General Design Standards

AMENDMENTS

DATE	REVISION	AUTHORIZED BY
December 17, 2021	**Section 6.0** - Lift Stations (V 1.0)	Engineering
April 13, 2023	Bulletin # 005 - General Design Standards **Amendment #1**	Engineering
May 10, 2023	**Bulletin #008** - Proof Roll Requirements	Engineering
March 19, 2024	**Bulletin #010** - Record Drawing and GIS Data Requirements Update	Engineering
April 08, 2025	General Design Standards **Amendment # 2**	Engineering

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Amended. Refer to Bulletin 005

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INTENT & USE OF DOCUMENT

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INTENT AND USE OF THIS DOCUMENT

The General Design Guidelines document provides the requirements with respect to the design and construction of municipal improvements in new development. The document will provide the information required by the engineer of record on behalf of the owner (Developer) to design the municipal improvements that will meet the City of Beaumont expectations.

The following principles are outlined within each applicable section of the document

- To ensure conformance of servicing design to the land development approval process and the applicable statutory, engineering and administrative requirements. These processes and requirements are in place to ensure that Developers provide municipal improvements and systems that are acceptable to the City for operation and maintenance.
- To provide a consolidated statement of City policies and expectations regarding the standard of municipal improvements required.
- To promote consistency and quality in the standard of municipal improvements provided
- To ensure that the municipal improvements will perform reliably in all circumstances and upon acceptance by the City
- To identify those design criteria that the City considers to be the minimum standards acceptable for typical conditions

The design information contained herein provides guidance beyond legislative and standard design practices. Beaumont retains full discretion in the application of, or deviation from these standards. Specific development conditions and standards may be applied to works that are beyond the scope of those indicated in this document. Where a need to deviate from the requirements is encountered, a proposal with supporting documentation shall be submitted to Engineering Services as per **Section 1.1.2 Variance Request**. Detailed submission requirements are found in **Section 1.2 Submission Standards**.

Where discrepancies occur between these standards and the terms of an approved Development Agreement, the Development Agreement will govern.

USE OF GENERAL DESIGN STANDARDS (GDS)

The Developer and the Consultant remain fully responsible for the design and construction of municipal improvements according to good engineering standards that address the specific needs and site conditions of their project. Certain projects may require more stringent criteria where appropriate and is the Developer's responsibility to ensure these standards are only used as a minimum requirement. Engineering Services approval indicates compliance with this document and is not a warranty of the design of the work. Further, the City expressly disclaims any responsibility for errors and omissions and the suitability of the drawings or the

designs to a particular site but requires the Consultant to assume full responsibility in this regard.

Engineering Services reserves the right to the interpretation of the intent of this document.

Beaumont reserves the right to change these standards or requirements, as required, to address current conditions, construction methods, and the scope of development.

This document, along with the latest editions of the Transportation Association of Canada (TAC) Guidelines, American Association of State Highway and Transportation Officials (AASHTO) Standards, American Society for Testing and Materials (ASTM) Standards, Stormwater Management Guidelines for the Province of Alberta, Provincial and the Canadian Computer Aided Drafting and Design standards provide the basis for the design of municipal construction projects and works intended for assumption by the municipality.

It is recognized that this document may require review and re-evaluation from time to time based on new technologies, best practices, and improved knowledge. It will be the responsibility of the Contract Administrator who is performing the contract administration for the work to verify that the installation of these systems will be in accordance with the latest revision of these Standards.

STATUTORY REQUIREMENTS FOR APPROVALS BY OTHER AUTHORITIES

The Developer and the Consultant undertaking a development project are to be aware of the statutory requirements governing such works and for compliance with those requirements. The Consultant shall obtain or arrange for all approvals from the authorities having the appropriate jurisdiction. The most recent version/ edition/amendment of bylaws, acts, regulations and standards, is to be used when referenced in this document. Where conflicts or inconsistencies with these standards arise in relation to statutory requirements, the Consultant shall be responsible to provide solutions and recommendations that will address those requirements along with an acceptable design that will meet the intent of this documents specifications.

DEFINITIONS

For the purposes of interpretation of these General Design Standards the following definitions shall apply:

Applicant may refer to the Developer, Consultant, Contractor, and/or Resident applying to undertake infrastructure work or develop land within the municipality.

Beaumont may refer to, as appropriate to the context, Beaumont as a corporate body, municipality, or any department therein. See also: **Municipality, Engineering Services**

A **Construction Completion Certificate** is a certificate issued by Beaumont, confirming that the work is complete and operational, that all deficiencies have been resolved, and that the Warranty Period for the work has commenced.

The **Consultant** refers to the professional engineer responsible for the preparation of designs, reports, studies, Engineering Drawings, and associated documents and for the execution and implementation of such designs, normally on behalf of a Developer. The Consultant must hold a valid permit to practice within the Province of Alberta and be registered in good standing with their applicable governing body. See also: **Engineer, Landscape Architect**

The **Contractor** refers to any person, persons, or corporation who shall undertake the installation of municipal infrastructure and services in Beaumont.

The **Developer** refers to the proponent of a land development proposal, or the Owner as defined in a Development Agreement. Responsibilities of the Developer stated in these standards may, where appropriate be referred to under a consultant, contractor, or other agent acting on the Developer's behalf.

The **Development Agreement** refers to a legal agreement between the Developer and Beaumont 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.

Deviation refers to a departure or alternative to these Standards, made through a formal request that must include a recommendation from the Consultant, and approved by the relevant department, prior to implementation. See **General Design Standards Variance Request Process** for detail.

Easement refers to an interest or right held by Beaumont for the purpose of providing utilities, access, or drainage.

The **Engineer, or Consulting Engineer** refers to the Professional Engineer responsible for the preparation of designs, reports, studies, Engineering Drawings, and associated documents and for the execution and implementation of such designs. The Engineer must hold a valid permit to practice within the Province of Alberta and be registered as an Engineer in good standing with APEGA.

Engineering Drawing refers to a technical drawing, and is used to fully and clearly define requirements for construction.

Engineering Services refers to the service area responsible for the application of these Standards. This may also refer to, as appropriate to the context, any service area within the City of Beaumont, including, but not limited to, planning, public infrastructure, parks, facilities, etc.

A **Final Acceptance Certificate** is a certificate issued by Beaumont, confirming that the work is complete and acceptable to the municipality, that all deficiencies and maintenance work have been resolved, and that the Warranty Period for the work has expired.

Franchise Utilities refer to utilities that are provided by an independent service provider who pay franchise fees to the municipality for access to municipal land and the exclusive rights to provide distribution, through a Franchise Agreement. In Beaumont, this includes gas, electrical power, street lighting, telephone, and cable television services. As these utilities can be installed within the frost zone, the term is interchangeable with **Shallow Utilities**. See **Section 3.6 Franchise Utilities** for detail.

Inspector shall refer to the person or corporate entity responsible to confirm and authorize sign off on all works requiring inspection. The Inspector shall determine whether work performed meets the specifications approved in the design drawings. Inspections, apart from those completed internally for pre-application, must be performed by a designated professional in the area of inspection. In cases outside the realm of Consultant expertise, a neutral third party professional in the area of concern (eg. geotechnical, environmental) must be used, and all inspected work and must meet any requirements stated in these design standards.

Landscape Architect refers to the consultant acting normally on behalf of the Developer to coordinate the preparation of all landscape drawings, inspect all on site work and coordinate with Engineering Services, and other pertinent groups in the issuance of Construction Completion Certificates and Final Acceptance Certificates. The Landscape Architect must be a member in good standing of the Alberta Association of Landscape Architects.

Municipal Improvement refers to any work performed within the Beaumont corporate limits. It may refer to new development or retrofit of existing municipal assets.

Municipal Reserve (MR) refers to land owned by the municipality for the development of parks and school grounds pursuant to Section 666 and Section 667(1) of the Municipal Government Act.

Municipality shall refer to the City of Beaumont.

The **Owner** refers to the owner of the land, the leaseholder, and/or permit holder where work is taking place.

A **Public Utility Lot (PUL)** refers to land designated for installation and maintenance of a public utility.

Shallow Utilities, refer to **Franchise Utilities**.

Warranty Period refers to the minimum period of time commencing with the issuance of a Construction Completion Certificate and ending with the issuance of a Final Acceptance Certificate, during which the Developer shall be responsible for the maintenance of municipal improvement work in accordance with the Development Agreement and/or contract documents, and repair of any deficiencies. See **Post Construction** for detail.

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SECTION 1.0
PROCESS

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1.1 SUBDIVISION DEVELOPMENT REQUIREMENTS

1.1.1 Introduction

This section indicates the general requirements in place with respect to the provision of municipal improvements and new developments. These requirements cover general standards and do not relieve the Engineer of the responsibility for provision of a finished product that demonstrates competent engineering design and construction practices.

Low Impact Development principles in the design of works within the municipality are encouraged in a Pilot Project capacity.

1.1.2 General Design Standards Variance Request Process

Creativity and innovation is encouraged in design and construction of infrastructure, subject to the appropriate standards, building codes, and acceptable industry best practice. Engineering Services has ultimate authority regarding the minimum standards required.

The proposal process for deviating from these standards is summarized in **Figure 1.1** and as follows:

a. Deviation request forms are submitted to Engineering Services. The Manager of Engineering will initiate review of the deviation request by concerned departments,

b. Engineering Services will provide a response within 4 (four) weeks of receipt. Depending on the nature of the deviation request, the response may require additional review time.

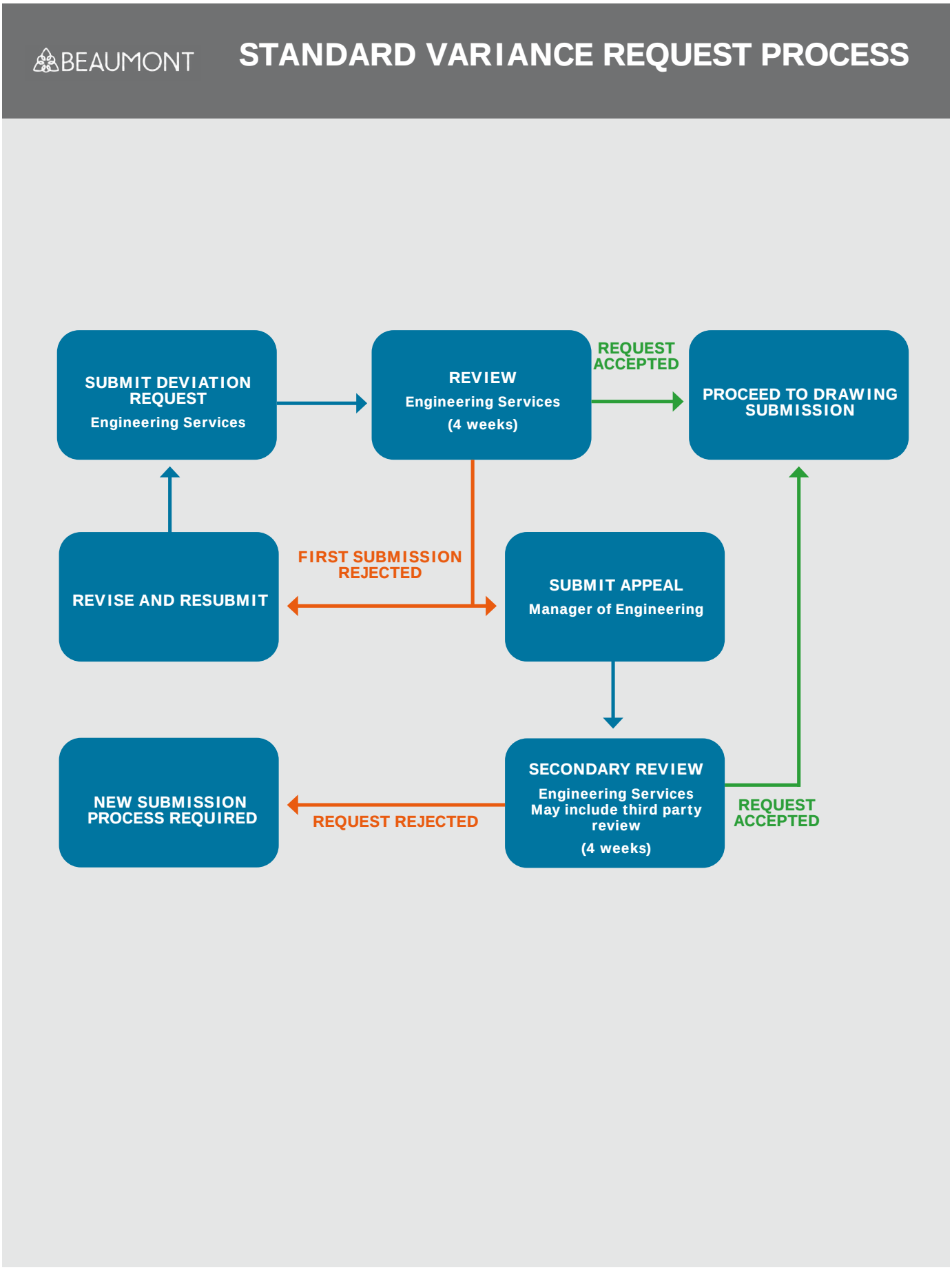
c. If the deviation request is accepted, the applicant will be advised on how the change may be applied on an ongoing basis,

d. If the deviation request is denied, the applicant will be advised of the reasons for refusal. The applicant may elect to re-submit the deviation request, provided the reasons for initial rejection are fully addressed in the subsequent submission.

Incomplete submissions (those without drawings and letter of explanation) of deviation request with insufficient supporting documentation will be returned to the applicant 'without' review. The onus is on the applicant to provide a complete submission.

It should be noted that any extraordinary costs incurred by Beaumont for review of submissions, and re-submissions on appeal, shall be the responsibility of the Developer as this may include third-party review of the proposed deviation.

Figure 1.1


BEAUMONT
STANDARD VARIANCE REQUEST PROCESS
SUBMIT DEVIATION REQUEST
Engineering Services
REVIEW
Engineering Services
(4 weeks)
REQUEST ACCEPTED
PROCEED TO DRAWING SUBMISSION
REVISE AND RESUBMIT
FIRST SUBMISSION REJECTED
SUBMIT APPEAL
Manager of Engineering
NEW SUBMISSION PROCESS REQUIRED
REQUEST REJECTED
SECONDARY REVIEW
Engineering Services
May include third party review
(4 weeks)
REQUEST ACCEPTED

1.1.3 Scope of Municipal Improvements

The scope of municipal improvements includes the following:

Surface

a. roadways, walkways and lanes
b. sidewalks and curb and gutter
c. traffic control signage, markings and devices including street name signage
d. general and Lot & Block grading provisions

Underground

a. drainage systems, including piped storm sewers and overland flow provisions
b. stormwater management facilities and their outlets
c. water mains and wastewater sewers
d. wastewater, water and stormwater service connections to individual properties
e. shallow bury utilities including power, telephone, natural gas and cable television servicing

Landscaping

a. landscaping for boulevards, parks, recreation facilities, medians, entrance features, walkways, public utility lots and related fencing and park furniture
b. sound attenuation barriers

1.1.4 Information Requirements

The Consulting Engineer shall submit the following information to support the phases and stages of development.

1.1.4.1 General Information Requirements

a. **General Information** - The land uses proposed shall be clearly identified. Residential developments should indicate the number of lots (density of multi-family), indicate appropriate land use by-law district being proposed. Delineate open space, school sites, trail linkages and road rights of way (show widths). Clearly show the connections to existing or proposed roads in adjacent development areas.
b. **Geotechnical Information** - The results of a geotechnical investigation, which has been completed by a qualified geotechnical engineering firm, shall be provided. The information provided shall be sufficient to assess overall soil and groundwater table conditions, the suitability of the site for development (foundation support) and the need to modify soil conditions to achieve the minimum standards. The report should be explicit in terms of recommendations for development and address any possible requirements to ensure that long-term stability and quality of development is assured.

c. **Environmental Site Assessment** - An environmental site assessment of the overall development area shall be provided in conformance with current legislative standards and in accordance with commonly accepted procedures and practices.

d. **Traffic Impact Assessment** - The results of a Traffic Impact Assessment, which has been completed by a qualified transportation engineering planning firm, shall be provided. The information provided shall be sufficient to assess overall transportation requirements and is used to identify transportation planning and traffic operation requirements.

e. **Special Provisions** - Where development is intended adjacent to a watercourse or within the potential flood plain of any drainage system, methods of preventing flooding within the development shall be provided.

f. **Overall Municipal Improvement Plan(s)** - Overall plan(s) of the proposed major services shall be provided indicating the location and sizing of water mains, wastewater and storm sewers, stormwater management facilities, municipal reserves/parks, transportation systems and pedestrian provisions. These plans should be developed after consultation with Engineering Services on capacity availability and points of connection.

g. **Noise Abatement Plan** – Where an arterial or higher level roadway class, or railway passes through or adjacent to a development area, the Developer shall be responsible for engagement of an independent consultant to conduct a noise study. Based on forecasted noise levels expected within the development area due to the roadway or rail line, the following will hold:

   i. Where the noise study determines a 24 hour Leq of 55 dBA or less measured or calculated at a distance of 5.0 metres from the nearest dwelling façade within the subdivision adjacent to the roadway or rail line, no further action by the Developer shall be required.

   ii. Where the noise study determines a 24 Leq in excess of 55 dBA, the Developer shall provide noise attenuation in a form that will reduce the level to 55 dBA or lower. At the discretion of Engineering Services, this maximum level may be increased.

1.1.4.2 Staged Development Information

a. **Overall Information** - Prior to application for detailed design drawing approval of the first stage of development, overall development proposals shall be provided including overall plans of all major services and roads showing sizes, location, and geometric configurations as required along with detailed engineering analyses and calculations to demonstrate the standards and objectives are achievable. Road designations shall be clearly indicated along with estimated average daily two-way traffic. A traffic signal warrant analysis may be required for collector road and arterial road intersections.

   Details of proposed storm water management facilities shall be provided, including:

i. Overall drainage basin plan;

ii. Size and location of storm water storage facilities and point of discharge;

iii. Overland flow paths with estimated peak flow rates;

iv. Detailed hydrology and hydraulic calculations;

v. Indication of staged development of facilities;

vi. Provisions for outlet control;

vii. Provisions for storm water quality improvement;

viii. Erosion control provisions;

ix. Details of any proposed integrated facilities such as wetland or shoreline treatments; and,

x. Details of staged development or any other improvements on site or off site that are related to the project.

b. **Detailed Design Information** – to be submitted with an application for design approval in accordance with the requirements of **Section 1.2.3**.

c. **The Geotechnical Report** - to be submitted with an application for design approval shall provide the following information:

i. Sufficient information to clearly define the water table conditions generally by providing boundary to boundary information

ii. Depth of topsoil and identification of any poor soil strata or areas of fill

iii. Soil type(s) and depth(s) below topsoil

iv. Identify any zones or areas that may influence construction requirements and require specific design of treatments

v. Provide detailed information on proposed pavement designs and the need for any special provisions (i.e. - geotextile, lateral drainage, etc.)

vi. Recommendations to achieve satisfactory compaction of all trenches

vii. Identify any known soil conditions that represent a toxic or contaminated zone or area so that an ESA may be requested and created.

viii. Identify sulphate levels and provide recommendations for the protection and durability of concrete structures in contact with soils and groundwater

ix. Identify any areas where building foundations will require specific design

x. Identify any conditions, either natural or as a result of construction that may result in the instability of natural or constructed slopes or embankments

xi. Provide full details of all logs from each test hole including groundwater levels at the time of hole completion, 7 day and 30 day intervals

xii. Borehole spacing shall be examined by the Geotechnical Consultant, but should be placed along proposed ROW, proposed location of underground structures, other types of municipal infrastructures (i.e. proposed SWM ponds, outlet structures, etc.) and where slope stability assessment is required.

d. **The Traffic Impact Assessment** - to be submitted with an application for design approval where requested by Engineering Services. The report shall include the following:

   i. Sufficient information to clearly define the parameters of any study undertaken

   ii. The results of the analysis.

e. **The Environmental Site Assessment** - to be submitted with an application for design approval where required by Engineering Services. The report shall provide, at minimum, the following information:

   i. Sufficient information to clearly define the environmentally sensitive conditions by providing boundary to boundary information

   ii. Specific locations that represent toxic or contaminated zones or areas.

The Developer shall make all arrangements for access to the site for any necessary inspections by Engineering Services during the design review process. Likewise, the Developer shall provide all easements and rights-of-way necessary to comply with these standards, the Development Agreement and any other agencies which have a vested interest in the development.

1.2 SUBMISSION STANDARDS

As part of any submission/re-submission (preliminary, detailed, or otherwise) package a letter outlining the following should be included:

i. Name, company, and contact information of person submitting the plans

ii. Any deviation from applicable Standards, Guidelines, Details, etc.

iii. Justification of all above mentioned deviations

iv. In the case of re-submissions, detail outlining how Department comments have been addressed are required

1.2.1 Review Timelines

When the Consulting Engineer submits complete sets of drawings, studies and other documents, the response period (timelines) required by Engineering Services, exclusive of the time required by the Consulting Engineer for re-submission, are provided below:

1.2.1.1 Engineering Submissions (Subdivision)

a. **Drawings**

DESCRIPTION	SUBMISSIONS	TIMELINES
Engineering	First	6 weeks maximum
	Subsequent	4 weeks maximum

b. **Supplementary Studies**

DESCRIPTION	SUBMISSIONS	TIMELINES
Stormwater Management	First	6 weeks maximum
	Subsequent	2 weeks maximum
Traffic Impact Assessment and/ or other relevant studies	First	6 weeks maximum
	Subsequent	4 weeks maximum

*Total review timeline is not cumulative, and will restart at each resubmission

Where planned municipal improvements are of sufficient complexity, Engineering Services may require submission, and review and approval of supplementary reports (Transportation Impact Assessment, Environment Impact Assessment, Geotechnical Report, etc.). Additional time for review, as outlined above, may be required.

Where a resubmission contains unaddressed comments without clarifying rationale, drawings and a letter advising that comments have not been addressed by the Applicant will be returned to the Developer without review. A meeting between the Developer and Engineering Services may be required to discuss the submission.

Beaumont has the right to extend reviews beyond the noted timelines.

Amended - 2025
Refer to Amendment #2
Number 1.1

1.2.2 Staged Preliminary Drawings

Drawings submitted for preliminary review must be in accordance with approved Area Structure Plans (ASP) for the area. The ASP describes proposed land uses, population densities, proposed roadways, pedestrian ways, reserves, utility lots, easements and all intended land use shall be followed. The location and source of water and sewer servicing shall be indicated as well as the general intended direction of overland storm water flows. The general sequence of development of the area must follow the approved ASP.

a. **Staged Preliminary Drawings** - Prior to any detailed design submissions, the Developer shall provide a preliminary proposal for the development. The proposal will set the basis for preliminary discussion of the project between Engineering Services and the Developer, and may avoid the expenditure by the Developer and their Agents of time, effort and money on concepts, and places that are 'unacceptable'. The proposal is to include, but not be limited to the following:

   i. Site conditions and topography;

   ii. Land uses, zoning, lot sizes, and density;

   iii. Proposed population and housing types;

   iv. Transportation requirements and pedestrian connectivity;

   v. Requirements for water, wastewater, and storm water servicing infrastructure; and,

   vi. Supporting design calculations.

   The preliminary proposal shall include plans at a scale of 1:1000 or 1:2000 of the proposed development and its staging, outlining the concept of lots, blocks and street patterns. The following information shall be included on one or more plans:

   i. Contours and existing land surface relative to geodetic datum (contour interval not greater than 0.5m);

   ii. Extent and size of water mains;

   iii. Extent and size of wastewater sewer mains;

   iv. Extent and size of storm sewer mains and an outline of overall drainage including adjacent lands;

   v. Curb-to curb road widths (face of curb to face of curb); and,

   vi. Any other information that the Developer considers necessary to aid in assessment and consideration of the proposed development.

   At such time as the preliminary proposal is approved along with required revisions, amendments or deletions, the Developer may proceed with a formal request to Engineering Services for zoning approval and subdivision approval.

1.2.3 Detailed Design Submission

Submissions will provide all relevant and required information on the detailed design of municipal improvements.

1.2.3.1 General

The detailed design submission shall consist of drawings, specifications and supporting documents. The drawings and specifications shall be in, SI, metric units and shall be developed under the supervision of a registered Professional Engineer with expertise in the field of municipal servicing and land development. The following items are required:

a. The Developer shall submit such engineering drawings a minimum of 3 months (some exceptions may apply at Beaumont discretion) before the proposed initial date of construction. Should Engineering Services not approve the Developer's engineering drawings or proposals, these will be returned to the Consultant with comments for revision by the Consultant. The period from the return of the engineering drawings to the re-submission of the revised drawings or proposals shall be deemed to be additional to that specified in Section 1.2.1. The time period for review by Engineering Services will be increased as a direct result of excessive number of cycles of review and comment as required.

b. A design brief, provided by the design professional at first submission, indicating that the particular stage represents the systems indicated in the Area Structure Plan and that these systems meet the basic minimum requirements of the standards. All interim measures are to be clearly indicated (i.e. stormwater storage, emergency access, construction access, turnaround, etc.).

c. A cost estimate of the improvements is to be submitted with IFC (Issued for Construction) drawings by completing a copy of the schedule of quantities and unit rates in the tender form of the specifications.

d. An indication of the proposed construction start date and completion dates for the various improvements.

e. Copies of all applications to all other agencies or jurisdictions and subsequent submission of all final agreements and permits (Public and Private Sector documents). Copies of all formal approvals, permits and agreements must be received by Engineering Services prior to any construction commencing. Where final approved drawings are required as part of an application, it shall be noted that the application will be made in the future allowing Beaumont to follow up where necessary prior to construction.

f. Details of all items required for compliance within the terms of the Development Agreement.

g. The Developer shall not proceed with construction until Engineering Services has approved the engineering drawings and Beaumont has executed a Development Agreement.

h. Where a Developer files more than three (3) Engineering Submissions due to revisions by the Developer or the Developer's failure to revise the Engineering Drawings as requested by Engineering Services, an additional fee may be charged as per the Fees and Charges Bylaw for each submission over and above the third (3rd) submission.

1.2.3.2 Specifications

One (1) set of specifications complete with schedule of quantities and tender form shall be provided.

Specifications submitted shall generally be in the Canadian National Master Construction (NMS) 50 Division format and contain bid requirements, general conditions, general requirements, special conditions and specifications as may be appropriate, the tender form and schedules of quantities, all specifications relevant to materials and execution of the work proposed.

1.2.3.3 Supplementary Reports

One (1) copy of the geotechnical report which shall be specific to the stage proposed for review shall be provided at first submission. Where a neighbourhood level geotechnical report does not provide sufficient test data for the particular stage under review, a supplementary letter may be required.

Where required by Engineering Services, one (1) copy of additional reports (eg. Traffic Impact Assessment, Environmental Site Assessment, etc.) shall be provided.

1.2.3.4 Engineering Drawings

Two (2) sets of engineering drawings shall be submitted. These shall be complete in every respect and signed and sealed by a Professional Engineer or Professional Technician registered to practice in the Province of Alberta along with AutoCAD and PDF files in a version acceptable to Engineering Services. Signature and seal to be applied to drawings IFC, if not before.

a. All hard copies of engineering drawings submitted to Engineering Services for approval must be signed and sealed by a registered professional engineer and shall be stamped with a permit to practice seal where appropriate. Engineering drawing submissions shall be complete and shall be accompanied by all supporting documents, calculations, cost information and geotechnical reports or other information as required by Engineering Services.

    i. Drawings shall be ANSI D (559mm x 864mm) or A1 (594mm x 841 mm) paper size. Drawings submitted on sizes other than those approved will be returned without review

    ii. Drawings shall be fully bounded on the left margin

    iii. Drawings shall be grey scale, excluding Redline submissions, or unless otherwise authorized by Engineering Services.

b. Each sheet shall fully identify the Developer, the Developer's Engineer, the name and stage of the project, provision for engineering stamps and seals and provision for recording dates, legends and changes in status of the drawings

c. Incomplete submissions, submissions found to contain excessive omissions or errors, or which do not include appropriate authentication of professional authorship, may be returned without review or comment, at the discretion of Engineering Services.

d. After engineering drawings are approved, digital electronic formats (AutoCAD and PDF) must be submitted within 7 business days from approval date

   i. Digital electronic format must use coordinate system CAN083-3TM114

   ii. PDF files must also be provided and named accordingly

Unless otherwise requested, drawings shall be to scale (metric) as follows:

DRAWING	SCALE
Cover Sheet	As Appropriate
Legal and Land Use Plan(s)	1 : 500*
Road and Sidewalk Plan(s)	1 : 500*
Minor Storm and Waste Water Systems, and Water Plan(s)	1 : 500*
Storm Water Drainage/Catchment Plan	1 : 1000
Waste Water Catchment Plan	1 : 1000
Lot Grading Plan(s)	1 : 500*
Public Utility Lot(s) (PUL) Plan(s)	1 : 500*
Plan/Profiles, Detail Drawings and Cross-Sections	1 : 500*
Noise Abatement Drawings	1 : 500
Standard Details	As Appropriate
Supporting Detail(s)	As Appropriate
Franchise Utility and Street Hardware Plans	1 : 500**
Landscape Drawings	1 : 500*

* 1 : 500 or 1 : 1000 as appropriate based on the size of the development or stage to clearly convey required information

** Please see Franchise Utility and Street Hardware Plans details below

Beaumont may request additional drawings as required.

1.2.3.4.1 THE FOLLOWING LIST OF DRAWINGS SHALL BE CONSIDERED A COMPLETE SUBMISSION THAT IS ACCEPTABLE FOR REVIEW:

a. **Cover Sheet**

The cover sheet shall include:

i. A key plan of sufficing size showing the location of the project;

ii. A list of drawings contained in the submission indicating title, chainage and drawing numbers, and;

iii. The cover page shall also include details of the Owner and Consulting Engineer.

b. Legal and Land Use Plans

The legal and land use plans shall show:

i. All proposed subdivision for the specific stage and the proposed boundary conditions relative to any future development

ii. All proposed land uses, legal dimensions and existing as well as proposed Alberta Survey Control Monuments (ASCM)

iii. All utility easements, public utility lots and municipal reserves and provide, in tabular form, the area of each major land use (i.e. - lanes, roads, utility lots, reserves, residential or other land use) indicating the sum total making up the gross development area

iv. Areas in square meters for all irregular shaped lots

c. Road, and Sidewalk Plans

The road and sidewalk plan shall show:

i. an overall plan of the development shall indicate all pedestrian walkways (trails), sidewalks, lanes, emergency access ways, and road rights-of-way with widths indicated (R.O.W. and curb to curb dimensions)

ii. include P.U.L. cross-sections

vi. road structure and location within stage designated by hatch

vii. manhole, hydrant, valve, and sign locations

viii. bus stop platforms

ix. curb ramp locations and type

x. curb type (straight face (SF), or rolled face (RF))

xi. curve table highlighting radiuses

d. Minor Storm, Waste Water, and Water System Plans

On a single plan provide the following information:

i. Elevations at Normal Water Level (NWL), 5 Year Level and High Water Level (HWL), and Freeboard

ii. The location, alignment, pipe type/material, size, direction of flow and gradients of all mains and appurtenances for STM, SAN, and WAT systems

iii. Deep utility spacing within Public Utility Lots (PULs)

iv. The location of all service connections

v. Service connection chart denoting the type of services to be installed for each lot or dual lot connection. The chart should include the following:

I. Lot/Block number
II. Service tee elevation
III. Length to property line (m)
IV. Slope (%)
V. Service elevation at property line
VI. Ground elevation at property line

vi. The design radius of coverage for hydrants

e. **Major Storm Drainage and Catchment Plan**

The major storm plan shall identify:

i. The stage represented by the drawings being submitted within the overall development
ii. The overall development area showing the storm sewers, storm water management and storage facilities and all receiving channels or drainage facilities
iii. The location and direction of major overland flows and receiving water course
iv. Overall surface drainage including: roads, P.U.L.s, back of lot swales and parks
v. Storm catchment tributary areas (in hectares)
vi. Storm pond cross-sections complete with labelled sideslopes
vii. The overall pond area (ha.) at NWL, 5-Year Level, and HWL
viii. The direction of major and minor flows
ix. The plan shall also provide a table showing minimum bottom of footing elevations where lots border a storm pond
vii. The network analysis design charts, indicating the design factors used for storm water system, along with the hydraulic design calculations for each manhole to manhole section. Shall also include catch basin and catch basin manhole capacity calculation. Lead capacity calculations may be requested at Engineering Services' discretion.
viii. Define all local drainage areas, indicate the area in hectares and indicate these areas clearly in the calculation tables

f. **Waste Water Catchment Plan:**

The waste water catchment plan shall show the following:

i. Wastewater limits of tributary area
ii. Wastewater area in hectares
iii. Contributing population
iv. Contributing flow (including infiltration)

v. The network analysis design charts, indicating the design factors used for waste water system, along with the hydraulic design calculations for each manhole to manhole section.

vi. Define all local drainage areas, indicate the area in hectares and indicate these areas clearly in the calculation tables

g. **Lot Grading Plans:**

The lot grading plan shall provide the following information:

i. Legal description (lot, block and plan numbers)

ii. Pre-development contours of a maximum of 0.5m interval including flow patterns on adjacent lands, excluding construction area

iii. A note referencing the latest Geotechnical Report for the area, and that this report will show the location of all bore logs and bore log information including the original ground elevation at the test hole and recorded water levels

iv. Proposed or existing elevations along the boundaries of the subdivision

v. Overall subdivision legal configuration and proposed finished ground elevations at all lot corners, points of deflection between lot corners and at the house location. The following will also be shown:

I. Finished lot grades at 13m from front property line, 10m from the rear property line and corners of lot for split drainage lots

II. Finished lot grades at 8m from front property line, 10m from rear property line and corners of lot for back to front drainage lots

vi. Drainage directional arrows with percentage grades shown along all side yards (including P.U.L.s).

vii. Each lot shall have the drainage detail type designation shown within the lot or by independent schedule on the specific sheet

viii. In an inset plan view showing street names and lot numbers, indicate lots that have more than 1.0m of fill to finished ground elevation at any location within the proposed building pocket or areas where building foundations will require specific design

ix. Indication, by the use of arrows, of all major flow directions and routing for a 1 in 100 year return frequency rainfall including roadways

x. The direction of all major overland drainage flows (1:100 year storm), ponding areas and flow depths

xi. The location of swales for lot drainage purposes

xii. Indication of all easements relating to storm water management facilities including swales

xiii. The location of drainage easements for lots that accept drainage from other lots

xiv. Minimum bottom of footing elevations to be shown, where lots border a storm pond

xv. Percent street grades (to two decimal places) for all roads within the development

xvi. Engineered fill lots

xvii. Cut-off swales and catchbasins to intercept interim block drainage and external drainage

xviii. Location of manholes, water valves, and curb ramps

Amended. Refer to Bulletin 005

h. Franchise Utility and Street Hardware Plans

The Developer shall submit full design details of the proposed power, telephone, cable television, internet, and natural gas systems. A single plan at 1:1000 or 1:500 scale shall provide the following information:

i. Gas, power, telephone, cable TV, and internet distribution including lot service locations, and power pedestal, transformer, and street light locations;

ii. All road crossings complete with the number and size of conduits (all non-standard alignments shall be detailed;

iii. Location of water and sewer service locations;

iv. Location of all infrastructure surface features including hydrants, catch basins, manholes, valves, street lights, pedestals, transformers and project fencing;

v. Community mail box locations;

vi. All driveway and emergency access locations complete with dimensions to any obstructions that fall within 2.0 meters;

vii. All traffic sign locations and sign designations.

i. Plan/Profiles, Detail Drawings and Cross-Sections

Provide plan/profiles, detail drawings, and cross sections of all proposed construction areas with sufficient extension to indicate the relationship to existing and future construction. These shall conform to the following:

i. Plans will include all horizontal geometric information including all curve data, legal dimensions on medians, islands and channelization;

ii. Profiles shall indicate all road and deep utility gradients, vertical curve information, chainages to EC and BC locations and manhole locations;

iii. Profile shall include all deep utility materials and their sizes;

iv. All below ground services and appurtenances, including the type of service (watermain, waste water or storm), diameter, length, grade and direction of flow, etc.;

v. Class, type and diameter of pipe shall be shown;

vi. Roads, including curbs, gutter, sidewalks, etc. and the ROW dimensions in plan view;

vii. Barricades shall be shown;

viii. Retaining walls shall be shown;

ix. Any required easements shall be shown;

x. Street names shall be shown;

xi. Manhole, hydrant, valve IDs in both plan and profile views shall be shown;

xii. Temporary or permanent storm water management facilities shall be identified;

xiii. Culverts and other drainage appurtenances shall be shown;

xiv. Where two or more sheets are required for one street, match lines must be used with no overlap or duplication of information;

xv. Where possibility of conflict with other services exists, connections shall be plotted on the profile with separation distances shown

xvi. Lip of gutter (LOG) elevations of the roadway shall be shown on profile drawings.

xvii. show detail of typical road cross-section including:

I road (and sidewalk, trail, etc.) structure

II. height of crown in millimetres

III. wick drains

IV. all alignments in roadway such as curb and gutter, water, storm sewer, wastewater sewer, gas, power, sidewalk, hydrants, transformers, and street lights all referenced to property line

V. road right-of-way width, road surface width

j. Landscape Plans

Landscape drawings are a requirement and are to be submitted with the Engineering Plans on a separate set, at the same time as the Engineering Drawings are submitted. Engineering drawings submitted without the accompanying landscape plans will be deemed incomplete and will not be accepted for review by Engineering Services. Plans shall be provided indicating:

i. all required tree planting, entrance features, landscaping, fencing, benches and any other fixed features.

ii. the relationship between tree planting and shallow bury utilities must be clearly indicated

k. Noise Abatement Plan(s)

Engineering Services may require the Developer to provide a Noise Impact Assessment where development abuts primary or secondary highways and major

arterials that abut or pass through a development area. A qualified, independent Consultant shall conduct these assessments. The Assessment must address present and future noise levels and identify measures required to adequately maintain noise at allowable levels. Assessments should indicate noise levels within the design objective of 55 dBA measured 5.0 metres from the nearest dwelling façade. In extenuating circumstances, and at the discretion of Engineering Services, the design noise level may be relaxed; however, it will not be permitted to exceed 60 dBA. The Developer shall provide noise abatement proposals for review.

l. Standard Details Plans

Provide standard details for design components including, but not limited to the following:

Amended - 2025
Refer to Amendment #2
Number 1.2

UNDERGROUND	i. manhole
	ii. catch basin
	iii. catch basin manholes
	iv. hydrant
	v. valves (Type "A" slider type)
	vi. thrust block
	vii. pipe bedding
SURFACE	i. sidewalk cross-section and plan views complete with reinforcement and contraction/surface joints
	ii. curb ramp
	iii. cathodic protection
	iv. curb and gutter
	v. road cross sections
	vi. emergency knock-down bollards
	vii. asphalt pathway
LANDSCAPE	i. fencing
	ii. landscape

Details shall be grouped on sheets according to improvement (underground, surface, landscape).

m. Erosion and Sedimentation Control Plans

Storm water runoff is part of the natural hydrological cycle, however, clearing, grading and other activities that remove vegetation and compact the soil result in increased runoff. A detailed erosion sedimentation control plan (ESC) must be prepared and submitted with the detailed engineering drawings.

i. **The ESC Plan** – shall:

I. minimize erosion and manage sediments based on site specific ESC measures;

II. adapt to varying field conditions;

III. clearly show the location and type of ESC measures/devices; and,

IV. protect critical/environmentally sensitive areas.

ii. **The Site Plan** – shall show:

I. Existing and final site contours at an interval and scale sufficient for distinguishing runoff patterns before and after disturbance

II. Existing vegetation, such as grassy areas or vegetative buffers, that may reduce erosion or off-site sedimentation

III. Limits of clearing and grading

IV. Critical areas within or near the project area, such as streams, lakes, wetlands, highly erodible soils, public streets, and residences

V. Locations and types of ESC measures, with dimensions

VI. A legend, if necessary

n. **Supporting Details**

All development submissions shall include sufficient detail to complete a full review of the development proposal. If alternatives for some aspects are being considered these should also be submitted. Submissions shall also include time lines of future phasing.

1.2.3.5 Landscape Drawing Submission Process

In the event a landscape plan is required, or if ground disturbance, seed, sod, or plant material are proposed for Beaumont owned lands, the process is as follows.

a. The Consultant / Developer shall submit two (2) A1 size printed sets and an electronic version of landscape drawings, stamped and sealed by a Landscape Architect to Beaumont – Municipal Office. Refer to **Section 4.2.2 - Landscape DP Plan Requirements**

b. The Landscape Architect shall submit a cover letter accompanying the drawings, and cost estimate, which shall include the following:

i. Anticipated time of construction;

ii. Whether or not all improvements proposed on municipally owned lands will be funded by the Developer;

iii. Extent of construction and implementation of landscape improvements and landscape rehabilitation to be managed and completed by the Developer; and,

iv. Acknowledgement that maintenance of all landscape improvements shall be the developers responsibility for the duration noted in **Section 1.3.4 – Warranty Period.**

c. Notify Engineering Services, in writing, to report that work is completed and that inspections are required. Inspection request forms may be found in **Appendix 1.0** of this document.

1.2.3.6 Redline Submissions (Subdivision)

a. **Engineering Redline Submissions**

In the event that a revision is required following Beaumont approval of one or more drawings in a design package, a new submission package shall be provided, providing the following information:

i. A cover letter outlining the changes included in the redline, and justification for the changes; and,

ii. All applicable drawings from the set to illustrate detail information regarding the changed design.

b. **Landscape Redline Submission Process**

If any design changes are required following approval of the Landscape drawings, the Developer/Landscape architect is responsible for obtaining drawing approval of these changes prior to commencing construction on the noted area.

The Developer is to obtain approval through drawing submission as follows:

i. Landscape Architect signed drawings that clearly identify any and all changes from the previously approved drawings as described in **Section 4.2.6 – Landscape Redline Revision Plan Requirements**.

ii. Drawing submission shall be accompanied by a letter outlining reasons and justifications for change(s).

iii. Approved Redline revisions are to be accurately reflected in the 'Record' Drawing

Please review Bulletin #010

1.2.4 Geographic Information System (GIS) and Asset Data Update

Once CCC is issued, all relevant GIS shall be updated with the new asset data, and submitted to Engineering Services as part of the 'Record' drawings.

Confirmation of the 'Record' drawing data shall also form part of the CCC inspection. Corrected electronic 'Record' drawings must be submitted to Engineering Services within four months of CCC approval.

a. **Drawing Submission** – Digital 'Record' Drawings must be submitted in AutoCAD Map3D compatible and PDF formats. AutoCAD drawings shall be formatted as a single file with a layout for each drawing sheet. PDF files shall be formatted as a single file showing all sheets, and should be a 600 dpi or better resolution.

b. **Drawing Presentation** – Drawings submitted must adhere to the following rules:

i. All drawing objects and text associated with those objects must be located in model space.

ii. All drawing objects to be shown at actual length and in ground coordinates based on NAD83 3TM projection, central meridian -114 with no scaling, rotating, or shifting required. Local Datum is not permissible.

iii. Drawing must be purged of all definitions that are not used such as: layers, layer filters, text styles, dimension styles, blocks, etc.

iv. All objects must be on the appropriate corresponding layer. (For example, water mains on a separate layer from water valves, hydrants etc.)

v. Newly constructed items must be in a separated layer from existing infrastructure.

vi. Duplicate objects and text are to be removed.

vii. External References are to be bound within the drawing.

c. **Digital Data Structure** – Line, point, text and dimensions in the AutoCAD drawings are as follows:

i. **Line features** – All linear features within the drawing are to be on the correct layer. Linear features are created by the AutoCAD commands, line, circle, arc and polyline. Lines representing a segment of any utility are to be one segment from point feature to point feature. For example, a water main is drawn as a polyline or line from each valve, reducer, etc. to the next point feature. The lines representing utilities are not to be broken at curves; they are to be one polyline until the next point feature. The exceptions to this rule are water mains that have a 45° or greater bend; the bend is treated as a point feature without requiring symbolic representation.

ii. **Point Features** – Point features within the drawing are to be represented by a point or a block. Points or Blocks shall be 'snapped' to linear features. For a complete list of features to be represented by points or blocks, and how they are to appear, refer to Table 1.2.4. All blocks are to be inserted on the layer that corresponds with the feature. Point Features are not to be exploded.

iii. **Text and Dimensions** – All text and dimensions within the CAD file are to be drawn in model space.

Table 1.2.4 Required Features

FEATURES	REQUESTED ATTRIBUTES DATA
Roads	Surface material Surface thickness Base material Base thickness Subbase material Subbase thickness

FEATURES	REQUESTED ATTRIBUTES DATA
Sidewalks	Surface material Surface thickness Base material Base thickness Subbase material Subbase thickness
Curb and Gutter	Material Height Gutter width
Trails and Walkways	Surface material Surface thickness Base material Base thickness Subbase material Subbase thickness
Crosswalks	Width Marking material Surface material
Pavement marking	Marking material Colour Line type Line width
Parking lots	Surface material Surface thickness Base material Base thickness Subbase material Subbase thickness
Parking lot marking	Marking material Colour Line type Line width
Sign	MUTCDC Code Sign Height Sign Width Post type Sign message Text colour Background colour

1.3 INSPECTIONS AND APPROVALS

The purpose of these guidelines is to outline the requirements and best practises for construction and inspection of municipal services and infrastructure work within Beaumont and is to be used in conjunction with the engineering design criteria and standard drawings. The guidelines are to provide direction and outline the expectations of the Developer's Consulting Engineers, and Contractors by summarizing the construction responsibilities related to the construction of new municipal infrastructure.

1.3.1 Prior to Construction Commencement

Prior to commencement of construction, the following information is required:

a. Preliminary Overall Servicing Proposal.

b. Tentative Plan showing lot configuration, dimensions, and all necessary right-of-way plans and supporting documents for the stage of development proposed for construction.

c. Subdivision approval by the Beaumont Subdivision Authority.

d. Final detailed plans and specifications approved.

e. Confirmation of compliance with the Environmental Protection Enhancement Act (EPEA) by Alberta Environment and Parks (AEP) and acceptance of licensing applications on behalf of Beaumont (Engineering Services reserves all rights to release of approvals).

f. Application shall be made to AEP directly for all approvals under the Act and pay all fees required to carry out any advertising or public notification.

g. Signed Development Agreement.

h. Approved Road Use Agreement must be in place for within boundaries of construction. Please see the required application form in **Appendix 1.0**

i. Payment of all off site and development fees due under the terms of the development agreement.

j. General Liability Insurance as outlined in the Development Agreement shall be provided. "City of Beaumont" shall be the named insured, with the certificate of insurance being forwarded to Engineering Services as proof. The insurance shall remain in effect during any construction.

k. Executed Development Agreement

A preconstruction start up meeting with Engineering Services and the Developer is mandatory and is to include representatives from the following: Developer, Consultant, Contractor, Geotechnical Engineer, Beaumont, and other agencies involved with the development. This meeting should occur at least 2 weeks prior to construction commencement.

1.3.2 During Construction

All work performed as part of construction shall conform to Occupational Health and Safety (OH&S) standards. The Developer shall ensure a satisfactory level of quality assurance during construction and shall employ a registered engineer to carry out inspections of all phases of the project including franchise utilities. The Developer shall also employ an accredited materials testing firm to carry out materials testing in accordance with the guidelines provided in these standards. The material testing firm shall be directed by the Developer's Engineer and provide reports and test results to Engineering Services in a timely manner.

The Developer's Engineer shall convene site meetings with a Beaumont representative and the Contractor every two weeks as a minimum frequency.

Notice must be provided to Engineering Services a minimum of 72 hours in advance for the following activities:

1. Any work within existing roadways and all road closures, traffic control, water service disruptions and other necessary provisions (i.e. - public notices). Approval shall be obtained from Engineering Services for this work; and,
2. All service tie-ins to existing municipally owned infrastructure. Inspection may be required for storm, wastewater, and/or water tie-ins.

   Detail on the requirements for the above work can be found under **Requirements for Temporary Access Approach Construction, Requirements for Road Closures, Requirements for Tie-Ins to Beaumont Infrastructure, Safe Disposal of Materials, Concrete and Cement-Based Products, Best Management Practices to be followed by on Site**, etc. in **Appendix 1.0.**

   Engineering Services reserves the right to carry out periodic inspections of the work without notice.

   Developer shall perform track out control including maintaining all infrastructure around their development including but not limited to roadways, trails, sidewalks, and manholes. It is recommended that the developer have a skid steer or equivalent to maintain cleanliness. Roads to be cleaned within the same day. Failure to do so may result in fines levied and work completed by the Municipality at Developer cost.

1.3.3 Post Construction

As a part of complete development process Developers are responsible for inspection, follow up, and completion of all construction components as agreed upon via design submission approval; post construction standards serve to outline the requirements as such. All Municipal Improvements (as laid out in **Detailed Design Submission**) are subject to inspection. For detailed inspection application forms, and checklists for each stage of post construction approval, please see **Appendix 1.0**.

Amended. Refer to Bulletin 005

1.3.3.1 Inspection Requirements

a. To be scheduled and completed between May 1 and November 15, weather dependent
   i. Two (2) business days required to schedule inspections
   ii. Construction deficiencies to be re-inspected before the end of the season must be requested no fewer than two (2) weeks before November 15 end date
b. Inspections are weather dependent
c. Cut-off dates are at the discretion of Engineering Services, and are weather dependent
d. Physical site conditions for inspections:
   i. Surface and underground municipal improvements shall be cleaned and visible in order to be inspected
   ii. A water truck shall be present onsite prior to scheduled inspection start time
   iii. Completion of work (or any outstanding item must be disclosed prior to inspection request)
e. CCTV, Pressure, Hydrant Flow, Chlorination and Bacteriological Tests must be provided prior to underground inspection request
f. Comments on deficiencies for a submitted CCTV must be addressed prior to a re-inspection request. Comments should include the name of the CCTV operator, and the Consulting firm reviewing results. A stamped review by the Consulting Engineer may be required.
g. **Video and Report Review**
   i. The works shall be coordinated through the Consulting Engineer and undertaken by a qualified company. The Consulting Engineer shall review the sewer videos and report, and submit to Engineering Services electronically in USB format a copy of all videos, reports, and general plan marked to show the sewers that have been inspected, deficiencies identified, and proposed method of repair.
   ii. Submission of 'Record' Drawings information within four (4) months of CCC.
   iii. Guidelines for CCTV requirements found in **Appendix 1.0** shall be followed.
   iv. Review by Engineering Services of all closed circuit video inspection (CCTV) reports on wastewater and storm sewer construction (submitted in USB format). The CCTV must be in color, and the camera must pan slowly around manholes, benching, service connections, etc. Storm and Wastewater laterals are required to be inspected as well. Laterals will require camera inspection at CCC according to the following guidelines:

I. 10% or a minimum of 5 lots, whichever is greater and Engineering Services will specify which lots are required

II. Service laterals CCTV shall be done after all shallows are installed

III. If service laterals are not provided with the CCTV for the main lines, it will be a condition of CCC and we'll specify a time to be submitted to Engineering Services

IV. Beaumont reserves the right to require additional testing if upon submission's review several issues are present

v. A sewer video inspection program for all new storm and wastewater sewers constructed as part of the municipal infrastructure for the plans of subdivisions and site plans.

vi. The Contractor shall flush, clean and remove all debris, silt and foreign materials from the sewer prior to the video inspection. All accumulated debris/silt or material shall be removed at downstream manhole.

vii. Each sewer run (i.e. manhole to manhole) shall be recorded in separate digital files to allow direct searching of individual section of the sewer without having to review the entire sewer video.

viii. Pan and tilt features are to be used on ALL service connections and defects.

ix. All manhole/pipe connections to be panned prior to entering and exiting the sewer line.

1.3.3.2 Construction Completion Certificate

Amended. Refer to Bulletin 005

Inspections for Construction Completion Certificate (CCC) issuance will be undertaken by Engineering Services from June 1 – November 15. A shortening or extension of this period may be made based on weather conditions and snow coverage at the discretion of the municipality.

a. **The following inspections and reviews are required prior to the issuance of a Construction Completion Certificate (CCC):**

i. A pre-inspection by the Developers representative and contractor to ensure completeness

ii. Submission of an inspection request. Refer to **Appendix 1.0** for an example inspection request form.

iii. A joint inspection of each completed improvement by all parties including the Developer's Engineer, and Beaumont representative.

iv. Review by Engineering Services of all materials testing results.

v. Sewer video inspections shall be completed for ALL site plan wastewater and storm sewer infrastructure, including service connections and reports provided to Engineering Services for review and all repairs are to be completed to Engineering Services satisfaction and acceptance prior to security reduction or release.

vi. Engineering Services will review the sewer videos, repair videos and other information provided by the Consultant to confirm the sewer condition and that no defects or deficiencies exist. In the event that, as part of Engineering Services review, three (3) or more remaining deficiencies are identified or the sewer video inspection is incomplete or of a poor quality, Engineering Services may stop its review and return the information to the Developer for correction and resubmission. Engineering Services reserves the right to charge the Developer for the time and associated cost incurred by Engineering Services in the review of the incomplete video submission. The fees shall be as shown in the Beaumont Fees and Charges Bylaw.

b. **Inspections for Landscape** components such as, Site Furnishings, Amenities & Features, and Fencing may be conducted throughout the year at the discretion of the Beaumont inspector based on weather conditions. The developer will be responsible for completing all necessary snow removal for proper review of the above mentioned components.

The CCC Application Submission shall include the following:

i. Cover Letter that includes project description, location, construction completion date, and clearly identify the landscape components that are to be inspected.

ii. 11" x 17" reductions of the latest Beaumont approved drawings, and/or Redlines.

iii. Redline approval for site changes during construction shall be submitted and approved prior to CCC application.

iv. Landscape Pre-Inspection report as completed by the Landscape Architect.

v. Following review of the CCC Application Submission Engineering Services shall coordinate a CCC inspection time and date with the Landscape Architect.

vi. CCC inspection shall be coordinated by Beaumont within (30) days of receipt of the above information.

vii. The Landscape Architect is responsible for providing one set of the current approved landscape drawings to site on which to record all deficiencies and their locations noted throughout the inspection.

viii. The Landscape Architect is responsible for providing a deficiency report following the inspection to: Owner, Beaumont Inspector, and Contractor; within (5) business days of the inspection date.

ix. The contractor will have (2) weeks from the deficiency report submission date to complete all noted deficiencies. The Landscape Architect will provide written request (memo or email notification) for re-inspection to the Beaumont inspector once all noted deficiencies have been confirmed as completed within the two week deadline.

x. The Beaumont inspector will coordinate a re-inspection within (2) weeks of deficiency report submission date. A shortening or extension of this period may be made at the discretion of the Beaumont inspector.

xi. In the event that a site is deemed unable to meet the above requirements the Developer/Landscape Architect will be responsible to re-submit a new CCC Application once the site meets the requirements as outlined in this document.

Amended. Refer to Bulletin 005

1.3.3.3 Final Acceptance Certificate

Inspections for Final Acceptance Certificate will be undertaken by Engineering Services from June 1 – November 15. A shortening or extension of this period may be made based on weather conditions and snow coverage.

a. **The following inspections and reviews are required prior to the issuance of a Final Acceptance Certificate (FAC)**:

i. A pre-inspection by the Developer's Engineer and Contractor to ensure completeness

ii. Where found, correction and identification of deficiencies must occur.

iii. Submission of inspection request (as per form in **Appendix 1.0**) along with a deficiency report.

iv. A joint inspection of all completed improvements by all parties including the Developer's representative, Department representative and Contractor

v. Correction of identified deficiencies and re-inspection.

vi. Review of all materials testing results for any deficiency correction and the final lift of asphalt.

vii. Review by Engineering Services of all closed circuit video inspection (CCTV) reports on wastewater and storm sewer infrastructure (submitted in USB format). The CCTV must be in color, and the camera must pan slowly around manholes, benching, service connections, etc.

viii. Provision of a one (1) year materials warranty by the paving contractor on the final asphalt lift.

ix. Satisfactory submission of all 'Record' Drawings information. Engineering Services will notify Developers of acceptance of 'Record' Drawing submission.

x. Any further testing, arising out of the FAC inspections and required repairs, which Engineering Services may request at their discretion

xi. Refer to the "FAC checklist" found in **Appendix 1 .0** for further information and directions to be followed.

xii. At least sixty (60), but no more than ninety (90) days prior to the expiry of the warranty period the Developer shall request a joint inspection with an Engineering Services' representative. All areas shall be prepared for

inspection including street cleaning, flushing and repair of curb stops/valves/ infrastructure (utilities).

xiii. At least seven (7) days prior to the placement of the final lift of asphalt the Developer shall request a joint inspection. Streets shall be flushed and cleaned just prior to actual inspection.

Inspections for Landscape components such as, Site Furnishings, Amenities & Features, and Fencing may be conducted throughout the year at the discretion of the Beaumont inspector based on weather conditions. The developer will be responsible for completing all necessary snow removal for proper review of the above mentioned components.

Early inspection based on CCC date of after August 15th may be made at the discretion of the Beaumont inspector. The Developer, Consultant, & Contractor must agree to maintain the site (should it be approved) for the remainder of the warranty period.

The FAC Application Submission shall include the following:

i. Cover Letter that includes job description, location, & clearly identify the landscape components that are to be inspected with the minimum warranty period completion date (as noted on CCC approval document).

ii. 11" x 17" reduction of the latest Beaumont approved drawings, and/or Redlines.

I. Redline approval for site changes during maintenance period shall be submitted and approved of prior to FAC application.

iii. CCC Approval Document

iv. Landscape Pre-Inspection report as completed by the Landscape Architect Firm.

v. Maintenance Records for the site between CCC and FAC submission. These records are to include maintenance tasks including dates; Pesticide application logs; Plant mortality replacements with dates.

Following review of the FAC Application Submission the Beaumont Parks and Facilities Division shall coordinate FAC inspection time and date with the Landscape Architect.

FAC inspection shall be coordinated by Beaumont within thirty days of receipt of the above information.

The Landscape Architect responsible for providing one set of the current approved landscape drawings to site in which to record all deficiencies / locations noted throughout the inspection.

The Landscape Architect is responsible for providing a deficiency report following the inspection to: Owner, Beaumont Inspector, & Contractor; within five (5) business days of the inspection date.

The contractor will have two (2) weeks from the deficiency report submission date to complete all noted deficiencies. The Landscape Architect will provide written

request for re-inspection to the Beaumont inspector once all noted deficiencies have been confirmed as completed.

The Beaumont inspector will coordinate a re-inspection within two (2) weeks of deficiency report submission date. A shortening or extension of this period may be made at the discretion of the Beaumont inspector.

In the event that a site is deemed unable to meet the above requirements the Developer/Landscape Architect will be responsible to re-submit a new FAC Application Submission once the site meets the requirements as outlined in this document.

'Record' Drawings submission of the Landscape drawings shall be submitted by the Developer / Landscape Architect within four (4) months following CCC Approval.

Amended - 2025
Refer to Amendment #2
Number 1.3

1.3.4 Warranty Period

A warranty period shall be required upon construction completion, the details of which may vary depending on the particular municipal improvement completed. These details, including responsibilities for maintenance, are outlined below:

a. **Underground Utilities** - Underground utilities are defined as all water mains, storm and wastewater sewers, water and sewer services, sewer distribution, telephone and cable television, natural gas distribution system and all accessory and ancillary installations. The warranty period shall be two (2) years from the date indicated on a Certificate of Construction Completion as issued by Engineering Services.

   During this period, the following maintenance shall be performed by the Developer:

   i. Repair or replacement of any deficient improvements due to issues with material, design, or installation

   ii. Repair or replacement of any deficiencies caused by trench backfill settlement, including damages to paved surfaces above trench

   iii. Any necessary testing or maintenance to ensure infrastructure functions as required

   Certificates may be issued in two stages, as follows:

   i. At completion of water, sewers, and services, with pavement and surface improvements above these underground improvements

   ii. At completion of power distribution, telephone, cable television, and internet servicing including street lights

b. **Surface Improvements** - Surface improvements are defined as all drainage provisions including stormwater management facilities, berms, fencing, landscaping, general grading, pathways, roadway construction, curbs and gutters, swales, sidewalks, tree planting, signage, traffic control devices, pavement markings, seeding, sodding, sports field and playground development and such local surface improvements required by the development agreement.

All surface improvements shall have a warranty period of two (2) years from the date of Construction Completion.

During this period, the Developer shall be responsible for any maintenance as required to keep infrastructure functioning as designed.

Where discrepancies exist between the above information and the approved Development Agreement (DA), the DA shall govern.

Certificates may be issued by separately generally as follows:

i. Completion of all roadworks, including curb and gutter, and walks

ii. Completion of sidewalks including pathways when connected to the sidewalk

iii. Completion of landscaping & fencing

iv. Completion of specific areas by agreement with Engineering Services and/ or Development Agreement provisions (eg. SWMF, sports fields, etc)

c. **Franchise Utilities** - The Developer shall warranty all shallow bury installations for a period of two (2) years from the date of accepted construction completion. The warranty shall include resetting light davits that have settled or moved from reasonable verticality.

Following any installation or disturbance, landscaping must be returned to pre-existing condition, or improved per updated standards if applicable, to the satisfaction of Engineering Services.

d. **Landscape** – The Developer shall be responsible for any defect or deficiency in the completed work for a minimum warranty period as outlined in the signed Servicing Agreement, or as identified below. Deficiencies shall be corrected at the Developers expense.

The Developer shall be responsible for all maintenance of completed work for a minimum warranty period as outlined in the Servicing Agreement, or as identified below.

Landscape improvements minimum warranty duration from date of CCC approval:

i. Trees, Shrubs, & Perennials - (2) years.

I. All trees that are replaced within the same growing season as the FAC Inspection are subject to an additional (1) year warranty period that may be separated from the landscape FAC at the discretion of the Beaumont Inspector.

ii. Sod – Two (2) years.

iii. Seed – Two (2) years.

iv. Fencing on public property – Two (2) years.

v. Fencing on private property – Two (2) years

vi. Site Furnishings, Amenities, & Features – Two (2) years.

1.3.5 Survey Control Monuments and Legal Posts

a. **Monuments** - The Developer shall provide survey control monuments at a maximum spacing of 500m with a minimum of two other intermediate markers within clear view of the primary control points. All monuments shall be indicated in the Street Hardware Plans.

b. **Legal Posts** - Final lot and subdivision definition by posting in accordance with the approved legal plan shall be subsequent to the completion of all utilities construction including shallow bury utilities and associated street hardware.

   The Developer shall locate all legal posts (including existing posts on subdivision boundary) at least sixty (60) days prior to an application for a Final Acceptance Certificate for surface improvements and submit a plan from an Alberta Land Surveyor showing the location of all found posts and the specific of the coordinate system being referenced Engineering Services, at their discretion, will identify disturbed or missing posts to be replaced. All replacement shall be the responsibility of the Developer.

1.3.6 'Record' Drawings and Reports

Within four (4) months of the issuing of a Construction Completion Certificate for the underground utilities the Developer shall submit 'Record' drawings in the form of:

a. Two (2) sets of signed and sealed 'Record' drawings in paper print format size A1;

b. An electronic copy in PDF format of the signed 'Record' drawing; and,

c. An electronic file in an Auto Cad version acceptable to Engineering Services. The electronic drawing file shall be in a form that includes one overall Auto Cad plan or model. This model must include all improvements and should reference specific overalls, plan profiles etc.

   i. One AutoCAD file with layout tabs to be submitted; not separate files

   ii. AutoCAD must use coordinate system NAD83-3TM114

The Consulting Engineer shall be responsible for obtaining 'Record' inverts and ties for all underground services, Tees and lateral connections. The 'Record' information shall be checked for discrepancies against design information as soon as possible as the construction proceeds, and at regular intervals so that corrective action can be taken, if required.

Information required for the 'Record' engineering drawings include:

a. Verification of location and survey of rim elevations and invert elevations of all sewers, manholes, catchbasins.

   i. Following the FAC asphalt lift installation, previously submitted and/or approved 'Record' drawings must be redlined to reflect new rim elevations. FAC issuance will not be approved until these elevations are received by Engineering Services.

b. Distance between sewer manholes, including pipe sizes and calculated sewer grades. Sewer lengths shall be shown to the nearest 0.1m and sewer grades calculated to two decimal places

c. Location (rim, invert, etc.) of any abandoned infrastructure, and the method with which it was abandoned.

d. Service line locations – can be provided on a separate sheet if overall underground plan is visually crowded.

e. Curb stop locations

Where there are major discrepancies (as determined by Engineering Services) between the design and 'Record' data, the Consulting Engineer is required, in writing, to explain the variance and verify that the 'Record' data discrepancy does not adversely affect the intent of the services.

These drawings shall contain the following information:

a. Date of construction completion

b. Date of construction records added

c. The following information in table form:

'RECORD' INFORMATION			
IMPROVEMENT	CONTRACTOR	INSTALLATION DATES	
Wastewater			
Storm			
Water			
Roads			
Sidewalks			
Landscaping			

d. Professional stamp and signature of the Engineer approving 'Record' drawings

e. A table summarizing all underground utility systems components which indicates materials, type, size, class, pressure rating, manufacturer, supplier, reference standard and make and model for equipment on each drawing.

'Record' drawings shall provide the following information relative to water, sewer and sump pump service connections:

i. lot number

ii. distance of the service saddle or wye from the downstream manhole

iii. invert elevation of the wastewater service, sump pump discharge connection and top of water service at termination within the front yard easement

iv. service lines – where a drawing has become overly full, a separate page titled "Service Lines" shall be included

v. service connections shall be referenced to the lot corner

vi. all riser connections shall be shown on the plan profile.

vii. additional detail of servicing in cul-de-sacs and/or any non 90 degree connections.

f. Included in the electronic Auto Cad plan shall be the results of an actual 'Record' site survey showing the precise location of all improvements and hardware as constructed. The following features shall be included:

i. manholes

ii. valves

iii. light standards

iv. transformers & pedestals

v. mailboxes, if installed

vi. catch basins

vii. curb stops

viii. detail on any abandoned infrastructure along with the method of abandonment

Failure to comply with the above 'Record' drawing submission requirements will result in a delay in acceptance of maintenance and return of Letter of Credit. Comments regarding revisions to the submission will be noted on the Engineer's submitted drawing set and returned to the sender.

1.3.7 Landscape 'Record' Drawing Submission Process

'Record' Drawings submission of the signed Landscape drawings shall be submitted by the Developer / Landscape Architect within (4) months following Construction Completion Certificate (CCC) Approval. 'Record' drawing submission required prior to issuance of Final Acceptance Certificate (FAC) paperwork.

The 'Record' Drawing submission shall include the following:

a. Electronic File: Spatially correct AutoCAD file

b. PDF File: Full Size set of stamped & signed Landscape drawings

c. Hardcopy: Three (3) full sets of stamped and signed Landscape drawings

'Record' drawings are to accurately denote the outcome of the site construction. This includes all Redline revisions throughout the construction and warranty period.

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SECTION 2.0
SURFACE

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2.1 ROADWAYS

Roadway classification is established through the Area Structure Plan (ASP) approval process and the transportation studies. A Transportation Impact Assessment (TIA) shall be required by Engineering Services in order to help determine the roadway requirements. All new roadways within Beaumont shall be fully urbanized, unless otherwise approved.

Amended. Refer to Bulletin 005

2.1.1 General Geometric Design Standards

a. Road classification and designation shall be in accordance with the classification system outlined in the Transportation Association of Canada (TAC) Manual - Geometric Design Standards for Canadian Roads and the Urban Supplement to the Geometric Design Guide for Canadian Roads. The following shall be used for specific design detail:

   i. Geometric Design Guide for Canadian Roads, TAC, 2017

   ii. Design Vehicle Dimensions for Use in Geometric Design, TAC, 1997.

   iii. Metric Curve Tables, TAC, 1977.

   iv. A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2001.

   v. Urban Highway Geometric Design Guide, Alberta Transportation, 2003

b. Individual street classification is to be based on functional use established by the latest approved Area Structure Plan (ASP).

   Alignment of all roadways should give consideration to design and operating speeds first to determine proper radius, use of super-elevation or crown, and vertical curve requirement (see **Vertical Alignment**). Super-elevation on Local or Collector Road classifications should be avoided where possible in urban areas as one step to assist with controlling operating speeds.

c. The Developer and the Consultant are responsible for ensuring that the infrastructure is designed and constructed to achieve design life expectations consistent with good design and construction practice.

d. All new residential developments shall incorporate traffic calming measures as required to meet design requirements as established in this document. Traffic calming measure requirements shall be defined by Beaumont on a case by case basis. The decision to include traffic calming measures will be based upon, but not be limited to, updated traffic data, rezoning, local resident requests, level of service, etc. Traffic calming measures shall be designed in accordance with the Canadian Guide to Neighbourhood Traffic Calming, Transportation Association of Canada, most recent version.

e. Roundabouts for new development will be designed in accordance with TAC guidelines.

f. The traffic control proposed at the intersection of two collector roads shall be reviewed to provide a traffic control method that will be self-enforcing and reduce traffic operational speeds to less than 40 km/h.

g. Traffic calming measures shall be implemented for roads in excess of 215 metres.

h. Long continuous collector roads, in excess of 1000 metres should be avoided wherever possible. Neighbourhood plans are to be designed such that the maximum volume on collector roads are to be 6000 vpd. Instances where road length must exceed 1000 metres for other reasons may require a cross connecting collector road intersection with all directional full stop controls.

i. Bay design shall be adequate to accommodate the traffic volumes and turning movements.

j. Deviations from listed requirements may be considered to accommodate individual project considerations, and will require explicit approval by Engineering Services.

2.1.1.1 Cross-section Elements and Geometric Requirements

Refer to **Table 2.2 Roadway Classification** at the end of this section for overall requirements.

Minimum Gutter Grades

The minimum gutter grade shall be 0.6% ± 0.02, except for culs-de sac, turning circles, and curb radii where it shall be 1.0%. Any gutter grades shown in record drawings to be outside of the above noted allowable range may be subject to extended maintenance periods, removal and replacement, or other remediation deemed appropriate by Engineering Services.

Boulevard Grades

Boulevard grades shall be minimum 2.0% and may range from 2.0% to 8.0% for all roads

2.1.1.2 Vertical Alignment

Curves and curb returns shall have a minimum grade of 0.8% and maximum 8.0% on paved roadways.

Tangents with a radius less than or equal to 20 metres shall have a minimum grade of 0.8%, or as defined in TAC roadway standards, whichever is greater.

Vertical curves shall be designed to the following minimum requirements:

Table 2.1 Vertical Curve 'k' Values

'K' VALUE (m)		
DESIGN SPEED	CREST (BASED ON STOPPING SITE DISTANCE)	SAG (BASED ON COMFORT CONTROL)
40	4	4
50	7	6
60	11	9
70	17	12
80	26	16

k = L/A where:
A = algebraic difference in grades (%)
L = length of vertical curve in metres

Vertical curves are required for all road profiles demonstrating an algebraic grade difference greater than:

ARTERIAL	1.0%
COLLECTOR	1.5%
LOCAL	1.5%
ALLEYS	2.0%
SHARED USE PATH	6.0%

Successive short tangent lengths of various grades are not an acceptable design to eliminate vertical curves.

2.1.1.3 Local Residential Roadways

a. **Sidewalks and Curbs**

i. All roadways, unless otherwise authorized or directed by Engineering Services, shall have separate sidewalks, 1.5m in width, on both sides of the road. Monolithic sidewalks (min. 1.5m width) may be allowed on one side of the local road at the discretion of Engineering Services, but not both.

I. Roadways fronting multi-family and commercial sites require sidewalks 1.5m in width. All commercial and multi-family requirements are outlined in **Section 5.3 Roadways**

II. The extent of sidewalks along park areas shall be determined at the discretion of Engineering Services, however as a principle where parks form a connection between neighbourhoods or links with school sites, sidewalk will be required along one or both sides of roadways.

ii. Low profile curb and gutter shall be required along both sides of Residential roads.

iii. Sidewalks and concrete walkways shall be 1.5 m wide with a maximum grade of 6% longitudinally, and 2% in the crossfall direction.

iv. Where sidewalks are required monolithically along collector roads and adjacent to school sites, sidewalk widths shall be 2.0 m wide.

v. Straight curb and gutter shall be required along park areas, side flankage lots, lots with lane garages, commercial, and multi-family sites.

vi. Curb ramps are an incline built monolithically into curb cut and walk and are required at each intersection or pedestrian road crossing.

vii. Consideration of proposals of "Sidewalk on 1 Side" must be able to demonstrate that mobility by all types of pedestrians is not significantly compromised.

viii. Drainage swales within walkways/PULs must be contained fully within soft landscaping or within concrete swale. Sidewalk shall not be used as drainage swale.

b. **Cul-De-Sac** – The maximum length of a cul-de-sac shall be one hundred twenty metres (120m) from the intersection property line to the property line at the end of the cul-de-sac as measured along the centreline of the right-of-way.

i. Minimum radius to curb face in bulb of cul-de-sac shall be 12.0 metres.

ii. Minimum grade from the centre of the bulb to the curb shall be 1.0%. Minimum grade around curb, within bulb, shall be 1.0%.

iii. Where a cul-de-sac exceeds 120m a provision must be made for a Public Utility Lot (PUL) for emergency access and water looping purposes. PUL minimum width shall be 6m.

iv. All cul-de-sacs, unless otherwise authorized or directed by Engineering Services, shall have sidewalks throughout with a width of 1.5m. Monolithic sidewalks (min. 1.5m width) may be authorized or directed at the discretion of Engineering Services. Where sidewalk variances are requested, the following will guide the design:

I. 10 or fewer lots fronting and/or flanking cul-de-sac: A request shall be send to Engineering Services for review and possible approval when Developer wants to remove sidewalks

II. 18 or fewer lots with less than 120m from main pedestrian connection: A request shall be send to Engineering Services for review and possible approval when Developer wants to install sidewalk on just one side

III. more than 18 lots and/or lots flanking the cul-de-sac will require sidewalk on both sides

c. **Multi-Use Paths (MUP) and Trails** – These shall be located as directed by Engineering Services, shall be asphalt or concrete surface, and 3.0m wide unless approved for special circumstances.

Geometric standards for MUPs and trails are as follows:

i. Design speed of 30 km/hr for maintenance vehicles;

ii. Minimum curve radius of 17 m;

iii. Minimum slope of 0.7%;

iv. Maximum slope of 8.0%; and,

Amended - 2025
Refer to Amendment #2
Number 2.1

v. Ramp widths at end of MUP and trails to match MUP and trail width.

MUPs and Trails shall be constructed adjacent to or within: Arterial road (min, one side, must be separate) ROWs, SWM Facilities, Utility corridors and Utility ROW wider than 6.0m

d. **Protected Bike Lanes** – Where bike lanes have been approved by Beaumont, they shall be designed in accordance with TAC guidelines.

e. **Driveways**

The following specifications apply for driveways:

i. Residential driveways shall NOT access arterial roads or major collector roads;

ii. Driveway slopes shall range from 2.0% to 8.0%;

iii. Residential driveways shall drain towards the street, unless permitted for special circumstances (drive under garage) by Beaumont;

iv. Residential driveways shall be aligned parallel to one of adjacent property lines, and shall not extend into corner lot triangle;

v. Location of the driveways shall be situated to maximize on-street parking; and,

Amended - 2025
Refer to Amendment #2
Number 2.2

vi. Residential driveways will be located at least 2.0m from roadway intersections.

f. **Lanes**

i. Length of lanes from street shall not exceed 120m

ii. Corners of all lane intersections shall be designed in accordance with those shown in **Table 2.2**

Amended - 2025
Refer to Amendment #2
Number 2.3

iii. Minimum longitudinal grade for lanes shall be 0.6% ± 0.02

2.1.1.4 Minor Collector Roadways

a. **Intersections –** Transitions from minor collector to local residential roadways shall not occur at intersections but through the use of tapers in the local residential street. Tapers shall be a minimum of 40:1.

b. **Road Crowns –** The nominal design crossfall shall be 3% on all roadways. The minimum crossfall on roadways shall be 2.5% to the centreline or such offset as approved by Engineering Services. The maximum crossfall shall be 4%. The final cross-section shall be parabolic maintaining the crossfall elevation at centreline or agreed offset. Road crown heights shall be in accordance with those illustrated in **Standard Details 2-7**, and **2-8**.

c. **Sidewalks –** Separate sidewalks (1.5m in width) are required on both sides of the roadway with curb ramps at all intersections and crosswalks. Monowalk may be installed where authorized by Engineering Services.

2.1.1.5 Major Collector Roadways

Major collector roadways may be divided or undivided as determined by Engineering Services to provide appropriate traffic control.

a. **Road Crowns –** The nominal design crossfall shall be 3% on all roadways. The minimum crossfall on roadways shall be 2.5% to the centreline or such offset as approved by Engineering Services. The maximum crossfall shall be 4%. The final cross-section shall be parabolic maintaining the crossfall elevation at centreline or agreed offset. Road crown heights shall be in accordance with those illustrated in **Standard Details 2-5**, and **2-6**.

b. **Sidewalks –** Separate sidewalks shall be 1.5m wide on both sides of major collector roadways.

2.1.1.6 Arterial Roadways

Arterial roadways shall be a specific design and shall incorporate divided sections, storage and turning lanes and shall have island turning access onto and off major collector roadways.

a. **Intersections –** shall be spaced in accordance with TAC guidelines; and,

b. **Sidewalks –** Separate sidewalks or asphalt trails shall be 3.0m wide on both sides of arterial roadways.

2.1.1.7 Emergency Access

Emergency access shall be provided at specific locations to facilitate fire and ambulance vehicle access where only one means of access to a neighbourhood is provided by the road network. Deflections in Emergency Access will be reviewed on a case by case basis, and may require wider ROW and paved surface to accommodate vehicle movements.

Developer shall provide turning movement design documentation to ensure emergency vehicles have sufficient driving surface and clearance from landscaping, and can enter/exit ROW efficiently.

Ensure positive drainage from emergency access to public ROW. Wherever possible ponding water should be prevented through design in emergency access.

Emergency access R.O.W. shall be 6.0m in width and have a 3.0m wide paved surface. Alternatives may be designed to accommodate all weather access for emergency vehicles but must be of a permanent structure. The following shall be provided at each end of the access:

a. A minimum of one (1) knockdown barrier post with shear pins, and mounted on a minimum 1 metre depth concrete pile shall be provided at each end of the access. These shall be placed at the extension of adjacent property lines or fence projections; or

b. A minimum of two (2) T-bollard posts located on outside of walk.

2.1.1.8 Transit Stops

The following requirements for transit stops shall be used in design:

a. Transit stop locations should be determined during the Neighbourhood Structure Plan (NSP) process. Beaumont to approve locations in partnership with Edmonton Transit;

b. The Developer will be responsible for installation of bus shelters, bus stop pads, signage, furniture, roadway improvements and upgrades as defined and required on the Development Agreement.

2.1.1.9 Staged Construction

Where subdivision construction is completed in stages a temporary turnaround area or looped roadway connection is to be provided. In all cases these shall be at minimum gravelled “all weather” access roads.

Turnarounds shall be designed with:

a. 14 m diameter on local/collector (without Transit); or

b. 17 m radius on collector/arterial (with Transit);

c. looped roadway connections and shall be a minimum of 6m in width;

d. signage denoting the temporary nature of the roadway, to be in accordance with signage requirements of Beaumont; and

e. traffic control structure where required by Beaumont.

Staged construction and temporary roads shall be designed to ensure positive drainage away from temporary roadways and maximum ponding standards are met. Use of temporary ditches with temporary CBs and tie-back slopes may be required.

All temporary turnarounds shall be constructed to a gravel stage prior to opening the road to public access. Where used by Transit, the road may require install of asphalt hard surface.

A temporary turnaround is not required where the roadway termination is visible from adjacent intersection (two lot maximum distance).

2.1.2 Table 2.2 Roadway Classification

	DIVIDED RURAL ARTERIAL	DIVIDED URBAN ARTERIAL	UNDIVIDED URBAN ARTERIAL	UNDIVIDED MAJOR COLLECTOR RESIDENTIAL	UNDIVIDED MINOR COLLECTOR RESIDENTIAL	ALL LOCAL	LANES
Design Classification	RAD 80	UAD 80	UAU 60	UCU 60	UCU 60	ULU 50	N/A
Daily Service Volume	<12,000 AADT	10,000 – 30,000	5,000-20,000	1,000-10,000	5000	<1,000 Residential <3,000 Commercial/ Industrial	<500
Design Speed (km/hr)	80	80	60	60	50	50	20
Right of Way Width (m) (excluding utility easements)	55	40	30	24	20	18	6
Roadway Width (FOC to FOC)	2 x 11.40 (to edge of asphalt)	2 x 8.40	15.80	12.0	11.0	10.0	4.0 or 6.0 (to edge of asphalt)
Number of Travel Lanes	4	4	4	2	2	2	1
Number of Parking Lanes	Not Permitted	Not Permitted	Not Permitted	2	2	2	Not Permitted
Median Width (FOC to FOC)	8.0	4.5	N/A	N/A	N/A	N/A	N/A
Gutter/Shoulder Width	1.00 Inside 3.00 Outside	0.50	0.50	0.25	0.25	0.25	N/A
Travel Lane Width	3.70	3.70	3.70	3.50	3.50	3.00	4m for residential/ 6m for commercial
Parking Lane Width	N/A	N/A	N/A	2.50	2.40	2.40	N/A
Min. Horizontal Radius (m)	250	600	160	130	130	85/15	1000
Rate of Superelevation (m/m)	0.04	0.04	0.04	N/A	N/A	N/A	N/A
Maximum Gradient (%)	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Gradient (%)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Min. Intersection Spacing	400	400	400	75	75	75	
Min. Angle of Intersection (“)	75	75	75	75	75	75	75
CORNER RADII (M)							
Arterial	Varies	Varies	Varies	15	N/A	N/A	N/A
Collector	15	15	15	12	12	10	N/A
Local	N/A	N/A	N/A	10	10	10	N/A
LEGAL CORNER CUTOFFS (M)							
Arterial	30 X 30	30 X 30	30 X 30	10 x 10	10 x 10	N/A	N/A
Collector	10 X 10	10 X 10	10 X 10	5 x 5	5 x 5	5 x 5	0
Local	N/A	N/A	N/A	5 x 5	5 x 5	6 x 6	0
Lane	N/A	N/A	N/A	N/A	N/A	3 x 3	5 x 5

Amended - 2025
Refer to Amendment #2
Number 2.4

2.1.3 Subgrades

2.1.3.1 Roadways, Multi-Use Paths/Trails, and Sidewalk, Curb and Gutter

Roadway subgrade shall be prepared for the full width of the roadway plus all shoulder widths where there is no curb and gutter. Preparation shall extend to a minimum of 150mm beyond all concrete work. Preparation shall consist of mixing, moisture conditioning, shaping, blading and compacting select clay material to form a uniform foundation for receiving base course material.

All subgrade shall:

a. be prepared to a minimum depth of 150mm;

b. achieve a compacted density of not less than 100% of Standard Proctor Density; and,

c. have a Moisture content no more than three percent (3%) over optimum nor more than one percent (1%) below optimum moisture content, determined in the laboratory in accordance with ASTM D698 Method A, at the completion of compaction.

The prepared subgrade shall be proof rolled in the presence of Engineering Services representative not more than 48 hours after completion of compaction. The proof roll shall consist of one pass in each traffic and/or parking lane with a vehicle having a single rear axle with dual tires loaded to 8200kg, or equivalent as determined by Engineering Services Representative. The subgrade shall be tested for density at a minimum of one field test for each 1000 m^2 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 or as directed by Engineering Services.

All moisture and density test results shall be available and meet the indicated standards prior to the placement of any base course material. Any areas which demonstrate deflection or rutting shall be reworked. Likewise areas that are excessively dry shall be reworked to achieve the indicated standard. Engineering Services reserves the right to perform retests, at the Developer's cost, at the time of roll testing to confirm moisture content and density.

Where cement is used to modify the subgrade, application rates shall not be less than 10kg/m^2 for a depth of 150mm. The Developer shall provide specific recommendations from a Geotechnical Engineer where cement modification is applied. Cement modification shall be a uniform treatment over the complete width of the roadway, MUP, trail, or sidewalk curb and gutter for the length identified.

2.1.3.2 Separate Sidewalk, Paving Stone

Separate sidewalks with a gravel base per **Detail 2-15** may be exempt from using subgrade cement stabilization at the discretion of the Geotechnical Engineer. For separate sidewalks without a gravel base (if approved for use by a Geotechnical Engineer), subgrade preparation shall be to a depth of 150mm and achieve a

Standard Proctor Density of not less than 98% and moisture content not more than three percent (3%) over, nor more than one percent (1%) under optimum moisture content. The prepared subgrade shall be roll tested as per **Section 2.1.3.1** for roadways. Cement modified subgrade shall be employed as per **Section 2.1.3.1** to achieve a minimum density of 98%.

Engineering Services reserves the right to carry out testing, at the Developer's cost, at the time of roll testing. All test results shall be available prior to placement of concrete, gravel or asphalt. Where site specific conditions require, geotechnical report recommendations may supercede.

2.1.4 Road Structures

The following are minimum structures for the various roadway classifications.

Table 2.3

CLASSIFICATION	ASPHALTIC CONCRETE (MM)		GRANULAR BASE (MM)	CEMENT MODIFIED SUBGRADE PREP (MM)
	SURFACE	BASE		
1. Emergency Access	75		150	150
2.Residential Lanes Centre	75		225	
Residential Lanes Edge	75		300	
3. Commercial Lanes Centre	50	75	300	
Commercial Lanes Edge	50	75	375	
4. Local Residential	35	65	200	150
5. Collector	50	100	200	150
6. Industrial Collector	50	175	250	300
7. Local Industrial	50	175	200	300
8. Arterial	50	250	300	300
9. Multi-Use Paths/Trails	75	N/A	350 - 450	150
10. Turn Arounds			200	

Amended. Refer to Bulletin 005

The Developer shall engage an independent geotechnical consultant fully registered in Alberta to conduct materials sampling from the development area and perform specific tests to determine structural requirements for adequate pavement design. Pavement design shall be based on the following criteria applied to Asphalt Institute and American Association of State Highway Officials (AASHO) design methods.

Table 2.4

ROAD CLASSIFICATION	DESIGN TRAFFIC NUMBER (DTN)	EQUIPMENT STANDARD AXLE LOADS (ESAL)
Local Residential	2.7	30,000
Local Industrial/Commercial	20.5	150,000
Minor Collector (no buses)	13.7	100,000
Minor Collector (with buses)	41	300,000
Major Collector (no buses)	27.5	200,000
Major Collector (with buses)	82	600,000
Minor Arterial	135	1,000,000
Major Arterial	410	3,000,000

The final lift shall proceed only after all other surface and underground deficiencies have been rectified.

2.1.5 Construction Materials

2.1.5.1 Subgrades

An independent geotechnical consultant shall be employed by the Developer to provide specific information relative to subgrade materials, their bearing capacity, long term stability, proposed placement and any proposed methods and modifications to ensure long term stability. The influence of local water table conditions shall be considered in all design methods.

Cement for subgrade stabilization shall be normal Portland Type 10.

Cement shall not be spread during or when there is imminent danger of high winds or rain to control dust.

2.1.5.2 Granular Base Course

Granular Base Course (GBC) shall be from crushed rock and shall generally meet the following criteria for acceptance:

a. GBC shall not contain more than two percent (2%) lightweight particles (coal, etc.) floating on a liquid with a specific gravity of 2.0 gradation shall fall within the following limits based on percent passing metric sieves

Table 2.5

SIEVE SIZE (MM)	PERCENT PASSING BY WEIGHT
20.0	100
16.0	84-94
10.0	63-86
5.0	40-67
1.25	20-43
0.63	14-34

SIEVE SIZE (MM)	PERCENT PASSING BY WEIGHT
0.315	9-26
0.160	5-18
0.080	2-10

b. The percentage fracture by weight (2 faces) shall be 75% or more with 100% of all material having one broken face in all material retained above the 5.0mm sieve. The L.A. abrasion loss shall not exceed 35%.

c. The Developer shall provide evidence of conformance with this specification at least seven (7) calendar days prior to placement.

2.1.5.3 Asphaltic Concrete Mix Design

Mix designs contained herein are based upon City of Edmonton design standard mixes. For more detail, please refer to the City of Edmonton Design Standards Volume 2 – Roadways.

a. **Aggregate** - Aggregate gradation shall conform to the following specifications for the various mix designs.

Table 2.6

DESIGNATION	1		
CLASS	10	10	20.0
APPLICATION	10MM-HT	10MM-LT	200MM-B
SEIVE SIZE (µMm)	% PASSING BY MASS	% PASSING BY MASS	% PASSING BY MASS
25000	100	100	100
20000	100	100	97 - 100
16000	100	100	83 - 97
12500	100	100	70 - 92
10000	97 - 100	97 - 100	61 - 84
8000	70 - 94	80 - 94	52 - 77
6300	45 - 85	65 - 85	44 - 70
5000	32 - 75	50 - 75	38 - 65
2500	23 - 55	35 - 55	26 - 52
2000	-	-	-
1250	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	10 - 14

Table 2.7

DESIGNATION	1				2	3				
CLASS	10	10	16.0	20.0	20	20	25	40	63	80
APPLICATION	10MM-HT	10MM-LT	SMA	200MM-B	SOIL CEMENT	GRANULAR BASE	GRANULAR BASE	GRANULAR BASE	GRANULAR BASE	GRANULAR SUB-BASE
80000	-	-	-	-	-	-	-	-	-	100
63000	-	-	-	-	-	-	-	100	100	-
25000	-	-	-	100	-	-	100	70 - 94	55 - 75	46 - 85
20000	-	-	100	97 - 100	100	100	82 -97	60 - 90	50 - 70	40 - 81
16000	-	-	97 - 100	83 - 97	-	-	70 - 93	55 - 85	44 - 65	32 - 76
12500	100	100	88 - 100	70 - 92	60 - 96	60 - 96	60 - 86	50 - 80	38 - 60	30 - 70
10000	97 - 100	97 - 100	30 - 80	61 - 84	-	-	52 - 79	44 - 74	-	-
8000	70 - 94	80 - 94	-	52 - 77	-	-	-	-	-	-
6300	45 - 85	65 - 85	22 - 45	44 - 70	-	-	-	-	23 - 47	-
5000	32 - 75	50 - 75	20 - 35	38 - 65	36 - 75	36 - 75	35 - 64	32 - 62	20 - 45	25 - 50
2500	23 - 55	35 - 55	16 - 26	26 - 52	-	-	-	-	-	-
2000	-	-	-	-	24 -54	24 -54	24 - 50	20 - 50	14 - 38	19 - 42
1250	16 - 45	25 - 45	14 - 22	18 - 41	20 -43	20 -43	19 - 43	17 - 43	12 - 34	15 - 38
630	11 - 36	20 - 36	13 - 20	13 - 31	14 - 34	14 - 34	14 - 34	12 - 34	10 - 28	10 - 32
400	-	-	-	-	11 - 29	11 - 29	10 - 27	10 - 28	8 - 24	7 - 27
315	8 - 26	14 - 26	12 - 18	9 - 22	9 - 26	9 - 26	9 - 24	8 - 25	7 - 22	6 - 24
160	5 - 15	7 - 15	10 - 16	6 - 14	6 - 20	6 - 20	6 - 18	5 - 18	4 - 17	3 - 18
80	3 - 8	4 - 8	10 - 14	10 - 14	2 - 10	2 - 10	2 - 10	0 - 10	0 - 10	0 - 10

Table 2.8

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
80000	-	-		100				100
25000	-	-				100		
20000	-	-		85 - 100	100			
14000	-	-			90 - 100			
10000	-	-			45 - 75		100	
5000	-	75 - 950	100	79 - 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				

In the tables on the previous page:

i. **Asphalt Cement Content:** the amount (percentage) of asphalt cement in the SGC hot-mix.

ii. **10mm – High Traffic (10mm - HT):** mix used primarily for paving residential collector roadways and selected arterial roadways.

iii. **10mm – Low Traffic (10mm - LT):** mix used for paving local residential roadways and alleyways.

iv. **20mm - Base (20mm-B);** base course for freeways, arterials, industrial/ commercial roadways and collector roadways.

b. **Asphaltic Cement -** Asphaltic cement shall be uniform premium grade and shall not foam at 175°C. The material shall have the following characteristics for 150-200 designation:

i. absolute viscosity (dmm) 155

ii. penetration (dmm) 150+

iii. flash point (C.O.C.) 205°C

iv. solubility in trichloroethelene % min. 99.5

v. ductility @ 25°C (max.) c.m. 100

c. **Mineral Fillers –** Portland cement, ground limestone or approved alternate according to AASHTO M-17 or ASTM D242 may be used to meet grading specifications. Mineral filler shall have zero plasticity index and shall meet the following gradation:

Table 2.9

SIEVE SIZE (MM)	MIN % PASSING BY MASS
600	100
300	92-100
80	60-100

d. **Mix Designs –** A mix design shall be based on the “Superpave Mix Design”, as set out in the latest editions of the Asphalt Institute manuals “For Asphalt Concrete and Other Hot-Mix Types” Manual Series No. 2 (MS-2), “Superpave Mix Design” Superpave Series No. 2 (SP-2), Section 1.4.2 SGC Mix Design, and shall conform to the following criteria:

Table 2.10

	REQUIREMENT		
MIX TYPE	10 MM - HT	10 MM - LT	20MM - B
SELECTED PARAMETERS			
Number of Gyrations			
Gyrations N_{design}	100	75	100
Gyrations $N_{maximum}$	160	115	160
Density at $N_{maximum}$ (%Gmm)	98.0 max	98.0 max	98.0 max
Bailey CA-CUW	60 to 105 max.	60 to 85 max.	60 to 85 max.
Air Voids, % of total mix (virgin mix)[1]	4.0 +/- 0.4%	3.0 +/- 0.4%	3.5 +/- 0.4%
VMA, %	13 min.	14 min.	12 min.
Voids filled, %	70 - 80	73 - 85	65 - 75
Tensile Strength Ratio % (AASHTO T283)[2]	80 min.	80 min.	80 min.
Minimum Film Thickness, mm	7.5 min.	7.5 min.	6.5 min.
APA (mm, 52°C, 8,000 cycles)	5.0 max.	7.0 max.	5.0 max.

Note 1: 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;

Note 2: Minimum Tensile Strength Ratio to be determined in accordance with AASHTO T283, with optional freeze-thaw, at air void content of 7.0+/- 0.5 percent;

e. **Crushed-Face Count in Mix**

Table 2.11

MIX TYPE	10 MM - HT		10 MM - LT		20 MM - B	
MINIMUM 2 CRUSHED-FACE	90%		85%		90%	
SIEVE FRACTION (MM)	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

The mix design testing shall be carried out by an accredited testing agency possessing a permit to practice under the Engineering, Geological and Geophysical Professions Act of Alberta and shall be submitted to Engineering Services for approval at least one week prior to commencement of work.

2.1.5.4 Pavement Construction

a. **Base Course** - The subgrade shall be trimmed to a uniform cross-section, true to line and grade. Supply and install Nilex Nudrain MD/7407 or approved equal, at the intersection of the curb with the approved subgrade on both sides of the roadway. These drains shall be connected to the catch basins at the downstream end of each run of wick drain. Drains shall be lapped 600mm where runs are in more than one section. No more than one lap joint will be permitted in 200

lineal metres of run. With the drain in place and connected to the catch basins or manholes, a 100mm thickness of base course shall be placed over the drain prior to commencing general placement of base course. Transverse drains connecting wick drains or draining low points shall be with 100mm dia. perforated pipe with geotextile sock installed with the crown just below subgrade level. Specific design shall be provided in this instance.

Base course material shall be spread uniformly over the subgrade in a manner that avoids segregation. Compaction shall only proceed on uniformly bladed lifts. Where the specified base course thickness exceeds 150mm, the material shall be compacted in two (2) lifts. Any non-uniform material shall be removed from the base course or reblended to achieve uniformity.

Apply water uniformly as required to achieve a density equivalent to 100% of Standard Proctor Density. The finished surface shall be rolled and bladed to achieve a smooth, dense surface. The cross-section shall be parabolic providing a constant depth of material over the subgrade. The surface shall be uniform depth at the gutter, within ±15mm at the crown and shall be free of rutting on flat surfaces.

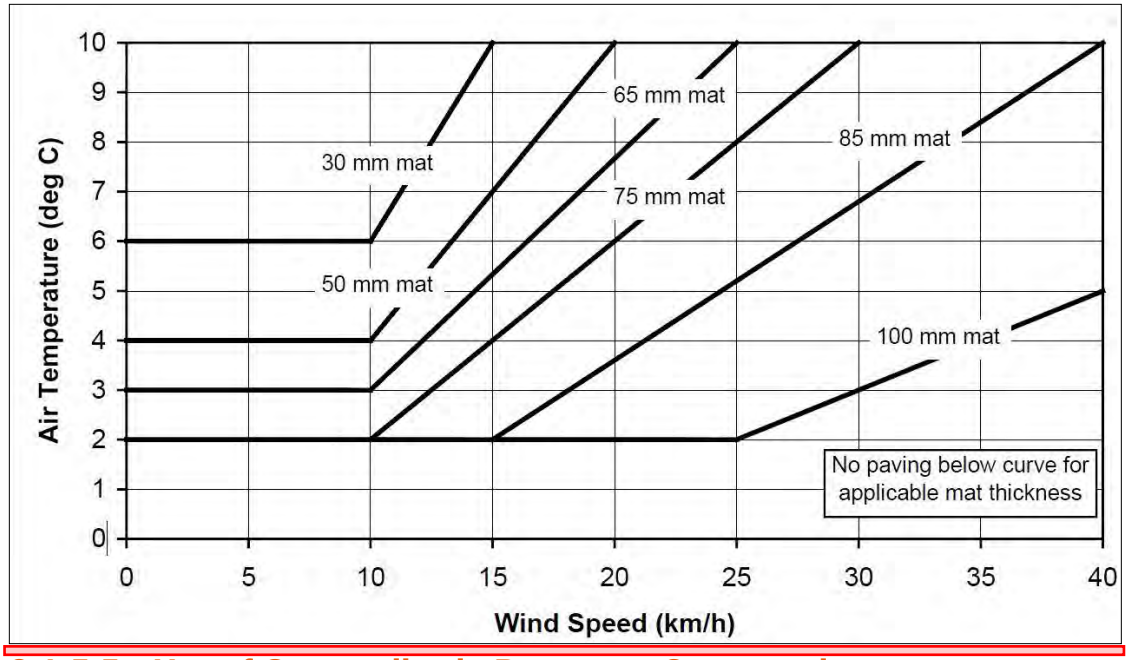
b. **Asphalt Surfacing** - A prime coat of medium cure (MC) series asphalt shall be applied at a minimum rate of 1.0 litres per square metre onto the base course surface. Should asphalt surfacing proceed within 48 hours, prime coat application may be waived at the discretion of Engineering Services. Priming shall not proceed if it is not apparent that conditions will permit full absorbency. If general absorbency has not been achieved after 24 hours, blotting sand shall be applied to prevent pick up. Excess blotting sand shall be removed within 48 hours to avoid washing into low areas and the storm sewer system. All concrete surfaces, catch basins and manhole frames shall be primed immediately prior to asphalt placement.

   The initial lift of asphaltic concrete shall be placed on the primed and approved base course surface. The asphalt material shall be delivered at not less than 170°C nor greater than 190°C, except where warm-mix asphalt is used at Engineering Services' discretion. All material shall be transported in clean metal containers. The length of mat placed shall be governed by the ground temperature, air temperature and wind conditions. The maximum length of paver advance in a single mat shall not exceed 200m. The maximum length of mat shall be reduced to 90m when the air temperature is less than 7°C. Paving shall not proceed when the air temperature is not rising above 2°C during the paving period.

   For all subsequent lifts of asphalt, the foregoing delivery and placing conditions apply. The existing asphalt surface shall be flushed and cleaned to remove all foreign material. The surface shall be roll tested at this time with an 8200 kg single axle (or equivalent as deemed appropriate by Engineering Services) provided by the Developer. Any deficiencies and noticeable deflection shall be corrected and re-inspected (roll tested) prior to tack coat application. The tack coat shall be a rapid cure (RC) type liquid asphalt. Paving shall not proceed until the tack coat has fully cured. Tack coat shall not be applied to an unclean surface or when weather/climatic conditions are not suitable for full curing or adhesion.

Paving shall be performed only when air temperature and wind speed conditions align with **Figure 2.1** below:

Figure 2.1 Air Temperature And Wind Limitations On Paving



Amended - 2025
Refer to Amendment #2
Number 2.5

2.1.5.5 Use of Geotextiles in Pavement Construction

Where either woven or non-woven geotextiles are used at the recommendation of a Geotechnical Engineer, the placement of material shall be in accordance with the following:

a. The surface to receive the geotextile shall be prepared to a relatively smooth condition free of obstructions, depressions, debris, and soft or low density pockets of material. The geotextile fabric shall be installed free from tensile stresses, folds, wrinkles, or creases.

b. If more than one width of geotextile fabric is used, the Contractor shall either overlap the joints by a minimum of 400 mm with no stitching, or overlap the joint by 200 mm and provide two rows of stitching at each joint.

c. The geotextile fabric shall be protected all times during construction. Wheeled or tracked vehicles shall not be allowed to travel directly on the geotextile fabric. Any geotextile fabric damaged during installation or during placement of granular material shall be replaced by the Contractor at Contractors expense.

2.1.5.6 Recycled Asphalt Paving and Other Alternate Structures

Where appropriate, Beaumont encourages the use of reclaimed existing asphalt pavement for new surfacing. This material shall adhere to the following standards and definitions and design:

a. **Reclaimed Asphalt Pavement (RAP):** RAP is salvaged, milled, pulverized, broken, or crushed asphalt pavement removed from an existing pavement.

b. **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.

c. **Virgin Aggregate:** new aggregate to SGC Hot-Mix Asphalt Concrete.

d. **Aggregate in Recycled Asphalt Mix:** SGC Hot-Mix Asphalt Concrete modified as follows:

Table 2.12

DESIGNATION	1		
CLASS	10	10	20.0
APPLICATION	10MM-HT	10MM-HT	200MM-B
SIEVE SIZE (MM)	% PASSING BY MASS	% PASSING BY MASS	% PASSING BY MASS
160	9 - 16	7 - 16	8 - 16
80	4 - 9	4 - 9	4 - 9

e. **Asphalt Cement:** The extracted blended asphalt cement shall meet the PG requirements as detailed in the SGC Hot-Mix Asphalt Concrete spec above.

f. **Mix Design and Proportions:**

i. A design shall be submitted for the specified mix type based on the following maximum RAP, RAS, or combination RAP and RAS content:

Table 2.13

MIX TYPE:	20MM - B	10MM – HT	10MM - HT
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 is using both RAP and RAS in the mix, subject to the above noted individual maximums (% by mass of total mix)	25	10	20

ii. 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.

iii. RAS shall contain no more that 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 5.000mm sieve

iv. RAS shall be free from asbestos fibres.

v. 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, RAP, or RAP and RAS materials meets the grade specified in the contract.

2.1.6 Materials Testing and Standard of Acceptance

2.1.6.1 General Grading

In areas of general grading, fill material shall be tested for compaction by a minimum of two (2) density tests per hectare per 150mm depth of filled area. Each lift shall not exceed 150mm in compacted thickness. All tests shall indicate a minimum density of 98% of maximum standard proctor density unless otherwise specified or directed by Beaumont, provided moisture content is not greater than 5% over optimum. Structural fills shall be certified by the Developer through a registered Professional Engineer and in conformance with the Geotechnical Report.

2.1.6.2 Subgrade Preparation

Density testing shall be carried out on all subgrades for roadways and concrete work. A minimum of one (1) density tests shall be carried out per 1,000m² of road subgrade and one (1) test per 50 lineal metres of curb, gutter and sidewalk. The minimum number of density tests on any project shall be four (4) for road subgrades and five (5) for concrete work.

Subgrades shall be initially reviewed if test results indicate all subgrade areas have achieved a density of 100% of Standard Proctor Density, with no single test below 99.5% and moisture content not more than one percent (1%) below nor greater than three percent (3%) above optimum moisture. Final review of subgrades shall be subject to a satisfactory roll test and satisfactory cross-section and gradients. When both reviews indicate general conformance with standards, placement of granular base course may proceed. All field densities shall be determined in accordance with ASTM D2922 (nuclear method).

All subgrades shall be roll tested by a motor grader at a minimum GVW of 20,000 kg.

2.1.6.3 Granular Base Course

The Developer shall provide sieve analysis and crushed face counts as a minimum prior to placement. Granular Base Course shall be tested at the same frequency as the subgrade. Conformance with compaction criteria, roll testing, uniformity and surface conditions will govern approval to proceed with asphalt surfacing.

One (1) sieve analysis per 1000 tonnes of gravel is required.

All Granular Base Courses shall be roll tested by a motor grader at a minimum GVW of 20,000 kg.

2.1.6.4 Asphaltic Concrete

A full mix design produced by an accredited geotechnical firm shall be submitted to Engineering Services at least 48 hours prior to asphalt surfacing proceeding. In terms of quality assurance, compacted Marshall density results shall be provided for each 1,000 m^2 of asphaltic pavement placed or one day's production, whichever is less. One undisturbed core shall be taken from each representative Marshall sample area with not less than two (2) cores taken per one day's production. Re-coring, at the developers expense, to establish relative thickness and density may be carried out with no more than three (3) new cores acceptable for each 1,000 m^2 of surfacing.

Amended. Refer to Bulletin 005

Asphaltic concrete pavement shall be compacted to meet the following standard (% of Marshall density):

Table 2.14

MINIMUM DENSITY (D)	TYPE OF PAVING
94%	New paving other than 2nd stage lift
94%	Second stage residential mat 40mm thick or less
93%	Lane, Trail and Emergency Access Paving
94%	Overlay greater than 40mm
94%	Overlay 40mm thick or less

Failure to meet the foregoing standards shall be cause for rejection depending on other quality and characteristics of the material or may be cause for Engineering Services to require additional asphalt thickness at the 2nd stage. The Developer, prior to the 2nd stage of surfacing, shall carry out a further geotechnical review of deficient asphalt. Rejection will occur should density testing exceed pay factors listed in **Table 2.15**.

Rejection shall require removal and replacement of the mat in question.

2.1.6.5 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 the following table to be applied to the price of the quantity of hot mix asphaltic concrete pavement in that mat area.

Table 2.15

94% REQUIRED		93% 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		
92.4	91.1	Less than 91.5	Reject
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		
Under 91.5	Grind and Resurface		

2.1.6.6 Asphalt Thickness

a. **Deficient Thickness:** If the average core thickness is deficient that area of asphalt pavement will be assessed a pay factor according to the following table to be applied to the price of the quantity of hot mix in that mat area placed with the current stage of paving.

   If the first or only stage or of asphalt is completed (i.e. lanes, etc.) and the average core thickness is deficient, that area of asphalt pavement will either: 1) be assessed a pay factor according to the following table to be applied to the price or, 2) be rejected and shall require removal and replacement.

Amended. Refer to Bulletin 005

Table 2.16 Asphalt Thickness Pay Factors

THICKNESS DEFICIENCY (MM)	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

b. **Excess Thickness:** Asphalt pavement with excess thickness may be accepted with no claim for extra payment, if surface and grade tolerances and texture are met.

Amended. Refer to Bulletin 005

2.1.6.7 Asphalt Oil Content

The allowable variation from the approved design asphalt content shall be ±0.30 percent by mass of mix.

Deficient Asphalt Oil Content: If the asphalt cement content, as determined by ESS indicates low or high asphalt oil content, the represented area of mat may be accepted subject to a pay factor according to **Table 2.17** and is to be applied to the unit price of the 250 tonnes or equivalent area of hot-mix in the mat.

Table 2.17 Asphalt Oil Content Pay Factor

QAL ASPHALT OIL CONTENT	PAY FACTOR (%)
0.00 - 0.20	100.0
0.21 - 0.25	98.0
0.26 - 0.30	94.0
0.31 - 0.35	90.0
0.36 - 0.40	86.0
0.41 - 0.45	82.0
0.46 - 0.50	78.0
≥0.51	Reject

2.2 CONCRETE WORK

2.2.1 General

The following requirements are specific to

- sidewalks
- curbs and gutters
- drainage swales
- walkways and
- other concrete structures relating to municipal improvements for all types of land development and infrastructure replacement.

Concrete work shall conform to the current detail requirements in terms of dimensions and cross-sectional elements.

2.2.2 Materials

2.2.2.1 Aggregate

a. maximum size - 25mm

b. petrographic examination indicating less than 1.0% ironstone in course aggregates and less than 1.5% in fine aggregates by mass in accordance with CAN3-A23.3M-ISA

2.2.2.2 Cement

a. Portland, Type GU, in conformance with CAN3-A5M. Type HS, sulphate resistant cement in conformance with CAN3-A5M, may be required at the recommendation of a geotechnical consultant sulphate resistant cement in conformance with CAN3-A5M.

2.2.2.3 Mix Designs

Mix designs shall be submitted to Engineering Services at least three (3) working days prior to concrete delivery. Mix designs shall comply with the following requirements.

Table 2.18 Mix Designs – Spring and Fall

CLASS	MINIMUM 28 DAY COMPRESSIVE STRENGTH (MPA)	SLUMP (MM)	ENTRAINED AIR LIMITS (% BY VOLUME)	MAXIMUM AGGREGATE SIZE (MM)	MAXIMUM WATER TO CEMENTING MATERIALS RATIO (BY MASS)	MINIMUM PORTLAND CEMENT CONTENT (KG/M³)	CEMENT TYPE
A	30	60 ± 20	5.5 – 8.0	20	0.45	335	GU*
B	30	60 ± 20	5.5 – 8.0	20	0.45	335	GU*
C	30	60 ± 20	> 5.5	20	0.45	335	GU*
D	30	100 ± 30	5.5 – 8.0	20	0.45	335	HS*
E	30	80 ± 20	5.5 – 8.0	20	0.45	300	HS*

Table 2.19 Mix Designs – Summer

CLASS	MINIMUM 28 DAY COMPRESSIVE STRENGTH (MPA)	SLUMP (MM)	ENTRAINED AIR LIMITS (% BY VOLUME)	MAXIMUM AGGREGATE SIZE (MM)	MAXIMUM WATER TO CEMENTING MATERIALS RATIO (BY MASS)	MINIMUM PORTLAND CEMENT CONTENT (KG/M³)	CEMENT TYPE
A	30	60 ± 20	5.5 – 8.0	20	0.45	302	GU*
B	30	60 ± 20	5.5 – 8.0	20	0.45	302	GU*
C	30	60 ± 20	> 5.5	20	0.45	302	GU*
D	30	80 ± 20	5.5 – 8.0	20	0.45	335	HS*
E	30	80 ± 20	5.5 – 8.0	20	0.45	300	HS*

* Note: GUb and HSb cements can be used only upon approval of Engineering Services

a. **Air Entraining** - an air entraining agent conforming to CAN3-A266.1M shall be added to all concrete in sufficient amounts to produce air entrainment as required.

b. **Fly Ash** - where permitted by Engineering Services, fly ash may replace not more than 10% of the specified minimum cement content in the mix up to October 15.

   Before May 16 and after October 15, no portion of the specified minimum cement content shall be replaced with fly ash.

   Where permitted by Engineering Services, use fly ash conforming to CAN/CSA-A23.5, Type C. Submit to Engineering Services together with the concrete mix design, the results of tests on the fly ash performed by an independent testing laboratory acceptable to Engineering Services.

c. **Calcium Chloride** - the use of calcium chloride shall be subject to Engineering Services approval and shall only be considered for cold weather concrete placement. The maximum amount permitted will be 2% by weight of cement. Calcium chloride shall be used only in conjunction with Type 10 Normal Portland Cement.

d. **Minimum Cement Content** - shall be 335 kg/m³.

e. **Slump** - shall be 40-80mm.

f. **Minimum Strength Requirements**:

Class C concrete: shall attain the minimum compressive strength corresponding to the percentage of entrained air in the plastic concrete as follows:

Table 2.20

% AIR CONTENT	MIN. 28 DAY COMPRESSIVE (MPA)
5.5 to 5.9	30
6.0 to 8.0	42-(2×air content)
Greater than 8.0	26

2.2.2.4 Reinforcing Steel

a. Bars - billet steel bars for concrete reinforcement to ASTM A615 or CSA G30.12-M, grade 300.

b. Welded Wire Mesh for concrete reinforcement to ASTM A185 or CSA G30.5.

2.2.2.5 Curing Compounds

Shall be a white pigmented resin base impervious membrane curing compound shall be used and shall conform to ASTM specifications C309, Type 2 - Class B.

2.2.2.6 Expansion Joints

Shall be to standard specifications for joint fillers in accordance with ASTM D1751.

2.2.2.7 Joint Sealant

Shall be hot poured type in conformance with ASTM D1190.

2.2.2.8 Granular Levelling Course

When required, a 100mm granular depth of levelling course shall be placed on the prepared subgrade. The levelling course shall conform to specification requirements for Crushed Gravel Base Course (see **Section 2.1.6.3 Granular Base Course**) where required.

2.2.2.9 Fillcrete

Where required, at the discretion of Beaumont, Fillcrete is to be used to gain necessary compaction densities for subbases, or pipe bedding.

Fillcrete shall be supplied in accordance with:

Table 2.21

COMPRESSIVE STRENGTH AT 28 DAYS (MPA)	SLUMP (MM)	ENTRAINED AIR (% BY VOLUME)	MAXIMUM AGGREGATE SIZE (MM)	MINIMUM PORTLAND CEMENT (KG/M3)
Minimum - 0.15 Maximum - 0.40	100 ± 25	6.0 - 8.0	5	30

2.2.3 Placing Concrete

2.2.3.1 Subgrade Preparation

All subgrade shall be cement modified and prepared 150mm beyond the concrete structure. Compaction shall be a minimum of 98% of Standard Proctor Density for a depth of 150mm below concrete work or granular levelling course. All subgrade materials shall be uniform in consistency, free of organic material and excessively silty clays. Where deflection by proof rolling is excessive the subgrade shall be stabilized by either reworking the material, subcut and replacement of material, or application of additional cement.

2.2.3.2 Surface Preparation

The proposed subgrade or levelling course surface shall be neatly trimmed, after compaction, to ensure a uniform concrete cross section. Where necessary, surfaces shall be redensified after trimming. Surfaces shall be moistened as necessary just prior to concrete placement to minimize moisture loss from the concrete.

2.2.3.3 Concrete

Concrete shall be densified when placed in the forms by means of a mechanical vibrator or extrusion equipment.

2.2.3.4 Curing

a. **Membrane Curing** - Exposed concrete surfaces shall be coated with a curing compound as specified at a rate of not less than 1 litre per 4 square metres of surface area.

b. **Moist Curing** - This method is not recommended for exposed surfaces unless permitted in writing by Engineering Services and under specific conditions.

2.2.3.5 Finishing

a. Perform initial and final finishing of concrete surfaces in accordance with Clause 22 of CAN/CSA-A23.1M.

b. Water shall not be added to surfaces during finishing.

c. Broom surfaces to provide a uniform texture with grooves not greater than 3mm. Apply brush finish longitudinally along curbs and gutters and transversely on walks and slabs.

d. Tool all edges for a width of 50mm and with a 6mm radius.

e. Provide all necessary weather and dust protection.

f. Contractors Stamp - The contractor shall place an imprint of the company name and the year of construction at 200m intervals in the top of curbs and the property side of walks.

g. At CC locations stamp the letters "C.C." into finished but still wet concrete on the property side of the sidewalk and/or curb and gutter of each curb stop location.

h. Imprint the letters "W.V." for each main line water valve location and "B.O." for each blow off valve location in the roadway side of the sidewalk after concrete has been finished but is still wet.

i. Failure to have the Contractor's stamp, the CC and WV imprints will result in a penalty to be issued by Engineering Services.

2.2.3.6 Cold Weather Concrete Install

From October 16 (or earlier as determined by Engineering Services based on weather conditions) to the end of construction season as defined by the Engineering Services, 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 7.4.2.5.3, CAN/CSA A23.1.

High early strength concrete shall attain a minimum compressive strength of 30.0 MPa in 7 days and shall be provided with cold weather protection to clause 7.4.2.5.3, CAN/CSA A23.1 (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.

When the air temperature is below 5°C provision shall be made to ensure concrete temperatures do not fall below 10°C for a period of 7 days.

2.2.4 Testing and Inspection

a. **Frequency: Slump and Compressive Strength Tests:**

   i. once per 100 cubic metres or at least once per day

b. **Testing Methods:**

   i. Strength Tests: as defined in Clause 17.1, CAN3-A23.2M-3C and 9C.

   ii. Air Content: to be taken at one-third load discharge in accordance with CAN3-A23.2M-1C and 5C.

c. **Reporting** - All tests shall be reported to Engineering Services by facsimile or email within three (3) calendar days.

   Further testing information can be reference in **Table 2.23 Roadway Testing Frequencies for Private Residential Development**

2.2.5 Concrete Acceptance Criteria

a. **Strength Test Results** - Generally all compressive strength test results shall equal or exceed specified minimum values at 28 days. Deficient strength results shall be cause for adjustment of the mix design and/or coring of placed concrete and subsequent testing to demonstrated strength values. Cylinder strengths must achieve a minimum of 100% specified strength and be proven by coring where strengths are deficient.

   Concrete work for roadways represented by a strength test result which is less than specified may be accepted subject to pay factor according to **Table 2.22**. If strength deficiencies persist, Engineering Services will require changes in the concrete mix design for the remainder of the work.

Table 2.22 Concrete Strength Pay Factors

% OF SPECIFIED STRENGTH	PAY FACTOR
97.0	100.00
96.9	99.92
96.8	99.84
96.7	99.76
96.6	99.68
96.5	99.60
96.4	99.52
96.3	99.44
96.2	99.36
96.1	99.28
96.0	99.20
95.9	99.10
95.8	99.00
95.7	98.90
95.6	98.80
95.5	98.70
95.4	98.60
95.3	98.50
95.2	98.40
95.1	98.30
95.0	98.20
94.9	98.07
94.8	97.94
94.7	97.81
94.6	97.68
94.5	97.55
94.4	97.42
94.3	97.29
94.2	97.16
94.1	97.03
94.0	96.90
93.9	96.75
93.8	96.60
93.7	96.45
93.6	96.30
93.5	96.15
93.4	96.00
93.3	95.85
93.2	95.70
93.1	95.55
93.0	95.40

% OF SPECIFIED STRENGTH	PAY FACTOR
92.9	95.22
92.8	95.04
92.7	94.86
92.6	94.68
92.5	94.50
92.4	94.32
92.3	94.14
92.2	93.96
92.1	93.78
92.0	93.60
91.9	93.41
91.8	93.22
91.7	93.03
91.6	92.84
91.5	92.65
91.4	92.46
91.3	92.27
91.2	92.08
91.1	91.89
91.0	91.70
90.9	91.47
90.8	91.24
90.7	91.01
90.6	90.78
90.5	90.55
90.4	90.32
90.3	90.09
90.2	89.86
90.1	89.63
90.0	89.40
89.9	89.13
89.8	88.86
89.7	88.59
89.6	88.32
89.5	88.05
89.4	87.78
89.3	87.51
89.2	87.24
89.1	86.97
89.0	86.70

% OF SPECIFIED STRENGTH	PAY FACTOR
88.9	86.38
88.8	86.06
88.7	85.74
88.6	85.42
88.5	85.10
88.4	84.78
88.3	84.46
88.2	84.14
88.1	83.82
88.0	83.50
87.9	83.12
87.8	82.74
87.7	82.36
87.6	81.98
87.5	81.60
87.4	81.22
87.3	80.84
87.2	80.46
87.1	80.08
87.0	79.70
86.9	79.28
86.8	78.86
86.7	78.44
86.6	78.02
86.5	77.60
86.4	77.18
86.3	76.76
86.2	76.34
86.1	75.92
86.0	75.50
85.9	74.95
85.8	74.40
85.7	73.85
85.6	73.30
85.5	72.75
85.4	72.20
85.3	71.65
85.2	71.10
85.1	70.55
85.0	70.00
under 85.0	remove & replace

Optional core strength test:

The Contractor has the option at the Contractor's expense of providing evidence of strength by coring and testing to CAN/CSA-A23.2-14C moisture conditioned, by a qualified laboratory within 7 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 tests at locations approved by the Engineer.

The average strength of the 3 cores shall equal 100% of the specified cylinder strength; otherwise, the concrete will be subject to the pay factors of Table 2.22 on the basis of the cylinder strength tests.

Optional core strength test results shall be submitted to Engineering Services.

b. **Air Content -** Concrete placed with an air content less than 5.5% shall be rejected, removed and replaced. Air over 8.0% may be accepted provided the specified strengths are achieved.

c. **Slump** - Some retempering of concrete in the mixer may be acceptable if the initial slump test is not satisfactory. If retempering is unsuccessful the load shall be rejected.

2.2.6 Crack Control

The contractor shall employ either sawn, formed or tooled contraction joints at specified intervals. Formed or tooled joints shall have a 6mm radius. All joints shall be filled with a joint sealer.

Construction joints shall be made between concrete pours or where new work abuts existing. The joint shall be dowelled (10m deformed bars). Existing concrete abutting new work shall be saw cut to form the new joint.

Joints shall be 3mm to 5mm in width with saw cuts not less than 50mm depth. Joints shall be at 3m spacing.

2.2.7 Construction Tolerances

a. **Walk or Slab Surfaces**

   i. surface variations shall be 6mm or less over a 3m straight edge.

   ii. cross fall shall:

      I. be 2% ±1% but;

      II. shall not exceed 4% or be less than 1% overall

b. **Gutter Grades/Cross Section** - The maximum vertical variation from designated elevation shall be 6mm with a maximum variation between 15m stations of 12mm. Horizontal variation shall be ±12mm over 30 metres.

   Variations outside these defined limits are cause for rejection.

2.2.8 Removal and Replacement Work

All removal and replacement work shall be performed between crack control joints or construction joints. All replacement work shall conform to these design standards. Deviations may be permitted at the discretion of Engineering Services.

Where removal work has been approved the following minimum distances shall be maintained:

a. One (1) m spacing from curbs

b. Full sidewalk panel must be removed and replaced

Where two panels are to be removed/replaced and there is a remnant panel of acceptable quality between them, it must also be removed and replaced to retain integrity of the sidewalk system.

Table 2.23 Roadway Testing Frequencies For Private Residential Development

MATERIAL	FREQUENCY	MINIMUM DENSITIES	OVERLYING INFRASTRUCTURE
Clay Subgrade	1 test for every 1000m^2	100% density for each 150mm lift of sub-grade	Pavement structures Concrete curbs Concrete gutter Commercial and alley crossings Asphalt pathways
		95% density for each 150mm lift	Concrete walkways Curb ramps Slabs Private crossings Walkways made of concrete pavers, brick pavers, and granular material
Soil Cement	For density: minimum 1 test for every 1000m^2 per supplier per day For strength: minimum 1 test (3 cylinders @ 7 days) for every 500 tonnes of mix per supplier per day	100% density for each 150mm	

MATERIAL	FREQUENCY	MINIMUM DENSITIES	OVERLYING INFRASTRUCTURE
Gravel Base Course	For density: minimum 1 test for every 1000m^2 per supplier per day	100% density for each 150mm lift of sub-grade	Concrete curbs Concrete gutters Asphalt roadways Commercial and alley crossings
		98% density for each 150mm lift of sub-grade	Concrete walkways Asphalt pathways
Asphalt	Minimum 1 test for Marshall specimen every 1000 tonnes per day per type Minimum 1 test every 250 tonnes for bitumen content and density per day per type Minimum 1 core sample for every 1000m^2 of compacted asphalt	94% density for all stages in staged paving	Freeways Arterial Industrial or commercial roadways Residential collector roadways Residential local roadways FAC overlays
		93% density	Alley paving Rehabilitation overlay Asphalt walk/bikeway
Concrete	Minimum 1 test per 60 m^3 per day, per class per supplier		

2.3 LOT GRADING

These design requirements have been prepared to provide guidance in the preparation of the subdivision grading plans as well as individual lot grading plans.

2.3.1 General Principles

Grading design for Subdivisions shall provide for proper surface drainage and maximize usable land area, in accordance with the Engineering Standards and the following criteria:

a. Overall grading must account for and accommodate external drainage tributary to the Subdivision

b. Grading must direct storm runoff to major and/or minor system

c. Road's ROW major flow route must be designed to safely convey flows above minor storm to an accepted outlet. Any other overland flow routes (e.g. swale) must be designed to safely convey flows to an accepted outlet system

d. Drainage shall be directed away from structures

e. Drainage must be contained within the site boundaries and directed to an accepted outlet

f. Proposed grades shall match existing ground elevations at the boundary of the Subdivision

g. Existing trees shall be preserved, where identified and approved by Beaumont Parks and Facilities Division.

h. Lot drainage for each phase of the Subdivision shall be self-contained

i. **All lot grade elevations are to be above the geodetic elevation of 709.5 meters, unless otherwise authorized by Engineering Services.**

j. **The designer must be familiar and in conformance with Beaumont's Surface Drainage Bylaw, and Municipal Lot Grading Guidelines.**

Lot Grading Plan Details – Shown in **DWGs 2-31** through **2-35** of the Standard Details at the back of this document

2.3.2 Lot Grading

The grading design for residential lots on the Subdivision Grading Plans shall be as follows:

All residential lots shall be designed to drain to the front, where possible. The ground adjacent to the building is to be at a minimum slope of 10% or more for 1.2m, draining water away from the building to the property lines. Outside this zone, surface grades shall be generally 2.0% to 6.0% with a minimum grade of 2.0% drainage throughout. Maximum grades are not to exceed 20%. In lane-less subdivisions, rear to front drainage is required. Where the rear portion of one lot

drains through an abutting lot, the slope of the downstream lot shall be 3.0% or greater, and a 2m wide drainage easement shall also be provided.

Level of Service - Lot grading and general grading shall provide protection of property for a 1 in 100-year return frequency design storm. Designs shall provide that maximum flooding or ponding shall be 600mm below the lowest anticipated ground elevation at buildings. Overflow routes and provisions shall be designed such that the maximum depth of ponding is not more than 300mm.

For institutional, commercial and industrial development, on site surface water storage is required. A maximum ponding depth of 300 mm shall be used for asphalt areas. An allowance of 0.035 cms per hectare discharge is to be used.

Amended. Refer to Bulletin 005

a. **Lot Grading Plan** - A lot grading plan shall be submitted as part of the engineering drawings for approval by Engineering Services. General considerations in the development of lot grading plans shall be to:

   i. Establish a proper and balanced relationship between the street elevation, building grade elevation, surrounding development and existing topography.

   ii. Integrate sound attenuation berms where required.

   iii. Ensure that the lot grading takes into account the intended house or building design.

   iv. Provide information to the builders and lot purchasers in terms of drainage and underlying building foundation restrictions, including high water table.

2.3.3 Swales

Swales are to be avoided in favour of back to front lot drainage, but may be permitted where other drainage designs cannot be implemented.

Where necessary, drainage from lots shall be by the formation of swale depressions along the proposed property lines. Swales shall be completed in accordance with approved engineering drawings and shall be controlled by the Alberta Land Surveyor providing services to the building permit applicant.

Amended - 2025
Refer to Amendment #2
Number 2.6

Concrete Swales draining more than three lots from one side or six lots from two sides shall have a 500mm wide concrete gutter along the invert (50mm channel depth, 200mm thickness concrete). Swales collecting and conveying flows from more than two properties are not to be routed along the side yard of a single family or duplex lot. The minimum gradient for concrete swales is 0.75%.

Swales without a concrete channel shall have a minimum longitudinal gradient of 2.0%.

Amended - 2025
Refer to Amendment #2
Number 2.7

2.3.4 Remnant Parcel Grading

Parcels of land that remain undeveloped in a subdivision must be graded to ensure interim storm water is managed without adversely straining existing infrastructure. Grading details are to be shown on the Subdivision Grading Plans and shall be as follows:

a. Minimum slope = 2%

b. Maximum slope = 5%

c. Parcel drainage shall be self-contained, with overland flow directed to adjacent roads or other outlet as accepted by Engineering Services.

d. Erosion control, sod, fence, or any other interim installation may be required where deemed necessary for management of the site

2.3.5 Unclassified Material

All unclassified material such as tanks, buried debris and unsuitable material shall be removed from the site to a point of disposal acceptable to Engineering Services and in conformance with legislative guidelines.

2.3.6 Topsoil

Topsoil and related fibrous organics shall be stripped from all roadway and building foundation areas.

Topsoil may be placed in localized depressions to achieve overall grading and drainage. The Developer shall allow for all settlement and compression of these materials to achieve acceptable finished grades. Where topsoil filling may be subject to localized high water table conditions, drainage provisions shall be provided (Geotechnical Report required).

2.3.7 Stripping and Grading Permit

In cases where subdivision grading is to occur prior to the approved grading of individual stages, a stripping and grading permit may be granted to allow for overall grading to occur.

In cases where construction of a stage has been completed, but there remain undeveloped individual lots they shall be graded to prevent ponding.

If Development Agreement is not yet signed, the Developer may obtain a Stripping and Grading Permit from Engineering Services prior to starting activities on site. Stripping and grading are to be performed in accordance with Engineering Services requirements.

2.3.8 Embankment Construction

General Embankment – Selected, uncontaminated clay and till materials shall be compacted to 98% of Standard Proctor Density in the top 1.5m of road rights-of-

way and to 98% of a Standard Proctor Density at not more than 5% over optimum moisture content for the area below the top 1.5m in general filling areas. General filling shall be a minimum of 300mm above proposed building foundation elevation, and shall be compacted to 95% of Standard Proctor Density.

Structural Embankment – Where filling is within 300mm of proposed building foundations or lower, the Developer shall provide structural filling under the direction of a Geotechnical Engineer. The design of such filling shall ensure adequate soil bearing capacity in accordance with the Alberta Building Code. Otherwise, the Developer shall identify the lots affected by special demarcations on the lot grading plan and identify the maximum depth of filling below proposed foundation elevation. These lots will be subject to specific foundation design by a registered engineer and supported by testing results at the time of building permit application. In general 98% of Standard Proctor Density is required for Engineered/Structural Fill areas.

2.3.9 Retaining Walls

Projects with retaining walls over 1.0m in height shall include construction details in the plans. Retaining wall structural calculations shall be submitted separately if the retaining wall is greater than four (4) feet in height. An engineer licensed in the Province of Alberta shall design and seal the calculations. Soils report used in the calculations shall also be submitted.

If a retaining wall has a drop off height greater than 0.61 m (2 ft), a handrail detail shall be included in the plans and shall comply with Building Inspection requirements (typically vertical pickets at 0.1m (4 inch) spacing) (International Building Code 1003.2.11.1 and International Residential Code).

If a screening wall or handrail is either attached to or in the proximity of the retaining wall, the structural calculations shall reflect the appropriate loads and the construction details shall show the connection between the two.

2.4 TRAFFIC/STREET SIGNS AND PAVEMENT MARKINGS

2.4.1 General

The developer shall prepare an overall plan of the subdivision on which is shown proposed traffic signs, traffic control devices, pavement markings and street name signs. This plan shall be submitted to Engineering Services for review with the detailed design drawings. Beaumont has specific requirements for bilingual presentation, which shall be incorporated into traffic signs and street name signs (See attached typical photos).

Only Thermoplastic Markings are approved for use in Beaumont for FAC to be issued. Prior to FAC, non-thermoplastic paint may be used on a temporary basis.

Pedestrian crosswalk lines indicate the location where pedestrian crossing of the roadway is permitted. Parallel (Standard) pedestrian crosswalk lines passing across the roadway provide a basic form of regulatory protection for the pedestrian.

Standard crosswalk lines shall be painted on the pavement as directed by Engineering Services at the following locations:

a. At signalized intersections.

b. At pedestrian actuated signals.

c. At intersections with pedestrian actuated flashers.

d. At multi-way stop controlled intersections with sidewalks.

e. On arterial roads where a collector intersects an arterial roadway with a high pedestrian volume.

f. At designated school crosswalk locations.

2.4.2 Installation

a. Standard traffic signs and traffic control devices shall be installed by the Developer and shall be in accordance with the Manual of Uniform Traffic Control Devices of the Transportation Association of Canada.

b. The Developer as per the Approved Traffic Control Devices and Street Name Signs drawing shall install reflectorized street name signs, of a type and colour satisfactory to Engineering Services. Reflectorized material shall be "High Intensity" grade.

c. All traffic and street signs shall be mounted and installed on 12 gauge "Telespar" posts, or on an equivalent post type approved by Engineering Services.

d. Signs shall be mounted at a height of 2.5 metres, plus or minus 0.5 metres, measured from the road elevation to the bottom of the sign.

e. Pavement markings shall be installed by the Developer and shall be:

i. applied in paint on longitudinal lines at CCC,

ii. applied in paint on traverse lines at CCC,

iii. applied as inlaid thermo-plastic on traverse lines at FAC,

iv. applied as inlaid thermo-plastic on longitudinal and transverse lines at CCC & FAC on Arterial roadways.

2.4.3 Costs

All costs associated with the supply and installation of traffic signs, traffic control devices, pavement markings and street name signs shall be borne by the Developer.

2.4.4 Beaumont Bilingual Signage

2.4.4.1 Specifications

All street name signage within Beaumont is to be produced:

a. with WHITE LETTERING ON BLUE BACKGROUND;

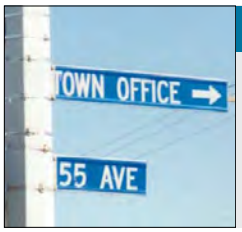
b. with bilingual lettering;

c. having a height of 150 mm; and,

d. having a width determined by the number of letters.

2.4.6.1 Typical Signage Examples

Streets	Ways
RUE “NAME” ST French word for Street is RUE	CHEMIN “NAME” WAY French word for Way is CHEMIN



Avenues
NUMBER” AVE E.g. 44 AVE

Stop
“STOP” on the Top “ARRÊT” underneath French word for STOP is ARRÊT

Yield

Regulatory Symbol is used.

Bays

BAIE [NAME] BAY

The French word for Bay is BAIE

Courts

COUR [NAME] COURT

The French name for Court is COUR

Closes

[NAME] CLOSE

Drives

PROMENADE [NAME] DR

French word for Drive is PROMENADE

Crescents

CERCLE [NAME] CRES

French word for Crescent is CERCLE

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SECTION 3.0
UNDERGROUND

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3.1 DEEP UTILITIES INSTALLATION

This section outlines the guidelines for install of all deep utilities. General information applying to all deep underground utilities is detailed, followed by sections pertaining specifically to each of the following, if applicable:

- Storm Sewer System
- Wastewater Sewer System
- Water System

a. **Public Utility Lots (PULs)**

Where deep utilities are present within Public Utility Lots (PULs), the following standards apply:

i. The PUL shall be a minimum 4.0m width for a single utility (sewer main, storm sewer, watermain or shallow bury utility).

ii. Where two utilities are located in a PUL, the lot shall be a minimum of 6.0m in width.

iii. A limit of three utilities will be allowed per utility lot, which shall be a minimum of 8.0m width.

iv. In all cases, easements 1.5m in width are required on both sides of the PUL. This may be waived where trench area of influence provided to and approved by Engineering Services.

v. Engineering Services at their discretion may request larger PUL's to facilitate overland flow, multiple residences or additional buried network.

b. **Pipe Bedding and Installation** - All pipes shall be selected to withstand the proposed imposed loads. Pipes shall be bedded on a natural or manufactured sand material, free of organic material and significant silt quantities. Bedding shall have the following general grading.

SIEVE SIZE (MM)	PERCENT (%) PASSING
10	100
5	70 - 100
0.16	5 - 20
0.08	0 - 12

The liquid limit shall not exceed 25% and plasticity index shall be less than six (6). Bedding and initial backfill shall extend to 300mm above the top of the pipe for the full width of the trench.

Trench width in the pipe zone (to 300mm above top of pipe) shall be kept to a practical minimum and shall not exceed the outside diameter of the pipe plus 750mm. The minimum depth of bedding below the pipe shall be 100mm.

Pipes shall be laid to the following tolerances:

i. horizontal alignment ±100mm

ii. vertical alignment ±10mm on pipe grades of 0.28% and flatter and ±15mm on pipe gradients above 0.28%

c. **Trenching and Backfilling** - All trenching shall be in conformance with Occupational Health and Safety regulations or in accordance with the specific recommendations of a Professional Engineer registered in the Province of Alberta. Where trenches exceed six (6) metres in depth, specific recommendations regarding trench excavation and support shall be provided under the seal of a Professional Engineer.

Development documents shall ensure contractors are aware of and familiar with the document "Safe Procedures for Pipeline and Utility Crossings", prepared by the Edmonton Area Pipeline and Utility Operator's Committee. This document is available through Alberta One Call.

The Developer shall have a geotechnical report prepared by a Professional Engineer relating to pipe foundations and trenching conditions as a part of the detail design of sewer systems. This report shall contain specific recommendations relating to site conditions that may be unsuitable for pipe support or pose trenching conditions that will require use of structural support.

Where suitable foundations exist for pipe support, Class B bedding shall be the minimum standard of pipe support. All bedding and backfill within the pipe zone shall be compacted to 95% of Standard Proctor Density and provide uniform support along the profile and throughout the length of pipe.

Backfilling above the pipe zone shall be compacted as follows:

i. To within 1.5m of finished ground, or design subgrade elevation, material shall achieve a density equal to 98% of a Standard Proctor Density or greater. Moisture content shall be limited to a maximum of 5% over the optimum moisture content for the material.

ii. Below the uppermost 1.5m of trench material shall achieve a density equal to 98% of Standard Proctor Density or greater. Where wastewater/ storm/water mains/services are being placed parallel, the uppermost 1.5m of trench material shall be placed and compacted uniformly across all adjoining trenches after servicing.

iii. Shallow Bury Utility trenches shall be considered to be in the upper 1.5m and shall achieve the above standard.

iv. Frozen material shall not be acceptable backfill.

v. Density tests shall be taken on backfill material in storm and wastewater sewer main and water main trenches with a minimum of two tests per 600mm of trench depth per 100m of trench length. Density tests on material within the pipe zone shall be taken once every 150m of pipe laid. For trenches less than 15m in length a minimum of three density tests evenly spaced through

the depth of trench. For service connection trenches, at least one additional (fourth, or more) density test shall be taken between the back of curb and separate walk over each service connection line within the uppermost 500mm as measured from final finished grade.

vi. If required densities cannot be achieved through the above mentioned means, Fillcrete should be used as an alternative in accordance with **Section 2.2.2.9**.

d. **Washed Rock Specifications** – where specifically specified for use, washed gravel shall consist of washed, crushed, or screened stone or gravel consisting of hard and durable particles meeting the following gradation limits and being free from sand, clay, cementitious, organic, and other deleterious material:

SIEVE SIZE (MM)	PERCENT (%) PASSING BY MASS
5	Maximum 10
0.08	Maximum 2

e. **Connection to Existing Utilities** - Where connection is proposed to existing sewers at manholes, the manhole barrel and existing benching shall be disturbed to the minimum required to make the connection, restored and made water tight using appropriate materials and good practice. Benching shall be restored to provide a smooth "free flowing" channel. All connections to existing sewers will require prior approval by Engineering Services.

f. **Abandonment of Existing Utilities (including capping abandoned pipe)** – Abandoned pipes shall be labelled on 'Record' drawings. Beaumont reserves the right to require removal of abandoned pipe.

3.1.1.1 Water Distribution System

Amended - 2025
Refer to Amendment #2
Number 3.1

a. **Location** - All water mains shall be located in the position indicated on the standard road cross-section details. All water mains shall have a minimum cover of 3.0 m from top of curb. Water mains shall maintain a horizontal separation of 1.5m from any property line or curb line and shall have a minimum separation of 3.0m from any sewer line. Where water mains are not looped, provision shall be made for flushing at the terminal points (fire hydrant).

i. **Depth** – Excepting areas where Engineering Services considers the risk of freezing based on soil conditions to be higher, water pipes must maintain a minimum depth of cover as described in the table on the following page:

Amended - 2025
Refer to Amendment #2
Number 3.2

Table 3.1

DIAMETER	MINIMUM DEPTH OF INVERT BELOW CURB TOP
150 mm	3.0 m
200 mm	3.0 m
250 mm	3.0 m
300 mm	3.0 m
350 mm	3.0 m
400 mm	3.0 m
450 mm	3.0 m

b. **Hydrants** - Hydrant spacing for medium and low-density areas shall be a maximum of 150m as measured along curb lines. Hydrant spacing for institutional, commercial, industrial or high-density areas shall be a maximum of 75m. For all other densities a spacing of 90m shall be used. Hydrants shall be set not less than 1.0m clear of curb lines and 300mm clear of sidewalks. Hydrants shall be set such that the flange at the base of the body is 100-150mm above finished ground. These flanges shall be the breakaway type. Hydrant drain ports shall be left open unless otherwise approved. Refer to hydrant installation details contained in **Standard Detail Drawing No. 3-15**. All hydrant leads shall have valves and shall be 150mm diameter. Hydrant valves shall be located:

   i. 1.0m horizontally from hydrant

   ii. 0.8m back from face of curb

   iii. within boulevard area, and not be located under curbs

   MUELLER CANADA CENTURY FIRE HYDRANT (CANADA VALVE) are to be used for all installations.

   A Zinc Anode shall be installed on the operating rod just above the drip valve (MUELLER CANADA PART NO. 349190), and record of this rod being installed must be provided to Engineering Services (including serial numbers for each installed anode).

c. **Valves** - Valves shall be installed in conformance with **Standard Detail Drawing No. 3-16** and the manufacturer's requirements. Tapping valves will be required where lateral extensions are required off lines that cannot be removed from service. Valves shall be located at positions indicated by Engineering Services but generally shall be located such that not more than 20 households or multi-family units and not more than 3 hydrants are isolated during any valve closure. Valves shall be positioned opposite property lines and at the projection of property lines at intersections. All valve boxes shall be installed plumb and flush with the proposed finished surface.

d. **Pipe Crossings** – Under normal conditions, water mains shall cross above sewers with sufficient vertical separation to allow for proper bedding and structural support of the water and sewer mains.

Amended - 2025
Refer to Amendment #2
Number 3.3

Where it is necessary for the watermain to cross below the sewer, a request must be made to Engineering Services for consideration and if approved, the watermain shall be protected by providing:

i. a vertical separation of at least 0.5m from the watermain crown to sewer invert;

ii. structural support of the sewer to prevent excessive joint deflection and settling; and

iii. centering of the length of watermain at the point of crossing so that the joints are equidistant from the sewer;

iv. vertical deflections of the lower pipe must not occur 3.0 m horizontally on either side of the centreline of the higher pipe.

3.1.1.2 Water and Sewer Services

a. **Location** - Each single-family lot shall have a separate service. Residential services shall have water, wastewater and sump pump collection services in common trench. Refer to servicing details common trench. Refer to servicing details on **Standard Detail Drawings 3-20** and **3-21**. Common trench installation shall be permitted up to and including 50mm dia. water services.

   i. Single services shall be located generally in the middle one-third of the lot frontage. Dual services may be installed in common trench. Dual servicing shall be permitted only when a minimum of 1.5m separation can be maintained from franchise utility services and driveways. Refer to the Standard Detail Drawings for spacing and offsets to property line.

   ii. Each housing unit shall have a separate service.

b. **Water Service Installation** - Corporation main stops shall be staggered radially and shall conform to the following:

   i. have a minimum of 600mm separation at the main; and,

   ii. not less than 300mm separation from a coupling when services are hot tapped.

   iii. tapped couplings may be used.

   iv. installation of copper service lines shall be under full line pressure

   v. the service line momentarily flushed at the completion of curb stop installation.

   vi. Each copper service or blow off shall have a horizontal gooseneck near the corporation main stop.

   vii. hot tap must be **under pressure**

   viii. main must be charged

ix. service saddles shall be used for 50mm dia. services. Connections 100mm and larger shall be constructed by tapping tee and valve installations to existing mains. Curb stops shall be supported on a 200mm x 300mm concrete block.

c. **Sewer and Sump Pump Discharge Connections** - Sewer service connections shall have a minimum depth of cover of 2.75m at the property line. Sump pump discharge connections shall have a minimum depth of cover of 1.8 metres at the property line. Where sewer services are required to connect to mains in excess of 4.5m depth to invert, risers shall be installed to within 3.6m of finished ground surface.

All services shall be laid on a minimum of 75mm granular bedding. All waste water services shall have a minimum gradient of 2.0% to the main. Storm discharge shall have a minimum slope of 1% from the property line to the collection main.

d. **Field Marking** - All service terminations at the property shall be marked with a red painted 100mm x 50mm stake extending 0.5m above ground level to the service invert.

e. **'Record' Drawings**– 'Record' drawings shall provide a table indicating the lot and block number of each service along with type of service (single or double) distance from both front property pins, invert elevation of the wastewater sewer service at the main and at the property line and diameter of water service. Detailed as built information including drawings or details shall be provided for any service which is not 90 degrees to the main. Servicing charts shall be provided immediately upon issuance of a Construction Completion Certificate.

Records shall be provided:

Amended. Refer to Bulletin 005

i. within 6 months of construction completion or;

ii. months prior to the issuance of the first occupancy permit within the development.

3.2 STORM WATER SYSTEMS

3.2.1 General Principles

Storm drainage system design includes the design of minor system (storm sewers) and a major system (overland flow routes, storm water management ponds, etc). The minor system shall incorporate weeping tile sump pump discharge collection. The minor system shall convey the more frequent rainfall runoff whereas the major system shall convey less frequent events above the capacity of the minor system. Overland conveyance in the major system shall be generally along roads, parks and utility lots avoiding inundation of private property yet limiting flooding to depths that do not prevent vehicle access by emergency services (fire, ambulance, and police). All storm water management facilities shall be designed by a Professional Engineer following the latest methods and practices outlined in "Stormwater Management Guidelines for the Province of Alberta", (latest edition) prepared by Alberta Environment.

3.2.2 Design Reports

Detailed design submissions shall contain all reports, calculations, analysis, drawings, model input and output files necessary to evaluate the proposed storm drainage system unless they have previously been submitted and approved. These calculations and reports are necessary for approval purposes and will also be required by Alberta Environment when applying for their approval of the storm drainage systems. Where modelling is used, design reports shall include all calculation parameters and assumptions. See **Section 3.2.4.2 Computer Modeling** for more information.

3.2.3 Design Criteria

3.2.3.1 Storm Sewer Design (Minor System)

The minor system shall be an underground piped system for collection of high frequency runoff from the development area and any such areas outside the development area as may be required by definition of the overall catchment area. This system shall collect and convey runoff generated by a 1 in 5-year storm event as defined by **Table 3.0** Edmonton - IDF Period: 1984-2010 as shown in **Appendix 3.0**.

a. Minor-system elements serving drainage areas of 30 ha or less shall be designed to accommodate the rate of runoff which would occur in a 1 in 5-year return period rainfall event:

   i. without surcharge of sewer pipes;

   ii. with ponding of water to a depth no greater than 150 mm at depressions and at drainage inlets;

   iii. with depths of flow and ponding on roadways limited so that no over-topping of curbs occurs on local roadways, a width equivalent to one traffic lane remains free from inundation on collector roads and one traffic lane in each travel direction remains free from inundation on arterial roads

iv. with storm water quality Best Management Practices prior to discharging into piped system

Sump pump discharge from weeping tile systems shall be collected in the minor system, or in a dedicated 'third pipe' system specifically designed to collect sump pump discharge. This 'third pipe' system shall be connected to the minor system and shall provide individual connection to each property.

b. Sewers Servicing Areas Greater than 30 ha

Storm sewer trunks, for this purpose being those storm sewer pipes proposed to serve drainage areas of greater than 30 uncontrolled ha, shall be designed with a reserve capacity to account for unanticipated changes in land use and runoff and to ensure downstream trunk sewers do not surcharge in advance of the upstream lateral sewers.

To achieve this objective the subject sewers are to be designed to accommodate, without surcharge, 1.25 times the rate of flow which would occur in a 5-year return period rainfall event.

In cases where the storm sewer trunk will receive both uncontrolled flow from areas 30 ha or larger and controlled discharges from storm water management facilities, the sewer is to be designed so as to accommodate, without surcharge, 1.25 times the 5 year design flow from the uncontrolled lands plus the maximum design storm water management facility outflow rate.

3.2.3.2 Stormwater Management (Major System)

Major systems shall have conveyance elements designed to accommodate runoff rates and volumes for a 100-year return period rainfall event. The depth of peak flows and ponding in developed areas shall be limited such that there is not a significant hazard to the public and very limited risk of erosion or other property damage. Major overland flow and ponding shall be maintained within the road right-of-way and shall not encroach on private lots. Depths of flows and ponding in roadways and public utility lots shall be a maximum of 300mm. Water depths at the crown in arterial roadways shall not exceed 150mm. Where lots back onto a stormwater management facility, the high water level shall be at least 300mm below the lowest anticipated building opening (basement windowsills), if the facility has an emergency overflow provided. Where there is no such emergency overflow, the HWL shall be at least 500mm below the builder opening. For these lots the high water level shall also be a minimum of 150mm below the footing elevation at the building.

Amended. Refer to Bulletin 005

Storage elements of the major system shall be designed such that there is no overtopping of the storage facilities due to the more critical storm event applied to the catchment area serviced. The performance of each stormwater management facility is to be verified by computer simulation of its response considering outflow rate as limited by control elements or downstream conditions, to the most critical of the design rainfall events from the following listing:

a. 1:100 year, 24-hour synthetic design based on the Huff distribution

b. July 14-15, 1937 storm event

c. July 10-11, 1978 storm event

d. July 2-3, 2004 storm event

e. July 12, 2012 storm event

Refer to **Tables 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6,** and **3.7** in **Appendix 3.0** for rainfall data references.

A high level emergency overflow shall be provided wherever feasible. The freeboard at normal high water level shall be 300mm below the lowest landscaped level at the adjacent buildings or building opening. Where an emergency overflow is not possible the freeboard requirement shall be 600mm.

With the outlet capacity as per **3.2.5.3 Major System and Stormwater Management Facilities (SWMF)**, the post event drawdown times shall be evaluated. The drawdown time shall start at the elevation of the 1:100 year Huff Distribution design storm and the storage facility shall provide the following storage capacities within the following time frames:

i. 1 in 5 year capacity in 24 hours

ii. 1 in 25 year capacity in 48 hours

iii. 90% of the 1:100 year volume to be available in 96 hours

The volume of the 1 in 5 and 1 in 25 year capacities shall be calculated based on the Huff distribution design storms.

Should the designed storage volume not provide the capacities within the noted timeframes, the pond, at the sole discretion of Engineering Services, may require additional freeboard storage volume to accommodate the designated capacities. This additional storage shall be provided separately from any flood plain storage that may be required.

Additional modeling may be required where the pond outlet relies only on piped flow and does not have a major overland flow path. This type of pond shall be modeled by computer simulation and show that the pond will operate without flooding private property during two sequential design storms.

The design of the overall system shall take into account future development and address requirements to accommodate runoff flows from contributory areas either developed or undeveloped.

3.2.4 Storm Water Runoff Analysis

The use of computer simulation methods is recommended for all final analysis and design details. The Rational Method may be used for detail design of minor storm drainage systems with catchment areas of 65 ha or less. The Rational Method shall not be used to design storm water management storage facilities.

3.2.4.1 Rational Method

The Rational Method is expressed as:

$$Q = \frac{(C \times i \times A)}{360}$$

Q = design flow (m^3/s)
i = average rainfall intensity (mm/hr)
C = runoff coefficient
A = contributing drainage area (hectares)

The runoff coefficient 'C' shall be consistent with the imperviousness of the respective land use.

The following formula relates 'C' to imperviousness (imp) which is expressed as a ratio of impervious area to the total area.

$$C = (0.95 \times imp) + 0.1(0.1 - imp)$$

Otherwise the value of 'C' shall be related to the type of land use as follows:

LAND USE	RUNOFF COEFFICIENT (C)
Residential – RA to RCD	C = 0.60
Terrace Housing/Apartments	C = 0.80
Parkland	C = 0.20

For use of the rational formula to determine peak runoff due to storms with return periods greater than a 1:5 year, the runoff coefficient shall be increased as listed below up to a maximum of 0.95:

DESIGN RETURN PERIOD	RUNOFF COEFFICIENT MODIFICATION
1:10 to 1:25 year storm	Multiply C by 1.10
Above 1:25 to 1:50 year storm	Multiply C by 1.20
Above 1:50 to 1:100 year storm	Multiply C by 1.25

Rainfall design intensity (i) shall be taken from data provided relating to the specific time of concentration. The maximum time of concentration to the first inlet shall be 15 minutes in residential areas and 8 minutes in commercial and high-density developments.

For single lot development, storm water runoff control shall be provided for lots greater than 0.16 ha (0.4 acres). The maximum discharge rate to the storm sewer system shall be controlled to the rate equivalent to the 1 in 5 year return storm. On site storage shall be provided for events up to and including the 1 in 25 year storm event. The maximum permissible depth of flooding shall be 300mm. Engineering Services may require storm water quality treatment by the provision of a high flow bypass oil grit separator or approved equivalent treatment system.

3.2.4.2 Computer Modeling

All storm water drainage conveyance and storage elements servicing areas larger than 65 ha shall be designed using computer-modelling techniques. The selection of applicable computer models is at the discretion of the Developers and their

consultants; however, models should be selected that have the capability to generate hydrographs for a critical storm or series of storms and which can route these hydrographs through a network of conduits, surface channels and storage facilities. The SWMM models are preferred for the design of drainage systems.

Modelling procedures shall generally take the following approach:

a. Preliminary examination of the drainage basin based on the initial development proposal (lumped areas).

b. Production of runoff hydrographs from these developed areas extended into pipe sizing and sewer routing.

c. Post development hydrographs shall be developed for key points of the sewer system and major systems (overland flows and storage) for the 5 and 100-year design storm that represents the most critical rare runoff event.

d. Systems that incorporate a series of interconnected ponds with relatively restricted outflow capacity may require modelling for sequential storm events

e. The 4-hour Chicago Distribution hyetographs should be used for analysis of major and minor conveyance systems by computer simulation. When stormwater storage is required, the 24-hour Huff Distribution design hydrographs should be used for storage drawdown analysis.

In presenting storm drainage designs the following shall be included:

a. Type and version of computer model

b. Parameters and simulation assumptions

   i. catchments

   ii. percent imperviousness

   iii. storm water storage area volumes

   iv. drawdown curves

c. Design storm used, with volumetric runoff coefficient or total runoff obtained, and peak flow versus area, shall be plotted for each event and shall use the appropriate hydrological modelling parameters from the following table:

Table 3.2

HYDROLOGICAL MODEL PARAMETER	VALUE	UNIT
HORTON'S INFILTRATION		
Initial Rate	7.5	mm/h
Final Rate	2.5	mm/h
Decay Factor	0.00115	s-1
DEPRESSION STORAGE – DEVELOPED AREAS		
Impervious Area	2	mm
Pervious Area	5	mm
DEPRESSION STORAGE – UNDEVELOPED		
Impervious Area	2	mm
Pervious Area	8	mm
MANNING'S COEFFICIENT, N		
Impervious Area	0.015	
Pervious Area	0.25	

When using Otthymo, a sensitivity analysis is required to analyze cn, tp and k to ensure appropriate storm drainage.

Tables 3.0, 3.1, 3.2, 3.4, 3.5, 3.6, and **3.7** at the end of this section shall be used for all stormwater management analyses.

3.2.5 Storm Sewer Requirements

3.2.5.1 Minor System

a. Pipe Sizing and Capacity

i. Minimum pipe size:

Storm sewer	300 mm
Catch basin lead	250 mm
F51 catch basin lead	375 mm

ii. Pipe sizing shall be sized by use of the Manning's Formula using the following "n" values:

All Smooth-Wall Pipe	n=0.013
Corrugated Metal Pipe - Un-paved	n=0.024
Corrugated Metal Pipe - Invert Paved	n=0.020
Corrugated Metal Pipe - All Paved	n=0.-13

Note: Corrugated metal pipe (CMP) is not approved for use in permanent mainline storm sewers or catch basin leads.

iii. Minimum design flow velocity = 0.60m/sec

iv. Maximum design flow velocity = 3.0m/sec

v. Minimum grade of catch basin leads shall be 2.0%

vi. Minimum slope:

PIPE SIZE	PERCENT SLOPE
300 mm	0.22
375 mm or large	0.15

Note: The minimum slope shall be increased by a factor of 1.5 on all curved sewer sections.

vii. Minimum culvert size:

Parks and pathways	300 mm
Commercial and Rural	600 mm

Storm sewer conveyance elements shall be designed to satisfy the level of service requirements stated in this section. Pipes shall be designed to adequately handle design flows of 1.25 times the 5 year design flow of the contributing area. Where this is exceeded, the design shall be adjusted to mitigate surcharging.

b. **Location** - Refer to typical right-of-way cross sections for various development conditions.

c. **Separation** - Storm sewers must be located a minimum of 3.0m horizontally from any water or sewer main and 2.0m horizontally from franchise utility lines. Minimum separation is measured from centre line to centre line. Reduced spacing between utilities may be approved by Engineering Services if jointless pipe is used for construction. Consult the most recent version of the "Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems", Alberta Environment, for minimum spacing requirements in these cases.

Amended - 2025
Refer to Amendment #2
Number 3.4

Curved sewers shall:

i. run parallel to the curb and gutter or street centreline;

ii. have longitudinal gradients increased by a factor of 1.5 for curved sections; and,

iii. have manholes provided at the beginning and end of each curved section as well as intermediate locations as required.

d. **Cover** - The minimum depth of cover from finished ground surface to the obvert of the pipe shall be 1.75m.

e. **Crossings** – Where storm lines cross over water mains a minimum of 0.5m vertical separation shall be maintained from the storm sewer invert to the crown of the water main. Storm sewer crossings over waste water sewers shall maintain a minimum of 0.5m vertical separation from the storm sewer invert to the crown of the wastewater sewer. Crossing design shall take into account structural support of the sewer or water main.

f. **Manholes** – Manholes shall be located at each change in alignment, grade, or pipe material, at all pipe junctions, at the beginning or end of radius pipe sections and at intervals along the pipe to permit entry for maintenance to the sewer. Manhole construction:

i. Shall not exceed 150m spacing along the pipe alignment;

ii. Shall be minimum 1200mm dia. with cone or flat tops and step irons;

iii. Where a non-standard manhole configuration is required, it shall be designed with reinforced concrete. Such designs shall be detailed on the Engineering Drawings.

iv. Where manhole depths exceed 5.0m, safety grating shall be incorporated into the manhole.

v. The pipe obvert of a sewer entering a manhole shall not be lower than the pipe obvert of the outlet sewer. Where drops of 1.0m or less occur at manholes the designer shall ensure free outlet flow and acceptable backwater conditions exist in the downstream sewer. Drops of more than 1.0m shall be avoided, but where unavoidable a drop structure shall be required. This will include for CB leads.

vi. Bends or changes from inlet flow direction to outlet flow direction shall be 90° or less. The designer shall take into account energy losses through bends and deflections. The minimum drop through a manhole on a straight run of pipe shall be 30mm. Where changes in direction occur, the minimum drop shall be 60mm from inlet to outlet.

g. **Catch Basins:**

i. Runoff shall not be required to flow a distance greater than 120m along roadway gutters before entering a catch basin or other inlet to a minor storm drainage system. Locations shall be chosen that avoid conflict with driveways and pedestrian crossings.

ii. Catch basin inlets shall be located:

I. to avoid significant runoff over or along sidewalks and walkways;

II. a minimum of 600mm from the edge of a walkway or sidewalk;

III. in strategic locations to avoid build-up or ponding in downstream areas; and,

IV. in the longitudinal centre of lanes to avoid wheel tracks.

iii. CBs should be upstream of curb ramps and crossing locations.

iv. Catch basin frame and cover application: Table 3.3 outlining frame and cover types shall be used to determine which model is compatible with curb types and applications based on City of Beaumont standard designations.

Table 3.3

FRAME & COVER TYPE (CITY OF BEAUMONT)	CURB TYPE	MIN. BARREL SIZE (MM)	ALLOWABLE APPLICATION
2a or F36	Straight Face	600	Catch basins only
4a or F36A	Straight Face	1200	Catch basin manholes only
6 or F39	No Curb	600	For off roadway locations or temporary inlets on roadways
K7 or F33	80mm Rolled Face	600	Current preferred inlet for residential areas
DK7 or K2	80mm Rolled Face	900	Preferred for residential areas where additional capacity is needed
8 or F38	No Curb	600	Lanes, swales, gutters, and curb ramps
F51 (no side inlet)	No Curb	900	For situations requiring increased capacity over 2a
F51 (with side inlet)	Straight Face	900	Situations requiring increased capacity over F51

The designer shall determine the capacity factor for each catch basin, catch basin manhole, or inlet condition and provide supporting information with the design submission. All grade rings shall be sealed with Ramneck or equivalent to provide watertight joints.

h. **Catch Basin Manholes:**

Where Catch Basin Manholes (CBMHs) are to be used, they must conform to the following:

i. Normal design locations for CBMH are at sags at intersections, and centre medians as governed by roadway design.

ii. CBMH used to intercept drainage in lanes are to be generally located at the longitudinal centreline of the lane, avoiding the wheel track.

i. **Catch Basin Leads** - The following standards shall apply:

i. minimum size: 250mm dia.

ii. maximum length of lead: 30m

iii. minimum gradient: 2.0%

iv. minimum depth of cover to top of pipe: 1.5m

All leads shall connect to a mainline manhole or catch basin manhole.

j. **Limits of Construction** – Sewers shall be terminated with a manhole at the subdivision limits when external drainage areas are considered in the design. The design of the terminal manholes must allow for possible future extension of the sewer.

Temporary sewer stubs (maximum length of one full pipe) may be permitted between phases of the development at the discretion of the Manager of Engineering.

3.2.5.2 Sump Pump Discharge Collection System

A sump pump discharge (SPD) collection service shall be provided to each newly developed single-family lot and to each multi-family unit (see **Section 5.5**). The system is dedicated to collection of weeping tile system discharges. There shall be no roof leaders, garage drain, wastewater line or any other plumbing systems connected to the sump pump/weeping tile system. The collection system shall discharge to the minor storm sewer system by connection of the service lateral to the fronting collection main. Details are appended to this section for configuration and location. Garage floor drains may be permitted, but will be connected to the waste water service connection and not the storm.

The general design criteria shall be as follows:

a. Minimum service size: 100mm dia.

b. Minimum collector size: 200mm dia

c. Pipe material: P.V.C. SDR 35 ring joint

d. Minimum grade of service line: 1.0%

e. Single-family lots minimum depth of cover shall be 1.8m to top of pipe at 0.3m from the house side of the 2.5m service easement.

f. All services be located such that they do not conflict with driveway locations.

3.2.5.3 Major System and Stormwater Management Facilities (SWMF)

a. **Geotechnical Considerations** - Specific geotechnical investigations shall be carried out relating to the design of all stormwater management lakes and dry ponds and are a prerequisite to planning and design.

b. **Erosion and Sediment Control** - Erosion and Sediment Control measures shall be incorporated in the planning and design process and included in the engineering drawings.

c. **Staged Construction** - When staged stormwater management facilities are proposed and approved, the standards applicable to the design and construction of interim facilities shall be generally in accordance with the standard set out for permanent facilities. This applies to both wet and dry pond facilities.

d. **Storage Alternatives** - The number and location of storage facilities shall be determined based on the major/minor system concept. A combination of facilities may prove the most viable and economically feasible. Engineering drawings shall present applicable parameters (i.e. storage tables and graphs) for each facility within the design. The following options should be considered.

i. Retention Storage: associated with longer-term storage and release after storm runoff has ended. Facilities are normally stormwater management lakes or wet ponds.

ii. Detention Storage: Low flows are generally not detained while large flows are restricted by outlet controls. This system is typically related to "super pipes" or "dry detention facilities" that reduce the load on downstream facilities.

iii. Off Stream Storage: minor conveyance systems may conduct low flows directly to an outlet that is restricted in terms of peak flows which are routed to storage. The storage may incorporate depressed open areas, reservoirs and low lying recreation fields which may also form part of the major system.

iv. Channel Storage: low gradient flow channels with wide bottoms can provide inherent storage.

v. On Stream Storage: on stream storage is achieved through the formation of storage ponds within the stream channel zone. This requires embankments and spillways designed to pass large floods.

e. **Outlet Control Works** - Outlet works for stormwater management facilities must incorporate appropriate means for control of outflow. Designs will incorporate maintenance provisions and allowance for unintentional blockage and the possible need to either stop outflow or increase the rate of outflow. The outlet flow rate shall be restricted to 2.5 litres per second per hectare.

f. **Emergency Overflow Provisions** - Where feasible, emergency overflow shall be provided. Should this not be practical or feasible, additional freeboard shall be provided. It is the responsibility of the developer to prove that flood plain storage is not required for a specific site.

h. **Maintenance and Service Manual** - Two (2) copies of a Maintenance and Service Manual shall be provided for the facility, which shall include:

i. equipment and suppliers lists with local addresses and contact telephone numbers

ii. operation, maintenance, service and repair instructions complete with parts lists for all mechanized and electrical equipment incorporated in the design

iii. Head Discharge and Stage

iv. location plan for all devices discharge relationships with relationship to surrounding features

v. an outline of normally expected operational requirements for the facility

h. Best Management Practices – One or more BMP's (best management practices) as indicated within the "Stormwater Management Guidelines for the Province of Alberta" and the "Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems" should be applied to address stormwater quality. The more stringent of the conformances shall apply.

3.2.6 Design Guidelines for Storm Water Management Facilities

a. **Minimum Storm Water Management Facility Size** - Generally facility shall have a surface area of 1.0 ha at normal water level. This is to discourage proliferation of a large number of small lakes and associated high maintenance costs. Engineering Services at their discretion may consider alternatives in certain instances.

b. **Side Slopes** - Side slopes requirements (**Detail 3-3**) are to be generally as follows:

   i. Areas normally or infrequently covered by water, from the design high water level down to a point 1.0 m below the normal water level, shall have a maximum slope of 7:1.

   ii. A slope of 3:1 shall be used from the 1.0 m depth point (below normal water level) to the SWMF bottom. This is to minimize the area of shallow water when the lake is at normal water level, to discourage the growth of unwanted vegetation.

   iii. Where confined space or extremes of topography dictate, limited areas within overflow areas located on Public Utility and Walkway lots may be graded with a slope of 5 horizontal and 1 vertical. Proposals to amend the slope requirements will be approved by Engineering Services on a site specific basis.

   iv. Where geotechnical report recommends site specific slopes different than those above, the geotechnical expertise shall govern.

c. **Minimum Depth** - The minimum water depth from NWL to SWMF bottom (beyond the side slope area) shall be 2.5m.

d. **Lake Bottom Materials** - For areas where groundwater table is below NWL, the bottom and side slopes shall be composed of a suitable low permeability material (permeability coefficient of approximately 1 x 10^{-6} cm/s).

   For areas where the water table is expected to be near or above NWL, the lake bottom may be a pervious material dictated by geotechnical considerations.

e. **Configuration/Layout** - Narrow and dead bay areas are to be avoided. Inlets and outlets should be located to maximize detention time and circulation within the lake water body.

f. **Integration of Wetlands and Development of Wetland Areas** – Development of wetlands and introduction of wetland areas into stormwater management facilities is encouraged. These areas must be strategically integrated and designed by professionals experienced and knowledgeable in the development of these features.

g. **Inlets and Outlets** - Inlets and outlets are to be fully submerged with the crown of the pipes at least 1.0m below NWL and 300mm above the SWMF bottom. To avoid backwater effects in upstream sewers, the obvert of the inlet sewer shall be at or above the 1 in 5 year lake level at the first manhole upstream of the lake inlet.

h. **Sediment Removal Provisions** - The design shall include an approved sedimentation removal process to control the inflow of heavy solids during development of the contributing basin. Sediment basins shall be provided at inlet locations and shall have their full volume available at the completion of development.

i. **Water Edge Treatment** - The edge treatment shall be compatible with adjacent land use and shall generally be of low maintenance and provide safe access to the water's edge. The edge treatment shall cover ground surfaces for 0.3m vertically above and below NWL and shall be adequate to prevent erosion of the shoreline due to wave action. The placement of a 250mm depth of 75mm nominal size washed rock with woven polypropylene geotextile fabric underneath is considered the minimum standard. Naturalized edge treatments will be considered. The final proposed treatment is subject to approval by Engineering Services.

j. **Maintenance Access** - Landscaping of the surrounding areas shall provide sufficient open space and gradients to permit maintenance vehicle access to all areas down to the NWL. All structures and facilities on site shall be located to permit clear vehicle access.

k. **Landscaping** - Landscaping of bounding areas is considered part of lake construction requirements and shall be submitted as part of the development engineering drawings. These plans shall include proposals for all public lands and any easement areas between NWL and HWL elevations. Refer to Landscaping standards **Storm Water Management Facilities** for specific details.

l. **Public Open Space** – Storm Water Management Facilities shall be designed with a minimum of 30% of the property open to adjacent municipal roadways. To avoid fragmentation a minimum of 20 continuous meters adjacent to collector, minor collector or local residential roads is required to be eligible.

3.2.7 Design Guidelines for Dry Detention Basins

Lands subject to inundation to the 1:100 year design water level shall be included in Public Utility Lots. Restrictive covenants shall be registered on titles of lots abutting the detention basin onto which detained water will encroach to ensure control of the basin area and adequate free board is maintained. Neither HWL nor Freeboard shall be design to encroach on private property. The natural water table should be considered when determining the water level designs for the basin. Geotechnical verification of surrounding water table should be undertaken.

All dry detention basins shall be off-line storage areas designed to temporarily detain excess runoff. The maximum live storage depth shall be 1.5m from invert of the outlet pipe.

Detention basin bottoms shall be sloped at a minimum of 0.7% and a slope of 1.0% or greater is recommended where feasible. Lateral slopes shall be 1.0% or greater.

Side slopes subject to inundation upon filling of the detention basin shall have a maximum slope of 7 horizontal to 1 vertical.

The minimum landscape standard shall be grass cover. Landscaping details shall be submitted with engineering drawings (see **Section 4.0 Landscaping**).

The obvert of the controlled discharge pipe shall be 150mm lower than the invert of the inlet/outlet pipe at the detention basin bottom. Inlet and outlet structures shall be grated over their openings. Bar spacing shall be maximum 150mm. Grated outlet structures shall be designed with 1.5 times the rated capacity to allow for plugging. Head walls and wing walls shall have guardrails and fences as appropriate to restrict access and for fall prevention.

3.2.8 Storm Sewers

3.2.8.1 Location

Storm sewers shall generally be located within road rights-of-way as shown on typical road cross-section information.

3.2.8.2 Materials of Construction

a. **Pipe** - Pipe for storm sewer mains and catch basin leads shall be either concrete or PVC pipe.

i. **Concrete Pipe**

I. Concrete pipe shall conform to ASTM C-14, ASTM C-76 or ASTM C-655, latest revision thereof. Pipe shall be made with Type 50, sulphate resistant cement. Joints shall be synthetic rubber gaskets. Elliptical reinforcement is not acceptable unless specific approval is given by Engineering Services prior to manufacture of the pipe.

II. Where pipe diameters are 900mm or less, lifting holes are not permitted.

III. Where pipe diameters are greater than 900mm, lifting holes are optional, however, there may not be more than 2 lift holes in a length of pipe.

IV. Seal lift holes watertight after installation of pipe.

ii. **PVC (PSM Type) Pipe**

I. Smooth wall PVC pipe products and fittings shall conform to Sections 4 and 5 of CSA Standard B182.2 for all basic material requirements, manufactured quality and dimensional tolerance.

II. Materials used for pipe shall come from a single compound manufacturer and shall have a cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM Standard D 1784. Materials used for moulded fittings shall come from a single compound manufacturer and shall have a classification of 12454-B, 12454-C or 13343-C as defined in ASTM Standard D 1784.

III. Notwithstanding the requirements of Section 4 of CSA Standard B182.2, compounds with different cell classifications than that noted above shall not be used without the prior approval of Engineering Services.

IV. Pipe shall be installed within two years from the production date indicated on the pipe and in stored and maintained in conformance with the manufacturers' specifications.

iii. **Open Profile Wall PVC Pipe**

I. Closed profile and dual-wall corrugated pipe, (if specifically approved by Engineering Services for a project) and open profile PVC pipe products and fittings shall conform to Sections 4 and 5 of CSA Standards 182.4 for all basic material requirements, manufactured quality and dimensional tolerance.

II. Materials used for pipe and fittings shall come from a single compound manufacturer and shall have a cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM Standard D 1784.

III. Notwithstanding the requirements of Section 4 of CSA Standard B182.4, compounds with different cell classifications than that noted above shall not be used without the prior approval of Engineering Services.

IV. Minimum waterway wall thickness shall conform to CSA-B182.4 Table 3 for pipe stiffness of 320 kPa.

V. Pipe shall be installed within two years from the production date indicated on the pipe and in stored and maintained in conformance with the manufacturers specifications.

Amended. Refer to Bulletin 005

VI. Inserta Tees are acceptable, and Inline Tees may be used where pipe sizes are equal to or larger than 450 mm.

VII. Strap on saddles are not acceptable for mainstops, hot taps, and ¾ or 1 inch services.

VII. Ultra-Rib and Kor-flo type products are acceptable.

b. **Manholes and Catch Basin Manholes** – Within roadways manholes and catch basin manholes shall have a minimum 1200mm inside diameter and be made of concrete with cone or flat top section.

c. **Catch Basins** – Catch basins shall be 600 to 900mm inside diameter concrete with minimum of 500mm sump.

3.2.8.3 Inspection

All sewers shall be inspected with closed circuit television camera equipment. Inspections shall be performed in accordance with the standard practices as set out in the CSA/NASSCO (CANADIAN STANDARDS ASSOCIATION/NATIONAL ASSOCIATION OF SEWER SERVICE COMPANIES) guidelines. The captured video shall be in color and display on screen the Lot and Block numbers of all service connections. The rate of camera progression shall not exceed 6m per minute.

Two inspections shall be performed: the first inspection shall be performed immediately prior to issuance of the Construction Completion Certificate and after road construction;

the second shall be performed immediately prior to issuance of the Final Acceptance Certificate for Underground Improvements. The Developer is responsible for cleaning and flushing all lines to facilitate camera inspections.

The maximum long-term deflection for any P.V.C. pipe shall not exceed 7.5% of the internal diameter.

The video equipment operator shall prepare a written report summarizing the results of the inspection. Still photos of problem areas encountered shall be included in the written report. The report shall be bound in a hard cover binder.

The data collected shall be submitted in USB format. One (1) copy of each of the USB and the written report shall be delivered to Engineering Services. A separate summary of the report and CCTV inspection shall be submitted by the Developers Consultant and Contractor.

3.3 WASTE WATER SYSTEM

3.3.1 Design Criteria

For all pipe systems 900mm nominal diameter and greater the submission of structural design calculations to Engineering Services is mandatory. For all other sizes, design calculations for a specific project shall be provided upon request.

a. **Residential/Domestic** - The sewer main capacity shall be designed on the basis of the subdivision design population (i.e. zoning and density requirements), plus all future contributing areas. Where available the minimum flow generation shall be based on the actual proposed lots and their zone type.

   The minimum average domestic flow contribution shall be calculated on the basis of 300 litres/capita/day (dry weather flow). Sewer capacity shall be designed on the peak dry weather flow estimated by application of the following peak factor to dry weather flows:

   Peaking Factor=$2.6P_{df}^{-0.1}$ OR 1.5 (whichever is greater)

   Where P is the design contributing population in thousands

   Design contributing population is per lot as per approved zoning.

b. **Commercial/Light Industrial** - Generally commercial and industrial flows should receive specific evaluation. For planning purposes and general design, a flow contribution of 18,000 litres/hectare/day shall be used with peak dry weather flow estimated by application of a peaking factor of three (3).

c. **Inflow/Infiltration Allowance** - An allowance of 0.28 litres/second/hectare shall be applied to all sewer design flow capacity calculations. This allowance would apply to the total drainage area on the basis of upstream area calculations (manhole to manhole). In addition, an allowance shall be made for inflow through manholes in sags by addition of 0.4 litres/second for each manhole.

d. **Total Combined Design Flow Capacity** - The total design sewer capacity shall be the combination of:

   i. Peak dry weather flow

   ii. Infiltration allowance

   iii. Inflow for sag manholes

   (NOTE: There shall be no connection of roof drainage and weeping tile systems to the wastewater system.)

e. **Pipe Flow Design** - The following shall apply to wastewater sewer pipe design:

   i. Minimum design flow velocity shall be 0.6m/s. Where 0.6m/s cannot be achieved within the first run of upstream pipe, a minimum pipe slope of 1.0% shall be maintained

   ii. Maximum design flow velocity shall be 3.0m/s

iii. Manning's n = 0.013 shall be used as the flow coefficient

iv. New sewers shall be designed with full flow capacity not exceeding 80% of the sewer diameter based on a maximum utilization of 86% of the pipe hydraulic capacity

$$\text{Full Sewer Flow Capacity} = \frac{\text{Estimated Total Design Peak Flow Rate}}{0.86}$$

v. The minimum pipe diameter shall be 200mm for residential and 250mm for commercial/light industrial

vi. Minimum pipe gradients shall be as follows:

I. Short laterals (cul-de-sacs) and uppermost sections shall be 1.0% minimum

II. Curved sewer design gradients shall be increased by a factor of 1.5

III. Minimum gradients shall be:

PIPE DIAMETER	% GRADIENT
200	0.40
250	0.28
300	0.22
375 or larger	0.15

vii. The min. grade of the first upstream leg of wastewater sewer shall not be less than 1.0%. Special cases will be reviewed under the discretion of Manager of Engineering.

f. **Design Submission** - Design calculations shall be submitted in a tabular form on the drawing showing the overall wastewater sewer system and shall include all allowances for future flow generation within the drainage area.

g. **Hydraulic Grade Line** – all wastewater sewer mains and lot services are to be above the geodetic elevation of 707 meters, except where otherwise approved by Engineering Services.

3.3.2 Waste Water Sewer Main Alignments and Location

a. General - All wastewater sewers shall generally be located along the centreline of the road right-of-way.

b. Wastewater sewers shall be located a minimum of 3.0m horizontally from any water main and 2.0m horizontally from any gas line measured from centreline to centreline.

c. Reduced spacing between utilities may be approved by Engineering Services if jointless pipe is used for construction. The most recent version of the Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems, Alberta Environment, shall be consulted for minimum spacing requirements in these cases.

Amended - 2025
Refer to Amendment #2
Number 3.5

d. The minimum depth of cover shall be 2.6m from finished surface to the top of the main pipes and 2.75m from finished surface to the top of service pipes.

e. Curved sewers shall run parallel to the centreline of the street. Manholes shall be constructed at each end of a curved sewer section. Where curved sewers are used, the design shall not exceed the maximum angle at which the joints remain tight. Curved sewers shall be laid with a radius of at least 60m unless otherwise supported by manufacturer's specifications.

f. Water main crossings shall be as described below:

   i. Water main should pass over wastewater sewers and have a minimum separation of 0.3 metres;

   ii. Where it is unavoidable and the water main passes under a wastewater sewer, maintain a minimum separation of 0.5 m (crown to sewer invert).

      I. Adequate soil structure must be maintained beneath wastewater sewer to ensure structural support of pipe, which may be accomplished using cement stabilization or other means deemed appropriate by Engineering Services.

   iii. Oblique crossings (less than 80°) shall not be permitted;

   iv. Designed to provide structural support for both pipes with pipe joints located equidistant from the intersection of the crossing

g. Manholes shall have a maximum spacing of 150m and be located at the following locations:

   i. Changes in pipe diameter

   ii. Changes in sewer gradient

   iii. Junctions of mains

   iv. Changes in direction

   In a straight run, the minimum drop through the manhole shall be 30mm. At changes in direction, there shall be a minimum drop of 60mm through the manhole.

   All bends in manhole benching shall be formed to provide the greatest length of curvature.

   Sewer deflection shall not exceed 90° through a single manhole.

h. Drop Manholes - Drop sections are required for invert grade differences greater than 1.0m in wastewater sewer manholes. For 200 mm and 250 mm mains, internal drops may be used. Benching is required for invert grade differences 300 mm or less. No more than two internal drops in one manhole.

i. Service Tees - For all new construction inline tees shall be installed. Tees used in retrofit situations must be approved by Engineering Services. Where wastewater system is of sufficient depth, riser tees shall be used for individual services.

3.3.3 System Materials

a. **General** - All construction shall be with new materials delivered in acceptable condition meeting current materials specifications and standards.

b. **Sewer Mains** - Pipe for wastewater sewer mains shall be polyvinyl chloride (PVC).

i. **PVC (PSM Type) Pipe**

I. Smooth wall PVC pipe products shall conform to Sections 4 and 5 of CSA Standard B182.2 for all basic material requirements, manufactured quality and dimensional tolerance.

II. Materials used for pipe shall come from a single compound manufacturer and shall have a cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM Standard D 1784. Materials used for moulded fittings shall come from a single compound manufacturer and shall have a classification of 12454-B, 12454-C or 13343-C as defined in ASTM Standard D 1784.

III. Notwithstanding the requirements of Section 4 of CSA Standard B182.2, compounds with different cell classifications than that noted above shall not be used without the prior approval of Engineering Services.

IV. Pipe shall be installed within two years from the production date indicated on the pipe and in conformance with the manufacturers specifications.

V. 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.

VI. The tracer wire used shall be a minimum of 14 gauge coated copper wire complete with sacrificial 5 lb. anodes spaced every 1,000 lineal metres, used for corrosion protection.

c. **Gaskets/Joint Rings** - Joint seals shall meet the requirements of CSA B182.2 and ASTM F477 and provide pipe joints capable of a hydrostatic pressure of 345 kPa (50 psi) without leakage.

For inline Tees or Wyes at service connection junctions, injection moulded gaskets shall conform to CSA B182.1 or CSA B182.2 with fabricated fittings conforming to CSA B182.2 and ASTM F679.

d. **Manholes** - Manholes shall be a minimum of 1200mm internal diameter and conform to the following standards:

i. Manufactured with Type 50 Cement

ii. Shall be precast with reinforcement conforming to ASTM C478 and CSA A257.4

iii. Shall include step irons of the standard safety type, hot dipped galvanized iron or aluminum bar of forged alloy 6061-76 with a minimum tensile strength of 200 MPa

iv. Shall have rubber gasket joints conforming to ASTM C443 and grouted inside and out with non-shrink grout. All grade rings to be grouted.

v. Shall be supplied with precast, pre-benched bases with cored connections fitted with Duraseal or G-Lock cast in joint systems

vi. Norwood NF80 solid cover or equal for all manholes in streets and driveways.

vii. Norwood NF90 solid cover or equal with rubber gasket-seal for all manholes in street sags or other low areas.

viii. Norwood F39 with solid cover or equal in all other locations

ix. Safety platforms shall be required on manholes with a depth greater than 7.0m.

3.3.4 Testing and Acceptance

All sewers shall be inspected with closed circuit television camera equipment in accordance with the **Beaumont CCTV Requirements and Guidelines, February 2017** found in **Appendix 1.0**. Inspections shall be performed in accordance with the standard practices as set out in NASSCO references.

The captured video shall be in color and display on screen the Lot and Block numbers of all service connections. The rate of camera progression shall not exceed 6m per minute.

Two inspections shall be performed: the first inspection shall be performed immediately prior to issuance of the Construction Completion Certificate and prior to road construction; the second shall be performed immediately prior to issuance of the Final Acceptance Certificate for Underground Improvements. The Developer is responsible for cleaning and flushing all lines to facilitate camera inspections.

Amended. Refer to Bulletin 005

The maximum long-term deflection for any PVC pipe shall not exceed 10% of the internal diameter.

The video equipment operator shall prepare a written report summarizing the results of the inspection. Still photos of problem areas encountered shall be included in the written report. The report shall be bound in a hard cover binder.

The data collected shall be transferred onto a USB drive. One (1) copy of each of the USB and the written report shall be delivered to Engineering Services.

At the discretion of Engineering Services, the Developer may be required to carry out a leakage test where each section (manhole to manhole) and associated service connections would be tested for water tightness. The maximum volume of leakage acceptable would be 0.005 litres/mm diameter/m of pipe per day with a constant 600mm head applied at the upper end of the sewer section.

All sewers shall be inspected with closed circuit television camera equipment.

Where concerns are raised based on CCTV footage, sewers installed using flexible pipes shall be inspected with mandrel or laser profiling equipment to check for excessive deflection.

Amended. Refer to Bulletin 005

The maximum short-term deflection (typically after 30 days) for any pipe shall not exceed 5% of the internal diameter.

The maximum long-term deflection (typically at FAC after 1 year) for any pipe shall not exceed 7.5% of the internal diameter.

All concrete sewer pipes to be installed as per ASTM C1479.

All thermoplastic sewer pipes to be installed as per ASTM D2321.

3.4 WATER DISTRIBUTION SYSTEM

3.4.1 Design Criteria

a. **General** - Water distribution systems in new subdivisions shall be looped internally and shall have more than one primary feeder main supplying the distribution system in the development area. Engineering Services may waive this requirement temporarily provided the Developer can demonstrate that the necessary fire flows can be delivered via the single connection regardless. In any event, a maximum of 50 lots may be serviced temporarily without looping of the system. The Developer shall provide looping internally within the subdivision as well as a second connection to the development within two (2) years of the issuance of a Construction Completion Certificate on the first phase of development. Beaumont's water model is available to the Developer's Engineer.

b. In cul-de-sacs, the watermain shall be looped except where the overall length of the cul-de-sac from the intersection curb line to the end of the bulb is 120m or less. A flush point shall be provided at the termination point of all dead end lines.

c. **The minimum diameter of watermain shall be 200mm for residential developments and 250mm for commercial and light industrial developments (see Section 5.9). The minimum diameter of watermain along the Ring Road shall be 300mm.**

d. **Location** – Unless otherwise approved by Engineering Services, water mains 400mm in diameter or less shall be located within road right of ways at a centreline alignment of 1.5m from the curb face on the side of the ROW opposite the main power, street light cable and telephone lines.

   A minimum horizontal separation of 3.0m must be maintained between water mains and any sewer main measured centreline to centreline. Engineering Services may approve lower spacing, but reserves the right to request additional clearance, particularly where pipe diameters exceed 300mm. In cases where there are two water mains located within a ROW, a centreline spacing of 1.5m must be maintained between the mains.

   Minimum vertical separations of 0.30m and 0.50m must be maintained for water main crossing above and below sewers, respectively.

e. **Hydraulic Design** - The water network shall be designed using the following parameters.

   Average Day Demand:

   i. residential - 360 litres/capita/day

   ii. commercial/light industrial 22,500 litres/hectare/day

   Peaking Factors:

   i. Peak Day = 2x Average Day

   ii. Peak Hour = 2x Peak Day

Amended - 2025
Refer to Amendment #2
Number 3.6

The system shall be designed to meet the criteria contained in "Water Supply for Public Fire Protection, 1999" (or latest edition) as produced by the Fire Underwriters Survey.

The minimum design fire flow for any watermain providing fire protection shall be as follows, plus allowance for peak day demand:

All Commercial Zoning (more detail can be found in Section 5.9)	270 l/s
Urban Services (Institutional), Public Education Services (more detail can be found in Section 5.9)	180 l/s
Medium and High Density Residential	180 l/s
All Single Family and Low Density Residential	100 l/s
Multi Family Residential	See Section 5.9

The minimum residual pressure at any location in the distribution system at ground level under fire flow conditions shall be 140 kPa (20 psi). The maximum Hazen & Williams coefficient of friction (C) for watermain sizing shall be C=120.

The normal operating range for residential distribution shall be between 350 kPa (50psi) to 550 kPa (80psi) pressure with velocities not to exceed 3.0 m/s under all operating conditions.

Specific design shall be applied to high value areas (schools, shopping centres, apartments, light industrial areas) and detailed calculations and network analysis provided.

3.4.2 System Materials

The water distribution system must comply with National Sanitation Foundation (NSF) 61, including Annex F. The NSF61 Annex F requirement will take effect and that consequently, all waterworks brass products supplied under NSF61 in our jurisdiction as of that date must conform to the revised regulation.

With the understanding that all current Beaumont approved manufacturers offer No-Lead brass lines, we anticipate that manufacturers' and distributors' will plan and collaborate effectively to ensure a complete transition to No-lead product distribution for all future work. **All materials must be no-lead.**

a. **General** - Only new materials shall be used in water network extensions. Materials shall be delivered and handled to ensure quality and reliability is provided in the construction of all components. Engineering Services reserves the right to reject any materials that are damaged or obviously mishandled.

b. **Pipe Material** - Piping material for use in the water distribution system shall be PVC Pipe conforming to AWWA C900 (pressure class 1035kPa/150psi, DR 18) or AWWA C905 (pressure class 690kPa/100psi, DR 25) and adhere to the CSA B137.3 standard. All pipe shall be stamped or be readily identifiable as to size, DR, CSA and AWWA standards.

PVC pipe shall not be installed in areas that are contaminated or could potentially be in contact with organic solvents or petroleum products that could prejudice the long-term integrity of the pipe.

c. **Fittings** - Cast iron and ductile iron fittings (Tees, crosses, bends, and reducers) sizes 100mm to 300mm diameter shall conform to AWWA C110. Fittings shall have bell ends and shall be supplied complete with vulcanized synthetic rubber gaskets conforming to AWWA C111 Standard. Flanges, if approved, shall be flat face conforming to ASME/ANSI B 16.1, Class 125. Exterior coatings shall be factory coated with an asphaltic coating or fusion bonded epoxy coating conforming to AWWA C213 Standard. Flanged connections shall have stainless steel 304 bolts and nuts and the body of the fitting protected by installation of a sacrificial zinc anode.

   PVC fittings in sizes 100mm-200mm shall be injection moulded, class 150 (1035 kPa) conforming to AWWA C907 Standard. Tees, elbows, tapped couplings and reducers in sizes 100mm-200mm shall conform to CSA B137.2. Fittings shall be supplied with elastomeric gaskets of the pressure-actuated type.

   PVC extruded fittings, sizes 250mm-400mm, shall be Class 150, DR18 conforming to AWWA C900 and CSA B137.3 Standards.

d. **Hydrants** - All fire hydrants shall be Canada Valve type and shall conform to AWWA C502 Standard, having 150mm diameter inlet elbows with cast-in bell ends (dry barrel). Hydrants shall include two (2) 63.5mm hose nozzles and one (1) 100mm “Storz” pumper connection. Barrels shall be epoxy or asphalt coated below ground level and protected with a sacrificial zinc anode. Upper rods to be made of stainless steel. Above ground hydrants shall be painted with RUST-OLEUM High Performance V7400 System 340 VOC DTM Paint.

Amended. Refer to Bulletin 005

COLOUR	TO BE USED FOR
Safety Yellow	Hydrant Bodies
Fire Hydrant Red	Hydrant bodies for commercial, institutional, and multifamily sites
Safety Orange	Caps and bonnet for the hydrants connected to water mains that are 150mm in diameter
Safety Green	Caps and bonnet for the hydrants connected to water mains that are 200mm in diameter
National Blue	Caps and bonnet for the hydrants connected to water mains that are 250 or larger in diameter
High Gloss Black	For Dead End Hydrants, only the bonnet will be painted black, caps will be painted the color of water main feeding the hydrants

e. **Valves** - Gate Valves, 150mm to 300mm diameter, shall be Canada Valve type and shall be iron body, bronze mounted with non-rising spindle, counter clockwise opening conforming to AWWA C500 or AWWA C509 for resilient seated gate valves. Coatings shall conform to AWWA C550 Standard. Valve boxes shall be protected with a zinc anode.

Valve Boxes shall be the cast iron type "A" sliding type conforming to ASTM A48 Standard, Class 25. Coatings shall conform to AWWA C213 Standard (asphaltic or fusion bonded epoxy). Valve boxes shall be complete with 25mm square operating rod with 50mm square operating nut suitable for 3.0m of cover. Operating nut rock disks to be 300-400 mm from the surface. All valve boxes in landscaped areas shall be Norwood Foundry sliding type "A". All valve boxes in roadways shall be Norwood Foundry screw type "B".

Butterfly Valves shall be used for 400mm and larger installations and conform to AWWA C504 Standard with stainless steel disc edge and operating shafts. Actuators shall have stop limiting collars. Valve boxes shall be fitted with non-metallic valve position indicators. Valve bodies shall be protected with a zinc anode.

Amended - 2025
Refer to Amendment #2
Number 3.7

All valves over 400mm diameter shall be housed in a vault or manhole chamber.

f. **Corrosion Protection** - Generally all materials used shall be corrosion resistant by nature of their composition and coating systems. Hydrants, valves and fittings shall be protected by installation of a 2.3kg (5 lb) zinc anode on valves and cast fittings and a 5.5kg (12 lb) zinc anode on hydrants. Zinc anodes shall conform to ASTM B418 Type II and shall have the following composition:

Aluminium	0.005% maximum
Cadmium	0.003%
Iron	0.001%
Zinc	Remainder

All bolts and nuts on hydrants, valves, couplings and buried fixtures shall be stainless steel type 304.

g. **Thrust Blocking** - All valves, hydrants, tees, bends and end plugs shall be thrust blocked in accordance with the detail indicated on Standard Detail Drawing No. 8-1. Concrete shall achieve a minimum compressive strength of 25 MPa in 28 days. Concrete mixes shall be with maximum 25mm aggregates, type 50 cement and air entraining to achieve a volumetric air content of 4% to 6%. Air and ground temperatures shall not be less than +5°C at the time of placing and the surrounding air temperatures must be maintained a +5°C for a minimum 12 hours after placement.

3.4.3 Testing and Acceptance

General - The Developer shall flush, disinfect and pressure test all water mains and service connections in accordance with the **Public Works Requirements for Tests in Beaumont** located in **Appendix 1.0**. The Developer is required to meet the following requirements and satisfaction of Engineering Services.

a. **Pressure Testing** - After completion of all installations including service connections, the system shall be pressure tested by the following procedures:

   i. Advise Engineering Services, at least 24 hours prior to system filling, that a pressure test is proposed and provide a plan outlining the location of testing, as well as the filling, testing and flushing procedures to be utilized.

ii. Slowly fill the system and ensure any air is forced from terminal points (service lines may be filled during service installation).

iii. Prove the reliability and accuracy of proposed test gauges and test equipment.

iv. Allow a settling period prior to final test application which is identified by relatively steady pressure reading but no less than 36 hours after placing the last thrust block or 24 hours from initial pressurization.

v. Each section between valves shall be brought to test pressures with the valves closed to test the valves under pressure (the test pressure shall be held for two minutes on each valve before release to the next valve).

vi. Have an Engineering Services representative witness the initial test pressure, check isolation valve at commencement of the test and record the initial volume in the make up water container. The test pressure shall be maintained at 1035 kPa for a duration of two (2) hours.

vii. The maximum length of main under test shall be 450m.

viii. The allowable leakage shall be determined as follows (PVC pipe only):

$$L = \frac{(ND\sqrt{P})}{128{,}225}$$

L = allowable leakage, litre/hr.

N = total number of joints

D = pipe diameter, mm

P = test pressure, kPa

b. **Disinfection** - All water mains shall be disinfected in accordance with AWWA Specification C 651 and in conformance with Alberta Environment. Chlorine testing for new pipe is 50 parts per million and 12 hours after flushing a bacteriological sample needs to be taken and sent to the Lab for analysis.

Prior to chlorination, Consultant shall provide Engineering Services a plan outlining the chlorination locations, as well as details of procedures to be used. All procedures performed shall be documented and submitted to Engineering Services for acceptance. At the completion of disinfecting and flushing, water samples shall be taken from access points near the point of chlorine injection, midpoints in the system and near the furthest point from filling. One sample per section of water main installed (valve to valve) shall be submitted to an accredited laboratory for bacteriological examination. Engineering Services' personnel shall perform or witness the sampling. In certain circumstances and at the sole discretion and approval of Engineering Services, they may choose to designate a representative to perform the sampling on their behalf.

The storm sewer system or any open water body shall not be used for disposal of chlorinated water. Should there not be an acceptable point of discharge on site, the chlorinated water shall be removed from site to an acceptable point of disposal or shall be de-chlorinated on site for disposal.

c. Flow Testing - Flow testing of hydrants shall be required by Engineering Services as a prerequisite to the issue of a Construction Completion Certificate, and again as a prerequisite to the issue of the Final Acceptance Certificate. At the discretion of Engineering Services, additional testing may be required prior to the issue of a Final Acceptance Certificate.

3.5 WATER AND SEWER SERVICES

3.5.1 Minimum Requirements

Each single-family dwelling shall be serviced with

a. 150mm diameter wastewater sewer service

b. 100mm diameter sump pump discharge collection service

~~Amended. Refer to Bulletin 005~~

c. ~~19mm diameter water service type K copper or 25mm diameter water service Type K copper when the length of service from the main to the curb stop is 20m or more~~

Amended - 2025 Refer to Amendment #2 Number 3.9

All wastewater sewer services shall have a minimum slope of 2% from the property to the main. Storm sewer services shall have a minimum slope of 1% from the property line to the collection main. Floor drains and/or sumps are permitted in garage floors.

The minimum depth of cover to invert shall be 2.75m from finished grade for water and wastewater services and 1.80m for storm services.

3.5.2 System Materials

a. **Water Services Materials** - All water services shall be constructed using type K copper piping conforming to AWWA C800 Standard up to and including 50mm dia. For 100mm or larger services, PVC piping shall be used (Class 150).

   Cathodic protection is required as per **Standard Detail 3-17**, **3-24**, or **3-25** as applicable.

   Corporation main stops shall be compression copper type (Mueller A-220 or equal) without thaw out and connector.

   Curb stops shall be copper compression, non-draining type (Mueller Ori-seal H15204 or equal). Curb stops for blow-offs shall be 50mm and self-draining. Main stops shall be no lead brass- conform to NSF61 Annex F.

   Water service direct hot taps shall be completely stainless steel or bronze combination. Service boxes shall be the extension type to 3.0m cover. Top sliding section of service box shall be one piece (No couplers). Service boxes shall be epoxy coated with stainless steel operating rod attached to a manganese bronze clevis and bronze or stainless steel cotter pin connection to the curb stop.

   Copper service lines and blow offs shall have sacrificial zinc anodes attached.

b. **Wastewater Sewer and Sump Pump Discharge Services Materials** - For single and multi-family development, all sewer and sump pump discharge service lines shall be PVC DR 35. Wastewater services shall be 150mm dia. Sump pump discharge collection services shall be 100mm dia.

   For non-residential services, PVC piping shall be used and specific design required.

3.5.3 Abandoning Water and Sewer Services

Any abandonment must be documented in the record drawings.

a. **Water Service** – double crimp with the main stop off or removal

b. **Sewer** – Fill and plug abandoned pipe or removal

3.6 FRANCHISE UTILITIES

3.6.1 General

Franchise Utilities are defined as street lighting, power, gas, telephone, cable television, and internet, all of which are considered to be part of the shallow bury utility system.

The Developer shall make all arrangements with each franchise utility to provide all easements and rights-of-way required to provide individual power services to each lot. All easements shall be registered in the name of the "City of Beaumont". All power installations shall be underground. Landscape must be returned to pre-existent conditions to the satisfaction of Engineering Services.

Street lighting shall be in approved steel davits consistent with existing lighting in Beaumont. All cabling for street lighting shall be underground. The location and density of streetlights shall be constructed to provide the following minimum lighting levels:

ROADWAY CLASS	AREA	ILLUMINANCE AVERAGE (LUX)	CRITERIA UNIFORMITY MAXIMUM AVG/ MIN RATIO	MAX/MIN RATIO
Arterial	Downtown Commercial Residential Industrial	22 17 12 9	3:1 3:1 3:1 3:1	6:1 6:1 6:1 6:1
Collector	Downtown Commercial Residential Industrial	17 13 10 6	3:1 3:1 3:1 3:1	6:1 6:1 6:1 6:1
Local	Downtown Commercial Residential Industrial	12 10 6 6	3:1 3:1 6:1 6:1	6:1 6:1 12:1 12:1
Lane	Downtown Commercial Residential	6 6 4	6:1 6:1 6:1	10:1 10:1 12:1

Street lights shall generally be offset 2.5m from the projection of common property lines with the face of posts at least 1.0m away from the back of curbs or 200mm away from the edge of sidewalks. Minimum depth of cover shall be 750mm.

Lighting shall be provided in park areas along walkways and where walkways enter park areas.

The Developer shall pay all costs and charges required by the utility company. All investment rebates will be payable to the "City of Beaumont".

A minimum of two (2) horizontal meters separation shall be used between shallow bury utilities and deep utilities. Transformers, pedestals and light standards shall be a minimum of two (2) meters from fire hydrants, curb stops and catch basins. Note that in general there should be at least 1.0m spacing between franchise utility infrastructure and other municipal hardware.

Any changes to driveway locations must be approved by Engineering Services.

Crossings should always be aligned so that the duct crosses the road at right angles (90 degrees), wherever possible and should be placed at a minimum cover from top of asphalt of 1.5m.

No removal or cut of concrete or pavement shall occur prior to receipt of explicit written authorization by the appropriate authority.

3.6.2 Telephone, Cable Television, and Internet Services

Telephone, cable television, and internet services shall be provided to each residential lot in the development. The Developer shall coordinate installation through the franchise utility holders. All services shall be underground.

The Developer shall provide all required easements for utility installation with easements in the name of the "City of Beaumont".

The minimum depth of cover for buried telephone, cable television and internet cabling shall be 1.2 meters.

The Developer shall pay all capital contributions and charges by the utility companies.

3.6.3 Natural Gas Servicing

A Natural Gas service shall be provided to each residential lot. Any easements required shall be provided by the Developer and shall be in the name of the "City of Beaumont".

Amended - 2025
Refer to Amendment #2
Number 3.8

Gas distribution shall generally be in the front of lots with gas meter installations at the side or rear of the units. Side installations shall be on the same side as the driveway. The minimum depth of cover shall be 1.2 meters

Any capital contribution required shall be the responsibility of the Developer.

3.6.4 Shallow Bury Utility Trenches

All trenches and pedestal installations shall be backfilled to achieve a minimum of 98% of Standard Proctor Density where trenches are in the zone of surface improvements including pavement, curbs and gutters and sidewalks. The zone shall be considered to extend 0.5m beyond the edge of concrete work and pavement structures. Trenches beyond this zone shall be compacted to 98% of maximum density at field moisture content.

If the trench depth is not consistent, is too shallow, or too deep, corrective measures must be taken which can include:

a. sanding - where the trench is too deep; or,

b. retrenching - where too shallow.

If cable has already been laid in the trench, it must be removed, before the trench is repaired and then laid again.

If trenches are left open for more than 72 hours, or if the walls have collapsed, or if other material has entered the trench (i.e. lumps, snow, water), the Inspector may request that corrective measures be taken which can include cleaning the trench or backfilling, compacting and retrenching.

Soil having high thermal resistivity containing large amounts of organics, peat, black loam, sod, clay that has hardened, stones, straw, snow or frozen material will not be acceptable. All backfill material will be subject to the approval of the Inspector. Sand or clean backfill material must be substituted for unsuitable backfill, subject to geotechnical verification.

Where clay is used as the backfill material, the moisture content of the clay cannot exceed the plastic limit, or more than 15%, when being placed in the trench. Backfill shall be placed in uniform lifts not exceeding 300 mm and compacted to Engineering Services' standards.

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SECTION 4.0
LANDSCAPING

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4.1 GENERAL INFORMATION

4.1.1 Role of the Landscape Architect or Designate

a. All Landscape drawings must be stamped and signed by a Landscape Architect who is a full member in good standing with the Alberta Association of Landscape Architects (AALA). This requirement also applies to such areas that fall within the scope of the Land Use Bylaw. Landscape drawings must be submitted with all other engineering drawings for each project. Engineering drawings submitted without the accompanying landscape plans will be deemed incomplete and will not be accepted for review by Engineering Services.

   The Landscape Architect, or their designate is responsible for carrying out the following responsibilities throughout the project:

   i. Staking or approval of all plant material locations, landscape structures, and site amenities with the contractor prior to installation to ensure that there are no utility conflicts and layout conforms with the approved landscape plans.

   i. Inspection and approval of final installation of all work.

   ii. Providing a copy of the current and approved construction drawings at inspections. This includes verifying any deviation of plan on-site and coordinating approvals of these changes prior to coordinating CCC / FAC inspections.

   iii. Submission of 'Record' drawings as described in **Section 1.3.7 - Landscape Asbuilt/ 'Record' Drawings Submission Process**.

   The Landscape Architect shall adhere to all requirements in these standards for landscape plans.

   The Landscape Architect is responsible for all revisions and re-submissions of the landscape plans to Engineering Services until approval.

4.2 LANDSCAPE PLAN & CONTENT

4.2.1 General Landscape Plan Requirements

General Landscape Plan drawing submissions are to include, but not be limited to, the following:

a. North Arrow, date, bar scale;

b. Scale of 1:500 or larger;

c. Key plan;

d. Subdivision or site name;

e. Legal description of the land on which the development is proposed;

f. Label and dimension property lines of the site;

g. Approximate or estimated location of land uses, building perimeters, and landscaping on adjacent sites;

h. Surface treatments i.e. sod, seed, mulch beds, etc.;

i. Clearly identify extents of intended mown vs non-mown turf areas;

j. Adjacent public area features such as streets, lanes, driveways, vehicle entrances, street furniture, and boulevard trees;

k. Overhead, surface, and underground utilities and limit of easements;

l. Outlines of all site structures, to include: building footprints at grade, and location & type of underground structures and overhangs within first two stories;

m. Building entrances, porches, decks, steps, walkways, other hard surfacing, or hard landscaping features, parking areas, curbs, lighting, fencing, walls, screens, recreational facilities, and garbage collection areas including information on materials colours, & patterns; (As applicable)

n. Existing and final site grading, including established lot boundaries, elevations, berming shown in half-metre contours, direction of site drainage, swales, ditches, constructed wetlands and Storm Water Management Facility locations or alignments, proposed catch-basin rim elevations, top-and-bottom of retaining wall elevations, and existing elevations of plant material to be retained; (unless otherwise included with the engineering drawings)

o. The height, material, and colour of all fencing, screening, & walls;

p. Existing trees and shrubs which are labelled, and sizes that are graphically illustrated by the mature size of the plant material. This is to include a plant list with the common name, botanical name, size, and condition of health. In Addition, caliper of tree trunks shall be noted. The landscape plan shall graphically illustrate the spread of the trees to be removed or relocated by the proposed construction;

q. Proposed trees, shrubs, perennials and groundcovers with a corresponding plant list identifying the common name, botanical name, quantity, size, and method of planting;

r. Details: Fencing, Features, Amenities, Planting, Hard Surface, Tree Protection;

s. Stamp and signature by a landscape architect registered with the Alberta Association of Landscape Architects;

4.2.2 Landscape DP Plan Requirements

In addition to the requirements noted in **Section 4.2.1 – General Landscape Plan Requirements**, please refer to the latest edition of the Beaumont Land Use Bylaw for further information.

4.2.3 Landscape Layout Plan Requirements

Landscape Layout plan requirements in addition to those noted in **Section 4.2.1 – General Landscape Plan Requirements**:

a. Subdivision name;

b. Designated use of adjacent land parcels and development stages. Identify stages as existing or proposed;

c. Location and description of all trees and shrubs to be protected;

d. Site laydown areas, & construction access locations;

e. Limits of project area;

4.2.4 Storm Water Management Facility Plan Requirements

Storm Water Management Facility plan requirements in addition to those noted in **Section 4.2.1 – General Landscape Plan Requirements**:

a. Normal water line labelled;

b. 1:5 year flood line labelled;

c. 1:25 year flood line labelled;

d. 1:100 year flood line labelled;

e. High water line labelled;

f. Planting bed extents and layout;

g. SWMF planting list;

h. Boat Ramp Detail;

4.2.5 Landscape Planting Plan Requirements

Landscape Planting plan requirements in addition to those noted in **Section 4.2.1 –General Landscape Plan Requirements**:

a. Where existing trees are identified and used to meet quantity requirements on planting plans, they must be included within the plant list and be subject to CCC and FAC inspection;

b. Minimum planting quantity requirements;

c. Locations for all proposed plant material referenced to plant list;

d. Seed/Sod mixes with application rates;

e. Plant material graphic symbols shall represent mature spread of shrubs as per TREES AND SHRUBS FOR THE PRAIRIES

f. Tree symbols are to be drawn at mature spread, as per the recommended tree spacing in **Section 4.4.2 Plant Material Setbacks, Sizing, & Spacing** – Trees, Shrubs, & Groundcovers;

g. Shrub symbols shall be shown at mature size with no overlap. Tree and Groundcover symbols may be overlapped at the discretion of the Parks and Facilities Division;

4.2.6 Landscape Redline Revision Plan Requirements

Landscape Redline revision plan requirements in addition to those noted in **Section 4.2.1– General Landscape Plan Requirements** are as follows:

a. All changes to the previously approved drawings are to be shown and/or highlighted in red;

b. Provide a list shown and/or highlighted in red describing all intended changes to the previously approved drawings;

c. Provide a letter listing all changes in quantity to the previously approved drawings;

4.3 LANDSCAPE REQUIREMENTS

Beaumont adheres to the Canadian Landscape Standards (CSLA).

4.3.1 Open Space Planting Requirements

a. A minimum of 80-85 trees per hectare is required for all Municipal Reserves, Parkland, and Open Space areas.

   i. This area shall be calculated as the total area of parkland, minus retained tree stand areas. Credit for individual retained specimen trees may be considered by the Parks and Facilities Division.

b. A minimum tree species mix of 60% Deciduous to 40% Coniferous is required. Justification may be requested by the Parks and Facilities Division if this quantity cannot be reached due to site restraints. Acceptance and variances shall be at Parks and Facilities Division discretion.

c. Shrubs may be substituted for trees at the rate of seven (7) shrubs to one (1) tree, up to a maximum 10% of the total number of trees required for the site.

d. Where naturalization planting is appropriate and being used, within the open space area, plant material may be substituted as per the following within the naturalized area for a maximum of 10% of the total number of full size trees required for the site. One (1) Full Size Tree for:

   i. Two (2) Potted Tree (40mm CAL.)

   ii. Five (5) Potted Tree (20mm CAL.)

   iii. Seven (7) Shrubs (1 or 2 Gal. Pot)

   iv. Twenty Five (25) Tree / Shrub Whips or Plugs (Min 100mm diameter Pot)

e. Emergent plant material does not qualify for tree substitution.

4.3.2 Specific Developments

Reference Document: “CITY OF BEAUMONT OPEN SPACE AND TRAILS MASTER PLAN”

4.3.2.1 School & Park Sites

Program requirements for new school and park sites vary from site to site, depending on school type, and park size.

Designers are advised to contact the Beaumont Parks and Facilities Division staff and review the “City Of Beaumont Open Space And Trails Master Plan” to determine the program for a specific site before proceeding with design. Discussions with Beaumont staff shall include space requirements for School Sites, Sports Field Requirements, and Passive Recreation Areas.

School and park sites may have other specific design considerations and requirements including, but not limited to, the following:

a. A school bus drop-off zone with adequate roadway frontage to accommodate bus parking.

b. Avoid access points to the schools, playgrounds, and community leagues through/ across vehicular movement areas.

c. Locating playgrounds centrally between schools and adjacent pathways is desirable. Wherever possible playgrounds should also have visual connection to any publically accessible heated areas / structures but not be in their shadow over winter.

d. Major activity nodes such as rinks, tennis courts, parking lots, and playgrounds should be located as far from adjacent private property as possible.

e. Connecting walkways through school and park sites are recommended to encourage neighborhood walkability.

f. Drainage from general park areas is to be directed away from school sites, as these sites are considered to be separate properties.

g. Drainage from general park areas is to be directed away from critical areas such as buildings on community league sites.

h. Drainage is to be directed away from playgrounds to reduce the potential for flooding.

4.3.2.2 Sports Fields

Sports Fields require a minimum 3.0m safety setback beyond the field of play in all directions. The setback must be turf with no vertical objects, and without hard or granular surfacing at a maximum grade of 2%. For ball diamonds, this also extends to a line 10.0m beyond and parallel to an extension of the backstop, down the first and third baselines, and behind the backstops. Larger setbacks to property lines are generally desired, dependent on field orientation and level of play. Contact the Parks and Facilities Division of Beaumont for more information.

Contact Engineering Services for sizes, slopes and other sports field design requirements

Design of sports fields shall comply with the governing standard of the sport.

4.3.2.3 Playgrounds

All new or upgraded playgrounds must meet the current CSA Z614 Children's Play-spaces and Equipment. The Landscape Architect must consult with Engineering Services prior to proceeding with conceptual design work.

4.3.3 Road Right-of-Ways

4.3.3.1 General

All Landscape in Road Right-of-Ways is to conform to **Section 4.4.1.5 – Tree Setbacks from Road, Walks, & Utilities**

Where required planting totals cannot be met due to conflicts along planting area described, the following options are allowable at the discretion of Engineering Services:

a. Remaining required trees may be placed elsewhere within the development;

b. Remaining required trees may be placed elsewhere as required by Engineering Services; or,

c. A fee may be levied based on the number of trees required remaining.

Amended - 2025
Refer to Amendment #2
Number 4.1

4.3.3.2 Roadway Tree Planting Corridors

The following standards apply where trees are to be planted within roadway tree planting corridors:

a. Where possible, collector and arterial roadways must incorporate a utility-free planting corridor within boulevards and medians to accommodate planting requirements with appropriate setbacks.

b. If trees are shown on the plan and cannot be planted due to utility or access conflicts, the Developer / Landscape Architect is responsible for contacting the Parks and Facilities Division to coordinate alternate plant locations of the same quantity and value.

4.3.3.3 Local and Collector Boulevards

The following standards apply where trees are to be planted within roadway tree planting corridors:

a. One (1) Boulevard tree is required in front of every lot in residential subdivisions.

b. Three (3) Boulevard trees are required along flankage of corner lots in residential subdivisions.

c. Biodiversity is encouraged and should be promoted, however, in general, only one or two varieties of deciduous tree species will be approved for planting on any one residential street block.

d. Trees & Shrubs may be planted along flankage at neighborhood entries upon approval from Beaumont.

Amended. Refer to Bulletin 005

e. Boulevards separated by a walk must be graded, top-soiled to a minimum 150mm depth, and sodded between the back of curb and the walk.

f. Trees & shrubs may be planted on traffic calming islands where they do not impede sight lines and at the discretion of Engineering Services. Shrubs must be low growing with a maximum 1000mm height at maturity.

4.3.3.4 Collector Roadways

Trees shall be planted on collector roads at a spacing that is appropriate for the variety selected. See Trees for appropriate spacing. The minimum quantity requirement is one (1) tree per ten (10) linear meters, on both sides of the collector roadway.

4.3.3.5 Arterial Roadways

The following shall apply for Arterial R.O.W.s:

a. Arterial R.O.W. must be graded, top-soiled, seeded or sodded, and landscaped.

b. There shall be the equivalent of one row of boulevard trees at 10m lineal spacing on each side of the arterial roadway.

c. There shall be the equivalent of one row of boulevard trees at 10m lineal spacing in 4.5m full width or wider arterial medians.

d. There shall be the equivalent of one row of shrubs spaced at 1.2m along both sides of the roadway placed in planting beds behind the walkway on each side of the arterial.

e. Within commercial and school zones, or adjoining open space, the requirement for shrubs along an arterial roadway is waived, but where opportunities exist, shrub planting in these areas is encouraged.

f. Where possible, new utility locations shall be adjusted to accommodate tree planting.

g. When roadway construction is staged, landscaping is required only on the portion being fully developed.

4.3.3.6 Roadway Islands, & Medians

a. All road islands and medians shall be landscaped for low maintenance. Designs shall include, where appropriate, trees, shrubs, groundcovers, mulch, and sod to the satisfaction of Engineering Services. Shrubs and groundcovers must be low growing with a maximum mature height of 1000mm at maturity.

b. A 500mm concrete verge is required on either side of a planting bed island or median.

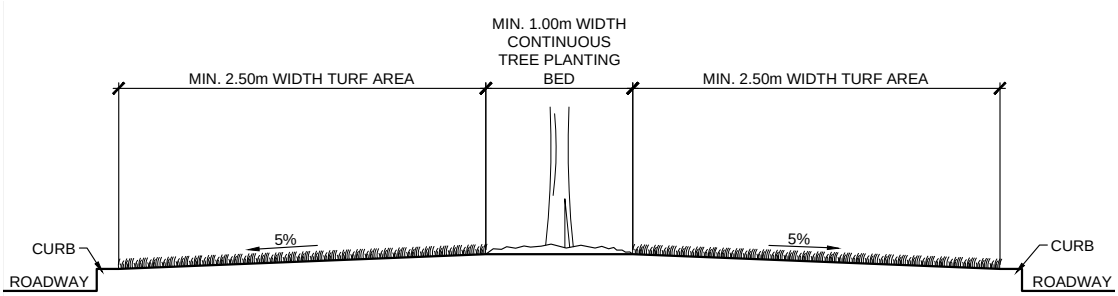
c. All vertical features (street signage, light poles, etc.) will be located within a mulch area, or, a concrete nose shall be provided at an appropriate size to include the features.

d. Trees planted in center medians shall be installed in continuous mulched beds 1.0m minimum width.

e. The required cross slope shall not be less than 5% from center of island to curb.

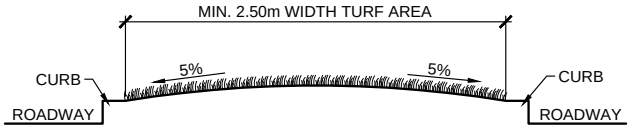
f. Turf in center medians and islands shall allow a driven mower to remain parallel to traffic with both wheels on the median. Turf shall not be installed in a median that does not accommodate a driven mower (2.5m width). See schematic(s) on following page for clarification.

Figure 4.1



TREE AND TURF MEDIAN DIMENSIONS

Figure 4.2



TURF MEDIAN DIMENSIONS

g. Cross sections and planting details of the proposed island or median treatment shall be provided and display the following information:

   i. Planting soil depth, width, & type;

   ii. Turf, and mulch locations, depths, and type;

   iii. Above and below ground utility alignments within 3.0m of road island;

   iv. Curb face;

   v. Back of curb, verge, or walk;

   vi. Dimensions for tree and shrub setbacks;

   vii. Freestanding features (i.e. signs, sculptures, light poles); and,

   viii. Private property lines.

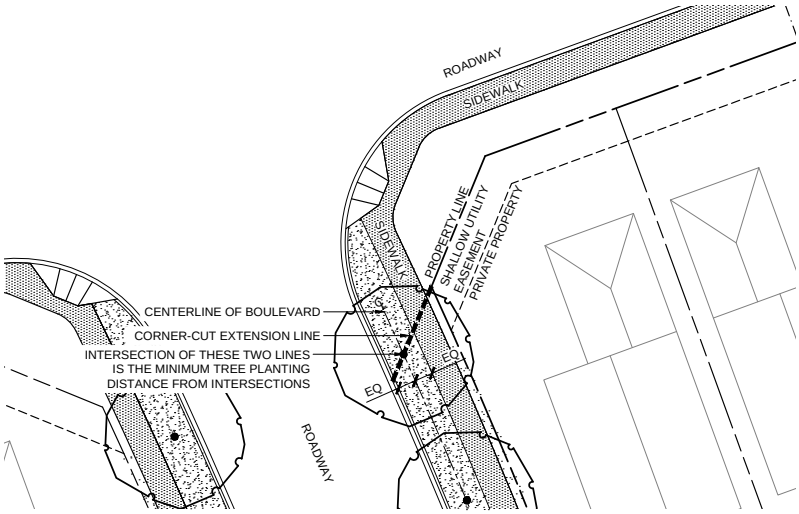
h. Above and below grade utilities should not be located under the landscaped road islands or medians to avoid conflicts with landscape improvements.

4.3.3.7 Corner Cuts, & Entrance Features

a. All corner cut & entrance feature planting shall be low maintenance. Designs shall include, where appropriate, trees (where site lines will be unaffected), shrubs, groundcovers, mulch, and sod.

b. Free standing architectural features shall not be located within turf areas unless appropriate consideration is given to maintenance and mowing requirements (i.e. signs, sculptures, light poles)

Figure 4.4



c. Due to sightline concerns no tree planting shall occur beyond the corner cut chamfer extension intersect. Site specific restrictions or variances may be required at the discretion of Engineering Services. See **Figure 4.4** for clarification.

4.3.4 Walkway Right-of-Ways

a. R.O.W. areas must be graded, top-soiled, seeded or sodded, and planted with trees and shrubs.

b. There shall be a minimum of four trees per 35 linear meters of walkway R.O.W. shrubs may be substituted at the rate of seven shrubs per tree.

c. Trees and shrubs must be contained within mulched beds.

d. There shall be no shrubs with a mature spread of over 1.0m.

e. Perennials & groundcovers are not recommended although exceptions may be made by Engineering Services for very hardy species.

f. Furniture may be provided by the Developer and placed at strategic locations within a walkway R.O.W. upon approval from Engineering Services.

g. Bollard barrier post standards and spacing must be approved by Engineering Services, and, where mulch beds are proposed, included within the mulched bed for ease of maintenance.

h. Where possible below grade utilities should be located under hard surface walkways to avoid conflict with landscape improvements.

i. When reviewing the proposed plant material the following design issues will be considered:

   i. Maintain adequate year-round sight lines from adjacent roads through the walkway R.O.W. for pedestrian

   ii. Safety and security;

iii. Maintain a minimum 2.5m branching height for all deciduous trees in R.O.W.'s at maturity to allow adequate pedestrian clearance beneath tree branches;

iv. Plant material shall be low maintenance and hardy to Beaumont's climate;

v. Shrubs with horizontal root habits shall not be allowed along private property lines; and,

vi. Encourage use of pyramidal / columnar tree forms to avoid tree branches overhanging into adjoining private property.

4.3.5 Major Utility Corridors

a. Utility corridors that may be landscaped are to be planted with a minimum of 70 trees per hectare designed and massed into major groupings in mulched tree beds. Minimum deciduous tree caliper shall be 60mm. Minimum coniferous tree height shall be 2.0m.

b. In the event that the Utility Authority will not allow landscaping in the R.O.W., the requirement for all, or a portion, of the landscaping will be waived.

c. The Developer/Landscape Architect is to contact the Utility Authority to determine landscape standards and to review designs and achieve permission in the form of a Servicing Agreement. The Servicing Agreement is to be submitted with any landscape plans submitted to Engineering Services for review.

d. The Developer/Landscape Architect shall provide to Engineering Services written confirmation from the Utility Authority when landscaping in utility corridors is not approved.

e. Shrubs shall be massed within large mulched planting beds.

f. Furniture may be provided by the Developer and placed at strategic locations within the utility corridor.

g. Contact the appropriate utility company regarding acceptable tree species, sizes, and locations on utility R.O.W.'s.

h. The Landscape Architect is to circulate the drawings to the utility company and achieve approval.

4.3.6 High Pressure Natural Gas Right-of-Ways

a. These guidelines will provide for some limited development without compromising the safety and/or integrity of high-pressure natural gas facilities.

b. These guidelines apply to odorized natural gas high pressure, above 100 psi or 740 kPa, pipeline R.O.W.

c. Authorization must be requested and approved by all utilities for all development on R.O.W.'s.

d. Developments that may be allowed:

i. Contouring – cover cannot be reduced over the pipeline but may be increased. The total cover cannot exceed 2.0m over the pipeline. This will allow access to the pipeline for repairs without having to shore of excessively back slope the excavation. Contouring must not restrict access to the R.O.W.

ii. Parallel walkways – must be located between the pipeline and the nearest boundary of the R.O.W. but must not encroach onto the R.O.W. by more than 3.0m nor be constructed over the pipeline.

iii. Trees – shall be planted no closer than 5.0m from the pipeline, have a mature height of no more than 10.0m. The mature canopy cannot extend over the pipeline.

iv. Shrubs – shall be hand planted with a minimum setback of 2.0m from the pipeline, and have a maximum mature height of 2.0m.

v. Lighting – shall be installed a maximum of 1.0m from the R.O.W. boundary on the same side as the walkway and shall be served by underground cabling.

vi. The responsibility for maintaining any of the above developments on the R.O.W. shall rest with Beaumont once FAC is granted, unless otherwise negotiated.

vii. Appropriate signage of these developed R.O.W.'s may be provided and maintained by the Developer and/or Beaumont.

viii. Any other proposed developments and/or use for these R.O.W.'s are not permitted.

ix. Non-compliance due to already approved deviations shall be allowed to continue until redevelopment occurs.

x. Development is not permitted on a R.O.W. that contains an un-odorized pipeline.

4.3.7 Storm Water Management Facilities

a. Constructed wetlands, dry detention basins, storm water management facilities, and areas surrounding new storm water management facilities must be graded, top-soiled, seeded or sodded, and landscaped by the Developer.

b. Landscaping must be naturalized below the 1 in 5 year flood line.

c. Plant material shall be selected to respect soil characteristics, side slopes, sun orientation, design of the facility, and its intended use.

d. Public Lands within the facility must be planted with a minimum of 70 trees per hectare.

e. In SWMFs this area shall be calculated as above the normal water line.

f. In dry detention basins the area shall be calculated above the 5 year water line.

g. A limited number of flood tolerant trees may be planted below the 1 in 5 year flood line and may count towards the required quantities at the discretion of the Parks and Facilities Division.

h. Shrubs above the 1 in 5 year flood level shall be massed within large planting beds to create major focal areas on the slopes of the SWMF. Trees are permitted within mulched planting beds.

i. Above the 1 in 5 year flood level, all planting beds shall have a minimum depth of 100mm deciduous wood chip mulch or approved alternate.

j. Plant material appropriate to withstand flood conditions may be located below the 1 in 5 year flood line.

k. Mulch is not permitted below the 1 in 5 year flood line. Planting beds below the 1 in 5 year flood line are difficult to maintain and must adhere to the following conditions:

    i. Must be weed and erosion free at CCC & FAC Inspections;

    ii. Erosion control is recommended around the perimeter of the Storm Water

    iii. Management Facility where adjacent land is bare soil or undeveloped;

    iv. 'Brush Blanket' may be installed in these planting beds during plant material establishment to minimize weed competition. Blanket must be removed and seed must be placed and established in these areas prior to FAC inspection;

    v. Weeds are to be removed on a monthly basis;

    vi. Shrub overlap of 20% mature size is recommended to encourage a stable weed-free, erosion-free environment. The use of fast growing plant material is encouraged;

l. Furniture may be provided by the Developer and placed at strategic locations within the Public Utility Lot at the discretion of Engineering Services.

m. Area must be kept free from weeds between construction commencement and issuance of FAC. Failure to do so will result in control by Engineering Services, and all costs shall be borne by the Developer / Contractor.

n. The site must be designed to permit access of maintenance vehicles, including water and pruning trucks with man-lifts.

o. The following signage shall be provided by the developer before issuance of CCC. Signs shall be installed between high-water line and normal water line. Signs to be maintained by contractor until issuance of FAC. All required signage to be clearly identified on the landscape plans for Beaumont approval:

    i. No Skating, No Boating, and No Swimming (see **Standard Details 4-10** and **4-11**) – Installed between high water line and normal water line;

    ii. No Motorized Vehicles – Installed at all entrance points to Storm Water Management Facility;

iii. Maintenance Information Sign – Installed at a strategic location to be coordinated with the Parks and Facilities Division;

I. Sign to include clear graphic representation of any and all non-maintained areas. This includes naturalized tree stands, naturalized grass areas and slopes, etc.

II. Developer shall obtain written approval from the Parks and Facilities Division of the sign design prior to producing or manufacturing final product.

4.3.8 Naturalization

Naturalization is required where determined at the discretion of Engineering Services when it provides ecosystem function (e.g. water filtration, water retention, slope stability, wildlife habitat or corridors, etc.)

a. Naturalization is encouraged where aesthetically appropriate and maintenance concerns are addressed.

b. Naturalized areas in Beaumont will require the following signage:

i. Maintenance Information Sign – Installed at a strategic location to be coordinated with the Parks and Facilities Division

ii. Sign to include clear graphic representation of any and all non-maintained areas. This includes naturalized tree stands, naturalized grass areas & slopes, etc;

iii. Developer shall obtain written approval from the Parks and Facilities Division of the sign's design prior to producing or manufacturing final product;

c. Naturalization may be a requirement when natural tree stands or natural open areas are removed or impacted during construction or other related activities.

d. Naturalized areas shall be a minimum setback of 30m from any playgrounds.

e. The Landscape Architect shall design an appropriate mix of native trees, shrubs, groundcovers, and wildflower seed mixes.

f. 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 & orientation, shall be taken into account when specifying species and size of plant material.

g. The Landscape Architect shall design any required subsurface drainage, surface drainage, and erosion control measures in a restoration area and, if required, coordinate this with other consultants to implement geotechnical, structural, and bioengineering principles.

h. The Landscape Architect shall specify all tree, shrub, and groundcover sizes. To promote biodiversity and a healthy growing environment, it is recommended that 10% of all plant material, where appropriate, be of larger sizes. Larger material (trees or larger shrubs) shall be at least 40mm caliper size (deciduous), 2.0m height (coniferous), and 1 or 2 gallon pot size (shrubs).

i. Forestry stock, seedlings, deciduous tree whips and propagated/rooted cuttings are acceptable for use from an approved source.

j. All plant material to be nursery grown stock, with exception of native spaded plugs and plant material.

k. Collected plant material may be used subject to prior approval by the Parks and Facilities Division. Landscape drawings shall identify areas to be planted with collected material and also indicate the site from where source material has originated.

l. The guide for acceptable levels of naturalization planting (plugs, whips, and bare root specimens) survival at FAC inspection shall be a minimum survival rate of 80%, with a minimum density of one plant per square metre in planted areas. Large, concentrated patches of dead plant material will not be accepted.

m. All existing natural sites must have rubbish and debris removed, and be checked for hazards such as old barbed wire fences, abandoned structures, basements, and any other objects that may be hazardous to citizens.

4.4 PLANT MATERIAL

As a general rule, all plant material must adhere to the Clean Plants Certification Program and all requirements noted therein.

4.4.1 Trees

4.4.1.1 General Recommendations

Plant material shall be chosen to contribute to the following objectives:

a. To minimize the visual impacts, and reduce spread, of pests & disease, Beaumont encourages planting a diversity of tree species native to the Beaumont area.

b. All plant material shall be supplied from Certified Clean Nurseries. If the contract plant material is unavailable from Certified Clean Nurseries the Developer/ Contractor may contact the Parks and Facilities Division for approval of purchase from alternative local vendors.

c. Coniferous tree planting is encouraged, where possible, to provide an enhanced level of winter interest to public space within Beaumont.

d. Calipers to be measured 6" above the root flair unless the graft union is above the 6".

e. If the graft union is 6" or more above the root flair, caliper to be measured 1.5" – 2" above the graft union or just above the taper from the graft union to the stem.

4.4.1.2 Soil Volume Requirements for Planting

Increased soil volumes have proven to improve overall health and lifespan of trees. Beaumont encourages Developers and Landscape Architects to maximize the potential soil availability for proposed trees in all design scenarios.

The following volume requirements will apply:

a. Any tree in an urban environment that will be surrounded by hard surface area shall be provided a minimum soil volume of 16m³, in accordance with **Standard Detail 4-19**.

b. Trees within Arterial R.O.W. boulevards & medians shall be provided a minimum soil volume of 14m³, in accordance with **Standard Detail 4-24**.

c. Beaumont also encourages increased soil volumes in Collector and Local boulevard scenarios.

d. Beaumont encourages subdrain installation when tree trenching is used. The Landscape Architect shall coordinate with the Parks and Facilities Division for further details.

e. Shrub planting shall receive a minimum soil depth of 450mm.

f. Perennial planting shall receive a minimum soil depth of 300mm.

g. All seed, sod, and naturalized grass areas shall receive a minimum soil depth of 200mm.

In the event the site does not allow for the minimum required soil volume, the Developer/Landscape architect is responsible for coordinating an approved alternative with the Parks and Facilities Division.

4.4.1.3 Tree Protection Zone

For all trees planted adjacent to construction activities, the following requirements apply:

a. Where sod will not be placed until completion of all construction activities, protection of boulevard trees is required.

b. For trees within 3m of active construction or construction traffic, trees shall be protected on all sides with minimum 1.2m height 10mm thick plywood, setback 1m from trunk of tree.

c. For trees 3-5m from active construction or construction traffic, trees shall be protected on all sides with minimum 1.2m height snow fencing, setback 1m from trunk of tree.

4.4.1.4 Approved Tree Species, Spread, and Spacing Requirements

Amended - 2025
Refer to Amendment #2
Number 4.2

Table 4.1 Approved Tree Species, Spread and Spacing Requirements

BOTANICAL NAME	COMMON NAME	SPACING
DECIDUOUS TREES (BOULEVARD/ROADWAY)		
*Caragana arborescens 'Sutherland'	Sutherland Caragana	3m
*Caragana x mordensis 'Snowbird'	Snowbird Hawthorn	5m
*Caragana x mordensis 'Toba'	Toba Hawthorn	5m
Fraxinus pensylvanica 'Foothills'	Foothills Green Ash	8m
Fraxinus pensylvanica 'Patmore'	Patmore Green Ash	8m
Fraxinus pensylvanica 'Prairie Spire'	Prairie Spire Green Ash	8m
Fraxinus pensylvanica 'Trojan'	Trojan Green Ash	8m
*Malus x 'Spring Snow'	Spring Snow Crabapple	5m
Quercus macrocarpa	Bur Oak	8m
Tilia Americana 'True North'	True North Linden	8m
Tilia x flavescens 'Dropmore'	Dropmore Linden	8m
Tilia cordata	Little Leaf Linden	8m
Tilia cordata 'Greenspire'	Greenspire Linden	8m
Ulmus americana 'Brandon'	Brandon Elm	8m
Ulmus Americana 'Patmore'	Patmore	8m
DECIDUOUS TREES (STORM WATER MANAGEMENT FACILITY – BELOW 1:5 YEAR FLOOD LINE)		
Acer negundo	Manitoba Maple	8m
Fraxinus pensylvanica 'Foothills'	Foothills Green Ash	8m
Fraxinus pensylvanica 'Patmore'	Patmore Green Ash	8m
Fraxinus pensylvanica 'Prairie Spire'	Prairie Spire Green Ash	8m
Fraxinus pensylvanica 'Trojan'	Trojan Green Ash	8m
Populus x 'Assiniboine'	Assiniboine Poplar	8m

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Refer to Amendment #2
Number 4.2

BOTANICAL NAME	COMMON NAME	SPACING
Populus x 'Northwest'	Northwest Poplar	10m
Populus tremuloides	Trembling Aspen	5m
Salix alba 'Vitellina'	Golden Willow	10m
Salix pentandra	Laurel Leaf Willow	10m
DECIDUOUS TREES (PARKS AND OPEN SPACE)		
Acer ginnala	Amur Maple	4m
Acer negundo	Manitoba Maple	8m
Acer saccharinum 'Silver Cloud'	Silver Cloud Silver Maple	10m
Acer tataricum 'GarAnn'	Hot Wings Tatarian Maple	6m
Aesculus glabra	Ohio Buckeye	5m
Alnus hirsute 'Harbin'	Pririe Horizon Alder	8m
Caragana arborescens 'Sutherland'	Sutherland Caragana	3m
Caragana x mordenensis 'Snowbird'	Snowbird Hawthorn	5m
Caragana x mordenensis 'Toba'	Toba Hawthorn	5m
Elaugnus angustifolia	Russian Olive	8m
Fraxinus pensylvanica 'Foothills'	Foothills Green Ash	8m
Fraxinus pensylvanica 'Patmore'	Patmore Green Ash	8m
Fraxinus pensylvanica 'Prairie Spire'	Prairie Spire Green Ash	8m
Fraxinus pensylvanica 'Trojan'	Trojan Green Ash	8m
Malus 'Big River'	Big River Crabapple	4m
Malus 'Dolgo'	Dolgo Crabapple	5m
Malus 'Gladiator'	Gladiator Crabapple	3m
Malus 'Royalty'	Royalty Crabapple	4m
Malus 'Rudolph'	Rudolph Flowering Crabapple	5m
Malus x 'Spring Snow'	Spring Snow Crabapple	5m
Malus x 'Thunderchild'	Thunderchild Crabapple	5m
Populus x 'Assiniboine'	Assiniboine Poplar	8m
Populus x 'Northwest'	Northwest Poplar	10m
Populus tremuloides	Trembling Aspen	5m
Quercus Macrocarpa	Bur Oak	8m
Salix pentandra	Laurel Leaf Willow	10m
Sorbus americana	American Mountain Ash	6m
Sorbus aucuparia 'Black Hawk'	Black Hawk Mountain Ash	5m
Sorbus aucuparia 'Fastigiata'	Pyramidal Mountain Ash	4m
Sorbus aucuparia 'Rossica'	Russian Mountain Ash	4m
Sorbus decora	Showy Mountain Ash	4m
Syringa reticulate 'Ivory Silk'	Japanese Tree Lilac	5m
Tilia americana 'True North'	True North Linden	8m
Tilia x flavescens 'Dropmore'	Dropmore Linden	8m

Amended - 2025
Refer to Amendment #2
Number 4.2

BOTANICAL NAME	COMMON NAME	SPACING
Tilia cordata 'Greenspire'	Greenspire Linden	8m
Ulmus americana 'Brandon'	Brandon Elm	8m
Ulmus americana 'Patmore'	Patmore Elm	8m
CONIFEROUS TREES		
Larix sibirica	Siberian Larch	5m
Picea glauca	White Spruce	4m
Picea pungens	Colorado Green Spruce	4m
Picea pungens 'Glauca'	Colorado Blue Spruce	4m
Picea abies	Norway Spruce	4m
Pinus banksiana	Jack Pine	6m
Pinus cembra	Swiss Stone Pine	4m
Pinus contorta latifolia	Lodgepole Pine	3m
Pinus ponderosa	Ponderosa Pine	6m
Pinus sylvestris	Scots Pine	10m
Pinus uncinata	Mountain Pine	3m

i. * For accent purposes only and will be reviewed on a site specific basis. Special attention should be paid towards location and quantity.

ii. See section 11.5.2.8 for additional populous species requirements.

4.4.1.5 Tree Setbacks from Roads, Walks, and Utilities

a. Where possible, trees shall be setback a minimum distance, measured from the center of the tree trunk, from above and below grade utilities, property lines, walkways, & roads as follows:

   Trees at maturity must not impede any signage or overhang trails / walks / paths.

Amended - 2025
Refer to Amendment #2
Number 4.3

Table 4.2 Tree Setback Distances from Roads, Walks, and Utilities

TREE SETBACK DISTANCES FROM UTILITIES AND PROPERTY LINES	
Light Standards/Power Hardware	3.5 m
Fire Hydrants	3.5 m
Stop Signs (*based on specific species)	3.5 - 5.0 m
Yield Signs (*based on specific species)	3.5 - 5.0 m
Transit Zones (ensure trees do not obstruct sightlines)	3.5 m
Other Signs (Crosswalk signs need to have a setback of 5.0 m plus (dependant on selected species)	2.0 m
Private Property on Walkway R.O.W.	1.0 m
Private Property on Open Parkland	3.0 m
Private Property on Boulevards	1.0 m
Shallow Underground Utilities	1.0 m
Gas or Oil R.O.W.	Contact Utility
Deep Underground Utilities	1.5 m

Wastewater and Storm Sewers	1.8 m
Wastewater and Storm Sewers and Manholes	2.0 m
Water Mains	2.5 m
Overhead power utilities shall be as established by the Utility Authority	
TREE SETBACKS FROM WALKWAYS AND ROAD	
Arterial Road Median Curb Face	2.0 m
Collector Road Median Curb Face	1.5 m
Local Road Median Curb Face	1.5 m
Arterial Road Boulevard Curb Face	1.5 m
Collector Road Boulevard Curb Face	1.5 m
Local Road Boulevard Curb Face	0.5 m
Distance from Driveways	1.0 m
Distance from Sidewalks	0.5 m

Amended - 2025
Refer to Amendment #2
Number 4.4

4.4.1.6 Tree Stake Coding

Amended - 2025
Refer to Amendment #2
Number 4.5

YEAR	COLOUR
2020	Blue
2021	White
2022	Yellow
2023	Green
2024	Blue

4.4.2 Plant Material Setbacks, Sizing, & Spacing

Beaumont suggests that all landscape improvements and plant material shall have increased setbacks from underground utilities.

There shall be no excavations undertaken within 1.0m of any underground utilities unless:

i. The excavation is done under direct control of the operator of the utility system.

ii. The excavation method is acceptable.

In the event that the mechanical tree digging equipment cannot maintain a minimum clearance of 1.0m from shallow utilities during installation, the pertinent Utility Authority must be contacted for approval and/or safety procedures (e.g. hand digging).

Any additional costs incurred will be at the Developers expense. Drawings are to note that the approval for plantings have been received from the Utility Authority, and identify the plant material affected. It should be noted that deep utilities require a minimum offset as referenced in **Section 4.4.1.5 – Tree Setbacks from Roads, Walks, & Utilities**.

Planting distances from low, intermediate, and high-pressure pipelines are to be observed as dictated by the Pipeline Authority.

Setback distances apply to all tree and tree form shrub species. Species with suckering root systems or large hanging canopies may require increased setbacks at the discretion of Engineering Services.

Setbacks for coniferous trees are to be no less that the distances indicated above, but will be reviewed and approved on a case by case basis in regard to concerns over potential mature size. Coniferous trees must maintain minimum clearances from vertical structures at mature spread.

All shrub/perennial beds shall contain 100mm depth shredded wood mulch and the soil depths shall comply with **Section 4.4.1.2 - Soil Volume Requirements**

Groups of coniferous trees shall be placed in mulched beds with appropriate spacing as provided in **Section 4.4.1.4 - Approved Tree Species, Spread, and Spacing Requirements**

Planting of Populus species on parkland adjacent to private property is generally not recommended, although exceptions may be made at the discretion of the Parks and Facilities Division in the following ways:

a. Northwest Poplar, Balsam Poplar, and Cottonwood are a minimum of 15m from private property lines;

b. Northwest Poplar, Balsam Poplar, and Cottonwood are a minimum of 10m from all hard surface areas, unless site specific construction details are used;

c. All other populous species including columnar varieties are a minimum of 10m from private property lines and 5.0m from hard surface areas. Exceptions may be made in naturalized areas at the discretion of the Parks and Facilities Division;

d. Allowances may be made at the discretion of the Parks and Facilities Division if there is special construction mitigation in place, such as a root barrier;

Shrub setbacks from shrub bed edges shall reflect mature diameter with the entire shrub contained within the bed extents.

Planting bed locations should accommodate the use of large turf maintenance equipment.

Provide a minimum 2.5m clearance between the edge of a bed and obstructions such as fencing, furniture, buildings, individual trees, etc. Where possible, shrub beds should be designed with tapered or flowing edges (angle shall be noticeably less than 90 degrees) to allow for ease of mowing, and eliminate the need for hand trimming.

Turf between planting beds and adjacent vertical structures must be a minimum width of 2.5m.

On drawings, shrub symbols should be shown at mature size with no overlap.

a. Perennials and groundcovers may be overlapped at the discretion of the Parks and Facilities Division.

b. The intent is to achieve balance between aesthetic impact, shrub health, and maintenance concerns.

There shall be a minimum 3.0m planting setback of shrub beds from play space envelopes (playground equipment, splash parks, etc.).

On school playground sites, there shall be no shrub beds within 30m of the playground envelope.

Refer to **Section 4.4.1.2 Soil Volume Requirements For Planting** for additional information.

4.4.2.1 Plant Material Minimum Sizes:

a. Unless noted otherwise and/or approved by Engineering Services all tree planting shall be 60mm caliper for deciduous trees and 2.5m height for coniferous trees.

b. If proposed trees are less than the minimum caliper, additional plant material may be required. Approval at Engineering Services discretion.

c. Minimum shrub spacing shall be based on spread at maturity. With the exception of naturalized areas, shrub size at planting shall be a minimum of:

   i. 300mm height for deciduous shrubs; and,

   ii. 450mm spread for coniferous shrubs.

4.4.3 Perennial Planting

Perennial planting in mulched beds will be reviewed on an individual basis and accepted at the discretion of the Parks and Facilities Division.

Only low maintenance, non-invasive, and hardy perennials will be accepted.

Refer to **Section 4.4.1.2 Soil Volume Requirements for Planting** for additional information

4.4.4 Annual Planting

Although annual plantings are not encouraged, proposed annuals will be reviewed on an individual basis. Alternate maintenance and warranty processes may be required at the discretion of Engineering Services.

4.4.5 Seed and Sod

4.4.5.1 General Requirements

a. Landscape drawings to clearly identify intended surface treatment for approval.

b. If seed is specified, the drawings must include the intended mix.

c. Beaumont encourages sod installation in public space, where appropriate, to avoid soil disturbance and erosion.

4.4.5.2 Sodding

The following requirements apply specifically when sod is used:

a. Use nursery sod which is freshly cut and healthy with a strong, fibrous root system, cultivated in nursery field as turf grass crop containing maximum of 2% of other grass species, and maximum of two broad leaf weeds and ten other weeds per 40 m2. Thickness of sod soil portion shall be maximum of 40 mm and minimum 25 mm.

b. Sod type: Bluegrass/Fescue grass sod: grown from minimum 65% Kentucky Bluegrass blend, 35% Creeping Red Fescue, or approved alternative.

c. Fertilize with commercial granular fertilizer, minimum of 50% of elements derived from organic sources.

d. Immediately after sodding, provide adequate protection against erosion, pedestrian and vehicular traffic damages. Remove protection after sod areas become established or as directed by the Department.

e. For grades exceeding 3:1, start laying sod at bottom of slope. Lay sod sections at right angles to slopes and secure with 4 to 5 pegs/m2, to prevent shifting. Drive pegs flush with sod surface.

f. Water sod immediately after placement to obtain moisture penetration in the upper 100mm of topsoil.

Amended - 2025
Refer to Amendment #2
Number 4.6

g. A two year warranty period is required on all sodded areas.

4.4.5.3 Seeding

The following apply specifically when seeding occurs:

a. Fertilizer: Complete commercial granular fertilizer, minimum of 50% of elements derived from organic sources.

b. Grass seed: certified Canada No. 1 seed, free of disease, weed seeds or other foreign materials in accordance with the Canada “Seeds Act” and “Seeds Regulations” for lawn grass mixtures, having minimum purity of 97% and germination of 75%.

c. Apply at a minimum rate of 250 Kg/hectare

d. A two year warranty period is required on all seeded areas.

e. Seed must be 100% germinated at FAC.

f. Recommended Seed Applications:

i. Park / Open Space (maintained)

30% Touchdown Kentucky Bluegrass
30% Banff Kentucky Bluegrass
30% Creeping Red Fescue
10% Fiesta II Perennial Rye Grass

ii. Standard Roadway Landscaping (maintained)

30% Argyll Kentucky Bluegrass
30% Kentucky Bluegrass
30% Creeping Red Fescue
10% Annual Rye Grass

iii. Restoration Seed Mix (native)

15% Awned Wheatgrass
15% Slender Wheatgrass
15% Western Wheatgrass
5% Sloughgrass
5% Idaho Fescue
5% Alkali Bluegrass
5% Junegrass
5% Sandberg
20% Green Needlegrass
10% Rocky Mountain Fescue

iv. Naturalization: Wet Meadow (non-maintained)

10% Awned Wheatgrass
10% Western Wheatgrass
10% Sloughgrass
20% Tufted Hair Grass
15% Giant Wild Rye
30% Fowl Bluegrass
5% Annual Ryegrass

v. Naturalization: Dry Meadow (non-maintained)

20% Junegrass
20% Rough Fescue
10% Green Needlegrass
15% Streambank Wheatgrass
20% Northern Wheatgrass
10% Sheeps Fescue
5% Annual Ryegrass

vi. Naturalization: Grassland Wet Seed Mix (spring flooding with dry conditions)

20% Northern Wheatgrass
20% Slender Wheatgrass
20% Nodding Bromegrass
5% Tufted Hair Grass
5% Tickle Grass
10% Sloughgrass
10% Alkali Bluegrass
10% Annual Ryegrass

vii. Wildflower Mixes shall be specified on the drawings by the Landscape Architect for Parks and Facilities Division review and approval.

Refer to **Section 4.4.1.2 Soil Volume Requirements for Planting** for additional information.

4.4.6 Tree Removal

All trees removed shall have prior approval from and be coordinated with Engineering Services. Trees removed from the development area shall have the roots fully removed from the soil. Burning within Beaumont boundaries is not permitted; consequently, all trees and roots shall be removed to an acceptable site for burning or disposal.

4.4.7 Weed Control

Noxious weeds must be:

a. controlled in accordance with the Provincial Weed Control Act.

b. eradicated in accordance with the Provincial Weed Control Act.

c. eradicated in landscaped areas between construction commencement and issuance of FAC. Failure to comply will result in control action by Beaumont, and all costs shall be borne by the Developer/Contractor.

Aquatic invasive species shall be controlled as per the Fisheries (Alberta) Act.

All work must comply with the Beaumont Integrated Pest Management (IPM) Plan.

4.5 SITE SPECIFIC FEATURES

4.5.1 Fencing

Fencing plans shall be included with all engineering drawing submissions.

All fencing shall conform to requirements as outlined in the project Development Agreement, and to any Standard Details applicable in these Standards. (see **Details 4-6**, and **4-7** for Double and Single Chain Link Gates, respectively)

Amended - 2025
Refer to Amendment #2
Number 4.7

Fencing adjacent to lanes shall be stepped down to ensure sight lines are maintained.

Alternative styles of fencing may be proposed, subject to approval by Engineering Services.

4.5.2 Fencing Adjacent to Open Space

School, and park sites are to be separated from private development by permanent fencing. Fences including the concrete pile must constructed entirely within private property. Fencing is to be maximum 1.2m height and suitable for containing pets.

Fencing adjacent to parkland with formalized sports fields or future sports fields shall be a maximum 1.8m height and suitable to protect against stray balls. All fencing surrounding these lands to meet this criteria as sports fields are subject to future realignments.

Park sites, open space, and parkland that is adjacent PULs/roadway shall be enclosed with Temporary Post & Rail Fence to protect from traffic damage during landscape establishment. The following will be required:

a. Coordinate with Beaumont for fencing details.

b. Post and rail fence will be removed by Beaumont upon landscape FAC acceptance.

4.5.3 Boulders

Boulders are to:

a. always be located within mulched beds or other non-mowed areas to minimize maintenance requirements.

b. be immovable by hand and located in visible areas to minimize public safety hazards.

c. be clearly shown and identified on the landscape drawings for approval.

4.5.4 Site Furniture

The following must be met when Site Furniture is to be included in a design:

a. Furniture such as benches, picnic tables, and waste receptacles may be provided on parkland if appropriately located and approved.

b. Vandal-proof hardware (tamper resistant and locking) is required for all site furniture with a minimum of one per waste receptacle, two per bench, and two per picnic table.

c. All site furniture shall be placed on a concrete pad or secured with a concrete footing.

d. The concrete pad should extend 150mm beyond the outside edges of the site furniture to accommodate mowing.

e. Concrete pad shall be located to allow 2.5m mowing separation from any vertical structure for any adjacent turf areas.

f. Setbacks shall be maintained from the face of the amenity as follows:

   i. Benches: 1.0m from back of walkway;

   ii. Waste Receptacles: 600mm from back of walkway;

   iii. Waste Receptacles: 3.0m from benches;

   iv. Picnic Tables: 1.0mm from back of walkway;

   v. Bicycle Racks/Posts: 600mm from back of walkway.

Amended - 2025
Refer to Amendment #2
Number 4.8

4.5.5 Entrance Features

4.5.5.1 Subdivisions

To be located on public side for subdivisions. Features are to be maintained until all stages of the subdivision are built and deemed complete.

Amended - 2025
Refer to Amendment #2
Number 4.9

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SECTION 5.0 COMMERCIAL, INSTITUTIONAL AND MULTI-FAMILY

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5.1 GENERAL

This section is intended to stand alone as a resource for General Design Standards for all commercial, institutional, some light industrial, apartment, condominium, townhouse, and other multiple residence developments. The term “Commercial” herein may refer to any or all of the previously listed developments where appropriate. This section has been prepared to address the need for such guidelines to be used as a tool by both applicants and approval authorities for the preparation and processing of Site Plan Control applications.

Work may be required within municipality right-of-way to support the proposed development, and requires explicit approval from the Manager of Engineering. This work may involve, but is not limited to, municipal servicing connections, curb cuts and/or fills, driveway accesses, turning lanes, sidewalks, boulevard restorations, traffic control signals, traffic control signage, roadside ditches and culverts related to immediate access and other requirements of the site.

All ties to municipal mains between the property line and the main service lines will be carried out under the direction of Engineering Services and the applicant must pay actual costs including project management and inspection.

5.2 ENGINEERING SUBMISSIONS

The detailed design submission shall consist of drawings, specifications and supporting documents. The drawings and specifications shall be in, SI, metric units and shall be developed under the supervision of a registered Professional Engineer with expertise in the field of municipal servicing and land development.

a. The Developer shall submit such engineering drawings a minimum of 3 months before the proposed initial date of construction. Should Engineering Services not approve the Developer's engineering drawings or proposals, these will be returned to the Consultant with comments for revision by the Consultant to the satisfaction of Engineering Services. The period from the return of the engineering drawings to the re-submission of the revised Drawings or proposals shall be deemed to be additional to that specified. The time period for review by Engineering Services, as detailed in **Section 5.2.1** will be increased as a direct result of an excessive number of cycles of review and comment as required.

b. The Developer shall not proceed with construction until Engineering Services has approved the engineering drawings and Beaumont has executed a Development Agreement for the development.

c. Where a Developer files more than three (3) Engineering Submissions due to revisions by the Developer or the Developer's failure to revise the Engineering Drawings as requested by Engineering Services, an additional fee may be charged for each submission over and above the third (3rd) submission.

d. As part of the submission/re-submission package a letter outlining the following should be included:

   i. Name, company, and contact information of person submitting the plans;

   ii. Any deviation from applicable Standards, Guidelines, Details, etc.;

   iii. Justification of all above mentioned deviations; and,

   iv. In the case of re-submissions, detail outlining how Engineering Services comments have been addressed are required.

5.2.1 Review Timelines

When the Consulting Engineer submits complete sets of drawings, studies and other documents, the response period (timelines) required by Engineering Services, exclusive of the time required by the Consulting Engineer for re-submission, are provided below:

a. **Drawings**

DESCRIPTION	SUBMISSIONS	TIMELINES
Engineering	First	6 weeks maximum
	Subsequent	4 weeks maximum

b. Supplementary Studies

DESCRIPTION	SUBMISSIONS	TIMELINES
Stormwater Management	First	6 weeks maximum
	Subsequent	2 weeks maximum
Traffic Impact Assessment and/ or other relevant studies	First	6 weeks maximum
	Subsequent	4 weeks maximum

Where planned municipal improvements are of sufficient complexity, Engineering Services may require submission of supplementary reports (Transportation Impact Assessment, Environment Impact Assessment, Geotechnical Report, etc.) for review and approval. Additional time for review, as outlined above, may be required.

Where a resubmission contains unaddressed comments without clarifying rationale, drawings, and a letter advising that comments have not been addressed by the Applicant will be returned to the Developer without review. A meeting between the Developer and Engineering Services may be required to discuss the submission.

5.2.2 Drawing Requirements

a. General

Two (2) full sets of Grading Plans, and Site Servicing Plans plus Storm Drainage Plans, (if required) including all other related drawings and two (2) copies of Stormwater Management Report (if required) shall be submitted for review and acceptance. All plans must be stamped and endorsed by a Professional Engineer or Professional Technician.

All Engineering Drawings shall:

i. be prepared in metric scale;

ii. be drawn to a minimum scale of 1:500;

iii. indicate existing underground and above ground utilities and trees across the frontage of site; and,

iv. be consistently detailed among the Grading Plan, the Site Servicing Plan, and other plans deemed necessary by Engineering Services in terms of elevations, building and servicing/utility locations.

b. Grading Plans Requirements

The Grading Plans shall communicate the overland storm drainage plan and include the following information:

i. Existing and proposed grades in the legend and the drawings;

ii. Boulevard grades;

iii. Asphalt (roadway, laneway, walk, or other where applicable) longitudinal and cross-fall grades;

iv. Concrete (curb and gutter, walk, garbage pad, or other where applicable) longitudinal and cross-fall grades;

v. Location and grading of ramps to underground garages;

vi. Landscaped area and berms grades; and,

vii. Cross-sections as required to clarify the proposed grading, particularly in relation to the adjacent lands.

The following elevations shall be shown on the Grading Plans:

i. Building first floor;

ii. Existing elevations at property line;

iii. Existing and proposed grades shall be indicated at the corners of the site and at appropriate intervals, along adjacent street lines and on adjacent lands sufficient to indicate the effect of the proposal on adjacent lands;

iv. Any elevations necessary to determine the grading and drainage patterns;

v. Top of curb on fronting street;

vi. Top of catchbasin and manholes;

vii. Drainage swales; and,

viii. Lowest basement elevation for underground parking garage.

c. **Site Servicing Plan Requirements:**

The following detail shall be outlined on the Site Servicing Plan:

i. Road, curb, walk, boulevard and/or ditch locations;

ii. Existing and proposed site service locations and details;

iii. Water main, wastewater and storm sewers within the development area;

iv. Manholes, catch basins, water valves, and fire hydrants;

v. Culverts locations; and,

vi. Applicable stormwater management devices and/or areas.

d. **Traffic Geometric Plan:**

The Traffic Geometric Plan should include the following information (if applicable; as determined by Engineering Services:

i. Existing and proposed structures and parking lot/road locations;

ii. Existing and proposed curb cuts/fills;

iii. Dimensions of all access widths, depths and radii;

iv. Dimension of parking spaces (typical) and aisle widths;

v. On-site vehicle turning movements (using AutoTURN), for site-specific appropriate vehicle types (e.g. garbage trucks, delivery trucks, etc.) highlighting the vehicle dimensions used in analysis;

vi. Fire truck route turning movement, highlighting the vehicle dimensions used in analysis;

vii. Full road width and accurate traffic control signs and pavement markings fronting the site;

viii. Location of all existing above grade utilities within the right-of-way; and,

ix. Existing and future access points on the opposite side of the street from the development to demonstrate connectivity where appropriate, or requested by Engineering Services.

5.3 ROADWAYS

Roadway design within commercial sites shall adhere to the following requirements:

a. Roadways designated for firefighting purposes and access to solid waste pick up shall:

   i. have a clear width of not less than 6 metres;

   ii. have a centreline radius of not less than 12 metres;

   iii. have an overhead clearance of not less than 5 metres;

   iv. have a change of gradient of not more than 1 in 12.5 over a minimum distance of 15 metres;

   v. be designed to support the expected loads imposed by firefighting and waste collection equipment;

   vi. have turnaround facilities for any dead-end portion of the access route;

   vii. be connected with a public thoroughfare; and,

   viii. conform to other standards as set out in **Section 2.1 Roadways** of these standards.

   ix. commercial alley should be a minimum of 6 metres wide and a minimum structure of 50mm 10mm-HT and 75mm 20mm-B.

b. Adequate off street parking shall be provided in accordance with the Land Use Bylaw of Beaumont.

c. Parking areas should be hard surfaced with paved access. In special cases, and where approved by Engineering Services parking areas may be surfaced with other appropriate materials such as gravel. These material should prevent dust.

d. All walkways shall be well lit and linked to street and to parking areas. Where possible, walkways should be separated from vehicular traffic. When crossing vehicular aisles and driveways, changes in material used to identify pedestrian walkways are encouraged.

e. All walkways shall be designed with a minimum width of 1.5 metres using interlocking brick, stone, concrete, asphalt or other hard surface. For walkways located in areas of increased pedestrian activity, such as building entrances and display windows, or where vehicle overhang is an issue, walkways should be greater than 1.5 metres in width.

f. Entrances shall be sufficiently wide to accommodate both in and out traffic, in accordance with the following:

   i. Entrance/driveway grades shall be 2% minimum to 8% maximum;

   ii. All entrance curve radii and curb cut shall be dimensioned and shall conform to the Curb Cut requirements in the Engineering Standards;

iii. All existing driveways adjacent to site or across the adjacent street shall be shown.

g. Where road work occurs and ties in to existing municipal roadways, the connection will conform to **Standard Detail 2-29** Restoration Cut.

h. Where necessary soil compaction cannot be achieved, Fillcrete may be used. The Fillcrete design shall conform to the following:

Table 5.1

COMPRESSIVE STRENGTH AT 28 DAYS (MPA)	SLUMP (MM)	ENTRAINED AIR (% BY VOLUME)	MAXIMUM AGGREGATE SIZE (MM)	MINIMUM PORTLAND CEMENT (KG/M3)
Minimum - 0.15 Maximum - 0.40	100 ± 25	6.0 - 8.0	5	30

5.4 LOT GRADING

Overall lot grading shall be governed by the information in this section for any commercial, institutional, or multi-family site.

For multi-family developments additional detail on the Grading Plan is required to outline lot specific drainage where individual dwellings exist. Where cross lot surface drainage is required to provide a drainage path for the rear yards, a private to private easement and restrictive covenant document is required to be registered on all the lots. The easement and restrictive covenant document shall be registered with Beaumont to cover all the lots within a continuous block. Specific notes must be provided on the Grading Plan to indicate the requirement for the private to private easement and restrictive covenant document to be registered on all the lots.

The Grading Plan must clearly establish and define the drainage path on any downstream lot that is required to convey surface runoff from an upstream lot. This will require that an additional lot grade elevation be provided on the Grading plan at the center of that lot along the defined flow path.

The relative surface elevations must allow for the slope of the ground adjacent to the building to be at a minimum of 10% for a distance of 2.0 m or to the property line, on all sides of the house, with the slope directing drainage away from the building and then for reasonable slopes of 2.0% from all points within the property to the property boundary at which the drainage may escape.

The minimum slope along cross-lot swales shall be 2%. The flow path shall be clearly illustrated using a flow arrow on the Grading Plan. Grass swales are to be used wherever possible, although concrete swales may be approved at the discretion of Engineering Services.

Swales elsewhere on any commercial site shall adhere to the following minimum longitudinal slope requirements:

a. Grass swale: minimum 2.0%; and,

b. Concrete swale: minimum 0.75%.

The following additional requirements shall govern the site grading design:

i. Boulevard grades shall be 2% minimum and 4% maximum.

ii. Asphalt (roadway, laneway, or walk) longitudinal grades shall be 2% minimum and 8% maximum, with cross-falls of at least 2%;

iii. Concrete (curb and gutter, walk, garbage pad, or other where applicable) longitudinal and cross-fall grades shall be 0.7% minimum/8% maximum, and 2% minimum, respectively;

iv. Ramps to underground garages shall be 15% maximum longitudinal grade; and,

v. Landscaped areas and berms in Residential Zoning shall be 2% minimum and 5 (horizontal): 1 (vertical) maximum slope grade.

vi. Berms in non-Residential Zoning shall be 2% minimum and 3 (horizontal): 1 (vertical) maximum slope grade.

5.4.1 Retaining Wall Requirements

A cross-section for any retaining wall over 1.0 m in height shall be shown on the Grading Plan at the highest and/or the most critical point and include a minimum of the following:

a. Location of guard/hand railing and height

b. Type and material of the retaining wall

c. Top and bottom elevations

d. Property line and easement locations

e. Footing location

f. Existing and proposed grades on both sides

g. Retaining wall shall be constructed 150 mm away (setback) from the property line

h. Any other related information, as necessary and as requested by the Engineering Services

Separate shop drawing(s) shall be stamped and approved by a Structural Engineer and provided at a Building Permit stage.

5.5 STORM SEWER SYSTEM

5.5.1 General Site Servicing Design Guidelines

a. Watermains, storm and wastewater sewers, drains and appurtenances shall be designed and constructed in accordance with the General Design Standards, Alberta Building Code and in accordance with appropriate Municipal Bylaws.

b. Trench backfill for the water mains, storm and wastewater sewer and drain installations shall consist of native or granular material, as approved by the Geotechnical Engineer, free of organics and contaminants, placed and compacted in lifts as required to achieve a minimum compaction of 98% of the Standard Proctor Density or as required by the Geotechnical Engineer.

c. Watermains and storm and wastewater sewers shall not be constructed under any existing building/structures.

Commercial or multiple residence sites shall be provided with storm sewer service lines as part of the overall design of the development.

All storm water runoff from the site shall be contained within the site and be drained to the internal storm sewer system. The general requirements shall include protection against surface flooding and property damage for the 1 in 100 year return frequency design storm. Storm water is stored on-site through the control of lot grading surface elevations. Designs should be such that the maximum ponding surface elevations are 150 mm below the lowest anticipated finished ground elevations at buildings. An over land flow route must be provided from all sags or depressions to provide for this 150 mm freeboard.

The maximum depth of surface ponding is limited to 300 mm.

All ties to municipal mains shall have an inspection manhole on the public right-of-way side at the property line. See **Standard Detail 3-6**.

Roof drain downspouts shall discharge to the ground surface. A splash pad, provided by the builder, shall be placed at each down spout location or other such approved device and orientated to ensure discharge occurs at least 1.5m from the face of the building.

Commercial property roof leaders shall connect to storm sewer system.

The design of the system shall conform to the requirements throughout this section.

5.5.2 Location

Storm sewers shall generally be located within road rights-of-way as shown on typical road cross-section information.

5.5.3 Materials of Construction

a. **Pipe** - Pipe for storm sewer mains and catch basin leads shall be either concrete or PVC pipe.

i. Concrete Pipe

I. Concrete pipe shall conform to ASTM C-14, ASTM C-76 or ASTM C-655, latest revision thereof. Pipe shall be made with Type 50, sulphate resistant cement. Joints shall be synthetic rubber gaskets. Elliptical reinforcement is not acceptable unless specific approval is given by Engineering Services prior to manufacture of the pipe.

II. Where pipe diameters are 900mm or less, lifting holes are not permitted.

III. Where pipe diameters are greater than 900mm, lifting holes are optional, however, there may not be more than 2 lift holes in a length of pipe.

IV. Seal lift holes watertight after installation of pipe.

ii. PVC (PSM Type) Pipe

I. Smooth wall PVC pipe products and fittings shall conform to Sections 4 and 5 of CSA Standard B182.2 for all basic material requirements, manufactured quality and dimensional tolerance.

II. Materials used for pipe shall come from a single compound manufacturer and shall have a cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM Standard D 1784. Materials used for moulded fittings shall come from a single compound manufacturer and shall have a classification of 12454-B, 12454-C or 13343-C as defined in ASTM Standard D 1784.

III. Notwithstanding the requirements of Section 4 of CSA Standard B182.2, compounds with different cell classifications than that noted above shall not be used without the prior approval of Engineering Services.

IV. Pipe shall be installed within two years from the production date indicated on the pipe and in stored and maintained in conformance with the manufacturers' specifications.

iii. Open Profile Wall PVC Pipe

I. Closed profile and dual-wall corrugated pipe, (if specifically approved by Engineering Services for a project) and open profile PVC pipe products and fittings shall conform to Sections 4 and 5 of CSA Standards 182.4 for all basic material requirements, manufactured quality and dimensional tolerance.

II. Materials used for pipe and fittings shall come from a single compound manufacturer and shall have a cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM Standard D 1784.

III. Notwithstanding the requirements of Section 4 of CSA Standard B182.4, compounds with different cell classifications than that noted above shall not be used without the prior approval of Engineering Services.

IV. Minimum waterway wall thickness shall conform to CSA-B182.4 Table 3 for pipe stiffness of 320 kPa.

V. Pipe shall be installed within two years from the production date indicated on the pipe and in stored and maintained in conformance with the manufacturers specifications.

VI. Inline Tees are acceptable, and Inserta Tees may be used where pipe sizes are equal to or larger than 450 mm.

VII. Strap on saddles are not acceptable for mainstops, hot taps, and ¾ or 1 inch services.

VIII. Ultra-Rib and Kor-flo type products are acceptable.

b. **Manholes and Catch Basin Manholes** – Within roadways manholes and catch basin manholes shall have a minimum 1200mm inside diameter and be made of concrete with cone or flat top section.

c. **Catch Basins** - Catch basins shall be 600 to 900mm inside diameter concrete with minimum of 500mm sump.

5.5.4 Inspection

All sewers shall be inspected with closed circuit television camera equipment. Inspections shall be performed in accordance with the standard practices as set out in the CSA/NASSCO (CANADIAN STANDARDS ASSOCIATION/NATIONAL ASSOCIATION OF SEWER SERVICE COMPANIES) guidelines. The captured video shall be in color and display on screen the Lot and Block numbers of all service connections. The rate of camera progression shall not exceed 6m per minute.

Two inspections shall be performed: the first inspection shall be performed immediately prior to issuance of the Construction Completion Certificate and prior to road construction; the second shall be performed immediately prior to issuance of the Final Acceptance Certificate for Underground Improvements. The Developer is responsible for cleaning and flushing all lines to facilitate camera inspections.

The maximum long-term deflection for any P.V.C. pipe shall not exceed 7.5% of the internal diameter.

The video equipment operator shall prepare a written report summarizing the results of the inspection. Still photos of problem areas encountered shall be included in the written report. The report shall be bound in a hard cover binder.

The data collected shall be transferred onto a USB or cloud based storage format that is compatible with Engineering Services system. One (1) copy of each of the USB and the written report shall be delivered to Engineering Services. A separate summary of the report and CCTV inspection shall be submitted by the Developers Consultant and Contractor.

5.6 STORMWATER MANAGEMENT REQUIREMENTS

a. Specific areas of Beaumont are subject to specific storm water management criteria limiting the outflow of storm water to a specified rate and requiring the design of a storm water management system by a Professional Engineer. In other areas of Beaumont, a storm water management system designed by a Professional Engineer may be required as determined by Engineering Services.

b. The proposed drainage of a site shall not adversely affect the drainage of the abutting lands nor the subject property

c. Grading of the site shall be such that the perimeter elevations are compatible with those of the adjacent lands

Commercial or multiple residence sites shall be provided with storm sewer service lines as part of the overall design of the development. The design of the system shall conform to the requirements described in this section:

5.6.1 General Principles

Storm drainage system design includes the design of minor system (storm sewers) and a major system (overland flow routes, storm water management facilities, etc). The minor system shall incorporate weeping tile sump pump discharge collection. The minor system shall convey the more frequent rainfall runoff whereas the major system shall convey less frequent events above the capacity of the minor system. Overland conveyance in the major system shall be generally along roads, parks and utility lots avoiding inundation of private property yet limiting flooding to depths that do not prevent vehicle access by emergency services (fire, ambulance, and police). All stormwater management facilities shall be designed by a Professional Engineer following the latest methods and practices outlined in “Stormwater Management Guidelines for the Province of Alberta”, (latest edition) prepared by Alberta Environment.

5.6.2 Design Reports

Detailed design submissions shall contain all reports, calculations, analysis, drawings, model input and output files necessary to evaluate the proposed storm drainage system unless they previously have been submitted and approved. These calculations and reports are important for approval purposes and will also be required by Alberta Environment when applying for their approval of the storm drainage systems. Design reports shall include all calculation parameters and assumptions. See Section **5.6.4.2 Computer Modeling** for more information.

5.6.3 Design Criteria

5.6.3.1 Storm Sewer Design (Minor System)

The minor system shall be an underground piped system for collection of high frequency runoff from the development area and any areas outside the development area as may be required by definition of the overall catchment area. This system shall collect and convey runoff generated by a 1 in 5-year storm event as defined by Edmonton Municipal Airport - IDF Period: 1914-1995 as shown in **Table 3.0** of **Appendix 3.0**.

Within commercial sites, Engineering Services may request that stormwater storage be accommodated within the site.

a. Minor-system elements serving sites including or within drainage areas of 30 ha or less shall be designed to accommodate the rate of runoff which would occur in a 1 in 5-year return period rainfall event:

   i. without surcharge of sewer pipes;

   ii. with ponding of water to a depth no greater than 150 mm at depressions and at drainage inlets;

   iii. with depths of flow and ponding on internal development roadways and roadways on adjacent lands, as follows:

      I. Ponding limited so that no over-topping of curbs occurs on local roadways; and,

      II. Where applicable, a width equivalent to one traffic lane shall remain free from inundation on collector roads and one traffic lane in each travel direction remains free from inundation on arterial roads.

   iv. with storm water quality Best Management Practices (BMPs) prior to discharging into piped system.

   Sump pump discharge from weeping tile systems shall be collected in the minor system, or in a dedicated 'third pipe' system specifically designed to collect sump pump discharge. This 'third pipe' system shall be connected to the minor system and shall provide individual connection to each property.

b. Sewers Servicing Areas Greater than 30 ha

   Storm sewer trunks, for this purpose being those storm sewer pipes proposed to serve drainage areas of greater than 30 uncontrolled ha, shall be designed with a reserve of capacity to account for unanticipated changes in land use and runoff and to ensure downstream trunk sewers do not surcharge in advance of the upstream lateral sewers.

   To achieve this objective the subject sewers are to be designed to accommodate, without surcharge, 1.25 times the rate of flow which would occur in a 5-year return period rainfall event.

In cases where the storm sewer trunk will receive both uncontrolled flow from areas 30 ha or larger and controlled discharges from stormwater management facilities, the sewer is to be designed so as to accommodate, without surcharge, 1.25 times the 5 year design flow from the uncontrolled lands plus the maximum design stormwater management facility outflow rate.

5.6.3.2 Stormwater Management (Major System)

Major systems shall have conveyance elements designed to accommodate runoff rates and volumes for a 100-year return period rainfall event. The depth of peak flows and ponding in developed areas shall be limited such that there is not a significant hazard to the public and very limited risk of erosion or other property damage. Depths of flows and ponding in roadways and public utility lots shall be a maximum of 300mm. Water depths at the crown in arterial roadways shall not exceed 150mm.

Amended. Refer to Bulletin 005

The maximum water surface level of flows and ponding is 300mm below the lowest anticipated building opening (basement windowsills) with a freeboard of 600mm. Where lots back onto a stormwater management facility, the high water level shall be a minimum of 300mm below the lowest anticipated building opening, if the facility has an emergency overflow provided. Where there is no such emergency overflow, the HWL shall be at least 500mm below the building opening. For these lots the high water level shall also be a minimum of 150 mm below the footing elevation of the building.

Storage elements of the major system shall be designed such that there is no overtopping of the storage facilities due to the more critical storm event applied to the catchment area serviced. The performance of each stormwater management facility is to be verified by computer simulation of its response considering outflow rate as limited by control elements or downstream conditions, to the most critical of the design rainfall events from the following listing:

i. 1:100 year, 24-hour synthetic design based on the Huff distribution
ii. July 14-15, 1937 storm event
iii. July 10-11, 1978 storm event
iv. July 2-3, 2004 storm event
v. July 12, 2012 storm event

Refer to **Tables 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6,** and **3.7** in **Appendix 3.0** for rainfall data references.

A high level emergency overflow shall be provided wherever feasible. The freeboard at normal high water level shall be 300mm below the lowest landscaped level at the adjacent buildings or building opening. Where an emergency overflow is not possible the freeboard requirement shall be 600mm.

With the outlet capacity as per Section 5.6.5, the post event drawdown times shall be evaluated. The drawdown time shall start at the elevation of the 1:100 year Huff

Distribution design storm and the storage facility shall provide the following storage capacities within the following time frames:

a. 1 in 5 year capacity in 24 hours

b. 1 in 25 year capacity in 48 hours

c. 90% of the 1:100 year volume to be available in 96 hours

The volume of the 1 in 5, and 1 in 25 year capacities shall be calculated based on the Huff distribution design storms.

Should the designed storage volume not provide the capacities within the noted timeframes, the SWMF, at the sole discretion of Engineering Services, may require additional freeboard storage volume to accommodate the designated capacities. This additional storage shall be provided separately from any flood plain storage that may be required.

Additional modeling may be required where the SWMF outlet relies only on piped flow and does not have a major overland flow path. This type of facility shall be designed with an additional 0.3m freeboard depth, and may where requested by Engineering Services require computer simulation modelling. The model shall demonstrate that the capacities will operate without flooding private property during two sequential design storms.

The design of the overall system shall take into account future development and address requirements to accommodate runoff flows from contributory areas either developed or undeveloped.

5.6.4 Stormwater Runoff Analysis

The use of computer simulation methods is recommended for all final analysis and design details. The Rational Method may be used for detail design of minor storm drainage systems with catchment areas of 65 ha or less. The Rational Method shall not be used to design stormwater management storage facilities. Engineering Services may request simulation where required.

5.6.4.1 Rational Method

The Rational Method is expressed as

$$Q = \frac{(C \times i \times A)}{360}$$

Q = design flow (m3/s)
i = average rainfall intensity (mm/hr)
C = runoff coefficient
A = contributing drainage area (hectares)

The runoff coefficient 'C' shall be consistent with the imperviousness of the respective land use.

The following formula relates 'C' to imperviousness (imp) which is expressed as a ratio of impervious area to the total area.

$$C=(0.95\times imp)+0.1(0.1-imp)$$

Otherwise the value of 'C' shall be related to the type of land use as follows:

LAND USE	COEFFICIENT
Multi-Family	C= 0.80
Commercial	C= 0.9

Commercial and multi-family development shall be reviewed on a specific basis with the following runoff coefficient applicable to various surfaces.

SURFACE	RUNOFF COEFFICIENT (C)
Asphalt, concrete, roof areas	0.95
Gravel	0.65
Grassed/Soft Landscaping/Sandy Soil	0.20
Clay Soil	0.40

For use of the rational formula to determine peak runoff due to storms with return periods greater than a 1:5 year, the runoff coefficient shall be increased as listed below up to a maximum of 0.95:

DESIGN RETURN PERIOD	RUNOFF COEFFICIENT MODIFICATION
1:10 to 1:25 year storm	Multiply C by 1.10
Above 1:25 to 1:50 year storm	Multiply C by 1.20
Above 1:50 to 1:100 year storm	Multiply C by 1.25

Rainfall design intensity (i) shall be taken from data provided relating to the specific time of concentration. The maximum time of concentration to the first inlet shall be 15 minutes in residential areas and 8 minutes in commercial and high-density developments.

For single lot development, stormwater runoff control shall be provided for lots greater than 0.16 ha (0.4 acres). The maximum discharge rate to the storm sewer system shall be controlled to the rate equivalent to the 1 in 5 year return storm. On site storage shall be provided for events up to and including the 1 in 25 year storm event. The maximum permissible depth of flooding shall be 300mm. Engineering Services may require stormwater quality treatment by the provision of a high flow bypass oil grit separator or approved equivalent treatment system.

5.6.4.2 Computer Modeling

All stormwater drainage conveyance and storage elements servicing areas larger than 65 ha shall be designed using computer-modelling techniques. The selection of applicable computer models is at the discretion of the Developers and their consultants; however, models should be selected that have the capability to generate hydrographs for a critical storm or series of storms and which can route these hydrographs through a network of conduits, surface channels and storage facilities. The SWMM models are preferred for the design of drainage systems.

Modelling procedures shall generally take the following approach:

a. preliminary examination of the drainage basin based on the initial development proposal (lumped areas).

b. production of runoff hydrographs from these developed areas extended into pipe sizing and sewer routing.

c. post development hydrographs shall be developed for key points of the sewer system and major systems (overland flows and storage) for the 5 and 100-year design storm that represents the most critical rare runoff event.

d. systems that incorporate a series of interconnected ponds with relatively restricted outflow capacity may require modelling for sequential storm events

e. the 4-hour Chicago Distribution hyetographs should be used for analysis of major and minor conveyance systems by computer simulation. When stormwater storage is required, the 24-hour Huff Distribution design hydrographs should be used for storage drawdown analysis.

In presenting storm drainage designs the following shall be included:

a. type and version of computer model

b. parameters and simulation assumptions

   i. catchments

   ii. percent imperviousness

   iii. storm water storage area volumes

   iv. drawdown curves

c. design storm used (documented and plotted)

d. volumetric runoff coefficient or total runoff obtained

e. peak flow versus area, plotted for each event

f. the appropriate hydrological modelling parameters from the following table:

HYDROLOGICAL MODEL PARAMETER	VALUE	UNIT
HORTON'S INFILTRATION		
Initial Rate	7.5	mm/h
Final Rate	2.5	mm/h
Decay Factor	0.00115	s-1
DEPRESSION STORAGE – DEVELOPED AREAS		
Impervious Area	2	mm
Pervious Area	5	mm
DEPRESSION STORAGE – UNDEVELOPED		
Impervious Area	2	mm
Pervious Area	8	mm
MANNING'S COEFFICIENT, N		
Impervious Area	0.015	
Pervious Area	0.25	

When using Otthymo, a sensitivity analysis is required to analyze cn, tp and k to ensure appropriate storm drainage.

Tables 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, and **3.7** in **Appendix 3.0** shall be used for all storm water management analyses.

5.6.5 Storm Sewer Requirements

5.6.5.1 Minor System

a. Pipe Sizing and Capacity

i. Minimum pipe size

Storm sewer	300 mm
Catch basin lead	250 mm
F51 catch basin lead	375 mm

ii. Pipe sizing shall be sized by use of the Manning's Formula using the following "n" values:

All Smooth-Wall Pipe	n = 0.013
Corrugated Metal Pipe - Unpaved	n = 0.024
Corrugated Metal Pipe - Invert Paved	n = 0.020
Corrugated Metal Pipe - All Paved	n = 0.013

Note: Corrugated metal pipe (CMP) is not approved for use in permanent mainline storm sewers or catch basin leads.

iii. Minimum design flow velocity = 0.60m/sec

iv. Maximum design flow velocity = 3.0m/sec

v. Minimum grade of catch basin leads shall be 2.0%

vi. Minimum slope:

Pipe Size	Percent Slope
300 mm	0.22
375 mm or larger	0.15

Note: the minimum slope shall be increased by a factor of 1.5 on all curved sewer sections.

vii. Minimum culvert size

Parks and pathways	300 mm
Commercial and Rural	600 mm

b. **Location** - Refer to typical right-of-way cross sections for various development conditions.

c. **Separation** - Storm sewers must be located a minimum of 3.0m horizontally from any water or sewer main and 2.0m horizontally from franchise utility lines.

Minimum separation is measured from centre line to centre line. Reduced spacing between utilities may be approved by Engineering Services if jointless pipe is used for construction. Consult the most recent version of the "Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems", Alberta Environment, for minimum spacing requirements in these cases.

Curved sewers shall:

i. run parallel to the curb and gutter or street centreline

ii. have longitudinal gradients increased by a factor of 1.5 for curved sections

iii. have manholes provided at the beginning and end of each curved section as well as intermediate locations as required.

d. **Cover** - The minimum depth of cover from finished ground surface to the obvert of the pipe shall be 1.75m.

e. **Crossings** - Water main crossings shall maintain a minimum of 0.5m vertical separation from the storm sewer invert as measured from the crown of the watermain. Wastewater sewer crossings shall maintain a minimum of 0.5m vertical separation from the storm sewer invert as measured from the crown of the wastewater sewer. Crossing design shall take into account structural support of the sewer or watermain.

f. **Manholes** – Manholes shall be located at each change in alignment, grade, or pipe material, at all pipe junctions, at the beginning or end of radius pipe sections and at intervals along the pipe to permit entry for maintenance to the sewer. Manhole construction shall:

i. Not exceed 150m spacing

ii. Be minimum 1200mm dia. with cone or flat tops and step irons

iii. Where a non-standard manhole configuration is required, it shall be designed with reinforced concrete. Such designs shall be detailed on the Engineering Drawings.

iv. Where manhole depths exceed 5.0m, safety grating shall be incorporated into the manhole.

v. The pipe obvert of a sewer entering a manhole shall not be lower than the pipe obvert of the outlet sewer. Where drops of 1.0m or less occur at manholes the designer shall ensure free outlet flow and acceptable backwater conditions exist in the downstream sewer. Drops of more than 1.0m shall be avoided.

vi. Bends or changes in direction shall be 90° or less. The designer shall take into account energy losses through bends and deflections. The minimum drop through a manhole on a straight run of pipe shall be 30mm. Where changes in direction occur, the minimum drop shall be 60mm from inlet to outlet.

g. **Limits of Construction** – Sewers shall be terminated with a manhole at the subdivision limits when external drainage areas are considered in the design. The design of the terminal manholes must allow for possible future extension of the sewer.

   Temporary sewer stubs (maximum length of one full pipe) may be permitted between phases of the development at the discretion of the Engineering Services.

h. **Catch Basins:**

   i. Runoff shall not be required to flow a distance greater than 120m along roadway gutters before entering a catch basin or other inlet to a minor storm drainage system. Locations shall be chosen that avoid conflict with driveways and pedestrian crossings.

   ii. Catch basins shall be located to avoid significant runoff over or along sidewalks and walkways. Catch basin inlets shall be installed a minimum of 600mm from the edge of a walkway or sidewalk. Catch basins shall be provided in strategic locations to avoid build-up or ponding in downstream areas.

   iii. CBs should be upstream of curb ramps and crossing locations.

   iv. Catch basin frame and cover application: The following frame and cover types shall be used for various curb types and applications based on City of Edmonton standard designations.

Table 3.0A

FRAME & COVER TYPE (CITY OF EDMONTON)	CURB TYPE	MIN. BARREL SIZE (MM)	ALLOWABLE APPLICATION
2a or F36	Straight Face	600	Catch basins only
4a or F36A	Straight Face	1200	Catch basin manholes only
6 or F39	No Curb	600	For off roadway locations or temporary inlets on roadways
K7 or F33	80mm Rolled Face	600	Current preferred inlet for residential areas
DK7 or K2	80mm Rolled Face	900	Preferred for residential areas where additional capacity is needed
8 or F38	No Curb	600	Lanes, swales, gutters, and curb ramps
F51 (no side inlet)	No Curb	900	For situations requiring increased capacity over 2a
F51 (with side inlet)	Straight Face	900	Situations requiring increased capacity over F51

The designer shall determine the capacity factor for each catch basin or inlet condition and provide supporting information with the design submission. All grade rings shall be sealed with Ramneck or equivalent to provide watertight joints.

i. **Catch Basin Leads** - The following standards shall apply:

   i. Minimum size: 250mm dia.

   ii. Maximum length of lead: 30m

   iii. Minimum gradient: 2.0%

   iv. Minimum depth of cover to top of pipe: 1.5m

   All leads shall connect to a mainline manhole or catch basin manhole.

j. **Limits of Construction** – Sewers shall be terminated with a manhole at the subdivision limits when external drainage areas are considered in the design. The design of the terminal manholes must allow for possible future extension of the sewer.

   Temporary sewer stubs (maximum length of one full pipe) may be permitted between phases of the development at the discretion of the Manager of Engineering.

5.6.5.2 Sump Pump Discharge Collection System

A sump pump discharge collection service shall be provided to each newly developed multi-family unit, or institutional, industrial or commercial structure. The system is dedicated to collection of weeping tile system discharges. There shall be no roof leaders, garage drain, wastewater line or any other plumbing systems connected to the sump pump/weeping tile system. The collection system shall discharge to the minor storm sewer system by connection of the service lateral to the fronting collection main. Details are appended to this section for configuration and location. Garage floor drains may be permitted, but will be connected to the waste water service connection and not the storm.

The general design criteria shall be as follows:

a. Minimum service size: 100mm dia.

b. Minimum collector size: 200mm dia

c. Pipe material: P.V.C. SDR 35 ring joint

d. Minimum grade of service line: 1.0%

e. Single-family lots minimum depth of cover shall be 1.8m to top of pipe at 0.3m from the house side of the 2.5m service easement.

f. All services be located such that they do not conflict with driveway locations.

5.6.5.3 Major System and Stormwater Management Facilities (SWMF)

Where sites (typically industrial) are of sufficient size to require management facilities the following requirements apply:

a. **Geotechnical Considerations** - Specific geotechnical investigations shall be carried out relating to the design of all stormwater management lakes and dry ponds and are a prerequisite to planning and design.

b. **Erosion and Sediment Control** - Erosion and Sediment Control measures shall be incorporated in the planning and design process and included in the engineering drawings.

c. **Staged Construction** - When staged stormwater management facilities are proposed and approved, the standards applicable to the design and construction of interim facilities shall be generally in accordance with the standard set out for permanent facilities. This applies to both wet and dry pond facilities.

d. **Storage Alternatives** - The number and location of storage facilities shall be determined based on the major/minor system concept. A combination of facilities may prove the most viable and economically feasible. Engineering drawings shall present applicable parameters (i.e. storage tables and graphs) for each facility within the design. The following options should be considered.

   i. Retention Storage: associated with longer-term storage and release after storm runoff has ended. Facilities are normally stormwater management lakes or wet ponds.

   ii. Detention Storage: Low flows are generally not detained while large flows are restricted by outlet controls. This system is typically related to “super pipes” or “dry detention facilities” that reduce the load on downstream facilities.

   iii. Off Stream Storage: minor conveyance systems may conduct low flows directly to an outlet that is restricted in terms of peak flows which are routed to storage. The storage may incorporate depressed open areas, reservoirs and low lying recreation fields which may also form part of the major system.

   iv. Channel Storage: low gradient flow channels with wide bottoms can provide inherent storage.

   v. On Stream Storage: on stream storage is achieved through the formation of storage ponds within the stream channel zone. This requires embankments and spillways designed to pass large floods.

e. **Outlet Control Works** - Outlet works for stormwater management facilities must incorporate appropriate means for control of outflow. Designs will incorporate maintenance provisions and allowance for unintentional blockage and the possible need to either stop outflow or increase the rate of outflow. The outlet flow rate shall be restricted to 1.8 litres per second per hectare.

f. **Emergency Overflow Provisions** - Where feasible, emergency overflow shall be provided. Should this not be practical or feasible, additional freeboard shall be provided. It is the responsibility of the developer to prove that flood plain storage is not required for a specific site.

g. **Maintenance and Service Manual** - Two (2) copies of a Maintenance and Service Manual shall be provided for the facility, which shall include:

   i. equipment and suppliers lists with local addresses and contact telephone numbers

   ii. operation, maintenance, service and repair instructions complete with parts lists for all mechanized and electrical equipment incorporated in the design

   iii. Head Discharge and Stage

   iv. location plan for all devices discharge relationships with relationship to surrounding features

   v. an outline of normally expected operational requirements for the facility

h. **Best Management Practices** – One or more BMP's (best management practices) as indicated within the "Stormwater Management Guidelines for the Province of Alberta" and the "Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems" should be applied to address stormwater quality. The more stringent of the conformances shall apply.

5.7 WASTE WATER SYSTEM

All ties to municipal mains shall have an inspection manhole on the public right-of-way side at the property line. See **Standard Detail 3-6**.

5.7.1 General Design Criteria

The professional engineer responsible for the preparation of engineering drawings is also responsible for the structural design of the sewer installation.

In all cases, designers shall keep a record of the structural design calculations associated with each project.

For all pipe systems 900mm nominal diameter and greater the submission of structural design calculations to Engineering Services is mandatory. For all other sizes, design calculations for a specific project shall be provided to Engineering Services upon request.

a. **Residential/Domestic** - The sewer main capacity shall be designed on the basis of the subdivision design population (i.e. zoning and required density), plus all future contributing areas. Where available the minimum flow generation shall be based on the actual proposed lots and their zone type.

   The minimum average domestic flow contribution shall be calculated on the basis of 300 litres/capita/day (dry weather flow). Sewer capacity shall be designed on the peak dry weather flow estimated by application of the following peak factor to dry weather flows:

   $$\text{Peaking Factor} = 2.6P_{df}^{-0.1} \text{ OR } 1.5 \text{ (whichever is greater)}$$

   Where P is the design contributing population in thousands

   Design contributing population is per lot as per approved zoning.

b. **Commercial/Light Industrial** - Generally commercial and industrial flows should receive specific evaluation. For planning purposes and general design, a flow contribution of 18,000 litres/hectare/day shall be used with peak dry weather flow estimated by application of a peaking factor of three (3).

c. **Inflow/Infiltration Allowance** - An allowance of 0.28 litres/second/hectare shall be applied to all sewer design flow capacity calculations. This allowance would apply to the total drainage area on the basis of upstream area calculations (manhole to manhole). In addition, an allowance shall be made for inflow through manholes in sags by addition of 0.4 litres/second for each manhole.

d. **Total Combined Design Flow Capacity** - The total design sewer capacity shall be the combination of:

   i. Peak dry weather flow

   ii. Infiltration allowance

   iii. Inflow for sag manholes

(NOTE: There shall be no connection of roof drainage and weeping tile systems to the waste water sewer system.)

e. **Pipe Flow Design** - The following shall apply to wastewater sewer pipe design:

i. Minimum design flow velocity shall be 0.6m/s

ii. Maximum design flow velocity shall be 3.0m/s

iii. Manning's n = 0.013 shall be used as the flow coefficient

iv. New sewers shall be designed with full flow capacity not exceeding 80% of the sewer diameter based on a maximum utilization of 86% of the pipe hydraulic capacity

$$\text{Full Sewer Flow Capacity} = \frac{\text{Estimated Total Design Peak Flow Rate}}{0.86}$$

v. The minimum pipe diameter shall be 200mm for residential and 250mm for commercial/light industrial

vi. Minimum pipe gradients shall be as follows:

I. Short laterals (cul-de-sacs) and uppermost sections shall be 0.8% minimum

II. Curved sewer design gradients shall be increased by a factor of 1.5

III. Minimum gradients shall be:

PIPE DIAMETER (MM)	% GRADIENT
200	0.40
250	0.28
300	0.22
375 or larger	0.15

vii. The min. grade of the first upstream leg of the wastewater sewer shall not be less than 1.0%., special cases will be reviewed under the discretion of Engineering Services.

f. **Design Submission** - Design calculations shall be submitted in a tabular form on the drawing showing the overall wastewater sewer system and shall include all allowances for future flow generation within the drainage area, where applicable.

g. **Hydraulic Gradeline** – All wastewater sewer mains and lot services are to be above the geodetic elevation of 707 meters, except where otherwise approved by Engineering Services.

5.7.2 Wastewater Sewer Main Alignments and Location

a. General - All wastewater sewers shall generally be located along the centreline of the road right-of-way, or site laneways.

b. Wastewater sewers shall be located a minimum of 3.0m horizontally from any watermain and 2.0m horizontally from any gas line measured centreline to centreline.

c. Reduced spacing between utilities may be approved by Engineering Services if jointless pipe is used for construction. The most recent version of the Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems, Alberta Environment, shall be consulted for minimum spacing requirements in these cases.

d. The minimum depth of cover shall be 2.6m from finished surface to the top of the main pipes and 2.75m from finished surface to the top of service pipes.

e. Curved sewers shall run parallel to the centreline of the street. Manholes shall be constructed at each end of a curved sewer section. Where curved sewers are used, the design shall not exceed the maximum angle at which the joints remain tight. Curved sewers shall be laid with a radius of at least 60m unless otherwise supported by manufacturer's specifications.

f. Water Main crossings shall be as follows:

   i. Water main should pass over wastewater sewers and have a minimum separation of 0.3m

   ii. Where it is unavoidable and the water main passes under a wastewater sewer, maintain a minimum separation of 0.5m (lower pipe crown to higher pipe sewer invert)

      I. Adequate soil structure must be maintained beneath wastewater sewer to ensure structural support of pipe, which may be accomplished using cement stabilization or other means deemed appropriate by Engineering Services.

   iii. Oblique crossings (less than 80°) shall not be permitted

   iv. Designed to provide structural support for both pipes with pipe joints located equidistant from the intersection of the crossing

g. Manholes shall have a maximum spacing of 150m and be located at the following conditions:

   i. Changes in pipe diameter

   ii. Changes in sewer gradient

   iii. Junctions of mains

   iv. Changes in direction

   v. On public ROW side of property line where tying into municipal mains (inspection manhole required)

   In a straight run, the minimum drop through the manhole shall be 30mm. At changes in direction, there shall be a minimum drop of 60mm through the manhole.

   All bends in manhole benching shall be formed to provide the greatest length of curvature.

   Sewer deflection shall not exceed 90° through a single manhole.

h. Drop Manholes - Drop sections are required for invert grade differences greater than 300 mm in wastewater sewer manholes. For 200 mm and 250 mm mains, internal drops may be used. Benching is required for invert grade differences 300 mm or less. No more than two internal drops in one manhole.

i. Service Tees - For all new construction inline tees shall be installed. Tees used in retrofit situations must be approved by Engineering Services. Where wastewater lines are of sufficient depth, riser tees shall be used for individual services.

5.7.3 System Materials

a. **General** - All construction shall be with new materials delivered in acceptable condition meeting current materials specifications and standards.

b. **Sewer Mains** - Pipe for wastewater sewer mains shall be polyvinyl chloride (PVC).

i. **PVC (PSM Type) Pipe**

I. Smooth wall PVC pipe products shall conform to Sections 4 and 5 of CSA Standard B182.2 for all basic material requirements, manufactured quality and dimensional tolerance.

II. Materials used for pipe shall come from a single compound manufacturer and shall have a cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM Standard D 1784. Materials used for moulded fittings shall come from a single compound manufacturer and shall have a classification of 12454-B, 12454-C or 13343-C as defined in ASTM Standard D 1784.

III. Notwithstanding the requirements of Section 4 of CSA Standard B182.2, compounds with different cell classifications than that noted above shall not be used without the prior approval of Engineering Services.

IV. Pipe shall be installed within two years from the production date indicated on the pipe and in conformance with the manufacturers specifications.

V. 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.

VI. The tracer wire used shall be a minimum of 14 gauge coated copper wire complete with sacrificial 5 lb. anodes spaced every 1,000 lineal metres, used for corrosion protection.

c. **Gaskets/Joint Rings** - Joint seals shall meet the requirements of CSA B182.2 and ASTM F477 and provide pipe joints capable of a hydrostatic pressure of 345 kPa (50 psi) without leakage.

For inline Tees or Wyes at service connection junctions, injection moulded gaskets shall conform to CSA B182.1 or CSA B182.2 with fabricated fittings conforming to CSA B182.2 and ASTM F679.

d. **Manholes** - Manholes shall be a minimum of 1200mm internal diameter and conform to the following standards:

   i. Manufactured with Type 50 Cement

   ii. Shall be precast with reinforcement conforming to ASTM C478 and CSA A257.4

   iii. Shall include step irons of the standard safety type, hot dipped galvanized iron or aluminum bar of forged alloy 6061-76 with a minimum tensile strength of 200 MPa

   iv. Shall have rubber gasket joints conforming to ASTM C443 and grouted inside and out with non-shrink grout.

   v. Shall be supplied with precast, pre-benched bases with cored connections fitted with Duraseal or G-Lock cast in joint systems

   vi. Norwood NF80 solid cover or equal for all manholes in streets and driveways.

   vii. Norwood NF90 solid cover or equal with rubber gasket-seal for all manholes in street sags or other low areas.

   viii. Norwood F39 with solid cover or equal in all other locations

   ix. Safety platforms shall be required on manholes with a depth greater than 7.0m.

5.7.4 Testing and Acceptance

All sewers shall be inspected with closed circuit television camera equipment in accordance with the **Beaumont CCTV Requirements and Guidelines, February 2017** found in **Appendix 1.0**. Inspections shall be performed in accordance with the standard practices as set out in NASSCO references.

The captured video shall be in color and display on screen the Lot and Block numbers of all service connections. The rate of camera progression shall not exceed 6m per minute.

Two inspections shall be performed: the first inspection shall be performed immediately prior to issuance of the Construction Completion Certificate and prior to road construction; the second shall be performed immediately prior to issuance of the Final Acceptance Certificate for Underground Improvements. The Developer is responsible for cleaning and flushing all lines to facilitate camera inspections.

The maximum long-term deflection for any PVC pipe shall not exceed 7.5% of the internal diameter.

The video equipment operator shall prepare a written report summarizing the results of the inspection. Still photos of problem areas encountered shall be included in the written report. The report shall be bound in a hard cover binder.

The data collected shall be transferred onto a USB or cloud based storage format that is compatible with Engineering Services system. One (1) copy of each of the USB or cloud storage link, and the written report shall be delivered to Engineering Services.

At the discretion of Engineering Services, the Developer may be required to carry out a leakage test where each section (manhole to manhole) and associated service connections would be tested for water tightness. The maximum volume of leakage acceptable would be 0.005 litres/mm diameter/m of pipe per day with a constant 600mm head applied at the upper end of the sewer section.

All sewers shall be inspected with closed circuit television camera equipment.

Additionally, all sewers installed using flexible pipes shall be inspected with mandrel or laser profiling equipment to check for excessive deflection.

The maximum short-term deflection (typically after 30 days) for any pipe shall not exceed 5% of the internal diameter.

The maximum long-term deflection (typically at FAC after 2 years) for any pipe shall not exceed 7.5% of the internal diameter.

All concrete sewer pipes to be installed as per ASTM C1479.

All thermoplastic sewer pipes to be installed as per ASTM D2321.

5.8 WATER DISTRIBUTION SYSTEM

General design criteria are as follows:

a. Water distribution systems within commercial sites may require internal looping. Where this is required by Engineering Services the water system shall have more than one primary feeder main supplying the distribution system in the development area. Engineering Services may waive this requirement temporarily provided the Developer can demonstrate that the necessary fire flows can be delivered via the single connection regardless. In any event, a maximum of 50 structures may be serviced temporarily without looping of the system. The Developer shall provide looping internally within the subdivision as well as a second connection to the development within two (2) years of the issuance of a Construction Completion Certificate on the first phase of development. Beaumont's water model is available to the Developer's Engineer.

b. Where cul-de-sacs or dead ends are present on a commercial site, the watermain shall be looped except where the overall length of the cul-de-sac from the intersection curb line to the end of the bulb is 120m or less. A flush point shall be provided at the termination point of all dead end lines

c. **The minimum diameter of watermain shall be 250mm for commercial and light industrial developments.**

d. **Hydraulic Design** - The water network shall be designed using the following parameters.

   Average Day Demand:

   i. residential - 360 litres/capita/day

   ii. commercial/light industrial 22,500 litres/hectare/day

   Peaking Factors:

   i. Peak Day = 2x Average Day

   ii. Peak Hour = 2x Peak Day

   The system shall be designed to meet the criteria contained in "Water Supply for Public Fire Protection, 1999" (or latest edition) as produced by the Fire Underwriters Survey.

The minimum design fire flow for any water main providing fire protection shall be as follows, plus allowance for peak day demand:

All Commercial Zoning	270 l/s
Urban Services (Institutional), Public Education Services	180 l/s
Multi Family Residential	High Density = 300 l/s
	Low Density = 180 l/s

The minimum residual pressure at any location in the distribution system at ground level under fire flow conditions shall be 140 kPa (20 psi). The maximum Hazen & Williams coefficient of friction (C) for watermain sizing shall be C=120.

The normal operating range for residential distribution shall be between 350 kPa (50psi) to 550 kPa (80psi) pressure with velocities not to exceed 3.0 m/s under all operating conditions.

Specific design shall be applied to high value areas (schools, shopping centres, apartments, light industrial areas) and detailed calculations and network analysis provided.

e. Fire hydrants shall have sufficient valves to isolate them from the domestic flow. All fire hydrants shall be Canada Valve type and shall conform to AWWA C502 Standard, having 150mm diameter inlet elbows with cast-in bell ends (dry barrel). Hydrants shall include two (2) 63.5mm hose nozzles and one (1) 100mm "Storz" pumper connection. Barrels shall be epoxy or asphalt coated below ground level and protected with a sacrificial zinc anode. Above ground hydrants shall be painted with RUST-OLEUM High Performance V7400 System 340 VOC DTM Paint.

Amended - 2025
Refer to Amendment #2
Number 5.2

They will be coded as follows:

COLOUR	TO BE USED FOR
Safety Yellow	Hydrant Bodies
Fire Hydrant Red	Hydrant bodies for commercial, institutional, and multi-family sites
Safety Orange	Caps and bonnet for the hydrants connected to water mains that are 150mm in diameter
Safety Green	Caps and bonnet for the hydrants connected to water mains that are 200mm in diameter
National Blue	Caps and bonnet for the hydrants connected to water mains that are 250mm or larger in diameter
High Gloss Black	For Dead End Hydrants, only the bonnet will be painted black, caps will be painted the colour of the water main feeding the hydrants.

f. All water piping between Beaumont's main and the water meter shall be constructed in accordance with Section 5.9 of these standards, and shall pass the pressure and disinfection tests.

g. Either a master meter or individual meters shall be provided including meters on irrigation lines. Where separate meters are provided, each service shall be constructed with a separate curb stop or isolation valve at a location approved by Engineering Services.

h. All ties shall have a valve on the public right-of-way side at the property line.

5.8.1 Testing and Acceptance

General - The Developer shall flush, disinfect and pressure test all water mains and service connections in accordance with the **Public Works Requirements for**

Tests in Beaumont located in **Appendix 1.0**. The Developer is required to meet the following requirements and satisfaction of Engineering Services.

a. Pressure Testing - After completion of all installations including service connections, the system shall be pressure tested by the following procedures:

   i. Advise Engineering Services, at least 24 hours prior to system filling, that a pressure test is proposed and provide a plan outlining the location of testing, as well as the filling, testing and flushing procedures to be utilized.

   ii. Slowly fill the system and ensure any air is forced from terminal points (service lines may be filled during service installation).

   iii. Prove the reliability and accuracy of proposed test gauges and test equipment.

   iv. Allow a settling period prior to final test application which is identified by relatively steady pressure reading but no less than 36 hours after placing the last thrust block or 24 hours from initial pressurization.

   v. Each section between valves shall be brought to test pressures with the valves closed to test the valves under pressure (the test pressure shall be held for two minutes on each valve before release to the next valve).

   vi. Have an Engineering Services representative witness the initial test pressure, check isolation valve at commencement of the test and record the initial volume in the make up water container. The test pressure shall be maintained at 1035 kPa for a duration of two (2) hours.

   vii. The maximum length of main under test shall be 450m.

   viii. The allowable leakage shall be determined as follows (PVC pipe only):

$$L = \frac{(ND\sqrt{P})}{128{,}225}$$

L = allowable leakage, litre/hr.

N = total number of joints

D = pipe diameter, mm

P = test pressure, kPa

b. **Disinfection** - All water mains shall be disinfected in accordance with AWWA Specification C 651 and in conformance with Alberta Environment. Chlorine testing for new pipe is 50 parts per million and 12 hours after flushing a bacteriological sample needs to be taken and sent to the Lab for analysis.

   Prior to chlorination, Consultant shall provide Engineering Services a plan outlining the chlorination locations, as well as details of procedures to be used. All procedures performed shall be documented and submitted to Engineering Services for acceptance. At the completion of disinfecting and flushing, water samples shall be taken from access points near the point of chlorine injection, midpoints in the system and near the furthest point from filling. One sample per section of water main installed (valve to valve) shall be submitted to an accredited laboratory for bacteriological examination. Engineering Services' personnel shall perform or witness the sampling. In certain circumstances and

at the sole discretion and approval of Engineering Services, they may choose to designate a representative to perform the sampling on their behalf.

The storm sewer system or any open water body shall not be used for disposal of chlorinated water. Should there not be an acceptable point of discharge on site, the chlorinated water shall be removed from site to an acceptable point of disposal or shall be de-chlorinated on site for disposal.

c. **Flow Testing** - Flow testing of hydrants shall be required by Engineering Services as a prerequisite to the issue of a Construction Completion Certificate, and again as a prerequisite to the issue of the Final Acceptance Certificate. At the discretion of Engineering Services, additional testing may be required prior to the issue of a Final Acceptance Certificate.

5.9 WATER AND SEWER SERVICES

Amended - 2025
Refer to Amendment #2
Number 5.3

5.9.1 Minimum Requirements

Non-residential developments or multi-family units shall have services sized to meet the requirements of this section. ~~Minimum water service for commercial sites is 50mm (2").~~

Each individual residence shall have separate services.

Each dwelling shall be serviced with

a. 150mm dia. wastewater sewer service

b. 100mm dia. sump pump discharge collection service

c. ~~19mm dia. water service type K copper or 25mm dia. water service when the length of service from the main to the curb stop is 20m or more~~

Amended - 2025
Refer to Amendment #2
Number 5.3

All wastewater sewer services shall have a minimum slope of 1% from the property to the main. Sump pump discharge shall have a minimum slope of 1% from the property line to the collection main. Floor drains are permitted in garage floors, but shall tie only into the waste water system, NOT the storm sewer.

The minimum depth of cover shall be 2.75m from finished grade for water and wastewater services and 1.80m for storm services.

5.9.2 Systems Materials

a. **Water Services Materials** - All water services shall be constructed using type K copper piping conforming to AWWA C800 Standard up to and including 50mm dia. For 100mm or larger services, PVC piping shall be used (Class 150).

   Cathodic protection is required as per **Standard Detail 3-17**, **3-24**, or **3-25** as applicable.

   Corporation main stops shall be compression copper type (Mueller A-220 or equal) without thaw out and connector.

   Curb stops shall be copper compression, non-draining type (Mueller Ori-seal H15204 or equal). Curb stops for blow-offs shall be 50mm and self-draining. Main stops shall be no lead brass- conform to NSF61 Annex F.

   Water service direct hot taps shall be completely stainless steel or bronze combination. Service boxes shall be the extension type to 3.0m cover. Top sliding section of service box shall be one piece (No couplers). Service boxes shall be epoxy coated with stainless steel operating rod attached to a manganese bronze clevis and bronze or stainless steel cotter pin connection to the curb stop.

   Copper service lines and blow offs shall have sacrificial zinc anodes attached.

b. **Wastewater Sewer and Sump Pump Discharge Services Materials** - For single and multi-family development, all sewer and sump pump discharge service lines shall be PVC DR 35. Wastewater services shall be 150mm dia. Sump pump

discharge collection services shall be 100mm dia.

For non-residential services, PVC piping shall be used and specific design required.

5.10 LANDSCAPING

A plan for landscaping shall be submitted to Engineering Services for approval.

Entrance features will be maintained by the appropriate governing body (ie. Condominium board, home owners association, etc). Beaumont will not be responsible for maintenance.

5.11 OTHER IMPROVEMENTS

Plans for all other services to be provided, including but not limited to gas, power, telephone, cable television, lighting, fences, signs, traffic signs, traffic control devices and street name signs, in the submission for approval by Engineering Services.

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APPENDIX 1

PROCESS

Amended - 2025
Refer to Amendment #2
Number 6.1

SAFE DISPOSAL OF MATERIALS, CONCRETE AND CEMENT-BASED PRODUCTS

Construction wastewater, waste and other debris should not enter the City's storm system: Keeping construction wastewater, waste and other debris out of the storm sewer helps prevent storm sewer blockage, damage to the sewer system, road flooding and harmful substances from entering local waterways and harm aquatic habitat.

UNDER NO CIRCUMSTANCE THE FOLLOWING MATERIALS ARE ALLOWED TO ENTER THE STORM SYSTEM:

- Mud/sand
- Concrete/ cement power
- Paint
- Oil/ petroleum products
- Soap
- Chemicals
- Any construction material, debris or dust

Best Management Practices to be followed by Developers, General Contractors, Construction Crews, Concrete Providers, Home Builders, Masons & Bricklayers, Patio Construction Crews, etc.

General Practices

1. Ensure that an Erosion & Sediment Control Plan is followed.
    a. Implement measures to keep sediment in place where soil is being disturbed by the construction processes, such as the use of sediment traps, storm inlet protections, fiber rolls, silt fences, etc.
2. Where land is being cleared, protect catch basins by covering the inlet with filter fabric or follow another approved method which will not allow sediment to enter the catch basin.
    a. Identify concrete mixer washout areas, away from storm sewers, ditches and waterways. Allow wash water to flow into a temporary waste pit, if necessary;

b. Hardened concrete must be disposed and /or recycled properly.

3. Secure open bags of cement and keep cement powder away from streets, gutters, storm sewers, rainfall and runoff.
4. Protect both dry and wet materials from rainfall and runoff by storing under cover.
5. Materials must not be stored near storm sewers, ditches and waterways.
6. Design an effective construction exit to prevent dirt and waste leaving the site
    a. This may include gravel, paving, rumble strips and wheel washing.
    b. Do not allow dirt from the site to be dragged out to City's roads.
    c. Regularly sweep streets, sidewalks and driveways using dry method/vacuum sweepers and dispose of waste properly.
7. Protect fresh concrete/ cement applications from rainfall and runoff until material is dry.
8. Mix only enough concrete or mortar for a two hour period.
9. When cleaning, sweep or wash fines onto a dirt area to be collected and properly disposed, not onto a street, gutter or storm sewers.
10. Never dispose or washout into the street, gutter, storm sewers, ditch or waterways.
    a. Do not power wash or hose to wash construction dirt and waste onto the roadways or into catch basins.

11. Block edges of work area nearby storm sewers with sandbags if necessary and clean area, returning it to conditions found prior to work.
12. The use of diesel fuel as a lubricant on concrete forms, tools or trailers is prohibited in City.
13. Wash vehicles off-site at a car wash/truck wash or establish a designated wash area on-site.

14. Change vehicle oil and antifreeze off-site at designated facilities.
15. In the event of a spill, ensure equipment and processes are in place to keep prohibited materials out of the storm sewer. If materials enter the storm sewer system, contact the RCMP to report the spill.
16. Under no circumstance materials, debris, concrete or cement wash are to be poured down the drainage system: drains, service connections, catch basins, manholes, etc.
17. Contravention of the requirements will results in fines being applied.

Operational Practices

Concrete Saw Cutting:

1. All dust must be collected to prevent it from being washed down into the City's storm water system
2. Slurry must be properly collected and disposed.
3. Sandbags, soil or other materials must be used to divert slurry to bare soil or grassy area where it can be vacuumed up.

Exposed Aggregate:

1. Only place concrete if weather permits. Do not place it if is about to rain.
2. Slurry controls must be in place and approved by the City of Beaumont prior to commencement of work.
    a. Assure that the controls in place can handle the amount of water that will be used.
    b. All slurry must be contained within property boundary and none should reach the streets and catch basins.
3. If acid wash is been used to expose the aggregate, it must not be diverted into grass area or bare soil. All acid wash must be collected and properly disposed.

Concrete Pumping:

1. Use tarps, heavy plastic or containment under the pump to catch drips.
2. Pump equipment must be washed out in designated areas for slurry control.
    a. Under no circumstance should it drain into the streets and reach the storm system.

Concrete Delivery Trucks:

1. Concrete chutes must be washed out onto designated areas for proper disposal. Never wash chutes onto roads, driveways, or drains.
    a. This practice will prevent contaminated water from flowing into streets, gutters, storm sewers or ditches.
2. Trucks must have chute covers while driving in City.

Cleaning of equipment that came in contact with concrete or cement:

1. All equipment that came into contact with concrete or cement must be washed in designated areas where the wastewater can be held for disposal.
    a. Where a designated area is not available, wash the equipment over a spot of bare soil or grass.
        i. It must be far enough away from storm drains, that in an event of rain, it will not get washed out into the drainage system.

CLOSED CIRCUIT TELEVISION (CCTV) SEWER INSPECTION REQUIREMENTS AND GUIDELINES

All sewers shall be inspected with closed circuit television camera equipment. Inspections shall be performed in accordance with the standard practices as set out in the CSA/NASSCO (NASSCO PACP, MACP and LACP) guidelines.

Amended - 2025
Refer to Amendment #2
Number 6.2

1 CCTV INSPECTION REPORTS

One hard copy of the final CCTV inspection report, including Consultant's review with corresponding video (first generation copy quality) shall be provided to the City of Beaumont within two weeks of the completion of the inspection. The complete final report will become the property of the City of Beaumont.

1.1 The City of Beaumont accepts USB Flash Drives or Cloud Storage.

1.2 Digital data to be formatted to enable direct upload of the defect coding data into the City of Beaumont database or the entire report will be returned to the Consultant/Contractor.

- 1.2.1 Video must be able to be viewed using Windows Media Player or VLC Media Player and have the ability to use all features of the video player including fast forward capability.
- 1.2.2 All USB Flash Drives shall be numbered and cross-indexed to the written report.
- 1.2.3 All defect coding data must be provided

1.3 The CCTV inspection must be conducted in a manner that provides an unobstructed view of the entire pipe. The pipe must be free of debris and/or obstructions that impede visibility.

1.4 If a pipe segment was not cleaned prior to CCTV inspection and significant debris/ obstructions are encountered, the inspection must be stopped and rescheduled after the line is properly cleaned.

- 1.4.1 Lines that were cleaned but still have debris/obstructions should be re-cleaned and re-televised.

1.5 To ensure photographic quality in reports, colour video and printers must be used.

1.6 Video footage shall indicate the size of the sewer, the manhole to manhole segment being inspected, flow direction, plus the street address or location.

1.7 If the video footage is of such poor quality that the Engineering Department is unable to evaluate the condition of the sewer/lateral, the Contractor shall be required to re-televise the sewer and provide another of better quality.

1.8 The submitted report must be a record of the exact location of each leak or fault discovered by the camera - e.g. open joints, broken, cracked, deformed or collapsed pipe, presence of excessive grease, roots, debris, accumulation, obstruction, infiltration, water depth variations and other points of significance. The reference location for distance measurements shall be the centreline of the launch manhole (chainage 0+00).

1.9 Still capture pictures of all sewer defects shall be taken. The photographs shall be co-ordinated with the written report by reference numbers. A minimum of one photograph per line or manhole to manhole segment shall be taken to show a representative view of the workmanship.

1.10 The report shall include all the manholes, its numbers and the Street and Avenue number

1.10.1 Each manhole to manhole section of pipe shall be located on the report form in such a way as to be readily identifiable. Identify such items as name of subdivision, street names, manhole numbers, type of pipe, joint length, direction of flows, pipe diameter, manhole depth, inspection date, name (s) of the inspection technician (s), persons viewing, and videotape identification numbers. Lot and block numbers for all services shall be provided.

1.10.2 The video footage of a manhole must indicate structural conditions of the cover, frame, barrel, benching, flow channel and steps of each manhole. The report shall also indicate the degree of severity for each identified defect. The report shall also identify cross-connections between sanitary and storm systems, high water marks and degree of sedimentation.

1.11 All storm and all sanitary sewer service connections (lateral connections) are mandatory.

1.11.1 The report shall include the location of all service connections together with a statement of opinion as to whether or not the service connections are subject to joint infiltration.

1.11.1.1 Protrusions of service connections into the main line shall be noted with reference to the degree of protrusion.

2 CCTV INSPECTION EQUIPMENT

Recorded picture quality and definition shall be to the satisfaction of the City of Beaumont. Use video capture equipment capable of capture with no frame loss to obtain digital video from first generation recordings.

The City of Beaumont shall not be responsible for any loss or damage to the Contractor's equipment. The Contractor shall carry all necessary insurance to cover loss, damage, and/or retrieval during inspection. The Contractor shall be responsible for any damages due to sewer back-up or flooding that are caused by his cleaning or inspection operations. The Contractor shall promptly inform the City of Beaumont if any such damages occur.

2.1 Television equipment shall consist of a self-contained camera and a monitoring unit connected by a coaxial cable. This equipment shall be specifically designed and constructed for such inspection purposes. The camera shall be mounted on adjustable skids, or wheels, or have a height adjustment to facilitate the inspection of different sizes of pipe and to allow for visual judgement of ovality, by centring the camera within the pipe. The camera shall be waterproof and shall have a remote controlled self-contained lighting system capable of producing effective illumination for all sizes of pipe.

2.2 The lighting system shall be capable of lighting the entire periphery of the pipe.

2.2.1 The CCTV camera and illumination system shall be capable of providing a clean, accurate colour and in-focus record of the sewers internal condition.

2.2.2 The light source will be adjustable to allow an even distribution of light around the sewer perimeter without loss of contrast, flare out of picture, or shadowing.

2.3 The camera must be pan and tilt type capable of panning 360° and tilting 270°. The adjustment of focus and iris will allow optimum picture quality and a focal range adjustable from 100 mm to infinity.

2.4 Location measurement of defects shall be made by devices having a proven accuracy of plus or minus 1.5% or 2 metres, whichever is greater. Cable markings, if used, shall not be spaced greater than 600 mm along the length of the cable. Distance measurement system used shall be regularly calibrated by the contractor, with records to be made available to the City of Beaumont.

The City of Beaumont may reject equipment that cannot meet the accuracy requirements. The Contractor shall promptly inform the City of Beaumont of significant discrepancies between City of Beaumont record drawings and actual field observations.

2.5 Video overlay equipment will be capable of superimposing alpha-numeric information onto the video tape and capable of providing a minimum of 15 lines of information, 30 characters per line.

2.6 Equipment shall be mounted in appropriate vehicle. Electrical power for the system shall be self-contained and shall not require removal for each set-up. External power sources from public or private residences shall not be permitted. Sound dampening shall be applied to the vehicle and equipment.

2.7 THE TRANSPORT UNIT

2.7.1 The transport unit must be capable of moving the camera through the sewer using either a rubber tired or crawler tractor.

2.7.2 The transport unit must be capable of passing over minor surface imperfections including but not limited to broken joints and solid debris up to 40 mm in height.

2.7.3 The transport unit must permit complete inspection of the sewer from the centre of the start manhole to the centre of the finish manhole.

2.7.4 The transport unit and cable must be capable of inspecting a minimum of 200 metres of sewer from a single access point.

2.7.5 The transport unit must use a remote reading counter to measure distance traveled from the centre of the start manhole; this information will be recorded in metres to the nearest 0.10 metre.

2.7.6 The transport unit must permit the adjustment of camera height so as to position the centre of the lens in the centre of circular sewers and two thirds of the vertical dimension above the invert of egg shaped sewers.

2.8 Stub lines and other locations where access is limited to one manhole shall be televised using a crawler equipped camera.

3 EXECUTION OF WORK

3.1 The Contractor will be responsible for locating and identifying the manholes and lines in the field. The Contractor shall advise the City of Beaumont of buried or non-locatable manholes in writing. Any discrepancies found should be noted and reported to the City of Beaumont.

3.2 All sewers and manholes must be completely clean and free of debris and ready for CCTV inspection.

3.3 Pictures must be clear and in focus and must not be hazy due to steam or water vapour. Level in sewer must be controlled by jetting, by-passing, etc. so that any significant occurrence or defect can be seen in enough detail for identification, including the invert of the line.

3.4 All CCTV operators and reviewers should be NAASCO qualified to carry on the work.

3.4.1 Only operators who have successfully attained Qualification for CCTV Operators or have completed an accepted alternate training program must be permitted to operate inspection equipment and perform condition coding.

3.4.2 The operator must be fully trained in all aspects of sewer inspection and capable of making accurate observations and recording of all conditions, which may be encountered in the sewers.

4 CCTV INSPECTION

4.1 GENERAL

4.1.1 The CCTV monitor shall display a full description at the beginning of each survey stating date, time, job location, street name, pipe diameter, start M.H. No., and end M.H. No.

4.1.2 Flow and camera direction, type of pipe, pipe condition, weather conditions, other specified information must also be documented.

4.1.3 At all significant pipe defects observed during an inspection, the operator shall record a still capture picture of the defect, the description of the defect, the chainage in meters from the manhole, and the CD counter location.

4.2 IMAGE AND VISIBILITY

4.2.1 The CCTV inspection must be conducted in a manner that provides an unobstructed view of the entire pipe. The first objective of the inspection is to fully document structural deficiencies and construction features since those defects and features will have the most long-term influence on pipe integrity. The pipe should be free of debris and obstructions and bellies of water that impede visibility.

4.2.2 The view inside of a pipe can be significantly distorted by improper positioning of the camera within the pipe. Centering of the camera is particularly important in smaller diameter pipes, which are the vast majority of pipes televised. For example, improper centering of the camera will exaggerate the amount of joint offset and inconsistent vertical positioning of the camera will cause incorrect estimates of water or debris levels.

4.3 LIGHTING

4.3.1 Lighting during the inspection should be adequate to fully illuminate the entire pipe, but not overly illuminate. Low lighting is more likely to occur in large diameter pipes or in dark material pipes such as polyethylene or ductile iron that do not reflect light. Another problem is excessive lighting or an overly-adjusted camera iris. This can result in a flaring of the image and exaggeration of pipe joint displacement or other pipe conditions.

4.4 COLOR

4.4.1 Correct color is very important for proper identification and documentation of defects. The operator should follow manufacturer's recommendations to ensure the camera and video display correctly reflect the true colors within the pipe and on the video display.

4.5 CAMERA POSITIONING AND DIRECTION OF TRAVEL

4.5.1 Ensure that the camera is centred in circular sewer lines and manhole risers and is set at two thirds of the vertical dimension of egg shaped sewer lines at all times during inspection.

4.5.2 Position tolerances will be +/- 10% of the vertical dimension of the sewer. Camera speed will not exceed 9 metres/minute during sewer and manhole inspections.

4.5.3 The camera descent rate in a manhole shall not exceed 20 metres per minute to allow adequate time for operator interpretation. A uniform rate of speed shall prevail.

4.5.4 If the camera position does not satisfy the requirements for the inspection, re-perform inspection at the Contractor's expense.

4.5.5 The Contractor will be required to inspect and record all sewer pipes and laterals and assess the condition of the pipe according to defect coding standards including but not limited to:

4.5.5.1 Structural condition of pipe walls. Length, size, material type, and depth of each pipe (all depths shall be referenced from the top of the manhole frame to the invert of the pipe being inspected.

4.5.5.2 Any blockage or obstructions located within the pipe.

4.5.5.3 Condition of pipe joints, and lateral connections.

4.5.5.4 Any change in pipe diameter or pipe materials encountered in any section between two manholes.

4.5.5.5 Report on grade of pipe as to whether it is uniform or whether there appears to be sectional settlement or grade changes.

4.5.5.6 Infiltration.

4.5.5.7 Explanations for water level fluctuations.

4.5.5.8 Location and condition of connection of sewer laterals, including pan and tilt of all junctions/connections unless otherwise specified by City of Beaumont.

4.5.5.9 Still capture pictures shall be taken of all significant structural and/or operational deficiencies.

4.5.5.10 The operator shall utilize the pan and tilt capability of the camera at the time of inspection to obtain still pictures of the defect that represent the extent of the defect and any other pertinent features related to the defect.

4.5.5.11 Special problems and conditions, such as sources of inflow, overflows, bypasses, and manholes located in natural ponding areas etc.

4.5.6 All measuring equipment shall be calibrated for accuracy before the work starts and maintained throughout the work.

4.5.7 The Contractor shall not attempt a CCTV inspection if water levels in the manhole obstruct the camera's view unless instructed by the City of Beaumont.

4.5.8 The camera operator shall, during the inspection, pan the camera to focus on observable deficiencies in the manhole.

4.6 EXECUTION OF THE WORK

4.6.1 At the start of each survey use a video overlay system to clearly display, on the monitor and video recording, the following alpha-numeric information for 30 seconds.

4.7 DISTANCE MEASUREMENT

4.7.1 Ensure that distance measurement within the sewer is accurate to within 0.5% of the above ground measurement.

4.7.2 Inspection distances will be determined by a remote reading counter capable of measuring to the nearest 0.10 metre.

4.7.3 If the distance measurement does not satisfy the accuracy requirements re-inspect the line at the Contractor's expense.

4.7.4 Use a steel tape to measure manhole depths from the sewer invert to the manhole frame to the nearest 0.01 of a metre.

4.7.5 Measure the distance between the centres of the start and finish manhole on the ground surface to the nearest 0.01 of a metre using a steel tape prior to beginning the inspection. Implement flow control measures to ensure a minimum of 80% of the height of the sewer is visible for the entire inspection. Evacuate all fog from the sewer. Keep camera lens clean at all times and keep the sewer clear of fog during the entire inspection.

4.7.6 Measure the vertical distance of manholes from the sewer invert to the manhole frame to the nearest 0.01 of a metre using a steel tape before beginning the sewer or manhole inspection.

4.8 DIRECTION OF FLOW SET-UP

4.8.1 Inspect sewers in the direction of flow unless a reverse set up is required. Begin with the upstream sewer in the system and proceed downstream in a consecutive manner. Inspect all contributing upstream sewers before proceeding downstream.

4.8.2 Ensure that the start manhole is clearly visible at the start of the inspection and perform the inspection from the centre of the start manhole to the centre of the finish manhole. At the start of the inspection record the length of sewer from the face of the manhole to the cable calibration point and adjust the distance reading at the cable calibration point such that zero is at the face of the start manhole.

4.8.3 Ensure that the automatic distance measurement is displayed on-screen at all times during the inspection. Ensure that the distance measurement is accurate from the cable calibration point to the centre of the finish manhole. Set a maximum camera speed of 9 metres/minute.

4.8.4 Keep the picture in focus during the inspection from the point of observation to a minimum of two pipe diameters ahead. Stop camera for 2 seconds at major defects and connections, junctions, and major branches. Rotate and pan the camera to provide a perpendicular view of all major defects, connections, junctions, and major branches. Major defects to include but not be limited to deformed sewers, displaced bricks, holes, large displaced joints, missing bricks, missing mortar, obstructions, and large open joints.

4.8.5 Capture an image (jpeg or digital file) and notify the Project Manager immediately if flow disparity, clear water infiltration, hole or missing bricks, collapse, void, or deformation greater than 10%, are observed during the course of inspection.

4.9 REVERSE SET-UP

4.9.1 If inspection of an entire sewer cannot be completed due to a collapse, excessive deformation or solid debris, intruding connections, obstructions, or large displaced joints, move equipment to the downstream manhole and attempt inspection in the upstream direction.

4.9.2 Advise the Project Manager if complete manhole-to-manhole inspection still cannot be performed. Jointly, the Contractor and Project Manager will decide to:

4.9.2.1 Abandon the inspection;

4.9.2.2 Re-perform the inspection subsequent to:

4.9.2.3 Perform solid debris cutting;

4.9.2.4 Remove intruding connections;

4.9.2.5 Modify the camera setup (position and/or method of transport);

4.9.2.6 Complete emergency repairs.

4.9.3 Track all locations where a complete inspection could not be obtained. Review these locations with the Project Manager on a daily basis. Record the Sewer ID number & Work Order No., steel tape measurement, length inspected (up and downstream), length of missing video and the reason the inspection could not be completed.

REQUIREMENTS FOR ROAD/ SIDEWALK CLOSURE

Written approval is to be granted prior to any travel lane or sidewalk being closed (partially or fully) due to construction activities. All Town of Beaumont rules, regulations and guidelines are to be followed by all contractors.

An application and all necessary supporting document must be submitted to Engineering Services for review and approval with a minimum of 20 (twenty) business days prior to the commencement of work.

The Manager of Engineering or his approved designate, will review, approve or decline the referred application.

1. Application:

a. Completed Application to be submitted by email or by mail to:
Engineering Services
5600 - 49 Street, Beaumont, AB T4X 1A1
Engineering@ beaumont.ab.ca

2. Supporting Documentation:

a. Drawings of the areas impacted to be provided with all streets and avenues labelled and a North Arrowd
b. Temporary Traffic & Pedestrian Accommodation Plan:
    i. The Applicant must ensure the approved Temporary Traffic & pedestrian Accommodation Plan is maintained and monitored.
    ii. Detailed explanation of proposed work and how vehicle, pedestrian and cyclists will be managed during planned work;
    iii. Indicate how access will be maintained to adjacent properties and how services such as Fire, Ambulance or Waste Collection will be maintained;
    iv. Regulatory Signs, Advance Warning Signs and Temporary Condition Signs are mandatory;
    v. Barricades and/or fences shall be used to delineate the work area
        1. Show location of any temporary fencing that will be erected
    vi. Protective devices, cones and/ or Marshalling Plan (flag-people) may be required, depending on the proposed work;
    vii. Identify impacts to public parking and provide options/solutions;
    viii. 2-way traffic to be maintained at all times if possible
c. Detour Plan if applicable
    i. Identify any detour routes for vehicles, pedestrians and cyclists;
d. Surface Restoration Plan:
    i. Fillcrete is required under the roads, sidewalk or curbs. Native clay fill and road crush is NOT approved in any circumstance

ii. The existing road must be backfilled with fillcrete to the bottom of asphalt structure and match existing asphalt. Fillcrete must be completely cured prior to paving
iii. No backfilling prior to Town's inspection
iv. Cold mix or area bridged with steel plates is required until hot mix asphalt can be done. Signage for this specific condition also required to be displayed.
v. Paving marks to be restored within 15 days of work completed, if applicable
vi. The area and its landscaping must be restored and brought back to its original state after construction is complete.

e. Approved Construction Notice to be distributed by Applicant 5 (five) business days prior to proposed closure. The notice must contain:
   i. Explanation of proposed work
   ii. Proposed start and end date and time
   iii. Name and phone number of the project's representative
   iv. Map of area showing the impacted area, with roads labelled and a North arrow;
   v. If changes in schedule will occur, a new notice must be distributed;
f. The Applicant must ensure the approved plan is maintained and monitored.

3. General Requirements:

a. Roadways shall not be obstructed with material, unless otherwise approved by Engineering Services and shall be barricaded as per approved plan;
b. All work areas shall be properly signed and barricaded as per approved plans until normal conditions are restored
   i. Any changes are to be submitted for approval prior to implementation;
c. Traffic lanes shall be bridged with steel plates when possible;
d. Construction must be carried out between 7:00am to 11:00pm Monday to Friday, 8:00am to 10:00pm Saturdays, and 9:00am to 10:00pm Sundays and Statutory Holidays, as per the Town of Beaumont's Noise Bylaw 642-05.
e. After Temporary Road Closure Application is approved by Engineering Services, it is the responsibility of the prime contractor or the job site supervisor to arrange, maintain and monitor Temporary Traffic Control.
f. After approval has been given by the Town, a confirmation of schedule for the proposed work is required a t least 2 (two) working days prior to commencement of the work.
g. Any damaged to Town's, residents or business property is to the sole responsibility of the Owner/Developer of the project and must be repaired within 15 days of completion of the proposed work.

ROAD/ SIDEWALK CLOSURE PERMIT APPLICATION

	APPLICATION # (CITY USE ONLY)
PROPOSED CLOSURE LOCATION (S)	
PURPOSE OF APPLICATION & DESCRIPTION OF PROPOSED WORK	
PROPOSED START DATE	PROPOSED COMPLETION DATE
APPLICANT'S NAME	
APPLICANT BUSINESS ADDRESS	CITY/ TOWN PROVINCE POSTAL CODE
APPLICANT'S EMAIL ADDRESS	APPLICANT'S TELEPHONE NUMBER
APPLICANT'S 24 HOUR EMERGENCY CONTACT NAME AND TELEPHONE NUMBER	
CONTRACTOR (if different from the Applicant)	PROJECT ENGINEER'S NAME
SUPPORTING DOCUMENTS INCLUDED IN THIS APPLICATION (select the ones that apply):	
SITE PLAN ☐	
TRAFFIC & PEDESTRIAN ACCOMODATION PLAN ☐	
DETOUR PLAN (if applicable) ☐	
PUBLIC/BUSINESS NOTIFICATION LETTER ☐	
OTHER: (provide information below) ☐	
APPLICANT'S SIGNATURE	APPLICATION DATE
APPROVING SIGNATURE (CITY USE ONLY)	APPROVAL DATE (CITY USE ONLY)

UTILITY CONNECTIONS

An application and all necessary supporting document must be submitted to Engineering Services for review and approval with a minimum of 15 (fifteen) business days prior to the commencement of work.

The Manager of Engineering or his approved designate, will review, approve or decline the referred application.

1. Application

a. Completed Application to be submitted by email or by mail to:
Engineering Services
5600 - 49 Street, Beaumont, AB T4X 1A1
Engineering@ beaumont.ab.ca

2. Supporting Documentation

a. Contact information
b. Project location
c. Project type and its timeline
d. How many locations
    i. List details
e. Reason/ type of work
    i. Method of work
f. Proposed start and end date
g. Describe how the work will impact traffic in general (vehicles, cyclists, pedestrians, etc) and provide:
    i. Road/ sidewalk closure plan
    ii. Temporary traffic & pedestrian accommodation plan
    iii. Detour plan if applicable
h. Surface restoration Plan
    i. Provide approximate size of cut and surface type (concrete, asphalt, etc)
    ii. Fillcrete is required under the roads, sidewalk or curbs. Native clay fill and road crush is NOT approved in any circumstance
    iii. The existing road must be backfilled with fillcrete to the bottom of asphalt structure and match existing asphalt. Fillcrete must be completely cured prior to paving
    iv. No backfilling prior to City's inspection
    v. Steel plates required to protect area until pavement can be done
    vi. Paving marks to be restored within 15 days of work completed, if applicable
    vii. The area and its landscaping must be restored and brought back to its original state after construction is complete.

3. Approved Construction Notice

Approved Construction Notice o be distributed by Applicant to all residents and business in the vicinity of the project 5 (five) business days prior to proposed closure. The notice must contain:

a. Explanation of proposed work
b. Proposed start and end date and time
    i. In case of any changes, a new notice must be approved by the City and then distributed by project's representative
c. Name and phone number of the project's representative
d. Map of area showing the impacted area, with roads labelled and a North arrow;
e. If changes in schedule will occur, a new notice must be distributed;
f. The Applicant must ensure the approved plan is maintained and monitored.
g. City will inform RCMP and Fire Department of the planned road closure

4. General requirements

a. A City's representative must be onsite during tie-in connections
    i. The City requires at least 72 hours' notice before tie-ins into our system starts;
    ii. We do not work on weekends, so tie-ins, hot taps, backfilling, etc must happen during working hours and on week days
b. All work areas shall be properly signed and barricaded as per approved plans until normal conditions are restored;
c. Roadways shall not be obstructed with material, unless otherwise approved by Engineering Services;
d. 2-way traffic to be maintained at all times is preferable
e. The City must be informed of all stages of the work, as it progresses;
f. Any changes are to be submitted for approval prior to implementation;
g. Construction must be carried out between 7:00am to 11:00pm Monday to Friday, 8:00am to 10:00pm Saturdays, and 9:00am to 10:00pm Sundays and Statutory Holidays, as per the City of Beaumont's Noise Bylaw 642-05.
h. Traffic lanes shall be bridged with steel plates when possible
i. Bedded sand underneath all pipes
j. 0.3 meters (1 feet) of sand above pipe
k. Sand pipe bedding to be compacted to 95% Standard Proctor Density and test result to be submitted to Engineering Division
l. Fillcrete up to bottom of pavement
m. The existing road must be backfilled with fillcrete to the bottom of asphalt structure and match existing asphalt
n. native clay fill and road crush is not approved in any circumstance
o. Make sure valve casings are straight prior to pour fillcrete over them

p. After fillcrete is placed, a few days is required for the fillcrete to be cured, and only then, the area can be paved
q. If work is done during winter and cold months: to create temporary road structure, cold mix asphalt is accepted until weather conditions permits permanent patch with hot mix asphalt
r. The same requirements applies for the fillcrete under the sidewalk or curbs
s. No backfilling prior to City's inspection

WATER AND/OR SEWER SERVICE CONNECTION PERMIT APPLICATION

WATER SERVICE CONNECTION STORM SEWER SERVICE CONNECTION SANITARY SEWER SERVICE CONNECTION	☐ ☐ ☐	APPLICATION # (CITY USE ONLY)
PROPOSED LOCATION (S)		
PURPOSE OF APPLICATION & DESCRIPTION OF PROPOSED WORK		
PROPOSED START DATE		PROPOSED COMPLETION DATE
APPLICANT'S NAME		
APPLICANT BUSINESS ADDRESS		CITY/ TOWN PROVINCE POSTAL CODE
APPLICANT'S EMAIL ADDRESS		APPLICANT'S TELEPHONE NUMBER
APPLICANT'S 24 HOUR EMERGENCY CONTACT NAME AND TELEPHONE NUMBER		
NAME OF COMPANY THAT WILL BE PERFORMING THE PROPOSED WORK		
SUPPORTING DOCUMENTS INCLUDED IN THIS APPLICATION (select the ones that apply): SITE PLAN ROAD/ SIDEWALK CLOSURE PLAN TRAFFIC & PEDESTRIAN ACCOMODATION PLAN DETOUR PLAN (if applicable) SURFACE RESTORATION PLAN PUBLIC/BUSINESS NOTIFICATION LETTER DRAFT OTHER: (provide information below)	 ☐ ☐ ☐ ☐ ☐ ☐ ☐	
APPLICANT'S SIGNATURE		APPLICATION DATE
APPROVING SIGNATURE (CITY USE ONLY)		APPROVAL DATE (CITY USE ONLY)

INSPECTION REQUEST FORM

Subdivision Name and Stage:
Engineering Consultant:
Proposed inspection dates & times (provide 2):

INSPECTION TYPE: ☐ CCC ☐ FAC ☐ 1ST INSPECTION ☐ RE-INSPECTION
REASON FOR RE-INSPECTION:

MUNICIPAL IMPROVEMENT INSPECTION REQUEST FOR:

☐ UNDERGROUND IMPROVEMENTS (WATER, SANITARY & STORM SEWERS)

☐ SURFACE IMPROVEMENTS:

- ☐ ROADS, CURB & GUTTERS, CURB RAMPS, SIGNAGE
- ☐ CONCRETE WALKWAYS
- ☐ SIDEWALKS
- ☐ PAVED LANES
- ☐ ASPHALT TRAILS

☐ LANDSCAPING & FENCING:

- ☐ BOULEVARD LANDSCAPING
- ☐ MR AND PUL LANDSCAPING
- ☐ SWMF LANDSCAPING
- ☐ FENCING

☐ OTHER: .....

IF RE-INSPECTION, HAVE DEFICIENCIES BEEN RECTIFIED? ☐ YES ☐ NO
COMMENTS:

CONSULTING ENGINEER CERTIFICATION: I hereby confirm that the above referred municipal improvement has been pre-inspected by Consultant and found acceptable for inspection according to the General Design Standards-2019. I confirm that all assets are visible and available for inspection.
Attached applicable check list as per municipal improvement requested above.

....
Consulting Engineer Name & Signature) Date

CITY OFFICE USE ONLY
REQUEST FOR INSPECTION: ☐ ACCEPTED ☐ REJECTED

DATE AND TIME SCHEDULED:

ENGINEERING SERVICES REPRESENTATIVE:

** Re-inspection fee applies at the discretion of the inspector if called out for subsequent inspections and deficiencies have not been corrected **

CHECK LIST FOR SURFACE FIELD INSPECTIONS

General Instructions:

1. Prior to a formal CCC or FAC inspection request, the Developer/Consultant must conduct their own independent inspection to ensure the infrastructure meets the minimum requirements to conduct a formal inspection.
    a. All sites eligible for inspection must be in an acceptable condition for inspection by the City. This is defined as being free of debris, dirt, snow, ice, etc with all aspects of the work readily accessible and visible to the City's Inspector.
    b. There should be no construction equipment, vehicles, or materials which may impede the inspection.
    c. Failure to meet this requirement may result in the cancellation of the inspection deeming it "incomplete".
        i. In this case, once the site is in an acceptable state for inspection, a request for another formal inspection is required.

2. Weather conditions must be adequate to properly inspect any municipal improvement.

3. The warranty start date of a CCC shall commence on the date the Inspector provides a passing inspection identifying "no deficiencies".

4. Instructions to complete the form:
    a. Put an "X" to indicate that the municipal improvement has been pre-inspected, repaired (if required) and is ready for City's inspection.
    b. All seasonal deficiencies must be completed and/or resolved within 60 days of issued CCC or if inspected after September 15, must be completed by June 30, in the year following the date of the CCC application.
    c. Items that are "Not Applicable", write N/A.

Date:

Subdivision/Stage #:

Developer:

Engineering Consultant:

☐ Consultant pre-inspected and corrected found deficiencies prior to City's inspection

☐ Site is cleaned, free of debris, dirt, snow, ice, equipment, etc with all aspects of the work readily accessible and visible to the City's Inspector

☐ Other:

SURFACE IMPROVEMENTS

GENERAL

- [ ] Geotechnical reports (if applicable)
- [ ] Asphalt & concrete test results and surface penalty assessment submitted
- [ ] Site is cleaned and ready to be inspected
- [ ] Full tank water truck to be onsite ready for inspection of drainage. All roads and gutters to be water flushed immediately prior to inspection.
  *** Inspections will not be permitted in freezing or near freezing temperatures

PAVED ROADS AND CURB RAMPS

- [ ] All roads have been built and paved
- [ ] All curb & gutters and catch basins are installed
- [ ] All aprons are installed (if applicable)
- [ ] All curb ramps are installed and built monolithically
- [ ] Curb ramps' tooled grooves shows correct walking path
- [ ] CC and WV locations are stamped on sidewalk or on curb & gutters (where it can't be done on the sidewalks)
- [ ] Contractor's Company Name stamped at start and end of concrete pour
- [ ] All signage installed
- [ ] Manholes and valves visible as per approved drawings
- [ ] All manholes, water valves, covers and caps have been cleaned of all debris after paving
- [ ] All wick drain pipes are installed and trimmed at 6 inches length
- [ ] Clay cap or landscaping completed around improvement
- [ ] Other:
- [ ] Other:

Comments:

SEPARATE WALKS AND/OR CONCRETE WALKWAYS

- ☐ All separate walks are built
- ☐ All concrete walkways are built
- ☐ All sidewalks are installed, cross falls have been checked, and are between 2% to 4% grades
- ☐ Clay cap at the edges of all structures is in place
- ☐ Structures are stamped (CC, WV, Contractor's Company Name)
- ☐ Apron connection is installed (if applicable)
- ☐ Other:

Comments:

PAVED ALLEYS

- ☐ All alleys are built
- ☐ Clay cap along the edges of alley is in place
- ☐ Concrete apron is installed
- ☐ Wick drain is installed on V-crown alley (if applicable)
- ☐ Drainage is acceptable and doesn't hold water
- ☐ MH, CB, CBMH, WV and ICDs are installed and visible (if applicable)
- ☐ Other:

Comments:

MULTI-USE TRAILS

- ☐ All Trails are built
- ☐ Clay cap along the edges of trail is in place
- ☐ Concrete commercial crossing (or apron) is installed
- ☐ Drainage is acceptable and doesn't hold water
- ☐ Other:

Comments:

CHECK LIST FOR UNDERGROUND FIELD INSPECTIONS

General Instructions:

1. Prior to a formal CCC or FAC inspection request, the Developer/Consultant must conduct their own independent inspection to ensure the infrastructure meets the minimum requirements to conduct a formal inspection.
    a. All sites eligible for inspection must be in an acceptable condition for inspection by the City. This is defined as being free of debris, dirt, snow, ice, etc with all aspects of the work readily accessible and visible to the City's Inspector.
    b. There should be no construction equipment, vehicles, or materials which may impede the inspection.
    c. Failure to meet this requirement may result in the cancellation of the inspection deeming it "incomplete".
        i. In this case, once the site is in an acceptable state for inspection, a request for another formal inspection is required.

2. Weather conditions must be adequate to properly inspect any municipal improvement.

3. The warranty start date of a CCC shall commence on the date the Inspector provides a passing inspection identifying "no deficiencies".

4. Instructions to complete the form:
    a. Put an "X" to indicate that the municipal improvement has been pre-inspected, repaired (if required) and is ready for City's inspection.
    b. All seasonal deficiencies must be completed and/or resolved within 60 days of issued CCC or if inspected after September 15, must be completed by June 30, in the year following the date of the CCC application.
    c. Items that are "Not Applicable", write N/A.

Date:

Subdivision/Stage #:

Developer:

Engineering Consultant:

☐ Consultant pre-inspected and corrected found deficiencies prior to City's inspection

☐ Site is cleaned, free of debris, dirt, snow, ice, equipment, etc with all aspects of the work readily accessible and visible to the City's Inspector

☐ Other:

UNDERGROUND IMPROVEMENTS (WATER, STORM & SANITARY SEWERS SYSTEMS):

WATER SYSTEM

GENERAL

- ☐ Flushing, disinfecting, and testing final report completed and submitted to the Engineering Division with hydrostatic test results, and satisfactory lab test results have been submitted prior to inspection request
- ☐ All system is installed

HYDRANTS

- ☐ All hydrants are installed, accessible and operating properly
- ☐ Zinc anode was installed on operating rod just above the drip valve (Mueller Canada part number 349190)
- ☐ All hydrants face the street
- ☐ All hydrants are painted as per Beaumont's Design Standards
- ☐ All pressure reducing valves and check valves installed, operable and accessible
- ☐ All hydrant valves are operable and accessible
- ☐ All hydrant valves are at correct elevation
- ☐ All hydrant isolation valves are installed, accessible and operating properly
- ☐ Bottom of hydrant (s) flange (s) are 100mm to 150mm above proposed finish grade
- ☐ Rock nut on operating rod are 300-400mm within surface
- ☐ All hydrants have been properly greased
- ☐ All gaskets are in good order
- ☐ Other:

Comments:

WATER VALVES

- ☐ Main water valves are installed, accessible and operating properly
- ☐ Water valves are at correct elevation
- ☐ Rock nut on operating rod are 300-400mm within surface
- ☐ Other:

Comments:

CC/ SERVICES

- [ ] CCs are installed, accessible and operating properly
- [ ] CCs are at proper elevation
- [ ] Property service connections records submitted for CCC
- [ ] Other:

Comments:

SANITARY & STORM SEWER SYSTEMS

GENERAL

- [ ] All utilities installed
- [ ] Mandrel testing performed (if required)
- [ ] Hydrostatic pressure test performed (if required)
- [ ] All lines cleaned and power flushed
- [ ] All lines, manholes and catch basin barrels are video recorded, reviewed by Consultant and Consultant's report has been provided to Engineering Services
- [ ] Rip-rap is installed on inlet/outlet
- [ ] Other:

Comments:

STORM & SANITARY MANHOLES

- [ ] All manholes and pipes unobstructed
- [ ] All manholes and structures installed and are accessible
- [ ] All manholes in safe condition, frame and cover secured, in good condition
- [ ] All frame and covers are the correct type and are at the proper elevation
- [ ] All grade rings are properly aligned
- [ ] All steps in manholes are aligned and spaced properly
- [ ] All the rings in manholes have been grouted
- [ ] All benching are completed and smooth
- [ ] All interior/ exterior drops installed
- [ ] All NF-90 sanitary manhole has its rubber gasket installed and in good condition
- [ ] Silt fence up around all inlets and/or gated top storm manholes
- [ ] Erosion control inlet protection installed

- [ ] All safety grates installed on storm manholes
- [ ] Other:

Comments:

LATERAL SERVICES

- [ ] Property service connections records submitted
- [ ] All services installed
- [ ] All temporary risers are installed for video recording of service laterals
- [ ] Other:

Comments:

CATCH BASINS

- [ ] All CB grates are the correct type and are installed at the proper elevation
- [ ] All wick drain pipes are installed and trimmed at 6 inches length
- [ ] All catch basins have been cleaned
- [ ] All catch basins have been grouted
- [ ] Other:

Comments:

SWMF – WET POND

- [ ] Inlet, outlet, benching and all structures are installed, have no damages, and are clean and free of debris and/or blockages
- [ ] Control structure is installed and outlet valve is adjusted properly in order to control the detention time and the resultant water quality discharged from the pond
- [ ] Pond levels are not lower than the normal permanent pool elevation
- [ ] The vegetation around the pond is established and healthy (seed to have germinated and sod to have netted)
- [ ] No signs of erosion around the pond
- [ ] Overland escape/spillway installed
- [ ] Sediment control is in place and there is no sediment accumulation
- [ ] Weeds, aquatic weeds, algae, and mosquitos are under control
- [ ] All pond signage is installed and is in good condition
- [ ] Pond maintenance access road is installed

- ☐ Boat ramp is installed (if applicable)
- ☐ Water quality is good
- ☐ There's no presence of oily sheen or spills near the inlet and/or outlet
- ☐ Maintenance Manual is provided
- ☐ Other:
- ☐ Other:

Comments:

SWMF – DRY POND

- ☐ Inlet, outlet, benching and all structures are installed, have no damages, and are clean and free of debris and/or blockages
- ☐ Outlet valve is adjusted properly in order to control the detention time and the resultant water quality discharged from the pond
- ☐ Vegetation is established and healthy (seed to have germinated and sod to have netted)
- ☐ All pond signage is installed and is in good condition
- ☐ No standing water in the pond more than 24 hours after a storm
- ☐ Sediment control is in place and there is no sediment accumulation
- ☐ Weeds, algae, and mosquitos are under control
- ☐ Pond's maintenance access road is installed
- ☐ Maintenance Manual is provided
- ☐ Other:
- ☐ Other:

Comments:

LIFT STATION & INLET/OUTLET VALVES

- ☐ Lift station constructed and functional
- ☐ Inlet/outlet valves installed and functional
- ☐ Other:
- ☐ Other:

Comments:

CHECK LIST FOR LANDSCAPE & FENCE FIELD INSPECTIONS

General Instructions:

1. Prior to a formal CCC or FAC inspection request, the Developer/Consultant must conduct their own independent inspection to ensure the infrastructure meets the minimum requirements to conduct a formal inspection.
    a. All sites eligible for inspection must be in an acceptable condition for inspection by the City. This is defined as being free of debris, dirt, snow, ice, etc with all aspects of the work readily accessible and visible to the City's Inspector.
    b. There should be no construction equipment, vehicles, or materials which may impede the inspection.
    c. Failure to meet this requirement may result in the cancellation of the inspection deeming it "incomplete".
        i. In this case, once the site is in an acceptable state for inspection, a request for another formal inspection is required.

2. Weather conditions must be adequate to properly inspect any municipal improvement.

3. The warranty start date of a CCC shall commence on the date the Inspector provides a passing inspection identifying "no deficiencies".

4. Instructions to complete the form:
    a. Put an "X" to indicate that the municipal improvement has been pre-inspected, repaired (if required) and is ready for City's inspection.
    b. All seasonal deficiencies must be completed and/or resolved within 60 days of issued CCC or if inspected after September 15, must be completed by June 30, in the year following the date of the CCC application.
    c. Items that are "Not Applicable", write N/A.

Date:

Subdivision/Stage #:

Developer:

Engineering Consultant:

☐ Consultant pre-inspected and corrected found deficiencies prior to City's inspection

☐ Site is cleaned, free of debris, dirt, snow, ice, equipment, etc with all aspects of the work readily accessible and visible to the City's Inspector

☐ Other:

LANDSCAPING/ SWMF LANDSCAPING

- ☐ All trees, shrubs, and sodding are installed
- ☐ All plants were purchased from Nurseries who are Clean Plant Certified in Alberta and have proof of origin
- ☐ Tree stakes painted in the appropriate colour coding for the year of installation
- ☐ All amenities: benches, garbage disposal, etc are installed
- ☐ Miscellaneous amenities: bridges, playgrounds, gazebos, etc are installed (if applicable)
- ☐ Pathway, walkways, etc are installed, if applicable (part of surface related items inspection)
- ☐ Park signage is installed (if applicable):
- ☐ Other:

Comments:

FENCING

- ☐ All noise attenuation fences are installed (if applicable)
- ☐ All wooden board fences are installed
- ☐ All chain link fences are installed (if applicable)
- ☐ All decorative fences are installed (if applicable)
- ☐ Bottom of fences have been surveyed and data provided to City
- ☐ Advertisement signs removed from fences
- ☐ Other:

Comments:

Please return forms to:
City of Beaumont
Engineering Services
5600 - 49 Street
Beaumont AB T4X 1A1
Phone: 780-929-4300
Email: engineering@ beaumont.ab.ca

Road Use Agreement Application

This form must be completed in its entirety. **Sketches of the proposed route must be included with this application**. If additional writing space is required, please submit under separate cover. Applications take at least three to five business days to process.

SECTION 1 – COMPANY INFORMATION		
Company Name:		
Requested by:	Company Phone:	
Mailing Address:		
City/City:	Province:	Postal Code:
Email Address:		

SECTION 2 – PROJECT INFORMATION	
Contractor:	Phone Number:
Field Contact:	Cell Number:
Email Address:	

SECTION 3 - ROAD USE AGREEMENT DETAILS	
Type of Road Use: Multi-trip at posted axel weight ☐	Multi-trip exceeding posted axel ☐
Haul Start Date: _____(mm/dd/yyyy)	Haul End Date:_____ (mm/dd/yyyy)
Haul from:	Haul to:

Route used: _____

_____

_____

_____

Equipment/material/product being hauled: _____

_____

_____

Specific loads/days/week for each route and equipment used: _____

_____

_____

_____

_____

SECTION 4 - AUTHORIZATION

I certify that the information given on this form is true and complete to the best of my knowledge and acknowledge my authorization of the information to be used for the purposes identified below.

Signature: **Date:**

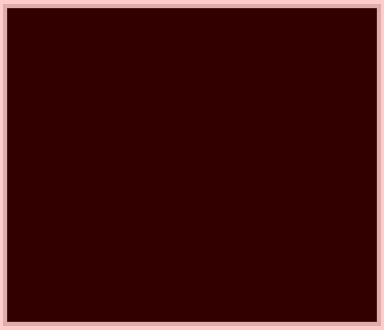
The personal information requested on this form is being collected under the authority Section 33(c) of the Freedom of Information and Protection of Privacy (FOIP) Act. The information collected will be used to process the road use agreement. If you have any questions about the collection or use of your personal information, contact the City of Beaumont's FOIP Coordinator at 5600-49th Street, Beaumont, Alberta, T4X 1A1 or (780) 929-8782.

Amended. Refer to Bulletin 005

Engineering Services
Mailing Address: 5600 49 Street
Beaumont, AB T4X 1A1

CONSTRUCTION COMPLETION CERTIFICATE

DEVELOPMENT AREA:
DEVELOPER:
DEVELOPMENT AGREEMENT DATED:
CONTRACTOR:
MUNICIPAL IMPROVEMENT(S):
BOUNDARIES OF THE DEVELOPMENT AREA: Location of Municipal Improvement referred to herein is as shown, outlined in red, on the plan on the reverse hereof (or see attached)
DATE OF APPLICATION:
PURSUANT TO THE DEVELOPMENT AGREEMENT I, OF THE FIRM HEREBY CERTIFY THAT THE MUNICIPAL IMPROVEMENT WORK NOTED HEREIN MEETS ALL REQUIREMENTS FOR A CONSTRUCTION COMPLETION CERTIFICATE AS SPECIFIED IN THE SAID SERVICING AGREEMENT MENTIONED ABOVE, AND CONSTRUCTED AS FAR AS CAN BE PRACTICALLY ASCERTAINED ACCORDING TO THE CITY OF BEAUMONT GENERAL DESIGN STANDARDS IN COMPLIANCE WITH THE REQUIREMENTS OF THE SAID DEVELOPMENT AGREEMENT, I, HEREBY, RECOMMEND THIS MUNICIPAL IMPROVEMENT FOR APPROVAL THE CONSTRUCTION COMPLETION CERTIFICATE BY THE CITY OF BEAUMONT.



_____ Date _____
P. Eng. or Landscape Architect (Consulting Firm)

_____ Date _____
Signing Officer of Consulting Firm

_____ Date _____
Authorized City of Beaumont Inspector

Approved on _____
_____
City of Beaumont - Manager, Municipal Projects

Rejected on _____
_____
City of Beaumont - Manager, Municipal Projects

Reason for rejection: (See attached Report) _____

I hereby certify that the items listed as reasons for rejection have been corrected.

_____ Date _____
Project Engineer or Landscape Architect (Consulting Firm)

Approved: _____ Date _____
City of Beaumont - Manager, Municipal Projects

Date Maintenance Period to Start: _____

Date Maintenance Period to End: _____

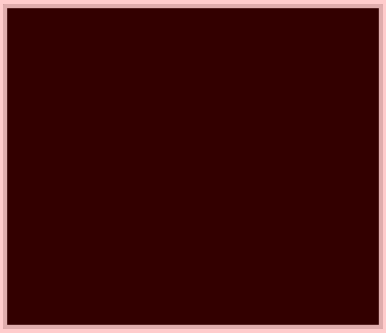
The personal information requested on this form is being collected under the authority of Section 33(c) of the Alberta Freedom of Information and Protection of Privacy Act. The information collected will be used for matters relating to planning and engineering matters. If you have any questions, please contact the FOIP Coordinator for the City of Beaumont at 5600-49th Street, Beaumont, Alberta, T4X 1A1 or 780-929-8782.

Amended. Refer to Bulletin 005

Engineering Services
Mailing Address: 5600 49 Street
Beaumont, AB T4X 1A1

FINAL ACCEPTANCE CERTIFICATE

DEVELOPMENT AREA:
DEVELOPER:
DEVELOPMENT AGREEMENT DATED:
CONTRACTOR:
MUNICIPAL IMPROVEMENT(S):
BOUNDARIES OF THE DEVELOPMENT AREA: Location of Municipal Improvement referred to herein is as shown, outlined in red, on the plan on the reverse hereof (or see attached)
DATE OF APPLICATION:
PURSUANT TO THE DEVELOPMENT AGREEMENT I,
OF THE FIRM **HEREBY CERTIFY THAT AS OF THE ABOVE DATE, THE SAID MUNICIPAL IMPROVEMENT(S) MEETS ALL THE REQUIREMENTS FOR FINAL ACCEPTANCE AS SPECIFIED BY THE SAID DEVELOPMENT AGREEMENT, AND I HEREBY RECOMMEND THIS (THESE) MUNICIPAL IMPROVEMENT(S) FOR FINAL ACCEPTANCE BY THE CITY OF BEAUMONT.**



_____ Date _____
P. Eng. or Landscape Architect (Consulting Firm)

_____ Date _____
Signing Officer of Consulting Firm

_____ Date _____
Authorized City of Beaumont Inspector

Approved on _____ _____
City of Beaumont - Manager, Municipal Projects

Rejected on _____ _____
City of Beaumont - Manager, Municipal Projects

Reason for rejection: (See attached Report) _____

I hereby certify that the items listed as reasons for rejection have been corrected.

_____ Date _____
Project Engineer or Landscape Architect (Consulting Firm)

Approved: _____ Date _____
City of Beaumont - Manager, Municipal Projects

Date Maintenance Period to End: _____

The personal information requested on this form is being collected under the authority of Section 33(c) of the Alberta Freedom of Information and Protection of Privacy Act. The information collected will be used for matters relating to planning and engineering matters. If you have any questions, please contact the FOIP Coordinator for the City of Beaumont at 5600-49th Street, Beaumont, Alberta, T4X 1A1 or 780-929-8782.

APPENDIX 2

SURFACE

APPENDIX 3

UNDERGROUND

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Table 3.0 IDF Curves– Intensity Tables

13 Rain Gauges' Upper Bound– IDF Period 1984-2010

IDF Intensity (mm/hr) Maximum Years of Record = 63

TIME		RETURN FREQUENCY						
MINUTE	HOURS	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	200-YR
5		61.0	86.3	110.7	147.7	180.0	215.7	255.1
6		57.2	80.9	103.0	136.9	166.1	198.9	235.8
7		53.9	76.2	96.5	127.8	154.6	185.1	219.9
8		51.0	72.1	91.0	120.0	144.8	173.5	206.5
9		48.4	68.5	86.1	113.3	136.5	163.6	195.0
10		46.1	65.2	81.8	107.5	129.3	155.0	185.0
11		44.0	62.3	78.0	102.3	122.9	147.4	176.3
12		42.2	59.7	74.6	97.7	117.3	140.7	168.6
13		40.5	57.4	71.5	93.6	112.2	134.8	161.6
14		38.9	55.2	68.7	89.9	107.7	129.4	155.4
15	0.25	37.5	53.2	66.2	86.5	103.6	124.6	149.8
16		36.2	51.4	63.9	83.4	99.9	120.2	144.6
17		34.9	49.7	61.8	80.5	96.4	116.1	139.9
18		33.8	48.2	59.8	77.9	93.3	112.4	135.6
19		32.8	46.7	58.0	75.5	90.4	109.0	131.6
20		31.8	45.4	56.3	73.3	87.7	105.8	127.9
21		30.9	44.1	54.7	71.2	85.2	102.9	124.4
22		30.0	42.9	53.2	69.2	82.9	100.1	121.2
23		29.2	41.8	51.8	67.4	80.7	97.5	118.2
24		28.4	40.8	50.5	65.7	78.7	95.1	115.4
25		27.7	39.8	49.3	64.1	76.8	92.9	112.7
26		27.0	38.8	48.1	62.6	74.9	90.7	110.2
27		26.4	37.9	47.0	61.2	73.2	88.7	107.8
28		25.8	37.1	46.0	59.8	71.6	86.8	105.6
29		25.2	36.3	45.0	58.5	70.1	85.0	103.5
30	0.5	24.7	35.6	44.1	57.3	68.7	83.3	101.5
31		24.1	34.8	43.2	56.1	67.3	81.7	99.5
32		23.6	34.1	42.3	55.0	66.0	80.1	97.7
33		23.2	33.5	41.5	54.0	64.7	78.6	96.0
34		22.7	32.9	40.7	53.0	63.5	77.2	94.3
35		22.3	32.3	40.0	52.0	62.4	75.9	92.7
36		21.8	31.7	39.3	51.1	61.3	74.6	91.2
37		21.4	31.1	38.6	50.2	60.3	73.4	89.7
38		21.1	30.6	38.0	49.4	59.3	72.2	88.3
39		20.7	30.1	37.3	48.6	58.3	71.0	87.0
40		20.3	29.6	36.7	47.8	57.4	69.9	85.7
41		20.0	29.1	36.2	47.0	56.5	68.9	84.5
42		19.7	28.7	35.6	46.3	55.6	67.9	83.3
43		19.3	28.2	35.1	45.6	54.8	66.9	82.1

Table 3.0 IDF Curves– Intensity Tables

(2 of 3)

TIME		RETURN FREQUENCY						
MINUTE	HOURS	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	200-YR
44		19.0	27.8	34.6	45.0	54.0	66.0	81.0
45	0.75	18.7	27.4	34.1	44.3	53.3	65.1	79.9
46		18.4	27.0	33.6	43.7	52.5	64.2	78.9
47		18.2	26.6	33.1	43.1	51.8	63.3	77.9
48		17.9	26.2	32.7	42.5	51.1	62.5	76.9
49		17.6	25.9	32.2	41.9	50.4	61.7	76.0
50		17.4	25.5	31.8	41.4	49.8	61.0	75.0
51		17.2	25.2	31.4	40.9	49.2	60.2	74.2
52		16.9	24.9	31.0	40.4	48.6	59.5	73.3
53		16.7	24.6	30.6	39.9	48.0	58.8	72.5
54		16.5	24.3	30.2	39.4	47.4	58.1	71.7
55		16.3	24.0	29.9	38.9	46.8	57.4	70.9
56		16.0	23.7	29.5	38.4	46.3	56.8	70.1
57		15.8	23.4	29.2	38.0	45.8	56.2	69.4
58		15.6	23.1	28.8	37.6	45.3	55.6	68.6
59		15.5	22.8	28.5	37.2	44.8	55.0	67.9
60	1.0	15.3	22.6	28.2	36.7	44.3	54.4	67.2
61		15.1	22.3	27.9	36.3	43.8	53.9	66.6
62		14.9	22.1	27.6	36.0	43.4	53.3	65.9
63		14.7	21.8	27.3	35.6	42.9	52.8	65.3
64		14.6	21.6	27.0	35.2	42.5	52.3	64.7
65		14.4	21.4	26.7	34.9	42.1	51.7	64.1
66		14.2	21.2	26.5	34.5	41.6	51.3	63.5
67		14.1	20.9	26.2	34.2	41.2	50.8	62.9
68		13.9	20.7	25.9	33.8	40.8	50.3	62.3
69		13.8	20.5	25.7	33.5	40.5	49.8	61.8
70		13.6	20.3	25.4	33.2	40.1	49.4	61.3
71		13.5	20.1	25.2	32.9	39.7	49.0	60.7
72		13.4	19.9	25.0	32.6	39.4	48.5	60.2
73		13.2	19.7	24.7	32.3	39.0	48.1	59.7
74		13.1	19.6	24.5	32.0	38.7	47.7	59.2
75		13.0	19.4	24.3	31.7	38.3	47.3	58.7
76		12.8	19.2	24.1	31.4	38.0	46.9	58.3
77		12.7	19.0	23.9	31.2	37.7	46.5	57.8
78		12.6	18.8	23.7	30.9	37.4	46.1	57.4
79		12.5	18.7	23.5	30.6	37.1	45.8	56.9
80		12.4	18.5	23.3	30.4	36.7	45.4	56.5
81		12.2	18.4	23.1	30.1	36.5	45.1	56.0
82		12.1	18.2	22.9	29.9	36.2	44.7	55.6
83		12.0	18.1	22.7	29.6	35.9	44.4	55.2
84		11.9	17.9	22.5	29.4	35.6	44.0	54.8
85		11.8	17.8	22.3	29.2	35.3	43.7	54.4
86		11.7	17.6	22.1	28.9	35.1	43.4	54.0
87		11.6	17.5	22.0	28.7	34.8	43.1	53.7
88		11.5	17.3	21.8	28.5	34.5	42.7	53.3

Table 3.0 IDF Curves– Intensity Tables

(3 of 3)

TIME		RETURN FREQUENCY						
MINUTE	HOURS	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	200-YR
89		11.4	17.2	21.6	28.3	34.3	42.4	52.9
90	1.5	11.3	17.1	21.5	28.1	34.0	42.1	52.6
120	2	9.1	13.9	17.6	23.1	28.2	35.1	44.0
180	3	6.7	10.4	13.3	17.6	21.5	27.1	34.3
240	4	5.3	8.4	10.9	14.4	17.8	22.5	28.7
300	5	4.5	7.2	9.3	12.4	15.3	19.5	24.9
360	6	3.9	6.3	8.2	10.9	13.5	17.3	22.3
420	7	3.4	5.6	7.4	9.8	12.2	15.7	20.2
480	8	3.1	5.1	6.7	8.9	11.2	14.4	18.6
540	9	2.8	4.6	6.2	8.2	10.3	13.3	17.3
600	10	2.6	4.3	5.7	7.7	9.6	12.4	16.2
660	11	2.4	4.0	5.3	7.2	9.0	11.7	15.2
720	12	2.2	3.7	5.0	6.7	8.5	11.0	14.4
780	13	2.1	3.5	4.7	6.4	8.0	10.5	13.7
840	14	2.0	3.3	4.5	6.1	7.7	10.0	13.1
900	15	1.9	3.2	4.3	5.8	7.3	9.5	12.5
960	16	1.8	3.0	4.1	5.5	7.0	9.1	12.0
1020	17	1.7	2.9	3.9	5.3	6.7	8.8	11.6
1080	18	1.6	2.8	3.8	5.1	6.5	8.5	11.2
1140	19	1.5	2.7	3.6	4.9	6.2	8.2	10.8
1200	20	1.5	2.6	3.5	4.7	6.0	7.9	10.5
1260	21	1.4	2.5	3.4	4.6	5.8	7.7	10.2
1320	22	1.4	2.4	3.3	4.4	5.6	7.27.4	9.9
1380	23	1.3	2.3	3.2	4.3	5.5	7.2	9.6
1440	24	1.3	2.2	3.1	4.2	5.3	7.0	9.3

Table 3.1 IDF Parameters

RATE=A*(T+C)^B	RETURN FREQUENCY						
PARAMETERS	**2-YR**	**5-YR**	**10-YR**	**25-YR**	**50-YR**	**100-YR**	**200-YR**
a (t in min)	460.81	521.52	549.94	664.78	730.54	808.33	906.23
b	-0.810	-0.749	-0.713	-0.697	-0.677	-0.652	-0.629
c (min>	7.152	6.024	4.477	3.649	2.927	2.578	2.503
R^2	0.998	1.000	0.999	0.998	0.996	0.992	0.985

Table 3.2 Chicago Distribution (Modified)

4 – Hr. Design Storm Data Edmonton Municipal Airport – IDT Period 1914 - 1995

Maximum Years of Record = 63

CHICAGO TYPE DISTRIBUTION – DESIGN STORM (5 - MINUTE INCREMENT) STORM						
TIME TD (MIN)	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
0	1.15	1.64	1.97	2.38	2.69	2.99
5	2.38	3.4	4.07	4.92	5.55	6.18
10	2.49	3.55	4.26	5.15	5.81	6.47
15	2.61	3.73	4.48	5.41	6.11	6.8
20	2.75	3.94	4.72	5.71	6.44	7.17
25	2.92	4.17	5	6.05	6.83	7.61
30	3.1	4.45	5.33	6.45	7.28	8.11
35	3.33	4.77	5.72	6.93	7.82	8.71
40	3.6	5.16	6.19	7.5	8.47	9.43
45	3.93	5.64	6.78	8.21	9.27	10.3
50	4.36	6.26	7.52	9.12	10.3	11.5
55	4.92	7.09	8.52	10.3	11.7	13
60	5.73	8.26	9.93	12	13.6	15.2
65	6.98	10.1	12.1	14.7	16.7	18.6
70	9.31	13.5	16.3	19.8	22.4	25
75	16.1	23.6	28.5	34.7	39.3	43.9
80	45.6	68.1	82.9	102	116	129
85	45.6	68.1	82.9	102	116	129
90	15.2	22.2	26.8	32.6	37	41.3
95	11.3	16.4	19.8	24.1	27.2	30.4
100	9.2	13.3	16.1	19.5	22.1	24.6
105	7.87	11.4	13.7	16.7	18.9	21
110	6.94	10	12.1	14.7	16.6	18.5
115	6.25	9.02	10.9	13.2	14.9	16.6
120	5.71	8.24	9.91	12	13.6	15.1
125	5.28	7.6	9.14	11.1	12.5	14
130	4.92	7.08	8.5	10.3	11.6	13
135	4.61	6.63	7.97	9.7	10.9	12.2
140	4.35	6.26	7.52	9.11	10.3	11.5
145	4.13	5.93	7.12	8.62	9.74	10.8
150	3.93	5.64	6.77	8.2	9.26	10.3
155	3.75	5.38	6.46	7.83	8.84	9.84
160	3.6	5.16	6.19	7.5	8.46	9.42
165	3.45	4.95	5.94	7.2	8.12	9.05
170	3.33	4.77	5.72	6.92	7.82	8.7
175	3.21	4.6	5.52	6.68	7.54	8.39
180	3.1	4.44	5.33	6.45	7.28	8.11
185	3.01	4.3	5.16	6.24	7.05	7.84
190	2.91	4.17	5	6.05	6.83	7.6
195	2.83	4.05	4.86	5.87	6.63	7.38
200	2.75	3.94	4.72	5.71	6.44	7.17
205	2.68	3.83	4.59	5.55	6.27	6.98
210	2.61	3.73	4.47	5.41	6.11	6.8
215	2.55	3.64	4.36	5.28	5.95	6.63

Table 3.2 Chicago Distribution (Modified)

(2 of 2)

CHICAGO TYPE DISTRIBUTION – DESIGN STORM (5 - MINUTE INCREMENT) STORM						
TIME TD (MIN)	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
220	2.49	3.55	4.26	5.15	5.81	6.47
225	2.43	3.47	4.16	5.03	5.68	6.32
230	2.38	3.39	4.07	4.92	5.55	6.17
235	2.33	3.32	3.98	4.81	5.43	6.04
240	1.15	1.64	1.96	2.37	2.67	2.97

Amended. Refer to Bulletin 005

Table 3.3 Huff Distribution Design Storms for Lake Drawdown Analysis Only

IDF Period: 1984-2010 | Maximum Years of Record = 27
Storm Duration = 24 hours
Hours Huff Distribution (First-Quartile 50% Probability), mm/hr

TIME TD.		RETURN FREQUENCY						
MINUTES	HOURS	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	200-YR
0	0	0	0	0	0	0	0	0
15		0.23	0.40	0.55	0.75	0.95	1.26	1.67
30		0.45	0.80	1.10	1.49	1.90	2.51	3.34
45		0.68	1.20	1.65	2.24	2.85	3.77	5.01
60	1	0.91	1.60	2.20	2.98	3.81	5.03	6.68
75		1.21	2.13	2.93	3.98	5.08	6.71	8.92
90		1.82	3.20	4.40	5.98	7.62	10.07	13.38
105		2.42	4.27	5.87	7.96	10.15	13.42	17.83
120	2	3.04	5.35	7.35	9.97	12.72	16.80	22.33
135		3.65	6.42	8.83	11.98	15.28	20.19	26.83
150		4.04	7.11	9.78	13.27	16.92	22.36	29.72
165		4.15	7.31	10.04	13.63	17.38	22.97	30.52
180	3	4.26	7.50	10.31	13.99	17.84	23.57	31.33
195		4.37	7.69	10.57	14.35	18.30	24.17	32.13
210		4.48	7.88	10.84	14.71	18.75	24.78	32.93
225		4.41	7.77	10.68	14.49	18.48	24.42	32.45
240	4	4.24	7.46	10.26	13.92	17.75	23.45	31.17
255		4.04	7.11	9.78	13.27	16.92	22.36	29.72
270		3.87	6.81	9.36	12.70	16.19	21.39	28.44
285		3.67	6.46	8.88	12.05	15.37	20.31	26.99
300	5	3.47	6.11	8.41	11.41	14.55	19.22	25.54
315		3.28	5.77	7.93	10.76	13.72	18.13	24.10
330		3.10	5.46	7.51	10.19	12.99	17.16	22.81
345		2.90	5.11	7.03	9.54	12.17	16.08	21.37
360	6	2.71	4.77	6.55	8.89	11.34	11.99	19.92
375		2.53	4.46	6.13	8.32	10.61	14.02	18.64
390		2.38	4.19	5.76	7.82	9.97	13.18	17.51
405		2.21	3.88	5.34	7.24	9.24	12.21	16.23
420	7	2.05	3.61	4.97	6.74	8.60	11.36	15.10
435		1.90	3.34	4.59	6.23	7.95	10.50	13.96
450		1.78	3.13	4.31	8.85	7.46	9.85	13.09
465		1.66	2.92	4.02	5.45	6.95	9.19	12.21
480	8	1.54	2.71	3.73	5.06	6.46	8.53	11.34
495		1.42	2.50	3.44	4.67	5.96	7.87	10.46
510		1.33	2.35	3.22	4.38	5.58	7.37	9.80
525		1.28	2.26	3.10	4.21	5.37	7.10	9.43
540	9	1.23	2.17	2.99	4.05	5.17	6.83	9.08
555		1.19	2.09	2.87	3.90	4.97	6.56	8.72
570		1.14	2.00	2.75	3.74	4.77	6.30	8.37
585		1.09	1.92	2.64	3.58	4.56	6.03	8.02
600	10	1.04	1.83	2.52	3.42	4.36	5.77	7.66

Amended. Refer to Bulletin 005

Huff Distribution Design Storms for Lake Drawdown Analysis Only

(2 of 3)

TIME TD.		RETURN FREQUENCY						
MINUTES	HOURS	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	200-YR
615		1.00	1.75	2.41	3.27	4.17	5.51	7.33
630		0.95	1.67	2.29	3.11	3.97	5.25	6.97
645		0.90	1.58	2.18	2.96	3.77	4.98	6.62
660	11	0.86	1.51	2.08	2.82	3.60	4.75	6.31
675		0.82	1.44	1.98	2.68	3.42	4.52	6.01
690		0.78	1.37	1.88	2.55	3.25	4.29	5.70
705		0.73	1.29	1.78	2.41	3.07	4.06	5.40
720	12	0.69	1.22	1.68	2.27	2.90	3.83	5.09
735		0.67	1.18	1.62	2.20	2.81	3.71	4.93
750		0.65	1.14	1.56	2.12	2.71	3.58	4.76
765		0.62	1.10	1.51	2.04	2.61	3.44	4.58
780	13	0.60	1.05	1.45	1.97	2.51	3.31	4.40
795		0.57	1.01	1.39	1.89	2.41	3.18	4.23
810		0.55	0.97	1.33	1.81	2.31	3.05	4.05
825		0.52	0.92	1.27	1.72	2.20	2.90	3.86
840	14	0.50	0.88	1.21	1.64	2.09	2.77	3.68
855		0.47	0.83	1.15	1.56	1.99	2.62	3.49
870		0.46	0.80	1.10	1.50	1.91	2.53	3.36
885		0.45	0.80	1.09	1.48	1.89	2.50	3.33
900	15	0.45	0.78	1.08	1.46	1.87	2.47	3.28
915		0.44	0.77	1.06	1.44	1.84	2.43	3.23
930		0.43	0.77	1.05	1.43	1.82	2.41	3.20
945		0.43	0.75	1.04	1.41	1.79	2.37	3.15
960	16	0.42	0.75	1.03	1.39	1.77	2.34	3.12
975		0.42	0.74	1.01	1.38	1.76	2.32	3.08
990		0.41	0.73	1.00	1.36	1.73	2.28	3.04
1005		0.41	0.72	0.99	1.34	1.71	2.26	3.00
1020	17	0.40	0.71	0.98	1.33	1.69	2.24	2.97
1035		0.40	0.70	0.96	1.31	1.66	2.20	2.92
1050		0.39	0.69	0.95	1.29	1.65	2.18	2.89
1065		0.39	0.68	0.94	1.27	1.62	2.14	2.84
1080	18	0.38	0.67	0.93	1.26	1.60	2.12	2.81
1095		0.38	0.66	0.91	1.23	1.57	2.08	2.76
1110		0.37	0.65	0.90	1.22	1.56	2.05	2.73
1125		0.37	0.65	0.89	1.21	0.15	2.03	2.70
1140	19	0.36	0.63	0.87	1.18	1.51	1.99	2.65
1155		0.35	0.62	0.86	1.16	1.48	1.96	2.60
1170		0.34	0.60	0.82	1.12	1.43	1.89	2.51
1185		0.33	0.58	0.79	1.08	1.37	1.81	2.41
1200	20	0.31	0.55	0.76	1.03	1.32	1.74	2.31
1215		0.30	0.53	0.73	0.99	1.26	1.67	2.22
1230		0.29	0.51	0.70	0.95	1.22	1.61	2.14
1245		0.28	0.50	0.69	0.93	1.19	1.57	2.09
1260	21	0.28	0.49	0.67	0.91	1.16	1.54	2.04

Amended. Refer to Bulletin 005

Huff Distribution Design Storms for Lake Drawdown Analysis Only

(3 of 3)

TIME TD.		RETURN FREQUENCY						
MINUTES	HOURS	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	200-YR
1275		0.27	0.47	0.65	0.88	1.13	1.49	1.98
1290		0.26	0.46	0.63	0.86	1.10	1.45	1.93
1305		0.25	0.45	0.61	0.83	1.06	1.40	1.86
1320	22	0.24	0.43	0.59	0.80	1.02	1.34	1.78
1335		0.23	0.41	0.56	0.76	0.97	1.28	1.70
1350		0.22	0.39	0.53	0.72	0.92	1.22	1.62
1365		0.21	0.37	0.51	0.69	0.88	1.16	1.55
1380	23	0.20	0.35	0.48	0.65	0.83	1.10	1.47
1395		0.19	0.33	0.46	0.62	0.79	1.04	1.38
1410		0.18	0.31	0.43	0.58	0.74	0.98	1.31
1425		0.17	0.29	0.40	0.55	0.70	0.92	1.23
1440	24	0.16	0.27	0.38	0.51	0.65	0.86	1.15

Table 3.4 Recorded Storm of July 14-15, 1937

(Edmonton Municipal Airport Rain Gauge)

TIME IN MINUTES	INTENSITY (MM/HR)
Day 1	
0.00	0.50
0.15	0.50
0.30	0.50
0.45	0.50
1.00	0.00
1.15	0.00
1.30	0.00
1.45	0.00
2.00	0.00
2.15	0.00
2.30	0.00
2.45	0.00
3.00	4.00
3.15	4.00
3.30	4.00
3.45	4.00
4.00	4.10
4.15	4.10
4.30	4.10
4.45	4.10
5.00	1.00
5.15	1.00
5.30	1.00
5.45	1.00
6.00	4.60
6.15	4.60
6.30	4.60
6.45	4.60
7.00	15.50
7.15	15.50
7.30	15.50
7.45	15.00
8.00	18.50
8.15	18.50
8.30	18.50
8.45	18.50
9.00	15.50
9.15	15.50
9.30	15.50

TIME IN MINUTES	INTENSITY (MM/HR)
9.45	15.50
10.00	7.40
10.15	7.40
10.30	7.40
10.45	7.40
11.00	2.30
11.15	2.30
11.30	2.30
11.45	2.30
12.00	2.50
12.15	2.50
12.30	2.50
12.45	2.50
13.00	1.50
13.15	1.50
13.30	1.50
13.45	1.50
14.00	0.50
14.15	0.50
14.30	0.50
14.45	0.50
15.00	0.50
15.15	0.50
15.30	0.50
15.45	0.50
16.00	1.00
16.15	1.00
16.30	1.00
16.45	1.00
17.00	0.50
17.15	0.50
17.30	0.50
17.45	0.50
18.00	0.50
18.15	0.50
18.30	0.50
18.45	0.50
19.00	0.50
19.15	0.50
19.30	0.50

TIME IN MINUTES	INTENSITY (MM/HR)
19.45	0.50
20.00	0.50
20.15	0.50
20.30	0.50
20.45	0.50
21.00	1.30
21.15	1.30
21.30	1.30
21.45	1.30
22.00	5.10
22.15	5.10
22.30	5.10
22.45	5.10
23.00	3.80
23.15	3.80
23.30	3.80
23.45	3.80
Day 2	
0.00	4.30
0.15	4.30
0.30	4.30
0.45	4.30
1.00	2.80
1.15	2.80
1.30	2.80
1.45	2.80
2.00	2.80
2.15	2.80
2.30	2.80
2.45	2.80
3.00	2.80
3.15	2.80
3.30	2.80
3.45	2.80
4.00	5.30
4.15	5.30
4.30	5.30
4.45	5.30
5.00	6.10
5.15	6.10

TIME IN MINUTES	INTENSITY (MM/HR)
5.30	6.10
5.45	6.10
6.00	6.40
6.15	6.40
6.30	6.40
6.45	6.40
7.00	5.10
7.15	5.10
7.30	5.10
7.45	5.10
8.00	3.30
8.15	3.30
8.30	3.30
8.45	3.30
9.00	6.40
9.15	6.40
9.30	6.40
9.45	6.40
10.00	5.30
10.15	5.30
10.30	5.30
10.45	5.30
11.00	2.30
11.15	2.30
11.30	2.30
11.45	2.30
12.00	1.80
12.15	1.80
12.30	1.80
12.45	1.80
13.00	0.50
13.15	0.50
13.30	0.50
13.45	0.50
14.00	0.00
14.15	0.00
14.30	0.00
14.45	0.00
15.00	0.50
15.15	0.50

TIME IN MINUTES	INTENSITY (MM/HR)
15.30	0.50
15.45	0.50
16.00	2.80
16.15	2.80
16.30	2.80
16.45	2.80
17.00	1.50
17.15	1.50
17.30	1.50
17.45	1.50
18.00	1.00
18.15	1.00
18.30	1.00
18.45	1.00
19.00	0.50
19.15	0.50
19.30	0.50
19.45	0.50
20.00	0.00
20.15	0.00
20.30	0.00
20.45	0.00
21.00	1.00
21.15	1.00
21.30	1.00
21.45	1.00
22.00	0.50
22.15	0.50
22.30	0.50
22.45	0.50
23.00	0.00
23.15	0.00
23.30	0.00
23.45	0.00

Table 3.5 Recorded Storm of July 10-11, 1978

TIME IN MINUTES	INTENSITY (MM/HR)
Day 1	
20:00	
20:05	
20:10	7.2
20:15	24.0
20:20	21.6
20:25	2.4
20:30	
20:35	
20:40	
20:45	
20:50	
20:55	
21:00	
21:05	
21:10	
21:15	
21:20	
21:25	
21:30	
21:35	
21:40	
21:45	
21:50	
21:55	
22:00	
22:05	
22:10	
22:15	38.4
22:20	14.4
22:25	4.8
22:30	4.8
22:35	4.8
22:40	19.2
22:45	7.2
22:50	2.4
22:55	
23:00	2.4
23:05	2.4
23:10	4.8
23:15	28.8
23:20	9.6
23:25	2.4
23:30	
23:35	
23:40	
23:45	
23:50	
23:55	
Day 2	
00:00	
00:05	
00:10	
00:15	
00:20	
00:25	
00:30	
00:35	
00:40	
00:45	
00:50	
00:55	
01:25	
01:30	
01:35	
01:40	
01:45	21.6
01:50	79.2
01:55	74.4
02:00	21.6
02:05	
02:10	
02:15	
02:20	
02:25	
02:30	
02:35	
02:40	
02:45	
02:50	
02:55	
03:00	
03:05	
03:10	
03:15	
03:20	
03:25	
03:30	
03:35	
03:40	
03:45	
03:50	
03:55	
04:00	
04:05	
04:10	
04:15	
04:20	
04:25	
04:30	
04:35	
04:40	
04:45	
04:50	
04:55	
05:00	
05:05	
05:10	
05:15	
05:20	
05:25	
05:30	
05:35	
05:40	
05:45	
05:50	
05:55	
06:00	
06:05	
06:10	
06:15	
06:20	
06:25	
06:30	
06:35	
07:05	
07:10	
07:15	2.4
07:20	
07:25	
07:30	
07:35	
07:40	
07:45	
07:50	
07:55	
08:00	
08:05	
08:10	
08:15	
08:20	
08:25	
08:30	
08:35	
08:40	
08:45	2.4
08:50	9.6
08:55	19.2
09:00	12.0
09:05	9.6
09:10	12.0
09:15	19.2
09:20	14.4
09:25	9.6
09:30	16.8
09:35	9.6
09:40	2.4
09:45	2.4
09:50	24.0
09:55	14.4
10:00	9.6
10:05	38.4
10:10	21.6
10:15	12.0
10:20	43.2
10:25	4.8
10:30	9.6
10:35	9.6
10:40	21.6
10:45	16.8
10:50	43.2
10:55	7.2
11:00	2.4
11:05	21.6
11:10	14.4
11:15	36.0
11:20	72.0
11:25	40.8
11:30	105.6
11:35	88.8
11:40	55.2
11:45	33.6
11:50	26.4
11:55	28.8
12:00	9.6
12:05	16.8
12:10	48.0
12:15	33.6
12:45	9.6
12:50	4.8
12:55	2.4
13:00	4.8
13:05	4.8
13:10	4.8
13:15	9.8
13:20	4.8
13:25	2.4
13:30	2.4
13:35	4.8
13:40	
13:45	2.4
13:50	
13:55	
14:00	4.8
14:05	9.6
14:10	2.4
14:15	2.4
14:20	
14:25	
14:30	
14:35	
14:40	
14:45	
14:50	
14:55	
15:00	
15:05	4.8
15:10	7.2
15:15	
15:20	
15:25	2.4
15:30	
15:35	
15:40	2.4
15:45	
15:50	
15:55	
16:00	
16:05	
16:10	
16:15	
16:20	4.8
16:25	2.4

Table 3.6 Recorded Storm of July 2-3, 2004

(City of Edmonton) Total of 135 mm

TIME IN MINUTES	INTENSITY (MM/HR)
Day 1	
16:00	0
16:05	0
16:10	0
16:15	0
16:20	0
16:25	0
16:30	7.2
16:35	33.6
16:40	21.6
16:45	21.6
16:50	16.8
16:55	0
17:00	9.6
17:05	0
17:10	2.4
17:15	2.4
17:20	12
17:25	45.6
17:30	26.4
17:35	9.6
17:40	7.2
17:45	7.2
17:50	4.8
17:55	7.2
18:00	2.4
18:05	2.4
18:10	2.4
18:15	0
18:20	2.4
18:25	0
18:30	0
18:35	0
18:40	2.4
18:45	0
18:50	0
18:55	0
19:00	0
19:05	0
19:10	0
19:15	0
19:20	0
19:25	0
19:30	0
19:35	0
19:40	0
19:45	0
19:50	0
19:55	0
20:00	0
20:05	0
20:10	0
20:15	0
20:20	0
20:25	0
20:30	0
20:35	0
20:40	0
20:45	0
20:50	0
20:55	0
21:00	0
21:05	0
21:10	0
21:15	0
21:20	0
21:25	0
21:30	0
21:35	0
21:40	4.8
21:45	33.6
21:50	72
21:55	129.6
22:00	103.2
22:05	127.2
22:10	158.4
22:15	100.8
22:20	64.8
22:25	52.8
22:30	40.8
22:35	19.2
22:40	7.2
22:45	4.8
22:50	4.8
22:55	2.4
23:00	4.8
23:05	2.4
23:10	0
23:15	0
23:20	0
23:25	0
23:30	0
23:35	0
23:40	0
23:45	0
23:50	0
23:55	0
Day 2	
0:00	0
0:05	0
0:10	0
0:15	4.8
0:20	2.4
0:25	0
0:30	2.4
0:35	0
0:40	4.8
0:45	2.4
0:50	2.4
0:55	4.8
1:00	4.8
1:05	4.8
1:10	2.4
1:15	0
1:20	4.8
1:25	2.4
1:30	0
1:35	2.4
1:40	2.4
1:45	0
1:50	2.4
1:55	0
2:00	4.8
2:05	2.4
2:10	2.4
2:15	2.4
2:20	4.8
2:25	2.4
2:30	0
2:35	2.4
2:40	2.4
2:45	7.2
2:50	4.8
2:55	4.8
3:00	4.8
3:05	2.4
3:10	7.2
3:15	4.8
3:20	2.4
3:25	9.6
3:30	2.4
3:35	7.2
3:40	4.8
3:45	2.4
3:50	4.8
3:55	2.4
4:00	2.4
4:05	0
4:10	2.4
4:15	0
4:20	4.8
4:25	2.4
4:30	2.4
4:35	2.4
4:40	0
4:45	0
4:50	4.8
4:55	0
5:00	0
5:05	0
5:10	0
5:15	2.4
5:20	0
5:25	0
5:30	0
5:35	0
5:40	2.4
5:45	2.4
5:50	4.8
5:55	2.4
6:00	4.8
6:05	9.6
6:10	2.4
6:15	2.4
6:20	2.4
6:25	2.4
6:30	0
6:35	4.8
6:40	2.4
6:45	2.4
6:50	2.4
6:55	2.4
7:00	2.4
7:05	2.4
7:10	0
7:15	0
7:20	4.8
7:25	0
7:30	2.4
7:35	2.4
7:40	2.4
7:45	2.4
7:50	4.8
7:55	2.4
8:00	0
8:05	2.4
8:10	4.8
8:15	4.8
8:20	2.4
8:25	0
8:30	2.4
8:35	2.4
8:40	2.4
8:45	0
8:50	2.4
8:55	0
9:00	2.4
9:05	2.4
9:10	0
9:15	2.4
9:20	2.4
9:25	2.4
9:30	2.4
9:35	4.8
9:40	2.4
9:45	2.4
9:50	7.2
9:55	4.8
10:00	4.8
10:05	2.4
10:10	2.4
10:15	4.8
10:20	0
10:25	2.4
10:30	2.4
10:35	0
10:40	2.4
10:45	0
10:50	0
10:55	2.4
11:00	0
11:05	2.4
11:10	2.4
11:15	0
11:20	0
11:25	2.4
11:30	0
11:35	2.4
11:40	0
11:45	2.4
11:50	2.4
11:55	0
12:00	0
12:05	2.4
12:10	0
12:15	2.4
12:20	2.4
12:25	0
12:30	2.4
12:35	2.4
12:40	2.4
12:45	0
12:50	2.4
12:55	0
13:00	2.4
13:05	0
13:10	2.4
13:15	0
13:20	4.8
13:25	2.4
13:30	2.4
13:35	2.4
13:40	2.4
13:45	2.4
13:50	4.8
13:55	2.4
14:00	2.4
14:05	2.4
14:10	2.4
14:15	2.4
14:20	0
14:25	2.4
14:30	0
14:35	4.8
14:40	4.8
14:45	4.8
14:50	2.4
14:55	2.4
15:00	4.8
15:05	2.4
15:10	2.4
15:15	2.4
15:20	2.4
15:25	2.4
15:30	2.4
15:35	0
15:40	2.4
15:45	0
15:50	2.4
15:55	0
16:00	0
16:05	0
16:10	2.4
16:15	0
16:20	0
16:25	0
16:30	0
16:35	0
16:40	0
16:45	0
16:50	0
16:55	0
17:00	0
17:05	0
17:10	0
17:15	0
17:20	0
17:25	0
17:30	0
17:35	0
17:40	0
17:45	0

Table 3.7 Recorded Storm of July 12, 2012

	INTENSITY (MM/H)
2:45	0.00
2:50	28.80
2:55	43.20
3:00	48.00
3:05	18.00
3:10	93.60
3:15	110.40
3:20	52.80
3:25	55.20
3:30	20.40
3:35	39.60
3:40	25.20
3:45	15.60
3:50	4.80
3:55	10.80
4:00	18.00
4:05	8.40
4:10	3.60
4:15	0.00

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STANDARD DETAIL DRAWINGS

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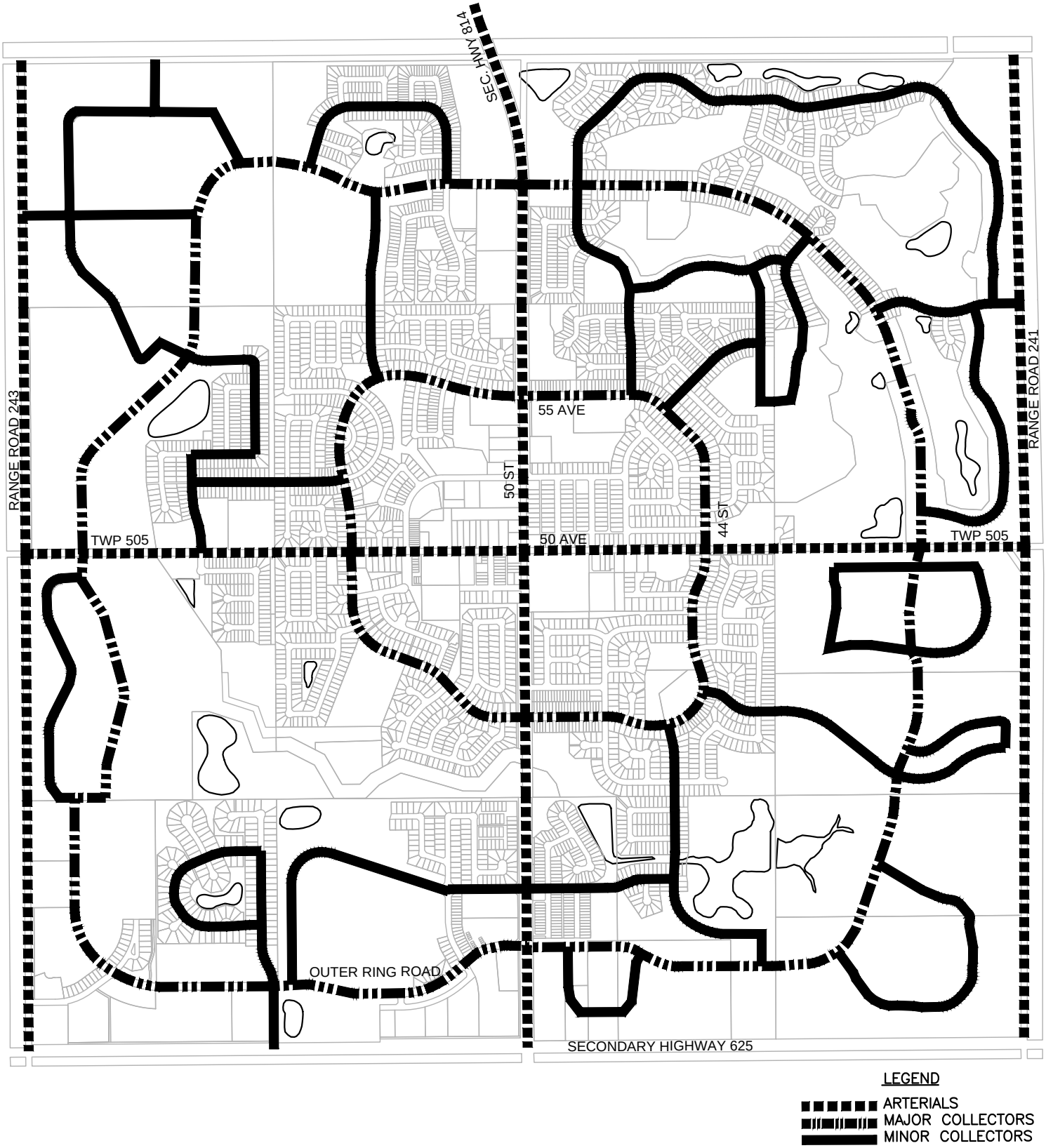


	REVISIONS	
Date	Details	By

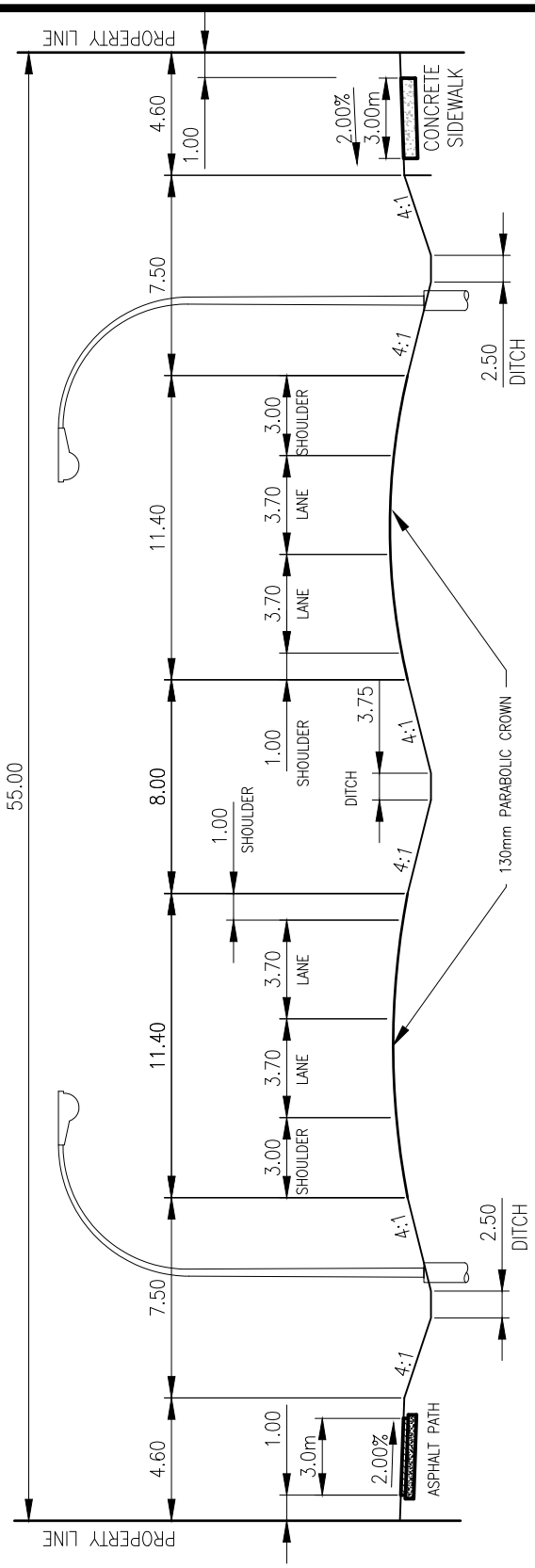
BEAUMONT

ROAD NETWORK

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2–1



NOTES:

- LANDSCAPING REQUIRED AS PER SECTION 4.0 OF THE GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DEEP UTILITIES (IF REQUIRED) TO BE LOCATED WITHIN ROADWAY OR MEDIAN.
- MEDIAN SURFACE TO BE CONCRETE IF LESS THAN 3m WIDE; OTHERWISE SURFACE TO BE GRASS.
- CONCRETE SIDEWALK OR ASPHALT PATH REQUIRED ON BOTH SIDES OF ROADWAY.
- ALL DIMENSIONS IN METRES.

	REVISIONS	
Date	Details	By

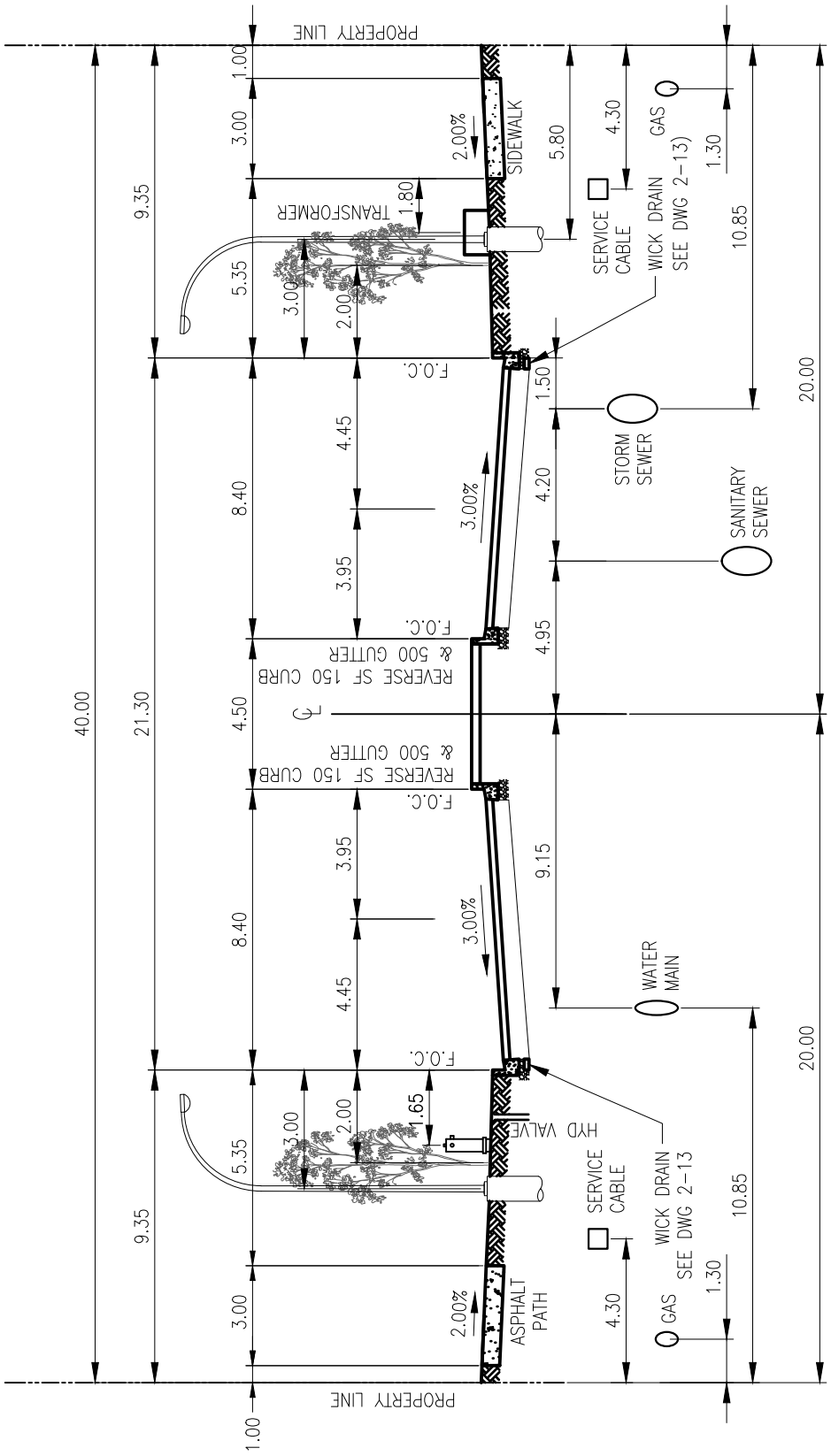
BEAUMONT

55.0m R.O.W.
DIVIDED RURAL ARTERIAL

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-2



NOTES:

- LANDSCAPING REQUIRED AS PER SECTION 4.0 OF THE GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DEEP UTILITIES (IF REQUIRED) TO BE LOCATED WITHIN ROADWAY OR MEDIAN, IF GRASS.
- MEDIAN SURFACE TO BE CONCRETE IF LESS THAN 3m WIDE; OTHERWISE SURFACE TO BE GRASS.
- CONCRETE SIDEWALK AND/OR ASPHALT PATH REQUIRED ON BOTH SIDES OF ROADWAY.
- ALL DIMENSIONS IN METRES.

*EXTEND SUBGRADE AND BASE MIN. 150mm BEHIND CURB.

	REVISIONS	
Date	Details	By

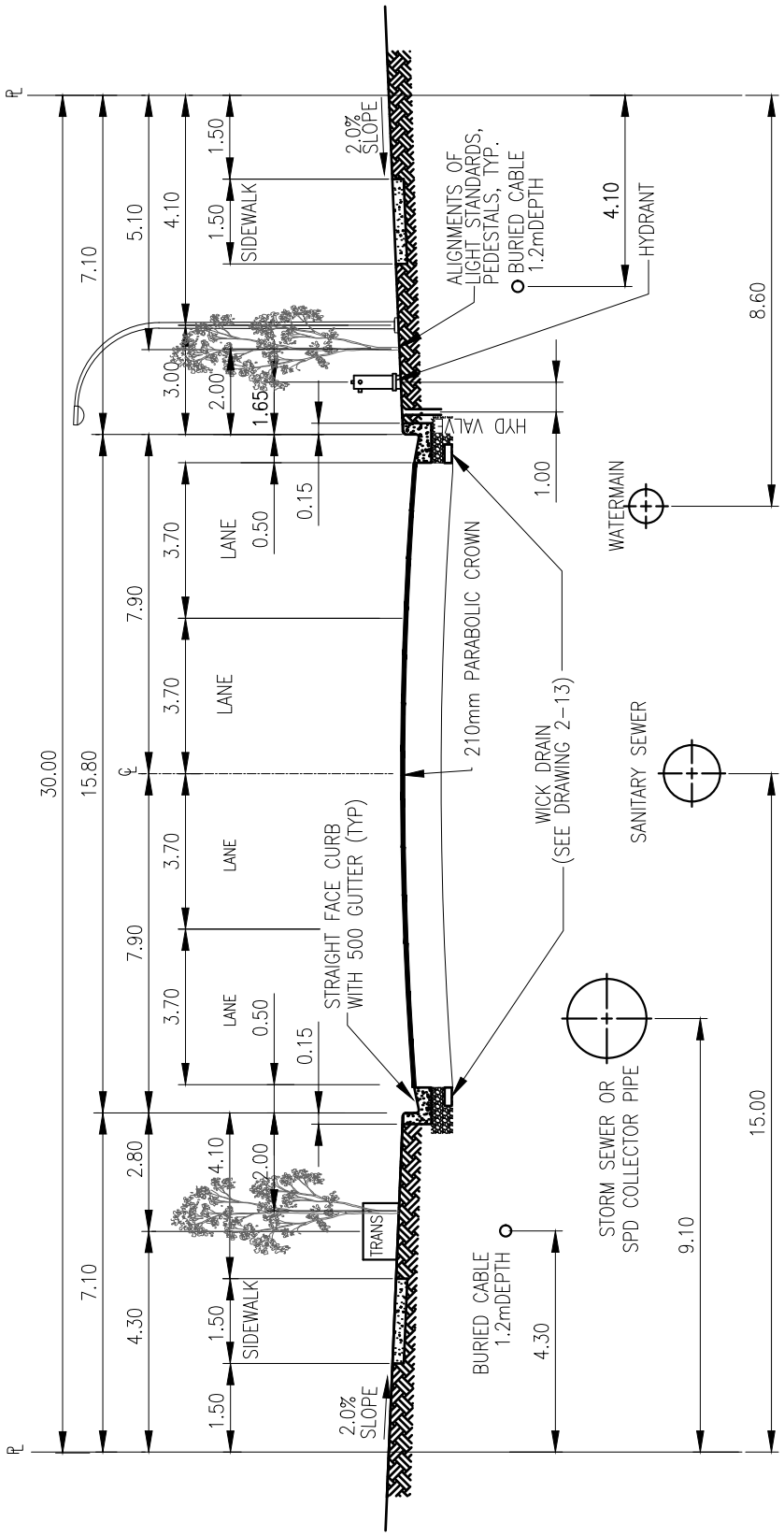
BEAUMONT

40.0m R.O.W.
DIVIDED URBAN ARTERIAL

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-3



NOTES:
- LANDSCAPING REQUIRED AS PER SECTION 4.0 OF THE GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DEEP UTILITIES (IF REQUIRED) TO BE LOCATED WITHIN ROADWAY.
- CONCRETE SIDEWALK AND/OR ASPHALT PATH REQUIRED ON BOTH SIDES OF ROADWAY.
- ALL DIMENSIONS IN METRES.

*EXTEND SUBGRADE AND BASE MIN. 150mm BEHIND CURB

	REVISIONS	
Date	Details	By

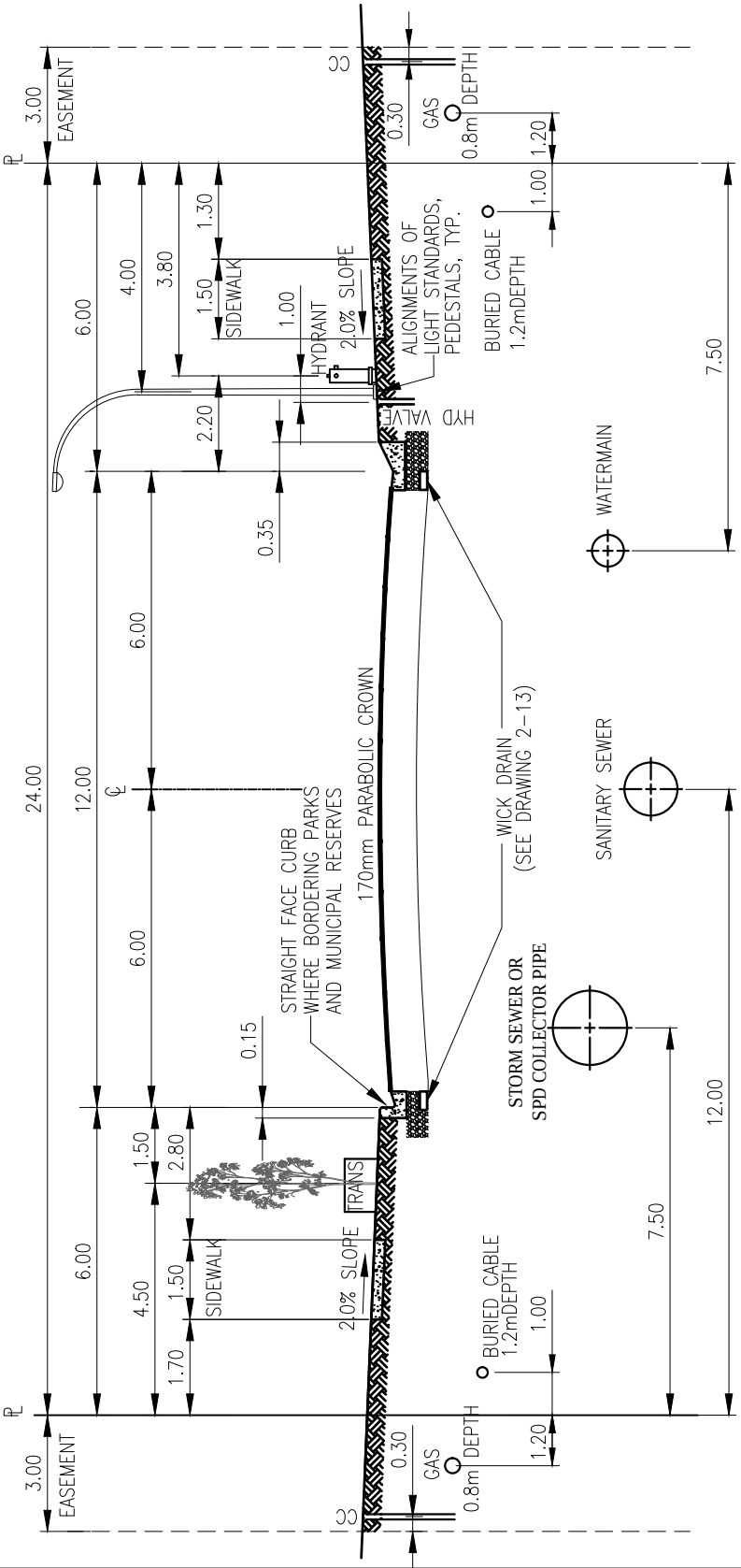
BEAUMONT

30.0m R.O.W. WITH 15.8m UNDIVIDED URBAN ARTERIAL

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-4



NOTES:
- LANDSCAPING REQUIRED AS PER SECTION 4.0 OF THE GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DEEP UTILITIES (IF REQUIRED) TO BE LOCATED WITHIN ROADWAY.
- CONCRETE SIDEWALK AND/OR ASPHALT PATH REQUIRED ON BOTH SIDES OF ROADWAY.
- ALL DIMENSIONS IN METRES.

*EXTEND SUBGRADE AND BASE MIN. 150mm BEHIND CURB

	REVISIONS	
Date	Details	By

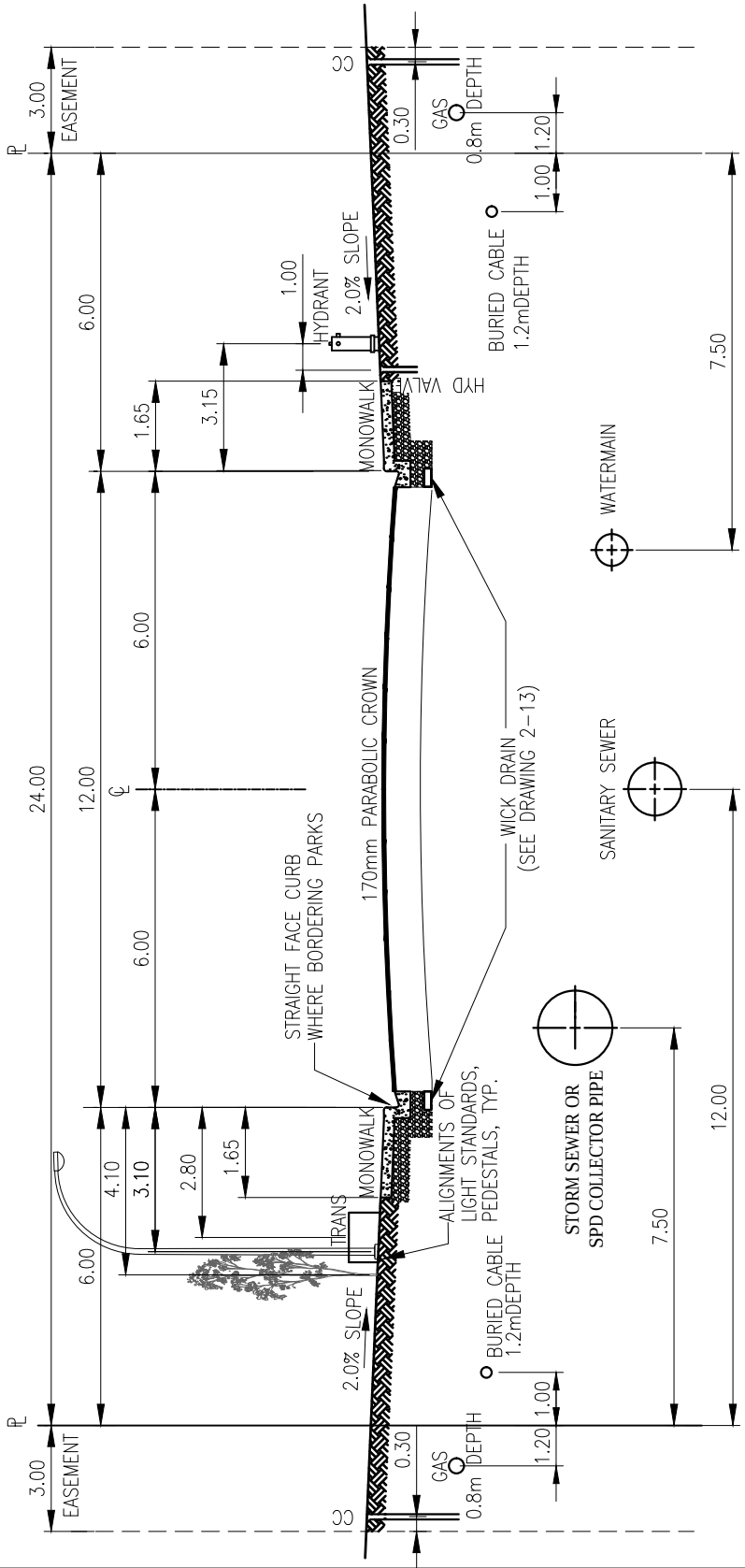
BEAUMONT

24.0m R.O.W. WITH 12.0m MAJOR RES. COLLECTOR (BLVD. WALK)

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-5



NOTES:

- LANDSCAPING REQUIRED AS PER SECTION 4.0 OF THE GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DEEP UTILITIES (IF REQUIRED) TO BE LOCATED WITHIN ROADWAY.
- CONCRETE SIDEWALK REQUIRED ON BOTH SIDES OF ROADWAY.
- ALL DIMENSIONS IN METRES.

*EXTEND SUBGRADE AND BASE MIN. 150mm BEHIND CURB

	REVISIONS	
Date	Details	By

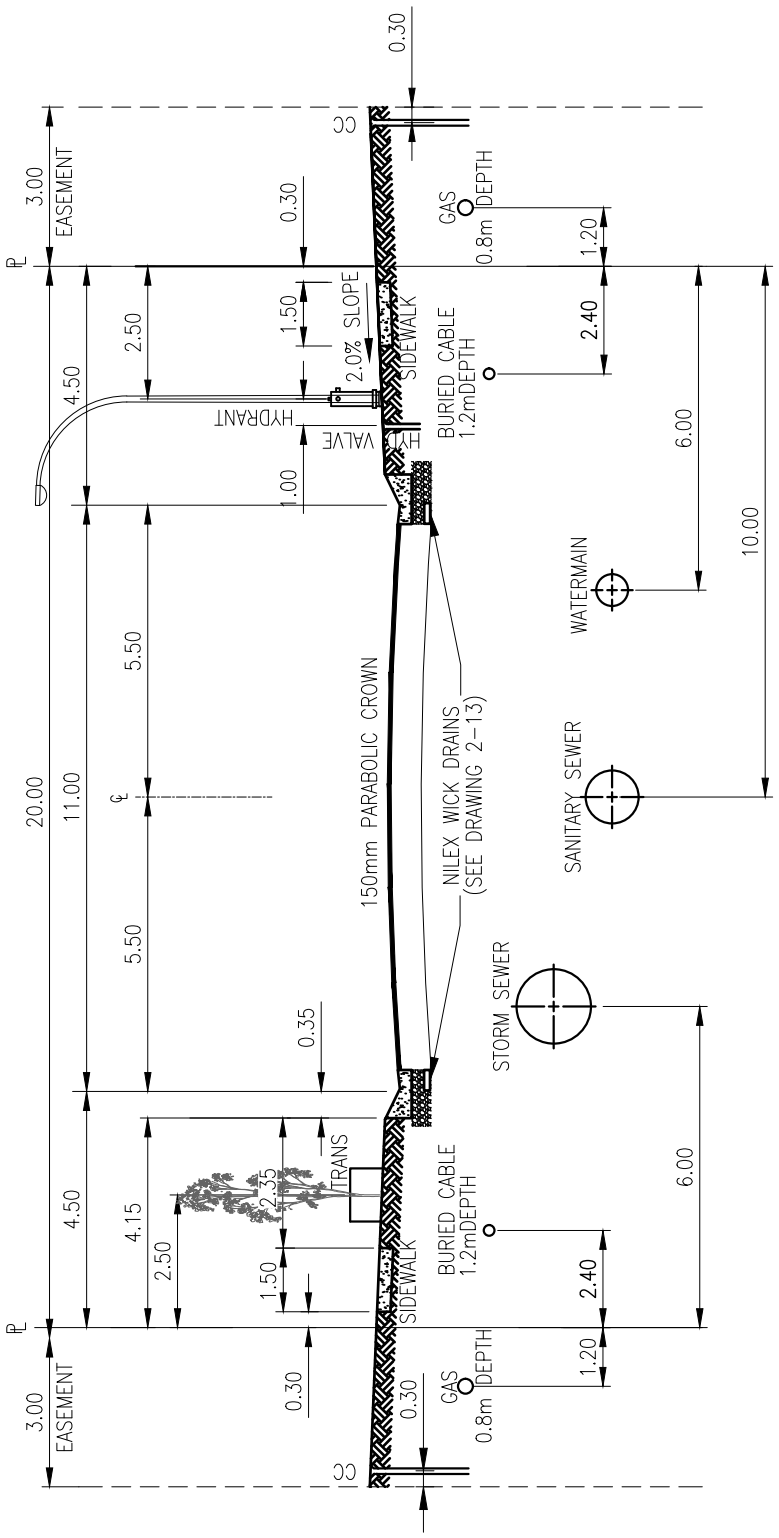
BEAUMONT

24.0m R.O.W. WITH 12.0m MAJOR RES. COLLECTOR (MONOLITHIC WALK)

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-6



NOTES:
- LANDSCAPING REQUIRED AS PER SECTION 4.0 OF THE GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DEEP UTILITIES (IF REQUIRED) TO BE LOCATED WITHIN ROADWAY.
- CONCRETE SIDEWALK OR ASPHALT PATH REQUIRED ON BOTH SIDES OF ROADWAY.
- ALL DIMENSIONS IN METRES.

*EXTEND SUBGRADE AND BASE MIN. 150mm BEHIND CURB

	REVISIONS	
Date	Details	By

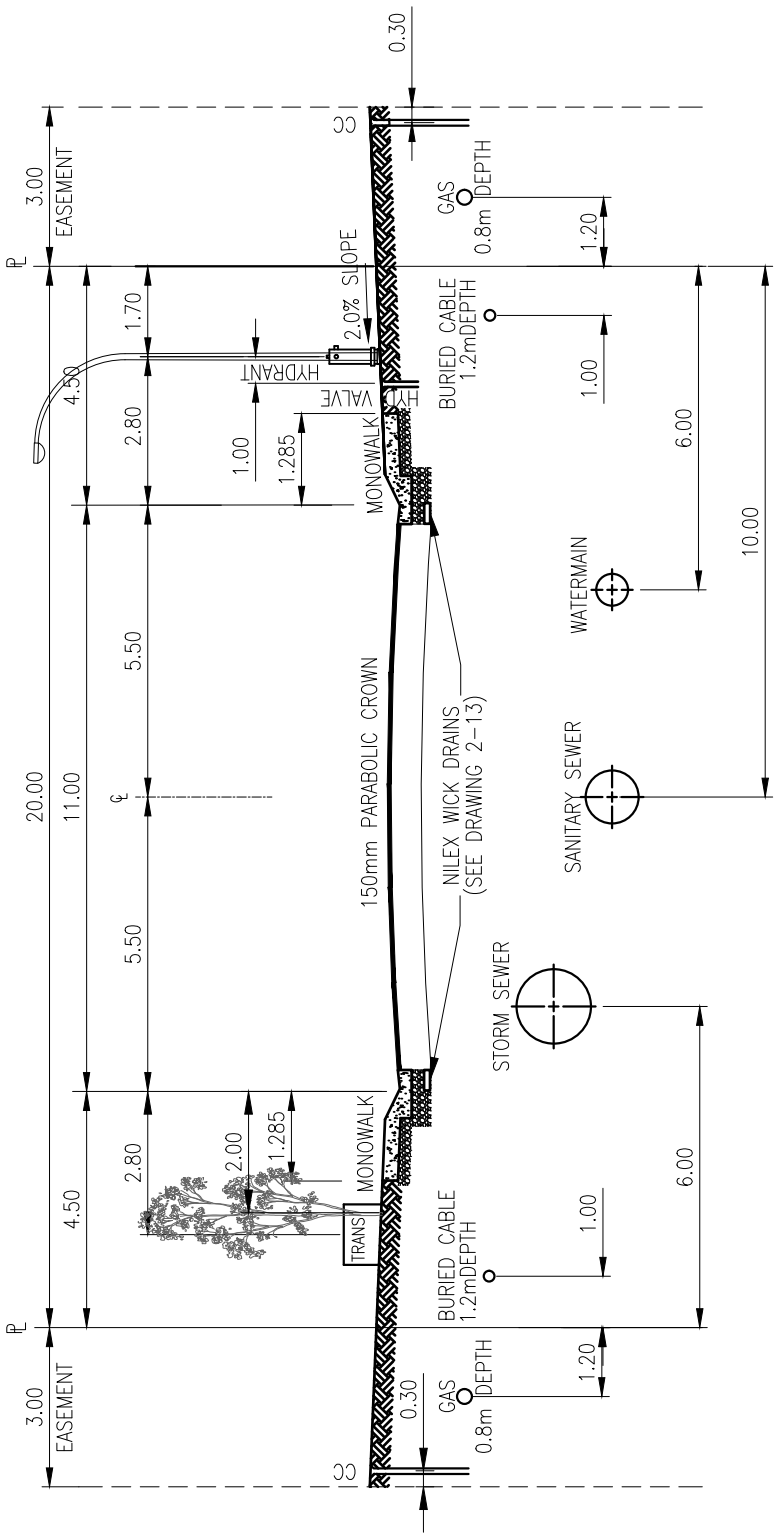
BEAUMONT

20.0m R.O.W. 11.0m MINOR COLLECTOR – (BLVD. WALK)

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2–7



NOTES:
- LANDSCAPING REQUIRED AS PER SECTION 4.0 OF THE GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DEEP UTILITIES (IF REQUIRED) TO BE LOCATED WITHIN ROADWAY.
- CONCRETE SIDEWALK OR ASPHALT PATH REQUIRED ON BOTH SIDES OF ROADWAY.
- ALL DIMENSIONS IN METRES.

*EXTEND SUBGRADE AND BASE MIN. 150mm BEHIND CURB

	REVISIONS	
Date	Details	By

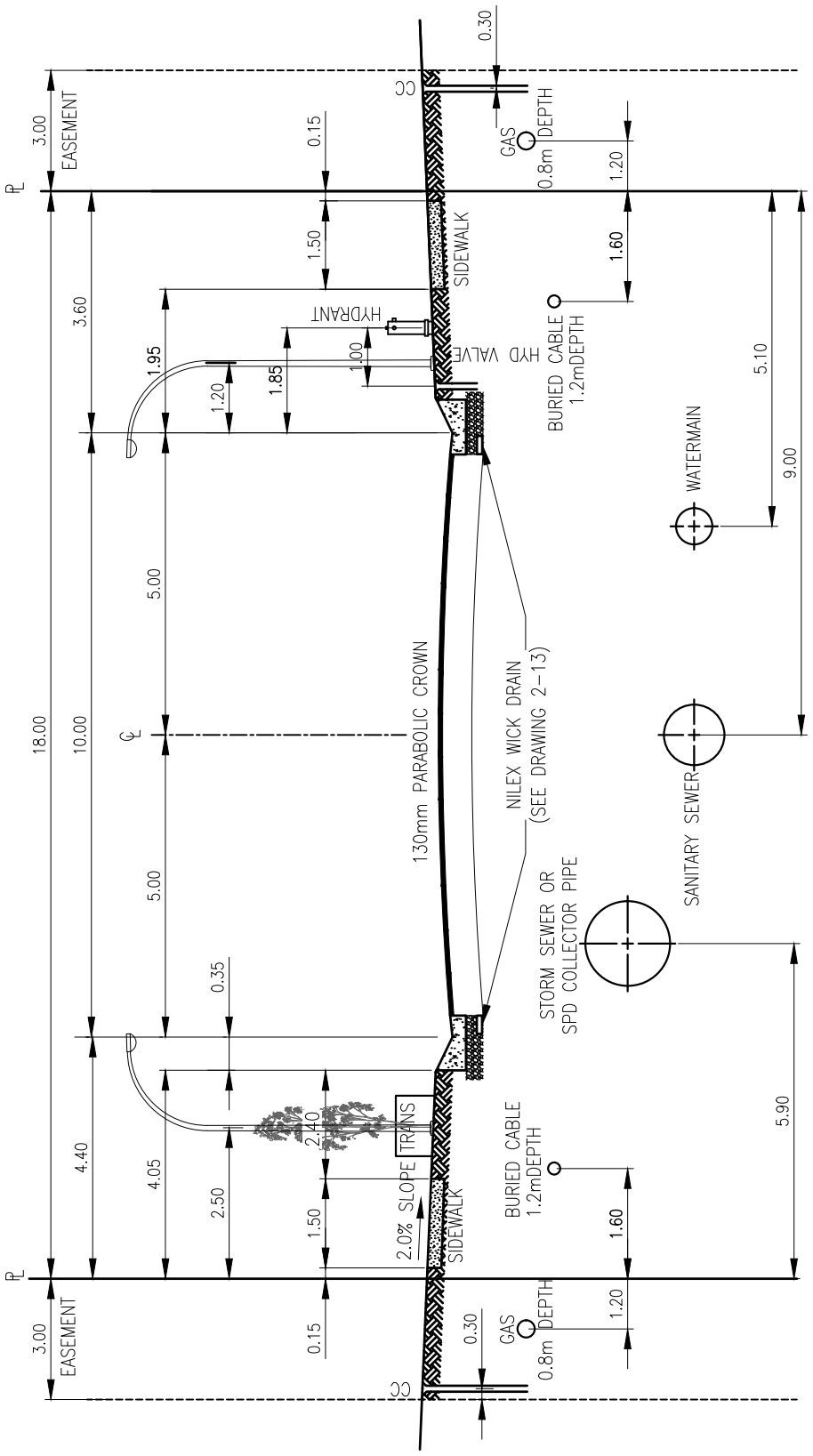
BEAUMONT

20.0m R.O.R. 11.0m MINOR COLLECTOR (MONOLITHIC WALK)

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-8



NOTES:
- LANDSCAPING REQUIRED AS PER SECTION 4.0 OF THE GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DEEP UTILITIES (IF REQUIRED) TO BE LOCATED WITHIN ROADWAY.
- CONCRETE SIDEWALK OR ASPHALT PATH REQUIRED ON BOTH SIDES OF ROADWAY.
- ALL DIMENSIONS IN METRES.

*EXTEND SUBGRADE AND BASE MIN. 150mm BEHIND CURB

	REVISIONS	
Date	Details	By

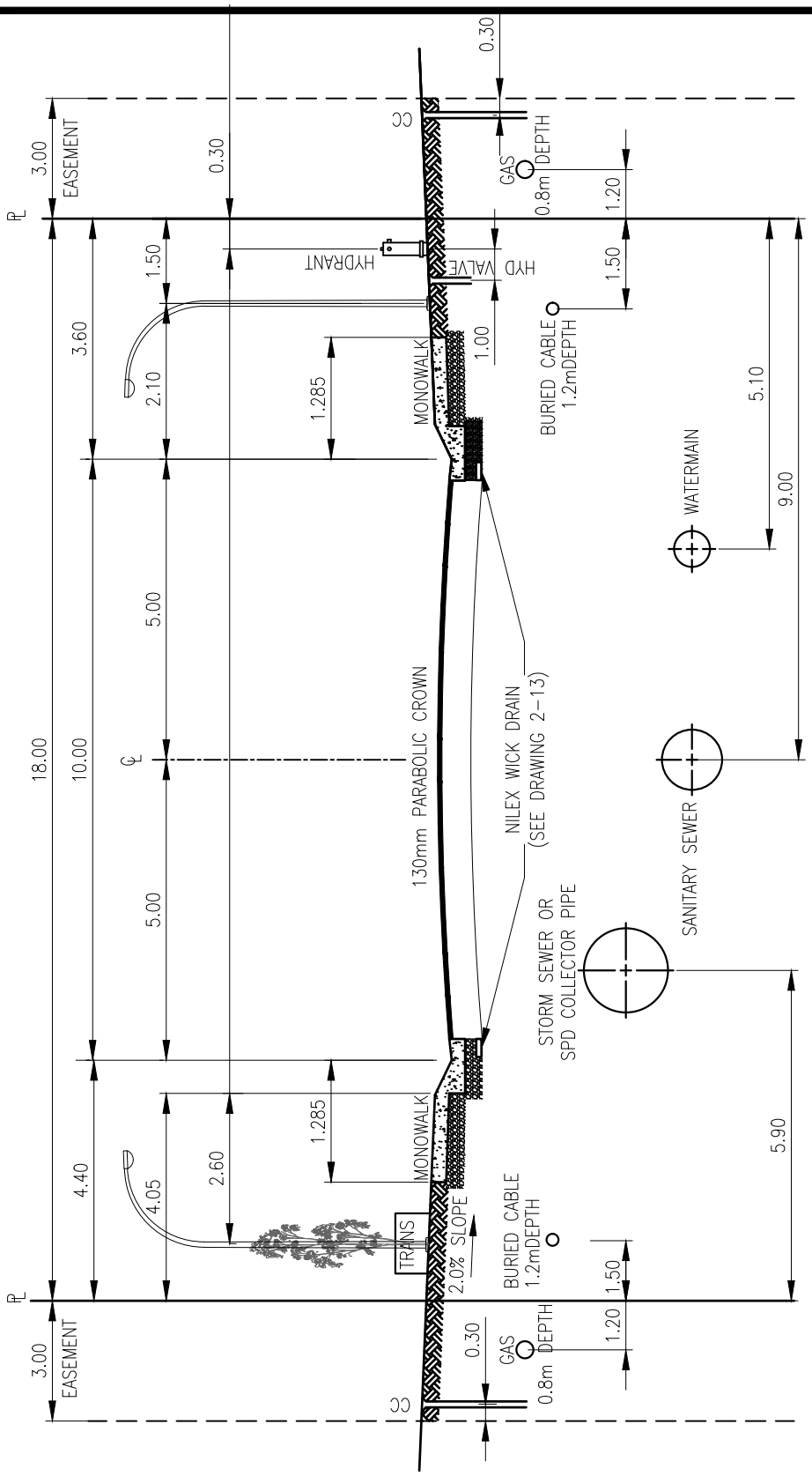
BEAUMONT

18.0m R.O.W. 10.0m
LOCAL RESIDENTIAL – BLVD. WALK

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2–9



NOTES:

- LANDSCAPING REQUIRED AS PER SECTION 4.0 OF THE GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DEEP UTILITIES (IF REQUIRED) TO BE LOCATED WITHIN ROADWAY.
- CONCRETE SIDEWALK OR ASPHALT PATH REQUIRED ON BOTH SIDES OF ROADWAY.
- ALL DIMENSIONS IN METRES.

*EXTEND SUBGRADE AND BASE MIN. 150mm BEHIND CURB

	REVISIONS	
Date	Details	By

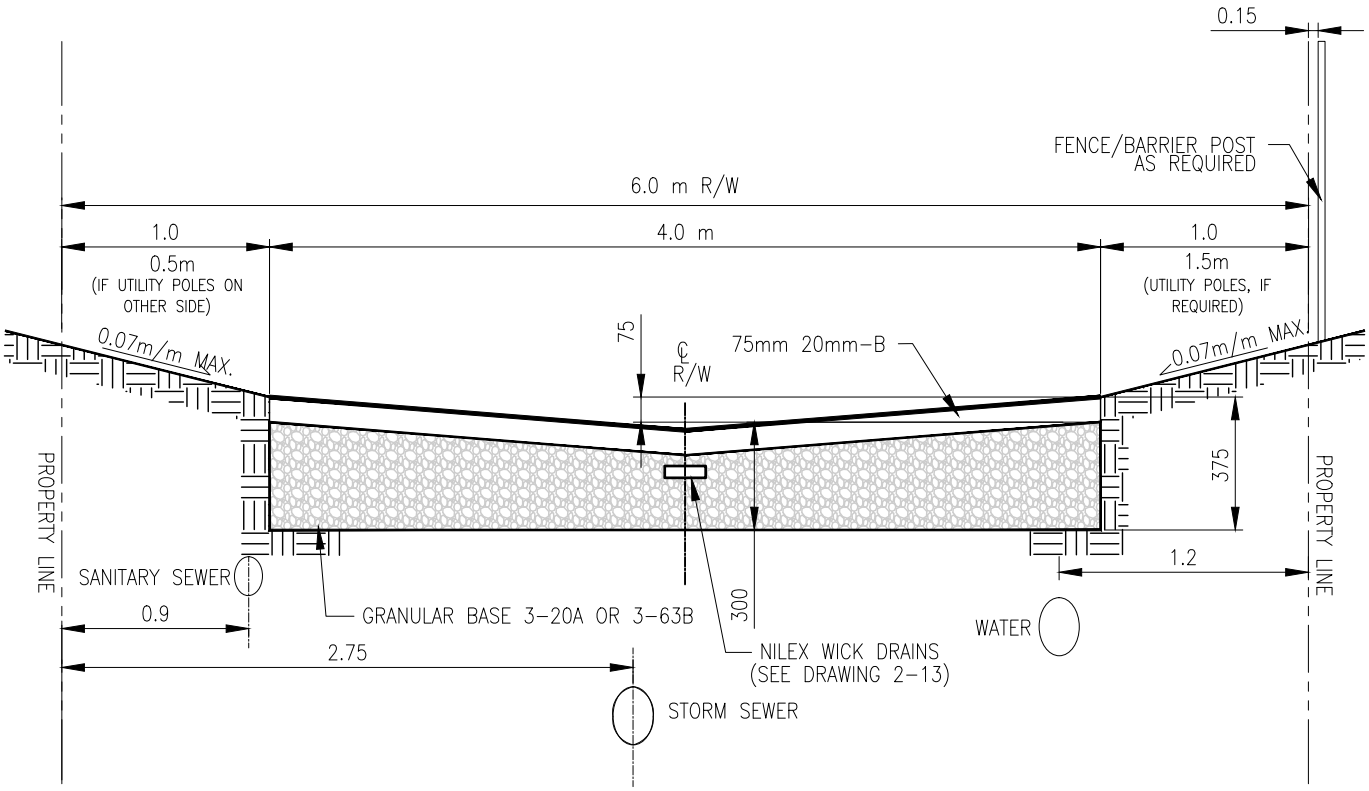
BEAUMONT

18.0m R.O.W. 10.0m
LOCAL RESIDENTIAL (MONOLITHIC WALK)

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. **2-10**



NOTES:

1. REDUCE CENTERLINE "V" TO 50mm AT TIE-IN TO BACK OF BOULEVARD WALK TO FACILITATE DRAINAGE AS REQUIRED.
2. DEPTH OF GAS TRENCH TO BE MINIMUM 1.1m.
3. EDGES OF PAVEMENT TO BE WARPED TO FIT DRIVEWAYS.
4. LANE IS CENTERED IN R.O.W. UNLESS THERE ARE UTILITY POLES.
5. STAGED ASPHALT PAVING WILL BE REQUIRED IF MULTIPLE UTILITIES ARE INSTALLED WITHIN THE 4.0m PAVED AREA.
6. ALL DIMENSIONS IN METRES UNLESS OTHERWISE STATED.

	REVISIONS	
Date	Details	By

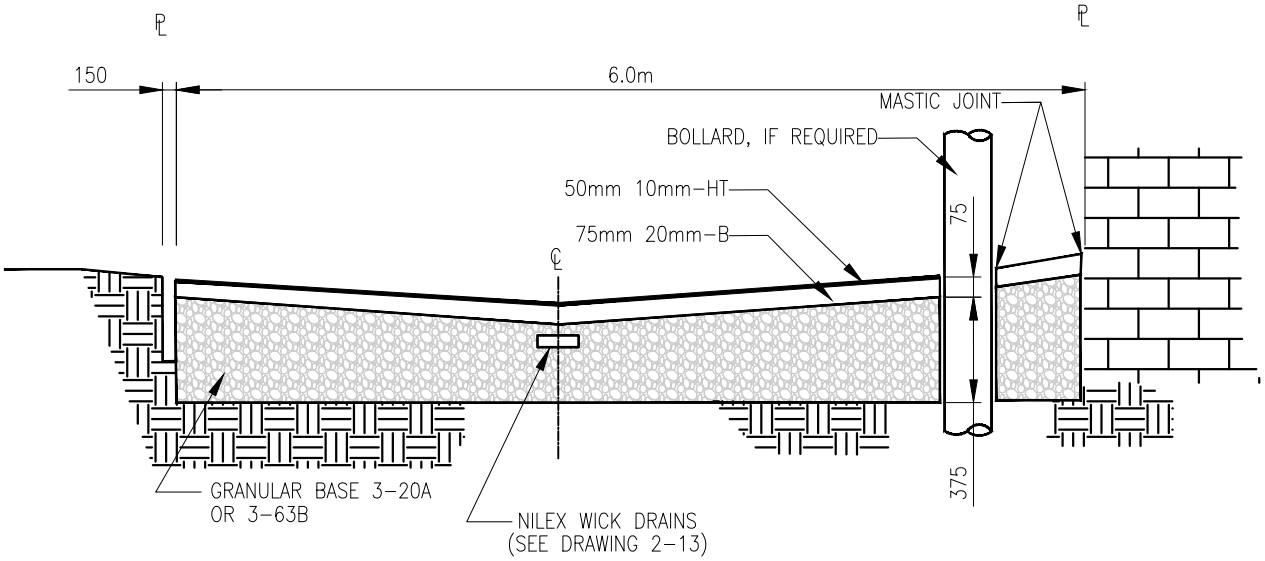
BEAUMONT

4.0m RESIDENTIAL LANE GENERAL CROSS SECTION

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-11



STRUCTURE:	TYPE	CENTRE	EDGE
ASPHALT		125	125
GRAVEL	3-20A	300	375
ALTERNATIVE STRUCTURE	3-63B	300	375

NOTES:

1. REDUCE CENTRELINE "V" TO 50mm AT TIE–IN TO BACK OF BOULEVARD WALK TO FACILITATE DRAINAGE AS REQUIRED.
2. IN ALLEY CONSTRUCTION, THE SAG POINT MAY BE OFF CENTRED AND/OR THE CROSS–FALL VARIED TO MATCH EXISTING GRADES ALONG THE ALLEY EDGES.
3. EXCAVATION LIMITS TO BE AS SHOWN ABOVE.
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

	REVISIONS	
Date	Details	By

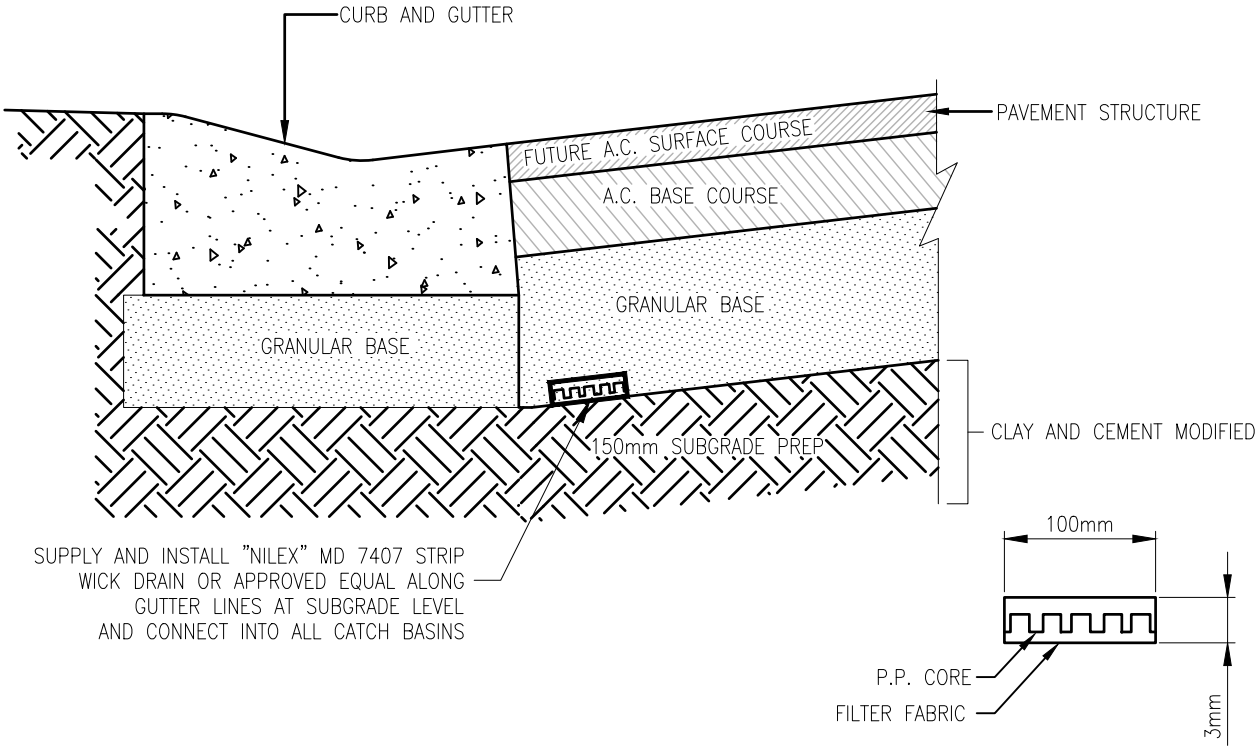
BEAUMONT

6.0m COMMERCIAL LANE

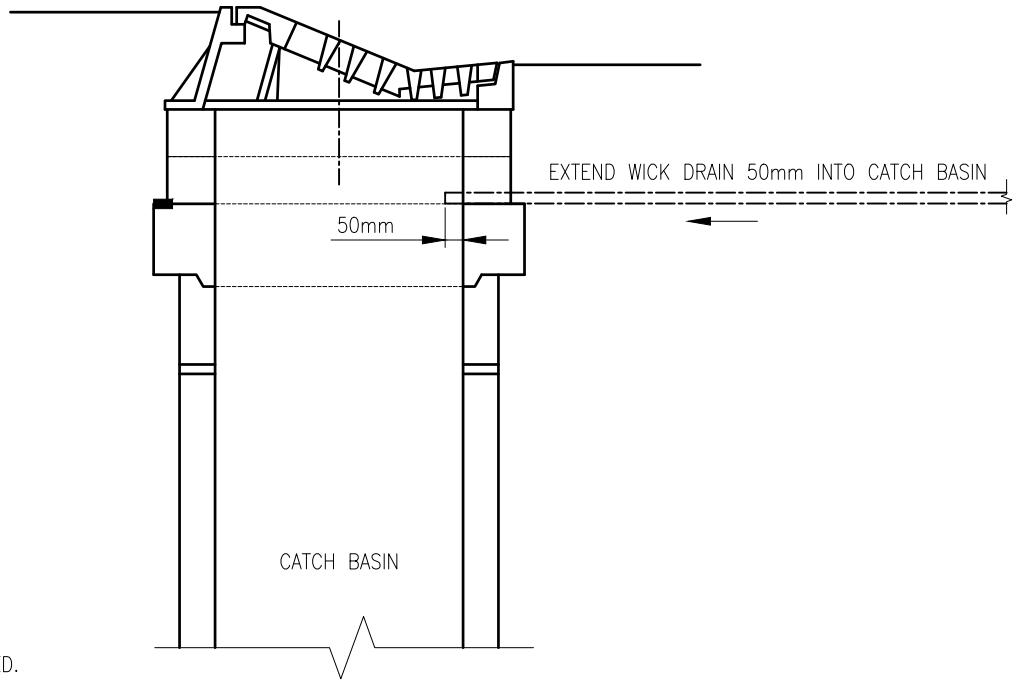
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2–12



WICK DRAIN DETAIL



NOTES:

1. SUBGRADE TO BE CEMENT MODIFIED.

	REVISIONS	
Date	Details	By

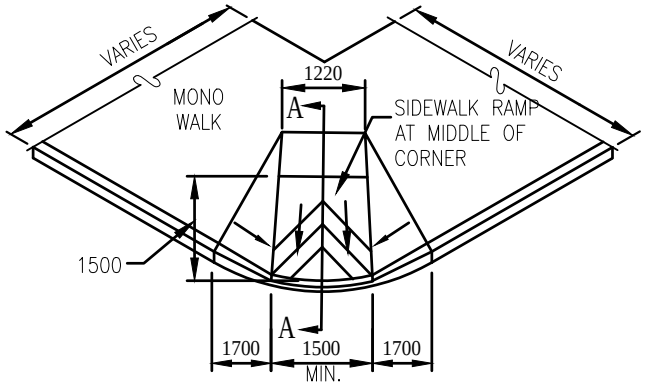
BEAUMONT

WICK DRAIN AND WICK DRAIN ENTERING CATCH BASIN

Date: **MARCH/2021**

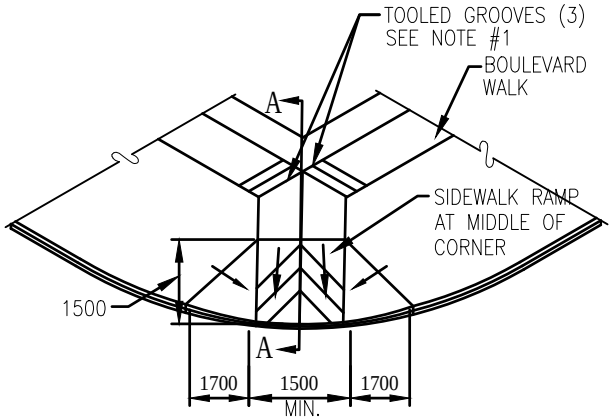
Scale: **N.T.S.**

DWG. NO. 2-13



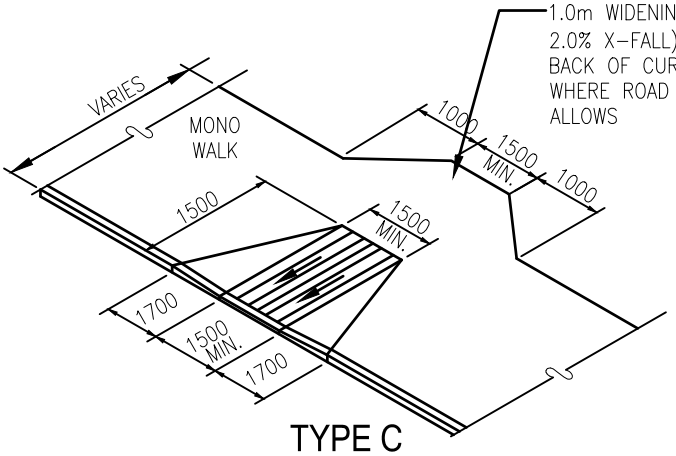
TYPE A

N.T.S.



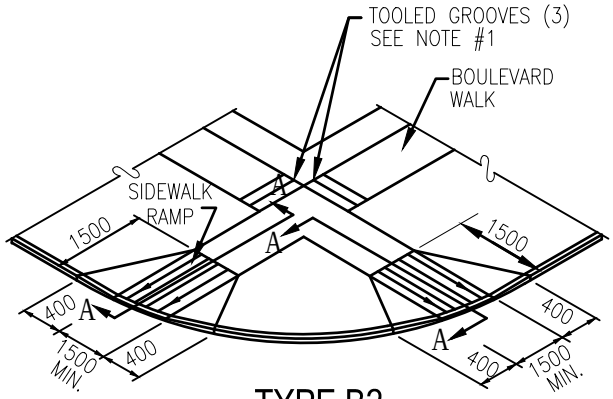
TYPE B1

N.T.S.



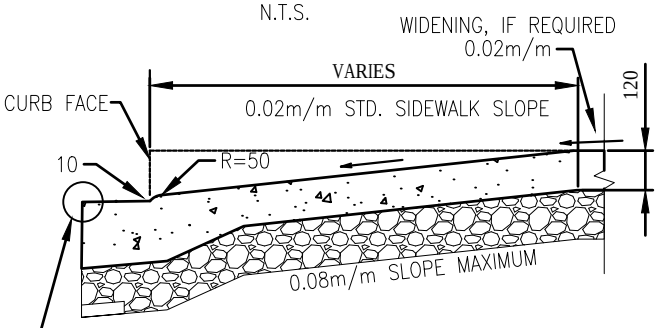
TYPE C

N.T.S.



TYPE B2

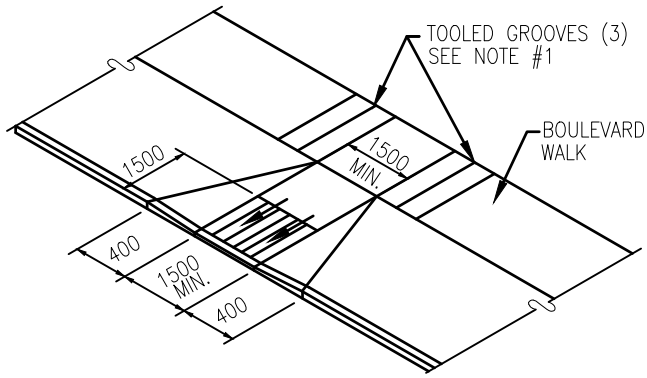
N.T.S.



TYPICAL CROSS SECTION A-A

N.T.S.

a) MATCH ASPHALT SURFACE TO GUTTER LIP WITHIN 3mm±
b) IF ASPHALT TOP LIFT IS DEFERRED, PLACE ASPHALT RAMP FOR THE WIDTH OF CURB RAMP, AND EXTENDING MINIMUM 1.0 m INTO ROAD.



TYPE D

N.T.S.

NOTES:

1. TOOLED GROOVES 5mm WIDE X 10mm DEEP, BROOM FINISH GROOVE SPACING 150mm O.C. ADJACENT TO CURB.
2. WHERE RAMP IS TO BE USED AS A TRANSITION, USE THE CENTER OF THE 1500mm RAMP AS THE CENTER OF THE TRANSITION.
3. CURBS AND RAMPS TO BE POURED MONOLITHICALLY.

	REVISIONS	
Date	Details	By

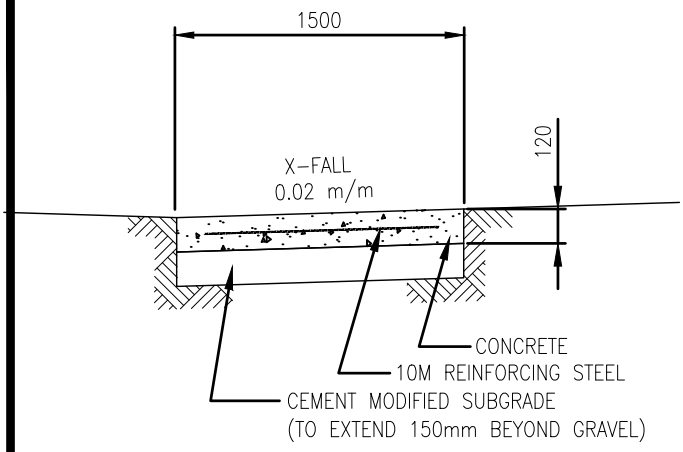
BEAUMONT

CURB RAMP DETAIL

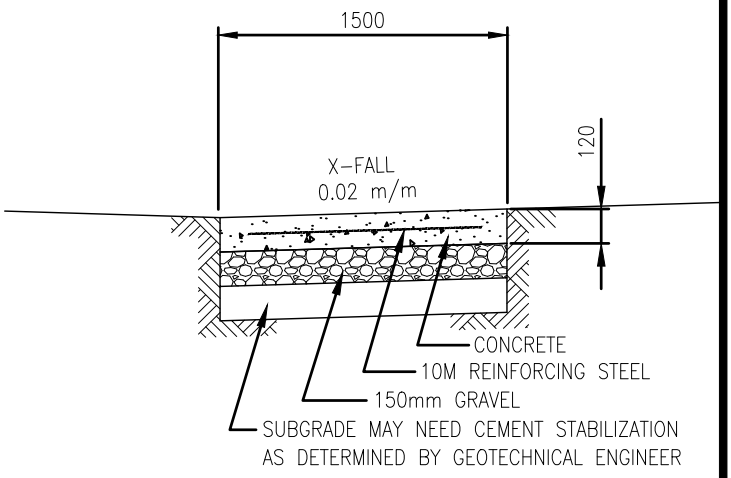
Date: **MARCH/2021**

Scale: **N.T.S.**

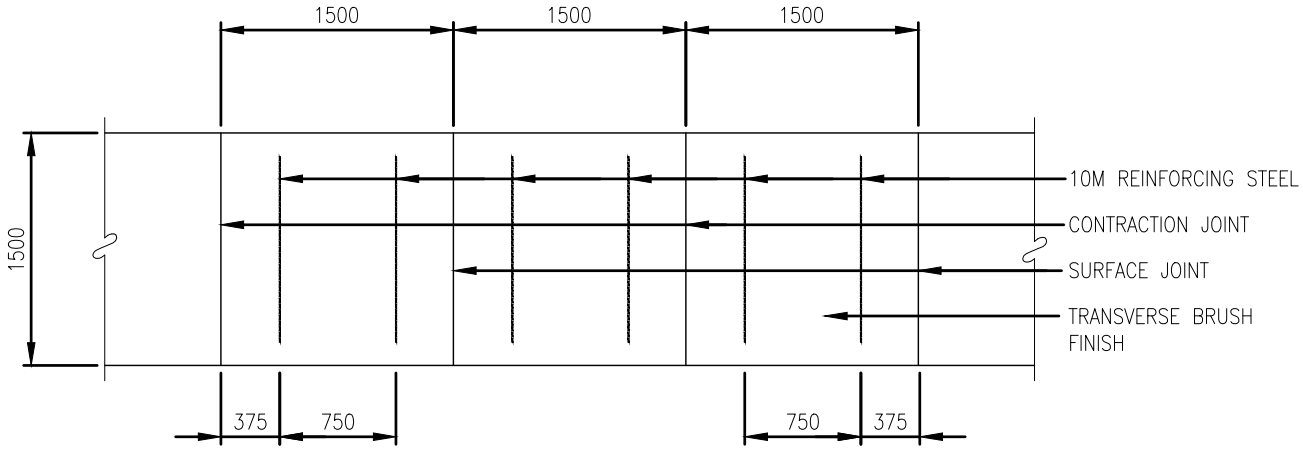
DWG. NO. 2-14



TYPICAL SECTION (NO GRAVEL)



TYPICAL SECTION



PLAN VIEW

NOTE:
- ALL DIMENSIONS IN MILLIMETRES
- GRAVEL REQUIREMENT SHOULD BE DETERMINED BY A GEOTECHNICAL EXPERT

	REVISIONS	
Date	Details	By

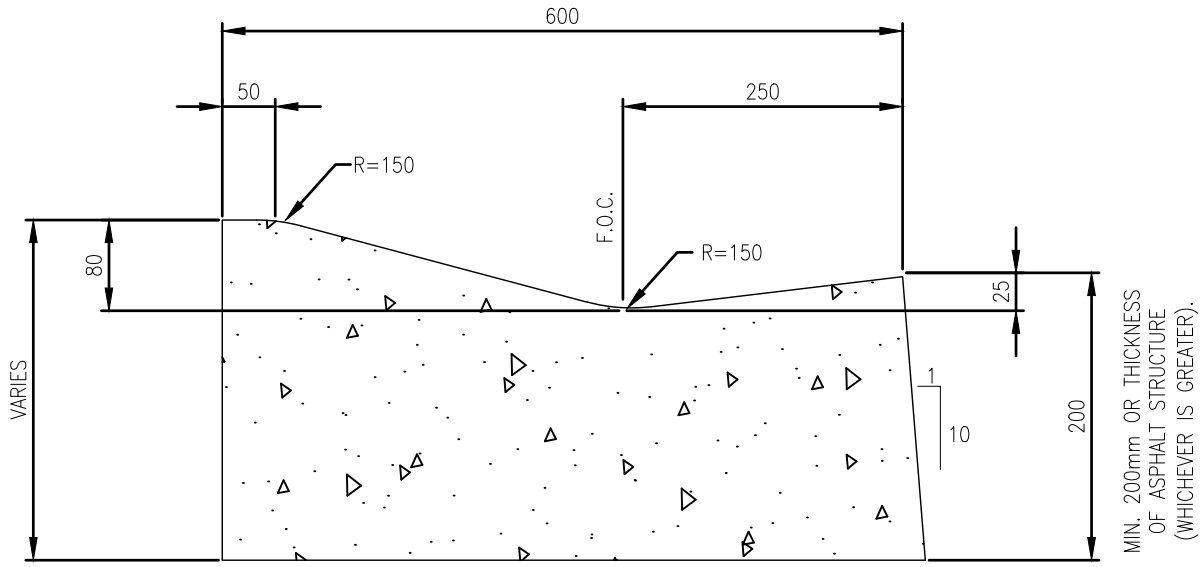
BEAUMONT

1.50m SEPARATE WALK DETAIL

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-15



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

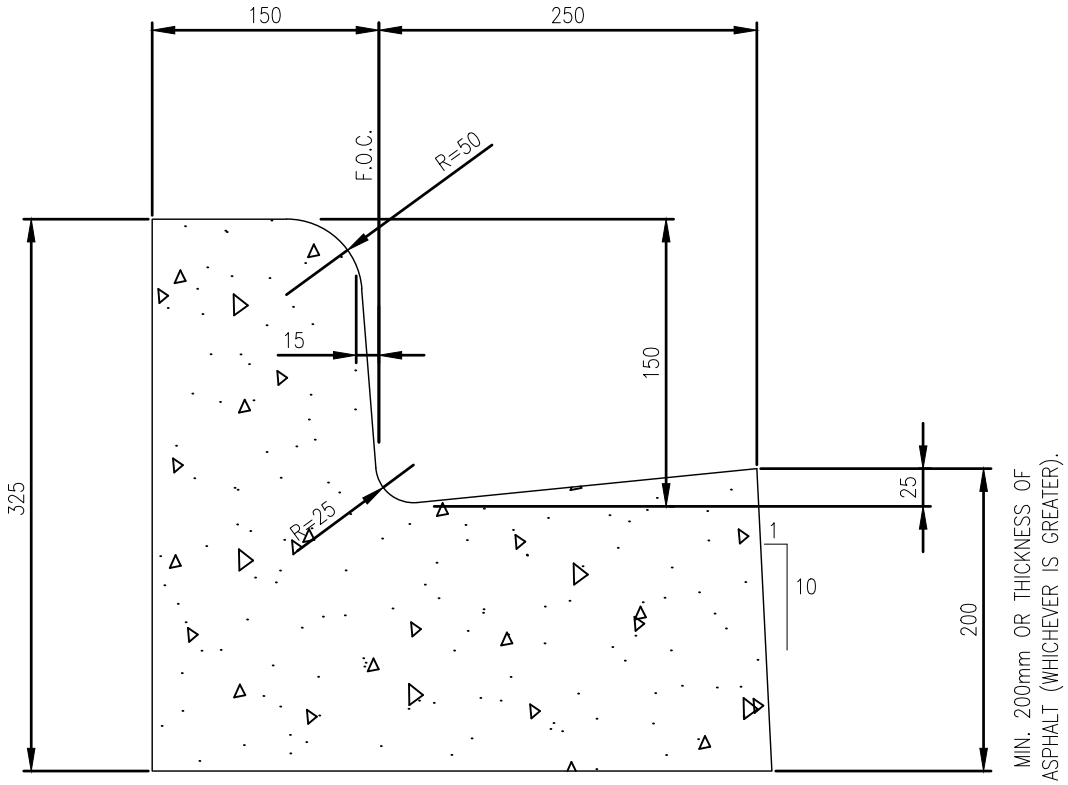
BEAUMONT

ROLL FACE CURB AND GUTTER

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-16



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

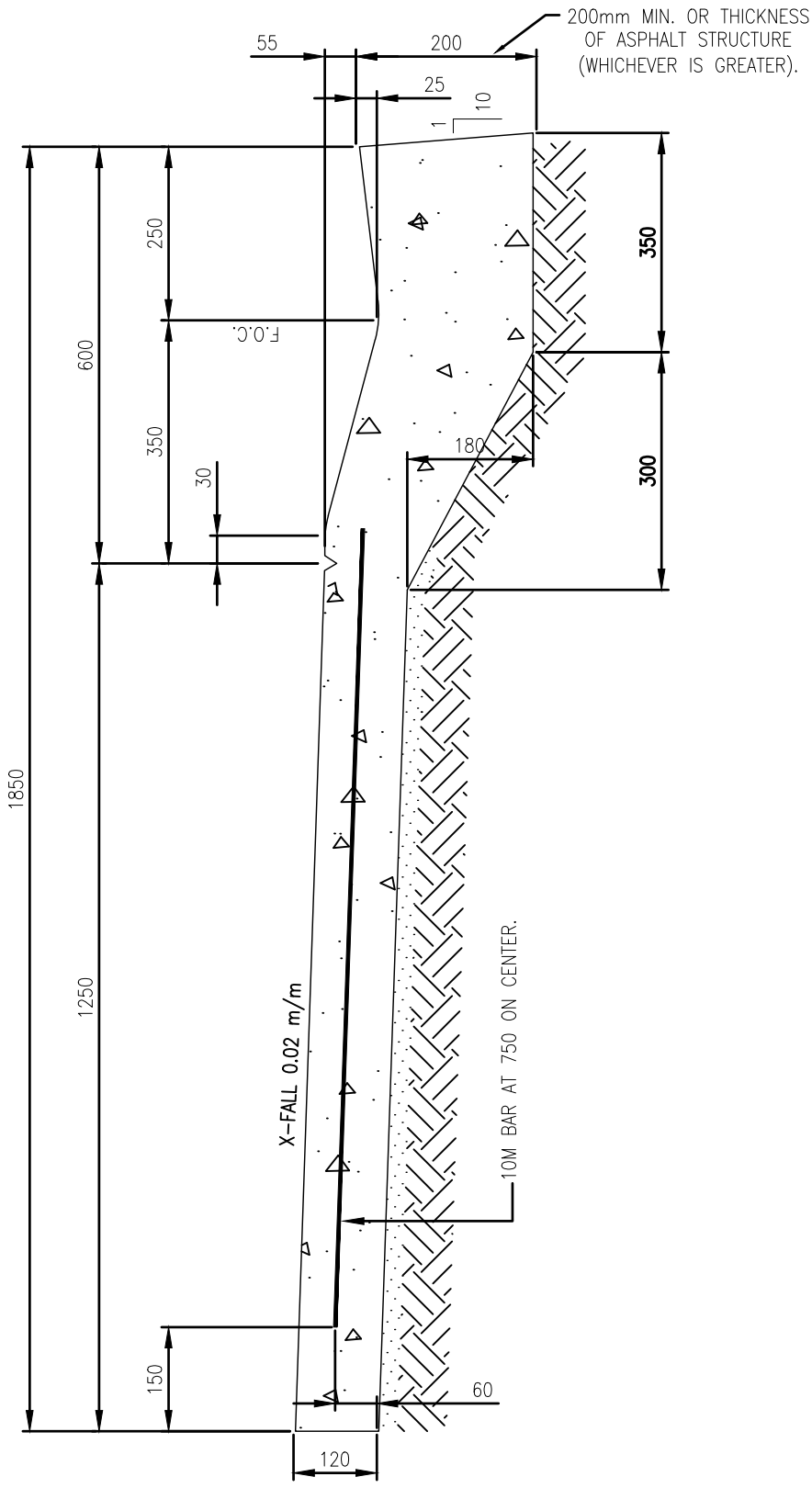
BEAUMONT

STANDARD STRAIGHT FACE 150mm CURB WITH 250mm GUTTER

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-17



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

BEAUMONT

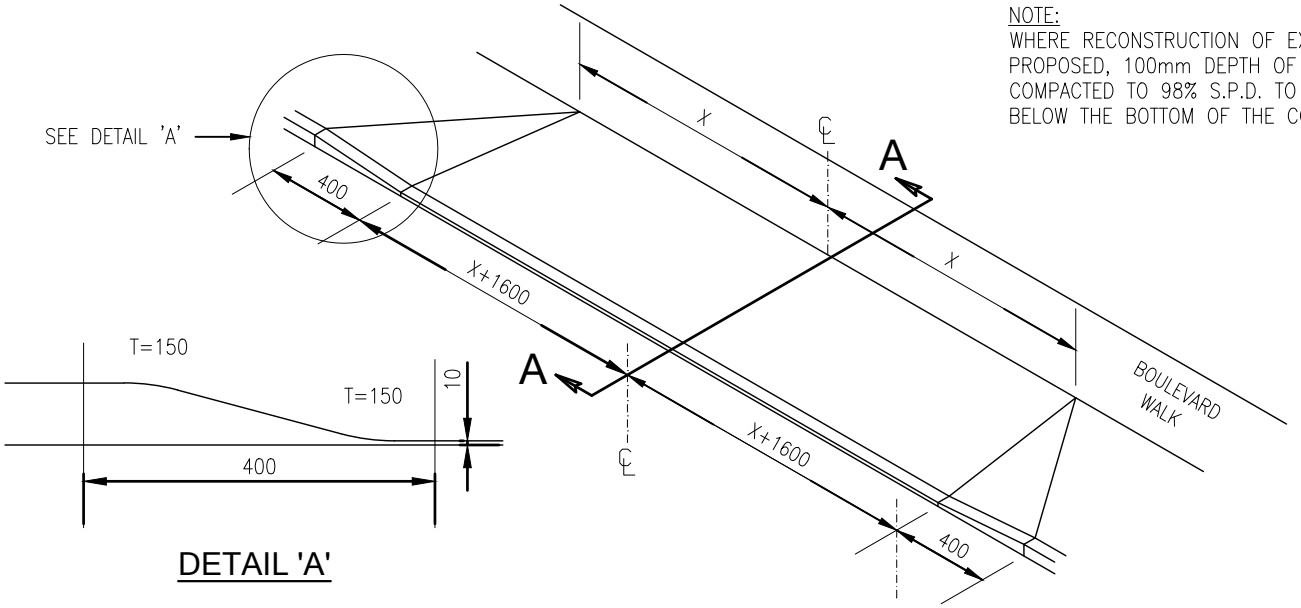
ROLL FACE MONOLITHIC WALK AND GUTTER

Date: **MARCH/2021**

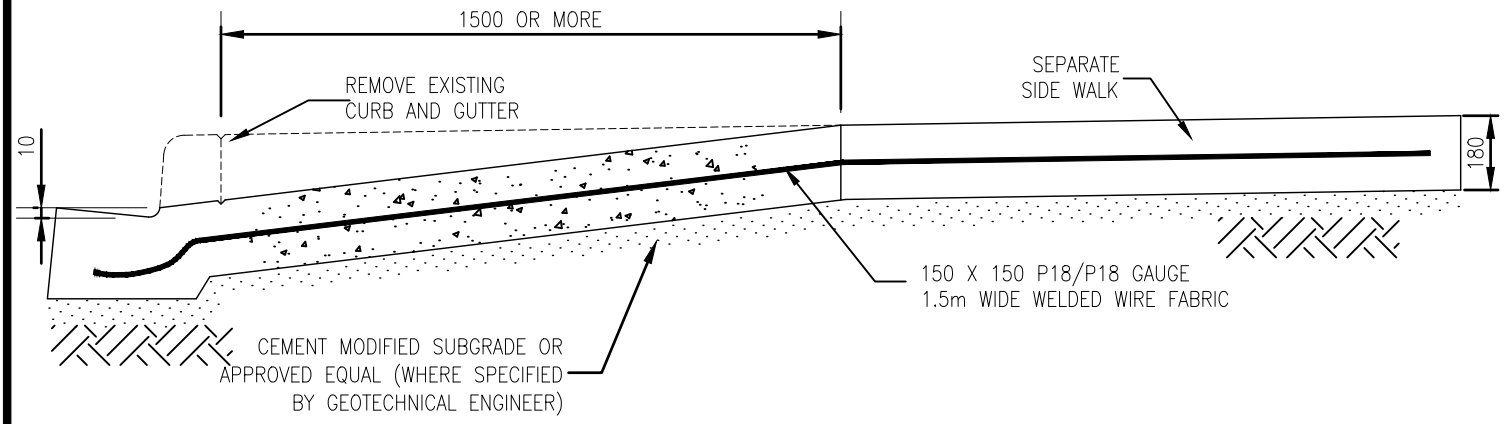
Scale: **N.T.S**

DWG. NO. 2-18

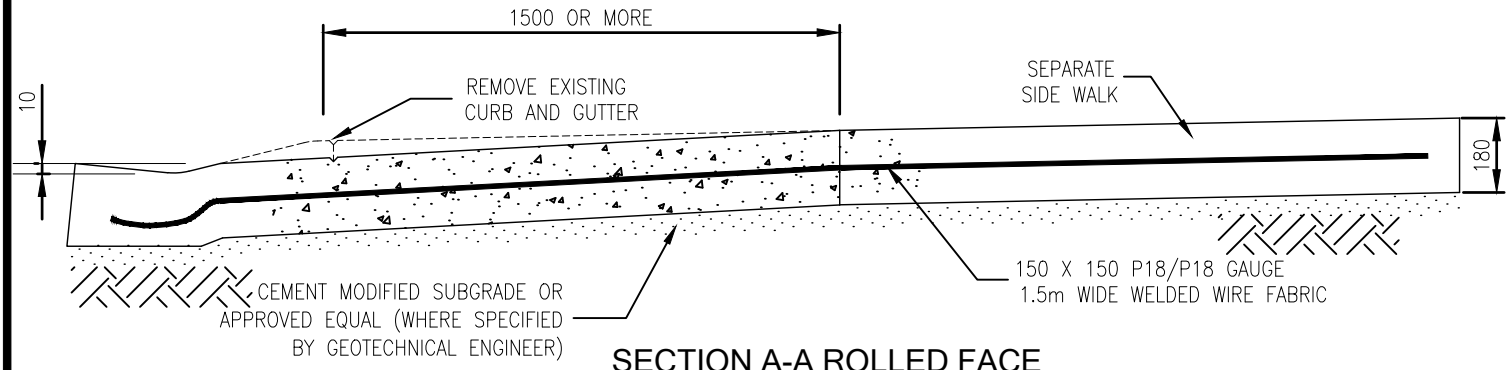
NOTE:
WHERE RECONSTRUCTION OF EXISTING IS PROPOSED, 100mm DEPTH OF GRANULAR COMPACTED TO 98% S.P.D. TO BE PLACED BELOW THE BOTTOM OF THE CONCRETE.



DETAIL 'A'



SECTION A-A STRAIGHT FACE



SECTION A-A ROLLED FACE

NOTES:
1. MAXIMUM SLOPE 8% UNLESS OTHERWISE APPROVED BY ENGINEER.
2. X-ING TO BE POURED MONOLITHICALLY WITH CURB AND GUTTER.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

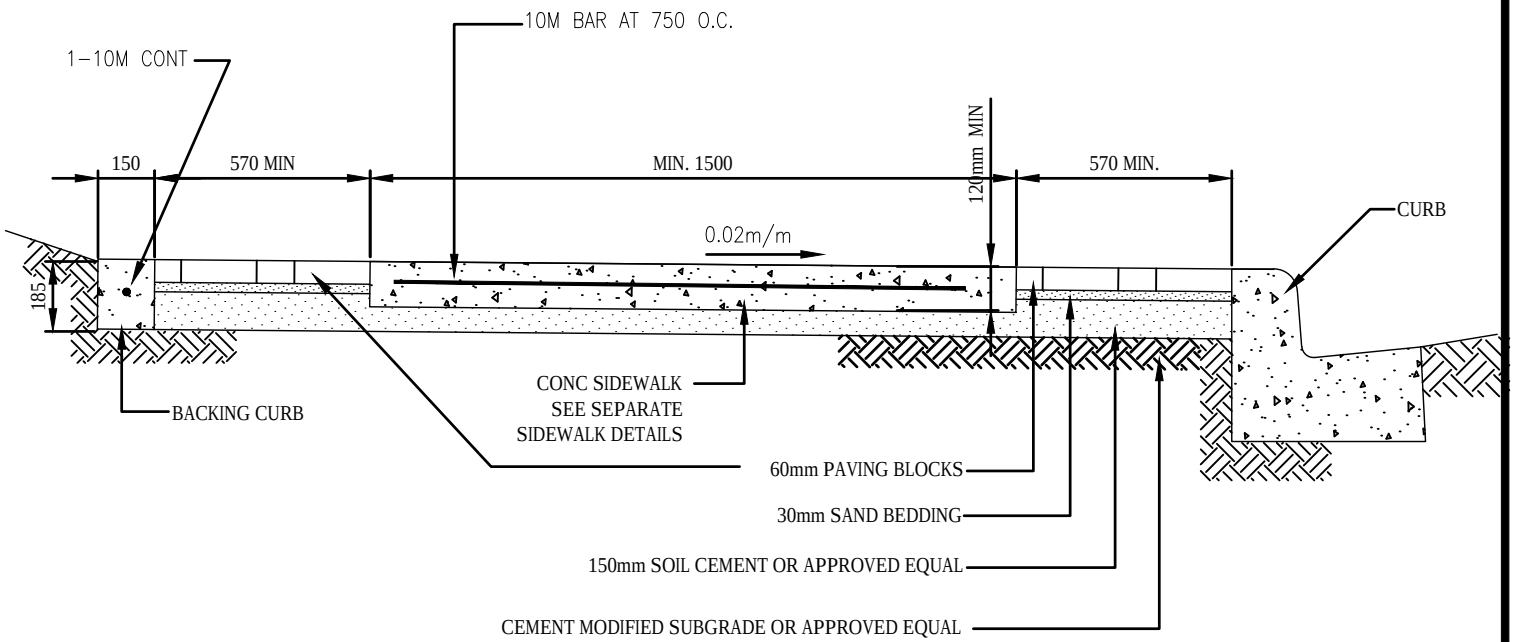
BEAUMONT

COMMERCIAL CROSSING
BOULEVARD WALK AND APRON
BOULEVARD GREATER THAN 1.5m WIDTH

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-19



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

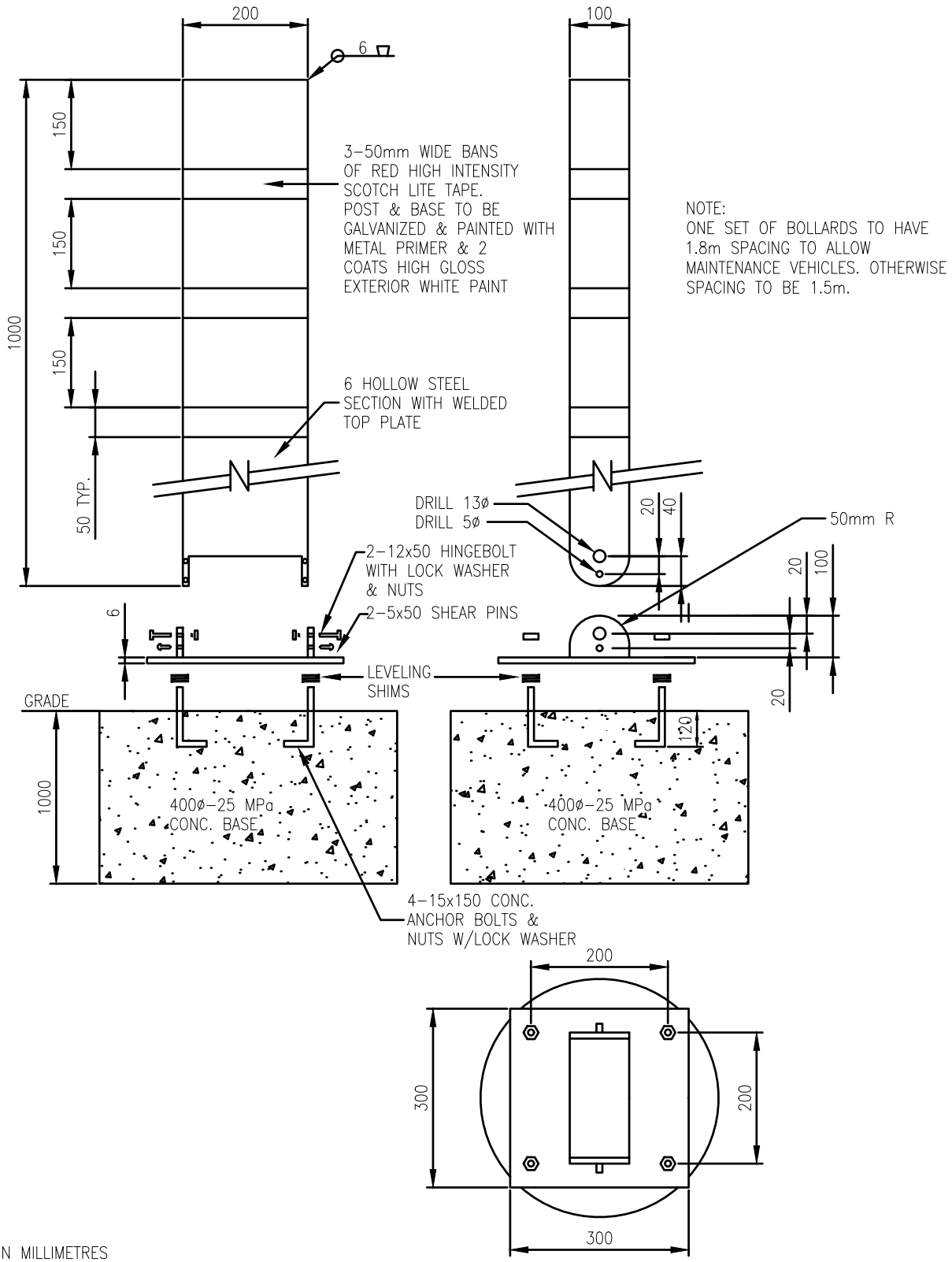
BEAUMONT

SIDEWALK SECTION (FRENCH THEME)

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-20



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

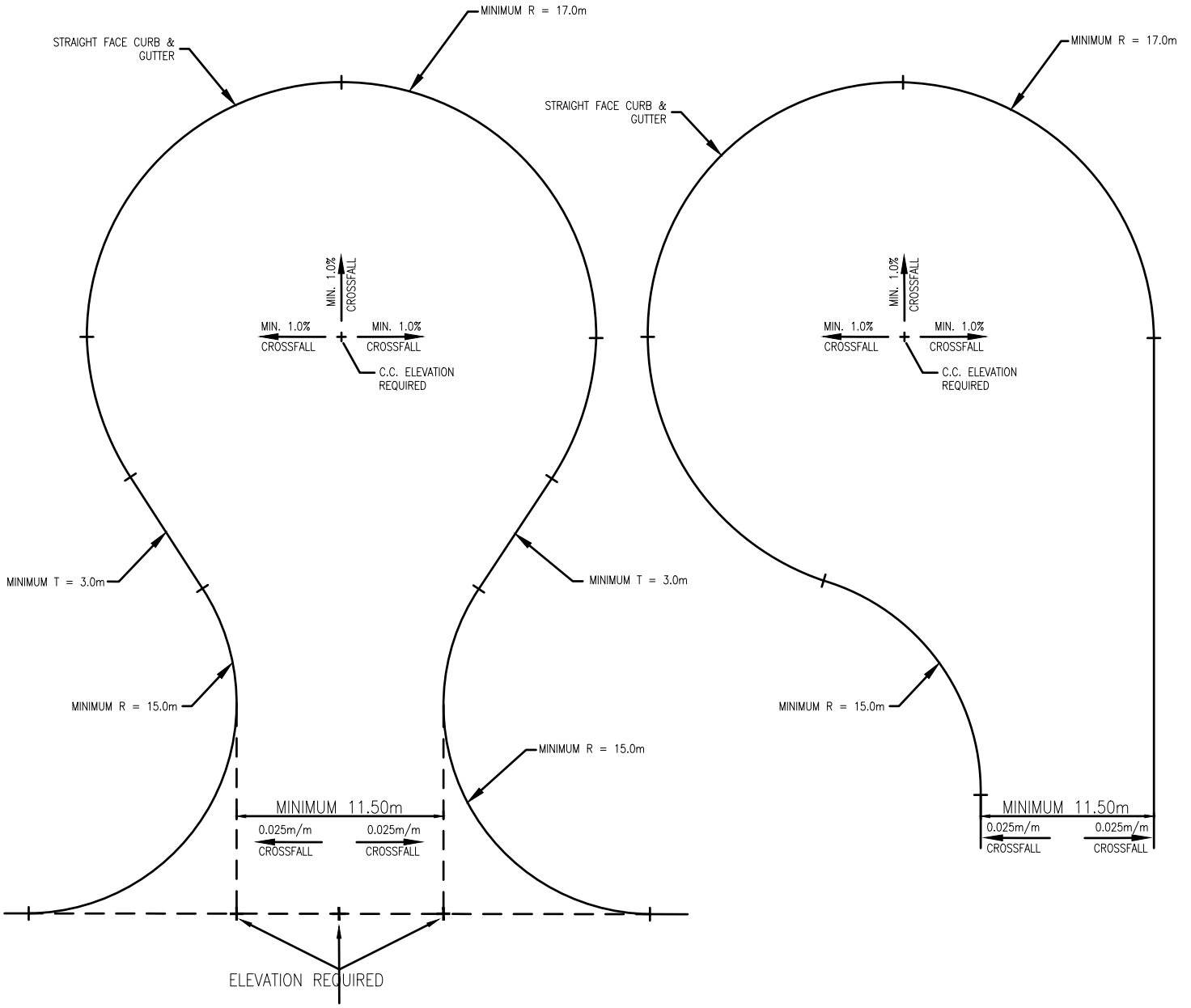
BEAUMONT

EMERGENCY KNOCK-DOWN BOLLARD DETAIL

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-21



NOTES:
1. PROVIDE ELEVATION FOR ALL TICK MARKS SHOWN.
2. FOR TEMPORARY TURNAROUND WITH NO CURB AND GUTTER, PLACE MINI BARRIERS OR INSTALL BARRIER POSTS AT 1.5m ON CENTRE ALONG EDGE OF TURNAROUND

	REVISIONS	
Date	Details	By

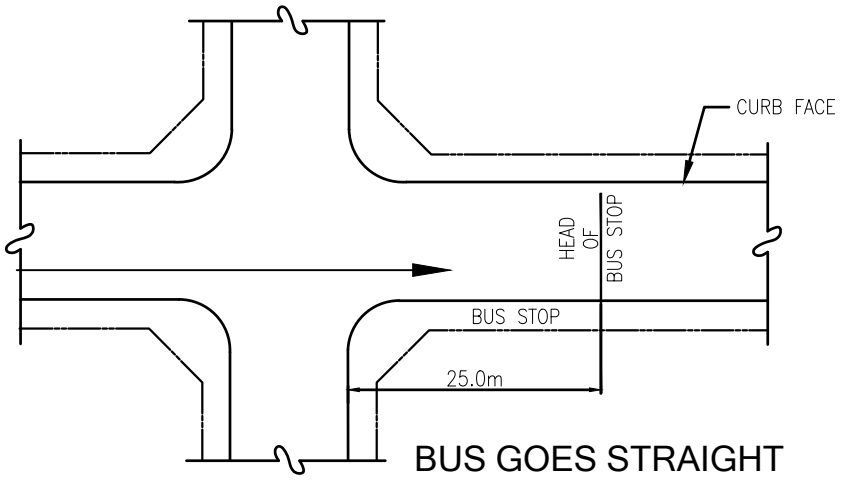
BEAUMONT

TRANSIT TURNAROUND

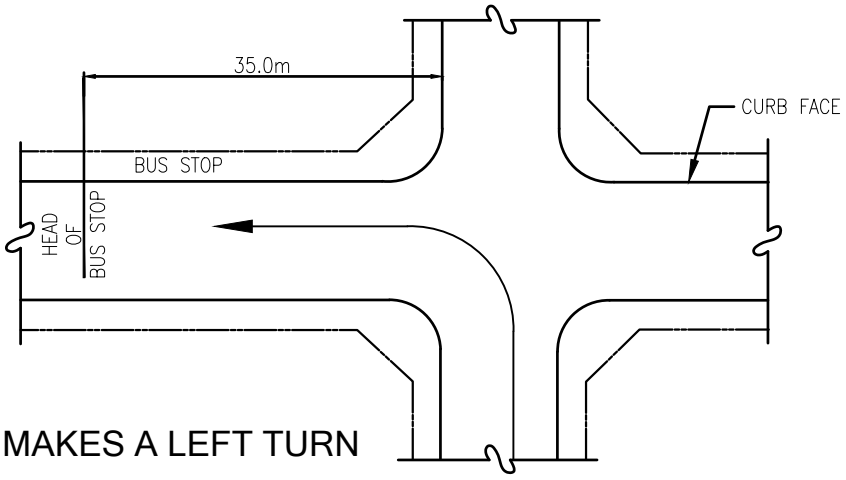
Date: **MARCH/2021**

Scale: **N.T.S.**

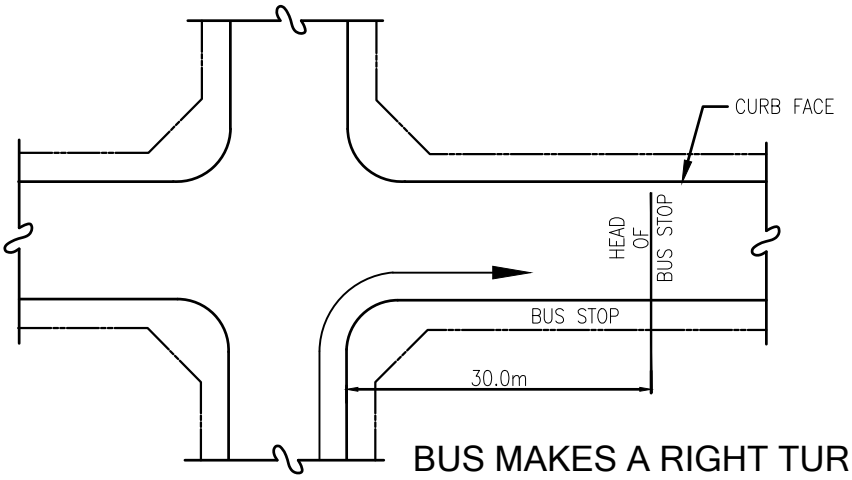
DWG. NO. 2-22



BUS GOES STRAIGHT THROUGH



BUS MAKES A LEFT TURN



BUS MAKES A RIGHT TURN

NOTES:
1. STRAIGHT FACE CURB REQUIRED AT BUS STOP.

	REVISIONS	
Date	Details	By

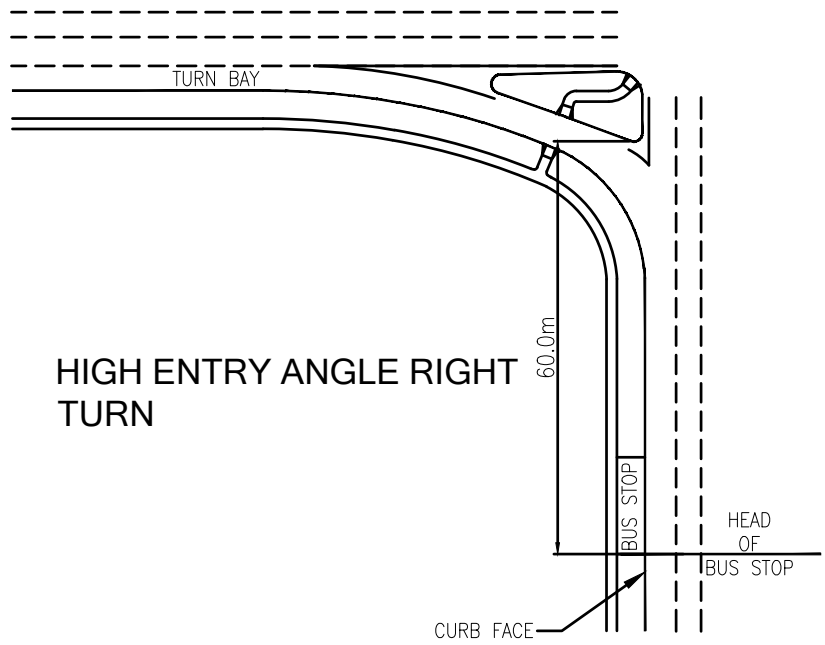
BEAUMONT

LOCATION OF BUS STOP (UNCHANNELIZED INTERSECTION)

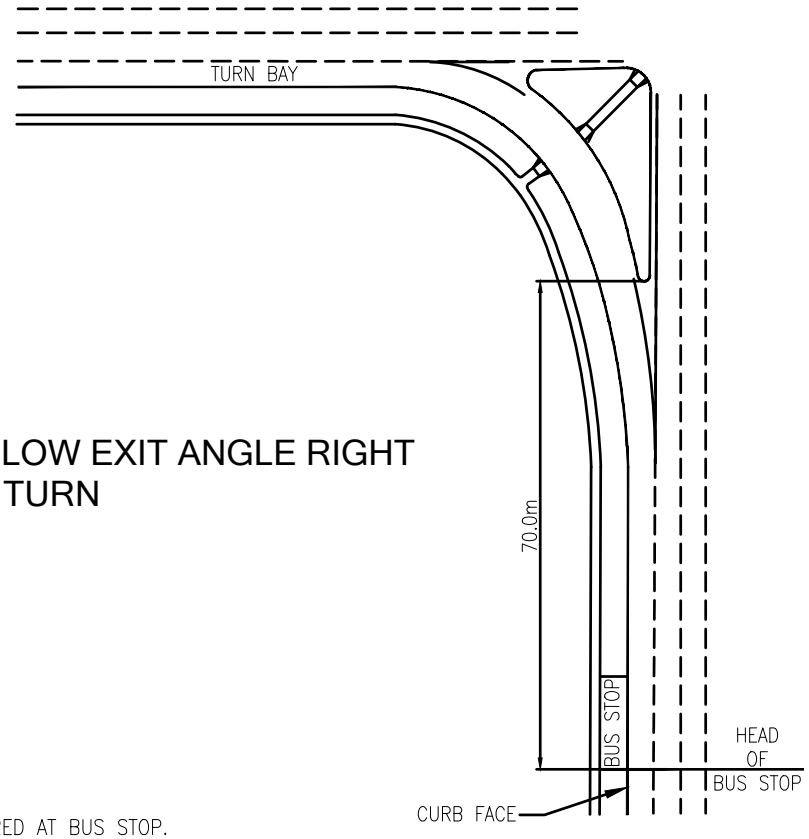
Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-23



HIGH ENTRY ANGLE RIGHT TURN



LOW EXIT ANGLE RIGHT TURN

NOTES:
1. STRAIGHT FACE CURB REQUIRED AT BUS STOP.

	REVISIONS	
Date	Details	By

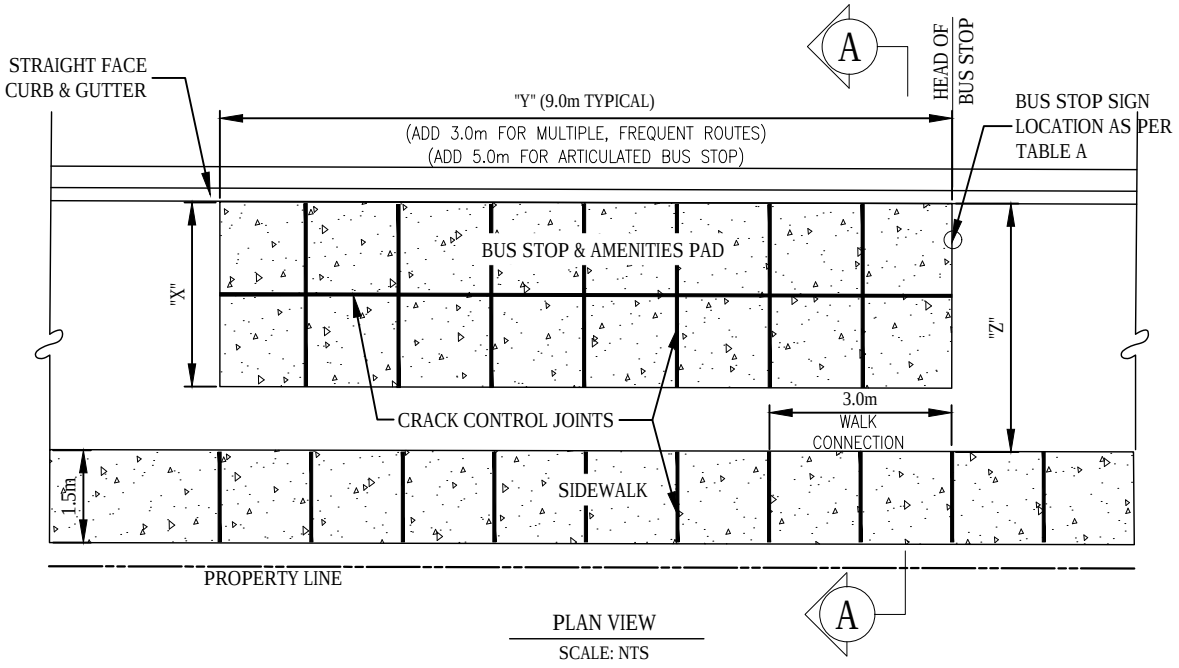
BEAUMONT

LOCATION OF BUS STOP (CHANNELIZED INTERSECTION)

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-24



PLAN VIEW

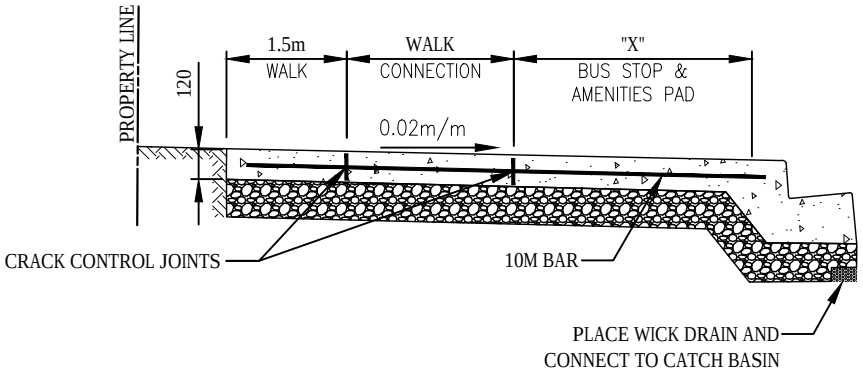
SCALE: NTS

NOTES:

1. PROVIDE A BUS STOP & AMENITIES PAD WITH WIDTH "X" AND LENGTH"Y" IN ACCORDANCE WITH THE DRAWING NOTES AD TABLE A (SEE BELOW). PROVIDE APPROPRIATE CRACK CONTROL JOINTS THROUGHOUT.
2. IF REQUIRED PAD WITH "X" IS LESS THAN 1.0m FROM SIDEWALK, POUR THE CONCRETE PAD TO THE SIDEWALK, OTHERWISE, PROVIDE A 3.0m WIDE WALK CONNECTION AT THE HEAD OF THE PAD.

TABLE A - BUS STOP & AMENITIES PAD SIZE

CONDITION	DISTANCE "Z" TO SIDEWALK	REQUIRED PAD WIDTH "X" (m)	REQUIRED PAD LENGTH "Y" (m)	BUS STOP SIGN LOCATION
OVER-CONSTRAINED	Z < 2.25m	NOT PERMISSIBLE	NOT PERMISSIBLE	NOT PERMISSIBLE
CONSTRAINED	2.25m <= "Z" < 3.6m	"X" = "Z"	12.0	3m BACK FROM HEAD
NOT CONSTRAINED	3.6m <= "Z"	"X" = "Z" (MAX 4.1m)	9.0	HEAD OF PAD



SECTION A-A

SCALE: NTS

ALL DIMENSIONS IN MILLIMETRES, UNLESS OTHERWISE STATED

	REVISIONS	
Date	Details	By

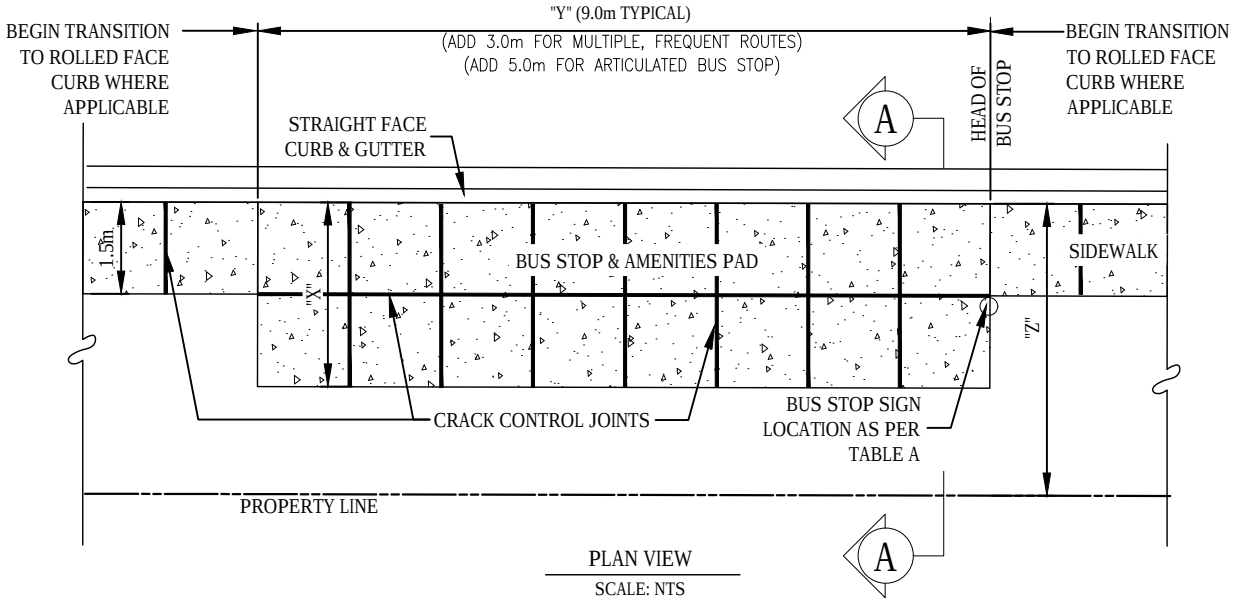
BEAUMONT

BUS STOP PAD BOULEVARD WALK

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-25



PLAN VIEW

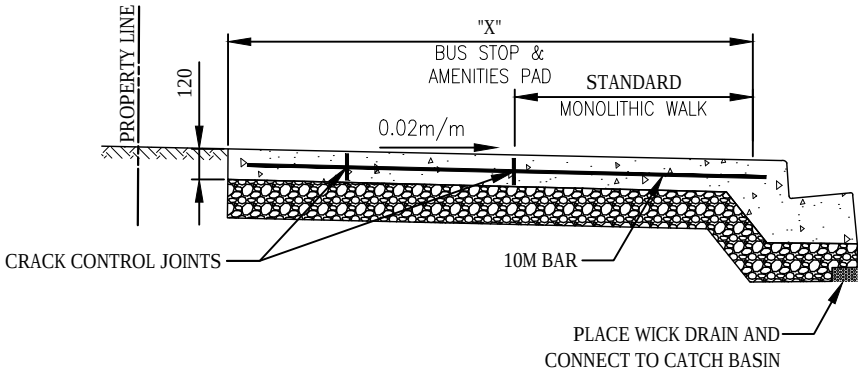
SCALE: NTS

NOTES:

1. PROVIDE A BUS STOP & AMENITIES PAD WITH WIDTH "X" AND LENGTH"Y" IN ACCORDANCE WITH THE DRAWING NOTES AD TABLE A (SEE BELOW). PROVIDE APPROPRIATE CRACK CONTROL JOINTS THROUGHOUT.
2. MAINTAIN MINIMUM 0.3m CLEARANCE BETWEEN PROPERTY LINE AND AMENITIES PAD.

TABLE A - BUS STOP & AMENITIES PAD SIZE

CONDITION	DISTANCE "Z" TO SIDEWALK	REQUIRED PAD WIDTH "X" (m)	REQUIRED PAD LENGTH "Y" (m)	BUS STOP SIGN LOCATION BEHIND SIDEWALK
OVER-CONSTRAINED	Z < 2.8m	2.1m	9.0	HEAD OF PAD
CONSTRAINED	2.8m <= "Z" < 3.9m	"Z" - 0.3m (MAX. 3.0m)	12.0	3m BACK FROM HEAD
NOT CONSTRAINED	"Z" > 3.9m	"Z" - 0.3m (MAX. 4.1m)	9.0	HEAD OF PAD



SECTION A-A

SCALE: NTS

ALL DIMENSIONS IN MILLIMETRES, UNLESS OTHERWISE STATED

	REVISIONS	
Date	Details	By

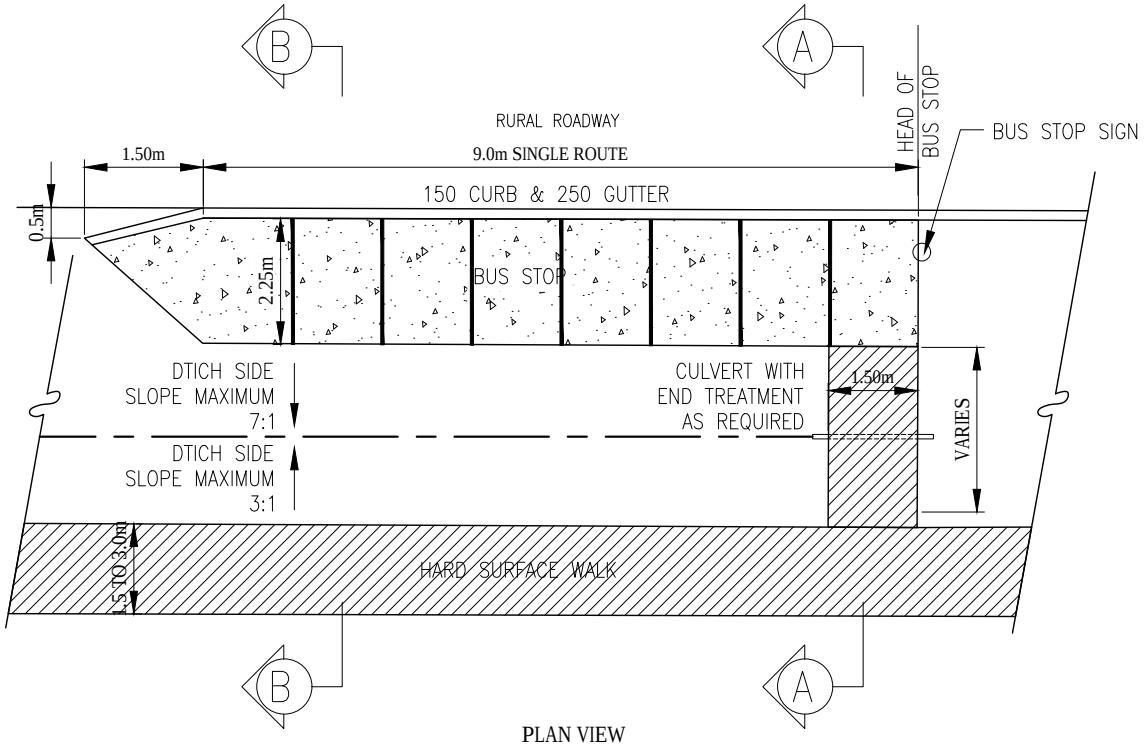
BEAUMONT

BUS STOP PAD MONOLITHIC WALK

Date: MARCH/2021

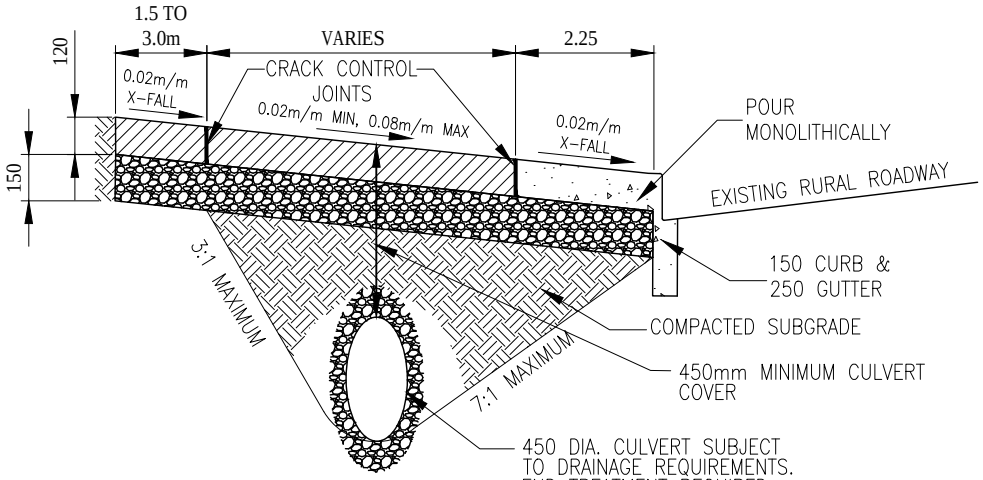
Scale: N.T.S.

DWG. NO. 2-26



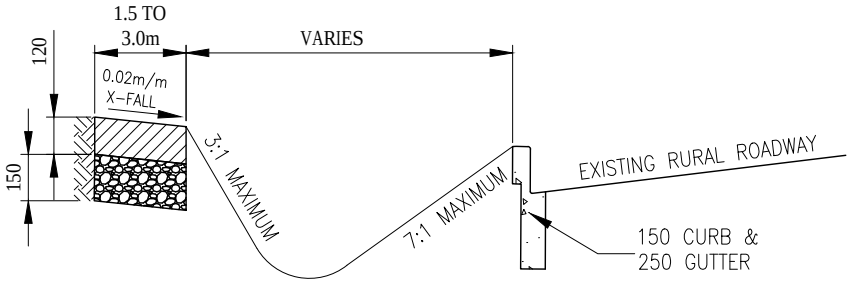
PLAN VIEW

SCALE: NTS



SECTION A-A

SCALE: NTS



SECTION B-B

SCALE: NTS

ALL DIMENSIONS IN MILLIMETRES, UNLESS OTHERWISE STATED

	REVISIONS	
Date	Details	By

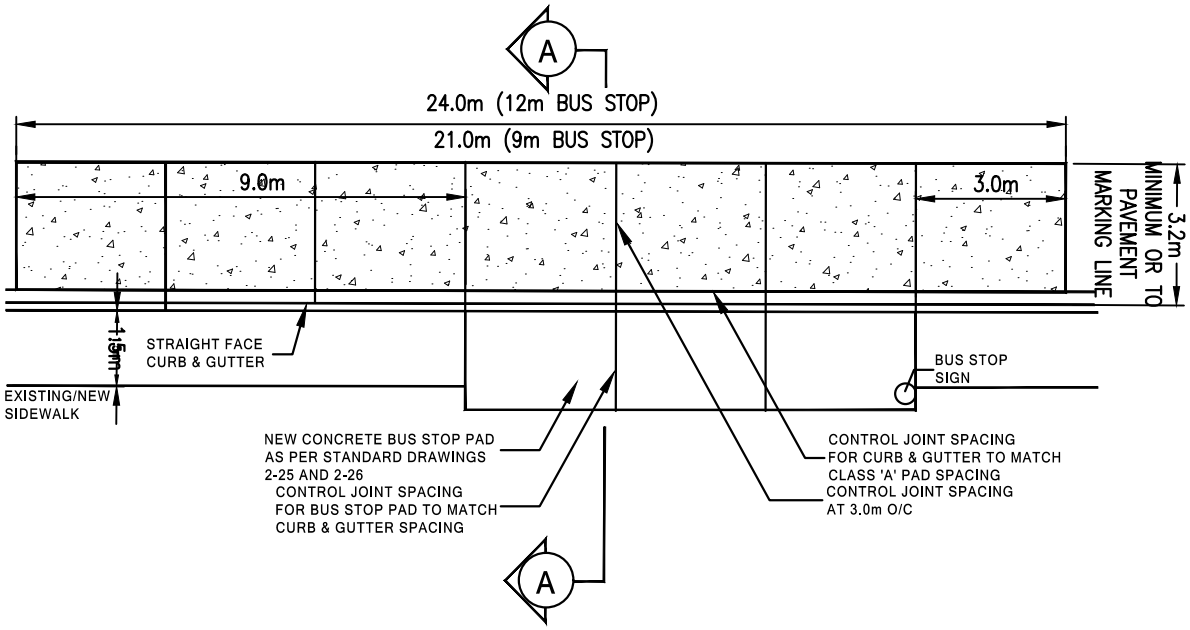
BEAUMONT

BUS STOP PAD RURAL ROADWAY

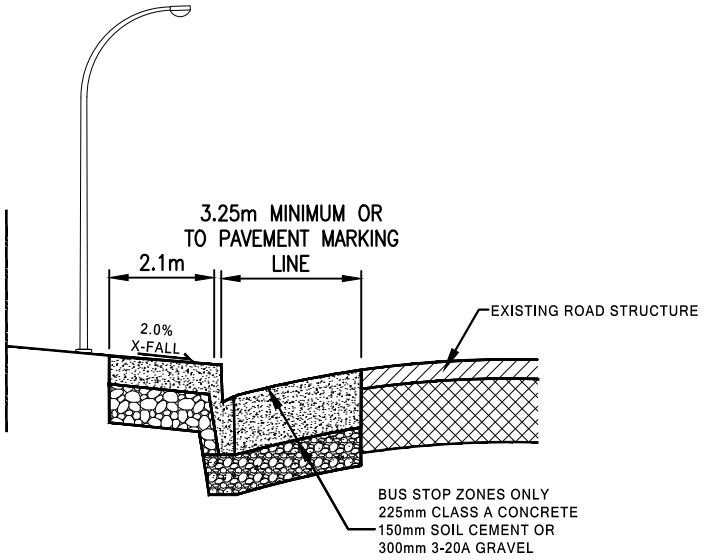
Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-27



PLAN VIEW
SCALE:NTS



SECTION A-A
SCALE:NTS

ALL DIMENSIONS IN MILLIMETRES, UNLESS OTHERWISE STATED

	REVISIONS	
Date	Details	By

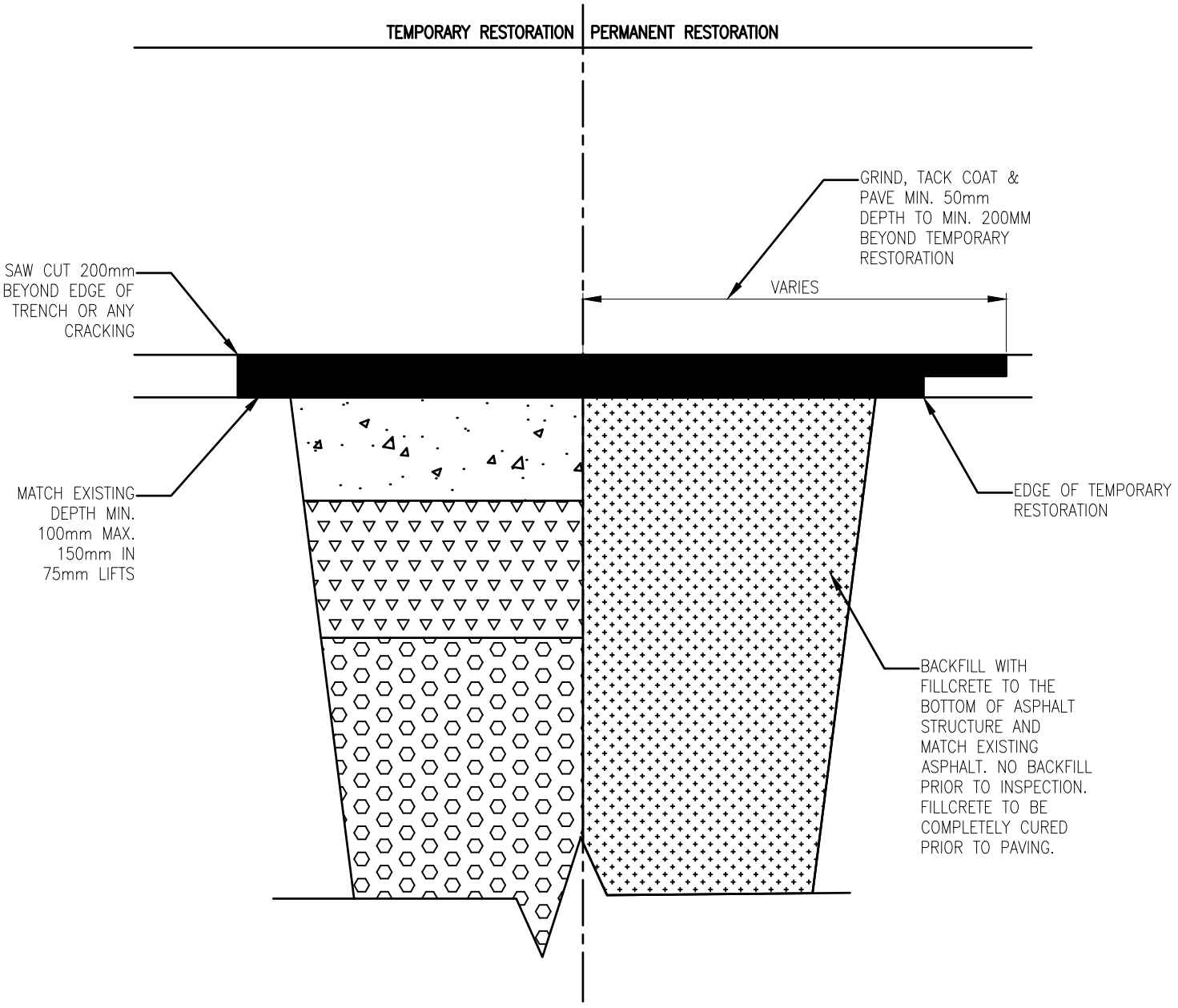
BEAUMONT

CONCRETE BUS STOP PAD RETROFIT

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-28



	REVISIONS	
Date	Details	By

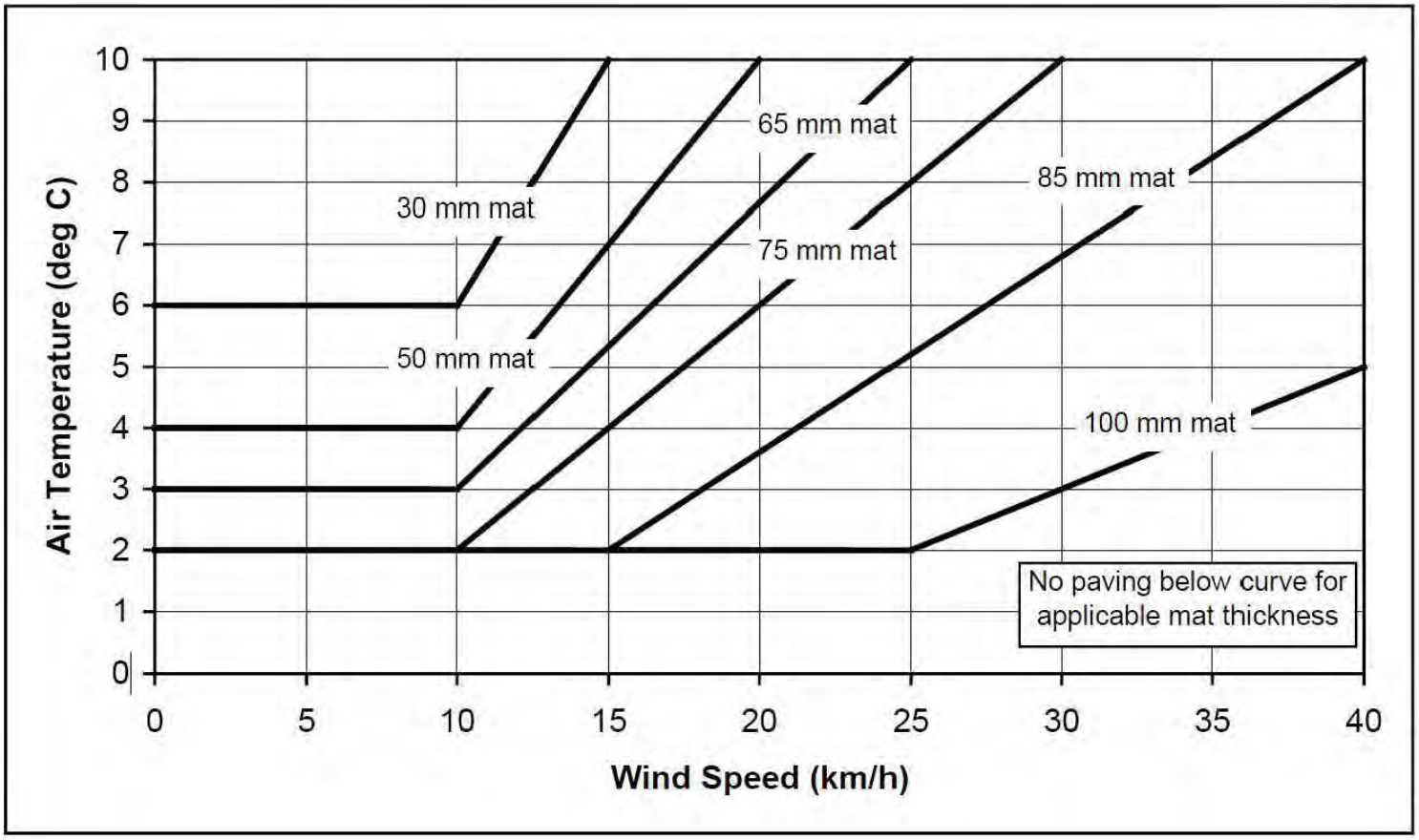
BEAUMONT

RESTORATION CUT PAVEMENT DETAIL

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-29



	REVISIONS	
Date	Details	By

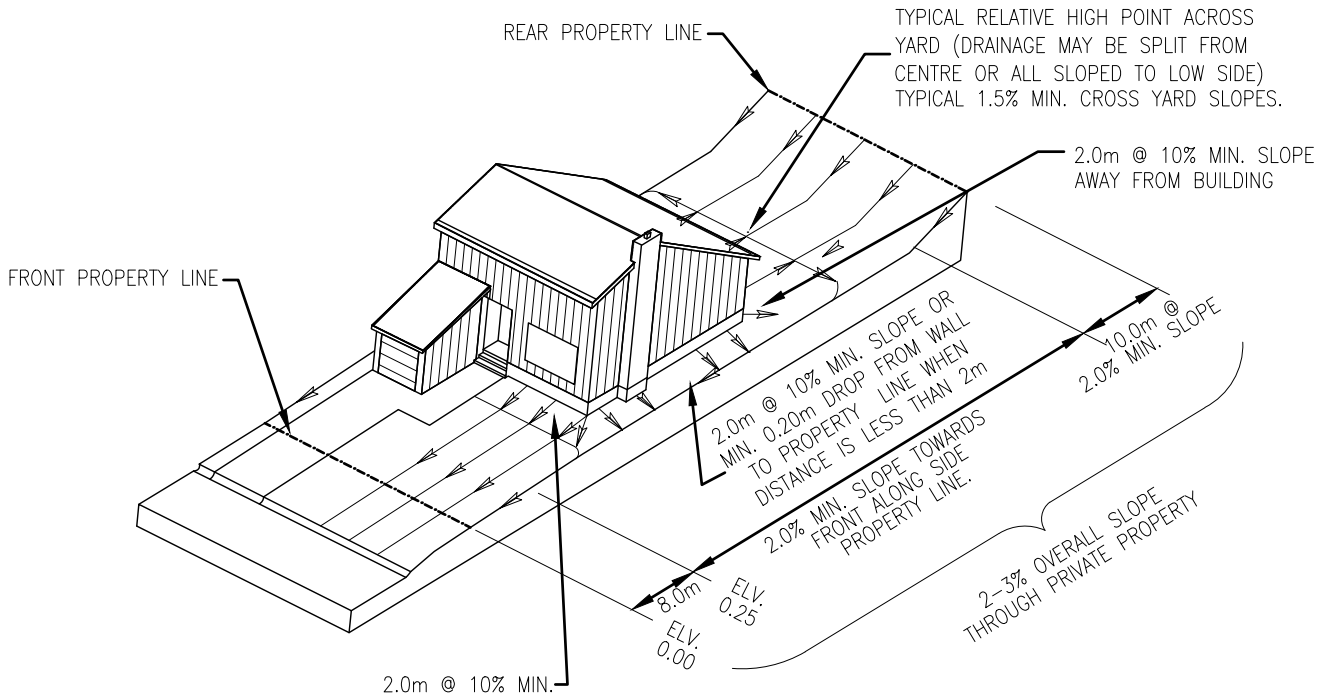
BEAUMONT

AIR TEMPERATURE & WIND LIMITATIONS WHILE PAVING

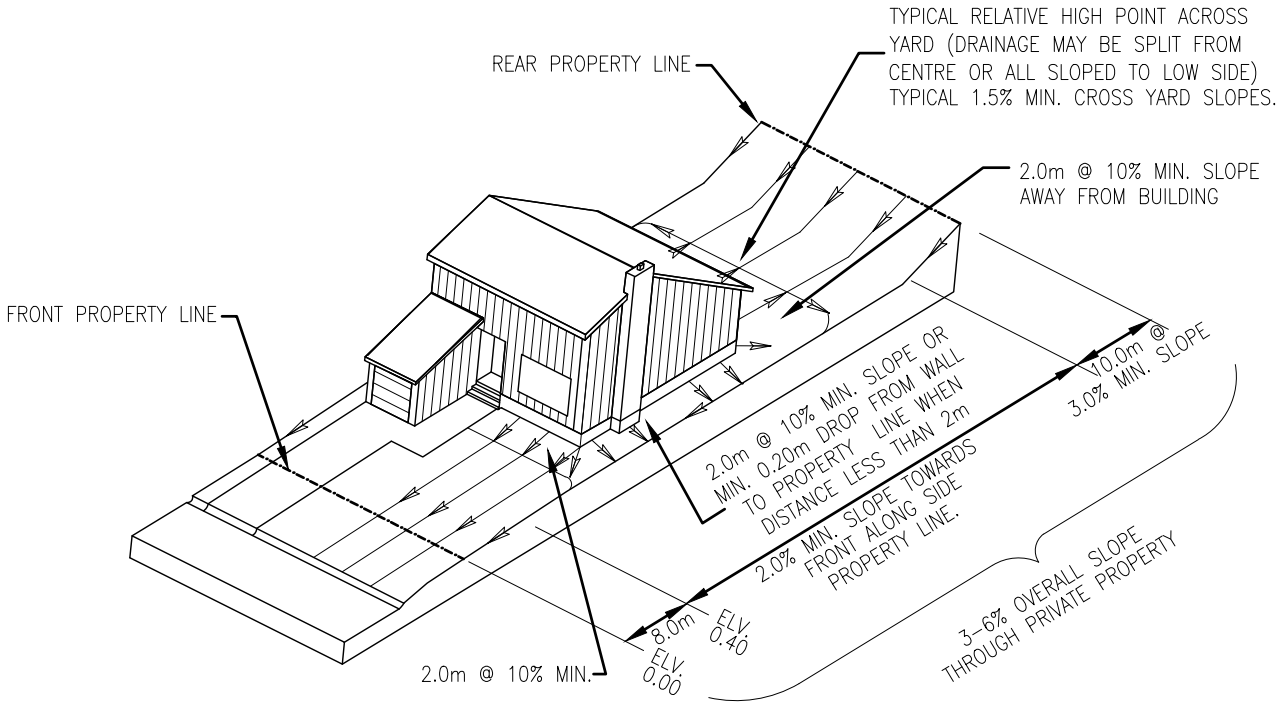
Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-30



2-3% OVERALL LOT SLOPE - TYPE A
REAR TO FRONT DRAINAGE



3-6% OVERALL LOT SLOPE - TYPE B
REAR TO FRONT DRAINAGE

	REVISIONS	
Date	Details	By

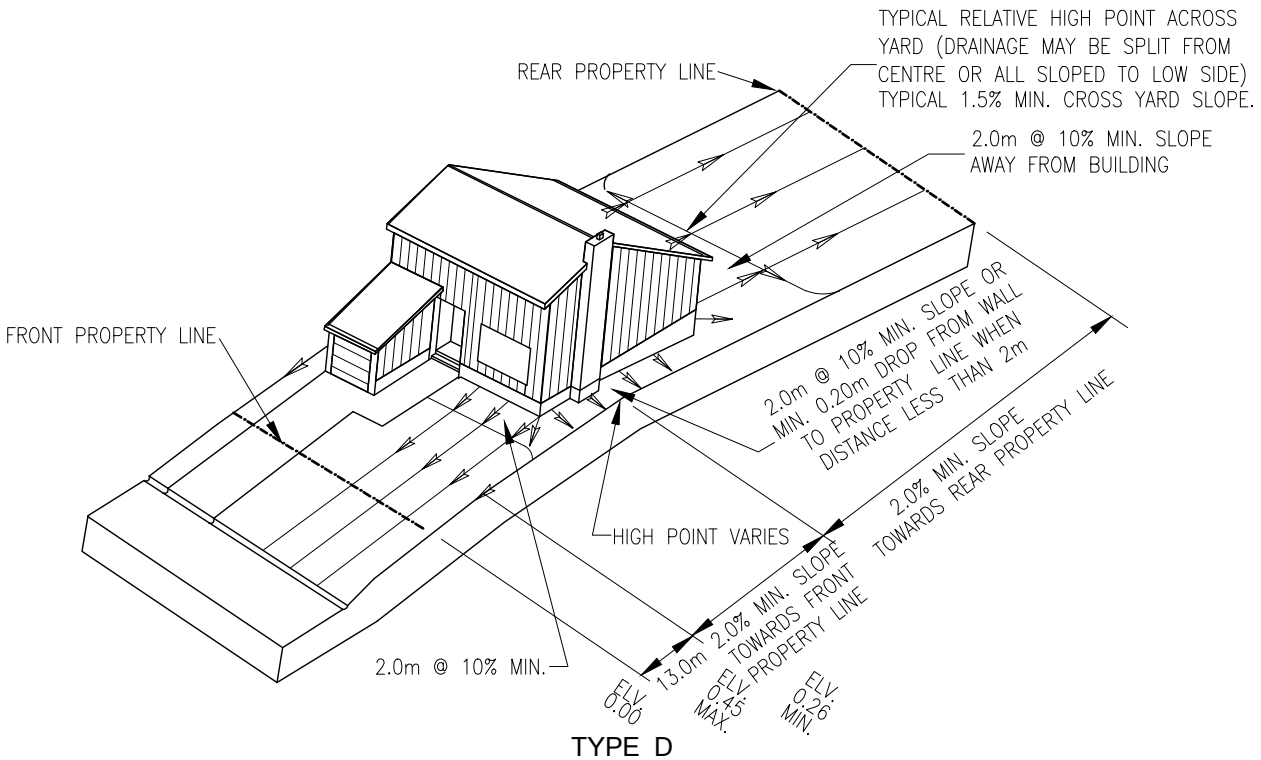
BEAUMONT

LOT GRADING TYPES 'A' & 'B' REAR TO FRONT DRAINAGE

Date: **MARCH/2021**

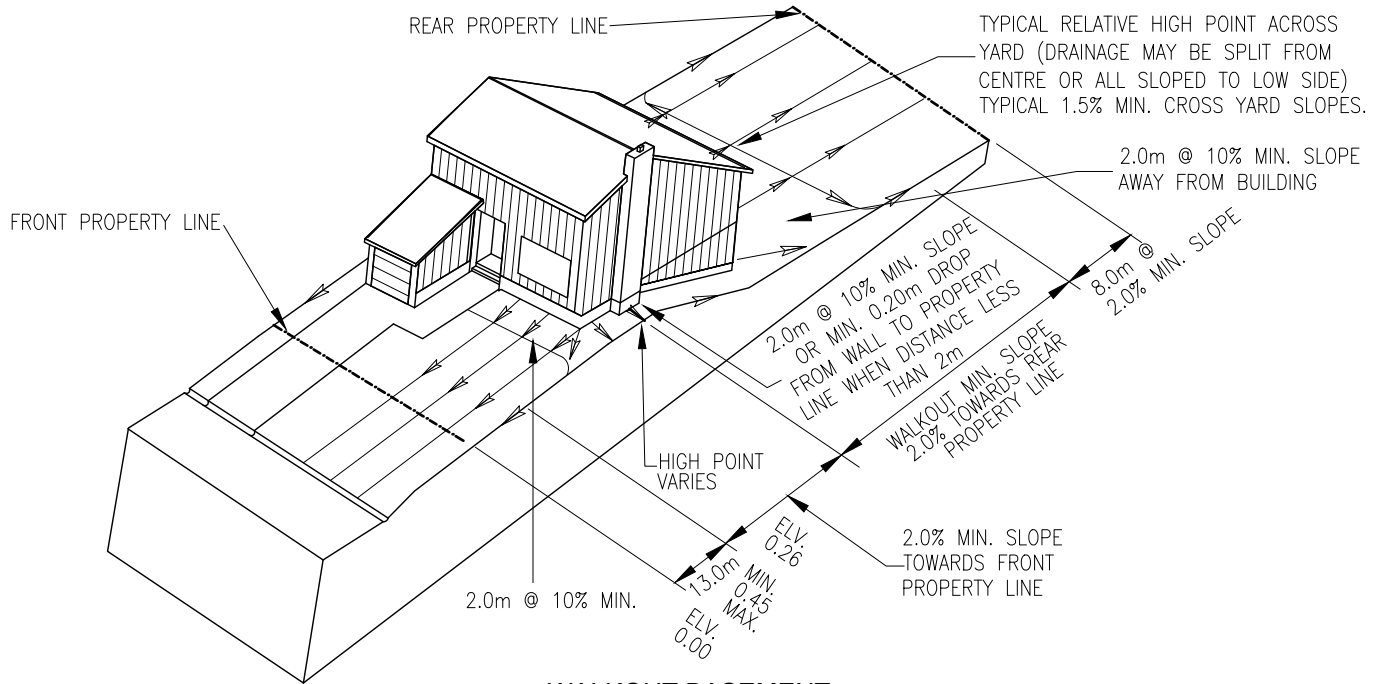
Scale: **N.T.S.**

DWG. NO. 2-31



TYPE D

STANDARD SPLIT DRAINAGE



WALKOUT BASEMENT

TYPE W

SPLIT DRAINAGE

	REVISIONS	
Date	Details	By

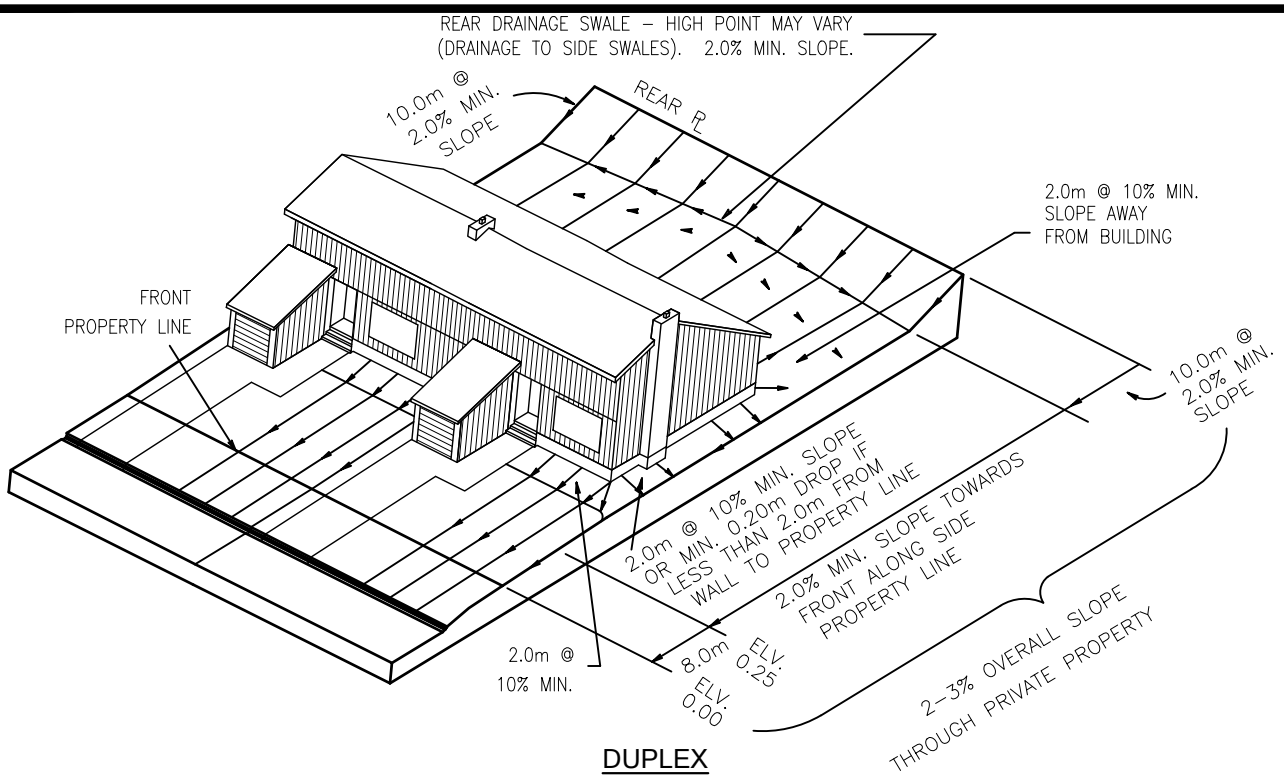
BEAUMONT

LOT GRADING TYPES 'D' & 'W'
SPLIT DRAINAGE

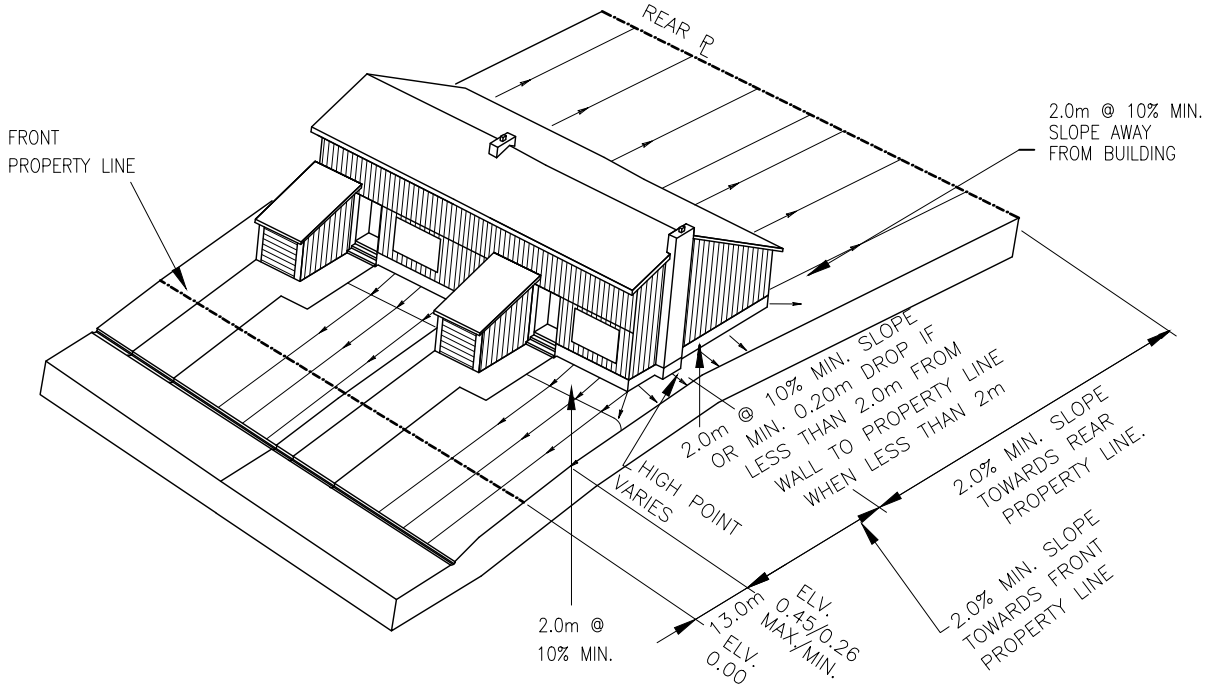
Date: MARCH/2019

Scale: N.T.S.

DWG. NO. 2-32



DUPLEX
TYPE A1
REAR TO FRONT 2-3% OVERALL LOT SLOPE



DUPLEX
TYPE D1
SPLIT DRAINAGE

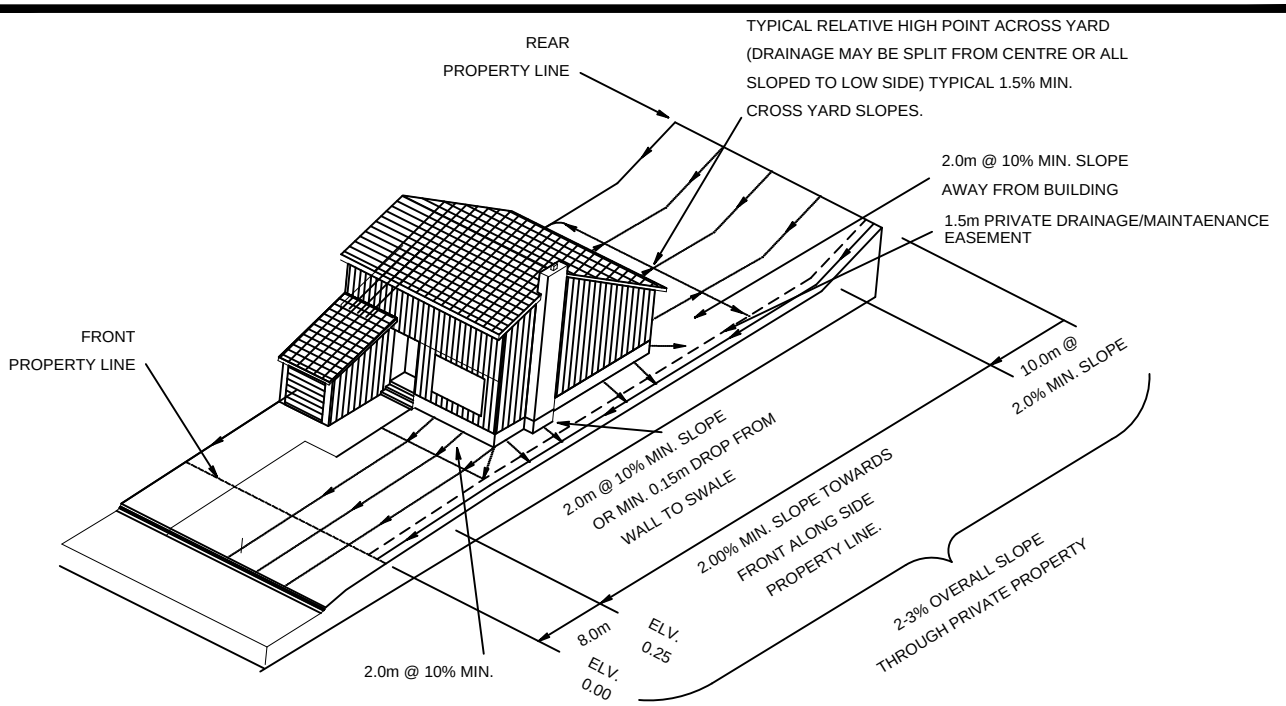
	REVISIONS	
Date	Details	By

BEAUMONT

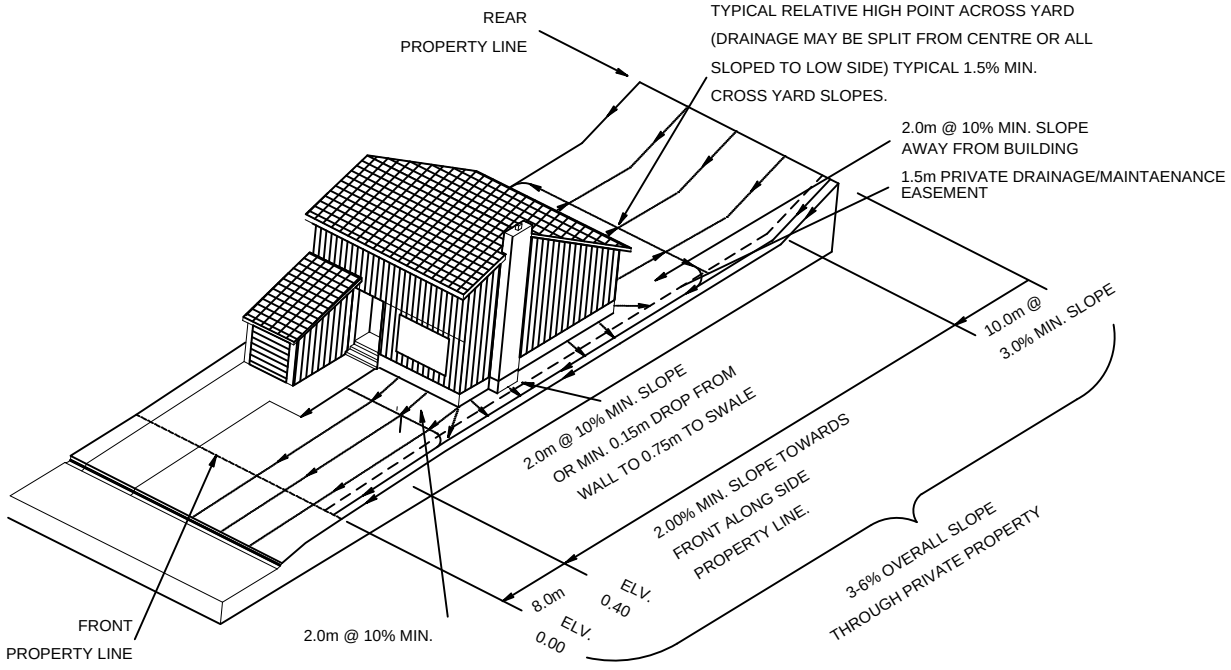
LOT GRADING TYPES 'A1' & 'D1'
DUPLEX DRAINAGE

Date: MARCH/2021
Scale: N.T.S.

DWG. NO. 2-33



2-3% OVERALL LOT SLOPE
'A' ZERO LOT LINE GRADING
REAR TO FRONT DRAINAGE



3-6% OVERALL LOT SLOPE
TYPE B ZERO LOT LINE
REAR TO FRONT DRAINAGE

	REVISIONS	
Date	Details	By

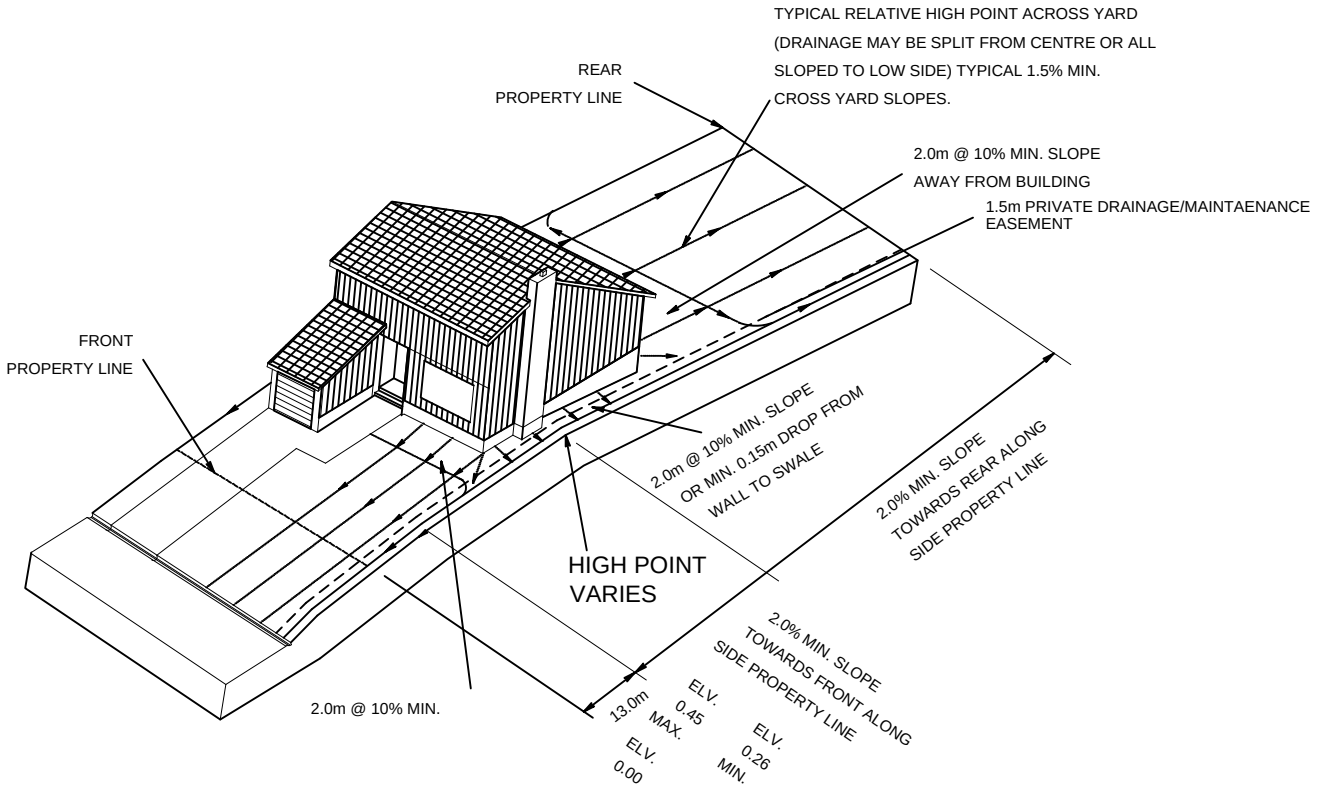
BEAUMONT

LOT GRADING ZERO LOT LINE TYPES 'A' & 'B' REAR TO FRONT DRAINAGE

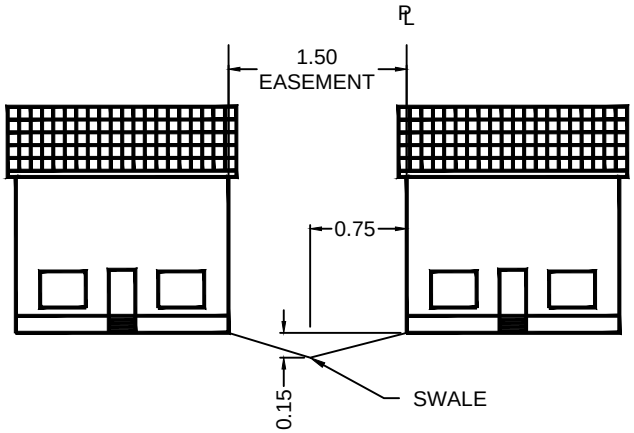
Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-34



TYPE D ZERO LOT LINE
SPLIT DRAINAGE



NOTES:
1. SWALE 0.15m DEEP ADJACENT TO BUILDING SWALE FOR ZERO LOT LINE GRADING

ZERO LOT LINE
ALL DRAINAGE TYPES
SWALE DETAIL FOR LOT LINE GRADING

ALL DIMENSIONS IN METRES

	REVISIONS	
Date	Details	By

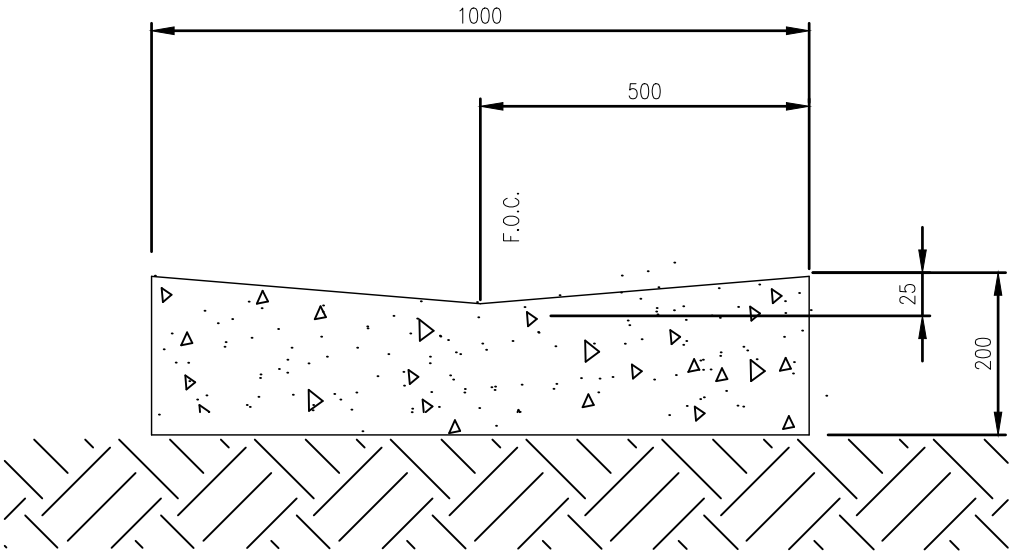
BEAUMONT

LOT GRADING ZERO LOT LINE TYPE 'D'
SPLIT DRAINAGE & SWALE DETAIL

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 2-35



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

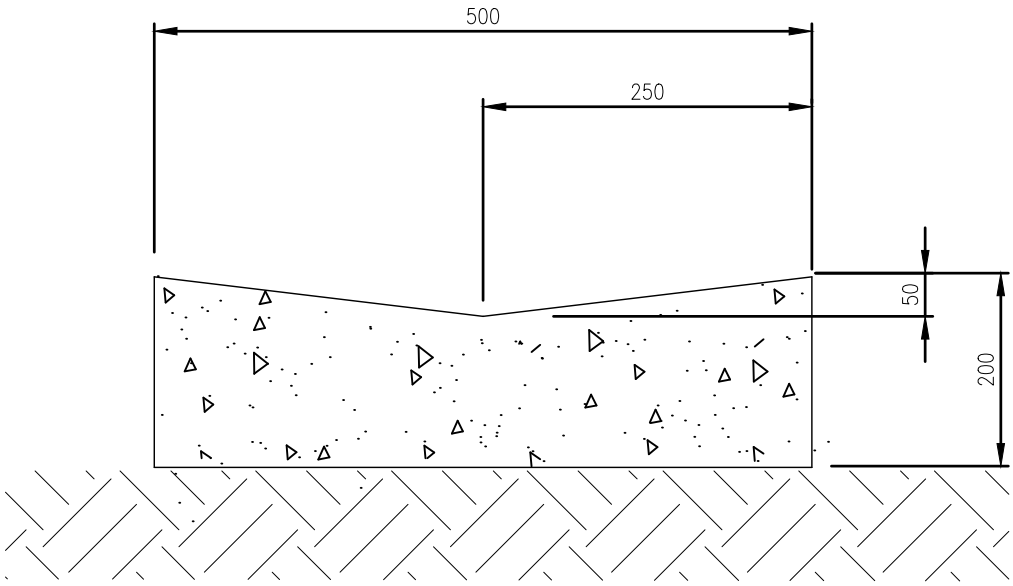
BEAUMONT

1.0m CONCRETE SWALE

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-36



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

BEAUMONT

0.5m CONCRETE SWALE

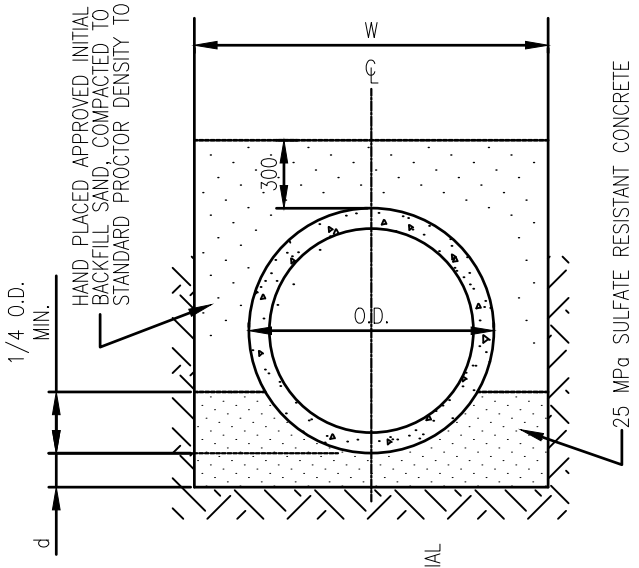
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 2-37

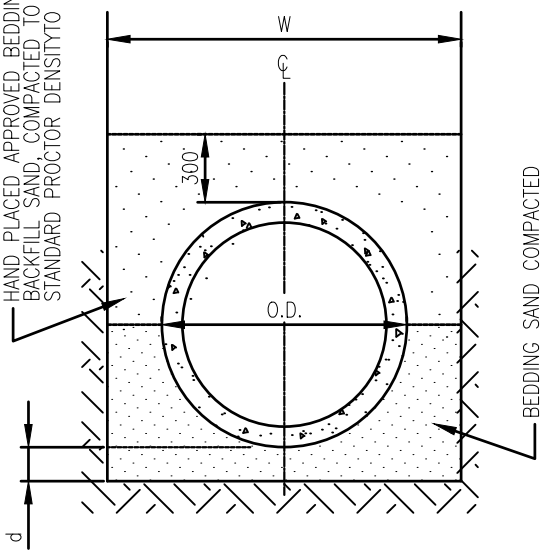
CLASS A BEDDING

B_f = 2.8



CLASS B BEDDING

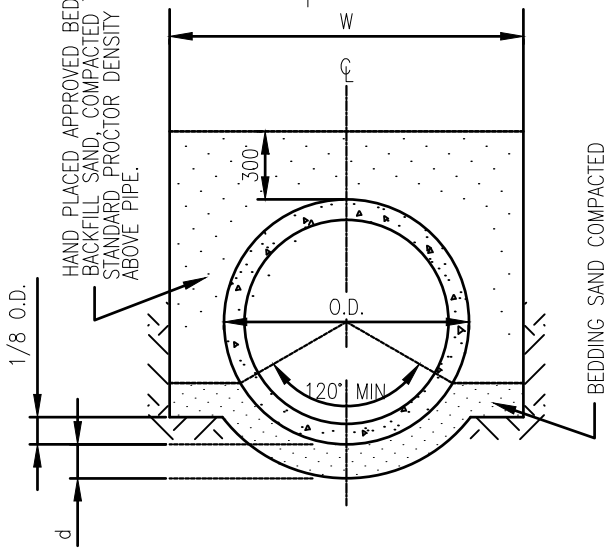
B_f = 1.9



CLASS B BEDDING

ALTERNATE – 375 I.D. & UNDER

B_f = 1.9



W = O.D. + 450mm (MINIMUM)
O.D. = OUTSIDE PIPE DIAMETER
d = DEPTH OF BEDDING BELOW PIPE
I.D. = 675mm OR SMALLER, d min = 75mm
I.D. = 750mm TO 1500mm, d min = 100mm
I.D. = 1650mm AND LARGER, d min = 150mm
I.D. = INSIDE PIPE DIAMETER

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

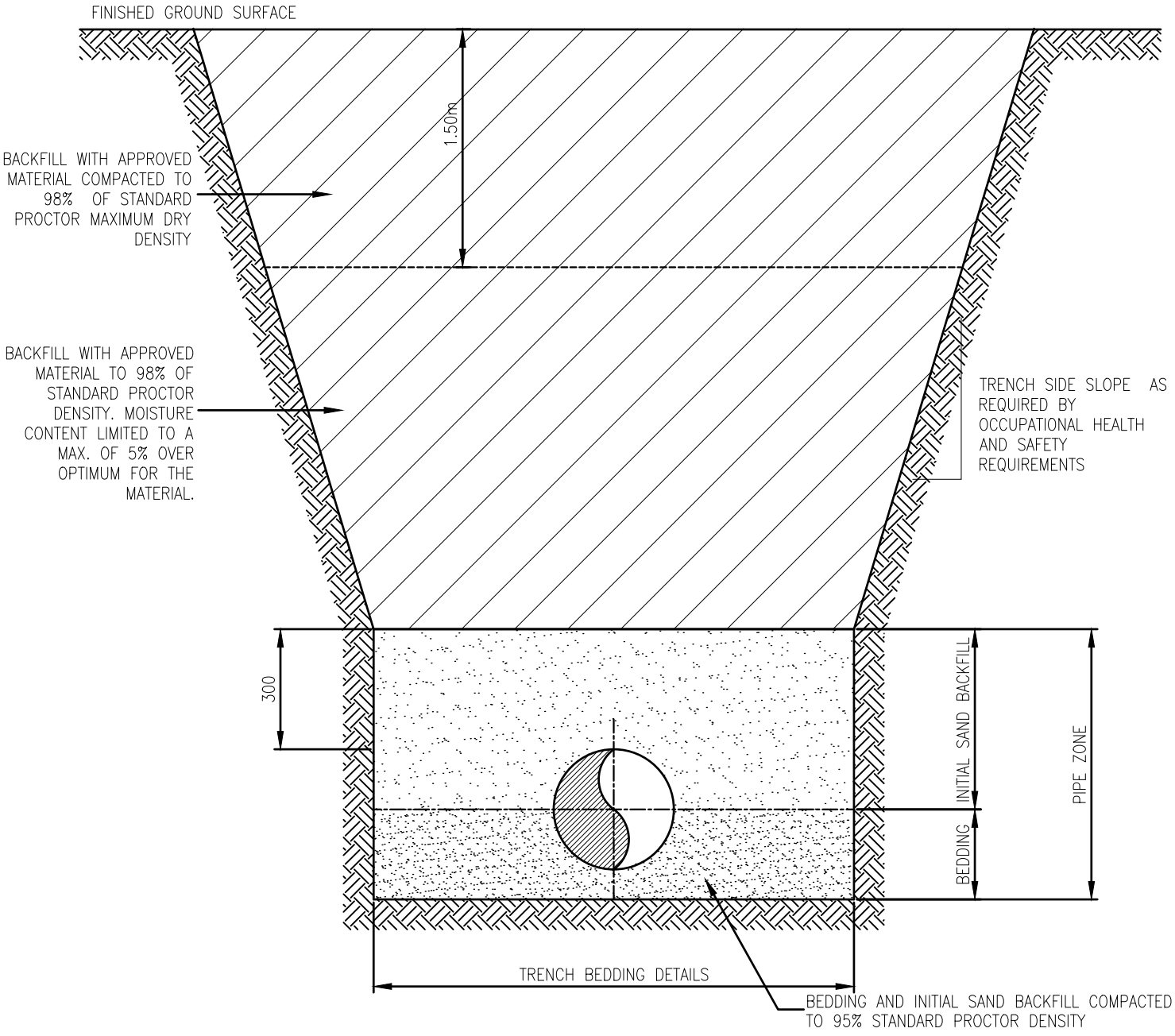
BEAUMONT

TYPES OF PIPE BEDDING

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3–1



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

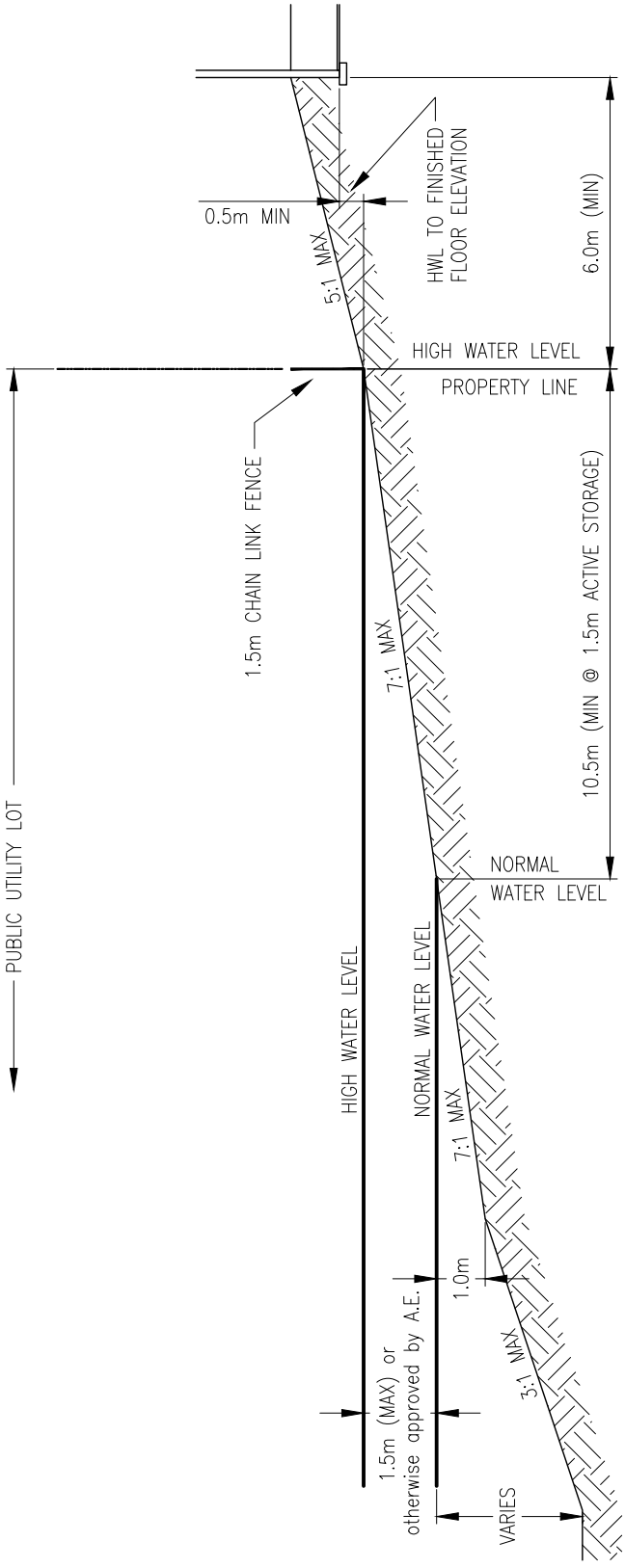
BEAUMONT

TRENCH BACKFILL

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3-2



	REVISIONS	
Date	Details	By

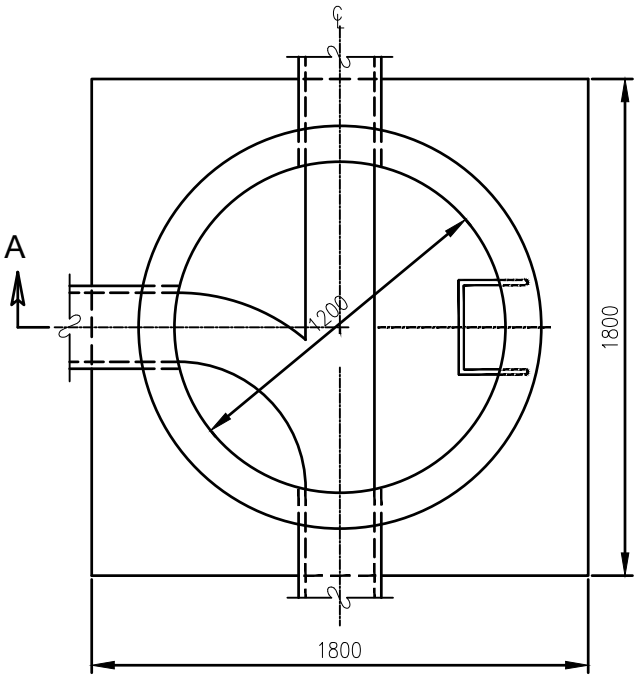
BEAUMONT

STORMWATER MANAGEMENT FACILITIES GENERAL CROSS SECTION

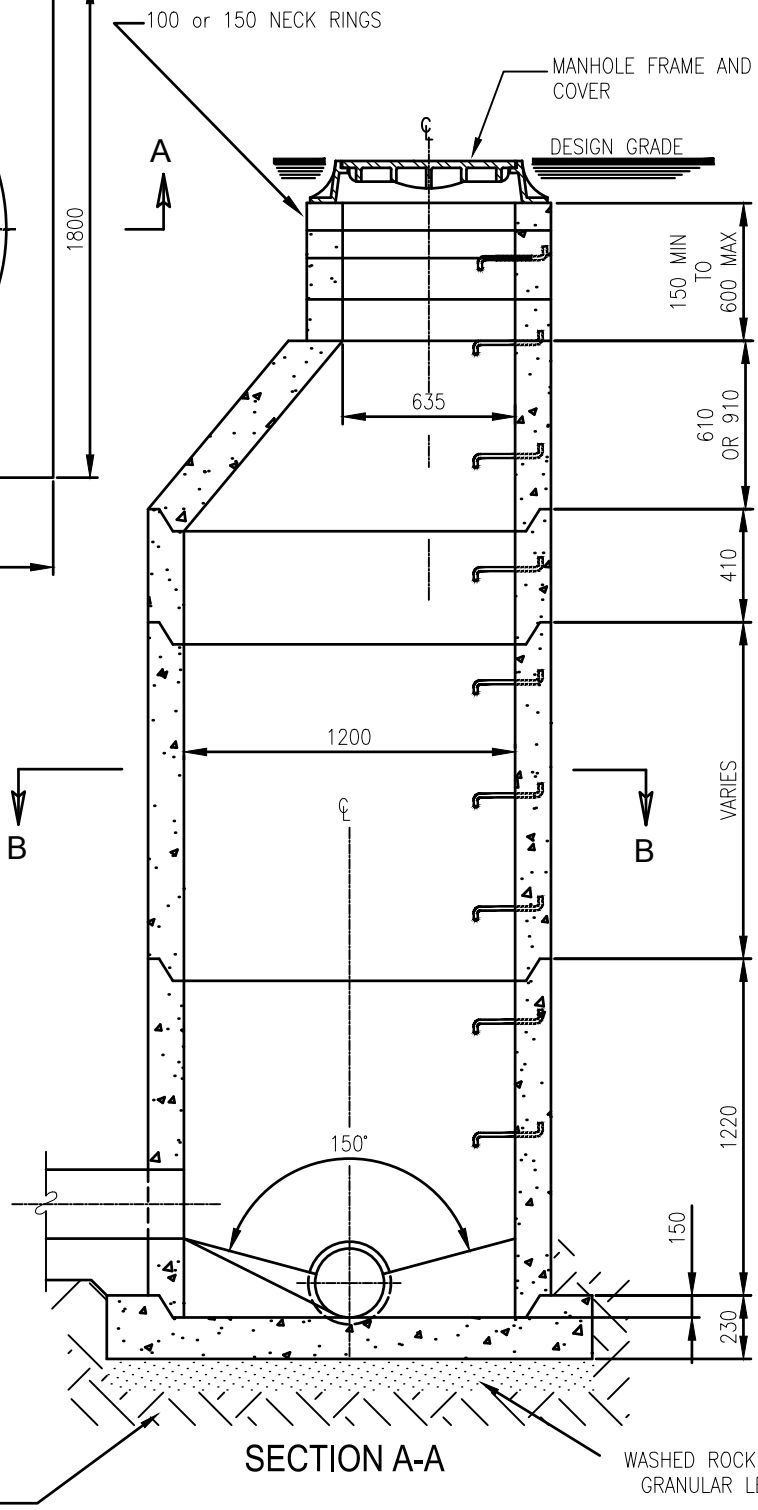
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3-3



SECTION B-B



SECTION A-A

UNDISTURBED SOIL OR TAMPED BACKFILL

WASHED ROCK OR COMPACTED GRANULAR LEVELING COURSE

NOTES:

1. MANHOLE PRECAST UNITS TO MEET A.S.T.M. C478.
2. PREBENCHED MANHOLE BASE UNITS WITH INTEGRAL GASKETS SHALL BE USED. POURED IN PLACE BASES ARE SUBJECT TO APPROVAL.
3. POURED IN PLACE CONCRETE TO BE 25MPa AT 28 DAYS.
4. INLET AND OUTLET PIPES TO BE GROUTED FLUSH WITH WALL.
5. RUBBER GASKET, KENT SEAL OR EQUIVALENT TO BE INSTALLED BETWEEN PRECAST BASES, PRECAST BARRELS, ALL NECK RINGS, CONE AND MANHOLE FRAME.
6. FLAT TOP SECTION TO BE USED FOR SHALLOW BURY MANHOLES UP TO 1.8m.
7. FOR MANHOLES EXCEEDING 7.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.
8. 1500mmØ MANHOLES SHALL BE USED ON PIPING DIAMETERS OF 750mm, 900mm AND 1050mm FOR PIPE SIZES 1200mmØ AND LARGER TEE RISER MANHOLES SHALL BE USED.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

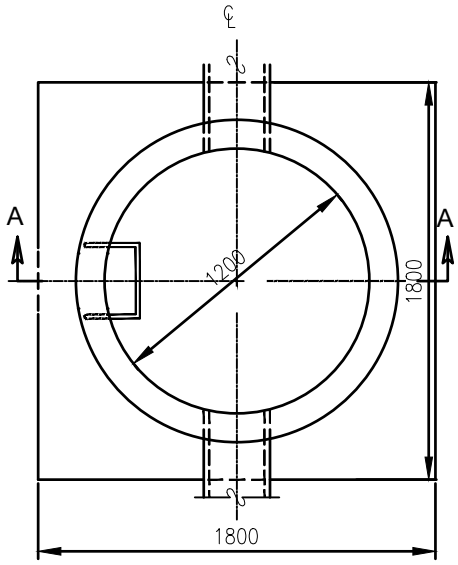
BEAUMONT

STANDARD 1200 DIA. MANHOLE

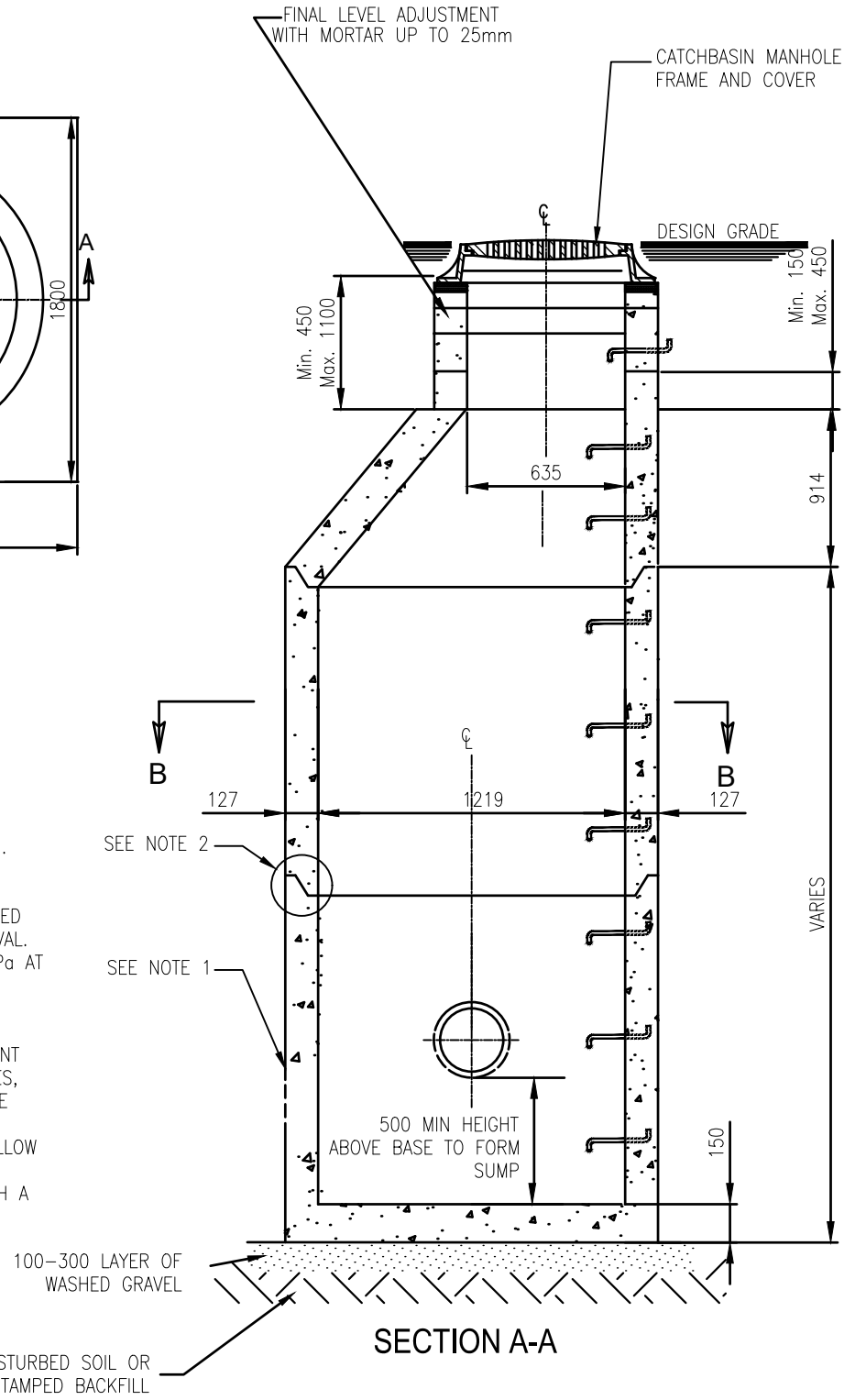
Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 3-4



SECTION B-B



SECTION A-A

NOTES:

1. UNIT CAN BE MADE UP FROM TWO ITEMS (BASE AND BARREL)
2. OPPOSITE ORIENTATION OF JOINTS IS ACCEPTABLE
3. 1200 X 635 SLAB TOP COULD BE USED INSTEAD OF CONE IN SHALLOW BURY INSTALLATIONS
4. MANHOLE PRECAST UNITS TO MEET A.S.T.M. C478.
5. PREBENCHED MANHOLE BASE UNITS WITH INTEGRAL GASKETS SHALL BE USED. POURED IN PLACE BASES ARE SUBJECT TO APPROVAL.
6. POURED IN PLACE CONCRETE TO BE 25MPa AT 28 DAYS.
7. INLET AND OUTLET PIPES TO BE GROUTED FLUSH WITH WALL.
8. RUBBER GASKET, KENT SEAL OR EQUIVALENT TO BE INSTALLED BETWEEN PRECAST BASES, PRECAST BARRELS, ALL NECK RINGS, CONE AND MANHOLE FRAME.
9. FLAT TOP SECTION TO BE USED FOR SHALLOW BURY MANHOLES UP TO 1.8m.
10. FOR MANHOLES EXCEEDING 7.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

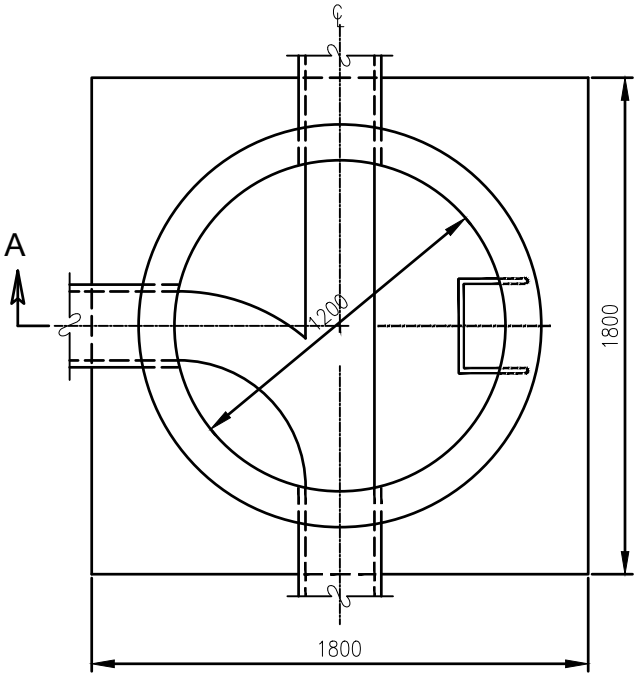
BEAUMONT

STANDARD 1200 DIA. CATCHBASIN MANHOLE

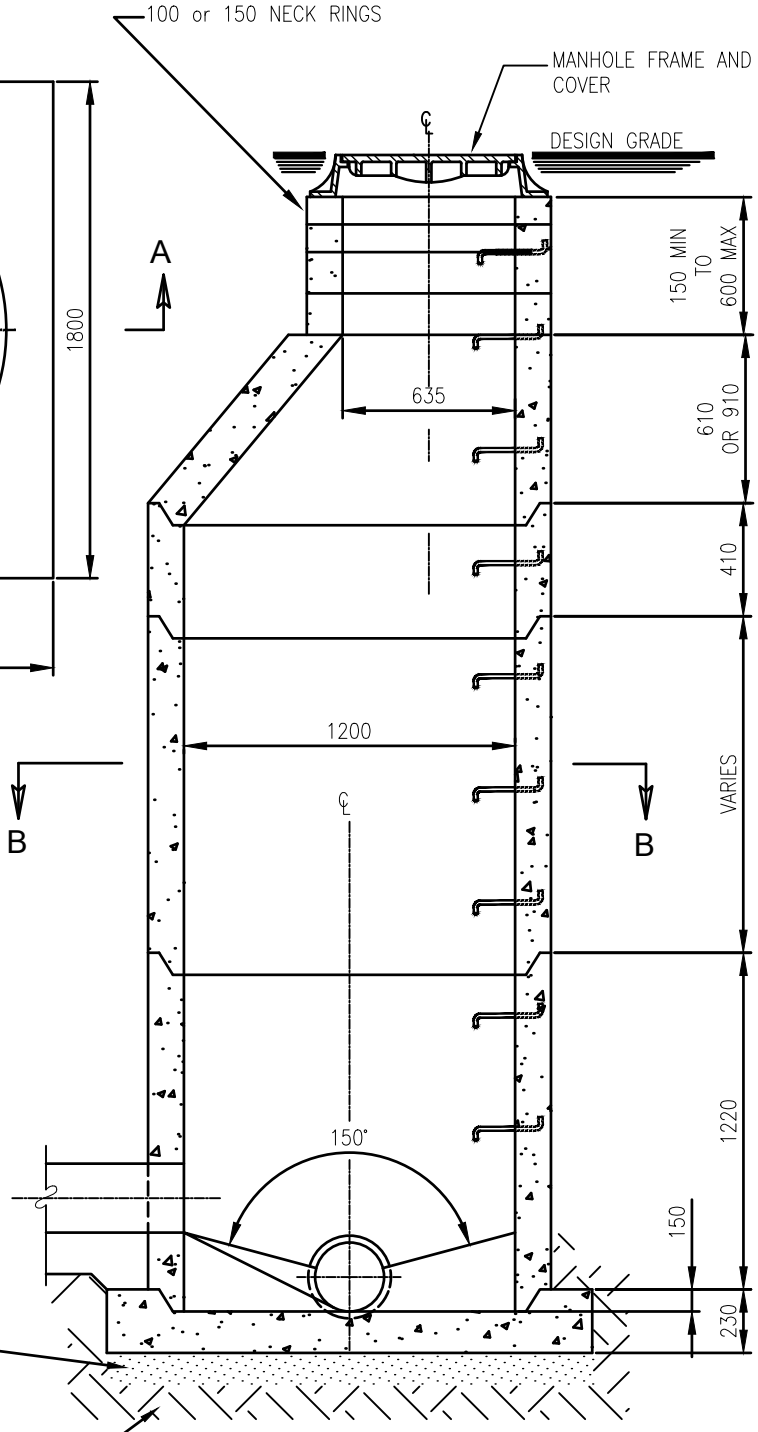
Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 3–5



SECTION B-B



SECTION A-A

NOTES:

1. MANHOLE PRECAST UNITS TO MEET A.S.T.M. C478.
2. PREBENCHED MANHOLE BASE UNITS WITH INTEGRAL GASKETS SHALL BE USED. POURED IN PLACE BASES ARE SUBJECT TO APPROVAL.
3. POURED IN PLACE CONCRETE TO BE 25MPa AT 28 DAYS.
4. INLET AND OUTLET PIPES TO BE GROUTED FLUSH WITH WALL.
5. RUBBER GASKET, KENT SEAL OR EQUIVALENT TO BE INSTALLED BETWEEN PRECAST BASES, PRECAST BARRELS, ALL NECK RINGS, CONE AND MANHOLE FRAME.
6. FLAT TOP SECTION TO BE USED FOR SHALLOW BURY MANHOLES UP TO 1.8m.
7. FOR MANHOLES EXCEEDING 7.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

BEAUMONT

INSPECTION MANHOLE

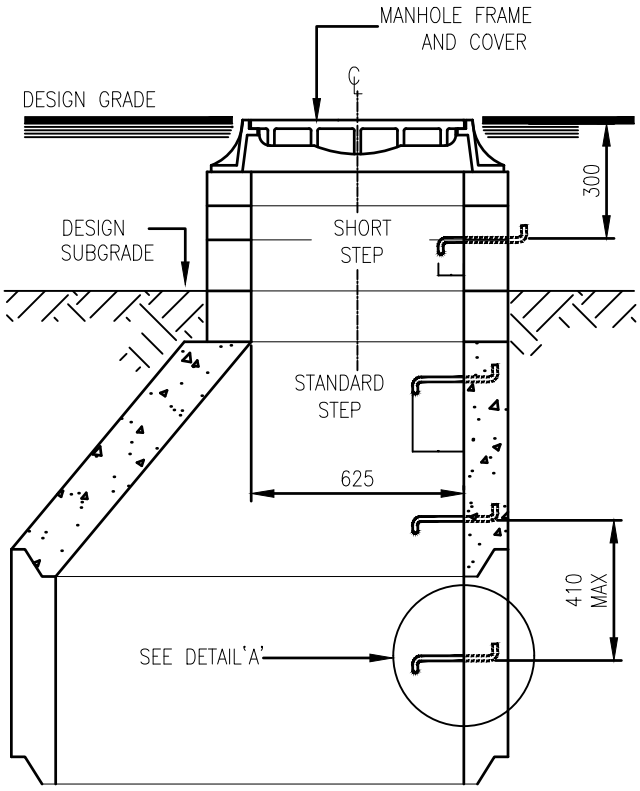
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3-6

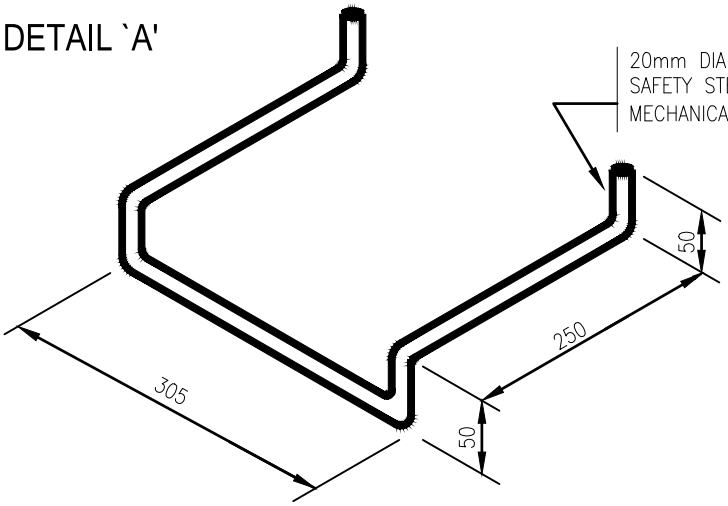
PLACEMENTS

1. EXCEPT WHERE SPECIFIED OTHERWISE, SAFETY STEPS SHALL BE INSTALLED IN ALL PRECAST MANHOLE SECTIONS & CONES, IN THE GRADE ADJUSTMENT SECTIONS AND IN CAST IN PLACE SECTIONS SO THAT WHEN THE VARIOUS SECTIONS ARE ASSEMBLED IN ANY COMBINATION THEY WILL FORM A CONTINUOUS VERTICAL LADDER WITH RUNGS EQUALLY SPACED AT A MAXIMUM OF 410mm TO WITHIN 300mm BELOW THE COVER AND TO WITHIN 600mm OF THE BASE OR BENCHING.
2. STEPS SHALL BE CAST FIRMLY IN PLACE OR SECURED WITH A SUITABLE MECHANICAL ANCHORAGE TO PREVENT PULLOUT, AND MAINTAIN WATER TIGHTNESS.
3. "STANDARD STEPS" SHALL PROJECT A DISTANCE OF 150mm MEASURED AT THE POINT OF EMBEDMENT.
4. A "SHORT STEP" WITH A PROJECTION OF 75mm SHALL BE INSTALLED WITHIN THE GRADE ADJUSTMENT SECTION, CAST INTO THE NECK OR FIRMLY MORTARED IN PLACE BETWEEN THE NECK RINGS, WITH THE ANCHOR LEGS OUTSIDE OF THE NECK RING.
5. EXCEPT AS SPECIFIED ABOVE, DESIGN AND INSTALLATION OF SAFETY STEPS SHALL CONFORM TO A.S.T.M. C478.
6. SAFETY STEPS REQUIRED TO FULL HEIGHT OF MANHOLE
7. WHERE POSSIBLE STEPS TO BE POSITIONED TO FACE ONCOMING TRAFFIC.



TYPICAL MANHOLE SECTION

DETAIL `A'



20mm DIA. GALVANIZED METAL OR ALUMINUM MANHOLE SAFETY STEPS, ANCHOR LEG MAY BE DELETED WHERE MECHANICAL ANCHORAGE IS PROVIDED (SEE NOTE #2)

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

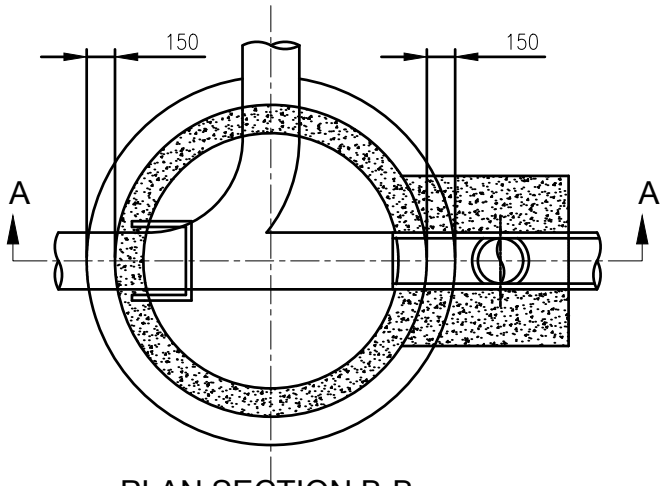
BEAUMONT

SAFETY STEPS FOR MANHOLES

Date: MARCH/2021

Scale: N.T.S.

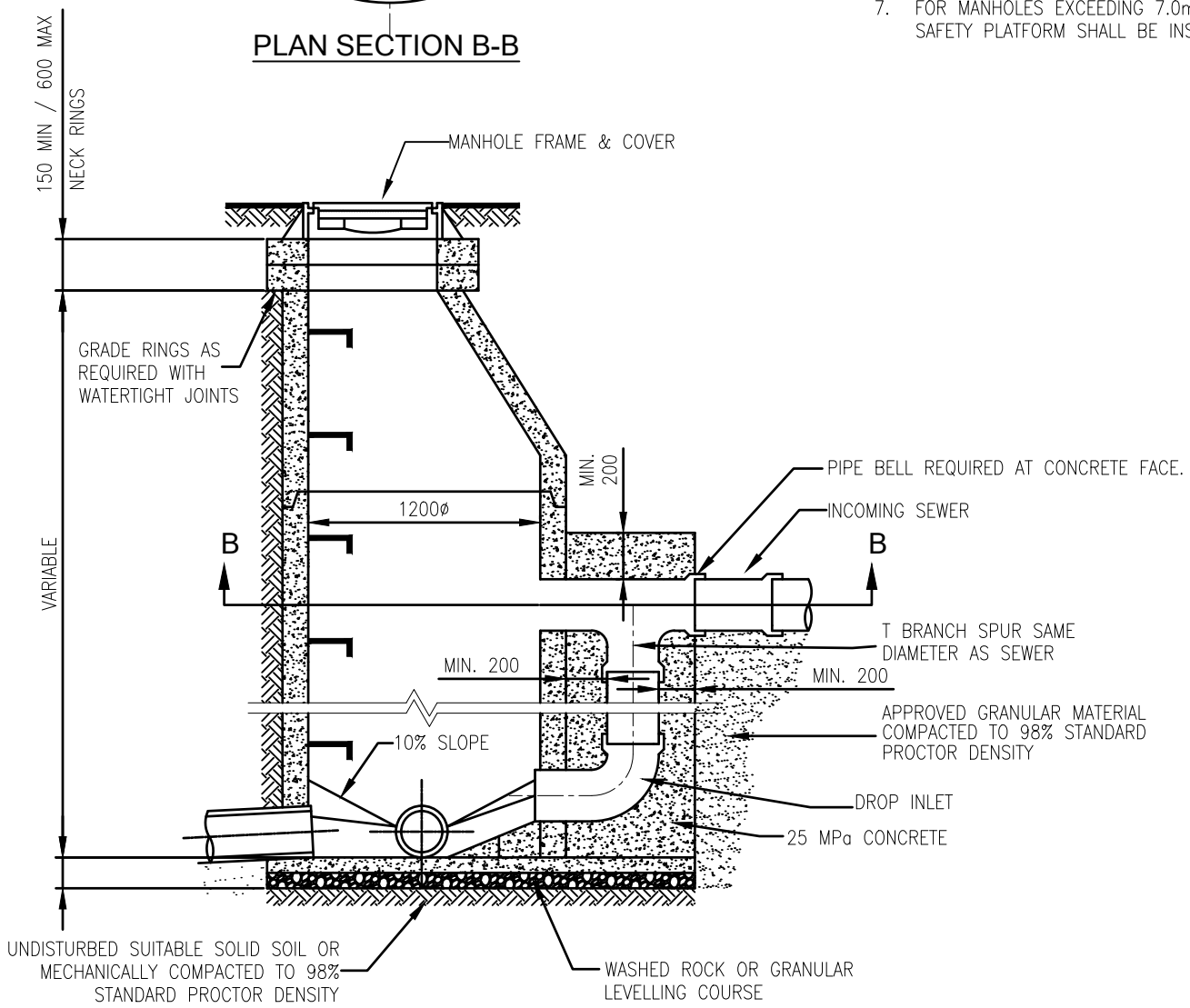
DWG. NO. 3-7



PLAN SECTION B-B

NOTES:

1. MANHOLE PRECAST UNITS TO MEET A.S.T.M. C478.
2. PREBENCHED MANHOLE BASE UNITS WITH INTEGRAL GASKETS SHALL BE USED. POURED IN PLACE BASES ARE SUBJECT TO APPROVAL.
3. POURED IN PLACE CONCRETE TO BE 25MPa AT 28 DAYS.
4. INLET AND OUTLET PIPES TO BE GROUTED FLUSH WITH WALL.
5. RUBBER GASKET, KENT SEAL OR EQUIVALENT TO BE INSTALLED BETWEEN PRECAST BASES, PRECAST BARRELS, ALL NECK RINGS, CONE AND MANHOLE FRAME.
6. FLAT TOP SECTION TO BE USED FOR SHALLOW BURY MANHOLES UP TO 1.8m.
7. FOR MANHOLES EXCEEDING 7.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.



SECTION A-A

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

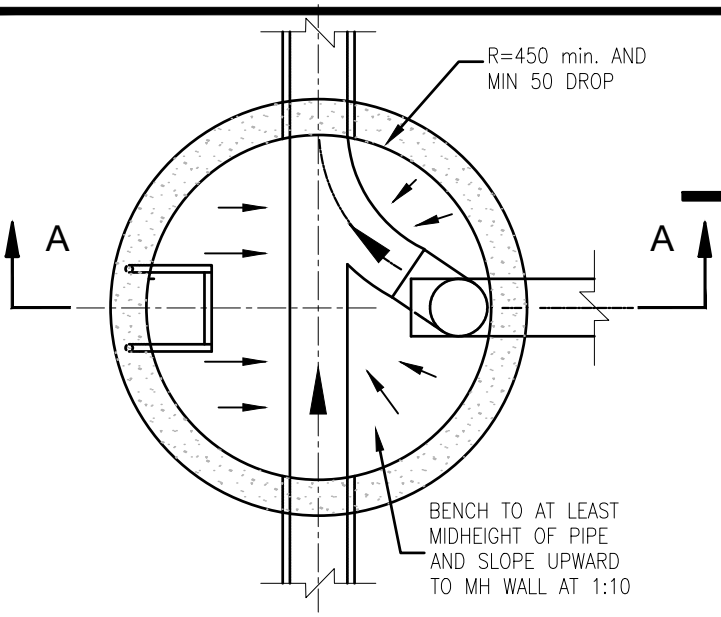
BEAUMONT

EXTERNAL DROP MANHOLE

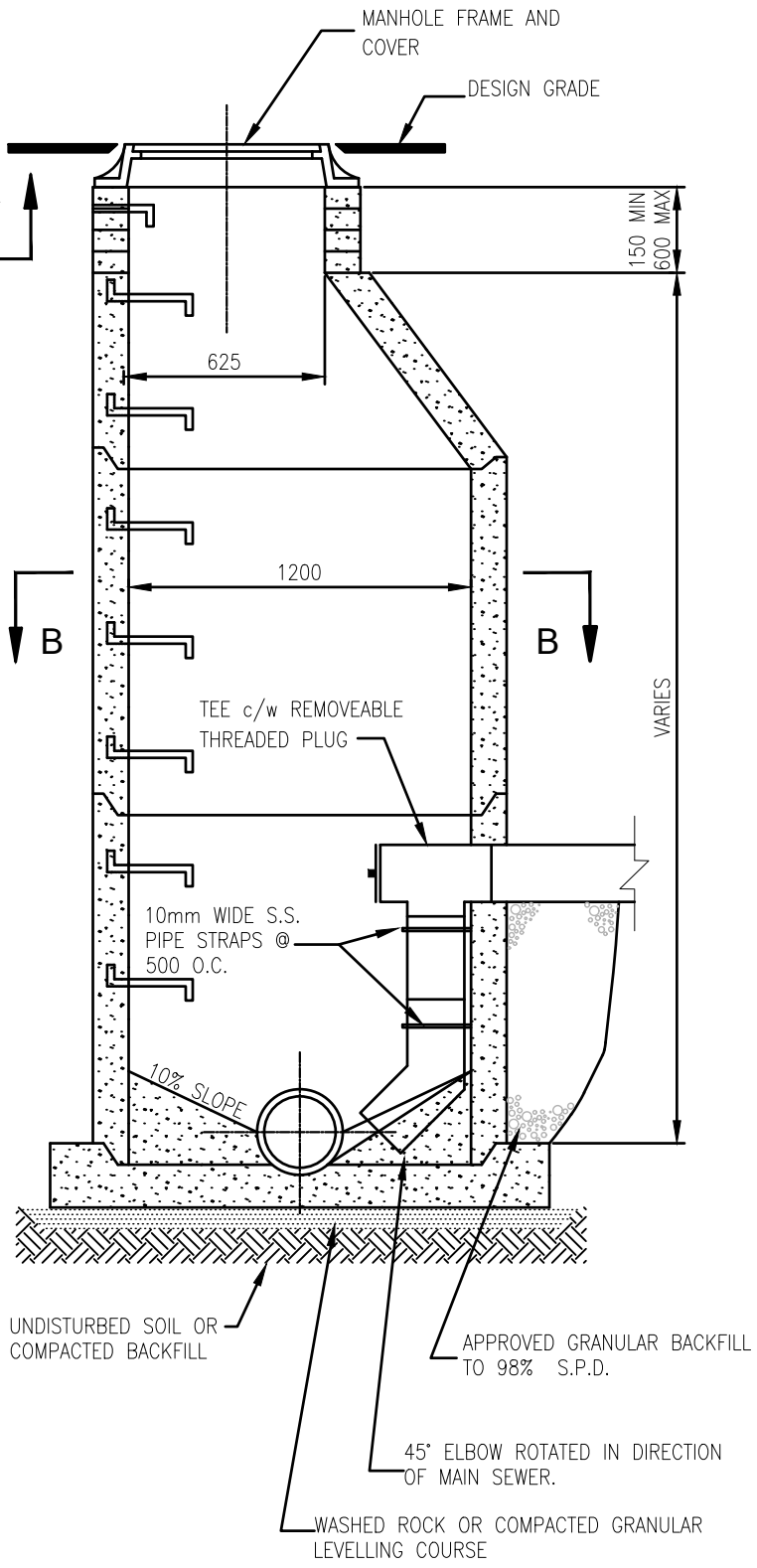
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3-8



SECTION B - B



SECTION A - A

NOTES:

1. MANHOLE PRECAST UNITS TO MEET A.S.T.M. C478.
2. PREBENCHED MANHOLE BASE UNITS WITH INTEGRAL GASKETS SHALL BE USED. POURED IN PLACE BASES ARE SUBJECT TO APPROVAL.
3. POURED IN PLACE CONCRETE TO BE 25MPa AT 28 DAYS.
4. INLET AND OUTLET PIPES TO BE GROUTED FLUSH WITH WALL.
5. RUBBER GASKET, KENT SEAL OR EQUIVALENT TO BE INSTALLED BETWEEN PRECAST BASES, PRECAST BARRELS, ALL NECK RINGS, CONE AND MANHOLE FRAME.
6. FLAT TOP SECTION TO BE USED FOR SHALLOW BURY MANHOLES UP TO 1.8m.
7. FOR MANHOLES EXCEEDING 7.0m IN DEPTH A SAFETY PLATFORM SHALL BE INSTALLED.
8. MANHOLE DROP CAN ONLY BE USED FOR 200mm, 250mm INCOMING SEWERS. MAXIMUM TWO INTERNAL DROPS PER MANHOLE.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

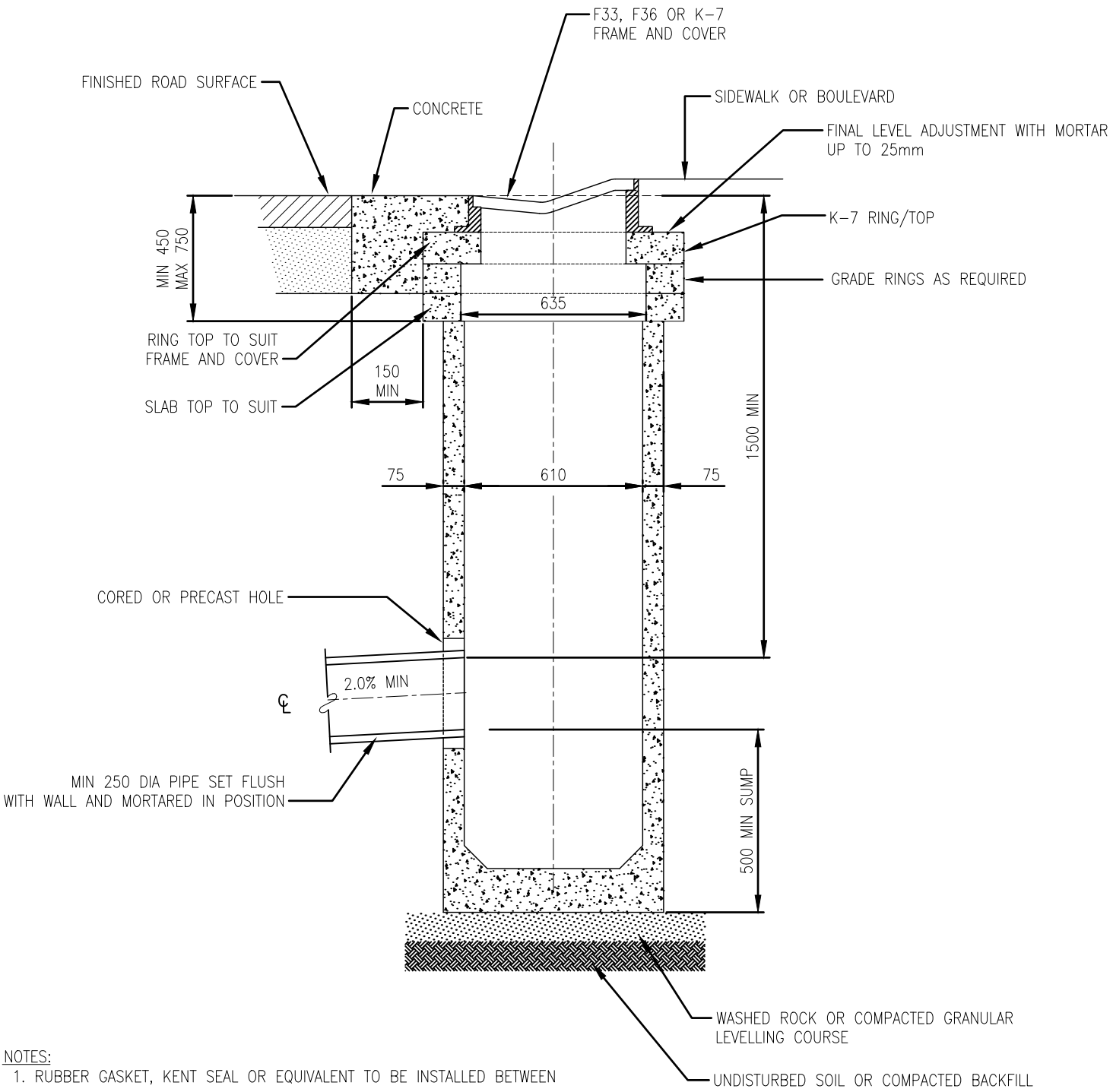
BEAUMONT

INTERNAL DROP MANHOLE

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3–9



NOTES:

1. RUBBER GASKET, KENT SEAL OR EQUIVALENT TO BE INSTALLED BETWEEN BARREL, ALL SHOULDER AND GRADE RINGS AND CATCH BASIN FRAME.
2. ALL ROUGH JOINTS SHALL BE PAINTED WITH MORTAR TO ENSURE SMOOTHNESS.
3. ALL CATCH BASIN COMPONENTS TO BE IN ACCORDANCE WITH ASTM C478.
4. CATCH BASIN BASE AND BARREL TO BE ONE PIECE.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

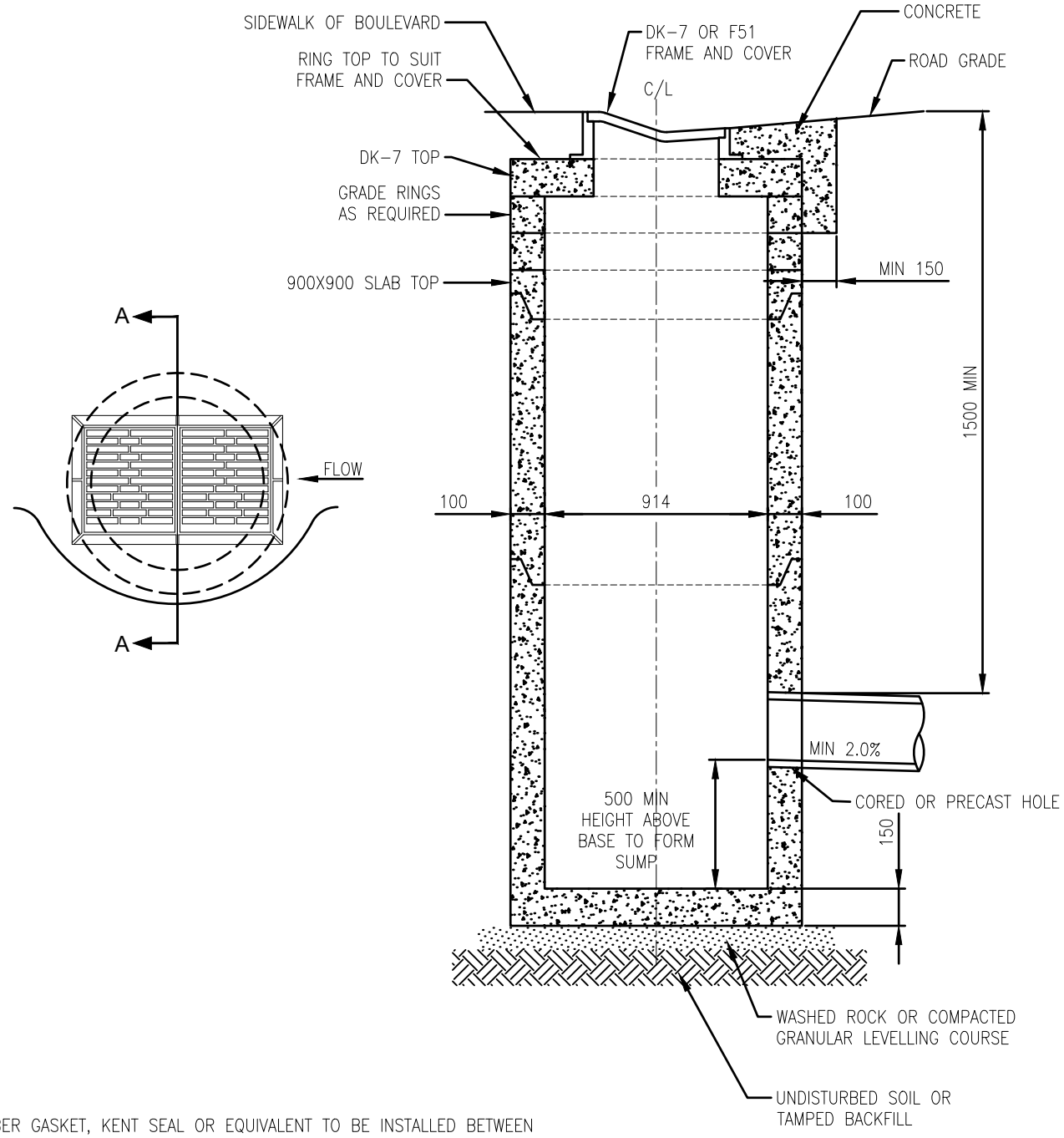
BEAUMONT

TYPICAL 600mm CATCH BASIN

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3-10



SECTION A-A

NOTES:

1. RUBBER GASKET, KENT SEAL OR EQUIVALENT TO BE INSTALLED BETWEEN BARREL, ALL SHOULDER AND GRADE RINGS AND CATCH BASIN FRAME.
2. ALL ROUGH JOINTS SHALL BE PAINTED WITH MORTAR TO ENSURE SMOOTHNESS.
3. ALL CATCH BASIN COMPONENTS TO BE IN ACCORDANCE WITH ASTM C478.
4. CATCH BASIN BASE AND BARREL TO BE ONE PIECE.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

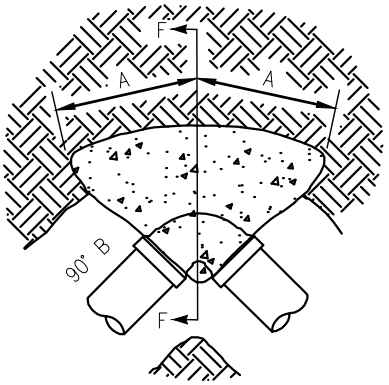
BEAUMONT

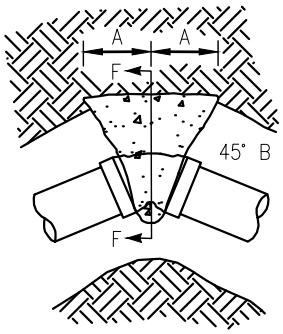
900mm PRECAST CB WITH "K" FRAME AND GRATE

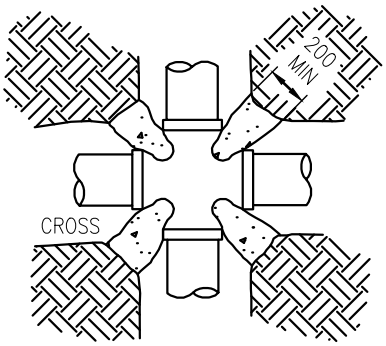
Date: MARCH/2021

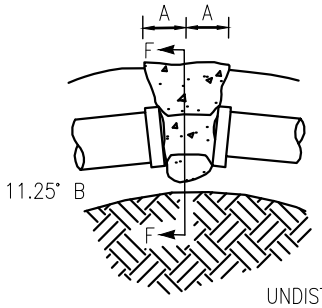
Scale: N.T.S.

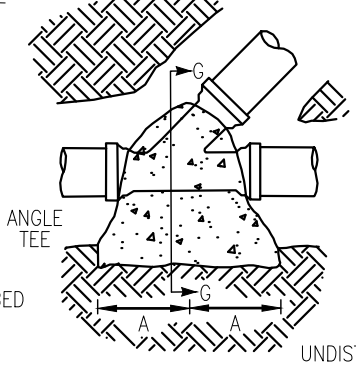
DWG. NO. 3-11

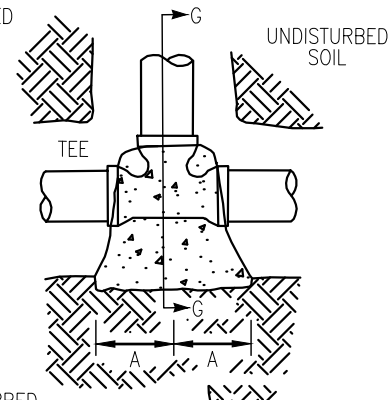


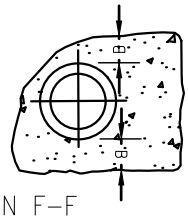






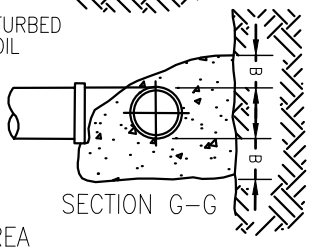






SECTION F–F

FOR DEAD END PLUG
THRUST BLOCK SEE
DWG. 3–13 OR 3–14



SECTION G–G

REQUIRED DIMENSIONS & BEARING AREA

	TEE & DEAD END									
DIA (mm)	100	150	200	250	300	350	400	450	500	600
A (mm)	250	370	550	740	930	920	1000	1000	1000	1000
B (mm)	75	100	100	100	100	200	250	350	450	700
AREA (m²)	0.14	0.28	0.47	0.71	1.00	1.44	1.87	2.35	2.88	4.11
	90° BEND									
DIA (mm)	100	150	200	250	300	350	400	450	500	600
A (mm)	350	520	770	860	960	940	1000	1000	1000	1020
B (mm)	75	100	100	150	200	350	450	600	750	1100
AREA (m²)	0.19	0.39	0.67	1.00	1.41	2.04	2.65	3.32	4.08	5.81
	45° BEND									
DIA (mm)	100	150	200	250	300	350	400	450	500	600
A (mm)	190	280	420	470	600	700	850	820	960	950
B (mm)	75	100	100	150	150	200	200	300	300	500
AREA (m²)	0.12	0.21	0.36	0.54	0.77	1.11	1.44	1.80	2.21	3.15

	22.5° BEND									
DIA (mm)	100	150	200	250	300	350	400	450	500	600
A (mm)	100	170	220	290	310	410	440	510	540	640
B (mm)	75	75	100	100	150	150	200	200	250	300
AREA (m²)	0.06	0.11	0.19	0.28	0.39	0.57	0.73	0.92	1.13	1.61
	11.25° BEND									
DIA (mm)	100	150	200	250	300	350	400	450	500	600
A (mm)	100	100	120	160	200	260	310	330	380	470
B (mm)	75	75	75	75	75	75	75	100	100	100
AREA (m²)	0.03	0.06	0.10	0.14	0.20	0.29	0.37	0.46	0.57	0.81

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. DESIGN BASIS:
   a. HYDRAULIC PRESSURE 1035kPa (150 psi)
   b. SOIL BEARING CAPACITY 72kPA (1500 lb/sq.ft) (MEDIUM SOFT CLAY)
3. TEMPORARY BLOCKING MUST BE APPROVED BY ENGINEERING SERVICES.
4. CONCRETE STRENGTH SHALL BE 25MPa AT 28 DAYS.
5. CONCRETE TO BE CLEAR OF BELLS.
6. CONCRETE TO BE PLACED UNDER ALL FITTINGS.
7. CONCRETE THRUST BLOCK REQUIRED FOR ALL FITTINGS.
8. BEARING SURFACE MUST BE ON UNDISTURBED SOIL.
9. 6mm POLYETHELENE MUST BE PLACED BETWEEN CONCRETE AND ALL PVC FITTINGS; CONCRETE SHALL NOT COME IN CONTACT WITH PIPE

	REVISIONS	
Date	Details	By

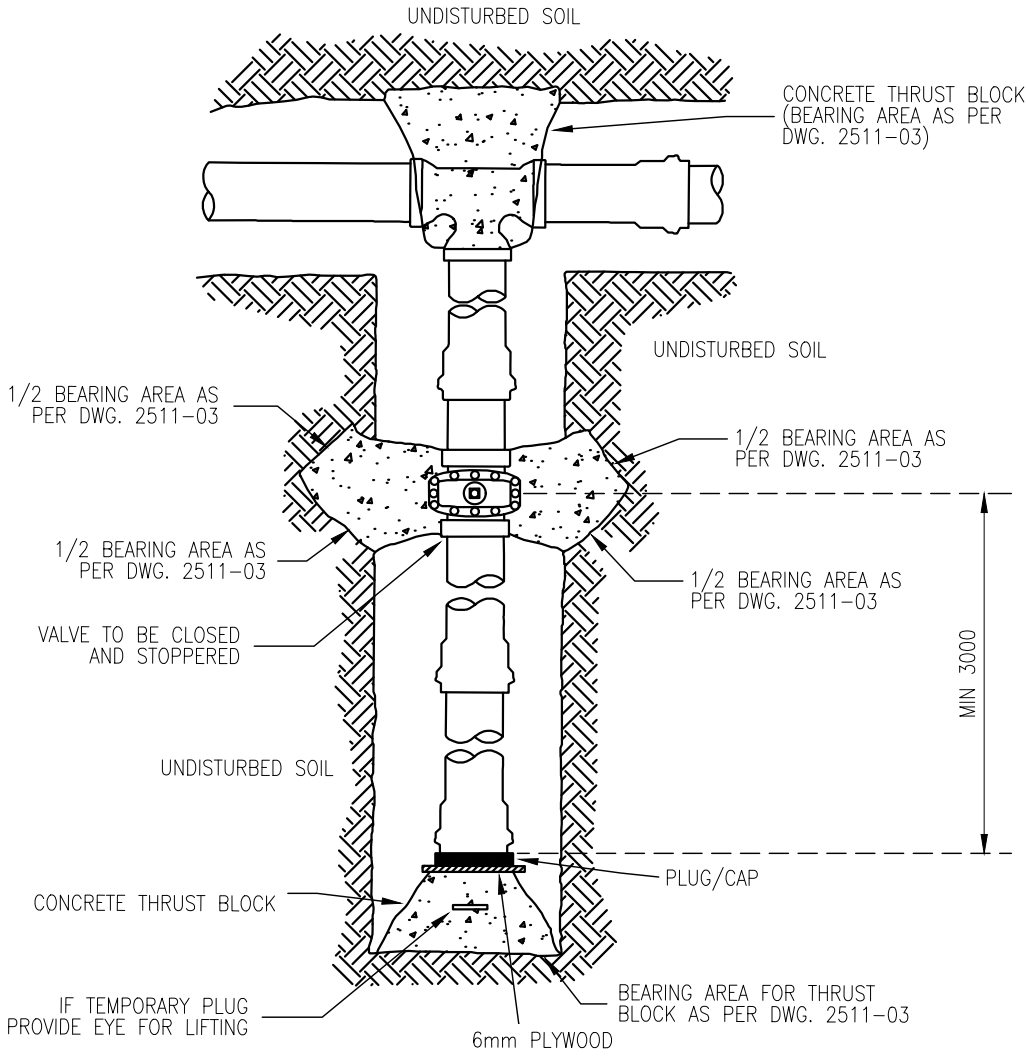
BEAUMONT

CONCRETE THRUST BLOCK DETAILS

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. **3–12**



PLAN VIEW

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. DESIGN BASIS:
   a. HYDRAULIC PRESSURE 1035 KPa (150 psi)
   b. SOIL BEARING CAPACITY 72 KPa (1500 lb/sq. ft) MEDIUM SOFT CLAY
3. TEMPORARY BLOCKING MUST BE APPROVED BY THE ENGINEER.
4. CONCRETE STRENGTH SHALL BE 25 MPa AT 28 DAYS.
5. CONCRETE TO BE CLEAR OF BELLS.
6. CONCRETE TO BE PLACED UNDER ALL FITTINGS.
7. CONCRETE THRUST BLOCK REQUIRED FOR ALL FITTINGS.
8. BEARING SURFACE MUST BE ON UNDISTURBED SOIL.
9. CONCRETE TO BE SULPHATE RESISTANT ACCORDING TO CSA-A3000-13.

	REVISIONS	
Date	Details	By

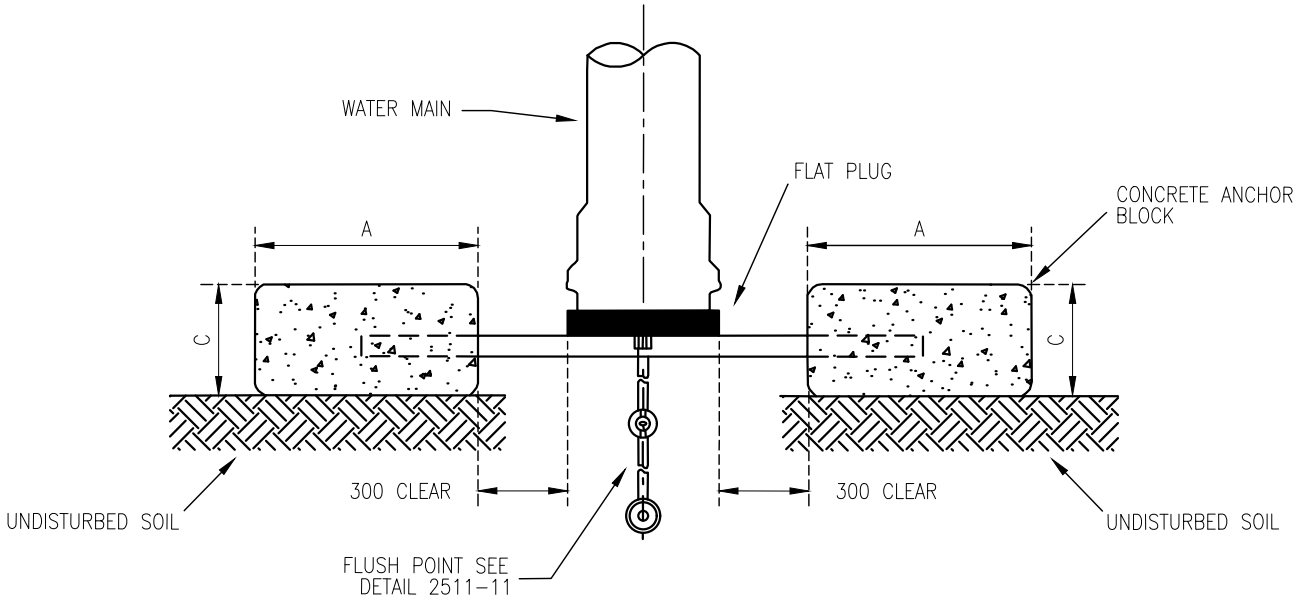
BEAUMONT

TYPICAL DEAD END UP TO 300mm

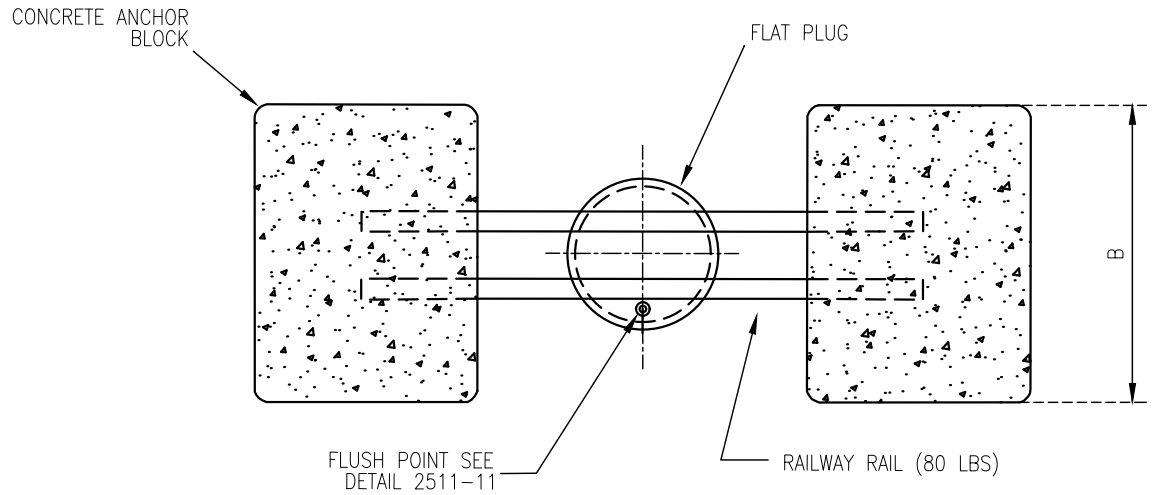
Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 3-13



PLAN VIEW



ELEVATION

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. DESIGN BASIS:
   a. 450 & 600 DIA – HYDRAULIC PRESSURE 1035 KPa (150 psi)
   b. SOIL BEARING CAPACITY 72 KPa (1500 lb/sq. ft) MEDIUM SOFT CLAY
3. CONCRETE STRENGTH SHALL BE 25 MPa AT 28 DAYS.
4. CONCRETE TO BE CLEAR OF ALL BELLS AND PIPE.
5. CONCRETE TO BE SULPHATE RESISTANT ACCORDING TO CSA-A3000-13.

DIA (mm)	450	600
A (mm)	1100	1400
B (mm)	1100	1500
C (mm)	800	900
AREA (m^2)	2.348	4.105

	REVISIONS	
Date	Details	By

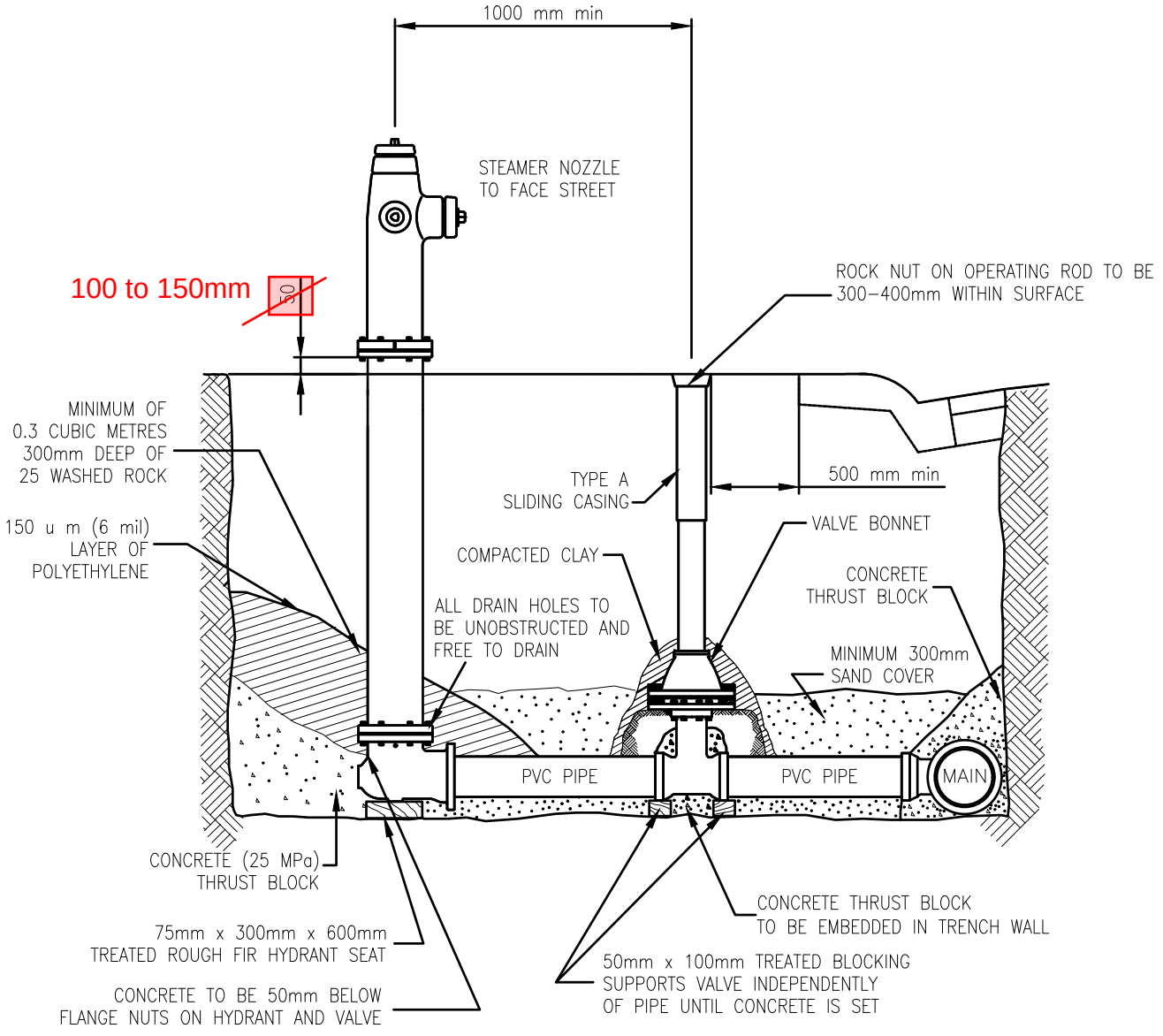
BEAUMONT

450mm AND 600mm BLOCK AND RAIL PLUG DETAIL

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 3-14



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. GRADE AT BOTTOM OF HYDRANT FLANGE IS 30mm PLUS 20mm PER METRE DISTANCE FROM FACE OF CURB ABOVE ESTABLISHED (EXISTING OR PROPOSED) CURB TOP ELEVATION.
3. SEE DRAWING 8–4 FOR CATHODIC PROTECTION REQUIREMENTS
4. MUELLER CANADA CENTURY FIRE HYDRANT (CANADA VALVE) TO BE USED
5. ZINC ANODE TO BE INSTALLED ON OPERATING ROD JUST ABOVE THE DROP VALVE – MUELLER CANADA PART NO. 349190
6. hydrant lead to be upsized if lead is equal or greater than 5m

	REVISIONS	
Date	Details	By
Apr 13, 2023	Amended. Refer to Bulletin 005	

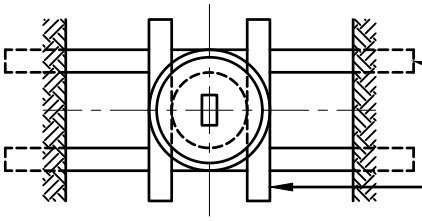
BEAUMONT

TYPICAL HYDRANT CONNECTION

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 3–15



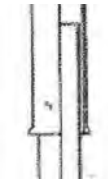
CROSSPIECES TO CONSIST OF 2 PIECES 38x84(2x4) TREATED WOOD.

CLEATS TO CONSIST OF 2 PIECES 38x38 (2x2) TREATED WOOD NAILED TO CROSSPIECES.

ROCK NUT ON OPERATING ROD TO BE 300–400mm WITHIN SURFACE

38x84 (2x4) CROSSPIECES TO BE FIRMLY EMBEDDED BELOW GROUND LEVEL.

TYPE "A" (SLIDING) VALVE BOX



TYPE "B" (THREADED) VALVE BOX

NORWOOD FOUNDRY VALVE BOX – USE TYPE "A" IN LANDSCAPED AREAS, AND TYPE "B" IN ROADWAYS

APPROVED BACKFILL MATERIAL

A

A

VALVE BONNET

300

38x38 (2"x2") CLEATS HOLDING PLATFORM TOGETHER ALSO SECURING BONNET.

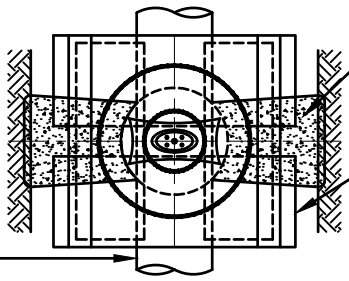
SAND BEDDING & INITIAL BACKFILL

SAND TO BE FILLED AROUND VALVE AND THRUST BLOCK UP TO FLANGE AND FIRMLY COMPACTED INTO PLACE. PLATFORM NOT TO REST ON ANY PART OF VALVE OR PIPE.

CONCRETE THRUST BLOCK

PLAN

PLATFORM CONSISTS OF 2 PIECES 38x156 (2"x6") TREATED WOOD CUT AS SHOWN AND HELD TOGETHER BY 38x38 (2"x2") TREATED WOOD CLEATS THEN PLACED ON TAMPED EARTH AT LEVEL OF FLANGE ON VALVE. BONNET SECURELY HELD TO PLATFORM BY CLINCHED STAINLESS STEEL OR HOT DIPPED GALVANIZED NAILS. ALL FIELD CUTS TO RECEIVE TWO BRUSH COATS OF APPROVED PRESERVATIVE.



PVC OR DUCTILE IRON MAIN OR HYDRANT LEAD

SECTION A-A

NOTES:

1. BOTTOM SECTION AT 900 OR 1500 LENGTH IS OPTIONAL ON 200, 250 & 300 VALVES AND 1200 OR 1500 ON 150 VALVES.
2. CONCRETE THRUST BLOCKS SHALL BE POURED CLEAR OF JOINTS OR FLANGES. SIZES SHOWN ARE BASED ON A MINIMUM SOIL BEARING OF 72kPa. IF THIS BEARING DOES NOT EXIST, SPECIAL DESIGNS ARE REQUIRED. REFER TO DRAWING D–4 FOR GEOMETRY.
3. ALL WOOD SHALL BE TREATED.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

	REVISIONS	
Date	Details	By
	Amended - 2025 Refer to Amendment #2 Number 7.1	

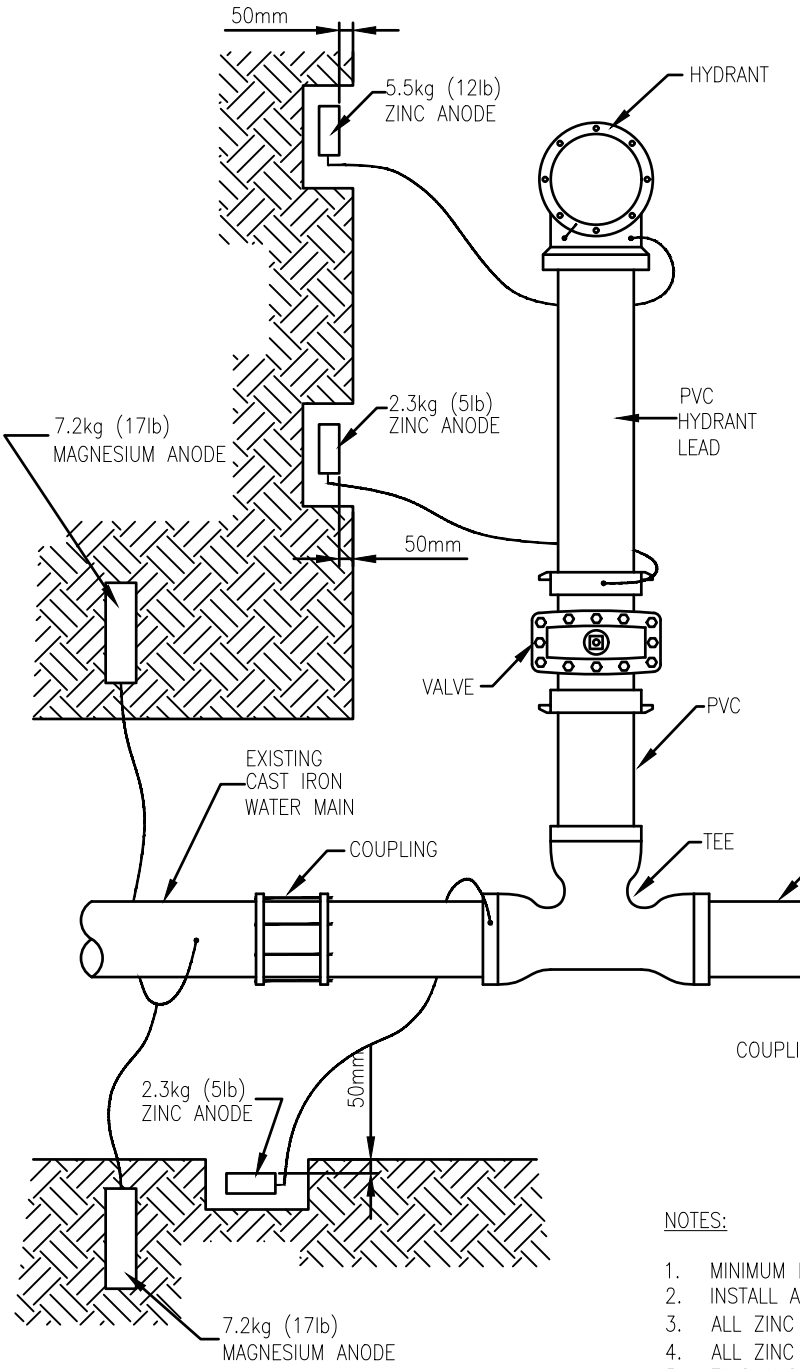
BEAUMONT

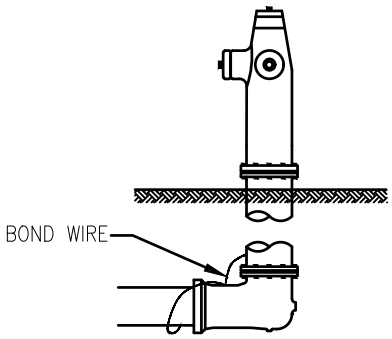
VALVE SUPPORT DETAIL

Date: MARCH/2021

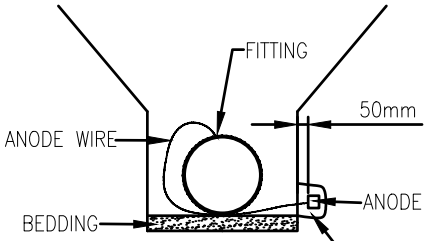
Scale: N.T.S.

DWG. NO. 3–16





HYDRANT ELEVATION



DETAIL A

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.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

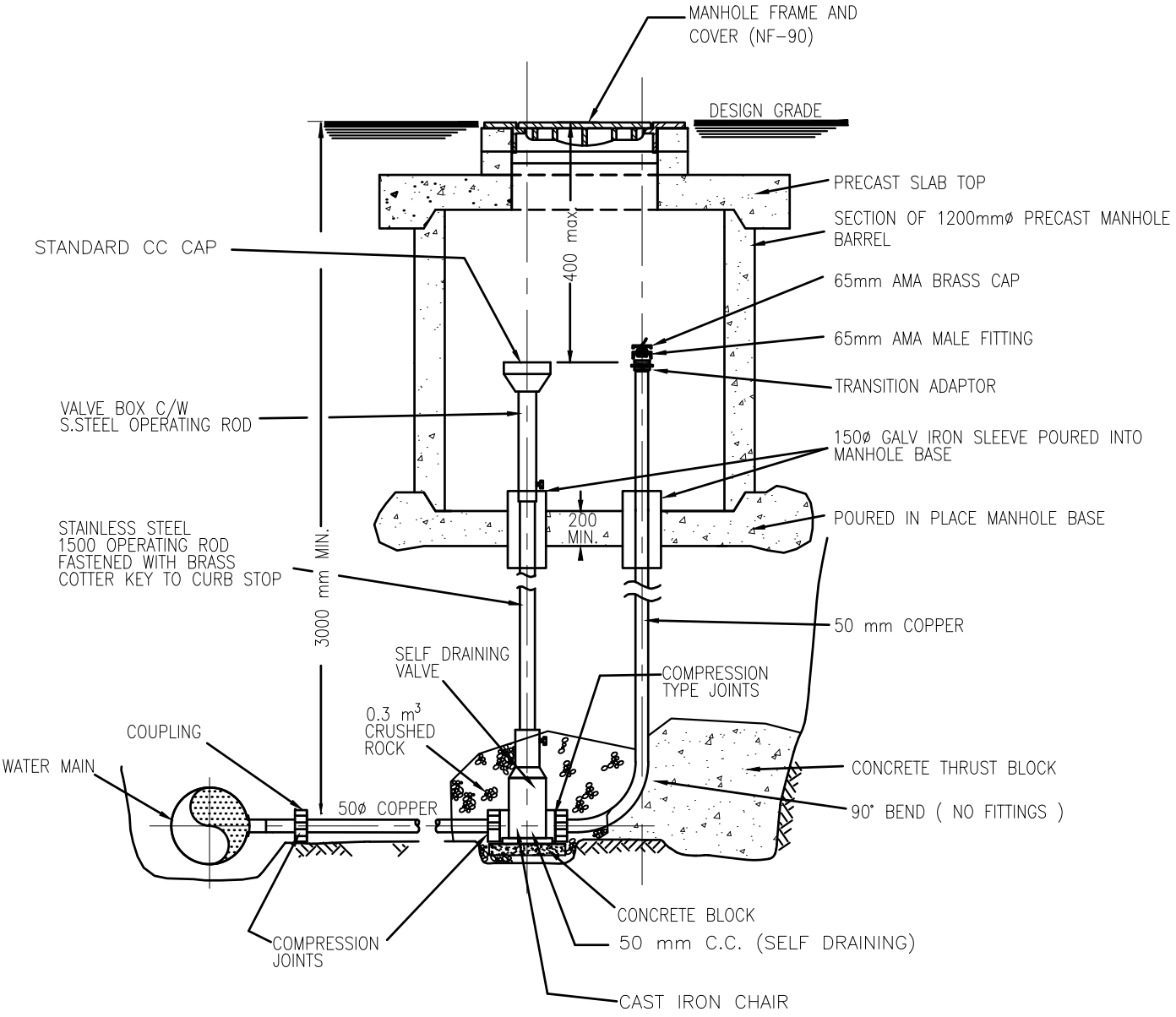
BEAUMONT

ANODE LOCATIONS AND INSTALLATIONS

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3-17



	REVISIONS	
Date	Details	By

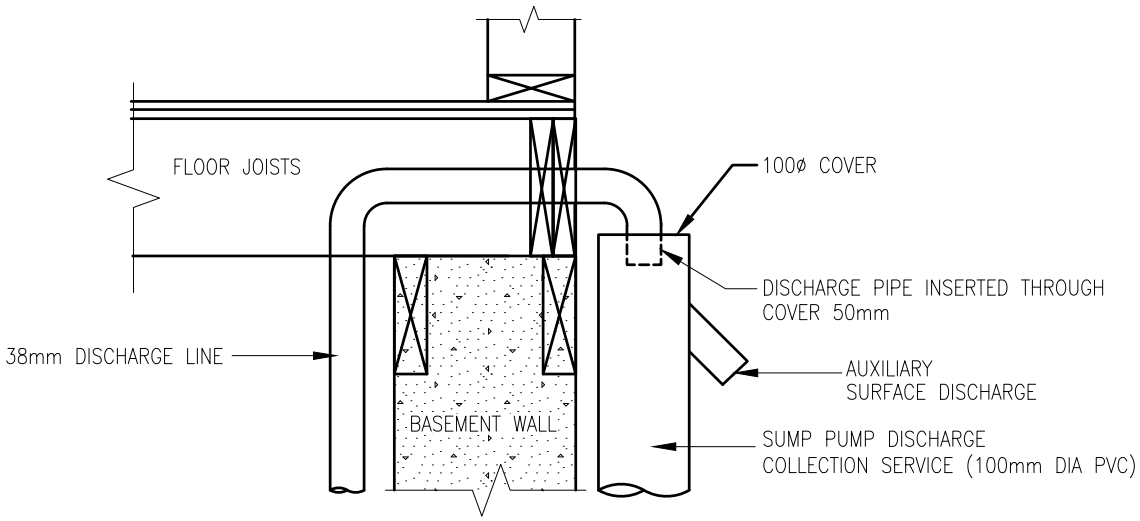
BEAUMONT

PERMANENT FLUSH POINT

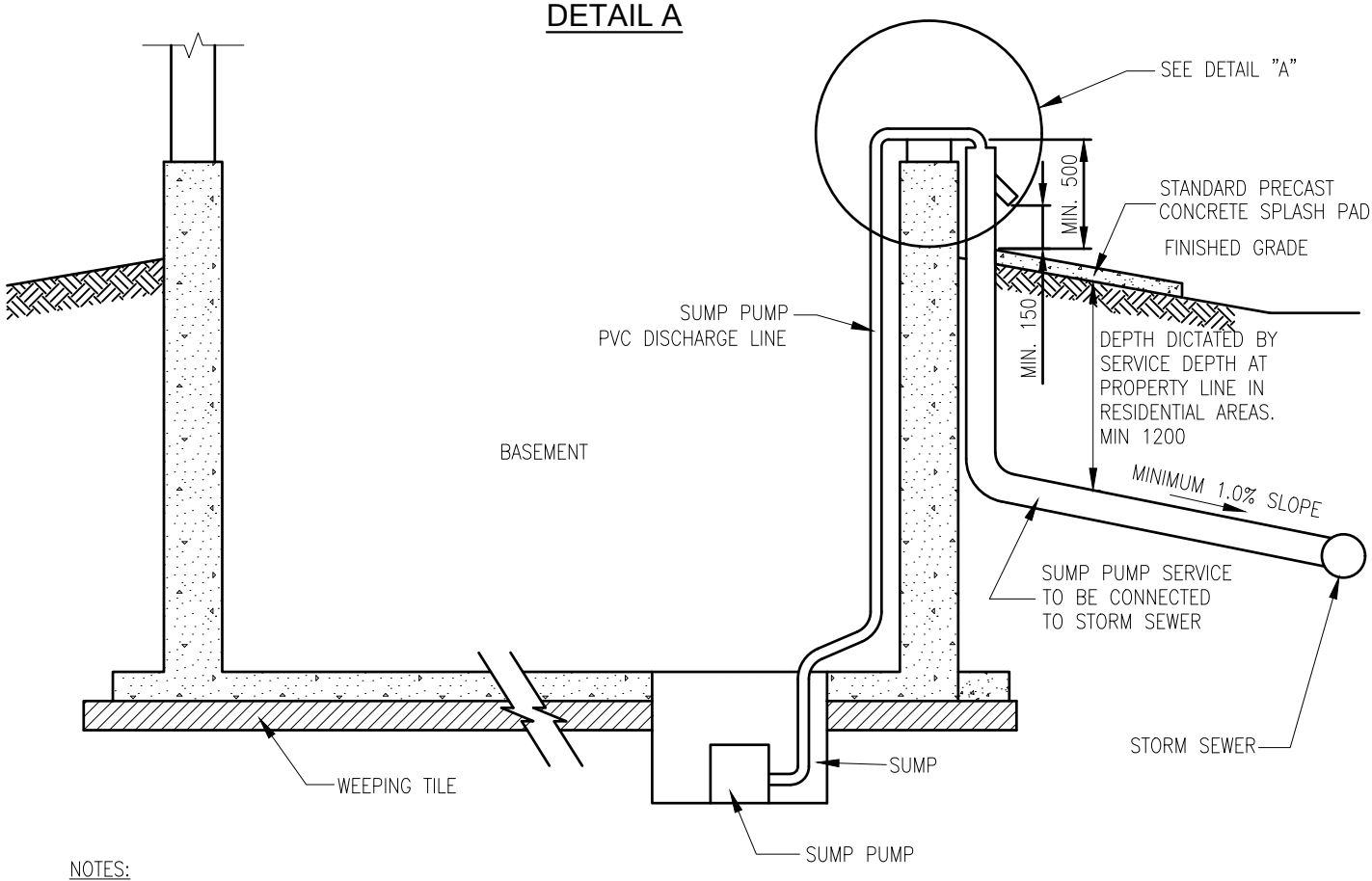
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3-18



DETAIL A



NOTES:

1. ROOF LEADERS (DOWNSPOUTS) OR ANY OTHER STORM WATER SOURCE SHALL NOT BE CONNECTED TO THE SUMP DISCHARGE COLLECTION SERVICE LINE.
2. THE AUXILIARY SURFACE DISCHARGE SHALL 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 HORIZONTAL DEFLECTIONS BETWEEN THE BUILDING COLLECTION PIPE SHALL NOT EXCEED 22 1/2 DEGREES.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

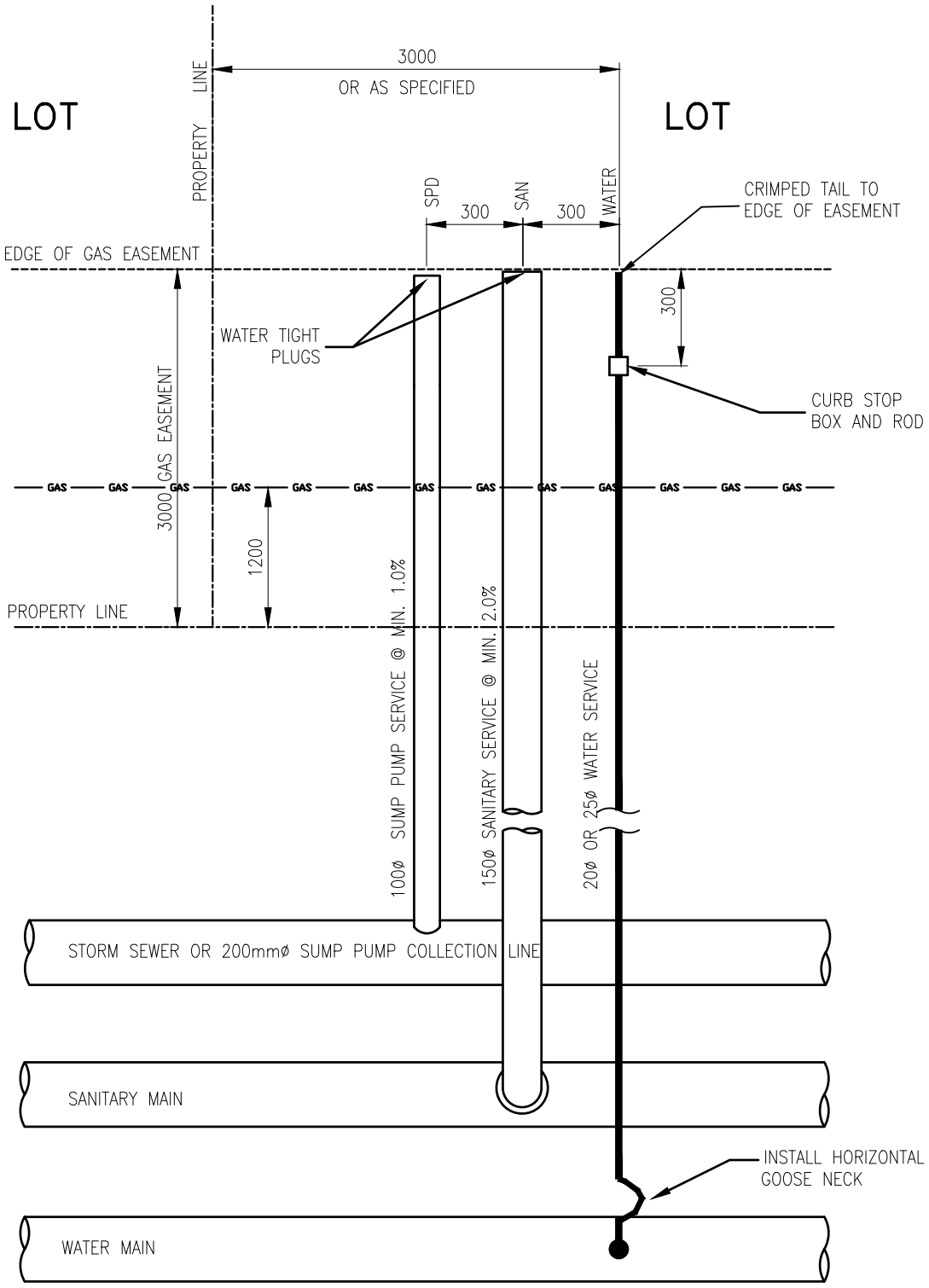
BEAUMONT

TYPICAL SUMP PUMP DISCHARGE CONNECTION

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3–19



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

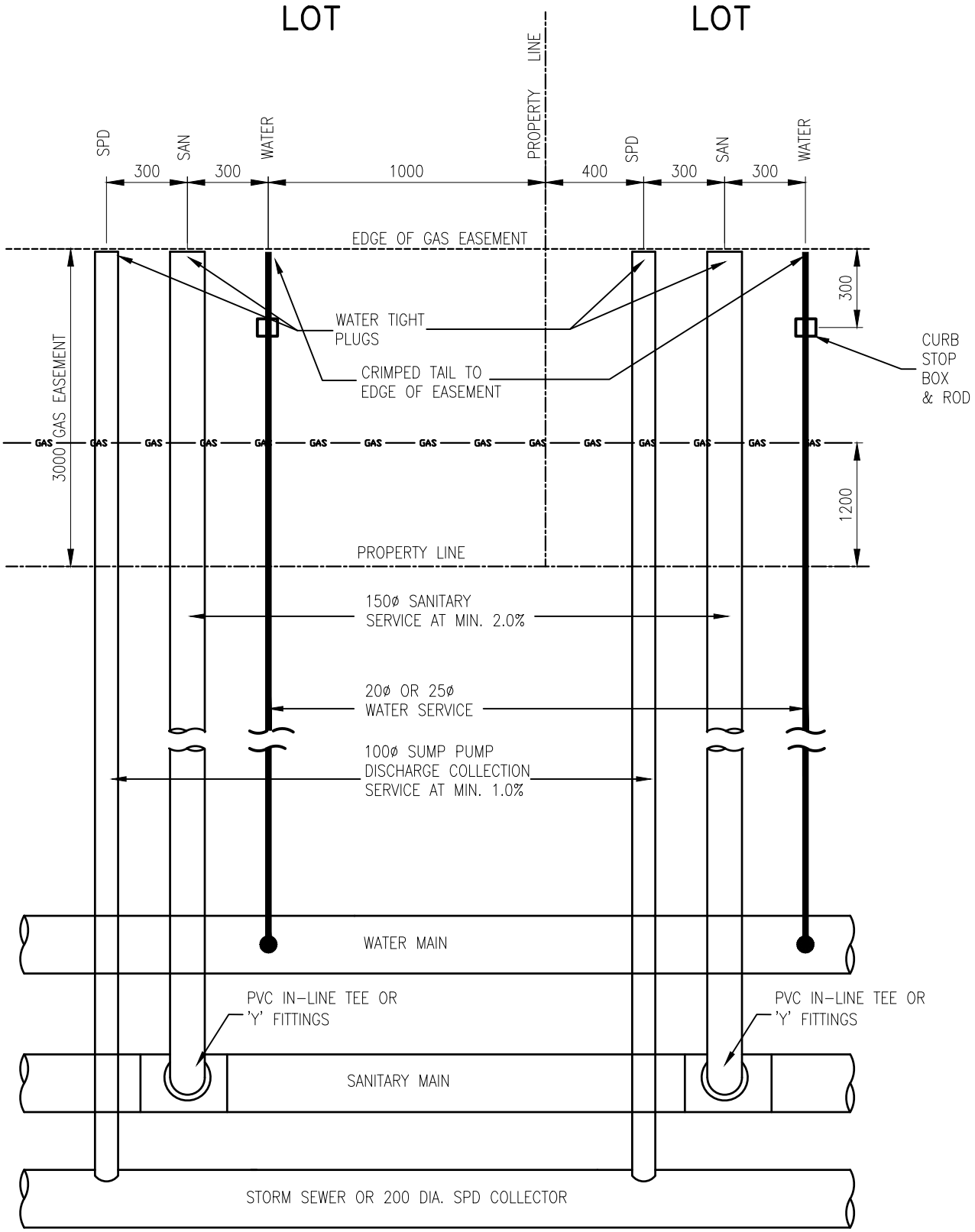
BEAUMONT

SINGLE SERVICE WITH SPD COLLECTOR

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3-20



ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

BEAUMONT

DOUBLE SERVICE WITH SPD COLLECTOR

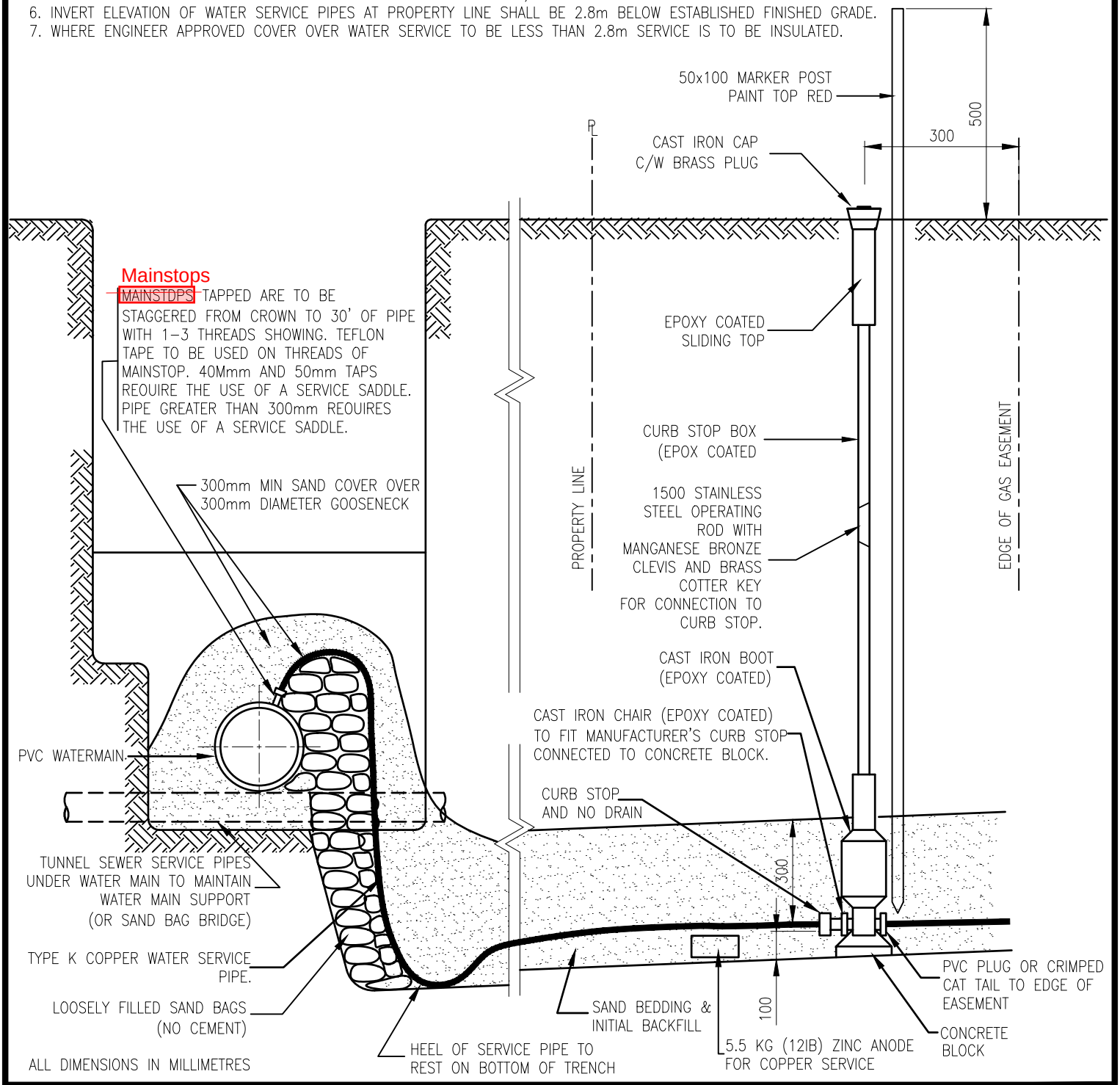
Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 3-21

NOTES:

1. COPPER LINE SHALL BE ONE PIECE, UNLESS LENGTH EXCEEDS 20.0m, AND ONLY THEN WILL A DOUBLE UNION BE ALLOWED
2. INVERT ELEVATION SHALL BE 2.8m BELOW ESTABLISHED FINISHED GRADE AT PROPERTY LINE.
3. MAIN STOP TAPS SHALL BE A MINIMUM OF 600mm APART AND NO LESS THAN 300mm TO A COUPLING OR COLLAR.
4. "CC' SHALL BE NEATLY STAMPED INTO THE CONCRETE CURB OR SIDEWALK DIRECTLY OPPOSITE EACH SERVICE.
5. AN ADDITIONAL GOOSENECK IS REQUIRED AT EACH SEWER CROSSING,
6. INVERT ELEVATION OF WATER SERVICE PIPES AT PROPERTY LINE SHALL BE 2.8m BELOW ESTABLISHED FINISHED GRADE.
7. WHERE ENGINEER APPROVED COVER OVER WATER SERVICE TO BE LESS THAN 2.8m SERVICE IS TO BE INSULATED.



	REVISIONS	
Date	Details	By
Apr 13, 2023	Amended. Refer to Bulletin 005	

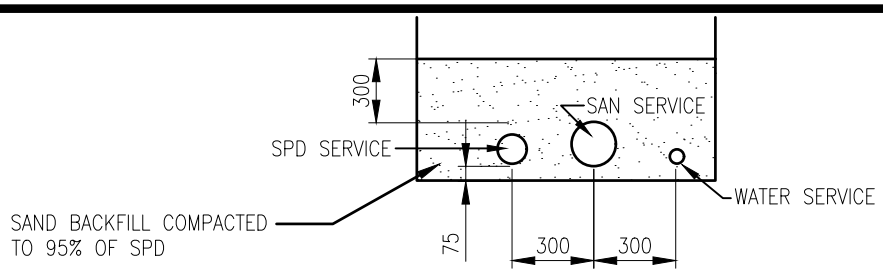
BEAUMONT

50mm AND SMALLER WATER SERVICE

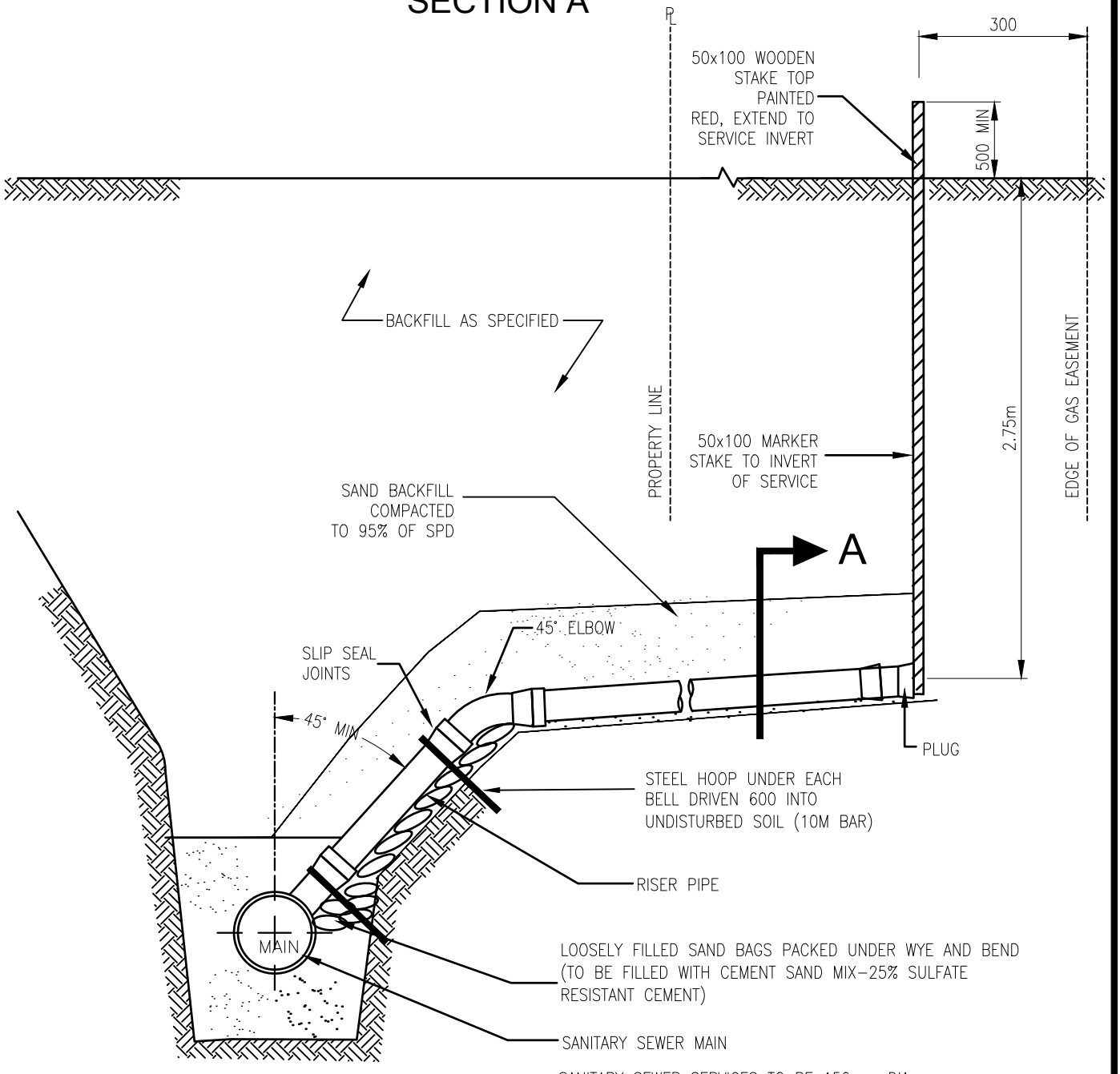
Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 3–22



SECTION A



ALL DIMENSIONS IN MILLIMETRES

SANITARY SEWER SERVICES TO BE 150mm DIA.
MINIMUM SLOPE FOR 150 DIA. SERVICES IS 2.0%

	REVISIONS	
Date	Details	By

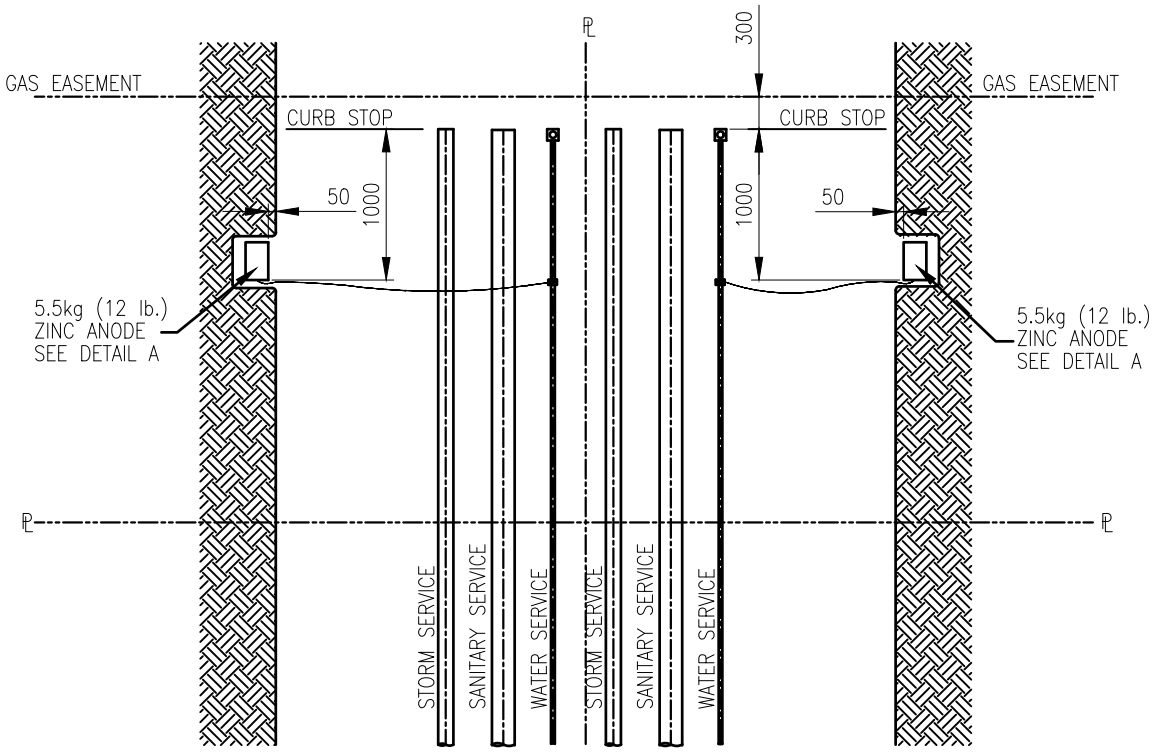
BEAUMONT

WASTEWATER SEWER SERVICE RISER DETAIL

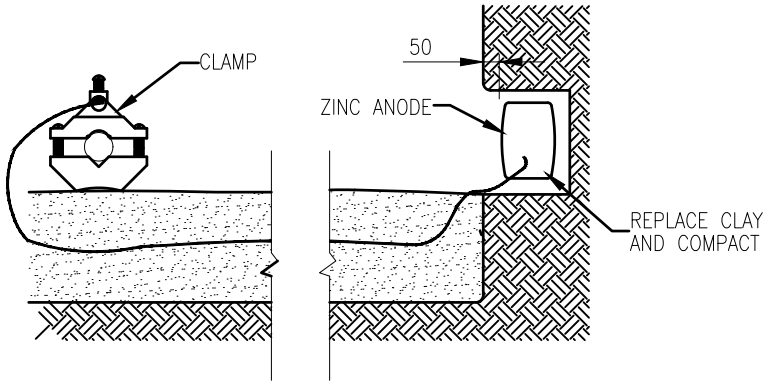
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 3–23



PLAN VIEW



DETAIL A

NOTES:

1. PIPE CLAMP TO BE ALL BRONZE OR APPROVED EQUIVALENT (INCLUDING NUTS AND BOLTS)
2. ZINC ANODES TO BE EMBEDDED INTO TRENCH WALL TO PROVIDE FOR A MINIMUM OF 50mm COMPACTED SOIL COMPLETELY AROUND ANODES.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

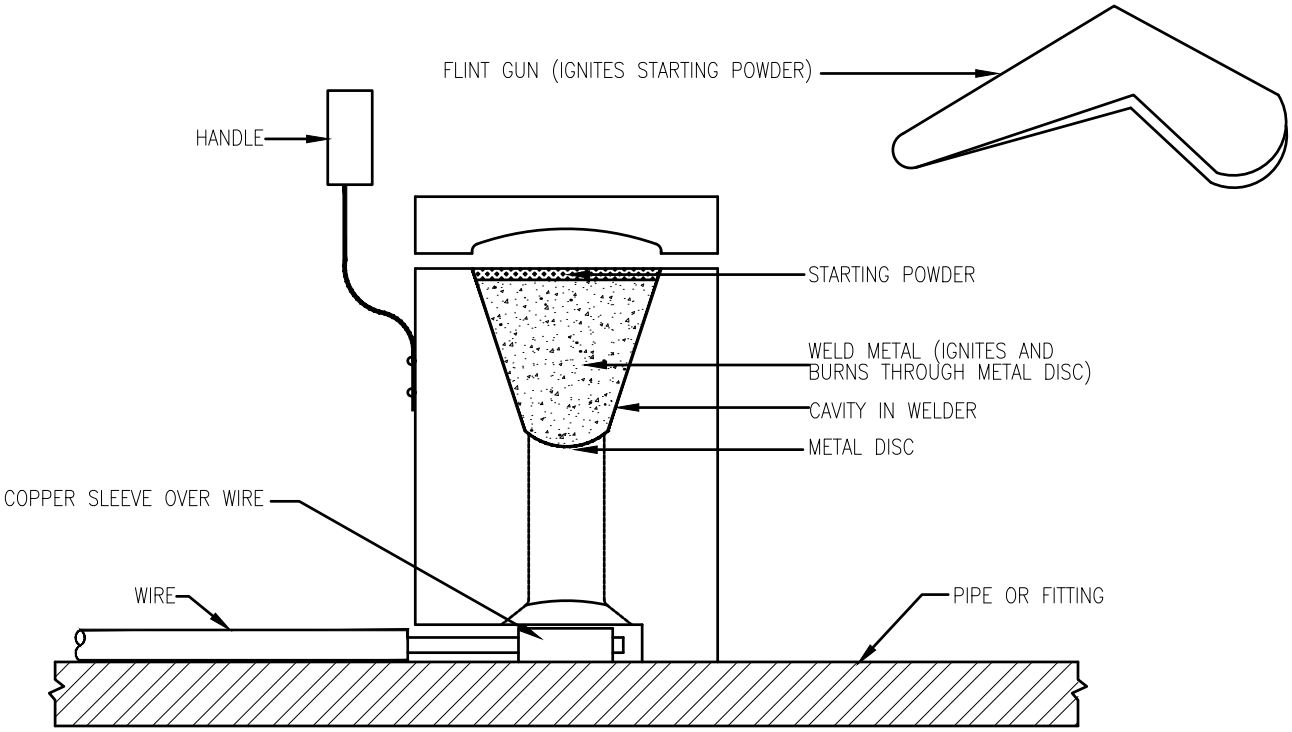
BEAUMONT

ANODE ON 50mm & SMALLER COPPER WATER SERVICE

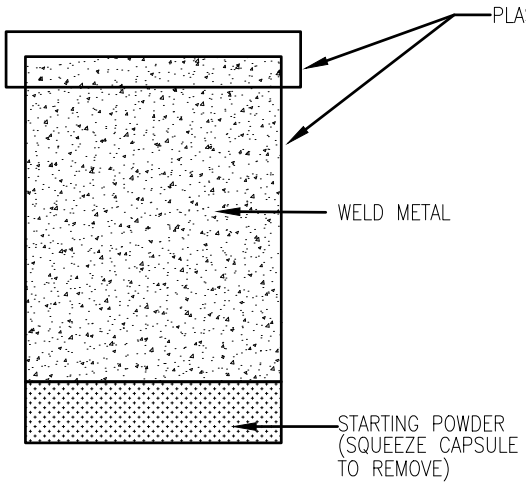
Date: MARCH/2021

Scale: N.T.S.

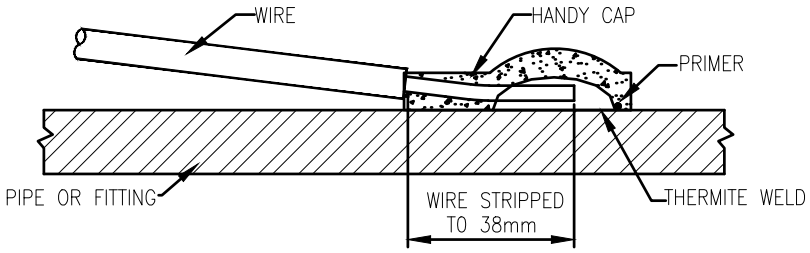
DWG. NO. 3-24



CADWELD



WELD METAL CAPSULE



FINISHED WELD

* CADWELD TO BE PERFORMED AS PER MANUFACTURERS SPECIFICATIONS.

ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By

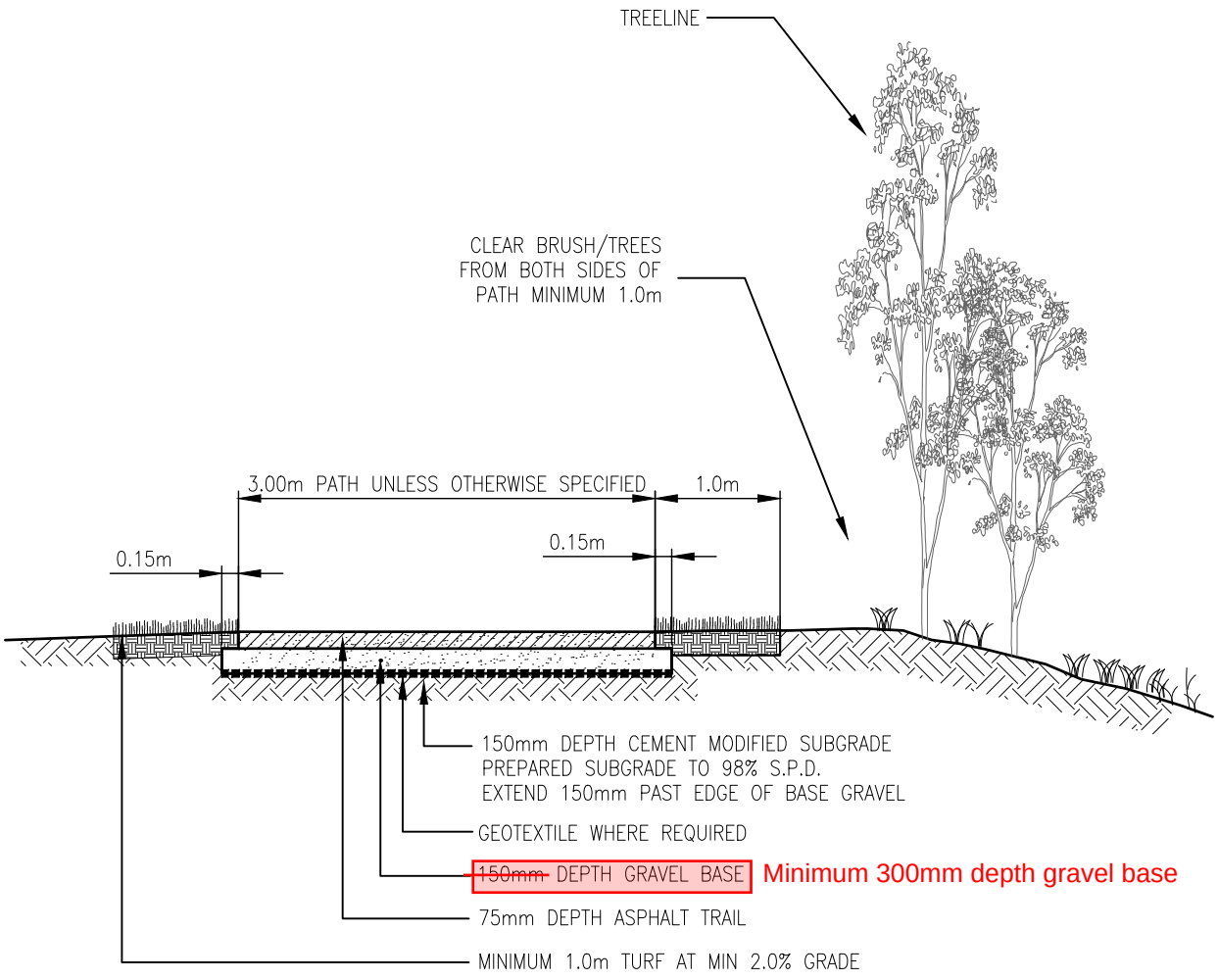
BEAUMONT

ANODE INSTALLATION CADWELD

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 3-25



NOTES:

- CROSS SLOPE TO BE IN DIRECTION OF NORMAL SURFACE DRAINAGE (MIN 2.0%)
- SURFACE OF NEW SODDED OR SEEDED EDGE TO BLEND IN NATURALLY WITH EXISTING SURFACE.
- REFER TO SPECIFICATIONS FOR ASPHALT TYPE AND DEPTH.
- ALL TRAIL EXCAVATION TO MATCH EXISTING NATURAL GRADE.
- REMOVE ALL DEBRIS AND EXCESS FILL FROM SITE OR AS DIRECTED.
- REPAIR ALL DAMAGE DONE TO SITE.
- ALL DIMENSIONS IN MILLIMETRES

	REVISIONS	
Date	Details	By
Apr 13, 2023	Amended. Refer to Bulletin 005	

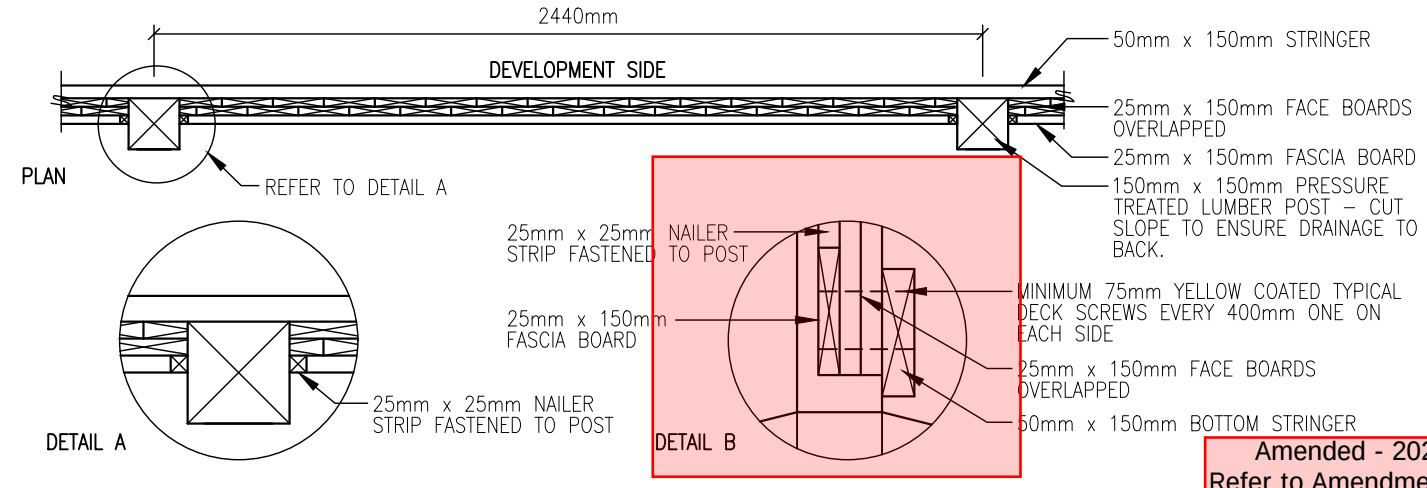
BEAUMONT

ASPHALT TRAIL DETAIL

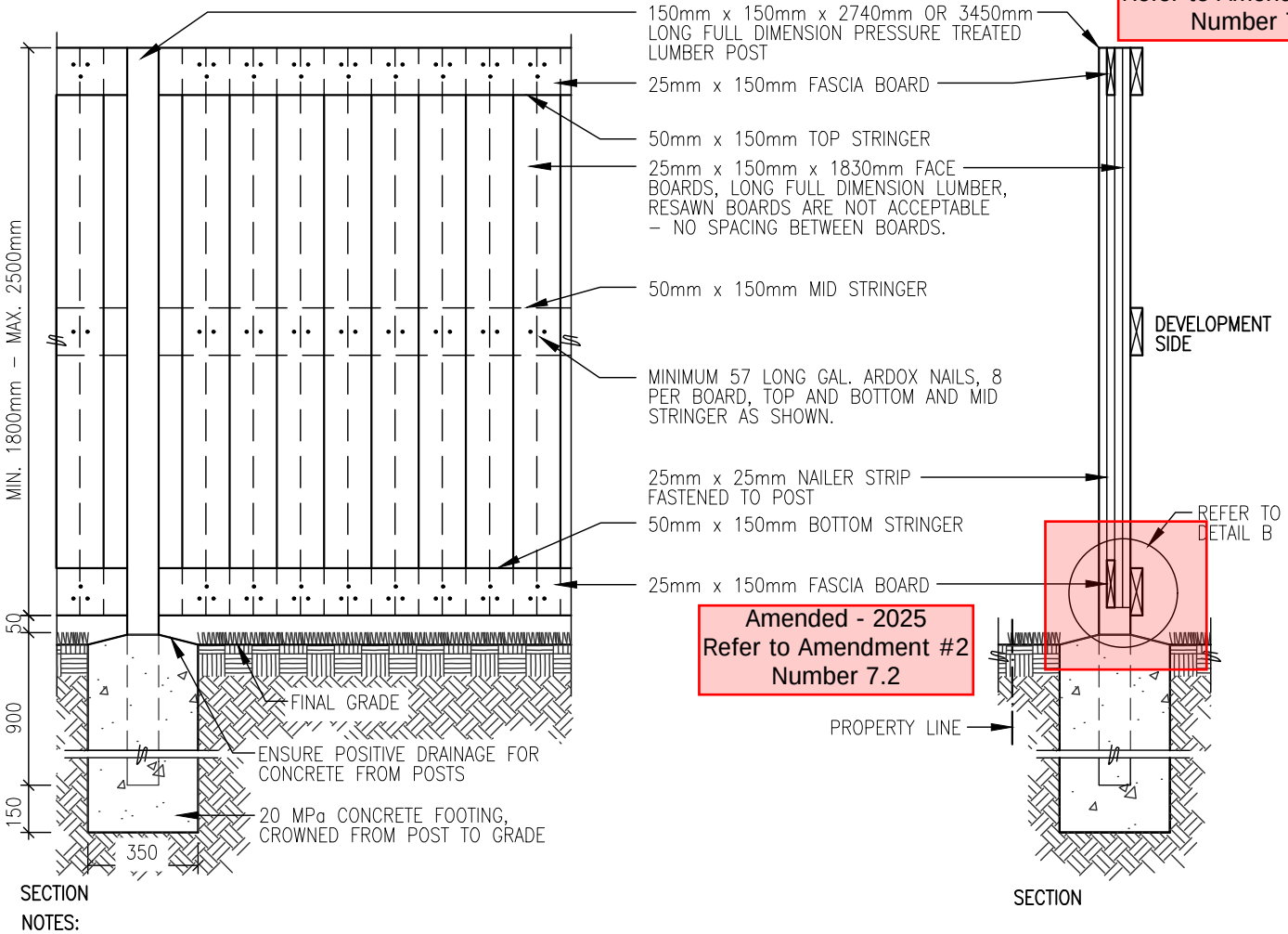
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 4–1



Amended - 2025
Refer to Amendment #2
Number 7.2



Amended - 2025
Refer to Amendment #2
Number 7.2

Amended - 2025
Refer to Amendment #2
Number 7.2

NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- FENCE TO BE LOCATED 150mm OFFSET FROM PROPERTY LINE WITHIN PRIVATE LOT.
- PRE-STAIN TWO COATS ALL WOOD MEMBERS PRIOR TO INSTALLATION, TOUCH UP AFTER CONSTRUCTION.
- WOOD USED MAY BE SPRUCE OR CEDAR DEPENDING ON AVAILABILITY AT TIME OF CONSTRUCTION.
- ALL WOOD CUTS TO BE COATED WITH TWO COATS OF APPROVED WOOD STAIN.
- POST HOLES SHOULD BE EXCAVATED TO REACH A DEPTH OF UNDISTURBED SUBGRADE.
- FENCE TO BE OFFSET 150mm ONTO PRIVATE PROPERTY.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

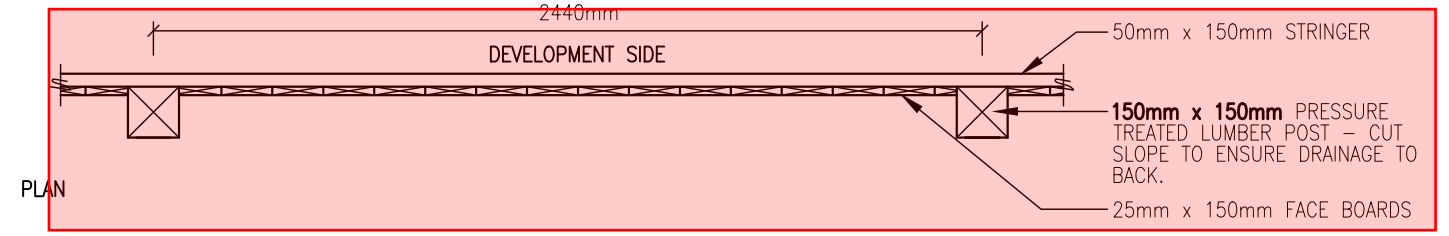
BEAUMONT

1.8m–2.5m NOISE ATTENUATION FENCE

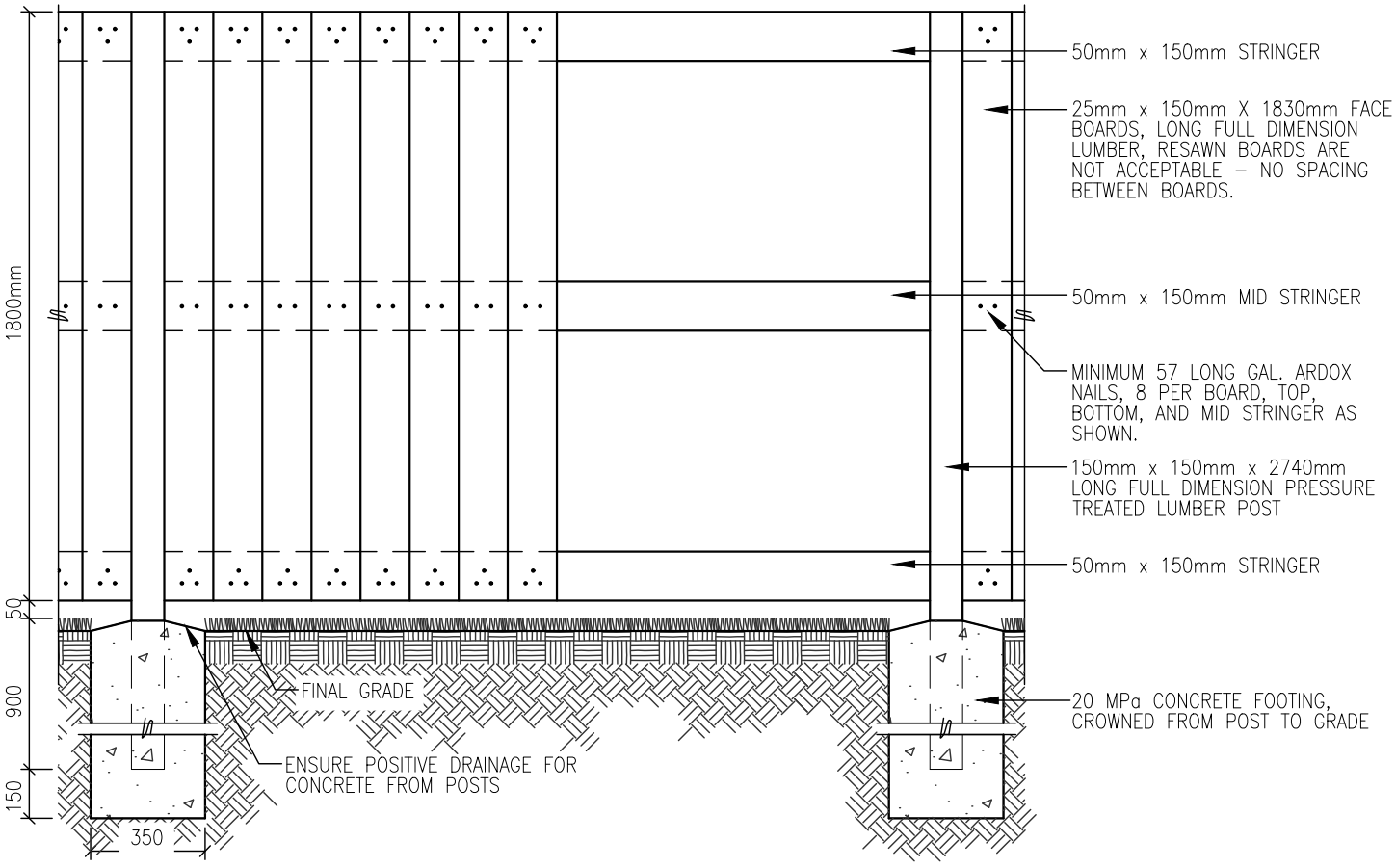
Date: MARCH/2021

Scale: N.T.S.

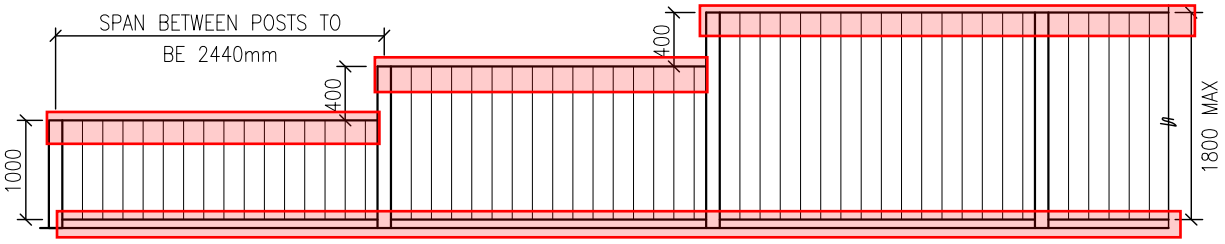
DWG. NO. 4–2



PLAN



SECTION



STEP DOWN ELEVATION

NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- FENCE TO BE LOCATED 150mm OFFSET FROM PROPERTY LINE WITHIN PRIVATE LOT.
- PRE–STAIN TWO COATS ALL WOOD MEMBERS PRIOR TO INSTALLATION, TOUCH UP AFTER CONSTRUCTION.
- WOOD USED MAY BE SPRUCE OR CEDAR DEPENDING ON AVAILABILITY AT TIME OF CONSTRUCTION.
- ALL WOOD CUTS TO BE COATED WITH TWO COATS OF APPROVED WOOD STAIN.
- POST HOLES SHOULD BE EXCAVATED TO REACH A DEPTH OF UNDISTURBED SUBGRADE.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By
Apr 13, 2023	Amended. Refer to Bulletin 005	

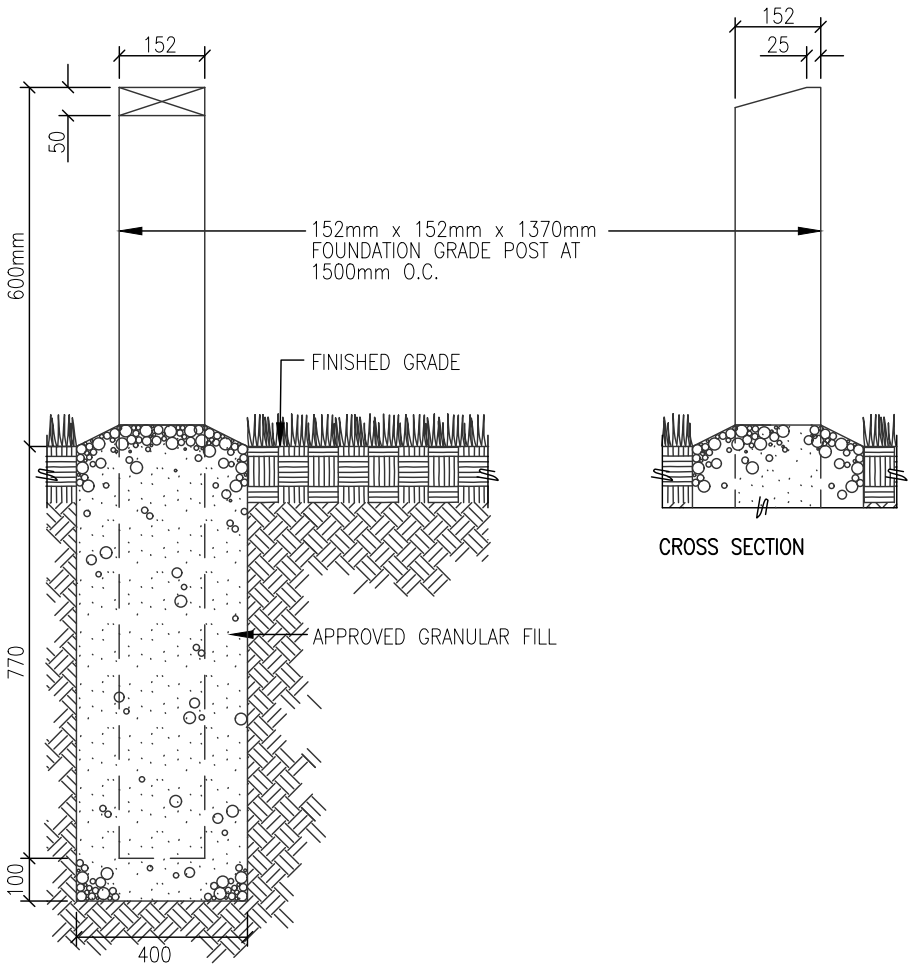
BEAUMONT

1.8m HT. WOOD SCREEN FENCE INSTALLATION

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 4–3



NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- ALL WOOD TO BE PRESSURE TREATED ACQ.
- WOOD USED MAY BE SPRUCE OR CEDAR DEPENDING ON AVAILABILITY AT TIME OF CONSTRUCTION.
- ALL WOOD CUTS TO BE COATED WITH TWO COATS OF APPROVED WOOD PRESERVATIVE.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

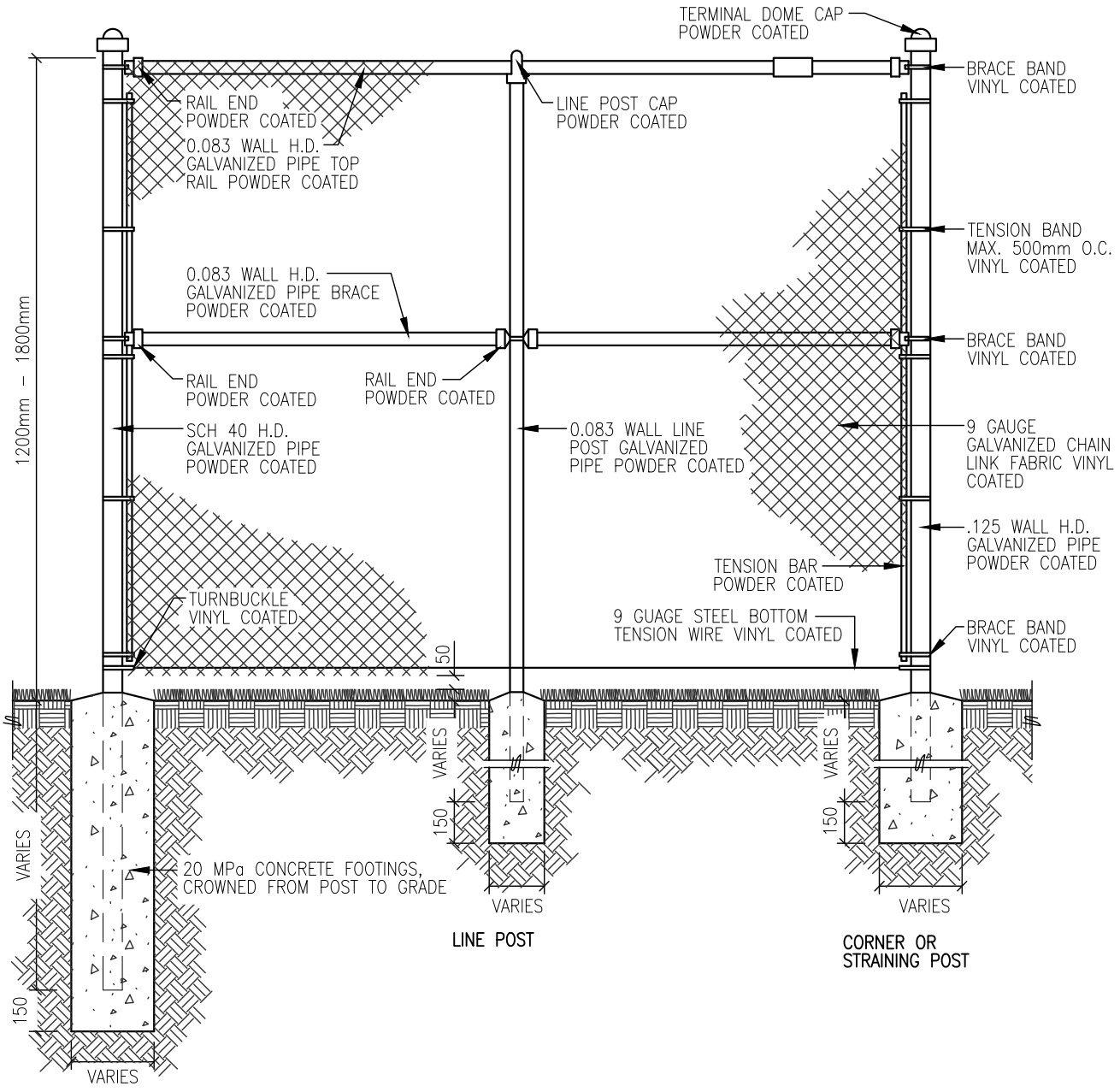
BEAUMONT

152mm x 152mm WOOD BOLLARD INSTALLATION

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 4–4



END OR GATE POST

LINE POST

CORNER OR
STRAINING POST

NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- WIRE MESH TO BE NINE GAUGE BEFORE VINYL COATING. COLOUR TO BE BLACK.
- SELVAGE KNUCKLED NO MORE THAN 25mm ABOVE TOP RAIL AND BELOW BOTTOM RAIL.
- ALL WIRE TIES TO BE 9 GUAGE AT MAXIMUM 500mm O.C.
- ALL TERMINAL DOME CAPS, RAIL ENDS AND LINE POST CAPS TO BE CAST ALUMINUM.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

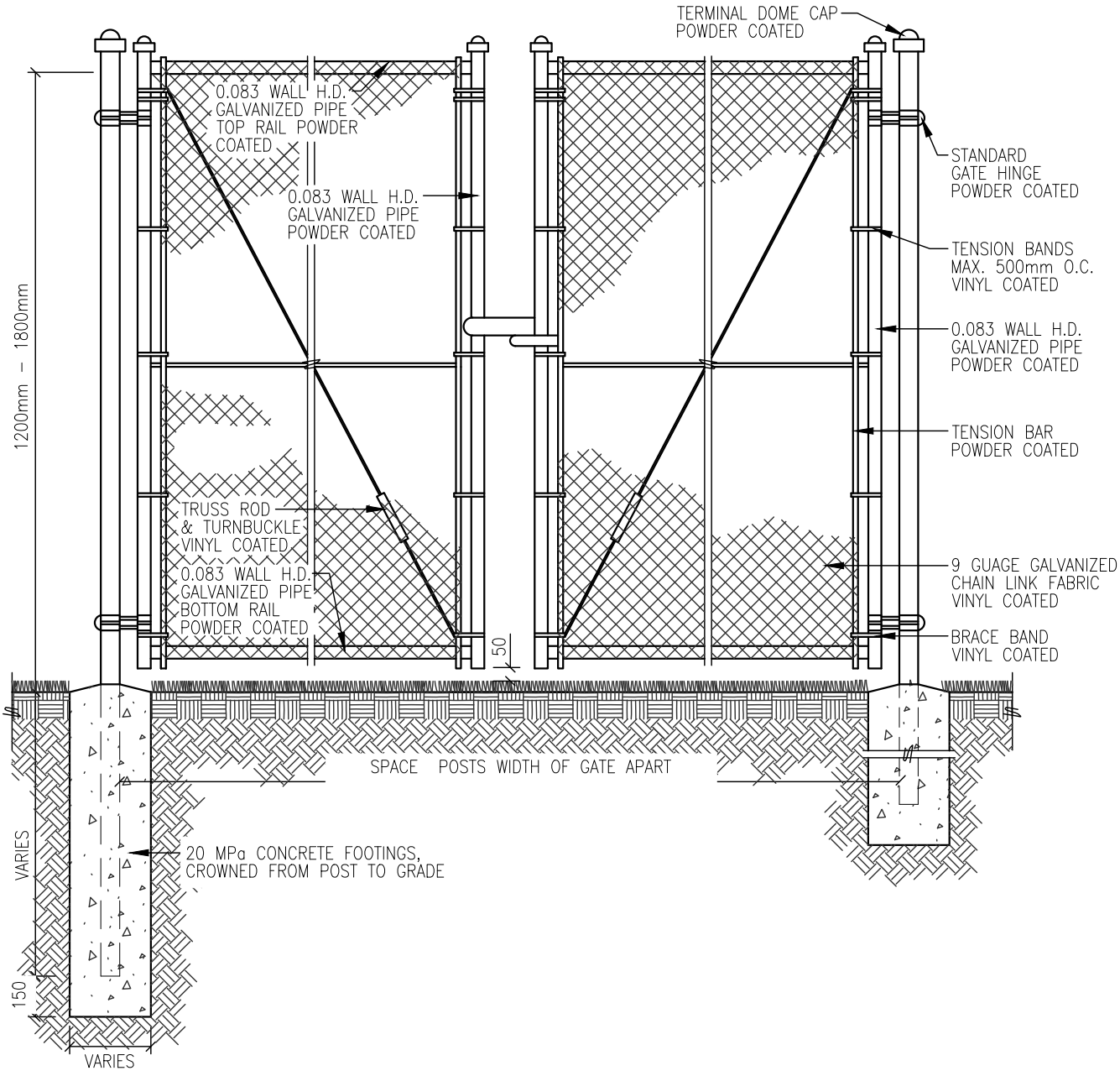
BEAUMONT

1.2m – 1.8m HT. CHAIN LINK FENCE INSTALLATION

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 4–5



NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- WIRE MESH TO BE NINE GAUGE BEFORE VINYL COATING. COLOUR TO BE BLACK.
- ALL WIRE TIES TO BE 9 GAUGE AT MAXIMUM 500mm O.C.
- ALL TERMINAL DOME CAPS, GATE HINGES, RAIL ENDS AND GATE POST CAPS TO BE ALUMINUM.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

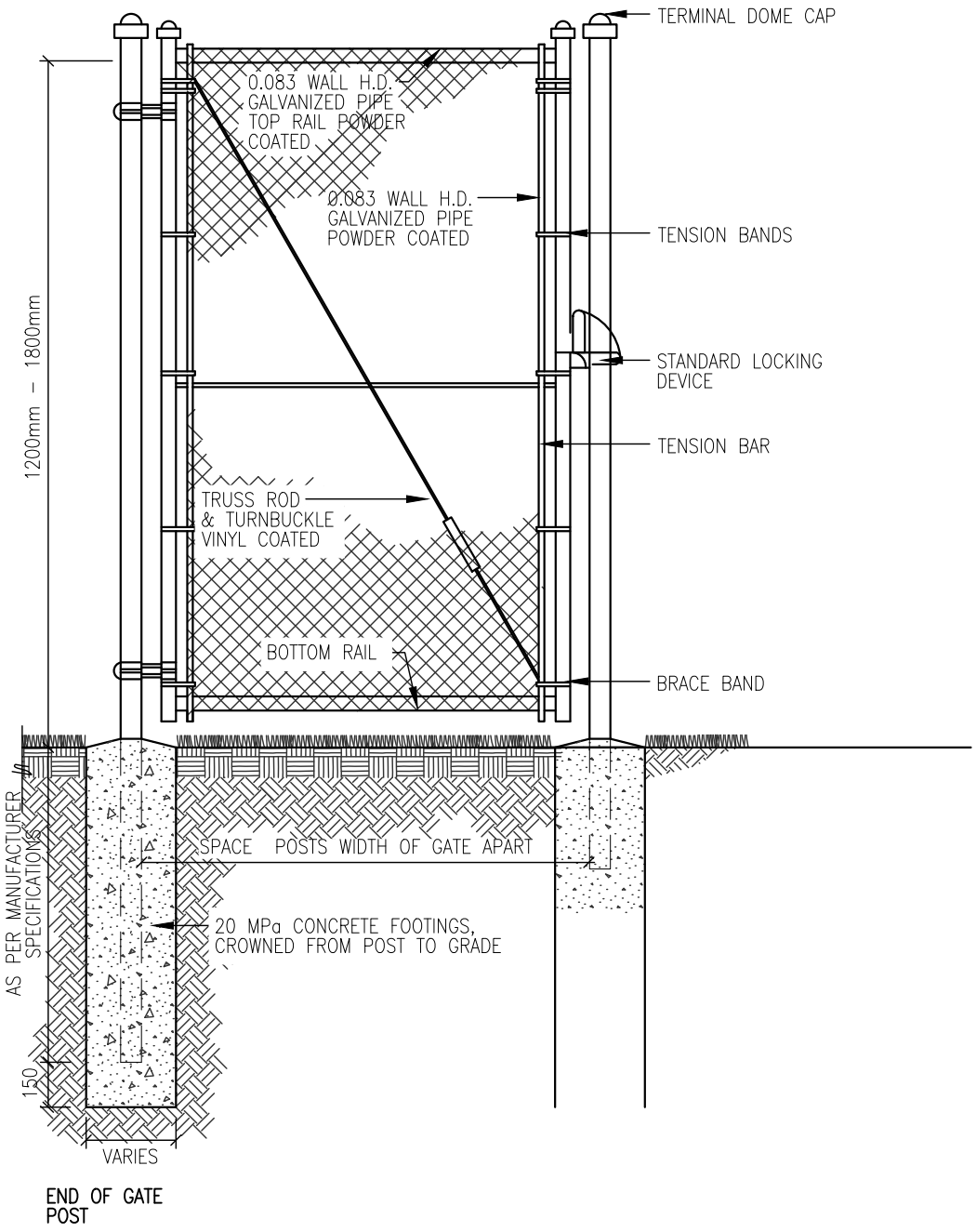
BEAUMONT

1.2m – 1.8m HT. CHAIN LINK DOUBLE GATE INSTALLATION

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 4–6



	REVISIONS	
Date	Details	By

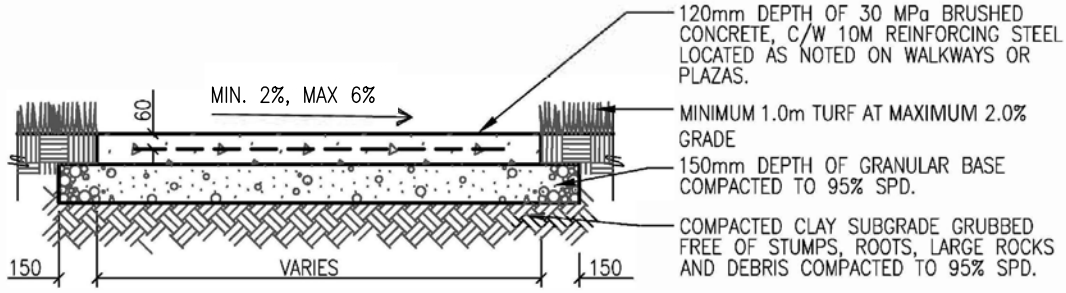
BEAUMONT

1.2m – 1.8m HT. CHAIN LINK SINGLE GATE INSTALLATION

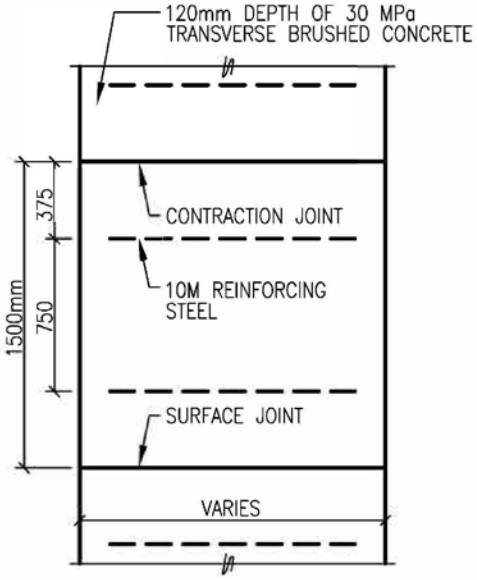
Date: **MARCH/2021**

Scale: **N.T.S.**

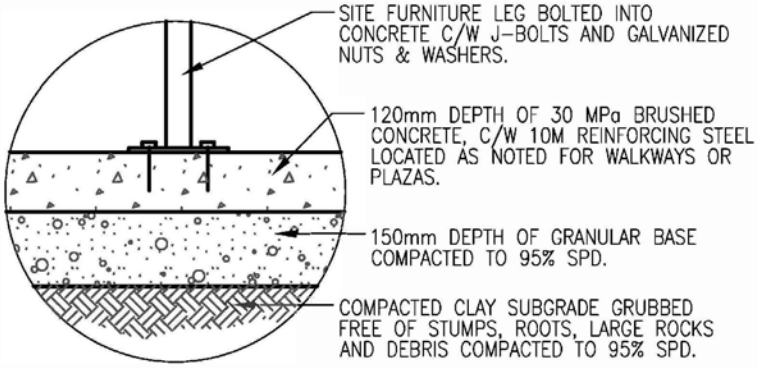
DWG. NO. 4–7



CROSS SECTION



CONCRETE WALKWAY PLAN VIEW



DETAIL
SCALE N.T.S.

NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DIMENSIONS/DEFINITION OF CONCRETE WALKWAY IS A WIDTH OF 1500-2400mm AND PLAZA IS GREATER THAN 2400mm.
- FOR PLAZA AREAS INSTALL REBAR AT 750mm O.C. IN BOTH DIRECTIONS. INSTALL CONTRACTION JOINTS AS PER LAYOUT DETAIL ON LANDSCAPE DRAWINGS.
- SET CONCRETE SURFACE FLUSH TO ADJACENT GRADES.
- ENSURE POSITIVE DRAINAGE OF CONCRETE AS PER OVERALL SITE DRAINAGE PLAN.
- SET CONCRETE SURFACE FLUSH TO ADJACENT GRADES, WHERE PRACTICAL. IF SURROUNDING AREA EXCEEDS 6%, STEEPER BACKSLOPES (UP TO 5:1) OR RETAINING WALLS MAY BE NEEDED TO TIE TO ADJACENT GROUND.
- ENSURE POSITIVE DRAINAGE OF CONCRETE AS PER OVERALL SITE DRAINAGE PLAN.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

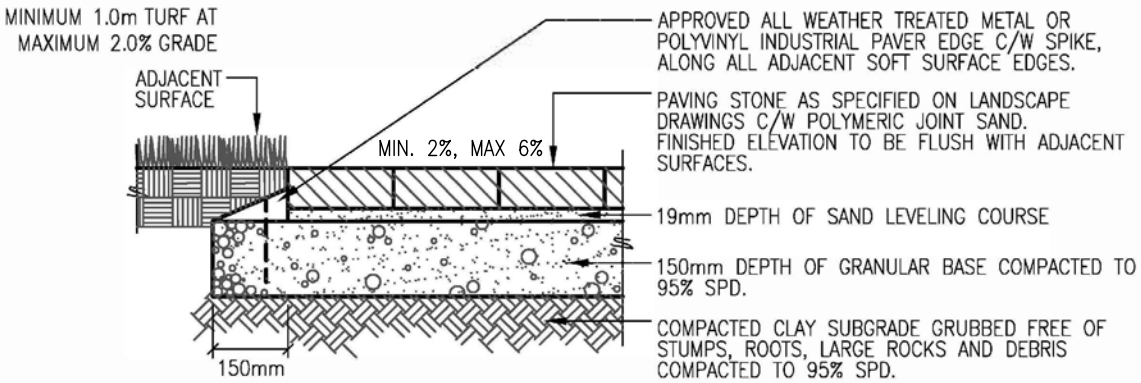
BEAUMONT

CONCRETE WALKWAY OR PLAZA INSTALLATION

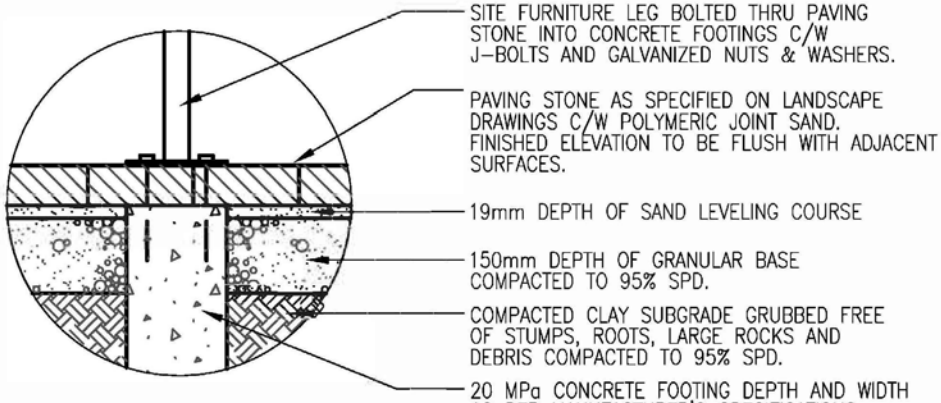
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 4-8



CROSS SECTION



SITE FURNITURE FOOTING WITHIN GRANULAR SURFACE

NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- DIMENSIONS OF PAVING STONE WALKWAY OR PLAZA AS PER LANDSCAPE DRAWINGS.
- SET PAVING STONE SURFACE FLUSH TO ADJACENT GRADES, WHERE PRACTICAL. IF SURROUNDING AREA EXCEEDS 6%, STEEPER BACKSLOPES (UP TO 5:1) OR RETAINING WALLS MAY BE NEEDED TO TIE TO ADJACENT GROUND.
- ENSURE POSITIVE DRAINAGE OF CONCRETE AS PER OVERALL SITE DRAINAGE PLAN.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

BEAUMONT

PAVING STONE WALKWAY OR PLAZA INSTALLATION

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 4-9

600 mm X 750mm
HIGH INTENSITY

600 mm X 750mm
HIGH INTENSITY

NOTES:
- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS		BEAUMONT	
Date	Details	By	NO SKATING/ NO BOATING/ NO SWIMMING SIGNAGE	
			Date: MARCH/2021	DWG. NO. 4–10
			Scale: N.T.S.	

750mm X 900mm
HIGH INTENSITY

750mm X 900mm
HIGH INTENSITY

NOTES:
- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

BEAUMONT

NO SKATING/ NO BOATING/ NO SWIMMING SIGNAGE (LARGER)

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 4-11

BLACK DETAIL

WHITE DETAIL

TO BE PLACED AT ENTRY TO ALL STORM WATER MANAGEMENT FACILITIES

NOTES:
- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

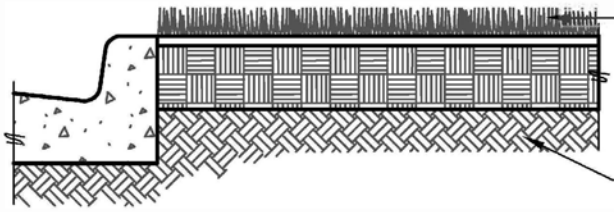
BEAUMONT

NO MOTORIZED VEHICLES SIGNAGE

Date: **MARCH/2021**

Scale: **N.T.S.**

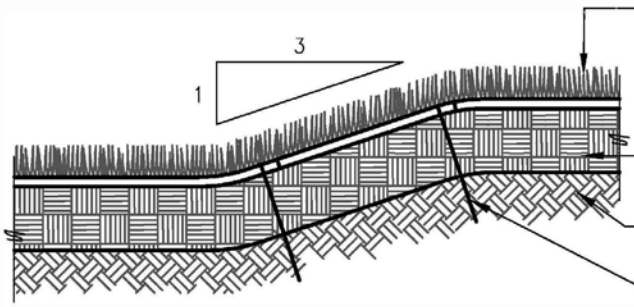
DWG. NO. 4-12



CANADA NO.1 SOD OVER 200mm DEPTH MINIMUM ROLLED AND COMPACTED NATURAL, FERTILE, FRIABLE AGRICULTURAL SOIL. FLUSH WITH ADJACENT SURFACE. ROOT ENHANCING FERTILIZER (11-51-0) TO BE SPREAD ON TOPSOIL PRIOR TO SODDING.

COMPACTED CLAY SUBGRADE GRUBBED FREE OF STUMPS, ROOTS, LARGE ROCKS AND DEBRIS.

CROSS SECTION



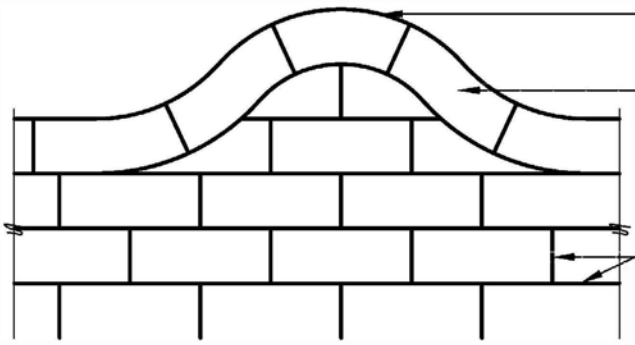
SOD TO BE LAID LENGTHWISE ACROSS FACE OF SLOPE. MAXIMUM SLOPE SODDED 3:1. ROOT ENHANCING FERTILIZER (11-51-0) TO BE SPREAD ON TOPSOIL PRIOR TO SODDING.

200mm DEPTH OF ROLLED AND COMPACTED NATURAL, FERTILE, FRIABLE AGRICULTURAL SOIL.

COMPACTED CLAY SUBGRADE GRUBBED FREE OF STUMPS, ROOTS, LARGE ROCKS AND DEBRIS.

ALL UPHILL ENDS OF SOD TO BE PEGGED WITH TWO 25mm x 25mm x 230mm WOODEN PEGS, DRIVEN IN BELOW LAWN LEVEL. REMOVE PEGS PRIOR TO FAC.

CROSS SECTION THROUGH SLOPE



EDGE OF PLANTING AREA OR WALKWAY.

FULL ROW OF SOD TO BE USED ALONG PERIMETER OF SODDED AREA.

SOD TO BE LAID CLOSELY PACKED TOGETHER. JOINTS IN ADJACENT ROWS SHALL BE STAGGERED. TOPDRESS WITH NATURAL, FERTILE, FRIABLE AGRICULTURAL SOIL TO FILL ALL JOINTS.

PLAN VIEW

NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

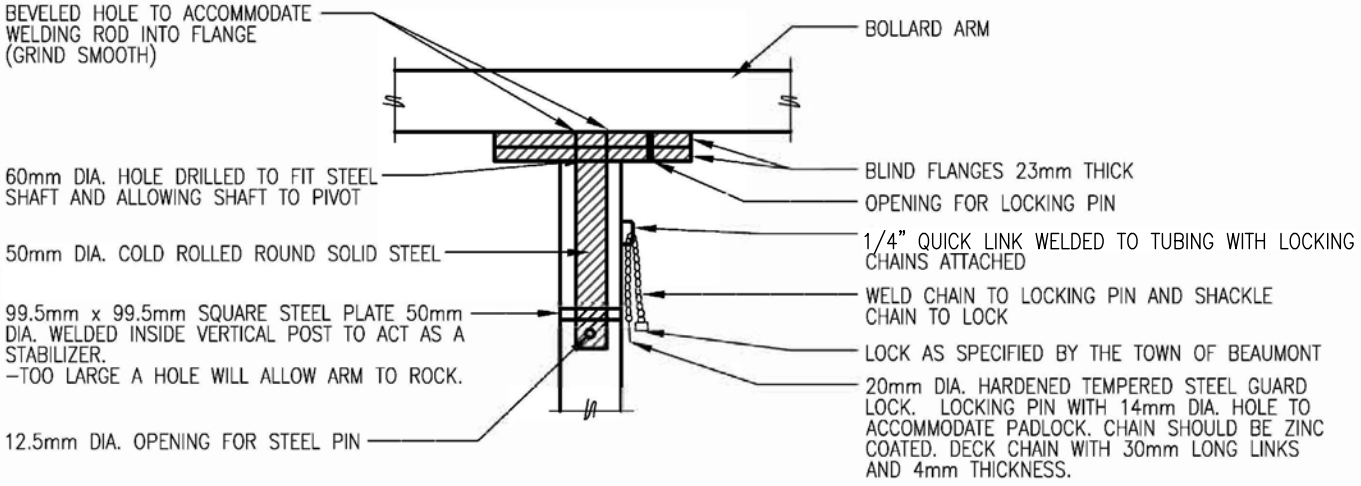
BEAUMONT

SOD INSTALLATION

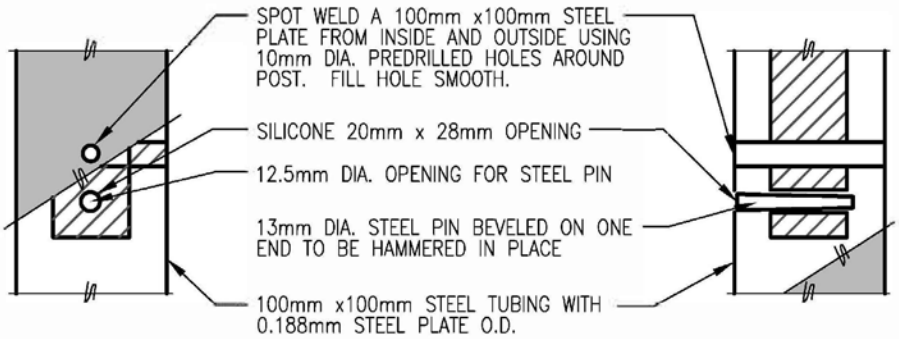
Date: MARCH/2021

Scale: N.T.S.

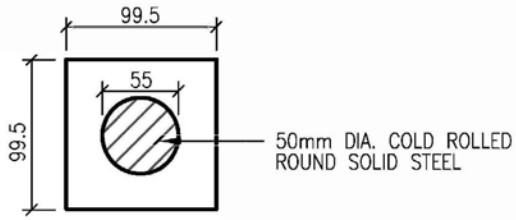
DWG. NO. 4-13



ASSEMBLY DETAIL



SECTION

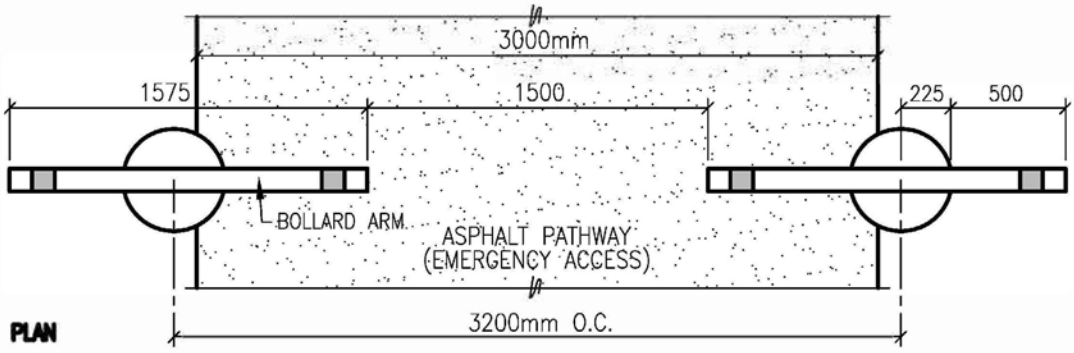


99.5mm x 99.5mm SQUARE STEEL PLATE

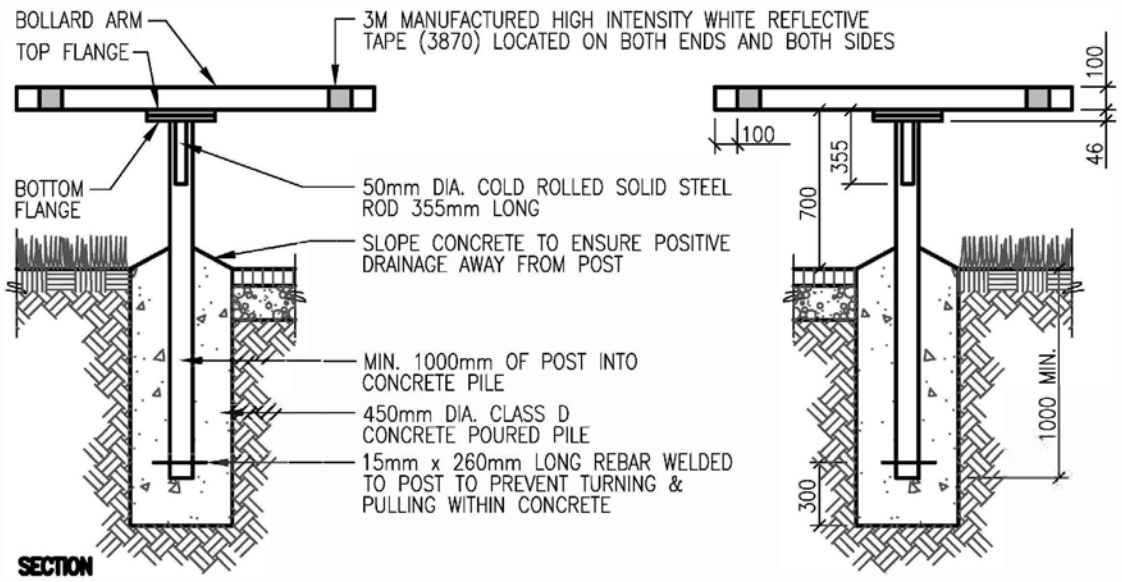
NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP SHALL CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- ALL METAL TO BE GALVANIZED.
- POWDER COATING OPTIONAL. COLOUR TO BE APPROVED BY THE CITY OF BEAUMONT.
- COUNTER WEIGHT TO BE PLACED IN SHORT END TO BALANCE ARM.
- ALL DIMENSIONS ARE IN MILLIMETRES.

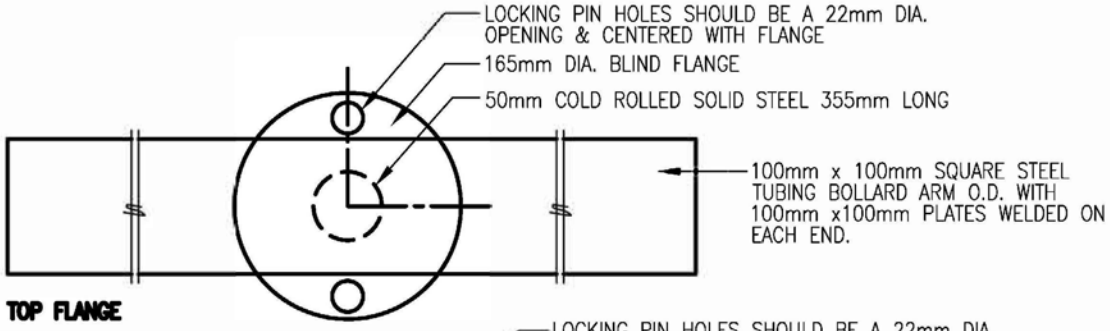
	REVISIONS		BEAUMONT	
Date	Details	By	T–BOLLARD ASSEMBLY	
			Date: MARCH/2021	DWG. NO. 4–14
			Scale: N.T.S.	



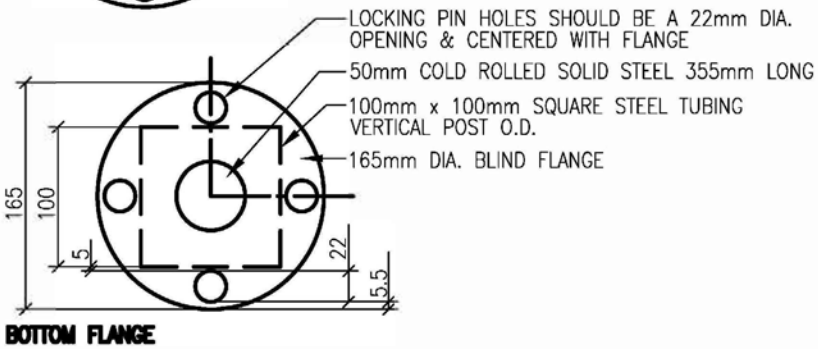
PLAN



SECTION



TOP FLANGE



BOTTOM FLANGE

NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN STANDARDS.
- ALL METAL TO BE GALVANIZED. POWDER
- COATING OPTIONAL. COLOUR TO BE APPROVED BY THE CITY OF BEAUMONT.
- COUNTER WEIGHT TO BE PLACED IN SHORT END TO BALANCE ARM.
- LOCK TO BE INSTALLED AS SOON AS T-BOLLARD HAS BEEN INSTALLED.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

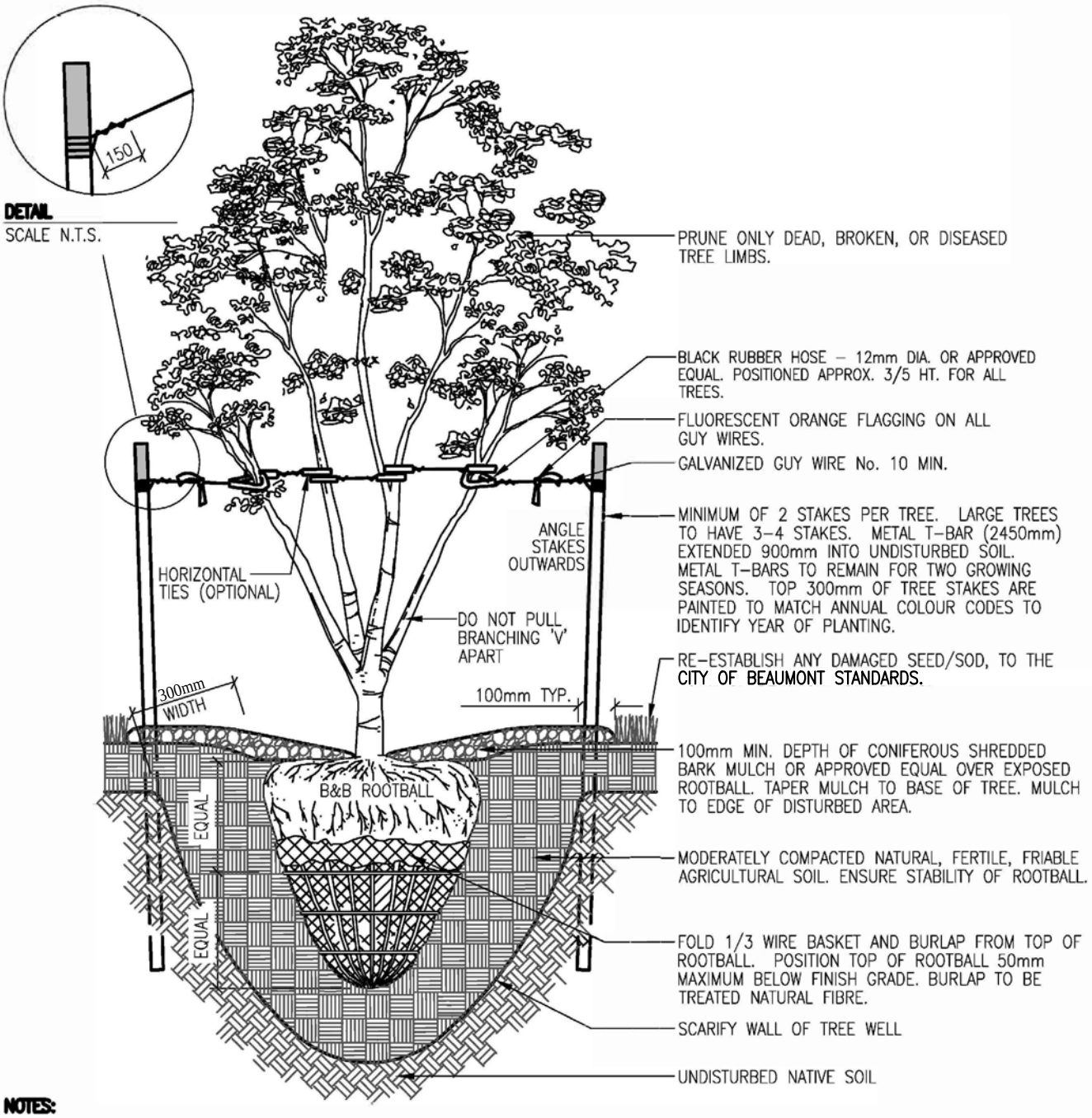
BEAUMONT

T-BOLLARD INSTALLATION

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 4-15



NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN STANDARDS.
- SATURATE SAUCER WITH WATER IMMEDIATELY AFTER PLANTING.
- POSITION TREE STAKES INTO DIRECTION OF PREVAILING WINDS IF MINIMUM UTILITY SETBACKS PERMIT.
- ALL TREE STAKES TO HAVE A MINIMUM 1.0m CLEARANCE FROM ALL U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- ALL ROOTBALL HOLES TO BE DUG BY HAND WHEN CLOSER THAN 1.0m TO U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

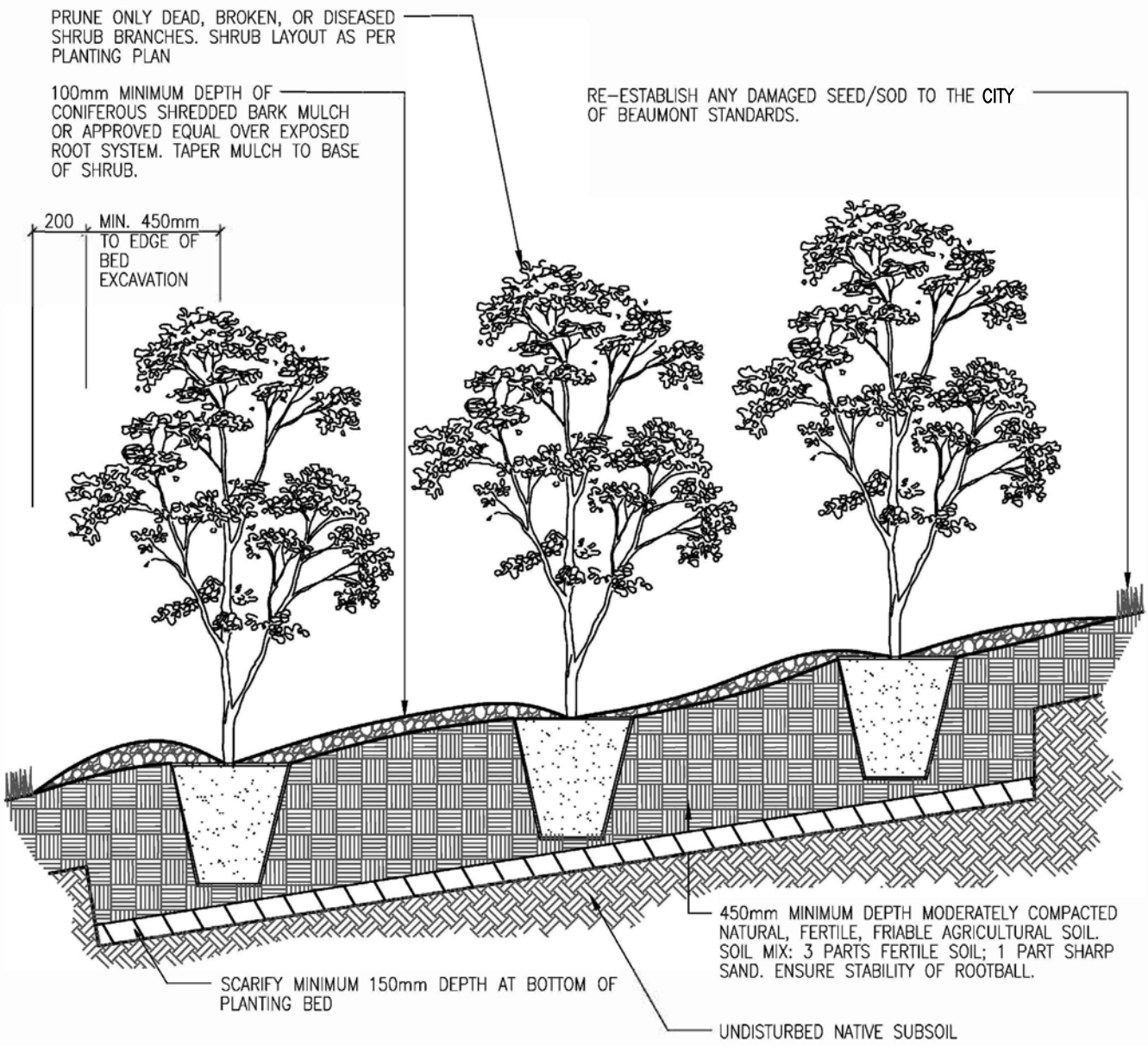
BEAUMONT

TYPICAL MULTI–STEM TREE INSTALLATION

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 4–16



NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- CONTRACTOR TO ALLOW FOR 20% SETTLEMENT WHEN PLACING SHRUB.
- CONTAINER IS TO BE REMOVED CAREFULLY FROM ROOT SYSTEM SO AS NOT TO DISTURB THE PLANT. SHRUB SHALL NOT BE PULLED FROM CONTAINER.
- PLANTING BED EDGERS ARE NOT REQUIRED, BUT MAY BE INCLUDED IF FLUSH TO THE GROUND.
- ALL SHRUB BED HOLES TO BE DUG BY HAND WHEN CLOSER THAN 1.0m TO U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

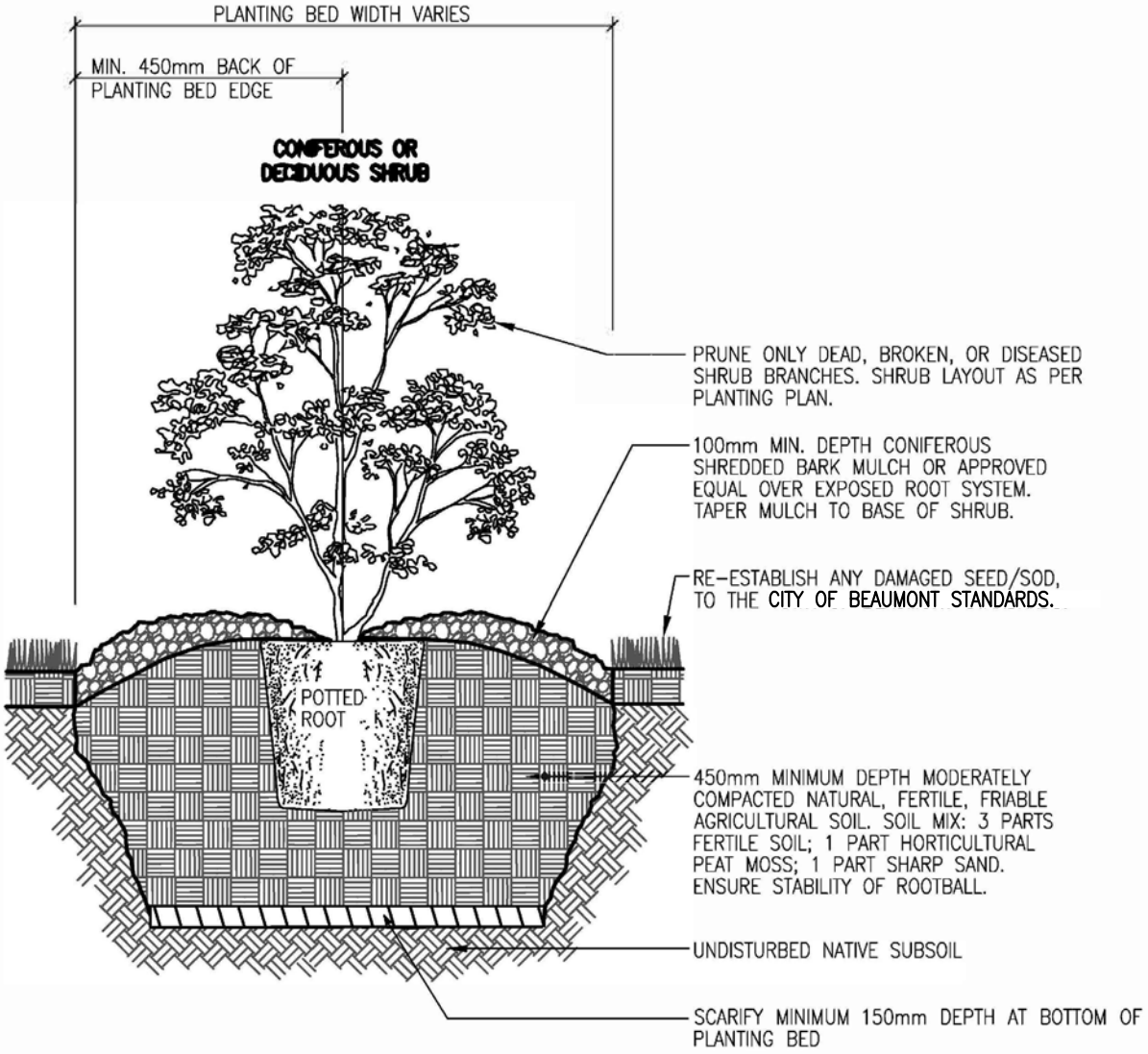
BEAUMONT

TYPICAL PLANTING BED INSTALLATION ON SLOPE

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 4-17



NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- CONTRACTOR TO ALLOW FOR 20% SETTLEMENT WHEN PLACING SHRUB.
- CONTAINER IS TO BE REMOVED CAREFULLY FROM ROOT SYSTEM SO AS NOT TO DISTURB THE PLANT. SHRUB SHALL NOT BE PULLED FROM CONTAINER.
- PLANTING BED EDGERS ARE NOT REQUIRED, BUT MAY BE INCLUDED IF FLUSH TO THE GROUND.
- ALL SHRUB BED HOLES TO BE DUG BY HAND WHEN CLOSER THAN 1.0m TO U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

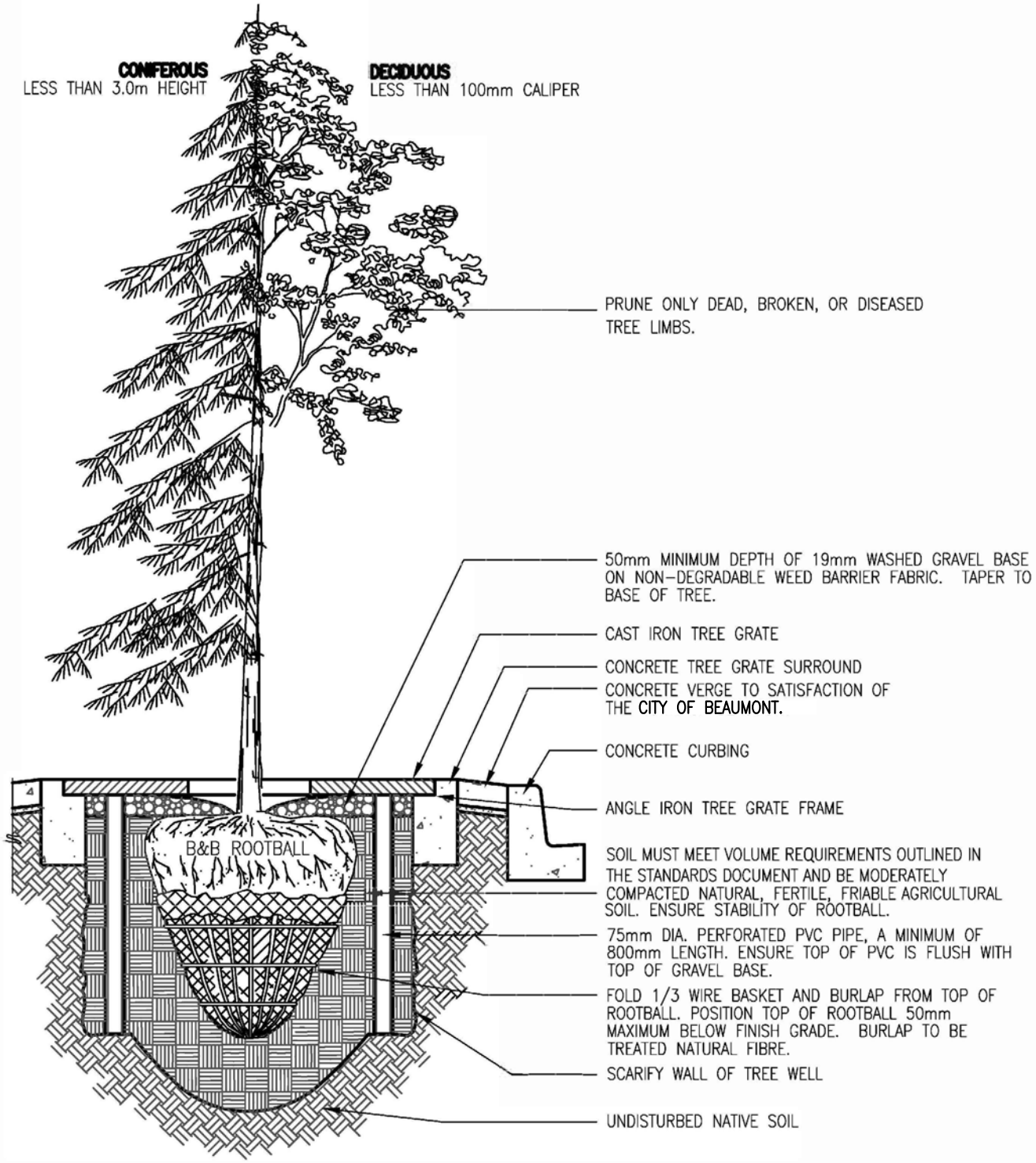
BEAUMONT

TYPICAL PLANTING BED INSTALLATION

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 4-18



NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE **BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.**
- SATURATE SAUCER WITH WATER IMMEDIATELY AFTER PLANTING.
- POSITION TREE STAKES INTO DIRECTION OF PREVAILING WINDS IF MINIMUM UTILITY SETBACKS PERMIT.
- ALL TREE STAKES TO HAVE A MINIMUM 1.0m CLEARANCE FROM ALL U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- ALL ROOTBALL HOLES TO BE DUG BY HAND WHEN CLOSER THAN 1.0m TO U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- **ALL DIMENSIONS ARE IN MILLIMETRES.**

	REVISIONS	
Date	Details	By

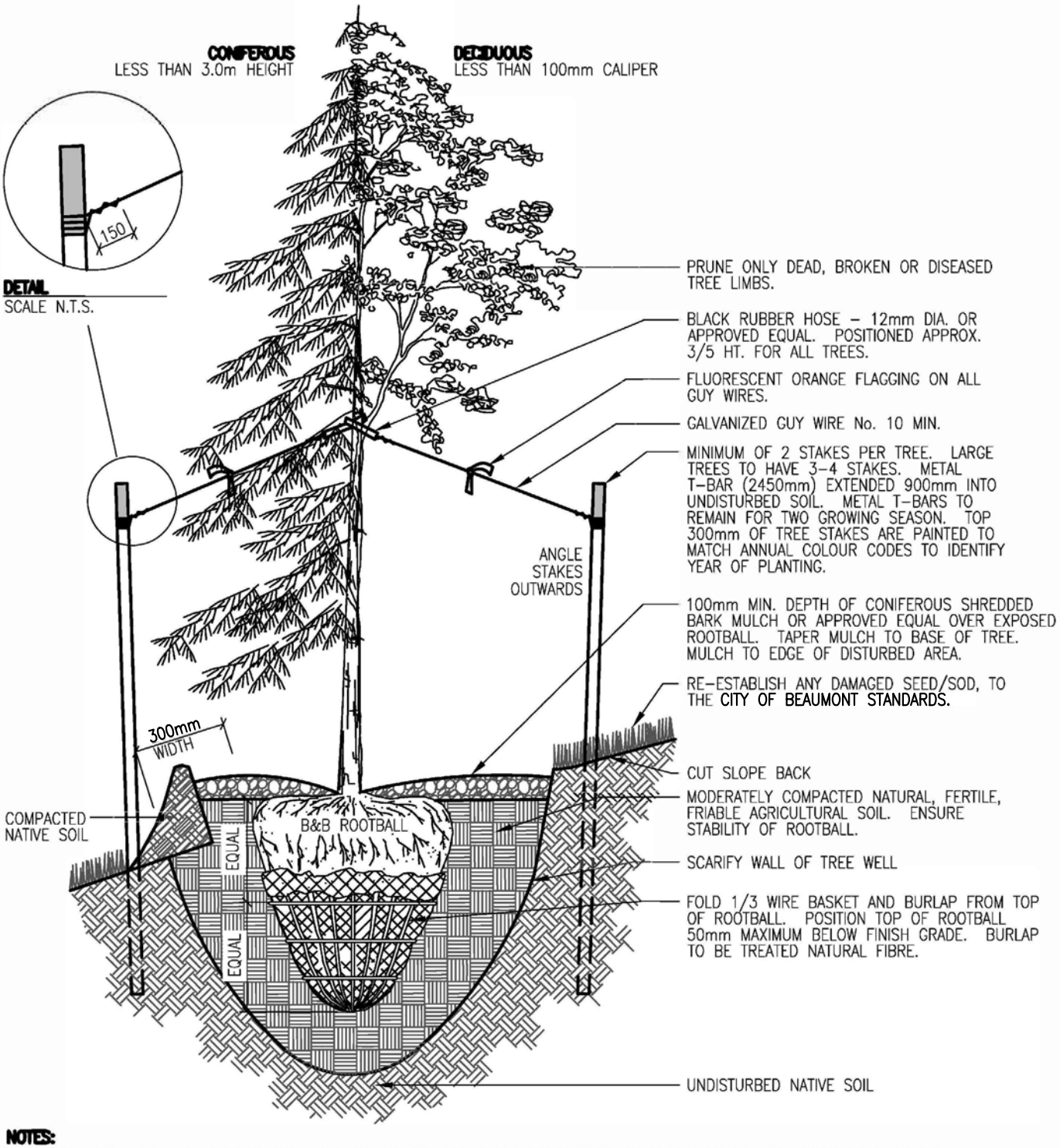
BEAUMONT

TYPICAL TREE GRATE PLANTING

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 4-19



NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- SATURATE SAUCER WITH WATER IMMEDIATELY AFTER PLANTING.
- POSITION TREE STAKES INTO DIRECTION OF PREVAILING WINDS IF MINIMUM UTILITY SETBACKS PERMIT.
- ALL TREE STAKES TO HAVE A MINIMUM 1.0m CLEARANCE FROM ALL U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- ALL ROOTBALL HOLES TO BE DUG BY HAND WHEN CLOSER THAN 1.0m TO U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- ALL DIMENSIONS ARE IN MILLIMETRES.

	REVISIONS	
Date	Details	By

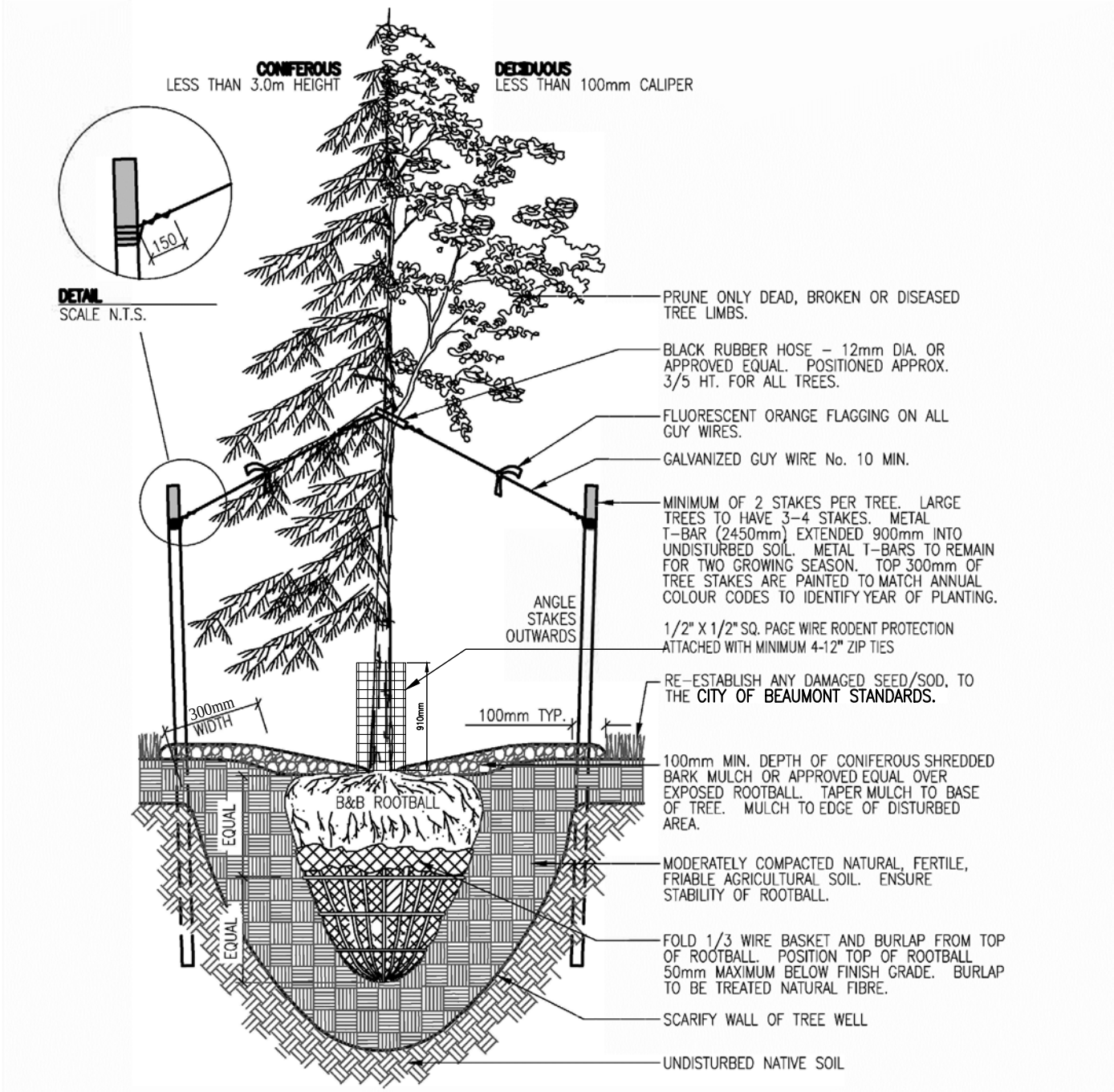
BEAUMONT

TYPICAL TREE INSTALLATION ON SLOPE

Date: MARCH/2021

Scale: N.T.S.

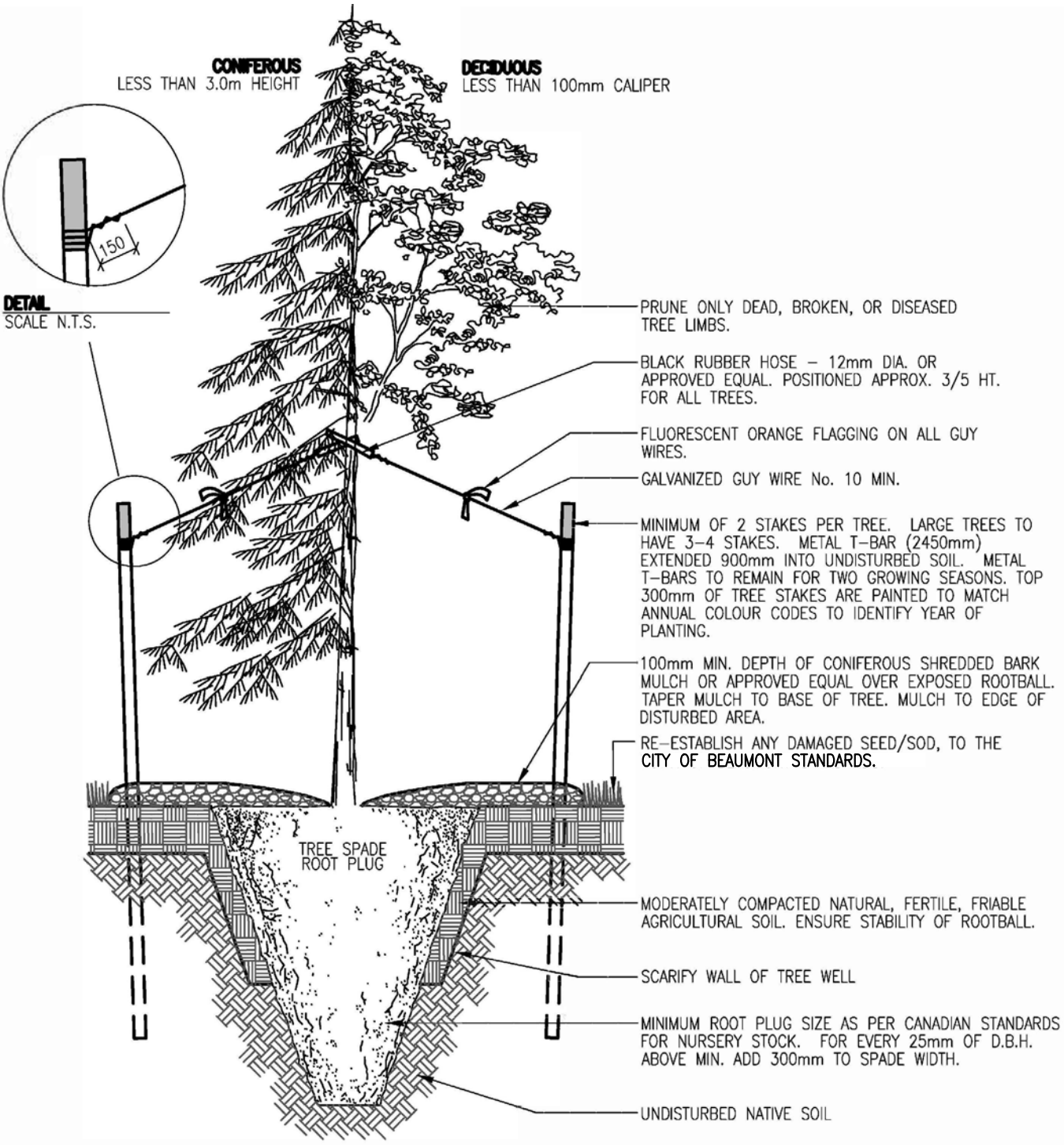
DWG. NO. 4-20



NOTES:

- SPECIFICATIONS: ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE **BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.**
- SATURATE SAUCER WITH WATER IMMEDIATELY AFTER PLANTING.
- POSITION TREE STAKES INTO DIRECTION OF PREVAILING WINDS IF MINIMUM UTILITY SETBACKS PERMIT.
- ALL TREE STAKES TO HAVE A MINIMUM 1.0m CLEARANCE FROM ALL U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- ALL ROOTBALL HOLES TO BE DUG BY HAND WHEN CLOSER THAN 1.0m TO U/G POWER, TELEPHONE AND GAS ALIGNMENTS.
- **ALL DIMENSIONS ARE IN MILLIMETRES.**

	REVISIONS		BEAUMONT	
Date	Details	By	TYPICAL TREE INSTALLATION	
			Date: **MARCH/2021**	DWG. NO. 4–21
			Scale: **N.T.S.**	



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	REVISIONS	
Date	Details	By

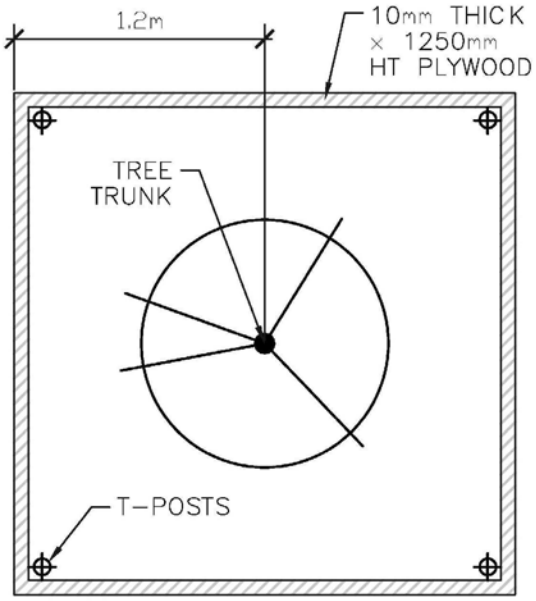
BEAUMONT

TYPICAL TREE TRANSPLANTED

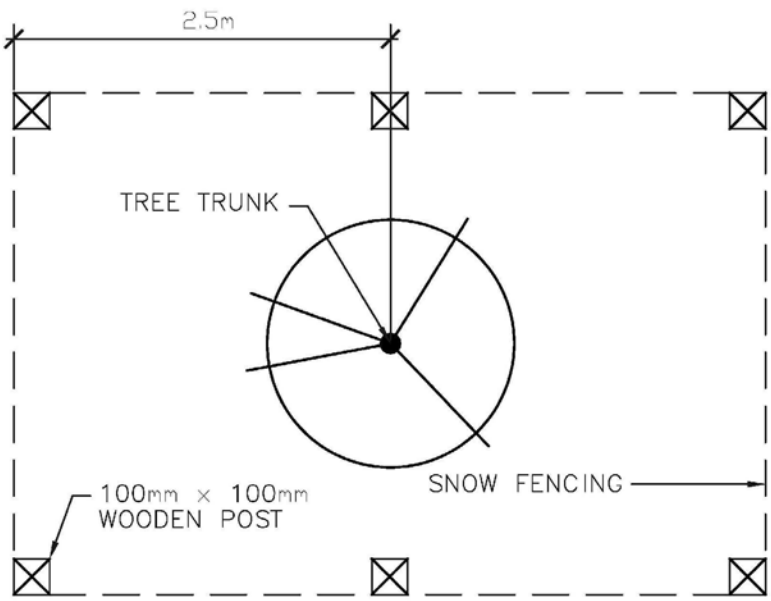
Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 4–22



DETAIL A - TREES WITHIN 1 - 3m OF ACTIVE CONSTRUCTION



DETAIL B – TREES WITHIN 3–5m OF ACTIVE CONSTRUCTION

NOTES:

ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.

DETAIL A – TREES WITHIN 1–3m OF ACTIVE CONSTRUCTION REQUIRE:
- 10mm PLYWOOD AND 1.25m HEIGHT ENCLOSURE SEPARATING TREE FROM THE PROJECT SITE.
- PLYWOOD TO BE SECURELY FASTENED TO T–POSTS WITH WIRE.

DETAIL B – TREES WITHIN 3–5m OF ACTIVE CONSTRUCTION REQUIRE:
- A STANDARD "SAFETY ORANGE" SNOW FENCE TO BE PLACED A MINIMUM OF 2.5m FROM THE PROJECT SITE.
- EXACT SHAPE AND SIZE TO BE DETERMINED ON SITE.

Amended - 2025
Refer to Amendment #2
Number 7.3

EXCAVATION WITHIN 2m OF EXISTING TREES REQUIRES:
- TREE TO BE TRNASPLANTED IF FEASIBLE.
- IF TRANSPLANTED TREE IS NOT FEASIBLE, TREE IS TO BE REMOVED AND THE VALUE OF THE TREE ASSESSED BY THE MUNICIPALITY.
- THE DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR THE ASSESSED VALUE.

EXCAVATION BEYOND 2m OF EXISTING TREES REQUIRES:
- PRIOR TO DIGGING, ALL TREE ROOTS TO BE SEVERED WITH A "ROOT CUTTER" TO A DEPTH OF 350mm TO 500mm
- IMMEDIATELY AFTER EXCAVATION, PRUNE ALL EXPOSED ROOTS FLUSH WITH THE EXCAVATION WALL.

INSTALL AND MAINTAIN TREE PROTECTION THROUGHOUT THE CONSTRUCTION PROCESS IN A CLEAN AND SAFE CONDITION.

ALL EQUIPMENT, SOIL, BUILDING MATERIALS, AND OTHER DEBRIS SHALL BE KEPT OUTSIDE THE HOARDING.

IN THE EVENT THE TREE PROTECTION IS PUNCTURED AND DAMAGE OCCURS TO THE TREE(S) WITHIN THE TREE PROTECTION, THE PROTECT MANAGER IS TO BE ADVISED IMMEDIATELY IN ORDER THAT THE DAMAGE BE ASSESSED BY THE BEAUMONT INSPECTOR AND CORRECTIVE ACTION TAKEN.

ON MANY CONSTRUCITON PROJECTS, STANDARD "SAFETY ORANGE" SNOW FENCING IS ALL THAT MAY BE REQUIRED. THIS WILL SERVE AS A "HEADS UP" WARNING TO WORKERS OR EQUIPMENT OPERATORS THAT AN ACTIVITY BEYOND THE FENCE MAY CAUSE TREE DAMAGE.

	REVISIONS	
Date	Details	By

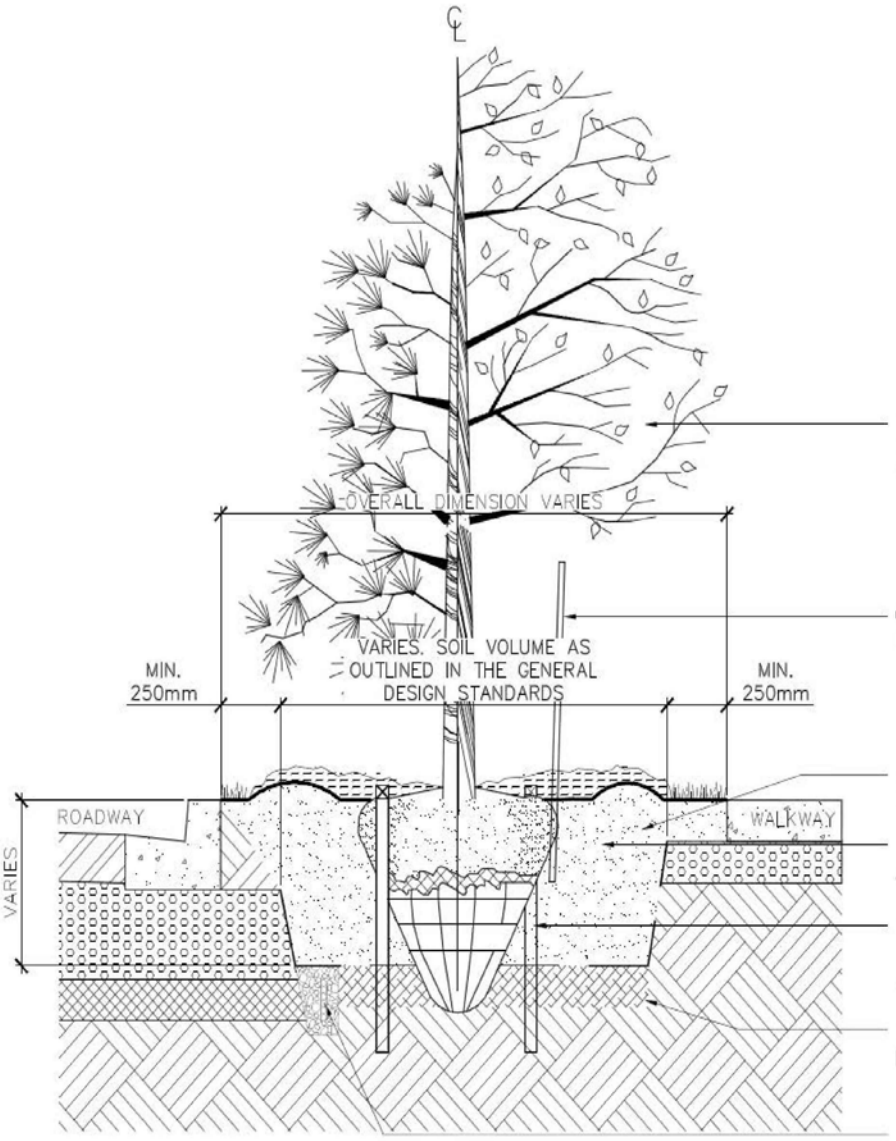
BEAUMONT

TREE PROTECTION ZONE

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 4–23



TREE PLANTING AND MULCH RING PER THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS AND STANDARD DETAIL 4–21.

ONE (1) TREE STAKE PAINTED AS REQUIRED FOR FUTURE IDENTIFICATION PURPOSES.

SOIL MIX PER SPECIFICATIONS. TO BE PLACED AND COMPACTED IN 200mm DEPTH LIFTS.

MODERATELY COMPACTED NATURAL, FERTILE, FRIABLE AGRICULTURAL SOIL TO MEET OR EXCEED SOIL VOLUME REQUIREMENTS. ENSURE STABILITY OF ROOTBALL.

38mm x 38mm (2" x 2") WOODEN FRAME TO BE ANCHORED INTO SUBGRADE AND ROOTBALL TO PREVENT MOVEMENT AND ELIMINATE THE NEED FOR ABOVE GROUND STAKING.

RIP BOTTOM OF TRENCH TO 150mm DEPTH. REMOVE EXCESS SUBGRADE FROM SITE AS REQUIRED.

OPTIONAL SUBDRAIN PIPE ENCOURAGED AND WILL BE REVIEWED BY BEAUMONT ON A PROJECT BY PROJECT BASIS.

NOTES:

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	REVISIONS	
Date	Details	By

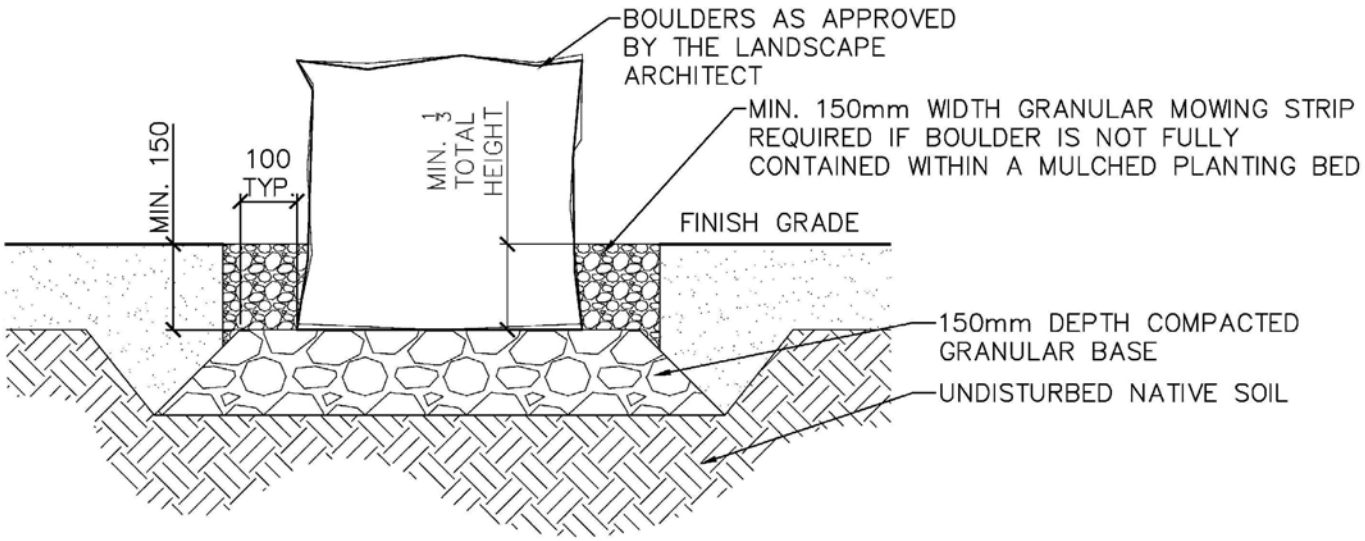
BEAUMONT

TYPICAL TREE TRENCH

Date: MARCH/2021

Scale: N.T.S.

DWG. NO. 4–24



NOTES:

- ALL COMPONENTS AND WORKMANSHIP TO CONFORM TO THE BEAUMONT GENERAL DESIGN AND CONSTRUCTION STANDARDS.
- IF BOULDERS ARE BEING PLACED IN AN AREA TO BE FINAL GRADED WITH GROWING MEDIUM, ENSURE THAT BOUDERS ARE IN PLACE PRIOR TO PLACEMENT OF GROWING MEDIUM.
- ENSURE BOULDERS ARE COMPLETELY SETTLED AND STABLE. BURY TO MINIMUM 1/3 TOTAL HEIGHT.

	REVISIONS	
Date	Details	By

BEAUMONT

BOULDER INSTALLATION

Date: **MARCH/2021**

Scale: **N.T.S.**

DWG. NO. 4-25

SECTION 6.0
LIFT STATIONS

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6.1 GENERAL

Gravity systems should be pursued whenever possible. Lift stations shall be permissible when gravity system challenges prevent an effective solution due to physical or economical limitations.

6.2 SUBMISSIONS

The detailed design submission shall consist of drawings, specifications and supporting documents, and should be preceded by the submittal of a design report, which would include the following sections:

a. General – Service Area Justification

b. Location

c. Access

d. Configuration

e. Design flows

f. Pumps

g. Wet well capacity

h. Staging

i. Force main analysis

j. Structural and Building Design

k. HVAC Design, including odour control

l. Power Supply and Electrical

m. Controls, SCADA and Alarms

n. Emergency Response Plan

o. Maintenance Requirements

Developer shall work with the City of Beaumont to identify and incorporate any site specific requirements that may exist.

6.3 LIFT STATION STANDARDS

6.3.1 Location and Access

1. All new lift stations shall be located on a separate Public Utility Lot (PUL) with appropriate land-use designation and must have a legal and physical address. The final legal plans must be

submitted to the City.

2. Special consideration should be given to the location of lift stations relative to existing or proposed adjacent development, in order to minimize the facilities aesthetic impact in terms of visibility, odour and noise. The location of pump stations in the immediate proximity of school sites and playgrounds should be avoided if possible. Safety and security measures are to be given special consideration in such cases.
3. Direct access to power and roadways shall be provided with a suitable loading area, parking and turning movements for the typical design vehicle and general function of the station.
4. The lift station shall be situated at a functional location for the drainage system to limit excess piping and force main length.
5. Lift stations are to be located outside the limits of any area subject to surface ponding or inundation by surface flow during major run off events so that they are accessible in all weather conditions. The location of the lift station shall be protected from flooding with the surface elevation 500mm above the 1:100 year flood event.

6.3.2 Configuration

1. Two types of lift stations shall be permissible:
    a. Wet well and dry well
        i. Lift stations should preferably be built with a wet well and dry well configuration, where pumps are installed in a dry well with pump suction from the wet well
    b. Wet well only
        i. Wet well only configurations are allowable for smaller stations with pump sizes less than 75kW, and depth less than 8.0m

6.3.3 Design Flows

1. Pumping system shall be designed to exceed the peak design flow determined for sanitary systems, and shall be designed to meet the allowable release requirements determined for storm water systems
2. Design flows shall be calculated in accordance with City of

Beaumont design standards

6.3.4 Pumps

1. Redundancy – Lift station shall have a minimum of two pumps, where one pump is capable of handling the peak flow requirements. When two pumps are used, pumps shall be identical and interchangeable. When three pumps are used, peak flow requirements can be satisfied by the two smallest pumps operating in parallel.
2. Pumps shall be able to alternate usage automatically. Impellers shall be non-clogging, capable of passing 75mm solids.
3. All pumps must be able to be serviced locally, with regional access to spare parts.
4. Each pump shall have a dedicated inlet pipe

6.3.5 Piping and Valves

1. All pipe within lift station shall be stainless steel or epoxy coated steel. Pressure pipes shall have a minimum pressure rating of 900kPa.
2. All brackets, hangars and supports shall be non corrosive. Nuts and bolts shall be stainless steel.
3. All equipment shall have adequate spacing and clearances for access and maintenance or replacement.
4. Check valves are required on each pump discharge line, prior to an isolation valve. Isolation valves are required on the discharge line after the check valve, and on the suction side. Air release valves are required at the high points of the discharge system. Drain valves are required at the low points of the discharge system, and must drain back to the wet well.

6.3.6 Well Structure

1. Wet well sizing shall be designed with the operation of the pumps considered such that pump run times do not exceed 1 hour per cycle.
2. Inlet piping shall be designed to prevent surcharge upstream, and to minimize turbulence to mitigate air entrainment and odour.

3. Dry well structures shall be accessible for maintenance in accordance with Occupational Health and Safety Standards.
4. Design shall account for potential buoyancy issues.

6.3.7 Staging

1. Design of systems where interim and ultimate staging requirements for development are required shall be designed to ultimate structure size with interim functional elements to facilitate effective use during interim periods whenever possible. Lift stations with staging requirements shall allow for equipment upgrades to be completed without disruption to ongoing flow requirements.
2. All stage plans shall be provided in the Design Report for review. All stages of the system must be designed in detail prior to the initial stage approval.

6.3.8 Superstructures

1. All wet well/dry well configuration lift stations as well as all sanitary lift stations shall require a superstructure. Equipment sizing for operational requirements may also dictate superstructure need.
2. When superstructures are required, architectural requirements shall meet relevant land use by-laws and be reviewed with the City of Beaumont to comply with additional surrounding aesthetic needs.
3. Superstructures shall include a wash station for facility cleaning and appropriate storage for supplies such as tools, spare parts, or safety equipment.
4. Lift stations shall be secure facilities. Building/hatch door locks shall be as indicated by the City of Beaumont. Superstructures shall be secured with a building entry alarm system compatible with the City of Beaumont needs. No external controls should be accessible, unless a security chain link fence is provided. All below grade lift stations shall have fencing to provide additional security.
5. All lift stations must have provisions for pump removal. When a superstructure is provided, overhead girder mounted cranes are to be included in the facility design for pump removal. Smaller stations can be accommodated through use of an appropriately rated davit system for pump removal.

6.3.9 HVAC

1. Mechanical systems shall be designed to provide proper ventilation, heating and odour control. Ventilation shall be continuous to prevent build up of moisture and gases. Heating of the lift station spaces shall be required to prevent freezing of any functional areas. All lift station mechanical systems shall comply with AEPW astewaterSystems Standard and Guidelines.

6.3.10 Electrical

1. Backup power shall be provided for all stations capable of supporting the entire bad for the building. Diesel generators are required unless exemption is granted from the City of Beaumont. Diesel fuel shall be stored in an appropriately sized double walled tank, sufficient for 24 hours of operation. Automatic bad transfer switch shall be provided to automatically transfer station bads to standby power generator in the event of utility power failure.
2. A hazardous area classification shall be completed and all building electrical work shall be completed in accordance with the Canadian Electrical Code. Electrical equipment such as pumps and motors shall be able to be locked out for maintenance.
3. TVSS unit, digital power meter, and UPS system will be required unless exemption is granted from the City of Beaumont.

6.3.11 Controls and Alarms

1. Pumps shall be controlled for continuous, unattended operation and to cycle through duty/assist/standby operations. Each pump cycle will be controlled by sensors for start/stop requirements. Level sensors shall be hydrostatic level and radar, with a high and low level float backup. Flow and pressure monitoring is also required. A detailed control philosophy is to be submitted for review by the City for approval.
2. SCADA for lift stations shall have sensors and measurement devices connected to a PLC that communicate through internet to the City's system. A local touch screen operator interface (HMI) shall be provided for local monitoring and set point entry. All SCADA systems shall be developed in consultation with the City to ensure site specific requirements are met. Backup radio/cell

systems shall be required, unless exemption is granted from the City of Beaumont. Minimum alarms for lift stations include wet well high level, wet well low level, pump failure, ventilation failure, building/cabinet low temperature, intrusion. Wet well level sensors shall include dual sensor systems as backup in case of primary failure.

6.3.12 Emergency Response Plan

1. An Emergency Response Plan will be required with features included in the design where required.
2. In the event of a mechanical or electrical failure, redundancy of pumps and backup power will be the primary response, with alarm notification of failures sent to operators through the communications system. Further levels of emergency response shall be reviewed for implementation such as a gravity overflow to a suitable pipe system that does not impact backup to the upstream system. Portable pumping and piping requirements to a suitable downstream system should be identified. Site plan design shall identify overflow of the station during complete failure of all levels of emergency backup that minimizes impact to the environment.
3. Site access to the station for maintenance and emergency vehicles shall be provided.
4. Design shall limit the operational need to enter into the wet well, however fall arrest system design shall be incorporated throughout the lift station system.

6.3.13 Operations and Maintenance

1. Design of lift stations should provide for functional and safe operations and maintenance activities.
2. The design for lift stations should include the preparation of an Operation and Maintenance Manual for the facility.

6.3.14 Forcemains

1. Forcemains shall be HDPE or non water pressure rated PVC, capable of handling the pumping system forces. Surge analysis calculations are to be used in developing the forcemain system to confirm issues related to water hammer or transient pressures

are mitigated. The level of detail for the surge analysis is relative to the risks identified in the Design Report.

2. The minimum allowable velocity is 0.9m/s and the maximum allowable velocity is 3.5m/s. The preferred velocity of flows in the system is between 0.9m/s and 2.0m/s
3. Force mains shall have air release valves located at the high points of the system, and drain valves located at the low points. Valves must be placed in concrete manhole chambers and in accessible locations for maintenance. Force mains shall not be installed flat to avoid ponding when not in use. Minimum cover shall be provided as per applicable sewer design standards.