mm: 90 degrees
  - 600 mm and larger: 45 degrees

In all situations, minimum flow velocities must be achieved.

- (vii) Manholes shall be located to avoid driveway conflicts (i.e. at the projection of property lines).
- (viii) Invert drops across manholes shall be as follows:
  - 12 mm for straight run connections
  - 50 mm for changes in direction
- (ix) Drop sections are required for invert grade differences greater than 300 mm in wastewater manholes. For 200 mm and 250 mm mains, internal drop manholes may be used.
- (x) Benching is required for invert grade differences 300 mm or less.
- (xi) Perched manholes or oversized manholes are required on 600 mm – 1050 mm diameter mains.
- (xii) Manholes exceeding 7 m in depth require safety platforms with a maximum spacing of 5 m.

#### 4.2.1.12 Service Connections

- (i) Each lot or unit shall have its own separate wastewater service connection.
- (ii) Connection manholes and service mains to property line for multi-family sites shall be completed at the time of initial subdivision development. Commercial / industrial service connections may be deferred until the lots develop provided there is no disturbance to the roadway while connection to the wastewater main is made.
- (iii) The minimum size of a wastewater service connection shall be 150 mm inside diameter.
- (iv) Non-residential and multi-family service connections shall be sized according to anticipated user requirements.
- (v) The minimum grade on service connections shall be 2.0%.
- (vi) Minimum depth of cover for service connections shall be 2.75 m, as measured from the top of pipe to finished grade.

- (vii) Services shall be located such that they do not conflict with driveway or access locations.
- (viii) Service connections shall extend beyond the gas line, terminating 0.15 m from the back (house side) of the easement.
- (ix) A wastewater sampling manhole shall be provided within the road ROW or frontage easement for each service to an industrial or commercial lot.

The sampling manhole shall be installed at the time that the lot develops and the service is installed.

- (x) Commercial / industrial service connections 200 mm or larger require a manhole connection.

#### 4.2.1.13 Lift Stations and Wastewater Force Mains

- (i) Gravity systems are the preferred method for wastewater conveyance. Alternative designs using lift stations and forcemains will only be considered if the constraints associated with a gravity system cannot be resolved. Justification for alternative drainage designs must be provided within ASP/ACP documents for the proposed development area. Strathcona County reserves the right to request any level of detail needed to justify the consideration of these systems.
- (ii) General design information should include but is not limited to the following:
  - a. Location and accessibility.
  - b. Service area.
  - c. Average and peak dry weather flows.
  - d. Average and peak wet weather flows.
  - e. Design pump discharge rates.
  - f. Wet well storage capacity.
  - g. Transient pressure analysis.
  - h. Forcemain surge protection devices and valving.
  - i. Wastewater detention times.
  - j. Odour control methods.
  - k. Staging requirements.
  - l. Operation and maintenance issues.
  - m. Cost estimates.
- (iii) Detailed lift station design shall include full mechanical redundancy and emergency backup systems (overflow provision and standby generator).
- (iv) A suitable building will be required at all proposed lift stations to house electrical and control equipment, as well as provide storage/office space. The building shall be architecturally compatible with the proposed development.
- (v) Forcemain outlet manholes which may be subject to sulphide attack shall be constructed with inert materials or have adequate protective coating.
- (vi) Detailed design shall be done in consultation with the County to ensure all site specific mechanical and electrical requirements are met.
- (vii) Corrosion Reduction
  - Any pressurized wastewater main made of PVC, PE, HDPE or any similar nonconductive material is to have tracer wire installed. The tracer wire is to have connection points exposed at every opportunity (all valves and air reliefs).

- Tracer wire and sacrificial anodes to be consistent in material and construction with [VOL. 1 SEC. 4.3, WATER DISTRIBUTION SYSTEM, SUB-SECTIONS 4.3.2.11 and 4.3.3.9.](#)

## 4.2.2 System Materials

### 4.2.2.1 General

The Developer shall supply and install only new materials. New material shall be installed within two years from the production date indicated on the certification form. All such materials which are defective in manufacture or has been damaged in transit or have been damaged after delivery shall be replaced by the Developer at his expense. All Standards referred to mean the latest edition of that Standard. The applicable standards are summarized at the back of this section (refer to [SUB-SECTION 4.2.4 OF THIS SECTION](#)). Where specific products are specified, it is intended that approved equals are also acceptable. The approval of the equal must be obtained from the IPS (Variance) Standards Committee before the equal product is used.

### 4.2.2.2 Wastewater Mains

- (i) Gravity wastewater mains shall be PVC or concrete pipe.
- (ii) PVC Pipe
  - PVC Pipe: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.1.](#)
  - Sealing Gaskets: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.1.2.](#)
  - In-line Tees or Wyes for all residential service connections, injection - refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTIONS 2.1.3.](#)
- (iii) Concrete Pipe
  - All concrete pipe shall be manufactured using sulphate resistant Type 50 cement.
  - Reinforced Concrete Pipe: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.1.](#)
  - All joints refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.1.9.](#)

### 4.2.2.3 Wastewater Services

- (i) For single family dwellings and multi-family units, wastewater service pipe and fittings shall be PVC 150 mm DR35 meeting the same specifications as the PVC main pipe.
- (ii) For non-residential services, PVC or concrete pipe shall be used and comply with [SUB-SECTION 4.2.2.2 OF THIS SECTION.](#)

### 4.2.2.4 Manholes

- (i) Precast Manholes: Refer to [VOL. 2 SEC. 7.501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.](#)
  - Manufacturers producing precast concrete manholes shall possess a current plant prequalification certificate.

- (ii) Manhole Steps: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.2.](#)
- (iii) Manhole Joints: [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.3.](#)
- (iv) Manholes Frame and Covers: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.3.](#) Approved frame and covers are as follows:
  - F80 solid cover or equal for all manholes in streets and driveways [STANDARD DRAWING 42107.](#)
  - F90 solid cover or equal with rubber gasket-seal for all manholes in street sags or other low areas [STANDARD DRAWING 42106.](#)
  - F39 with solid cover or equal in all other locations [STANDARD DRAWING 42108.](#)

"Strathcona County" and "SAN" shall be stamped on all wastewater manhole frames and covers.

- (v) Pre-benched Manhole Bases: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.4.](#)
- (vi) Tee Riser Manholes: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.5.](#)
- (vii) Aluminium Safety Platforms: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.7.](#)
- (viii) All manholes located on any Arterial Roadways, Park Reserves, PUL's, School Grounds, vacant lots and undeveloped land shall be required to have a Locking Manhole Cover or F80 or F90 frame and solid cover or equal.

#### 4.2.2.5 Bedding and Initial Backfill Sand

- (i) Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.9.](#)

#### 4.2.2.6 Concrete

- (i) All concrete must be sulfate resistant and where required for the construction of the system, shall develop a compressive strength of not less than 25 MPa in 28 days.
- (ii) All reinforcing steel shall conform to the requirements of CSA G30.12 and G30.16 for new billet steel, grade 400. Welded wire mesh shall conform to CSA G30.5. Minimum concrete cover on all reinforcing steel = 75 mm.

### 4.2.3 System Installation

#### 4.2.3.1 General

The system standards are intended to address key points only and not to be considered as a substitute for a detailed material and construction specification to be prepared by the Developer's Engineer.

#### 4.2.3.2 Trenching, Bedding, and Backfilling

- (i) Trenching: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTIONS 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 and 3.8.](#)

- (ii) Bedding and Backfilling: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTIONS 3.10, 3.11 and 3.12](#).
- (iii) At the discretion of the IPS (Variance) Standards Committee, appropriate methods may be required to be established for cases where the applicant has adequately demonstrated through approved engineering methodologies, that the above compaction standards cannot be achieved.
- (iv) Trenching and Bedding Testing: Refer to [VOL. 2 SEC. 001, MATERIALS TESTING, SUB-SECTIONS 1.2 and 1.3](#).

#### 4.2.3.3 Pipe Installation

- (i) The pipe installation shall be conducted in conformance with the pipe manufacturer's specifications.
- (ii) Construction Tolerances:
  - Alignment: Maximum deviation  $\pm 150$  mm.
  - Grade: The invert of the wastewater main shall not deviate more than 5 mm + 20 mm/1.0 m diameter from the design elevation.

#### 4.2.3.4 Connection to Existing Utilities

Strathcona County must be contacted prior to any connection to County utilities. Tying into existing manholes shall be performed in a manner acceptable to the Strathcona County Utilities, according to the dictates of good practice. Existing manhole floors shall be re-channelled and properly benched, the junction area shall be grouted to form a smooth joint, all debris including concrete and excavated material shall be removed and the vicinity of the connection shall be left in a tidy condition acceptable to the Strathcona County Utilities.

#### 4.2.3.5 Manholes

- (i) Manholes and T-Riser manholes shall be installed as depicted on the [STANDARD DRAWINGS 42101, 42102 and 42103](#) and in accordance with material manufacturer's instructions.
- (ii) Flexible manhole connectors are required wherever flexible pipe systems connect to a concrete manhole.
- (iii) External and internal drop manholes to be constructed as per [STANDARD DRAWINGS 42104 and 42105](#).

#### 4.2.3.6 Service Connections

- (i) For single family dwellings, wastewater services shall be installed in common trench with the water and sump pump discharge collection service as depicted on [STANDARD DRAWING 42003](#). Class B bedding is required.
- (ii) Inline Tee or Wye fittings must be installed during wastewater main construction at all service connections. Saddles are allowed only for service connections to existing mains. Tee fitting service connections for wastewater mains will be allowed provided they discharge into the top half of the main.
- (iii) Where wastewater services are required to connect to mains in excess of 4.5 m deep, risers shall be installed to 4.5 m below finished surface in accordance with [STANDARD DRAWING 42109](#).



- (iv) In residential subdivisions with front yard gas servicing, water, wastewater, and sump pump discharge collection services shall be extended beyond the gas line and sump pump discharge collection main and terminate a minimum of 0.15 m from the back of the easement line. All services shall be properly capped.
- (v) Install red painted stakes 38 mm x 89 mm x 750mm long, extending 450 mm above ground at the service connection.

#### 4.2.3.7 Augering of All Service Connections and Main Extensions Into Commercial/Industrial Sites

- (i) All service connections into commercial/industrial sites shall be installed by augering under proposed and existing streets and sidewalks except where augering is not feasible due to adverse soil conditions. Open trenching may be permitted subject to the Strathcona County Representative's acceptance of the need and acceptance of the backfill material.
- (ii) All auger pit excavations shall be backfilled with granular bedding material and mechanically compacted, in lifts not to exceed 150 mm in depth, to a minimum of 95% Standard Proctor Density to 300 mm above the pipe.
- (iii) Backfill of auger pit excavation over 300 mm above the pipe shall be compacted in lifts not to exceed 150 mm in depth, to a minimum of 98% Standard Proctor Density.

#### 4.2.3.8 Inspection and Testing

- (i) During wastewater main installation, all mains shall be subject to inspection by the Strathcona County Representative, or his designate.
- (ii) The maximum acceptable long-term deflection for any PVC or other flexible pipe is 7.5% of the normal internal diameter.

Strathcona County will provide all equipment and conduct the video inspection up to six months prior to Final Acceptance and at the Developer's expense. An optional inspection can also be conducted at the Construction Completion at the Developer's or Contractor's expense.

The Developer's Consulting Engineer or Contractor shall contact Strathcona County Utilities to schedule the video inspection. The Developer Contractor shall be responsible to ensure all mains are clean prior to the commencement of the camera work. Request for video inspection will be entertained six months prior to FAC. Strathcona County Utilities will undertake the camera work and review process in a timely manner. If any defects/deficiencies are identified, it will be the Contractor's responsibility to correct and re-request another camera inspection.

- (iii) Where deemed necessary by Strathcona County, an exfiltration and/or infiltration test shall be conducted. Any deficiencies shall be corrected by the contractor and those portions of the system affected shall be subject to an additional video inspection.



## PIPE LEAKAGE ALLOWANCES

Pipe Material	Leakage Allowance
PVC	<p><u>Infiltration Test:</u>  5.0 L/day/mm dia/km is allowable with no allowance for external hydrostatic head. The groundwater table is to be above pipe crown at all locations of the test section.</p> <p><u>Exfiltration Test:</u>  5.0 L/day/mm dia/km is the combined allowable exfiltration from pipe and manholes with hydrostatic head at the high manhole is to be a minimum 0.6 m higher than crown of pipe or groundwater table, whichever is higher. The water level is not to exceed 7.6 m above top of pipe at low manhole.</p>
Concrete	<p><u>Infiltration Test:</u>  20.0 L/day/mm dia/km is allowable with average depth of groundwater a minimum of 0.6 m above crown of pipe. Where the average head of groundwater is 1.8 m or more above the crown, the infiltration limit is increased by the ratio of the square root of the actual head to a base head of 1.8 m.</p> <p><u>Exfiltration Test:</u>  20.0 L/day/mm dia/km is the combined allowable exfiltration from pipe and manholes when average head on the test section is 0.9 m above crown of pipe or groundwater table, whichever is higher.</p> <p>Exfiltration limit is increased by the ratio of the square root of the actual head to a base head of 0.9 m when the average head on the test section is greater than 0.9 m above crown of pipe or groundwater table, whichever is higher.</p>

### 4.2.4 Summary of Wastewater Collection System Standards

The following is a summary of the standards applicable to the wastewater systems materials and construction. In all cases, it is intended that the latest revision apply.

#### ASTM

A48/A48M	Gray Iron Castings
C14	Concrete Sewer, Storm and Drain, and Culvert Pipe
C76	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
C443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
C478	Precast Reinforced Concrete Manhole Sections
D698	Moisture - Density Relations of Soils and Soil-Aggregate Mixtures
D3034	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

CSA

A5	Portland Cements
A23.1/A23.2	Concrete Materials and Methods of Concrete Construction
A257 Series	Standards for Concrete Pipe
B182.1	Sewer Pipe Fittings
B182.2	PVC Sewer Pipe and Fittings (PSM Type)
B182.11	Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings
G30.12	Billet Steel Bars for Concrete Reinforcement

## 4.3 WATER DISTRIBUTION SYSTEM

### 4.3.1 System Design

Development submissions must include a hydraulic network analysis (HNA) to be updated and confirmed for each stage of subdivision. The HNA must include an analysis of average day demand, maximum day demand, peak hour demand, and fire flow scenarios. The minimum design criteria to be applied are as follows:

#### 4.3.1.1 Residential Population Density

- (i) 3.5 persons / lot

Strathcona County may consider lower population densities for multi-family land uses through a formal variance request.

#### 4.3.1.2 Residential Design Consumption

- (i) Average Day Demand: 300 L/person/day
- (ii) Maximum Day Demand: 600 L/person/day
- (iii) Peak Hour Demand: 900 L/person/day

#### 4.3.1.3 Commercial / Industrial Design Consumption

For preliminary planning purposes, the following commercial / industrial consumption shall be used, however; each application shall be reviewed on a case-by-case basis.

- (i) 20,000 L/ha/day

#### 4.3.1.4 Fire Demand

For preliminary planning purposes, the following fire flows shall be used in a maximum day demand scenario. When sufficient detail allows, fire demand conditions shall be verified according to Water Supply for Public Fire Protection, A Guide to Recommended Practice, Fire Underwriters Survey, latest edition.

- (i) Single Family Residential: 100 L/s (Applicable land uses as per Land Use Bylaw 8-2001 – R1A, R1B, R1C)
- (ii) Mid Value Multi-family: 180 L/s (Applicable land uses as per Land Use Bylaw 8-2001 – R2A, R2B, R3)
- (iii) High Value: 250 L/s (Applicable land uses as per Land Use Bylaw 8-2001 – R4, R5, Commercial, Industrial)

Hydrant flow tests are the responsibility of the designer to determine the available fire flow. Hydrant flow tests are to be coordinated through the Strathcona County Utility Operations department.

For private sprinkler systems, a separate analysis shall be completed to determine pipe sizes and system configurations required to provide the necessary flow in accordance with National Fire Protection standards and the Fire Underwriters Survey.

## 4.3.1.5 Normal Operating Pressures

- (i) Average Day, Maximum Day, and Peak Hour Scenarios: 350 kPa (50 psi) to 700 kPa (100 psi)
- (ii) Fire Demand: Residual Pressure shall not drop below 140 kPa at ground level.

Strathcona County reserves the right to request pressure control measures for areas identified with pressure in excess of 550 kPa.

## 4.3.1.6 Flow Velocity

- (i) Maximum: 3.0 m/s

## 4.3.1.7 Hazen Williams Roughness Coefficient, C

- (i) 120 for all pipes, regardless of material

## 4.3.1.8 Water Mains

- (i) In residential, commercial and industrial subdivisions the water main alignments and hydrant locations shall be as depicted on [STANDARD DRAWINGS 41102, 41103, 41104, 41105, 41107, 41109, 41110, 41112, 41113, 41114, 41115, 41116, 41117, 41119](#) and [41120](#). A reduction from 3 m to 2.5 m separation between water and wastewater sewer mains may be considered at the discretion of the IPS (Variance) Standards Committee.
- (ii) The minimum diameter for distribution mains shall be as follows:
  - 200 mm for residential developments (150 mm may be considered for cul-de-sacs without hydrant connections).
  - 300 mm for commercial / industrial developments.
- (iii) Whenever possible, water mains shall cross above wastewater and storm sewers. Minimum vertical separation between water mains and sewer crossings shall be as follows:
  - 0.5 m under normal conditions from invert to crown to allow for proper bedding and structural support of water and sewer mains.
  - If the minimum separation cannot be met, bridging options will be considered through consultation with the County (i.e. casing, metal plates, etc.).
  - Where it is necessary to cross below the sewer, the water main shall be protected by providing the following:
    1. The same vertical separation requirements as indicated above;
    2. Structural support of the sewer to prevent excessive joint deflection and settling; and
    3. Centering the length of both the water main and sewer at the point of crossing so that the joints are equidistant from the crossing location.
- (iv) Casings are required for all water mains crossing arterial roads. At a minimum, the casing must span the extents of the carriageway.
- (v) The ultimate water distribution system for new subdivisions must be looped. Industrial / commercial subdivisions must be looped at all times. Non-looped systems will be considered in the following residential situations:

- Initial stages up to 50 residential lots may be considered on a single feed provided the developer can demonstrate that required fire flows can still be achieved. Looping must be provided within one year of this interim servicing condition. Ultimate water looping design must be submitted at the time of interim stages, and security requirements are to be based on ultimate design to ensure completion prior to FAC.
  - Single feeds will be considered for residential cul-de-sacs of less than 120 m as measured from the street curb line to the start of the bulb.
- (vi) Mains shall be at a depth adequate to provide a minimum 2.75 m cover from finished grade to top of pipe and the same depth of cover over service line goosenecks (in the case of single family dwelling services).
- (vii) An air release, such as a blow-off or hydrant, shall be required when a change in elevation exists greater than two pipe diameters between the obvert of the lower pipe (sag) and the invert of the upper pipe (crest).
- (viii) Any water main installed made of Polyethylene or similar non-conductive material is to have tracer wire installed. The tracer wire shall have connection points exposed at every opportunity (all valves, blow-offs and hydrants).
- (ix) Tracer wire used must be a minimum of 14 gauge coated copper wire complete with sacrificial 5 lb anodes spaced every 1000 l/m.

#### 4.3.1.9 Hydrants

Maximum allowable spacing between fire hydrants shall be as follows:

- 150 m in single family residential areas.
  - 90 m in multi family residential, institutional, and commercial / industrial.
  - Variances may be considered if it can be demonstrated that the alternative hydrant location provides more efficient connection and response time. The Strathcona County Fire Marshal needs to be included for input on any variance requests.
- (i) Hydrants shall be located at the beginning of the curve of the curb return at the corners of intersections or at the extension of property lines.
- (ii) In cul-de-sacs of 75 m in length or less, the hydrant shall be installed at or near the intersection of the intersecting street.
- (iii) Hydrants are to be set to ensure that the pumper port faces the street. If non-standard alignment locations are accepted for either the main or the hydrant, the hydrant valve must not be installed directly in front of the pumper port.

#### 4.3.1.10 Valves

- (i) Distribution main valves shall be located as follows:
- on the projection of property lines at mid block; and
  - at the beginning of curb returns at road intersections.
- (ii) Distribution main valves shall be located such that in the event of a shutdown:
- no more than two hydrants are taken out of service;
  - no more than 4 valves are required to achieve the shutdown; and
  - no more than 25 single family units are affected.

- (iii) Maximum length of a dead end line in a residential neighbourhood is 120 m. A blow off valve must be installed at the end of dead end line. Blow off valves must be a minimum of 50 mm in size.
- (iv) Valves on hydrant leads are to be located in the boulevard area. All hydrants must be separated from the distribution system by a valve. Valves shall be spaced a minimum of 1 m from the hydrant body to allow for easy operation.
- (v) Valves shall be the same size as the main they are installed on.
- (vi) Based on diameter, the following valves are to be used:
  - Gate Valves – 150 mm to 350 mm
  - Butterfly Valves – 400 mm and greater
- (vii) Gate valves shall be direct buried, while butterfly valves shall be located in a vault or chamber.

#### 4.3.1.11 Pressure Control Valves

- (i) Pressure reducing valves may be required depending on which pressure zone the subdivision is located in. The valve design shall be in accordance with the submitted HNA and completed in consultation with the County. Valve design must include the following:
  - A fire flow / high demand valve and an average day demand valve installed at the same elevation.
  - Isolation valves for each pressure control valve so they can be isolated independently.
  - Strainers upstream of the valve to provide laminar flow.
  - Air release valves to vent entrained air to atmosphere upstream and downstream of the control valve to prevent air from entering the pilot system.
  - Upstream and downstream pressure gauges.
  - A full flow external bypass line.
  - Valves to isolate entire control valve system.
- (ii) Pressure control valves shall be installed in a chamber with the following components:
  - Inlet and outlet ventilation pipes at high and low elevations with mechanical method of venting.
  - 3" thick spray foam insulation on exterior of vault for frost protection.
  - Floor graded to sump pit with removable galvanized sump grate.
  - Sump pit to extend full length of one side of structure.
  - ½ HP 115V submersible pump with float switch and cord.
  - Sump pump should discharge to storm sewer or to surface with adequate drainage so as not to create icing issues. Pump should also drain to prevent freezing of pump or discharge pipe.
  - Lighting to be installed on ceiling so as not to interfere with vault access.
  - Access to power for operation of sump, lights, and ventilation.
  - Access hatch and ladder to be placed in a position that facilitates operation and maintenance of control valves.
  - Access hatch to be placed 25 mm above final grade to limit infiltration. Hatch also to include seals and trough and be capable of self-draining.
  - Ladder to include a rising ladder safety post.

**4.3.1.12 Service Connections**

- (i) Each lot or multi-family unit shall have its own separate water service connection.
- (ii) The installation of a water main service to property line for a multi-family site development shall be completed at the time of initial subdivision development.
- (iii) Services to single family dwellings or multi-family units shall be as follows:
  - 20 mm if the length of the service (from main to property line) is less than 20 m,
  - 25 mm if the length of service is greater than 20 m
- (iv) Non-residential or apartment service connections shall be sized according to anticipated user requirements. Commercial/Industrial service connections may be deferred until the individual lots develop provided there will not be a disturbance to the roadway while making the connection to the water main. A shut-off valve must be installed at property line when the lot is serviced.
- (v) Minimum depth of cover shall be 2.75 m, as measure from top of pipe (gooseneck) to finished grade.
- (vi) Service connections shall extend beyond the gas line, terminating 0.15 m from the back (house side) of the easement.
- (vii) Curb stop locations shall be as depicted on [STANDARD DRAWINGS 42003](#) and [42004](#). They shall be located such that they do not conflict with driveway locations or sidewalks.
- (viii) If the curb stop must be placed within a driveway or hard surface location, the valve must be placed within a PVC sleeve.
- (ix) Parks may require a water service. The size, type and requirement will be determined in consultation with a Strathcona County Representative with Environmental and Open Space Planning.

**4.3.2 System Materials****4.3.2.1 General**

The Developer shall supply and install only new materials. New material shall be installed within 2 years from the production date indicated on the certification form. All such materials which are defective in manufacture or has been damaged in transit or have been damaged after delivery shall be replaced by the Developer at his expense. All Standards referred to mean the latest edition of that Standard. The applicable standards are summarized at the back of this section (see [SUB-SECTION 4.3.4 OF THIS SECTION](#)). Where specific products are specified, it is intended that approved equals are also acceptable. Approval of the equal must be obtained from the IPS Standards Committee, before the equal product is used.

**4.3.2.2 PVC Pipe**

Polyvinyl chloride (PVC) pipe sizes 100 mm to 300 mm shall be DR18, Class 150, (1035 kPa) Cast Iron Outside Diameter, with bell and spigot ends. Polyvinyl chloride (PVC) pipe size 350 mm to 900 mm shall be DR25, Class 1138. The pipe shall be supplied with integral wall thickened bell ends and continuous (jointless) elastomeric gasket. Gaskets shall be of a pressure actuated seal design. PVC pipe shall be certified under CSA 137.3 - "Rigid Poly Vinyl Chloride Pipe for Pressure Applications".

The interior of the pipe shall be clean and no debris or PVC shavings shall be trapped inside the pipe. Pipe sizes 100 mm to 300 mm shall also conform to the AWWA C900 and pipe sizes 350 - 900 mm shall also conform to the AWWA C905 Standard. The pipe shall be manufactured from clean, 12454B PVC compound conforming to ASTM resin specification D1784. All watermain pipe shall be certified for potable water service.

#### 4.3.2.3 Fusible Polyvinyl Chloride (PVC) Pipe

Fusible PVC pipe may be used in trenchless applications. Fusible polyvinyl chloride (PVC) pipe sizes 100 mm to 300 mm shall be DR18, Class 1138, (1035 kPa) Cast Iron Outside Diameter, conforming to AWWA C900 and CSA B137.3 standards. The pipe is to be extruded with plain ends square to the pipe and free of any bevel or chamfer. Pipe size greater than 300 mm shall conform to AWWA C905.

#### 4.3.2.4 Steel Pipe

Steel pipe shall be used for transmission mains only, and conform to AWWA C200 and ASTM Specification A53, with bevelled ends for field butt welding. Fittings shall be standard weight seamless or welded with bevelled ends for butt welding. Flanges shall be 150 lb forged ASA type. Steel pipe shall be coated and lined to the following specifications:

- Internal Lining: Epoxy lined suitable for potable service, to AWWA C210 and NSF61 compliant.
- Coating: Yellow Jacket No. 1 extruded polyethylene as supplied by Shaw Pipe Protection Limited or approved equal.

#### 4.3.2.5 Tapping Valve Sleeves

Tapping valve sleeves shall be stainless steel and compliant with AWWA C223-02.

- Body: Type 304 Stainless steel plate, thick gauge ASTM A240, and corrosion resistant.
- Flange: Stainless steel ring flange per AWWA C228-08, compatible with ANSI Class 125 and 150 bolt circles.
- Sidebars: Heavy gauge Type 304 stainless steel.
- Bolts and Nuts: Type 304 stainless steel trackhead bolts and heavy hex nuts. 5/8" UNC rolled thread. Nuts coated to prevent galling.
- Test Plug: 3/4" NPT Type 304 stainless steel. Threads coated to prevent galling.
- Gaskets: Made from styrene butadiene rubber compounded for water service in accordance with ASTM D 2000.

#### 4.3.2.6 Fittings

##### Cast and Ductile Iron Fittings

Cast and ductile iron fittings (i.e., tees, crosses, bends, reducers) sizes 100 mm to 400 mm shall conform to the AWWA C110. Fittings shall have bell-ends and shall be supplied complete



with vulcanized synthetic rubber gaskets conforming to the AWWA C111 Standards. Flanges, if approved, shall be flat face conforming to ASME/ANSI B 16.1 Class 125. The exterior of all fittings shall be factory coated with an asphaltic coating or a fusion bonded, epoxy coating conforming to AWWA C213. Corrosion to be reduced with installation of a zinc sacrificial anode.

#### Polyvinyl Chloride (PVC) Fittings

PVC injection-molded fittings, sizes 100 - 200 mm Class 150 (1035 kPa) conforming to AWWA C907. Tees, elbows, tapped (AWWA thread) couplings and reducers sizes 100 - 200 mm shall also conform to CSA - B137.2. Fittings shall be supplied with continuous (jointless) elastomeric gaskets. All gaskets for PVC fittings (except for repair coupling) shall be of a pressure actuated seal design.

PVC extruded fittings, sizes 250 - 400 mm shall be Class 150 (1035 kPa), DR 18, conforming to AWWA C900 or C905 and CSA 137.3. Fabricated fittings are to be fiberglass reinforced.

PVC fittings shall not be installed in areas contaminated or potentially contaminated with organic compounds (organic solvents or petroleum products), i.e., near buried petroleum fuel tanks, abandoned gas stations, petro storage areas or petro refinery sites.

#### 4.3.2.7 Surface Quality of Castings

All castings for fittings, valve bodies, hydrant barrels, valve and service bottom and top boxes and any other castings which are to be incorporated in the water system shall be free from injurious defects. All surfaces of castings shall be free of burned-in sand and shall be reasonably smooth, sharp edges shall be rounded to a minimum radius of 3 mm. Runners, risers, fins and other useless cast-on pieces shall be removed by the Manufacturer prior to the delivery of the casting to the coating applicator.

#### 4.3.2.8 Hydrants

- (i) Hydrants shall be of a style and make acceptable to the Strathcona County Utilities representative and shall:
- be compression type conforming to AWWA Specification C502, latest revision, for dry barrel fire hydrants.
  - include two 63.5 mm hose nozzles.
  - include one 125 mm pumper connection.
  - have threads on hose and pumper connections which are the same as on existing hydrants in Strathcona County.
  - hydrant upper barrel and nozzle section must be a single solid cast unit.
  - consist of a minimum 2.45 m barrel with a 300 mm extension.
  - have inlet elbow with bell-end compatible with 150 mm Cast Iron Outside Diameter pipe.
  - have O-ring seals. Packing glands and stuffing boxes are unacceptable.
  - have hydrant body painted with corrosion resistant fluorescent yellow paint with pumper nozzle caps and hose nozzle caps painted according to size as follows:

- 150 mm water main feeder - red
  - 200 mm water main feeder - yellow
  - 250 mm or larger water main feeder – green
  - have barrel with asphaltic or epoxy coating.
  - have corrosion reduced with installation of a zinc sacrificial anode.
- (ii) Storz fittings are required on the steamer port for fire hydrants.

#### 4.3.2.9 Valves

- (i) Gate Valves (150 mm - 350 mm)
- Valves shall be iron body, bronze mounted gate valves with a non-rising spindle, which open by turning in a counter clockwise direction. All valves shall conform to AWWA C500 for bronze mounted solid wedge gate valves or AWWA C509 for resilient seated gate valves.
  - Interior to be factory coated with epoxy coating conforming with AWWA C550. Exterior to be factory applied epoxy coated. Corrosion reduction to be provided by installation of a zinc sacrificial anode.
  - Valve ends compatible with pipe joint type (Cast Iron Outside Diameter).
  - Cast iron valve boxes conforming to ASTM A48, Class 25 of the screw or sliding type shall be required on all valves. Coating inside and outside shall be an asphaltic coating or fusion bonded epoxy conforming with AWWA C213. Set screws to be galvanized.
  - Extension stem to be 25 mm square mild steel with 50 mm operating nut and flange suitable for 3.0 m bury.
  - All valves in roadways or sidewalks shall be Norwood Foundry Type B screw type valve box or an approved equal.
  - Schedule 40 PVC valve boxes for the bottom boot of Norwood Foundry Type A siding type valve boxes or approved equal are permitted in areas not exposed to vehicle loading.
- (ii) Butterfly Valves (400 mm and Larger)
- All butterfly valves shall be iron body, EPDM seat material, bronze disc, conforming to AWWA C504.
  - All wetted parts are to be stainless steel.
  - Minimum pressure rating of 1050 Kpa.
  - Valve ends compatible with pipe joint type (Cast Iron Outside Diameter).
  - Actuator appropriately selected for valve size and in consultation with the Strathcona County Representative.
  - Exterior and interior epoxy coating. Corrosion reduction to be provided by installation of a zinc sacrificial anode.
- (iii) Air Release Valves
- Should be installed in a vault of appropriate size to allow for maintenance and operation.
  - Vault should be insulated with 3" spray foam insulation for frost protection, along with frost plugs.
  - Vault should be water tight to ground water infiltration.

- A single valve should be utilized for both the air relief function and the vacuum relief function of an ARV valve. The valve should be a double orifice (small and large) with an anti-shock orifice mechanism.
  - Flanges should consist of fusion bonded epoxy powder coated ductile cast iron BS2789 Grade 450/12 or Mild Steel BS4360 Grade 43A.
  - Floats should be made of High Density Polyethylene.
  - O-ring seals should consist of EDPM rubber (NSF61).
  - Valve body should have a ½" female connection with stainless steel ball valve and fittings for flushing and draining.
  - ARV barrier seal gaskets should consist of Klingsil C4430 / Treadit Naloor Gasket material.
  - ARV body barrel should be constructed from AISI 304L Stainless Steel.
- (iv) Pressure Control Valves
- Valve(s) shall be a hydraulically operated globe / angle valve. The inner valve assembly shall be top and bottom guided by means of bearing bushings. The inner valve assembly shall be the only moving part and shall be securely mounted on an AISI 316 Stainless Steel stem. Lower grades of stainless steel stems will not be acceptable.
  - The stainless steel stem shall be provided with wrench flats on all valves 25 mm to 400 mm, for ease of assembly and maintenance. Wrench flats will be fully accessible when inner valve is assembled.
  - All pressure containing components shall be constructed of ASTM A536-65 / 45 / 12 ductile iron. The flanges shall be designed to ANSI Class 150 or Class 300 standards.
  - Valve(s) shall have a protective fusion bonded epoxy coating internally and externally. The protective fusion bonded epoxy coating shall conform to the ANSI / AWWA C116 / A21.16 (current version) specification. No machining of any external parts after final coating will be acceptable to ensure a continuous coating surface throughout the entire valve.
  - The valve cover shall have a separate stem cap on valves larger than 50 mm giving access to the stem for alignment check, spring installation and ease of assembly.
  - On valve(s) 25 mm and larger, bonnets shall be accurately located to bodies utilizing locating pins. Locating pins shall eliminate corrosion resulting from the use of uncoated ductile iron to ductile iron surfaces. Valves with lipped spigot covers shall not be acceptable due to risk of rust and difficulty in assembly.
  - Valve(s) 80 mm to 200 mm shall have the AISI 316 Stainless Steel seat with integral bottom guide, bolted in place, utilizing Spirallock™ thread tapping technology. The AISI 316 Stainless Steel seat ring shall be easily replaceable without special tools. Valves 250 mm and larger shall incorporate a two-piece seat and bottom guide design.
  - The valve(s) shall form a drip-tight seal between the stationary stainless steel seat ring and the resilient disc, which has a rectangular cross-section and is retained by clamping on three and one half sides. The resilient disc shall be constructed of Buna-N or EPDM for normal service conditions.

- All external fasteners shall be AISI 18-8 Stainless Steel with AISI 18-8 Stainless Steel washers.
- The valve(s) shall be covered by a minimum three year (3) warranty against defects in materials and workmanship. The stainless steel seat shall be covered by a lifetime replacement warranty.
- Valve(s) 200 mm and smaller shall provide smooth frictionless motion with actuation being achieved by the use of a flat style EPDM / Buna-N diaphragm. They shall be constructed of nylon fabric bonded with synthetic rubber. The diaphragms shall not be used as a seating surface.
- Valve(s) 250 mm and larger shall provide smooth frictionless motion and maximum low flow stability with actuation being achieved by the use of the Singer Rolling Diaphragm technology. The diaphragms shall not be used as a seating surface.

#### 4.3.2.10 Service Connections

- (i) Service pipe shall be Type K Copper conforming to AWWA C800, up to and including 50 mm in size. For 20 mm and 25 mm sizes, Blue Kitec Water Service Tubing (200 psi rating) and conforming to CSA B137.10, or approved equal, is also acceptable.
- (ii) For 100 mm and larger service connections, PVC or Ductile Iron pipe shall be used and comply with the [SUB-SECTIONS 4.3.2.2](#) and [4.3.2.3 OF THIS SECTION](#).
- (iii) Corporation main stops shall be copper flare or compression to Mueller thread Mueller A-220 or equal without thaw out connector. For Kitec pipe, Cambridge Brass main stops are required.
- (iv) Curb stops shall be copper flare or compression to copper flare or compression curb valve, no drain, Mueller Oriseal H15204 or equal. Curb stops for blow offs shall be 50 mm draining type.
- (v) For Kitec pipe, Cambridge Brass curb stops (equivalent in quality to the Mueller stops specified above) are required.
- (vi) Water service saddles (straps and nuts and bolts) shall be stainless steel, bronze, or a combination of both. Stainless steel shall be Type 304. Service saddles shall comply with the pipe manufacturer's specifications.
- (vii) Curb stop boxes shall be epoxy coated with stainless steel rod, brass cap, and manganese bronze clevis and bronze cotterpin for connection to the curb stop. Newer style residential service valve operating rods with 16 mm diameter rod and a 38 mm operating nut are not accepted.
- (viii) On copper service lines, a zinc sacrificial anode shall be installed to reduce corrosion.

#### 4.3.2.11 Corrosion Reduction

- (i) All system components shall be manufactured of or coated with corrosion resistant materials - stainless steel, bronze, galvanized, epoxy coated, asphaltic coated, cement mortar lined, yellow jacket coated, etc.
- (ii) As a minimum, corrosion reduction shall be provided for hydrants, valves, fittings and service lines by installation of 2.3 kg (5 lb) zinc anodes on valves and cast or ductile iron fittings and 5.5 kg (12 lb) zinc anodes on hydrants and service lines. Lead wire shall be of AWG #10/7 copper wire. Zinc anodes shall conform to ASTM B418 Type II and shall have the following compositions:
  - Aluminum 0.005% maximum

- Cadmium 0.003%
- Iron 0.001%
- Zinc Remainder

Refer to [STANDARD DRAWINGS 43008](#), [43009](#) and [43010](#).

- (iii) Exterior nuts and bolts on valves, hydrants, couplings, etc. shall be stainless steel type 304.

#### 4.3.2.12 Bedding and Initial Backfill Sand

The bedding and initial backfill sand, free from organic material, shall be coarse grained with minimal silt and meet the following grading requirements: 100% passing the 25 000 Sieve, 95% passing the 5 000 Sieve and a maximum allowable 10% passing the 63 Sieve. The liquid limit shall not exceed 25 and the Plasticity Index shall not exceed 6. The bedding and initial backfill shall extend from a minimum of 100 mm in depth below the pipe, up both sides to the trench wall, to 300 mm in depth above the pipe (refer to [STANDARD DRAWINGS 42001](#) and [42002](#)).

#### 4.3.2.13 Concrete

All concrete where required for the construction of water mains, shall develop a compressive strength of not less than 25 MPa in 28 days (refer to [STANDARD DRAWINGS 43004](#) and [43005](#)).

All reinforcing steel shall conform to the requirements of CSA G30.12 and G30.16 for new billet steel, grade 400. Welded wire mesh shall conform to CSA G30.5. Minimum concrete cover on all reinforcing steel = 75 mm.

### 4.3.3 System Installation

#### 4.3.3.1 General

The system installation standards are intended to address key points only and not to be considered as a substitute for a detailed construction specification to be prepared by the Developer's Engineer.

#### 4.3.3.2 Trenching, Bedding and Backfilling

- (i) Trenching: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTIONS 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 and 3.8](#).
- (ii) Bedding and Backfilling: Refer [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTIONS 3.10, 3.11 and 3.12](#).
- (iii) If the above compaction standards cannot be achieved because of abnormal weather or wet ground conditions the Infrastructure and Planning Services (IPS) Standards Committee, may at their sole discretion establish a more appropriate standard for the individual case on receipt of an acceptable proposal from the Developer's Engineer.

- (iv) Trenching and Bedding Testing: Refer to [VOL. 2 SEC. 001, MATERIALS TESTING, SUB-SECTIONS 1.2 and 1.3.](#)

#### 4.3.3.3 Operation of Existing Hydrants & Valve & Water Use

- (i) The Developer shall not open or close any existing valves. A representative of the Strathcona County Utilities department shall be notified and they will open or close valves.
- (ii) The Developer shall obtain permission for using a hydrant as a water source for construction and also arrange for payment of water used. If permission is granted, Strathcona County Representative will outline the conditions of use which would address backflow prevention and possible installation of a meter on the hydrant.

#### 4.3.3.4 Pipe Installation

- (i) The pipe installation shall be conducted in conformance with the pipe manufacturer's specifications.
- (ii) Construction Tolerances: Alignment -  $\pm 100$  mm Grade -  $\pm 50$  mm
- (iii) Thrust block installation shall be as shown on [STANDARD DRAWING 43004](#) and [43005](#)
- (iv) Air release valves to be installed as shown on drawing [STANDARD DRAWING 43006](#).

#### 4.3.3.5 4.3.3.5 Hydrants

- (i) Hydrants shall be installed as depicted on [STANDARD DRAWING 43001](#) and in accordance with manufacturer's instructions.
- (ii) There shall be an isolating gate valve on a 150 mm lead to each hydrant.
- (iii) Hydrants shall be set so that the bottom flange is approximately 50 mm above final ground elevation at the hydrant.
- (iv) Hydrants must have breakaway flanges installed at the base of the body and must not extend below the ground grade line.
- (v) Hydrant drain ports shall be left open except in areas with high water tables and where the possibility of contamination exists. In these areas, the port shall be closed and the Strathcona County Representative informed and they will label the hydrant "NO DRAIN".

#### 4.3.3.6 Valves

- (i) Valves, valve boxes, and fittings shall be installed as depicted on the [STANDARD DRAWING 43002](#) and in accordance with manufacturer's specifications.
- (ii) When connection into the side of an existing water main is required, the connection shall be accomplished by use of a tapping valve and sleeve and not shutting down the water service, unless otherwise approved by the Strathcona County Representative.
- (iii) A valve must be installed near the end of a water main that will be extended in the future as depicted to avoid disruption of service.
- (iv) Valve boxes complete with operating extension stems and rock disk nut are required on all valves.
- (v) The top of the valve box is to be set at final grade elevation on unpaved areas and between 5 to 15 mm below finished grade on paved areas.
- (vi) The rock disk nut shall not be more than 600 mm below finished grade.



- (vii) An approved screw down Type B valve is required in concrete with a PVC sleeve and asphalt, and a sliding type cast iron valve casing in other areas shall be installed over each valve and the top ends shall be adaptable to the plugs specified.

#### 4.3.3.7 Service Connections

- (i) Service connections are to be installed perpendicular to the property line from the water main where possible.
- (ii) Residential water services shall be installed in common trench with sanitary sewer and sump pump discharge collection services as depicted on the [STANDARD DRAWING 42003](#). Class B bedding shall be used. Common trench installation is only permitted for sizes up to 50 mm.
- (iii) Tapping for residential service connections shall be done with full operating pressure in the main unless otherwise approved by the Strathcona County Representative, and in strict compliance with manufacturer's instructions.
- (iv) Each residential service connection shall incorporate a horizontal gooseneck and utilize a corporation main stop. Connections shall be staggered radially as required by PVC pipe manufacturers.
- (v) Service saddles must be used where the tap diameter is greater than 25 mm or where the water main is greater than 300 mm.
- (vi) For 100 mm and larger services, a tapping valve and sleeve must be used for connection to an existing main.
- (vii) For residential services, the symbol "CC" shall be stamped in the sidewalk opposite the location of the curb cock.
- (viii) Parks may require a water service. The size, type and requirement will be determined by the Strathcona County Representative.

#### 4.3.3.8 Augering of All Service Connections and Main Extensions Into Multi-Family Sites

- (i) All service connections and main extensions into multi-family sites shall be installed by augering under proposed or existing streets and sidewalks
- (ii) Except where augering is not feasible due to adverse soil conditions. Open trenching may be permitted subject to the Strathcona County Representative, acceptance of the need and acceptance of the backfill material.
- (iii) All auger pit excavations shall be backfilled with granular bedding material and mechanically compacted, in lifts not to exceed 150 mm in depth, to a minimum of 98% Standard Proctor Density to 300 mm above the pipe.
- (iv) Backfill of auger pit excavation over 300 mm above the pipe shall be compacted in lifts not to exceed 150 mm in depth, to a minimum of 98% Standard Proctor Density within the road ROW and 95% outside the road ROW.

#### 4.3.3.9 Installation of Anodes

- (i) Anodes and leads shall be installed on hydrants, valves, services and cast or ductile iron fittings as depicted on the [STANDARD DRAWINGS 43008](#), [43009](#) and [43010](#).
- (ii) Connection of the anode lead shall be by Cad welding. The connection point shall be then coated with Polyken primer and tape.

- (iii) A minimum of 2 L (0.5 gallon) of water is to be poured on each 2.3 kg (5 lb) anode and 3 L (0.75 gallons) on 5.5 kg (12 lb) anode to initiate the anode operation. An alternative is to soak the above anodes in water for a minimum of 10 minutes.

#### 4.3.3.10 Inspection and Testing

- (i) Before acceptance of the work, the entire system shall be subjected to a hydrostatic pressure test in the presence of the Strathcona County Representative. The Developer shall provide all necessary labour, materials and equipment for the test including a suitable pump, measuring tank, pressure hoses, connections, plugs, caps, gauges and all other apparatus necessary for filling the main, pumping to the required test pressure and recording the pressure and leakage losses. The Developer shall provide evidence that the gauges used are accurate.

The water distribution system may only be charged through one valve. Only one valve may be operated during pressure and leakage testing as well.

Prior to the start of pressure and leakage, chlorination and bacteria testing, the Developer's Consultant will be required to provide a plan outlining how the

testing is to be accomplished. The plan must include the sequence of valve turning, sections of water main to undergo pressure and leakage testing, how chlorination is to be accomplished, and locations when chlorine residual and bacteria tests are to be taken. Testing will not be allowed to proceed until the above is approved by the Strathcona County Representative.

The Developer will be required to give 24 hour notice to the Strathcona County Representative.

The system shall be filled with water slowly and air bled off at each hydrant. If there are sections that cannot be bled from hydrants, due to the profile of the main, the Developer may be required to tap the main at high points and install temporary bleeder valves. At the completion of testing, these taps shall be satisfactorily plugged at the Developer's expense.

When the line has been filled and most of the air expelled, time should be allowed for the remaining air and water to reach a constant temperature.

The test section may be pressured through a hydrant or a tap may be installed in the line. After testing the pipe shall be plugged at the Developer's expense.

The mains or section of mains shall be subject to a pressure of not less than 1035 kPa. Test sections shall not exceed 450 m of main.

- (ii) Leakage tests shall be made only after completion of services, partial or complete backfill, and a minimum of 24 hours after the pipe has been filled with water. No test shall be applied until at least 36 hours after the last concrete reaction or thrust block has been cast with high early strength cement, or at least seven days after the last concrete reaction or thrust block has been cast with standard cement. The duration of each test shall be two hours.



The allowable leakage shall be determined by the following formula:

$$L = \frac{ND P^{1/2}}{128,225} \text{ For PVC Pipe} \quad L = \frac{ND P^{1/2}}{32,046} \text{ For Ductile Iron Pipe}$$

Where:

L = allowable leakage, L/hr

N = total number of joints

D = pipe diameter, mm

P = test pressure, kPa

Leakage allowance for new construction for materials of other than PVC or ductile iron shall be in accordance with the applicable AWWA standard.

The charging of mains for the purpose of pressure and leakage testing shall be permitted between April 15th and October 15th inclusive. Testing of mains outside this period shall be weather dependent and at the sole discretion of Strathcona County.

Each section between valves shall be brought to test pressures with the valves closed, to test the valves under pressure. Test pressure shall be held without loss for two minutes before opening the valve and releasing the pressure into the next section.

- (iii) Prior to the initial acceptance of the water system, water mains are to be disinfected in accordance with AWWA C651 continuous feed method. Procedural method of disinfection including chlorine concentration calculations and contact times are to be submitted to the Strathcona County Representative for acceptance. Upon completion of the disinfection one bacteria sample is to be submitted for each 90 linear metres of water main installed unless otherwise approved by the Strathcona County Representative. Upon 48 hours notice samples will be taken by Strathcona County personnel and the water main is to remain valved off until such time as the bacteria sample results are approved.

Under Alberta Environmental Protection standards and regulations, super chlorinated water used for disinfection of the system cannot be directed into a storm sewer or open water body. De-chlorination will be required before being discharged into the environment.

- (iv) Prior to initial acceptance of the water system and the system put into service, bacteriological testing shall be carried out on all water mains and acceptable test results achieved.
- (v) Prior to issuance of the CCC, hydrants flow testing shall be conducted by the Developer's Consulting Engineer to verify that the flows and pressures identified in the design calculations are being provided in the field. The Developer's Consulting Engineer shall coordinate the testing with the Strathcona County Representative to ensure he is present for all testing. Results of the testing shall be compiled by the Developer's Consulting Engineer and submitted to the Strathcona County Representative with a comparison of the actual flows and design flows for the same hydrant. Where the actual

flows do not meet the minimum fire and service requirements all hydrants in the project must be tested and the Developer must advise the corrective action he shall be taking to provide the necessary service level. The location and extent of initial testing shall be as required by the Strathcona County Representative.

#### 4.3.4 Summary of Water Distribution System Standards

The following is a list of standards applicable to water distribution system materials and construction. In all cases, it is intended that the latest version apply.

##### ASTM

A48/A48M	Gray Iron Castings
D698	Moisture - Density Relations of Soils and Soil-Aggregate Mixtures

##### CSA

A23.1/A23.2	Concrete Materials and Methods of Concrete Construction
B137.1	Polyethylene Pipe, Tubing, and Fittings for Cold Water Pressure Services
B137.2	PVC Injection-Moulded Gasketed Fittings for Pressure Applications
B137.3	Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications

##### AWWA

C104	Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
C111	Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
C150	Standard for Thickness Design of Ductile-Iron Pipe
C151	Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water
C200	Steel Water Pipe - 6 In. (150 mm) and Larger
C205	Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 in. (100 mm) and Larger - Shop Applied
213	Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
500	Metal-Seated Gate Valves for Water Supply Service
502	Dry-Barrel Fire Hydrants
504	Rubber-Seated Butterfly Valves
509	Resilient-Seated Gate Valves for Water Supply Service
550	Protective Epoxy Interior Coatings for Valves and Hydrants
651	Disinfecting Water Mains
800	Underground Service Line Valves & Fittings
900	Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 in., for Water Distribution
905	Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Dia. 14-36 in.
907	Polyvinyl Chloride (PVC) Pressure Fittings for Water – 4 in. - 8 in. (100 mm - 200 mm)

## 4.4 STORM WATER MANAGEMENT SYSTEM

### 4.4.1 System Design

#### 4.4.1.1 General

- (i) The concept of a major and minor storm drainage system has three purposes:
  - the control of storm water to minimize inconvenience or disruption of activity as a result of runoff from more frequent but less intense storms, and
  - control of storm water runoff to prevent or minimize damage to property, physical injury and loss of life which may occur during or after a very infrequent or unusual storm and
  - provide improved water quality by filtering contaminants prior to entering receiving down stream water courses.
- (ii) Where the entire system is to be designed to provide a level of protection commensurate with the fundamental purposes stated above, the minor system is to be designed to an appropriate level of convenience. This level of convenience refers to the frequency which the minor system capacity would be exceeded.
- (iii) When the minor system capacity is exceeded the major system must provide a continuous overland flow route for runoff water to follow. Generally major system routing shall utilize roadways and open channels with carefully designed and controlled lot grading and building elevations.
- (iv) Storm sewers shall be designed as a separate sewer system. Effluent from sanitary sewers or any potentially contaminated drainage from industrial, agricultural, or commercial operations shall not be discharged to storm sewers.
- (v) The Developer and his Engineering Consultant must address the guidelines presented in the latest edition of the publication "Stormwater Management Guidelines for the Province of Alberta" prepared by Alberta Environmental Protection.

#### 4.4.1.2 Minor System

##### (i) Design Criteria

- The Minor System must be designed to accommodate the runoff generated by a 1:5 year storm event or greater plus the flows from the sump pump discharge collection system.
- The Rational Method shall be used in estimating flows for the design of storm sewers serving areas smaller than 65 ha as follows:

$$Q = \frac{CIA}{360}$$

Where            Q = the quantity of runoff in cubic metres per second  
                     C = the runoff coefficient  
                     I = the intensity of rainfall in millimetres per hour  
                     A = the contributing area in hectares

- Rainfall data shall be taken from the officially recognized Regional Station located at the Edmonton Municipal Airport. Intensity-duration-frequency data is reproduced in [FIGURE 1 AT THE BACK OF THIS SECTION](#).

- For a 1:5 year analysis, the following runoff coefficients shall be used:

<u>Land Use</u>	<u>Runoff Coefficient, C</u>
Parks, reserves and school grounds	0.15
Residential:	
Single Family	0.40
Multiple Family	0.60
High Density	Must be Calculated
Commercial	Must be Calculated
Industrial	Must be Calculated

Due to the wide variation of impervious areas for commercial, industrial and high density residential areas, the runoff coefficient must be calculated using the following formula:

$$C = \frac{(0.95 \times \text{Impervious Area}) + 0.10 (\text{Total Area} - \text{Impervious Area})}{\text{Total Area}}$$

For an analyses for less frequent storms, the runoff coefficient must be increased accordingly to reflect the impact of antecedent moisture conditions.

- Computer modelling shall be required by the Strathcona County Representative, for design of the system servicing areas greater than 65 ha.
- Maximum inlet time of 15 minutes shall be used for residential areas. The use of shorter inlet times is required in commercial, industrial, or higher density residential areas, where a large percentage of the total area is impervious.

(ii) Pipe Sizing

- Minimum Pipe Size:

Storm Sewer	300 mm
Catch Basin Lead	250 mm
F51 Catch Basin Lead	300 mm
- Pipe sizing shall be determined by utilizing the Manning's Formula using a minimum "n" value of 0.013.
- Minimum flow velocity = 0.60 m/sec. Maximum flow velocity = 3.0 m/sec.
- The minimum grade of catch basin leads shall not be less than 1.0%.
- Minimum slope:

Size	Slope %
300 mm	0.22
375 mm & larger	0.15
Minimum slopes shall be increased by 50% on all curves.	

## (iii) Storm Sewer Main Alignments and Locations

- In residential/commercial subdivisions, storm sewers shall be installed on the alignments depicted on the [STANDARD DRAWINGS 41102, 41103, 41104, 41105, 41107, 41109, 41110, 41112, 41113, 41114, 41115, 41116, 41117, 41119 and 41120](#). For industrial areas and multi-family site developments, typical cross-sections depicting infrastructure locations must be developed to suit the particular development.
- The installation of a main into a multi-family site development would normally be completed at the time the site develops. However, the Developer's Consultant must address the depth requirements for servicing the site in the establishment of the design depth for the main located on the abutting street.
- Storm sewer service must be provided to all commercial and industrial lots.
- Storm sewers must be located at least 2.5 m horizontally from any water main and at least 1.8 m horizontally from gas lines.
- PUL widths shall be a minimum of 4.0 m for a single utility and 6.0 m for one containing two utilities. A 1.0 m easement is required on the lots on each side of a PUL.
- In residential areas, mains shall be at a depth adequate to provide the required minimum depth of cover over sump pump discharge collection service connections and catch basin leads. In other areas, the minimum depth of cover must be 1.5 m to top of pipe.
- Curved sewers shall be permitted with the following restrictions:
  - The curve shall run parallel to the curb or street centreline.
  - The minimum grade for sewers on a curve shall be 50% greater than the minimum grade required for a straight run of sewer.
  - Manholes shall be located at the beginning and end of each curve and intermediate locations as required.
- At water main crossings of sanitary and storm sewers, the following shall apply:
- Under normal conditions, water mains shall cross above sewers with a sufficient vertical separation to allow for proper bedding and structural support of the water and sewer mains.
- Where it is necessary for the water main to cross below the sewer, the water main shall be protected by providing:
  - A vertical separation of at least 0.5 m from water main crown to sewer invert;
  - Structural support of the sewer to prevent excessive joint deflection and settling; and
  - A centering of the length of water main at the point of crossing so that the joints are equidistant from the sewer.

## (iv) Manholes

- The maximum spacing between manholes shall be 150 m.
- Manholes are also required at all transitions in size, grade, or direction, and at junctions and the ends of mains. They should be located to avoid driveway conflicts.
- At manholes where size changes occur, the crowns (obverts) of the mains shall be designed to match.

- Inverts in manholes shall have a minimum 12 mm drop for straight run sewer manholes. At changes in direction, manholes shall have at least 50 mm fall across the manhole in the direction of flow from inlet to outlet elevation.
  - Manhole locations within any Municipal Reserve or Conservation Easement should be avoided when possible.
- (v) Catch Basins
- The maximum run between catch basins shall be 150 m with minimum grades.
  - Spacing and capacity of catch basins shall be such that ponding shall not occur during a 1:5 year storm.
  - The minimum inside diameter for a catch basin barrel shall be 900 mm. Where the catch basin barrel is one piece construction including the connection to the lead the Strathcona County Representative, at his sole discretion may permit a reduction in the diameter of the barrel.
  - The minimum sump depth in catch basins shall be 600 mm.
  - Catch basins shall be installed to intercept all overland flows, including back lanes, prior to crossing walkways. At curb returns, catch basins shall be installed to intercept runoff on the uphill side of cross walks.
  - Concrete swales crossing roadways will not be permitted.
  - Ramneck or equivalent shall be used to seal grade rings and water tight joints must result.
- (vi) Catch Basin Leads
- The minimum size of catch basin leads shall be 250 mm inside diameter. Hydraulic calculations shall be presented to justify the various catch basin lead sizes.
  - The maximum length of a catch basin lead shall be 30 m. A catch basin manhole shall be required at the upper end if the lead exceeds 30 m.
  - The minimum grade on a catch basin lead shall be 1.00%.
  - Minimum depth of cover shall be 1.5 m to top of pipe.
  - All leads shall be connected to a main line manhole or a catch basin manhole.
- (vii) Storm Sewer Service Connections
- Non-residential, apartment, and multi-family site service connections shall be sized according to anticipated site requirements. These service connections would normally be installed at the time that the lot is developed.
  - For non-residential, apartment, and multi-family site service connections, the Developer's Consultant must address the depth requirements for servicing of these lots in the establishment of the design depth for the storm sewer main in the abutting street.
  - Services shall be located such that they do not conflict with driveway locations.
  - All proposed school sites shall be provided with a storm sewer service. The size, type and location will be determined by the Strathcona County Representative.

## 4.4.1.3 Sump Pump Discharge Collection System

## (i) General

- The sump pump discharge collection system is a component of the storm drainage system in the new development areas of the Urban Services Area of Strathcona County. Sump pump discharge collection service must be provided to the property line of each newly developed single family lot or to each multi-family unit.
- It is a system strictly dedicated to the collection of discharge from sump pumps which must be installed in all buildings with basements and weeping tiles (foundation drains). In the case of residential single family lots and multi-family units, roof leaders (downspouts) or any other storm water source must not be connected to this system.
- It is required to address the problems experienced in developed areas with surface discharge of sump pumps. Problems have included winter icing on driveways and sidewalks and dead lawns due to saturation in the summer.
- A design objective must be to provide collection mains and services which are installed at a depth which will provide frost protection and connecting to a storm sewer system (down to the outfall structure into a SWMF) installed at a depth which also provides frost protection. In areas where the system must be connected to existing previously installed shallower mains (without complete frost protection), the level of service will drop since the risk of freezing and blocking of lines increases and could result in overflows to surface during part of the winter and possibly causing icing problems.

## (ii) Estimating Weeping Tile (Foundation Drain) Flows

- The Developer's Engineering Consultant must estimate weeping tile flows as a component of the detailed Geotechnical/ Hydrogeological Investigation (see [SECTION 2.2.1.1](#)) to be completed by a qualified Geotechnical Engineer or Hydrogeologist. This investigation must assess the predevelopment subsurface soil, groundwater, and other conditions and the anticipated post-development conditions; estimate weeping tile flows; and define any special design and construction measures to be taken for foundations or other infrastructure that may be impacted by weeping tile flows causing settlements or other problems.
- If considerable flows are anticipated during the summer, they must be added to the flows used to size the storm sewers in order that the level of service provided by the storm sewer system does not drop considerably.
- If high flows are expected such that sump pumps would be required to pump continuously or excessively, then alternatives and a recommended solution must be presented by the Developer.

## (iii) Alignments and Locations of Mains

- For the system where a depth adequate to provide frost protection can be achieved, sump pump discharge collection services can be connected to the storm sewer which would be extended to in front of all lots or sump pump discharge collection mains can be installed in the easement provided at the front of all lots (3.0 m on flankage) with service branches (see [STANDARD DRAWINGS 42003](#) and [42004](#)).



- For the system where a depth adequate to provide frost protection cannot be achieved, sump pump discharge collection mains must be installed in the 4.0 m easement required in front of all lots (3.0 m on flankage) with service branches (see [STANDARD DRAWINGS 42005](#) and [42006](#)). This alignment may result in the lines not freezing as easily (possibly more snow cover in a landscaped area) and would provide a location where any repairs could be completed more economically.
  - The system mains shall be connected to storm sewer system manholes or deep catch basins with lead sizes which address the additional sump pump discharge flows.
  - Other alignment and location requirements would be the same as specified for storm sewer mains in [SECTION 4.4.1.2](#).
- (iv) Pipe Sizing
- Minimum Pipe Size: Residential Lots - 150 mm.
  - Pipe sizing shall be determined by utilizing the Manning's Formula using a minimum "n" value of 0.013.
  - Minimum grade - 0.6%.
- (v) Cleanouts
- The criteria for cleanout locations is the same as for manhole locations on the storm sewer system. The maximum spacing for cleanouts is 100 m. All cleanouts not located at the end of a line shall be a bi-directional tee design. See [STANDARD DRAWING 42108](#). Cleanouts are required at every junction or where a 22½° bend or greater is utilized. Sweeping bends and multiple 22½° bends are allowed.
- (vi) Sump Pump Discharge Service Connections
- Each lot or multi-family unit shall have its own separate service connection.
  - The minimum size of a sump pump discharge collection service connection to a single family dwelling or multi-family unit shall be 100 mm inside diameter.
  - The minimum grade on the service line shall be 2.0%.
  - The minimum grade on the main line shall be 1.0% where possible.
  - In the case of single family lots, the minimum depth of cover shall be 2.60 m to the top of pipe from finished grade at a point 0.15 m from the back (house side) of the easement required along the front of all lots. A minimum cover of 1.8 m at the property line will be accepted on service mains connected to the storm sewer main installed in the centre of roadways.
  - Services shall be located such that they do not conflict with driveway locations.

#### 4.4.1.4 Major System and Storm Water Management Facilities (SWMF)

(i) General

- The overall major drainage system for the Urban Services Area must be designed to provide continuous overland flow routes with minimum depths of ponding in roadway sags and to provide overflow routes at all SWMF. The development of the major drainage system framework shall be a key component of the Master Drainage Plan to be developed by the Developer's Engineering Consultant for new drainage basins (watersheds).



- The major system shall accommodate a 1:100 year storm condition with maximum surcharging in the roadway gutter of 180 mm.
  - If downstream constraints require a gutter flow in excess of 180 mm, special modelling and design calculations shall be submitted to the Strathcona County Representative for review. The Strathcona County Representative, shall determine the extent, if any, of a relaxation of the maximum 180 mm gutter flow standard on an individual basis. The major drainage system shall be fully contained within the boundary of Public Property.
  - Arterial roads shall not be part of the major overland flow system. Where the slope of the terrain makes it particularly difficult to prevent the major drainage from accessing an arterial ROW the Strathcona County Representative, may grant the Developer permission to discharge primary drainage flow on to the arterial ROW subject to:
    - no adverse impact on the drainage on the arterial road, or
    - the opportunity for the provision of a depressed swale or pathway with sufficient flow and/or storage capacity to accommodate a 1:100 year storm event and carry the flow to the point of discharge into an off arterial overland flow route, and
    - the Developer's agreement to pay for the cost of such additional works or changes needed to accommodate the increased discharge.
  - Provisions must be taken to employ control/abatement measures to that construction material and debris does not enter any storm water management facility at any point during subdivision construction.
- (ii) Lot Grading
- Carefully designed and controlled lot grading is an important component of the Major System.
  - Lots shall be designed to drain from back to front except under extreme cases where the Developer can satisfy the Strathcona County Representative that back to front drainage is not technically feasible. If an alternate system is required it must be designed so that surface water crosses the fewest lots possible in its path to the street. No more than two lots shall be crossed. In extreme cases the Strathcona County Representative, may permit more than two lots to be crossed provided a concrete drainage swale and easement are established. The potential problem areas shall be identified in the Design Brief.
  - Minimum and maximum slopes on landscaped areas to be 2% and 10% respectively. An initial minimum grade of 10% over a distance of 1.5 m is to be provided around all buildings. Driveway slopes must be no less than 2% and no greater than 8%.
  - Parks, school sites and open areas shall be graded in accordance with the requirements of [VOL. 1 SEC. 6, OPENSOURCE, SUB-SECTION 6.1](#). On site ponding shall not be permitted.

## (iii) Storm Water Management Facilities (SWMF)

General

- Large scale SWMF shall be classified as either "natural wetlands" or "constructed wetlands": depending on whether the installation is intended to permanently retain water or temporarily store peak flows.
- Small scale storm water management is also required for commercial, industrial or higher density residential (apartment or multi-family sites) developments.
- These Standards present only the engineering requirements for these facilities. Developers must consult with the Strathcona County Representative concerning any landscaping, fencing, lighting, recreational or any special operation/maintenance requirements.
- The Developer and his Engineering Consultant must address the guidelines presented in the latest edition of the publication "Stormwater Management Guidelines for the Province of Alberta" prepared by Alberta Environmental Protection.
- Storm water quality best management practices shall be an objective in the design of SWMF's.

Storm Water Management Analysis and Report

- Storm Water Management Reports must be prepared and submitted (see [SECTION 2.2.1.4](#)).
- The design of the SWMF shall be based on determining the critical volume for the 1:100 year storm event and as outlined in the Provincial guidelines. The analysis must incorporate calculations for a range of storm durations to assess which will result in the critical volume for the specific drainage basin and outlet characteristics involved and must also address the requirement that the stored volume in the facility must drain within a few days.
- The scope of the report must also include an analysis of the capacity and characteristics of the downstream receiving drainage course or creek and identification of works needed to avoid downstream flooding or erosion or sedimentation problems.
- For commercial, industrial, or higher density residential (apartment or multi-family sites) developments, onsite stormwater management is required. This must include storage of stormwater generated by a 1:25 year storm event at the critical duration and provision of an overflow route for stormwater generated by more major events. A report must be submitted along with plans presenting design calculations for the onsite storm water management scheme, site grading, and locations of storage and depth of ponding, and detail drawings of the proposed outlet control device (see [SECTION 2.3](#)).

Wetland Ponds

- The land required shall be designated a PUL.
- The minimum surface area at normal water level for any single pond shall be 2 ha.
- Storm water quality best management practices shall be reflected in the design.

- An overflow channel and overland drainage route must be provided at the high water level to the satisfaction of the Strathcona County Representative.
- The design of the pond and permitted water level fluctuations must ensure that:
  - The lowest basement weeping tile of any building on a lot adjacent to the lake shall be a minimum of 300 mm above the high water level.
  - The lowest manhole invert shall be at or above the normal water level elevation.
  - The pipe obvert at the lowest manhole upstream of the pond shall be above the high water level during a one in five year storm event.
  - A minimum distance of 6 m shall be maintained from any basement wall to the high water level.
  - The minimum depth of the body of the pond, at normal water level, shall be 2.5 m.
  - The lake bottom and side slopes shall be composed of an impervious material.
  - Areas of stagnant or poorly circulated water shall be eliminated.
  - Shoreline improvements shall be subject to review and acceptance by the Strathcona County Representative.
  - The shoreline treatment between the high water level and the normal water level shall be chosen to ensure that erosion does not occur and natural wetland vegetation develops.
- Easements, in favour of Strathcona County, shall be granted over any private property situated between the normal and high water levels.
- The design shall incorporate a semi-annual turnover at average annual precipitation.
- Pond sideslopes shall be as shown on the [STANDARD DRAWING 44005](#).
- Submerged inlets/outlets are preferred and shall be constructed such that the top of the pipes are a minimum of 1.0 m below normal water level.
- Inlets/outlets not submerged shall be above normal water level and require fencing along adjacent shoreline for 5.0 m in each direction from the centreline of pipe. In addition all exposed inlets/outlets, including the downstream end of outlets, shall be provided with a galvanized removable grate permanently fixed to the structure.
- Minimum width of the water surface at the normal water level shall be 25 m. A silt trap shall be provided at the inlets of each pond. A defined path via publicly owned land or established drainage courses shall be identified and designed to carry flows when the design storage is exceeded.
- The lake and perimeter area design must allow for vehicle access to inlets, outlets, and other facilities requiring maintenance.

#### Constructed Wetlands

- The use and designs of constructed wetlands or combined wet pond - constructed wetlands for storm water management must be reviewed on a site specific basis in order to integrate the existing environmental factors.

SWMF Inlets, Outlets, Outfall Structures

This Section shall apply to pond inlets/outlets and outfall structures.

- Obverts of outfall pipes shall be above the five year flood level of receiving streams.
- Inverts shall be above winter ice or the pipe must be completely submerged with obverts 1.0 m below normal water level.
- Located such that there is minimal adverse effect on surrounding property.
- Aesthetically blended into the landscape design.
- Drop structures and energy dissipators shall be used where necessary to prevent erosion in combination with appropriate rip-rap and filter fabric treatment at structures and in the downstream water course.
- Galvanized grates shall be provided to restrict access. Provisions for opening or removing the grate are required.
- Outfall pipe shall be constructed using Class A bedding.
- Provisions shall be made to manage the migration of water along the pipe zone.
- Outlet velocity and depth shall be kept within the following limits:

Water Velocity	Permissible Depth
0.5 m/s	0.80 m
1.0 m/s	0.32 m
2.0 m/s	0.21 m
3.0 m/s	0.09 m

- Provide weeping tile on all outfall structures.
- Provide key or cutoff wall at outfalls to prevent undermining of the structure, if necessary.

#### 4.4.2 System Materials

##### 4.4.2.1 General

The Developer shall supply and install only new materials. All such materials which are defective in manufacture or have been damaged in transit or have been damaged after delivery shall be replaced by the Developer at his expense. All Standards referred to mean the latest edition of that Standard (see [SECTION 4.4.4](#)). Where specific products are specified, it is intended that approved equals are also acceptable. The approval of the equal must be obtained from the IPS Standards Committee before the equal product is used.

##### 4.4.2.2 Storm Drainage System Mains and Catch Basin Leads

- (i) Storm sewer and sump pump discharge collection mains and catch basin leads shall be PVC or concrete pipe. Concrete pipe must be used for systems in industrial subdivisions or along arterial roads that are dangerous goods routes.

In areas of retrofit or where directional drilling is required, polyethylene pipe will be acceptable. Materials and installation specifications are subject to the approval of the Strathcona County Representative.

- (ii) PVC Pipe
  - PVC pipe shall be DR35 in the 200 mm - 900 mm size range conforming to CSA B182.2 and ASTM D3034, ASTM F679, NQ 3624-130 and NQ 3624-135 standards with a minimum stiffness of 320 kPa. The pipe must be manufactured from 12454-B or 12364-C compound.
  - Ultra Rib PVC or approved equal is also acceptable in the 200 mm - 600 mm size range. It shall conform to CSA B182.4 and ASTM F794 with a minimum stiffness of 320 kPa.
  - Sealing gaskets shall meet requirements of CSA B182.2 and ASTM F477 with the additional requirement that joints shall be able to withstand 345kPa/50 psi hydrostatic pressure.
  - For the in-line Tees or Wyes required at all sump pump discharge collection service connections, injection molded gasketed fittings shall conform to CSA B182.1 or CSA B182.2 and fabricated fittings must conform to CSA B182.2 and ASTM F679.
  - PVC pipe shall not be installed in areas contaminated or potentially contaminated with organic compounds (organic solvents or petroleum products), i.e., near buried petroleum fuel tanks, abandoned gas stations, petro storage areas or petro refinery sites or the locations (see [SECTION 4.4.2.2](#)).
- (iii) Concrete Pipe
  - All concrete pipe shall be manufactured using sulphate resistant Type 50 cement.
  - Non-reinforced concrete pipe in the 200 mm - 375 mm sizes shall be a minimum Class 3 conforming to CSA A257.1 and ASTM C14.
  - Reinforced concrete pipe in the 250 mm and larger sizes shall conform to CSA A257.2 and ASTM C76.
  - All joints shall be confined "O" ring rubber gasket conforming to ASTM C443 and CSA 257.3.

#### 4.4.2.3 Sump Pump Discharge Collection Services

- (i) Sump pump discharge collection service pipe and fittings shall be a minimum 100 mm diameter DR35 meeting the same specifications as the PVC main pipe above except the minimum pipe stiffness must be 625 kPa (90 psi).

#### 4.4.2.4 Manholes

- (i) Precast Manholes: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTIONS 2.2.1, 2.2.4, and 2.2.5](#).
- (ii) All manholes shall be a minimum 1200 mm inside diameter. Oversize manholes are permitted to accommodate large diameter pipes.
- (iii) Manhole Steps: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.2](#).
- (iv) Manhole Joints: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.3](#).
- (v) Manhole Frame and Covers: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTIONS 2.3.3, 2.3.4 and 2.3.5](#). Approved frame and covers are as follows:
  - TF80 solid cover or equal for all manholes in streets and driveways.

- Norwood NF90 solid cover or equal with rubber gasket-seal for all manholes in street sags or other low areas.
  - Norwood F39 with solid cover or equal in all other locations.
  - “Strathcona County” logo shall be on all frames and covers.
- (vi) Pre-benched Manhole Bases: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.4.](#)
- (vii) Tee Riser Manholes: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.5.](#)
- (viii) Perched manholes or oversize manholes are required on 600 mm - 1050 mm mains.
- (ix) Aluminium Safety Platforms: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 2.2.7.](#)
- (x) All manholes located on any Arterial Roadways, Park Reserves, PUL's, School Grounds, vacant lots and undeveloped land shall be required to have a Locking Manhole Cover or NF80 or NF90 frame and solid cover or equal.

#### 4.4.2.5 Catch Basins

- (i) Catch basin frames and covers shall be cast iron complying with same Standard as manhole frames and covers and shall be required to provide sufficient inlet capacity. Standard models to be as follows:
- Top inlet round top catch basins equal to Norwood F-38 or Norwood F-39 open grate,
  - Side inlet for 190 mm straight face curb and gutter equal to Norwood F-51 or F-36A for all sag locations,
  - Side inlets for rolled curb and gutter shall be Norwood F-33, K-2, DK-7 (for low profile curb) or equal,
  - Other types shall require acceptance by the IPS Standards Committee.
- (ii) Catch basins shall be a minimum 900 mm barrel with 600 mm sump complying with the same Standards as manholes.
- (iii) Catch basin steps shall be standard safety type, of hot dipped galvanized iron or aluminum.

### 4.4.3 System Construction

#### 4.4.3.1 General

The system standards are intended to address key points only and not to be considered as a substitute for a detailed material and construction specification to be prepared by the Developer's Engineer.

#### 4.4.3.2 Trenching, Bedding, and Backfilling

- (i) Trenching: Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTIONS 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 and 3.8.](#)
- (ii) Bedding and Backfilling: Refer [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTIONS 3.10, 3.11 and 3.12.](#)

- (iii) If the above compaction standards cannot be achieved because of abnormal weather or wet ground conditions the IPS Standards Committee may at their sole discretion establish a more appropriate standard for the individual case on receipt of an acceptable proposal from the Developer's Engineer.
- (iv) Trenching and Bedding Testing: Refer to [VOL. 2 SEC. 001, MATERIALS TESTING, SUB-SECTIONS 1.2 and 1.3](#).

#### 4.4.3.3 Pipe Installation

- (i) The pipe installation shall be conducted in conformance with the pipe manufacturer's specifications.
- (ii) Construction Tolerances: Alignment -  $\pm 150$  mm, Grade - 5 mm + 20 mm/1.0 m diameter.

#### 4.4.3.4 Connection to Existing Utilities

Breaking into existing manholes shall be performed in a manner acceptable to the Strathcona County Representative, according to the dictates of good practice. Existing manhole floors shall be re-channelled and properly benched, the junction area shall be grouted to form a smooth joint, all debris including concrete and excavated material shall be removed and the vicinity of the connection shall be left in a tidy condition acceptable to the Strathcona County Representative.

#### 4.4.3.5 Manholes and Catch Basins

- (i) Manholes and T-Riser manholes shall be installed as depicted on the [STANDARD DRAWINGS 42101](#), [42102](#) and [42103](#) and in accordance with material manufacturer's instructions.

#### 4.4.3.6 Sump Pump Discharge Collection Service Connections

- (i) Each lot or multi-family unit shall have a separate service connection.
- (ii) For single family dwellings, sump pump discharge collection services shall be installed in common trench with the water and sanitary service as depicted on the [STANDARD DRAWING 42002](#). Class B bedding is required.
- (iii) Inline Tee or Wye fittings must be installed during sewer main construction at all service connections. Saddles are allowed only for service connections to existing mains. Tee fitting service connections will be allowed provided they discharge into the top half of the main.
- (iv) Where sump pump discharge collection services are required to connect to mains in excess of 4.5 m deep, risers shall be installed to 4.5 m below finished surface.
- (v) In residential subdivisions with front yard gas servicing, water, sanitary sewer, and sump pump discharge collection services shall be extended beyond the gas line and sump pump discharge collection main and terminate a minimum of 0.15 m from the back of the easement line. All services shall be properly capped.
- (vi) Red painted stakes of size 38 mm x 89 mm shall be extended from the end of the service connection to a minimum of 0.50 m above ground level.



## 4.4.3.7 Augering of All Services Connections and Main Extensions Into Multi-Family Sites

- (i) All service connections and main extensions into multi-family sites shall be installed by augering under proposed and existing streets and sidewalks except where augering is not feasible due to adverse soil conditions. Open trenching may be permitted subject to the Strathcona County Representative acceptance of the need and acceptance of the backfill material.
- (ii) All auger pit excavations shall be backfilled with granular bedding material and mechanically compacted, in lifts not to exceed 150 mm in depth, to a minimum of 95% Standard Proctor Density to 300 mm above the pipe.
- (iii) Backfill of auger pit excavation over 300 mm above the pipe shall be compacted in lifts not to exceed 150 mm in depth, to a minimum of 98% Standard Proctor Density.

## 4.4.3.8 Inspection and Testing

- (i) Prior to the initial and final acceptance of the project, all storm drainage system components including the sump pump discharge collection mains shall be subject to inspection by the Strathcona County Representative, or his designate at the time of FAC for streets. Video inspection reports prior to FAC shall be required.
- (ii) The maximum acceptable long-term deflection for any PVC or other flexible pipe is 7½% of the normal internal diameter.
- (iii) All sewers shall be inspected by camera after backfilling of the trench to finished grade.

Strathcona County will conduct the television inspection with qualified personnel at FAC at the Developer's expense and issue a formal inspection report, pictures and video tape to all parties. An optional inspection can also be conducted at the CCC at the Developer's expense.

All television inspection shall be carried out by qualified personnel who shall be given at least 21 days advance notice of any testing to be carried out.

- Testing Equipment:

The closed circuit television crew shall provide all equipment and materials necessary to conduct the inspection as specified herein.

The television equipment shall be a self-contained camera and a monitoring unit connected by cable. It must be waterproof and be capable of lighting the entire pipe. Picture capabilities must be of quality to show the entire pipe periphery.

There must be capability of providing measurement within the line to an accuracy of one third of a metre per kilometre. Picture quality must be such to produce a continuous 600 line resolution picture showing the entire periphery of the pipe. The following capabilities and items must be available:

- a direct voice communication
- a camera towing service
- self-contained electrical power
- proper safety equipment to protect employees and the general public.



The cameras rate of progress shall be uniform during inspection and shall not exceed 6 m/min.

- Report:

A television log shall be maintained during the inspection showing locations of leak, fault, open joint, break, crack, collapse, deflection, settlement, obstruction, infiltration, or any other defect affecting the overall performance of the mains. The location of the defect shall be referenced from the manhole.

A separate log shall be kept of service connections with comments of condition.

Photographs shall be taken as directed or at the discretion of the television scanning operator. A minimum of one photo per manhole reach is required plus one of every deficiency.

Manhole identify shall be noted clearly as indicated on the drawings.

A final typewritten report with corresponding photograph secured properly and referenced to the text along with a copy of the video tape shall be submitted within two weeks after compilation of inspection.

- Cleaning:

The Developer is responsible for cleaning and flushing all lines.

- Miscellaneous:

The crew shall be responsible for all works performed by any subcontractors, for traffic control and any other related work incidental to the completion of television inspection.

(iv) Inspection and Acceptance

The location of all deficient work will be recorded and the Developer will be required to repair, re-lay, restore or otherwise make good, to the satisfaction of the Strathcona County Representative, any deficient work including the repair of alignment problems, cracked or broken pipe, deformed pipe, leaks or any other faults not conforming with these specifications or the pipe manufacturers which the television inspection revealed.

After the deficiencies are repaired and corrected and before final acceptance, the Strathcona County Representative, reserves the right to have the faulty areas re-televised at the Developer's expense.

(v) Where deemed necessary by the Strathcona County Representative, an exfiltration and/or infiltration test shall be conducted. These tests shall not be required if video inspections are done immediately after sewer construction and no deficiencies are

observed. Any deficiencies shall be corrected by the Contractor and those portions of line affected shall be subject to an additional video inspection.

Sewer Leakage Allowances	
Pipe Material	Leakage Allowance
PVC	<p><u>Infiltration Test:</u> 5.0 L/day/mm dia/km is allowable with no allowance for external hydrostatic head. The groundwater table is to be above pipe crown at all locations of the test section.</p> <p><u>Exfiltration Test:</u> 5.0 L/day/mm dia/km is the combined allowable exfiltration from pipe and manholes with hydrostatic head at the high manhole is to be a minimum 0.6 m higher than crown of pipe or groundwater table, whichever is higher. The water level is not to exceed 7.6 m above top of pipe at low manhole.</p>
Concrete	<p><u>Infiltration Test:</u> 20.0 L/day/mm dia/km is allowable with average depth of groundwater a minimum of 0.6 m above crown of pipe. Where the average head of groundwater is 1.8 m or more above the crown, the infiltration limit is increased by the ratio of the square root of the actual head to a base head of 1.8 m.</p> <p><u>Exfiltration Test:</u> 20.0 L/day/mm dia/km is the combined allowable exfiltration from pipe and manholes when average head on the test section is 0.9 m above crown of pipe or groundwater table, whichever is higher.</p> <p>Exfiltration limit is increased by the ratio of the square root of the actual head to a base head of 0.9 m when the average head on the test section is greater than 0.9 m above crown of pipe or groundwater table, whichever is higher.</p>

#### 4.4.4 Summary of Storm Drainage System Standards

The following is a summary of the standards applicable to the storm drainage system materials and construction. In all cases, it is intended that the latest revision apply.

##### ASTM

A48	Gray Iron Castings
C14	Concrete Sewer, Storm and Drain, and Culvert Pipe
C76	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
C443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
C478	Precast Reinforced Concrete Manhole Sections
D698	Moisture - Density Relations of Soils and Soil-Aggregate Mixtures
D3034	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

##### CSA

A5	Portland Cements
A23.1	Concrete Materials and Methods of Concrete Construction

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A257 Series	Standards for Concrete Pipe
B182.1	Sewer Pipe Fittings
B182.2	PVC Sewer Pipe and Fittings (PSM Type)
B182.4	Profile PVC Sewer Pipe and Fittings
B182.11	Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings
G30.12	Billet Steel Bars for Concrete Reinforcement

## FIGURE 1, IDF Curves Formula

Edmonton Municipal Airport - IDF Period: 1914-1995

Max Years of Record 63

Constants	Return Frequency					
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
a=	221.51	335.29	410.83	505.47	576.99	647.86
b=	1.580	1.545	1.535	1.522	1.528	1.536
c=	0.647	0.654	0.656	0.658	0.660	0.661

$$I = a/(t + b)^c$$

I Intensity (mm/hr)

t Time

a,b,c Constants from table above

Note: Constants where derived from a least squares solution of raw data

### IDF Intensity Table (mm/hr)

Time		Return Frequency					
Minutes	Hours	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
1		120.0	182.0	223.1	274.9	312.8	350.2
2		97.1	146.6	179.3	220.6	251.1	281.1
3		82.8	124.6	152.3	187.2	213.0	238.4
4		72.9	109.4	133.6	164.1	186.7	209.0
5		65.5	98.2	119.8	147.1	167.3	187.3
6		59.8	89.5	109.1	133.9	152.3	170.5
7		55.2	82.5	100.6	123.3	140.2	157.0
8		51.4	76.7	93.5	114.6	130.3	145.9
9		48.2	71.9	87.6	107.3	122.0	136.6
10		45.5	67.7	82.5	101.1	114.9	128.6
11		43.1	64.2	78.1	95.7	108.8	121.8
12		41.0	61.0	74.3	91.0	103.4	115.7
13		39.2	58.3	70.9	86.8	98.7	110.4
14		37.5	55.8	67.9	83.1	94.4	105.7
15	0.25	36.0	53.5	65.1	79.8	90.6	101.4
16		34.7	51.5	62.7	76.7	87.2	97.5
17		33.5	49.7	60.4	74.0	84.0	94.0
18		32.4	48.0	58.4	71.5	81.2	90.8
19		31.3	46.5	56.5	69.1	78.5	87.9
20		30.4	45.1	54.8	67.0	76.1	85.1
21		29.5	43.7	53.2	65.0	73.9	82.6
22		28.7	42.5	51.7	63.2	71.8	80.3
23		27.9	41.4	50.3	61.5	69.8	78.1
24		27.2	40.3	49.0	59.9	68.0	76.1
25		26.6	39.3	47.8	58.4	66.3	74.2
26		25.9	38.4	46.6	57.0	64.7	72.4
27		25.3	37.5	45.5	55.7	63.2	70.7

Time		Return Frequency					
Minutes	Hours	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
28	0.5	24.8	36.7	44.5	54.4	61.8	69.1
29		24.3	35.9	43.6	53.2	60.4	67.6
30		23.8	35.1	42.6	52.1	59.2	66.2
31		23.3	34.4	41.8	51.1	58.0	64.8
32		22.8	33.7	41.0	50.1	56.8	63.5
33		22.4	33.1	40.2	49.1	55.7	62.3
34		22.0	32.5	39.4	48.2	54.7	61.1
35		21.6	31.9	38.7	47.3	53.7	60.0
36		21.2	31.3	38.0	46.5	52.7	59.0
37		20.9	30.8	37.4	45.7	51.8	58.0
38	0.75	20.5	30.3	36.8	44.9	51.0	57.0
39		20.2	29.8	36.2	44.2	50.1	56.0
40		19.9	29.3	35.6	43.5	49.3	55.2
41		19.6	28.9	35.0	42.8	48.6	54.3
42		19.3	28.4	34.5	42.1	47.8	53.5
43		19.0	28.0	34.0	41.5	47.1	52.7
44		18.7	27.6	33.5	40.9	46.4	51.9
45		18.5	27.2	33.0	40.3	45.8	51.2
46		18.2	26.9	32.6	39.8	45.1	50.4
47		18.0	26.5	32.1	39.2	44.5	49.8
48	1	17.7	26.1	31.7	38.7	43.9	49.1
49		17.5	25.8	31.3	38.2	43.3	48.4
50		17.3	25.5	30.9	37.7	42.8	47.8
51		17.1	25.2	30.5	37.2	42.2	47.2
52		16.9	24.9	30.1	36.8	41.7	46.6
53		16.7	24.6	29.8	36.3	41.2	46.1
54		16.5	24.3	29.4	35.9	40.7	45.5
55		16.3	24.0	29.1	35.5	40.2	45.0
56		16.1	23.7	28.7	35.1	39.8	44.5
57		15.9	23.4	28.4	34.7	39.3	44.0
58	1.25	15.8	23.2	28.1	34.3	38.9	43.5
59		15.6	22.9	27.8	33.9	38.5	43.0
60		15.4	22.7	27.5	33.6	38.1	42.5
61		15.3	22.5	27.2	33.2	37.7	42.1
62		15.1	22.2	26.9	32.9	37.3	41.6
63		15.0	22.0	26.6	32.5	36.9	41.2
64		14.8	21.8	26.4	32.2	36.5	40.8
65		14.7	21.6	26.1	31.9	36.1	40.4
66		14.5	21.3	25.9	31.6	35.8	40.0
67		14.4	21.1	25.6	31.3	35.4	39.6
68		14.3	20.9	25.4	31.0	35.1	39.2
69		14.1	20.8	25.1	30.7	34.8	38.9
70		14.0	20.6	24.9	30.4	34.5	38.5
71		13.9	20.4	24.7	30.1	34.1	38.2
72		13.8	20.2	24.5	29.8	33.8	37.8
73		13.6	20.0	24.2	29.6	33.5	37.5
74		13.5	19.8	24.0	29.3	33.2	37.1
75		13.4	19.7	23.8	29.1	33.0	36.8
76		13.3	19.5	23.6	28.8	32.7	36.5

Time		Return Frequency					
Minutes	Hours	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
77		13.2	19.3	23.4	28.6	32.4	36.2
78		13.1	19.2	23.2	28.3	32.1	35.9
79		13.0	19.0	23.0	28.1	31.9	35.6
80		12.9	18.9	22.9	27.9	31.6	35.3
81		12.8	18.7	22.7	27.7	31.4	35.0
82		12.7	18.6	22.5	27.4	31.1	34.8
83		12.6	18.4	22.3	27.2	30.9	34.5
84		12.5	18.3	22.1	27.0	30.6	34.2
85		12.4	18.2	22.0	26.8	30.4	34.0
86		12.3	18.0	21.8	26.6	30.2	33.7
87		12.2	17.9	21.7	26.4	29.9	33.4
88		12.1	17.8	21.5	26.2	29.7	33.2
89		12.0	17.6	21.3	26.0	29.5	33.0
90	1.5	11.9	17.5	21.2	25.8	29.3	32.7
120	2	9.94	14.5	17.6	21.4	24.3	27.1
180	3	7.67	11.2	13.5	16.5	18.6	20.8
240	4	6.37	9.28	11.2	13.6	15.4	17.2
300	5	5.52	8.03	9.69	11.8	13.3	14.9
360	6	4.91	7.13	8.60	10.5	11.8	13.2
420	7	4.45	6.45	7.77	9.45	10.7	11.9
480	8	4.08	5.91	7.12	8.66	9.79	10.9
540	9	3.78	5.48	6.60	8.02	9.06	10.1
600	10	3.53	5.11	6.16	7.48	8.45	9.42
660	11	3.32	4.80	5.78	7.03	7.94	8.85
720	12	3.14	4.54	5.46	6.64	7.50	8.36
780	13	2.98	4.31	5.18	6.30	7.11	7.93
840	14	2.84	4.10	4.94	6.00	6.77	7.55
900	15	2.72	3.92	4.72	5.73	6.47	7.21
960	16	2.61	3.76	4.52	5.49	6.20	6.91
1020	17	2.51	3.62	4.35	5.28	5.96	6.64
1080	18	2.42	3.48	4.19	5.08	5.74	6.39
1140	19	2.34	3.36	4.04	4.91	5.54	6.17
1200	20	2.26	3.25	3.91	4.74	5.35	5.96
1260	21	2.19	3.15	3.79	4.59	5.18	5.77
1320	22	2.12	3.06	3.67	4.45	5.03	5.60
1380	23	2.06	2.97	3.57	4.33	4.88	5.44
1440	24	2.01	2.89	3.47	4.21	4.75	5.29

**5.1 RURAL TRANSPORTATION****5.1.1 Rural Grid Roads**

5.1.1.1 Grid Road refers to any Township Road or Range Road within Strathcona County over which Strathcona County is the Road Authority.

5.1.1.2 Refer to the current Strathcona County Sustainable Rural Road Master Plan. Contact:

Strathcona County  
Transportation Planning and Engineering  
2001 Sherwood Drive  
Sherwood Park, AB T8A 3W7

for the current grid road classification network.

**5.1.1.3 Road Classification**

- (i) Class I: A roadway that typically has over 1000 vehicles per day (vpd).
- (ii) Class II: A roadway that typically has between 250 - 1000 vehicles per day (vpd).
- (iii) Class III & IV: A roadway that typically has less than 250 vehicles per day (vpd).

5.1.1.4 The Geotechnical Report must include specific recommendations for pavement structure construction based on insitu conditions and projected traffic volume. The stronger of the 20 year structure recommended by the Geotechnical Consultant or the structure outlined in each road classification shall be used.

**5.1.2 Class I – Hot Mix Asphaltic Concrete Roadway**

Refer to [STANDARD DRAWING 51101](#).

**5.1.2.1 Right-of-Way (ROW)**

- (i) Standard ROW is 40.0 m.
- (ii) Provision for one bicycle trail is required. Refer to Strathcona County's Trails Master Plan for network map.

**5.1.2.2 Cross-Section**

- (i) Design life of 20 years.
- (ii) Roadway consisting of a 9.0 m finished top (two 3.5 m lanes and 1.0 m shoulders) and a 12.4 m subgrade, with a crossfall of 2%.
- (iii) Sideslopes shall be a minimum of 4:1.
- (iv) Ditch depth is to be a minimum of 1.0 m below the top of subgrade shoulder.
- (v) Desired ditch bottom width is 3.5 m, however, width is variable subject to bicycle paths, available ROW width, and topography.
- (vi) Desired backslopes are 4:1, minimum of 3:1, with provision for 6:1 for agricultural purposes.

- (vii) Ditch berms are required when adjacent to casual water, so as to relocate waterbody outside of the road ROW limits.

#### 5.1.2.3 Structure

- (i) Road structure dependant on Geotechnical Report findings.
- (ii) Minimum structure to consist of:
  - 150 mm subgrade preparation, compacted to 100% Standard Proctor Density.
  - 200 mm granular base (may include up to 50 mm cold mix asphaltic concrete).
  - 60 mm Type ACB or Type III hot-mix asphaltic concrete base course.
  - 40 mm Type ACO hot-mix asphaltic concrete surface course.

#### 5.1.2.4 Clear Zone Requirements

- (i) TAC Clear Zone range of 9.0 m to 11.0 m from shoulder line, effective for 750 to 8,000 vpd.
- (ii) Power poles to be located 0.5 m from property line when no trees are present (agricultural lands).
- (iii) If trees are present, the required 5.0 m buffer between the powerlines and the tree canopy (as required by the power utility company) is met by aligning the power poles 5.0 m from property line. By doing so, no tree clearing on private lands is required.

### 5.1.3 Class II – Cold Mix Asphaltic Concrete Roadway

Refer to [STANDARD DRAWING 51102](#).

#### 5.1.3.1 Right-Of-Way (ROW)

- (i) Standard ROW is 30.0 m with additional backsloping agreements when required.
- (ii) Recommended ROW is 40.0 m to alleviate the need for backsloping agreements, tree clearing ([SEE SUB-SECTION 5.1.2.4 ITEM \(iii\) OF THIS SECTION](#)) and facilitate future transition to a Class I roadway (with potential for bicycle trail).

#### 5.1.3.2 Cross-Section

- (i) Design life of 10 years.
- (ii) Roadway consisting of a 7.5 m finished top (two 3.75 m lanes and a 10.0 m subgrade, with a crossfall of 2%.
- (iii) Sideslopes shall be a minimum of 4:1.
- (iv) Ditch depth is to be a minimum of 1.0 m below the top of subgrade shoulder.
- (v) Desired ditch bottom width is 2.5 m, however, width is variable subject to available ROW width and topography.
- (vi) Backslopes shall be a minimum of 3:1, with provision for 6:1 for agricultural purposes. Backsloping agreements will typically be required.
- (vii) (vii) Ditch berms are required when adjacent to casual water, so as to relocate waterbody outside of the road ROW limits.

#### 5.1.3.3 Structure

- (i) Road structure dependant on Geotechnical Report findings.



- (ii) Minimum structure to consist of:
  - 150 mm subgrade preparation, compacted to 100% Standard Proctor Density.
  - 150 mm granular base.
  - 50 mm cold-mix asphaltic concrete surface course.

**5.1.3.4 Clear Zone Requirements**

- (i) TAC Clear Zone range of 6.75 m to 8.25 m from shoulder line, effective for 500 to 4,000 vpd.
- (ii) Power poles to be located 0.5 m from property line when no trees are present (agricultural lands).
- (iii) If trees are present, the required 5.0 m buffer between the powerlines and the tree canopy (as required by the power utility company) is met by aligning the power poles 2.0 m from property line and requiring 3.0 m of tree clearing on private lands.

**5.1.4 Class III – Dust Abated Gravel Roadway**

Refer to [STANDARD DRAWING 51103](#).

**5.1.4.1 Right-of-Way (ROW)**

- (i) Standard ROW is 30.0 m with additional backsloping agreements when required.

**5.1.4.2 Cross-Section**

- (i) Roadway consisting of 7.5 m finished top (two 3.75 m lanes) and 10.0 m subgrade (to facilitate future upgrading to a Class II roadway) and a crossfall of 3%.
- (ii) Refer to Class II for further requirements.

**5.1.4.3 Structure**

- (i) Minimum structure to consist of:
  - 150 mm subgrade preparation compacted to 100% Standard Proctor Density.
  - 100 mm granular surface (first lift of staged lifts).
  - Subsequent 50 mm granular surface lift after 12 months.

**5.1.4.4 Dust Abatement**

- (i) Trigger factor for conversion of a spot-residential dust abated Class IV road to full intersection-to-intersection dust abated Class III roadway per Strathcona County Policy SER-009-030, SECTION 4.
- (ii) Surface treated with Spec Crude or alternate dust abatement material as specified by the Strathcona County Transportation and Agriculture Services department.

**5.1.5 Class IV – Gravel Roadway**

Refer to [STANDARD DRAWING 51103](#).

- 5.1.5.1 Right-of-Way (ROW)
  - (i) Refer to Class III roadway.
- 5.1.5.2 Cross-Section
  - (i) Refer to Class III roadway.
- 5.1.5.3 Structure
  - (i) Refer to Class III roadway.
- 5.1.5.4 Spot Residential Dust Abatement
  - (i) Residential accesses on Class IV gravel roads receive 150 m of dust abatement.
- 5.1.6 Horizontal**
  - 5.1.6.1 Horizontal
    - (i) See TAC Manual.
  - 5.1.6.2 Vertical
    - (i) See TAC Manual.
  - 5.1.6.3 Grade
    - (i) Design speed for Class I rural grid roads is 100 km/h.
    - (ii) Design speed for Class II, III, and IV rural grid roads is 90 km/h.
    - (iii) Minimum Crest and Sag vertical curve K-values shall be as per TAC standards.
    - (iv) Minimum longitudinal road and ditch grade is 0.3%.
    - (v) Maximum longitudinal road and ditch grade is 5.0%.
- 5.1.7 Proposed Pipeline Crossing Requirements**
  - 5.1.7.1 In general, an unimproved or undeveloped county grid road may be considered for future upgrading. This upgrading will typically require a 20.0 m (Class I or II) or 10.0 m (Class III or IV) road ROW widening, which may fall on one side or the other, or a combination of the two. Therefore, in order to facilitate future work with a minimum disturbance to the pipeline, a future road ROW zone of 60.0 m or 40.0 m (depending on roadway class) must be examined when crossing perpendicular to the roadway. If the pipeline is skewed, the length of pipe within the future road ROW widening zone is thereby increased.
  - 5.1.7.2 If no depth is pre-specified, the top of pipe is to be a minimum of 1.8 m below the single most lowest elevation within the expanded 60.0 m or 40.0 m road widening zone.
  - 5.1.7.3 The top of pipe is to be level throughout the road widening zone.
  - 5.1.7.4 Top of pipe elevation is to be labelled on the cross-section and profile (referenced from the labelled lowest ground elevation). Generic use of not to scale "1.8 m minimum cover" dimensions is insufficient to ensure proper pipe elevation.

- 5.1.7.5 Heavy wall pipe is to be utilized throughout the road widening zone, per the chart on [STANDARD DRAWING 51111](#). Refer to Strathcona County's Municipal Development Plan for land use categories.
- 5.1.7.6 No open cuts are permitted.
- 5.1.7.7 Roadway centreline profile information for 200 m in either direction from the proposed crossing location is required to be submitted for review and acceptance by the Strathcona County Representative to confirm minimum crossing elevations as compared to future profile improvements.
- 5.1.7.8 All elevations are to be reported and illustrated as geodetic. No assumed elevations are permitted.
- 5.1.8 Proposed Waterlines and Sanitary Sewers**
- 5.1.8.1 Centreline alignment is typically to be 4.5 m from property line, but can vary due to available ROW, existing utilities, and topography.
- 5.1.8.2 Depth of cover dependant on utility requirements.
- 5.1.8.3 Service connections to be located at lot accesses.
- 5.1.9 Proposed Power Pole Locations**
- 5.1.9.1 Refer to Clear Zone Requirements – See [SUB-SECTION 5.1.3.4 OF THIS SECTION](#).
- 5.1.10 Proposed Shallow Utilities Crossings**
- 5.1.10.1 Crossings shall be in conduit for the full width of the crossing.
- 5.1.10.2 Depth of cover is dependent on utility requirements.
- 5.1.10.3 Connections of roadways to Grid Roads to facilitate access will be guided by this section and [STANDARD DRAWINGS 51001](#), [51002](#), and [51003](#).
- 5.1.11 Residential Access from Grid Roads**
- 5.1.11.1 Highways
- (i) Alberta Infrastructure and Transportation is the Road Authority on all Highways (previously referred to as Primary and Secondary) within Strathcona County. They include Highways 14, 15, 16, 21, 38, 216, 628, 629, 630, 824, 830, and the unnumbered Sherwood Park Freeway.
  - (ii) Application for access is to be made through the Stony Plain office at 780-963-5711.

## 5.1.11.2 County Grid Roads

- (i) Posted 80 km/h Roads
  - Directly opposite an existing roadway or access.
  - A minimum of 90.0 m centreline to centreline from any existing roadway or access, regardless of which side of the grid road it is located on.
  - Must have a minimum vertical and horizontal sightline of 170.0 m in both directions (both horizontally and vertically).
- (ii) Posted 50 km/h Roads
  - Directly opposite an existing roadway or access.
  - A minimum of 60.0 m centreline to centreline from any existing roadway intersection.
  - A minimum of 45.0 m centreline to centreline from any existing access, regardless of which side of the grid road it is located on.
  - Must have a vertical and horizontal sightline of 85.0 m in both directions (both horizontally and vertically).

## 5.1.11.3 Width

- (i) 6.0 m wide at property line for single lot service.
- (ii) 10.0 m wide at property line for dual lot service, thereafter, splitting into two once within private lands.
- (iii) 10.0 m return radii, unless rural water service connection is made which allows for a reduction to 7.5 m.

## 5.1.11.4 Structure and Cross-Section

- (i) For access to a Class I rural grid road, the first 6.0 m from the edge of pavement shall be hard-surfaced, either in hot mix or cold mix asphaltic concrete (per Alberta Infrastructure and Transportation's requirements for access to a highway). The remainder of surface to be a minimum of 50 mm gravel surface to property line.
- (ii) For access to a Class II, III, or IV rural grid road, surface shall be a minimum of 50 mm gravel surface between the edge of the grid road and property line.
- (iii) Embankment material to be clay and/or granular.
- (iv) Compacted to minimum 97% Standard Proctor Density.
- (v) Sideslopes are to be a minimum of 4:1
- (vi) Minimum 400 mm diameter x 1.6 mm wall thickness culvert. A culvert design may be required in some locations that may result in larger diameter culvert.
- (vii) Refer to [VOL. 1 SEC. 5.4, STORMWATER MANAGEMENT](#) for further culvert requirements.
- (viii) Application for access construction and/or construction inspection, based on the above conditions, is to be made through Strathcona County Transportation and Agriculture Services department at 780-417-7100.

## 5.1.11.5 Grade

- (i) The maximum permissible gradient for an access approaching a roadway is between -2.0% to -0.6% and 0.6% to 2.0% for a minimum of 10.0 m from the road edge is required.

- (ii) Transition from above grade requirements to grade on private property is recommended to be by way of a 10.0 m long vertical curve.
- (iii) Final grade on private property recommended to be minimum  $\pm 0.6\%$  to maximum  $\pm 8.0\%$ .

#### 5.1.11.6 Delineator Posts

- (i) Flexible delineator posts are required at all new residential accesses to an 80 km/h rural grid road and are recommended for all other access locations. [SUB-SECTION 5.1.16.3 OF THIS SECTION](#) of this document.

### 5.1.12 Rural Hamlet Roads

#### 5.1.12.1 General

- (i) Development where the lot size is less than 0.15 ha (1,500 m<sup>2</sup>) shall be considered “high density parcel development” or urban density.
- (ii) Development where the minimum lot size is 0.80 ha (8,000 m<sup>2</sup>) shall be considered “low density parcel development” or country residential or rural density.
- (iii) Hamlet road development within high density parcel developments shall conform to urban service standards as described in the [VOL. 1 SEC. 4.1, ROADS](#).
- (iv) Hamlet road development within low density parcel developments shall conform to [SUB-SECTION 5.1.13 OF THIS SECTION](#).
- (v) Development where lot size is between 0.15 ha and 0.80 ha shall be considered hybrid. Hybrid roads are to be reviewed on a case by case basis and all submissions to be forwarded to the Strathcona County Representative, for review and acceptance.

#### 5.1.12.2 Right-of-way (ROW)

- (i) Refer to [VOL. 1 SEC. 4.1, ROADS, TABLE 4-1](#) for urban roadway ROW requirements.
- (ii) For low density parcel developments the minimum roadway right-of-way is 30.0 m and cul-de-sac bulb radius is 30.0 m. Refer to [STANDARD DRAWING 51004](#).
- (iii) For hybrid parcel development, roadway ROW will be reviewed on a case by case basis.

#### 5.1.12.3 Cross-Section

- (i) Refer to [VOL. 1 SEC. 4.1, ROADS, TABLE 4-1](#) for urban cross section requirements.
- (ii) Where required, only separate sidewalks will be permitted.
- (iii) Low density parcel development cross-section requirements shall conform to [SUB-SECTION 5.1.13 OF THIS SECTION](#).
- (iv) For hybrid parcel development, roadway cross-section requirements will be reviewed on a case-by-case basis.

#### 5.1.12.4 Structure

- (i) Road structure is subject to revision by Geotechnical Report recommendations.
- (ii) High density parcel developments road structure shall conform to [VOL. 1 SEC. 4.1, ROADS, TABLE 4-5](#) or [TABLE 4-6](#) for urban roadway structure requirements.
- (iii) Straight-faced curb and gutter is required.
- (iv) Low density parcel developments road structure shall conform to [SUB-SECTION 5.1.13 OF THIS SECTION](#).

- (v) For hybrid parcel development, roadway structure requirements will be reviewed on a case-by-case basis.

#### 5.1.12.5 Alignment

- (i) Horizontal
  - High density parcel development horizontal alignment shall conform to [VOL. 1 SEC. 4.1, ROADS, SUB-SECTION 4.1.10.](#)
  - Low density parcel development horizontal alignment shall conform to [SUB-SECTION 5.1.13.7\(i\) OF THIS SECTION.](#)
- (ii) Vertical
  - High density parcel development vertical alignment shall conform to [VOL. 1 SEC. 4.1, ROADS, SUB-SECTION 4.1.9.](#)
  - Low density parcel development horizontal alignment shall conform to [SUB-SECTION 5.1.13.7\(ii\) OF THIS SECTION.](#)
- (iii) Grade
  - High density parcel development grade shall conform to [VOL. 1 SEC. 4.1, ROADS, SUB-SECTION 4.1.9.](#)
  - Low density parcel development grade shall conform to [SUB-SECTION 5.1.13.7\(iii\) OF THIS SECTION.](#)

### 5.1.13 Rural Residential Subdivision Roadway

#### 5.1.13.1 Access Location and Spacing

- (i) Refer to [SUB-SECTION 5.1.11 OF THIS SECTION](#) for applicable location and spacing requirements for the Country Residential Subdivision access roadway(s).

#### 5.1.13.2 Right-Of-Way (ROW)

- (i) Roadway ROW is 30.0 m.
- (ii) Cul-de-sac bulb and return radii are 30.0 m.

#### 5.1.13.3 Subdivision Entrances

- (i) Country Residential Subdivisions gaining access from a Class I rural grid road require ROW tapers, to accommodate deceleration and acceleration lanes.
- (ii) Country Residential Subdivisions of 20 lots or greater, gaining access from Class II, III, or IV rural grid roads require ROW tapers, to accommodate deceleration and acceleration lanes.
- (iii) Country Residential Subdivisions less than 20 lots, gaining access from Class II, III, or IV rural grid roads are subject to the Strathcona County Representative's review in terms of requiring ROW tapers, based on rural grid road traffic counts and future demands on the grid road.
- (iv) 10.0 m x 10.0 m corner cuts are required.
- (v) If a subdivision entry feature is desired, additional road ROW is to be dedicated, typically a 1.0 m wide strip, located behind the standard corner-cut.
- (vi) Refer to [STANDARD DRAWINGS 51107](#) and [51108](#).

- (vii) Refer to [STANDARD DRAWING 51001](#) for pavement structure requirements with respect to deceleration taper and lane, acceleration taper, and subdivision entrance based on what class of grid road is being accessed.
- (viii) Refer to [TABLE 5-1](#) below for requirements for second access and/or emergency second access for subdivisions as a whole and cul-de-sac roads within subdivisions.

**TABLE 5-1**

Cul-de-sac Length	Number of Lots <sup>(1)</sup>	Road Width	Second Access Required <sup>(2)</sup>	Emergency Access Required <sup>(3)</sup>
< 170 m	< 20	7.5 m	No	No
> 170 m	< 20	7.5 m	No	Yes
> 170 m	< 20	8.5 m	No	No
> 170 m	> 20	8.5 m	Yes	No
Overall Development	> 20	8.5 m	Yes <sup>(2)</sup>	No

**NOTES:**

- <sup>(1)</sup> Number of Lots based on a density of 0.81 ha (2 acre) lots.
- <sup>(2)</sup> Second Access Required. For new Country Residential Subdivisions where adjacent roads are not present, provision for future access with subsequent development for subdivisions greater than 16.2 ha (40 acres) and less than 48.6 ha (120 acres) upon written request by the Developer may be considered for approval by the Strathcona County Representative and Fire Marshal.
- <sup>(3)</sup> Emergency Access, 4 m wide asphalt paved trail and T-bollards in 6.0 m ROW.

**5.1.13.4 Internal Intersections**

- (i) Internal roadway intersections are to be spaced a minimum of 75.0 m centreline to centreline from the grid road or a minimum 60.0 m centreline to centreline from one another.
- (ii) 6.0 m x 6.0 m corner cuts are required at all internal roadway intersections.

**5.1.13.5 Cross-Section**

- (i) Roadway consisting of either an 8.5 m finished top (two 3.5 m lanes and 0.75 m shoulders) and 12.0 m subgrade or a 7.5 m finished top (two 3.5 m lanes and 0.25 m shoulders) and 11.0 m subgrade.
- (ii) Sideslopes and backslopes to be a minimum of 5:1.
- (iii) Ditch depths to be confirmed by Geotechnical Report.
- (iv) Minimum ditch depths to be 0.75 m below top of subgrade.
- (v) Ditches to be minimum 1.0 m wide.
- (vi) Minimum 600 mm diameter x 2.8 mm wall thickness through-grade culvert. A culvert design may be required in some locations that may result in larger diameter culverts being required.
- (vii) Refer to [STANDARD DRAWINGS 51104](#), [51105](#), [51106](#) and [51002](#).

**5.1.13.6 Structure**

- (i) Road structure is subject to revision by Geotechnical Report recommendations.
- (ii) Design life is 20 years.

- (iii) Minimum structure to consist of:
  - 150 mm cement-stabilized subgrade preparation.
  - 200 mm of 20 mm granular base.
  - 75 mm Type III asphaltic concrete base course.
  - 40 mm Type ACR asphaltic concrete surface course (staged six months prior to FAC date).
- (iv) Cement stabilization of subgrade to be per specification outlined in [VOL. 2 SEC. 404, CEMENT STABILIZED SUBGRADE](#).
- (v) Subgrade and granular base to be compacted to 100% Standard Proctor Density.
- (vi) When tying in a previous phase or rural grid road, a minimum of 0.75 m width shall be ground out of the old phase and a 1.5 m Type 8502 or approved alternate glass grid shall be placed to tie the new and old pavement together at the joint.

## 5.1.13.7 Alignment

- (i) Horizontal
  - The minimum centreline radius of curve shall be 90.0 m.
  - The minimum tangent length shall be 30.0 m.
  - Intersection return radius is 15.0 m.
- (ii) Vertical
  - All vertical curves shall be designed to meet the minimum requirements of:
    - Crest K=15
    - Sag K=10
  - The minimum length of a vertical curve shall be 30.0 m.
  - The minimum tangent length shall be 30.0 m.
- (iii) Grade
  - At all intersections between a grid road and a subdivision road, an upgrade towards the grid road, of minimum 0.6% to maximum 2.0%, for a distance of 30.0 m is required, regardless of whether the roadway is in a cut or fill section.
  - At all internal subdivision roadway intersections, for any roadway connecting to an intersection, the maximum permissible gradient is 2% for a minimum distance of 30.0 m from the end of the curb return.
  - Minimum longitudinal road and ditch grade is 0.6%, maximum longitudinal grade is 6.0%.

## 5.1.13.8 Utilities

- (i) Gas Main
  - Gas line shall be 1.5 m off property line.
  - Minimum depth to be 1.1 m below grade.
  - Refer to [STANDARD DRAWINGS 51104](#), [51105](#) and [51106](#).
- (ii) Water Main
  - Water main shall be 4.5 m off property line.
  - Minimum depth to be 2.75 m below ditch grade.
  - Refer to [STANDARD DRAWINGS 51104](#), [51105](#) and [51106](#).
  - Service connections are to cross perpendicular to the road ROW.



- Water main valve marker posts are required adjacent to the property line perpendicular to the valve. Refer to [STANDARD DRAWINGS 53004](#), [53006](#), [53008](#), and [53009](#).
- (iii) Low Pressure Sanitary Sewer Main
  - Sanitary sewer main shall be 4.5 m off property line, opposite side to the water line.
  - Minimum depth to be 2.75 m below ditch grade.
  - Refer to [STANDARD DRAWINGS 51104](#), [51105](#) and [51106](#).
  - Service connections are to cross perpendicular to the road ROW.
  - Sanitary sewer main valve marker posts are required adjacent to the property line and perpendicular to the valve.
- (iv) Underground Power, Telephone and Cable TV Service
  - All lines are to be underground.
  - Power lines are to be located 3.m off property line.
  - Refer to [STANDARD DRAWINGS 51101](#), [51102](#), [51103](#), [51104](#), [51105](#) and [51106](#).
- (v) Street Lights
  - Street lights are not supported in the rural service area.
  - If provided by the Developer, they are to be designed and installed to meet TAC guidelines for rural areas and will require a Home Owners Association be in place to assume maintenance or replacement costs.
  - Decorative lights are not permitted within the road ROW.

#### 5.1.13.9 Noise Attenuation

- (i) Refer to [VOL. 1 SEC. 4.1, ROADS, SUB-SECTION 4.1.18](#).
- (ii) Development adjacent to any Highway, Class I grid road, or an unimproved grid road identified as being a future major transportation corridor, shall be considered as if adjacent to an urban arterial roadway in terms of traffic volumes to be modeled (27,000 vpd).
- (iii) Development adjacent to all other grid roads shall be modeled at 7,500 vpd unless reduced by the Strathcona County Representative.
- (iv) Noise attenuation may take the form of restricted development pockets (maximizing the distance from the roadway), or with structures that may take the form of a double-board fence, berm, or combination of berm and fence.
- (v) If a restricted development pocket is selected, it must be reflected on all engineering drawings and be registered as a caveat on the lot.
- (vi) If a fence is selected, it shall be constructed 0.15 m inside the residential property line.
- (vii) If a berm is selected, it shall be entirely located on private property.
- (viii) If a berm and fence combination is selected, a PUL shall be dedicated for the front slope of the berm, such that the fence is located the required 0.15 m inside the residential property line.
- (ix) A noise caveat is to be registered on all lots adjacent to grid roads.

#### 5.1.13.10 Roadside Layby (Canada Post Superbox, Information Sign, etc.)

- (i) Location and Spacing
  - For country residential subdivisions with multiple accesses, the layby will be located on the roadway from which the addressing is based.

- The layby shall be located on the right hand side of the roadway.
- The layby shall be located as far as is practical from the grid road and any internal roadway or residential access.
- (ii) Size
  - Layby shall be 3.0 m wide (finished surface) and be 6 m long for developments  $\leq 8$  residential lots, 12 m long for developments  $\leq 55$  residential lots, or 18 m long for developments  $> 55$  residential lots.
  - Layby shall have 5:1 tapers.
  - Refer to [STANDARD DRAWING 51006](#).
- (iii) Identification
  - Layby shall require a flexible delineator post at each end. Refer to [SUB-SECTION 5.1.16.3 OF THIS SECTION](#) of this document.
  - A solid white line shall be painted at the roadway shoulder.
  - Refer to [STANDARD DRAWING 51006](#).
- (iv) Ditch Alignment
  - Standard sideslope (minimum 5:1), ditch bottom (1.0 m) and backslope (minimum 5:1) shall be utilized.
  - Realignment of the ditch bottom may require either backsloping and/or drainage easements to be registered against the adjacent residential lot or a widening in the road ROW.

#### 5.1.13.11 Individual Lot Access

- (i) Location and Spacing
  - All access locations are to have a minimum sightline distance of 85.0 m in the vertical and horizontal in both directions along the subdivision roadway per TAC guidelines for driver's eye height and setback.
  - The initial access location is to be a minimum of 75.0 m centreline to centreline from the rural grid road.
  - Access locations are to be directly opposite or a minimum of 60.0 m centreline to centreline from any internal subdivision roadway intersection.
  - All other access locations are to be directly opposite or a minimum of 45.0 m centreline to centreline from any other access.
  - Corner lots are to have their access located on the internal subdivision roadway of lesser traffic volume.
  - Locations are to be shown on the approved engineering site plans and all accesses are to be constructed in conjunction with the subdivision roadway.
- (ii) Width
  - 6.0 m wide at property line for single lot service.
  - 10.0 m wide at property line for dual lot service, thereafter, splitting into two.
  - 10.0 m return radii for country residential subdivisions without connection to a rural water distribution system.
  - 7.5 m return radii for country residential subdivisions with connection to a rural water distribution system.

- (iii) Structure and Cross-Section
  - Base structure and base course asphaltic concrete consistent with subdivision roadway structure (road edge to property line). See minimum roadway/access structure requirements in [SUB-SECTION 5.1.13.6](#).
  - During roadway base course paving.
  - Sideslopes are to be a minimum of 4:1.
  - Minimum 400 mm diameter x 1.6mm wall thickness culvert.
- (iv) Grade
  - The maximum permissible gradient for an access approaching a roadway is between -2.0% to -0.6% and 0.6% to 2.0% for a minimum of 10.0 m from the road edge is required.
  - Transition from above grade requirements to grade on private property to be by way of a 10.0 m long vertical curve.
  - Final grade on private property recommended is minimum  $\pm 0.6\%$  to maximum  $\pm 8.0\%$ .
- (v) Delineator Posts
  - Flexible delineator posts are recommended for all access locations. Refer to [SUB-SECTION 5.1.16.3 OF THIS SECTION](#).

## 5.1.14 Rural Commercial Development

### 5.1.14.1 Access

- (i) Location and Spacing
  - Refer to [SUB-SECTION 5.1.11 OF THIS SECTION](#) for applicable location, spacing requirements, and delineator post requirements.
- (ii) Width
  - 9.0 m wide at property line.
  - Minimum 15.0 m return radii for any access expecting truck traffic.
  - Minimum 10.0 m return radii for any access solely for use of passenger vehicles (i.e., staff parking, customer parking).
- (iii) Structure and Cross-Section
  - Minimum structure to accommodate trucks:
    - 150 mm subgrade preparation compacted to 100% Standard Proctor Density
    - 200 mm of 20 mm granular
    - 100mm asphalt
  - Minimum structure to accommodate passenger vehicles:
    - 150 mm subgrade preparation compacted to 100% Standard Proctor Density
    - 150 mm of 20mm granular
    - 75 mm asphalt
  - Asphalt surface is to extend from road edge to property line.
  - Where tying into existing roadway structure, a minimum 0.75 m wide x 50 mm deep shall be ground out of the existing roadway and a 1.5 m wide mat of Glasgrid Type 8502 shall be placed to tie the new and existing pavements together at the joint.
  - Sideslopes are to be a minimum of 4:1.

- Minimum 400 mm diameter x 2.0 mm wall thickness culvert. A culvert design may be required in some locations that may result in larger diameter culverts being required.
- (iv) Grade
  - An upgrade towards the subdivision roadway, of minimum 1% to maximum 2%, for a distance of 10.0 m is required, regardless of whether the access is in a cut or fill section.
  - A vertical curve of minimum 15.0 m in length is required as a transition between the upgrade and the remainder of the access.
  - Minimum longitudinal grade is 0.6%, maximum longitudinal grade is 6.0%.

### 5.1.15 Roadside Drainage

#### 5.1.15.1 Ditches

##### (i) Velocities

- The maximum velocity of runoff in ditches must be less than the scour velocity of the particular ditch lining used for the ditch.
- Protection must be provided during the establishment of the ditch lining when vegetation is used as the ditch lining.
- The minimum velocity of runoff in ditches must be sufficient to maintain the conveyance of the runoff silt loading.
- All roadside ditches must have positive grades so that standing water is minimized.
- The Engineer is to provide certification that ditch scouring velocities are within acceptable limits or provide documentation outlining remedial corrections.

##### (ii) Seeding

- Seeding of roadside ditches is to be per the [VOL. 1 SEC. 6, OPENSOURCE](#).

#### 5.1.15.2 Culverts

##### (i) Sizing

- The minimum culvert size for a road crossing is 600 mm; larger size culverts may be required to accommodate the ditch flow.
- The minimum culvert size for an access is 400 mm; larger size culverts may be required to accommodate the ditch flow.
- A detailed design may be required to confirm culvert sizing. Refer to [VOL. 1 SEC. 4.4, STORM WATER MANAGEMENT SYSTEM, SUB-SECTION 4.4.1.2](#).
- The minimum wall thickness is 1.6 mm for 400 mm diameter culverts, 2.0 mm for all larger diameter culverts. Refer to [STANDARD DRAWING 51110](#).

##### (ii) Installation

- All culverts to be buried a  $\frac{1}{4}$  of the diameter below ditch invert.
- Culverts are to have 3:1 sloped end treatments.
- Culverts of  $\leq 600$  mm require rip-rap erosion control. Other forms of erosion control will be reviewed on a case by case basis by the Strathcona County Representative.
- Refer to [STANDARD DRAWING 51109](#).

## 5.1.16 Traffic Control Devices and Signs

### 5.1.16.1 Sign Installation

#### (i) Sign Posts

- Sign posts are to be placed and installed in accordance with [VOL. 2 SEC. 903, SIGN INSTALLATION](#).
- Refer to [STANDARD DRAWING 51203](#).

#### (ii) Sign Boards

- Signs are to be placed and installed in accordance with the Manual of Uniform Traffic Control Devices for Canada.

### 5.1.16.2 Street Name and Address Signs

- High intensity reflective material is required for the lettering and background for all signage.
- Street name signs at intersections shall consist of white lettering on a green metal plate. Lettering size shall be 200 mm.
- 100 mm white address numbering on a green metal plate will be required on all cul-de-sacs in addition to the street name signage.
- Sign blades shall be 250 mm deep mounted on end mount brackets as per the following:
  - up to 900 mm in length are to be mounted on BM 18 bracket
  - greater than 900 mm in length are to be mounted on BM 36 bracket
- Sign sheeting shall be 5052 - H38 grade aluminum, high tensile 234MPa -262MPa (34,000 psi - 38,000 psi) with 3M High Intensity Grade reflective material.

### 5.1.16.3 Delineator Posts

- Posts are to be installed at the intersection of a Country Residential Subdivision road and a County grid road (Class II, III, or IV), six per intersection. Refer to [STANDARD DRAWING 51002](#) and [51003](#).
- Posts are to be installed at each residential access to an 80 km/h grid road and are recommended at all other accesses, two per access. Refer to [STANDARD DRAWING 51005](#).
- Posts are to be installed at each roadside layby (i.e., Canada Post Superbox location), two per layby. Refer to [STANDARD DRAWING 51006](#).
- Posts shall be GlasForms Inc., Fiberglass Composite Markers, Dual-Flex, Part Number DF66-00 (66" long in White) with Orange reflective stickers applied to both sides, or approved alternate.
- Posts shall include one composite post anchor and shall be installed 18" in depth, thereby leaving 4' visible above ground.
- Refer to [STANDARD DRAWING 51204](#).

### 5.1.16.4 Discontinuous Rumble Strips

- Grid road intersections and other high-traffic locations may, at the discretion of the Strathcona County Representative, require the installation of discontinuous rumble strips.
- Refer to [STANDARD DRAWINGS 51201](#) and [51202](#).

**5.1.17 Final Acceptance**

- 5.1.17.1 The FAC for roads excluding surface course asphalt shall be issued, subject to all deficiencies being rectified, two years after the issuance of the CCC for roads or one year after the issuance of the FAC for underground improvements, whichever occurs later. An additional twelve-month materials and workmanship warranty period shall be required on the surface course of asphalt.
- 5.1.17.2 Notwithstanding the above, if a pavement structure other than the ones specified in this document is authorized by the IPS Standards Committee, then a two year maintenance period shall be required from the date of issuance of a CCC. Note that prior approval must be obtained from the IPS Standards Committee for alternative pavement structures.

## **5.2. RURAL LOW-PRESSURE SANITARY SERVICING**

### **5.2.1 System Design Overview**

- 5.2.1.1 The sanitary sewer system shall be of sufficient capacity to service the ultimate population projection of the development area. The flows and factors outlined in the following sections shall be used in the design of low pressure sanitary sewer systems.

The Developer and the Developer's Consultant are responsible to ensure that the infrastructure is designed and constructed to achieve manufacturers' design life expectations consistent with good design and construction practice. System proposals must identify disposal means in accordance with Alberta Environment regulations and guidelines. Plan-profile drawings, specifications and a letter report shall be prepared by a qualified Professional Engineer and be submitted to Strathcona County and Alberta Environmental Protection for review and approval prior to construction.

### **5.2.2 Estimating Average Sewage Flows**

- 5.2.2.1 A sewage generation rate of 250L/person/day for a low pressure sewer system with no infiltration rate shall be used, unless otherwise determined by the IPS Standards Committee. Any sewage generation rate other than the above will be dependent upon the disposal system capacity.
- 5.2.2.2 In determining residential flows a minimum of 3.5 persons per household shall be used unless otherwise determined by the IPS Standards Committee.
- 5.2.2.3 Recommended pump rate and head will need to be provided. This information will be included in any plumbing permit issued by Strathcona County and will ensure that all residents are aware of this requirement.

### **5.2.3 Pipe Sizing**

- 5.2.3.1 A report from the Developer's Consultant must be prepared to ensure that pipe sizing is calculated in consideration with the topography of the serviced lands and the population projections.

### **5.2.4 System Materials**

#### **5.2.4.1 General**

- (i) The Developer shall supply and install only new materials.
- (ii) All such materials which are defective in manufacture, damaged in transit, or have been damaged after delivery shall be replaced by the Developer at his expense.
- (iii) All Standards referred to mean the latest edition of that Standard.
- (iv) Where specific products are specified, it is intended that approved equals are also acceptable.
- (v) The "approved as equal" must be obtained from the IPS Standards Committee before the equal product is used.

#### **5.2.4.2 High Density Polyethylene (HDPE) Pipe**

- (i) High Density Polyethylene pressure (HDPE) pipe shall be DR11 or DR13.5, PE 3408 Iron pipe sized (IPS) and shall conform to CSA B137.1, ASTM F714 and ASTM D3350 Standards. Pipe sized from 13mm through 76mm shall conform to ANSI/AWWA C901-02 Standard. Pipe sized from 100 mm through 1575 mm shall conform to ANSI/AWWA C906-00 Standard.



- (ii) Shop only moulded pipe fittings shall be used. If unavailable other alternatives must meet Strathcona County approval first.
- (iii) All joints are to be thermal heat fused. Mechanical service connections are not approved.
- (iv) All components shall be made of corrosion resistant material.
- (v) Pipe age not to exceed two years at time of installation.

### **5.2.5 Low Pressure Sewer Mains**

- 5.2.5.1 In country residential subdivisions the sewer main alignments shall be as depicted on the Typical Country Residential Right-of-Way Roadway cross-section [STANDARD DRAWINGS 51104](#) to [51106](#).
- 5.2.5.2 Mains shall be at a depth adequate to provide a minimum of 2.75 m depth of cover from finished grade to top of pipe.
- 5.2.5.3 Auguring or directional drilling is required under all roads.
- 5.2.5.4 Compaction of any trenches and auger pits and repair of any settlements that occur within two years is required.
- 5.2.5.5 A separate service line with a curb stop, marked "SEWER" at the property line is required for each lot.
- 5.2.5.6 Flushing pipes are required at the start of each collection main to facilitate removal of main line blockages.
- 5.2.5.7 Manual air/vacuum relief valves are required at all high points for removal of hydrogen sulphide gases from anaerobic decomposition of organics.
- 5.2.5.8 A minimum distance of 2.5 m horizontal separation must be maintained between a sewer main and any water main.

- 5.2.5.9 A minimum distance of 3.0 m horizontal separation must be maintained between a sewer main and any gas line.
- 5.2.5.10 PUL widths shall be a minimum of 4.0 m for a single utility and 6.0 m for one containing two utilities. A 1.0 m easement is required on the lots on each side of a PUL.
- 5.2.5.11 Tracer Wire of 14 gauge copper shall be installed simultaneously with the pipe on all mains and services. Splicing the tracer wire can be done by soldering, and mechanical connections, the following shall apply.
- (i) Tracer wire shall not be connected to the steel pipe or transition couplings.
  - (ii) Tracer wire shall be brought flush to the ground at every valve box riser, at every road crossing, at every facility location and at each end of every plastic pipe section. It shall be brought flush to the ground inside a rigid PVC conduit and looped inside a PVC junction box, within a type A valve box marked "SEWER". An electrical continuity test shall be performed prior to acceptance.
- 5.2.5.12 Marker posts shall be installed perpendicular to all valves, air release and flushing standpipe locations, adjacent to the property line. Warning signs and painted fence posts shall be installed at the edge of the road ROW where low pressure sewers cross roadways.
- 5.2.5.13 Posts shall be GlasForms Inc., Fiberglass Composite Markers, Dual-Flex, Part number DF66-00 (66" long in White) with Orange reflective stickers applied to both sides, or approved alternate.
- (i) Posts shall include one composite post anchor and shall be installed 18" in depth, thereby leaving 4' visible above ground.
  - (ii) Refer to [STANDARD DRAWING 51204](#).

**5.2.6 Fittings**

- 5.2.6.1 High Density Polyethylene (HDPE), DR 11 conforming to ASTM F714 and CAN B137.1, shop molded fittings shall be used.
- 5.2.6.2 All HDPE molded fittings shall meet the requirements of ASTM D2683 for socket-type fittings, ASTM D3261 for butt-type fittings, or ASTM F1055 electrofusion-type fittings.

**5.2.7 Valves**

- 5.2.7.1 Gate valves for 75 mm and larger shall be iron body, bronze mounted gate valves with a non-rising spindle, which open by turning in a counter clockwise direction. All valves shall conform with AWWA C500 for bronze mounted solid wedge gate valves or AWWA C509 for resilient seated gate valves. Interior to be factory coated with epoxy coating conforming to AWWA C550. Exterior to be factory applied epoxy coated. Corrosion reduction to be provided by installation of a zinc sacrificial anode. Valves to be flanged for polyethylene pipe.
- 5.2.7.2 Brass inverted key-type curb stops shall be used for valves 50 mm and smaller conforming with ASTM B62 compression type. Curb stops to have adjustable bituminous or epoxy coated cast iron service base with stem to suit 3.0 m depth of bury. Top of cast iron box to be marker "SEWER". All curb stops shall incorporate 75 mm long stainless steel sleeves for connections to polyethylene pipe.
- 5.2.7.3 Valve ends compatible with pipe joint type (Cast Iron Outside Diameter) to be used.
- 5.2.7.4 Cast iron valve boxes conforming to ASTM A48, Class 25 of the screw or sliding type shall be required on all valves. Coating inside and outside shall be an asphaltic coating or fusion bonded epoxy conforming to AWWA C213. Set screws to be galvanized. Top of box to be marked "SEWER".

- 5.2.7.5 Extension stem to be 25 mm square mild steel with 50 mm operating nut and flange suitable for 3.0 m bury. A rock disk nut is required on all valves.
- 5.2.7.6 Schedule 40 PVC valve boxes for the bottom boot of Norwood Foundry Type A siding type valve boxes or approved equal are permitted in areas not exposed to vehicle loading.

### **5.2.8 Service Connections**

#### **5.2.8.1 General**

- (i) Each lot must have a separate service.
- (ii) Curb stops marked "SEWER" shall be installed at the private property line, located within the 3.5 m utility easement.

#### **5.2.8.2 Details**

- (i) Sanitary sewer service pipe shall be 40 mm, DR 11 polyethylene pipe, Series 110 Municipal tubing.
- (ii) Main connections shall be made by means of fused in-line tees or saddles. All fittings and joints must be assembled by electro fusion or butt fusion for HDPE piping. Services to be in one piece, no mechanical connections are permitted between main connection and curb stop.
- (iii) Curb Stops shall be non-draining type located adjacent to driveway locations.
- (iv) Minimum depth of cover shall be 2.75 m from finished grade over top of pipe.

### **5.2.9 Septic Tank/Pump**

- 5.2.9.1 Use two-compartment tank or a single-compartment tank with a pump vault, sized and constructed in accordance with Alberta Plumbing Codes.

- 5.2.9.2 Extend tank access risers at least 150 mm above finished ground surface, provide watertight manhole covers and divert surface runoff away from the manhole cover.
- 5.2.9.3 Tank must be large enough to provide the following.
- (i) 450 mm for pump submergence, minimum.
  - (ii) Full day of emergency storage capacity above the high water alarm level, utilizing the septic tank freeboard capacity below ground and/or below building drain outlet invert.
  - (iii) Minimum 12-hour retention time below high water alarm level for proper treatment of the sewage flow.
  - (iv) Storage of sludge and scum accumulation.
  - (v) Typically 3800 L (1000 gal) minimum total tank storage for an average three bedroom dwelling.
  - (vi) Reference "Alberta Private Sewage System Standard of Practice 1999", Section 5 Septic Tanks, Sewage Holding Tanks and Sewage Effluent Tanks.
- 5.2.9.4 Tank must be sealed watertight tank (fibreglass, or one piece precast pump tank or special provisions for assuring watertight tank.)
- 5.2.9.5 Anti-buoyancy provisions must be adequate.
- 5.2.9.6 All pipe and wire conduits into tank must be through hubs or fittings made during the construction of the tank and installed in a watertight and gastight fashion.
- 5.2.9.7 No drainage or any water other than sanitary waste water shall be allowed to enter the tank.
- 5.2.9.8 The effluent shall enter the pump compartment or pump vault from the clear zone of the tank between the scum and sludge layers.

5.2.9.9 Pump must comply with the following.

- (i) Submersible.
- (ii) Capable of 3 minute minimum pump run time at 1 L/s pumping rate.
- (iii) Must be a CSA approved effluent pump capable of delivering 0.3 L/s at 70 m of total dynamic head or at a pressure established by Strathcona County. Pump must be readily removable from the ground surface.

5.2.9.10 Pump discharge pipe must be of DR 11 HDPE or stronger and include a check valve, disconnect union and gate valve within the pump tank.

5.2.9.11 The pump screens shall be no larger than 3 mm in size and occupy a surface area of 1.44 sq/m or equivalent product approved by Strathcona County.

5.2.9.12 Pumps must be activated by either mechanical level controllers or Mercury level control switches.

5.2.9.13 When any pump is located at a higher elevation than the elevation of the terminal end then a siphon-break valve must be provided for that pump.

5.2.9.14 Provisions for ventilation should be provided.

#### **5.2.10 System Installation**

5.2.10.1 General

- (i) The system installation standards are intended to address key points only and are not to be considered as a substitute for a detail construction specification to be prepared by the Developer's Engineer.

**5.2.10.2 Trenching, Bedding and Backfilling**

- (i) All trenching and backfilling shall be completed in strict conformance with OHS and any other applicable regulations and directions of the Strathcona County Safety Officer.
- (ii) If unsuitable soil conditions (i.e., organics, high moisture content, rock, etc.) are encountered, the method for dealing with these conditions shall be assessed by a qualified Professional Engineer commissioned by the Developer, and a letter report submitted to the Strathcona County Representative.
- (iii) For open trench construction Class "B" bedding as depicted on the [STANDARD DRAWING 42002](#) shall be used for all sewer mains in suitable soil conditions. If unsuitable pipe foundation conditions exist, the design for a special pipe foundation and bedding shall be prepared by a qualified Professional Engineer and submitted to the Strathcona County Representative.
- (iv) In all new subdivisions it shall be the Developer's responsibility to ensure that utility trenches are adequately compacted. In the road ditch or ditch slope the road ROW 95% on Standard Proctor Density shall be required. 98% shall be required if in the slope of the road.
- (v) A two year warranty on trench settlement shall be required in all areas of work performed by trencher machine excavation.
- (vi) If the above compaction standards cannot be achieved because of abnormal weather or wet ground conditions the Strathcona County Representative may at his sole discretion establish a more appropriate standard for the individual case on receipt of an acceptable proposal from the Developer's Engineer.

**5.2.10.3 Augering of All Service Connections**

- (i) All service connections shall be installed by augering under proposed or existing streets except where augering is not feasible due to adverse soil conditions. Open trenching may be permitted subject to the Strathcona County Representative's acceptance of the need and acceptance of the backfill material.
- (ii) All auger pit excavations shall be backfilled with granular bedding material and mechanically compacted, in lifts not to exceed 150 mm in depth, to a minimum of 98% Standard Proctor Density to 300 mm above the pipe.
- (iii) Backfill of auger pit excavation over 300 mm above the pipe shall be compacted in lifts not to exceed 150 mm in depth, to a minimum of 95% in the road ditch or ditch slope or a minimum of 98% if in the sideslope of the road.

**5.2.11 Inspection and Testing**

- 5.2.11.1 Before acceptance of the work, the entire system shall be subjected to a hydrostatic pressure test in the presence of the Strathcona County Representative. The Developer shall provide all necessary labour, materials and equipment for the test including a suitable pump, measuring tank, pressure hoses, connections, plugs, caps, gauges and all other apparatus necessary for filling the main, pumping to the required test pressure and recording the pressure and expansion-leakage losses. The Developer shall provide evidence that the gauges used are accurate.
- 5.2.11.2 Expel air from collection system, by slowly filling main with water. High points must have automatic air/vacuum relief valves to vent air when filling and be closed when pressure is applied.
- 5.2.11.3 A hydrostatic test pressure of 1.5 times the rated pressure of the pipe at the lowest point in the system main shall be applied.



- 5.2.11.4 Pressurized pipe to require test pressure over a three hour period and hold required test pressure for an additional hour to allow for pipe expansion and stretching prior to the leakage test.
- 5.2.11.5 Test period shall be for two hour duration. Amount of make-up water (leakage) required to return the pipe to required test pressure shall not exceed the allowance given in the following table.

**Field Testing of Low Pressure Sewer Systems**

Nominal Pipe Size (mm)	Allowance for Expansion (Leakage) (litres/100 m of pipe) 2 Hour Test
50	1.6
75	1.9
100	3.1
150	7.5
200	12.5

- 5.2.11.6 Total time under test pressure must not exceed eight hours. If test is not accepted due to leakage or equipment failure, test section must be permitted to “relax” for eight hour period prior to the next testing sequence.

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on the correct sides when the document is printed double-sided.

## 5.3 RURAL WATER DISTRIBUTION

### 5.3.1 System Design Overview

- 5.3.1.1 Consideration of the water distribution and transmission systems shall be in accordance to the **Strathcona County Rural Water Servicing Capital Cost Policy** and the **Rural Water Servicing Plan**.
- 5.3.1.2 Plan-profile drawings, specifications and a letter report shall be prepared by a qualified Professional Engineer and be submitted to Strathcona County and Alberta Environmental Protection for review and approval prior to construction. The letter report shall include the design parameters and design calculations for sizing the lines based on 1.9 L/min restricted flow at minimum residual pressure of 140 kPa at the property line (700 kPa maximum). A cistern (min 3,400 L capacity) will be required on each lot which shall be which should be set back significantly from the road and at an elevation which will maintain positive water pressure. A significant head loss through the required metering chamber at each lot must also be allowed for. Fire protection will be required in the hamlet areas but not areas outside of the hamlets.

### 5.3.2 Water Mains

- 5.3.2.1 Water main alignments shall be as depicted on the Typical Country Residential Roadway cross-section [STANDARD DRAWINGS 51104, 51105](#), and [51106](#).
- 5.3.2.2 Mains shall be at a depth adequate to provide a minimum of 2.75 m depth of cover from finished grade to top of pipe.
- 5.3.2.3 Auguring or directional drilling is required under all roads, and is recommended in all other locations.
- 5.3.2.4 Compaction of any trenches and auger pits within the road ROW is required to 98% Standard Proctor Density in the road sideslopes and 95% in the ditch bottom. Repair of any settlements that occur within two years is required.

- 5.3.2.5 A separate service line with a metering chamber 1.5 m inside the property line is required for each lot. A 3.5 m utility easement is required to be registered on all lots.
- 5.3.2.6 Air release facilities and blow off valves are required at ends of lines and high points.
- 5.3.2.7 A minimum of one Water Sampling Station is required per subdivision located at the end of a water main (see [STANDARD DRAWING 53010](#)).
- 5.3.2.8 A minimum distance of 2.5 m horizontal separation must be maintained between a water main and any sewer main.
- 5.3.2.9 A minimum distance of 3.0 m horizontal separation must be maintained between a water main and any gas line (see [STANDARD DRAWINGS 51104, 51105, and 51106](#)).
- 5.3.2.10 PUL widths shall be a minimum of 4.0 m for a single utility and 6.0 m for one containing two utilities. A 1.0 m easement is required on the lots on each side of a PUL.
- 5.3.2.11 Tracer Wire of 14 gauge copper shall be installed simultaneously with the pipe on all mains and services. Splicing the tracer wire can only be done by soldering, no mechanical connections permitted, the following shall apply.
- (i) Tracer wire shall not be connected to the steel pipe or transition couplings.
  - (ii) Tracer wire shall be brought flush to the ground at every valve box riser, at every road crossing, at every facility location and at each end of every plastic pipe section. It shall be brought flush to the ground inside a rigid PVC conduit and looped inside a PVC junction box within a Type A valve box marked "WATER". Splicing of tracer wire shall to be soldered only, no mechanical connections are permitted, an electrical continuity test to be performed prior to acceptance.

- 5.3.2.12 Marker posts (see [STANDARD DRAWING 51204](#)) shall be installed perpendicular to all valve and appurtenances locations, adjacent to the property line. Warning signs and painted fence posts (see [STANDARD DRAWING 53011](#)) shall be installed at the edge of the road ROW where water mains cross roadways.

### **5.3.3 System Materials**

#### **5.3.3.1 General**

- (i) The Developer shall supply and install only new materials.
- (ii) All such materials that are defective in manufacture, damaged in transit or have been damaged after delivery shall be replaced by the Developer at his expense.
- (iii) All Standards referred to mean the latest edition of that Standard.
- (iv) Where specific products are specified, it is intended that approved equals are also acceptable.
- (v) The “approved as equal” must be obtained from the IPS Standards Committee before the equal product is used.

#### **5.3.3.2 High Density Polyethylene (HDPE) Pipe**

- (i) HDPE pressure pipe shall be DR11 or DR13.5, PE 3408 Iron pipe sized (IPS) and shall conform to CSA B137.1, ASTM F714 and ASTM D3350 Standards. Pipe sized from 13 mm through 76 mm shall conform to ANSI/AWWA C901-02 Standard. Pipe sized from 100 mm through 1,575 mm shall conform to ANSI/AWWA C906-00 Standard.
- (ii) All joints are to be thermal heat fused. Mechanical service connections are not approved.

- (iii) All components shall be made of corrosion resistant materials.
- (iv) The interior of the pipe shall be clean and no debris or HDPE shavings shall be trapped inside the pipe.
- (v) Pipe age not to exceed two years at time of installation.

**5.3.4 Fittings**

- 5.3.4.1 HDPE fittings shall be DR 11 PE 3408 conforming to ASTM F714 and CAN B137.1, Standards.
- 5.3.4.2 All HDPE molded fittings shall meet the requirements of ASTM D2683 for socket-type fittings, ASTM D3261 for butt-type fittings, or ASTM F1055 electrofusion-type fittings.
- 5.3.4.3 Cast iron fittings shall comply with AWWA Specification C-110, C-111 and be supplied with tyton joint and require a zinc sacrificial anode as per Strathcona County requirements. The exterior of all fittings shall be coated with asphaltic coating or a fusion bonded epoxy coating conforming to AWWA C213.

**5.3.5 Valves**

- 5.3.5.1 Valves shall be iron body, bronze mounted gate valves with a non-rising spindle, which open by turning in a counter clockwise direction. All valves shall conform with AWWA C500 for bronze mounted solid wedge gate valves or AWWA C509 for resilient seated gate valves.
- 5.3.5.2 Interior to be factory coated with epoxy coating conforming to AWWA C550. Exterior to be factory applied epoxy coated. Corrosion reduction to be provided by installation of a zinc sacrificial anode.
- 5.3.5.3 Valve ends compatible with pipe joint type (Cast Iron Outside Diameter). Flange fittings for PE pipe and Bell and spigot for PVC.

- 5.3.5.4 Cast iron valve boxes conforming to ASTM A48, Class 25 of the screw or sliding type shall be required on all valves. Coating inside and outside shall be an asphaltic coating or fusion bonded epoxy conforming to AWWA C213. Set screws to be galvanized. Top of box to be marked "WATER".
- 5.3.5.5 Extension stem to be 25 mm square mild steel with 50 mm operating nut and flange suitable for 3.0 m bury. A rock disk nut is required on all valves.
- 5.3.5.6 All valves in roadways or sidewalks shall be Norwood Foundry Type B screw type valve box or an approved equal.
- 5.3.5.7 Schedule 40 PVC valve boxes for the bottom boot of Norwood Foundry Type A siding type valve boxes or approved equal are permitted in areas not exposed to vehicle loading.
- 5.3.5.8 Distribution mains shall be located such that in the event of a shutdown no more than 25 single family units are involved in a shutdown. Maximum spacing of valves shall be no more than 1.6 km.

### **5.3.6 Service Connections**

Each lot unit must have a separate service. Meter chambers shall be installed 1.5 m inside the private property line, located within the 3.5 m utility easement.

- 5.3.6.1 Water service pipe shall be DR11, PE 3408 and conform to ANSI/AWWA C902-02 standards. Minimum service diameter is 25 mm.
- 5.3.6.2 Main connections shall be made by means of a branch saddle or tapping tee. All fittings and joints must be thermal heat fused; either hot iron heat-joining practice, ASTM D2657 or electrofusion joining method, ASTM F1290 or ASTM F1055. Services to be one piece, no mechanical connections permitted between main meter chambers.

5.3.6.3 Meter chambers shall be located 2 m minimum from shoulder of driveway.

5.3.6.4 Minimum depth of cover shall be 2.75 m from finished grade to the top of pipe.

### **5.3.7 System Installation**

The system installation standards are intended to address key points only and are not to be considered as a substitute for a detail construction specification to be prepared by the Developer's Engineer.

#### **5.3.7.1 Trenching, Bedding and Backfilling**

- (i) All trenching and backfilling shall be completed in strict conformance with OHS and any other applicable regulations and directions of the Strathcona County Safety Officer.
- (ii) If unsuitable soil conditions (i.e., organics, high moisture content, rock, etc.) are encountered, the method for dealing with these conditions shall be assessed by a qualified Professional Engineer commissioned by the Developer, and a letter report submitted to the Strathcona County Representative.
- (iii) Class "B" bedding as depicted on the [STANDARD DRAWING 42002](#) shall be used for all water mains in suitable soil conditions. If unsuitable pipe foundation conditions exist, the design for a special pipe foundation and bedding shall be prepared by a qualified Professional Engineer and submitted to the Strathcona County Representative.
- (iv) Compaction of any trenches and auger pits within the road ROW is required to 95% Standard Proctor Density except for the slope of road itself which requires 98%. Repair of any settlements that occur within two years is required.



- (v) If the above compaction standards cannot be achieved because of abnormal weather or wet ground conditions the Strathcona County Representative may at his sole discretion establish a more appropriate standard for the individual case on receipt of an acceptable proposal from the Developer's Engineer.

#### 5.3.7.2 Augering of All Service Connections

- (i) All road service connections shall be installed by augering under proposed or existing streets except where augering is not feasible due to adverse soil conditions. Open trenching may be permitted subject to the Strathcona County Representative's acceptance of the need and acceptance of the backfill material.
- (ii) All auger pit excavations shall be backfilled with granular bedding material and mechanically compacted, in lifts not to exceed 150 mm in depth, to a minimum of 98% Standard Proctor Density to 300 mm above the pipe.
- (iii) Backfill of auger pit excavation over 300 mm above the pipe shall be compacted in lifts not to exceed 150 mm in depth, to a minimum of 95% Standard Proctor Density within the road ROW except on the sideslope of the road which requires 98%.

#### 5.3.7.3 Installation of Anodes

- (i) Anodes and leads shall be installed on valves, and cast or ductile iron fittings as depicted on [STANDARD DRAWING 43007](#).
- (ii) Connection of the anode lead shall be by Cad welding. The connection point shall be then coated with Polyken primer and tape. ([See STANDARD DRAWING 43009](#)).

- (iii) A minimum of 2 L (0.5 gallon) of water is to be poured on each 2.3 kg (5 lb) anode and 3 L (0.75 gallons) on 5.5 kg (12 lb) anode to initiate the anode operation. An alternative is to soak the above anodes in water for a minimum of 10 minutes.

#### 5.3.7.4 Inspection and Testing

- (i) Before acceptance of the work, the entire system shall be subjected to a hydrostatic pressure test in the presence of the Strathcona County Representative. The Developer shall provide all necessary labour, materials and equipment for the test including a suitable pump, measuring tank, pressure hoses, connections, plugs, caps, gauges and all other apparatus necessary for filling the main, pumping to the required test pressure and recording the pressure and leakage losses. The Developer shall provide evidence that the gauges used are accurate.
  - The water distribution system may only be charged through one valve. Only one valve may be operated during pressure and leakage testing as well.
  - Prior to the start of pressure and leakage, chlorination and bacteria testing, the Developer's Consultant will be required to provide a plan outlining how the testing is to be accomplished. The plan must include the sequence of valve turning, sections of water main to undergo pressure and leakage testing, how chlorination is to be accomplished, and locations when chlorine residual and bacteria tests are to be taken. Testing will not be allowed to proceed until the above is approved by the Strathcona County Representative.
  - The Developer will be required to give 24-hour notice to the Strathcona County Representative.

- The system shall be filled with water slowly and air bled off at each air release blow-off location. The Developer is required to provide automatic or manual air releases, as specified by the Strathcona County Representative along the main at high points within a profile.
  - When the line has been filled and most of the air expelled, time should be allowed for the remaining air and water to reach a constant temperature.
  - The test section may be pressured through an air relief valve or a tap may be installed in the line. After testing the pipe shall be plugged at the Developer's expense.
  - The mains or section of mains shall be subject to a pressure of not less than 1100 kPa. Test sections shall not exceed 450 m of main.
- (ii) Leakage tests shall be made only after completion of services, partial or complete backfill, and a minimum of 24 hours after the pipe has been filled with water. No test shall be applied until at least 36 hours after the last concrete reaction or thrust block has been cast with high early strength cement, or at least seven days after the last concrete reaction or thrust block has been cast with standard cement. The duration of each test shall be two hours.
- (iii) The allowable leakage for HDPE pipe material shall be determined by the following procedures and tables.
- Expel air from collection system, by slowly filling main with water. High points must have automatic air/vacuum relief valves to vent air when filling and be closed when pressure is applied.
  - A hydrostatic test pressure of 1.5 times the rated pressure of the pipe at the lowest point in the system main shall be applied.

- Pressurized pipe to require test pressure over a three hour period and hold required test pressure for an additional hour to allow for pipe expansion and stretching prior to the leakage test.
- Test period shall be for two hour duration. Amount of make-up water (leakage) required to return the pipe to required test pressure shall not exceed the allowance given in the following table.

Field Testing of High Density Polyethylene Pipe  
(HDPE) Water Systems

Nominal Pipe Size mm	Allowance for Expansion (Leakage) (litres/100 m of pipe) 2 Hour Test
50	1.6
75	1.9
100	3.1
150	7.5
200	12.5
250	16.2
300	28.7
350	33.7
400	41.1
450	53.6

- Total time under test pressure must not exceed eight hours. If test is not accepted due to leakage or equipment failure, test section must be permitted to “relax” for eight hour period prior to the next testing sequence.
- (iv) Prior to the initial acceptance of the water system, water mains are to be disinfected in accordance with AWWA C651 continuous feed method. Procedural method of disinfection including chlorine concentration calculations and contact times are to be submitted to the Strathcona County Representative for acceptance. Upon 48 hours notice samples will be taken by Strathcona County personnel and the water main is to remain valved off until such time as the bacteria sample results are approved.

- Under Alberta Environmental Protection standards and regulations, super chlorinated water used for disinfection of the system cannot be directed into a ditch drainage system or open water body. De-chlorination will be required before being discharged into the environment.
- Prior to initial acceptance of the water system and the water system put into service, bacteriological testing shall be carried out on all water mains and acceptable test results achieved.

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on the correct sides when the document is printed double-sided.

## **5.4. RURAL STORMWATER MANAGEMENT**

### **5.4.1 General**

- 5.4.1.1 In support of an application for ASP an environmental site assessment of the development area must be conducted in accordance with CSA Standards and a report submitted, including a geotechnical investigation conducted by a qualified Engineer to address the suitability of the site for development.
- 5.4.1.2 A Storm Water Management Report is required to be submitted and include a description of the proposed storm water management and drainage system both on-site and off-site. Supporting plans to include proposed suitable building locations and elevations, standards to be incorporated in the final design, with hydrology and hydraulic calculations that justify the system design in accordance with Alberta Environment and Strathcona County requirements. The proposed system must accommodate any drainage from adjacent areas, which had naturally drained through the site. Any drainage from the proposed development which is directed onto existing developed private properties shall be controlled such that post development runoff rates are equal or less than pre-development runoff rates.
- 5.4.1.3 The drainage system design and construction should address the following objectives:
- Eliminate or at the least minimize property damage and flooding.
  - Maintain release rate of runoff from new development to pre-development rates or as required to protect the receiving drainage course.
  - Control soil erosion, sedimentation, and erosion of creek channels and drainage courses and ditches.
  - Protect significant wetlands in accordance with the **Provincial Wetlands Policy**.

### **5.4.2 Existing Provincial Regulations**

- 5.4.2.1 The requirements of the following and any other Provincial regulations, guidelines and standards for storm drainage systems should be observed.

- (i) Environmental Protection and Enhancement Act
- (ii) Waste Water and Storm Drainage Regulations
- (iii) Standards and Guidelines for Municipal Waterworks, Waste Water and Storm Drainage Systems
- (iv) Storm Water Management Guidelines for the Province of Alberta
- (v) Water Act
- (vi) Provincial Wetlands Policy
- (vii) Municipal Government Act
- (viii) Subdivision and Development Regulation
- (ix) Subdivision and Development Amendment Regulation
- (x) Public Lands Act
- (xi) Environmental Guidelines for the Review of Subdivisions in Alberta

#### **5.4.3 Suitable Development Area Definition**

- 5.4.3.1 The term “Suitable Development Area” is used throughout the Country Residential Subdivision Standards document. It was developed by the **Standards and Guidelines Branch of Alberta Environment**.
- 5.4.3.2 Each lot of a proposed country residential subdivision should have a Suitable Development Area. This area is suitable for the construction and use of a residence, accessory buildings, an access road, a privately owned domestic water well and a private sewage disposal systems (ancillary buildings as well as access roads may be constructed outside this developable area at the landowners risk). Specifically, the Suitable Development Area for an unserviced residential lot is:



- (i) At least 1 ac (~ 0.40 ha) in size as required in the current **Strathcona County Land Use Bylaw**.
- (ii) Does not include any part of a lot that cannot be developed for non environmental reasons, for example, a lot boundary setback strip required by a municipality.
- (iii) Does not include any part of a lot that will require significant modification such as re-grading, filling or draining.
- (iv) Does not include any portion of an Environmentally Significant Area.
- (v) Has low water table conditions (low water table conditions are present where the water table is 1.8 m (6') or more below the ground surface during the frost free period up until the end of August and 2.4 m (8') or more below the ground surface during the remainder of the year).
- (vi) Can have a private sewage disposal system in which there is minimal, long term risk that it will malfunction and contaminate surface and/or groundwater outside of municipal servicing areas and will be in accordance with the requirements of the **"Alberta Private Sewage System Standard of Practice 1999"**.
- (vii) Presents minimal risk to property, health or safety by natural environmental hazards such as flooding, erosion and slope instability.
- (viii) Can have a privately owned domestic water well that provides an adequate, long term supply of potable water.
- (ix) Lot grading plans are required when imported fill is necessary to create the 0.4 ha suitable building pocket.

- (x) A minimum of 0.5 m elevation separation for the lowest landscape grade level or lowest opening to the building above the High Water Level of any adjacent water body, drainage or overflow channel.

#### **5.4.4 System Design Requirements**

##### **5.4.4.1 General**

- (i) The design of the storm drainage system should be completed in two stages, namely preliminary design and final design. The scope and level of detail required for each stage is generally outlined in the following sections.

##### **5.4.4.2 Preliminary Design**

- (i) The preliminary design of the grading and drainage system shall be completed in conjunction with the ASP and SP for the development in order that land requirements for the following are identified at an early stage and reflected on the plans prepared:
  - Environmental Reserves for wetlands that will be retained as part of the development.
  - Environmental Reserves for existing creeks or drainage courses and the floodplain areas adjacent to them since development within the 1:100 year floodplain (as defined under the provincial regulations referred to under [SUB-SECTION 5.4.2 OF THIS SECTION](#) is not permitted.
  - PUL's for drainage ditches that are not adjacent to roadways or are required to accommodate drainage from abutting lands that has naturally been draining through the proposed development area.
  - PUL's for storm water detention facilities that may be required.

- (ii) The preliminary design shall be completed to a level of detail sufficient to meet the requirements of these standards, to permit a clear assessment of the proposed drainage system, and to meet the requirements of Alberta Environment for purposes of approvals and licensing. A report and plans should be submitted to Strathcona County in support of the ASP submission and include the following:
- The plan of the development (scale - 1:2000) depicting existing ground contours (0.5 m interval), existing creeks or drainage courses and their estimated floodplains, existing wetlands, and the proposed storm water drainage and management scheme.
  - Smaller scale plan depicting the development and the limits of natural upstream drainage basins that drain into the site and must still be accommodated through the onsite drainage system.
  - The results of an assessment of offsite downstream ditches, culverts, and water courses and a plan of any offsite downstream drainage improvements that are required to accommodate drainage from the development and to minimize the potential for downstream flooding or erosion.
  - A preliminary cross-section showing water levels and pipe elevations for storm water detention areas. Where existing wetlands are used for detention, sufficient information must be provided to quantify the wetlands perimeter before and after development including at the 1:100 year event.
  - A description of the proposed storm water management and drainage system (both onsite and offsite), standards to be incorporated in the final design, and the hydrology and hydraulic calculations that justify the system design and define the estimated floodplain where existing creeks or drainage courses pass through the development.
  - A sediment and erosion control plan shall be submitted.

**5.4.4.3 Final Design**

- (i) The final design shall be submitted in support of the SP based upon the preliminary design accepted by Strathcona County and Alberta Environment. The following should be submitted to Strathcona County:
- An Overall Drainage Plan (Scale - 1:1,000 or 1:1,500) depicting the following:
  - Existing 0.5 m interval ground contours (based on an actual field survey), wetlands, and creeks or drainage courses and their estimated floodplains where possible.
  - The designated SDA on each lot together with design building and lot grading elevations where possible.
  - Subdivision road and driveway layout and culvert locations and sizes.
  - Drainage arrows to depict the direction of existing and proposed drainage.
  - Boundary limits of each drainage area tributary to culverts and ditches.
  - Existing wetlands to be retained.
  - Existing wetlands to be filled in or drained.
  - Storm water runoff control facilities.

## 6.1 PARK/OPEN SPACE DEVELOPMENT ACTIVITIES

Parks and open spaces may be developed or left in a natural state in both the urban and rural areas of Strathcona County. Open spaces may be neighbourhood, community and regional parks, public utility lots, municipal and environmental reserves, naturalized, conserved and reclaimed areas, wetlands and storm water management facilities, buffers, trails and walkways. These areas should be designed to maximize universal accessibility and CPTED. See [SECTION 1.4 Definitions](#). Development requirements are listed below in the following two tables;

### 6.1.1 Developed Open Space

Appropriate Development Activities	Neighbourhood Parks	Community Parks	Regional	Constructed SWMF	PUL
Sizes	Minimum 0.8 ha	Minimum 4 ha	Minimum 8 ha		
Grade/Loam	Yes	Yes	Yes	Yes	Yes
Seed/Sod	Yes	Yes	Yes	Yes	Yes
Trees	Yes	Yes	Yes	Yes	Yes
Shrubs	Yes	Yes	Yes	Yes	Yes
Fence	Yes	Yes	Yes	Yes	Yes
T-bollards	Yes	Yes	Yes	Yes	Yes
Benches	Yes	Yes	Yes	Yes	Yes
Garbage Receptacles	Yes	Yes	Yes	Yes	Yes
Bike Rack	Yes	Yes	Yes	Yes	No
Picnic Tables	Yes	Yes	Yes	Yes	No
Backstop, Sideline or Outfield Fence Chain Link	N/A	Yes	Yes	N/A	N/A
Trails / Walkways	Yes	Yes	Yes	Yes	Yes
Trail Signs	Yes	Yes	Yes	Yes	Yes
Play Equipment & Age Signs	Yes	Yes	Yes	No	No
Thin Ice Signs/No Swimming	No	No	No	Yes	Yes
Park Name Sign	Yes	Yes	Yes	No	No
SWMF Sign	N/A	N/A	N/A	Yes	Yes
Basketball/ Sand Volleyball	No	If Required	If Required	No	No
Ball Diamonds	No	If Required	If Required	No	No
Soccer/Football Fields	No	If Required	If Required	No	No
Ice Rinks	No	If Required	If Required	No	No
Parking	If Required	If Required	If Required	No	No

\*Parks shall include a Standard Park Name Sign as per [STANDARD DRAWING 61505](#)

## 6.1.2 Undeveloped Open Space

Appropriate Development Activities	MR	CE	ER	Natural Wetlands / SWMF	PUL
Grade / Loam	No	No	No		
Seed / Sod / Reclamation					As Required
Fence	If Required	No	If Required	If Required	Yes
Marker Posts	No	Yes	Yes	No	No
T-Bollards	If Required	No	If Required	If Required	If Required
Trails / Walkways	Yes	No	If Required	If Required	If Required
Trail Signs	Yes	No	If Required	If Required	If Required
Picnic Tables	Yes	No	No	If Required	If Required
Benches	Yes	No	No	If Required	If Required
Garbage Receptacles	Yes	No	No	If Required	If Required
No Motorized Use Signs	Yes	Yes	Yes	Yes	Yes
Play Equipment & Age Signs	If Required	No	No	No	No
Thin Ice Signs / No Swimming	No	No	No	Yes	Yes
Educational Signage	If Required	No	If Required	If Required	No

## 6.2 SITE AMENITIES

### 6.2.1 Playgrounds

- 6.2.1.1 All Developers who construct playgrounds on public lands in Strathcona County shall do so in accordance with the CSA Standards, Children's playspaces and equipment standards, in its latest version and [VOL. 2 SEC. 7, CONSTRUCTION SPECIFICATION 7.801 - PLAYGROUND CONSTRUCTION](#).
- 6.2.1.2 A concept meeting with the Developer Representative prior to submission of drawings may be required. Locations, extent of playground, plans and construction to be accepted by Strathcona County.
- 6.2.1.3 All playground apparatus must be metal and may contain plastic components, i.e., slides, panels and roofs. Must be purchased from an approved playground manufacturer or their sales representative.
- 6.2.1.4 Playground equipment will be designed to accommodate separate age groups as determined by most current CSA Standards.
- 6.2.1.5 A retainer made of material approved by Recreation Parks and Culture with a minimum depth of 300 mm settled depth playground sand is required; see [STANDARD DRAWING 61826](#). Alternative surfaces may be considered.
- 6.2.1.6 Swing sets are to be heavy duty to accommodate heavy usage as per the Children's playspaces and equipment standards, in its latest version. Alternates to be submitted IPS Standards Committee approval.

- 6.2.1.7 In addition to the Canadian CSA Standards, Strathcona County requires:
- (i) All playground encroachment zones to be inside the retained sand area;
  - (ii) Deck heights to be a maximum 1.5 m. Where decks exceed 1.5 m, decks must be completely enclosed from top side of deck to underside of roof;
  - (iii) Posts supporting roofs must be covered by the roofline.
    - The protective surfacing zone for a swing structure shall extend no less than 1.8 m from the further most part of the structure.
  - (iv) Maximum top rail height of swing set to be no greater than 2.4 m
- 6.2.1.8 All playgrounds will have signs in locations approved by the Strathcona County Representative identifying the following: Refer to [STANDARD DRAWING 61508](#).
- (i) Intended age for play structure;
  - (ii) A safety contact number, while under developer's maintenance; and
  - (iii) Once the playground is accepted by Strathcona County the sign shall be changed to state Strathcona County's contact number.
- 6.2.1.9 Wheelchair accessibility is preferred.
- 6.2.1.10 Playground sites shall be fenced along roadways to a minimum height of 1.2 m.
- 6.2.1.11 Playground designs to be submitted to Strathcona County as separate drawings, to scale, in metric, A1 and electronically. Two and three dimensional drawings to be supplied by manufacturer.
- 6.2.1.12 Quick link chain link fence or safety fence is required until playground construction has been accepted by Strathcona County. "Keep Out – Construction Area" sign to be visible at all times.
- 6.2.2 Sports Fields**
- 6.2.2.1 Based on current Strathcona County inventory and user needs, administration will determine the locations, types and sizes required.
- 6.2.2.2 Preferred orientation for soccer fields and ball fields is a north to south direction. Site conditions may dictate an alternative.
- 6.2.2.3 Backstop, goal posts and player benches to be installed prior to FAC.
- 6.2.2.4 Sports field survey reference pins to be installed at time of construction. The sports field reference pins shall be 500 mm lengths of 15 mm diameter rebar, to a depth of 50 mm below final grade.
- 6.2.2.5 All sports fields to be maintained for a two year minimum.
- 6.2.2.6 Soccer field and post sizes to be as per the most current Canadian Soccer Association Long Term Player Development - Wellness to World Cup, and as included in the [STANDARD DRAWING 61807](#) and [61808](#).
- 6.2.2.7 All ball fields shall be sized according to the current sport association standard, see [STANDARD DRAWING 61801, 61802, 61803, 61804, and 61805](#).

### 6.2.3 Trails/Walkways

- 6.2.3.1 Trails in Strathcona County are defined as developed, semi-developed, undeveloped or paved shoulder/bike lane as per the Strathcona County Trails Strategy.
- 6.2.3.2 Trails may be asphalt, granular, mulch or natural grass pathways.
- 6.2.3.3 All 3 m wide asphalt, trails require signs and line painting; see [STANDARD DRAWING 61501, 61502, 61503, 61504, 61401](#), and [61404](#).
- 6.2.3.4 Asphalt trails to be designed in accordance with the Geometric Design Guidelines (TAC) for Canadian Roads and Bikeway Traffic Control Guidelines of Canada.
- 6.2.3.5 Trails through remnant tree stands, surrounding wetlands and surrounding storm water management facilities may be required and shall be approved on a site by site basis.
- 6.2.3.6 Trails within storm water management facilities shall not be installed below the 1:25 year level. Access points below the 1:25 year level may be considered.
- 6.2.3.7 Furniture and garbage receptacles (rest stops) to be provided by the Developer and placed at a minimum of 0.5 km locations or as site conditions and design intent allows. [STANDARD DRAWING 61409](#).
- 6.2.3.8 Root barrier installed at a minimum 600 mm depth is required where the trail is within 1.5 m proximity to planting beds and native tree stands as per [STANDARD DRAWING 61402](#). Consideration to be given pending plant type.
- 6.2.3.9 All trails to be maintained until FAC.

### 6.2.4 Entry Features

- 6.2.4.1 Entry entrance feature shall be placed on public road ROWs.
- 6.2.4.2 A dedication of 1 m wide at the corner cut shall be identified on the drawing submission.
- 6.2.4.3 Entry features with power or water requirements are not permitted.
- 6.2.4.4 Entry feature designs shall be stamped, signed and dated by a licensed Structural Engineer in good standing with APEGA in the province of Alberta. Entry feature designs shall be incorporated into the final set of record drawings.

### 6.2.5 T-Bollards/Furnishings

- 6.2.5.1 T-bollards shall be installed on public lands to prevent unauthorized vehicular traffic use as approved by the Strathcona County Representative.
- 6.2.5.2 T-bollards to be built and installed in accordance with the T-bollard [STANDARD DRAWING 61601, 61602, 61603, 61604, 61605](#), and [61606](#). T-bollards to be closed and locked after installation with Lock 834 and key 302.



- 6.2.5.3 T-bollard locations will be approved by the Strathcona County Representative based on the following:
- (i) One pair of t-bollards to be located at property line on back of lots in accordance with chicane [STANDARD DRAWING 61602](#);
  - (ii) One pair of T-bollards to be located on back of easement (3.5 – 4 m) on front of lots;
  - (iii) One pair of t-bollards will be required at the end of a trail within a PUL when it intersects with another trail linkage.
- 6.2.5.4 Furniture adjacent to trails, shall be set back a minimum of the following or as site conditions allow:
- (i) Benches: 1 m back of trail, see [STANDARD DRAWING 61301, 61302](#), and [61303](#); and
  - (ii) Waste Receptacles: 250 mm back of trail, [STANDARD DRAWING 61304](#).
- 6.2.5.5 Furniture shall meet and be installed in accordance with the [VOL. 2 SEC. 7, CONSTRUCTION SPECIFICATION 7.805 - SITE FURNITURE](#).
- 6.2.5.6 Rest stops shall be provided at a minimum of 500 m locations or as site requires, see [STANDARD DRAWING 61409](#).
- 6.3 FENCING**
- 6.3.1 General**
- 6.3.1.1 Fence to be located 150 mm inside property line on private property.
- 6.3.1.2 After construction is complete an FAC shall be issued providing fence has been installed in accordance with the Design and Construction Standards and is free from deficiencies. A maintenance period is not required.
- 6.3.1.3 In the urban area perimeter fencing is required around all sport fields, school and park sites and will be chain-link except those portions that abut private property where there is the option of using wood-screen fencing, see [STANDARD DRAWING 61201, 61205](#), and [61208](#). In rural area fencing to be determined on a site by site basis specific to the sites requirements.
- 6.3.1.4 Maintenance equipment gates are required at controlled access points to the road system to allow maintenance equipment in the park, see [STANDARD DRAWING 61209](#).
- 6.3.1.5 Back of lot gates are not permitted for lots backing onto natural areas, wetlands or storm water management facilities. Gates onto other public areas shall be reviewed on a site by site basis.
- 6.3.1.6 Openings in the fence must be provided adjacent to sport fields to provide pedestrian access.
- 6.3.1.7 Fence to be located between private and public property unless otherwise approved by the Strathcona County Representative. Appropriateness of fence in rural area determined by Planning and Development Services. Fencing heights will be a minimum of:
- (i) 1.2 m chain link where urban park space is adjacent to a roadway.
  - (ii) 1.5 m or 1.8 m chain link or 1.8 m single board wood screen fence where private property abuts public property.
  - (iii) Fencing to be used in the rural area may include post and rail fence, marker posts or paige wire fence. The intent of the rural fence is to restrict access from motorized vehicles while permitting wildlife access.

Wood Fencing

- 6.3.1.8 Consistent 1.8 m single board wood screen fencing shall be required on all collector roadways where the lots back onto the roadway, see [STANDARD DRAWING 61201, 61202, 61203, 61204, and 61212](#).
- 6.3.1.9 Flankage single board wood screen fence may be required where side yards are parallel to a collector roadway. Fence to be 1.8 m at back of lot stepped down to front property line over two sections, 0.4 m per section to a final height of 1 m.
- 6.3.1.10 1.8 m single board wood screen fence is required on either side of a PUL. Fence to be 1.8 m at back of lot stepped down to front property line over two sections, 0.4 m per section to a final height of 1 m.
- 6.3.1.11 Where determined by a noise impact assessment a 1.8 m double closed board noise attenuation screen fencing and berm is required, see [STANDARD DRAWING 61202](#).
- 6.3.1.12 In the rural area, building location to be positioned to discourage use of berm and noise attenuation fence, ensuring noise attenuation requirements of Design and Construction Standards are met. Natural tree stands to be incorporated into the development to ensure noise attenuation requirements of Design and Construction Standards are met. Noise attenuation by fencing and berming shall only be considered in the rural area if all other noise attenuation options (building setbacks, tree retention) are unavailable.

Chain Link Fencing

- 6.3.1.13 Sideline or outfield fencing may be required on ball diamonds as determined by Strathcona County.
- 6.3.1.14 Chain link is preferred around park sites, sports fields and SWMF, see [STANDARD DRAWING 61205](#).

Post and Rail Fencing

- 6.3.1.15 In the rural area post and rail fencing is required between private and public property to prevent access and encroachment onto adjacent properties. In heavily treed areas or environmentally sensitive areas marker posts may be considered as an alternative to delineate boundaries. See [STANDARD DRAWING 61214](#).

Paige Wire Fencing

- 6.3.1.16 In the rural area paige wire fencing may be required where post and rail fencing or marker posts are not practical, but may otherwise be required and will be determined on a site-by-site basis. See [STANDARD Drawing 61211](#).

Marker Posts

- 6.3.1.17 Marker posts are required to delineate boundaries of CE, and ERE. Marker posts may be required where fencing is not practical but may otherwise be required. See [STANDARD DRAWING 61702](#). Marker Post locations to be determined on a site by site basis.

## 6.4 LANDSCAPING

### 6.4.1 General

Ensure maintenance logs are maintained and submitted with the FAC pre-inspection report. See [VOL. 1 SEC. 8 – FORMS – MAINTENANCE LOG](#).

- 6.4.1.1 All mature deciduous trees along boulevards, trails and sidewalks shall be a branching height of 2.5 m. Deciduous trees shall have a 1.8 m minimum branching height at time of planting.
- 6.4.1.2 Deciduous trees to be a minimum caliper of 60 mm at time of planting and shall meet the Canadian Standards for Nursery Stock.
- 6.4.1.3 Coniferous trees shall have a minimum height of 2.5 m at time of planting and shall meet the Canadian Standards for Nursery Stock.
- 6.4.1.4 Shrubs shall be mass planted within beds with spacing appropriate to species as per the Canadian Standards for Nursery Stock. Minimum shrub height or spread (whichever is greater) shall be 450 mm at time of planting.
- 6.4.1.5 A mowing strip is required between existing vegetation, planting bed edges and all other elements, such as fencing and curbs. The mowing strip shall be a minimum of 1.8 m wide.
- 6.4.1.6 Native planting is encouraged using plant material native to Alberta.
- 6.4.1.7 No annual plantings are allowed in planting beds that will be maintained by Strathcona County after FAC.
- 6.4.1.8 Perennials and bulbs are allowed in planting beds that will be maintained by Strathcona County after FAC.
- 6.4.1.9 All Green Ash shall be seedless. Poplars, Mayday, Birch Amur Cherry, Mountain Ash and Schubert Chokecherry are not acceptable for boulevard trees.
- 6.4.1.10 A minimum of 75 trees per hectare is required for Municipal Reserve. Shrubs may be substituted for trees at the rate of five shrubs to one tree, as site conditions and design may dictate.  
  
A minimum of 75 trees per hectare are required for SWMF. Areas to be calculated for the entire parcel minus the NWL.
- 6.4.1.11 The use of filter fabric and edging within planting beds is not allowed due to long term maintenance.
- 6.4.1.12 Plant material shall be selected and designed to prevent monoculture and the spread of disease.
- 6.4.1.13 Shredded wood mulch or similar loose materials, shall not be used in planting beds within drainage swales.

## 6.4.2 Roadway Tree Planting/Landscaping

6.4.2.1 Trees shall be set back a minimum distance, measured from centre of the tree trunk, from walks, roads, Infrastructure and utilities as follows:

- (i) 2.0 m from Arterial road median face of curb;
- (ii) 1.5 m from Collector road median face of curb;
- (iii) 1.5 m from Local road median face of curb;
- (iv) 2.0 m from Arterial road boulevard face of curb;
- (v) 1.5 m from Collector road boulevard face of curb;
- (vi) 1.5 m from Local road boulevard face of curb;
- (vii) 3.5 m minimum distance from street light;
- (viii) 7.5m from street corners and intersections;
- (ix) 2.0m from driveways;
- (x) 3.5m from yield and stop signs;
- (xi) 3.5m from bus stop signs;
- (xii) 2.0m from all other signs;
- (xiii) 1.0m from underground power lines;
- (xiv) 3.5m from all power hardware;
- (xv) 1.8m from water mains, water services and water valves;
- (xvi) 2.0m from sewer mains, manholes and services;
- (xvii) 3.5m from fire hydrants;
- (xviii) 1.5m from gas and all other services;
- (xix) 1.0 from other underground utilities;
- (xx) 2.0 from structures;

\*Any distances shall conform to the Design and Construction Standard Drawings.

6.4.2.2 Planting distance from overhead utilities shall be as per the requirements as established by the respective utility authority. Letter of confirmation of utility restrictions to be submitted to the Strathcona County Representative for review.

6.4.2.3 No poplar or willow species are permitted within 10 m of underground water and wastewater.

6.4.2.4 Tree planting is required on boulevards where lots have a side yard or back onto a road as space and utilities permit.

6.4.2.5 Urban boulevard tree planting is required on any roadways with separate walks. Rural roadside planting is required where right of way and utilities allow.

6.4.2.6 Urban boulevards with separate walkways must be graded, topsoiled, seeded or sodded from walkway to curb. Rural roadside planting to be reflective of adjacent natural areas.

6.4.2.7 Artificial turf or synthetic turf products shall not be installed in any roadway right of way, boulevard or median.

6.4.2.8 All commercial properties must be graded, topsoiled, seeded or sodded from the private property line to the road edge.

6.4.2.9 Boulevards may be designed to include planting beds, shrubs and groundcovers with approved setbacks. Shrubs and perennials planted in boulevards, islands and roundabouts, should not exceed 500 mm in height at maturity.

- 6.4.2.10 Barberry, Pygmy Caragana, and Roses are not acceptable for boulevard planting beds.
- 6.4.2.11 The Developer is required to supply the equivalent of one tree per urban residential lot as follows: [VOL. 2 SEC. 7, CONSTRUCTION SPECIFICATION 7.612, PLANTINGS](#) for minimum sizes.
- (i) Tree planting of one per lot; or
  - (ii) Tree planting equal to one tree per lot located in other areas of the neighborhood. This may be ornamental and/or naturalized planting; or
  - (iii) Funds equal to one tree per lot, directed to Strathcona County for future tree planting. Tree value to be determined by the Developer and/or the Developer Representative and Strathcona County on an annual basis and will be based upon current prices for supply and install of a 60mm caliper deciduous tree. Strathcona County will provide administration.
- 6.4.2.12 The total number of residential lots and corresponding trees are to be noted on the final set of construction drawings and on the as-built set of drawings.
- 6.4.2.13 All berms shall have maximum side slopes of 4:1, a minimum top width of 1 m and be topsoiled and sodded/seeded. Berm tops shall be centered on the property line. Fences shall be 150 mm inside property line on private property.
- 6.4.2.14 Plant material to have limited horizontal root growth and non-sucker-type roots to avoid encroachment into adjoining privately owned lands.
- 6.4.2.15 Only Elm grown in Alberta with proof of origin will be accepted.
- 6.4.2.16 The street lighting design and tree planting design must be coordinated to eliminate conflicts between the lighting pattern and tree canopy.
- 6.4.2.17 No poplar or willow species are permitted within 10 m of underground water and wastewater.
- 6.4.2.18 Barberry, Pygmy Caragana, and Roses are not acceptable for boulevard planting beds.
- 6.4.3 Medians And Cul-de-Sac Islands**
- 6.4.3.1 Cul-de-sac islands are to be designed in accordance with the Design and Construction Standards. An island will be permitted in a cul-de-sac where the radius of the cul-de-sac bulb is greater than 14 m.
- 6.4.3.2 Landscape designs for medians and cul-de-sac islands shall include, where appropriate, trees, shrubs, ground covers, soil mix for planting beds, mulch and sod to the satisfaction of the Strathcona County Representative. Shrubs and perennials should not exceed 500 mm in height at maturity.
- 6.4.3.3 Turf within median, road and cul-de-sac islands will be allowed only at the discretion of Strathcona County.
- 6.4.3.4 All paving stone and paving stone header, concrete or other special hard surfaced treatment to the satisfaction of the Strathcona County Representative.
- 6.4.3.5 Barberry, Pygmy Caragana, and roses are not acceptable for medians and cul-de-sac planting beds.

**6.4.4**      Utility Corridor and Public Utility Lot (PUL)

- 6.4.4.1      Where possible, landscape improvements and plant materials are suggested to have increased setbacks from underground utilities.
- 6.4.4.2      In the event a minimum utility clearance of 1 m is not maintained from the edge of the excavation by the tree spade, the involved utility company must be contacted for approval and safety procedures, e.g., by hand digging or hydrovac.
- 6.4.4.3      Distance from intermediate and high-pressure pipelines as required by crossing or ground disturbance agreements with pipeline authority.
- 6.4.4.4      All trails/walkways to be determined at ASP and Conceptual Plan Stage Utility Corridors
- 6.4.4.5      Utility corridor must be graded, topsoiled, seeded, fenced and planted in accordance with this document, Design and Construction Standards and approved landscape plans.
- 6.4.4.6      All pipeline-crossing agreements must be in place prior to construction.
- 6.4.4.7      Utility corridor landscape improvements to range from low maintenance naturalization to a more formal landscape design, depending on the existing landscape character already established, or to new design intent.
- 6.4.4.8      The Developer Representative shall provide to the Strathcona County Representative written confirmation from the utility authority when landscaping in utility corridor is not recommended.
- 6.4.4.9      Utility corridors that may be landscaped are to be planted with a minimum of 75 trees per hectare. Shrub groupings may be substituted at the rate of five shrubs for one tree. Calculations based on available space for planting.
- 6.4.4.10      Existing trees within or abutting the utility corridor shall be conserved wherever possible.
- 6.4.4.11      Urban Public Utility Lots (PUL's) may provide connections between sections of Strathcona County's trail system and/or provide access to park and recreation facilities through subdivisions.
- 6.4.4.12      Rural PUL's may provide connections between trail systems within a subdivision or other country residential subdivisions.
- 6.4.4.13      Urban PUL's shall be fenced, graded and seeded or sodded. Planting are required where space and utilities allow and will be reviewed on a site by site basis.
- 6.4.4.14      Rural PUL's shall be fenced with paige wire to allow wildlife movement and may or may not require grading and seeding/or sodding. Use rollback material from area when possible.
- 6.4.4.15      PUL's 4 m wide, not designated as Heritage Parkway, to have up to 1.8 m concrete or an asphalt path a minimum of 3.0 m wide. Surface may vary from concrete, asphalt, gravel, chips or grass in the rural area. Trails to be maintained until CCC.

- 6.4.4.16 Where the PUL provides emergency access, in urban and rural areas the finished surface must be built to provide adequate structure and space for emergency vehicle widths and loads. Emergency accesses must have a minimum right of way of 6 m and a minimum paved carriageway of 4 m. See Design and Construction Standards for further information.
- 6.4.4.17 Where the PUL provides access for maintenance to SWMF, manholes or other requirements determined by the Strathcona County Representative, surfaces must be built to provide a minimum of 3 m in width, adequate structure and space for maintenance vehicles.
- 6.4.4.18 PUL linear slope shall not exceed 6% without approved erosion control.
- 6.4.4.19 Overland drainage PUL in the urban area is required to be sodded/seeded and fenced on both sides. Bioswales to be utilized where ever possible. Overland drainage PUL in the rural area to utilize bioswales and natural vegetation when possible. Fencing may be required to the satisfaction of the Strathcona County Representative.
- 6.4.4.20 Constructed wetland PUL's shall be landscaped as per Naturalization Design Standards and Stormwater Management Facility (SWMF) Design Standards.
- 6.4.4.21 Visual screening or aesthetic enhancement of utilities and structures shall be provided through landscaping with consideration of setbacks and access.

#### **6.4.5 Naturalization**

- 6.4.5.1 Naturalized planting areas are preferred by Strathcona County.
- 6.4.5.2 Collected plant materials and seed bank soils may be used upon prior approval of the Strathcona County Representative. The Developer Representative shall identify areas to be planted with collected material and indicate site where material is being taken from, prior to construction.
- 6.4.5.3 Areas identified for conservation, which are disturbed during construction, must be restored with plant material indigenous to the area.
- 6.4.5.4 To establish healthy growing natural areas it is recommended that a minimum of 25% of all plant materials to be covered by caliper stock (deciduous minimum of 50 mm or coniferous minimum 1.8 ), 25% mix of shrubs (2 year minimum), 50% whips and cuttings. Live staking is permitted. Densities of shrubs, whips and cuttings and live staking at the discretion of Strathcona County.
- 6.4.5.5 The Landscape Architect shall design an appropriate mix of native trees, shrubs, ground covers and wild flower seed mixers to rehabilitate affected areas. The landscape drawings shall identify all plant communities to be established and all other information necessary to implement the proposed landscape improvements. Site characteristics, including slope, soil and orientation, and their appropriateness to the site shall be taken into account when specifying species and size of plant materials.
- 6.4.5.6 The Landscape Architect shall specify all tree, shrub and ground cover sizes. To establish healthy growing environments it is recommended that 25% of all plant materials be of larger sizes. Deciduous trees shall have a minimum of 50 mm caliper whilst coniferous trees shall be a minimum 1.8 m height.
- 6.4.5.7 All plant materials to be nursery grown stock with the exception of native tree spade plugs.

- 6.4.5.8 The Landscape Architect is to identify appropriate plant installation specifications and details on landscape drawings.
- 6.4.5.9 Forestry stock, seedlings, deciduous tree whips, propagated and rooted cuttings are acceptable.
- 6.4.5.10 Where trees may be approved for removal, if possible relocate the young trees and associated native material to other areas.
- 6.4.5.11 Noxious weeds must be controlled during the establishment of the naturalized area. The method of control must be approved by the Strathcona County Representative prior to application.
- 6.4.5.12 As a guideline, native shrub bed planting shall be calculated at approximately one plant per square metre.
- 6.4.5.13 The guide for acceptable levels of shrub survival at FAC shall be 80% of the original planting at density of one plant per square metre.
- 6.4.5.14 Mowing strip of a minimum of 1.8 m is required along path/trail edges, between fences and planting beds.
- 6.4.5.15 Where there is a natural area conserved, developed or enhanced, or a wetland restoration, a sign outlining landscaping and no mow area is required.

#### **6.4.6 Stormwater Management Facility (SWMF)**

- 6.4.6.1 Construct SWMF in accordance with the most current Design and Construction Standards, this document and provincial and federal policies.
- 6.4.6.2 Wetlands must be part of an integrated landscape approach to water quality and quantity control, and will not be expected to provide primary treatment. Best Management practices to be used for primary treatment. Landscaping of constructed SWMF must include mass plantings and naturalized shorelines.
- 6.4.6.3 Landscaping of constructed SWMF must include mass plantings and naturalized shorelines mimicking natural wetlands typical of the Strathcona County region, see [STANDARD DRAWING 61701](#). The Terrestrial Vegetation Zone (see [STANDARD DRAWING 61701](#)) must be a minimum of 5 m in width.
- 6.4.6.4 Natural wetlands do function within the watershed to improve water quality, and conservation or restoration of wetlands to maintain or improve water quality are acceptable practices. However, pollutants should not be intentionally diverted to wetlands for primary treatment. Wetlands must be part of an integrated landscape approach to water quality control, and cannot be expected to compensate for insufficient use of BMP's within the contributing area of the drainage basin. Utilization of existing wetlands with construction of SMF which mimic natural wetlands are preferred. Mass planted and naturalized shorelines are required.
- 6.4.6.5 Landscape plans for public lands of the SWMF's are required. Plant material selection to be indicative of natural wetland areas typical of the Strathcona County region. Live topsoils to be used when ever possible. In rural areas wetlands to remain in their natural state.



- 6.4.6.6 Erosion and sediment control plans and management plans are required. Industry standard BMP's to be approved by the Strathcona County Representative. Storm sewer inlets and outlets must have grates as per Design and Construction Standards and be landscaped to visually screen the inlets/outlets. Grates must be approved by the Strathcona County Representative.
- 6.4.6.7 Access to silt traps to have a minimum 3 m width and surface to be strong enough to hold maintenance vehicles.
- 6.4.6.8 Special features must be designed and stamped by the appropriate recognized professionals.
- 6.4.6.9 "No Swimming" and "Thin Ice" signs must be installed between high-water line and normal water line, see [STANDARD DRAWING 61507](#). Signs must be maintained by the Developer until FAC of the SWMF.
- 6.4.6.10 Sign for SWMF showing no mow areas, natural areas, habitat, wildlife, safety and function is required, see [6.4.7 SWMF Signage](#). In rural areas more detail on site specific area would be required.
- 6.4.6.11 Shredded wood mulch shall not be installed below the 1:10 year water level.

#### **6.4.7 SWMF Signage**

- 6.4.7.1 The following information shall be outlined on signs located at the main entry points to the SWMF:
  - (i) A plan outlining features of the SWMF including trails, view decks, trash receptacles etc.
  - (ii) You are here locator.
  - (iii) Advisory message regarding environmentally sensitive public lands:
    - a. Stay on designated trails to protect wildlife nesting areas;
    - b. Keep dogs on leash and scoop the poop;
    - c. Dispose of garbage in the receptacles provided;
    - d. Keep wildlife wild. Do not approach or feed wild animals, including birds.
  - (iv) An explanation of the purpose and benefits of the SWMF.
  - (v) Educational information that is specific to the SWMF.

### **6.5 LANDSCAPE INSPECTION PROCESS**

- 6.5.1 The Developer's Representative shall provide a yearly anticipated landscape construction and inspection schedule to Planning and Development Services, prior to May 31 or prior to any construction commencement.

## 6.5.2 Inspection Categories

Strathcona County will carry out landscape inspections as follows:

Landscape Elements	Maintenance Requirements
<b>Soft Landscaping</b>	
Trees, Shrubs, Perennials, Turf, Natural Areas.	Minimum 2 years from CCC
<b>Trails</b>	
Granular, Asphalt Trails.	Minimum 2 years from CCC
<b>Site Furniture</b>	
Benches, Picnic Tables, Trash Receptacles, Trail Signage.	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
<b>Fencing</b>	
Fences, Gates, Marker Posts.	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
<b>Park and SWMF Signage</b>	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
<b>Entry Features and Retaining Walls</b>	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
<b>Bridges, Boardwalks and Lookouts</b>	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
<b>Playgrounds</b>	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.

- 6.5.3 Soft landscaping CCC and FAC inspections may occur from June 1 until September 30 weather permitting. Soft landscaping inspections will not be conducted after September 30. All other FAC inspections may be conducted year round, weather permitting.
- 6.5.4 The Developer's Representative shall submit the following to Planning and Development Services to request a CCC inspection.
- (i) Written request sent by email or mail
  - (ii) Pre-inspection report
  - (iii) Reduced drawings (11x17 set)
  - (iv) Infrastructure summary
- 6.5.5 The Developer's Representative shall submit the following to Planning and Development Services to request a FAC inspection.
- (i) Written request sent by email or mail
  - (ii) Pre-inspection report
  - (iii) Reduced drawings (11x17 set)
  - (iv) As-built drawings (CAD & PDF)
  - (v) Maintenance logs ([link to form](#))

- 6.5.6 In order to facilitate all landscape inspections, a complete set of the required paperwork must be received prior to scheduling the landscape inspection.
- 6.5.7 The Developer's Representative shall provide a detailed inspection report within 3 business days following the inspection and ensure that all deficiencies have been rectified prior to re-inspection.
- 6.5.8 All deficiencies identified during inspections shall be repaired within 30 days following the original inspection date. If deficiencies are not corrected by the agreed date, the stage will be subject to a full re-inspection.
- 6.5.9 The Developer/Owner shall replace any trees, shrubs, perennials or grass which may have died or failed to achieve proper growth, as determined by the County at its discretion. The Developer shall repair any other landscape amenities such as site furniture, fencing, entry features, retaining walls, trails, bridges, boardwalks, lookouts or playgrounds which are not in accordance with the plans prior to issuance of FAC

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on the correct sides when the document is printed double-sided.

Standard drawings have been provided for the guidance of designers in the interpretation of the standards. Where the standards and the drawings conflict, the standards shall govern. Standard drawings are dimensioned in millimetres unless otherwise noted.

	Drawing Number	Issued
<b><u>URBAN SERVICE AREA</u></b>		
<b>Intersection/Plan View</b>		
Layout of Crosswalks and Ramps at Urban Intersections .....	<a href="#">41001</a>	2019
Rehabilitated Intersection Islands – Minimum Size .....	<a href="#">41002</a>	2019
Typical Collector/Arterial Intersection – Signage .....	<a href="#">41003</a>	2019
Collector/Arterial Corner Cut – Detail .....	<a href="#">41004</a>	2019
Typical Collector/Arterial Intersection – Geometry .....	<a href="#">41005</a>	2019
Arterial/Collector Developer Site-Specific Contrib. ....	<a href="#">41006</a>	2019
Multi-Family/Non-Residential Crossing .....	<a href="#">41007</a>	2019
Sightline Triangles Undivided Roadways .....	<a href="#">41008</a>	2019
Minimum Sightline Triangles – Divided Roadways .....	<a href="#">41009</a>	2019
Minimum Sightlines – Left Turn from Major Rd. ....	<a href="#">41010</a>	2019
Typical Auxiliary Lane Geometry .....	<a href="#">41011</a>	2019
Cul-de-sac Bulb – Sidewalk, Island, and Parking Restrictions		
Cul-de-sac P.U.L. Contains a Walkway .....	<a href="#">41012</a>	2019
Cul-de-sac Bulb – Sidewalk, Island, and Parking Restrictions		
Cul-de-sac P.U.L. Does Not Contain a Walkway .....	<a href="#">41013</a>	2019
<b>Road Cross-Section</b>		
Paved Residential Lane .....	<a href="#">41101</a>	2019
Local Residential Roadway		
18.0m Right-of-Way, 9.0m Surface, Separate Sidewalk .....	<a href="#">41102</a>	2019
Local Residential Roadway		
18.0m Right-of-Way, 9.0m Surface, Monolithic Sidewalk .....	<a href="#">41103</a>	2019
Local Residential Roadway		
18.0m Right-of-Way, 9.5m Surface, Separate Sidewalk .....	<a href="#">41104</a>	2019
Local Residential Roadway		
18.0m Right-of-Way, 9.5m Surface, Monolithic Sidewalk .....	<a href="#">41105</a>	2019
Local Residential Roadway		
Cul-de-Sac Bulb – Cross Section .....	<a href="#">41106</a>	2019

	Drawing Number	Issued
Local Industrial/Business Commercial Roadway 20.0m Right-of-Way, 11.5m Surface, Separate Sidewalk .....	<a href="#">41107</a>	2019
Local Roadway Road Structure and Wick Drain .....	<a href="#">41108</a>	2019
Minor Residential Collector Roadway 20.0m Right-of-Way, 11.5m Surface, Separate Sidewalk .....	<a href="#">41109</a>	2019
Minor Residential Collector Roadway 20.0m Right-of-Way, 11.5m Surface, Monolithic Sidewalk .....	<a href="#">41110</a>	2019
Minor Residential Collector Roadway Structure and Wick Drain .....	<a href="#">41111</a>	2019
Major Residential Collector Roadway 24.0m Right-of-Way, 7.0m Surface, Separate Sidewalk .....	<a href="#">41112</a>	2019
Major Residential Collector Roadway 24.0m Right-of-Way, 12.5m Surface, Separate Sidewalk .....	<a href="#">41113</a>	2019
Major Residential Collector Roadway – Parking Left 24.0m Right-of-Way, 9.75m Surface, Separate Sidewalk .....	<a href="#">41114</a>	2019
Major Residential Collector Roadway – Parking Right 24.0m Right-of-Way, 9.75m Surface, Separate Sidewalk .....	<a href="#">41115</a>	2019
Industrial/Business Commercial Collector Roadway 24.0m Right-of-Way, 13.5m Surface, Separate Sidewalks .....	<a href="#">41116</a>	2019
Industrial/Business Commercial Collector Roadway 24.0m Right-of-Way, 13.5m Surface, Separate Sidewalk and Asphalt Trail .....	<a href="#">41117</a>	2019
Major Residential and Industrial/Business Commercial Collector Roadways Road Structure and Wick Drain .....	<a href="#">41118</a>	2019
Four Lane Divided Collector Roadway 32.0m Right-of-Way, 3.0m Trail and Separate Sidewalk .....	<a href="#">41119</a>	2019
Four Lane Divided Collector Roadway – With Turn Lane 32.0m Right-of-Way, 3.0m Trail and Separate Sidewalk .....	<a href="#">41120</a>	2019
Four Lane Divided Collector Roadway Road Structure and Wick Drain .....	<a href="#">41121</a>	2019
Four Lane Divided Arterial Roadway 50.0m Right-of-Way Standard, 57.0m Right-of-Way at Intersections .....	<a href="#">41122</a>	2019
Six Lane Divided Arterial Roadway 50.0m Right-of-Way Standard, 61.0m Right-of-Way at Intersections .....	<a href="#">41123</a>	2019
Developer Constructed Lane Expansion on Arterial Roadway .....	<a href="#">41124</a>	2019
Lane Expansion Concrete Base .....	<a href="#">41125</a>	2019
Asphalt Emergency Vehicle Access in P.U.L. ....	<a href="#">41126</a>	2019

	Drawing Number	Issued
<b>Concrete Curb/Sidewalk</b>		
Sidewalk Ramp for Wheelchair or Bicycle on Monowalk (Type 1) .....	<a href="#">41201</a>	2019
Sidewalk Ramp for Wheelchair or Bicycle on Separate Walk (Type 2) .....	<a href="#">41202</a>	2019
Commercial Vertical Curb Crossing Detail (Retrofit Only) .....	<a href="#">41203</a>	2019
Lane Apron for Curb & Gutter with No Sidewalk (Retrofit Only) .....	<a href="#">41204</a>	2019
Residential Crossing from Mountable Curb & Gutter with Separate Walk .....	<a href="#">41205</a>	2019
Residential Crossing from Straight Faced Curb & Monolithic Sidewalk .....	<a href="#">41206</a>	2019
Drop Curb with 250mm Gutter – Sections .....	<a href="#">41207</a>	2019
200mm Curb with 500mm Gutter – Section .....	<a href="#">41208</a>	2019
Standard Barrier Curb and Curb Crossing – Sections .....	<a href="#">41209</a>	2019
150mm Standard Curb and 250mm Gutter – Sections .....	<a href="#">41210</a>	2019
200mm Standard Curb and 250mm Gutter – Sections .....	<a href="#">41211</a>	2019
Low-Profile & Standard Mountable Curb & Gutter – Sections .....	<a href="#">41212</a>	2019
Concrete Drainage Swale – Sections .....	<a href="#">41213</a>	2019
Minor Walkway – 1.5m Crowned and Sloped .....	<a href="#">41214</a>	2019
Monolithic Sidewalk with Standard Mountable Curb & Gutter .....	<a href="#">41215</a>	2019
Monolithic Sidewalk with Low-Profile Mountable Curb & Gutter .....	<a href="#">41216</a>	2019
Monolithic Sidewalk with 150mm Curb & 250mm Gutter .....	<a href="#">41217</a>	2019
Roundabout Typical Apron Section .....	<a href="#">41218</a>	2019
Depressed Curb & Gutter for Catch Basin .....	<a href="#">41219</a>	2019
Center Median – End Treatment .....	<a href="#">41220</a>	2019
Bus Stop Pad – Monowalk .....	<a href="#">41221</a>	2019
Bus Stop Pad – Separate Walk .....	<a href="#">41222</a>	2019
<b>Traffic Control/Operations</b>		
Barrier Posts .....	<a href="#">41301</a>	2019
Urban Sign Installation .....	<a href="#">41302</a>	2019
Traffic Signal Pole Configuration Type I Cantilever (12.0m or Less) .....	<a href="#">41303</a>	2019
Traffic Signal Pole Configuration Type II Cantilever (12.0m or Greater) .....	<a href="#">41304</a>	2019

	Drawing Number	Issued
Traffic Signal Pole Configuration Advance Warning Flasher .....	<a href="#">41305</a>	2019
Traffic Signal Pole Configuration Pedestrian Crossing Cantilever .....	<a href="#">41306</a>	2019
Traffic Signal Pole Configuration 4.0m Pedestrian Signal Pole .....	<a href="#">41307</a>	2019
Rapid Flashing Beacon (RFB) .....	<a href="#">41308</a>	2019
Traffic Signal Pole Configuration 5.0m Pedestal Signal Pole .....	<a href="#">41309</a>	2019
Traffic Signal Pole Configuration CCTV Pole .....	<a href="#">41310</a>	2019
Traffic Signal Pole Identification Markings .....	<a href="#">41311</a>	2019
Traffic Signal Pole Stub .....	<a href="#">41312</a>	2019
Traffic Signal Pole Base Adapter .....	<a href="#">41313</a>	2019
 <b>Pavement Marking</b>		
Detail – Layout of Crosswalks at Mid-Block & Intersections .....	<a href="#">41401</a>	2019
 <b>Deep Utilities – General</b>		
Trenching Detail .....	<a href="#">42001</a>	2011
Types of Trench Bedding .....	<a href="#">42002</a>	2011
Single Family Connection – Single Family Lot .....	<a href="#">42003</a>	2016
Dual Service Connection – Single Family Lots .....	<a href="#">42004</a>	2016
Single Family Lot Service Connection with Sump Pump Discharge Collection Main .....	<a href="#">42005</a>	2016
Dual Single Family Lot Service Connection with Sump Pump Discharge Collection Main ...	<a href="#">42006</a>	2016
Typical 50mm and Smaller Residential Water, 150mm Sanitary Sewer, and 100mm Sump Pump Discharge Collection Services .....	<a href="#">42007</a>	2016
 <b>Sanitary</b>		
Standard 1200mm Manhole for Pipes up to 600mm in Diameter .....	<a href="#">42101</a>	2016
Typical Perched Manhole for 600 to 1050mm Diameter Pipes .....	<a href="#">42102</a>	2016
T-Riser Manhole for Pipes 1200mm and Larger .....	<a href="#">42103</a>	2011



	Drawing Number	Issued
External Drop Manhole .....	<a href="#">42104</a>	2016
Internal Drop Manhole .....	<a href="#">42105</a>	2011
F-90 Type Manhole Frame and Cover .....	<a href="#">42106</a>	2016
F-80 Floating Type Manhole Frame and Cover .....	<a href="#">42107</a>	2016
F-39 Type Manhole Frame and Cover Single Vent .....	<a href="#">42108</a>	2016
Residential Sanitary Sewer Service Riser Connection .....	<a href="#">42109</a>	2016
Typical Sump Pump Discharge Connection .....	<a href="#">42110</a>	2016
Typical Sump Pump Discharge Collection Main – In-Line/End-of-Line Cleanout .....	<a href="#">42111</a>	2016
<b>Water</b>		
Typical Hydrant and Valve Placement .....	<a href="#">43001</a>	2016
Standard Method of Supporting Valves and Valve Boxes .....	<a href="#">43002</a>	2011
Valve Box Detail – Sliding Type A and Screw Type B .....	<a href="#">43003</a>	2011
Concrete Thrust Block – Horizontal Details for Water Mains .....	<a href="#">43004</a>	2016
Concrete Thrust Block – Vertical Details for Water Mains .....	<a href="#">43005</a>	2016
Typical Air Release Valve (ARV) Installation .....	<a href="#">43006</a>	2016
Blow Off Valve Detail .....	<a href="#">43007</a>	2016
Anode Locations and Installation .....	<a href="#">43008</a>	2016
Anode on 50mm and Smaller Copper Water Service .....	<a href="#">43009</a>	2016
Detail – Anode Installation Cadweld .....	<a href="#">43010</a>	2016
Type B Valve Box Lid with Top Nut .....	<a href="#">43011</a>	2016
<b>Storm</b>		
Standard 1200mm Catch Basin Manhole for Pipes to 600mm Diameter .....	<a href="#">44001</a>	2011
Typical 900mm Catch Basin .....	<a href="#">44002</a>	2011
900mm Catch Basin with F51 Frame & Cover and Side Inlet .....	<a href="#">44003</a>	2011
Wick Drain Connection to Catch Basin .....	<a href="#">44004</a>	2011
Cross-Section for a Wet Pond .....	<a href="#">44005</a>	2011
T-K2 Catch Basin Frame and Locking Grate .....	<a href="#">44006</a>	2011
T-K7 Double Frame and Locking Grate .....	<a href="#">44007</a>	2011

	Drawing Number	Issued
<b><u>RURAL SERVICE AREA</u></b>		
<b>Intersection/Plan View</b>		
Typical Intersection Treatment Country Residential Subdivision Road to Class-I Grid Road .....	<a href="#">51001</a>	2011
Typical Intersection Treatment Country Residential Subdivision Road to Class-II Grid Road .....	<a href="#">51002</a>	2011
Country Residential Subdivision Access Detail Structure, Line Painting, Culvert Location and Ditch Layout .....	<a href="#">51003</a>	2011
Country Residential Subdivision Cul-de-Sac Roadways Road Width and Bulb Layout Options .....	<a href="#">51004</a>	2011
Private Approaches .....	<a href="#">51005</a>	2011
Layby (Canada Post Superbox, Information Sign, etc.) C.R.S. Roadway New Construction or Retrofit to Existing Grid Road .....	<a href="#">51006</a>	2011
<b>Road Cross-Sections</b>		
Class I (Hot-Mix Asphaltic Concrete) Rural Grid Road 40.0m Right-of-Way, 9.0m Finished Top, 12.4m Subgrade .....	<a href="#">51101</a>	2011
Class II (Cold-Mix Asphaltic Concrete) Rural Grid Road 30.0m Right-of-Way, 7.5m Finished Top, 10.0m Subgrade .....	<a href="#">51102</a>	2011
Class III (Gravelled) Rural Grid Road 30.0m Right-of-Way, 7.5m Finished Top, 10.0m Subgrade .....	<a href="#">51103</a>	2011
Country Residential Subdivision Roadway 30.0m Right-of-Way, 8.5m Finished Top, 12.0m Subgrade .....	<a href="#">51104</a>	2011
Country Residential Subdivision Roadway – With 1 Trail 30.0m Right-of-Way, 8.5m Finished Top, 10.5m Subgrade .....	<a href="#">51105</a>	2011
Country Residential Subdivision Roadway – Redevelopment Only 20.0m Right-of-Way, 7.0m Finished Top, 9.0m Subgrade .....	<a href="#">51106</a>	2011
Industrial Local Roadway 30m Right-of-Way, 9.0m Finished Top, 12.5m Subgrade .....	<a href="#">51107</a>	2011
Industrial Collector Roadway 30.0m Right-of-Way, 11.5m Finished Top, 15.0m Subgrade .....	<a href="#">51108</a>	2011
Hand Placed Rip-Rap for Pipe Culverts .....	<a href="#">51109</a>	2011

	Drawing Number	Issued
Culverts .....	<a href="#">51110</a>	2011
Industrial Pipeline Crossings and Parallel Pipelines Design Class I, Class II, Class III, and Class IV Rural Grid Roads .....	<a href="#">51111</a>	2011
<b>Traffic Control/Operation</b>		
Rural Grid Road Discontinuous Milled Rumble Strip Placement .....	<a href="#">51201</a>	2011
Rural Grid Road Discontinuous Milled Rumble Strip Placement .....	<a href="#">51202</a>	2011
Rural Sign Installation .....	<a href="#">51203</a>	2011
Flexible Delineator Posts .....	<a href="#">51204</a>	2011
<b>Sanitary</b>		
Low Pressure Sewer Air and Vacuum Relief Valve and Chamber Detail .....	<a href="#">52001</a>	2011
Low Pressure Sewer Buried Valve Detail .....	<a href="#">52002</a>	2011
Low Pressure Sewer Flushing Pipe Detail .....	<a href="#">52003</a>	2011
Low Pressure Sewer Service Connection Detail .....	<a href="#">52004</a>	2011
Single Family Lot Service Connection .....	<a href="#">52005</a>	2011
Typical Buried Sanitary Sewer Water Warning Sign .....	<a href="#">52006</a>	2011
<b>Water</b>		
Typical Rural Water 25mm Residential Meter Chamber Detail .....	<a href="#">53001</a>	2011
Typical Rural Water Manhole Frost Cover Detail .....	<a href="#">53002</a>	2011
Typical Rural Water Automatic Air-Vent Manhole .....	<a href="#">53003</a>	2011
Trenching Detail .....	<a href="#">53004</a>	2011
Typical Rural Water Blow-Off Valve .....	<a href="#">53005</a>	2011
Rural Water Air Release .....	<a href="#">53006</a>	2011
Types of Trench Bedding .....	<a href="#">53007</a>	2011
Typical Rural Water Marker Post Detail .....	<a href="#">53008</a>	2011
Standard Method of Supporting Valves & Valve Boxes .....	<a href="#">53009</a>	2011
Water Sampling Station .....	<a href="#">53010</a>	2011
Typical Buried Water Warning Sign .....	<a href="#">53011</a>	2011

	Drawing Number	Issued
<b>Storm</b>		
Cross-Section for a Wet Pond .....	<a href="#">54001</a>	2011
Stormwater Outlet Pipe Detail .....	<a href="#">54002</a>	2011
Silt Fence Detail .....	<a href="#">54003</a>	2011
 <b><u>OPEN SPACE DEVELOPMENT STANDARDS (OSDS)</u></b>		
<b>Tree Planting Details</b>		
Coniferous/Deciduous Tree Planting .....	<a href="#">61001</a>	2011
Tree Planting on Slopes .....	<a href="#">61002</a>	2011
Machine Dug Tree .....	<a href="#">61003</a>	2011
Native Tree Spade Planting .....	<a href="#">61004</a>	2011
 <b>Planting Bed</b>		
Coniferous B&B Shrub Bed Planting .....	<a href="#">61101</a>	2011
Bare Root/Container Shrub Planting .....	<a href="#">61102</a>	2011
Live Staking .....	<a href="#">61103</a>	2011
Planting Around Switching Cubicle .....	<a href="#">61104</a>	2011
 <b>Fences and Gates</b>		
1.8m Wood Screen Fence .....	<a href="#">61201</a>	2012
Noise Attenuation Fence .....	<a href="#">61202</a>	2012
3.0m Double Closed Board Fence .....	<a href="#">61203</a>	2012
Wood Fence Gate Detail .....	<a href="#">61204</a>	2012
Chain Link Fence .....	<a href="#">61205</a>	2016
Chain Link Gate .....	<a href="#">61206</a>	2016
Chain Link Maintenance Gate .....	<a href="#">61207</a>	2011
Pipe Rail Fence .....	<a href="#">61208</a>	2011
Steel Pipe Gate .....	<a href="#">61209</a>	2011
Steel Pipe Gate Locking Sleeve .....	<a href="#">61210</a>	2011
Paige Wire Fence Detail .....	<a href="#">61211</a>	2011
Fence Baffle Gate .....	<a href="#">61212</a>	2012

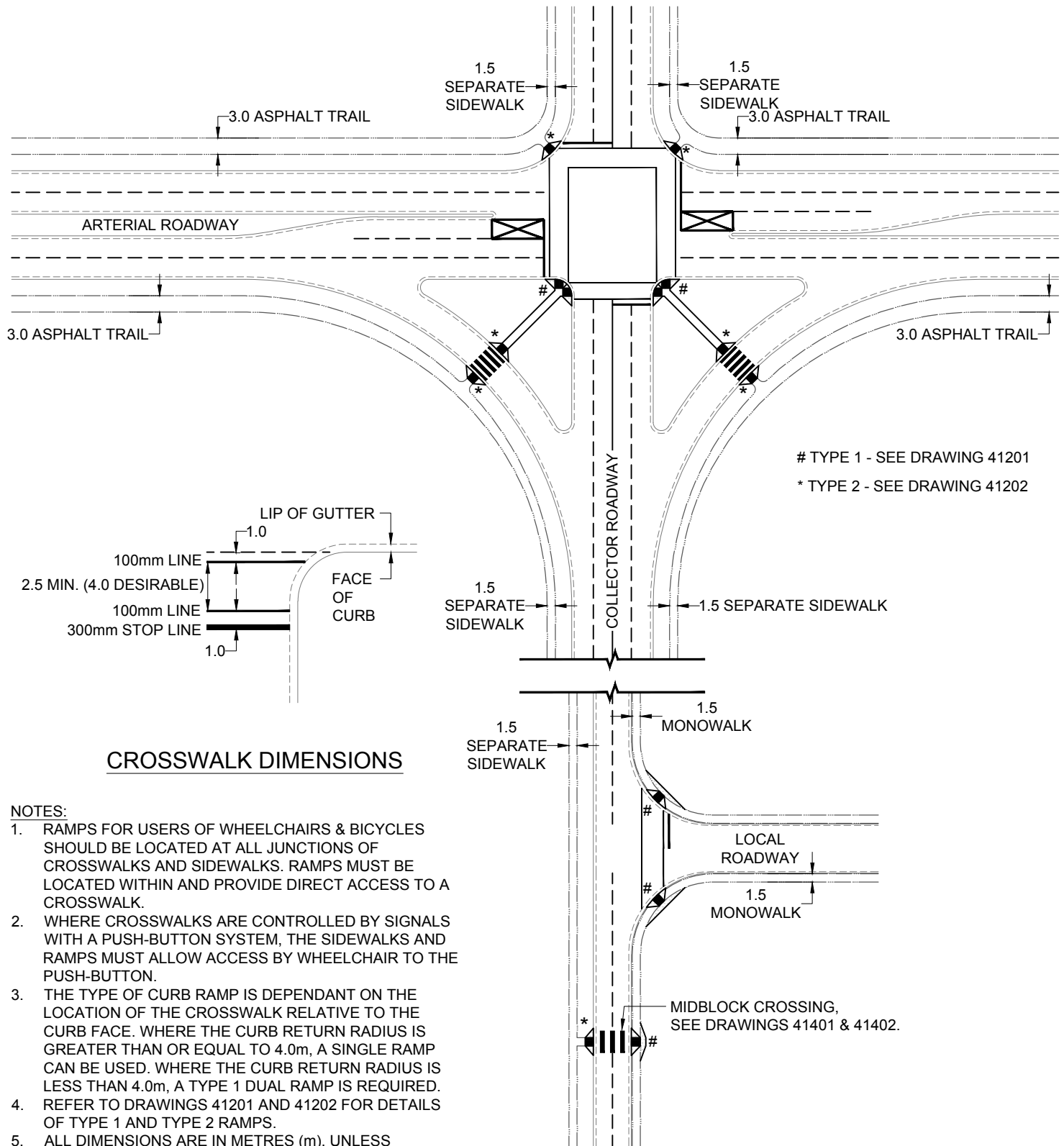
	Drawing Number	Issued
Split Rail Fence .....	<a href="#">61213</a>	2011
Post and Rail Fence .....	<a href="#">61214</a>	2012
<b>Site Furniture</b>		
Single Pedestal Bench Layout .....	<a href="#">61301</a>	2012
Single Pedestal Anchor Plate .....	<a href="#">61302</a>	2012
Single Pedestal Bench Detail .....	<a href="#">61303</a>	2012
Trash Receptacle Details .....	<a href="#">61304</a>	2012
Pedestal Mounted Picnic Table Detail .....	<a href="#">61305</a>	2012
Portable Picnic Table Plan/Elevation .....	<a href="#">61306</a>	2012
Portable Picnic Table Details .....	<a href="#">61307</a>	2012
<b>Trails and Paving</b>		
Asphalt Trail (3.0m Width) .....	<a href="#">61401</a>	2011
Root Barrier Section and Elevation .....	<a href="#">61402</a>	2011
Corrugated Steel Culvert with Geotextile .....	<a href="#">61403</a>	2011
Asphalt Trail Line Painting (3m) .....	<a href="#">61404</a>	2011
Removal Zone and Clearing Width .....	<a href="#">61405</a>	2011
Paving Stone .....	<a href="#">61406</a>	2011
Paving Stone Landscaped Median .....	<a href="#">61407</a>	2011
Gravel Pedestrian Trail .....	<a href="#">61408</a>	2011
Trail Side Rest Area – Plan and Profile .....	<a href="#">61409</a>	2016
<b>Signage</b>		
Trail Sign Detail .....	<a href="#">61501</a>	2012
Trail Sign Installation Detail .....	<a href="#">61502</a>	2012
Trail Signs 1 .....	<a href="#">61503</a>	2012
Trail Signs 2 .....	<a href="#">61504</a>	2012
Standard Park Name Sign .....	<a href="#">61505</a>	2016
Community Event Information Sign .....	<a href="#">61506</a>	2011
No Swimming/Thin Ice Signs .....	<a href="#">61507</a>	2011

	Drawing Number	Issued
Playground Play Safe Sign .....	<a href="#">61508</a>	2011
No Motorized Vehicles Sign .....	<a href="#">61509</a>	2011
<b>Bollards</b>		
T-Bollard Section and Elevation .....	<a href="#">61601</a>	2016
Chicane T-Bollard Layout .....	<a href="#">61602</a>	2016
T-Bollard 1100mm Section .....	<a href="#">61603</a>	2011
T-Bollard Assembly Detail .....	<a href="#">61604</a>	2016
T-Bollard Flange Detail .....	<a href="#">61605</a>	2011
T-Bollard Locking Pin Detail .....	<a href="#">61606</a>	2012
<b>Environmental: SWMF and ER/MR Marker Posts</b>		
S.W.M.F. Planting Detail .....	<a href="#">61701</a>	2011
ER/MR/Conservation Easement Marker Post .....	<a href="#">61702</a>	2011
<b>Sports Fields and Playgrounds</b>		
Ball Infield Detail .....	<a href="#">61801</a>	2012
Ball Diamond Dimensions .....	<a href="#">61802</a>	2012
Pitchers Mound Detail .....	<a href="#">61803</a>	2012
Canopy Backstop Plan and Details .....	<a href="#">61804</a>	2012
Canopy Backstop Section/Elevation .....	<a href="#">61805</a>	2012
Player's Bench .....	<a href="#">61806</a>	2012
Soccer Field Dimensions 1 .....	<a href="#">61807</a>	2012
Soccer Field Dimensions 2 .....	<a href="#">61808</a>	2012
Permanent Soccer Goal .....	<a href="#">61809</a>	2012
Football Field Layout .....	<a href="#">61810</a>	2012
Combination Goal Post Detail .....	<a href="#">61811</a>	2012
Outdoor Rink Layout .....	<a href="#">61812</a>	2012
Outdoor Rink Detail .....	<a href="#">61813</a>	2012
Basketball Court Layout .....	<a href="#">61814</a>	2012
Outdoor Basket Ball – Backboard/Post .....	<a href="#">61815</a>	2012

	Drawing Number	Issued
Standard Rugby Sports Field .....	<a href="#">61816</a>	2012
Sand Volleyball Court Layout .....	<a href="#">61817</a>	2012
Double Timber Edger Layout for Volleyball Courts .....	<a href="#">61818</a>	2012
Volleyball Court Rope Details .....	<a href="#">61819</a>	2012
Volleyball Court Post Footings .....	<a href="#">61820</a>	2012
Tennis Court Layout .....	<a href="#">61821</a>	2012
Tennis Court Post Footings .....	<a href="#">61822</a>	2012
Tennis Court Slope Drainage .....	<a href="#">61823</a>	2012
Tennis Court Drainage .....	<a href="#">61824</a>	2012
Playground Equipment Footing .....	<a href="#">61825</a>	2012
Playground Concrete Retainer .....	<a href="#">61826</a>	2012
Alternative Playground Retainers .....	<a href="#">61827</a>	2012
Jump Pit Detail .....	<a href="#">61828</a>	2012
Horse Shoe Pit Layout .....	<a href="#">61829</a>	2012

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.





## REVISIONS

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED TEXT	S. ENGLEDER
12-JAN-2017	REMOVED DETAIL 1 & SECTION A-A (MOVED TO DWG. 41201). UPDATED RAMP TYPES & NOTES	D. LEGROW
18-DEC-2015	UPDATED DETAIL 1 & SECTION A-A WITH PROPER DIM. ADDED BREAK LINE & REMOVED RD. DIRECTION ARROWS	S. ENGLEDER
08-OCT-2015	UPDATED OF TRAILS/SIDEWALKS, REMOVED DETAIL 2 ADDED LOCAL RD. & MIDBLOCK X-ING & LABELS/NOTES	D. LEGROW
09-FEB-2011	REVISED DRAWING NUMBER & REVISIONS	J. EGGEN



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## LAYOUT OF CROSSWALKS AND RAMPS AT URBAN INTERSECTIONS

APPROVED: K. COLE, P. ENG.

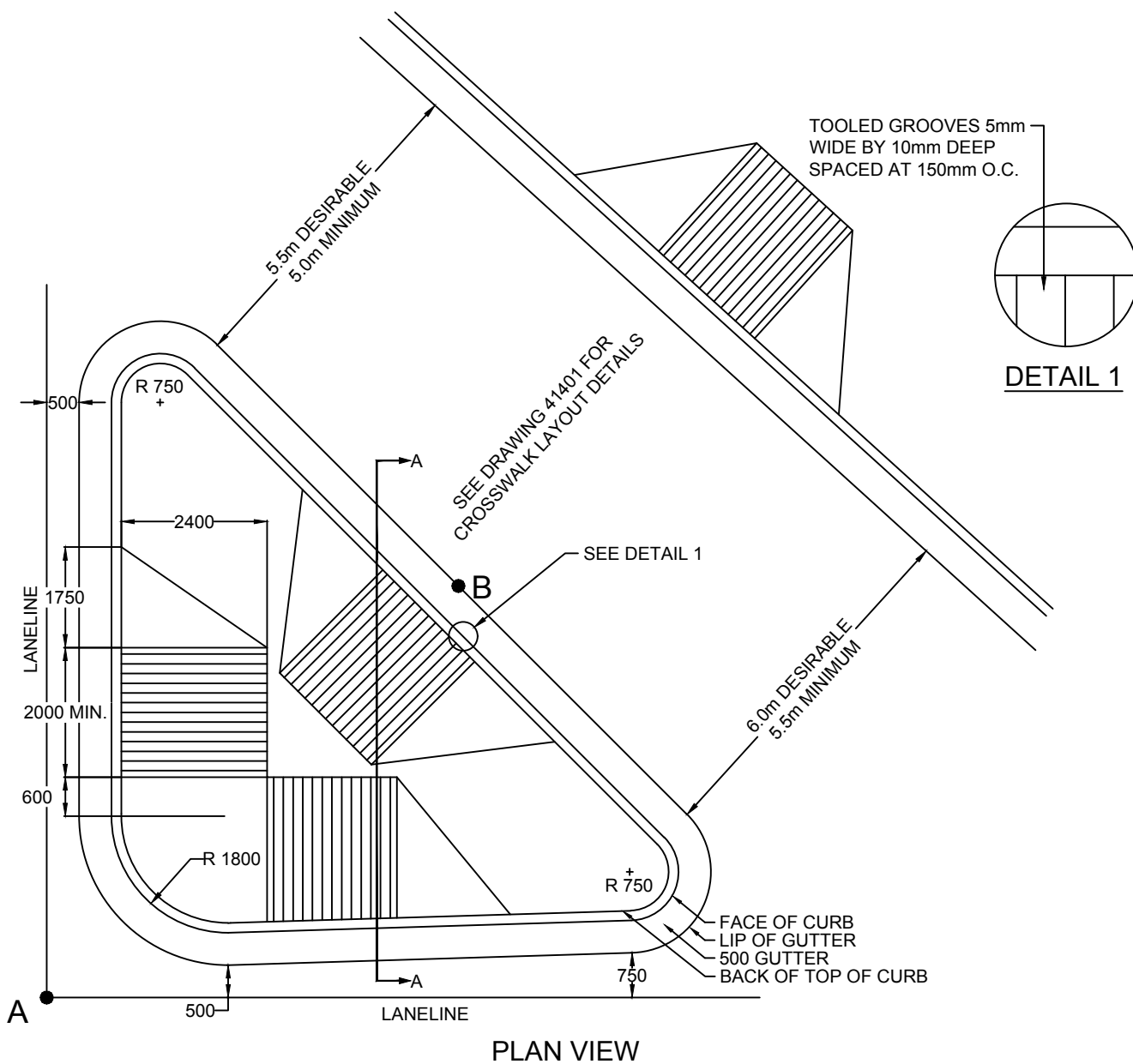
DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

**41001**

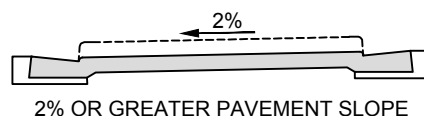
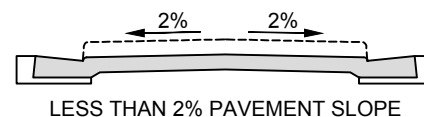
DATE: 25-JUL-1997 SCALE: N.T.S. DRAWN: J. EDGINGTON, C.E.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT




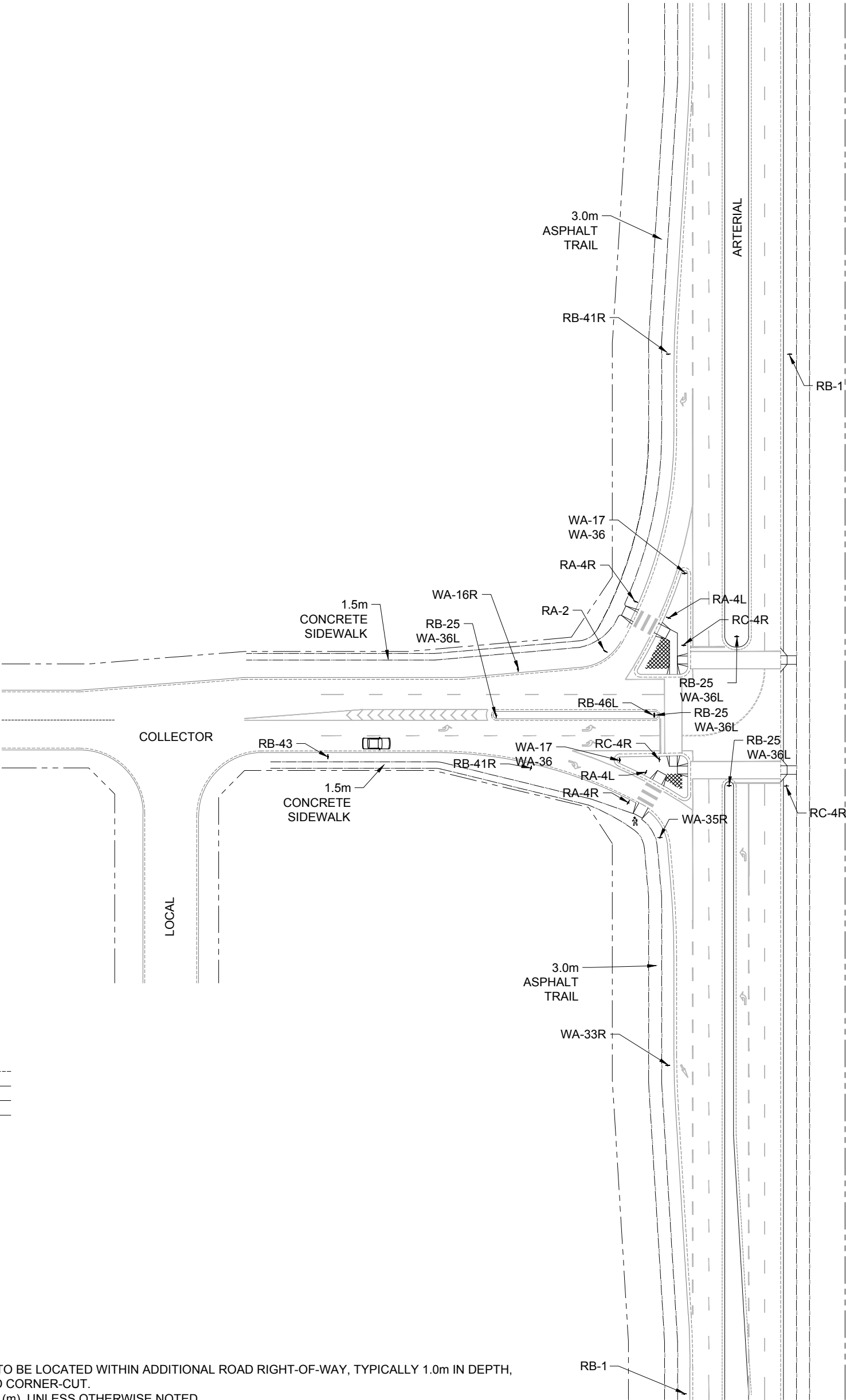
#### NOTES:

1. MINIMUM DIMENSION FROM POINT A TO POINT B IS 9.0m.
2. MAXIMUM RAMP WIDTH SHALL BE 3.0m.
3. WHERE CROSSWALKS ARE CONTROLLED BY SIGNALS WITH A PUSH-BUTTON SYSTEM, THE SIDEWALKS AND RAMPS MUST ALLOW ACCESS BY WHEELCHAIR TO THE PUSH-BUTTON.
4. RAMP LENGTH OF 2.4m IS BASED ON A CURB HEIGHT OF 200mm AND A MAXIMUM RAMP INCLINE OF 8%.
5. ADD 10M REINFORCING RODS TO THE ENDS OF ALL BULLNOSES, MEDIANS, AND TRAFFIC ISLANDS.
6. FILL MATERIAL FOR ISLANDS SHALL BE EARTH, CONCRETE OR ASPHALTIC CONCRETE AS APPROVED BY THE COUNTY.
7. SIDEWALKS AND RAMPS SHALL BE CONCRETE.
8. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.



#### SECTION A-A


REVISIONS			 STRATHCONA COUNTY	2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA		© 2019
DATE	DETAILS	DRAWN				
15-MAY-2019	REVISED DIMENSION AND TEXT	S. ENGLEDER	REHABILITATED INTERSECTION ISLANDS - MINIMUM SIZE			
07-JUN-2016	LABELED L.O.G. AND F.O.C. ON PLAN VIEW	D. LEGROW				
18-DEC-2015	CHANGED RAMP WIDTH	S. ENGLEDER				
06-OCT-2015	CHANGED "EDGE LINE" TO LANELINE"	D. LEGROW				
21-APR-2011	REVISED DRAWING NUMBER & REVISIONS	J. ORR				
			APPROVED: K. COLE, P. ENG.		DRAWING NUMBER	
			CHECKED: S. JOHNSON, P.TECH. (ENG.)		41002	
			DATE:30-APR-2003	SCALE: N.T.S.		DRAWN: R. YANITSKI, A.S.C.T.
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT			

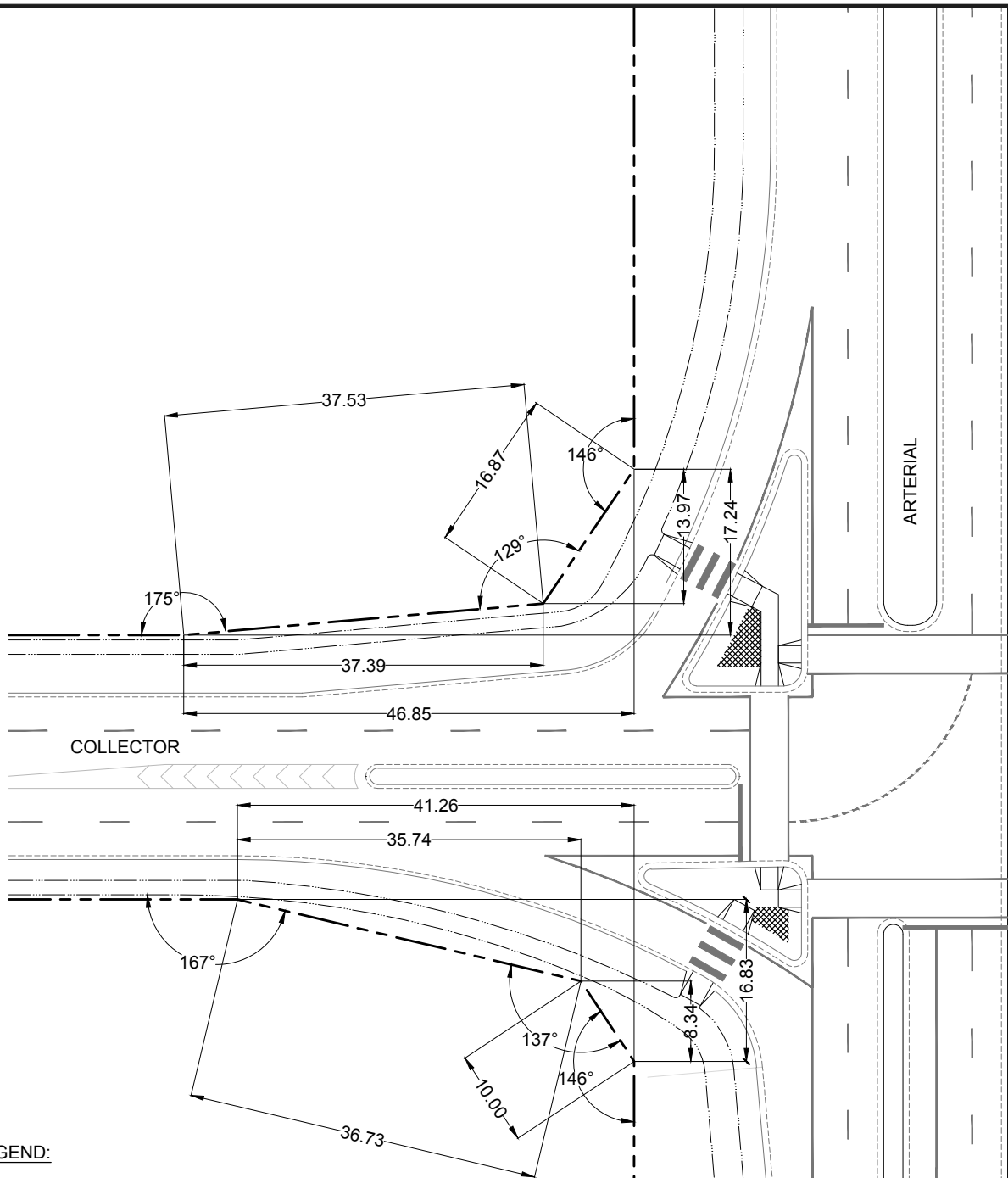


LEGEND:

LIP OF GUTTER  
PROPERTY LINE  
SIDEWALK/TRAIL  
BACK TOP OF CURB  
POSSIBLE POLE LOCATIONS

- NOTES:
- ENTRY FEATURE, IF DESIRED, IS TO BE LOCATED WITHIN ADDITIONAL ROAD RIGHT-OF-WAY, TYPICALLY 1.0m IN DEPTH, LOCATED BEHIND THE STANDARD CORNER-CUT.
  - ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
  - CORNER-CUT DETAIL SHOWN IN DRAWING 41004.
  - APPLICABLE TRAIL/SIDEWALK SIGNAGE MUST BE INSTALLED. REFER TO DRAWINGS 61501 THROUGH 61504.

REVISIONS			 STRATHCONA COUNTY	2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA		© 2019
DATE	DETAILS	DRAWN				
15-MAY-2019	REVISED TITLE & NOTES	S. ENGLER	TYPICAL COLLECTOR / ARTERIAL INTERSECTION - SIGNAGE			
11-APR-2017	ADDED RB-46L SIGN	D. LEGROW				
06-OCT-2015	ADDED SIGNAGE, LINEMARKINGS, TRAIL SIGNS NOTE; REMOVED INTERSECTION DETAIL	D. LEGROW	APPROVED: K. COLE, P. ENG.		DRAWING NUMBER	
21-JAN-2015	REVISED LINEMARKINGS AND SIGNAGE	J. ORR	CHECKED: S. JOHNSON, P.TECH. (ENG.)		41003	
21-APR-2011	REVISED DRAWING NUMBER	J. ORR	DATE: 04-JUN-2009	SCALE: N.T.S.		
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT			



#### LEGEND:

LIP OF GUTTER	----
PROPERTY LINE	----
SIDEWALK/TRAIL	----
BACK TOP OF CURB	----
POSSIBLE POLE LOCATIONS	XXXX

#### NOTE:

1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

#### REVISIONS

DATE	DETAILS	DRAWN
18-DEC-2015	ADDED LIP OF GUTTER TO MEDIANS	S. ENGLEDER
21-JAN-2015	REVISED LINE MARKINGS	J. ORR
21-APR-2011	REVISED DRAWING NUMBER	J. ORR
08-JUL-2009	REVISIONS	W. GINKA
04-JUN-2009	DRAFT 1	J. EGGEN



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#### COLLECTOR / ARTERIAL CORNER CUT - DETAIL

APPROVED: K. COLE, P. ENG.

DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

41004

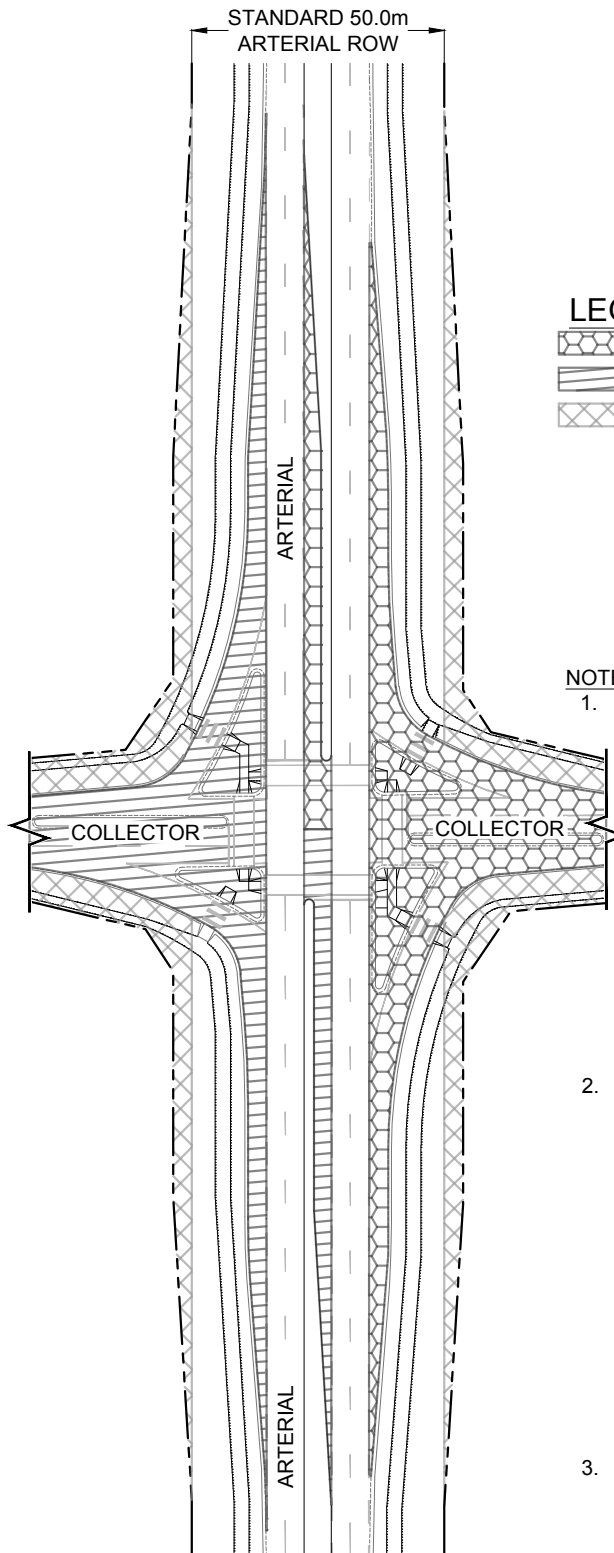
DATE: 04-JUN-2009 SCALE: N.T.S. DRAWN: J. EGGEN, C.E.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



## TWO OPPOSING ALL-DIRECTIONAL ACCESSES WITH SINGLE LEFT-TURN LANES

## SINGLE ALL-DIRECTIONAL ACCESS WITH SINGLE LEFT-TURN LANE

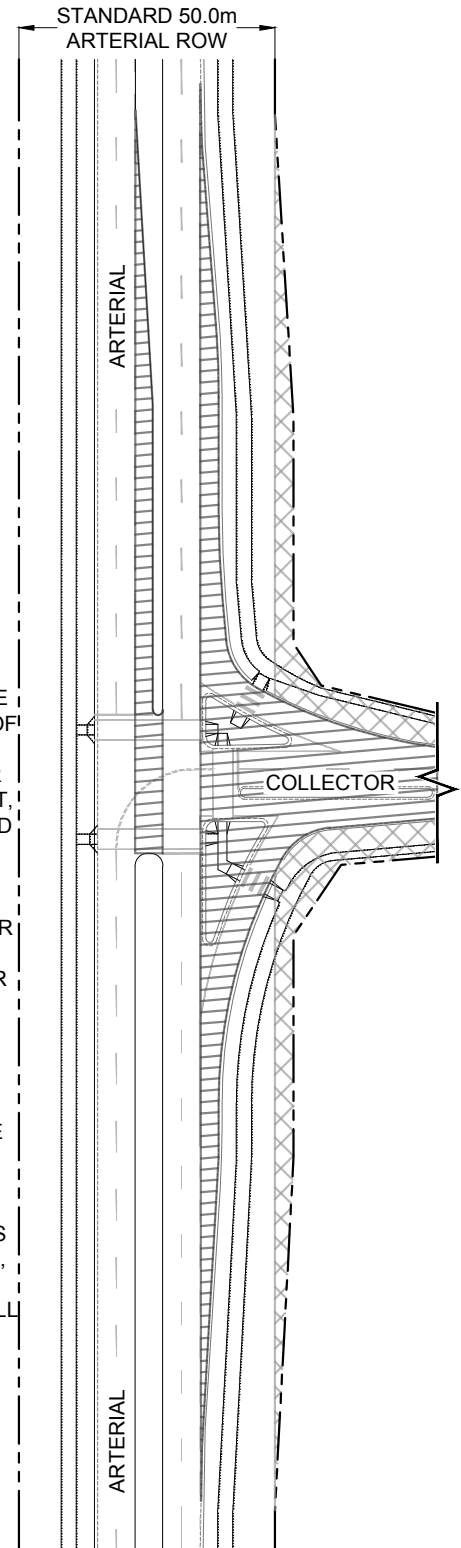


### LEGEND

- DEVELOPER CONTRIBUTIONS
- DEVELOPER CONTRIBUTIONS
- ROW WIDENING

### NOTES:

1. THE DEVELOPER IS RESPONSIBLE FOR THE CONSTRUCTION COST OF THE ARTERIAL/COLLECTOR INTERSECTION(S) REQUIRED FOR ACCESS TO THEIR DEVELOPMENT, INCLUDING AUXILIARY LANES, AND RELATED COSTS. FOR CALCULATION PURPOSES, THE CONTRIBUTION ZONE SHALL END WHERE THE CURB RETURN/TAPER FROM THE ARTERIAL ROADWAY TERMINATES ON THE COLLECTOR ROADWAY, UNLESS OTHERWISE AGREED UPON.
2. THE DEVELOPER/OWNER SHALL DEDICATE ANY/ALL LAND REQUIRED OVER AND ABOVE THE STANDARD ARTERIAL ROADWAY ROW WIDTH FOR THE ARTERIAL/COLLECTOR INTERSECTION(S). THIS INCLUDES LAND FOR THE CORNER CUT-OFF, AND AUXILIARY LANES. A STANDARD ARTERIAL MEDIAN WILL ACCOMMODATE ONE LEFT TURN LANE WITHOUT THE NEED TO WIDEN THE ARTERIAL ROADWAY ROW.
3. REFER TO THE MOST RECENT VERSION OF THE STRATHCONA COUNTY OFFSITE DEVELOPMENT LEVIES BYLAW FOR MORE INFORMATION.



### REVISIONS

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED NOTES	S. ENGLER
07-JUN-2016	UPDATED LIMITS OF CONTRIBUTION ZONE	D. LEGROW
03-MAR-2016	ADDED NOTES	D. LEGROW
09-FEB-2015	NEW DETAIL	J. ORR



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### ARTERIAL / COLLECTOR DEVELOPER SITE-SPECIFIC CONTRIB.

APPROVED: K. COLE, P. ENG.

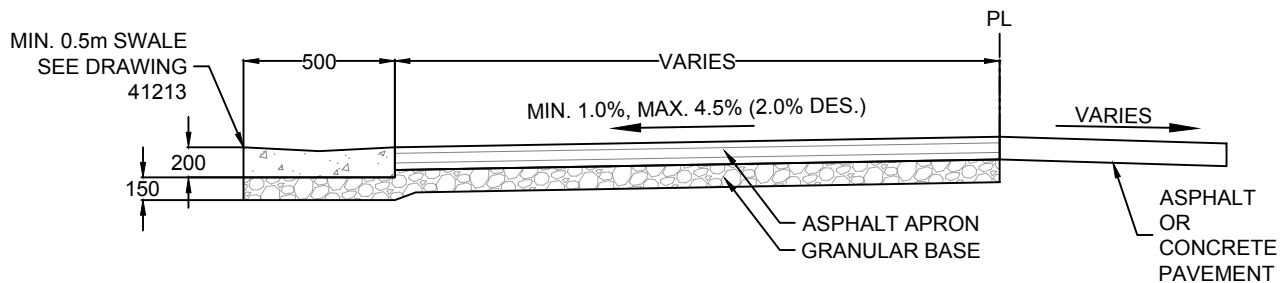
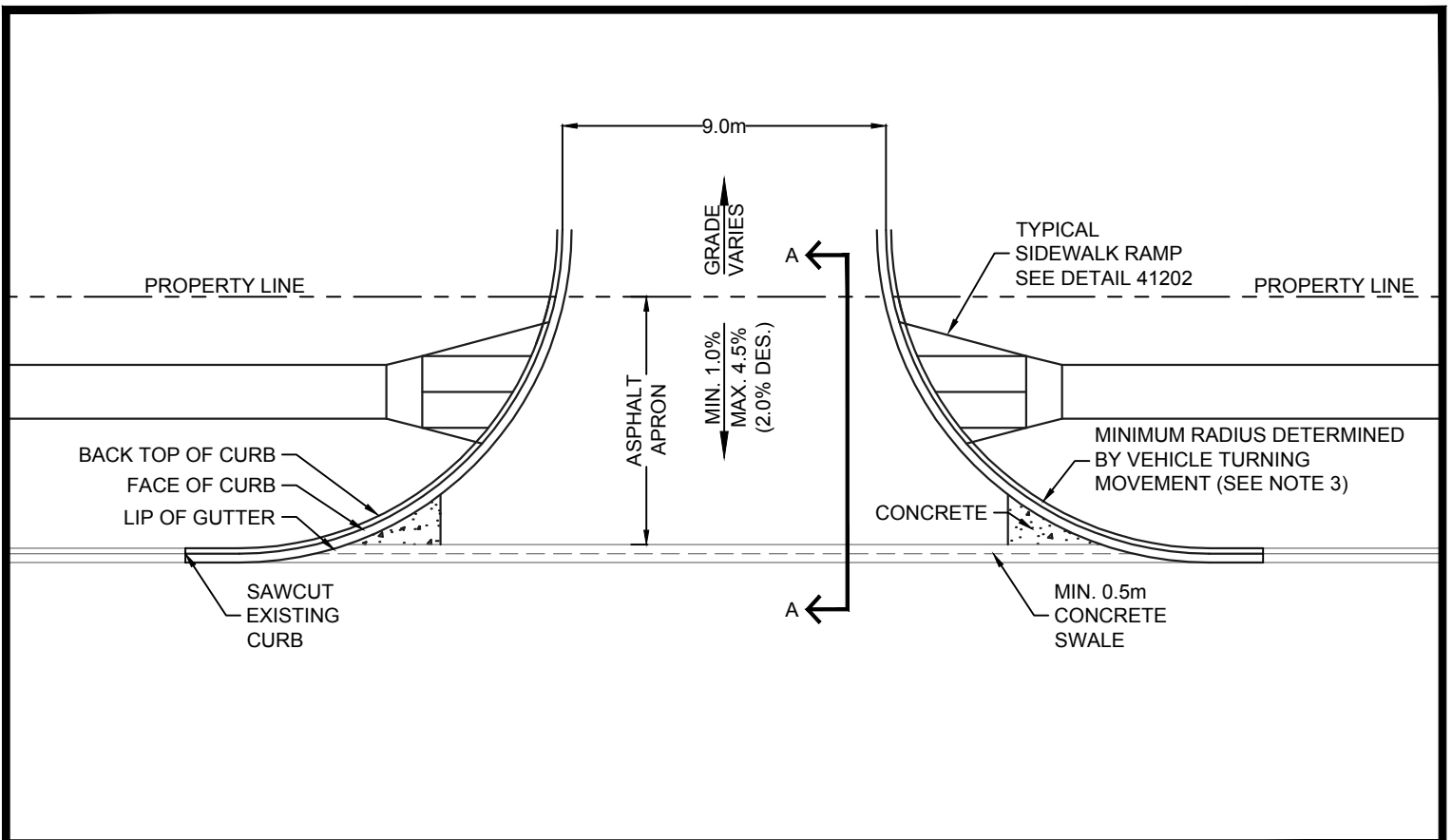
DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

41006

DATE: 09-FEB-2015 SCALE: N.T.S. DRAWN: J. ORR, C.E.T.


TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



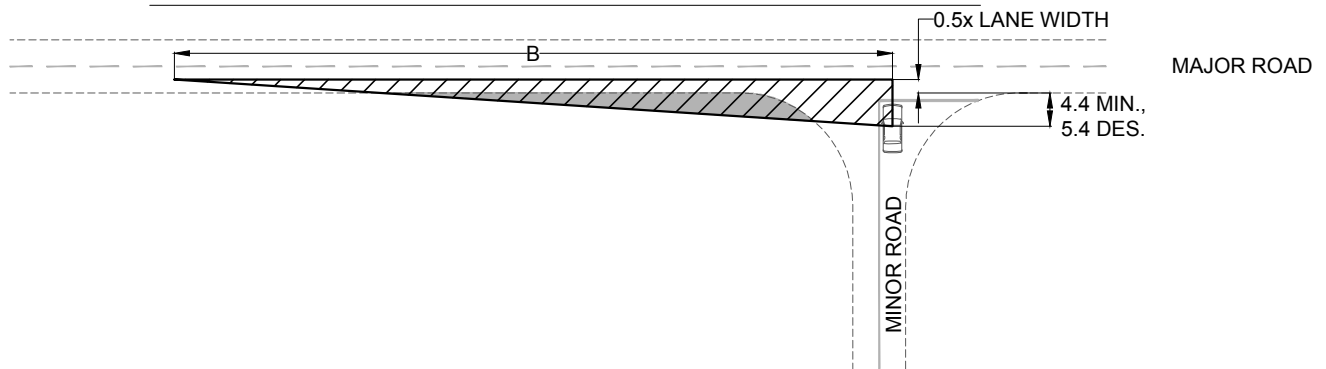
**SECTION A-A**

**NOTES:**

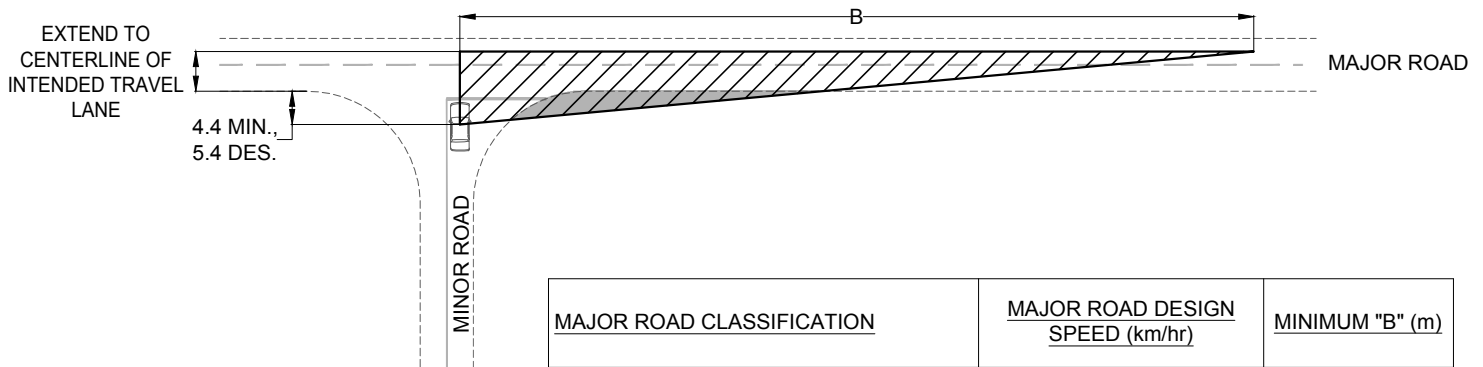
1. CONCRETE SWALE REQUIRED WHERE ROADWAY LONGITUDINAL GRADE IS LESS THAN 1.0%.
2. MINIMUM STRUCTURE TO BE EQUAL TO ROADWAY STRUCTURE.
3. MINIMUM CURB RETURN RADIUS TYPICALLY 6m FOR MULTI-FAMILY CROSSING, 10m FOR COMMERCIAL CROSSING, AND 15m FOR INDUSTRIAL CROSSING.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN	MULTI-FAMILY / NON-RESIDENTIAL CROSSING			
28-FEB-2017	ADDED NOTE RE. MINIMUM CURB RETURN RADII; REVISED TITLE, S/W RAMP LAYOUT	D. LEGROW				
07-JUN-2016	SPECIFIED DESIRABLE GRADE SPECIFIED MAXIMUM GRADE	D. LEGROW	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER
18-DEC-2015	EXTENDED SWALE, ADDED CONCRETE	S. ENGLER	CHECKED: S. JOHNSON, P.TECH. (ENG.)			41007
19-FEB-2015	NEW DETAIL	J. ORR	DATE: 19-FEB-2015	SCALE: N.T.S.	DRAWN: J. ORR, C.E.T.	
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT			

## SIGHTLINE TRIANGLE: RIGHT TURN FROM STOP SIGN



## SIGHTLINE TRIANGLE: LEFT TURN FROM STOP SIGN



MAJOR ROAD CLASSIFICATION	MAJOR ROAD DESIGN SPEED (km/hr)	MINIMUM "B" (m)
LOCAL LANE (PAVED)	30	N/A
LOCAL RESIDENTIAL CUL-DE-SAC	50	
LOCAL RESIDENTIAL	50	65
LOCAL INDUSTRIAL/BUSINESS COMMERCIAL	50	
MINOR RESIDENTIAL COLLECTOR	50	95
MAJOR RESIDENTIAL COLLECTOR	50	
INDUSTRIAL/BUSINESS COMMERCIAL COLLECTOR	50	

### NOTES:

1. THE SHORT LEG OF THE SIGHTLINE TRIANGLE STARTS AT THE DRIVER'S EYE ON THE MINOR ROAD, A MINIMUM OF 4.4m BEHIND FACE-OF-CURB, OR 3.4m BEHIND THE STOP LINE, WHICHEVER IS GREATER. FOR A RIGHT TURN, THE SHORT LEG ENDS AT THE CENTERLINE OF THE CLOSEST MAJOR ROAD LANE (AS SHOWN). FOR A LEFT TURN, THE SHORT LEG ENDS AT THE CENTERLINE OF THE INTENDED TRAVEL LANE ON THE MAJOR ROAD (IE. ADDITIONAL WIDTH IS REQUIRED FOR ADDITIONAL LANES). SEE DRAWING 41009 FOR SIGHT LINE REQUIREMENTS ON DIVIDED ROADWAYS. SEE DRAWING 41010 FOR SIGHT LINE REQUIREMENTS AT INTERSECTIONS WITH TRAFFIC SIGNAL CONTROL.
2. SIGHTLINE TRIANGLE FOR A CROSSING MOVEMENT CAN BE THE SAME AS A RIGHT TURN MOVEMENT. ADDITIONAL ANALYSIS MAY BE REQUESTED BY THE COUNTY.
3. REFER TO CHAPTER 9 OF THE TAC GEOMETRIC DESIGN GUIDE FOR MORE INFORMATION.
4. AREA OF SIGHTLINE TRIANGLE SHALL NOT CONTAIN ANY OBJECT OR VEGETATION (PERMANENT OR TEMPORARY) TALLER THAN 0.5m. TREES (WHERE APPROVED) MUST HAVE A MINIMUM BRANCHING HEIGHT OF 2.5m. ENSURE THAT SIGHTLINES ARE ALSO VERIFIED WITH ROADWAY GRADE AND THAT PEDESTRIAN FACILITIES AND PARKING LOCATIONS ARE TAKEN INTO ACCOUNT.
5. DRIVEWAYS (WHERE APPROVED) SHALL BE CONSTRUCTED TO PROVIDE A MINIMUM CLEARANCE OF 1.5m FROM ANY STRUCTURE, INCLUDING HYDRANTS, LIGHT STANDARDS, SERVICE PEDESTALS, CURB COCKS, AND TRANSFORMERS IN ACCORDANCE WITH THE STREET HARDWARE PLAN.
6. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

### REVISIONS

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED TITLE, TEXT & NOTES	S. ENGLER
11-APR-2017	ADDED NOTE RE. TREE BRANCHING HEIGHT	D. LEGROW
12-JAN-2017	ADDED NOTE RE. DRIVEWAYS	D. LEGROW
09-AUG-2016	UPDATED NOTES, DIMENSIONS, TITLE	D. LEGROW
19-FEB-2016	NEW DETAIL	D. LEGROW



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### SIGHTLINE TRIANGLES UNDIVIDED ROADWAYS

APPROVED: K. COLE, P. ENG.

DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

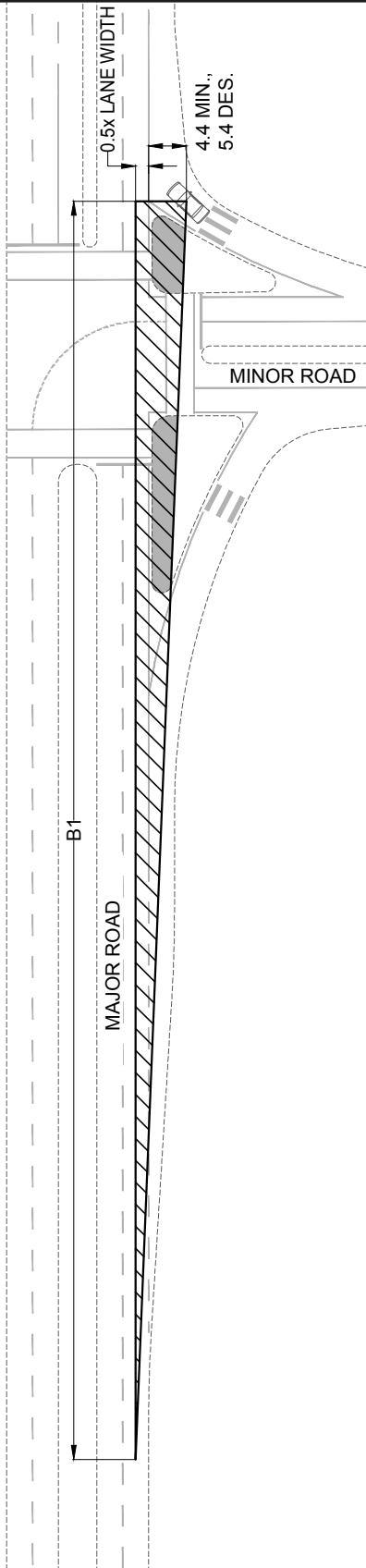
**41008**

DATE: 19-FEB-2016 SCALE: N.T.S. DRAWN: D. LEGROW

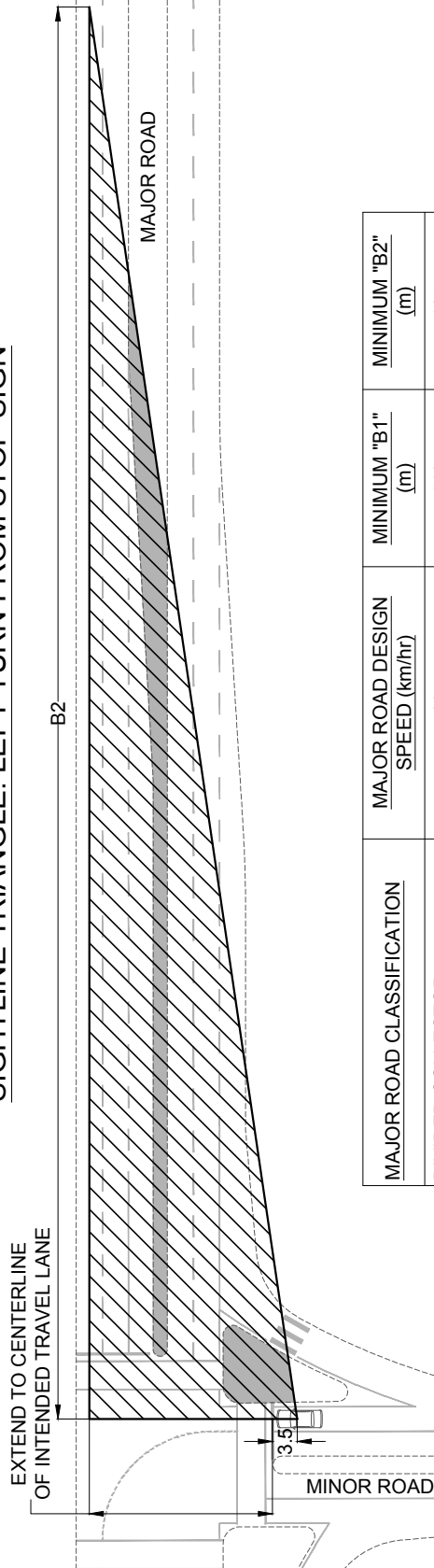
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



# SIGHTLINE TRIANGLE: RIGHT TURN FROM STOP SIGN



# SIGHTLINE TRIANGLE: LEFT TURN FROM STOP SIGN



MAJOR ROAD CLASSIFICATION	MAJOR ROAD DESIGN SPEED (km/hr)	MINIMUM "B1" (m)	MINIMUM "B2" (m)
DIVIDED COLLECTOR	60	110	135
MINOR DIVIDED ARTERIAL	70	130	160
MAJOR DIVIDED ARTERIAL	80	145	180

## NOTES:

- THE SHORT LEG OF THE SIGHTLINE TRIANGLE STARTS AT THE DRIVER'S EYE ON THE MINOR ROAD (DIMENSIONS VARY, SEE DIAGRAMS ABOVE). FOR A RIGHT TURN, THE SHORT LEG ENDS AT THE CENTERLINE OF THE CLOSEST MAJOR ROAD LANE (AS SHOWN). FOR A LEFT TURN, THE SHORT LEG ENDS AT THE CENTERLINE OF THE INTENDED TRAVEL LANE ON THE MAJOR ROAD (AS SHOWN). SEE DRAWING 41008 FOR SIGHT LINE REQUIREMENTS ON UNDIVIDED ROADWAYS. SEE DRAWING 41010 FOR SIGHT LINE REQUIREMENTS AT INTERSECTIONS WITH TRAFFIC SIGNAL CONTROL.
- SIGHTLINE TRIANGLE FOR A CROSSING MOVEMENT CAN BE THE SAME AS A RIGHT TURN MOVEMENT. ADDITIONAL ANALYSIS MAY BE REQUESTED BY THE COUNTY.
- REFER TO CHAPTER 9 OF THE TAC GEOMETRIC DESIGN GUIDE FOR MORE INFORMATION.
- AREA OF SIGHTLINE TRIANGLE SHALL NOT CONTAIN ANY OBJECT OR VEGETATION (PERMANENT OR TEMPORARY) TALLER THAN 0.5m. TREES (WHERE APPROVED) MUST HAVE A MINIMUM BRANCHING HEIGHT OF 2.5m. ENSURE THAT SIGHTLINES ARE ALSO VERIFIED WITH ROADWAY GRADE AND THAT PEDESTRIAN FACILITIES AND PARKING LOCATIONS ARE TAKEN INTO ACCOUNT.
- DRIVEWAYS (WHERE APPROVED) SHALL BE CONSTRUCTED TO PROVIDE A MINIMUM CLEARANCE OF 1.5m FROM ANY STRUCTURE, INCLUDING HYDRANTS, LIGHT STANDARDS, SERVICE PEDESTALS, CURB COCKS, AND TRANSFORMERS IN ACCORDANCE WITH THE STREET HARDWARE PLAN.
- ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

## REVISIONS

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED TITLE & NOTES	S. ENGLERD
11-APR-2017	ADDED NOTE RE. TREE BRANCHING HEIGHT	D. LEGROW
12-JAN-2017	ADDED NOTE RE. DRIVEWAYS	D. LEGROW
09-AUG-2016	UPDATED NOTES, DIMENSIONS, TITLE	D. LEGROW
18-FEB-2016	NEW DETAIL	D. LEGROW



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## MINIMUM SIGHTLINE TRIANGLES - DIVIDED ROADWAYS

APPROVED: K. COLE, P. ENG.

CHECKED: S. JOHNSON, P.TECH. (ENG.)

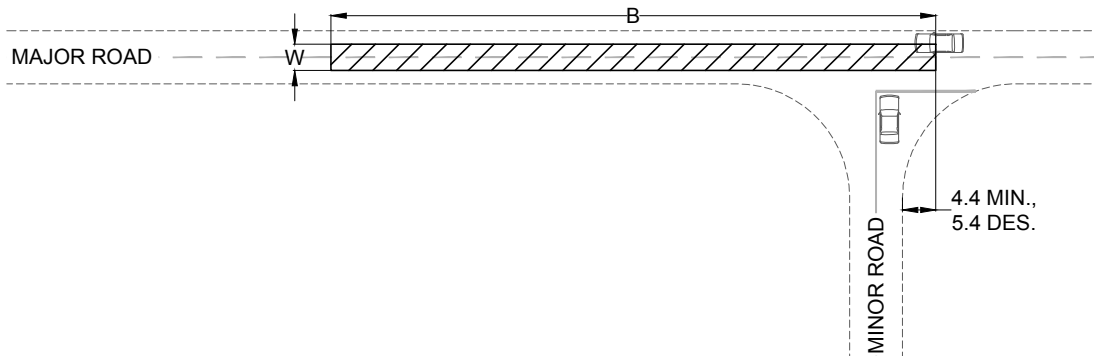
DATE: 18-FEB-2016 SCALE: N.T.S. DRAWN: D. LEGROW

DRAWING NUMBER

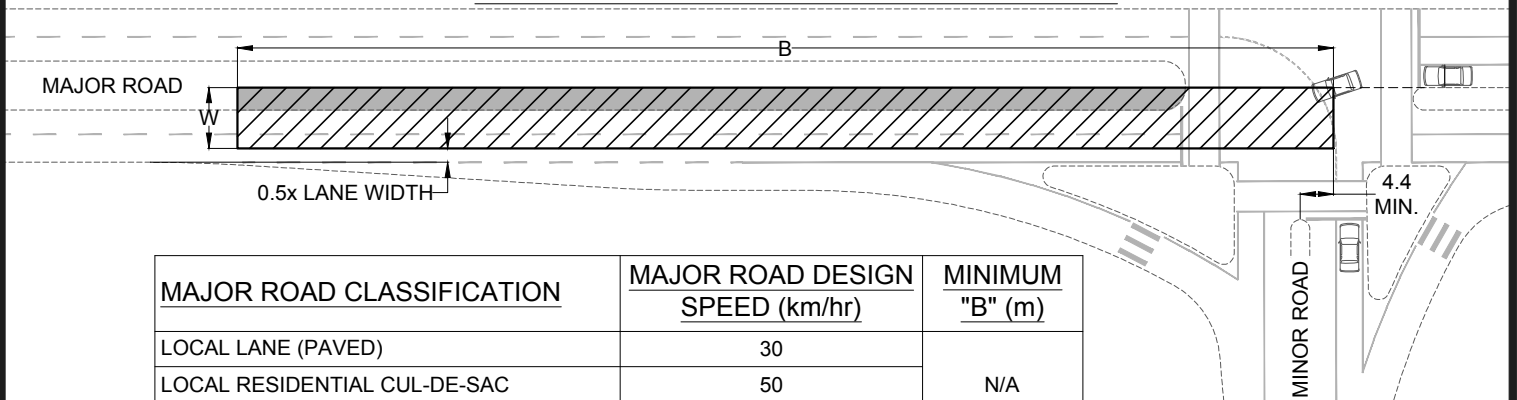
41009

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

## LEFT TURN FROM MAJOR ROAD: UNDIVIDED



## LEFT TURN FROM MAJOR ROAD: DIVIDED



MAJOR ROAD CLASSIFICATION	MAJOR ROAD DESIGN SPEED (km/hr)	MINIMUM "B" (m)
LOCAL LANE (PAVED)	30	N/A
LOCAL RESIDENTIAL CUL-DE-SAC	50	
LOCAL RESIDENTIAL	50	
LOCAL INDUSTRIAL/BUSINESS COMMERCIAL	50	80
MINOR RESIDENTIAL COLLECTOR	50	
MAJOR RESIDENTIAL COLLECTOR	50	
INDUSTRIAL/BUSINESS COMMERCIAL COLLECTOR	50	
DIVIDED COLLECTOR	60	105
MINOR DIVIDED ARTERIAL	70	120
MAJOR DIVIDED ARTERIAL	80	135

### NOTES:

- SIGHTLINE REQUIREMENT STARTS AT THE DRIVER'S EYE ON THE MAJOR ROAD, A MINIMUM OF 4.40m BEHIND FACE-OF-CURB OR MEDIAN CENTER, AS APPLICABLE, OF THE MINOR ROAD. WIDTH ("W") OF SIGHT LINE ENDS AT THE CENTERLINE OF THE FARTHEST THROUGH LANE ON THE MAJOR ROAD (IE. ADDITIONAL WIDTH IS REQUIRED FOR ADDITIONAL LANES OR MEDIAN WIDTH).
- AT INTERSECTIONS WITH TRAFFIC SIGNAL CONTROL, THIS DRAWING SHALL BE USED AS THE PRIMARY SIGHTLINE GUIDELINE. TURNING MOVEMENT SIGHTLINES (SHOWN ON DRAWING 41008 AND 41009) CAN BE REDUCED, AS LONG AS A VEHICLE AT A STOP BAR IS VISIBLE TO ALL OTHER VEHICLES AT THEIR RESPECTIVE STOP BARS (IE. THE PHYSICAL EXTENT OF THE INTERSECTION IS FREE OF VISUAL OBSTRUCTIONS). ADDITIONAL ANALYSIS MAY BE REQUESTED BY THE COUNTY.
- REFER TO CHAPTER 9 OF THE TAC GEOMETRIC DESIGN GUIDE FOR MORE INFORMATION.
- AREA OF SIGHTLINE SHALL NOT CONTAIN ANY OBJECT OR VEGETATION (PERMANENT OR TEMPORARY) TALLER THAN 0.5m. TREES (WHERE APPROVED) MUST HAVE A MINIMUM BRANCHING HEIGHT OF 2.5m. ENSURE THAT SIGHTLINES ARE ALSO VERIFIED WITH ROADWAY GRADE AND THAT PEDESTRIAN FACILITIES AND PARKING LOCATIONS ARE TAKEN INTO ACCOUNT.
- ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

### REVISIONS

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED TITLE & NOTES	S. ENGLERD
11-APR-2017	ADDED NOTE RE. TREE BRANCHING HEIGHT	D. LEGROW
09-AUG-2016	UPDATED NOTES, DIMENSIONS	D. LEGROW
23-FEB-2016	NEW DETAIL	D. LEGROW



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### MINIMUM SIGHTLINES - LEFT TURN FROM MAJOR RD.

APPROVED: K. COLE, P. ENG.

DRAWING NUMBER

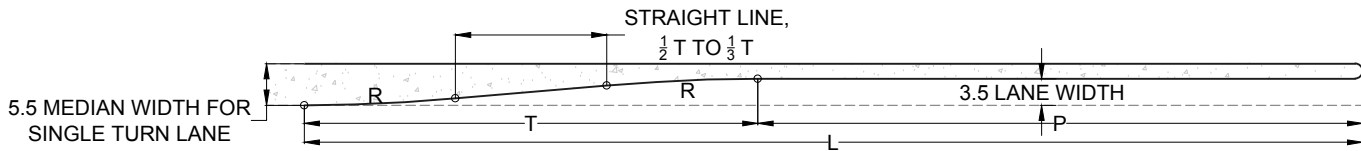
CHECKED: S. JOHNSON, P.TECH. (ENG.)

41010

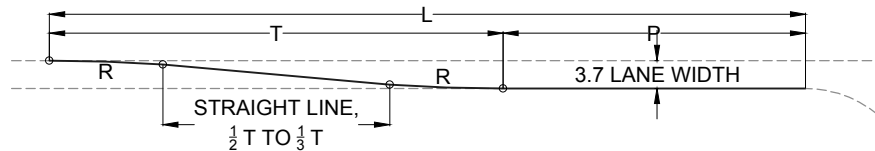
DATE: 23-FEB-2016 SCALE: N.T.S. DRAWN: D. LEGROW

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

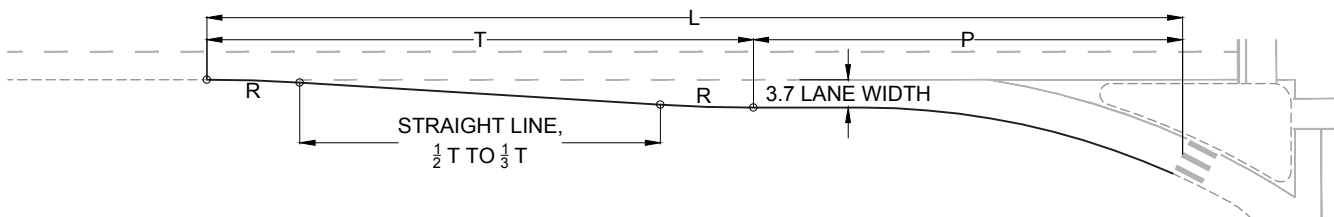
## STANDARD 3.5m LEFT TURN LANE: DELINEATED BY A MEDIAN



## STANDARD 3.7m RIGHT TURN LANE (UNDIVIDED)



## STANDARD 3.7m RIGHT TURN LANE (DIVIDED)



ROAD CLASSIFICATION	DESIGN SPEED (km/hr)	RADIUS "R" (m)	MINIMUM TAPER "T" LENGTH (m)	MINIMUM PARALLEL LANE "P" LENGTH (m)	MINIMUM TOTAL LENGTH "L" (m)
LOCAL LANE (PAVED)	30	N/A	N/A	N/A	N/A
LOCAL RESIDENTIAL CUL-DE-SAC	50				
LOCAL RESIDENTIAL	50				
LOCAL INDUSTRIAL/BUSINESS COMMERCIAL	50	90	20	20	40
MINOR RESIDENTIAL COLLECTOR					
MAJOR RESIDENTIAL COLLECTOR					
INDUSTRIAL/BUSINESS COMMERCIAL COLLECTOR	60	150	30	30	60
DIVIDED COLLECTOR					
MINOR DIVIDED ARTERIAL					
MAJOR DIVIDED ARTERIAL	70	220	40	40	80
	80	220	45	60	105

- NOTES:
- WHERE A LEFT TURN LANE IS DELINEATED BY PAINT LINES, THE LINES SHALL FOLLOW THE SAME GEOMETRY AS THE LIP-OF-GUTTER GEOMETRY SHOWN ABOVE.
  - FOR A DIVIDED RIGHT TURN LANE, PARALLEL LANE ("P") LENGTH CAN BE MEASURED TO THE CROSSWALK (AS SHOWN).
  - ADDITIONAL STORAGE LENGTH MAY BE REQUIRED, AS DETERMINED BY A SITE-SPECIFIC T.I.A. OR BY THE COUNTY. ADDITIONAL STORAGE LENGTH SHALL BE PROVIDED BY INCREASING THE PARALLEL LANE "P" LENGTH.
  - EXACT LENGTH OF STRAIGHT LINE ON TAPER SHOULD BE FIELD-FIT TO ENSURE A SMOOTH TRANSITION BETWEEN THE CURVES. STRAIGHT LINE LENGTH SHOULD BE BETWEEN  $\frac{1}{2} T$  AND  $\frac{1}{3} T$ .
  - FOR MORE GEOMETRY INFORMATION, REFER TO THE TAC URBAN SUPPLEMENT, SECTION U.D.9, FLARED INTERSECTIONS AND AUXILIARY LANES. FOR MEDIAN WIDTHS, REFER TO THE APPLICABLE CROSS SECTION. FOR MEDIAN END TREATMENT DETAILS, SEE DRAWING 41219.
  - ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

### REVISIONS

DATE DETAILS DRAWN



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### TYPICAL AUXILIARY LANE GEOMETRY

APPROVED: K. COLE, P. ENG.

DRAWING NUMBER

09-AUG-2016 UPDATED NOTES, DIMENSIONS; ADDED DIAGRAM FOR DIVIDED RIGHT TURN LANE D. LEGROW

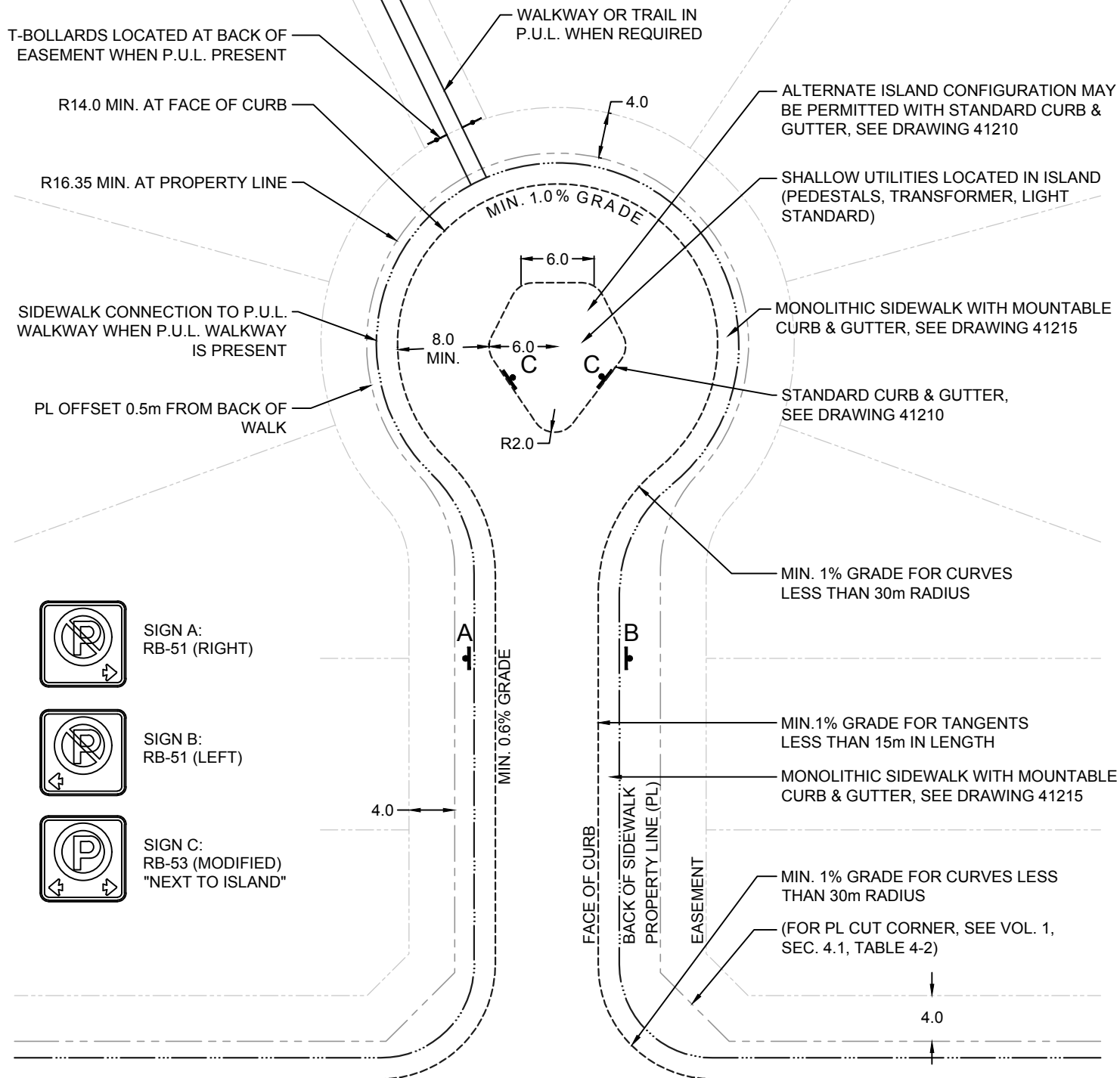
CHECKED: S. JOHNSON, P.TECH. (ENG.)

41011

18-FEB-2016 NEW DETAIL D. LEGROW

DATE: 18-FEB-2016 SCALE: N.T.S. DRAWN: D. LEGROW

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



# NOTES:

1. PARKING PERMITTED (24hr) AROUND ISLAND (APPROXIMATELY 5 STALLS).
2. ISLAND CONFIGURATION MUST BE SUCH THAT AN 8.0m LANE WIDTH IS MAINTAINED AROUND THE BULB TO ENSURE SUFFICIENT SPACE FOR PARKING/DRIVING, SNOW CLEARING, AND GARBAGE PICK UP.
3. NO PARKING PERMITTED IN BULB OR CURB RETURNS. "NO PARKING" SIGN SHALL BE LOCATED AT PROPERTY LINE PRIOR TO CURB RETURN, AND IN ACCORDANCE WITH DRIVEWAY CONFIGURATION.
4. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

## REVISIONS

DATE	DETAILS	DRAWN
13-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLERD
24-APR-2017	MINIMUM 1% GRADE ON CURB RETURN, ISLAND LAYOUT	D. LEGROW
10-MAR-2016	REVISED DRAWING NUMBERS	D. LEGROW
23-FEB-2016	UPDATED NOTES, SIGNAGE, ISLAND LAYOUT, SIDEWALK, DRAWING TITLE	D. LEGROW
12-FEB-2015	REVISED NOTES	J. ORR



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CUL-DE-SAC BULB - SIDEWALK, ISLAND, AND PARKING RESTRICTIONS  
CUL-DE-SAC P.U.L. CONTAINS A WALKWAY

APPROVED: K. COLE, P. ENG.

DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

41012

DATE: 22-DEC-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

T- BOLLARDS LOCATED AT BACK OF  
EASEMENT WHEN P.U.L. PRESENT

R14.0 MIN. AT FACE OF CURB

R15.0 MIN. AT PROPERTY LINE

ALTERNATE ISLAND CONFIGURATION MAY  
BE PERMITTED WITH STANDARD CURB &  
GUTTER, SEE DRAWING 41210

SHALLOW UTILITIES LOCATED IN ISLAND  
(PEDESTALS, TRANSFORMER, LIGHT  
STANDARD)

LOW-PROFILE CURB & GUTTER,  
SEE DRAWING 41212

STANDARD CURB & GUTTER,  
SEE DRAWING 41210

MIN. 1% GRADE FOR CURVES  
LESS THAN 30m RADIUS

SIDEWALK TO END AT OR BEFORE  
MIDPOINT OF CURB RETURN  
LEADING INTO CUL-DE-SAC BULB

MIN. 1% GRADE FOR TANGENTS  
LESS THAN 15m IN LENGTH

MONOLITHIC SIDEWALK WITH MOUNTABLE  
CURB & GUTTER, SEE DRAWING 41215

MIN. 1% GRADE FOR CURVES  
LESS THAN 30m RADIUS

(FOR PL CUT CORNER, SEE VOL. 1,  
SEC. 4.1, TABLE 4-2)



SIGN A:  
RB-51 (RIGHT)



SIGN B:  
RB-51 (LEFT)



SIGN C:  
RB-53 (MODIFIED)  
"NEXT TO ISLAND"

#### NOTES:

1. PARKING PERMITTED (24hr) AROUND ISLAND (APPROXIMATELY 5 STALLS).
2. ISLAND CONFIGURATION MUST BE SUCH THAT AN 8.0m LANE WIDTH IS MAINTAINED AROUND THE BULB TO ENSURE SUFFICIENT SPACE FOR PARKING/DRIVING, SNOW CLEARING, AND GARBAGE PICK UP.
3. NO PARKING PERMITTED IN BULB OR CURB RETURNS. "NO PARKING" SIGN SHALL BE LOCATED AT PROPERTY LINE PRIOR TO CURB RETURN, AND IN ACCORDANCE WITH DRIVEWAY CONFIGURATION.
4. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

#### REVISIONS



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CUL-DE-SAC BULB - SIDEWALK, ISLAND, AND PARKING RESTRICTIONS  
CUL-DE-SAC P.U.L. DOES NOT CONTAIN A WALKWAY

APPROVED: K. COLE, P. ENG.

DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

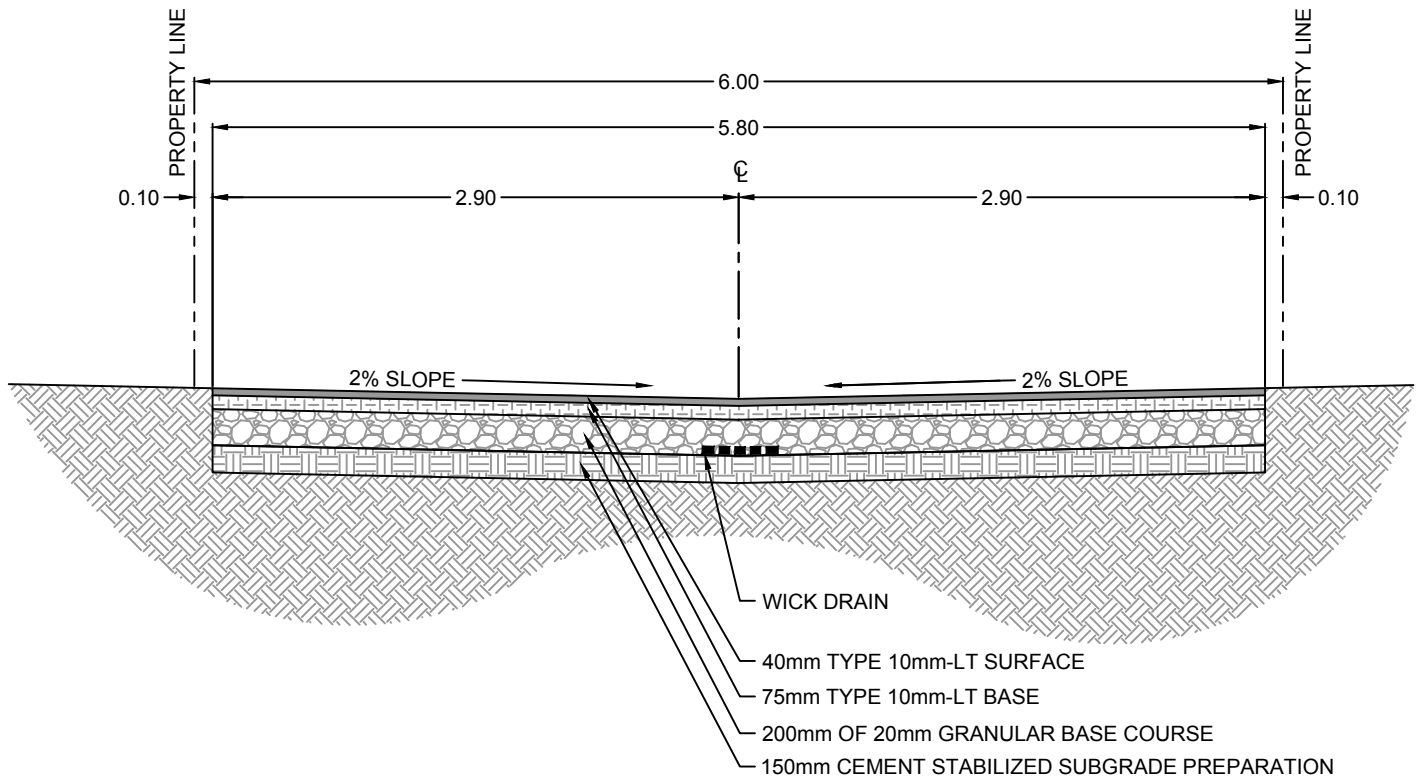
41013

DATE: 23-FEB-2016 SCALE: N.T.S. DRAWN: D. LEGROW, T.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT


DATE	DETAILS	DRAWN
13-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLER
24-APR-2017	MINIMUM 1% GRADE ON CURB RETURN, ISLAND LAYOUT	D. LEGROW
23-FEB-2016	CREATED DRAWING FROM SIDEWALK, ISLAND AND PARKING RESTRICTIONS DRAWING	D. LEGROW

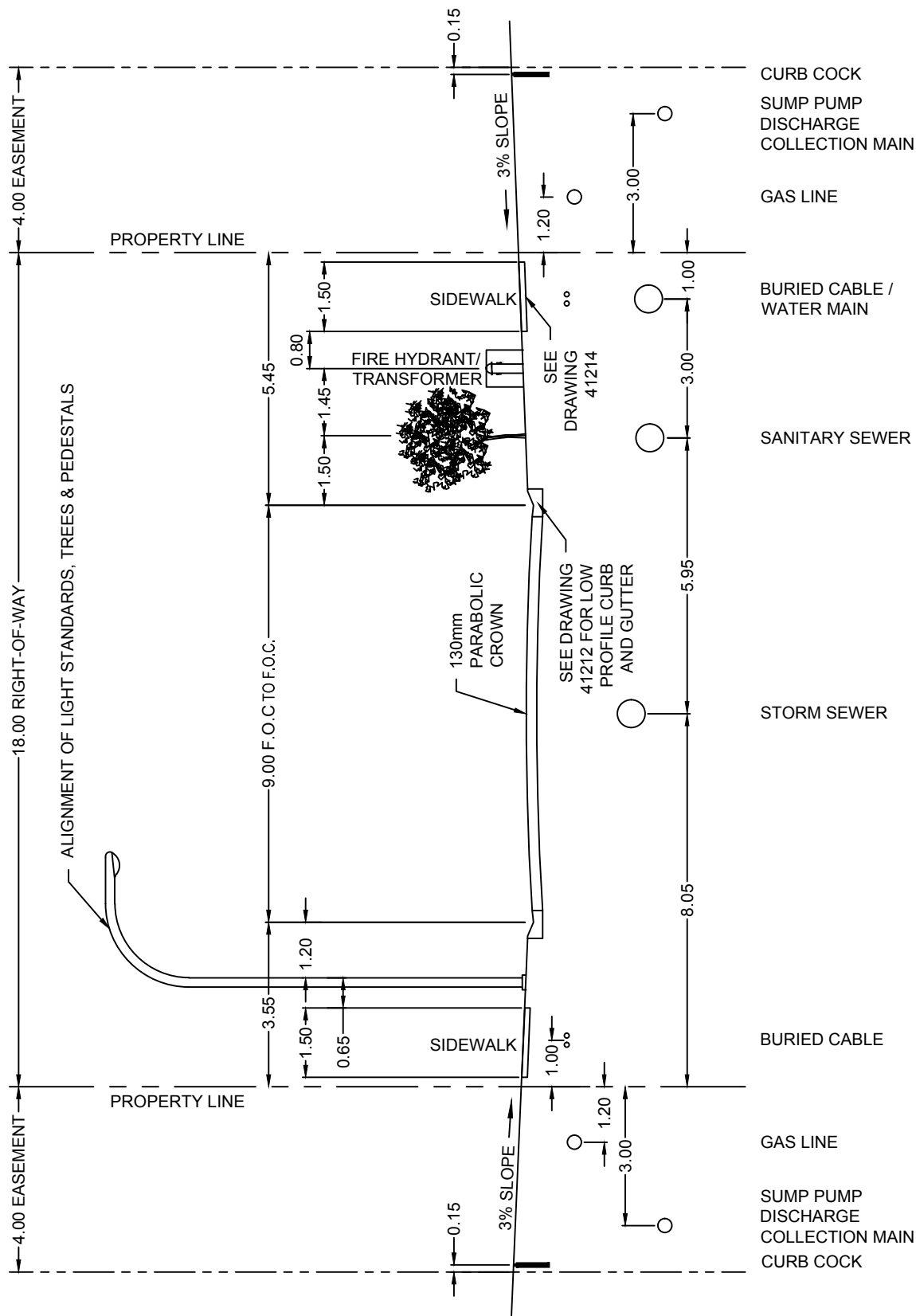
Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.



#### NOTES:

1. MINIMUM LONGITUDINAL GRADE FOR ASPHALT LANES IS 0.8%.
2. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
3. WICK DRAIN SHALL BE INSTALLED IN LANE OR AT CONNECTION TO STREET WHEN STORM SEWER PRESENT.

REVISIONS			<div> STRATHCONA COUNTY</div> <div>2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA</div> <div>© 2019</div>		
DATE	DETAILS	DRAWN			
13-SEP-2018	REVISED DRAWING NUMBERS, TITLE CHANGED	S. ENGLER	PAVED RESIDENTIAL LANE		
12-JAN-2017	REVISED LANE STRUCTURE	D. LEGROW			
21-DEC-2015	REVISED LANE STRUCTURE & NOTES	S. ENGLER	APPROVED: K. COLE, P. ENG.		DRAWING NUMBER
06-FEB-2015	REVISED LANE STRUCTURE	J. ORR	CHECKED: S. JOHNSON, P.TECH. (ENG.)		41101
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR	DATE: 18-DEC-1997	SCALE: N.T.S.	
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT		



- NOTES:
1. TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL.
  2. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41108.
  3. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

## REVISIONS

DATE	DETAILS	DRAWN
13-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLER
26-APR-2018	WICK DRAIN LOCATION, REMOVED 50mm CONDUIT	S. ENGLER
12-JAN-2017	REVISED ROAD STRUCTURE	D. LEGROW
21-DEC-2015	REVISED ROAD STRUCTURE	S. ENGLER
09-OCT-2015	ADDED 50mm CONDUIT, WICK DRAIN NOTE	D. LEGROW



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LOCAL RESIDENTIAL ROADWAY

18.0m RIGHT-OF-WAY, 9.0m SURFACE, SEPARATE SIDEWALK

APPROVED: K. COLE, P. ENG.

CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 08-JAN-1997

SCALE: N.T.S.

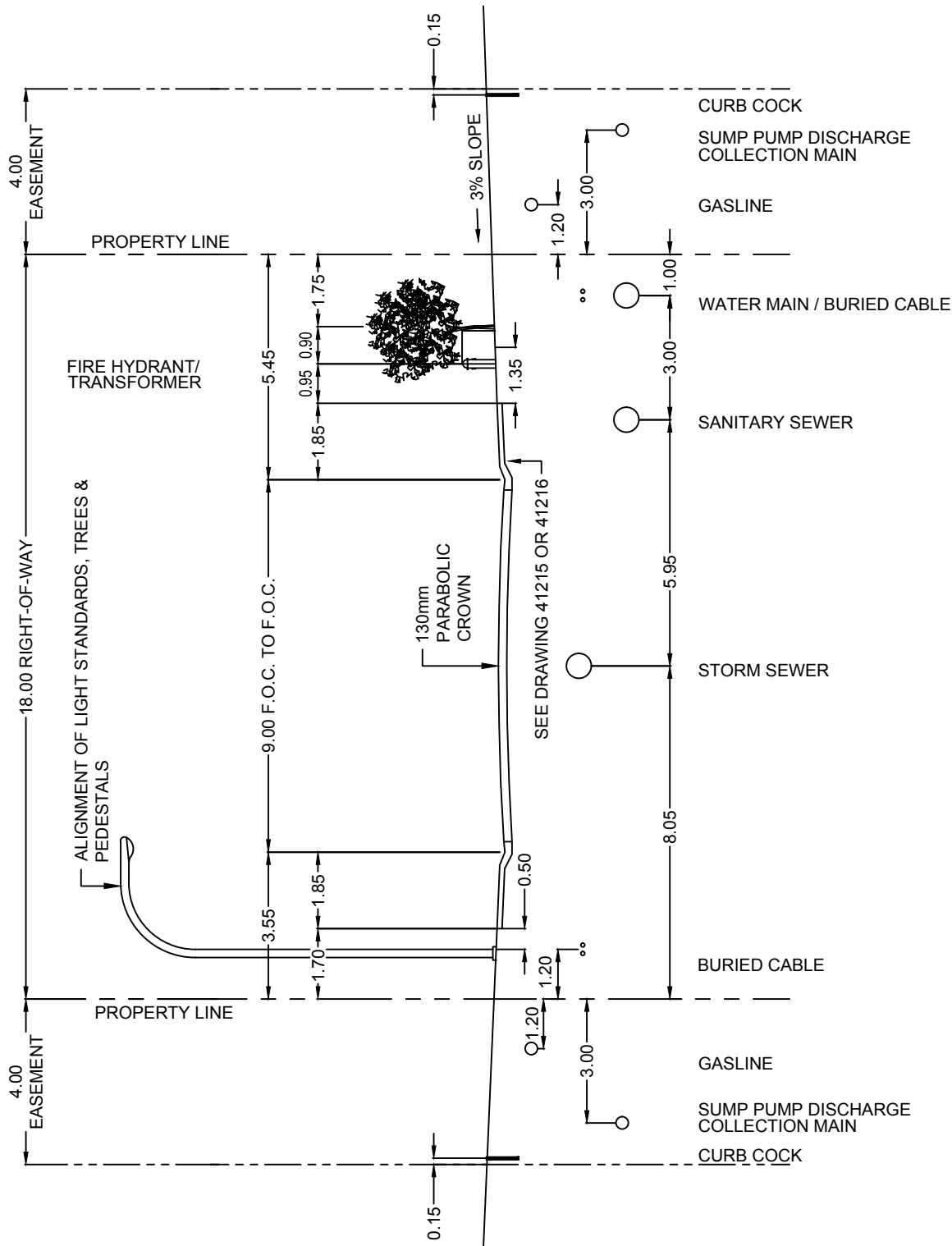
DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER


41102

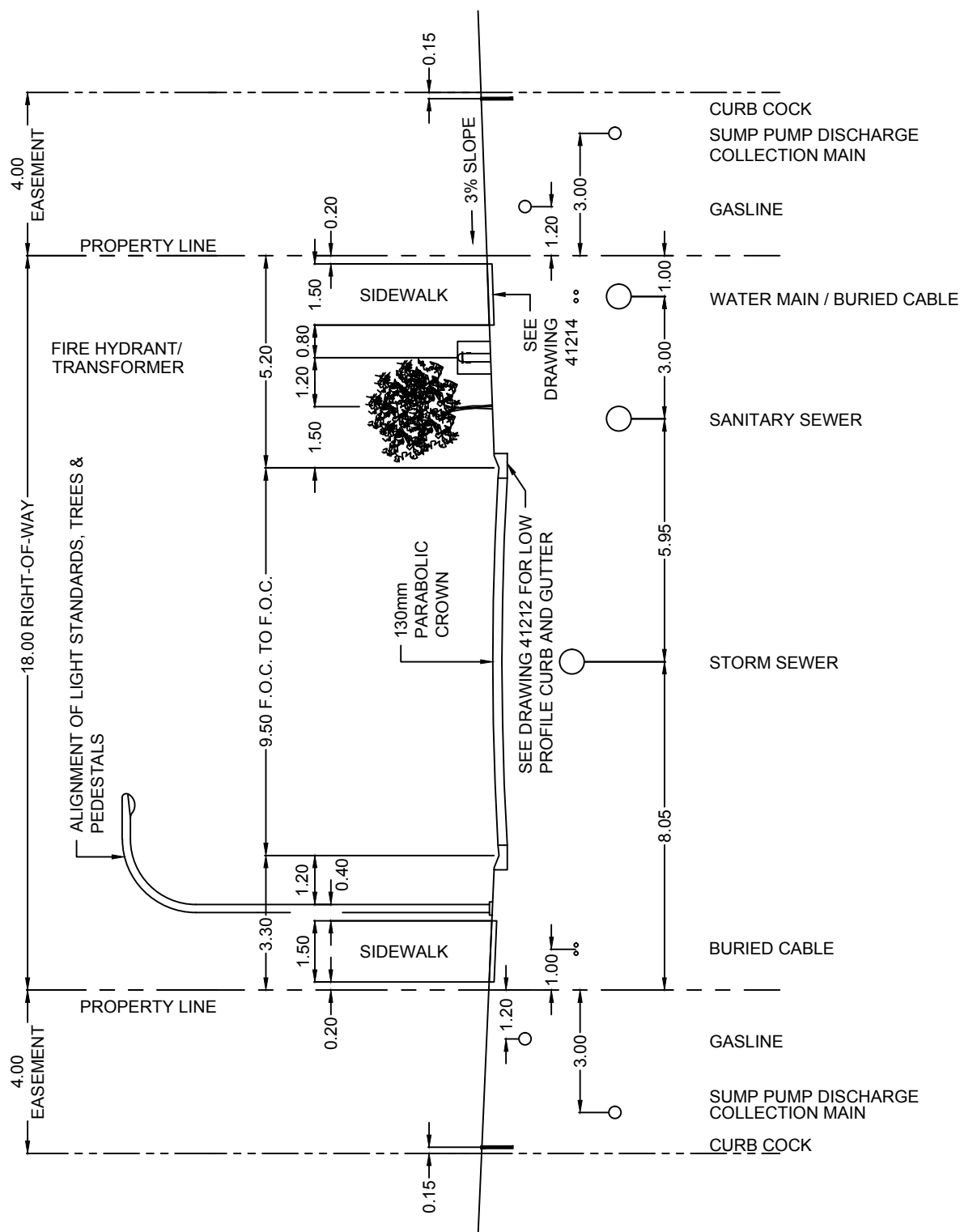
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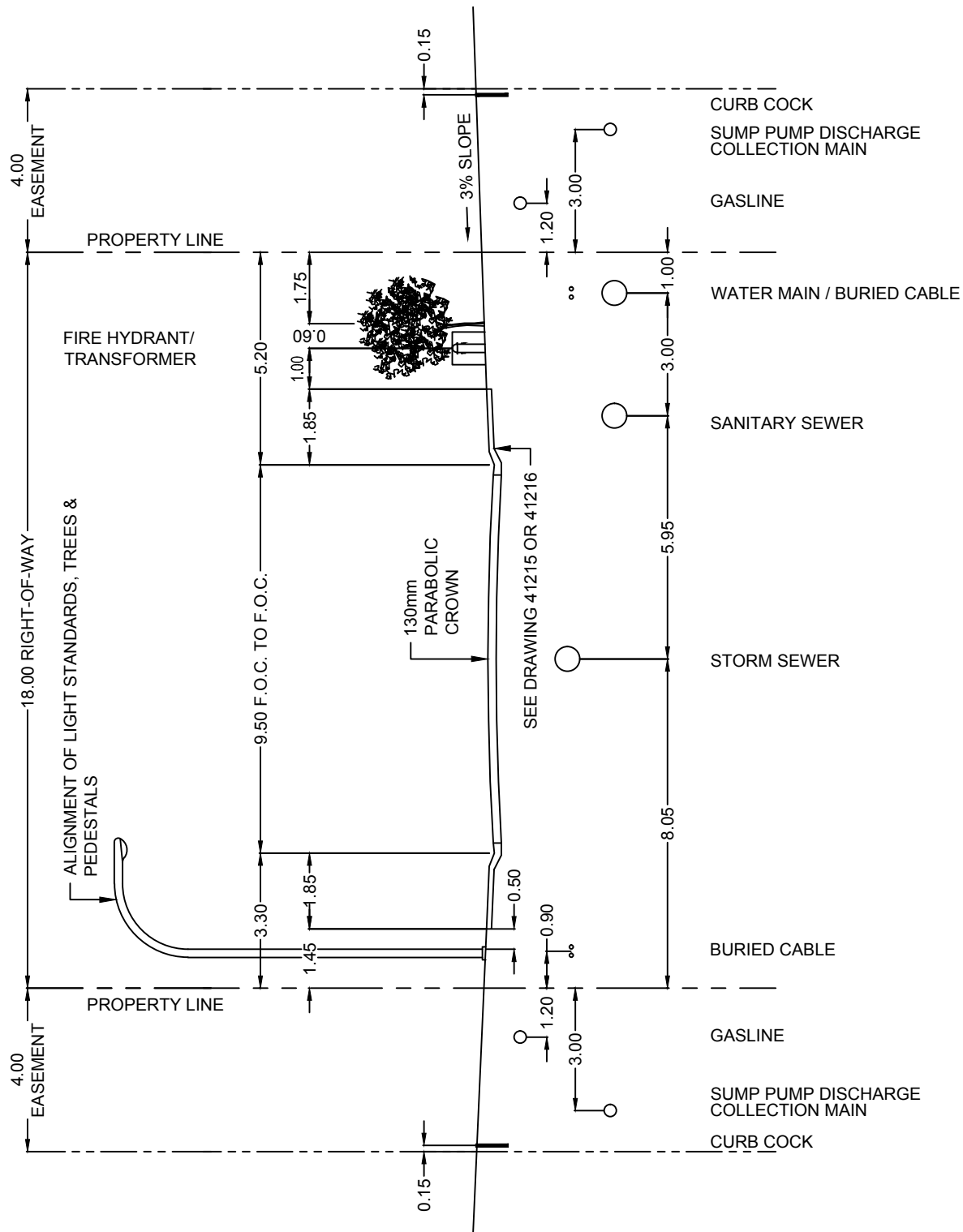
- NOTES:
1. TRANSFORMER TO BE CENTERED 1.35m AWAY FROM BACK OF WALK.
  2. ALIGNMENT OF LIGHT STANDARDS AND UTILITY PEDESTALS TO BE MINIMUM 0.50m AWAY FROM BACK OF WALK.
  3. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
  4. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41108.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
13-SEP-2018	REVISED DWG NUMBERS, ADDED REF. TO DWG 41216	S. ENGLER	LOCAL RESIDENTIAL ROADWAY 18.0m RIGHT-OF-WAY, 9.0m SURFACE, MONOLITHIC SIDEWALK			
01-AUG-2018	WICK DRAIN LOCATION, REMOVED 50mm CONDUIT	S. ENGLER				
30-NOV-2016	CORRECTED MONOWALK DRAWING REFERENCE, REVISED ROAD STRUCTURE	D. LEGROW	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER  <b>41103</b>
21-DEC-2015	REVISED ROAD STRUCTURE	S. ENGLER	CHECKED: S. JOHNSON, P.TECH. (ENG.)			
09-OCT-2015	ADDED 50mm CONDUIT, WICK DRAIN NOTE	D. LEGROW	DATE: 01-AUG-1997	SCALE: N.T.S.	DRAWN: R. DEKKER, C.E.T.	
						TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



- NOTES:
- TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL.
  - ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
  - FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41108.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
14-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLER	LOCAL RESIDENTIAL ROADWAY 18.0m RIGHT-OF-WAY, 9.5m SURFACE, SEPARATE SIDEWALK			
01-AUG-2018	WICK DRAIN LOCATION, REMOVED 50mm CONDUIT	S. ENGLER				
12-JAN-2017	REVISED ROAD STRUCTURE	D. LEGROW	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER  <b>41104</b>
21-JAN-2015	REVISED ROAD STRUCTURE	S. ENGLER	CHECKED: S. JOHNSON, P.TECH. (ENG.)			
09-OCT-2015	ADDED 50mm CONDUIT, WICK DRAIN NOTE	D. LEGROW	DATE: 01-AUG-1997	SCALE: N.T.S.	DRAWN: R. DEKKER, C.E.T.	
						TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



- NOTES:
1. TRANSFORMER TO BE CENTERED 1.00m AWAY FROM BACK OF WALK.
  2. ALIGNMENT OF LIGHT STANDARDS AND UTILITY PEDESTALS TO BE 0.50m AWAY FROM BACK OF WALK.
  3. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
  4. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41108.

## REVISIONS

DATE	DETAILS	DRAWN
14-SEP-2018	REVISED DWG NUMBERS, ADDED REF. TO DWG 41216	S. ENGLER
08-AUG-2018	WICK DRAIN LOCATION, REMOVED 50mm CONDUIT	S. ENGLER
12-JAN-2017	REVISED ROAD STRUCTURE	D. LEGROW
21-JAN-2015	REVISED ROAD STRUCTURE	S. ENGLER
09-OCT-2015	ADDED 50mm CONDUIT, WICK DRAIN NOTE	D. LEGROW



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LOCAL RESIDENTIAL ROADWAY

18.0m RIGHT-OF-WAY, 9.5m SURFACE, MONOLITHIC SIDEWALK

APPROVED: K. COLE, P. ENG.

CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 05-OCT-1997

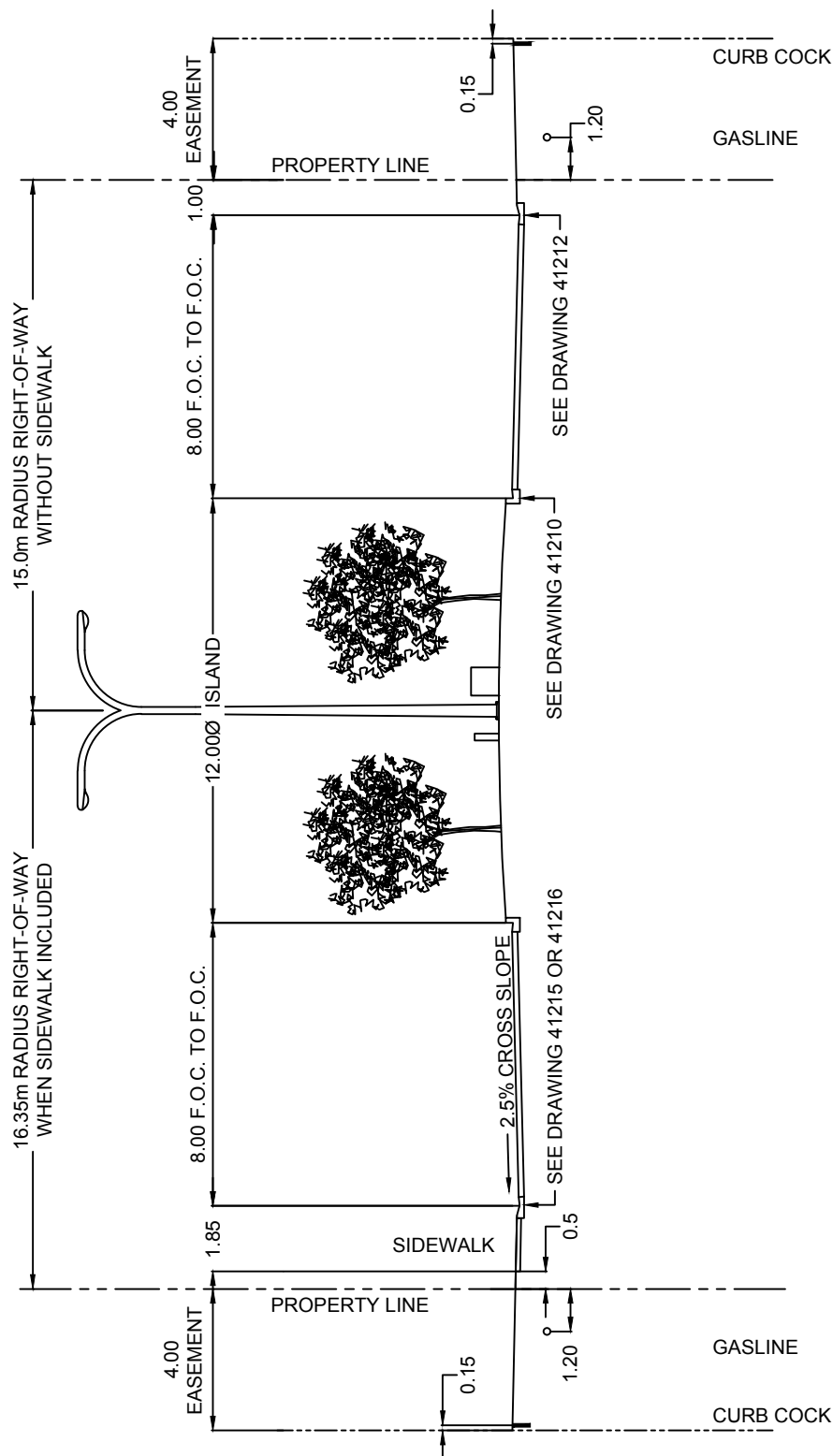
SCALE: N.T.S.

DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER

**41105**

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



# NOTES:

1. LIGHT STANDARD AND UTILITY PEDESTALS/TRANSFORMERS ARE TO BE LOCATED IN THE ISLAND.
2. POWER, CABLE TV, AND TELEPHONE LINES TO RADIATE OUTWARD FROM ISLAND TO EACH RESIDENTIAL LOT IN CONDUIT.
3. WHEN CUL-DE-SAC BULB CONNECTS TO A P.U.L. WITH A WALKWAY/TRAIL, ENSURE THAT A SIDEWALK EXTENDS TO THE WALKWAY/TRAIL, AND PROPERTY AND GAS LINES MAINTAIN PROPER CLEARANCE FROM SIDEWALK. IF THERE IS NO P.U.L., OR IF THE P.U.L. DOES NOT CONTAIN A WALKWAY/TRAIL, THE SIDEWALK SHALL TERMINATE AT/AROUND THE MID-POINT OF THE RETURN RADIUS OF THE CUL-DE-SAC BULB. SEE DRAWINGS 41012 AND 41013 FOR MORE DETAILS.
4. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41108.
5. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

## REVISIONS

DATE	DETAILS	DRAWN
14-SEP-2018	REVISED DRAWING NUMBERS, CHANGED TITLE, ADDED REFERENCE TO DWG 41216	S. ENGLEDER
29-MAR-2017	UPDATED DRAWING REFERENCES	D. LEGROW
22-DEC-2016	DOUBLE - HEAD LIGHT STANDARD IN ISLAND	D. LEGROW
21-DEC-2015	ADDED SIDEWALK AND NOTE	S. ENGLEDER
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR



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## LOCAL RESIDENTIAL ROADWAY CUL-DE-SAC BULB - CROSS SECTION

APPROVED: K. COLE, P. ENG.

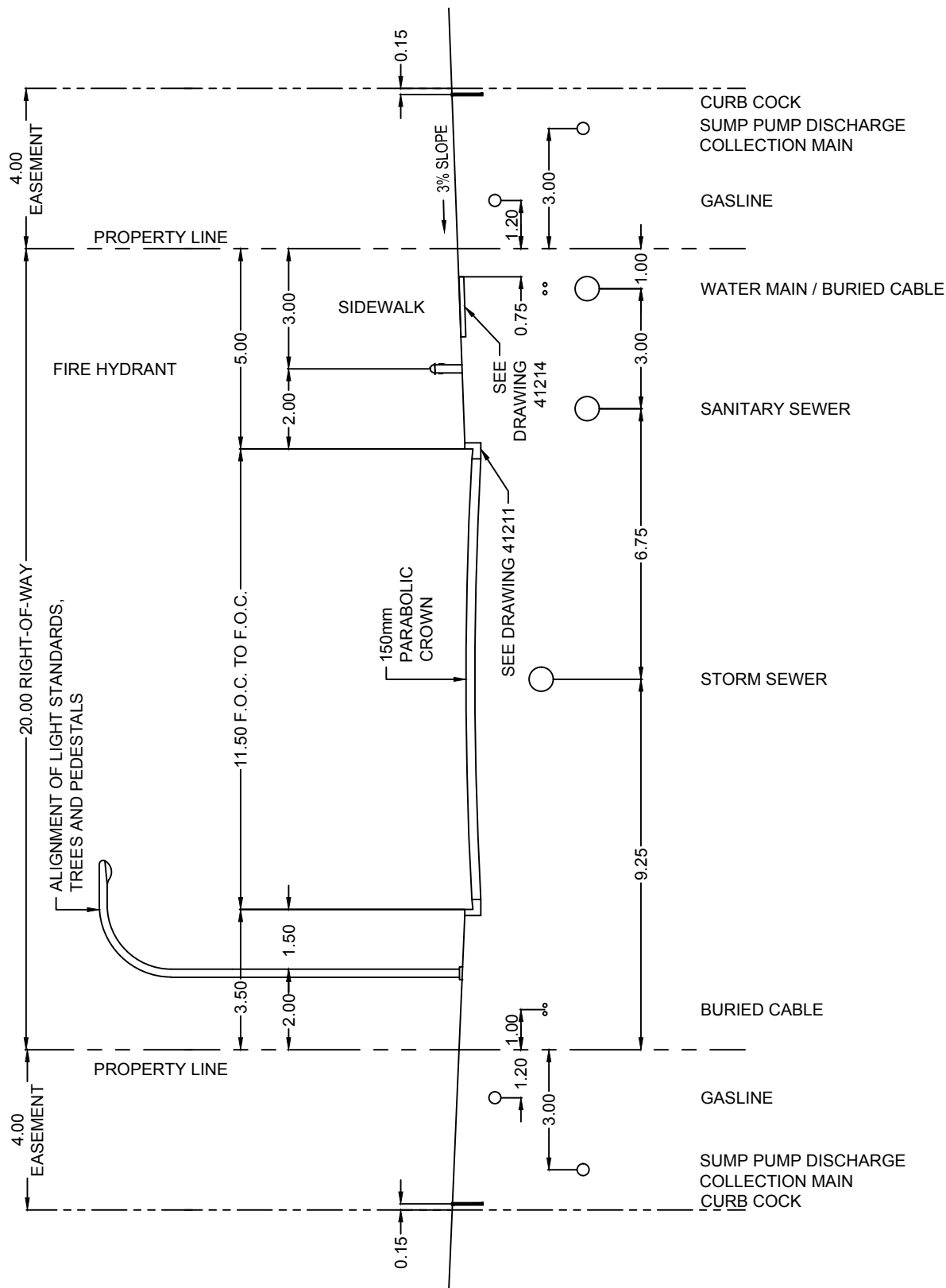
CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 05-JUN-2003 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER

41106

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



- NOTES:
1. TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL.
  2. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
  3. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41108.

## REVISIONS

DATE	DETAILS	DRAWN
14-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLER
02-AUG-2018	WICK DRAIN LOCATION, REMOVED 50mm CONDUIT	S. ENGLER
15-DEC-2016	REVISED TITLE AND ROAD STRUCTURE	D. LEGROW
21-DEC-2015	REVISED ROAD STRUCTURE	S. ENGLER
06-FEB-2015	ADDED 50mm CONDUIT, WICK DRAIN NOTE, CHANGED TITLE	D. LEGROW



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LOCAL INDUSTRIAL/BUSINESS COMMERCIAL ROADWAY  
20.0m RIGHT-OF-WAY, 11.5m SURFACE, SEPARATE SIDEWALK

APPROVED: K. COLE, P. ENG.

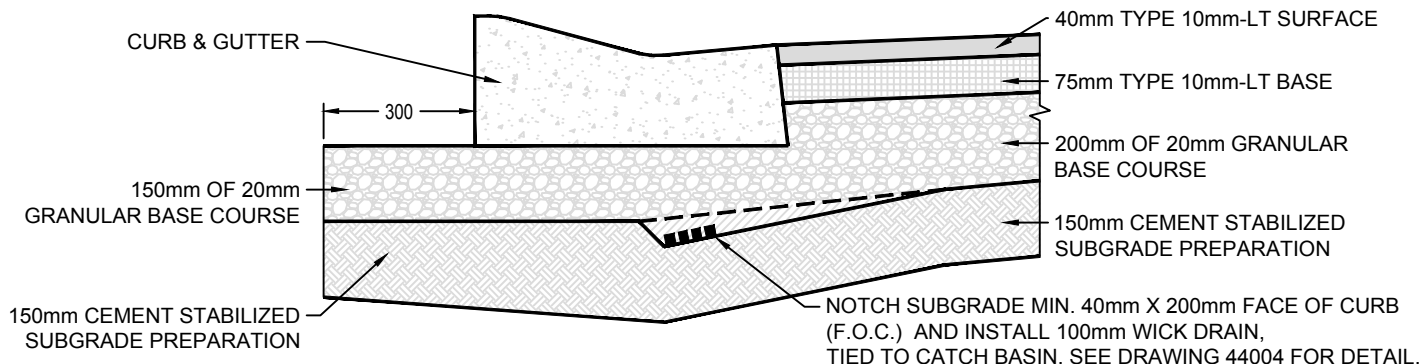
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CHECKED: S. JOHNSON, P.TECH. (ENG.)

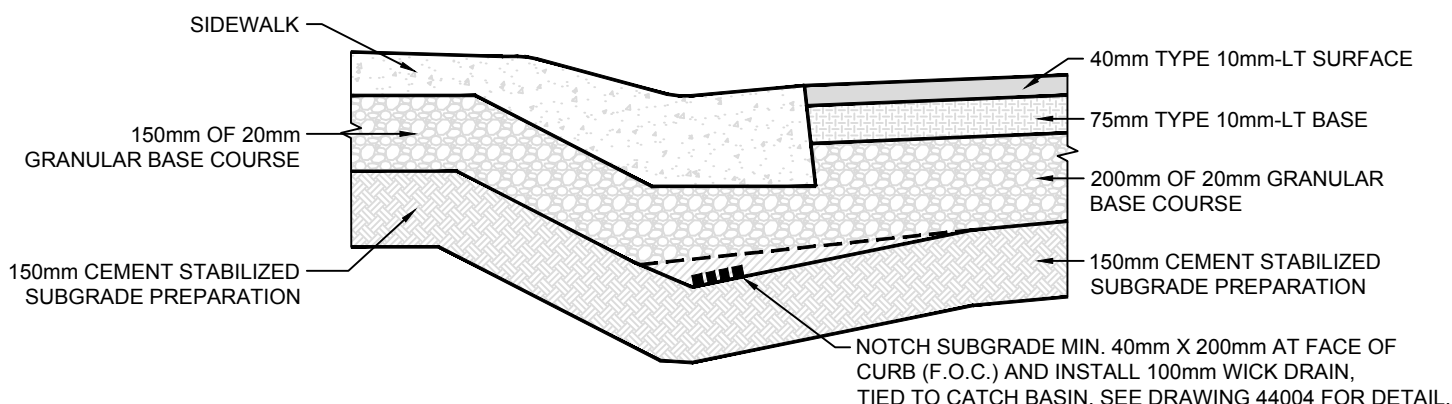
41107

DATE: 01-AUG-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

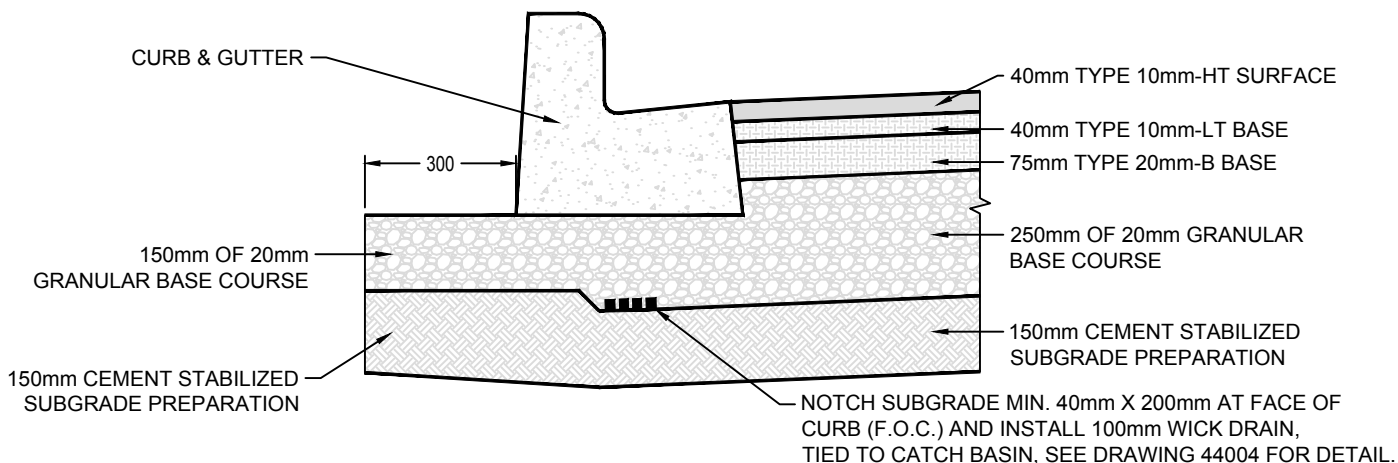
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### LOCAL RESIDENTIAL ROADWAY - SEPARATE SIDEWALK




### LOCAL RESIDENTIAL ROADWAY - MONOLITHIC SIDEWALK

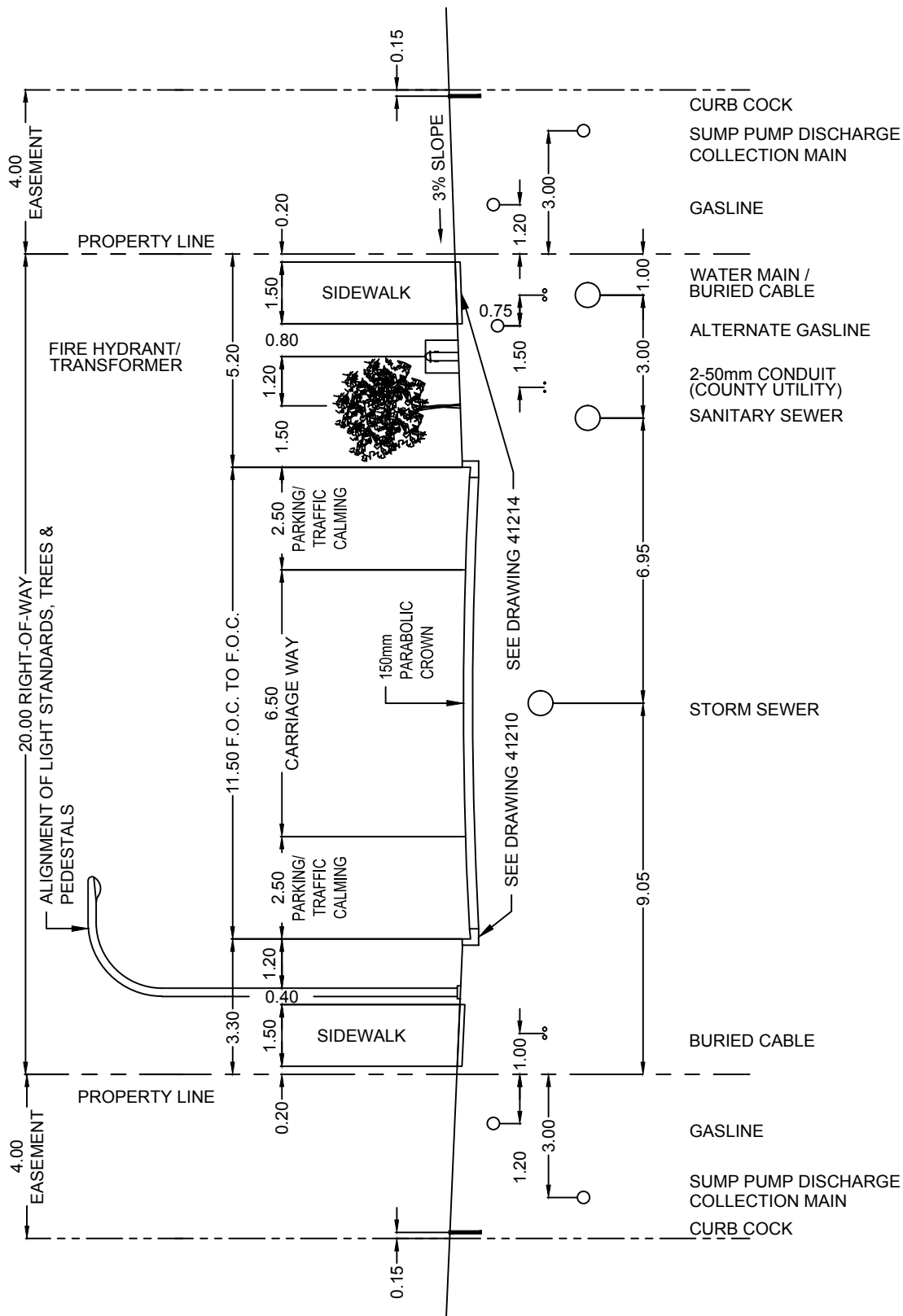


### LOCAL INDUSTRIAL / BUSINESS COMMERCIAL ROADWAY


#### NOTES:

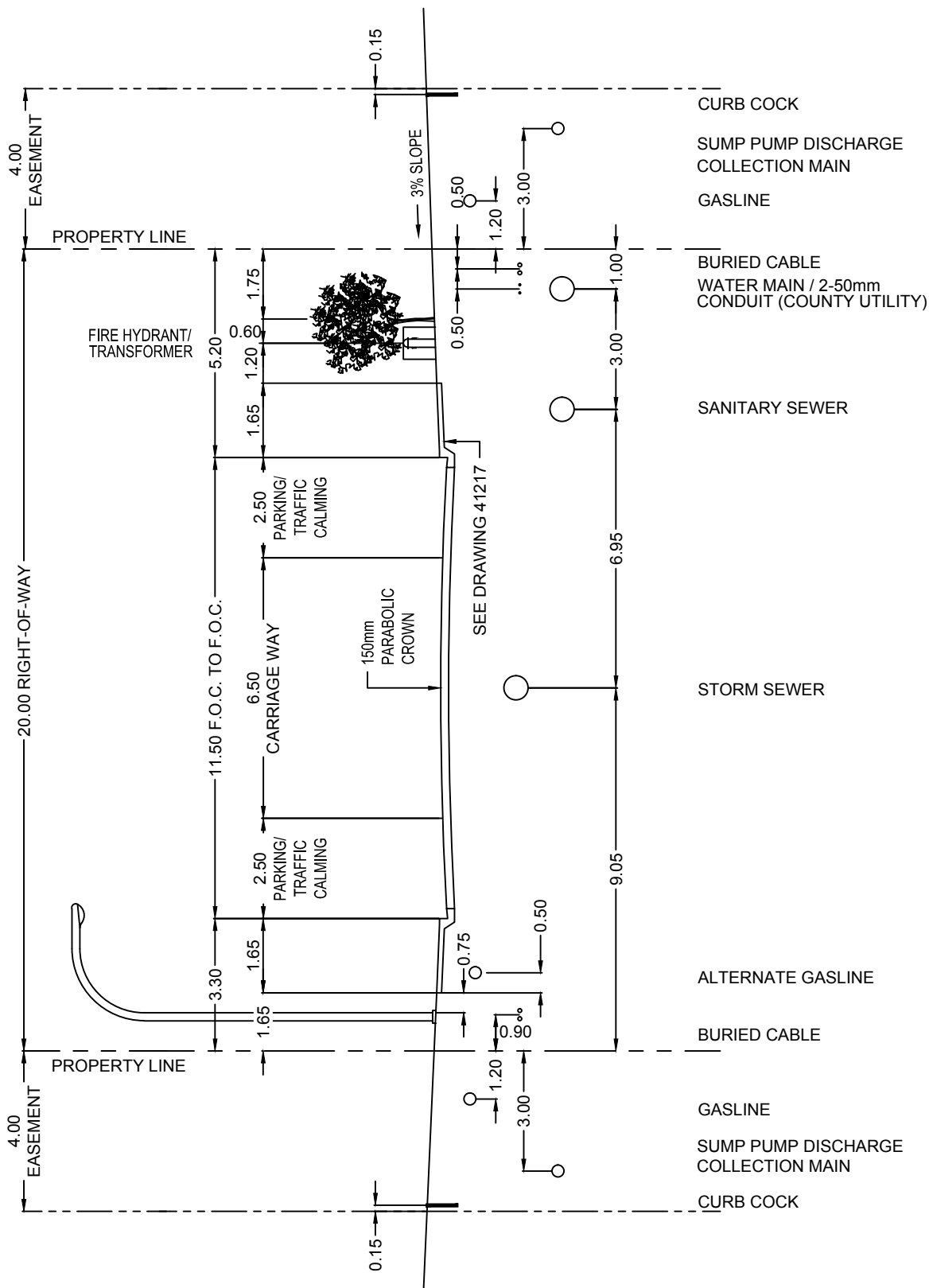
1. ENSURE POSITIVE LONGITUDINAL GRADE ALONG BASE OF WICK DRAIN AND DRAINAGE FROM BOTH SIDES.
2. IF GRANULAR BASE IS NOT BEING USED UNDER THE CURB AND GUTTER, INSTALL WICK DRAIN AT THE EDGE OF THE GRANULAR BASE UNDER THE ROADWAY.
3. ROAD STRUCTURE AS PER VOLUME 1 SECTION 4.1, TABLE 4-5 OR 4-6.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY	2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA		© 2019
DATE	DETAILS	DRAWN				
			LOCAL ROADWAY ROAD STRUCTURE AND WICK DRAIN			
			APPROVED: K. COLE, P. ENG.			DRAWING NUMBER  <b>41108</b>
			CHECKED: S. JOHNSON, P.TECH. (ENG.)			
18-OCT-2018	NEW DETAIL	J. EGGEN	DATE: 18-OCT-2018	SCALE: N.T.S.	DRAWN: J.EGGEN, P.L.(ENG.)	TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



- NOTES:
1. TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL.
  2. ALTERNATE GAS LINE SHOWN FOR USE ONLY WHERE RESIDENTIAL DEVELOPMENT RESTRICTS ACCESS TO THE EASEMENT (SUCH AS WHERE THERE IS A FENCE ON THE BACK OR SIDE OF THE PROPERTY, ALONG THE ROADWAY).
  3. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
  4. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41111.
  5. 50mm CONDUIT SHOWN FOR USE ONLY WHERE REQUIRED BY THE COUNTY FOR FUTURE SIGNAL NETWORK SYSTEMS (CONFIRM INSTALL REQUIREMENTS WITH THE COUNTY PRIOR TO CONSTRUCTION).

REVISIONS			 STRATHCONA COUNTY				2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA		© 2019
DATE	DETAILS	DRAWN							
14-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLERD	MINOR RESIDENTIAL COLLECTOR ROADWAY 20.0m RIGHT-OF-WAY, 11.5m SURFACE, SEPARATE SIDEWALK						
10-SEP-2018	WICK DRAIN LOCATION	S. ENGLERD							
15-DEC-2016	ADDED PARKING/TRAFFIC CALMING LANES & ALT. GAS LINE, REVISED TITLE & STRUCTURE	D. LEGROW	APPROVED: K. COLE, P. ENG.					DRAWING NUMBER	
29-FEB-2016	REVISED ROAD STRUCTURE	D. LEGROW	CHECKED: S. JOHNSON, P.TECH. (ENG.)					41109	
09-OCT-2015	ADDED 50mm CONDUIT, WICK DRAIN NOTE	D. LEGROW	DATE: 05-AUG-1997	SCALE: N.T.S.	DRAWN: R. DEKKER, C.E.T.				
									TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



#### NOTES:

1. TRANSFORMER TO BE CENTERED 1.00m AWAY FROM BACK OF WALK.
2. ALIGNMENT OF LIGHT STANDARDS AND UTILITY PEDESTALS TO BE 0.50m AWAY FROM BACK OF WALK.
3. ALTERNATE GAS LINE SHOWN FOR USE ONLY WHERE RESIDENTIAL DEVELOPMENT RESTRICTS ACCESS TO THE EASEMENT (SUCH AS WHERE THERE IS A FENCE ON THE BACK OR SIDE OF THE PROPERTY, ALONG THE ROADWAY).
4. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
5. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41111.
6. 50mm CONDUIT SHOWN FOR USE ONLY WHERE REQUIRED BY THE COUNTY FOR FUTURE SIGNAL NETWORK SYSTEMS (CONFIRM INSTALL REQUIREMENTS WITH THE COUNTY PRIOR TO CONSTRUCTION).

#### REVISIONS

DATE	DETAILS	DRAWN
27-AUG-2019	CORRECTED SIDEWALK DIMENSIONS	P. TOMKO
14-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLER
11-SEP-2018	WICK DRAIN LOCATION	S. ENGLER
15-DEC-2016	ADDED PARKING/TRAFFIC CALMING LANES AND ALT. GAS LINE, REVISED TITLE AND ROAD STRUCTURE	D. LEGROW
29-FEB-2016	REVISED ROAD STRUCTURE	D. LEGROW



STRATHCONA  
COUNTY

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

© 2019

MINOR RESIDENTIAL COLLECTOR ROADWAY  
20.0m RIGHT-OF-WAY, 11.5m SURFACE, MONOLITHIC SIDEWALK

APPROVED: K. COLE, P. ENG.

DRAWING NUMBER

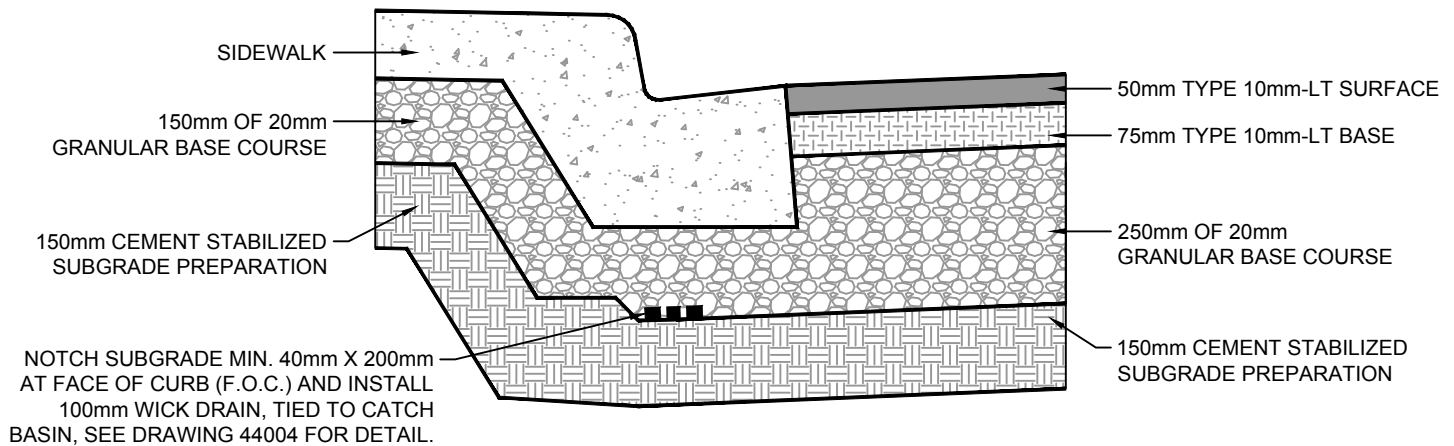
CHECKED: S. JOHNSON, P.TECH. (ENG.)

41110

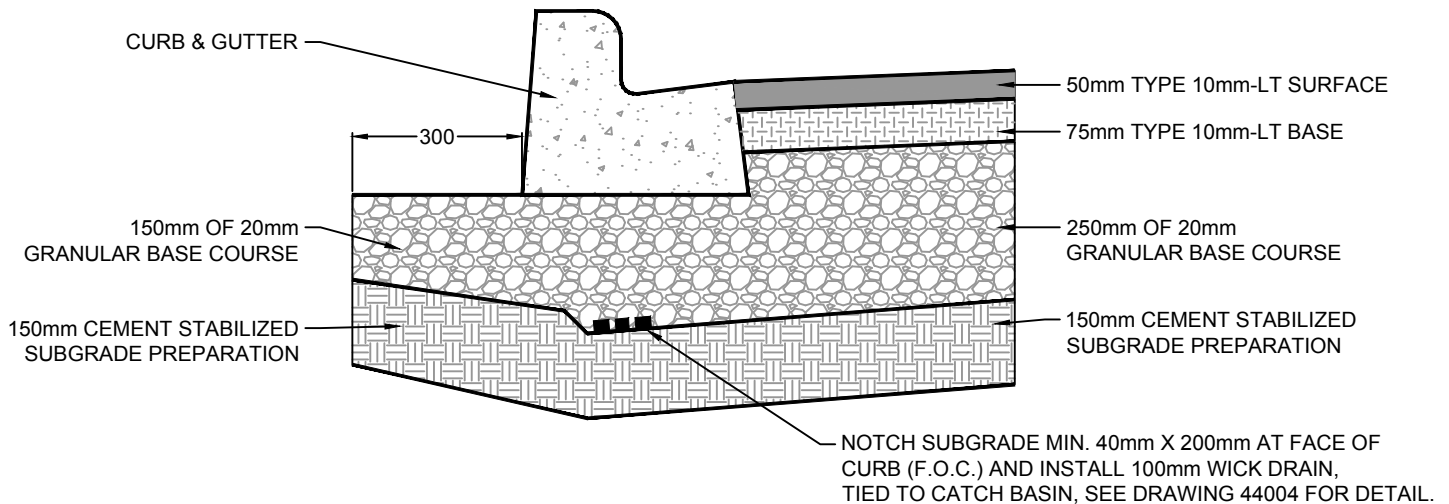
DATE: 05-AUG-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT






### MINOR RESIDENTIAL COLLECTOR ROADWAY - MONOLITHIC SIDEWALK



### MINOR RESIDENTIAL COLLECTOR ROADWAY - SEPARATE SIDEWALK


#### NOTES:

1. ENSURE POSITIVE LONGITUDINAL GRADE ALONG BASE OF WICK DRAIN AND DRAINAGE FROM BOTH SIDES.
2. IF GRANULAR BASE IS NOT BEING USED UNDER THE CURB AND GUTTER, INSTALL WICK DRAIN AT THE EDGE OF THE GRANULAR BASE UNDER THE ROADWAY.
3. ROAD STRUCTURE AS PER VOLUME 1 SECTION 4.1, TABLE 4-5 OR 4-6.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

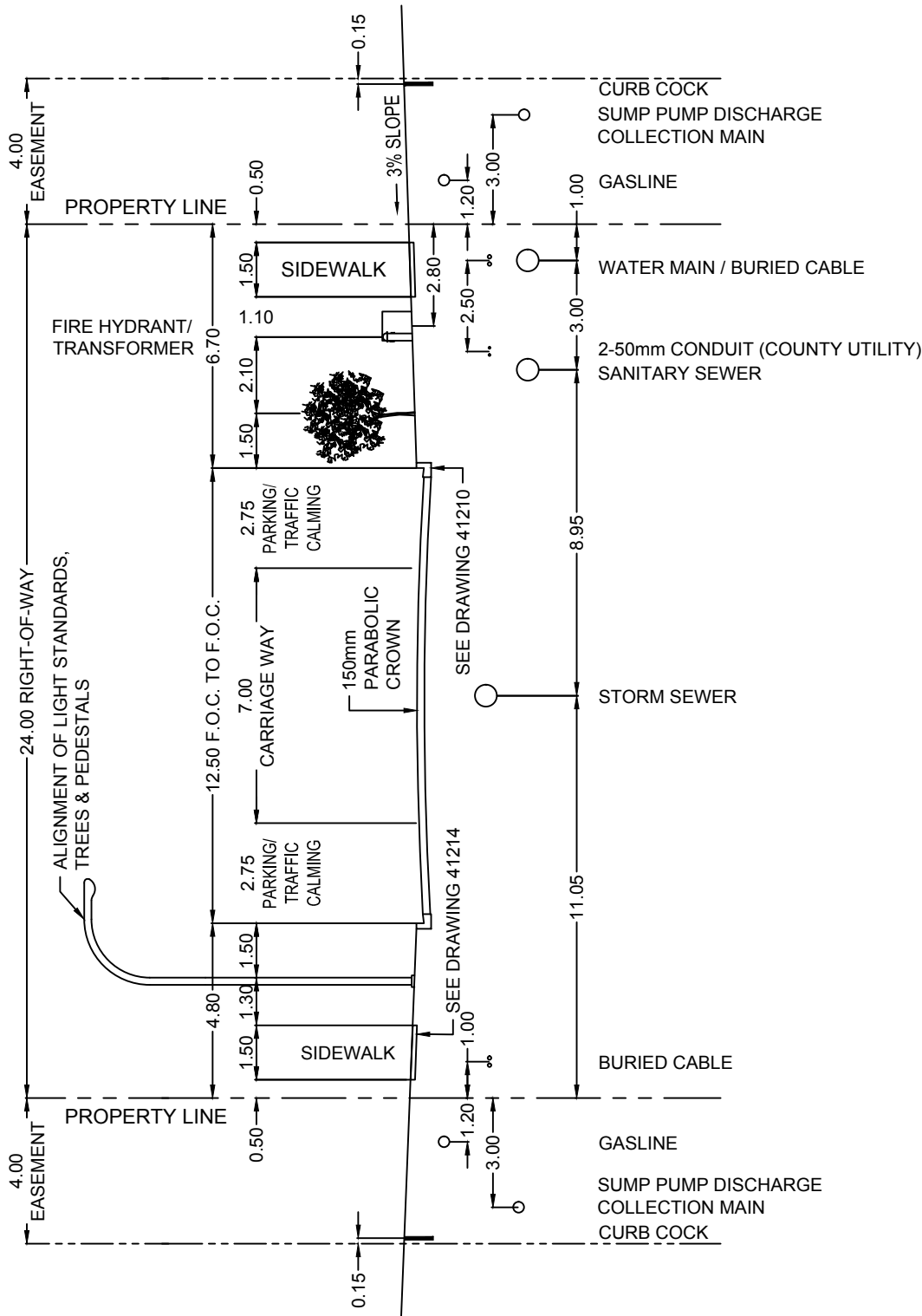
REVISIONS			 STRATHCONA COUNTY			2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019	
DATE	DETAILS	DRAWN								
			MINOR RESIDENTIAL COLLECTOR ROADWAY STRUCTURE AND WICK DRAIN							
			APPROVED: K. COLE, P. ENG.						DRAWING NUMBER	
			CHECKED: S. JOHNSON, P.TECH. (ENG.)						41111	
17-OCT-2018	CREATED DETAIL	J. EGGEN	DATE: 17-OCT-2018	SCALE: N.T.S.	DRAWN: J.EGGEN P.L.(ENG.)		TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT			

[illegible]

1. TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL.
2. PLANTING ZONES MUST PROVIDE FOR 1.50m OFFSET FROM ALL STREET FURNITURE.
3. ALTERNATE GAS LINE SHOWN FOR USE ONLY WHERE RESIDENTIAL DEVELOPMENT RESTRICTS ACCESS TO THE EASEMENT (SUCH AS WHERE THERE IS A FENCE ON THE BACK OR SIDE OF THE PROPERTY, ALONG THE ROADWAY).
4. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
5. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41118.
6. 50mm CONDUIT SHOWN FOR USE ONLY WHERE REQUIRED BY THE COUNTY FOR FUTURE SIGNAL NETWORK SYSTEMS (CONFIRM INSTALL REQUIREMENTS WITH THE COUNTY PRIOR TO CONSTRUCTION).

REVISIONS			 <b>STRATHCONA COUNTY</b> 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
11-SEP-2018	REVISED DRAWING NUMBERS, CHANGED TITLE	S. ENGLER	<b>MAJOR RESIDENTIAL COLLECTOR ROADWAY</b> <b>24.0m RIGHT-OF-WAY, 7.0m SURFACE, SEPARATE SIDEWALK</b>			
15-DEC-2016	ADDED TRAFFIC CALMING ZONES AND ALT. GAS LINE, REVISED TITLE AND ROAD STRUCTURE	D. LEGROW				
07-JUN-2016	ADDED MINIMUM ROAD STRUCTURE DIAGRAM	D. LEGROW	APPROVED: K. COLE, P.ENG.			DRAWING NUMBER
09-OCT-2015	ADDED 50mm CONDUIT	D. LEGROW	CHECKED: S. JOHNSON, P.TECH. (ENG.)			<b>41112</b> <small>TRANSPORTATION PLANNING &amp; ENGINEERING DEPARTMENT</small>
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR	DATE: 30-JAN-2004	SCALE: N.T.S.	DRAWN: R. DEKKER, C.E.T.	

# **TWO LANES OF PARKING (DEMARKED WITH TWO SOLID WHITE PAINTED LINES)**



## **NOTES:**

1. TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL.
2. PLANTING ZONES MUST PROVIDE FOR 1.50m OFFSET FROM ALL STREET FURNITURE.
3. ALTERNATE GAS LINE SHOWN FOR USE ONLY WHERE RESIDENTIAL DEVELOPMENT RESTRICTS ACCESS TO THE EASEMENT (SUCH AS WHERE THERE IS A FENCE ON THE BACK OR SIDE OF THE PROPERTY, ALONG THE ROADWAY).
4. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
5. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41118.
6. 50mm CONDUIT SHOWN FOR USE ONLY WHERE REQUIRED BY THE COUNTY FOR FUTURE SIGNAL NETWORK SYSTEMS (CONFIRM INSTALL REQUIREMENTS WITH THE COUNTY PRIOR TO CONSTRUCTION).

## **REVISIONS**

DATE	DETAILS	DRAWN
14-SEP-2018	REVISED DRAWING NUMBERS, CHANGED TITLE	S. ENGLERD
15-DEC-2016	ADDED TRAFFIC CALMING ZONES AND ALT. GAS LINE, REVISED TITLE AND ROAD STRUCTURE	D. LEGROW
07-JUN-2016	ADDED MINIMUM ROAD STRUCTURE DIAGRAM	D. LEGROW
21-DEC-2015	CHANGED ROAD CROWN TO 150mm	S. ENGLERD
09-OCT-2015	ADDED 50mm CONDUIT	D. LEGROW



**STRATHCONA  
COUNTY**

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

© 2019

**MAJOR RESIDENTIAL COLLECTOR ROADWAY  
24.0m RIGHT-OF-WAY, 12.5m SURFACE, SEPARATE SIDEWALK**

APPROVED: K. COLE, P. ENG.

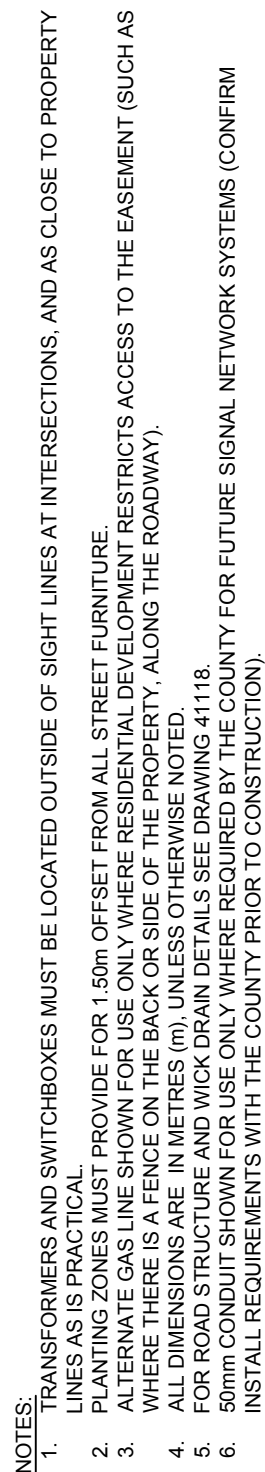
CHECKED: S. JOHNSON, P.TECH. (ENG.)


DATE: 30-JAN-2004 | SCALE: N.T.S. | DRAWN: R. DEKKER, C.E.T.

**DRAWING NUMBER**

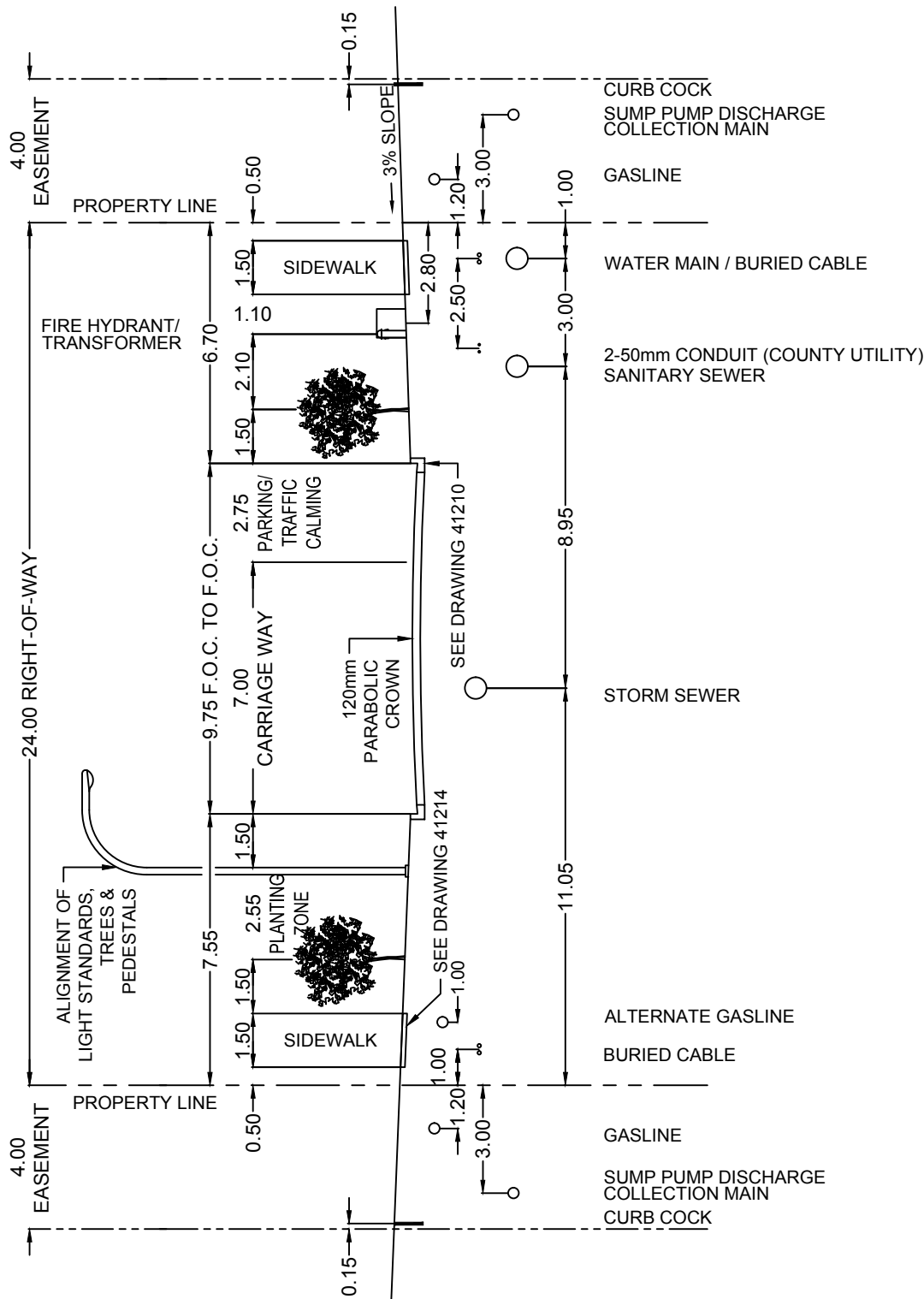
**41113**

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



REVISIONS			 <b>STRATHCONA COUNTY</b> 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			
DATE	DETAILS	DRAWN				© 2019
11-SEP-2018	REVISED DRAWING NUMBERS, CHANGED TITLE	S. ENGLADER	<b>MAJOR RESIDENTIAL COLLECTOR ROADWAY - PARKING LEFT  24.0m RIGHT-OF-WAY, 9.75m SURFACE, SEPARATE SIDEWALK</b>			
15-DEC-2016	ADDED TRAFFIC CALMING ZONES AND ALT. GAS LINE, REVISED TITLE AND ROAD STRUCTURE	D. LEGROW				
07-JUN-2016	ADDED MINIMUM ROAD STRUCTURE DIAGRAM	D. LEGROW	APPROVED: K. COLE, P. ENG.			<b>41114</b> <small>TRANSPORTATION PLANNING &amp; ENGINEERING DEPARTMENT</small>
09-OCT-2015	ADDED 50mm CONDUIT	D. LEGROW	CHECKED: S. JOHNSON, P.TECH. (ENG.)			
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR	DATE: 30-JAN-2004	SCALE: N.T.S.	DRAWN: R. DEKKER, C.E.T.	

ONE LANE OF PARKING  
(DEMARKED WITH A SOLID WHITE PAINTED LINE)



NOTES:

1. TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL.
2. PLANTING ZONES MUST PROVIDE FOR 1.50m OFFSET FROM ALL STREET FURNITURE.
3. ALTERNATE GAS LINE SHOWN FOR USE ONLY WHERE RESIDENTIAL DEVELOPMENT RESTRICTS ACCESS TO THE EASEMENT (SUCH AS WHERE THERE IS A FENCE ON THE BACK OR SIDE OF THE PROPERTY, ALONG THE ROADWAY).
4. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
5. FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41118.
6. 50mm CONDUIT SHOWN FOR USE ONLY WHERE REQUIRED BY THE COUNTY FOR FUTURE SIGNAL NETWORK SYSTEMS (CONFIRM INSTALL REQUIREMENTS WITH THE COUNTY PRIOR TO CONSTRUCTION).

REVISIONS

DATE	DETAILS	DRAWN
11-SEP-2018	REVISED DRAWING NUMBERS, CHANGED TITLE	S. ENGLERD
15-DEC-2016	ADDED TRAFFIC CALMING ZONES AND ALT. GAS LINE, REVISED TITLE AND ROAD STRUCTURE	D. LEGROW
07-JUN-2016	ADDED MINIMUM ROAD STRUCTURE DIAGRAM	D. LEGROW
09-OCT-2015	ADDED 50mm CONDUIT	D. LEGROW
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR



STRATHCONA  
COUNTY

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

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MAJOR RESIDENTIAL COLLECTOR ROADWAY - PARKING RIGHT  
24.0m RIGHT-OF-WAY, 9.75m SURFACE, SEPARATE SIDEWALK

APPROVED: K. COLE, P.ENG

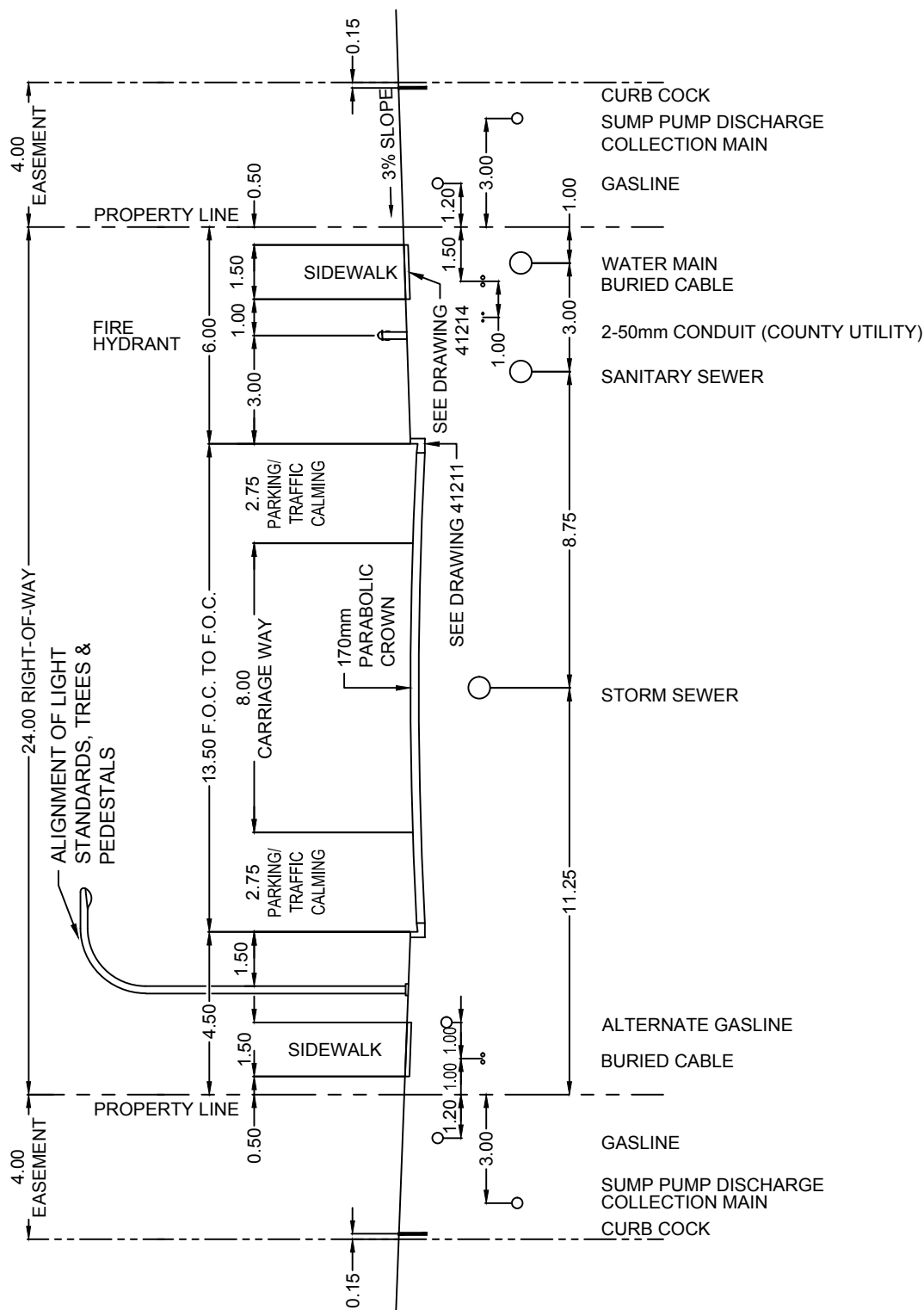
DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

41115

DATE: 30-APR-2001 | SCALE: N.T.S. | DRAWN: R. DEKKER, C.E.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



# NOTES:

- TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL.
- A 3.0m WIDE TRAIL MAY BE SUBSTITUTED FOR THE 1.5m WIDE SIDEWALK, AS REQUIRED BY THE COUNTY.
- ALTERNATE GASLINE SHOWN FOR USE ONLY WHERE DEVELOPMENT RESTRICTS ACCESS TO THE EASEMENT (SUCH AS WHERE THERE IS A FENCE ON THE BACK OR SIDE OF THE PROPERTY, ALONG THE ROADWAY).
- ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
- FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41118.
- 50mm CONDUIT SHOWN FOR USE ONLY WHERE REQUIRED BY THE COUNTY FOR FUTURE SIGNAL NETWORK SYSTEMS (CONFIRM INSTALL REQUIREMENTS WITH THE COUNTY PRIOR TO CONSTRUCTION).

## REVISIONS

DATE	DETAILS	DRAWN
11-SEP-2018	REVISED DRAWING NUMBERS, CHANGED TITLE	S. ENGLERD
24-APR-2017	ADDED PARKING/TRAFFIC CALMING ZONES AND ALT. GAS LINE, REVISED TITLE AND ROAD STRUCTURE	D. LEGROW
12-FEB-2016	REVISED TITLE, ROAD STRUCTURE	S. ENGLERD
09-OCT-2015	ADDED 50mm CONDUIT, REVISED STRUCTURE, UPDATED ASPHALT BASE/SURFACE COURSE NOTES	J. ORR
06-FEB-2015	REVISED ROAD STRUCTURE	J. ORR



STRATHCONA  
COUNTY

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

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INDUSTRIAL / BUSINESS COMMERCIAL COLLECTOR ROADWAY  
24.0m RIGHT-OF-WAY, 13.5m SURFACE, SEPARATE SIDEWALKS

APPROVED: K. COLE, P. ENG.

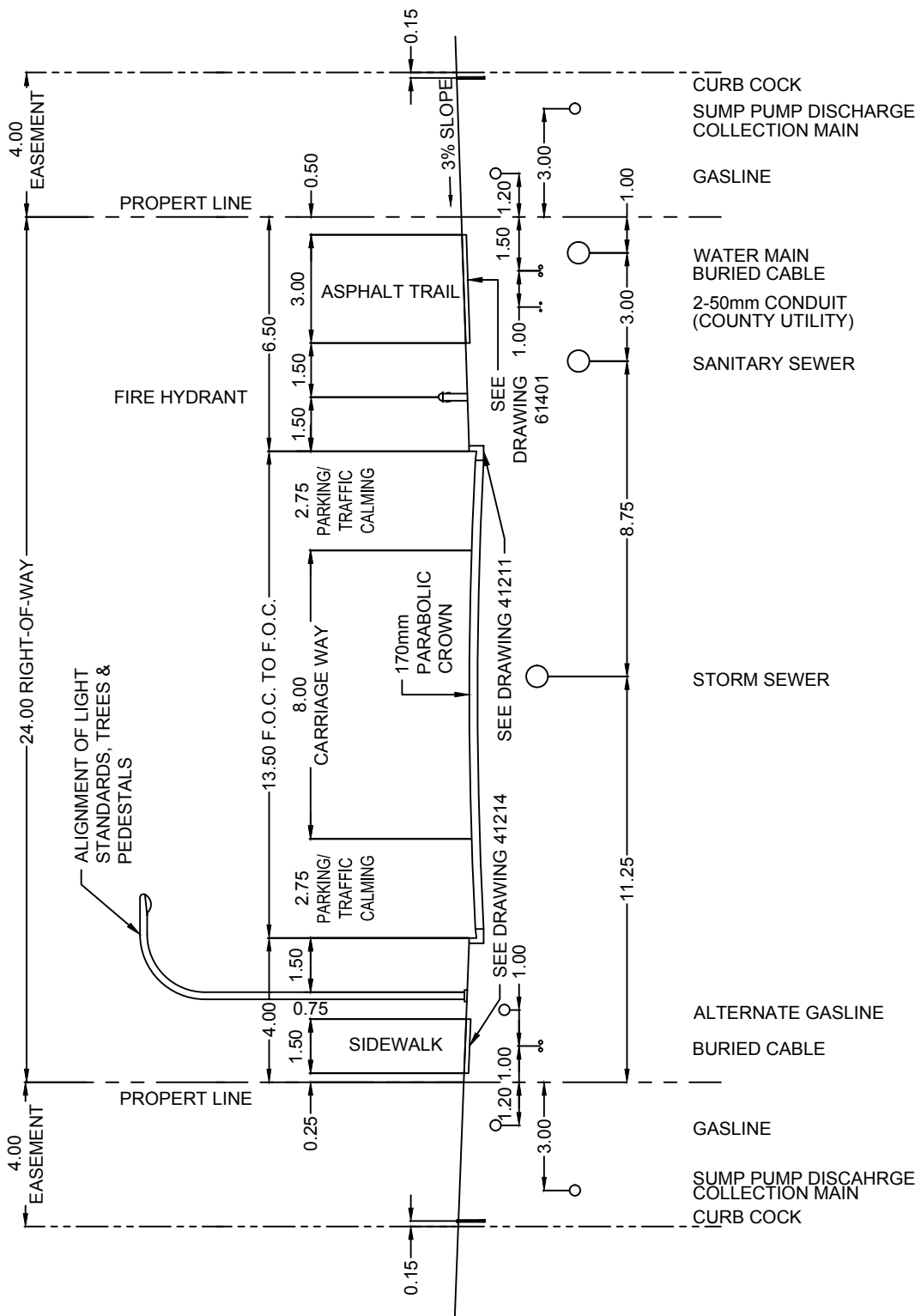
DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

41116

DATE: 29-JUL-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



# NOTES:

- TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL.
- A 3.0m WIDE TRAIL MAY BE SUBSTITUTED FOR THE 1.5m WIDE SIDEWALK, AS REQUIRED BY THE COUNTY.
- ALTERNATE GASLINE SHOWN FOR USE ONLY WHERE DEVELOPMENT RESTRICTS ACCESS TO THE EASEMENT (SUCH AS WHERE THERE IS A FENCE ON THE BACK OR SIDE OF THE PROPERTY, ALONG THE ROADWAY).
- ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.
- FOR ROAD STRUCTURE AND WICK DRAIN DETAILS SEE DRAWING 41118.
- 50mm CONDUIT SHOWN FOR USE ONLY WHERE REQUIRED BY THE COUNTY FOR FUTURE SIGNAL NETWORK SYSTEMS (CONFIRM INSTALL REQUIREMENTS WITH THE COUNTY PRIOR TO CONSTRUCTION).

## REVISIONS

DATE	DETAILS	DRAWN
11-SEP-2018	REVISED DRAWING NUMBERS, CHANGED TITLE	S. ENGLER
24-APR-2017	ADDED PARKING/TRAFFIC CALMING ZONES AND ALT. GAS LINE, REVISED TITLE AND ROAD STRUCTURE	D. LEGROW
12-FEB-2016	REVISED TITLE, ROAD STRUCTURE	S. ENGLER
09-OCT-2015	ADDED 50mm CONDUIT, REVISED STRUCTURE, UPDATED ASPHALT BASE/SURFACE COURSE NOTES	J. ORR
06-FEB-2015	REVISED ROAD STRUCTURE	J. ORR



STRATHCONA  
COUNTY

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

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INDUSTRIAL/BUSINESS COMMERCIAL COLLECTOR ROADWAY  
24.0m RIGHT-OF-WAY, 13.5m SURFACE, SEPARATE SIDEWALK AND ASPHALT TRAIL

APPROVED: K. COLE, P.ENG.

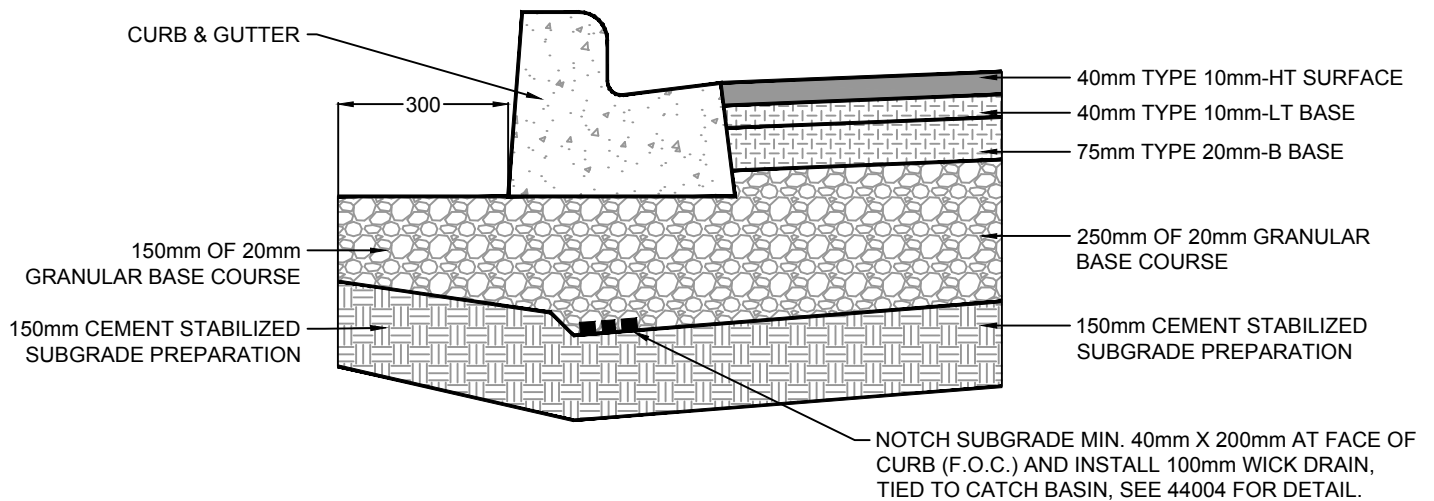
DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

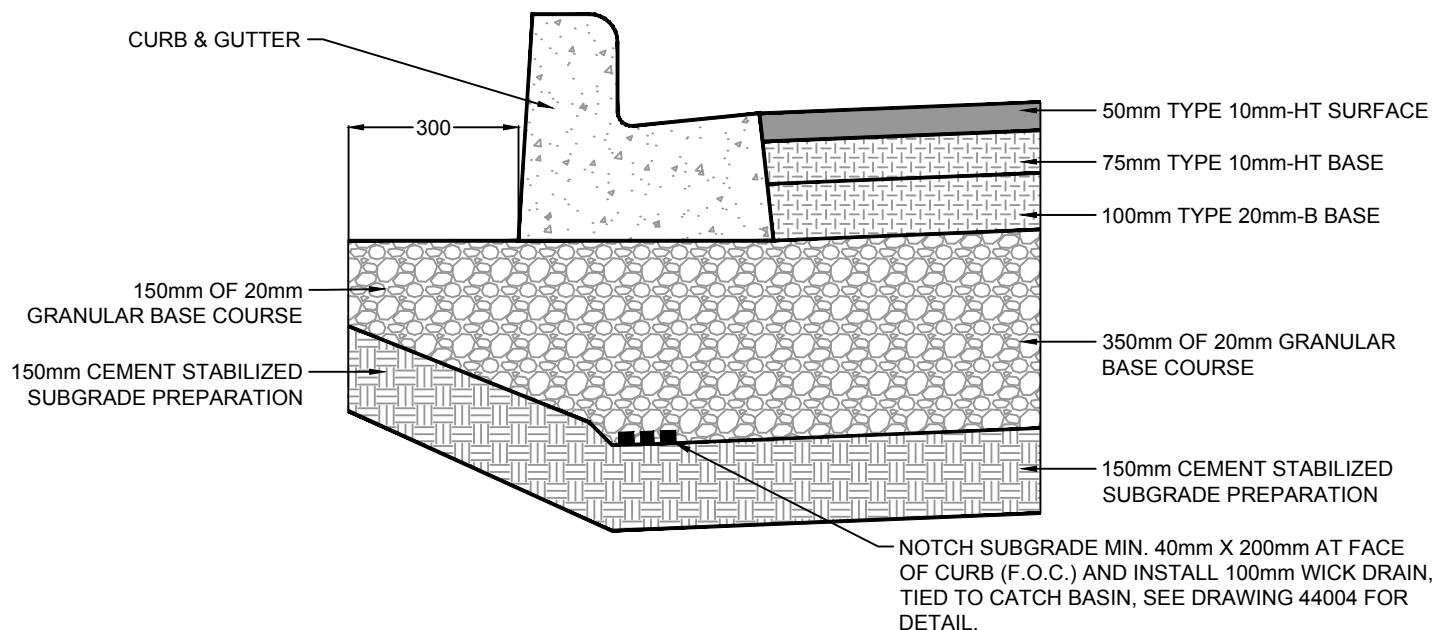
41117

DATE: 29-JUL-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT




### MAJOR RESIDENTIAL COLLECTOR ROADWAY



### INDUSTRIAL / BUSINESS COMMERCIAL COLLECTOR ROADWAY

#### NOTES:


1. ENSURE POSITIVE LONGITUDINAL GRADE ALONG BASE OF WICK DRAIN AND DRAINAGE FROM BOTH SIDES.
2. IF GRANULAR BASE IS NOT BEING USED UNDER THE CURB AND GUTTER, INSTALL WICK DRAIN AT THE EDGE OF THE GRANULAR BASE UNDER THE ROADWAY.
3. ROAD STRUCTURE AS PER VOLUME 1 SECTION 4.1, TABLE 4-5 OR 4-6.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

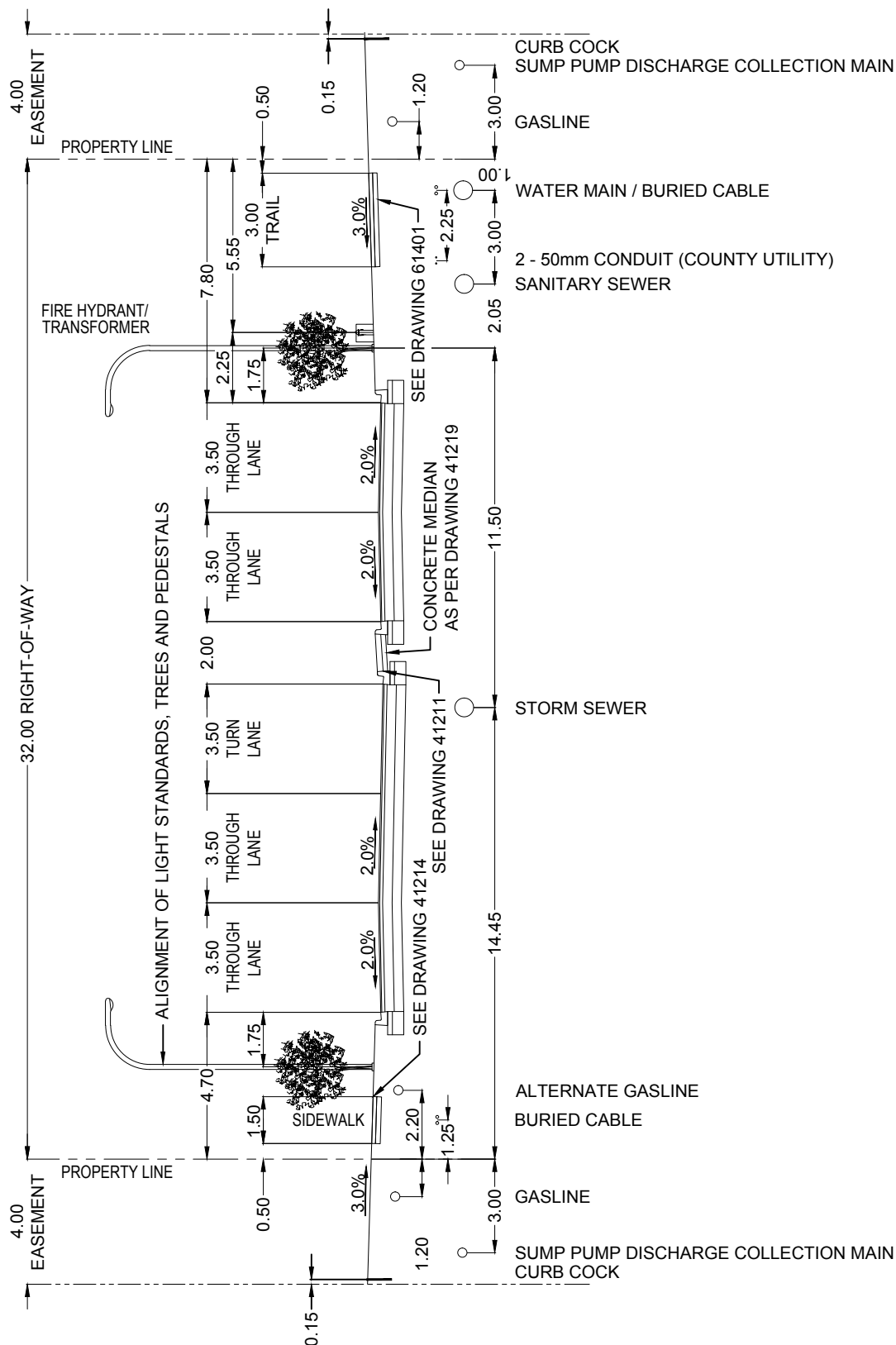
REVISIONS			 STRATHCONA COUNTY			2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN							
			MAJOR RESIDENTIAL AND INDUSTRIAL / BUSINESS COMMERCIAL COLLECTOR ROADWAYS ROAD STRUCTURE AND WICK DRAIN						
			APPROVED: K. COLE, P. ENG.						DRAWING NUMBER
			CHECKED: S. JOHNSON, P.TECH. (ENG.)						41118
17-OCT-2018	CREATED DETAIL	J. EGGEN	DATE: 17-OCT-2018	SCALE: N.T.S.	DRAWN: J. EGGEN, C.E.T.				
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT									




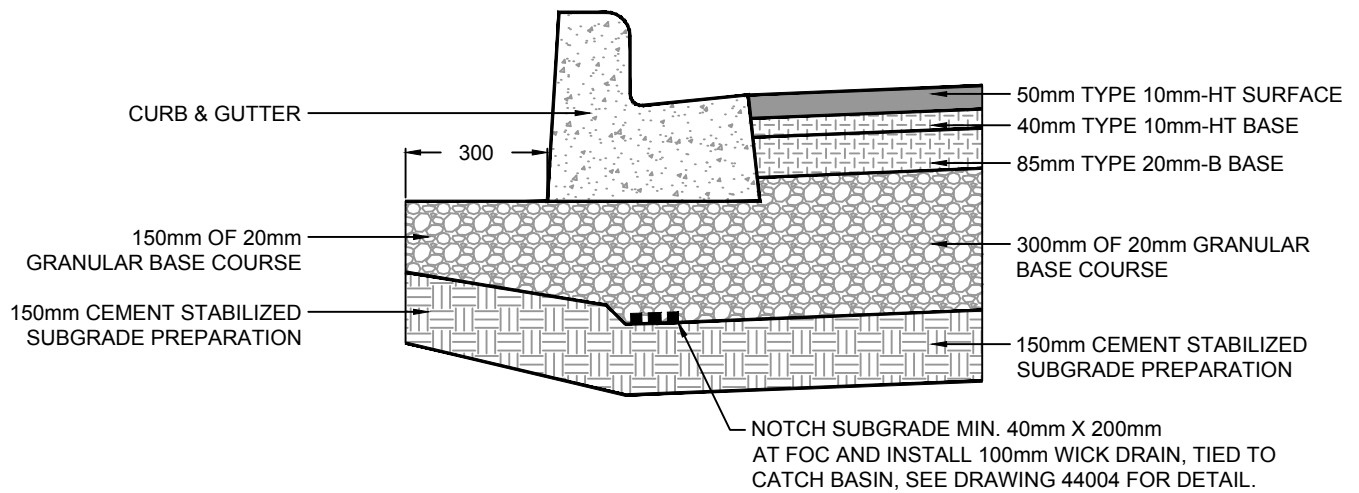


- TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA © 2019			
DATE	DETAILS	DRAWN				
13-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLERD	FOUR LANE DIVIDED COLLECTOR ROADWAY 32.0m RIGHT-OF-WAY, 3.0m TRAIL AND SEPARATE SIDEWALK			
14-DEC-2016	REVISED NOTE RE ALT. GAS LINE REVISED ROAD STRUCTURE	D. LEGROW				
16-MAY-2016	3.5m LANES, MEASURE TO LOG, 32m ROW, ADDED ALT. GAS LINE LOCATION	D. LEGROW	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER  <b>41119</b>  <small>TRANSPORTATION PLANNING &amp; ENGINEERING DEPARTMENT</small>
20-APR-2016	ADDED UTILITIES	D. LEGROW	CHECKED: S. JOHNSON, P.TECH. (ENG.)			
07-APR-2016	ADDED WICK DRAIN NOTE	D. LEGROW	DATE: 19-FEB-2015	SCALE: N.T.S.	DRAWN: J. ORR, C.E.T.	




REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA © 2019		
DATE	DETAILS	DRAWN			
12-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLERD	FOUR LANE DIVIDED COLLECTOR ROADWAY - WITH TURN LANE 32.0m RIGHT-OF-WAY, 3.0m TRAIL AND SEPARATE SIDEWALK		
14-DEC-2016	REVISED NOTE RE ALT. GAS LINE REVISED ROAD STRUCTURE	D. LEGROW			
16-MAY-2016	3.5m LANES, MEASURE TO LOG, 32m ROW, ADDED ALT. GAS LINE LOCATION	D. LEGROW	APPROVED: K. COLE, P.ENG		DRAWING NUMBER
20-APR-2016	ADDED UTILITIES	D. LEGROW	CHECKED: S. JOHNSON, P.TECH. (ENG.)		41120 <small>TRANSPORTATION PLANNING &amp; ENGINEERING DEPARTMENT</small>
07-APR-2016	ADDED WICK DRAIN NOTE	D. LEGROW	DATE: 19-FEB-2015	SCALE: N.T.S.	



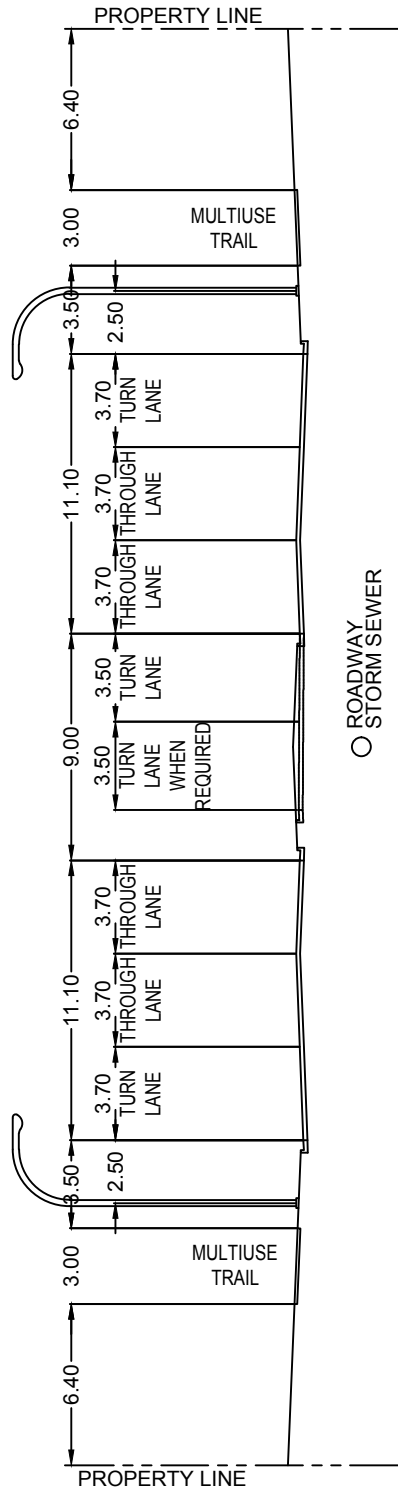
## DIVIDED COLLECTOR ROADWAY

### NOTES:

1. ENSURE POSITIVE LONGITUDINAL GRADE ALONG BASE OF WICK DRAIN AND DRAINAGE FROM BOTH SIDES.
2. IF GRANULAR BASE IS NOT BEING USED UNDER THE CURB AND GUTTER, INSTALL WICK DRAIN AT THE EDGE OF THE GRANULAR BASE UNDER THE ROADWAY.
3. ROAD STRUCTURE AS PER VOLUME 1 SECTION 4.1, TABLE 5-5 OR 4-6.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

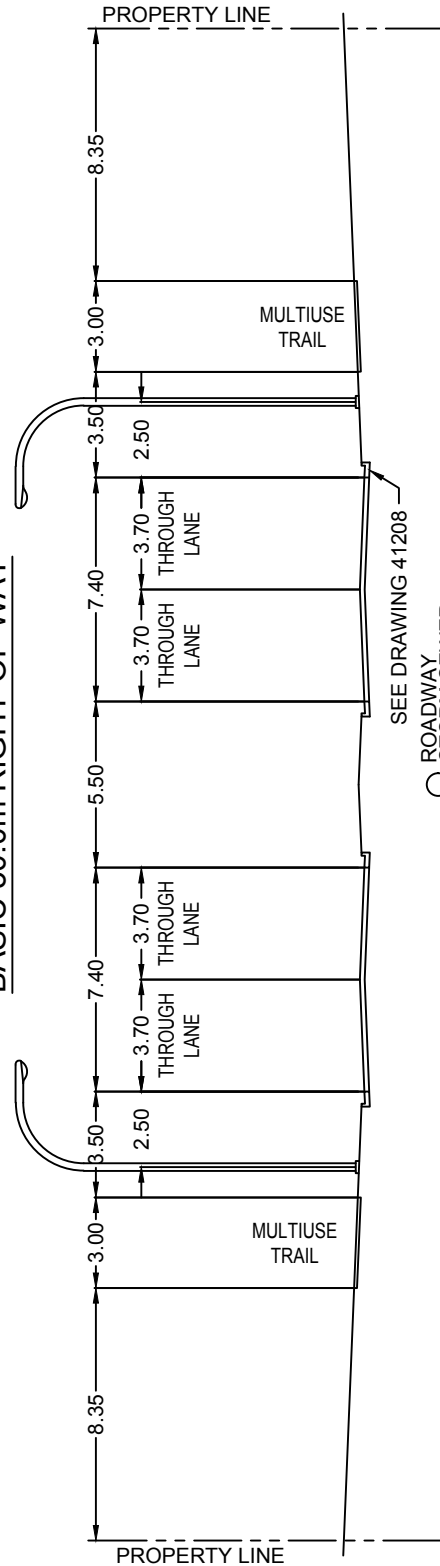
REVISIONS			 STRATHCONA COUNTY			2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN							
			FOUR LANE DIVIDED COLLECTOR ROADWAY ROAD STRUCTURE AND WICK DRAIN						
			APPROVED: K. COLE, P.ENG.						DRAWING NUMBER
			CHECKED: S. JOHNSON, P.TECH. (ENG.)						
17-OCT-2018	CREATED DETAIL	J. EGGEN	DATE: 19-FEB-2015	SCALE: N.T.S.	DRAWN: J. ORR, C.E.T.				41121
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT									

## 57.0m RIGHT-OF-WAY REQUIRED AT INTERSECTIONS



○ ROADWAY  
STORM SEWER

## BASIC 50.0m RIGHT-OF-WAY



SEE DRAWING 41208

○ ROADWAY  
STORM SEWER

NOTES:

1. TRANSFORMERS AND SWITCH BOXES MUST BE LOCATED OUTSIDE OF SIGHT LINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL. A CLEAR SIGHT LINE MUST BE MAINTAINED AT INTERSECTIONS. SIGHT LINE DISTANCES ARE SHOWN ON DRAWINGS 41008-41010.
2. OTHER UTILITY ALIGNMENT REQUIREMENTS WILL BE REVIEWED ON A PER REQUEST BASIS.
3. TREE ALIGNMENTS TO BE DETERMINED AFTER UTILITY PLACEMENT.
4. FOR MINIMUM ROAD STRUCTURE, SEE VOL. 1, SEC. 4.1, TABLE 4-5 OR 4-6.
5. POSITIVE OFFSET LEFT TURN LANES SHOULD BE USED WHEREVER POSSIBLE TO INCREASE VISIBILITY.
6. USE OF DUAL LEFT TURN LANES SHOULD BE AVOIDED UNLESS ABSOLUTELY NECESSARY, AND SHOULD ONLY BE INSTALLED WITH PROTECTED LEFT TURN MOVEMENTS.
7. FINAL BOULEVARD WIDTH IS SUBJECT TO NOISE ATTENUATION REQUIREMENTS.
8. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE STATED.

### REVISIONS

DATE	DETAILS	DRAWN
19-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLER
21-DEC-2016	ADDED NOTES RE. SIGHT LINES, LEFT TURN LANES, BOULEVARD WIDTH	D. LEGROW
06-FEB-2015	REVISED TURN LANE	J. ORR
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT



STRATHCONA  
COUNTY

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

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FOUR LANE DIVIDED ARTERIAL ROADWAY  
50.0m RIGHT-OF-WAY STANDARD, 57.0m RIGHT-OF-WAY AT INTERSECTIONS

APPROVED: K. COLE, P. ENG.

CHECKED: S. JOHNSON, P.TECH. (ENG.)

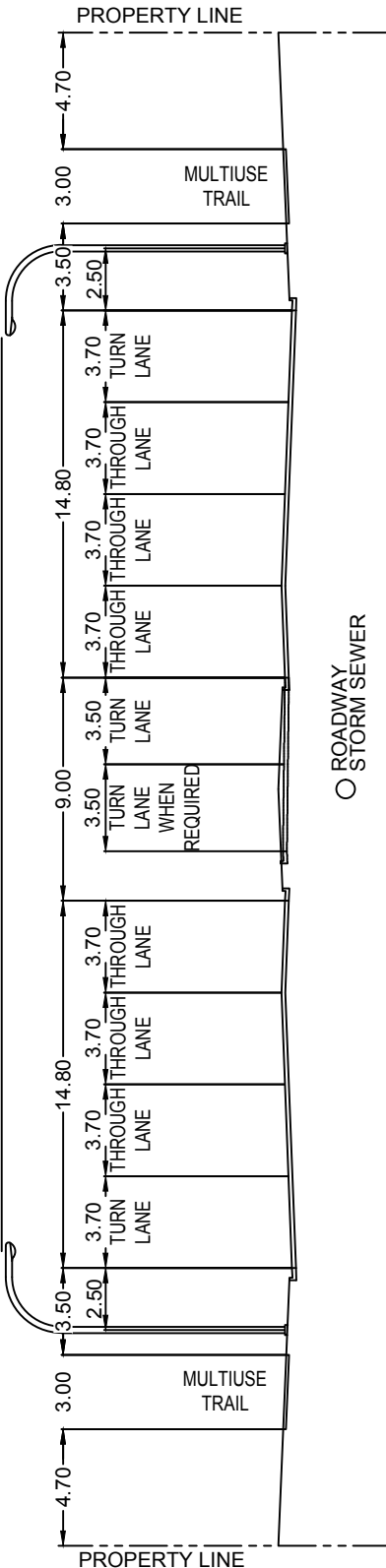
DATE: 28-MAY-1998 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER

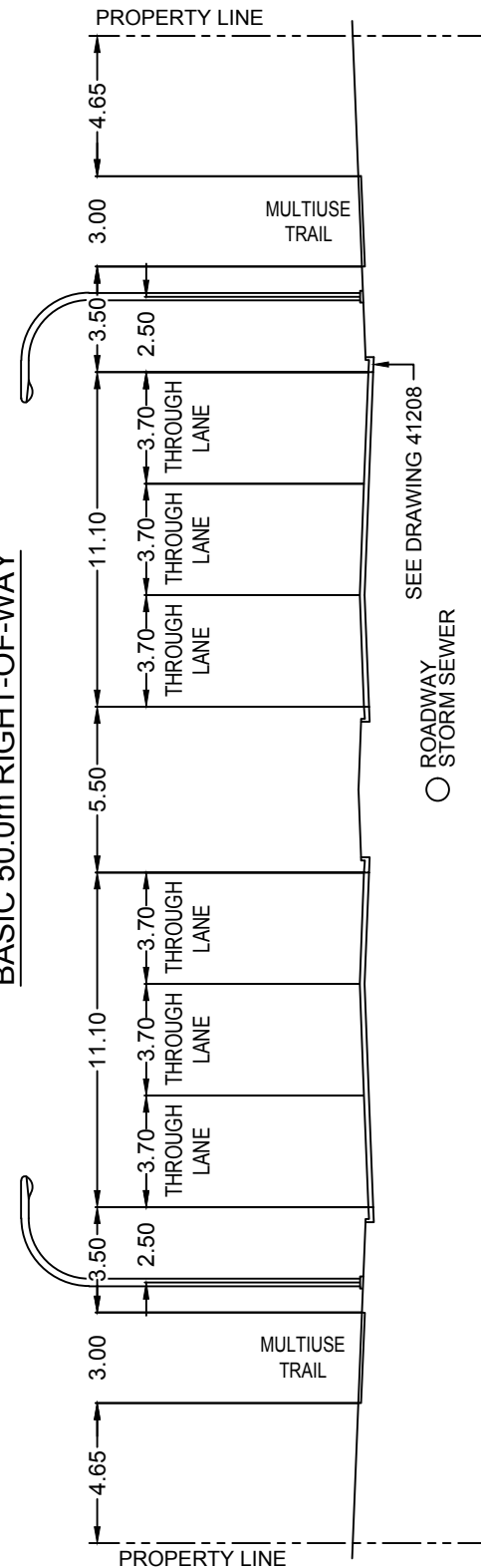
41122

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

# BASIC 61.0m RIGHT-OF-WAY REQUIRED AT INTERSECTIONS



# BASIC 50.0m RIGHT-OF-WAY



## NOTES:

- TRANSFORMERS AND SWITCHBOXES MUST BE LOCATED OUTSIDE OF SIGHTLINES AT INTERSECTIONS, AND AS CLOSE TO PROPERTY LINES AS IS PRACTICAL. A CLEAR SIGHT LINE MUST BE MAINTAINED AT INTERSECTIONS. SIGHT LINE DISTANCES ARE SHOWN ON DRAWINGS 41008-41010.
- OTHER UTILITY ALIGNMENT REQUIREMENTS WILL BE REVIEWED ON A PER REQUEST BASIS.
- TREE ALIGNMENTS TO BE DETERMINED AFTER UTILITY PLACEMENT.
- FOR MINIMUM ROAD STRUCTURE, SEE VOL. 1, SEC. 4.1, TABLE 4-5 OR 4-6.
- POSITIVE OFFSET LEFT TURN LANES SHOULD BE USED WHEREVER POSSIBLE TO INCREASE VISIBILITY.
- USE OF DUAL LEFT TURN LANES SHOULD BE AVOIDED UNLESS ABSOLUTELY NECESSARY, AND SHOULD ONLY BE INSTALLED WITH PROTECTED LEFT TURN MOVEMENTS.
- FINAL BOULEVARD WIDTH IS SUBJECT TO NOISE ATTENUATION REQUIREMENTS.
- ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE STATED.

## REVISIONS

DATE	DETAILS	DRAWN
19-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLEDER
21-DEC-2016	ADDED NOTES RE. SIGHT LINES, LEFT TURN LANES, BOULEVARD WIDTH	D. LEGROW
06-FEB-2015	REVISED TURN LANE	J. ORR
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT



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ALBERTA, T8A 3W7, CANADA

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SIX LANE DIVIDED ARTERIAL ROADWAY  
50.0m RIGHT-OF-WAY STANDARD, 61.0m RIGHT-OF-WAY AT INTERSECTIONS

APPROVED: K. COLE, P. ENG.

CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 28-MAY-1998 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

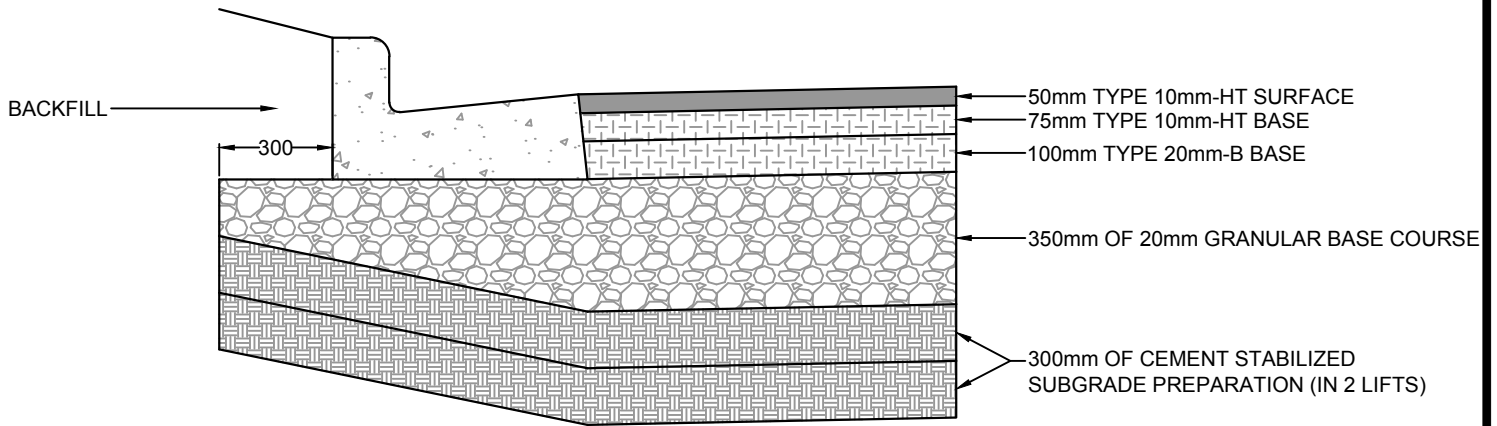
DRAWING NUMBER

41123

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

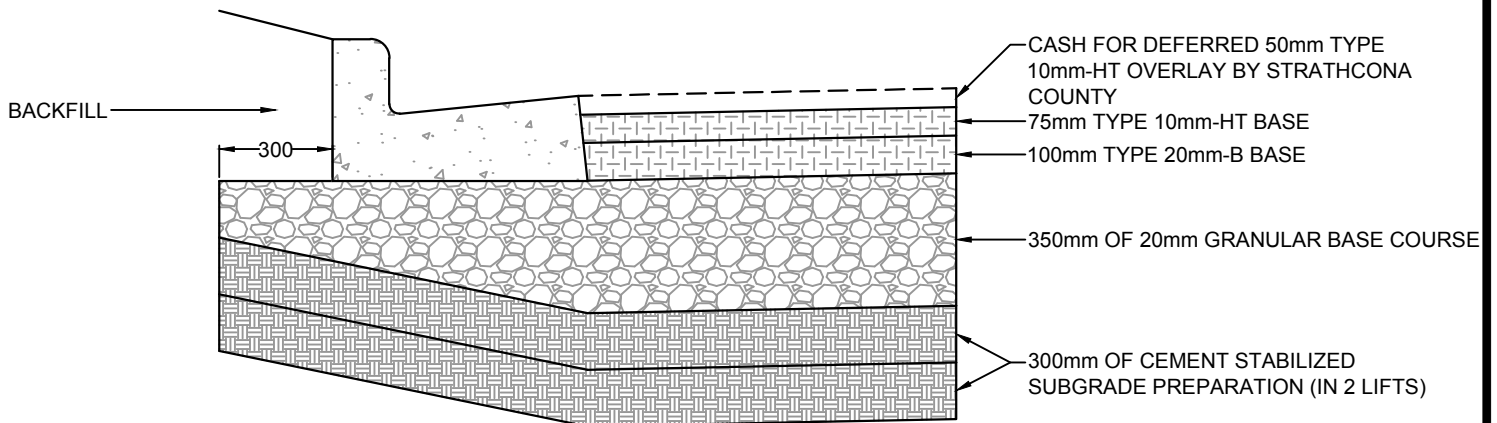
## LANE EXPANSION ON FULL-STRUCTURE ARTERIAL ROADWAY

(PAVEMENT STRUCTURE AND CURB & GUTTER PLACEMENT)




## LANE EXPANSION ON INTERIM-STRUCTURE ARTERIAL ROADWAY

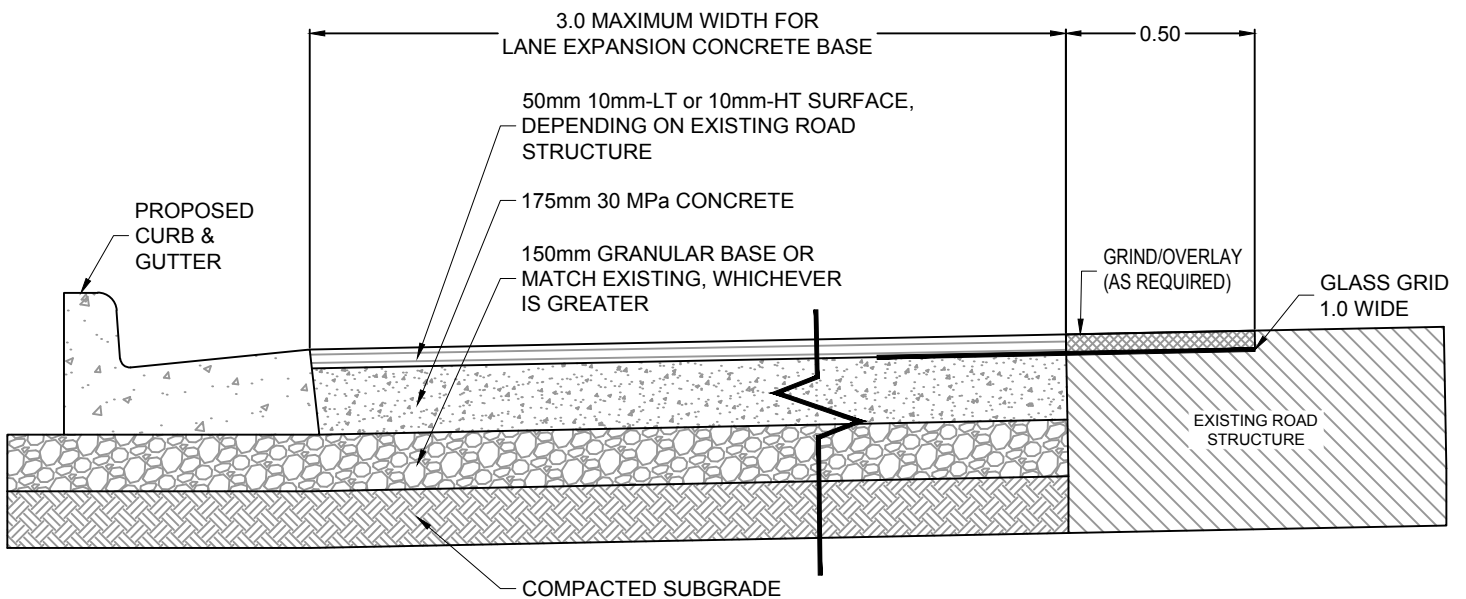
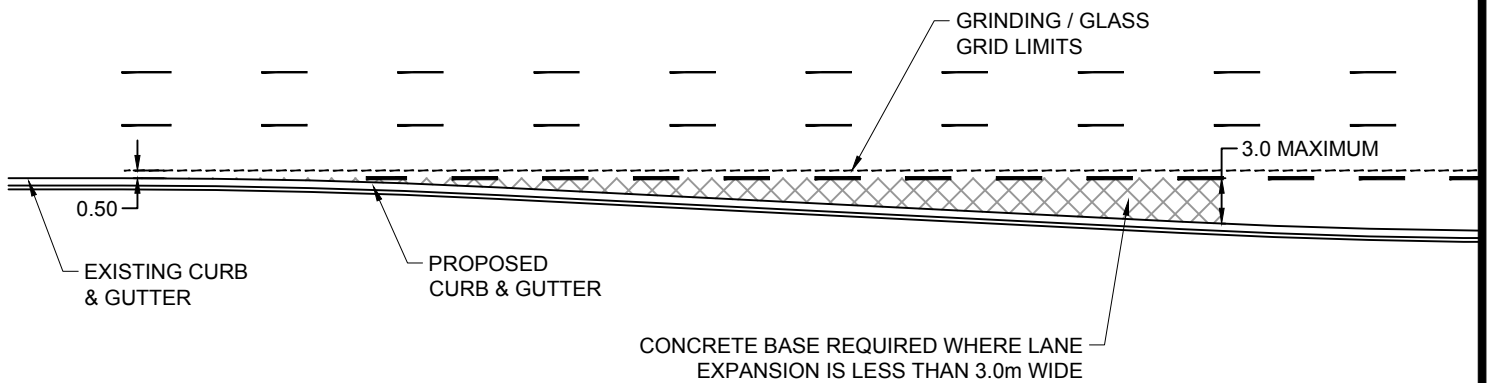
(PAVEMENT STRUCTURE AND CURB & GUTTER PLACEMENT)



### NOTES:


1. FOR WIDTHS LESS THAN 3.0m, SEE DRAWING 41125 FOR STRUCTURE.
2. COMPACTION: 100%
3. CONCRETE: 30MPa
4. ALL DIMENSIONS IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

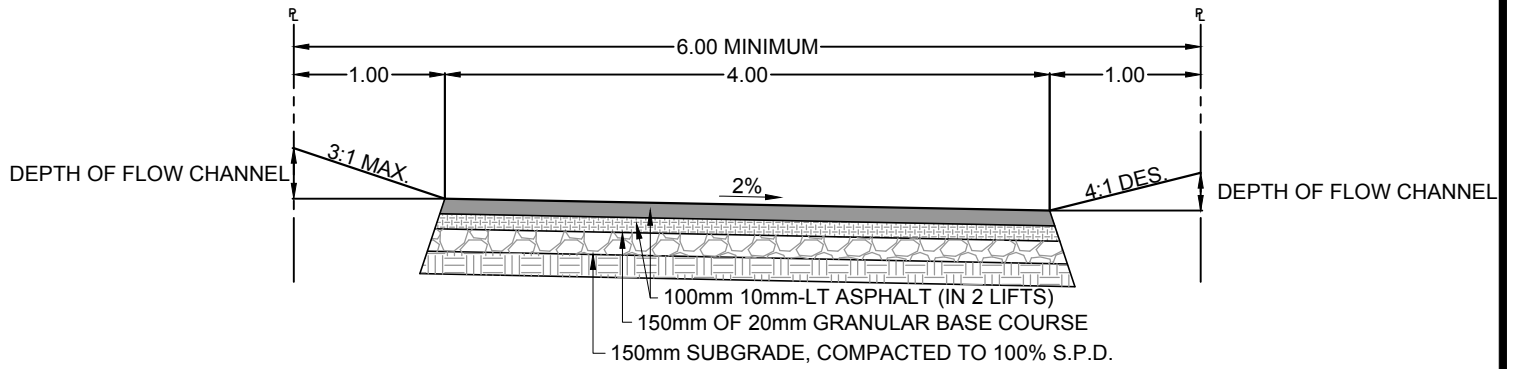
REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA © 2019		
DATE	DETAILS	DRAWN			
19-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLER	DEVELOPER CONSTRUCTED LANE EXPANSION ON ARTERIAL ROADWAY		
12-JAN-2017	REVISED ROAD STRUCTURE	D. LEGROW			
06-FEB-2015	REVISED NOTES	J. ORR	APPROVED: K. COLE, P. (ENG.)	DRAWING NUMBER <b>41124</b>	
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR	CHECKED: S. JOHNSON, P.TECH. (ENG.)		
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT	DATE: 05-JUN-2003   SCALE: N.T.S.   DRAWN: R. DEKKER		



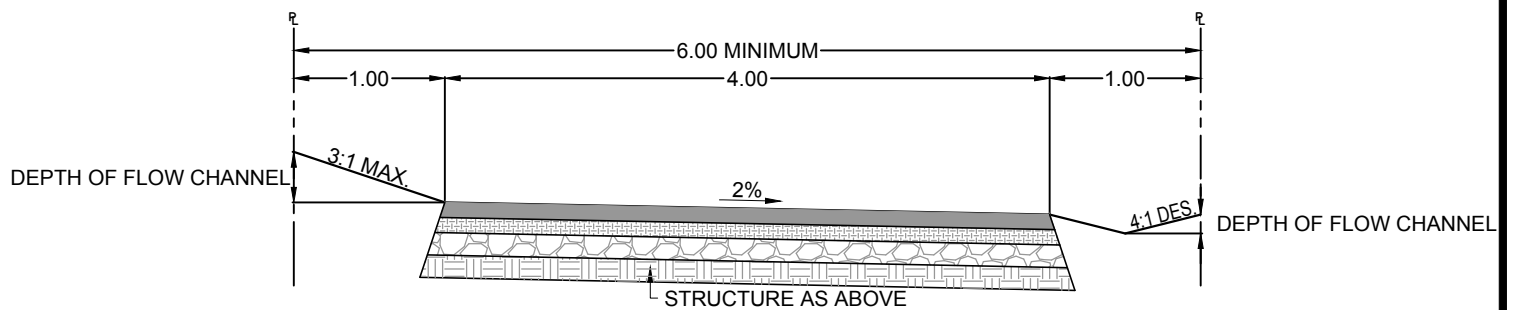
**NOTE:**

1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

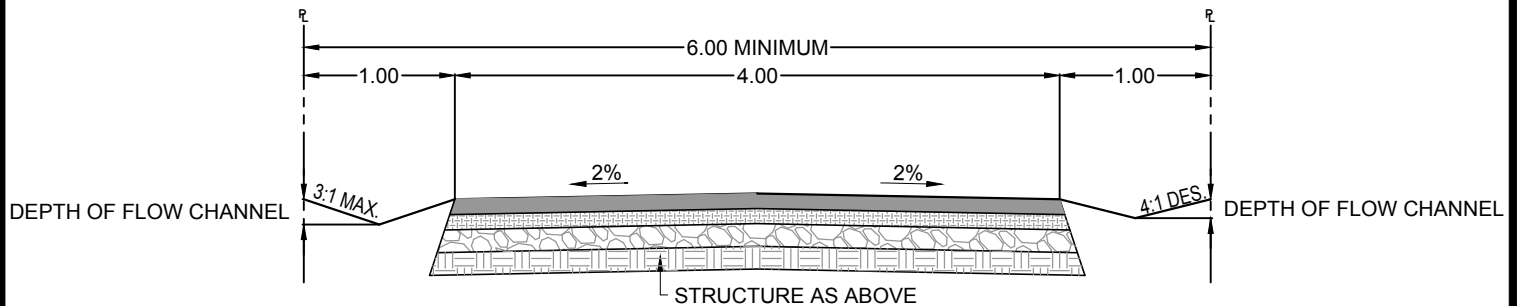
REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLER	LANE EXPANSION CONCRETE BASE			
12-JAN-2017	REVISED LANE STRUCTURE, UPDATED LEADERS, ADDED COMPACTED SUBGRADE	D. LEGROW				
04-MAR-2016	CHANGED DRAWING NUMBER	S. ENGLER	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER
06-FEB-2015	DIMS & NOTES	J. ORR	CHECKED: S. JOHNSON, P.TECH. (ENG.)			41125
09-JAN-2015	CREATED DETAIL	J. ORR	DATE: 09-JAN-2015	SCALE: N.T.S.	DRAWN: J. ORR, C.E.T.	
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT						



**CROSSFALL WITHOUT SWALE (LONGITUDINAL DRAINAGE)**




**CROSSFALL WITH SWALE**



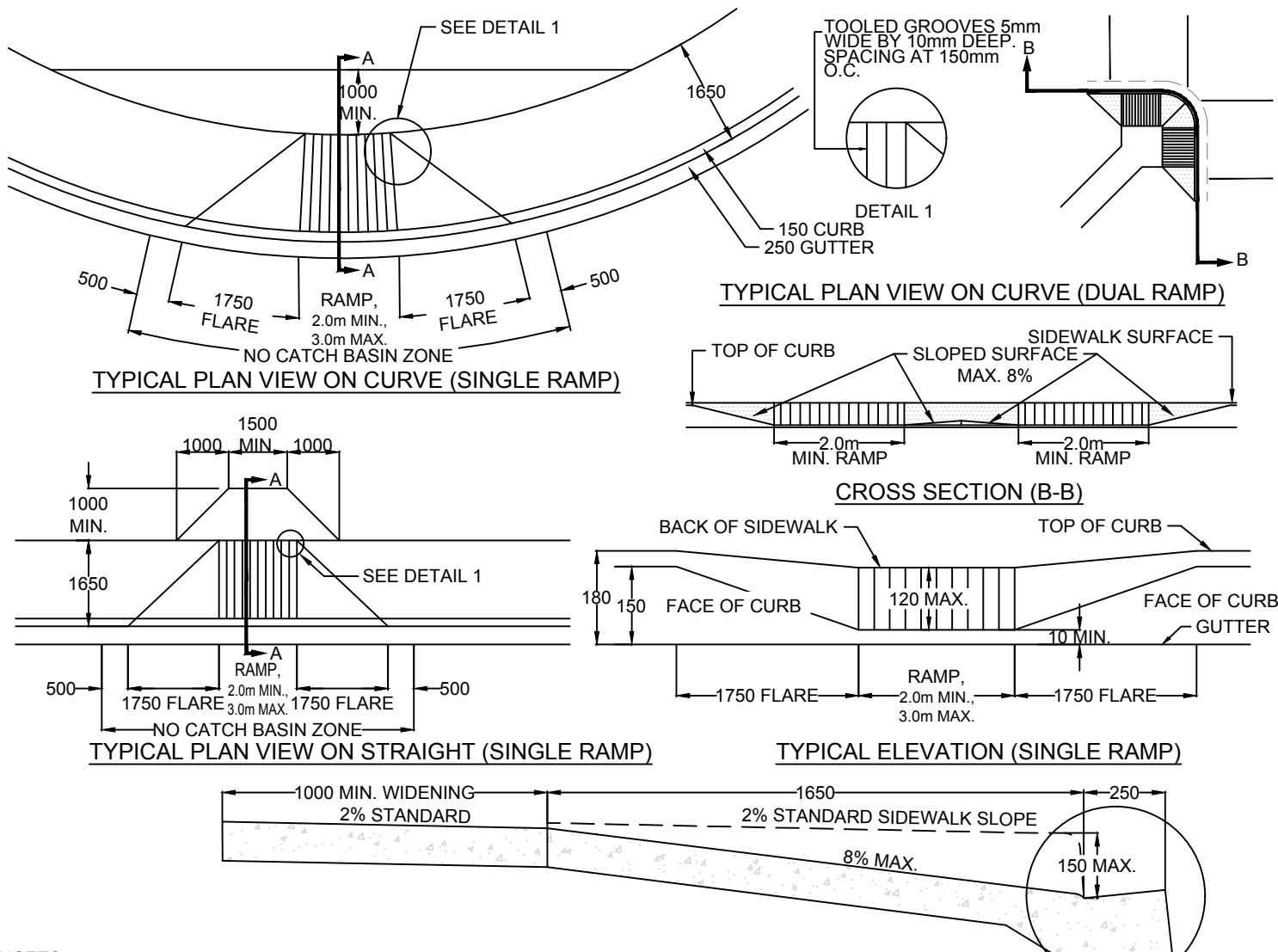
**CROWNED WITH SWALES**

**NOTES:**

1. ENSURE DEPTH OF FLOW CHANNEL IS SUFFICIENT, BASED ON AN APPROVED DRAINAGE PLAN.
2. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
			ASPHALT EMERGENCY VEHICLE ACCESS IN P.U.L.			
19-SEP-2018	REVISED DRAWING NUMBERS	S. ENGLER	APPROVED: K. COLE, P.ENG.			DRAWING NUMBER
16-MAR-2017	ADDED SECTIONS FOR CROSS-FALL AND CROWNED WITH SWALE(S), REVISED STRUCTURE	D. LEGROW	CHECKED: S. JOHNSON, P.TECH. (ENG.)			41126
04-APR-2016	CREATED DRAWING	D. LEGROW	DATE: 04-APR-2016	SCALE: N.T.S.	DRAWN: D. LEGROW, T.T.	
						TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

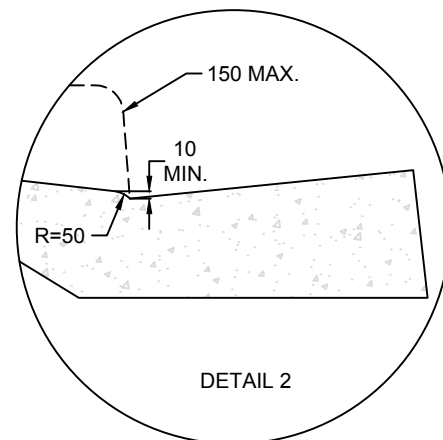




#### NOTES:

1. RAMPS FOR USERS OF WHEELCHAIRS & BICYCLES SHOULD BE LOCATED AT ALL JUNCTIONS OF CROSSWALKS AND SIDEWALKS. RAMPS MUST BE LOCATED WITHIN AND PROVIDE DIRECT ACCESS TO A CROSSWALK. WHERE CROSSWALKS ARE CONTROLLED BY SIGNALS WITH A PUSHBUTTON SYSTEM, THE SIDEWALKS AND RAMPS MUST ALLOW ACCESS BY WHEELCHAIR TO THE PUSHBUTTON.
2. GROOVES ON SIDEWALK RAMPS ARE TO ALERT PERSONS WHO ARE VISUALLY IMPAIRED OF THE CURB-CUT AND A STREET CROSSING.
3. CONCRETE SIDEWALKS, CURBS, AND RAMPS TO BE POURED MONOLITHICALLY. REFER TO DRAWING 41216 FOR MONOLITHIC SIDEWALK STRUCTURE. RAMPS TO FOLLOW THE SAME STRUCTURE.
4. MINIMUM WIDTH OF RAMP IS 2.0m. IT MAY BE NECESSARY TO BUILD WIDER RAMPS IN BUSY URBAN AREAS WHERE THE VOLUME OF PEDESTRIAN TRAFFIC IS HIGH. MAXIMUM WIDTH OF RAMP IS 3.0m.
5. MAXIMUM RAMP SLOPE IS 8%. WHERE THE SIDEWALK IS LESS THAN 1.5m WIDE, THE 8% MAXIMUM SLOPE SHOULD NOT BE EXCEEDED, AND THEREFORE, THE BACK OF THE SIDEWALK MUST BE LOWERED ACCORDINGLY. ON A SHARP CORNER WHERE A TYPE 1 DUAL RAMP IS BEING USED, THE SLOPE ON THE FLARED AREAS SHOULD BE LESS THAN 8%. THIS WILL PROVIDE A SMOOTHER SIDEWALK FOR GENERAL USE, ESPECIALLY FOR PEDESTRIANS WHO ARE NOT USING THE CROSSWALK.
6. REFER TO DRAWING 41001 FOR TYPICAL LAYOUT OF CROSSWALKS AND THE TYPE OF RAMP TO BE USED.
7. WHERE RIGHT-OF-WAY IS AVAILABLE, THE SIDEWALK IS TO BE WIDENED AT CORNER LOCATIONS AS SHOWN SO THAT AT LEAST A 1.0m WIDTH OF 'FLAT' SIDEWALK IS PROVIDED ADJACENT TO THE RAMP.
8. ENSURE CATCH BASINS ARE MINIMUM 500mm AWAY FROM RAMP FLARES, MEASURED FROM WIDEST POINT OF FLARE TO CENTER OF CATCH BASIN. CATCH BASIN, FRAME OR COVER CANNOT BE INSTALLED WITHIN THE RAMP OR FLARE UNDER ANY CIRCUMSTANCES.
9. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

#### CROSS SECTION (A-A)



#### REVISIONS

DATE	DETAILS	DRAWN
16-MAY-2019	REVISED NOTES	P. TOMKO
08-AUG-2018	REVISED TITLE, ADDED DIAGRAM FOR RAMP ON CURVE & WIDENING ON CROSS-SECTION, UPDATED NOTES	D. LEGROW
15-SEP-2016	ADDED MAXIMUM 3.0m RAMP WIDTH CORRECTED 10mm MIN. ON DETAIL 2	D. LEGROW
23-DEC-2015	REVISED STRUCTURE	S. ENGLEDER
06-FEB-2015	REVISED STRUCTURE, ADDED NO CB ZONE	J. ORR



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#### SIDEWALK RAMP FOR WHEELCHAIR OR BICYCLE ON MONOWALK (TYPE 1)

APPROVED: K. COLE, P. ENG.

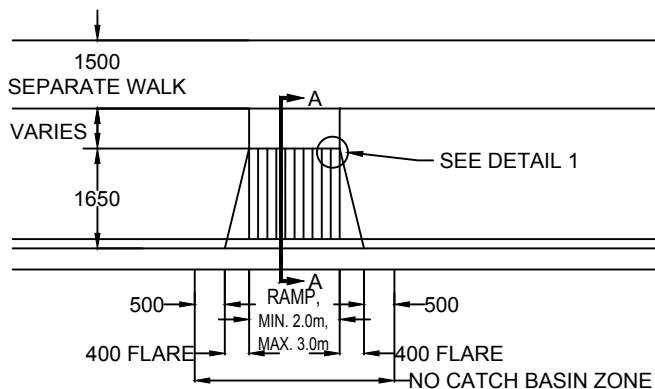
CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 25-JUL-1997 | SCALE: N.T.S. | DRAWN: J. EDGINGTON, C.E.T.

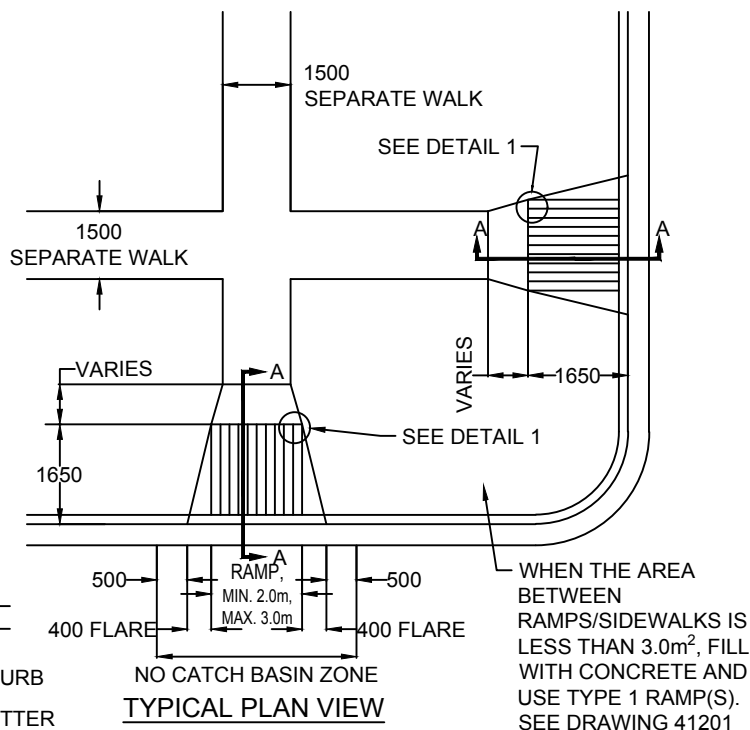
DRAWING NUMBER

41201

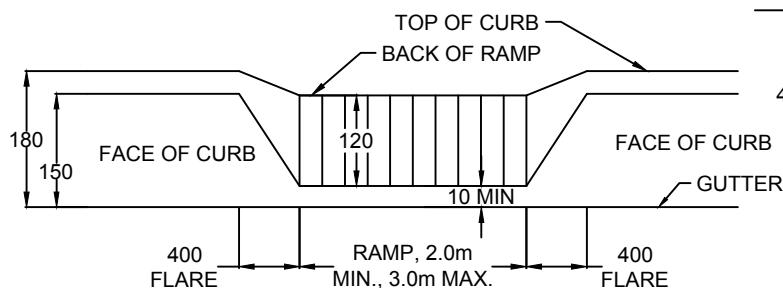
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



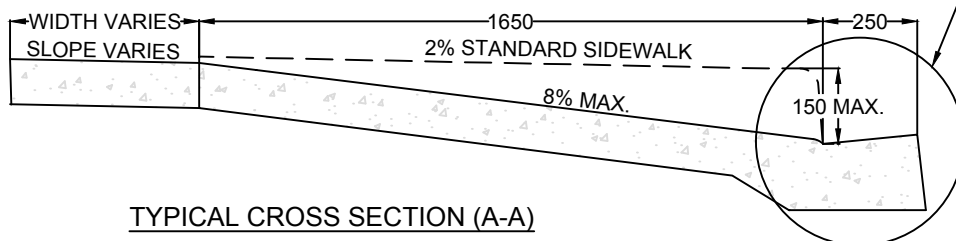
**TYPICAL PLAN VIEW**  
RAMP PERPENDICULAR  
TO SIDEWALK



**TYPICAL PLAN VIEW**  
RAMP PARALLEL WITH  
SIDEWALK



**TYPICAL ELEVATION**

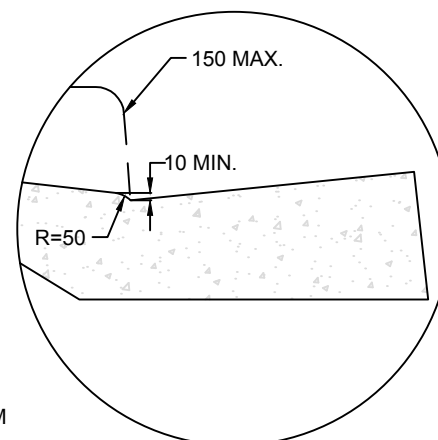


**TYPICAL CROSS SECTION (A-A)**

**NOTES:**

1. RAMPS FOR USERS OF WHEELCHAIRS & BICYCLES SHOULD BE LOCATED AT ALL JUNCTIONS OF CROSSWALKS AND SIDEWALKS. RAMPS MUST BE LOCATED WITHIN A CROSSWALK. WHERE CROSSWALKS ARE CONTROLLED BY SIGNALS WITH A PUSHBUTTON SYSTEM, THE SIDEWALKS AND RAMPS MUST ALLOW ACCESS BY WHEELCHAIR TO THE PUSHBUTTON.
2. GROOVES ON SIDEWALK RAMPS ARE TO ALERT PERSONS WHO ARE VISUALLY IMPAIRED OF THE CURB-CUT AND A STREET CROSSING.
3. CONCRETE SIDEWALKS, CURBS, AND RAMPS TO BE POURED MONOLITHICALLY. REFER TO DRAWING 41214 FOR SIDEWALK STRUCTURE. RAMPS TO FOLLOW THE SAME STRUCTURE.
4. MINIMUM WIDTH OF RAMP IS 2.0m. IT MAY BE NECESSARY TO BUILD WIDER RAMPS IN BUSY URBAN AREAS WHERE THE VOLUME OF PEDESTRIAN TRAFFIC IS HIGH. MAXIMUM WIDTH OF RAMP IS 3.0m.
5. MAXIMUM RAMP SLOPE IS 8%. WHERE THE SIDEWALK IS LESS THAN 1.5m WIDE, THE 8% MAXIMUM SLOPE SHOULD NOT BE EXCEEDED, AND THEREFORE, THE BACK OF THE SIDEWALK MUST BE LOWERED ACCORDINGLY.
6. REFER TO DRAWING 41001 TO TYPICAL LAYOUT OF CROSSWALKS AND THE TYPE OF RAMP TO BE USED.
7. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.
8. ENSURE CATCH BASINS ARE MINIMUM 500 mm AWAY FROM RAMP FLARES, MEASURED FROM THE WIDEST POINT OF FLARE TO CENTER OF CATCH BASIN. CATCH BASIN, FRAME OR COVER CANNOT BE INSTALLED WITHIN THE RAMP OR FLARE UNDER ANY CIRCUMSTANCES.

**DETAIL 1**



**DETAIL 2**

**REVISIONS**

DATE	DETAILS	DRAWN
16-MAY-2019	REVISED NOTES	P. TOMKO
12-JAN-2017	REVISED TITLE, REMOVED DIAGRAM FOR RAMP ON CURVE, CHANGED PLAN/ELEVATION FOR SEP. WALK	D. LEGROW
15-SEP-2016	ADDED MAXIMUM 3.0m RAMP WIDTH CORRECTED 10mm MIN. ON DETAIL 2	D. LEGROW
23-JAN-2015	REVISED STRUCTURE	S. ENGLEDER
06-FEB-2015	ADDED NO CATCH BASIN ZONE	J. ORR



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**SIDEWALK RAMP FOR WHEELCHAIR OR BICYCLE ON  
SEPARATE WALK (TYPE 2)**

APPROVED: K. COLE, P. ENG.

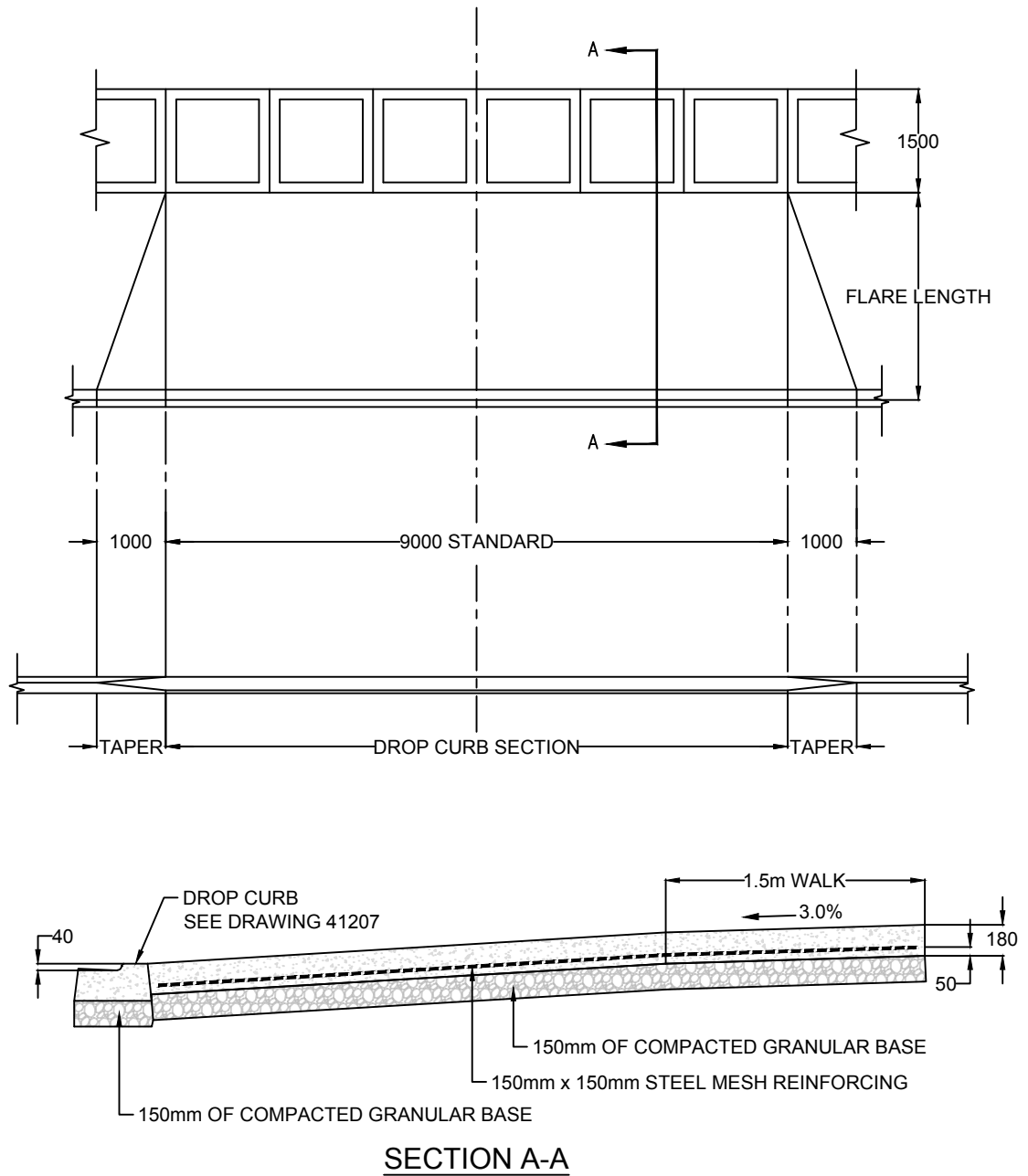
CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 25-JUL-1997 SCALE: N.T.S. DRAWN: J. EDGINGTON, C.E.T.

DRAWING NUMBER

**41202**

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



#### NOTES:

1. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.
2. SIDEWALK CROSS-FALL TO BE 3% TOWARDS THE ROAD UNLESS OTHERWISE AUTHORIZED.
3. COMMERCIAL DRIVEWAYS SHALL BE A MINIMUM 180mm THICK WITH 150 x 150 STEEL MESH REINFORCING.
4. EXISTING STANDARD CURB & GUTTER TO BE REMOVED AND REPLACED WITH TAPER AND DROP CURB SECTIONS. ENSURE THAT 40mm FACE OF CURB IS MAINTAINED THROUGHOUT THE DROP CURB SECTIONS TO FACILITATE PROPER DRAINAGE.
5. REMOVAL OF EXISTING CONCRETE WILL REQUIRE SAW CUTTING AT THE PROPOSED TIE-IN JOINTS.
6. EXISTING CONCRETE STRUCTURE MUST BE DRILLED FOR STEEL DOWEL INSTALLATION WITH TIE-INS.
7. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

#### REVISIONS

DATE	DETAILS	DRAWN
15-SEP-2016	ADDED NOTE RE. 40mm F.O.C.	D. LEGROW
18-FEB-2016	ADDED (RETROFIT ONLY) TO DRAWING TITLE	D. LEGROW
13-FEB-2015	REVISED CROSSING STRUCTURE	J. ORR
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR
09-FEB-2011	REVISED DRAWING NUMBERS	J. EGGEN



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#### COMMERCIAL VERTICAL CURB CROSSING DETAIL (RETROFIT ONLY)

APPROVED: K. COLE, P. ENG.

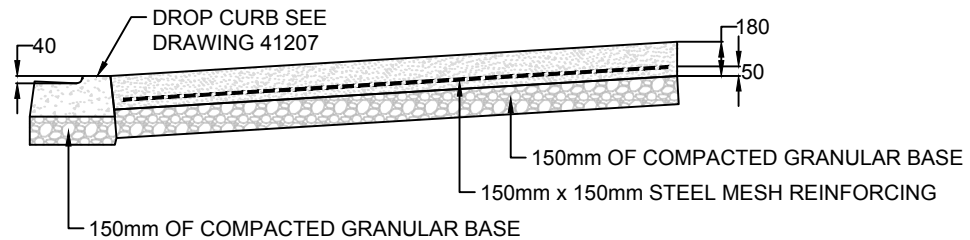
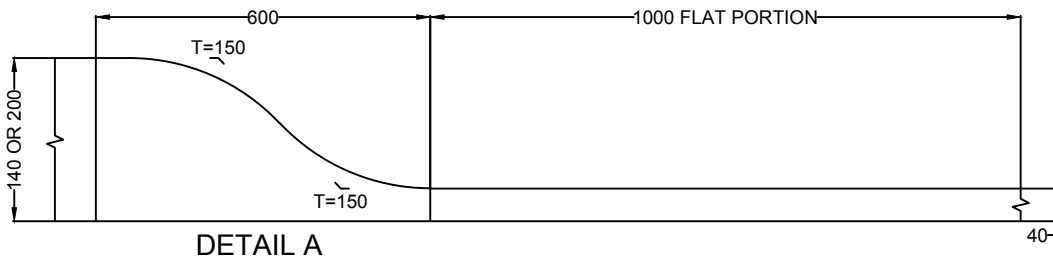
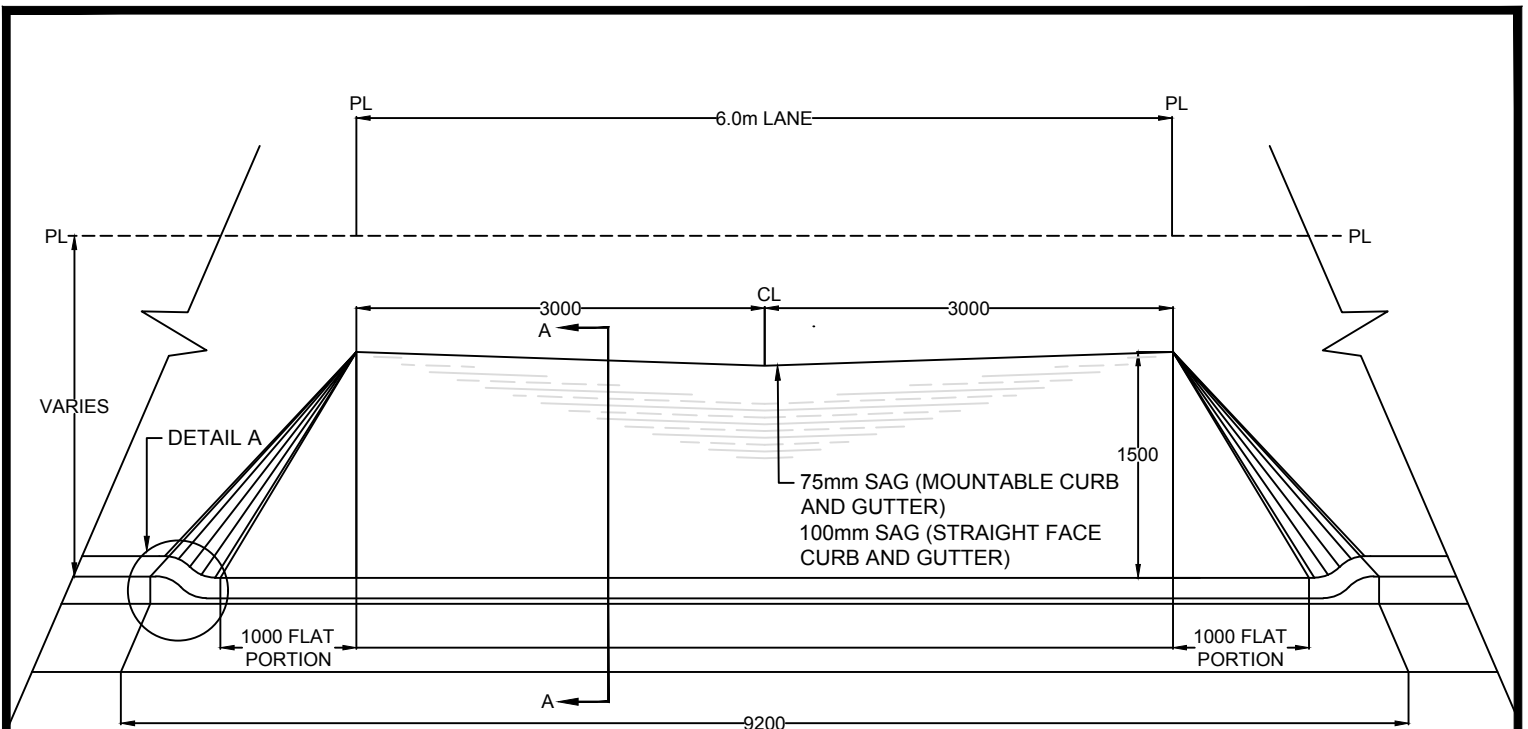
DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

41203

DATE: 07-JUL-1997 SCALE: N.T.S. DRAWN: J. EDGINGTON, C.E.T.


TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

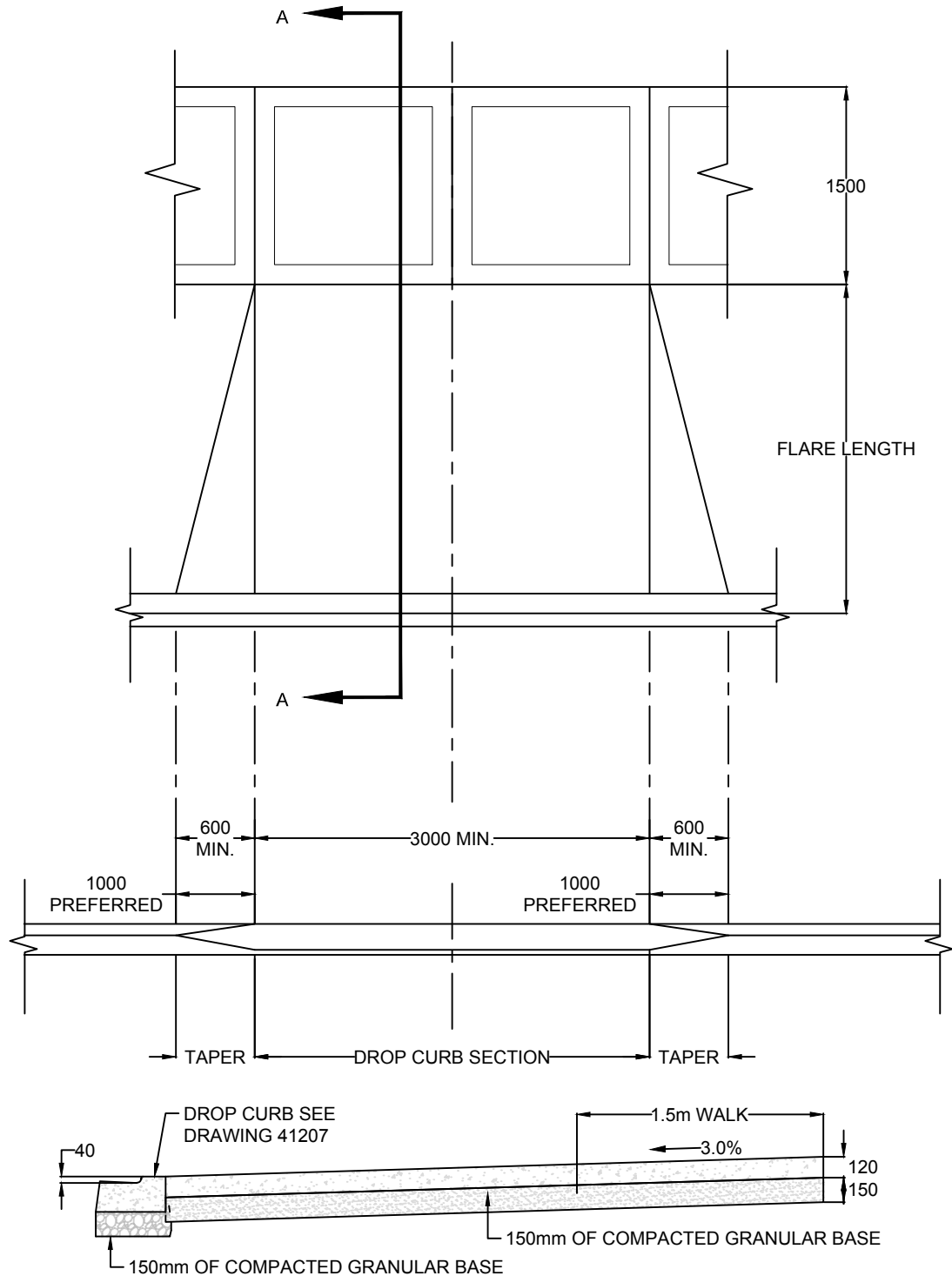


### SECTION A-A

#### NOTES:

1. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.
2. SIDEWALK CROSS-FALL TO BE 3% TOWARDS THE ROAD UNLESS OTHERWISE AUTHORIZED.
3. LANE APRONS SHALL BE MINIMUM 180mm THICK WITH 150 x 150 P18/P18 GAUGE WELDED WIRE FABRIC THROUGHOUT.
4. EXISTING STANDARD CURB & GUTTER TO BE REMOVED AND REPLACED WITH TAPER AND DROP CURB SECTIONS. ENSURE THAT 40mm FACE OF CURB IS MAINTAINED THROUGHOUT THE DROP CURB SECTIONS TO FACILITATE PROPER DRAINAGE.
5. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.


REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
11-APR-2017	ADDED NOTE RE. 40mm F.O.C.	D. LEGROW	LANE APRON FOR CURB & GUTTER WITH NO SIDEWALK (RETROFIT ONLY)			
22-FEB-2016	ADDED FLAT PORTION, RETROFIT ONLY	D. LEGROW				
13-FEB-2015	REVISED APRON STRUCTURE	J. ORR	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER  <b>41204</b>
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR	CHECKED: S. JOHNSON, P.TECH. (ENG.)			
09-FEB-2011	REVISED DRAWING NUMBERS & REVISIONS	J. EGGEN	DATE: 30-JUL1997	SCALE: N.T.S.	DRAWN: J. EDGINGTON, C.E.T.	
						TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

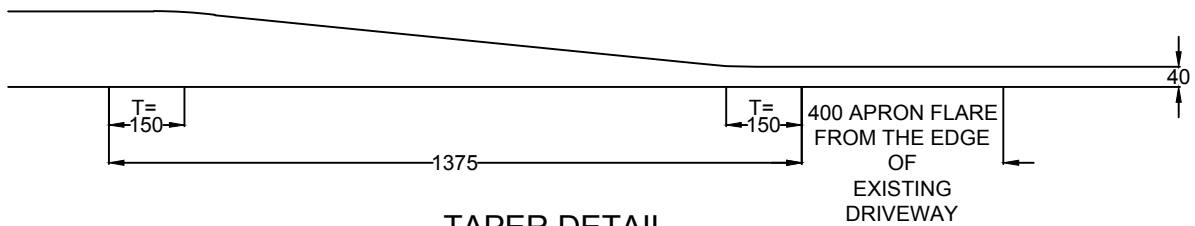
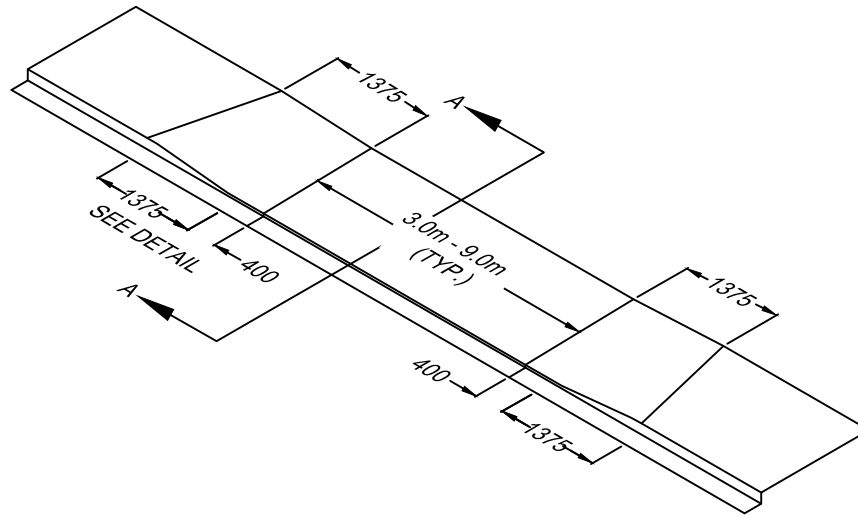


**SECTION A-A**

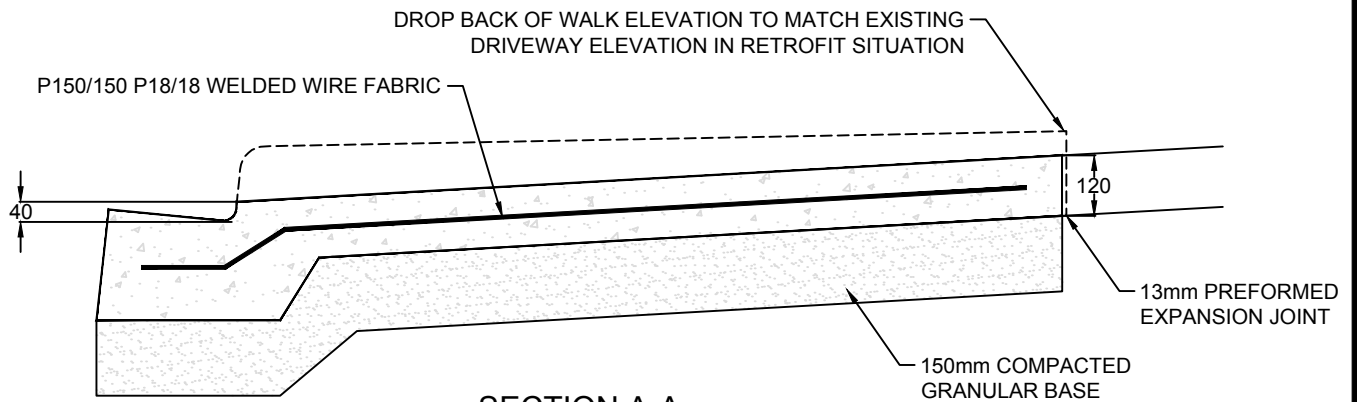
**NOTES:**

1. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.
2. SIDEWALK CROSS-FALL TO BE 3% TOWARDS THE ROAD UNLESS OTHERWISE AUTHORIZED.
3. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019	
DATE	DETAILS	DRAWN					
13-FEB-2015	REVISED CROSSING STRUCTURE	J. ORR	RESIDENTIAL CROSSING FROM MOUNTABLE CURB & GUTTER WITH SEPARATE WALK				
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR					
09-FEB-2011	REVISED DRAWING NUMBERS	J. EGGEN	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER	
07-FEB-2003	NOTES	R. DEKKER	CHECKED: S. JOHNSON, P.TECH. (ENG.)			41205	
31-JUL-1997	MINOR REVISIONS	R. DEKKER	DATE: 30-JUL-1997	SCALE: N.T.S.	DRAWN: J. EDGINGTON, C.E.T.		
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT				



**TAPER DETAIL**



**SECTION A-A**

**NOTES:**

1. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.
2. FOR ROLLED FACE CURB ADJUST TAPER LENGTH FROM 1375mm TO 700mm.
3. SIDEWALK CROSS-FALL TO BE 3% TOWARDS THE ROAD UNLESS OTHERWISE AUTHORIZED.
4. EXISTING STANDARD CURB & GUTTER TO BE REMOVED & REPLACED WITH TAPER & DROP CURB SECTIONS. ENSURE THAT 40mm FACE OF CURB IS MAINTAINED THROUGHOUT THE DROP CURB SECTIONS TO FACILITATE PROPER DRAINAGE.
5. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

**REVISIONS**

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED NOTES	M. MOTIUK
15-AUG-2016	ADDED NOTE RE. 40mm F.O.C.	D. LEGROW
23-DEC-2015	REVISED SIDEWALK STRUCTURE	D. LEGROW
13-FEB-2015	REVISED SIDEWALK STRUCTURE	J. ORR
21-APR-2011	REVISED DRAWING NUMBER & REVISIONS	J. ORR



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**RESIDENTIAL CROSSING FROM STRAIGHT FACED CURB & MONOLITHIC SIDEWALK**

APPROVED: K. COLE, P. ENG.

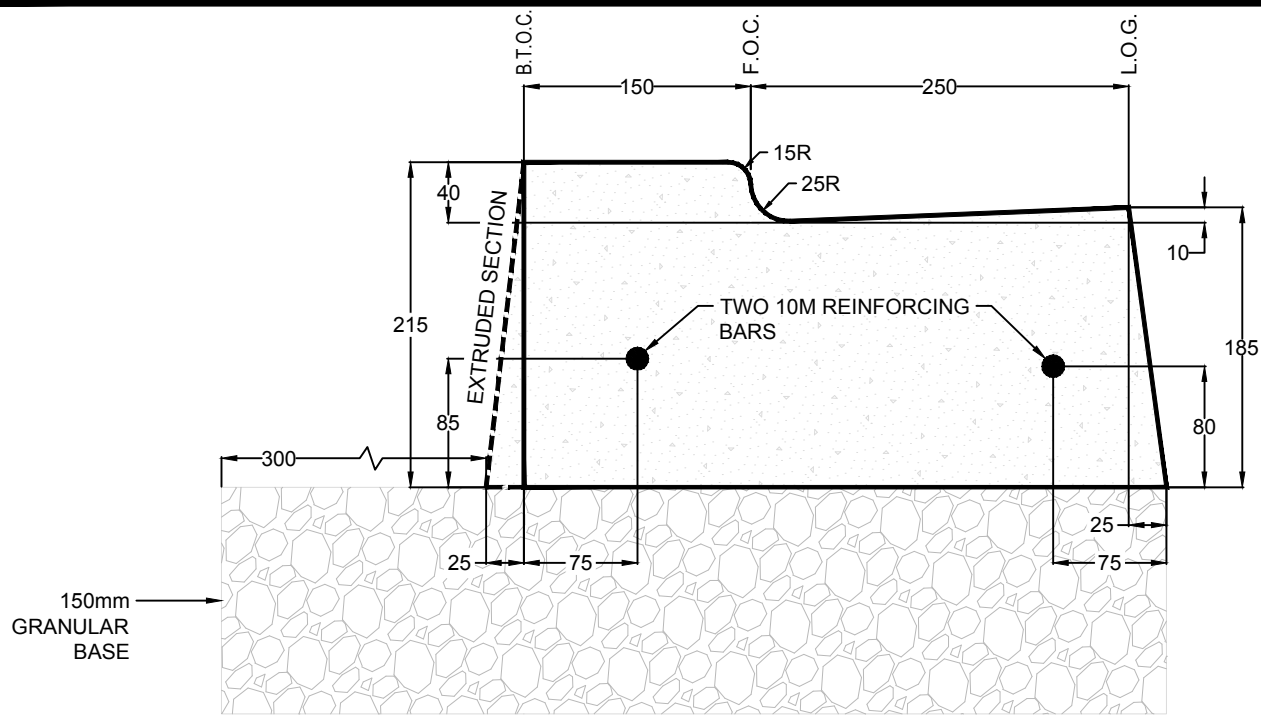
CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 17-DEC-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

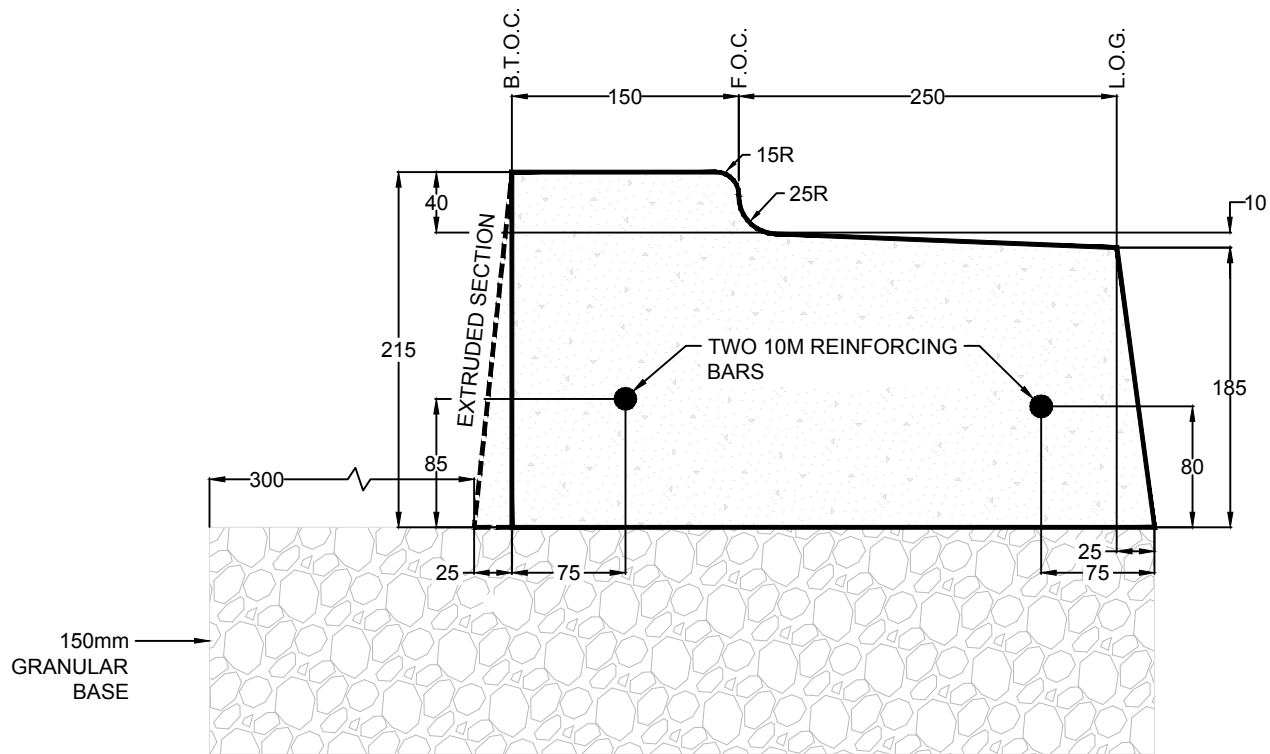
**DRAWING NUMBER**

**41206**

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



**DROP CURB & 250 GUTTER**



**DROP CURB & 250 REVERSE GUTTER**

**NOTES:**

1. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.
2. REINFORCING BARS ARE REQUIRED AT CONSTRUCTION JOINTS AND FUTURE TIE-IN LOCATIONS.
3. REINFORCING BARS SHALL EXTEND INTO CONCRETE A MINIMUM OF 300mm.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

**REVISIONS**

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED NOTES	M. MOTIUK
16-FEB-2019	ADDED REVERSE GUTTER SECTION, UPDATED DRAWING TITLE	D. LEGROW
13-FEB-2015	REVISED CURB STRUCTURE	J. ORR
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR
09-FEB-2011	REVISED DRAWING NUMBERS	J. EGGEN



STRATHCONA  
COUNTY

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

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**DROP CURB WITH 250mm GUTTER - SECTIONS**

APPROVED: K. COLE, P. ENG.

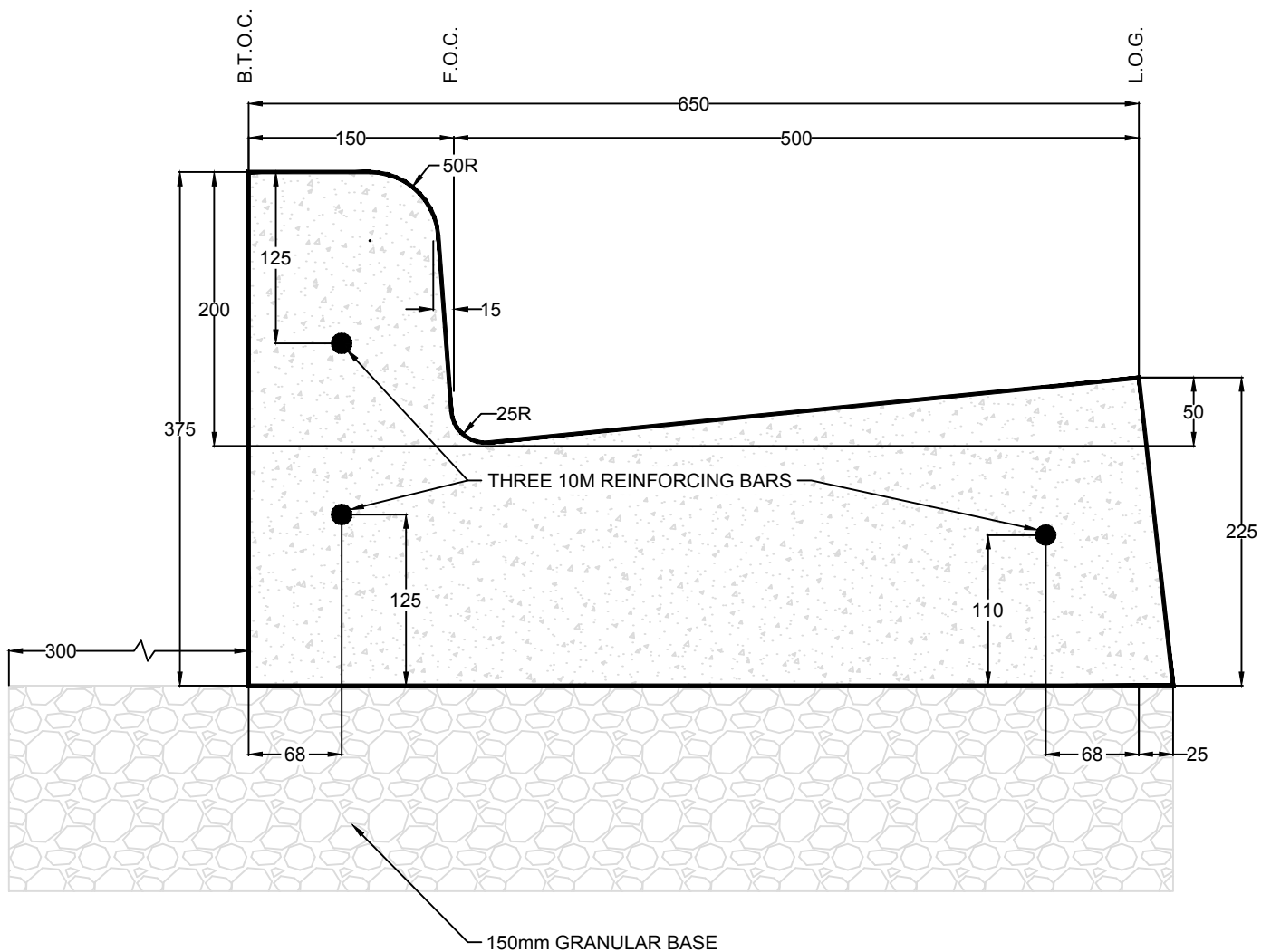
CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 25-JUL-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER


**41207**

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

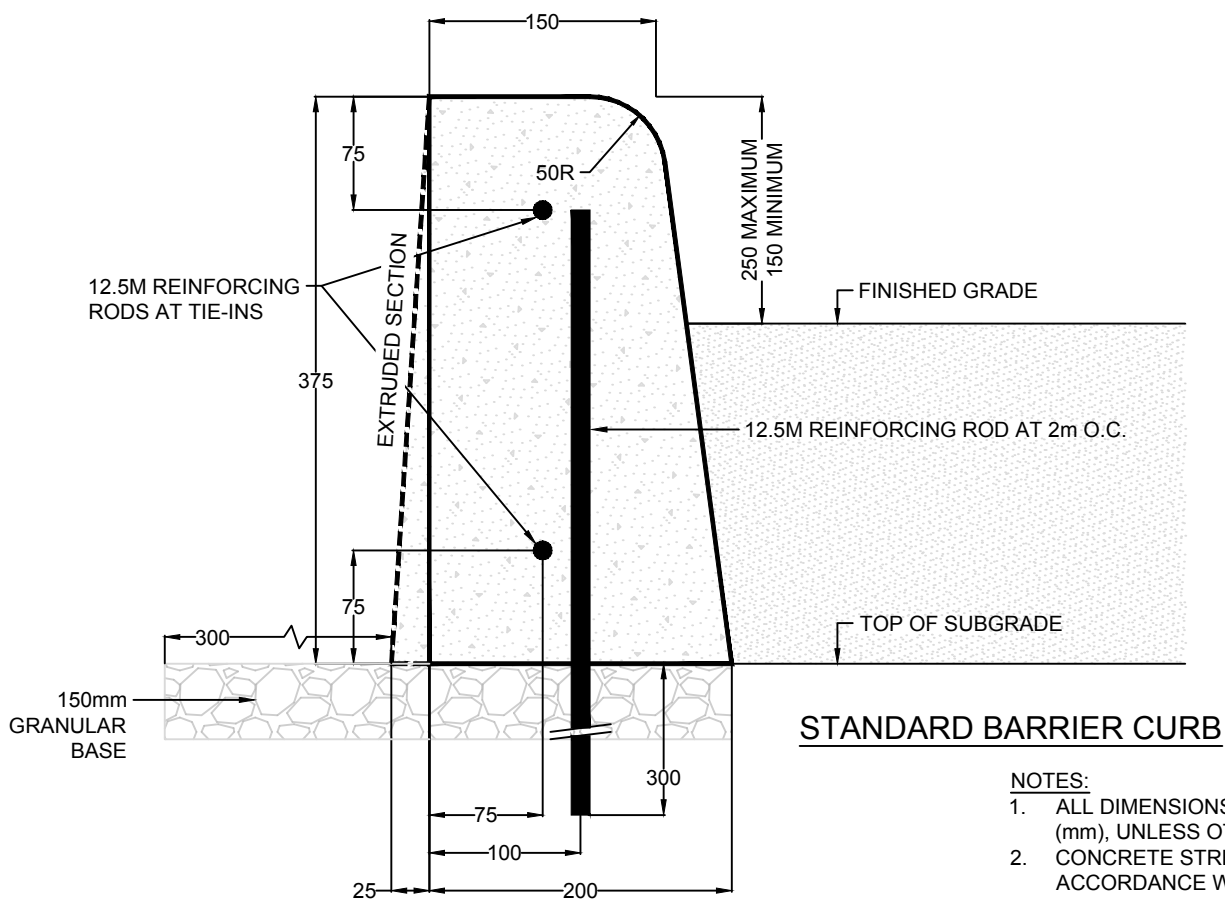
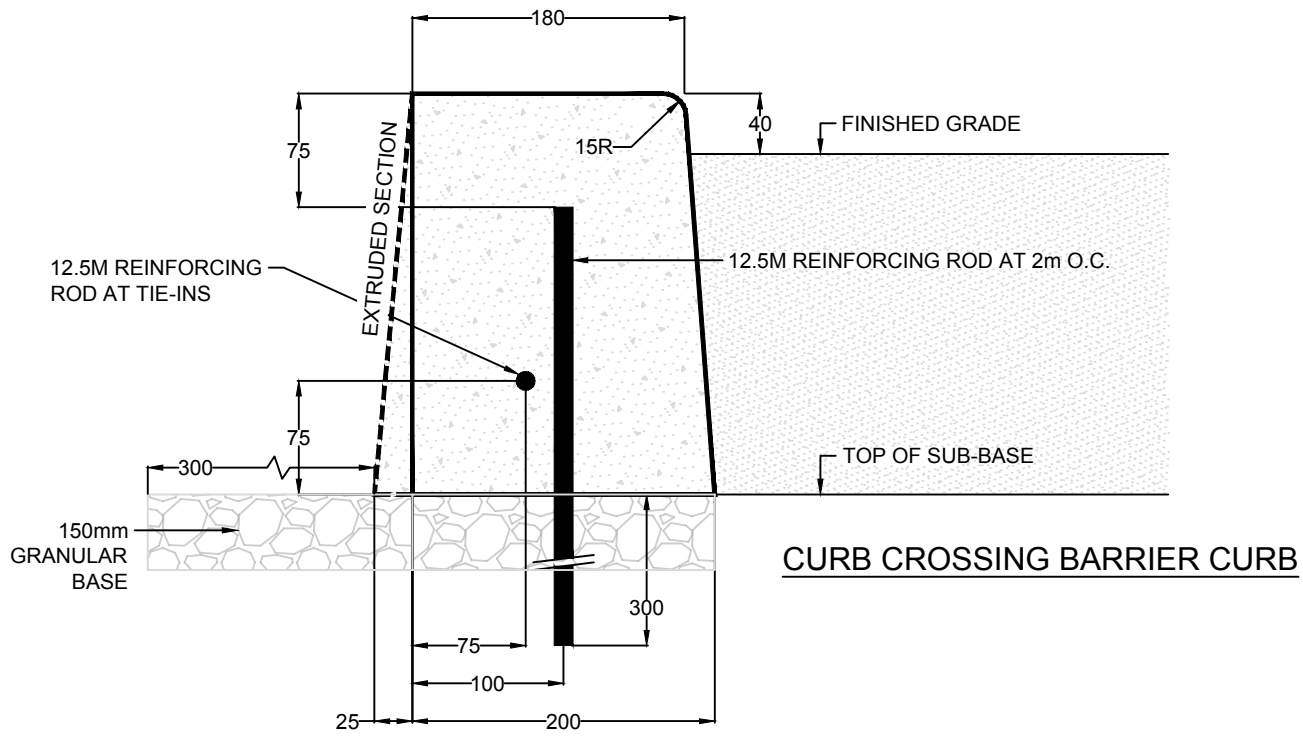


#### NOTES:

1. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.
2. REINFORCING BARS ARE REQUIRED AT CONSTRUCTION JOINTS AND FUTURE TIE-IN LOCATIONS.
3. REINFORCING BARS SHALL EXTEND INTO CONCRETE A MINIMUM OF 300mm.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
15-MAY-2019	REVISED NOTES	M. MOTIUK	200mm CURB WITH 500mm GUTTER - SECTION			
13-FEB-2015	REVISED CURB STRUCTURE	J. ORR				
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT	CHECKED: S. JOHNSON, P.TECH. (ENG.)			41208
24-JUL-1997	NOTES	R. DEKKER	DATE: 11-JAN-1995	SCALE: N.T.S.	DRAWN: R. DEKKER, C.E.T.	
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT			





**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.
2. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.

**REVISIONS**

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED CURB STRUCTURES & ANNO	M. MOTIUK
13-FEB-2015	REVISED CURB STRUCTURES & ANNO	J. ORR
21-APR-2011	REVISED DRAWING NUMBER & REVISIONS	J. ORR
14-FEB-2011	REVISED DRAWING NUMBER	O. BUTT
07-FEB-2003	NOTES	R. DEKKER



**STRATHCONA  
COUNTY**

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

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**STANDARD BARRIER CURB AND CURB CROSSING - SECTIONS**

APPROVED: K. COLE, P. ENG.

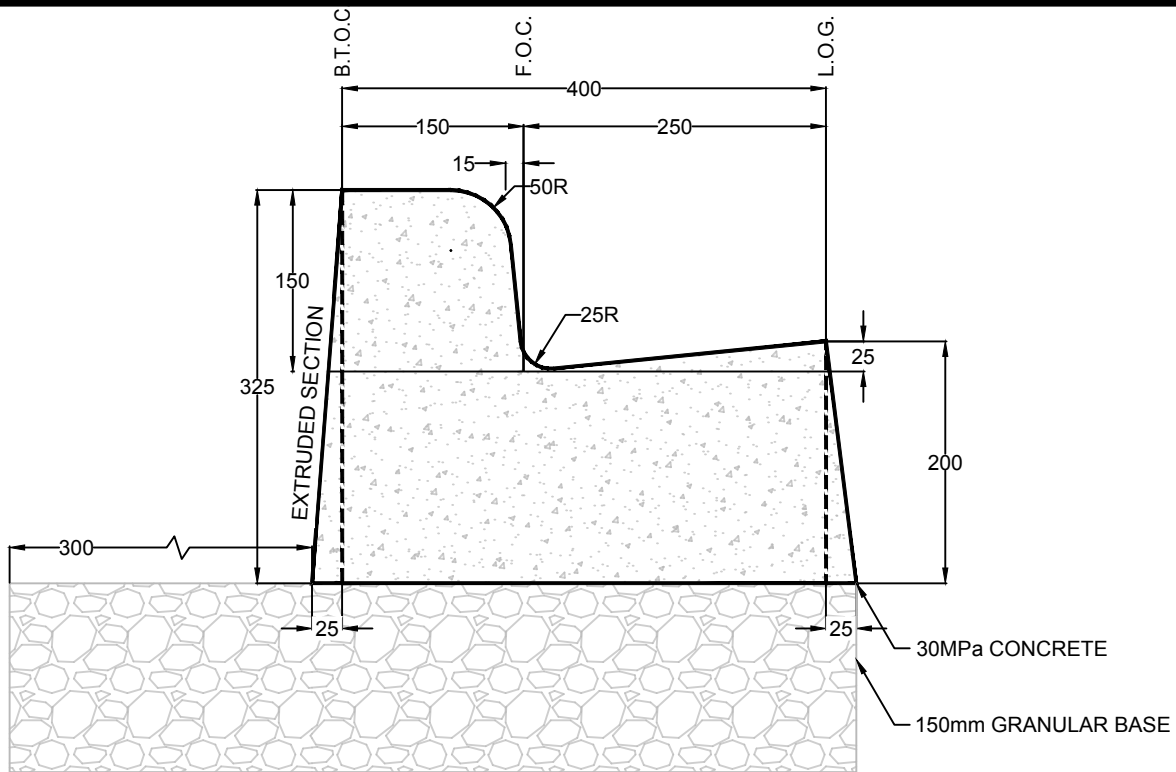
DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

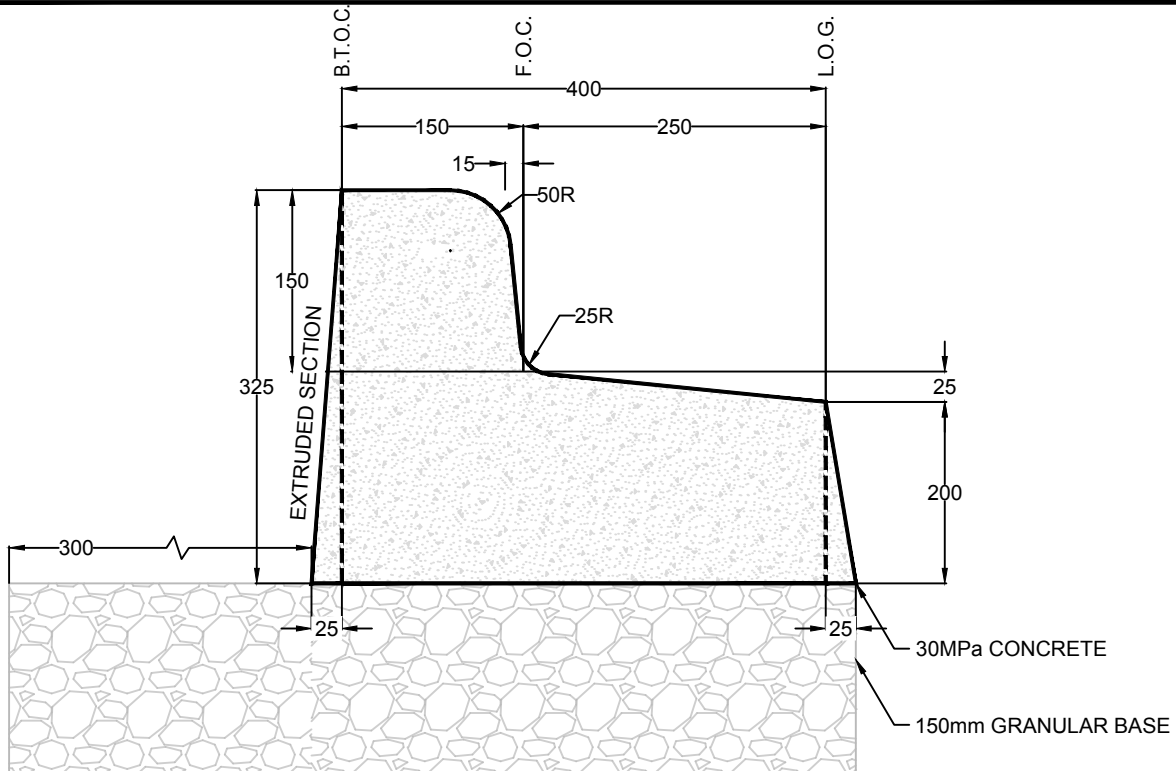
**41209**

DATE: 25-JUL-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



**150 STANDARD CURB & 250 GUTTER**



**150 STANDARD CURB & 250 REVERSE GUTTER**

**NOTE:**

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

**REVISIONS**

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED DRAWING	M. MOTIUK
07-JUN-2016	REMOVED NOTE FOR REVERSE CURB & GUTTER IN NEW DEVELOPMENTS	D. LEGROW
13-FEB-2015	ADDED NOTES	J. ORR
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT



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**150mm STANDARD CURB AND 250mm GUTTER - SECTIONS**

APPROVED: K. COLE, P.ENG.

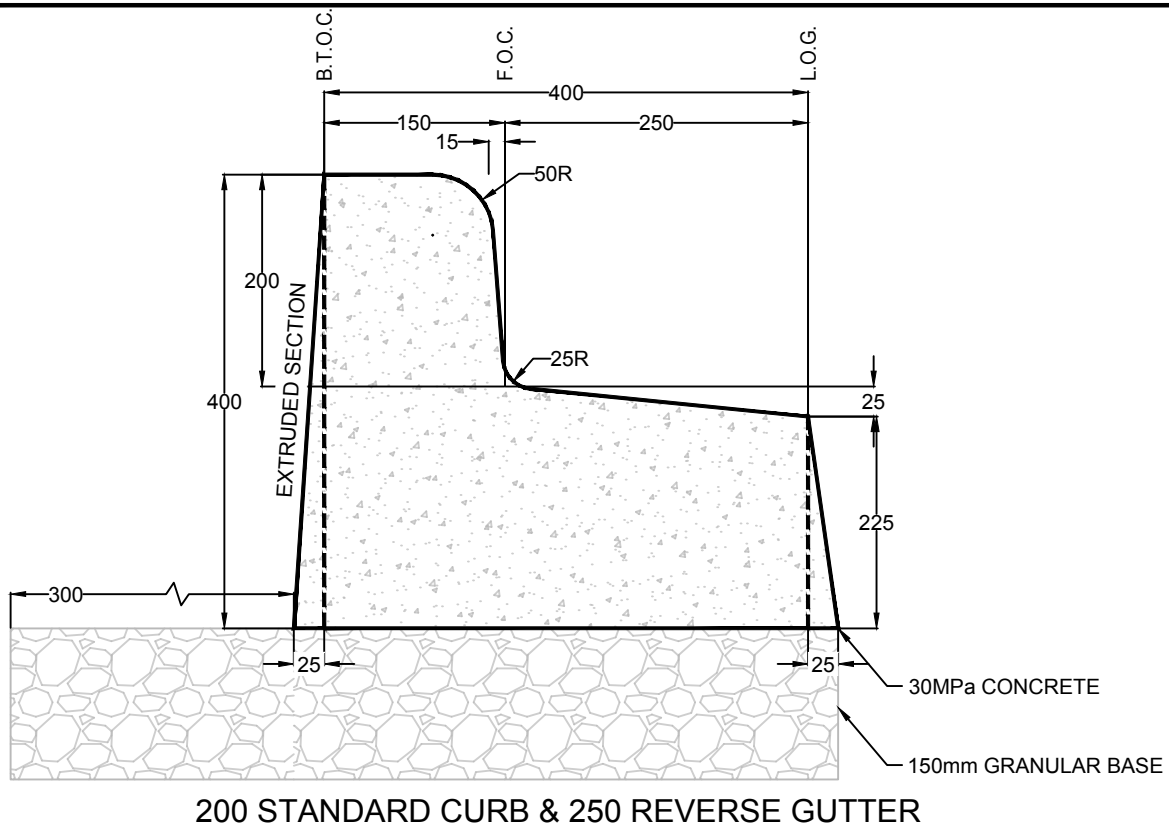
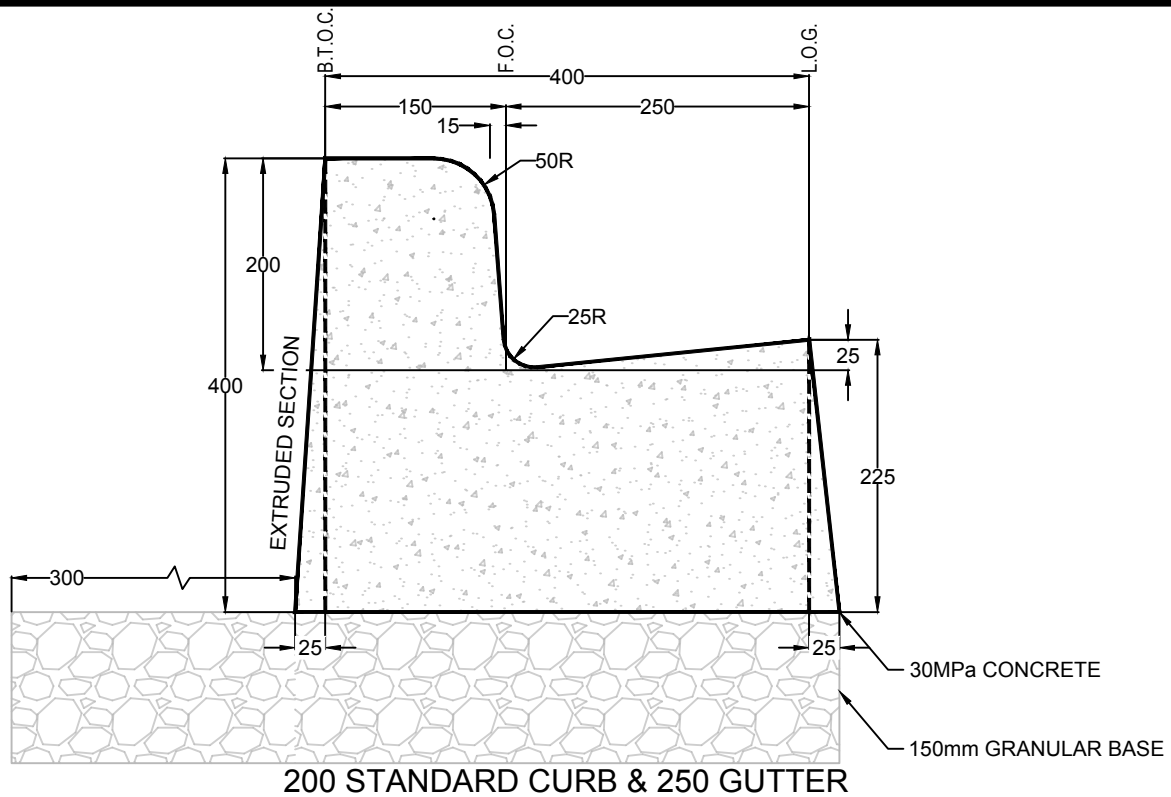
CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 20-JUL-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER

**41210**

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



**NOTE:**

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

**REVISIONS**

DATE	DETAILS	DRAWN
07-JUN-2016	REMOVED NOTE FOR REVERSE CURB & GUTTER IN NEW DEVELOPMENTS	D. LEGROW
13-FEB-2015	ADDED NOTES	J. ORR
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT
09-APR-2004	NOTES	R. DEKKER



STRATHCONA  
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**200mm STANDARD CURB AND 250mm GUTTER - SECTIONS**

APPROVED: K. COLE, P.ENG.

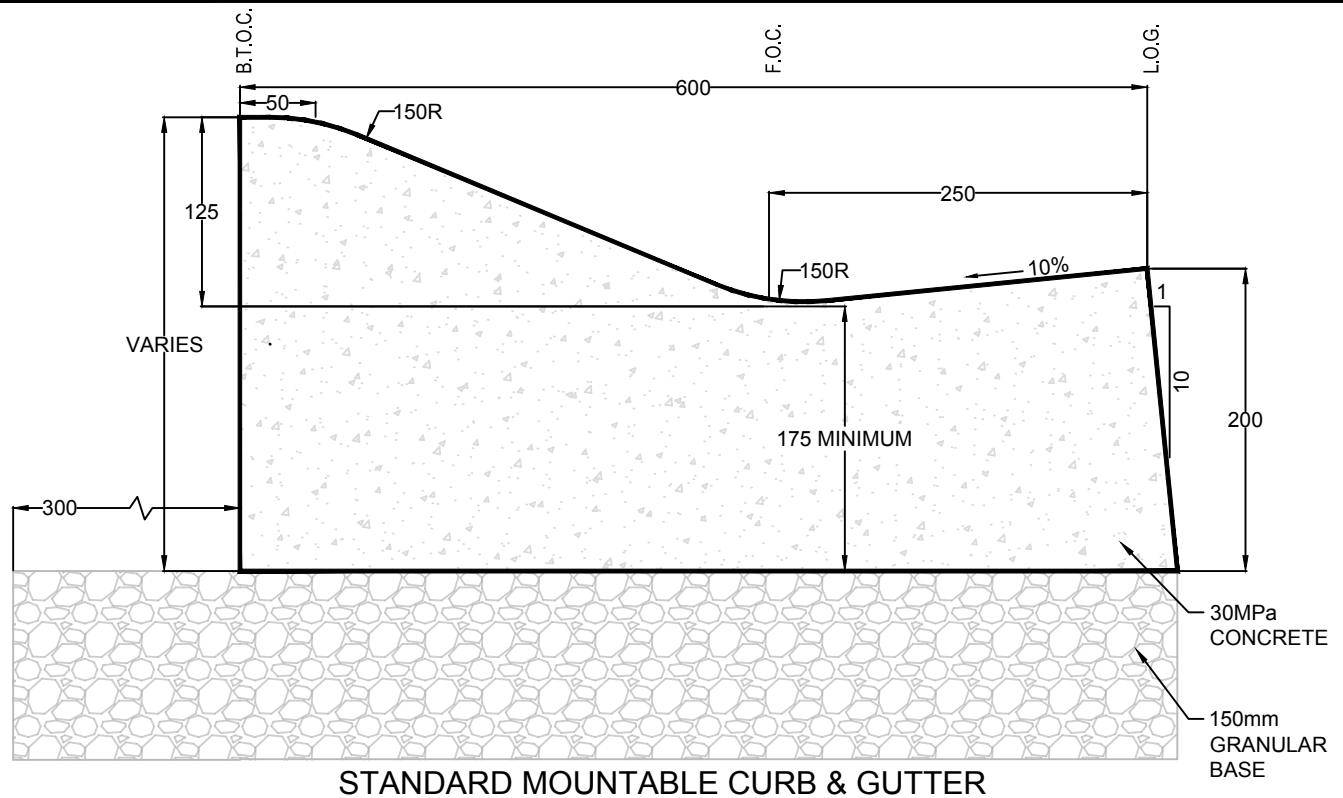
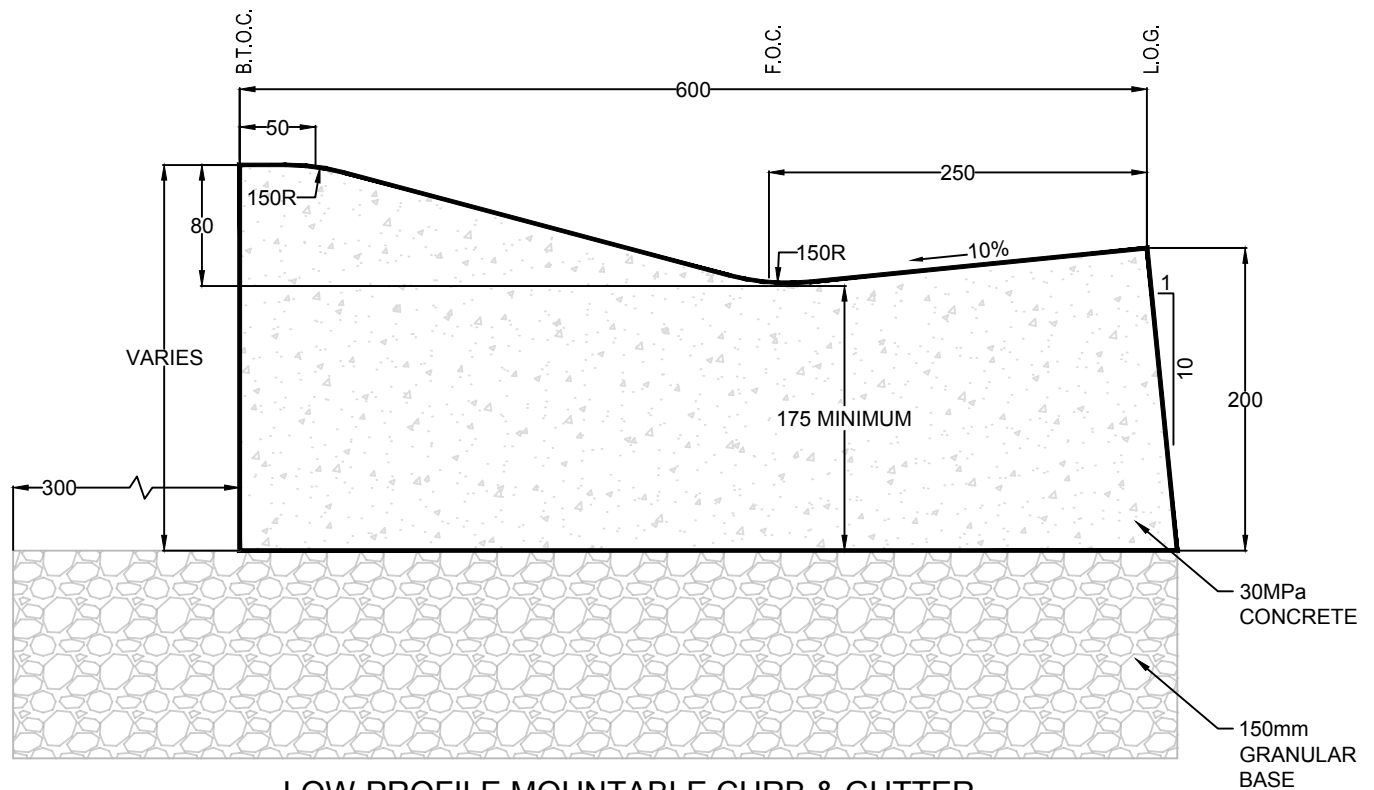
DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

**41211**


DATE: 30-JUL-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

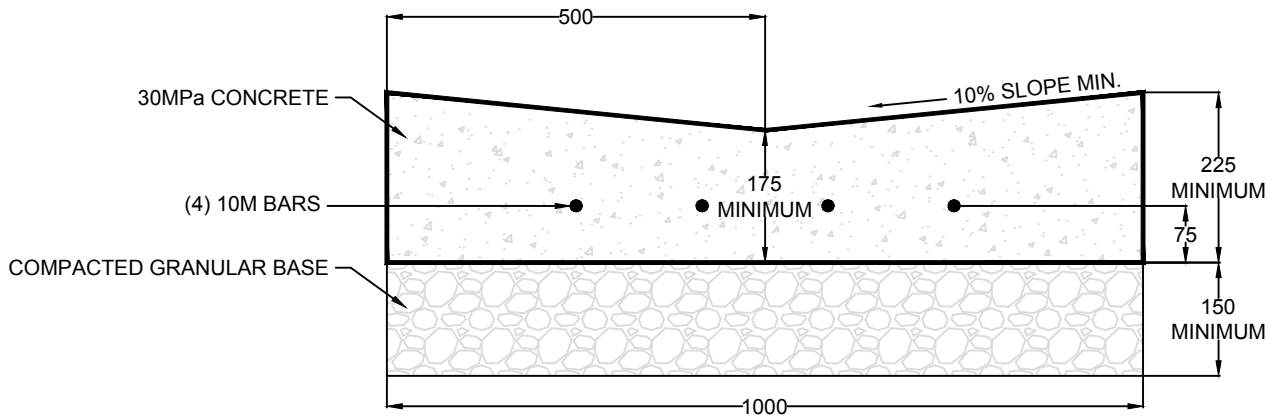
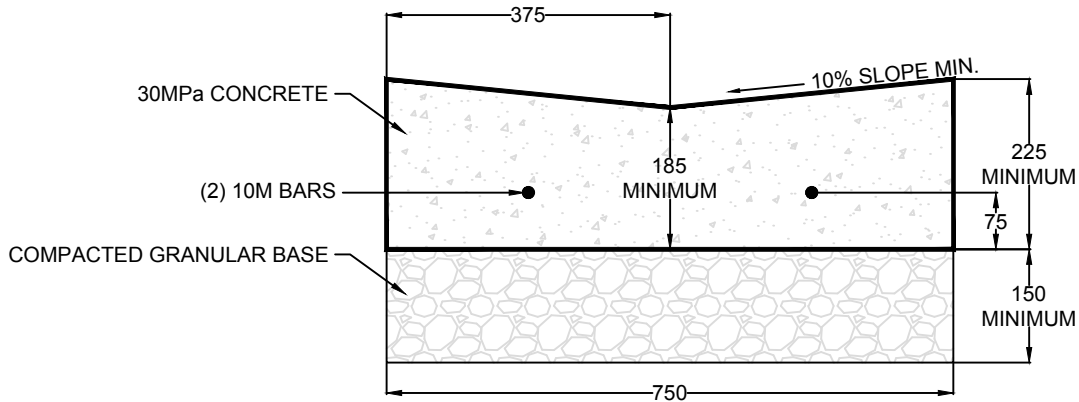
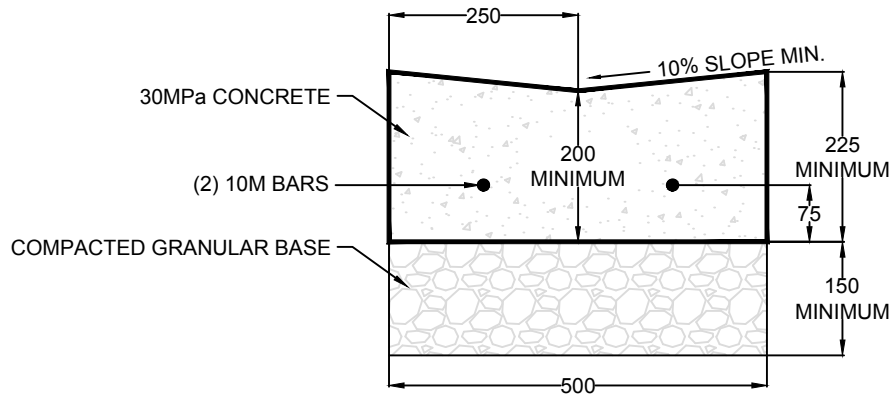
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



**NOTE:**


1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

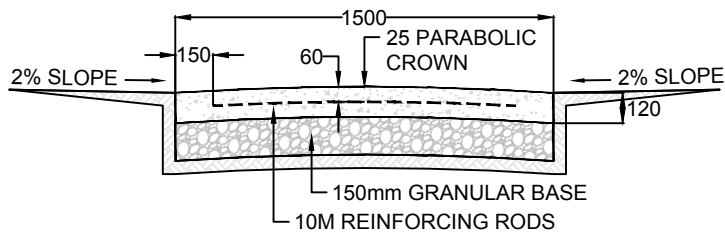
REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019	
DATE	DETAILS	DRAWN	LOW-PROFILE & STANDARD MOUNTABLE CURB & GUTTER SECTIONS				
23-DEC-2015	REVISED CURB STRUCTURE	S. ENGLEDER					
13-FEB-2015	REVISED CURB STRUCTURE	J. ORR					
21-APR-2011	REVISED DRAWING NUMBER & REVISIONS	J. ORR					
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT	APPROVED: K. COLE, P.ENG.				DRAWING NUMBER
09-APR-2003	NOTES	R. DEKKER	CHECKED: S. JOHNSON, P.TECH. (ENG.)				41212
			DATE: 24-JUL-1997	SCALE: N.T.S.	DRAWN: R. DEKKER, C.E.T.		
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT				



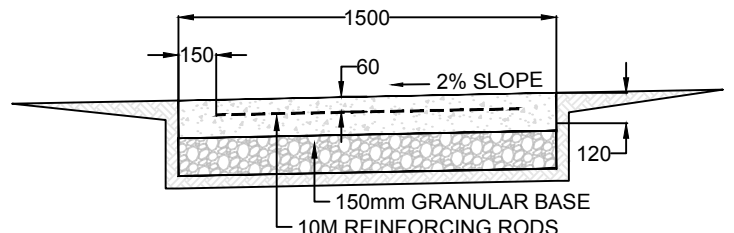
#### NOTES:

1. REINFORCING BARS ARE REQUIRED AT CONSTRUCTION JOINTS AND FUTURE TIE-IN LOCATIONS.
2. REINFORCING BARS SHALL EXTEND INTO CONCRETE A MINIMUM OF 300mm.
3. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

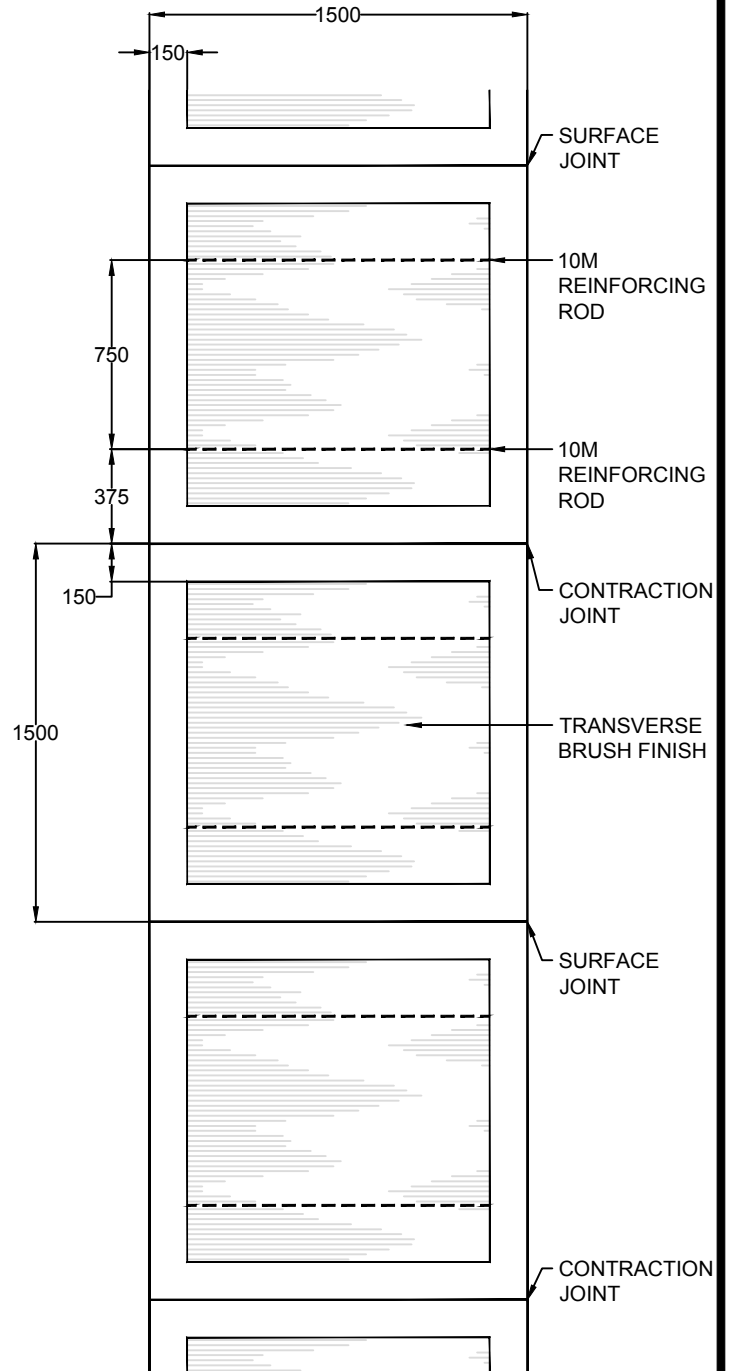
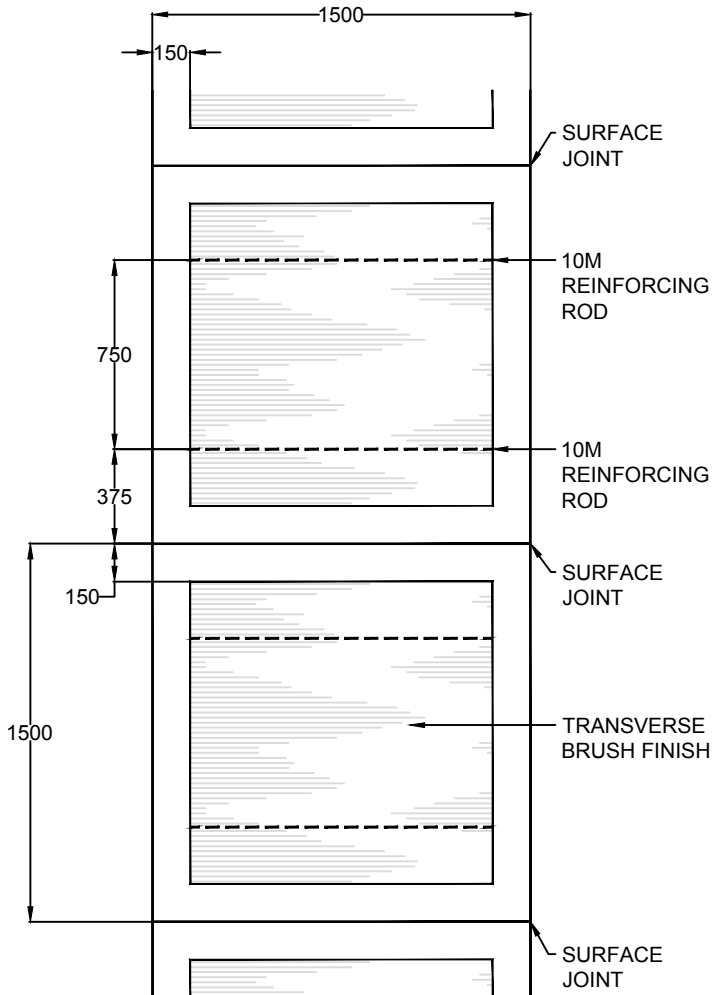
REVISIONS				STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN					
07-JUN-2016	ROUNDED DEPTH OF 750 SWALE TO 185, CHANGED REBAR SPACING IN 1000 SWALE	D. LEGROW	CONCRETE DRAINAGE SWALE - SECTIONS				
23-DEC-2015	REVISED MIN. DEPTHS	S. ENGLEDER					
12-FEB-2015	ADDED REBAR & REVISED MIN. DEPTHS	J. ORR	APPROVED: K. COLE, P. ENG.				DRAWING NUMBER
21-APR-2011	REVISED DRAWING NUMBER & REVISIONS	J. ORR	CHECKED: S. JOHNSON, P.TECH. (ENG.)				41213
14-FEB-2011	REVISED DRAWING NUMBER	O. BUTT	DATE: 22-DEC-1997	SCALE: N.T.S.	DRAWN: R. DEKKER, C.E.T.		
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT				



**1.5m CROWNED MINOR WALKWAY**



**1.5m SLOPED MINOR WALKWAY**



**NOTES:**

1. MINIMUM 150mm GRANULAR BASE MATERIAL SHALL BE COMPACTED TO 100% S.P.D.
2. CONCRETE STRENGTH TO BE 30 MPa, IN ACCORDANCE WITH THE COUNTY'S STANDARDS.
3. DESIRED SIDEWALK WIDTH IS 1.8m.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

**REVISIONS**

DATE	DETAILS	DRAWN
23-DEC-2015	NOTES	S. ENGLERDER
12-FEB-2015	ADDED GRAVEL	J. ORR
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT
09-APR-2003	NOTES	R. DEKKER



**STRATHCONA**  
COUNTY

2001 SHERWOOD DRIVE, SHERWOOD PARK  
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**MINOR WALKWAY - 1.5m CROWNED AND SLOPED**

APPROVED: K. COLE, P.ENG.

CHECKED: S. JOHNSON, P.TECH. (ENG.)

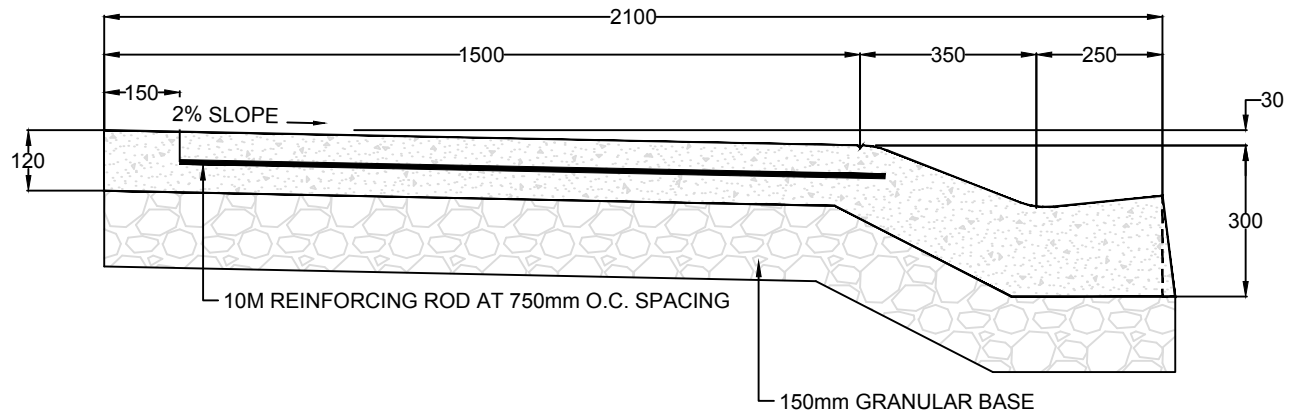
DATE: 28-JUL-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER

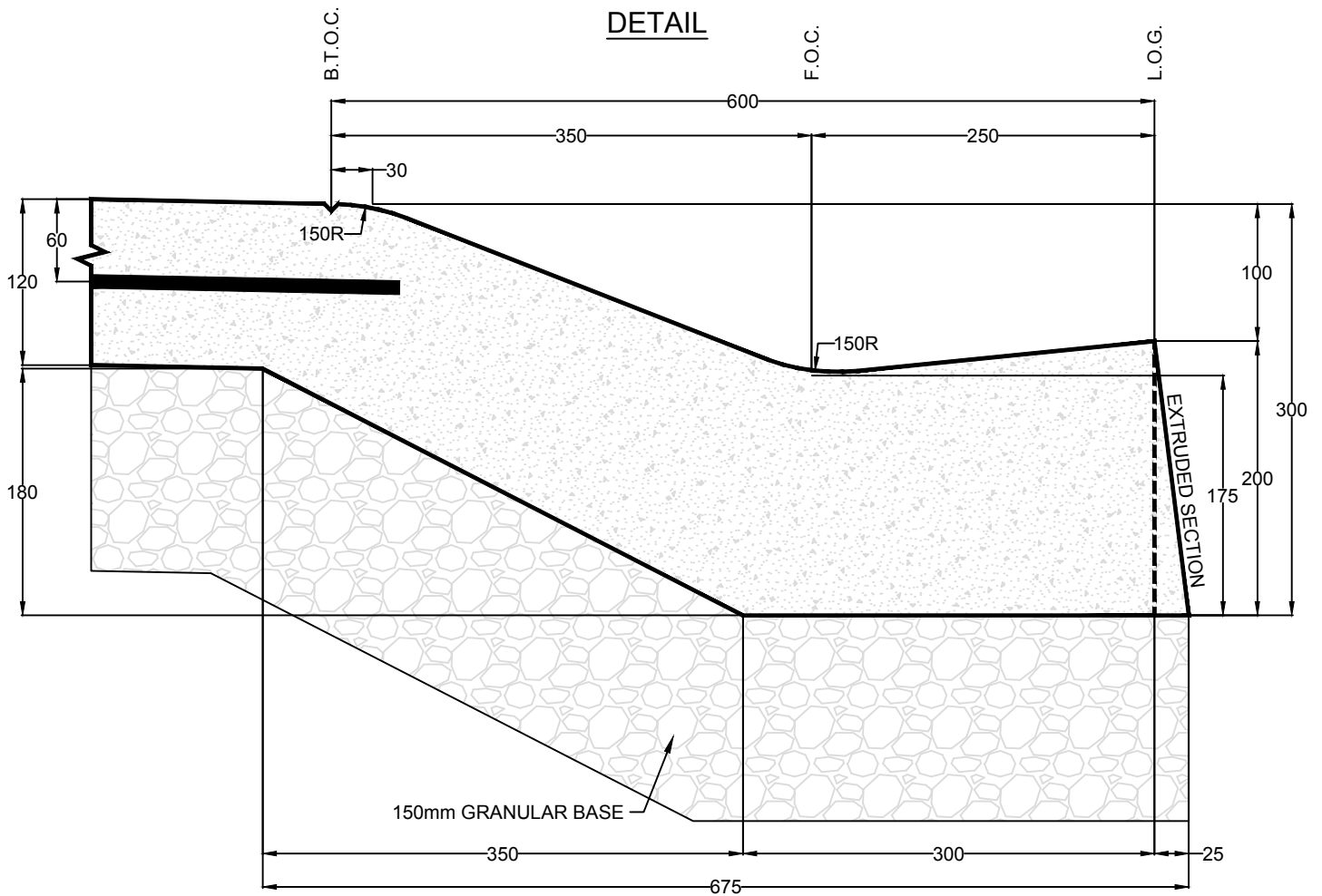
**41214**

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

## TYPICAL SECTION



## DETAIL



### NOTES:

1. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.
2. MIN. 150mm GRANULAR MATERIAL COMPACTED TO 100% S.P.D., WHEN REQUIRED.
3. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

### REVISIONS

DATE	DETAILS	DRAWN
15-MAY-2019	REVISED NOTES	M. MOTIUK
23-DEC-2015	ADDED 150mm GRANULAR BASE, NOTES	S. ENGLEDER
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT
07-FEB-2003	NOTES	R. DEKKER



STRATHCONA  
COUNTY

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

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### MONOLITHIC SIDEWALK WITH STANDARD MOUNTABLE CURB & GUTTER

APPROVED: K. COLE, P.ENG.

CHECKED: S. JOHNSON, P.TECH. (ENG.)

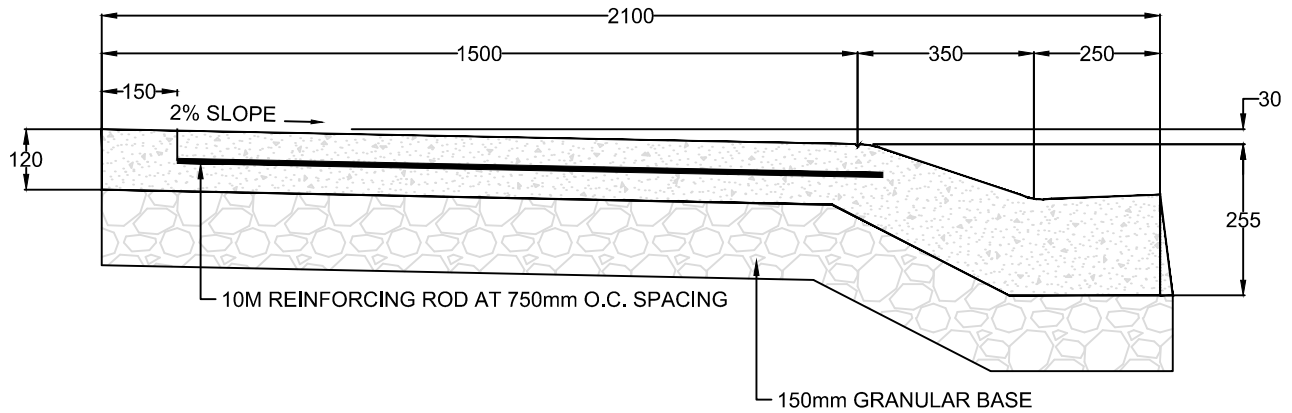
DATE: 28-JUL-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER

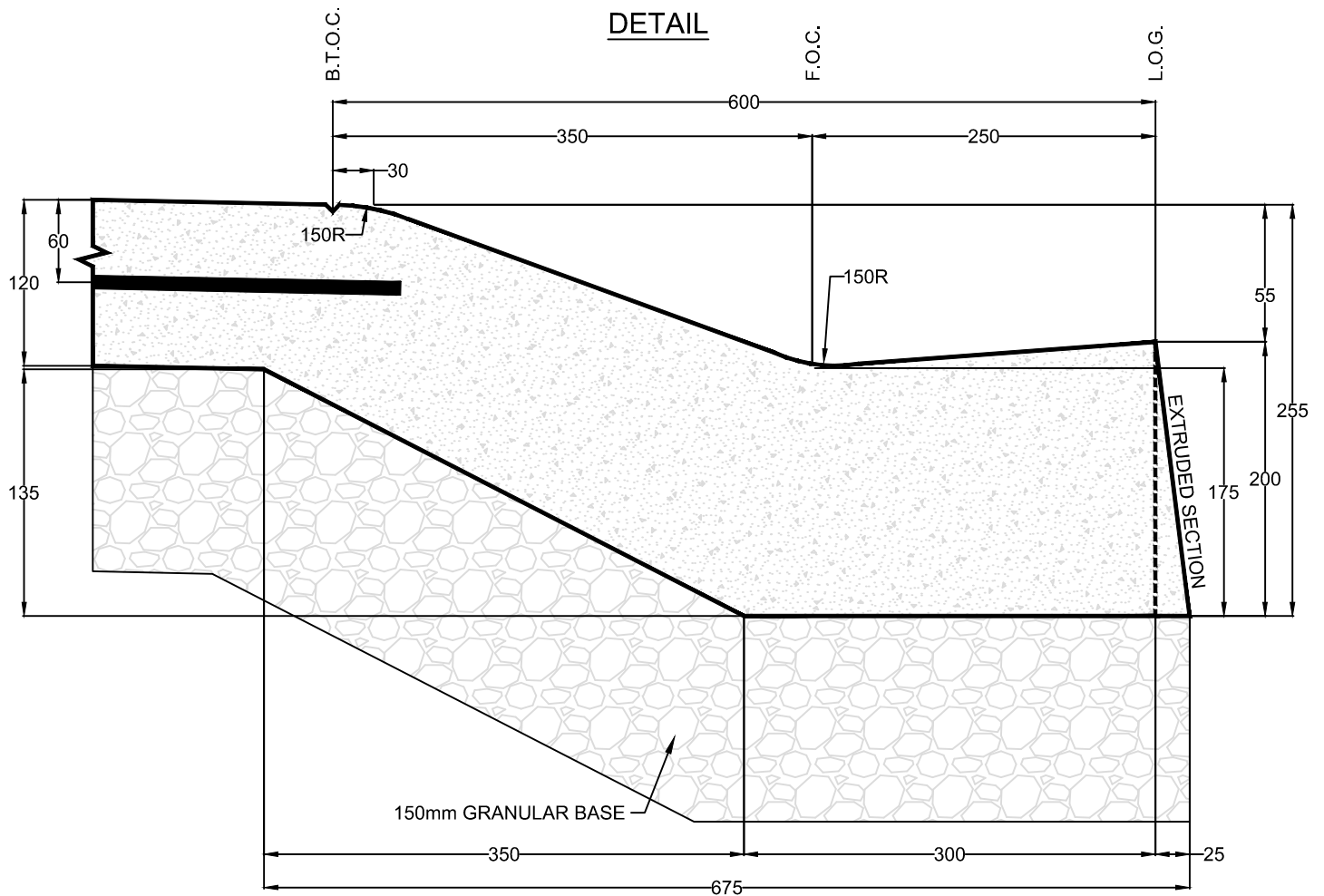
**41215**

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

## TYPICAL SECTION



## DETAIL



### NOTES:

1. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.
2. MIN. 150mm GRANULAR MATERIAL COMPACTED TO 100% S.P.D., WHEN REQUIRED.
3. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

### REVISIONS

DATE	DETAILS	DRAWN
19-AUG-2019	CREATED DRAWING	P. TOMKO



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ALBERTA, T8A 3W7, CANADA

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### MONOLITHIC SIDEWALK WITH LOW-PROFILE MOUNTABLE CURB & GUTTER

APPROVED: K. COLE, P.ENG.

DRAWING NUMBER

CHECKED: S. JOHNSON, P.TECH. (ENG.)

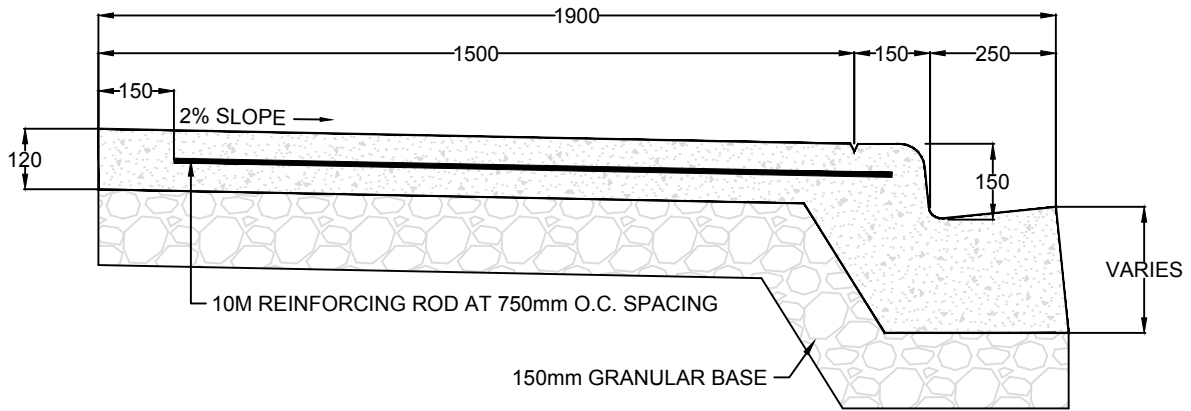
**41216**

DATE: 19-AUG-2019 SCALE: N.T.S. DRAWN: P. TOMKO

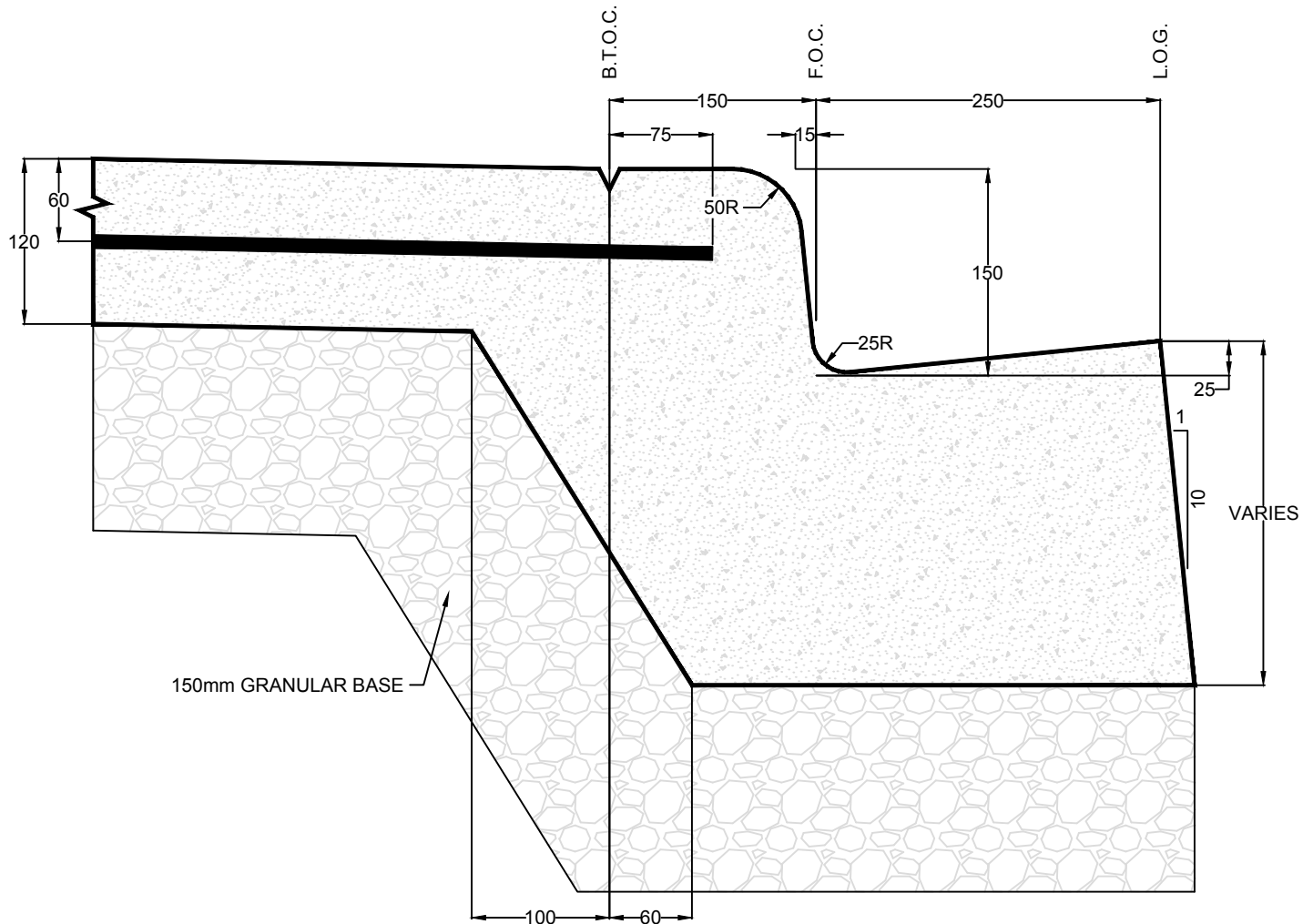
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



## TYPICAL SECTION



## DETAIL



### NOTES:

1. CONCRETE STRENGTH TO BE IN ACCORDANCE WITH ENGINEERING STANDARDS.
2. DEPTH OF GUTTER FACE TO MATCH ROAD STRUCTURE.
3. MIN. 150mm GRANULAR MATERIAL COMPACTED TO 100% S.P.D., WHEN REQUIRED.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

### REVISIONS

DATE	DETAILS	DRAWN
19-AUG-2019	REVISED DRAWING NUMBER	P. TOMKO
15-MAY-2019	REVISED NOTES	P. TOMKO
12-DEC-2015	ADDED 150mm GRANULAR BASE, NOTES	S. ENGLEDER
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT



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2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

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### MONOLITHIC SIDEWALK WITH 150mm CURB & 250mm GUTTER

APPROVED: K. COLE, P. ENG.

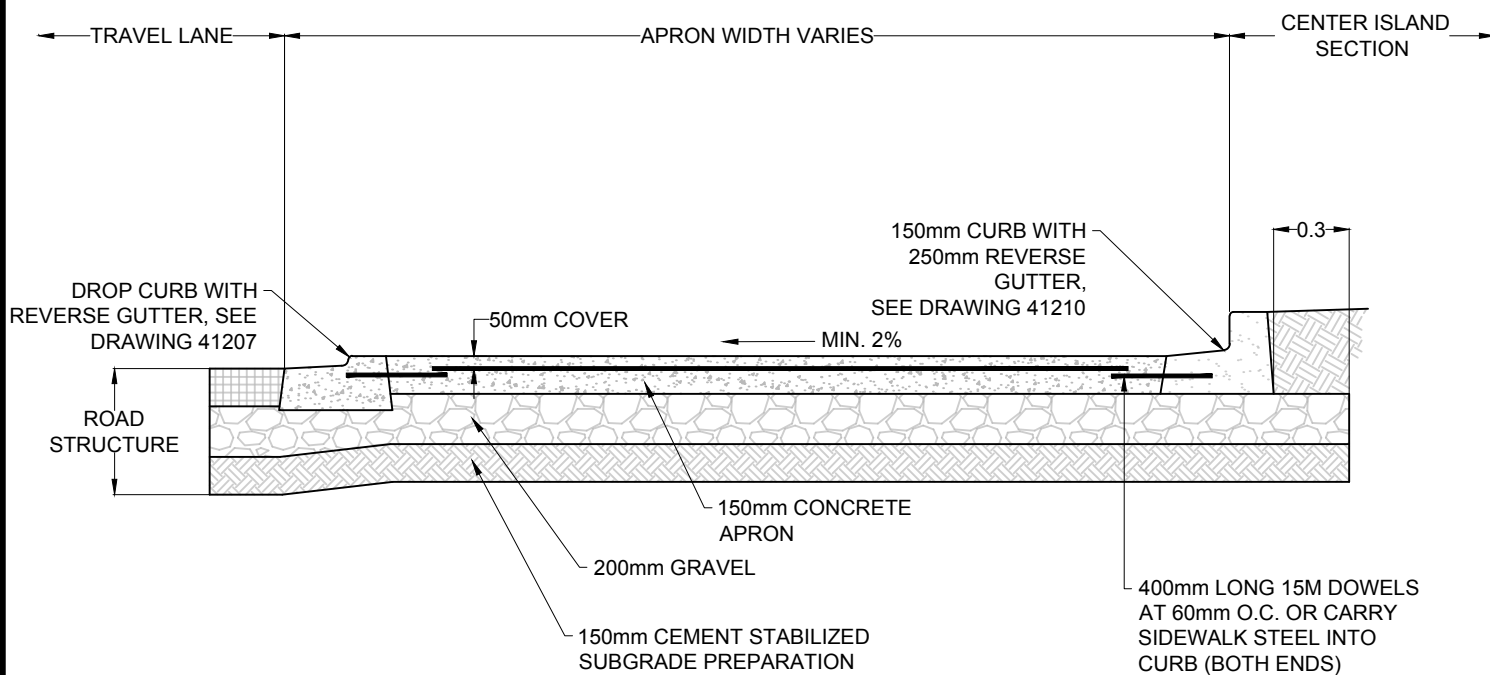
CHECKED: S. JOHNSON, P. TECH. (ENG.)

DATE: 29-JUL-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER


**41217**

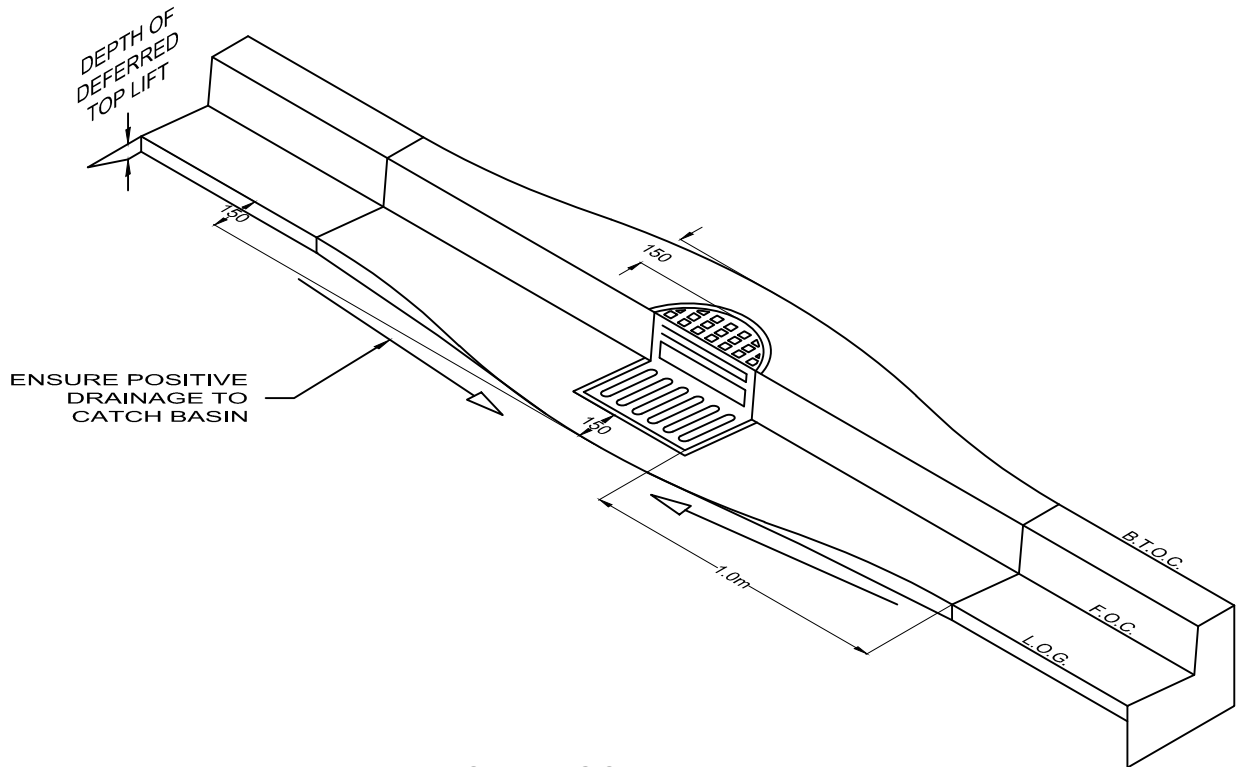
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



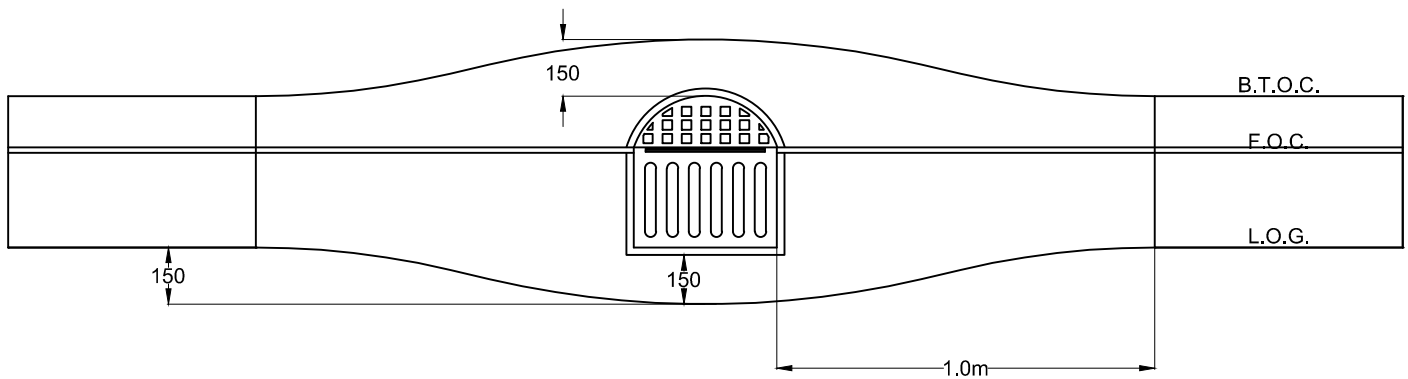
NOTES:

1. PROVIDE 40mm DEEP TRANSVERSE CONTROL JOINTS @ 3.0m O.C.
2. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY			2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019	
DATE	DETAILS	DRAWN								
			ROUNDAABOUT TYPICAL APRON SECTION							
19-AUG-2019	REVISED DRAWING NUMBER	P. TOMKO	APPROVED: K. COLE, P. ENG.						DRAWING NUMBER	
21-DEC-2015	ADDED TEXT	S. ENGLER	CHECKED: S. JOHNSON, P.TECH. (ENG.)						41218	
06-FEB-2015	NEW DETAIL	J. ORR	DATE: 06-FEB-2015		SCALE: N.T.S.		DRAWN: J. ORR, C.E.T.			
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT										




ORTHAGONAL VIEW

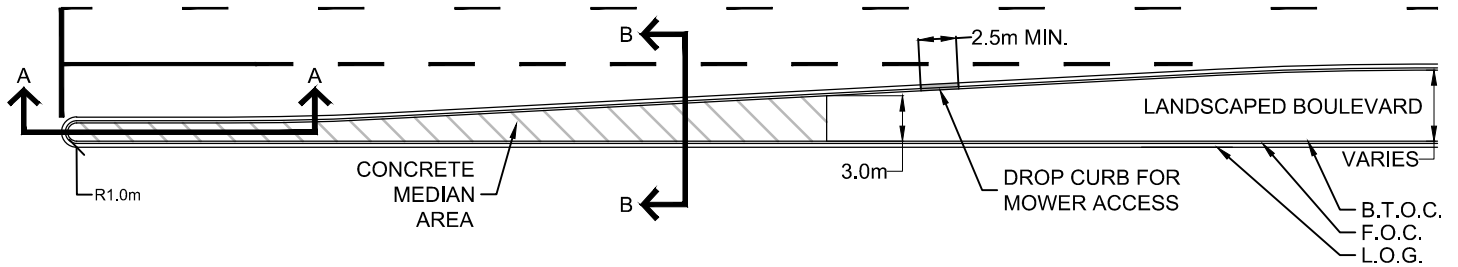


PLAN VIEW

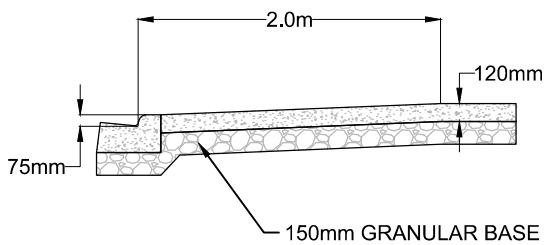
**NOTES:**

1. TYPICAL CURB AND GUTTER TREATMENT AT CATCH BASIN WHEN ASPHALT TOP LIFT IS DEFERRED. LOCATION TO BE DETERMINED BY ENGINEER.
2. MINIMUM 0.6% SLOPE FOR 5.0m IN EACH DIRECTION ON A SAG VERTICAL CURVE.
4. IF FINAL LIFT OF ASPHALT IS 50mm OR GREATER, CURB AND GUTTER SHALL BE REMOVED AND REPLACED AT FINAL LIFT ELEVATIONS AT FAC.
5. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

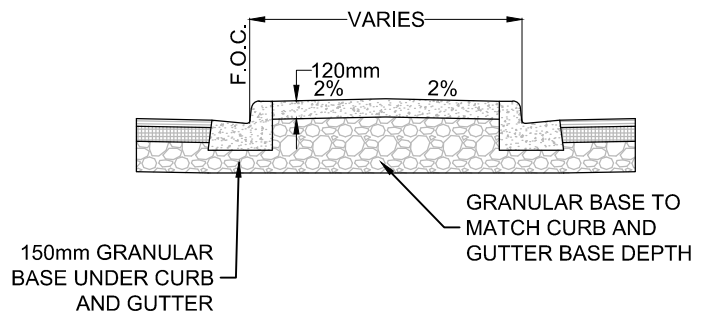
REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019	
DATE	DETAILS	DRAWN					
			DEPRESSED CURB & GUTTER FOR CATCH BASIN				
19-AUG-2019	REVISED DRAWING NUMBER	P.TOMKO	APPROVED: K. COLE, P. ENG.				DRAWING NUMBER
23-DEC-2015	NOTES, DIMENSION OF DEFERRED TOP LIFT	S. ENGLEDER	CHECKED: S. JOHNSON, P.TECH. (ENG.)				41219
19-FEB-2015	NEW DETAIL	J. ORR	DATE: 19-FEB-2015	SCALE: N.T.S.	DRAWN: J. ORR, C.E.T.		
							TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



PLAN VIEW



SECTION A-A



SECTION B-B

REVISIONS

DATE	DETAILS	DRAWN
19-AUG-2019	REVISED DRAWING NUMBER	P. TOMKO
23-DEC-2015	ADDED 2% CROSS-FALL	S. ENGLEDER
19-FEB-2015	NEW DETAIL	J. ORR



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CENTER MEDIAN - END TREATMENT

APPROVED: K. COLE, P. ENG.

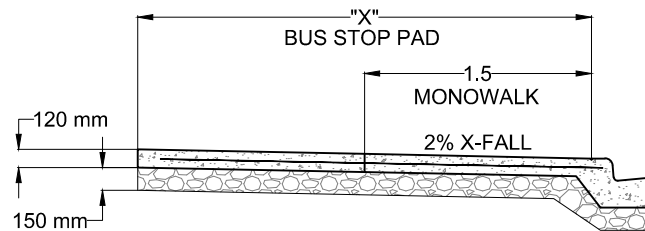
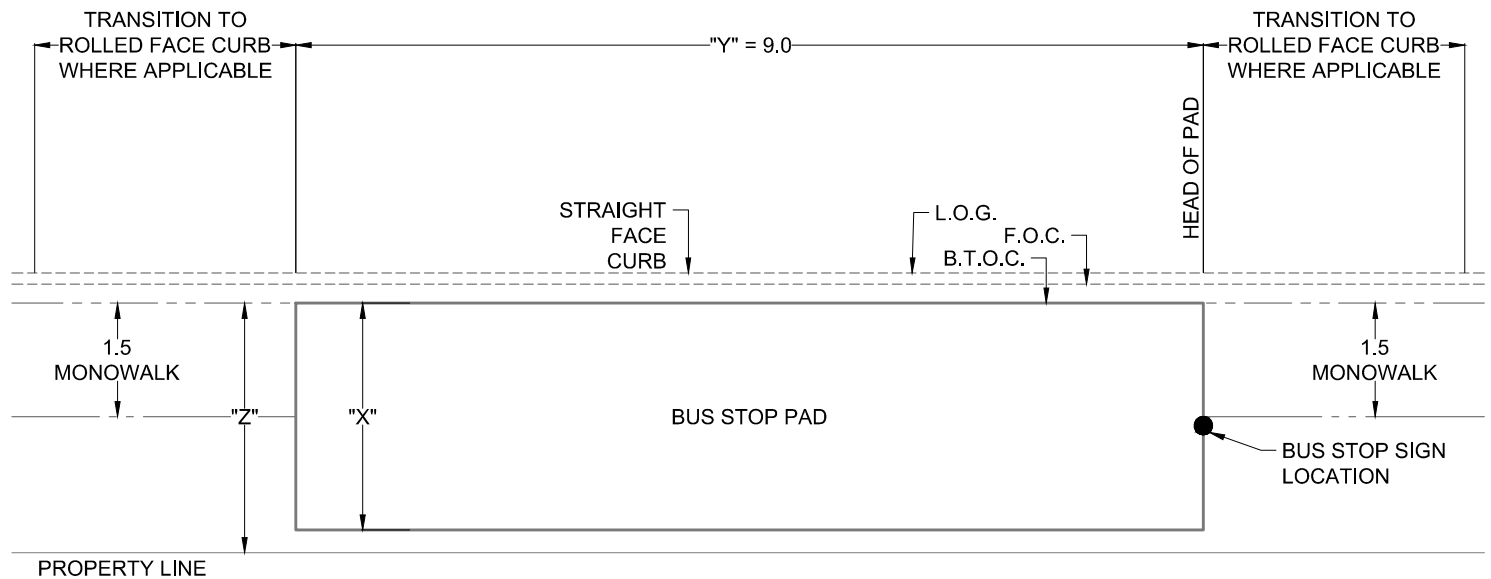
CHECKED: S. JOHNSON, P.TECH. (ENG.)

DATE: 19-FEB-2015 SCALE: N.T.S. DRAWN: J. ORR, C.E.T.

DRAWING NUMBER

41220


TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

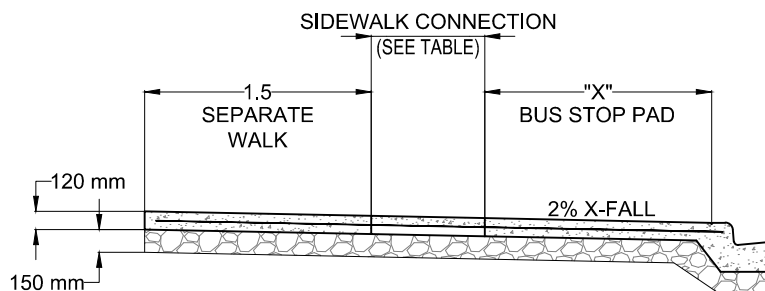
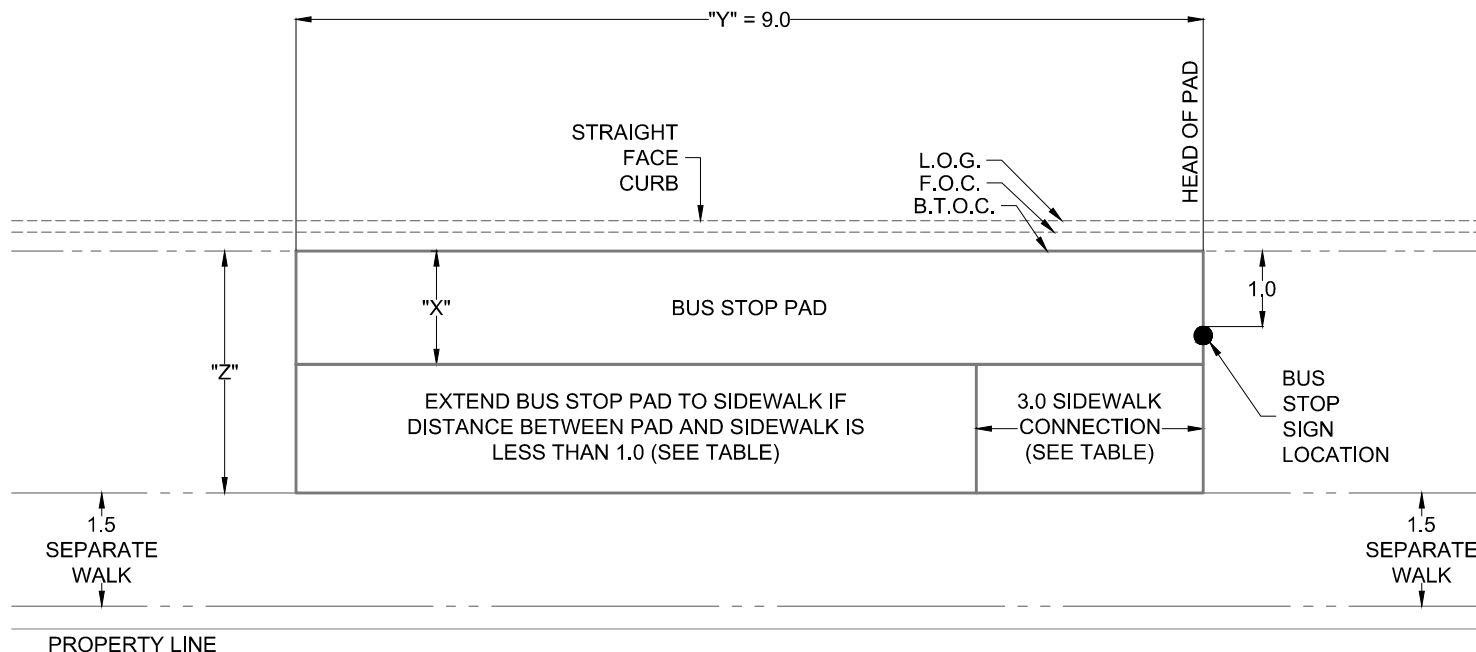


CONDITION	DISTANCE "Z" TO PROPERTY LINE (m)	REQUIRED WIDTH "X" (m)
OVER-CONSTRAINED*	"Z" < 3.1	2.8
CONSTRAINED	3.1 <= "Z" < 3.9	"Z" - 0.3 (MAX 3.0)
NOT CONSTRAINED	"Z" >= 3.9	3.0
*NO SHELTER PERMITTED		

#### NOTES:

1. PROVIDE A BUS STOP PAD WITH LENGTH "Y" AND WIDTH "X" IN ACCORDANCE WITH DRAWING NOTES AND TABLE ABOVE. PROVIDE APPROPRIATE CRACK CONTROL JOINTS THROUGHOUT.
2. MAINTAIN A MINIMUM 0.3m CLEARANCE BETWEEN PROPERTY LINE AND BUS STOP PAD.
3. CONCRETE ROAD BASE MAY BE REQUIRED ADJACENT TO THE BUS STOP PAD, SUBJECT TO REVIEW BY THE COUNTY.
4. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA				© 2019
DATE	DETAILS	DRAWN					
			BUS STOP PAD - MONOWALK				
19-AUG-2019	REVISED DRAWING NUMBER	P. TOMKO					
28-FEB-2017	UPDATED LABELS FOR CLARITY; REVISED TITLE, DIMENSIONS TABLE	D. LEGROW	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER	
15-SEP-2016	ADDED NOTE RE. CONCRETE ROAD BASE	D. LEGROW	CHECKED: S. JOHNSON, P.TECH. (ENG.)			41221	
19-DEC-2015	NEW DETAIL	J. ORR	DATE: 19-DEC-2015	SCALE: N.T.S.	DRAWN: J. ORR, C.E.T.		
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT				




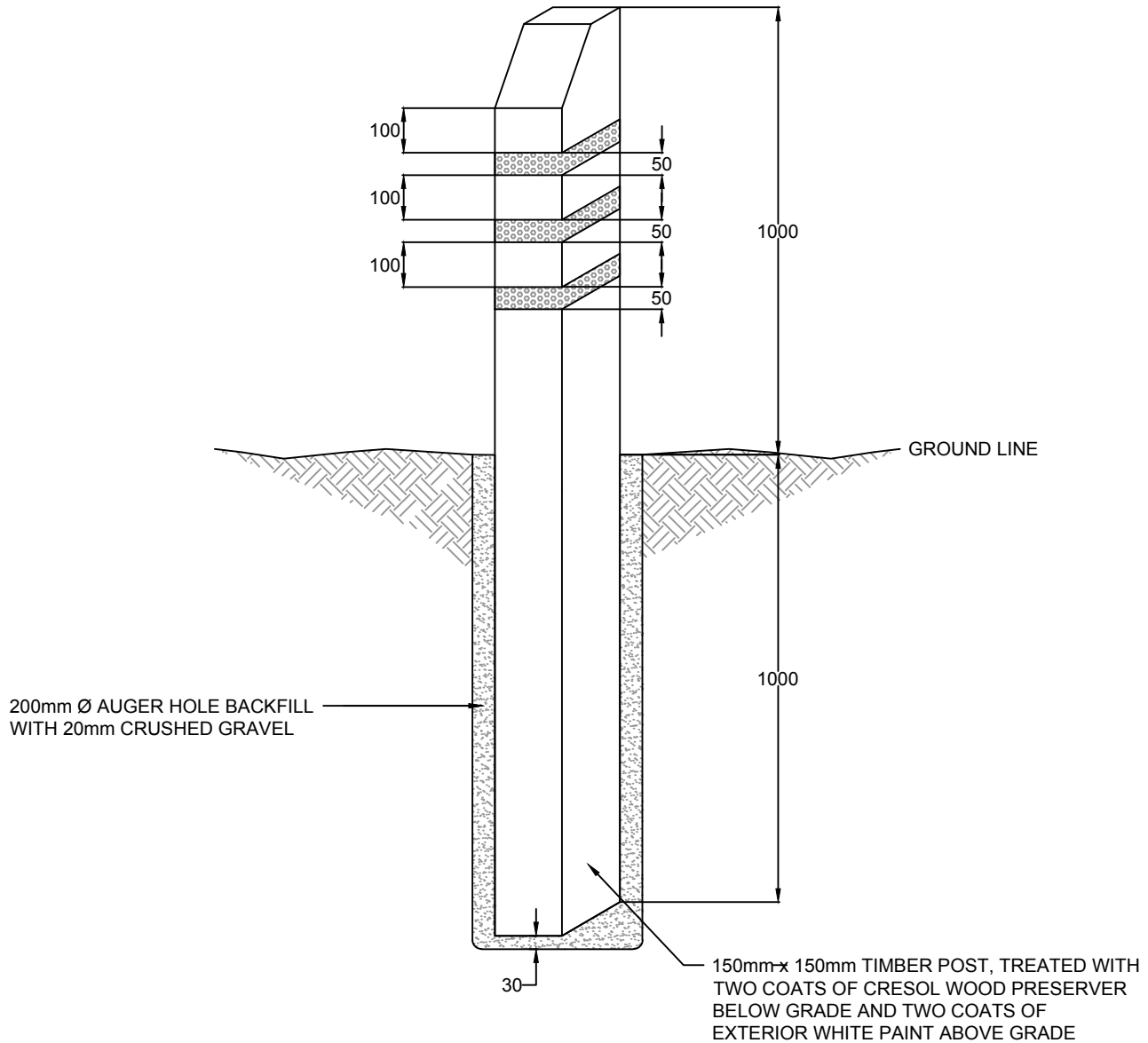
CONDITION	DISTANCE "Z" TO SIDEWALK (m)	REQUIRED WIDTH "X" (m)	SIDEWALK CONNECTION
OVER-CONSTRAINED*	"Z" < 1.3	"X" = "Z"	NO
CONSTRAINED	1.3 <= "Z" < 2.25	"X" = "Z"	NO
PARTIALLY CONSTRAINED	2.25 <= "Z" < 4.0	"X" = "Z"	NO
NOT CONSTRAINED	"Z" >= 4.0	3.0	YES

\*NO SHELTER PERMITTED

#### NOTES:


1. PROVIDE A BUS STOP PAD WITH LENGTH "Y" AND WIDTH "X" IN ACCORDANCE WITH DRAWING NOTES AND TABLE ABOVE. PROVIDE APPROPRIATE CRACK CONTROL JOINTS THROUGHOUT.
2. IF REQUIRED PAD WIDTH "X" IS LESS THAN 1.0m FROM SIDEWALK, POUR THE CONCRETE PAD TO THE SIDEWALK. OTHERWISE, PROVIDE A 3.0m WIDE SIDEWALK CONNECTION AT THE HEAD OF THE PAD.
3. CONCRETE ROAD BASE MAY BE REQUIRED ADJACENT TO THE BUS STOP PAD, SUBJECT TO REVIEW BY THE COUNTY.
4. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

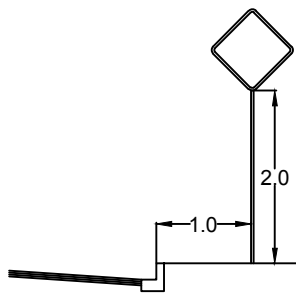
REVISIONS			<div> STRATHCONA COUNTY</div> <div>2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA</div> <div>© 2019</div>		
DATE	DETAILS	DRAWN			
			BUS STOP PAD - SEPARATE WALK		
19-AUG-2019	REVISED DRAWING NUMBER	P. TOMKO			
28-FEB-2017	UPDATED LABELS FOR CLARITY; REVISED TITLE, DIMENSIONS TABLE	D. LEGROW	APPROVED: K. COLE, P. ENG.		DRAWING NUMBER
15-SEP-2016	ADDED NOTE RE. CONCRETE ROAD BASE	D. LEGROW	CHECKED: S. JOHNSON, P.TECH. (ENG.)		41222
19-DEC-2015	NEW DETAIL	J. ORR	DATE: 19-DEC-2015	SCALE: N.T.S.	
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT		



**NOTE:**

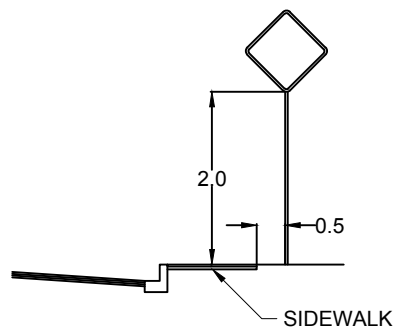
1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLER	BARRIER POSTS			
18-FEB-2016	REMOVED GUARD RAIL DETAILS	D. LEGROW				
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR	APPROVED: K. COLE, P. ENG.			DRAWING NUMBER  41301
14-FEB-2011	REVISED DRAWING NUMBERS	O. BUTT	CHECKED: S. JOHNSON, P.TECH. (ENG.)			
11-FEB-2003	NOTES	R. DEKKER	DATE: 22-DEC-1997	SCALE: N.T.S.	DRAWN: J. EDGINGTON, C.E.T.	
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT			



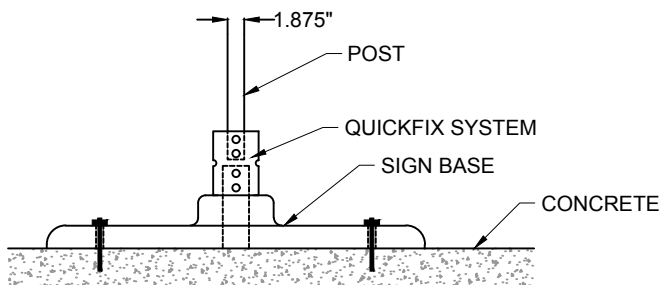
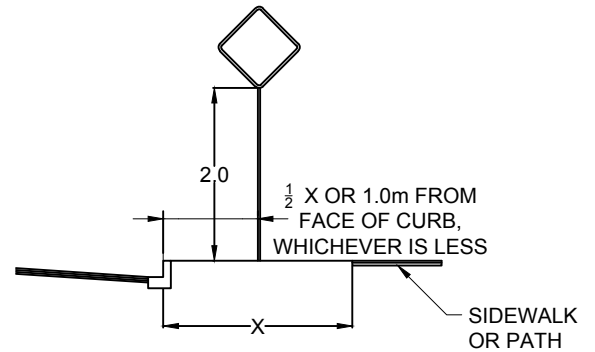
## CONCRETE

POST INSTALLATION DETAIL



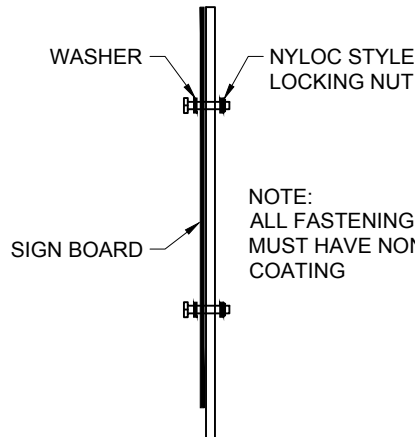
## GROUND

POST INSTALLATION DETAIL

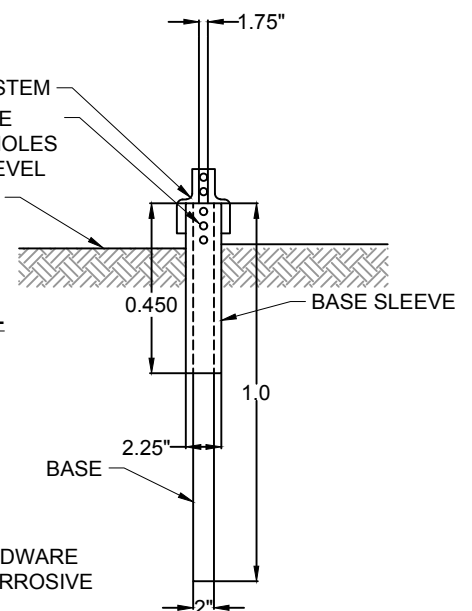


QUICKFIX SIGN SYSTEM  
LEAVE BASE & BASE  
SLEEVE 2-3 BOLT HOLES  
ABOVE GROUND LEVEL  
EXISTING GROUND

## SIGN BOARD FASTENING DETAIL



NOTE:  
ALL FASTENING HARDWARE  
MUST HAVE NON-CORROSIVE  
COATING



## ACTUAL INCH & MILLIMETRE SIZES

1.75"	44.45mm
1.88"	47.50mm
2.00"	50.80mm
2.25"	57.15mm
2.50"	63.50mm
WALL	
0.105"	2.667mm

## APPROVED POSTS AND HARDWARE:

GROUND & NEW CONCRETE MOUNT:

TELESPAR.  
SQUARE FIT.  
EACH SIGN INSTALLATION REQUIRES  
A POST, BASE, AND BASE SLEEVE.

EXISTING CONCRETE MOUNT:

SCHEDULE 40, 47.5mm Ø PIPE.

ALUMINUM BREAK-A-WAY SYSTEMS:

QUICKFIX SIGN SYSTEM.

METAL UTILITY POLE MOUNTS:

FASTENERS ARE HANGER  
ANCHOR OR APPROVED  
EQUIVALENT.  
(ELCO TEXTRON CAT. #2E605)

## NOTES:

- QUICKFIX BASES ARE REQUIRED ON ARTERIAL AND MAJOR COLLECTOR ROADS ONLY.
- ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

## REVISIONS

DATE	DETAILS	DRAWN
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLER
29-MAR-2017	UPDATED CLEARANCE DIMENSIONS	D. LEGROW
18-FEB-2016	REMOVED NEW CONCRETE DETAIL/NOTE	D. LEGROW
19-JAN-2015	ADJUSTED SIGN POST OFFSET	J. ORR
21-APR-2011	REVISED DRAWING NUMBERS	J. ORR



2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

© 2019

## URBAN SIGN INSTALLATION

APPROVED: K. COLE, P. ENG.

CHECKED: S. JOHNSON, P.TECH. (ENG.)

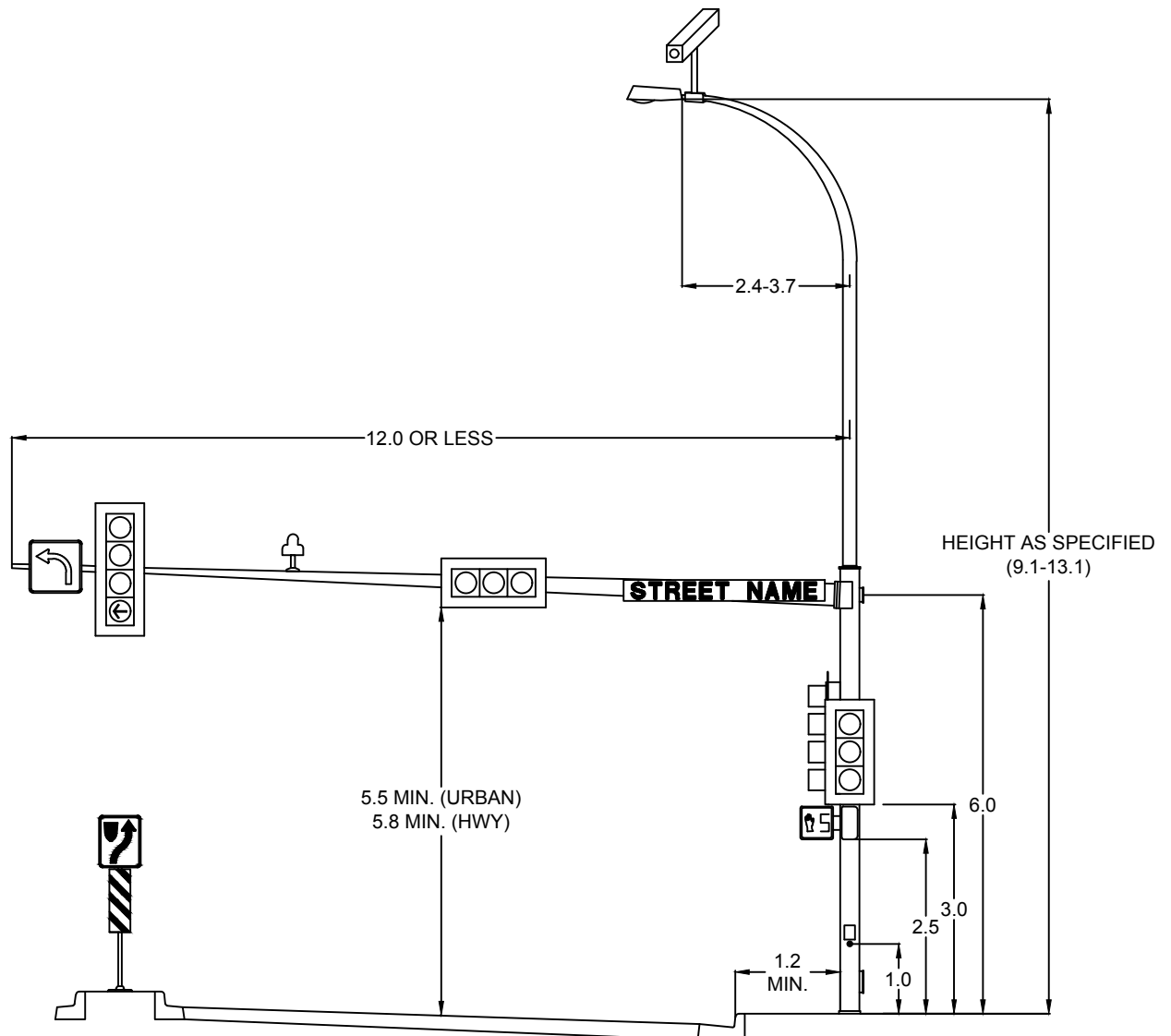
DATE: 02-AUG-1996 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

DRAWING NUMBER

41302


TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

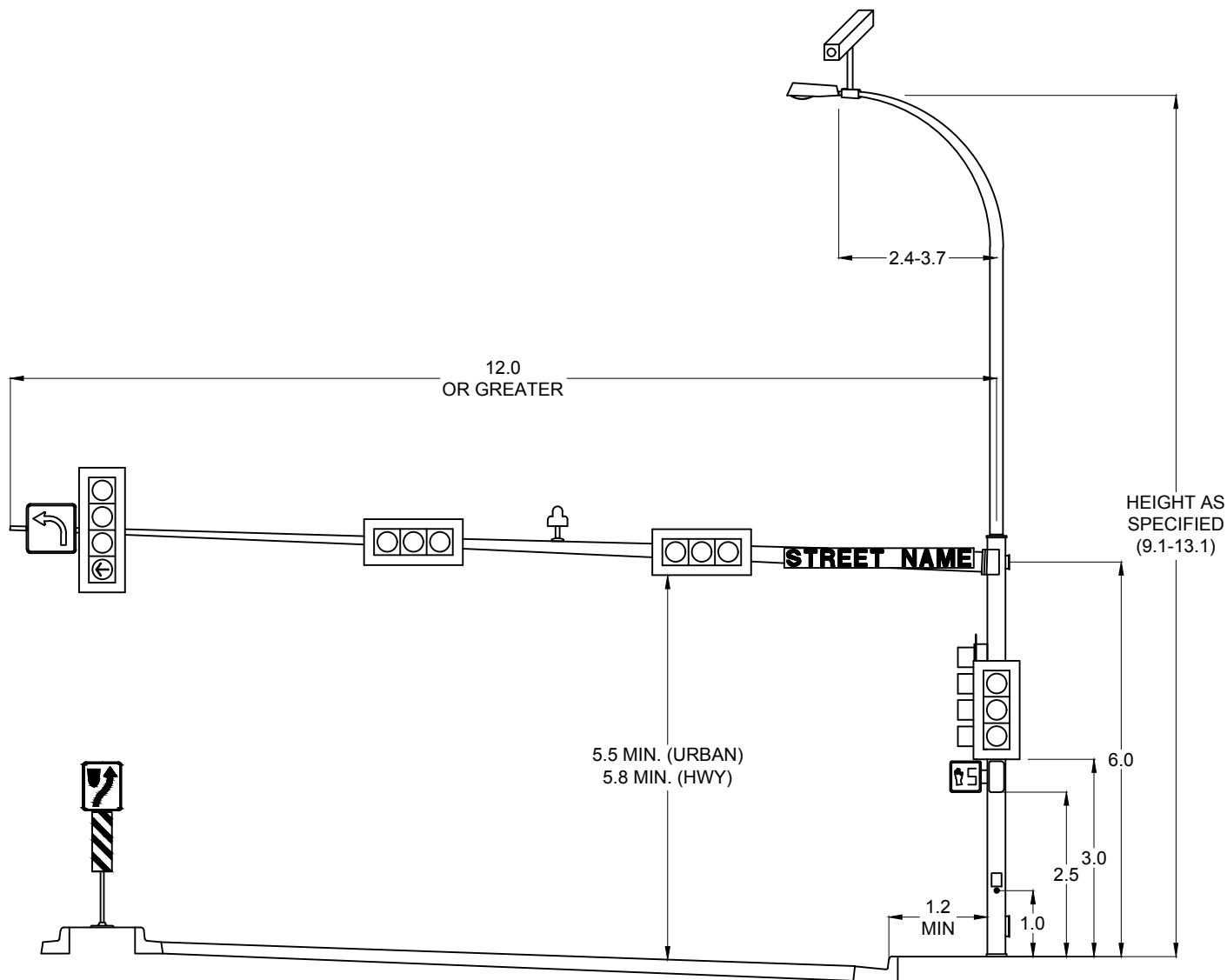




**NOTE:**


1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

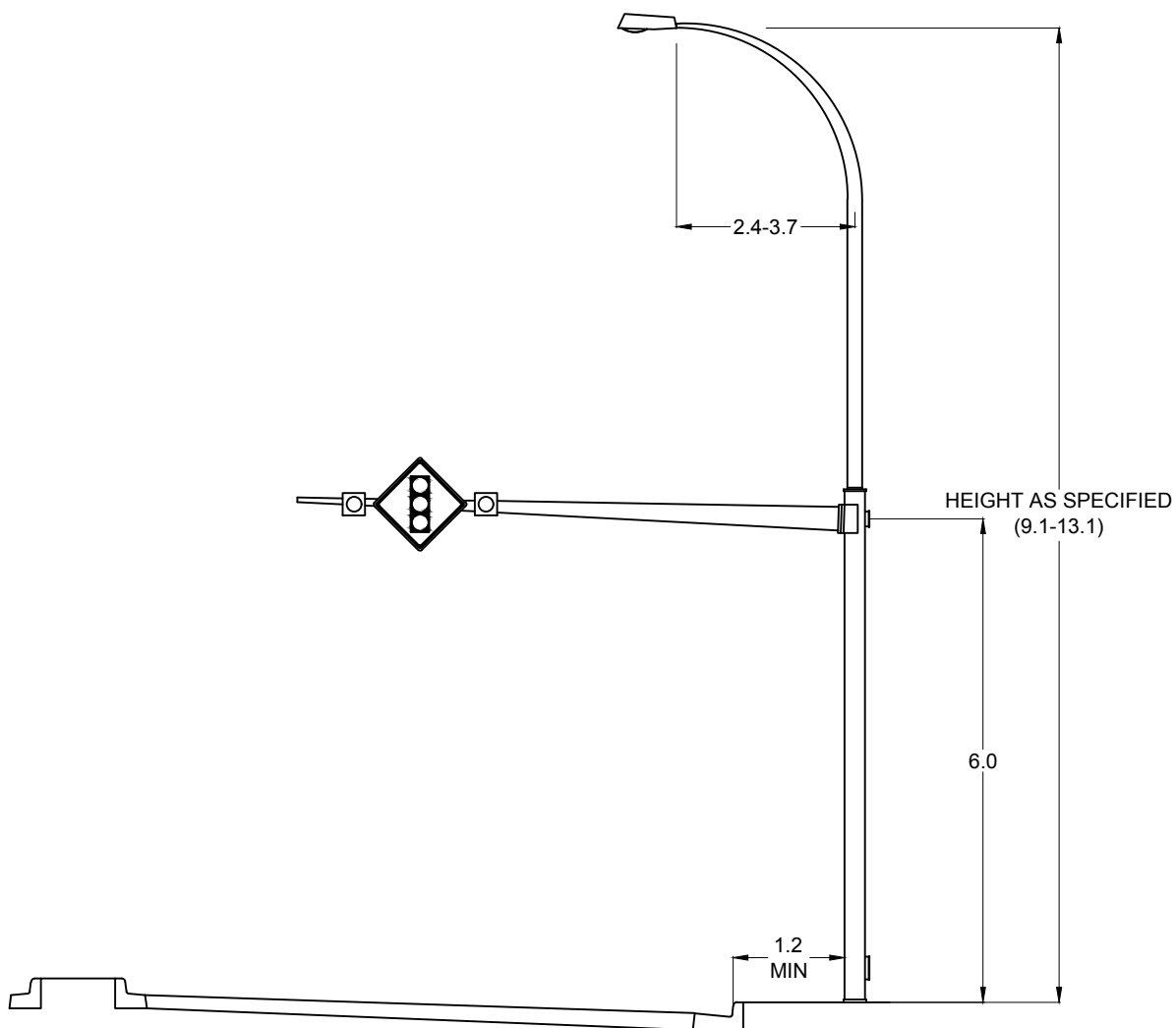
REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
			TRAFFIC SIGNAL POLE CONFIGURATION TYPE I CANTILEVER (12.0m OR LESS)			
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLER	APPROVED: R. ANDERS, P. ENG.			DRAWING NUMBER  <b>41303</b> <small>TRANSPORTATION PLANNING &amp; ENGINEERING DEPARTMENT</small>
11-APR-2017	DIMENSIONS, PED. COUNTDOWN, RADIO DEVICE	D. LEGROW	CHECKED: K. WONG, P. ENG.			
21-APR-2011	REVISED DIMENSIONS	J. ORR	DATE: 25-JUL-1997   SCALE: N.T.S.   DRAWN: R. YANITSKI, C.E.T.			
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN				



**NOTE:**


1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

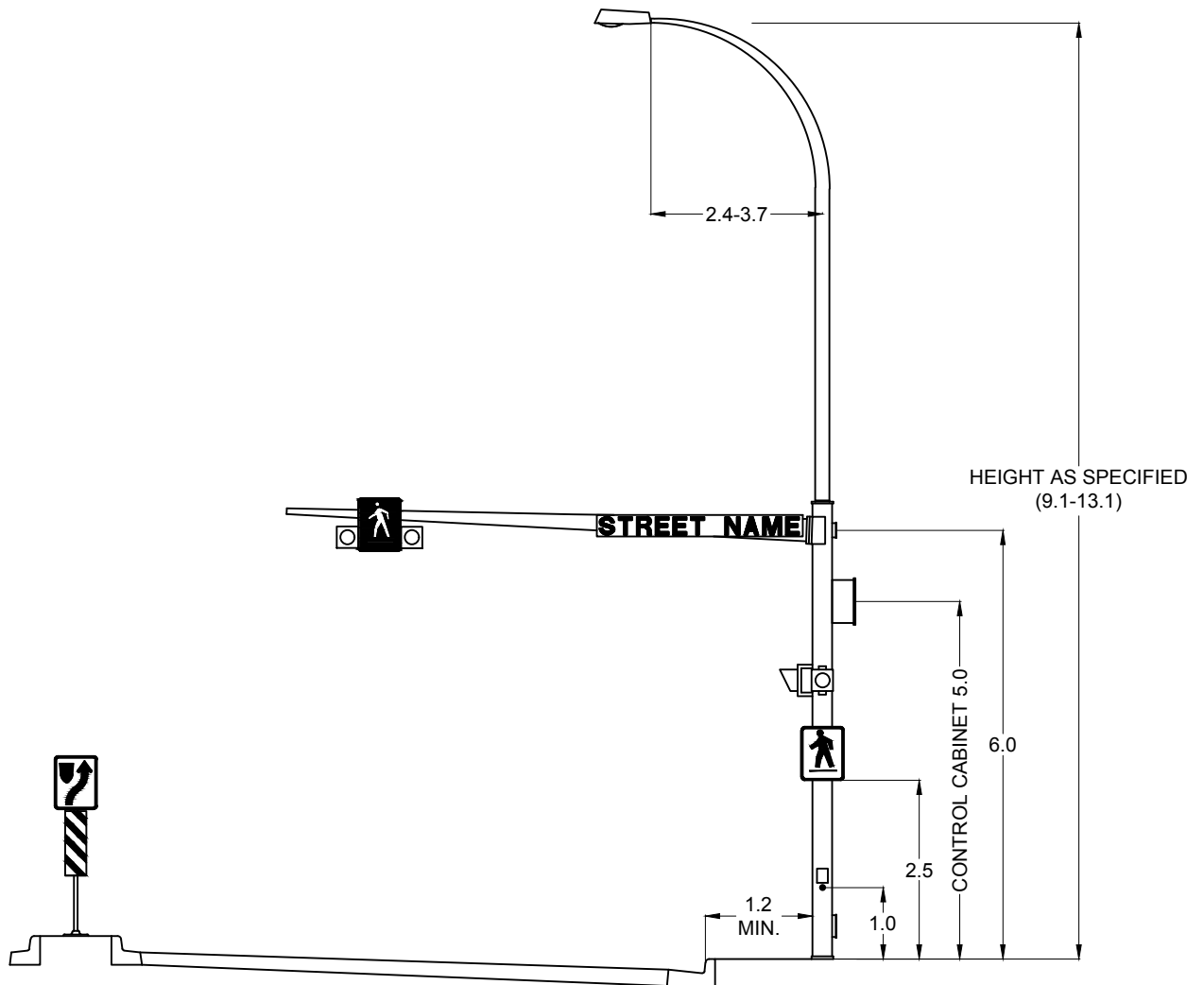
REVISIONS			<div> STRATHCONA COUNTY</div> <div>2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA</div> <div>© 2019</div>		
DATE	DETAILS	DRAWN			
			TRAFFIC SIGNAL POLE CONFIGURATION TYPE II CANTILEVER (12.0m OR GREATER)		
28-MAY-2019	REVISED DRAWING NUMBERS	S. ENGLEDER	<div>APPROVED: R. ANDERS, P.ENG.</div> <div>CHECKED: K. WONG, P.ENG.</div> <div>DATE: 25-JUL-1997   SCALE: N.T.S.   DRAWN: R. YANITSKI, C.E.T.</div> <div>41304</div> <div>TRANSPORTATION PLANNING &amp; ENGINEERING DEPARTMENT</div>		
11-APR-2017	DIMENSIONS, PED. COUNTDOWN, RADIO DEVICE	D. LEGROW			
21-APR-2011	REVISED DIMENSIONS	J. ORR			
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN			



**NOTE:**


1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

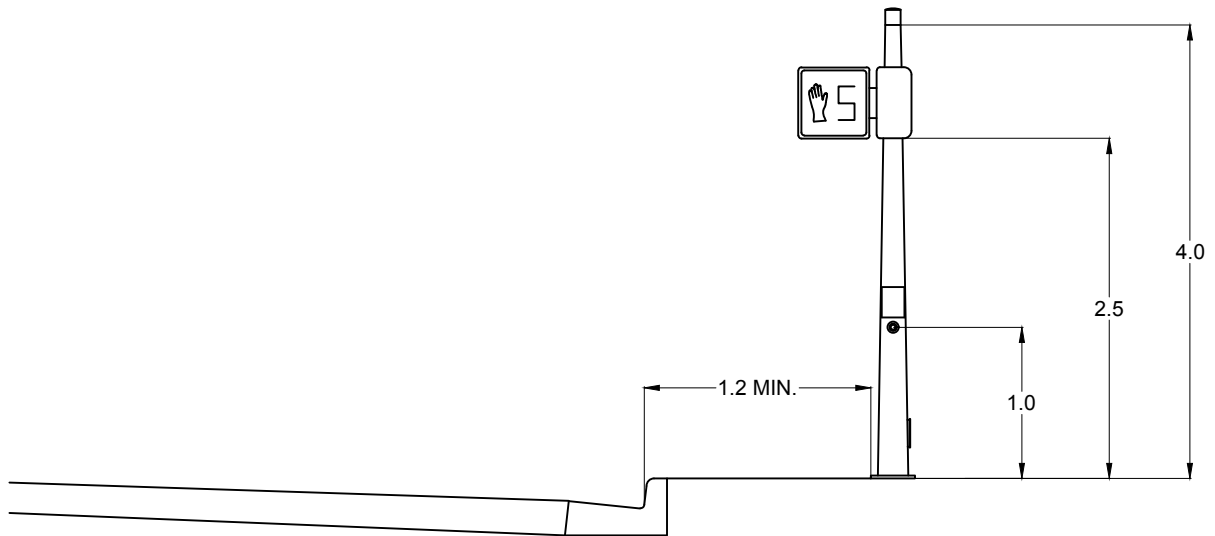
REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
			TRAFFIC SIGNAL POLE CONFIGURATION ADVANCE WARNING FLASHER			
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLEDER	APPROVED: R. ANDERS, P.ENG.			DRAWING NUMBER  <b>41305</b> <small>TRANSPORTATION PLANNING &amp; ENGINEERING DEPARTMENT</small>
15-MAY-2017	DIMENSIONS, TITLE, SIGN BOARD	D. LEGROW	CHECKED: K. WONG, P.ENG.			
21-APR-2011	REVISED DIMENSIONS	J. ORR	DATE: 25-JUL-1997   SCALE: N.T.S.   DRAWN: R. YANITSKI, C.E.T.			
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN				



**NOTE:**


1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

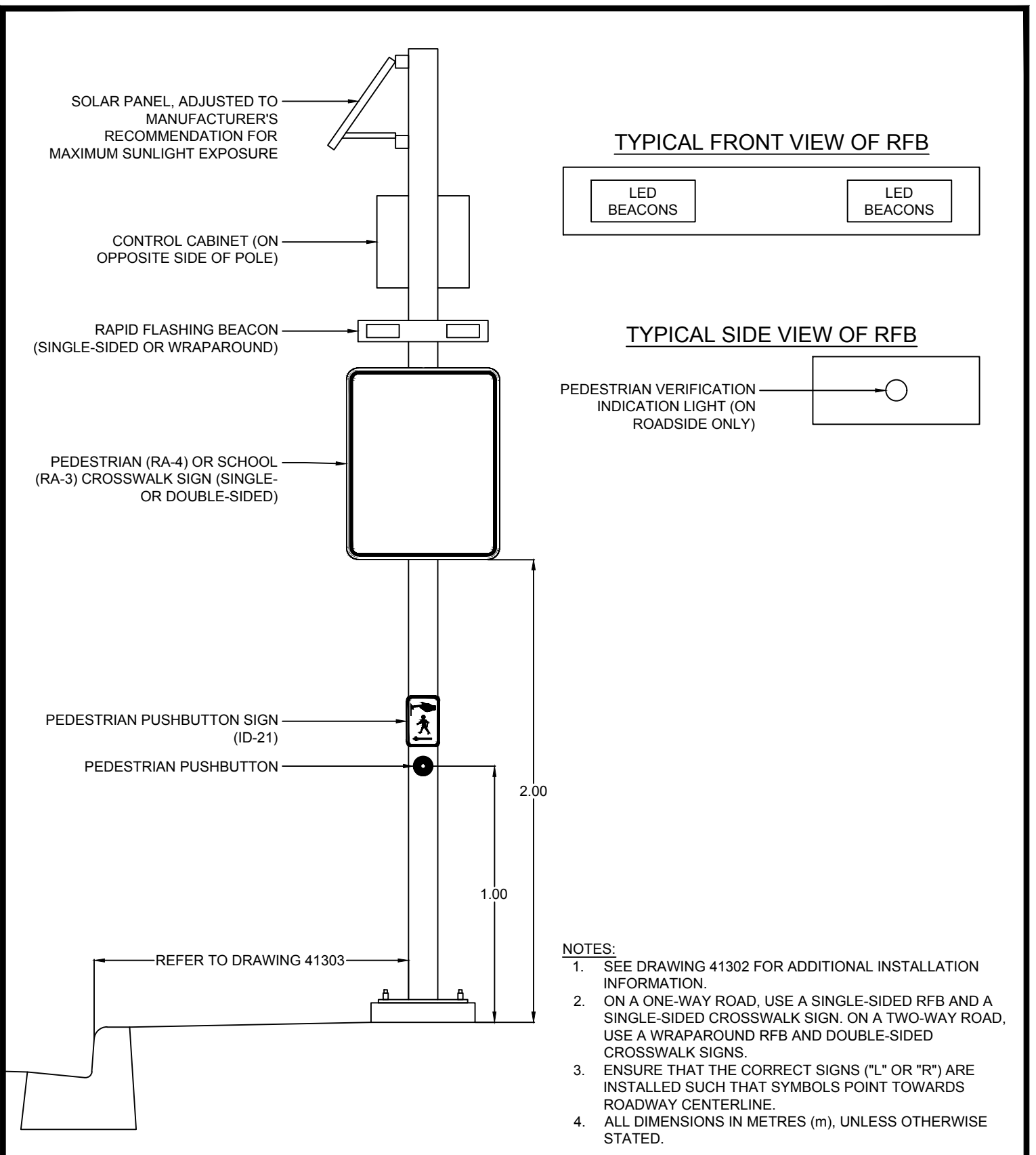
REVISIONS				STRATHCONA COUNTY			2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019	
DATE	DETAILS	DRAWN									
			TRAFFIC SIGNAL POLE CONFIGURATION PEDESTRIAN CROSSING CANTILEVER								
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLEDER									
11-APR-2017	DIMENSIONS, TITLE, FLASHING LIGHTS	D. LEGROW	APPROVED: R. ANDERS, P. ENG.						DRAWING NUMBER		
21-APR-2011	REVISED DIMENSIONS	J. ORR	CHECKED: K. WONG, P. ENG.						41306		
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN	DATE: 25-JUL-1997	SCALE: N.T.S.	DRAWN: R. YANITSKI, C.E.T.						
										TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT	




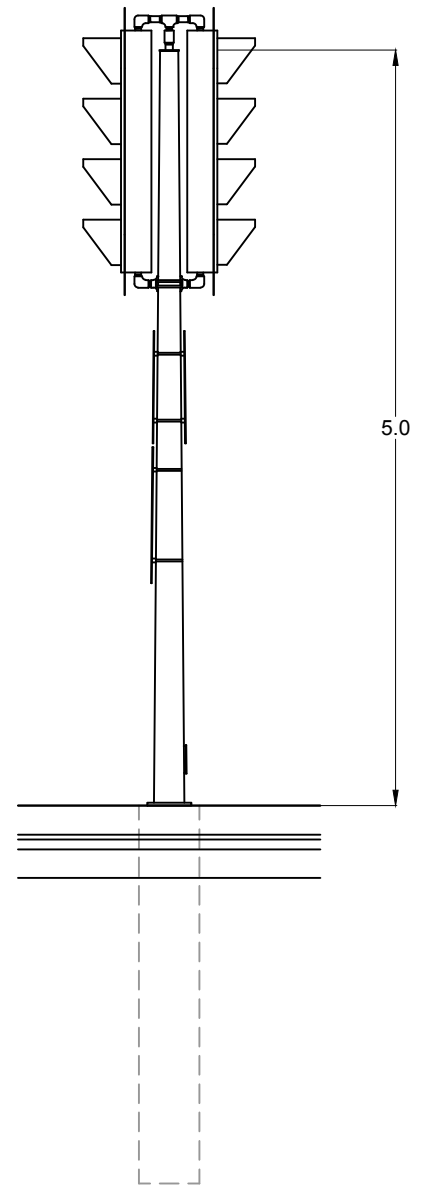
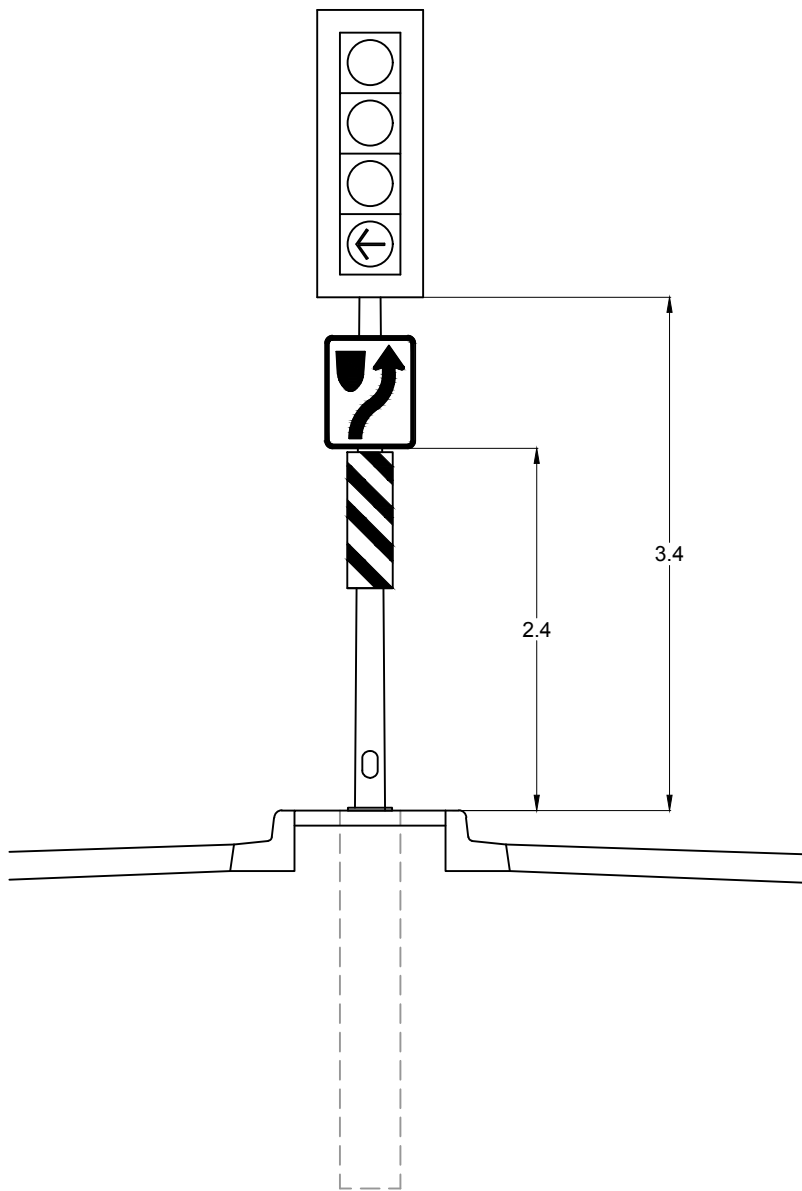
**NOTE:**

1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA © 2019			
DATE	DETAILS	DRAWN				
			TRAFFIC SIGNAL POLE CONFIGURATION 4.0m PEDESTRIAN SIGNAL POLE			
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLEDER				
11-APR-2017	DIMENSIONS, TITLE, PED. COUNTDOWN	D. LEGROW	APPROVED: R. ANDERS, P.ENG.			DRAWING NUMBER
21-APR-2011	REVISED DIMENSIONS	J. ORR	CHECKED: K. WONG, P.ENG.			41307
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN	DATE: 25-JUL-1997	SCALE: N.T.S.	DRAWN: R. YANITSKI, C.E.T.	
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT			




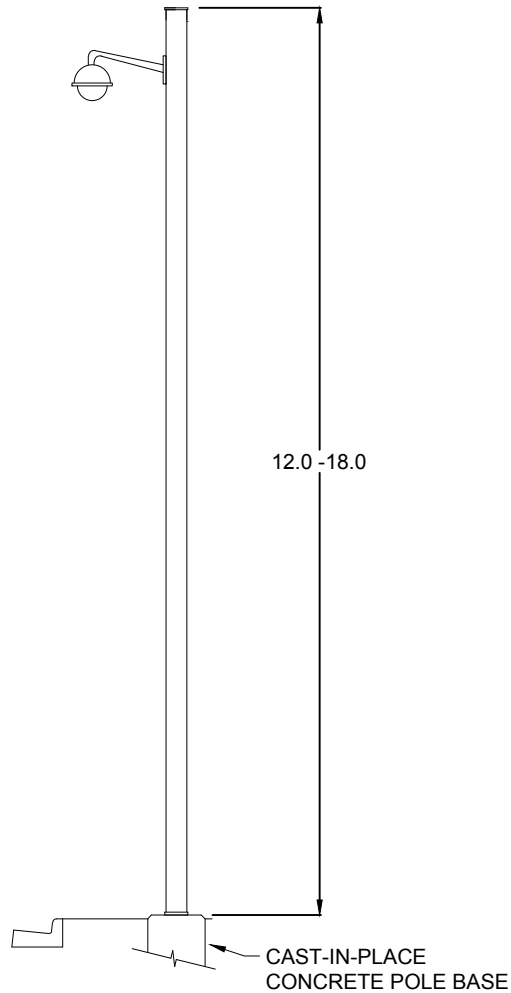
REVISIONS			<div>  <div> <div>STRATHCONA COUNTY</div> <div>2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA</div> </div> </div> <div>© 2019</div>	
DATE	DETAILS	DRAWN		
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLERDER	<div>RAPID FLASHING BEACON (RFB)</div> <div> <div>APPROVED: R. ANDERS. P. ENG.</div> <div>CHECKED: K. WONG, P. ENG.</div> <div>DATE: 29-DEC-2016   SCALE: N.T.S.   DRAWN: D. LEGROW, T.T.</div> </div>	
15-MAY-2019	REVISED TITLE	P. TOMKO		
29-MAR-2017	ADDED SIGN DIAGRAMS, UPDATED CLEARANCE DIM.	D. LEGROW	<div>DRAWING NUMBER</div> <div>41308</div> <div>TRANSPORTATION PLANNING &amp; ENGINEERING DEPARTMENT</div>	
29-DEC-2016	NEW DETAIL	D. LEGROW		



**NOTE:**


1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
			TRAFFIC SIGNAL POLE CONFIGURATION			
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLEDER	5.0m PEDESTAL SIGNAL POLE			
11-APR-2017	TITLE SPELLING	D. LEGROW	APPROVED: R. ANDERS, P.ENG.			DRAWING NUMBER  <b>41309</b>
02-MAY-2011	REVISED DRAWING NUMBER & REVISIONS	J. ORR	CHECKED: K. WONG, P.ENG.			
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN	DATE: 25-JUL-1997	SCALE: N.T.S.	DRAWN: R. YANITSKI, C.E.T.	
						TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



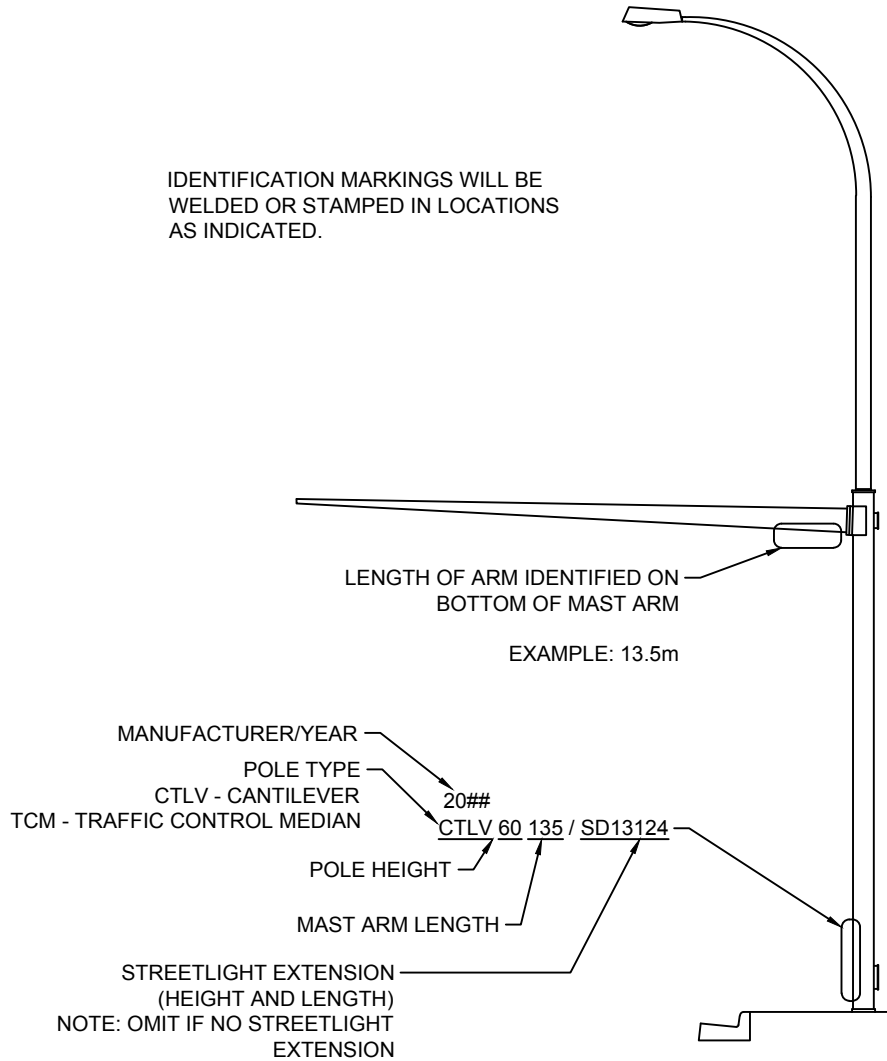
**NOTE:**

1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
			TRAFFIC SIGNAL POLE CONFIGURATION CCTV POLE			
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLER				
11-APR-2017	DIMENSIONS, CAMERAS, TITLE	D. LEGROW	APPROVED: R. ANDERS, P. ENG.			DRAWING NUMBER
02-MAY-2011	REVISED DRAWING NUMBERS	J. ORR	CHECKED: K. WONG, P. ENG.			41310
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN	DATE: 25-JUL-1997	SCALE: N.T.S.	DRAWN: R. YANITSKI, C.E.T.	
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT			




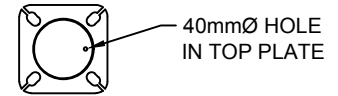
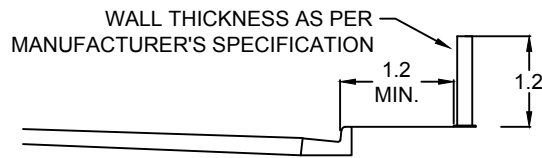
IDENTIFICATION MARKINGS WILL BE  
WELDED OR STAMPED IN LOCATIONS  
AS INDICATED.



**NOTE:**

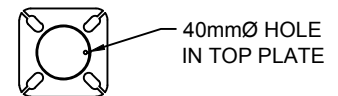
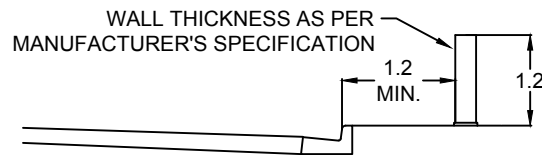
1. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
			TRAFFIC SIGNAL POLE IDENTIFICATION MARKINGS			
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLEDER				
11-APR-2017	POLE TYPE TCM	D. LEGROW				
29-APR-2011	REVISED DIMENSIONS	J. ORR				
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN	APPROVED: R. ANDERS, P.ENG.			
			CHECKED: K. WONG, P.ENG.			41311
			DATE: 25-JUL-1997	SCALE: N.T.S.	DRAWN: R. YANITSKI, C.E.T.	
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT			



PLAN VIEW

280mmØ B.C.D. POLE STUB




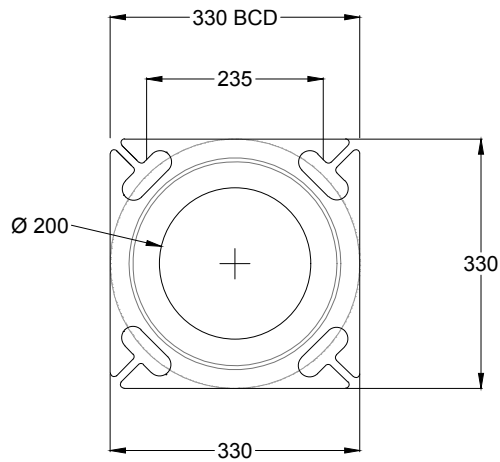
PLAN VIEW

330 to 406mmØ SLOTTED B.C.D. POLE STUB

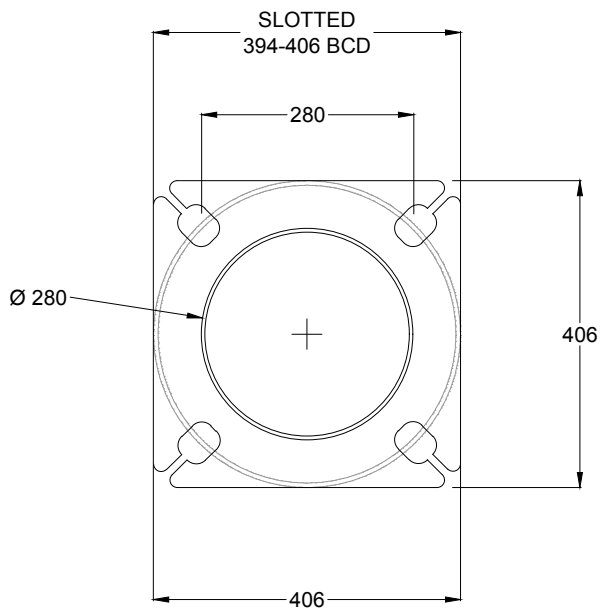
**NOTES:**

1. POLE STUBS ARE USED TO PROTECT ANCHOR BOLTS AND CONDUIT WHEN TRAFFIC SIGNAL POLE BASE IS INSTALLED PRIOR TO TRAFFIC SIGNALS BEING WARRANTED.
2. POLE STUB SHALL BE HOT DIPPED GALVANIZED.
3. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

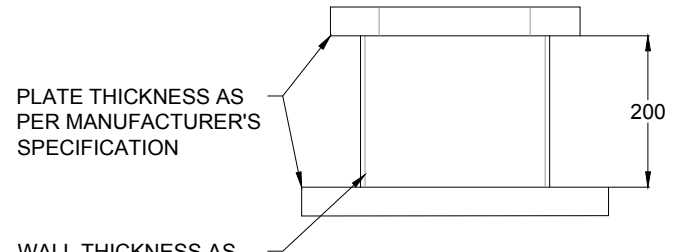
REVISIONS			<div> STRATHCONA COUNTY</div> <div>2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA</div> <div>© 2019</div>		
DATE	DETAILS	DRAWN			
			TRAFFIC SIGNAL POLE STUB		
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLER			
15-MAY-2017	DIMENSIONS, WALL THICKNESS	D. LEGROW	APPROVED: R. ANDERS, P.ENG.		DRAWING NUMBER
29-APR-2011	REVISED DRAWING NUMBERS	J. ORR	CHECKED: K. WONG, P.ENG.		41312
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN	DATE: 25-JUL-1997	SCALE: N.T.S.	
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT		



**TOP PLATE**




**BOTTOM PLATE**



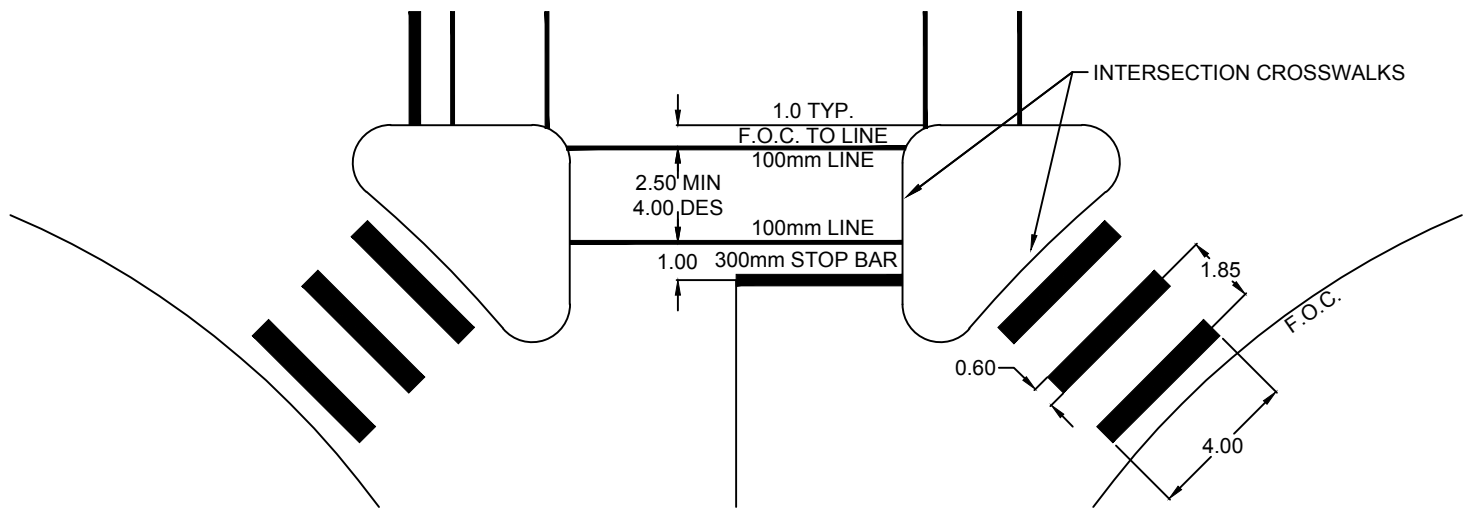
**ELEVATION**

**NOTE:**

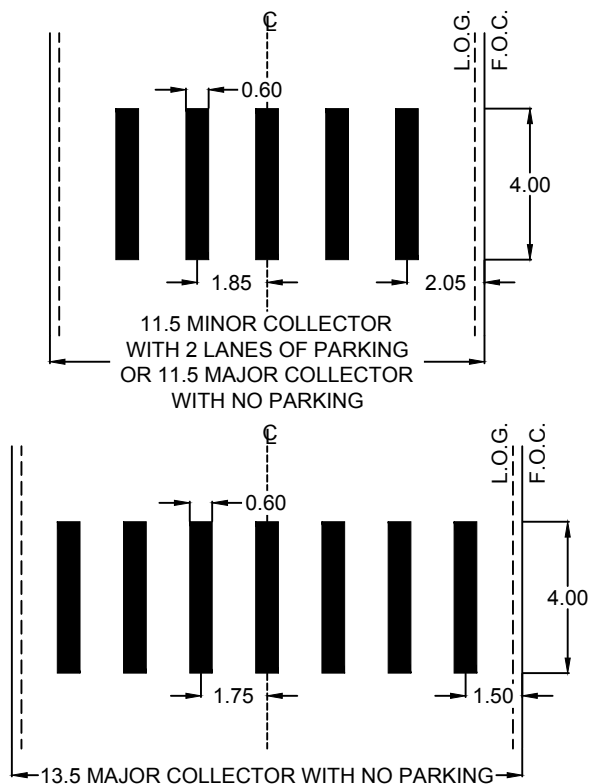
1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY			2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN							
			TRAFFIC SIGNAL POLE BASE ADAPTER						
28-MAY-2019	REVISED DRAWING NUMBER	S. ENGLEDER							
15-MAY-2017	WALL AND PLATE THICKNESS	D. LEGROW	APPROVED: R. ANDERS, P.ENG.					DRAWING NUMBER	
02-MAY-2011	REVISED DRAWING NUMBER & REVISIONS	J. ORR	CHECKED: K. WONG, P.ENG.					41313	
31-JUL-1997	REVISED TITLE BLOCK	J. EGGEN	DATE: 25-JUL-1997	SCALE: N.T.S.	DRAWN: R. YANITSKI, C.E.T.				
TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT									

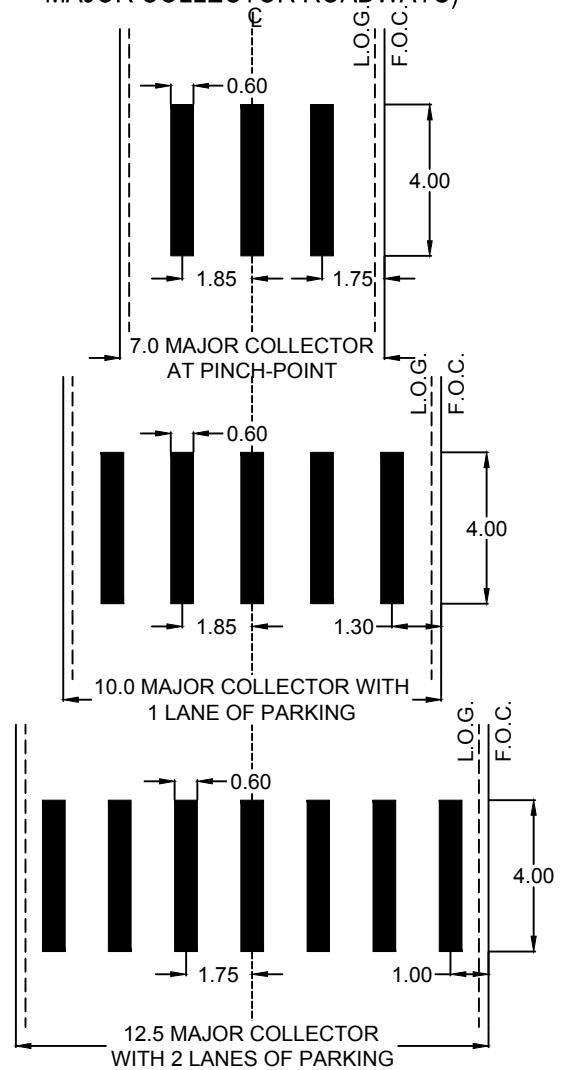
Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.



MID-BLOCK ZEBRA CROSSWALK (MINOR & MAJOR COLLECTOR ROADWAYS)



MID-BLOCK ZEBRA CROSSWALK (TRAFFIC CALMED MAJOR COLLECTOR ROADWAYS)



**NOTES:**

1. ALL PAVEMENT MARKINGS TO BE APPLIED IN ACCORDANCE WITH VOL. 2 SEC 701, PAVEMENT MARKING - GENERAL.
2. ALL DIMENSIONS ARE IN METRES (m), UNLESS OTHERWISE NOTED.

**REVISIONS**

DATE	DETAILS	DRAWN
18-MAR-2017	ADDED REFERENCE TO CONSTRUCTION SPECIFICATION	D. LEGROW
04-JAN-2016	CHANGED LINE THICKNESS FROM 0.75 TO 0.60	S. ENGLER
02-MAY-2011	REVISED DRAWING NUMBER & REVISIONS	J. ORR
09-FEB-2011	REVISED DRAWING NUMBER & REVISIONS	J. EGGEN



STRATHCONA  
COUNTY

2001 SHERWOOD DRIVE, SHERWOOD PARK  
ALBERTA, T8A 3W7, CANADA

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**DETAIL - LAYOUT OF CROSSWALKS AT MID-BLOCK & INTERSECTIONS**

APPROVED: K. COLE, P. ENG.

DRAWING NUMBER

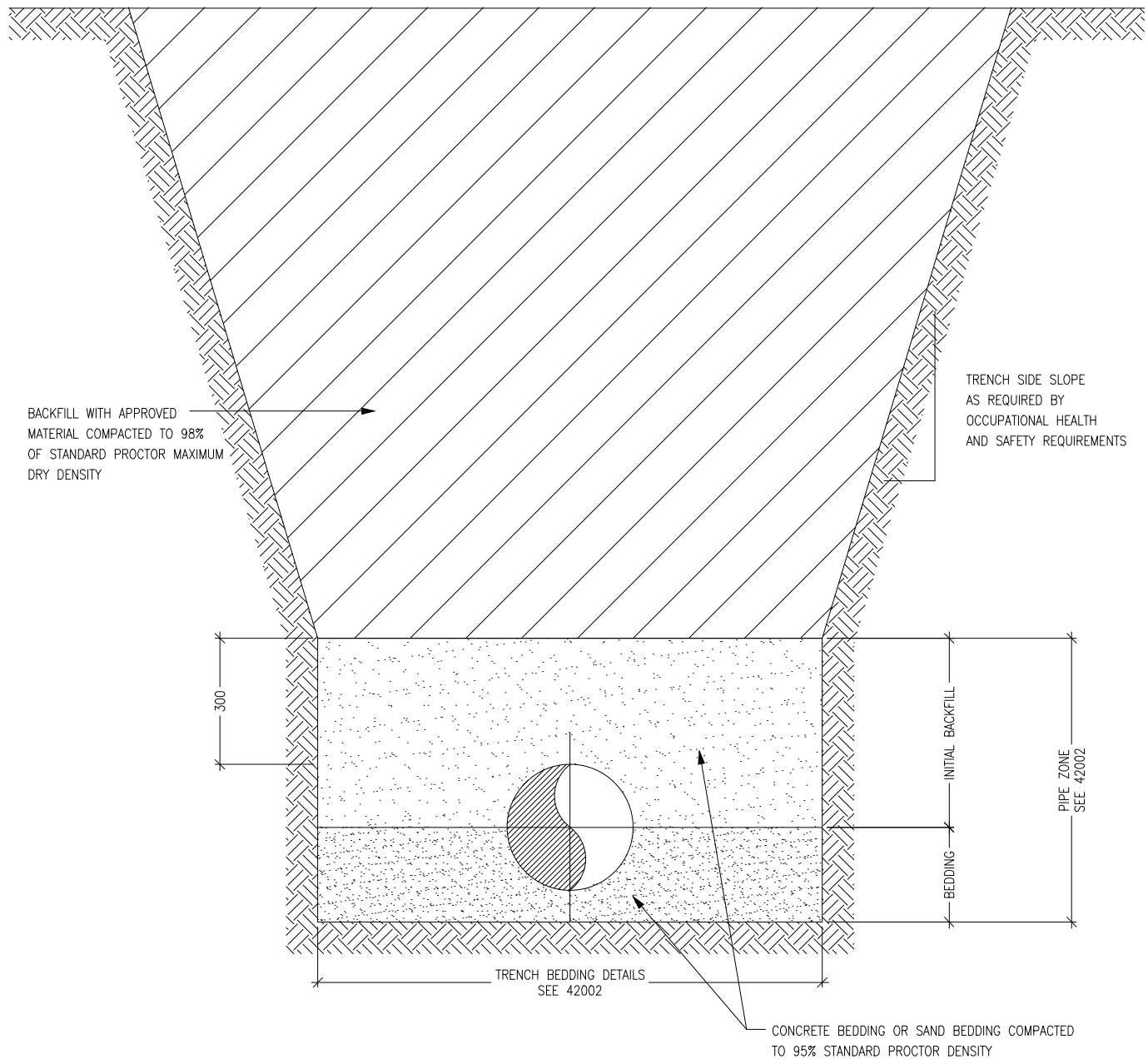
CHECKED: S. JOHNSON, P. TECH. (ENG.)

**41401**

DATE: 29-DEC-1997 SCALE: N.T.S. DRAWN: R. DEKKER, C.E.T.

TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.

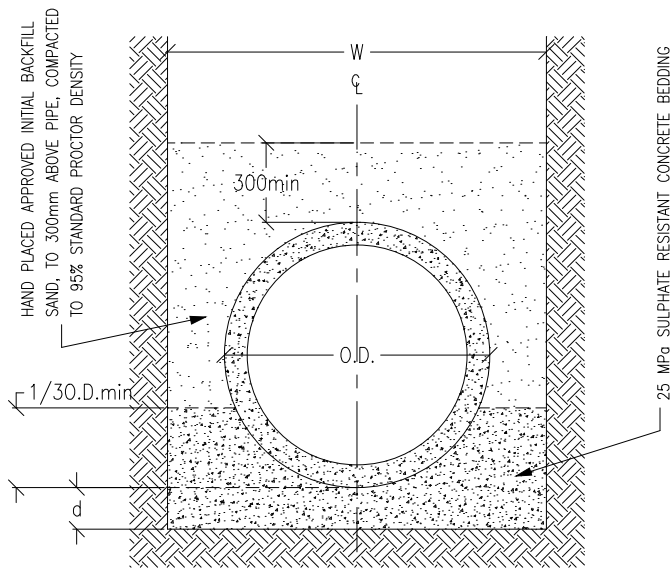


# NOTES:

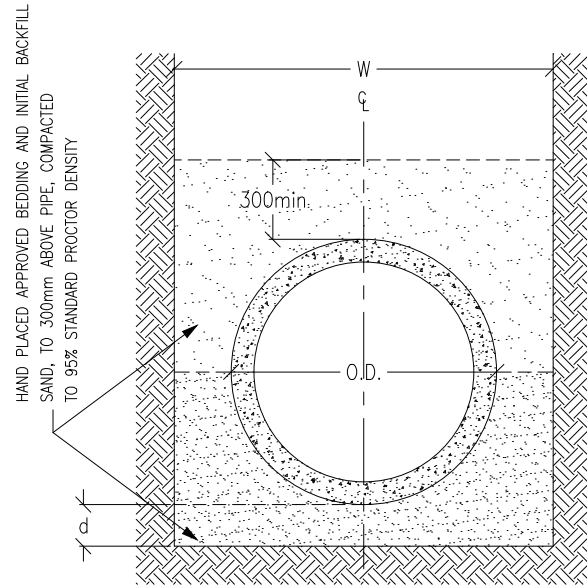
1. ALL DIMENSIONS IN MILLIMETRES.

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Drawn			
YY/MM/DD	X	X	Trenching Detail		
YY/MM/DD	X	X			
11/02/09	REVISED DRAWING NUMBERS	J. Eggen	Approved: R.F. Horton, P.Eng.		Drawing Number:
03/03/06	NOTES	R. Dekker	Checked: D.J. Murdoch, P.Eng.		42001 <small>Utilities Department</small>
98/06/11	NOTES	R. Dekker	Date: 98/02/04	Scale: 1:15	

### CLASS A BEDDING

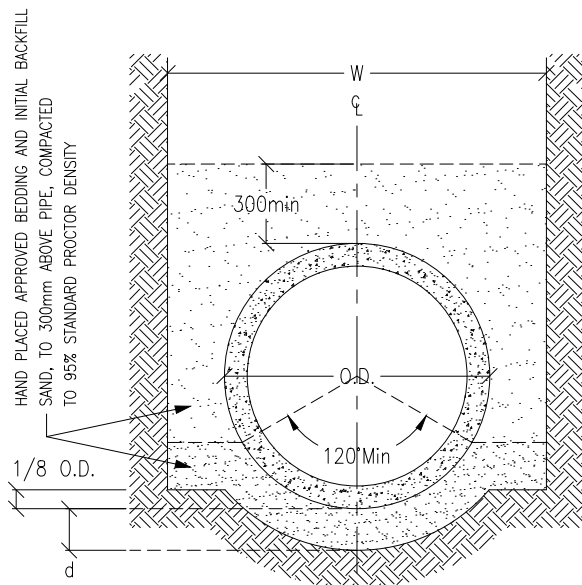


### CLASS B BEDDING



### CLASS B BEDDING

ALTERNATE - 375mm I.D. & UNDER



#### NOTES:

W = TRENCH WIDTH FOR CONCRETE PIPE - MAXIMUM - O.D. + 750mm  
- MINIMUM - O.D. + 450mm

O.D. = OUTSIDE PIPE DIAMETER

I.D. = INSIDE PIPE DIAMETER

d = DEPTH OF BEDDING BELOW PIPE

I.D. = 675mm OR SMALLER - d min = 100mm

I.D. = 750mm AND LARGER - d min = 150mm

1. THESE BEDDING TYPES APPLY ONLY WHERE SOLID, SUITABLE SOIL CONDITIONS EXIST. IN AREAS WITH UNSUITABLE SOIL CONDITIONS, SPECIAL BEDDING AND PIPE FOUNDATION DESIGNS ARE REQUIRED.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

#### REVISIONS

Date	Details	Drawn
YY/MM/DD	X	X
11/02/09	REVISED DRAWING NUMBERS	J. Eggen
03/02/07	NOTES	R. Dekker
98/06/26	DIMENSIONS	R. Dekker
98/02/11	1998 UPDATES	J. Edgington

**Strathcona**  
County

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#### Types of Trench Bedding

Approved: R.F. Horton, P.Eng.

Checked: D.J. Murdoch, P.Eng.

Date: 96/01/11

Scale: N.T.S.

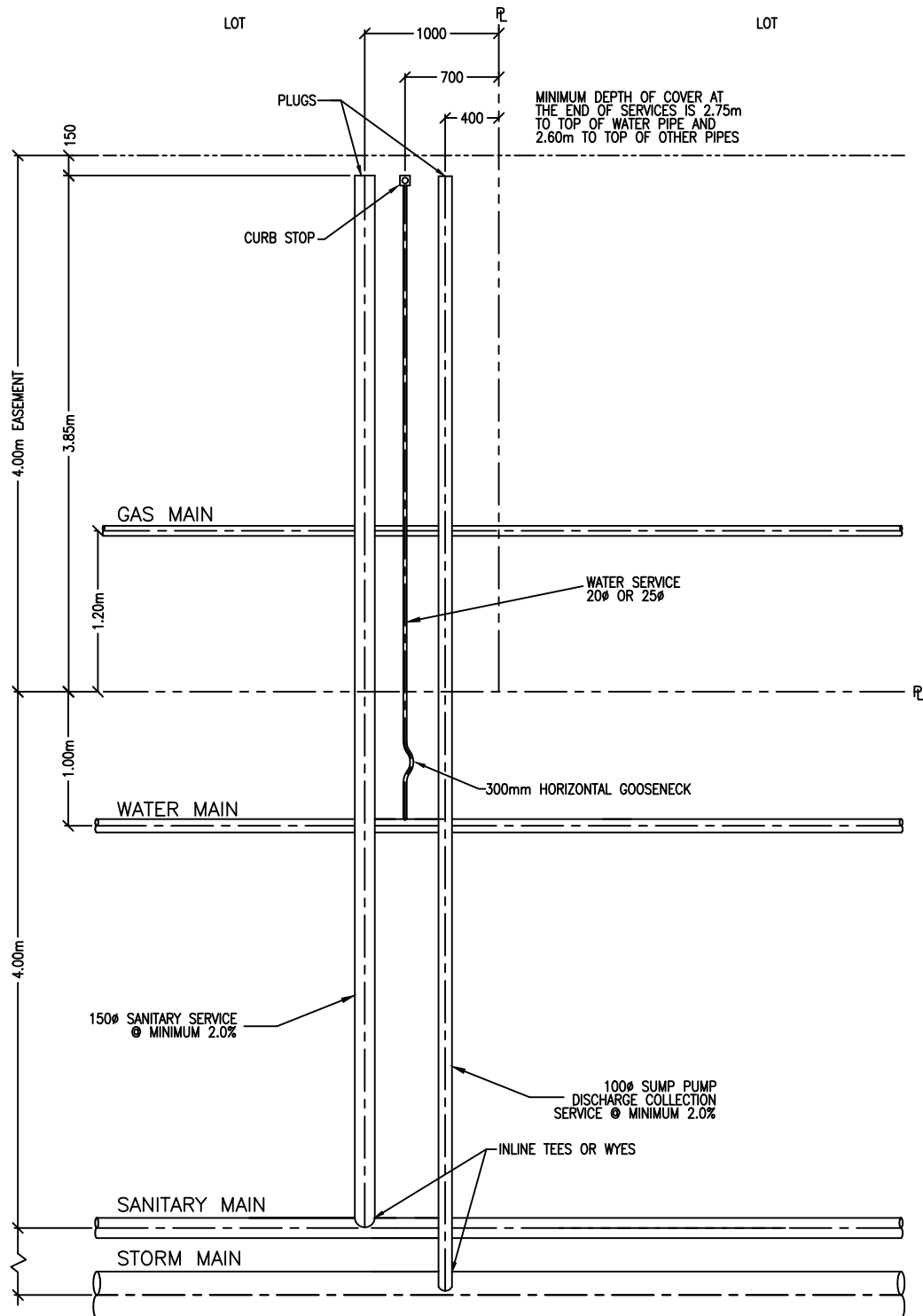
Drawn: Alvin Ma, C.E.T.

Drawing Number:

**42002**


Utilities Department

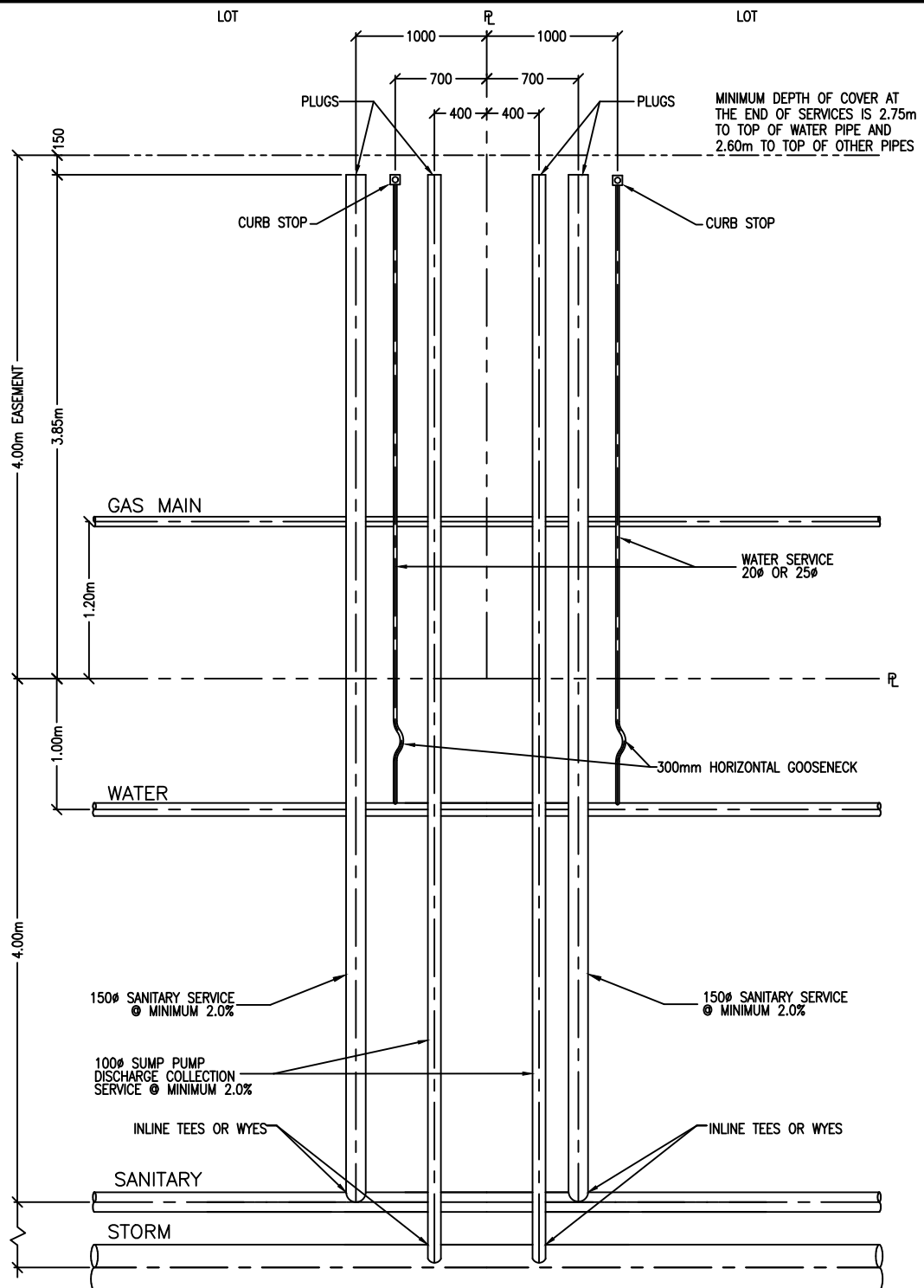




**NOTES:**


1. FOR SERVICES TO LOTS ON THE OPPOSITE SIDE OF THE STREET, THE SAME GENERAL ARRANGEMENT IS REQUIRED.
2. FOR PROFILE VIEW AND ADDITIONAL NOTES, SEE DRAWING 42007.
3. SUMP PUMPS ARE REQUIRED IN ALL HOUSES. THE REQUIRED SUMP PUMP AND DISCHARGE PIPING ARRANGEMENT IS DEPICTED ON DWG NO. 42110. THE DIRECT CONNECTION OF WEEPING TILE DRAINAGE SYSTEMS TO THE SANITARY MAIN IS NOT PERMITTED.
4. THIS DETAIL WOULD ONLY BE APPLICABLE IF THE STORM MAIN BETWEEN THIS LOT AND THE OUTFALL INTO THE STORMWATER MANAGEMENT FACILITY IS AT A DEPTH ADEQUATE FOR FROST PROTECTION AND TO RESULT IN THE REQUIRED SERVICE DEPTH AT PROPERTY LINE.
5. AUGERED INSTALLATION IS REQUIRED UNDER EXISTING STREETS AND SIDEWALKS.
6. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

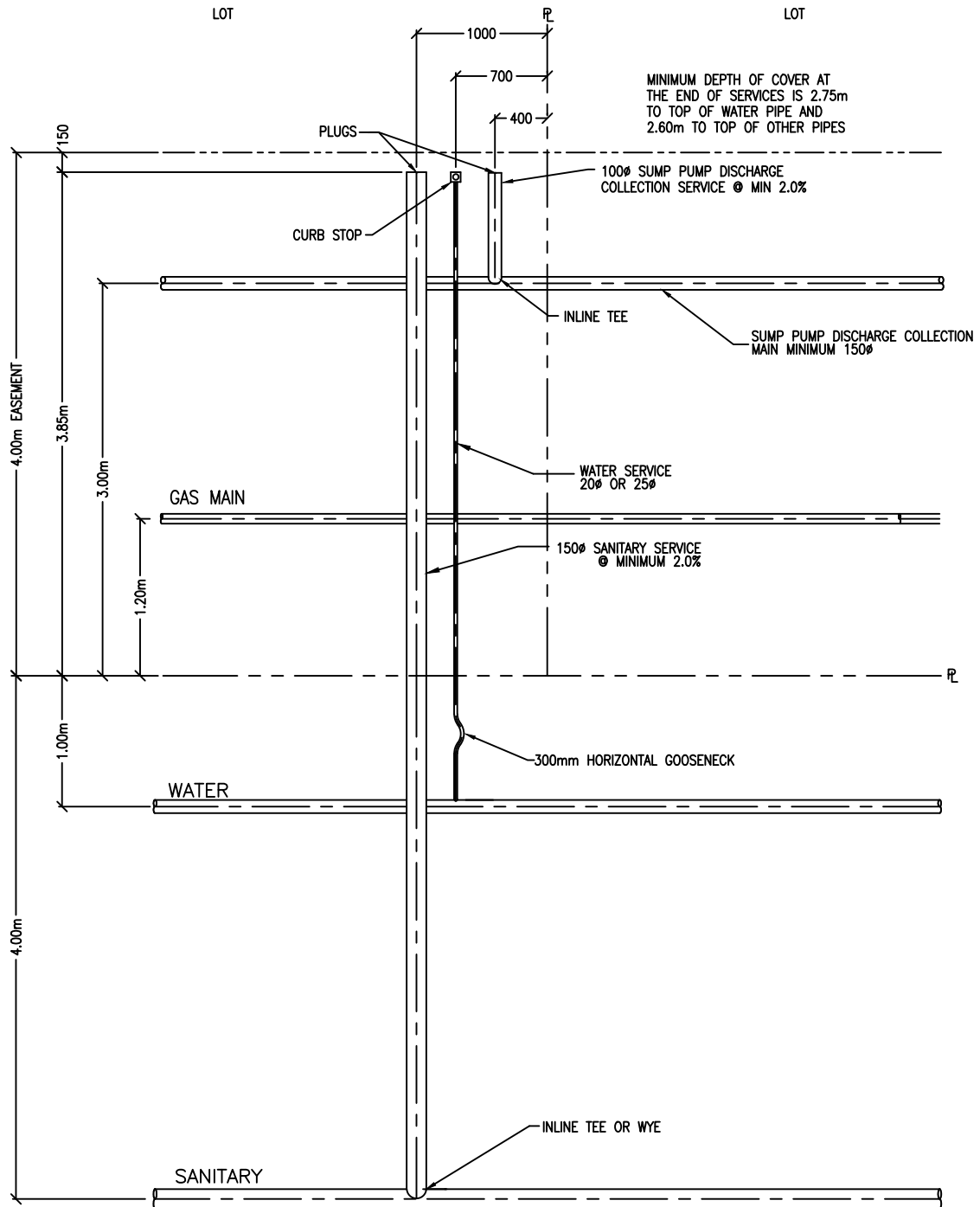
REVISIONS			 STRATHCONA COUNTY2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA				© 2015
Date	Details	Drawn	Single Family Connection - Single Family Lot				
11/05/02	REVISED DRAWING NUMBERS	J. Orr					
11/02/09	REVISED DRAWING NUMBERS	J. Eggen					
03/06/25	NOTES	R. Dekker	Approved: R.F. Horton, P.Eng.				Drawing Number:
03/03/06	EASEMENT & NOTES	R. Dekker	Checked: D.J. Murdoch, P.Eng.				42003 <small>Utilities Department</small>
98/06/11	EASEMENTS	R. Dekker	Date: 98/02/12	Scale: 1:50	Drawn: E. Herman, T.T.		



**NOTES:**


1. FOR SERVICES TO LOTS ON THE OPPOSITE SIDE OF THE STREET, THE SAME GENERAL ARRANGEMENT IS REQUIRED.
2. FOR PROFILE VIEW AND ADDITIONAL NOTES, SEE DRAWING 42007.
3. SUMP PUMPS ARE REQUIRED IN ALL HOUSES. THE REQUIRED SUMP PUMP AND DISCHARGE PIPING ARRANGEMENT IS DEPICTED ON DWG NO. 42110. THE DIRECT CONNECTION OF WEEPING TILE DRAINAGE SYSTEMS TO THE SANITARY MAIN IS NOT PERMITTED.
4. THIS DETAIL WOULD ONLY BE APPLICABLE IF THE STORM MAIN BETWEEN THIS LOT AND THE OUTFALL INTO THE STORMWATER MANAGEMENT FACILITY IS AT A DEPTH ADEQUATE FOR FROST PROTECTION AND TO RESULT IN THE REQUIRED SERVICE DEPTH AT PROPERTY LINE.
5. AUGERED INSTALLATION IS REQUIRED UNDER EXISTING STREETS AND SIDEWALKS.
6. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

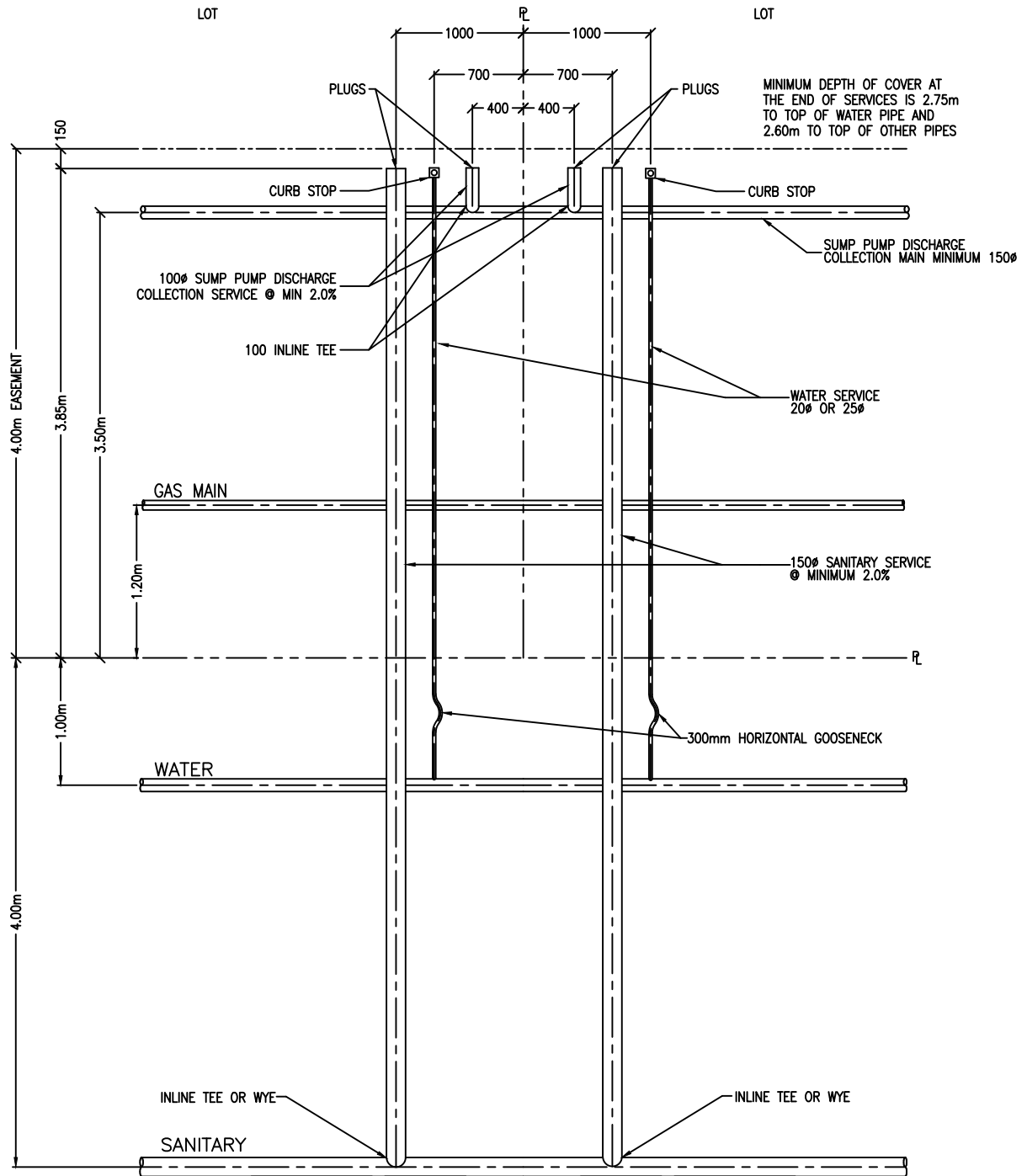
REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2015	
Date	Details	Drawn	Dual Service Connection - Single Family Lots				
11/05/02	REVISED DRAWING NUMBERS	J. Orr					
11/02/09	REVISED DRAWING NUMBERS	J. Eggen					
03/06/25	NOTES	R. Dekker	Approved: R.F. Horton, P.Eng.				Drawing Number:
03/03/06	EASEMENTS & NOTES	R. Dekker	Checked: D.J. Murdoch, P.Eng.				42004 <small>Utilities Department</small>
99/06/29	SERVICE ALIGNMENTS	R. Dekker	Date: 98/02/13	Scale: 1:50	Drawn: E. Herman, T.T.		



#### NOTES:


1. FOR SERVICES TO LOTS ON THE OPPOSITE SIDE OF THE STREET, THE SAME GENERAL ARRANGEMENT IS REQUIRED.
2. SUMP PUMPS ARE REQUIRED IN ALL HOUSES. THE REQUIRED SUMP PUMP AND DISCHARGE PIPING ARRANGEMENT IS DEPICTED ON ON DWG. NO. 42110. THE DIRECT CONNECTION OF WEEPING TILE DRAINAGE SYSTEMS TO THE SANITARY MAIN IS NOT PERMITTED.
3. AUGERED INSTALLATION IS REQUIRED UNDER EXISTING STREETS AND SIDEWALKS.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2015
Date	Details	Drawn	Single Family Lot Service Connection with Sump Pump Discharge Collection Main			
11/05/02	REVISED DRAWING NUMBERS	J. Orr				
11/02/14	REVISED DRAWING NUMBERS	O. Butt				
04/03/01	SPDCM ALIGNMENT	J. Patterson	Approved: R.F. Horton, P.Eng.			Drawing Number:  42005 <small>Utilities Department</small>
03/06/25	NOTES	R. Dekker	Checked: D.J. Murdoch, P.Eng.			
03/03/06	EASEMENT & NOTES	R. Dekker	Date: 98/02/13	Scale: 1:50	Drawn: E. Herman, T.T.	



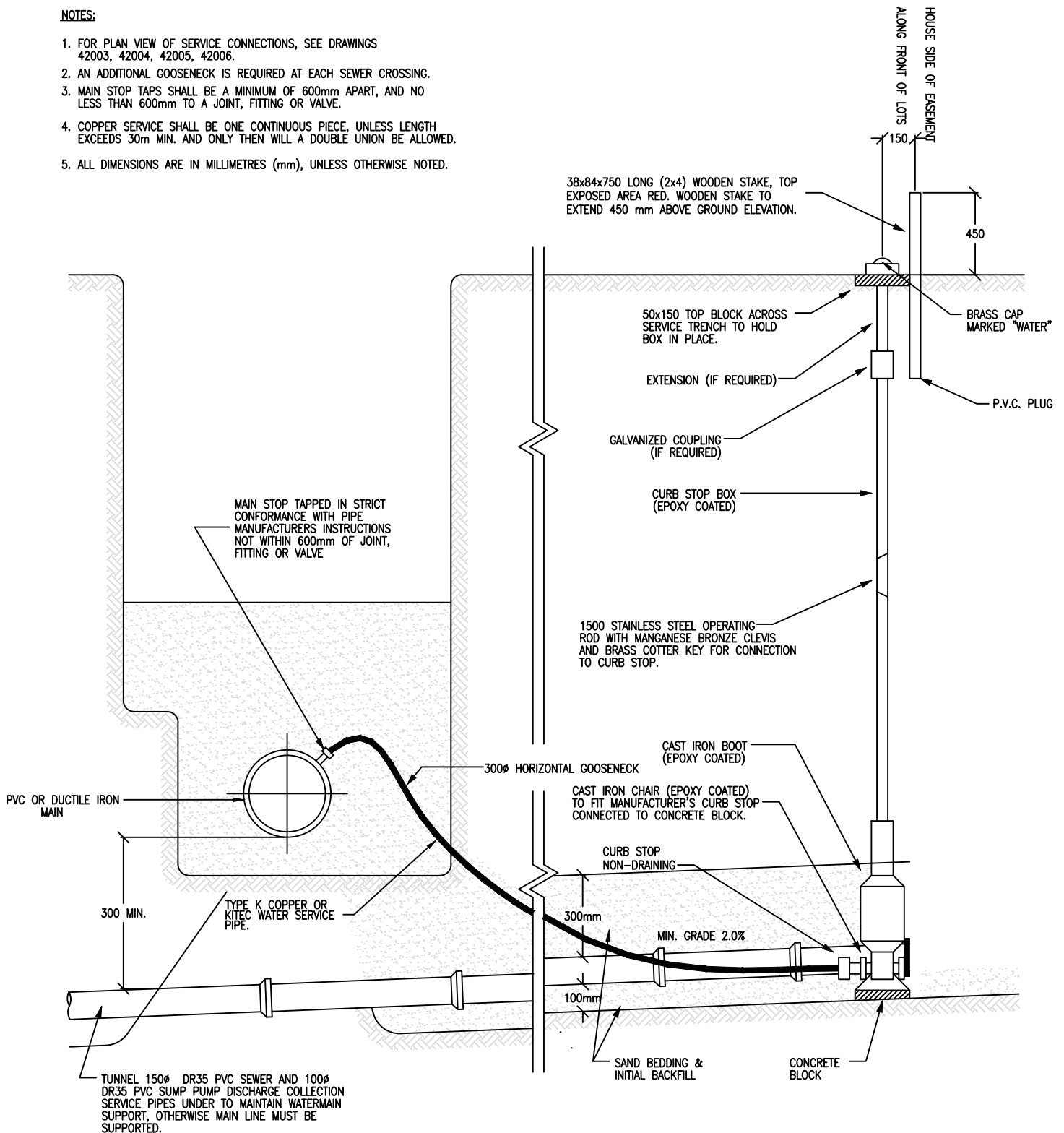
**NOTES:**

1. FOR SERVICES TO LOTS ON THE OPPOSITE SIDE OF THE STREET, THE SAME GENERAL ARRANGEMENT IS REQUIRED.
2. SUMP PUMPS ARE REQUIRED IN ALL HOUSES. THE REQUIRED SUMP PUMP AND DISCHARGE PIPING ARRANGEMENT IS DEPICTED ON ON DWG. NO. 42110. THE DIRECT CONNECTION OF WEEPING TILE DRAINAGE SYSTEMS TO THE SANITARY MAIN IS NOT PERMITTED.
3. AUGERED INSTALLATION IS REQUIRED UNDER EXISTING STREETS AND SIDEWALKS.
4. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA				© 2015	
Date	Details	Drawn	Dual Single Family Lot Service Connection with Sump Pump Discharge Collection Main					
11/05/02	REVISED DRAWING NUMBERS	J. Orr						
11/02/14	REVISED DRAWING NUMBERS	O. Butt						
03/06/25	NOTES	R. Dekker	Approved: R.F. Horton, P.Eng.					Drawing Number:  42006 <small>Utilities Department</small>
03/03/06	EASEMENT & NOTES	R. Dekker	Checked: D.J. Murdoch, P.Eng.					
99/06/29	SERVICE ALIGNMENTS	R. Dekker	Date: 98/02/13	Scale: 1:50	Drawn: E. Herman, T.T.			

**NOTES:**

1. FOR PLAN VIEW OF SERVICE CONNECTIONS, SEE DRAWINGS 42003, 42004, 42005, 42006.
2. AN ADDITIONAL GOOSENECK IS REQUIRED AT EACH SEWER CROSSING.
3. MAIN STOP TAPS SHALL BE A MINIMUM OF 600mm APART, AND NO LESS THAN 600mm TO A JOINT, FITTING OR VALVE.
4. COPPER SERVICE SHALL BE ONE CONTINUOUS PIECE, UNLESS LENGTH EXCEEDS 30m MIN. AND ONLY THEN WILL A DOUBLE UNION BE ALLOWED.
5. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.



**REVISIONS**

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. Orr
11/02/14	REVISED DRAWING NUMBERS	O. Butt
03/06/25	NOTES	R. Dekker
03/03/06	NOTES	R. Dekker
98/02/03	1998 UPDATES	J. Edgington



**STRATHCONA COUNTY** 2001 Sherwood Drive, Sherwood Park  
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**Typical 50mm and Smaller Residential Water, 150mm Sanitary Sewer, and 100mm Sump Pump Discharge Collection Services**

Approved: M. Hanley, M.Eng., P.Eng.

Checked: S. Olson, P.Eng.

Date: 96/01/18

Scale: N.T.S.

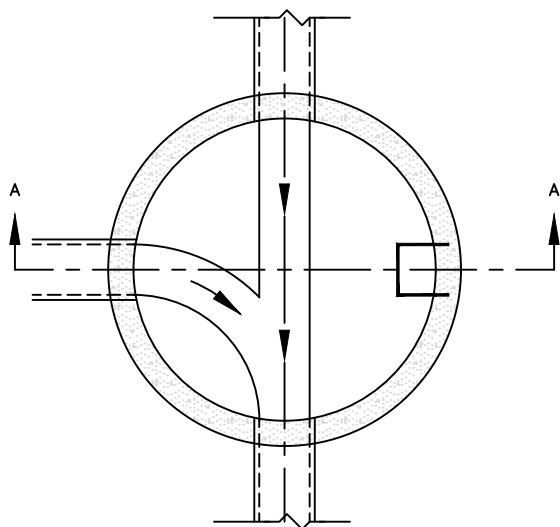
Drawn: J. Orr, T.T.

Drawing Number:

**42007**

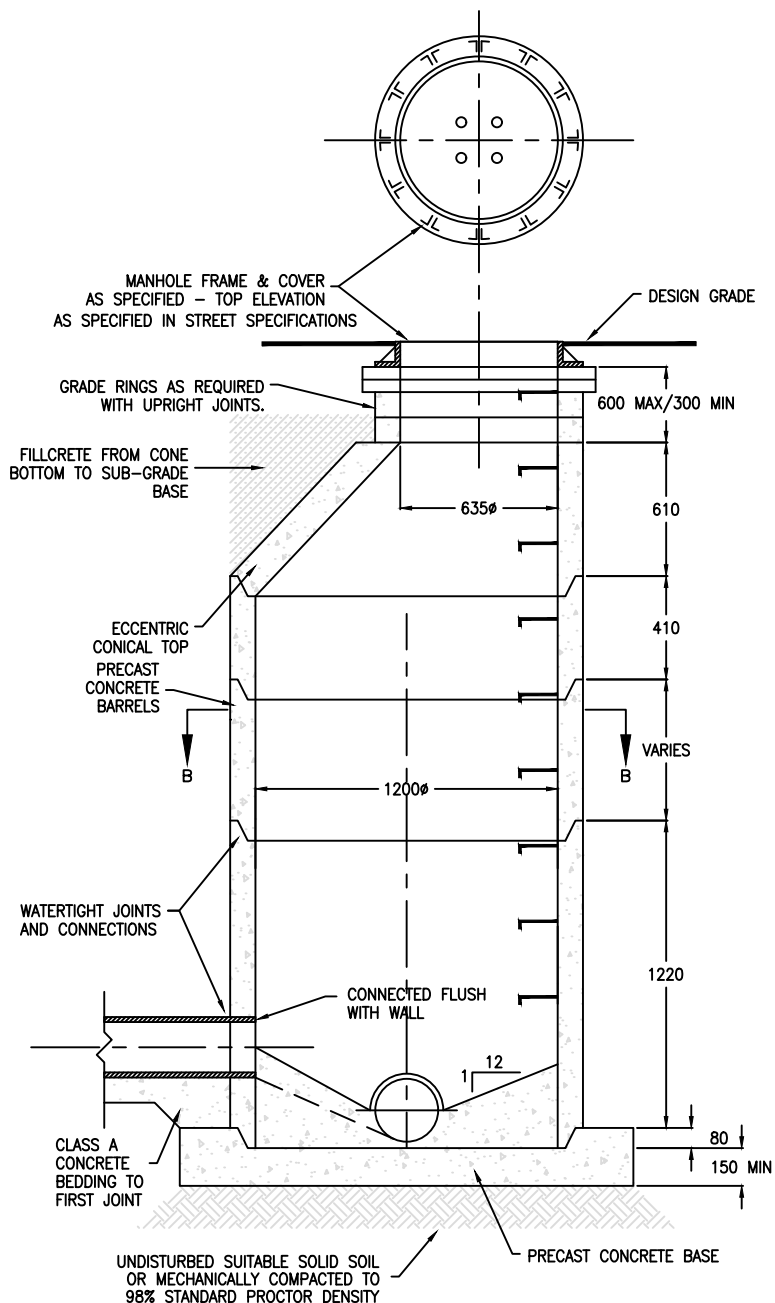
Utilities Department

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on the correct sides when the document is printed double-sided.

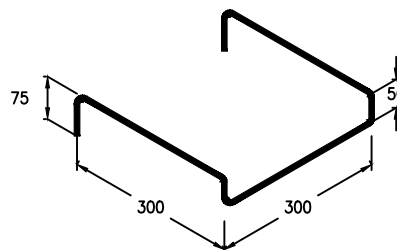


SECTION B-B

1. SAFETY STEPS TO BE SPACED AT 400 MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE 300 MAX. ABOVE BENCHING.
2. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
3. CAST IN PLACED CONCRETE TO BE 25 MPa AT 28 DAYS.
4. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
5. CHANNELLING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. COMPACT BACKFILL AROUND MANHOLES TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
7. FLAT TOP SECTION TO BE USED FOR SHALLOW BURY MANHOLES OF UP TO 1.80m.
8. FOR MANHOLES EXCEEDING 7.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.
9. PRE-BENCHED MANHOLE BASES MUST BE USED WHEREVER POSSIBLE WITH PRECORED CONNECTION HOLES AND WATER TIGHT DURASEAL OR G-LOC JOINTS OR APPROVED EQUAL.
10. IF PRECAST CONCRETE BASES ARE UNAVOIDABLE, THICKNESS AND REINFORCEMENT MUST BE DESIGNED FOR THE SPECIFIC MANHOLE DEPTH AND SOIL CONDITIONS.
11. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND BETWEEN RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED WITH NON-SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN BE ACHIEVED.
12. ALL DIMENSIONS ARE IN MILLIMETERS (mm), UNLESS OTHERWISE INDICATED.



SECTION A-A



20mm GALVANIZED IRON/ALUMINUM  
MANHOLE SAFETY STEPS

## REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. Orr
11/02/09	REVISED DRAWING NUMBERS	J. Eggen
03/03/06	NOTES	R. Dekker
98/02/11	1998 UPDATES	T. Wyman



STRATHCONA COUNTY  
2001 Sherwood Drive, Sherwood Park  
Alberta, T8A 3W7, CANADA

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Standard 1200mm Manhole for Pipes up to 600mm in Diameter

Approved: R.F. Horton, P.Eng.

Drawing Number:

Checked: D.J. Murdoch, P.Eng.

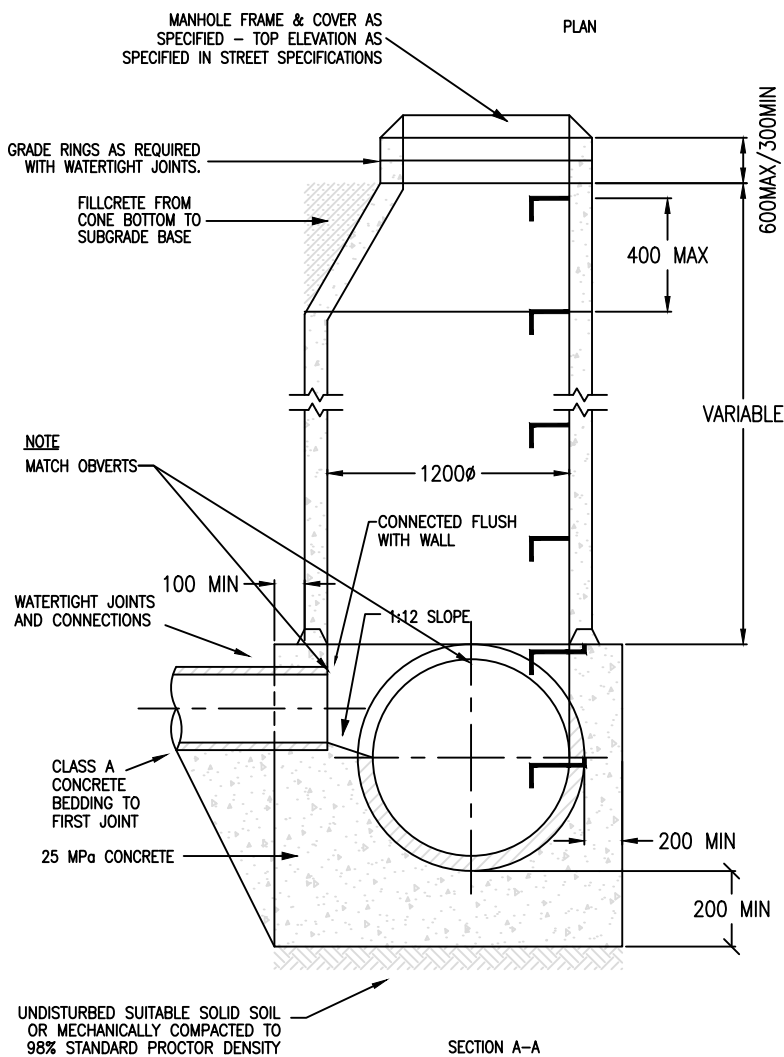
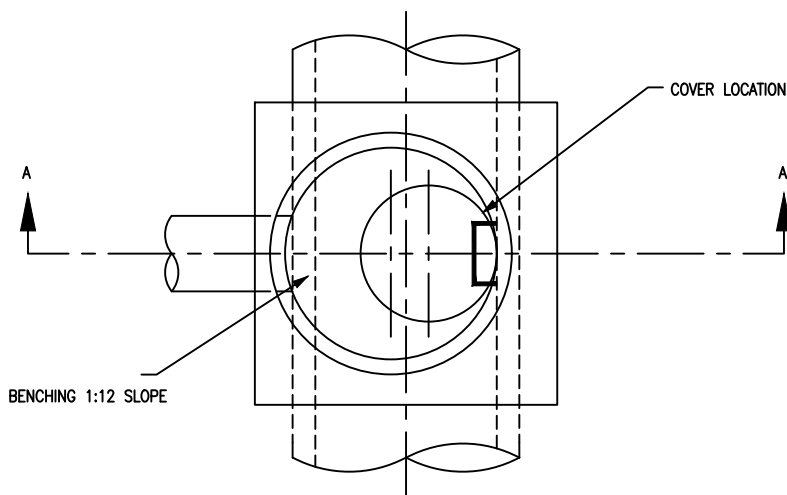
42101

Date: 94/04/19

Scale: N.T.S.

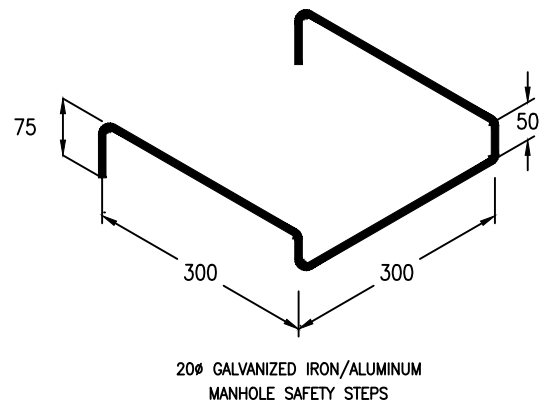
Drawn: R. Dekker, C.E.T.

Utilities Department



#### NOTES:

1. SAFETY STEPS TO BE SPACED AT 400 MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE 300 MAX. ABOVE BENCHING.
2. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
3. CAST IN PLACED CONCRETE TO BE 25 MPa AT 28 DAYS.
4. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
5. CHANNELLING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. COMPACT BACKFILL AROUND MANHOLES TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
7. FLAT TOP SECTION TO BE USED FOR SHALLOW BURY MANHOLES OF UP TO 1.80m.
8. FOR MANHOLES EXCEEDING 7.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.
9. THE DEPTHS OF CONCRETE AND REINFORCEMENT FOR THE CONCRETE BASE MUST BE DESIGNED FOR THE SPECIFIC MANHOLE DEPTH AND SOIL CONDITIONS.
10. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND BETWEEN RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED WITH NON-SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN BE ACHIEVED.
11. ALL DIMENSIONS ARE IN MILLIMETERS (mm), UNLESS OTHERWISE INDICATED.



#### REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. Orr
11/02/09	REVISED DRAWING NUMBERS	J. Eggen
03/03/06	NOTES	R. Dekker
98/02/11	1998 UPDATES	T. Wyman



**STRATHCONA COUNTY** 2001 Sherwood Drive, Sherwood Park  
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#### Typical Perched Manhole for 600 to 1050mm Diameter Pipes

Approved: R.F. Horton, P.Eng.

Checked: D.J. Murdoch, P.Eng.

Date: 96/01/10

Scale: N.T.S.

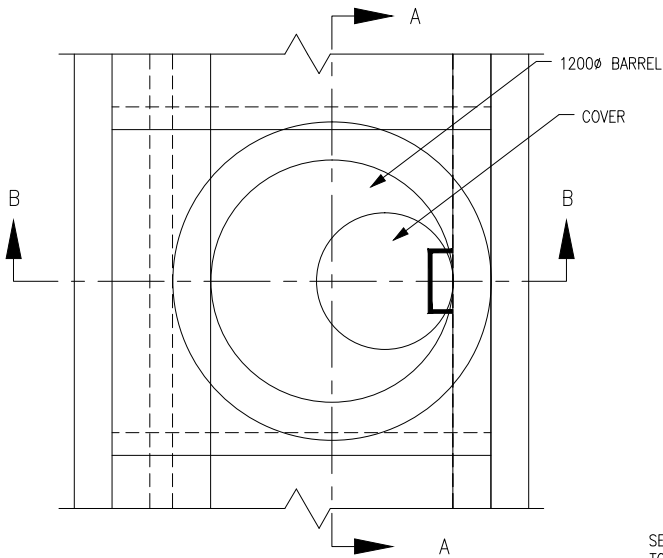
Drawn: A. Ma, C.E.T.

Drawing Number:

**42102**

Utilities Department

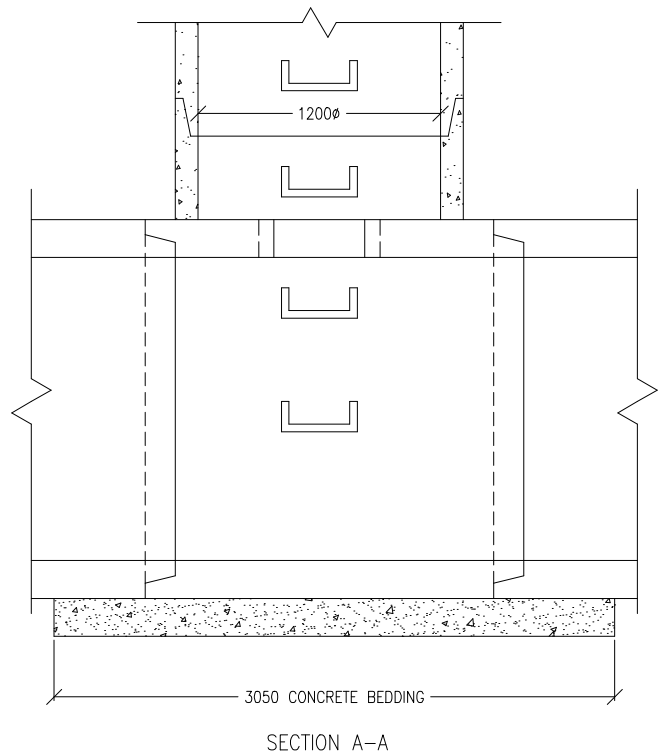
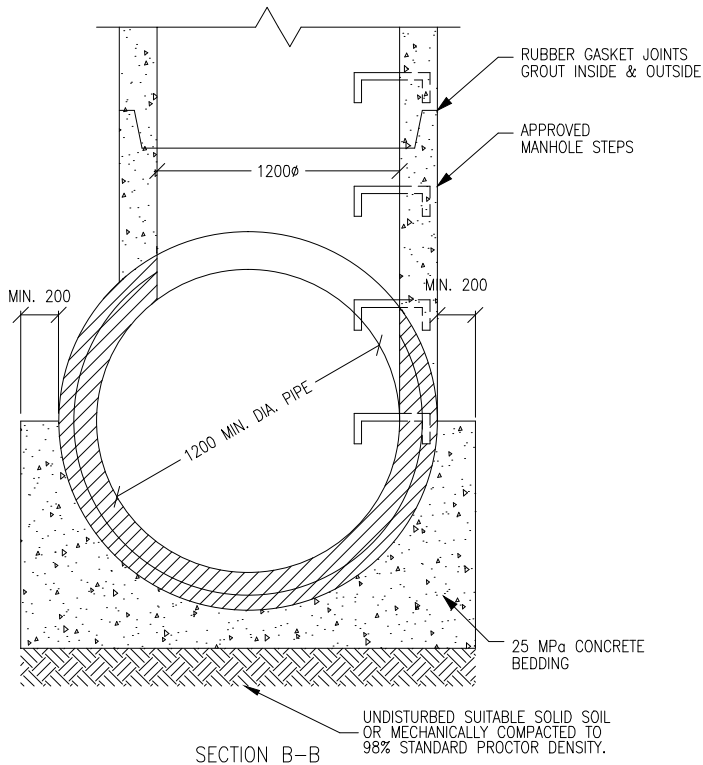




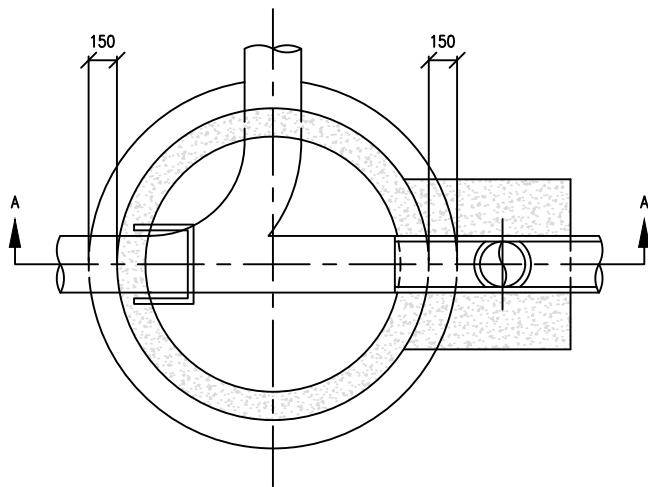
SEE DETAIL 42102 FOR  
TOP OF MANHOLE AND  
STEP DETAILS

#### NOTES:

1. THIS TYPE OF MANHOLE IS TO BE BUILT ONLY ON MAINS OF 1200mm DIAMETER OR LARGER AND WHERE THERE IS NO CHANGE IN DIRECTION OF FLOW, I.E. A "STRAIGHT-THROUGH" FLOW.
2. SAFETY STEPS TO BE SPACED AT 400 MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE 300 MAX. ABOVE BENCHING.
3. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
4. CAST IN PLACE CONCRETE TO BE 25 MPa AT 28 DAYS.
5. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
6. COMPACT BACKFILL AROUND MANHOLES TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
7. FOR MANHOLES EXCEEDING 7.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.
8. THE CONCRETE BEDDING MUST BE DESIGNED FOR THE SPECIFIC MANHOLE DEPTH AND SOIL CONDITIONS.
9. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>
Date	Details	Drawn	
YY/MM/DD	X	X	<div>T-Riser Manhole for Pipes 1200mm and Larger</div> <div>Approved: R.F. Horton, P.Eng.</div> <div>Checked: D.J. Murdoch, P.Eng.</div> <div>Date: 96/01/11</div> <div>Scale: N.T.S.</div> <div>Drawn: Alvin Ma, C.E.T.</div> <div>Drawing Number: 42103 Utilities Department</div>
11/05/02	REVISED DRAWING NUMBERS	J. ORR	
11/02/09	REVISED DRAWING NUMBERS	J. Eggen	
03/02/07	NOTES	R. Dekker	
98/02/02	1998 UPDATES	T. Wyman	

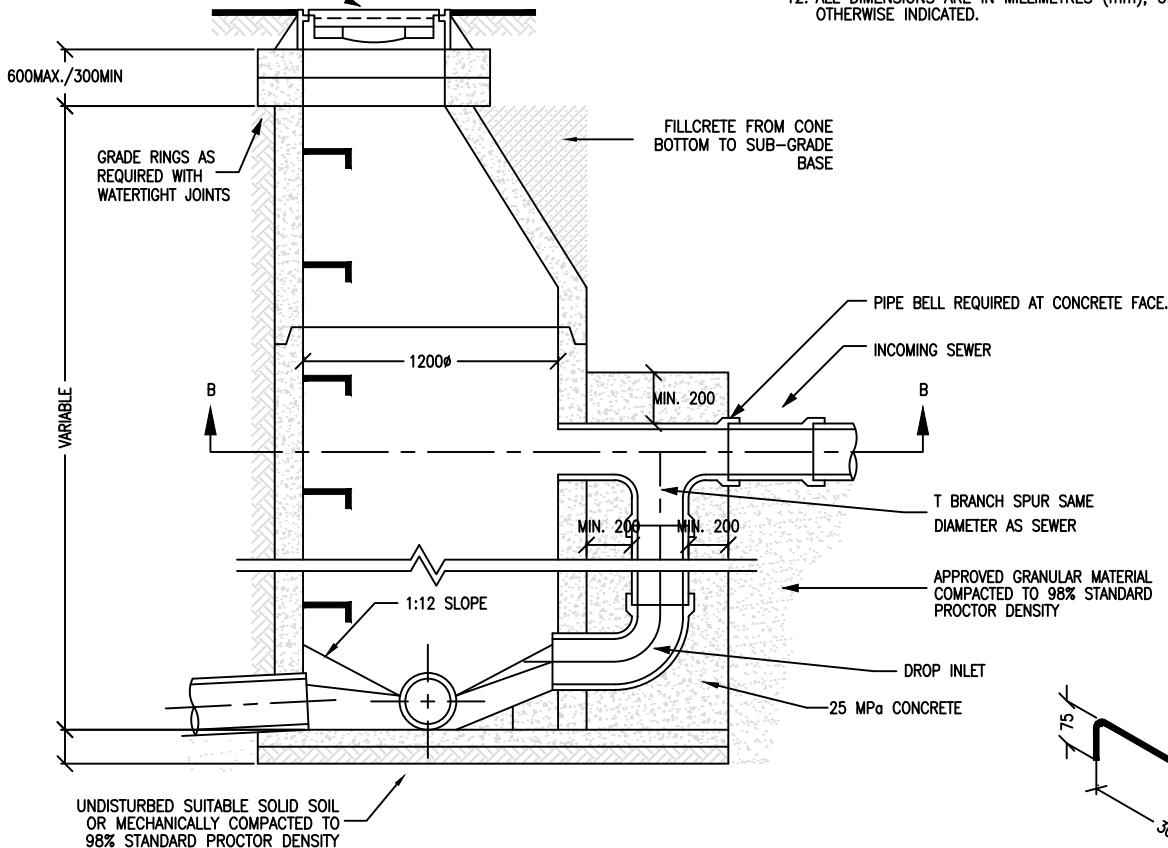


MANHOLE FRAME & COVER AS SPECIFIED - TOP ELEVATION AS SPECIFIED IN STREET SPECIFICATIONS

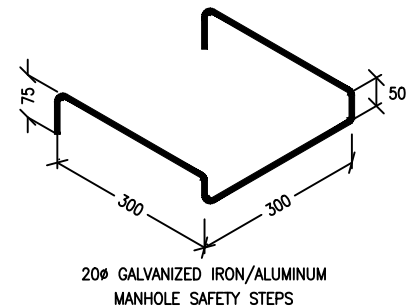
PLAN SECTION B-B

# NOTES:

1. SAFETY STEPS TO BE SPACED AT 400 MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE 300 MAX. ABOVE BENCHING.
2. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
3. CAST IN PLACE CONCRETE TO BE 25 MPa AT 28 DAYS.
4. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
5. CHANNELLING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. COMPACT BACKFILL AROUND MANHOLES TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
7. FLAT TOP SECTION TO BE USED FOR SHALLOW BURY MANHOLES OF UP TO 1.80m.
8. FOR MANHOLES EXCEEDING 7.0m IN DEPTH, A SAFETY PLATFORM SHALL BE INSTALLED.
9. PRE-BENCHED MANHOLE BASES MUST BE USED WHEREVER POSSIBLE WITH PRECORED CONNECTION HOLES AND WATER TIGHT DURASEAL OR G-LOC JOINTS OR APPROVED EQUAL.
10. PRECAST CONCRETE BASES ARE RECOMMENDED. THICKNESS AND REINFORCEMENT MUST BE DESIGNED FOR THE SPECIFIC MANHOLE DEPTH AND SOIL CONDITIONS.
11. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND BETWEEN RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED WITH NON-SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN BE ACHIEVED.
12. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE INDICATED.



SECTION A-A



## REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. Orr
11/02/09	REVISED DRAWING NUMBERS	J. Eggen
03/03/06	NOTES	R. Dekker
98/02/02	1998 UPDATES	T. Wyman



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Alberta, T8A 3W7, CANADA

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## External Drop Manhole

Approved: R.F. Horton, P.Eng.

Checked: D.J. Murdoch, P.Eng.

Date: 96/01/15

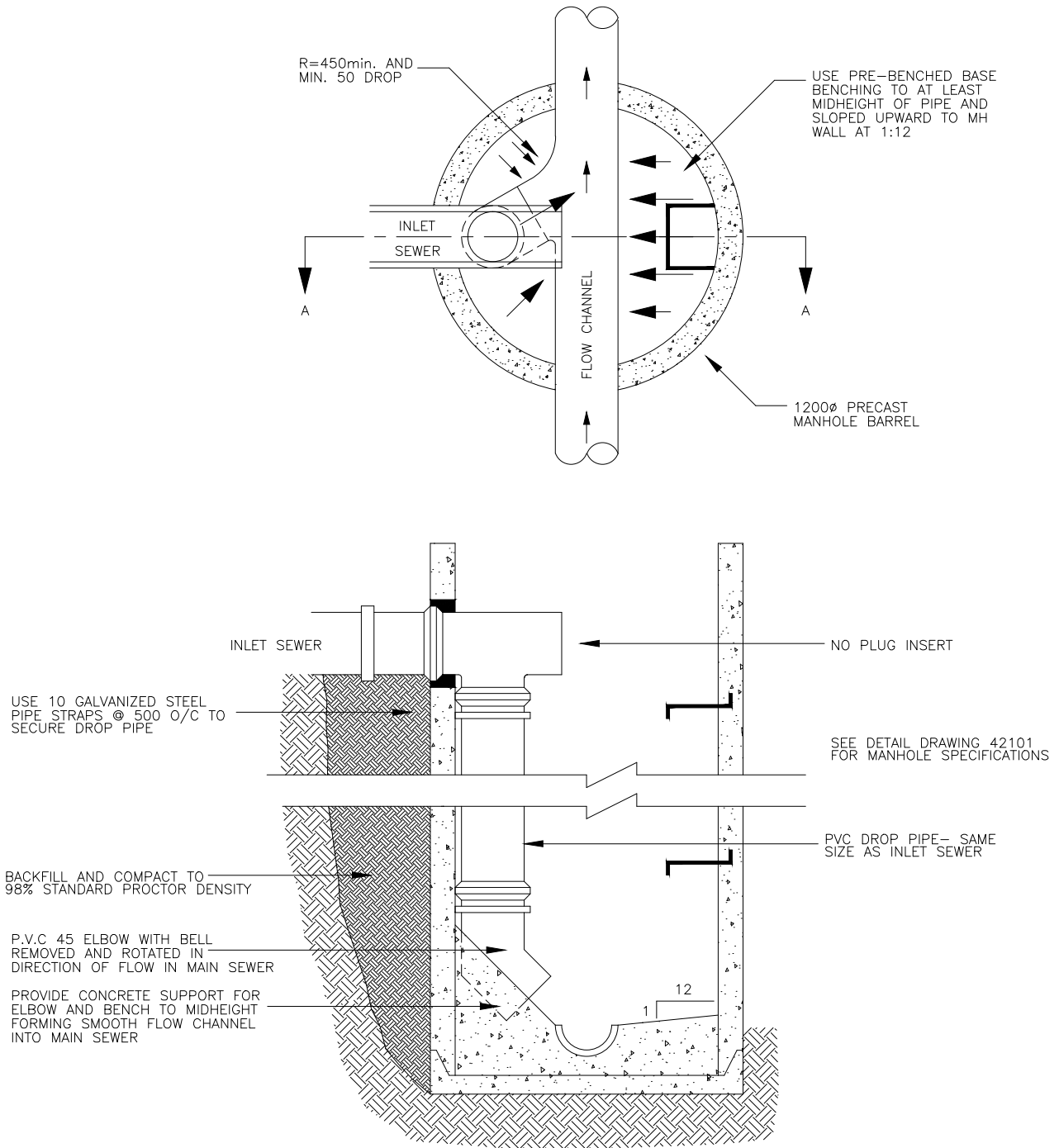
Scale: N.T.S.

Drawn: A. Ma, C.E.T.

Drawing Number:

42104

Utilities Department

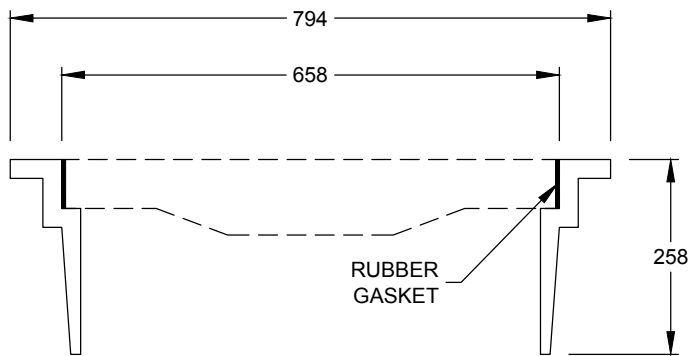
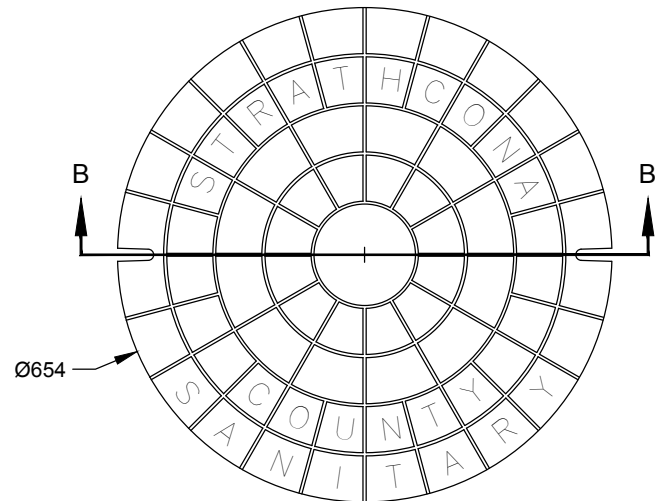
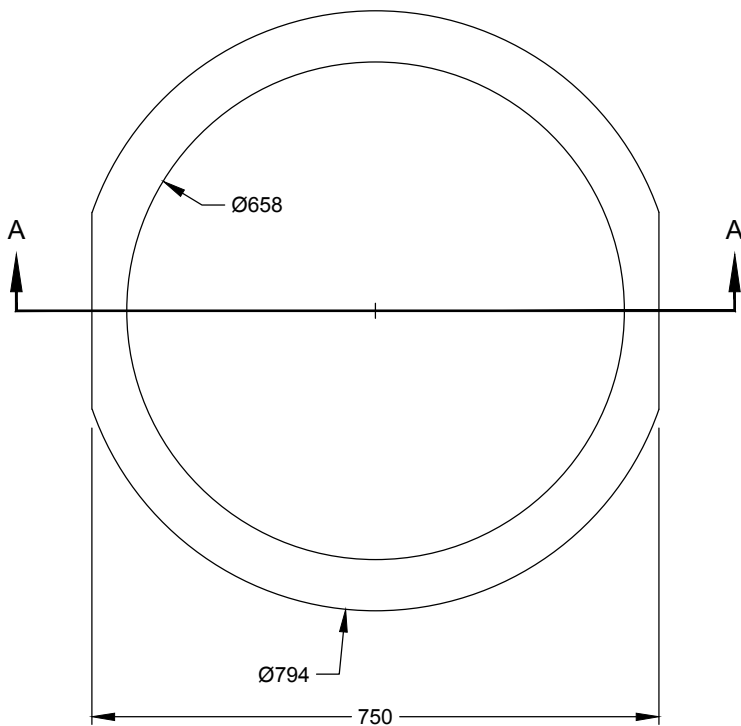


SECTION A-A

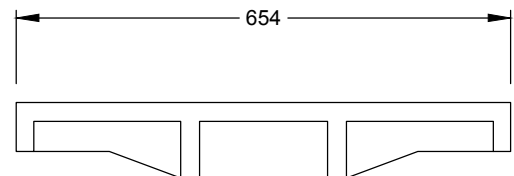
**NOTES:**

1. AN INTERNAL DROP CAN ONLY BE USED FOR 200mm AND 250mm INCOMING SEWERS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Drawn			
YY/MM/DD	X	X	Internal Drop Manhole		
11/05/02	REVISED DRAWING NUMBERS	J. ORR			
11/02/09	REVISED DRAWING NUMBERS	J. Eggen	Approved: R.F. Horton, P.Eng.		Drawing Number:  42105 <div>Utilities Department</div>
03/02/07	NOTES	R. Dekker	Checked: D.J. Murdoch, P.Eng.		
98/02/02	1998 UPDATES	T. Wyman	Date: 94/03/28	Scale: N.T.S.	




SECTION A-A



SECTION B-B

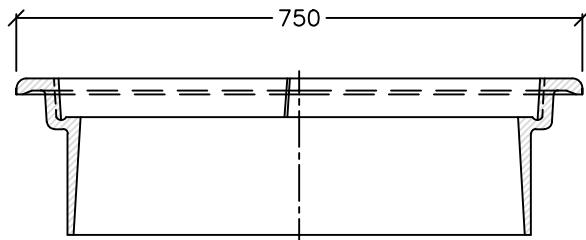
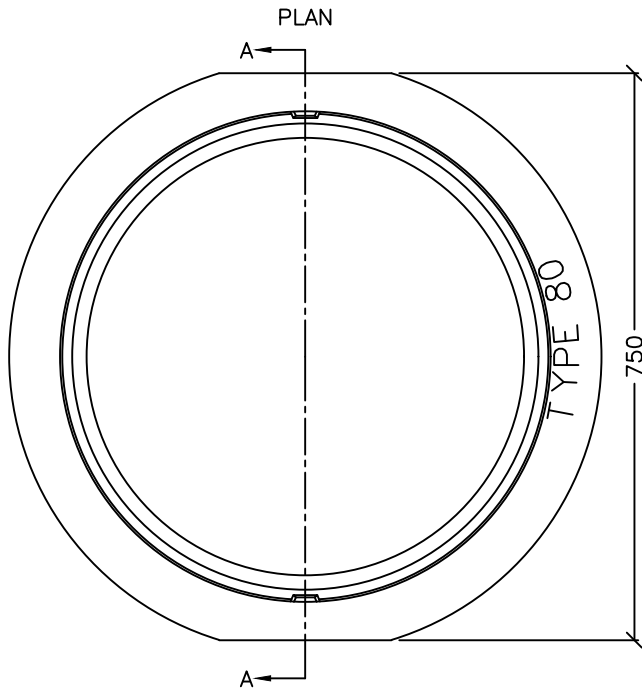
**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.
2. BEARING SURFACE TO BE MACHINED TO PREVENT ROCKING.

REVISIONS			 <b>STRATHCONA COUNTY</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		
Date	Details	Drawn			
			<b>F-90 Type Manhole Frame and Cover</b>  Approved: L. Knorr, P.Eng Checked: D. Zeldenrust, P.Eng Date: 15/04/02    Scale: N.T.S.    Drawn: J. Orr, C.E.T.		
15/04/02	CREATED DETAIL	J. Orr			
			Drawing Number: <b>42106</b> <small>Utilities Department</small>		

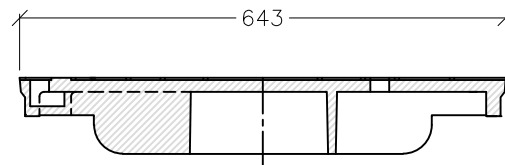
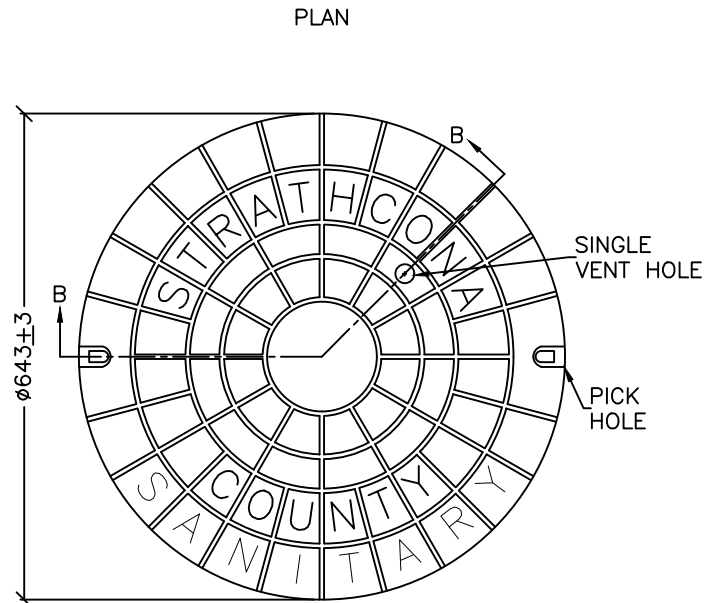
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F-80 FLOATING TYPE MANHOLE



SECTION A-A

F-80 COVER



SECTION B-B

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.
2. BEARING SURFACE TO BE MACHINED TO PREVENT ROCKING.

**REVISIONS**

Date	Details	Drawn
16/10/13	REVISED DETAIL	J. Orr
15/04/02	REVISED DRAWING NUMBERS	J. Orr
11/05/02	REVISED DRAWING NUMBERS	J. Orr
11/02/09	REVISED DRAWING NUMBERS	J. Eggen



**STRATHCONA COUNTY**  
2001 Sherwood Drive, Sherwood Park  
Alberta, T8A 3W7, CANADA

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**F-80 Floating Type Manhole Frame and Cover**

Approved: R.F. Horton, P.Eng.

Checked: D.J. Murdoch, P.Eng.

Date: 03/06/25

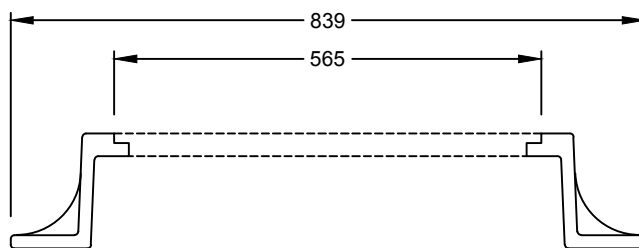
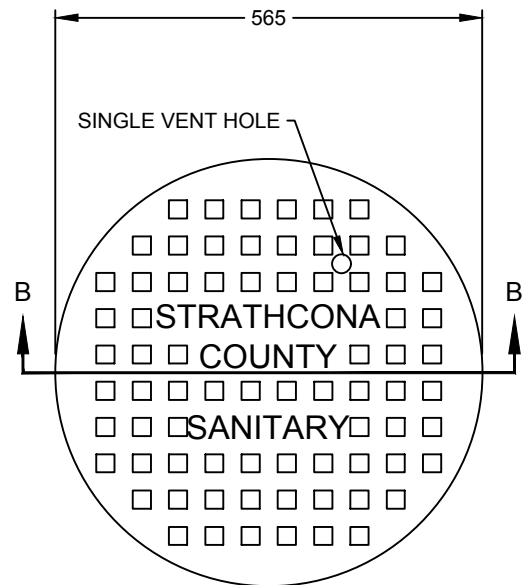
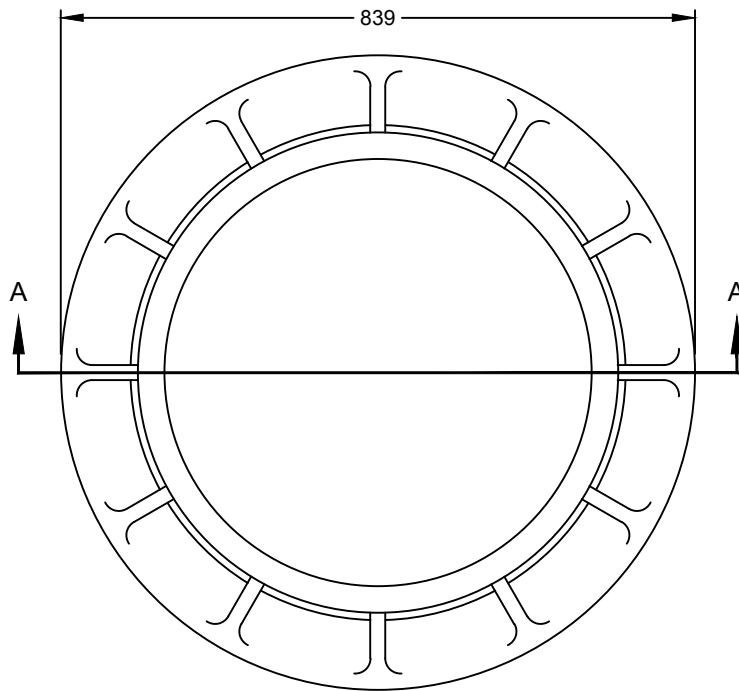
Scale: N.T.S.

Drawn: R. Dekker, C.E.T.

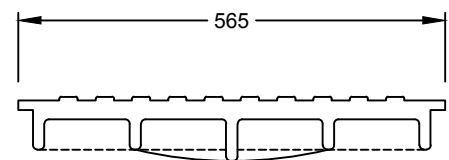
Drawing Number:

**42107**

Utilities Department




SECTION A-A



SECTION B-B

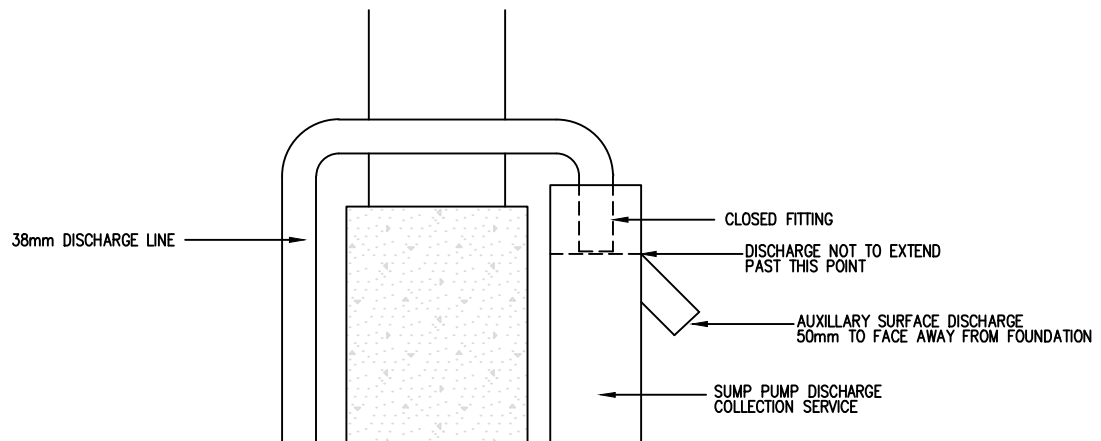
**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.
2. BEARING SURFACE TO BE MACHINED TO PREVENT ROCKING.

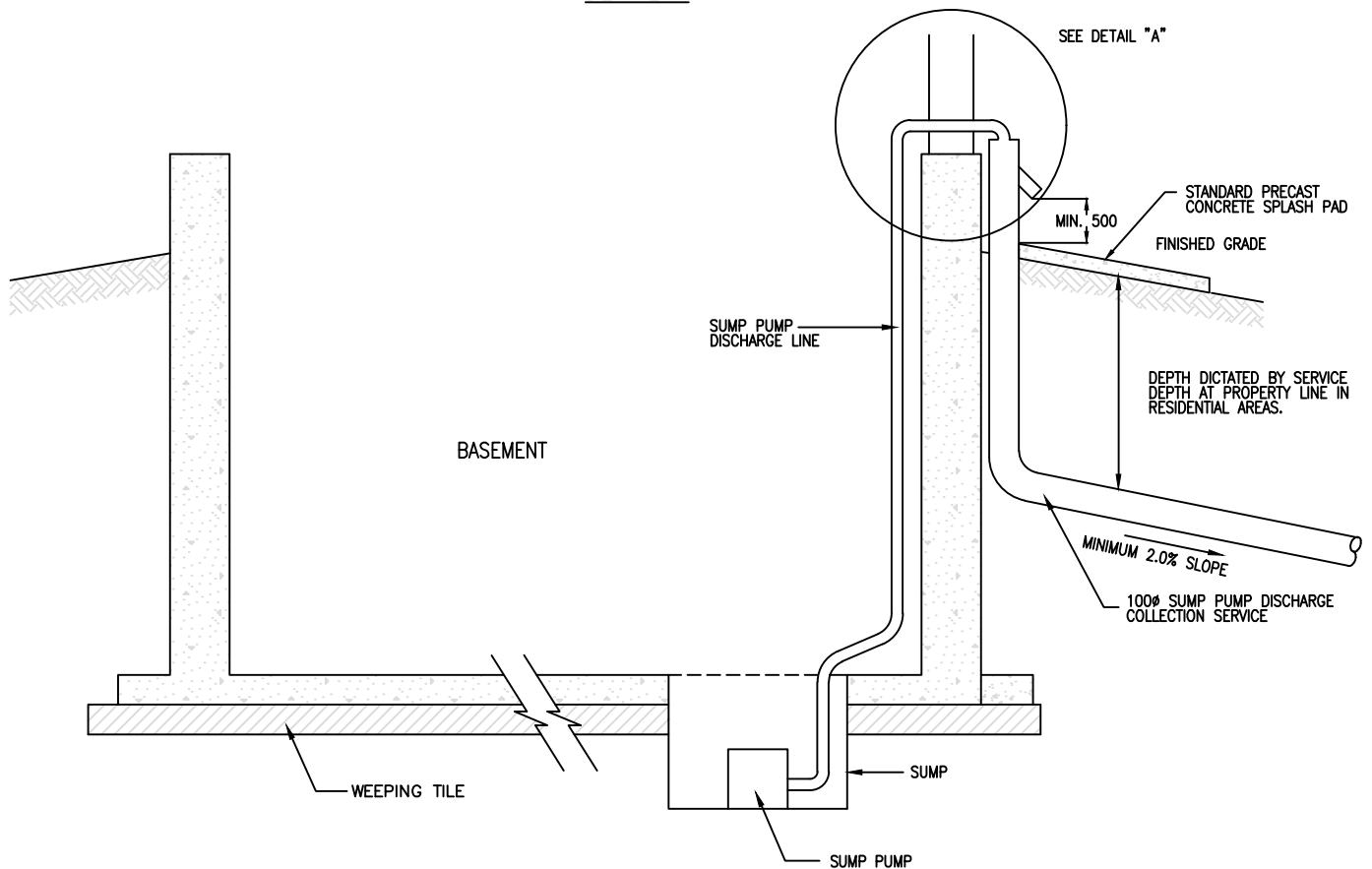
REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2016
Date	Details	Drawn				
			F-39 Type Manhole Frame and Cover Single Vent			
			Approved: L. Knorr, P.Eng			Drawing Number:  42108  Utilities Department
15/11/09	SINGLE VENT	S. Engleder	Checked: D. Zeldenrust, P.Eng			
15/04/02	CREATED DETAIL	J. Orr	Date: 15/04/02	Scale: N.T.S.	Drawn: J. Orr, C.E.T.	

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DETAIL A

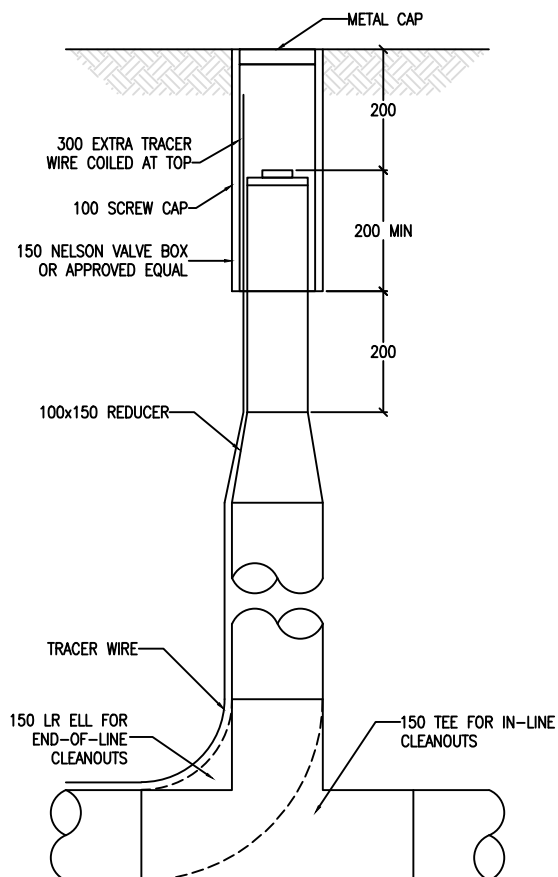


**NOTES:**

1. ROOF LEADERS (DOWNSPOUTS) OR ANY OTHER STORM WATER SOURCE MUST NOT BE CONNECTED TO THE SUMP DISCHARGE COLLECTION SERVICE LINE.
2. THE AUXILIARY SURFACE DISCHARGE MUST BE INSTALLED TO PROVIDE AN OVERFLOW IN THE EVENT THAT THE STORM DRAINAGE SYSTEM CANNOT ACCOMMODATE FLOWS DUE TO CAPACITY, FREEZING OR OTHER PROBLEMS.
3. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.


REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2016	
Date	Details	Drawn					
16/02/19	REVISED DRAWING NUMBERS	D. LeGrow	Typical Sump Pump Discharge Connection				
15/04/02	REVISED DRAWING NUMBERS	J. Orr					
11/05/02	REVISED DRAWING NUMBER & REVISIONS	J. Orr	Approved: M. Hanley, M.Eng., P.Eng.			Drawing Number:	
11/02/14	REVISED DRAWING NUMBERS	O. Butt	Checked: S. Olson, P.Eng.			42110 Utilities Department	
05/10/31	NOTES	J. Patterson	Date: 98/02/16	Scale: N.T.S.	Drawn: E. Herman, T.T.		



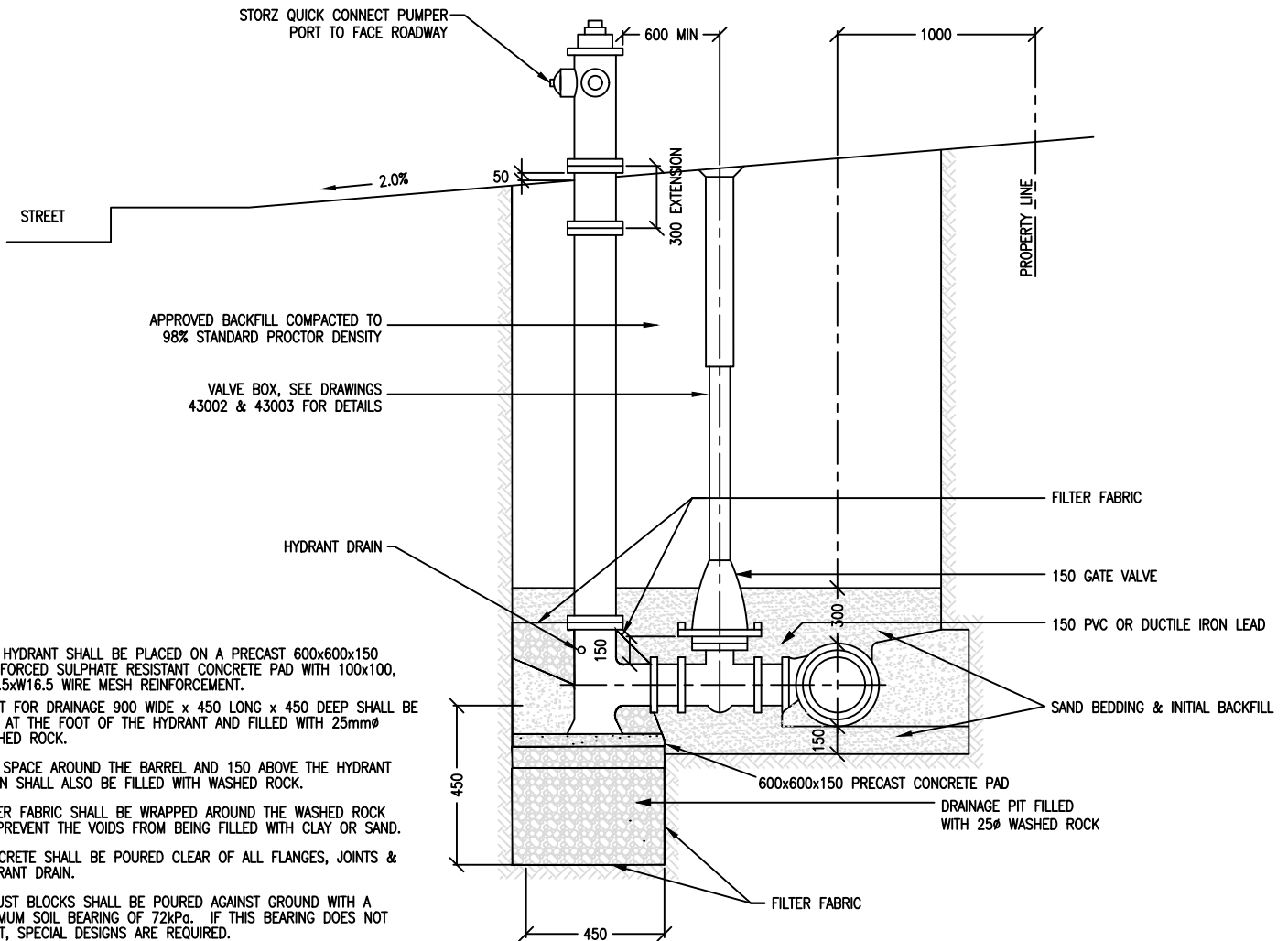
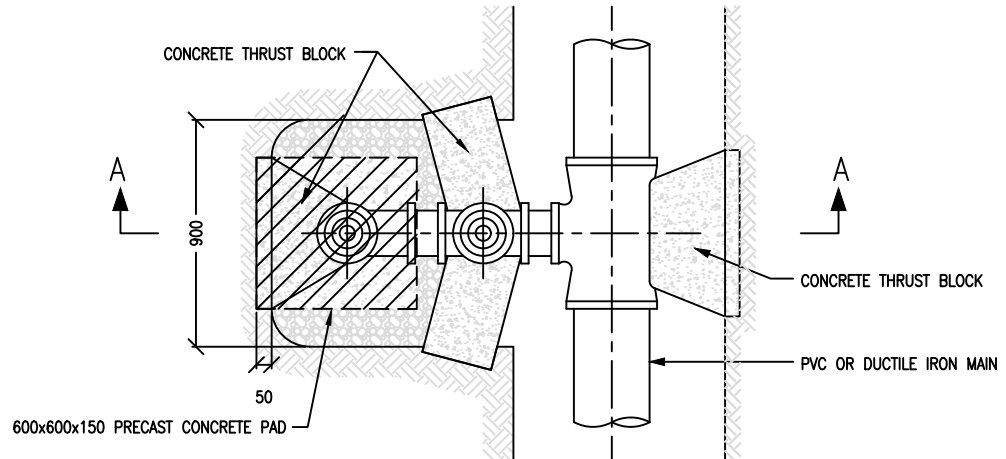


**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 <b>STRATHCONA COUNTY</b>	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		© 2016
Date	Details	Drawn				
16/02/19	REVISED DRAWING NUMBERS	D. LeGrow	<b>Typical Sump Pump Discharge Collection Main - In-Line / End-of-Line Cleanout</b>			
15/04/02	REVISED DRAWING NUMBERS	J. Orr				
11/05/02	REVISED DRAWING NUMBERS	J. Orr	Approved: R.F. Horton, P.Eng.			<b>Drawing Number:</b>  <b>42111</b> <small>Utilities Department</small>
11/02/14	REVISED DRAWING NUMBERS	O. Butt	Checked: D.J. Murdoch, P.Eng.			
03/06/25	NOTES	R. Dekker	Date: 03/01/27	Scale: 1:125	Drawn: A. Ma, C.E.T.	

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.



**NOTE:**

1. THE HYDRANT SHALL BE PLACED ON A PRECAST 600x600x150 REINFORCED SULPHATE RESISTANT CONCRETE PAD WITH 100x100, W16.5xW16.5 WIRE MESH REINFORCEMENT.
2. A PIT FOR DRAINAGE 900 WIDE x 450 LONG x 450 DEEP SHALL BE DUG AT THE FOOT OF THE HYDRANT AND FILLED WITH 25mm $\phi$  WASHED ROCK.
3. THE SPACE AROUND THE BARREL AND 150 ABOVE THE HYDRANT DRAIN SHALL ALSO BE FILLED WITH WASHED ROCK.
4. FILTER FABRIC SHALL BE WRAPPED AROUND THE WASHED ROCK TO PREVENT THE VOIDS FROM BEING FILLED WITH CLAY OR SAND.
5. CONCRETE SHALL BE POURED CLEAR OF ALL FLANGES, JOINTS & HYDRANT DRAIN.
6. THRUST BLOCKS SHALL BE POURED AGAINST GROUND WITH A MINIMUM SOIL BEARING OF 72kPa. IF THIS BEARING DOES NOT EXIST, SPECIAL DESIGNS ARE REQUIRED.
7. REFER TO DETAIL 43004 FOR THRUST BLOCK GEOMETRY.
8. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

**SECTION A-A**

**REVISIONS**

Date	Details	Drawn
11/02/09	REVISED DRAWING NUMBERS	J. Eggen
03/02/07	NOTES	R. Dekker
98/06/10	REALIGNMENT	R. Dekker
98/02/03	1998 UPDATES	J. Edgington



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Alberta, T8A 3W7, CANADA

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**Typical Hydrant and Valve Placement**

Approved: R.F. Horton, P.Eng.

Checked: D.J. Murdoch, P.Eng.

Date: 96/01/19

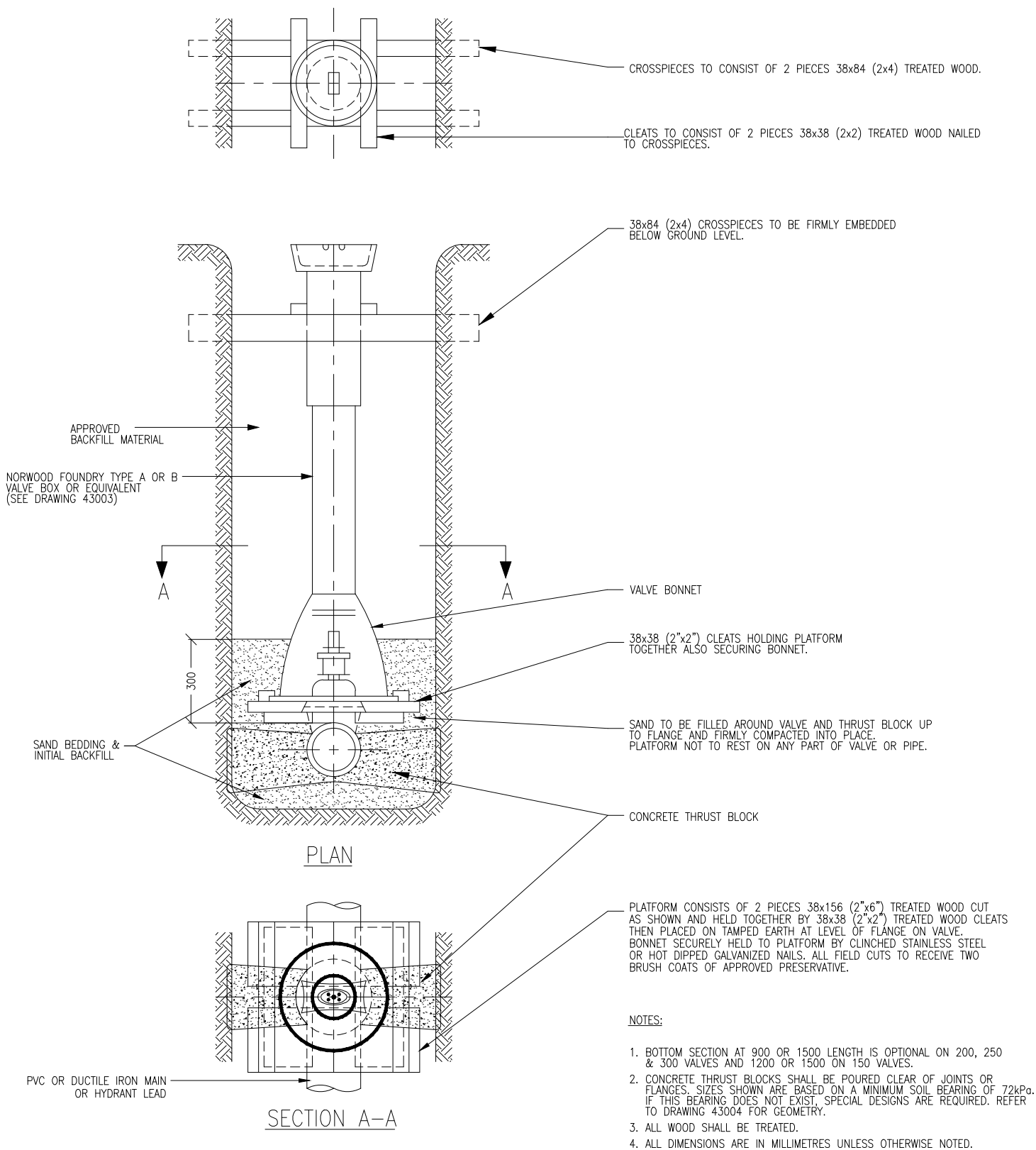
Scale: N.T.S.

Drawn: A. Ma, C.E.T.

Drawing Number:

**43001**

Utilities Department



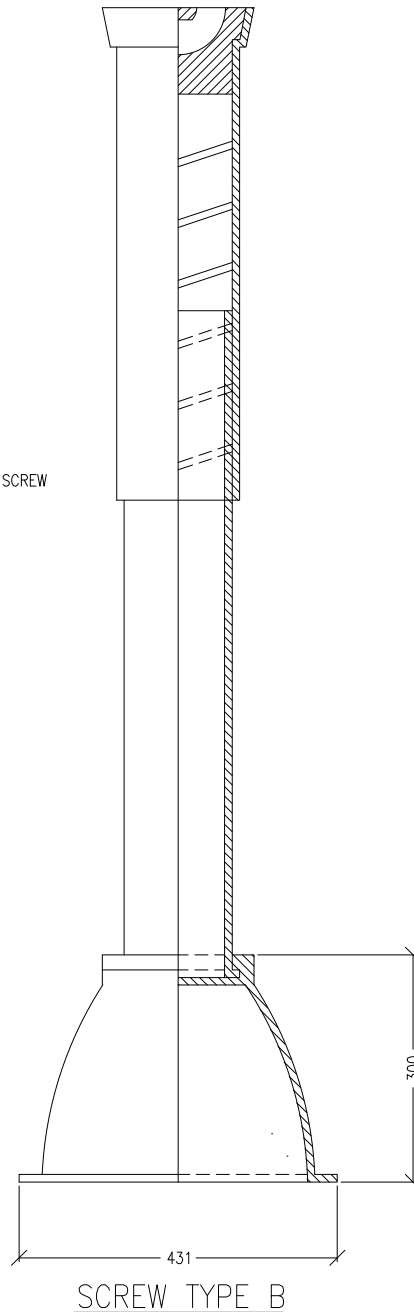
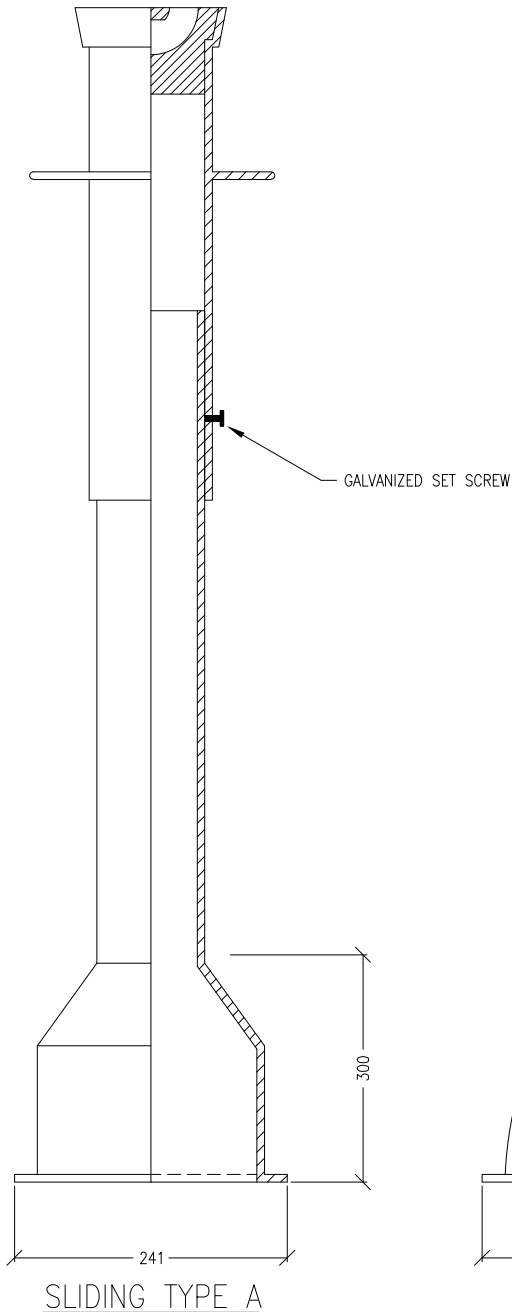
REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Drawn			
YY/MM/DD	X	X	Standard Method of Supporting Valves and Valve Boxes		
YY/MM/DD	X	X			
11/02/09	REVISED DRAWING NUMBERS	J. Eggen	Approved: R.F. Horton, P.Eng.		Drawing Number:
03/02/07	NOTES	R. Dekker	Checked: D.J. Murdoch, P.Eng.		43002
98/02/04	1998 UPDATES	J. Edgington	Date: 96/01/24	Scale: N.T.S.	
			Utilities Department		



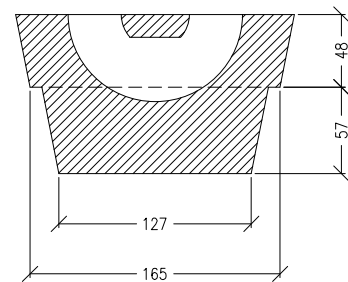
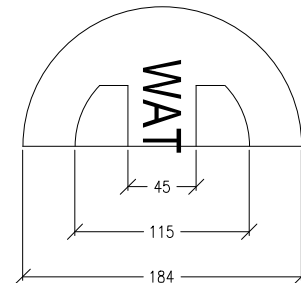
STANDARD VALVE PLUG

NOTES:

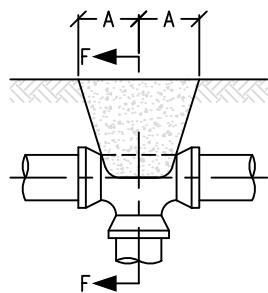
1. VALVE BOXES SHALL BE EXTERNALLY AND INTERNALLY COATED WITH ASPHALTIC OR EPOXY COATING.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



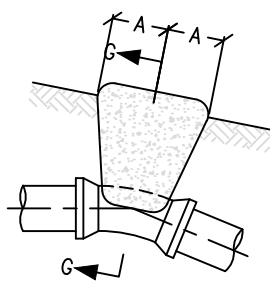
PLUG C/W CORED HANDHOLES  
AND MARKED 'WATER'



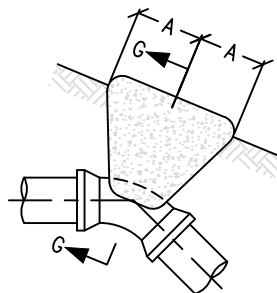
REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Drawn			
YY/MM/DD	X	X	Valve Box Detail - Sliding Type A and Screw Type B		
YY/MM/DD	X	X			
11/02/09	REVISED DRAWING NUMBERS	J. Eggen	Approved: R.F. Horton, P.Eng.		Drawing Number:  43003 <div>Utilities Department</div>
03/02/07	NOTES	R. Dekker	Checked: D.J. Murdoch, P.Eng.		
98/02/04	SCREW TYPE ADDITION & 1998 UPDATES	J. Edgington	Date: 96/01/24	Scale: N.T.S.	



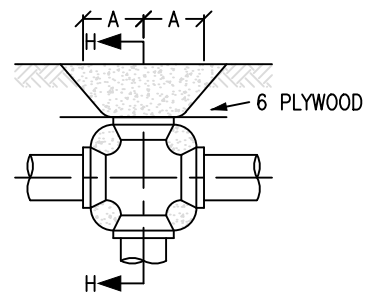
TEE & DEAD END CONNECTION



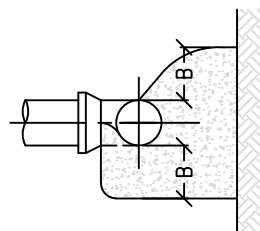
22 1/2° & 11 1/4° BENDS



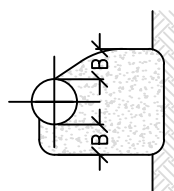
45° BENDS



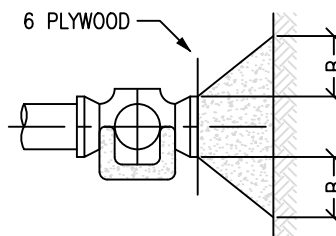
CROSS & DEAD END PLUG



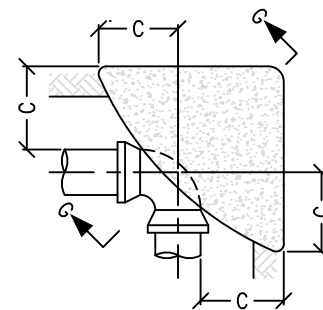
SECTION F-F



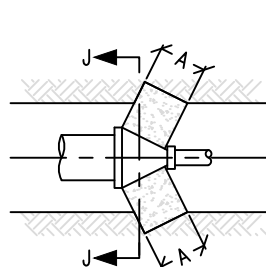
SECTION G-G



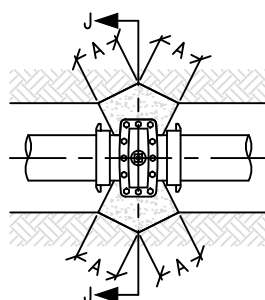
SECTION H-H



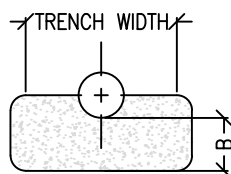
90° BENDS



REDUCER



VALVE



SECTION J-J

NOTES:

1. CONCRETE TO BE 25 MPa AT 28 DAYS.
2. CONCRETE TO BE CLEAR OF BELLS AND PIPE.
3. MINIMUM 75mm OF CONCRETE UNDER ALL FITTINGS.
4. 6 mil POLYETHYLENE MUST BE PLACED BETWEEN CONCRETE AND ALL PVC FITTINGS, CONCRETE SHALL NOT COME IN CONTACT WITH THE PIPE.
5. REFER TO DRAWING 43005 FOR VERTICAL DETAILS.
6. ALL DIMENSIONS IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

THRUST AREAS CALCULATED FOR 1035 MPa.

SOIL BEARING OF 72kPa (MEDIUM SOFT CLAY). IF BEARING NOT AVAILABLE, SPECIAL DESIGNS ARE REQUIRED.

	TEE	BRANCH & CROSS VALVE REDUCER				22 1/2° & 11 1/4° BENDS					45° BENDS					90° BENDS				
DIA.	350	300	250	200	150	350	300	250	200	150	350	300	250	200	150	350	300	250	200	150
A	1200	950	750	525	375	375	305	230	200	150	750	560	450	375	305					
B	75	75	75	75	75	150	150	125	100	75	150	150	125	100	75	550	525	350	300	200
C																600	450	400	350	300
AREA Sq. m.	1.40	1.03	0.76	0.48	0.28	0.57	0.43	0.28	0.20	0.15	1.12	0.80	0.56	0.38	0.23	2.06	1.49	1.03	0.70	0.40

REVISIONS

Date	Details	Drawn
15/04/09	REVISED NOTES	J. Orr
11/02/09	REVISED DRAWING NUMBERS	J. Eggen
03/02/07	NOTES	R. Dekker
98/02/03	VALVE & REDUCER DETAIL	J. Edgington



STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park  
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Concrete Thrust Block - Horizontal Details for Water Mains

Approved: R.F. Horton, P.Eng.

Checked: D.J. Murdoch, P.Eng.

Date: 96/01/17

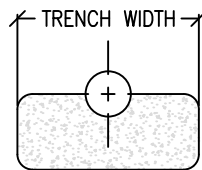
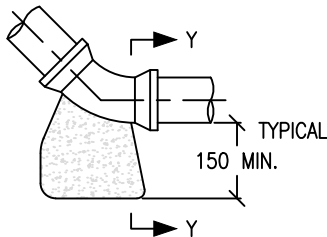
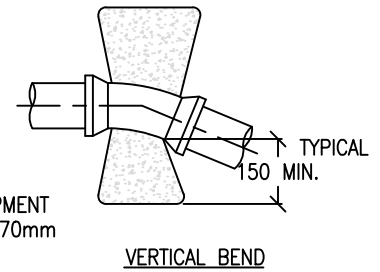
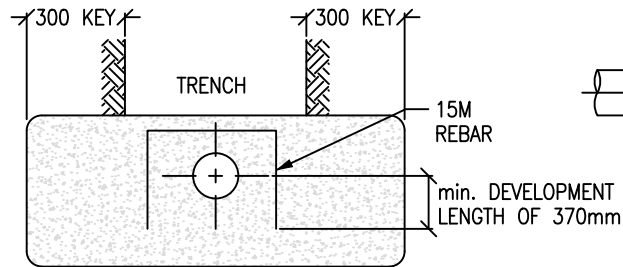
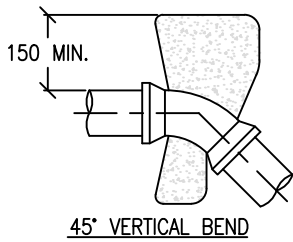
Scale: N.T.S.

Drawn: A. Ma, C.E.T.

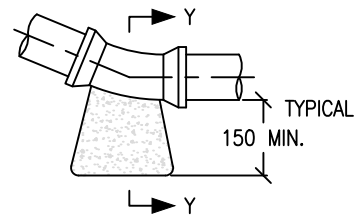
Drawing Number:

43004

Utilities Department




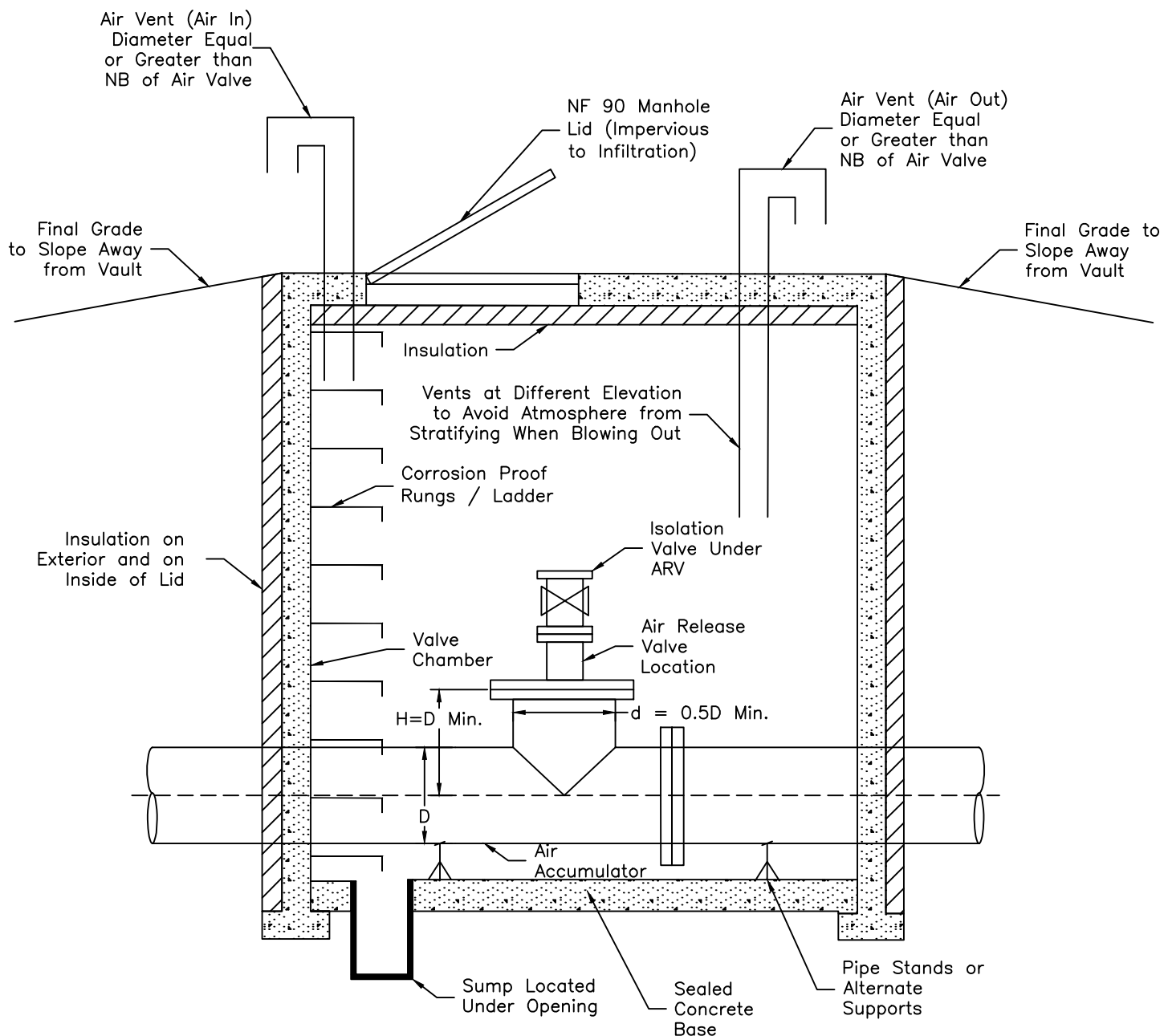
SECTION Y-Y



NOTES:


1. CONCRETE TO BE 25 MPa AT 28 DAYS.
2. CONCRETE TO BE CLEAR OF BELLS AND PIPE.
3. MINIMUM 75mm OF CONCRETE UNDER ALL FITTINGS.
4. 6 mil POLYETHYLENE MUST BE PLACED BETWEEN CONCRETE AND ALL PVC FITTINGS, CONCRETE SHALL NOT COME IN CONTACT WITH THE PIPE.
5. REFER TO DRAWING 43004 FOR HORIZONTAL DETAILS.
6. ALL DIMENSIONS IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA				© 2015
Date	Details	Drawn					
			Concrete Thrust Block - Vertical Details for Water Mains				
15/04/09	REVISED NOTES	J. Orr					
11/02/09	REVISED DRAWING NUMBERS	J. Eggen					
03/02/07	NOTES	R. Dekker					
98/02/03	1998 UPDATES	J. Edgington	Date: 96/01/17		Scale: N.T.S.	Drawn: A. Ma, C.E.T.	



**NOTES:**

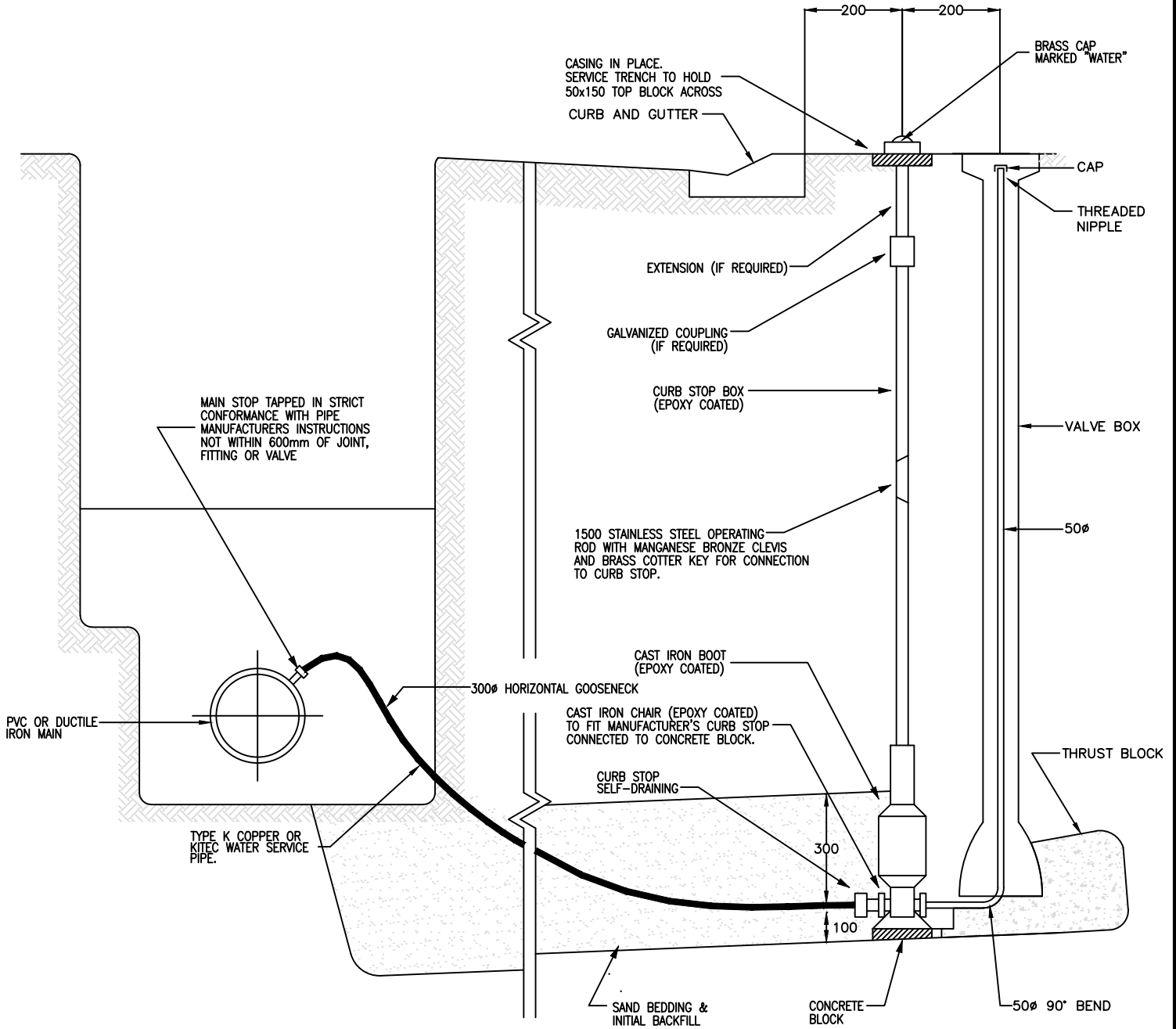
1. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.
2. ARV VAULT SHOULD BE WATER TIGHT & IMPERVIOUS TO INFILTRATION.
3. SAFETY STEPS TO BE SPACED AT 400 MAX DISTANCE. FIRST STEP TO BE 150 MAX BELOW FRAME, LAST STEP TO BE 300 MAX ABOVE BOTTOM.

REVISIONS			 STRATHCONA COUNTY			2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2016		
Date		Details		Drawn							
				Typical Air Release Valve (ARV) Installation							
				Approved: L. Knorr, P.Eng				Drawing Number:			
16/10/13	MODIFIED CREDITS		J. Orr	Checked: D. Zeldenrust, P.Eng				43006 <small>Utilities Department</small>			
15/04/02	CREATED DETAIL		J. Orr	Date: 15/04/02		Scale: N.T.S.					



**NOTES:**

1. COPPER LINE SHALL BE ONE CONTINUOUS PIECE, UNLESS LENGTH EXCEEDS 30m MIN. AND ONLY THEN WILL A DOUBLE UNION BE ALLOWED.
2. INVERT ELEVATION SHALL BE 2.80m BELOW ESTABLISHED FINISHED GRADE.
3. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.



**REVISIONS**

Date	Details	Drawn
11/02/09	REVISED DRAWING NUMBERS	J. Eggen
03/03/06	NOTES	R. Dekker



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Alberta, T8A 3W7, CANADA

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**Blow Off Valve Detail**

Approved: R.F. Horton, P.Eng.

Checked: D.J. Murdoch, P.Eng.

Date: 98/02/13

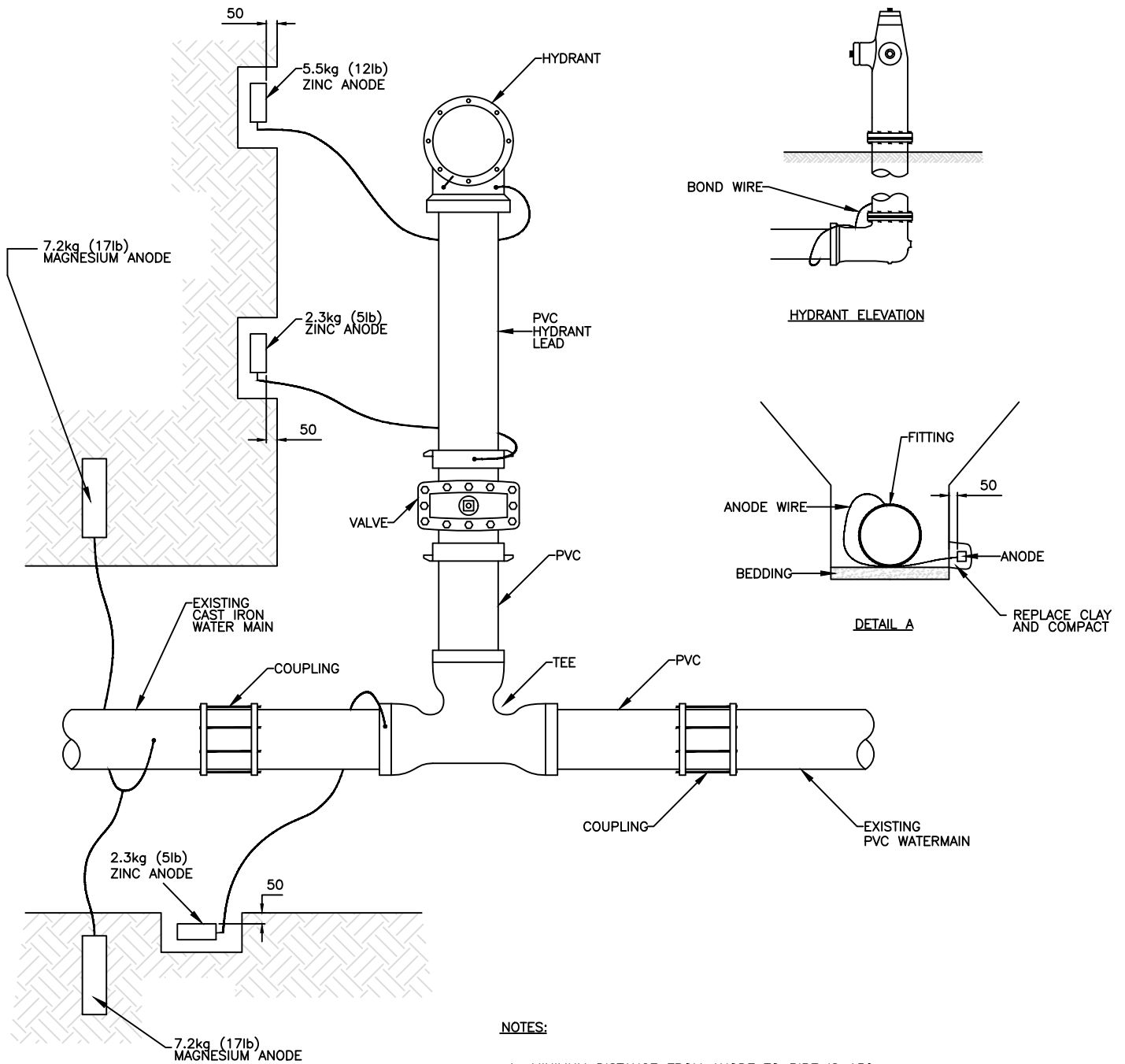
Scale: N.T.S.

Drawn: J. Edgington C.E.T.

Drawing Number:


**43007**

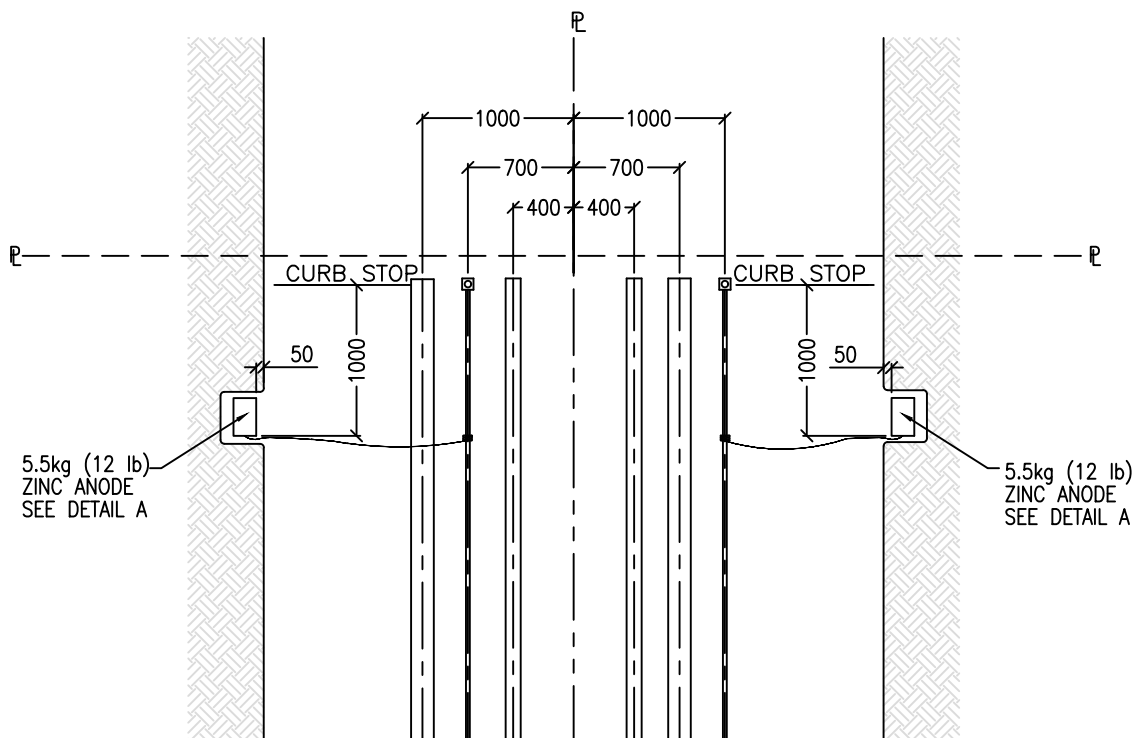
Utilities Department



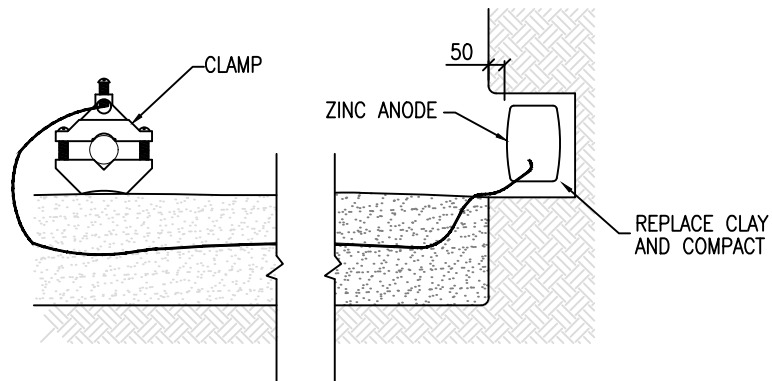
**NOTES:**

1. MINIMUM DISTANCE FROM ANODE TO PIPE IS 150mm.
2. INSTALL ANODE AT APPROX. PIPE DEPTH IN NATIVE SOIL.
3. ALL ZINC ANODES ON FITTINGS AND VALVES ARE 2.3kg (5lb).
4. ALL ZINC ANODES ON HYDRANTS ARE 5.5kg (12lb).
5. ZINC ANODES TO BE EMBEDDED INTO TRENCH WALL TO PROVIDE FOR A MINIMUM OF 50mm OF COMPACTED CLAY COMPLETELY SURROUNDING THE ANODE.
6. ANODES TO BE AT LEAST 300mm CLEAR OF THRUST BLOCKS.
7. ALL DIMENSIONS IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2015
Date	Details	Drawn				
			Anode Locations and Installation			
			Approved: R.F. Horton, P.Eng.			Drawing Number:
11/02/09	REVISED DRAWING NUMBERS	J. Eggen	Checked: D.J. Murdoch, P.Eng.			43008 <small>Utilities Department</small>
03/02/07	NOTES	R. Dekker	Date: 98/02/13	Scale: N.T.S.	Drawn: J. Edgington C.E.T.	




PLAN VIEW  
SCALE: 1:50

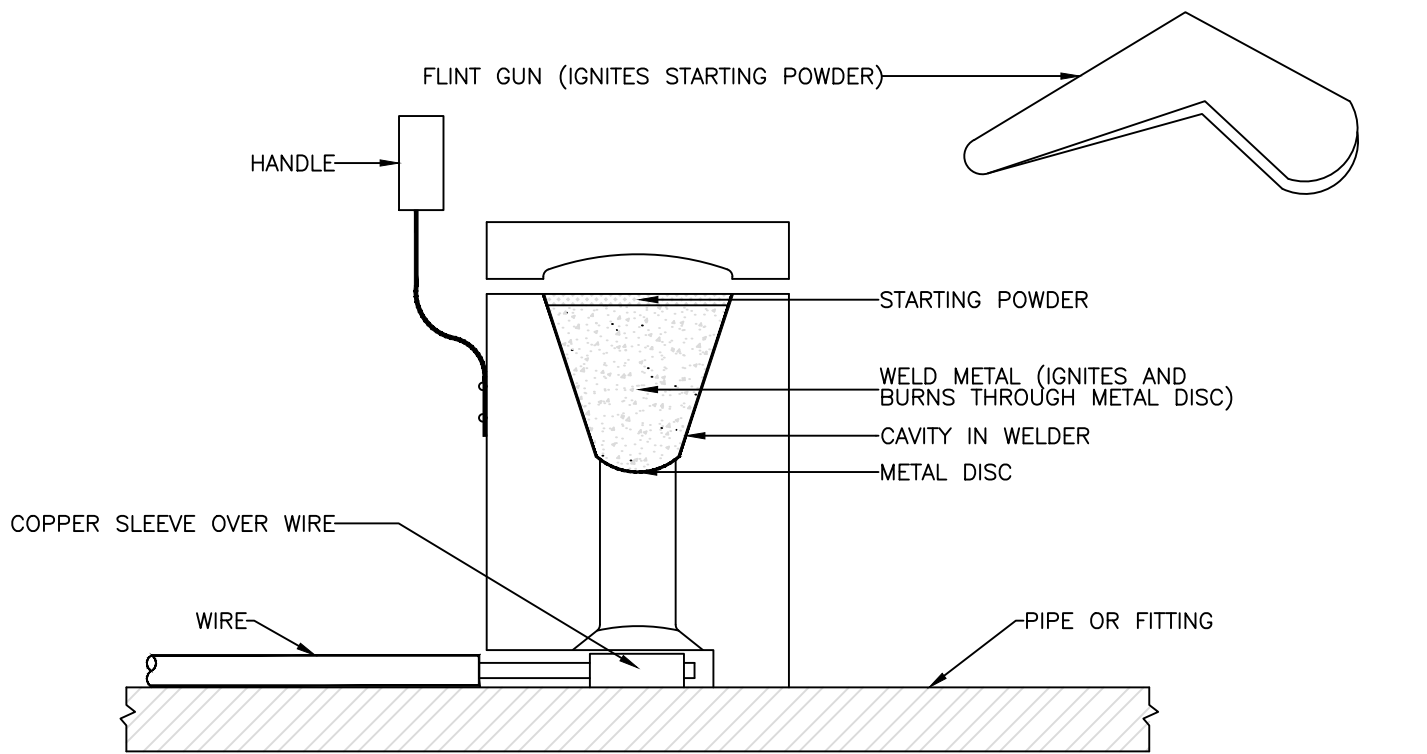


DETAIL A

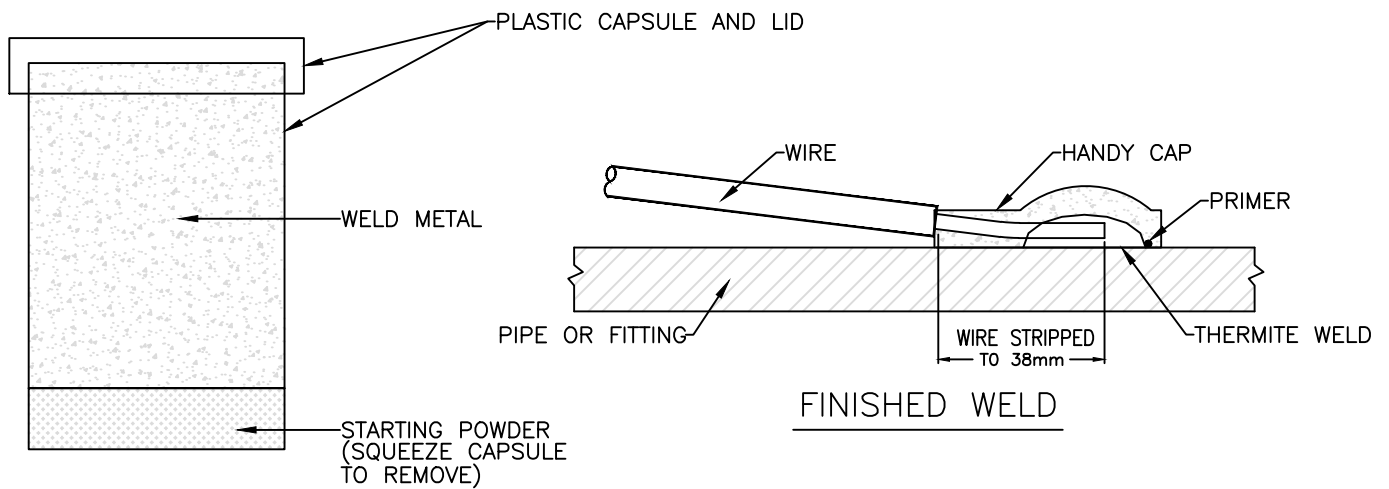
**NOTES:**

1. PIPE CLAMP TO BE ALL BRASS OR APPROVED EQUIVALENT.
2. ZINC ANODES TO BE EMBEDDED INTO TRENCH WALL TO PROVIDE FOR A MINIMUM OF 50mm COMPACTED SOIL COMPLETELY AROUND ANODES.
3. ALL DIMENSIONS IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2015
Date	Details	Drawn				
			Anode on 50mm and Smaller Copper Water Service			
11/02/08	REVISED DRAWING NUMBERS	J. Eggen	Approved: R.F. Horton, P.Eng.			Drawing Number:  43009  Utilities Department
03/03/06	STORM & SANITARY ALIGNMENT, NOTES	R. Dekker	Checked: D.J. Murdoch, P.Eng.			
03/02/07	STORM & SANITARY ALIGNMENT, NOTES	R. Dekker	Date: 98/02/13	Scale: N.T.S	Drawn: E. Herman, T.T.	




CADWELD

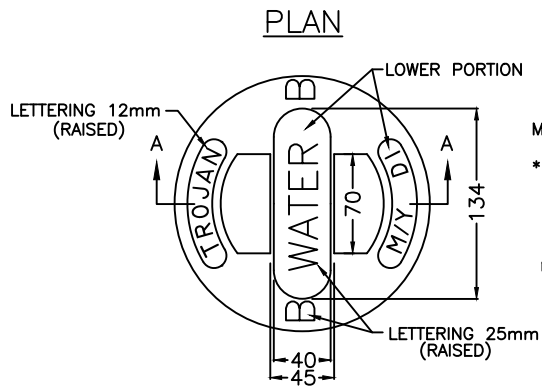


WELD METAL CAPSULE

FINISHED WELD

\* CADWELD TO BE PERFORMED AS PER MANUFACTURERS SPECIFICATIONS.

REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2015
Date	Details	Drawn				
			Detail - Anode Installation Cadweld			
			Approved: R.F. Horton, P.Eng.			Drawing Number:
11/02/09	REVISED DRAWING NUMBERS	J. Eggen	Checked: D.J. Murdoch, P.Eng.			43010 <small>Utilities Department</small>
03/02/07	NOTES	R. Dekker	Date: 98/02/13	Scale: N.T.S.	Drawn: J. Edgington C.E.T.	

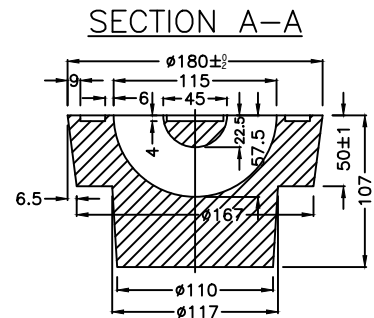


MATERIAL SPECIFICATION:

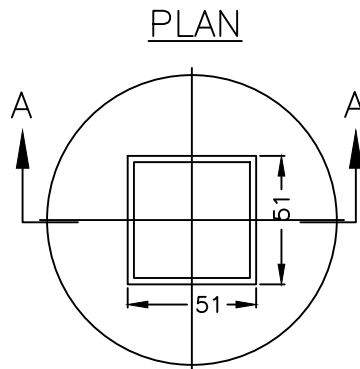
\* DUCTILE IRON A.S.T.M. A536  
GRADE 65-45-12.

MASS = 11.3kg (25.2lb)  $\pm 3\%$ .

MEASUREMENTS IN MILLIMETRES (mm).



## VALVE BOX LID

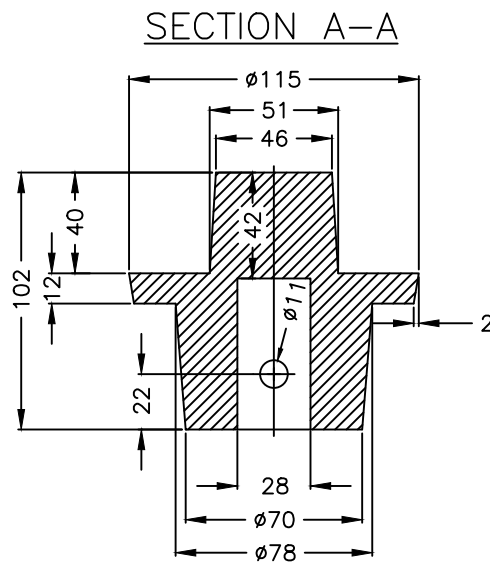


MATERIAL SPECIFICATION:

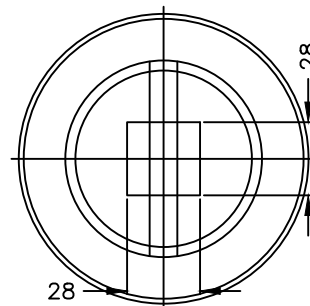
\* GREY CAST IRON TO CONFORM  
TO CLASS 20 A.S.T.M. A48.

\* MASS = 3.3kg (7.25lb)  $\pm 3\%$ .

MEASUREMENTS IN MILLIMETRES (mm).



## BOTTOM VIEW



## TOP NUT

### REVISIONS

Date	Details	Drawn
11/02/09	Notes	J. Eggen



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### Type B Valve Box Lid With Top Nut

Approved: M. Hanley, M.Eng., P.Eng.

Checked: S. Olson, P.Eng.

Date: 08/04/24

Scale: N.T.S.

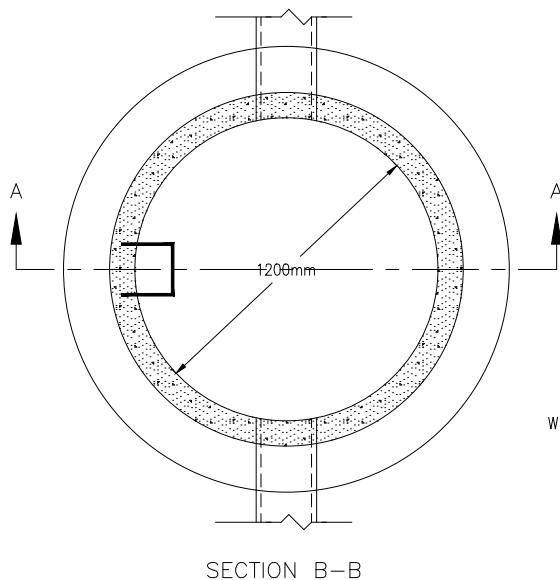
Drawn: W. Tang

Drawing Number:

43011

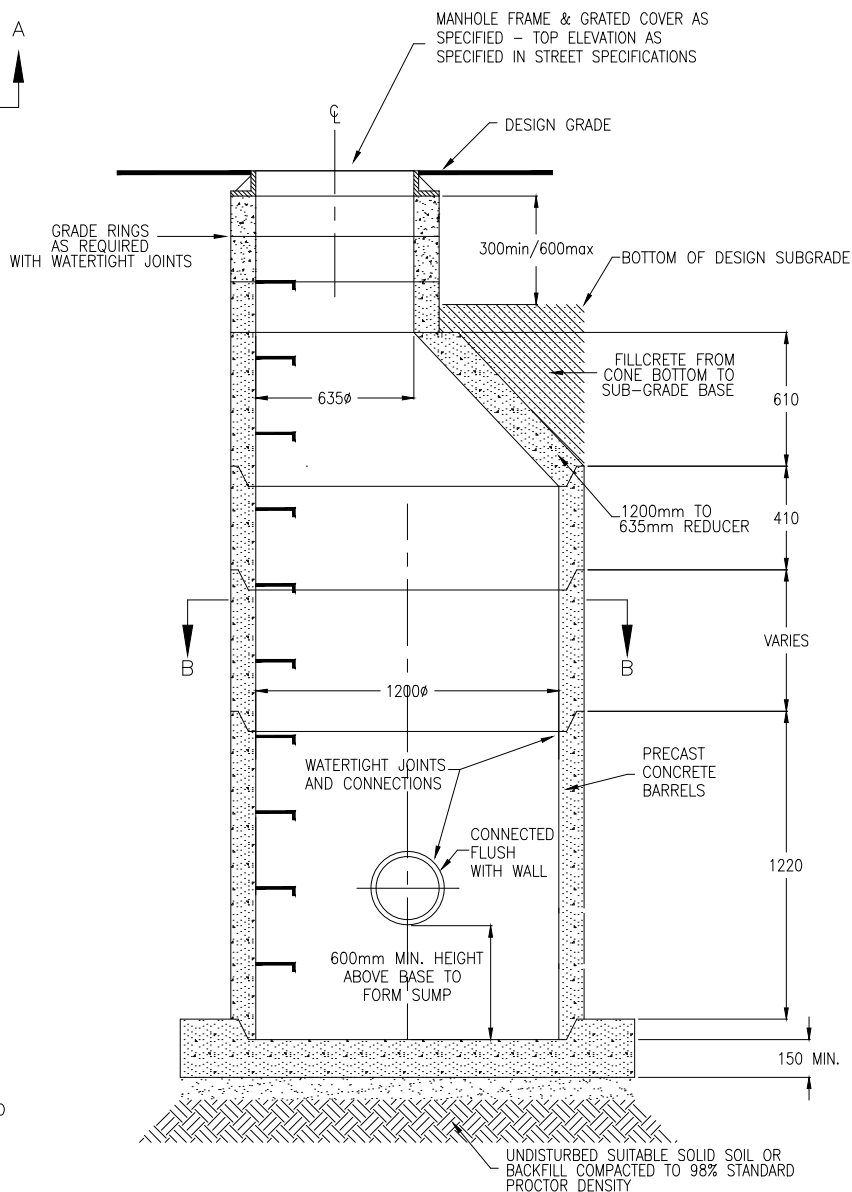
Utilities Department

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.



# NOTES:

1. SAFETY STEPS TO BE SPACED AT 400 MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE 300 MAX. ABOVE BENCHING.
2. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS.
3. CAST IN PLACE CONCRETE TO BE 25 MPa AT 28 DAYS.
4. ALL JOINTS TO BE SET WITH RUBBER GASKET AND FINISHED WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE.
5. CHANNELLING AND BENCHING TO BE FINISHED TO TROWEL SMOOTHNESS.
6. COMPACT BACKFILL AROUND MANHOLES TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
7. FLAT TOP SECTION TO BE USED FOR SHALLOW BURY MANHOLES OF UP TO 1.80m.
8. FOR MANHOLES EXCEEDING 7.0M IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.
9. PRE-BENCHED MANHOLE BASES MUST BE USED WHEREVER POSSIBLE WITH PRECORED CONNECTION HOLES AND WATER TIGHT DURASEAL OR G-LOC JOINTS OR APPROVED EQUIVALENT.
10. PRECAST CONCRETE BASES ARE RECOMMENDED. THICKNESS AND REINFORCEMENT MUST BE DESIGNED FOR THE SPECIFIC MANHOLE DEPTH AND SOIL CONDITIONS.
11. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND BETWEEN RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED WITH NON-SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN BE ACHIEVED.
12. WICK DRAINS TO CONNECT TO CATCH BASIN MANHOLE. CONSTRUCT TO MANUFACTURES SPECIFICATION ENSURING WATERTIGHT JOINTS.
13. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.



SECTION A-A

## REVISIONS

Date	Details	Drawn
YY/MM/DD	X	X
YY/MM/DD	X	X
11/02/09	REVISED DRAWING NUMBERS	J. Eggen
03/03/06	NOTES	R. Dekker
98/02/02	1998 UPDATES	T. Wyman

**Strathcona**  
County

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## Standard 1200mm Catch Basin Manhole for Pipes to 600mm Diameter

Approved: R.F. Horton, P.Eng.

Drawing Number:

Checked: D.J. Murdoch, P.Eng.

**44001**

Date: 96/01/10

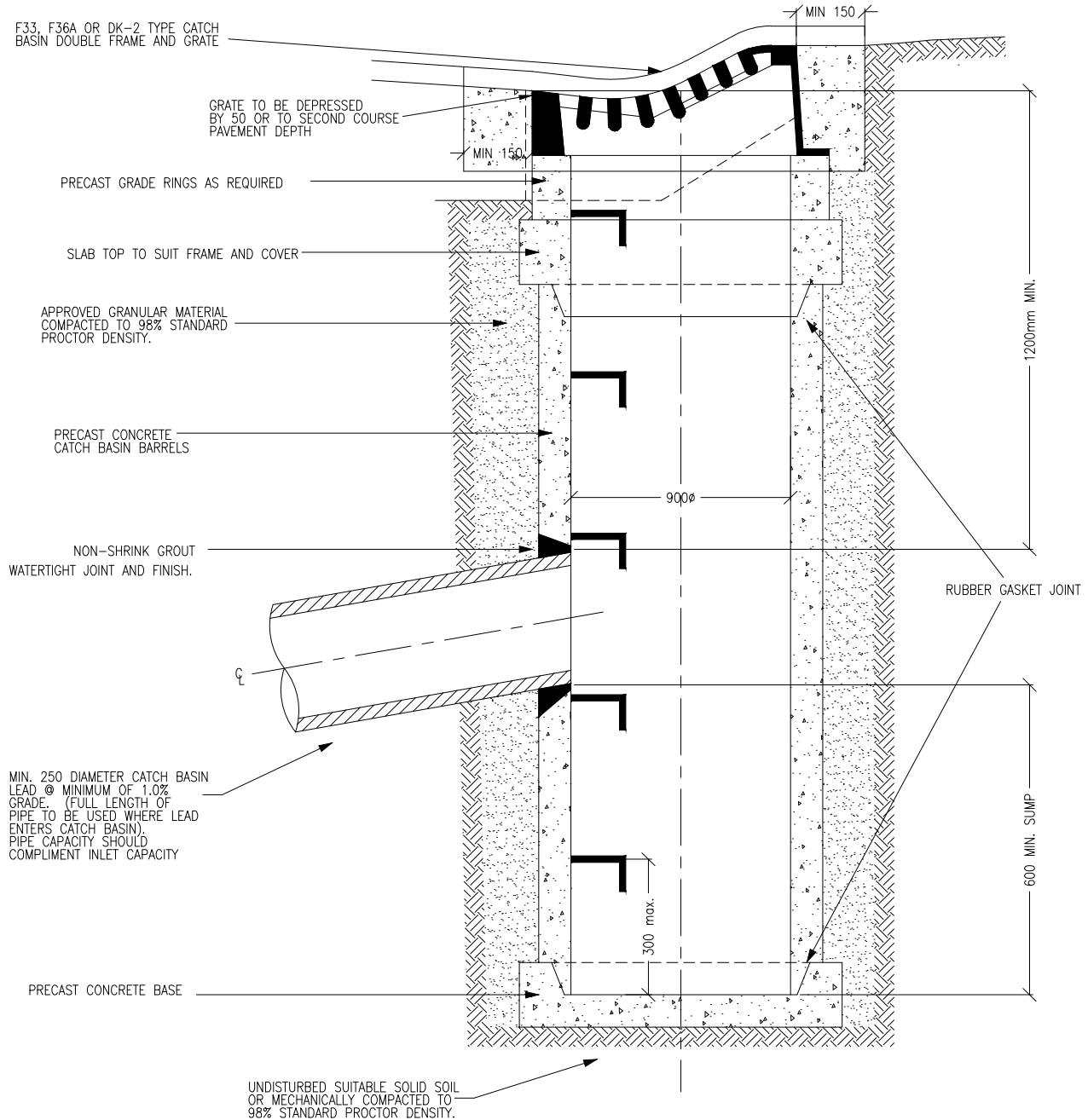
Scale: N.T.S.

Drawn: Alvin Ma, C.E.T.

Utilities Department

NOTES:

1. SAFETY STEPS TO BE SPACED AT 400 MAX. DISTANCE. FIRST STEP TO BE 150 MAX. BELOW FRAME, LAST STEP TO BE 300 MAX. ABOVE BENCHING.
2. PRECAST CONCRETE COMPONENTS TO MEET CURRENT A.S.T.M. C478 STANDARDS
3. CAST IN PLACE CONCRETE TO BE 25 MPa AT 28 DAYS.
4. ALL JOINTS TO BE SET WITH RUBBER GASKET WITH NON-SHRINK GROUT INSIDE AND OUTSIDE FOR FULL CIRCUMFERENCE. THIS INCLUDES JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND FRAMES, AND BETWEEN GRADE RINGS AND SLAB TOPS.
5. PRECAST CONCRETE BASE THICKNESS AND REINFORCEMENT MUST BE DESIGNED FOR THE SPECIFIC CATCHBASIN DEPTH AND SOIL CONDITIONS.
6. JOINTS BETWEEN GRADE RINGS, GRADE RINGS AND CONES, AND BETWEEN RINGS AND FRAMES MUST BE WATERTIGHT. RAM NECK MATERIAL FINISHED WITH NON-SHRINK GROUT MAY BE USED IF WATERTIGHT JOINTS CAN BE ACHIEVED.
7. WICK DRAINS TO CONNECT TO CATCH BASIN. SUCH AS TO ENSURE WATERTIGHT JOINTS.
8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.



REVISIONS

Date	Details	Drawn
YY/MM/DD	X	X
YY/MM/DD	X	X
11/02/09	REVISED DRAWING NUMBERS	J. Eggen
03/03/06	NOTES	R. Dekker
98/02/02	1998 UPDATES	T. Wyman

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Typical 900mm Catch Basin

Approved: R.F. Horton, P.Eng.

Checked: D.J. Murdoch, P.Eng.

Date: 96/01/11

Scale: N.T.S.

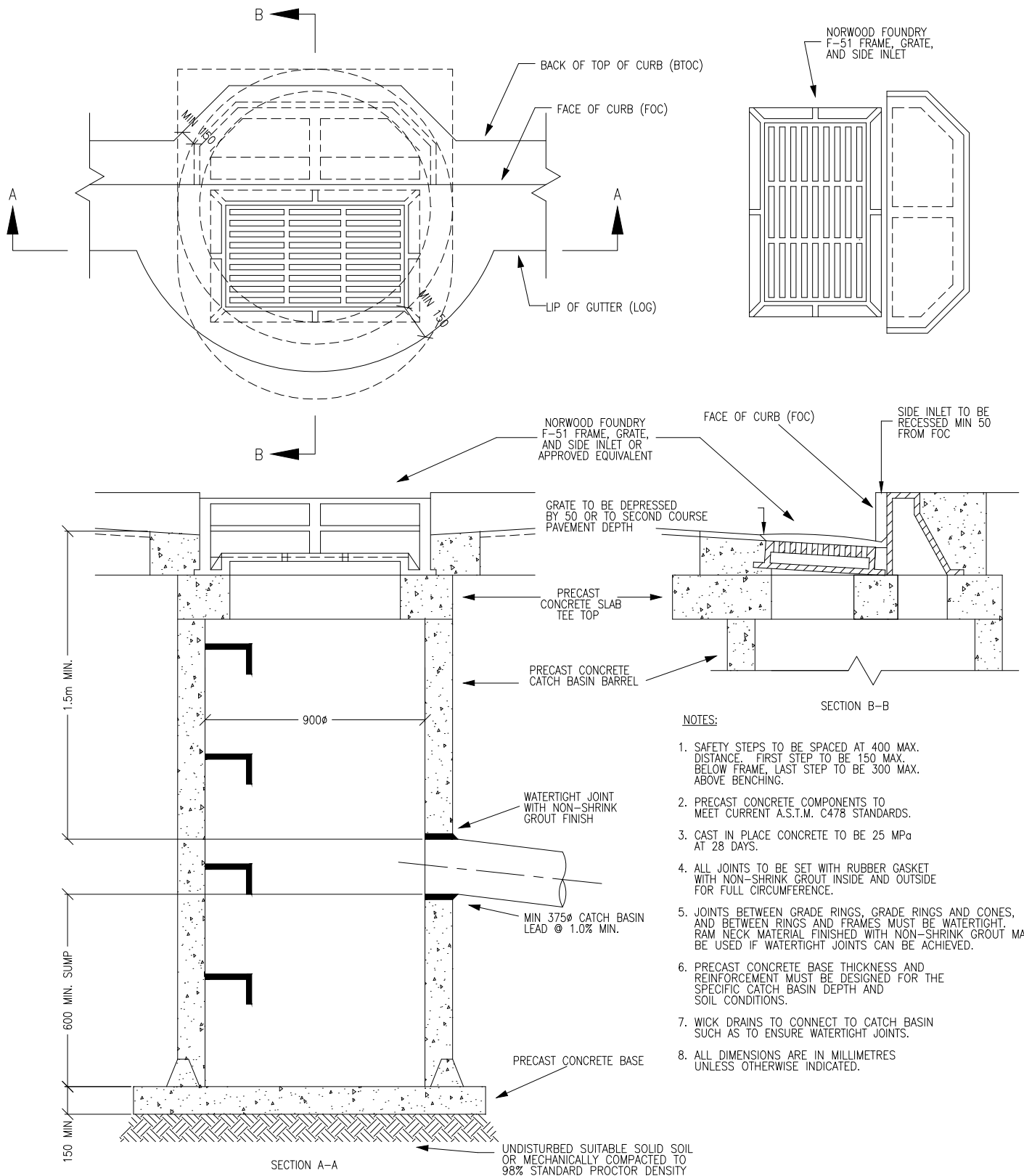
Drawn: Alvin Ma, C.E.T.

Drawing Number:

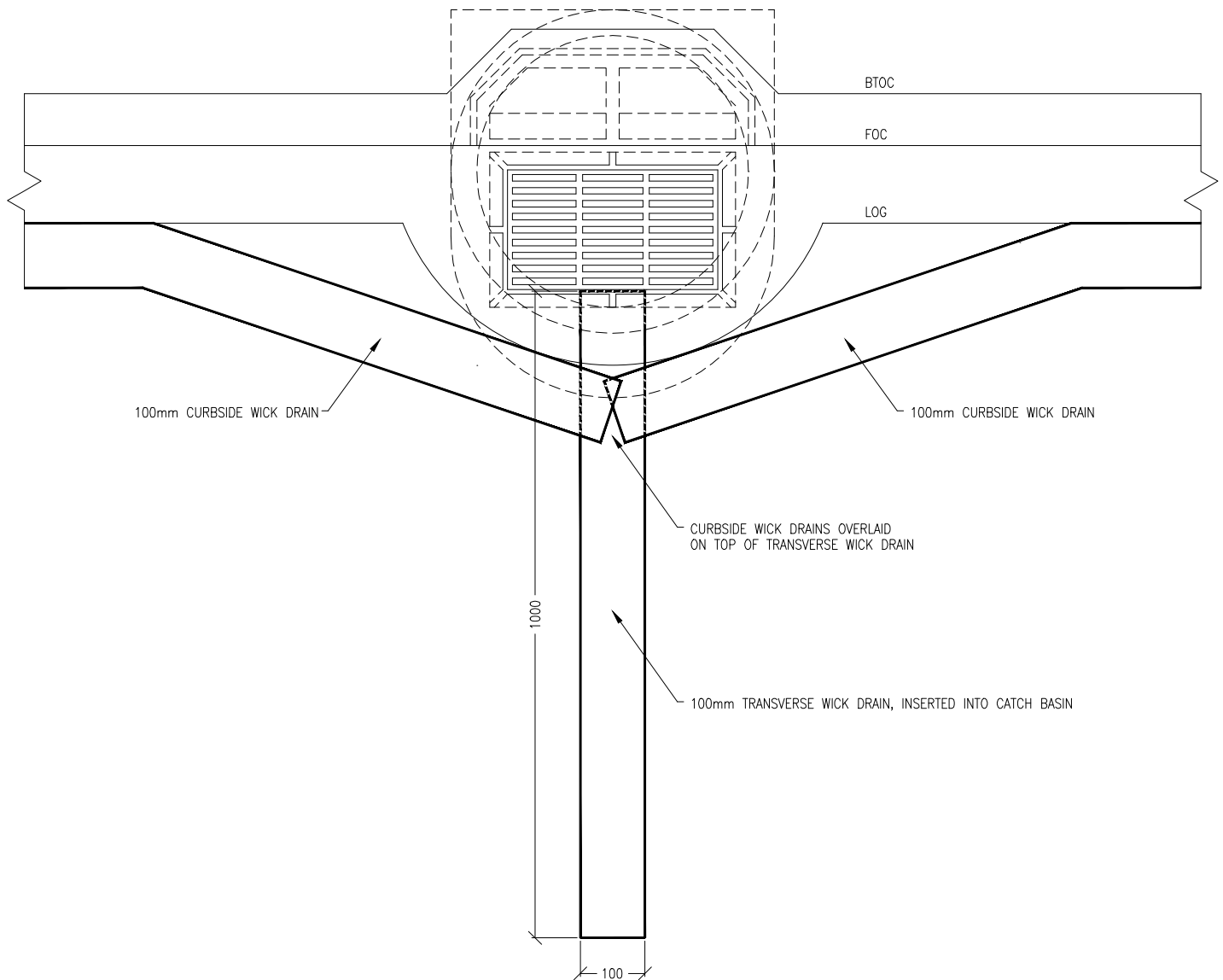
**44002**

Utilities Department



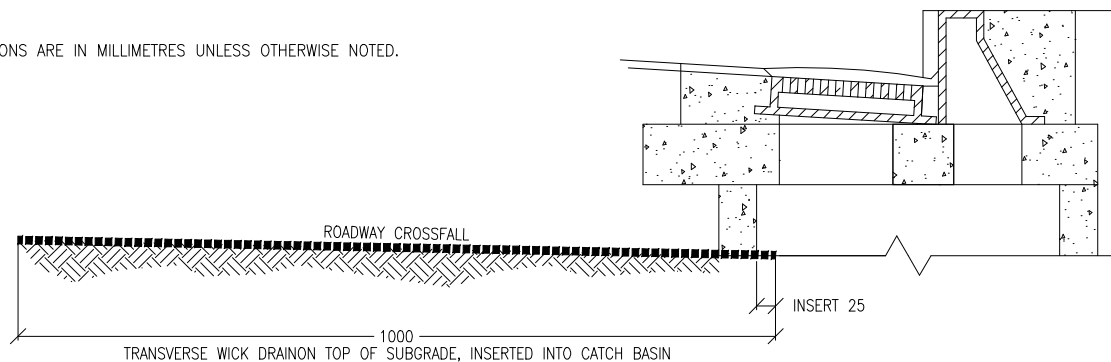


REVISIONS			Strathcona County	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		© 2011
Date	Details	Drawn				
YY/MM/DD	X	X	900mm Catch Basin with F51 Frame & Cover and Side Inlet			
11/02/09	REVISED DRAWING NUMBERS	J. Eggen				
03/02/07	NOTES	R. Dekker				
98/06/12	DIMENSIONS	R. Dekker				
98/02/02	1998 UPDATES	T. Wyman				
			Approved: R.F. Horton, P.Eng.			Drawing Number:
			Checked: D.J. Murdoch, P.Eng.			44003 <small>Utilities Department</small>
			Date: 96/01/12	Scale: N.T.S.	Drawn: Alvin Ma, C.E.T.	

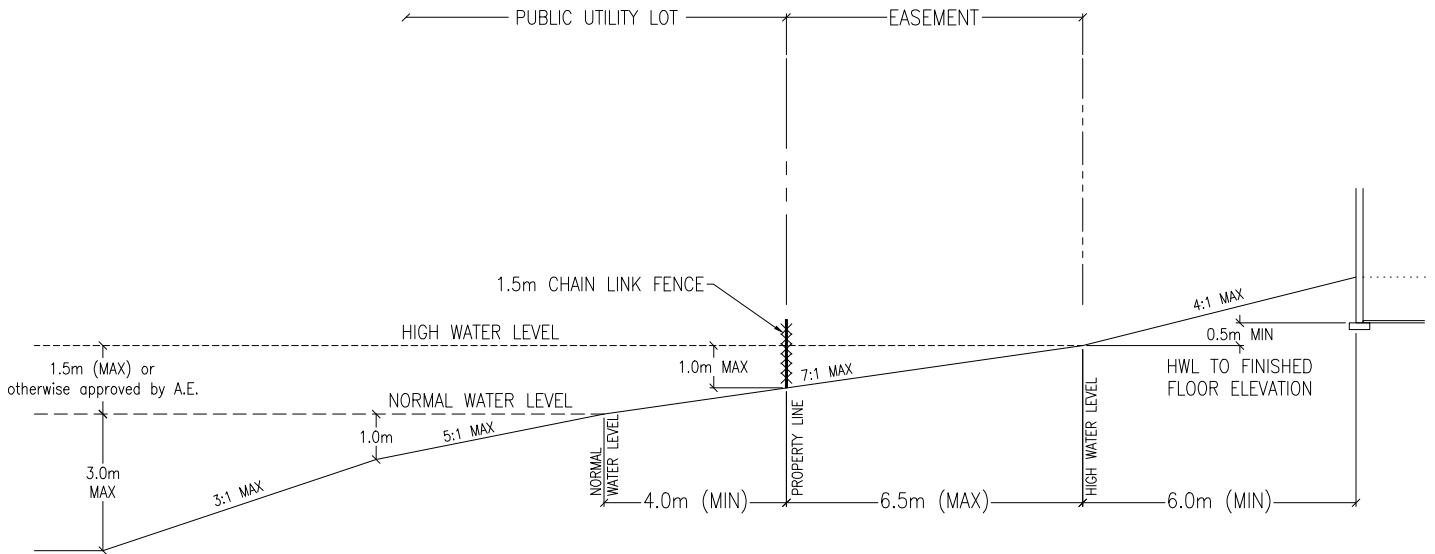


**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.



REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Drawn			
YY/MM/DD	X	X	Wick Drain Connection to Catch Basin		
YY/MM/DD	X	X			
11/02/09	REVISED DRAWING NUMBERS	J. Eggen	Approved: R.F. Horton, P.Eng.		Drawing Number:
03/02/07	NOTES	R. Dekker	Checked: C.E. Batty, P.Eng.		44004 <small>Utilities Department</small>
98/05/28	CROSS SECTION	R. Dekker	Date: 98/03/17	Scale: N.T.S. Drawn: Richard Dekker, C.E.T.	

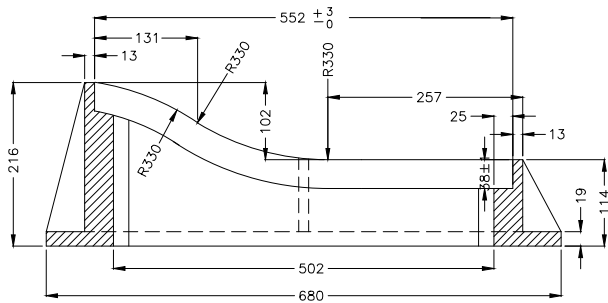
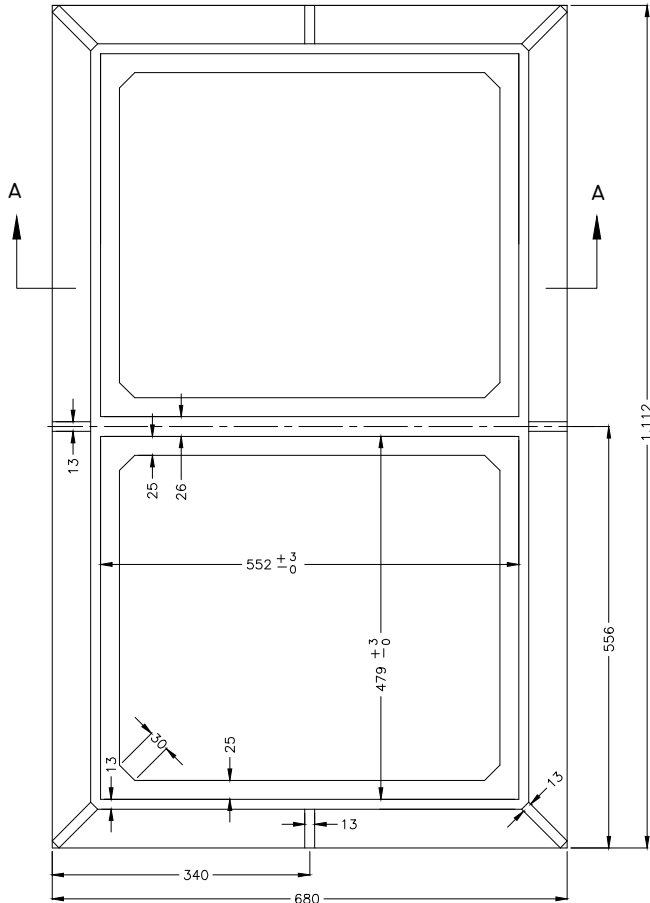


REVISIONS			<div><div>Strathcona County</div><div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div><div>© 2011</div></div>		
Date	Details	Drawn			
YY/MM/DD	X	X	Cross-Section for a Wet Pond		
YY/MM/DD	X	X			
11/02/09	REVISED DRAWING NUMBERS	J. Eggen	Approved: R.F. Horton, P.Eng.		Drawing Number:
03/06/23	DIMENSIONS	R. Dekker	Checked: D.J. Murdoch, P.Eng.		44005 <small>Utilities Department</small>
03/04/10	DIMENSIONS & NOTES	R. Dekker	Date: 03/03/12	Scale: 1:150	

# T-K2 FRAME

MASS: 184.14KG (409.20LBS)

## PLAN



SECTION A-A

### MATERIAL SPECIFICATIONS:

- \* FRAME
  - GREY CAST IRON TO CONFORM TO CLASS 20 A.S.T.M. A48 (LATEST EDITION)
- \* GRATE
  - DUCTILE IRON TO CONFORM TO A.S.T.M. A536 (LATEST EDITION) GRADE 65-45-12.

### MEASUREMENTS IN MILLIMETERS

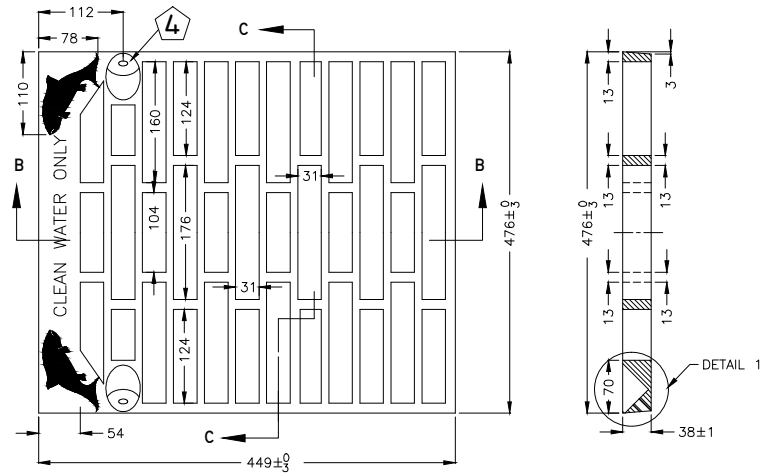
TABLE 1  
MANUFACTURING TOLERANCE

ALL DIMENSIONS SHALL CONFORM TO  $\pm 2\text{mm}$  TOLERANCE EXCEPT:  
(1) AS NOTED.  
(2) NO DEVIATION SHALL BE ACCEPTABLE FOR DIMENSIONS WHICH ARE LESS THAN 10mm

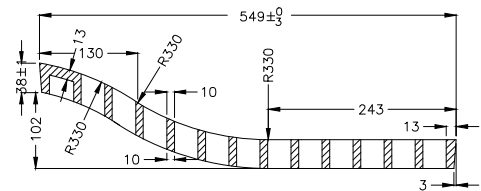
# T-K2 LOCKING GRATE

MASS: 22.77KG (50.60LBS)

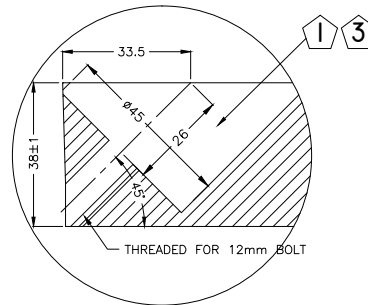
## PLAN



SECTION C-C

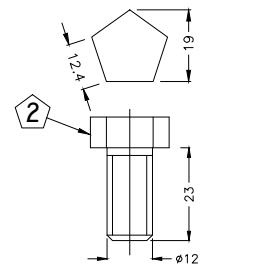


SECTION B-B



BOLT POCKET DETAIL I

SCALE 1:1



STAINLESS STEEL 12MM BOLT WITH COARSE THREAD

SCALE 1:1

## REVISIONS

Date	Details	Drawn
YY/MM/DD	X	X
YY/MM/DD	X	X
YY/MM/DD	X	X
YY/MM/DD	X	X
11/02/09	NOTES	J. Eggen

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## T-K2 Catch Basin Frame and Locking Grate

Approved: M. Hanley, M.Eng., P.Eng.

Checked: S. Olson, P.Eng.

Date: 08/04/24

Scale: N.T.S.

Drawn: W. Tang

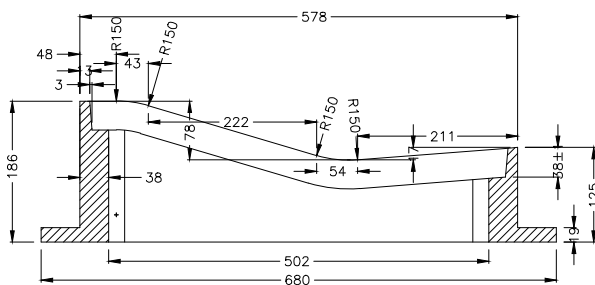
Drawing Number:

**44006**

Utilities Department

MASS: 184.14KG (409.20LBS)

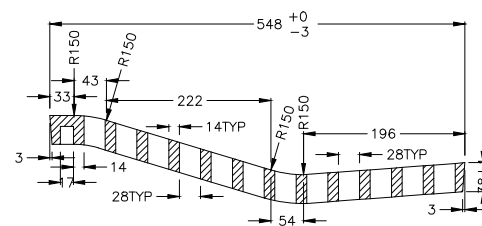
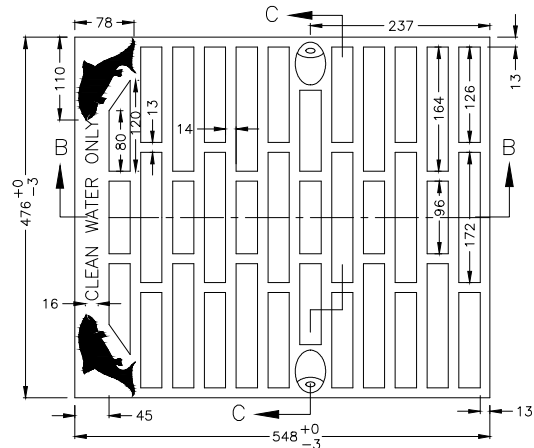
Technical drawing of a rectangular frame with dimensions and tolerances. The overall width is 680 and the overall height is 1,010. The inner frame has a width of 502 and a height of 429. The outer frame has a width of 552<sup>+3</sup><sub>0</sub> and a height of 479<sup>+3</sup><sub>0</sub>. The frame is composed of two main sections: a top section with a height of 26 and a bottom section with a height of 13. The frame is shown with a dashed line indicating a fold or break. The drawing includes arrows and dimension lines to specify the measurements and tolerances.



MEASUREMENTS IN MILLIMETERS

ALL DIMENSIONS SHALL CONFORM TO  
±2MM TOLERANCE EXCEPT:  
(1) AS NOTED.  
(2) NO DEVIATION SHALL BE ACCEPTABLE FOR DIMENSIONS  
WHICH ARE LESS THEN 10MM

MASS: 22.77KG (50.60LBS)



Technical drawing of a circular base plate. The overall diameter is  $38 \pm 1$ . A central hole has a diameter of  $\phi 40$ . The distance from the center of the hole to the top edge is 33.5. The distance from the center of the hole to the bottom edge is 4. The distance from the center of the hole to the left edge is 6. The hole is threaded for a 12mm bolt.

PENTA BOLT HEAD  
INSCRIBED IN Ø25MM CIRCLE

27

12

STAINLESS STEEL 12MM BOLT  
WITH COARSE THREAD  
SCALE 1:1

Date	Details	Drawn
rr/MM/DD	X	X
rr/MM/DD	X	X
rr/MM/DD	X	X
rr/MM/DD	X	X
1/02/09	NOTES	J. Eggen

# Strathcona County

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Alberta, T8A 3W7, CANADA

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### T-K7 Double Frame and Locking Grate

Approved: M. Hanley, M.Eng., P.Eng.

Checked: S. Olson, P.Eng.

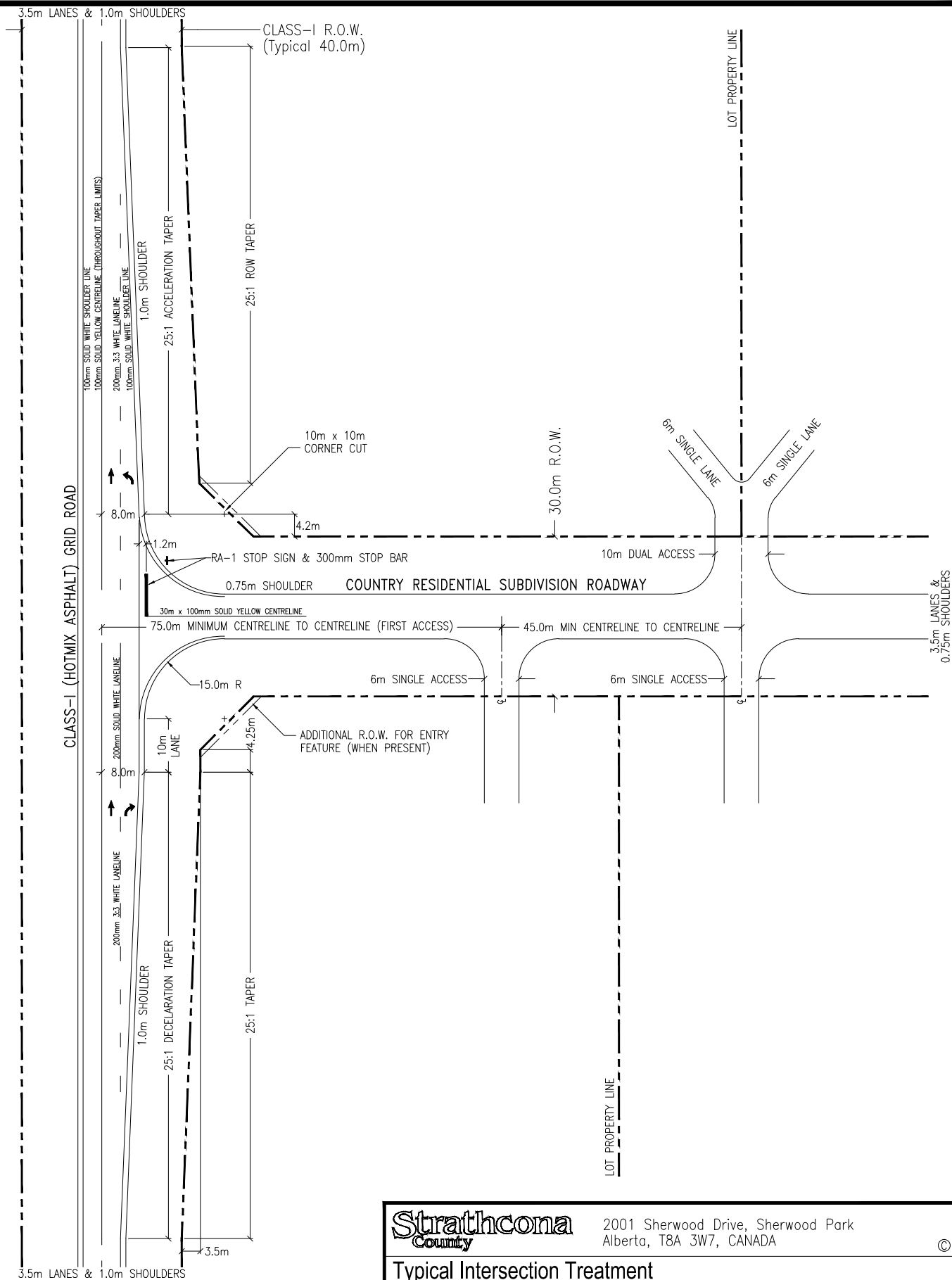
Date: 08/04/24	Scale: N.T.S.	Drawn: W. Tang
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Drawing Number:

44007

Utilities Department

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on the correct sides when the document is printed double-sided.



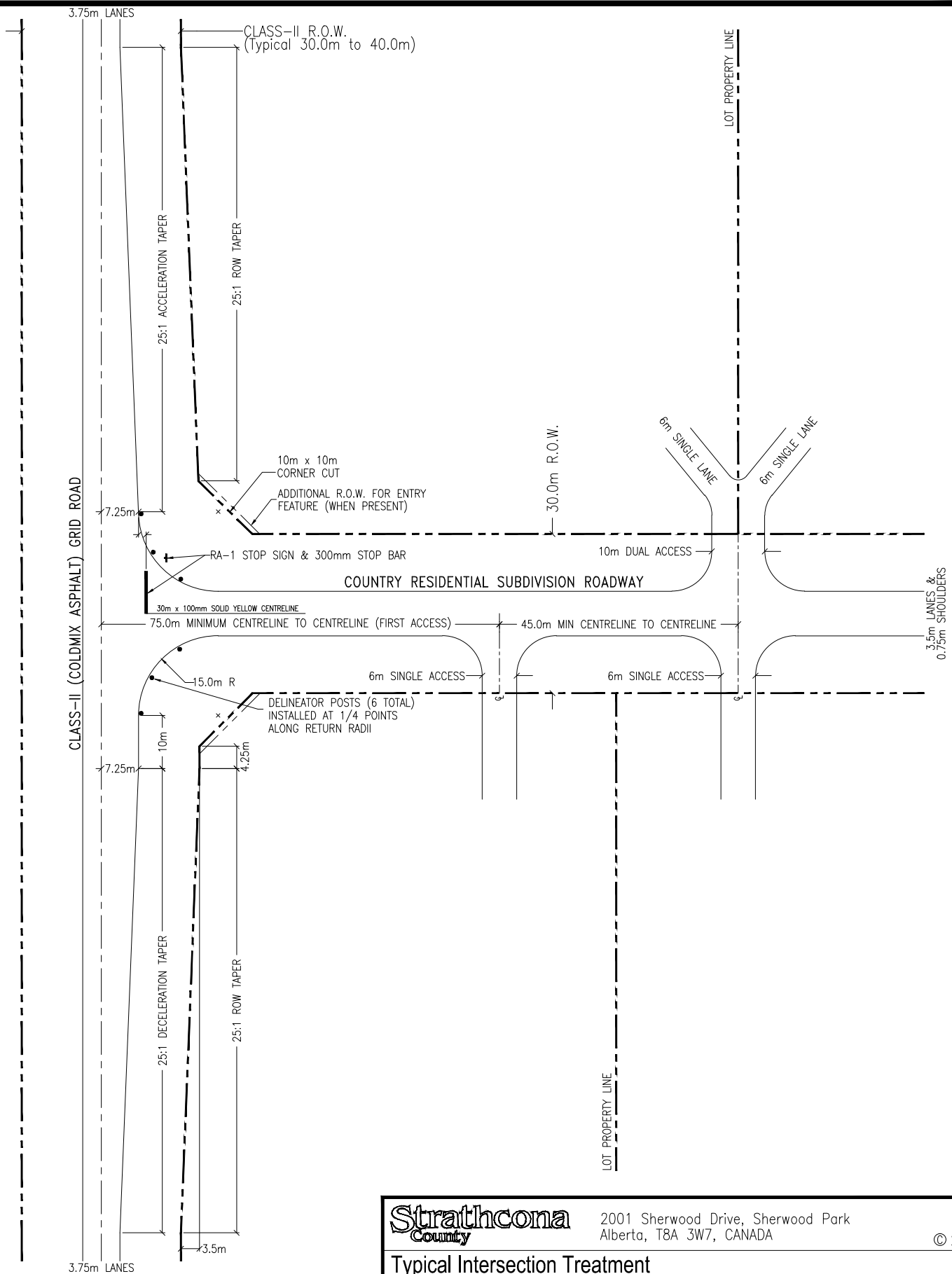
**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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### Typical Intersection Treatment Country Residential Subdivision Road to Class-I Grid Road

Date	Details	Drawn	Approved: M. MacGarva, M.Eng, P.Eng.			Drawing Number
11/05/02	REVISED DRAWING NUMBERS	J. ORR	Checked: D.L. Schilbe, P.L. (Eng)			51001
11/02/10	Revised Drawing Numbers	O. Butt	Date: 1999/07/05	Scale: 1:1,000	Drawn: Richard Dekker, R.E.T.	
Capital Planning & Construction Department						



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## Typical Intersection Treatment Country Residential Subdivision Road to Class-II Grid Road

Approved: M. MacGarva, M.Eng, P.Eng.

Drawing Number:

Checked: D.L. Schilbe, P.L. (Eng)

**51002**

Date: 1999/07/05

Scale: 1:1,000

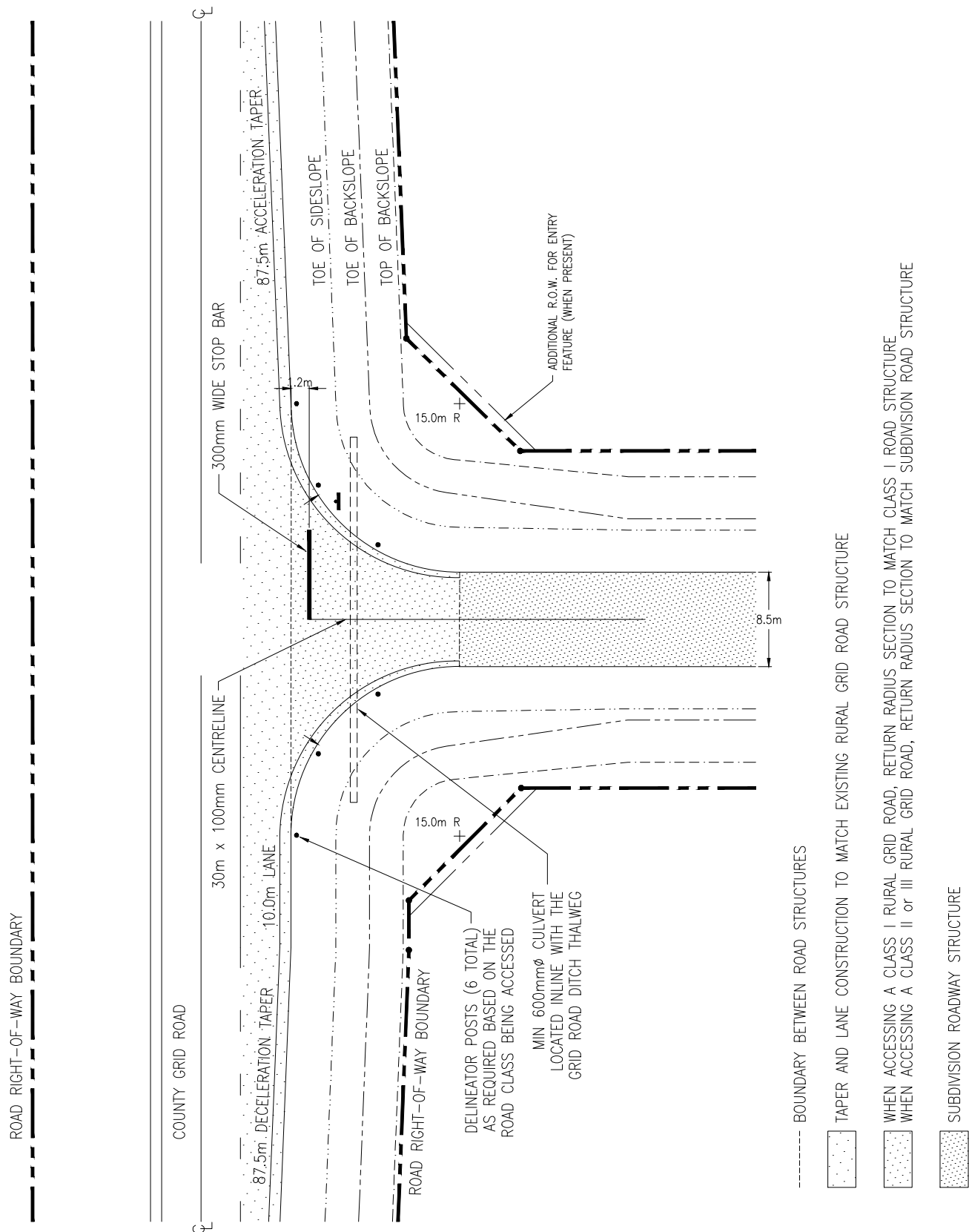
Drawn: Richard Dekker, R.E.T.

Capital Planning & Construction Department

### REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	Revised Drawing Numbers	O. Butt





# REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	R. Dekker

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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## Country Residential Subdivision Access Detail Structure, Line Painting, Culvert Location, and Ditch Layout

Approved: M. MacGarva, M.Eng, P.Eng.

Drawing Number:

Checked: D.L. Schilbe, P.L. (Eng)

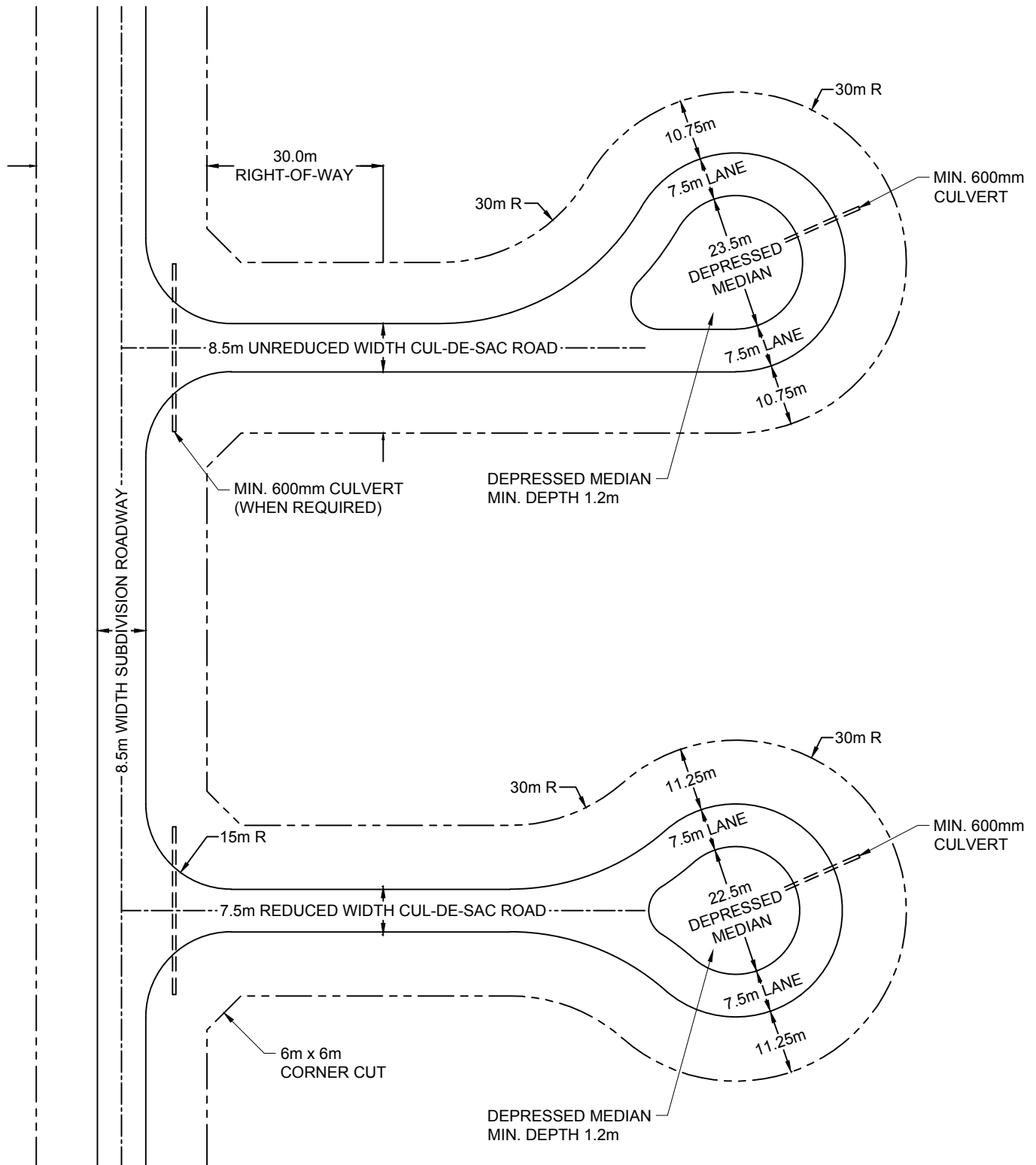
**51003**

Date: 1994/06/23

Scale: 1:50


Drawn: Richard Dekker, R.E.T.

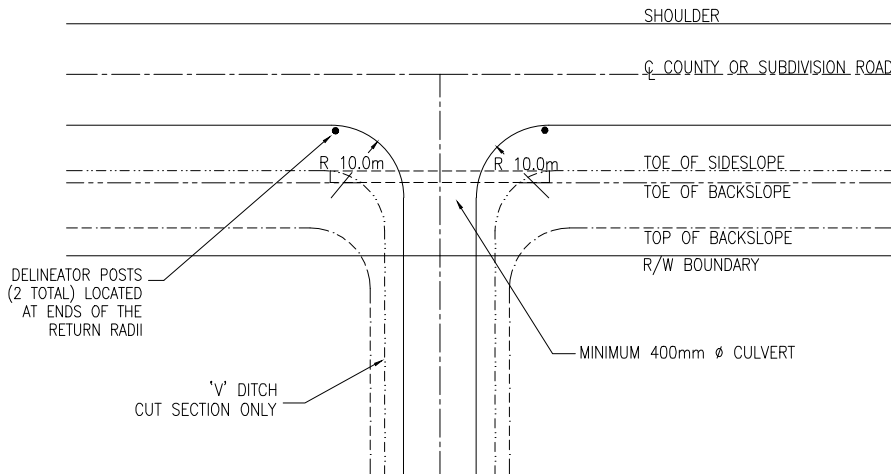
Capital Planning & Construction Department



# NOTES:

- REFER TO VOL. 1, SEC. 5.1, RURAL TRANSPORTATION, SUB-SECTION 5.1.13.3 (viii) FOR CRITERIA FOR ROADWAY WIDTH REDUCTION (BASED ON CUL-DE-SAC LENGTH, NUMBER OF LOTS, AND EMERGENCY ACCESS REQUIREMENTS).

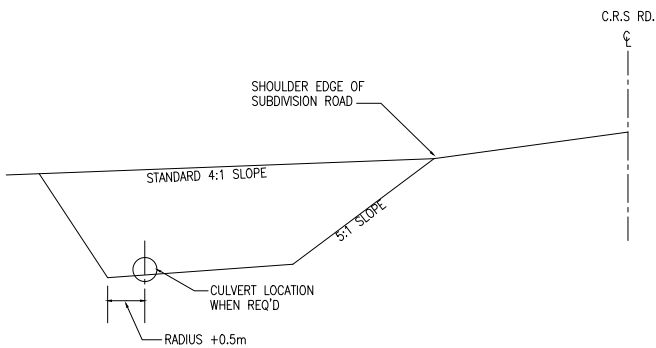
REVISIONS			 STRATHCONA COUNTY 2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA			© 2019
DATE	DETAILS	DRAWN				
			COUNTRY RESIDENTIAL SUBDIVISION CUL-DE-SAC ROADWAYS ROAD WIDTH AND BULB LAYOUT OPTIONS			
19/08/19	UPDATED NOTES WITH SUB-SECTION 5.1.13.3(viii)	P. TOMKO				
11/05/02	REVISED DRAWING NUMBERS	J. ORR	APPROVED: D.L. SCHILBE, P.L. (ENG.)			DRAWING NUMBER  <b>51004</b>
11/02/10	REVISED DRAWING NUMBERS	O. BUTT	CHECKED: S. JOHNSON, P.TECH. (ENG.)			
06/01/19	FINAL REVISIONS FOR APPROVAL	R. DEKKER	DATE: 01/16/95	SCALE: N.T.S.	DRAWN: R. DEKKER, R.E.T.	
						TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT



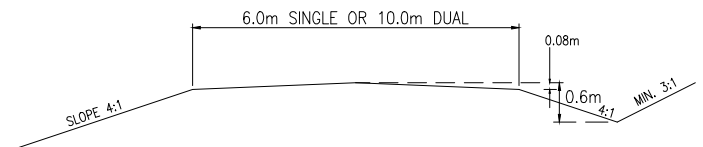
(FIG. 1)

MINIMUM LENGTH OF VERTICAL CURVE		
ALGEBRAIC DIFF. IN GRADIENT (%)	LENGTH (L) METRES	
	CREST	SAG
1	6 m	8 m
2	12 m	15 m
3	14 m	23 m
4	25 m	31 m
5	30 m	38 m
6	37 m	46 m
7		46 m
8		46 m
9		46 m

(FIG. 2)



(FIG. 3)  
DETAIL OF DITCH AND CULVERT LOCATION



(FIG. 4)  
MINIMUM PRIVATE APPROACH CROSS SECTION

NOTES:

1. EACH RESIDENTIAL LOT WILL ONLY BE GRANTED ONE ACCESS. PROVISION FOR A SECOND AGRICULTURAL ACCESS MAY BE GIVEN.
2. THE USE OF 10.0m WIDE DUAL-LOT vs. 6.0m WIDE SINGLE-LOT ACCESSSES IS ENCOURAGED.
3. IF RURAL WATER SERVICE IS UTILIZED, RETURN RADII MAY BE REDUCED FROM 10.0m TO 7.5m.
4. ACCESS TO A CLASS I GRID ROAD MUST BE PAVED FROM ROAD EDGE FOR A MINIMUM OF 6.0m.
5. ACCESS WITHIN A COUNTRY RESIDENTIAL SUBDIVISION MUST BE ASPHALT FROM ROAD EDGE TO PROPERTY LINE.
6. LOTS ACCESSING OFF A COUNTY GRID ROAD ARE TO HAVE THEIR ACCESS SPACED:
  - 90.0m CENTRELINE TO CENTRELINE FROM OR DIRECTLY OPPOSITE TO ANY OTHER ROADWAY OR ACCESS
7. LOTS WITHIN A COUNTRY RESIDENTIAL SUBDIVISION SHALL HAVE THEIR ACCESS LOCATED ON THE INTERNAL SUBDIVISION ROADWAY.
8. LOTS WITHIN A COUNTRY RESIDENTIAL SUBDIVISION SHALL HAVE THEIR ACCESS SPACED:
  - 75.0m CENTRELINE TO CENTRELINE FROM THE GRID ROAD
  - 60.0m CENTRELINE TO CENTRELINE FROM OR DIRECTLY OPPOSITE TO ANY INTERNAL ROADWAY
  - 45.0m CENTRELINE TO CENTRELINE FROM OR DIRECTLY OPPOSITE TO ANY OTHER LOT ACCESS
9. ACCESS FOR CORNER LOTS SHALL BE TO THE ROAD OF LESSER DESIGNATION AND/OR TRAFFIC VOLUME.
10. ALL RESIDENTIAL ACCESSSES REQUIRE TWO DELINEATOR POSTS, SEE DRAWING 51204.

REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	R. Dekker

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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Private Approaches

Approved: M. MacGarva, M.Eng, P.Eng.

Checked: D.L. Schilbe, P.L. (Eng)

Date: 1995/01/16

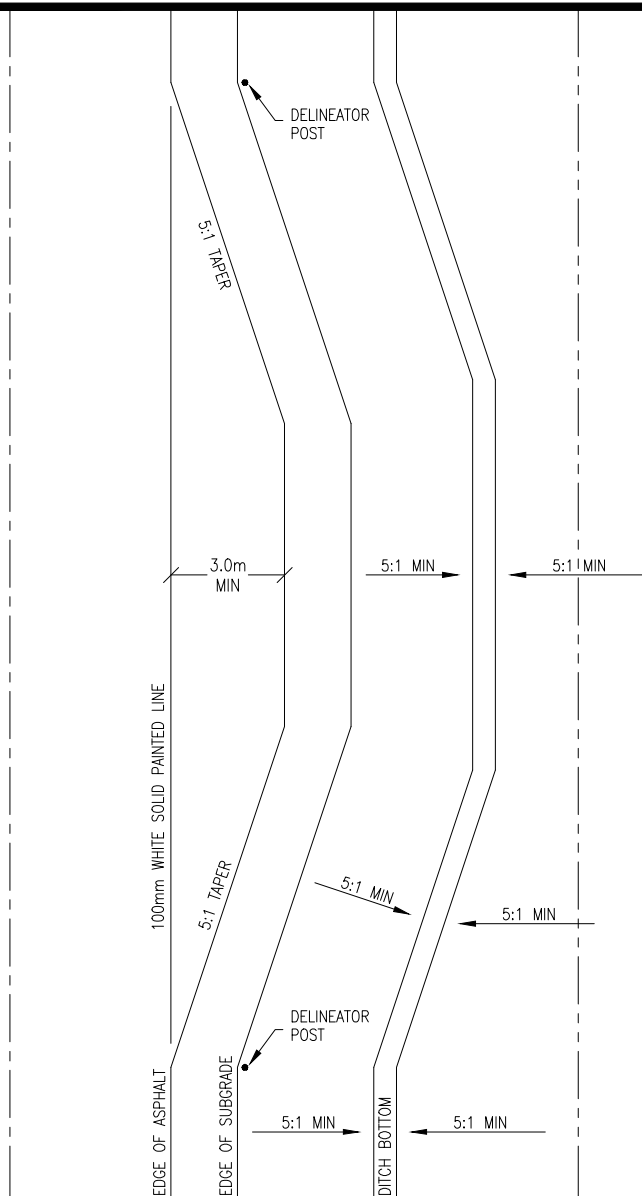
Scale: N.T.S.

Drawn: Richard Dekker, R.E.T.

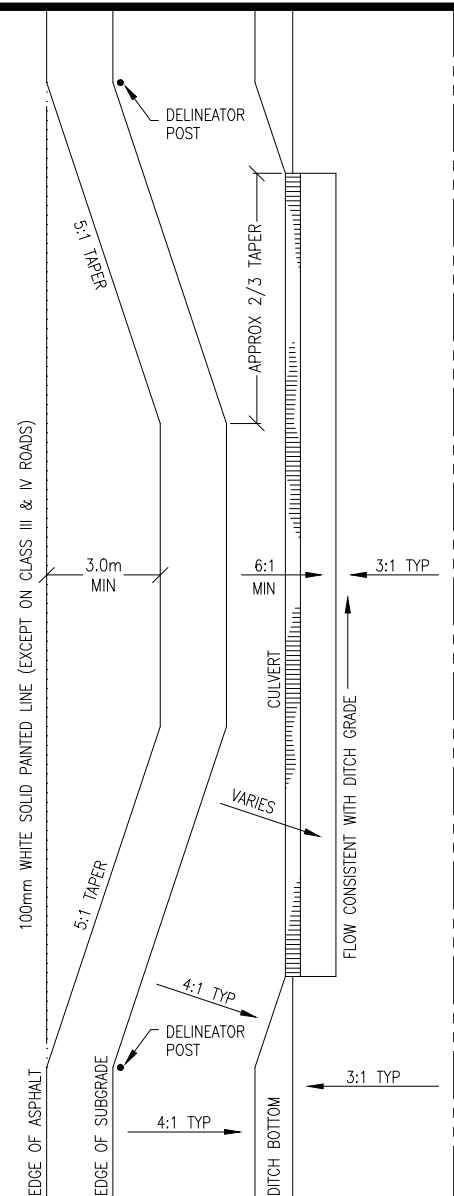
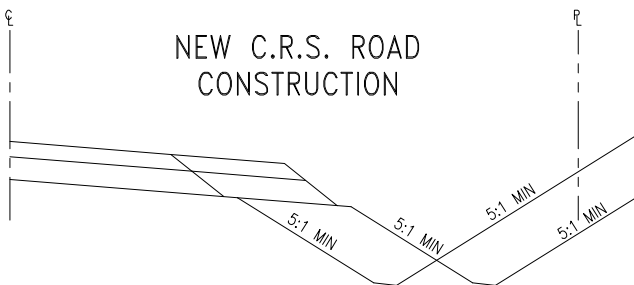
Drawing Number:

**51005**

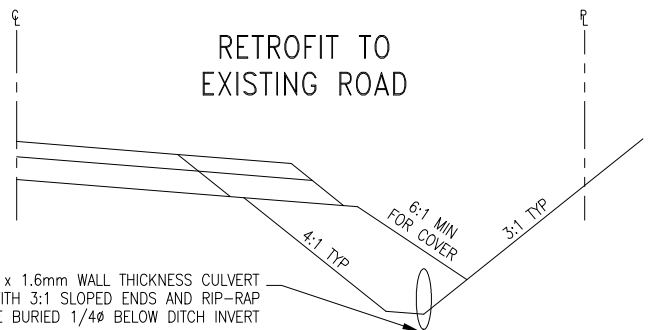
Capital Planning & Construction Department



NEW C.R.S. ROAD  
CONSTRUCTION



RETROFIT TO  
EXISTING ROAD



MIN 400mmØ x 1.6mm WALL THICKNESS CULVERT  
COMPLETE WITH 3:1 SLOPED ENDS AND RIP-RAP  
TO BE BURIED 1/4Ø BELOW DITCH INVERT

**NOTES:**

1. IN COUNTRY RESIDENTIAL SUBDIVISIONS, DEVELOPER IS TO GRADE DITCH AT 5:1, WHICH MAY REQUIRE INCREASED R.O.W. OR A DRAINAGE EASEMENT.
2. CANADA POST SUPERBOX LAYBYS IN COUNTRY RESIDENTIAL SUBDIVISIONS SHALL BE ON THE RIGHT WHEN ENTERING THE SUBDIVISION.
3. LENGTH OF LAYBY DETERMINED BY CANADA POST SUPERBOX REQUIREMENTS OR SIZE OF INFORMATION SIGN.
4. SOLID WHITE SHOULDER LINE REQUIRED TO DEMARCAT LAYBY, AS WELL AS DELINEATOR POSTS AT BOTH ENDS.

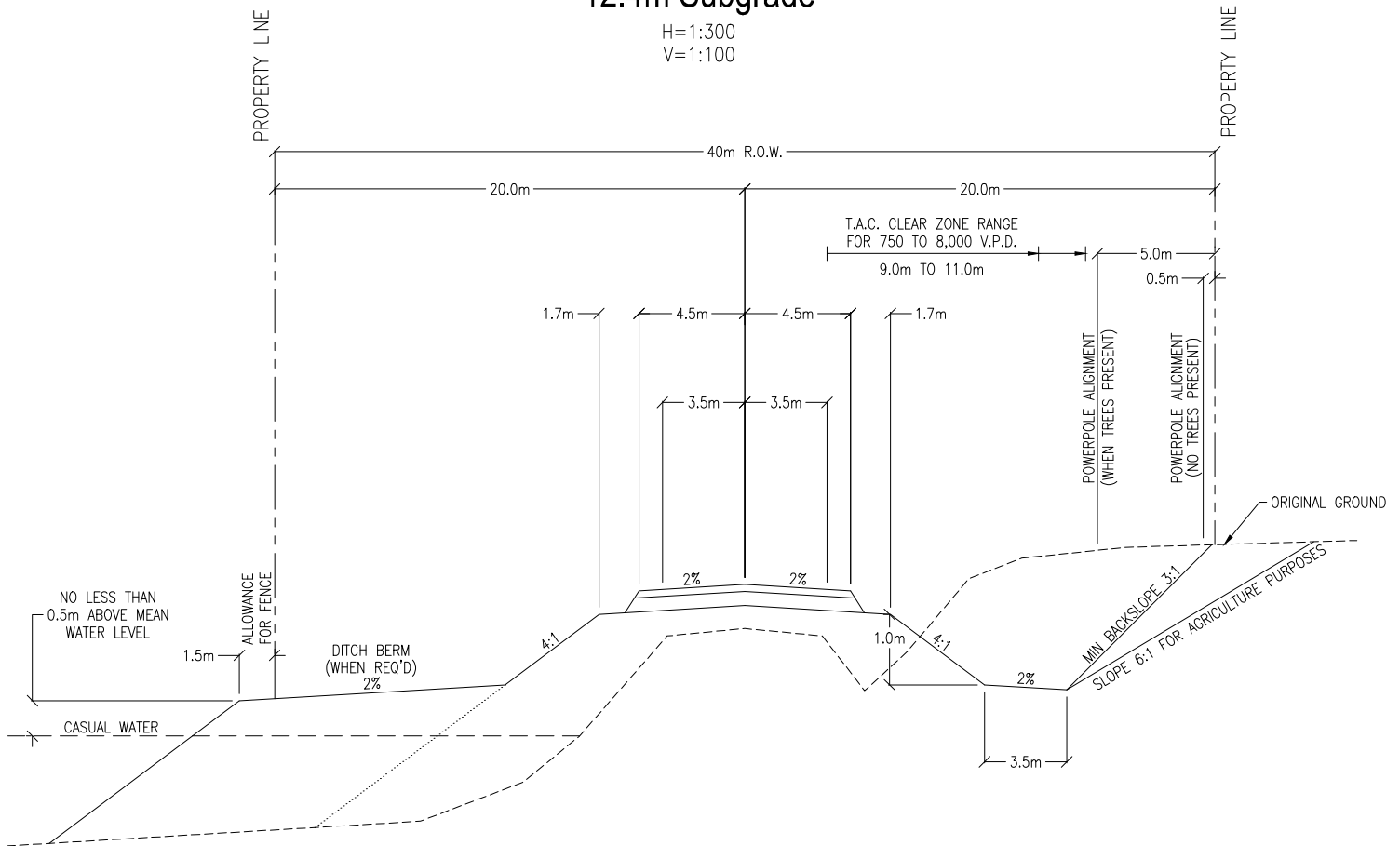
REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011 Layby (Canada Post Superbox, Information Sign, etc) C.R.S. Roadway New Construction or Retrofit to Existing Grid Road		
Date	Details	Drawn			
11/05/02	REVISED DRAWING NUMBERS	J. ORR	Approved: M. MacGarva, M.Eng, P.Eng.	<b>Drawing Number:</b> <b>51006</b> <small>Capital Planning &amp; Construction Department</small>	
11/02/10	Revised Drawing Numbers	O. Butt	Checked: D.L. Schilbe, P.L. (Eng)		
2006/01/19	Final Revisions for Approval	R. Dekker	Date: 2002/03/21 Scale: N.T.S. Drawn: Richard Dekker, R.E.T.		

# Class I Rural Road

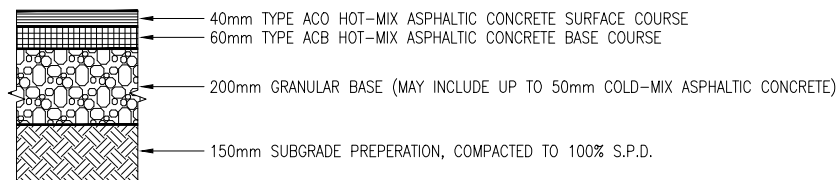
## 9.0m Finished Top

## 12.4m Subgrade

H=1:300  
V=1:100



### MINIMUM ROAD STRUCTURE



### NOTES:

1. STANDARD ALIGNMENT OF POWERPOLES IS 0.5m FROM PROPERTY LINE WHEN NO TREES ARE PRESENT. IF PRESENT, THE REQUIRED 5.0m OFFSET BETWEEN POWERLINES AND TREE CANOPY IS MET WITH A 5.0m POWERPOLE OFFSET WITHIN THE RIGHT-OF-WAY.
2. GEOTECHNICAL CONSULTANT TO CONFIRM SUITABILITY OF CROSS-SECTION STRUCTURE.
3. MINIMUM LONGITUDINAL GRADE FOR ROAD AND DITCH TO BE 0.3%, DESIRABLE 0.6%.
4. POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.
5. DESIRED 4:1 BACKSLOPING (MINIMUM 3:1), WITH PROVISION FOR 6:1 FOR AGRICULTURAL PURPOSES.

### REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
2006/01/19	Final Revisions for Approval	R. Dekker

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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### Class I (Hot-Mix Asphaltic Concrete) Rural Grid Road

### 40.0m Right-of-Way, 9.0m Finished Top, 12.4m Subgrade

Approved: M. MacGarva, M.Eng, P.Eng.

Checked: D.L. Schilbe, P.L. (Eng)

Date: 1995/01/16

Scale: AS NOTED

Drawn: Richard Dekker, R.E.T.

Drawing Number:

**51101**

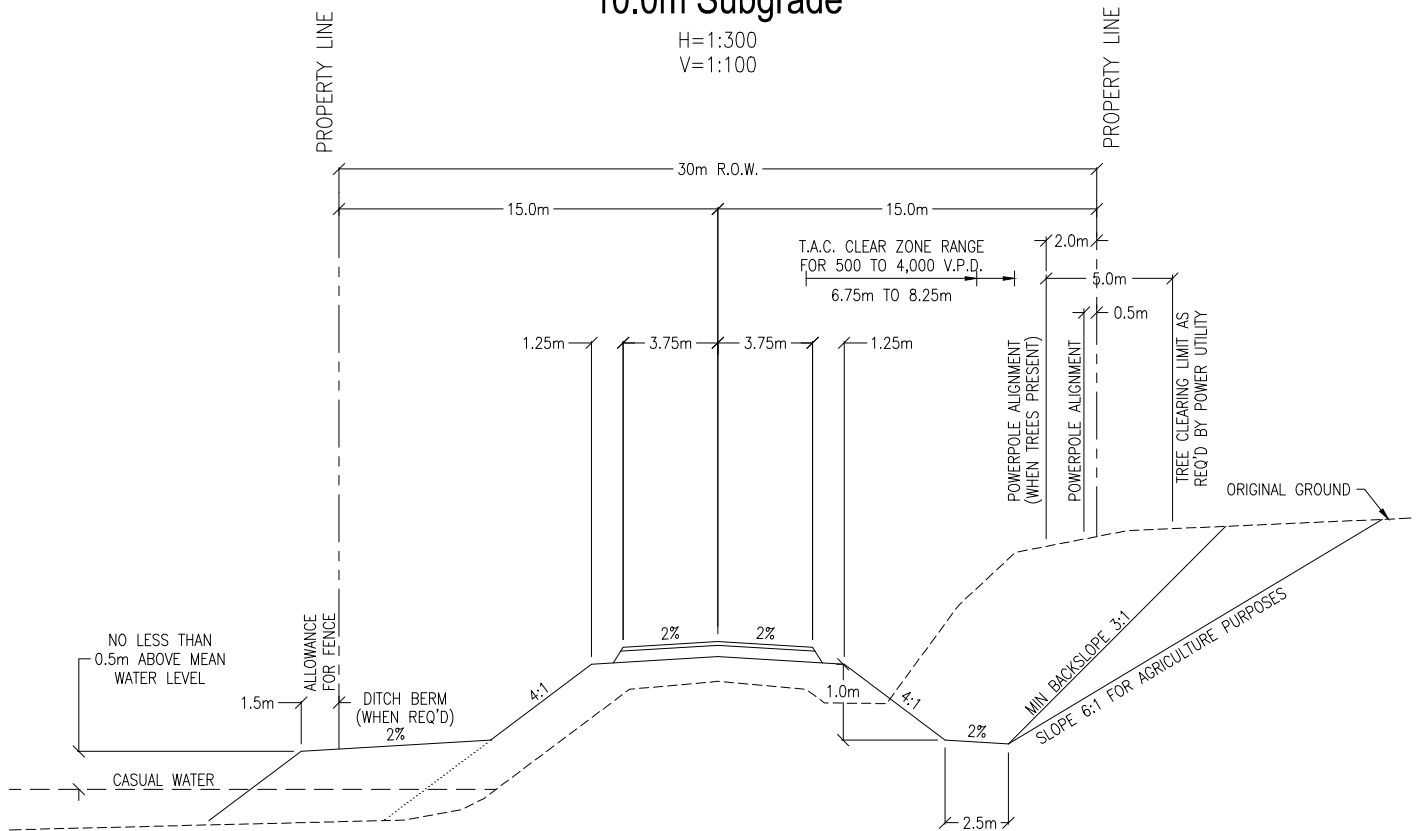
Capital Planning & Construction Department

# Class II Rural Road

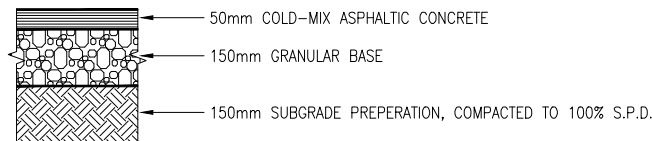
## 7.5m Finished Top

## 10.0m Subgrade

H=1:300  
V=1:100



### MINIMUM ROAD STRUCTURE



### NOTES:

1. TYPICAL 30.0m ROAD RIGHT-OF-WAY WITH BACKSLOPING AGREEMENTS.
2. STANDARD ALIGNMENT OF POWERPOLES IS 0.5m FROM PROPERTY LINE WHEN NO TREES ARE PRESENT. IF PRESENT, THE REQUIRED 5.0m OFFSET BETWEEN POWERLINES AND TREE CANOPY (AS REQUIRED BY THE POWER UTILITY COMPANY) IS MET WITH A 2.0m POWERPOLE OFFSET WITHIN THE RIGHT-OF-WAY AND 3.0m OF TREE CLEARING WITHIN PRIVATE PROPERTY.
3. RECOMMENDED 40.0m ROAD RIGHT-OF-WAY TO ALLEVIATE NEED FOR BACKSLOPING AGREEMENTS, POWER UTILITY COMPANY TREE CLEARING, AND TO FACILITATE FUTURE TRANSITION TO A CLASS-I ROADWAY.
4. GEOTECHNICAL CONSULTANT TO CONFIRM SUITABILITY OF CROSS-SECTION STRUCTURE.
5. MINIMUM LONGITUDINAL GRADE FOR ROAD AND DITCH TO BE 0.3%, DESIRABLE 0.6%.
6. POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.
7. DESIRED 4:1 BACKSLOPING (MINIMUM 3:1), WITH PROVISION FOR 6:1 FOR AGRICULTURAL PURPOSES.

### REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	R. Dekker

**Strathcona**  
County

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**Class II (Cold-Mix Asphaltic Concrete) Rural Grid Road**  
**30.0m Right-of-Way, 7.5m Finished Top, 10.0m Subgrade**

Approved: M. MacGarva, M.Eng, P.Eng.

Drawing Number:

Checked: D.L. Schilbe, P.L. (Eng)

**51102**

Date: 1995/01/16

Scale: AS NOTED

Drawn: Richard Dekker, R.E.T.

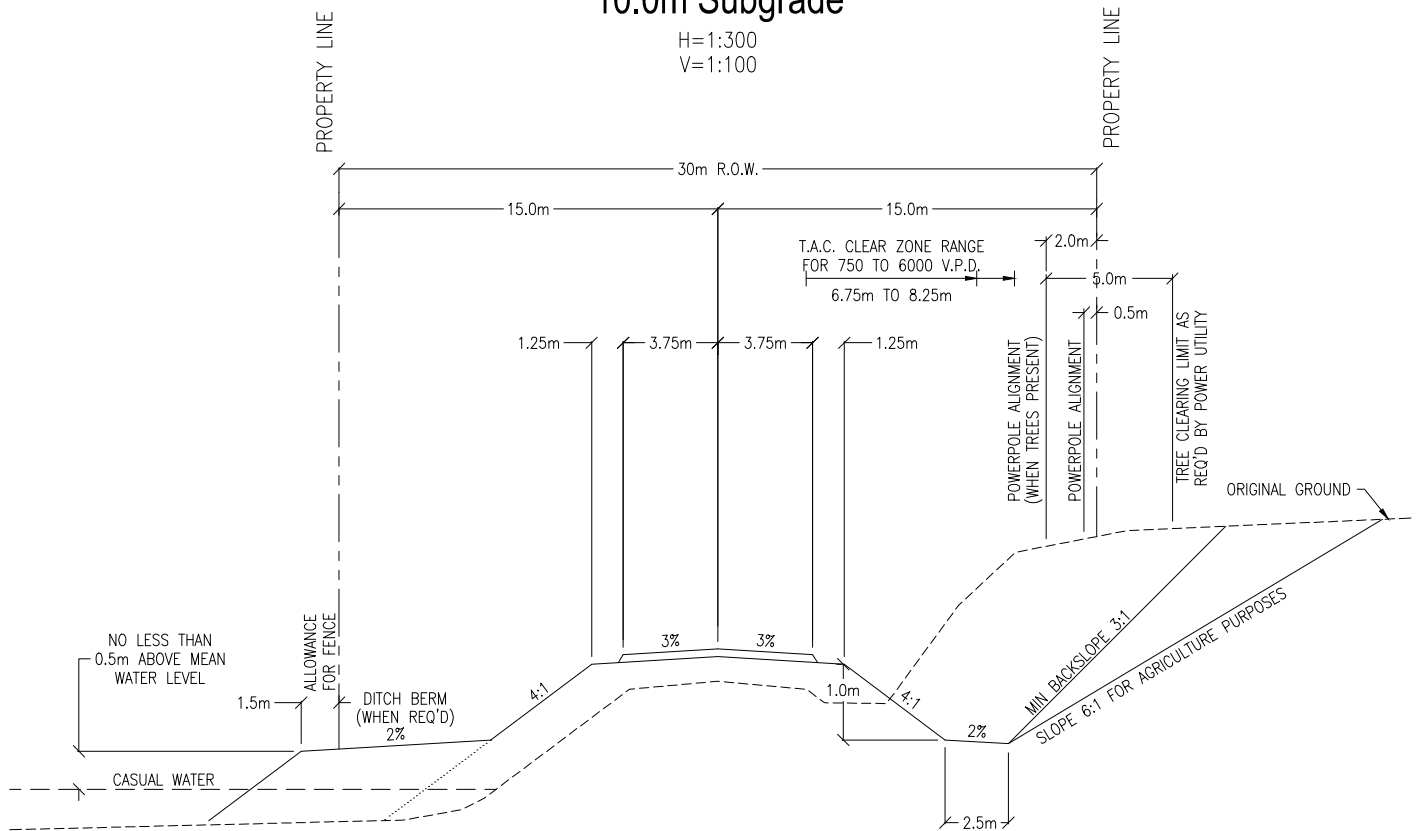
Capital Planning & Construction Department

# Class III Rural Road

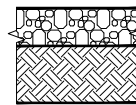
## 7.5m Finished Top

## 10.0m Subgrade

H=1:300  
V=1:100



### MINIMUM ROAD STRUCTURE



100mm GRANULAR BASE (INITIAL LIFT) WITH 50mm GRANULAR SURFACE (SUBSEQUENT LIFTS)  
150mm SUBGRADE PREPERATION, COMPACTED TO 100% S.P.D.

### NOTES:

1. TYPICAL 30.0m ROAD RIGHT-OF-WAY WITH BACKSLOPING AGREEMENTS.
2. STANDARD ALIGNMENT OF POWERPOLES IS 0.5m FROM PROPERTY LINE WHEN NO TREES ARE PRESENT. IF PRESENT, THE REQUIRED 5.0m OFFSET BETWEEN POWERLINES AND TREE CANOPY (AS REQUIRED BY THE POWER UTILITY COMPANY) IS MET WITH A 2.0m POWERPOLE OFFSET WITHIN THE RIGHT-OF-WAY AND 3.0m OF TREE CLEARING WITHIN PRIVATE PROPERTY.
3. CLASS IV RURAL GRID ROAD AS ABOVE BUT SURFACE TREATED WITH DUST ABATEMENT MATERIAL.
4. MINIMUM LONGITUDINAL GRADE FOR ROAD AND DITCH TO BE 0.3%, DESIRABLE 0.6%.
5. POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.
6. DESIRED 4:1 BACKSLOPING (MINIMUM 3:1), WITH PROVISION FOR 6:1 FOR AGRICULTURAL PURPOSES.

### REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	R. Dekker

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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### Class III (Gravelled) Rural Grid Road

### 30.0m Right-of-Way, 7.5m Finished Top, 10.0m Subgrade

Approved: M. MacGarva, M.Eng, P.Eng.

Checked: D.L. Schilbe, P.L. (Eng)

Date: 1989/09/11

Scale: N.T.S.

Drawn: Richard Dekker, R.E.T.

Drawing Number:

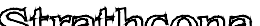
**51103**

Capital Planning & Construction Department

H=1:200  
V=1:50

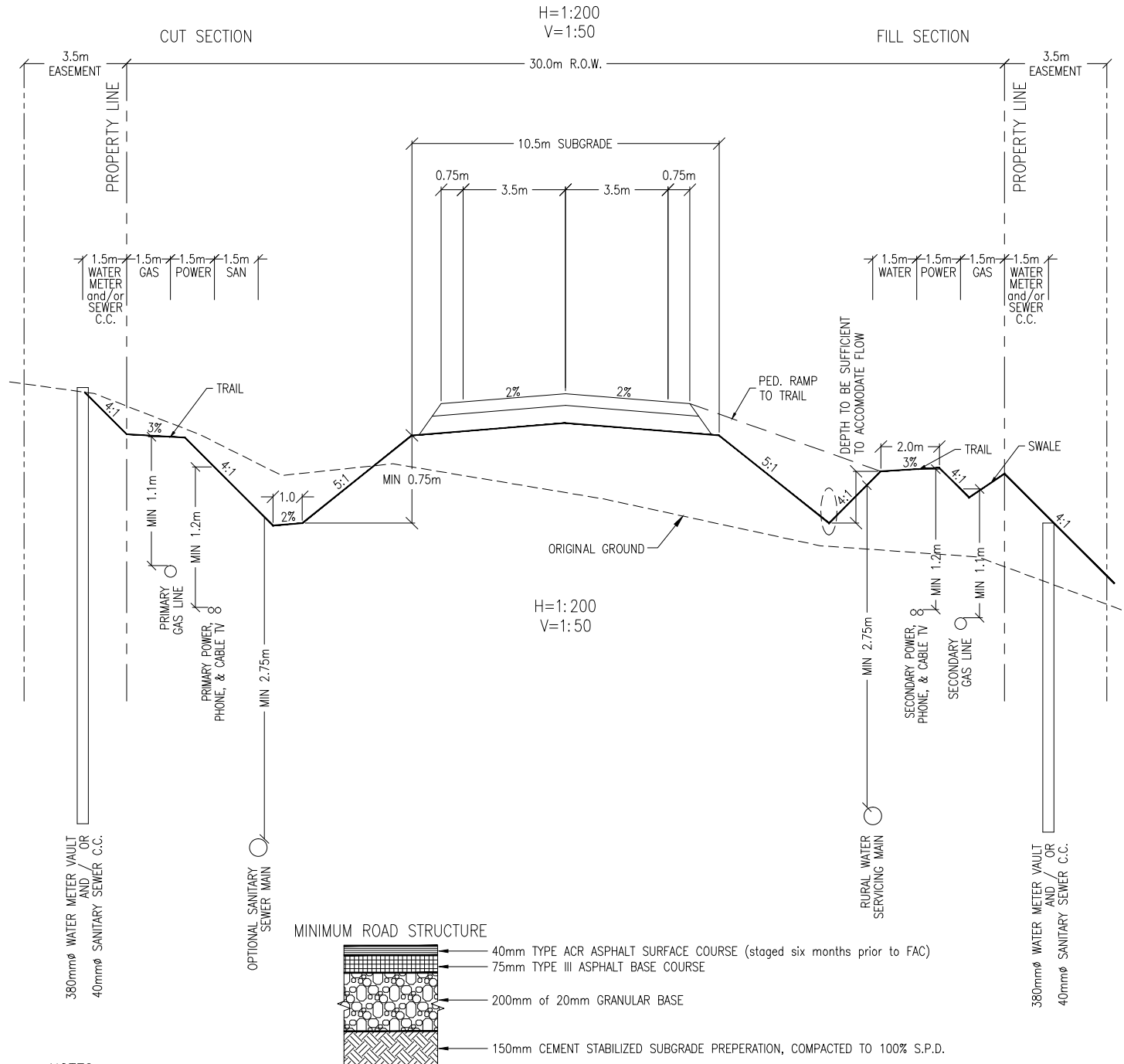


1. PROVISION FOR 7.5m FINISHED TOP AND 11.0m SUBGRADE ON CUL-DE-SAC ROADS PER LOT NUMBER AND SECOND ACCESS REQUIREMENTS.
2. MINIMUM LONGITUDINAL GRADE FOR ROAD AND DITCH TO BE 0.6%.
3. POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.
4. DITCH DEPTH TO BE CONFIRMED BY GEOTECHNICAL REPORT.
5. MINIMUM ROAD STRUCTURE SUBJECT TO REVISION BY GEOTECHNICAL REPORT RECOMMENDATIONS.
6. ALL TRENCHES IN ROAD OR SIDESLOPE REQUIRE COMPACTION TO 98% STANDARD PROCTOR DENSITY.
7. ALL TRENCHES IN DITCH BOTTOM OR BACKSLOPE TO 95% STANDARD PROCTOR DENSITY.

REVISIONS			 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2011
Date	Details	Drawn	Country Residential Subdivision Roadway 30.0 m Right-of Way, 8.5m Finished Top, 12.0m Subgrade			
11/05/02	REVISED DRAWING NUMBERS	J. ORR	Approved: M. MacGarva, M.Eng, P.Eng.			DWG. NO.
11/02/10	Revised Drawing Numbers	O. Butt	Checked: D.L. Schilbe, P.L. (Eng)			<b>51104</b> <small>Capital Planning &amp; Construction Department</small>
2006/01/19	Minimum Structure & Final Revisions for Approval	R. Dekker	Date: 1991/02/12	Scale: <sup>AS</sup> NOTED	Drawn: Richard Dekker, R.E.T.	
2005/03/30	Minimum Structure	R. Dekker				



# Country Residential Subdivision Roadway with Trail 8.5m Finished Top on 10.5m Subgrade



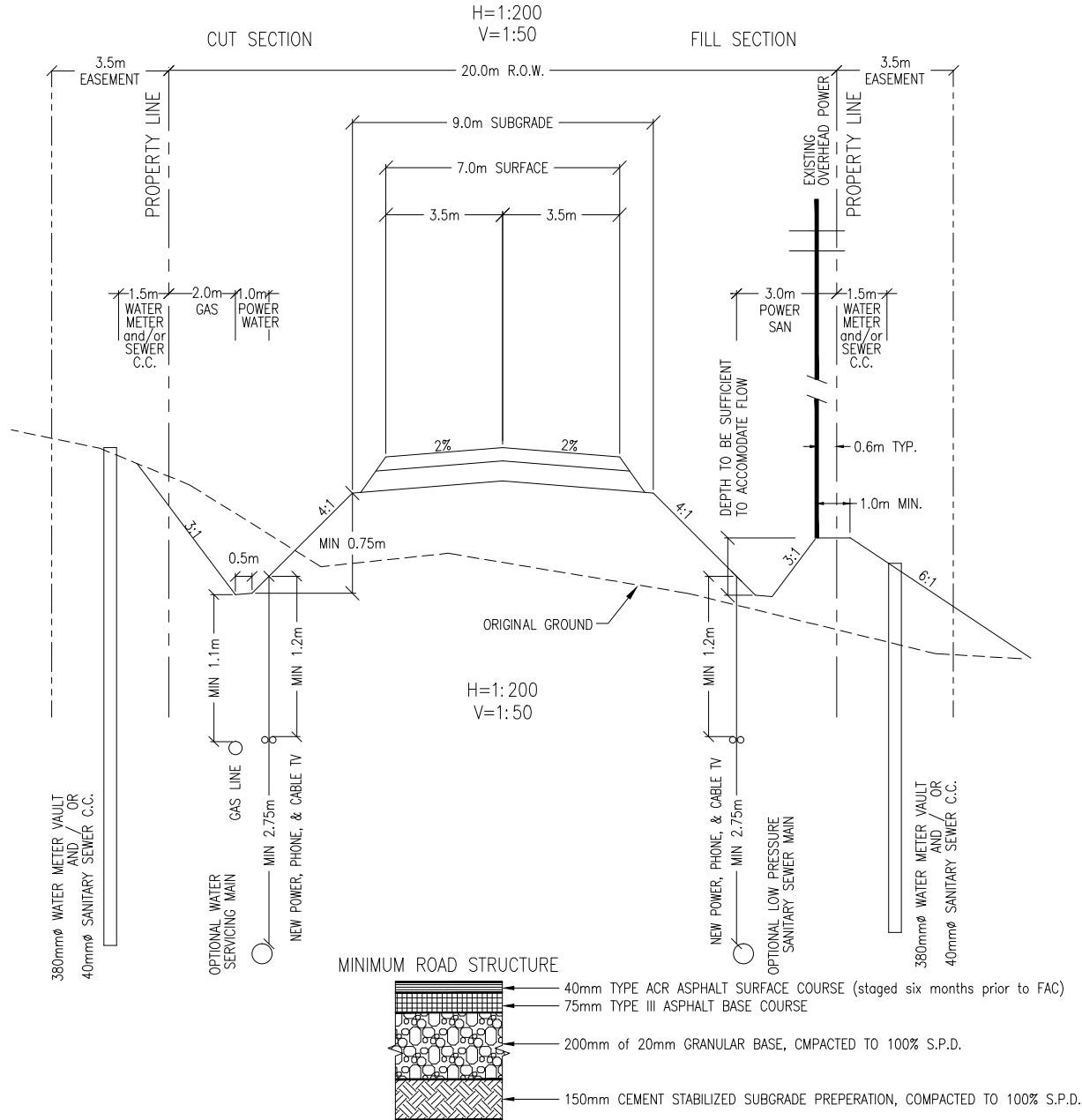
## NOTES:

1. PROVISION FOR 7.5m FINISHED TOP AND 9.5m SUBGRADE ON CUL-DE-SAC ROADS PER LOT NUMBER AND SECOND ACCESS REQUIREMENTS.
2. MINIMUM LONGITUDINAL GRADE FOR ROAD AND DITCH TO BE 0.6%.
3. POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.
4. DITCH DEPTH TO BE CONFIRMED BY GEOTECHNICAL REPORT.
5. MINIMUM ROAD STRUCTURE SUBJECT TO REVISION BY GEOTECHNICAL REPORT RECOMMENDATIONS.
6. ALL TRENCHES IN ROAD RIGHT-OF-WAY REQUIRE COMPACTION TO 95% STANDARD PROCTOR DENSITY.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011		
Date	Details	Drawn			
11/05/02	REVISED DRAWING NUMBERS	J. ORR	<b>Country Residential Subdivision Roadway - With 1 Trail</b> <b>30.0 m Right-of Way, 8.5m Finished Top, 10.5m Subgrade</b> Approved: M. MacGarva, M.Eng, P.Eng. Checked: D.L. Schilbe, P.L. (Eng) Date: 2004/06/25 Scale: AS NOTED Drawn: Jason Eggen, C.E.T.		
11/02/10	Revised Drawing Numbers	O. Butt			
2006/01/19	Final Revisions for Approval	R. Dekker			
			<b>DWG. NO.</b> <b>51105</b> <small>Capital Planning &amp; Construction Department</small>		

# Country Residential Subdivision Roadway - Redevelopment Only

## 7.0m Finished Top on 9.0m Subgrade

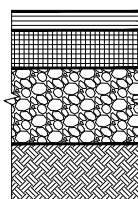


### NOTES:


1. VALID ONLY FOR NW & SW 15-53-22-W4, NW 30-53-21-W4, AND SW 05-52-22-W4, AS PER MAP #1, 2007 MDP.
2. ALL NEW ROAD CONSTRUCTION SHALL INCLUDE UNDERGROUND POWER INSTALLATION.
3. CONSTRUCTION OF NEW, NON-CONNECTED ROADWAYS SHALL BE PER DETAIL DRAWINGS 51004 and 51105.
4. BACKSLOPING AGREEMENTS AND LOT GRADING TO ACCOMMODATE DRAINAGE ARE REQUIRED.
5. INSTALLATION OF WATER AND SANITARY SERVICES AFTER THE SHALLOW UTILITIES HAVE BEEN INSTALLED SHALL BE BY HORIZONTAL DRILLING.
6. WATER VALVING, SANITARY SEWER APPURTENANCES, AND PHONE & CABLE PEDESTALS TO BE INDIVIDUALLY ASSESSED AND LOCATED.
7. MINIMUM LONGITUDINAL GRADE FOR ROAD AND DITCH TO BE 0.6%.
8. POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.
9. DITCH DEPTH TO BE CONFIRMED BY GEOTECHNICAL REPORT.
10. MINIMUM ROAD STRUCTURE SUBJECT TO REVISION BY GEOTECHNICAL REPORT RECOMMENDATIONS.
11. ALL TRENCHES IN ROAD RIGHT-OF-WAY REQUIRE COMPACTION TO 95% STANDARD PROCTOR DENSITY.
12. CUL-DE-SAC DESIGN REQUIRES 24.75m BULB AND RETURN RADII.

REVISIONS			Strathcona County		
Date	Details	Drawn	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		
11/05/02	REVISED DRAWING NUMBERS	J. ORR	<b>Country Residential Subdivision Roadway - Redevelopment Only</b> <b>20.0 m Right-of Way, 7.0m Finished Top, 9.0m Subgrade</b> Approved: M. MacGarva, M.Eng, P.Eng. Checked: D.L. Schilbe, P.L. (Eng) Date: 2009/03/06 Scale: AS NOTED Drawn: Karolina Haggerty, T.T.		
11/02/10	Revised Drawing Numbers	O. Butt			
2009/07/22	Revision to Include Cul-de-sac Design Radii	K. Haggerty T.T.			
2009/06/30	Approved by Council				
2009/06/24	Final Revisions for Approval	K. Haggerty, T.T.			
			DWG. NO. <b>51106</b> <small>Capital Planning &amp; Construction Department</small>		

H=1:200  
V=1:50



1. MINIMUM LONGITUDINAL GRADE FOR ROAD AND DITCH TO BE 0.6%.
2. POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.
3. DITCH DEPTH TO BE CONFIRMED BY GEOTECHNICAL REPORT.
4. MINIMUM ROAD STRUCTURE SUBJECT TO REVISION BY GEOTECHNICAL REPORT RECOMMENDATIONS.
5. ALL TRENCHES IN ROAD OR SIDESLOPE REQUIRE COMPACTION TO 98% STANDARD PROCTOR DENSITY, IN DITCH BOTTOM OR BACKSLOPE. 95% S.P.D. IS ACCEPTABLE.

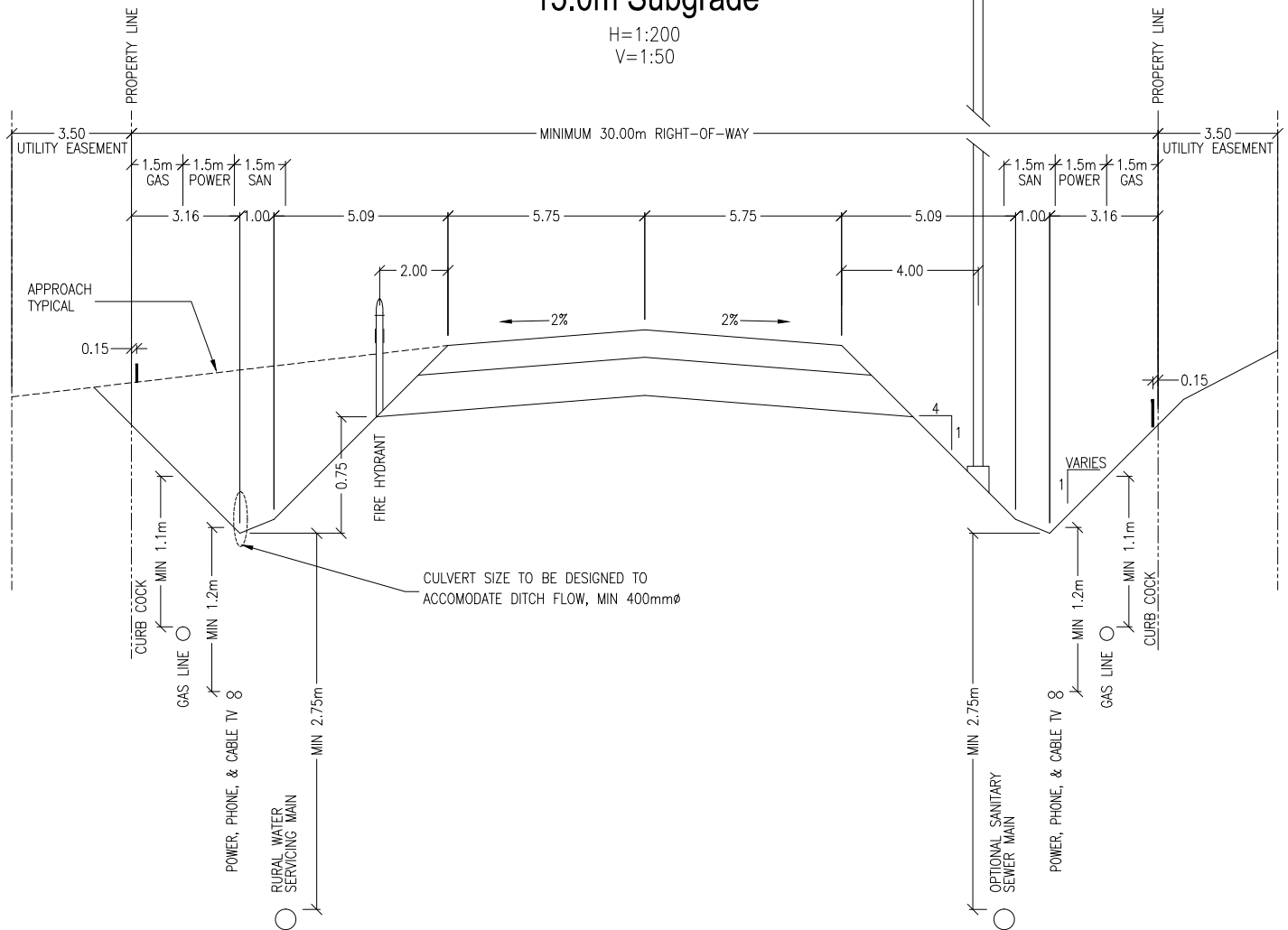
REVISIONS			 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA				© 2011
Date	Details	Drawn	Industrial Local Roadway 30m Right-of-Way, 9.0m Finished Top, 12.5m Subgrade				
11/05/02	REVISED DRAWING NUMBERS	J. ORR	Approved: M. MacGarva, M.Eng, P.Eng.				Drawing Number:  <b>51107</b> <small>Capital Planning &amp; Construction Department</small>
11/02/10	Revised Drawing Numbers	O. Butt	Checked: D.L. Schilbe, P.L. (Eng)				
2005/01/19	Final Revisions for Approval	J. Edgington	Date: 1999/06/21	Scale: 1:200	Drawn: Devin Boudreau, C.Tech.		

# Rural Industrial Collector Roadway

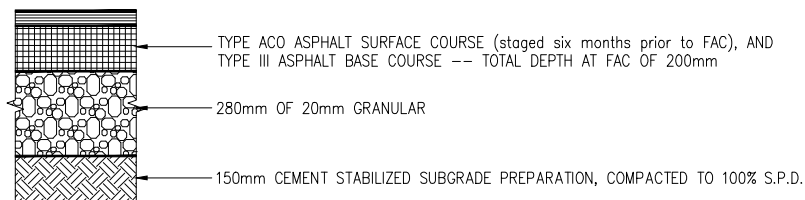
## 11.5m Finished Top

## 15.0m Subgrade

H=1:200  
V=1:50



### MINIMUM ROAD STRUCTURE



### NOTES:

1. MINIMUM LONGITUDINAL GRADE FOR ROAD AND DITCH TO BE 0.6%.
2. POSITIVE DRAINAGE IS TO BE MAINTAINED AT ALL LOCATIONS.
3. DITCH DEPTH TO BE CONFIRMED BY GEOTECHNICAL REPORT.
4. MINIMUM ROAD STRUCTURE SUBJECT TO REVISION BY GEOTECHNICAL REPORT RECOMMENDATIONS.
5. ALL TRENCHES IN ROAD OR SIDESLOPE REQUIRE COMPACTION TO 98% STANDARD PROCTOR DENSITY, IN DITCH BOTTOM OR BACKSLOPE, 95% S.P.D. IS ACCEPTABLE.

### REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	J. Edgington

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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### Industrial Collector Roadway

### 30.0m Right-of-Way, 11.5m Finished Top, 15.0m Subgrade

Approved: M. MacGarva, M.Eng, P.Eng.

Checked: D.L. Schilbe, P.L. (Eng)

Date: 1999/06/21

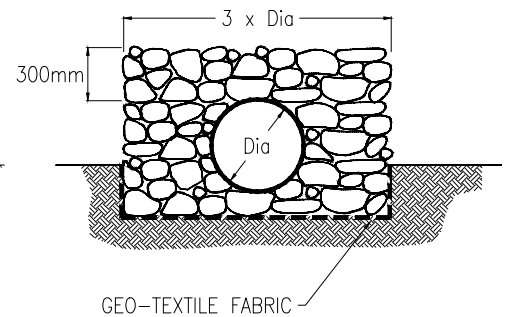
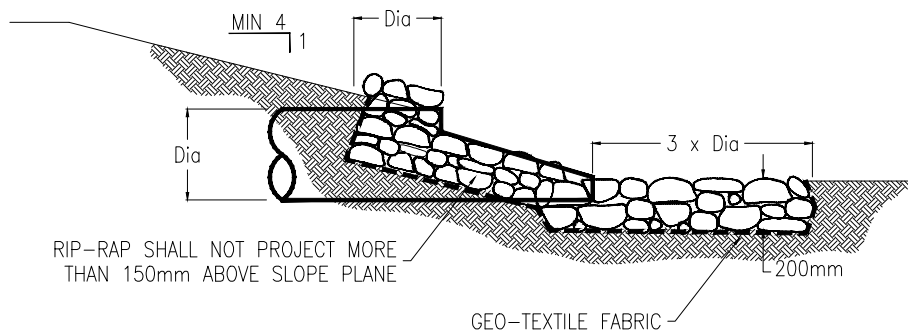
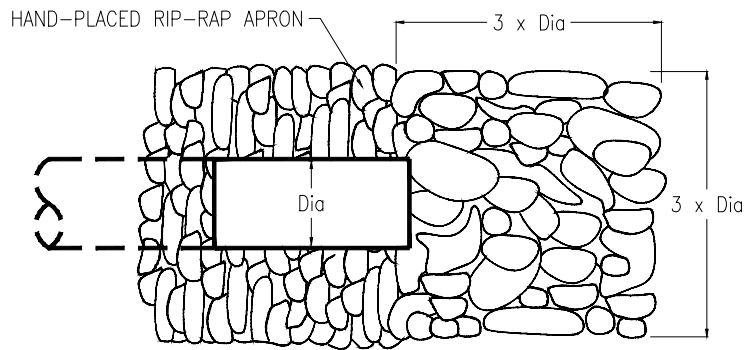
Scale: 1:200

Drawn: Devin Boudreau, C.Tech.

Drawing Number:

**51108**

Capital Planning & Construction Department

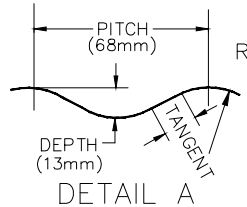
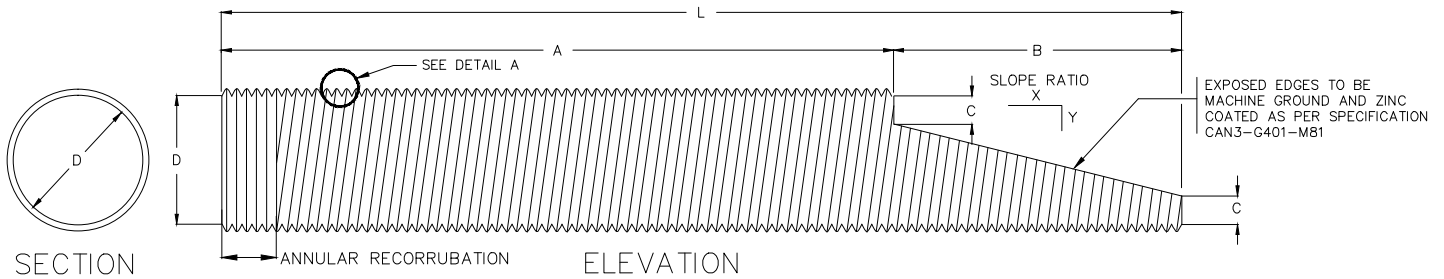


**NOTES:**

1. CULVERTS TO BE BURIED 1/4 DIAMETER BELOW DITCH INVERT.
2. CULVERTS TO HAVE 3:1 SLOPE END TREATMENTS, SEE DRAWING "51110" FOR DETAILS.
3. ROCK SIZE SHALL BE MINIMUM 200mm AND MAXIMUM 450mm.

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Drawn			
			Hand Placed Rip-Rap for Pipe Culverts		
			Approved: M. MacGarva, M.Eng., P.Eng.		Drawing Number:
11/05/02	REVISED DRAWING NUMBER	J. ORR	Checked: D.L. Schilbe, P.L. (Eng)		51109
2006/01/19	Final Revisions for Approval	R. Dekker	Date: 1994/11/30	Scale: N.T.S. Drawn: Daniel Leckie, A.Sc.T.	
			Capital Planning & Construction Department		

# DETAILS OF STANDARD SLOPED END SECTIONS FOR C.S.P. ROUND CULVERTS



NOTES:  
THE HELICALLY CORRUGATED PIPE IS TO HAVE THE PIPE ENDS RECORRUGATED TO PROVIDE ANNULAR CORRUGATIONS FOR COUPLING PURPOSES (AS SHOWN). THE MINIMUM LENGTH WITH ANNULAR CORRUGATIONS SHALL BE 300mm FOR DIAMETERS OF 900mm OR LESS AND 600mm FOR A DIAMETER OF GREATER THAN 900mm. THE COUPLER SHALL BE AN ANNULAR CORRUGATED BAND TYPE. THERE SHALL BE A MINIMUM OF 3 BOLTS PER COUPLER FOR DIAMETERS OF 800mm OR GREATER.

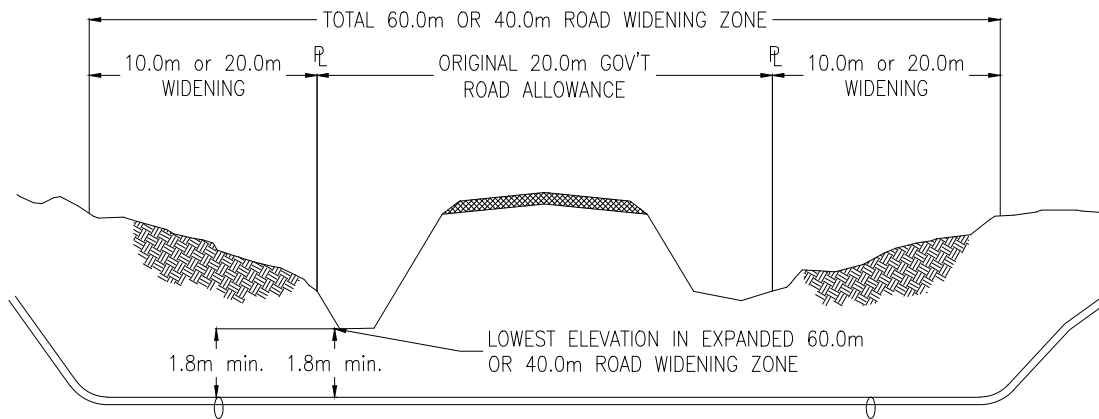
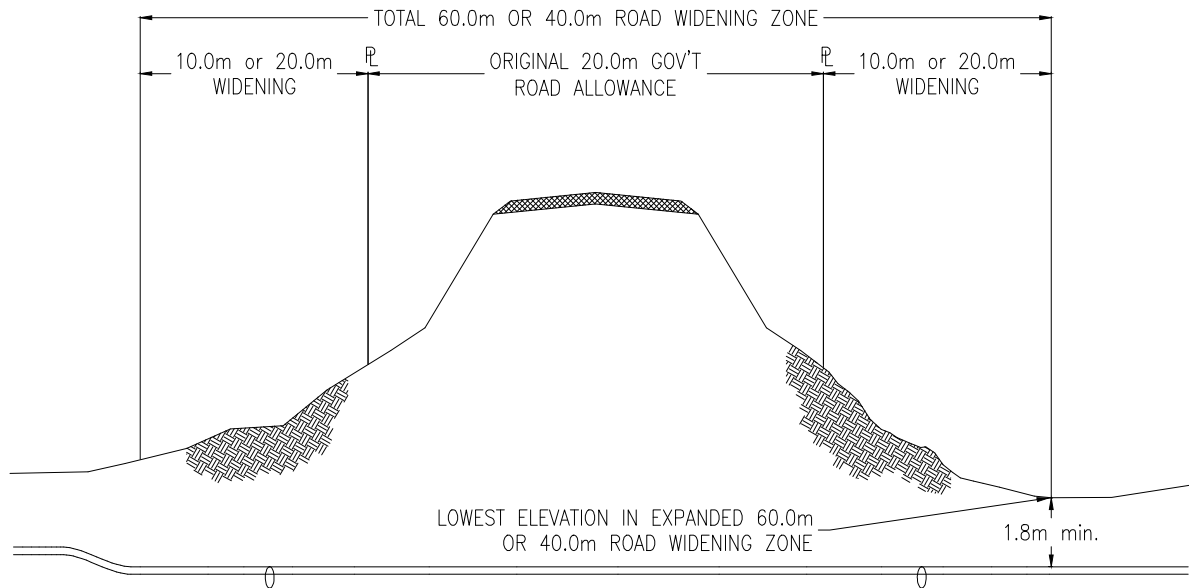
INSIDE DIAMETER "D" mm	SLOPE RATIO X:Y	"C" mm	"A" m	"B" m	INVERT LENGTH OF SLOPED END SECTION "L" m
400	3:1	100	5.40	0.60	6.0
500	3:1	125	5.25	0.75	6.0
600	3:1	125	4.95	1.05	6.0
700	3:1	150	4.80	1.20	6.0
800	3:1	175	4.65	1.35	6.0
900	3:1	200	4.50	1.50	6.0
1000	3:1	225	4.35	1.65	6.0
1200	3:1 4:1	225 275	3.75 3.40	2.25 2.60	6.0
1400	3:1 4:1	250 300	3.30 2.80	2.70 3.20	6.0

THICKNESS OF CORRUGATED STEEL PIPE—TABLE A																															
DIA. IN mm	AREA IN m <sup>2</sup>	*HEIGHT OF COVER ABOVE TOP OF CULVERT IN m																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
400	0.126	1.6															2.0					2.8									
500	0.196	1.6										2.0					2.8														
600	0.283	1.6					2.0										2.8					3.5									
700	0.385	2.0															2.8					3.5					4.2				
800	0.503	2.0										2.8					3.5					4.2									
900	0.636	2.0					2.8					3.5					4.2														
1000	0.786	2.8										3.5					4.2														
1200	1.131	2.8					3.5					4.2					FOR FILLS OVER 11m—USE TABLE B														
1400	1.540	3.5					4.2					FOR FILLS OVER 9m—USE TABLE B																			
*THE IMPERFECT TRENCH CONDITION METHOD OF INSTALLATION IS TO BE USED WHEN HEIGHT OF COVER OVER AN 800mm DIA. C.S.P. EXCEEDS 21m AND WHEN HEIGHT OF COVER OVER A 900mm DIA. C.S.P. EXCEEDS 19m.																															

\*THE IMPERFECT TRENCH CONDITION METHOD OF INSTALLATION IS TO BE USED WHEN HEIGHT OF COVER OVER AN 800mm DIA. C.S.P. EXCEEDS 21m AND WHEN HEIGHT OF COVER OVER A 900mm DIA. C.S.P. EXCEEDS 19m.

METRIC 5% VERTICALLY ELONGATED C.S.P.—TABLE B																															
DIA. IN mm	AREA IN m <sup>2</sup>	*HEIGHT OF COVER ABOVE TOP OF CULVERT IN m																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1200	1.131	2.8								3.5												4.2									
1400	1.540	3.5																4.2													

REVISIONS			Strathcona County	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		© 2011
Date	Details	Drawn				
			Culverts			
			Approved: M. MacGarva, M.Eng., P.Eng.			Drawing Number:  <b>51110</b> <small>Capital Planning &amp; Construction Department</small>
11/05/02	REVISED DRAWING NUMBERS	J. ORR	Checked: D.L. Schilbe, P.L. (Eng)			
2006/01/19	Final Revisions for Approval	R. Dekker	Date: 1994/11/29	Scale: N.T.S.	Drawn: Daniel Leckie, A.Sc.T.	



#### CSA Z662 PIPE CLASS

#### LOCATIONS

#### CSA Z662 CODE

CLASS I

– AGRICULTURAL AREAS

4.3.2.2

CLASS II

– AGRICULTURAL / LARGE  
RURAL RESIDENTIAL AREAS  
– COUNTRY RESIDENTIAL AREAS

4.3.2.3

CLASS III

– URBAN SERVICE AREA  
– FUTURE URBAN STUDY AREAS.  
– INDUSTRIAL AREAS

4.3.2.4

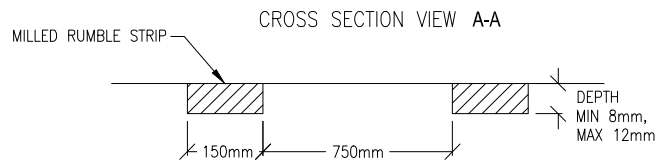
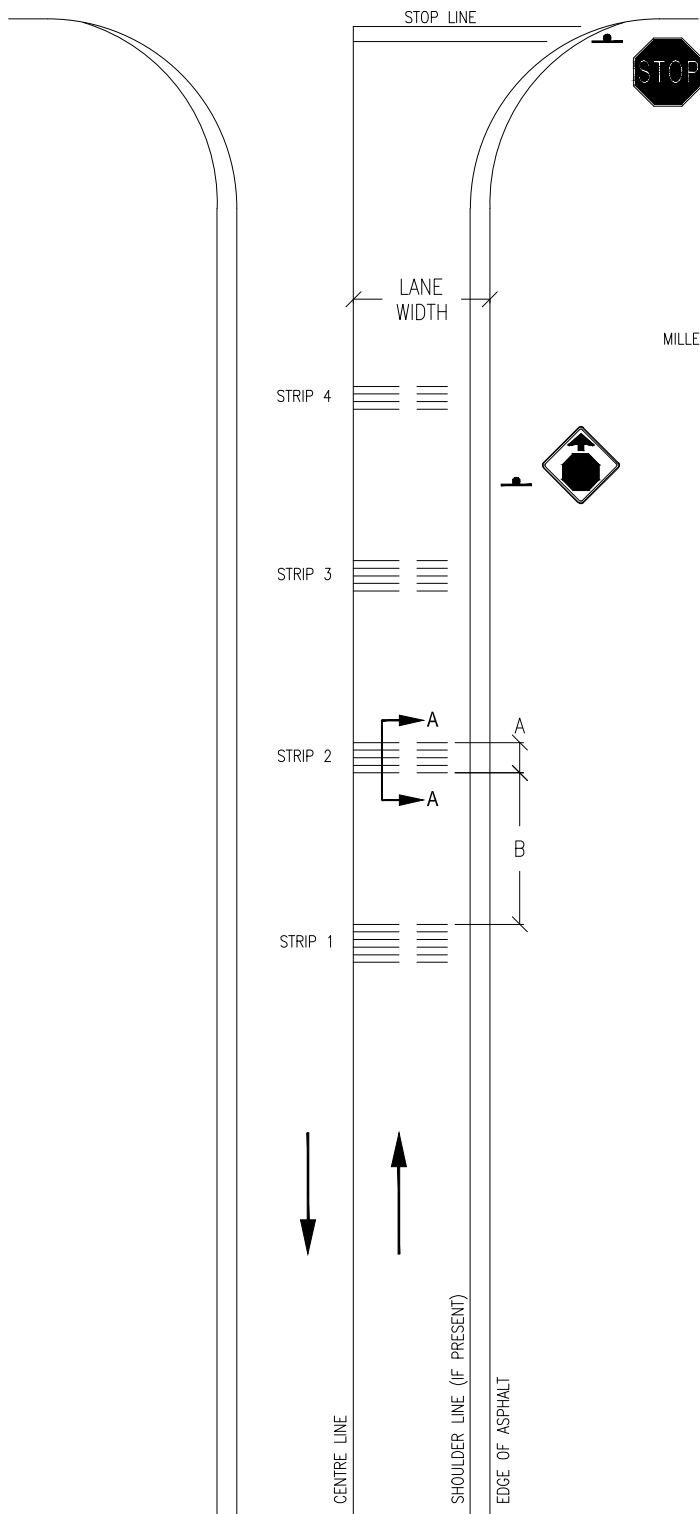
#### NOTES:

1. THE LAND USE AREAS ARE OUTLINED IN THE MUNICIPAL DEVELOPMENT PLAN.
2. THE PIPELINE COMPANY OR REPRESENTATIVE SHALL PROVIDE A LONGITUDINAL PROFILE OF THE ROAD FOR 200m IN BOTH DIRECTIONS FROM THE PIPELINE CROSSING.
3. FOR PIPELINE CROSSINGS OF, OR ADJACENT TO, UNIMPROVED CLASS I AND II ROADWAYS, THE TOTAL ROAD WIDENING ZONE IS 60.0m. FOR PIPELINE CROSSINGS OF, OR ADJACENT TO, UNIMPROVED CLASS III AND IV ROADWAYS, THE TOTAL ROAD WIDENING ZONE IS 40.0m.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011	
Date	Details	Drawn		
11/05/02	REVISED DRAWING NUMBERS	J. ORR	<b>Industrial Pipeline Crossings and Parallel Pipelines</b> <b>Design Class I, Class II, Class III, and Class IV Rural Grid Roads</b> Approved: M. MacGarva, M.Eng., P.Eng. Checked: D.L. Schilbe, P.L. (Eng) Date: 1998/09/28   Scale: N.T.S.   Drawn: Jeff Edgington, C.E.T.	
11/02/10	Revised Drawing Numbers	O. Butt		
2006/01/19	Final Revisions for Approval	R. Dekker		
			<b>Drawing Number:</b> <b>51111</b> <small>Capital Planning &amp; Construction Department</small>	

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.





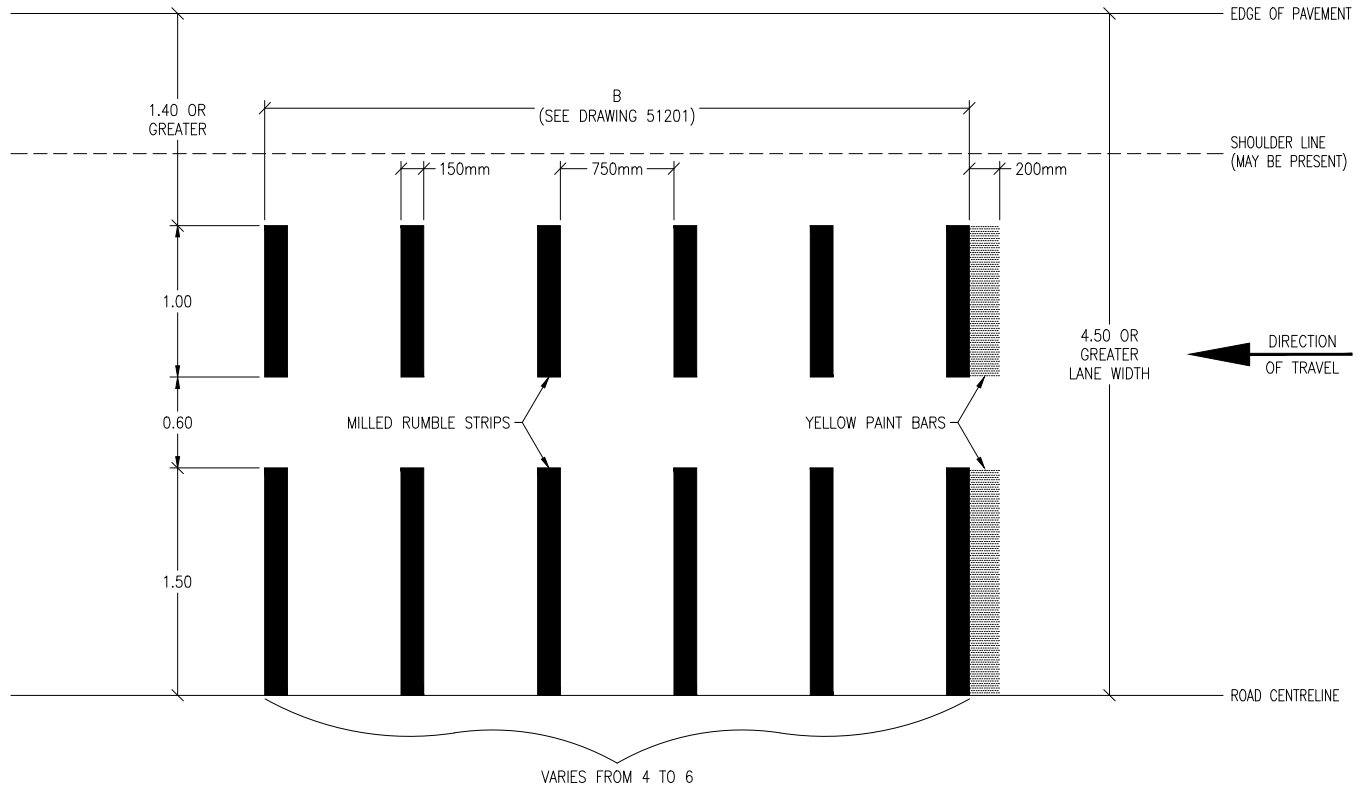
DETAIL MEASUREMENTS FOR DISCONTINUOUS RUMBLE STRIP LAYOUT					
START STATION (m)	END STATION (m)	STRIP NUMBER	A STRIP LENGTH	B STRIP SPACING	NUMBER OF BARS
STOPLINE	0.00				
90.00	92.85	4	2.85m	42.15m	4
135.00	138.75	3	3.75m	46.25m	5
185.00	188.75	2	3.75m	51.25m	5
240.00	244.65	1	4.65m		6

**NOTES:**

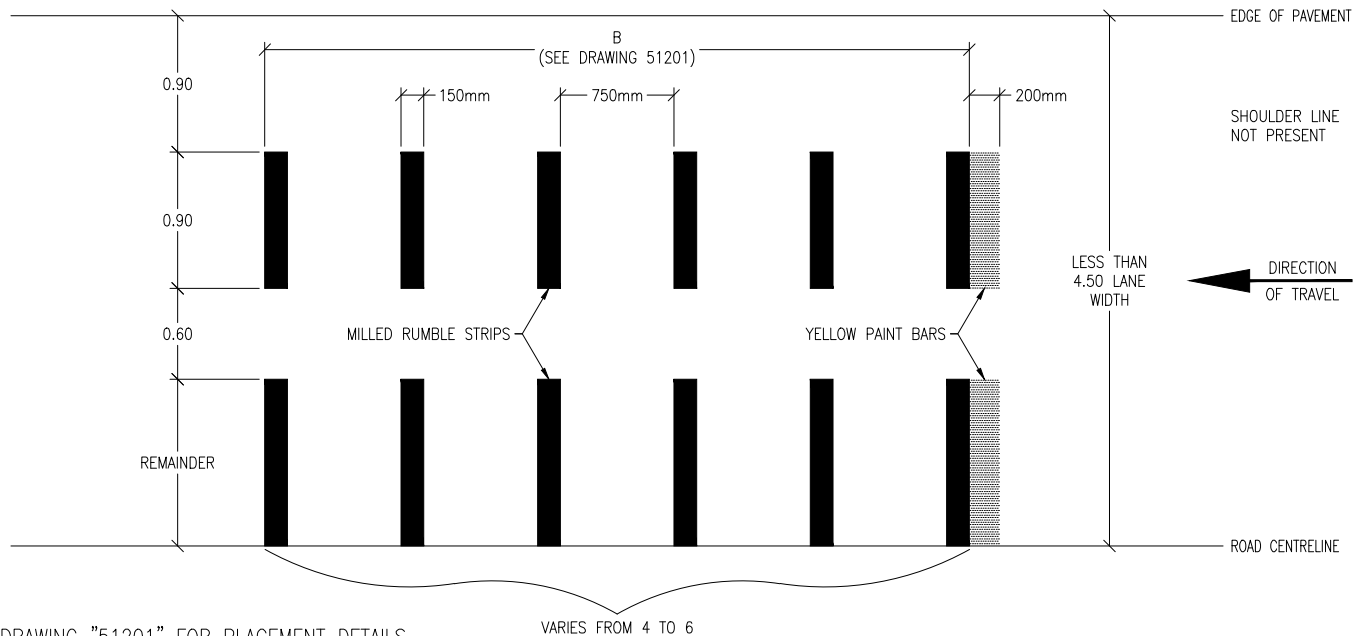
1. SEE DRAWING "51202" FOR STRIP DETAILS.

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Drawn			
			Rural Grid Road		
			Discontinuous Milled Rumble Strip Placement		
11/05/02	REVISED DRAWING NUMBERS	J. ORR	Approved: M. MacGarva, M.Eng., P.Eng.		Drawing Number:
11/02/10	Revised Drawing Numbers	O. Butt	Checked: D.L. Schilbe, P.L. (Eng)		51201
2006/01/19	Final Revisions for Approval	R. Dekker	Date: 95/01/16	Scale: N.T.S.	
			Capital Planning & Construction Department		

## ROADS EQUAL TO OR GREATER THAN 9.0m IN WIDTH



## ROADS LESS THAN 9.0m IN WIDTH



### NOTES:

1. SEE DRAWING "51201" FOR PLACEMENT DETAILS.
2. ALL DIMENSIONS IN METRES UNLESS OTHERWISE NOTED.

### REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	R. Dekker

**Strathcona**  
County

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### Rural Grid Road Discontinuous Milled Rumble Strip Placement

Approved: M. MacGarva, M.Eng., P.Eng.

Checked: D.L. Schilbe, P.L. (Eng)

Date: 1998/06/03

Scale: 1:50


Drawn: Richard Dekker, R.E.T.

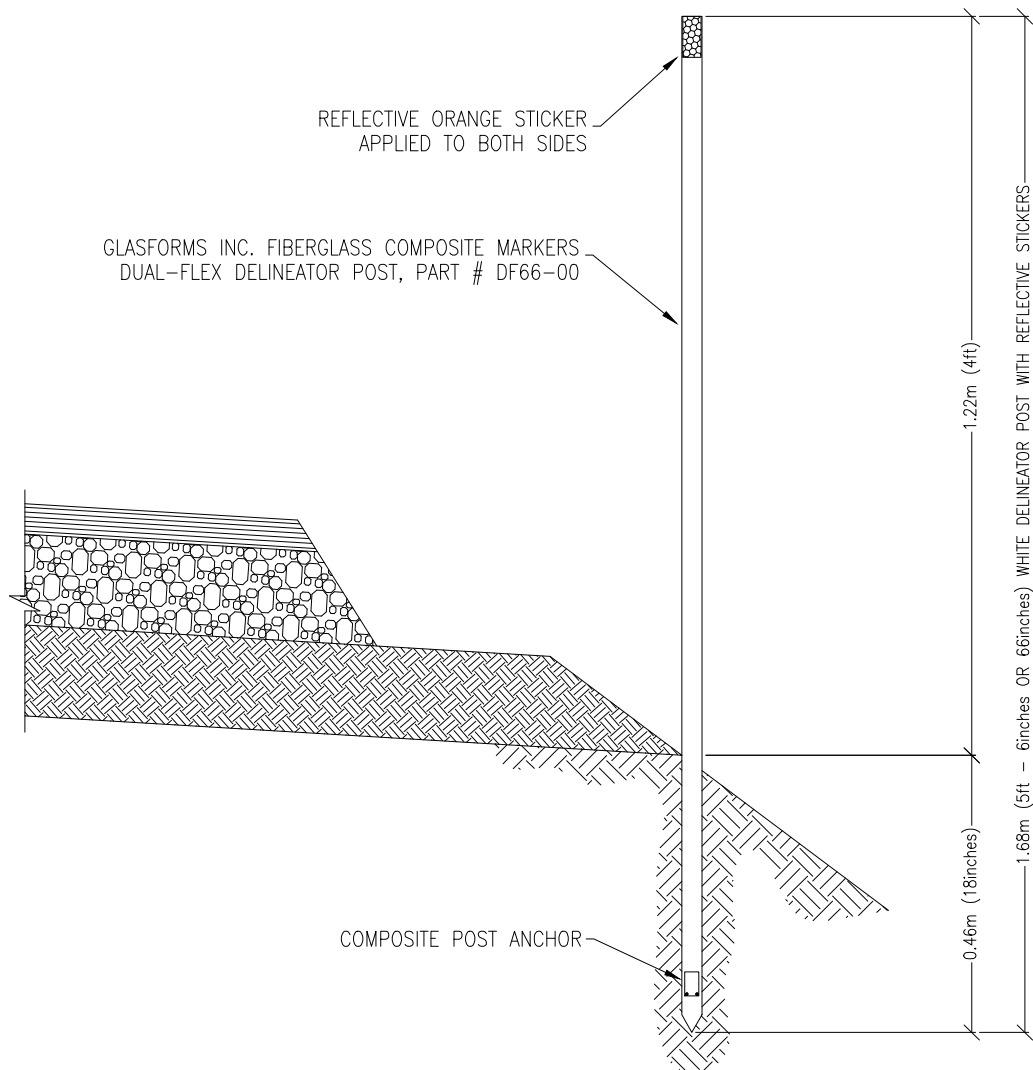
Drawing Number:

**51202**

Capital Planning & Construction Department

PIPE, ALUMINUM SCHEDULE 40, 47.5mm Ø

REVISIONS			 STRATHCONA COUNTY		2001 SHERWOOD DRIVE, SHERWOOD PARK ALBERTA, T8A 3W7, CANADA		© 2019	
DATE	DETAILS	DRAWN						
			RURAL SIGN INSTALLATION					
19/08/19	UPDATED SECTION REFERENCE	P. TOMKO						
11/05/02	REVISED DRAWING NUMBERS	J. ORR	APPROVED: D.L. SCHILBE, P.L. (ENG.)				DRAWING NUMBER	
11/02/10	REVISED DRAWING NUMBERS	O. BUTT	CHECKED: S. JOHNSON, P.TECH. (ENG.)				51203	
06/01/19	FINAL REVISIONS FOR APPROVAL	R. DEKKER	DATE: 94/06/23		SCALE: N.T.S.	DRAWN: R. DEKKER		
			TRANSPORTATION PLANNING & ENGINEERING DEPARTMENT					

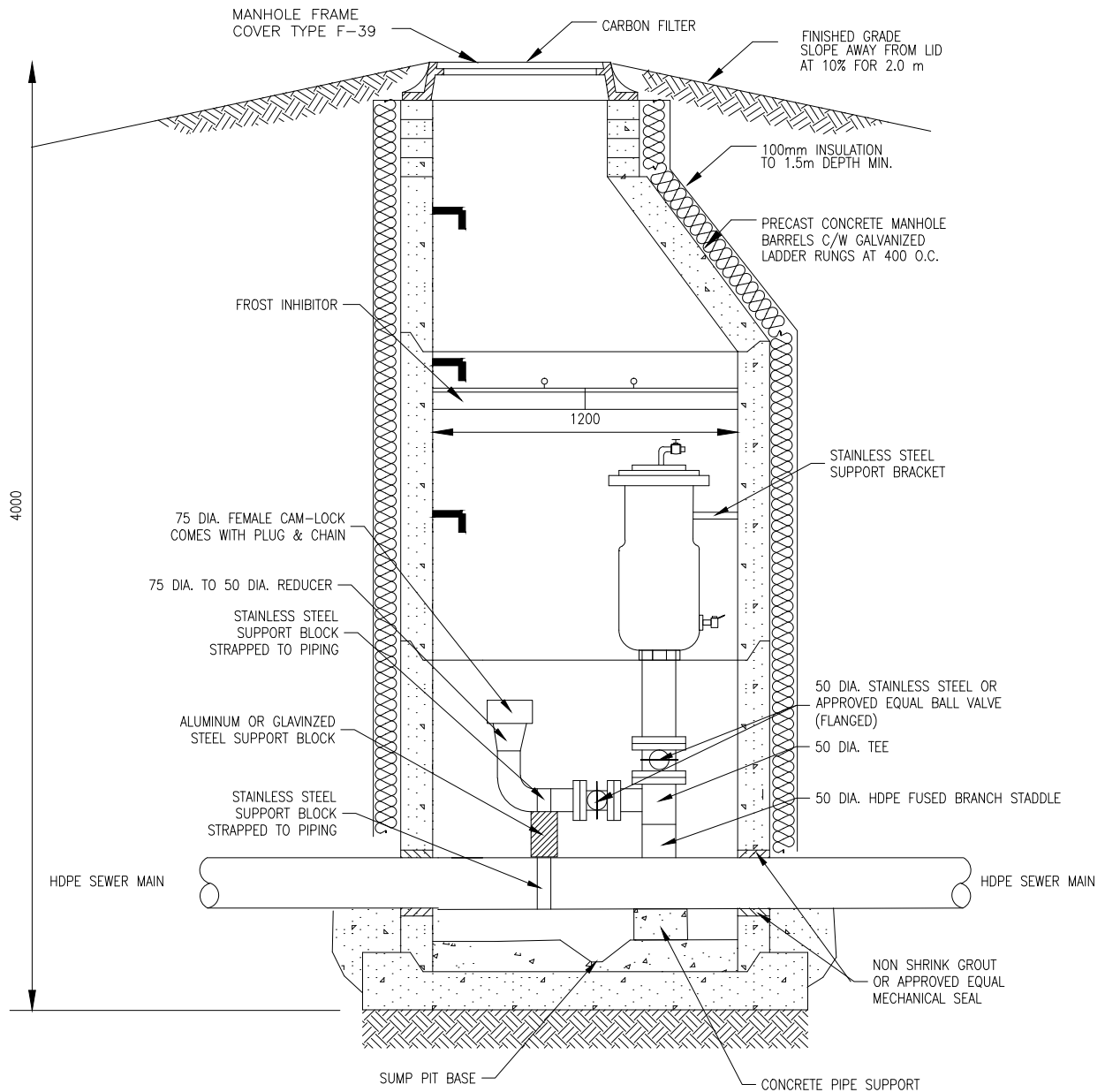


#### NOTES:

1. POSTS TO BE INSTALLED AT EDGE OF SUBGRADE PREPARATION.
2. EACH POST TO INCLUDE ONE POST ANCHOR.
3. SIX POSTS REQUIRED PER SUBDIVISION ACCESS (EXCEPT ON CLASS I GRID ROADS).
4. TWO POSTS REQUIRED PER RESIDENTIAL ACCESS.

REVISIONS			Strathcona County		
Date	Details	Drawn	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		
			© 2011		
			Flexible Delineator Posts		
11/05/02	REVISED DRAWING NUMBERS	J. ORR	Approved: M. MacGarva, M.Eng., P.Eng.		Drawing Number:
11/02/10	Revised Drawing Numbers	O. Butt	Checked: D.L. Schilbe, P.L. (Eng)		51204
2006/01/19	Final Revisions for Approval	R. Dekker	Date: 2002/03/20	Scale: N.T.S.	
			Capital Planning & Construction Department		

# AIR AND VACUUM RELIEF VALVE AND CHAMBER DETAIL



## NOTES:

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. EXTERIOR OF MANHOLE TO BE INSULATED WITH 100mm HI60 STYROFOAM INSULATION TO AT LEAST 1.5m BELOW GROUND.

## REVISIONS

Date	Details	Approved
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	J. Patterson

**Strathcona**  
County

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## Low Pressure Sewer Air and Vacuum Relief Valve and Chamber Detail

Approved: M. MacGarva, M.Eng., P.Eng.

Checked: L. Knorr, P.Eng.

Date: 2003/02/10

Scale: N.T.S.

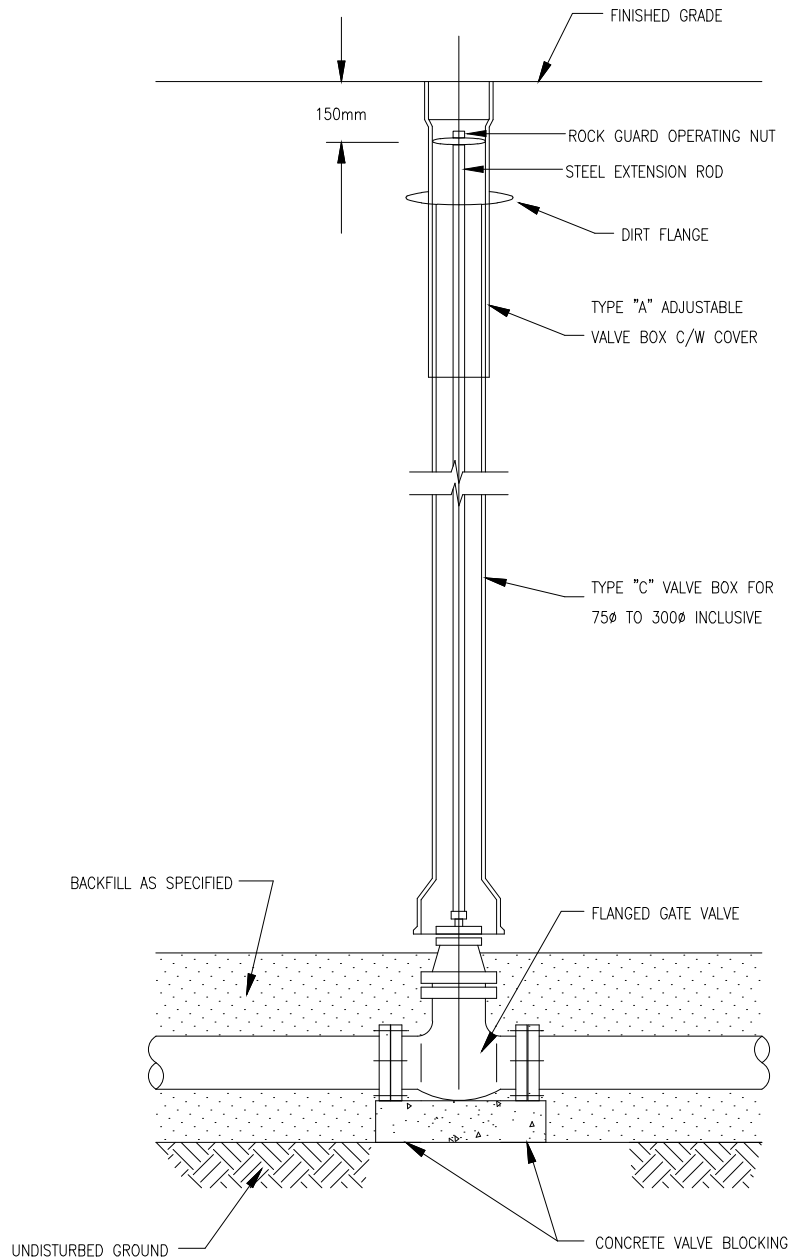
Drawn: D. Boudreau, C.Tech.

Drawing Name:

**52001**

Utilities Department

## BURIED VALVE DETAIL



### NOTES:

1. VALVE BOX TOPS TO BE SET FLUSH WITH SURFACE IN BOULEVARDS, GREEN SPACES AND CONCRETE SIDEWALKS.
2. VALVE AND VALVE BOXES SHALL BE EPOXY COATED TO PREVENT CORROSION. ALL TRIM TO BE STAINLESS STEEL.
3. VALVE BOX TOPS MARKED "SEWAGE".
4. TRACER WIRE TO SURFACE OF EVERY MAINLINE VALVE.

### REVISIONS

Date	Details	Approved
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	J. Patterson

**Strathcona**  
County

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### Low Pressure Sewer Buried Valve Detail

Approved: M. MacGarva, M.Eng., P.Eng.

Checked: L. Knorr, P.Eng.

Date: 2003/02/10

Scale: N.T.S.

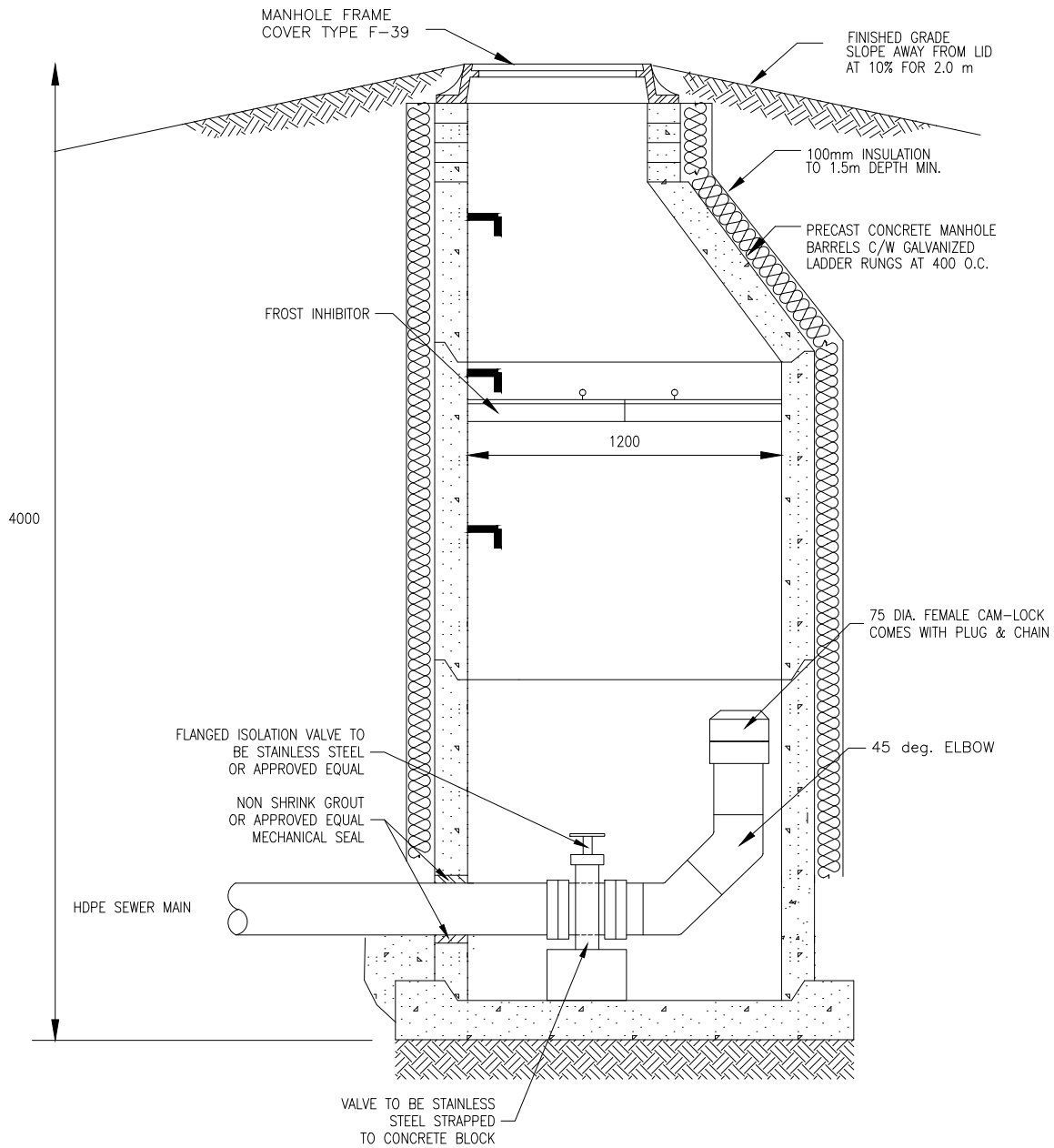
Drawn: D. Boudreau, C.Tech.

Drawing Name:

**52002**

Utilities Department

# FLUSHING PIPE



## NOTES:

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. EXTERIOR OF MANHOLE TO BE INSULATED WITH 100mm H160 STYROFOAM INSULATION TO AT LEAST 1.5m BELOW GROUND.

## REVISIONS

Date	Details	Approved
11/02/10	Revised Drawing Numbers	O. Butt
2006/03/16	Included manhole for frost protection	J. Patterson
2006/01/19	Final Revisions for Approval	J. Patterson

**Strathcona**  
County

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## Low Pressure Sewer Flushing Pipe Detail

Approved: M. MacGarva, M.Eng., P.Eng.

Checked: L. Knorr, P.Eng.

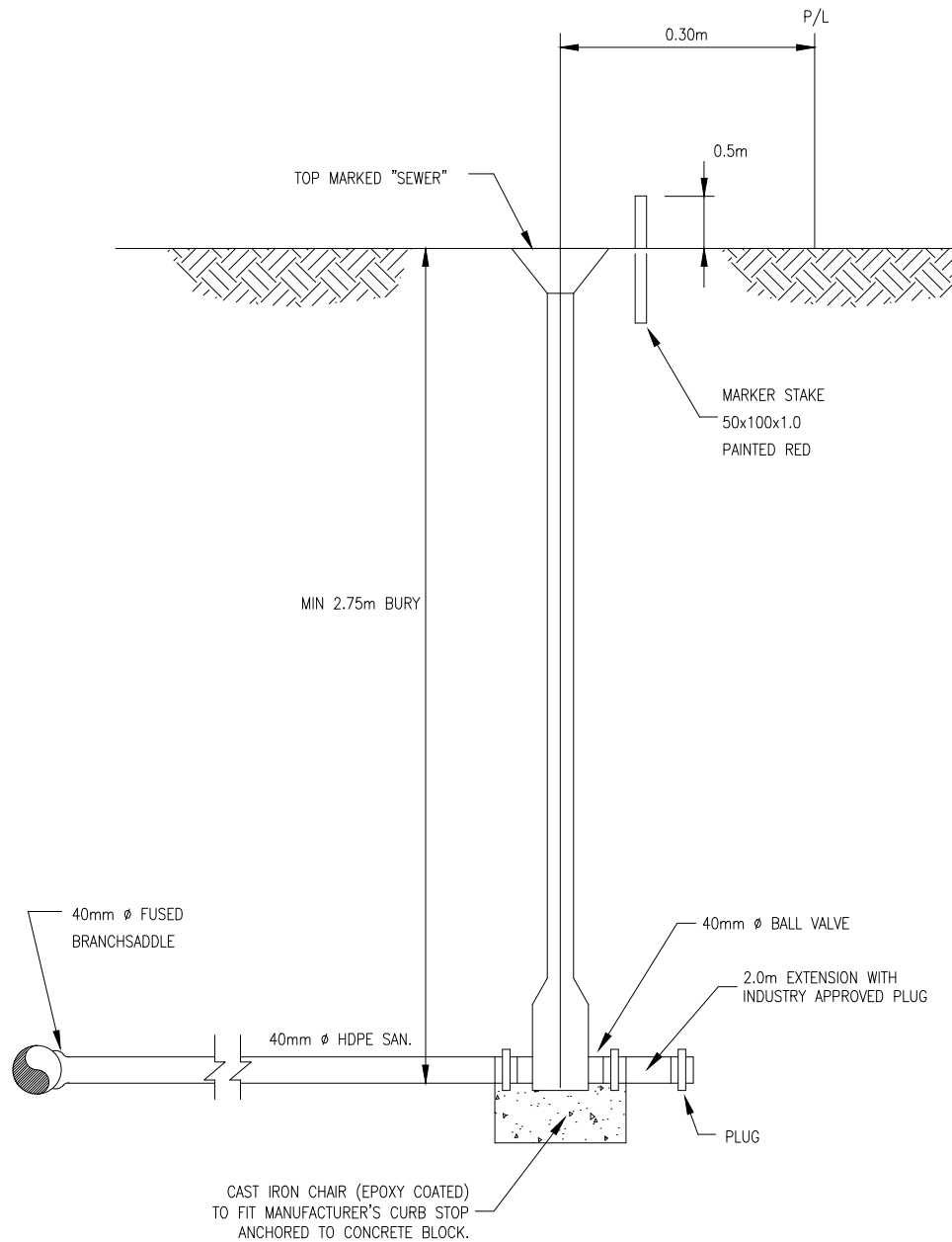
Date: 2003/02/10 Scale: N.T.S. Drawn: D. Boudreau, C.Tech.

Drawing Name:

**52003**

Utilities Department

# SERVICE CONNECTION



## NOTES:

1. CURB STOP AND BOX TO BE EPOXY COATED TO PREVENT CORROSION. ALL TRIM TO BE STAINLESS STEEL.
2. ALL CURB STOPS TO BE NON-DRAINING.
3. TRACER WIRE TO SURFACE ON SELECTED SERVICE BOXES.
4. SERVICES ARE COPPER PIPE SIZE (CPS).

## REVISIONS

Date	Details	Approved
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	J. Patterson

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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## Low Pressure Sewer Service Connection Detail

Approved: M. MacGarva, M.Eng., P.Eng.

Checked: L. Knorr, P.Eng.

Date: 2003/02/10

Scale: N.T.S.

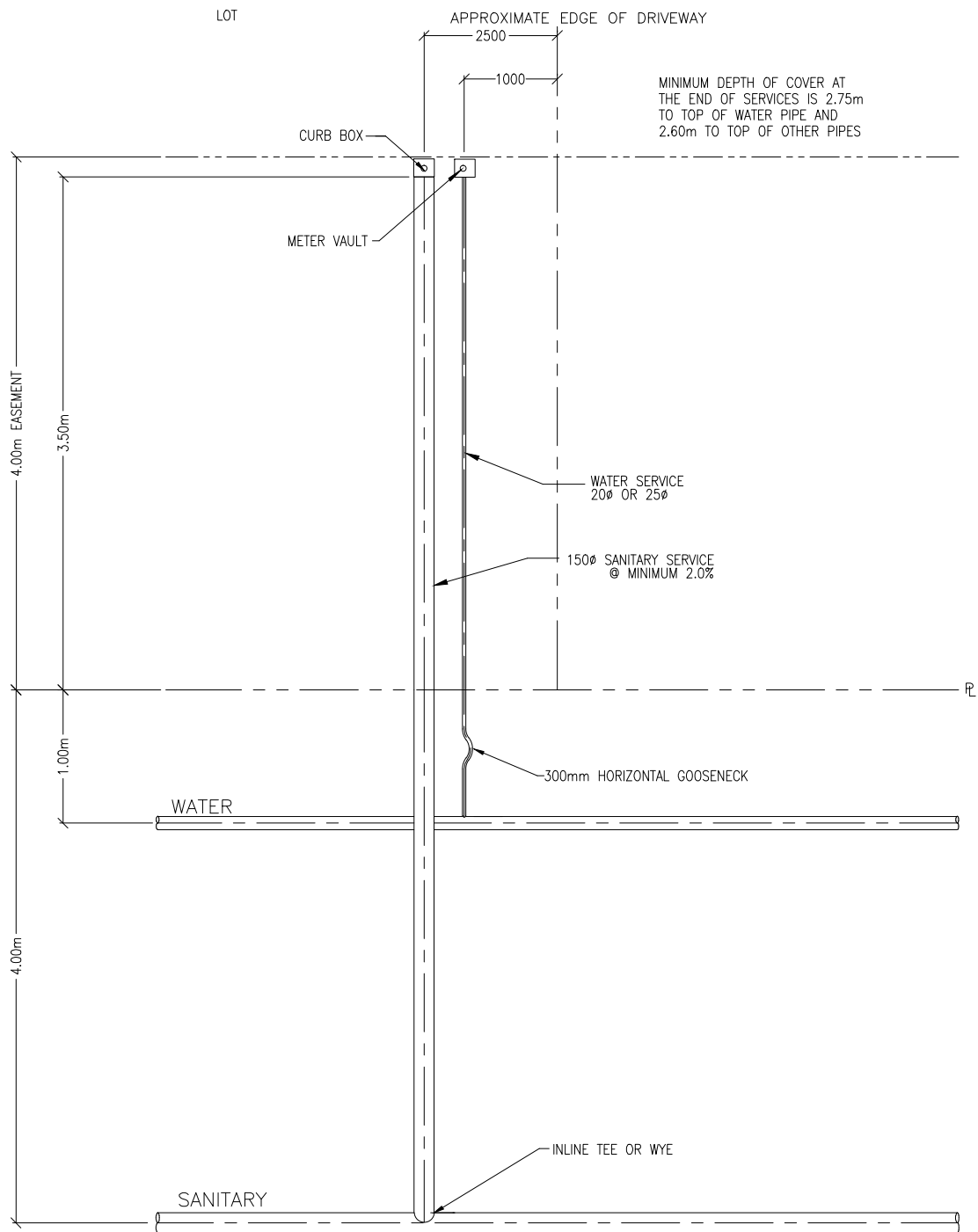
Drawn: D. Boudreau, C.Tech.

Drawing Name:

**52004**

Utilities Department

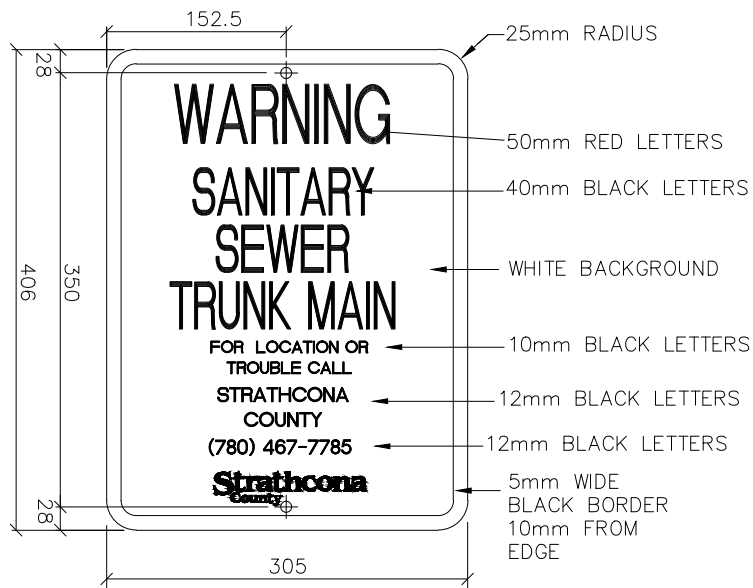




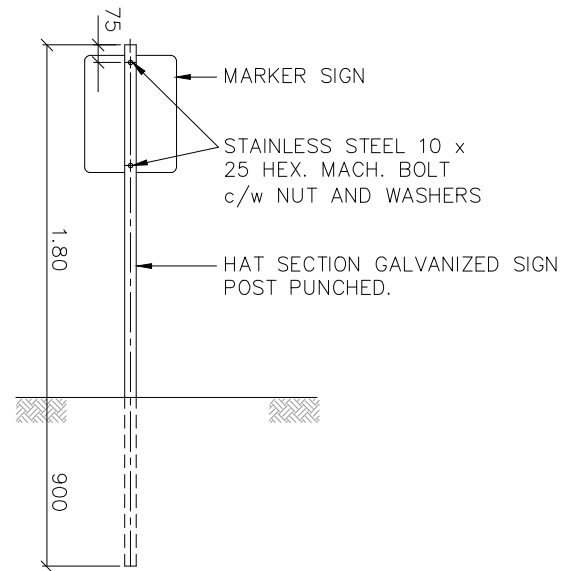
NOTES:

1. FOR SERVICES TO LOTS ON THE OPPOSITE SIDE OF THE STREET, THE SAME GENERAL ARRANGEMENT IS REQUIRED.
2. AUGERED INSTALLATION IS REQUIRED UNDER PROPOSED OR EXISTING STREETS AND SIDEWALKS.
3. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.

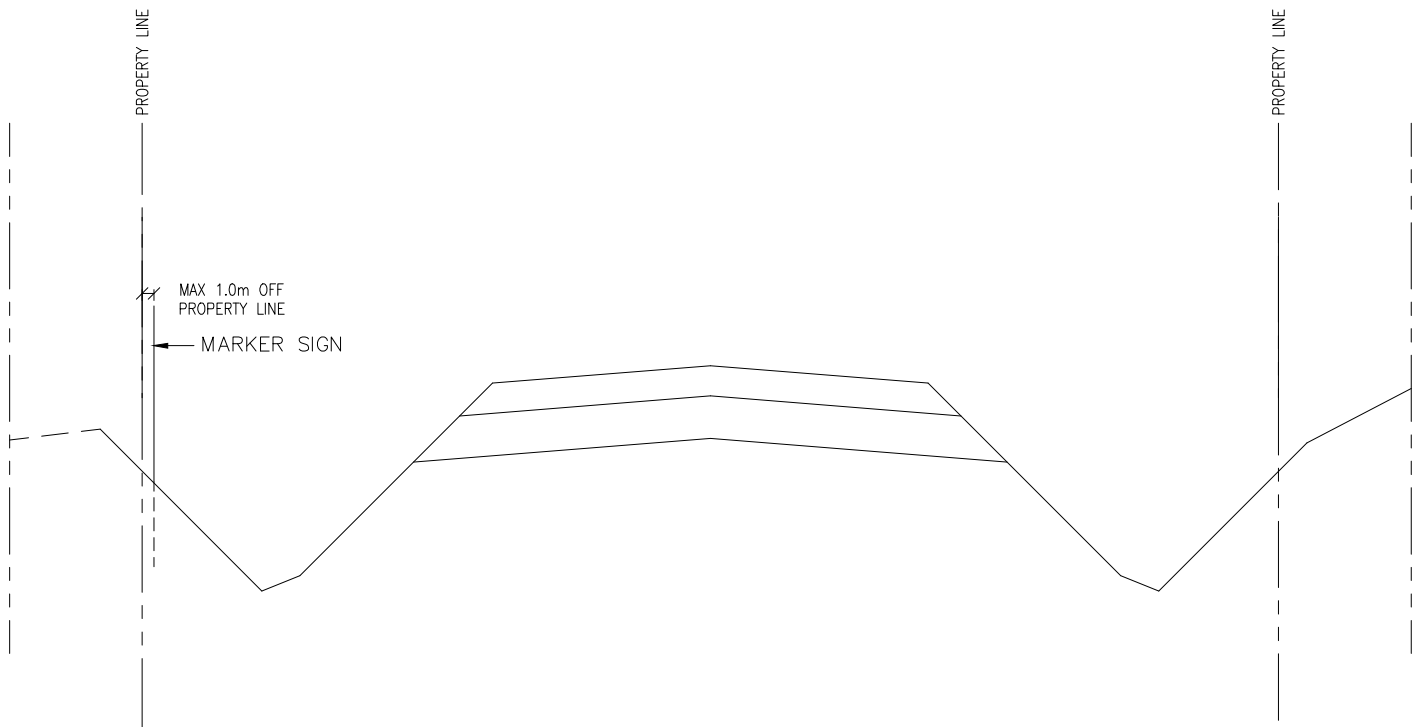
REVISIONS			Strathcona County		
Date	Details	Drawn	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		
			© 2011		
			Single Family Lot Service Connection		
			Approved: M. MacGarva, M.Eng., P.Eng.		Drawing Name:
11/02/10	Revised Drawing Numbers	O. Butt	Checked: L. Knorr, P.Eng.		52005
2006/01/20	Final Revisions for Approval	R. Dekker	Date: 2006/01/18	Scale: 1:50	
			Drawn: James Patterson, C.E.T.		
			Utilities Department		



SANITARY SEWER WARNING SIGN

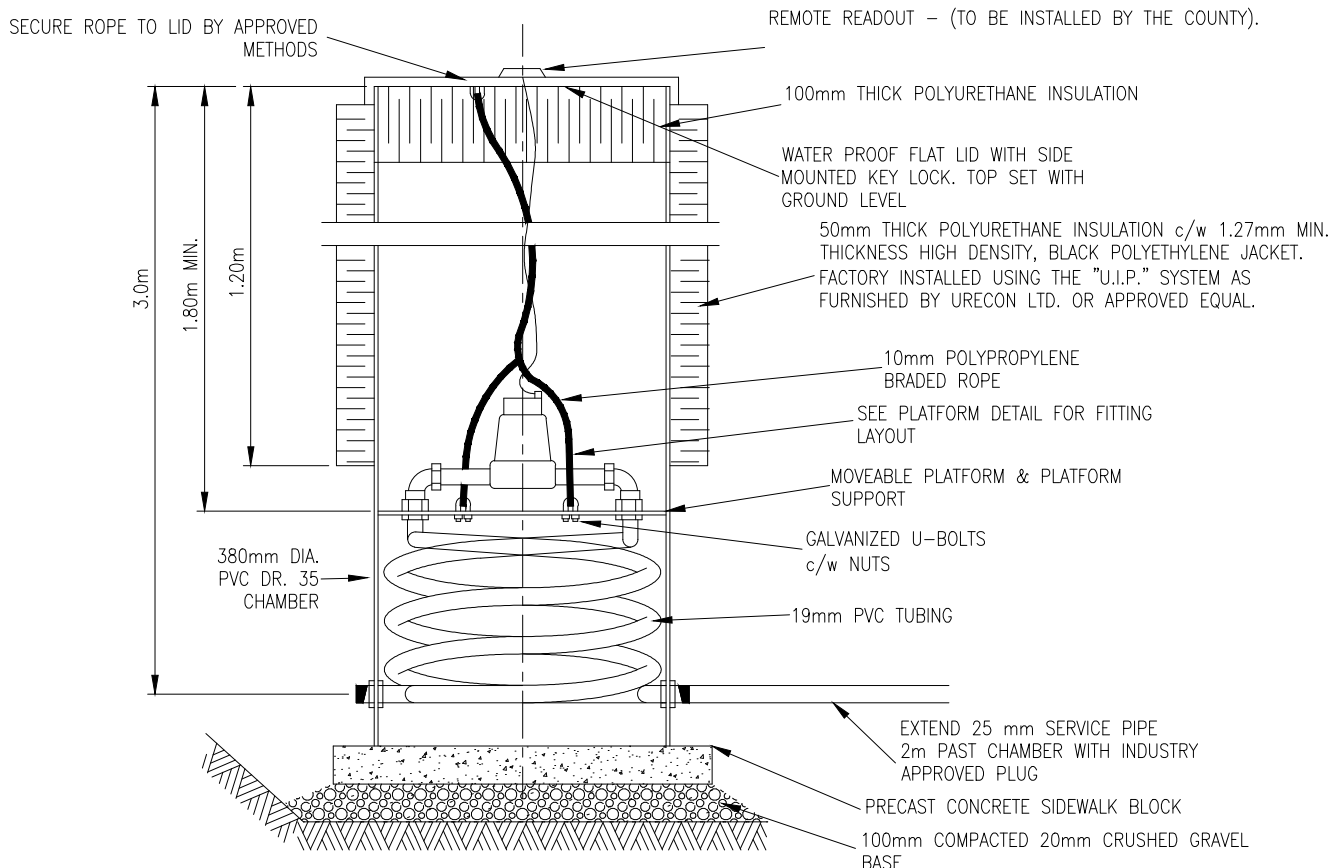


WARNING SIGN POST

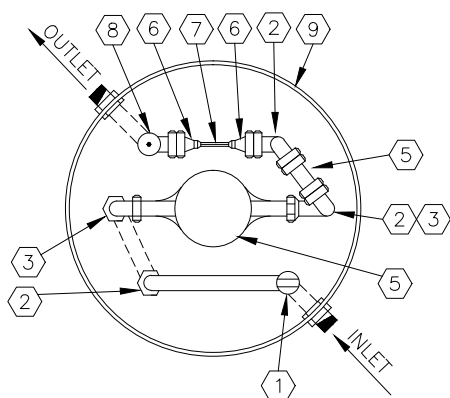


NOTE:  
SIGNS TO BE PLACED ON BOTH SIDES OF EVERY ROAD CROSSING, EVERY PROPERTY FENCE LINE,  
AT ALL MAJOR APPURTANCES AND AT A MINIMUM OF EVERY 1 km ALONG THE ALIGNMENT.

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Approved			
			Typical Buried Sanitary Sewer Warning Sign		
11/07/22	Revised Sign Spacing	J. Orr	Approved: M. Hanley, M.Eng., P.Eng.		Drawing Name:
11/02/11	Revised Drawing Numbers	O. Butt	Checked: S. Olson, P.Eng.		52006
2006/01/19	Final Revisions for Approval	J. Patterson	Date: 2000/02/08	Scale: N.T.S. Drawn: D. Boudreau, C.Tech.	
			Utilities Department		



## SECTION



## PLAN

### KEY TO NUMBERED PARTS

1. 19mm ANGLE VALVE – FORD AV41 OR EQUIVALENT
2. 19mm QUARTER BEND – CANADIAN BRASS LTD. OR EQUIVALENT
3. 19mm QUARTER BEND WITH METER COUPLING – MUELLER OR EQUIVALENT
4. SENSUS 3/4" FULL FLOW METER c/w REMOTE READOUT SYSTEM (SUPPLIED AND INSTALLED BY THE COUNTY).
5. 19mm WATTS SERIES 7 DUEL CHECK BACKFLOW PREVENTER
6. 19mm x 9.5mm REDUCER – CANADIAN BRASS LTD. OR EQUIVALENT
7. FLOW REGULATOR – DOLE GA SERIES OR EQUIVALENT (0.50 igpm)
8. 19mm TEE AND PLUG – CANADIAN BRASS LTD. OR EQUIVALENT
9. 380mm DIA. METER VAULT – MUELLER THERMAL COIL

NOTE: COILED PVC TUBING HAS BEEN OMITTED FOR CLARITY

### REVISIONS

Date	Details	Approved
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	J. Patterson

**Strathcona**  
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### Typical Rural Water 25mm Residential Meter Chamber Detail

Approved: M. MacGarva, M.Eng., P.Eng.

Checked: L. Knorr, P.Eng.

Date: 2000/02/08

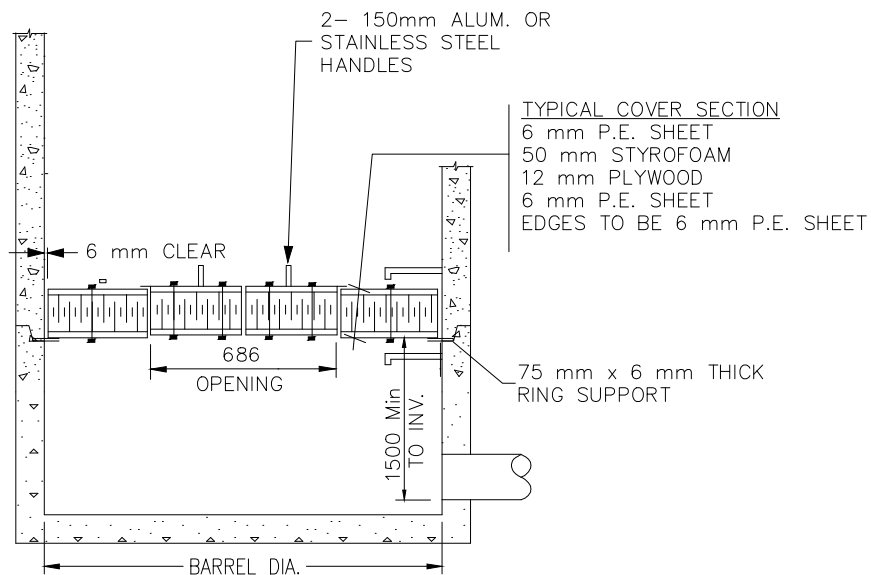
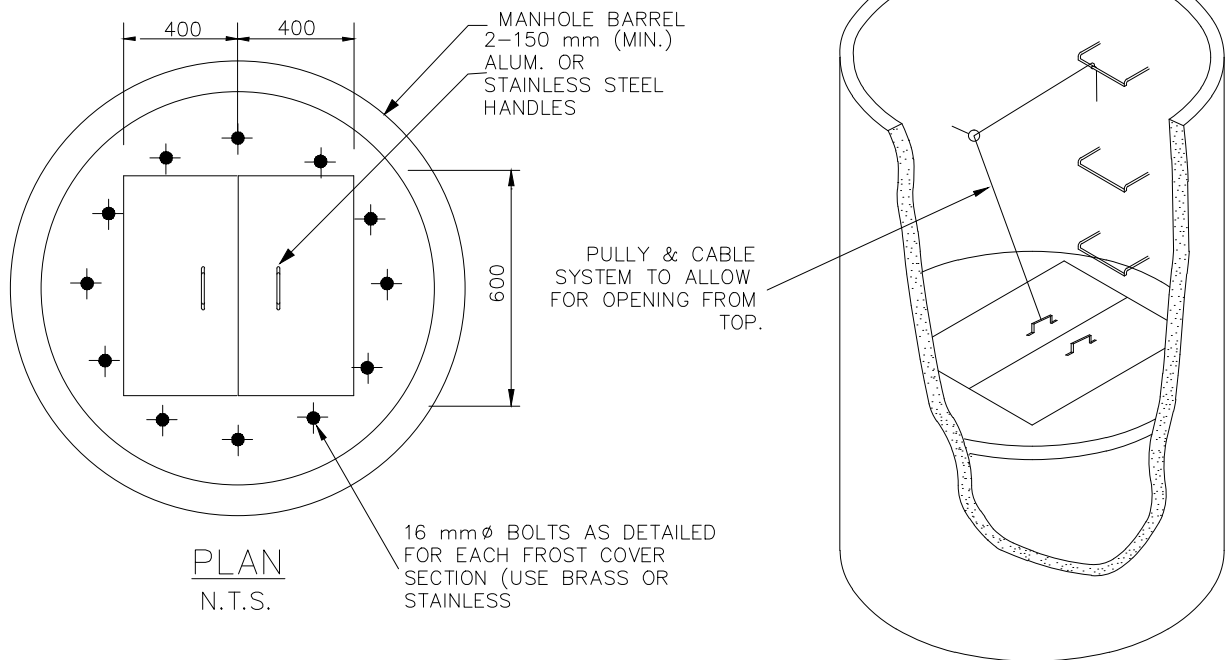
Scale: N.T.S.

Drawn: D. Boudreau, C.Tech.

Drawing Name:

**53001**

Utilities Department

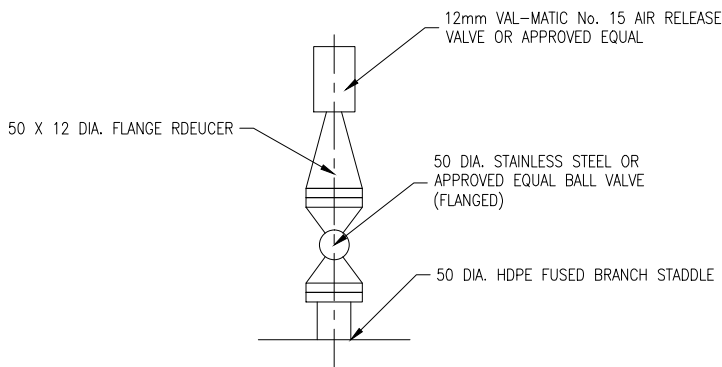


SECTION  
N.T.S.

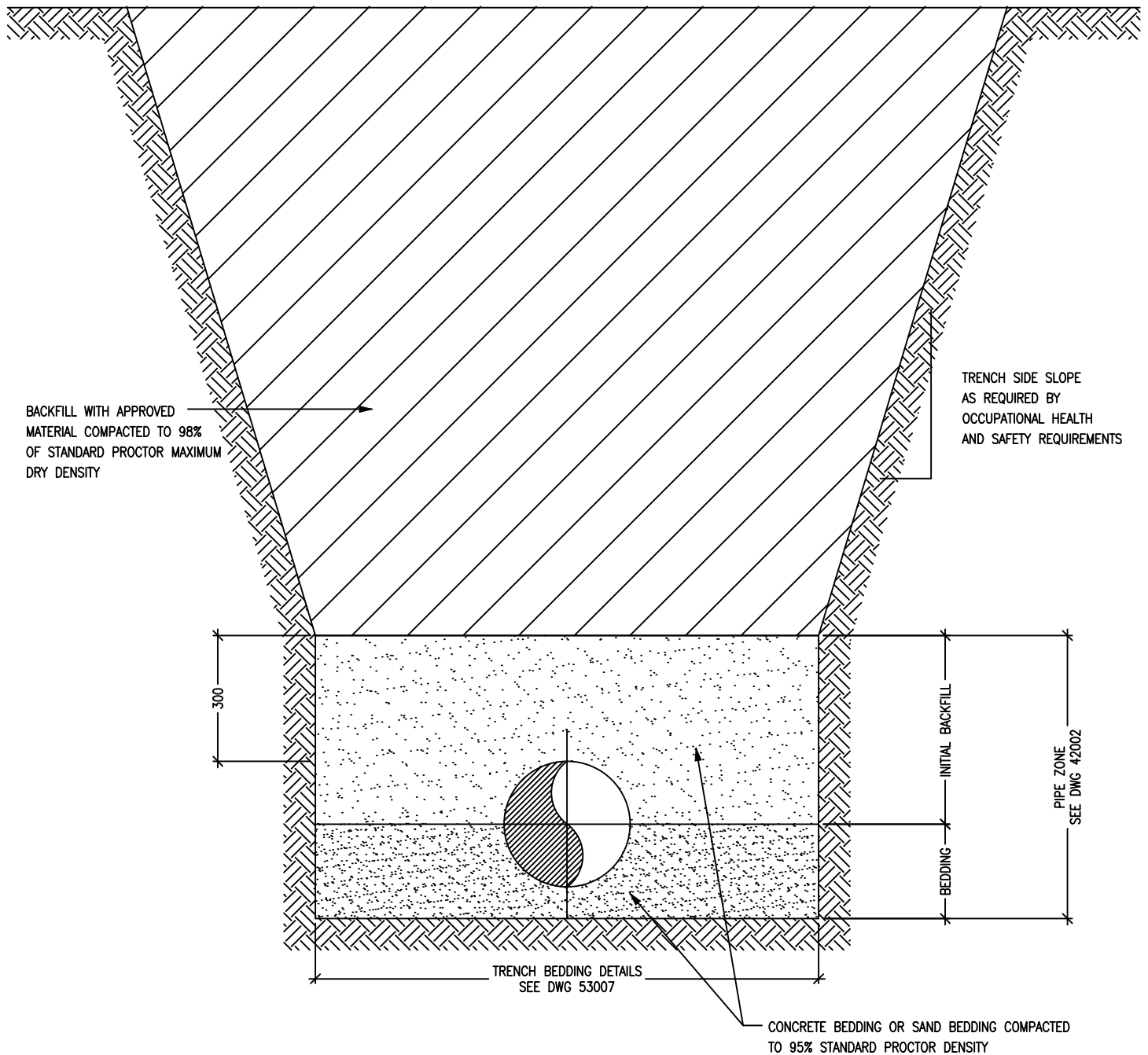
NOTES:

1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES.
2. PULLY & CABLE SYSTEM FOR OPENING FROM TOP AS PER ENGINEER'S INSTRUCTION.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011		
Date	Details	Approved			
			<b>Typical Rural Water Manhole Frost Cover Detail</b>		
11/02/10	Revised Drawing Numbers	O. Butt	Approved: M. MacGarva, M.Eng., P.Eng. Checked: L. Knorr, P.Eng.		
2006/01/19	Final Revisions for Approval	J. Patterson	Date: 2000/02/08 Scale: N.T.S. Drawn: D. Boudreau, C.Tech.		
			<b>Drawing Name:</b> <b>53002</b> <small>Utilities Department</small>		



REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Approved	Typical Rural Water Automatic Air-Vent Manhole		
			Approved: M. MacGarva, M.Eng., P.Eng.		Drawing Name:
11/02/10	Revised Drawing Numbers	O. Butt	Checked: L. Knorr, P.Eng.		53003
2006/01/19	Final Revisions for Approval	J. Patterson	Date: 2000/02/08	Scale: N.T.S. Drawn: D. Boudreau, C.Tech.	
			Utilities Department		



# NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.

## REVISIONS

Date Details Drawn

19/08/19	Updated Drawing Reference	P. Tomko
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	J. Patterson

**Strathcona**  
County

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## Trenching Detail

Approved: M. MacGarva, M.Eng., P.Eng.

Drawing Name:

Checked: L. Knorr, P.Eng.

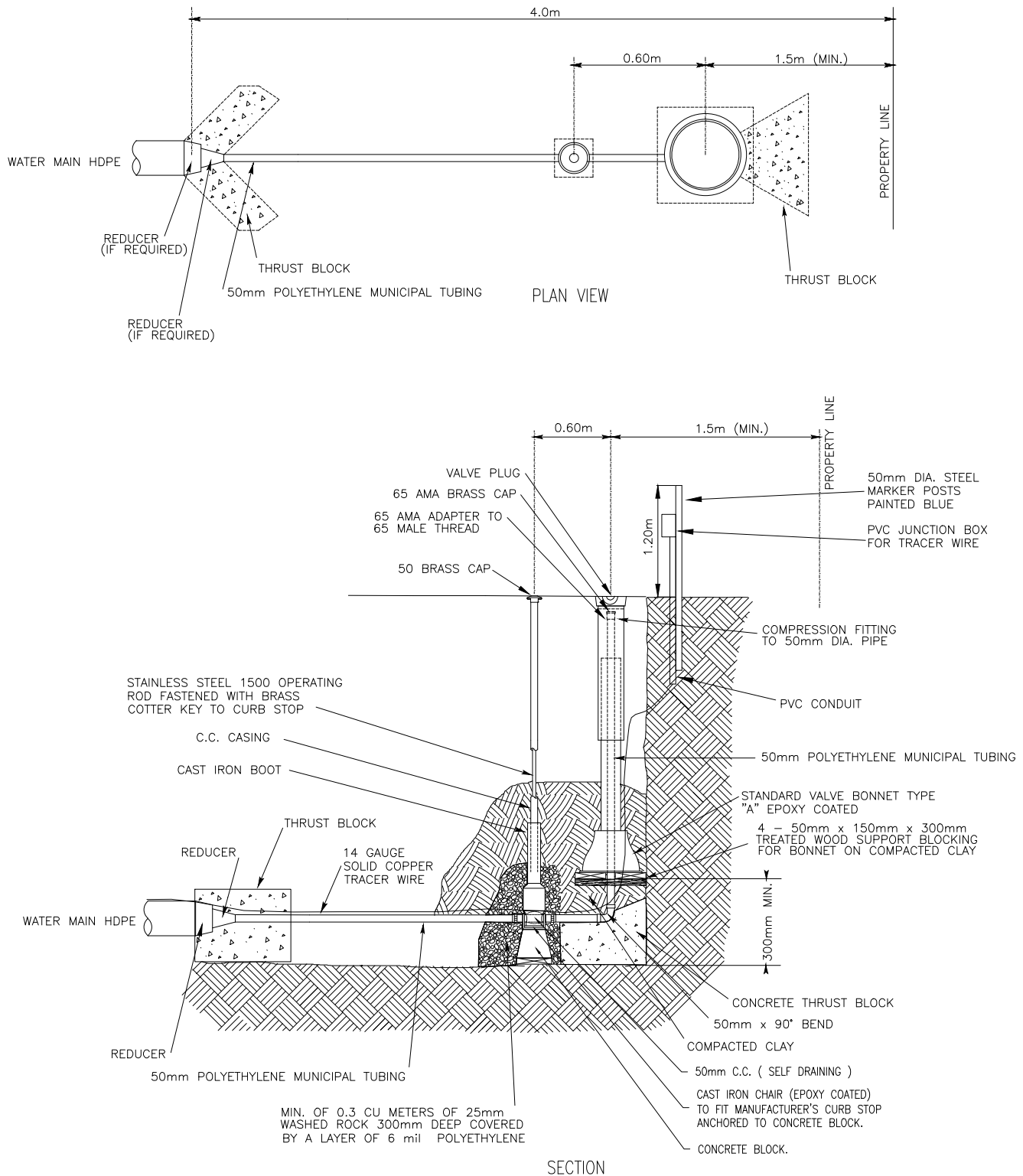
**53004**

Date: 1998/02/04

Scale: 1:15

Drawn: T.S. Wyman, P.Eng.

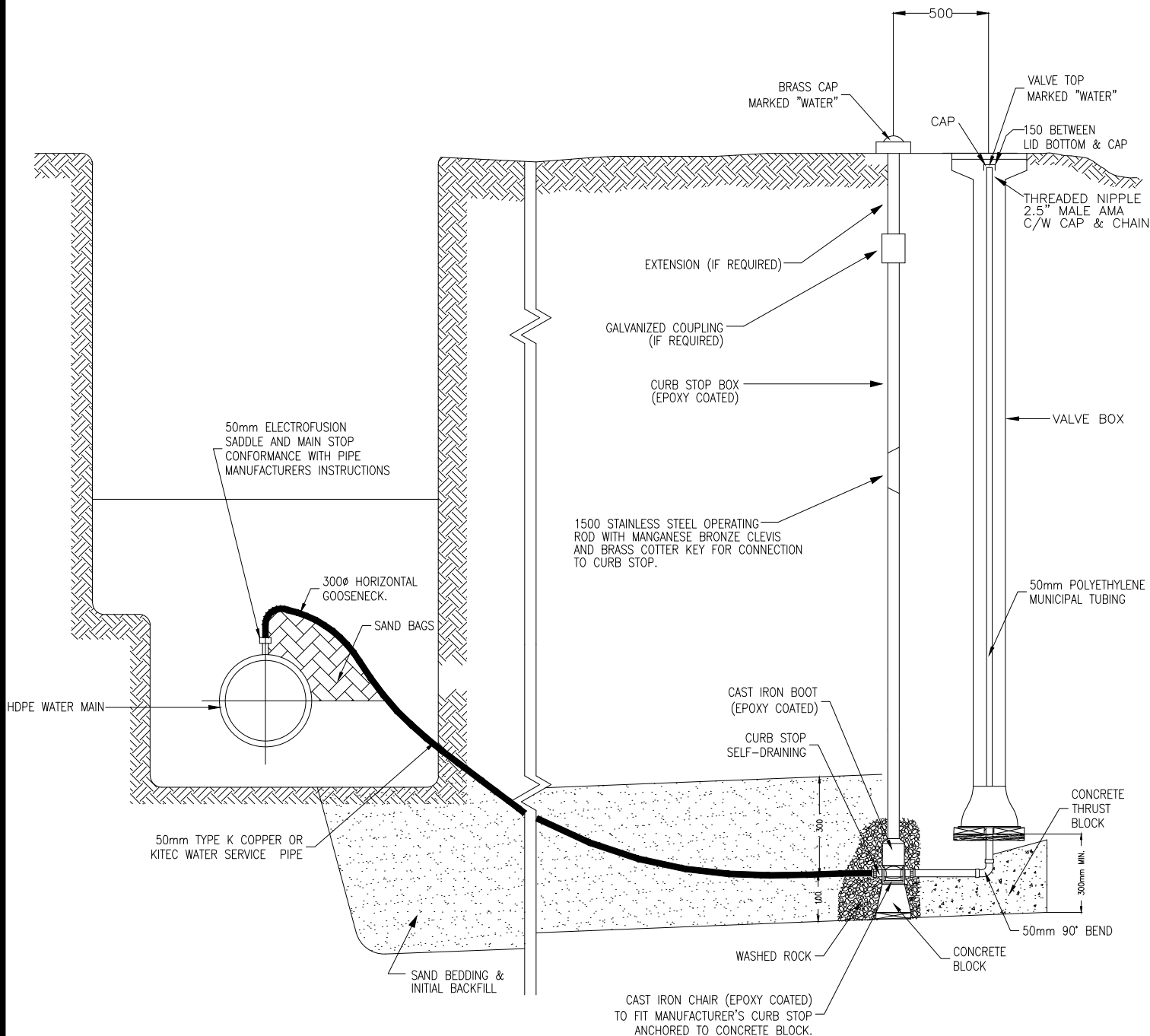
Engineering & Environmental Planning Department



**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. WATERMAIN SIZE VARIES - 50mm/75mm/100mm/150mm

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011		
Date	Details	Approved			
			<b>Typical Rural Water Blow-Off Valve</b>		
11/02/10	Revised Drawing Numbers	O. Butt	Approved: M. MacGarva, M.Eng., P.Eng. Checked: L. Knorr, P.Eng.		
2006/01/19	Final Revisions for Approval	J. Patterson	Date: 2000/02/08	Scale: N.T.S.	Drawing Name: <b>53005</b> Utilities Department

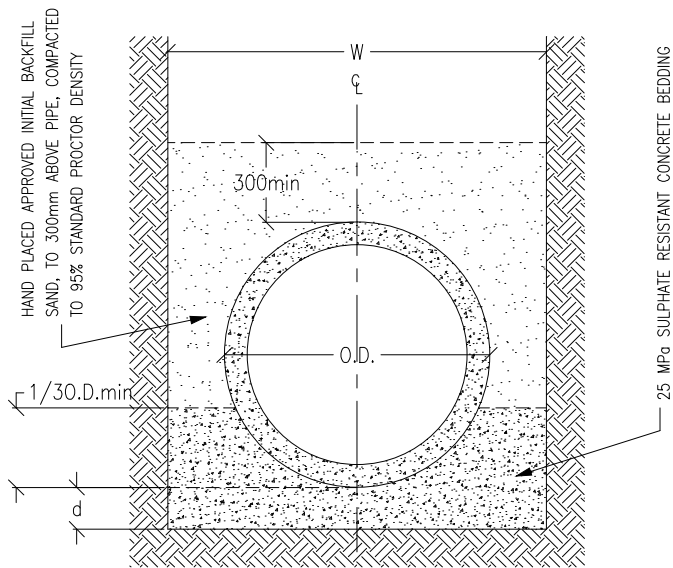


- NOTES:
1. LINE SHALL BE ONE CONTINUOUS PIECE.
  2. INVERT ELEVATION SHALL BE 2.80m BELOW ESTABLISHED FINISHED GRADE,
  3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

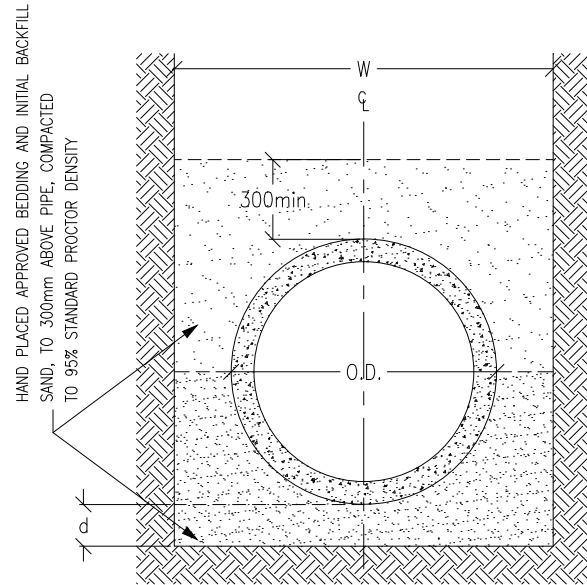
REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>			
Date	Details	Drawn				
			Rural Water Air Release			
			Approved: M. MacGarva, M.Eng., P.Eng.			Drawing Name:  <div>53006</div> <div>Utilities Department</div>
11/02/10	Revised Drawing Numbers	O. Butt	Checked: L. Knorr, P.Eng.			
2006/01/20	Final Revisions for Approval	R. Dekker	Date: 2003/10/03	Scale: N.T.S.	Drawn: James Patterson, C.E.T.	



## CLASS A BEDDING

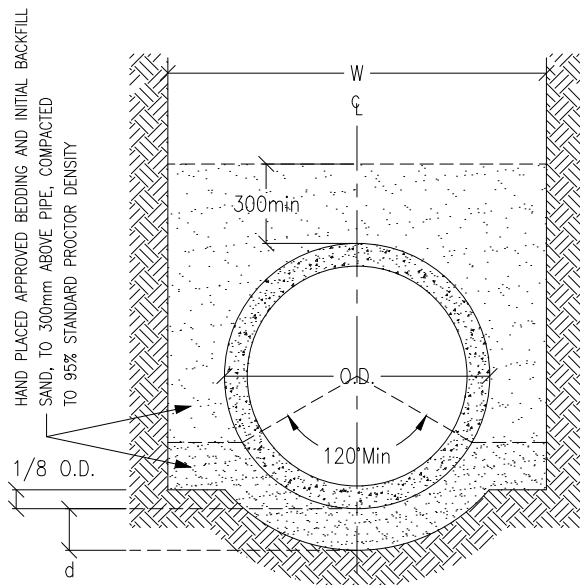


## CLASS B BEDDING



## CLASS B BEDDING

ALTERNATE - 375mm I.D. & UNDER



### NOTES:

W = TRENCH WIDTH FOR CONCRETE PIPE - MAXIMUM - O.D. + 750mm  
- MINIMUM - O.D. + 450mm

O.D. = OUTSIDE PIPE DIAMETER

I.D. = INSIDE PIPE DIAMETER

d = DEPTH OF BEDDING BELOW PIPE

I.D. = 675mm OR SMALLER - d min = 100mm

I.D. = 750mm AND LARGER - d min = 150mm

1. THESE BEDDING TYPES APPLY ONLY WHERE SOLID, SUITABLE SOIL CONDITIONS EXIST. IN AREAS WITH UNSUITABLE SOIL CONDITIONS, SPECIAL BEDDING AND PIPE FOUNDATION DESIGNS ARE REQUIRED.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

### REVISIONS

Date	Details	Drawn
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/20	Final Revisions for Approval	R. Dekker

**Strathcona**  
County

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### Types of Trench Bedding

Approved: M. MacGarva, M.Eng., P.Eng.

Checked: L. Knorr, P.Eng.

Date: 1996/01/11

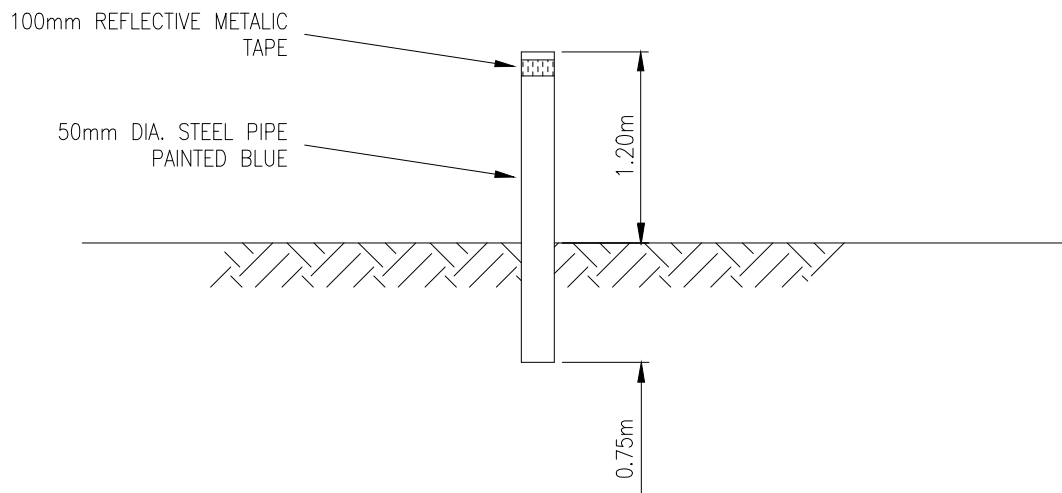
Scale: N.T.S.

Drawn: Alvin Ma, C.E.T.

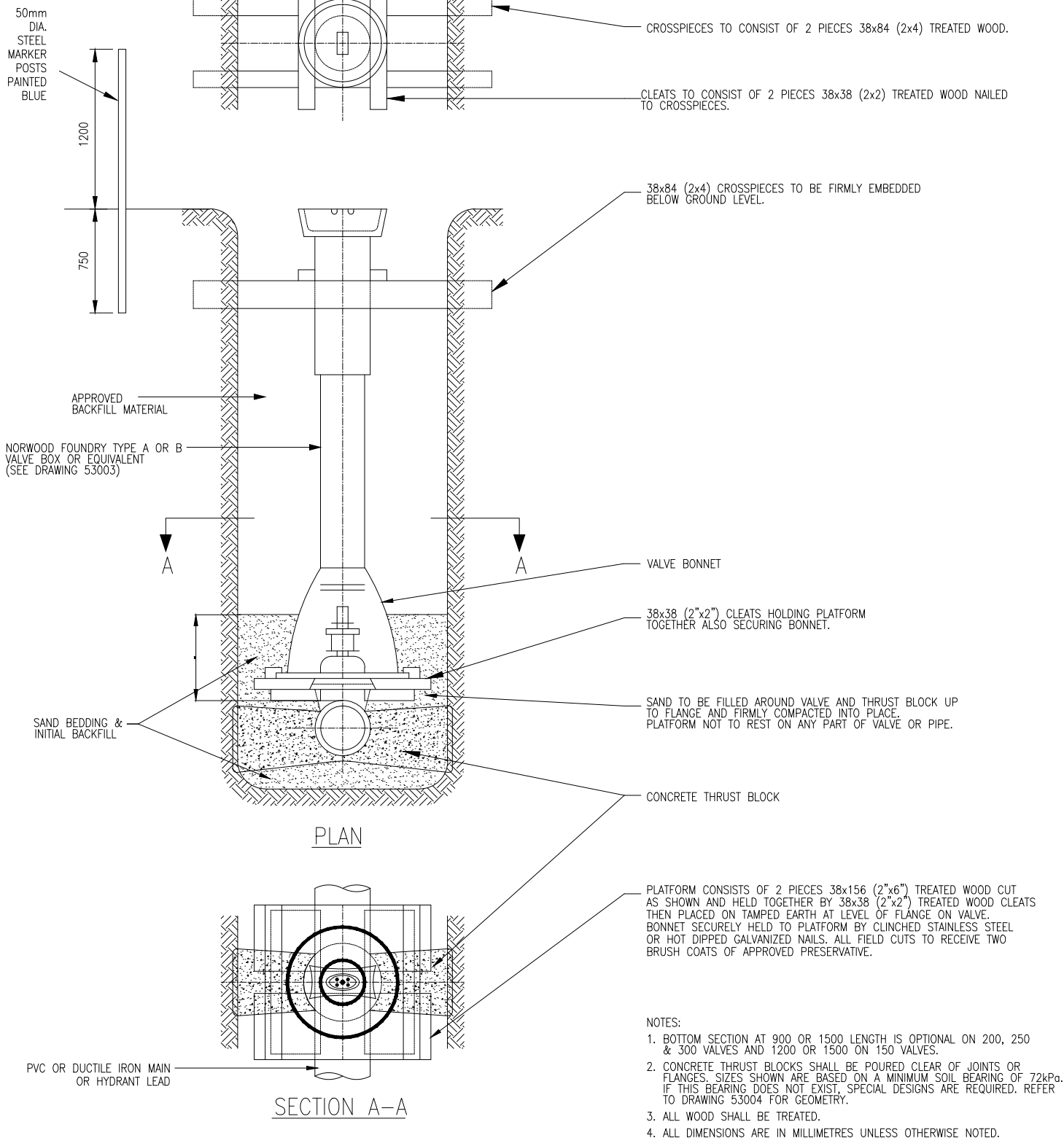
Drawing Name:

**53007**

Utilities Department



REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Approved			
			Typical Rural Water Marker Post Detail		
			Approved: M. MacGarva, M.Eng., P.Eng.		Drawing Name:
11/02/11	Revised Drawing Numbers	O. Butt	Checked: L. Knorr, P.Eng.		53008 <div>Utilities Department</div>
2006/01/19	Final Revisions for Approval	J. Patterson	Date: 2000/02/22	Scale: N.T.S. Drawn: D. Boudreau, C.Tech.	



## REVISIONS

Date	Details	Drawn
11/02/11	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	J. Patterson

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## STANDARD METHOD OF SUPPORTING VALVES & VALVE BOXES

Approved: M. MacGarva, M.Eng., P.Eng.

Checked: L. Knorr, P.Eng.

Date: 1996/01/24

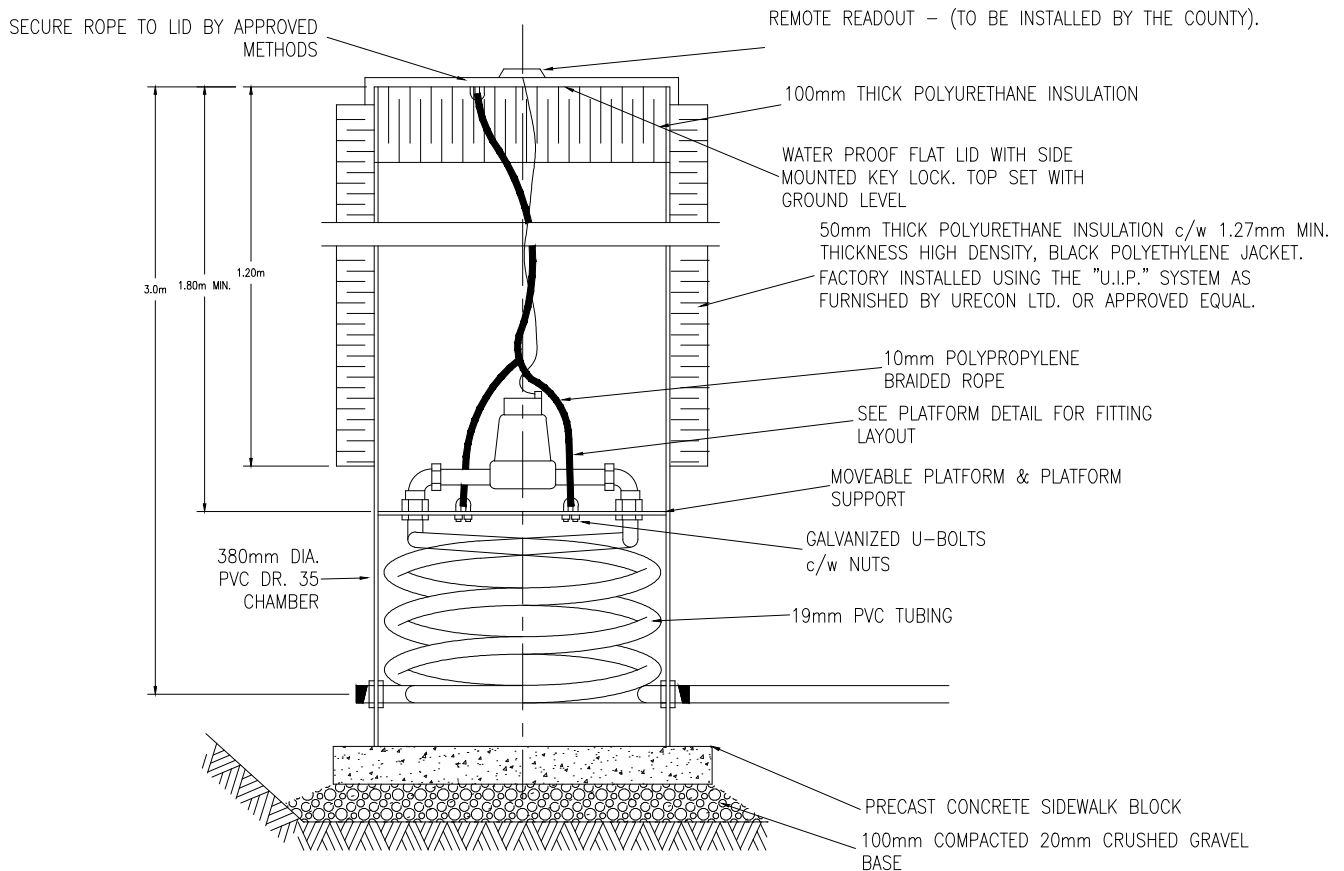
Scale: N.T.S.

Drawn: Alvin Ma, C.E.T.

Drawing Name:

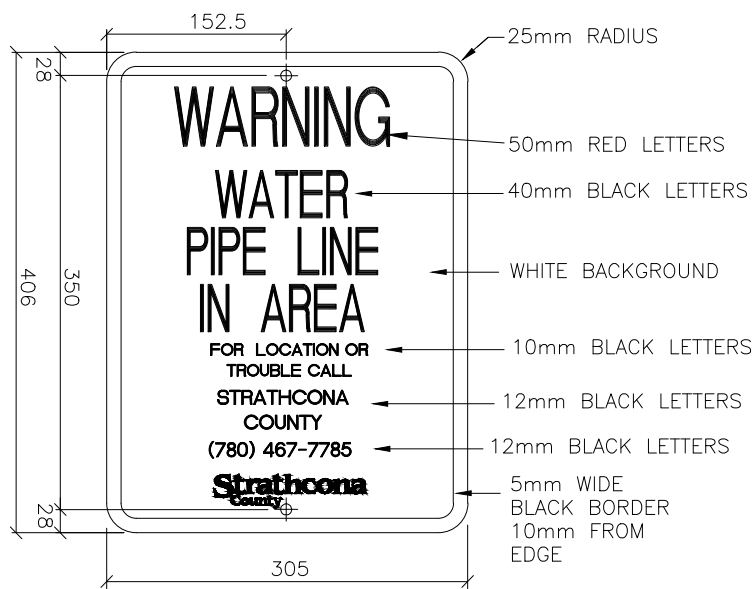
**53009**

Utilities Department

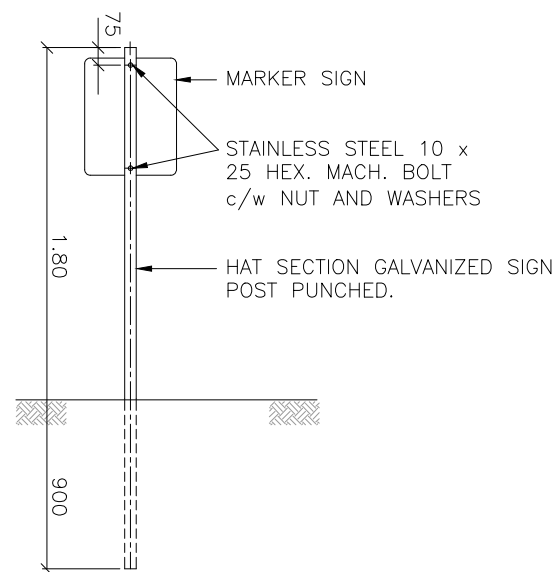


TYPICAL RURAL WATER 25mm RESIDENTIAL METER CHAMBER

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Approved			
			Water Sampling Station		
			Approved: M. MacGarva, M.Eng., P.Eng.		Drawing Name:
11/02/11	Revised Drawing Numbers	O. Butt	Checked: L. Knorr, P.Eng.		53010 <small>Utilities Department</small>
2006/01/20	Final Revisions for Approval	R. Dekker	Date: 2002/12/10	Scale: N.T.S.   Drawn: James Patterson, C.E.T.	



WATERLINE WARNING SIGN



WARNING SIGN POST

NOTE:  
SIGNS TO BE PLACED ON BOTH SIDES OF A ROAD CROSSING, EVERY PROPERTY FENCE LINE, AT ALL VALVES AND APPURTANCES IN RURAL AREAS, AND AT A MINIMUM OF 1km ALONG THE ALIGNMENT.

## REVISIONS

Date	Details	Approved
11/02/10	Revised Drawing Numbers	O. Butt
2006/01/19	Final Revisions for Approval	J. Patterson

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## Typical Buried Water Warning Sign

Approved: M. Hanley, M.Eng., P.Eng.

Checked: S. Olson, P.Eng.

Date: 2000/02/08

Scale: N.T.S.

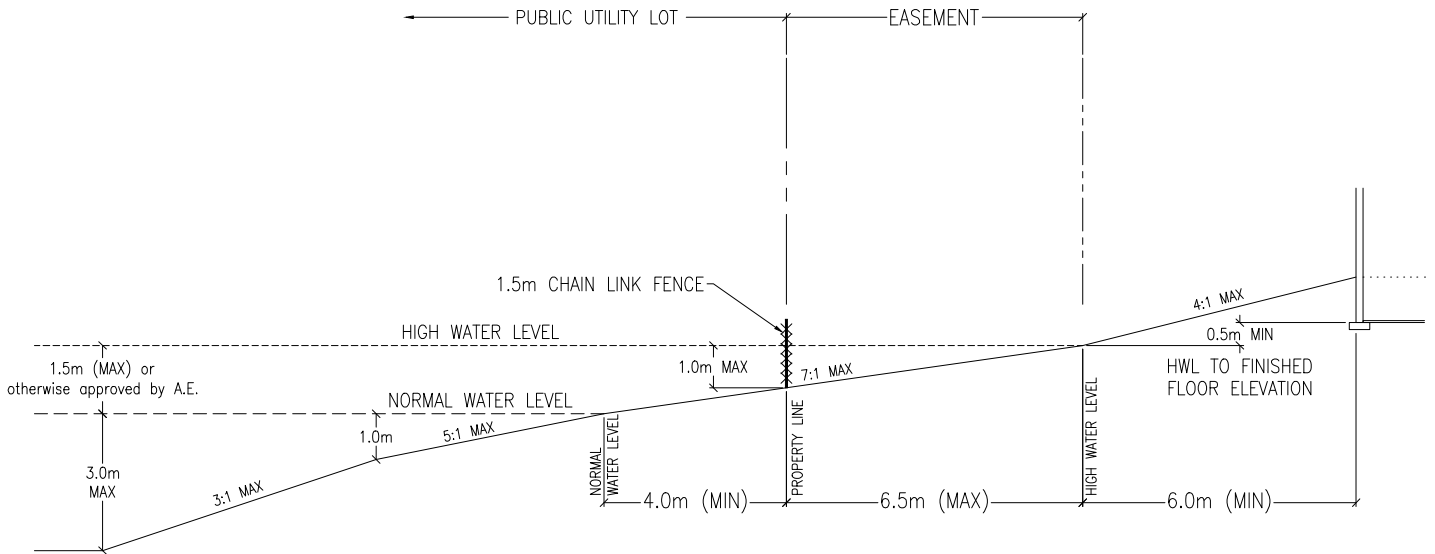
Drawn: D. Boudreau C.Tech.

Drawing Name:

**53011**

Utilities Department

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.



## REVISIONS

Date	Details	Drawn
11/02/11	Revised Drawing Numbers	O. Butt
2006/03/23	Final Revisions for Approval	R. Dekker

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## Cross-Section for a Wet Pond

Approved: M. MacGarva, M.Eng., P.Eng.

Checked: L. Knorr, P.Eng.

Date: 2003/03/12

Scale: 1:150

Drawn: Richard Dekker, R.E.T.

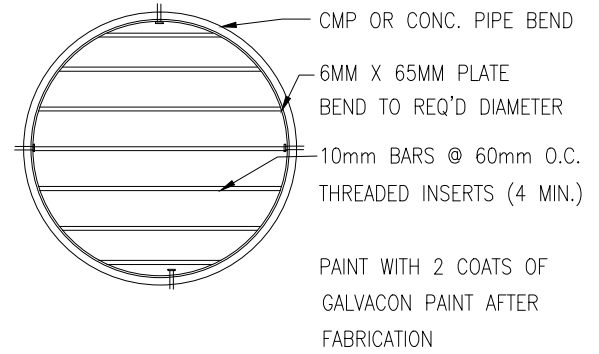
Drawing Number:

**54001**

Utilities Department

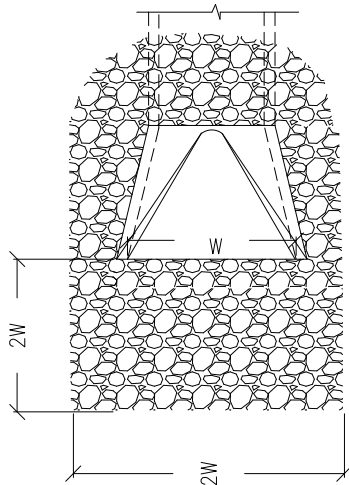
**NOTES:**

FLARED END TO SUIT PIPE (CSP OR CONCRETE)  
 RIP RAP TO BE HAND PLACED -150mm MIN. DIA.  
 INSTALL RODENT GATE AS PER DETAIL  
 RODENT GATE MUST BE REMOVABLE  
 RIP RAP SHALL BE HAND PLACED ROCK COBBLE OR  
 AS SPECIFIED BY THE ENGINEER



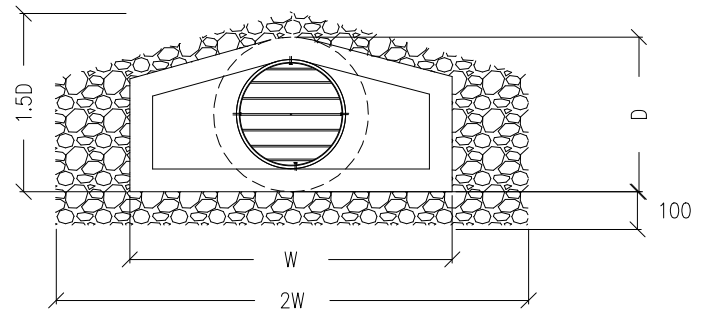
**RODENT GATE**

N.T.S.



**PLAN VIEW**

N.T.S.



**END VIEW**

N.T.S.

**FLARED END SECTION**

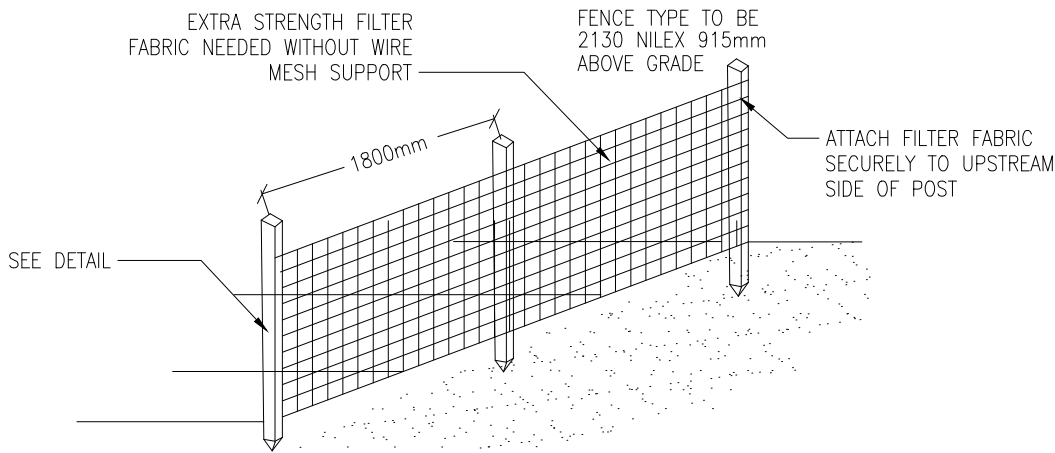
N.T.S.

REVISIONS			Strathcona County		
Date	Details	Drawn	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		
			© 2011		
			Stormwater Outlet Pipe Detail		
			Approved: M. MacGarva, M.Eng., P.Eng.		Drawing Number:
11/02/11	Revised Drawing Numbers	O. Butt	Checked: L. Knorr, P.Eng.		54002 <small>Utilities Department</small>
2006/03/23	Final Revisions for Approval	J. Patterson	Date: 2002/08/29	Scale: N.T.S.	



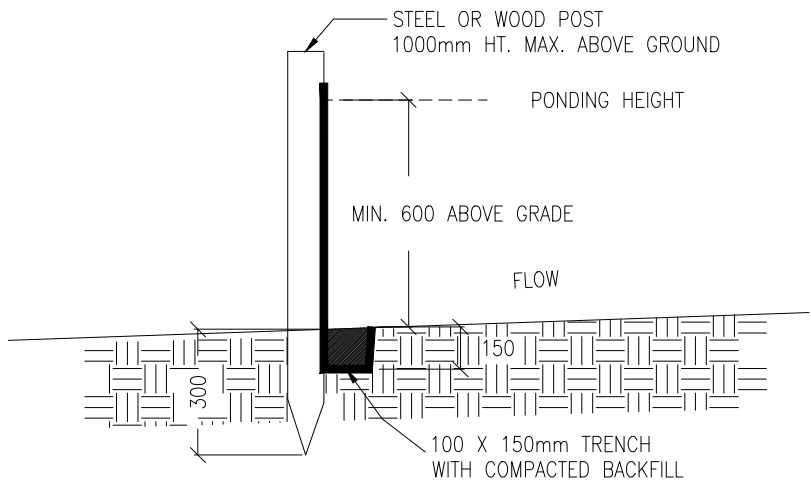
NOTES:

WOVEN WIRE FABRIC TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES  
ADJOINING FILTER CLOTHS SHALL BEOVERLAPPED BY 150mm AND FOLDED  
SEDIMENT SHALL BE REMOVED WHEN FENCE IS HALF FULL OR LESS  
RODENT GATE MUST BE REMOVABLE  
FENCES TO BE INSPECTED PERIODICALLY FOR DAMAGE AND AFTER SIGNIFICANT RAINFALL



SIDE VIEW

N.T.S.



END VIEW

N.T.S.

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Date	Details	Drawn			
			Silt Fence Detail		
			Approved: M. Hanley, M.Eng., P.Eng.		Drawing Number:  54003 <small>Utilities Department</small>
			Checked: S. Olson, P.Eng.		
11/02/11	Revised Drawing Numbers	O. Butt	Date: 2006/03/24	Scale: N.T.S.	Drawn: James Patterson, C.E.T.

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.

NOTE:  
 -PRUNE ONLY TO REMOVE DEAD,  
 DAMAGED, DISEASED, OR  
 CROSSING WOOD.

STAKING OPTION #1 IF REQUIRED  
 METAL T-BAR (2100mm) EXTENDED  
 INTO UNDISTURBED SOIL. SEE STAKING  
 AND GUYING CHART. STAKES TO BE  
 COLOR CODED ACCORDING TO YEAR OF  
 PLANTING.

BROAD FLEXIBLE MATERIAL  
 ALONG STEM AS PER  
 SPECIFICATION. MONITOR  
 TREE FOR GIRDLING.

SAUCER SHALL BE  
 SOAKED WITH  
 WATER IMMEDIATELY  
 AFTER PLANTING

BURLAP SHALL BE  
 ROLLED DOWN 1/3  
 PRIOR TO  
 BACKFILLING

UNDISTURBED  
 SOIL

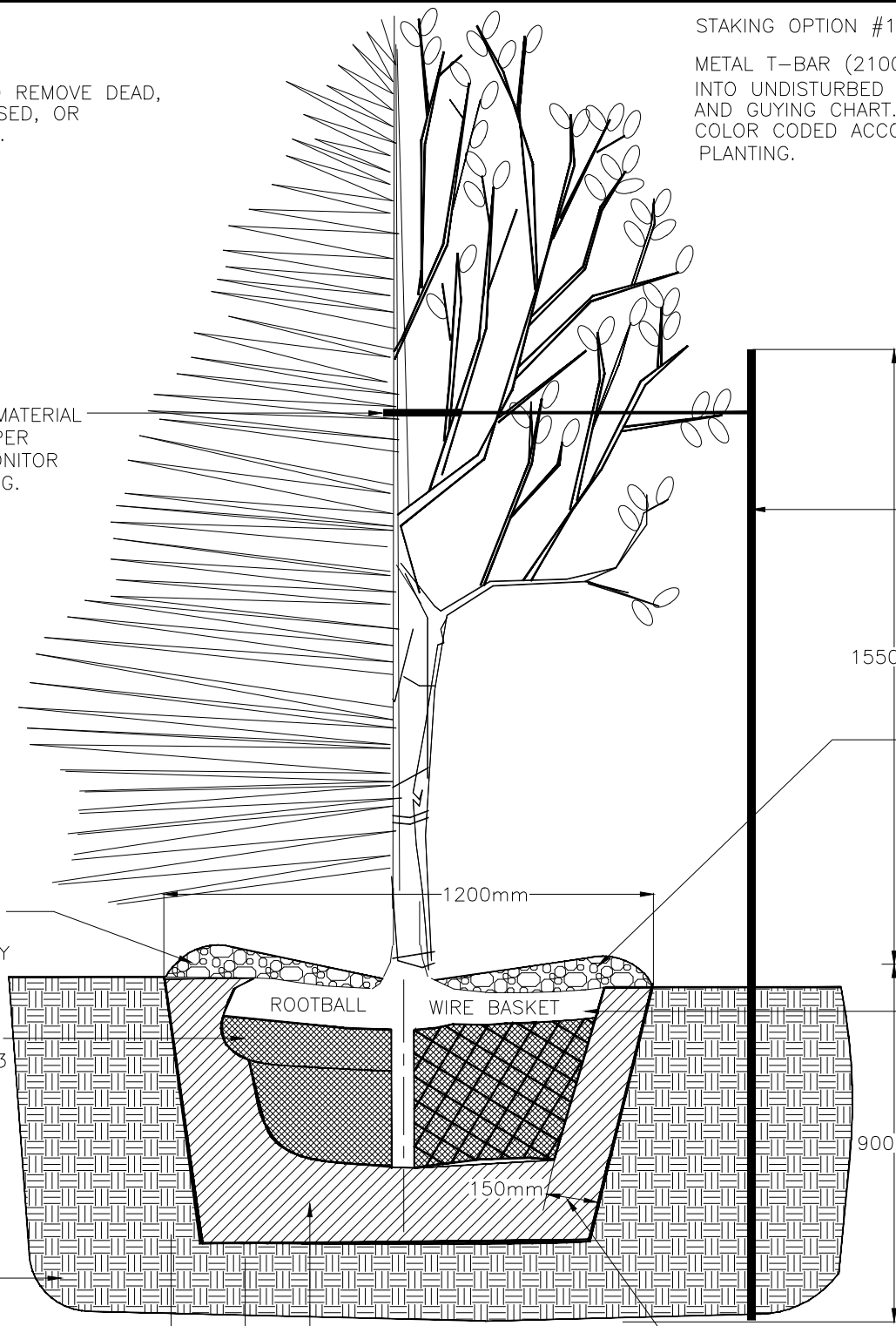
METAL T-BAR TO  
 REMAIN FOR MIN  
 1- MAX 2  
 GROWING SEASONS

MIN. 100 mm  
 SHREDDED MULCH  
 (TO BE TAPERED  
 AT BASE OF  
 TRUNK) AS PER  
 SPECIFICATION  
 APPLIED OVER  
 COLORED PRE-  
 EMERGENT.

TOP OF WIRE  
 BASKET TRIMMED  
 BELOW TOP OF  
 ROOTBALL

BACKFILL NATIVE SOIL  
 OR SOIL MIX  
 1 PART SAND  
 1 PART PEAT MOSS/COMPOST  
 3 PART TOPSOIL

PROVIDE MIN. 150mm COMPACTED SOIL  
 MIX FOR ROOTBALL TO REST ON TO



# REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
06/03/10	Changed mulch & t-bar notes	M. Forgues
02/06/24	Printed	A. McLenaghan
01/12/06	Notes, tree graphic, planting method	A. McLenaghan

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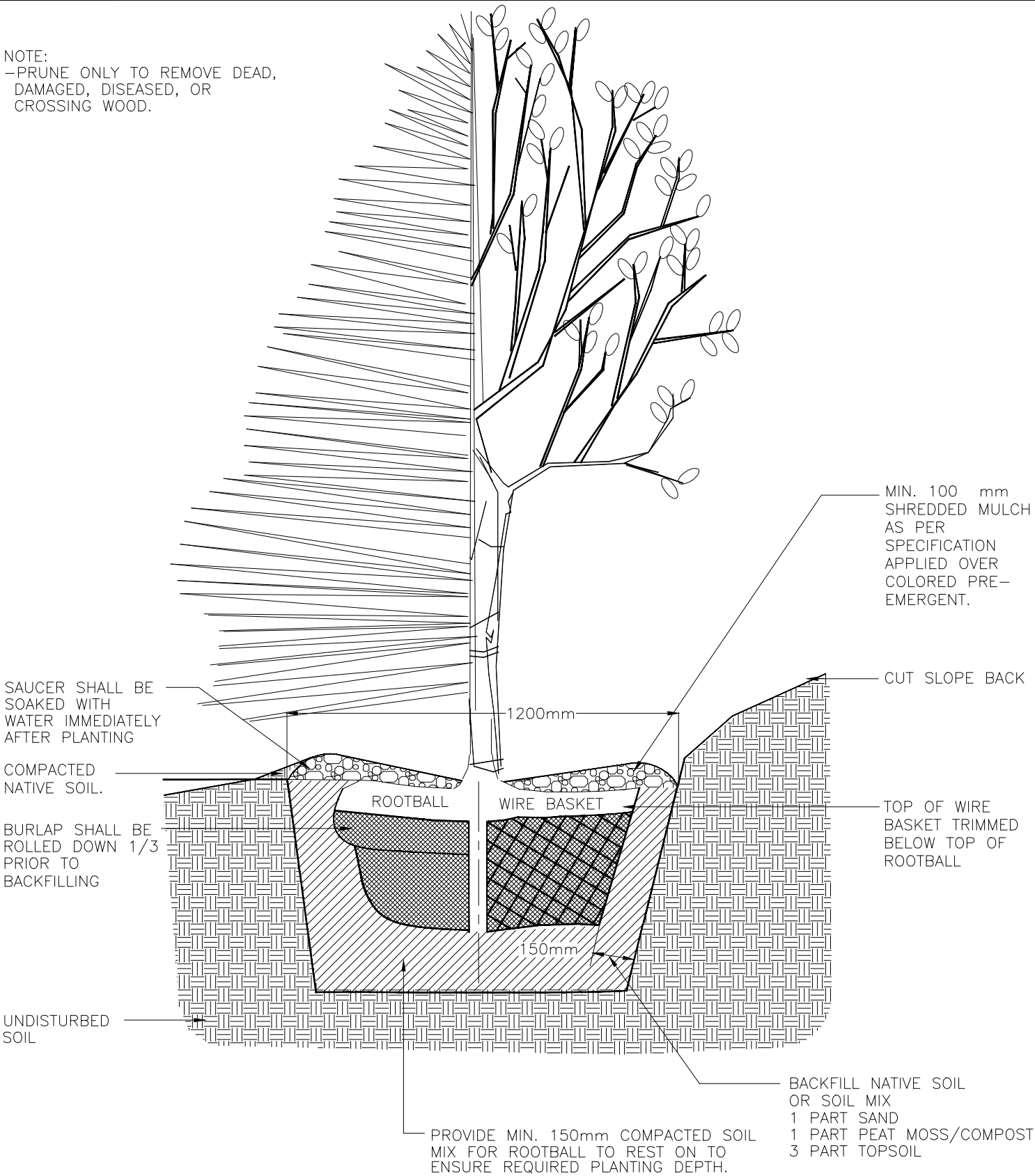
© 2011

## CONIFEROUS/DECIDUOUS TREE PLANTING

Approved: P. Alexander, AALA, CSLA	DWG. NO.
Checked: J.M. Talbot, MLA, CSLA	61001
Date: 03/08/94	Scale: N.T.S.
Drawn: DAN LECKIE	

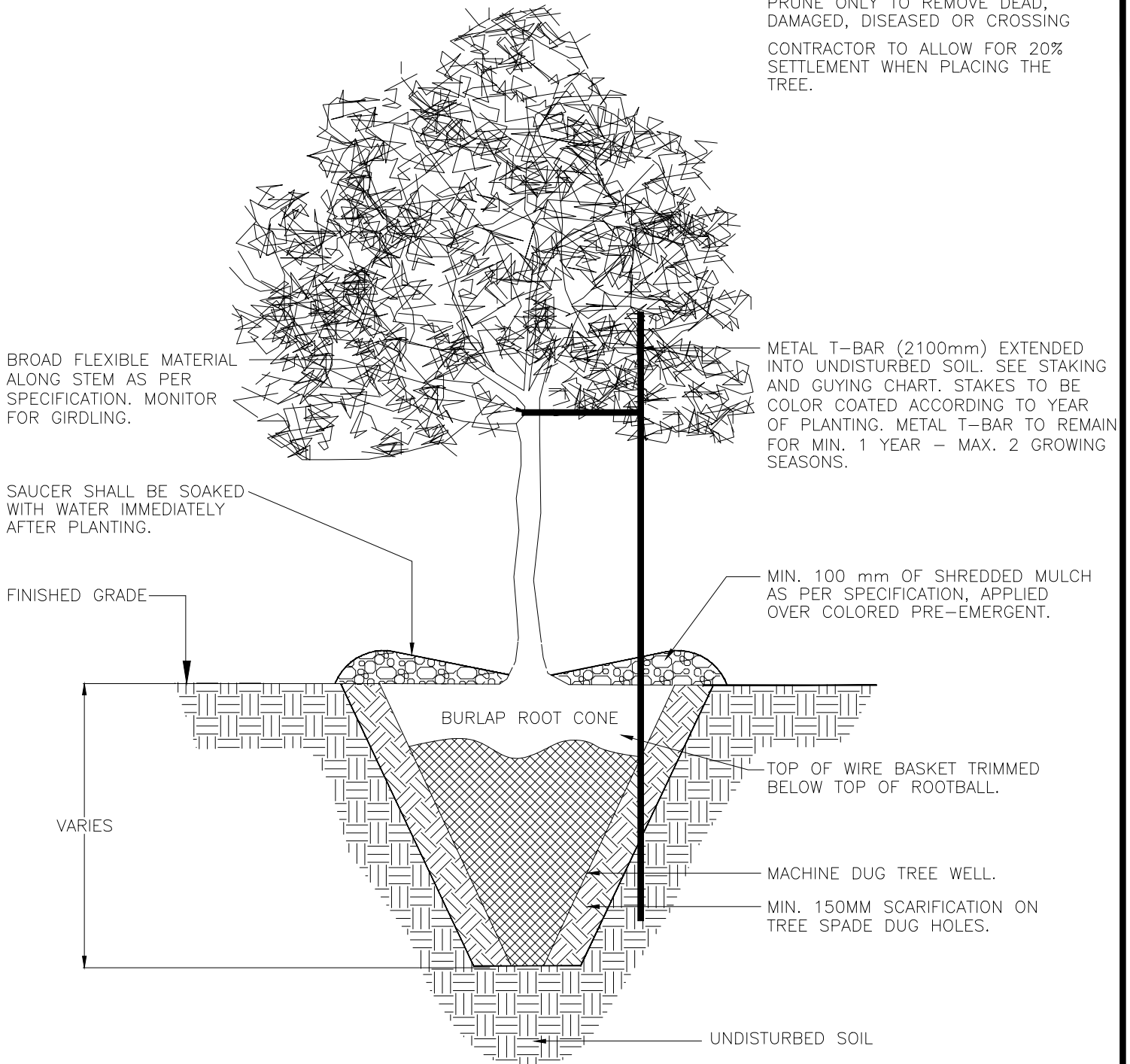
Planning & Development Services Department

NOTE:  
 -PRUNE ONLY TO REMOVE DEAD,  
 DAMAGED, DISEASED, OR  
 CROSSING WOOD.



REVISIONS			<div> <div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> </div> <div>© 2011</div>		
Date	Details	Drawn	TREE PLANTING ON SLOPES		
YY/MM/DD	X	X	Approved: P. Alexander, AALA, CSLA		
11/05/02	REVISED DRAWING NUMBERS	J. ORR	Checked: J.M. Talbot, MLA, CSLA		
11/02/10	REVISED DRAWING NUMBERS	O. Butt	Date: 11/12/01		
06/03/10	Dimension removed from detail	M. Forgues	Scale: N.T.S.		
02/06/24	Printed	A. McLenaghan	Drawn: AMY McLENAGHAN		
			<div>DWG. NO.</div> <div>61002</div> <div>Planning &amp; Development Services Department</div>		

NOTE:  
PRUNE ONLY TO REMOVE DEAD,  
DAMAGED, DISEASED OR CROSSING  
CONTRACTOR TO ALLOW FOR 20%  
SETTLEMENT WHEN PLACING THE  
TREE.



# REVISIONS

Date	Details	Drawn
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
06/03/10	Added scarification	M. Forgues
02/06/24	Printed	A. McLenaghan
11/12/01	Notes, tree staking, mulch	A. McLenaghan

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Alberta, T8A 3W7, CANADA

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## MACHINE DUG TREE

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

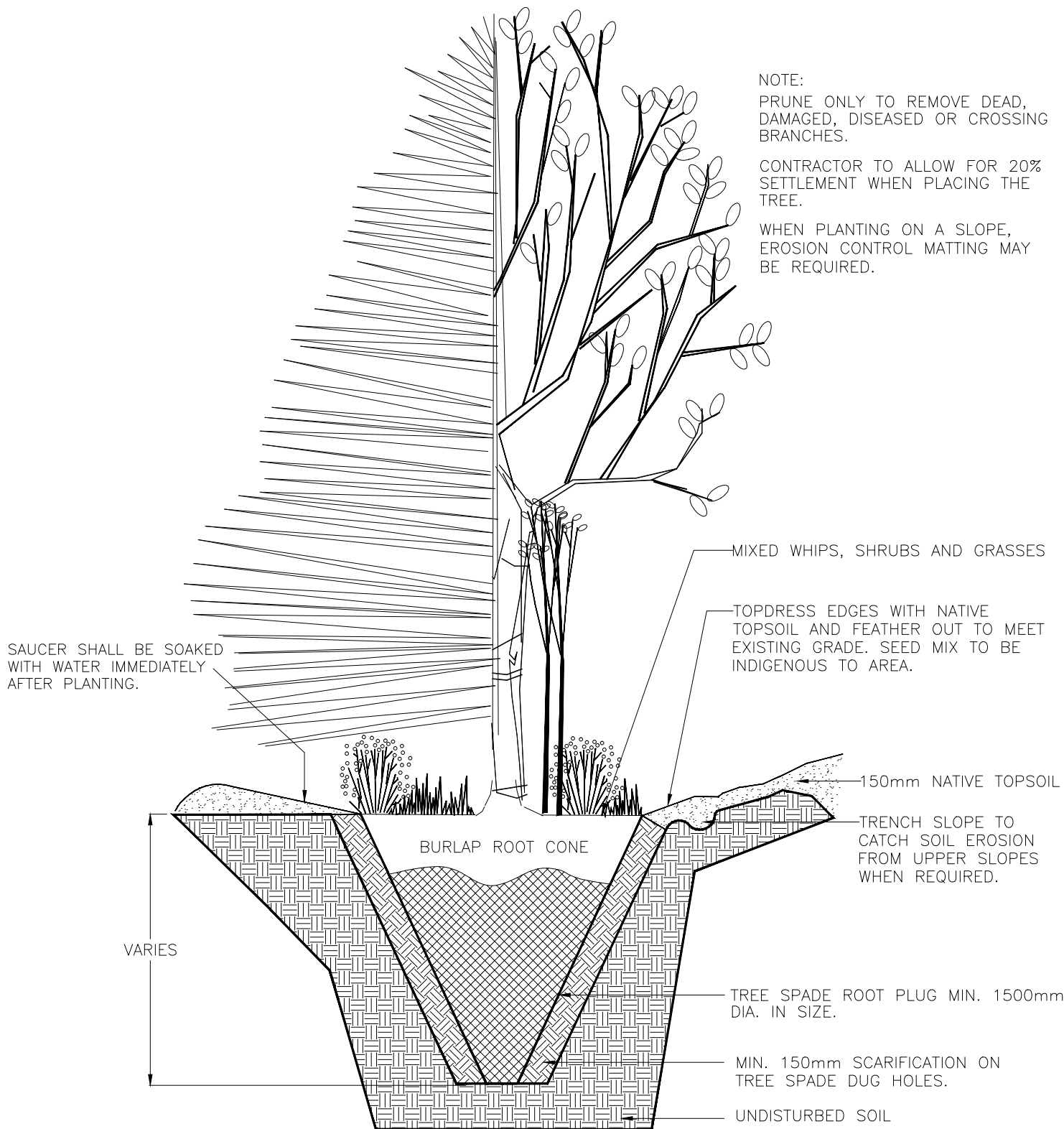
61003

Date: 94/06/22

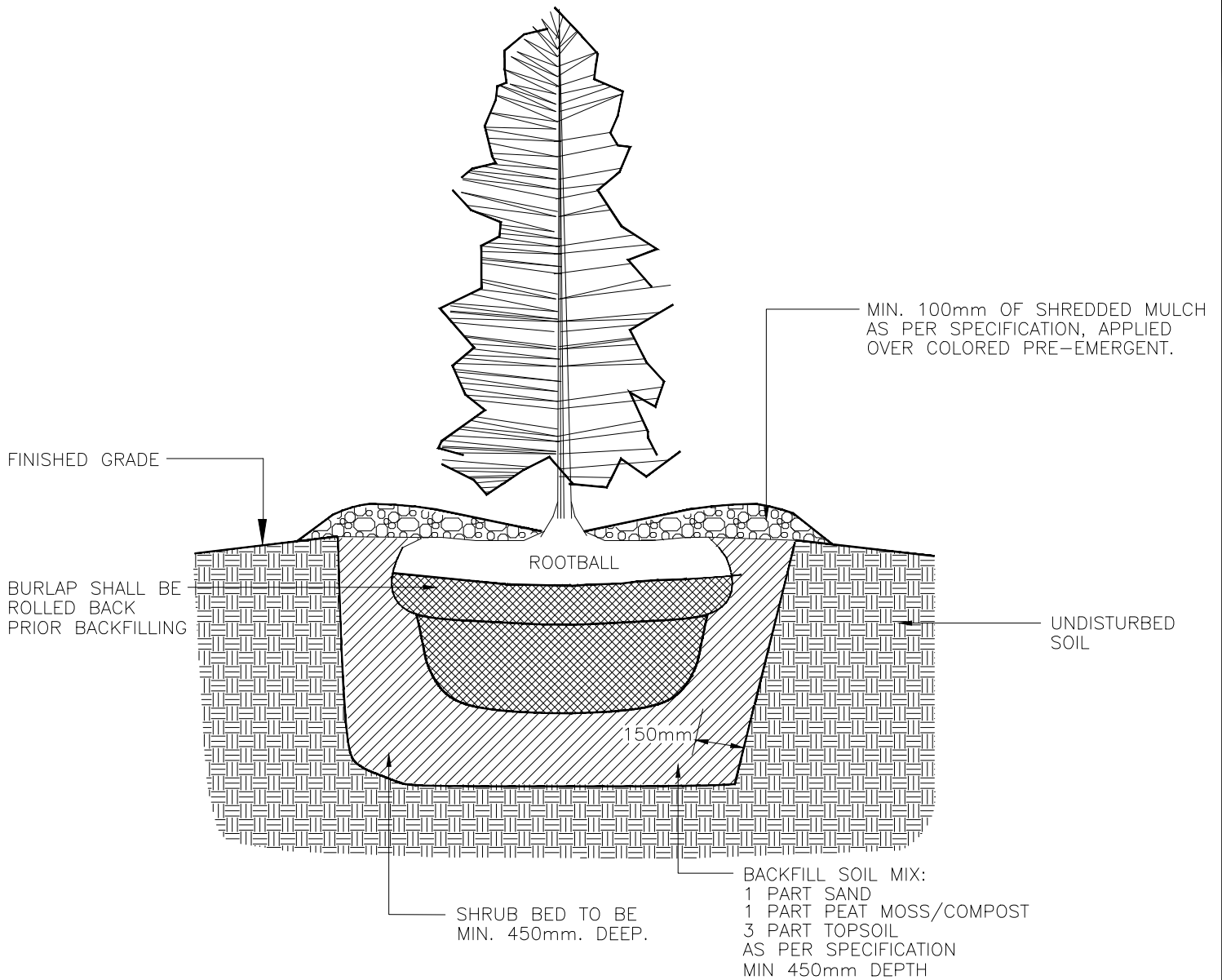
Scale: N.T.S.

Drawn: DAN LECKIE

Planning & Development Services Department



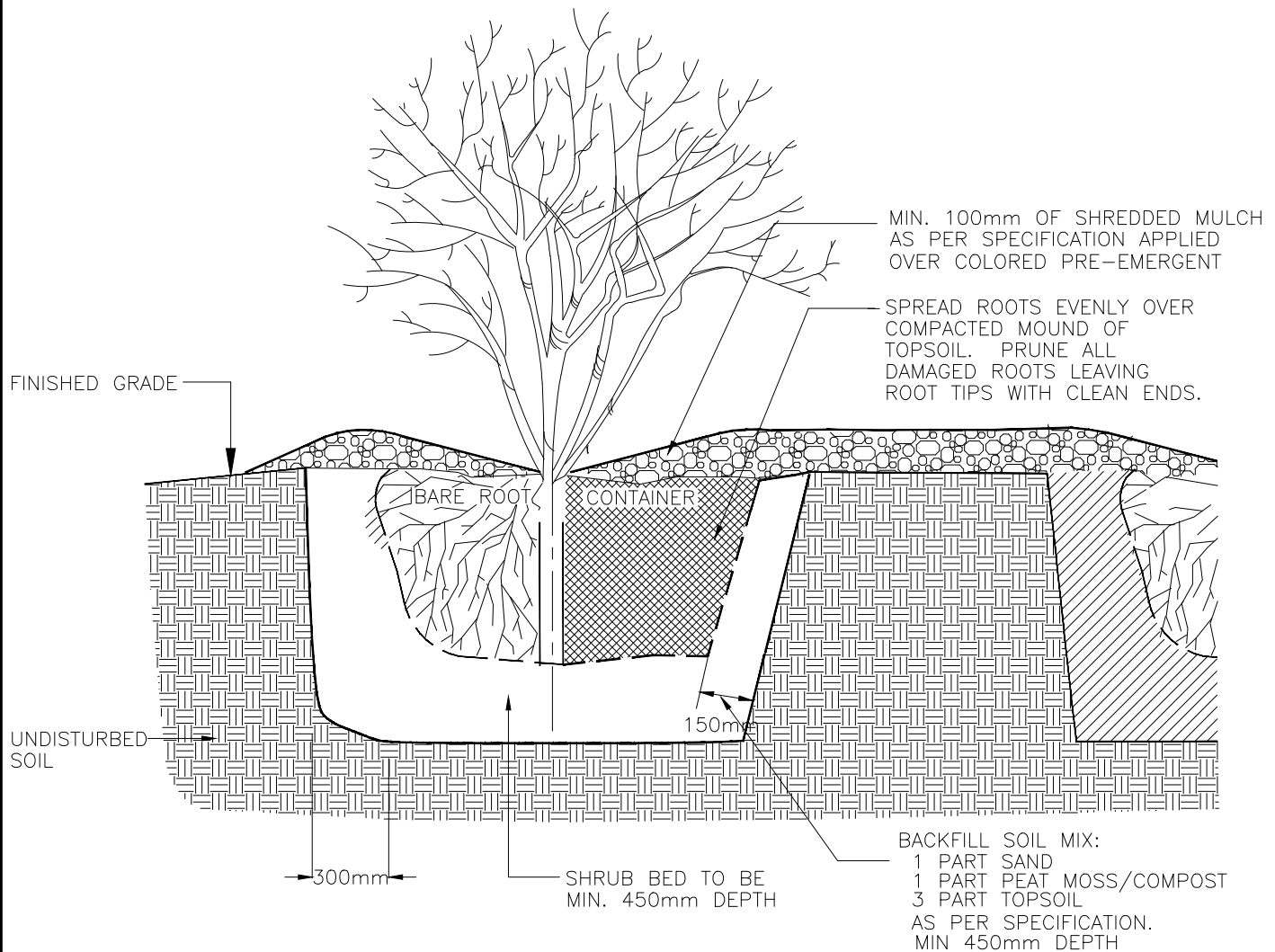
REVISIONS			<div>Strathcona County</div>	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA	© 2011
Date	Details	Drawn			
YY/MM/DD	X	X	NATIVE TREE SPADE PLANTING		
11/05/02	REVISED DRAWING NUMBERS	J. ORR			
11/02/10	REVISED DRAWING NUMBERS	O. Butt			
06/03/10	Removed scarification under root plug	M. Forgues	Approved: P. Alexander, AALA, CSLA		DWG. NO.
05/03/09	DETAIL ADDED TO OSDS	L. Laing	Checked: J.M. Talbot, MLA, CSLA		61004
			Date: 03/05/06	Scale: N.T.S.	Drawn: AMY McLENAGHAN
			Planning & Development Services Department		



**NOTE:**

- MULCH TO BE 100mm DEEP AT DRIP LINE (AT TIME OF PLANTING), TAPERING TO 0mm AT TRUNK FLARE.
- LOOSEN ROOT MASS PRIOR TO PLANTING.
- THE USE OF POLY EDGING AND FILTER FABRIC IS NOT PERMITTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011		
Date	Details	Drawn			
11/05/02	REVISED DRAWING NUMBERS	J. ORR	<b>CONIFEROUS B&amp;B SHRUB BED PLANTING</b> Approved: P. Alexander, AALA, CSLA Checked: J.M. Talbot, MLA, CSLA Date: 94/08/03   Scale: N.T.S.   Drawn: DAN LECKIE		
11/02/10	REVISED DRAWING NUMBERS	O. Butt			
06/03/10	Added to drip line note	M. Forgues			
02/06/24	Printed	A. McLenaghan			
11/12/01	Notes, dimensions, tree graphic	A. McLenaghan			
			<b>DWG. NO.</b> <b>61101</b> <small>Planning &amp; Development Services Department</small>		

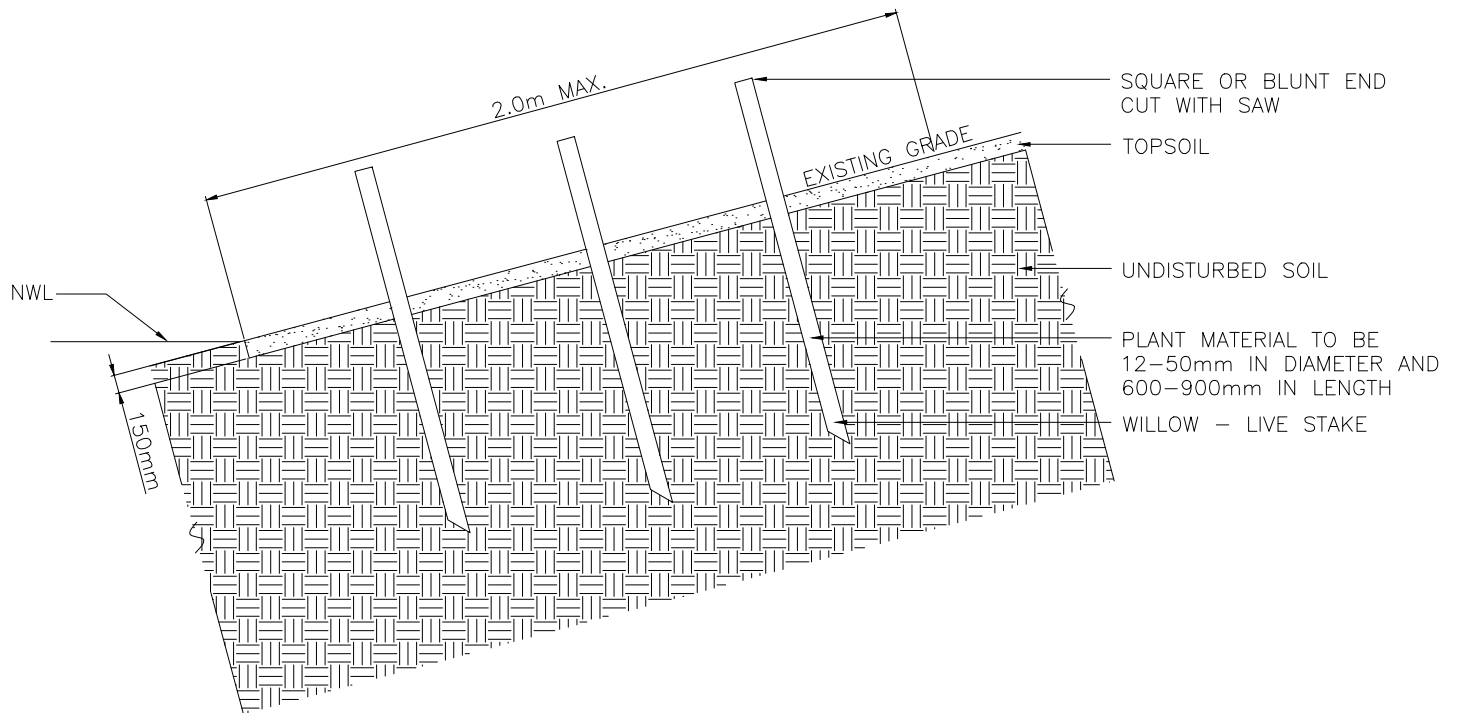


**NOTE:**

- MULCH TO BE 100mm DEEP AT DRIP LINE, TAPERING TO 0mm AT TRUNK FLARE.
- LOOSEN ROOT MASS PRIOR TO PLANTING.
- CONTAINER IS TO BE CUT CAREFULLY AWAY. SHRUB SHALL NOT BE PULLED FROM CONTAINER.
- THE USE OF POLY EDGING AND FILTER FABRIC IS NOT PERMITTED.

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Drawn			
YY/MM/DD	X	X	<div>BARE ROOT/CONTAINER SHRUB PLANTING</div> <div>Approved: P. Alexander, AALA, CSLA</div> <div>Checked: J.M. Talbot, MLA, CSLA</div> <div>Date: 01/11/22    Scale: N.T.S.    Drawn: AMY McLENAGHAN</div> <div>DWG. NO. 61102</div> <div>Planning &amp; Development Services Department</div>		
11/05/02	REVISED DRAWING NUMBERS	J. ORR			
11/02/10	REVISED DRAWING NUMBERS	O. Butt			
06/03/10	Added 'depth' to shrub bed note	M. Forgues			
02/06/24	Printed	A. McLenaghan			



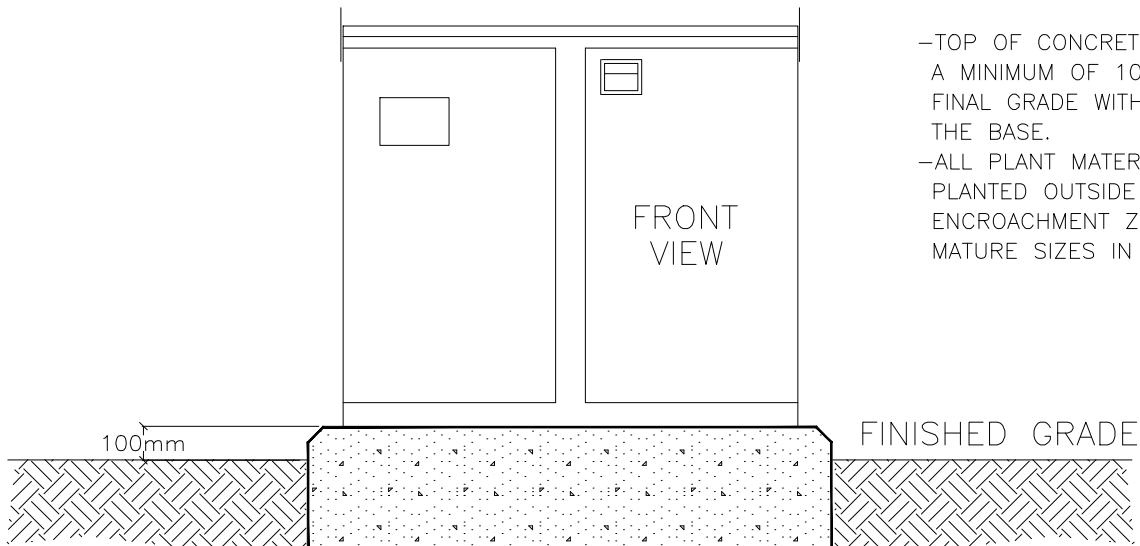
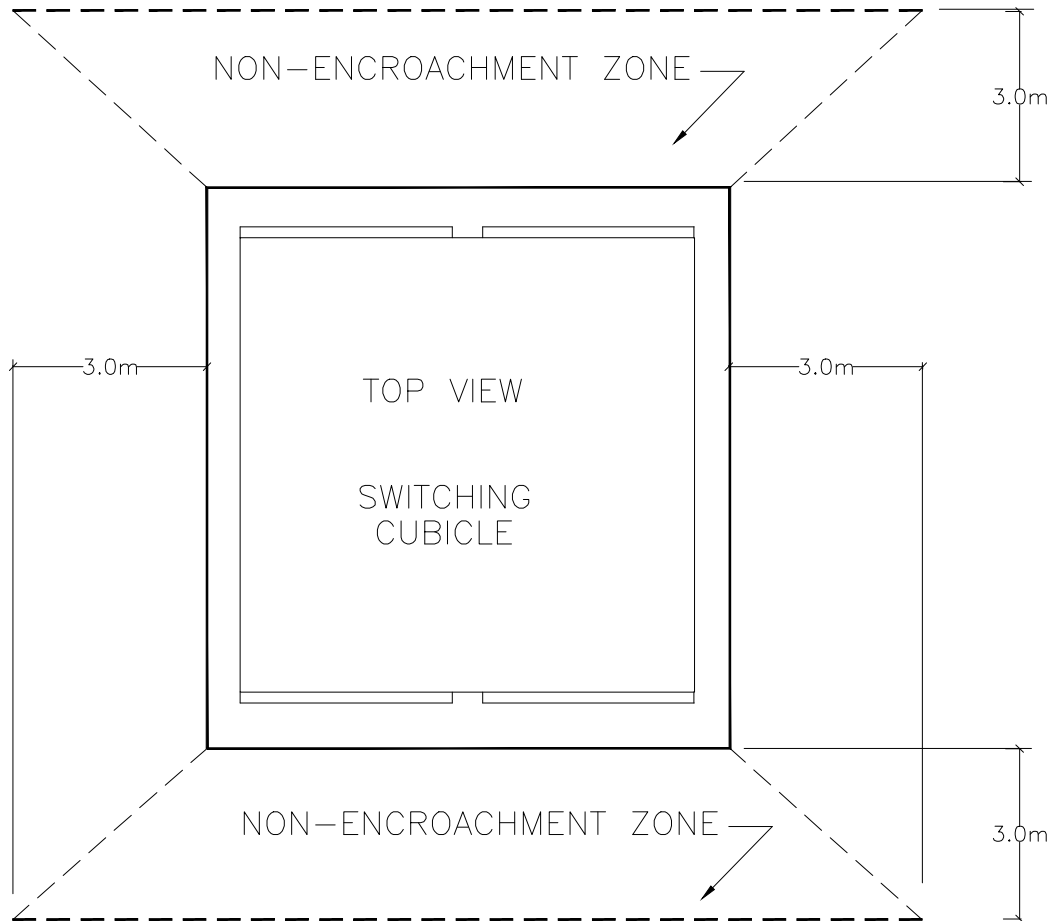


**NOTES:**

- ALL MATERIAL TO BE STAKED SHALL BE FRESHLY CUT ON AN ANGLE WITH A SAW ONLY.
- SIDE BRANCHES ARE TO BE REMOVED.
- BUDS ARE REQUIRED TO FACE UPWARD AFTER INSTALLATION.
- A MINIMUM OF THREE BUDS PER STAKE IS REQUIRED.
- BANK TO REMAIN INTACT
- CUTTINGS TO BE TAMPED IN WITH 80% OF THEIR LENGTH BELOW GRADE

\* THIS IS ONLY AN EXAMPLE, LIVE STAKING WILL BE REVIEWED ON A SITE BY SITE BASIS.

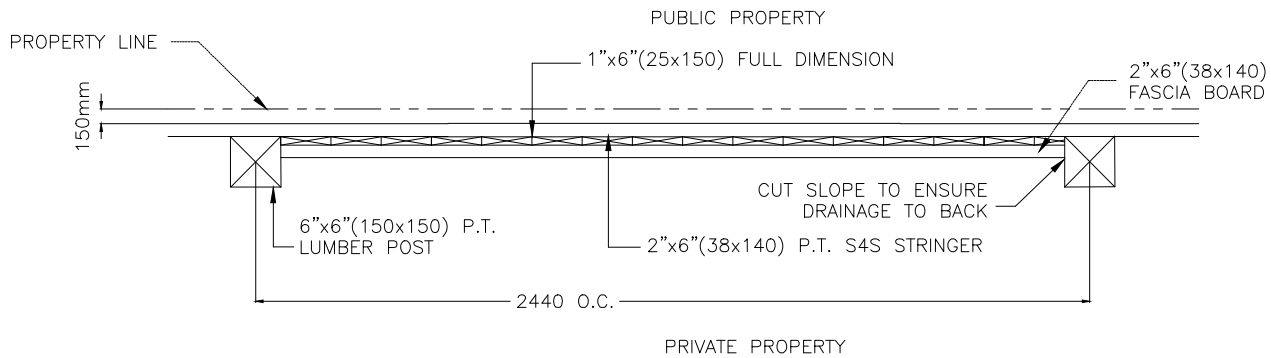
REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011		
Date	Details	Drawn			
YY/MM/DD	X	X	<b>LIVE STAKING</b>		
11/05/02	REVISED DRAWING NUMBERS	J. ORR			
11/02/10	REVISED DRAWING NUMBERS	O. Butt	Approved: P. Alexander, AALA, CSLA		<b>DWG. NO.</b>
06/03/10	Added a note	M. Forgues	Checked: J.M. Talbot, MLA, CSLA		<b>61103</b>
05/03/09	DETAIL ADDED TO OSDS	L. Laing	Date: 03/04/11	Scale: N.T.S.	Drawn: AMY McLENAGHAN
			Planning & Development Services Department		



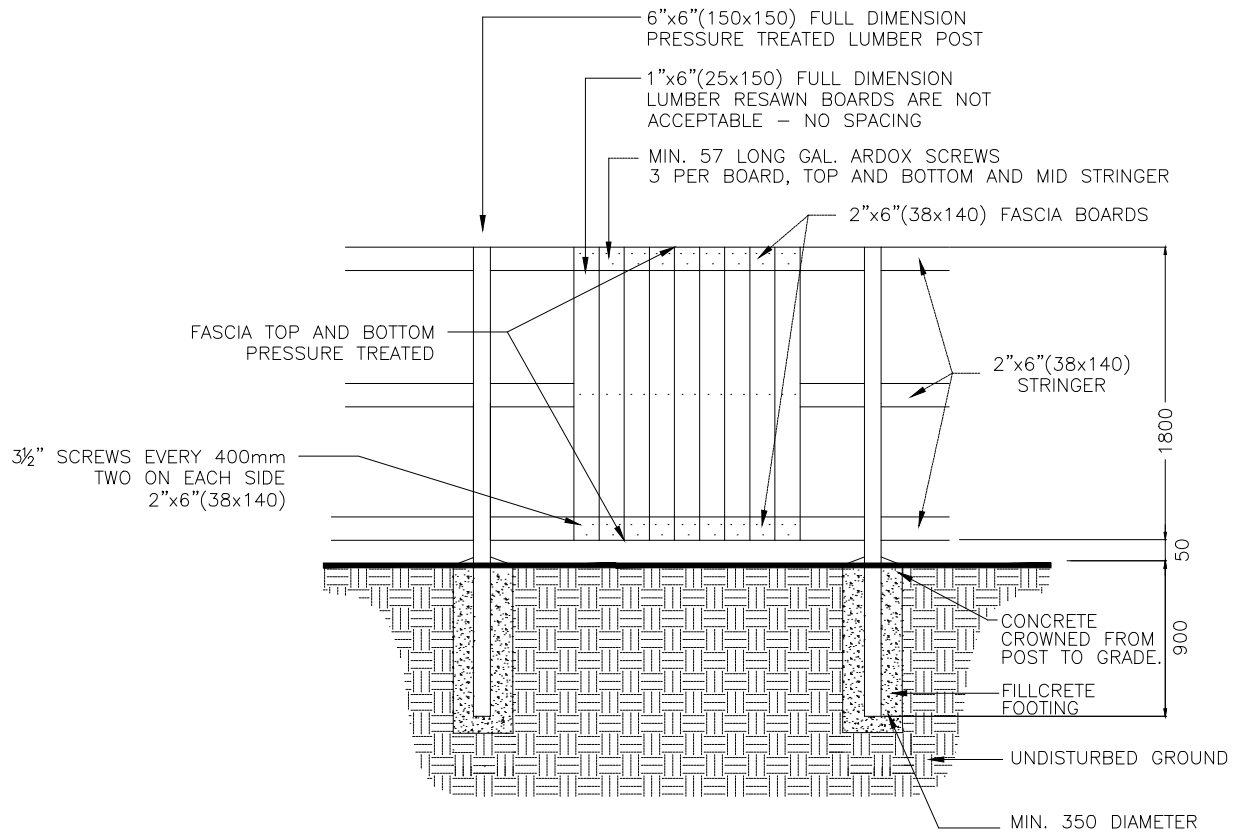
**NOTE:**

- TOP OF CONCRETE BASE TO BE A MINIMUM OF 100mm ABOVE FINAL GRADE WITHIN 3.0m OF THE BASE.
- ALL PLANT MATERIAL TO BE PLANTED OUTSIDE OF NON-ENCROACHMENT ZONE. INCLUDE MATURE SIZES IN ASSESSMENT.

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Date	Details	Drawn			
YY/MM/DD	X	X	<b>PLANTING AROUND SWITCHING CUBICLE</b>		
YY/MM/DD	X	X			
11/05/02	REVISED DRAWING NUMBERS	J. ORR	Approved: P. Alexander, AALA, CSLA		<b>DWG. NO.</b>
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Checked: J.M. Talbot, MLA, CSLA		<b>61104</b>
02/06/24	Printed	A. McLenaghan	Date: 22/02/95	Scale: N.T.S.	Drawn: DAN LECKIE
Planning & Development Services Department					



FENCE PLAN



FENCE SECTION

NOTE:

- POST HOLES SHOULD BE EXCAVATED TO REACH A DEPTH OF UNDISTURBED SUBGRADE.
- SMOOTH SIDE OF PICKETS TO BE FACING PUBLIC PROPERTY, STRINGERS TO BE INSIDE PRIVATE PROPERTY.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
- PRE-STAIN, TWO COATS PRIOR TO INSTALLATION, TOUCH UP AFTER CONSTRUCTION.
- 150mm INSIDE PROPERTY LINE.

REVISIONS

Date	Details	Drawn
12/10/22	REVISED DRAWING	EE
11/05/02	REVISED DRAWING NUMBERS	ORR
11/02/10	REVISED DRAWING NUMBERS	Butt
06/03/10	Changed concrete crown	M.Forgues
05/10/24	Added concrete crown note	M.Forgues

**Strathcona**  
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1.8m WOOD SCREEN FENCE

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

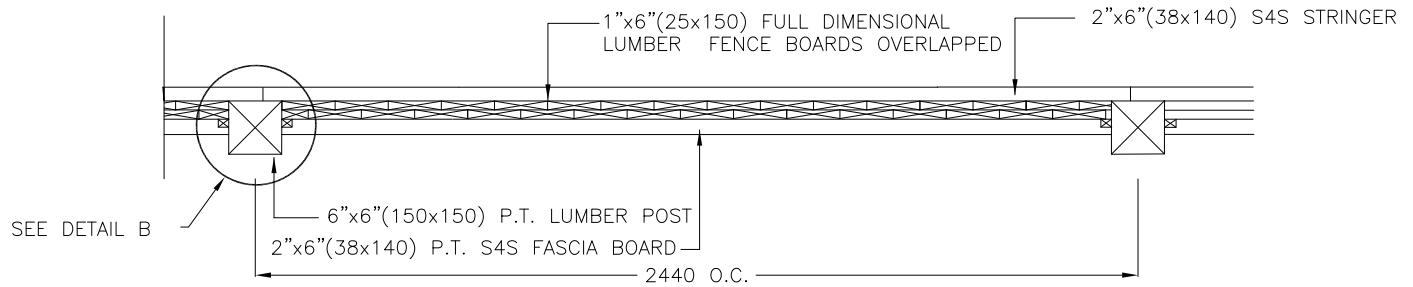
61201

Date: 06/12/93

Scale: N.T.S.

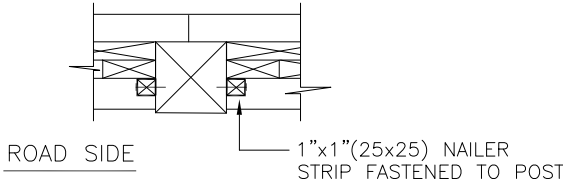
Drawn: D. BROWN

Planning & Development Services Department



PLAN VIEW

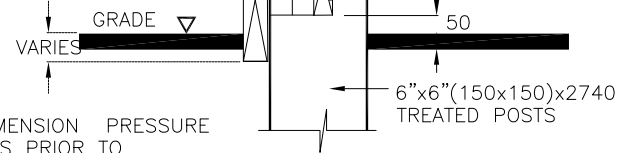
YARD SIDE



DETAIL B

MIN 75MM COATED  
TYPICAL DECK SCREWS  
EVERY 400MM TWO ON  
EACH SIDE.

ADJUST STRINGER TO  
PROVIDE NO GAP ON  
GROUND, 2"x8"(38x190)  
PRESSURE TREATED  
LUMBER

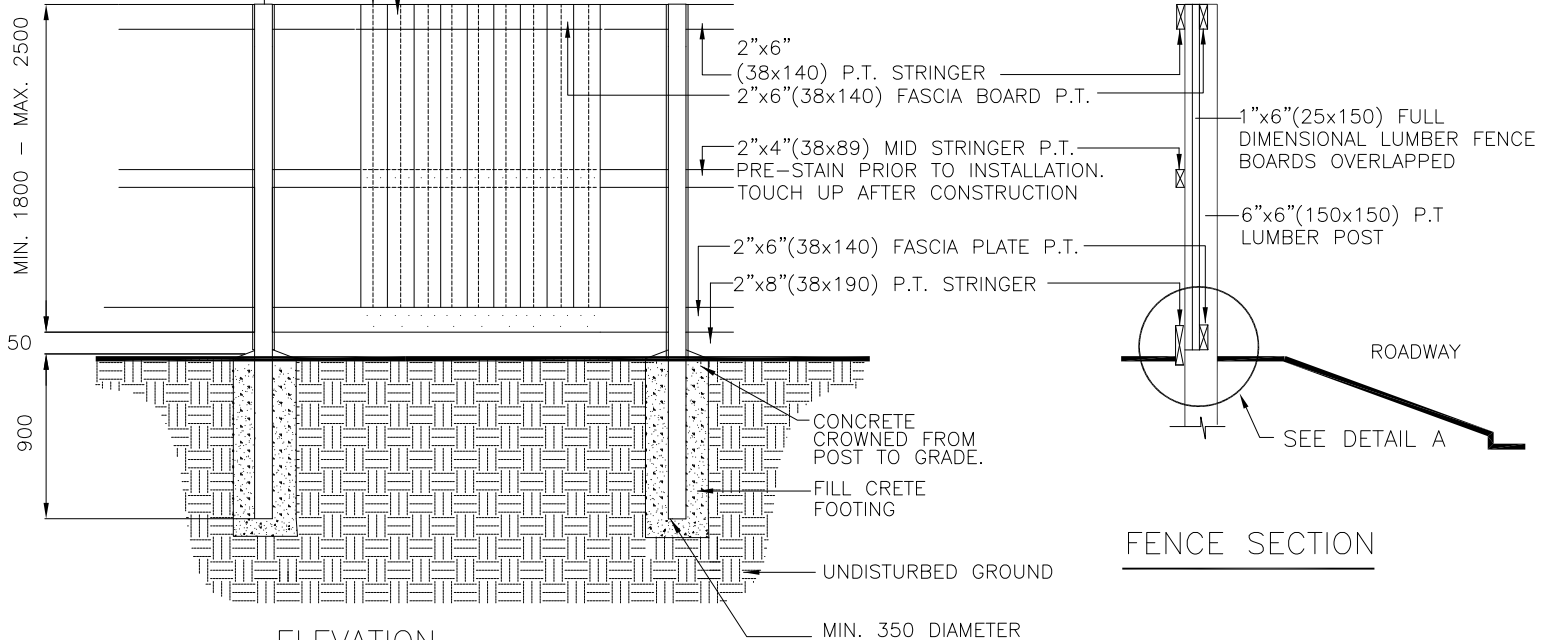


DETAIL A

6"x6"(150x150)x2780 or 3450 LONG FULL DIMENSION PRESSURE  
TREATED LUMBER POST PRE-STAIN, TWO COATS PRIOR TO  
STRINGER INSTALLATION, TOUCH UP AFTER CONSTRUCTION.

1"x6"(25x150)x1830 LONG S4S LUMBER PRE-STAINED TWO  
COATS, TOUCH UP AFTER CONSTRUCTION RESAWN BOARDS  
ARE NOT ACCEPTABLE - NO SPACING BETWEEN BOARDS

MIN. 57 LONG GAL. ARDOX SCREWS 3 PER BOARD,  
TOP AND BOTTOM AND MID STRINGER



ELEVATION

FENCE SECTION

NOTE:  
-POST HOLES TO BE EXCAVATED TO REACH A DEPTH OF UNDISTURBED SUBGRADE.  
-ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.  
-PRE-STAIN, TWO COATS PRIOR TO INSTALLATION, TOUCH UP AFTER CONSTRUCTION.

REVISIONS

Date	Details	Drawn
12/10/22	REVISED DRAWING	J. E.
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
05/02/11	Adjusted Concrete Footings	L. Laing
02/01/23	Changed structural stringer to fascia board	A. McLenaghan

**Strathcona**  
County

2001 Sherwood Drive, Sherwood Park  
Alberta, T8A 3W7, CANADA

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NOISE ATTENUATION FENCE

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

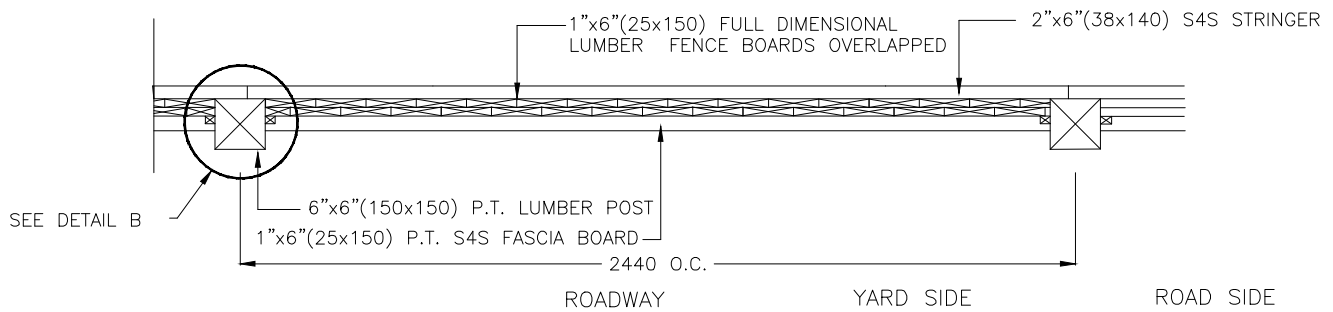
61202

Date: 17/02/95

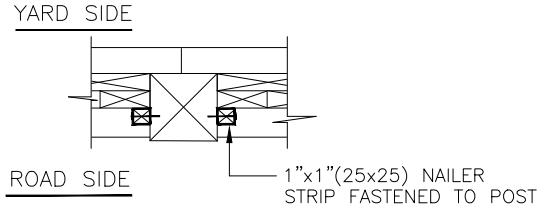
Scale: N.T.S.

Drawn: DAN LECKIE

Planning & Development Services Department



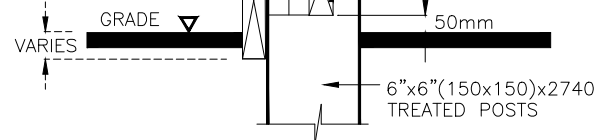
PLAN VIEW



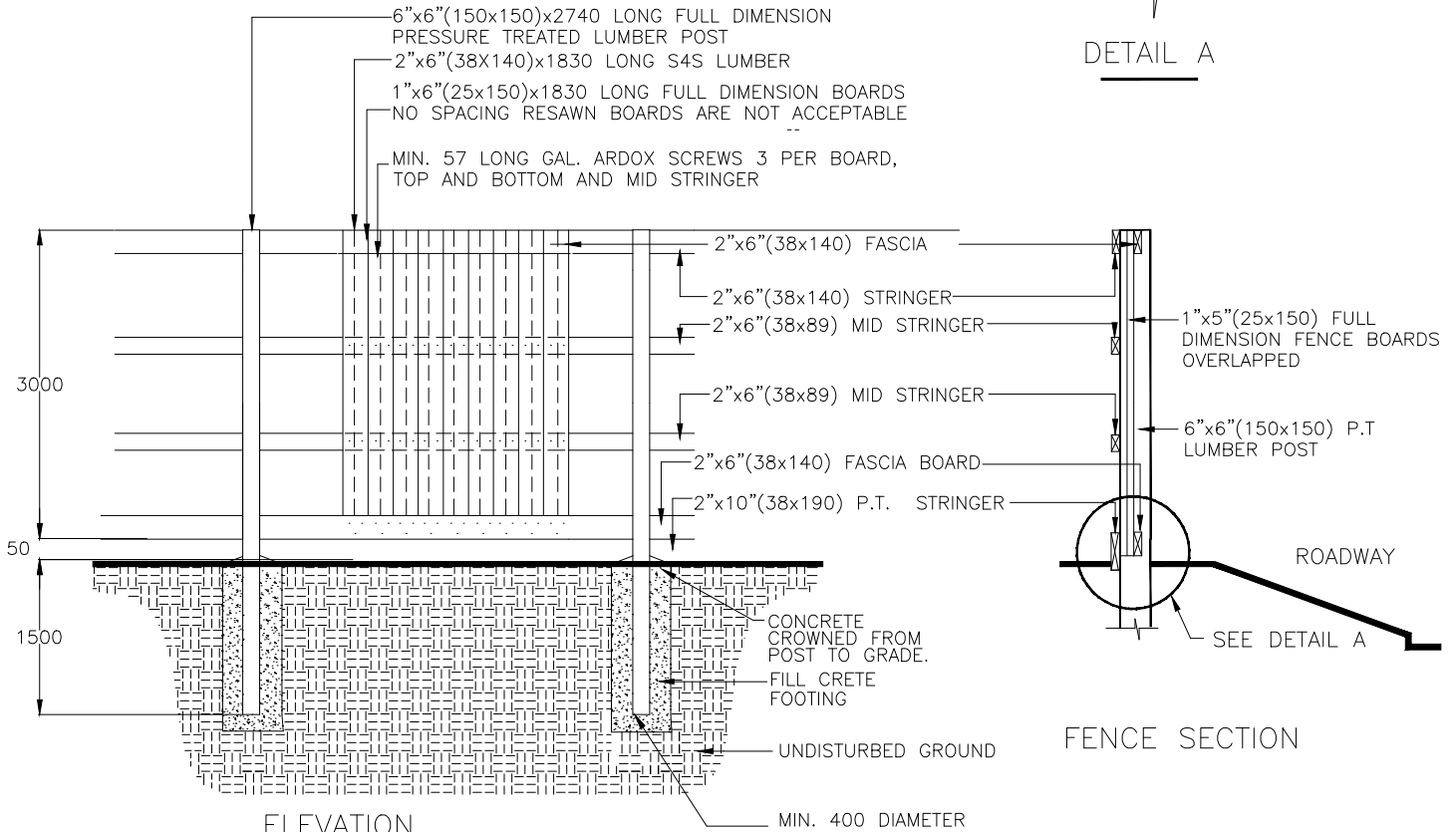
DETAIL B

MIN. 75MM COATED TYPICAL DECK SCREWS EVERY 400MM TWO ON EACH SIDE.

ADJUST STRINGER TO PROVIDE NO GAP ON GROUND, 2"x8"(38x190) PRESSURE TREATED LUMBER



DETAIL A



ELEVATION

FENCE SECTION

NOTE:

- POST HOLES TO BE EXCAVATED TO REACH A DEPTH OF UNDISTURBED SUBGRADE.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
- PRE-STAIN, TWO COATS PRIOR TO INSULATION, TOUCH UP AFTER CONSTRUCTION.

REVISIONS

Date	Details	Drawn
12/10/23	REVISED LUMBER DIMENSIONS	J. ORR
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
06/03/10	Changed concrete crown	M. Forgues
05/02/11	Adjusted Concrete Footings	L. Laing

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3.0m DOUBLE CLOSED BOARD FENCE

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

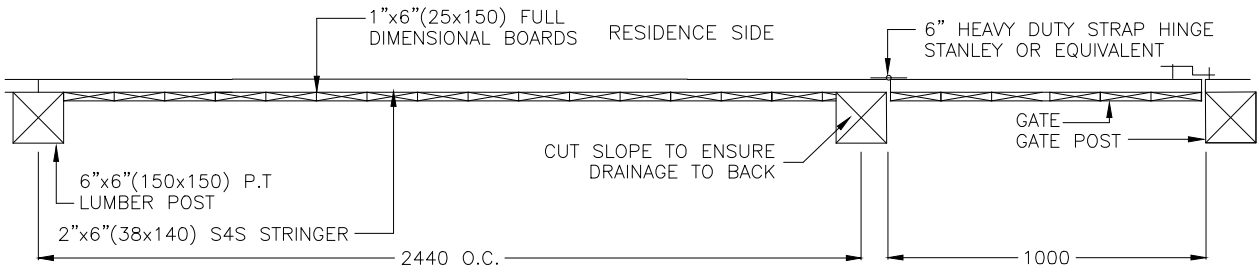
61203

Date: 08/04/95

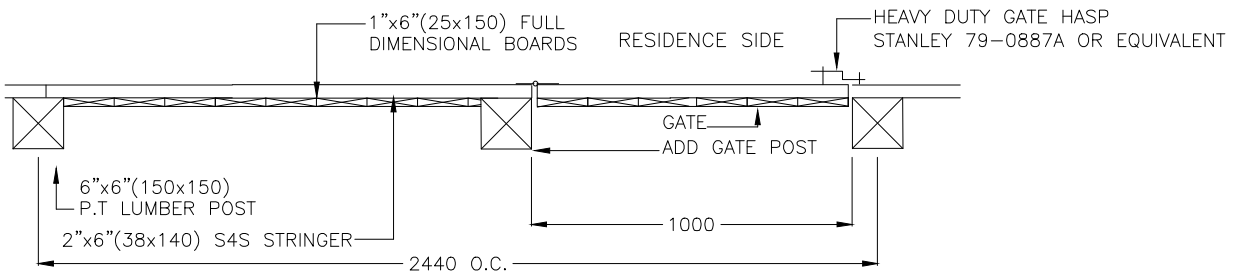
Scale: N.T.S.

Drawn: DAN LECKIE

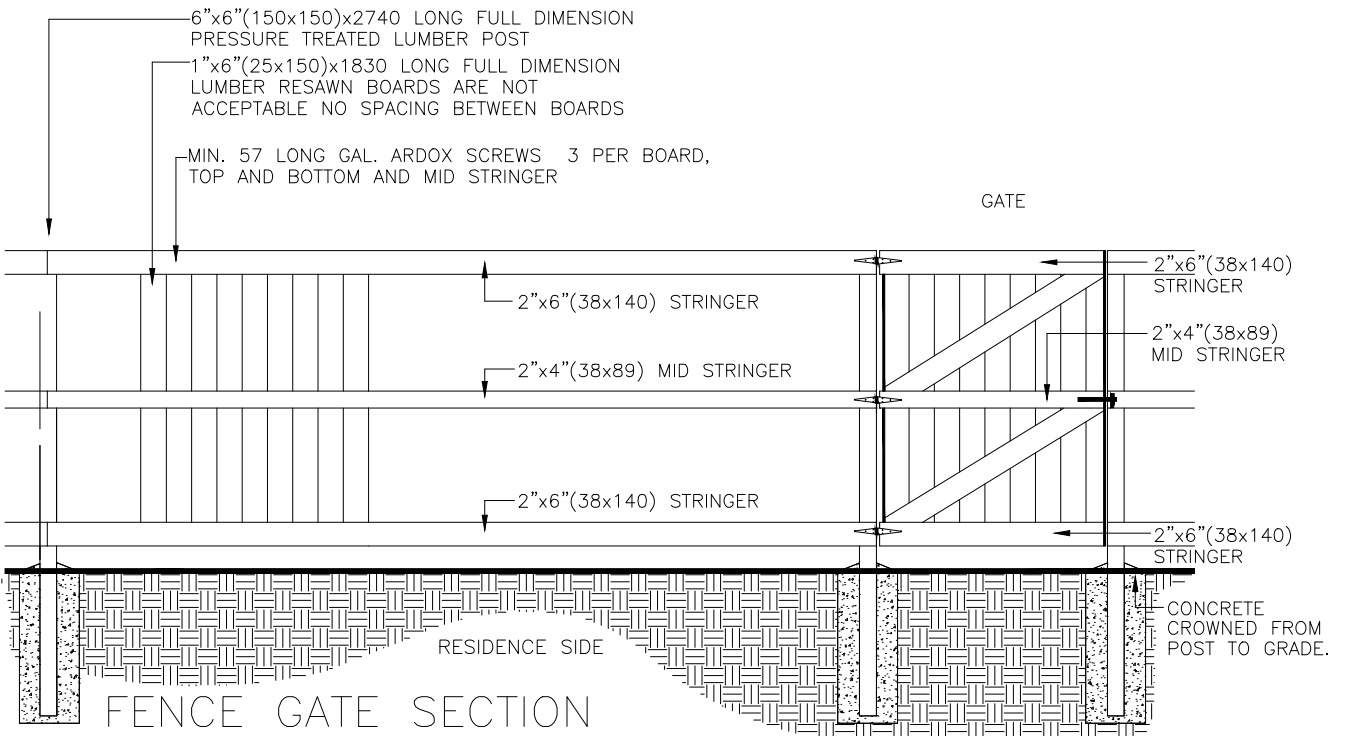
Planning & Development Services Department



NEW FENCE GATE DETAIL



EXISTING FENCE GATE DETAIL (RETRO-FIT)



NOTE:  
 -POST HOLES TO BE EXCAVATED TO REACH A DEPTH OF UNDISTURBED SUBGRADE  
 -ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED  
 -PRE-STAIN, TWO COATS PRIOR TO INSTALLATION, TOUCH UP AFTER CONSTRUCTION

#### REVISIONS

Date	Details	Drawn
12/10/23	REVISED LUMBER DIMENSIONS	J. ORR
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
06/03/10	Changed concrete crown	M. Forgues
05/10/24	Added concrete crown note	M. Forgues

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#### WOOD FENCE GATE DETAIL

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

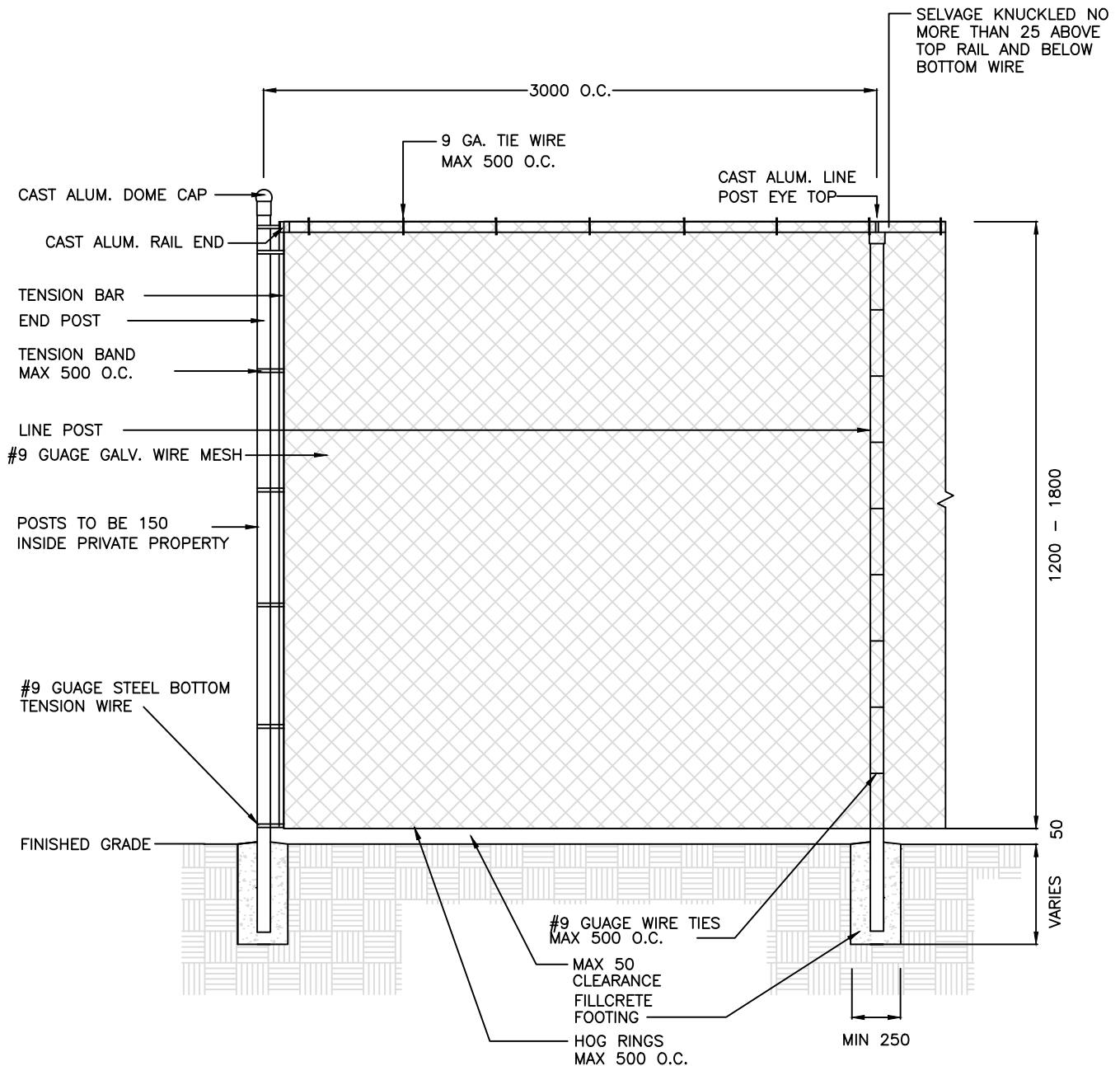
61204

Date: 05/09/95

Scale: N.T.S.


Drawn: DAN LECKIE

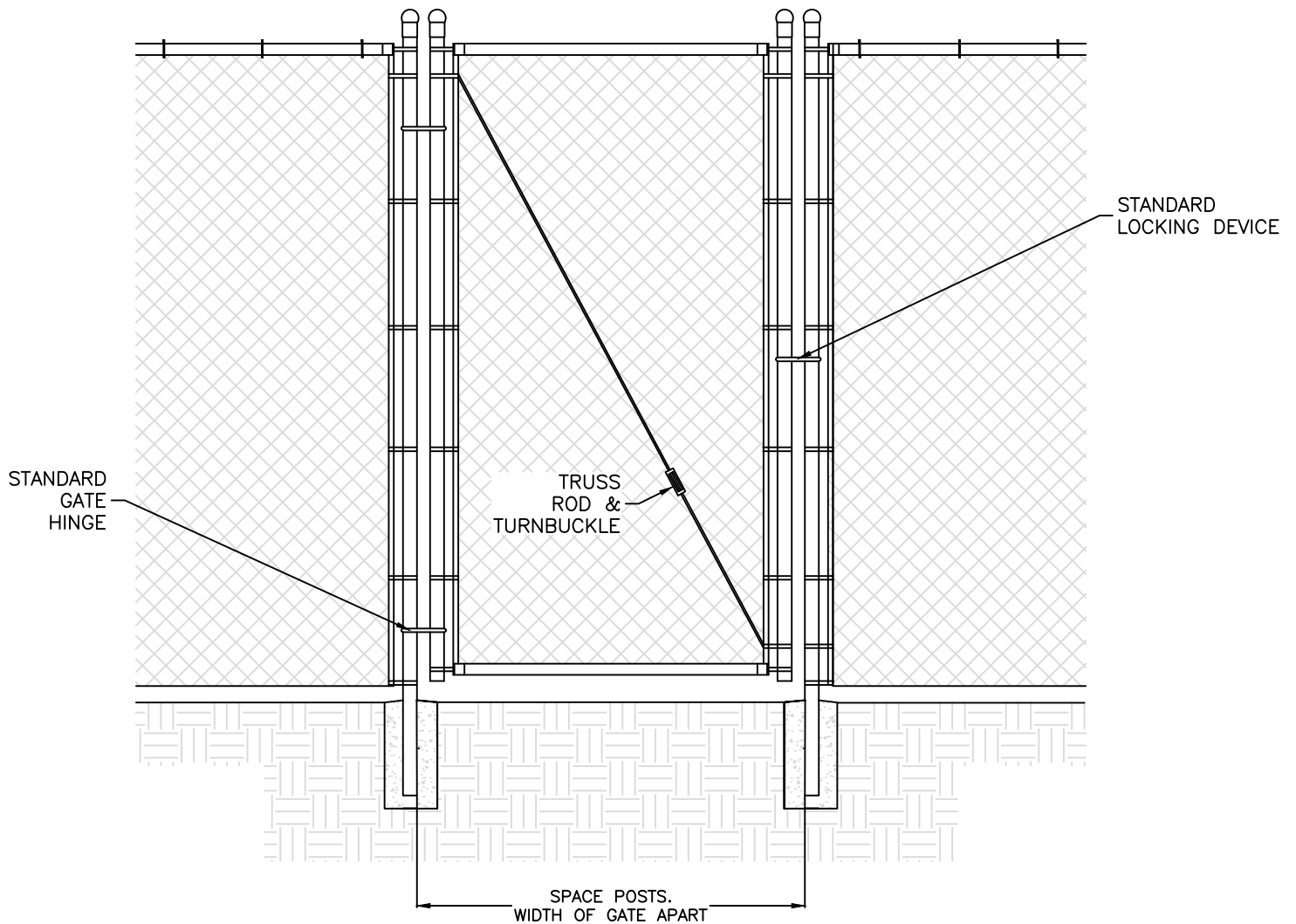
Planning & Development Services Department



**NOTE:**


1. REFER TO CHAIN LINK FENCING SPECIFICATION, VOL. 2, SEC. 7.611 CHAIN LINK FENCING FOR FURTHER DETAILS.
2. WIRE MESH TO BE #9 GAUGE BEFORE VINYL COATING.
3. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA				© 2016	
Date	Details	Drawn	Chain Link Fence					
16/09/22	REVISED VOLUME 2 REFERENCE	J. Orr						
11/05/02	REVISED DRAWING NUMBERS	J. Orr	Approved: S. Csaszar, P.Eng					DWG. NO.
11/02/10	REVISED DRAWING NUMBERS	O. Butt						
05/02/11	ADJUSTED CONCRETE FOOTINGS	L. Laing	Checked: C. Cano, LAT, AALA					61205
02/06/24	PRINTED	A. McLenaghan	Date: 93/12/21	Scale: N.T.S.	Drawn: D. Brown	Planning & Development Services Department		

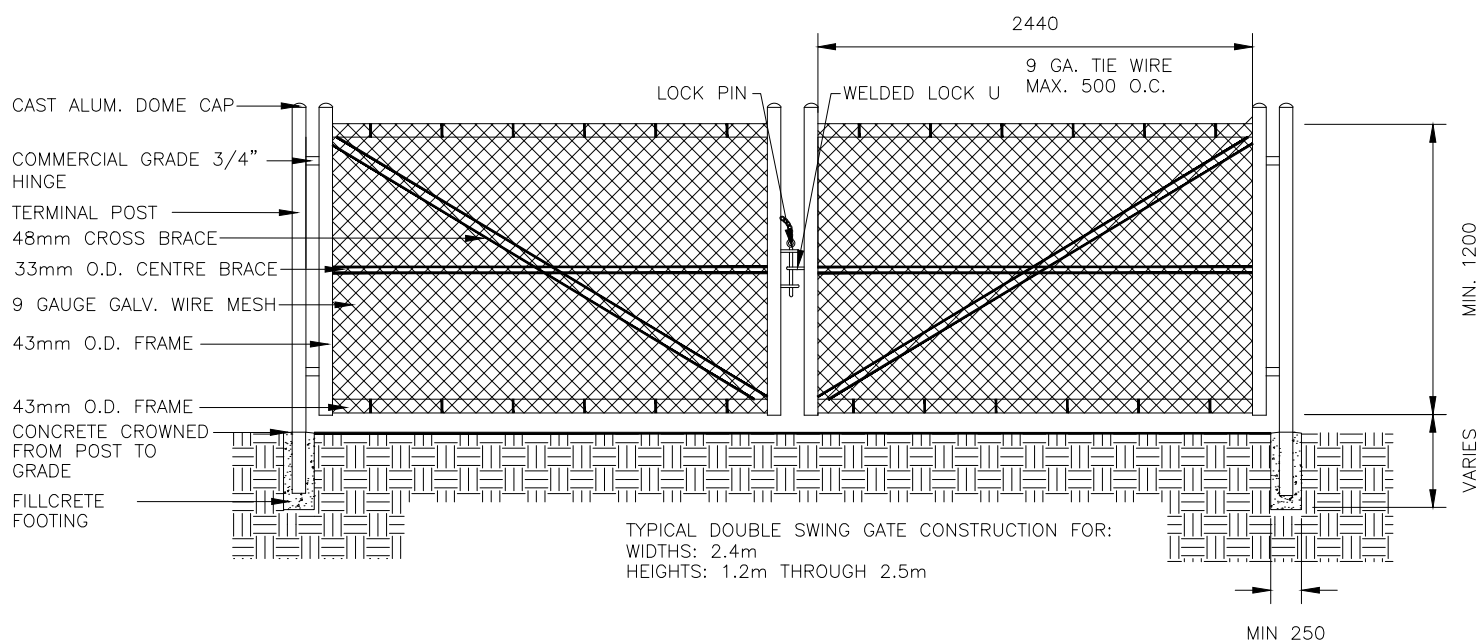


**NOTE:**

1. REFER TO CHAIN LINK FENCING SPECIFICATION, VOL. 2, SEC. 7.611 CHAIN LINK FENCING FOR FURTHER DETAILS.
2. WIRE MESH TO BE #9 GAUGE BEFORE VINYL COATING.
3. ALL DIMENSIONS ARE IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 <b>STRATHCONA COUNTY</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2016
Date	Details	Drawn				
			<b>Chain Link Gate</b>			
			Approved: S. Csaszar, P.Eng			DWG. NO.
16/09/22	REVISED VOLUME 2 REFERENCE	J. Orr	Checked: C. Cano, LAT, AALA			<b>61206</b>
12/10/23	NEW DETAIL	J. Eggen	Date: 12/10/23	Scale: N.T.S.	Drawn: J. Eggen, C.E.T.	
						Planning & Development Services Department





NOTES:

—ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
06/03/10	Changed concrete crown	M. Forgues
05/10/24	Added concrete crown note	M. Forgues
05/02/14	Change Concrete Footings	L. Laing

**Strathcona**  
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CHAIN LINK MAINTENANCE GATE

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

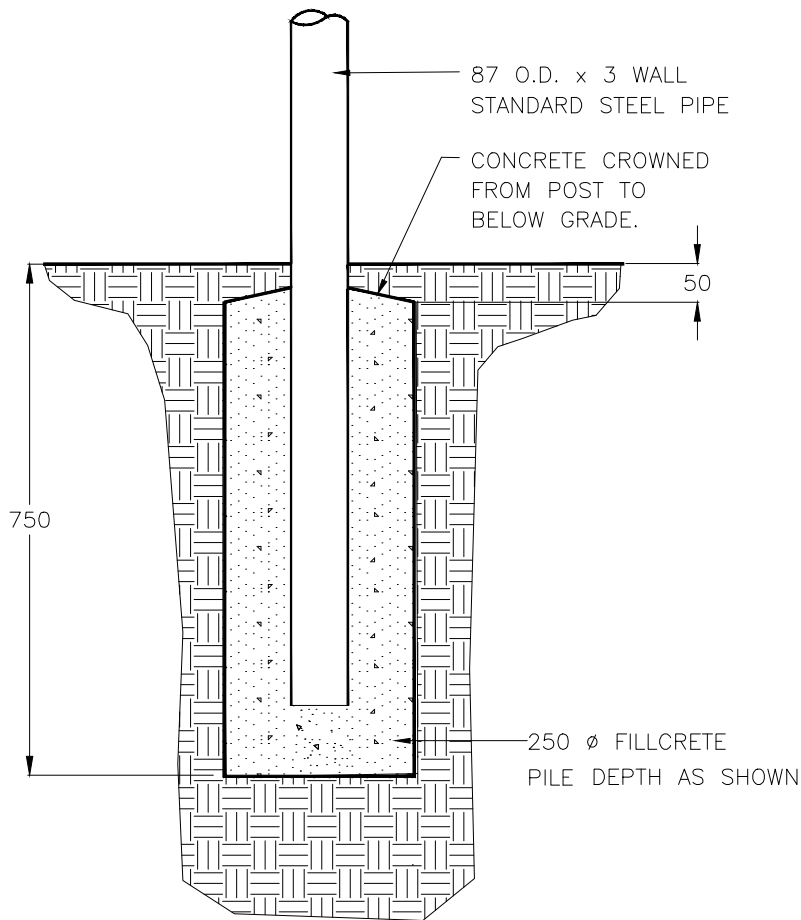
61207

Date: 01/11/28

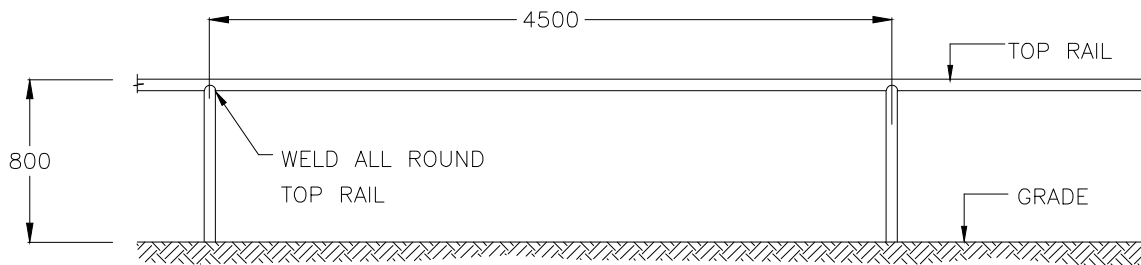
Scale: N.T.S.

Drawn: AMY McLENAGHAN

Planning & Development Services Department



SECTION



ELEVATION

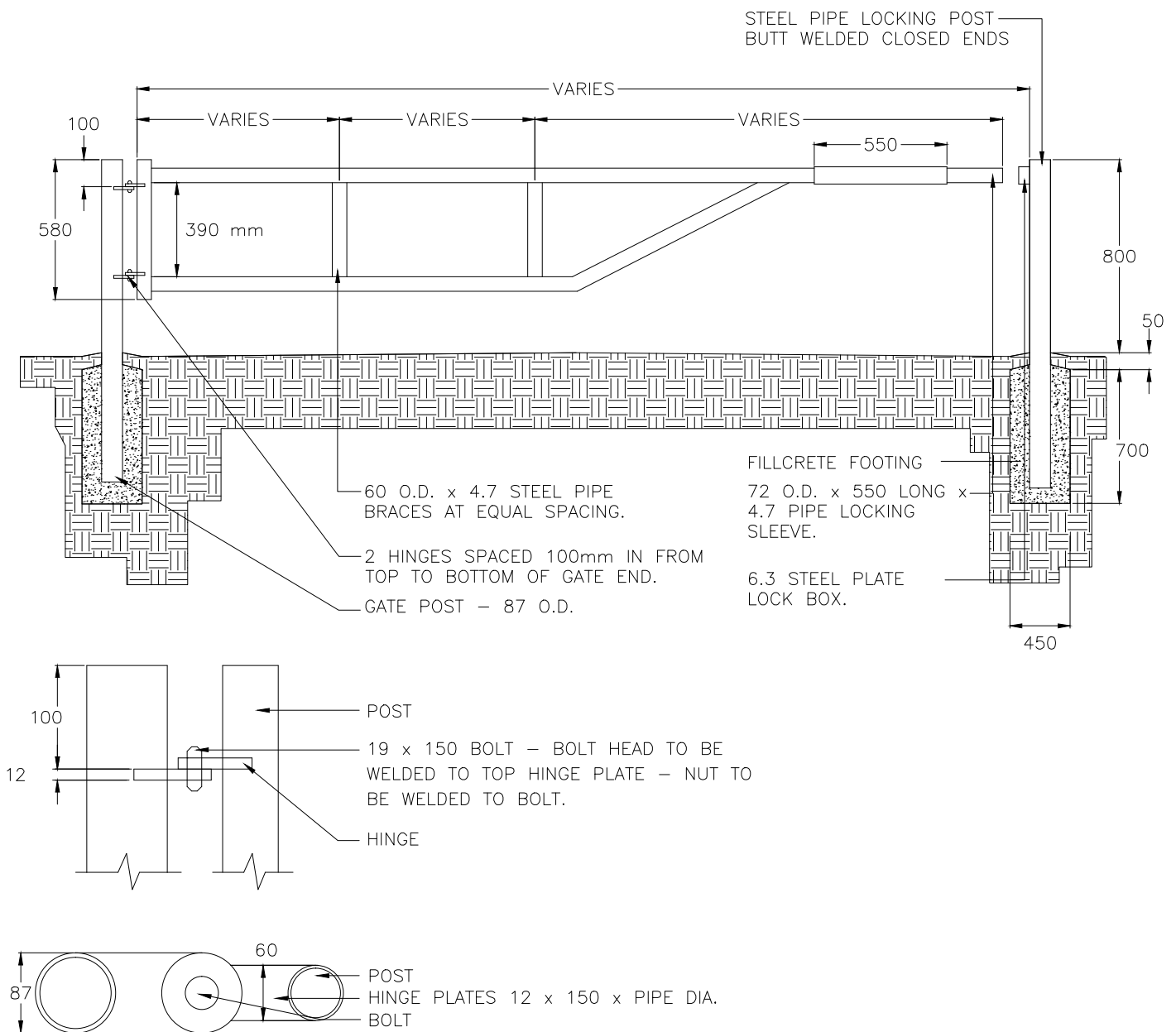
NOTES:

- ALL WELDS TO BE GROUND SMOOTH
- PAINTING SHALL BE IN ACCORDANCE WITH THE C.P.C.A. (CANADIAN PAINTING CONTRACTORS ASSOCIATION) MANUAL FORMULA 12A.
- ALL EXPOSED SURFACES ABOVE GRADE SHALL BE PRIMED BEFORE PAINTING.
- ALL PAINT COLOURS TO BE APPROVED BY THE COUNTY PRIOR TO APPLICATION.

NOTES:

—ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>		
Date	Details	Drawn			
11/05/03	REVISED DRAWING NUMBERS	J. ORR	PIPE RAIL FENCE		
11/02/10	REVISED DRAWING NUMBERS	O. Butt			
05/10/24	Added concrete crown note	M. Forgues	Approved: P. Alexander, AALA, CSLA		DWG. NO.
05/02/14	Change Concrete Footings	L. Laing	Checked: J.M. Talbot, MLA, CSLA		61208
02/06/24	Printed	A. McLenaghan	Date: 27/07/94	Scale: N.T.S.	
			Planning & Development Services Department		



NOTE:

- GATE FINISH TO BE RED ALKYD SEMI-GLOSS PAINT.
- ALL WELDS TO BE GROUND SMOOTH.
- PAINTING SHALL BE IN ACCORDANCE WITH C.P.C.A.  
(CANADIAN PAINTING CONTRACTORS ASSOCIATION)
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS

Date	Details	Drawn
YY/MM/DD	X	X
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
05/02/14	Change Concrete Footings	L. Laing
02/06/24	Printed	A. McLenaghan

**Strathcona**  
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STEEL PIPE GATE

Approved: P. Alexander, AALA, CSLA

Checked: J.M. Talbot, MLA, CSLA

Date: 01/11/23

Scale: N.T.S.

Drawn: AMY McLENAGHAN

DWG. NO.

61209

Planning & Development Services Department

25 TEMPERED STEEL LOCKING CHAIN  
SUFFICIENT LENGTH TO ALLOW EASY  
PLACEMENT OF BOLT.

60 O.D. x 4.7  
STEEL PIPE RAIL

SPOT WELDED

72 O.D. x 550 LONG x 4.7  
STEEL PIPE LOCKING SLEEVE.

87 O.D. x 3 STEEL PLATE  
LOCKING POST BUTT WELDED  
CLOSED ENDS - 6.3 PLATE.

SPOT WELDED

6

8 DIA. LOCK HOLE 8  
FROM BOTTOM

80 x 80 TOP  
80 x 172 SIDES  
6.3 STEEL PLATE LOCK BOX

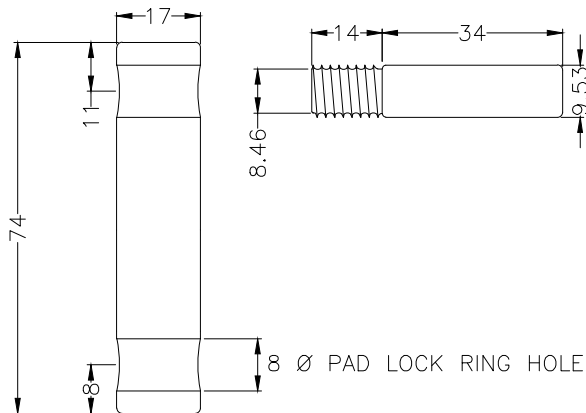
17 DIA x 125 STEEL  
ROD LOCKING BOLT - 40  
DIA. x 10 HIGH HEAD.

550

13

R10 mm

28



NOTE:

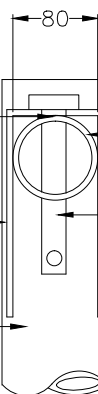
-THE FINISH SHALL BE RED ALKYD SEMI-GLOSS PAINT  
-ALL DIMENSIONS ARE IN MILLIMETERS.

## PIN DETAIL

DRILL 21 DIA. HOLE IN  
LOCKING SLEEVE AND TOP  
PLATE OF LOCK BOX.

FILLET WELD LOCK BOX  
TO POST.

87 x 3 STEEL PIPE



72 o.d. X 550 X 4.7 STEEL  
PIPE LOCKING SLEEVE.

125 LONG x 17 DIA. STEEL  
ROD LOCKING BOLT - 40mm x  
10mm HIGH HEAD.

80 x 80 TOP  
80 x 172 SIDES  
6.3 STEEL PLATE LOCK BOX

NOTES:

-ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

## REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
02/06/24	Printed	A. McLenaghan

**Strathcona**  
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## STEEL PIPE GATE LOCKING SLEEVE

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

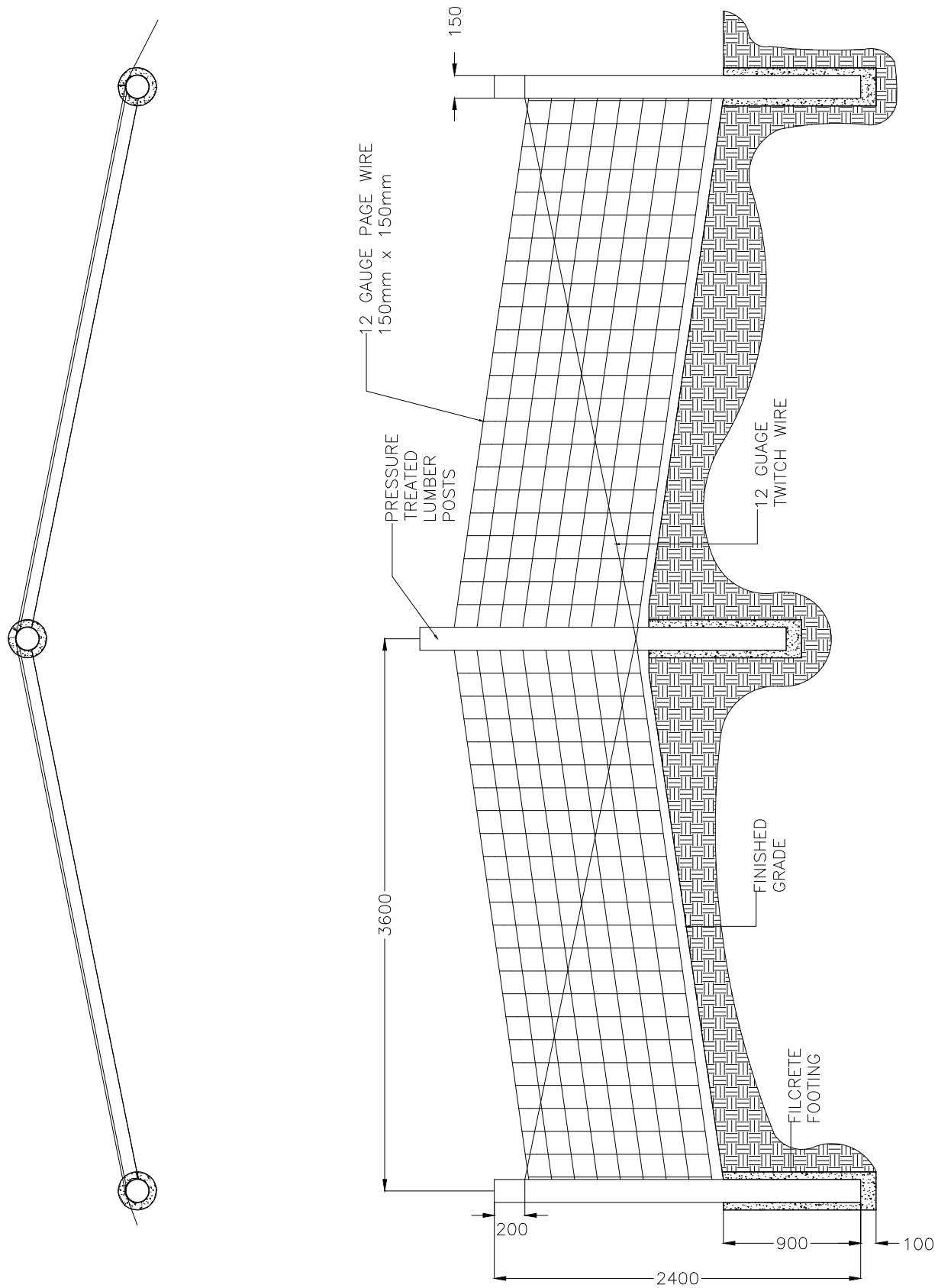
61210

Date: 01/11/26

Scale: N.T.S.

Drawn: AMY McLENAGHAN

Planning & Development Services Department



# REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
05/03/15	DETAIL ADDED TO OSDS	L. LAING

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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## PAIGE WIRE FENCE DETAIL

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

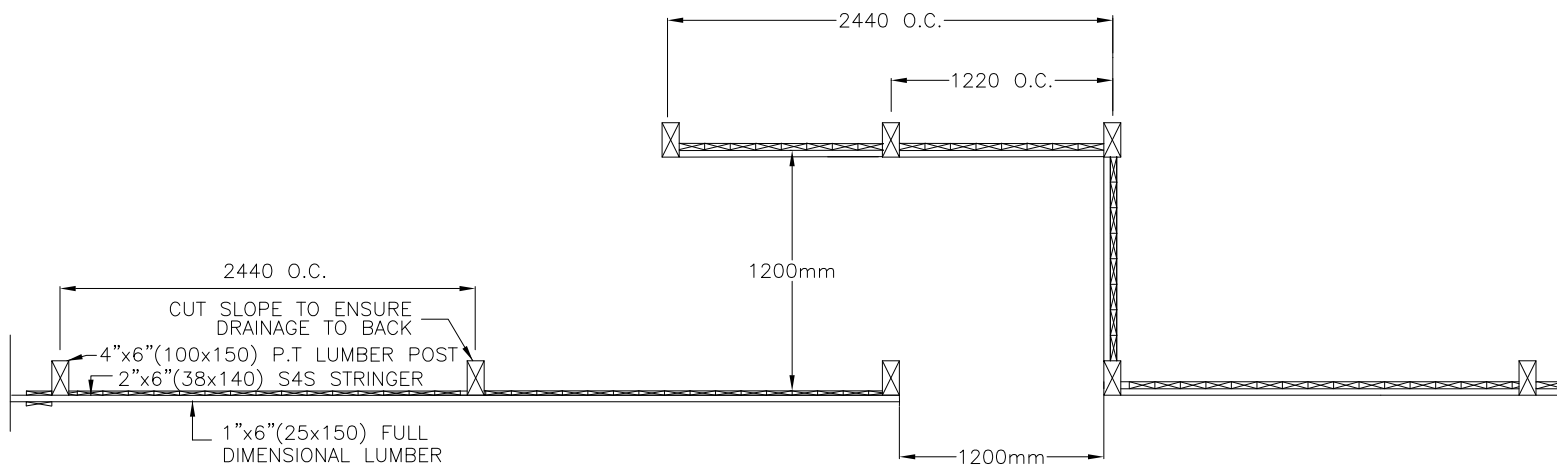
61211

Date: 05/03/15

Scale: N.T.S.

Drawn: L. LAING

Planning & Development Services Department



NOTES:  
 -ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

#### REVISIONS

Date	Details	Drawn
12/10/23	REVISED LUMBER DIMENSIONS	J. ORR
11/05/04	REVISED DRAWING NUMBER & REVISIONS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
02/06/24	Printed	A. McLenaghan
02/01/29	Changed fence board size option	A. McLenaghan

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#### FENCE BAFFLE GATE

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

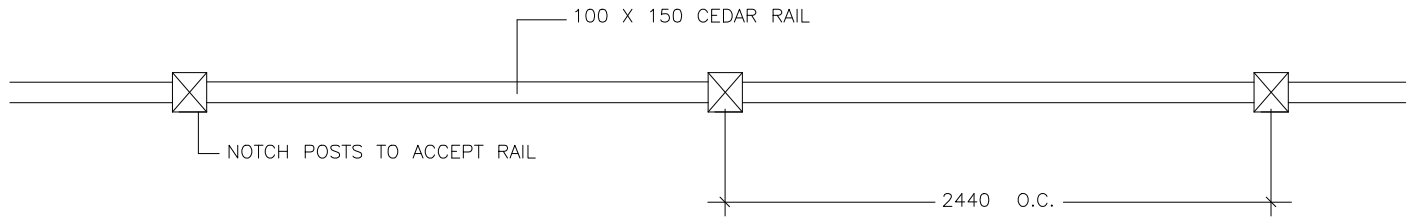
61212

Date: 27/07/94

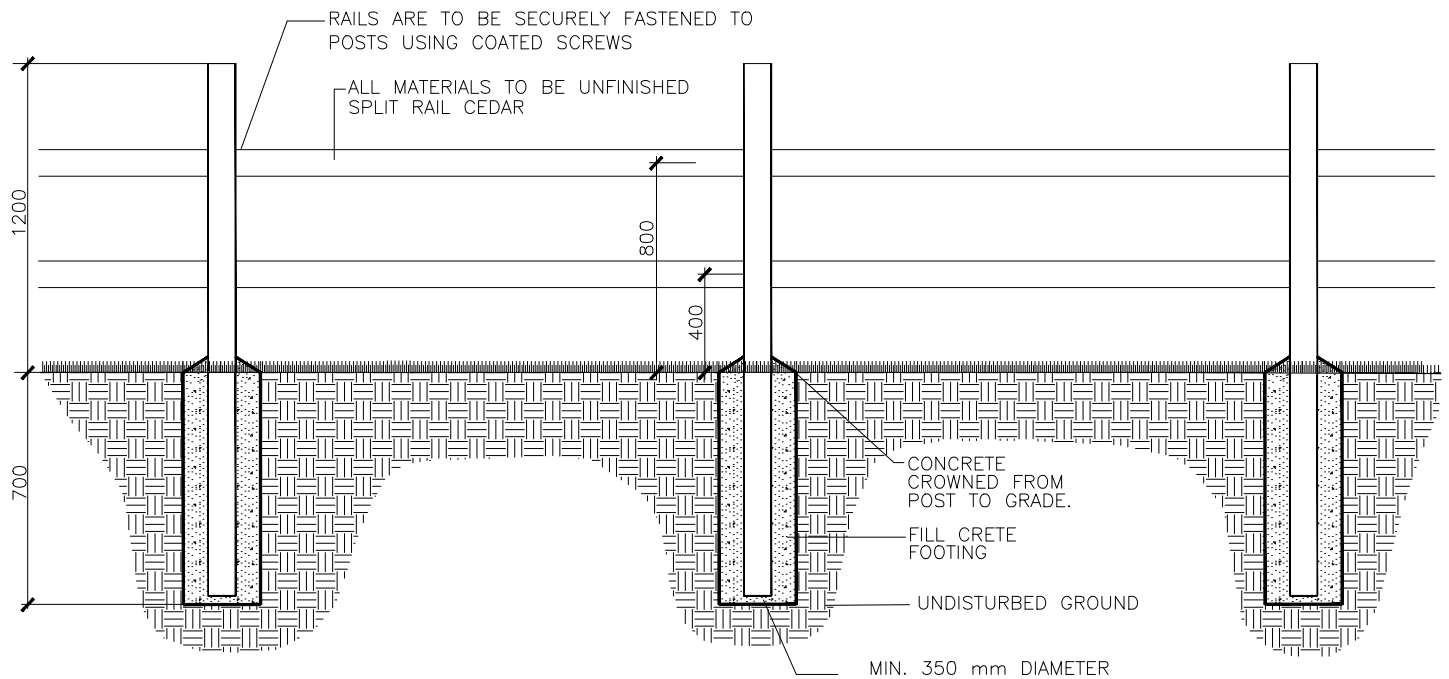
Scale: N.T.S.

Drawn: D. BROWN

Planning & Development Services Department



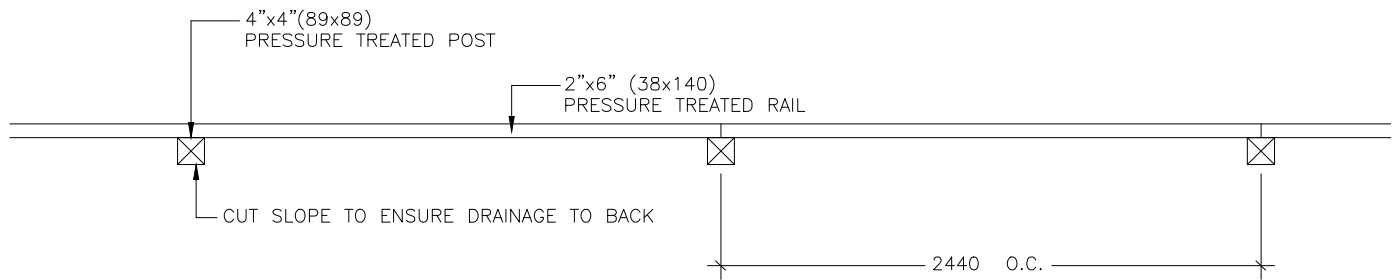
FENCE PLAN



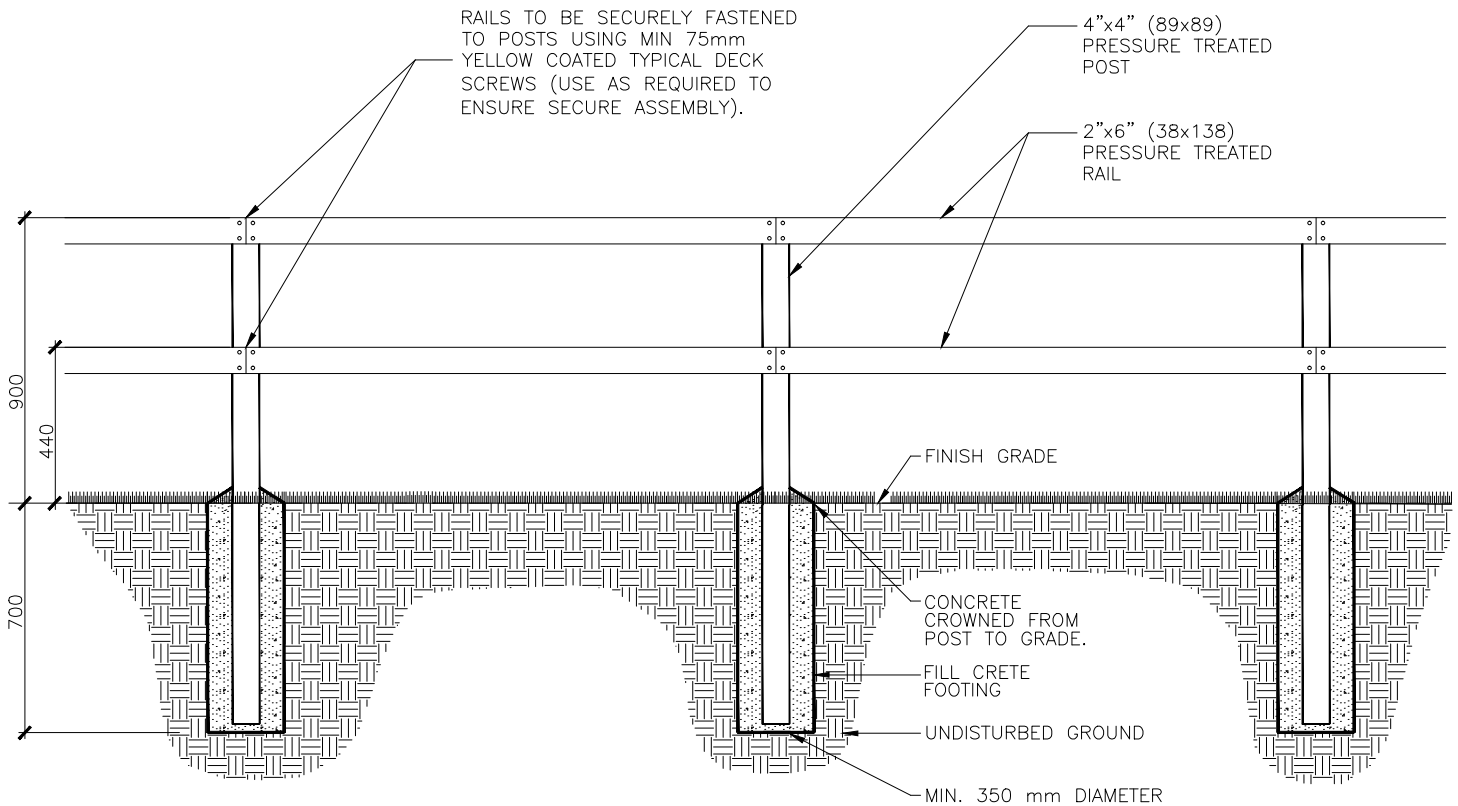
FENCE SECTION

NOTE:  
 -POST HOLES SHOULD BE EXCAVATED TO REACH A DEPTH OF UNDISTURBED SUBGRADE.  
 -ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011		
Date	Details	Drawn			
			<b>SPLIT RAIL FENCE</b>		
11/05/05	REVISED DRAWING NUMBERS	J. ORR	Approved: P. Alexander, AALA, CSLA		<b>DWG. NO.</b>
11/02/10	REVISED DRAWING NUMBERS	O. Butt	Checked: J.M. Talbot, MLA, CSLA		<b>61213</b>
08/02/26	Detail Added to the OSDS	M. Forgues	Date: 08/02/26	Scale: N.T.S.	Drawn: M. FORGUES
Planning & Development Services Department					



FENCE PLAN



FENCE SECTION

NOTE:

- ALL WOOD TO BE PRESSURE TREATED.
- ALL WOOD CUTS TO BE COATED WITH TWO COATS OF APPROVED WOOD PRESERVATIVE.
- POST HOLES SHOULD BE EXCAVATED TO REACH A DEPTH OF UNDISTURBED SUBGRADE.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS

Date	Details	Drawn
12/10/23	NEW STANDARD DETAIL	K. HARRIS

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Alberta, T8A 3W7, CANADA

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POST AND RAIL FENCE

Approved: J.M. Talbot, MLA, CSLA

DWG. NO.

Checked: Jocelyn Thrasher-Haug, M.Sc., P.Ag., P.Biol.

61214

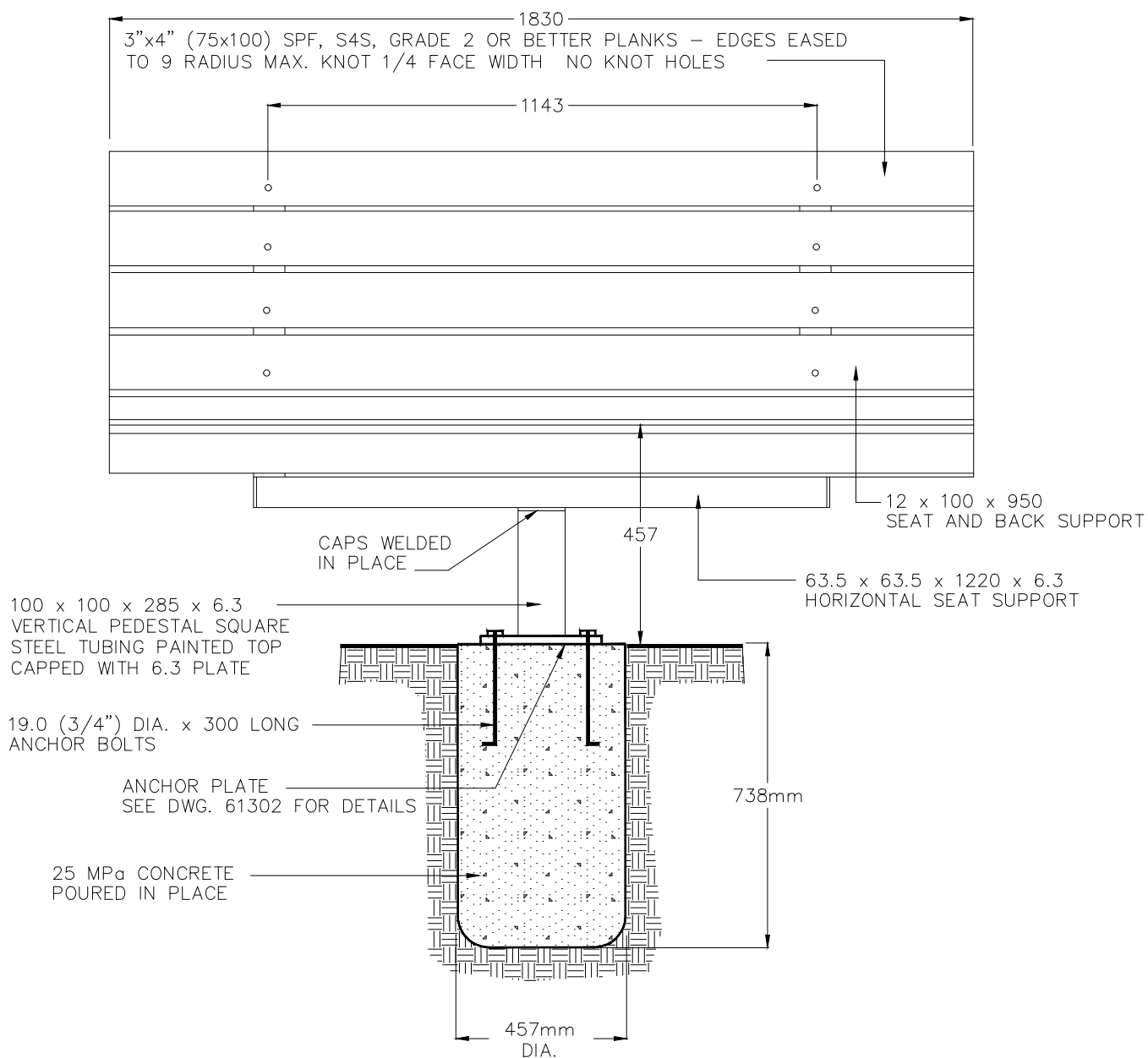
Date: 12/10/23

Scale: N.T.S.

Drawn: K. HARRIS

Planning & Development Services Department





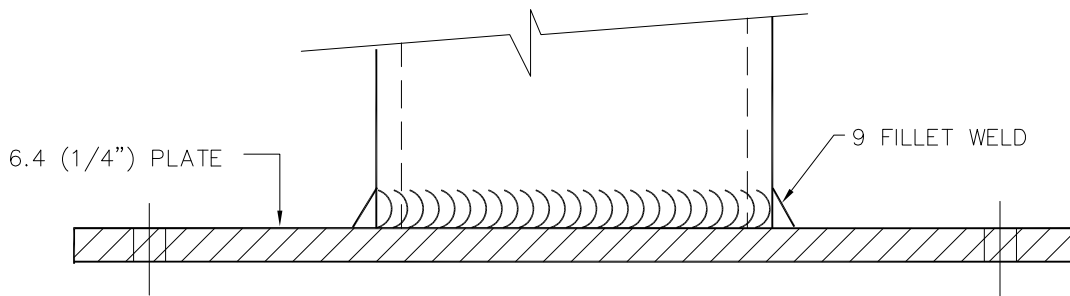
## FRONT VIEW

### GENERAL NOTES:

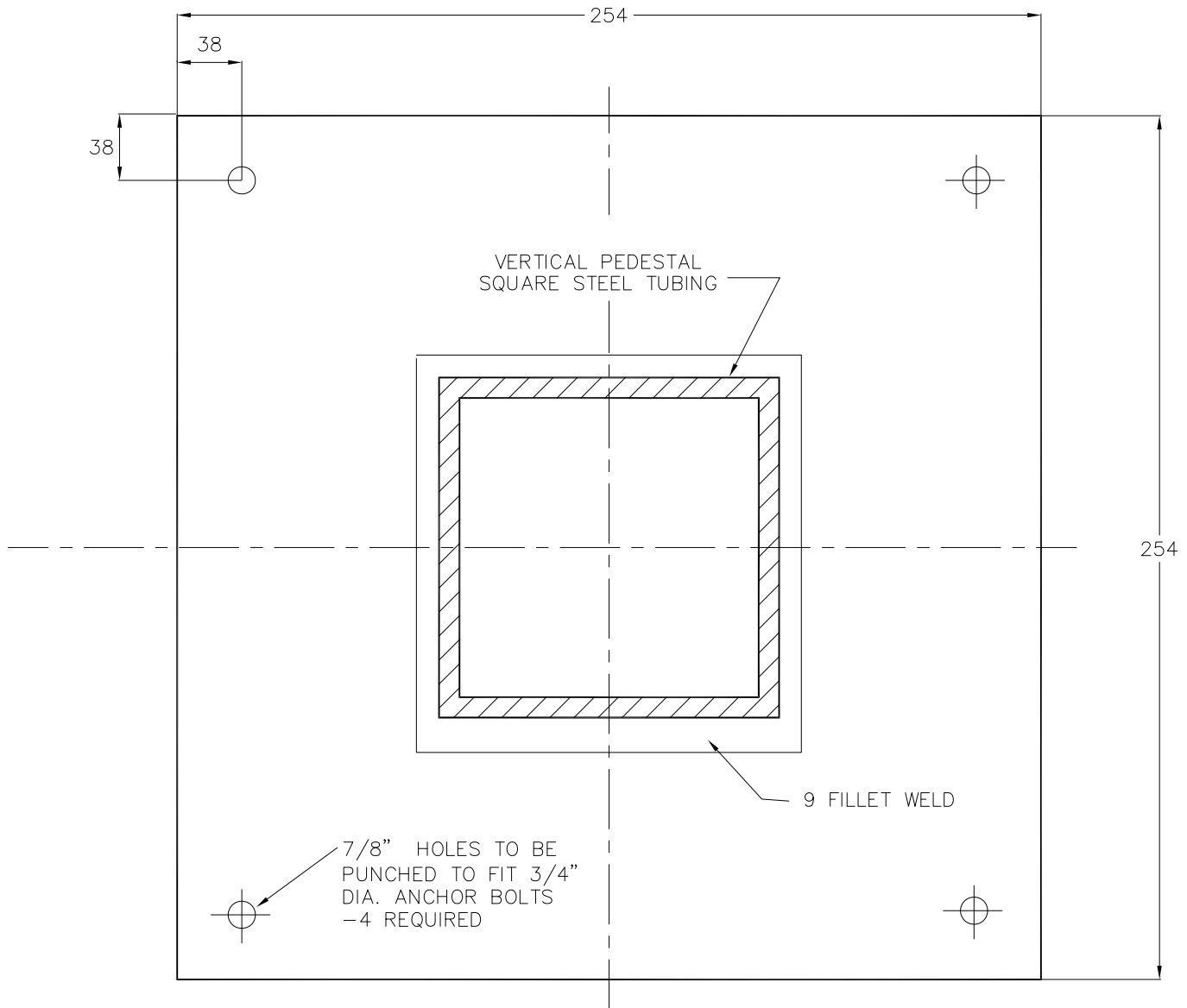
- FINISH ON ALL METAL FRAME COMPONENTS TO BE BLACK ALKYD SEMI GLOSS PAINT OR POWDER COATED
- FRAME COMPONENTS SHALL BE ELECTRICALLY WELDED
- WOOD TO BE NON-PRESSURE TREATED SPF GRADE 2 OR BETTER
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

### REVISIONS

Date	Details	Drawn	<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
12/10/23	REVISED LUMBER DIMENSIONS	J. ORR	<b>SINGLE PEDESTAL BENCH LAYOUT</b>		
11/05/03	REVISED DRAWING NUMBERS	J. ORR			
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Approved: P. Alexander, AALA, CSLA	DWG. NO.	
05/02/11	Remove Pressure Treated Wood	L. Laing	Checked: J.M. Talbot, MLA, CSLA	61301	
02/02/20	Lumber size	A. McLenaghan	Date: 17/05/94   Scale: N.T.S.   Drawn: DAN LECKIE	Planning & Development Services Department	



SECTION



PLAN VIEW – ANCHOR PLATE FOR BENCH,  
TABLES, T-BOLLARDS & RECEPTACLES

# REVISIONS

Date	Details	Drawn
12/10/23	REVISED DRAWING NUMBERS	J.E.
11/05/05	REVISED DRAWING NUMBERS	J. ORR
11/02/09	REVISED DRAWING NUMBERS	O. Butt
05/02/11	Adjust size of bolts – notation	L. Laing
02/06/24	Printed	A. McLenaghan

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## SINGLE PEDESTAL ANCHOR PLATE

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

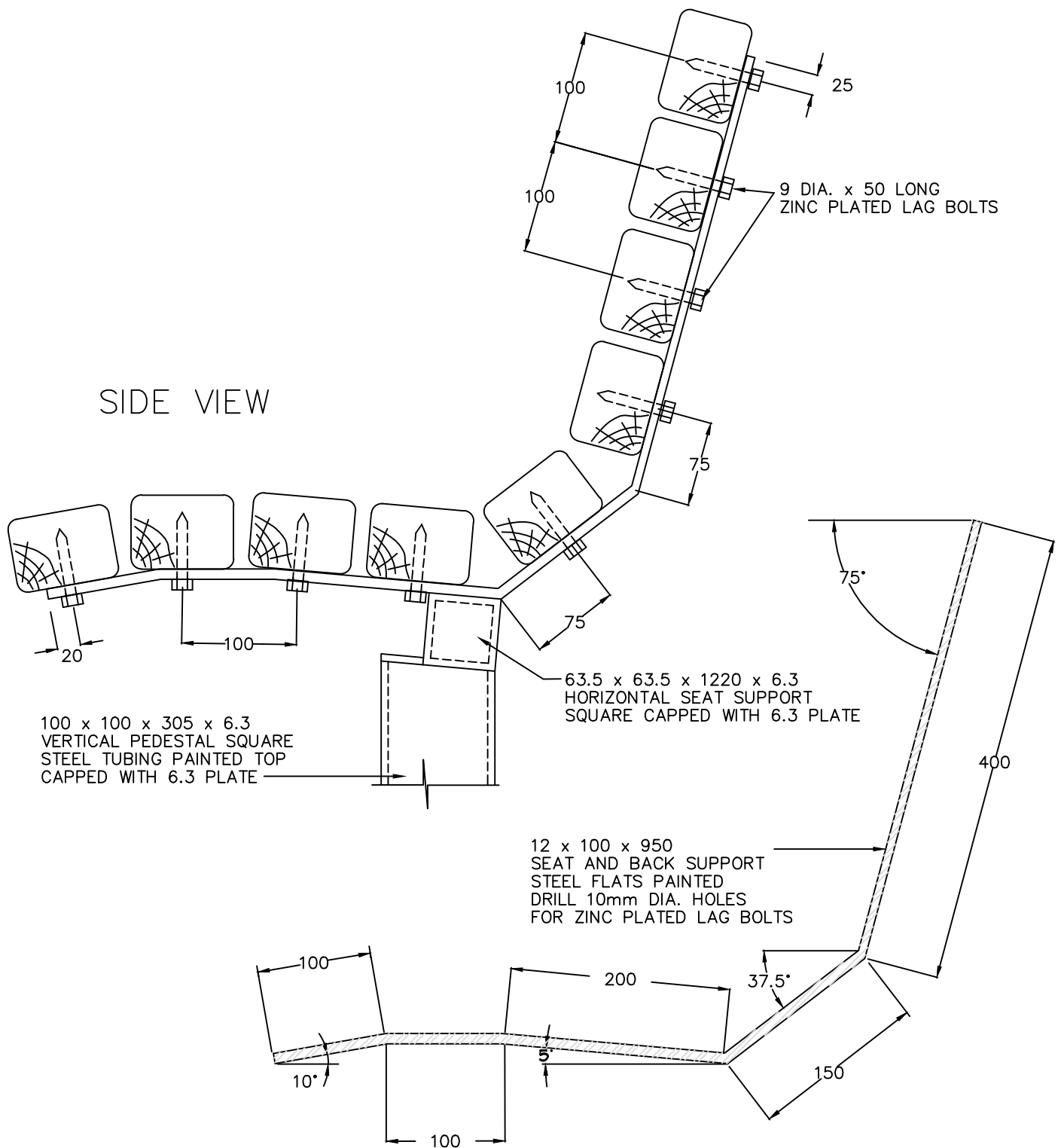
61302

Date: 09/09/94

Scale: N.T.S.

Drawn: DAN LECKIE

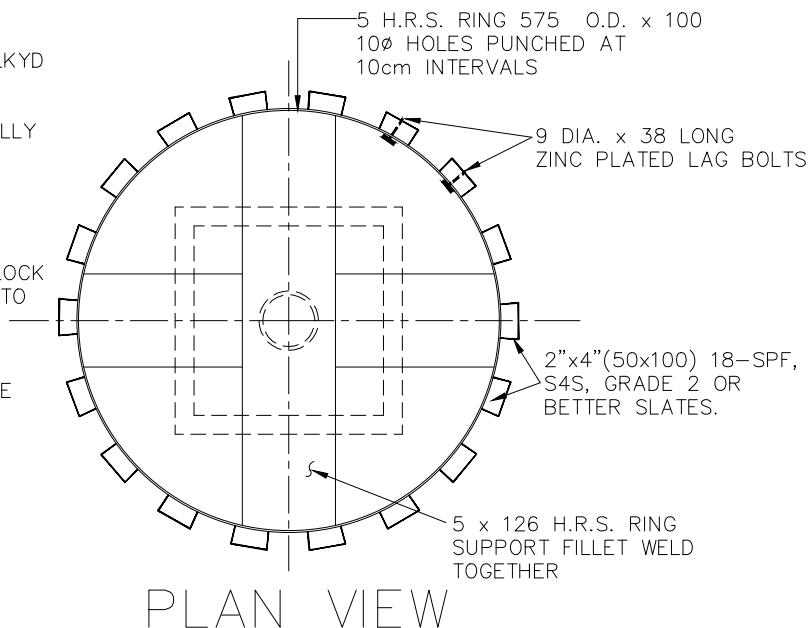
Planning & Development Services Department



NOTE:  
 -SEE DWG 61302 FOR ANCHOR PLATE DETAILS.  
 -ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

## SUPPORT DETAIL

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012	
Date	Details	Drawn		
12/10/23	REVISED DRAWING NUMBERS	J. ORR	<b>SINGLE PEDESTAL BENCH DETAIL</b>	
11/05/05	REVISED DRAWING NUMBERS	J. ORR		
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Approved: P. Alexander, AALA, CSLA	DWG. NO.
02/06/24	Printed	A. McLenaghan	Checked: J.M. Talbot, MLA, CSLA	61303
02/02/20	Lumber size	A. McLenaghan	Date: 19/04/94 Scale: N.T.S. Drawn: DAN LECKIE	Planning & Development Services Department



- 25 GAL. 18 GAUGE BARREL
- BLACK SEMI-GLOSS OUTSIDE  
COATED INSIDE
- 3 HOLES PUNCHED IN  
BOTTOM FROM INSIDE OUT  
FOR WATER DRAINAGE.

REVISIONS			<div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></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3"x10" (75x254) x 1830mm SPF, S4S, GRADE 2 OR BETTER PLANKS.

R=10mm ALL PLANK EDGES

6mm x 64mm x 75mm  
STEEL ANGLE (TYP.)

9mm x 113mm ZINC PLATED  
LAG BOLTS

64mm x 64mm x 546mm  
STEEL TUBING

NOTE:  
WOOD TO BE NON-PRESSURE TREATED  
SPF GRADE 2 OR BETTER

100mm x 100mm x 6mm x 1220mm  
STEEL TUBING

6mm x 64mm x 75mm  
STEEL ANGLE (TYP.)

254mm x 254mm x  
6.4mm BASEPLATE  
SEE DWG. 61302  
FOR DETAILS

385.4mm

724mm

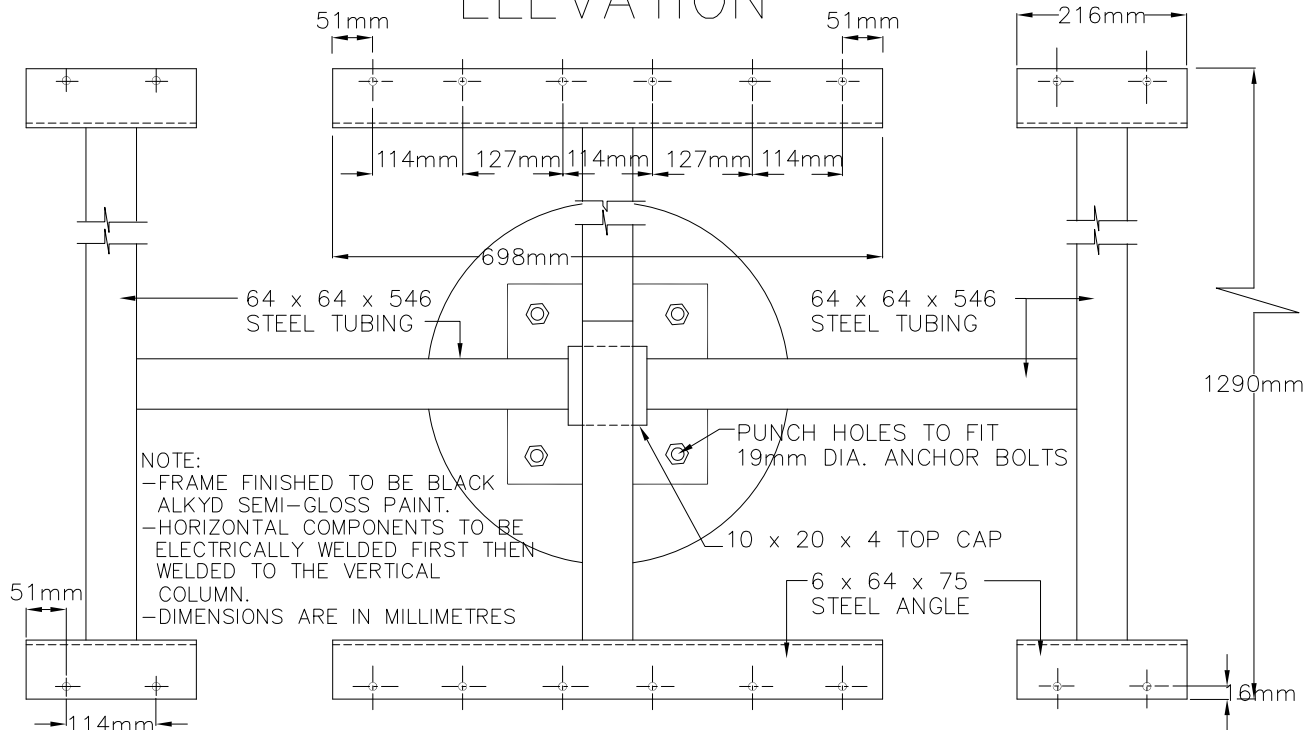
19.0mm (3/4")  
DIA.  
x 300mm LONG  
ANCHOR BOLTS  
4 REQUIRED

460mm DIA.

460mm DIA. CONCRETE  
FOOTING x 740mm DEEP  
25MPa CONCRETE  
POUR IN PLACE

1472mm

ELEVATION



PLAN VIEW - FRAME ONLY

# REVISIONS

Date	Details	Drawn
12/10/23	REVISED LUMBER DIMENSIONS	J.E.
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/09	REVISED DRAWING NUMBERS	O. BUTT
05/02/11	Remove Pressure Treated Wood	L. Laing
02/02/20	15.9 dia. anchor bolts to 19mm dia.	A. McLenaghan

Strathcona  
County

2001 Sherwood Drive, Sherwood Park  
Alberta, T8A 3W7, CANADA

© 2012

## PEDESTAL MOUNTED PICNIC TABLE DETAIL

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

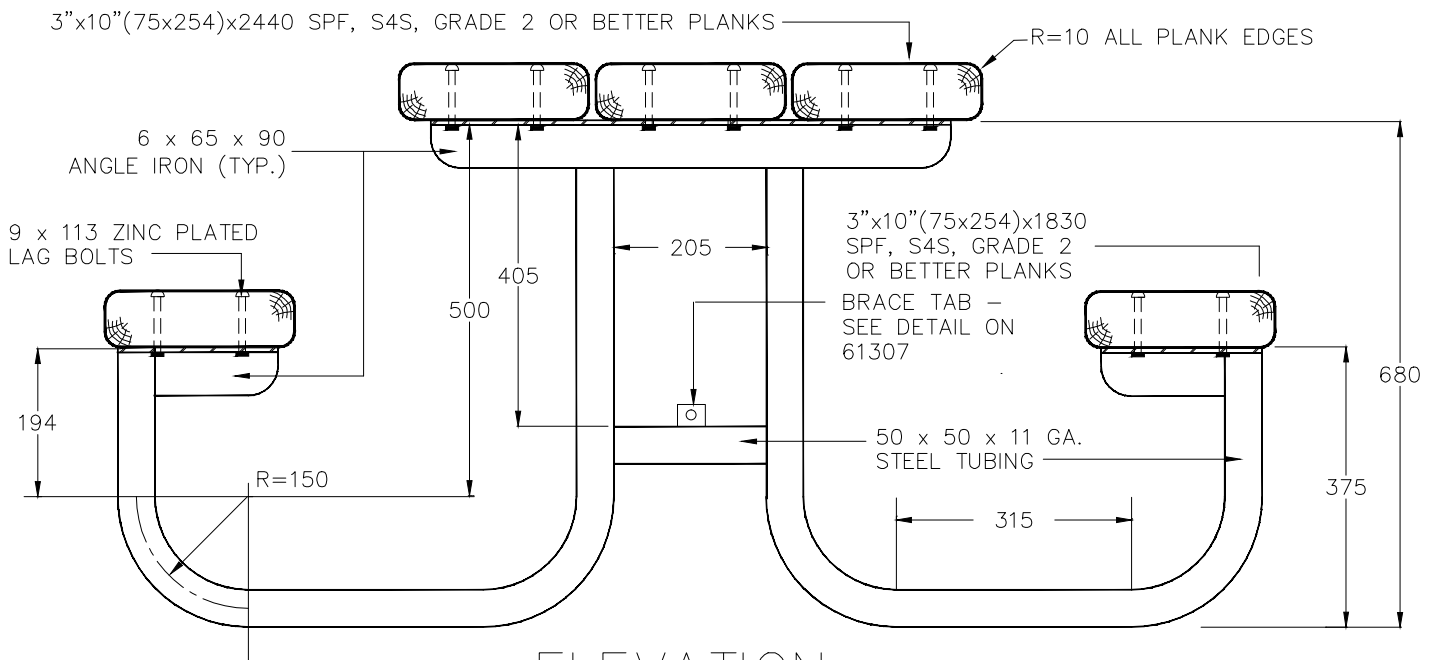
61305

Date: 06/04/94

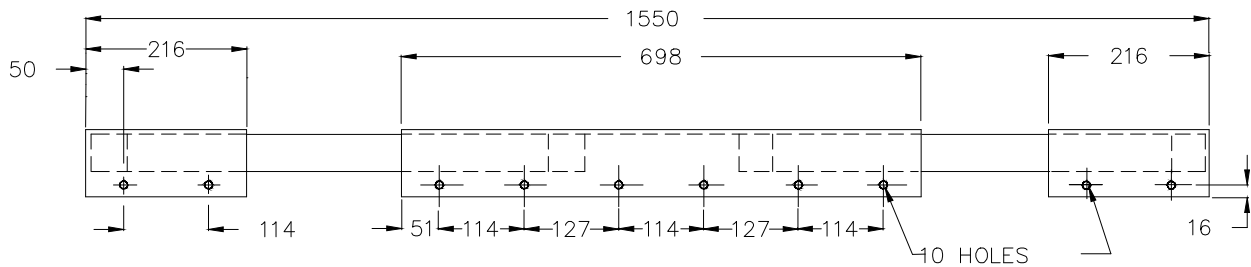
Scale: N.T.S.

Drawn: DAN LECKIE

Planning & Development Services Department



ELEVATION



PLAN VIEW — FRAME ONLY

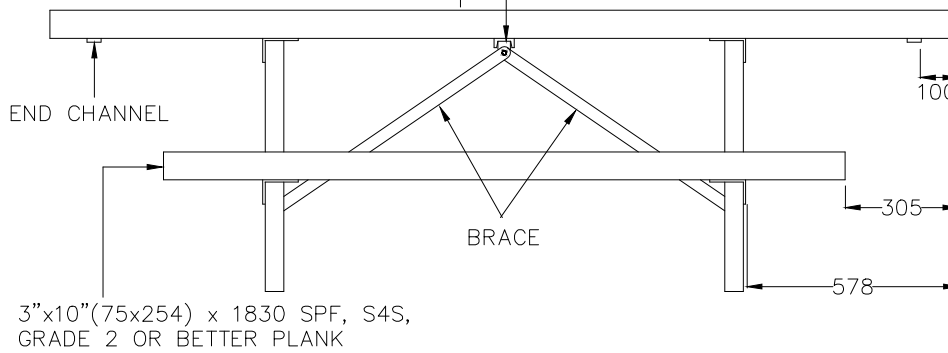
NOTES:

- ALL METAL PARTS FINISHED WITH BLACK ALKYD SEMI-GLOSS PAINT OR POWDER COATED.
- ALL MECHANICAL FASTENERS SHALL BE ZINC PLATED.
- ALL LUMBER TO BE SPF, S4S, GRADE 2 OR BETTER.
- WOOD TO BE NON-PRESSURE TREATED SPF GRADE 2 OR BETTER
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

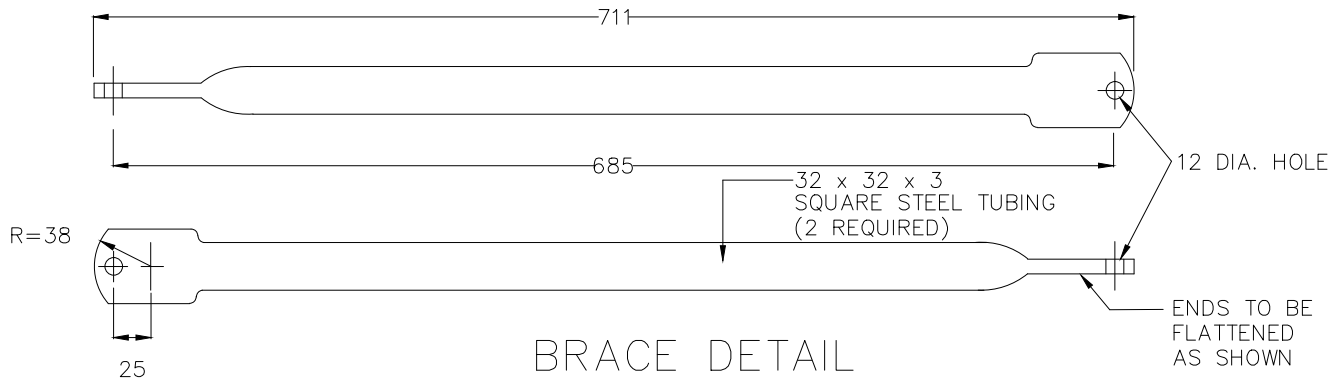
REVISIONS

Date	Details	Drawn	<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
12/10/23	REVISED LUMBER DIMENSIONS	J. ORR			
11/05/03	REVISED DRAWING NUMBERS	J. ORR	<b>PORTABLE PICNIC TABLE PLAN/ELEVATION</b>		
11/02/09	REVISED DRAWING NUMBERS	O. Butt			
05/02/11	Remove Pressure Treated Wood	L. Laing	Approved: P. Alexander, AALA, CSLA	DWG. NO.	
06/02/24	Printed	A. McLenaghan	Checked: J.M. Talbot, MLA, CSLA	61306	
			Date: 11/04/94	Scale: N.T.S.	Drawn: DAN LECKIE
				Planning & Development Services Department	

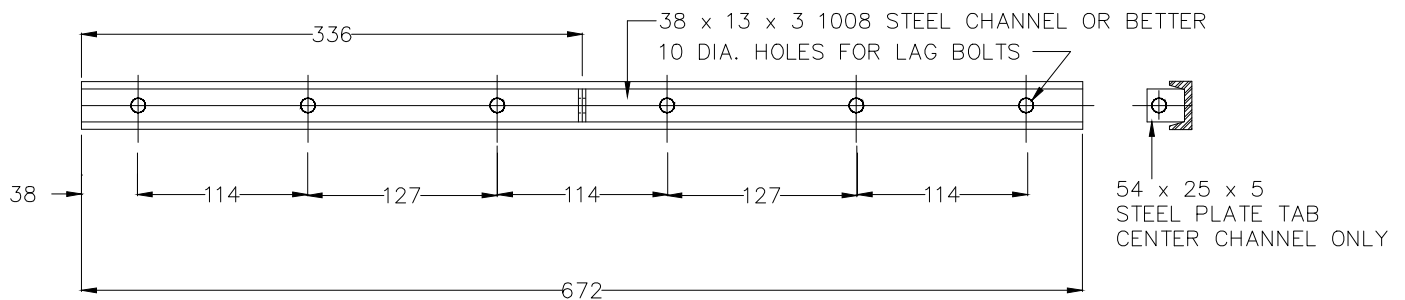
3"x10" (75x254) x 2440 SPF, S4S, GRADE 2 OR BETTER PLANKS.



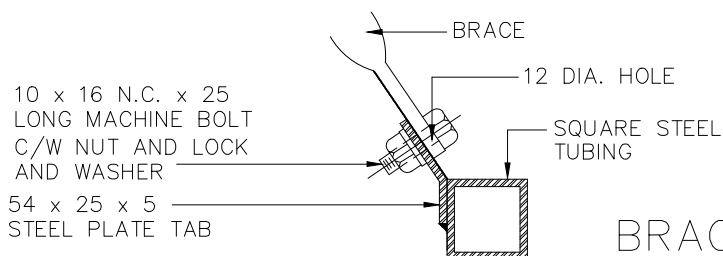
ELEVATION



BRACE DETAIL



CHANNEL DETAIL



BRACE TAB DETAIL

NOTES:  
 - WOOD TO BE NON-PRESSURE TREATED SPF GRADE 2 OR BETTER.  
 - ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

# REVISIONS

Date	Details	Drawn
12/10/23	REVISED DRAWING DIMENSIONS	J. ORR
11/05/05	REVISED DRAWING NUMBERS	J. ORR
11/02/09	REVISED DRAWING NUMBERS	O. Butt
05/02/11	Remove Pressure Treated Wood	L. Laing
02/06/24	Printed	A. McLenaghan

**Strathcona**  
County

2001 Sherwood Drive, Sherwood Park  
 Alberta, T8A 3W7, CANADA

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## PORTABLE PICNIC TABLE DETAILS

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

61307

Date: 12/04/94

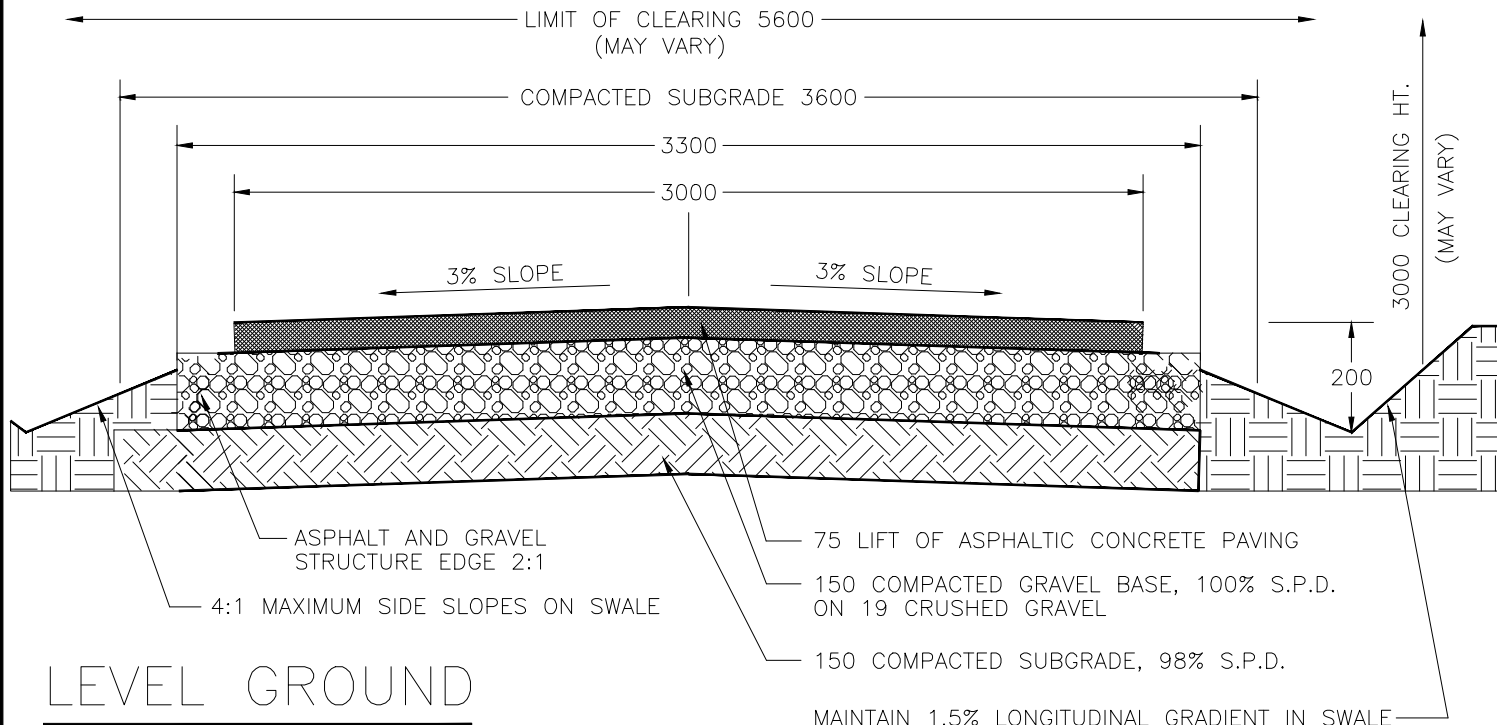
Scale: N.T.S.

Drawn: DAN LECKIE

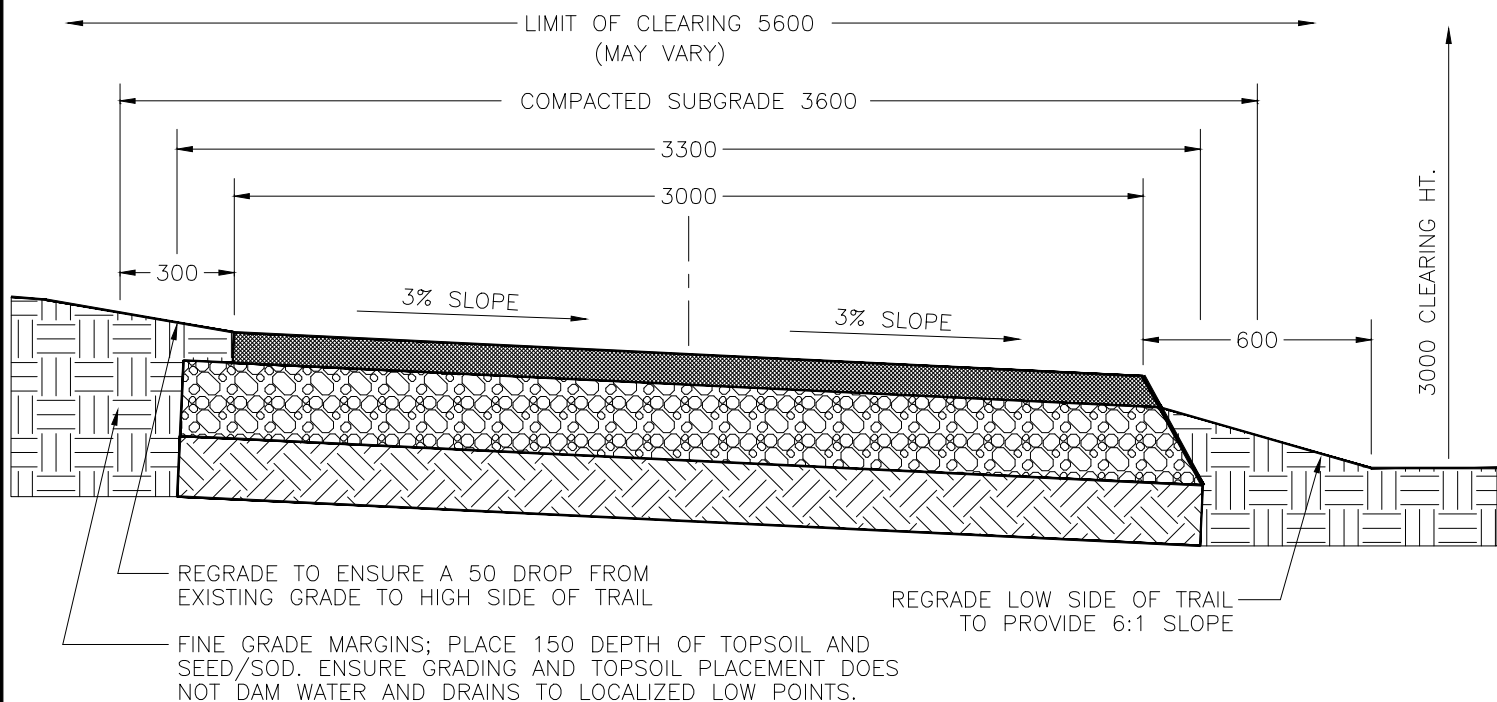
Planning & Development Services Department

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on the correct sides when the document is printed double-sided.





## LEVEL GROUND



## MINIMUM SIDESLOPE

NOTE: —ALL DIMENSIONS ARE IN MILLIMETRES

—ENSURE ALL JOINS WITH EXISTING VEGETATION SMOOTH AND CONTINUOUS, WHERE NECESSARY TRIM BACK ROOTS AND CLEAR DEBRIS.

### REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
08/04/02	Changed asphalt depth	M. Forgues
02/06/24	Printed	A. McLenaghan
01/01/30	3.0 m as standard	B. Wispinski

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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### ASPHALT TRAIL (3.0m WIDTH)

Approved: M. MacGarva, M.Eng., P.Eng.

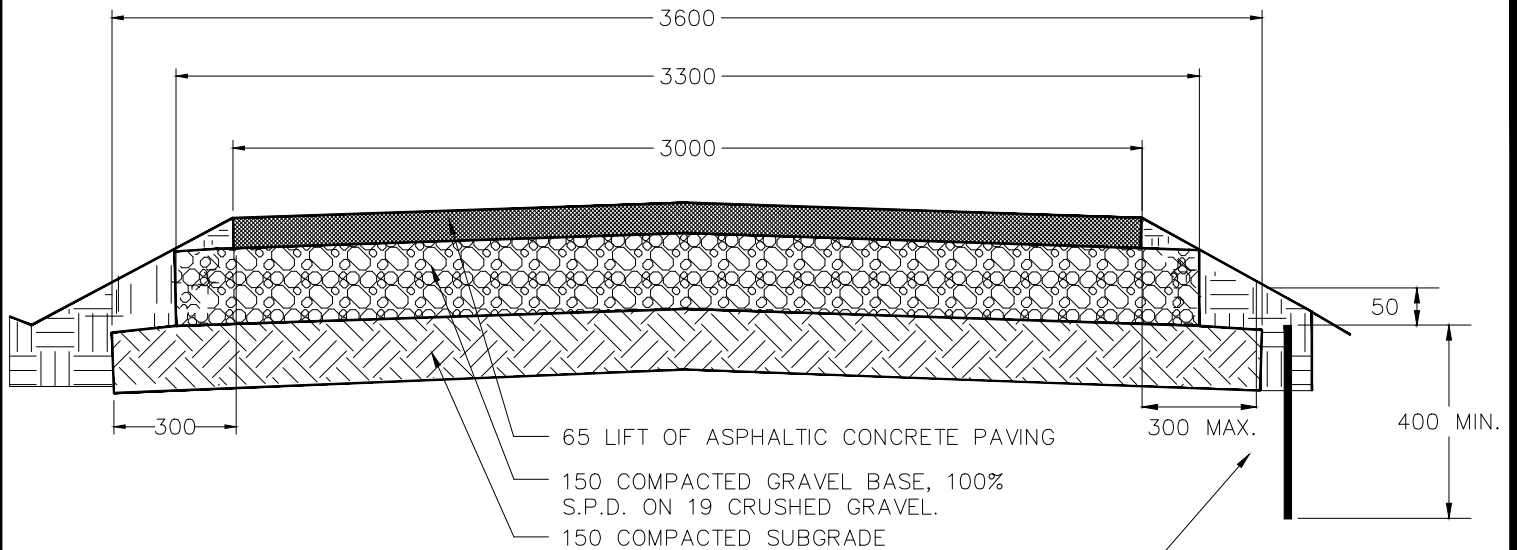
DWG. NO.

Checked: D.L. Schilbe, P.L. (Eng)

61401

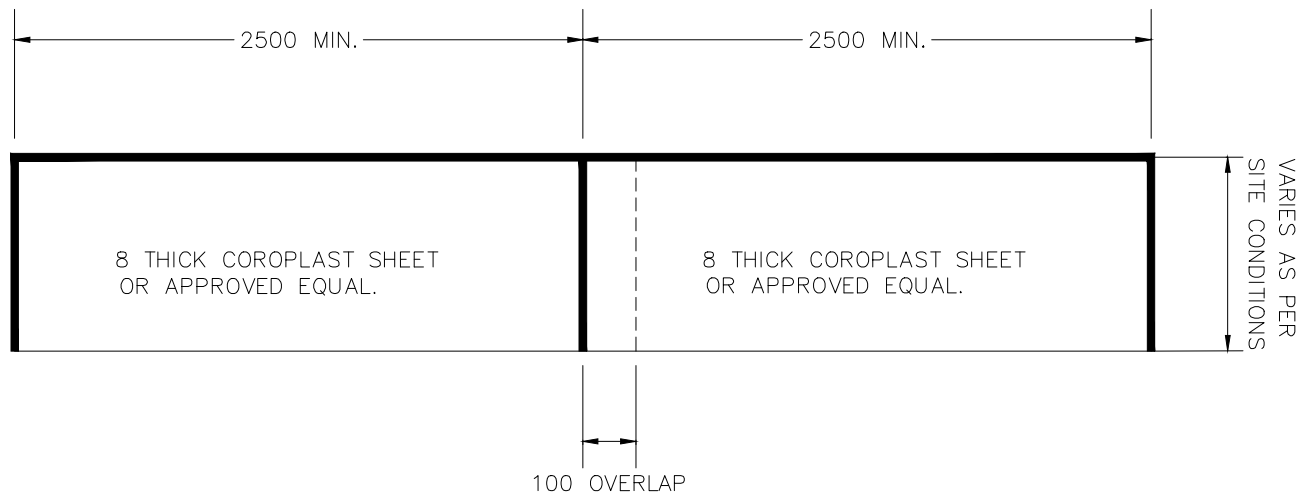
Date: 27/04/94 Scale: N.T.S. Drawn: B. ANDRE

Capital Planning & Construction Department



## TRAIL SECTION

COROPLAST / CORRUGATED PLASTIC OR APPROVED EQUIVALENT REQUIRED THROUGH NATIVE TREE STANDS OR WHERE TRAIL IS IN CLOSE PROXIMITY TO WILLOWS AND POPLAR TREES.



## ELEVATION

### NOTE:

- SITE CONDITIONS MAY WARRANT THE USE OF GEO-GRID.
- DEPTH OF ROOT BARRIER VARIES ACCORDING TO PLANT VARIETIES AND MANUFACTURE'S RECOMENDATIONS.
- A TRENCH SHOULD BE DUG FOR THE ROOT BARRIER PRIOR TO IT BEING INSTALLED IN THE GROUND.
- ROOT BARRIER SHOULD BE BURIED 50MM BELOW FINAL GRADE.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

### REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
08/02/26	Added more root barrier notes	M. Forgues
02/06/24	Printed	A. McLenaghan
01/10/09	Trail width, added note	A. McLenaghan

**Strathcona**  
County

2001 Sherwood Drive, Sherwood Park  
Alberta, T8A 3W7, CANADA

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### ROOT BARRIER SECTION AND ELEVATION

Approved: M. MacGarva, M.Eng., P.Eng.

DWG. NO.

Checked: D.L. Schilbe, P.L. (Eng)

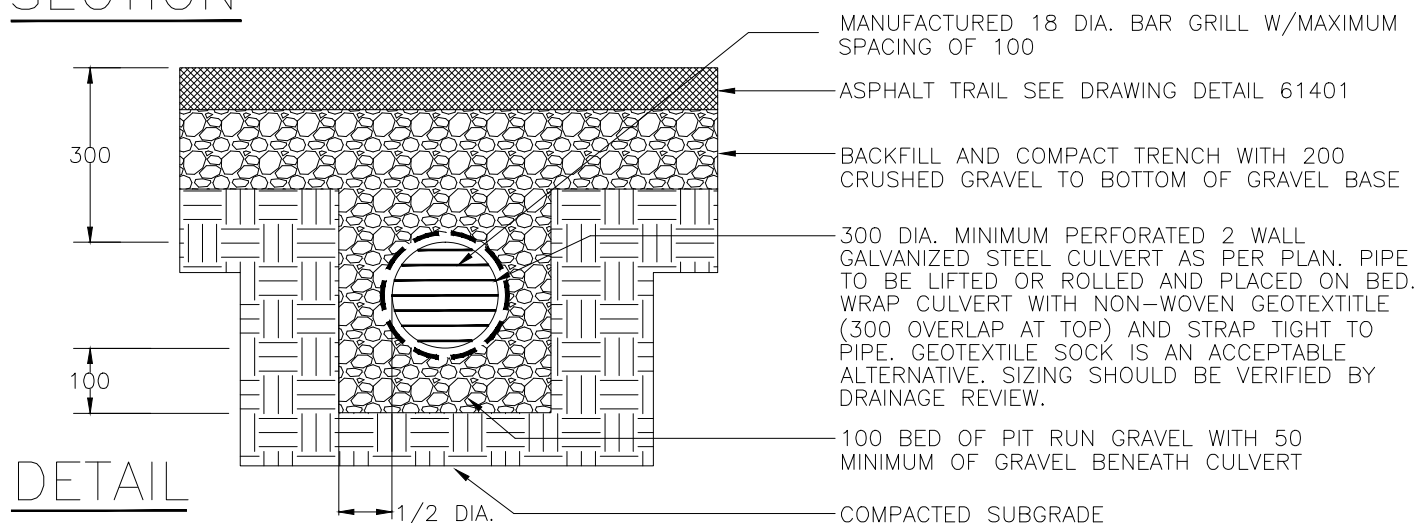
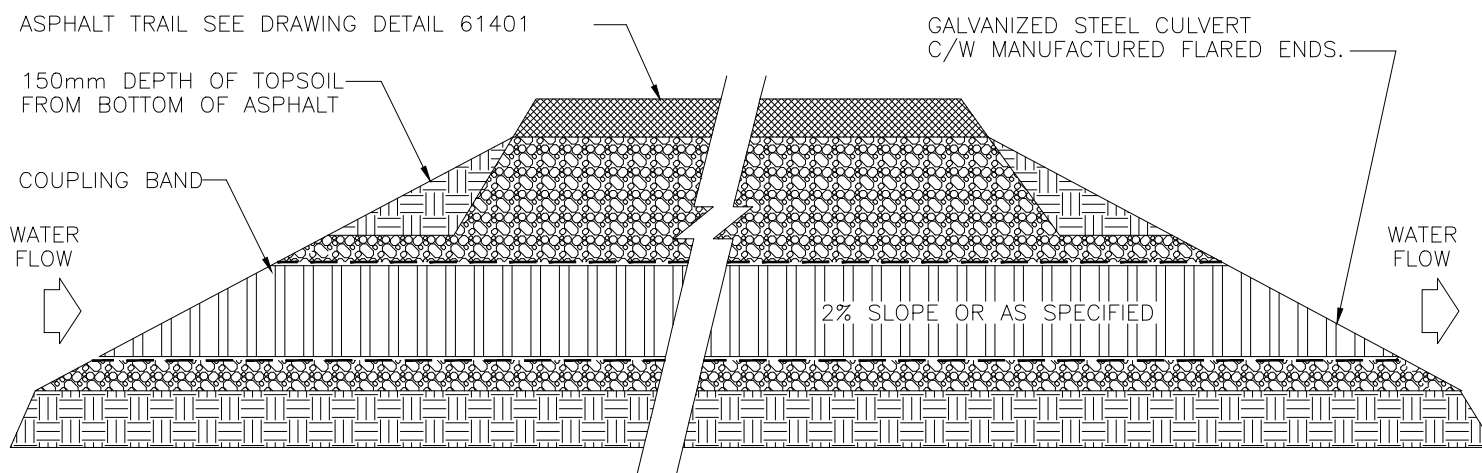
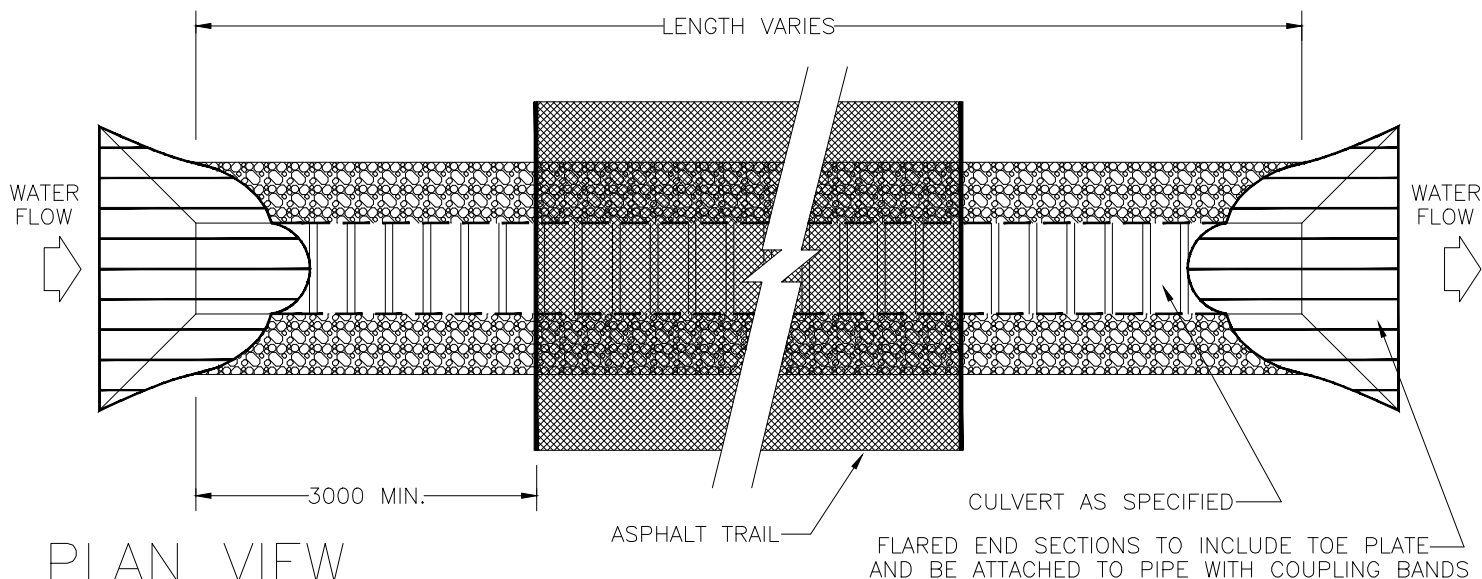
61402

Date: 27/04/94

Scale: N.T.S.

Drawn: B. ANDRE

Capital Planning & Construction Department



#### REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
08/04/02	Revised depth of culvert	M. Forgues
02/06/24	Printed	A. McLenaghan
94/06/24	Revised culvert comments	X

**Strathcona**  
County

2001 Sherwood Drive, Sherwood Park  
Alberta, T8A 3W7, CANADA

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#### CORRUGATED STEEL CULVERT WITH GEOTEXTILE

Approved: M. MacGarva, M.Eng., P.Eng.

DWG. NO.

Checked: D.L. Schilbe, P.L. (Eng)

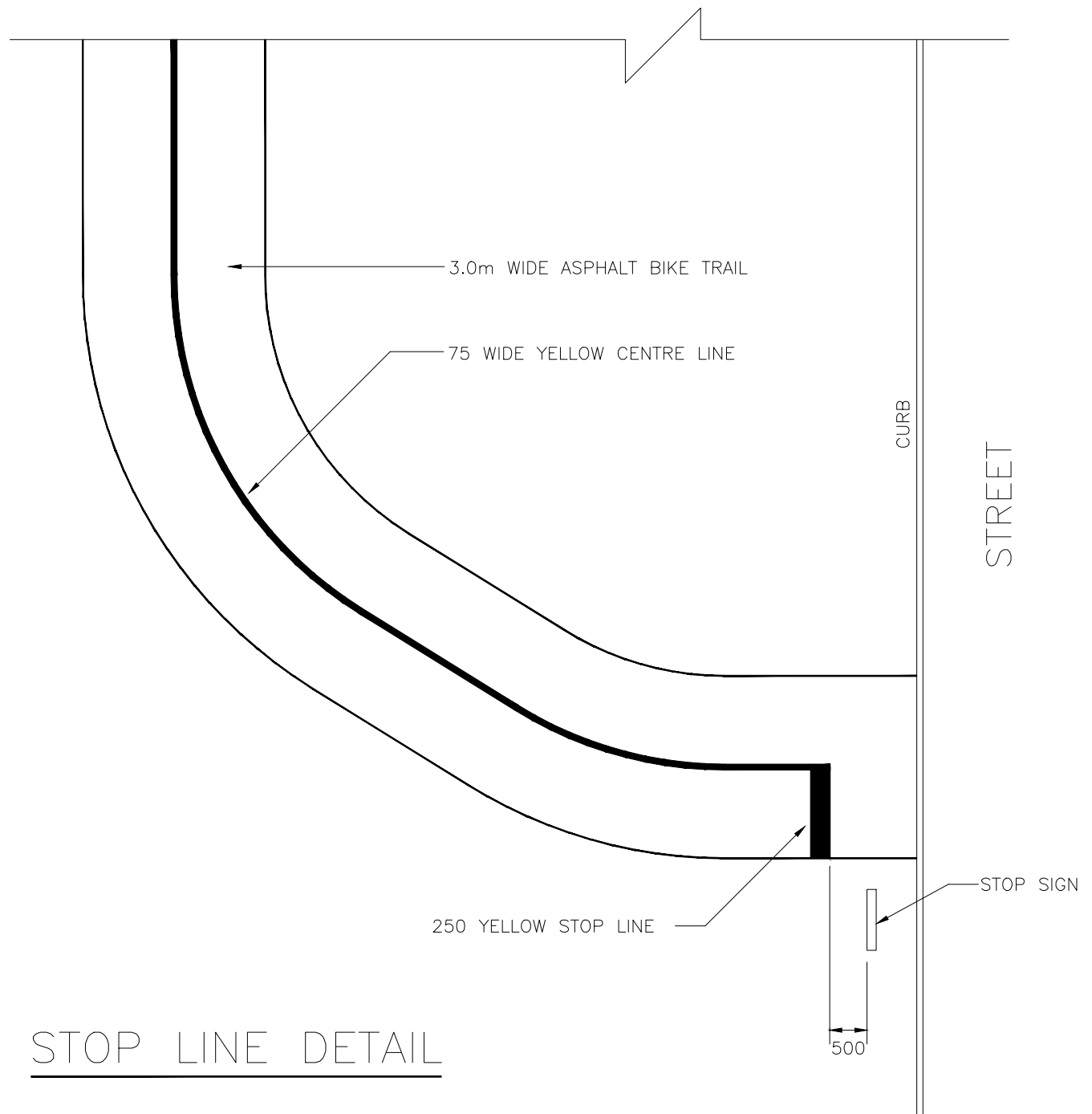
61403

Date: 94/06/24

Scale: N.T.S.

Drawn: B. ANDRE

Capital Planning & Construction Department

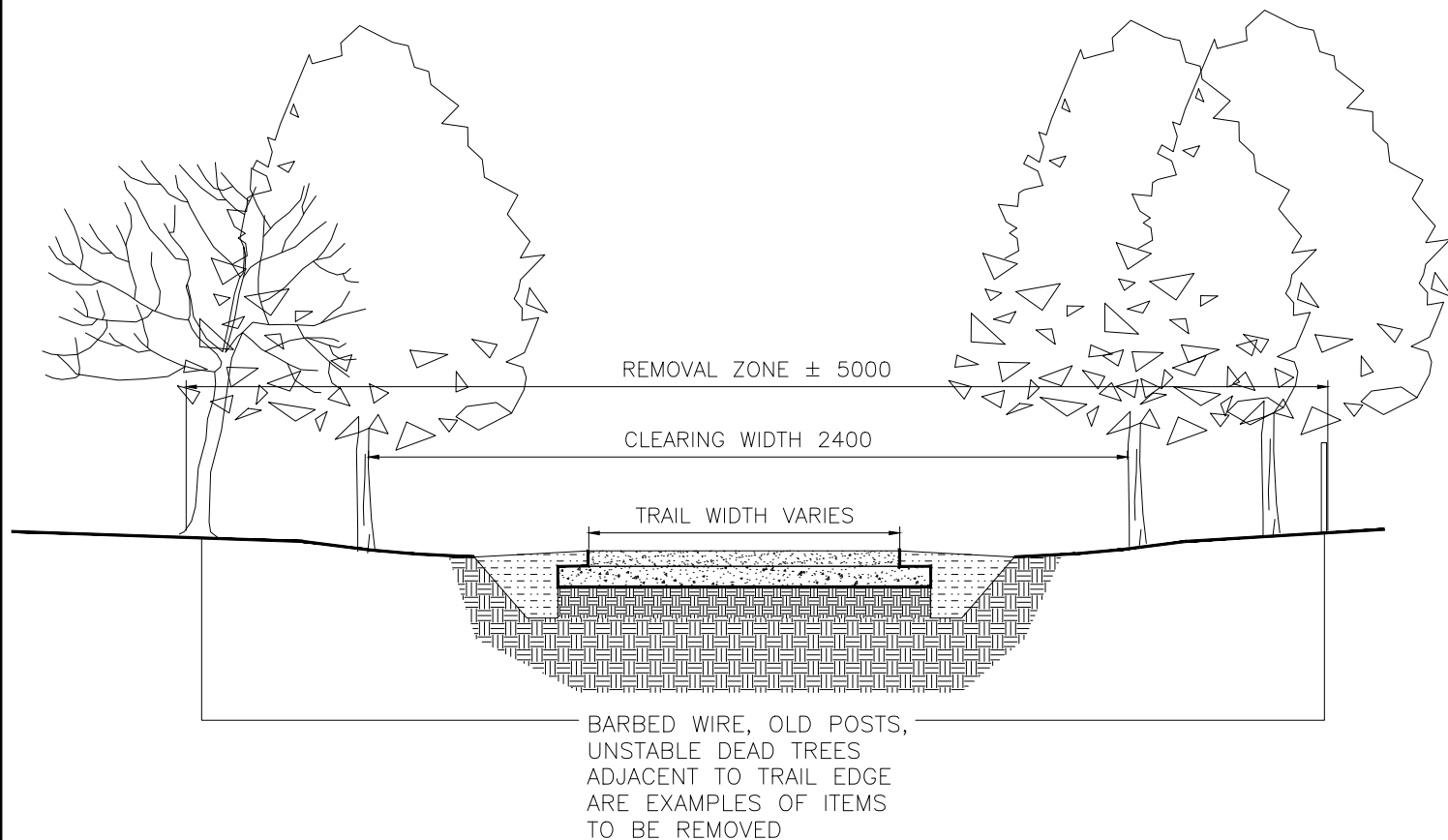


## STOP LINE DETAIL

### NOTES:

- PAINT TO CONFORM TO CGSB 1—GP—74M ALKYD PAINT.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011	
Date	Details	Drawn		
11/05/03	REVISED DRAWING NUMBERS	J. ORR	<b>ASPHALT TRAIL LINE PAINTING (3m)</b> Approved: M. MacGarva, M.Eng., P.Eng. Checked: D.L. Schilbe, P.L. (Eng) Date: 27/04/94   Scale: N.T.S.   Drawn: B. ANDRE	
11/02/10	REVISED DRAWING NUMBERS	O. Butt		
02/06/24	Printed	A. McLenaghan		
01/02/08	Changed trail width	B. Wispinski		
			<b>DWG. NO.</b> <b>61404</b> <small>Planning &amp; Development Services Department</small>	

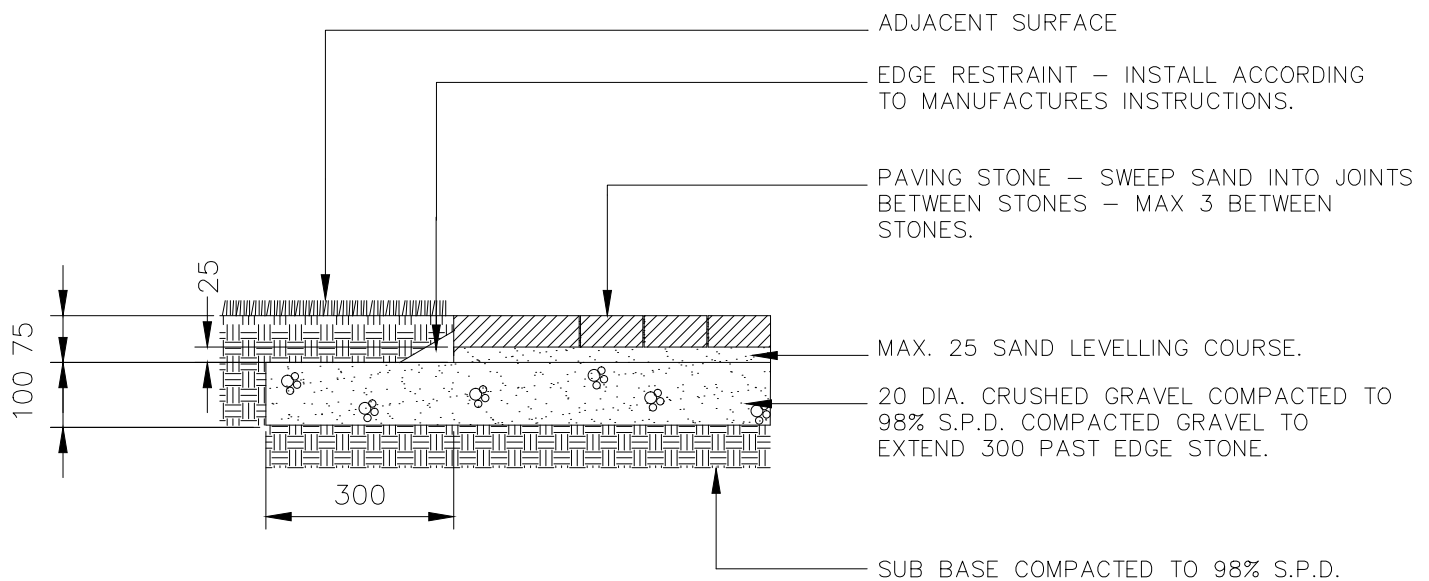


#### NOTES:

- TRAIL WIDTH TO BE MODIFIED TO ACCOMMODATE EXISTING TREES
- TRAIL WIDTH TO BE INCREASED AT INTERSECTIONS WITH CASUAL PATHS, BLIND INTERSECTIONS AND CORNERS
- CONTRACTORS RESPONSIBILITY TO REHABILITATE ALL DISTURBED AREAS ALONG TRAIL EDGE WITH TOPSOIL AND A NATURAL SEED MIXTURE
- CLEARING ZONE TO BE 2400 IN WIDTH, 3600 IN HEIGHT AT CENTER OF TRAIL.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

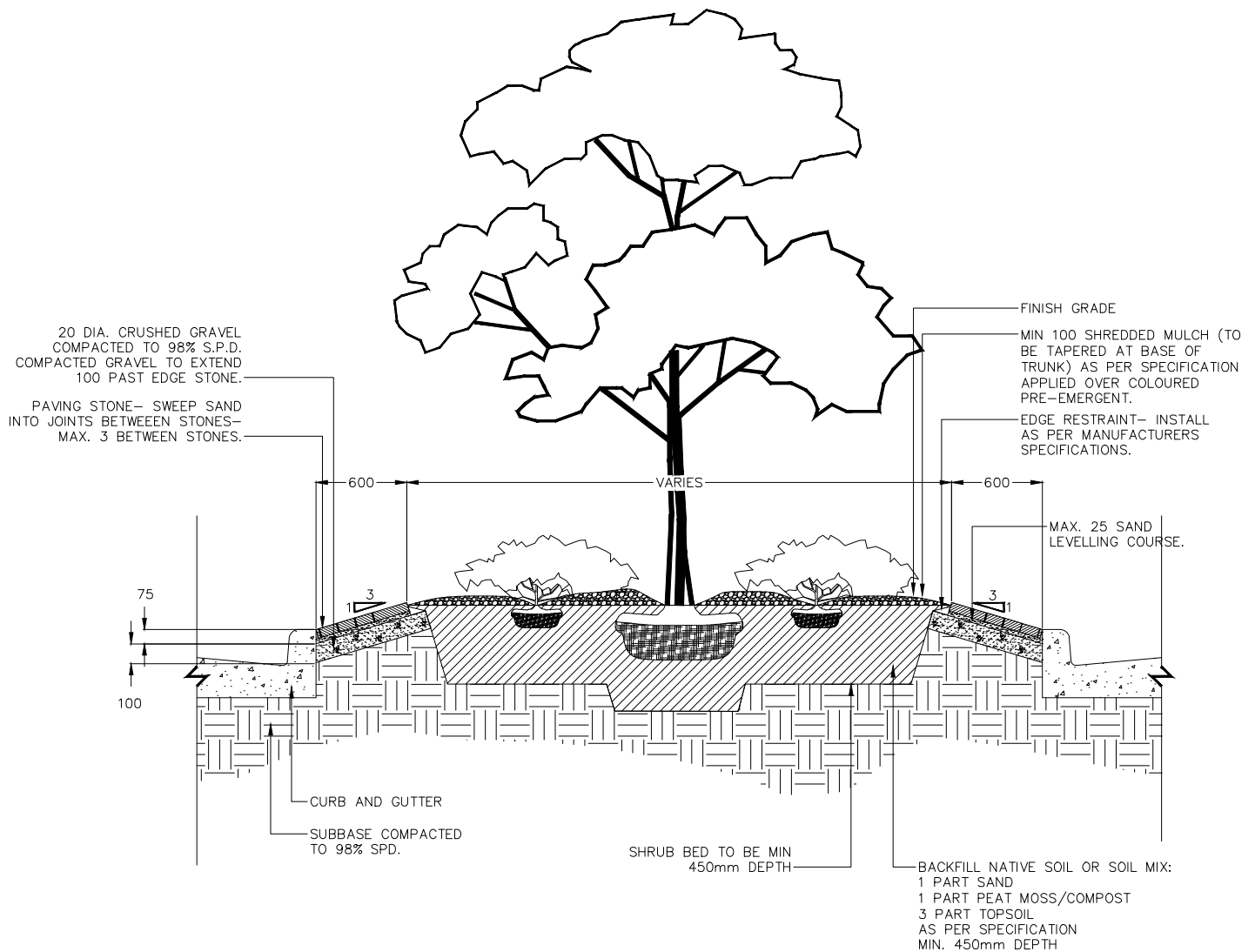
REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>			
Date	Details	Drawn				
			REMOVAL ZONE AND CLEARING WIDTH			
11/05/03	REVISED DRAWING NUMBERS	J. ORR	Approved: P. Alexander, AALA, CSLA			DWG. NO.
11/02/10	REVISED DRAWING NUMBERS	O. Butt	Checked: D.L. Schilbe, P.L. (Eng)			61405
05/03/09	DETAIL ADDED TO OSDS	L. Laing	Date: 02/07/15	Scale: N.T.S.	Drawn: AMY McLENAGHAN	
						Planning & Development Services Department

#### REMOVAL ZONE AND CLEARING WIDTH



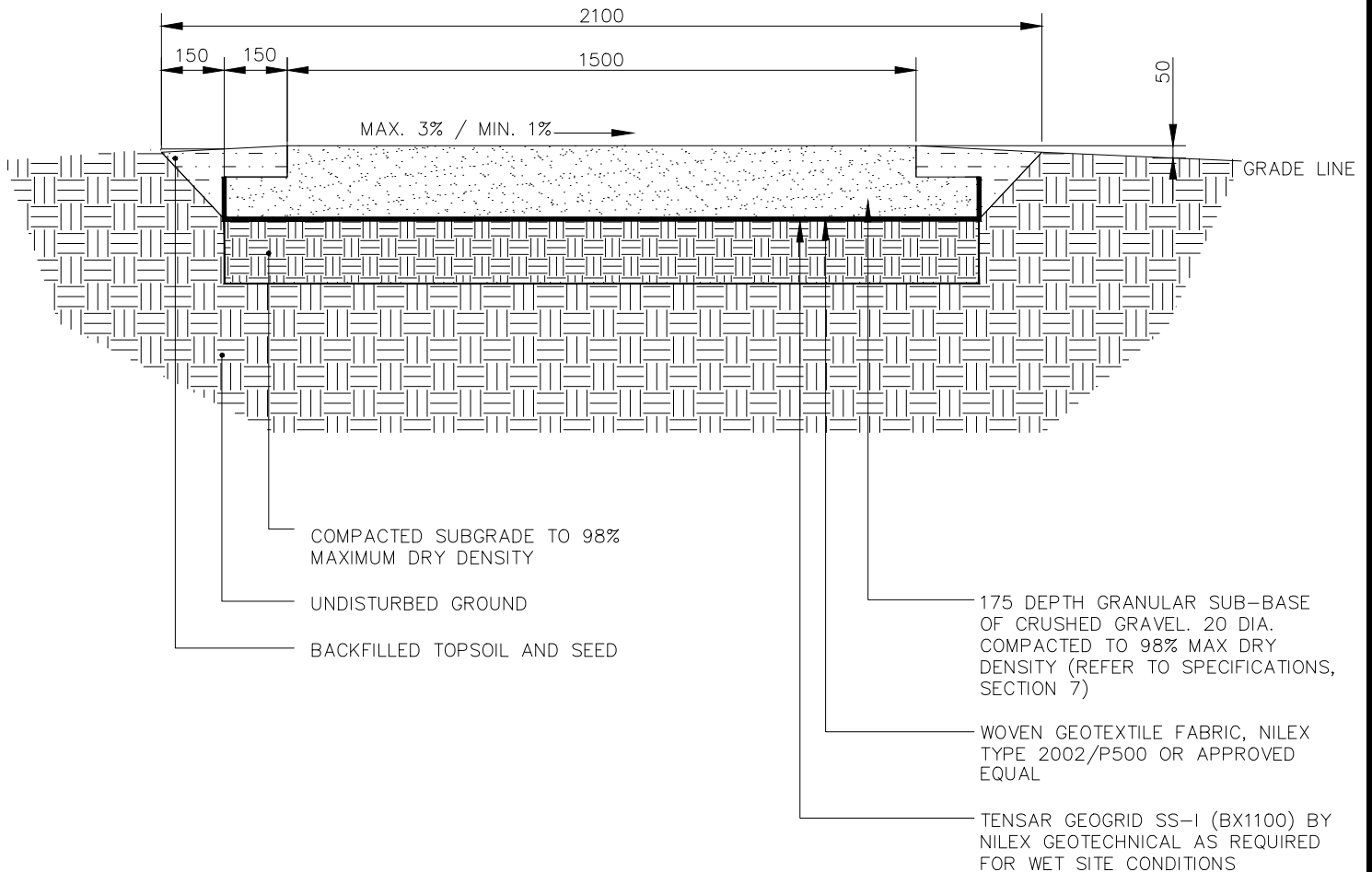
NOTES:  
—ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011		
Date	Details	Drawn			
11/05/03	REVISED DRAWING NUMBERS	J. ORR	<b>PAVING STONE</b>		
11/02/10	REVISED DRAWING NUMBERS	O. Butt			
06/03/10	Changed crushed gravel dimension	X	Approved: M. MacGarva, M.Eng., P.Eng.		<b>DWG. NO.</b>
YY/MM/DD	DETAIL ADDED TO OSDS	L. Laing	Checked: D.L. Schilbe, P.L. (Eng)		<b>61406</b>
			Date: 02/07/23	Scale: N.T.S.	Drawn: AMY McLENAGHAN
			Planning & Development Services Department		



NOTES:  
-ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

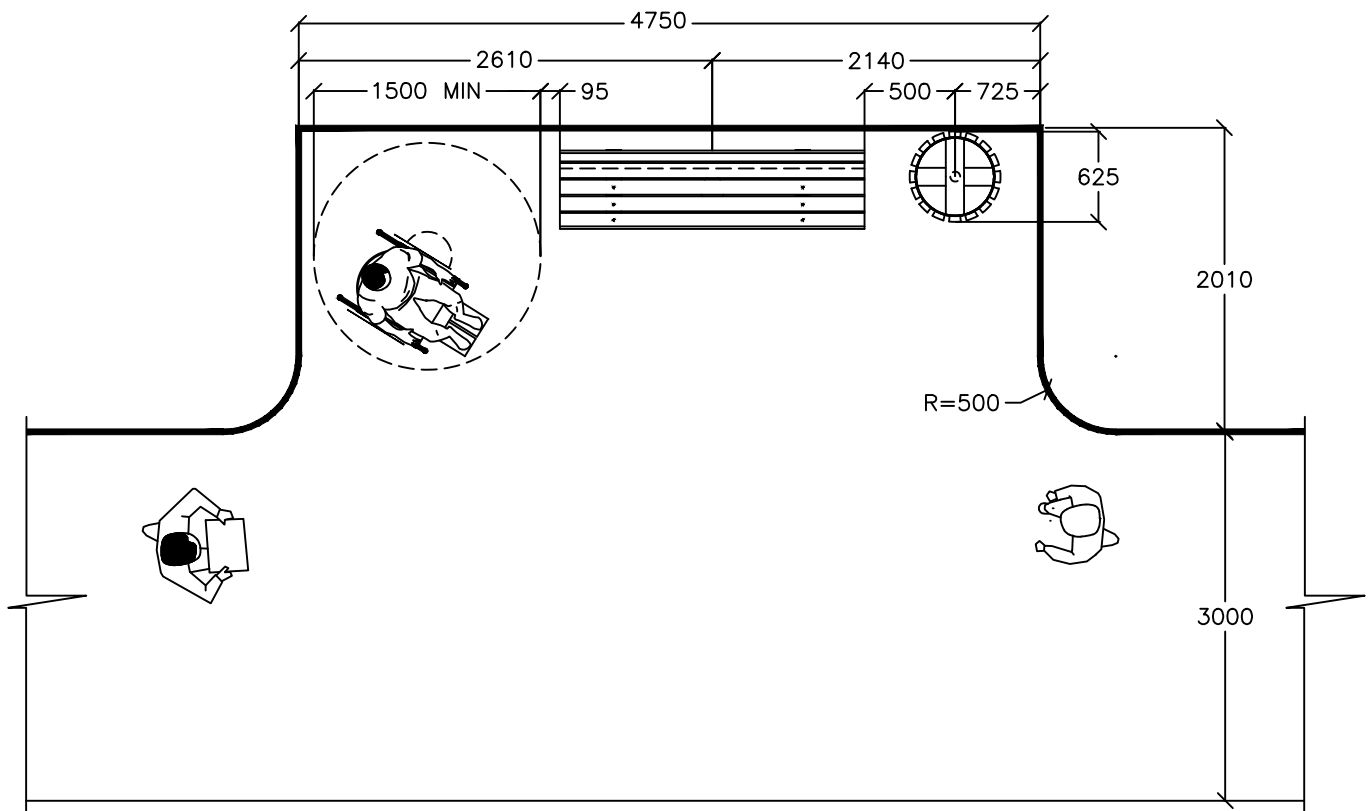
REVISIONS			Strathcona County				2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		© 2011	
Date	Details	Drawn	PAVING STONE LANDSCAPED MEDIAN							
			Approved: P. Alexander, AALA, CSLA						DWG. NO.  61407	
11/05/03	REVISED DRAWING NUMBERS	J. ORR	Checked: D.L. Schilbe, P.L. (Eng)						Planning & Development Services Department	
11/02/10	REVISED DRAWING NUMBERS	O. Butt	Date: 24/05/07    Scale: N.T.S.    Drawn: DANIELLE BUSHORE							
08/01/30	Detail added to the OSDS	D. Bushore								



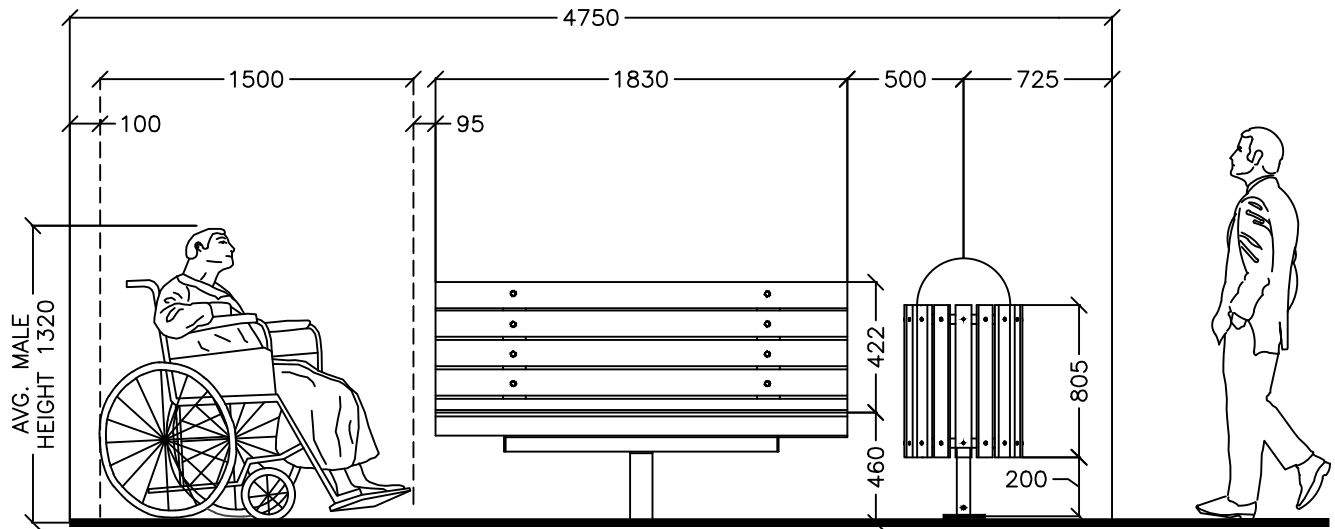
- NOTES:
- EXCAVATION OF TOP MATERIAL TO BE DONE TO A WIDTH OF 2400.
  - ALL TRAIL EXCAVATION TO MATCH EXISTING NATURAL GRADE.
  - ALL DISTURBANCE ALONG TRAIL EDGE TO BE REHABILITATED.
  - COMPACTION REQUIREMENTS MAY BE MODIFIED ACCORDING TO SITE CONDITIONS ENSURE SLOPE ON TRAIL TIES IN WITH EXISTING GRADES (TRAIL CROSS FALL MAX. 3% / MIN. 1%).
  - TRAIL TO BE 50 ABOVE ADJACENT GRADE (FOR DRAINAGE).
  - REFER TO DRAWING 61402 FOR ROOT BARRIER (FOR TREE STANDS).
  - ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011		
Date	Details	Drawn			
11/05/03	REVISED DRAWING NUMBERS	J. ORR	<b>GRAVEL PEDESTRIAN TRAIL</b>		
11/02/10	REVISED DRAWING NUMBERS	O. Butt			
06/04/13	Revised as per comments from UDI	M. Forgues	Approved: M. MacGarva, M.Eng., P.Eng.		<b>DWG. NO.</b>
05/11/03	Revised as per M. MacGarva's comments	M. Forgues	Checked: D.L. Schilbe, P.L. (Eng)		<b>61408</b>
05/10/26	Modified geogrid & added a dimension	M. Forgues	Date: 02/07/15	Scale: N.T.S.	Drawn: AMY McLENAGHAN
			Capital Planning & Construction Department		






PLAN VIEW – REST AREA



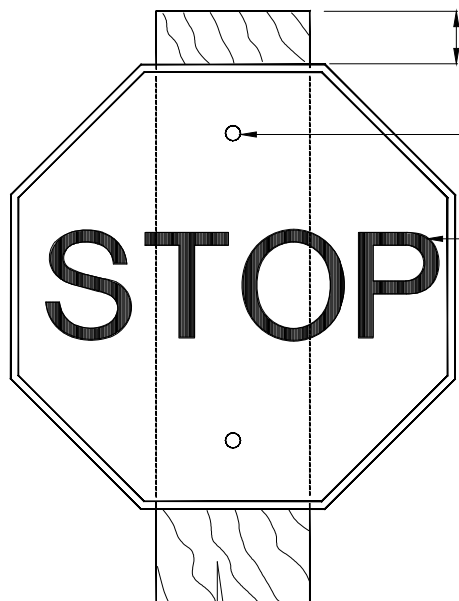
PROFILE – SITE FURNISHINGS

**NOTE:**

1. REST AREA SLOPE TO MATCH TRAIL SLOPE.
2. SEE DRAWING 61301 AND 61303 FOR BENCH LAYOUT/DETAILS.
3. SEE DRAWING 61304 FOR TRASH RECEPTACLE DETAILS.
4. ALL DIMENSIONS IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2016
Date	Details	Drawn				
16/09/30	UPDATED DIMENSIONS AND DWG REFERENCES	D. LeGrow	Trail Side Rest Area - Plan and Profile			
11/05/03	REVISED DRAWING NUMBERS	J. Orr				
11/02/10	REVISED DRAWING NUMBERS	O. Butt	Approved: S. Csaszar, P.Eng			DWG. NO.
08/04/02	ADDED A NOTE ABOUT SLOPING	M. Forgues	Checked: C. Cano, LAT, AALA			61409
06/03/10	CHANGED TRAIL DIMENSION	M. Forgues	Date: 94/04/27	Scale: N.T.S.	Drawn: D. Leckie	
						Planning & Development Services Department

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.



SIGN FACE

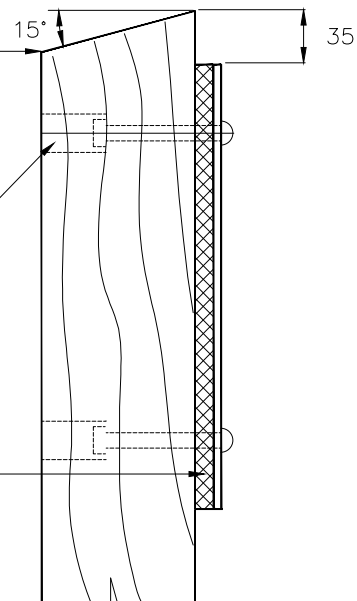
15° TREATED ANGLE CUT

10 DIA. x 75 LENGTH CARRIAGE BOLTS (2 PER SIGN) C/W LOCKING NUT

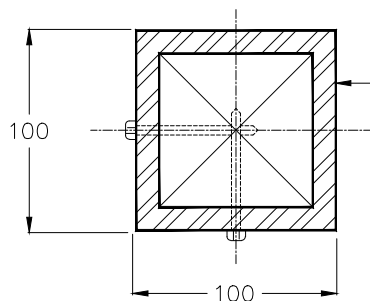
LETTERING TO BE WHITE HELVETICA

COUNTERSUNK 25 DIA. HOLE TO ACCOMMODATE LOCKING NUT  
TREATED DOWEL PLUGS TO BE GLUED IN PLACE

19 THICK WHITE CREZON BACKING CUT TO MATCH SIGN



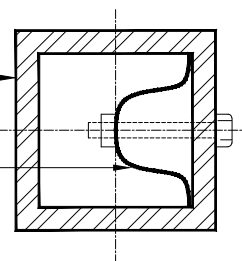
SIDE VIEW



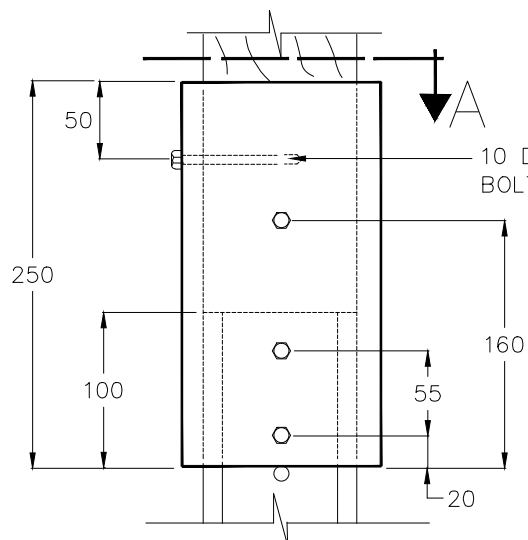
SECTION A

100 x 100 STEEL TUBING WITH 89 I.D.

U-FLANGE



SECTION B

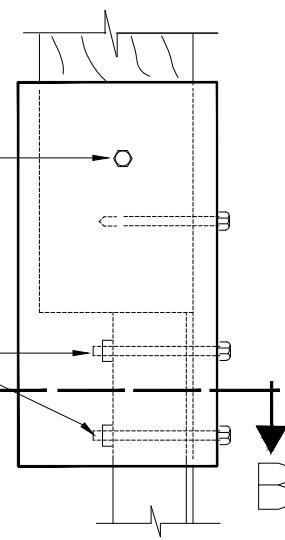


SIGN BASE FRONT VIEW

10 DIA. x 60 LENGTH LAG BOLT (2 PER BASE)

10 x 60 LENGTH BOLTS C/W LOCKING NUT (2 PER BASE)

NOTES:  
-ALL DIMENSIONS IN MILLIMETERS  
UNLESS OTHERWISE NOTED.



SIGN BASE SIDE VIEW

# REVISIONS

Date	Details	Drawn
12:10:23	REVISED DR◻WIN◻ TITLE	◻E◻
11:05:03	REVISED DR◻WIN◻ N◻MBERS	◻ORR
11:02:0◻	REVISED DR◻WIN◻ N◻MBERS	O◻Butt
06:02:27	◻dded lettering colour ◻ style	M◻Forgues
02:06:24	Printed	◻McLenaghan

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County

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## TRAIL SIGN DETAIL

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

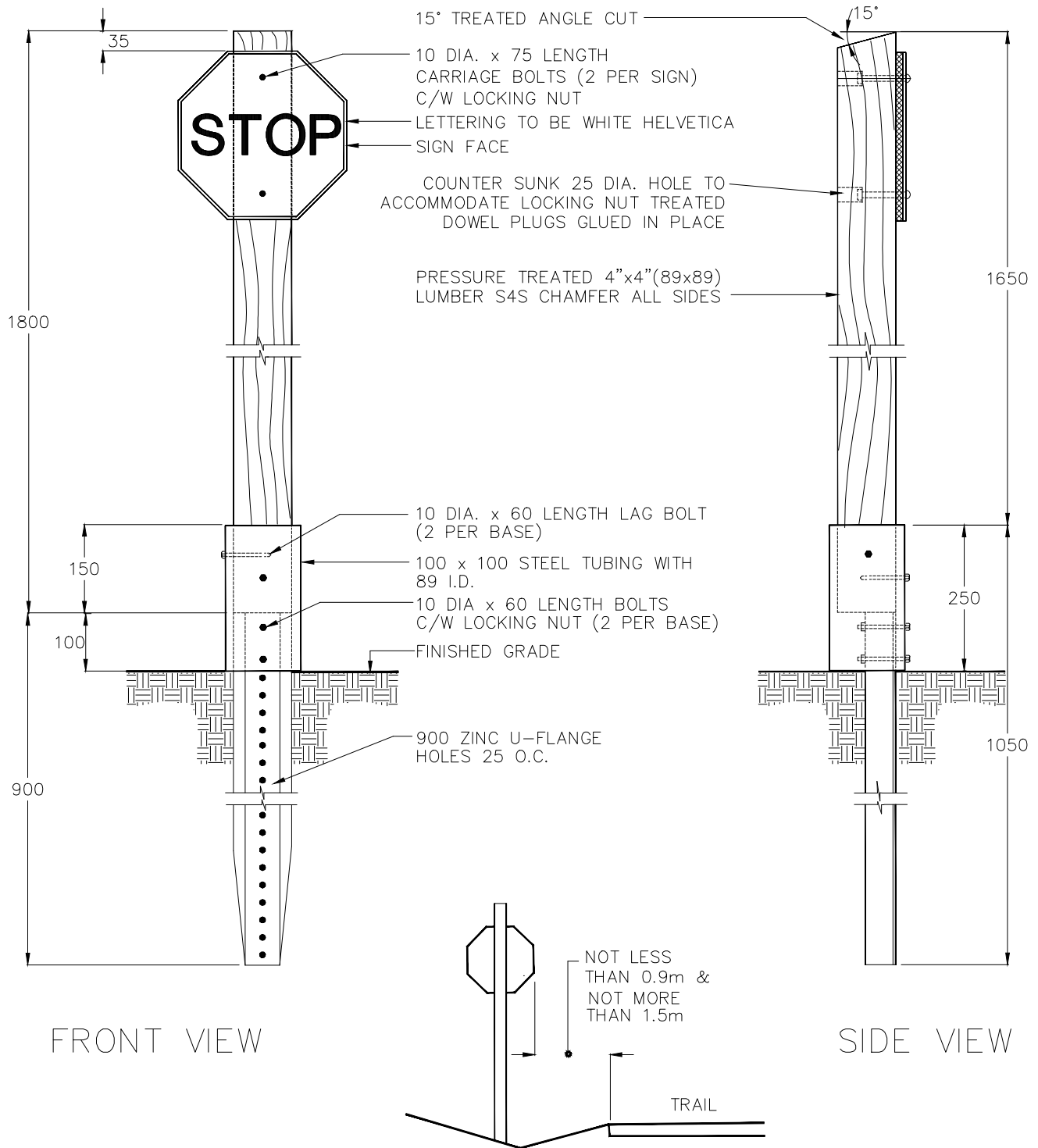
61501

Date: 13/04/94

Scale: N.T.S.

Drawn: DAN LECKIE

Planning & Development Services Department



**NOTE:**

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.
- ALL HARDWARE TO BE ZINC PLATED BASE COLOR TO BE TREMCLAD BROWN

**REVISIONS**

Date	Details	Drawn
12.10.23	REVISED DRAWING TITLE	EE
11.05.03	REVISED DRAWING NUMBERS	ORR
11.02.0	REVISED DRAWING NUMBERS	Butt
06.02.27	Added lettering colour style	McForgues
02.06.24	Printed	McLenaghan

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**TRAIL SIGN INSTALLATION DETAIL**

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

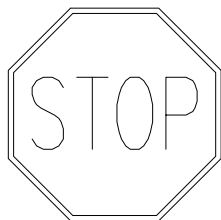
61502

Date: 14/04/94

Scale: N.T.S.

Drawn: DAN LECKIE

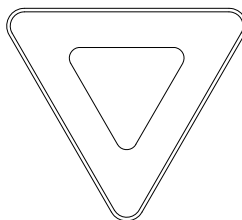
Planning & Development Services Department



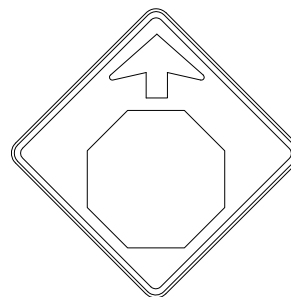
**T-1**  
300mm x 300mm  
W/R - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
9.5mm HOLES. LARGE  
CROPPED CORNERS



**T-2**  
300mm x 300mm  
B/Y - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
9.5mm HOLES. CENTERED,  
CROPPED CORNERS



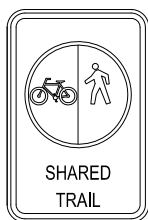
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W/R - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
TRIANGLE - 9.5mm HOLES.  
CENTERED - LARGE  
CROPPED CORNERS



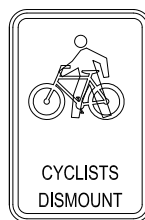
**T-4**  
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R/B/Y - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
DIA. 9.5mm HOLES.  
CENTERED - CROPPED



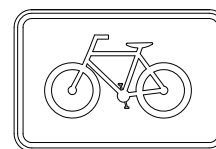
**T-5**  
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R/B/Y - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
RECT - 9.5mm CENTERED  
CROPPED CORNER



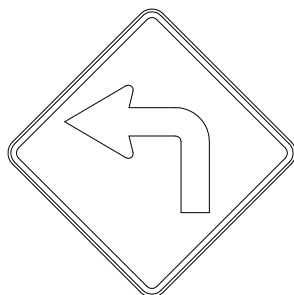
**T-6**  
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G/B/W - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
RECT - 9.5mm CENTERED  
CROPPED CORNER



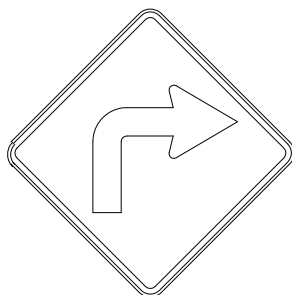
**T-7**  
200mm x 300mm  
W/BR - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
RECT - 9.5mm CENTERED  
CROPPED CORNER



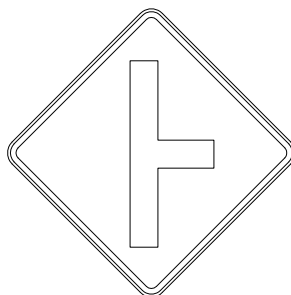
**T-11**  
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W/BR - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
SQUARE - 9.5mm CENTERED  
LARGE CROP



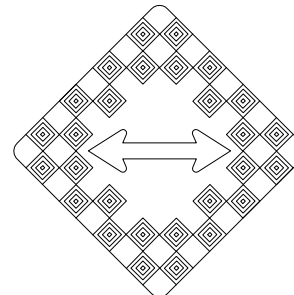
**T-8L**  
300mm x 300mm  
B/Y - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
DIA. 9.5mm ON CENTER,  
LARGE CROP



**T-8R**  
300mm x 300mm  
B/Y - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
DIA. 9.5mm ON CENTER,  
LARGE CROP



**T-9**  
300mm x 300mm  
B/Y - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
DIA. 9.5mm CENTERED,  
LARGE CROP



**T-10**  
300mm x 300mm  
B/Y - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
DIAG - 9.5mm CENTERED,  
LARGE CROP

**BACKING BOARD NOTES:**  
-7.5mm TO MATCH SIGN SIZE  
-HOLES TO MATCH  
-WHITE / PRIMER - SIDES AND EDGES

#### REVISIONS

Date	Details	Drawn
12/10/22	REVISED DRAWING TITLE & TRAIL SIGN NO.s	J.E.
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
05/10/26	Added notes	M. Forgues
02/06/24	Printed	A. McLenaghan

**Strathcona**  
County

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#### TRAIL SIGNS 1

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

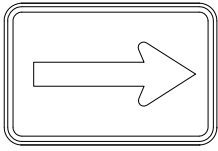
61503

Date: 31/05/95

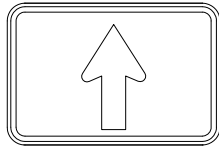
Scale: N.T.S.

Drawn: DAN LECKIE

Planning & Development Services Department



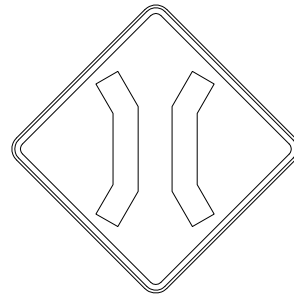
T-12  
300mm x 200mm  
W/BR - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
RECT - 9.5mm CENTERED  
LARGE CROP



T-13  
300mm x 200mm  
W/BR - HI SIGN GRADE  
ALUMINIUM - 2mm/.081  
RECT - 9.5mm CENTERED  
LARGE CROP



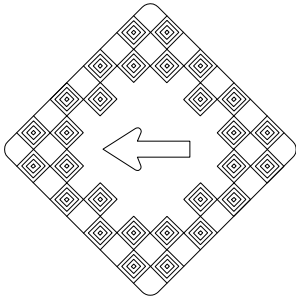
T-14  
300mm x 300mm



T-15  
300mm x 300mm



T-16  
300mm x 200mm



T-17  
300mm x 300mm



T-18  
300mm x 300mm

BACKING BOARD NOTES:  
-7.5mm TO MATCH SIGN SIZE  
-HOLES TO MATCH  
-WHITE / PRIMER - SIDES AND EDGES

#### REVISIONS

Date	Details	Drawn
12/10/22	REVISED DRAWING TITLE & TRAIL SIGN NO.s	J.E.
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
05/10/26	Added notes	M. Forgues
02/06/24	Printed	A. McLenaghan

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County

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Alberta, T8A 3W7, CANADA

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#### TRAIL SIGNS 2

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

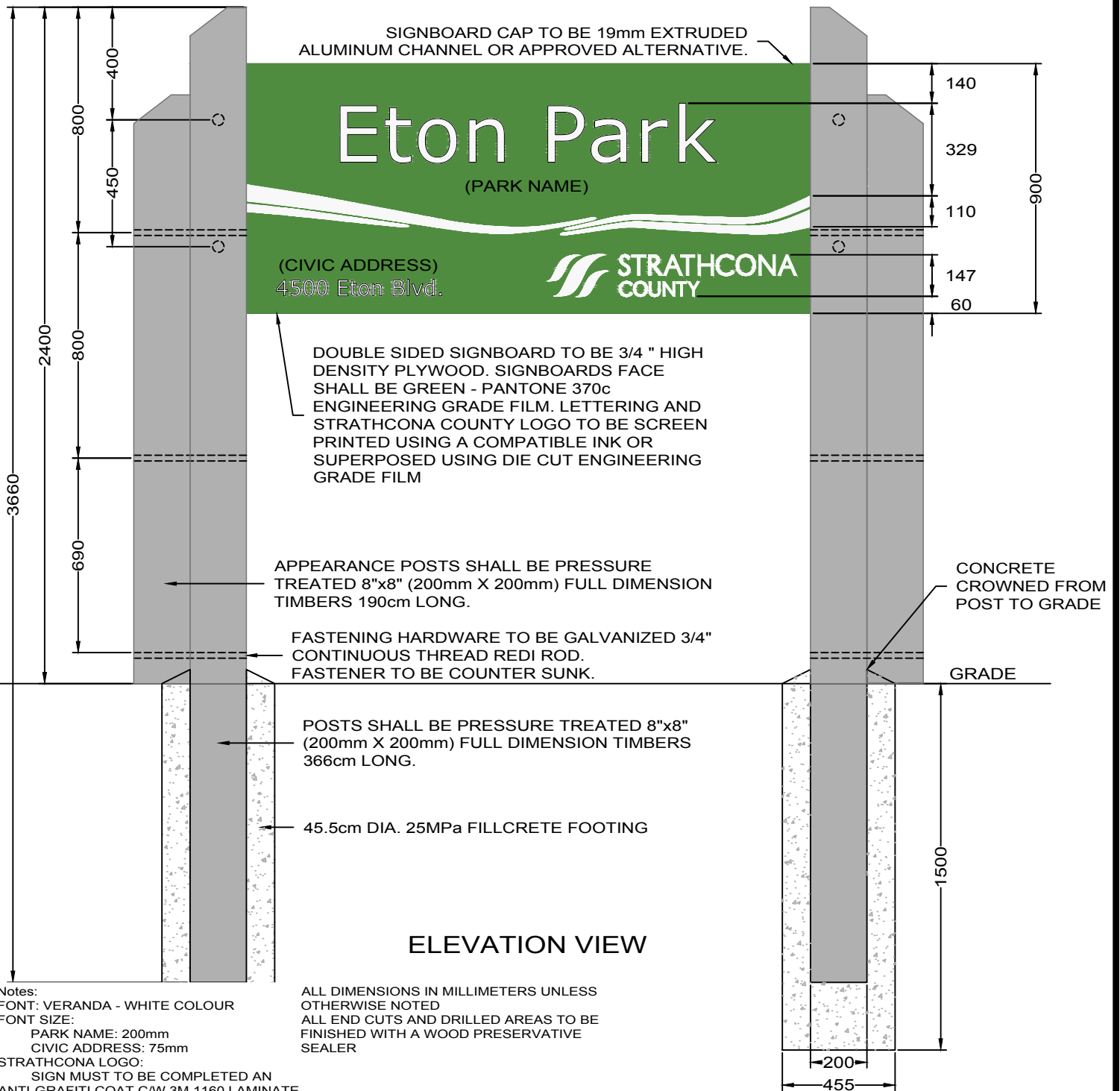
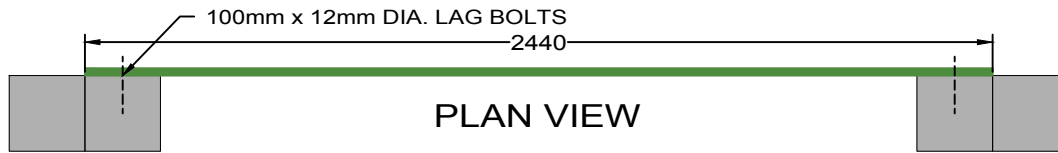
61504

Date: 31/05/95

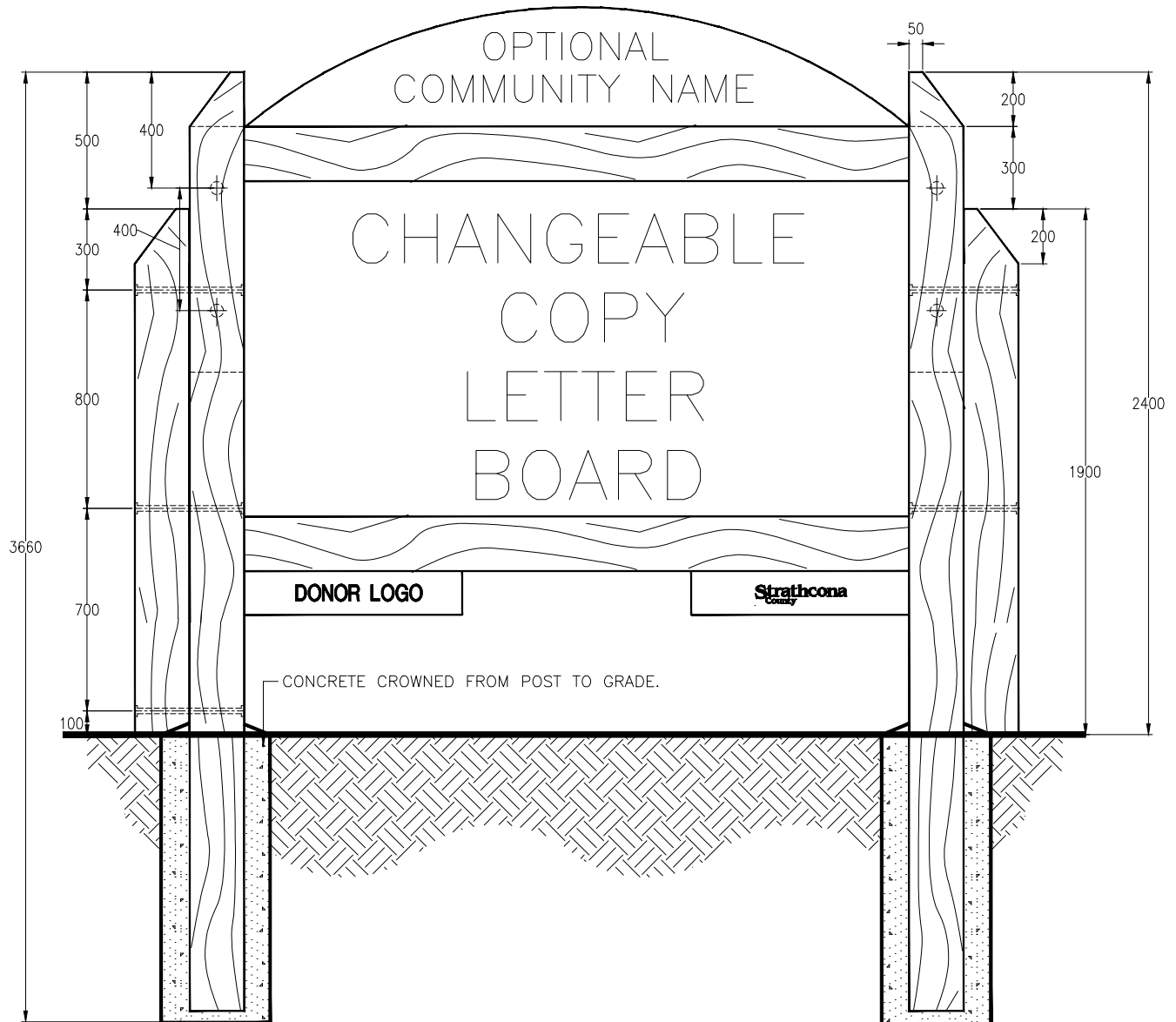
Scale: N.T.S.

Drawn: DAN LECKIE

Planning & Development Services Department



REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2016	
Date	Details	Drawn		
16/09/22	UPDATED NOTES	J. Orr	<b>STANDARD PARK NAME SIGN</b> Approved: S. Csaszar, P.Eng Checked: C. Cano, LAT, AALA Date: 27/06/16   Scale: N.T.S.   Drawn: J. Orr, C.E.T.	
16/06/27	UPDATED SIGN FOR NEW COUNTY BRAND	J. Orr		
12/10/23	ADDED CIVIC ADDRESS TO SIGN	J. Eggen		
11/05/03	REVISED DRAWING NUMBERS	J. Orr		
11/02/10	REVISED DRAWING NUMBERS	O. Butt		
			DWG. NO.	61505
			Planning & Development Services Department	



NOTE:  
-ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011	
Date	Details	Drawn		
11/05/03	REVISED DRAWING NUMBERS	J. ORR	<b>COMMUNITY EVENT INFORMATION SIGN</b>	
11/02/10	REVISED DRAWING NUMBERS	O. Butt		
06/03/10	Changed concrete crown	M. Forgues	Approved: P. Alexander, AALA, CSLA	<b>DWG. NO.</b>
05/10/24	Added concrete crown note	M. Forgues	Checked: J.M. Talbot, MLA, CSLA	<b>61506</b>
02/06/24	Printed	A. McLenaghan	Date: 97/06/11   Scale: N.T.S.   Drawn: E. HERMAN	Planning & Development Services Department





BLACK

450mm □ 600mm  
□ I □ □ INTENSIT □



450mm □ 600mm  
□ I □ □ INTENSIT □

#### REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
10/01/25	Changed Thin Ice Sign Size	M. Forgues
05/02/14	Change Thin Ice Sign—Size and Graphic	L. Laing
02/06/24	Printed	A. McLenaghan

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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#### NO SWIMMING/THIN ICE SIGNS

Approved: P. Alexander, AALA, CSLA

Checked: J.M. Talbot, MLA, CSLA

Date: 01/12/20

Scale: N.T.S.

Drawn: AMY McLENAGHAN

DWG. NO.

61507

Planning & Development Services Department

# Play Safe

This playground is designed for ages 18 months to 5 years.

Adult supervision is recommended

Pets are not permitted on the equipment or in the sand area

This playground is checked regularly by park staff. If you see any damage or vandalism please call 467-2211

**Strathcona**  
County  
RECREATION, PARKS  
& CULTURAL SERVICES

300mm x 350mm  
BLACK ON WHITE  
3M 100 INTENSIT

# Play Safe

This playground is designed for ages 5 years to 12 years.

Adult supervision is recommended

Pets are not permitted on the equipment or in the sand area

This playground is checked regularly by park staff. If you see any damage or vandalism please call 467-2211

**Strathcona**  
County  
RECREATION, PARKS  
& CULTURAL SERVICES

300mm x 350mm  
BLACK ON WHITE  
3M 100 INTENSIT

## REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
08/01/30	Adjust ages on sign	M. Forgues
05/02/11	Adjust ages on signs	L. Laing
03/04/22	Changed text, added no pets permitted	A. McLenaghan

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

© 2011

## PLAYGROUND PLAY SAFE SIGN

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

61508

Date: 01/12/20

Scale: N.T.S.

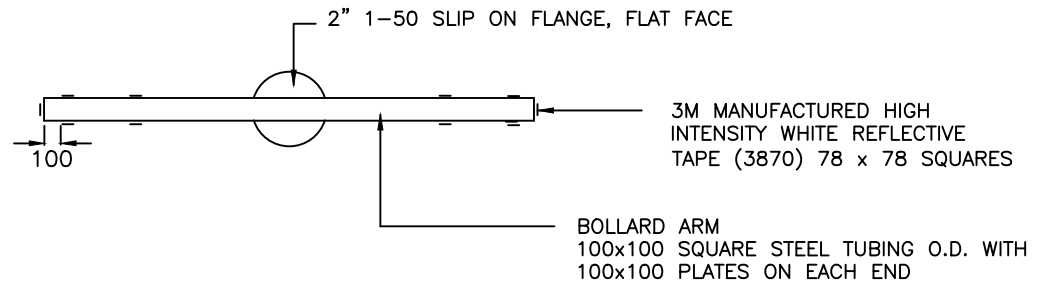
Drawn: AMY McLENAGHAN

Planning & Development Services Department

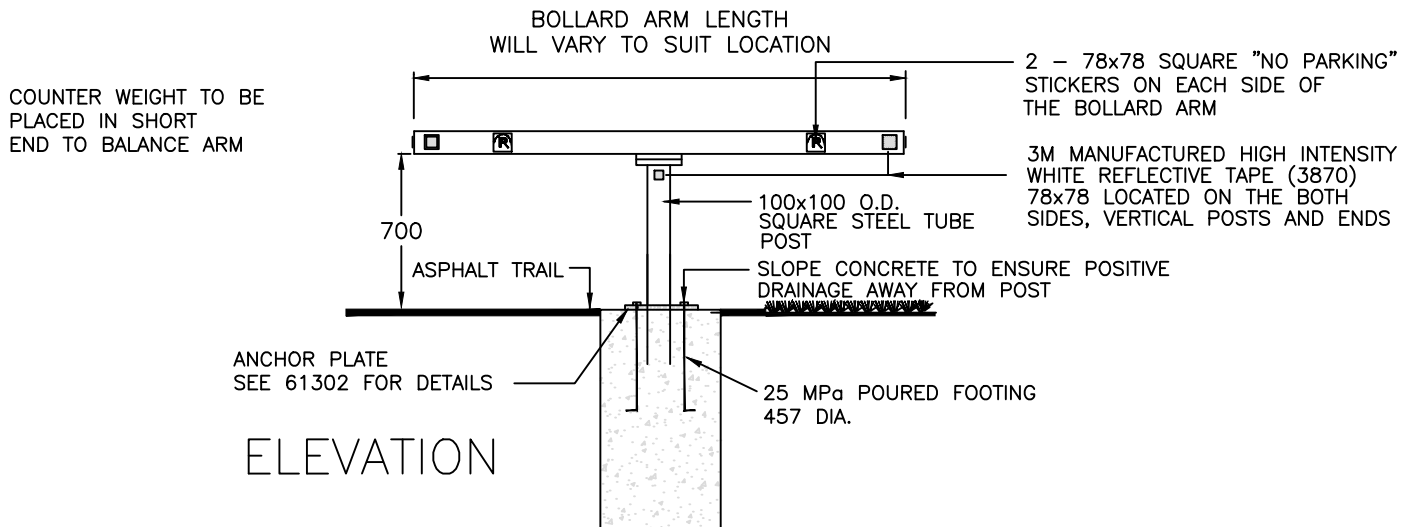


REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2011</div>			
Date	Details	Drawn				
			NO MOTORIZED VEHICLES SIGN			
11/05/03	REVISED DRAWING NUMBERS	J. ORR	Approved: P. Alexander, AALA, CSLA			DWG. NO.
11/02/10	REVISED DRAWING NUMBERS	O. Butt	Checked: J.M. Talbot, MLA, CSLA			61509
05/11/07	DETAIL ADDED TO THE OSDS	M. Forgues	Date: 05/11/07	Scale: N.T.S.	Drawn: M. FORGUES	
			Planning & Development Services Department			

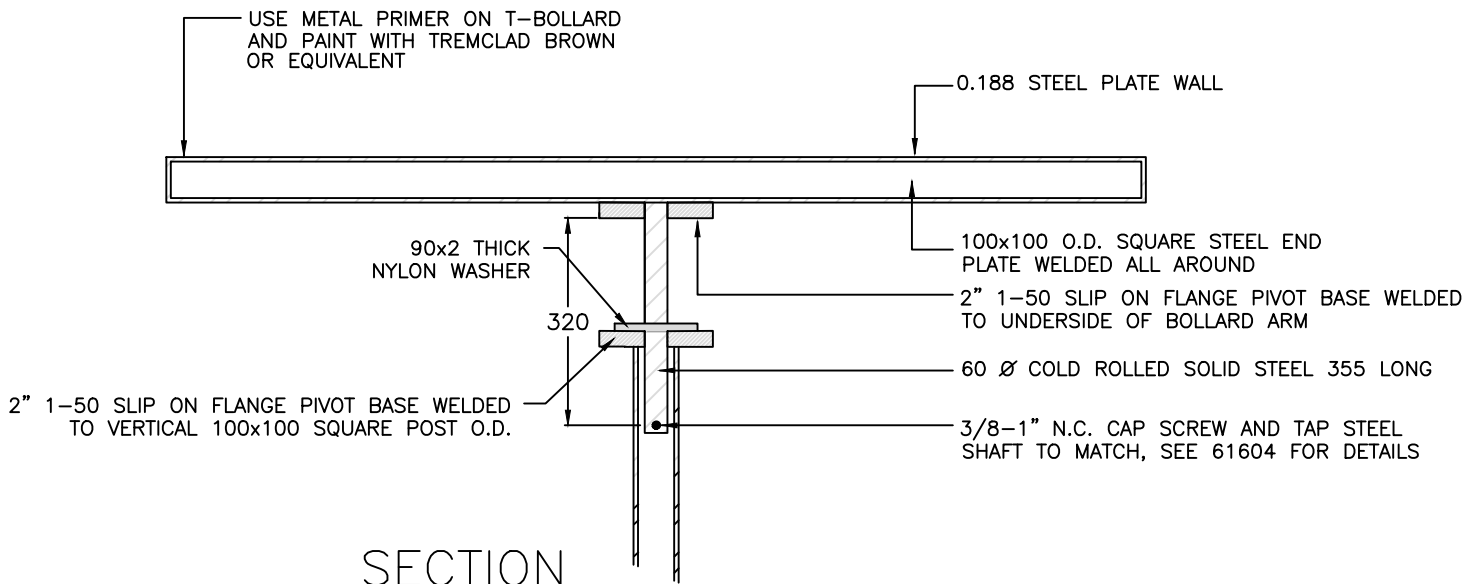
Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.



## PLAN




## ELEVATION

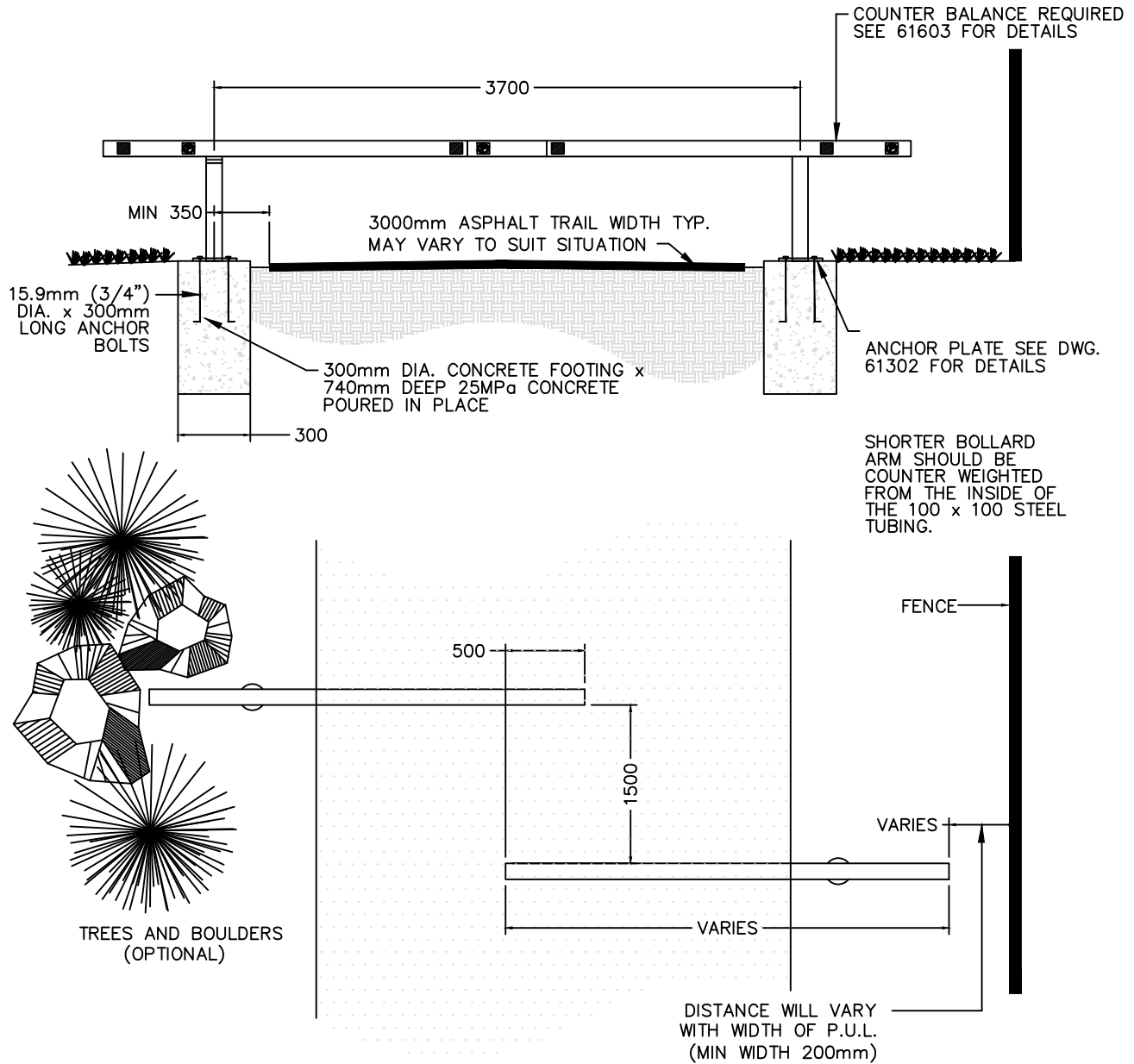


## SECTION

### NOTE:


- ALL DIMENSIONS IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

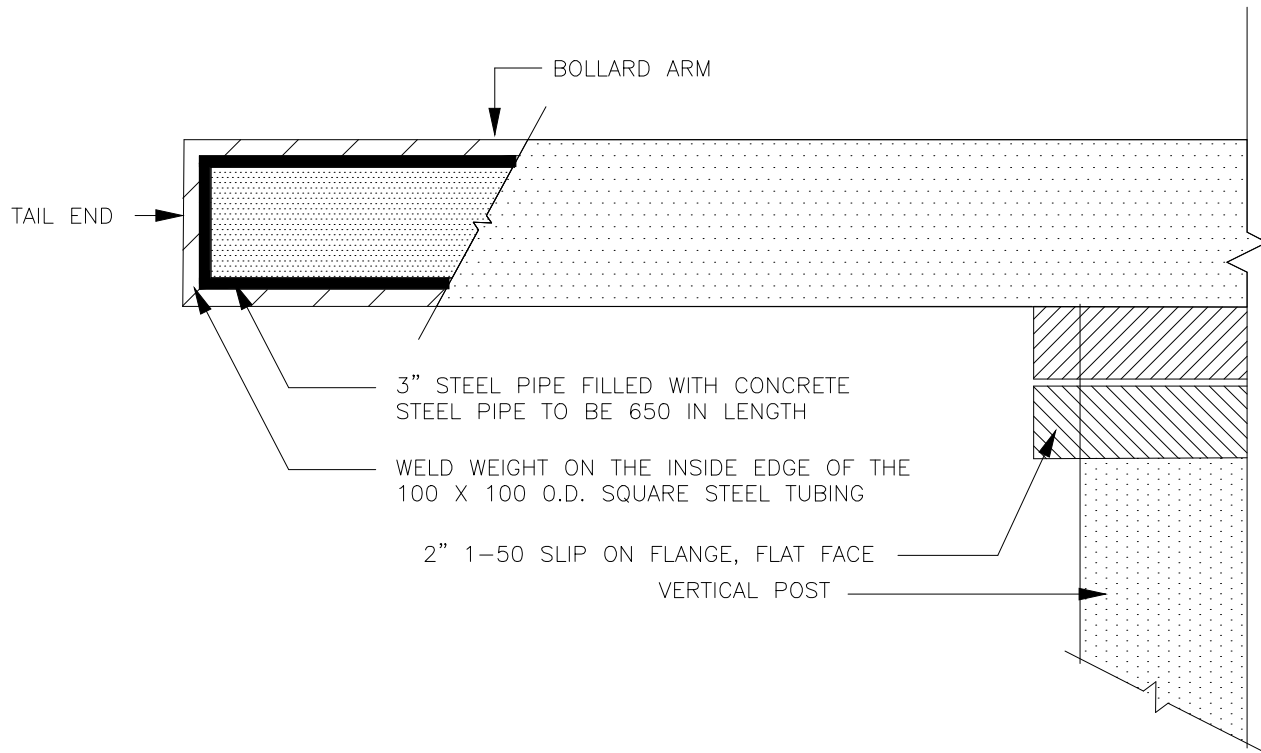
REVISIONS			 STRATHCONA COUNTY 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA				© 2016	
Date	Details	Drawn	T-Bollard Section and Elevation					
16/09/22	REVISED ANCHOR PLATE REFERENCE	J. Orr						
12/10/22	REVISED DRAWING	J. Eggen	Approved: S. Csaszar, P.Eng					DWG. NO.
11/05/03	REVISED DRAWING NUMBERS	J. Orr						
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Checked: C. Cano, LAT, AALA					61601
08/04/02	CHANGED FLANGE AND STICKER SIZES	M. Forgues						
			Date: 93/06/12		Scale: N.T.S.	Drawn: D. Brown		Planning & Development Services Department



**NOTE:**

1. ENSURE THAT BOLLARD ARMS ARE EVEN WITH EXISTING FENCE STRUCTURES.
2. ALL DIMENSIONS IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.
3. FOOTING LOCATIONS MAY VARY BASED ON TRAIL WIDTH.

REVISIONS			 STRATHCONA COUNTY	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		© 2016
Date	Details	Drawn				
16/09/22	REVISED ANCHOR PLATE DETAILS	J. Orr	Chicane T-Bollard Layout			
11/05/03	REVISED DRAWING NUMBER & REVISIONS	J. Orr				
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Approved: S. Csaszar, P.Eng			DWG. NO.
10/01/25	ADDED COUNTER BALANCE NOTE	M. Forgues	Checked: C. Cano, LAT, AALA			61602
06/03/10	CHANGED PILE DIAMETER & ADDED NOTE	M. Forgues	Date: 01/11/26	Scale: N.T.S.	Drawn: A. McLenaghan	
			Planning & Development Services Department			

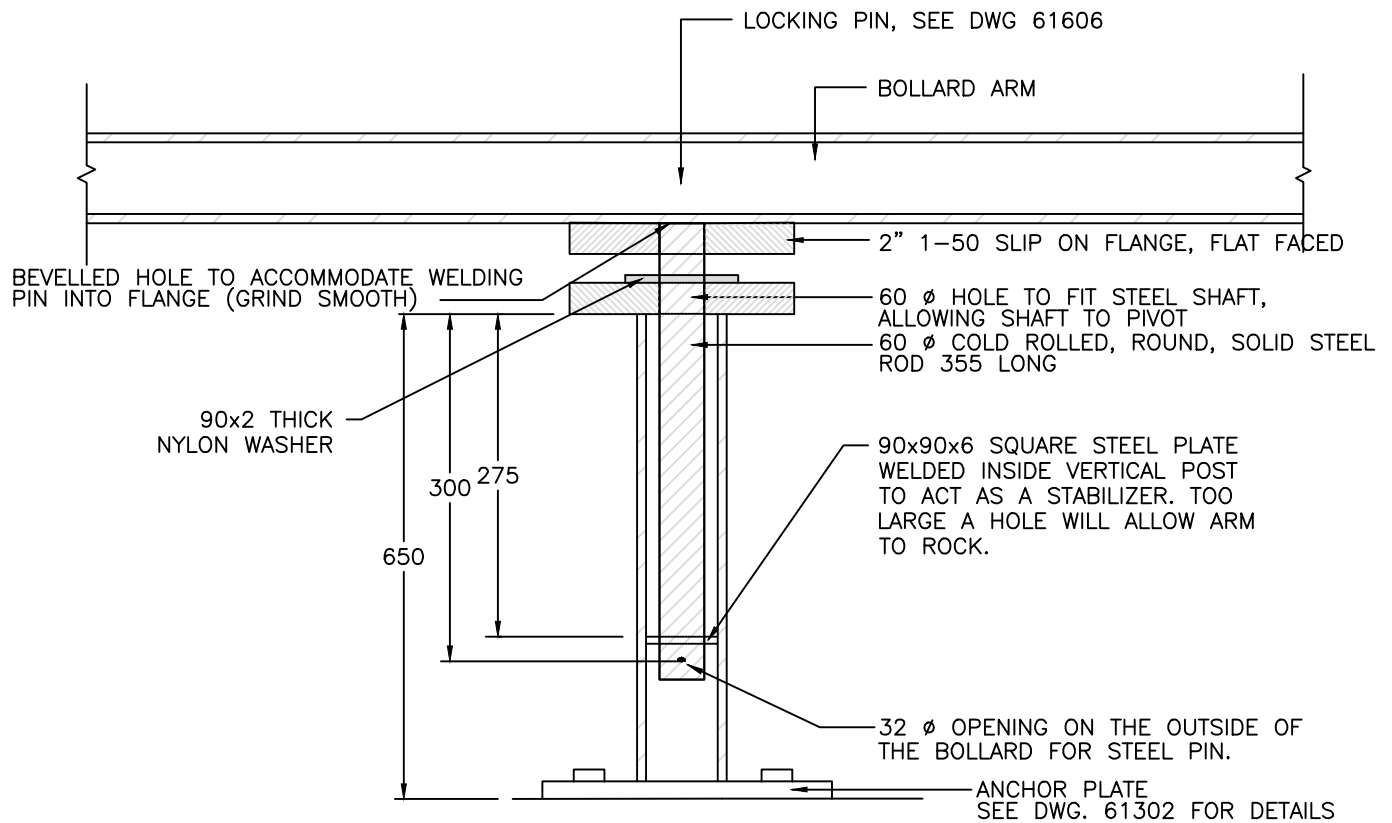


## 1100 COUNTER BALANCE BOLLARD SECTION

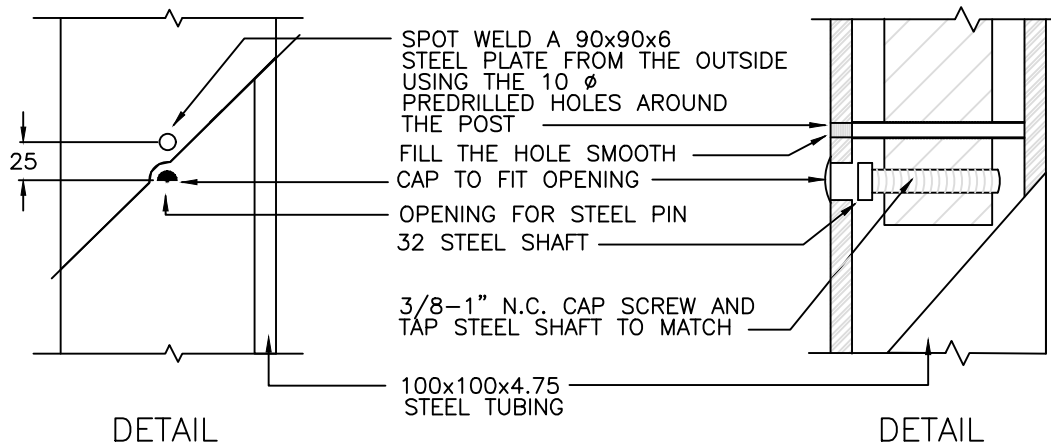
### NOTE:

—ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2011		
Date	Details	Drawn			
11/05/03	REVISED DRAWING NUMBERS	J. ORR	<b>T-BOLLARD 1100mm SECTION</b>		
11/02/09	REVISED DRAWING NUMBERS	O. Butt			
10/01/25	Added concrete to steel pipe	M. Forgues	Approved: P. Alexander, AALA, CSLA		<b>DWG. NO.</b>
08/04/02	Flange size changed	M. Forgues	Checked: J.M. Talbot, MLA, CSLA		<b>61603</b>
02/06/24	Printed	A. McLenaghan	Date: 12/06/93	Scale: N.T.S.	Drawn: D. BROWN
			Planning & Development Services Department		



ASSEMBLY DETAIL




DETAIL

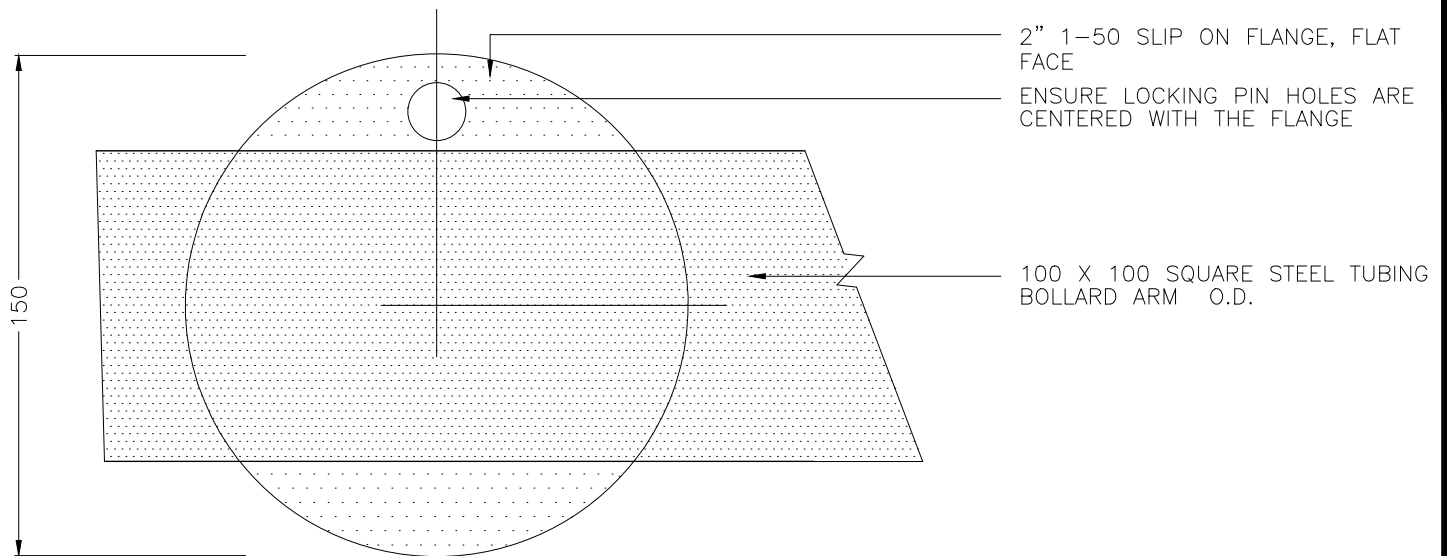
DETAIL

**NOTE:**

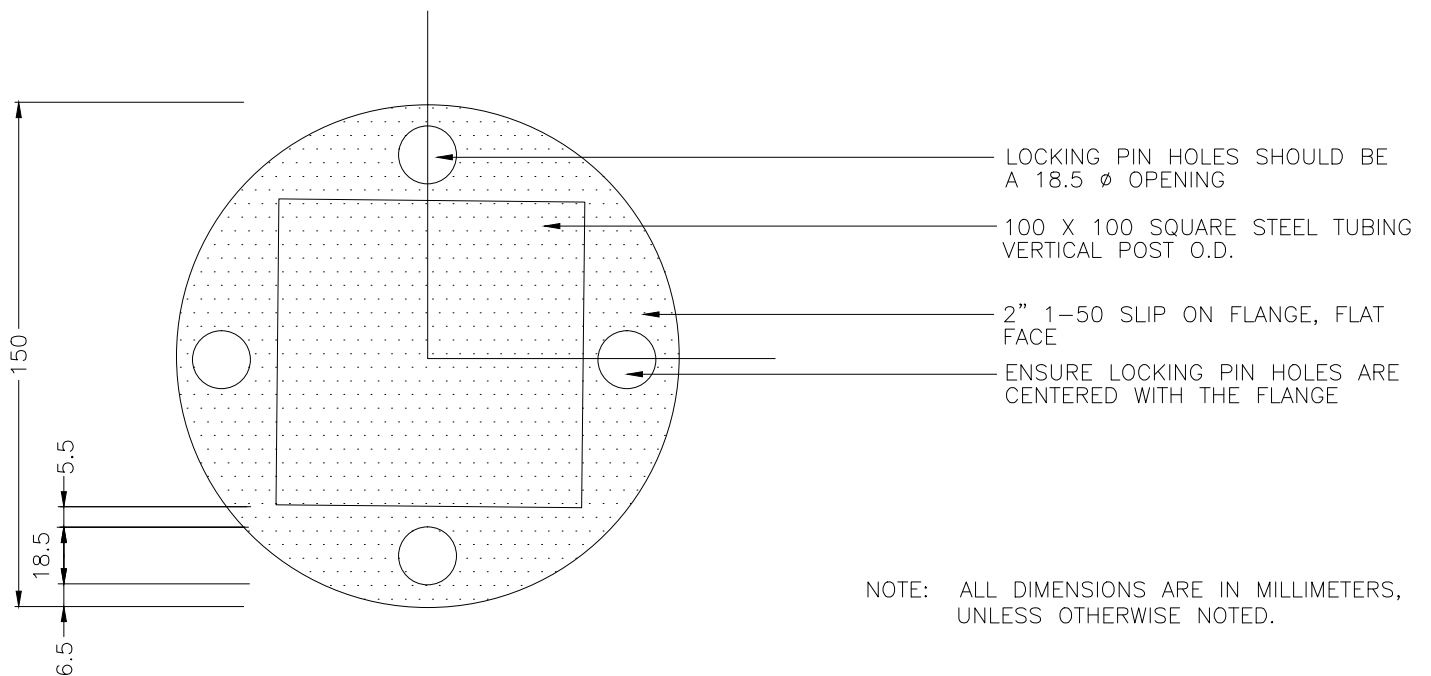
1. ALL DIMENSIONS IN MILLIMETRES (mm), UNLESS OTHERWISE NOTED.

REVISIONS			 STRATHCONA COUNTY	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA			© 2016
Date	Details	Drawn					
16/09/22	REVISED ANCHOR PLATE REFERENCE	J. Orr	T-Bollard Assembly Detail				
12/10/22	REVISED DRAWING	J. Eggen					
11/05/03	REVISED DRAWING NUMBER & REVISIONS	J. Orr	Approved: S. Csaszar, P.Eng				DWG. NO.
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Checked: C. Cano, LAT, AALA				61604
10/01/25	ADDED NOTES	M. Forgues	Date: 93/06/12	Scale: N.T.S.	Drawn: D. Brown		
			Planning & Development Services Department				





TOP FLANGE



BOTTOM FLANGE

REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBERS	J. ORR
11/02/09	REVISED DRAWING NUMBERS	O. Butt
10/01/25	Changed flange dimensions	M. Forgues
08/04/02	Changed flange size	M. Forgues
02/06/24	Printed	A. McLenaghan

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County

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**T-BOLLARD FLANGE DETAIL**

Approved: P. Alexander, AALA, CSLA

**DWG. NO.**

Checked: J.M. Talbot, MLA, CSLA

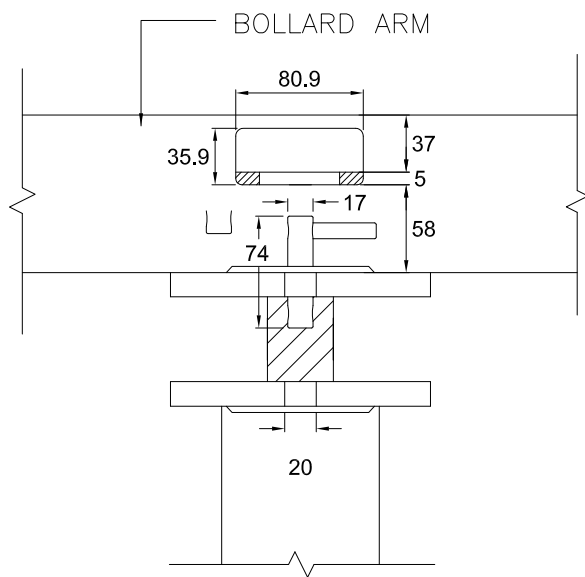
**61605**

Date: 12/06/93

Scale: N.T.S.

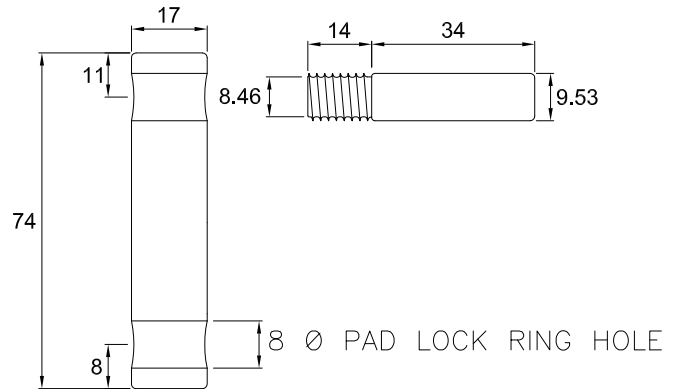
Drawn: D. BROWN

Planning & Development Services Department

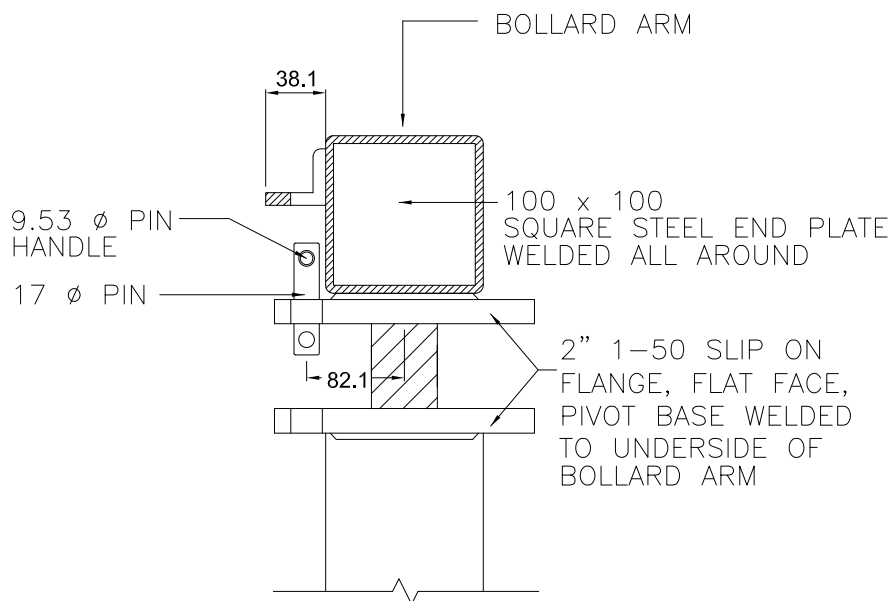


FRONT

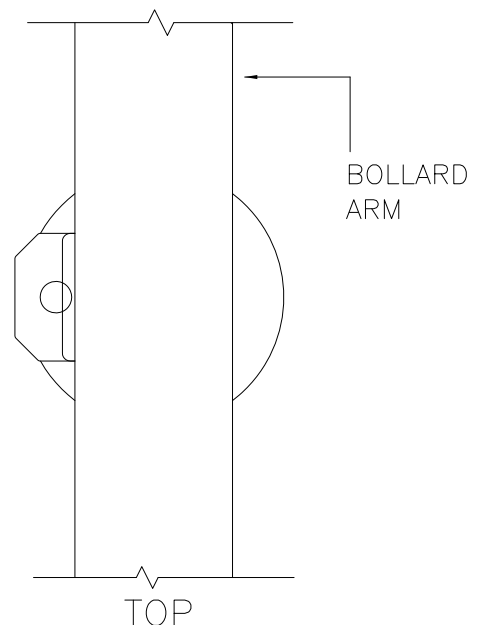
NOTE:  
-ALL DIMENSIONS IN MILLIMETERS  
UNLESS OTHERWISE NOTED.



PIN DETAIL



SIDE



TOP

# REVISIONS

Date	Details	Drawn
12/10/22	REVISED DRAWING	J.E.
11/05/03	REVISED DRAWING NUMBER & REVISIONS	J. ORR
11/02/09	REVISED DRAWING NUMBERS	O. Butt
10/01/25	Changed flange size	M. Forgues
08/04/02	Changed flange size	M. Forgues

**Strathcona**  
County

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## T-BOLLARD LOCKING PIN DETAIL

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

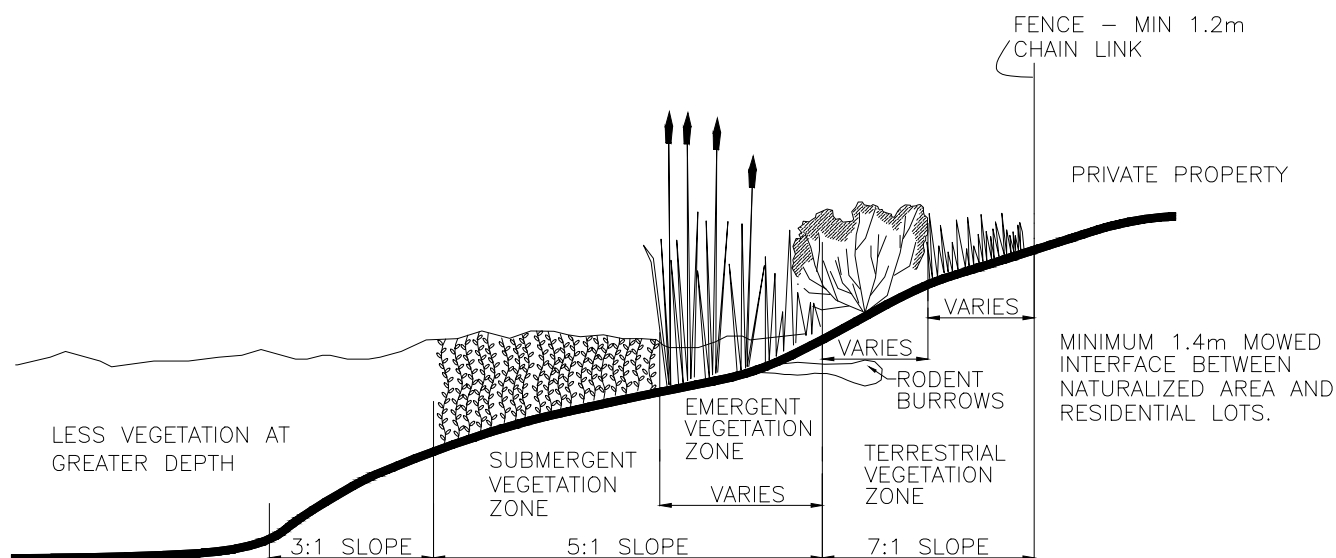
61606

Date: 09/03/01

Scale: N.T.S.

Drawn: T. TARNOWSKI

Planning & Development Services Department

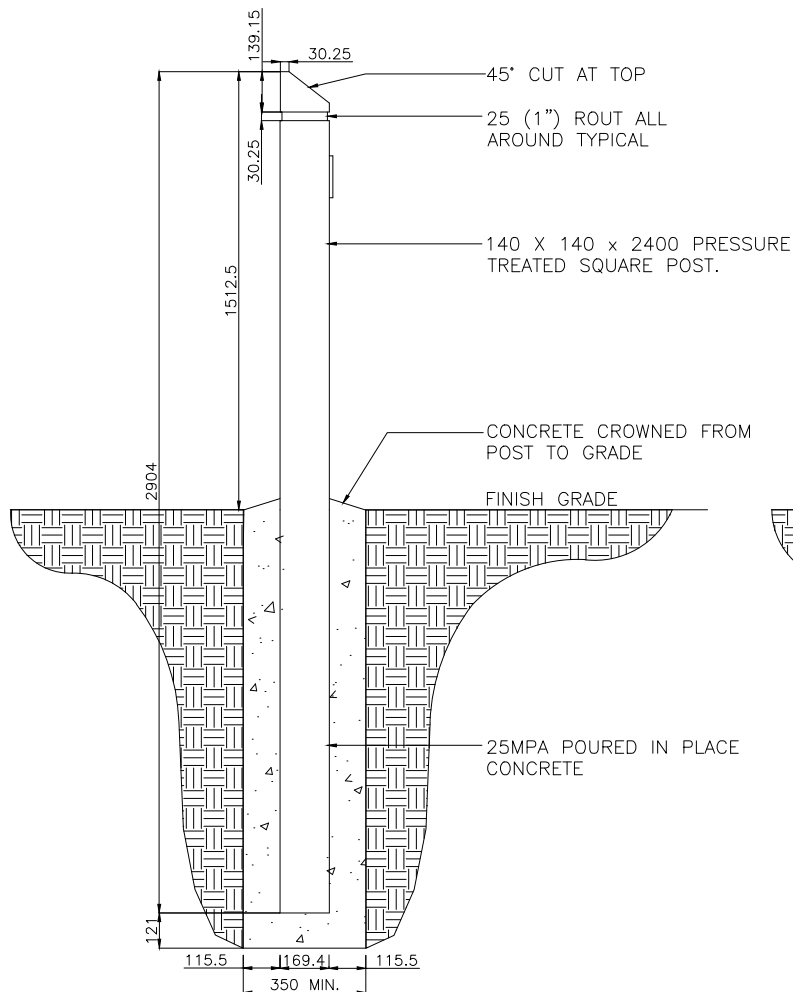


#### NOTES:

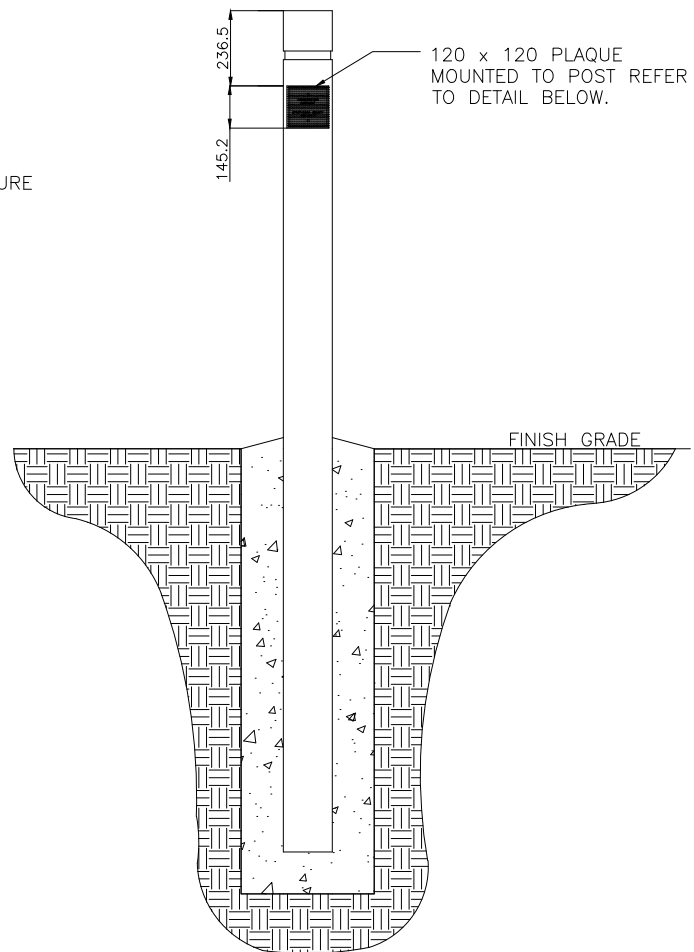
- FENCE AND DENSE SHORELINE DISCOURAGES GOOSE ACCESS TO RIPARIAN AND ORNAMENTAL VEGETATION.
- SETBACK BETWEEN SHORE OF NWL AND PROPERTY LINE CONTAINS UNDERMINING OF SHORE BY MUSKRATS ON PUBLIC PROPERTY.
- VEGETATED, NATURALIZED SHORELINE RESULTS IN IMPROVED WATER QUALITY AND STABILIZES BANKS AND SHORE, DECREASING EROSION AND IMPROVING AESTHETIC QUALITY.

\* THESE ARE THE THREE ZONES THAT WE ARE LOOKING FOR, WIDTHS MAY VARY ON A SITE BY SITE BASIS.

REVISIONS			<div>Strathcona County</div>	2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA		© 2011
Date	Details	Approved				
11/05/03	REVISED DRAWING NUMBERS	J. ORR	S.W.M.F. PLANTING DETAIL			
11/02/10	REVISED DRAWING NUMBERS	O. Butt				
08/05/06	CHANGED MOWING NOTE	M. Forgues	Approved: P. Alexander, AALA, CSLA			DWG. NO.
10/03/06	ADDED A NOTE	M. Forgues	Checked: J.M. Talbot, MLA, CSLA			61701
24/10/05	VEGETATION ZONES DIMENSIONED	M. Forgues	Date 11/04/94	Scale: N.T.S.	Drawn: A. McLENAGHAN	Planning & Development Services Department



SIDE ELEVATION/SECTION



FRONT ELEVATION/SECTION

## CONSERVATION EASEMENT MARKER POST DETAILS



120 x 120 CAST ALUMINUM  
PLAQUE, c/w RAISED EDGE,  
LETTERS AND LOGO, c/w  
TWO 6 Ø HOLES TO  
ACCEPT FASTENERS.

## CONSERVATION EASEMENT MARKER POST-DETAIL DETAILS

NOTE:  
-ALL DIMENSIONS IN MILLIMETERS  
UNLESS OTHERWISE NOTED.

### REVISIONS

Date	Details	Drawn
11/05/03	REVISED DRAWING NUMBER & REVISIONS	J. ORR
11/02/10	REVISED DRAWING NUMBERS	O. Butt
06/03/10	CHANGED CONCRETE CROWN	M. Forgues
05/10/24	ADDED CONCRETE CROWN NOTE	M. Forgues
05/03/14	DETAIL ADDED TO OSDS	L. Laing

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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## ER/MR/Conservation Easement Marker Post

Approved: P. Alexander, AALA, CSLA

DWG. NO.

Checked: J.M. Talbot, MLA, CSLA

61702

Date: 05/03/14

Scale: N.T.S.

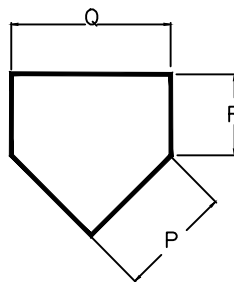
Drawn: L. LAING

Planning & Development Services Department



# MINIMUM AND MAXIMUM BALL DIAMOND DIMENSIONS

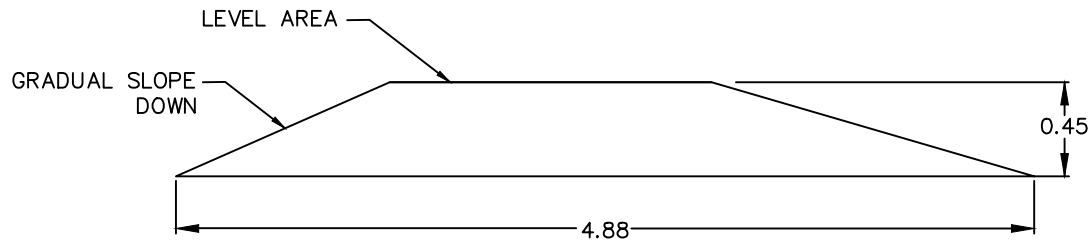
DIMENSIONS		LEVEL OF PLAY	
		MINIMUM	MAXIMUM
BASE LINES	A	13.72m (45ft)	27.43m (90ft)
PITCHING DISTANCE	B	CHECK CURRANT BALL STANDARDS	CHECK CURRANT BALL STANDARDS
CENTRE FIELD BOUNDARY	C1	CHECK CURRANT BALL STANDARDS	CHECK CURRANT BALL STANDARDS
FOUL LINE BOUNDARY	D	CHECK CURRANT BALL STANDARDS	CHECK CURRANT BALL STANDARDS
BACKSTOP SETBACK	E	4.57m (15 ft)	CHECK CURRANT BALL STANDARDS
HOME PLATE	P	0.305m (12in)	
	Q	0.43m (17in)	
	R	0.22m (8.5in)	
ALL BALL FIELDS SHALL BE BUILT ACCORDING TO THE CURRENT SPORT ASSOCIATION STANDARD.			



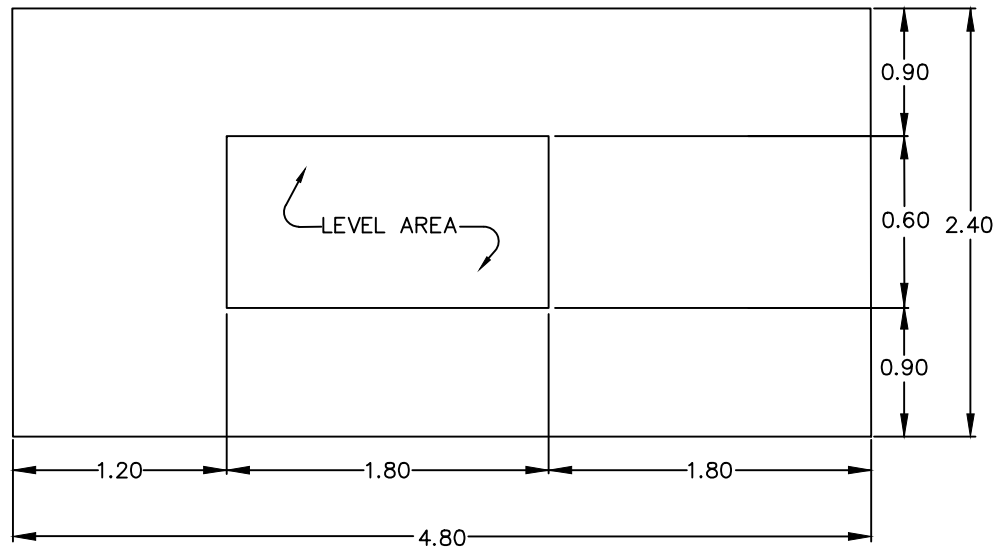
HOME PLATE

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012	
Date	Details	Drawn		
13/04/30	CHANGED COPYRIGHT YEAR	A. DAM	<b>BALL DIAMOND DIMENSIONS</b> Approved: P. Alexander, AALA, CSLA Checked: J.M. Talbot, MLA, CSLA Date: 26/04/94 Scale: N.T.S. Drawn: DAN LECKIE	
11/05/03	REVISED DRAWING NUMBERS	J. ORR		
11/02/09	REVISED DRAWING NUMBERS	O. Butt		
08/04/02	Chart changed	M. Forgues	DWG. NO. 61802 Planning & Development Services Department	
05/11/03	Chart changed and one added	M. Forgues		

# FOR 27.43m (90ft) DIAMONDS



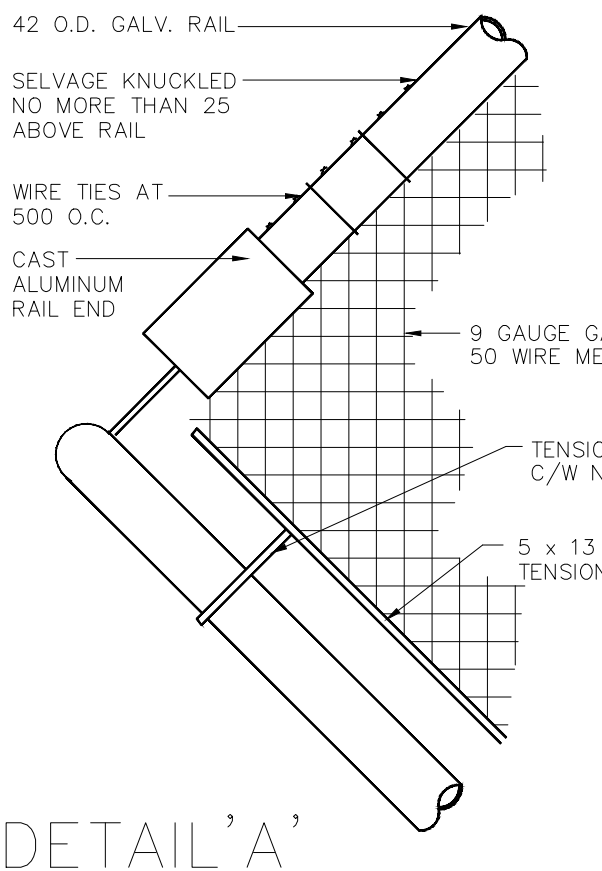
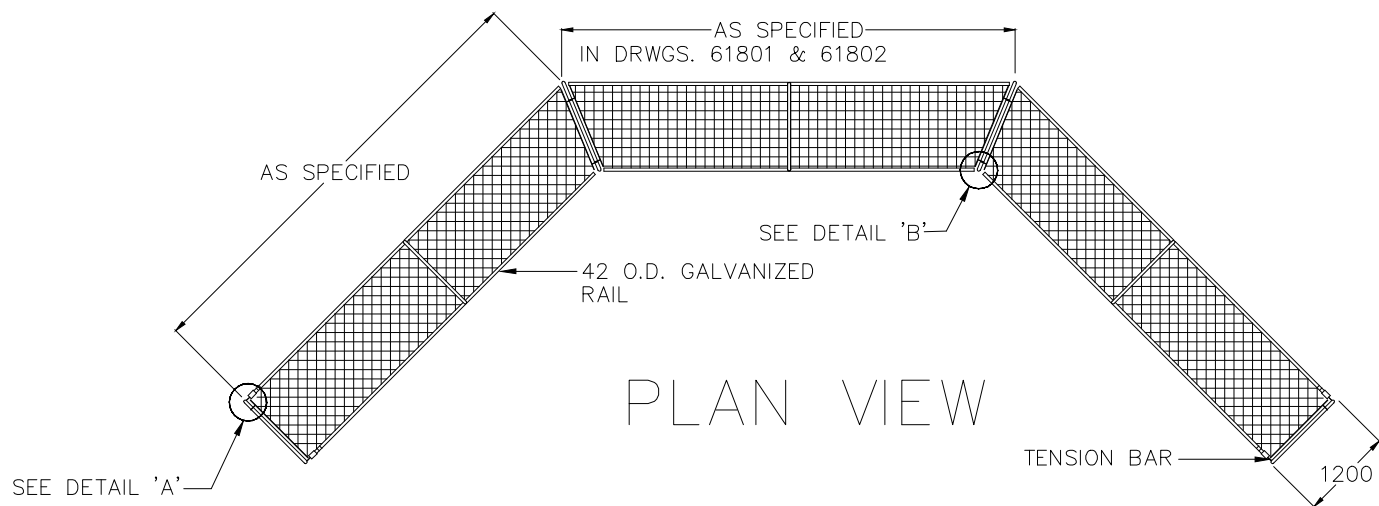
ELEVATION



PLAN VIEW

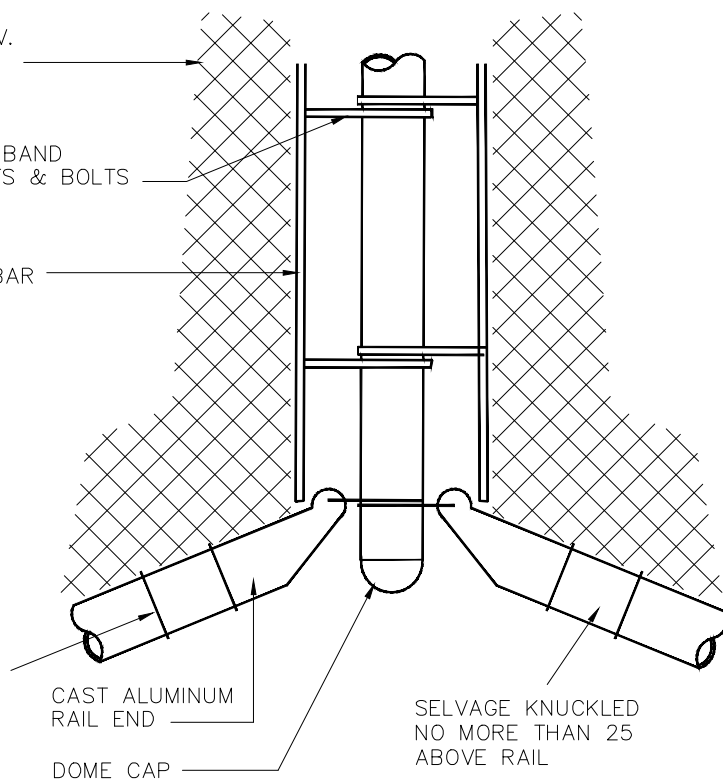
NOTES:  
-DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED..

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012			
Date	Details	Drawn				
13/04/30	REVISED DRAWING NUMBERS	A. DAM	<b>PITCHERS MOUND DETAIL</b> Approved: P. Alexander, AALA, CSLA Checked: J.M. Talbot, MLA, CSLA Date: 02/11/05   Scale: N.T.S.   Drawn: M. FORGUES			
11/05/06	REVISED DRAWING NUMBERS	J. ORR				
10/02/09	REVISED DRAWING NUMBERS	O. Butt				
06/03/10	Changed dimensions	M. Forgues				
05/11/02	Added to the OSDS	M. Forgues				
			DWG. NO.			61803
			Planning & Development Services Department			



WIRE TIES AT 500 O.C.

## DETAIL 'B'



### REVISIONS

Date	Details	Drawn
13/05/01	REVISED DRAWING NUMBERS	A. DAM
11/05/02	REVISED DRAWING NUMBERS	J. ORR
11/02/09	REVISED DRAWING NUMBERS	O. Butt
02/06/24	Printed	A. McLenaghan

**Strathcona**  
County

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Alberta, T8A 3W7, CANADA

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### CANOPY BACKSTOP PLAN AND DETAILS

Approved: P. Alexander, AALA, CSLA

DWG. NO.

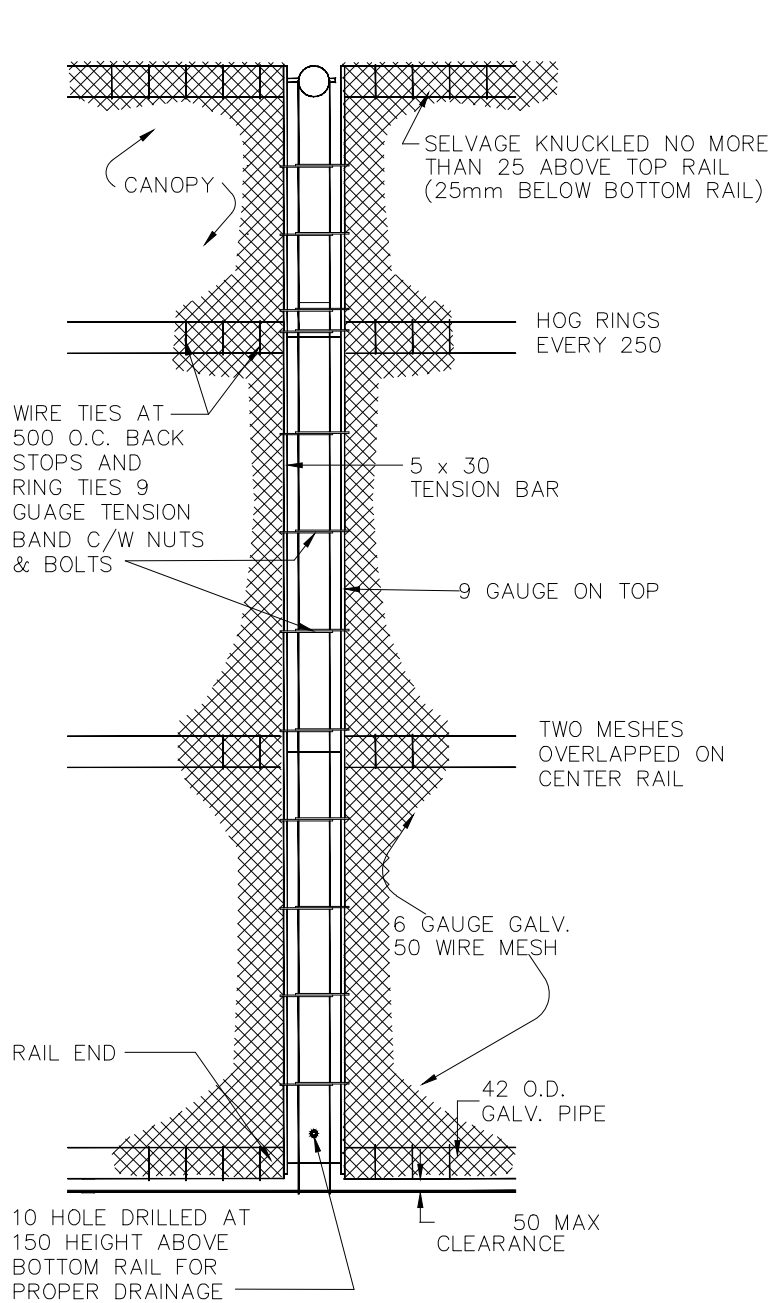
Checked: J.M. Talbot, MLA, CSLA

61804

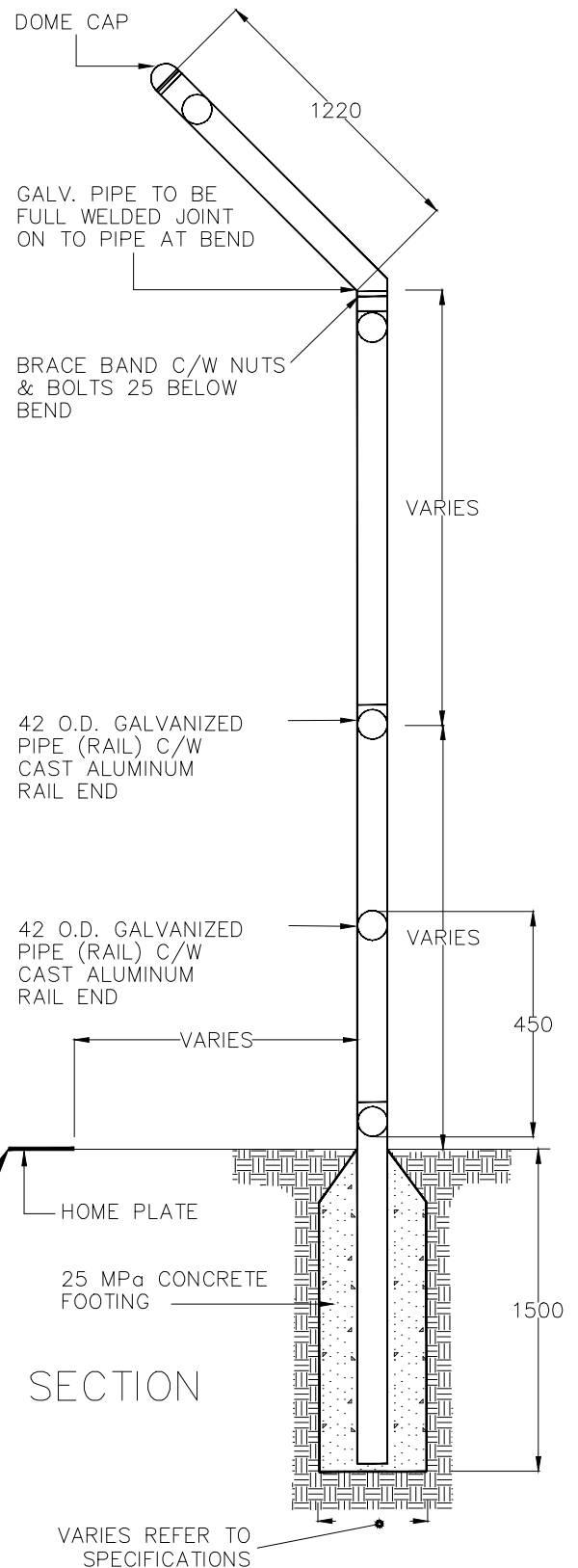
Date: 25/04/94 Scale: N.T.S. Drawn: DAN LECKIE

Planning & Development Services Department





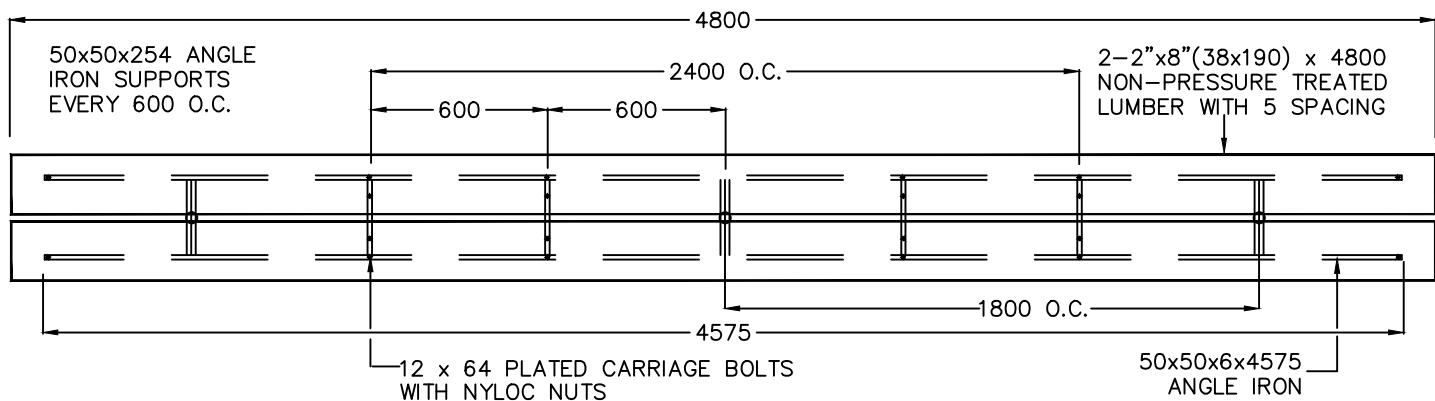
ELEVATION



SECTION

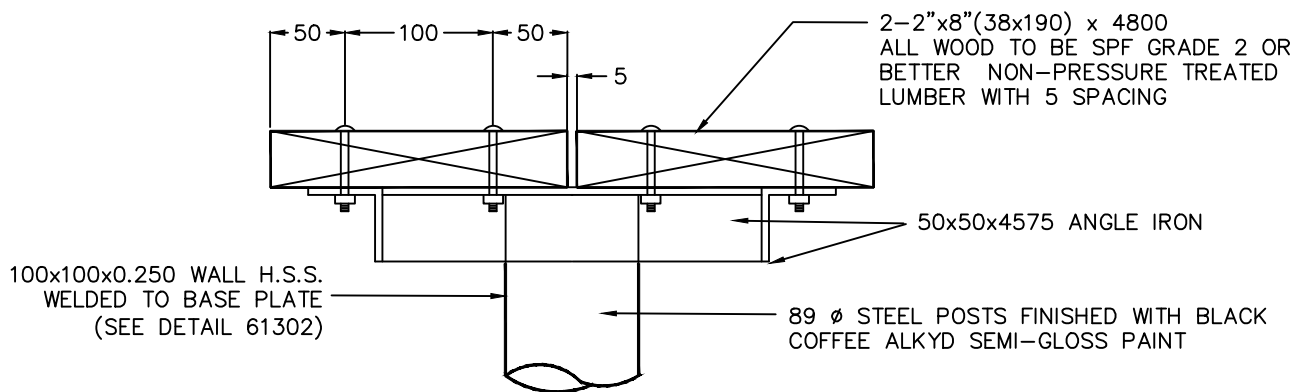
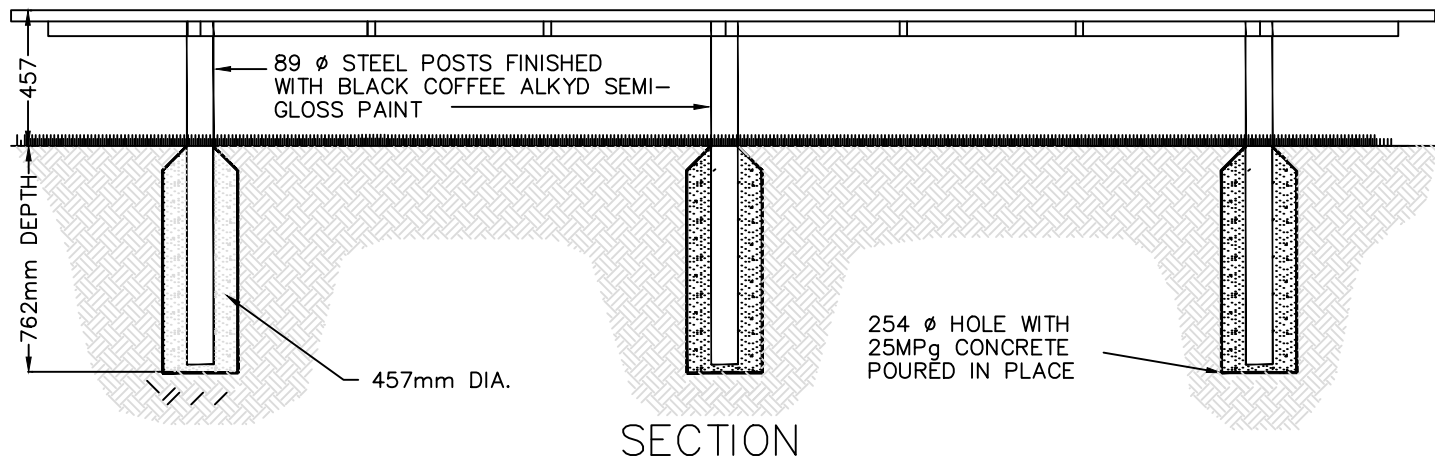
NOTE:  
 -ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.  
 -REFER TO SPECIFICATIONS FOR SPECIFIC DIMENSIONS.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
13/05/01	REVISED DRAWING NUMBERS	CDM	<b>CANOPY BACKSTOP SECTION/ELEVATION</b> Approved: P. Alexander, AALA, CSLA Checked: J.M. Talbot, MLA, CSLA Date: 25/04/94    Scale: N.T.S.    Drawn: DAN LECKIE DWG. NO. 61805 <small>Planning &amp; Development Services Department</small>		
12/10/22	REVISED DRAWING	ED			
11/05/06	REVISED DRAWING NUMBERS	ORR			
11/02/00	REVISED DRAWING NUMBERS	Butt			
02/06/24	Printed	McLenaghan			



ANGLE IRON AND ANGLE IRON SUPPORTS TO BE FINISHED WITH BLACK ALKYD SEMI-GLOSS PAINT.

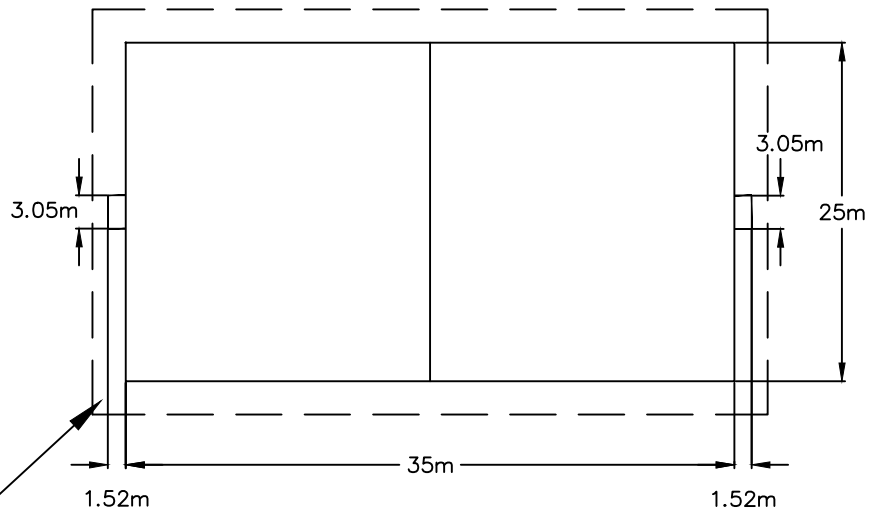
PLAN VIEW



NOTE:  
-ALL DIMENSIONS IN MILLIMETERS  
UNLESS OTHERWISE NOTED.

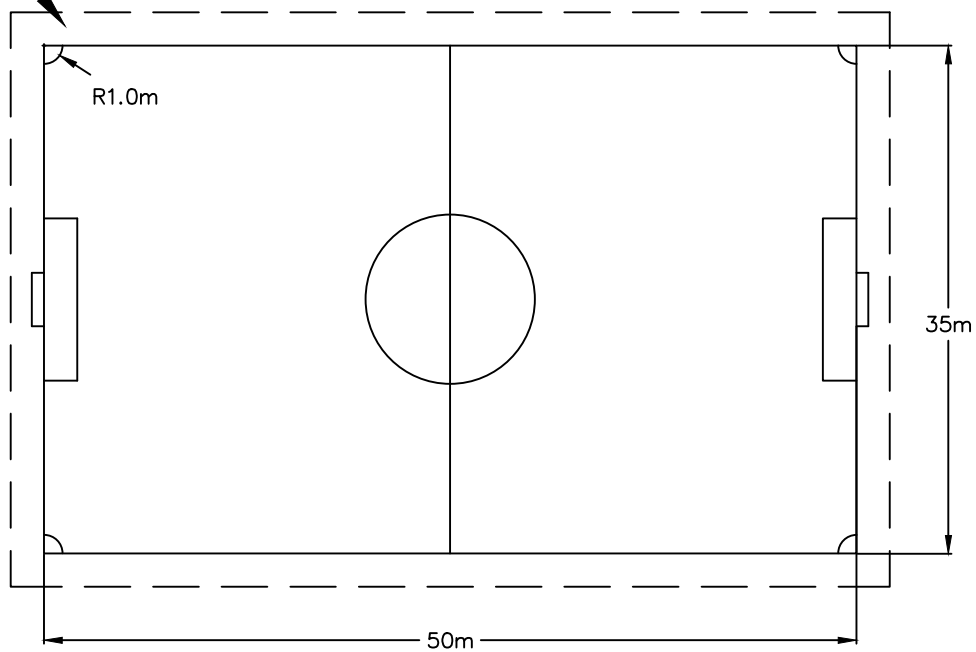
REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2012</div>		
Date	Details	Drawn			
13.05.01	REVISED DRAWING NUMBERS	DDM	PLAYER'S BENCH		
12.10.22	REVISED DRAWING	ED			
11.05.03	REVISED DRAWING NUMBERS	ORR	Approved: P. Alexander, AALA, CSLA		DWG. NO.
11.02.00	REVISED DRAWING NUMBERS	O Butt	Checked: J.M. Talbot, MLA, CSLA		61806
05.02.11	Remove Pressure Treated Wood	L Laing	Date: 30/07/94	Scale: N.T.S.	Drawn: DAN LECKIE
Planning & Development Services Department					

### SMALL SOCCER FIELD



3.00 m NO  
ENCROACHMENT  
ZONE TO BE  
LEVEL WITH  
PLAYING AREA

### MEDIUM SOCCER FIELD

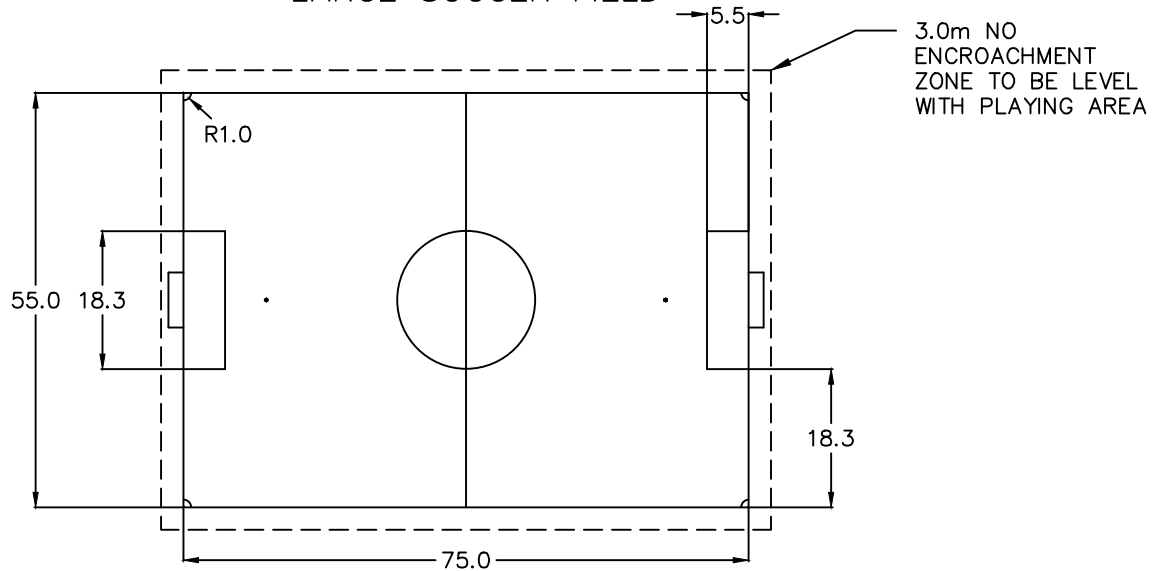


#### NOTES:

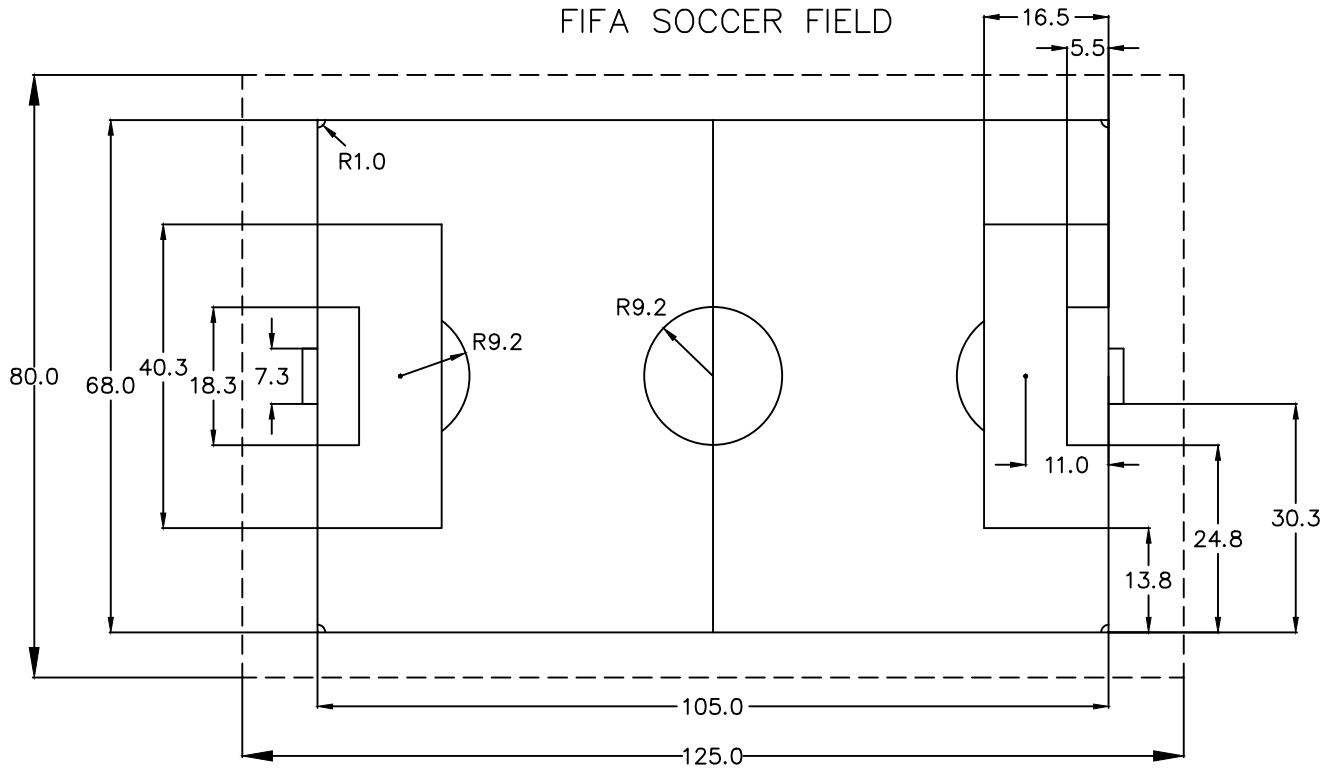
- CORNER PINS TO BE SURVEYED AND INSTALLED ACCORDING TO SPECIFICATIONS.
- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.
- SEE DETAIL 61809 FOR GOAL DIMENSIONS

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012			
Date	Details	Drawn				
13/05/01	REVISED DRAWING NUMBERS & NOTES	A. DAM	<b>SOCCER FIELD DIMENSIONS 1</b>			
12/10/23	REVISED SOCCER FIELD DIMENSIONS	J. ORR				
11/05/03	REVISED DRAWING NUMBER & REVISIONS	J. ORR	Approved: J.M. Talbot, MLA, CSLA			DWG. NO.
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Checked: Jocelyn Thrasher-Haug, M.Sc., P.Ag., P.Biol.			61807
02/06/24	Printed	A. McLenaghan	Date: 24/01/95	Scale: N.T.S.	Drawn: DAN LECKIE	Planning & Development Services Department

## LARGE SOCCER FIELD



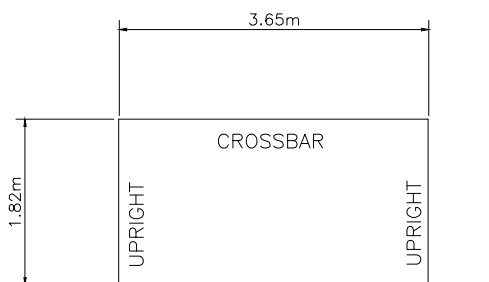
## FIFA SOCCER FIELD



### NOTES:

- CORNER PINS TO BE SURVEYED AND INSTALLED ACCORDING TO SPECIFICATIONS.
- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.
- SEE DETAIL 61809 FOR GOAL DIMENSIONS

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
13/05/01	REVISED DRAWING NUMBER	A. DAM	<b>SOCCER FIELD DIMENSIONS 2</b>		
12/10/23	ADDED LARGE & FIFA FIELDS	J. ORR			
11/05/03	REVISED DRAWING NUMBER & REVISIONS	J. ORR	Approved: J.M. Talbot, MLA, CSLA	DWG. NO.	
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Checked: Jocelyn Thrasher-Haug, M.Sc., P.Ag., P.Biol.	61808	
02/06/24	Printed	A. McLenaghan	Date: 24/01/95   Scale: N.T.S.   Drawn: DAN LECKIE	Planning & Development Services Department	

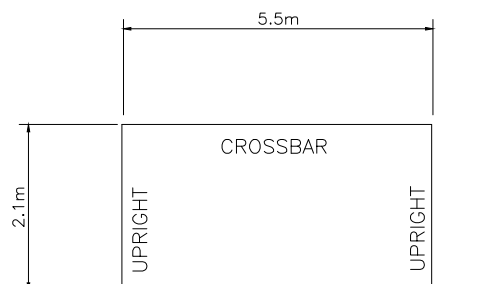


**NOTE:**

- PERMANENT SOCCER GOAL CONSTRUCTED OF 76 O.D. SCHEDULE 40 PIPE LEGS AND 50 X 100 RECTANGULAR TUBE CROSS MEMBER. PROTECTED WITH POLYESTER WHITE POWDER COATING.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

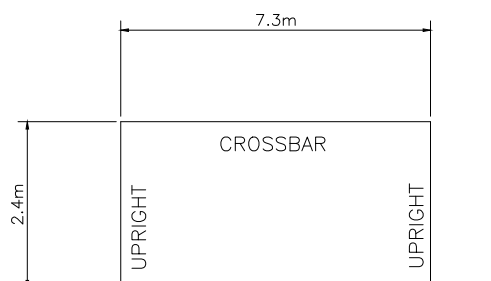
**SMALL**

HEIGHT: 1.82m  
WIDTH: 3.65m



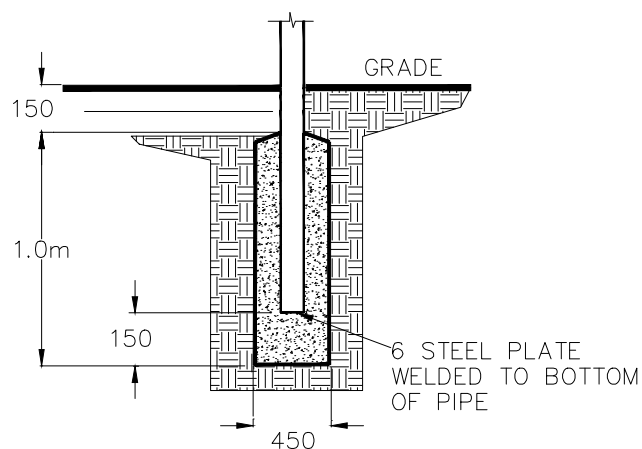
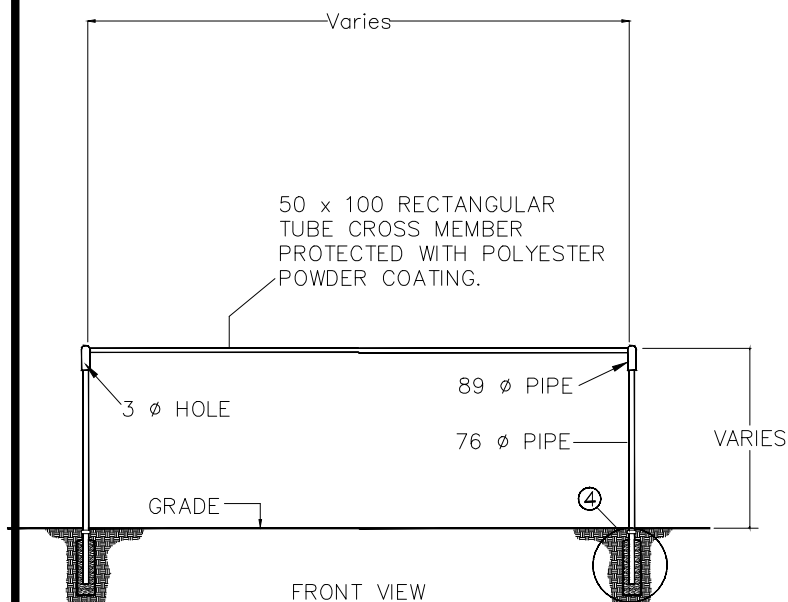
**MEDIUM**

HEIGHT: 2.1m  
WIDTH: 5.5m

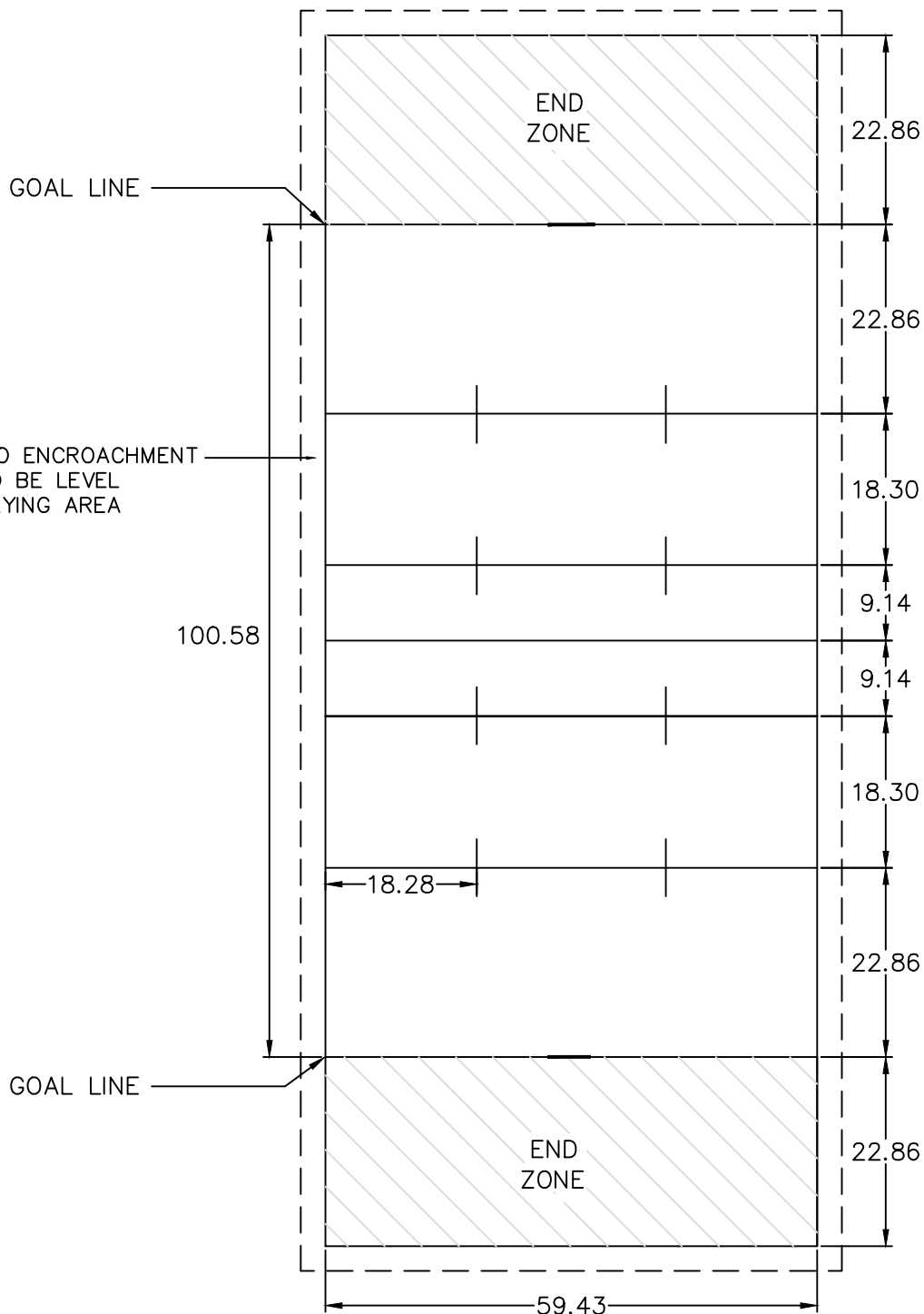


**LARGE**

HEIGHT: 2.4m  
WIDTH: 7.3m

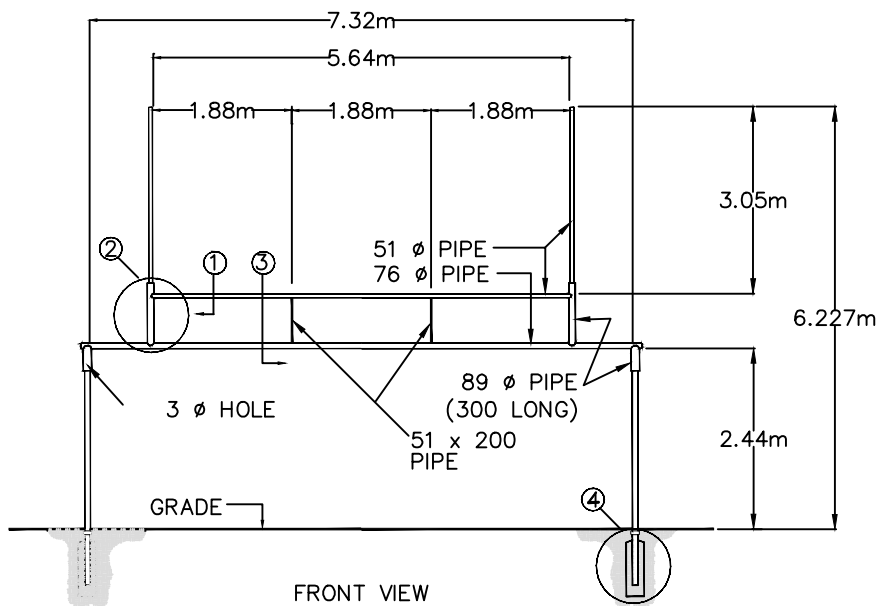


REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
13/05/01	REVISED DRAWING NUMBERS	A. DAM	<b>PERMANENT SOCCER GOAL</b> Approved: P. Alexander, AALA, CSLA Checked: J.M. Talbot, MLA, CSLA Date: 22/01/01   Scale: N.T.S.   Drawn: B. WISPINSKI		
11/05/06	REVISED DRAWING NUMBERS	J. ORR			
11/02/09	REVISED DRAWING NUMBERS	O. Butt			
05/10/24	Small crossbar dimensions changed	M. Forgues			
05/02/17	Change Concrete Footing	L. Laing			
			DWG. NO. <b>61809</b> <small>Planning &amp; Development Services Department</small>		



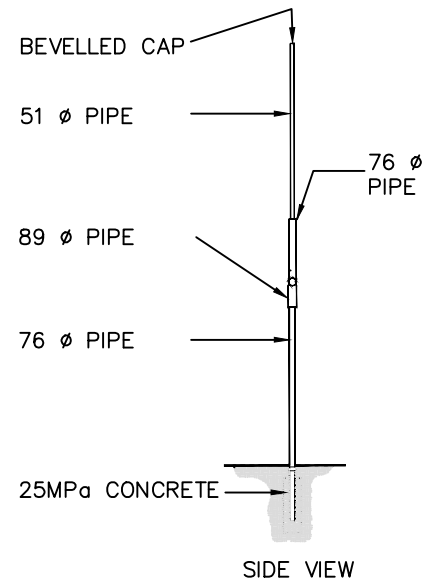
NOTE:  
-ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012			
Date	Details	Drawn				
13/05/03	REMOVED GOAL DIMENSIONS	A. DAM	<b>FOOTBALL FIELD LAYOUT</b>			
13/05/01	REVISED DRAWING NUMBERS	A. DAM				
11/05/03	REVISED DRAWING NUMBERS	J. ORR	Approved: P. Alexander, AALA, CSLA			DWG. NO.
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Checked: J.M. Talbot, MLA, CSLA			61810
02/06/24	Printed	A. McLenaghan	Date: 01/06/01	Scale: N.T.S.	Drawn: A. McLENAGHAN	Planning & Development Services Department

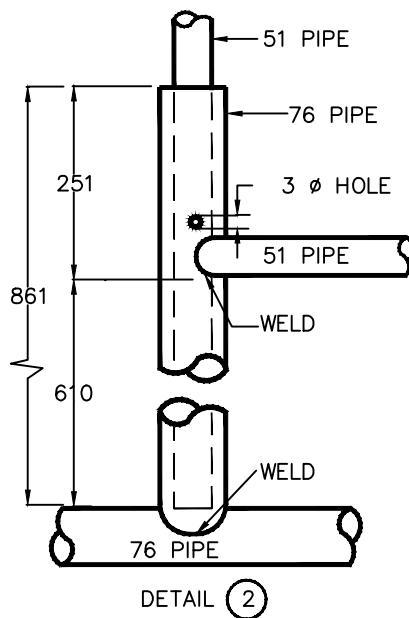
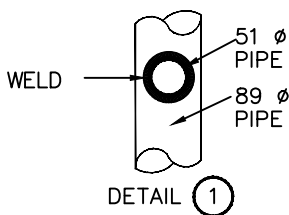


FRONT VIEW

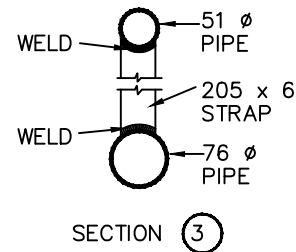
## COMBINATION GOAL POSTS



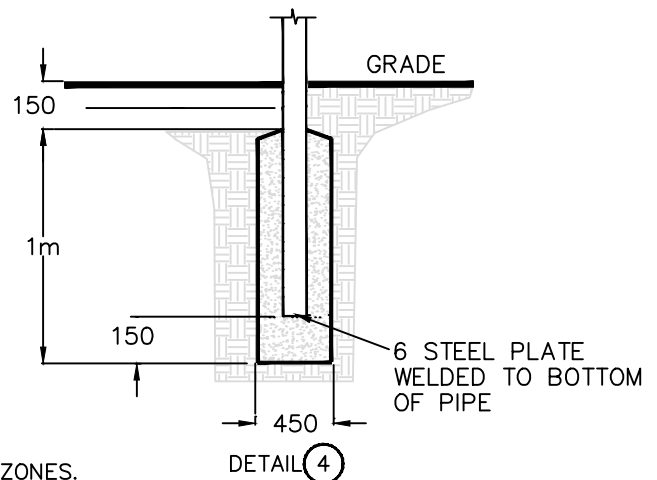
SIDE VIEW



DETAIL 2



SECTION 3

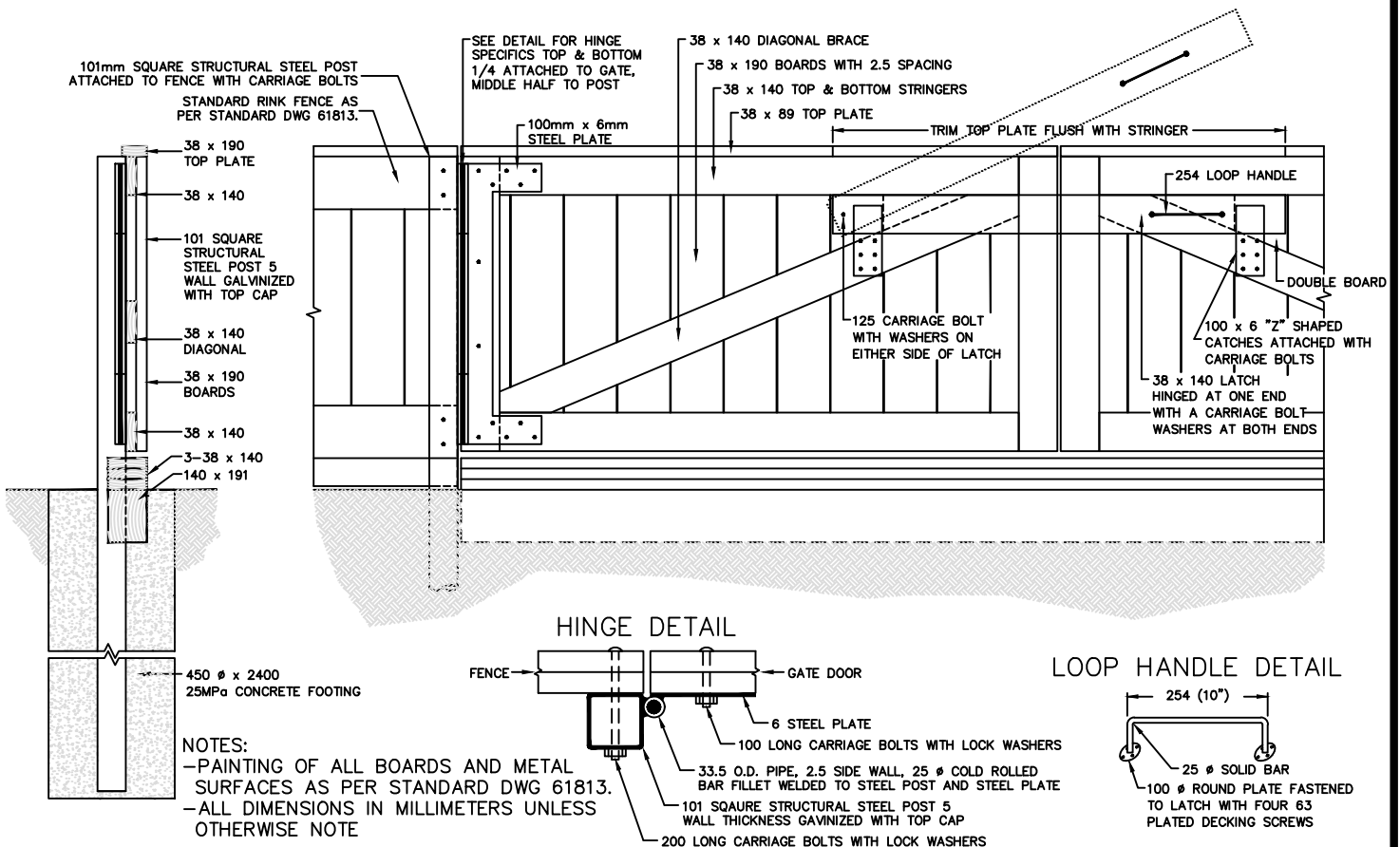
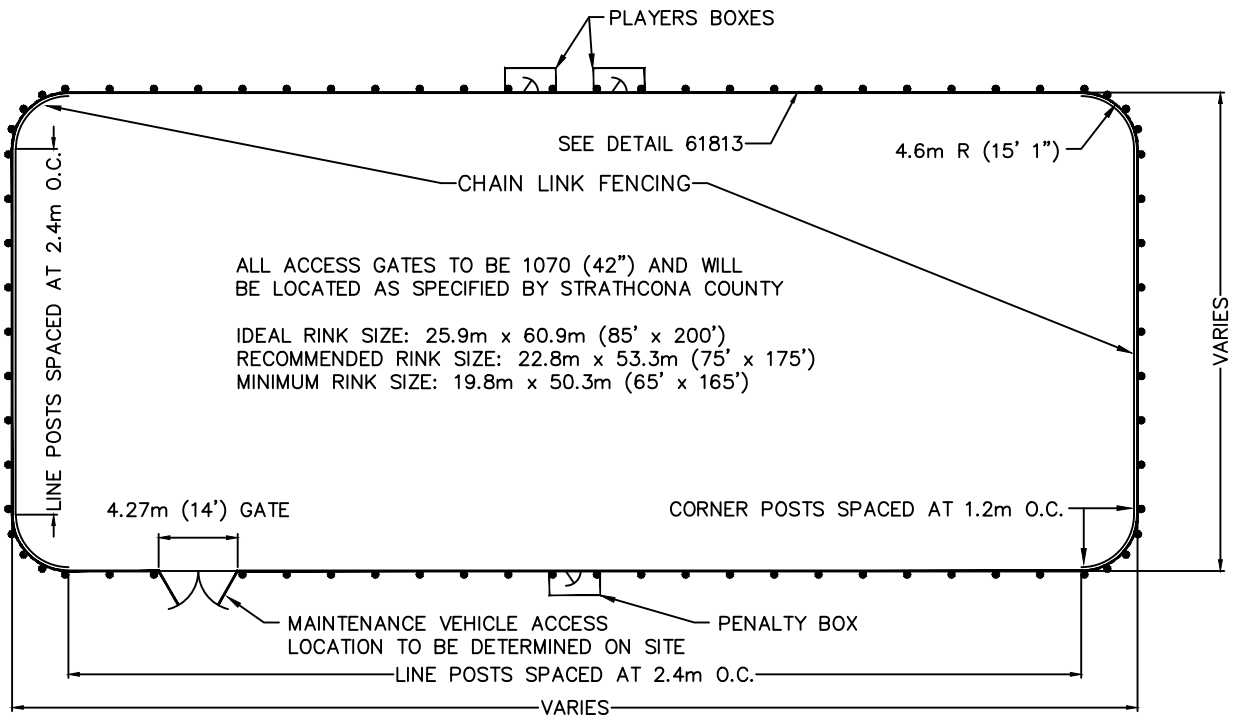


DETAIL 4

### NOTES:

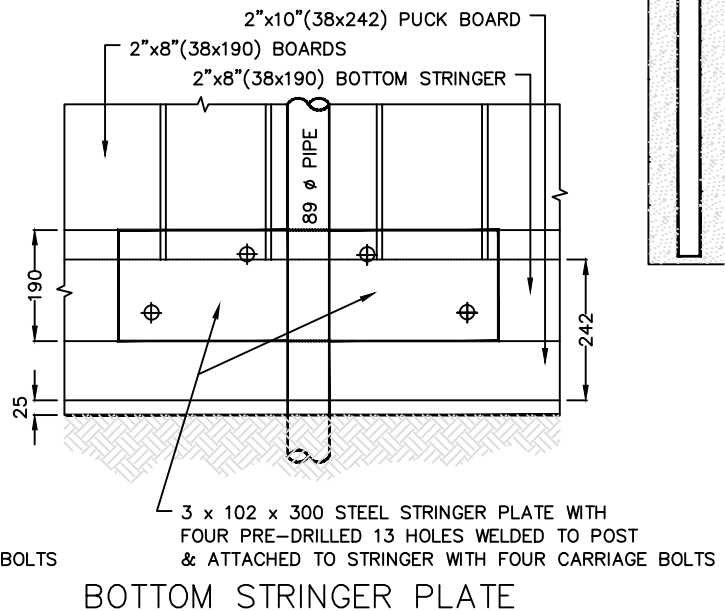
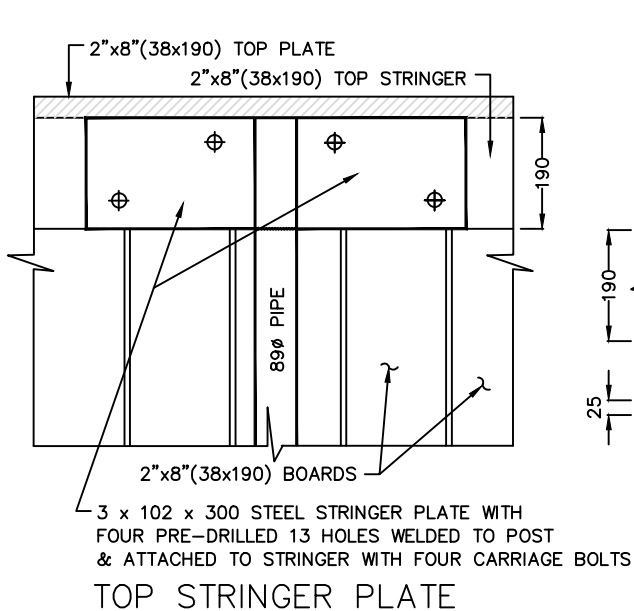
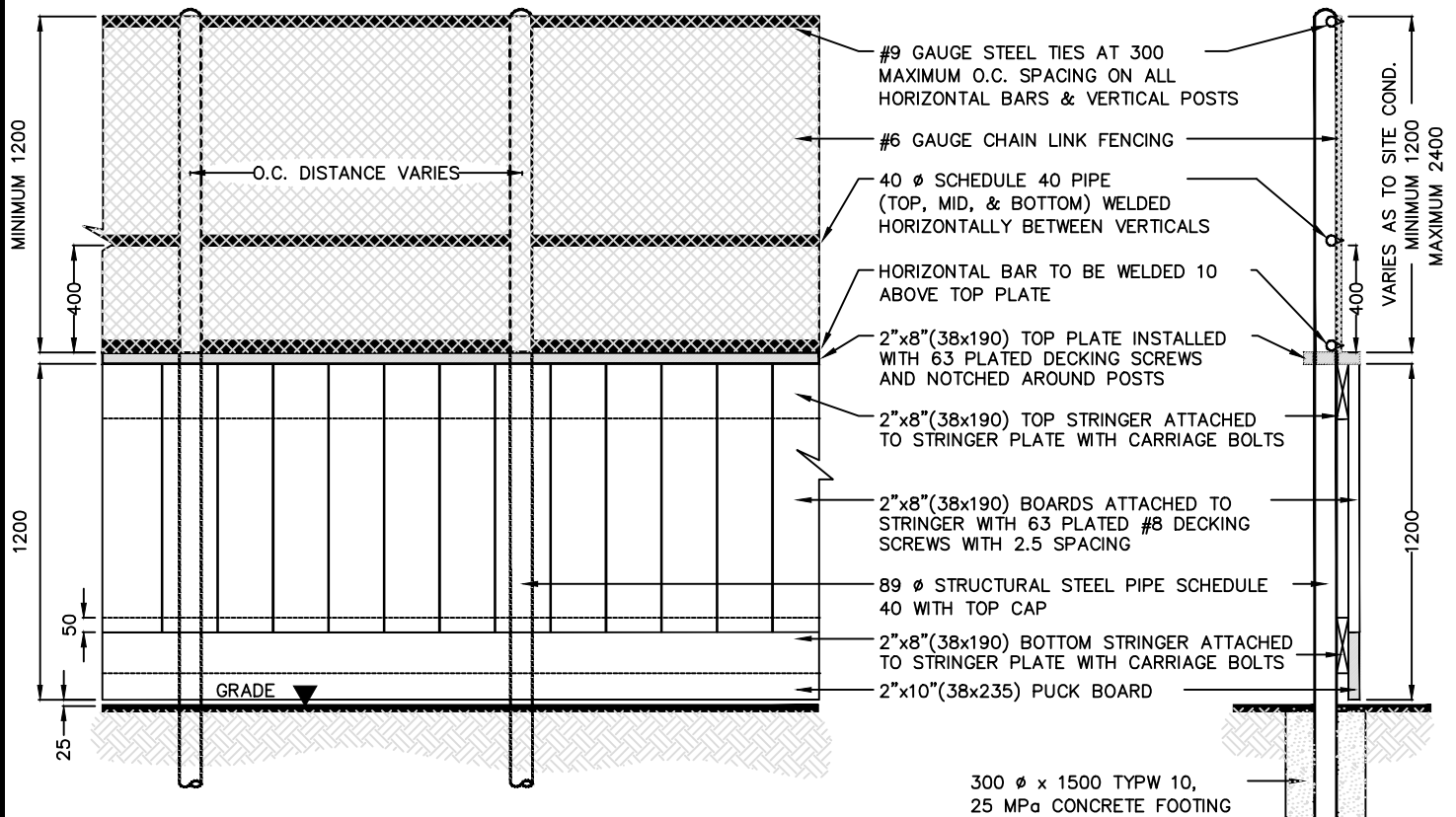
- MATERIAL—STANDARD BLACK PIPE, SCHEDULE 40.
- DRILL SLEEVES AND PIPES PER 130mm DIA,
- BOLT DURING FABRICATION
- SLEEVES TO BE CONTOURED FOR WELDING.
- POSTS TO BE SET IN CONCRETE.
- ALL EXPOSED METAL TO BE POWDER COATED WHITE.
- TO BE USED ONLY WITH SOCCER/FOOTBALL FIELDS WITH END ZONES.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
13/05/01	REVISED DRAWING NUMBERS	A. DAM	<b>COMBINATION GOAL POST DETAIL</b>		
11/05/03	REVISED DRAWING NUMBERS	J. ORR			
11/02/09	REVISED DRAWING NUMBERS	O. Butt	P. Alexander, AALA, CSLA		
05/02/17	Change Concrete Footing	L. Laing	Approved: J.M. Talbot, MLA, CSLA		
02/06/24	Printed	A. McLenaghan	Date: 30/03/94 Scale: N.T.S. Drawn: DAN LECKIE		
			DWG. NO. 61811 Planning & Development Services Department		



REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
13/05/01	REVISED DRAWING NUMBERS	A. DAM	<b>OUTDOOR RINK LAYOUT</b>		
11/05/03	REVISED DRAWING NUMBERS	J. ORR			
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Approved: P. Alexander, AALA, CSLA	DWG. NO.	
02/06/24	Printed	A. McLenaghan	Checked: J.M. Talbot, MLA, CSLA	61812	
02/02/20	Stove bolt changed to carriage bolt	A. McLenaghan	Date: 31/03/94   Scale: N.T.S.   Drawn: DAN LECKIE	Planning & Development Services Department	



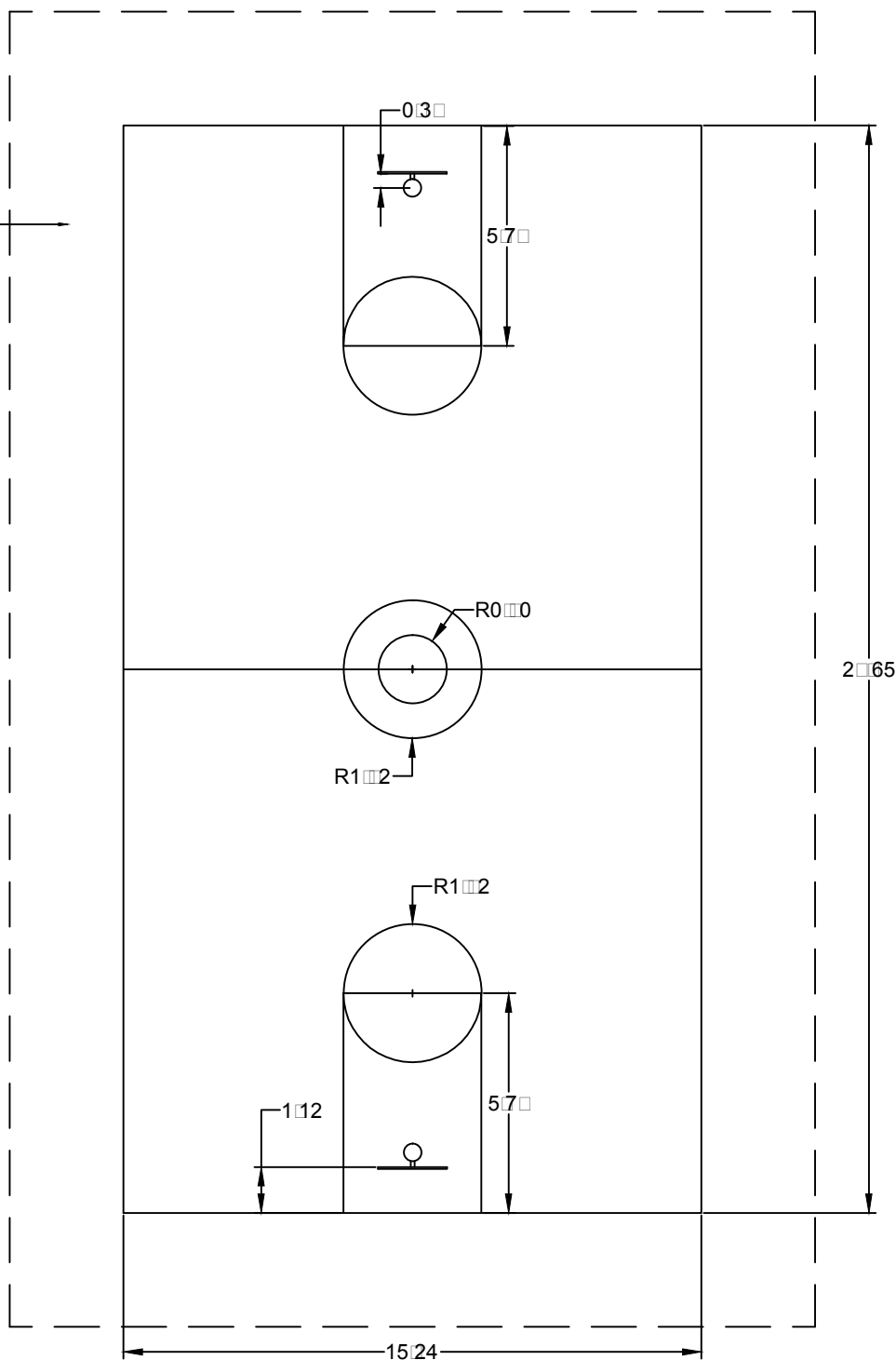


#### NOTES:

- ALL BOARDS TO BE PAINTED WITH BEHR PINTO WHITE OR APPROVED EQUIVALENT.
- ALL WELDS TO BE PAINTED WITH ZINC OXIDE. ALL METAL SURFACES TO BE PAINTED WITH TWO COATS OF TREMCLAD FLAT WHITE FOR METAL.
- TENSION BANDS TO BE INSTALLED ON END POSTS AT 500 O.C. SPACING.
- STEEL WIRE TIES ARE TO BE USED, NOT ALUMINUM.
- DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

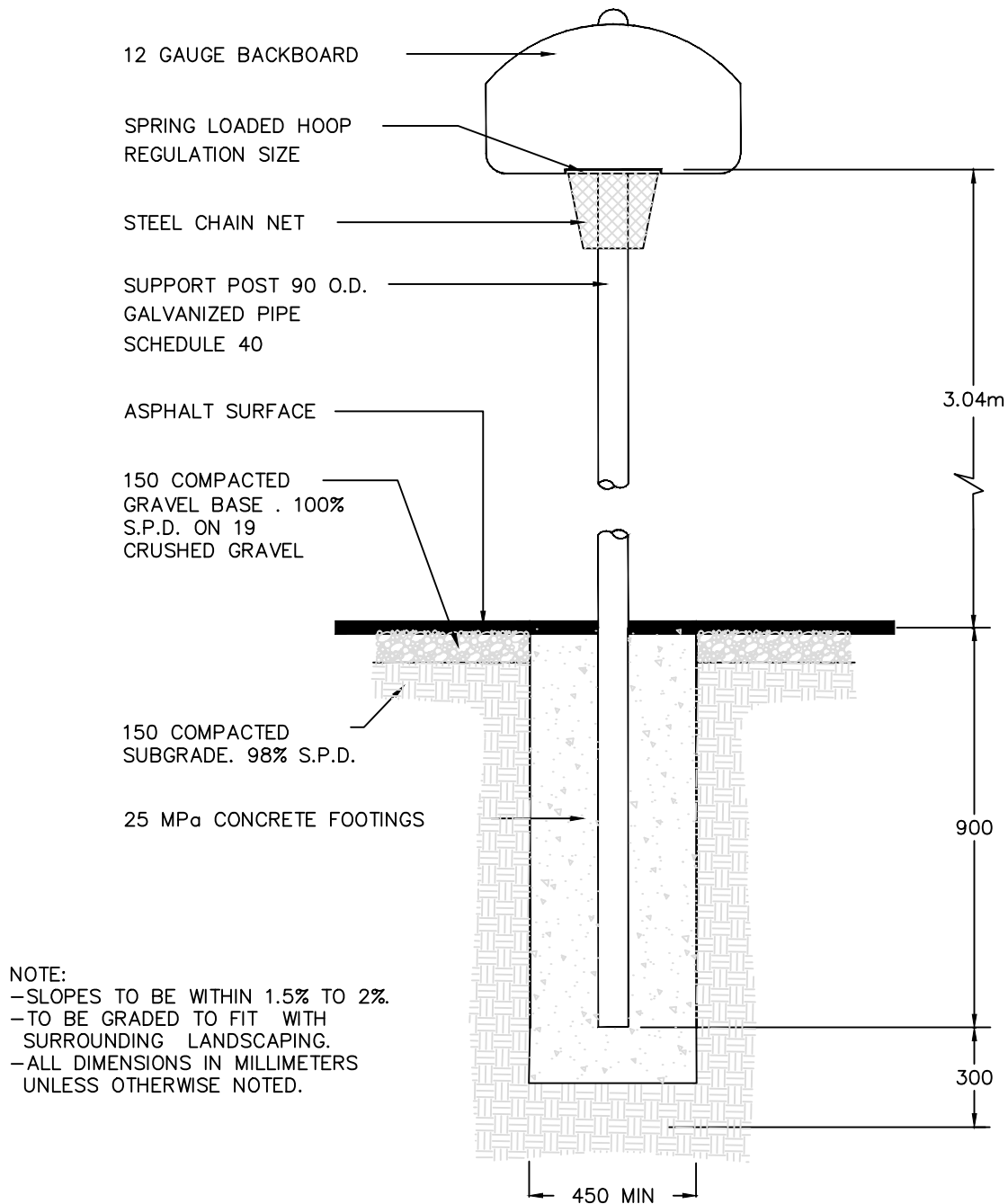
REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
13.05.01	REVISED DRAWING NUMBER	□□□□	<b>OUTDOOR RINK DETAIL</b> Approved: P. Alexander, AALA, CSLA Checked: J.M. Talbot, MLA, CSLA Date: 31/03/94    Scale: N.T.S.    Drawn: DAN LECKIE		
12.10.22	REVISED DRAWING NUMBER	□□□□			
11.05.06	REVISED DRAWING NUMBERS	□□□□			
11.02.00	REVISED DRAWING NUMBERS	□□□□			
02.06.24	Printed	□□□□	DWG. NO. 61813 Planning & Development Services Department		

3.00m NO  
ENCROACHMENT ONE  
TO BE LEVEL WITH  
PLUMB LINE OR RE



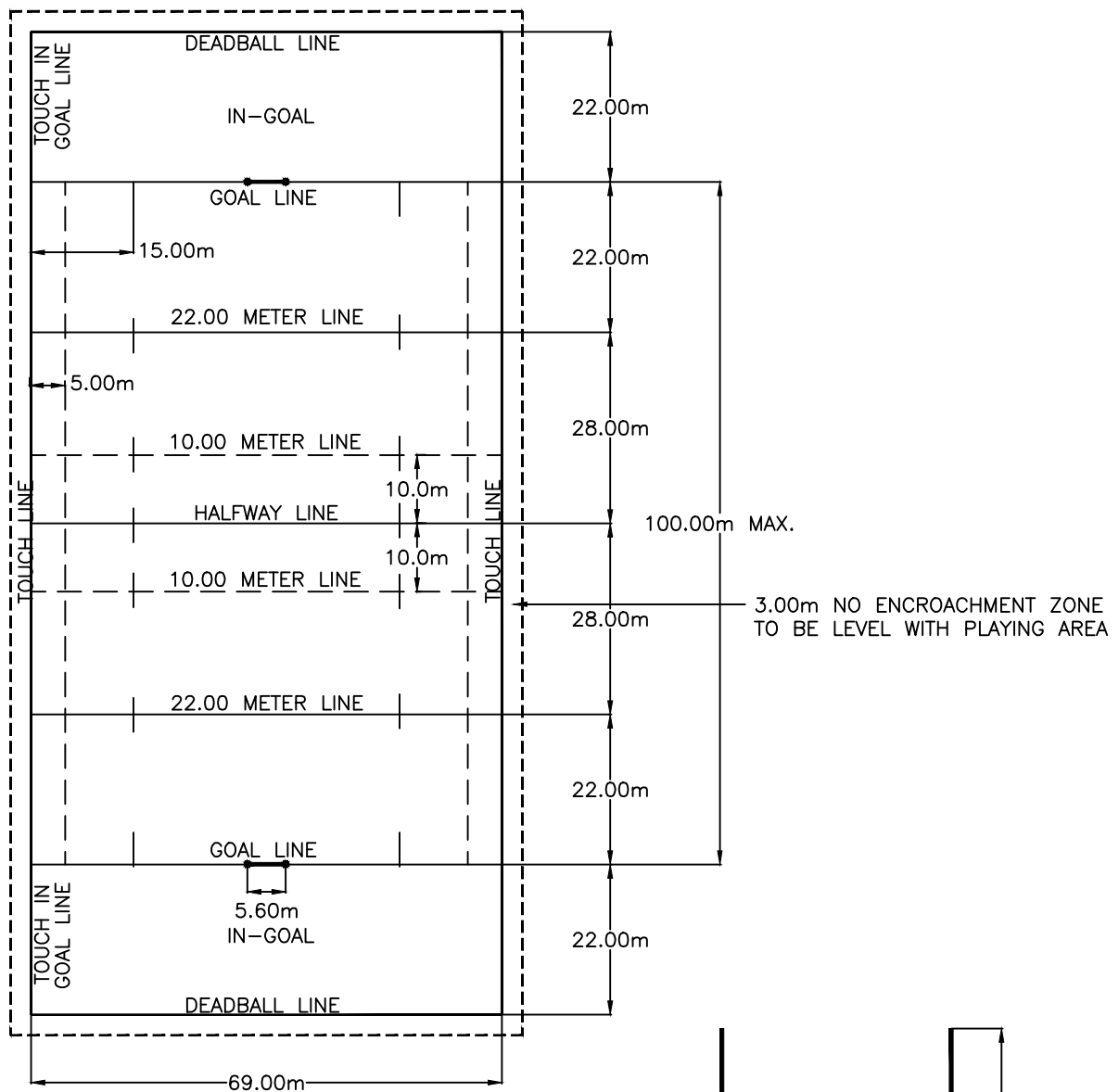
NOTE:  
-MEASURE TO INSIDE EDGE OF BOUNDARY LINES  
-ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED  
-SEE DETAIL 6115 FOR OUTDOOR BASKETBALL BACKBOARD POST

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
13.05.01	REVISED DRAWING NUMBER & NOTE	DDM	<b>BASKETBALL COURT LAYOUT</b>		
12.10.22	REVISED DRAWING NUMBER	EE			
11.05.03	REVISED DRAWING NUMBER & REVISIONS	ORR	Approved: P. Alexander, AALA, CSLA		DWG. NO.
11.02.00	REVISED DRAWING NUMBERS	O Butt	Checked: J.M. Talbot, MLA, CSLA		61814
02.06.24	Printed	McLenaghan	Date: 01/06/01	Scale: N.T.S.	Drawn: A. McLENAGHAN
			Planning & Development Services Department		

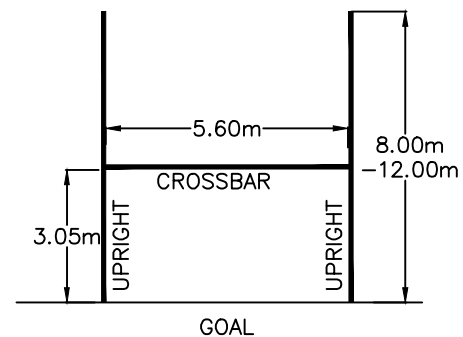


OUTDOOR BASKETBALL COURT BACKBOARD/POST

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012			
Date	Details	Drawn				
13/05/01	REVISED DRAWING NUMBERS	A. DAM	<b>OUTDOOR BASKETBALL-BACKBOARD/POST</b>			
11/05/06	REVISED DRAWING NUMBERS	J. ORR				
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Approved: P. Alexander, AALA, CSLA		DWG. NO.	
05/02/17	Add Concrete to Footing	L. Laing	Checked: J.M. Talbot, MLA, CSLA		61815	
02/06/24	Printed	A. McLenaghan	Date: 29/03/94	Scale: N.T.S.	Drawn: DAN LECKIE	Planning & Development Services Department

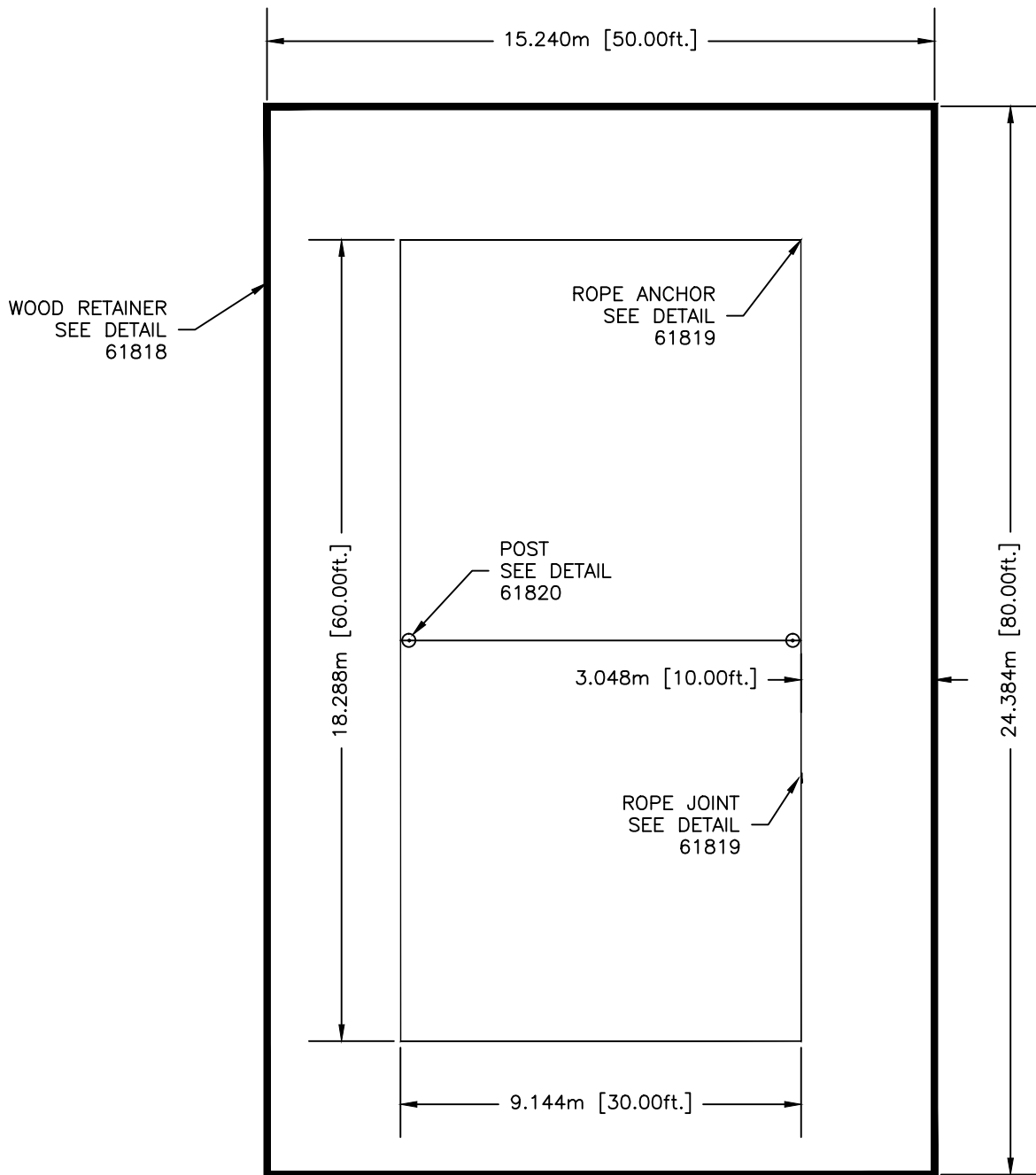


PLAN VIEW



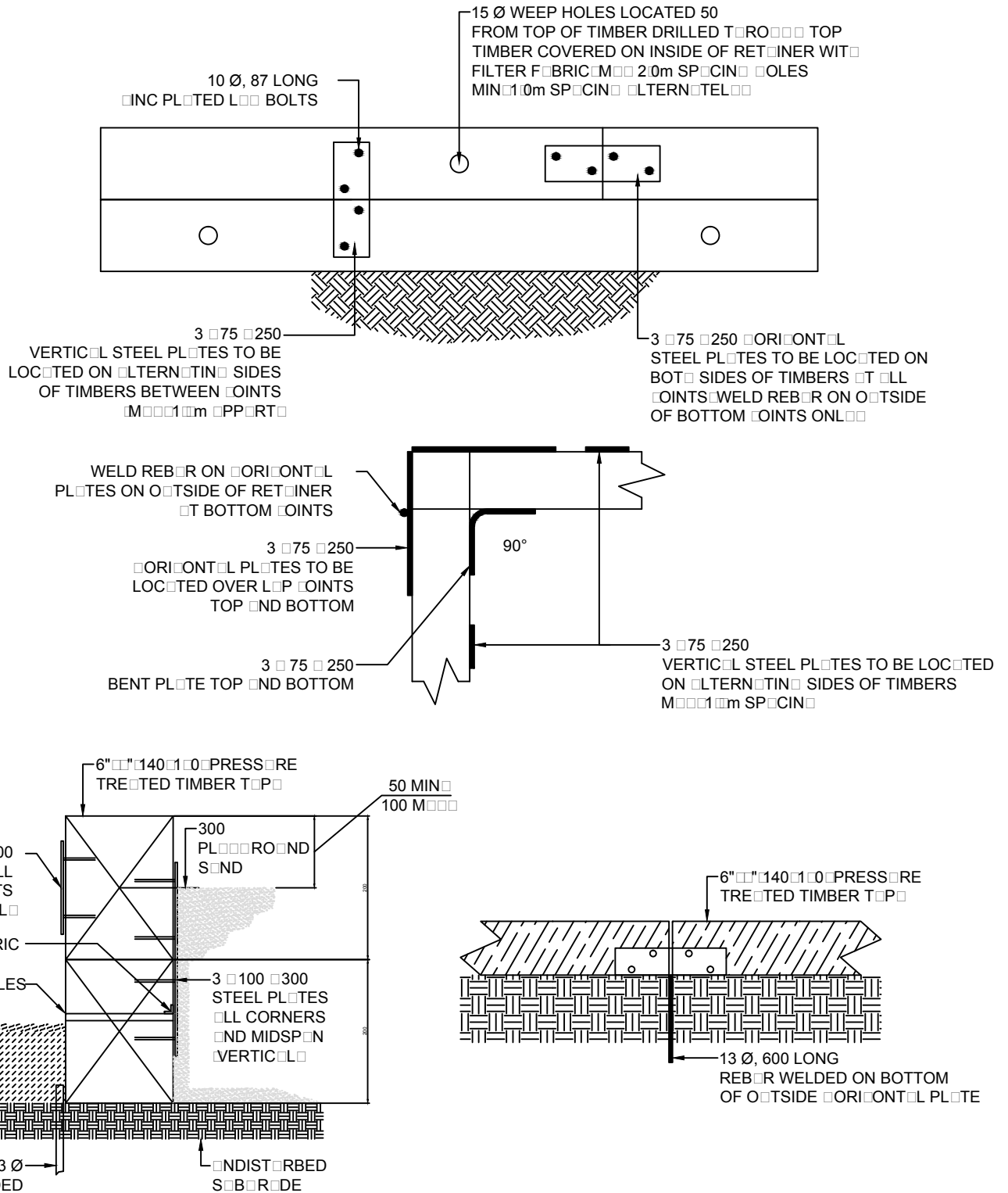
NOTE:  
-ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2012</div>		
Date	Details	Drawn			
13/05/01	REVISED DRAWING NUMBERS	A. DAM	STANDARD RUGBY SPORTS FIELD		
11/05/06	REVISED DRAWING NUMBERS	J. ORR			
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Approved: P. Alexander, AALA, CSLA		DWG. NO.
02/06/24	Printed	A. McLenaghan	Checked: J.M. Talbot, MLA, CSLA		61816
02/02/20	Goal post heights	A. McLenaghan	Date: 94/10/05	Scale: N.T.S.	
			Planning & Development Services Department		



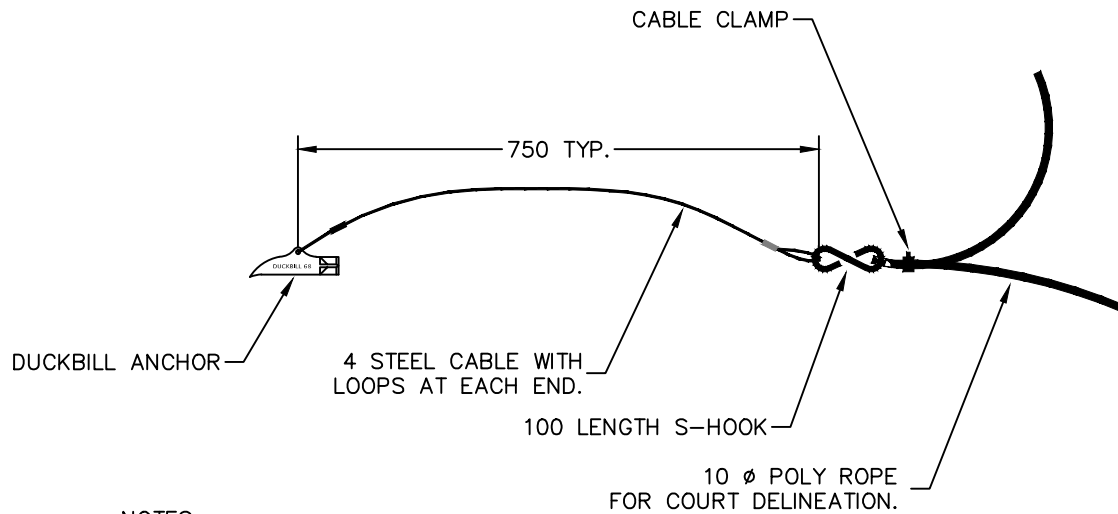
NOTES:  
 -SLOPE SUBGRADE TO ENSURE POSITIVE DRAINAGE.  
 -ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
			<b>SAND VOLLEYBALL COURT LAYOUT.</b>		
13/05/01	REVISED DRAWING NUMBER	A. DAM	Approved: P. Alexander, AALA, CSLA		DWG. NO.
11/05/06	REVISED DRAWING NUMBERS	J. ORR	Checked: J.M. Talbot, MLA, CSLA		61817
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Date: 98/10/27 Scale: N.T.S. Drawn: JEFF EDGINGTON T.T.		Planning & Development Services Department
02/06/24	Printed	A. McLenaghan			



NOTES:  
-ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED

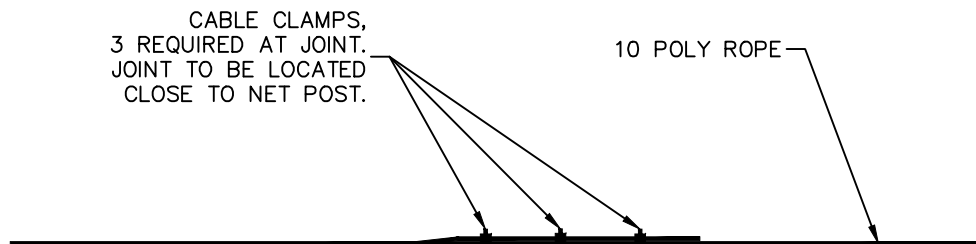
REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
13.05.01	REVISED DRAWING NUMBERS	DDM	<b>DOUBLE TIMBER EDGER LAYOUT FOR VOLLEYBALL COURTS</b>		
12.10.22	REVISED DRAWING TITLE	ED			
11.05.06	REVISED DRAWING NUMBERS	ORR	Approved: P. Alexander, AALA, CSLA	DWG. NO.	
02.06.24	Printed	McLanaghan	Checked: J.M. Talbot, MLA, CSLA	61818	
02.01.0	Added section, weep holes, bent plate	McLanaghan	Date: 98/10/27 Scale: N.T.S. Drawn: JEFF EDGINGTON T.T.		



NOTES:

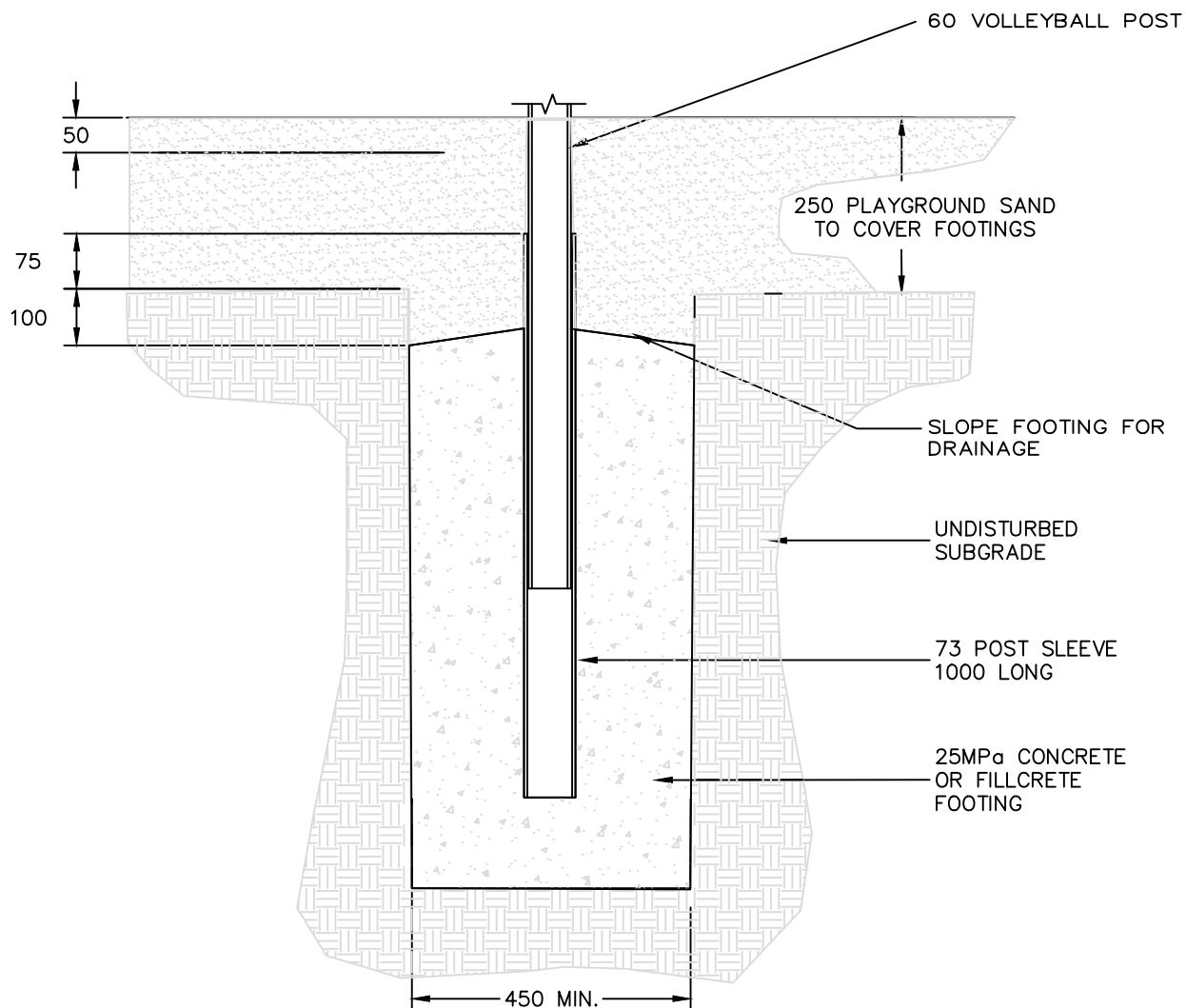
- #68 DUCKBILL ANCHOR, DRIVEN INTO GROUND TO DEPTH OF LOOP.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

CORNER ANCHOR DETAIL



ROPE JOINT DETAIL

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012	
Date	Details	Drawn		
13/05/01	REVISED DRAWING NUMBERS	A. DAM	<b>VOLLEYBALL COURT ROPE DETAILS</b> Approved: P. Alexander, AALA, CSLA Checked: J.M. Talbot, MLA, CSLA Date: 98/10/27   Scale: N.T.S.   Drawn: JEFF EDGINGTON T.T.	
11/05/06	REVISED DRAWING NUMBERS	J. ORR		
11/02/09	REVISED DRAWING NUMBERS	O. Butt		
02/06/24	Printed	A. McLenaghan		
			DWG. NO. 61819 Planning & Development Services Department	




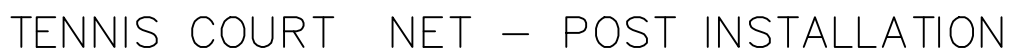
**NOTES:**

- POSTS TO BE SUPPLIED AND INSTALLED WITH A GROUND SLEEVE.
- VOLLEYBALL POST TO BE BLUE IMP. RC392 OR APPROVED EQUAL.
- VOLLEYBALL NET TO BE BLUE IMP. RC389 OR APPROVED EQUAL.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
13/05/01	REVISED DRAWING NUMBERS	A. DAM	<b>VOLLEYBALL COURT POST FOOTINGS</b>		
11/05/03	REVISED DRAWING NUMBERS	J. ORR			
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Approved: P. Alexander, AALA, CSLA	DWG. NO.	
05/02/17	Add Concrete to Footing	L. Laing	Checked: J.M. Talbot, MLA, CSLA	61820	
02/06/24	Printed	A. McLenaghan	Date: 98/10/27	Scale: N.T.S.	Drawn: JEFF EDGINGTON T.T.

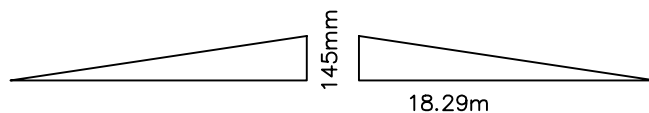
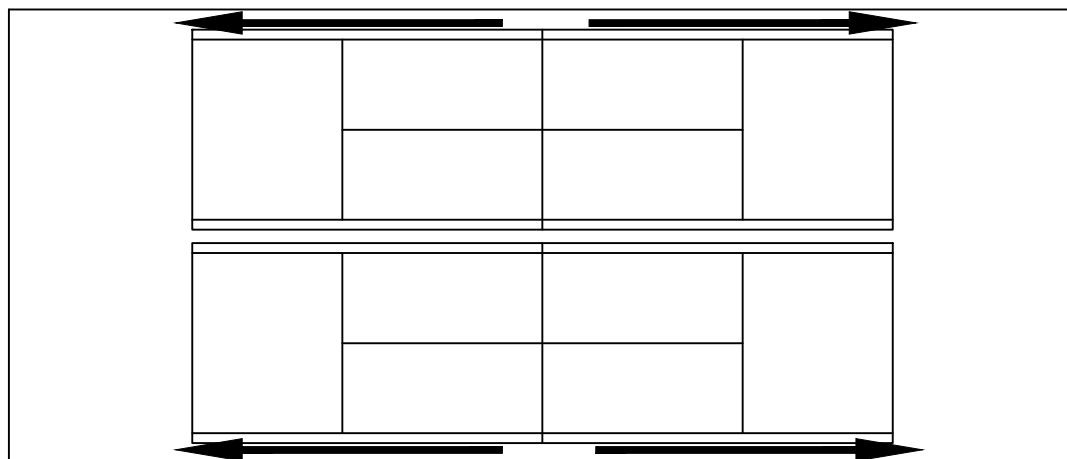
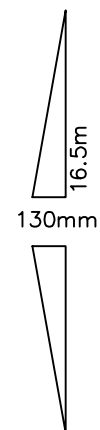
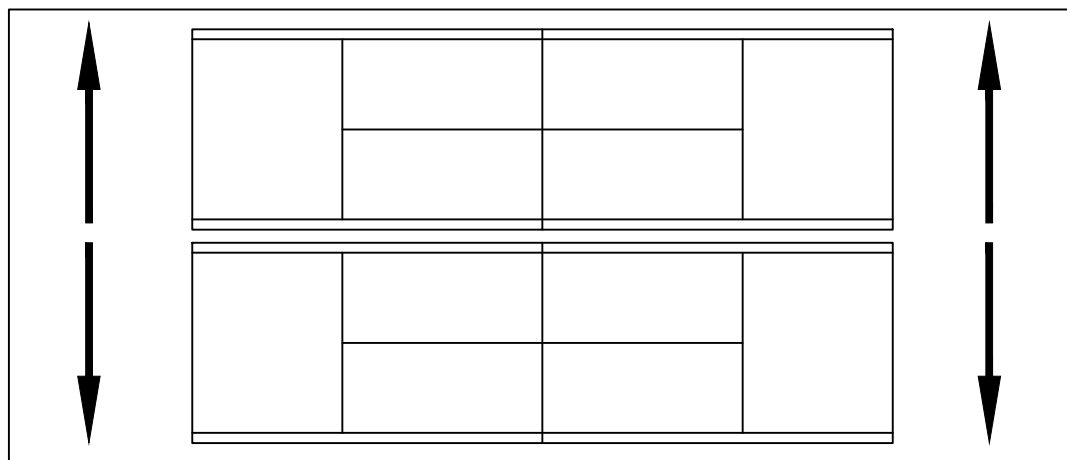
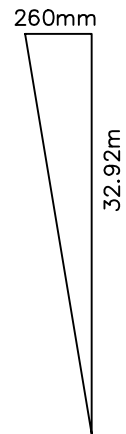
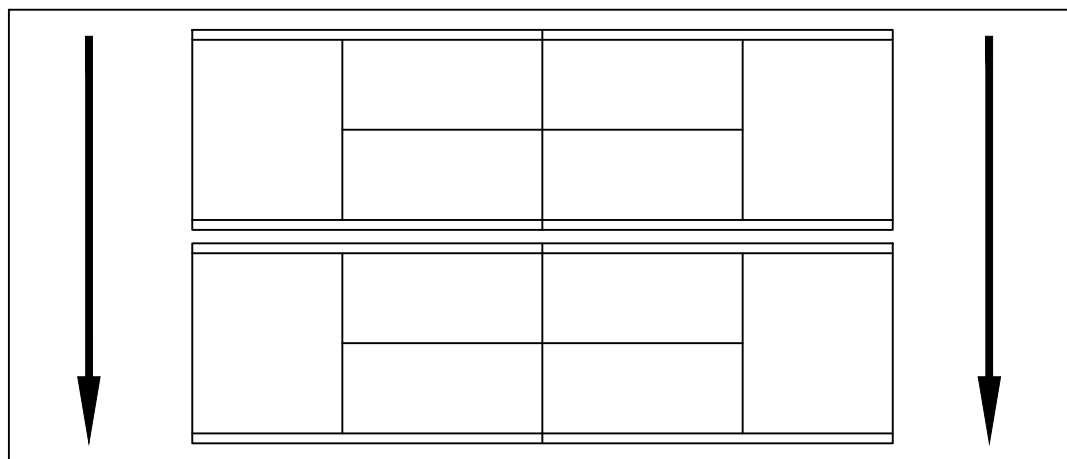


REVISIONS			 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA				© 2012
Date	Details	Drawn	TENNIS COURT LAYOUT				
13/05/01	REVISED DRAWING NUMBER	A. DAM					
11/05/06	REVISED DRAWING NUMBERS	J. ORR					
11/02/09	REVISED DRAWING NUMBERS	O. Butt					
05/10/24	Changed extension to required	M. Forgues	Approved: P. Alexander, AALA, CSLA				DWG. NO.
02/06/24	Printed	A. McLenaghan	Checked: J.M. Talbot, MLA, CSLA				61821
			Date: 11/04/94	Scale: N.T.S.	Drawn: DAN LECKIE	Planning & Development Services Department	



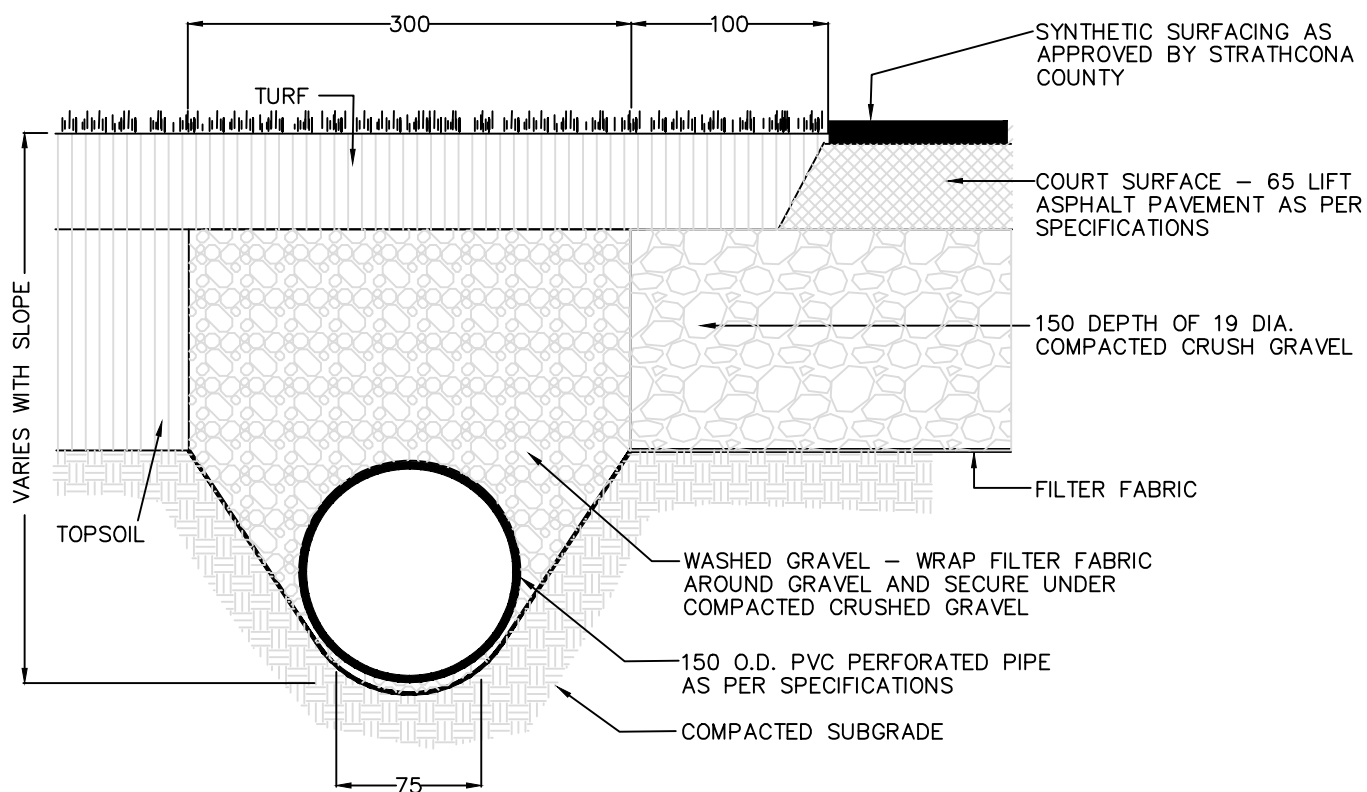
-POSTS TO BE SUPPLIED AND INSTALLED WITH A GROUND SLEEVE WITH FLANGE FLUSH WITH ASPHALT SURFACE.

Planning & Development Services Department



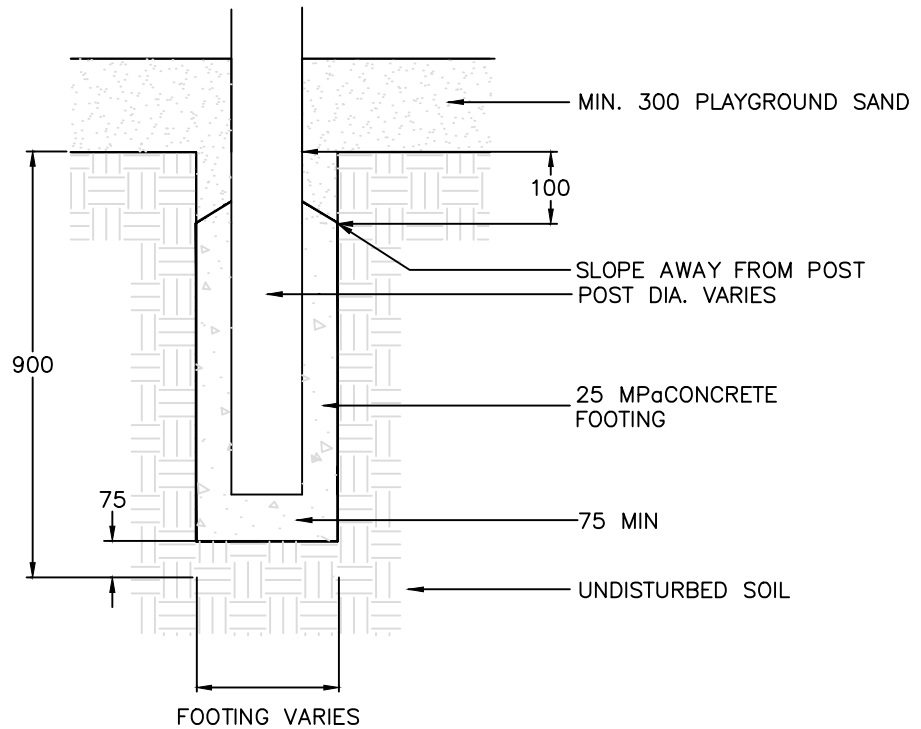
NOTE: THE SLOPE FOR AN ASPHALT COURT SHOULD BE 0.8% OR 25.4mm DROP FOR EVERY 3m IN LENGTH.

REVISIONS			<div>Strathcona County</div> <div>2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA</div> <div>© 2012</div>			
Date	Details	Drawn				
			TENNIS COURT SLOPE DRAINAGE			
13/05/01	REVISED DRAWING NUMBERS	A. DAM				
11/05/03	REVISED DRAWING NUMBERS	J. ORR	Approved: P. Alexander, AALA, CSLA			DWG. NO.
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Checked: J.M. Talbot, MLA, CSLA			61823
02/06/24	Printed	A. McLenaghan	Date: 12/04/94	Scale: N.T.S.	Drawn: DAN LECKIE	Planning & Development Services Department



## TENNIS COURT — SURFACE & SUB-DRAINAGE SYSTEM

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012	
Date	Details	Drawn		
13/05/01	REVISED DRAWING NUMBERS	A. DAM	<b>TENNIS COURT DRAINAGE</b> Approved: P. Alexander, AALA, CSLA Checked: J.M. Talbot, MLA, CSLA Date: 12/04/94   Scale: N.T.S.   Drawn: DAN LECKIE DWG. NO. 61824 <small>Planning &amp; Development Services Department</small>	
11/05/03	REVISED DRAWING NUMBERS	J. ORR		
11/02/09	REVISED DRAWING NUMBERS	O. Butt		
02/06/24	Printed	A. McLenaghan		



**NOTES:**

- POST TO BE CENTERED IN FOOTING.
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

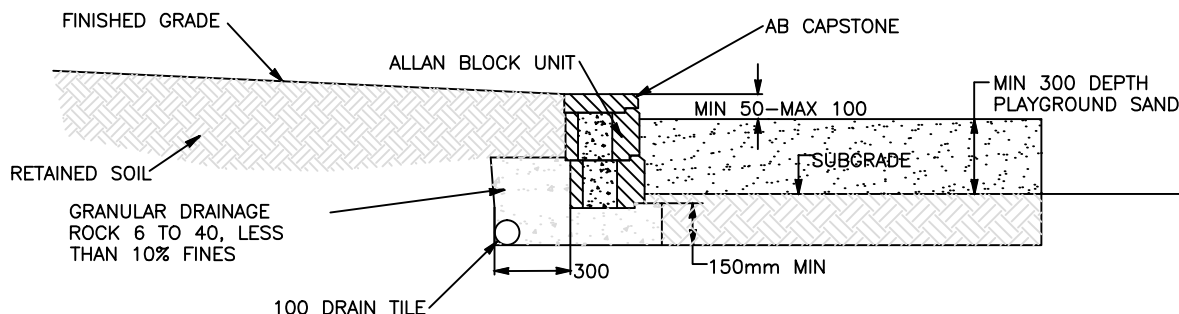
REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012			
Date	Details	Drawn				
13/05/01	REVISED DRAING NUMBERS	A. DAM	<b>PLAYGROUND EQUIPMENT FOOTING</b>			
11/05/03	REVISED DRAWING NUMBERS	J. ORR				
11/02/10	REVISED DRAWING NUMBERS	O. Butt	Approved: P. Alexander, AALA, CSLA		DWG. NO.	
05/02/15	Adjust Concrete Footing	L. Laing	Checked: J.M. Talbot, MLA, CSLA		61825	
02/06/24	Printed	A. McLenaghan	Date: 25/01/95	Scale: N.T.S.	Drawn: DAN LECKIE	Planning & Development Services Department



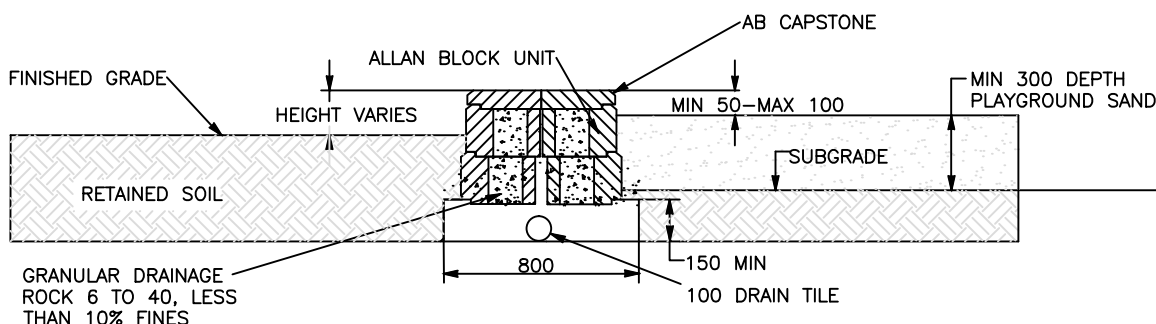
-ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED

Planning & Development Services Department

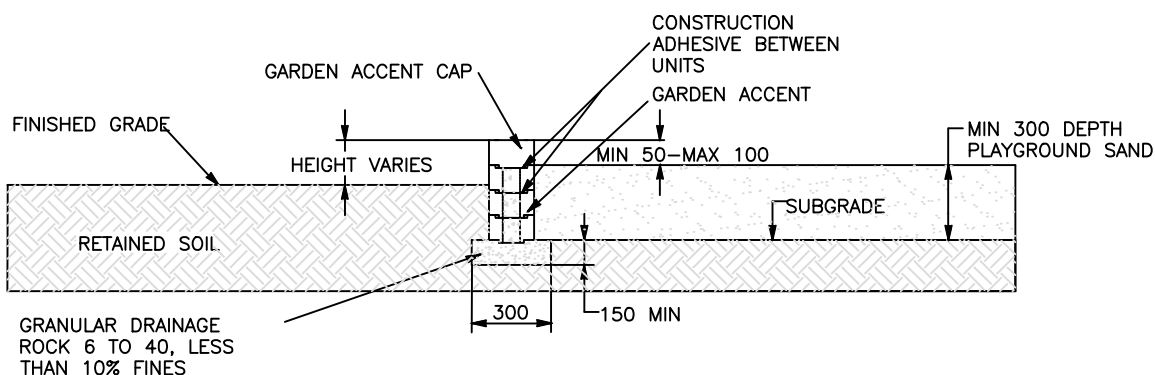
## ALLAN BLOCK RETAINER TYPICAL SECTION



## ALLAN BLOCK PARAPET RETAINER TYPICAL SECTION



## ALLAN BLOCK GARDEN ACCENT TYPICAL SECTION



NOTES:  
-ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012	
Date	Details	Drawn		
11/05/03	REVISED DRAWING NUMBERS	J. ORR	<b>ALTERNATIVE PLAYGROUND RETAINERS</b>	
11/02/10	REVISED DRAWING NUMBERS	O. Butt		
06/03/10	CHANGED DIMENSIONS	M. Forgues	Approved: P. Alexander, AALA, CSLA	DWG. NO.
05/11/04	ADDED TO OSDS	M. Forgues	Checked: J.M. Talbot, MLA, CSLA	61827
			Date: 05/11/04 Scale: N.T.S. Drawn: M. FORGUES	Planning & Development Services Department

200

FILL THE JUMP PIT WITH PLAYGROUND SAND, LEAVING A CROWN IN THE CENTER FOR COMPACTION. LEAVE IT LOOKING A LITTLE LIKE A MOAT. APPROXIMATELY 25 BELOW THE EXISTING GRASS ALL THE WAY AROUND AND STACKED LEVEL IN THE CENTER.

## SECTION DETAILS

TAKE OFF BOARD

2440

LEVEL SAND AREA

4880

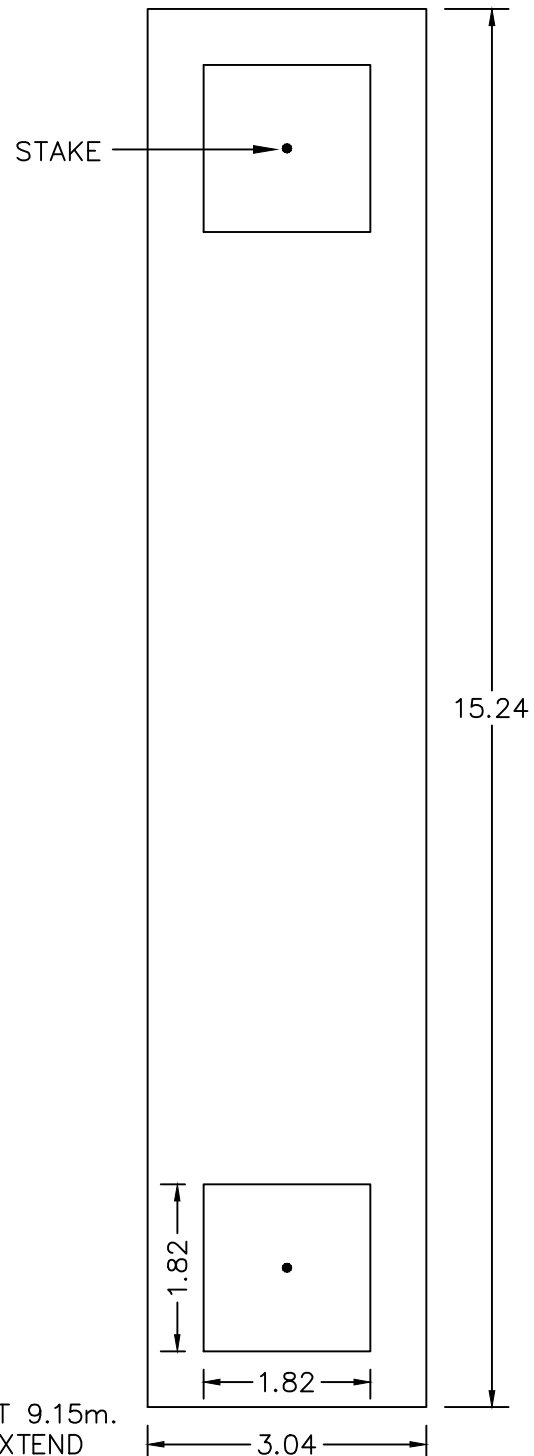
1400

## PLAN VIEW DETAILS

NOTE:  
-ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012	
Date	Details	Drawn		
13/05/01	REVISED DRAWING NUMBERS	A. DAM	<b>JUMP PIT DETAIL</b> Approved: P. Alexander, AALA, CSLA Checked: J.M. Talbot, MLA, CSLA Date: 05/11/03   Scale: N.T.S.   Drawn: M. FORGUES	
11/05/03	REVISED DRAWING NUMBERS	J. ORR		
11/02/10	REVISED DRAWING NUMBERS	O. Butt		
06/03/10	CHANGED JUMP PIT DEPTH	M. Forgues	DWG. NO. 61828 <small>Planning &amp; Development Services Department</small>	
05/11/03	DETAIL ADDED TO OSDS	M. Forgues		





**NOTES:**

- 12.20m BETWEEN BASE OF STAKES, LADIES COURT 9.15m.
- STAKES TO BE STEEL, 25mm IN DIAMETER AND EXTEND 350mm ABOVE GROUND.
- ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.

REVISIONS			<b>Strathcona County</b> 2001 Sherwood Drive, Sherwood Park Alberta, T8A 3W7, CANADA © 2012		
Date	Details	Drawn			
			<b>HORSE SHOE PIT LAYOUT</b>		
13/05/01	REVISED DRAWING NUMBERS	A. DAM			
11/05/03	REVISED DRAWING NUMBERS	J. ORR	Approved: P. Alexander, AALA, CSLA		DWG. NO.
11/02/09	REVISED DRAWING NUMBERS	O. Butt	Checked: J.M. Talbot, MLA, CSLA		61829
02/06/24	Printed	A. McLenaghan	Date: 01/06/01	Scale: N.T.S.	Drawn: AMY McLENAGHAN
			Planning & Development Services Department		

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.

Use the links below to access the PDF fillable forms.

[Acceptance of Detailed Engineering and Landscape Drawings – Application](#)

[Chlorine Residual and Bacterial Sampling – Report](#)

[Closed Circuit Television \(CCTV\) Inspection – Request](#)

[Combined Water Pressure and Leakage Test – Report](#)

[Construction Completion – Infrastructure Summary](#)

[Contractors' Monthly Maintenance – Verification](#)

[Design and Construction Update – Suggestions](#)

[Extension to a Waterworks, Wastewater or Storm Drainage System – Notification](#)

[Hydrant Flow Test – Application](#)

[Landscape Inspection – Report](#)

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.

Keep on hand and refer to the most recent version of the Edmonton Area Pipeline & Utility Operators' Committee (EAPUOC) Manual, "Guidelines for Working Near Buried Facilities." Refer to <https://eapuoc.com/resources/eapuoc-manual> for more information about the Manual and how to order a copy.

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1. INSPECTION PROCESS REQUIREMENTS****1.1.1. Future Addition****2.0 CCC – REQUIREMENTS****2.1. GENERAL**

2.1.1. The Developer's Representative or Contract Manager shall submit the following to Planning and Development Services to request a CCC inspection:

2.1.1.1. Written request sent by email or mail.

2.1.1.2. Pre-inspection reports.

- (i) [Construction Completion – Infrastructure Summary](#)
- (ii) [Landscape Inspection – Report](#)
- (iii) [Closed Circuit Television \(CCTV\) Inspection – Request](#)

2.1.1.3. Reduced drawings (11x17 set).

**2.2. UTILITIES****2.2.1. Sanitary**

2.2.1.1. Refer to [VOL. 1 SEC. 4.2, WASTEWATER COLLECTION SYSTEM, SUB-SECTION 4.2.3.8.](#)

2.2.1.2. Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 3.21.](#)

**2.2.2. Water**

2.2.2.1. Refer to [VOL. 1 SEC. 4.3, WATER DISTRIBUTION SYSTEM, SUB-SECTION 4.3.3.10.](#)

2.2.2.2. Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 3.21.](#)

**2.2.3. Storm**

2.2.3.1. Refer to [VOL. 1 SEC. 4.4, STORM WATER MANAGEMENT SYSTEM SUB-SECTION 4.4.3.8.](#)

2.2.3.2. Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 3.21.](#)

- 2.3. ROADS
- 2.3.1. Roads
- 2.3.1.1. Refer to [VOL. 1 SEC. 4.1, ROADS, SUB-SECTION 4.1.13.10.](#)
- 2.3.1.2. Refer to [VOL. 1 SEC 5.1, RURAL TRANSPORTATION, SUB-SECTION 5.1.17.](#)
- 2.3.2. Pavement Markings
- 2.3.2.1. Refer to [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL, SUB-SECTION 3.10.](#)
- 2.3.3. Traffic Signals
- 2.3.3.1. Future addition
- 2.4. LANDSCAPE
- 2.4.1. Soft landscaping CCC inspections may occur from June 1 until September 30 weather permitting. Soft landscaping inspections will not be conducted after September 30.
- 2.4.2. The Developer's Representative or Contract Manager shall provide a yearly anticipated landscape construction and inspection schedule to Planning and Development Services, prior to May 31 or prior to any construction commencement.
- 2.4.3. In order to facilitate all landscape inspections, a complete set of the required paperwork must be received prior to scheduling the landscape inspection.
- 2.4.4. The Developer's Representative or Contract Manager shall provide a detailed inspection report within 3 business days following the inspection and ensure that all deficiencies have been rectified prior to re-inspection.
- 2.4.5. All deficiencies identified during inspections shall be repaired within 15 business days following the original inspection date pending [SUB-SECTION 2.4.1 OF THIS SECTION](#). If deficiencies are not corrected by the agreed date, the stage will be subject to a full re-inspection.
- 2.4.6. Inspection Categories

Strathcona County will carry out landscape inspections as follows:

Landscape Elements	Maintenance Requirements
Trees, shrubs, perennials, turf and natural areas.	Minimum 2 years from CCC.
Granular and asphalt trails	Minimum 2 years from CCC.



**2.4.7. Seeding and Sodding**

2.4.7.1. Refer to [VOL. 2 SEC. 603, SEEDING AND SODDING, SUB-SECTION 4.0.](#)

2.4.7.2. Refer to [VOL. 2 SEC. 603, SEEDING AND SODDING, SUB-SECTION 5.0.](#)

**2.4.8. Playground**

2.4.8.1. Refer to [VOL. 2 SEC. 615, PLAYGROUND CONSTRUCTION.](#)

**2.4.9. Soccer Field**

2.4.9.1. Refer to [VOL. 2 SEC. 616, SOCCER FIELD DEVELOPMENT, SUB-SECTION 4.0.](#)

2.4.9.2. Refer to [VOL. 2 SEC. 616, SOCCER FIELD DEVELOPMENT, SUB-SECTION 5.0.](#)

**2.4.10. Ball Field**

2.4.10.1. Refer to [VOL. 2 SEC. 617, BALL FIELD DEVELOPMENT, SUB-SECTION 4.0.](#)

2.4.10.2. Refer to [VOL. 2 SEC. 617, BALL FIELD DEVELOPMENT, SUB-SECTION 5.0.](#)

**3.0 FAC – REQUIREMENTS****3.1. GENERAL**

3.1.1. The Developer's Representative or Contract Manager shall submit the following to Planning and Development Services to request a FAC inspection:

3.1.1.1. Written request sent by email or mail.

3.1.1.2. Pre-inspection reports.

- (i) [Construction Completion – Infrastructure Summary](#)
- (ii) [Landscape Inspection – Report](#)
- (iii) [Closed Circuit Television \(CCTV\) Inspection – Request](#)
- (iv) [Contractors Monthly Maintenance – Verification](#)

3.1.1.3. Reduced drawings (11x17 set).

3.1.1.4. As-built drawings (CAD & Mylar).

## 3.2. UTILITIES

## 3.2.1. Sanitary

3.2.1.1. Refer to [VOL. 1 SEC. 4.2, WASTEWATER COLLECTION SYSTEM, SUB-SECTION 4.2.3.8.](#)3.2.1.2. Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 3.21.](#)

## 3.2.2. Water

3.2.2.1. Refer to [VOL. 1 SEC. 4.3, WATER DISTRIBUTION SYSTEM, SUB-SECTION 4.3.3.10.](#)3.2.2.2. Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 3.21.](#)

## 3.2.3. Storm

3.2.3.1. Refer to [VOL. 1 SEC. 4.4, STORM WATER MANAGEMENT SYSTEM SUB-SECTION 4.4.3.8.](#)3.2.3.2. Refer to [VOL. 2 SEC. 501, INSTALLATION OF SEWERS, SUB-SECTION 3.21.](#)

## 3.3. ROADS

## 3.3.1. Roads

3.3.1.1. Refer to [VOL. 1 SEC. 4.1, ROADS, SUB-SECTION 4.1.13.10.](#)3.3.1.2. Refer to [VOL. 1 SEC 5.1, RURAL TRANSPORTATION, SUB-SECTION 5.1.17.](#)

## 3.3.2. Pavement Markings

3.3.2.1. Refer to [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL, SUB-SECTION 3.10.](#)

## 3.3.3. Traffic Signals

## 3.3.3.1. Future Addition

## 3.4. LANDSCAPE

3.4.1. Soft landscaping FAC inspections may occur from June 1 until September 30 weather permitting. Soft landscaping inspections will not be conducted after September 30. All other FAC inspections may be conducted year round, weather permitting.

3.4.2. The Developer's Representative or Contract Manager shall provide a yearly anticipated landscape construction and inspection schedule to Planning and Development Services, prior to May 31 or prior to any construction commencement.

- 3.4.3. In order to facilitate all landscape inspections, a complete set of the required paperwork must be received prior to scheduling the landscape inspection.
- 3.4.4. The Developer's Representative or Contract Manager shall provide a detailed inspection report within 3 business days following the inspection and ensure that all deficiencies have been rectified prior to re-inspection.
- 3.4.5. All deficiencies identified during inspections shall be repaired within 15 business days following the original inspection date pending [SUB-SECTION 3.4.1 OF THIS SECTION](#). If deficiencies are not corrected by the agreed date, the stage will be subject to a full re-inspection.
- 3.4.6. The Developer/Owner shall replace any trees, shrubs, perennials or grass which may have died or failed to achieve proper growth, as determined by the County at its discretion. The Developer shall repair any other landscape amenities such as site furniture, fencing, entry features, retaining walls, trails, bridges, boardwalks, lookouts or playgrounds which are not in accordance with the plans prior to issuance of FAC.
- 3.4.7. Inspection Categories

Strathcona County will carry out landscape inspections as follows:

Landscape Elements	Maintenance Requirements
Trees, shrubs, perennials, turf and natural areas.	Minimum 2 years from CCC.
Granular and asphalt trails	Minimum 2 years from CCC.
benches, picnic tables, trash receptacles, trail signage	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
Fences, gates and marker posts	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
Park and SWMF Signage	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
Entry Features and Retaining Walls	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
Bridges, Boardwalks and Lookouts	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.
Playgrounds	FAC shall be issued once accepted by Strathcona County. A maintenance period is not required.

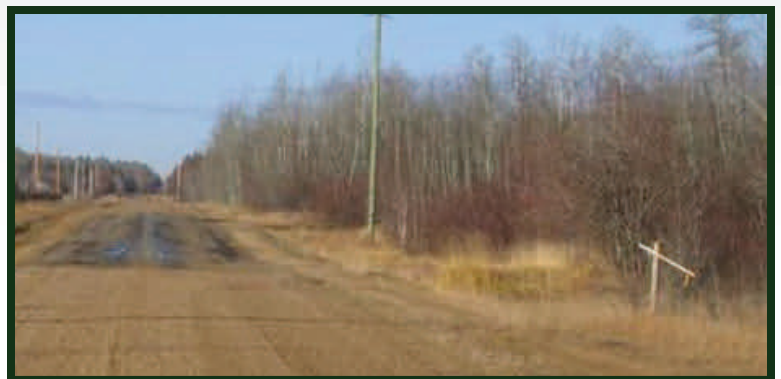
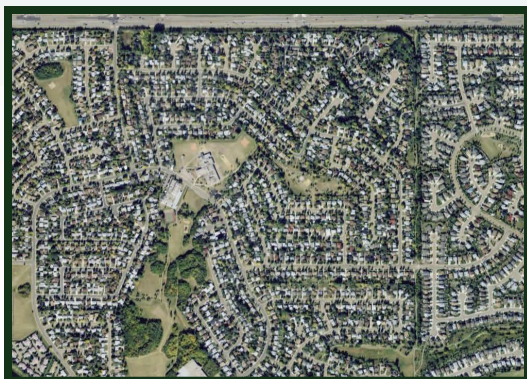
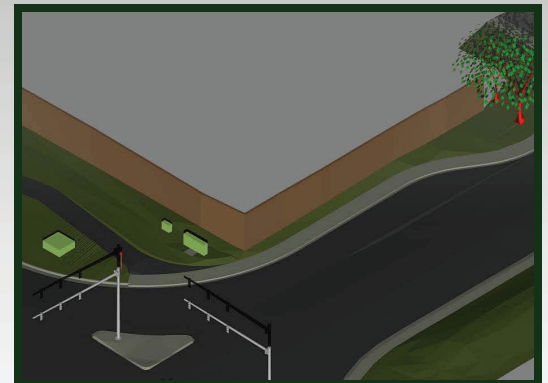
- 3.4.8. Seeding and Sodding
- 3.4.8.1. Refer to [VOL. 2 SEC. 603, SEEDING AND SODDING, SUB-SECTION 4.0](#).
- 3.4.8.2. Refer to [VOL. 2 SEC. 603, SEEDING AND SODDING, SUB-SECTION 5.0](#).
- 3.4.9. Rural Road and Reclamation Seeding
- 3.4.9.1. Refer to [VOL. 2 SEC. 620, RURAL ROAD AND RECLAMATION SEEDING SUB-SECTION 3.6](#).

- 3.4.9.2. Refer to [VOL. 2 SEC. 620, RURAL ROAD AND RECLAMATION SEEDING SUB-SECTION 3.7.](#)
- 3.4.10. Plantings
  - 3.4.10.1. Refer to [VOL. 2 SEC. 604, PLANTINGS, SUB-SECTION 4.0.](#)
  - 3.4.10.2. Refer to [VOL. 2 SEC. 604, PLANTINGS, SUB-SECTION 5.0.](#)
  - 3.4.10.3. Refer to [VOL. 2 SEC. 604, PLANTINGS, SUB-SECTION 6.0.](#)
- 3.4.11. Gravel Trails
  - 3.4.11.1. Refer to [VOL. 2 SEC. 610, GRAVEL PEDESTRIAN TRAILS, SUB-SECTION 4.0.](#)
  - 3.4.11.2. Refer to [VOL. 2 SEC. 610, GRAVEL PEDESTRIAN TRAILS, SUB-SECTION 5.0.](#)
- 3.4.12. Playground
  - 3.4.12.1. Refer to [VOL. 2 SEC. 615, PLAYGROUND CONSTRUCTION.](#)
- 3.4.13. Soccer Field
  - 3.4.13.1. Refer to [VOL. 2 SEC. 616, SOCCER FIELD DEVELOPMENT, SUB-SECTION 4.0.](#)
  - 3.4.13.2. Refer to [VOL. 2 SEC. 616, SOCCER FIELD DEVELOPMENT, SUB-SECTION 5.0.](#)
- 3.4.14. Ball Field
  - 3.4.14.1. Refer to [VOL. 2 SEC. 617, BALL FIELD DEVELOPMENT, SUB-SECTION 4.0.](#)
  - 3.4.14.2. Refer to [VOL. 2 SEC. 617, BALL FIELD DEVELOPMENT, SUB-SECTION 5.0.](#)
- 3.4.15. Wetlands
  - 3.4.15.1. Refer to [VOL. 2 SEC. 605, CONSTRUCTED WETLANDS, SUB-SECTION 2.1.5.11.](#)
  - 3.4.15.2. Refer to [VOL. 2 SEC. 605, CONSTRUCTED WETLANDS, SUB-SECTION 2.1.5.12.](#)
  - 3.4.15.3. Refer to [VOL. 2 SEC. 605, CONSTRUCTED WETLANDS, SUB-SECTION 2.1.14.](#)
  - 3.4.15.4. Refer to [VOL. 2 SEC. 605, CONSTRUCTED WETLANDS, SUB-SECTION 2.1.15.](#)
- 3.4.16. Natural Area
  - 3.4.16.1. Refer to [VOL. 2 SEC. 807, NATURAL AREA MAINTENANCE, SUB-SECTION 3.0.](#)



# DESIGN AND CONSTRUCTION STANDARDS

September 2019



**Volume 2**  
**Construction Specifications**

 **STRATHCONA**  
COUNTY

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.

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3.0	Preparation
4.0	Restoration
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3.0	Execution
4.0	Acceptance

**Section 613      Park Signs**

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**Section 615      Playground Construction**

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3.0	Execution
4.0	Maintenance
5.0	Acceptance
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**Section 616      Soccer Field Development**

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3.0	Execution
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<b>Section 619</b>	<b>Rural Road and Reclamation Topsoil Placement</b>
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2.0	Products
3.0	Execution



4.0 Measurement and Payment

**Section 807 Natural Area Maintenance**

1.0 General

2.0 Execution

3.0 Maintenance

**Section 901 Traffic Signal Installation**

1.0 General

2.0 Products

**Section 902 Maintenance Procedure for Traffic Signal Installations and Equipment**

1.0 External Maintenance to Outside Plant

2.0 Internal Cabinet Maintenance

3.0 Emergency Response

4.0 Minor System Upgrading

5.0 Support Equipment

6.0 Materials and Supplies

**Section 903 Sign Installation**

1.0 General

2.0 Products

3.0 Execution

4.0 Measurement and Payment

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**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 The testing agency is to work in conjunction with the Contractor or in-house Strathcona County Construction Crews and the Contract Manager/Developer Representative to ensure quality of materials, workmanship and compliance with the CONSTRUCTION SPECIFICATIONS of all materials incorporated into the work.

1.1.2 The testing firm will be required to closely monitor the progress of each project and have staff available on site to perform the requisite testing upon the contractor's completion of a component of the work. The maximum time to begin carrying out requested field testing, shall be 48 hours from when the request was made.

Once a test has been requested, the Consultant shall inform the Contract Manager/Developer Representative and Contractor of the day and time the field test will be carried out by the Consultant's Field Technician. If the scheduled time is changed, the Consultant shall supply prompt notice to the Strathcona County Representative and the Contractor.

1.1.3 It shall be the responsibility of the testing agency to advise the Contractor and Contract Manager/Developer Representative immediately should the results of any tests during the process of the work not meet the requirements of the CONSTRUCTION SPECIFICATIONS. Notification shall be substantiated in writing.

1.1.4 Test results shall be supplied to the Contractor and the Strathcona County Representative as shown in the CONSULTANT AGREEMENT. In the case of in-house work one copy will be supplied to the Strathcona County Representative.

From the time the field testing is complete, the time necessary to complete laboratory work based on test procedure specification plus 48 hours.

1.1.5 The Consultant's field technician shall submit, by handwritten report, test results (where due to nature of the test, this is possibly i.e., density results) to the Contract Manager/Developer Representative or his representative at the project site.

1.1.6 Invoices submitted by the testing firm must be separate for each project as listed on the CONSULTANT AGREEMENT.

1.1.7 Transportation to the site shall be paid for each project site visited on a per kilometer basis and shall cover the cost of personnel, vehicle, gas, insurance and any other expense incurred to provide safe transportation to the job site.

**1.1.8 Specification / Standard Legend**

CSA – Canadian Standards Association

ASTM – American Society for Testing and Materials

ATT – Alberta Transportation Tests

## TLT – Transportation Laboratory Testing

## 1.2 TEST PROCEDURES

## 1.2.1 Subgrade and Earthworks

## 1.2.1.1 Standard Proctor includes:

- (i) Sampling
- (ii) Moisture-Density Relationship (ASTM D698)
- (iii) In-situ Moisture Content
- (iv) Calculations and Reports
- (v) Classifications of Soil (ASTM D2487)

## 1.2.1.2 Embankment Densities include:

- (i) Density by Nuclear Method (ASTM D2922)
- (ii) Moisture Content by Nuclear Method (ASTM D3017)
- (iii) Calculations and Reports

## 1.2.1.3 Subgrade Densities include:

- (i) Density by Nuclear Method (ASTM D2922)
- (ii) Moisture Content by Nuclear Method (ASTM D3017)
- (iii) Calculations and Reports

## 1.2.1.4 Trench Backfill Densities include:

- (i) Density by Nuclear Method (ASTM D2922)
- (ii) Moisture Content by Nuclear Method (ASTM D3017)
- (iii) Calculations and Reports

## 1.2.1.5 Topsoil Testing includes:

- (i) Clubroot Testing
  - DNA testing for clubroot shall be done at an accredited laboratory
  - Existing topsoil shall be tested prior to construction and one test per 100 m<sup>2</sup> is required
  - Introduced topsoil shall be tested prior to arrival on site and one test per tonne is required

## 1.2.2 Concrete Testing

## 1.2.2.1 Concrete Tests

- (i) Sampling Plastic Concrete (CSA A23.2-1C)
- (ii) Slump and Slump Flow of Concrete (CSA A23.2-5C)
- (iii) Air Content of Plastic Concrete by the Pressure Method (CSA A23.2-4C)
- (iv) Making and Curing Concrete Compression and Flexural Test Specimens (CSA 23.2-3C)
- (v) Capping Concrete Test Specimens (ASTM C617)

- (vi) Compressive Strength of Cylindrical Concrete Specimens (CSA 23.2-9C)
- (vii) Reporting (CSA A23.2-9C)
- 1.2.3 Granular Base Materials
  - 1.2.3.1 Supply of Granular Materials includes:
    - (i) Sampling (ASTM D75)
    - (ii) Sieve Analysis on Supplied Aggregate (ASTM C136, C117)
    - (iii) Moisture Content of Aggregate (ASTM C566)
    - (iv) Atterberg-Limits Liquid Limit, Plastic Limit and Plasticity Index of Soils (ASTM D4318-05)
    - (v) Crushed Faces ATT 50
    - (vi) Calculations and Reports
  - 1.2.3.2 Standard Proctor includes:
    - (i) Sampling (ASTM D75)
    - (ii) Moisture-Density Relationship (ASTM D698)
    - (iii) Moisture Content of Aggregate (ASTM C566)
    - (iv) Calculations and Reports
  - 1.2.3.3 Density Testing includes:
    - (i) Density by Nuclear Method (ASTM D2922)
    - (ii) Moisture Content by Nuclear Method (ASTM D3017)
    - (iii) Calculations and Reports
- 1.2.4 Hot Mix Asphaltic Concrete
  - 1.2.4.1 Supply of Aggregate Production includes:
    - (i) Sieve Analysis (ASTM C136, C117)
    - (ii) Moisture Content
    - (iii) Crushed Faces ATT 50
    - (iv) Sand Equivalency (ASTM D2419)
    - (v) Los Angeles Abrasion (CSA A23.2 16A or 17A)
    - (vi) Coating and Stripping (ASTM C1664)
    - (vii) Calculations and Reports
  - 1.2.4.2 Supply of Mineral Filler (ASTM D546, D242)
  - 1.2.4.3 Supply of Asphalt Binder includes:
    - (i) Absolute Viscosity (ASTM D2171)
    - (ii) Kinematics Viscosity (ASTM D2170)
    - (iii) Penetration (ASTM D5)
    - (iv) Flash Point (ASTM D92)
    - (v) Ductility (ASTM D113)
    - (vi) Thin Film Oven Test (ASTM D1754)
    - (vii) Solubility in Trichloroethylene (ASTM D2042)

- 1.2.4.4 Marshall Stability Test includes:
- (i) Sampling (ASTM D979)
  - (ii) Preparation of 3 Marshall Specimens (ASTM D6906-04)
  - (iii) Marshall Stability and Flow of Bituminous Mixtures (ASTM D6927) Each Mold
  - (iv) Unit Weight (ASTM D1188 or D2726) Each Mold
  - (v) Extraction (ASTM D2172) or Ignition Asphalt Content (ASTM D6307, ATT 74)
  - (vi) Sieve Analysis Extracted Material (ASTM C136, C117 D5444 or ATT 26)
  - (vii) Air Voids by Calculation
  - (viii) Voids in mineral aggregate (VMA) calculation
  - (ix) Bitumen Content
  - (x) Asphalt Film Thickness calculation ([VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING](#) or TLT 311)
  - (xi) Reporting
- 1.2.4.5 SGC Hot Mix Asphalt Test includes:
- (i) Sampling
  - (ii) Mix bulk specific gravity, average of two SGC specimens
  - (iii) Asphalt cement content, reported to two significant digits
  - (iv) MTD of loose mix
  - (v) Gradation of extracted mix
  - (vi) Air voids by calculation and by MTD
  - (vii) Voids in mineral aggregate (VMA) calculation
  - (viii) Voids filled with asphalt cement (VFA)
  - (ix) Film thickness calculation ([VOL. 2 SEC. 311, SGC HOT-MIX ASPHALT CONCRETE PAVING](#))
  - (x) Sample time and location
  - (xi) Reporting
- 1.2.4.6 Asphaltic Concrete Density includes:
- (i) Unit Weight (ASTM D2726, D1188)
  - (ii) Compaction Calculation Lift
  - (iii) Air Voids Calculation
  - (iv) Thickness Determination (mm)
  - (v) Reporting
- 1.2.4.7 Coring includes:
- (i) Coring and sampling asphaltic concrete including technician time.  
**Note:** 1 coring unit = 100 mm of core diameter x 1 mm depth
- 1.2.5 Supply of Cold Mix Asphaltic Concrete
- 1.2.5.1 Supply of Aggregate Production includes:
- (i) Sieve Analysis (ASTM C136, C117)
  - (ii) Los Angeles Abrasion (CSA A23.2 16A or 17A)
  - (iii) Crushed Faces ATT 50

- (iv) Atterberg Limits - Liquid Limit, Plastic Limit and Plasticity Index of Soils (ASTM D4318-05)
  - (v) Moisture Content
- 1.2.5.2 Supply of Asphalt Binder includes:
  - (i) Flash Point (Tag Open Cup) (ASTM D3143)
  - (ii) Viscosity, Kinematics (ASTM D2170)
  - (iii) Distillation (ASTM D402)
- 1.2.5.3 Marshall Stability Test includes:
  - (i) Sampling (ASTM D979)
  - (ii) Preparation of 3 Marshall Specimens (ASTM D6906-04)
  - (iii) Marshall Stability and Flow of Bituminous Mixtures (ASTM D6927) Each Mold
  - (iv) Unit Weight (ASTM D1188 or D2726) Each Mold
  - (v) Extraction (ASTM D2172) or Ignition Asphalt Content (ASTM D6307, ATT 74)
  - (vi) Sieve Analysis Extracted Material (ASTM C136, C117 D5444 or ATT 26)
  - (vii) Air Voids by Calculation
  - (viii) Voids in mineral aggregate (VMA) Calculation
  - (ix) Bitumen Content
  - (x) Reporting
- 1.2.5.4 Asphaltic Concrete Density includes:
  - (i) Unit Weight by Nuclear Method (ASTM D2922-05)
  - (ii) Compaction Calculation
  - (iii) Air Voids Calculation
  - (iv) Calculations and Reports
- 1.2.5.5 Coring includes:
  - (i) Coring and sampling asphaltic concrete including technician time.  
**Note:** 1 coring unit = 100 mm of core diameter x 1 mm depth
- 1.2.6 Mix Design
- 1.2.6.1 Cold Mix Design:
  - (i) Mix design shall include all labour, testing and material required to provide the data based on Strathcona County's design criteria. All material sampling shall be conducted by the mix design Consultant.
  - (ii) Liquid asphalt shall be as per indicated by Strathcona County.
  - (iii) The mix design shall follow the Marshall method mix design as outlined in the latest edition of procedure TLT 302 or TLT 303 as appropriate.
- 1.2.7 Density Control
- 1.2.7.1 The test will be as per Alberta Transportation Standard Specifications for Highway Construction, 2013 (3.5.5.6).

### 1.3 FREQUENCY OF TESTING

1.3.1 The following specifies the minimum testing requirements. Where failures occur, additional testing may be required by the Contract Manager/Developer Representative at the Contractor's expense.

#### 1.3.1.1 Test Zone and Material

- (i) Subgrade: Minimum of one density test for every 1,000 m<sup>2</sup> of compacted subgrade. Subgrade Standard Proctor Test is to be performed as required for relationship to field densities.

#### 1.3.1.2 Embankment

- (i) Minimum of one density test for every 2,000 m<sup>2</sup> compacted layers of fill. Standard Proctor Test to be performed as required for relationship to field densities.

#### 1.3.1.3 Pipe Zone and Trenching

- (i) Pipe Bedding: A minimum of one density test within the initial lift of pipe zone bedding for every 100 lineal meters of trench. Standard Proctor Tests on the pipe zone material shall be performed as required for relationship to field densities.
- (ii) Trenching: A minimum of one density test for every 0.5m of depth of trench per 100m in length of trench. Standard Proctor Tests on the trench backfill material shall be performed as required for relationship to field densities.

### 1.3.2 Concrete Curb, Gutter, Walk, Median Crossings

1.3.2.1 Minimum of one test each of strength, slump, and air content for not less than every 60m<sup>3</sup> of each class of concrete placed, but not less than one each day concrete is poured.

### 1.3.3 Granular Base Materials

#### 1.3.3.1 Supply

- (i) Minimum of one test each of gradation, moisture content, crushed faces for every 1,000 tonnes, but not less than one for each day's production. Plasticity index for every 15,000 tonnes, but not less than one for each material source.

#### 1.3.3.2 Granular Base Course Proctor and Density

- (i) Minimum of one density for every 2,000m<sup>2</sup> for grid road or highway projects, or 1000m<sup>2</sup> for urban roads, country residential or hamlets of compacted 150mm lifts of gravel or sand. Standard Proctor Tests to be performed as required for relationship to field densities.

### 1.3.4 Hot Mix Asphaltic Concrete

1.3.4.1 Aggregate production will be tested for gradation and crushed faces and sand equivalency at a rate of not less than one test per 1,000 tonnes of aggregate. Los Angeles Abrasion and coating and stripping, and sand equivalency at a rate of one per each material source.



- 1.3.4.2 The asphaltic binder shall be tested for all the requirements as specified in [VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING](#) or at least once for each paving project.
- 1.3.4.3 Mineral filler shall be tested for grain size at least once for each 5,000 tonnes of mix produced.
- 1.3.4.4 One Marshall Stability Test, one extraction test and sieve analysis of extracted material to be carried out on the Asphaltic Plant mix for each 1,000 tonnes of production, but not less than one each day of production.
- 1.3.4.5 One density and thickness recorded for each 1,000 m<sup>2</sup> for urban residential roads or for each 2,000 m<sup>2</sup> for all other roads.
- 1.3.5 Cold Mix Asphaltic Concrete
- 1.3.5.1 Minimum of one test each of gradation, moisture content, crushed faces for every 1,000 tonnes, but not less than one for each day's production. Plasticity index for every 15,000 tonnes, but not less than one for each material source.
- 1.3.5.2 Asphalt binder shall be tested for the requirements as specified in Strathcona County [VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING](#) or at least once for each cold mix project.
- 1.3.5.3 Two tests for residual asphalt content, air voids, stability and flow shall be conducted for each full day of production.
- 1.3.5.4 When required, one density and thickness recorded for each 2,000 m<sup>2</sup> of cold mix surfacing.
- 1.3.6 Mix Design
- 1.3.6.1 Number of mix designs will be based on requirements by Strathcona County or the general Consultant in consultation with the Geotechnical Consultant on a project by project basis.
- 1.3.7 Density Control
- 1.3.7.1 When requested, the Consultant shall perform tests necessary to establish benchmark data for a control strip (see Alberta Transportation).
- 1.4 MEASUREMENT AND PAYMENT
- 1.4.1 The various tests indicated on the SCHEDULE OF QUANTITIES will be paid for at the fixed fee unit cost or time basis if indicated so on the SCHEDULE OF QUANTITIES. This price and payment shall be full compensation for all personnel, equipment, labour, tools, and incidentals necessary to complete the test and for reporting the test results to the Contractor and Contract Manager/Developer Representative.

For control strip, transportation to site shall be for each project site visited on a per kilometre basis and shall cover the cost of personnel, vehicle, gas, insurance, and any other expense incurred to provide safe transportation to the job site.

All testing required for each control strip of the specified length shall constitute one complete control strip.

## **2.0 SPECIAL TESTING REQUIREMENTS**

### **2.1 SUB-SOIL INVESTIGATION**

#### **2.1.1 Description**

2.1.1.1 Sub-soil investigations will be comprised of auguring or boring at selected locations, sampling, testing, and reporting the geotechnical properties of various soils encountered.

2.1.1.2 The testing agency shall prepare a summary report for each project examined. This report shall contain the agency's recommendations concerning:

- (i) The suitability of each type of soil for subgrade and embankment purposes;
- (ii) The need for special watering or de-watering techniques;
- (iii) Identification of any seepage or water bearing zones and their ramifications;
- (iv) If required, a pavement design using traffic figures supplied by the County;
- (v) Any other details considered pertinent to the proposed construction.

#### **2.1.2 Test Procedures**

##### **2.1.2.1 Auguring and Test Hole Logs and Sample Testing**

A log of each test hole shall include the following information:

- (i) Location of test hole;
- (ii) A profile of the various types of soil and the depths at which they are encountered;
- (iii) A visual description and classification of each type of soil encountered (ASTM D2487);
- (iv) Moisture content profile;
- (v) Free water level.

2.1.2.2 Each type of soil encountered in test holes for a roadway project shall be examined as follows:

- (i) At least one Atterberg Limits test, liquid limit, plastic limit, (ASTM D4318) including plotting the results on the appropriate test hole log;
- (ii) A sieve analysis where non-cohesive soils are encountered (ASTM C136 and C117);
- (iii) Results of a soaked California Bearing Ratio test (ASTM D1883), if required;
- (iv) Water soluble sulphate content, if required;
- (v) A Geotechnical Report will be prepared by the Consultant and summarize above data taken from soil samples (design of pavement thickness or equivalent, if requested).

### 2.1.3 Frequency of Testing

- 2.1.3.1 Testing frequency will be as directed by Strathcona County through consultation with the Consultant.

### 2.1.4 Measurement and Payment

#### 2.1.4.1 Auguring and Test Hole Logs

The unit of measure shall be the actual number of holes at specified depths that the testing agency augers.

Payment at the respective fixed fee unit cost or time basis if indicated so in the SCHEDULE OF QUANTITIES per bore hole shall be full compensation for all equipment, personnel, labour, tools, and incidentals necessary to complete boring, testing, reporting the test results (with pavement thickness recommendations, if requested) to the Contract Manager/Developer Representative in bound report form.

#### 2.1.4.2 Project Testing

The various tests indicated on the SCHEDULE OF QUANTITIES will be paid for at the fixed fee unit cost or time basis if indicated so in the SCHEDULE OF QUANTITIES. This fixed fee unit cost or time basis shall be full compensation for all equipment, personnel, labour, tools, and incidentals necessary to complete the test and for reporting the test results (with pavement thickness recommendations) to the Contract Manager/Developer Representative in bound report form.

#### 2.1.4.3 Analysis of Previous Data

When previous test holes and/or geotechnical data is available by others and the County requests its study or analysis, payment shall fall under the consulting hourly rate SCHEDULE OF QUANTITIES.

#### 2.1.4.4 Pavement Thickness Design

Structural pavement thickness design and recommendation for construction methods and pavement constituents (i.e., subgrade compaction, gravel quantity and quality and asphaltic concrete quantity and quality based on best practice methods) will be paid for on a lump sum basis per project, as identified in the SCHEDULE OF QUANTITIES.

## 2.2 BENKLEMAN BEAM

- 2.2.1 Benkleman Beam Test shall be conducted when directed by Strathcona County.

## 2.2.2 Test Procedures

- 2.2.2.1 When required, pavement deflections will be measured using a Benkleman Beam. Locations will be tested in each travelled lane at 100 m or 150 m intervals as directed by the Contract Manager/Developer Representative. The test locations will be staggered such that stations in one travelled lane are not adjacent to stations in the opposite travelled lane. The agency will also attempt to locate and test any section with obvious deficiencies and keep a separate record of these locations.

The agency will keep an accurate record of test locations, supported with photographs or other means, so that all test locations can be easily identified in the future.

- 2.2.2.2 Equivalent technology such as dynaflect or falling weight deflectometer (FWD) test would be an acceptable alternative.

## 2.2.3 Reporting

- 2.2.3.1 The testing agency shall prepare a summary for each section of roadway examined, including:
- (i) A log of recorded deflections at each station;
  - (ii) A design for an asphalt overlay thickness as outlined in the Asphalt Institute Manual MS-17, including all calculations and assumptions on which the design is based;
  - (iii) Identification of areas exhibiting excessive deflection;
  - (iv) Proposals to correct any deficiencies causing excessive deflection;
  - (v) Any other details considered pertinent to the pavement evaluation.

## 2.2.4 Frequency of Testing

- 2.2.4.1 Testing frequency shall be when directed by Strathcona County through consultation with the Consultant.

## 2.2.5 Measurement and Payment

- 2.2.5.1 The unit of measure for Benkleman Beam testing shall be the actual number of test 3-point deflections conducted by the agency. Payment at the respective fixed fee unit cost or time basis shall be full compensation for all personnel, labour, equipment, tools, and incidentals necessary to complete their test, and reporting the results to the Contract Manager/Developer Representative.
- 2.2.5.2 A separate payment will be made for asphaltic concrete overlay, thickness, quantity and quality design and base repair strategy report. The thickness design report should be based on [SUB-SECTION 2.2.3.1 OF THIS SECTION](#).

## 2.3 SOIL CEMENT TESTS

- 2.3.1 When requested, the Consultant will conduct testing during the production and placement of soil cement or soils with cement added.

## 2.3.2 Test Procedures

## 2.3.2.1 Maximum Density (Standard Proctor)

Maximum density as used in this article is the dry unit mass of sample at optimum moisture content as determined in the laboratory according to ASTM D558 Method B.

## 2.3.2.2 Representative Tests (Density)

A field density test, representing not more than 1,000 m<sup>2</sup> of soil cement, will be taken according to ASTM D2922/D3017 for comparison with a maximum density determined according to ASTM D558 Method B. If a tested density fails, 2 more tests will be taken from the same area and the average of the 3 tests represents that area.

## 2.3.2.3 Compressive Strength

Test Procedure:

- (i) Samples of soil cement are taken at plant or at jobsite;
- (ii) Specimens are moulded on site or in the laboratory into 101.6 mm diameter by 116.4 mm height cylinders using the comp active effort specified in ASTM D558 Method B;
- (iii) Specimens are cured for 7 days to ASTM D1632:9.1;
- (iv) After 7 days curing, specimens are tested for compressive strength to ASTM D1633 Method A.

## 2.3.3 Frequency of Testing

## 2.3.3.1 At least once strength test will be taken per 500 tonnes of mix or one day's production whichever is less.

## 2.3.4 Measurement and Payment

## 2.3.4.1 The unit of measure for soil cement is based on the actual number of tests taken as specified by the ASTM test specification.

## 2.4 HOT IN-PLACE ASPHALT PAVING RECYCLING

## 2.4.1 Where Hot In-Place Pavement Recycling (HIPR) is indicated as a potential pavement rehabilitation strategy, the Consultant will be required to conduct an in-depth evaluation of the proposed project, a mix design if the project is deemed feasible, followed by quality assurance testing during construction.

Five distinct phases of this work are:

- (i) Preliminary feasibility investigation;
- (ii) Determination of existing pavement properties;
- (iii) Mix design;

- (iv) Quality assurance testing;
- (v) Final report.

## 2.4.2 Test Procedures

### 2.4.2.1 Preliminary Feasibility Investigation

This work consists of:

- (i) Benkleman Beam, dynaflect or FWD testing to determine the structural adequacy of the existing pavement;
- (ii) A visual reconnaissance, inspection and evaluation of existing pavement deficiencies;
- (iii) Reporting findings, including a discussion of the viability of HIPR as a pavement rehabilitation strategy.

### 2.4.2.2 Determination of Existing Pavement Properties

This work includes:

- (i) Recovering asphalt concrete pavement cores;
- (ii) Determining the following properties of the existing pavement:
  - Density;
  - Thickness;
  - Asphalt cement content;
  - Aggregate gradation;
  - Penetration of the recovered asphalt cement;
  - Viscosity of the recovered asphalt cement;
- (iii) Identifying deficiencies in the existing mix that need to be addressed by the HIPR mix design and reporting findings and recommendations.

### 2.4.2.3 Mix Design

This work includes:

- (i) Recovering asphalt concrete cores to utilize for the mix design;
- (ii) Determining whether rejuvenator is required; if so, the type and amount;
- (iii) Determining whether admixtures are required; if so, the type and amount;
- (iv) Determining the properties of the proposed mix;
- (v) Report findings and recommendations.

### 2.4.2.4 Quality Assurance Testing

Quality assurance includes testing to determine:

- (i) Coring;
- (ii) Marshall stability;
- (iii) Asphalt density;
- (iv) Asphalt penetration;

- (v) Asphalt viscosity.

#### 2.4.2.5 Final Report

The Consultant will be required to submit a final report that includes:

- (i) A summary of relevant information from prior reports and the results of the quality assurance testing;
- (ii) An evaluation of the effectiveness of the project.

#### 2.4.3 Frequency of Testing

- 2.4.3.1 Frequency of testing shall be as directed by Strathcona County, based on consultation with the Consultant.

#### 2.4.4 Measurement and Payment

##### 2.4.4.1 Preliminary Feasibility Investigation

- (i) Benkleman Beam, dynaflect of FWD testing will be paid for by the actual number of tests conducted as outlined in [SUB-SECTION 2.2 OF THIS SECTION](#).
- (ii) Collecting visual pavement distress information, evaluating the information collected, providing recommendations, and reporting will be paid for on a lump sum basis.

##### 2.4.4.2 Determination of Existing Pavement Properties

- (i) Measurement and payment for recovering asphalt concrete cores will be by the coring unit depth.
- (ii) Measurement and payment for determining existing pavement properties will be based on the number of cores analysed.

##### 2.4.4.3 Mix Design

- (i) Measurement and payment will be on a lump sum basis for designing/optimizing a recycle mix to correct existing pavement deficiencies.
- (ii) Note that the Consultant should include the cost of recovering existing asphalt cores, to utilize for the mix design, in the lump sum price. There is no separate payment for this.

##### 2.4.4.4 Quality Assurance

- (i) Measurement and payment will be based on the actual number of quality assurance tests conducted.

##### 2.4.4.5 Final Report

- (i) Measurement and payment for the final report will be on a lump sum basis for producing ten bound copies of a final report that summarizes: the process; the information collected; the analyses conducted; procedures used; and findings. The report must include an evaluation of the effectiveness of this project and recommendations for future projects.

**2.5 QUALITY ASSURANCE EVALUATION (ASPHALTIC HOT MIX, COLD MIX AND CONCRETE)**

2.5.1 In any given year, Strathcona County completes several projects that are managed in one of two ways: 1) in-house; or 2) with prime Consultants to project-manage, including evaluation of quality assurance tests. The work proposed in this section deals with Strathcona County in-house projects that are managed without prime Consultants. There are four materials (asphaltic hot mix, cold mix, concrete and aggregates production) and in which, when indicated on the SCHEDULE OF QUANTITIES the Geotechnical Consultant will be required to not only conduct the quality assurance tests but also monitor and evaluate and report on the Marshall test results for asphaltic hot mix and cold mix and compressive strength for concrete.

**2.5.2 Procedures**

The Geotechnical Consultant will assign knowledgeable personnel to projects to compile and review test results on a daily basis or as required. Any concerns relating to test results must be reported to the Strathcona County Representative as soon as possible.

**2.5.3 Frequency**

The Consultant will compile and review test results as soon as results are available.

**2.5.4 Measurement and Payment**

Payment will be based on per test result basis for each, asphaltic hot mix, cold mix Marshall review or concrete compressive strength review.

**2.6 PROJECT CONSULTING**

2.6.1 Shall be time spent when requested by Strathcona County, by the Consulting Firm's Project Manager for special problems with respect to soils, granular, or ground penetrating radar interpretation. This time should not overlap with time ordinarily spent on other testing or reporting outlined in the SCHEDULE OF QUANTITIES.

**2.6.2 Procedure**

Consultant to use professional discretion in consultation with Strathcona County.

**2.6.3 Frequency**

As requested by Strathcona County.

**2.6.4 Measurement and Payment**

Payment shall be by the hour for actual time spent on site or in the office working on a "special" problem by the Consulting Firm's Project Manager.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of site protection, erosion control, preparation and restoration in the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative and must follow current Strathcona County Policies.

**2.0 PROTECTION****2.1 UTILITY PROTECTION**

- 2.1.1 Contact all required utility companies prior to commencing work and become informed of exact location of all utilities.
- 2.1.2 Protect utilities during construction and assume liability for damage to utilities. Do final excavation by hand when required by utility company.
- 2.1.3 When existing pipes, ducts or other underground services intersect excavations, support pipe to approval of utility company.
- 2.1.4 When existing overhead line poles are adjacent to excavation, temporarily support them to approval of utility company concerned.
- 2.1.5 Protect existing underground irrigation and drainage lines during construction. Repair all damages. Do final excavation by hand, if needed.

**2.2 EXISTING FEATURES**

- 2.2.1 Protect existing plant material, turf, lawns, buildings, sidewalks, curbs, fences, paved areas and other features against damage.
- 2.2.2 Box or fence existing trees to remain before commencing work, when instructed by the Contract Manager/Developer Representative. Do not remove protection until directed by the Contract Manager/Developer Representative.
- 2.2.3 Do not maneuver heavy equipment within branch spread of trees.

**2.3 DAMAGE AND SETTLEMENTS OF CLAIM**

- 2.3.1 The Contractor shall be liable for any loss or damage to any work in place or to any equipment, supplies, or materials on job site caused by him, his agents, employees, or guests.

## 2.4 BENCH MARKS AND REFERENCE LINES

2.4.1 Establish construction survey and layout and maintain staking throughout construction period.

2.4.2 Protect bench marks and reference lines from damage. Re-establish if disturbed or destroyed.

## 2.5 PERMITS, LICENSES, REGULATIONS, CODES AND INSPECTIONS

2.5.1 The Contractor is obligated to follow all regulations, ordinances, and codes governing the type of work he is doing on the job site. Any permits that are needed for the installation or construction of any work that are required by the authorities of jurisdiction, shall be obtained and paid for by the Contractor following whatever ordinances, regulations, and codes requiring the permits. If the authorities of the jurisdiction require inspections at said points of the installation, the Contractor shall arrange for, and be present at, any such inspections.

2.5.2 In the event that the specifications for the project and existing ordinances, regulations or codes are in conflict, the conflict shall be noted in writing by the Contractor to the Contract Manager/Developer Representative. The Contract Manager/Developer Representative shall take the appropriate steps to rectify the differences.

## 2.6 SAFETY

2.6.1 The Contractor shall provide adequate signs, barricades, signal lights and watchmen and take all necessary precautions for the protection of the work and the safety of the public.

2.6.2 All barricades and obstructions shall be protected at night by signal lights or flares which shall be kept burning from sunset to sunrise. Barricades shall be of substantial construction and shall be painted to increase their visibility at night. Suitable warning signs shall be so placed and illuminated at night as to show in advance where construction, barricades or detours exist. All open excavation will be protected with snow fence if left open overnight.

## 3.0 PREPARATION

### 3.1 VEHICLE ACCESS

3.1.1 Provide and maintain temporary roadways and walkways for vehicular and pedestrian traffic as directed by Contract Manager/Developer Representative.

3.1.2 Minimize disruption to existing building accesses, utility services, traffic movement, parking accommodation and building users.

### 3.2 DEMOLITION

3.2.1 Conform to Municipal LUB and provincial regulations regarding demolition, hauling, dumping, and disposal of materials.

3.2.2 Excavate and dispose of designated asphalt pavement structure, curbs, gutters, sidewalks, commercial crossings, bollards, fences, trees, rubbish and other designated features off site, as directed by the Contract Manager/Developer Representative and in accordance with municipal LUB and provincial regulations.

3.2.3 Mark all cut lines on concrete and asphalt surfaces with chalk line or washable paint, and obtain approval from the Contract Manager/Developer Representative before cutting. Clean surfaces remaining at completion of work.

3.2.4 Cut all asphalt and concrete clean, true, vertical, and free of chips and gouges.

### 3.3 EROSION CONTROL

3.3.1 Permanent or temporary erosion control is required in all areas under construction. Method, application and duration to be determined as site conditions dictate based on approval of Contract Manager/Developer Representative and Strathcona County.

3.3.2 Erosion control to be in accordance with the Design and Construction Standards.

## 4.0 RESTORATION

### 4.1 REPAIRS

4.1.1 Restore and make good any damage to all private and public property, including but not limited to: pavement, concrete, grassed areas, planted areas, and structures damaged or disturbed in any way during construction of work and during maintenance period, all in a manner satisfactory to Contract Manager/Developer Representative.

4.1.2 Restore stockpile sites within or adjacent to contract limits to a "rake clean" condition, acceptable to the Contract Manager/Developer Representative and seed with specified mix if required.

### 4.2 CLEAN-UP

4.2.1 Remove all work material, equipment and excess excavated material from site.

4.2.2 Clean up immediately soil and debris spilled onto pavement and/or concrete.

4.2.3 Leave site in neat, clean condition.

## 5.0 MEASUREMENT AND PAYMENT

5.1 The cost of completing work in this section will not be paid for directly or as a separate item, unless specified otherwise in the SCHEDULE OF QUANTITIES.

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of clearing the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the sections shown on the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative. It shall include but not be limited to removing buildings, structures, utility poles, fences, lumber, trash piles, brush, trees, down timber, weeds and other obstructions and material interfering with or otherwise affected by the proposed work. Salvaging of these materials may be designated by the Contract Manager/Developer Representative.

**2.0 EXECUTION****2.1 GENERAL**

- 2.1.1 The Contractor shall clear each part of the site at times and to the extent required or approved by the Contract Manager/Developer Representative.
- 2.1.2 Wetland drainage and other surface disturbances must be completed prior to April 15 or commenced after September 15 to minimize conflict with wildlife reproduction unless otherwise approved.
- 2.1.3 Tree clearing may be completed prior to April 15 or commence after July 31.
- 2.1.4 Strathcona County Representative must receive written notification of tree a minimum of 96 hours prior to removal.
- 2.1.5 For clearing operations commencing after February 15, the Contract Manager/ Developer Representative must arrange for the areas to be inspected for nesting owls by a qualified professional no more than one week in advance of the start date. If owls are present, clearing must not proceed without notification, to and approval from, Alberta Sustainable Development. Report to be submitted to Environmental Analyst 72 hours prior to tree removal.
- 2.1.6 Underground structures and chambers shall be demolished to the depths shown on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative. They shall be properly cleaned out and filled with suitable material compacted to at least 95% of Standard Proctor Density at optimum moisture content.
- Disused sanitary and surface water drains shall be removed and trenches shall be backfilled with suitable material in layers not to exceed 150 mm in depth and compacted to a minimum of 95% of Standard Proctor Density at optimum moisture content.

- 2.1.7 Trees designated by the Contract Manager/Developer Representative to be left in place and trees that are within 5 m of the project shall be protected as follows:
- (i) Tree dripline within 3 to 5 m of the project: install snowfence at the maximum distance possible from the trees;
  - (ii) Trees dripline within 1 to 3 m of the project: install plywood 10 mm thick, 1.22 m in height enclosing tree; install enclosure at the maximum distance possible from trees;
  - (iii) Trees dripline within 1 m of the project: 102 mm x 102 mm x 1.22 m wooden posts at 305 mm intervals secured vertically around tree trunk with strapping or an equivalent;
  - (iv) The Contractor is responsible for erecting, maintaining, and removing such protection;
  - (v) All equipment, soil, building materials and other debris shall be kept outside the protection area;
  - (vi) Protections to be maintained in clean and safe condition;
  - (vii) In the event the protection is punctured and damage occurs to the tree(s) within the protection, the Strathcona County Arborist shall be advised in order that damage can be assessed and corrective action taken;
  - (viii) Tree removal must not proceed without tree removal plan acceptance by Strathcona County. Where possible, leave trees on private lots; and
  - (ix) Timing of tree removal to be in accordance with Strathcona County's Land Use Bylaw 8.
- 2.1.8 All materials arising from clearing shall be disposed of by the Contractor off the site in a dump to be provided by the Contractor at his expense.
- 2.1.9 Tree parts and residues should be salvaged and disposed of in a productive manner (i.e. lumber production, firewood, wood chip mulch). On site burning is not permitted.
- 2.1.10 Wherever possible, retain surface topsoil from treed areas to be utilized for naturalization of other areas.

**3.0 MEASUREMENT AND PAYMENT****3.1 MEASUREMENT**

- 3.1.1 The unit of measure shall be the lump sum or by the hectare and the quantity paid for shall be the lump sum Contract price or the actual number of hectares acceptably cleared and measured in its original position.

**3.2 PAYMENT**

- 3.2.1 Payment at the respective Contract lump sum price or unit rate per hectare shall be full compensation for clearing, grubbing, protection of designated trees, depositing in dumps all shrubs, trees, stump roots and backfilling and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

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**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this section shall consist of the removal and disposal of existing asphalt or concrete pavements where and as shown on the CONSTRUCTION DRAWINGS.

**2.0 PRODUCTS****2.1 GENERAL****2.1.1 Asphalt Pavements**

Asphalt pavements shall include any asphalt road surface constructed with hot mix asphaltic concrete. Not included under this item are any oiled or tarred surfaces or asphalt pavements encountered below the original ground surface. Asphalt pavement placed on concrete pavement or base shall be included under the removal of the concrete pavement or base.

**2.1.2 Concrete Pavements**

Concrete pavements shall include any Portland cement concrete pavements reinforced or otherwise and also any asphalt surfaced Portland cement concrete pavement or base. Concrete pavement encountered below the ground surface shall not be considered part of this item.

**3.0 EXECUTION****3.1 GENERAL**

- 3.1.1 Disposal shall be to a dump provided by the Contractor at his own expense or to locations as directed by the Contract Manager/Developer Representative.
- 3.1.2 All types of pavement shall be sawn or otherwise cut and carefully removed without damaging the adjacent pavement structure. Adjacent pavement structures or any other work must be undisturbed.
- 3.1.3 The Contractor shall saw-cut or cut with a chisel-type hammer to the full depth of the existing pavement structure, or as directed by the Contract Manager/Developer Representative, to ensure an even edge to the pavement which is to remain.
- 3.1.4 The Contractor shall use all due care necessary to ensure that his operations do not cause the remaining pavement to break or otherwise fail. Failed pavement shall, at the Contractor's expense, be re-sawn, removed and replaced.

**4.0 MEASUREMENT AND PAYMENT****4.1 MEASUREMENT**

- 4.1.1 The unit of measurement for removal of asphalt pavement and concrete pavement shall be the unit contained in the SCHEDULE OF QUANTITIES. The quantity paid for shall be the number of units acceptably removed and disposed of as measured in place by the Contract Manager/ Developer Representative. No extra payment shall be made for multiple layers regardless of the depth.

**4.2 PAYMENT**

- 4.2.1 Payment at the respective Contract price bid per unit shall be full compensation for the sawcutting, removal and disposal of all materials, and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this section shall consist of the removal and disposal of all types of concrete curb, concrete gutter, monolithic concrete curb and gutter, concrete sidewalk and concrete median slabs as shown on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**2.0 EXECUTION****2.1 GENERAL**

- 2.1.1 Disposal shall be to a site arranged by the Contractor at his own expense.
- 2.1.2 Curb and gutter attached to existing concrete base which is to remain, shall be carefully broken out so as not to damage the concrete base.
- 2.1.3 Reinforcing rods which extend into the concrete base shall be left intact and straightened to serve as dowels for widening the existing concrete base.
- 2.1.4 Where directed by the Contract Manager/Developer Representative, indicated in the CONSTRUCTION DRAWINGS or in the SPECIAL PROVISIONS, sawcut the limits of removal on existing concrete to depth necessary to produce a straight clean vertical edge through the full depth of the existing concrete before breaking. Failed edges shall, at the Contractor's expense, be re-sawn, removed and replaced.

**3.0 MEASUREMENT AND PAYMENT****3.1 MEASUREMENT**

- 3.1.1 The unit of measurement shall be the lineal metre for curb and gutter, and square metre for sidewalk and median. The quantity paid for shall be the actual number of lineal metres or square metres acceptably removed and disposed of as measured in place and no deductions shall be made for catch basin or manhole openings.

**3.2 PAYMENT**

- 3.2.1 Payment for the removal of these items at the respective Contract Unit rate bid per lineal metre and square metre shall be full compensation for sawcutting, the removal and disposal as herein required, all labor, tools, equipment and incidentals necessary to complete the work.

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**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this section shall consist of excavation and removal of existing culverts and/or pipes as indicated on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**2.0 EXECUTION****2.1 GENERAL**

- 2.1.1 Carefully remove the culverts and/or pipes in a manner such that no unnecessary damage occurs to the materials.
- 2.1.2 Pile and place the culverts and/or pipes neatly at locations specified by the Contract Manager/Developer Representative.
- 2.1.3 If, in the opinion of the Contract Manager/Developer Representative, the materials cannot be reused, the Contractor shall, at his own expense, dispose of the materials to a dump provided by the Contractor or to locations as directed by the Contract Manager/Developer Representative.
- 2.1.4 All trenches, holes and pits resulting from the removal of miscellaneous structures shall be filled with approved material, placed in layers not exceeding 0.15 m in depth. Each layer shall be thoroughly compacted, by mechanical tamping or rolling, to 100% standard proctor density on areas falling within the limits of the subgrade, and to a density of not less than the density of the undisturbed adjacent soil on areas outside the limits of the subgrade.
- 2.1.5 When directed by the Contract Manager/Developer Representative or at the locations shown on the CONSTRUCTION DRAWINGS, the Contractor shall completely fill existing culverts, starting at the upstream end, with a permanent cementitious fill material with a minimum compressive strength of 0.5 MPa to prevent future collapse of the culverts.
- The filling of the culverts shall be carried out using methods and materials acceptable to the Contract Manager/Developer Representative. The Contractor shall take precautions during filling operations to ensure that no blow outs or disruptions of the existing roadway occur.
- When a replacement culvert is being installed, the replacement culvert shall be in operation before grouting of the abandoned culvert begins.

**3.0 MEASUREMENT AND PAYMENT****3.1 MEASUREMENT**

- 3.1.1 The unit of measure for the removal of culverts and pipes shall be the lineal metre. The quantity paid for shall be the number of lineal metres acceptably removed as measured in place. The measurement for the filling of culverts will be at the unit indicated in the TENDER FORM.

**3.2 PAYMENT**

- 3.2.1 Payment at the respective Contract price bid per lineal metre shall be full compensation for removal and disposal, backfilling and compacting of trenches or voids and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS. Payment for the filling of culverts will be at the rate in the TENDER FORM and shall be full compensation for all labour, materials and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this section shall consist of removal of existing fences as indicated on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**2.0 EXECUTION****2.1 GENERAL**

- 2.1.1 The Contractor shall carefully take down the fence, roll the wire, and pile or place the materials neatly at locations as specified by the Contract Manager/Developer Representative. If, in the opinion of the Contract Manager/Developer Representative, the fencing material cannot be reused the Contractor shall, at his own expense, dispose of the materials to a dump provided by the Contractor or to locations as directed by the Contract Manager/Developer Representative.
- 2.1.2 All holes resulting from the removal of fenceposts shall be filled with approved material, placed in layers not exceeding 0.15 m in depth. Each layer shall be thoroughly compacted, by mechanical tamping or rolling, to 100% proctor density on areas falling within the limits of the subgrade, and to a density of not less than the density of the undisturbed adjacent soil on areas outside the limits of the subgrade.

**3.0 MEASUREMENT AND PAYMENT****3.1 MEASUREMENT**

- 3.1.1 The unit of measure for removal of fences shall be the lineal metre. The quantity paid for shall be the number of lineal metres measured in place.

**3.2 PAYMENT**

- 3.2.1 Payment at the respective Contract price bid per lineal metre shall be full compensation for removal, piling, placing and hauling of the materials, filling and compacting holes, and for all equipment, tools, labour, and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

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**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This section specifies requirements for roadway and other excavation, borrow excavation, topsoil stripping, embankment construction and disposal of material and conforming to lines, grades, dimensions, and typical cross sections shown on plans or established by the Contract Manager/Developer Representative.

1.1.2 Unless otherwise indicated on the CONSTRUCTION DRAWINGS or in the CONTRACT DOCUMENTS the Contractor shall at his own expense make arrangements for the provision of sites for the stockpiling of material, borrowing of material and the disposal of unsuitable and surplus material.

**1.2 DEFINITIONS****1.2.1 Agricultural Land**

Agricultural Land includes any area used for crops, livestock, or forage, regardless of existing land use classifications.

**1.2.2 Soil Layers**

Horizon A – Topsoil: The uppermost part of the soil ordinarily moved in tillage or its equivalent in uncultivated soils and normally ranging in depth from 5 cm to 45 cm. May appear in two distinct layers that should be stockpiled separately.

Horizon B – Subsoil: The soil material found beneath the topsoil but above the bedrock; broadly, the part of the profile below plough depth.

Horizon C – Overburden: The soil material found beneath the subsoil.

**1.2.3 Solid Rock Excavation**

Solid Rock Excavation shall include the removal from their original position of rock in solid beds or masses, and boulders or detached rock having a volume of one half cubic metre content or more; and placing, disposing or stockpiling of the materials as directed by the Contract Manager/Developer Representative.

**1.2.4 Channel Excavation**

Channel Excavation shall include the excavation and placing of material excavated for the improvement of existing water courses, stream diversions and off-set muskeg drainage ditches located parallel to the roadway and not forming the normal contiguous roadway ditch. Excavation for a ditch section, which is adjoining the roadway embankment, shall not be classed as channel excavation.

## 1.2.5 Common Excavation

Common Excavation shall include the excavation and placing of all material not covered by the specifications for solid rock, borrow, borrow topsoil, topsoil stripping, waste and channel excavation.

## 1.2.6 Borrow Topsoil Excavation

Borrow Topsoil Excavation shall consist of the excavation and salvage of topsoil, subsoil and overburden from borrow areas and borrow pit haul roads. Such materials excavated from a stockpile and redistributed on borrow areas and borrow pit haul roads shall also be classified as "Borrow Topsoil Excavation".

## 1.2.7 Borrow Excavation

Borrow Excavation shall consist of the excavation and placing of suitable material obtained from locations outside the right-of-way.

Excavation of roadways, roadway ditches and slopes thereof, in accordance with the CONSTRUCTION DRAWINGS and/or as noted in the SPECIAL PROVISIONS, either inside or outside of the right-of-way, will not be classified as Borrow Excavation.

When the Contract Manager/Developer Representative directs that a roadway excavation be widened from that shown on the CONSTRUCTION DRAWINGS or as noted in the SPECIAL PROVISIONS, for the purpose of obtaining additional material, the material excavated outside the right-of-way will be classified as Common Excavation.

## 1.2.8 Topsoil Stripping

Topsoil Stripping shall include all topsoil stripping other than defined in [SUB-SECTION 3.2.6 OF THIS SECTION](#). Material capable of supporting vegetative growth, suitable for use in top dressing and landscaping.

## 1.2.9 Waste Excavation

Material unsuitable for use in the work or surplus to requirements but not including material classified as "rock excavation".

## 1.3 REQUIREMENT OF REGULATORY AGENCIES

## 1.3.1 Adhere to Municipal, Provincial and Federal Environmental requirements.

## 1.4 TRAFFIC PROVISIONS AND ACCOMMODATION

- 1.4.1 Provide and maintain roadways, walkways, and detours for vehicular and pedestrian traffic and access to fire hydrants. An approved Right of Way Construction Activity Permit (ROWCAP) is required when any type of work is to be conducted on a road or in a road right of way. A Park Access Permit may be required when any type of work is to be conducted in a Strathcona County open space, or when the work requires the Contractor to cross turfed areas owned by the County.
- 1.4.2 The Contractor shall provide and maintain reasonable access to all private property, public property and places of business at all times. When actual construction operations prohibit provision of such access, the Contractor shall notify any residents to be affected by the closure and Strathcona County one week in advance of the closure.
- 1.4.3 In the event of inclement weather, the Contractor shall place a suitable lift of crushed gravel to make the roads passable.
- 1.4.4 The Contractor shall provide all labour, equipment and material necessary to make the roads passable at all times at his own expense.
- 1.4.5 When any travelled roadway is being entered or crossed by equipment, traffic must be controlled by flagperson, and sufficient warning signs to ensure the safety of the public as approved by the Contract Manager/Developer Representative.
- 1.4.6 To avoid the spread of clubroot or other agricultural diseases, the Contractor should avoid using their vehicles or equipment on any Agricultural Land (land that is used for crops, livestock or forage) wherever possible. If it is not possible to avoid using the vehicles or equipment on Agricultural Land, then the vehicles and equipment must be cleaned in accordance with the site-specific Clubroot Management Plan.

## 2.0 PRODUCTS

### 2.1 MATERIALS

- 2.1.1 Embankment materials require approval by the Contract Manager/Developer Representative.
- 2.1.2 Material used for embankment shall not contain organic matter, frozen lumps, weeds, sod, roots, logs, stumps, or any other objectionable matter.
- 2.1.3 In general, topsoil must comply with [VOL. 2 SEC. 602, TOPSOIL AND PLANTING MIX URBAN](#), unless otherwise stated in this Specification. Topsoil must be tested for the presence of clubroot. Topsoil that is confirmed positive with clubroot shall not be imported for use in the County. Pre-existing clubroot-positive soil must be addressed in the site-specific Clubroot Management Plan. Refer to [SUB-SECTION 3.2.1.3 OF THIS SECTION](#) for cleaning requirements.

**3.0 EXECUTION****3.1 GENERAL**

- 3.1.1 A site-specific Clubroot Management Plan suitable for the development must be submitted to Strathcona County for approval prior to construction or development. Special considerations for working with clubroot-positive topsoil stockpiles near rivers, creeks and other waterbodies may be necessary.
- 3.1.2 Trucks must be loaded in such a manner that no spillage occurs at time of loading or during transport, and care must be taken to prevent material being deposited onto improved streets from the wheels of such vehicles.
- 3.1.3 Haul roads must be kept clear and free from dust by grading and watering whenever, in the opinion of the Contract Manager/Developer Representative, conditions warrant this treatment.
- 3.1.4 The cost of repair of any damage caused by construction equipment shall be the responsibility of the Contractor.
- 3.1.5 All excavating and hauling equipment must be equipped with suitable muffling systems.
- 3.1.6 Provide adequate time for the Contract Manager/Developer Representative to make necessary measurements where there is a change in the classification materials.

**3.2 EXCAVATIONS****3.2.1 General**

- 3.2.1.1 Notify the Contract Manager/Developer Representative when material below natural ground level under embankments requires to be excavated.
- 3.2.1.2 Strip topsoil from areas indicated or directed prior to beginning of excavation or embankments. Avoid contamination of topsoil and underlying soil.
- 3.2.1.3 All vehicles and equipment used in contact with topsoil shall be cleaned in accordance with the site-specific Clubroot Management Plan.
- 3.2.1.4 Where the design subgrade surface is in cut and following the excavation and salvage of topsoil and subsoil material, excavation shall be carried out to a depth of 0.6 m below the design subgrade surface, and the excavated material shall be utilized or disposed of as directed by the Contract Manager/Developer Representative. The exposed surface shall be bladed and compacted to 97% Standard Proctor density. The excavated area shall be backfilled using suitable materials placed in successive layers to the required lines and grades.

At the transition point from a cut section to a fill section, excavation shall be carried out to 1.0m below the design subgrade surface or to an elevation determined by the Contractor Manager/Developer Representative, for a distance of 60m in both directions from the transition point. The suitable excavated material shall be used to construct embankments. The exposed surface shall be bladed and compacted to 97% Standard Proctor density, and then backfilled using suitable materials placed in successive layers to the required lines and grades.

The above recommendations are dependent on the materials encountered and the discretion of the Contract Manager/Developer Representative.

- 3.2.1.5 Where the design subgrade surface is in fill and the exposed surface is 0.6m or greater below the design subgrade surface, it shall be bladed, compacted and backfilled using suitable materials placed in successive layers to the required lines and grades.

Where the design subgrade surface is in fill and the exposed surface is less than 0.6m below the design subgrade surface, excavation shall be carried out to 0.6m below the design subgrade surface or to an elevation determined by the Contract Manager/Developer Representative; and the suitable excavated material used to construct embankments. The exposed surface shall then be bladed, compacted and backfilled using suitable materials placed in successive layers to the required lines and grades.

The exposed surface shall be compacted to 97% Standard Proctor density.

The above recommendations are dependent on the materials encountered and the discretion of the Contract Manager/Developer Representative.

### 3.2.2 Solid Rock Excavation

#### 3.2.2.1 Rock Cuts

All rock cuts shall be excavated to below grade and then backfilled to grade with suitable material, as directed by the Contract Manager/Developer Representative. In solid rock cuts, where pockets which will not drain are formed below the design roadway elevation by blasting, the Contractor shall, at his own expense, provide drainage by ditching to a free outlet, as ordered, and backfilling both the pockets and the trench to an elevation 0.30 m below profile grade with broken rock or coarse gravel.

#### 3.2.2.2 Overbreak

Overbreak materials will be considered as that portion of the rock which is excavated, displaced or loosened outside and beyond the slopes or grade as established by the Contract Manager/Developer Representative regardless of whether any such overbreak is due to blasting, to the inherent character of any formation encountered, or to any other cause.

If any rockslide occurs as a result of overbreak, all slide debris will be considered as overbreak.

Overbreak material shall be removed by the Contractor at the direction of the Contract Manager/Developer Representative. Such overbreak material may, as approved by the Contract Manager/Developer Representative, be used to replace material which would otherwise have to be obtained from other sources.

#### 3.2.2.3 Pre-Shearing

Where the Contract Manager/Developer Representative so directs, the Contractor shall pre-shear rock faces to minimize overbreak and produce a stable slope.

#### 3.2.2.4 Trimming Rock Slopes

Slopes undercut at the base, or destroyed in any manner by act of the Contractor, shall be resloped by the Contractor at his own expense to the slope as staked by the Contract Manager/Developer Representative.

In solid rock excavation the slopes must be carefully scaled down, and all rocks and fragments likely to slide or roll down the slopes removed to the satisfaction of the Contract Manager/Developer Representative.

#### 3.2.3 Common Excavation

Material shall be excavated to the extent specified herein and as shown on the plans, or as directed by the Contract Manager/Developer Representative; and shall be utilized for embankment or disposed of as directed by the Contract Manager/Developer Representative.

#### 3.2.4 Waste Excavation

Waste material shall be disposed of to a site provided by the Contractor.

#### 3.2.5 Topsoil Stripping

##### 3.2.5.1 The Contractor shall remove the topsoil and stockpile it separately in accordance with the following:

- (i) The Contractor shall salvage the topsoil, subsoil and overburden in a manner, which prevents contamination of one material with another. A minimum distance of 3m is required between stockpiles of different materials. The materials shall be stockpiled separately in a safe and accessible location as approved by the Contract Manager/Developer Representative.

- (ii) Topsoil may consist of two distinct layers. The blacker layer shall be stockpiled separately from the lower brownish layer. The Contractor shall consult with the Contract Manager/Developer Representative who will determine if separate salvage and stockpiling is required. The Contractor shall suspend the salvage and stockpiling of topsoil and subsoil materials when excessively wet, frozen or other adverse conditions are encountered. These operations shall remain suspended until field conditions improve or the Contract Manager/Developer Representative approves alternate procedures.
- (iii) The Contractor shall maintain erosion and drainage control in the vicinity of all stockpiles to the satisfaction of the Contract Manager/Developer Representative, and ensure that surface drainage does not adversely affect adjacent lands or future reclamation operations.
- (iv) If topsoil is to be stockpiled for periods exceeding six weeks, the stockpiles must be covered to prevent any wind or water erosion or weed growth. Covers may include matting, an approved seed mixture (such as tall fescues and perennial ryegrasses), or other methods approved by the Contract Manager/Developer Representative. Cruciferous/brassica species are not allowed on stockpiles.
- (v) Topsoil stockpiles shall not be located on any Agricultural Lands (land that is used for crops, livestock or forage) if the clubroot testing has confirmed the presence of clubroot.

### 3.2.6 Borrow Topsoil Excavation

All topsoil, subsoil and overburden materials from borrow and borrow haul road areas shall be separately excavated, salvaged, stockpiled and reused in accordance with the requirements for development and reclamation of borrow areas specified in [SUB-SECTION 3.2.7 OF THIS SECTION](#).

### 3.2.7 Borrow Excavation

#### 3.2.7.1 General

The borrowing of materials for embankment will be allowed only after all roadway excavations have been completed and hauled into the embankment, or after all the economic possibilities of obtaining further material by the widening of roadway excavations or ditches have been exhausted.

Borrow areas will be entered only with the approval and permission of the Contract Manager/Developer Representative. They shall be regular in width and, if required, shall be connected with ditches and drained to the nearest watercourse. Particular care shall be taken to work the area so as to cause a minimum of damage and inconvenience to the landowner.

On completion of the Work, borrow areas shall be trimmed and left in a neat and uniform condition, as directed by the Contract Manager/Developer Representative. The Contractor shall not operate or park equipment in the borrow locations outside of the limits of the actual borrow area, haul roads or stockpile sites. Any areas disturbed, compacted or otherwise affected by the Contractor's operations shall be restored to original condition.

Borrow areas will be staked out and cross-sectioned by the Contract Manager/Developer Representative before the Contractor begins work therein. Any material excavated from borrow areas prior to measurement will not be paid for.

The borrow locations as shown on the CONSTRUCTION DRAWINGS may be subject to revisions, additions, or deletions at the discretion of the Contract Manager/Developer Representative. The Contractor shall be prepared to accept such borrow location arrangements as will ultimately be made by the Contract Manager/Developer Representative and shall have no claim against the Contract Manager/Developer Representative on this account.

Changes in borrow locations, as directed by the Contract Manager/Developer Representative, could result in the required use of soil of undetermined characteristics, and may also affect the equipment fleet required to undertake the Work, as well as the quantities associated with the Work.

When the construction of access roads to borrow areas is required, the location and dimensions of the access roads shall be approved by the Contract Manager/Developer Representative.

#### 3.2.7.2 Approval, General Operations and Notification Requirements

The Contract Manager/Developer Representative may obtain the required approval for borrow pit operations associated with the project as shown in the CONTRACT DOCUMENTS. Any excavation operations outside the limits of these approvals or when the Contract Manager/Developer Representative has not obtained approvals, will require the Contractor to obtain all necessary approvals from the local Reclamation Inspector of Alberta Environmental Protection.

The Contractor shall inform the Reclamation Inspector at least ten days before starting:

- (i) Annual pit activities or operations;
- (ii) Any salvage of topsoil or subsoil materials;
- (iii) Any replacement of topsoil or subsoil materials; and
- (iv) Shall ensure that an approval amendment from Alberta Environmental Protection has been obtained prior to making any major changes or revisions that affect the activities and operations described in the original approval or alternately shall ensure that the Reclamation Inspector has given approval to any minor revisions or changes affecting activities and operations and equivalent land capabilities.

Any agreements between the Contractor and the landowner to modify the approved plan shall be in writing and a copy provided to the Contract Manager/Developer Representative and the Reclamation Inspector.



### 3.2.7.3 Conservation of Topsoil, Subsoil and Overburden on Borrow Areas and Stockpile Sites

The Contractor shall excavate, salvage and stockpile the topsoil, subsoil and overburden in a manner, which prevents contamination of one material with another. A minimum distance of 3m is required between stockpiles of different materials. The materials shall be stockpiled separately in a safe, stable, and accessible location as approved by the Contract Manager/Developer Representative.

If topsoil is to be stockpiled for periods exceeding six weeks, or when directed by the Contract Manager/Developer Representative, the Contractor shall protect the stockpile from wind erosion by applying an approved seed mixture or other approved biodegradable soil stabilizer.

If subsoil or overburden is to be stockpiled for periods exceeding three months, or when directed by the Contract Manager/Developer Representative, the Contractor shall protect the stockpile from wind erosion by applying an approved seed mixture or other approved biodegradable soil stabilizer.

The Contractor shall suspend the excavation, salvage, and stockpiling of topsoil and subsoil materials when wet, frozen or other adverse conditions are encountered. These operations shall remain suspended until field conditions improve or the Contract Manager/Developer Representative approves alternative procedures.

The Contractor shall not construct stockpiles at locations where they are subject to erosion. He shall maintain erosion and drainage control in the vicinity of all borrow pits and stockpiles to the satisfaction of the Contract Manager/Developer Representative and shall ensure that surface drainage does not adversely affect adjacent lands, watercourses or future reclamation operations. Consider seeding stockpiles with quickly-germinating species (such as tall fescues and perennial ryegrasses) to establish vegetative cover quickly and prevent erosion. Cruciferous/brassica species are not allowed on stockpiles.

If clubroot is present in topsoil, additional erosion control methods may be required, which may include the use of tackifiers in hydroseed, hydromulch, erosion control blankets or wetting down stockpiles during construction, or a combination thereof, as determined by the site-specific Clubroot Management Plan.

### 3.2.7.4 Reclamation

#### (i) General

The Contractor shall reclaim borrow and borrow pit haul road areas in accordance with the applicable legislation, the approval, the requirements of the specifications and as directed by the Contract Manager/Developer Representative.

Borrow reclamation shall be performed as soon as possible after completion of excavation operations in any borrow area and will not be permitted to be carried over into the year of the next growing season.

Notwithstanding the requirement for expeditious reclamation of borrows, reclamation shall not be carried out if, in the opinion of the Contract Manager/Developer Representative, there is insufficient time left in the season to allow vegetation to root and minimize soil erosion of the reclaimed areas.

(ii) General Reclamation Conditions for Landscape Borrows or Disturbed Areas Around Dugouts, Borrow Haul Roads and Stockpile Sites

Upon completion of the excavation operations, the Contractor shall contour the site to match the surrounding lands and to ensure positive drainage. The entire area shall be scarified to a minimum depth of 0.5 m or to the depth of compaction, whichever is greater, or as directed by the Contract Manager/Developer Representative. Where large clay clumps or ridges are prevalent, discing shall be performed following scarification. All rocks larger than 70 mm maximum dimension shall be removed.

Where overburden has been salvaged, it shall be redistributed uniformly over the entire area and disced as required to break up lumps and level ridges. Overburden material may be used to contour the site, however, subsoil material shall only be used for contouring with the approval of the Contract Manager/Developer Representative. Contouring of lands shall not be performed using topsoil materials.

The Contractor shall replace all soil levels uniformly in lifts in the reverse order that they were removed. The Contractor shall disc each replaced soil layer. No work of any kind shall take place on frozen or wet surface areas.

Topsoil shall be evenly redistributed over the entire area and rocks, roots and stumps removed. Redistribution of topsoil shall only be done in weather, which, in the opinion of the Contract Manager/Developer Representative, is suitable. The Contract Manager/Developer Representative will not allow work to proceed when wind conditions are such that material is being carried beyond the designated work areas or that the material is not being uniformly applied.

In areas where dry soils are encountered, discing and harrowing may destroy soil structure and lead to loss through wind erosion. When these types of areas are encountered, the Contract Manager/Developer Representative shall be consulted to determine alternative procedures for site reclamation.

For those areas of the Province where the topsoil, subsoil and overburden are rocky tills, rock picking will be required to ensure rock content of the reclaimed land does not exceed the rock content prior to disturbance. If rock content prior to disturbance is not known, the Contract Manager/Developer Representative will use adjoining land to determine the extent of rock picking required.

Material salvaged from dugout borrow excavations shall generally not be replaced inside the dugout.

### 3.2.7.5 Seeding of Reclaimed Areas

Unless otherwise directed by the Contract Manager/Developer Representative, the Contractor shall seed reclaimed sites in accordance with [VOL. 2 SEC. 603, SEEDING AND SODDING](#) and the following:

- (i) Areas to be seeded shall be fine graded to a uniform surface and be loose to plow depth at the time of seeding. Such fine grading shall be performed in a manner, which does not affect the distribution of topsoil or result in excess compaction.
- (ii) All disturbed areas resulting in exposed soils within borrow areas and haul roads shall be seeded.

## 3.3 EMBANKMENTS

3.3.1 Where indicated or directed by the Contract Manager/Developer Representative, scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces.

3.3.2 Do not place frozen material or place material on frozen surfaces. Snow or ice shall not be placed in embankments or allowed to be covered up in them.

### 3.3.3 Compaction

3.3.3.1 Place and compact to full width in uniform layers not to exceed 150 mm in depth when compacted.

3.3.3.2 Compact each layer to a minimum 97% of Standard Proctor Density at optimum moisture content. Within the road right-of-way, the upper 300mm shall be compacted in 150mm layers to a minimum of 100% of Standard Proctor Density at optimum moisture content.

When working with soils that have moderate or greater swelling potential, as determined by the Geotechnical Consultant, the moisture content for compaction shall be within a range of optimum to 3% above optimum, or as designated by the Geotechnical Consultant. High plastic clay soils are considered to have moderate to very high swelling potential unless proven otherwise. When working with predominately silt materials, as determined by the Geotechnical Consultant, the moisture content shall be within a range of 3% below optimum to optimum, or as designated by the Geotechnical Consultant.

## 3.4 FINISHING

3.4.1 Shape and compact embankments to within the following tolerances:

3.4.1.1 30 mm vertically

3.4.1.2 100 mm horizontally

3.4.1.3 When tolerances are exceeded, Contractor to correct at his own expense

- 3.4.2 Trim slopes from top to bottom to a uniform slope. Loose material at the bottom of the slope shall be removed or blended into the general work.
- 3.4.3 Remove boulders from cut slopes and fill resulting cavities.
- 3.5 **PROTECTION OF WORK**
- 3.5.1 Damage to compacted layers by construction traffic shall be repaired by the Contractor at his own expense.
- 3.5.2 Maintain crowns and cross slopes to provide good surface drainage.
- 3.5.3 Provide adequate means of trapping silt when discharging temporary drainage systems into permanent drainage systems.
- 3.5.4 Provide where necessary temporary water courses, ditches, drains, pumping or other means of maintaining the earthworks free of water.
- Remove snow and ice from any portion of the work as deemed necessary by the Contract Manager/Developer Representative.
- 4.0 **MEASUREMENT AND PAYMENT**
- 4.1 **GENERAL**
- 4.1.1 Payment at the respective Contract unit rate bid per cubic metre for each class of excavation shall be full compensation for excavating to grade, supplying, loading, separating materials if required, disposing of unsuitable and/or surplus compacting material to be used in embankments and other areas of fill, for adding or removing moisture, for benching or trenching existing slopes against which new fill is to be placed, trimming of slopes, placing spreading and grading material as required in boulevard areas or slopes, traffic control, maintenance of haul roads, stockpiling selected materials and all temporary surface drainage which may be necessary during construction and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.
- 4.2 **SOLID ROCK EXCAVATION**
- 4.2.1 Solid Rock Excavation eligible for payment will be the actual number of cubic metres of solid rock excavated as measured in its original position and accepted and recorded by the Contract Manager/Developer Representative. Payment will be made at the unit prices bid (if any) for the applicable class of excavation, plus an additional payment per cubic metre for "Solid Rock Excavation – Extra Over".

- 4.2.2 Pre-shearing, pre-splitting, line drilling, cushion blasting, perimeter blasting, buffer blasting or any such techniques that may be used for excavation by blasting shall not be paid for separately, but shall be included in the unit price for "Solid Rock Excavation – Extra Over".
- 4.2.3 Overbreak which, with the approval of the Contract Manager/Developer Representative, is used to replace material that would otherwise have to be obtained from other sources, will be paid for on the basis of classification of the replaced material. Any overbreak which is not used to replace other material will not be paid for and shall be removed at the Contractor's own expense. Any additional restoration work required due to overbreak shall be at the Contractor's expense.
- 4.3 CHANNEL EXCAVATION
- 4.3.1 Channel Excavation will be paid for at the price bid per cubic metre for "Channel Excavation", which payment shall be compensation in full for all labour, equipment, tools and incidentals necessary to complete the work prescribed. In the event that material classified as solid rock is encountered in channel excavation, such material will be classified and paid for as solid rock.
- 4.4 COMMON EXCAVATION
- 4.4.1 Common Excavation will be paid for at the price bid per cubic metre for "Common Excavation", includes compensation in full for all equipment, tools and incidentals necessary to complete the work prescribed and will be measured by one of the following methods:
- 4.4.1.1 Cross-sections: volume calculated by average end-area method, measured in its original position.
- 4.4.1.2 Truck Load volume calculated by counting full truckloads and applying the appropriate load factor, each full load deemed to be:
- (i) For Clay, Silt, Topsoil, Peat: 2/3 of the level volume truck box.
  - (ii) For Sand and Gravel: The level volume of the truck box.
- For Truck Load volume measurement the volume of the truck box for each truck shall be physically measured and verified prior to the use of the truck if measurements cannot be made the volume of each individual truck box shall be agreed upon and documented prior to the use of the truck.
- 4.4.2 The excavation and utilization or disposal of existing surface and subgrade materials resulting from obliteration operations will be classified and paid for as "Common Excavation". This payment shall include conditioning of the material as may be required for its satisfactory incorporation into embankment construction, and all work required to complete the restoration of the area except topsoiling.

**4.5 TOPSOIL STRIPPING**

Topsoil Stripping will include the total quantity of topsoil, subsoil and overburden excavated in the construction limits. Topsoil Stripping will be paid for at the price bid per cubic metre for "Topsoil Stripping" measured as per [SUB-SECTION 4.4 OF THIS SECTION](#). Payment shall be compensation in full for the excavation and separate stockpiling of the Topsoil Stripping materials in a location or locations as designated by the Contract Manager/Developer Representative.

**4.6 WASTE EXCAVATION**

Waste Excavation will include the total quantity of material designated as Waste Material. Waste Excavation will be paid for at the price bid per cubic metre for "Waste Excavation" measured as per [SUB-SECTION 4.4 OF THIS SECTION](#). Payment shall be compensation in full for the excavation and disposal to a site provided by the Contractor at his expense.

**4.7 BORROW TOPSOIL EXCAVATION**

Borrow Topsoil Excavation will include the total quantity of topsoil, subsoil and overburden excavated in borrow areas following any clearing and grubbing operation which may be required.

Borrow Topsoil Excavation will be paid for at the price bid per cubic metre for "Borrow Topsoil Excavation", measured as per [SUB-SECTION 4.4 OF THIS SECTION](#). Payment shall be compensation in full for the excavation and separate stockpiling of the excavated borrow materials in a location or locations as designated by the Contract Manager/Developer Representative.

Payment will also be made at the price bid per cubic metre for "Borrow Topsoil Excavation" for the excavation from the separate overburden, subsoil and topsoil stockpiles and the proper redistribution of such materials over the borrow areas. This payment will be full compensation for rock removal, scarifying, redistribution and discing and any other operations necessary to complete the Work to the satisfaction of the Contract Manager/Developer Representative.

If all of the materials from a borrow pit are placed in stockpile and subsequently all redistributed over the borrow area, the measurement for the second operation shall be taken as equal to the quantity originally measured in its original position. If all of the materials are not redistributed over the borrow area, the measurement for the second operation shall be based on measurements of the stockpiles before and after redistribution.

No additional payment will be made for handling material in layers.

#### 4.8 BORROW EXCAVATION

Borrow Excavation will be the quantity of material excavated, measured as specified herein, following the removal of borrow topsoil excavation as directed by the Contract Manager/Developer Representative.

Borrow Excavation will be paid for at the price bid per cubic metre for "Borrow Excavation", measured by one of the following methods:

4.8.1 In place, in embankment calculated by cross-sections taken before and after placement of borrow excavation in embankment.

4.8.2 As per [SUB-SECTION 4.4 OF THIS SECTION](#).

Payment shall be compensation in full for all equipment, tools, and incidentals necessary to complete the work prescribed. Scarifying and trimming of borrow surface and removal of rocks larger than a 70 mm maximum dimension prior to and after the redistribution of topsoil, and the smoothing, trimming, and maintenance of borrow haul roads, will not be paid for directly, but will be considered as incidental to borrow excavation.

Borrow Excavation used in the construction of haul roads to borrow areas, as directed by the Consultant, will be paid for at the price bid per cubic metre for "Borrow Excavation".

Where, upon completion of haul, the material in the haul road is excavated and deposited as directed by the Contract Manager/Developer Representative, the excavation of this material will be paid for at the price bid per cubic metre for "Borrow Excavation", measured as specified herein, which payment shall be compensation in full for required restoration of the borrow haul road areas and disposal areas, including all equipment, tools and incidentals necessary to complete the work prescribed.

When the Contractor has been directed by the Contract Manager/Developer Representative to excavate unsuitable borrow material, including stones or rocks, and not place this material in the embankment, this excavation will be paid for at the price bid per cubic metre for "Borrow Excavation". Subsequent disposal of this unsuitable material, including stones or rocks, as directed by the Consultant, will not be paid for directly, but will be considered as incidental to borrow excavation.

Solid rock, as defined in [SUB-SECTION 1.2.1.1 OF THIS SECTION](#) of this specification, encountered in borrow excavations, where the Contractor has been directed by the Contract Manager/Developer Representative to excavate this material, will be paid for at the price bid per cubic metre for "Solid Rock Excavation", which payment shall be compensation in full for all labour, equipment, tools and incidentals necessary to complete the work prescribed.

The cost of erecting and removing temporary fences associated with borrow areas will not be paid for directly, but will be considered as incidental to borrow excavation.

#### 4.9 EMBANKMENT

The placing, compacting, moisture adjustment and finishing of materials in embankments will not be paid for directly, but will be considered part of the work paid for as excavation of the various classes as designated and measured as specified herein.

##### 4.9.1 Preparation of Existing Ground

The cost of preparing the ground following the excavation of unsuitable material, scarifying and compacting the exposed surface, denuding, and benching of the existing highway embankment slopes, scarifying hillsides, scarifying and compacting existing road embankment to obtain bond, shall be considered as incidental to the work, and no direct payment will be made.

When the subgrade is excavated below design subgrade surface, reconstructed in 0.15m layers and compacted, as directed by the Contract Manager/Developer Representative, the excavation will be paid for at the unit price bid per cubic metre for the class of material excavated.

The required excavation and disposal of unsuitable material encountered in existing roadbeds or encountered in the preparation of the existing ground surface will be paid for at the price bid per cubic metre for "Waste Excavation".

Excavation for benching will not be paid for directly, but shall be considered as incidental to the work.

##### 4.9.2 Rock Materials Used in Embankment

Relatively finer material used for filling the interstices in embankments constructed of rock, concrete or other solid material will be paid for at the applicable unit price bid for the class of material used.

Removal and disposal of rock, concrete, or other solid material from the furnished embankment surface shall be considered incidental to the grading operation and no direct payment will be made.

##### 4.9.3 Compaction

Compaction will not be paid for directly, but shall be considered part of the work paid for as excavation of the various classes as designated and measured as specified herein. Drying wet material will not be paid for directly, but shall be included in the unit price bid for excavation.

##### 4.9.4 Water for Compaction

Water required for moisture content adjustment of embankment materials will not be paid for separately. Payment for supplying, applying, and incorporating water in embankment material will be considered included in the unit prices bid for the various classes of excavation.



## 4.10 OVERHAUL

When the contract contains a bid item for the payment of overhaul on the cubic metre kilometre basis, overhaul will be measured and determined in the following manner:

The number of cubic metre kilometres of overhaul to be paid for will be the product of the number of cubic metres of overhauled material, as measured in its original position, and the overhaul distance in kilometres.

The overhaul distance will be the distance between the centres of mass of the overhauled material in its original position and after placing, less 300m free haul.

The haul distance for roadway excavation will be measured along the centreline of the roadway. The haul distance for material obtained from borrow pits or for material hauled to disposal sites will be measured along the shortest practical route, as designated by the Contract Manager/Developer Representative.

The quantities of overhaul, determined as provided above, will be paid for at the price bid per cubic metre kilometre for "Overhaul", which price and payment shall be compensation in full for all labour, equipment, tools, and incidentals necessary to complete the work.

When the Contract does not include a bid item for the payment of overhaul, the prices bid for excavation shall include full compensation for all overhaul of excavated materials, and no additional compensation will be allowed for such work.

## 4.11 SEEDING

Seeding of reclaimed areas, borrow sites, and rural roads shall be completed, measured and paid for in accordance with [VOL. 2 SEC. 620, RURAL ROAD AND RECLAMATION SEEDING](#). Seeding of urban roads shall be completed, measured and paid in accordance with [VOL. 2 SEC. 603, SEEDING AND SODDING](#).

## 4.12 TOPSOIL PLACEMENT

Topsoil Placement shall be measured paid in accordance with [VOL. 2 SEC. 602, TOPSOIL AND PLANTING MIX URBAN](#) for urban applications and for rural applications, [VOL. 2 SEC. 619, RURAL ROAD AND RECLAMATION TOPSOIL PLACEMENT](#).

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This section specifies requirements for working and compacting the subgrade soil.

**1.2 DEFINITION**

1.2.1 Prepared Subgrade: Soil immediately below a pavement structure or slab compacted to a depth of 150 mm, 300 mm, or as specified. It is the uppermost soil placed on an embankment or fill, or remaining in the bottom of a cut where no replacement fill is needed.

**2.0 PRODUCTS****2.1 MATERIALS**

2.1.1 Use only subgrade soils with no deleterious material approved by the Contract Manager/Developer Representative.

**2.2 EQUIPMENT**

2.2.1 Equipment: Various pieces of equipment designed for and capable of, disking, scarifying, spreading, spraying water, compacting, and trimming soil to specified depth.

**3.0 EXECUTION****3.1 GENERAL**

3.1.1 Loosen soil to designated depth and break down lumps into uniform pieces to avoid compaction planes.

3.1.2 Moisture shall be added or removed as necessary to achieve optimum moisture content.

3.1.3 Spread soil in lifts not exceeding 150 mm when compacted. Compact each lift to the required density in [SUB-SECTION 3.3 OF THIS SECTION](#).

3.1.4 Leave surface of compacted subgrade slightly higher than required elevation. Then trim to designated crown and grade, leaving finished surface free of depressions, humps and loose material.

3.1.5 The surface immediately below the specified depth of subgrade preparation must be bladed and compacted to 97% maximum density. At the discretion of the Contract Manager/Developer Representative, the full depth of subgrade material must be windrowed to the side.

## 3.2 TOLERANCES

3.2.1 Quality Control: Check finished surface of subgrade to ensure it meets the following tolerances:

Grade: 6 mm maximum variation above designated elevation.  
25 mm maximum variation below designated elevation.

3.2.2 When Tolerance Exceeded:

Trim high spots and refinish surface to within tolerance.

Add approved material to low areas, scarify and blend to full subgrade depth, recompact to required density, and refinish surface. Alternatively, compensate low areas with extra thickness of subsequent base course.

## 3.3 DENSITY REQUIREMENTS

3.3.1 Maximum Density: As used in this article, is the dry unit mass of sample at optimum moisture content as determined in the laboratory according to ASTM D698 Method A.3.3.2 Required Density:

Minimum 100% of maximum density for each 150 mm lift of subgrade under pavement structure, asphalt bike trail, curb, gutter, lane, or commercial crossings.

Minimum 100% of maximum density for each 150 mm lift of subgrade under walk, walk ramp, slabs, or private crossing.

Minimum 97% of maximum density for the surface immediately below the specified depth of subgrade preparation.

3.3.3 Testing Frequency: The quality assurance laboratory will take a minimum of one field density test for each 1000 m<sup>2</sup> of compacted subgrade lift according to ASTM D1556, ASTM D2167, or ASTM D2922 for comparison with a maximum density determined according to ASTM D698 Method A.3.3.4 Noncompliance: If a tested density is below the required density, rework the area represented by the failed test to full depth of lift, alter the soil moisture as necessary, and recompact to required density.

## 3.3.5 The Contractor shall assume the risk of uncovering and reworking the subgrade if it is covered before the Contract Manager/Developer Representative has accepted test results thereof.

### 3.4 PROOF ROLLING

3.4.1 Proof rolling is performed to verify the stability and uniformity of the subgrade compaction. This procedure shall be performed in the presence of the Contract Manager/Developer Representative. Actual requirements for representation on the project site for the proof rolling will be site dependent.

#### 3.4.2 Vehicle

- (i) Must be a dual wheel, tandem axle truck, fully-loaded water truck, grader, or other vehicle approved by the Contract Manager/Developer Representative;
- (ii) The tire pressure shall be no less than 90% of the manufacturer's recommended maximum inflation; and
- (iii) The minimum gross weight of the loaded truck shall be 24,000 kg. A weigh scale slip shall be available upon request to confirm the truck weight.

#### 3.4.3 Procedure

The proof rolling vehicle shall be operated at a rate not to exceed 3.0 to 6.0 km/hr, or a comfortable walking pace. Adjust the speed to allow the Inspector/Engineer to measure any deflections and/or areas of rutting.

Operate the proof roll in a pattern so that all areas are loaded with at least one pass of the proof rolling vehicle.

After proof rolling, check the subgrade for conformance to the plans, and correct all surface irregularities. Re-shape the subgrade to specified tolerances.

#### 3.4.4 Evaluation

3.4.4.1 There shall not be any visually discernable rutting or deflection of the subgrade during the proof roll. Any discernable rutting or deflection shall be considered a failure, and will require the subgrade to be reworked and compacted.

3.4.4.2 Excessive rutting and/or deflections must be reviewed by a Geotechnical Engineer who is to provide remedial recommendations as to how to meet density and performance requirements.

3.4.4.3 When remedial work is performed under 3.4.4.2, a final proof roll must be performed upon completion of the work. If remedial work is performed as directed under 3.4.4.1, a second proof roll may be required at the discretion of the Contract Manager/Developer Representative.

### 3.5 PROTECTION OF FINISHED WORK

3.5.1 Do not permit vehicle traffic over the prepared subgrade.

3.5.2 If subgrade floods, drain immediately. Discharge into a municipal facility must be approved by Strathcona County.

- 3.5.3 Maintain protection of prepared subgrade until subsequent subbase or base course is placed. Repair if damaged.

#### **4.0 MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

- 4.1.1 The unit of measurement for the preparation of subgrade shall be the square metre. Unless otherwise stated, the quantity paid for shall be the number of square metres acceptably prepared as shown on the CONSTRUCTION DRAWINGS.

##### **4.2 PAYMENT**

- 4.2.1 Payment at the respective Contract unit rate bid per square metre shall be full compensation for windrowing, scarifying, pulverizing, and compacting the subgrade, drying, or adding water, all temporary surface drainage which may be necessary during construction and repairing subgrade damaged by the weather or Contractor and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

## 1.0 GENERAL

### 1.1 DESCRIPTION

- 1.1.1 The Contractor shall furnish all materials, equipment and labour for the installation of the filter fabric as shown on the plans or as directed by the Contract Manager/Developer Representative.

Installation of filter fabric shall consist of site preparation and placement of the synthetic fabric on the prepared surface.

## 2.0 PRODUCTS

### 2.1 NON-WOVEN GEOTEXTILE

- 2.1.1 Non-woven geotextile include:
- (i) continuous monofilaments or staple filters;
  - (ii) random fibers that are physically entangled by punching with needles;
  - (iii) random fibers that are pressed and melted together at the contact points.

The non-woven geotextile fabric shall meet the following requirements:

Property	ASTM Test	Material Specification <sup>1</sup> Average Roll Value	
		Type B <sup>2</sup>	Type C <sup>3</sup>
Grab Tensile Strength (N)	D4632	650 min	875 min
Grab Tensile Elongation (%)	D4632	50% min	50% min
Mullen Burst (MPa)	D3786	2.1 min	2.7 min
Puncture (N)	D4833	275 min	550 min
Trapezoid Tear (N)	D4533	250 min	350 min
Ultraviolet Stability (% retained strength)	D4355	70% @ 150 hr	70% @ 150 hr
Apparent Opening Size (mm)	D4751	0.2 max	0.2 max
Permittivity (per sec)	D4491	1.5 min	1.2 min
Flow Rate (L/sec/m <sup>2</sup> )	D4491	102 min	102 min
Minimum fabric lap shall be 300mm			

- Note
- 1: All numeric values except A.O.X. represent minimum average roll value as measured in the weaker principal direction;
  - 2: Typically used in medium duty situations such as under Class IM, 1 & 2 riprap
  - 3: Typically used in heavy duty applications such as under Class 3 riprap

### 2.2 WOVEN GEOTEXTILE

- 2.2.1 Woven geotextiles consist of continuous monofilaments, staple fibres, multi-filament yarns or slit files that are woven into a fabric.

2.2.2 Woven geotextiles shall have the following material properties:

WOVEN GEOTEXTILE FILTER FABRIC SPECIFICATIONS AND PHYSICAL PROPERTIES	
Grab Strength	1275 N
Elongation (Failure)	15%
Puncture Strength	275 N
Burst Strength	3.6 MPa
Trapezoidal Tear	475 N
Minimum Fabric Lap to be 1000 mm	

### 3.0 EXECUTION

#### 3.1 CONSTRUCTION REQUIREMENTS

##### 3.1.1 Site Preparation

All vegetation shall be removed to the extent of cutting all trees, tree stumps, and shrubs as close to ground level as possible and removing all cut material and other wood debris from the installation area. Grass, weeds, leaves and fine wood debris which make up the surface mat and the existing root mat should be left in place. All surface depressions, generally greater than 50 cm in depth, should be filled and levelled, however, site inspection will determine the extent of the levelling surface contours.

Site preparation shall be approved by the Contract Manager/Developer Representative before the Contractor begins the placement of filter fabric.

##### 3.1.2 Protection of Filter Fabrics (from UV radiation)

Strength losses in filter fabrics can occur from exposure to ultraviolet radiation for even moderate lengths of time.

The Contractor shall protect the covering on fabric rolls from tearing during handling. The covering should not be removed until immediately before use.

After placement, the fabric should be covered as soon as possible. During a working day, the Contractor shall only place the area of fabric that can be properly covered within the same working day.

##### 3.1.3 Placement of Fabric

Filter fabric shall be placed in a manner to avoid tearing or puncturing by any means and shall make an even, effective contact with the ground surface.



The fabric shall be unrolled in the direction indicated by the Contract Manager/Developer Representative. The method of joining adjacent fabric sections will also be indicated by the Contract Manager/Developer Representative. One of the following methods of joining will be indicated: sewing, pinning, stapling, heat bonding or simple overlapping.

If simple overlapping is to be used, the Contractor shall use a minimum of 50 cm of overlap on joints.

The Contractor shall repair all torn, punctured or separated sections of fabric to meet the approval of the Contract Manager/Developer Representative before placing cover material. All patches used shall be sufficiently large enough to properly cover damaged sections and shall meet the requirements of the indicated method of joining.

#### 3.1.4 Placement of Cover Material

A minimum thickness of 30 cm of cover material shall be applied to the surface of the filter fabric before crossing the area with construction equipment. Equipment should have a low bearing pressure on the soil, thus tracked vehicles are preferred. At no time shall any equipment operate directly on the filter fabric without approval of the Contract Manager/Developer Representative.

Cover material should be spread along the surface of the filter fabric. Dumping of cover material directly over the fabric will not be permitted. The direction of the spreading of material will be indicated by the Contract Manager/Developer Representative.

### 4.0 **MEASUREMENT AND PAYMENT**

#### 4.1 **MEASUREMENT**

- 4.1.1 The unit of measurement for the installation of filter fabric shall be the square metre. The quantity paid for shall be the actual numbers of square metres of filter fabric placed in accordance with this SPECIFICATION.

#### 4.2 **PAYMENT**

- 4.2.1 Payment at the respective Contract unit rate bid per square metre shall cover all costs for the site preparation, supply and installation of the filter fabric.

If, in the opinion of the Contract Manager/Developer Representative, the Contractor has caused tearing, puncturing or separating of fabric sections due to improper handling or construction operations, the costs of repair and patching material for such sections shall be borne by the Contractor.

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This section specifies requirements for asphaltic plant mix, base course and surface course.

1.1.2 The work includes supply and placement of hot mix asphaltic concrete, tack and prime coats.

**1.1.3 Definitions**

1.1.3.1 Mixes are designated according to use as follows:

- (i) Asphalt Concrete Base (ACB): Base course for freeways, arterials, industrial/commercial and collector roadways.
- (ii) Asphalt Concrete Residential (ACR): For paving alleys, local roadways and trails.
- (iii) Asphalt Concrete Overlay (ACO): For paving freeways, arterials, industrial/commercial and collector roadways.

**1.2 MAINTENANCE OF TRAFFIC**

1.2.1 Perform work in a manner that will cause the least disruption to traffic.

1.2.2 Closing of streets, detouring of traffic, posting of traffic signs and provision of flagmen shall be the Contractor's responsibility.

1.2.3 The Contractor must maintain detour roads.

**1.3 MATERIALS TESTING BY THE CONTRACTOR**

1.3.1 Materials supplied by the Contractor shall be tested for compliance with these CONSTRUCTION SPECIFICATIONS by an approved testing agency paid for by the Contractor. No material shall be used until it has been approved by the Contract Manager/Developer Representative.

1.3.2 The Contractor shall submit copies of test data to the Contract Manager/Developer Representative within 24 hours of receiving results.

**1.4 SUBMITTALS BY THE CONTRACTOR**

1.4.1 Asphalt Cement: Submit certified test results in writing with the mix design that the asphalt cement complies with the specifications. This certification shall include, but not be limited to:

- Name of the supplier
- Source(s) of the base asphalt cement(s)
- Type and source(s) of admixture(s)
- Proportions of materials
- Current laboratory test results of the asphalt cement
- Certification statement that the asphalt cement complies with the requirements of this specification.

Certification shall be submitted (1) for a binder used in the design of a job mix formula as part of a submittal, and, (2) during the life of an approved job mix formula.

1.4.2 Mineral Aggregate: Submit one copy of results of each of the following control tests for each class of aggregate to be used:

- (i) Los Angeles Abrasion Test - ASTM C 131
- (ii) Crushed Face Count
- (iii) Specific Gravity and Absorption ASTM C 127 and ASTM C 128
- (iv) Sieve Analysis - ASTM C 136, C 117

1.4.3 Mineral Filler: Submit mill test results and gradation for mineral filler prior to aggregate production in accordance with ASTM D 546, D242.

1.4.4 Mix Design: Submit a mix design for each required asphalt concrete mix type at least 10 days before the start of production and for each subsequent change in supplier or source of materials. No hot mix production can proceed until the applicable mix design and job mix formula have been approved. A previously approved mix design of the required mix type may be accepted if the same materials for which the design was approved are used, provided the job mix formula requirements are satisfied.

1.4.5 Job Mix Formula: Submit with the mix design the proportions of materials and plant settings to include the following.

For Batch Plant:

- Sieve analysis of combined aggregate in the mix.
- Sieve analysis of aggregate in each bin separation to be used.
- Mass of material from each bin for each batch of mix.
- Mass of asphalt in each batch.
- Mixing temperature of asphalt determined from its temperature-viscosity curve.

For Continuous or Drum-Mix Plant:

- Sieve analysis of combined aggregate in the mix.
- Mass of asphalt per tonne of mix.
- Mixing temperature of asphalt determined from its temperature-viscosity curve.
- Settings of aggregate and asphalt feed systems.

1.4.6 Plant Scale Certificates: Submit prior to start of paving.

1.4.7 Quality Control Plan: Before beginning hot mix production, submit a quality control plan including the following recommended tests and frequency for each mix type produced to the Contract Manager/Developer Representative. Make the test results available weekly to the Contract Manager/Developer Representative for review.

Tests Per Sample: 3 Marshall Specimens per test  
Asphalt content  
Air voids

Stability and flow  
Film thickness  
Moisture content in mix  
Gradation in mix  
Plant discharge temperature  
Asphalt storage temperature

Frequency: A minimum of 2 tests per day per mix type in full production

## 1.5 MATERIALS TESTING BY THE OWNER

1.5.1 The Owner will employ a testing agency to do on-site materials testing as the work progresses.

1.5.2 The Contract Manager/Developer Representative and the Owner's testing agency shall have access at all times to all parts of the operation for testing, for verification of weights, temperatures, proportion and character of materials.

## 1.6 QUALITY ASSURANCE

### 1.6.1 Asphalt Cement

1.6.1.1 Quality assurance sampling and testing of the asphalt cement shall be performed by the Contractor, at no cost to the County, to verify compliance to the specification. A sample shall be taken at random during paving operations on County projects from a load(s) delivered to the Contractor's asphalt plant at least twice a month or as directed by the Contract Manager/Developer Representative or the Owner's testing agency. The sample shall be tested by an independent laboratory engaged by the Contractor to verify compliance with the specification requirements as stated in [SUB-SECTION 2.2 OF THIS SECTION](#).

1.6.1.2 Test results shall be reported in writing to the Contract Manager/Developer Representative or the Owner's testing agency by the Contractor. Non-complying test results will be reported to the Contract Manager/Developer Representative or the Owner's testing agency within 24 hours of completion of the test(s). Compliant sample test results shall be submitted in writing to the Contract Manager/Developer Representative or the Owner's testing agency no later than 10 working days after the date of sampling.

1.6.1.3 A test report shall include, but not be limited to:

- Report date,
- Date of sampling,
- Bill of lading number of load sampled,
- Destination of load,
- Report of test results,
- Standard test identifications,
- Specification requirements,
- Statement of compliance, and

- Certification signature.

Failure to comply with quality assurance testing may result in rejection of either the binder, and/or the job mix formula, and/or the associated job mix placed on a project.

- 1.6.1.4 If non-complying material is identified, the paving program may be suspended for 24 hours, as directed by the Contract Manager/Developer Representative, during which time the Contractor and the Contract Manager/Developer Representative will meet to determine the impact of the non-compliance, and specify the necessary remedial action to be taken by the Contractor. Remedial action shall be either acceptance, or acceptance at a pay adjustment, or removal and replacement at no cost to the County. The paving program may continue upon written authorization by the Contract Manager/Developer Representative.
- 1.6.1.5 Production binder identified to be in non-compliance shall not be shipped to a project. Asphalt concrete batched and placed with non-complying binder shall be removed and replaced, as directed by the Contract Manager/Developer Representative, with complying material by the Contractor at no cost to the County.
- 1.6.1.6 Binder substitution in an authorized job mix formula shall not be allowed without prior approval of the Contract Manager/Developer Representative.
- 1.6.1.7 Actual asphalt cement content, in which unit price adjustments will be based on, is defined as the amount of asphalt cement in the mix as determined through the Quality Assurance testing program.
- 1.6.2 Production Mix Analysis: Full Marshall testing will be conducted at a minimum frequency of one Marshall Test for each 1,000 tonnes of hot mix, or a day's production, whichever is less.
- 1.6.3 Job Mix Formula: The quality assurance laboratory will test a trial batch of the job mix formula to verify the mix design. The mix design and job mix formula will not be approved until successful results are obtained. If the initial trial batch fails, submit results of further trial batch tests performed by a qualified independent laboratory.

## 2.0 PRODUCTS

### 2.1 LIQUID ASPHALT

- 2.1.1 Types and grades of liquid asphalt indicated below shall conform to the related properties in [APPENDIX F](#).

Liquid Asphalt Type & Grade	Application Rate L/m <sup>2</sup>	Concentration
Prime Coat MC-30	1.5 ± 0.5	100%
Tack Coat SS-1	0.5 ± 0.2	50%
RC-30/70	0.3 ± 0.1	100%

- 2.1.2 Dilute SS-1 emulsified asphalt with equal amount of water.

## 2.2 ASPHALT CEMENT

- 2.2.1 Premium grade 150-200(A) or 80-100(A), to specifications outlined in [APPENDIX D](#). Or Performance Graded (PG) 58-28, PG 64-28, Polymer Modified PG 76-28 or Polymer Modified PG 70-28 to AASHTO M320, Table 2 (included in [APPENDIX E](#)). For the Polymer Modified PG 76-28 and Polymer Modified PG 70-28 straight asphalt cement shall be modified with SB-type copolymers to reach the specified performance grade. No other modifiers are allowed unless approved in writing by the Contract Manager/Developer Representative.

Note: If using PG asphalt cement, PG 58-28 shall be used in all mixes. Mixes used as an overlay on arterial roadways shall utilize PG 64-28, when specified in the CONTRACT DOCUMENTS.

## 2.3 MINERAL AGGREGATE

### 2.3.1 Mix Types

Designation	1	1	1
Class	25	12.5	12.5
Application	Base (ACB)	Residential (ACR)	Overlay (ACO)

- 2.3.2 Coarse Aggregate: Coarse fractions retained on the 5.0 mm sieve shall consist of hard, clean, durable crushed stone, crushed slag, crushed gravel or a combination thereof or of material naturally occurring in a fractured condition.

- 2.3.2.1 L.A. Abrasion: Coarse aggregate shall not exhibit more than 32% wear (L.A. abrasion test) for all mix classes.

- 2.3.2.2 Crushed Faces: For each mix type, the minimum percentage retained above the 5,000  $\mu$ m sieve, having at least 2 crushed faces shall be as follows, provided there is a minimum 50% crushed face count in each individual sieve size greater than 5,000  $\mu$ m:

Mix Type:	ACB		ACR		ACO	
Minimum 2 Crushed Faces	90%		75%		90%	
Sieve Fraction ( $\mu$ m)	1 Face	2 Face	1 Face	2 Face	1 Face	2 Face
- 25 000 to + 20 000	90	80	-	-	-	-
- 20 000 to + 12 500	90	85	-	-	-	-
- 12 500 to + 10 000	95	90	75	70	95	90
- 10 000 to + 5 000	98	95	85	0	98	95

- 2.3.3 Fine Aggregate: That fraction of the total aggregate passing the 5.0 mm sieve. Fine aggregate shall contain manufactured or crushed fines at a percentage by mass of fine aggregate of as follows:

Manufactured Fines	Base (ACB)	Overlay (ACO)
Minimum	75%	75%
Maximum	100%	100%

- 2.3.3.1 Pit run shall be pre-screened to remove natural sand, and subsequently crushed and screened to obtain manufactured fines.
- 2.3.3.2 The Contractor shall notify the Contract Manager/Developer Representative when production of manufactured fines is scheduled, so that he has an opportunity to inspect the manufacturing process. Failure to notify the Contract Manager/Developer Representative will result in non-approval of the fines for use in asphalt concrete.
- 2.3.3.3 Mineral Filler: Portland cement, fly ash, or ground limestone may be used if necessary to meet grading specifications and if permitted by the Contract Manager/Developer Representative. Mineral filler shall have zero plasticity index and shall meet the following gradation:

Sieve Size (mm)	% Passing by Mass
0.400	100
0.160	90
0.080	70
0.045	62

- 2.3.4 Aggregate Gradation: When tested by means of laboratory sieves the combined aggregates in the mix shall meet the following requirements:

PERCENT PASSING BY MASS		
Sieve Size (mm)	ACB	ACO & ACR
25.000	100	-
20.000	80-95	-
12.500	68-85	100
10.000	60-80	75-90
5.000	40-60	50-70
2.500	30-50	35-50
1.250	25-40	25-40
0.630	20-30	20-30
0.315	15-23	14-23
0.160	9-15	7-14
0.080	4-8	4-8

## 2.4 RECYCLED ASPHALT PAVEMENT

### 2.4.1 Materials

- 2.4.1.1 Reclaimed Asphalt Pavement (RAP): salvaged, milled, pulverized, broken, or crushed asphalt pavement removed from an existing pavement.
- 2.4.1.2 Recycled Asphalt Shingles (RAS): pre-consumer or post-consumer shingles that have been processed, sized, and are ready for incorporation into a hot mix asphalt mixture.



2.4.1.3 Aggregate in Recycled Asphalt Mix: Hot mix asphalt concrete modified as follows:

Mix Type	ACB	ACO	ACR
Designation 1 Class	25	12.5	12.5
Sieve Size	Total % Passing by Mass		
160	9-16	7-14	7-14
80	4-9	3-8	3-8

2.4.1.4 Asphalt Cement: The extracted blended asphalt cement shall meet the requirements as detailed in [SUB-SECTION 2.2 OF THIS SECTION](#).

2.4.2 Mix Design and Proportioning

2.4.2.1 Submit a recycled asphalt mix design to [SUB-SECTION 2.5 OF THIS SECTION](#) for the specified mix type based on the following maximum RAP, RAS, or combination of RAP and RAS content:

RAP/RAS Content	ACB	ACO	ACR
Maximum RAP content if only using RAP in the mix (% by mass of total mix)	25	10	20
Maximum RAS content if only using RAS in the mix (% by mass of total mix)	3	3	3
Maximum RAP and RAS content if using both RAP and RAS in the mix, subject to the above noted individual maximums (% by mass of total mix)	25	10	20

2.4.2.2 Determine asphalt content and gradation of the RAS material for mixture design purposes in accordance with AASHTO T-164, Method A or B and AASHTO T-30. Calculate and ensure the ratio of the virgin binder to total binder is greater than 80% in surface mixtures and 75% in non-surface mixtures. "Surface" mixtures are defined as mixtures that will be final lifts or riding surfaces of a pavement structure. "Non-Surface" mixtures are defined as mixtures that will be intermediate or base layers in a pavement structure.

2.4.2.3 RAS shall contain no more than 0.5% by total cumulative weight of extraneous waste materials including but not limited to, metals, glass, paper, rubber, wood nails, plastics, soil, brick tars, and other contaminating substances. This percentage shall be determined on material retained on the 5.000 mm sieve.

2.4.2.4 RAS shall be free from asbestos fibers.

2.4.2.5 The Contractor shall, with the mix design, furnish PG test results from the virgin binder, the binder extracted from the individual RAP or RAS materials and PG test results indicating that the binder in the mix resulting from the blending of the RAP, RAS, or RAP and RAS materials meets the grade specified in the contract.

### 2.4.3 Asphalt Plant

2.4.3.1 The mixing plant shall be capable of receiving and mixing the proportions of RAP, RAS, virgin aggregate and asphalt cement as designed.

2.4.3.2 The mixing plant shall be capable of thorough degradation and heating of RAP and RAS particles and blending with virgin aggregate and asphalt cement to produce a homogeneous mix at the point of discharge.

## 2.5 MIX DESIGN

2.5.1 Mixes are designated according to use as follows:

2.5.1.1 Asphalt Concrete Base (ACB): base course for freeways, arterials, industrial/commercial roadways and collector roadways.

2.5.1.2 Asphalt Concrete Residential (ACR): paving alleys, local roadways and trails.

2.5.1.3 Asphalt Concrete Overlay (ACO): paving freeways, arterials, industrial/commercial roadways and collector roadways.

2.5.2 The mix design shall be performed by a qualified laboratory possessing a permit to practice under the Engineering and Geoscience Professions Act of Alberta, following the Marshall Method of Mix Design as set out in the latest edition of the Asphalt Institute Manual Series No. 2 (MS-2) to the following criteria:

Criteria	ACB	ACR	ACO
Max size of aggregate, mm	25	12.5	12.5
Number of blows	75	50	75
Minimum stability, kN	6.7	4.5	6.7
Minimum Tensile Strength Ratio <sup>1</sup> , %	75	75	75
Flow value, 0.254 mm unit	6 - 12	8 - 16	6 - 12
Air voids, % of total mix			
Virgin Mix	4.0 ± 0.4	3.0 ± 0.4	4.0 ± 0.4
Mix Containing RAS <sup>3</sup>	3.5 ± 0.4	2.5 ± 0.4	3.5 ± 0.4
Voids filled, % of total mix	67 - 78	73 - 85	68 - 80
Minimum film thickness <sup>2</sup> , µm	6.0	7.0	7.0

Note 1: Minimum Tensile Strength Ratio to be determined in accordance with AASHTO T-283 at air void content of 7.0 ± 0.5%.

Note 2: Minimum film thickness to be determined to method outlined in [APPENDIX B](#).

## 2.6 JOB MIX FORMULA

2.6.1 Submit with the mix design the proportions of materials and plant settings to include the following:

### 2.6.1.1 For Batch Plant

- (i) Sieve analysis of the combined aggregate in the mix.
- (ii) The sieve analysis of aggregate in each bin separation to be used.
- (iii) The mass of the material to be used from each bin for one batch of mix.

- (iv) The mass of asphalt to be used in each batch.
- (v) The mixing temperature of the asphalt as determined from the temperature-viscosity relationship for the asphalt.

#### 2.6.1.2 For Continuous or Drum-Mix Plant

- (i) Sieve analysis of the combined aggregate in the mix.
- (ii) Mass of asphalt per tonne of mix.
- (iii) The mixing temperature of the asphalt as determined from the temperature-viscosity relationship for the asphalt.
- (iv) Settings of aggregate and asphalt feed systems.

2.6.2 Do not make changes to the approved job mix formula without written approval from the Contract Manager/Developer Representative. Display the currently approved job mix formula in clear sight of plant operator. Failure to display the job mix formula will result in a plant shutdown order by the Contract Manager/Developer Representative.

### 3.0 EXECUTION

#### 3.1 EQUIPMENT

3.1.1 Asphalt Mixing Plant: Conforming to ASTM D995, capable of consistently producing a homogeneous mixture in which all aggregate particles are uniformly and thoroughly coated with asphalt, and meeting the following supplementary requirements:

3.1.1.1 Plant production shall not proceed unless all plant scales have been certified by Weights and Measures, Canada Consumer and Corporate Affairs prior to start of construction season. Provide copies of the certificates to the Contract Manager/Developer Representative.

3.1.1.2 Provide free and safe access for the Contract Manager/Developer Representative to verify the proportions, settings, temperatures, and to take samples of asphalt, aggregate, and mixture.

3.1.1.3 All asphalt paving plants are required to be operated in accordance with Alberta Environmental Protection Code of Practice. All Contractors operating asphalt plants shall provide proof of registration with Alberta Environmental Protection and agree that the asphalt plant shall be operated in accordance with the Code of Practice.

3.1.2 Pressure Distributor: Self-powered, equipped with tachometer, pressure gauge, adjustable length spray bar, positive displacement asphalt pump with separate power unit, heating coils and burner for even heating of asphalt, thermometer; capable of maintaining a uniform speed and uniform application of liquid asphalt at designated rate to surface widths up to 4m; equipped with nozzle capable of hand spraying a uniform application of liquid asphalt.

3.1.3 Trucks for Transporting Mix: Compatible with size and capacity of paver; with clean, tight smooth-sided boxes equipped with waterproof tarpaulins of sufficient size to cover securely all material when boxes are fully loaded; side of box to have a 12 mm diameter hole 300 mm from bottom for checking mix temperature.

- 3.1.4 Paver: Self-propelled; with automatic screed controls to maintain grade from a reference string line and to control cross fall, smoothness and joint matching; with vibratory screed equipped with vibratory extensions and augers capable of uniformly spreading the mixture to specified widths and depths without segregation or tearing. Follow the manufacturer's recommended operating procedures.
- 3.1.5 Rollers: Self-propelled, reversible; static steel-tired or pneumatic-tired rollers, or vibratory rollers; with wetting and scraping devices to prevent adhesion of mix to drums or tires (petroleum derivatives not permitted for cleaning); capable of attaining required density and smoothness; pneumatic-tired rollers to be equipped with wind skirts. Follow the manufacturer's recommended operating procedures.
- 3.1.6 Hand Tools: Rakes, lutes, tampers, straightedge, level and others as necessary to complete the work.
- 3.2 AGGREGATE IN STOCKPILE
- 3.2.1 Stockpile aggregate in horizontal lifts. Stacking conveyors are not allowed for stockpiling. Draw aggregate from stockpile in a manner that mixes the full depth of stockpile face.
- 3.2.2 When it is necessary to blend aggregates from one or more sources to produce the combined gradation, stockpile each source of aggregate individually. Do not blend aggregates in stockpile; feed through separate bins to the cold elevator feeders.
- 3.3 PRODUCTION OF THE MIX
- 3.3.1 Reference Practice: Follow good practices in handling materials and in plant production of hot mix as set out in the latest edition of the Asphalt Plant Manual, Asphalt Institute Manual Series No. 3 (MS-3), except where inconsistent with these CONSTRUCTION SPECIFICATIONS.
- 3.3.2 Production Rate: Produce hot mix at a rate compatible with the rate of placement and compaction on the job.
- 3.4 GOOD PAVING PRACTICE
- 3.4.1 Refer to the latest edition of the Asphalt Institute Manual Series No. 22 (MS-22), Construction of Hot Mix Asphalt Pavements, for guidance in good practices of handling materials and hot mix production insofar as consistent with these CONSTRUCTION SPECIFICATIONS.
- 3.4.2 Provide an experienced foreman who shall be in full time attendance on the paving site to take charge of the entire paving operation from transporting of mix to final rolling.

### 3.5 BASE PREPARATION

- 3.5.1 The Contract Manager/Developer Representative will inspect the base or subbase before paving. The Contractor shall repair imperfections and cleanup. Surface shall be true to line and grade within tolerance, firm, dry and free of loose and foreign matter.
- 3.5.2 Catch basins, manholes, water valves, and other fixtures shall be brought to proper grade before the final lift. Provide temporary protection where necessary until completion of paving.
- 3.5.3 Apply tack coat to surfaces intended to contact hot mix, including the sides of gutter, catch basin, manhole and other concrete and metal fixtures. Before placing hot mix, let tack coat completely cure and have tacked surfaces inspected by the Contract Manager/Developer Representative. Refer to [SUB-SECTION 2.1 OF THIS SECTION](#).
- 3.5.4 Multiple Lift Paving: Apply tack coat to previous lift before laying the next lift, unless permitted otherwise by the Contract Manager/Developer Representative. Clean surface before tacking.
- 3.5.5 Preparation for Overlay or for Succeeding Stage Paving:
- 3.5.5.1 Sweeping and Cleaning: Sweep the existing pavement surface with an approved mechanical sweeper. Remove all residual debris and foreign matter accumulations.
- 3.5.5.2 Surface Milling: If specified, grind the existing surface to specified depth. Refer to [VOL. 2 SEC. 305, SURFACE MILLING](#).
- 3.5.5.3 Tack Coat: Do not apply tack coat unless surface is dry and free of dust and any other matter that could reduce the bond. Refer to [SUB-SECTION 2.1 OF THIS SECTION](#).
- 3.5.5.4 Prime Coat: Blot up excess primer with sand and keep traffic off the primed area until the primer has been completely absorbed and set.
- 3.5.5.5 Asphalt Levelling Course: The Contract Manager/Developer Representative will designate those areas having 25 mm or more depressions for levelling course application. Spread the levelling course of hot asphalt mix with a paver to one lift at a time, not exceeding 75 mm compacted thickness, and compact to required density.

### 3.6 WEATHER LIMITATIONS

- 3.6.1 The following restrictions apply, unless waived by the Contract Manager/Developer Representative:
- 3.6.1.1 No paving when rain or snow is imminent, or when surface to be paved is wet, icy or snow-covered, **or frozen at any point within 150 mm of the surface**.
- 3.6.1.2 No paving when air temperature and wind speed conditions are below the applicable mat curve in [APPENDIX G](#).

### 3.7 TRANSPORTATION OF MIXTURE

3.7.1 Haul vehicles shall comply with the Alberta Highway Traffic Act and Alberta Motor Transport Act and have Alberta Class 1 Registration. **Transport the mixture in approved trucks with protective covers properly secured to the sides and back of the truck box so that no funneling air movement develops under the cover during hauling.**

3.7.2 Before loading with hot mix, thoroughly clean the box of any accumulation of asphaltic material. Lubricate inside surfaces with a light coating of soap, detergent solution, or an approved release agent. Petroleum derivatives are not permitted.

3.7.3 Maintain trucks clean of mud and other matter that could contaminate the paving area.

3.7.4 Discharge hot mix into the paver hopper without spilling and without the truck box bearing down on the hopper.

3.7.5 If the unit for payment is tonnes, no payment will be made for asphalt tonnage unless the Contract Manager/Developer Representative is provided with a copy of the corresponding asphalt mix load ticket immediately upon delivery on site.

### 3.8 SPREADING

3.8.1 Placing the mixture shall be a continuous operation with the paver moving at a uniform speed compatible with the rate of compaction rolling.

3.8.2 Spreading temperature of mix: from 125°C to 150°C as measured in the truck just before discharge.

3.8.3 Spread hot mix uniformly in one or more lifts, or as directed by the Contract Manager/Developer Representative, to depths sufficient to obtain the following minimum and maximum compacted thicknesses:

Mix Type	Minimum (mm)	Maximum (mm)
ACR	40	75
ACO	40	75
ACB	65	125

3.8.4 Segregation: If segregation of mix material occurs, the Contract Manager/Developer Representative will immediately suspend spreading until the cause is determined and corrected.

3.8.5 Prior to roller compaction, remove flat spots, sandy accumulations, high and low spots, and other irregularities and repair with hot mix. Scratch surface with rake tines to ensure bonding of added mix. Do not broadcast onto the mat loose material that has been raked off.

- 3.8.6 Any piece of machinery causing the spillage of fuel oil, lubricating oil or hydraulic oil onto the surface prior to laying or onto the finished surface shall be removed from the work. Any areas of base or surface course affected by the spillage will be cut out and replaced as the Contract Manager/Developer Representative shall direct and at the Contractor's own expense.
- 3.9 HAND SPREADING
- 3.9.1 Hand spread mix in small areas not accessible to paver, and where permitted by the Contract Manager/Developer Representative.
- 3.9.2 Do not broadcast material. Hand place carefully to avoid segregation of coarse and fine aggregate. Use lutes and rakes to thoroughly loosen and uniformly distribute the mix. Remove lumps that do not break down readily.
- 3.9.3 Heat hand tools enough to keep them free from sticking asphalt. Do not overheat as to burn mix material.
- 3.9.4 Before rolling, check surface with template or straightedge, and correct irregularities.
- 3.10 COMPACTION
- 3.10.1 Compact the asphalt mat with rollers in good working order and operated by competent operators. Use the number, type and mass of rollers adequate to obtain required compaction and compatible with the rate of hot mix placement.
- 3.10.2 Develop and follow the best pattern of rolling to obtain the most uniform compaction across the mat including joints and edges. Indicate the rolling pattern to the Contract Manager/Developer Representative when requested.
- 3.10.3 Perform compaction rolling with rollers following the paver as closely as possible, until required density is obtained. Perform finish rolling to eliminate equipment marks and to achieve a surface with a uniform tightly knit texture.
- 3.10.4 **Complete final rolling before the mat temperature reaches 80°C.**
- 3.10.5 For small areas inaccessible to rollers, use an approved vibratory plate compactor or hand tamper to thoroughly compact the mix. **Minimal amounts of water may be sprayed on the asphalt surface to aid compaction with plate compactors or hand tampers.**
- 3.10.6 If mat is difficult to roll, redesign the mix and obtain the Contract Manager's/Developer Representative's approval of trial batch before resuming paving.

### 3.11 JOINTS

#### 3.11.1 Transverse Joint:

3.11.1.1 Plan length of spread to provide for a minimum 1 m offsetting of transverse joints in successive lifts and adjacent mats.

3.11.1.2 A transverse joint shall be straight, have a vertical face painted with tack coat before butted with fresh mat, be thoroughly compacted, and meet surface tolerances.

#### 3.11.2 Longitudinal Joint:

3.11.2.1 Plan mats so that the surface longitudinal joint will be offset not more than 150 mm from the indicated marking line between travel lanes. If permitted by the Contract Manager/Developer Representative, the joint may be located at the centre of travel lane.

3.11.2.2 Plan width of spread to provide for a minimum 150 mm offsetting (in a dovetail pattern) of longitudinal joints in successive lifts.

3.11.2.3 Create a longitudinal joint while the first of two adjacent mats is above 80°C. Allow 25 to 50 mm overlap between mats. This may be accomplished by multiple pavers in staggered formation, or by limiting paver advance to the following when weather limitations in [SUB-SECTION 3.6 OF THIS SECTION](#) do not apply.

Air Temperature °C	Maximum Advance (m)
Above 27	250
15 – 27	190
7 – 15	125
Below 7	90

3.11.2.4 Do not roll the 150 mm wide strip along edge of first mat until adjoining mat is placed. Roll the joined mat immediately to ensure bonding while the joint temperature is above 80°C.

3.11.2.5 For all lifts on freeways, arterial roadways, industrial/commercial and collector roadways, carefully roll off the edge of a mat if a minimum joint temperature of 80°C cannot be maintained prior to the placement of the adjacent mat. Trim off the rolled asphalt to a width of 150 mm resulting in a clean vertical face to the full depth of the mat. Paint the exposed face with tack coat to [SUB-SECTION 2.1 OF THIS SECTION](#) prior to placing the adjacent mat.

3.11.2.6 Should this longitudinal joint treatment not be performed where required, the area of asphalt pavement will be assessed a pay factor of 95%. This pay factor will be applied to the price of the total quantity of asphalt placed in the mat area.

3.11.2.7 A longitudinal joint shall be thoroughly compacted and shall meet surface tolerances.



### 3.12 MIX PRODUCTION TOLERANCES

3.12.1 Mixing Temperature: Allowable variation from design mixing temperature shall be + 9°C.

3.12.2 Asphalt Cement Content: Allowable variation from approved design asphalt cement content shall be  $\pm 0.3\%$  by mass of mix. Unit price adjustments for high or low asphalt cement contents can be found in [APPENDIX C](#).

3.12.2.1 In the event of a deficient asphalt cement content result, the following asphalt cement content appeal mechanism will be allowed by the Contract Manager/Developer Representative and shall be paid for by the Contractor.

- The original core location shall be confirmed by the Quality Assurance agency.
- The Contractor will then be allowed to re-core for determination of asphalt cement content. The re-coring (which may require multiple cores to obtain the required quantity of materials for a re-test) will be taken from the mat representing the original test within 10 m on either side of the original test location. Only a single test is required for verification process.
- The asphalt cement content test result from the re-core will supersede the original QA result.
- If the asphalt cement content of the re-core is within the penalty range the penalty will be calculated in accordance with [APPENDIX C](#) for the quantity of asphalt represented by the test. No further re-coring is allowed.
- If the asphalt cement content of the re-core is in the "grind and resurface" range, additional cores will be taken at equal distances on either side of the original core and tested for asphalt cement content. This process is to be repeated until locations on either side of the re-core identify asphalt within specification. The spacing is at the discretion of the Contractor.
- Once the area of asphalt to be "ground and resurfaced" is identified, the area inclusive of the last core used to delineate the deficient area shall be ground and resurfaced to the satisfaction of the Contract Manager/Developer Representative.

3.12.3 Aggregate Gradation: Tolerances in aggregate extracted from the approved job mix gradation:

Sieve Size (µm)	% Passing by Mass	
	Individual Sample	Average of Last 3 Samples
20,000	$\pm 5.0$	$\pm 3.0$
12,500	$\pm 5.0$	$\pm 3.0$
10,000	$\pm 5.0$	$\pm 3.0$
5,000	$\pm 5.0$	$\pm 3.0$
2,500	$\pm 4.0$	$\pm 2.5$
1,250	$\pm 4.0$	$\pm 2.5$
630	$\pm 3.0$	$\pm 2.0$
315	$\pm 3.0$	$\pm 2.0$
160	$\pm 2.0$	$\pm 1.5$
80	$\pm 1.5$	$\pm 1.0$

3.12.4 Air Voids: For each mix type, the air voids shall not exceed the following tolerances:

Air Voids	ACB	ACR	ACO
% of total Mix – Virgin Mix	4.0 ±1.0	3.0 ±1.0	4.0 ±1.0
% of total Mix – Mix Containing RAS	3.5 ±0.5	2.5 ±0.5	3.5 ±0.5

3.12.5 Minimum Film Thickness in Mix (to be determined by method outlined in [APPENDIX B](#)):

Film Thickness	ACB	ACR	ACO
Minimum Film Thickness, µm	6.0	7.0	7.0

3.12.6 Voids Filled in Mix:

Voids Filled	ACB	ACR	ACO
Voids Filled, %	67 - 78	73 - 85	68 - 80

3.12.7 Nonconforming Mix: If one or more of the preceding mix production tolerances are exceeded, the Contract Manager/Developer Representative will order suspension of mix production until the Contractor has demonstrated to the Contract Manager's/Developer Representative's satisfaction that corrective measures have been taken to produce a mix that meets these CONSTRUCTION SPECIFICATIONS. The Contract Manager/Developer Representative will also require the Contractor to remove the nonconforming mix from the roadway at the Contractor's cost.

### 3.13 SURFACE TOLERANCES

3.13.1 Smoothness: Maximum variation under 3 m straightedge as follows:

- (i) Longitudinal in direction of travel: 3 mm
- (ii) Transverse to direction of travel: 6 mm

3.13.2 Grade: ±6 mm maximum variation from designated grade elevations.

3.13.3 Texture: Finished surface shall have a tightly knit texture free of visible signs of poor workmanship such as, but not limited to:

- (i) Segregation.
- (ii) Areas exhibiting excess or insufficient asphalt.
- (iii) Improper matching of longitudinal and transverse joints.
- (iv) Roller marks, cracking, or tearing.

3.13.4 If surface and grade tolerances are exceeded, or if surface texture is not met, grind down and resurface defective areas as directed by the Contract Manager/Developer Representative.

### 3.14 THICKNESS TOLERANCE

3.14.1 The quality assurance laboratory will take a minimum of one core per 1,000 m<sup>2</sup> of asphalt pavement and determine the thickness of the mat, for each stage of paving.

- 3.14.2 A thickness deficiency at the completion of the first stage of paving may be accepted by the Contract Manager/Developer Representative provided the deficiency is less than 12 mm and the deficient thickness can be included in the subsequent stage of paving.
- 3.14.3 If the initial core thickness is deficient at the completion of the final lift of paving, that initial thickness is discarded, and 3 new cores will be taken within 10 m of the original core location at a minimum spacing of 2.5 m between cores. The average thickness of the 3 new cores represents that area. All costs for recoring are the responsibility of the Contractor.
- 3.14.4 Deficient Thickness: If the average core thickness is deficient, that area of asphalt pavement will be assessed a pay factor according to [APPENDIX C](#) to be applied to the price of the quantity of hot mix in that mat area placed with the current stage of paving.
- 3.14.5 Asphalt pavement with excess thickness may be accepted if surface and grade tolerances and texture are met, but no additional payment is due.
- 3.15 DENSITY
- 3.15.1 Required Density: Each mat of hot mix placed shall be compacted to the following minimum density (% of Marshall density) according to type of pavement, or as indicated in the SPECIAL PROVISIONS.
- 98% New Construction, all lifts in staged paving for freeways, arterials, industrial/commercial roadways, residential collector roadways and local roadways, asphalt walkway/bikeway, alley/lane paving
- 97% Rehabilitation Overlay 40mm thick or more
- 96% Rehabilitation Overlay less than 40 mm thick
- 3.15.2 Sampling and Testing: The quality assurance laboratory will:
- 3.15.2.1 Take samples of hot mix at jobsite and test for density of laboratory compacted Marshall specimens.
- 3.15.2.2 Drill cores from compacted mat placed from same load of hot mix from which Marshall specimens were taken, and representing 1,000 m<sup>2</sup> or from suspect compacted mat, and test for density.
- 3.15.3 Basis of Acceptance: Pavement compaction will be accepted on the basis of the ratio (in percent) of the core density to the density of Marshall specimen. If cores were drilled from mat where no Marshall specimen was taken, acceptance will be based on the ratio of core density to the average density of all Marshall specimens to date.

- 3.15.4 Number of Cores: A single core is initially taken representing 1,000 m<sup>2</sup> of mat or a day's production, whichever is less. If the initial core density is below specified, that initial density is discarded, and 3 new cores will be taken within 10 m of the original core location at a minimum spacing of 2.5 m between cores. The average density of the 3 new cores represents that area. All costs for recoring are the responsibility of the Contractor.
- 3.15.5 Pay Factors: If the average core density is below specified, the represented area of mat may be accepted subject to a pay factor according to [APPENDIX C](#) to be applied to the price of the quantity of hot mix in that mat area.
- 3.16 TOLERANCES FOR PAYMENT BY THE TONNE
- 3.16.1 Where asphaltic concrete is measured and paid for by the tonne, the Contractor shall determine the application rate required to yield the design tonnage.
- 3.16.2 Monitor the actual application rate during paving operations and make adjustments when necessary to ensure conformance to the quantity specified in the SCHEDULE OF QUANTITIES.
- 3.16.3 No payment shall be made for overruns in excess of 5% of the specified tonnage unless previously authorized by the Contract Manager/Developer Representative.
- 3.16.4 Both thickness and density requirements as stated above in [SUB-SECTIONS 3.14](#) and [3.15 OF THIS SECTION](#) shall apply.
- 3.17 CLEANUP
- 3.17.1 Leave site clean and free of debris and surplus materials.
- 3.17.2 Opening to Traffic: Open new pavement to traffic when surface has cooled to ambient temperature and when authorized by the Contract Manager/Developer Representative. Remove barricades and signs no longer needed.
- 4.0 MEASUREMENT AND PAYMENT
- 4.1 MEASUREMENT
- 4.1.1 Asphalt Surface or Overlay: Measured by the square metre if the compacted thickness is specified, or by truck haul cards if the tonnage is specified; for mix types as indicated in the SCHEDULE OF QUANTITIES.
- 4.1.2 Asphalt Base: Measured by the square metre at a specified compacted thickness for mix types, as indicated in the SCHEDULE OF QUANTITIES.

## 4.2 PAYMENT

- 4.2.1 Payment at the unit rate bid shall be full compensation for designing the mix; supplying, testing, and mixing the mineral aggregate, asphalt cement, and filler; for hauling the mix from the plant to the jobsite; for cleaning the base; tacking or priming the base; spreading and compacting the mix; cleaning up the site; controlling traffic; and for all labour, equipment, tools and incidentals necessary to complete the work in accordance with these CONSTRUCTION SPECIFICATIONS, less any deductions for deficiencies.

## APPENDIX A: MARSHALL IMMERSION TEST

### A1 GENERAL

#### A1.1 DESCRIPTION

- .1 This is a test method involving the measurement of loss of Marshall stability resulting from action of water on compacted asphalt paving mixtures containing penetration grade asphalt cement.
- .2 Numerical index of reduced stability is obtained by comparing the stability of specimens determined by the usual Marshall procedure with the stability of specimens that have been immersed in water for a prescribed period.

#### A1.2 REFERENCE

- .1 Perform testing according to ASTM D1559-82 as modified below.

### A2 PRODUCTS

#### A2.1 MATERIALS

- .1 Representative samples of each asphalt paving mixture.

#### A2.2 APPARATUS

- .1 One or more water baths with automatic controls for immersing specimens. Baths normally used for Marshall test are suitable for this purpose.
- .2 Scale and water bath with suitable accessory equipment for weighing test specimens in air and in water to determine their densities.
- .3 Supply of flat transfer plates of glass or metal. One plate must be kept under each specimen during the immersion period and during subsequent handling, except when weighing and testing, to prevent breakage or distortion of the specimen.
- .4 Apparatus required to conduct a Marshall test.

**A3 EXECUTION****A3.1 PREPARATION OF TEST SPECIMENS**

- .1 Prepare at least 8 specimens for each test.
- .2 Compact test specimens using the required number of blows on each face.

**A3.2 TEST PROCEDURE**

- .1 Weigh each specimen in air and water. Weigh in water as rapidly as possible to minimize absorption.
- .2 Calculate the specific gravity of each specimen as follows:  
  
Specific Gravity =  $A/(A-B)$   
where A = mass of specimen in air in grams  
B = mass of specimen in water in grams
- .3 Sort each set of 8 specimens into 2 groups of 4, so that the average specific gravity of group 1 is essentially the same as that of group 2.
- .4 Test group 1 specimens for Marshall stability.
- .5 Immerse group 2 specimens in water at 60°C for 24 hours ( $\pm 30$  min), then test immediately for Marshall stability.

**A3.3 TEST REPORT**

- .1 Report the numerical index of resistance of asphalt paving mixture to detrimental effect of water, expressed as a ratio (in percent) of the stability retained after immersion to the original stability.
- .2 Calculate the index as follows:  
  
Index of Retained Stability =  $(S_2/S_1) \times 100$   
  
where  $S_1$  = average Marshall stability of group 1  
 $S_2$  = average Marshall stability of group 2

## APPENDIX B: METHOD FOR DETERMINING FILM THICKNESS

### B1 Surface Area Factor ( $S_a$ ):

Sieve Size ( $\mu\text{m}$ )	Surface Area Factor ( $\text{m}^2/\text{kg}$ )
5000	0.38
2500	0.78
1250	1.55
630	2.90
315	5.60
160	12.20
80	29.00

Determine total surface area as the sum of the surface areas for the 7 specified sieve sizes according to the formula:

$$S_a = 0.38 + \frac{\text{Total \% Passing} \times \text{Surface Area Factor}}{100}$$

### B2 Corrected $S_a$ ( $S_{ac}$ ):

Correct  $S_a$  for actual Aggregate Bulk Specific Gravity by the formula:

$$S_{ac} = S_a (2.650 / \text{Actual Bulk Specific Gravity})$$

### B3 Film Thickness ( $F_t$ ) Calculation:

$$F_t = \frac{10 (P_{ac} - P_{abs})}{S_{ac} \times SG_{ac}} \text{ in microns } (\mu\text{m})$$

where

$P_{ac}$  = Percent Asphalt Cement Content by dry mass of Aggregate

$P_{abs}$  = Percent of Absorbed Asphalt Cement by dry mass of Aggregate

$S_{ac}$  = Corrected  $S_a$

$SG_{ac}$  = Specific Gravity of Asphalt Cement



## APPENDIX C: ASPHALT PAY FACTORS

### C1 Asphalt Density Pay Factors

98% REQUIRED		97% REQUIRED		96% REQUIRED	
Actual Density %	Pay Factor %	Actual Density %	Pay Factor %	Actual Density %	Pay Factor %
98.0	100.0	97.0	100.00	96.0	100.0
97.9	99.9	96.9	99.9	95.9	99.7
97.8	99.8	96.8	99.7	95.8	99.3
97.7	99.6	96.7	99.4	95.7	98.9
97.6	99.4	96.6	99.1	95.6	98.4
97.5	99.1	96.5	98.7	95.5	97.8
97.4	98.7	96.4	98.2	95.4	97.1
97.3	98.3	96.3	97.7	95.3	96.4
97.2	97.8	96.2	97.1	95.2	95.6
97.1	97.2	96.1	96.3	95.1	94.6
97.0	96.5	96.0	95.5	95.0	93.4
96.9	95.8	95.9	94.6	94.9	92.2
96.8	95.0	95.8	93.6	94.8	90.7
96.7	94.2	95.7	92.5	94.7	89.1
96.6	93.3	95.6	91.3	94.6	87.3
96.5	92.3	95.5	89.9	94.5	85.1
96.4	91.1	95.4	88.4	94.4	82.6
96.3	89.8	95.3	86.7	94.3	79.5
96.2	88.5	95.2	84.8	94.2	75.5
96.1	87.1	95.1	82.7	94.1	69.7
96.0	85.5	95.0	80.3	94.0	60.0
95.9	83.8	94.9	77.6	Under 94.0 Reject	
95.8	82.0	94.8	74.3		
95.7	80.0	94.7	70.6		
95.6	77.7	94.6	66.0		
95.5	75.4	94.5	60.0		
95.4	73.0	Under 94.5 Reject			
95.3	70.3				
95.2	67.2				
95.1	63.7				
95.0	60.0				
Under 95.0 Reject					

Actual Density - % of Marshall Density  
Pay Factor - % of contract price

### C2 Asphalt Thickness Pay Factors

Thickness Deficiency (%)	Pay Factor (%)
10.0	100.0
11.0	97.0
12.0	93.7
13.0	90.0
14.0	85.5
15.0	80.5
16.0	75.0
17.0	68.0
18.0	60.0
19.0	50.0
Over 19.0	Grind and Resurface

### C3 Asphalt Cement Pay Factors

Quality Assurance Asphalt Cement Content (%)	Pay Factor (%)
± 0.0 – 0.30	100.0
± 0.31 - 0.35	96.0
± 0.36 – 0.40	90.0
± 0.41 – 0.45	84.0
± 0.46 – 0.50	78.0
± 0.51	Grind and Resurface

## APPENDIX D: SPECIFICATIONS FOR ASPHALT CEMENTS

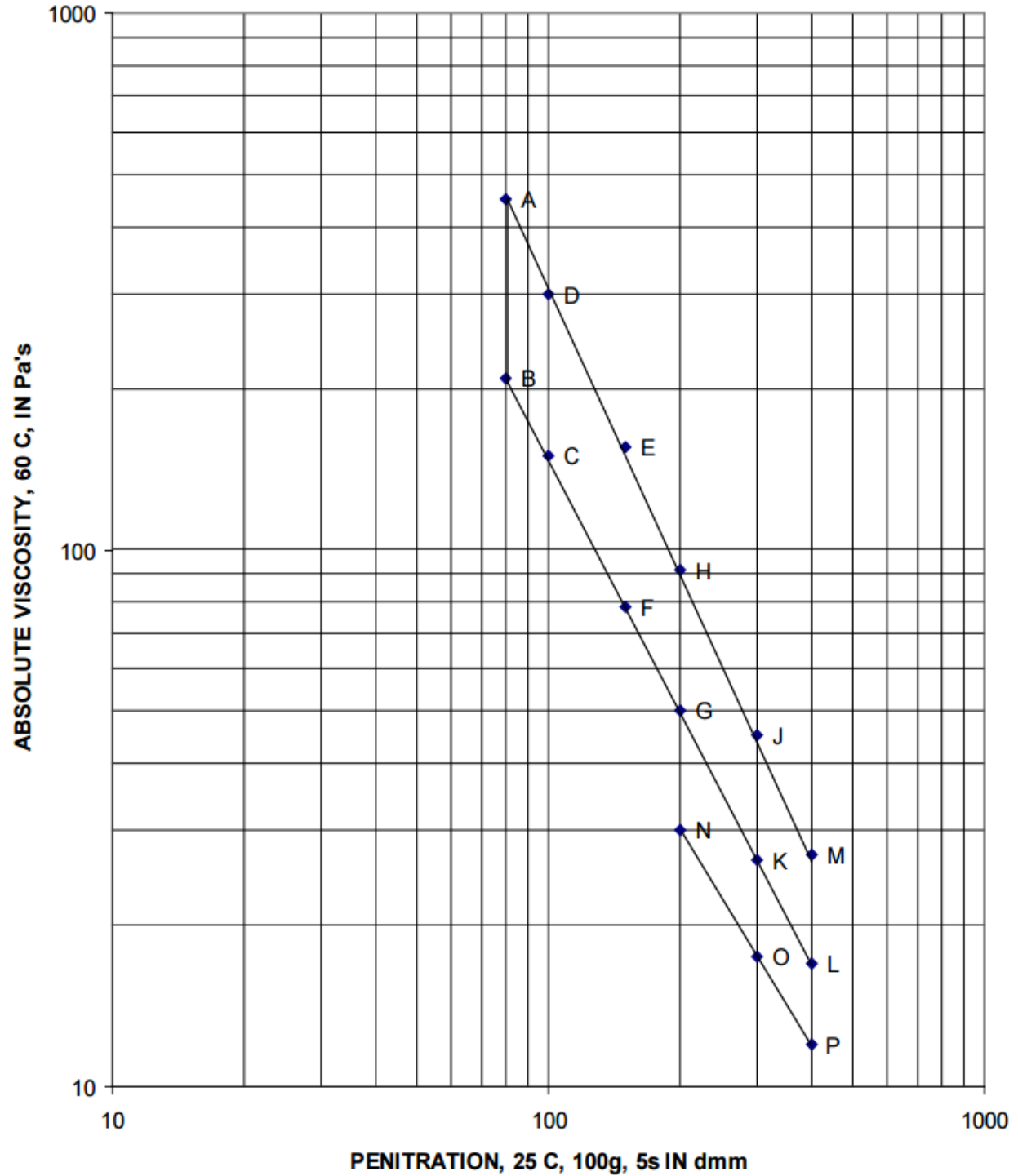
### D1 Test Characteristics for Premium and Regular Grade Asphalt Cements

TEST CHARACTERISTICS	ASTM TEST METHOD	PREMIUM GRADE ASPHALT CEMENTS						REGULAR GRADE ASPHALT CEMENTS					
		80-100 (A)			150-200 (A)			200-300 (A)			200-300 (B)		
Absolute Viscosity, 60°C, Pa.s	D2171	The viscosity and penetration values must fall within the area bounded by A-B-C-D-A, plotted as straight lines on a full logarithmic plot (log-log), with the coordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by E-F-G-H-E, plotted as straight lines on a full logarithmic plot (log-log), with the coordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by G-H-J-K-G, plotted as straight lines on a full logarithmic plot (log-log), with the coordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by G-N-O-K-G, plotted as straight lines on a full logarithmic plot (log-log), with the coordinates of the points as follows:		
Penetration, 25°C, 100g, 5 s, dmm	D5	Pt.	Abs. Visc.	Pen.	Pt.	Abs. Visc.	Pen.	Pt.	Abs. Visc.	Pen.	Pt.	Abs. Visc.	Pen.
		A	450	80	E	155	150	G	50	200	G	50	200
		B	208	80	F	78	150	H	92	200	N	30	200
		C	150	100	G	50	200	J	45	300	O	17.5	300
		D	300	100	H	92	200	K	26.5	300	K	26.5	300
Kinematic Viscosity 135°C, mm <sup>2</sup> /s	D2170	The viscosity and penetration values must fall within the areas bounded by A-B-C-D-A, plotted as straight lines on a full logarithmic plot (log-log), with the coordinates of the points as follows:			The viscosity and penetration values must fall within the areas bounded by E-F-G-H-E, plotted as straight lines on a full logarithmic plot (log-log), with the coordinates of the points as follows:			The viscosity and penetration values must fall within the areas bounded by G-H-J-K-G, plotted as straight lines on a full logarithmic plot (log-log), with the coordinates of the points as follows:			The viscosity and penetration values must fall within the areas bounded by G-N-O-K-G, plotted as straight lines on a full logarithmic plot (log-log), with the coordinates of the points as follows:		
Penetration, 25°C, 100g, 5s, dmm	D5	Pt.	Kin. Visc.	Pen.	Pt.	Kin. Visc.	Pen.	Pt.	Kin. Visc.	Pen.	Pt.	Kin. Visc.	Pen.
		A	600	80	E	360	150	G	205	200	G	205	200
		B	417	80	F	255	150	H	285	200	N	165	200
		C	350	100	G	205	200	J	205	300	O	125	300
		D	500	100	H	285	200	K	150	300	K	150	300
Flash Point, Cleveland Open Cup °C minimum	D92	235			205			175			175		
Solubility in Trichloroethylene % minimum	D2042	99.5			99.5			99.5			99.5		
Tests on Residue from Thin-Film Oven Test: Ratio of Absolute Viscosity of Residue from Thin-Film Oven Test to Original Absolute Viscosity, maximum:	D1754	4.0			4.0			4.0			5.0		
	D2171												
Ductility, 25°C, cm, minimum	D113	100			100			---			---		
Ductility, 15.6°, cm, minimum	D113	---			---			100			100		

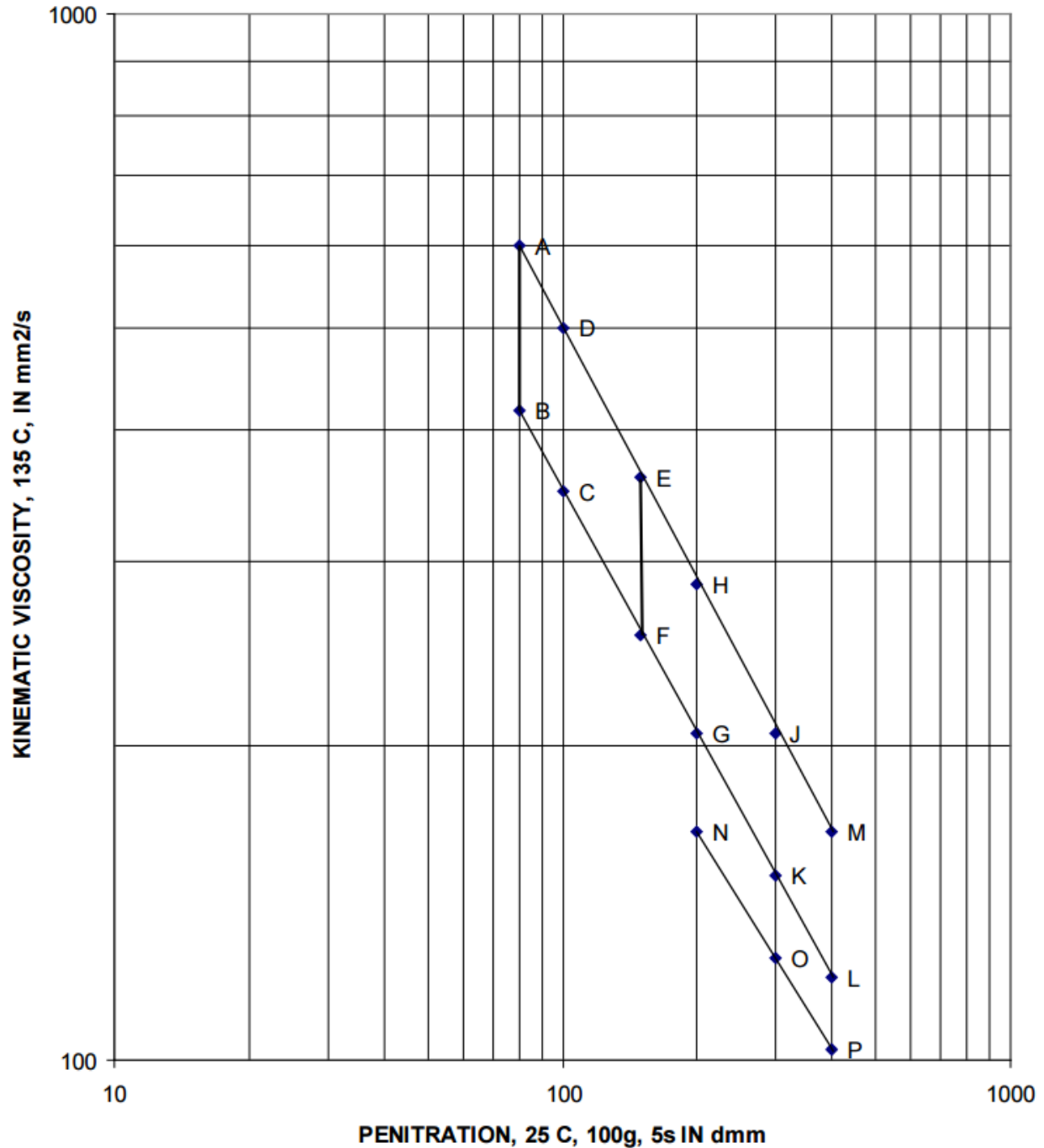
**General Requirement:**

- The asphalt shall be prepared by the refining of petroleum. It shall be uniform in character and shall not foam when heated to 175°C.
- The temperature at delivery to the site shall be between 135°C and 175°C.

**D2 Absolute Viscosity Plot**



**D3 Kinematic Viscosity Plot**



## APPENDIX E: AASHTO M320, TABLE 2

**Table 2—Performance-Graded Asphalt Binder Specification**

Performance Grade	PG 46				PG 52				PG 58				PG 64									
	34	40	46		10	16	22	28	34	40	46	16	22	28	34	40	10	16	22	28	34	40
Average 7-day max pavement design temperature, °C <sup>a</sup>	<46				<52				<58				<64									
Min pavement design temperature, °C <sup>a</sup>	>34	>40	>46		>10	>16	>22	>28	>34	>40	>46	>16	>22	>28	>34	>40	>10	>16	>22	>28	>34	>40
Original Binder																						
Flash point temp, T 48, min °C	230																					
Viscosity, T 316: <sup>b</sup> max 3 Pa·s, test temp. °C	135																					
Dynamic shear, T 315: <sup>c</sup> G*/sinδ <sup>d</sup> , min 1.00 kPa test temp @ 10 rad/s, °C	46				52				58				64									
Rolling Thin-Film Oven Residue (T 240)																						
Mass change, <sup>e</sup> max, percent	1.00																					
Dynamic shear, T 315: G*/sinδ <sup>d</sup> , min 2.20 kPa test temp @ 10 rad/s, °C	46				52				58				64									
Pressurized Aging Vessel Residue (R 28)																						
PAV aging temperature, °C <sup>f</sup>	90				90				100				100									
Dynamic shear, T 315: G* sinδ <sup>d</sup> , max 5000 kPa test temp @ 10 rad/s, °C	10	7	4		25	22	19	16	13	10	7	25	22	19	16	13	31	28	25	22	19	16

<sup>a</sup> Pavement temperatures are estimated from air temperatures using an algorithm contained in the LTPP Bind program, or by following the procedures as outlined in M 323 and R 335.

<sup>b</sup> This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

<sup>c</sup> For quality control of unmodified asphalt binder production, measurement of the viscosity of the original asphalt binder may be used to supplement dynamic shear measurements of G\*/sinδ at test temperatures where the asphalt is a Newtonian fluid.

<sup>d</sup> G\*/sinδ = high temperature stiffness and G\* sinδ = intermediate temperature stiffness.

<sup>e</sup> The mass change shall be less than 1.00 percent for either a positive (mass gain) or a negative (mass loss) change.

<sup>f</sup> The PAV aging temperature is based on simulated climatic conditions and is one of three temperatures, 90°C, 100°C, or 110°C. Normally the PAV aging temperature is 100°C for PG 58-xx and above. However, in desert climates, the PAV aging temperature for PG 70-xx and above may be specified as 110°C.

<sup>g</sup> For verification of grade, at a minimum perform T 313 at the test temperature and at the test temperature minus 6°C and T 314 at the test temperature. Testing at additional temperatures for T 313 may be necessary if 300 MPa is not bracketed at the initial two test temperatures. Compare the failure stress from T 314 to the calculated induced thermal stress as per R 49. If the failure stress exceeds the induced thermal stress, the asphalt binder is deemed a "PASS" at the specification temperature.

**AASHTO M320, Table 2 (continued)**
**Table 2—Performance-Graded Asphalt Binder Specification (Continued)**

Performance Grade	PG 70						PG 76						PG 82					
	10	16	22	28	34	40	10	16	22	28	34	10	16	22	28	34		
Average 7-day max pavement design temperature, °C <sup>a</sup>	<70						<76						<82					
Min pavement design temperature, °C <sup>a</sup>	>10	>16	>22	>28	>34	>40	>10	>16	>22	>28	>34	>10	>16	>22	>28	>34		
Original Binder																		
Flash point temp, T 48, min °C	230																	
Viscosity, T 316, <sup>b</sup> max 3 Pa.s, test temp, °C	135																	
Dynamic shear, T 315: <sup>c</sup> G*/sinδ <sup>d</sup> , min 1.00 kPa test temp @ 10 rad/s, °C	70						76						82					
Rolling Thin-Film Oven Residue (T 240)																		
Mass change, <sup>e</sup> max, percent	1.00																	
Dynamic shear, T 315: G*/sinδ <sup>d</sup> , min 2.20 kPa test temp @ 10 rad/s, °C	70						76						82					
Pressurized Aging Vessel Residue (R 28)																		
PAV aging temperature, °C <sup>f</sup>	100 (110)						100 (110)						100 (110)					
Dynamic shear, T 315: G* sinδ <sup>d</sup> , max 5000 kPa test temp @ 10 rad/s, °C	34	31	28	25	22	19	37	34	31	28	25	40	37	34	31	28		
Critical low cracking temp, R 49 <sup>g</sup> Critical cracking temp determined by R 49, test temp, °C	0	-6	-12	-18	-24	-30	0	-6	-12	-18	-24	0	-6	-12	-18	-24		

<sup>a</sup> Pavement temperatures are estimated from air temperatures using an algorithm contained in the LTPP Bind program, may be provided by the specifying agency, or by following the procedures as outlined in M 323 and R 315. This requirement may be waived at the discretion of the specifying agency if the supplier warrants that the asphalt binder can be adequately pumped and mixed at temperatures that meet all applicable safety standards.

<sup>b</sup> For quality control of unmodified asphalt binder production, measurement of the viscosity of the original asphalt binder may be used to supplement dynamic shear measurements of G\*/sinδ at test temperatures where the asphalt is a Newtonian fluid.

<sup>c</sup> G\*/sinδ = high temperature stiffness and G\* sinδ = intermediate temperature stiffness.

<sup>d</sup> The mass change shall be less than 1.00 percent for either a positive (mass gain) or a negative (mass loss) change.

<sup>e</sup> The PAV aging temperature is based on simulated climatic conditions and is one of three temperatures 90°C, 100°C, or 110°C. Normally the PAV aging temperature is 100°C for PG 58-xx and above. However, in desert climates, the PAV aging temperature for PG 70-xx and above may be specified as 110°C.

<sup>f</sup> For verification of grade, at a minimum perform T 313 at the test temperature and at the test temperature minus 6°C and T 314 at the test temperature. Testing at additional temperatures for T 313 may be necessary if 300 MPa is not bracketed at the initial two test temperatures. Compare the failure stress from T 314 to the calculated induced thermal stress as per R 49. If the failure stress exceeds the induced thermal stress, the asphalt binder is deemed a "PASS" at the specification temperature.

## APPENDIX F: SPECIFICATIONS FOR LIQUID AND ANIONIC EMULSIFIED ASPHALTS

### F1 Medium Curing Liquid Asphalts

Medium curing liquid asphalts shall conform to the requirements specified in the following table, for the grade designated by the Contract Manager/Developer Representative:

REQUIREMENTS	ASTM TEST METHOD	ASPHALT GRADE							
		MC-30		MC-70		MC-250		MC-800	
		min.	max.	min.	max.	min.	max.	min.	max.
Flash Point, Open Tag, °C	D1310	38	----	38	----	65	----	65	----
Kinematic Viscosity at 60°C, mm <sup>2</sup> /s	D2170	30	60	70	140	250	500	800	1600
Distillation Test: % by volume of total distillate to 360°C	D402								
- to 225°C		----	25	----	20	----	10	----	----
- to 260°C		40	70	20	60	15	55	----	35
- to 315°C		75	93	65	90	60	87	45	80
Residue from distillation to 360°C									
- Volume % by difference		50	----	55	----	67	----	75	----
Tests on Residue from Distillation:									
- Penetration at 25°C, 100g, 5s, dmm	D5	120	250	120	250	120	250	120	250
- Ductility at 25° C, cm <sup>(1)</sup>	D113	100	----	100	----	100	----	100	----
- Solubility in Trichlorethylene, % by mass	D2042	99.5	----	99.5	----	99.5	----	99.5	----
Water, % by mass or volume	D95	----	0.2	----	0.2	----	0.2	----	0.2
Delivery Temperature, °C		35	55	55	75	75	95	90	110

Notes: (1) If the ductility at 25° is less than 100, the material will be acceptable if its ductility at 15° is more than 100.

General Requirements: The asphalt shall not foam when heated to the application temperature range recommended by the Asphalt Institute.

- The asphalt shall be produced by the refining of petroleum and shall be uniform in character.



## **F2 Rapid Curing Liquid Asphalts**

Rapid curing liquid asphalts shall conform to the requirements specified in the following table, for the grade designated by the Contract Manager/Developer Representative:

REQUIREMENTS	ASTM TEST METHOD	ASPHALT GRADE					
		RC-30		RC-70		RC-250	
		min.	max.	min.	max.	min.	max.
Flash Point, Open Tag, °C	D1310	----	----	----	----	27	----
Kinematic Viscosity at 60°C, mm <sup>2</sup> /s	D2170	30	60	70	140	250	500
Distillation Test: % by volume of total distillate to 360°C	D402						
- to 190°C		15	----	10	----	----	----
- to 225°C		55	----	50	----	35	----
- to 260°C		75	----	70	----	60	----
- to 315°C		90	----	85	----	80	----
Residue from distillation to 360°C							
- Volume % by difference		50	----	55	----	65	----
Tests on Residue from Distillation:							
- Penetration at 25°C, 100g, 5 s, dmm	D5	80	120	80	120	80	120
- Ductility at 25° C, cm <sup>(1)</sup>	D113	100	----	100	----	100	----
- Solubility in Trichloroethylene, % by mass	D2042	99.5	----	99.5	----	99.5	----
Water, % by mass or volume	D95	----	0.2	----	0.2	----	0.2
Delivery Temperature, °C		35	55	55	75	75	95

Notes: (1) If the ductility at 25° is less than 100, the material will be acceptable if its ductility at 15° is more than 100.

General Requirements: The asphalt shall not foam when heated to the application temperature range recommended by the Asphalt Institute.

- The asphalt shall be produced by the refining of petroleum and shall be uniform in character.

### F3 Anionic Emulsified Asphalts

Anionic emulsified asphalts shall conform to the requirements specified in the following table, for the grade designated by the Contract Manager/Developer Representative:

REQUIREMENTS	ASTM TEST METHOD	ASPHALT TYPE AND GRADE							
		RAPID SETTING (RS)				SLOW SETTINGS (SS)			
		RS-1		RS-2		SS-1		SS-1H	
		min.	max.	min.	max.	min.	max.	min.	max.
Viscosity at 25°C, SF s	D244	20	100	----	----	20	60	20	60
Viscosity at 50°C, SF s		----	----	50	300	----	----	----	----
Residue by Distillation, % by mass <sup>(1)</sup>	D244	55	----	60	----	55	----	55	----
Settlement in 5 days, % difference by mass <sup>(2)</sup>	D244	----	3	----	3	----	5	----	5
Storage Stability Test, 24 h, % by mass <sup>(3)</sup>	D244	----	1	----	1	----	1	----	1
Sieve Test, % retained on a No. 1000 Sieve, % by mass <sup>(4)</sup>	D244	----	0.10	----	0.10	----	0.10	----	0.10
Demulsibility, 35 ml of 1.11 g/l CaCl <sub>2</sub> , % by mass	D244	60	----	60	----	----	----	----	----
Cement Mixing Test, % by mass	D244	----	----	----	----	----	2.0	----	2.0
Particle Charge <sup>(5)</sup>		Negative		Negative		----	----	----	----
Tests on Residue from Distillation:									
- Penetration at 25°C, 100g, 5s, dmm	D5	100	200	100	200	100	200	40	100
- Ductility at 25°C and 5 cm/min, cm	D113	60	----	60	----	60	----	60	----
- Solubility in Trichloroethylene, % by mass	D2042	97.5	----	97.5	----	97.5	----	97.5	----
Delivery Temperature, °C		35	65	45	70	40	70	40	70

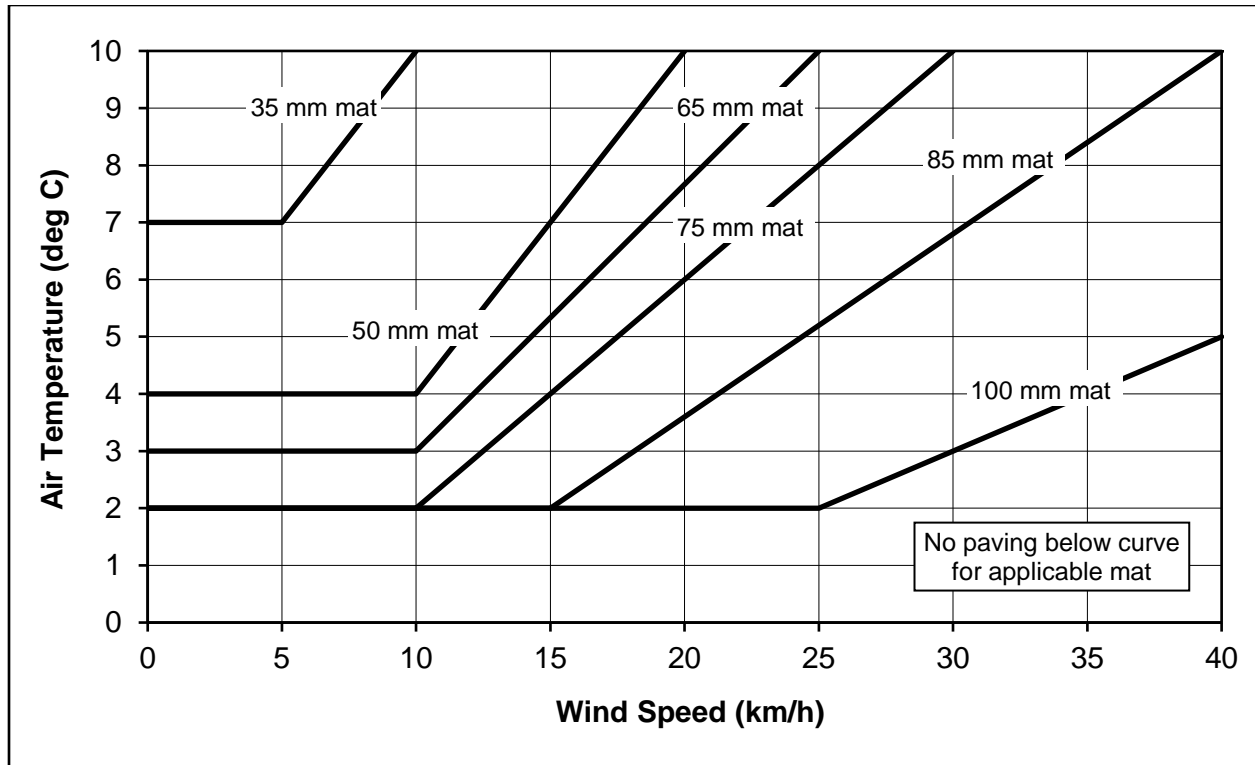
Notes:

- (1) Upper limit on % residue is governed by the consistency limits.
- (2) The test requirement for settlement may be waived when the emulsified asphalt is used in less than 5d time.
- (3) The 24th storage stability test may be used instead of the 5d settlement test, however, in case of dispute, the 5d storage settlement test shall govern.
- (4) CGSB 8-GP-2M, Sieves, Testing, Woven Wire, Metric.
- (5) Particle Charge Test (Qualitative): The rapid setting grades will be tested for particle charge according to the procedure described in ASTM D244, with the modification that the asphalt deposit will, for anionic emulsions, be found on the anode (positive electrode) and shall be continuous and opaque. In the event of dispute, the test will be repeated using freshly distilled water as the wash water for the electrodes, before evaluating the asphalt deposit.

General Requirements: All tests shall be performed within 15 days of date of delivery.

- The asphalt shall be uniform in character and shall have a refined petroleum base.

## APPENDIX G: AIR TEMPERATURE AND WIND LIMITATIONS ON PAVING



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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Granular materials shall consist of crushed gravel, 80 mm minus gravel, pit run, or sand, meeting the accompanying CONSTRUCTION SPECIFICATIONS, and produced in accordance with the methods described.

**1.2 SUBMITTALS**

- 1.2.1 Provide copies of scale certificates to the Contract Manager/Developer Representative prior to use.

- 1.2.2 Each truckload of aggregate weighed in shall have a ticket filled out and submitted to the Contract Manager/Developer Representative.

**1.2.3 Quality Assurance**

- 1.2.3.1 The quality assurance laboratory will conduct sieve analyses to ASTM C136 and other tests to ensure that aggregate being produced and supplied meets the specified requirements. The Contractor shall provide a daily estimate of production tonnage to the quality assurance laboratory.

- 1.2.3.2 A minimum of one sieve analysis per 500 tonnes of aggregate supplied to a jobsite is required. The aggregate may be sampled from a stockpile at the jobsite or at the gravel pit / crusher site.

- 1.2.3.3 If the aggregate fails to meet the specified gradation, the contractor shall suspend gravel placement until proof of compliance with the specification is provided to the Contract Manager/Developer Representative. Alternatively, the contractor may elect to remove the suspect gravel from the jobsite and provide acceptable aggregate from a different source.

**1.2.4 Quality Control Plan**

- 1.2.4.1 Submit a minimum of one sieve analysis per 500 tonnes of aggregate for stockpile or 300 tonnes of aggregate shipped directly from the crusher to the jobsite to the Contract Manager/Developer Representative. Do not stockpile or ship aggregate to the jobsite until the Contract Manager/Developer Representative has accepted the applicable test results. Make the test results available weekly to the Contract Manager/Developer Representative for review.

- 1.2.4.2 Evaluation of Tests: The average grading of the first 8 consecutive sieve tests shall conform to the specified grading band. If it does not, adjust the production process so that the average grading of material already produced and that produced in the next 8 consecutive tests will conform to specifications. Failing this, do not supply aggregate represented by the nonconforming average of 16 tests. The preceding evaluation will be repeated for subsequent series of 8 consecutive tests.

## 2.0 PRODUCTS

### 2.1 SOURCE

2.1.1 The source of the aggregate must be submitted and shall be approved by the Contract Manager/Developer Representative before commencement of operations.

2.1.2 All aggregates shall consist of sound, hard and durable particles of sand, gravel and rock, free of elongated particles, injurious amounts of flaky particles, soft shale, coal, ironstone, clay lumps and organic and other deleterious material. The Contractor shall use reasonable care in the selection of material in a pit so as to produce a uniform product.

2.1.3 The Contractor shall engage an independent testing laboratory acceptable to the Contract Manager/Developer Representative to perform aggregate stockpile tests required in this Section. Material from the stockpile shall not be used until the required test results have been reviewed and accepted by the Contract Manager/Developer Representative.

### 2.2 STORAGE AND PROTECTION

2.2.1 Place aggregate in horizontal lifts of 750 mm maximum thickness. Avoid segregation of particle sizes. Do not dump aggregate over the edges or down the faces of the stockpile. On completion, peak the stockpile at a minimum 3% grade.

### 2.3 MATERIALS

2.3.1 Aggregates Designation 1 for SGC Hot-mix Asphalt Concrete (in accordance with [VOL. 2 SEC. 311, SGC HOT-MIX ASPHALT CONCRETE](#)) shall conform to the following requirements:

Designation	1		
Class	10	10	20.0
Application	10mm-HT	10mm-LT	20mm-B
80 000			
63 000			
25 000			100
20 000			97-100
16 000			83-97
12 500	100	100	70-92
10 000	97-100	97-100	61-84
6 300	45-85	65-85	44-70
5 000	32-75	50-75	38-65
2 500	23-55	35-55	26-52
2 000	-	-	-
1 250	16-45	25-45	18-41
630	11-36	20-36	13-31
400	-	-	-
315	8-26	14-26	9-22
160	5-15	7-15	6-14
80	3-8	4-8	3-7

Designation	1
Class	10 20
Application	10mm-LT & 10mm-HT 20mm-B
+5,000 $\mu\text{m}$ with $\geq 2$ fractured faces (% mass)	Refer to <a href="#">VOL. 2 SEC. 311, SGC HOT-MIX ASPHALT CONCRETE</a> for applicable requirements.
Plasticity Index <400 $\mu\text{m}$	
Liquid Limit	
LA abrasion wear (% mass)	
Soundness loss (% mass)	
Lightweight Pieces (% mass)	

2.3.2 Aggregates Designation 1 for Hot-mix Asphalt Concrete (in accordance with [VOL. 2 SEC. 301, HOT-MIX ASPHALTIC CONCRETE PAVING](#)) and Aggregates Designation 2 and 3 for all mix types shall conform to the following requirements:

Designation	1		2	3				
Class	12.5	25	20	20	25	40	63	80
Application	ACR & ACO	ACB	Soil Cement	Granular Base	Granular Base	Granular Base	Granular Base	Granular Sub-Base
80 000								100
63 000						100	100	-
25 000		100			100	70-94	55-75	46-85
20 000		80-95	100	100	82-97	60-90	50-70	40-81
16 000		-	-	84-95	70-93	55-85	44-65	32-76
12 500	100	68-85	60-96	60-90	60-86	50-80	38-60	30-70
10 000	75-90	60-80	-	50-84	52-79	44-74	-	-
6 300	-	-	-	-	-	-	23-47	-
5 000	50-70	40-60	36-75	37-62	35-64	32-62	20-45	25-50
2 500	35-50	30-50	-	-	-	-	-	-
2 000	-	-	24-54	26-50	24-50	20-50	14-38	19-42
1 250	25-40	25-40	20-43	19-43	19-43	17-43	12-34	15-38
630	20-30	20-30	14-34	14-34	14-34	12-34	10-28	10-32
400	-	-	11-29	11-28	10-27	10-28	8-24	7-27
315	14-23	15-23	9-26	10-25	9-24	8-25	7-22	6-24
160	7-14	9-15	6-20	6-18	6-18	5-18	4-17	3-18
80	4-8	4-8	2-10	2-10	2-10	0-10	0-10	0-10

Designation	1		2	3			
Class	12.5	25	20	20 & 25	40	63	80
Application	ACR & ACO	ACB	Soil Cement	Granular Base	Granular Base	Granular Base	Granular Sub-Base
+5000 $\mu\text{m}$ with $\geq 2$ fractured faces (% mass)	90 min - ACO 75 min - ACR	90 min	60 min	60 min	75 min	75 min	
Plasticity Index <400 $\mu\text{m}$	0	0	6 max	6 max	6 max	6 max	
Liquid Limit			25 max	25 max	25 max	25 Max	
LA abrasion wear (% mass)	32 max	32 max					
Soundness loss (% mass)	16 max	16 max					
Lightweight Pieces (% mass)	2 max	2 max	2 max	2 max	2 max	2 max	2 max

2.3.3 Aggregates Designation 4, 5, 6, and 7 for all mix types shall conform to the following requirements:

Designation	4		5		6		7	
Class	2.5	10	5	80	20	25	10	80
Application	Unit Pavers Joint Sand	Unit Pavers Bedding	Grout Sand	Culvert Bedding	Sub-Drain Rock	Sewer Rock	Sewer Backfill	Culvert Backfill
80 000				100				100
25 000				-		100		-
20 000				85-100	100	-		-
14 000				-	90-100	-		-
10 000		100		-	45-75	-	100	-
5000		75-95	100	70-90	0-15	10 max	70-100	30-60
2500	100	35-70	-	-	0-5	-	-	-
1250	85-100	20-50	-	-	-	-	-	-
800	-	-	-	40-80	-	-	-	-
630	50-90	10-40	-	-	-	-	-	-
315	25-60	5-20	50-95	-	-	-	-	-
160	12-30	2-8	-	-	-	-	5-20	-
80	10-15	0-5	25 max	0-15	-	2 max	0-12	0-15

2.3.4 When specified by the Contract Manager/Developer Representative, in areas where unsuitable subgrade material had been removed, such excavation is to be backfilled with approved Granular Sub-Base to depth and extent as directed by the Contract Manager/Developer Representative and compacted to 97% Standard Proctor Density.

2.3.5 Sand for horticultural mortar use shall meet the following grading specifications:

PASSING (µm)	CUMULATIVE PERCENT BY WEIGHT
2 500	100
1 250	90 - 100
800	75 - 95
315	20 - 50
160	0 - 4
80	0 - 1

2.3.6 Sand for playgrounds shall meet the following grading specifications:

PASSING (µm)	CUMULATIVE PERCENT BY WEIGHT
2 500	100
1 250	90 - 100
800	75 - 95
315	20 - 50
160	0 - 4
80	0 - 1

2.3.7 Shale for ball diamonds must be minimum 6.35 mm red shale dust, or maximum 9.35 mm red shale dust.



## 2.4 EQUIPMENT

2.4.1 Crushers: Capable of producing aggregate as specified.

2.4.2 Truck Weigh Scales: To be furnished by the Contractor. Have the scales inspected and certified by the Weights and Measures Branch of Canada Consumer and Corporate Affairs prior to the start of every construction season, and as requested by the County, to ensure their accuracy.

2.4.3 Scale Tickets: Supply truckers with scale ticket forms approved by the County.

2.4.4 Metric Sieves: CAN/CGSB-8.2-M sieve sizes shall replace ASTM E11 sieves as follows:

CAN/CGSB-8.2-M Sieves (µm)	ASTM E11 Sieves (mm)
125 000	125.0
80 000	75.0
63 000	63.0
50 000	50.0
40 000	37.5
25 000	25.0
20 000	19.0
16 000	16.0
12 500	12.5
10 000	9.5
5 000	4.75
2 500	2.36
2 000	2.00
1 600	1.70
1 250	1.18
800	0.850
630	0.600
400	0.425
315	0.300
160	0.150
80	0.075

## 3.0 EXECUTION

3.1 Crushed aggregate shall consist of sound, hard, and durable particles of sand, gravel, and rock. It must be free of elongated particles, injurious amounts of flaky particles, soft shale, coal, ironstone, clay lumps, and organic and other deleterious material.

3.2 Adjust and modify aggregate as required to meet gradation requirements by aggregate splitting, elimination of fines, or blending with sand.

3.3 When sand elimination is required to meet grading specifications, the sand shall be eliminated prior to the crushing operation.

- 3.4 If blending of materials from more than one source is required to meet grading specifications, all such blending shall be done in the production equipment.
- 3.5 When stockpiling is specified, the stockpile shall be built in layers not more than 750 mm thick. Gravel must not be pushed over the side of the stockpile. The stockpile shall be built within the boundaries as specified by the Contract Manager/Developer Representative. When the stockpile is completed it shall be peaked using a minimum 3% grade.
- 3.6 Granular material intended for future stabilization shall be delivered to location and spread to the required grades.
- 3.7 Haul vehicles shall comply with the Alberta Highway Traffic Act and Alberta Motor Transport Act and have Alberta Class 1 Registration. Transport material in approved trucks with protective covers lapped over and secured to the sides and back of truck box until discharge.
- 4.0 PAYMENT AND MEASUREMENT**
- 4.1 Payment for pit run shall be per tonne of gravel supplied, installed and compacted.
- 4.2 Granular materials will be paid at the price bid per tonne or cubic metre or m<sup>2</sup> depth or as specified per the SCHEDULE OF QUANTITIES. This price and payment shall be full compensation for supplying, crushing, blending, screening and hauling of the aggregate; for all equipment, labour, tools, quality control and incidentals necessary to complete the item in accordance with these CONSTRUCTION SPECIFICATIONS.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Granular sub-base and base course shall consist of approved granular materials supplied, placed and compacted in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the sections shown on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**2.0 PRODUCTS****2.1 MATERIALS AND GRADING**

- 2.1.1 Aggregate for gravel sub-base and base course shall be crushed gravel and shall consist of sound, hard, durable particles and shall not contain organic, soft or other deleterious materials nor materials that break up when alternately frozen and thawed or wetted and dried. It shall be uniformly graded to comply completely with the gradations indicated in [VOL. 2 SEC. 302, GRANULAR MATERIALS](#) and shall not be subject to extreme variations from maximum to minimum of the gradation specified.

**2.2 SUBGRADE**

- 2.2.1 The subgrade shall be prepared according to the requirements of [VOL. 2 SEC. 202, COMPACTED SUBGRADE PREPARATION](#) or [VOL. 2 SEC. 404, CEMENT STABILIZED SUBGRADE](#) and to cross sections shown on the CONSTRUCTION DRAWINGS. The Contractor shall maintain the subgrade to the specified section, free from ruts, waves and undulations until sub-base material is placed. The subgrade shall be in a firm dry condition and must be approved by the Contract Manager/Developer Representative before granular material is placed. The deposition of granular material on a soft, muddy, or rutted subgrade will not be permitted.

Hauling over the subgrade, or sub-base course, will not be permitted when, in the opinion of the Contract Manager/Developer Representative, damage to the subgrade or sub-base course may result.

**3.0 EXECUTION****3.1 QUALITY ASSURANCE****3.1.1 Testing Frequency**

The quality assurance laboratory will take a minimum of one representative field density test on a compacted granular lift for each 1 500 m<sup>2</sup> of road, 1 000 m<sup>2</sup> of alley, or 500 m<sup>2</sup> of concrete or asphalt walk, monolithic walk, curb ramp, alley crossing, commercial crossing, private crossing, or median or island strip, per day, according to ASTM D1556, ASTM D2167, or ASTM D2922 for comparison with a maximum density determined according to ASTM D698 Method A.

### 3.1.2 Required Density

The compacted lift thickness of a granular course shall not exceed 150 mm, or as directed by the Contract Manager/Developer Representative. The required density of granular base courses is shown in the following table.

Compacted Granular Base Course	Required Percentage of Maximum Density
under roads, curb and gutter	100%
under commercial or alley crossings	100%
under asphalt or concrete walk	100%
under walk portion of monolithic walk, transit pads	98%
under curb ramps	98%
under private crossings	98%
under median or island strips	98%
as granular walkways	95%

## 3.2 PLACING AND COMPACTION

3.2.1 The sub-base and base course material shall not be placed until the subgrade or sub-base surface has been approved by the Contract Manager/Developer Representative.

3.2.2 Unless otherwise specified, the granular material shall be placed in layers not exceeding 150 mm when compacted. Materials shall be spread in uniform lifts, without segregation, to such loose depths that when compacted, the layer shall have the required thickness.

3.2.3 When granular base is required under concrete curb and gutter, the material shall extend 300 mm behind the back of curb.

3.2.4 Materials shall be placed by mechanical spreaders or deposited in windrows and levelled by blading to required cross section and depth. During spreading operations, remixing of the deposited material will be required if segregation or lack of uniformity is apparent.

3.2.5 Each lift of granular material shall be compacted at near optimum moisture content to the required density as determined by the Standard Proctor Density test for the material used. Any ruts or irregularities formed in the surface of any layer during compaction shall be smoothed by blading during the compaction operations.

3.2.6 If a density test result is less than the required density, the area shall be reworked to the full depth of the lift; the aggregate moisture content altered as necessary and then recompact to the required density. Following recompaction, the area shall be tested at normal testing frequencies. All work/costs required for retesting is to be done/borne by the Contractor.

- 3.2.7 The Contractor shall assume the risk of uncovering and reworking the granular base if it is covered before the Contract Manager/Developer Representative has accepted test results thereof.
- 3.2.8 In order to maintain the optimum moisture content of the material as determined by the Standard Proctor Density test, water shall be added and the material bladed until a uniform mixture is obtained. If the moisture content exceeds the optimum, the material shall be aerated by mechanical means or other method approved by the Contract Manager/Developer Representative until the optimum moisture content is obtained. The Contractor shall supply and add or remove water from the material as required to obtain the specified density at their own expense.
- 3.2.9 Each layer of material must be thoroughly consolidated, finished and dried before succeeding layers are placed. The grade shall be finished in such a manner that no segregation of rock or fines exist in the completed base. The gravel shall be cleaned of all loose or deleterious material.
- 3.3 SHAPING
- 3.3.1 The finished surface of compacted granular base and sub-base materials shall conform to the required cross-section, lines and grades as shown on the CONSTRUCTION DRAWINGS.
- 3.3.2 Check finished surface of granular base to ensure that it meets the following tolerances:
- 3.3.2.1 Surface Tolerance: 5 mm maximum variation under 3 m straightedge.
- 3.3.2.2 Grade Tolerance: 6 mm maximum variation above designated elevation and 15 mm maximum variation below designated elevation.
- 3.3.3 When Tolerance Exceeded
- 3.3.3.1 Trim high spots and refinish surface to within tolerance.
- 3.3.3.2 Add approved aggregate to low areas, scarify, blend, respread and recompact to required density and refinish surface. Alternatively, compensate low areas with extra thickness of subsequent granular base course.
- 3.4 SUBSEQUENT PAVING COURSE
- 3.4.1 Do not permit vehicular traffic on the compacted granular base before paving unless otherwise directed by the Contract Manager/Developer Representative.
- 3.4.2 If the granular base floods, drain immediately by natural flow or by pumping to catch basins, manholes, or ditches if approved by the Contract Manager/Developer Representative and in accordance with best practices.

- 3.4.3 Repair any damage, including freezing, to the granular base course and retest for density before paving.

#### **4.0 MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

The unit of measure for granular subbase and base course shall be as specified in the SCHEDULE OF QUANTITIES. The quantity paid for shall be the number of square metres, tonnes or cubic metres acceptably placed and compacted. When the unit specified in the SCHEDULE OF QUANTITIES is square metres, the width considered will be the width distance measure at the top of the finished surface, including the 300 mm extending behind the back of curb, when applicable.

##### **4.2 PAYMENT**

Payment at the respective Contract price limit shall be full compensation for supplying, crushing, hauling, placing, spreading, drying or adding water, mixing, grading, compacting, and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this section shall consist of supply and placement of GlasGrid System 8502 pavement reinforcement, on transverse and longitudinal cracks.

**2.0 PRODUCTS****2.1 GENERAL**

- 2.1.1 GlasGrid shall be used to reduce reflective cracking in asphalt overlays.
- 2.1.2 GlasGrid:
- 2.1.2.1 Reinforces asphalt concrete overlays in pavement construction;
- 2.1.2.2 Fiber glass grid is designed to turn crack stresses horizontally and dissipate the stress; and
- 2.1.2.3 Helps prevent cracks from reflecting through a new asphalt overlay to the surface.

**2.2 CONSTRUCTION**

- 2.2.1 The surface shall be thoroughly broomed and cleaned prior to placement.
- 2.2.2 Where a levelling asphalt course is required, it shall be placed prior to GlasGrid.
- 2.2.3 Adjoining rolls shall be overlapped 50 mm and ends of rolls 300 mm.
- 2.2.4 The GlasGrid shall be installed free from tensile stresses, folds, wrinkles, or creases.

**3.0 MEASUREMENT AND PAYMENT****3.1 MEASUREMENT**

- 3.1.1 The unit of measurement for GlasGrid pavement reinforcement shall be the lineal metre. The quantity paid for shall be the number of lineal metres acceptably placed as measured by the Contract Manager/Developer Representative.

**3.2 PAYMENT**

- 3.2.1 Payment at the respective price bid per lineal metre shall be full compensation for cleaning the surface, supplying, hauling and placing the GlasGrid and for all labour, equipment, tools and incidentals necessary to complete the work in accordance with these CONSTRUCTION SPECIFICATIONS.

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on the correct sides when the document is printed double-sided.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this section shall consist of surface milling or grinding of existing asphalt pavements and hauling the millings for disposal.

**2.0 EXECUTION****2.1 GENERAL**

- 2.1.1 The surface milling or cold planning machine shall:
- (i) be capable of averaging 4000 m<sup>2</sup> per shift.
  - (ii) have a mandrel with a minimum cutting width of 1.83 m.
  - (iii) have sufficient power to cut 50 mm or more in depth.
  - (iv) have sufficient lighting for night work.
  - (v) have slope and grade controls.
  - (vi) leave a smooth safe running surface.

**2.2 CONSTRUCTION**

- 2.2.1 When milling is specified between gutters for the full width or for a partial width of the roadway, the milling operation shall result in a smooth surface of constant cross section at the depth specified.

Prior to commencement of any milling pass the Contractor shall employ boning roads, string lines, or any other suitable devices to determine the depth of cut required to attain the required cross section.

- 2.2.2 When milling is specified along the gutter only, the minimum width of cut shall be 1.8 metres. The cut shall be to the depth specified at the gutter lip, tapering to zero at the outside edge of the cut.
- 2.2.3 Transverse tie-ins shall be cut to the depth specified and tapered to zero over a 5.0 m minimum width for every 50 mm of cut depth.
- 2.2.4 Prior to the opening of any portion of the roadway, all excess millings and debris shall be swept and removed from the surface.
- 2.2.5 Surplus materials (millings) shall be hauled to the Strathcona Public Services Yard and shall remain the property of Strathcona County.
- 2.2.6 If it is anticipated that more than 24 hours will transpire between milling and paving operations, then the Contractor shall provide, at transverse tie-ins, a tar paper and asphalt ramp construction joint on the upstand facing oncoming traffic.

- 2.2.7 Milling shall completely expose frames of manholes; water valves and survey monuments which do not require adjustment. All manholes, water valves and survey monuments in areas open to traffic will be ramped temporarily with a tar paper and asphalt, approved rubber donut or approved equivalent.

### **3.0 MEASUREMENT AND PAYMENT**

#### **3.1 MEASUREMENT**

- 3.1.1 The unit of measurement for surface milling shall be the lineal metre for milling along gutters and for transverse tie-ins and for milling specified areas, the unit of measure shall be the square metre, or as specified in the SCHEDULE OF QUANTITIES. The quantity paid for shall be the number of units as specified in the SCHEDULE OF QUANTITIES acceptably milled as measured in place.

#### **3.2 PAYMENT**

- 3.2.1 Payment at the respective bid shall be full compensation for milling, hauling, controlling traffic, ramps, cleaning up the location, and for all labour, equipment, tools, and incidentals necessary to complete the work in accordance with these CONSTRUCTION SPECIFICATIONS.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Cold mix asphaltic concrete paving shall consist of mineral aggregate, filler and cutback asphalt combined in accordance with these CONSTRUCTION SPECIFICATIONS, laid to the specified thickness and compaction, and conforming to the lines, grades and cross-sections as shown on the plans or as established by the Contract Manager/Developer Representative.

**2.0 PRODUCTS****2.1 MATERIALS****2.1.1 Mineral Aggregates**

- 2.1.1.1 When tested by means of laboratory sieves, the combined aggregate in the mix shall meet the following gradation requirements;

Sieve Size	% Passing
20,000	100
5,000	50 - 70
630	20 - 45
160	5 - 15
63	2 - 10

- 2.1.1.2 Prior to commencing the plant mixing operations a minimum of 75% of the anticipated total gravel tonnage must be crushed, stockpiled, and approved.
- 2.1.1.3 Material must be stockpiled in such a manner as to prevent segregation.
- 2.1.1.4 All aggregates shall be free from vegetation, clay ball or other extraneous materials.
- 2.1.1.5 A minimum of 60% by weight of material retained on the #5000 sieve shall have at least two (2) crushed faces.
- 2.1.1.6 Material passing the #5000 sieve shall have a sand equivalent value of not less than 40 when tested according to ASTM D2419.
- 2.1.1.7 The plasticity index of the material passing the 63 sieve shall not exceed 4. The liquid limit shall not exceed 25.
- 2.1.1.8 The moisture content of the aggregate prior to the application of oil shall not exceed 0.5%. The aggregate shall be dried in a device separate from the oil mixing unit.

2.1.1.9 If the contractor wishes to use a filler to meet these CONSTRUCTION SPECIFICATIONS, the type of filler must be approved by the Contract Manager/Developer Representative.

2.1.2 Liquid Asphalt

2.1.2.1 The liquid asphalt shall be prepared by refining of petroleum and shall be uniform in character. The liquid asphalt will be HF-500M-HR grade meeting the following characteristics:

GRADE	HF-500M		HF-1000M		TEST <sup>(1)</sup> METHODS
REQUIREMENTS	min.	max.	min.	max.	
Residue by Distillation, % by mass	65	(2)	65	(2)	Par. 6.2.1
Oil Portion of Distillate, % by volume of emulsion	1	2	1	7	A.S.T.M. D6997 & Par. 6.2.2
Viscosity at 50°C, SF s	50	---	50	---	ASTM D244
Sieve Test, % retained on No. 1000 sieve % by mass <sup>(3)</sup>	---	0.10	---	0.10	Par. 6.2.2
Coating Test (see Notes 4 and 5)	(5)		(5)		ASTM D6998
Workability at -10°C	---	---	---	Pass	Par. 6.2.3
Storage Stability Test, 24h, % by mass	---	1.5	---	1.5	ASTM D6930
Demulsibility, 50 ml, 5.55 g/l CaCl <sub>2</sub> , % by mass	---	---	---	---	ASTM D6936
Tests on Residue from Distillation:	500	---	---	---	Par. 6.2.4
a) Penetration at 25°C, 100 g, 5 s, dmm	500	---	---	---	
b) Apparent Viscosity at 60°C, Pa s	8	20	2	8	Par. 6.2.5/ A
c) Float Test at 60°C, s	1200	---	1200	---	Par./A1.6.2.6
d) Solubility in Trichloroethylene, % by mass	97.5	---	97.5	---	ASTM D2042
Delivery Temperature, °C	40	70	40	70	

Notes:

- (1) Test methods are as outlined in CGSB CAN2-16.5-M84.
- (2) Upper limit on % residue is governed by the viscosity limits.
- (3) CGSB 8-GP-2M, Sieves, Testing, Woven Wire, Metric.
- (4) Follow ASTM D244, except that the mixture of limestone and emulsified asphalt shall be capable of being mixed vigorously for 5 min., at the end of which period the stone shall be thoroughly and uniformly coated. The mixture shall then be completely immersed in tap water and the water poured off. The stone shall then not be less than 90% coated.
- (5) Follow ASTM D244, except that the mixture of limestone and emulsified asphalt shall be mixed vigorously for 5 min., then allowed to stand for 3 hrs, after which the mixture shall be capable of being mixed an additional 5 min. The mixture shall then be rinsed twice with approximately its own volume of tap water, without showing appreciable loss of bituminous film. After the second mixing the aggregate shall be at least 90% coated.

The contractor shall supply a copy of the following liquid asphalt properties:

- (i) temperature - viscosity chart
- (ii) a composition chart showing the kinematic viscosity of the HF-500M vs. percent solvent by weight
- (iii) analysis of the liquid asphalt

### 2.1.3 Mineral Filler

2.1.3.1 Mineral Filler shall consist of Portland Cement, flyash or ground limestone. Mineral filler shall have a Plasticity Index of zero and when tested by means of laboratory sieves shall meet the following gradation:

Sieve Size (mm)	Total Passing Sieve Percent by Mass
0.4	100
0.16	90
0.063	70
0.045	62

Mineral filler shall be added in such quantities as shall be required to meet these CONSTRUCTION SPECIFICATIONS.

## 2.2 MIX DESIGN

### 2.2.1 General

The Contractor shall submit to the Contract Manager/Developer Representative, at least three working days before commencement of placement, a mix design based on the Marshall Method as outlined by the Asphalt Institute "Asphalt Cold Mix" manual (MS-14).

A separate and complete mix design shall be required for each 20,000 t of mix produced, or one-half of the job total, whichever is less, or for change in the nature or course of the material.

The mix design shall be carried out by an accredited testing company, employed by the Contractor at his expense and approved by the Contract Manager/Developer Representative.

The mix shall have a minimum oil content of 5.0% by weight of dry aggregate.

**2.2.2 Mix Design Criteria (50 Blow Marshall)**

Mix properties after 25 percent curing of liquid asphalt solvent.

Stability	3000+ newtons
Flow value (mm)	2 - 4
% Air Voids, Total Mix	3 - 6
% V.M.A. (Based on ASTM Bulk Specific Gravity of Aggregate	14 min.

**3.0 EXECUTION****3.1 PAVING PLANT REQUIREMENTS****3.1.1 General**

The paving plant shall be of a type capable of consistently meeting or exceeding all of the requirements of these CONSTRUCTION SPECIFICATIONS.

**3.1.2 Production**

The asphalt shall be heated to a temperature at which it can be applied to the aggregate. Mixing shall continue until all the asphalt is uniformly dispersed through the mix and all aggregate particles are coated with asphalt. The drying and mixing process shall not reduce the cutback level to such a degree that the mix cannot be properly placed. Up to the time of spreading and placing, the amount of cutback in the mix shall not be reduced to less than 25% of the original cutback weight.

**3.1.3 Sampling**

The plant shall be equipped with devices to allow samples to be taken of bitumen and aggregates, and shall indicate the temperature of the bitumen. The Contract Manager/Developer Representative shall have access at any time to all parts of the plant for verification of weights or proportions.

**3.1.4 Multiple Feed**

If the Contractor requires aggregate feed from more than one source, each aggregate shall be fed from a separate feeds which can be easily adjusted and accurately calibrated. Aggregate from these sources shall be combined prior to entering the plant. The feed system shall be equipped with automatic devices which shall produce a positive coupling between the bitumen flow and the cold aggregate feed.

### 3.2 CONSTRUCTION METHODS

#### 3.2.1 Weather Limitations

Asphaltic concrete mixture shall not be placed:

- (i) During periods of rain or when there is imminent danger of rain.
- (ii) When air temperature is 10°C. or cooler, except in specific situations where in the opinion of the Contract Manager/Developer Representative conditions warrant the risk involved.

#### 3.2.2 Base Preparation

The prepared base shall be dry and clean of all loose or foreign material.

Where tack coat or asphalt sealer is applied, it shall be thoroughly cured prior to placing the mixture.

#### 3.2.3 Transportation of Mixture

The mixture shall be transported in vehicles equipped with and using protective covers and clean, tight smooth sided boxes. The inside surface of the box may be lubricated with a light coating of soap or detergent solution; petroleum derivatives shall not be permitted.

Any accumulation of asphaltic material which has collected in the box shall be thoroughly cleaned before loading.

Trucks shall be maintained perfectly clean of mud or any substance which could contaminate the working area.

#### 3.2.4 Spreading and Compaction

The mixture shall be placed and spread to a uniform thickness. The thickness and method of placement shall be at the Contractor's discretion.

Compaction shall not be attempted until the volatile content is reduced to 50% of that contained in the original asphaltic material. If at any time during compaction the mix exhibits undue rutting or shoving, rolling shall be ceased. The mix shall be thoroughly compacted and cured before additional courses are placed.

#### 3.2.5 Prime Coat

The prepared base shall be dry and free of foreign material. If it is found desirable to apply a prime coat it shall be applied by means of an approved distributor at a uniform rate of 1/2 to 1 1/2 litres per square metre at a temperature recommended by the asphalt manufacturer. The application shall be made when the air temperature is over 10°C. Sand shall be used to blot excess prime.

### 3.2.6 Tack Coat

Upon the base surface or surface between successive layers of surface course which have been cleaned of loose or deleterious material by brooming, an asphaltic tack coat will be applied uniformly at a rate of from 1/4 to 3/4 litres per square metre by means of an approved pressure distributor and at an application temperature recommended by the asphalt manufacturer.

It shall be applied only when the surface is dry and when the air temperature in the shade is not less than 10°C. The tack coat shall be applied for the full width of the paved surface between shoulders, or to such other width as may be specified by the Contract Manager/Developer Representative, and shall be RC-70, unless otherwise specified. All depressions and defective areas shall be eliminated by laying levelling patches on areas designated by the Contract Manager/Developer Representative before placing any of the surface course.

### 3.2.7 Surface Requirements

The surface course shall be checked prior to roller compaction and inequalities adjusted. Areas found to have flat spots, sand accumulation, or other irregularities shall be removed and replaced with satisfactory material.

Irregularities in alignment and grade shall be corrected by the addition or removal of mixture before rolling. Before the addition of material to any mat, the surface shall be broken with the tynes of a rake to ensure proper bonding.

Edges against which mixture is to be placed shall be straight and approximately vertical. A lute or rake shall be used immediately behind the paver, when required, to obtain a true line and vertical face.

### 3.2.8 Joints

Traverse joints shall be carefully constructed and thoroughly compacted to provide a smooth riding surface. Joints shall be straight edged or stringlined to assure smoothness and true alignment and shall be offset at least 1 m from joints of adjacent mats.

Where directed by the Contract Manager/Developer Representative, joints shall be painted with hot asphalt cement or equivalent tack coat material.

Where previously laid asphalt is to be abutted, it shall be cut back to a point where the vertical face is the depth of the previously laid mat. The exposed edge of the existing pavement shall be painted with approved bituminous material and freshly laid mixture raked against it, tamped and rolled.

### 3.2.9 Existing Structures

All concrete or metal structures, such as gutters, manholes, shall be painted with an approved bituminous material prior to placing the mix.



### 3.2.10 Rolling

Rolling shall be carried out in a manner to produce the density and surface meeting the requirements of this Section.

## 3.3 OPENING TO TRAFFIC

### 3.3.1 Clean Up

Locations shall be cleaned of all excess material resulting from the paving operations, and any damage to County or private property caused by the Contractor, shall be required to the Contract Manager's/Developer Representative's satisfaction within three days of the date of completion of the street or lane. Failure to clean up may result in other crews undertaking this work without notice to the Contractor and costs deducted from money due to the Contractor.

The Contract Manager/Developer Representative may direct the Contractor to maintain the closed street or lane with proper lighting and barricades until the cleanup is complete or the damage repaired.

## 3.4 TOLERANCE AND ENFORCEMENT

### 3.4.1 Thickness

The pavement shall have the thickness specified. Areas suspected to be deficient in thickness shall be cored on the basis of the average thickness of three cores for every 1000 m<sup>2</sup> of pavement. The contract price shall be adjusted as follows:

Specified (mm)	Deficiency (mm)	Price Adjustment
50 75	3 - 15 4 - 22	Adjusted Price = $\frac{(\text{Avg. Core Thickness})^2}{\text{Contract Price (Specified Thickness)}^2}$
50	Over 15	No Payment
75	Over 22	No Payment

No additional payment for thickness greater than specified.

### 3.4.2 Density

#### 3.4.2.1 For each day's paving the Owner shall at his cost:

- (i) have a minimum of one marshall specimen taken,
- (ii) have one core sample taken for approximately every 1000 m<sup>2</sup> of pavement, and
- (iii) compare core densities with marshall density.

- 3.4.2.2 If any core fails to meet the density specified, the Contractor shall at his discretion and his expense:
- (i) Have 2 additional cores taken in the area in question. The average of the 3 cores shall represent that area.
  - (ii) Areas with density less than 93% (based on one or the average of three cores) shall not be eligible for payment
  - (iii) The average density of all cores for that day's paving (excepting the cores having less than 93%) shall be used in calculating the penalty for density deficiency.

### 3.4.3 Smoothness

- 3.4.3.1 The surface of the compacted pavement shall be true to the required grade and cross section and have the acceptable riding quality.

When checked by means of a 4.5 m straightedge, held in successive positions parallel to the centre line in contact with the surface, the pavement surface shall not deviate from the straightedge by more than 5 mm.

If there is sufficient deviation from this standard to result in an objection riding surface, the Contractor shall repair the defect in one of the following ways as order by the Contract Manager/Developer Representative:

- (i) Overlay the existing surface with a shallow lift of sheet asphalt based on a mix design proposed by the Contractor and approved by the Contract Manager/Developer Representative.
- (ii) Slurry seal or chip seal designed by the Contractor and approved by the Contract Manager/Developer Representative.
- (iii) Remove and resurface.

### 3.4.4 Texture

The completed pavement shall have a tightly knit texture and shall be free from segregation and surface cracking.

## 4.0 MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

#### 4.1.1 Cold Asphaltic Concrete Mix by Mass

Cold Asphaltic concrete mix shall be measured by the tonne if the thickness is not specified.

#### 4.1.2 Cold Asphaltic Concrete Pavement by Area

Cold Asphaltic pavement shall be measured by the square metre if the thickness is specified.

## 4.2 PAYMENT

## 4.2.1 Basis of Payment

Accepted cold asphaltic concrete pavement shall be paid for at the unit rate bid, which shall be full compensation for designing the mix; supplying, testing and mixing the mineral aggregate, asphalt and filler; for hauling the mixture from the plant to the jobsite; for cleaning the base; application of the Prime Coat and Tack Coats; tacking the abutting structures; spreading and compacting the mixture; cleaning up the location; controlling traffic; and for all labour, equipment, tools and incidentals necessary to complete the work in accordance with these CONSTRUCTION SPECIFICATIONS, less any deductions for deficiencies.

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This intent of THIS CONSTRUCTION SPECIFICATION is to outline the design, testing methods, quality control, measurement and payment procedures for the application of a "polymer modified micro-surface."

1.1.2 THIS CONSTRUCTION SPECIFICATION covers all materials, equipment, construction and application procedures for rutfilling and/or surfacing of existing paved surfaces. The micro-surfacing shall be a mixture of cationic polymer modified asphalt emulsion, mineral aggregate, mineral filler, water and other additives, properly proportioned, mixed and spread on the paved surface.

**1.2 APPLICABLE SPECIFICATIONS****1.2.1 General**

1.2.1.1 The following agencies specifications and test methods form a part of THIS CONSTRUCTION SPECIFICATION.

AASHTO American Association of State Highway and Transportation Officials

ASTM American Society for Testing and Materials

ISSA International Slurry Seal Association

**1.2.1.2 Aggregate and Mineral Filler**

AASHTO T2 ASTM D75 Sampling Mineral Aggregates

AASHTO T27 ASTM C126 Sieve Analysis of Aggregates

AASHTO T11 ASTM C117 Materials finer than No. 200 Sieve Mineral Aggregate

AASHTO 176 ASTM D2419 Sand Equivalent Value of Soils and Fine

AASHTO T84 ASTM C128 Specific Gravity and Absorption of Fine Aggregate

AASHTO T19 ASTM C29 Unit Weight of Aggregate

AASHTO T96 ASTM C131 Resistance to Abrasion of Small Size Coarse Aggregate by use of the Los Angeles Test Method

AASHTO T37 ASTM D546 Sieve Analysis of Mineral Filler

	AASHTO T104	ASTM C88	Soundness of Aggregates by use of Sodium Sulphate or Magnesium Sulphate
1.2.1.3	Emulsified Asphalt		
	AASHTO T40	ASTM D140	Sampling Bituminous Materials
	AASHTO T59	ASTM D244	Testing Emulsified Asphalt
	AASHTO M140	ASTM D977	Specification for Emulsified Asphalt
	AASHTO M208	ASTM D2397	Specification for Cationic Emulsions
		ASTM D3910	Design, Testing and Construction for Slurry Seal
1.2.1.4	Slurry Seal Test Methods		
	ISSA T101	Guide for Sampling Slurry Mix for Extraction Test	
	ISSA T106	Measurement of Slurry Seal Consistency	
	ISSA T100	Test Method for Wet Track Abrasion of Slurry Seals	
	ISSA T102	Mixing, Setting and Water Resistance Test to Identify "Quick Set" Emulsified Asphalts	
	ISSA T112	Method to Estimate Slurry Seal Spread Rates and to Measure Pavement Macro-texture	
	ISSA T114	Wet Stripping Test for Cured Slurry Seal Mixes	
	ISSA T115	Determination of Slurry Seal Compatibility	
	ISSA T1248	Method for Determination of Aggregate Degradation Value	
	ISSA T124C	Test for Durability of Aggregates	

**2.0 PRODUCTS****2.1 EMULSIFIED ASPHALT**

- 2.1.1 The emulsified asphalt shall be a quick-set polymer modified cationic type CSS-1H emulsion and shall conform to the requirements specified in AASHTO M208 and ASTM 2397. It shall pass applicable storage and settlement tests. The polymer material shall be milled into the emulsion or blended into the asphalt cement prior to the emulsification process. The cement mixing test shall be waived for this emulsion. The residue of the emulsion shall have a minimum ring and ball softening point of 60°C.

**2.2 AGGREGATE****2.2.1 General**

The mineral aggregate used shall be of the type and grade specified for micro-surfacing. The aggregate shall be manufactured crushed stone such as granite, or other high quality aggregate or combination thereof.

**2.2.2 Aggregate Physical Requirements**

Grading: The aggregate including natural fines when tested by AASHTO methods T11 or T27, or ASTM C117 or C136 should meet the following gradation requirements.

Sieve Size	% Passing
9.5 mm	100
4.75 mm	90 - 100
2.36 mm	65 - 90
1.18 mm	45 - 70
0.6 mm	30 - 50
0.3 mm	18 - 30
0.15 mm	10 - 21
0.075 mm	5 - 15

Deleterious Substances: To limit the permissible amount of claylike fines in an aggregate, a sand equivalent value of 65 or higher is required when tested by ASTM 2419.

Soundness: The aggregate shall have a weighted loss of not more than 15% when sodium sulphate test is used or 20% when magnesium sulphate test is used.

Hardness: The aggregate wear, from resistance to abrasion, shall be a maximum of 35% when using AASHTO T96 or ASTM C131 test methods.

**2.3 MINERAL FILLER**

- 2.3.1 Mineral filler shall be any recognized brand of non-air entrained portland cement that is free of lumps. It may be accepted upon visual inspection. The amount of mineral filler needed shall be determined by the laboratory mix design and will be considered as part of the material gradation requirement.

**2.4 WATER**

- 2.4.1 The water shall be potable and shall be free of harmful soluble salts.

**2.5 POLYMER MODIFIER**

- 2.5.1 A minimum of 2.5% polymer solids content based on bitumen weight content, certified from the emulsion supplier, along with special quick-setting emulsifier agents shall be milled into the asphalt emulsion.

The emulsified asphalt shall be so formulated that when the paving mixture is applied with the relative humidity at not more than 50% and the ambient air temperature of at least 24°C the material will cure sufficiently so that rolling traffic can be allowed in one hour with no damage to the surface.

**2.6 ADDITIVES**

- 2.6.1 These additives are any other materials that are added to the emulsion mix or to any the component materials to provide the specified quick-set properties. The additives shall be supplied by the emulsion manufacturer or a supplier authorized by him as being compatible with the mixture.

**3.0 EXECUTION****3.1 GENERAL**

- 3.1.1 Upon receipt of the Notice to Proceed and at least one week before work commences, the contractor shall submit, to the Contract Manager/Developer Representative, a signed mix design covering the specific materials to be used on the project. This design shall be performed by a qualified independent laboratory. Once the materials are approved, no substitution will be permitted, unless first tested and approved by the laboratory preparing the mix design.



### 3.2 MIX DESIGN

- 3.2.1 The qualified independent laboratory shall develop the job mix design and present certified test results for the contractors approval. Compatibility of the aggregate and modified CSS-1H shall be verified by the mix design. The job mix formula shall provide a minimum Marshall stability of 8.0 kN and a flow of 1.5 to 4.0 mm when tested according to the modified ASTM 1559 or AASHTO 2450 procedure. All component materials used in the mix design shall be representative of the material proposed by the contractor for use on the project.

### 3.3 SPECIFICATIONS

- 3.3.1 Strathcona County shall approve the design mix and all micro-surfacing materials and methods prior to use. The component materials shall be within the following limits:

<b>Residual Asphalt</b>	6% to 11.5% by dry weight of aggregate
<b>Mineral Filler</b>	1.5% to 3% by dry weight of aggregate
<b>Polymer Based</b>	Minimum of 2.5% solids based on bitumen Modifier weight content
<b>Additive</b>	As required to provide the specified properties
<b>Water</b>	As required to produce proper mix consistency

### 3.4 EQUIPMENT

#### 3.4.1 General

- 3.4.1.1 All equipment, tools and machines used in the performance of this work shall be maintained in satisfactory working condition at all times to ensure a high quality product.

#### 3.4.2 Mixing Equipment

- 3.4.2.1 The material shall be mixed by a self propelled micro-surfacing mixing machine which shall be a continuous flow mixing unit able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, control setting additive and water to maintain an adequate supply to the proportioning controls.

The machine may be equipped with self-loading devices which provide for the loading of materials while continuing to lay micro-surfacing, thereby minimizing construction joints.

- 3.4.2.2 If the machine is not equipped with self-loading devices which provide for the loading of materials while continuing to lay micro-surfacing, the contractor shall provide 2 self-propelled micro-surfacing mixing machines.

#### 3.4.3 Proportioning Devices

- 3.4.3.1 Individual volume or weight controls for proportioning each material to be added to the mix, i.e., aggregate, mineral filler, emulsified asphalt and water shall be provided and properly marked. These proportioning devices are usually revolution counters or similar devices and are used in material calibration and determining the materials output at any time.

#### 3.4.4 Emulsified Pump

- 3.4.4.1 The emulsified asphalt pump shall be a heated positive displacement type pump.

#### 3.4.5 Spreading Equipment

- 3.4.5.1 The surfacing mixture shall be spread uniformly by means of a mechanical type spreader box attached to the mixer. The spreader box for surfacing shall be wide enough to cover one lane width in one pass. The rut fill spreader box shall be not less than 1.75 m wide.

Both spreader boxes shall be equipped with paddles to agitate and spread the materials throughout the box. A front seal shall be provided to insure no loss of the mixture at the road contact point. The rear seal shall act as final strike off and shall be adjustable.

The mixture shall be spread to fill cracks and minor surface irregularities and leave a uniform skid resistant application of material on the surface. The spreader box and rear strike off shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike off. The longitudinal joint where two passes join, shall be neat appearing, uniform and lapped.

All excess material shall be removed from the job site prior to opening the road. The spreader box shall have suitable means provided to side shift the box to compensate for variations in pavement geometry.

#### 3.4.6 Auxiliary Equipment

- 3.4.6.1 Suitable crack and surface cleaning equipment, traffic control equipment, hand tools and any support equipment shall be provided as necessary to perform the work.

### 3.5 MACHINE CALIBRATION

- 3.5.1 Each mixing unit to be used in performance of the work shall be calibrated prior to construction, or previous calibration documentation covering the exact materials to be used may be acceptable provided they were made during that calendar year. The documentation shall include the individual calibration of each material at various settings, which can be related to the machine's metering devices.

### 3.6 WEATHER LIMITATIONS

- 3.6.1 The material shall be spread only when the atmospheric temperature is at least 10°C and rising and the weather is not foggy or rainy and there is no forecast of temperatures below 0°C within 24 hours from the time of placement of the mixture.

### 3.7 NOTIFICATION AND TRAFFIC CONTROL

#### 3.7.1 Notification

All homeowners and businesses affected by the construction shall be notified 3 days in advance of the surfacing. This notification shall be in the form of a written hand delivered notice stating the times and dates that construction is expected on their road. In addition, portable signs warning drivers of the pending road resurfacing are to be placed one week in advance of the work.

#### 3.7.2 Traffic Control

Suitable methods shall be used by the contractor to protect the micro-surface from traffic until the new surface will support that traffic without damage. All traffic control methods used shall be in accordance with Strathcona County CONSTRUCTION SPECIFICATIONS and shall be employed in a safe manner.

### 3.8 SURFACE PREPARATION

#### 3.8.1 General

##### 3.8.1.1 The area to be surfaced shall be thoroughly cleaned of vegetation, loose aggregate and soil, particularly soil that is bound to the surface. Water used in pre-wetting the surface shall be applied by the mixing machine immediately ahead of the spreader box at a rate to dampen the surface without any free flowing water allowed.

Manholes, valve boxes and other service entrances will be protected from the surfacing material.

#### 3.8.2 Cracks in Surface

##### 3.8.2.1 Cracks in the surface shall be sealed with a conventional crack sealer prior to the application of the micro-surfacing (see [VOL. 2 SEC. 308, CRACK FILLING](#)).

#### 3.8.3 Tack Coat

##### 3.8.3.1 A tack coat shall not be required on asphalt surfaces. On concrete and brick surfaces the contractor shall apply a tack coat consisting of one part emulsified asphalt and three parts water with a distributor at 0.45 - 0.70 litres per square metre. This emulsified asphalt shall be the SS or CSS emulsion grade.

### 3.9 STOCKPILE

#### 3.9.1 Precautions shall be taken to insure that stockpiles do not become contaminated.

### 3.10 APPLICATION

#### 3.10.1 General

- 3.10.1.1 The surface should be pre-wetted by spraying ahead of the spreader box when required by local conditions. The rate of application of the spray shall be adjusted during the day to suit temperatures, surface texture, humidity and dryness of the pavement surface. The modified mixture shall be of the desired consistency upon leaving the mixer and no additional materials shall be added. A sufficient amount of material shall be carried in all parts of the spreader at all times so that a complete coverage is obtained. Overloading of the spreader shall be avoided. No lumping, balling or unmixed aggregate shall be permitted.

No streaks, such as those caused by oversized aggregate, will be left in the finished surface. If excess oversize develops, the job will be stopped until the contractor proves to Strathcona County that the situation has been corrected.

#### 3.10.2 Joints

- 3.10.2.1 No excessive buildup, uncovered areas or unsightly appearance shall be permitted on longitudinal or transverse joints. An excessive overlap will not be permitted on longitudinal joints.

The contractor shall provide suitable width spreading equipment to produce a minimum number of longitudinal joints throughout the project. When possible, longitudinal joints shall be placed on lanes lines. Half passes and odd width passes will be used only in minimum amounts. If half passes are used, they shall not be the last pass of any paved area.

#### 3.10.3 Mix Stability

- 3.10.3.1 The modified mixture shall possess sufficient stability so that premature breaking of the material in the spreader box does not occur. The mixture shall be homogeneous during and following mixing and spreading, it shall be free of excess water or emulsion and free of segregation of the emulsion and aggregate fines from the coarser aggregate.

#### 3.10.4 Hand Work

- 3.10.4.1 Areas which cannot be reached with the mixing machine shall be surfaced using hand squeegees to provide complete and uniform coverage. The area to be handworked shall be lightly dampened prior to mix placement.

Care shall be exercised to leave no unsightly appearance from handwork. The same type finish as applied by the spreader box shall be required. Handwork shall be completed during the machine applying process.

## 3.10.5 Lines

- 3.10.5.1 Care shall be taken to insure straight lines along curbs and shoulders. No runoff on these areas will be permitted. Lines at intersections will be kept straight to provide a good appearance.

## 3.10.6 Rolling

- 3.10.6.1 If required by Strathcona County, specified areas shall be rolled by a self propelled 10 tonne pneumatic roller with a tire pressure of 345 kPa (3.4 ATMS) and equipment with a water spray system. The surfaced area shall be subjected to a minimum of 2 full coverages by the roller. Rolling should not commence until the mixture has cured enough so that it will not pick up on the tires of the roller.

## 3.11 QUALITY CONTROL

## 3.11.1 Materials

- 3.11.1.1 The contractor will permit Strathcona County Materials Engineer, to take samples of the aggregate and asphalt emulsion used in the project at Strathcona County's discretion. Gradation and sand equivalent tests may be run on the aggregate and residual asphalt content tests on the emulsion. Test results will be compared to these CONSTRUCTION SPECIFICATIONS. Tests will be run at the expense of Strathcona County. Strathcona County will notify the contractor immediately if any test fails to meet these CONSTRUCTION SPECIFICATIONS.

## 3.11.2 Polymer Modified Micro-Surfacing

- 3.11.2.1 Samples of the material may be taken directly from the mixing unit(s). Consistency and residual asphalt content tests may be made on the samples and compared to these CONSTRUCTION SPECIFICATIONS. Tests will be run at the expense of Strathcona County. Strathcona County will notify the contractor immediately if any test fails to meet these CONSTRUCTION SPECIFICATIONS.

Strathcona County may use the recorders and measuring facilities of the unit to determine application rates, asphalt emulsion content, mineral filler and additive.

## 3.11.3 Non-Compliance

- 3.11.3.1 If any two successive tests fail on the stockpile material, the job shall be stopped. It is the responsibility of the contractor, at his own expense, to prove to Strathcona County that the conditions have been corrected. If any 2 successive tests on the mix from the same machine fail, the use of the machine shall be suspended.

It will be the responsibility of the contractor, at his own expense, to prove to Strathcona County that the problems have been corrected and that the machine is working properly.

**4.0 MEASUREMENT AND PAYMENT****4.1 MEASUREMENT****4.1.1 Aggregate**

4.1.1.1 The quantity of aggregate used in the accepted portions of the work shall be measured by net ticket weight of each individual load of aggregate shipped to the project from the approved job site scale. The weight of mineral filler used shall be calculated and included in the total aggregate weight.

**4.1.2 Polymer Modified Asphalt Emulsion**

4.1.2.1 The quantity of polymer modified asphalt emulsion used in the accepted portion of the work shall be measured by litres or tonnes of material based on the accepted load tickets issued from the manufacturer. At the completion of the project any unused emulsion shall be weighed back and that quantity deducted from the accepted emulsion quantity delivered.

**4.2 PAYMENT****4.2.1 Aggregate**

4.2.1.1 The accepted quantity of aggregate used in the "polymer modified micro-surfacing" will be paid for at the contract unit price per tonne for the type material specified. The unit price shown in the contract shall be full compensation for all materials; including mineral filler, labour, tools, equipment, traffic control and all other incidentals necessary to complete the work.

**4.2.2 Polymer Modified Asphalt Emulsion**

4.2.2.1 The accepted quantity of polymer modified asphalt emulsion used will be paid for at the contract unit price per litre or tonne for the material specified. The unit price shown in the contract shall be full compensation for all materials; including modifiers and additives, necessary to complete the work.

**4.2.3 Aggregate and Polymer Modified Asphalt Emulsion**

4.2.3.1 The accepted quantity of aggregate and polymer modified asphalt emulsion will be paid for at the contract unit price per tonne for the material specified. The unit price shown in the contract shall be full compensation for all materials; including modifiers and additives, necessary to complete the work.

## 1.0 GENERAL

### 1.1 DESCRIPTION

1.1.1 This section specifies requirements and procedures for routing, cleaning and sealing cracks and joints.

#### 1.1.2 Applicable Specifications

The following agencies' specifications and test methods form part of THIS CONSTRUCTION SPECIFICATION.

ASTM                      American Society for Testing Materials

SS-S                      U.S.A. Federal Specifications

#### 1.1.3 Types of Crack Filling

Class I                      Crack filling on streets in residential areas.

Class II                      Crack filling on arterial roadways.

Class III                      Crack filling treatment on arterial roadways; usually transverse cracks with edges that have deteriorated to the point where the opening is too wide to fill with hot poured sealing compound.

The methods of filling cracks are as follows:

Designation	Minimum Routing Dimensions		Method of Cleaning	Filler
	Width (mm)	Depth (mm)		
Class I	19	12	routed and compressed air	hot poured sealing compound
Class II	37	6	routed and compressed air	hot poured sealing compound
Class III	N/A	20	routed and compressed air	asphalt sand mix or OptiMix

## 2.0 PRODUCTS

### 2.1 MATERIAL

#### 2.1.1 Hot Poured Sealing Compound

- 2.1.1.1 The crack filler shall be a hot poured rubberized asphalt thermoplastic sealing compound that will adhere effectively to all bituminous or concrete surfaces and also has the flexibility and resiliency to adapt to varying climatic conditions. A combination of adhesive and cohesive strengths to ensure effective performance through all cycles of expansion and contraction.

Approved products are: Hydrotech Sealz 6160

#### 2.1.2 Physical Properties of Sealing Compound

The physical properties of the sealing compound are to meet the following criteria:

Property	Test Method	Specifications	Typical Result
Pour Point	ASTM D 3407		19°C (374°F)
Penetration at 25°C/mm (77°F/in.)	ASTM D 3407	90 mm Max (3.5 in. Max)	75 mm (2.95 in.)
Flow at 60°C (140°F)	ASTM D 3407	3 mm (.118 in.)	Nil
Cold Bond Extensibility at 29°C (-20°F) 3 Cycles, 50% Extension	ASTM D 3407	No cracks, separation or opening more than 6.4 mm (25 in.)	Pass
Resiliency at 25°C (%) (77°F)	ASTM D 3407	60% Min	70
Asphalt Compatibility	ASTM D 3407	No failure in adhesion, formation of an oily extrudate at the interface between the sealant and the asphaltic concrete or softening or other deleterious effects of the asphaltic concrete.	Pass

#### 2.1.3 Tack Coat and Asphalt:

The physical properties of the asphalt and sand mix are to comply with [VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING](#) and [VOL. 2 SEC. 302, GRANULAR MATERIALS](#).

#### 2.1.4 OptiMix:

This product can be obtained by contacting:

Sil Silica Inc.  
 P.O. Box 6100, Station C



Edmonton, AB T5B 4K5  
Phone: 780-467-2627  
Fax: 780-467-2752

## 2.2 EQUIPMENT

2.2.1 Router: The router must be portable and capable of cutting the pavement surface in a single pass to a minimum width and depth specified in [SUB-SECTION 1.1.3 OF THIS SECTION](#).

2.2.2 Hot Compressed Air Lance: Capable of blowing hot compressed air at a minimum line pressure of 690 kpa.

2.2.3 Compressor: The compressor shall be of 125 C.F.M. capacity or greater and oil free, with air being delivered through a blowpipe with a maximum pipe diameter of 16 mm to ensure that an adequate supply of air is available to efficiently clean the cracks.

2.2.4 Melting Kettle: Mobile, rubber tired, double jacketed oil bath kettle, using high flash point (minimum 315° C) oil heat transfer medium; with an automatic agitator to continuously stir the sealant during heating; with two thermocouple devices to monitor the temperatures of the heating oil and the sealant and which can be read by the Contract Manager/Developer Representative at road level. The temperature readings shall be in Celsius degrees with an accuracy of  $\pm 2\%$ . Use of a direct fired kettle is NOT permitted.

2.2.5 Sealant Dispenser: Want fitted with proper size tip and connected to a low pressure pump from the melter.

## 3.0 EXECUTION

### 3.1 ROUTING

3.1.1 Before routing, sweep designated pavement area clean of dirt accumulations to expose cracks and joints.

3.1.2 Where Classes I and II cracks are designated, rout cracks and joints that are 2 to 25 mm wide, unless directed otherwise by the Contract Manager/Developer Representative. Do not rout cracks in areas with severe block cracking.

3.1.3 Where Class III cracks are designated, route as required, to loosen material in the crack.

3.1.4 Make the cut as near perpendicular to the pavement as possible, cleaning the crack completely and exposing the freshly milled surfaces.

**3.2 SEALANT APPLICATION****3.2.1 Class I and II**

3.2.1.1 Immediately before pouring the sealant in the routed cracks, and using the hot compressed air lance, air blow the routed groove until all loose debris is removed and the surfaces in the routed crack are dry and darkened but not burned. Cleaning with the hot air lance shall advance not more than 2 minutes ahead of placing the sealant into the groove.

3.2.1.2 Blow loose debris to the edge of road away from the area to be sealed so that fresh sealant is not contaminated. Sealed cracks that are contaminated with routing debris are not acceptable and shall be redone.

3.2.1.3 Carefully apply the sealant with the tip of pouring cone or wand placed close to the bottom of groove to ensure uniform application. Fill the groove only to the extent that when cooled the sealant is flush with the adjacent pavement surface within  $\pm 2$  mm.

3.2.1.4 Dust the newly sealed cracks with fly ash or other approved material, when required to prevent tracking.

**3.2.2 Class III**

3.2.2.1 Blow loose debris to the edge of road away from the area to be sealed so that fresh sealant is not contaminated. Sealed cracks that are contaminated with routing debris are not acceptable and shall be redone.

3.2.2.2 Class III cracks shall be filled with asphalt sand mix or Optimix and compacted immediately after filling.

**4.0 MEASUREMENT AND PAYMENT****4.1 MEASUREMENT**

4.1.1 Measurement of cracks filled shall be by the metre.

**4.2 PAYMENT**

4.2.1 Payment for Class I and Class II cracks filled with the sealing compound, will be paid for by the metre at the rate quoted in the TENDER FORM and shall include routing, cleaning, filling the crack with sealing compound, sealing compound, and all labour, materials, and tools incidental to the completion of the work.

4.2.2 Payment for Class III cracks filled with asphalt and sand mix or OptiMix, will be paid for by the metre, at the rate quoted in the TENDER FORM, and shall include routing, cleaning, filling the crack with asphalt and sand mix, or OptiMix, asphalt and sand mix or OptiMix, and all labour, material and tools incidental to the completion of the work.

**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 Chip seal coat shall consist of a wearing course composed of crushed and washed stone fragments held in place by asphalt binder, spread and rolled on a prepared surface to the lines and dimensions shown on the plans or as designed by the Contract Manager/Developer Representative.

1.1.2 The work includes supply and placement of asphaltic binder and aggregate chips.

**1.2 MAINTENANCE OF TRAFFIC**

1.2.1 Perform work in a manner that will cause the least disruption to traffic.

1.2.2 Closing of streets, detouring of traffic, posting of traffic signs and provision of flagmen shall be the Contractor's responsibility.

1.2.3 Maintain detour roads.

**1.3 MATERIALS TESTING BY THE CONTRACTOR**

1.3.1 Materials supplied by the Contractor shall be tested for compliance with these CONSTRUCTION SPECIFICATIONS by an approved testing agency paid for by the Contractor. No material shall be used until it has been approved by the Contract Manager/Developer Representative.

1.3.2 The Contractor shall submit copies of test data to the Contract Manager/Developer Representative within 24 hours of receiving results.

**1.4 SUBMITTALS BY THE CONTRACTOR**

1.4.1 Asphalt: Submit refinery product data for asphalt cement binder.

1.4.2 Mineral Aggregate: Submit one copy of results of each of the following control tests.

Los Angeles Abrasion Test - ASTM C 131

Crushed Face Count

Flakiness Index - Alberta Transportation Test Method - 49

Sieve Analysis - ASTM C 136, C 117

1.4.3 Spread Design: Submit asphalt binder and aggregate spread designs based on the method outlined in the Asphalt Institute Manual (Series No. 13) "Asphalt Surface Treatments".

1.4.4 Plant Scale Certificates: Submit prior to start of paving.

## 1.5 MATERIALS TESTING BY THE OWNER

1.5.1 The Owner may employ a testing agency to do on-site quality assurance testing as the work progresses.

1.5.2 The Contract Manager/Developer Representative and the Owner's testing agency shall have access at all times to all parts of the operation for testing, for verification of weights, temperatures, proportion and character of materials.

## 2.0 PRODUCTS

### 2.1 ASPHALT

2.1.1 The asphalt binder used in chip seal coats will be an RS-1K emulsified asphalt unless otherwise specified in the SPECIAL PROVISIONS.

### 2.1.2 MINERAL AGGREGATE

2.1.2.1 Coarse Aggregate: Coarse fractions retained on the 5.0 mm sieve shall consist of hard, clean, durable crushed stone, crushed slag, crushed gravel or a combination thereof or of material naturally occurring in a fractured condition.

- (i) L.A. Abrasion: Coarse aggregate shall not exhibit more than 35% wear (L.A abrasion test) for all mix classes.
- (ii) Crushed Faces: All the aggregate retained on the 5.0 mm sieve shall have at least 1 crushed face, and a minimum of 75% by weight shall have at least 2 crushed faces.
- (iii) Aggregate Gradation: When tested by means of laboratory sieves the combined aggregates in the mix shall meet the following requirements:

Sieve Size (mm)	Percent Passing By Mass
12.500	100
10.000	55 - 75
5.000	0 - 15
1.250	0 - 3
0.080	0 - 0.3

(iv) Flakiness Index: The maximum Flakiness Index of the aggregate shall be 15%.

### 2.1.3 SPREAD DESIGN

2.1.3.1 The spread design shall be performed by a qualified laboratory possessing a permit to practice under the Engineering, Geological and Geophysical Professions Act of Alberta, following the method set out in the latest edition of the Asphalt Institute Manual Series No. 13 (MS-13) to the following criteria:

- (i) Aggregate Spread: Minimum application rate of 15kg/m<sup>2</sup>.
- (ii) Asphalt Binder Spread: Minimum application rate of 2.0kg/m<sup>2</sup>.

(iii) Traffic Factor: 0.60

### 3.0 EXECUTION

#### 3.1 EQUIPMENT

3.1.1 Self-powered pressure asphalt distributors equipped with tachometer, pressure gauge, adjustable length spray bar, positive displacement asphalt pump with separate power unit, heating coils and burner for even heating of asphalt, thermometer; capable of maintaining a uniform speed and uniform application of liquid asphalt at designated rate to surface widths up to 4 m; equipped with nozzle capable of hand spraying a uniform application of liquid asphalt.

#### 3.1.2 Power Sweepers

3.1.3 Self-propelled aggregate spreaders capable of spreading the aggregate uniformly at the specified rate in one application over the full width of the asphalt applied. The spreaders shall be capable of controlling and adjusting the width and rate of spread. The spreaders shall be equipped with the necessary devices to enable it to be attached securely to the aggregate haul truck while in the process of dumping the aggregates into the spreader.

3.1.4 Self propelled pneumatic tire rollers or self-propelled vibratory rollers with rubber coated drums or both.

3.1.5 Hauling vehicles shall be suitably equipped to enable secure attachment to the spreader while in the process of dumping the aggregate.

#### 3.2 CHIP PRODUCTION

3.2.1 The crushed aggregate shall be washed prior to application as chip seal coat. The chips shall be uncoated stone fragments meeting the specified gradation after washing.

3.2.2 The Contractor shall obtain the required permit/licence from the Division of Standards and Approvals of Alberta Environment prior to any discharge of wash water.

3.2.3 The Contractor shall provide all necessary safety precautions when using settling ponds.

3.2.4 Upon completion of the work, the Contractor shall restore all areas occupied or used by his operations to a condition equal to or better than the original.

3.2.5 Stockpile chips in horizontal lifts. Stacking conveyors are not allowed for stockpiling. Draw aggregate from stockpile in a manner that mixes the full depth of stockpile face.

### 3.3 BASE PREPARATION

- 3.3.1 Before the asphalt binder is applied, the surface to be treated shall be cleaned of all dirt, sand, dust, or objectionable matter. Asphalt binder shall not be applied until the surface has been cleaned as required and the section approved by the Contract Manager/Developer Representative.

### 3.4 LIMITATIONS

- 3.4.1 The placement of chip seal coat shall be limited to the period from May 1 to August 15. Chip seal coat shall not be constructed when, in the opinion of the Contract Manager/Developer Representative, damage to the finished product may occur for any reason.
- 3.4.2 Construction shall be carried out during daylight hours only.
- 3.4.3 The asphalt binder shall not be applied to the prepared surface when one or more of the following conditions apply:
- (i) The atmospheric temperature at the construction area is 15°C and falling but may be applied when the temperature is 10°C and rising,
  - (ii) The weather is misty or rainy,
  - (iii) Precipitation is a threat for the construction area within 12 hours as forecast by Environment Canada for the vicinity, and
  - (iv) An atmospheric temperature at the construction area of less than 5°C is predicted by Environment Canada within 24 hours.

### 3.5 APPLICATION OF ASPHALT BINDER

- 3.5.1 Asphalt binder shall be applied only to dry surfaces. The asphalt binder shall be applied with a pressure distributor in a single uniform continuous spread over the section to be treated.
- 3.5.2 The application temperature of the asphalt binder shall be between 70°C and 90°C.
- 3.5.3 The application of asphalt binder shall not precede the application of chips by more than 30 m.
- 3.5.4 The Contractor shall determine the rate of application of the asphalt binder taking into consideration the texture and absorbency of the surface, characteristics of the chips, traffic density and other pertinent factors.
- 3.5.5 The longitudinal edge of a previously constructed chip seal coat shall be power swept prior to constructing the chip seal on the adjacent section. All loose chips on the sealed lane must be removed to at least 0.15 m from the proposed longitudinal joint with a minimum dislodgement of embedded chips. The Contractor shall ensure that asphalt binder application on the previously constructed longitudinal edge is overlapped by not less than 50 mm or more than 100 mm.

3.5.6 Transverse joints of successive sections or lanes shall be started and ended on a strip of building paper for each spread to prevent overlap. The paper shall be removed and disposed of as approved by the Contract Manager/Developer Representative. Skipped areas shall be corrected by hand spray. Structures, curbs, guardrail, and other appurtenances shall not be spattered with the asphalt binder. The Contractor shall remove any spattering caused by his operation. Asphalt binder shall not be spilled, sprayed, or tracked on completed sections of chip seal coat. Bridge expansion joints and drains shall be protected with building paper.

### 3.6 APPLICATION OF CHIPS

3.6.1 The application of asphalt binder shall be followed immediately with the chips which shall be uniformly spread by means of an approved mechanical spreader capable of spreading the aggregate at the established rate of application.

3.6.2 The Contractor shall determine the rate of application of the chips taking into consideration chip loss and the requirement for 99% minimum final coverage after sweeping.

3.6.3 Chips shall be wet but with no free water prior to spreading.

3.6.4 The longitudinal construction joints between adjacent lanes shall be kept clean of foreign material. The Contractor shall take special care at longitudinal joints to ensure that chips are overlapped by not less than 50 mm and no more than 100 mm.

3.6.5 Immediately after spreading, the aggregate shall be rolled. A minimum of two coverages by the rollers shall be completed within one quarter hour after the chips have been spread. The Contractor shall determine the amount of additional compaction required based on consideration of compaction equipment, atmospheric conditions and acceptance requirements.

3.6.6 Vibratory rollers shall not operate in the vibratory mode when they are stationary.

3.6.7 After initial set of the binder (normally 1-3 hours depending on atmospheric conditions) the surface shall be broomed to remove any loose chips. Brooming shall be repeated as often as required until no loose chips are evident.

3.6.8 The Contractor shall broom the chip seal coat when required and as often as required during a two week period following the initial application or as directed by the Contract Manager Developer Representative.

3.6.9 During the brooming operations all intersections shall be swept clear of loose chips. Paved shoulders and all paved approaches shall be swept clear of loose chips before acceptance of the work.

### 3.7 TOLERANCES

3.7.1 A minimum of 99% chip coverage has been obtained with no single bare area greater than 0.01 m<sup>2</sup> in any one square metre,

- 3.7.2 there is no streaking or ravelling,
- 3.7.3 the surface of the seal has a uniform, even texture,
- 3.7.4 no over-rich or bleeding areas are evident, and
- 3.7.5 no loose chips are evident.
- 3.7.6 Chip Seal Coat that does not meet the foregoing requirements shall be repaired or reconstructed at the Contractor's expense to the satisfaction of the Contract Manager/Developer Representative.
- 3.7.7 Without in any way limiting his obligations or liabilities herein, during construction and during the one year warranty period, the Contractor shall be fully responsible for all claims for damages caused by flying chips from the area worked and shall address, respond to and deal with each claim submitted.
- 3.8 CLEANUP
- 3.8.1 Leave site clean and free of debris and surplus materials.
- 3.8.2 Remove barricades and signs no longer needed.
- 4.0 MEASUREMENT AND PAYMENT**
- 4.1 MEASUREMENT
- 4.1.1 Accepted chip seal coat will be measured by the square metre.
- 4.2 PAYMENT
- 4.2.1 Payment at the unit rate bid shall be full compensation for:
- (i) designing the seal coat application,
  - (ii) supplying, testing, crushing and washing of aggregate to produce chips,
  - (iii) surface preparations,
  - (iv) loading, hauling, application and compaction of the chips,
  - (v) supplying, storage, hauling, and application of the asphalt binder,
  - (vi) brooming of the finished surfaces,
  - (vii) traffic accommodation and signing,
  - (viii) all labour, equipment, tools and incidentals necessary to complete the work in accordance with these CONSTRUCTION SPECIFICATIONS.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Hot-In-Place Recycling (HIPR) shall consist of heating the existing asphalt concrete pavement, milling the heated pavement to a depth of 50 mm, mixing the milled materials, adding as directed, fresh aggregate (coated or uncoated), or rejuvenating agent and spreading and compacting the resultant mixture, all in one continuous operation, to the depths, lines, grades and dimensions shown on the plans or designated by the Contract Manager/Developer Representative. The work shall be accomplished by a single pass of an equipment train.

**2.0 MATERIALS****2.1 RECYCLED HOT-MIX ASPHALT**

- 2.1.1 The completed HIPR Hot-Mix Asphalt shall meet the requirements of ASTM D3515.

**2.2 REJUVENATING AGENT AND OTHER ADDITIVES**

- 2.2.1 The Contractor shall supply a rejuvenating agent (Cyclogen "L" or equivalent approved by the Contract Manager/Developer Representative) that meets the requirements of the Witco Chemical Company specifications for Cyclogen "L" material as follows:

Property	Test Method	Specification
Viscosity @ 60°C, cST	ASTM D 2170-85	200 - 500
Flash Pt., COC, °C	ASTM D 92-85	204 min
Volatility	ASTM D 1160-87	
IPB, °C	10mm	149 min
2%v, °C		191 min
5%v, °C		210 min
RTFC weight change, %w	ASTM D 2872-88	4.0 max
Saturates, %w	ASTM D 2007-86	2.8 max
RTFC Retained	ASTM D 2872-88	2.5 max
Viscosity Ratio		
Specific Gravity	ASTM D 70-82	0.98 - 1.02

- 2.2.2 The Contractor will be required to add 0.3% Cyclogen "L" rejuvenating agent to the recycle mix. The addition of aggregate will not be required.

Note: The mix design is based on laboratory testing and may require modifications to suit field conditions.

**3.0 CONSTRUCTION****3.1 GENERAL**

- 3.1.1 Equipment, materials and methods used on the work shall be adequate to produce the final product as specified, and shall be subject to the approval of the Contract Manager/Developer Representative. The Contract Manager/Developer Representative may order the discontinuance of use of any equipment, materials or method which, in the opinion of the Contract Manager/Developer Representative, will fail to produce satisfactory results.

HIPR shall not proceed when, in the opinion of the Contract Manager/Developer Representative, these CONSTRUCTION SPECIFICATIONS for the finished product cannot be achieved for any reason.

Aggregate materials and asphalt mixes shall be handled so that segregation of the coarse and fine fractions does not occur.

**3.2 HOURS OF WORK**

- 3.2.1 Construction activity on the roadway shall take place during daylight hours only.

**3.3 TESTING****3.3.1 General**

- 3.3.1.1 The Contract Manager/Developer Representative will take samples, and carry out testing and inspection of materials incorporated or being incorporated in the work. The Contractor shall cooperate with the Contract Manager/Developer Representative or his agent for such sampling, testing and inspection. To facilitate inspections and tests, notify the Contract Manager/Developer Representative sufficiently in advance of operations to allow scheduling of tests. Contractor to pay costs for uncovering and making good work that is covered before required inspection or testing is completed and approved by the Contract Manager/Developer Representative.

This shall not relieve the Contractor of any obligation to perform all the work strictly in accordance with the requirements of the Contract.

- 3.3.1.2 The Contractor shall provide, at their own expense, sampling stands, sampling devices, and other facilities which the Contract Manager/Developer Representative requires to safely obtain representative samples of the item being produced.

- 3.3.1.3 Tests and sample locations will be selected by the Contract Manager/Developer Representative.

- 3.3.1.4 Test results will be available to the Contractor for his information. It is the responsibility of the Contractor to interpret test results and alter their operation so that their project meets the required CONSTRUCTION SPECIFICATIONS.

Note: In all Test Methods used as reference in these CONSTRUCTION SPECIFICATIONS, metric sieves as specified in Canadian General Standards Board Specification 8-GP-2M shall be substituted for any other specified wire cloth sieve in accordance with the following table:

AASHTO Designation M92 Opening (mm)	ASTM Designation E11 (U.S. Standard Series) Opening or Designation	CGSB Specification 8-GP-2M Opening $\mu\text{m}$
125.0	5"	125,000
75.0	3"	80,000
63.0	2 1/2"	63,000
50.0	2"	50,000
37.5	1 1/2"	40,000
25.0	1"	25,000
19.0	3/4"	20,000
16.0	5/8"	16,000
12.5	1/2"	12,500
9.5	3/8"	10,000
4.75	#4	5,000
2.36	#8	2,500
2.00	#10	2,000
1.70	#12	1,600
1.18	#16	1,250
0.850	#20	800
0.600	#30	630
0.425	#40	400
0.300	#50	315
0.150	#100	160
0.075	#200	80
0.045	#325	45

### 3.4 HOT-IN-PLACE RECYCLING (HIPR)

3.4.1 The pavement surface to be recycled shall be cleaned of all dirt, dust, and other objectionable matter to the approval of the Contract Manager/Developer Representative.

3.4.2 The existing asphalt surface shall be heated a minimum of 0.10 to 0.20 m wider on each side than the width being processed. The processing width shall be as shown on the plans or as directed by the Contract Manager/Developer Representative. The temperature of the asphalt material prior to the milling shall not be greater than 155°C. Multi-phase heating/milling is required in which the first unit heats and mills the pavement to partial depths while the following units heat and mill the remaining pavement to the total specified depth. Single phase milling will only be permitted if, once milled, the milled material continues to be thoroughly heated and mixed. In contrast, single phase equipment where the total specified depth of pavement is processed (milled and heated) at one point in the operation will not be permitted.

- 3.4.3 The recycler unit shall be equipped to enable fresh aggregate (coated or uncoated) to be metered into the material being processed at a controlled and uniform rate which is specified or designated by the Contract Manager/Developer Representative. The recycler shall be able to add fresh aggregates (coated or uncoated) in a manner such that all materials are uniformly mixed with the recycled material. The mechanical capacity to add fresh aggregate (coated or uncoated) shall be an integral part of the recycler unit. The recycler unit shall be equipped with a paving machine with an activated heated screed complete with augers and strike-off device capable of distributing and placing the reprocessed mix to the full lane width of the pavement. The paving machine must meet all the requirements of the Contract Manager/Developer Representative.
- 3.4.4 The temperature of the mixture immediately behind the screed shall not be less than 120°C. The equipment shall be regulated so that excessive heating and/or hardening of the existing asphalt cement does not occur. This requires that the existing pavement surface be radiantly heated and no open flame heating will be permitted.
- 3.4.5 Immediately behind the recycler operations, the Contractor shall compact the mixture to the specified density.
- 3.4.6 The finished pavement surface shall be smooth, homogeneous and free from segregation.
- 3.4.7 At locations where recycling operations begin or end, the Contractor shall ensure that the transition between the milled and unmilled surface is smooth with no irregularities. If any irregularities occur resulting from the HIPR, the Contractor shall repair these areas with fresh asphalt mix and/or by additional reprocessing, at their own expense, as directed by the Contract Manager/Developer Representative
- 3.5 ADDITION OF FRESH AGGREGATES
- 3.5.1 If fresh aggregate (coated or uncoated) is required, the Contractor shall provide material meeting these CONSTRUCTION SPECIFICATIONS for fresh aggregate (coated or uncoated) outlined by the Contract Manager/Developer Representative at the time of construction. If precoated aggregate is to be used, then the estimated range of asphalt content required is from 1.0% to 3.5% by weight of dry aggregate. The Contractor will be responsible to ensure that the asphalt plant is properly calibrated to produce precoated aggregates within this low asphalt content range. The addition rate of fresh aggregate may fluctuate slightly at the time of construction. The Contractor shall have no claim against Strathcona County for additional payment should the Contract Manager/Developer Representative decide to discontinue the use of fresh aggregate.
- 3.6 ADDITION OF REJUVENATING AGENT
- 3.6.1 The recycler unit shall be equipped to enable rejuvenating agent to be uniformly added to the heated and milled mixture. Such equipment shall provide for the following:
- 3.6.1.1 Positive feed and shut-off, interlocked to the movement and processing rate of the recycler.

- 3.6.1.2 Control of the quantity to  $\pm 0.05$  L/m<sup>3</sup> from the application rate as specified by the Contract Manager/Developer Representative for the surface area milled.
- 3.6.1.3 Measurement of the total volume used by means of a calibrated metering device capable of recording accumulated litres to an accuracy of  $\pm 2\%$ . Calibration of the metering device in the presence of the Contract Manager/Developer Representative or by some other means acceptable to the Contract Manager/Developer Representative shall be done prior to the production of HIPR material.
- 3.6.1.4 Heating and maintaining the temperature to within  $\pm 5^{\circ}\text{C}$  of the application temperature established by the Contract Manager/Developer Representative.
- 3.6.2 The Contractor shall uniformly mix the required rejuvenating agent into the mix being recycled at the rate directed by the Contract Manager/Developer Representative.
- 3.6.3 The application rate for rejuvenating agent may range up to 0.25 L/m<sup>2</sup> depending on field tests at the time of construction. The Contractor shall have no claim against Strathcona County for additional payment should the Contract Manager/Developer Representative decide to discontinue the use of a rejuvenating agent.
- 3.6.4 HIPR shall only take place when the ambient air temperature is  $2^{\circ}\text{C}$  or higher and the surface temperature is  $5^{\circ}\text{C}$  or higher at the centre of the travelled lane being HIPR.
- 3.6.5 The Contractor shall ensure that the longitudinal edges of the recycled pavement are blended to conform in elevation with the adjacent pavement sections. The Contractor shall also ensure the appropriate cross slopes for safety and drainage are maintained at all times. Excess materials shall be removed and deposited in a location that they can be incorporated into the recycled mix. At no time shall excess material be case across the newly processed surface.
- 3.6.6 All unsuitable or waste materials shall be removed from the job site. Disposals of unsuitable or waste materials is considered incidental to the project.
- 3.6.7 The cutting drums and mixing operations shall be set to produce a uniform fully recycled mix without lumps.
- 3.7 EMISSION CONTROL
- 3.7.1 This CONSTRUCTION SPECIFICATION contains a requirement for the HIPR of asphalt pavement, an operation which has the particular potential to produce unlawful air emissions unless carried out carefully and with appropriate equipment. The Contractor shall have no claim to any exemption from the requirements of the Clean Air Act or any other related legislation, or to any payment for extra costs resulting from the need to comply with these requirements, by virtue of this CONSTRUCTION SPECIFICATION or for any other reason.

### 3.8 MANHOLES, CATCH BASINS AND VALVES

3.8.1 Prior to proceeding with the road work, the Contractor shall ensure that all catchbasins and manholes which are within the operating area of the heating units, have been checked for possible presence of fumes/gases and cleared by the Fire Authority having jurisdiction in the Contract areas.

3.8.2 Damage to manholes, valves, and catchbasins due to the Contractor's operations shall be repaired by the Contractor at no cost to Strathcona County.

### 4.0 FINAL PRODUCT REQUIREMENTS

The following final product requirements will determine acceptability. If the final product does not comply with all these requirements, the Contractor shall, entirely at their expense, correct the deficiencies, reprocess, or remove and replace defective material. All methods, materials and equipment used for correction of deficiencies shall be subject to the approval of the Contract Manager/Developer Representative.

#### 4.1 SURFACE TOLERANCES

4.1.1 The entire surface of the processed pavement shall meet the following requirements:

4.1.1.1 Conforming with [VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING, SUB-SECTION 3.13](#), and,

4.1.1.2 Conforming to the "Single Lift" category of Alberta Transportation and Utilities test method ATT 59, "Smoothness of Pavements, Profilograph Method", which is detailed in the SPECIAL PROVISIONS of this document.

#### 4.1.2 Density

4.1.2.1 The density of any recycled section will be considered satisfactory when it meets the requirements of [VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING, SUB-SECTION 3.15](#), for overlay thickness of more than 40 mm.

4.1.2.2 The Contract Manager/Developer Representative will establish the required Marshall density by sampling the processed mixture and determining the density of a briquette formed by using the 75 blow Marshall Method.

The Marshall density will be of the specimen density that results from heating a representative sample of the rejuvenated and blended mixture to a temperature of 130°C prior to the 75 blow Marshall Method.

4.1.2.3 The mix for density testing shall be obtained from the laydown machine and the roadway shall be marked at that location for subsequent coring. The core shall be cut at the specified heater recycling thickness (i.e. 50 mm) prior to determining its density.

**4.1.3 Acceptability**

- 4.1.3.1 The final product shall meet the requirements of these CONSTRUCTION SPECIFICATIONS in all respects. Any deficiencies shall be corrected at the Contractor's expense to the satisfaction of the Contract Manager/Developer Representative. The worksite shall be cleaned and left in condition satisfactory to the Contract Manager/Developer Representative. Failure to meet any of these requirements will result in the rejection of the project.

**5.0 MEASUREMENT AND PAYMENT****5.1 HOT-IN-PLACE RECYCLING**

- 5.1.1 Payment of accepted HIPR will be made at the Contract unit price per square metre for "HIPR" for the required 50 mm depth, which payment will be compensation in full for all labour, equipment, tools, and incidentals necessary to complete the work and shall include cleaning, heating, milling, mixing, laying and compacting the recycled asphalt mixture, and traffic accommodation.

**5.2 REJUVENATING AGENT**

- 5.2.1 Measurement of the rejuvenating agent incorporated into the HIPR process will be in litres as determined by the calibrated measuring device on the recycling unit.

Payment for the rejuvenating agent will be made at the contract unit price per litre for "Supply of Rejuvenating Agent". This price will include compensation for supply, delivery, storage, handling and addition of the rejuvenating agent.

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on the correct sides when the document is printed double-sided.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 This specification covers the production of a hot mixture of asphalt cement, aggregate, and/or other materials for paving.
- 1.1.2 This specification also covers the requirements for submittals, materials, mix design, quality control, quality assurance, and mix production.
- 1.1.3 This specification also covers the supply and placement of Superpave Gyratory Compactor (SGC) hot-mix asphalt concrete for roadway paving.

**1.2 DEFINITIONS**

- 1.2.1 Asphalt Cement Content: The amount (percentage) of asphalt cement in the SGC hot-mix, as determined in [SUB-SECTION 1.7.3 OF THIS SECTION](#), and is the value upon which any unit price adjustments will be based.
- 1.2.2 10mm – High Traffic (10mm-HT): Mix used primarily for paving divided collector roadways and arterial roadways.
- 1.2.3 10mm – Low Traffic (10mm-LT): Mix used primarily for paving local and collector roadways.
- 1.2.4 20mm – Base (20mm-B): Base course for freeways, arterials, industrial/business commercial roadways, and collector roadways.
- 1.2.5 Bailey CA-CUW: Coarse Aggregate (CA) Chosen Unit Weight (CUW) of combined aggregate as defined by the "Bailey Method".
- 1.2.6 Bailey CA-LUW: Bailey Method CA – Loose Unit Weight (LUW).
- 1.2.7 Bailey CA-RUW: Bailey Method CA – Rodded Unit Weight (RUW).
- 1.2.8 Bailey FA-LUW: Bailey Method Fine Aggregate (FA) – LUW.
- 1.2.9 Bailey FA-RUW: Bailey Method FA – RUW.
- 1.2.10 Bailey Method: A method of selecting asphalt concrete aggregate proportions, indicated by the most recent edition of "Achieving Volumetrics and HMA Compactability", as published by the Asphalt Institute and the Heritage Research Group.
- 1.2.11 Bailey Nominal Maximum Aggregate Size (BNMAS): The first sieve, in the standard sieve series (2.50 mm, 5.0 mm, 10.0 mm, 12.5 mm, 20.0 mm, and 25.0 mm), larger than the first standard sieve to retain more than 15% by weight.

- 1.2.12 Job Mix Formula: Establishes the target combined aggregate gradation, plant settings, approved asphalt cement content to be used for production of the asphalt mix, and the associated production tolerances, based on the submitted SGC mix design and the results of the trial batch of SGC hot-mix, as tested by the County, and requires approval of the County.
- 1.2.13 Overlay: Paving over an existing pavement for rehabilitation purposes and not as part of staged paving.
- 1.2.14 SGC Density: The SGC shall be used to prepare laboratory formed specimens at a specified number of design gyrations ( $N_{\text{design}}$ ) of either 75 or 100 gyrations. The SGC formed specimens shall be used for the determination of volumetric properties on a field produced SGC hot-mix as outlined in the Asphalt Institute SP-2 Manual.
- 1.2.15 SGC Specimens: Test specimens prepared using the SGC at  $N_{\text{design}}$  of either 75 or 100. The SGC formed specimens are be used for the determination of volumetric properties on the laboratory produced SGC hot-mix, as outlined in the Asphalt Institute SP-2 Manual.
- 1.2.16 Staged Paving: Paving where a lift or lifts that form part of the total pavement structure are deferred to a future date.
- 1.3 MAINTENANCE OF TRAFFIC
- 1.3.1 Perform work in a manner that will cause the least disruption to traffic.
- 1.3.2 Closing of streets, detouring of traffic, posting of traffic signs, and provision of flagpeople shall be the Contractor's responsibility.
- 1.3.3 The Contractor must maintain all detour roads.
- 1.4 MATERIALS TESTING BY THE CONTRACTOR
- 1.4.1 Materials supplied by the Contractor shall be tested for compliance with these CONSTRUCTION SPECIFICATIONS by an approved testing agency paid for by the Contract. No material shall be used until it has been approved by the Contract Manager/Developer Representative.
- 1.4.2 Unless otherwise specified, the Contractor shall submit copies of test data to the Contract Manager/Developer Representative within 24 hours of receiving results.
- 1.5 MATERIALS TESTING BY THE OWNER
- 1.5.1 The owner will employ a testing agency to do on-site materials testing as the work progresses.
- 1.5.2 The Contract Manager/Developer Representative and the Owner's testing agency shall have access at all times to all parts of the operation for testing, and for verification of weights, temperatures, proportion, and character of materials.

## 1.6 SUBMITTALS BY THE CONTRACTOR

1.6.1 Asphalt Cement: Submit written certification with the SGC mix design that the asphalt cement complies with these CONSTRUCTION SPECIFICATIONS. This certification shall include, but not be limited to:

- Name of the supplier.
- Source(s) of the base asphalt cement(s).
- Type and source(s) of admixture(s).
- Proportions of materials used in the asphalt cement.
- Current laboratory test results of the asphalt cement.
- Certification statement from the supplying agency that the asphalt cement is a straight run, non-air blown/oxidized, non-chemically modified asphalt cement and, if the asphalt cement is modified, it has been modified only with a SB-type copolymer and that it complies with the requirements of these CONSTRUCTION SPECIFICATIONS.

Certification shall be submitted:

- (i) For the asphalt cement used in the mix design as part of a submittal; and
- (ii) At the start of mix production, utilizing the approved job mix formula.

1.6.2 Aggregates: Submit LA Abrasion, soundness, detrimental matter, and Plasticity Index test results for each aggregate source for each SGC mix type at least once per year. Submit results of gradation and crushed face count(s) at the following frequencies:

For a stockpile existing at the time of Contract award:

- A minimum of one gradation and crushed faces count(s) test per 500 tonnes of aggregate. In addition, submit the average gradation and crushed faces count(s) for each entire stockpile when submitting a mix design using aggregate from the stockpile(s).

For aggregate stockpiled during the Contract:

- A minimum of one gradation and crushed face count(s) per 500 tonnes of aggregate, or each day's production, whichever is less.

Submit results to the County within 72 hours of the completion of testing. Do not use aggregate until test results have been reviewed and accepted by the Contract Manager/Developer Representative.

1.6.3 Mineral Filler: Submit mill test results and gradation for mineral filler prior to aggregate production in accordance with ASTM D546, D242.

## 1.6.4 SGC Mix Design

1.6.4.1 Submit a SGC mix design, carried out by an independent testing agency, for each required mix type at least 10 days before the start of any SGC hot-mix production, and for each subsequent change in supplier or source of materials. No SGC hot-mix production can proceed until the applicable mix design and job mix formula have been approved by the Contract Manager/ Developer Representative. A previously-approved SGC mix design of the required mix type may be accepted, if the same materials for which the mix design was approved are used, and provided that the previously-approved job mix formula requirements are satisfied.

1.6.4.2 Submit all applicable SGC mix design characteristics, including but not limited to:

- Legal description of all aggregate sources.
- Source of RAP.
- Individual aggregate, Reclaimed Asphalt Pavement (RAP), and mineral filler gradations.
- Individual aggregate one and two crushed-face counts.
- RAP aggregate one and two crushed-face counts.
- Water absorption of the individual aggregates and the combined aggregates.
- Based on the individual aggregate results, the calculated water absorption of the combined aggregates.
- Aggregate blend.
- Combined aggregate gradation.
- Bulk specific gravity of individual aggregates and mineral filler.
- Based on the individual aggregate results, the calculated bulk specific gravity of the combined aggregates.
- Maximum Theoretical Density (MTD) of the RAP.
- Binder content of the RAP, determined by total mix to two significant digits.
- Bulk specific gravity of the RAP binder.
- Bailey CA-RUW for each individual coarse aggregate stockpile.
- Bailey CA-LUW for each individual coarse aggregate stockpile.
- Bailey FA-RUW for each individual fine aggregate stockpile.
- Bailey FA-LUW for each individual fine aggregate stockpile.
- Virgin asphalt cement bulk specific gravity.
- Mixing and compaction temperature, as determined by the asphalt cement's temperature-viscosity curve, which is to be provided, or as recommended by the asphalt cement supplier.
- Two hour, short-term oven aging temperature.
- Anti-stripping agent supplier, product name, product specification sheet, and application rate.
- Bailey CA-CUW.
- Comments on the other Bailey parameters (CA Ratio, FAc Ratio, and FAF Ratio).
- A hard copy of the Bailey spreadsheet with an electronic copy of the Bailey spreadsheet to be e-mailed to the County.
- Number of design gyrations ( $N_{\text{design}}$ ) in the SGC.
- Number of maximum gyrations ( $N_{\text{maximum}}$ ) in the SGC.

- A minimum of five individual and separate asphalt cement contents must be used in the SGC mix design and each individual asphalt cement content must be separated by a minimum of 0.40% to a maximum of 0.60% (by dry weight of aggregate).
- Graph of mix's MTD versus asphalt cement content (by total mix) reported to two significant digits.
- All other graphs used in the mix design (by total mix).
- Individual mix property results are to be plotted and a second order polynomial graph drawn through the individual data points.
- Recommended initial asphalt cement content and associated mix parameters.
- Ratio of virgin asphalt cement content to total asphalt cement content.
- Asphalt cement absorption of the combined aggregates.
- Ignition oven asphalt cement content correction factor.
- Where specified in the SPECIAL PROVISIONS, Asphalt Pavement Analyzer (APA) result.
- Where specified in the SPECIAL PROVISIONS, Tensile Strength Ratio (TSR), including the optional freeze-thaw cycle.

1.6.4.3 The review of the submitted SGC mix design will not begin until all of the applicable information required in [SUB-SECTION 1.6.4.2 OF THIS SECTION](#) has been provided.

1.6.5 Job Mix Formula: Submit with the SGC mix design the applicable proportions of materials and plant settings to be used, including the following:

For Batch Plant:

- Sieve analysis of combined aggregate in the mix.
- Sieve analysis of aggregate in each bin separation to be used.
- Sieve analysis of RAP if used.
- Mass of material from each bin for each batch of mix.
- Mass of asphalt cement in each batch.
- Mass of anti-stripping agent in each batch.
- Mixing temperature of asphalt cement determined from its temperature-viscosity curve, or as recommended by the manufacturer.

For Continuous or Drum-mix Plant:

- Sieve analysis of each aggregate and mineral filler.
- Sieve analysis of combined aggregate in the mix.
- Sieve analysis of RAP if used.
- Mass of asphalt cement per tonne of mix.
- Mass of anti-stripping agent per tonne of mix.
- Mixing temperature of asphalt cement determined from its temperature-viscosity curve, or as recommended by the manufacturer.
- Settings of aggregate and asphalt cement feed systems (blend).

1.6.6 Plant Scale Certificates: Provide a copy of the plant scale certificates at least 10 days prior to any SGC hot-mix production.

- 1.6.7 Quality Control Plan: Before commencing SGC hot-mix production, submit a quality control plan to the Contract Manager/Developer Representative for review and approval. The quality control plan is to include the following recommended tests and frequency for each mix type produced, as a minimum:

Tests Per Sample:

- Mix bulk specific gravity, average of two SGC specimens.
- Asphalt cement content, reported to two significant digits.
- MTD of loose mix.
- Gradation of the extracted mix.
- Moisture content of the mix.
- Air voids by calculation and by MTD.
- Voids in the mineral aggregate (VMA).
- Voids filled with asphalt cement.
- Film thickness calculation.
- Sample time and location.
- Plant discharge temperature.
- Asphalt storage temperature.

Frequency:

- Minimum two tests per day per mix type in full production.

Make the test results available weekly to the Contract Manager/Developer Representative for review.

1.7 QUALITY ASSURANCE

- 1.7.1 Inspection and Testing: In addition to field inspections by the Contract Manager/Developer Representative, the testing agency will conduct plant inspection and materials sampling and testing described in the following paragraphs.

- 1.7.2 Asphalt Plant: Inspections may be conducted at least once a week during production to check plant calibrations, plant operation, production settings, temperatures, and materials handling. Samples of materials and mixture may be taken and tested.

1.7.3 Asphalt Cement

- 1.7.3.1 Quality assurance sampling and testing of the asphalt cement shall be performed by the Contractor, at no cost to the County, to verify compliance to these CONSTRUCTION SPECIFICATIONS. A sample shall be taken at random during paving operations on County projects from a load(s) delivered to the Contractor's asphalt plant at least twice a month or as directed by the Contract Manager/Developer Representative or the Owner's testing agency. The sample shall be tested by an independent testing agency engaged by the Contractor to verify compliance with the specification requirements as stated in [SUB-SECTION 2.2 OF THIS SECTION](#).

1.7.3.2 Test results shall be reported in writing to the Contract Manager/Developer Representative by the Contractor. Non-complying sample test results shall be reported to the Contract Manager/Developer Representative within 24 hours of completion of the test(s). Compliant sample test results shall be submitted in writing to the Contract Manager/Developer Representative no later than 10 working days after the date of sampling.

1.7.3.3 A test report shall include, but not be limited to:

- Report date.
- Date of sampling.
- Bill of lading number of load sampled.
- Destination of load.
- Report of test results.
- Standard test identifications.
- Specification requirements.
- Statement of compliance.
- Certification signature.

Failure to comply with quality assurance testing may result in rejection of either the asphalt cement, and/or the job mix formula, and/or the associated job mix placed on the project.

1.7.3.4 If non-complying material is identified, the paving program may be suspended for 24 hours, as directed by the Contract Manager/Developer Representative, during which time the Contractor, the Contract Manager/Developer Representative will meet to determine the impact of the non-compliance, and specify the necessary remedial action to be taken by the Contractor. Remedial action shall be either acceptance, or acceptance at a pay adjustment, or removal and replacement at no cost to the County. If suspended, the paving program shall only continue upon written authorization by the Contract Manager/Developer Representative.

1.7.3.5 Asphalt cement identified to be in non-compliance shall not be shipped to a project. SGC hot-mix mixed and placed with identified non-complying asphalt cement shall be removed and replaced, as directed by the Contract Manager/Developer Representative, with complying material supplied by the Contractor at no cost to the County.

1.7.3.6 Asphalt cement substitution in an approved job mix formula shall not be allowed without prior approval of the Contract Manager/Developer Representative.

1.7.3.7 Actual asphalt cement content, in which unit price adjustments will be based on, is defined as the amount of asphalt cement in the mix as determined through the quality assurance testing program.

1.7.4 Production Mix Analysis

1.7.4.1 Full mix sample testing will be conducted at a minimum frequency of one test for each 1,000 tonnes of SGC hot-mix, or a day's production, whichever is less.

- 1.7.4.2 Where specified in the SPECIAL PROVISIONS, TSR testing, with the optional freeze-thaw cycle, and APA testing, shall be carried out at a minimum frequency of one set per week's production.
- 1.7.4.3 The determination of the asphalt cement content will utilize the asphalt ignition oven correction factor, as determined for each SGC hot-mix, by the County.
- 1.7.5 Job Mix Formula: The testing agency will test a trial batch of the job mix formula to verify the mix design. The mix design and job mix formula will not be approved until successful results are obtained. If the initial trial batch fails, submit results of further trial batch tests performed by a qualified independent laboratory.
- 1.7.6 Thickness Cores
- 1.7.6.1 The testing agency will take a minimum of one core per 1,000 m<sup>2</sup> of SGC hot-mix asphalt pavement and determine the thickness of the mat, for each stage of paving.
- 1.7.6.2 A thickness deficiency at the completion of the first stage of paving may be accepted by the Contract Manager/Developer Representative, provided the deficiency is less than 12 mm and the deficient thickness can be included in the subsequent stage of paving.
- 1.7.6.3 If the initial core thickness is deficient at the completion of the final lift of paving, that initial thickness is discarded, and 3 new cores will be taken within 10 m of the original core location at a minimum spacing of 2.5 m between cores. The average thickness of the 3 new cores represents that area. All costs for recoring are the responsibility of the Contractor.
- 1.7.7 Asphalt Cement Content and Density Specimen Sampling and Testing
- 1.7.7.1 The testing agency will:
- (i) Determine the Maximum Theoretical Density (MTD) and asphalt cement content of the SGC hot-mix at a minimum frequency of one test for every 1,000 tonnes of SGC hot-mix produced, or a day's production, whichever is less.
  - (ii) Drill cores from compacted mat placed from same load of SGC hot-mix from which SGC specimens were obtained and representing 1,000m<sup>2</sup>, or from suspect compacted mat, and test for density.
  - (iii) Where specified in the SPECIAL PROVISIONS, obtain a second core from the compacted mat for rut testing in the Asphalt Pavement Analyzer (APA). Refer to [SUB-SECTION 1.7.8 OF THIS SECTION](#) for more information.
- 1.7.7.2 Basis of Acceptance: SGC hot-mix pavement compaction will be accepted based on the ratio (in percent) of the core density to the MTD. If cores were taken from a mat where no MTD are available, acceptance will be based on the ratio of core density to the average MTD for all specimens to date.



- 1.7.7.3 Number of Cores: A single core is initially taken, representing the quantity of SGC hot-mix in not more than 1,000 m<sup>2</sup> of mat, with a minimum of one core taken from a day's production. If the initial core density is below specified, that initial density is discarded, and 3 new cores will be taken within 10 m of the original core location at a minimum spacing of 2.5 m between cores. The average density of the 3 new cores represents that area. All costs for recoring are the responsibility of the Contractor.
- 1.7.8 Rutting Susceptibility (Where Specified in the SPECIAL PROVISIONS)
- 1.7.8.1 Where specified in the SPECIAL PROVISIONS, the testing agency will determine the rutting susceptibility of laboratory SGC hot-mix specimens at a minimum frequency of one test for every 5,000 tonnes of SGC hot-mix produced, for an individual project, by subjecting the SGC hot-mix specimens to the APA procedure. The APA device will meet the requirements of AASHTO T340 and is equipped with an automatic rut measurement system. The APA device will be calibrated at least once per year according to the procedures in the test method. In addition, the load cell used for checking wheel loads will be calibrated at least once per year. Each test shall have 6 cylindrical samples fabricated and tested with the interior temperature of the APA set at 52°C. The downward force shall be set at 45 kg and the hoses shall be pressurized to 689 kPa. Each specimen shall be compacted so that  $7.0 \pm 0.5\%$  air voids are achieved. The APA rut test results shall be provided to the nearest 0.1 mm.
- 1.7.8.2 Where specified in the SPECIAL PROVISIONS, the testing agency will determine the rutting susceptibility of SGC hot-mix field core specimens taken at the location of the SGC hot-mix samples by subjecting the field core specimens to the APA procedure as described in the above section. The average rut depth for the specimens tested shall not exceed the specified APA requirements for the mix type. If the initial APA rutting is above specified, that initial APA result is discarded, and 6 new cores will be taken within 10 m of the original core location at a minimum spacing of 2.5 m between cores. The average APA result of the 6 new cores will be taken as to represent that area.
- 1.7.9 Tensile Strength Ratio (TSR) (Where Specified in the SPECIAL PROVISIONS)
- Where specified in the SPECIAL PROVISIONS, the testing agency will determine the TSR of SGC hot-mix field samples at a minimum frequency of one test for every 5,000 tonnes of SGC hot-mix produced, for an individual project, in accordance with AASHTO T283, including the optional freeze-thaw cycle.
- 1.8 QUALITY CONTROL
- 1.8.1 General: The Contractor is responsible for quality control throughout all stages of the SGC hot-mix production and placement including the aggregates, asphalt cement, and any other materials used in the mix. The Contractor shall utilize a qualified testing agency to undertake the quality control sampling and testing to determine and monitor the properties of the materials being produced and used on the project.

- 1.8.2 Sampling and Testing: The Contractor shall follow the sampling and testing methods and frequencies indicated in their quality control plan and/or as accepted or modified by the Contract Manager/Developer Representative.

## 2.0 PRODUCTS

### 2.1 LIQUID ASPHALT

- 2.1.1 In accordance with [VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING, SUB-SECTION 2.1.](#)

### 2.2 ASPHALT CEMENT

- 2.2.1 In accordance with [VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING, SUB-SECTION 2.2.](#)

### 2.3 AGGREGATES

- 2.3.1 In accordance with [VOL. 2 SEC. 302, GRANULAR MATERIALS](#), and as indicated below.

- 2.3.2 When tested by means of laboratory sieves, the combined aggregates in the SGC mix shall meet the following requirements:

Designation	1	1	1
Class	10.0	10.0	20
Application	10mm-HT	10mm-LT	20mm-B
Sieve Size (µm)	% Passing by Mass	% Passing by Mass	% Passing by Mass
25,000	100	100	100
20,000	100	100	97-100
16,000	100	100	83-97
12,500	100	100	70-92
10,000	97-100	97-100	61-84
8,000	70-94	80-94	52-77
6,300	45-85	65-85	44-70
5,000	32-75	50-75	38-65
2,500	23-55	35-55	26-52
1,250	16-45	25-45	18-41
630	11-36	20-36	13-31
315	8-26	14-26	9-22
160	5-15	7-15	6-14
80	3-8	4-8	

- 2.3.3 Coarse Aggregate: Coarse fractions retained on the 5.0 mm sieve shall consist of hard, clean, durable crushed stone, crushed slag, crushed gravel or a combination thereof, or of material naturally occurring in a fractured condition.

2.3.3.1 At the mix design gradation, the virgin coarse aggregate must meet the following requirements:

Property	Test Method	Requirement
LA Abrasion, % loss, Charge C	AASHTO T 96	30.0% maximum
Soundness (5 Cycles), % loss, MgSO <sub>4</sub>	AASHTO T 104	16.0% maximum
Detrimental Matter, %	Alberta Infrastructure TLT 107	2.0% maximum

2.3.3.2 Crushed-face Count in Mix: For each mix type, the minimum percentage, by mass retained down to the 5,000 µm sieve, having at least 2 crushed faces shall be as follows (provided there is a minimum 50% crushed-face count in each individual sieve size greater than 5,000 µm):

Mix Type	10mm-HT		10mm-LT		20mm-B	
Minimum 2 Crushed-face	90%		85%		90%	
Sieve Fraction (µm)	1 Face	2 Face	1 Face	2 Face	1 Face	2 Face
- 25,000 to + 12,500	-	-	-	-	90	85
- 12,500 to + 10,000	95	90	90	85	95	90
- 10,000 to + 5,000	98	95	93	90	98	95

2.3.4 Fine Aggregate: That fraction of the total aggregate passing the 5,000 µm sieve.

2.3.4.1 Fine aggregate shall contain a minimum 75% manufactured or crushed fines. The total percent of manufactured fines in a mix is taken as the percentage of manufactured fines in the minus 5,000 µm sieve fraction of the total combined aggregate. When the amount of manufactured fines in the RAP is unknown, it will be assumed that the amount of manufactured fines in the minus 5,000 µm sieve portion is 55% for 12.5 mm and 10 mm maximum-sized RAP aggregate.

2.3.4.2 Pit run shall be pre-screened to remove natural sand, and subsequently crushed and screened to obtain manufactured fines.

2.3.4.3 The Contractor shall notify the Contract Manager/Developer Representative when production of manufactured fines is scheduled, so that they have an opportunity to inspect the manufacturing process. Failure to notify the Contract Manager/Developer Representative will result in non-approval of the fines for use in asphalt concrete.

2.3.4.4 Mineral Filler: The mineral filler, if required, should consist of limestone dust, or an approved alternate, meeting the requirements of AASHTO M-17 or ASTM D242. The mineral filler must be free from organic impurities, shall have a plasticity index of zero, and shall meet the following gradation requirements:

Sieve Size (µm)	% Passing by Mass
600	100
300	92-100
80	60-100

2.3.4.5 At the mix design gradation, the virgin fine aggregate must meet the following requirements:

Property	Test Method	Requirement
Soundness (5 Cycles), % loss, $MgSO_4$	AASHTO T 104	16.0% maximum
Plasticity Index	AASHTO T 90	Non-plastic

## 2.4 MIX DESIGN

2.4.1 The mix design for the SGC hot-mix shall be performed by a qualified testing agency following the procedures indicated in "Superpave Mix Design", as set out in the latest editions of the Asphalt Institute Manual Series No. 2 (MS-2), "Superpave Mix Design" Superpave Series No. 2 (SP-2), [SUB-SECTION 1.6.4 OF THIS SECTION](#), and to the following criteria:

Selected Parameters	Mix Type		
	10mm-HT	10mm-LT	20mm-B
Number of Gyration			
Gyrations $N_{design}$	100	75	100
Gyrations $N_{maximum}$	160	115	160
Density at $N_{maximum}$ (% $G_{mm}$ )	98.0 max	98.0 max	98.0 max
Bailey CA-CUW	60-85 (fine-graded) 95-105 (coarse-graded)	60-85	60-85
Air Voids, % of total mix <sup>1</sup>			
Virgin Mix	4.0 ± 0.4%	3.0 ± 0.4%	3.5 ± 0.4%
Mix Containing RAS	3.5 ± 0.4%	2.5 ± 0.4%	3.0 ± 0.4%
VMA, %	13 min	14 min	12 min
Voids Filled, %	70-80	73-85	65-75
Tensile Strength Ratio, % (AASHTO T283) <sup>2</sup>	80 min	80 min	80 min
Minimum Film Thickness <sup>3</sup> , mm	7.5	7.5	6.5
APA <sup>4</sup> (mm, 52°C, 8,000 cycles)	5.0 max	7.0 max	5.0 max

### NOTES:

- <sup>1</sup> The mix design air voids shall be selected at the mid-point of the specified range, or the lowest value within the range in which all the other mix design criterion are met.
- <sup>2</sup> Where specified in the SPECIAL PROVISIONS, minimum TSR to be determined in accordance with AASHTO T283, with optional freeze-thaw, at air void content of 7.0 ± 0.5%.
- <sup>3</sup> Minimum film thickness to be determined in accordance with [APPENDIX A](#).
- <sup>4</sup> Where specified in the SPECIAL PROVISIONS, SGC mix shall be subjected to the APA procedure during the mix design process. Refer to [SUB-SECTION 1.7.8 OF THIS SECTION](#) for more information.

2.4.2 Modifications to the SGC mix design procedure or criteria are as follows:

2.4.2.1 Metric sieves in accordance with CGSB Specification 8-GP-2M shall be used.

2.4.2.2 PG asphalt cement content shall be reported based on the total mass of the mix.

## 2.5 JOB MIX FORMULA

2.5.1 Do not make changes to the approved job mix formula without written authorization from the Contract Manager/Developer Representative. Display the currently approved job mix formula in clear sight of the plant operator. Failure to display the job mix formula will result in a plant shutdown order by the Contract Manager/Developer Representative.

### 3.0 EXECUTION

#### 3.1 EQUIPMENT

- 3.1.1 Asphalt Mixing Plant: Conforming to ASTM D995, capable of consistently producing a homogeneous mixture in which all aggregate particles are uniformly and thoroughly coated with asphalt cement, heated to the mixing temperature for the grade of asphalt cement, and meeting the following supplementary requirements:
- 3.1.1.1 SGC hot-mix production shall not proceed unless all plant scales have been certified by Weights and Measures, Canada Consumer and Corporate Affairs, prior to start of construction season and as often as deemed necessary by the Contract Manager/Developer Representative to ensure their accuracy. Plant production shall not proceed until plant calibrations and recalibrations have been reviewed by the Contract Manager/Developer Representative on site. Notify the Contract Manager/Developer Representative at least 24 hours before plant calibrations are made or altered.
- 3.1.1.2 Provide free and safe access for the Contract Manager/Developer Representative to verify proportions, settings and temperatures, and to take samples of asphalt, aggregate and mixture.
- 3.1.1.3 All asphalt mixing plants are required to be operated in accordance with the Alberta Environmental Protection Code of Practice. All Contractors operating asphalt plants shall provide proof of registration with Alberta Environmental Protection and agree that the asphalt plant shall be operated in accordance with the Code of Practice.
- 3.1.2 Pressure Distributor: Self-powered, equipped with tachometer, pressure gauge, adjustable length spray bar, positive displacement asphalt pump with separate power unit, heating coils and burner for even heating of asphalt, and thermometer; capable of maintaining a uniform speed and uniform application of liquid asphalt at designated rate to surface widths up to 4 m; equipped with nozzle capable of hand spraying a uniform application of liquid asphalt.
- 3.1.3 Trucks for Transporting Mix: Trucks shall be compatible with size and capacity of the paver; with clean, tight, smooth-sided boxes equipped with waterproof tarpaulins of sufficient size to securely cover all material when boxes are fully loaded. The side of the truck box shall have a 12 mm diameter hole 300 mm from the bottom for checking mix temperature. Use only approved release agents, such as water based liquid soap, dry soap powder, or approved material, and drain all excess release agents from truck beds prior to loading SGC hot-mix. Petroleum derivatives are not permitted as release agents.
- 3.1.4 Paver: Pavers shall be self-propelled; with automatic screed controls to maintain grade from a reference string line or ski, and to control crossfall, smoothness and joint matching; with vibratory screed equipped with vibratory extensions and augers capable of uniformly spreading the mixture to specified widths and depths without segregation or tearing. Follow the manufacturer's recommended operating procedures.

- 3.1.5 Rollers: Shall be self-propelled, reversible; static, oscillating or vibratory steel-drum or pneumatic-tired rollers; with wetting and scraping devices to prevent adhesion of mix to drums or tires (petroleum derivatives are not permitted for cleaning); capable of attaining required density and smoothness; and pneumatic-tired rollers to be equipped with wind skirts. Follow the manufacturer's recommended operating procedures.
- 3.1.6 Hand Tools: Rakes, lutes, tampers, straightedges, levels, and other hand tools as necessary to complete the work shall be available.
- 3.2 AGGREGATE IN STOCKPILE
- 3.2.1 Stockpile aggregate in horizontal lifts. Stacking conveyors are not allowed for stockpiling. Draw aggregate from stockpile in a manner that mixes the full depth of stockpile face.
- 3.2.2 When it is necessary to blend aggregates from one or more sources to produce the combined gradation, stockpile each source or size of aggregate individually. Do not blend aggregates in a stockpile; feed through separate bins to the cold elevator feeders.
- 3.3 PRODUCTION OF THE MIX
- 3.3.1 Reference Practice: Follow good practices in handling materials and in plant production of hot mix as set out in the latest edition of the Asphalt Plant Manual, Asphalt Institute Manual Series No. 3 (MS-3), except where inconsistent with these CONSTRUCTION SPECIFICATIONS.
- 3.3.2 Production Rate: Produce SGC hot-mix at a rate compatible with the rate of placement and compaction on the project.
- 3.4 GOOD PAVING PRACTICE
- 3.4.1 Refer to the latest edition of the Asphalt Institute Manual Series No. 22 (MS-22), Construction of Hot Mix Asphalt Pavements, for guidance in good paving practice insofar as consistent with these CONSTRUCTION SPECIFICATIONS.
- 3.4.2 Provide an experienced foreman who shall be in full time attendance on the paving site to take charge of the entire paving operation from transporting of the mix to final rolling.
- 3.4.3 Production, placement, compaction and quality assurance of the SGC mix should be pursuant to the requirements of TB-1 "Hot Mix Asphalt Materials, Mixture Design and Construction" as prepared by the National Centre for Asphalt Technology (NCAT) and published by the National Asphalt Pavement Association (NAPA), for guidance in good practices of handling materials and hot-mix production insofar as consistent with this specification.
- 3.5 BASE PREPARATION
- 3.5.1 The Contract Manager/Developer Representative will inspect the existing pavement, base, or subbase before SGC hot-mix paving. The Contractor shall repair imperfections and clean up as

- directed by the Contract Manager/Developer Representative. Surface shall be true to line and grade within tolerance, firm, dry, and free of loose and deleterious material.
- 3.5.2 For new construction, or as directed by the Contract Manager/Developer Representative, all catch basins, manholes, water valves, and other fixtures shall be brought to proper grade before final lift paving. Provide temporary protection where necessary until completion of paving.
- 3.5.3 Apply tack coat to surfaces intended to contact hot-mix, including the sides of gutters, catch basins, manholes, and other concrete and metal fixtures. Before placing SGC hot-mix, let tack coat completely cure and have tacked surfaces inspected by the Contract Manager/Developer Representative. Refer to [SUB-SECTION 2.1 OF THIS SECTION](#).
- 3.5.4 Multiple Lift Paving: Apply tack coat to the previous lift before placing a lift, unless permitted otherwise by the Contract Manager/Developer Representative. Clean the exposed surface before tacking.
- 3.6 PREPARATION FOR OVERLAY OR FOR SUCCEEDING STAGE PAVING
- 3.6.1 Sweeping and Cleaning: Sweep the existing pavement surface with an approved mechanical sweeper. Remove all residual debris and accumulations of deleterious material.
- 3.6.2 Surface Milling: If specified, grind the existing surface to specified depth in accordance with [VOL. 2 SEC. 305, SURFACE MILLING](#).
- 3.6.3 Tack Coat: When the existing surface has passed inspection by the Contract Manager/Developer Representative, apply tack coat to surfaces intended to be in contact with SGC hot-mix, including the sides of gutters, catch basins, manholes, and other concrete and metal fixtures. Before placing SGC hot-mix, let tack coat completely cure and have tacked surfaces inspected by the Contract Manager/Developer Representative. Refer to [SUB-SECTION 2.1 OF THIS SECTION](#).
- 3.6.4 Prime Coat: Blot up excess primer with sand and keep traffic off the primed area until the primer has been completely absorbed and set.
- 3.6.5 Asphalt Levelling Course: The Contract Manager/Developer Representative will designate those areas having 20 mm or greater depressions for levelling course application. Spread the levelling course of SGC hot-mix with a paver one lift at a time, not exceeding 60 mm compacted thickness, and compact to required density.
- 3.7 WEATHER LIMITATIONS
- 3.7.1 No paving is permitted when rain or snow is imminent, or when the surface or base to be paved is wet, icy or snow-covered, or frozen at any point within 150 mm of the surface, unless waived by the Contract Manager/Developer Representative.

3.7.2 No paving is permitted when air temperature and wind speed conditions are below the applicable mat curve in [APPENDIX C](#), unless waived by the Contract Manager/Developer Representative.

### 3.8 TRANSPORTATION OF MIXTURE

3.8.1 Haul vehicles shall comply with the Alberta Highway Traffic Act and Alberta Motor Transport Act and have Alberta Class 1 Registration. Transport the SGC hot-mix in approved trucks with protective covers properly secured to the sides and back of truck box so that no funneling air movement develops under the cover during hauling.

3.8.2 Before loading with SGC hot-mix, thoroughly clean the box of any accumulation of asphaltic material. Lubricate inside surfaces with a light coating of soap, detergent solution or an approved release agent. Petroleum derivatives are not permitted.

3.8.3 Maintain trucks clean of mud and other material that could contaminate the paving area.

3.8.4 Discharge SGC hot-mix into the paver hopper without spilling and without the truck box bearing down on the hopper.

3.8.5 If the unit for payment is tonnes, no payment will be made for SGC hot-mix tonnage unless the Contract Manager/Developer Representative is provided with a copy of the corresponding asphalt mix load ticket immediately upon arrival at the site.

### 3.9 SPREADING

3.9.1 Placing the SGC hot-mix shall be a continuous operation with the paver moving at a uniform speed compatible with the rate of compaction rolling and SGC hot-mix delivery.

3.9.2 Ensure that mix compaction temperature meets the asphalt cement manufacturer's requirements, as measured in the mat, immediately behind the paver.

3.9.3 Spread the SGC hot-mix uniformly in one or more lifts, or as directed by the Contract Manager/Developer Representative, to depths sufficient to obtain the following minimum and maximum compacted thicknesses:

Mix Type	Minimum Compacted Thickness (mm)	Maximum Compacted Thickness (mm)
10mm-LT	40	75
10mm-HT	40	75
20mm-B	45	100

3.9.4 Excess SGC hot-mix is to be wasted. Do not pick up any SGC hot-mix materials that has been placed through a paver and put back into the paver hopper. Placing of any excess paver laid SGC hot-mix back into the paver hopper will be assessed a \$500.00 penalty per occurrence, as documented by the Contract Manager/Developer Representative.

3.9.5 If segregation of mix material occurs, the Contract Manager/Developer Representative will immediately suspend spreading until the cause is determined and corrected.



- 3.9.6 Prior to roller compaction, remove flat spots, sandy accumulations, high and low spots, and other irregularities, and repair with SGC hot-mix. Scratch surface with rake tines to ensure bonding of added mix. Do not spread loose SGC hot-mix that has been raked off onto the mat.
- 3.9.7 Any piece of machinery causing the spillage of fuel oil, lubricating oil or hydraulic oil onto the surface prior to laying or onto the finished surface shall be removed from the work. Any areas of base or surface course affected by the spillage will be cut out and replaced as the Contract Manager/Developer Representative shall direct and at the Contractor's own expense.
- 3.10 HAND SPREADING
- 3.10.1 Hand spread SGC hot-mix in small areas not accessible to paver, and where permitted by the Contract Manager/Developer Representative.
- 3.10.2 Do not broadcast SGC hot-mix. Hand place mix carefully to avoid the segregation of coarse and fine aggregate. Use lutes and rakes to thoroughly loosen and uniformly distribute the SGC hot-mix. Remove lumps that do not break down readily.
- 3.10.3 Heat hand tools to prevent asphalt sticking. Do not overheat tools to prevent damaging of the SGC hot-mix.
- 3.10.4 Before rolling, check surface with template or straightedge, and correct irregularities.
- 3.11 COMPACTION
- 3.11.1 Compact the SGC hot-mix mat with rollers in good working order and operated by competent operators. Use the number, type, and mass of rollers required to obtain the required compaction within the available compaction time and compatible with the rate of SGC hot-mix placement.
- 3.11.2 Develop and follow the best pattern of rolling to obtain the uniform compaction across the mat, including joints and edges, without degrading the aggregate through over compaction. Indicate the rolling pattern to the Contract Manager/Developer Representative when requested.
- 3.11.3 Perform compaction rolling with rollers following the paver as closely as possible, until required density is obtained. Perform finish rolling to eliminate equipment marks and to create a surface with a uniform tightly knit texture.
- 3.11.4 Complete final rolling before the mat surface temperature reaches 40°C as determined with an infrared thermometer.
- 3.11.5 For small areas inaccessible to rollers, use an approved vibratory plate compactor or hand tamper to thoroughly compact the SGC hot-mix. Minimal amounts of water may be sprayed on the asphalt surface to aid compaction with plate compactors or hand tampers.

3.11.6 If compaction or finish rolling difficulties occur, suspend paving operations, redesign the mix and obtain Contract Manager/Developer Representative's approval of a trial batch before resuming paving.

## 3.12 JOINTS

### 3.12.1 Transverse Joint

3.12.1.1 Plan length of spread to provide for a minimum 1 m offset of transverse joints in successive lifts and adjacent mats.

3.12.1.2 Transverse joints shall be straight, have a vertical face painted with tack coat before placement of the adjacent mat, be thoroughly compacted, and meet surface tolerances.

### 3.12.2 Longitudinal Joint

3.12.2.1 Plan mat limits to ensure that surface longitudinal joints will be offset not more than 150 mm from the centre of a proposed pavement marking line between travel lanes. If permitted by the Contract Manager/Developer Representative, the joint may be located at the centre of a travel lane.

3.12.2.2 Plan width of spread to provide for a minimum 150 mm offset (in a dovetail pattern) of longitudinal joints in successive lifts.

3.12.2.3 Create a longitudinal joint while the temperature at the edge of the first of two adjacent mats is above 80°C. Allow an overlap of 25 to 50 mm between mats. This may be accomplished by multiple pavers in staggered formation, or by limiting paver advance to the following:

Air Temperature °C	Maximum Advance (m)
Above 27	250
15 – 27	190
7 – 15	125
Below 7	90

3.12.2.4 Do not roll the 150 mm wide strip along edge of first mat until the adjacent mat is placed. Roll the joined mat immediately to insure bonding while the mix at the joint is about 80°C.

3.12.2.5 If a hot longitudinal joint as described in [SUB-SECTION 3.12.2.3 OF THIS SECTION](#) cannot be created, then carefully roll the edge of the first mat, form or cut a clean vertical face 150 mm back from the mat edge and to the full depth of the mat, and paint with tack coat before placing the adjacent mat.

3.12.2.6 The finished longitudinal joint shall be thoroughly compacted and shall meet surface tolerances.

3.12.2.7 Should the longitudinal joint treatment indicated in [SUB-SECTION 3.12.2.5 OF THIS SECTION](#) not be performed where required, the area of asphalt pavement will be assessed a pay factor of

- 95%. This pay factor will be applied to the price of the total quantity of asphalt placed in the mat area.
- 3.13 MIX PRODUCTION AND PAVING TOLERANCES
- 3.13.1 Mixing Temperature: The allowable variation from the design mixing temperature shall be  $\pm 10^{\circ}\text{C}$ .
- 3.13.2 Asphalt Cement Content: Allowable variation from approved design asphalt cement content shall be  $\pm 0.3\%$  by mass of mix. Unit price adjustments for high or low asphalt cement contents can be found in [APPENDIX B](#).
- 3.13.2.1 In the event of a deficient asphalt cement content result, the following asphalt cement content appeal mechanism will be allowed by the County and shall be paid for by the Contractor:
- (i) The original core location shall be confirmed by the testing agency.
  - (ii) The Contractor will then be allowed to re-core for determination of asphalt cement content. The re-coring (which may require multiple cores to obtain the required quantity of materials for a re-test) will be taken from the mat representing the original test within 10 m on either side of the original test location. Only a single test is required for verification process. All core holes to be filled with hot-mix asphalt, by the Contractor, to the satisfaction of the Contract Manager/Developer Representative and at no expense to the County.
  - (iii) The result from the asphalt cement content test from the re-core will supersede the original QA result.
  - (iv) If the asphalt cement content of the re-core is within the penalty range, the penalty will be calculated in accordance with [APPENDIX B](#) for the quantity of asphalt represented by the test. No further re-coring is allowed.
  - (v) If the asphalt cement content of the re-core is in the "grind and resurface" range, additional cores will be taken at equal distances on either side of the original core and tested for asphalt cement content. This process is to be repeated until locations on either side of the re-core identify asphalt within specification. The spacing is at the discretion of the Contractor.
  - (vi) Once the area of asphalt to be "ground and resurfaced" is identified, the area inclusive of the last core used to delineate the deficient area shall be removed and replaced to the satisfaction of the Contract Manager/Developer Representative.

- 3.13.3 Aggregate Gradation: The variation from the approved job-mix aggregate gradation shall not exceed the following limits:

Sieve Size (µm)	% Passing by Mass	
	Individual Sample	Average of Last 3 Samples
20,000	± 2.0	± 1.0
16,000	± 3.0	± 1.0
12,500	± 4.0	± 2.0
10,000	± 5.0	± 3.0
8,000	± 4.0	± 3.0
6,300	± 4.0	± 3.0
5,000	± 3.0	± 3.0
1,250	± 3.0	± 2.5
630	± 3.0	± 2.0
315	± 3.0	± 2.0
160	-3.0 to +1.0	-2.0 to +1.0
80	-2.5 to +1.0	-1.0 to +0.5

- 3.13.4 Air Voids: For each mix type, the air voids shall not exceed the following tolerances:

Air Voids	10mm-HT	10mm-LT	20mm-B
% of total mix	4.0 ± 0.5	3.0 ± 0.5	3.5 ± 0.5

- 3.13.5 Minimum Film Thickness in Mix (determined by method outlined in [APPENDIX A](#)):

Film Thickness	10mm-HT	10mm-LT	20mm-B
Minimum Film Thickness, µm	7.5	7.5	6.5

- 3.13.6 Voids Filled in Mix

	10mm-HT	10mm-LT	20mm-B
Voids Filled, %	70-80	73-85	65-75

- 3.13.7 If one or more of the preceding SGC mix production tolerances are not met, the Contract Manager/Developer Representative will order suspension of mix production until the Contractor has demonstrated to the Contract Manager's/Developer Representative's satisfaction that corrective measures have been taken to produce a mix that meets the requirements of these CONSTRUCTION SPECIFICATIONS. The Contract Manager/Developer Representative will also require the Contractor to remove the nonconforming mix from the roadway at the Contractor's cost.

- 3.13.8 Mixture Handling Tolerance: In accordance with [SUB-SECTION 3.9.4 OF THIS SECTION](#), a \$500.00 penalty shall be assessed for each documented occurrence.

## 3.14 SURFACE TOLERANCES

- 3.14.1 Smoothness: Maximum variation under a 3 m straightedge shall be as follows:

- Longitudinal (in the direction of travel): 3 mm.
- Transverse (across the direction of travel): 6 mm.

- 3.14.2 Grade:  $\pm 6$  mm maximum variation from designated grade elevations.
- 3.14.3 Texture: Finished surface shall be free of visible signs of poor workmanship, such as, but not limited to:
- Segregation, as demonstrated through sandy spots or excessively open spots (areas of water bleeding from the mat).
  - Areas exhibiting excess or insufficient asphalt cement, as demonstrated through fat spots or open textured spots.
  - Improper matching of longitudinal and transverse joints.
  - Dimpling, roller marks, cracking, or tearing.
- 3.14.4 If surface and grade tolerances are exceeded, or if surface texture is not met, grind down and resurface defective areas as directed by the Contract Manager/Developer Representative.

### 3.15 THICKNESS TOLERANCE

- 3.15.1.1 Deficient Thickness: If average core thickness is deficient, that area of asphalt pavement will be assessed a pay factor according to [APPENDIX B](#), to be applied to the price of the quantity of SGC hot-mix in that mat area.
- 3.15.1.2 Excess Thickness: Asphalt pavement with excess thickness may be accepted if surface and grade tolerances and texture are met, but no additional payment is due.

### 3.16 DENSITY TOLERANCE

- 3.16.1.1 Required Density: Each mat of hot-mix placed shall be compacted to the following minimum density (Percent of Maximum Theoretical Density (MTD)) for the type of paving, or as indicated in the SPECIAL PROVISIONS:

Minimum Density (%)	Type of Paving
94	All stages in staged paving for roadways, except lanes; FAC overlays.
93	Paving for lanes.
93	Rehabilitation overlay.
93	Asphalt trail.

- 3.16.1.2 Deficient Density: If the average core density is below specified, the represented area of mat may be accepted subject to a pay factor according to [APPENDIX B](#), to be applied to the price of the quantity of SGC hot-mix in that mat area.
- 3.17 APA TOLERANCE (WHERE SPECIFIED IN THE SPECIAL PROVISIONS)
- 3.17.1 Maximum APA Rutting: If average core APA rutting is above 5.0 mm for 10mm-HT and 20mm-B, or above 7.0 mm for 10mm-LT, that area of asphalt pavement will be assessed a pay factor according to [APPENDIX B](#), to be applied to the price of the quantity of SGC hot-mix in that mat area.

- 3.18 TSR TOLERANCE (WHERE SPECIFIED IN THE SPECIAL PROVISIONS)
- 3.18.1 Deficient TSR: If the TSR result, as determined by the testing agency, of field samples is below 80.0% (for laboratory prepared samples of field mix), the following actions will be taken by the Contract Manager/Developer Representative:
- (i) First occurrence; the Contractor will receive a warning letter from the Contract Manager/Developer Representative indicating the deficient TSR value.
  - (ii) Second consecutive occurrence; the Contractor will have their production suspended until they can provide acceptable TSR test results to the Contract Manager/Developer Representative. During this time, the Contractor and the Contract Manager/Developer Representative will meet to determine the impact of the non-compliance, and specify the necessary remedial action to be taken by the Contractor. Remedial action shall be either acceptance, acceptance at a pay adjustment as detailed in [APPENDIX B](#), or removal and replacement at no cost to the County. If suspended, the paving program shall only continue upon approval by the Contract Manager/Developer Representative.
- 3.19 CLEANUP
- 3.19.1 Leave site clean and free of debris and surplus materials.
- 3.19.2 Opening to Traffic: Open new SGC hot-mix pavement to traffic when the surface has cooled to ambient temperature or when authorized by the Contract Manager/Developer Representative. Remove barricades and signs when no longer needed.
- 4.0 MEASUREMENT AND PAYMENT**
- 4.1 MEASUREMENT
- 4.1.1 Asphalt Surface or Overlay: Measured by the square metre if the compacted thickness is specified, or by truck haul cards if the tonnage is specified; for mix types as indicated in the SCHEDULE OF QUANTITIES.
- 4.1.2 Asphalt Base: Measured by the square metre at a specified compacted thickness for mix types, as indicated in the SCHEDULE OF QUANTITIES.
- 4.2 PAYMENT
- 4.2.1 Payment at the unit rate bid shall be full compensation for designing the mix; supplying, testing, and mixing the mineral aggregate, asphalt cement, and filler; for hauling the mix from the plant to the jobsite; for cleaning the base; tacking or priming the base; spreading and compacting the mix; cleaning up the site; controlling traffic; and for all labour, equipment, tools and incidentals necessary to completed the work in accordance with these CONSTRUCTION SPECIFICATIONS, less any deductions for deficiencies.

## APPENDIX A: METHOD FOR DETERMINING FILM THICKNESS

### A1 Surface Area Factor ( $S_a$ ):

Sieve Size ( $\mu\text{m}$ )	Surface Area Factor ( $\text{m}^2/\text{kg}$ )
5,000	0.38
2,500	0.78
1,250	1.55
630	2.90
315	5.60
160	12.20
80	29.00

Determine total surface area as the sum of the surface areas for the 7 specified sieve sizes according to the formula:

$$S_a = 0.38 + \frac{\sum (\% \text{ Passing} \times \text{Surface Area Factor})}{100}$$

### A2 Corrected $S_a$ ( $S_{ac}$ ):

Correct  $S_a$  for actual Aggregate Bulk Specific Gravity by the formula:

$$S_{ac} = S_a (2.650 / \text{Actual Bulk Specific Gravity})$$

### A3 Film Thickness ( $F_t$ ) Calculation:

$$F_t = \frac{10 (P_{ac} - P_{abs})}{S_{ac} \times SG_{(ac)}} \text{ in microns } (\mu\text{m})$$

where

$P_{ac}$  = Percent Asphalt Cement Content by dry mass of Aggregate

$P_{abs}$  = Percent of Absorbed Asphalt Cement by dry mass of Aggregate

$S_{ac}$  = Corrected  $S_a$

$SG_{ac}$  = Specific Gravity of Asphalt Cement

## APPENDIX B: ASPHALT PAY FACTORS

### B1 Asphalt Density Pay Factors

94% Density Required		93% Density Required	
Actual Density (%)	Pay Factor (%)	Actual Density (%)	Pay Factor (%)
94.0	100.0	93.0	100.0
93.9	99.9	92.9	98.4
93.8	99.8	92.8	96.8
93.7	99.6	92.7	95.2
93.6	99.4	92.6	93.9
93.5	99.1	92.5	92.0
93.4	98.7	92.4	90.4
93.3	98.3	92.3	88.8
93.2	97.8	92.2	87.3
93.1	97.2	92.1	85.7
93.0	96.5	92.0	84.1
92.9	95.8	91.9	82.5
92.8	95.0	91.8	80.9
92.7	94.2	91.7	79.3
92.6	93.3	91.6	77.7
92.5	92.3	Less than 91.6	Grind and Resurface
92.4	91.1		
92.3	89.8		
92.2	88.5		
92.1	87.1		
92.0	85.5		
91.9	83.8		
91.8	82.0		
91.7	80.0		
91.6	77.7		
Less than 91.6	Grind and Resurface		

### B2 Asphalt Thickness Pay Factors

Thickness Deficiency (%)	Pay Factor (%)
10.0	100.0
11.0	97.0
12.0	93.7
13.0	90.0
14.0	85.5
15.0	80.5
16.0	75.0
17.0	68.0
18.0	60.0
19.0	50.0
Over 19.0	Grind and Resurface



### **B3 Asphalt Cement Pay Factors**

Asphalt Cement Content (%)	Pay Factor (%)
± 0.00-0.30	100.0
± 0.31-0.35	94.0
± 0.36-0.40	90.0
± 0.41-0.45	86.0
± 0.46-0.50	78.0
± 0.51	Grind and Resurface

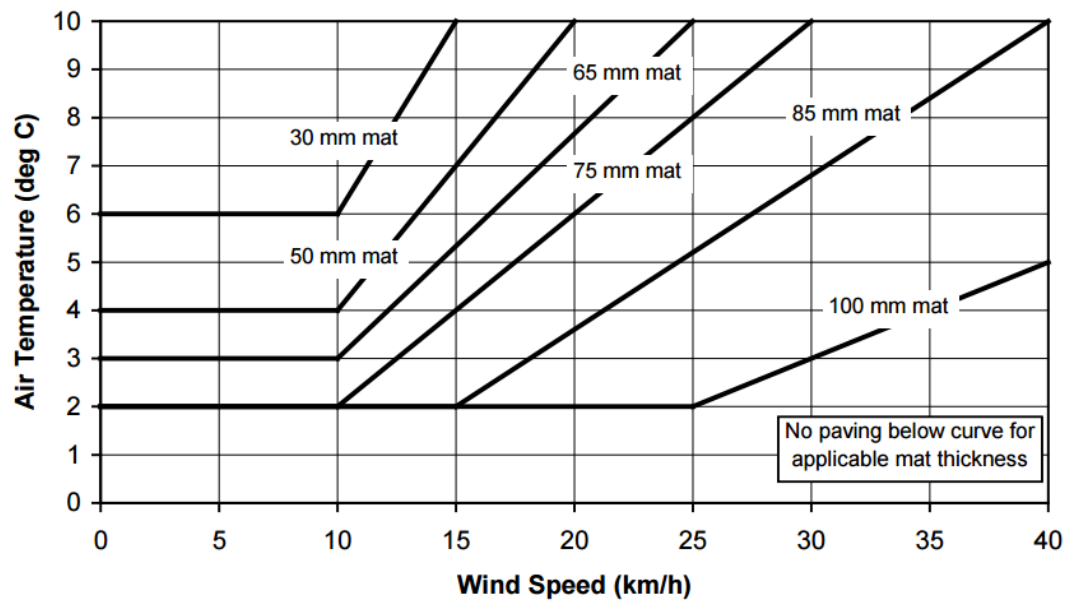
### **B4 APA Rutting Pay Factors**

APA Rutting Measurement (mm)		Pay Factor (%)
10mm-HT and 20mm-B Mixes	10mm-LT Mix (mm)	
5.0	7.0	100.0
5.2	7.2	95.0
5.4	7.4	90.0
5.6	7.6	85.0
5.8	7.8	80.0
6.0	8.0	75.0
6.2	8.2	70.0
6.4	8.4	65.0
6.6	8.6	60.0
6.8	8.8	55.0
Over 6.8	Over 8.8	Grind and Resurface

### **B5 TSR Pay Factors**

Percentage of TSR	Pay Factor (%)
80.0 or higher	100.0
78.0-79.9	99.0
76.0-77.9	97.0
74.0-75.9	95.0
72.0-73.9	92.0
70.0-71.9	89.0
68.0-69.9	85.0
66.0-67.9	81.0
64.0-65.9	76.0
62.0-63.9	71.0
60.0-61.9	65.0
Less than 60.0	Grind and Resurface

## APPENDIX C: AIR TEMPERATURE AND WIND LIMITATIONS ON PAVING



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Plant mixed cement stabilized base course shall consist of mineral aggregate, portland cement, and water uniformly mixed in a plant designed for this purpose, and hauled, spread and compacted to the specified thickness on the job site; and shall conform to lines, grades and typical cross sections as shown on the Construction Drawings or as established by the Contract Manager/Developer Representative.

**2.0 PRODUCTS****2.1 CEMENT**

- 2.1.1 The cement shall be **Portland Cement** to CAN/CSA-A3000, A3001-13 Type GU – General use hydraulic cement.

**2.2 AGGREGATE**

- 2.2.1 When tested by means of laboratory sieves the mineral aggregate shall conform to [VOL. 2 SEC. 302, GRANULAR MATERIALS](#), Designation 2 Class 20.

**2.3 WATER**

- 2.3.1 The water used for mixing shall be free from oils, acids, alkalis, organic materials or any substance which could affect the hydration of the cement. The source shall be approved by Contract Manager/Developer Representative.

**3.0 EXECUTION****3.1 COMPOSITION AND PROPORTIONING**

- 3.1.1 Mix Design: The Contractor shall submit to the Contract Manager/Developer Representative at least seven days prior to commencing production, a mix design performed by a qualified laboratory, based on the PCA Shortcut Method B and meeting the following criteria:

- 3.1.1.1 Minimum compressive strength: 3.0 MPa at 7 days.

- 3.1.1.2 The mix design shall list the following information:

- (i) A minimum of one sieve analysis for each 2000 tonnes of aggregate in stockpile and the overall average gradation of the stockpile;
- (ii) Mass of cement per tonne of dry aggregate; and
- (iii) Mass of water per tonne of dry aggregate.

- 3.1.2 Job Mix Formula: A job mix formula based on the mix design shall be submitted to the Contract Manager/Developer Representative at least 7 days prior to commencing construction. It shall also be posted in a conspicuous place in sight of the plant operator and shall contain the following:
- 3.1.2.1 Batch Plants:
- (i) Weight of aggregate per batch;
  - (ii) Weight of cement per batch;
  - (iii) Weight of water per batch; and
  - (iv) Time of mixing.
- 3.1.2.2 Continuous Plant:
- The settings which govern the cement and aggregate conveyors as well as the water supply shall be indicated, as determined by trial batches.
- 3.1.3 Changes of Proportion: The Contractor shall notify the Contract Manager/Developer Representative of any proposed changes in the plant settings prior to making these changes.
- 3.2 MIXING PLANT REQUIREMENTS
- 3.2.1 General: The plant shall be of any type which can consistently produce an aggregate cement mixture which meets the requirements of these CONSTRUCTION SPECIFICATIONS.
- 3.2.2 Continuous Plant: Continuous plants shall be of a type having positive interlocking control between the gravel feed, and cement feed.
- 3.2.3 Batch Plant: Batch plants shall be of a type which automatically measures the aggregate cement and water. It shall be equipped so that predetermined settings cannot be changed by the operator without concurrence of the Contract Manager/Developer Representative.
- 3.3 MATERIALS
- 3.3.1 Mixing: Aggregate, Portland Cement, and Water shall be mixed in the plant in the proportion necessary to produce a 7 day strength of 3.0 MPa according to the test method ASTM D698.
- 3.3.2 Hauling and Placing: The mixture shall be hauled to the construction location in trucks equipped with and using protective covers and shall be placed on the moistened subgrade in a uniform layer by an approved spreader. Not more than thirty minutes shall elapse between the placing of soil cement in adjacent spreads. Placement of soil cement should be within depths of 100 mm-200 mm or as approved by the Contact Manager/Developer Representative.
- 3.3.3 Do not place the soil cement mixture when the subgrade or subbase is frozen, or when the ambient air temperature is likely to drop below 2°C within 24 hours. Protect the soil cement from freezing for at least 7 days after placement.

3.3.4 Compaction: Spreading and compaction of the mixture shall begin not later than 60 minutes after the time of mixing, and shall be completed not more than 2 hours after the time of mixing.

3.3.5 Density: The base shall be compacted in one lift to a density not less than 100% of the Standard Proctor Density test.

3.3.6 Finishing: After compaction has been attained, the surface shall be shaped to proper lines, grades and section.

The moisture content of the surface material shall be maintained at not less than the optimum moisture content during finishing operations. The finished surface shall contain no segregation, loose material or imprints.

3.3.7 Joints: At the end of each days work, a construction joint shall be made by trimming the end of the compacted mixture to a straight line normal to the centre line of the roadbed, and with a vertical edge in compacted soil cement.

3.3.8 Curing Seal: The bituminous material for curing base course shall be A.E.P. (asphalt emulsion primer) and shall be applied immediately after the packing is completed. Rate of application shall be determined by the Contract Manager/Developer Representative and may vary from 0.5 to 1.4 L/m<sup>2</sup>.

3.3.9 Surfacing: The wearing course of the asphaltic concrete shall be applied within 72 hours of completion of soil cement. If the wearing course cannot be applied within this time, then the area shall be sanded if required, opened to traffic, and left for a period of not less than seven days or more than fourteen days. The location must be cleaned and repaired, at Contractors expense, prior to application of the wearing course.

#### 3.4 TOLERANCES AND ENFORCEMENT

3.4.1 Surface: The surface of the cement stabilized base shall not vary by more than 12 mm under 3 m straightedge.

3.4.2 Grade: If the grade of the stabilized base is higher than the design grade by more than 6 mm the Contractor shall grind the area without destroying the surface, provided specified thickness is met. If the thickness specified after removing the excess no longer meets the specified thickness then the reductions in [SUB-SECTION 3.4.3 OF THIS SECTION](#) shall apply.

If the grade of the stabilized base is lower than the design grade by more than 15 mm, the elevation difference may be made up with an extra thickness of the subsequent paving course at the expense of the Contractor.

3.4.3 Thickness: Areas suspected of being deficient or excessive in thickness shall be cored at the rate of three cores per 1000 m<sup>2</sup>. If the average core thickness is deficient, that area will be assessed a pay factor according to [TABLE 320.1 OF THIS SECTION](#).

Excess thickness may be accepted if surface and grade tolerances are met, but no additional payment is due.

TABLE 320.1 SOIL CEMENT THICKNESS PAY FACTORS	
Thickness Deficiencies (mm)	Pay Factor (% of Contract Price)
15	100.0
16	97.8
17	95.3
18	92.3
19	88.8
20	84.8
21	80.0
22	74.5
23	68.0
24	60.0
25	50.0
Over 25	Remove and replace or reconstruct

- 3.4.4 Density: Maximum density is the dry unit mass of sample at optimum content as determined in the laboratory according to ASTM D558 Method B. Each test shall represent approximately 1000 m<sup>2</sup> of the base. If any test fails to meet the density specified, two additional tests shall be taken within the area in question and the average result of these tests shall represent the area. All work/costs required for retesting is to be done/borne by the Contractor. The unit price bid shall be adjusted for any density deficiency as follows:

TABLE 320.2 SOIL CEMENT DENSITY PAY FACTORS	
Average Percent of Maximum Density	Pay Factor (% of Contract Price)
99.0	100.0
98.8	99.8
98.6	99.4
98.4	98.8
98.2	97.9
98.0	96.8
97.8	95.5
97.6	94.0
97.4	92.2
97.2	90.1
97.0	87.8
96.8	85.3
96.6	82.5
96.4	79.5
96.2	76.2
96.0	72.7
95.8	68.9
95.6	64.7
95.4	60.2
95.2	55.3
95.0	50.0
Under 95.0	Remove and replace or reconstruct

- 3.4.5 Strength: Seven day compressive tests (ASTM D1633 Method A) shall be taken at the plant or jobsite. Each test shall represent approximately 500 t of mixture.

The average of all tests as well as the average of any three consecutive tests shall equal or exceed the specified strength.

Specimens are moulded on site or in the laboratory into 101.6 mm diameter by 116.4 mm height cylinders using the compactive effort specified in ASTM D558 Method B. Specimens are cured for 7 days to ASTM D1632:9.1.

Should the average of any 3 consecutive tests fall below the specified strength the material produced during the period represented by these tests shall be paid for at an adjusted unit rate.

If the average core strength is below 3.0 MPa but greater than 2 MPa the rate shall have the same ratio to the bid unit rate that the square of the actual strength shall have to the square of the specified strength.

Should the average fall below 2 MPa the payment shall be reduced by 50%.

- 3.4.6 Surface Smoothness: The surface of the cement stabilized base course shall be such that, when tested with a 3 m straight edge placed on the surface of the roadway the maximum deviation of the surface from the edge of the straight edge shall not exceed 12 mm.

- 3.4.7 Reconstruction: Areas to be reconstructed shall be pulverized for the full depth until all the material being reprocessed passes the 25 mm sieve.

- 3.4.7.1 For a portion reprocessed the same day as originally constructed, add 50% of the original cement content.

- 3.4.7.2 For a section reprocessed the day following the original construction, add 75% of the original cement content.

- 3.4.7.3 For a section reprocessed after more than one day has elapsed since original construction, add 100% of original cement content.

### 3.5 RECONSTRUCTION - ROAD MIX

When reconstruction of the stabilized base is required, it shall be done according to the following SPECIFICATION.

3.5.1 Mixers: Mixers shall be approved cross shaft type capable of accurately and consistently controlling the depth of material being processed. They shall be capable of accurately controlling the volume of water added as related to the volume of material being mixed. They shall be capable of producing a homogeneous mixture of aggregate, cement, and water across the full cross section of the street or lane, for depth required. The mixture shall be pulverized so that all the material passes the 25 mm sieve.

3.5.2 Cement Spreaders: Cement Spreaders shall be the metered cross auger type capable of accurately spreading cement so that all parts of the mixture shall contain at least the minimum specified amount of cement.

3.5.3 Mixing Procedure

Pulverize: The stabilized base shall be completely pulverized so all materials passes the 25 mm sieve.

Spreading Cement

- (i) Cement shall be spread accurately and uniformly so that in no place shall the measured amount of cement be less than the specified amount.
- (ii) Cement shall not be spread in quantities greater than can be processed within 6 hours.
- (iii) Cement shall not be spread during periods of high winds or rain, or when there is an imminent danger of high winds or rain.

Completion: The compaction, finishing, joints, sealing and surfacing shall be done in accordance with [SUB-SECTION 3.3 OF THIS SECTION](#).

## 4.0 MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

4.1.1 Cement stabilized base shall be measured by the square metre if the thickness is specified.

4.1.2 Cement stabilized base shall be measured by the tonne if the thickness is not specified.

### 4.2 PAYMENT

4.2.1 The accepted cement stabilized base shall be paid for at the unit price bid which shall be full compensation for supplying and loading the mineral aggregate supplying and adding cement and water, mixing, hauling to location, spreading, compacting stabilized base, curing, sealing and for all equipment, tools and incidentals required to complete the work according to these CONSTRUCTION SPECIFICATIONS less any deductions for deficiencies.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Construction of curb, curb and gutter, sidewalk, median, island slabs, or concrete road base shall consist of air entrained concrete placed on a prepared base to the lines, grades and cross-sections shown on the CONSTRUCTION DRAWINGS or determined by the Contract Manager/Developer Representative and in accordance with these CONSTRUCTION SPECIFICATIONS.

**2.0 PRODUCTS****2.1 MATERIALS****2.1.1 Cement**

Portland Cement shall conform to the Standard Specifications for Portland Cement, CAN/CSA-A3000, A3301-13 for the following types:

Type GU – General Use hydraulic cement

Type HE – High early-strength hydraulic cement

Type HS – High sulphate-resistant hydraulic cement

Unless otherwise indicated, Portland cement Type GU shall be used. After October 15, Type HS sulphate-resistant cement will not be allowed.

**2.1.2 Aggregates**

Concrete aggregates shall conform to CAN/CSA A23.1-14, Concrete Materials and Methods of Concrete Construction.

Coarse aggregate shall have no more than 1.0% ironstone by mass of total coarse sample, and in aggregate down to what is retained on the 2.5 mm sieve shall have no more than 1.5% ironstone by mass of total fine sample, as determined by CAN/CSA A23.2-15A, Petrographic Examination of Aggregates for Concrete.

No aggregate from any one supplier or source shall be used unless proof of compliance with these CONSTRUCTION SPECIFICATIONS, as performed by an independent testing laboratory approved by the Contract Manager/Developer Representative, is first submitted to the Contract Manager/Developer Representative at least 10 days before the intended use.

## 2.1.3 Water

The water used in mixing concrete shall conform to clause 4.2.2, CAN/CSA A23.1-14: clear, free from injurious amounts of oil, acid, alkali, organic matter, sediment, or other substance harmful to the mixing and curing of concrete. For concrete and fillcrete, the Contract Manager/Developer Representative will allow a maximum of 20% of the mix water can consist of recycled slurry water. If recycled slurry water is utilized in the production of concrete or fillcrete the supplier shall provide quality assurance reports for the slurry water to the Contract Manager/Developer Representative.

## 2.1.4 Air Entraining Agent

An air entraining agent conforming to ASTM C260 shall be added to all concrete in sufficient amounts to produce air entrainment as required.

## 2.1.5 Chemical Admixtures

Admixtures including accelerators, retarders, and water-reducing agents, shall conform to ASTM C494, Chemical Admixtures for Concrete. Do not use chemical admixtures without written authorization of the Contract Manager/Developer Representative.

## 2.1.6 Flyash

Where permitted by the Contract Manager/Developer Representative, flyash may replace not more than 10% of the specified minimum cement content in the mix up to October 15.

After October 15, no portion of the specified minimum cement content shall be replaced with fly ash.

Where permitted by the Contract Manager/Developer Representative, use fly ash conforming to CAN/CSA-A3000, A3001-13 pozzolan type F or CI. Submit to the Contract Manager/Developer Representative together with the concrete mix design, the results of tests on the fly ash performed by an independent testing laboratory acceptable to the Contract Manager/Developer Representative.

## 2.1.7 Bar Reinforcement

Unless otherwise specified on the CONSTRUCTION DRAWINGS, reinforcing bars shall conform to the requirements of the Standard Specifications for Deformed and Plain Billett Steel Bars for Concrete Reinforcement CAN/CSA G30.18, grade 400.

## 2.1.8 Wire Reinforcement

Cold drawn wire or welded wire fabric for concrete reinforcement shall conform to the Standard Specifications for Welded Steel Wire Fabric for Concrete Reinforcement CSA G30.5M.

### 2.1.9 Curing Compound

A White Pigmented Resin Base Impervious Membrane Curing Compound shall be used and shall conform to ASTM Specifications C309, Type 2 - Class B.

### 2.1.10 Expansion Joint Filler

Expansion joint filler shall be non-extruding bituminous type and conforming to the ASTM Specification D1751.

### 2.1.11 Joint Sealant

Joint sealant shall conform as follows:

Median Application: Hot poured conforming to ASTM D1190.

Sidewalk Application: Cold applied, elastomeric joint sealant conforming to ASTM C-920-01.

## 2.2 CONCRETE MIX DESIGN

### 2.2.1 The concrete shall meet the following requirements:

	Straight Face Curb	All Other Structures
Minimum compressive strength at 28 days	30 MPa	30 MPa
Maximum size of coarse aggregate	20 mm	20 mm
Slump <sup>(1)</sup>	60 ± 20 mm	60 ± 20 mm
Entrained Air Content	5.5% or higher	5.5% or higher
Maximum water/cementing materials ratio (by mass)	0.45	0.45
Minimum Portland Cement Content	335 kg/m <sup>3</sup>	300 kg/m <sup>3</sup>

NOTE: <sup>(1)</sup> Slump for slip formed shall be:  
- 20 ± 10 mm for concrete for curb and gutter, new Jersey Barrier  
- 30 ± 10 mm for walk, monolithic walk, pavement  
Type HE or HS cement may be substituted for Type GU cement.

### 2.2.2 The Contractor shall submit to the Contract Manager/Developer Representative for approval, tests of aggregates and the mix proposed for the concrete. The proposed mix will be checked by the Contract Manager/Developer Representative who will have the Contractor make adjustments to the mix if deemed necessary.

If required, the Contractor shall produce evidence satisfactory to the Contract Manager/Developer Representative that the proportions selected will produce concrete of the quality specified. This may include the preparation of satisfactory trial mixes and at least 7 days compressive strength results thereon before the concrete is used. A 7 day test should give approximately 70% of the 28 day strength. These trial mixes shall be made under site conditions with similar equipment.

After the mix has been adequately proven as to strength and performance, adjustment may be undertaken, but only with the approval of the Contract Manager/Developer Representative. If during the progress of the Work the mix design is found to be unsatisfactory because of workability or other reasons, the Contractor to make the necessary adjustments. Notwithstanding the Contract Manager/Developer Representative approval of the design mix, it remains the responsibility of the Contractor that the concrete meets all the requirements of this CONSTRUCTION SPECIFICATION.

### 2.2.3 Seasonal Concrete Mix Requirements

2.2.3.1 Spring Mixes: From the commencement of the construction season to May 15, or as directed by the County, no replacement of the minimum cement content with fly ash (see [SUB-SECTION 2.1.6 OF THIS SECTION](#)) is permitted.

2.2.3.2 Summer Mixes: From May 16 to September 30, no more than 10% of the specified minimum cement content may be replaced with fly ash (see [SUB-SECTION 2.1.6 OF THIS SECTION](#)).

2.2.3.3 Fall Mixes: From October 1 to October 15, no replacement of the minimum cement content with fly ash (see [SUB-SECTION 2.1.6 OF THIS SECTION](#)) is permitted and Type HS cement may not be used.

2.2.3.4 Cold Weather Mixes: From October 16 to the end of the construction season, or as directed by the County, the requirements for cold weather concrete in [SUB-SECTION 3.6.6 OF THIS SECTION](#) must be met.

## 3.0 EXECUTION

### 3.1 PRODUCTION OF CONCRETE

#### 3.1.1 Storage

Cement and aggregate shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter; any material which has deteriorated or which has been damaged shall not be used for concrete.

#### 3.1.2 Batching Materials

Have the measurement of cement, aggregate, water and admixtures and the batching plant conform to Sections 7 and 8 of ASTM C94. Proportion all ingredients in accordance with the approved mix designs.

#### 3.1.3 Mixing

Mix thoroughly the ingredients to produce concrete of a satisfactory uniform mass in accordance with procedures, equipment and uniformity requirements described in Sections 9 and 10 of ASTM C94.

### 3.2 DELIVERY OF CONCRETE

#### 3.2.1 Rotating Drum Trucks

3.2.1.1 Transport concrete to the work site using equipment with mixing or agitating capabilities meeting the requirements in Section 10 of ASTM C94.

3.2.1.2 Rotate the drum on the jobsite at mixing speed for 3 minutes just before discharge.

#### 3.2.2 Additional Water

3.2.2.1 Do not add water after the initial introduction of mixing water to the batch, except when on arrival at the work site the slump of the concrete is less than that specified and only if permitted by the Contract Manager/Developer Representative.

3.2.2.2 Introduce additional water in an amount not exceeding 12 litres/m<sup>3</sup> to bring the slump within required limits.

3.2.2.3 Let the drum or blades turn an additional 30 revolutions, or more if necessary, at mixing speed until the required uniformity of the concrete is attained.

3.2.2.4 Never add water to the batch at any later time.

3.2.2.5 If a load of concrete is retempered with water and the resulting slump exceeds the specified maximum slump, that load of concrete will be rejected.

3.2.2.6 If the need for retempering with water becomes persistent or continuous, the Contract Manager/Developer Representative may refuse to accept concrete loads that have been retempered with water.

#### 3.2.3 Retempering with Air

3.2.3.1 An approved air-entraining agent may be added on site to boost the air content of a load of concrete, subject to the following conditions:

- (i) The addition of the air-entraining agent is performed by a quality control technician working for the concrete supplier or Contractor.
- (ii) The quality control technician must perform an air content test on each load of concrete retempered with air and shall immediately provide test results to the Contract Manager/Developer Representative.
- (iii) The discharge of the concrete can be completed within 1.5 hours after initial mixing at the plant, or before the drum has turned 300 revolutions, whichever comes first.
- (iv) If the need for retempering with air-entraining admixtures becomes persistent or continuous, the Contract Manager/Developer Representative or his representative may refuse to accept concrete loads that have been retempered with air-entraining admixtures.
- (v) Guidelines for retempering with air-entraining admixtures:

Measured Air Content (%)	Action
5.0 – 5.4	Addition of water or air-entraining admixtures as deemed necessary by the supplier to meet specifications
4.0 – 4.9	Air-entraining admixtures or air-entraining admixtures and water must be added as deemed necessary by the supplier to meet specifications
< 3.9	No re-tempering with air-entraining admixtures or water is permitted; load will be rejected

- (vi) When retempering with air-entraining admixtures, the supplier will be given one opportunity to meet the specified air content.
- (vii) The use of deairentaining admixtures is not permitted.
- (viii) A load of concrete will be rejected if it is retempered with air-entraining admixtures and the resulting air content exceeds the specified maximum air content.
- (ix) A load of concrete that is rejected at the jobsite may not be retempered at the concrete plant with cement, aggregate, sand or admixtures and subsequently returned to the jobsite.

3.2.4 When the ambient air temperature is lower than 5°C, the concrete delivered to the site shall have a temperature between 15°C and 30°C.

#### 3.2.5 Discharge Time

Complete the discharge of concrete within 1.5 hours, or before the drum has turned 300 revolutions, whichever comes first, after the initial introduction of mixing water to the cement and aggregates.

#### 3.2.6 Delivery Record

Provide the Contract Manager/Developer Representative with delivery ticket showing batch plant location, supplier's name, ticket and truck numbers, mechanically punched date and time of initial plant mixing, class and mix design designation, cement type and aggregate sizes, type and amount of admixtures, water added, volume of concrete, site arrival time, discharge time, and other information requested by the Contract Manager/Developer Representative.

### 3.3 TESTING AND INSPECTION

#### 3.3.1 Facilities

Proper facilities shall be provided for the Contract Manager/Developer Representative to inspect the ingredients and processes used in the manufacture and delivery of the concrete.

The manufacturer shall afford the Contract Manager/Developer Representative all reasonable facilities without charge for securing samples to determine whether the concrete is being furnished in accordance with this CONSTRUCTION SPECIFICATION.

### 3.3.2 Certification

The manufacturer of the ready mixed concrete shall furnish to the Contract Manager/Developer Representative a statement showing the quantities of materials used for each type of concrete and when any changes in composition is made.

### 3.3.3 Sampling and Testing

#### 3.3.3.1 Sampling and testing shall be carried out in accordance with the following:

- (i) Compression Test Specimens: Standard Method of Making and Curing Concrete Test Specimens in the Field (ASTM Designation C31).
- (ii) Compression Tests: Standard Method of Test for Compressive Strength of Cylindrical Concrete Specimens (ASTM Designation C39).
- (iii) Air Content: Standard method of Test of Air Content of Freshly Mixed Concrete by the Pressure Method (ASTM Designation C231).
- (iv) Slump: Standard Method of Test for Slump for Portland Cement Concrete (ASTM Designation C143).
- (v) Sampling Fresh Concrete: Standard Method of Sampling Fresh Concrete (ASTM Designation C172).

### 3.3.4 Test Frequency

Strength tests as well as slump and air-content tests shall generally be made at a frequency of not less than one test for each 100 m<sup>3</sup> of concrete placed, or at least once each day.

### 3.3.5 Conformance

#### 3.3.5.1 Strength

Concrete shall attain the minimum compressive strength corresponding to the percent of entrained air as follows. The 7-day strength is required for concrete placed after October 15, with cold weather protection strictly in accordance with Clause 7.1.2, CAN/CSA A23.1-14.

% Air Content	28-day Minimum Compressive Strength MPa		7-day Minimum Compressive Strength MPa (Placed After October 15)	
	Straight Face Curb & Gutter	All Other Structures	Straight Face Curb & Gutter	All Other Structures
5.5 to 5.9	30	30	27	30
6.0 to 8.0	42 - (2 * Air Content)	30	27	30
8 or greater	26	30	27	30

Strength values shall be interpolated for fractional air-content percentages.

The average of all sets of three consecutive strength tests shall equal or exceed the minimum specified strength and no single test shall fall more than 5 MPa below the specified compressive strength.

## 3.3.5.2 Slump

Slump tests will be taken at the point of the middle third of concrete load with every strength test and as required by the Contract Manager/Developer Representative.

For any load of concrete, if the measured slump is outside the specified limits, a check test is taken on another portion of the load, or a retest is done if retempering with water is permitted by the Contract Manager/Developer Representative. If a second test fails, the Contract Manager/Developer Representative may reject that load of concrete including removal of portion already poured.

## 3.3.5.3 Air Content

Air content tests will be taken between the 10% and 90% points of discharge of a concrete load with every strength test and as required by the Contract Manager/Developer Representative. If tested air content is outside specified limits, the Contract Manager/Developer Representative will require one of the following:

- (i) Air below 5.5% but not below 5.0%: Concrete poured from the load shall be removed and the rest of the load shall be discarded. However, the Contractor may elect at his own risk, to pour the rest of the load, provided that within 40 days after placement, he shall submit proof that such load of concrete meets the spacing factor requirement as determined for an air-void examination done by a quality control laboratory according to "air void examination" below, failing which the Contractor shall remove all concrete from that load.
- (ii) Air below 5.0%: Concrete poured from the load shall be removed and the rest of the load shall be discarded.
- (iii) Air above 8.0%: Concrete will be accepted if the compressive strength criteria is satisfied.

## 3.3.5.4 Air Void Examination

- (i) Method: To ASTM C457, modified point-count traverse method at 100X magnification.
- (ii) Sample: A 100 mm diameter core drilled from hardened concrete within each portion of pour in question.
- (iii) Cross-Section Preparation: The top of core shall be ground to 2 mm  $\pm$  0.5 mm below and parallel to the finished concrete surface texture to produce a surface suitable for microscopic examination.
- (iv) Maximum Spacing Factor Allowable: If the spacing factor obtained by a full traverse of the cross-section of the single core is greater than 0.23 mm concrete represented by the core shall be removed and replaced.
- (v) Where concrete has been rejected and is to be removed for not meeting the spacing factor, the Contractor, at the Contractor's expense, shall prove that the concrete left in place at both ends of the removal, meets the specified spacing factor by air-void examination to be performed by a qualified laboratory. The test results shall be submitted to the Contract Manager/Developer Representative.



### 3.3.6 Deficient Strength

In the event that the concrete tests fail to meet the specified strength, the Contract Manager/Developer Representative shall have the right to require any one or all of the following at the Contractor's expense:

- 3.3.6.1 Changes in the concrete mix proportions for the remainder of the work.
- 3.3.6.2 Coring and testing of the concrete represented by the tests which failed to meet the required strength; sampling and testing shall be according to ASTM Designation C42.
- 3.3.6.3 Replacement of any portion of the concrete, represented by the tests, which fail to meet these CONSTRUCTION SPECIFICATIONS including necessary testing.
- 3.3.6.4 Reduced payment for the portion of the work failing to meet the compressive strength criteria as follows:

Average Cylinder Strength (% of Specified Strength)	Pay Factor (% of Contract Price)
97.0	100.0
96.0	99.2
95.0	98.2
94.0	96.9
93.0	95.4
92.0	93.6
91.0	91.7
90.0	89.4
89.0	86.7
88.0	83.5
87.0	79.7
86.0	75.5
85.0	70.0
Under 85.0	No Payment

### 3.3.6.5 Optional Core Strength Test

The Contractor has the option, at the Contractor's expense to show evidence of strength by coring and testing to CAN/CSA A23.2-14.C by a qualified laboratory within 14 days of a failed 28-day cylinder test, or within 3 days of a failed 7-day cylinder test. Three cores shall be drilled from the hardened concrete represented by the failed cylinder strength test at locations approved by the Contract Manager/Developer Representative.

If the average strength of the three cores is equal to at least 85% of the specified strength and no one core is less than 75% of the specified strength, then the specified strength will be considered met; however, the concrete will still be subject to the pay factors in [SUB-SECTION 3.3.6.4 OF THIS SECTION](#) on the basis of the cylinder strength test.

## 3.4 FORMS

## 3.4.1 General

All forms shall be of wood, metal, or other approved materials. Wood used in forms for exposed surfaces shall be dressed to a uniform thickness and shall be free of loose knots or other defects. For unexposed surfaces, undressed wood may be used.

## 3.4.2 Design

3.4.2.1 The forms shall be substantial, unyielding and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incidental to the construction operation. They shall be sufficiently tight to prevent leakage of mortar and so designed that the finished concrete shall conform to shape, lines and dimensions shown on the CONSTRUCTION DRAWINGS and shall have a smooth surface.

3.4.2.2 A minimum of 50 m of forms shall be placed before a pour to allow checking for true line and grade.

3.4.2.3 Curbs having a radius of 50 m or less shall be constructed with flexible forms.

## 3.4.3 Cleaning and Piling

The inside of all forms shall be thoroughly cleaned and coated with an approved oil to prevent adherence of concrete. Any material which will adhere to or discolour the concrete shall not be used. The oil shall be applied before any reinforcement is placed.

## 3.4.4 Removal

Forms may be removed from the curb face while the concrete is sufficiently green to allow the curb face to be finished.

## 3.5 REINFORCEMENT

## 3.5.1 Location

## 3.5.1.1 Sidewalk and Crossings

Unless otherwise indicated on the CONSTRUCTION DRAWINGS, the Contractor shall place 10M steel reinforcing bars 1/3 m on either side of every joint, 50 mm above the base of the concrete.

The Contractor shall place reinforcement in crossings as shown on the CONSTRUCTION DRAWINGS.

## 3.5.1.2 Curb, Curb and Gutter, Gutter

Unless otherwise indicated, 10M sized bars shall be placed in the curb, curb and gutter, and gutter sections as shown on the CONSTRUCTION DRAWINGS at the following locations:

- (i) Where radius is equal to or less than 50 m.
- (ii) All crossings of sewer, utility, or other trenches.
- (iii) All catch basins.
- (iv) All curb crossings.
- (v) All curb returns.

Reinforcing shall extend a minimum of 1 m beyond the limits of the items specified above.

The Contractor shall be required to place reinforcement which shall protrude from the end of any section if the section is to be continued.

Where paving is to be concrete, the curb and gutter or gutter shall be tied to the base by placing 12.5 mm diameter reinforcing bars 1.25 m and 2 m in length alternately at 1.5 m centres with a minimum of 2 bars per curb and gutter section.

## 3.5.1.3 Tying Existing Concrete To New Concrete

The Contractor will be required to tie new concrete to existing concrete with 1000 mm lengths of 10M rebar, doweled 200 mm into the existing concrete. The number of dowels required is as follows:

- (i) Separate Curb and Gutter: 2 dowels in the gutter section and 1 dowel in the curb section.
- (ii) Separate Sidewalk: 3 dowels.
- (iii) Monolithic Curbs, Gutter and Sidewalk: 1 dowel in the gutter section and 3 dowels in the sidewalk section.

## 3.5.2 Cleaning

Metal reinforcement, before being positioned, shall be thoroughly cleaned of mill and rust scale and of coatings that will destroy or reduce the bond. Reinforcement appreciably reduced in section shall be rejected. Where there is a delay in depositing concrete, reinforcement shall be reinspected and, when necessary, cleaned.

## 3.5.3 Bending

Reinforcement shall be carefully formed to the dimensions indicated or as specified. Cold bends shall be made around a pin having a diameter of 4 or more times the least dimension of the reinforcement bars for steel of structural grade and 8 or more times that for steel of intermediate or hard grade.

### 3.5.4 Straightening

Metal reinforcement shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown shall not be used. Heating of reinforcement will be permitted only when the entire operation is approved by the Contract Manager/Developer Representative.

### 3.5.5 Placing Reinforcement

Metal reinforcement shall be accurately positioned and secured against displacement by using annealed iron wire of not less than No. 18 gauge or suitable clips at intersections and shall be supported by concrete or metal chairs or spacers or metal hangers.

The minimum clear distance between parallel bars shall be 1.5 times the diameter of round bars or 1.5 times the diagonal of square bars; if the ends of bars are anchored as specified, the clear spacing may be made equal to the diameter of round bars or to the diagonal of square bars, but in no case shall the spacing between bars be less than 25 mm or less than 1.25 times the maximum size of the coarse aggregate. Unless otherwise shown, reinforcement shall have a cover of 75 mm concrete.

### 3.5.6 Splicing

Splices, where permitted, shall provide sufficient lap to transfer the stress between bars by bond and shear. In such splices, adjacent bars shall not be spliced at the same point.

### 3.5.7 Future Bonding

Exposed reinforcement bars intended for bonding with future extensions shall be protected from corrosion.

## 3.6 CONSTRUCTION

### 3.6.1 Subgrade and Base

All excavations shall be carried out to the depths, widths, and grades as shown on the plans and as stated out on site. Any unsuitable or unstable material shall be removed as specified by the Contract Manager/Developer Representative. Such excavation if below the required grade shall be backfilled with suitable material and compacted to grade. The top on 150 mm of the finished base shall be compacted to 100% of Standard Proctor.

All embankments shall be constructed with a top width of at least 300 mm wider on each side of the structure to be built on it. Embankments shall be constructed in layers no more than 150 mm in depth and compacted to 97% of Standard Proctor; with the exception of the top 150 mm which shall be compacted to 100% percent of Standard Proctor.

All concrete curb, curb and gutter, sidewalk and slabs shall be constructed on a granular base course unless otherwise directed by the contract manager/developer representative. The granular base course shall consist of 150 mm compacted thickness of Designation 3 Class 20 aggregate. Compaction and tolerance testing shall be to Section 7.303 Granular Sub-Base and Base Course.

The final finishing of the base shall ensure the minimum thickness of the concrete and base shown on the CONSTRUCTION DRAWINGS.

Where necessary the base shall be kept sufficiently moist to prevent absorption of water from freshly poured concrete.

### 3.6.2 Handling and Placing Concrete

Concrete shall be placed only after the subgrade, base and forms have been approved the Contract Manager/Developer Representative. At the end of a pour, the concrete must be finished to a regular joint and the excess concrete shall not be washed between the forms.

Concrete shall be handled from the mixer to the place of deposit and placed as quickly as possible and in such a manner as to prevent segregation of the ingredients. It shall be deposited in the forms as near as practicable to its final position to avoid rehandling. When the ambient air temperature in the shade is 23°C or higher, concrete at time of placement shall not have a temperature exceeding 30°C. Place hot and cold weather concrete to CAN/CSA A23.1-14. Ensure that the procedures used are approved by the Contract Manager/Developer Representative.

The concrete shall be deposited in the forms, within 60 minutes of the start of mixing. The rate of delivery of the mixed concrete shall be such that the interval between placing of successive batches shall not exceed 30 minutes and concreting operations shall be continuous until the section of pour is completed. Should the concreting operation be unavoidably interrupted, then construction joints shall be formed at a location approved by the Contract Manager/Developer Representative.

### 3.6.3 Compacting and Finishing

#### 3.6.3.1 Monolithic Curb, Gutter, Sidewalk, and Road Base

The concrete shall be compacted by means of a vibrating screed, the design of which must be approved by the Contract Manager/Developer Representative.

After vibration, the concrete shall be worked with wood and steel trowels to a smooth finish. The final finish shall be a brush finish with an approved nylon bristol brush, transversely on the walk, and longitudinally along the curb and gutter. If there is evidence of concrete bleeding, finishing shall cease until the excess water has evaporated to the satisfaction of the Contract Manager/Developer Representative. All edges, including contraction and surface joints, shall be tooled for a width of 50 mm and rounded to a radius of 5 mm. The radii shown on the CONSTRUCTION DRAWINGS must be maintained at the top and bottom of the curb face.

All exposed concrete surfaces shall be checked with a 3 m straightedge and any depressions exceeding 5 mm shall be corrected at the Contractor's expense.

#### 3.6.3.2 Curb, Curb and Gutter, Gutter

The concrete shall be vibrated internally by means of a poker or pencil vibrator not exceeding 50 mm in diameter. The surface of the concrete shall be a brush finish and shall meet the requirements of [SUB-SECTION 3.6.3.1 OF THIS SECTION](#).

#### 3.6.3.3 Extruded Curb, Gutter, and Sidewalks

Slip form paving machines on concrete extruding machines may be used for placing concrete provided they meet the following requirements and they have received the approval of the Contract Manager/Developer Representative prior to commencement of the Work:

Vibrators on the equipment shall be adequate to produce a dense smooth mass free of honey combing.

Grade and Line Control of the equipment shall be capable of meeting grade and line tolerances as described in [SUB-SECTION 3.6.3.1 OF THIS SECTION](#).

#### 3.6.4 Joints

##### 3.6.4.1 Contraction Joints

Contraction joints shall be cut at every 3 m by means of a making tool or other approved method. Joints shall not be less than 50 mm or more than 60 mm in depth and 5 mm in width. The edge of the joint shall be rounded off with an edger having an arc of a circle of 5 mm radius. Contraction joints in monolithic sidewalks must be extended through the widths of the sidewalk and curb and gutter.

##### 3.6.4.2 Expansion Joints

Lateral expansion joints are required every 25 m and shall be continuous through the sidewalk. The joint shall consist of an approved mastic preformed material, 15 mm by 90 mm cross-section, laid plumb and straight, 5 mm below the finished sidewalk grade. The edge of the joint shall be rounded off with an edger having an arc of a circle of 5 mm radius.

- Other expansion joints shall be constructed as directed by the Contract Manager/Developer Representative.
- 3.6.4.3 Surface Joints
- Surface joints 10 mm in depth and 5 mm in width shall be cut every 3 m midway between the contraction joints. The edge of the joint shall be rounded off with an edger having an arc of a circle of 5 mm radius.
- 3.6.4.4 Transverse Construction Joints
- Shall be formed at the end of each pour. Use 10 m deformed tie-bars at 300 mm spacing and extending at least 300 mm into both sides of the joint.
- 3.6.4.5 Joints Abutting Existing Curb
- Where walk or slab is to be constructed abutting existing curb, a 10 mm wide by 30 mm deep slot shall be formed between the back of curb and walk or slab. This slot shall be filled with the specified joint sealant.
- 3.6.5 Curing
- Exposed concrete surfaces shall be protected by using an impervious membrane or any other method approved by the Contract Manager/Developer Representative or a period of at least 7 days.
- A white pigmented resin Base Impervious Membrane Curing Compound (ASTM Specifications C309, Type 2 -Class B) shall be applied under pressure with a spray nozzle in such a manner as to cover the entire exposed surface thoroughly and completely with a uniform film at a rate which will depend on the roughness of the surface of the concrete, but in no case shall be less than 1 litre per 4 square metres of concrete surface.
- Other precautions to ensure the development of strength shall be taken as the Contract Manager/Developer Representative may direct.
- 3.6.6 Concreting in Cold Weather
- All classes of concrete placed after October 15 shall attain a minimum compressive strength of 27.0 MPa in 7 days and shall be provided with cold-weather protection to clause 7.1.2, CAN/CSA A23.1-14. High early strength concrete (for special situations or conditions where the Contract Manager/Developer Representative requires that the specified 28 day compressive strength be met in 7 days) shall attain a minimum compressive strength of 30.0 MPa in 7 days and shall be provided with cold weather protection to clause 7.1.2, CAN/CSA A23.1-14 (type 2 curing).

This cold weather protection must be adequate to maintain concrete surface temperatures at a minimum of 10°C for a period of 7 days following placement. Concrete shall be protected from freezing for a minimum of 4 days after placement, or for the time necessary to achieve 75% of the specified 28-day compressive strength, whichever is greater.

### 3.6.7 Backfilling

The Contractor shall backfill behind the curb and gutter and along walk edges with suitable material immediately after removal of the forms. The backfill shall extend at least 1/3 m behind the curb or curb and gutter and shall be compacted in two lifts.

All backfill shall be compacted by a hand operated mechanical tamper to at least 95% of Standard Proctor Density at optimum moisture content.

Backfill shall be carried out to the top of curb or sidewalk unless landscaping is to follow immediately, in which case it shall be left low by an amount specified by the Contract Manager/Developer Representative.

The Contractor shall supply all backfill material and shall clean up all excess material after compaction.

### 3.6.8 Surfacing Concrete Road Base

3.6.8.1 Asphalt surfacing of the concrete road base, in accordance with [VOL. 2 SEC. 301, HOT MIX ASPHALTIC CONCRETE PAVING](#), may proceed when the concrete has attained at least 75% of its specified strength, as confirmed by a test on a field-cured cylinder.

3.6.8.2 If surfacing cannot proceed on schedule, do not allow vehicular traffic on the new concrete base until cylinder testing has confirmed that the concrete has attained at least 75% of its specified strength.

3.6.8.3 The Contractor shall, at the Contractor's expense, remove and replace asphalt surfacing if the concrete base requires removal due to unacceptable strength test results.

### 3.6.9 Nameplate

The name of the Contractor and year of construction shall be placed in the surface of the curb or sidewalk by use of an approved plate or marking tool at least once in each block or at 75 m intervals, whichever is less.

### 3.6.10 Weather Conditions

Unless otherwise approved by the Contract Manager/Developer Representative, the placing of concrete shall be suspended during periods of precipitation.



Where concrete has been freshly placed and there is a reasonable likelihood of precipitation or where directed by the Contract Manager/Developer Representative the Contractor shall ensure that the concrete is protected with plastic sheeting or other approved material for a period to be approved by the Contract Manager/Developer Representative.

Should the Contractor fail to observe these precautions he shall replace all damaged concrete at his own expense.

### 3.7 TOLERANCES AND ENFORCEMENT

3.7.1 Straight Edge: All exposed concrete surfaces shall be checked by the Contractor with a 3 m straight edge, and any water pockets or deviations in line or grade exceeding 6 mm shall be corrected immediately.

3.7.2 Elevation: Differences in elevation at any given point from that given on the survey stakes shall not exceed 10 mm.

3.7.3 Alignment: Deviations in alignment at any given point from that given on the survey stakes shall not exceed 25 mm and the fluctuations in the alignment shall not be greater than 25 mm in a 30 m section.

3.7.4 Crossfall: The crossfall shall not vary more than 10 mm per meter of walk width from that specified or shown on the CONSTRUCTION DRAWINGS.

3.7.5 Enforcement: Concrete not meeting the above criteria shall be replaced. If in the opinion of the Contract Manager/Developer Representative, it is not practical to remove and replace the concrete, then a reduced payment may be substituted. This payment shall be 50% of the unit price for the quantity not within the tolerances.

#### 3.7.6 Walk Or Crossing Thickness

3.7.6.1 Areas of suspect thickness shall be cored at a rate of 3 cores per 500 m<sup>2</sup>. The average thickness of the 3 cores represents the thickness of that area. If the average core thickness is deficient, the area will be assessed a pay factor as follows:

Thickness Deficiency (mm)	Pay Factor (% of Contract Price)
6	100.0
7	97.0
8	93.7
9	90.0
10	85.5
11	80.5
12	75.0
13	68.0
14	60.0
15	50.0
Over 15	Remove and Replace

3.7.6.2 If the average core thickness is deficient, the cost of the coring shall be borne by the Contractor.

3.7.6.3 Concrete walk or crossing with excess thickness may be accepted if surface and grade tolerances are met, but no additional payment is due.

#### **4.0 MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

4.1.1 Monolithic curb, gutter, and sidewalk shall be by lineal metre excluding ramp length, as measured in place along the face of the curb.

4.1.2 Curb and gutter shall be by lineal metre as measured in place along the face of the curb.

4.1.3 Separate sidewalk shall be by square metre as measured in place.

4.1.4 Crossings and Aprons shall be by lineal metre as measured in place longitudinally on the midpoint of the width.

4.1.5 Medians, island slabs, and road base shall be by square metre as measured in place.

4.1.6 Paraplegic Ramps shall be measured by the number constructed.

##### **4.2 PAYMENT**

4.2.1 Payment for concrete monolithic curb, gutter and sidewalk, curb and gutter, separate sidewalk, crossings and aprons, paraplegic ramps, medians, island slabs, and road base shall be full compensation for designing and testing the mix; supplying hauling and placing the mix; supply and placement of reinforcement; construction of subgrade; cleaning up the location; controlling traffic; and for all labour, equipment, tools and incidentals necessary to complete the work in accordance with these CONSTRUCTION SPECIFICATIONS.

4.2.2 Where granular base course is required under curb and gutter, payment for the base course material and the subgrade preparation will be in accordance with [VOL. 2 SEC. 303, GRANULAR SUB-BASE AND BASE COURSE](#) and [VOL. 2 SEC. 202, COMPACTED SUBGRADE PREPARATION](#), respectively.

**1.0 GENERAL****1.1 DESCRIPTION**

Road mixed cement stabilized base course shall consist of mineral aggregate, portland cement and water, uniformly mixed and compacted to the specified thickness and conforming to lines, grades and typical cross-sections as shown on CONSTRUCTION DRAWINGS or as established by the Contract Manager/Developer's Representative.

**2.0 PRODUCTS****2.1 MATERIALS**

**2.1.1 Portland Cement:** Portland Cement shall conform to standard specifications for Portland Cement (CAN/CSA-A3000, A3001-13 Type GU General use hydraulic cement).

**2.1.2 Water:** The water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, organic materials or other deleterious substances. The source shall be approved by Contract Manager/Developer Representative.

**2.1.3 Mineral Aggregate:** Mineral aggregates shall consist of material existing in the area to be stabilized; of approved selected aggregates, or a combination of these materials.

**2.1.4 Curing Seal:** The bituminous material for curing base course shall be A.E.P. (asphalt emulsion primer).

**3.0 EXECUTION****3.1 EQUIPMENT**

**3.1.1 Mixers:** Mixers shall be an approved cross shaft type capable of accurately and consistently controlling the depth of material being processed. They shall be capable of producing a homogeneous mixture of aggregate, cement, and water across the full cross-section of the street or lane, for the depth required.

**3.1.2 Cement Spreaders:** Cement Spreaders shall be a metered cross auger type capable of accurately spreading cement so that all parts of the mixture will contain at least the minimum specified cement content.

**3.2 CONSTRUCTION METHODS****3.2.1 Preparation**

**3.2.1.1 Exploratory Cuts:** Exploratory cuts shall be made by a grader or other means and extending through the gravel to determine the elevation and quality of the subsoil.

(i) Existing Gravel Lanes: One cut shall be made along the centreline.

- (ii) Existing Gravel Streets: Two cuts will be made at the third points of the street.

### 3.2.1.2 Preparation of Existing Gravel Streets and Lanes

- (i) If the elevation of the subsoil under the gravel is found to be higher than the proposed subgrade elevation by more than 50 mm, the gravel shall be removed and the surplus subsoil excavated to the proper grade and cross section.
- (ii) If the elevation of the subsoil under the gravel is found to be higher than the proposed subgrade elevation by less than 50 mm, the gravel surface shall be brought to the proper grade and cross section by adding or removing gravel. The subsoil shall be incorporated into the gravel according to the requirements of [SUB-SECTION 3.2.3 OF THIS SECTION](#).
- (iii) If organic or other material is encountered in the subgrade, which in the opinion of the Contract Manager/Developer's Representative requires excavating, the gravel shall be removed and the undesirable soil excavated, and any areas excavated below subgrade elevation shall be brought back to the proper grade and cross section with material designated by the Contract Manager/Developer's Representative.

### 3.2.1.3 Premixing: Where up to 50 mm of subsoil is to be incorporated into the base, the following procedure shall be followed:

- (i) The gravel surface shall be prepared according to the requirements of [SUB-SECTION 3.2.1.2 OF THIS SECTION](#).
- (ii) The specified quantity of cement shall be spread evenly over the area to be premixed.
- (iii) The gravel, cement, and subsoil shall be uniformly mixed to the depth specified.
- (iv) The mixing procedure shall be repeated a sufficient number of times to produce a homogeneous mixture of gravel, subsoil and cement.
- (v) The mixture shall be laid out to the proper line and grade and lightly packed prior to the final processing.

## 3.2.2 Cement Spreading

### 3.2.2.1 General

Cement shall be spread accurately and uniformly so that in no place shall the measured amount of cement be less than the specified amount. The application rate shall be 18kg/m<sup>2</sup> for 150 mm thick compacted lift, unless otherwise specified.

### 3.2.2.2 Time

Cement shall not be spread in quantities greater than can be processed within 6 hours.

### 3.2.2.3 Weather Limitations

Cement shall not be spread during periods of high winds or rain, or when there is imminent danger of high winds or rain.

### 3.2.3 Mixing Stabilized Base

#### 3.2.3.1 General

Mixing shall produce a uniform homogeneous mixture of aggregate cement and water. It shall produce a mixture pulverized to the point where all of the material mixed shall pass the 25 mm square sieve.

#### 3.2.3.2 Mixing Procedure

The prepared base shall be uniformly covered with Portland Cement of the rates specified. The mixing operation shall combine cement, water and aggregate for the specified depth, in 1 pass.

If it is necessary to overlap a pass of the mixer with material previously mixed, the water shall be omitted from that portion of the material which is being double mixed. If additional mixing is required, it shall be carried out without any further addition of water.

### 3.2.4 Compaction

Spreading and compaction of the mixture shall begin not later than 30 minutes after the time of mixing and shall be completed not more than 2 hours after the time of mixing.

### 3.2.5 Density

The base shall be compacted in one lift to a density not less than 100% of the Proctor Density test.

### 3.2.6 Finishing

After compaction has been attained, the surface will be shaped to proper lines, grades and sections.

### 3.2.7 Moisture Content

The moisture content of the surface material must be maintained at not less than the optimum moisture content during finishing operations. The finished surface shall contain no segregation, loose material or imprints.

### 3.2.8 Joints

At the end of each day's work, a construction joint shall be made by trimming the end of the compacted mixture to a straight line normal to the centreline of the roadbed, and with a vertical edge in compacted gravel.

### 3.2.9 Curing Seal

The Curing Seal shall be applied immediately after the packing is completed. Rate of application shall be determined by the Contract Manager/Developer Representative and may vary from 0.5 to 1.4 litres/m<sup>2</sup>.

### 3.2.10 Surfacing

3.2.10.1 The wearing course of the asphaltic concrete shall be applied within 72 hours of completion of soil cement. If the wearing course cannot be applied within this time, then the area shall be sanded if required, opened to traffic, and left for a period of not less than 7 days or more than 14 days. The location must be cleaned and repaired, at the Contractor's expense prior to application of the wearing course.

3.2.10.2 If the road is required for traffic before paving, cover the surface with sand and open the road to traffic not earlier than 72 hours after soil cement placement. When ready to pave, remove the sand, repair any damage, clean the soil cement surface and apply prime coat. This work shall be done at the Contractor's expense.

## 3.3 TOLERANCE AND ENFORCEMENT

### 3.3.1 Surface Smoothness

The surface of the cement stabilized base course shall be such that, when tested with a 3 m straight edge placed on the surface of the roadway the maximum deviation of the surface from the edge of the straight edge shall not exceed 12 mm.

### 3.3.2 Grade

3.3.2.1 If the grade of the stabilized base is higher than the design grade by more than 6 mm then the Contractor shall grind the area without destroying the surface, provided specified thickness is met. If the thickness specified after removing the excess no longer meets the specified thickness then the reductions in [SUB-SECTION 3.3.3.1 OF THIS SECTION](#) shall apply.

3.3.2.2 If the grade of the stabilized base is lower than the design grade by more than 15 mm, the elevation difference may be made up with an extra thickness of the subsequent paving course.

### 3.3.3 Thickness

3.3.3.1 Areas suspected of being deficient or excessive in thickness shall be cored at the rate of three cores per 1000 m<sup>2</sup>. If the average core thickness is deficient, that area will be assessed a pay factor according to [TABLE 325.1 OF THIS SECTION](#).

Excess thickness may be accepted if surface and grade tolerances are met, but no additional payment is due.

TABLE 325.1	
Thickness Deficiency (mm)	Pay Factor (% of Contract Price)
15	100.0
16	97.8
17	95.3
18	92.3
19	88.8
20	84.8
21	80.0
22	74.5
23	68.0
24	60.0
25	50.0
Over 25	Reconstruct

### 3.3.4 Cement Quantity

The amount of cement spread over any given area shall not vary from the amount specified by more than 10% by weight, and in no case shall the total amount of cement for any given location be less than the total specified.

### 3.3.5 Density

Maximum density is the dry unit mass of sample at optimum content as determined in the laboratory according to ASTM D558 Method B. Each test shall represent approximately 1000 m<sup>2</sup> of the base. If any test fails to meet the density specified, two additional tests shall be taken within the area in question and the average result of these tests shall represent the area. The unit price bid shall be adjusted for any density deficiency as follows:

Average Percent of Maximum Density (mm)	Pay Factor (% of Contract Price)
99.0	100.0
98.8	99.8
98.6	99.4
98.4	98.8
98.2	97.9
98.0	96.8
97.8	95.5
97.6	94.0
97.4	92.2
97.2	90.1
97.0	87.8
96.8	85.3
96.6	82.5
96.4	79.5
96.2	76.2
96.0	72.7
95.8	68.9
95.6	64.7

Average Percent of Maximum Density (mm)	Pay Factor (% of Contract Price)
95.4	60.2
95.2	55.3
95.0	50.0
Under 95.0	Reconstruct

### 3.3.6 Reconstruction

#### 3.3.6.1 Reconstruction shall be done in accordance with the following:

- For a portion reprocessed the same day as originally constructed, add 50% of the original cement content.

#### 3.3.6.2 For a section reprocessed the day following the original construction, add 75% of the original cement content.

#### 3.3.6.3 For a section reprocessed after more than one day has elapsed since original construction, add 100% of original cement content.

## 4.0 MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

#### 4.1.1 Cement Stabilized Base shall be measured by the square metre for the thickness specified.

#### 4.1.2 Applied cement shall be measured by the 10 kg unit.

### 4.2 PAYMENT

#### 4.2.1 Cement Stabilized Base

The accepted area of cement stabilized base shall be paid for at the unit rate bid, which rate shall be full compensation for any exploratory testing, preshaping of the surface, scarifying, pulverizing, drying the aggregate if required, for supplying water, for mixing aggregate, water, and cement, for spreading, compacting, and finishing the mixture, for sealing and protecting the completed base, for supplying and spreading blotting sand if required and for all equipment, labour, tools, and incidentals necessary to complete the requirements of these CONSTRUCTION SPECIFICATIONS less any deductions for deficiencies.

#### 4.2.2 Supply of Cement

The cement content in the accepted area of base or premixed base shall be paid for at the unit rate bid, which price shall be full compensation for supplying and spreading the cement in the quantities specified, and for all equipment, labour, tools and incidentals necessary to complete the requirements of these CONSTRUCTION SPECIFICATIONS.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Cement stabilized subgrade shall consist of soil immediately below a pavement structure or slab, mixed with portland cement and compacted to a depth of 150 mm, 300 mm, or as specified.

**2.0 PRODUCTS****2.1 MATERIALS**

- 2.1.1 Portland Cement: To CAN/CSA-A3000, type GU, general use hydraulic cement.
- 2.1.2 Water: The water used shall be clean and free from injurious materials or other deleterious substances. The source shall be approved by Contract Manager/Developer Representative.

**3.0 EXECUTION****3.1 EQUIPMENT**

- 3.1.1 Cement Spreaders: Capable of spreading cement uniformly.
- 3.1.2 Mixing Equipment: Designed for and capable of mixing full depth of subgrade in one pass, subject to Contract Manager/Developer Representative approval.

**3.2 CONSTRUCTION METHODS****3.2.1 Preparation**

- 3.2.1.1 Subgrade areas to be stabilized will be indicated on plans or designated by the Contract Manager/Developer Representative.
- 3.2.1.2 Pregrade and shape soil to designated grade and cross-section.
- 3.2.1.3 Proof roll pre-graded area prior to stabilization to determine cement content, as directed by the Contract Manager/Developer Representative.

**3.2.2 Stabilization**

- 3.2.2.1 Loosen soil to required depth of subgrade. Work soil with cultivating and mixing equipment until soil is pulverized into no larger than 25 mm pieces, exclusive of stones.

**3.2.3 Dust Control**

- 3.2.3.1 Contain cement dust within site area. Do not spread cement during or when there is imminent danger of high winds or rain.

- 3.2.3.2 Spread and blend cement into soil at a minimum rate of 10 kg per square metre of 150 mm compacted depth or as directed by Contract Manager/Developer Representative.
- 3.2.3.3 Add water to blended soil and cement sufficient for best achieving the required compaction. Mix to a homogeneous mixture.
- 3.2.3.4 Spread the mixture uniformly in lifts of 150 mm compacted thickness. Compact each lift to the required density.
- 3.2.3.5 Complete compaction and finishing on same day of mixing.
- 3.2.3.6 Water may be lightly sprayed with a pressurized distributor for surface finishing.
- 3.2.3.7 Leave surface of compacted subgrade slightly higher than required elevation; then trim to indicated crown and grade. Leave finished surface even and free of depressions, humps or loose material.

### 3.3 TOLERANCES

#### 3.3.1 Quality Control

Check finished surface of stabilized subgrade to ensure it meets the following tolerances:

##### 3.3.1.1 Grade:

- (i) 6 mm maximum variation above designated elevation.
- (ii) 25 mm maximum variation below designated elevation.

When Tolerance Exceeded:

Trim high spots and refinish surface to within tolerance.

Add approved mixed material to low areas, scarify and blend to full subgrade depth, recompact to required density, and refinish surface. Alternatively, compensate low areas with extra thickness of subsequent subbase or base course.

### 3.4 DENSITY REQUIREMENTS

- 3.4.1 Maximum Density: As used in this article, is the dry unit mass of sample at optimum moisture content as determined in the laboratory according to ASTM D698 Method A.
- 3.4.2 Required Density: Minimum 100% of maximum density for each 150 mm lift of stabilized subgrade.
- 3.4.3 Testing Frequency: The quality assurance laboratory will take a minimum of one field density test for each 1,000 m<sup>2</sup> of compacted subgrade lift according to ASTM D2167 for comparison with a maximum density determined according to ASTM D698 Method A.

- 3.4.4 Proof Rolling: A proof roll of the finished subgrade will be required to confirm adequate bearing capacity of the subgrade soils. The proof roll shall be supervised by the Contract Manager/Developer's Representative, and must be performed in accordance with [VOL. 2 SEC. 202, COMPACTED SUBGRADE PREPARATION, SUB-SECTION 3.4.](#)
- 3.4.5 Non-compliance: If a density test result is less than the required density, that test result is discarded and 3 retests shall be performed on the area represented by the failed test. The average of the 3 retests shall represent the density of that area. If this average is less than the required density, the area shall be reworked to the full depth of the lift, the soil moisture altered as necessary and recompacted to the required density. If the area is not retested but is reworked and recompacted the area shall be tested at normal testing frequencies. All costs for retesting shall be the responsibility of the contractor.
- 3.4.6 The Contractor shall assume the risk of uncovering and reworking the subgrade if it is covered before the Contract Manager/Developer Representative has accepted test results thereof.
- 3.5 PROTECTION OF FINISHED WORK
- 3.5.1 Do not permit vehicular traffic over the stabilized subgrade.
- 3.5.2 If subgrade floods, drain immediately by natural flow or by pumping to catch basins, manholes, or ditches. This shall be done at the expense of the Contractor.
- 3.5.3 Maintain protection of stabilized subgrade until subsequent subbase or base course is placed. Repair any damage, including that caused by freezing and retest as required by the Contract Manager/Developer Representative if damaged.
- 3.6 RECONSTRUCTION
- 3.6.1 Break up and pulverize rejected stabilized subgrade into no larger than 25 mm pieces. Spread the pulverized material for addition of cement.
- 3.6.2 Add cement as follows:
- 3.6.2.1 For a section reprocessed within 24 hours and 48 hours of the original construction, add 50% of the original cement content.
- 3.6.2.2 For a section reprocessed more than 48 hours following the original construction, add 100% of the original cement content.
- 4.0 MEASUREMENT AND PAYMENT
- 4.1 MEASUREMENT
- 4.1.1 Cement stabilized subgrade shall be measured by the square metre for the thickness specified.

- 4.1.2 Cement for stabilizing subgrade shall be measured by the unit specified in the SCHEDULE OF QUANTITIES. The rate of cement spreading will be checked by the mass of cement deposited on a test tarpaulin 1m square placed in the path of the cement spreader.
- 4.2 PAYMENT
- 4.2.1 The accepted area of cement stabilized subgrade shall be paid at the unit rate bid which shall be full compensation for pregrading soil to designated grade and cross-section; scarifying, pulverizing, blading; drying the soil if necessary; supplying water; mixing soil, cement and water; repulverizing and remixing where required; spreading, shaping and compacting the mixture to required density; moistening the surface and trimming to final grade; correcting deficiencies; protection; damage repair.
- 4.2.2 The cement for stabilizing subgrade shall be paid at the unit bid, which shall be full compensation for supply and spreading of cement at designated rate for stabilizing subgrade. If cement spread is less than designated rate, only the actual quantity spread will receive payment. Cement spread in excess of designated rate will not receive payment.

## 1.0 GENERAL

### 1.1 DESCRIPTION

1.1.1 Full depth reclamation using foamed asphalt consists of the following:

1.1.1.1 Pulverization of existing asphalt, soil cement and/or aggregate roadway structures;

1.1.1.2 Addition and mixing of stabilizing agents into the reclaimed base; and

1.1.1.3 Grading and compaction of the reclaimed base course.

### 1.2 DEFINITION

#### 1.2.1 Full Depth Reclamation Using Foamed Asphalt

1.2.1.1 Full depth reclamation using foamed asphalt shall consist of a full depth recycling process, where the existing bituminous cover and the top portion of the underlying base material are reclaimed and transformed into a homogenous mixture by an in-place process using foamed asphalt and if required additional course aggregate and granular material.

1.2.1.2 Shall be performed by utilizing a recycling machine to pulverise, to the depth shown on the plans, the materials in the upper layers of the existing pavement structural section together with any imported aggregate base and to achieve the required grading and consistency of mix in a single pass. The recycled material shall exit from the mixing chamber in a manner that prevents particle segregation. Spreading and placing to form the new structural section shall be by motor grader or screed mounted on the rear of the recycling machine. Pre-pulverizing may be done prior to the foamed asphalt application with no extra compensation.

1.2.1.3 Pulverize and reuse materials in the upper layers of the existing roadway structural section.

1.2.1.4 Adjust the gradation of the existing materials by the addition of imported aggregate base (admixture aggregate) if and where necessary.

1.2.1.5 Procure, furnish, and mix in a combination of foamed bitumen and cementitious stabilizing agents together with sufficient water to approximate the optimum moisture content.

1.2.1.6 Place and compact to achieve a new structural section, as shown on the plans, as specified in these CONSTRUCTION SPECIFICATIONS and the SPECIAL PROVISIONS, unless otherwise directed by the Contract Manager/Developer Representative.

### 1.3 QUALITY ASSURANCE

1.3.1 Maximum Density: The dry unit mass of a sample at optimum moisture content as determined in the laboratory according to ASTM D1557.

1.3.2 Required Density: A minimum of 98% of the maximum density in accordance with ASTM D1557 for the full depth foamed in-place recycled material.

1.3.3 Testing Frequency: The quality assurance laboratory will take a minimum of one field density test for each 1 000 m<sup>2</sup> of compacted full depth foamed in-place recycled material according to ASTM D2167 or ASTM D2922 for comparison with a maximum density determined according to ASTM D1557.

## 2.0 PRODUCTS

### 2.1 MATERIALS

2.1.1 Cementitious Stabilizing Agent: Portland Cement to CAN/CSA A3000-18, Type GU, General use hydraulic cement shall be the only cementitious stabilizing agent employed in the full depth foamed in-place recycling process.

2.1.2 In-Situ Materials: The existing pavement structure to be pulverized has been investigated, and the results are included in the contract SPECIAL PROVISIONS. If additional coring or sampling is desired, the coring or sampling shall be at the expense of the Contractor, upon approval of the Contract Manager/Developer Representative.

2.1.3 Bituminous Stabilizing Agents: Foamed bitumen shall be the only bituminous stabilizing agent employed in the full depth foamed in-place recycling process. Foamed bitumen shall be produced from premium grade asphalt cement 150-200 (A), in accordance with [APPENDIX A](#).

2.1.4 Water: May be obtained from Strathcona County fire hydrants according to the General Requirements. Other water sources are subject to the Contract Manager/Developer Representative approval.

2.1.5 Admixture Aggregate: 20mm aggregate to be incorporated into the existing road structure to ensure adequate fines for stabilization shall meet the following gradation:

Sieve Size (mm)	Percent Passing (%)
20 000	100
12 500	60-90
5 000	40-60
2 000	25-45
400	15-25
160	10-20
80	10-15

## 2.2 FOAMED BITUMEN MIX DESIGN

2.2.1 Submit to the Contract Manager/Developer Representative for approval a Foamed Bitumen Mix Design performed by a qualified laboratory at least 14 days before initial Foamed Bitumen Recycling work for each location.

2.2.1.1 The design of the foamed asphalt shall be completed with a laboratory asphalt expanding plant. The half-life and expansion ratio of the expanded asphalt bitumen shall be determined at a minimum of five (5) moisture contents. A minimum of two (2) trials shall be completed at each moisture content and the average values obtained shall be used in the final analysis. The moisture content of the expanded asphalt bitumen shall be established to provide a maximum expansion ratio and maximum half-life. The moisture content of the binder shall be selected to provide a minimum half-life of eight (8) seconds.

2.2.1.2 The mix design sample shall be a representative sample of the roadway being rehabilitated and shall be obtained using the anticipated recycling equipment.

## 2.3 FOAMED BITUMEN MIX DESIGN CRITERIA

2.3.1 The combined/pulverized material should meet the following gradation:

Sieve Size (mm)	Percent Passing (%)
38 000	100
20 000	70-100
12 500	60-85
5 000	45-70
2 500	33-60
400	15-35
160	10-25
80	5-20

2.3.2 Portland Cement Content: Minimum 1.0% by mass of dry aggregate.

2.3.3 Bitumen: Minimum 2.6% by mass of dry aggregate.

2.3.4 The mix design should be performed at various bitumen contents using Marshall criteria of 75 blows per face. The Indirect Tensile Strength of the specimens should be determined. The samples should be tested dry and after 1 (one) hour of vacuum saturation in water. The ratio of Dry to Saturated tensile strength (TSR) must be a minimum of 50%.

2.3.5 The final design shall be based on a foamed bitumen content that provides:

2.3.5.1 Optimum bulk density;

2.3.5.2 Optimum dry strength properties;

2.3.5.3 Optimum wet strength properties; and

2.3.5.4 Optimum resistance to moisture penetration.

## 2.4 EQUIPMENT

2.4.1 Reclaimer/Stabilizer: A roadway structure pulverizing machine with the following characteristics, and subject to the Contract Manager/Developer Representative approval:

2.4.1.1 A minimum power capacity of 600 horsepower;

2.4.1.2 A milling drum that rotates upward into the direction of advance with a minimum cut width of 2.0 m;

2.4.1.3 The capability of pulverizing asphalt, soil cement and gravel roadway structures to depths of at least 400 mm in a single pass, and accurately maintaining a pre-set depth of cut;

2.4.1.4 Due to the cut depths as detailed in the contract documents, there is no requirement for the effective volume of the mixing chamber to be increased in relation to the depth of cut;

2.4.1.5 Two microprocessor controlled systems, complete with two independent pumping systems and spraybars, one to regulate the application of foamed bitumen stabilizing agent and a separate system to regulate the water (for increasing the moisture content of the recycled material), both in relation to the forward speed and mass of the material being recycled;

2.4.1.6 Two spraybars shall each be fitted with nozzles at a maximum spacing of one nozzle for each 155 mm width of chamber; the contractor shall ensure that all nozzles utilized in the foamed asphalt process shall be maintained in working order for the duration of the process;

2.4.1.7 The foamed bitumen shall be produced at the spraybars in individual expansion chambers, or one large expansion chamber, into which hot bitumen and water are injected under pressure through orifices that promote atomization. The rate of addition of water into hot bitumen shall be kept at a constant (percentage by mass of bitumen) by the same microprocessor;

2.4.1.8 An inspection (or test) nozzle shall be fitted at one end of the spraybar that produces a representative sample of foamed bitumen;

2.4.1.9 An electrical heating system capable of maintaining the temperature of all bitumen flow components above 150°C; and

2.4.1.10 A single bitumen feed pipe installed between the modified milling or recycling machine and the supply tanker can be used. A system that incorporates a return pipe to the supply tanker may be used providing the overall temperature of the bitumen can be maintained.

2.4.2 Compaction Equipment: Self-propelled vibratory steel drum, sheepfoot/padfoot rollers and pneumatic-tired rollers capable of achieving the required compaction of the cold foamed in-place recycled material, and providing a surface suitable for the placement of hot-mix asphalt



concrete. The frequency and amplitude of vibrating rollers shall exceed a static mass of 15 tons and shall be adjustable.

2.4.3 Supply Tankers for Bituminous Stabilizing Agent: Only tankers with a capacity exceeding 10,000 L shall be used to supply the recycling machine with bitumen. Each tanker shall be fitted with two recessed pin-type two hitches, one in front and the other in the rear, thereby allowing the tanker to be pushed from behind by the recycling machine, and to push a water tanker in front. No leaking tanker will be permitted on the job site. In addition, each tanker shall be equipped with the following:

2.4.3.1 A thermometer to show the temperature of the bottom third of the tank;

2.4.3.2 A rear feed valve, with a minimum internal diameter of 75mm, capable of draining the contents of the tank when fully opened;

2.4.3.3 All-round cladding to retain heat; and

2.4.3.4 A calibrated dipstick marked at intervals of no more than 100 L, for measuring the contents of the tank.

### 3.0 EXECUTION

#### 3.1 PREPARATION

3.1.1 Roadway areas to be reclaimed will be indicated on plans or designated by the Contract Manager/Developer Representative.

3.1.2 Ensure that any conflicts with underground utilities in the zone of reclamation are resolved prior to pulverization.

3.1.3 Clearing all foreign matter from the entire roadway width, including any adjacent lanes or shoulders that are not to be recycled.

3.1.4 Remove all standing water.

#### 3.2 UNSUITABLE WEATHER CONDITIONS

3.2.1 Wet Weather: No full depth foamed reclamation work shall be performed during wet conditions, nor started without completing before wet conditions set in.

3.2.2 Cold Weather: No full depth foamed reclamation work shall be performed if the ambient pulverized roadway material temperature is below 0°C other than finishing and compaction operations.

3.2.3 Windy Weather: Spreading of cementitious stabilizing agents on the roadway ahead of the recycling machine will not be allowed when windy conditions adversely affect the operations.

**3.2.4      Time Limitations**

The maximum time period between mixing the recycled material with a stabilizing agent and compacting the placed material shall be determined by the type of stabilizing agent applied. Where a combination of two or more different stabilizing agents are used, the stabilizing agent that predominates shall dictate the time limitation. Where Portland Cement is added in conjunction with a bituminous stabilizing agent at an application rate of less than 2 percent, the time limit of the bituminous stabilizing agent shall apply. The maximum time periods shall be as follows:

Stabilizing Agent	Time Limit
Portland Cement	3 Hours
Bitumen Emulsion	Before the emulsion breaks
Foamed Bitumen	24 Hours if kept moist

**3.3      PRODUCTION PLAN**

3.3.1      Prior to beginning with the recycling work each day, the Contractor shall prepare a production plan detailing proposals for the forthcoming day's work. The production plan shall contain the following information:

3.3.1.1      A sketch showing the overall layout of the length and width of roadway intended for recycling during the day, broken into the number of parallel cuts required to achieve the stated width, and the overlap dimensions at each joint between cuts;

3.3.1.2      The sequence and length of each cut to be recycled before starting on the adjacent or following cut;

3.3.1.3      An estimate of the time required for pulverizing, mixing and compacting the cut. The sketch shall also show the time when completion of each is expected;

3.3.1.4      The proposed water addition for each cut;

3.3.1.5      The quantity and location where aggregate base is to be imported;

3.3.1.6      The amount and type of stabilizing agent, or agents, to be applied to each cut;

3.3.1.7      The proposed quality control testing program; and

3.3.1.8      Any other information that is relevant for the intended work.

**3.4      PULVERIZATION**

3.4.1      Pulverize the existing roadway structure into fragments no larger than 25 mm maximum dimension, exclusive of existing aggregate. The forward speed of the recycling machine, rotation rate of the recycling drum, and the positioning of the gradation control beam shall be set to break down the in-situ material to an acceptable grading.

- 3.4.2 The Contractor shall take all necessary steps to ensure that the grading of the recycled material conforms to the requirements specified in [SUB-SECTION 3.11 OF THIS SECTION](#).
- 3.4.3 In the event that the roadway is pre-pulverized, shaped and recompacted prior to the addition of stabilizing admixtures. The pre-pulverized material shall be compacted to a minimum of 95% of the maximum density in accordance with ASTM D1557.
- 3.5 ADDITION OF WATER AND STABILIZING ADMIXTURES
- 3.5.1 Add stabilizing admixtures to the foamed asphalt reclamation as specified or as directed by the Contract Manager/Developer Representative.
- 3.5.1.1 Portland Cement: As detailed in [SUB-SECTION 2.1.1 OF THIS SECTION](#).
- 3.5.1.2 Bituminous Stabilizers: As detailed in [SUB-SECTION 2.1.3 OF THIS SECTION](#).
- 3.5.2 Ensure that the stabilizing admixtures are uniformly distributed and mixed with the pulverized material. The microprocessor control system for the addition of water and foamed bitumen shall be set and carefully monitored to meet the required compaction moisture and stabilizer content. Bulk bitumen tankers shall be dipped at the end of each cut in order to determine actual usage against the calculated theoretical demand.
- 3.6 OVERLAP OF LONGITUDINAL JOINTS
- 3.6.1 Premark cut lines on the road surface designating the width of each cut in a section of the roadway.
- 3.6.2 To ensure complete recycling across the full width of the roadway, longitudinal joints between successive cuts shall overlap a minimum of 150 mm.
- 3.6.3 Premarked cut lines on the road surface shall be checked to ensure that the width of the first cut is equal to that of the milling drum and that the width of all successive cuts shall be narrower than the drum width by at least 150 mm. The milling/recycling machine shall be steered so as to accurately follow the premarked lines. Any deviation in excess of 50 mm shall be rectified immediately by reversing to where the deviation commenced and reprocessing along the correct line, without the addition of any further water or stabilizing agent.
- 3.6.4 The overlap width shall be confirmed before starting each new cut sequence and any adjustments made to ensure that the amount of water and fluid stabilizing agents to be added is reduced proportionately by the width of the overlap.

### 3.7 CONTINUITY OF STABILIZED LAYER

3.7.1 The Contractor shall ensure that there is no gap of unrecycled material created between successive cuts (along the same longitudinal cut line), nor any untreated wedges created by the entry of the milling drum into existing material by:

3.7.1.1 Carefully marking the exact location at which each cut terminates, this mark shall coincide with the position of the center of the pulverizing drum at the point at which the supply of stabilizing agent ceased.

3.7.1.2 Start the next successive cut at least 0.5 m behind this mark to ensure continuity.

### 3.8 SUBGRADE INSTABILITY

3.8.1 Where subgrade instability is encountered during the recycling process, the subgrade shall be:

3.8.1.1 Excavated and removed to a depth of 600 mm; and

3.8.1.2 Replaced and backfilled with 3-20A granular base placed in lifts not exceeding 150 mm when compacted and followed by successive layers until the level of the existing roadway is reached.

### 3.9 GRADING AND COMPACTION

3.9.1 In accordance with [VOL. 2 SEC. 302, GRANULAR MATERIALS](#) and [VOL. 2 SEC. 303, GRANULAR SUB-BASE AND BASE COURSE](#).

3.9.2 Leave the surface of the compacted recycled material slightly higher than the required elevation; then trim to the design crown and grade. Leave the finished surface even and free of depressions, humps or loose material.

3.9.3 Rolling shall commence as soon as it is practical, and follow the predetermined sequence specified in [SUB-SECTION 3.11 OF THIS SECTION](#).

### 3.10 WATERING, FINISHING AND CURING

3.10.1 After compaction the roadway surface shall be treated with a light application of water, and rolled with pneumatic-tired rollers to create a close-knit texture. The finished layer shall be free from:

3.10.1.1 Surface laminations;

3.10.1.2 Segregation of fine and coarse aggregate; and

3.10.1.3 Corrugations or any other defects that may adversely affect the performance of the layer.

- 3.10.2 Tack coat shall not be applied until the moisture content of the recycled layer is at least 2 percent below the as placed moisture content.
- 3.11 TEST SECTIONS
- 3.11.1 At the start of the project the contractor shall assemble all items of plant and equipment for the recycling operations and process a section of the roadway to:
- 3.11.1.1 Demonstrate that the equipment and processes and produce recycled layers to meet the requirements specified in these provisions;
- 3.11.1.2 Determine the effect on the grading of the recycled material by varying the forward speed of the recycling machine and the rotation of the pulverizing drum; and
- 3.11.1.3 Determine the sequence and manner of rolling necessary to obtain the minimum compaction requirements.
- 3.11.2 The test section shall be at least 100 m in length of a full lane-width.
- 3.11.3 If the test section fails or if modifications are made to the methods, processes, equipment, and materials, additional test sections shall be performed in accordance with the requirements listed above before further work can be performed.
- 3.12 FIELD QUALITY CONTROL
- 3.12.1 Check the finished surface of the reclaimed base course to ensure it meets the following tolerances:
- 3.12.1.1 Grade: 6 mm maximum variation above design elevation.  
6 mm maximum variation below design elevation.
- 3.12.2 When the tolerance is exceeded:
- 3.12.2.1 Trim high areas and refinish surface to within tolerance.
- 3.12.2.2 Add recycled material to low areas, scarify and blend to full reclamation depth, recompact to required density, and refinish surface.
- 3.12.2.3 Density Tests: If a density test result is less than the required density, the initial test result is discarded and three retests shall be performed on the area represented by the failed test. The average of the three retests shall represent the density of that area. If this average is less than the required density, the area shall be reworked to the full depth of the lift, the moisture content altered as necessary and recompact to the required density. If the area is not retested but is reworked and recompact the area shall be tested at normal testing frequencies.

**3.13      PROTECTION OF FINISHED WORK**

- 3.13.1      Do not permit vehicular traffic over the recycled material until permitted by the Contract Manager/Developer Representative.
- 3.13.2      If the recycled material floods, drain immediately by natural flow or by pumping to catch-basins, manholes, or ditches. This shall be done at the expense of the Contractor.
- 3.13.3      Maintain protection of the recycled material until paved with hot-mix asphalt concrete. Repair any damage, including that caused by freezing, and retest as required by the Contract Manager/Developer Representative.

**4.0          MEASUREMENT AND PAYMENT****4.1          MEASUREMENT**

- 4.1.1      Full depth pavement reclamation using foamed asphalt shall be measured by the square metre for the depth specified.
- 4.1.2      Cement stabilizing agent shall be measured by the 10 kg unit.

**4.2          PAYMENT**

- 4.2.1      Payment at the respective Contract unit rate bid per square metre at the specified depth of full depth pavement reclamation using foamed asphalt shall be full compensation for for all labour, equipment, tools, and incidentals necessary to complete the work in accordance with these CONSTRUCTION SPECIFICATIONS, including all temporary surface drainage which may be necessary during construction and repairing damage caused by the weather.
- 4.2.2      The foamed asphalt shall be paid for at the oil content set out in the SPECIAL PROVISIONS. Based on the detailed mix design, the  $\pm 0.2\%$  oil will be paid for according to the SPECIAL PROVISIONS.
- 4.2.3      The cement content in the accepted area shall be paid for at the unit rate bid, which shall include full compensation for supplying and spreading the cement in the quantities specified, and for all equipment, labour, tools, and incidentals necessary to complete the requirements of these CONSTRUCTION SPECIFICATIONS.

## APPENDIX A: SPECIFICATIONS FOR PREMIUM GRADE ASPHALT CEMENTS

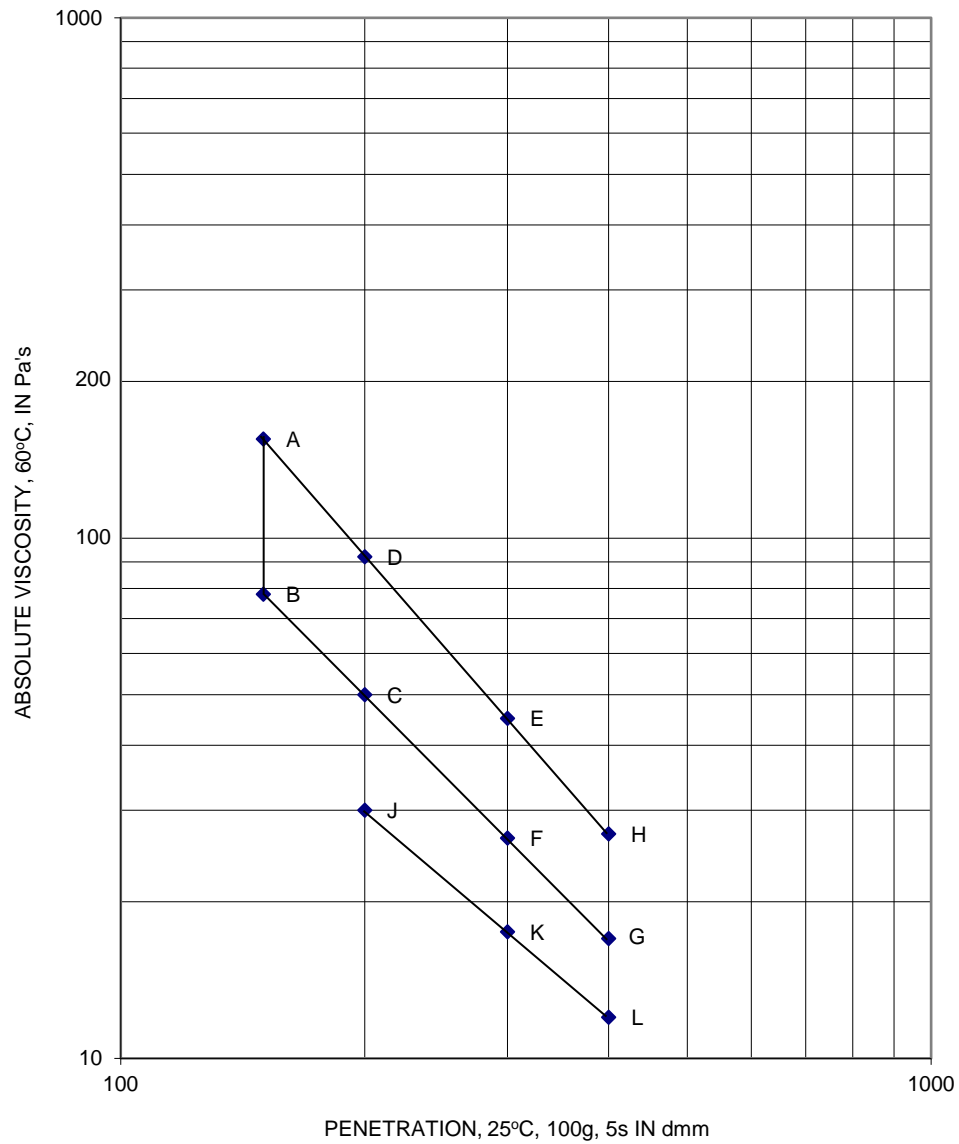
### A1 Test Characteristics for Premium Grade Asphalt Cements

TEST CHARACTERISTICS	ASTM TEST METHOD	Premium Grades of Asphalt Cements					
		150-200 (A)			200-300 (A)		
Absolute Viscosity, 60°C, Pa·s	D2171	The viscosity and penetration values must fall within the area bounded by A-B-C-D-A plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by C-D-E-F-C plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:		
Penetration, 25°C, 100g, 5s, dmm	D5	<u>Pt.</u>	<u>Abs. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Abs. Visc.</u>	<u>Pen.</u>
		A	155	150	C	50	200
		B	78	150	D	92	200
		C	50	200	E	45	300
Kinematic Viscosity, 135°C, sq. mm/s	D5	D	92	200	F	26.5	300
		The viscosity and penetration values must fall within the area bounded by A-B-C-D-A plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:			The viscosity and penetration values must fall within the area bounded by C-D-E-F-C plotted as straight lines on a full logarithmic plot (log-log), with the co-ordinates of the points as follows:		
		<u>Pt.</u>	<u>Kin. Visc.</u>	<u>Pen.</u>	<u>Pt.</u>	<u>Kin. Visc.</u>	<u>Pen.</u>
		A	360	150	C	205	200
Penetration, 25°C, 100g, 5s, dmm	D5	B	225	150	D	285	200
		C	205	200	E	205	300
		D	285	200	F	150	300
Flash Point, Cleveland Open Cup, °C minimum	D92	205			175		
Solubility in Trichlorethylene, % minimum	D2042	99.5			99.5		
Tests on Residue from Thin-Film Oven Test: Ratio of Absolute Viscosity of Residue from Thin-Film Oven Test to Original Absolute Viscosity, maximum:	D1754	4.0			4.0		
	D2171						
Ductility, 25°C, cm, maximum	D113	100			-		
Ductility, 15.6°C, cm, minimum		-			100		

#### General Requirement:

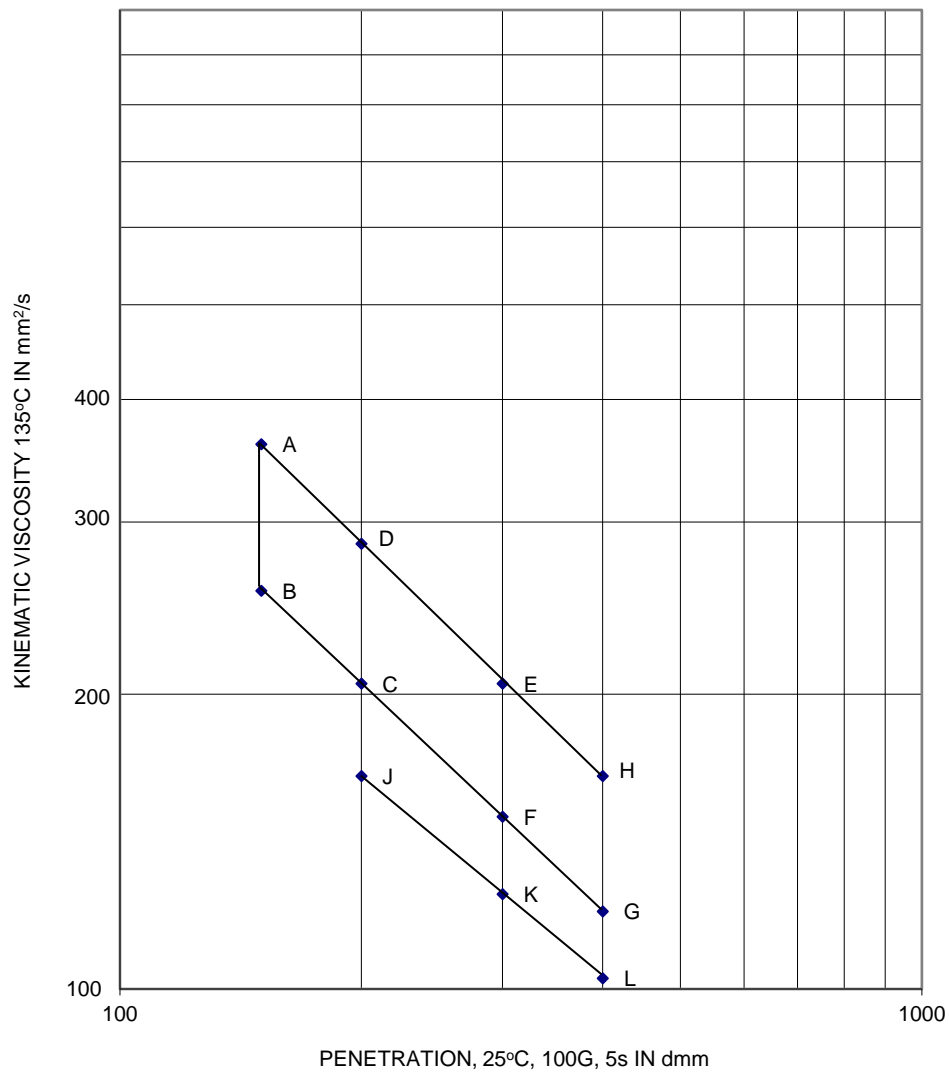
- The asphalt shall be prepared by the refining of petroleum. It shall be uniform in character and shall not foam when heated to 175°C.
- The temperature at delivery to the site shall be between 170°C and 190°C.

**A2 Absolute Viscosity Plot**





**A3 Kinematic Viscosity Plot**



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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this section of the CONSTRUCTION SPECIFICATIONS is that required for the installation of storm and sanitary sewers, their appurtenances including manholes, catch basins, pipe bedding, connection to existing mains, service connections and testing.

**2.0 PRODUCTS****2.1 SEWER PIPES**

The following list is the approved pipe materials at the time of publication. Proposed pipe material must be submitted to Strathcona County for acceptance, prior to installation.

**PVC PIPES**

- 2.1.1 PVC pipe shall be DR35 in the 200 mm – 900 mm size range conforming to CSA B182.2 and ASTM D3034, ASTM F679, NQ 3624-130 and NQ 3624-135 standards with a minimum stiffness of 320 kPa. The pipe must be manufactured from 12454-B or 12364-C compound.
- 2.1.2 Sealing gaskets shall meet requirements of CSA B182.2 and ASTM F477 with the additional requirement that joints shall be able to withstand 345 kPa/50 psi hydrostatic pressure.
- 2.1.3 For the in-line Tees or Wyes required at all service connections, injection molded gasketed fittings shall conform to CSA B182.1 or CSA B182.2 and fabricated fittings must conform to CSA B182.2 and ASTM F679.
- 2.1.4 Ultra Rib PVC or approved equal is also acceptable in the 200 mm – 600 mm size range. It shall conform to CSA B182.4 and ASTM F794 with a minimum stiffness of 320 kPa. (storm sewer only).
- 2.1.5 PVC pipe shall not be installed in areas contaminated or potentially contaminated with organic compounds (organic solvents or petroleum products) i.e., near buried petroleum fuel tanks, abandoned gas stations, petro storage areas or petro refinery sites.

**CONCRETE PIPES**

- 2.1.6 Concrete pipe must be used for storm sewer systems in industrial subdivisions or along arterial roads that are dangerous goods routes. All concrete pipe shall be manufactured using sulphate resistant Type 50 cement.
- 2.1.7 Non-reinforced concrete pipe in the 200 mm – 375 mm sizes shall be a minimum Class 3 conforming to CSA A257.1 and ASTM C14.

- 2.1.8 Reinforced concrete pipe in the 250 mm and larger sizes shall conform to CSA A257.2 and ASTM C76.
- 2.1.9 All joints shall be confined "O" ring rubber gasket conforming to ASTM C443 and CSA 257.3.
- 2.2 PRECAST MANHOLES
- 2.2.1 Precast manhole sections shall conform to the Standard Specifications for precast reinforced concrete manhole sections (ASTM Designation C478) -1200 mm I.D. Manholes shall be manufactured using sulphate resistant Type 50 cement.
- 2.2.2 Manhole steps shall be standard safety type, hot dipped galvanized iron conforming to ASTM A615 and ASTM A123 or aluminum forged of 6061-76 alloy having a minimum tensile strength of 200 MPa.
- 2.2.3 All joints shall be sealed with rubber gaskets conforming to ASTM C443 and grouted inside and outside with non-shrink grout.
- 2.2.4 Pre-benched manhole bases shall be used wherever possible with pre-cored connection holes and watertight Duraseal or G-Loc joints or approved equal.
- 2.2.5 Tee Riser manholes shall conform to CSA 257.2/ASTM C76 (pipe component) and CSA A257.4/ASTM C76 for the manhole riser component.
- 2.2.6 Perched manholes or oversized manholes are required on 600 mm - 1050 mm mains.
- 2.2.7 Aluminum safety platforms shall be required in all manholes with a depth greater than 7.0 m. A platform design shall be submitted to the Strathcona County Engineer for acceptance and shall include structural details, fastening details and location within the manhole.
- 2.2.8 All manholes located on any Arterial Roadways, Park Reserves, Public Utility Lots, School Grounds, vacant lots and undeveloped land shall be required to have a Locking Manhole Cover or NF80 or NF90 frame and solid cover or equal. NF90 Manhole frame and covers shall be used in all sags and other low areas susceptible to ponding.
- 2.2.9 All Locking Manhole Cover Devices shall require the Strathcona County Engineer's acceptance prior to installation.
- 2.3 FRAMES, GRATINGS, COVERS
- 2.3.1 All manhole covers and catch basin frames shall be labeled "Strathcona County". Manhole covers shall have a clear "SAN" stamped on it for sanitary and a clear "STM" stamped on it for storm.
- 2.3.2 Frames, grates and covers as shown on the STANDARD DRAWINGS.

- 2.3.3 Castings shall be true in form and dimensions, free from faults, cracks, blow holes and other defects affecting their quality and shall be guaranteed not to rock when installed.
- 2.3.4 Castings shall conform to all requirements of ASTM A48 and ASTM A536, Class 20 Gray Iron.
- 2.3.5 Manhole frames and covers shall be asphaltic coated cast iron, minimum 145 kg per set minimum.
- 2.3.6 Approved manhole frame and covers:
- 2.3.6.1 Storm manholes: NF 80
- 2.3.6.2 Sanitary manholes:
- (i) NF 80: Solid cover or equal for all manholes located in streets, driveways and hard surfaced areas.
  - (ii) NF 90: Solid frame and cover or equal with rubber gasket-seal for all manholes in street sags or other low areas.
  - (iii) F 39: Solid cover or equal in all other locations.
- 2.3.7 Approved catch basin and catchbasin manhole frame and covers:
- 2.3.7.1 F-51 catchbasin frame and covers shall consist of a 2 piece side inlet for the curb section and a 2 piece frame and grating for the gutter section.
- 2.3.7.2 F-36 catchbasin frame and covers shall consist of a 2 piece grating and a one-piece frame.
- 2.3.7.3 F-36A catchbasin manhole frame and covers shall consist of a 2 piece grating and a 1 piece frame.
- 2.3.7.4 Slotted NF 80 catchbasin manhole frame and covers.
- 2.4 CATCH BASINS
- 2.4.1 Catch basin manholes shall conform to ASTM Designation C478 for precast reinforced concrete. Top section shall be precast conical where depth exceeds 1.8 m from top of pipe to top of manhole and precast flat where depth is less than 1.8 m.
- Catch basin barrels shall conform to ASTM C478 with precast top and base 900 mm I.D.
- 2.5 CATCH BASIN LEADS
- 2.5.1 Where, in accordance with [SUB-SECTION 2.1.6 OF THIS SECTION](#), catch basin leads are to be concrete, they shall conform to the Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (ASTM Designation C14).

2.5.2 In cases other than stated in [SUB-SECTION 2.1.6 OF THIS SECTION](#), catch basin leads may be in accordance with [SUB-SECTIONS 2.1.1](#) or [2.1.4 OF THIS SECTION](#).

## 2.6 CONCRETE

2.6.1 All concrete for bedding, manholes, catch basin and other appurtenances shall develop a minimum compressive strength of 25 MPa at 28 days. The maximum slump shall be 75 mm. Maximum water/cement ratio = 0.49. Air Content = 4% - 6%, cement shall be sulphate resistant, Type 50. Aggregates, proportioning, measurement, mixing, placing and finishing shall be in accordance with the applicable sections of CSA A.23.1 and A23.2. Concrete poured during temperatures lower than 5°C shall have a temperature not less than 5°C and suitable means shall be provided to maintain this temperature for 72 hours.

2.6.2 All reinforcing steel shall conform to the requirements of CSA G30.12 and G30.16 for new billet steel, grade 400. Welded wire mesh shall conform to CSA G30.5. Minimum concrete cover on all reinforcing steel = 75 mm.

## 2.7 CEMENT MORTAR

2.7.1 Cement mortar shall consist of 1 part Portland Cement and 2 parts clean sharp sand with sufficient water added to produce a stiff paste.

## 2.8 BITUMINOUS COMPOUND

2.8.1 Compound for water proofing shall conform to CG5B 37-GP-6.

## 2.9 PIPE BEDDING MATERIAL

2.9.1 The bedding and initial backfill sand shall be free from frozen material, clay, organic material, be coarse grained with minimal silt and meet the following grading requirements: The liquid limit shall not exceed 25 and the Plasticity Index shall not exceed 6. The bedding and initial backfill shall extend from a minimum of 100 mm in depth below the pipe, up both sides to the trench wall, to 300 mm in depth above the pipe.

Sand, complying with the following gradation:

Sieve Size	Percent Passing
10.0 mm	100
5.0 mm	70 - 100
0.16 mm	5 - 20
80 micro-m	0 - 12

- 2.9.2 Crushed or screened stone or gravel, hard, durable, washed, free from any fines and deleterious material to meet the following gradation:

Sieve Size	Percent Passing
25.0 mm	100
5.0 mm	10 max
80 micro-m	2 max

Use for poor ground below pipe zone.

- 2.9.3 Testing to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2-M.

## 2.10 IMPORTED GRANULAR BACKFILL

- 2.10.1 Crushed, pit run or screened stone, gravel or sand consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials, complying with the following gradation:

Sieve Size	Percent Passing
75.0mm	100
25.0mm	55-95
5.0 mm	25-50
80 micro-m	2-10

- 2.10.2 Testing to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2-M.

- 2.10.3 Use above initial backfill for imported backfill or fill.

## 2.11 SELECT NATIVE BACKFILL

- 2.11.1 Selected material from excavation or other sources, approved by Contract Manager/Developer Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

- 2.11.2 Use above initial backfill for backfill or fill.

## 3.0 EXECUTION

### 3.1 CLASSIFICATION

- 3.1.1 Excavation shall be classified by the type of material excavated as follows:

## 3.1.1.1 Normal

Normal excavation is defined as the excavation of all materials other than rock and shall include hard pan, quick sand, frozen earth, snow, ice, and other miscellaneous material such as old catch basin leads, etc.

## 3.1.1.2 Rock

Rock excavation is defined as boulders, pieces of concrete, or masonry, exceeding ½ cubic metre in volume or solid ledge rock, concrete or masonry which requires for its removal, drilling, blasting, wedging, sledging or barring, or breaking up with a power operated hand tool. No soft or disintegrated rock, concrete or masonry which can be removed with a hand pick or power operated excavator or shovel, and no loose, shaken or previously blasted rock shall be included as rock excavation.

## 3.2 TRENCHING

## 3.2.1 The trench shall be excavated to the required alignment, grade and depth shown on the CONSTRUCTION DRAWINGS or as established by the Contract Manager/Developer Representative.

The trench walls shall be shaped in accordance with Occupational Health and Safety Regulations.

Trenches shall be excavated only as far in advance of the pipe laying operation as safety, traffic and weather conditions permit. The Contract Manager/Developer Representative may limit the amount of trench to be opened or left open at any time.

Do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation, unless otherwise authorized by the Contract Manager/Developer Representative in writing.

Where excavation is made in rock, or where excavation is made in a material which cannot provide an even, uniform and smooth surface or where large stones are encountered in the trench, such material shall be removed to provide a clear distance between any part or projection of such material and the surface of all pipe and fittings of not less than 150 mm for pipe having an outside diameter of 610 mm or less, and 250 mm for pipes having an outside diameter greater than 610 mm. The subgrade shall then be made by backfilling with an approved sand compacted in 150 mm layers. The finished subgrade surface shall be shaped by hand tools to provide a uniform continuous support for the pipe.

The bottom of trench excavations shall be in undisturbed native material, free from loose, soft or organic matter.



Where required due to unauthorized over-excavation, fill under pipe zone with fill material approved by the Contract Manager/Developer Representative and compact to 95% Standard Proctor Density.

Notify Contract Manager/Developer Representative when soil at bottom of excavation appears unsuitable and proceed as directed by Contract Manager/Developer Representative.

Disposal of unsuitable excavated material shall be done at the Contractor's expense and as directed by the Contract Manager/Developer Representative.

### 3.3 TRENCH WIDTHS

- 3.3.1 The minimum trench width below the crown of the pipe shall be not less than the nominal diameter of the pipe plus 400 mm. The maximum width of the trench below the crown of the pipe including shoring shall be not more the nominal diameter of the pipe plus 600 mm or not more than a total width of 900 mm, whichever is the larger. Where the maximum trench width is exceeded, the Contractor shall, at his own expense, provide special bedding or take other precautions as directed by the Contract Manager/Developer Representative.

Where more than one pipe is laid in the same trench, the width shall be the sum of the outside diameters of the pipes plus 750 mm, unless otherwise approved by the Contract Manager/Developer Representative.

The Contractor should be aware that increased trench width can cause increased soil loads on the pipe. Where the maximum trench width is exceeded, the Contractor shall, at his own expense, provide special bedding, or a higher strength pipe or take other precautions as directed by the Contract Manager/Developer Representative.

### 3.4 TRENCH DEWATERING

- 3.4.1 Keep excavations free of water while work is in progress.

Protect open excavations against flooding and damage due to surface run-off.

Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.

The trench shall be dewatered to facilitate construction, and so that the workmen may work safely and effectively. In no case shall the pipe be used as a drain for such water. It is essential that the discharge of the trench dewatering pumps be conducted away from the site of the work and into natural drainage channels, drains, or storm sewers.

Ground and surface water shall be controlled in the trenches to the extent that excavation and pipe installation can proceed in the specified manner and such that the trench bottom is not disturbed or softened by workmen. Trench water, muck or other foreign material shall not be permitted to enter the pipe being installed.

The Contractor shall be responsible for dewatering the trench excavations and shall ensure that loss, damage, nuisance, or injury to the public does not result due to these operations.

### 3.5 BRACING AND SHORING

- 3.5.1 Trench bracing may be removed when the backfilling has reached the respective level of such bracing. Sheet piling shall be removed as the backfilling proceeds. Backfilling of holes left by sheet piling below the trench bottom shall be carefully compacted, and thereafter backfilling and withdrawal of sheet piling shall proceed together. No voids shall be left in the backfill by the withdrawal of the sheet piling. Unless otherwise approved by the Contract Manager/Developer Representative, all shoring shall be removed.

The Contract Manager/Developer Representative may order shoring to be permanently left in place. Shoring that has been ordered left in place shall be cut off and removed to a depth of 900 mm below the existing or future proposed subgrade whichever is the lower, or to an elevation designated by the Contract Manager/Developer Representative.

Prefabricated cages or shields, provided they conform with all applicable safety requirements, may be used to supplement or replacement conventional shoring.

When a cage or shield is used in the trench instead of shoring, special care shall be taken to ensure that there is no lateral or longitudinal movement of the pipe when the cage is moved. The cage shall be raised vertically so that the bottom member is clear of the crown of the pipe before the cage is pulled forward in the trench.

Bracing and shoring is the sole responsibility of the Contractor.

Open-cut trenches shall be sheeted and braced as required by the Construction Safety Regulations of the Occupational Health and Safety Act, to prevent sliding or caving of the sides of the trench and as may be necessary to protect life, property, and the Work. When close sheet piling is required, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheet piling. The Contract Manager/Developer Representative reserves the right to order the sheet piling driven to the full depth of the trench or to such additional depths as may be required for the protection of the Work. Where the soil in the lower limits of a trench has the necessary stability, the Contract Manager/Developer Representative at his discretion may permit the Contractor to stop the driving of sheet piling at some designated elevation above the trench bottom. The granting of permission by the Contract Manager/Developer Representative, however, shall not relieve the Contractor in any degree from his full responsibility under the Contract.

Sheet piling and bracing which have been ordered left in place must be cut off and removed for a depth of 1 m below the established street grade or the existing surface of the street, whichever is lower. Trench bracing, except that which must be left in place, may be removed when the backfilling has reached the respective levels of such bracing. Sheet piling, except that which has been left in place, shall be removed as the backfilling proceeds.

Backfilling of holes, left by sheeting below the bottom of the trench, shall be carefully done, and thereafter backfilling and withdrawal of sheeting shall proceed together; no voids shall be left in the trench by the withdrawal of the sheeting.

Sheetings shall not be driven any further below the bottom of the trench than is necessary to ensure proper support of the sheeting and bracing. The cost of furnishing, placing, and removing the sheeting and bracing shall be included in the price bid for the Work.

When sheeting and bracing have been ordered left in place by the Contract Manager/Developer Representative, the payment for such material shall be as extra work as outlined in the CONTRACT DOCUMENTS, and shall include the upper 1 m of "cut-off" section of the sheeting. No extra will be allowed for bracing which the Contractor is unable to move on account of it being held by the side of the trench caving in or by the backfilling.

### 3.6 EXCAVATED MATERIAL

- 3.6.1 All excavated materials shall be piled in accordance with Occupational Health and Safety Regulations and in a manner that will not endanger the work and where practicable, will avoid obstructing sidewalks, roadways, and driveways. Gutters shall be kept clear or other satisfactory provisions made for street drainage and natural watercourse shall not be obstructed. Hydrant valve boxes, curb stop boxes, and other utility controls shall be left unobstructed and accessible.

Any surplus material shall either be incorporated in the Work as directed by the Contract Manager/Developer Representative or disposed of to an approved location. All excavated unsuitable material shall be disposed of to an approved location. The cost of disposing of any surplus or unsuitable material shall be borne by the Contractor.

### 3.7 EXISTING STRUCTURES

- 3.7.1 The Contractor shall be responsible for locating and protecting from damage all underground and surface structures, utility pipelines, overhead lines, water and sewer mains, building services, cables, culverts, sidewalks, and other obstruction encountered in the progress of the Work. Any such damage shall be repaired by the Contractor at his expense as directed by the Contract Manager/Developer Representative.

In any location where the use of trench digging machinery might cause such damage, the Contractor shall carry out the trenching by hand at no extra cost to the Owner.

### 3.8 BARRICADES, SIGNS AND WARNINGS

- 3.8.1 The Contractor shall at his own expense maintain all requisite barriers, fences and warning signs or other precautions to protect the workers and general public against accidents or injury. All excavations or obstructions shall be clearly marked between sunset and sunrise with proper warning flares or lights.

### 3.9 ALTERATIONS

- 3.9.1 Where obstructions to the Work are encountered which require an alteration of the Work in order to carry out the intent of the Contract, the Contractor shall make alterations to line and grade in accordance with instruction and CONSTRUCTION DRAWINGS prepared by the Contract Manager/Developer Representative. Such alterations will be paid as provided for by the CONTRACT DOCUMENTS.

### 3.10 BEDDING

- 3.10.1 Unless shown otherwise in the CONSTRUCTION DRAWINGS, the pipe shall be laid on the trench bottom using one of the following classes of bedding:

#### 3.10.1.1 Class "A" Bedding

To provide Class "A" bedding, the pipe shall be bedded and cradled in concrete to the depths shown on [STANDARD DRAWING 42002](#). The concrete shall be poured to the full width of the trench and thoroughly vibrated around and under the pipe. The remainder of the pipe shall be entirely surrounded to a depth of at least 300 mm above its top with approved granular material carefully placed by hand and compacted in layers not exceeding 150 mm in thickness to at least 95% of Standard Proctor Density at optimum moisture content.

#### 3.10.1.2 Class "B" Bedding

To provide Class "B" bedding, the pipe shall be set on sand as specified in [SUB-SECTION 2.9 OF THIS SECTION](#) and shown on [STANDARD DRAWING 42002](#).

The remainder of the pipe shall be entirely surrounded to a height of at least 300 mm above its top with granular material carefully placed by hand to fill completely all spaces under and adjacent to the pipe. The granular material shall be thoroughly compacted on each side and as far as practicable under the pipe in layers not exceeding 150 mm in thickness, to at least 95% of Standard Proctor Density at optimum moisture content.

### 3.11 BEDDING IN ROCK

- 3.11.1 In rock, excavation shall be carried down to give a minimum clearance of 150 mm below the pipe. Sand shall be used for bedding and thoroughly compacted to at least 95% of Standard Proctor Density at optimum moisture content.

### 3.12 BACKFILLING

- 3.12.1 After the pipe laying has been approved, backfilling shall be carried out with materials free from frozen lumps, large clods, stones or extremely wet earth. Backfilling shall be done in accordance with the following procedure or as directed by the Contract Manager/Developer Representative:

### 3.12.1.1 Native Backfill Outside Right-of-Way

Backfill material excavated from trench shall be placed in uniform lifts and compacted to a density of at least 95% of Standard Proctor Density at optimum moisture content. If mechanical compaction methods are used, the layers shall not exceed 1/3 m in depth. If compacted by hand, each layer shall not exceed 150 mm.

The permission of the Contract Manager/Developer Representative must be obtained before the use of any material containing rock or spalls. In any case, no rocks, spalls, or boulders will be permitted in the backfill within 1 m above the top of the pipe. No organic materials, frozen material, topsoil or similar material shall be used in the backfilling.

### 3.12.1.2 Native Backfill Inside Right-of-Way

Backfilling of trenches under the roadway shall be carried out by placing the material excavated from trench in uniform lifts not exceeding 1/3 m in depth and compacted to a density of 98% of Standard Proctor Density at optimum moisture content.

## 3.13 PIPES IN OR UNDER EMBANKMENTS

### 3.13.1 No heavy construction equipment shall be permitted to pass over pipes until the minimum amount of cover is placed over the top of pipes as listed below:

Minimum Cover      - 1/3 of a metre above the top of corrugated metal or plastic pipes.

                                 - 2/3 of a metre above the top of concrete, clay or asbestos-cement pipes.

Notwithstanding the above, the Contractor shall be responsible for any damage to the pipe caused by the construction equipment.

## 3.14 AUGERING OR BORING

### 3.14.1 Where specified on the CONSTRUCTION DRAWINGS or required by the Contract Manager/Developer Representative, auguring or boring methods shall be employed by the Contractor to install a major pipe crossing.

Unless otherwise specified, the encasing pipe shall be standard wall steel pipe and shall conform to ASTM A53 Grade A or approved equal.

Auguring or boring with or without casing, may be used if it is to the advantage of the Contractor to use such method in lieu of machine trenching at no additional cost to the Owner.

## 3.15 CLEANING UP

- 3.15.1 The Contractor shall clean up and dispose of all surplus material, trash and other debris as work progresses. Before the job is considered as being completed, the Contractor shall remove all equipment, appliances, barriers, surplus material from roadways, sidewalks, crossings, and water courses, restore roadworks, sidewalks and crossings and do such other work as directed by the Contract Manager/Developer Representative in order to level the site in a satisfactory condition. This work shall be done with a minimum of inconvenience to the public and at no time be more than 150 m behind the actual construction.

## 3.16 PIPE LAYING JOINTING

3.16.1 Handling of Materials

- 3.16.1.1 No damaged pipes shall be incorporated in the Work without the approval of the Contract Manager/Developer Representative.

The interior of pipes and fittings shall be kept free of all foreign matter.

3.16.2 Pipe Laying

- 3.16.2.1 Each pipe shall be set and maintained to line and grade by a method approved by the Contract Manager/Developer Representative.

Pipe laying shall commence at the lowest point of the length being laid and the pipes shall be placed with the spigot ends pointing in the direction of the flow, unless otherwise permitted by the Contract Manager/Developer Representative. No outlet is guaranteed at the lower end of any sewer main the Contractor has to lay.

3.16.3 Jointing

- 3.16.3.1 Joints shall be made in accordance with the recommendations of the manufacturer and the instructions of the Contract Manager/Developer Representative.

## 3.17 BREAKING INTO SEWERS, MANHOLES AND CATCH BASINS

- 3.17.1 Breaking into existing manholes and catch basins shall be performed in a manner acceptable to the Contract Manager/Developer Representative and in accordance with good practice. Existing manhole floors shall be re-channeled and properly benched, the junction area grouted to form a smooth joint. All debris must be removed and the area in vicinity of the connection shall be left in a tidy condition.

## 3.18 SERVICE CONNECTIONS

- 3.18.1 Service connections shall be installed in the upper half of the pipe as shown on the CONSTRUCTION DRAWINGS.
- 3.18.2 Inline Tee or Wye fittings must be installed during sewer main construction at all services connections.
- 3.18.3 Saddles are allowed for service connections to existing mains.
- 3.18.4 Sewer service risers shall be installed where the depth of main exceeds 4.5 m.
- 3.18.5 Blue/Green for Water/Sanitary respectively, painted stakes of size 38 mm by 89 mm shall be installed to a minimum of 500 mm above the ground.

## 3.19 MANHOLES

3.19.1 General

- 3.19.1.1 The Contractor shall be responsible for the complete placement of all manholes at the locations shown on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative. All materials are to be supplied by the Contractor.

All sections of the manhole shall be installed plumb and shall be bonded together with cement mortar to the satisfaction of the Contract Manager/Developer Representative. A minimum of 100 mm, to a maximum of 400 mm of grade rings are required immediately beneath the manhole frame.

The Contractor shall be responsible for backfilling and tamping the excavated area around the outside of manholes to at least 98% of Standard Proctor Density at optimum moisture content.

An area 0.6 m wide from the bottom of the cone to the subgrade elevation in roadways shall be backfilled with fillcrete or an acceptable alternative.

3.19.2 Manholes

- 3.19.2.1 Manholes shall be constructed to the dimensions shown on the CONSTRUCTION DRAWINGS.
- 3.19.2.2 20 mm diameter galvanized steel safety steps shall be installed every 400 mm of height. The first step shall be 150 mm maximum below the frame. The last step shall be 300 mm maximum above the base.
- 3.19.2.3 Precast conical section shall be used where depth exceeds 2 m from top of pipe to top of manhole and precast flat top used where length is less than 2 m.

- 3.19.2.4 If a precast concrete bottom slab is used, the concrete shall have a minimum compressive strength of 25 MPa. The slab shall be reinforced as shown on the CONSTRUCTION DRAWINGS.
- 3.19.2.5 The floors of the manholes shall conform to the curvature and slope of the sewer pipes. Pipe sections inside the manhole shall be cut flush with the inside wall of the manhole and the cast-in-place concrete benching and all rough broken edges finished smooth and neat. Manhole tops shall be set as directed by the Contract Manager/Developer Representative.
- 3.19.2.6 All joints shall be sealed with rubber gaskets conforming to ASTM C443 and grouted inside and outside carefully to make manholes watertight.
- 3.19.2.7 Aluminum safety platforms shall be required in all manholes with a depth greater than 7.0 m.

### 3.20 CATCH BASINS

#### 3.20.1 General

- 3.20.1.1 The Contractor shall be responsible for the complete placement of all catch basins at the locations shown on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative prior to the installation of all curb and gutter. All materials shall be supplied by the Contractor.

All sections of the catch basin shall be installed plumb and shall be bonded together with cement mortar to the satisfaction of the Contract Manager/Developer Representative. Bricks and mortar shall be used where it is necessary to raise grates and side inlets to meet the curb and gutter grade. The total depth of such adjustment not to exceed 100 mm.

The Contractor shall be responsible for backfilling and compacting the excavated area around the outside of catch basins to at least 98% of Standard Proctor Density at optimum moisture content.

#### 3.20.2 Catch Basins

- 3.20.2.1 The catch basin shall be constructed to the dimensions shown on the CONSTRUCTION DRAWINGS. The concrete in the precast top slab base shall have a minimum compressive strength of 25 MPa at 28 days.

#### 3.20.3 Catch Basin Frames, Grates, and Inlets

- 3.20.3.1 Frames and grates and side inlets shall conform to the CONSTRUCTION DRAWINGS unless otherwise shown. The gutter inlet should be between 25 mm and 50 mm lower than the gutter grade at the location of the catch basin



**3.20.4      Catch Basin Leads**

- 3.20.4.1      Installation of leads for catch basins shall be governed by all the same specifications as mains. In addition, the minimum slope of the pipe, regardless of size, shall be 2% unless specifically altered by the Contract Manager/Developer Representative or shown on the CONSTRUCTION DRAWINGS.

**3.21          VIDEO INSPECTIONS**

- 3.21.1          Strathcona County will conduct the television inspection with qualified personnel at Final Acceptance (FAC) at the Contractor's expense and issue a formal report, pictures and video tape. An optional inspection can be done at Construction Completion (CCC) at the Contractor's expense.

**4.0          MEASUREMENT AND PAYMENT****4.1          SEWER PIPE**

The unit of measure for the sewer pipe shall be the lineal metre. The quantity paid for shall be the number of lineal metres acceptably installed as measured along the centreline of the pipe from centre to centre of manhole or catch basin on the surface of the ground. The depth of the pipe shall be taken as the average depth from the invert of the pipe to the ground surface as determined by measurements taken every 15 m at the time the grade stakes are set.

Payment at the respective Contract price bid per lineal metre shall be full compensation for supply of materials, trench excavation, shoring as required, placing the bedding, laying and jointing the pipe and breaking into new catch basins, manholes and mains as required, backfill as specified, compaction, disposal of surplus material, dewatering, and for all labour and use of equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

**4.2          REPLACING UNSUITABLE SUBGRADE MATERIAL**

The unit of measure for the replacement of unsuitable subgrade material shall be the cubic metre. The quantity paid for shall be the number of cubic metres acceptably replaced as measured in place. The quantity shall be computed from the length, width, and depth ordered removed by the Contract Manager/Developer Representative.

Payment at the respective Contract price bid per cubic metre shall be full compensation for excavating and disposing of the unsuitable material, dewatering, supplying, hauling, placing, and compacting the replacement sand or gravel and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

#### 4.3 MANHOLES

The unit of measure for manholes shall be the vertical metre. The quantity paid for shall be the number of vertical metres acceptably installed. Measurement shall be from the lowest invert in the manhole to the bottom of the manhole cover.

Payment at the respective Contract price bid per vertical metre shall be full compensation for excavating and disposing of surplus material, timbering and shoring, supplying and installing the manhole complete including steps, manhole base, dewatering, backfilling with imported granular material, compacting, and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

#### 4.4 CATCH BASINS

The unit of measure for catch basins shall be by number. The quantity paid for shall be the number acceptably installed.

Payment at the respective Contract price bid per unit shall be full compensation for excavating and disposing of surplus material, shoring and timbering, supplying and installing the catch basin complete including frame, grate and cover, dewatering, backfilling with imported granular material, compacting, and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

#### 4.5 CATCH BASIN LEADS

The unit of measure for catch basin leads shall be the lineal metre. The quantity paid for shall be the number of lineal metres acceptably installed, as measured on the surface of the ground along the centreline of the pipe from the centre of the catch basin to the centre of the manhole or pipe it enters.

Payment at the respective Contract price bid per lineal metre regardless of depth shall be full compensation for excavating and disposing of surplus material, supplying, installing and bedding the pipe, timbering and shoring, connecting to catch basins, manholes or pipes including all fittings, dewatering, backfilling and compacting, and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

#### 4.6 BREAKING INTO EXISTING MANHOLES, CATCH BASINS OR SEWERS

The unit of measure for breaking into existing manholes, catch basins or sewers shall be by number. The quantity paid for shall be the number of connections acceptably made.

Payment at the respective Contract price bid per unit shall be full compensation for making the necessary opening in the manhole, catch basin or sewer, cutting the pipe neatly to conform to the inner surface of the manhole, catch basin or sewer, connecting, and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

Breaking into manholes, catch basins or sewers which are placed as part of this contract shall not be considered for payment under this item.

#### 4.7 RISERS

Unless otherwise specified, the unit of measure for risers shall be the vertical metre. The quantity paid for shall be the number of vertical metres acceptably installed.

Payment at the respective Contract price bid per vertical metre shall be full compensation for excavating and disposing of surplus material, supplying and installing the riser including all fittings and marker, timbering and shoring, and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATION.

#### 4.8 SERVICE CONNECTIONS

The unit of measure for the service connections shall be the lineal metre. The quantity paid for shall be the number of metres acceptably installed as measured along the centreline of the trench on the surface of the ground.

Payment at the respective Contract price bid per lineal metre shall be full compensation for excavating, shoring and timbering, supplying, installing, connecting and bedding the pipe, dewatering, backfilling with earth, disposal of surplus material and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

#### 4.9 AUGERING OR BORING

The unit of measure for augering and boring shall be the lineal metre. The quantity paid for shall be the number of lineal metres acceptably installed as measured from end to end of the boring and including the carrier pipe where no casing is required or from end to end of the casing and including the carrier pipe and casing where casing is required.

Payment at the respective contract price bid per lineal metre shall be full compensation for excavating, shoring and timbering, augering or boring, supplying and installing the casing and carrier pipes, dewatering and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this section specifies the requirements of adjusting existing manholes, catch basins and water valves.

**2.0 PRODUCTS****2.1 MATERIALS**

- 2.1.1 Precast Manhole Sections: To ASTM C478-75 circular. Top sections eccentric cone or flat slab top type with opening offset.

- 2.1.2 Precast Catch Basin Sections: To ASTM C139-73, ASTM C478-78a.

- 2.1.3 Mortar:

Aggregate: To CSA A82.56-M1976

Cement: To CAN3-A8-M77, sulphate resistant (Type 50)

- 2.1.4 Ladder Rungs: To CSA G30.13-M1977, No. 25M billet steel deformed bars, hot dipped galvanized to CSA G164-1965 (R1972). Rungs to be safety pattern (drop step type).

- 2.1.5 Adjusting Rings: To ASTM C478-78a.

- 2.1.6 Concrete Brick: To CSA A165.2-1972.

- 2.1.7 Valve Casings: Shall be screw down Norwood Foundry Type "B" or approved equal.

**3.0 EXECUTION****3.1 MANHOLES AND CATCH BASINS**

- 3.1.1 Remove existing frame and cover.

- 3.1.2 Adjust barrel to required elevation by removing or installing precast concrete sections.

- 3.1.3 Set frame and cover to required elevation using no more than 0.4 m height of grade rings from the bottom of the frame and cover to top of the cone.

- 3.1.4 Recess catch basin frame and cover 1 cm below gutter elevation and 1 cm behind the face of curb.

- 3.1.5 Recess manhole frame and cover 5 mm below finished surface elevation.

- 3.1.6 Join brick course to frame with cement mortar, parge and make smooth and watertight.
- 3.1.7 Install additional ladder rungs in manholes as directed by the Contract Manager/Developer Representative.
- 3.2 WATER VALVES
- 3.2.1 Excavate and expose adjustable portion of water valve casing.
- 3.2.2 Adjust water valve casing to required elevation.
- 3.2.3 Recess top of water valve 5 mm below finished surface elevation.
- 3.2.4 Backfill excavation. Ensure water valve casing will not settle.
- 3.2.5 Replace valve casing with Type "B" screw down type, if existing casing is not Type "B".
- 3.2.6 Where valve is in concrete, paving stone, or asphalt bikepath, a PVC sleeve is required to be installed over the valve casing for the depth of the top section of the valve casing.
- 4.0 MEASUREMENT AND PAYMENT
- 4.1 MEASUREMENT
- 4.1.1 Manholes and Catch Basins: Adjust catch basin or manhole shall include supply of material, excavation, removing and resetting frame and cover, installation of masonry to final grade, backfilling and compaction, and all incidental work for which separate payment is not specified elsewhere to adjust existing catch basins, catch basin manhole and manholes to grade.
- 4.1.2 Water Valves: Adjusting of water valve shall include all labour, equipment and materials required to raise or lower the water valve to final grade and to replace valve casing to Type "B" if existing casing is not Type "B".
- 4.2 PAYMENT
- 4.2.1 Manholes and Catch Basins: Payment shall be at the unit price bid for each accepted catch basin, catch basin manhole or manhole adjusted to final grade.
- 4.2.2 Water Valves: Payment shall be at the unit price bid for each accepted water valve adjusted to final grade.

**1.0 GENERAL****1.1 DESCRIPTION**

The work covered by this section specifies the requirements for supplying and installing roadway base drainage at the sag locations of arterial roads. Refer to [STANDARD DRAWING 44004](#).

**2.0 PRODUCTS****2.1 MATERIALS**

Mebra Wick Drain: #7407 or equivalent

**3.0 EXECUTION**

3.1 Place Wick Drain on top of clay subgrade surface immediately below lowest granular material layer.

3.2 Connect Wick Drain to catchbasin or manhole in accordance with [STANDARD DRAWING 44004](#).

**4.0 MEASUREMENT AND PAYMENT**

4.1 Roadway base drainage shall be paid at the unit price bid per lineal metre and shall include supplying and installing the Wick Drain and breaking into catchbasin or manhole barrels.

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on the correct sides when the document is printed double-sided.



## 1.0 GENERAL

### 1.1 DESCRIPTION

- 1.1.1 This specification covers the design, materials, implementation, and measurement and payment of all open cut crossings of rural road rights of way for pipelines and utilities.
- 1.1.2 The pipeline or utility crossing the road right of way shall not have a low point or a zero grade within 100 m from either side of the right of way property lines.

## 2.0 PRODUCTS

- 2.1 The pipe bedding and pipe zone material shall be fine granular material free from organic material and meet the following requirements:

Sieve Size (mm)	Percent Passing By Mass
10.00	100
2.50	80 or more
0.63	60 or less
0.315	30 or less
0.160	20 or less
0.063	15 or less

The material passing the 0.315 mm sieve must have a liquid limit not exceeding 25 and a plasticity index not exceeding 6.

- 2.2 The open cut trench backfill material shall be imported local clay at or near optimum moisture content and free of any organic material.
- 2.3 The road construction from the prepared subgrade to the crown shall match the adjacent existing road construction or comply to the following, whichever is greater:

Minimum Roadway Structure	
50 mm	cold mix
200 mm	20 mm crushed gravel
150 mm	subgrade preparation

**3.0 EXECUTION**

- 3.1 Notification of the intended road closure, that is to be published in the local papers, and method of signing the intended closure must be submitted to Strathcona County review 4 weeks prior to the road closure.
- 3.2 The pipe bedding and pipe zone material shall be compacted to 95% of a standard Proctor Density test in lifts not exceeding 150 mm.
- 3.3 The trench backfill material shall be compacted in the road right of way as follows:

Depth of Trench	Required Compaction
Top of pipe zone to 0.5 m below finished subgrade	95% Standard Proctor
0.5 m below finished subgrade to finished subgrade	97% Standard Proctor

The lifts shall be no greater than 150 mm thick.

- 3.4 The frequency of compaction testing shall be as follows:

Pipe Zone: Three times per crossing.

Trench: One test for every 600 mm of trench depth.

- 3.5 The existing landscaping and ground cover adjacent to the road and the road ditches must be restored in accordance with Strathcona County's current LANDSCAPING SPECIFICATIONS.

**1.0 GENERAL****1.1 DESCRIPTION**

The work covered by this section specifies the requirements for producing, supplying and installing unshrinkable fill (fillcrete) to be used for trench backfill with permission from the County.

**2.0 PRODUCTS****2.1 MATERIALS****2.1.1 Portland Cement**

In accordance with CAN/CSA A3000-18 for each of the following types:

Type GU – General use hydraulic cement;  
Type HE – High early-strength hydraulic cement; and  
Type HS – High sulfate-resistant hydraulic cement.

Unless otherwise indicated, Portland Cement Type GU shall be used. After October 15, Portland Cement Type HS may not be used.

**2.1.2 Fine Aggregate**

In accordance with CAN/CSA-A23.1-14, Clause 4.2.3.

**2.1.3 Water**

In accordance with CAN/CSA-A23.1-14, Clause 4.2.2. Free from oils, acids, alkalis, organic materials, or any substance with could affect the hydration of the cement. The source shall be approved by the Contract Manager/Developer Representative.

**2.1.4 Air-Entraining Agent**

An air-entraining agent, in accordance with ASTM C260, shall be added in sufficient amounts to produce air entrainment as required.

**2.1.5 Chemical Admixtures**

In accordance with ASTM C494, including water-reducing agents, retarders, and accelerators. Chemical admixtures shall not be used unless permitted in writing by the Contract Manager/Developer Representative.

### 2.1.6 Fly Ash

Where permitted by the Contract Manager/Developer Representative, fly ash may replace not more than 10% of the specified minimum cement content in the mix, up to October 15. After October 15, no portion of the specified minimum cement content shall be replaced with fly ash.

Where permitted by the Contract Manager/Developer Representative, use fly ash in accordance with CAN/CSA A3000-18, pozzolan Type C. Tests on the fly ash must be performed by an independent testing laboratory, as accepted by the Contract Manager/Developer Representative. Submit the test results, along with the mix design, to the Contract Manager/Developer Representative.

## 2.2 MIX DESIGN

### 2.2.1 Fillcrete shall be supplied in accordance with the following:

Compressive Strength at 28 Days (MPa)	Slump (mm)	Entrained Air (% by Volume)	Maximum Aggregate Size (mm)	Minimum Portland Cement (kg/m <sup>3</sup> )
Minimum 0.15 Maximum 0.40	100 ± 25	6.0 – 8.0	5	30

### 2.2.2 The Contractor shall submit to the Contract Manager/Developer Representative for approval, tests of aggregates and the mix proposed for the fillcrete. The proposed mix will be checked by the Contract Manager/Developer Representative who will have the Contractor make adjustments to the mix if deemed necessary.

## 3.0 EXECUTION

### 3.1 PRODUCTION AND DELIVERY

#### 3.1.1 Fillcrete shall be produced in accordance with CSA-A23.1-14, Clause 8.11, and shall conform to the approved mix design.

#### 3.1.2 Prior to loading fillcrete onto rotating drum trucks, the supplier shall ensure that the drum is clean and free of any paste or concrete materials remaining from previous concrete/fillcrete batches.

### 3.2 PRODUCTION FACILITIES

#### 3.2.1 The supplier shall maintain a minimum stockpile of 100 tonnes of cement powder at the production plant site at all times.

#### 3.2.2 Suppliers shall have a computerized batching system that provides computer printed records and load tickets. Hand written loading times will not be accepted.

#### 3.2.3 Plant scale certification shall be maintained to CAN/CSA-A23.1-14, Clause 5.2.3.

### 3.3 PROTECTION OF FINISHED WORK

- 3.3.1 Protect fillcrete from freezing or other adverse weather conditions for a minimum of 24 hours after placement.
- 3.3.2 Fillcrete that is exposed to significant infiltration of water within 24 hours of placement must be removed and replaced.
- 3.3.3 A minimum 150mm Granular Base Course must be placed on the fillcrete surface before allowing any vehicular traffic over the fillcrete. The Granular Base Course must be placed in accordance with [VOL. 2 SEC. 303, GRANULAR SUB-BASE AND BASE COURSE](#) a minimum of 24 hours after fillcrete placement.

### 3.4 FIELD QUALITY CONTROL

- 3.4.1 The County will conduct an initial plant inspection prior to the production of any fillcrete. This inspection shall include, but not be limited to, an inspection of production and quality control facilities, as well as a review of the supplier's quality control program.
- 3.4.2 Required Strength: The result of each compressive strength test must be within the specified compressive strength range.

## 4.0 MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

Fillcrete shall be measured by cubic metres as measured in place.

### 4.2 PAYMENT

Payment shall be full compensation for designing and testing the mix; supplying and hauling the mix; controlling traffic; cleaning up the location; and for all labour, equipment, tools and incidentals necessary to completed the work in accordance with these CONSTRUCTION SPECIFICATIONS.

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of requirements for working and compacting the subgrade soil and conforming to lines, grades, dimensions and typical cross sections in the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the sections shown on the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**1.2 DEFINITIONS**

- 1.2.1 Prepared subgrade: soil immediately below the topsoil or planting mix or other landscaping treatment.

**2.0 PRODUCTS****2.1 MATERIALS**

- 2.1.1 Use only subgrade soils as per subgrade specifications approved by the Contract Manager/Developer Representative.

**2.2 EQUIPMENT**

- 2.2.1 Equipment: various pieces of equipment designed for and capable of, disking, scarifying, spreading, spraying water, compacting, and trimming soil to specified depth.

**3.0 EXECUTION****3.1 GENERAL**

- 3.1.1 When unsuitable material is encountered at the subgrade elevation, undercut until sufficient deleterious material is removed as directed by the Contract Manager/Developer Representative. Replace with approved material as specified. Remove rejected material from site.
- 3.1.2 Exclude stones larger than 100 mm from top 500 mm of design subgrade elevation.
- 3.1.3 Exclude all stones larger than 25 mm from surface of subgrade.
- 3.1.4 Subgrade elevation shall be the final grade minus surfacing material depth.
- 3.1.5 Shape and roll alternately to obtain a smooth even and uniformly compacted base.

- 3.1.6 Subgrade must be graded to eliminate ponding areas and have an optimum gradient of 2% in all directions with a variance  $\pm 0.5$  %.
- 3.1.7 Playground subgrade must be graded to a minimum 1.5% and to a maximum 2% slope. Compaction to be 98% Standard Proctor Density at optimum moisture content.
- 3.1.8 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- 3.1.9 Blend slopes into surrounding areas to form, smooth, even transition.
- 3.1.10 Scarify subgrade over entire area to receive topsoil. Repeat cultivation in areas where equipment used for hauling and spreading has compacted subgrade.
- 3.1.11 Slope all grades away from buildings, trails, playgrounds, parking lots and sidewalks or as shown in approved CONSTRUCTION DRAWINGS.
- 3.1.12 Prepare subgrade surface to following grades unless otherwise specified as per site conditions:
  - 3.1.12.1 Seeded areas: (except soccer fields): 150 mm below final design grade;
  - 3.1.12.2 Soccer/football fields: 200 mm below final design grade;
  - 3.1.12.3 Sodded areas: 125 mm below final design grade;
  - 3.1.12.4 Shrub beds: 450 mm below final design as per site conditions;
  - 3.1.12.5 Shale ball fields: 250 mm below final design grade; and
  - 3.1.12.6 Turf ball fields: 200 mm below final design grade.
- 3.2 DENSITY REQUIREMENTS
  - 3.2.1 Maximum Density: As used in this article, is the dry unit mass of sample at optimum moisture content as determined in the laboratory according to ASTM D698 Method A.
  - 3.2.2 Required Density:
    - 3.2.2.1 Minimum 98% of maximum density for the subgrade for playgrounds.
    - 3.2.2.2 There will be no specified density for seeded/sodded areas, shrub beds and sport fields.



**3.2.3      Testing Frequency:**

- 3.2.3.1      The quality assurance laboratory will take a minimum of one field density test for each 1000 m<sup>2</sup> of compacted subgrade lift according to ASTM D1556, ASTM D2167, or ASTM D2922 for comparison with a maximum density determined according to ASTM D698 Method A.

**3.2.4      Noncompliance:**

- 3.2.4.1      If a tested density is below the required density, rework the area represented by the failed test to full depth of lift, alter the soil moisture as necessary, and re-compact to required density.

- 3.2.5      The Contractor shall assume the risk of uncovering and reworking the subgrade if it is covered before the Contract Manager/Developer Representative has accepted test results thereof.

**3.3      PROTECTION OF FINISHED WORK**

- 3.3.1      Do not permit vehicle traffic over the prepared subgrade.

- 3.3.2      If subgrade floods, drain immediately. Drainage into a municipal facility must be approved by Environmental Operations prior to operation proceeding.

- 3.3.3      Maintain protection of prepared subgrade until subsequent sub-base or base course is placed. Repair if damaged.

**4.0      MEASUREMENT AND PAYMENT**

- 4.1      The cost of preparing the subsoil surface will not be paid for directly, but will be considered part of the work required under topsoil placement unless a specific item for Landscaping Subgrade Preparation is included in the SCHEDULE OF QUANTITIES.

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on the correct sides when the document is printed double-sided.

## 1.0 GENERAL

### 1.1 DESCRIPTION

- 1.1.1 The work covered by this specification shall consist of topsoil installation placed and compacted in the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the sections shown on the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

### 1.2 DEFINITION

- 1.2.1 Topsoil to be fertile agricultural soil, capable of sustaining vigorous plant growth, free of subsoil, clay, stone, lumps, noxious odor, roots other foreign matter except for native soils where seed base or roots may be used for re-establishment of natural vegetation cover and approved by Contract Manager/Developer Representative.

## 2.0 PRODUCTS

### 2.1 TOPSOIL

#### 2.1.1 Stockpiled Topsoil On-Site or Imported Topsoil

- 2.1.1.1 As a minimum, topsoil shall be natural, fertile, agricultural soil, capable of sustaining plant growth, free from subsoil, slag, stones, vegetation including weeds and foreign matter.

Sand (% of dry mass)	40% (+/- 3%)
Clay (%of dry mass)	30% (+/- 3%)
Silt (%of dry mass)	30% (+/- 3%)
Organic Matter	6 – 10% by dry mass
Toxic Chemicals	None
pH Value	6.0 – 7.5
Electrical Conductivity	Maximum 1.5 mhos/cm <sup>2</sup>
Nitrate Nitrogen	10 – 20 ppm
Phosphorus	10 – 60 ppm
Potassium	80 – 250 ppm

- 2.1.1.2 Native on-site topsoil may be used provided it meets the above requirements or amended with approved soil amendments. Amendments to be to be approved by Contract Manager/Developer Representative. Special provisions may be considered for native areas.

- (i) Topsoil used from available, approved on-site stockpiles as directed by the Contract Manager/Developer Representative, must be free of roots, branches, clay, stones larger than 25 mm, subsoil and all other debris.
- (ii) Topsoil to be screened not shredded through 5 mm screen.
- (iii) Soils analysis shall be performed by a soils test lab accredited by the Standards Council of Canada in the Association for Environmental Analytical Laboratories or CAEAL.

- (iv) Such analysis shall be performed on samples from each topsoil source, and shall determine nitrogen, phosphorus, potash, soluble salt content, electrical conductivity, pH value and physical values of sand, clay and organic matter, conforming to the outline listed above. Recommendations for amendments to be requested from soils lab. The information to be submitted to Contract Manager/Developer Representative and amendments to the soil to be determined on a site by site basis with Strathcona County approval.

## 2.2 SOIL MIXES

- 2.2.1 Soil mix for shrub and flowerbeds must meet the topsoil specifications and be a 3-1-1 mix of topsoil, sand and peat.
- 2.2.2 Other composted soil mixes may be accepted. To be approved by Contract Manager/Developer Representative.
- 2.2.3 Top dressing for reseeding of sport fields and turfed areas during the maintenance period shall be a 2-1-1 mix of peatmoss, sand and either soil or compost. Soil mix may change to accommodate soil test results. Scarify bare areas prior to soil mix and seed application.
- 2.2.4 Live topsoil/pond muck refers to the substrate or organic soils, and all materials within the soil, that could lead to vegetative establishment of a replacement wetland including seeds, spores, mycorrhizae, tubers and other propagules taken from an existing designated wetland (donor) site.

## 2.3 FERTILIZER

- 2.3.1 Formulation ratio as required from soil test results. Fertilize shrub and flower beds according to soil analysis. Applied in accordance with the manufacturer's directions.

## 2.4 MANURE

- 2.4.1 Friable, loose cow manure, free of large lumps, twine and other foreign material, well aged and having a pH between 5.5 and 7.5.

## 2.5 PEAT MOSS

- 2.5.1 Decomposed plant material, fairly elastic and homogeneous, free of decomposed colloidal residue, wood, sulphur and iron. Minimum of 60% organic matter by mass; pH value between 5.5 and 7.

## 2.6 HORTICULTURE SAND

- 2.6.1 Sharp sand free of deleterious soluble salts and other contaminants likely to cause efflorescence and reduced skid resistance, and graded within the following limits:

Sieve Size (mm)	% Passing by Weight
2.5	100
1.25	85 – 100
0.8	80 – 90
0.315	30 – 60
0.16	2 – 10
0.063	1% Maximum

## 2.7 LIME

- 2.7.1 Ground agricultural limestone containing minimum 85% of total carbonates.

## 2.8 SULPHUR

- 2.8.1 Finely crushed agricultural elemental sulphur, free of impurities.

## 2.9 COMPOST

- 2.9.1 Commercially prepared compost shall be free from weed seeds. Physical contaminants such as glass, metal, plastic and rock shall be less than 0.5%. Pathogen and heavy metal levels shall satisfy the requirements for Class A compost. The carbon to nitrogen ratio shall be 40:1 or less. Organic matter content should exceed 45%. Contract Manager/Developer Representative shall approve the source of the compost.

## 2.10 EQUIPMENT

Cultivators: Capable of scarifying, discing or harrowing.

Rollers: Of suitable size and mass for the work.

## 3.0 EXECUTION

- 3.1 When loading topsoil from a stockpile, do not leave a vertical face at end of day's work.
- 3.2 Scarify subgrade prior to installing topsoil.
- 3.3 Broadcast soil additives on subsoil base prior to topsoil installation if required from soil test results.
- 3.4 Do not mix topsoil and subsoil during loading and hauling.
- 3.5 Install dry topsoil during dry weather over approved dry unfrozen subgrade.

- 3.6 Apply topsoil up to the following minimum depths after settlement:
- 150 mm for seeded areas;
  - 100 mm for sodded areas;
  - 450 mm for flower beds;
  - 450 mm for shrub beds; and
  - 200 mm for sport fields.
- 3.7 Manually spread topsoil around trees and plants to prevent damage by grading equipment.
- 3.8 Fine grade by floating prior to seeding or sodding to eliminate rough spots and low and soft areas ensuring positive drainage.
- 3.9 Bring topsoil up to within 25 mm of design finished grade on seeded and sodded areas. Fine grade again if necessary.
- 3.10 Leave surface smooth, uniform and sufficiently firm to prevent sink pockets when irrigated. Hand rake all areas not accessible by equipment.
- 3.11 Ensure interface edges between walkways, trails, sport fields, playgrounds, site furnishings, natural tree stands and all surrounding property receive required amount of topsoil for the landscape application and form a smooth even transition with positive drainage.
- 3.12 Cut smooth falls to catch basin and manholes, rims, and finish flush.
- 3.13 Do not bury refuse or foreign material of any kind on site. Excavate and remove immediately from site all soil contaminated by oil, gasoline or any other substances harmful to healthy, vigorous plant growth.
- 3.14 Weeds to be controlled throughout maintenance guarantee period of related work includes but not limited to dandelion, jimsonweed, quackgrass, horsetail, morning glory, rush grass, mustard, lambsquarter, chickweed, crabgrass, Canada Thistle, tansy ragwort, scentless chamomile, bermuda grass, bindweed, bent grass, perennial sorrel, brome grass, red root pigweed, buckweed, toadflax, foxtail, perennial sow thistle, leafy surge, field scabious and common tansy and all noxious and restricted weeds as identified under the Alberta Weed Control Act.
- 3.15 Collection of the live topsoil shall take place when the material is dormant, when mortal damage as a result of excavation will be minimized. The donor site may require de-watering depending upon the preceding weather conditions. The boundaries of the desirable live topsoil area to be excavated will be determined in the field by the Contract Manager/Developer Representative.

- 3.16 The removal of the live topsoil shall be carried out with a track-mounted backhoe or equivalent low pad pressure vehicle. Live topsoil shall be removed to a nominal depth to which the limit of the dark organic material and useful plant parts extend. The Contractor shall carefully control his operations to ensure maximum salvage of the material without contaminating it with clay and other unsuitable materials.
- 3.17 Sites to receive the live topsoil shall be scarified to a depth of 200 mm, by ripping, rototilling, or discing prior to placement of the live topsoil.
- 3.18 The live topsoil shall be conveyed to the site and placed in the areas indicated on the drawings or as directed by the Contract Manager/Developer Representative. Material removed from the donor site locations shall be replaced by material approved by Contract Manager/Developer Representative.
- 3.19 In constructed wetlands, low-load tracked equipment will be required to place the live topsoil, at depths specified on drawings or as directed by the Contract Manager/Developer Representative.
- 4.0 ACCEPTANCE**
- 4.1 Topsoil will be accepted when all soils analysis reports have been submitted to Contract Manager/Developer Representative and/or Strathcona County Representative for review confirming topsoil is in accordance with the Design and Construction Standards.
- 5.0 MEASUREMENT AND PAYMENT**
- 5.1 MEASUREMENT**
- 5.1.1 Measurement to be in square meters of topsoil to specified depth, ready for seed or sod.
- 5.2 PAYMENT**
- 5.2.1 Payment at the respective bid per square metre shall be full compensation for preparing the subsoil surface; supply, hauling, spreading, discing, harrowing, floating and compacting the topsoil; cleanup and disposal of all unused materials; and for all labour and use of equipment necessary to complete the work in accordance with these CONSTRUCTION SPECIFICATIONS.

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on the correct sides when the document is printed double-sided.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of supply and installation of seeding, sodding, fertilizing, watering, mulching and maintenance in the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the sections shown on the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**1.2 QUALITY**

- 1.2.1 Weeds to be controlled throughout construction and maintenance period includes but not limited to dandelion, jimsonweed, quackgrass, horsetail, morning glory, rush grass, mustard, lambsquarter, chickweed, crabgrass, Canada thistle, tansy ragwort, scentless camomile, bermuda grass bindweed, bent grass, perennial sorrel, brome grass, red root, pigweed, buckweed, toadflax, foxtail, and perennial sow thistle and all noxious and restricted weeds as identified under the Alberta Weed Control Act.

**1.3 MATERIAL DELIVERY, HANDLING AND STORAGE**

- 1.3.1 Use all means necessary to protect material before, during and after installation. Provide adequate protection to materials, which may deteriorate if exposed to weather.
- 1.3.2 Fertilizer shall be packaged in waterproof bags labelled clearly, indicating net mass, analysis and manufacturer. Store on pallets and protect from weather if required by Contract Manager/Developer Representative. Forward all labels to Contract Manager/Developer Representative at time of Construction Completion.
- 1.3.3 Deliver and store grass seed in original packages with label indicating:
- (i) analysis of seed mixture,
  - (ii) percentage of pure seed by weight,
  - (iii) year of production,
  - (iv) net mass,
  - (v) date tagged and location.
- 1.3.4 Store all seed in dry weatherproof place and protect from damage by heat, rodents and other causes.
- 1.3.5 Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted
- 1.3.6 Do not deliver or install small, irregular or broken pieces of sod. Do not install two or more small pieces where one large piece could be installed.
- 1.3.7 During wet weather allow sod to dry sufficiently to prevent tearing during lifting and handling.

- 1.3.8 During dry weather protect sod from drying and water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Dry sod will be rejected.

## **2.0 PRODUCTS**

### **2.1 GRASS SEED MIXES**

- 2.1.1 Consult the Contract Manager/Developer Representative to determine specific requirements for grass seed mixture and seeding rate, if not specified.

- 2.1.2 Use only Certified Canada No. 1 varieties in accordance with the Canadian Seeds Act and Regulations and having minimum purity of 97% and germination of 75%, and be mixed to the following by weight:

- 2.1.2.1 General Park Mix (225 kg per hectare)
- 30% Creeping Red Fescue - minimum 2 varieties
  - 25% Tall Fescue - minimum 2 varieties
  - 15% Kentucky Bluegrass
  - 15% Chewings Fescue - single variety
  - 15% Perennial Ryegrass – single variety

- 2.1.2.2 Boulevard Mix (225kg per hectare)
- 25% Sheep Fescue - single variety
  - 25% Hard Fescue - single variety
  - 20% Tall Fescue - minimum 2 varieties
  - 15% Perennial Ryegrass
  - 10% Canada Bluegrass - single variety
  - 5 % Annual Ryegrass

- 2.1.2.3 Rural Road Mix (250kg per hectare)
- 25% Creeping Red Fescue- minimum 2 varieties
  - 25% Tall Fescue - minimum 2 varieties
  - 25% Northern Wheatgrass - minimum 2 varieties
  - 25% Tickle Grass - single variety

- 2.1.2.4 Naturalization Mix (250kg per hectare)
- 25% Sheeps Fescue - single variety
  - 25% Plains Rough Fescue – single variety
  - 20% Creeping Red Fescue - minimum 2 varieties
  - 10% Perennial Ryegrass - single variety
  - 10% Red Clover - single variety
  - 7% American Vetch – single variety
  - 3% June Grass (Koeleria Macrantha)

- 2.1.2.5 Wet Meadow Mix (200kg per hectare)  
25% Fowl Bluegrass - minimum 2 varieties  
20% Awned Wheatgrass - single variety  
20% Slender Wheatgrass – single variety  
20% Hard Fescue - single variety  
10% Sloughgrass - single variety  
5% American Vetch – single variety
- 2.1.2.6 Salt Affected Wet Meadow Mix (60kg per hectare)  
20% Alkali grass - single variety  
20% Slender Wheatgrass – single variety  
30% Bebb's Sedge - single variety  
30% Sloughgrass - single variety
- 2.1.2.7 Special Conditions  
(i) Seed mixes for special conditions or where requested by Contract Manager/Developer Representative (i.e., wetlands, naturalization, reclamation) to be developed on an as needed, site-specific basis and approved by the IPS Standards Committee.  
(ii) Consult the Contract Manager/Developer Representative to determine specific requirements for grass seed mixture and seeding rate.
- 2.2 SOD
- 2.2.1 Nursery grown, Minimum 25% Hard Fescue, 25% Chewings Fescue, 25% Creeping Red Fescue, and 25% Rocky Mountain Fescue blended equally, of Certified Canada No. 1 Seed. If available locally.
- 2.2.2 Sod to be healthy and vigorous with a strong, fibrous root system, free of stones, burned or bare spots, disease, insect infestation, netting, and contain no more than 1% weeds and other grasses.
- 2.2.3 Cut in accordance with recommendations of Nursery Sod Growers Association of Alberta, approximately 0.5 m<sup>2</sup> in area and have 13-25 mm soil thickness.
- 2.2.4 Sod shall be required in all areas of intensive use and grass swales, as follows:
- 2.2.4.1 Install sod a minimum of 4.5 m beyond playgrounds, splash parks, and hard surface sports facilities.
- 2.2.4.2 Install sod a minimum of 2.0 m from each side of centre line of grass swales or beyond edge of concrete swales.
- 2.2.4.3 Install sod a minimum of 2.0 m beyond edge of asphalt trails and concrete sidewalks.

**2.3 FERTILIZER**

- 2.3.1 Formulation ration of fertilizers used at time of seeding, sodding and as supplementary during maintenance/guarantee period to be determined from soil test results and approved by Contract Manager/Developer Representative prior to installation.

**2.4 MULCH**

- 2.4.1 Refer to [SUB-SECTION 3.4 OF THIS SECTION](#).

**2.5 TURF ESTABLISHMENT BLANKET**

- 2.5.1 Based on approved design matting or approved equal to be used on banks of storm water management facilities, culverts and slopes and any other areas where excessive erosion may occur.

**2.6 STAPLES**

- 2.6.1 Steel wire, 25 mm wide by 200 mm deep by 3 mm diameter.

**2.7 EQUIPMENT**

- 2.7.1 "Brillion": Type or similar mechanical seeder, capable of rolling and covering the seed with 3 mm to 6 mm of soil.
- 2.7.2 Hydroseeder: Capable of thoroughly mixing water, seed, fertilizer, and pulverized wood fibre, and of uniformly spraying the mix at designated rate.
- 2.7.3 Ensure equipment is steam cleaned, free of soil and seed to prevent site contamination.

**2.8 WATER**

- 2.8.1 Potable, free of minerals and chemicals that may be detrimental to plant growth. Water shall be hauled from a local standpipe or by contacting Strathcona County Utilities for arrangement for use of fire hydrants.

**3.0 EXECUTION****3.1 PREPARATION**

- 3.1.1 Remove weeds and debris from topsoil surface already in place. As required, spray site allowing weeds to die off prior to completion of grading.
- 3.1.2 Loosen fine grade surface free of humps and hollows and free of deleterious and refuse material. Ensure positive drainage.

### 3.2 FERTILIZING

- 3.2.1 After cultivation, apply specified fertilizer from soil analysis in accordance with the manufacturer's direction spreading evenly with a mechanically calibrated distributor. Mix thoroughly into top 50 mm of topsoil not more than 48 hours before seeding.
- 3.2.2 Float surface to achieve approved design elevations.
- 3.2.3 Apply specified fertilizer spreading evenly with a mechanically calibrated distributor. Mix thoroughly into top 50 mm of topsoil, not more than 48 hours before seeding.
- 3.2.4 Float surface to achieve elevations within tolerances of 25 mm in 3 m, when measured in any direction after fertilizer has been spread cultivated.

### 3.3 SEEDING

- 3.3.1 Apply the specified seed mixture as per [SUB-SECTION 2.1.2 IN THIS SECTION](#).
- 3.3.2 Seed half the amount of prescribed seed mix in one direction, seeding the other half of seed mixture in a perpendicular direction.
- 3.3.3 Seed when weather conditions, soil temperatures and moisture conditions are suitable. Do not seed when seedbed is covered with frost, snow or standing water.
- 3.3.4 Seed when wind is less than 8 km/hour.
- 3.3.5 Seed using Brillion or similar mechanical seeder or hydroseed as specified.
- 3.3.6 In small areas where use of a mechanical seeder is impractical, seed by hand.
- 3.3.7 After seeding, ensure seed has contact with soil. Compact topsoil with light rolling, to ensure design grades are maintained and surface is smooth and uniform.
- 3.3.8 Erect barricades and warning signs to protect seeded areas from traffic until grass is established, where possible.

### 3.4 HYDROSEEDING

- 3.4.1 Do all seeding when weather conditions, soil temperature and moisture conditions are suitable.
- 3.4.2 Use a hydroseeder to seed slopes 3 horizontal to 1 vertical or steeper. Use seed mixes approved for conditions by Contract Manager/Developer Representative.
- 3.4.3 Mix seed with water, mulch and fertilizer in the following suggested quantities to cover 4000m<sup>2</sup>:
  - (i) 640 kg of wood fibre mulch;
  - (ii) 80 kg of seed;

- (iii) 140 kg of fertilizer; and
- (iv) 6,400 litres of water.

3.4.4 Do not spray seed and mulch mixture onto trees, bike paths, roads, parking lots, interlocking paving stone, bridges, houses, fences or other surfaces not meant for seeding. Remove over-spray.

3.4.5 Hydro seeding should not be carried out in wind velocities which cause seed mix to be blown.

### 3.5 SEED PROTECTION ON SLOPES

3.5.1 Install in accordance with manufacturer's directions and approved drawings.

3.5.2 Erect barricades and warning signs to protect seeded areas from traffic until grass is established.

### 3.6 SODDING

3.6.1 Place sod during growing season. Do not place sod at freezing temperatures or over frozen soil.

3.6.2 Lay sod in rows, smooth, even and flush with adjoining surfaces and with joints staggered. Butt sections closely without overlapping or leaving gaps. Top-dress and seed sod seams where required.

3.6.3 Roll sod to remove depressions and irregularities.

3.6.4 Saturate sod with water as necessary to ensure vitality.

3.6.5 Erect barricades and warning signs to protect sodded areas from traffic until grass is established.

## 4.0 MAINTENANCE

### 4.1 SEEDING

4.1.1 Maintain all seeded areas in a healthy, vigorous, growing condition for a minimum of 2 years or until FAC including but not limited to the following:

4.1.1.1 All landscape maintenance work described in this section shall be executed by personnel under constant direction and control of a Journeyman Landscape Gardener, a Certified Landscape Technician or equivalent and in strict accordance with best horticultural practice.

4.1.1.2 During mowing and trimming operations, protect all trees, shrubs and site features from damage.

- 4.1.1.3 Pick up and dispose of debris accumulated on landscaped areas prior to mowing and/or trimming.
- 4.1.1.4 Program timing of maintenance operations to growth, weather conditions and use of site as per best horticultural practice.
- 4.1.1.5 Seeded areas that require mowing to be cut when grass covers 75% of the area and is less than 100 mm in height. Grass to be maintained at 65mm in second year. Areas to be mown 48 hours prior to CCC or FAC inspections.
- 4.1.1.6 Water when necessary to prevent seed and underlying soil from drying out.
- 4.1.1.7 Prior to and during establishment of turf, noxious and nuisance weeds must be controlled and restricted.
- 4.1.1.8 Noxious and Nuisance weeds must be controlled by pulling cutting and/or spraying.
- 4.1.1.9 On recommendation from the Contract Manager/Developer Representative or through weed inspections by Transportation and Agriculture Services, weed notices will be issued on soil used for landscaping when weeds are not controlled. Upon notification weeds must be cut or sprayed with 96 hours of notification, weather permitting. Use chemicals in strict accordance with manufacturer's recommendations and Provincial laws. Damage resulting from use of chemicals shall be the contractor's responsibility.
- 4.1.1.10 Undertake weed, insect and fungus control after the public has been notified by advertisements in local newspapers, a minimum of 2 weeks prior to any application, and treated areas shall be posted for 24 hours after application. Chemical shall be applied by or under the supervision of licensed applicators. All Federal and Provincial regulations regarding use, transportation and storage of chemicals shall be strictly adhered to.  
Submit Biocide report at time of FAC inspection. Damage resulting from use of chemicals shall be the contractor's responsibility.
- 4.1.1.11 If seed fails to germinate within 4 growing months, cultivate and re-seed until germination takes place or additional seed. Re-seed on a regular basis all areas which show deterioration, are bare, burned out, are thin or washed out throughout maintenance period. Use top-dressing in accordance with [VOL. 2 SEC. 602, TOPSOIL AND PLANTING MIX URBAN, SUB-SECTION 2.2.3.](#)
- 4.1.1.12 Scarify surfaces prior to topsoil and seed application when top-dressing.
- 4.1.1.13 Trim turf edges neatly, by hand clipping if necessary, and remove all clipping from planting beds, tree saucers and pavement. No mow areas to follow above requirements and require mowing only for weed control or to assist with turf establishment.
- 4.1.1.14 Contractor shall keep a written log of all maintenance trips and submit a copy of the log once per month to the Contract Manager/Developer Representative.

Maintenance log shall contain:

- (i) Work performed, and materials used;
- (ii) Written confirmation of the dates for watering; and
- (iii) Written confirmation of the dates and types of fertilizer.
- (iv) Written confirmation of dates and types of weed control used.

## 4.2 SODDING

4.2.1 Maintain all sodded areas in a healthy vigorous growing condition for a minimum of two years or until FAC is issued. This shall include but not limited to the following:

4.2.1.1 All landscape maintenance work described in this section shall be executed by personnel under constant direction and control of a Journeyman Landscape Gardener, a Certified Landscape Technician or equivalent and in strict accordance with best horticultural practice.

4.2.1.2 Do each operation continuously and complete within a reasonable time period.

4.2.1.3 Store on site-equipment and materials in approved location.

4.2.1.4 On a daily basis, collect and dispose of debris and excess materials resulting from the work.

4.2.1.5 Program timing of maintenance operations to growth, weather conditions and use of site.

4.2.1.6 Mow grass regularly to maintain height at 65 mm. Ensure turf is mown 48 hours prior to CCC or FAC inspections.

4.2.1.7 Pick up and dispose of paper and refuse accumulated on landscaped areas prior to mowing.

4.2.1.8 During trimming operations, protect all trees, shrubs and site features from damage.

4.2.1.9 Trim edges of sodded areas neatly, by hand clipping, if necessary, and remove all clippings from planting bed, tree saucers and pavement.

4.2.1.10 Roll sod to remove depressions and irregularities. Correct any areas that settle.

4.2.1.11 Water when necessary to saturate sod.

4.2.1.12 Prior to and during establishment of turf, noxious weeds must be controlled and restricted by spraying and cutting prior to weed seeding.

4.2.1.13 Noxious and nuisance weeds must be controlled by cutting and/or spraying, prior to and during establishment of turf.

4.2.1.14 On recommendation from Contract Manager/Developer Representative or through weed inspections by Transportation and Agriculture Services, weed notices will be issued on soil used for landscaping when weeds are not controlled. Upon notification weeds must be cut or sprayed



with 96 hours of notification weather permitting. Use chemicals in strict accordance with manufacturer's recommendations and Provincial laws. Damage resulting from use of chemicals shall be remedied at the contractor's cost.

- 4.2.1.15 Undertake weed, insect and fungus control after the public has been notified by advertisements in local newspapers a minimum of two weeks prior to any application, and treated areas shall be posted for 24 hours after application. Chemical shall be applied by or under the supervision of licensed applicators. All Federal and Provincial regulations regarding use, transportation and storage of chemicals shall be strictly adhered to. Damage resulting from use of chemicals shall be remedied at contractors cost.
- 4.2.1.16 Re-sod or top-dress as directed areas which show deterioration or which are thin, bare or burned out.
- 4.2.1.17 Repair all damages resulting from erosion, washouts or any other cause.
- 4.2.1.18 Dependent on sod condition, additional supplementary fertilizer may be required based on soil analysis.
- 4.2.1.19 Contractor shall keep a written log of all maintenance trips and submit a copy of the log once per month to the Contract Manager/Developer Representative. Copies will be required by Strathcona County prior to issuance of FAC. Maintenance log shall contain:
  - (i) Work performed, and materials used;
  - (ii) Written confirmation of the dates for watering; and
  - (iii) Written confirmation of the dates and types of fertilizer.
  - (iv) Biocide report

## **5.0 ACCEPTANCE**

### **5.1 SEEDING**

#### **5.1.1 Acceptance**

- 5.1.1.1 Seeded areas will be accepted when permanent grass cover has been established, the turf is free of bare and dead spots, is relatively weed free, and no soil is visible when the grass has been cut to 65 mm height on the third cutting.

Turf areas to be mown 48 hours prior to inspections, if required.

Maintenance log to be submitted prior to issuance of FAC.

Naturalization areas to be accepted when seed cover is established and is characteristic of the seed mix.

## 5.1.2 Guarantee

5.1.2.1 Guarantee all seeded areas for a minimum of two years from the date of CCC until FAC, to be healthy, well established turf grass with no bare or dead spots.

## 5.2 SOD

## 5.2.1 Acceptance

5.2.1.1 Sodded areas shall be accepted when all sodded areas have a healthy, even, vigorously growing stand of grass, free of disease, weeds and thin or bare spots and voids.

5.2.1.2 Turf to be mown 48 hours prior to inspections.

5.2.1.3 Maintenance log to be submitted prior to issuance of FAC.

## 5.2.2 Guarantee

5.2.2.1 Guarantee all sodded areas for a minimum of two years from date of CCC to FAC, to be in a healthy, vigorous growing condition, free of disease, weeds, thin or bare spots and settlement.

**6.0 MEASUREMENT AND PAYMENT**

## 6.1 MEASUREMENT

6.1.1 Measured in square metres of surface area.

## 6.2 PAYMENT

6.2.1 Payment shall include supply and application of fertilizer, pesticides and seed (method specified in the SCHEDULE OF QUANTITIES) or sod, and one year maintenance.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of supply and installation of plant materials in the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the sections shown on the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**1.2 QUALITY ASSURANCE**

- 1.2.1 All plant material shall meet Horticultural Standards of Canadian Nursery Trades Association (CNTA) regarding grading, quality, and nomenclature or accept other standards where stated otherwise and approved by Contract Manager/Developer Representative.
- 1.2.2 Approval of nursery grown plant material at source of supply does not preclude right of the Contract Manager/Developer Representative to inspect plants upon arrival on site, during planting or after planting and reject damaged plants or those not conforming to specifications.
- 1.2.3 Supply nursery grown plants true to type, structurally sound, well balanced, healthy, vigorous, of normal growth habits, densely foliated when in leaf with healthy, well-developed root systems.
- 1.2.4 Only Elm grown in Alberta, from a Dutch Elm disease free source are acceptable. Proof of origin is required.

**1.3 MATERIAL, DELIVERY, HANDLING AND STORAGE**

- 1.3.1 Branches shall be tied with rope or twine only, in such a manner that no damage will occur to the bark or branches.
- 1.3.2 During transportation of plant material, the Contractor shall exercise care to prevent injury and drying out of trees. Should the roots be dried out, large branches broken, ball of earth broken/loosened or areas of bark torn, the Contract Manager/Developer Representative may reject the injured tree(s) and order them replaced at no additional cost to the owner. All plants shall be covered at all times during transportation with tarpaulin or canvas.
- 1.3.3 Plants must be protected at all times from sun or drying winds. If not planted immediately, plant rootballs shall be kept in the shade, well protected with soil, wet mulch or other acceptable material and kept well watered.
- 1.3.4 Handle plants with care to prevent injuries to trunk, branches and roots.
- 1.3.5 Move trees with soil balls only when wrapped tightly in burlap.
- 1.3.6 Protect root zone of bare root plants with wet straw, moss or other suitable material.

**1.4 SUBSTITUTIONS**

1.4.1 Alternatives and plant substitutions require prior approval of Contract Manager/Developer Representative and Planning and Development Services department.

1.4.2 Substitutions or use of larger plants may be approved by the Contract Manager/Developer Representative and the Planning and Development Services department. Rootballs are to be increased in proportion to size of plants as per CNTA.

Substitutions shall be of nearest similar species and size specified.

**2.0 PRODUCTS****2.1 PLANT CHARACTERISTICS**

2.1.1 All plants shall be true to form and growth habit typical of their species.

2.1.2 Trees shall be straight according to their natural habit of growth. Double leaders not acceptable.

2.1.3 Clump or multi-stem trees shall have 3 or more main stems originating from common base at ground line.

2.1.4 Shrubs shall have a natural form, typical of genus, species and variety, with a minimum of 4 canes.

2.1.5 Vines shall have at least 4 runners, each with minimum length of 300 mm.

2.1.6 Ground covers shall have healthy tops, size proportionate to root requirements, typical of species and variety.

2.1.7 Herbaceous plants shall have healthy crowns, size proportionate to root requirements, typical of species and variety, not less than 2 years old.

**2.2 PLANT MEASUREMENT**

2.2.1 Plants will be measured in units of caliper, height, or spread called for on the CONSTRUCTION DRAWINGS.

2.2.2 Caliper, measured on deciduous trees only, shall mean trunk diameter measured no less than 150 mm above ground level for trees with a caliper up to 100 mm. Trees 100 mm and larger caliper are to be measured 300 mm above the ground.

2.2.3 Coniferous height will be measured from grade at which plant originally stood at its source to top of main body of plant, not to top of long leader.

- 2.2.4 Spread is lateral diameter of main body of plant at its widest natural dimension, not from branch tip to branch tip.
- 2.2.5 Minimum deciduous tree caliper shall be 60 mm. Minimum coniferous tree height shall be 2.5 m.
- 2.2.6 Minimum shrub height and spread at planting shall be deciduous 450 mm height and coniferous 450 mm spread.
- 2.3 BARE ROOT PLANTS
- 2.3.1 Bare root plants must be of specified size as per CNTA. Roots must be pruned to remove damaged portions prior to installation.
- 2.4 CONTAINER GROWN PLANTS
- 2.4.1 All plants to be grown in containers for minimum of 3 months.
- 2.4.2 Plants to have an established root system which will "hold" soil when removed from container is required.
- 2.4.3 All plants shall be hardened off, dormant, and have sound buds set intact prior to planting.
- 2.4.4 Container size must be in proportion to plant size. Root bound plants are not acceptable.
- 2.5 BALLED AND BURLAPPED PLANTS
- 2.5.1 Trees delivered to site shall contain rootballs not exceeding sizes as outlined in the Canadian Standards for Nursery Stock:

Deciduous

Caliper (mm)	Ball Diameter (mm)
20	400
25	450
30	500
40	600
50	700
60	700
70	800
80	900
90	900
100	1000
125	1200
150	1500
175	1750
200	2000

Coniferous

Height (mm)	Ball Diameter (mm)
1000	350
1250	400
1500	500
1750	600
2000	900
2500	1000
3000	1200
3500	1400
4000	1650

- 2.5.2 Adjust ball size according to growth habits of plants.
- 2.5.3 Ball size shall be sufficiently large to contain at least 75% of fibrous root system with a ball depth not less than 50% of ball diameter.
- 2.5.4 Soil balls shall be secured with burlap, heavy twine and rope, or burlap, wire baskets and rope.
- 2.5.5 Supply single burlap on rootballs less than 500 mm in diameter; double burlap on balls from 500 mm to 600 mm in diameter; double burlap and drumlace with 6 mm rope at minimum spacing on rootballs 600 mm and larger in diameter.
- 2.5.6 Larger rootballs than listed above are recommended when plants have not been transplanted or root pruned for 4 or more years or when plants are dug out of season.
- 2.5.7 The minimum rootball size for multi-stemmed trees shall be one size larger than the sizes specified for single-stemmed trees of equivalent caliper as shown in the table in [SUB-SECTION 2.5.1 OF THIS SECTION](#).
- 2.6 FERTILIZER
- 2.6.1 Application to be based on soil analysis.
- 2.6.2 Do not fertilize trees at time of planting.
- 2.6.3 Fertilizer dates and type to be included in maintenance log.
- 2.7 PLANTING MIX
- 2.7.1 Soil mix for back filling of shrub planting beds to be 3 parts topsoil, 1 part horticultural sand, 1 part peat moss in accordance with these CONSTRUCTION SPECIFICATIONS.
- 2.7.2 Topsoil may be used for plant pits.

- 2.8 PRE-EMERGENT (WEED GERMINATION CONTROL)
- 2.8.1 For tree wells and shrub beds, apply coloured granular pre-emergent at time of planting to weed free surface in accordance with manufacturer's directions.
- 2.9 MULCH
- 2.9.1 Shredded Wood Mulch: free from non-organic material, wood preservatives, diseased wood, weeds and weed seeds. For use on trails, pathways and picnic site as surface cover and on planting beds to be applied to a 100 mm depth, weed free surface, after application of pre-emergent is applied.
- 2.9.2 Decorative: Type and locations to be approved by Contract Manager/Developer Representative.
- 2.9.3 Prohibited Mulches: The following mulches are prohibited: sawdust and shavings, peatmoss, manure or raw compost, paper products, plastic, rubbers, aluminum foil, gelatinous sprays, plywood and other lumbers containing chemical adhesives or wood preservatives.
- Installation
- 2.9.4 Do not mound mulch around base of shrubs or tree trunks.
- 2.9.5 During application all mulches shall be kept at least 50 mm to 75 mm away from tree trunks.
- 2.9.6 All mulches to be installed during active growing season. Water plants prior to applying mulch.
- 2.10 WATER
- 2.10.1 Potable, free of minerals and chemicals which may be detrimental to plant growth. Water shall be hauled from a local standpipe or by contacting Environmental Operations for arrangements for use of fire hydrants.
- 2.11 TREE TIES
- 2.11.1 Material used for tree ties should have a flat, smooth surface and be elastic to allow for slight movement for the tree. Suitable materials include rubber strips or webbing and belting.
- 2.12 STEEL STAKES
- 2.12.1 T-bar stakes, 40 mm x 40 mm x 5 mm thick x 2.1 m long, primed with one coat black zinc rich paint to CGSB1 – GP - 1816. Top 300 mm of the tree stake to be colour coded according to year planted and will be on a 4 year rotational basis as follows:
- 2011 - green;  
2012 - blue;  
2013 - white;

2014 - yellow;  
2015 – green;  
2016 – blue;  
2017 – white;  
2018 – yellow;  
2019 – green; and,  
2020 – blue.

### **3.0 EXECUTION**

#### **3.1 PLANTING**

- 3.1.1 Install plant material when ground is frost-free.
- 3.1.2 The Contract Manager/Developer Representative to approve staking location of trees and planting beds prior to excavation and planting.
- 3.1.3 The Contract Manager/Developer Representative to verify depth of shrub bed excavation to be in accordance with these CONSTRUCTION SPECIFICATIONS prior to topsoil mix installation or planting.
- 3.1.4 Centre trees and shrubs at location of stakes and face to give best appearance. Plant at same depth as previously grown at source.
- 3.1.5 Place tree or shrub on minimum bed of 150 mm firmly tamped planting mix or topsoil. Bury no foreign material beneath planting area. Form soil in concave manner in centre of excavation for container grown, balled or burlapped trees and shrubs. Form soil in convex manner in centre of excavation for bare root plants. Spread roots of bare root plants to their approximated natural position, prune broken or damaged roots.
- 3.1.6 Remove all containers from containerized plant material. Remove twine or wire and fold burlap back from balled and burlapped plant material. Ensure that soil ball remains intact.
- 3.1.7 Fill with water, allowing soil to settle around roots or soil ball. After water has been absorbed, fill to grade with planting mix tamping firmly to remove all air pockets. Leave dish in concave manner at base of trees and shrubs. Fill with water and allow to be absorbed.
- 3.1.8 For individual tree planting, construct an earth saucer around the base of each tree to drip line of tree as conditions will allow.
- 3.1.9 Apply pre-emergent in tree pits and planting beds to weed free surface in accordance with manufacturer's directions.
- 3.1.10 Apply 100 mm depth of mulch in accordance with [SUB-SECTION 2.9 OF THIS SECTION](#).



- 3.1.11 Remove and dispose of off-site excess excavated soil and turf stripped from planting beds and plant pits or as directed by the Contract Manager/Developer Representative.
- 3.1.12 Shrub setbacks shall be a minimum of 450 mm from edge of shrub bed.
- 3.1.13 Slope grades in planting beds to ensure positive drainage from building foundations before planting.

### 3.2 STAKING AND GUYING

- 3.2.1 Stake and guy only when necessary for the specific conditions encountered with the approval of the Contract Manager/Developer Representative. Trees that settle out of plumb due to inadequate soil compaction either under or adjacent to the rootball shall be excavated and reset. In no case shall trees that have settled out of plumb be pulled upright using guy wires.

- 3.2.2 Brace all trees in vertical position immediately after planting by guying or staking as follows:

Deciduous (Caliper)	Coniferous (Height)	Tree Support Method
Up to 30 mm	Up to 1.5 m	1 stake, 1 tie
30 mm – 100 mm	1.5 m – 3.0 m	2 stakes, 2 ties
100 mm – 150 mm	3.0 m – 3.5 m	3 guys, with 2 anchors
150 mm and over	3.5 m and over	4 guys, with 4 anchors

- 3.2.3 Space stakes around tree just outside root ball. Drive posts 450 -500 mm into ground.

### 3.3 PRUNING

- 3.3.1 Plants shall not be heavily pruned at time of planting. Pruning is only required at planting time to correct defects in the tree structure, including removal of injured branches, double leaders, waterspouts, suckers and interfering branches.

- 3.3.2 Prune all trees and shrubs in accordance with the most current ISA standards to preserve natural character of plant. Pruning shall be done with clean, sharp tools.

- 3.3.3 Make all cuts without damaging branch collar.

- 3.3.4 All injured tree and shrub roots shall be pruned to make clean ends before planting.

### 3.4 MECHANICAL TREE MOVING

- 3.4.1 All utility locates are the responsibility of the Contractor.

- 3.4.2 Excavate plant with mechanical tree spade of sufficient size to excavate required soil ball size.

- 3.4.3 Excavate tree pit to size not less than excavated tree's soil ball.

- 3.4.4 Scarify sides of tree pit to ensure root penetration after planting.

- 3.4.5 Plant trees, immediately upon delivery, plumb in centre of pit at same depth as previously grown. Face to give best appearance.
- 3.4.6 Provide warning markers and barricades around excavated pits.
- 3.4.7 Place excavated plugs in former tree locations when possible and remove excess plugs from site.
- 3.4.8 Subgrade material from the digging of tree pits by a tree spade is to be removed from the site at the Contractor's expense.
- 3.4.9 Saturate with water and allow soil ball to settle in pit. Fill to grade with topsoil as previously outlined. Construct 100 mm high lip around outer edge of pit.
- 3.4.10 Guy or stake (if required) immediately after installation as required.
- 3.4.11 Apply pre-emergent to weed free surface in accordance with manufacturer's directions.
- 3.4.12 Apply 100 mm mulch in accordance with [SUB-SECTION 2.9 OF THIS SECTION](#).

#### **4.0 MAINTENANCE**

##### **4.1 FERTILIZING**

- 4.1.1 Maintenance shall include all measures necessary to establish and maintain all plant material in an acceptable, vigorous and healthy growing condition for a minimum of 2 years from the issuance of a CCC until FAC.
- 4.1.2 It is preferred that all landscape maintenance work described in this section shall be executed by personnel including a certified Arborist, under the constant direction and control of a "Journeyman Landscape Gardener" as defined by Alberta Manpower, and in strict accordance with specifications and best horticultural practice.
- 4.1.3 Program timing of maintenance operations to growth, weather conditions and use of site.
- 4.1.4 Do not fertilize plant material in first year after planting. Fertilizer for trees to be a slow release formula of 3-1-1 in the Spring of the second year of planting.
- 4.1.5 Fertilize shrubs with 20-20-20 in accordance with manufacturer's directions in the spring of the second year.
- 4.1.6 Fertilizer placed in holes and drilled or punched in the soil or injected into the soil in a solution under pressure.
- 4.1.7 The Contractor will provide written confirmation of the dates for water, fertilizer type and applications prior to the issuance of FAC.

- 4.1.8 Apply water after fertilizing to ensure penetration of fertilizers.
- 4.1.9 Contractor shall keep a written log of all maintenance trips and submit a copy of the log once per month to the Contract Manager/Developer Representative. Maintenance log shall contain:
- (i) work performed, and materials used;
  - (ii) written confirmation of the dates for watering;
  - (iii) written confirmation of the dates and types of fertilizer; and,
  - (iv) tree and shrub year of planting and year and variety of replacement.
- 4.2 WATERING
- 4.2.1 Test moisture levels of individual plant species and provide adequate water to ensure survival.
- 4.2.2 Water every week for first six weeks after planting, weather dependent.
- 4.2.3 Water twice per month after planting until mid August.
- 4.2.4 Water 3 times prior to freeze up, to freeze trees and underlying soil in to prevent from drying out.
- 4.3 WEED CONTROL
- 4.3.1 Pre-emergent to be applied at time of planting to weed free shrub beds or tree wells.
- 4.3.2 Shallow cultivate and weed shrub beds and tree wells when required.
- 4.3.3 Apply herbicide in accordance with manufacturer's direction to ensure beds and tree wells are maintained.
- 4.4 PEST AND DISEASE CONTROL
- 4.4.1 Control disease and insects using chemicals in accordance with manufacturer's directions and government regulations.
- 4.4.2 Public notification of insect and fungus control is required by posting signs 48 hours before and after application. Chemicals shall be applied by or under the supervision of licensed applicators. All Federal and Provincial regulations regarding use, transportation and storage of chemicals will be strictly adhered to.
- 4.4.3 Rodent wire protection to be used around trunk of tree when necessary.
- 4.5 PLANT ACCESSORIES
- 4.5.1 Maintain accessories in proper condition; adjust turnbuckles to keep tree guys taut and replace ties, flagging and stakes when required.

- 4.5.2 All tree staking to be removed at the end of one year maintenance where growing conditions allow. All tree stakes to be removed prior to FAC.
- 4.6 PLANT CARE
- 4.6.1 Straighten plants that lean or sag.
- 4.6.2 Adjust plant that settle or are planted too low.
- 4.6.3 Prune all trees and shrubs in accordance with the most current ISA standards to preserve natural character of plant.
- 4.6.4 Prune to remove dead, diseased, injured, broken, rubbing, and crowded limbs.
- 4.6.5 Prune all suckers from the base, trunk and inside crown of tree.
- 4.6.6 Pruning cuts should be located to leave a wound of the smallest diameter.
- 4.6.7 Prune to ensure that there is a central leader on coniferous trees.
- 4.6.8 Prune at the proper times according the plant requirements as follows:
- (i) Shade trees from October 15 to April 15 except Birch and Maple;
  - (ii) Birch and Maple from June 15 to July 15;
  - (iii) Fruit trees from March 15 to April 15;
  - (iv) Evergreens from April 15 to May 15; and,
  - (v) Elm from October 1 to March 31. Haul off site and dispose of pruning by burning.
- 4.7 PLANT REPLACEMENTS
- 4.7.1 All plant material that has been replaced within 1 year of FAC inspection must be identified through colour code on tree stakes as per [SUB-SECTION 2.12.1 OF THIS SECTION](#), and through coloured flagging on shrubs.
- 4.7.2 Dead trees will be replaced in a timely manner.
- 4.7.3 A spot of spray paint on tree replacements staking will be colour coded for year of planting and will be on a four year rotational basis as follows:
- 2011 - green;
  - 2012 - blue;
  - 2013 - white;
  - 2014 - yellow;
  - 2015 – green;
  - 2016 – blue;
  - 2017 – white;
  - 2018 – yellow;

2019 – green; and,  
2020 – blue.

## **5.0 ACCEPTANCE**

- 5.1 At the time of inspection all plant material shall be in a vigorous and healthy growing condition. Tree wells and planting beds shall be neat and free of weeds and debris.
- 5.2 Plant material may be accepted providing plant material has been installed in accordance with the Design and Construction Standards.
- 5.3 Mulch to be topped up to ensure consistent 100 mm depth.
- 5.4 Contractor maintenance logs to be submitted on a monthly basis to the Contract Manager/ Developer Representative. Copies will be required prior to issuance of FAC.

## **6.0 GUARANTEE**

- 6.1 Guarantee all plant material for a minimum of two years from the date of CCC to FAC, to be in a healthy and satisfactory growing condition.

## **7.0 MEASUREMENT AND PAYMENT**

### **7.1 MEASUREMENT**

- 7.1.1 The unit of measure for planting shall be as specified in the TENDER FORM. The quantity paid for shall be the number of units acceptably installed as counted in place.

### **7.2 PAYMENT**

- 7.2.1 Payment at the respective Contract price bid per unit shall be full compensation for supplying, delivering, installing, removing debris and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 The work covered by this specification shall consist of construction of wetlands for the purpose of stormwater management facilities as outlined in areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

1.1.2 Unless otherwise indicated on the CONSTRUCTION DRAWINGS, the Contractor shall, at his own expense make arrangements for the provision of sites for the stockpiling of material (including live soil), borrowing of material and the disposal of unsuitable and surplus material.

**2.0 EXECUTION****2.1 GENERAL****2.1.1 Constructed Wetlands**

2.1.1.1 Constructed wetlands are not intended to replace all of the functions of natural wetlands but to minimize point source and non point source pollution prior to entry into streams, natural wetlands and other receiving waters.

2.1.1.2 Where mitigation or compensation for lost natural wetlands is required, further functions must be addressed as per Provincial and Federal guidelines.

2.1.1.3 The land required for the constructed wetland will be dedicated as PUL to Strathcona County and will not be granted as MR.

2.1.1.4 Generally, the area of land which would be covered by water when the water level is at the most critical design storm event level, HWL, will be designated as a "PUL".

2.1.1.5 This designation will also apply to all ROWs for access to and protection of inlets, outlets and flow control facilities, and for maintenance access routes to the wetland.

2.1.1.6 Constructed wetlands must be graded, seeded and landscaped by the Developer to the satisfaction of Strathcona County.

2.1.1.7 Lots abutting the constructed wetland are allowed provided that there are areas around the wetland that are open for maintenance access routes to the wetland and secondary uses to the public.

- 2.1.1.8 A restrictive covenant will be placed upon lots abutting the constructed wetland to control lot development so as not to compromise the design requirements of the SWMF and ensure that an adequate freeboard is maintained. Where overland overflow is available, a minimum of 0.3m freeboard (as defined in the Design and Construction Standards) above HWL is acceptable; otherwise, a minimum of 0.5 m is required.
- 2.1.2 Suspended Solids Removal
- 2.1.2.1 The minimum design requirement for total suspended solids removal is 85% of particle size 75µm or greater, as recommended by Alberta Environment, April 2001.
- 2.1.3 Wetland Drainage Areas
- 2.1.3.1 A minimum drainage area of 5 ha is required to generate constant or periodic flow to the constructed wetland.
- 2.1.3.2 The smallest practical drainage area is considered to be 20 ha. For drainage areas between 5 ha and 20 ha in size, Strathcona County may approve the use of constructed wetlands on a site-specific basis.
- 2.1.3.3 To determine that a permanent pool can be maintained in a constructed wetland, hydrological studies are to be conducted using the size and characteristic of the drainage area.
- 2.1.3.4 Strathcona County prefers that fewer, larger wetlands be constructed rather than a series of smaller constructed wetlands.
- 2.1.3.5 The Developer is required to implement appropriate sediment controls during development in the drainage area to minimize sediment loading to the forebay and wetland during the construction phase of the project and during the staged construction of the SWMF.
- 2.1.3.6 If the wetland is for mitigation or compensation of a lost natural wetland, a forebay is required as per Alberta Environment.
- 2.1.4 Wetland Soil Characteristics
- 2.1.4.1 For wetland deep water areas, low soil permeability of 10<sup>-7</sup> m/s is recommended to maintain a permanent pool of water and minimize exfiltration. Compacted sandy clays and silty clay loams may be suitable provided that documented geotechnical testing demonstrates low soil permeability.
- 2.1.4.2 Wetland vegetative zones can be constructed using soils from recently displaced wetlands, sterilized topsoil, or peat from within the drainage basin or region. A layer of 10 cm to 30 cm of soil shall be spread over the vegetation zones of the constructed wetland. Planting will be done in this soil following construction.



- 2.1.5 Wetland Vegetation
  - 2.1.5.1 Plant material shall be selected to respect soil characteristics, slopes, vegetation, zonation, and design of the facility and its intended use.
  - 2.1.5.2 Minimum of 75 trees per hectare required. This area shall be calculated as above the NWL.
  - 2.1.5.3 Shrubs may be substituted at a rate of 5 shrubs to one tree.
  - 2.1.5.4 Plant material appropriate to withstand flooding condition.
  - 2.1.5.5 Landscaping may follow naturalization design of equal value, at the discretion of Strathcona County.
  - 2.1.5.6 Constructed wetlands shall be landscaped as per [VOLUME 1, SECTION 6, SUB-SECTION 6.4.5](#) and [6.4.6](#).
  - 2.1.5.7 Vegetated buffers around the perimeter of the pond are required for erosion control and additional sediment and nutrient removal.
  - 2.1.5.8 Minimum buffer width of 10 m of vegetation around the perimeter of the pond is required for erosion control and additional sediment and nutrient removal.
  - 2.1.5.9 After construction and placement of soil the entire vegetation area shall be planted with a native water tolerant grass species mix to quickly establish a protective canopy and rigorous root development to stabilize the soil.
  - 2.1.5.10 In the spring of the year following construction the entire vegetation zone shall be overseeded with legumes and other native wetland material. Also, at approximately the same time, the area above NWL shall be planted with woody species. Plants shall be selected for tolerance to flooding and oxygen-reduced environments.
  - 2.1.5.11 One year after CCC a stable mixture of native wetland vegetation and woody species shall be established in a healthy vigorous growing condition.
  - 2.1.5.12 Prior to FAC and two years after CCC a diverse population of wetland vegetation and water tolerant woody plants should be established.
  - 2.1.5.13 Manipulation of water levels may be used to control plant species and maintain plant diversity.
  - 2.1.5.14 Harvesting emergent vegetation is not recommended.
- 2.1.6 Upland Vegetation
  - 2.1.6.1 Requirements for screening the constructed wetland, between NWL and HWL, from adjacent land uses and for visual aesthetics shall be agreed by the Developer and Strathcona County.

- 2.1.6.2 A mow strip of a minimum of 1.4 m shall extend from the public utility lot boundary towards the constructed wetland NWL. This is to act as a safety bench and weed barrier to prevent root invasion of adjacent properties by Poplar species.
- 2.1.6.3 A mow strip of a minimum of 1.4 m shall be required at the back of lot.
- 2.1.7 Wetland Water Depth
- 2.1.7.1 Use a variety of water depths, 0.1 m to 0.6 m with an average permanent water depth of 0.3 m, to encourage emergent vegetation.
- 2.1.7.2 Deep water areas, greater than 2 m, are to be limited to less than 25% of wetland surface area.
- 2.1.7.3 Water level fluctuation in excess of 1 m above NWL should be infrequent to prevent killing of the vegetation.
- 2.1.8 Wetland Surface Area
- 2.1.8.1 The surface area of the constructed wetland shall be a minimum of one hectare at the NWL.
- 2.1.9 Permanent Pool
- 2.1.9.1 The permanent pool at the outlet requires a depth of 2.4 m to 3.0 m. Size can be variable depending on the wetland's configuration.
- 2.1.9.2 Side slopes shall be a maximum of 7H: 1V along accessible areas around open and deep water areas at the permanent pool.
- 2.1.10 Inlet and Outlet
- 2.1.10.1 Inlets are to discharge to a forebay.
- 2.1.10.2 A variable water level control structure is required on the outlets for maintenance and water management purposes and to assist with the establishment and management of vegetation.
- The control structure should be capable of maintaining water levels between 0.5 m below NWL and 0.5 m above NWL. Variable water level control should be obtained through the manipulation of stop logs or similar overflow devices.
- 2.1.10.3 Inlets and outlets should be located to avoid short-circuiting and maximize the flow path.
- 2.1.10.4 The maximum depth in the inlet and outlet areas is restricted to 3.0 m.
- 2.1.10.5 Inlets and outlets are to be fully submerged, with the crown of the pipe at least 1.0 m below NWL. Inlet and outlet pipe inverts are to be a minimum of 100 mm above the bottom.

- 2.1.10.6 Provide reinforced grassed maintenance access, with a minimum width of 4 m, to forebay and permanent pool to allow for sediment removal.
- 2.1.11 Grading
- 2.1.11.1 Slopes shall be 5H:1V or flatter to support larger areas of wetland vegetation. Terraced slopes are acceptable.
- 2.1.11.2 A 2 m wide shallow marsh bench around the wetlands at NWL with a 10H:1V slope and the use of terraced grading are recommended to improve public safety.
- 2.1.11.3 Side slopes around the accessible deep areas in sediment forebay and permanent pool areas shall be a maximum of 7H:1V.
- 2.1.11.4 At the discretion of Strathcona County, the side slope may be 5H:1V in areas of high density vegetation to limit access to the open water.
- 2.1.12 Outflow Control
- 2.1.12.1 The quickest drawdown time shall be 24 hours for a 1 in 2 year storm to facilitate settling. For the most critical storm event, 90% of the total active storage volume shall have a drawdown time of 96 hours.

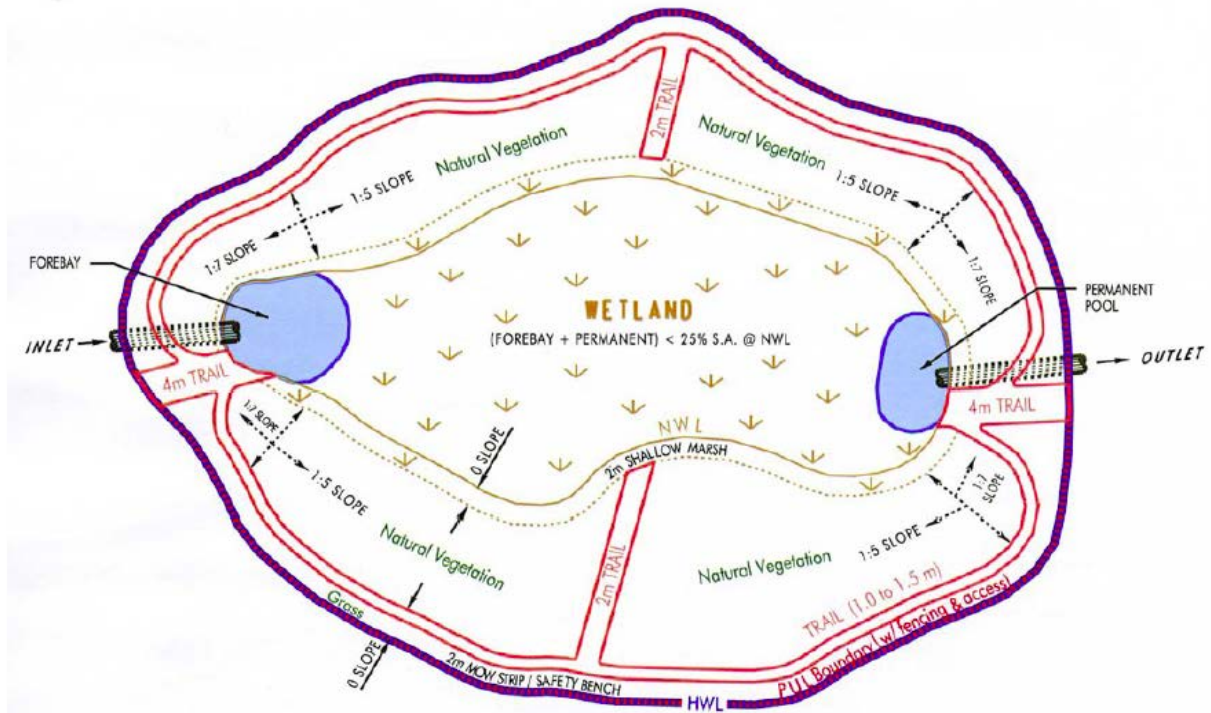
Time After Commencing Drawdown from Full Level at HWL	Available Volume Between HWL and NWL
≥24 hours	Volume equivalent to runoff from 1 in 2 year storm
48 hours	Volume equivalent to runoff from 1 in 5 year storm
≤96 hours	90% of total storage volume above NWL

- 2.1.13 Floatables, Oil and Grease
- 2.1.13.1 To trap floatable materials, oil and grease, inlets and outlets are to be below normal water level.
- 2.1.14 Maintenance
- 2.1.14.1 The Contract Manager/Developer Representative is required to provide an operations manual (or management plan) for the maintenance of the constructed wetland.
- 2.1.14.2 Maintenance and warranty period shall be 2 years from CCC issuance.
- 2.1.14.3 Removal of accumulated sediment during construction from forebays will be required prior to issuance of the FAC.
- 2.1.14.4 Sediment traps are to be cleaned during the maintenance period.
- 2.1.14.5 Sediment removal is required when forebay and permanent pool volumes are reduced by greater than 25%.

- 2.1.14.6 Replacement or adjust plantings and manage nuisance species during the maintenance period.
- 2.1.14.7 During the maintenance period, the facility shall be inspected at least twice each year to determine vegetation distribution and the preservation of design depth. These inspection reports shall be submitted when applying for the FAC.
- 2.1.14.8 In future years, wetland vegetation regeneration should be possible by lowering the water level in the fall season using the control structure.
- 2.1.14.9 Erosion control is required throughout construction period until vegetation is well established and agreed to by Strathcona County. For sediment and erosion control practices refer to Design and Construction Standards.
- 2.1.14.10 Use preventative measures against weed development. Non-native species management is required. Selective cutting, hand-pulling and spot spraying may be required.
- 2.1.15 Monitoring
  - 2.1.15.1 The Developer shall monitor stormwater quality. If required by Strathcona County, effluent from the permanent pool shall be sampled and tested for the following parameters: Total Suspended Solids, Total Phosphorus, NH<sub>3</sub>, Biochemical Oxygen Demand, Dissolved Oxygen and fecal coliforms each year during the maintenance period and the data provided to Strathcona County.
  - 2.1.15.2 The Developer shall monitor wetland and upland vegetation and take any corrective action required during the maintenance period.
  - 2.1.15.3 At the end of the maintenance period, before the issuance of the FAC, the Developer shall ensure that at least 75% of the grass cover and 30% of the non-grass emergent vegetation around the wetland's edge has established given normal seasonal conditions. A vegetation survey by a qualified professional shall be submitted to Strathcona County.
- 2.1.16 Public Information
  - 2.1.16.1 The Developer is required to inform the general public by means of signage and brochures that the facility is a wetland constructed for stormwater management.
- 2.1.17 Recreational Uses
  - 2.1.17.1 To accommodate recreational uses for the public, a walkway may be required in the buffer strip between NWL and HWL, at the discretion of Strathcona County.
  - 2.1.17.2 Planting strategies should deter direct public access to the wetland so as to avoid disturbance of the wetland fauna.

- 2.1.17.3 Activities that involve direct contact with water or ice are not permitted unless otherwise noted by Strathcona County.
- 2.1.18 Access
  - 2.1.18.1 Access is required to all inlets and outlets for maintenance, operation of water control structures, removal of debris and litter and vegetation management. Access shall be in conjunction with the potential trail system and should be sufficient width and composition to convey currently used maintenance vehicles.
- 2.1.19 Fencing
  - 2.1.19.1 The Developer is required to use where possible natural solutions such as grading and planting strategies to provide safety features around the wetland, inlets and outlets.
  - 2.1.19.2 The Developer shall provide a fence 150 mm inside adjacent private property with openings for maintenance and public access to trails only. Back of lot gates are not permitted.
- 2.1.20 Wildlife
  - 2.1.20.1 At the discretion of Strathcona County and the Developer the design may incorporate features that either encourage or discourage wildlife. Nesting islands are to be reviewed on a site by site basis.
- 2.1.21 Mosquito Control
  - 2.1.21.1 The Developer shall include design features that minimize mosquitoes in a constructed wetlands facility. Features can include system design and vegetation management that would preclude stagnant backwaters and shading of the water surface, providing habitat for purple martin, swallows, baitfish, dragon flies, bats and other predators.

### Schematic Diagram of Constructed Wetland



## **1.0 GENERAL**

### **1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of wood screen fencing supplied and installed within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS, most recent CSA standards and manufacturer's directions.

## **2.0 PRODUCTS**

### **2.1 WOOD**

- 2.1.1 Pressure treated timber and lumber shall be #1 construction grade Spruce, Western Pine or Douglas Fir dressed and conforming to C.S.A.

### **2.2 CONCRETE**

- 2.2.1 Concrete for piles to be fillcrete as follows:

Compressive Strength at 28 days (Mpa)	Slump (mm)	Entrained Air (% by volume)	Maximum Aggregate Size (mm)	Minimum Cement (kg/m <sup>3</sup> )
Minimum – 0.15 Maximum – 0.40	100 ± 25	6.0 – 8.0	5	30

- 2.2.2 As a minimum, footing and post depth to be sufficient to reach undisturbed material.

### **2.3 FASTENERS**

- 2.3.1 Nails, spikes, bolts and lag screws to be hot dipped galvanized in accordance with C.S.A.

## **3.0 EXECUTION**

### **3.1 FENCE CONSTRUCTION**

- 3.1.1 Posts will be rejected when the following applies or structural integrity is compromised:
- (i) Cracks are 50% of the depth of the post on the face it occurs;
  - (ii) Cracks exceeds 25% the width of the post on the face it occurs or are wider than 12mm.; or if
  - (ii) Mechanical damage is evident.
- 3.1.2 Cracks 6 – 12 mm are to be re-stained with fence stain ensuring stain penetrates core wood.
- 3.1.3 Board spacing to be tight ensuring spacing between boards does not exceed 12 mm when boards are dry.

- 3.1.4 Fence full dimension or S4S and grade two or better.
- 3.1.5 All boards to be free of loose knots, bark, cracks and have straight edges.
- 3.1.6 Resawn lumber will be accepted for fence pickets only when deemed necessary by the Developer's Representative/Contract Manager. Resawn boards are to be a minimum 50mm with a recommended maximum of 1 resawn board per section and an allowable limit of 2 resawn boards per section of fence.
- 3.1.7 Posts and any wood in contact with the ground to be pressure treated.
- 3.1.8 Fence boards including stringers and fascia to be pre-stained with 2 coats of stain.
- 3.1.9 Fence posts to be stained prior to installation of stringers and fence boards.
- 3.1.10 Touch up stain to be applied after construction to any boards where stain has been removed, i.e., nail holes, faded, see through, etc.
- 3.1.11 Nailer strips to be fastened to post.
- 3.1.12 Fascia boards on double board fence to be attached to fence boards.
- 3.1.13 For noise attenuation on double board fence, adjust yard side pressure treated bottom stringer to provide no gap on ground.
- 3.1.14 Bottom of double board fence on roadside to be 50 mm above ground.
- 3.1.15 Standard wood screen fence to be 50 mm above grade.

#### **4.0 ACCEPTANCE**

- 4.1 Wood fencing may be accepted immediately upon completion of construction providing fence has been installed in accordance with these CONSTRUCTION SPECIFICATIONS and free from deficiencies. A maintenance period is not required.

#### **5.0 MEASUREMENT FOR PAYMENT**

- 5.1 Measurement and payment for the supply and installation of the fence shall be made on a lineal metre basis. The unit cost shall include all materials and execution necessary and incidental to the work, including utility locations, post hole augering and fence staining and erection.



## 1.0 GENERAL

### 1.1 DESCRIPTION

- 1.1.1 The work covered by this specification shall consist of chain link fencing supplied and installed within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS, most recent CSA standards and manufacturer's directions.

### 1.2 STANDARDS

- (i) Steel Pipe to ASTM A120-82
- (ii) Chain Link Fabric to CAN2-138.1-96
- (iii) Fence, Chain Link, Frame Work, Zinc-coated, Steel to CAN2-138.2-96
- (iv) Fence, Chain Link Installation to CAN2-138.3-96

## 2.0 PRODUCTS

### 2.1 GENERAL

- 2.1.1 Pipe: Steel butt weld, Schedule 40, hot dip galvanized to 550-g/m<sup>2</sup> coating.
- 2.1.2 Top, Bottom and Brace Rail: Plain end, Schedule 40 hot dip galvanized to 550-g/m<sup>2</sup> coating.
- 2.1.3 Chain link fabric is to be nine gauge, galvanized or vinyl coated as specified.
- 2.1.4 Galvanized: Pre-galvanized steel wire to 490-g/m<sup>2</sup>, nine gauge, and 3.5 mm diameter.
- 2.1.5 Vinyl Coated: Pre-galvanized steel wire to 490-g/m<sup>2</sup>, nine gauge, 4.26 mm diameter **after** coating.
- 2.1.6 Posts and rails to be powder coated.
- 2.1.7 Concrete to be fillcrete as follows:

Compressive Strength at 28 days (Mpa)	Slump (mm)	Entrained Air (%) by volume)	Maximum Aggregate Size (mm)	Minimum Cement (kg/m <sup>3</sup> )
Minimum – 0.15 Maximum – 0.40	100 ± 25	6.0 – 8.0	5	30

### 2.2 COMPONENTS

#### 2.2.1 Line Posts:

- (i) 48 mm O.D., 4.05 kg/m (fences 1.8 m and under)
- (ii) 60 mm O.D., 5.43 kg/m (fences over 1.8 m)

- 2.2.2      Corner, Terminal and Straining Posts:  
(i)        3 mm O.D., 8.62 kg/m (fences 1.8 m and under)  
(ii)       89 mm O.D., 11.28 kg/m (fences over 1.8m)
- 2.2.3      Gate Posts:  
(i)        73 mm O.D., 8.62 kg/m (fences 1.8 m and under, maximum leaf width 3 m)  
(ii)       89 mm O.D., 11.28 kg/m (fences over 1.8 m, maximum leaf width 3 m)
- 2.2.4      Top and Brace Rail:  
(i)        42 mm O.D., 3.38 kg/m, plain end, sleeve coupled.
- 2.2.5      Gate Frame:  
(i)        42 mm O.D., 3.38 kg/m. Gate leaves to have horizontal and vertical intermediate brace on gate leaves 3 m wide and over.
- 2.2.6      Post Caps:  
(i)        Cast aluminum, sized to post diameter, set screw retained.
- 2.2.7      Line Post Eye Tops:  
(i)        Cast aluminum.
- 2.2.8      Rail Ends:  
(i)        Cast aluminum.
- 2.2.9      Fittings:  
(i)        Sleeves, bands, clips, tension bards, fasteners and fittings galvanized steel.
- 2.2.10     Fabric:  
(i)        50 mm diamond mesh, interwoven nine gauge wire, top selvage knuckle end closed, bottom selvage knuckle end closed.  
(ii)       Coated mesh to be 9 gauge wire before coating.
- 2.2.11     Bottom Tension Wire:  
(i)        Nine-gauge steel single strand hot-dipped galvanized to 490 g/m<sup>2</sup>.
- 2.2.12     Double Gate Hardware:  
(i)        Cane bolt centre rest, three piece drop latch and latch catch with drop bolt. Gate hinge 180° male and female. Chain hold open.
- 2.2.13     Single Gate Hardware:  
(i)        3 piece drop latch and latch catch with drop bolt. Gate hinge 180° male and female. Chain hold open.

- 2.2.14 Crawl Hole:  
(i) 610 mm square opening. Two part, 25 mm flat bar sandwich frame, bolted in the corners.

### 3.0 EXECUTION

#### 3.1 INSTALLATION

- 3.1.1 Install to alignment specified, line posts, corner posts, and gateposts. Attach top and brace rails to provide rigid structure for specified high fabric and gates.

- 3.1.2 Maximum spacing of posts is 3 m on centre.

- 3.1.3 Install line, corner and terminal posts plumb, set in concrete footings as follows:

Fence Height		Concrete Depth	Hole Diameter at Top
1.2 m, 1.5 m & 1.8 m	Line Posts	760 mm	250 mm
	Gate and Corner Posts	900 mm	300 mm
2.4 m, 3.0 m & 3.6 m	Line Posts	900 mm	250 mm
	Gate and Corner Posts	1060 mm	300 mm

- 3.1.4 Set post to within 150 mm from bottom of concrete footing.
- 3.1.5 Set top of concrete footing flush with finished grade. Slope and trowel finish top to ensure water run-off.
- 3.1.6 Position bottom of fabric 25 mm above finished grade with bottom tension wire between posts.
- 3.1.7 Align top of posts to ensure that top rail varies gradually with changes in ground elevations.
- 3.1.8 Pass top rail through line post tops to form continuous bracing. Install 150 mm long couplings mid-span at pipe ends.
- 3.1.9 For fences 1.8 m and over, brace each gate and corner post back to adjacent line post with horizontal centre brace rail. Install brace rail, one bay from corner and gate posts.
- 3.1.10 Fasten fabric to top rail, line posts, brace rails and bottom tension wire with nine gauge wire ties at maximum 500 mm centres.
- 3.1.11 Attach fabric to corner and gate posts with tension bars and tension bar clips. Stretch fabric between posts at intervals of 3 m maximum.
- 3.1.12 Install straining posts every 90 m.
- 3.1.13 Install gates of sizes shown using fabric to match fence. Install two hinges per leaf and hardware specified.

- 3.1.14 Install centre rests set in concrete and cane bolts at centre of double gate openings.
- 3.1.15 Welded gate frame joints to be painted with one coat of zinc paint.
- 3.1.16 Cut fabric for crawl holes, selvage knuckle end closed top and bottom. Place 2 part frames around opening in fabric and bolt together.

#### **4.0 MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

###### **4.1.1 Chain Link Fencing**

The unit of measure for chain link fencing shall be as specified in the TENDER FORM. The quantity paid for shall be the number of lineal metres acceptably installed as measured in place.

###### **4.1.2 Gates, Crawl Holes and Corner/Terminal Posts**

The unit of measure for gates, crawl holes and corner/terminal posts shall be as specified in the TENDER FORM. The quantity paid for shall be the number of units acceptably installed as counted in place.

##### **4.2 PAYMENT**

- 4.2.1 Payment at the respective Contract price bid per unit shall be full compensation for supplying, delivering, auguring, assembling, removing debris and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

#### **5.0 ACCEPTANCE**

- 5.1 Chain link fencing may be accepted immediately upon completion of construction providing fence has been installed in accordance with these CONSTRUCTION SPECIFICATIONS and free from deficiencies. A maintenance period is not required.

#### **6.0 GUARANTEE**

- 6.1 All materials to be free of structural defects.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of paige wire fencing supplied and installed within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS, most recent CSA standards and manufacturer's directions.

**2.0 PRODUCTS****2.1 WOOD**

- 2.1.1 Pressure treated timber and lumber shall be #1 construction grade Spruce, Western Pine or Douglas Fir dressed and conforming to C.S.A.

**2.2 CONCRETE**

- 2.2.1 Concrete for piles to be fillcrete as follows:

Compressive Strength at 28 days (Mpa)	Slump (mm)	Entrained Air (% by volume)	Maximum Aggregate Size (mm)	Minimum Cement (kg/m <sup>3</sup> )
Minimum – 0.15 Maximum – 0.40	100 ± 25	6.0 – 8.0	5	30

- 2.2.2 As a minimum, footing and post depth to be sufficient to reach undisturbed material.

**2.3 WIRE**

- 2.3.1 12 gauge twitch wire with 150 x 150 mm spacing.

**2.4 FASTENERS**

- 2.4.1 As per manufacturer's directions.

**3.0 EXECUTION****3.1 INSTALLATION**

- 3.1.1 Fencing shall be constructed in accordance with the approved plans at the locations as designated on the CONSTRUCTION DRAWINGS and per our [STANDARD DRAWING 61211](#).
- 3.1.2 All trees, brush and other obstacles which interfere with the construction of the fence shall be removed prior to commencing fence construction.

- 3.1.3 Allowable taper from end to end of posts shall not exceed 38 mm in diameter. Posts shall be installed with the large end down.
- 3.1.4 Maximum spacing of posts is 3 m on centre and post shall be set with the large end down.
- 3.1.5 The posts shall be set in holes to the required depth, and tamped in a plumb and firm position to the line and spacing shown on the plans or as directed by the Consultant.
- 3.1.6 All fence wire shall be pulled with hand stretchers, or tensioning apparatus capable of adjustment.
- 3.1.7 Gates shall be constructed and located on the plans or as by the Consultant.
- 4.0 ACCEPTANCE**
- 4.1 Paige wire fencing may be accepted immediately upon completion of construction providing fence has been installed in accordance with these CONSTRUCTION SPECIFICATIONS and free from deficiencies. A maintenance period is not required.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by these CONSTRUCTION SPECIFICATIONS shall consist of granular pedestrian trails placed and compacted in the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**1.2 RESTRICTION OF EQUIPMENT**

- 1.2.1 The equipment used for construction of the gravel trail shall be restricted by the Contract Manager/Developer Representative if considered to be oversized for the work. Replace with suitable equipment as directed by the Contract Manager/Developer Representative.

**2.0 PRODUCTS****2.1 MATERIALS AND GRADING**

- 2.1.1 Aggregate for gravel sub-base and base course shall be crushed gravel and shall consist of sound, hard, durable particles and shall not contain organic, soft or other deleterious materials nor materials that break up when alternately frozen and thawed or wetted and dried. It shall be uniformly graded to comply completely with the gradations indicated in [VOL. 2 SEC. 302, GRANULAR MATERIALS](#) and shall not be subject to extreme variations from maximum to minimum of the gradation specified.

**3.0 EXECUTION****3.1 GENERAL**

- 3.1.1 Contractor will establish horizontal pathway centre line trail alignment.
- 3.1.2 Contractor to offset centre line stakes prior to construction and ensure that the offset stakes are protected during the construction process.
- 3.1.3 Pathway finish grade shall blend into existing topography. Crown or crossfall shall be incorporated in the finished pathway surface to ensure positive drainage.
- 3.1.4 Pathway alignment must be approved by the Contract Manager/Developer Representative prior to initiation of the work.
- 3.1.5 Do not pull or rip out roots of trees that are to remain. If excavation through roots is required, excavate by hand and cut roots with sharp axe. Protect existing vegetation as outlined in [VOL. 2 SEC. 102, CLEARING AND GRUBBING](#).

- 3.1.6 Remove broken and dead branches that constitute a hazard to safety. Make clean smooth sloping cuts.
- 3.1.7 Unnecessary tree destruction will not be tolerated.
- 3.2 EXCAVATION
  - 3.2.1 Excavation for trail widths includes removing topsoil and/or common material to a minimum depth of 150mm or as directed by the Contract Manager/Developer Representative.
  - 3.2.2 Dispose of all excavated material from the site as directed by the Contract Manager/Developer Representative.
  - 3.2.3 When transporting excavated material off-site, use trail alignment where possible.
  - 3.2.4 Excavation is to follow existing contours and is to ensure positive drainage, as per approved CONSTRUCTION DRAWINGS.
  - 3.2.5 Approved excavated materials may be used for trail construction on steep side slopes or low areas to provide proper grades and proper drainage. This is preferable to cutting into the slope which may initiate erosion problems.
- 3.3 FILL
  - 3.3.1 Fill may be required in low areas to raise trail base, and for embankment construction. Fill will be obtained from approved excavated material, for embankment material as per [VOL. 2 SEC. 201, EXCAVATION AND EMBANKMENT](#).
  - 3.3.2 All fill material is subject to the approval of the Contract Manager/Developer Representative, prior to placing.
  - 3.3.3 Place fill in layers not exceeding 150 mm. Maintain optimum moisture in the fill and compact to 98% Maximum Dry Density.
- 3.4 SUBGRADE PREPARATION
  - 3.4.1 The subgrade shall be prepared according to the requirements of [VOL. 2 SEC. 202, COMPACTED SUBGRADE PREPARATION](#) unless the modification is required to accommodate site conditions, i.e., Constructed Wetlands, tree stands etc. The Contractor shall maintain the subgrade to the specified section, free from ruts, waves and undulations until sub-base material is placed. The subgrade shall be in a firm dry condition and must be approved by the Contract Manager/Developer Representative before granular material is placed. The deposition of granular material on a soft, muddy, or rutted subgrade will not be permitted.



- 3.4.2 Hauling over the subgrade, or sub-base course, will not be permitted when, in the opinion of the Contract Manager/Developer Representative, damage to the subgrade or sub-base course may result.
- 3.5 GRANULAR BASE CONSTRUCTION
- 3.5.1 Place and compact 12.5 mm diameter crushed gravel course on leveled subgrade and compact to 98% of Maximum Dry Density as per [VOL. 2 SEC. 302, GRANULAR MATERIALS](#).
- 3.5.2 Ensure that coarse aggregate and fine aggregates are well mixed.
- 3.5.3 Geotextile material or tensor fabric may be required to assist with load bearing capacity of trail.
- 3.5.4 Root intrusion material is required on trails beside treed areas or planting beds on a site specific basis.
- 3.6 TRAIL EDGE RESTORATION
- 3.6.1 Restore areas damaged during construction to the same condition as existed previous to construction.
- 3.6.2 Seed damaged and/or disturbed trail edge areas with seed mixture as approved by the Contract Manager/Developer Representative and in accordance with [VOL. 2 SEC. 603, SEEDING AND SODDING](#).
- 3.6.3 Topsoil will be required for landscape rehabilitation work along the trail edge as per [VOL. 2 SEC. 602, TOPSOIL AND PLANTING MIX URBAN](#).
- 3.7 CLEAN-UP
- 3.7.1 On a daily basis, as the work proceeds, and upon completion, remove rubbish and surplus material from the site.
- 4.0 ACCEPTANCE
- 4.1 Trails will be accepted providing trails have been installed in accordance with the Design and Construction Standards, maintained for a minimum of 2 years and deficiencies have been completed.
- 5.0 GUARANTEE
- 5.1 Guarantee all trails for a minimum of 2 years from date of CCC to FAC against settlement and repair all such settlement to the satisfaction of Strathcona County.

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of supply and installation of paving stone in the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**2.0 PRODUCTS****2.1 MATERIALS****2.1.1 Paving Stone**

The paving stone shall be manufactured in conformance with ASTM C902 with a compressive strength of 55 MPa with no unit less than 50 MPa. Moisture absorption to be a maximum of 8% with no individual unit greater than 11% at time of delivery. Color shall be as specified on approved CONSTRUCTION DRAWINGS.

**2.1.2 Sand Leveling Course**

Sand leveling course to be as per [VOL. 2 SEC. 302, GRANULAR MATERIALS](#).

**2.1.3 Granular Base**

Granular base to be 20mm dia. of crushed gravel compacted to 98% SPD. See [VOL. 2 SEC. 302, GRANULAR MATERIALS](#).

**2.1.4 Edge Restraint**

Pressure treated lumber, concrete strip preformed PVC edging or other material or structure as indicated on approved CONSTRUCTION DRAWINGS.

**3.0 EXECUTION****3.1 SITE PROTECTION, PREPARATION AND RESTORATION**

- 3.1.1 Refer to [VOL. 2 SEC. 101, SITE PROTECTION, PREPARATION AND RESTORATION](#).

**3.2 SUBGRADE PREPARATION**

- 3.2.1 See [VOL. 2 SEC. 202, COMPACTED SUBGRADE PREPARATION](#).

### 3.3 GRANULAR BASE

3.3.1 The subgrade is to be approved by Contract Manager/Developer Representative before granular base is placed.

3.3.2 Place a 100 mm depth of 20 mm dia. crushed gravel on the compacted subgrade. See [VOL. 2 SEC. 302, GRANULAR MATERIALS](#) and [VOL. 2 SEC. 303, GRANULAR SUB-BASE AND BASE COURSE](#). Do not use sand for corrective leveling.

### 3.4 SAND LEVELING COURSE

3.4.1 Granular base is to be approved by Contract Manager/Developer Representative before sand leveling course is placed.

3.4.2 Sand shall be in conformance with [VOL. 2 SEC. 302, GRANULAR MATERIALS, SUB-SECTION 2.3.5](#).

3.4.3 Evenly place and screed 25 mm of compacted sand leveling course over area to be paved.

3.4.4 Once screed, the sand shall not be disturbed. If screed sand is disturbed or exposed to rain, it shall be removed or loosed, respread and rescreeded.

3.4.5 Place no more sand than what can be covered with paving stone on the same day.

### 3.5 EDGE RESTRAINT

3.5.1 Install according to approved CONSTRUCTION DRAWINGS.

### 3.6 PAVING STONE

3.6.1 Place paving on sand leveling course in pattern in accordance with approved CONSTRUCTION DRAWINGS.

3.6.2 Joint spaces to be no wider than 3 mm.

3.6.3 Gaps around the edge of the paved surface shall be filled with standard edge pieces or with stones cut to fit. Stones shall be cut to a straight even surface without chips or cracks.

3.6.4 Avoid disturbance to paving stones prior to tamping.

3.6.5 Paving stones shall be vibrated to their final level with a vibrating plate compactor.

3.6.6 Joint sand to contain a minimum of 30% of 3 mm particles, or as per manufacturer's standards.

3.6.7 Brush and vibrate joint sand to completely fill joints between stones.

3.6.8 Additional joint sand is to be swept from surface.

3.6.9 Check finished surface to ensure surface and grade tolerances are met.

3.6.10 Soil cement may be required in conditions where surface run off is prevalent.

#### **4.0 TOLERANCE**

##### **4.1 SURFACE TOLERANCE**

4.1.1 After final vibrating, the surface shall be true to grade.

#### **5.0 CLEANUP**

5.1 Do not open newly installed paving stone to pedestrian or vehicle traffic until directed by the Contract Manager/Developer Representative.

5.2 Before opening to traffic, ensure surface is clean and free from surplus material and debris.

#### **6.0 MEASUREMENT AND PAYMENT**

##### **6.1 MEASUREMENT**

The unit of measure for paving stone shall be as specified in the TENDER FORM. The quantity paid for shall be the number of square metres or as stated in the TENDER FORM, acceptably placed.

##### **6.2 PAYMENT**

6.2.1 Payment at the respective Contract price limit shall be full compensation for preparing subgrade, supplying, placing, spreading, the base course and leveling course, and placing the paving stones and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of site furniture specifications placed and installed within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS, most recent CSA standards and manufacturer's directions.

**1.2 WORKMANSHIP**

- 1.2.1 Assembly of furniture shall be performed in accordance with the manufacturer's directions and generally accepted practices for the various types of components.
- 1.2.2 Material damaged during assembly will have to be replaced by material of identical type available from manufacturer.

**1.3 DELIVERY, STORAGE AND HANDLING**

- 1.3.1 Contractor to be responsible for inspection of the components for damage prior to turnover. Should any damaged components be found, report it immediately to the Contract Manager/Developer Representative.
- 1.3.2 Handle components so as to avoid shock stress and damage to painted finish.
- 1.3.3 Upon acceptance of components by the Contract Manager/Developer Representative, place material in safe storage.

**2.0 PRODUCTS**

- 2.1 All components for the furniture shall be supplied by the Contractor. This includes hardware for assembling the furniture.
- 2.1.1 All components to be natural.
- 2.1.2 All metal components to be pre-drilled.
- 2.1.3 Concrete For Piles: Normal Portland Cement, type 50, 25 Mpa, 28 day strength, 75mm slump, air entrained 4 - 6% maximum aggregate size 20mm unless otherwise specified. Fillcrete is not acceptable for this application.
- 2.1.4 All hardware to be plated to prevent rust.

**3.0 EXECUTION****3.1 GENERAL****3.1.1 Furniture Assembly**

3.1.1.1 Assemble furniture as per the CONSTRUCTION DRAWINGS and manufacturer's directions.

**3.1.2 Furniture Installation**

3.1.2.1 Install furniture as per details per manufacturer's specifications.

3.1.2.2 Ensure that furniture is level, plumb, straight and centered.

**4.0 ACCEPTANCE**

4.1 Site furniture may be accepted immediately upon completion of construction providing the furniture has been installed in accordance with these CONSTRUCTION SPECIFICATIONS and free from deficiencies. A maintenance period is not required.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of park signs specifications supplied and installed within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS, most recent CSA standards and manufacturer's directions.

**2.0 PRODUCTS****2.1 INFORMATION SIGNS**

- 2.1.1 Double sided signboard to be  $\frac{3}{4}$ " high density plywood.
- 2.1.2 Signboards face shall be Green – Pantone 370c engineering grade film. Lettering and Strathcona County logo to be screen printed using a compatible ink or superposed using die cut engineering grade film. Alternative films will be considered provided the product has written guarantee for a minimum life expectancy of 5 years.
- 2.1.3 Park name to be White. Park name and civic address lettering to be Verdana.
- 2.1.4 Strathcona County logo to be White, PMT to be supplied as required.
- 2.1.5 Foundation post shall be pressure treated 200 mm x 200 mm full dimension timber, 3.66 m long. Set post in 455 mm diameter, concrete footing filled with fillcrete as follows:

Compressive Strength at 28 days (MPa)	Slump (mm)	Entrained Air (% by volume)	Maximum Aggregate Size (mm)	Minimum Cement (kg/m <sup>3</sup> )
Minimum – 0.15 Maximum – 0.40	100 ± 25	6.0 – 8.0	5	30

- 2.1.6 Appearance post shall be 200 mm x 200 mm full dimension timber, 1.9 m long.
- 2.1.7 Fastening hardware to be galvanized steel.
- 2.1.8 Sign board cap to be 19 mm extruded aluminum channel or approved alternate, painted white to match sign board.
- 2.2 PLAYGROUND SIGNS**
- 2.2.1 Signboard shall be 19mm crezon. Back and edges shall be primed with exterior primer and painted using white exterior alkylid paint.
- 2.2.2 Sign shall be 300 mm x 350 mm in size.

- 2.2.3 Wording and lettering material to be approved by Contract Manager/Developer Representative and Planning and Development Services department.
- 2.2.4 For post installation, [STANDARD DRAWING 61502](#).
- 2.2.5 Sign designs supplied by manufacturers that match and attach to equipment may be considered.
- 3.0 MAINTENANCE**
  - 3.1 GENERAL
    - 3.1.1 All signs to be maintained free of defects for minimum of one year after issuance of CCC until FAC.

**1.0 GENERAL**

## 1.1 DESCRIPTION

- 1.1.1 The work covered by this specification shall consist of playground construction specifications placed and installed within the limits of construction or as designated by the Contract Manager/ Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS, most recent CSA standards and manufacturer's directions.

## 1.2 DEFINITION

- 1.2.1 No-Encroachment Zone: A no-encroachment zone is the area adjacent to the protective surfacing zone intended to allow pedestrian traffic near the play equipment in use while minimizing the risk of injury to pedestrians.

**2.0 PRODUCTS**

## 2.1 PLAYGROUND SAND

- 2.1.1 When tested by means of laboratory sieves, the sand shall meet with the following grading requirements and be uniformly graded between limits as specified in [VOL. 2 SEC. 302, GRANULAR MATERIALS, SUB-SECTION 2.3.6.](#)

- 2.1.2 Natural, coarse, without very fine particles and gravel.

- 2.1.3 Clean sand free from clay, shale and organic matter.

## 2.2 HARDWARE

- 2.2.1 10 mm diameter, 87 mm long zinc plated lag bolts.

- 2.2.2 3 mm x 75 mm x 250 mm vertical steel plates.

- 2.2.3 13 mm diameter, 600 mm long rebar.

## 2.3 GEO-TEXTILE FILTER FABRIC

- 2.3.1 Geo-Technical Products non-woven geotextile heavy duty or approved equivalent.

## 2.4 CONCRETE

- 2.4.1 Normal portland cement, Type 50, 25 Mpa. 28 day strength, 50-100 mm slump, air entrained 4-6%. Fillcrete is not acceptable for this application.

**3.0 EXECUTION****3.1 GENERAL**

- 3.1.1 All playground development must include a sub-base graded for positive drainage at a minimum of 1.5% and up to a maximum 2.0% grade.
- 3.1.2 Retainers are to be constructed in accordance with [STANDARD DRAWING 61826](#) or an alternate material approved by Recreation Parks and Culture department and with the following:
  - 3.1.2.1 Retainer height based on grading requirements to ensure 1.5% minimum and 2.0% maximum slope;
  - 3.1.2.2 Preferred retainer height on down slope side to be no more than 2 high (400 mm) above finished grade on inside of retainer (to allow easy access and egress);
  - 3.1.2.3 Entire top surface of retainer to be eased and sanded smooth, free of splinters and sharp edges and treated in accordance with CSA guidelines;
  - 3.1.2.4 Weep holes required as [STANDARD DRAWING 61826](#); and
- 3.1.3 All hardware used on signs, retainers and play equipment to be plated to prevent rusting as [STANDARD DRAWING 61502](#).
- 3.1.4 Playground signs identifying intended age groups for play structure and safety contact number to be installed in best visible locations and accepted by Recreation Parks and Culture department as [STANDARD DRAWING 61508](#).
- 3.1.5 Area designated for playground construction to remain fenced (snowfence or temporary chain link) with "Do Not Enter Signs" attached to fence. Area to remain secured from public access at all times until FAC is issued and all deficiencies identified by Recreation Parks and Culture department are rectified.
- 3.1.6 Bridging required over newly seeded/sodded areas. Designate access points as required.
- 3.1.7 Sand to be installed immediately upon approval of retainer and play equipment installation.
- 3.1.8 Wheelchair accessibility is preferred.
- 3.1.9 Inspections to be completed in accordance with the following chart.
- 3.1.10 All playgrounds must include a swing set; minimum 4 unit for senior structures and/or minimum of 2 unit for tot lots.
- 3.1.11 All slides to face north or east.

### FAC Process for Playgrounds

Contract Manager/Developer Representative Responsibility	Strathcona County Responsibility
<ul style="list-style-type: none"> <li>Provide subgrade survey to Strathcona County Representative prior to installation of retainer and equipment</li> </ul>	<ul style="list-style-type: none"> <li>Strathcona County Representatives to review.</li> </ul>
<ul style="list-style-type: none"> <li>Submit compaction test and request inspection of subgrade. Allow 48 hours.</li> </ul>	<ul style="list-style-type: none"> <li>Strathcona County Representatives to inspect.</li> </ul>
<ul style="list-style-type: none"> <li>Request inspection of play equipment and retainer prior to sand installation. Footings must be exposed. Allow 48 hours.</li> </ul>	<ul style="list-style-type: none"> <li>Strathcona County Representatives inspect.</li> </ul>
<ul style="list-style-type: none"> <li>Submit deficiency report to Strathcona County Representative.</li> </ul>	
<ul style="list-style-type: none"> <li>All deficiencies previously identified to be corrected immediately. Contact Strathcona County Representative upon completion of deficiencies for re-inspection. Allow 48 hours.</li> </ul>	<ul style="list-style-type: none"> <li>Strathcona County Representatives inspect.</li> </ul>
<ul style="list-style-type: none"> <li>After sand installation submit a pre-inspection report with reduced drawing confirming sand and equipment are installed in compliance with CSA, Design and Construction Standards and approved landscape drawings and written request for a FAC inspection. Complete deficiencies immediately. Contact Strathcona County Representative for re-inspection. Submit Compliance certificate. Allow 10 working days.</li> </ul>	<ul style="list-style-type: none"> <li>Once deficiencies are rectified, Strathcona County Representatives to issue FAC and produce paperwork</li> </ul>

## 4.0 MAINTENANCE

### 4.1 GENERAL

4.1.1 No maintenance required after issuance of FAC.

## 5.0 ACCEPTANCE

5.1 Playgrounds may be accepted providing playgrounds have been installed in accordance with [VOLUME 1, SECTION 6, OPEN SPACE STANDARDS](#), CSA Guidelines and Manufacturers instructions and free of deficiencies.

## 6.0 GUARANTEE

6.1 Guarantee play equipment and retainer maybe accepted immediately upon completion of construction, providing it has been installed in accordance with the manufacturer's specifications as well as the approved set of CONSTRUCTION DRAWINGS, the development agreements and [VOLUME 1, SECTION 6, OPEN SPACE STANDARDS](#).

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of soccer fields in the areas within the limits of construction in accordance with these CONSTRUCTION SPECIFICATIONS and approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**2.0 PRODUCTS****2.1 MATERIALS AND GRADING**

- 2.1.1 Topsoil supply and installation as per [VOL. 2 SEC. 602, TOPSOIL AND PLANTING MIX URBAN](#).
- 2.1.2 Clay fill to be inorganic fine grained sand clay soil free from roots, rocks larger than 25 mm and building debris. Excavated material is suitable if it conforms to the above and is approved by the Contract Manager/Developer Representative.

**2.2 SUBGRADE**

- 2.2.1 The subgrade shall be prepared according to the requirements of [VOL. 2 SEC. 601, GENERAL LANDSCAPE SUBGRADE PREPARATION](#) and to cross sections shown on the CONSTRUCTION DRAWINGS. The Contractor shall maintain the subgrade to the specified section, free from ruts, waves and undulations. The subgrade shall be in a firm dry condition and must be approved by the Contract Manager/Developer Representative before topsoil is placed.
- 2.2.2 Hauling over the subgrade will not be permitted when, in the opinion of the Contract Manager/Developer Representative, damage to the subgrade may result.

**3.0 EXECUTION****3.1 GENERAL**

- 3.1.1 Ideal field construction to have a longitudinal slope of 0.1 to 0.2% from one end to the other depending on site drainage conditions.
- 3.1.2 Topsoil depth to be 200 mm after compaction.
- 3.1.3 Contractor/Developer Representative to provide topographical survey to Strathcona County after topsoil installation and prior to seeding or sodding.
- 3.1.4 Install sport field reference layout pins at time of construction, using 500 mm lengths of 15 mm diameter rebar at minimum depth of 50 mm below final grade.

- 3.1.5 Seed in accordance to [VOL. 2 SEC. 603, SEEDING AND SODDING](#).
- 3.1.6 Guarantee and maintain soccer field in accordance with Maintenance [VOL. 2 SEC. 603, SEEDING AND SODDING](#).
- 3.1.7 Any designs for underground irrigation are required on a site specific basis and will be submitted to the Planning and Development Services department for approval.

#### **4.0 ACCEPTANCE**

- 4.1 Seeded areas will be accepted when permanent grass cover has been established, the turf is free of bare and dead spots, is weed free, and no soil is visible when the grass has been cut to 65 mm height on the third cutting.
- 4.2 Sodded areas shall be accepted when all sodded areas have a healthy, even, vigorously growing stand of grass, free of disease, weeds and thin or bare spots.
- 4.3 Goal posts to be installed prior to issuance of FAC.

#### **5.0 GUARANTEE**

- 5.1 Guarantee all seeded areas for a minimum of two years from the date of CCC to FAC, to be healthy, well established turf grass with no bare or dead spots.
- 5.2 Guarantee all sodded areas for a minimum of two years from date of CCC to FAC, to be in a healthy, vigorous growing condition, free of disease, weeds, thin or bare spots and settlement.
- 5.3 Goal posts to be installed prior to issuance of FAC.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this CONSTRUCTION SPECIFICATION shall consist of turf and shale ball field development in the areas within the limits of construction in accordance with these CONSTRUCTION SPECIFICATIONS and approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**2.0 PRODUCTS****2.1 MATERIALS AND GRADING**

- 2.1.1 Topsoil supply and installation as per [VOL. 2 SEC. 602, TOPSOIL AND PLANTING MIX URBAN](#).
- 2.1.2 Clay fill to be inorganic fine-grained sand clay soil free from roots, rocks larger than 25 mm and building debris. Excavated material is suitable if it conforms to the above and is approved by the Contract Manager/Developer Representative.
- 2.1.3 Hauling over the subgrade will not be permitted when, in the opinion of the Contract Manager/Developer Representative, damage to the subgrade may result.

**3.0 EXECUTION****3.1 GENERAL**

- 3.1.1 Ideal field construction to have a longitudinal slope of no greater than 1.5% from one end to the other depending on site drainage conditions.
- 3.1.2 Topsoil depth to be 200 mm after compaction.
- 3.1.3 Hauling over the subgrade will not be permitted when, in the opinion of the Contract Manager/Developer Representative, damage to the subgrade may result.
- 3.1.4 Use soil mix as specified in [VOL. 2 SEC. 602, TOPSOIL AND PLANTING MIX URBAN](#) for Sports Fields. Topsoil depth to be 200 mm after compaction.
- 3.1.5 Ball fields subgrade and surface must be graded to eliminate ponding areas and have an optimum gradient of 2% in all directions with a variance of  $\pm 0.5$  % with high point being in the middle of the field.
- 3.1.6 Topographic survey of ball field after shale or topsoil installation to be provided to Contract Manager/Developer Representative prior to seeding.

- 3.1.7 Install sport field reference layout pins at time of construction, using 500 mm lengths of 15 mm diameter bar as indicated on the CONSTRUCTION DRAWINGS at minimum depth of 50 mm below final grade.
- 3.1.8 Establish turf ball field in accordance with [VOL. 2 SEC. 603, SEEDING AND SODDING](#).
- 3.1.9 Any designs for underground irrigation are required on a site specific basis and will be submitted to the Planning and Development Services department for approval.
- 3.2 SHALE INFIELD
- 3.2.1 Excavate infield to provide a 150 mm clay subgrade and 100 mm shale depth prepared in accordance with [VOL. 2 SEC. 601, GENERAL LANDSCAPE SUBGRADE PREPARATION](#). See [VOL. 2 SEC. 302, GRANULAR MATERIALS, SUB-SECTION 2.3.7](#).
- 3.2.2 Compact subgrade in accordance with [VOL. 2 SEC. 202, COMPACTED SUBGRADE PREPARATION](#).
- 3.2.3 Compact shale in continuous horizontal lifts not exceeding 50 mm.
- 3.2.4 Ensure that shale field is free of contamination of subsoil or grass during construction.
- 3.2.5 Extend shale field 200 mm past backstop for maintenance purposes.
- 4.0 ACCEPTANCE
- 4.1 Seeded areas will be accepted when permanent grass cover has been established, the turf is free of bare and dead spots, is relatively weed free, and no soil is visible when the grass has been cut to 65 mm height on the third cutting.
- 4.2 Backstop to be installed prior to issuance of FAC.
- 5.0 GUARANTEE
- 5.1 Guarantee all seeded areas for a minimum of two years from the date of CCC to FAC, to be healthy, well established turf grass with no bare or dead spots.
- 5.2 Shale fields may be accepted immediately upon completion and installation of the backstop. No maintenance period is required.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Fencing shall consist of supplying and erecting wire fence, chain link fence, gates and related appurtenances of the class or classes specified, in accordance with these specifications and in conformance with the dimensions, details and requirements shown on CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**1.2 CLASSIFICATION OF FENCE**

- 1.2.1 Fencing will be classified according to type as follows:

Class A: 3 barbed wires with wooden posts at 5 m maximum spacing ([Dwg. CB6-2.12M1](#))

Class B: 4 barbed wires with wooden posts at 3.75 m maximum spacing ([Dwg. CB6-2.12M2](#))

Class C: 2 barbed wires and 813 mm paige wire with wooden posts ([Dwg. CB6-2.12M3](#))

Class D: 2 barbed wires and 914 mm paige wire with wooden posts ([Dwg. CB6-2.12M4](#))

Class E: 2 barbed wires and 1067 mm paige wire with wooden posts ([Dwg. CB6-2.12M5](#))

Class F: 2134 mm paige wire with wooden posts ([Dwg. CB6-2.12M7](#))

Class G: 4 barbed wires with wooden posts at 5 m maximum spacing ([Dwg. CB6-2.12M8](#))

Class H: Chain Link Fence

Details of each classification are shown on the CONSTRUCTION DRAWINGS. The use of alternative Class B fencing as shown on [Drawings CB6-2.12M2A](#) and [CB6-2.12M11](#) will be allowed only when specified or approved by the Consultant.

**1.3 MATERIALS**

- 1.3.1 The Contractor shall supply all materials for new fencing, including posts, wire, staples and gates in accordance with the particular specification.

**1.3.1.1 General for Wood Posts**

Posts shall be of sound quality, free from all decay, shakes, splits, multiple crooks or any other defects which would render them structurally unsuitable for the purpose intended. All posts shall comply with the minimum-maximum top diameter as specified. The top of the post shall mean the small end of the post. The ends of the posts shall be cut square and the length of individual posts shall not vary by more than plus or minus 25 mm from the length required for the applicable installation.

**1.3.1.2 Split Cedar Posts**

Untreated split cedar posts shall be cut from sound timber and shall have an allowable taper from end to end not exceeding 114 mm in perimeter.

**1.3.1.3 Pressure Treated Wood Posts and Braces**

Pressure treated wood posts and braces shall be fir or pine timber as specified. Knots that are sound, well spaced, smoothly trimmed and which do not impair the strength of the posts or braces will be permitted, providing they do not exceed 38 mm in diameter on any face. Posts shall be naturally round and shall have all bark peeled or otherwise removed. Allowable taper from end to end of posts shall not exceed 38 mm in diameter.

Braces shall be sawn square or rectangular to the standard nominal dimensions as specified.

Posts and braces shall be treated by pressure methods with 50/50 creosote-petroleum solution or a chromated copper arsenate solution. The preservative agent shall conform to the requirements of the current edition of C.S.A. Standard 080. The minimum retention of preservative in the wood, as determined by assay shall be as specified in the following table:

	Round Posts	Sawn Braces
Sample Zone for Assay (mm from surface)	0 - 19	0 - 16
Minimum Net Retention (kg/m <sup>3</sup> ) Creosote-Petroleum	96	96
Chromated Copper Arsenate (CCA)	6.4	6.4

Requirements for the preservation treatment of round posts and sawn braces shall conform to the current requirements of C.S.A. Standard 080 with specific attention to 0.80.1, 080.2 and 080.5.

**1.3.1.4 Metal Stays and Keeper Wire****Metal Stays**

Metal stays shall be fabricated from high tensile steel sheet conforming to the requirements of the current "Standard Specification for Weight (mass) of Coating on Iron and Steel Articles with Zinc or Zinc Alloy Coatings", A.S.T.M. Designation A90, with additions as described in this CONSTRUCTION SPECIFICATION.

Metal stays shall conform to the following minimum requirements:

Length	860 mm
Yield Strength	22,727 kg
High Tensile Steel Breaking Strength	29,545 kg
Barbed Wire Slot Sized	4.75 mm x 15.90 mm

Reflective sheeting for metal stays shall meet or exceed the requirements as specified in ASTM - D4956, Performance Requirements Type III, High Intensity Retro-reflective Sheeting.

#### Keeper Wire

High Tensile Galvanized Keeper Wire shall conform to the requirements of the current "Standard Specification for Steel Wire, Cold-Drawn for Mechanical Springs" A.S.T.M. Designation A227, with additions as described in this CONSTRUCTION SPECIFICATION.

Keeper wire shall conform to the following minimum requirements:

Length	860 mm
Yield Strength	35,909 kg
High Tensile Steel Breaking Strength	41,818 kg

#### 1.3.1.5 Two Strand Barbed Wire

Two strand barbed wire shall conform to the requirements of the current "Standard Specifications for Zinc-Coated (Galvanized) Steel Barbed Wire" A.S.T.M. Designation A121, (Class 1 or better) and shall consist of two strands of 2.5 mm thickness wire, twisted with four-point, 2.0 mm thickness round barbs spaced not more than 152 mm apart.

Each spool delivered to the job site shall be legibly marked showing the mass, linear measure, thickness and name or mark and address of the Manufacturer.

#### 1.3.1.6 Single Strand Barbed Wire

Single strand barbed wire shall conform to the requirements of the current edition A.S.T.M. Designation A121, "Standard Specifications for Zinc-Coated (Galvanized) Steel Barbed Wire". The requirements regarding uniform twisting of strands will be waived.

Single strand barbed wire shall conform to the following minimum requirements:

Measure of wire per spool	402 m
Minimum mass per spool	24 kg
Wire thickness	2.64 mm
Minimum tensile breaking strength of wire	500 kg
Barb spacing	125 mm
Number of points per barb	4

The barbs shall be firmly and securely fixed in position.

#### 1.3.1.7 Woven Wire (Paige Wire)

Woven wire shall conform to the requirements of the current "Standard Specification for Zinc-Coated (Galvanized) Iron or Steel Farm-Field and Railroad Right-of-Way Wire Fencing" A.S.T.M. Designation A116, (Class 1 or better) except that Section 5 of the A.S.T.M. Specification shall be deleted and replaced with the requirements pertaining to size and style of the woven wire mesh as hereinafter provided.

Each roll delivered to the job site shall be legibly marked showing the length, name or mark and address of the Manufacturer.

All wire of a specified class for use on a particular project shall be of identical design unless otherwise specified by the Consultant.

The woven wire mesh design shall conform with one of the following Classes as specified.

### 1.4 CONSTRUCTION

#### 1.4.1 General

Fencing shall be constructed in accordance with plans, at the locations as designated on the plans and Drawing CB6-2.12.M6 or as directed by the Consultant.

All trees, brush or other obstacles which interfere with the construction of the fence shall be removed prior to commencing fence construction

Opening for gates shall be provided at locations designated by the Consultant.

The whole work of fencing shall be carried out in a substantial and workmanlike manner.

#### 1.4.2 Wood Posts

The posts shall be set in holes to the required depth and tamped in a plumb and firm position to the line and spacing shown on the plans or as directed by the Consultant. Post holes shall be large enough to allow for proper tamping. Posts shall be set with the large end down. Backfill shall be placed in layers not exceeding 0.15 m and compacted by hand tampers, machine tampers, or other suitable equipment. Completed backfill shall be crowned slightly to permit drainage away from the posts.

Driving of posts, including methods employed drilled pilot holes, will only be permitted if the results of these methods produces a satisfactory, uniform, undamaged plumb product, with the post firmly implanted into the soil to the depth as indicated on the plans. If, in the opinion of the Consultant, the results obtained from the driving of posts, as described, are not satisfactory, then this method shall be discontinued.

Sharpening of posts will not be permitted.

Intermediate brace posts shall be erected in conformance with the maximum spacing requirements as shown on the plans, or at such additional locations as directed by the Consultant.

#### 1.4.3 Metal Stays and Reflective Tubing

Where applicable, metal stays shall be installed to the line and spacing as shown on the plans or as directed by the Consultant. Fence wire shall be placed into the pre-punched slots of the metal stay and locked in place with a keeper wire inserted into the back of the metal stay. Reflective tubing shall be installed between the top wire and the second wire at each metal stay as indicated on the CONSTRUCTION DRAWINGS.

#### 1.4.4 Wire

All fence wire shall be pulled tight with hand stretchers, or tensioning apparatus capable of adjustment. The use of tractors or trucks for tightening fence wire will not be permitted, unless the pull is controlled by adjustable tensioning apparatus.

#### 1.4.5 Gates

Gates shall be constructed and located as shown on the plans or as directed by the Consultant. All gates shall be constructed and/or installed in a workmanlike manner.

#### 1.4.6 Taking Down and Re-Erecting of Existing Fence

Where specified, existing fences shall be taken down, the materials carefully salvaged, and the fence re-erected in accordance with the class specified, to the satisfaction of the Consultant. Fencing materials damaged through the carelessness of the Contractor shall be replaced at his expense.

#### 1.4.7 Remove and Salvage of Existing Fences

Where removal and salvage of existing fences is specified, the Contractor shall carefully take down the fence, roll the wire, and pile and place the material at locations as directed by the Consultant. Materials that are not suitable for salvage shall be disposed of at locations as directed or acceptable to the Consultant.

#### 1.4.8 Remove and Dispose of Existing Fences

Where removal and disposal of existing fences is specified, the Contractor shall completely remove the fence and dispose of all materials at locations acceptable to the Consultant.

#### 1.4.9 Chain Link Fence Construction

For chain link fencing the contractor shall perform minor leveling or landscaping of the ground where necessary. The fence shall be installed with a consistent elevation or slope and shall follow ground contours smoothly without any sharp changes in grade.

##### 1.4.9.1 Post Location

Line posts shall be set not more than 3 m apart, measured parallel to the ground surface.

Corner posts shall be installed where the alignment change exceeds 20°.

Where end or corner posts are more than 150 m apart over reasonably smooth grade, the Contractor shall set straining posts at equal intervals not exceeding 150 m on a straight continuous stretch of fence. The Contractor shall set additional straining posts at sharp changes in grade and where directed by the Consultant.

##### 1.4.9.2 Post Setting

Post holes shall be dug or drilled to the following minimum diameters and depths that will allow at least 150 mm of footing below the bottom of the post:

Fabric Height (m)	1.5	1.8	2.1	2.4
Line post hole diameter (mm)	200	250	250	250
Line post depth (m)	0.9	0.9	0.9	0.9
Terminal Post hole diameter (mm)	300	360	360	360
Terminal Post depth (m)	1.2	1.2	1.2	1.2

The concrete footings shall be constructed by placing concrete in the post holes embedding the posts to a minimum depth below ground of 0.75 m for line posts and 1.05 m for terminal posts. The concrete shall be extended 50 mm above ground level and crowned to drain away from the post. The posts shall be braced in plumb position and true to alignment and elevation until the concrete has set. The concrete footings shall cure for a minimum of 5 days before proceeding with further work.

##### 1.4.9.3 Top Rail

Top rails shall be supported at each line post with a line post cap so that a continuous brace is formed between terminal posts. The rails shall be joined with sleeves to allow for expansion and contraction. Connections to terminal posts shall be made securely using rail ends and brace bands.

##### 1.4.9.4 Terminal Post Bracing

Braces shall be installed from end and gate posts to the nearest line post at midpanel and parallel to the top rail. Braces shall be installed on both sides of corner and straining posts in a similar manner.



**1.4.9.5 Bottom Tension Wire**

A tension wire shall be installed within the bottom 150 mm of fabric. The wire shall be stretched taut and free of sag and fastened securely to the end, corner, gate and straining posts with tension bands and turnbuckles.

**1.4.9.6 Chain Link Fabric**

The fabric shall be placed outside of the enclosed area or as directed by the Consultant. The bottom of the fabric shall be 50 mm above the finished ground. The fabric shall be stretched to tension as recommended by the manufacturer and fastened to the end, corner, gate and straining post with tension bands at 300 mm spacing. The fabric shall also be secured to line posts, top rails and the bottom tension wire with tie wire at 450 mm intervals. The tie wire shall have a minimum of 2 twists. The fabric shall have a smooth uniform appearance, free of sag, dent and bulge.

**1.4.9.7 Damaged Surfaces**

Damaged surfaces shall be cleaned with a wire brush to remove loose and cracked spelter coatings. Two coats of approved zinc pigmented paint shall be applied.

**2.0 MEASUREMENT AND PAYMENT****2.1 GENERAL**

The construction of fences of all classifications and the taking down and re-erecting of existing fences will be measured by the kilometre, or fraction thereof, complete in place, including the length across constructed, installed or re-erected gates.

Where fences are removed only, the existing fence will be measured by the kilometre, or fraction thereof.

Length measurement will be calculated on the basis of through highway centerline chainage for fencing parallel to the highway, and on the basis of measured length in all other cases.

**2.2 SUPPLY AND INSTALL NEW FENCE**

Payment will be made at the unit price bid per kilometre or fraction thereof, for "New Fence - Supply and Install" of the class specified, complete in place, and including the installation of gates. This payment will be full compensation for supplying all materials, constructing the fence and for all equipment, tools, labour, and incidentals necessary to complete the work.

**2.3 TAKING DOWN AND RE-ERECTING EXISTING FENCE**

Payment will be made at the unit price bid per kilometre or fraction thereof, for "Taking Down and Re-erecting Existing Fence" of the class specified. This payment will be full compensation for taking down, salvaging and re-erecting the fence, and for all equipment, tools, labour and incidentals necessary to complete the work.

**2.4 REMOVE AND SALVAGE OF EXISTING FENCES**

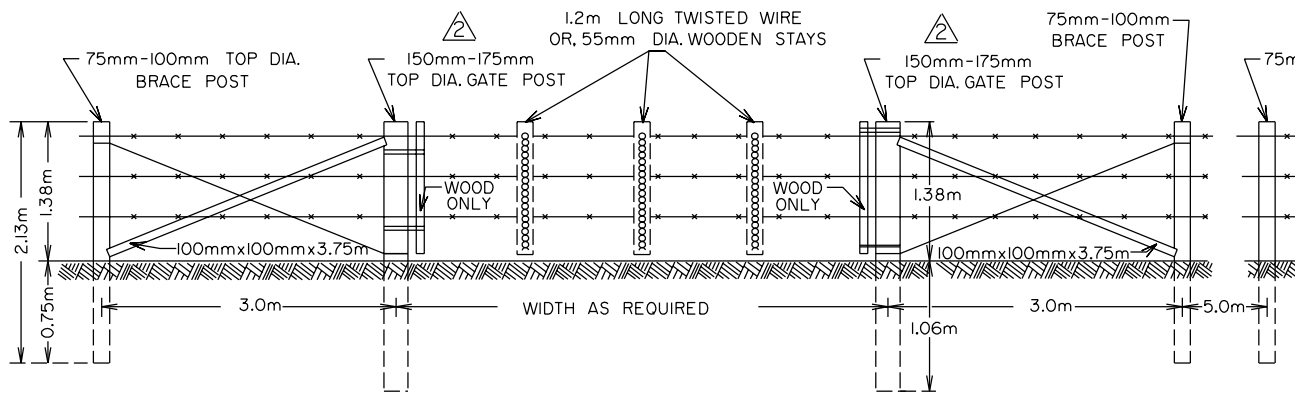
Payment will be made at the unit price bid per kilometre or fraction thereof, for "Remove and Salvage of Existing Fence". This payment will be full compensation for removing and stockpiling salvaged materials and/or disposing of unsalvageable materials; and for all equipment, tools, labour and incidentals necessary to complete the Work.

**2.5 REMOVE AND DISPOSE OF EXISTING FENCES**

Payment will be made at the unit price bid per kilometre or fraction thereof, for "Remove and Dispose of Existing Fence". This payment will be full compensation for removing and disposing of the fence and for all equipment, tools, labour and incidentals necessary to complete the work.

**2.6 CLEARING FENCE LINE**

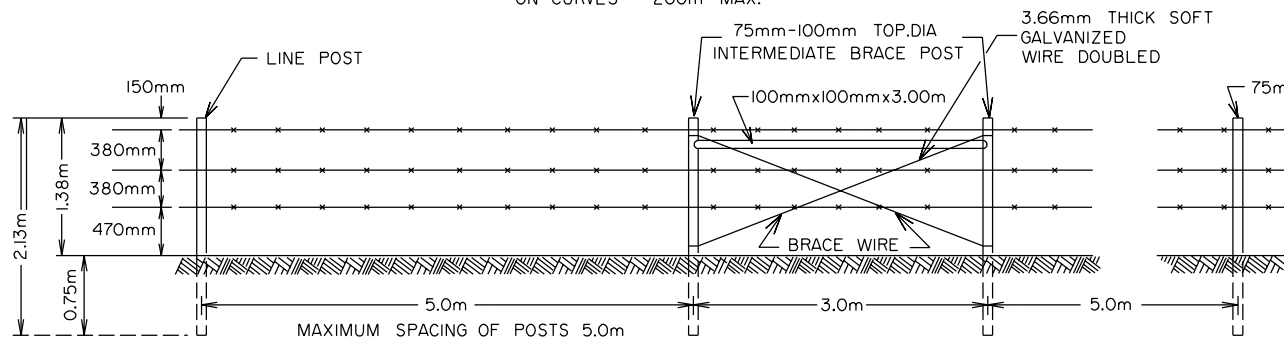
The removal of trees, brush or other obstacles will be measured and paid for in accordance with [VOL. 2 SEC. 102, CLEARING AND GRUBBING.](#)



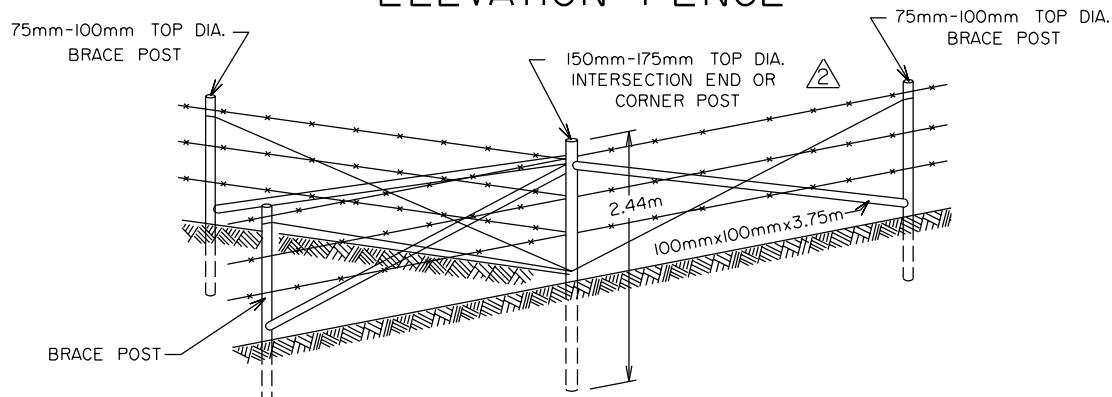
ELEVATION FARM GATE

### SPACING OF BRACE ASSEMBLIES

ON TANGENT - 400m MAX.  
ON CURVES - 200m MAX.



ELEVATION FENCE



INTERSECTION

### ESTIMATED MATERIAL INCLUDED IN 1km OF FENCING

LINE POSTS - 2.13m LONG AND 75 mm - 100mm TOP DIA - - - - - 200  
BARBED WIRE (1 SPOOL = 402m) - - - - - 7.5 SPOOLS  
( "SINGLE STRAND" 2.64mm THICK BARBED WIRE ) OR ( FOUR POINT  
GALVANIZED 2.5mm THICK STRANDS.)  
40mm STAPLES ( APPROX. 140 STAPLES PER kg ) - - - - - 5.5 kg

### ESTIMATED MATERIAL REQUIRED FOR 1 GATE

GATE STAYS: 1.2m LONG AND 55mm TOP DIA. WOODEN OR - - - - - 3  
1.2m LONG TWISTED WIRE - - - - - 3  
GATE, INTERSECTION, AND END CORNER POSTS  
2.44m LONG AND 150mm-175mm TOP DIA. - - - - - 4  
100mmx100mm DIMENSION LUMBER BRACES - - - - - 7  
3.66mm THICK SOFT GALVANIZED WIRE FOR DIAGONAL  
BRACING ( APPROX. 1.5kg PER BRACE ) - - - - - 11 kg

### NOTES:

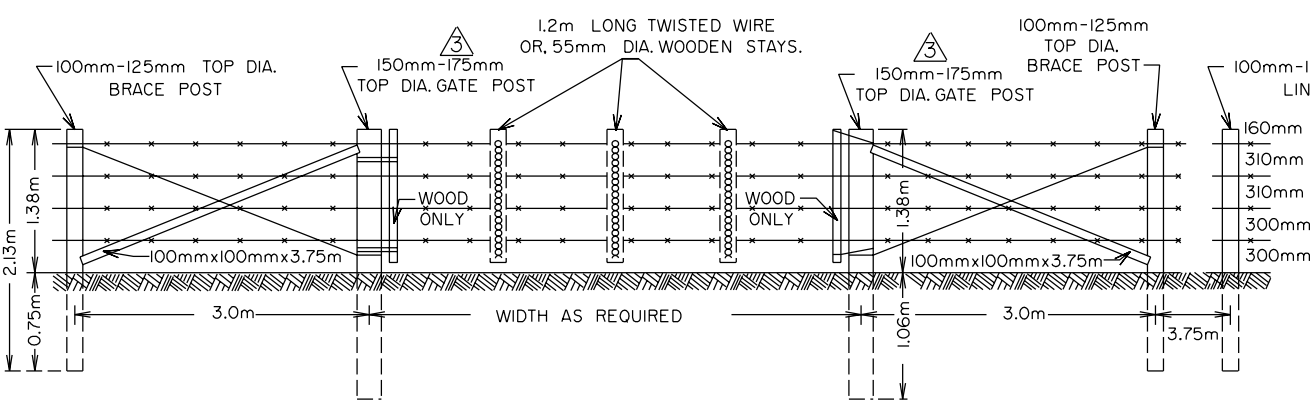
1. ALL FENCE POSTS SHALL BE PRESSURE TREATED.
2. ALLOWABLE TAPER FROM END TO END OF POSTS SHALL NOT EXCEED 38mm IN DIAMETER. POSTS SHALL BE INSTALLED WITH THE LARGE END DOWN.

2	MILL TOLERANCE FOR GATE POST ADDED	B.K	02/02
1	MATERIAL LIST CHANGED		07/95
No.	REVISIONS	BY	DATE

Approved:	
ORIGINAL SIGNED BY ALLAN KWAN	
Executive Director, Roadway Engineering Branch	
Date: May 26, 1993	

CLASS "A" FENCE

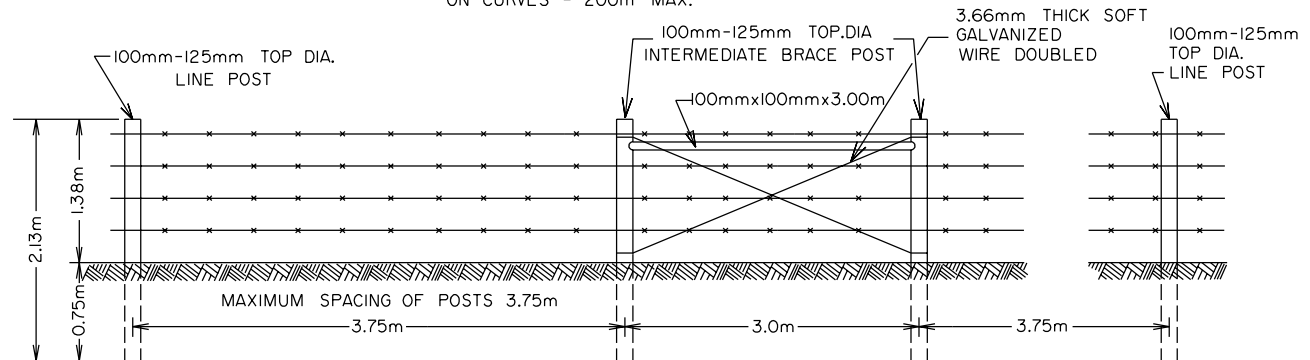
Prepared By: M.K.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-2.12MI
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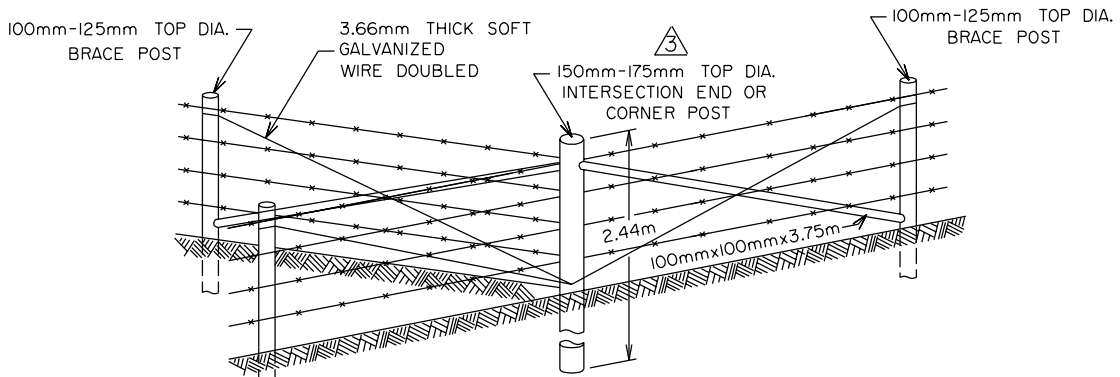
ELEVATION FARM GATE

SPACING OF BRACE ASSEMBLIES

ON TANGENT - 400m MAX.  
ON CURVES - 200m MAX.



ELEVATION FENCE



INTERSECTION



ESTIMATED MATERIAL INCLUDED IN 1km OF FENCING

- LINE POSTS - 2.13m LONG AND 100 mm - 125mm TOP DIA. ----- 267
- BARBED WIRE ( 1 SPOOL = 402m ) ----- 10 SPOOLS
- TWO STRAND BARBED WIRE ( FOUR POINT GALVANIZED 2.5mm THICK STRANDS ) ----- 2
- 40mm STAPLES ( APPROX. 140 STAPLES PER kg ) ----- 8 kg

ESTIMATED MATERIAL REQUIRED FOR 1 GATE

- GATE STAYS: 1.2m LONG AND 55mm TOP DIA. WOODEN OR ----- 3
- 1.2m LONG TWISTED WIRE ----- 3
- GATE, INTERSECTION, AND END CORNER POSTS
- 2.44m LONG AND 150mm-175mm TOP DIA. ----- 4
- 100mmx100mm DIMENSION LUMBER BRACES ----- 7
- 3.66mm THICK SOFT GALVANIZED WIRE FOR DIAGONAL BRACING ( APPROX. 1.5kg PER BRACE ) ----- 11 kg

NOTES:

1. ALL FENCE POSTS SHALL BE PRESSURE TREATED.
2. ALLOWABLE TAPER FROM END TO END OF POSTS SHALL NOT EXCEED 38mm IN DIAMETER. POSTS SHALL BE INSTALLED WITH THE LARGE END DOWN.
3. SINGLE STRAND BARBED WIRE ALLOWED IF REQUESTED BY THE LANDOWNER.

3	MILL TOLERANCE FOR GATE POST ADDED	B.K	02/02
2	2 STRAND BARBED WIRE RECOMMENDED	B.K	06/96
1	MATERIAL LIST CHANGED	B.K	07/95
No.	REVISIONS	BY	DATE

Approved:  
  
ORIGINAL SIGNED  
BY ALLAN KWAN  
  
Executive Director,  
Technical Standards Branch

Date: May 26, 1993

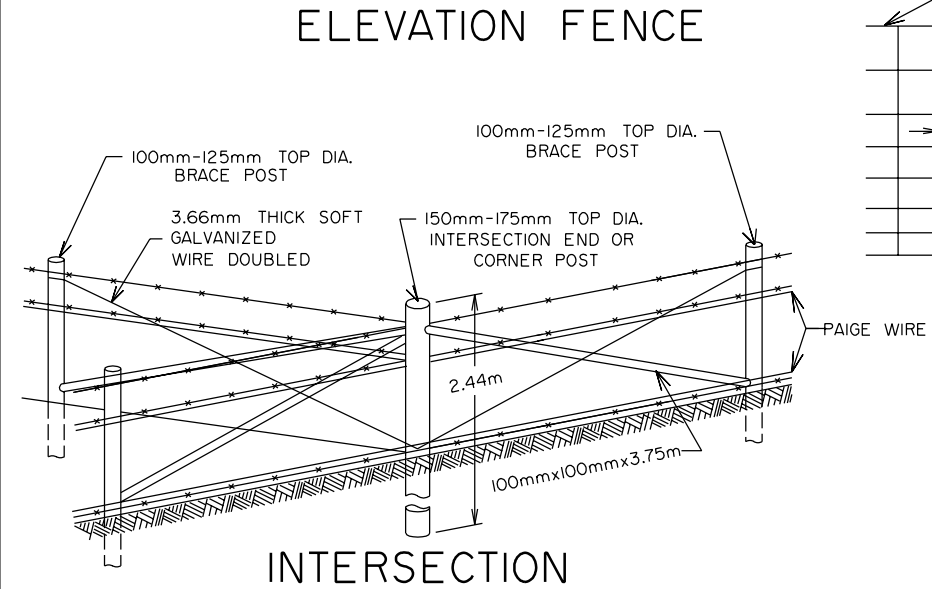
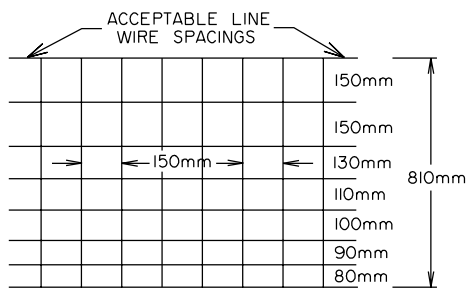
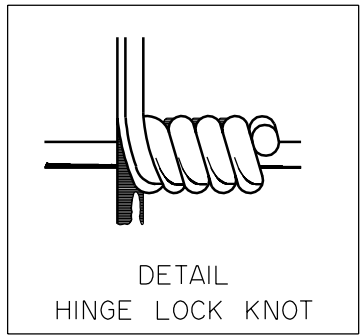
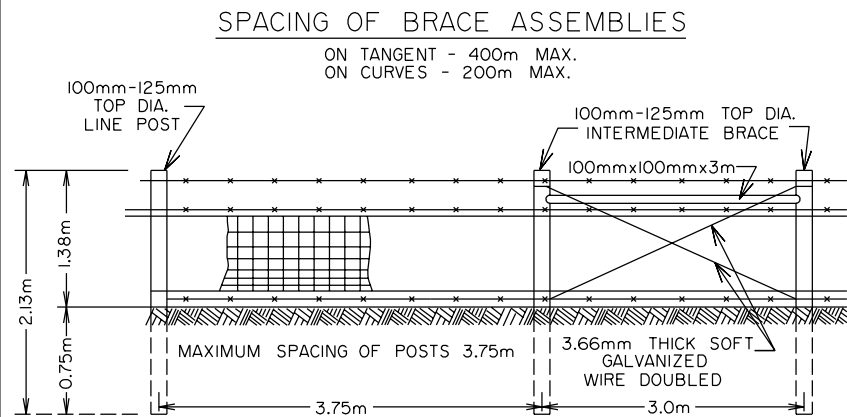
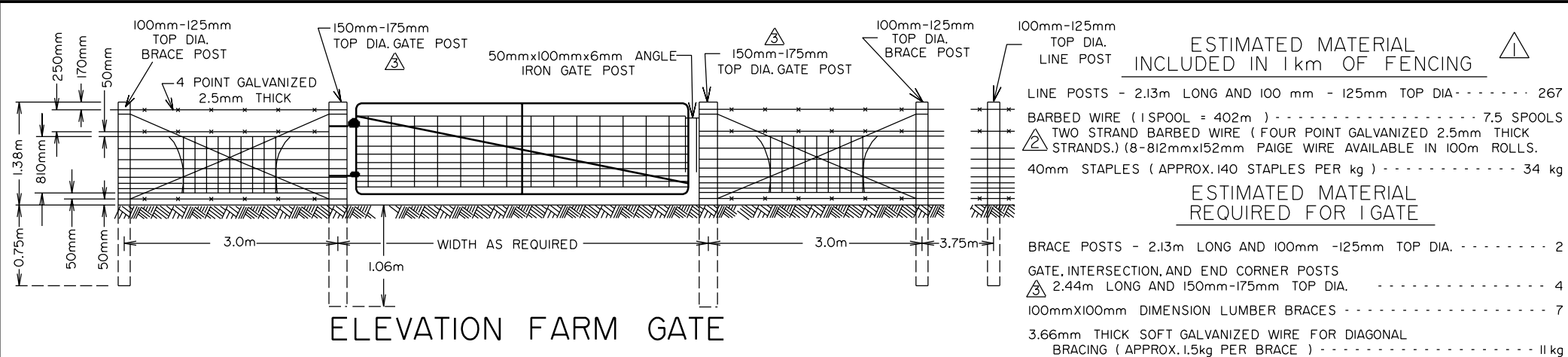
CLASS "B" FENCE


Prepared By: M.K.




Checked By: B.K


Scale: N.T.S.

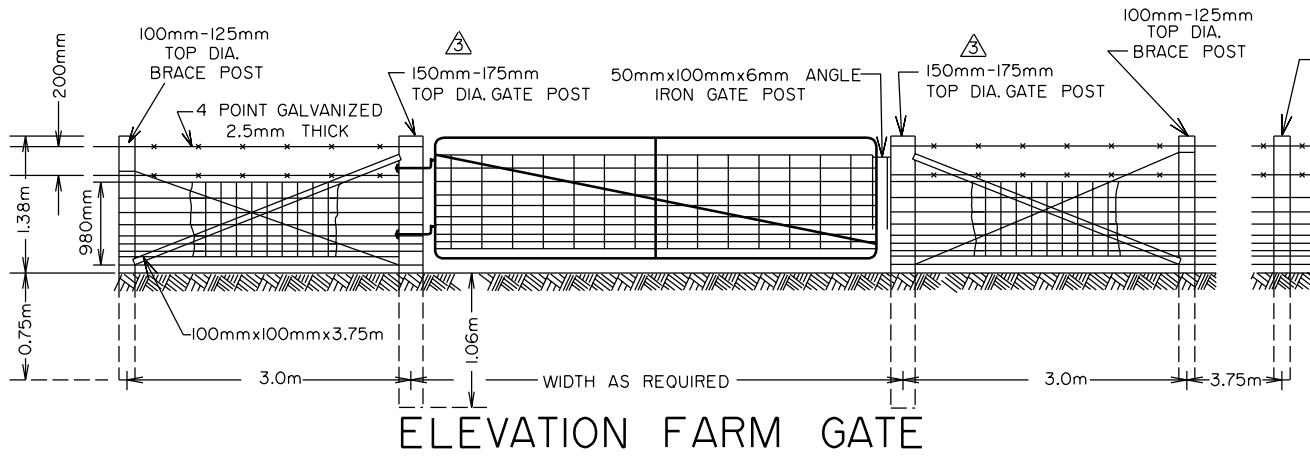
Dwg No.: CB6-2.12M2



- ## NOTES:
1. ALL FENCE POSTS SHALL BE PRESSURE TREATED.
  2. ALLOWABLE TAPER FROM END TO END OF POSTS SHALL NOT EXCEED 38mm IN DIAMETER. POSTS SHALL BE INSTALLED WITH THE LARGE END DOWN.
  3. PAIGE WIRE FENCE WIRES TO BE SPACED AS SHOWN ABOVE WITH 3.35mm THICK TOP AND BOTTOM WIRES AND 2.34mm FILLER WIRE.
  4. ADJACENT ROLLS OF PAIGE WIRE TO BE JOINED AT POST LOCATIONS.
  5. LINE AND STAY WIRES TO BE JOINED SECURELY WITH HINGE-LOCK KNOT CONSTRUCTION (SEE DETAIL).
  6. NOMINAL DIMENSIONS FOR PAIGE WIRE SHOWN
  7. SINGLE STRAND BARBED WIRE ALLOWED IF REQUESTED BY THE LANDOWNER.
- 

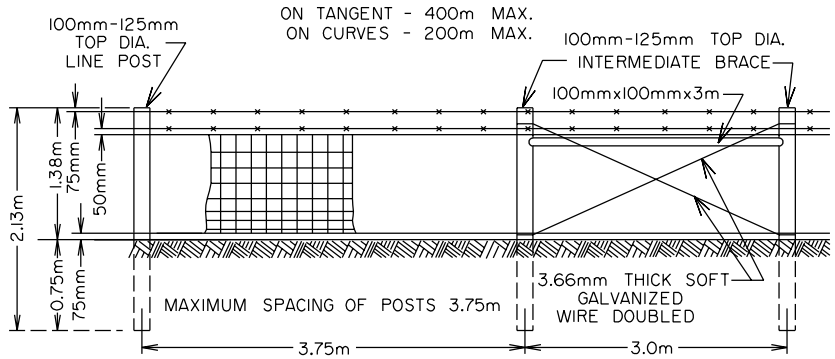
	MILL TOLERANCE FOR GATE POST ADDED	B.K	02/02
	2 STRAND BARBED WIRE RECOMMENDED	B.K	06/96
	MATERIAL LIST CHANGED	B.K	07/95
No.	REVISIONS	BY	DATE

Approved:  ORIGINAL SIGNED BY ALLAN KWAN ----- Executive Director, Technical Standards Branch			
Date: May 26, 1993			
CLASS "C" FENCE			
Prepared By: M.K.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-2.12M3

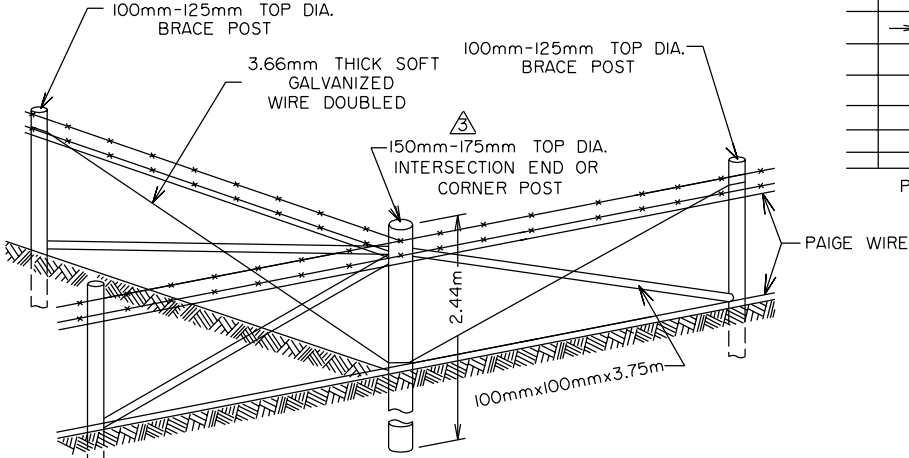


ELEVATION FARM GATE

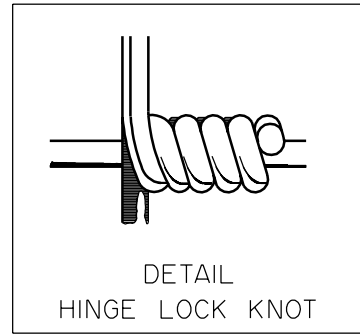
SPACING OF BRACE ASSEMBLIES



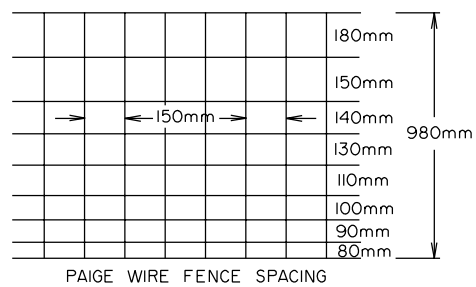
ELEVATION FENCE



INTERSECTION



DETAIL HINGE LOCK KNOT



PAIGE WIRE FENCE SPACING

ESTIMATED MATERIAL INCLUDED IN 1km OF FENCING

- LINE POSTS - 2.13m LONG AND 100 mm - 125mm TOP DIA. - - - - - 267
- BARBED WIRE ( 1 SPOOL = 402m ) - - - - - 5 SPOOLS
- TWO STRAND BARBED WIRE ( FOUR POINT GALVANIZED 2.5mm THICK STRANDS.) ( 9 - 978mmx152mm) PAIGE WIRE AVAILABLE IN 100m ROLLS.
- 40mm STAPLES ( APPROX. 140 STAPLES PER kg ) - - - - - 34 kg

ESTIMATED MATERIAL REQUIRED FOR 1 GATE

- BRACE POSTS - 2.13m LONG AND 100mm - 125mm TOP DIA. - - - - - 2
- GATE, INTERSECTION, AND END CORNER POSTS
- 2.44m LONG AND 150mm-175mm TOP DIA. - - - - - 4
- 100mmx100mm DIMENSION LUMBER BRACES - - - - - 7
- 3.66mm THICK SOFT GALVANIZED WIRE FOR DIAGONAL BRACING ( APPROX. 1.5kg PER BRACE ) - - - - - 11 kg

NOTES:

1. ALL FENCE POSTS SHALL BE PRESSURE TREATED.
2. ALLOWABLE TAPER FROM END TO END OF POSTS SHALL NOT EXCEED 38mm IN DIAMETER. POSTS SHALL BE INSTALLED WITH THE LARGE END DOWN.
3. PAIGE WIRE FENCE WIRES TO BE SPACED AS SHOWN ABOVE WITH 3.35mm THICK TOP AND BOTTOM WIRES AND NOT LIGHTER THAN 2.64mm THICK FILLER WIRES.
4. ADJACENT ROLLS OF PAIGE WIRE TO BE JOINED AT POST LOCATIONS.
5. LINE AND STAY WIRES TO BE JOINED THROUGHOUT WITH HINGE-LOCK KNOT CONSTRUCTION (SEE DETAIL).
6. NOMINAL DIMENSIONS FOR PAIGE WIRE SHOWN
7. SINGLE STRAND BARBED WIRE ALLOWED IF REQUESTED BY THE LANDOWNER.

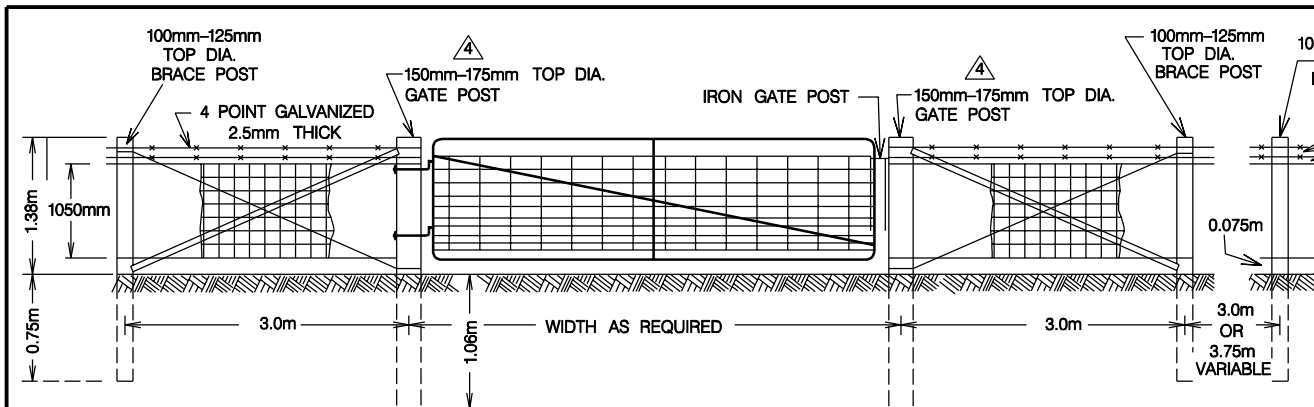
3	MILL TOLERANCE FOR GATE POST ADDED	B.K	02/02
2	2 STRAND BARBED WIRE RECOMMENDED	B.K	06/96
1	MATERIAL LIST CHANGED	B.K	07/95
No.	REVISIONS	BY	DATE

Approved:  
  
ORIGINAL SIGNED  
BY ALLAN KWAN  
  
Executive Director,  
Technical Standards Branch

Date: May 26, 1993

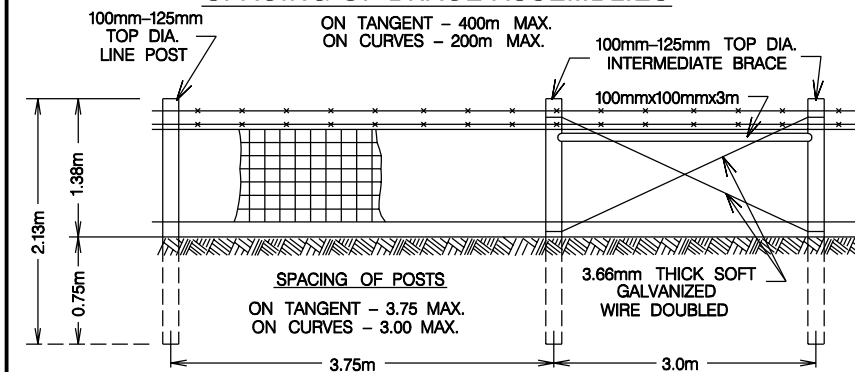
CLASS "D" FENCE

Prepared By: M.K.	Checked By: B.K	Scale: N.T.S.	Dwg No.: CB6-2.12M4
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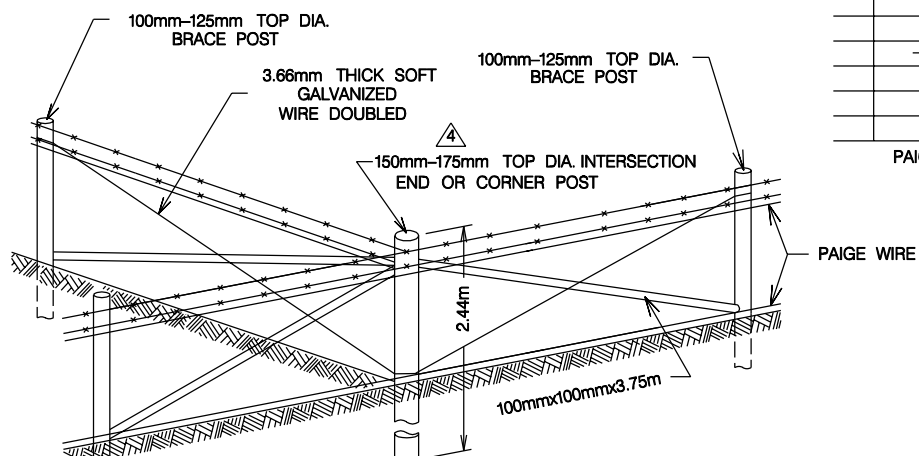


## ELEVATION FARM GATE

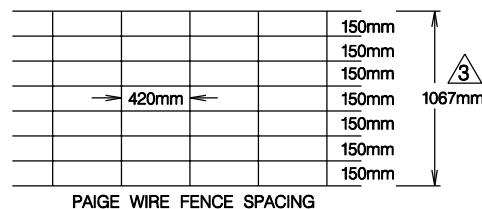
## SPACING OF BRACE ASSEMBLIES



## ELEVATION FENCE



## INTERSECTION



PAIGE WIRE FENCE SPACING

### ESTIMATED MATERIAL INCLUDED IN 1 km OF FENCING

LINE POSTS - 2.13m LONG AND 100 mm - 125mm TOP DIA - - - - - 267

BARBED WIRE ( 1 SPOOL = 402m ) . . . . . 5 SPOOLS

2 TWO STRAND BARBED WIRE (FOUR POINT GALVANIZED 2.5mm THICK STRANDS.) (8 - 1064mmx420mm) PAIGE WIRE AVAILABLE IN 100m, 150m, 200m ROLLS.

40mm STAPLES ( APPROX. 140 STAPLES PER kg )	- - - - -	19 kg
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### ESTIMATED MATERIAL REQUIRED FOR 1 GATE

BRACE POSTS - 2.13m LONG AND 100mm -125mm TOP DIA. - - - - - 2

### GATE, INTERSECTION, AND END CORNER POSTS

2.44m LONG AND 150mm-175mm TOP DIA. - - - - - 4

100mmX100mm DIMENSION LUMBER BRACES

3.66mm THICK SOFT GALVANIZED WIRE FOR DIAGONAL

BRACING ( APPROX. 1.5kg PER BRACE ) - - - - - 11 kg

NOTES:

1. ALL FENCE POSTS SHALL BE PRESSURE TREATED.
2. ALLOWABLE TAPER FROM END TO END OF POSTS SHALL NOT EXCEED 38mm IN DIAMETER. POSTS SHALL BE INSTALLED WITH THE LARGE END DOWN. (4)
3. PAIGE WIRE FENCE WIRES TO BE SPACED AS SHOWN ABOVE WITH 3.35mm THICK GALVANIZED WIRE USED THROUGHOUT.
4. ADJACENT ROLLS OF PAIGE WIRE TO BE JOINED AT POST LOCATIONS.
5. LINE AND STAY WIRES TO BE JOINED THROUGHOUT WITH TIGHT-LOCK KNOT CONSTRUCTION (SEE DETAIL).
6. NOMINAL DIMENSIONS FOR PAIGE WIRE SHOWN
7. SINGLE STRAND BARBED WIRE ALLOWED IF REQUESTED BY THE LANDOWNER. (2)

4	MILL TOLERANCE FOR CORNER POST ADDED	B.K	202
3	REV DETAIL, DIMENSION AND NOTE	B.K	1099
2	2 STRAND BARBED WIRE RECOMMENDED	B.K	0696
1	MATERIAL LIST CHANGED	B.K	0795
No.	REVISIONS	BY	DATE

Approved:

ORIGINAL SIGNED  
BY ALLAN KWAN

Executive Director,  
Technical Standards Branch

Date: May 26, 1993

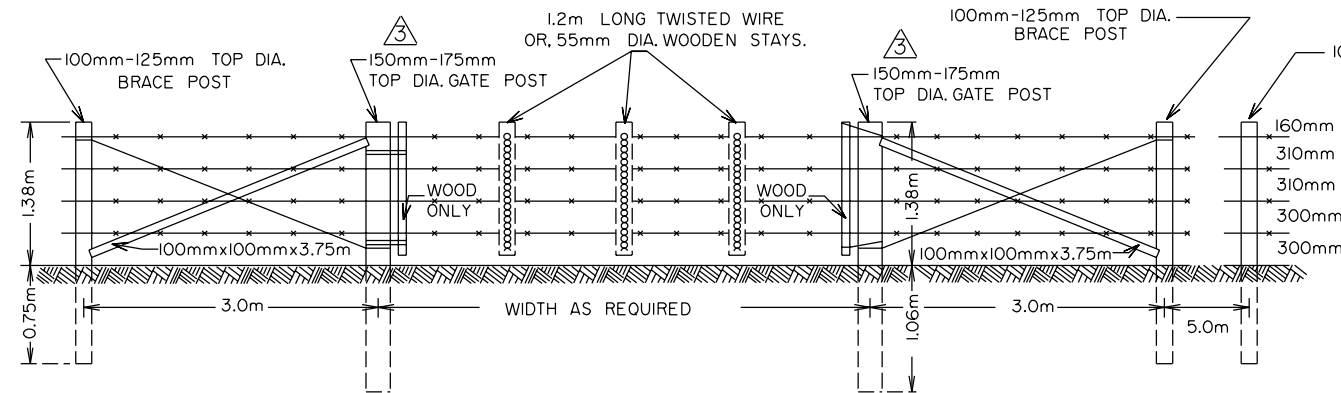
**Alberta**  
TRANSPORTATION

## CLASS "E" FENCE

Prepared By: M.K.	Checked By: B.K	Scale: N.T.S.	Dwg No.: CB6-2.12M5
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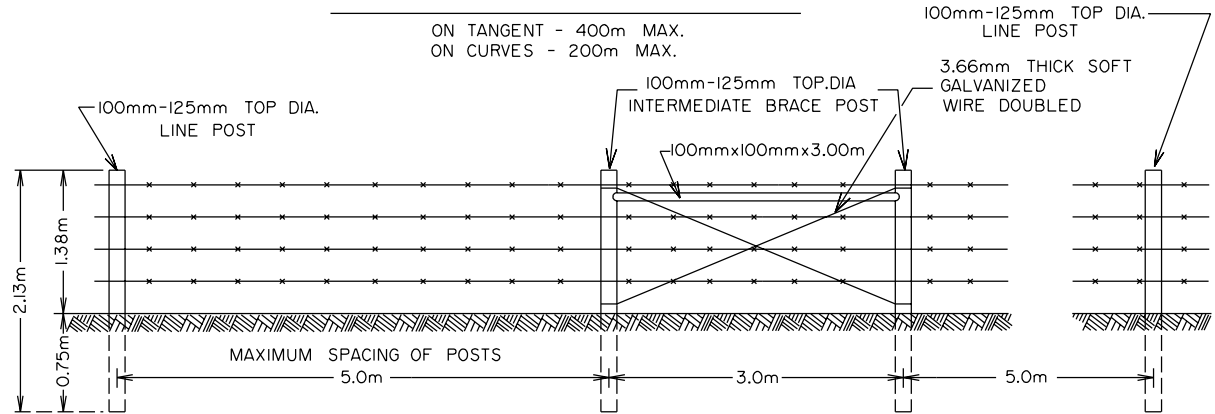




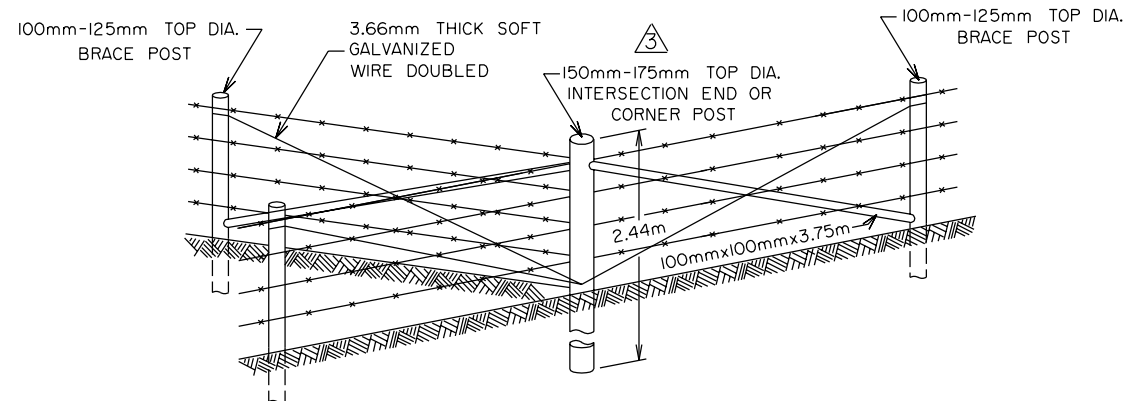
### ELEVATION FARM GATE

#### SPACING OF BRACE ASSEMBLIES

ON TANGENT - 400m MAX.  
ON CURVES - 200m MAX.



### ELEVATION FENCE



### INTERSECTION

#### ESTIMATED MATERIAL INCLUDED IN 1km OF FENCING

- LINE POSTS - 2.13m LONG AND 100 mm - 125mm TOP DIA - - - - - 200
- BARBED WIRE ( 1 SPOOL = 402m ) - - - - - 10 SPOOLS
- TWO STRAND BARBED WIRE ( FOUR POINT GALVANIZED 2.5mm 2.5mm THICK STRANDS.)
- 40mm STAPLES ( APPROX. 140 STAPLES PER kg ) - - - - - 6 kg

#### ESTIMATED MATERIAL REQUIRED FOR 1 GATE

- GATE STAYS - 1.2m LONG AND 55mm TOP DIA - - - - - 2
- GATE, INTERSECTION, AND END CORNER POSTS
- 2.44m LONG AND 150mm-175mm TOP DIA. - - - - - 4
- 100mmX100mm DIMENSION LUMBER BRACES - - - - - 7
- 3.66mm THICK SOFT GALVANIZED WIRE FOR DIAGONAL BRACING ( APPROX. 1.5kg PER BRACE ) - - - - - 11 kg

#### NOTES:

- ALL FENCE POSTS SHALL BE PRESSURE TREATED.
- ALLOWABLE TAPER FROM END TO END OF POSTS SHALL NOT EXCEED 38mm IN DIAMETER. POSTS SHALL BE INSTALLED WITH THE LARGE END DOWN.
- SINGLE STRAND BARBED WIRE ALLOWED IF REQUESTED BY THE LANDOWNER.

3	MILL TOLERANCE FOR GATE POST ADDED	B.K	02/02
2	2 STRAND BARBED WIRE RECOMMENDED	B.K	06/96
1	MATERIAL LIST CHANGED	B.K	07/95
No.	REVISIONS	BY	DATE

Approved:  
  
ORIGINAL SIGNED  
BY ALLAN KWAN  
  
Executive Director,  
Technical Standards Branch

**Alberta**  
TRANSPORTATION

Date: May 26, 1993

CLASS "G" FENCE  
CLASS "B" WITH MODIFIED POST SPACING

Prepared By: M.K.

Checked By: B.K

Scale: N.T.S.

Dwg No.: CB6-2.12M8

Blank pages have been included in this document so that the pages print  
on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of topsoil installation placed and compacted in the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the sections shown on the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**1.2 DEFINITION**

- 1.2.1 Topsoil to be fertile agricultural soil, capable of sustaining vigorous plant growth, free of subsoil, clay, stone, lumps, noxious odor, roots other foreign matter except for native soils where seed base or roots may be used for re-establishment of natural vegetation cover and approved by Contract Manager/Developer Representative.

**2.0 PRODUCTS****2.1 TOPSOIL****2.1.1 Stockpiled Topsoil On-Site**

- 2.1.1.1 Topsoil used from available, approved on-site stockpiles as directed by the Contract Manager/Developer Representative, must be free of roots, branches, clay, stones larger than 50 mm, subsoil and all other debris.

**2.2 FERTILIZER**

- 2.2.1 Formulation ratio as required from soil test results. Applied in accordance with the manufacturer's directions.

**2.3 MANURE**

- 2.3.1 Friable, loose cow manure, free of large lumps, twine and other foreign material, well aged and having a pH between 5.5 and 7.5.

**2.5 PEAT MOSS**

- 2.3.2 Decomposed plant material, fairly elastic and homogeneous, free of decomposed colloidal residue, wood, sulphur and iron. Minimum of 60% organic matter by mass; pH value between 5.5 and 7.

**2.4 HORTICULTURE SAND**

- 2.4.1 Sharp sand free of deleterious soluble salts and other contaminants likely to cause efflorescence and reduced skid resistance, and graded within the following limits:

Sieve Size (mm)	% Passing by Weight
2.5	100
1.25	85 – 100
0.8	80 – 90
0.315	30 – 60
0.16	2 – 10
0.063	1% Maximum

**2.5 LIME**

- 2.5.1 Ground agricultural limestone containing minimum 85% of total carbonates.

**2.6 SULPHUR**

- 2.6.1 Finely crushed agricultural elemental sulphur, free of impurities.

**2.7 COMPOST**

- 2.7.1 Commercially prepared compost shall be free from weed seeds. Physical contaminants such as glass, metal, plastic and rock shall be less than 0.5%. Pathogen and heavy metal levels shall satisfy the requirements for Class A compost. The carbon to nitrogen ratio shall be 40:1 or less. Organic matter content should exceed 45%. Contract Manager/Developer Representative shall approve the source of the compost.

**2.8 EQUIPMENT**

- 2.8.1 Cultivators: capable of scarifying, discing or harrowing.

- 2.8.2 Rollers: of suitable size and mass for the work.

**3.0 EXECUTION**

- 3.1 Unless stated otherwise in the SPECIAL PROVISIONS, for a rural road construction project, all topsoil removed from the road ROW shall be spread to a uniform depth over the disturbed areas within the road ROW.

- 3.2 Where Strathcona County has entered into an agreement with the landowner to allow the limits of construction to extend beyond the road ROW, the topsoil removed shall be returned to the area outside the ROW.

- 3.3 When loading topsoil from a stockpile, do not leave a vertical face at end of day's work.

- 3.4 Scarify subgrade prior to installing topsoil.
- 3.5 Do not mix topsoil and subsoil during loading and hauling.
- 3.6 Install dry topsoil during dry weather over approved dry unfrozen subgrade.
- 3.7 Manually spread topsoil around trees and plants to prevent damage by grading equipment.
- 3.8 Fine grade by floating prior to seeding or sodding to eliminate rough spots and low and soft areas ensuring positive drainage.
- 3.9 Bring topsoil up to within 25 mm of design finished grade on seeded and sodded areas. Fine grade again if necessary.
- 3.10 Leave surface smooth, uniform and sufficiently firm to prevent sink pockets when irrigated.
- 3.11 Do not bury refuse or foreign material of any kind on site. Excavate and remove immediately from site all soil contaminated by oil, gasoline or any other substances harmful to healthy, vigorous plant growth.
- 3.12 Weeds to be controlled throughout maintenance guarantee period of related work includes but not limited to dandelion, jimsonweed, quackgrass, horsetail, morning glory, rush grass, mustard, lambsquarter, chickweed, crabgrass, Canada thistle, tansy ragwort, scentless chamomile, bermuda grass, bindweed, bent grass, perennial sorrel, brome grass, red root pigweed, buckweed, toadflax, foxtail, perennial sow thistle, leafy surge, field scabious and common tansy.
- 3.13 When the collection of the live topsoil/pond muck is required, it shall take place when the material is dormant, when mortal damage as a result of excavation will be minimized. The donor site may require de-watering depending upon the preceding weather conditions. The boundaries of the desirable live topsoil/pond muck area to be excavated will be determined in the field by the Contract Manager/Developer Representative.
- 3.14 The removal of the live topsoil/pond muck shall be carried out with a track-mounted backhoe or equivalent low pad pressure vehicle. Live topsoil/pond muck shall be removed to a nominal depth of 300 mm to which the limit of the dark organic material and useful plant parts extend. The Contractor shall carefully control his operations to ensure maximum salvage of the material without contaminating it with clay, and other unsuitable materials.
- 3.15 Areas in the stormwater management facility to receive the live topsoil/pond muck shall be scarified to a depth of 200 mm, by ripping, rototilling, or discing prior to placement of the live topsoil/pond muck.

- 3.16 The live topsoil/pond muck shall be conveyed to the stormwater management and placed in the areas indicated on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative. Material removed from the donor site locations shall be replaced by material from the stormwater management facility site. Low-load tracked equipment will be required to place the live topsoil/pond muck, at a 300 mm depth, to the final design grades indicated on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

#### **4.0 MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

- 4.1.1 Measurement to be in cubic metres of topsoil to specified depth, ready for seed or sod.

##### **4.2 PAYMENT**

- 4.2.1 Payment at the respective bid per square metre shall be full compensation for preparing the subsoil surface; supply, hauling, spreading, discing, harrowing, floating and compacting the topsoil; cleanup and disposal of all unused materials; and for all labour and use of equipment necessary to complete the work in accordance with these CONSTRUCTION SPECIFICATIONS.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this CONSTRUCTION SPECIFICATION shall consist of supply and installation of seeding, sodding, fertilizing, watering, mulching and maintenance in the areas within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the sections shown on the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**1.2 QUALITY**

- 1.2.1 Weeds to be controlled throughout construction and maintenance period includes but not limited to dandelion, jimsonweed, quackgrass, horsetail, morning glory, rush grass, mustard, lambsquarter, chickweed, crabgrass, Canada thistle, tansy ragwort, scentless camomile, bermuda grass bindweed, bent grass, perennial sorrel, brome grass, red root, pigweed, buckweed, toadflax, foxtail, and perennial sow thistle and all noxious and restricted weeds as identified under the Alberta Weed Control Act.

**1.3 MATERIAL DELIVERY, HANDLING AND STORAGE**

- 1.3.1 Use all means necessary to protect material before, during and after installation. Provide adequate protection to materials, which may deteriorate if exposed to weather.
- 1.3.2 Fertilizer shall be packaged in waterproof bags labelled clearly, indicating net mass, analysis and manufacturer. Store on pallets and protect from weather if required by Contract Manager/Developer Representative. Forward all labels to Contract Manager/Developer Representative at time of Construction Completion.
- 1.3.3 Deliver and store grass seed in original packages with label indicating:
- (i) analysis of seed mixture,
  - (ii) percentage of pure seed by weight,
  - (iii) year of production,
  - (iv) net mass,
  - (v) date tagged and location,
  - (vi) store all seed in dry weatherproof place and protect from damage by heat, rodents and other causes.
- 1.3.4 Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.
- 1.3.5 Do not deliver small, irregular or broken pieces of sod.
- 1.3.6 During wet weather allow sod to dry sufficiently to prevent tearing during lifting and handling.

- 1.3.7 During dry weather protect sod from drying and water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Dry sod will be rejected.

## 2.0 PRODUCTS

### 2.1 GRASS SEED MIXES

- 2.1.1 Seed mixes listed in this document are to be used as a general guideline. Seed mixes may be amended to suit the site conditions. Consult the Contract Manager/Developer Representative to determine specific requirements for grass seed mixture and application rates.

- 2.1.1.1 Use only Certified Canada No. 1 varieties in accordance with the Canadian Seeds Act and Regulations and having minimum purity of 97% and germination of 75%, and be mixed to the following by weight:

- 2.1.1.2 See [VOL. 2 SEC. 603, SEEDING AND SODDING, SUB SECTION 2.1.2.](#)

#### 2.1.1.3 Reclamation of Borrow Sites

- (i) Hay Land Mix (35-50 kg per hectare) depending on conditions
  - 40% Tall Fescue
  - 30% Meadow Brome
  - 20% Alfalfa
  - 10% Russian Wild Rye
- (ii) Pasture and Idle Land Mix (30-50kg per hectare) depending on conditions
  - 20% Russian Wild Rye
  - 25% Tall Fescue
  - 15% Sainfoin
  - 15% Slender Wheatgrass
  - 15% Meadow Brome
  - 10% Creeping Red Fescue

#### 2.1.1.4 Special Conditions

Seed mixes for special conditions (ie. wetlands, naturalization) to be developed on an as need, site specific basis.

Consult the Contract Manager/Developer Representative to determine specific requirements for grass seed mixture and seeding rate.

### 2.2 FERTILIZER

- 2.2.1 Formulation ration of fertilizers used at time of seeding, sodding and as supplementary during maintenance/guarantee period to be determined from soil test results and approved by Contract Manager/Developer Representative prior to installation.



## 2.3 MULCH

2.3.1 Refer to [SUB-SECTION 3.4 OF THIS SECTION](#).

## 2.4 TURF ESTABLISHMENT BLANKET

2.4.1 Based on approved design matting or approved equal to be used on banks of storm water management facilities, culverts and slopes and any other areas where excessive erosion may occur.

## 2.5 STAPLES

2.5.1 Steel wire, 25 mm wide by 200 mm deep by 3 mm diameter.

## 2.6 EQUIPMENT

2.6.1 "Brillion": Type or similar mechanical seeder, capable of rolling and covering the seed with 3 mm to 6 mm of soil.

2.6.2 Hydroseeder: Capable of thoroughly mixing water, seed, fertilizer, and pulverized wood fibre, and of uniformly spraying the mix at a designated rate.

2.6.3 Ensure equipment is steam cleaned, free of soil and seed to prevent site contamination.

## 2.7 WATER

2.7.1 Potable.

# 3.0 EXECUTION

## 3.1 PREPARATION

3.1.1 Remove weeds and debris from topsoil surface already in place. As required, spray site allowing weeds to die off prior to completion of grading.

3.1.2 Loosen final grade surface free of humps and hollows and free of deleterious and refuse material. Ensure positive drainage.

## 3.2 FERTILIZING

3.2.1 After cultivation, apply specified fertilizer from soil analysis in accordance with the manufacturer's direction spreading evenly with a mechanically calibrated distributor. Mix thoroughly into top 50 mm of topsoil not more than 48 hours before seeding.

3.2.2 Float surface to achieve approved design elevations.

- 3.2.3 Apply specified fertilizer spreading evenly with a mechanically calibrated distributor. Mix thoroughly into top 50 mm of topsoil, not more than 48 hours before seeding.
- 3.2.4 Float surface to achieve elevations within tolerances of 25 mm in 3 m, when measured in any direction after fertilizer has been spread cultivated.
- 3.3 SEEDING
- 3.3.1 Float surface to achieve design elevations within tolerance of 25 mm in 3 m, when measured in any direction after fertilizer has been spread and cultivated.
- 3.3.2 Compact topsoil with suitable rollers, leave surface smooth, uniform and sufficiently firm to prevent sink pockets.
- 3.3.3 Cultivate topsoil to a depth of 25 mm and apply seed.
- 3.3.4 Seed half the amount of prescribed seed mix in one direction, seeding the other half of seed mixture in a perpendicular direction.
- 3.3.5 Seed when weather conditions, soil temperatures and moisture conditions are suitable. Do not seed when seedbed is covered with frost, snow or standing water.
- 3.3.6 Seed when wind is less than 8 km/hr.
- 3.3.7 Seed using Brillion or similar mechanical seeder or hydroseed as specified.
- 3.3.8 In small areas where use of a mechanical seeder is impractical seed by hand.
- 3.3.9 After seeding, ensure seed has contact with soil, surface is smooth, uniform and sufficiently firm to prevent sink pockets.
- 3.3.10 Water entire area with fine spray immediately after each area has been sown. Apply enough water to ensure penetration of at least 50 mm. Avoid washing out seeds.
- 3.3.11 Erect barricades and warning signs to protect seeded areas from traffic until grass is established.
- 3.4 HYDROSEEDING
- 3.4.1 Do all seeding when weather conditions, soil temperature and moisture conditions are suitable.
- 3.4.2 Use a hydroseeder to seed slopes 3 horizontal to 1 vertical or steeper. Use seed mixes approved for conditions by Contract Manager/Developer Representative.

- 3.4.3 Mix seed with water, mulch and fertilizer in the following suggested quantities to cover 4000 m<sup>2</sup>:
- (i) 640 kg of wood fibre mulch;
  - (ii) 80 kg of seed;
  - (iii) 140 kg of fertilizer; and
  - (iv) 6,400 litres of water.
- 3.4.4 Do not spray seed and mulch mixture onto trees, bike paths, roads, parking lots, interlocking paving stone, bridges, houses, fences or other surfaces not meant for seeding. Remove over-spray.
- 3.4.5 Hydro seeding should not be carried out in wind velocities which cause seed mix to be blown.
- 3.5 SEED PROTECTION ON SLOPES
- 3.5.1 Install in accordance with manufacturer's directions and approved CONSTRUCTION DRAWINGS.
- 3.5.2 Erect barricades and warning signs to protect seeded areas from traffic until grass is established.
- 3.6 MAINTENANCE
- 3.6.1 Maintain all turf free of deficiencies until acceptance at date of Final Acceptance Certificate, minimum two years.
- 3.6.2 Nuisance weeds must be controlled by cutting and/or spraying only when necessary.
- 3.6.3 On recommendation from Contract Manager/Developer Representative or through weed inspections by Transportation and Agriculture Services, weed notices will be issued on soil used for landscaping when weeds are not controlled. Upon notification weeds must be cut or sprayed with 96 hours of notification, weather permitting. Use chemicals in strict accordance with manufacturer's recommendations and Provincial laws. Damage resulting from use of chemicals shall be the contractor's responsibility.
- 3.6.4 Undertake weed, insect and fungus control after the public has been notified by advertisements in local newspapers, a minimum of 2 weeks prior to any application, and treated areas shall be posted for 24 hours after application. Chemical shall be applied by or under the supervision of licensed applicators. All Federal and Provincial regulations regarding use, transportation and storage of chemicals shall be strictly adhered to. Submit Biocide report at time of FAC inspection. Damage resulting from use of chemicals shall be the contractor's responsibility.
- 3.6.5 Reseed/resod all areas which show deterioration, are bare, burned out, are thin or washed out on a regular basis throughout maintenance period.

**3.7 ACCEPTANCE**

3.7.1 Areas will be accepted by the Contract Manager/Developer Representative provided that:

3.7.1.1 Seeded areas are properly established after minimum 1 year from construction completion date;

3.7.1.2 Turf is free of eroded, bare or dead spots not greater than one square metre in size and provides a minimum of 80% ground cover as determined by the Contract Manger/Developer Representative;

3.7.1.3 No surface soil is visible when grass has been cut to height of 75 mm; and

3.7.1.4 The area has been cut a minimum of 1 time and within 1 week of acceptance.

**4.0 MEASUREMENT AND PAYMENT****4.1 MEASUREMENT**

4.1.1 Measured in square metres of surface area.

**4.2 PAYMENT**

4.2.1 Payment shall include supply and application of fertilizer, weed control, cutting and seed (method specified in the SCHEDULE OF QUANTITIES) or sod, and one year maintenance.

**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This section specifies the general requirements for pavement markings regardless of the type of pavement marking used. Deviations from these general requirements will be covered in the specific requirements for each material.

1.1.2 The work shall consist of furnishing all materials, equipment and labour necessary for the required pavement preparation and application of uniformly retro reflective pavement marking materials in accordance with the plans or as described herein. All pavement markings shall conform with the Manual of Uniform Traffic Control Devices for Canada (Current Edition).

**1.2 DEFINITIONS**

1.2.1 Plastic Pavement Marking Material: Any type of pavement marking material, excluding paint, consisting of various materials that harden and retain their shape after being applied to the pavement or concrete surface. Includes Type 1 "Thermoplastic", Type 2 "Spray Plastic" and Type 3 "Cold Plastic".

1.2.2 Painted Pavement Marking Material: Type 4 "Painted" alkyd-based traffic paint.

**2.0 PRODUCTS****2.1 MATERIALS**

2.1.1 Marking materials shall be a formulation, identified by a manufacturer's code number, prequalified by and have the same composition as the prequalified marking material. Acceptance criteria for new plastic pavement marking materials is included in [SUB-SECTION 2.2 OF THIS SECTION](#).

2.1.2 When plastic pavement marking are to be installed, the Contractor and Subcontractor (applicator) shall provide written evidence that he has a minimum of 3 years successful experience supplying and installing pavement markings, as specified in [VOL. 2 SEC. 703, MMA SPRAY PLASTIC PAVEMENT MARKINGS](#), [VOL. 2 SEC. 704, COLD PLASTIC PAVEMENT MARKINGS](#), [VOL. 2 SEC. 705, PAINTED PAVEMENT MARKINGS](#), and [VOL. 2 SEC. 706, THERMOPLASTIC PAVEMENT MARKINGS](#), and be acceptable to the Owner.

2.1.3 Pavement marking materials shall conform to the following CONSTRUCTION SPECIFICATIONS:

[VOL. 2 SEC. 703, MMA SPRAY PLASTIC PAVEMENT MARKINGS](#)  
[VOL. 2 SEC. 704, COLD PLASTIC PAVEMENT MARKINGS](#)  
[VOL. 2 SEC. 705, PAINTED TRAFFIC LINES AND MARKINGS](#)  
[VOL. 2 SEC. 706, THERMOPLASTIC PAVEMENT MARKINGS](#)

- 2.1.4 A material safety data sheet for each material, including resin, catalyst, activator, glass beads and cleaning solvent to be used on the project shall be furnished by the Contractor to the Contract Manager/Developer Representative prior to the start of work. The applicator shall maintain current material safety data sheets for all materials present with this work in an immediately accessible location.
- 2.1.5 Glass Beads: Overlay type to CGSB 1-GP-74M, and as follows:
- 2.1.5.1 Manufactured from glass of a composition designed to be highly resistant to the effects of traffic wear and weathering. Glass beads shall not contain lead or be manufactured from materials containing lead.
- 2.1.5.2 The glass shall be colourless to a degree that the resulting beads, when added to white paint, do not impart a noticeable hue.
- 2.1.5.3 Beads shall be treated in such a manner as to overcome the effects of water, as vapour or liquid, on the beads before the beads are added to the pavement marking.
- 2.1.5.4 The surface of the beads shall be smooth, lustrous, and free from film, scratches, and pits. A minimum of 80% by mass shall be of true spherical shape. No more than 25% by mass of the beads shall have imperfections such as milkiness, dark specks, incipient fractures, air inclusions in the form of bubbles greater than 10% of the volume of the bead, or any other defects.
- 2.1.5.5 Index of Refraction: Liquid immersion test at 25° C in accordance with CGSB 1-GP-71 Method 49.1. A refractive index of 1.50 to 1.60 is required.
- 2.1.5.6 The beads for mixing with and for surface application on pavement marking material shall meet the following gradation requirements when tested in accordance with ASTM D1214:

Sieve Size (Microns)	% Passing
850	90 - 100
300	15 - 50
180	0 - 10

- 2.1.5.7 Beads shall show resistance to corrosion after exposure to a 1% solution (by weight) of sulphuric acid.
- 2.2 CRITERIA FOR ACCEPTANCE
- 2.2.1 Plastic pavement marking materials shall be acceptable for installation on Strathcona County roadways based on the following criteria:
- 2.2.1.1 The Contractor/Supplier has installed that particular product in other cities with similar climatic conditions as Strathcona County.

- 2.2.1.2 The material was installed on roadways with more than 10,000 vehicles per day and over 90% of the marking material remained in good condition after 3 years of service.
- 2.2.1.3 The Contractor has provided 3 references for the product's past performance.
- 2.2.1.4 The Contractor shall submit the requested information for Strathcona County's assessment of a product at least 1 week prior to bidding on any roadway projects in Strathcona County.
- 2.2.1.5 Plastic pavement marking material that does not meet the above noted criteria may be considered for installation at locations specified by the County for evaluation purposes. The material will be considered an acceptable product if 90% of the markings remain in good condition after 3 years of service.

### **3.0 EXECUTION**

#### **3.1 DRAWING CONFIRMATION**

- 3.1.1 Arrange a meeting with the Contract Manager/Developer Representative to review the pavement marking drawings prior to the commencement of pre-marking for the installation of the permanent pavement marking materials.

#### **3.2 GENERAL**

- 3.2.1 Lines shall be applied as solid, dashed or dotted stripes, either singly or in combination, as shown on the CONSTRUCTION DRAWINGS. The Contractor shall use an accurate dashing mechanism, which is capable of being easily adjusted to retrace existing dashed markings or to apply new materials at the correct spacing. Dashed lines that are to be applied over plainly visible existing dashed lines shall begin within 150 mm of the beginning of the existing dash, unless otherwise directed by the Contract Manager/Developer Representative.
- 3.2.2 Gaps not marked as a result of template use for symbols and words shall be filled with marking material after template removal.
- 3.2.3 Pavement markings shall be free of uneven edges, overspray or other readily visible defects that detract from the appearance or function of the pavement markings.
- 3.2.4 Methods and equipment used for pavement preparation, marking and marking removal shall be subject to the approval of the Contract Manager/Developer Representative. Glass beads shall be kept dry during storage and prior to use.
- 3.2.5 The Contractor shall furnish to the Contract Manager/Developer's Representative copies of current manufacturer's instructions and recommendations for application of any marking material, including primer, activator, catalyst and/or adhesive, called for CONSTRUCTION DRAWINGS.
- 3.2.6 Other construction work such as shoulder paving, seeding and/or mulching shall be scheduled and performed in a manner to avoid damage to applied pavement marking.

### 3.3 STORAGE

3.3.1 Store pavement marking materials as per manufacturer's instructions.

### 3.4 SITE PREPARATION

3.4.1 The plastic pavement marking Contractor must provide a minimum two working days written notice to the Contract Manager/Developer Representative prior to installing any plastic pavement markings.

3.4.2 Maintain vehicular and pedestrian traffic as directed by the Contract Manager/Developer Representative. Provide flagmen, barricades, flares and signing to protect workers and public.

3.4.3 Sweep or air blow pavement surface clean and dry.

3.4.4 If required, remove existing markings and repair pavement surface in accordance with [VOL. 2 SEC. 702, PAVEMENT SURFACE CLEANING MARKING REMOVAL](#).

3.4.5 Pre-mark intended lines at a minimum offset of 150 mm. Pre-mark outline of symbols. Contract Manager/Developer Representative to inspect and approve pre-marking. Any correction to pre-marking shall be at the Contractor's expense. All marking shall be within  $\pm 12$  mm of that specified on the CONSTRUCTION DRAWINGS, unless the Contract Manager/Developer Representative approves variances. All pre-marking lines remaining after a period of six (6) weeks must be removed or blackened out by the Contractor at their own expense.

### 3.5 LINE TYPES

3.5.1 Lines shall be sharp, well defined and uniformly retroreflective. The width of line applied shall be the width specified. Fuzzy lines, excessive overspray or non-uniform application are unacceptable. Lines shall provide proper visibility. Pavement markings that are improperly applied, located or reflectorized shall be corrected.

3.5.2 Lines applied with insufficient material quantities shall be properly reapplied. Improperly located lines shall be removed in accordance with [VOL. 2 SEC. 702, PAVEMENT SURFACE CLEANING MARKING REMOVAL](#); new lines shall then be applied in the correct locations at the Contractor's expense, including furnishing of approved materials.

### 3.6 LINE DIMENSIONS AND ACCEPTABLE PAVEMENT MARKING MATERIALS

3.6.1 Line dimensions shall be as follows:

Line Type	Color	Size	Pattern
Centre Line	Yellow	100 mm	Continuous line; break at intersections
Lane Line	White	100 mm	3.0 m line, 6.0 m skip
Edge Line	White or Yellow	100 mm or 200 mm	Continuous line, white on the right, yellow on the left.
Intersection Guide	White or	100 mm	0.5 m line, 0.5 m skip; color as specified on



Line Type	Color	Size	Pattern
Lines	Yellow		Drawings
Continuity Lines	White	200 mm	3.0 m line, 3.0 m skip
Stop Bars	White	300 mm	1.0 m separation from crosswalk; otherwise 4.5 m back off F.O.C. extension
Crosswalk	White	100 mm	2 parallel lines; 4.0 m apart
Crosswalk Bars	White	600 mm	4.0 m long
Advance Yield Lines (Shark's Teeth)	White	500 mm x 750 mm	Spaced 650 mm centre to centre
Arrow symbols	White	----	Arrow style and size to conform to MUTCD - Figure C1-3
Other symbols	White	----	Symbol dimensions to conform to MUTCD

3.6.2 Acceptable pavement marking materials for the various road classifications are generally as follows:

Item	Type of Material at CCC <sup>1</sup>	Type of Material at FAC
<b>Expressways and Arterial Roadways<sup>2</sup></b>		
1. Centre Lines	Type 2 or Type 3	Type 1B
2. Edge Lines	Type 2 or Type 3	Type 1B
3. Lane Lines	Type 2 or Type 3	Type 1B
4. Stop Bars	Type 2 or Type 3	Type 1A
5. Crosswalk/Advance Yield Lines	Type 2 or Type 3	Type 1A
6. Guide Lines	Type 2 or Type 3	Type 1A
7. Arrows and Symbols	Type 2 or Type 3	Type 1A
8. Concrete Bridge Decks	Type 2 or Type 3	Type 1B
9. Asphalt Bridge Decks	Type 2 or Type 3	Type 1A
<b>Collector Roadways</b>		
1. Centre Lines	Type 4	Type 2 or Type 3
2. Lane Lines	Type 4	Type 2 or Type 3
3. Stop Bar	Type 2 or Type 3	Type 2 or Type 3
4. Crosswalk/Advance Yield Lines	Type 2 or Type 3	Type 2 or Type 3
5. Arrows and Symbols	Type 4	Type 2 or Type 3
<b>Local Roadways</b>		
1. All Lines	Type 4	Type 2 or Type 3

**NOTES:**

- Type of material at CCC is allowed for staged paving projects only. Pavement marking material on paving projects that are not staged must be in accordance with the type of material at FAC shown.
- Expressway and arterial roadways include any portion of a collector or local roadway within 50 m of an intersecting expressway or arterial roadway.
- Type 1A: Thermoplastic "Inlaid" material as specified in [VOL. 2 SEC. 706, THERMOPLASTIC PAVEMENT MARKINGS](#).
- Type 1B: Thermoplastic "Onlaid" material as specified in [VOL. 2 SEC. 706, THERMOPLASTIC PAVEMENT MARKINGS](#).
- Type 2: Spray applied hybridized polymer epoxy material as specified in [VOL. 2 SEC. 703, MMA SPRAY PLASTIC PAVEMENT MARKINGS](#).
- Type 3: Surface applied cold plastic material as specified in [VOL. 2 SEC. 704, COLD PLASTIC PAVEMENT MARKINGS](#).
- Type 4: Painted material as specified in [VOL. 2 SEC. 705, PAINTED PAVEMENT MARKINGS](#).

## 3.7 INSTALLATION

3.7.1 Paint Application: As specified in [VOL. 2 SEC. 705, PAINTED PAVEMENT MARKINGS](#).

3.7.2 Thermoplastic Application: As specified in [VOL. 2 SEC. 706, THERMOPLASTIC PAVEMENT MARKINGS](#).

3.7.3 Spray Plastic Application: As specified in [VOL. 2 SEC. 703, MMA SPRAY PLASTIC PAVEMENT MARKINGS](#).

3.7.4 Cold Plastic Application: As specified in [VOL. 2 SEC. 704, COLD PLASTIC PAVEMENT MARKINGS](#).

## 3.8 PROTECTION AND CLEANUP

3.8.1 Do not permit traffic over applied markings until directed by the Contract Manager/Developer Representative.

3.8.2 Protect surrounding areas and structures from disfiguration and damage. Repair any damage as directed by the Contract Manager/Developer Representative.

3.8.3 On completion of the work, and prior to opening to traffic, clean up, and leave site free of debris and waste matter.

## 3.9 WORKMANSHIP

3.9.1 Faulty markings, such as non-straight lines, non-uniform, excessive overflow, overspray, etc., shall be redone within 5 working days at no cost to the Owner.

3.9.2 Removal of pavement markings due to incorrect installation, incorrect location, or obsolete marking due to new roadway geometry, must be completed by a removal process as outlined in [VOL. 2 SEC. 702, PAVEMENT SURFACE CLEANING MARKING REMOVAL](#) and must be submitted to the Contract Manager/Developer Representative for approval. Removal processes that are not approved include, but are not limited to: painting or blacking out the marking and/or leaving the marking to wear out over time.

## 3.10 ACCEPTANCE/WARRANTY

## 3.10.1 General

3.10.1.1 The warranty period for Painted Pavement Markings is described in [VOL. 2 SEC. 705, PAINTED PAVEMENT MARKINGS](#).

3.10.1.2 Plastic pavement markings shall be warranted against failure due to:

- (i) Poor adhesion;
- (ii) Defective materials; and

- (iii) Improper installation.

### 3.10.2 Initial Acceptance of Plastic Pavement Markings

#### 3.10.2.1 All plastic pavement markings shall have the following initial acceptance requirements:

- (i) Following initial completion of all pavement marking, there will be a 180 day observation period before initial acceptance. During the observation period, the Contractor, at no additional cost to the Owner, shall replace markings that the Contract Manager/Developer Representative determines are not performing satisfactorily due to defective materials, workmanship, in manufacture or application. At the end of the observation period, the minimum required retention percentage, by area, for markings installed will be 100%.
- (ii) Determination of Percentage Retained: The percentage retained shall be calculated as the nominal area of the strip less the area of loss divided by the nominal area and expressed as a percentage of the nominal area.
- (iii) The Contractor shall be notified, in writing, within 30 calendar days after the 180 day observation period if there is a failure to achieve the required percentage retained.
- (iv) When such a notification is made prior to September 1, the replacement material shall be installed during the same construction season. Replacement materials for any notification after September 1 shall be installed prior to June 1 of the following year.
- (v) Initial Acceptance: Initial acceptance of the pavement marking will be 180 days after the initial completion of all pavement marking work, or upon completion of all corrective work, whichever occurs last.
- (vi) The Contractor/Subcontractor shall submit a request in writing for the Plastic Pavement Marking CCC following the initial observation period. The Contract Manager/Developer Representative will issue a CCC for Plastic Pavement Marking once the Initial Acceptance criteria are met.

### 3.10.3 Final Acceptance/Warranty Period

#### 3.10.3.1 The warranty period for plastic pavement markings shall be two (2) years for Spray Plastic and Cold Plastic Pavement Markings, and four (4) years for Thermoplastic Pavement Markings, commencing on issuance of the CCC for Plastic Pavement Marking.

#### 3.10.3.2 The guarantee for the plastic pavement marking material shall be subject to traffic and normal summer and winter roadway maintenance procedures.

#### 3.10.3.3 The warranty period shall be a continuous operation and shall be carried on until the expiration of the period, at which time the Contractor's liability shall cease, unless there is an outstanding order from the Contract Manager/Developer Representative requiring the Contractor to correct warranty work that has not been completed. During the warranty period, the Contractor, at no additional cost to the Owner, shall replace markings that the Contract Manager/Developer Representative determines are not performing satisfactorily due to defective materials, workmanship, in manufacture or application.

3.10.3.4 For longitudinal lines, a minimum of 100% of the longitudinal line must be present on any given 300 m segment. For lateral markings or symbols, a minimum of 100% of the lateral marking or symbol must be present. The percentage retained will be calculated as specified in [SUB-SECTION 3.10.2.1 OF THIS SECTION](#). Failure to meet these performance measures shall be considered a complete failure of that marking, and it must be replaced under warranty terms.

3.10.3.5 During the warranty period, the minimum required retention percentage, by area, for markings other than the markings specified in [SUB-SECTION 3.10.3.5 OF THIS SECTION](#) will be as follows:

Year	Percentage Retained	
	Thermoplastic	Spray and Cold Plastic Marking
1	100%	100%
2	95%	90%
3	90%	N/A
4	85%	N/A

3.10.3.6 The percentage retained will be calculated as specified in [SUB-SECTION 3.10.2.1 OF THIS SECTION](#). In the event that the minimum retention is not achieved, the Contractor shall either:

- (i) Replace the failing section(s) to the satisfaction of, and at no additional cost to, the County; or
- (ii) Reimburse the County at the contract prices for the quantity of line failing, as determined by the Contract Manager/Developer Representative.

3.10.3.7 The Contractor shall also guarantee that in all instances there shall be sufficient material remaining at end of the designated warranty period so that pre-marking is not necessary.

3.10.3.8 The Contract Manager/Developer Representative shall give notice to the Contractor of observed defects to the markings within the warranty period.

3.10.3.9 The Contractor shall promptly correct, at their own expense and to the satisfaction of the Contract Manager/Developer Representative, any defects observed in the pavement markings during the warranty period. The Contractor shall pay for any damage to other work resulting from defects in the pavement markings that arise during the warranty period.

3.10.3.10 Notwithstanding the provisions of this Specification, if an applicable law or product warranty extends the liability for faulty products or workmanship beyond the warranty period, then the provisions of the applicable law or product warranty shall apply.

3.10.3.11 All warranty locations where the pavement marking is missing and a grind is showing shall be considered a material failure and shall be replaced by the Contractor at no additional cost to the County. Locations that do not show a grind shall be considered normal wear.

## 4.0 MEASUREMENT AND PAYMENT

4.1 Lines shall be measured in lineal metres of material installed for each type of line installed. Gaps between line segments are not measured.

- 4.2 Pavement marking including reflective glass beads shall be measured in lineal metres of material installed.
- 4.3 No additional payment will be made for the supply of pavement marking material and reflective glass beads.
- 4.4 Symbols and letters will be measured in specified units.
- 4.5 Removal of pavement markings will be in specified units.
- 4.6 Pavement markings will be measured complete in place in the units designated. Line quantities will be the length of completed marking, excluding the gaps.
- 4.7 All work performed and measured as prescribed above will be paid for as provided in the respective items for each type of pavement marking material supplied and installed. Payment shall include all labour, equipment, materials, traffic safety control and pre-marking necessary to complete the work.

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This section specifies the requirements for removal of pavement markings.

**2.0 PRODUCTS****2.1 MATERIALS**

2.1.1 Abrasives used for removal of painted pavement markings to be products specially designed for sand blasting.

2.1.2 Type ACO asphaltic concrete pavement.

2.1.3 Tack coat.

**3.0 EXECUTION****3.1 REMOVALS**

3.1.1 In areas designated, remove:

3.1.1.1 Removal processes that are not approved include: painting or blacking out the marking (including System 400) and/or leaving the marking to wear out over time.

3.1.1.2 Thermoplastic in-laid lines by grinding out marking material and underlying asphalt to the width and length of the lines to a depth of 25 mm below the adjacent pavement structure.

3.1.1.3 Thermoplastic in-laid symbols by grinding out marking material and underlying asphalt to a rectangular area equal to the width and length of the symbol to a depth of 25 mm below the adjacent pavement structure.

3.1.1.4 Spray type and cold plastic lines and symbols by grinding off marking material. Do not damage underlying asphalt.

3.1.1.5 Paint markings by sand blasting, do not damage underlying asphalt.

3.1.1.6 Exercise care to avoid dislodgement of coarse aggregate particles, excessive removal of fines, damage to bituminous binder, or damage to joint and crack sealers.

3.1.1.7 Heater milling equipment not to be used.

3.1.1.8 All residue from operations to be removed from site and disposed of by the Contractor.

**3.2 REPAIR**

3.2.1 No repair is required for removal of painted, spray type and/or cold pavement markings.

3.2.2 Grooves remaining after removal of thermoplastic inlaid pavement markings are to be filled using Type ACO asphaltic concrete pavement. Apply tack coat before placing asphalt mix.

**4.0 MEASUREMENT AND PAYMENT**

4.1 Lines removed to be measured in lineal metres for each type of marking material.

4.2 Symbols and letters removed to be measured in units specified in the unit price schedule.

4.3 Unit price tendered for removal to include tack coat and asphalt repair where required by this SPECIFICATION.



**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This section specifies the requirements for supply and installation of MMA Spray Plastic Pavement Marking.

**1.2 PLASTIC PAVEMENT MARKING SUBCONTRACTOR QUALIFICATIONS**

1.2.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).

**2.0 PRODUCTS****2.1 MATERIALS**

2.1.1 Spray Plastic Pavement Marking: Hybridized polymer epoxy spray type pavement marking material, having a specific gravity of 1.27 minimum at 25° C and conforming to the following:

2.1.1.1 Water Absorption: 0.5% maximum by mass retained water after 24-hour immersion, according to ASTM D570 Procedure A.

2.1.1.2 Spray Plastic material shall not be softened by heat after final cure.

**2.1.1.3 Abrasion Resistance**

- (i) Maximum weight loss of 0.45 g when subjected to 200 revolutions on a Taber Abrader at 25° C using H-22 Calibrade wheels weighted to 500 g with test sample kept wet during test with distilled water in accordance with ASTM D4060; or
- (ii) Maximum weight loss of 90 g when subjected to 1000 revolutions on a Taber Abrader at 25° C using CS-17 Calibrade wheels weighted to 1000 g with test sample kept wet during test with distilled water in accordance with ASTM C501.
- (iii) Prepare test sample with representative material placed on 100 mm square plate, 2 ± 0.1 mm thick.

2.1.1.4 Chemical resistance to anti-freeze, brake fluid, motor oil, diesel fuel, gasoline, calcium chloride, sodium chloride, transmission fluid. No signs of degradation after seven days immersion.

2.1.1.5 Reheating: The thermoplastic compound shall maintain proper performance properties when heated 4 times to the application temperature. After heating to 800° C for 6 hours while continually stirring at 50 to 100 RPM, the Brookfield viscosity shall not exceed 16,000 cps at 12 RPM.

2.1.1.6 No deterioration when in direct contact with asphalt cement in asphalt materials, or with sodium chloride, calcium chloride, or other de-icing chemicals.

2.1.1.7 Nontoxic and not harmful to persons or property when in hardened state.

- 2.1.1.8 No discoloration from sunlight ultraviolet exposure and no bond failure for the warranted life of the material.
- 2.1.1.9 Safety: In the plastic state, the material shall not give off fumes that are toxic or otherwise injurious to persons or property.
- 2.1.2 Glass Beads: As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 2.1.3 Pre-marking Paint: As approved by the Contract Manager/Developer Representative.
- 2.2 MIX FORMULATION
  - 2.2.1 White: Conforming to U.S. Federal Standard 595B Color Number 37925, 70% minimum when measured with the Color Guide Reflectometer 0,45° daylight luminous directional reflectance, with a green filter.
  - 2.2.2 Yellow: Conforming to U.S. Federal Standard 595B Color Number 33538, 40% minimum when measured with the Color Guide Reflectometer 0,45° daylight luminous directional reflectance, with a green filter.
  - 2.2.3 No formulation change unless approved by the Contract Manager/Developer Representative. Any significant change will be subject to field trials.
- 3.0 EXECUTION
  - 3.1 STORAGE
    - 3.1.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
  - 3.2 SITE PREPARATION
    - 3.2.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
  - 3.3 INSTALLATION
    - 3.3.1 Mix and apply Spray Plastic markings according to manufacturer's instructions and procedures.
    - 3.3.2 Minimum thickness shall be 0.5 mm above pavement surface.
    - 3.3.3 Apply glass beads to surface of spray plastic material before it sets, at a rate of 140 g/m<sup>2</sup> to 250 g/m<sup>2</sup>.
    - 3.3.4 Trim surplus material to give clean straight edges and let marking cure to a hardened state.

**3.4 PROTECTION AND CLEANUP**

3.4.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL.](#)

**3.5 WORKMANSHIP**

3.5.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL.](#)

**3.6 ACCEPTANCE/WARRANTY**

3.6.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL.](#)

**4.0 MEASUREMENT AND PAYMENT**

4.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL.](#)

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This section specifies the requirements for supply and installation of Cold Plastic Pavement Marking.

**1.2 PLASTIC PAVEMENT MARKING SUBCONTRACTOR QUALIFICATIONS**

1.2.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).

**2.0 PRODUCTS****2.1 MATERIALS**

2.1.1 Cold Plastic Pavement Marking: Two component, cold-extruded and cold-curing pavement marking material, having a specific gravity of 1.9 minimum at 25° C and conforming to the following:

2.1.1.1 Water Absorption: 0.5% maximum by mass retained water after 24-hour immersion, according to ASTM D570 Procedure A.

2.1.1.2 Impact Resistance: Minimum 1.13 J at 25° C when material is cast into a bar 25 mm<sup>2</sup> cross-section by 75 mm long, with 25 mm extended above vice jaws in a cantilever beam (Izod type) tester using the 2.82 J scale, according to ASTM D256 Method C.

2.1.1.3 Abrasion Resistance: Maximum weight loss of 0.60 g when subjected to 200 revolutions on a Taber Abrader at 25° C using H-22 Calibrade wheels weighted to 500 g with test sample kept wet during test with distilled water. Prepare test sample with representative material placed on 100 mm square plate, 3 ± 0.1 mm thick.

2.1.1.4 Chemical resistance to anti-freeze, brake fluid, motor oil, diesel fuel, gasoline, calcium chloride, sodium chloride, transmission fluid. No signs of degradation after seven days immersion.

2.1.1.5 Reheating: The thermoplastic compound shall maintain proper performance properties when heated 4 times to the application temperature. After heating to 800° C for 6 hours while continually stirring at 50 to 100 RPM, the Brookfield viscosity shall not exceed 16,000 cps at 12 RPM.

2.1.1.6 No deterioration when in direct contact with asphalt cement in asphalt materials, or with sodium chloride, calcium chloride, or other de-icing chemicals.

2.1.1.7 Nontoxic and not harmful to persons or property when in hardened state.

2.1.1.8 No discoloration from sunlight ultraviolet exposure and no bond failure for the warranted life of the material.

- 2.1.1.9 Safety: In the plastic state, the material shall not give off fumes that are toxic or otherwise injurious to persons or property.
- 2.1.2 Glass Beads: As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 2.1.3 Pre-marking Paint: As approved by the Contract Manager/Developer Representative.
- 2.2 MIX FORMULATION
- 2.2.1 White: Conforming to U.S. Federal Standard 595B Color Number 37925, 70% minimum when measured with the Color Guide Reflectometer 0,45° daylight luminous directional reflectance, with a green filter.
- 2.2.2 Yellow: Conforming to U.S. Federal Standard 595B Colour Number 33538, 40% minimum when measured with the Color Guide Reflectometer 0,45° daylight luminous directional reflectance, with a green filter.
- 2.2.3 No formulation change unless approved by the Contract Manager/Developer Representative. Any significant change will be subject to field trials.
- 3.0 EXECUTION
- 3.1 STORAGE
- 3.1.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 3.2 SITE PREPARATION
- 3.2.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 3.3 INSTALLATION
- 3.3.1 Mix and apply Cold Plastic markings according to manufacturer's instructions and procedures.
- 3.3.2 Minimum thickness of 2.0 mm and maximum thickness of 3.0 mm above pavement surface.
- 3.3.3 Apply glass beads to surface of material before it sets, at a rate of 140 g/m<sup>2</sup> to 250 g/m<sup>2</sup>.
- 3.3.4 Trim surplus material to give clean straight edges and let marking cure to a hardened state.
- 3.4 PROTECTION AND CLEANUP
- 3.4.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).

**3.5 WORKMANSHIP**

3.5.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).

**3.6 ACCEPTANCE/WARRANTY**

3.6.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).

**4.0 MEASUREMENT AND PAYMENT**

4.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).

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on the correct sides when the document is printed double-sided.



**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This section specifies the requirements for supply and installation of Painted Pavement Marking.

**2.0 PRODUCTS****2.1 MATERIALS**

2.1.1 Painted Pavement Marking: Hot-applied alkyd-based traffic paint conforming to the following:

2.1.1.1 Traffic paint shall be homogenous, and shall be well-ground to a uniform smooth consistency and properly dispersed in the distributor. The traffic paint shall flow evenly and smoothly, and cover solidly when applied to pavements.

2.1.1.2 The traffic paint shall be free from skin, dirt, sand, or any other foreign particles that can clog screens, valves, pumps, or other devices used in a distributor.

2.1.1.3 Settled pigment shall be easily redispersed with minimum resistance to form a smooth uniform product of proper consistency, and shall be capable of being sprayed at the temperature intended for the paint.

2.1.1.4 Traffic paint shall be guaranteed not to skin, gel, or cake in containers when stored outside under summer and winter conditions for a minimum of 12 months after delivery.

2.1.1.5 The materials used in the manufacture of the traffic paint shall be of high quality and consistency, such that the appearance will not change in service to impair the colour or visibility of the marking. The traffic paint film shall be flat in finish, and the white and yellow markings shall be visible under daylight and artificial light.

2.1.1.6 Traffic paint shall not be softened by heat after final cure.

2.1.1.7 The chemical composition of the traffic paint shall be at the discretion of the paint manufacturer, but any changes after the tender period must be communicated to the County in writing immediately along with documentation that these changes do not affect the performance of the materials.

2.1.1.8 No deterioration when in direct contact with asphalt cement in asphalt materials, or with sodium chloride, calcium chloride, or other de-icing chemicals.

2.1.1.9 Nontoxic and not harmful to persons or property when in hardened state.

2.1.1.10 In addition to the above requirements, the traffic paint shall meet the requirements detailed in [APPENDIX A](#).

- 2.1.2 Glass Beads: As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 2.1.3 Pre-marking Paint: As approved by the Contract Manager/Developer Representative.
- 2.1.4 Cleaner Solvent: As specified by the paint manufacturer.
- 2.1.5 Paint Thinner: In accordance with CAN/CGSB-1.5.
- 2.2 MIX FORMULATION
  - 2.2.1 White: Conforming to U.S. Federal Standard 595 Color Number 37925, or to CGSB 1-GP-12.1C, White 513-301.
  - 2.2.2 Yellow: Conforming to U.S. Federal Standard 595 Color Number 33538, or to CGSB 1-GP-12.1C, Yellow 505-308.
- 2.3 EQUIPMENT
  - 2.3.1 Paint applicator to be an approved pressure type mobile distributor capable of applying paint in single, double, and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut off.
  - 2.3.2 Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint.
  - 2.3.3 Thoroughly clean distributor tank before refilling with paint of different colour.
- 3.0 EXECUTION
  - 3.1 STORAGE
    - 3.1.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
  - 3.2 SITE PREPARATION
    - 3.2.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
  - 3.3 INSTALLATION
    - 3.3.1 Apply traffic paint according to manufacturer's instructions and procedures.
    - 3.3.2 Unless otherwise approved by the Contract Manager/Developer Representative, apply traffic paint only when air temperature is above 10° C and no rain is forecast. Protect surrounding areas and structures from paint overspray. Remove any smears immediately.

- 3.3.3 Apply traffic paint evenly at a rate of 0.33 L/m<sup>2</sup>. The first application of paint to new asphalt pavement surfaces shall be increased by 25% over the specified rate, and the first application shall be double-painted.
- 3.3.4 Paint lines must be of uniform colour and density with sharp edges.
- 3.3.5 Do not thin paint unless approved by the Contract Manager/Developer Representative.
- 3.3.6 Markings shall be within  $\pm 12$  mm of the dimensions indicated on the drawings or in the most recent version of the Manual of Uniform Traffic Control Devices of Canada, unless the Contract Manager/Developer Representative approves variances.
- 3.3.7 If specified, apply glass beads at a rate of 100 g/m<sup>2</sup> of painted area. The glass beads shall be applied to the wet paint so that the beads are embedded and retained in the paint and uniformly cover the painted surface.
- 3.4 PROTECTION AND CLEANUP
- 3.4.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 3.5 WORKMANSHIP
- 3.5.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 3.6 ACCEPTANCE/WARRANTY
- 3.6.1 Painted pavement markings shall be warranted against failure due to poor adhesion and defective materials.
- 3.6.2 The guarantee for painted pavement marking material shall be subject to traffic and normal summer and winter roadway maintenance procedures.
- 3.6.3 The warranty period for painted pavement markings shall be two (2) years, commencing on issuance of the CCC for Painted Pavement Marking.
- 3.6.4 Following issuance of the CCC for Painted Pavement Marking, the Contract Manager/Developer Representative will inspect the painted pavement markings for deficiencies each spring and fall until such time that the FAC for Painted Pavement Marking is issued.
- 3.6.5 During the warranty period and until the FAC for Painted Pavement Marking is issued, the Contractor, at no additional cost to the Owner, shall replace markings that the Contract Manager/Developer Representative determines are not performing satisfactorily due to defective materials, workmanship, in manufacture or application.

3.6.6 The Contractor shall also guarantee that in all instances there shall be sufficient material remaining at end of the designated warranty period so that pre-marking is not necessary.

#### 4.0 MEASUREMENT AND PAYMENT

4.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).

## APPENDIX A: TRAFFIC PAINT REQUIREMENTS

Test	Minimum Requirement	Maximum Requirement	Test Method CGSB 1-GP-71	Test Method ASTM
Abrasion Resistance * (maximum loss, mg)		50		D4060
Bleeding Ratio **	0.95			
Consistency (kreb units) At 23° ± 1° C At 7° ± 1° C	80	95 125	4.5 4.5	
Drying Time (minutes) At 23° ± 1° C		3	5.1	
Fineness of Grind (Hegman)	3			D1210
Total Nonvolatiles (% by mass)	68	72		
Pigment Content (% by mass)	49	53	21	
Prime Pigment TiO <sub>2</sub> or PbCrO <sub>4</sub> (% by mass)	10			D1364 / D126
Reflectance (%) White Paint Yellow Paint	80 50			E1347 E1347
Settling (12 months)	8			D869
Water (%)		0.5	24.1	

**NOTES:**

\* Abrasion Resistance, average of 3 test samples prepared as follows: 15 ± 1 mm wet film thickness applied to steel test plates, air dried for 30 minutes, then baked at 70° C for 48 hours; test plates are then cleaned, weighed, and tested for 1,000 cycles using a Taber Abrader operated with 500 g load and CS-10 abrader wheels.

\*\* Bleeding Ratio based on U.S. Federal Specification TT-P-85d, asphalt felt to conform to U.S. Federal Specification HH-F-191.

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**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 This section specifies the requirements for supply and installation of Thermoplastic Pavement Marking.

**1.2 PLASTIC PAVEMENT MARKING SUBCONTRACTOR QUALIFICATIONS**

1.2.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).

**2.0 PRODUCTS****2.1 MATERIALS**

2.1.1 Thermoplastic Pavement Marking: Hot-extruded, having a specific gravity of 2.0 minimum at 25° C, having a softening point of 90° C minimum according to ASTM E28, and conforming to the following:

2.1.1.1 Water Absorption: 0.5% maximum by mass retained water after 24-hour immersion, according to ASTM D570 Procedure A.

2.1.1.2 Impact Resistance: Minimum 1.13 J at 25° C when material is cast into a bar 25 mm<sup>2</sup> cross-section by 75 mm long, with 25 mm extended above vice jaws in a cantilever beam (Izod type) tester using the 2.82 J scale, according to ASTM D256 Method C.

2.1.1.3 Abrasion Resistance: Maximum weight loss of 0.60 g when subjected to 200 revolutions on a Taber Abrader at 25° C using H-22 Calibrade wheels weighted to 500 g with test sample kept wet during test with distilled water. Prepare test sample with representative material placed on 100 mm square plate, 3 ± 0.1 mm thick.

2.1.1.4 Chemical resistance to anti-freeze, brake fluid, motor oil, diesel fuel, gasoline, calcium chloride, sodium chloride, transmission fluid. No signs of deterioration after seven days immersion.

2.1.1.5 Reheating: The thermoplastic compound shall maintain proper performance properties when heated 4 times to the application temperature. After heating to 800° C for 6 hours while continually stirring at 50 to 100 RPM, the Brookfield viscosity shall not exceed 16,000 cps at 12 RPM.

2.1.1.6 No deterioration when in direct contact with asphalt cement in asphalt materials, or with sodium chloride, calcium chloride, or other de-icing chemicals.

2.1.1.7 Nontoxic and not harmful to persons or property when in hardened state.

2.1.1.8 No discoloration from sunlight ultraviolet exposure and no bond failure for the warranted life of the material.

- 2.1.1.9 Safety: In the plastic state, the material shall not give off fumes that are toxic or otherwise injurious to persons or property.
- 2.1.2 Glass Beads: As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 2.1.3 Pre-marking Paint: As approved by the Contract Manager/Developer Representative.
- 2.2 MIX FORMULATION
- 2.2.1 White: Conforming to U.S. Federal Standard 595B Color Number 37925, 70% minimum when measured with the Color Guide Reflectometer 0,45° daylight luminous directional reflectance, with a green filter.
- 2.2.2 Yellow: Conforming to U.S. Federal Standard 595B Color Number 33538, 40% minimum when measured with the Color Guide Reflectometer 0,45° daylight luminous directional reflectance, with a green filter.
- 2.2.3 No formulation change unless approved by the Contract Manager/Developer Representative. Any significant change will be subject to field trials.
- 2.3 EQUIPMENT
- 2.3.1 Grooving Machine, Applicators: Subject to Contract Manager's/Developer Representative's approval.
- 3.0 EXECUTION
- 3.1 STORAGE
- 3.1.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 3.2 SITE PREPARATION
- 3.2.1 For Thermoplastic "Onlaid", as specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 3.2.2 For Thermoplastic "Inlaid", as specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#), and then cut grooves in the asphalt as follows:
- 3.2.2.1 Width and Length: The same size as the line/symbol, within  $\pm 12$  mm of that specified on drawings, unless the Contract Manager/Developer Representative approves variances.
- 3.2.2.2 Depth:
- (i) Transverse markings, including guide lines and symbols: 10 mm; and
  - (ii) Longitudinal markings: 5 mm.



- 3.2.2.3 Remove grindings and haul to designed disposal location. Sweep or air blast groove clean and dry.
- 3.2.2.4 No grooving of the roadway will be permitted in any one day beyond what can be cleaned and inlaid with thermoplastic material in that day.
- 3.3 INSTALLATION
- 3.3.1 Heat material and apply according to manufacturer's extrusion instructions and procedures.
- 3.3.2 For Thermoplastic "Onlaid", apply hot molten material onto asphalt within  $\pm 3.0$  mm of the depths specified in [SUB-SECTION 3.2.2.2 OF THIS SECTION](#).
- 3.3.3 For Thermoplastic "Inlaid", fill groove with hot molten material. Do not overfill more than 3.0 mm above pavement surface.
- 3.3.4 Apply glass beads to surface of extruded material while it is still molten or has not set, at a rate of 140 g/m<sup>2</sup> to 250 g/m<sup>2</sup>.
- 3.3.5 Trim surplus material to give clean straight edges and let marking cure to a hardened state.
- 3.4 PROTECTION AND CLEANUP
- 3.4.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 3.5 WORKMANSHIP
- 3.5.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 3.6 ACCEPTANCE/WARRANTY
- 3.6.1 As specified in [VOL. 2 SEC. 701, PAVEMENT MARKING – GENERAL](#).
- 4.0 MEASUREMENT AND PAYMENT
- 4.1 As specified in [CONSTRUCTION SPECIFICATION 7.701, PAVEMENT MARKING – GENERAL](#).

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on the correct sides when the document is printed double-sided.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Pipe culverts of the type specified shall be installed in conformity with these CONSTRUCTION SPECIFICATIONS at locations and to the lines and grades as shown in the CONSTRUCTION DRAWINGS. See [STANDARD DRAWINGS 51003](#), [51004](#), [51005](#) and [51006](#).

**2.0 PRODUCTS****2.1 MATERIALS**

- 2.1.1 Corrugated Metal Pipe shall conform to the CSA Standard G401-M for Corrugated Steel Pipe (CSP) Products.

- 2.1.2 Reinforced Concrete Pipe shall conform to the ASTM Specifications C76.

Prior to the start of the Work the Contractor shall obtain the Contract Manager/Developer Representative approval for the type of pipe he proposes to use. The Contractor shall furnish, without charge, such information as the Contract Manager/Developer Representative may require.

- 2.1.3 All culverts shall include pre-manufactured sloped-end sections.

**3.0 EXECUTION****3.1 EXCAVATION AND PREPARATION OF TRENCH**

- 3.1.1 The trench shall be excavated to the required alignment, grade and depth shown on the CONSTRUCTION DRAWINGS or as established by the Contract Manager/Developer Representative.

In general, the excavation for the culvert base shall be carried to a depth of not less than 300 mm below the invert grade. Excavate a minimum width of 3 times the pipe diameter to permit pipe assembly and to accommodate operation of compaction equipment on either side of the culvert.

The trench shall be free of projecting rocks, large stones, stumps or other obstructions. Any unsuitable material shall be excavated as directed by the Contract Manager/Developer Representative. On completion of the excavation, the Contractor shall compact this surface to uniform density.

The Contractor shall then build the culvert bed to the established elevation for the pipe installation using gravel material or other material accepted by the Contract Manager/Developer Representative. The material shall be compacted to a density of 97% of Standard Proctor Density at optimum moisture content.

Where the trench is in solid rock or other hard materials, it shall be excavated to a depth of at least 150 mm below the grade established for the bottom of the pipe and this additional excavation shall be backfilled with approved suitable material in such a manner as to ensure a uniform bearing for the length of the culvert.

### 3.2 LAYING AND JOINTING PIPE

#### 3.2.1 The pipes shall be laid on the prepared base true to the lines and grades shown on the CONSTRUCTION DRAWINGS or established by the Contract Manager/Developer Representative.

Care shall be exercised at all times when handling the pipes. They shall not be dropped on the ground when unloading nor dragged on the ground. When lowering the pipe into the trench, rope slings shall be used where practicable. Pipes shall not be bumped or pushed into place with dozers or similar equipment.

##### 3.2.1.1 Corrugated Steel Pipes

Sections of pipes shall be securely joined together by means of the coupling bands. Corrugated steel pipe for the round or elongated type and pipe arch culvert constructed from individual steel plates shall have the outside laps of circumferential joints in each pipe section on the upstream end of longitudinal lap seams at the sides of the pipe.

##### 3.2.1.2 Reinforced Concrete Pipe

The pipes shall be laid commencing at the downstream or outlet end with the bell or grooved end facing upstream and each successive section being added in the alignment with the previous section.

Where specified rubber gaskets shall be fitted between the bevelled surfaces of the tongue and groove ends of the connecting concrete pipe sections to form a flexible water tight seal.

End sections shall be anchored to adjacent sections by means of tie bars, when provided, and all lifting holes and holes engaging tie bars shall be filled with mortar finished off flush with the surfaces of the pipe.

### 3.3 BACKFILLING

#### 3.3.1 Selected backfilling material, free from stone, frozen lumps, etc. shall be placed under and around the pipe and thoroughly tamped or otherwise compacted in place in alternate layers on opposite sides of the pipe. Each layer shall be 150 mm deep.

The trench shall be completely filled and pipe covered to a depth of at least 1/2 of a metre with material hand placed and compacted to a density of 97% of Standard Proctor Density at Optimum moisture content before proceeding with the normal embankment construction over the culvert and before heavy construction equipment shall be permitted to pass over the pipe.

If a trench is not required, the culvert pipe shall be laid true to line and grade, on a bed that is uniformly firm throughout its entire length and the backfilling around and over the pipe shall be completed as specified in the preceding paragraph.

#### **4.0 MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

- 4.1.1 The unit of measure for pipes shall be the lineal metre measured along the invert of the pipe including elbows or sloped end sections.

##### **4.2 PAYMENT**

- 4.2.1 Payment at the respective Contract price bid per lineal metre shall be full compensation for excavating and trench preparation, supplying, including elbows or sloped end sections, installing and bedding the pipe, dewatering, backfilling, disposal of surplus material and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.

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**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 Rip rap shall consist of hand laid rock rip rap or bagged concrete rip rap placed on the embankment slopes, the ends of culverts and ditch bottoms to the lines and grades shown on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**2.0 PRODUCTS****2.1 PREPARATION AND PLACING**

- 2.1.1 The slope to be rip rapped shall be dressed and compacted to the lines and grades shown on the CONSTRUCTION DRAWINGS or as required by the Contract Manager/Developer Representative.

**2.2 HAND LAID ROCK RIP RAP**

- 2.2.1 Hand laid rock rip rap shall consist of sound, durable rocks having at least a minimum dimension of 200 mm and a maximum dimension size of 400 mm. The rocks shall be placed on the surface to be covered as shown on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative, on slopes not exceeding 1 1/2:1, starting with the larger rocks on the bottom row. Each rock shall be placed with the broad flat surface resting on a horizontal earth bed prepared for in such that the weight of the rock is carried by the earth and not by the underlying stones. Rocks shall be laid in successive rows, or layers, proceeding upward with the joints staggering those of the adjacent rows as to secure a "shingled" effect, evenly stepped. Voids between stones shall be filled with spalls rammed into place. The finished work shall present an even, tight, and reasonably plane surfaced, varying not more than 75 mm from the required contour.

**2.3 BAGGED RIP RAP**

- 2.3.1 The burlap bags used shall be of approximately (0.01) cubic metre capacity. Bags are to be filled to approximately 70% percent of capacity with a 50/50 mixture of sand and cement. Bags shall be immediately placed on the area to be rip-rapped, in a manner identical to that specified above for Hand Laid Rip Rap so as to form a "shingled" effect, evenly stepped.

The bags when laid shall be flattened and tamped in close contact with each other, care being taken to exclude dirt and debris between the bags. The bagged rip-rap shall be kept moist for a period of 24 hours after placing.

No rip-rap installation shall be permitted during cold weather without approval of the Contract Manager/Developer Representative and adequate precautions shall be taken for the protection or heating.

The bags of concrete shall, when laid, be flattened and tamped in close contact with each other, care being taken to exclude dirt and debris between the bags. The bagged concrete rip rap shall be kept moist for a period of 24 hours after placing. No concreting shall be permitted during cold weather without approval of the Contract Manager/Developer Representative and adequate precautions shall be taken for the protection or heating of the concrete.

## 2.4 RANDOM RIP RAP

- 2.4.1 Random rip rap shall consist of graded mixture of sound, durable rocks or pit-run gravel. The gradation shall be such that 50% of the riprap consists of material having at least a minimum dimension of 200 mm and maximum dimension of 400 mm. The riprap shall be dumped over the area until the required depth is attained. The occasional manual handling of the refractory rock or stone shall in no manner be constructed to transform the classification of random riprap into that of hand laid rip rap.

## 3.0 MEASUREMENT AND PAYMENT

### 3.1 MEASUREMENT

- 3.1.1 The unit of measure for Random Rip Rap shall be cubic metre. The quantity paid for shall be the number of cubic metres acceptably placed as specified on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.
- 3.1.2 The unit measurement for Hand Laid Rip Rap and Bagged Rip Rap shall be square metre. The quantity paid for shall be the number of square meters acceptably placed as specified on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

### 3.2 PAYMENT

- 3.2.1 Payment at the respective Contract bid price shall be full compensation for excavating, supply, hauling, placing, backfilling, and for all labour and use of all equipment and incidentals necessary to complete the Work in accordance with these CONSTRUCTION SPECIFICATIONS.



**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 This specification covers the erection, removal, salvage and reinstallation or disposal of guardrail and guideposts.

**2.0 PRODUCTS****2.1 MATERIALS**

- 2.1.1 Materials required for the construction of deep beam guardrail and guideposts shall be supplied by the Contractor and approved by the Contract Manager/Developer Representative.

**3.0 EXECUTION****3.1 GENERAL**

- 3.1.1 Construction of guardrail will include several types of installations in accordance with the plans and CONSTRUCTION SPECIFICATIONS and as directed by the Contract Manager/Developer Representative. These installations will include but not be limited to:
- Standard Deep-Beam sections;
  - Several end sections including, Turn Down Terminal sections and Wing Terminal sections; and
  - Other sections if so defined on CONSTRUCTION DRAWINGS and in the SPECIAL PROVISIONS.

Guide posts are generally placed in series as shown on the drawings or as directed by the Contract Manager/Developer Representative.

**3.2 CONSTRUCTION**

- 3.2.1 Guardrail and guide posts shall be accurately set to the required depth and alignment, in a manner resulting in a smooth continuous installation, as shown on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative. Permissible tolerance for plumb and grade of posts shall be 6 mm maximum.
- 3.2.2 Holes for the guardrail and guide posts shall be excavated by auger. The diameter of the holes augured for guardrail shall be of sufficient size to allow for pneumatic tamping.
- 3.2.3 Unsuitable material at the bottom of the holes excavated for guardrail shall be replaced with granular material at the Contractor's expense, as directed by the Contract Manager/Developer Representative. The Contractor shall thoroughly compact the bottom of the hole. The guardrail posts shall rest directly and solidly on the bottom of the hole at the time of installation.

- 3.2.4 Excavated material which is unsuitable for use as backfill shall be substituted with granular material by the Contractor at his expense. Backfill shall be thoroughly compacted using pneumatic tampers, in layers not exceeding 150 mm, for the full depth of the excavation.
- 3.2.5 Guardrail laps shall be in the direction of traffic flow. Bolts shall be tightened to a torque of 100 Nm. Metal reflectors (Scotchlite or equivalent) shall be attached to the top of every third guardrail post with 2-50 mm nails.
- 3.2.6 The Contractor shall take all necessary precautions to eliminate damage to galvanizing. Minor abrasions shall be repaired by painting with two coats of zinc rich paint. Major abrasions shall be repaired by re-galvanizing. The method to be used for repair of any damage shall be approved by the Contract Manager/Developer Representative before such work is commenced. The Contractor, at his own cost, shall carry out the repair or replace components to the satisfaction of the Contract Manager/Developer Representative.
- 3.2.7 The guardrail shall be connected to new or existing bridge walls or parapets as shown on the CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.
- 3.2.8 Surplus excavated material and debris shall be removed from the site by the Contractor at his expense.
- 3.2.9 At the end of the warranty period, the permissible tolerance for plumb and grade of all posts shall be 13 mm.
- 3.3 REMOVAL AND SALVAGE OF EXISTING GUARDRAIL
- 3.3.1 The Contractor shall remove and salvage each section of guardrail, including posts, designated for removal and neatly pile the salvaged material near the site as designated by the Contract Manager/Developer Representative. The Contractor shall fill and compact holes left from the post removal before nightfall.
- 3.3.2 The Contract Manager/Developer Representative will designate the material to be reused and the material for disposal. Material, other than bolts, damaged by the Contractor during removal shall be replaced with new material by the Contractor at his own expense.
- 3.3.3 The Contractor shall haul the material for reuse to the location within the contract limits for installation or to the County's storage yard as directed by the Contract Manager/Developer Representative. The Contractor shall haul and dispose of material for disposal at his own disposal sites.
- 3.3.4 At sites where existing guardrail is to be removed and salvaged and new or salvaged guardrail is to be installed at the same location, the Contractor shall complete the installation within 5 working days of the site becoming available for re-erection of the guardrail.

- 3.3.5 Until guardrail is erected, the Contractor shall erect barricades and delineators as shown in The Uniform Traffic Control Devices Manual for embankments bridge ends and other fixed objects. Other safety protection shall be provided as directed by the Contract Manager/Developer Representative.
- 3.4 REMOVAL OF EXISTING GUIDE POSTS
- 3.4.1 The Contractor shall remove and dispose of existing guide posts as directed by the Contract Manager/Developer Representative.
- 4.0 MEASUREMENT AND PAYMENT**
- 4.1 MEASUREMENT
- 4.1.1 Measurement for installation and removal of guardrail, turn down terminals and bridge connections will be made to the nearest 0.1 m along the face of the rail from the centreline of the end posts.
- 4.2 PAYMENT
- 4.2.1 Payment for guardrail, bridge connections and turn down terminal installations will be made at the unit price bid per metre for the particular type of guardrail installed. This unit price will include full compensation for loading, and hauling of materials, excavation, backfill, installation, cleanup and all work incidental to the complete installation of the particular type of guardrail.
- 4.2.2 No separate payment will be made for wing terminal sections. The costs of installing these sections will be included in the unit price for the standard guardrail installation.
- 4.3 REMOVAL AND SALVAGE OF EXISTING GUARDRAIL
- 4.3.1 Payment for removal of existing guardrail will be made at the unit price per metre for "Removal and Salvage of Existing Guardrail" for the type of guardrail removed. This unit price will include full compensation for removal, salvage and either load, haul and stockpile for reuse or load, haul and disposal of the material as directed by the Contract Manager/Developer Representative.
- 4.4 GUIDE POST INSTALLATION
- 4.4.1 Payment for guide post installation will be made at the unit price bid per post. This unit price will include full payment for loading and hauling the material, installing the posts, backfilling, compacting, removing and disposing of all debris and the use of all equipment, tools, labour and incidentals necessary to complete the work.

## 4.5 GUIDE POST REMOVAL

- 4.5.1 No separate payment will be made for guide post removal. The removal and disposal of existing guide posts is considered incidental to the work.

**1.0 GENERAL****1.1 DESCRIPTION**

- 1.1.1 The work covered by this specification shall consist of maintenance of natural areas as outlined within the limits of construction or as designated by the Contract Manager/Developer Representative in accordance with these CONSTRUCTION SPECIFICATIONS and conforming to the approved CONSTRUCTION DRAWINGS or as directed by the Contract Manager/Developer Representative.

**2.0 EXECUTION****2.1 GENERAL****2.1.1 Natural Areas**

- 2.1.1.1 The land required for the natural areas will be dedicated to Strathcona County as MR and/or ER. CE may be considered in some areas.
- 2.1.1.2 Natural areas adjacent to private property designated as MR may have a minimum 1.8 m width mown buffer around the perimeter for maintenance access routes. ER and naturalized PULs shall not be mown.

**3.0 MAINTENANCE****3.1 ACTIVITIES REQUIRED FROM CCC UNTIL FAC**

- 3.1.1 As part of the maintenance reporting, identify and describe existing vegetation and site conditions to determine site specific goals and indicate best management strategies:
- (i) Prepare a site map.
  - (ii) Vegetation and wildlife inventory (Rare or Endangered).
  - (iii) Non-native species and management.
  - (iv) Biodiversity.
  - (v) Ecological health.
  - (vi) Soil.
  - (vii) Microclimate.
- 3.1.2 In existing natural areas restore any disturbed areas to original condition.
- 3.1.3 Where wetlands, streamcourses and/or waterbodies are part of the natural area, ensure erosion control measures are maintained until establishment of plant material and grasses.
- 3.1.4 Use preventative measures against weed development. Non-native species management is required. Selective cutting, hand-pulling and spot spraying may be required.

- 3.1.5 Remnant tree stands are to be maintained free of hazard trees by the Developer until FAC. Standing trees that are dead, partially dead or decaying that can be used as habitat may be left and some coarse woody debris can be left on the ground. Falling and pruning should attempt to maximize the length of large diameter pieces left in the tree stand. Coarse woody debris must not be continuous, and must be left as natural as possible. Hazard trees and the best practices for managing remnant tree stands are defined in Strathcona County Policy SER-009-035.
- 3.1.6 Tree removal to be completed in accordance with [VOL. 2 SEC. 102, CLEARING AND GRUBBING](#).
- 3.1.7 Constructed Wetlands to be maintained in accordance with [VOL. 2 SEC. 605, CONSTRUCTED WETLANDS](#).
- 3.1.8 Monitor ER areas to ensure function has not been impacted by Development. Where problems occur, restoration plans to be approved by Strathcona County prior to implementation.

**1.0 GENERAL****1.1 DESCRIPTION**

1.1.1 The Contractor shall complete the installation of traffic control signals as shown on the CONSTRUCTION DRAWINGS.

1.1.2 The work consists of the supply of all labour, supervision, equipment and materials except as may be otherwise specified herein, and installation of all materials to provide a complete and operating traffic signal control system as shown on the CONSTRUCTION DRAWINGS. Any work, even if not shown or specified, which is obviously necessary or reasonably implied to complete the work shall be done as if it were both shown and specified.

**2.0 PRODUCTS****2.1 MATERIALS SUPPLIED BY THE CONTRACTOR**

2.1.1 The Contractor shall supply all required electrical and construction materials necessary for the satisfactory completion of the project, excepting materials as specified in the SPECIAL PROVISIONS.

2.1.2 All electrical materials supplied by the Contractor shall be new, C.S.A. approved, and shall be subject to the approval from the Electrical Protection Branch. All materials shall conform to the requirements detailed on the CONSTRUCTION DRAWINGS and other clauses of this specification.

**2.2 WORKMANSHIP**

2.2.1 For work involving electrical connections and contacts, cables, etc. tradesmen thoroughly qualified and experienced in such work shall be employed.

2.2.2 The Contractor shall install the complete signal system in a good, proper and workmanlike manner in compliance with the Electrical Protection Act.

**2.3 CODES, PERMITS AND INSPECTION**

2.3.1 All electrical installation shall comply with the requirements of the current edition of the Canadian Electrical Code and the regulations of the Electrical Protection Branch of the Department of Labour.

2.3.2 The Contractor shall obtain all permits required and, after completion of the work, furnish to the Contract Manager/Developer Representative a Certificate of Final Inspection and Approval from the Electrical Protection Branch.

2.3.3 The Contractor shall obtain all necessary permits prior to the start of the work.

- 2.3.4 The Contractor shall pay all fees for permits and any costs which may be incurred during testing inspection by the electrical inspecting authority. These costs shall be considered to be included in the Contractor's tender.
- 2.3.5 The Contract Manager/Developer Representative will carry out inspections on behalf of Strathcona County.
- 2.3.6 All orders for revisions or changes to the design shall have the approval of the Contract Manager/Developer Representative.
- 2.4 EXAMINATION OF THE LAYOUT DRAWING
- 2.4.1 The Contractor shall examine carefully the layout drawings to ensure that the work under this contract can be satisfactorily carried out. Should any difficulty arise showing conflict with or requiring additional work beyond the work of the CONSTRUCTION DRAWING, the Contractor shall bring this matter to the attention of the Contract Manager/Developer Representative prior to tender submission.
- 2.5 SETTING OUT OF THE WORK
- 2.5.1 The Contractor shall examine the CONSTRUCTION DRAWINGS and these CONSTRUCTION SPECIFICATIONS (especially figure dimensions) immediately after the contract is awarded and report any discrepancies, errors or omissions to the Contract Manager/Developer Representative. The Contractor shall give personal supervision to the layout work and do all necessary levelling and measuring or employ competent personnel to do so.
- 2.5.2 No plea as to the action and direction of other than the Contract Manager/Developer Representative shall be admitted in justification of any error in installation where a departure is made from the CONSTRUCTION DRAWINGS, these CONSTRUCTION SPECIFICATIONS or the CONTRACT. It shall remain the duty of the Contractor to take their own measurements of the work.
- 2.5.3 The Contractor shall correct all work completed contrary to the intent of the drawings and contract and bear all costs for the same. Where the intent of the CONSTRUCTION DRAWINGS, these CONSTRUCTION SPECIFICATIONS, and the CONTRACT is not clear, the Contractor shall obtain a clarification from the Contract Manager/Developer Representative before proceeding with the work.
- 2.5.4 In setting out the work, the Contractor shall make reference to locations of the overhead and buried lines of the utility companies so as to avoid damage or conflicts.
- 2.6 ALTERATIONS AND EXTRA WORK
- 2.6.1 Alterations in this signal installation contract entailing additional work or deletions shall be carried out only upon the written request of the Contract Manager/Developer Representative.



- 2.6.2 The Contract Manager/Developer Representative reserves the right to change locations of signal heads, detectors, push buttons, etc. before installation by not more than 6 m from points indicated on the plans without additional charge.
- 2.6.3 The number of wires per conduit and size of conduit shall not be changed except with the approval of the Contract Manager/Developer Representative. The actual route of the conduit shall be altered to avoid existing cables, utility lines, and other obstructions.
- 2.6.4 Any price submitted for additional work or alteration shall include a price breakdown for all labour, materials and equipment. Pricing for labour, materials and equipment shall be justified by invoices, time sheets, etc. No extras shall be allowed without proper written authorization.
- 2.7 DRAWINGS AND SPECIFICATIONS
- 2.7.1 The CONSTRUCTION DRAWINGS and these CONSTRUCTION SPECIFICATIONS are complimentary each to the other and what is called for by one shall be binding as if called for by both.
- 2.7.2 Should any discrepancy appear between the CONSTRUCTION DRAWINGS and these CONSTRUCTION SPECIFICATIONS which leaves doubt as to the true intent and meaning of the plans and specifications, a ruling shall be obtained from the Contract Manager/Developer Representative before submitting a tender. If this is not done, it shall be assumed that the next most expensive alternative has been figured.
- 2.7.3 The layout plan of the traffic signal installations indicates only the general location and route to be followed by the conduits and/or wire and do not show all the structural, mechanical, location of pull boxes, or connecting details. The Contractor shall follow the requirements of CSA and install electrical conduits and boxes at locations where conveniently possible and necessary.
- 2.8 UNDERGROUND WIRING
- 2.8.1 Underground wiring shall be installed in industry accepted SDR.11, 2" HDPE orange pipes, as shown on the CONSTRUCTION DRAWINGS. Adaption from plastic to steel conduit at the pole base shall be by means of conduit or plastic pipe connector with conduit to plastic being threaded and the plastic to plastic being glued. Connections shall be watertight.
- 2.8.2 A green insulated grounding conductor shall be installed throughout all lines and shall connect to the ground studs on all feeders and pullboxes and to the grounding studs at all pole bases.
- 2.8.3 All conduit shall be installed free from dents and bruises and as soon as installed shall have the ends plugged to prevent the entrance of dirt or moisture. All conduits shall be thoroughly cleaned out before installation of conductors.
- 2.8.4 When pulling cables in ducts a 6.5 mm stranded nylon pullrope shall be provided in the duct for drawing cable through at a later date. The pullrope shall be kink free, continuous in length with a surplus 3 m at each end of the duct.

- 2.8.5 No splices or joints shall be drawn inside ducts.
- 2.8.6 Cable shall be run in one length, where practicable, without splices, from termination to termination. When cable cutting is required, cable ends shall be effectively sealed against moisture, immediately after cutting.
- 2.8.7 Where splices and terminations are made, they shall be made by experienced cable splicers regularly engaged in this type of work.
- 2.8.8 All underground runs shall be open-trenched except where underground conduit is shown crossing existing pavement and they shall be drilled or pushed under the pavement at a minimum depth of 1.2 m. The Contractor shall not be allowed to cut the existing pavement without permission from the Contract Manager/Developer Representative. Permission to cut the pavement shall not be considered unless the Contractor has made a minimum of 3 attempts at each crossing and has been unable to successfully install the conduit.
- 2.8.9 Underground runs shall be buried to a minimum depth of 1.2 m below finished grade except where indicated otherwise on the plans or by the direction of the Contract Manager/Developer Representative.
- 2.8.10 Where cutting of a paved area is involved, the patching method shall be approved by the Contract Manager/Developer Representative.
- 2.9 EXCAVATION AND BACKFILLING OF TRENCHES FOR CONDUITS
- 2.9.1 All trenching shall be governed by Provincial and local Municipal Codes relating to trenching and safety.
- 2.9.2 The Contractor shall provide all excavation, sand bedding, and granular backfill if required.
- 2.9.3 All conduits and ducts shall be supplied by the Contractor and shall be the sizes and type indicated on the CONSTRUCTION DRAWINGS.
- 2.9.4 Backfilling of trenches shall be done to the satisfaction of the Contract Manager/Developer Representative and shall be done with material removed from the trenches, provided it is 75 mm material or less. If the material is more than 75 mm material, the Contractor shall remove the material and replace it with minus 75 mm select granular aggregate. The backfill material shall be placed in 150 mm lifts and compacted with a pneumatic or vibrating mechanical compactor.
- 2.9.5 The Contractor shall supervise all backfilling of electrical services and underground conduit runs.
- 2.9.6 Trenches shall not be excessively wet and shall not contain pools of water during backfilling operations.
- 2.9.7 All trenches shall be completely backfilled and tamped level with the adjacent surface.

**2.10 WIRES AND CABLES**

- 2.10.1 All wiring shall be 98% conductivity copper with 600 volt insulation and shall bear a CSA approval label. All wires and cables shall meet standards for installation in wet environments.
- 2.10.2 Smaller conductors for control or low voltage work shall be used where called for.
- 2.10.3 Where connections are made or conductors pass through junction boxes there shall be 0.3 m of slack left in each junction box.
- 2.10.4 Traffic signal conductors shall be supplied in colours as shown on the CONSTRUCTION DRAWINGS. In special cases, extra colour coding is required, and shall be accomplished with coloured vinyl tape for identification as shown on the drawings. The colours of vinyl tape shall be white, red, blue, orange, and yellow. Black shall be used for bundling only.
- 2.10.5 Each signal head shall be separately wired to the base of the pole and all common connections shall be made at the base of the pole accessible from the handhole.
- 2.10.6 Conductors for each phase shall be bundled together and held with black tape at the base of each pole, in each junction box, or any other point where all conductors are accessible. This shall be done for each splice leg and where conductors enter or leave conduit.
- 2.10.7 Conductor from the mast arm hanger to cable entrances shall be bundled and taped together.
- 2.10.8 The Contractor shall be required to drill and tap the poles for wire outlets. These wire outlets shall be with grommets.
- 2.10.9 Vertical runs of cable shall always be routed in metal conduits equipped with entrance fittings (weather heads) or routed inside metal poles, concrete poles, or pedestals.
- 2.10.10 Cable runs shall be separated by function. Traffic signal cables, interconnect cables, detector and pedestrian pushbutton leads may be in separate sheaths or jackets. If one prime cable is used for all circuits, the colour code shall be followed for future proper identification.
- 2.10.11 Detector and pedestrian pushbutton leads shall be routed directly from each detector or pushbutton to the controller cabinet field terminals.
- 2.10.12 Detector circuits shall be routed to the controller cabinet through different cables than those used for other functions. Particular attention must be given to any special installation instructions and/or cable requirements provided by the detector manufacturer.
- 2.10.13 Splices in both aerial and underground cable shall be electrically sound and waterproof.
- 2.10.14 Wire connections in splices shall be soldered and individually wrapped with electrical tape to ensure good electrical continuity and separation.

- 2.10.15 Underground splices shall be located in a pull or splice box or in the base of poles or pedestals. Splices must never be located within a conduit run or within a pole or pedestal in a manner so as not to be readily accessible through the handhole.
- 2.11 PULL BOXES OR JUNCTION BOXES
- 2.11.1 The Contractor shall supply and install pull boxes at all locations indicated in the signal plans and at any corner or turn where pull boxes are necessary, and as required by job conditions and/or the Canadian Electrical Code.
- 2.11.2 Where possible, junction boxes shall be positioned behind or to the side of poles and pavement edges.
- 2.11.3 Pull boxes shall be precast of non-ferrous metal and shall have a removable cover equipped with cap screws and threaded holes in the cover making provision for its removal after sealing.
- 2.11.4 Junction boxes shall be completely filled and sealed to prevent the entrance of moisture, or frost and to prevent corrosion.
- 2.11.5 After closing the conduit opening with Oakum, the junction box shall be completely filled with melted amber petroleum (vaseline) or equivalent.
- 2.12 SEALING OF CONDUITS, CABINET BOTTOM LIP, ETC.
- 2.12.1 All conduit joints and pull box entrances and exits shall be sealed with proper weatherproof compound to prevent seepage of water.
- 2.12.2 The controller cabinet bottom in contact with the concrete pedestal shall be sealed with weatherproof compound to prevent seepage of water.
- 2.13 PEDESTRIAN PUSHBUTTON ACTUATION RELAY
- 2.13.1 The pedestrian actuation shall be controlled by low voltage relay switching. The low voltage relay switching shall be operated from 24 volt A.C. supply from the controller cabinet.
- 2.14 GROUNDING
- 2.14.1 A 3 m or longer copper-weld ground rod of 20 mm in diameter shall be supplied and installed in close proximity to the controller cabinet.
- 2.14.2 The ground rod shall be bonded to the neutral of the main breaker by connection of the ground rod with #8 conductor in 1 single circuit.
- 2.14.3 Only one (1) ground point shall be installed at each service.
- 2.14.4 Rigid steel conduit shall also require grounding.

- 2.14.5 Ground conductors shall be installed in all conduits and ducts and shall be T.W.H. green in colour. These ground conductors shall be secured to the existing grounding studs in each standard.
- 2.14.6 Individual grounding of all remotely located accessory devices and cabinets, and all metal poles and pedestals, with at least a #8 AWG wire in the manner described above shall be mandatory for reasons of safety and satisfactory operations.
- 2.14.7 A ground network shall be provided which bonds all grounds to one common source. This network shall include the grounded or neutral side of the A.C. power supply.
- 2.14.8 Ground rods which may be subject to accidental damage or vandalism shall be encased in metal conduits or wooden moulding.
- 2.15 SIGNAL HEAD INSTALLATION
- 2.15.1 The Contractor shall install signal heads as shown on the CONSTRUCTION DRAWINGS and these locations shall be checked with the Contract Manager/Developer Representative in the field before final mounting.
- 2.15.2 The signal heads on the horizontal span shall be mounted to give maximum vertical clearance for the roadway.
- 2.15.3 The signal heads on the side poles shall be mounted as shown on the CONSTRUCTION DRAWING. The Contractor shall be required to drill and tap the steel poles as required.
- 2.15.4 All conductors from mast hangers to cable entrances shall be taped together.
- 2.15.5 The Contractor shall completely cover the signal heads from the time they are installed until the system is turned on for full operation.
- 2.16 VEHICLE LOOP DETECTORS
- 2.16.1 All detector loops shall be direct cut and consist of 3 turns of #14 stranded cross-link, unless otherwise specified.
- 2.16.2 The loop shall be saw-cut to a depth of 50 mm and be wide enough to take the wire. To prevent abrasion of the wire insulation, diagonal saw-cuts of 45° shall be used at all corners.
- 2.16.3 When saw-cutting the pavement, good workmanship shall be followed to ensure the slot edges are smooth. The slots are to be cleaned and dried prior to installation of the wire.
- 2.16.4 One continuous, unbroken length of wire shall be used to form a loop of the number of turns required and the lead-in from the loop to junction box. The lead-in shall be spliced to the loop at the junction box.

- 2.16.5 Shielded audio cable (Beldon 8270) shall be used for loop lead-ins.
- 2.16.6 All splices shall be carefully made to ensure constant low resistance and be insulated in such a manner that, under the prevailing environmental conditions, the installation maintains resistance to ground of not less than five megohms. To ensure consistent low resistance connections, the splices shall be soldered. To ensure the loop installation is correct, a continuity check on the loop wiring and a resistance check on the loop to ground using a "megger" or other suitable insulation tester shall be performed.
- 2.16.7 When installing a 12 mm thick backer rod and sealing the slot, the Contractor shall use "3M Brand Detector Loop Sealant" unless otherwise specified or approved by the Contract Manager/Developer Representative.
- 2.17 RESTORATION OF EXISTING FEATURES
- 2.17.1 All existing sidewalks, ditches, culverts, gravel surfaces and other surface features affected by the Contractor's construction operations shall, as closely as possible, be returned to their original condition upon completion of the work in the area.
- 2.17.2 Restoration work shall be the responsibility of the Contractor and no additional compensation shall be paid.
- 2.18 SIDEWALK REPAIRS
- 2.18.1 Where it is necessary to break the concrete sidewalk or curb for the installation of conduits, bases, and junction boxes, the Contractor shall be responsible for repairs to this broken sidewalk or curb. The concrete shall be cut with a pavement saw where possible.
- 2.18.2 Where sidewalk is repaired, 10 mm premoulded asphalt expansion joints shall be installed between the vertical surface of a base and the concrete used for sidewalk repairs.
- 2.18.3 Base gravel shall be mechanically compacted.
- 2.18.4 The broken face of the sidewalk shall be washed before the concrete repair is carried out.
- 2.18.5 The repaired concrete shall be the same depth as the existing sidewalk and the surface of the repair shall be even and trowel-finished as near as possible to the existing surface.
- 2.19 TESTS
- 2.19.1 All portions of the electrical work shall be tested and checked for satisfactory operation by the Contractor.
- 2.19.2 The Contractor shall ensure that a qualified electrical inspection engineer or technician is available to perform on-site testing of the ground fault protection system.

- 2.19.3 Before energizing any portion of the electrical system, the Contractor shall perform megger tests on all feeders and branch circuits. The results of such tests shall conform to the requirements of the Canadian Electrical Code and shall be to the satisfaction of the electrical inspection authority and the Contract Manager/Developer Representative.
- 2.20 RECORD PLANS AND ACTUAL SIGNALS INSTALLED
- 2.20.1 The Contract Manager/Developer Representative will furnish the Contractor with one set of prints to be used for record work as actually installed. The Contractor shall accurately record on this set of plans day by day, all outlets, conduit fixtures and equipment as actually installed on the job. Any changes to the contract work shall be similarly recorded.

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on the correct sides when the document is printed double-sided.



Traffic signal maintenance can be broken down into the following categories:

- 1.0      External Maintenance to Outside Plant: That part of signalized location which is external to the actual controller and its associated terminal facility.
- 2.0      Internal Cabinet Maintenance: That part of the signalized location which refers to all the control equipment such as the actual terminal facility and all of its associated assemblies - maintenance and repair of same.
- 3.0      Emergency Response: Which consists of:
  - (i)      External problem;
  - (ii)     Internal problem; and,
  - (iii)    Emergency damage/accident.
- 4.0      Minor System Upgrading
- 5.0      Support Equipment: Required by the Contractor.

The purpose of this document is to provide the minimum standards acceptable to provide maintenance and service for a traffic signal system. Properly followed each of the procedures not only act as a form of maintaining signals, they also provide a step by step method of trouble shooting and therefore diagnosing problems that occur.

Each of the above noted categories is outlined as to what is expected both in performance of work as well as the method of reporting each on the forms provided. Accurate documentation is essential for the overall effect of the plan.

It is to be understood that maintenance is defined as those tasks and duties necessary to properly maintain an efficient trouble free system. Any work to upgrade the present system as indicated by the reporting sheets that is in excess of 4 hours per location must be approved by the Contract Manager/Developer Representative or their representative. The maintenance program should provide to the owner sufficient information to plan any large capital expenditures to upgrade a particular part of the system. Therefore, any large projects such as roadway expansion, rephasing, system retiming, will be individually quoted as per plans and specifications provided.

It is expected that in addition to the necessary tools and aerial equipment required to do the job that Contractor also carry an adequate supply of spare equipment to properly service and repair the control equipment.

## 1.0      **EXTERNAL MAINTENANCE**

This refers to the outside plant, that part of the system which is external to the control terminal facility.

The Contractor shall provide sheets for recording the following information, as well as a detailed description of each duty to be performed.

## 1.1 SIGNAL AND PEDESTRIAN HEADS

1.1.1 Signal and pedestrian heads shall be checked for fatigue, metal/plastic, paint and weather stripping, condition of visor and hangers.

1.1.2 Hanging support bolts shall be torqued to proper tension as per the manufacturer's recommendation.

1.1.3 Lamps shall be replaced when required. Lens and reflector shall be cleaned, hinges shall be oiled, and fasteners shall be checked for operation.

1.1.4 The final head adjustment shall be properly aligned as to where it is pointing on the road for oncoming traffic.

## 1.2 SUPPORT STRUCTURES

1.2.1 Aerial Installations shall be checked for:

1.2.1.1 Span Wire/Messenger:

- (i) Fatigue at support points;
- (ii) Tension durability, insulation value, overhead clearance;
- (iii) Cables properly attached and neat, lashed if required; and
- (iv) Visible damage/paint if required - note in report.

1.2.1.2 Downhauls (where applicable):

- (i) Correct tension and durability;
- (ii) Fatigue or wear;
- (iii) Proper guards if required; and
- (iv) Clamps tight and secure.

1.2.2 Davit and Cantilever Type Structures shall be checked for:

- (i) Proper bolts and nuts on Davit, torqued to proper tension with torque wrench (correct tension shall be provided);
- (ii) Pole and arm welds shall be visibly checked for deterioration;
- (iii) Proper anchor bolt tension;
- (iv) Proper pole alignment;
- (v) Any undue sag or poor overhead clearance shall be noted and corrected if possible;
- (vi) Any attachments such as cable entrance and push button;
- (vii) Signs shall be made neat and presentable; and
- (viii) If required to be painted, make note in report.

### 1.2.3 Signs

#### 1.2.3.1 Overhead and Illuminated:

- (i) Shall be thoroughly cleaned or relamped when required; and
- (ii) If a sign shows wear or is illegible, it shall be noted, and then will be scheduled for repair and/or replacement as per the County's instruction.

#### 1.2.3.2 Ground Mounted:

- (i) Shall be cleaned and checked for trueness, alignment and damage; and
- (ii) If a sign shows wear or is illegible, it shall be noted, and then will be scheduled for repair and/or replacement as per the County's instruction.

#### 1.2.4 Loop Detector Cuts:

- (i) Shall be checked for deterioration of the patch in the case of a conduit type installation.
- (ii) Shall be checked for wire floating to the surface in the case of a direct cut installation.
- (iii) Any deficiencies shall be noted and scheduled for improvement or replacement as required.

#### 1.2.5 Pedestrian Push Buttons:

- (i) Shall be checked by sending a helper around to push and inspect the buttons and signals for proper operation.
- (ii) Any jammed or broken buttons shall be repaired, if possible, or scheduled for replacement.

### 1.3 JUNCTION BOXES

#### 1.3.1 Junction boxes shall be checked for the following:

- (i) Overall condition;
- (ii) Cover is in place and of good condition;
- (iii) Cover is adequately secured;
- (iv) Cover is bonded to the electrical network of the signal system; and
- (v) Structural integrity of the junction box is intact.

#### 1.3.2 Any deficiencies shall be noted and scheduled for repair and/or replacement as per the County's instruction.

### 1.4 VIDEO DETECTION HARDWARE

#### 1.4.1 Video detection hardware and components shall be checked for overall condition. Any deficiencies shall be noted and scheduled for repair and/or replacement as per the County's instruction.

#### 1.4.2 The lens of the video detection cameras shall be cleaned.

**1.5 SUMMARY**

It is expected that upon completion of the above tasks, the location in question shall be neat, clean, and in good working order. If any deficiencies do exist they shall be noted on the report sheets. The above maintenance shall be required twice yearly, including one complete relamping, with the exception of locations that are equipped with LED lamping.

**2.0 INTERNAL CABINET MAINTENANCE**

As this area's function, reliability, and overall operation constitute the heart of the signal operation, it is imperative that the maintenance be properly performed as outlined and accurately recorded.

The Contractor shall provide sheets for recording this information, as well as a detailed description of each duty to be performed.

**2.1 CABINET**

2.1.1 Shall be cleaned by wiping all dust off equipment, shelves, etc., and air filter shall be replaced with a new one. Vent covers shall be removed or installed to match seasonal changes.

2.1.2 Entire interior of cabinet shall be vacuumed and kept clean of any debris.

2.1.3 Heater and ventilating fan shall be checked for operation to ensure that they are in condition to run another duty cycle before requiring maintenance.

2.1.4 All mechanical parts (e.g., locks, hinges, handles, latching mechanisms, etc.) of cabinets shall be checked for operation and lubrication.

**2.2 ELECTRICAL CONNECTIONS AND EQUIPMENT**

2.2.1 All electrical connections shall be checked to see that they are secure and tight. Care must be taken not to overtighten or damage wire ends and terminal lugs.

2.2.2 Ground connections shall be tested by means of a ground-rod tester to make sure that the ground resistance meets C.E.C. specifications. This figure shall be noted on the sheets.

2.2.3 All light relays shall be checked for leakage using a suitable digital voltmeter. The Ohmmeter test is unacceptable and the person checking the NEMA load switch shall know the acceptable level of leakage for a solid-state switching device. The levels noted shall be recorded. Turned on voltage shall be recorded also to check that it is within the allowable NEMA standards.

2.2.4 Solid-state flasher shall be tested for operation during the test period to see that it will operate properly during a failed period.

2.2.5 Flash transfer relays shall be visually tested for operation and any visible wear.

- 2.2.6 Intersection shall be tested for flash operation.
- 2.3 Terminal Facility Pluggables: The following shall be followed and checked for operation:
- (i) Controller timing shall be tested as per sheets in cabinet. The version of software shall be checked and updated to the most recent version;
  - (ii) All indicator lamps shall be tested;
  - (iii) All switching devices for operation connectors shall be tested and checked for tightness;
  - (iv) Applicable ground and line voltage shall be checked and recorded;
  - (v) Applicable controller inputs (e.g., vehicle and pedestrian detectors, maximum 2 indication, pre-empt indication, etc.) shall be tested; and
  - (vi) Proper controller outputs (e.g. light relay turn on, timing extension, etc.) shall also be tested. Where applicable, controller shall be checked for system operation. This would consist of interface with coordinator, acceptance of information from master coordination check, coordinated free operation, special communications test.
- 2.4 Conflict Monitor: Shall be tested to meet the following:
- (i) It shall trip at no more than 28 volts  $\pm$  10%;
  - (ii) It shall trip on low 24 volt DC;
  - (iii) Voltage monitor shall be accurately checked;
  - (iv) Red, yellow, and green inputs conflict properly;
  - (v) It shall fail on low voltage AC;
  - (vi) It shall trip properly as per chart provided;
  - (vii) It shall be tested so that when removed it will "fail" the intersection; and
  - (viii) An automated conflict monitor test shall be done at least once a year.
- 2.5 VEHICLE DETECTOR
- 2.5.1 Shall be tested that it is receiving all calls, skipping and gapping out properly. Verify field of view.
- 2.5.2 Loop sensitivity shall be checked and adjusted if necessary.
- 2.5.3 The version of software shall be checked and updated to the most recent version, unless otherwise advised.
- 2.5.4 Shall be disconnected and failed wires tested with Ohmmeter.
- Note: If more than 10 OHMS resistance to ground is measured, then loop shall be isolated, tested with megger, and results reported. Care shall be taken not to damage detector amplifier unit. After tests are completed, it shall be reconnected, retuned, and checked for operation.**
- 2.6 PEDESTRIAN PUSH BUTTON
- 2.6.1 Shall be tested for proper operations.

- 2.6.2 Shall be sure that it accurately puts calls into the applied phases, and skips the phase when the button is not pressed.
- 2.6.3 Shall be checked and noted that pedestrian is unable to extend green time.
- 2.7 AUXILIARY DEVICES: External clocks, maximum two (2) timers auxiliary logic devices, etc.
- 2.7.1 These shall be tested to see that they comply with the applicable print at each of the associated terminal facilities and/or all discrepancies must be noted and brought to the attention of the Contract Manager/Developer Representative.
- 2.8 SUMMARY

Notation shall be made in the log book any time an intersection is not in normal operation. This shall include when an intersection is put on flash, when it is not coordinated or responding to system information, and any abnormal behaviour caused by the tests. Complete detail of time arrived, time taken doing tests, and final completion shall be noted in the log book as well as on the maintenance report sheet.

**In the event of a malfunction, it shall be the Contractor's responsibility not to change any of the existing wiring, functions, or timings to make the intersection work, without the written permission of the Contract Manager/Developer Representative.**

For example, the Contractor is not allowed to override monitor channels, slash designations, etc. in an attempt to keep the intersection operating. In all cases, the intersection, if not working normally, shall be left in a failed state which is on flash. This is the safest situation from a liability point of view.

**Internal maintenance is required twice yearly.**

### 3.0 EMERGENCY RESPONSE

The responsibility of the Contractor is as follows:

- 3.1.1 To provide full operations on a 24-hour basis to respond to receipt of call out within a 30 minute period;
- 3.1.2 Indicate date and time of dispatch on trouble report;
- 3.1.3 Indicate who dispatched repairman;
- 3.1.4 Time of arrival;
- 3.1.5 Upon arrival, intersection status shall be accurately reported and all information included on traffic call out sheet;

3.1.6 After recording all statistics, the first duty is to make the intersection safe. For example, put on a flashing operation. If a flashing operation is not feasible, it shall be the Contractor's responsibility to supply stop signs for the minor roadway, and to supply traffic control devices to close one of the dual left turn lanes as required for traffic safety, during the time that repairs are being carried out; and

3.1.7 Contractor's report shall include a detailed description of what repairs are required, which equipment was replaced, and their time. If there is any collision or damage caused during the malfunction period, a detailed report shall be filled out in addition to the normal report which shall include any information required from the local police, etc. This shall include the County's position in relation to the accident in regards to the failing of the intersection.

#### **4.0 MINOR SYSTEM UPGRADING**

4.1.1 Where upgrading of existing systems is required the Contractor will be asked to submit a quotation. The quotation shall include the following information:

- (i) Location;
- (ii) Summary of work involved to complete the task;
- (iii) Schedule;
- (iv) Amount of labour and equipment required;
- (v) Materials list including unit prices; and
- (vi) Subcontractors.

4.1.2 Upon completion of the work, the Contractor shall submit an invoice for the materials, labour, equipment, etc. actually incorporated into the work, and shall be paid according to the rates as set out in the SCHEDULE OF QUANTITIES, or as per the quotation, whichever is less.

#### **5.0 SUPPORT EQUIPMENT**

Support equipment required by the Contractor is broken down into the following categories: trucks and related equipment; signs; and shop equipment necessary for solid-state repair of equipment.

##### **5.1 TRUCKS AND RELATED EQUIPMENT**

To properly do signal maintenance, the following minimum equipment is required:

5.1.1 Aerial boom truck with height capacity of reaching at least 10 m. This device shall be in good working order, including all emergency lighting for working on roadways. This shall include the capability of having an arrowboard for working on the freeway during an emergency, as well as amber flashing beacons both front and rear. These shall be mounted in such a way that they are conspicuous to the motoring public.

5.1.2 Service Van: This van shall, in most cases, be used to do the maintenance as outlined in [SECTION 2.0, INTERNAL CABINET MAINTENANCE](#) of this section.

This van shall also have adequate emergency flasher and safety cones. As this van is not in conflict with traffic in the same sense as the aerial truck, the arrow board may not be required.

This represents the minimum acceptable mobile equipment required for this Contract. Those bidding on this Contract shall note that if, upon inspection of the equipment, the Contract Manager/Developer Representative finds that it is:

- (i) In poor condition and therefore unreliable for the job;
- (ii) Unsightly in body and cosmetic appearance; and/or
- (iii) Not yet in operating condition.

Any or all of the above items shall be just cause for the Contract Manager/Developer Representative to request that the equipment be brought up to an acceptable standard. Failure to do so shall result in the bidder being disqualified.

## 5.2 SIGNS

The service van and boom truck shall be equipped, at all times, with portable signs for use in the event of signal shut down or as required for traffic control.

## 5.3 SHOP EQUIPMENT NECESSARY FOR SOLID-STATE REPAIR OF EQUIPMENT

The Contractor shall have, or have access to, the following shop equipment. In the case where the Contractor does not have the equipment, documentation verifying the availability of the equipment shall be required.

- (i) NEMA traffic controller tester;
- (ii) NEMA relay tester and flasher tester;
- (iii) Scope or curve tracing equipment for testing printed circuit boards;
- (iv) Diagnostic equipment for testing the County's system; and
- (v) NEMA 8-phase controller.

## 6.0 MATERIALS AND SUPPLIES

This section covers equipment that is required to effectively maintain and repair traffic signals and their associated devices.

Invoicing for materials incorporated into routine maintenance, trouble calls, and system upgrading shall include a complete list of all materials used and their associated unit prices.

## 6.1 EXTERNAL MAINTENANCE

- (i) 1 - 12" polycarbonate signal head c/w backboard;
- (ii) 1 - 8" polycarbonate signal head c/w backboard;
- (iii) 4 pedestrian push buttons;
- (iv) 4 pedestrian push button signs;
- (v) Sufficient lamps shall be carried on truck to completely relamp an entire intersection at any given time;
- (vi) Mounting hardware sufficient to dress 1 complete pole; and



- (vii) Normal electrical hardware, such as connectors, marrettes, etc. On any call out, the truck should be able to completely rework or repair one corner of the intersection without disabling the intersection for any long periods of time.

## 6.2 INTERNAL CABINET MAINTENANCE

The van must carry:

- (i) 4 - NEMA load switches;
- (ii) 2 - NEMA two-circuit 15 Amp flashers;
- (iii) 2 - loop detector amplifiers;
- (iv) Sufficient signal lamps for emergency;
- (v) 1 - complete cross walk control mechanism;
- (vi) 1 - monitor tester;
- (vii) 1 - NEMA type 12L monitor;
- (viii) 1 - NEMA type 6L monitor;
- (ix) 1 - megger - solid waste;
- (x) 1 - fluke, 8020 digital metre/equipment;
- (xi) 1 - ground tester; and
- (xii) Assorted hand tools and testing devices required to work safely in the terminal facility.

## 6.3 SUMMARY

All potential bidders on this Contract shall clearly understand the position of Strathcona County. All of the equipment outlined here shall be the minimum acceptable standard equipment that any signal Contractor who is engaged in the installation, maintenance and repair of signal systems would carry in-house. The County will not reimburse the Contractor for capital expenditures, either directly or indirectly.

The signal electricians and technicians who are employed under this Contract shall have a minimum of six months experience on NEMA type control equipment.

The repair and service of microprocessor-based equipment, as well as full knowledge of integrated central controlled systems, is an essential item under this Contract. It is not Strathcona County's policy to provide any training to the Contractor or their people. The County may provide, upon request, the standard service manual which is applicable to the equipment being serviced.

The Contractor is expected to learn and understand existing equipment and new equipment as it is introduced, at their own expense.

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on the correct sides when the document is printed double-sided.

## 1.0 GENERAL

### 1.1 DESCRIPTION

- 1.1.1 This section specifies the requirements for supplying and installing traffic signs along Strathcona County roadways.
- 1.1.2 Refer to [STANDARD DRAWING 41303](#) for urban installation and [STANDARD DRAWING 51203](#) for rural installations.

## 2.0 PRODUCTS

- 2.1 Where signs are to be installed in soil, approved manufacturers of sign posts are:

**TABLE 2.1: Telespar Square Fit**

Post			Base Installation			
Max. Sign Size (cm)	Post Length (m)	Outside Dimension (mm)	Base		Base Sleeve	
			Length (mm)	Outside Dimensions (mm)	Length (mm)	Outside Dimensions (mm)
75 x 75	3.65 (12ft)	45 x 45	1.0	50 x 50	0.45	57 x 57
90 x 90	4.27 (14ft)	50 x 50	1.0	57 x 57	0.45	64 x 64
(i) The wall thickness for the above components is 2.7 mm.						
(ii) All post installation components shall be galvanized.						
(iii) Signs with a surface area greater than 1 m <sup>2</sup> shall be installed on 2 posts.						

- 2.2 New Concrete: Where signs are to be installed on new concrete constructed in the same project as the sign installation, a 100 mm diameter PVC sleeve shall be inserted in the fresh concrete at the sign location. The PVC sleeve must extend for the full depth of the concrete. Where the concrete is poured on asphalt, the asphalt must be perforated with a hole extending through the asphalt to the clay subgrade. The post end sign base installation will proceed in accordance with [TABLE 2.1 OF THIS SECTION](#).
- 2.3 Existing Concrete: Where signs are to be installed on existing concrete, the installation shall consist of the following:
- Posts: Aluminum pipe, Schedule 40, 47.5 mm, (1 7/8") outside diameter, is approved.
  - Base: Round cast Patt. #AD5, 2169
  - Breakaway: Quikfix Sign Systems
- 2.4 When signs are to be installed on metal utility poles, the signboard shall be attached to the pole with a HangerMate anchor (Elco Textron Cat. No. 2E605) or approved equal.

**2.5      Mounting Height: Urban Area: 2.0 m**

Exception: Where a WB - 25 and WB - 54 are mounted on a median signal pedestal post, the WB 54, shall be mounted 50 mm above the concrete or ground surface and the WB -25 mounted immediately above.

- Rural Area: 1.8 m

**2.6      Approved manufacturers of sign post breakaway systems are:**

- Quikfix Sign Systems

Breakaway systems will be used in the urban area on arterial and collector roads. Breakaways are not used in the rural area.

**2.7      Sign sheeting shall be 5052 - H38 grade aluminum, high tensile 234 mpa -262 mpa (34,000 psi - 38,000 psi) with 3M High Intensity Grade reflective material.****2.8      An identification sticker must be affixed to the back of the sign. The information to be contained on the sticker shall be as per the following:**

STRATHCONA COUNTY IT IS UNLAWFUL TO REMOVE *(Insert Date Of Installation)*
--

Minimum size – 75 mm x 75 mm

**2.9      The month and year of the installation is to be included on the sticker. The installer may choose to manufacture a sticker showing all the months of the year, along with five to ten year dates. The appropriate month and year would then be hole punched in order to illustrate the month and year the sign was installed.****3.0      EXECUTION****3.1      It is the responsibility of the Installer to locate all utilities prior to installation. Known utility contacts are, but not necessarily limited to, the following:**

- Alberta First Call – general;
- Strathcona County Water and Wastewater Services – water and sewer;
- Strathcona County Transportation and Agriculture Services - signal cables;
- Canadian Utilities, Water Department - water transmission;
- Shaw Cable - cable facilities; and
- Various individual pipeline companies - oil and gas transmission.

**3.2      Sign locations are to be staked by installer and approved by the County prior to installation.****3.3      Sign installations shall be in accordance with [STANDARD DRAWING 41303](#) for urban installation and [STANDARD DRAWING 51203](#) for rural installations.**

3.4 Sign posts shall be installed vertical to the satisfaction of the Contract Manager/Developer Representative.

#### **4.0 MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

4.1.1 The unit of measurement shall be at the units specified in the TENDER FORM.

##### **4.2 PAYMENT**

4.2.1 Payment at the respective Contract unit bid per unit shall be specified in the TENDER FORM and shall be full compensation for installations including supply and installation of all posts, signs, necessary hardware, and breakaway system where applicable and completion of the "Sign Report" and its delivery to the "Contract Manager"/Developer Representative.