

Calgary



**2022 Standard Specifications
Erosion and Sediment Control**

UTILITY AND PIPELINE LOCATION NUMBERS

Prior to commencement of any work, the contractor is responsible for contacting the appropriate authorities to locate existing underground utilities and pipelines in or adjacent to the construction work site. The utility or pipeline agencies must be contacted a minimum of 2 working days in advance prior to commencement of work.

UTILITY LOCATES:

ALBERTA ONE-CALL FIELD LOCATION SERVICE CALLS

Phone 1-800-242-3447, Web: albertaonecall.com

To follow up on existing locate requests in **Calgary:** [403-245-7252](tel:403-245-7252)

Alberta One-Call covers utilities owned by:

Utility	Utility Locates	Emergencies
ATCO	1-800-242-3447	403-245-7222
ENMAX	1-800-242-3447	403-514-6100
TELUS	1-800-242-3447	403-310-3344 option 211
City of Calgary Water Resources	1-800-242-3447	311

OTHER UTILITIES (NOT PART OF THE ALBERTA ONE-CALL SERVICE):

Shaw (cable television): 1-866-DIGSHAW (1-866-344-7429) (Utility Locates and Emergency Calls)

EMERGENCY SERVICE

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

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

Failure to report a damaged buried or aboveground utility, even if it has not been severed, can lead to it failing at some time in the future with catastrophic results.

EROSION AND SEDIMENT CONTROL CONTACT INFORMATION

CONTACTING THE CITY OF CALGARY:

General ESC Questions: 311

Drainage Permits: Contact 311 or visit calgary.ca/StmPP.

Key phrases to ensure that you are promptly connected with the ESC staff are:

- Erosion and Sediment Control
- Erosion and Sediment Control Inspection
- Erosion and Sediment Control Approval
- Drainage Permit
- Drainage Permit Self-Assessment

EMERGENCIES:

Immediate response required from Police, Fire and/or Emergency Medical Services: **9-1-1**

RELEASE REPORTING:

Reports of releases (including sediment) must be made to:

- 311 (The City of Calgary);
- 1-800-222-6514 (Alberta Environment and Parks) 24-hour release reporting line; and

IMPORTANT NOTICE

The following is a Summary of revisions to the Standard Specifications – Erosion and Sediment Control.

Revisions for 2022 are noted in bold italics within the body of this document.

Section:

Overarching – <i>Stormwater Bylaw</i>	Update <i>Drainage Bylaw</i> to new name of <i>Stormwater Bylaw</i> .
Overarching – stormwater	Updated storm drainage verbiage to read stormwater to align with Bylaw update.
Acronyms	Add Can-CISEC and CESSWI
200	Add controls to what customers may use. Add relevant MSDS and CAS information. Update web page.
300	Clarify for review and approval.
100.1	Delete Water Resources.
100.2	Add and for clarity purposes. Add the requirement to supply City of Calgary SR number.
100.3.1	Clarification on requirement to comply. Expand on requirement to comply to clarify that an amendment is required if owner changes.
100.3.2	Clarify only relevant sections of Specifications apply to small sites.
100.3.3	Add web page information to align with new digital application option.
100.4	Delete information about contractors and other impacted site being aware of controls and practices. Add identification of run-off areas and controls and practices related to as well as run-off to adjacent properties requiring authorization from neighbors to align with application requirements.
100.5	Add that the qualified designer must have a validation in good standing. Clarification that the P.Eng, P.L.Eng, and P.Ag. must be APEGA/Alberta certified.
100.6	Clarification that professional justification is an option for RUSLE. Clarify when 2 tonnes/ha/yr should be followed. Add soil tolerance of 4 tonnes/ha/yr under certain circumstance.
100.7	Update ESC Inspector title. Update web page and contact information.
100.9.1	Expand on deep and shallow underground utility installation.
100.10	Update titles. Expand to include dewatering activities.
100.11	Delete requirement for winterization plans, moved into Specifications for standard controls.

	Revise winter dates to match development agreements.
100.12	Revise pre-construction meeting requirements to include written permission from Environmental Compliance Specialist prior to the commencement of work and removed controls having to be in place prior to contact.
100.13	Add inspection requirements on what must be collected during and inspection. Add winter inspection frequency. Add information on when inspections may cease, including requirement for written permission.
100.14	Add typical designations for qualified inspectors.
100.15	Update title for clarification. Remove 2 tonnes/ha/yr and reference 100.6 RUSLE-FAC. Add amendment required when change of ownership.
100.16	Clarify order of preference.
100.18.1	Updates to idle site management that accounts for site size. Water Management Plans added and defined.
100.18.2	Large Site Safety Plans added and defined. Clarification is provided on what must be included in a Large Site Safety Plan.
100.19	Clarification on what constitutes a stockpile. Add requirement for stockpiles to comply with Calgary Parks Development Guidelines and Standard Specifications: Landscape Construction. Add requirement measures for nesting birds. Added topsoil management for biodiversity.
100.20.1	Expand on how mud tracking may be managed.
100.20.2	Add construction staging area requirements.
100.20.3	Add travel corridor requirements.
100.22	Add information on prohibited substances and how to prevent releases.
100.23	Updated title for clarification that the section covers responsibilities. Add responsibilities of property owner. Clarify responsibilities of developer. Add responsibilities of homebuilder. Add example drawing of lot level controls.
100.24	Clarify how long a landowner must follow the ESC Plan.
100.26	Clarification on what the good housekeeping practices cover. Updated good housekeeping practices to align with updated in the rest of the Specifications. Clarify that section 200 of the Specifications must be followed for good housekeeping.
200.1.1.3	Subsoil testing and amendments, if required, for seeding Winter operations added for seeding.

200.1.2.2	Expand to cover interim and permanent use of sod. Add staking requirements for sod being installed on slopes 33% or greater.
200.1.2.3	Winter operations added for sod. Fertilizer only if testing shows it is required
200.1.2.a	Add specification for existing cover.
200.1.3.2	Add percent slope limit without ASTM testing for RECP's.
200.1.3.3	Clarify TRM installation for channels. Add winter operations for RECP's.
200.1.4.2	Add that mulch and tackifiers re not recommended for channels and areas of concentrated flow.
200.1.4.3	Add that hydromulch must be applied above freezing. Add winter operations for hydromulch and tackifier.
200.1.5.3	Add winter operations for compost blankets.
200.1.6	Clarify K-value adjustment relates to surface stone visible when looking down.
200.1.6.2	Clarify aggregate can cause health and safety concerns.
200.1.6.3	Add steeper slopes my require surface texturing to prevent aggregate from sliding. Add winter operations for aggregate cover.
200.2.1.3	Add winter operations for wattles/logs/barriers.
200.2.1.a	Add specification for buffer strips.
200.2.2.1	Delete sediment traps.
200.2.2.2	Add requirement for auxiliary spillway when ponds 250m ³ or greater. Clarify that skimmers require a drainage authorization and non-standard specification information. Addition of information on designed sediment containment systems.
200.2.2.2.1	Clarify that cross-check structures must be shown on drawings.
200.2.2.3	Add winter operations for sediment containment systems.
200.2.3.2	Clarify that no erosion is to occur in the channel. Update drawing detail reference. Clarify cross check structures are installed 100mm below the top of channel. Revise side slopes from 2H:1V to 3H:1V.
200.2.3.3	Add winter operations for diversion channels.
200.2.4.2	Clarify that berms greater than 1 meter require non-standard specification information.
200.2.4.3	Add winter operations for diversion berms.
200.2.5.1	Clarify that texturing is temporary. Expand to confirm the presence of shallow utilities. Clarify examples when surface texturing is not suitable.
200.2.5.2	Revise minimum depth of contours and revise spacing between troughs.
200.2.5.3	Expand to include the depth of the track imprint.

	Expand to include dimensions of tamping equipment imprints. Add winter operations for surface texturing.
200.2.6.2	Expand to clarify meters of silt fence required to serve an area. Clarify that silt fence configuration must be shown on the drawing. Expand on j-hook installation.
200.2.6.3	Add winter operations for silt fence.
200.3.1.1	Expand what types of construction entrances and exits can be used and clarify need for non-standard specification information.
200.3.1.2	Clarify construction access be inside construction boundary, authorization required to cross sidewalks. Updates rock type and size and width of access. Clarify what rock must not contain.
200.3.1.3	Update rock size. Add winter operation for gravel access.
200.3.2.1	Revise winter dates to match development agreements. Expand to include gravel size.
200.3.2.2	Clarify where geotextile fabric may not be installed in regard to inlets. Revise winter dates to match development agreements.
200.3.2.3	Revise ponding height and installation parameters for block and gravel inlet. Update depth for silt fence barrier stakes and installation parameters for silt fence. Add winter operations for storm inlet controls.

Drawings:

Sheet 1	Update sod drawing
Sheet 1b	Add sod channel installation
Sheet 2	Updated rolled erosion control products slope installation
Sheet 3	Update rolled erosion control products channel installation
Sheet 4	Update sediment containment systems - pond
Sheet 5	Update sediment containment systems - ditch
Sheet 6	Update diversion channel
Sheet 7	Update diversion berm
Sheet 8	Update surface tracking
Sheet 9	Update contour furrowing
Sheet 14	Update stabilized gravel access
Sheet 15	Update block and stone sediment filter
Sheet 16	Update silt fence barrier

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Commonly Used Acronyms and Abbreviations:

AEP	Alberta Environment and Parks
ASTM	American Society for Testing and Materials International
CAN-CISEC	<i>Canadian Certified Inspector of Sediment and Erosion Control</i>
CAS	Chemical Abstracts Service
CCME	Canadian Council of Ministers of the Environment
CESSWI	<i>Certified Erosion, Sediment & Stormwater Inspector</i>
cm ²	square centimetre
CPESC	Certified Professional in Erosion and Sediment Control
ESC	erosion and sediment control
H:V	horizontal to vertical
ha	hectare
kg/ha	kilogram per hectare
kg/m	kilogram per metre
LID	low-impact development
m	metre
m/s	metre per second
m ²	square metre
m ³ /ha	cubic metre per hectare
mm	millimetre
MSDS	material safety data sheet
NPK	nitrogen, phosphorus, and potassium
P.Ag.	Professional Agrologist
P.Eng.	Professional Engineer
P.L.Eng.	Professional Licensee
RECP	rolled erosion control product
ROW	right-of-way
RUSLE	Revised Universal Soil Loss Equation

RUSLE-FAC	Revised Universal Soil Loss Equation for Application in Canada
t/ha	tonne/ha
t/ha/y	tonne/hectare/year
The City	The City of Calgary
TRM	turf reinforcement mat

How to Use These Specifications

These *Standard Specifications Erosion and Sediment Control (Specifications)* set out requirements for construction site erosion and sediment control in Calgary. The *Specifications* form part of all approved Erosion and Sediment Control (ESC) Plans and must be followed when developing ESC Plans and during all stages of construction. Failure to follow these specifications as they apply to the ESC Plan is a contravention of the ESC Approval and subsequently The City of Calgary (The City) **Stormwater Bylaw**.

ESC Plan Development: Use these *Specifications* as a reference document when creating ESC Plans. The Plan must align with the general requirements section and any standard control or practice you are using must follow the implementation, maintenance, inspection, and removal requirements outlined in the Standard Specification section.

The *Specifications* are split into the three following categories:

- 100, General Requirements
- 200, Specifications
- 300, Drawings

ESC Plan Implementation: A copy of these *Specifications* must be available on all construction sites. Staff responsible for the implementation, inspection, maintenance and removal of erosion and sediment controls and practices must comply with all 100, General Requirements laid out in the *Specifications*. Additionally, they are required to follow all 200, Specifications and 300, Drawings that have been noted in their ESC Plan.

100 General Requirements

Proper management of soil erosion and sediment control begins with careful planning and execution of an approved ESC Plan. The *General Requirements* section contains requirements related to all construction sites.

200 Standard Specifications

Standard Specifications include general design, installation, maintenance and removal requirements for common erosion and sediment controls used in Calgary.

Customers may use **controls and** practices that are not listed in the standard specifications. These practices are referred to as non-standard specifications; they must be identified in the ESC Plan submission and must include all appropriate supporting information. **At a minimum, supporting information for non-standard specifications must include the following:**

- Manufacturer's Specification Sheet (which may include the information noted below)
- **Relevant MSDS and CAS information**
- C or P-value
- Design Requirements
- Installation Requirements
- Inspection Requirements
- Maintenance Requirements
- Removal Requirements

For the most current supporting information requirements for non-standard specifications please visit calgary.ca/StmPP.

200.1. Erosion Control

Providing rapid protective cover on all exposed soil surfaces is the single most important practice for minimizing erosion. Cover may include topsoil application used in conjunction with seeding, mulching, hydroseeding, or erosion control blankets. The ESC designer has many options to select the proper erosion control practices for their site.

200.2 Sediment Control

Sediment controls can generally be classed as filtering and entrapment methods or impounding and gravity-settling methods that are used to prevent sediment-laden water from leaving a site.

200.3 Support Practices

Gravel pads, inlet protection, perimeter protection – those practices with no C or P-value.

300 Standard Drawings

Standard installation drawings are provided at the end of this document for clarity on how the proposed ESC practices are required to be installed. Drawings related to non-standard practices must be included in the ESC Plan ***for review and approval.***

100 General Requirements

100.1 Scope

These *Standard Specifications Erosion and Sediment Control (Specifications)* form part of all Erosion and Sediment Control (ESC) Plans approved for construction under **Section 15(3)(d)** and Section 16 of the **Stormwater Bylaw (37M2005)**.

All work must be carried out in accordance with the documents outlined below. In case of inconsistency or conflict between these documents, documents govern in the following order:

- 1) **Stormwater Bylaw 37M2005**
- 2) *Standard Specifications Erosion and Sediment Control*
- 3) Development Permit, Master Development Agreement, and/or The City of Calgary Standard General Conditions (applicable for City projects only)
- 4) Manufacturer's specifications
- 5) Other City of Calgary specifications (e.g. Landscape, Roads)

All deviations from these *Specifications* or the approved ESC Plan require disclosure and written approval from The City of Calgary (The City).

100.2 Release Reporting

A "Person," as defined under the **Stormwater Bylaw**, involved in carrying out a construction activity, must report any releases of sediment-laden water or other contaminants to a storm**water** system.

Release reporting information by calling:

- a) 311 (City of Calgary staff and contractors follow the Corporate Substance Release Reporting Procedure); and
- b) 1-800-222-6514 (Alberta Environment and Parks) 24-hour release reporting line.

If requested, a Person must provide the release reporting number provided by Alberta Environment and Parks (AEP) **and The City of Calgary Service Request (SR) number**

100.3 Requirement to Comply

100.3.1 Sites Equal to or Greater than 0.4 ha

No person may commence or continue earth-moving activities on a site larger than or equal to 0.4 hectare (ha) unless the work is done pursuant to an ESC Approval issued under Section 16 of the **Stormwater Bylaw**.

Once approval of the ESC Plan is granted, **the site** must comply with the approved ESC Plan.

Prior to obtaining approval, the site must comply **with any previous** ESC Approval that was provided under the previous Development Permit (DP) or Development Agreement (DA) until a new ESC Approval is issued for the site.

100.3.2 Sites less than 0.4 ha

Sites with disturbed areas less than 0.4 ha, and where there are no site characteristics that indicate greater than normal ESC concerns must adhere to the **relevant sections of the Specifications, of note are Section 100.23 Development Responsibilities and Section 100.26 Good Housekeeping Practices.**

While these sites do not generally require submission of an ESC Plan **for review and approval.** The City reserves the right to **require an ESC Approval be in place prior to construction** on any site that is less than 0.4 ha if they believe there is potential of an adverse effect to property, infrastructure, health and safety, or the environment.

100.3.3 Construction Site Dewatering

No person may dewater a site (pumping or directing impounded surface water and/or groundwater into a storm**water** system) unless the activity complies with the **Stormwater Bylaw.**

To obtain permission to dewater a site or find information on Drainage Permits, contact 311 **or visit calgary.ca/StmPP.**

100.4 Erosion and Sediment Control Plans

ESC Plans must outline how any potential releases from the parcel will not cause an adverse effect (as defined by the **Stormwater Bylaw**) during a construction activity.

The ESC Plan must ensure that:

- a) All construction and land-disturbing activities and associated erosion controls, sediment practices, and stormwater management practices have been identified;
- b) all locations where run-off occurs have been identified and controls and practices have been proposed to protect neighboring properties from adverse effects; and**
- c) run-off to an adjacent property, where the water does not enter the storm system or street, requires written approval from the impacted neighbor(s) that confirms they accept the discharge of water during the construction stage.**

The ESC Plan consists of:

- a) The ESC Approval letter;
- b) Application form;
- c) City of Calgary Specifications for Erosion and Sediment Control;
- d) All applicable drawings;
- e) Attachments (including nomograph and sieve analysis data).

100.5 Qualified Designer

ESC Plans must be created, stamped, and signed by a professional designer with experience in the design and implementation of erosion and sediment controls who holds a valid designation, **in good standing**, as either a:

- Certified Professional in Erosion and Sediment Control (CPESC), or
- **APEGA Certified** Professional Engineer (P.Eng.), or
- **APEGA Certified** Professional Licensee (P.L.Eng.), or
- Professional Agrologist (P.Ag.) **certified by the Alberta Institute of Agrologists** with experience in ESC.

The ESC Plan must comply with and reference these *Specifications* at the time of the ESC Plan submittal.

100.6 Revised Universal Soil Loss Equation For Application in Canada (RUSLE-FAC)

Unless a professional justification has been approved, soil loss, for all areas and slopes on the proposed construction site, must ***comply with the following requirements:***

Soil Loss Tolerance	Requirements for Drainage Divide
2 tonnes/hectare/year (t/ha/y) using the Revised Universal Soil Loss Equation for Application in Canada (RUSLE-FAC)	<p>Run off may go to:</p> <ul style="list-style-type: none"> • *Surface waters (e.g. river, lake, stream, wetland); • Storm system (e.g. catch basins, pipes, storm pond, gutter, concrete, or grass swale); • Environmentally sensitive area (e.g. environmental reserve); or • Private or public property.
4 tonnes/hectare/year (t/ha/y) using the Revised Universal Soil Loss Equation for Application in Canada (RUSLE-FAC)	<p>Run off must go to:</p> <ul style="list-style-type: none"> • Properly sized sediment containment system, or • Be contained in the drainage area where it will not flow off site to a surface water, stormwater system, environmentally sensitive area or private or public property.

* Construction adjacent to a water body, such as a wetland or a river, may be subject to additional provincial and federal requirements.

100.7 Amendments to the Approved ESC Plan

An amendment to the ESC Approval must be obtained for any deviations from the approved ESC Plan. An amendment request must contain the:

- a) Project name;
- b) Project reference number (Development Permit, Development Agreement, Development Liaison, Construction Drawing number);
- c) Municipal site address;
- d) Notification that it is an amendment for a previous ESC Approval;
- e) A detailed description of what is being amended; and
- f) Applicable amended drawing and details portions of the ESC Plan.

Amendments must be submitted to The City ***Environmental Compliance Specialist*** following the process outlined at the following link calgary.ca/StmPP ***Amendments related to significant changes in the construction boundary may require a full resubmission. To discuss call 311.***

If the land is sold, the ESC Plan must be amended to reflect the new owner. An amendment is not required to the ESC Plan if the transfer is to a homebuilder or a homeowner.

100.8 Documentation Accessibility

The following information must be available upon request, and retained for a minimum of two years following final site stabilization:

- a) ESC Plan, including all amendments;
- b) *Specifications for Erosion and Sediment Control*;
- c) Documentation (including photos and up-to-date written records) detailing implementation, inspection, and maintenance of ESC practices; **and**
- d) Drainage Permit (if applicable).

100.9 Trench Excavations

Soil windrowed during utility excavations should be placed up-gradient of the trench.

Do not deposit or store soil from utility excavations in locations where it may migrate off the site by any means including wind, water, and vehicle tracking.

When deep utilities (storm and wastewater) are being installed, controls must be put in place to prevent any water in the excavation from entering a utility pipe which has an active downstream connection.

If utility excavations separate a slope from a control or practice required to meet RUSLE in Section 100.6 (2 tonnes/ha/yr), the excavation must serve as an interim sediment pond until such time that the excavation is backfilled.

100.10 Authority to Access Site

The City must have free and uninterrupted access to work areas to carry out inspections. The owner, site developer, contractor, their authorized agents, or a combination of these, must provide access for The City ***Environmental Compliance Specialist*** to conduct a complete inspection of all ESC practices and Dewatering Activities.

100.11 Winter

Winter is defined as the dates between November **1** and April **30** of each year.

A pre-winter inspection is required to note any deficiencies that do not comply with the ***ESC Plan and these Specifications***. This winter shutdown inspection must be documented and available upon request.

Inspection and maintenance of the site will be required throughout winter at the frequency defined in Section 100.13, regardless of whether a project site is subject to winter shutdown or if construction is continuing. Any change to inspection frequency during winter must be pre-approved via an amendment (see section 100.13.3).

100.12 Pre-construction Meeting

Prior to the commencement of construction on any site 0.4ha or greater in size, contact the Environmental Compliance Specialist at ESC@calgary.ca to discuss ESC implementation on site and determine if a pre-construction meeting is required. Provide at least five business days notice ***when setting up or rescheduling pre-construction meetings.***

Prior to the commencement of construction, the site must have written permission from the Environmental Compliance Specialist.

100.13 Inspections

100.13.1 Frequency

Inspection of all ESC practices must be completed and documented at least every seven days and at critical times when erosion or sediment releases could occur, including:

- Windy weather;
- Significant precipitation events; and/or
- Melt events.

At a minimum, significant precipitation events are defined as greater than 12 millimetres (mm) of precipitation within any 24-hour period, or precipitation or snowmelt on wet or thawing soils. Shorter duration, but more intense events may also be deemed “significant”.

Deficiencies documented during inspections must be corrected promptly, and the maintenance documented. Corrective actions, identified by the Qualified Inspector, (see Section 100.14) must be taken as soon as possible and not longer than 72 hours after the identification of the deficiency, as long as the corrective timelines do not risk public health or safety.

100.13.2 Inspection Requirements

When inspections are conducted the following information must be collected:

- a) Project Information including the project name, address, urban file number, owner name, ESC consultant name, ESC inspector name;***
- b) Responses to The City’s 10-question Inspection Checklist;***
- c) Inspection Details including the inspection date, weather, inspection attendees, project start date, estimated project end date, ESC drawing(s) being followed, previous date of inspection, list of deficiencies note in the previous inspection;***
- d) Control and Practice Assessment including a list of controls and practices that should be on site, descriptions of the locations for each control and practice, a photo of the control and practices, observations noted about the control or practice and any requirement that needs to be followed to ensure alignment with the approved ESC Plan; and***
- e) Sign off by the Qualified Inspector including a title and credentials.***

100.13.3 Winter Inspection Frequency Reduction Request (WIFRR)

A request may be submitted for a reduction in ESC inspection frequency from weekly to every 28 days and after significant rain/melt events through the winter months (November 1 to April 30). WIFRR applications are available on the [Inspection Website](#) and must be completed, within the window defined on the website, and sent to ESC@calgary.ca for review, by an Environmental Compliance Specialist.

To apply for a reduction in ESC inspection frequency the site must meet the following requirements:

- a) There will be little to no activity on site throughout winter;***
- b) The site matches an approved ESC drawing; and***

c) There is no evidence of non-compliance (dirt ramp, release, socks, and donuts, missing mandatory cover).

ESC inspection frequency may only be reduced upon receipt of written confirmation from an Environmental Compliance Specialist.

100.13.4 **Inspection Completion**

ESC Inspections can be stopped when:

- a) The site matches the final approved ESC drawings;***
- b) All temporary ESC controls are removed;***
- c) If the site is a subdivision – the site must be at 80% stabilization with long-term cover, for all other sites all seeding types are established with at least 80% growth;***
- d) If sod is required as part of the plan, it was inspected for at least two months after placement and it is confirmed sod has taken; and***
- e) When written permission has been obtained from an Environmental Compliance Specialist to cease inspections.***

To obtain inspection completion forward the final ESC Inspection report to ESC@calgary.ca.

100.14 **Qualified Inspector**

Inspections must be conducted by a Qualified Inspector.

A Qualified Inspector is a person who has training in ESC inspections or someone who is directly under the supervision of a person who has ESC inspection training and aids in understanding the purpose and requirements of ESC inspections.

Typically, a Qualified Inspector will have a designation as a CAN-CISEC, CESSWI, or CPESC.

100.15 **Transfer of Ownership**

Where the site owner transfers ownership of a piece of property, it must be properly stabilized and all slopes on the parcel must ***meet the soil loss tolerances outlined in Section 100.6 RUSLE-FAC***, using only controls ***and practices*** contained within the boundary of the property.

The ESC Plan is tied to the land and must be followed for the property, or any piece of the property, until a subsequent ESC Plan is approved by The City.

When the ownership on the parcel is changed, an amendment, as outlined in Section 100.7 must be submitted providing updated contact information. An amendment is not required to the ESC Plan if the transfer is to a homebuilder or a homeowner.

100.16 **Low-Impact Development**

Low-impact developments (LIDs) are critical areas that must be clearly identified in ESC Plans.

The ESC Plan must outline how the critical area will be protected for the duration of the project and until final stabilization.

LIDs must be installed ***in the following order:***

- 1) ***Install LID*** after the upstream catchment area is stabilized; if ***this is not possible***;
- 2) ***the LID*** must be ***completely*** isolated from the construction site, ***if the LID cannot be isolated; then***
- 3) sacrificial measures, such as sod, must be ***used***.

100.17 Sediment Removal

The owner, site developer, contractor, and authorized agents are responsible for removing all sediment, mud, construction debris, and any other substance that may accumulate in any part of the stormwater system, whether on private property or within public right-of-ways (ROWs).

The owner, site developer, contractor, and authorized agents will obtain all necessary permissions, permits, authorizations and approvals to access all property and infrastructure when cleaning sediment, mud, construction debris, and any other substance discharged into the stormwater system.

100.18 Site Stabilization

100.18.1 Idle Site Management

Idle site management is required for any idle exposed areas in accordance with the requirements listed below. These requirements may apply to the entire site, if the entire site is idle, or parts of the site if only parts of the site are idle.

Idle Site Management Requirements		
Overall Site Size (Section 1.6 of the ESC Application)	Days Idle	
	30 – 364 days	365 days or more
0 – 2 ha	No Short-Term Cover required	Long-Term cover required
2+ - 10 ha	1) Short-Term cover <u>or</u> 2) Water Management Plan	Long-Term cover required
10+ ha	1) Short-Term cover <u>or</u> 2) Water Management Plan <u>and</u> Limited Exposure Plan *If a site has more than 10ha exposed, short-term cover is triggered	Long-Term cover required

Short-Term Cover: Is defined as a control that has a defined lifespan and must be reapplied; examples include blankets, mulches, and tackifiers.

Long-Term Cover: Is defined as a control that, once installed, will continue to provide cover with limited or no reapplication; examples include vegetated cover such as sod or established seedlings. Long-term cover is deemed installed when it reaches 80% ground cover.

Water Management Plan: Is defined as a plan that outlines how water will be retained and managed on site in order to meet the soil loss tolerances outlined in Section 100.6 RUSLE-FAC.

Limited Exposure Plan: Is a plan that breaks the site down into 10ha parcels or less and explains how the construction site will not have more than 10ha exposed at one time. The limited exposure plan will be a Phasing Plan that includes:

- a) **The boundary of the project;**
- b) **phases with area boundary and size shown; and**
- c) **timelines for each phase from exposure of land until long-term stabilization.**

The following conditions must be met if all or part of the site is left in a state where active construction is not occurring:

- a) **The idle area must comply with the requirements listed in the Idle Site Management Requirements table;**
- b) **The inspection frequency listed in Section 100.13 must be maintained, unless written approval has been obtained via an amendment;**
- c) **Documentation associated with the site must be maintained, but may be kept at an alternate specified location; and**
- d) **The idle area must be stabilized to reduce annual soil loss of all slopes in accordance with soil loss tolerances outlined in Section 100.6 RUSLE-FAC.**

100.18.2 **Large Site Management**

A maximum of 65 ha of land may be exposed to erosion at any given time during construction, unless otherwise authorized through an ESC Approval Letter.

Sites with ESC Approval to expose greater than 65 ha require:

- a) An ESC Plan;
- b) a Phasing Plan (ESC10) which clearly shows how the soil disturbance area is to be limited to 65ha at any one-time during development of the site; and
- c) an ESC Large Site Safety Plan that is available to staff working on the construction site.

Large Site Safety Plan: Is defined as a plan that outlines how erosion and sediment on sites greater than 65ha will be managed to ensure the safety, health and welfare of people and the protection of people and property.

A Large Site Safety Plan must identify the risks that are present due to the size of the site and the responses that are taken to reduce these risks. Risks will include but are not limited to dust plumes, which can impact air quality and reduce visibility on public roadways, and large volumes of concentrated water which can cause scour, flooding, dangerous conditions, and property damage.

A large site safety plan must include, at minimum, the following information:

- a) **Total site size;**
- b) **The name(s), phone number(s) of the individual(s) responsible for ensuring the large site safety plan gets implemented on site;**
- c) **A list of activities that have the potential of generating dust (e.g. haul routes, work related to stockpiles);**
- d) **A list of all parties that may be impacted (e.g. hospital, commuters, airport, assisted living facilities, nurseries, farmers - crops);**
- e) **A plan that identifies what dust mitigation actions will be taken for each activity type and clear direction on when the dust mitigation action is triggered;**
- f) **A communication plan that:**

- i. Explains how the plan is successfully implemented when needed;*
- ii. outlines how staff working on site will be educated about the large site safety plan;*
- iii. identifies how complaints will be addressed; and*
- iv. outlines when, how, and where release will be reported to.*

100.19 Stockpiles

Stockpiles include all types of soil (topsoil, subsoil) and may vary in size, from grouped truck dumps to large stockpiles.

Soil stockpiles must be properly placed and protected on site so material will not be eroded to off-site areas, including City Streets and the Stormwater System. Stockpile locations must be shown on your ESC Plan.

Soil temporarily stockpiled windrows (on linear piles) during utility excavations must be placed up-gradient of the trench.

Any stockpiling of soil, sand, gravel, or other material on a City Street where wind/water could transport the material off-site is prohibited under The City of Calgary Streets Bylaw. Some exceptions are made for utility work where a Street Use Permit is issued by The City. In such cases, all conditions of the Street Use Permit as well as The City of Calgary Stormwater Bylaw and Streets Bylaw must always be complied with.

A stockpile is deemed in place after the first placement of soil.

Stockpiles in place for less than 30 days must have, at a minimum, functional sediment control practices on the down-gradient side of the pile that will contain sediment. A two-metre (m) buffer must be in place between the toe of the stockpile and the sediment **control practice** or silt fence.

Long-term stockpiles (in place more than 30 days) must be stabilized with an appropriate erosion control measure (cover) **and functional sediment control practices on the down-gradient side of the pile that will contain sediment.**

When soil is being added to or removed from a stockpile, any face that has been undisturbed for more than 30 days must be stabilized with an appropriate erosion control measure.

Stockpiles in place for more than one year must be stabilized with an appropriate long-term cover as defined in Section 100.18.

Stockpiles must comply with the latest version of the Calgary Parks Development Guidelines and Standard Specifications: Landscape Construction.

Ensure that stockpiles have mitigation measures in place to deter nesting birds from using the piles as habitat. If nesting occurs, work will be discontinued until the chicks have fledged or additional approvals are obtained from regulatory authorities.

The Government of Canada recommends that stockpile slopes do not exceed 70 degrees as steeper slopes create suitable nesting sites for some swallow species.

Topsoil, microorganisms that live in topsoil, and the seed bank present in these soils are all resources that require proper storage and care when stockpiling. Practices that maintain the biological integrity of topsoil should be incorporated into the ESC Plan. Examples include, minimizing stockpile height and width, minimizing stockpiling duration, avoiding unnecessary compaction, and undertaking de-compaction operations, and, when required, incorporating an aeration system. See The City of Calgary's Soil Handling Recommendations (201) for more details on best practices for stockpiling.

100.20 Vehicle Movement and Mud Tracking

100.20.1 *Mud Tracking*

Mud tracking must be controlled by means of installing, maintaining, and using stabilized construction entrances and exits at all access locations. Traffic entering and leaving the site must be minimized when soils are wet.

All sediment transported onto City streets must be removed immediately.

Construction entrances and exits may include but are not limited to stabilized gravel access, rattle grates, track pads, track out control mats, and wheel wash stations.

100.20.2 *Construction Staging Areas*

Construction staging areas are where equipment, vehicles, site trailers, storage structures, and/or portable facilities are placed on site. These areas may be subject to high traffic and/or soil compaction.

Construction staging areas should be located in a well drained area away from low areas where water may collect.

Construction staging areas may include but are not limited to gravel, mud mats, track mats, and blast mats.

Construction staging areas must have a cover that prevents soil from:

- a) Adhering to footwear, vehicles, and equipment;***
- b) being detached by the natural forces including but not limited to wind and water.***

100.20.3 *Travel Corridors*

Travel corridors are areas where vehicles and equipment regularly cross to facilitate construction. These areas may be subject to high traffic and soil compaction. They also have a high probability of destroying cover types such as mulch and tackifiers not designed for vehicle travel, and RECPs and practices such as silt fence, buffer strips, wattles, logs, and barriers.

Travel Corridors must have a cover that can't be damaged by vehicle movement.

Travel corridor cover types may include but are not limited to gravel, approved haul route tackifier, mud mats, track mats, and blast mats.

When travel corridors appear on a site they must:

- a) Have a cover value equal to or better than the cover value (C-value) shown on the Approved ESC Plan; and***
- b) if they are greater than 10 meters or have a slope % higher than 1% and no cover was shown on the drawing(s), have a cover product installed that is capable of supporting vehicle travel.***

100.21 Haul Routes

When soil or subsoil is to be moved to or from the construction site, a detailed haul route map showing the location where soil is to be stored and the haul routes that are to be used ***must be created and kept on site.***

The haul route map must be supplied to Environmental Compliance Specialist upon request.

100.22 Pollution Prevention

Practices must be implemented on all sites to prevent the release of prohibited substances to the storm **water** system and water bodies as a result of construction dewatering, surface washing, sand blasting, saw cutting, washing vehicles, washing out of concrete mixers and concrete trucks (including chutes and tools), and any other activities that could result in a prohibited discharge.

Water exposed to fresh concrete or saw cutting slurry must not be allowed to enter the wastewater system, storm **water** system or any watercourse. The water and slurry must be disposed of in accordance with all applicable regulations and at approved locations.

To prevent the release of prohibited substances to the stormwater system and water bodies the following must occur:

- a) Prohibited substances must be stored in the appropriate primary and secondary containment with the appropriate spill kit(s) on site;***
- b) Drip trays must be installed under all stationary equipment;***
- c) Site machinery and vehicles must be inspected daily for leaks;***
- d) Any leaks found must be mitigated immediately; and***
- e) Leaks resulting in a spill into the stormwater system must follow reporting requirements set out in Section 100.2.***

100.23 Development Responsibilities

100.23.1 *Property Owner*

During development, the **property** owner is responsible for ensuring:

- a) The approved ESC Plan for the property they own is being followed;***
- b) deficiencies noted during ESC Inspections are remedied;***
- c) all legislation relevant to ESC is being adhered to;***
- d) the timely removal and proper disposal of all temporary ESC measures when they are no longer required to ensure compliance with the approved ESC Plan;***
- e) if they sell all or part of the land that the land is stabilized against erosion in compliance with these Specifications and the approved ESC Plan; and***
- f) that the next owner receives a copy of the approved ESC Plan.***

100.23.2 *Developer*

In the case of a subdivision development, the Developer, who is the interim guardian of the stormwater system until all Final Acceptance Certificates have been received, is responsible for ensuring:

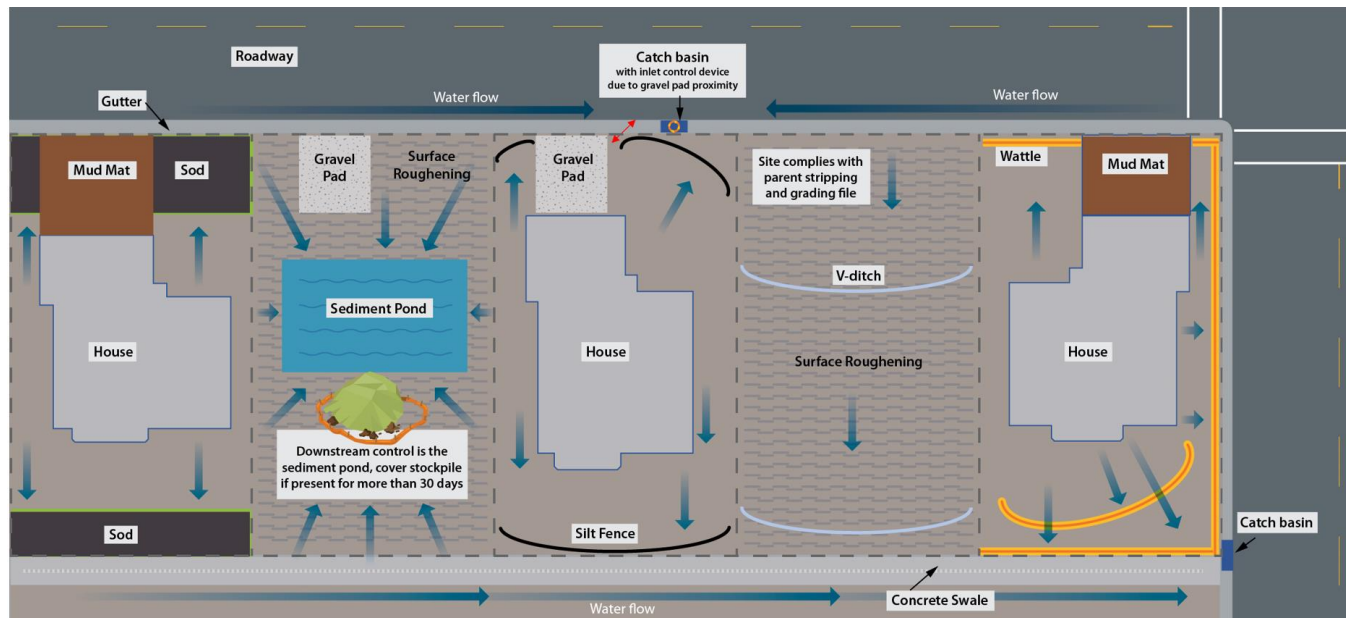
- a) That homebuilders receive a copy of the approved ESC Plan;***
- b) ESC inspections related to development area the ESC Plan covers are continued at the frequency outlined in Section 100.13 by a Qualified Inspector as outlined in Section 100.14 to ensure properties in the development area, which may or may not be owned by others, do not cause adverse effects to the stormwater system or public property; and***
- c) that work in the development area adheres to the Approved ESC Plan.***

100.23.3 **Homebuilder**

A Homebuilder is responsible for following the ESC Plan, tied to the property they purchased. This includes ensuring that lot-level good housekeeping practices are followed. These practices will include installation of:

- a) A construction entrance/exit control to prevent mud tracking;**
- b) perimeter controls to manage run-on and run-off;**
- c) controls to protect the stormwater system, including but not limited to swales, catch basins, and LIDs;**
- d) stockpile controls if stockpiles are present..**

The figure below outlines different options that can be mixed and matched for lot-level controls.

100.24 **Change of Landowner**

Upon purchase of a property, which has been developed with an Approved ESC Plan, the landowner must comply with the Approved ESC Plan until such time that:

- a) for a subdivision all Final Acceptance Certificates for the *Development Agreement* are acknowledged;**
- b) a new ESC Plan is approved for the area; or**
- c) the project is complete and written authorization has been provided to cease ESC Inspections under Section 100.13.4 Inspection Completion.**

100.25 **Obstruction of Stormwater System**

No one may install inlet protection on any part of the storm **water** system, public or private, without prior written approval.

All inlet protection installed under a catch basin grate or manhole must be equipped with an overflow system.

All inlet protection approved on the ESC Plan must be removed when the first lift of impermeable surface (e.g. asphalt or concrete) has been installed. Any inlet protection to remain after this point must obtain a separate authorization under the **Stormwater Bylaw**.

100.26 Good Housekeeping Practices

Good housekeeping practices must always be followed during soil disturbance. **This includes small sites, utility work, City projects, and private developments** that do not trigger ESC Plan submissions under Section 100.3 of this document. Please refer to the general requirements listed below.

1. Ensure proper placement and protection of stockpiled soils and materials **in alignment with Section 100.19 Stockpiles of these Specifications.**
2. **Construction waste, such as wash-water containing concrete residue (e.g. wash-water generated during exposed aggregate preparation) and drywall or mortar slurry must not leave your site and enter onto a City street or into the stormwater system. Likewise, concrete/cement residue must not be washed or dislodged from equipment onto a street or into the stormwater system.**
3. **Equipment/vehicles operated on site must be inspected at least daily for leaks. Any leaks must be managed in a manner that prevents a prohibited release to the stormwater system.**
4. **Mud track-out must be controlled during construction in accordance with Section 100.20 of these Specifications.**
5. Dust control must be implemented on site, when required.
6. Temporary sediment control at any storm inlets requires prior written approval **as outlined in Section 100.25 of these Specifications. For most sites, the only location where inlet protection will be approved is directly adjacent to a stabilized site exit or stockpile.** Failure to obtain approval can lead to fines under the **Stormwater Bylaw**. Please contact **calling 311** for more information if you wish to use inlet protection on or near your good housekeeping site.
7. **Spills and sediment releases that may cause, have caused, or are causing an Adverse Effect (defined in The City of Calgary [Stormwater Bylaw](#) as “impairment of or damage to, or the ability to cause impairment of or damage to: (i) the Stormwater System; (ii) human health or safety; (iii) property; or (iv) the environment” must be immediately reported to The City by calling 9-1-1 (for emergencies) or 311 [and](#) to Alberta Environment and Parks at 1-800-222-6514 in accordance with Section 100.2 of these Specifications.**
8. **All disturbed areas must be stabilized within 30 days of construction completion (e.g. Asphalt, concrete, sod, mulch & tackifier and seed).**
9. **At a minimum, Inspections of stormwater pollution prevention practices on your project must be completed and documented at least every seven days as well as during or within 24 hours of rainfall or snowmelt conditions sufficient to cause runoff. Some practices require more frequent inspection. Follow Section 100.13 Inspections of these Specifications.**
10. **For installation, inspection, maintenance, and removal information follow Section 200 of the Standard Specifications.**

200 Specifications

200.1 Erosion Control

200.1.1 SEEDING

C-Value	1.0 * *When completely established, C-value will be dependent on ground cover. 80% cover is required to achieve long-term cover status
Drawing	None
Manufacturer's Specification	Follow supplier's installation criteria.

200.1.1.1 General

Seeding involves placing an approved seed mix onto prepared ground so that in the future the exposed soil will be covered with vegetation.

200.1.1.2 Design Requirements

An ESC designer who is familiar with the area's soils, climate, and seeding requirements must be consulted before proposing a seed mix for site or applying seed to a site.

The seed must be specified and installed in accordance with Chapter 5 of the City's *Development Guidelines and Standard Specifications for Landscape Construction* (current edition).

Seed rates for temporary and permanent seeding should be based on a Pure Live Seed (PLS) of 80%. This rate is calculated by multiplying the minimum seed purity (%) and the minimum germination rates (%) from the seed tag. Divide by 100% to get the % PLS.

Use certified Canada No. 1 seed, free of diseases, weed seeds or foreign materials that meet the requirements of the *Seed Act*.

If seeding occurs after the 50% frost probability date for the site, a dormant seeding method must be used. In this case, the seed should be applied late in the season when there is no chance of germination and applied with a seed drill so cold temperatures do not damage the seed.

Nothing in this part of the Specifications relieves a person from complying with the most recent versions of the Provincial *Weed Control Act*, *Weed Control Regulation, AR 19/2010*, or The City of Calgary *Community Standards Bylaw*.

200.1.1.3 Implementation

1) Site Preparation

Concentrated run-off must be diverted away from all exposed slopes and areas to be seeded.

For soil that is compacted, crusted, or hardened, the soil must be loosened (with discing, raking, or harrowing) and surface roughened.

When seeding on subsoil, soil tests must be conducted to ensure subsoil is favorable for successful germination. If subsoil is not favorable, appropriate amendments must be added.

2) Application of Seed

Seed must be applied immediately after seedbed preparation while the soil is loose and moist. If the seedbed has been idle long enough for the soil to become compact, the soil must be harrowed or loosened.

Seed must be uniformly applied at the rates specified in the ESC Plan.

Broadcast seed must be incorporated into the soil by raking or chain dragging, and then lightly compacted to provide good seed-soil contact.

Temporary irrigation must be implemented until self-sustaining vegetation cover is established.

Seed may be installed via hydroseeding, see Specification 200.1.4.

Winter Operations

Dormant seeding is an acceptable method if the seed type is amendable to such treatment and the timing (prior to snowfall) is appropriate.

Seed must not be installed on frozen ground or snow.

200.1.1.4 Inspection and Maintenance

All seed, fertilizer, mulch, and other materials must be clearly marked and made available for inspection (contents, weight, analysis, supplier, and manufacturer).

Keep records of materials used and all certification tags for inspection and records.

Verify that seed and hydroseed applications meet specifications.

- Seed germination and seedling density must be evaluated.
- Re-application or additional soil amendments must be applied to maintain specified thickness of the cover.

Where seeds fail to achieve long-term germination, the area must be reseeded, fertilized, and mulched within the planting season using not less than half the original application rates.

Noxious weeds must be removed.

200.1.2 SODDING

C-Value	0.01
Drawing	1
Manufacturer's Specification	Follow supplier's installation criteria.

200.1.2.1 General

Sodding is the use of grass sod to cover and immediately stabilize disturbed areas of bare soil.

200.1.2.2 Design Requirements

Sod, when specified as part of the permanent landscaping plan, must be specified, and installed in accordance with The City's *Development Guidelines and Standard Specifications for Landscape Construction* (current edition). **Sodding, for the purposes of interim erosion control, must follow the specifications detailed in this section (200.1.2)**

Lay sod strips on slopes with the long length parallel to the slope contours and perpendicular to the direction of the slope.

When used in open channels, lay sod strips perpendicular to the anticipated direction of the flow.

If the slope on which sod is being installed is greater than 33%, staking is required to keep the sod in place. While biodegradable stakes are recommended for all areas, they are mandatory if the area is to be mowed. If non-biodegradable staking is used, they must be removed once the sod has established.

Nothing in this part of the Specifications relieves a person from complying with the most recent versions of the Provincial *Weed Control Act, Weed Control Regulation, AR 19/2010*, or The City of Calgary *Community Standards Bylaw*.

Sod must not be:

- Applied during unfavourable weather conditions;
- Placed on frozen ground surfaces; and
- Used on slopes greater than 3H:1V without staking.

200.1.2.3 Implementation

1) Prior to laying sod:

Sod must be kept moist during storage and transportation.

During dry, hot weather, cool the ground surface using irrigation before laying sod.

Apply slow release **appropriate** fertilizer, **if soil testing indicates amendments are required**, on prepared surface (smooth surface free of rocks, weeds, and debris over 50 mm in diameter).

2) During sod laying:

The joint ends of adjacent sod strips must be butted tightly together. There must be no open joints or overlap adjacent pieces of sod.

Each sod strip must be rolled or tamped firmly to provide continuous contact between topsoil and underside of sod strip.

On slopes steeper than 3H:1V, each strip of sod must be secured with an anchor embedded a minimum of 150 mm into underlying soil. Space anchors a maximum distance of 600 mm apart.

Finished sod surfaces must be flush with adjoining areas, pavement, or top surface structures.

Irrigate freshly installed sod to moisten the topsoil to minimum depth of 100 mm.

Winter Operations

Sod must be laid prior to frozen ground conditions when there is still time for root growth prior to the grass going dormant.

200.1.2.4 Inspection and Maintenance

Sodded areas must be inspected at least every seven days for the first two months after placement and after significant storm events or snowmelt likely to cause erosion.

If damaged by washout or rilling, the sod must be immediately re-graded and damaged areas re-sodded.

Re-sod bare spots larger than 15 square centimetres (cm²).

200.1.2.a EXISTING COVER

C-Value	<p>Broadleaf crop cover must comply with City of Calgary Parks and Landscape Specifications</p> <p>Vegetation must be evenly and randomly distributed.</p>																																																																																											
	<table border="1"> <thead> <tr> <th rowspan="2">Vegetative Canopy Type and Height</th> <th rowspan="2">% Cover</th> <th rowspan="2">Type</th> <th colspan="6">C-Values for cover that contacts the soil surface</th> </tr> <tr> <th colspan="6">Percent Ground Cover</th> </tr> <tr> <th></th> <th></th> <th></th> <th>0</th> <th>20</th> <th>40</th> <th>60</th> <th>80</th> <th>95+</th> </tr> </thead> <tbody> <tr> <td rowspan="2">No appreciable canopy</td> <td rowspan="2"></td> <td>Grass</td> <td>0.45</td> <td>0.20</td> <td>0.10</td> <td>0.04</td> <td>0.01</td> <td>0.00</td> </tr> <tr> <td>Broadleaf Crop</td> <td>0.45</td> <td>0.24</td> <td>0.15</td> <td>0.09</td> <td>0.04</td> <td>0.01</td> </tr> <tr> <td rowspan="6">Tall broadleaf crop or short brush with average drop fall height of 20 inches</td> <td rowspan="2">25</td> <td>Grass</td> <td>0.36</td> <td>0.17</td> <td>0.09</td> <td>0.04</td> <td>0.01</td> <td>0.00</td> </tr> <tr> <td>Broadleaf Crop</td> <td>0.36</td> <td>0.20</td> <td>0.13</td> <td>0.08</td> <td>0.04</td> <td>0.01</td> </tr> <tr> <td rowspan="2">50</td> <td>Grass</td> <td>0.26</td> <td>0.13</td> <td>0.07</td> <td>0.35</td> <td>0.01</td> <td>0.00</td> </tr> <tr> <td>Broadleaf Crop</td> <td>0.26</td> <td>0.16</td> <td>0.11</td> <td>0.08</td> <td>0.04</td> <td>0.01</td> </tr> <tr> <td rowspan="2">75</td> <td>Grass</td> <td>0.17</td> <td>0.10</td> <td>0.06</td> <td>0.03</td> <td>0.01</td> <td>0.00</td> </tr> <tr> <td>Broadleaf Crop</td> <td>0.17</td> <td>0.12</td> <td>0.09</td> <td>0.07</td> <td>0.04</td> <td>0.01</td> </tr> </tbody> </table>	Vegetative Canopy Type and Height	% Cover	Type	C-Values for cover that contacts the soil surface						Percent Ground Cover									0	20	40	60	80	95+	No appreciable canopy		Grass	0.45	0.20	0.10	0.04	0.01	0.00	Broadleaf Crop	0.45	0.24	0.15	0.09	0.04	0.01	Tall broadleaf crop or short brush with average drop fall height of 20 inches	25	Grass	0.36	0.17	0.09	0.04	0.01	0.00	Broadleaf Crop	0.36	0.20	0.13	0.08	0.04	0.01	50	Grass	0.26	0.13	0.07	0.35	0.01	0.00	Broadleaf Crop	0.26	0.16	0.11	0.08	0.04	0.01	75	Grass	0.17	0.10	0.06	0.03	0.01	0.00	Broadleaf Crop	0.17	0.12	0.09	0.07	0.04	0.01	<p><i>(Sources: Adapted from Table C-5 RUSLEFAC: Agriculture and Agri-Food Canada, 2002)</i></p>				
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200.1.2.a.1 General

Maintaining existing vegetation can provide benefits by reducing run-off and directly protecting areas from erosion. It is cost effective, as the control is already in place and can also act as a buffer strip in areas where vegetation must be removed.

200.1.2.a.2 Design Requirements

All vegetated areas to be protected must be clearly delineated on the plan.

Vegetation must be evenly and randomly distributed across the site. The lowest cover areas should be used to assess C-values.

Nothing in this part of the Specifications relieves a person from complying with the most recent versions of the Provincial Weed Control Act, Weed Control Regulation, AR 19/2010, or The City of Calgary Community Standards Bylaw.

200.1.2.a.3 Implementation

Areas of existing vegetation that are scheduled for preservation must be identified and protected prior to clearing and grubbing operations or other soil-disturbing activities.

Either locate temporary roadways, storage facilities, and parking areas away from preserved vegetation or ensure barriers are in place to protect existing vegetation.

Communicate with staff onsite the areas of vegetation that are to be preserved.

200.1.2.a.4 Inspection and Maintenance

Ensure buffer strips and vegetation used for cover are maintained and not damaged.

200.1.3 **ROLLED EROSION CONTROL PRODUCTS (RECPs)**

C-Value	C-Value = 0.3* *C-value varies depending on product type chosen. A manufacturer's specification showing a C-value derived from ASTM testing must be provided if a C-value lower than 0.3 is to be assigned.
Drawing	2, 3
Manufacturer's Specification	Attach: Manufacturer's Specification to <i>Erosion and Sediment Control Plan Application Form</i> . Design and install as per Manufacturer's Specifications. If there is a discrepancy between these Specifications and the Manufacturer's Specifications, the more stringent of the two will apply.

200.1.3.1 General

RECPs consist of prefabricated blankets or netting which are formed from both natural and synthetic materials.

RECPs may be used in conjunction with seeding to accelerate the establishment of vegetation, especially on slopes.

RECPs approved for use by The City fall into the following two categories:

- **Erosion Control Blanket (ECB):** A temporary biodegradable rolled erosion control product composed of processed natural or polymer fibers.
- **Turf Reinforcement Mat (TRM):** A RECP composed of non-degradable synthetic fibers, filaments, nets, wire mesh and/or other elements. TRM is often selected for lining high-flow channels.

200.1.3.2 Design Requirements

RECPs used for disturbed slopes adjacent to water bodies or environmentally sensitive areas must be a net-free wildlife-friendly product.

Upstream flows must be managed to prevent flowing under the RECP.

RECPs may not be used in excessively rocky locations.

Netted RECPs may not be used in areas where final vegetation will be mowed.

The longevity of the RECP must match the expected time period that the blanket will be in place.

RECPs may be installed on slopes of 50% grade or less unless installation at a grade greater than 50% is supported through appropriate ASTM testing.

200.1.3.3 Implementation

The slope must be properly prepared, as follows, before installing the blanket,:

- Slope must be fine graded to a smooth profile free of weeds, rills, and crusting;
- Large rocks, debris, and other materials greater than 50 mm in diameter must be removed; and

- Voids must be filled and the slope lightly compacted.

If seeding is planned, then prior to installing the RECP, the area must be seeded in accordance with Specification 200.1.1.

1) Installation of ECB

Anchor trench must be dug at 300 mm deep by 300 mm wide and set back at least 1 m from the crest of the slope. Install the end of the blanket in the trench, providing 750 mm of excess blanket extended upslope of the trench. Staples must be installed at 300 mm centres along the width of the trench and 1000 mm centers along the length of the trench.

Anchor trench must be backfilled and compacted. If seeding, seed must be placed over the compacted soil at this point. Compacted soil must be covered with at least 300 mm of the terminal end of the blanket. The terminal end downslope of the anchor trench must be stapled in at 300 mm centres.

One of the following must be used to anchor the blanket into the ground:

- U-shaped wire staples;
- metal geotextile stake pins;
- biodegradable stakes; or
- triangular wooden stakes.

Staples must be a minimum of 150 mm in length. Staples must be driven into the ground, so they are flush with the surface of the ground. Slope must be fine graded to a smooth profile free of weeds, rills, and crusting;

Large rocks, debris, and other materials greater than 50 mm in diameter must be removed prior to laying of the blanket(s).

Blankets must be unrolled down the slope, in a controlled manner, starting at the anchor trench. Excess slack must be removed from the blanket every six meters.

The staple pattern to secure the blankets must be as per the manufacture's specifications.

A minimum 100 mm overlap must be used when rolling adjacent sections of blanket, unless specified otherwise by the manufacture's specifications.

If the blanket needs to be spliced in the middle of a slope, the blankets must be 'shingled' with the upslope blanket overlapping the downslope blanket by a minimum of 100 mm.

2) Installation of Turf Reinforcement Mats (TRMs) in Channels

Longitudinal anchor trenches and terminal slope and channel anchor trenches must be dug to measure 300mm deep by 150 mm wide.

Longitudinal anchor trenches **at the top of the channel slope** must be installed **parallel** to the flow line.

Terminal slope and channel anchor trenches must be installed **perpendicular** to the flow line.

Longitudinal, terminal and channel anchor trenches must be installed into the trench allowing for 300 mm of excess mat extending upstream of the trench. The mat must be stapled at 300-mm centres along the width of the trench.

All anchor trenches must be backfilled and compacted. Compacted soil must be covered with at least 300 mm of the terminal end of the blanket. The anchor trench must be stapled in at 300-mm centres perpendicular to flow line.

The mat must be unrolled, in a controlled manner, in the direction of water flow, starting with the mat in the channel bottom. Adjoining mats must be installed away from the centre of the channel bottom and must be overlapped as recommended by the manufacturer. Overlap seams must be stapled at 300 mm centres or as noted in manufacturer specifications.

The staple pattern to secure the TRM must be as per the manufacturer's specifications.

Check slots must be installed as per the manufacturer's specifications.

The mat must be installed from the channel bottom, up the channel sides in a shingle-type installation (with the upslope mat overlapping the lower mat 100 mm, or as specified by the manufacturer).

Edges of the matting must be buried in 300 mm deep by 150 mm wide longitudinal anchor trenches, extending the mat at least 300 mm above the crest of the channel side slopes.

Winter Operations

Prior to winter, ensure blankets are properly entrenched in anchor trenches and that staple numbers meet the manufacturer's requirements. Resolve any locations where the blanket doesn't make direct contact with the soil.

Remove snow cover prior to installing the blanket. Use stakes that won't break during installation. Pneumatic methods may be required to penetrate the soil during frozen ground conditions.

Installation where anchor trenches are required may not be possible during frozen ground conditions. These installs must occur prior to winter.

200.1.3.4.1 Inspection and Maintenance

Verify that check slots, anchors, and joints are secure; if they are not, repair.

Ensure staples are flush with the ground; if they are not, repair.

Check for areas where hydraulic uplift of the RECP may have occurred. Repair any damage immediately and install additional staples as necessary.

Verify RECPs have good contact with the soil, and look for erosion, undermining, or blanket separation.

If weeds have caused 'tenting' where direct contact with the soil has been lost, remove weeds, and reengage contact between the blanket and the soil.

If undermining has occurred, identify the cause and resolve; re-install lost soil and, if applicable, seed.

200.1.3.4 Removal

If the blanket is removed, fill in any trench channels to prevent channeling of water.

All staples, that will not biodegrade, must be removed.

200.1.4 **HYDROMULCH & TACKIFIER**

C-Value	Varies depending on Manufacturer's Specifications
Drawing	N/A
Manufacturer's Specification	<p>Attach: Manufacturer's Specification to <i>Erosion and Sediment Control Plan Application Form</i>.</p> <p>Design and install as per Manufacturer's Specifications.</p> <p>If there is a discrepancy between these Specifications, the <i>Development Guidelines and Standard Specifications for Landscape Construction</i> (current edition) and the Manufacturer's Specifications, the more stringent of the three will apply.</p>

200.1.4.1 General

Hydromulch is a temporary erosion cover that uses a hydraulically applied slurry to cover soil and protect it from erosion. At application, hydromulch consists of water, fibre mulch and a tackifier. It may or may not include a non-toxic tracer (e.g. indicator dye) if required for visibility.

Tackifier is a temporary erosion cover that consists of an organic polymer agent that covers soil and protects it from erosion. At application, tackifier consists of water and tackifier. It must include a non-toxic tracer (e.g. indicator dye).

200.1.4.2 Design Requirements

An ESC designer who is familiar with the area's soil, climate, and seeding requirements must be consulted before proposing hydromulch or tackifier on a site.

If seed is to be added to the hydromulch it must be specified according to Specification 200.1.1.

The hydromulch and tackifier used must have a Material Safety Data Sheet available on site.

The hydromulch and tackifier used must have a Chemical Abstract Service number.

Hydromulch and tackifiers must be non-toxic and have documented confirmation that they can pass a Lethal Dose 50 (LD50) for aquatic organisms.

Hydromulch and tackifiers must be made of products that will biodegrade in Calgary's climate.

Hydromulch and tackifier products must have a minimum ground cover, in all areas, of 80-100%.

Mulch and tackifiers are not recommended for channels or areas where there will be concentrated flow.

200.1.4.3 Implementation

1) Site Preparation

Concentrated run-off must be diverted away from all exposed slopes and areas to be hydromulched or tackified.

Hydromulch requires 24 hours curing time after application. Hydromulch must not be applied if precipitation is forecast within the next 24-hour period.

2) Application

Do not over-spray hydromulch or tackifier onto roads, sidewalks, water courses and existing vegetation.

Hydromulch and/or tackifiers must be clearly visible when applied and may require the addition of a non-toxic tracer to support this.

If installing with seed, hydromulch must be applied immediately after seedbed preparation while the soil is loose and moist. If the seedbed has been idle long enough for the soil to become compact, the soil must be harrowed or loosened.

Hydromulch must be uniformly applied at the rates specified in the ESC Plan.

Records must be kept of materials used and all certification tags for inspection.

Hydromulch and/or tackifiers must be applied from more than one direction to prevent shadowing.

Hydromulch must be applied when temperatures are above freezing.

Winter Operations

Prior to winter, ensure locations with hydraulically applied products have been properly covered with an adequate product and that the areas are in good shape without damage from vehicle and equipment movement.

Hydraulically applied products must be installed when temperatures are above freezing to prevent damage to installation equipment. Installation of hydraulically applied products often requires overnight temperatures to be above freezing to allow for equipment loading. Contact the installer prior to winter and clarify their installation limitations.

Hydraulically applied products require forethought as areas must be brought to grade prior to winter to ensure installation can occur. On all job sites where hydraulically applied controls are required, efforts must be made to bring these areas to grade as quickly as possible.

200.1.4.4 Inspection and Maintenance

The effectiveness of the hydromulch and/or tackifier cover must be maintained until permanent cover is established. Any areas where hydromulch and/or tackifier has been damaged or removed must be promptly repaired and replaced.

Records of materials used and all certification tags for inspection and records must be kept on site and available for inspection.

The hydromulch and/or tackifier applications rates must meet those approved in the ESC Plan. If they do not, reapplication is required.

Ground coverage must be clearly discernible and the hydromulch and/or tackifier application must provide a minimum of 80% coverage in all areas. Coverage is determined on square meter transects.

Exercise care to minimize damage to protected areas while making repairs. For temporary applications, maintain an unbroken ground cover throughout the period of construction when the soils are not being reworked.

Remove noxious weeds.

Where hydromulch and/or tackifier is being replaced by the growth of vegetation from seed, ensure the effectiveness of the hydromulch and/or tackifier is maintained until vegetation is established.

200.1.5 **COMPOST BLANKETS**

C-Value	0.05 (based on application and slope information below)	
	Compost Blanket Depth	Slope Limitations
	50 mm	Slopes less than 25%
	100 mm	Slopes between 25-50%
	Not applicable	Slopes greater than 50%
	Varies depending on product type and depth. A manufacturer's specification showing a C-value derived from ASTM testing must be provided if a C-value lower than 0.05 is to be assigned or if the application depths provided in the table above are not adhered to.	
Drawing	N/A	
Manufacturer's Specification	<p>Attach: Manufacturer's Specification to <i>Erosion and Sediment Control Plan Application Form</i>.</p> <p>Design and install as per Manufacturer's Specifications.</p> <p>If there is a discrepancy between these Specifications, the <i>Development Guidelines and Standard Specifications for Landscape Construction</i> (current edition) and the Manufacturer's Specifications the more stringent of the three will apply.</p>	

200.1.5.1 General

Compost is produced by controlled biological decomposition of organic materials from agriculture, forestry, commercial and residential activities. A compost blanket is a layer of loosely applied composted material placed on the soil in disturbed areas to reduce stormwater run-off and erosion.

200.1.5.2 Design Requirements

Compost blankets must not be applied in areas subject to concentrated run-off.

Use a compost blanket with a well-graded mixture of coarse and fine particles as this provides desirable erosion protection.

Upstream runoff must be diverted away from exposed slopes.

To prevent water from sheeting between the compost blanket material and the soil surface on a slope, a minimum 1 m wide band of blanket material should be installed on the shoulder of the slope. Alternatively, a compost berm may be placed at the top of the slope.

If seed is to be added to the compost blanket it must be specified according to Specification 200.1.1.

Compost used in compost blankets must meet the criteria for Category A quality in accordance with the *Canadian Council of Ministers of the Environment (CCME) Guidelines for Compost Quality*, and also meet local municipal and provincial requirements.

200.1.5.3 Implementation

Compost must be free of Noxious and Prohibited noxious weeds as defined in the *Weed Control Act 125/2016*, pesticide residues, and garbage.

Compost blankets must be installed by a specialized, certified supplier using a pneumatic blower truck or pre-approved alternative.

Prepare the slopes by removing loose rocks, roots, clods, stumps, and debris over 50 mm in diameter.

Machine track-walk up and down slopes before application according to Specification 200.2.5.

Extend compost blankets 1.0 m over the crest of the treated slope.

Winter Operations

Prior to winter, ensure locations with compost blankets have been properly covered with an adequate product and that the areas are in good shape without damage from vehicle and equipment movement.

Install compost blankets when the ground is free of snow where soil has been track-packed or surface roughened to prevent compost blankets from shearing off the slope. Any seed installed with the compost blanket must be dormant seed. Clearing of snow with equipment is acceptable prior to the installation of compost only if proper track packing or surface roughening can still be achieved.

200.1.5.4 Inspection and Maintenance

Confirm compost application depth meets requirements for the slope; if not, apply additional compost.

Re-apply compost to bare or eroded areas as required.

If compost is eroding from an area, install additional upstream controls.

For steep slopes, greater than 25%, wattles, logs or barriers should be installed (See Specification 200.2.1).

200.1.6 AGGREGATE COVER

C-Value & K-Value Adjustments	<table border="1"> <thead> <tr> <th rowspan="2">Type</th> <th colspan="2">Application Rate</th> <th rowspan="2">Slope %</th> <th rowspan="2">C-Factor</th> <th colspan="2">Length limit</th> </tr> <tr> <th>tons/acre</th> <th>Kg/ha</th> <th>feet</th> <th>meters</th> </tr> </thead> <tbody> <tr> <td rowspan="7">Crushed Stone 6.35 mm (1/4") – 38.1 mm (1 1/2")</td> <td>135</td> <td>302,630</td> <td><16</td> <td>0.05</td> <td>200</td> <td>61</td> </tr> <tr> <td>135</td> <td>302,630</td> <td>16-20</td> <td>0.05</td> <td>150</td> <td>46</td> </tr> <tr> <td>135</td> <td>302,630</td> <td>21-33</td> <td>0.05</td> <td>100</td> <td>30</td> </tr> <tr> <td>135</td> <td>302,630</td> <td>34-50</td> <td>0.05</td> <td>75</td> <td>23</td> </tr> <tr> <td>240</td> <td>538,009</td> <td><21</td> <td>0.02</td> <td>300</td> <td>91</td> </tr> <tr> <td>240</td> <td>538,009</td> <td>21-33</td> <td>0.02</td> <td>200</td> <td>61</td> </tr> <tr> <td>240</td> <td>538,009</td> <td>34-50</td> <td>0.02</td> <td>150</td> <td>46</td> </tr> </tbody> </table>						Type	Application Rate		Slope %	C-Factor	Length limit		tons/acre	Kg/ha	feet	meters	Crushed Stone 6.35 mm (1/4") – 38.1 mm (1 1/2")	135	302,630	<16	0.05	200	61	135	302,630	16-20	0.05	150	46	135	302,630	21-33	0.05	100	30	135	302,630	34-50	0.05	75	23	240	538,009	<21	0.02	300	91	240	538,009	21-33	0.02	200	61	240	538,009	34-50	0.02	150	46
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(Source: Adapted from Table C-8 from Wischmeier and Smith, 1978)																																																												
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Drawing	N/A																																																											

200.1.6.1 General

Aggregate cover is the application of clean washed gravel following the application rates in the table above or the presence of stone or gravel at a rate of 10% or more.

200.1.6.2 Design Requirements

Concentrated upstream run-off must be diverted away from areas of aggregate cover.

1) Critical Areas:

- On slopes with highly erosive soils (silt and sand), the granular blanket must be thick enough to prevent erosion of the soils underneath.
- For areas of high groundwater seepage, aggregate cover with a non-woven geotextile fabric underlay must be used to eliminate migration of clay fines into the blanket.

2) Aggregate Quality:

- Aggregates must not contain recycled concrete, mine waste, iron blast furnace slag, or blended nickel slag or clinkers due to **health and safety concerns including** the potential of groundwater contamination from materials contained in the aggregate.
- Aggregate fines must be less than 5% material passing the 2.5-mm sieve.

200.1.6.3 Implementation

Apply after the sites have received their initial grading for quick stabilization. ***Steeper slopes will require track packing or surface roughening to ensure aggregate doesn't slide of the slope.***

Winter Operations

Install aggregate cover when the ground is free of snow. Clearing snow with equipment is acceptable prior to the installation of aggregate cover. For steeper slopes, ensure track packing or surface roughening can be achieved prior to installation.

200.1.6.4.1 Inspection and Maintenance

In areas with frequent traffic, inspect for loss of cover due to gravel and stones punching into the soil. If loss of gravel occurs, apply a top-dress.

Check slopes for washouts during and after significant weather events (rainfall, run-off, and snow melt).

Immediately repair any damage discovered.

200.2 Sediment Control

200.2.1 WATTLES/LOGS/BARRIERS

P-Value	Varies depending on Manufacturer's Specifications
Drawing	N/A
Manufacturer's Specification	Attach: Manufacturer's Specification to <i>Erosion and Sediment Control Plan Application Form</i> . Design and install as per Manufacturer's Specifications. If there is a discrepancy between these Specifications and the Manufacturer's Specifications, the more stringent of the two will apply.

200.2.1.1 General

Wattles, logs, and barriers look similar in that they are cylindrical and are placed upon contours across slopes. Wattles, such as straw wattles, are used to slow down the velocity of silt laden run-off while logs, such as aspen curl logs, and barriers, such as compost berms, slow down water and filter it through the log or barrier.

200.2.1.2 Design Requirements

Wattles, logs, and barriers must all be installed as per the Manufacturer's Specifications.

Concentrated upstream run-off must be captured and diverted away from exposed slopes or conveyed down the slope in a suitable channel.

200.2.1.3 Implementation

Any rills and gullies on the slope must be repaired prior to the installation of wattles, logs, and barriers.

Spacing of wattles, logs and barriers must comply with the Manufacturer's Specifications for the product size and type.

Winter Operations

Prior to winter, remove all soil behind the wattle, logs, or barriers to ensure 100% capacity prior to run-off events. For filtering products, which are filled with sediment, replace product prior to winter.

Installation of wattles, logs, or barriers, during the winter is only acceptable in areas where snow has been cleared and if the anchoring method is still possible. Pneumatic methods may be required to penetrate the soil during frozen ground conditions.

200.2.1.4 Inspection and Maintenance

All sections of the wattle, log or barrier must be inspected to ensure they are in good contact with the soil.

Any rills or undermining must be repaired promptly; add additional run-off or erosion control for areas subject to rilling.

For wattles, remove sediment retained behind the wattle when it reaches one-third of the exposed height of the structure.

For logs and barriers that filter run-off, remove, and replace the log or barrier when sediment reaches half the height of the product.

200.2.1.5 Removal

Removal or retrieval of the wattle, log or barrier is not required as long as the entire product (netting included) is organic, will decompose, and the product is not installed in an area where final vegetation will be mowed.

Barriers such as compost socks (with the mesh split and removed) may be left onsite if spread out and vegetated or if it is spread out and used as a soil amendment.

200.2.1.a BUFFER STRIPS

P-Value	Slopes 0% to 10% - 0.6 Slopes 11% - 24% - 0.8
Drawing	None
Manufacturer's Specification	Follow either Section A. Existing Vegetation, B. Sod, or C. Seeding of this Vegetative Controls section of the Specification.

200.2.1..a1 General

Buffer Strips are areas of vegetation that have been left at the beginning of the project, grown using seed, or installed using sod. They allow for the deposition of sediment when water flows across the strip.

200.2.1.a.2 Design Requirements

Buffer strips must have a minimum of 65% vegetative cover.

Buffer strips must be a minimum of 15m wide to obtain a C-value. Buffer strips smaller than this may still be installed and used to improve run-off but will not obtain a C-value.

Nothing in this part of the Specifications relieves a person from complying with the most recent versions of the Provincial Weed Control Act, Weed Control Regulation, AR 19/2010, or The City of Calgary Community Standards Bylaw.

200.2.1.a.3 Implementation

Buffer strip installation must comply with either Section A. Existing Vegetation, B. Sod, or C. Seeding of this Vegetative Controls section of the Specification.

Winter Operations

Buffer strip winter operations must comply with any relevant parts of the winter operation requirements of 200.1.1 Seeding, or 200.1.2 Sodding of the Specification.

200.2.1.a.4 Inspection and Maintenance

Buffer strip inspection and maintenance must comply with either Section A. Existing Vegetation, B. Sod, or C. Seeding of this Vegetative Controls section of the Specification.

200.2.2 SEDIMENT CONTAINMENT SYSTEMS

<p>P-Value</p>	<p>The P-value for sediment containment systems is based on the storage volume/hectare and sediment containment system type used (simple or designed) as outlined in the table below.</p> <p>The higher P-value must be selected when a proposed sediment containment system falls between the storage volumes listed. No interpolation is allowed.</p> <table border="1" data-bbox="712 598 1440 1314"> <thead> <tr> <th><i>Example Design Volume (m³/ha)</i></th> <th><i>Simple Sediment Containment System</i></th> <th><i>Designed Sediment Containment System</i></th> </tr> </thead> <tbody> <tr> <td>No Pond</td> <td>1.0</td> <td>1.0</td> </tr> <tr> <td>100</td> <td>0.7</td> <td>0.5</td> </tr> <tr> <td>150</td> <td>0.6</td> <td>0.4</td> </tr> <tr> <td>200</td> <td>0.6</td> <td>0.4</td> </tr> <tr> <td>300</td> <td>0.5</td> <td>0.3</td> </tr> <tr> <td>400</td> <td>0.4</td> <td>0.2</td> </tr> <tr> <td>500</td> <td>0.3</td> <td>0.1</td> </tr> <tr> <td>750</td> <td>0.2</td> <td></td> </tr> <tr> <td>1000</td> <td>0.1</td> <td></td> </tr> </tbody> </table> <p>Go to calgary.ca/StmPP - Approvals to access the Sediment Containment System P-value Calculator</p>	<i>Example Design Volume (m³/ha)</i>	<i>Simple Sediment Containment System</i>	<i>Designed Sediment Containment System</i>	No Pond	1.0	1.0	100	0.7	0.5	150	0.6	0.4	200	0.6	0.4	300	0.5	0.3	400	0.4	0.2	500	0.3	0.1	750	0.2		1000	0.1	
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200.2.2.1 General

The function of a sediment containment system is to provide storage capacity for stormwater run-off from site and to slow the flow velocity of run-off to allow for the sedimentation of suspended soil particles to occur.

Sediment containment systems include:

- sediment ponds; and
- storage ditches.

200.2.2.2 Design Requirements

Clean run-on from stabilized areas must be diverted away from sediment containment systems.

Sediment containment systems, **including sediment forebays** must be:

- constructed below grade; the use of berms to increase the volume of sediment containment is prohibited;
- used in conjunction with other upstream ESC measures;
- located to maximize storage benefit from the terrain and for ease of clean-out and disposal of trapped sediment;
- a minimum of 0.5 m deep and a maximum of 1 m deep;
- constructed with side wall slopes no steeper than 3H:1V;
- flat bottomed; and
- **for sediment ponds greater than 250m³ in size, constructed with an auxiliary spillway, with an adequate width to accommodate flows, that consists of an apron, protected from erosion with cover (e.g. geotextile and riprap material, dissipating mat, TRM) designed to convey water back to a sheet flow pattern without causing additional erosion.**

Sediment containment systems must **not**:

- **have skimmers that flow offsite. The use of skimmers is a non-standard practice and requires completion of the non-standard portion of the ESC Plan Application. Skimmers that flow offsite will also require a drainage authorization.)**
- be placed in areas with high groundwater tables and/or the potential to intercept groundwater;
- be constructed outside of the site property boundary without the adjacent landowner's permission;
- Be constructed within the 1 in 5-year return period inundation area for any of Calgary's creeks or rivers;
- be perched on slopes where they may impact the stability of the slope; and
- have access to **the stormwater system**. This restriction includes direct access to stormwater infrastructure and indirect access such as seepage through gravel bedding and pipe joints into infrastructure.

Designed sediment containment systems shall have the following additional features:

- **Have a minimum length to width ratio (L:W) of 2:1;**
- **Have a designated inflow ditch installed as per Specification 200.2.2.2.1, stabilized with check dams (rock, wattles, sediment logs or barriers as per Specification 200.2.1 and Drawing 6);**
- **The designated inflow ditch shall have a minimum bottom width of 0.3 m, minimum depth of 0.3 m maximum longitudinal slope of 2% and sides slopes of 2H:1V, or flatter; the designer shall ensure the inflow ditch is sized appropriately to safely convey anticipated design inflows without overtopping;**
- **Have an excavated sediment forebay with a minimum depth of 0.5 m, a minimum width of 3.0 m, and a minimum volume equivalent to 10% of the sediment containment system designed volume;**
- **The sediment forebay shall be separated from the main sediment containment system with a berm constructed of in-situ material;**
- **The forebay berm shall be stabilized with geotextile or plastic installed as**

per specification 200.1.3; and

- *Have a designated, stabilized auxiliary spillway stabilized with a control or practice, capable of managing the shear stress of the concentrated flow to safely convey overflow spill back to a sheet flow condition away from the containment system.*

200.2.2.2.1 Storage Ditches

Storage ditches must **not** have a grade along the ditch line that exceeds 2%.

Storage ditches must include compacted soil cross check structures at the spacing outlined in the table:

Table 200.2.2.2.1 Storage and diversion ditch cross check structure spacing

Cross Check Structure Spacing (m)			
	Ditch Depth		
% Slope	0.5 m	0.75 m	1.0 m
1.0	50	75	100
1.5	33	50	67
2.0	25	37	50

Cross check structures installed in storage ditches must:

- Be installed 0.1 m below surface grade;
- Have 1H:1V side slopes;
- **Be shown on the ESC drawings**, and
- Have a 1.5 m flat top.

Storage ditch volume, serving area and serving volume must be provided in the ESC Plan and P-values must be selected given the Sediment Containment Systems P-value/volume noted in Section 200.2.2.

200.2.2.3 Implementation

All vegetation, roots, and debris must be cleared from the footprint area of the **inflow ditch**, sediment containment system, **sediment forebay, auxiliary spillway** and embankments, and disposed of properly.

Sediment containment systems, **sediment forebays and designated inflow ditches** must be constructed by excavating a volume of soil in the ground per the ESC Plan, and the sidewalls, bottoms and cross check structures must be well compacted.

A stake must be set in the **sediment forebay and in the** basin or trap, and a mark added to indicate one-third design depth. Storage ditch cross check structures **and designated inflow ditch check dams** must be spaced as per Table 200.2.2.2.1.

Winter Operations

Prior to winter, clean out sediment containment systems to 100% capacity. This includes the cleaning of any sumps associated with designed ponds.

Sediment containment systems may be installed during the winter if the ground is not yet frozen. When the ground is frozen, larger equipment and/or frost rippers may be used dig sediment ponds. It may not be possible to install sediment containment systems that require compacted cross check structures (e.g. storage ditches) when soils are frozen.

200.2.2.4 Inspection and Maintenance

The sediment containment system, ***including the designated inflow ditch and sediment forebay***, must be inspected for areas of standing water during every inspection and after precipitation events. If the containment systems do not dewater within three days, they must be manually dewatered to maintain adequate storage volume for the next runoff event.

Inspect for rilling, gullyng and slumping ***of soils and damage or displacement to check dams, the forebay berm, and the auxiliary spillway stabilization***; repairs must be made immediately.

Sediment must be removed when it reaches one-third the design depth of the sediment containment system, ***including the sediment forebay***.

Removed sediment must be disposed of by either spreading and stabilizing it onsite or removing it to a suitable location.

200.2.2.5 Removal

The sediment containment system, ***and sediment forebay***, must be backfilled once construction is complete and the drainage area is stabilized. ***Any geotextiles, synthetic check dams, and RECP materials shall be removed from site and properly disposed of.***

200.2.3 DIVERSION CHANNELS

P-Value	1.0
Drawing	5, 6

200.2.3.1 General

Diversion channels are used to direct water into an appropriate ESC measure.

200.2.3.2 Design Requirements

Channels intended for diversion do not have a P-value. If the channel is intended for run-off storage, refer to the section on Sediment Containment Systems for P-values based on storage volume.

Channels must be designed to manage the volume and flow velocity of a two-year, 24-hour storm event and the final channel must have the proper grade and cross-section shape to discharge the design flow and provide positive drainage.

Channels must be stabilized with an erosion control measure (e.g. riprap, RECPs, vegetation), capable of withstanding the run-off velocity that the ditch is designed for.

The slope along the channel ditch line must be a minimum of 2% and a maximum of 5% to maintain positive drainage and avoid water ponding and breaching of channel flow.

Cross check structures are required in diversion channels that are moving on-site storm water.

Cross check structures are not required if the diversion channel is only moving clean run-on off-site ***and erosion will not occur in the channel.***

Cross check structures must be composed of 75 mm to 300 mm clean wash gravel and must adhere to all specification details in drawing 6. Check structures must be space within the channel so that the bottom of the upstream check structure is level with the top of the downstream check structure. ***Cross check structures must be installed 100mm below the top of the channel.***

Channels must be constructed:

- A minimum of 0.5 m deep and a maximum of 1 m deep;
- With any overburden placed upstream from the ditch and leveled out or compacted;
- With parabolic or trapezoidal cross-sections, with side slopes of 3H:1V or flatter;
- So that run-off is directed to an appropriately stabilized outlet when discharging to a sediment containment system; and
- With an erosion control designed to withstand water velocity and shear.

200.2.3.3 Implementation

Excavate channel to the slope percentage specified in the ESC Plan.

Place overburden on the upstream side of the ditch and compact it.

Channels must be stabilized with an appropriate erosion control practice immediately after construction.

- **Winter Operations**

Prior to winter, repair any issues, such as scour, and ensure that diversion channels have been adequately protected from scour with the product identified in the approved ESC Plan.

Diversion channels may be installed during the winter if the ground is not yet frozen. When the ground is frozen, larger equipment and/or frost rippers may be used to dig diversion channels. If the ditch specifies a cover product (e.g. blanket,) it must be possible to install this at the same time.

It may not be possible to install sediment containment systems that require compacted cross check structures when soils are frozen.

200.2.3.4 Inspection and Maintenance

Inspect the channel for sediment deposition and remove if present.

Ensure the erosion control installed is adequate to withstand the flows encountered; repair any damage to the erosion controls when required.

Repair any damage to the channel before the end of each working day.

Prior to freeze-up, stabilize all temporary channels adequately to handle snowmelt.

200.2.3.5 Removal

The diversion channel must be backfilled once construction is complete and the drainage area is stabilized. If required, remove the erosion control that was being used to stabilize the ditch.

The backfilled area must be graded to match the surrounding grade.

200.2.4 **DIVERSION BERMS**

P-Value	1.0
Drawing	7

200.2.4.1 General

Diversion berms are linear piles of compacted earth that are used to direct stormwater into an appropriate ESC measure.

200.2.4.2 Design Requirements

Diversion berms do not have a P-value.

Ponding of water behind the berm is not authorized.

Diversion berms must be designed to manage the volume and flow velocity of a two-year, 24-hour storm event and the final berm must have the proper grade and shape, discharge the design flow, and provide positive drainage.

The entire berm must be compacted and stabilized with an appropriate erosion control cover to withstand flow velocity and shear stress.

The catchment area must not exceed two hectares.

Typical berm design details are:

- Cross sectional dimensions:
 - Minimum 0.5 m high and maximum 1 m high;
 - Minimum width of 0.5 m and a maximum height of 1 m.
- Berms must be trapezoidal in cross-section with side slopes of 2H:1V or flatter.
- Berms greater than 1 m in height must be designed by a geotechnical engineer **and their use requires completion of the non-standard portion of the ESC Plan Application.**

200.2.4.3 Implementation

Apply soil lifts at an appropriate depth to achieve compaction to a minimum of 97% of Standard Proctor Density.

Construct the berm to achieve slope percentage and trapezoidal cross-sections as specified in the ESC Plan.

Berm must be stabilized immediately after construction with an appropriate erosion control practice as approved in the site ESC Plan.

Winter Operations

Prior to winter, ensure the cover specified to withstand flow velocity and shear stress has been installed and is in good working order. Repair any areas where cover has been moved or damaged.

Diversion berms may be installed during the winter if the ground is not yet frozen. Compaction rates can't be achieved when the ground is frozen.

200.2.4.4 Inspection and Maintenance

Inspect the berm for sediment deposition and remove if present.

Ensure the erosion control installed is adequate to withstand flows encountered; repair any damage to the erosion controls when required.

Repair any damage to the berm and re-compact as soon as function is compromised.

Prior to freeze-up, stabilize all berms adequately to handle snowmelt.

200.2.4.5 Removal

The diversion berms must be removed or flattened to meet the surrounding grade once construction is complete and the drainage area is stabilized. If required, remove the erosion control that was being used to stabilize the berm.

200.2.5 SURFACE TEXTURING

P-Value	Varies depending on texturing practices:		
	Surface Roughening		
	P-value	0.9	
	Contour Furrowing		
	P-Value	% Slope	Max Length
	0.6	1 to 2	120
	0.5	3 to 5	90
	0.5	6 to 8	60
	0.6	9 to 12	40
	0.7	13 to 16	25
Terracing			
P-Value	% Slope		
0.12	1 to 2		
0.10	3 to 8		
0.12	9 to 12		
0.14	13 to 16		
0.16	17 to 20		
0.18	>20		
(Source: Designing for Effective Sediment and Erosion Control on Construction Sites, Fifield, 2001)			
Drawings	Surface Roughening	8	
	Contour Furrowing	9	

200.2.5.1 General

Surface texturing involves modifying the soil surface to reduce run-off velocity and, in many cases, increase infiltration. There are three common types of slope texturing practices used in Calgary:

- **Surface roughening:** involves running tracked machinery on exposed soil *in a manner that creates micro ponding/infiltration zones horizontal to the slope direction.*

- **Contour furrowing:** involves using mechanical equipment to deep-rip furrows into the exposed soil perpendicular to the flow of water down a slope. The furrows slow the water down and allows it to accumulate in the furrow trenches.
- **Terracing/benching:** terracing and benching is used to reduce the effective length of long slopes (break up slopes) by providing large benches running along the slope contours.

All three types of texturing are intended to be used as a temporary ESC practice.

Always confirm the presence of shallow utilities or other conditions where contour furrowing would not be a suitable practice.

Conditions where surface texturing is not suitable include, but are not limited to:

- ***high-traffic areas;***
- ***exposure of a contaminated soil;***
- ***mixing of subsoil with topsoil;***
- ***geotechnical requirement to avoid saturating a slope with infiltrating runoff.***

200.2.5.2 Design Requirements

All slope texturing must be maintained through construction activities, or the P-value reverts to 1.0.

1) Surface roughening

Machine-tracking must be limited to one or two passes to prevent excessive compaction.

Machine-tracking must be installed ***in a manner that creates micro ponding/infiltration zones horizontal*** to the slope direction.

Excessively wet or clayey soils must not be track packed.

2) Contour furrowing

Contour furrows must follow the contour lines of the slope.

Furrows must be installed at a ***minimum*** depth ***of*** 200 mm with a maximum spacing of 600 mm between contours ***troughs***.

3) Terracing/benching

Benches and terraces must have sufficient volume to contain a two-year, 24-hour storm event (380 cubic metres per hectare [m³/ha]) within the terrace without overflowing.

All benches and terraces must be designed and stamped by a qualified geotechnical engineer for slope stability.

200.2.5.3 Implementation

1) Surface roughening

Use tracked construction equipment to move up and down the slope, leaving depressions.

Tracks must be installed ***in a manner that creates micro ponding/infiltration zones horizontal*** to the slope direction.

If using tracked equipment, the minimum depth of imprint left by the track in the soil must be 30 mm.

If using equipment with multiple tamping feet (e.g. Sheepsfoot roller), the imprint left in the soil must be of minimum dimensions 60mm long x 50 mm wide x 50 mm depth.

2) Contour furrowing

Furrows must be ripped across the width of and horizontal to the slope.

3) Terracing/benching

A diversion channel or other appropriate measure must be installed at the top and bottom of the slope to be terraced (see Specification for Diversion Channels). Water from the diversion channels must flow into a sediment containment system or an area approved within the ESC Plan.

Narrow, flatter sections of terrain on the slope must be constructed horizontal to slope direction.

Benches and terraces must be graded back towards the slope and drained with a gentle gradient to a stabilized outlet.

Winter Operations

Prior to winter, ensure surface texturing is installed in all required areas. Repair areas that have been damaged, flattened or damaged by natural and mechanical forces.

Surface texturing may be installed during the winter if the ground is not yet frozen. When the ground is frozen, larger equipment and/or frost rippers may be used to surface texture.

200.2.5.4 Inspection and Maintenance

Inspect for rills and gullies; surface texturing must be reinstalled when impacted by wind, water, and onsite construction activities.

Ensure there have been no concentrated sediment releases from terracing and benching; if required, repair and resolve upstream concerns.

200.2.5.5 Removal

If required, level slopes to design grade.

200.2.6 **SILT FENCE**

P-Value	0.6
Drawing	10, 11

200.2.6.1 General

Silt fence is a semi-porous geotextile material attached to wooden or metal posts and is primarily used to promote sedimentation through ponding sediment-laden runoff.

200.2.6.2 Design Requirements

The maximum area draining to the silt fence must not exceed 0.1 ha per 30 m run of silt fence. **To calculate the serving area a silt fence is capable of managing use the following calculation:**

Meters of Silt Fence that will Pond Water * 0.0333 = Hectares Silt Fence Can Serve

<i>Meters of Silt Fence that will Pond Water</i> <i>(if using J-hooks, use the smile portion where water will pond for the number of meters, not the straight length that goes to the bottom of the J-hook)</i>	<i>Hectares Silt Fence Can Serve</i>
5	0.017
10	0.033
15	0.050
20	0.067
25	0.083
30	0.100
35	0.117
40	0.133

The maximum length of a section of silt fence must not exceed 40 m.

The runoff path length above a fence must not exceed 30 m.

Silt fence must be installed in J-hook or Smile. ***The configuration of the silt fence must be clearly shown on the drawings.***

Silt fence must be installed a minimum of 2 m away from the toe of the slope.

Maximum slope gradient upstream of a fence must not exceed 2H:1V.

J-hook spacing is impacted by serving area and slope percentage. The steeper the slope and the larger the serving area, the less distance between J-hooks. Even with shallow slopes and small serving areas, J-hook spacing must never exceed 30 m.

Silt fence must be proposed/installed on ground contours with the ends of the fence pointed upslope.

Silt fence must not:

- Be constructed in areas where flow velocity is to exceed 0.03 m/s;
- Be installed around the perimeter of construction site in a long linear fashion;
- Be installed on existing fence, such as chain link or temporary construction fence;
- Be installed in locations where concentrated run-off occurs;
- Be used in drainage swales where there are grades that exceed 2% and/or the contributing area exceeds 0.8 ha;
- Be designed to impound sediment or water more than 0.45 m high; and
- Use wire backing for fence reinforcement, unless previously approved in the ESC Plan.

200.2.6.3 Implementation

Silt fence must be trenched into the ground at a minimum of 0.2 m deep.

Silt fence must be installed at a minimum height of 0.6 m and a maximum height of 0.9 m (from grade to the top of the silt fence fabric).

Silt fence trench must be backfilled and compacted to grade to hold the base of the silt fence firmly in place.

Silt fence posts must be driven 600 mm into the ground and be spaced at a maximum distance of 2 m apart.

Silt fence must be secured on either:

- Steel posts (minimum 2 kilograms per metre [kg/m] with projections for fastening fence);
or
- Wood posts (100 mm in diameter, with a minimum length of 1.35 m).

Silt fence must be firmly secured to the upstream side of posts using staples, wire, or plastic tie-straps.

Where joints are required, construct at minimum 0.4-m overlap between silt fence ends and wrap the end-posts together with a ½ turn at minimum.

Winter Operations

Prior to winter, clean silt fence to 100% capacity.

Silt fence may be installed during the winter if the ground is not yet frozen. When the ground is frozen, silt fence may be installed by laying a 400mm flap on the upstream side of the installation and covering the flap with a seal that would hold the flap down ensuring direct contact with the ground and the flap the entire way along to ensure no undermining of the silt fence. Examples of such a seal would be 50mm of 20mm+ crushed stone or gravel, or 50mm of soil.

200.2.6.4 Inspection and Maintenance

Ponded water behind silt fence must be removed within 24 hours after each storm event.

Sediment must not be allowed to exceed 50% of the height of the silt fence.

Silt fence must be firmly entrenched and anchored in the soil.

Replace damaged fabric and address flow around and/or undermining problems immediately.

200.2.6.5 Removal

Silt fence fabric and posts must be removed both above and below grade once the upstream catchment area has been permanently stabilized.

Any excavations required to remove silt fence and post must be backfilled, compacted, covered with an appropriate erosion control and stabilized.

200.3 Support Practices

200.3.1 STABILIZED GRAVEL ACCESS

P-Value	1.0
Drawing	14

200.3.1.1 General

Stabilized gravel access pads consist of a layer of gravel over a geotextile base used to reduce mud tracking in areas where vehicles enter and exit a construction site.

Construction entrances and exits may also include, rattle grates, rig mats, track pads, track out control mats, and wheel wash stations. To use any practice not located in the *Approved Products List Erosion and Sediment Control*, submit a Non-standard Control attachment with the ESC Application.

200.3.1.2 Design Requirements

Install stabilized construction access points at all locations where vehicles are directed to enter or exit a construction site.

The stabilized construction access point must be located inside the construction boundary.

The stabilized construction access point may not be placed in any portion of the stormwater system including but not limited to the gutter.

Stabilized access must not be located on steep grades or entrances to curves in public roadways.

Avoid installing entrances over grated-top manholes and catch basins.

Installation of any practices used to cross a sidewalk requires authorization from The City Traffic Engineer under the Streets Bylaw.

Use clean wash rock that is hard, durable, **washed** and 40 mm **or greater** in diameter.

The thickness of the pad must be a minimum of 150 mm in depth.

Access must be a minimum width of **4** m and a minimum length of 15 m.

Install a sediment trap on the downstream side of the stabilized construction entrance.

Install a diversion ridge that will direct water to a downstream sediment **containment system** when the stabilized construction entrance is angled towards the roadway with a slope of 2% or greater.

Aggregates must not contain recycled concrete, mine waste, iron blast furnace slag, or blended nickel slag or clinkers due to health and safety concerns including the potential of groundwater contamination from materials contained in the aggregate.

200.3.1.3 Implementation

Level the ground at the stabilized construction entrance and install a diversion ridge, if required.

Install geotextile fabric and place 40mm **or greater** diameter rock on top.

If required install a downstream sediment ***containment system***.

Winter Operations

Prior to winter, ensure the gravel access is in good condition to support access during freeze-thaw conditions. This may require repair, clean out, and/or top dressing.

A gravel access may be installed during the winter by removing snow prior to installation so that the filter fabric has contact with the soil.

200.3.1.4 Inspection and Maintenance

Ensure all traffic is using the stabilized construction access points.

Inspect the entrance for effectiveness daily during active construction.

Excessively muddy vehicle wheels and tires must be washed to remove sediment prior to entering City streets. When washing is required, wash on an area stabilized with crushed stone that drains into an approved sediment trap or basin.

Maintain the entrance in a condition that will prevent tracking or flowing of sediment onto public right-of-ways (ROWs). This maintenance may require top dressing, repair, clean-out, or some combination of these activities for any measures used to trap sediment.

Immediately remove all sediment spilled, dropped, washed, or tracked onto City streets.

200.3.1.5 Removal

Remove the stabilized construction access when permanent stabilization has been established on site roadways or when access at the location is no longer required.

200.3.2 **STORM INLET CONTROLS**

P-Value	1.0
Drawing	15, 16
Manufacturer's Specification	<p>For manufactured inlet protection, attach the Manufacturer's Specification to <i>Erosion and Sediment Control Plan Application Form</i>.</p> <p>Design and install as per the Manufacturer's Specifications.</p> <p>If there is a discrepancy between these Specifications and the Manufacturer's Specifications, the more stringent of the two will apply.</p>

200.3.2.1 General

Inlet controls are temporary devices that only work when temperatures are above 0 °C. They must be removed before winter sets in (November 1) and reinstalled before significant spring runoff events (April 30).

Three standard types of inlet protection in Calgary are:

- **Block and gravel inlet sediment barrier:** cinder blocks surrounded by filter fabric and **20mm plus washed** gravel.
- **Silt fence sediment barrier:** silt fence installed around an inlet.
- **Manufactured inlet protection:** protection designed to attach to a catch basin or be placed directly over a catch basin.

200.3.2.2 Design Requirements

Prior approval (via an ESC Plan) must be received before installing inlet protection on any part of the public or private storm **water** system. Failure to obtain approval can lead to fines under the **Stormwater Bylaw (37M2005)**.

Storm inlet controls may only be installed on an impermeable surface, such as pavement, when the control is located on a catch basin less than 5 m downstream of a construction access.

Inlet control must be removed after the first lift of impermeable surface has been installed.

Inlet control must not be the only practice proposed on site at any time during construction and must be paired with an upstream erosion control.

Inlet controls must be installed with **designed** overflow devices to accommodate high flows. **Installation of a geotextile fabric over or under the inlet is not acceptable.**

Inlet controls must be removed during periods of time when icing could occur. This time period is defined as November 1 to April 30.

200.3.2.3 Implementation

1) Block and gravel

Block and gravel systems must be chosen when low ponding (less than **190 mm**) is expected.

Blocks with appropriately sized holes to allow filtered water to flow through to the inlet must be placed one to two blocks high (**190-380mm**) **high** around the inlet with block **holes** facing the direction of flow.

Filter fabric must be placed on the outside face of the blocks **with 150 mm of fabric overlapping on the top the block. Filter fabric must be anchored 300 mm under clean washed stone.**

20 - **40** mm diameter clean washed **stone** must be placed around the entire inlet (0.6 – 1.0 m wide) and the **stone** must be sloped away from the top of the concrete blocks **at a 50% grade or flatter.**

Stones must be placed **from grade to 50 mm below the top of the block.**

The slope to the block and the gravel inlet protection must be less than 5%.

2) Silt fence barrier

Four wooden stakes (100 mm x 50 mm x 1000 mm deep) must be driven to a depth of **600** mm, at each corner of the **storm inlet.**

The top elevation of the stakes must be:

- A maximum of 0.5 m above the ground; and
- Graded to the silt fence barrier at a maximum of 5%.

Stakes must be secured with a top wooden frame connected between each stake.

Silt fence must be secured around the 100 x 50 mm frame and firmly anchored to the wooden frame.

Filter fabric must be embedded into the soil at least **200** mm deep. **If the ground is frozen, add gravel (20mm +) around the outside or trenched in, using a 400mm flap on the upstream side of the installation and covering the flap with a seal that would hold the flap down ensuring direct contact between the ground and the flap the entire way along to ensure no undermining of the silt fence. Examples of such a seal would be 50mm of 6.35mm to 38.1mm crushed stone or gravel, or 50mm of soil.**

3) Manufactured inlet protection

Refer to the manufacturer's information for more details on implementation.

Winter Operations

Prior to winter, remove all inlet protection. This time period is defined as November 1 to April 30. Inlet controls must be removed during periods of time when icing could occur.

200.3.2.4 Inspection and Maintenance

Remove accumulated sediment after each run-off event and deposit it at a location where it cannot be re-entrained or transported.

Repair or replace damaged materials as soon as function is compromised.

200.3.2.5 Removal

Inlet sediment control systems must be removed:

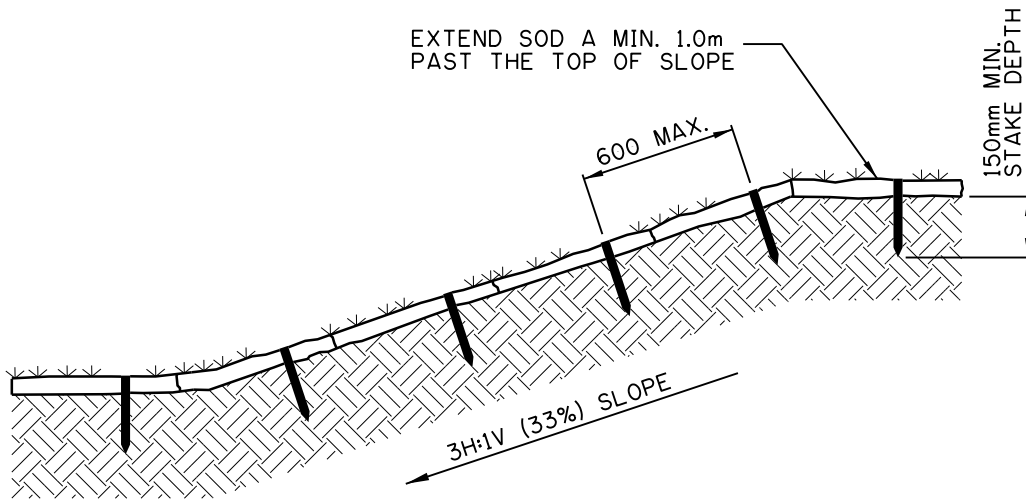
- When the contributing area is stabilized;
- When the first lift of pavement is installed around the catch basin;
- During winter (November **1** to April **30**); and
- When they are no longer called for in the ESC Plan.

Any inlet protection that remains in place after it is no longer required as part of the approved ESC Plan must have a separate authorization under the ***Stormwater Bylaw (37M2005)***.

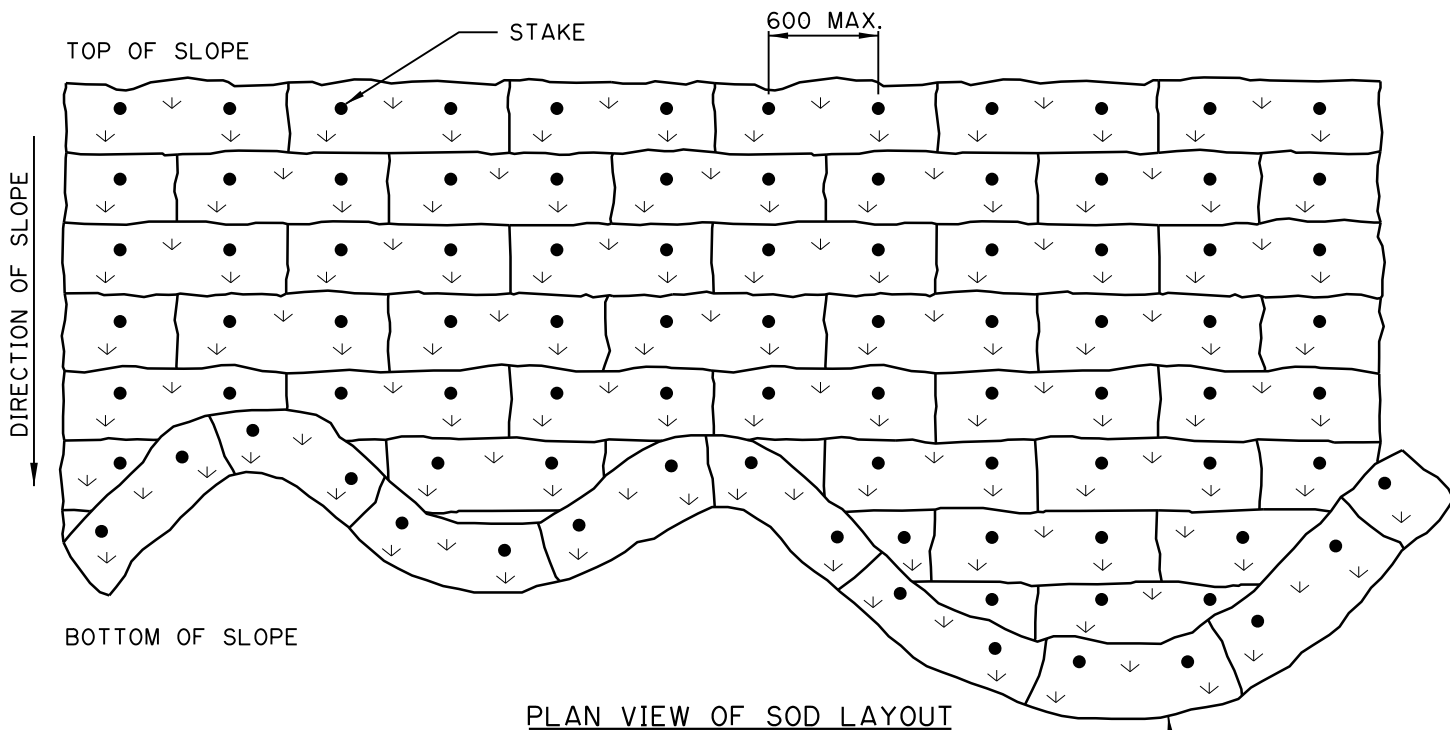
- **Standard Drawings**

1	Sodding
2	Rolled Erosion Control Product: Slope Installation
3A	Sodding Channel Installation
3	Rolled Erosion Control Product: Channel Installation
4A	Simple Sediment Containment System
4B	Designed Sediment Containment System
5	Sediment Containment System Storage Ditch
6	Sediment Containment System Storage Ditch with Gravel
7	Diversion Berm
8	Surface Tracking
9	Contour Furrowing
10	Silt Fence
11	Silt Fence

12	Combined with 10&11
13	Combined with 10&11
14	Stabilized Gravel Access
15	Block and Stone Sediment Filter
16	Silt Fence Box



CROSS SECTION OF 3H:1V (33%) SLOPE




FULL ROW OF SOD TO BE USED ON PERIMETER OF SODDED AREAS

NOTES:

1. STAKING REQUIRED ON SLOPES 3H:1V (33%) OR GREATER.
2. STAKES MUST BE REMOVED AFTER ESTABLISHMENT OF VEGETATION IF NOT BIODEGRADABLE.
3. SOD TO BE PLACED PERPENDICULAR TO SLOPE DIRECTION.
4. SOD TO BE LAID CLOSELY TOGETHER WITH JOINTS IN ADJACENT ROWS STAGGERED.

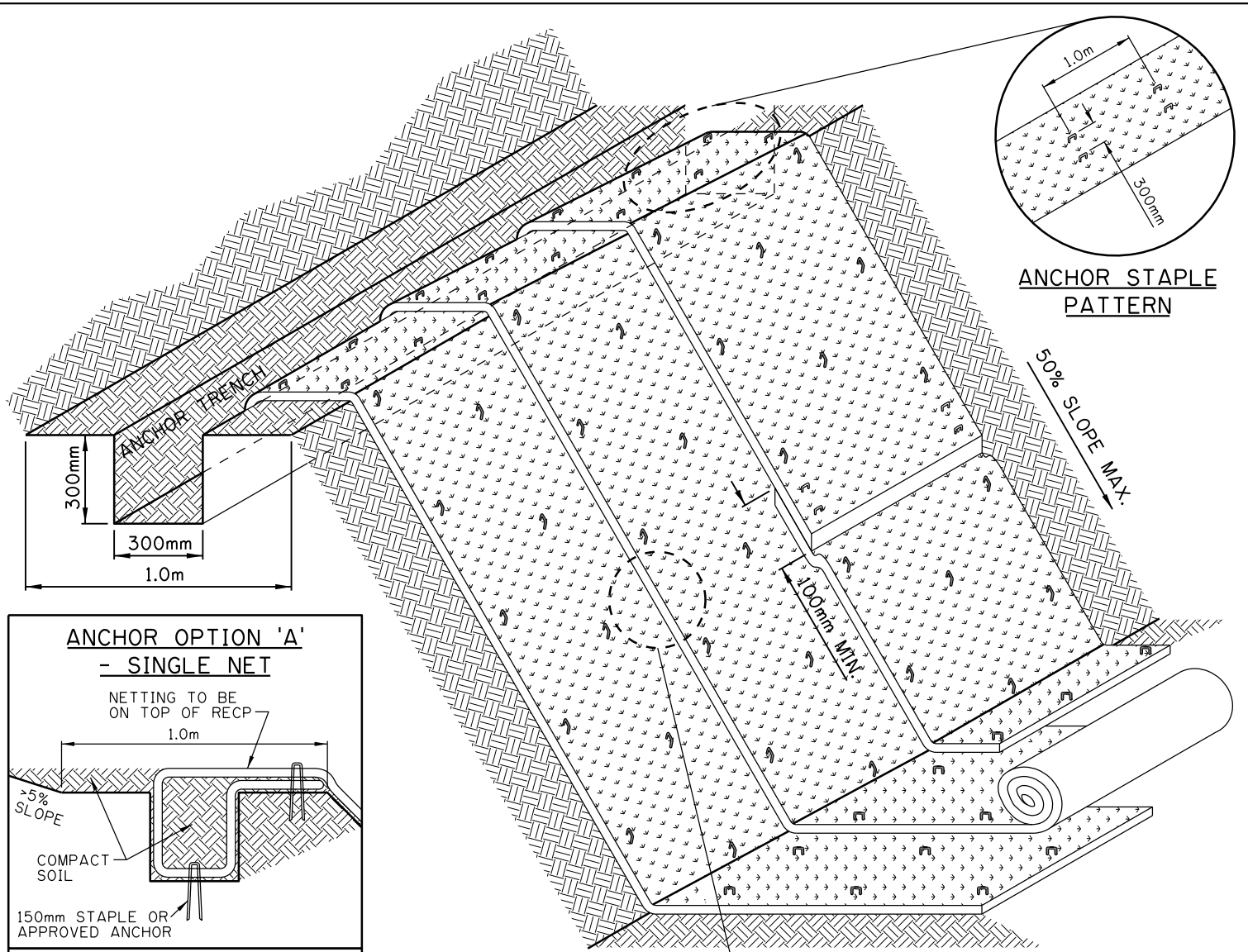
DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

No.	Date	Revision	App'd
2	2022/03/17	DESIGN DETAILS MODIFIED BY COC	AP
1	2017/08/29	DESIGN DETAILS MODIFIED BY COC	AP

Date	2017/08/29
Scale	N.T.S
Approved by	
for The City of Calgary	

EROSION CONTROL
SODDING

Sheet	1
File Number	502.0001.001



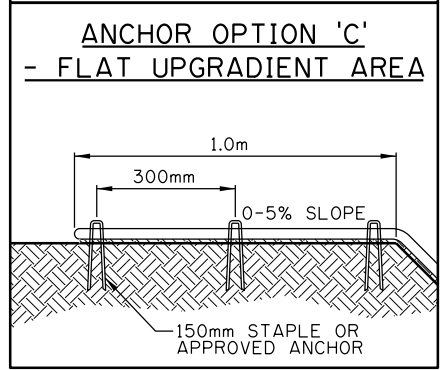
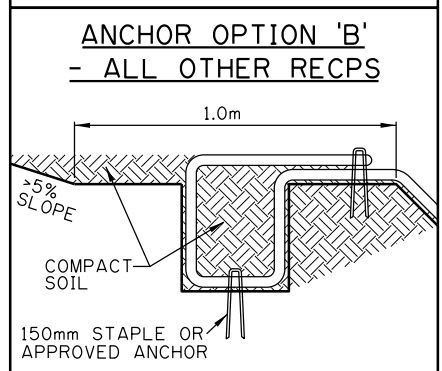
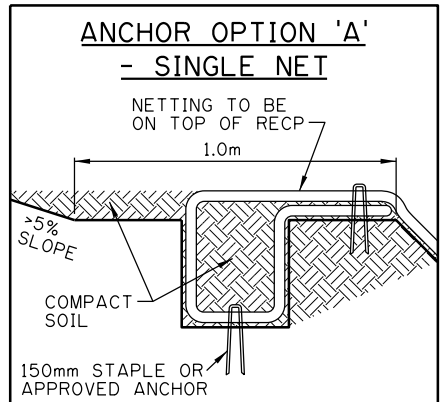
ANCHOR STAPLE PATTERN

50% SLOPE MAX.

100mm MIN

150mm ANCHOR

OVERLAP BETWEEN ADJACENT RECP ROLLS



NOTES:

1. A MINIMUM OF 1500mm EXCESS RECP TO BE USED IN ANCHOR TRENCH.
2. ENSURE SLOPE SURFACE IS FREE OF LOOSE MATERIAL & THAT THERE IS GOOD SOIL TO RECP CONTACT.
3. IF SEED TO BE USED, IT MUST BE INSTALLED BEFORE RECP IS INSTALLED OVER SOIL.
4. STAPLE PATTERN TO MEET MANUFACTURER'S SPECIFICATION.
5. ALL ANCHORS TO BE REMOVED (UNLESS BIODEGRADABLE) AFTER VEGETATION IS ESTABLISHED.

DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

No.	Date	Revision	App'd
2	2022/03/17	DESIGN DETAILS MODIFIED BY COC	AP
1	2017/11/20	DESIGN DETAILS MODIFIED BY COC	AP

Date
2017/11/20

Scale
N.T.S

Approved by
[Signature]

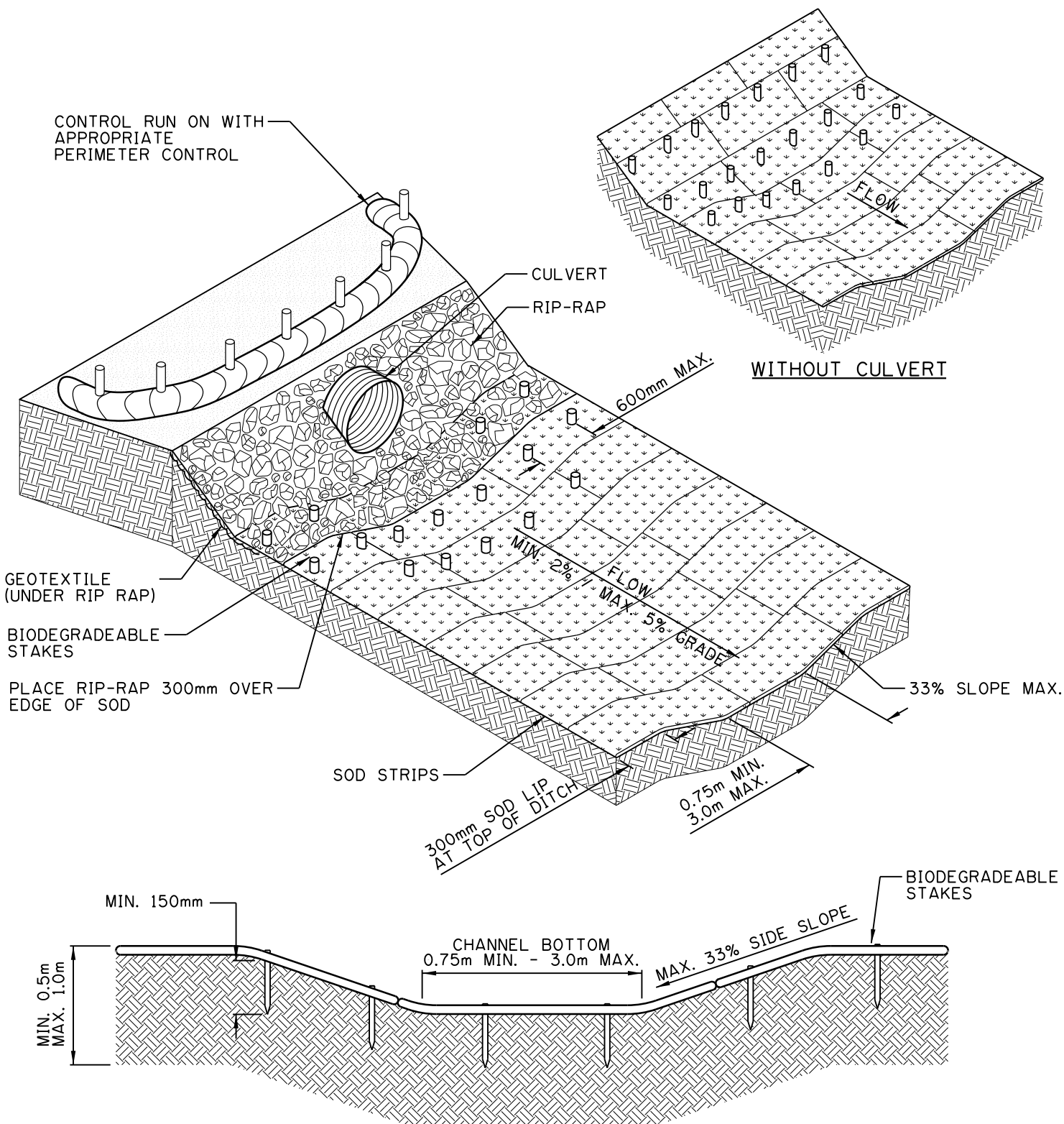
for The City of Calgary

EROSION CONTROL

ROLLED EROSION CONTROL PRODUCT (RECP) SLOPE INSTALLATION

Sheet
2

File Number
502.0002.001



NOTES:

1. MIN. GRADE OF DITCH 2%. MAX. 5%.
2. MAX. SIDE SLOPE 33%.
3. CONTROL RUN ON WITH APPROPRIATE PERIMETER CONTROL.
4. INSTALL SOD PERPENDICULAR TO CHANNEL FLOW.
5. STAKE SOD EVERY 600mm MAX.
6. MAX. CHANNEL BOTTOM WIDTH 3.0m. MIN. 0.75m.
7. FOR CHANNELS WITH CULVERT INLET - INSTALL RIP-RAP AROUND CULVERT AND DOWN TO FIRST STRIP OF SOD.
8. SEE INSET DRAWING FOR SOD INSTALL WITHOUT CULVERT.
9. STAKES MUST BE REMOVED AFTER ESTABLISHMENT OF VEGETATION IF NOT BIODEGRADABLE.
10. STAKES TO BE MIN. 150mm DEEP.
11. STAKES MUST BE INSTALLED LEVEL WITH TOP OF SOD.
12. SOD TO BE INSTALLED CLOSE TOGETHER WITH JOINTS IN ADJACENT ROWS STAGGERED.
13. DRAWING DETAIL IS ONLY APPLICABLE TO FLAT-BOTTOM/TRAPEZOIDAL DITCHES.

CROSS SECTION


DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

No.	Date	Revision	App'd

Date
2022/03/17

Scale
N.T.S

Approved by



for The City of Calgary

EROSION CONTROL

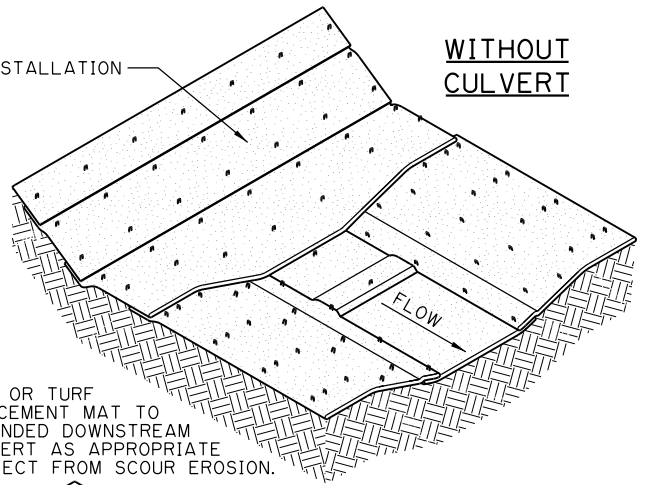
SODDING CHANNEL INSTALLATION

Sheet
3A

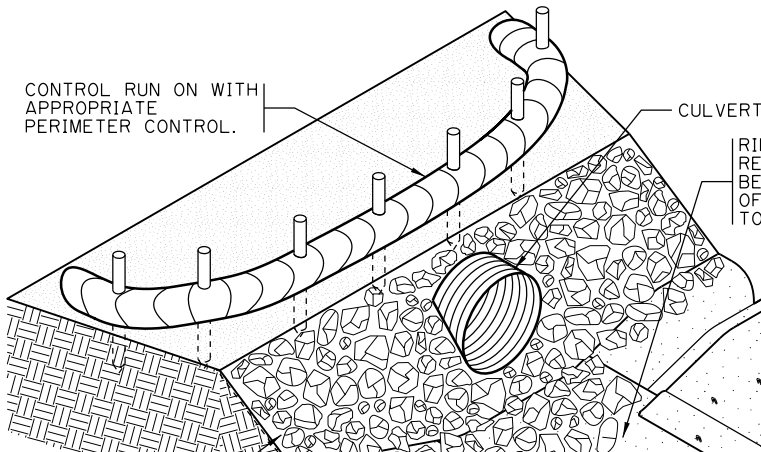
File Number
502.0003.002

SHINGLED INSTALLATION

**WITHOUT
CULVERT**



CONTROL RUN ON WITH
APPROPRIATE
PERIMETER CONTROL.

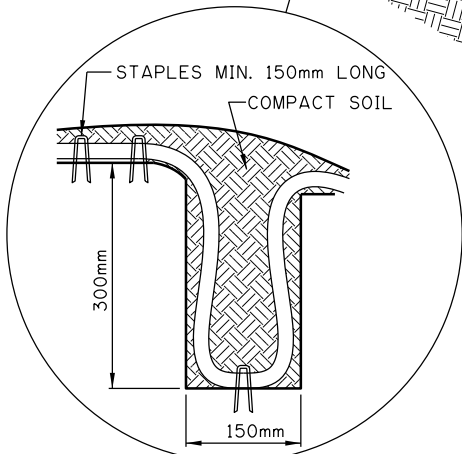
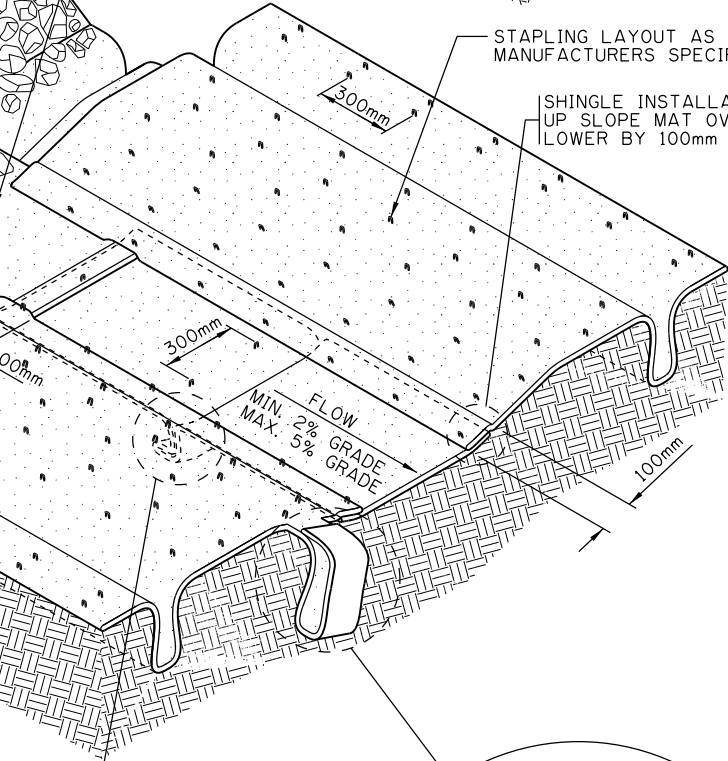


RIP-RAP OR TURF
REINFORCEMENT MAT TO
BE EXTENDED DOWNSTREAM
OF CULVERT AS APPROPRIATE
TO PROTECT FROM SCOUR EROSION.

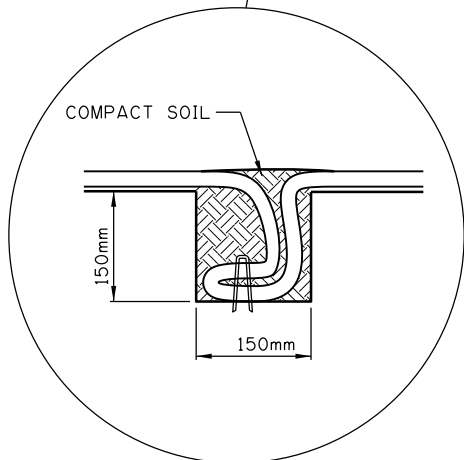
STAPLING LAYOUT AS PER
MANUFACTURERS SPECIFICATIONS.

SHINGLE INSTALLATION WITH
UP SLOPE MAT OVERLAPPING
LOWER BY 100mm MIN.

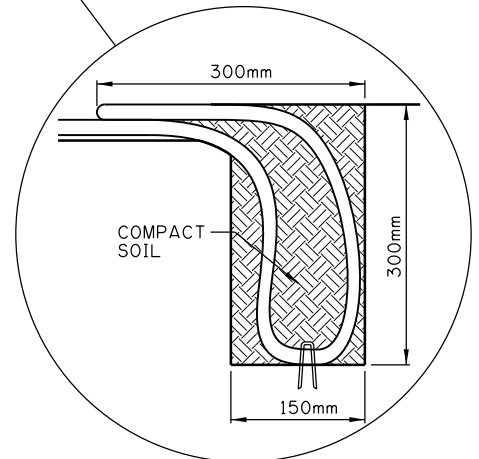
RIP-RAP
GEOTEXTILE



**LENGTHWISE
ANCHOR TRENCH**



CHECK SLOT



**TERMINAL SLOPE
AND ANCHOR TRENCH**

NOTES:

1. MIN. GRADE OF DITCH 2%. MAX. 5%.
2. CONTROL RUN ON WITH APPROPRIATE PERIMETER CONTROL.
3. STAPLES TO BE MIN. 150mm LONG.
4. STAPLES TO BE REMOVED AFTER VEGETATION ESTABLISHED (IF APPLICABLE).
5. IF VEGETATING, SEED MUST BE APPLIED BEFORE RECP INSTALL.
6. STAPLES TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATION.

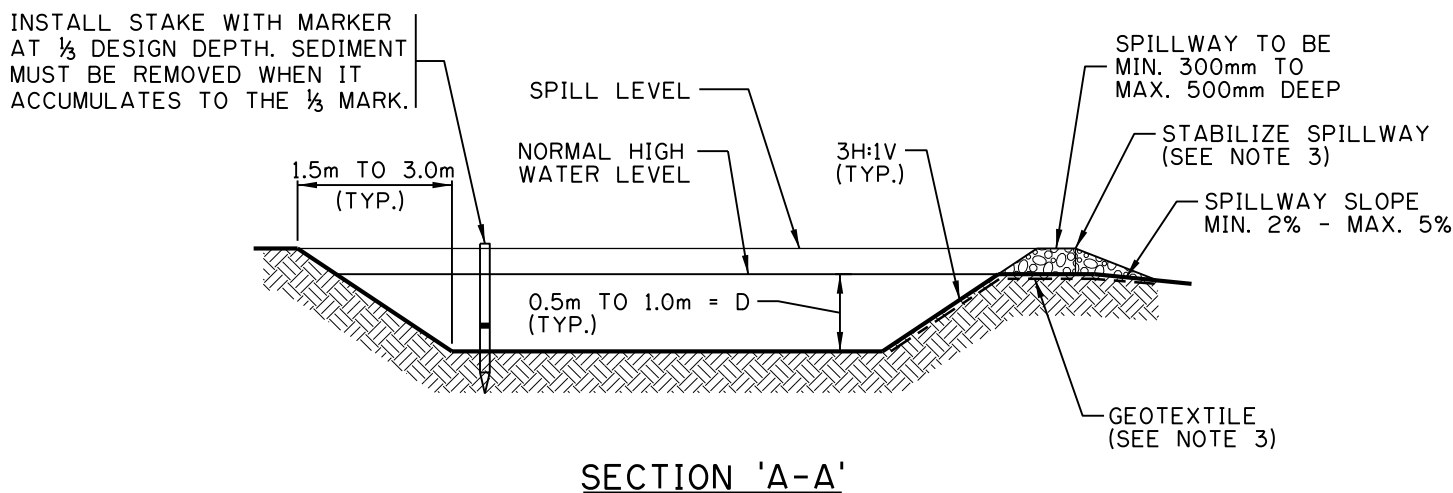
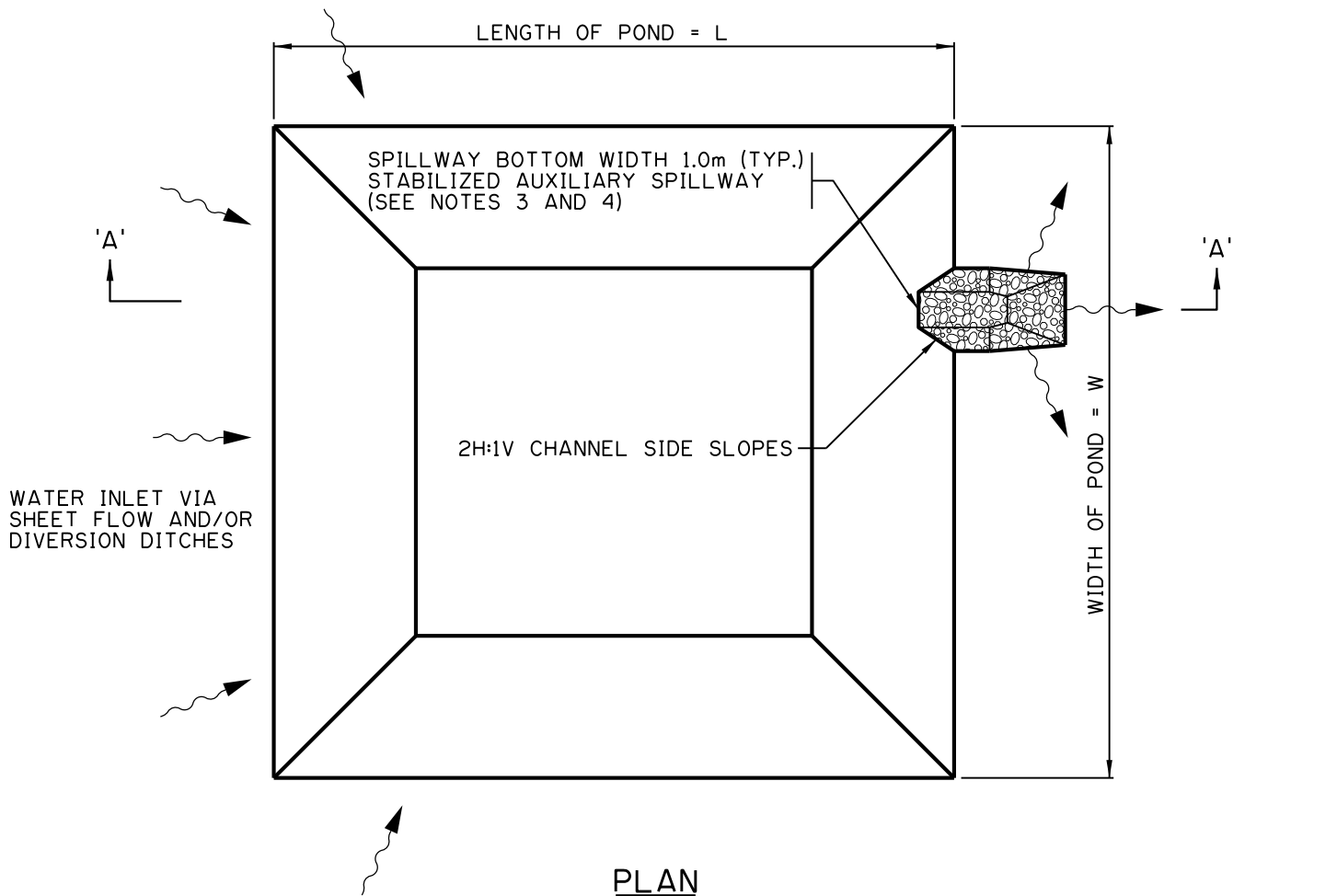
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No.	Date	Revision	App'd
2	2022/03/23	DESIGN DETAILS MODIFIED BY COC	AP
1	2017/11/20	DESIGN DETAILS MODIFIED BY COC	AP

Date	2017/11/20
Scale	N.T.S
Approved by	
for The City of Calgary	

EROSION CONTROL
**ROLLED EROSION
CONTROL PRODUCT (RECP)
CHANNEL INSTALLATION**

Sheet	3
File Number	502.0003.001



NOTES:

1. LxWxD MUST BE EQUAL TO VOLUME REQUIRED TO MEET SELECTED P-VALUE.
2. BOTTOM OF THE POND MUST BE FLAT (0% GRADE).
3. STABILIZED AUXILIARY SPILLWAY TO BE INSTALLED AT LOW END OF THE POND TO CONVEY WATER BACK TO A SHEET FLOW CONDITION AND MITIGATE ADDITIONAL EROSION. SPILLWAY TO CONSIST OF AN APRON STABILIZED WITH TRM (SEE SPECIFICATION 200.1.3) OR ROCK. ROCK TO BE SIZED TO ACCOMMODATE ANTICIPATED CHANNEL FLOW RATE; ROCK UNDERLAIN BY GEOTEXTILE (GEOTEXTILE INSTALLED AS PER RECP SPECIFICATION 200.1.3).
4. AUXILIARY SPILLWAYS ARE REQUIRED FOR SEDIMENT CONTAINMENT SYSTEMS 250m³ OR LARGER IN VOLUME.

DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

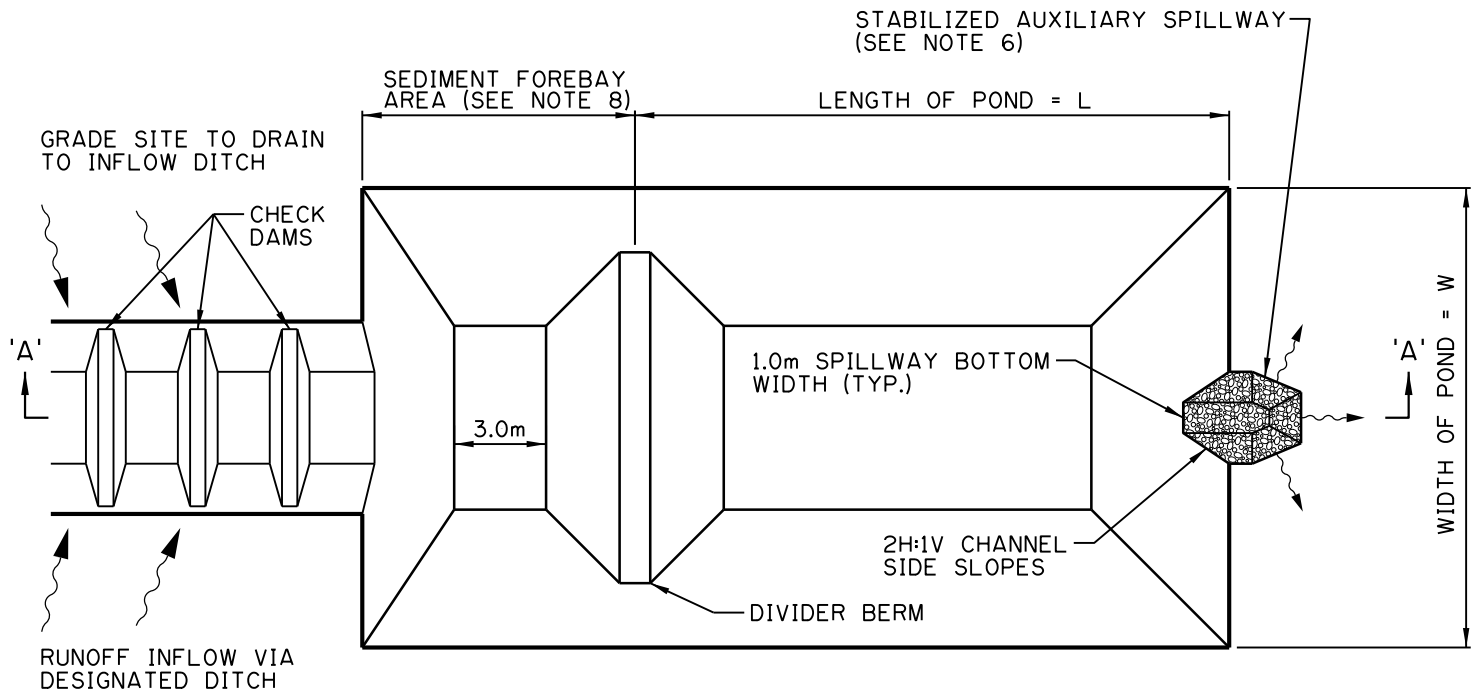
No.	Date	Revision	App'd
2	2022/04/11	DESIGN DETAILS MODIFIED BY COC	AP
1	2017/08/29	DESIGN DETAILS MODIFIED BY COC	AP

Date	2017/08/29
Scale	N.T.S
Approved by	
for The City of Calgary	

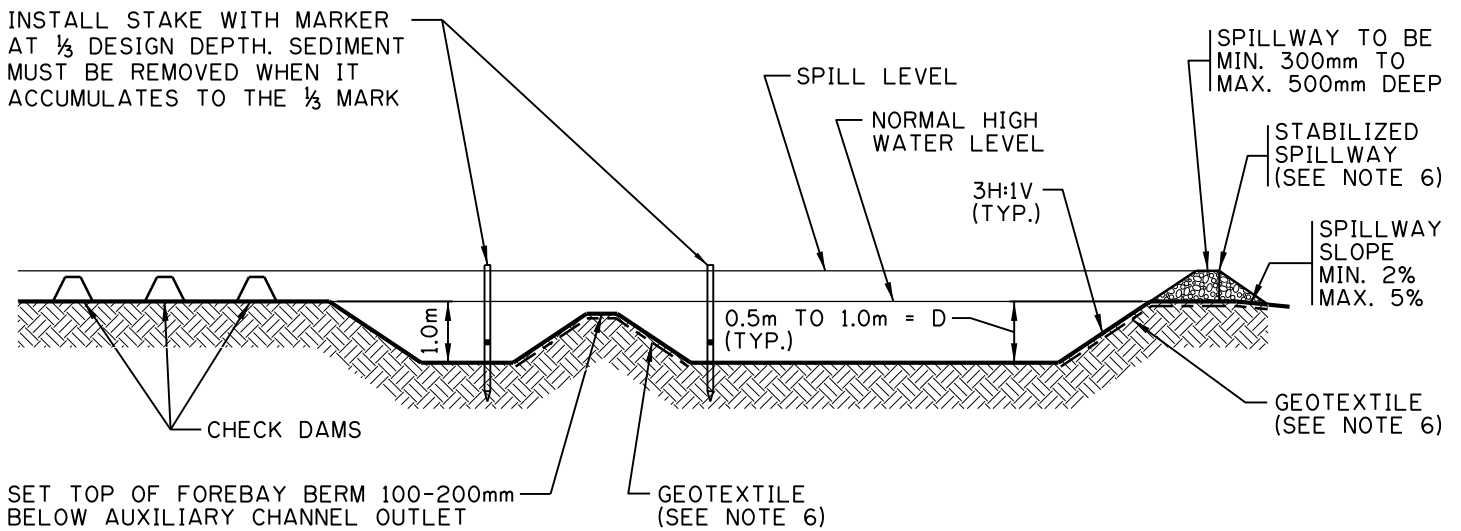
EROSION CONTROL

SIMPLE SEDIMENT CONTAINMENT SYSTEM

Sheet	4A
File Number	502.0004.001



PLAN



SECTION 'A-A'

NOTES:

1. $L \times W \times D$ MUST BE EQUAL TO VOLUME REQUIRED TO MEET SELECTED P-VALUE.
2. BOTTOM OF THE POND MUST BE FLAT (0% GRADE).
3. MINIMUM RATIO OF POND $2L:1W$.
4. DITCH CHECK DAMS CAN BE CONSTRUCTED OF WATTLES, LOGS OR ROCK AS PER SPECIFICATION 200.2.1 AND SHEET 6.
5. CHECK DAMS SHALL BE PLACED SUCH THAT THE ENDS ARE AT A HIGHER ELEVATION THAN THE CENTRE (I.E. SPILL OCCURS OVER THE CENTRE FIRST).
6. STABILIZED AUXILIARY SPILLWAY TO BE INSTALLED AT LOW END OF THE POND TO CONVEY WATER BACK TO A SHEET FLOW CONDITION AND MITIGATE ADDITIONAL EROSION. AUXILIARY SPILLWAY TO CONSIST OF AN APRON STABILIZED WITH ROCK OR RECP (TRM). ROCK TO BE SIZED TO ACCOMMODATE ANTICIPATED CHANNEL FLOW RATE; ROCK UNDERLAIN BY GEOTEXTILE FABRIC INSTALLED AS PER SPECIFICATION 200.1.3.
7. FOREBAY BERM CONSTRUCTED OF IN-SITU MATERIAL. STABILIZED WITH GEOTEXTILE OR PLASTIC INSTALLED AS PER SPECIFICATION 200.1.3.
8. SEDIMENT FOREBAY VOLUME TO BE MINIMUM 10% OF POND VOLUME.

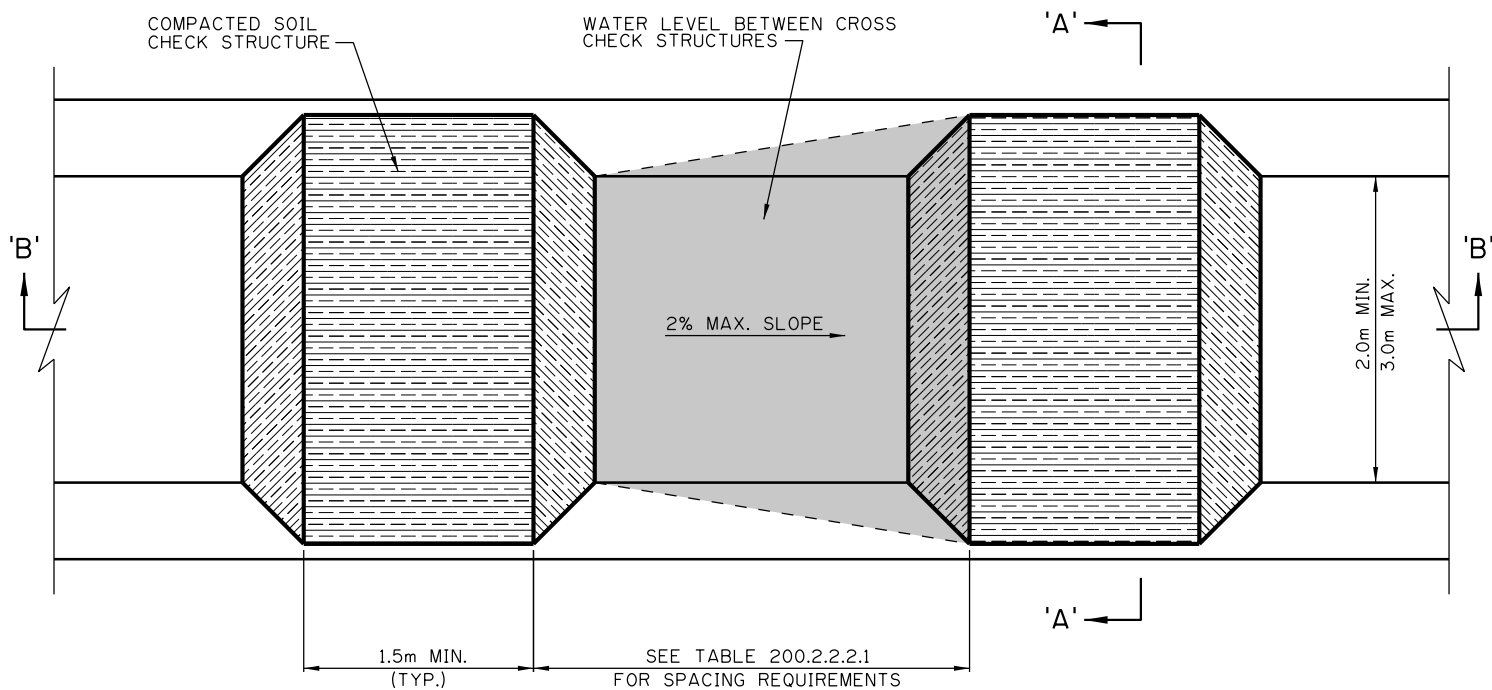
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No.	Date	Revision	App'd

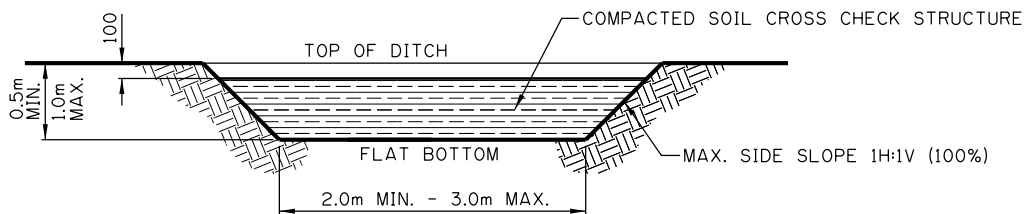
Date 2022/04/11	
Scale N.T.S	
Approved by	

EROSION CONTROL
DESIGNED SEDIMENT CONTAINMENT SYSTEM

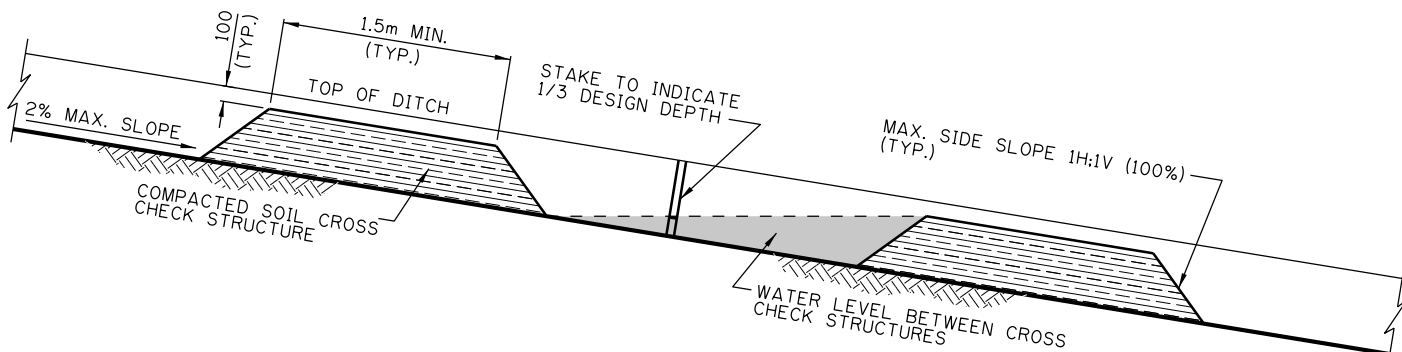
Sheet 4B
File Number 502.0004.002



COMPACTED SOIL CROSS CHECK STRUCTURE



SECTION 'A-A'



SECTION 'B-B'

NOTES:

1. STORAGE DITCHES MUST NOT HAVE A GRADE ALONG DITCH LINE THAT EXCEEDS 2%.
2. CHECK STRUCTURES MUST BE COMPOSED OF COMPACTED SOIL AND MUST BE SPACED AS PER TABLE 200.2.2.2.1.
3. TOP OF CROSS CHECK STRUCTURE MUST BE AT LEAST 0.1m BELOW TO OF DITCH. SIDE SLOPES AT THE UPSTREAM AND DOWNSTREAM SIDE OF CHECK STRUCTURES MUST NOT EXCEED 1:1.
4. DITCH MUST BE A MINIMUM OF 0.5m DEEP AND MAX 1.0m DEEP.
5. SIDE WALLS OF DITCH MUST NOT EXCEED 1:1 SLOPE.
6. P-VALUES MAY BE ASSIGNED GIVEN THE SEDIMENT CONTAINMENT SYSTEMS P-VALUE/VOLUME NOTED IN SECTION 200.2.2.

DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

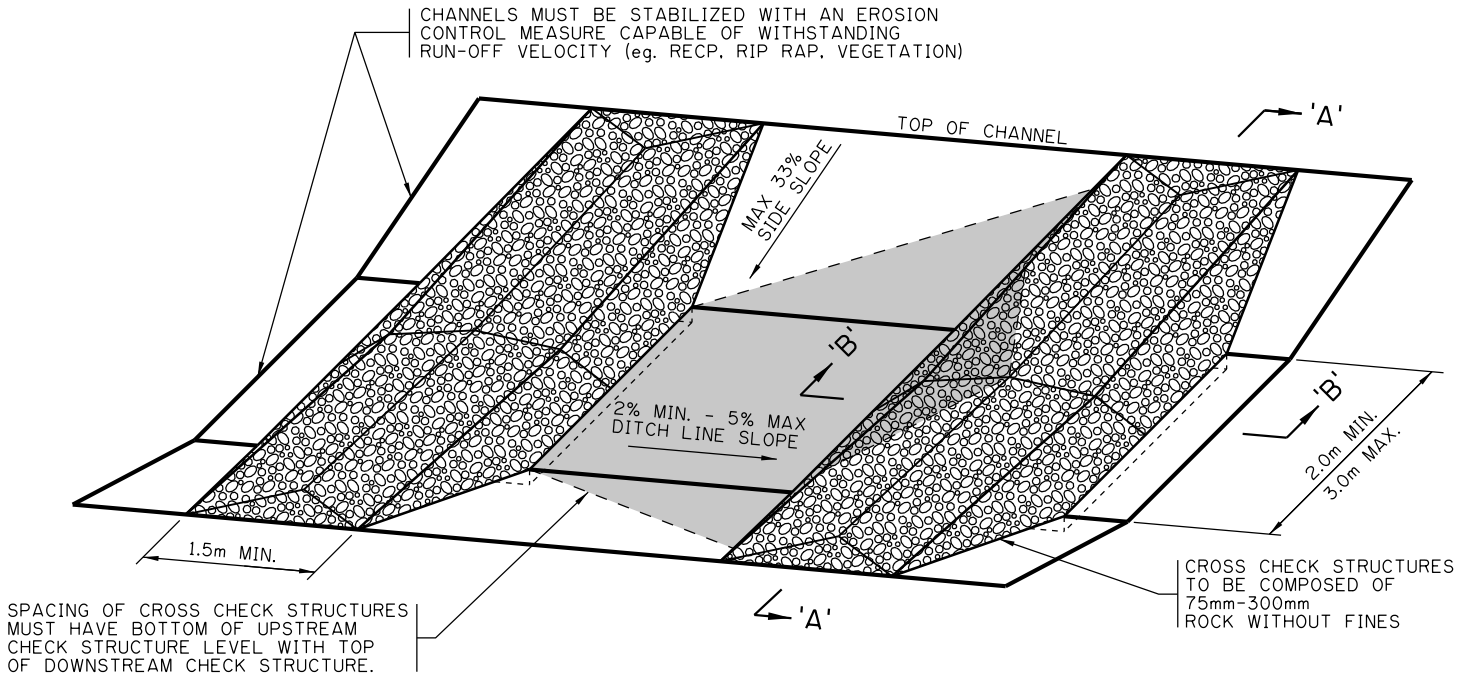
No.	Date	Revision	App'd

Date 2022/04/11	
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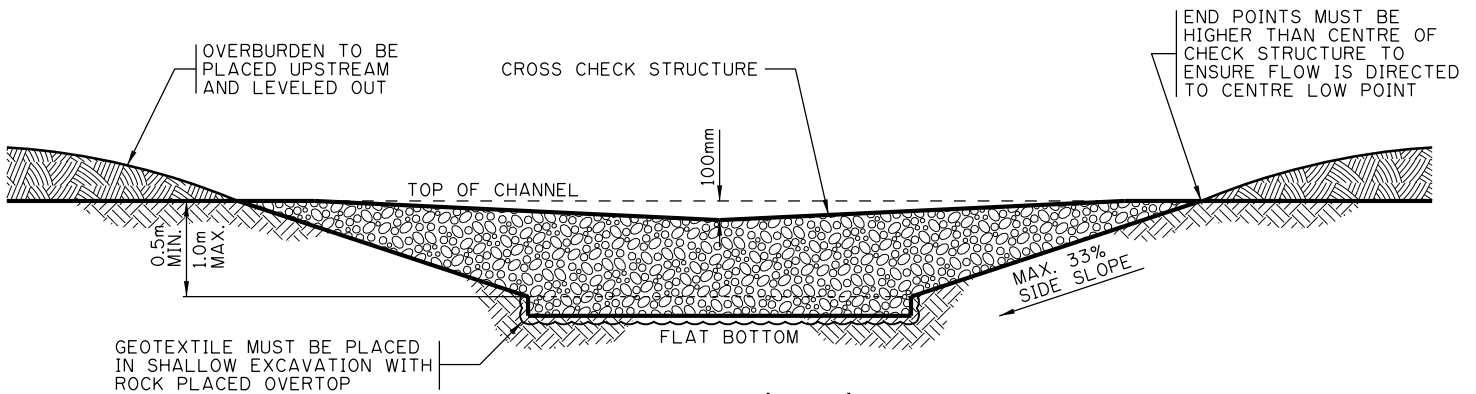
EROSION CONTROL
SEDIMENT CONTAINMENT SYSTEM STORAGE DITCH

Sheet 5
File Number 502.0005.001

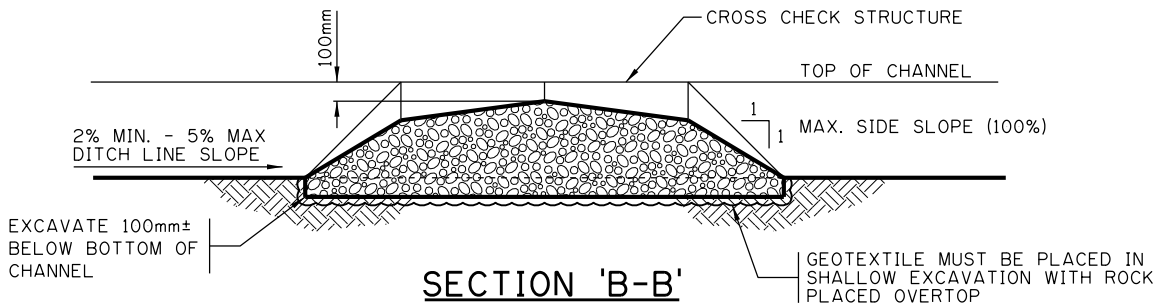
CHANNELS MUST BE STABILIZED WITH AN EROSION CONTROL MEASURE CAPABLE OF WITHSTANDING RUN-OFF VELOCITY (eg. RECP, RIP RAP, VEGETATION)



CROSS CHECK STRUCTURE CHANNEL



SECTION 'A-A'



SECTION 'B-B'

NOTES:

1. DIVERSION CHANNEL DITCH LINE SLOPE MUST BE MINIMUM 2% - MAXIMUM 5%.
2. DIVERSION CHANNEL MUST BE STABILIZED WITH EROSION CONTROL MEASURE CAPABLE OF WITHSTANDING RUN-OFF VELOCITY (eg. RECP, RIPRAP, VEGETATION).
3. OVERBURDEN TO BE PLACED UPSTREAM & LEVELED OUT.
4. CROSS CHECK STRUCTURES TO BE 1.5m WIDE AND 100mm BELOW TOP OF CHANNEL WITH MAX 1:1 (100%) SIDE SLOPES.
5. CROSS CHECK STRUCTURES TO BE COMPOSED OF 75mm-300mm CLEAN WASHED GRAVEL.
6. SPACING OF CROSS CHECKS MUST HAVE BOTTOM OF UPSTREAM CHECK STRUCTURE LEVEL WITH TOP OF DOWNSTREAM CHECK STRUCTURE.

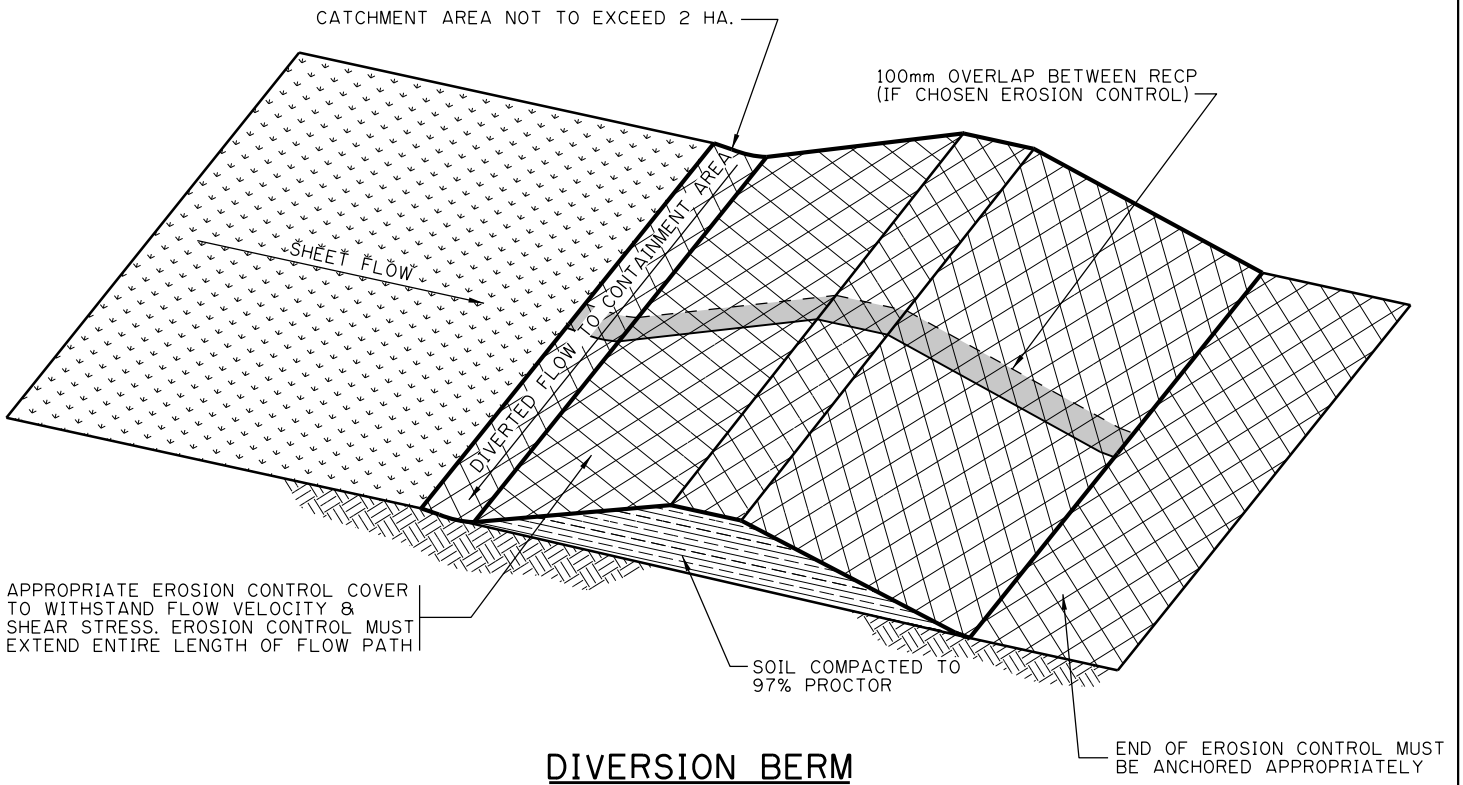
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No.	Date	Revision	App'd

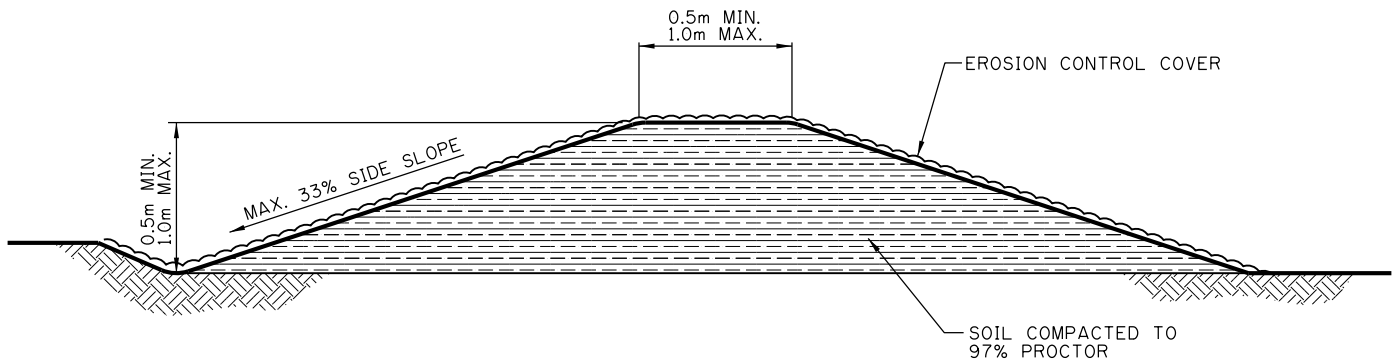
Date	2022/04/05
Scale	N.T.S.
Approved by	

EROSION CONTROL
SEDIMENT CONTAINMENT SYSTEM
STORAGE DITCH WITH
75mm-300mm WASHED GRAVEL

Sheet	6
File Number	502.0006.001



DIVERSION BERM



CROSS SECTION

NOTES:

1. REFER TO SPECIFICATION TBD FOR INSTALL OF ANY ASSOCIATED DIVERSION DITCH.
2. APPROPRIATE EROSION CONTROL MUST BE INSTALLED AFTER CREATION OF BERM. APPROPRIATE EROSION CONTROL INCLUDES: RECP, RIP RAP & VEGETATION.
3. EROSION CONTROL MUST EXTEND ENTIRE LENGTH OF FLOW PATH. REFER TO SPECIFICATION TBD FOR RECP INSTALLATION.
4. DIVERSION BERM MUST DISCHARGE TO SEDIMENT CONTAINMENT SYSTEM.
5. CATCHMENT AREA MUST NOT EXCEED 2 HA.
6. NO PONDING OF WATER BEHIND BERM IS AUTHORIZED.
7. BERM TO BE CONSTRUCTED OF SOIL COMPACTED TO 97% PROCTOR.
8. BERM TO BE TRAPEZOIDAL IN CROSS SECTION.

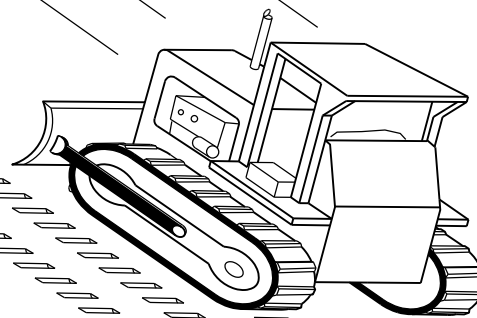
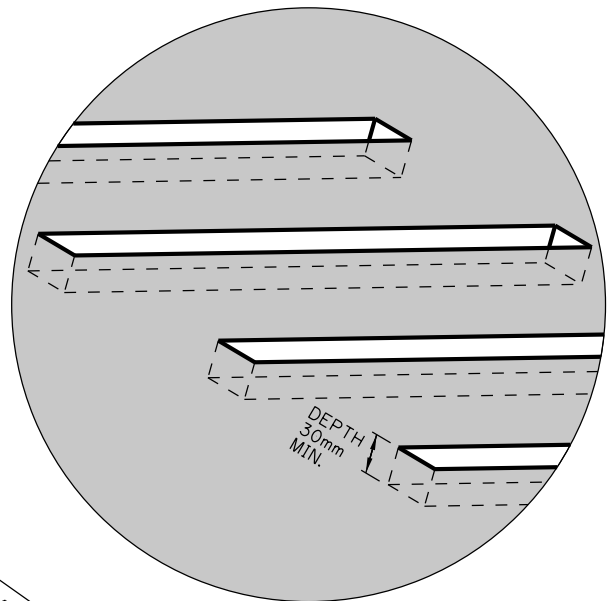
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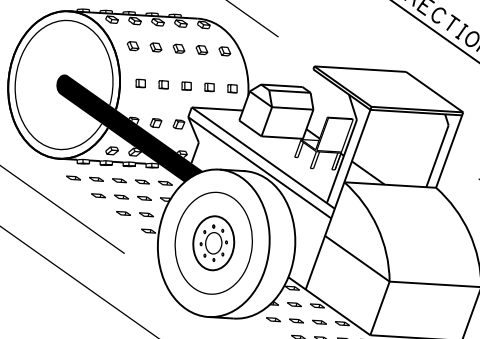
Date 2022/03/23	
Scale N.T.S.	
Approved by	

EROSION CONTROL
DIVERSION BERM

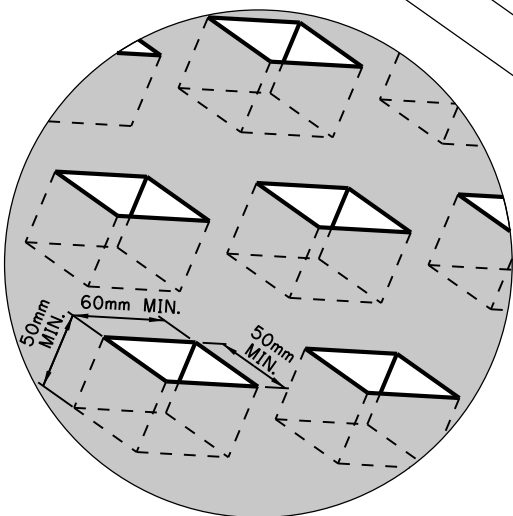
Sheet 7
File Number 502.0007.001



TRACK PACKING



SHEEP'S FOOT ROLLER



NOTES:

1. TRACKS MUST BE APPLIED PERPENDICULAR TO SLOPE.
2. TRACKING MUST BE LIMITED TO ONE OR TWO PASSES TO PREVENT EXCESSIVE COMPACTION.
3. EXCESSIVELY WET OR CLAYEY SOILS MUST NOT BE SURFACE ROUGHENED.


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Date
2022/03/24

Scale
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for The City of Calgary

EROSION CONTROL

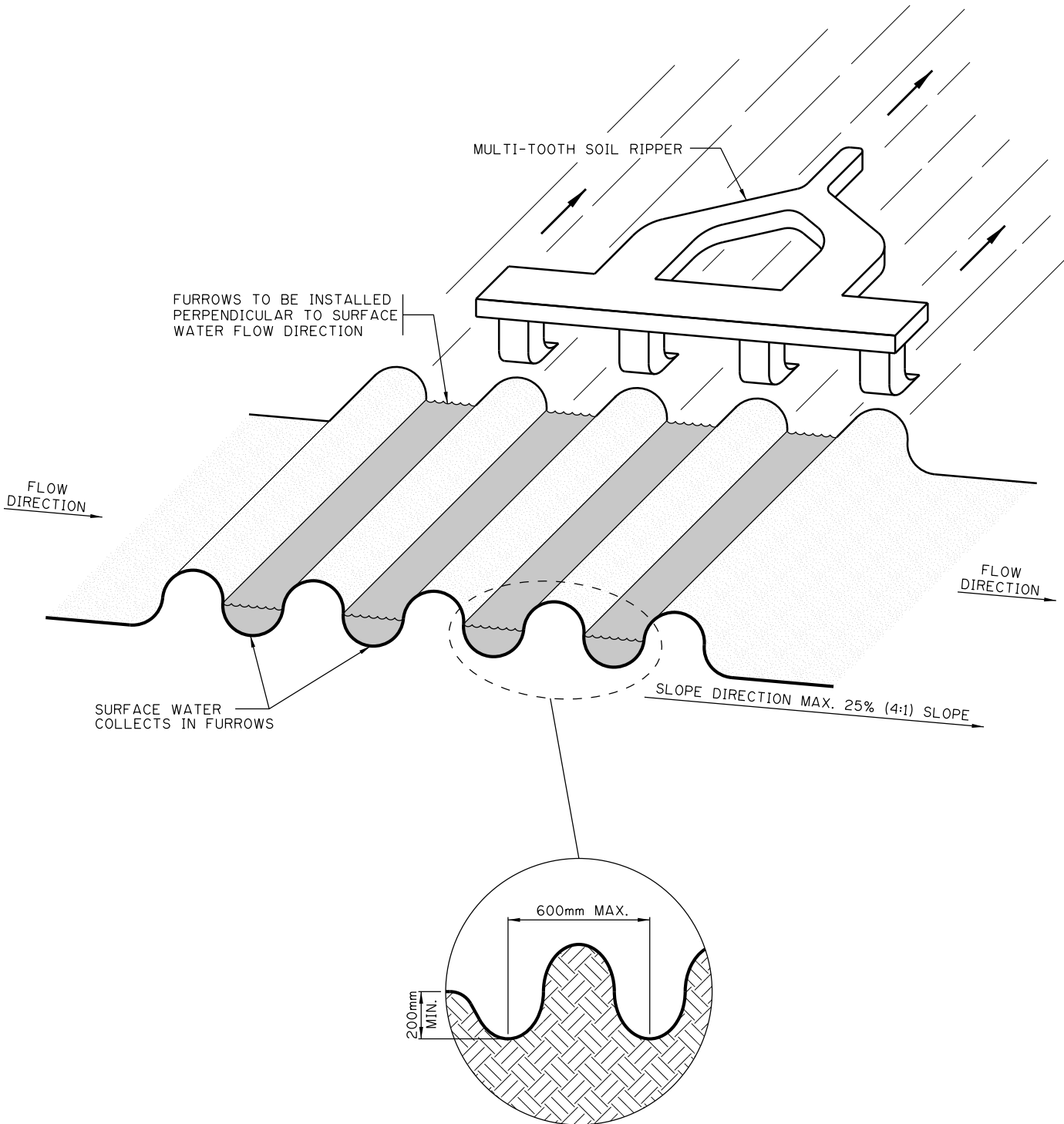
SURFACE TRACKING

Sheet

8

File Number

502.0008.001



NOTES:

1. FURROWS TO BE INSTALLED PERPENDICULAR TO SURFACE WATER FLOW DIRECTION AND ON A MAXIMUM 25% SLOPE.
2. FURROWS TO BE INSTALLED WITH APPROPRIATE MULTI-TOOTHED SOIL RIPPING ATTACHMENT/MACHINE.
3. FURROWS TO BE RE-INSTALLED AS REQUIRED TO MAINTAIN 200mm MINIMUM DEPTH.

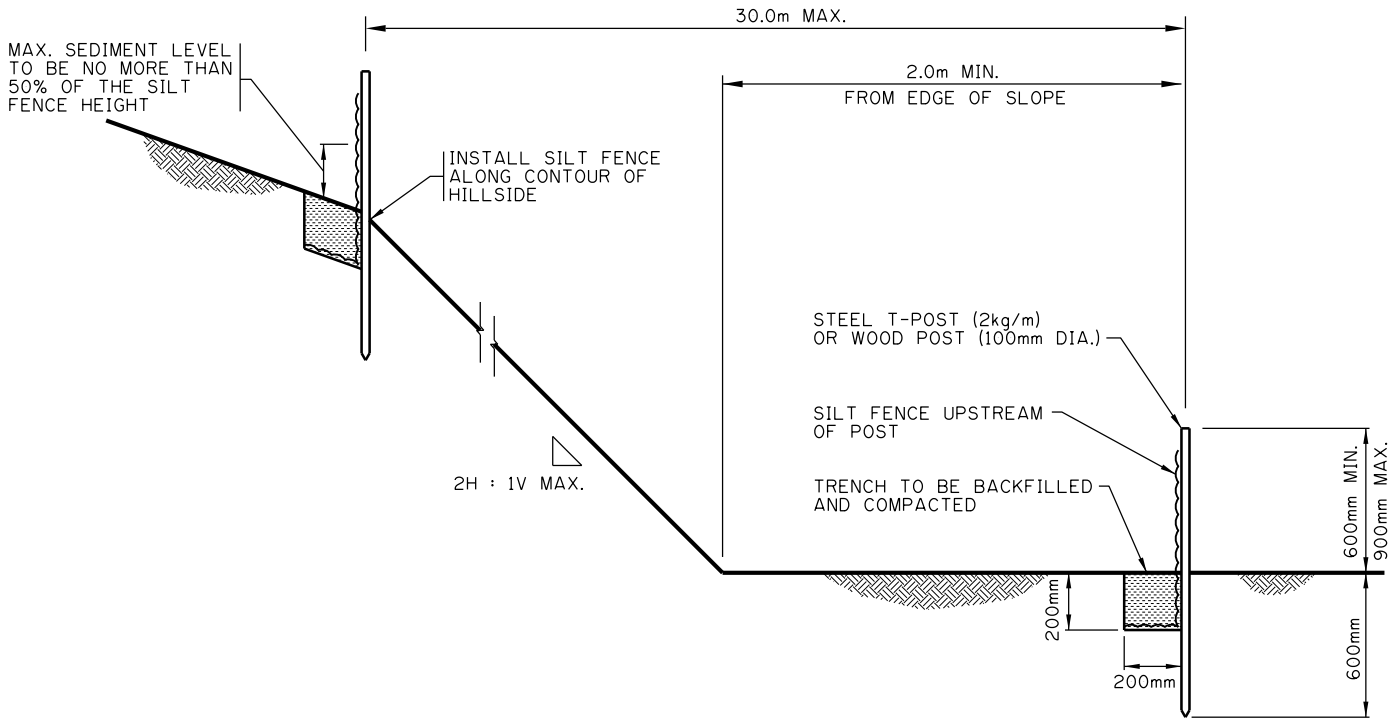
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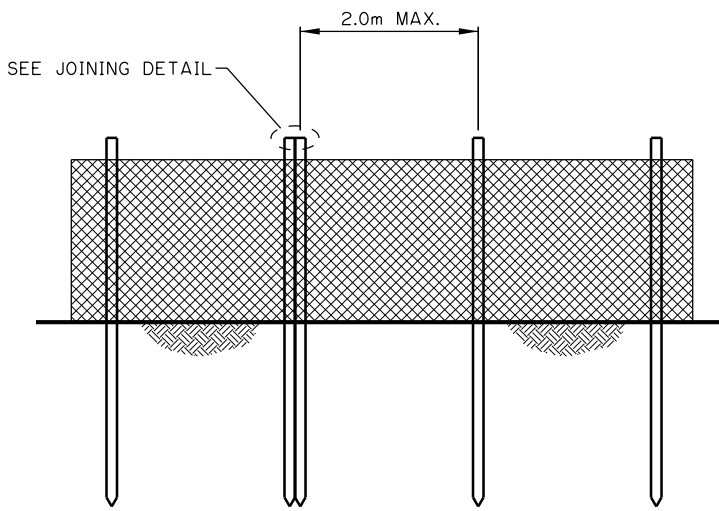
Date 2022/03/29	
Scale N.T.S	
Approved by	
for The City of Calgary	

EROSION CONTROL
CONTOUR FURROWING

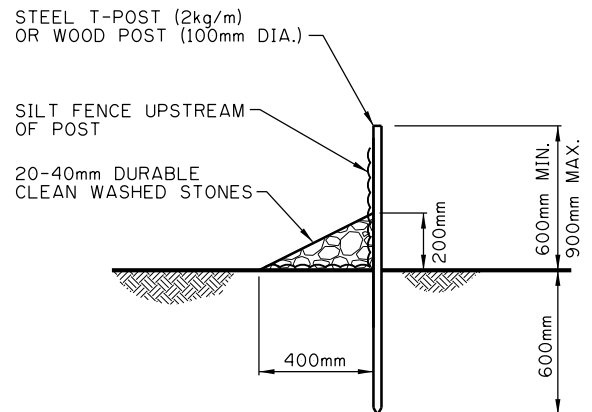
Sheet 9
File Number 502.0009.001



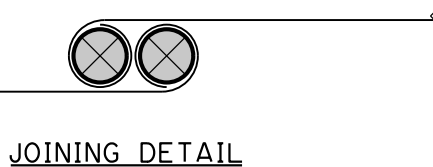
SECTION



ELEVATION



TEMPORARY FROZEN GROUND INSTALLATION



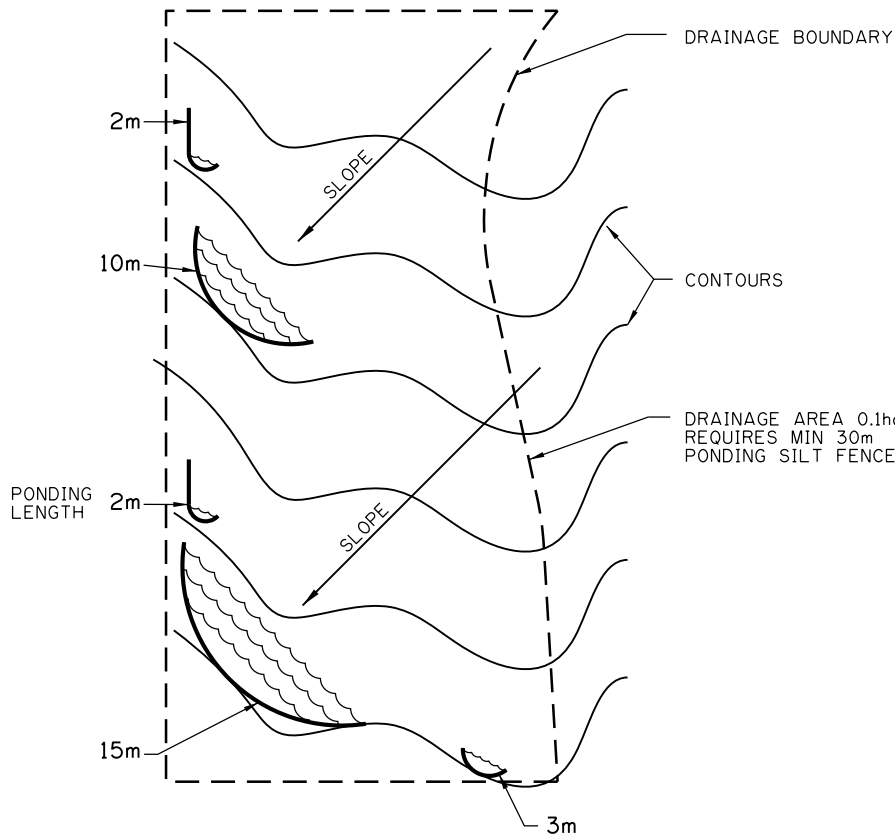
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1	2017/08/29	DESIGN DETAILS MODIFIED BY COC	AP

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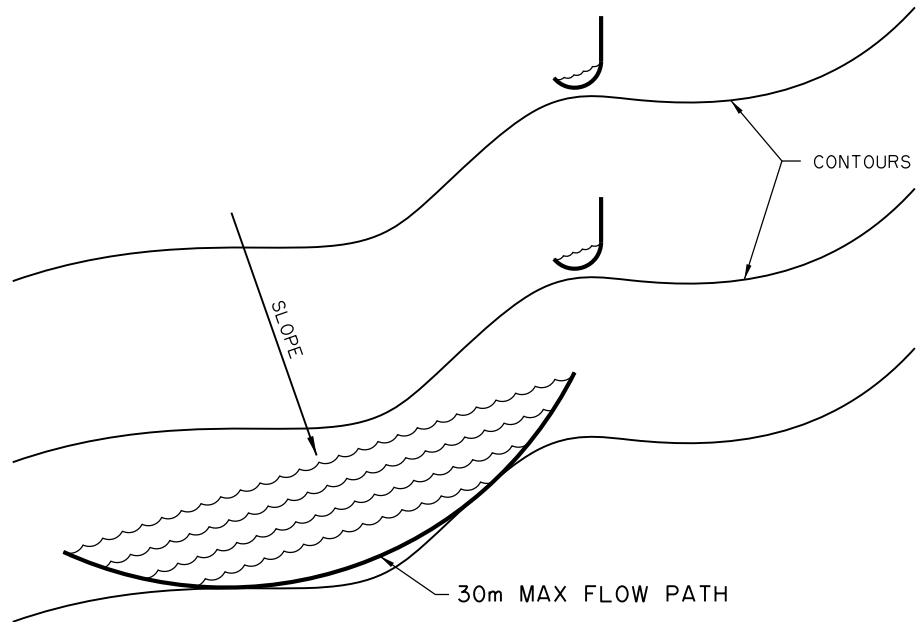
EROSION CONTROL
SILT FENCE INSTALLATION

Sheet	10
File Number	502.0010.001



NOTE:

- DISCREET SEGMENTS OF SILT FENCE INSTALLED WITH J-HOOKS OR 'SMILES' ALLOWS FOR MAX PONDING.
- INSTALL SILT FENCE ON CONTOURS WITH ENDS POINTED UPSLOPE.



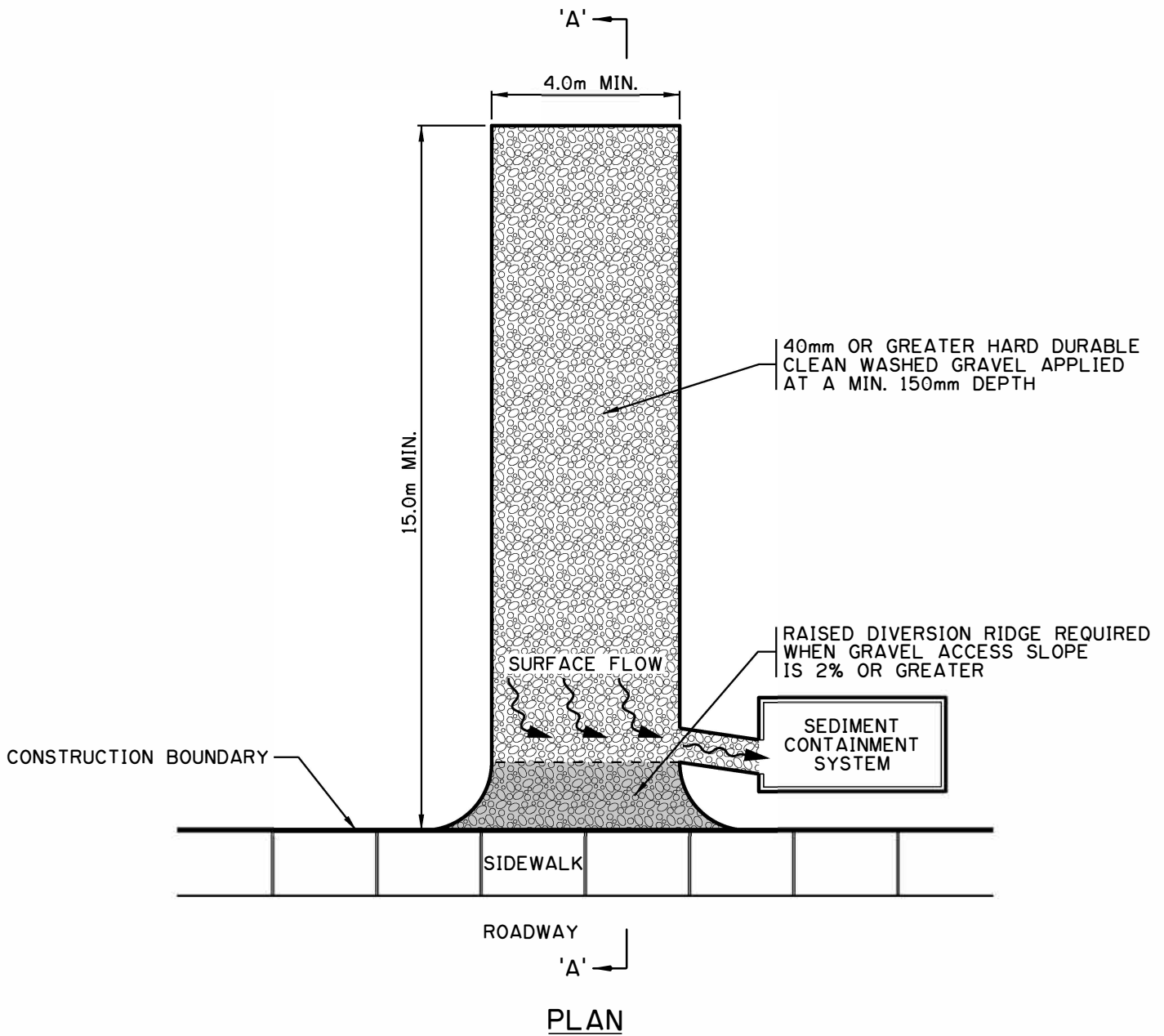
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1	2017/08/29	DESIGN DETAILS MODIFIED BY COC	AP

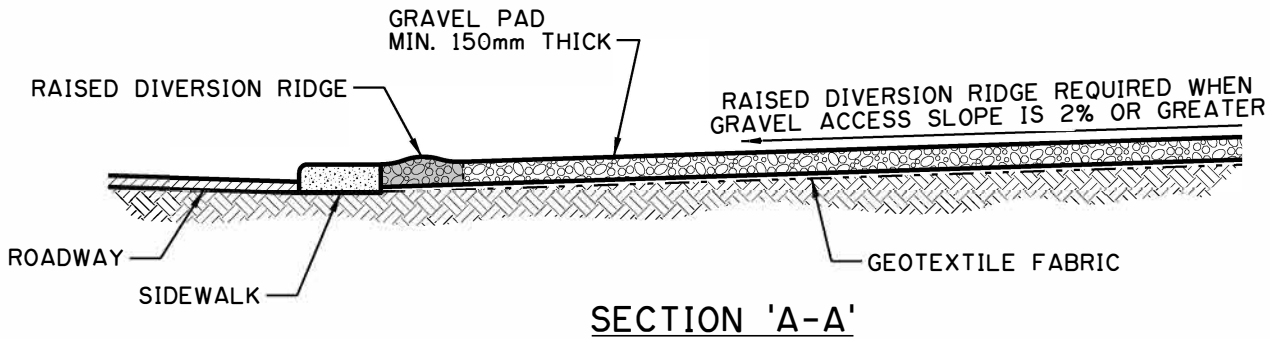
Date	2017/08/29
Scale	N.T.S
Approved by	
for The City of Calgary	

EROSION CONTROL
SILT FENCE

Sheet	11
File Number	502.0011.001



PLAN



SECTION 'A-A'

NOTES:


1. STABILIZED ACCESS MUST NOT BE LOCATED ON STEEP GRADES OR ENTRANCES TO CURVES IN PUBLIC ROADWAY.
3. GEOTEXTILE FABRIC MUST BE INSTALLED PRIOR TO INSTALLING GRAVEL.
4. GRAVEL ACCESS MUST BE MAINTAINED TO AVOID TRACKING OF SEDIMENT TO PUBLIC ROADWAY.
5. A SEDIMENT CONTAINMENT SYSTEM MUST BE INSTALLED DOWNSTREAM OF THE GRAVEL ACCESS.
6. SEDIMENT CONTAINMENT SYSTEM MUST BE INSTALLED & MAINTAINED AS PER SPECIFICATION 200.2.2 AND SHEET 4A.

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No.	Date	Revision	App'd
2	2022/03/31	DESIGN DETAILS MODIFIED BY COC	AP
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Date
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Scale
N.T.S.



Approved by

for The City of Calgary

EROSION CONTROL

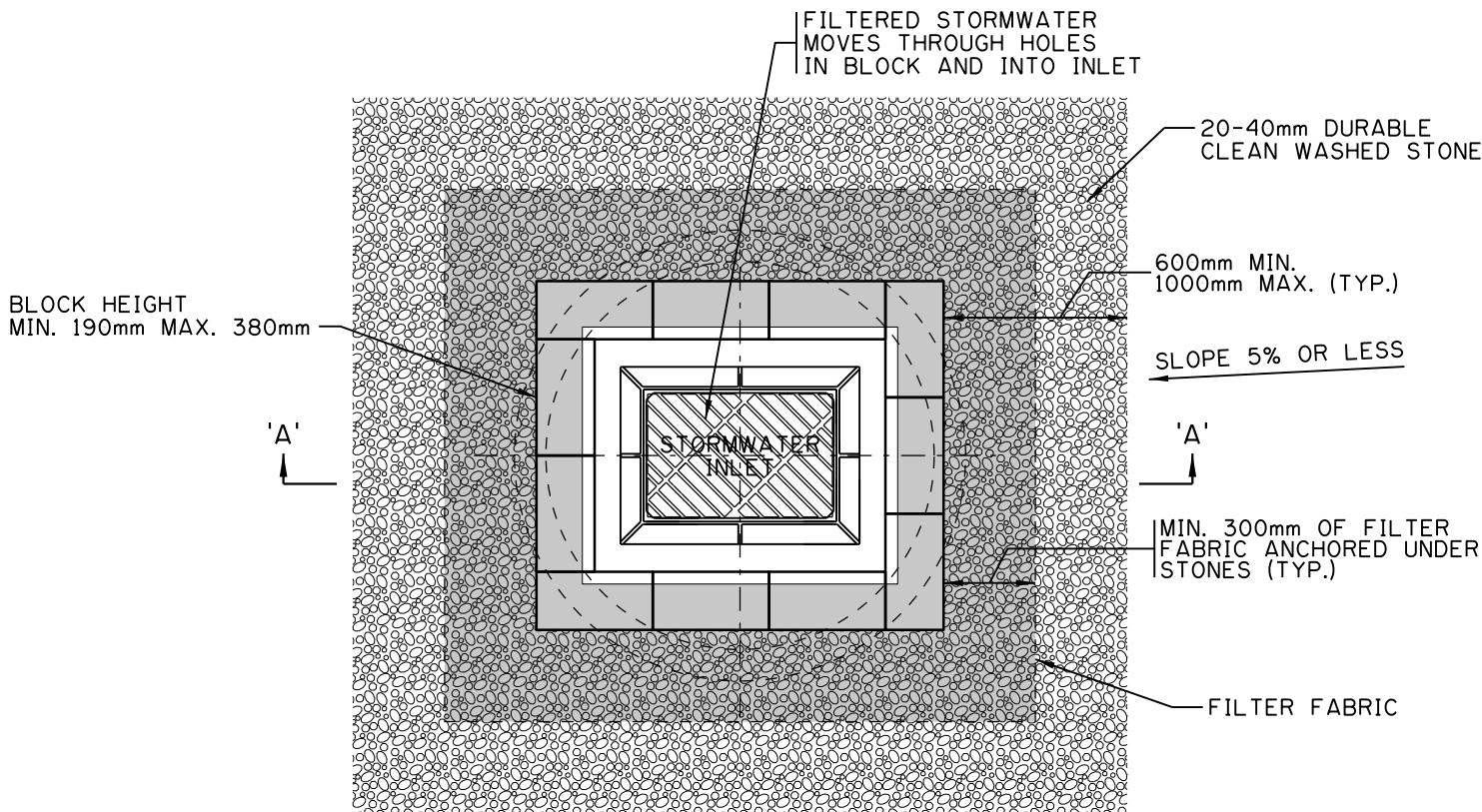
STABILIZED GRAVEL ACCESS

Sheet

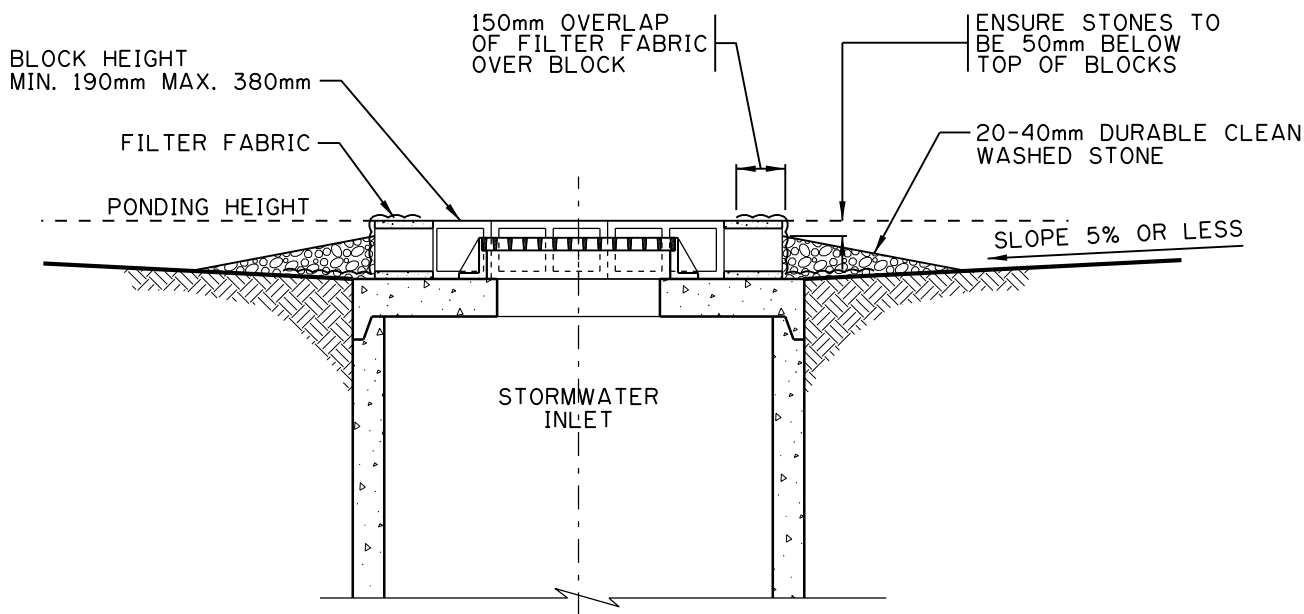
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File Number

502.0014.001



PLAN



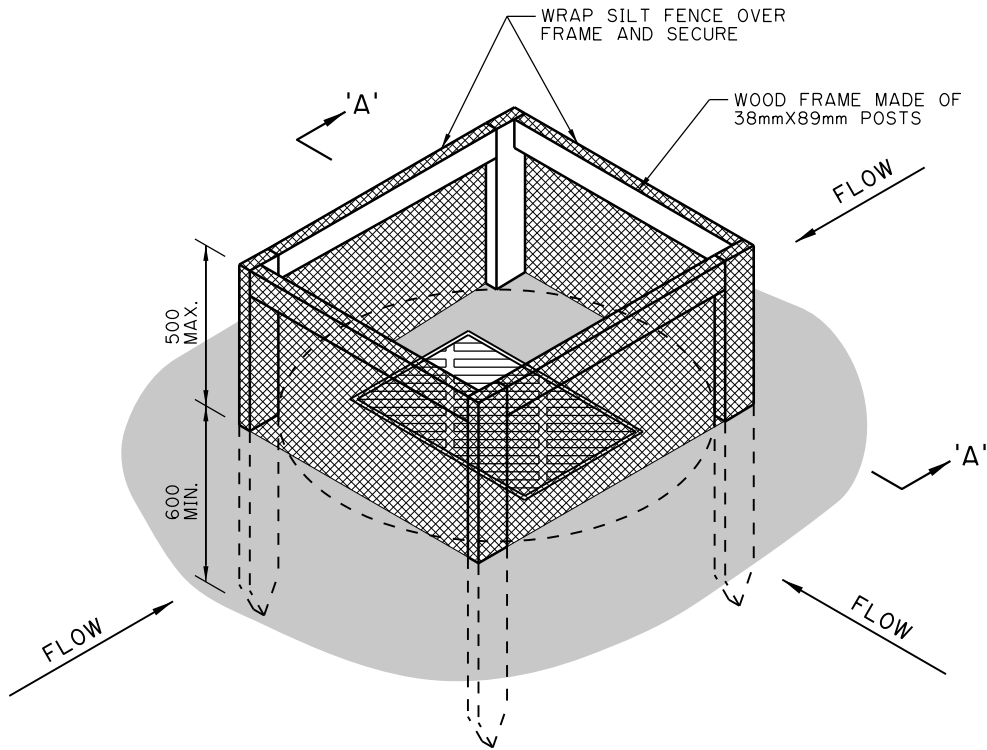
SECTION 'A-A'

NOTES:

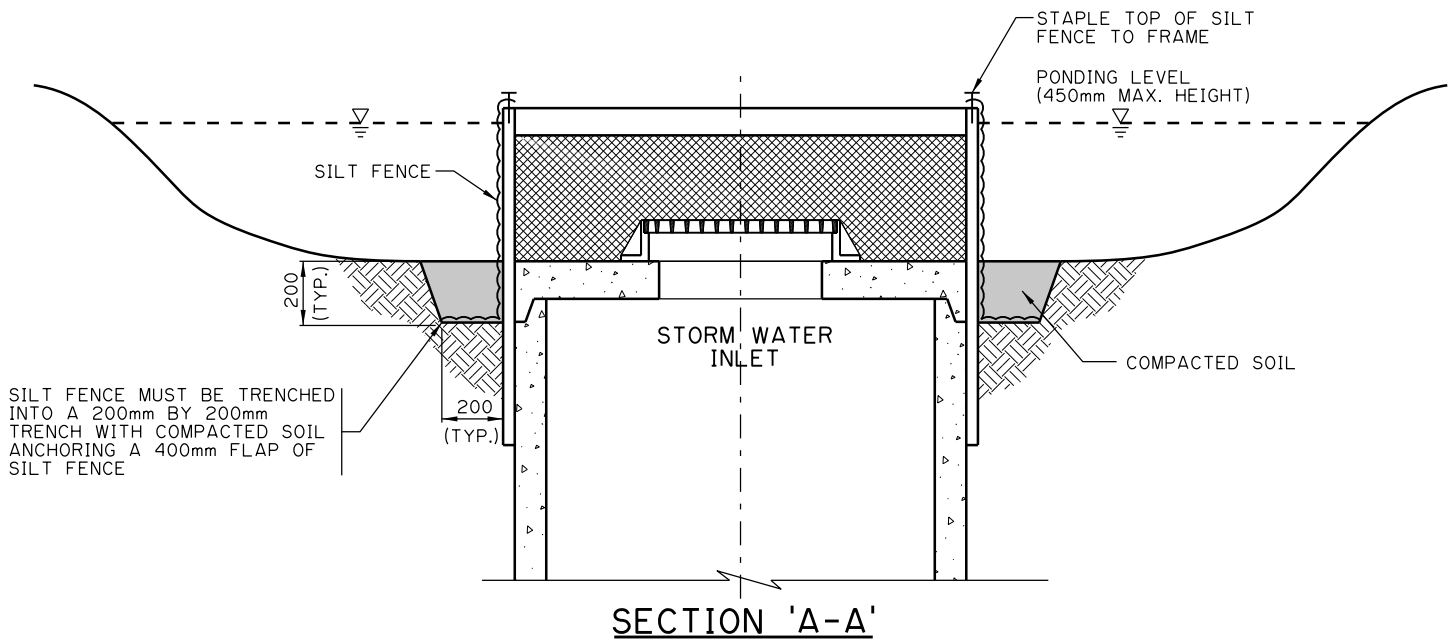
1. FOR USE ON CONSTRUCTION SITES PRIOR TO PAVING.
2. NOT FOR USE ON ROADWAYS.
3. ONLY FOR USE IN DRAINAGE AREAS. 5% SLOPE OR LESS.
4. BLOCKS MUST HAVE HOLES OF APPROPRIATE SIZE TO ALLOW FILTERED WATER TO FLOW THROUGH TO INLET.
5. TOP OF BLOCKS MUST BE LOWER THAN HIGHEST ELEVATION IN DRAINAGE AREA TO PREVENT BYPASS OF STORMWATER AROUND BLOCK AND STONE SEDIMENT FILTER.

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		Date	2017/08/29		EROSION CONTROL	Sheet	15
		Scale	N.T.S.			File Number	
2	2022/03/15	DESIGN DETAILS MODIFIED BY COC	AP	Approved by	BLOCK AND STONE SEDIMENT FILTER		
1	2017/08/29	DESIGN DETAILS MODIFIED BY COC	AP			for The City of Calgary	
No.	Date	Revision	App'd				ISC: Unrestricted



SILT FENCE BOX



SILT FENCE MUST BE TRENCHED INTO A 200mm BY 200mm TRENCH WITH COMPACTED SOIL ANCHORING A 400mm FLAP OF SILT FENCE

NOTES:

1. DIMENSIONS OF FRAME TO ACCOMMODATE SIZE OF STORM INLET WITH POSTS NO MORE THAN 2 METERS APART.
2. METAL T-POST MAY BE USED IN PLACE OF WOODEN STAKES.
3. TOP FRAME REQUIRED FOR STABILITY.
4. WHERE JOINTS ARE REQUIRED, CONSTRUCT A 400mm OVERLAP BETWEEN SILT FENCE ENDS AND WRAP THE END POSTS TOGETHER WITH A 1/2 TURN MINIMUM
5. SILT FENCE BARRIER NOT TO BE USED ON ROADWAYS.
6. TOP OF FRAME MUST BE LOWER THAN HIGHEST ELEVATION IN DRAINAGE AREA TO PREVENT BYPASS OF STORM WATER AROUND SILT FENCE BOX.
7. TO BE USED IN DRAINAGE AREAS WITH >5% SLOPE.

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No.	Date	Revision	App'd
2	2022/03/31	DESIGN DETAILS MODIFIED BY COC	AP
1	2017/08/29	DESIGN DETAILS MODIFIED BY COC	AP

Date
2017/08/29

Scale
N.T.S.



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for The City of Calgary

EROSION CONTROL

SILT FENCE BOX

Sheet

16

File Number

502.0016.001