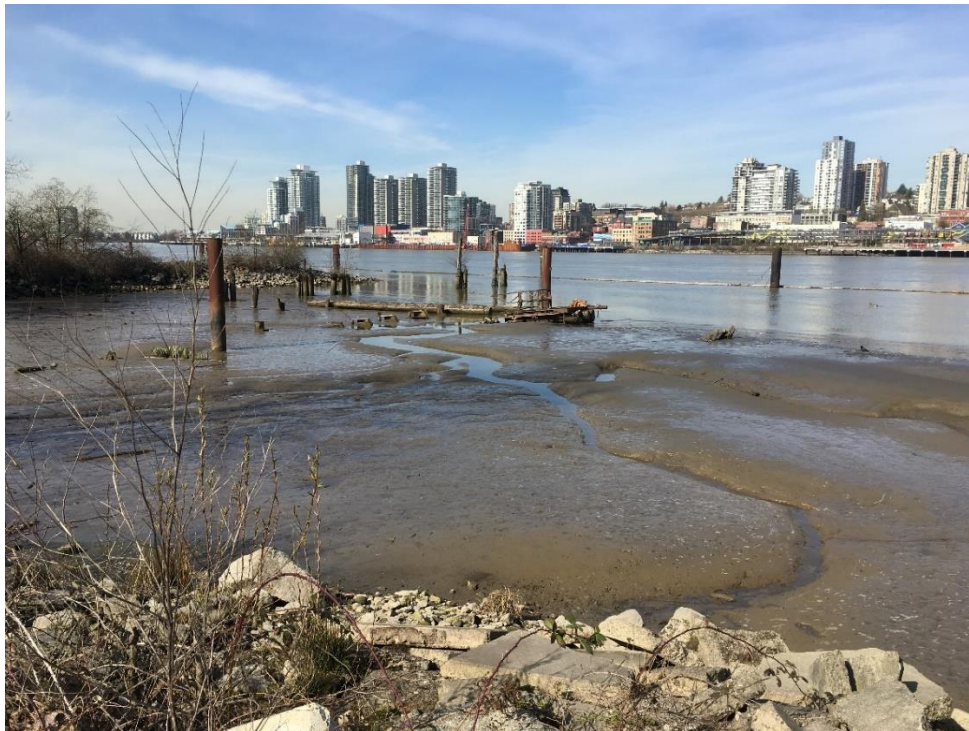


# Stormwater Pollution Prevention Plan

## 21780/21832/21840 South Westminster Shore & 10880 Dyke Road, Surrey

PREPARED FOR: Goodrich Group of Companies

Vancouver Fraser Port Authority Application 18-037



PREPARED BY:



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## List of Acronyms

BCWQG	British Columbia Water Quality Guidelines
BMPs	Best Management Practices
CBs	Catch Basins
CEMP	Construction Environmental Management Plan
DFO	Fisheries and Oceans Canada
EMA	<i>Environmental Management Act</i>
ESC	Erosion and Sediment Control
FA	<i>Fisheries Act</i>
FSA	<i>Fire Services Act</i>
MOE	Ministry of Environment
MSDS	Material Safety Data Sheet
OCP	Official Community Plan
PLG	Pacific Land Group
PEng	Professional Engineer
QEP	Qualified Environmental Professional
RPBio	Registered Professional Biologist
SPEA	Streamside Protection and Enhancement Area
SPPP	Stormwater Pollution Prevention Plan
VFPA	Vancouver Fraser Port Authority
WHMIS	Workplace Hazardous Materials Information System
WMA	<i>Waste Management Act</i>
WSA	<i>Water Sustainability Act</i>

## **1.0 INTRODUCTION**

Pacific Land Group (PLG) and Centras Engineering have been retained by Goodrich Group of Companies (Client) to complete a Stormwater Pollution Management Plan (SPPP) as part of a Project and Environmental Review application to the Vancouver Fraser Port Authority (VFPA). A lumber storage use is proposed for the properties located at 21780/21832/21840 South Westminster Shore & 10880 Dyke Road, Surrey, BC (Subject Properties/Site) and includes proposed paving of a vacant area and installation of a rail spur. PLG and Centras Engineering collaborated on the preparation of this report to in consideration of the VFPA's SPPP guidelines.

Measures, as set forth in this SPPP, have been developed based on site-specific information and have been customized to address and reduce the risk of stormwater pollution on-site. This report has been collaboratively prepared by a Qualified Environmental Professional (QEP) Kyla Milne, R.P.Bio, PLG and Steven O'Connell, P.Eng, Centras Engineering.

This SPPP will be used as a guide and resource for the VFPA, Contractors, the designated SPPP Manager, and government agencies (if applicable) to measure compliance with the environmental protection and mitigation requirements of the Project.

Environmental measures apply to all Contractors and personnel, including SPPP Managers that are on-Site during Project activities. Therefore, the words "Contractor" or "Operator" used in this document apply to any company or personnel responsible for practices as described within. It is the Contractors' responsibility to ensure their employees and subcontractors are familiar and comply with the contents of this SPPP.

## **2.0 OVERVIEW**

Due to the proposed development occurring within the VFPA's jurisdiction, there is an increased concern of stormwater quality discharged from site that may have an impact on adjacent environments. Stormwater management plans and quality control measures are presented within this report to ensure water quality is protected.

The objectives of this SPPP are to:

- Design site specific treatment systems;
- Minimize the amount of stormwater discharge into nearby environments;
- Prevent and/or reduce the quantity of pollutant being discharged through stormwater; and
- Manage and treat stormwater if pollutant loading cannot be prevented.

Additional mitigation measures can be found in the project's Construction Environmental Management Plan (CEMP).

### **2.1 Background**

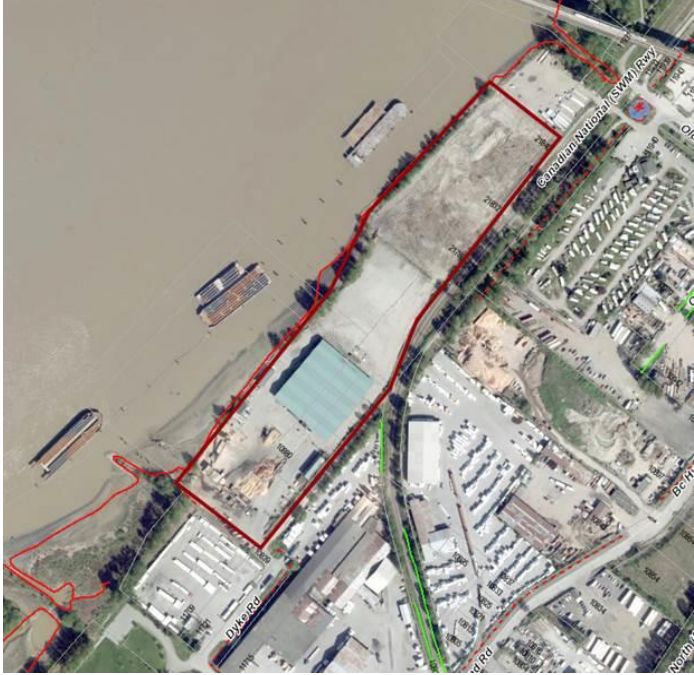
The Subject Properties contains an existing paved lumber yard on the west half of the property and a vacant gravel lot to the east. The existing lumber yard is complete with catch basins (CBs) around the site and five outlet headwalls which discharge into the Fraser River. The client is looking to expand the lumber yard by paving the existing gravel lot.

The proposed drainage solution for the expansion is to sheet flow the paved area towards a bioswale along north end of the site. The bioswale is an independent system from the existing drainage infrastructure on site for the existing lumber yard. The bioswale will collect the stormwater runoff from the lumber yard expansion and effectively filter and remove pollutants. Within the bioswale there will be overflow drains complete with sumps, which then direct the treated stormwater to the Fraser River via storm pipes and outlet headwalls.

The bioswale will be constructed outside of the 10-metre setback from the high-water-mark of the Fraser River. With the exception of newly constructed stormwater outfalls associated with the bioswale construction, no additional infrastructure is planned within the riparian buffer.

**3.0 SITE INVENTORY**

The Site is approximately 2.31 acres (0.94 hectares) in size and located in Surrey, BC. The geographical coordinates at the project's approximate centre are 49.2004657 and -122.89671528, and borders the Fraser River on the northwestern side of the Property (Figure 1, below). The Site is designated "Industrial" in the Port of Vancouver's Land Use Plan and similarly designated in the City of Surrey's Official Community Plan (OCP). The Site is located adjacent to industrial developments to the northeast and southwest, industrial developments on the other side of the Canadian National Railway to the southeast, and the Fraser River to the northwest.



**Figure 1.** 2018 COSMOS aerial image of the Subject Property (dark red outline).

**3.1 Project Activities**

It is understood that the proposed Project will consist of the following activities:

- Removal of some vegetation (clearing and grubbing) to accommodate proposed Project works;
- Excavation within the undeveloped portion of land;
- Paving of existing unpaved areas within the Site for increased lumber storage; and
- Installation of a rail spur, for the purpose of transloading lumber and wood pellets from trucks, vans, and rail cars into containers for export.

In order to carry out these activities, material handling (i.e., transport, storage, disposal), and fuelling and servicing of construction equipment is necessary. Mitigation measures will be considered throughout all phases of development to ensure stormwater quality is not negatively impacted from construction activities.

### 3.2 Potential Project Materials and Pollutants

Activities from the proposed development involve the use of certain materials and substances. Sediment runoff and toxic wastes produced by construction works can negatively affect the adjacent aquatic habitat and accumulate overtime, causing environmental concern.

Potential materials and substances involved in the proposed project include, but are not limited to the following:

- |                           |                    |
|---------------------------|--------------------|
| • Concrete/asphalt        | • Nails            |
| • Aggregate               | • Plastic sheeting |
| • Wood chips              | • Organic waste    |
| • Soils                   | • Steel            |
| • Paints                  | • Lumber           |
| • Fuels, oils and greases | • Dewatering       |
| • Cleaning agents         |                    |

Fuel handling and storage facilities will also comply with the provincial *Fire Services Act* and its regulations. Workers and contractor will adhere to established fire prevention and response protocols and standard best practices.

#### 3.2.1 Hazardous Materials

The Contractor will comply with all applicable laws, regulations and permit conditions when handling, transporting, and disposing hazardous materials related to this Project. Hazardous materials on-site will be identified, stored and documented appropriately. Workplace Hazardous Materials Information System (WHMIS) and Material Safety Data Sheets (MSDS) will be available for all individuals on-site.

#### 3.2.2 Storage Areas

Prior to construction, laydown areas will be identified for storage of construction equipment and materials. Designated areas will be located on a flat, stable area at least 30 m away from any waterbody. Storage procedures should be documented.

## 4.0 HYDROLOGIC ASSESSMENT

The hydrologic patterns of the site can be divided into two sections, the existing yard at the west part of the site and the proposed yard at the east part of the site. The drainage infrastructure and patterns will be identified for both sections of the site, followed by the hydrologic parameters of the water quality event and storm drainage event for the new proposed yard.

### 4.1 Existing Drainage Infrastructure

The existing yard at the southwest portion of the site is currently a paved lumber yard which drains to 12 CBs around the site. These CBs lead to 5 outlets which discharge the runoff into the Fraser River. The proposed works for the project is entirely separate from the existing drainage infrastructure and will not alter the functionality or flows of the existing drainage system.

### 4.2 Proposed Drainage Infrastructure

The east portion of the site is currently an empty gravel lot and will become an extension to the existing paved lumber yard. The natural grade of the site is sloped toward the northwest to the Fraser River. The proposed site will drain to a new bioswale along the northern property line of the site. The bioswale will be 4.5m wide and 0.75m high with a 1.5m wide flat bottom section and 2H:1V side slopes and will be located outside of the Fraser River's protective 10 metre setback. There is an elevated lawn catch basin at 0.45m from the bioswale bottom to discharge the runoff to the Fraser River.

Two (2) new stormwater outfalls will be constructed to convey water from the bioswale and lawn basin to the Fraser River during rain events. Additional locations and stormwater management practices were considered (i.e., relocation of the outfalls and potential infiltration galleries). Based on the results of Braun Geotechnical's Geotechnical Assessment and further consultation with the Braun's Geotechnical Engineer, the Subject Property has moist to wet soils at a shallow depth and a relatively high groundwater table with rapid fluctuations; as such, infiltration is not possible.

The construction of two new outfalls immediately adjacent to the Fraser River will better protect the riparian area from erosion currently observed as a result of uncontrolled sheet flows off the site during high rain events. The bioswale will be constructed at a slight grade differential from one end of the bioswale to the other. The construction of two outfalls is preferred to manage the flows and convey storm water to the Fraser River foreshore. Splitting up the bioswale into two flat zones maximizes the swales function by maximizing retention and infiltration. One single outfall would overload one end of the bioswale and it wouldn't retain and infiltrate as well as two outfalls.

Please refer to **Appendix A** for the Site Grading Plan prepared by Centras for the bioswale details, location and outlet headwall locations.

There are two sub-catchments for the proposed site. Sub catchment #1 is 1.13Ha and Sub catchment #2 is 1.38 Ha. Each catchment follows the same drainage pattern described above. A water quality event and storm drainage event analysis for the proposed site was



completed for each sub-catchment to show the adequacy of the proposed drainage infrastructure. The results for Sub catchment #2 are shown below as it is the larger area and will govern the calculations.

#### 4.2.1 Water Quality Event

The water quality event is defined as the common storm event after a dry period where the “first flush” concentrations of potential pollutants are rapidly moved to the drainage system. For the water quality event analysis, 50% of the 2-year return period storm event with a time of concentration of 15 minutes was used. See **Appendix B** for the Water Quality Event calculations using the rational method showing the peak flow and runoff volume for the site for both sub catchment #1 and sub catchment #2.

For sub catchment #2, the peak flow amount is calculated to be **0.0914m<sup>3</sup>/s** and the total volume is calculated to be **242m<sup>3</sup>**. As per the modified rational method calculations, the bioswale has adequate storage volume to store the water quality event storm the duration of the 2-hour storm event. The plantings within the bioswale will clean any pollutants in the storm water runoff before it is ultimately discharged from the bioswale into the Fraser River.

#### 4.2.2 Storm Drainage Event

The storm drainage event is defined as the storm event used to evaluate the capacity of the drainage system to prevent flooding and ensure safe drainage. For the storm drainage event analysis, the 10-year return period storm event with a time of concentration of 15 minutes was used. See **Appendix C** for the Storm Drainage Event calculations using the rational method showing the peak flow and runoff volume for the site for both sub catchment #1 and sub catchment #2.

For sub catchment #2, the peak flow amount is calculated to be **0.151m<sup>3</sup>/s** and the total volume is calculated to be **346m<sup>3</sup>**. As per the modified rational method calculations, the bioswale has adequate storage volume to store the water quality event storm for 75 minutes, which will allow sufficient time for the plantings within the bioswale to clean any pollutants in the storm water runoff.

## 5.0 SITE SPECIFIC ISSUES AND RISKS

### 5.1 Applicable Legislation

#### 5.1.1 Federal Legislation

The Project team will follow and comply with the following Federal Acts and Guidelines, including, but not limited to:

- Federal Fisheries Act (FA)
- Ministry of Environment (MOE) and Fisheries and Oceans Canada (DFO) Land Development Guidelines for the Protection of Aquatic Habitat

#### 5.1.2 Provincial Legislation

The Project team will follow and comply with the following Provincial Acts and Regulations, including, but not limited to:

- BC *Environmental Management Act (EMA)*
  - Spill Reporting Regulations
  - Contaminated Sites and Hazardous Waste Regulations
- BC *Fire Services Act (FSA)*
- BC *Water Sustainability Act (WSA)*
- BC *Waste Management Act (WMA)*
- BC *Water Quality Guidelines (BCWQG)*
- WorkSafeBC Occupational Health and Safety Regulations

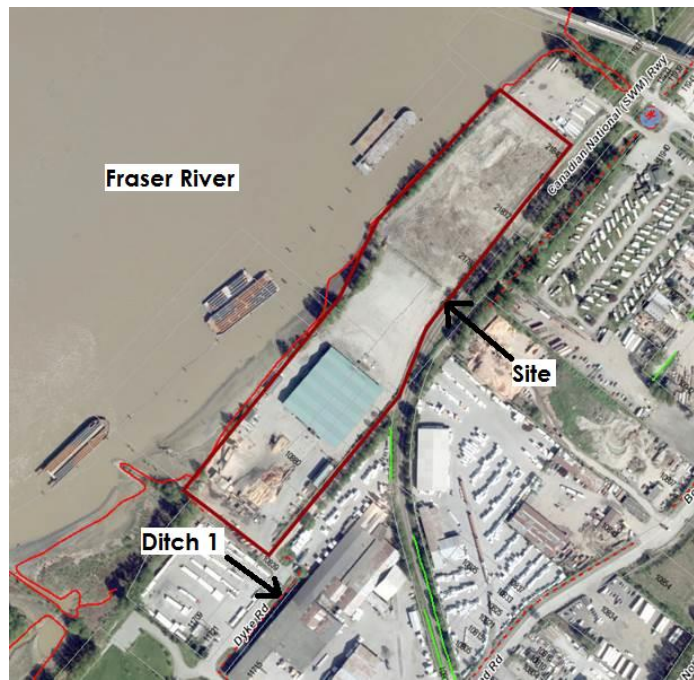
### 5.1.3 *Municipal Legislation*

The Project team will follow and comply with the following Municipal Bylaws, including, but not limited to:

- The City of Surrey (the City) Erosion and Sediment Control (ESC) Bylaw 2006 No. 16138

Numerous Best Management Practices (BMPs) have been developed by industry associations and government agencies for activities near environmentally sensitive areas. In addition, the provincial document, *Develop with Care 2014 – Environmental Guidelines for Urban and Rural Land Development in British Columbia*, provides a comprehensive set of guidelines and BMPs (e.g., Urban Environment).

In this SPPP, Project works are addressed with respect to various environmental protection measures that can be applied directly or with modification, as required. These measures aim to promote environmental management by protecting the existing Site conditions and reducing the potential for migration of Project-related materials and products off-Site. Although the project is located near water (i.e., adjacent off-site Fraser River and Ditch 1; see Figure 2, below), permits/notifications for instream work are not anticipated.



**Figure 2.** COSMOS aerial image of the Subject Property (red outline) and adjacent off-site watercourses.

## 5.2 Potential Pollutant Sources

Materials and substances that may be introduced through activities of the proposed project and have the potential to act as pollutants have been described in the below sections.

### 5.2.1 Soils

Excavation will involve removing vegetation and soils from unpaved areas, resulting in exposed surfaces and stockpile formations. Increased risk of off-site sediment runoff is of main concern during this construction phase.

### 5.2.2 Concrete/asphalt

Paving will involve the use of concrete and asphalt. Increased risk of off-site sediment runoff materials and dust will be present.

### 5.2.3 Metals

Rail spur installation will involve the use of metals and welding materials. Potential risks of metal debris washing into adjacent aquatic environment are present.

### 5.2.4 Wood Wastes

The Subject Property is an active storage lumberyard. Mitigation measures must be implemented to contain construction activities to the proposed area of development. This will help ensure that wood waste (i.e., woodchips, sawdust) do not enter adjacent aquatic environments.

### 5.2.5 Liquid Wastes

Risk of accidental fuel and oil spills from construction equipment is present throughout operations. Paints and cleaning agents may be used, and appropriate measures should be taken to avoid environmental contamination.

### 5.2.6 Solid Wastes

Solid waste (i.e., paper products, oil filters, spent batteries, discarded food items) may be present during development and proper disposal methods should be used to prevent materials from being washed into nearby drainage infrastructure and the Fraser River.

### 5.3 Potential Sensitive Receptors

To our knowledge, no stormwater issues have been identified by the public, stakeholder or First Nations. The natural grade of the site is sloped toward the northwest to the Fraser River and therefore, stormwater effects are not anticipated to the public or First Nations.

Table 1 below summarizes watercourses with potential sensitivity to stormwater.

**Table 1.** Watercourses Potentially Affected by Site Stormwater Discharge

Watercourse	Watercourse Classification	Location	Potential to be affected (N/Y)
Fraser River and its shoreline	Fraser River Estuary Management Program, (FREMP).	The River borders the Site to the north.	Y - The Fraser River has the potential to be temporarily impacted by a sudden accidental discharge. An accidental discharge event is considered to be short in duration, temporary and correctable.
Unnamed Dashed Red-coded ditches	Dashed Red (AO by Surrey), considered to potentially provide overwintering habitat.	Several AO ditches are located south of the Subject Properties.	No - The natural grade of the site is sloped toward the northwest to the Fraser River and is not expected to impact these ditches.
Unnamed Green-coded ditches	Green, C (C by City of Surrey) non fish bearing.	C ditches are located south of the Subject Properties.	No - The natural grade of the site is sloped toward the northwest to the Fraser River and is not expected to impact these ditches.

### 5.4 Identified Issues

No large tank fuel storage will be required for project works. Where small amounts of fuel are required to operate small pieces of equipment (i.e., oils, lubricants etc), these items will be placed within appropriate spill containment areas. In the event of an accidental spill, all workers will respond in accordance with the Project's Spill Prevention and Emergency

Response Plan (please refer to the Project CEMP for the Spill Prevention and Emergency Response Plan).

#### 5.5 Potential Pollutant Pathways

Pollutant pathways for the Subject Property will be by way of the stormwater drainage system and overland flow.

### 6.0 STORMWATER POLLUTION PREVENTION PLAN

The project will be subject to the potential pollutants outlined in Section 5 which would be transported by stormwater to the proposed bioswale along the north side of the project. In the design of the storm water infrastructure, reducing and eliminating the potential pollutants was the highest priority. The proposed bioswale is the solution to collecting and treating the stormwater before the runoff is discharged from the site. It is important to develop a management plan to effectively prevent, contain/reduce, and treat the pollutants in the stormwater before the clean water is discharged into the Fraser River.

#### 6.1.1 Prevention and Management Strategy

Preventing the release or presence of the polluting materials on the site is the most effective measure to reduce the amount of pollutants in the stormwater. The site is currently covered in gravel which makes for an efficient pollutant control method. Any rainfall will drain through the voids in the gravel and into the groundwater. The gravel also acts as a cover for the erodible surfaces such as native soil.

During construction, any excavation is to only expose the amount of area that can be expected to be covered by non-erodible material by the end of the day to limit the time and area of exposed soil. Once the site has been prepared with the granular sub-base and granular base as per the geotechnical report, the potential of sediment pollution from construction is greatly diminished.

Upon completion of the project, the site will be paved and used for lumber storage. It is noted that the owner is currently sweeping the existing lumber yard daily and owns his own sweeper to keep the paved areas clean. The owner of the property is to extend the usage of the sweeper to the new site and keep all paved areas clean and free of debris. Daily sweeping, especially before a rainfall event, is critical to minimizing the pollutants interaction with stormwater.

#### 6.1.2 Containment/Reduction

The containment and reduction of potential pollutants is the secondary goal if prevention is not achievable. To contain and reduce pollutants during construction, an Erosion and Sediment Control Plan has been prepared by Centras Engineering and is attached to this report in **Appendix D**. A silt fence will be installed around the perimeter of the site and there will be a rock access pad at the site entrance to ensure no sediment is being tracked into the site our out onto the public roads. In addition, the onsite pavement should be swept daily to keep all paved surfaces free of debris, sediment or other potential pollutants.

Additionally, there will be polyethylene sheeting used to cover any stockpiled material that contains pollutants.

### 6.1.3 Treatment

As it is challenging to eliminate all pollutants from a site, the final measure in the pollution prevention plan is to provide treatment for the stormwater. The proposed development is proposing a bioswale along the north property line of the project where all of the stormwater runoff is directed. As per the calculations for the Water Quality Event described in Section 4 above, the bioswale has adequate storage capacity for the entire water quality event. The bioswale complete with plantings will act as a treatment system to remove hydrocarbons and suspended soils. The stormwater will have sufficient time in the bioswale to allow the pollutants to settle and allow clean stormwater runoff to discharge into the Fraser River.

An erosion and sediment control plan has been prepared to minimize and prevent pollutants from interacting with stormwater during the project construction phase.

## 7.0 EROSION AND SEDIMENT CONTROL

Erosion and Sediment Control (ESC) measures are designed to be Site-specific and adaptable, and will vary depending on Site conditions and local weather. ESC measures must be implemented and adhered to as follows:

- Prior to commencement of Project works, the limits of construction will be clearly marked, including the installation of protective fencing for the Streamside Protection and Enhancement Area (SPEA) for the Fraser River, and the off-site Class A/O watercourse located 40 meters southeast of the Dyke Road entrance to the Site.
- Utilize current paved areas (i.e., western portion of the Site) when accessing the Site, by foot or equipment, to minimize soil/sediment disturbance and erosion, especially on soft soils within the work areas;
- Take reasonable care to avoid damage to freshly disturbed areas and where soils have been recently disturbed so as not to generate sediments that could potentially migrate or become tracked off-Site;
- Minimize the potential to generate sediment-laden water within the Site (e.g., undertaking a section of work that can reasonably be completed within a work shift, and covering exposed stockpiles to remain on-Site for an extended period of time);
- Imported fill and soils to be utilized during grading work shall be protected when stockpiled with tarpaulin or polyethylene sheeting to prevent the dispersal of silts and fines outside of the delineated work zone;
- Soils of any kind shall not be placed on roads, curbs or walkways;
- Temporary silt fencing and catch basin inserts will be installed by qualified personnel along the boundary of the work area and within catch basins, respectively, to act as sediment barriers by preventing the dispersal of silts and fines outside of the delineated work zone for the duration of the Project; and
- Re-grading of the Site will be completed as soon as possible in order to ensure that disturbed areas and exposed soils are stabilized.

Refer to Appendix D for the ESC plan prepared by Centras Engineering Ltd. for the construction of the phase II portion.

## **8.0 IMPLEMENTATION AND MONITORING REQUIREMENTS**

The overall objective of the SPPP monitoring program is to prevent pollutants produced through construction activities from entering aquatic resources and wildlife ecosystems through stormwater discharge. Monitoring and implementation of mitigation measures are intended to protect these valuable resources.

### **8.1 Implementation and Monitoring**

Maintaining existing and proposed drainage infrastructure is critical to ensure functionality and effectiveness. The two drainage facilities that will require maintenance for the proposed lumber yard are the bioswale, overflow lawn drains, storm sewer pipes, and outlet headwalls.

The planting material specified for the bioswale is either native or adaptive to its surroundings and will establish with the soils in the rain garden. Establishment maintenance is required within the first growing season following initial installation. After establishment, the maintenance of the vegetated biofiltration rain garden will be self-sustaining. During the establishment period, monitor the planting material on a monthly basis following initial installation and remove any invasive vegetation and litter. No chemicals, fertilizers, pesticides or herbicides are to be used within the bioswale. Water newly installed vegetation on a weekly basis and as recommended by the QEP.

Exposed soil is subject to weeds and invasive plants. Hand cultivate the mulch layer and remove any weeds, invasive plants and refuse materials at least once per month.

The elevated lawn catch basin is a 1050mm diameter manhole barrel with a grated lid. These manholes contain sumps and will require regular cleaning to ensure the sumps are not filled with debris and sediment. The manhole provides vertical access to the outlet pipes that lead to the outlet headwalls. Storm sewer pipes typically require very little maintenance over their life-span, however, sediment build up can occur over time. Maintenance procedures for the underground storm sewer system includes pressurized flushing at least once every five years or as otherwise necessary. The outlet headwalls where storm water runoff flows enter the Fraser River should be monitored for erosion. Ensure there is ample rip rap rock at the headwall outlets for erosion protection.

### **8.2 Adaptive Management and Continuous Improvement**

The overall goal of this SPPP is to implement a set of BMPs to target and prevent the release of potential pollutant sources (identified above) from entering identified sensitive receptors (also identified above). If BMPs as set out by the project CEMP are not working effectively, the contents of that plan and associated projects plans (i.e., ESC Plan) will be reviewed and updated, as necessary. Please refer to the project CEMP for specific mitigation measures developed for this project.

### 8.3 Storm Water Quality

Just upstream of the outfall headwall is the storm water oil and grit interceptor. Prior to any storm water drainage runoff exiting from the site to the Fraser River all of the upstream storm water runoff passes through a storm water oil and grit interceptor manhole. The storm water oil and grit interceptor manhole is engineered specifically to this site and its sub-catchment areas to separate any suspended oils caused from upstream paved surfaces and also removes a minimum 85% of the annual total suspended solids. The 85% total suspended solids removal rate is a standard LEED specification.

The proposed storm water oil and grit interceptor for this development is the CDS Technologies Storm Water Treatment System (CDS 2020-4 model) which is a true hydrodynamic (swirl concentrator) oil/grit separator that combines screening and enhanced gravity settling to remove floating, neutrally buoyant and non-buoyant solids from storm water runoff. The non-blocking screen captures 100% of the pollutants equal to the screen aperture size (2,400 microns and larger) and is proprietary to CDS Technologies.

All non-buoyant solids are directed to a sump that separates the captured pollutants from the treatment flow path to prevent the larger storm events from re-suspending previously trapped material. The floatable debris and oil/grease are trapped upstream of the baffle for easy removal by a vacuum truck. The storm water oil and grit interceptor manholes for this site are positioned for easy access by hose and vacuum truck for future maintenance.

The CDS Technologies Storm Water Treatment System can be installed as a bend structure, can accommodate multiple inlets, and does not require an elevation difference between the inlet and outlet pipes. The CDS Technologies Storm Water Treatment System is fully verified by third-party agencies such as NJCAT and others. Please refer to their website [www.rainwatermanagement.ca](http://www.rainwatermanagement.ca) for further product information and specifications. The CDS Technologies is also on the British Columbia Ministry of Transportation's approved products list.

### 8.4 Maintenance Procedures

The on-site storm water management facilities are designed and constructed to require limited inspection and maintenance throughout their life cycle while providing high efficiency. The property owners are to undertake the following maintenance procedures as outlined in the following sections.

Storm sewer manholes, underground storm sewers and storm water oil and grit separator manholes are defined as confined spaces. Do not enter inside these manholes and underground sewers to perform maintenance procedures without the proper equipment, ventilation and WorkSafe BC certification for confined spaces. Only highly skilled and trained professionals to complete these tasks.

To ensure proper unobstructed runoff flows to the underground storm sewer pipe systems, catch basin and lawn drains need to be inspected at least semi-annually. Routine maintenance includes clearing grates and sumps of any leaves and debris and ensuring the trapping hood on the outlet pipe with the basin is functioning properly. A plugged inlet grate



or a plugged outlet pipe will prevent storm water surface runoff from entering into the catch basin or lawn drain and will result in water ponding on the surface.

Catch basins and lawn drains are vital to capturing and retaining heavier silts, sediments and debris and preventing it from entering into the downstream storm water drainage systems. To function properly, catch basins and lawn drains to be vacuumed and cleaned by a vacuum pump truck on an annual basis. Sediments and debris removed from the basins to be disposed offsite at an approved facility. Upon cleaning out the catch basins and lawn drains, they will be recharged with clean water after the next rainfall event.

Annual maintenance inside the storm water oil and grit separator to be completed at zero storm water runoff flow condition. Maintenance is a key to any storm water oil and grit separator system for proper long-term effectiveness. CDS allows for unobstructed access without confined space requirements. Refer to the attached document in Appendix E for detailed maintenance guidelines for the CDS system prepared by Rainwater Management.

## 8.5 Outfall Monitoring, Stormwater Sampling and Reporting

Outfall monitoring should be completed by a qualified individual (e.g., QEP) assigned to this Project for Project activities, as described above. The responsibilities of the monitor may consist of, but are not limited to, the following:

- Completing a pre-construction site visit to establish and confirm baseline conditions and prepare a comfort letter confirming that all ESC and pre-construction requirements are in place;
- Conducting regular monitoring Site visits during active construction, specifically during construction of the two new outfalls;
- Conducting water quality monitoring, as required, for surface water runoff that may be required to be directed off-Site;
- Preparation of environmental monitoring reports, including photographic documentation, which describe Site conditions, on-Site construction observations, work progress, recommendations for environmental protection and mitigation, and scheduled upcoming Project activities;
- Ensure the Fraser River foreshore is appropriately protected during construction activities.

### 8.5.1 Water Quality Sampling and Frequency

For **one year** following construction of the bioswale and two outfalls, storm water quality monitoring should take place **monthly** to establish a database of results to properly assess continued effectiveness of the newly installed system. Sampling should be scheduled during a high rain event to properly evaluate the systems function and appropriately capture temporary or potential increases in contaminants in runoff during a higher rain event (i.e., >25 mm of rain in a 24-hour period).

Sampling may include testing for parameters such as LEPH, HEPH, PAH, metals, sodium, chloride, NTU, pH etc. Additional parameters can be added at the discretion of the QEP completing the sampling. Laboratory analysis should be compared to the BC Water Quality

Guidelines (BCWQG) for Aquatic Life. Following a review of laboratory analysis, results will be compared to applicable standards (i.e., BCWQG) and a monthly storm water monitoring report will be prepared.

Following the completion of one year's worth of storm water outfall monitoring, outfall monitoring and associated laboratory analysis could be reduced to quarterly, to continue monitoring the overall effectiveness of the system.

#### 8.5.2 Reporting

Monitoring reports will be submitted by the QEP/monitor to VPA, the Client, and the Contractor following each visit to the Project Location. Reports will include a list of construction activities, water quality monitoring, and any environmental protection measures implemented. Monthly (Year 1)/Quarterly (after Year 1) water quality reports will also be distributed, as noted above, and will include laboratory analysis following sampling of the two outfall locations. Monthly/Quarterly storm outfall reports will be compared to previous reports to evaluate the overall effectiveness of the bioswale. Where required, the monthly/quarterly sampling reports will include recommendations for adjustment (if necessary), depending on the storm water quality analysis results. Any additional events of non-compliance will be tracked with the measures taken to correct those deficiencies.

## 9.0 STATEMENT OF LIMITATIONS

This SPPP is meant to be a living and flexible document that can be used to provide guidance in environmental protection measures that can be implemented during routine Project activities, as well as unanticipated events or requirements that may arise during the course of construction.

This report has been prepared solely for the internal use of PLG, Centras Engineering, Goodrich Group and the VFPA. Any use which other parties make of this report, or any reliance on or decisions made based on it, are the responsibility of such parties. PLG accepts no responsibility for damages, if any, suffered by other parties as a result of decisions made or actions based on this report.

**10.0 PROFESSIONAL STATEMENT**

This report entitled *Stormwater Pollution Prevention Plan*, has been prepared Kyla Milne (Biologist; PLG) and Steven O'Connell (Engineer; Centras).

Please contact the undersigned should you have comments or questions regarding this correspondence.

Sincerely,

**CENTRAS ENGINEERING LTD./PACIFIC LAND RESOURCE GROUP INC.**



Steve O'Connell, P.Eng.  
Centras Engineering Ltd., Principal



Kyla Milne (Bryant), RPBio, QEP  
Pacific Land Group, Biologist

# APPENDIX A. Site Grading Plan

**GENERAL NOTES:**

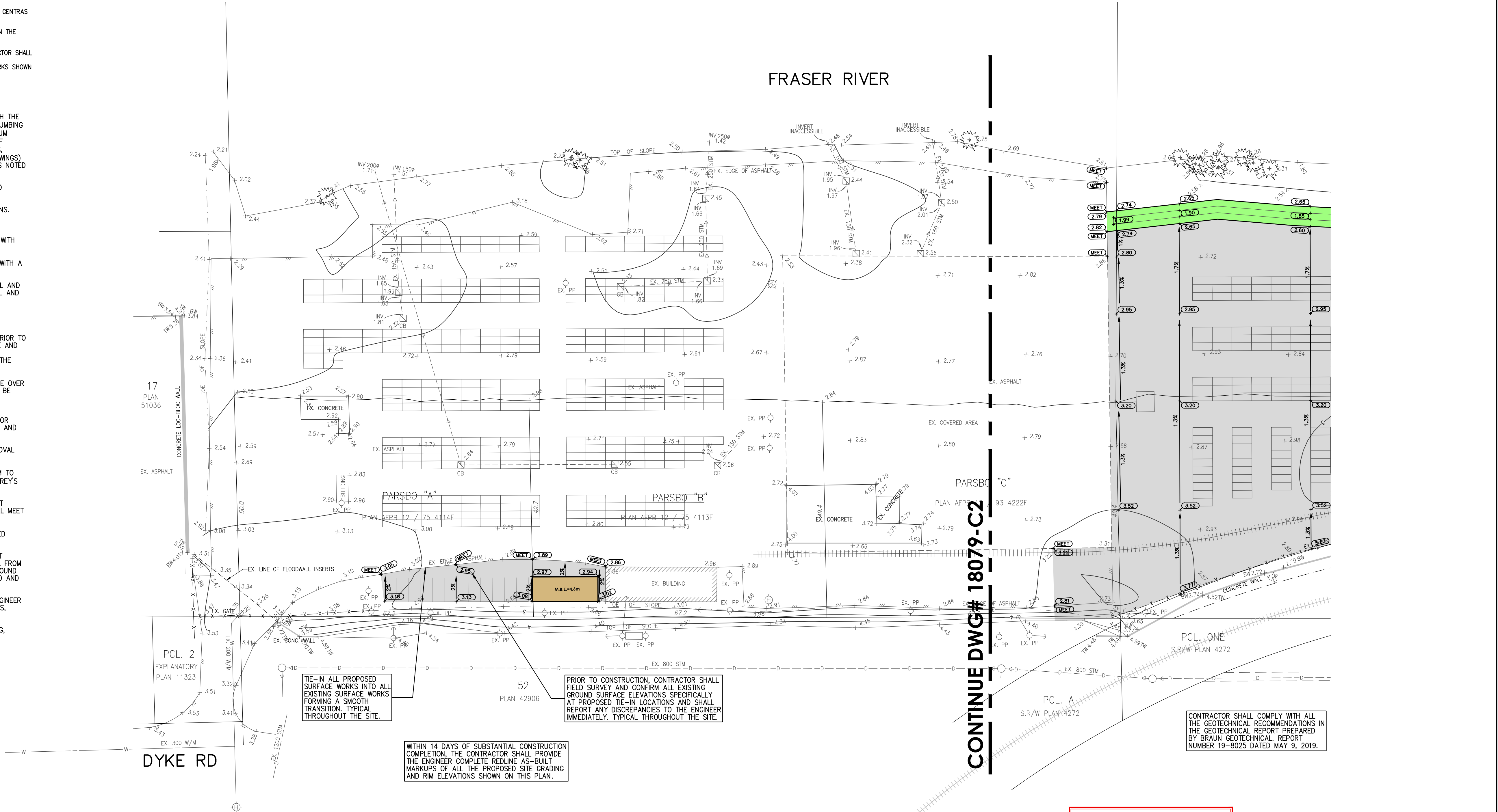
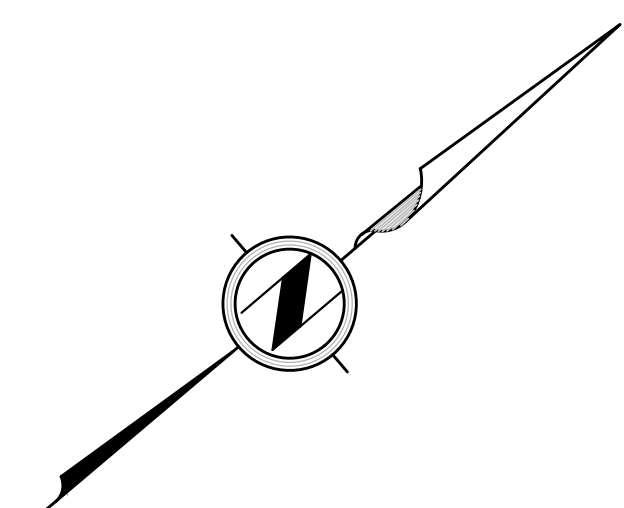
- A TREE CUTTING PERMIT AND AN EROSION & SEDIMENT CONTROL PERMIT SHALL BE OBTAINED PRIOR TO ANY WORKS COMMENCING ONSITE.
- TEMPORARY TREE PROTECTION BARRIER FENCES SHALL BE CONSTRUCTED AND INSPECTED BY THE CITY OF SURREY'S PARKS DEPARTMENT AS PER THE LOCATIONS AND INSTRUCTIONS IN THE ARBORIST REPORT AND LANDSCAPING DRAWINGS PRIOR TO ANY WORKS COMMENCING ONSITE.
- A PLUMBING PERMIT AND ALL OTHER APPLICABLE APPROVALS AND PERMITS SHALL BE OBTAINED PRIOR TO ANY UNDERGROUND CIVIL WORKS COMMENCING ONSITE. THE CONTRACTOR SHALL ARRANGE AND PAY FOR ALL PERMIT FEES FOR OBTAINING THE REQUIRED PERMITS.
- PRIOR TO CIVIL SITE SERVICES CONSTRUCTION, THE CONTRACTOR SHALL ARRANGE FOR A PRE-CONSTRUCTION MEETING ONSITE WITH CENTRAS ENGINEERING LTD. TO REVIEW AND DISCUSS THE ISSUED FOR CONSTRUCTION CIVIL DRAWINGS, CONSTRUCTION METHODS, GENERAL COORDINATION BETWEEN TRADES, SCHEDULE, TIMING, SITE REVIEWS, TESTING PROCEDURES, TESTING RESULTS, ETC.
- ALL CONSTRUCTION WORKS SHALL BE COMPLETED IN SUCH A MANNER SO AS TO PREVENT THE RELEASE OF ANY CONSTRUCTION WATER, SILT, CONCRETE LEACHATE AND ANY OTHER DELETERIOUS SUBSTANCES SHALL BE DISPOSED OF OR PLACED IN SUCH A MANNER AS TO PREVENT ITS ENTRY INTO ANY STORM SEWER SYSTEM OR WATER COURSE.
- THE DEVELOPER AND CONTRACTOR ARE RESPONSIBLE FOR SWEEPING OF THE EXISTING ROADWAYS FREE OF ANY DIRT AND SEDIMENT CAUSED BY CONSTRUCTION ACTIVITY ON A DAILY BASIS.
- THE CONTRACTOR SHALL REINSTATE ALL DISTURBED WORKS TO PRE-CONSTRUCTION CONDITIONS OR BETTER AND TO CURRENT MMCD AND CITY OF SURREY'S STANDARDS AND TO THE SATISFACTION OF CENTRAS ENGINEERING LTD.
- ALL NEW ONSITE ELECTRICAL AND TELECOMMUNICATIONS SERVICES AND CONNECTIONS SHALL BE LOCATED UNDERGROUND. REFER TO THE ELECTRICAL SITE PLAN AND BC HYDRO DRAWINGS FOR DETAILS.
- A MINIMUM OF 48 HOURS NOTICE SHALL BE PROVIDED BY THE CONTRACTOR TO CENTRAS ENGINEERING LTD. PRIOR TO CIVIL CONSTRUCTION COMMENCEMENT.
- THE CONTRACTOR SHALL COMPLY WITH ALL THE ARBORIST RECOMMENDATIONS IN THE ARBORIST REPORT AND GEOTECHNICAL REPORT.
- UPON SUBSTANTIAL CONSTRUCTION COMPLETION (WITHIN 30 DAYS), THE CONTRACTOR SHALL PROVIDE CENTRAS ENGINEERING LTD. WITH COMPLETE AS-CONSTRUCTED REDLINE INFORMATION (B.C.L.S. OR P.ENG. CERTIFIED) FOR ALL THE PROPOSED CIVIL WORKS SHOWN ON THESE PLANS.

**SITE GRADING NOTES:**

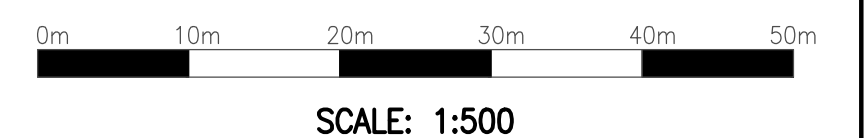
- ALL ONSITE CIVIL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE BRITISH COLUMBIA'S BUILDING CODES AND PLUMBING CODES, MASTER MUNICIPAL CONSTRUCTION DOCUMENTS (MMCD) PLATINUM EDITION, THE CITY OF SURREY'S DESIGN CRITERIA MANUAL, THE CITY OF SURREY'S STANDARD CONSTRUCTION DOCUMENTS (GENERAL CONDITIONS, SUPPLEMENTARY SPECIFICATIONS AND SUPPLEMENTARY STANDARD DRAWINGS) AND ALL OTHER APPLICABLE MUNICIPAL BYLAWS AND POLICIES, UNLESS NOTED OTHERWISE.
- ALL DIMENSIONS, OFFSETS, SIZES AND ELEVATIONS ARE METRIC AND TO GEODETIC DATUM, UNLESS NOTED OTHERWISE.
- ALL BUBBLED ELEVATIONS ARE FINISHED SURFACE PAVEMENT ELEVATIONS.
- CHANGES IN GRADE LINES SHALL BE FORMED BY SMOOTH CURVES.
- ADJUST ALL EXISTING AND PROPOSED RIMS, I.C.'S AND COVERS FLUSH WITH FINISHED SURFACE GRADES (UNLESS NOTED OTHERWISE).
- TIE-IN ALL PROPOSED SURFACE WORKS TO EXISTING SURFACE WORKS WITH A SMOOTH TRANSITION.
- FINISHED SURFACE ELEVATIONS SHALL BE INSTALLED WITHIN A VERTICAL AND HORIZONTAL TOLERANCE OF 10mm OR THEY ARE SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.
- REFER TO ARCHITECTURAL PLANS FOR CONCRETE CURBING DETAILS.
- EXISTING SUB-GRADE SHALL BE PREPARED AS PER GEOTECHNICAL RECOMMENDATIONS AND APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF IMPORTED SUB-BASE AND BASE MATERIALS. SUB-BASE AND BASE MATERIALS SHALL BE INSTALLED AND COMPACTED AS PER THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT AND APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO COMMENCING ASPHALT PAVING.
- ALL LOOSE AND/OR ORGANIC MATERIAL WITHIN THE ROADWAY SHALL BE OVER EXCAVATED AS DIRECTED BY THE GEOTECHNICAL ENGINEER AND SHALL BE REPLACED WITH APPROVED ENGINEERED FILL AS PER GEOTECHNICAL RECOMMENDATIONS AND APPROVAL.
- REFER TO THE GEOTECHNICAL REPORT AND MMCD SECTION 32.12.16 FOR HOT-MIX ASPHALT PAVEMENT RECOMMENDATIONS SUCH AS MIX DESIGN AND MINIMUM FINISHED PAVEMENT THICKNESS.
- SURFACE WATER PONDING IS NOT PERMITTED AND IS SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.
- IF REQUIRED, ASPHALT PAVEMENT CUTS AND PATCHES SHALL CONFORM TO MMCD STANDARD DRAWING NUMBER G5 AND TO CURRENT CITY OF SURREY'S STANDARDS.
- REFER TO LANDSCAPE DRAWINGS FOR DECORATIVE SURFACE TREATMENT DETAILS AND SPECIFICATIONS. DECORATIVE SURFACE TREATMENTS SHALL MEET H2O TRAFFIC LOADING SPECIFICATIONS.
- REFER TO ARCHITECTURAL AND/OR LANDSCAPE DRAWINGS FOR DETAILED GRADING AROUND BUILDINGS AND LANDSCAPE AREAS.
- PRIOR TO INSTALLATION OF CONCRETE CURBING AND HOT-MIX ASPHALT PAVING, THE CONTRACTOR SHALL OBTAIN WRITTEN SIGN OFF APPROVAL FROM THE ELECTRICAL CONSULTANT AND BC HYDRO THAT ALL THE UNDERGROUND ELECTRICAL AND TELECOMMUNICATIONS SERVICES HAVE BEEN INSTALLED AND ARE ACCESSIBLE TO THE ELECTRICAL CONSULTANT AND BC HYDRO.
- THE DEVELOPER SHALL EMPLOY THE SERVICES OF A GEOTECHNICAL ENGINEER FOR FIELD REVIEWS AND CERTIFICATIONS RELATED TO STRIPPING DEPTHS, SUB-GRADE EXCAVATION, SUB-GRADE PREPARATION, ENGINEERED FILL, BACKFILL MATERIALS WITHIN TRENCHES, SHORING, ROAD STRUCTURE MATERIALS, COMPACTION, ASPHALT MIX DESIGN, ASPHALT CORE TESTING, ASPHALT COMPACTION TESTING, ETC.

**LEGEND**

- 2.76 EXISTING GROUND SURFACE ELEVATION.
- 3.5 EXISTING GROUND SURFACE CONTOUR ELEVATION.
- PROPOSED EXTENT OF TEMPORARY SITE OFFICE TRAILER BUILDING (BY OTHERS).
- ASPHALT PAVEMENT SURFACE AS PER THE GEOTECHNICAL CONSULTANT'S REQUIREMENTS.
- PROPOSED EXTENT OF STORM WATER MANAGEMENT BIOSWALE.
- EXISTING GROUND SURFACE ELEVATION.
- PROPOSED FINISHED SURFACE ELEVATION.
- MEET EXISTING GROUND SURFACE ELEVATION.
- OVERLAND FINISHED SURFACE FLOW DIRECTION.
- PROPOSED CATCH BASIN MANHOLE.
- STORM SEWER
- STORM WATER OIL & GRIT INTERCEPTOR MANHOLE



**NOT FOR CONSTRUCTION**



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LEGAL BENCHMARK	ALL ELEVATIONS ARE GEODETIC AND REFER TO SURVEY MONUMENT NUMBER: 1277J
	LOCATED AT: ON S. END OF PATTULLO BRIDGE AT LAMP STANDARD AND HAVING ELEVATION OF: 12.856m

No.	REVISIONS / SUBMISSIONS	DATE
1	ISSUED FOR REVIEW	MAY 5, 2019
2	ADDRESS REVIEW COMMENTS	JAN 14, 2020

**GOODRICH TERMINAL**  
 9985 GRACE ROAD  
 SURREY, BC V3V 3V7  
 TEL: 604-588-0132

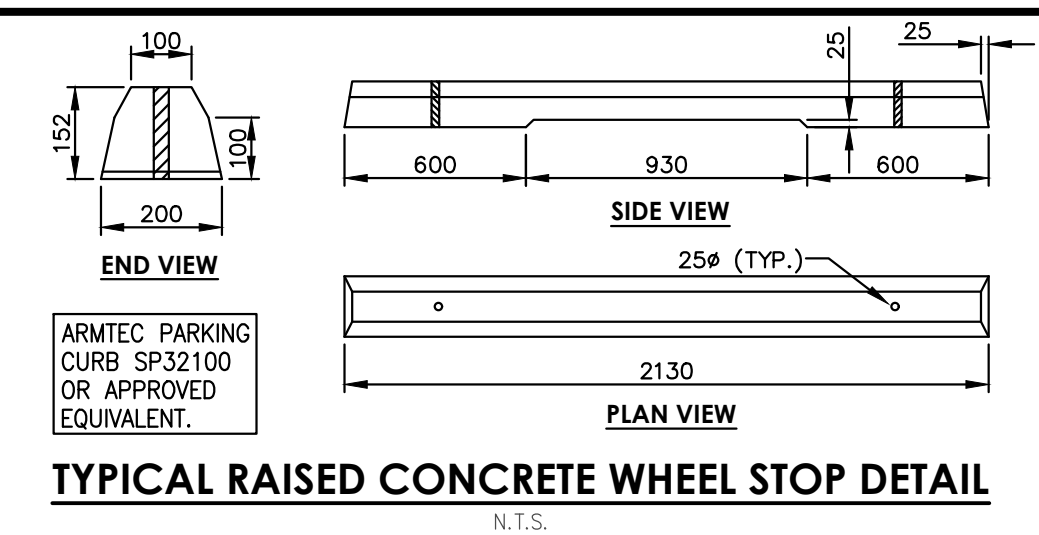
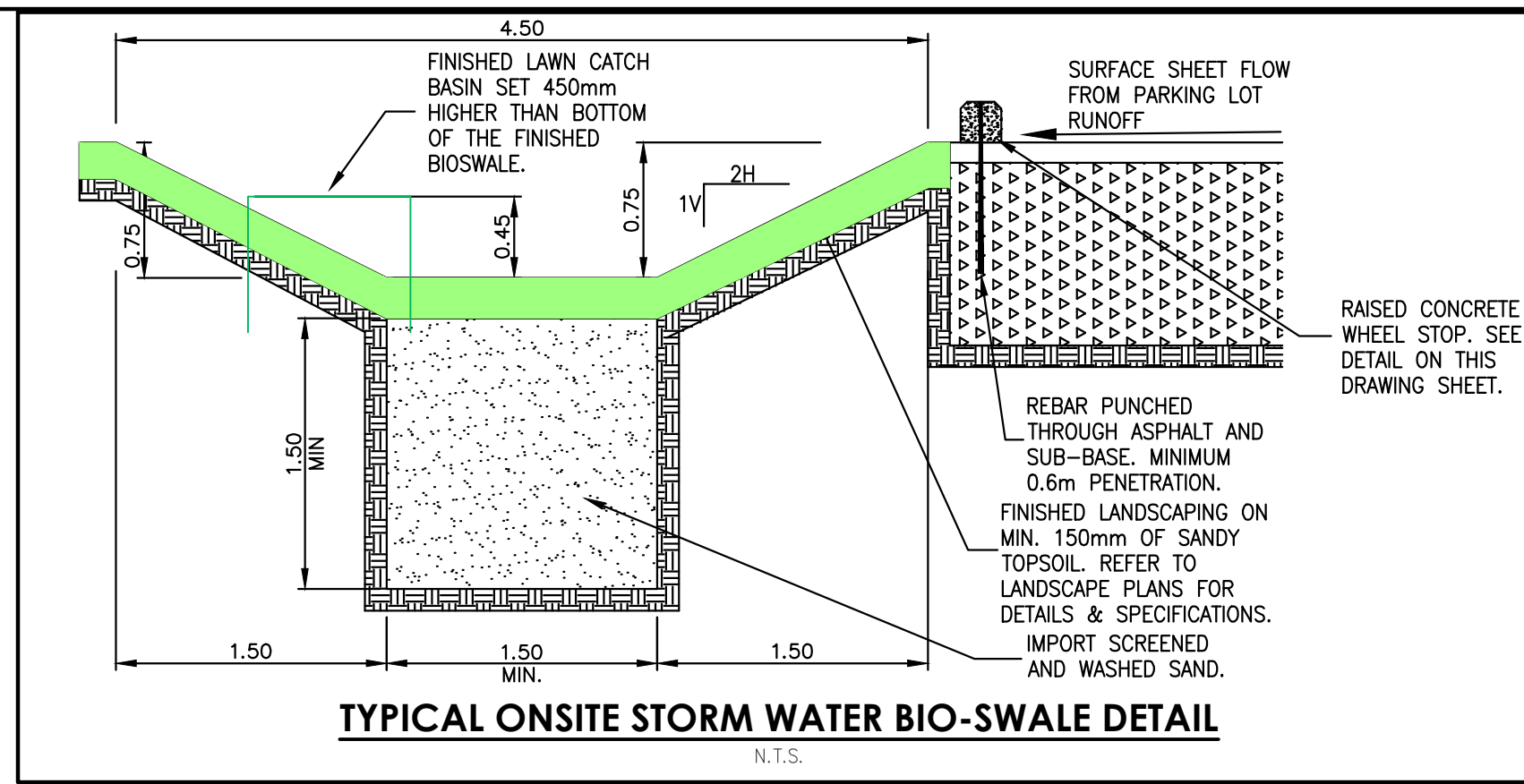
**CENTRAS**  
 Engineering Ltd  
 CROYDON BUSINESS CENTRE  
 #216-2630 CROYDON DRIVE  
 SURREY, BC V3S 6T3  
 PH: 604-782-6927 EMAIL: info@centras.ca

**PROJECT NAME**  
 OUTDOOR LUMBER STORAGE YARD  
**PROJECT SITE ADDRESS**  
 10880 DYKE RD AND 21780 SOUTH  
 WESTMINSTER SHORE, SURREY, BC

**ENGINEER'S SEAL**  
 February 17, 2020

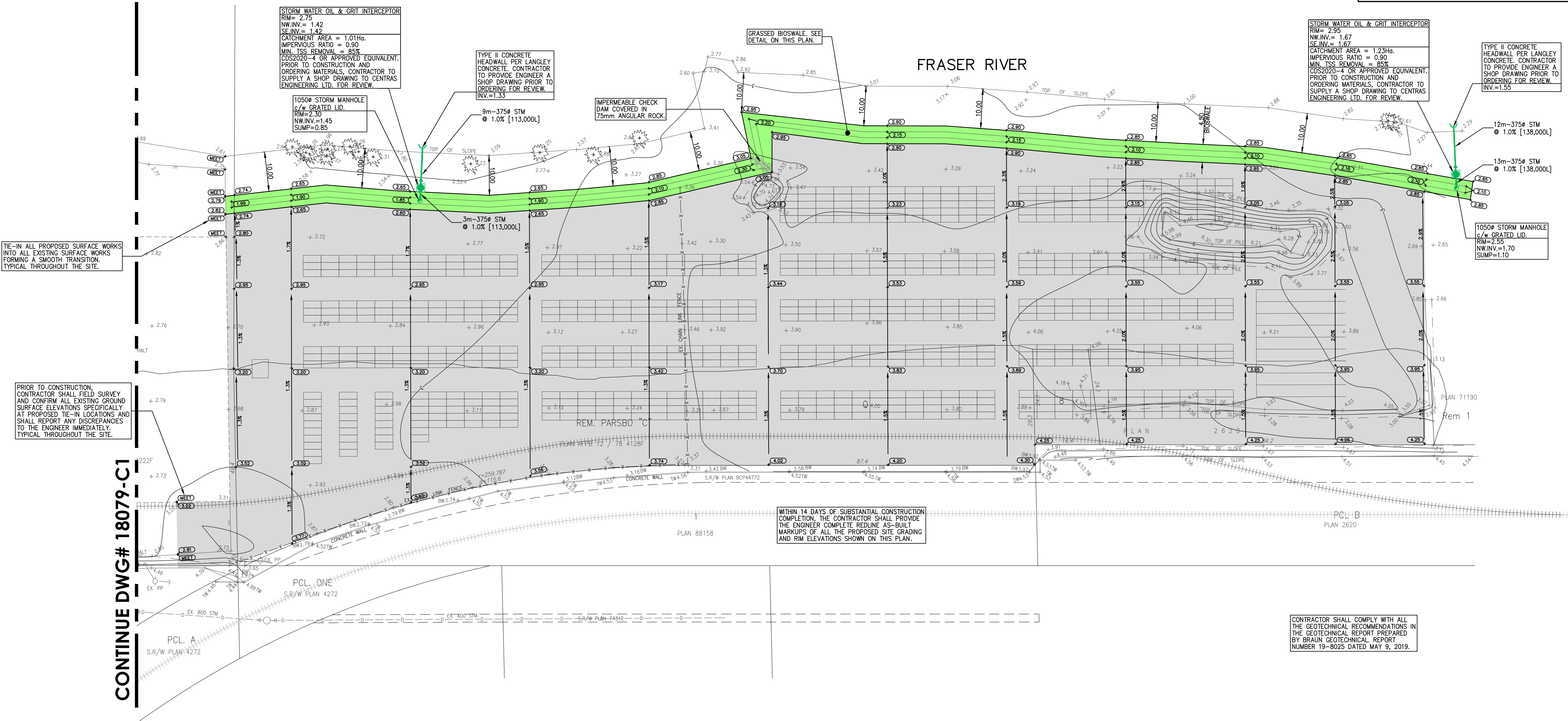
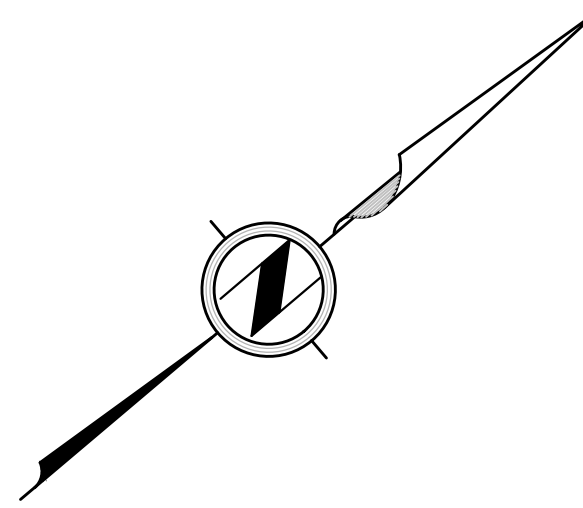
<b>CITY OF SURREY</b>			
<b>SITE GRADING PLAN (SOUTH)</b>			
DESIGN:	SBO	DRAWING NUMBER	<b>18079-C1</b>
DRAWN:	SBO	HOR. SCALE	1:500
CHECKED:	SBO	VER. SCALE	
ENGINEER:	SBO	REV.	1

DESTROY ALL PRINTS BEARING PREVIOUS REVISION NUMBER



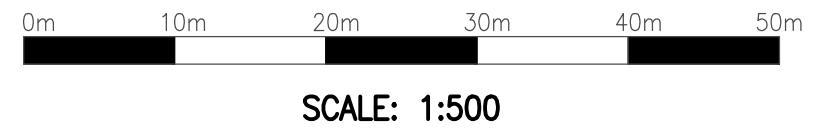
**LEGEND**

- 2.76 EXISTING GROUND SURFACE ELEVATION.
- 3.5 EXISTING GROUND SURFACE CONTOUR ELEVATION.
- PROPOSED EXTENT OF TEMPORARY SITE OFFICE TRAILER BUILDING (BY OTHERS).
- ASPHALT PAVEMENT SURFACE AS PER THE GEOTECHNICAL CONSULTANT'S REQUIREMENTS.
- PROPOSED EXTENT OF STORM WATER MANAGEMENT BIOSWALE.
- 2.92 EXISTING GROUND SURFACE ELEVATION.
- 3.85 PROPOSED FINISHED SURFACE ELEVATION.
- MEET MEET EXISTING GROUND SURFACE ELEVATION.
- OVERLAND FINISHED SURFACE FLOW DIRECTION.
- PROPOSED CATCH BASIN MANHOLE.
- STORM SEWER
- STORM WATER OIL & GRIT INTERCEPTOR MANHOLE



CONTINUE DWG# 18079-C1

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No.	REVISIONS / SUBMISSIONS	DATE	CLIENT	ENGINEER-OF-RECORD	PROJECT NAME	ENGINEER'S SEAL	CITY OF SURREY	
							DESIGN:	SBO
			<b>GOODRICH TERMINAL</b> 9985 GRACE ROAD SURREY, BC V3V 3V7 TEL: 604-588-0132	 <b>CENTRAS</b> Engineering Ltd CROYDON BUSINESS CENTRE #216-2630 CROYDON DRIVE SURREY, BC V3S 6T3 PH: 604-782-6927 EMAIL: info@centras.ca	<b>OUTDOOR LUMBER STORAGE YARD</b>  <b>PROJECT SITE ADDRESS</b> 10880 DYKE RD AND 21780 SOUTH WESTMINSTER SHORE, SURREY, BC	 <b>February 17, 2020</b>	<b>SITE GRADING PLAN (NORTH)</b>	

DESTROY ALL PRINTS BEARING PREVIOUS REVISION NUMBER

# **APPENDIX B.** Water Quality Event Calculations

# ONSITE STORM WATER DETENTION VOLUME CALCULATIONS MODIFIED RATIONAL METHOD - 50% - 2 YEAR

**Analysis Scenario:** 50% 2-Year Post Development Storm Event - Sub Catchment #1

**Developer/Project:** Goodrich Group of Companies

**Site Addresses:** 21780/21832/21840 South Westminster Shore & 10880 Dyke Road, Surrey

**Analysis Date:** August 2019

**Centras Project:** 18079

**Bioswale Parameters:**

Length (m): **144**

Cross Sectional Area (m<sup>2</sup>): **1.08**

Volume in Bioswale (m<sup>3</sup>): **155.52**

Cross Sectional Area in Sand (m<sup>2</sup>): **2.250**

Void Ratio: **33%**

Volume in Bioswale (m<sup>3</sup>): **106.92**

Total Volume in Bioswale (m<sup>3</sup>): **262**

**2-Year Post Development Parameters:**

IDF Curve: **Surrey Kwantlen Park**

Intensity= $aT^b$

Where I (mm/hr), T (hr), a & b Are Constants

$a_{2-yr} = 12.852$        $b_{2-yr} = -0.482$

Runoff Coefficient (R): **0.95**

Catchment Area (Ha): **1.1300**

N: **0.00278**



Storm Duration (Minutes)	Intensity (mm/hr)	Peak Inflow (m <sup>3</sup> /s)	Inflow Volume (m <sup>3</sup> )	Release Rate (m <sup>3</sup> /s)	Outflow Volume (m <sup>3</sup> )	Storage Volume (m <sup>3</sup> )
5	21.29	0.06353	19.06	0.00000	0.00	19.06
10	15.24	0.04548	27.29	0.00000	0.00	27.29
<b>15</b>	12.54	<b>0.03741</b>	33.67	0.00000	0.00	33.67
20	10.91	0.03257	39.08	0.00000	0.00	39.08
25	9.80	0.02924	43.87	0.00000	0.00	43.87
30	8.98	0.02678	48.21	0.00000	0.00	48.21
40	7.81	0.02332	55.96	0.00000	0.00	55.96
50	7.02	0.02094	62.82	0.00000	0.00	62.82
60	6.43	0.01918	69.04	0.00000	0.00	69.04
75	5.77	0.01722	77.50	0.00000	0.00	77.50
90	5.29	0.01577	85.17	0.00000	0.00	85.17
120	4.60	0.01373	98.86	0.00000	0.00	98.86
<b>MINIMUM ONSITE STORM WATER DETENTION VOLUME (m<sup>3</sup>):</b>						<b>98.86</b>



# ONSITE STORM WATER DETENTION VOLUME CALCULATIONS MODIFIED RATIONAL METHOD - 50% - 2 YEAR

**Analysis Scenario:** 50% 2-Year Post Development Storm Event - Sub Catchment #2

**Developer/Project:** Goodrich Group of Companies

**Site Addresses:** 21780/21832/21840 South Westminster Shore & 10880 Dyke Road, Surrey

**Analysis Date:** August 2019

**Centras Project:** 18079

**Bioswale Parameters:**

Length (m): **164**

Cross Sectional Area (m<sup>2</sup>): **1.08**

Volume in Bioswale (m<sup>3</sup>): **177.12**

Cross Sectional Area in Sand (m<sup>2</sup>): **2.250**

Void Ratio: **33%**

Volume in Bioswale (m<sup>3</sup>): **121.77**

Total Volume in Bioswale (m<sup>3</sup>): **299**

**2-Year Post Development Parameters:**

IDF Curve: **Surrey Kwantlen Park**

Intensity= $aT^b$

Where I (mm/hr), T (hr), a & b Are Constants

$a_{2-yr} = 12.852$       $b_{2-yr} = -0.482$

Runoff Coefficient (R): **0.95**

Catchment Area (Ha): **1.3800**

N: **0.00278**



Storm Duration (Minutes)	Intensity (mm/hr)	Peak Inflow (m <sup>3</sup> /s)	Inflow Volume (m <sup>3</sup> )	Release Rate (m <sup>3</sup> /s)	Outflow Volume (m <sup>3</sup> )	Storage Volume (m <sup>3</sup> )
5	21.29	0.07758	23.27	0.00000	0.00	23.27
10	15.24	0.05555	33.33	0.00000	0.00	33.33
<b>15</b>	12.54	<b>0.04569</b>	41.12	0.00000	0.00	41.12
20	10.91	0.03977	47.72	0.00000	0.00	47.72
25	9.80	0.03571	53.57	0.00000	0.00	53.57
30	8.98	0.03271	58.88	0.00000	0.00	58.88
40	7.81	0.02848	68.34	0.00000	0.00	68.34
50	7.02	0.02557	76.71	0.00000	0.00	76.71
60	6.43	0.02342	84.31	0.00000	0.00	84.31
75	5.77	0.02103	94.64	0.00000	0.00	94.64
90	5.29	0.01926	104.02	0.00000	0.00	104.02
120	4.60	0.01677	120.73	0.00000	0.00	120.73
<b>MINIMUM ONSITE STORM WATER DETENTION VOLUME (m<sup>3</sup>):</b>						<b>120.73</b>

# **APPENDIX C.** Storm Drainage Event Calculations

# ONSITE STORM WATER DETENTION VOLUME CALCULATIONS MODIFIED RATIONAL METHOD - 10 YEAR

**Analysis Scenario:** 10-Year Post Development Storm Event - Sub Catchment #1

**Developer/Project:** Goodrich Group of Companies

**Site Addresses:** 21780/21832/21840 South Westminster Shore & 10880 Dyke Road, Surrey

**Analysis Date:** August 2019

**Centras Project:** 18079

**Bioswale Parameters:**

Length (m): **144**

Cross Sectional Area (m<sup>2</sup>): **1.08**

Volume in Bioswale (m<sup>3</sup>): **155.52**

Cross Sectional Area in Sand (m<sup>2</sup>): **2.250**

Void Ratio: **33%**

Volume in Bioswale (m<sup>3</sup>): **106.92**

Total Volume in Bioswale (m<sup>3</sup>): **262**

**10-Year Post Development Parameters:**

IDF Curve: **Surrey Kwantlen Park**

Intensity= $aT^b$

Where I (mm/hr), T (hr), a & b Are Constants

$a_{10-yr} =$  **19.323**      $b_{10-yr} =$  **-0.552**

Runoff Coefficient (R): **0.95**

Catchment Area (Ha): **1.1300**

N: **0.00278**



Storm Duration (Minutes)	Intensity (mm/hr)	Peak Inflow (m <sup>3</sup> /s)	Inflow Volume (m <sup>3</sup> )	Release Rate (m <sup>3</sup> /s)	Outflow Volume (m <sup>3</sup> )	Storage Volume (m <sup>3</sup> )
5	76.17	0.22732	68.19	0.00000	0.00	68.19
10	51.95	0.15505	93.03	0.00000	0.00	93.03
<b>15</b>	<b>41.53</b>	<b>0.12395</b>	111.56	0.00000	0.00	111.56
20	35.44	0.10575	126.90	0.00000	0.00	126.90
25	31.33	0.09350	140.25	0.00000	0.00	140.25
30	28.33	0.08455	152.18	0.00000	0.00	152.18
40	24.17	0.07213	173.12	0.00000	0.00	173.12
50	21.37	0.06377	191.32	0.00000	0.00	191.32
60	19.32	0.05767	207.60	0.00000	0.00	207.60
75	17.08	0.05098	229.42	0.00000	0.00	229.42
90	15.45	0.04610	248.95	0.00000	0.00	248.95
120	13.18	0.03933	283.19	0.00000	0.00	283.19
<b>MINIMUM ONSITE STORM WATER DETENTION VOLUME (m<sup>3</sup>):</b>						<b>283.19</b>

#

# ONSITE STORM WATER DETENTION VOLUME CALCULATIONS MODIFIED RATIONAL METHOD - 10 YEAR

**Analysis Scenario:** 10-Year Post Development Storm Event - Sub Catchment #2

**Developer/Project:** Goodrich Group of Companies

**Site Addresses:** 21780/21832/21840 South Westminster Shore & 10880 Dyke Road, Surrey

**Analysis Date:** August 2019

**Centras Project:** 18079

**Bioswale Parameters:**

Length (m): **164**

Cross Sectional Area (m<sup>2</sup>): **1.08**

Volume in Bioswale (m<sup>3</sup>): **177.12**

Cross Sectional Area in Sand (m<sup>2</sup>): **2.250**

Void Ratio: **33%**

Volume in Bioswale (m<sup>3</sup>): **121.77**

Total Volume in Bioswale (m<sup>3</sup>): **299**

**10-Year Post Development Parameters:**

IDF Curve: **Surrey Kwantlen Park**

Intensity= $aT^b$

Where I (mm/hr), T (hr), a & b Are Constants

$a_{10-yr} = 19.323$      $b_{10-yr} = -0.552$

Runoff Coefficient (R): **0.95**

Catchment Area (Ha): **1.3800**

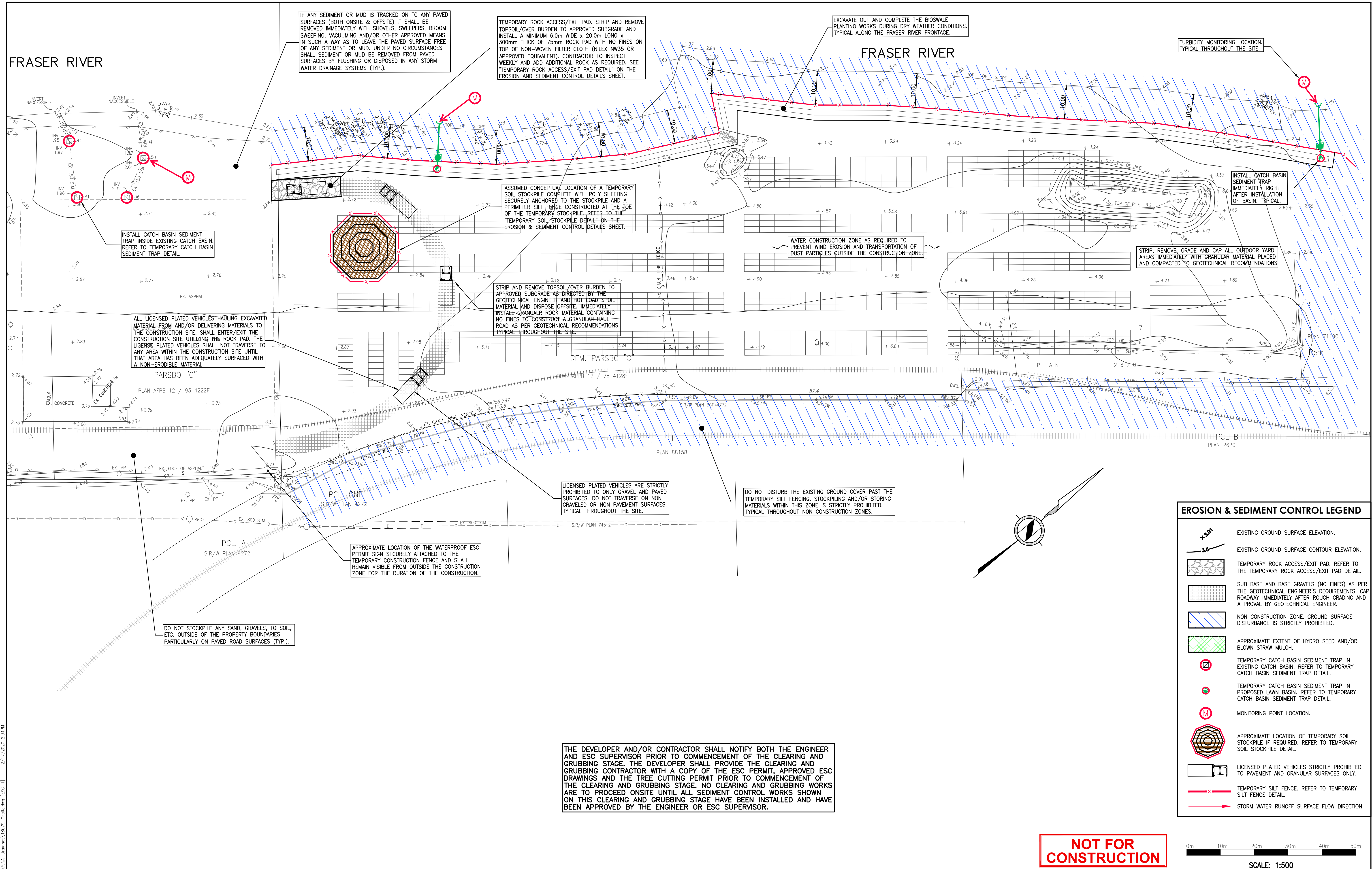
N: **0.00278**



Storm Duration (Minutes)	Intensity (mm/hr)	Peak Inflow (m <sup>3</sup> /s)	Inflow Volume (m <sup>3</sup> )	Release Rate (m <sup>3</sup> /s)	Outflow Volume (m <sup>3</sup> )	Storage Volume (m <sup>3</sup> )
5	76.17	0.27761	83.28	0.00000	0.00	83.28
10	51.95	0.18935	113.61	0.00000	0.00	113.61
<b>15</b>	<b>41.53</b>	<b>0.15138</b>	136.24	0.00000	0.00	136.24
20	35.44	0.12915	154.98	0.00000	0.00	154.98
25	31.33	0.11418	171.27	0.00000	0.00	171.27
30	28.33	0.10325	185.85	0.00000	0.00	185.85
40	24.17	0.08809	211.41	0.00000	0.00	211.41
50	21.37	0.07788	233.64	0.00000	0.00	233.64
60	19.32	0.07042	253.53	0.00000	0.00	253.53
75	17.08	0.06226	280.18	0.00000	0.00	280.18
90	15.45	0.05630	304.03	0.00000	0.00	304.03
120	13.18	0.04803	345.85	0.00000	0.00	345.85
<b>MINIMUM ONSITE STORM WATER DETENTION VOLUME (m<sup>3</sup>):</b>						<b>345.85</b>

#

# APPENDIX D. ESC Plans



EROSION & SEDIMENT CONTROL LEGEND	
	EXISTING GROUND SURFACE ELEVATION.
	EXISTING GROUND SURFACE CONTOUR ELEVATION.
	TEMPORARY ROCK ACCESS/EXIT PAD. REFER TO THE TEMPORARY ROCK ACCESS/EXIT PAD DETAIL.
	SUB BASE AND BASE GRAVELS (NO FINES) AS PER THE GEOTECHNICAL ENGINEER'S REQUIREMENTS. CAP ROADWAY IMMEDIATELY AFTER ROUGH GRADING AND APPROVAL BY GEOTECHNICAL ENGINEER.
	NON CONSTRUCTION ZONE. GROUND SURFACE DISTURBANCE IS STRICTLY PROHIBITED.
	APPROXIMATE EXTENT OF HYDRO SEED AND/OR BLOWN STRAW MULCH.
	TEMPORARY CATCH BASIN SEDIMENT TRAP IN EXISTING CATCH BASIN. REFER TO TEMPORARY CATCH BASIN SEDIMENT TRAP DETAIL.
	TEMPORARY CATCH BASIN SEDIMENT TRAP IN PROPOSED LAWN BASIN. REFER TO TEMPORARY CATCH BASIN SEDIMENT TRAP DETAIL.
	MONITORING POINT LOCATION.
	APPROXIMATE LOCATION OF TEMPORARY SOIL STOCKPILE IF REQUIRED. REFER TO TEMPORARY SOIL STOCKPILE DETAIL.
	LICENSED PLATED VEHICLES STRICTLY PROHIBITED TO PAVEMENT AND GRANULAR SURFACES ONLY.
	TEMPORARY SILT FENCE. REFER TO TEMPORARY SILT FENCE DETAIL.
	STORM WATER RUNOFF SURFACE FLOW DIRECTION.

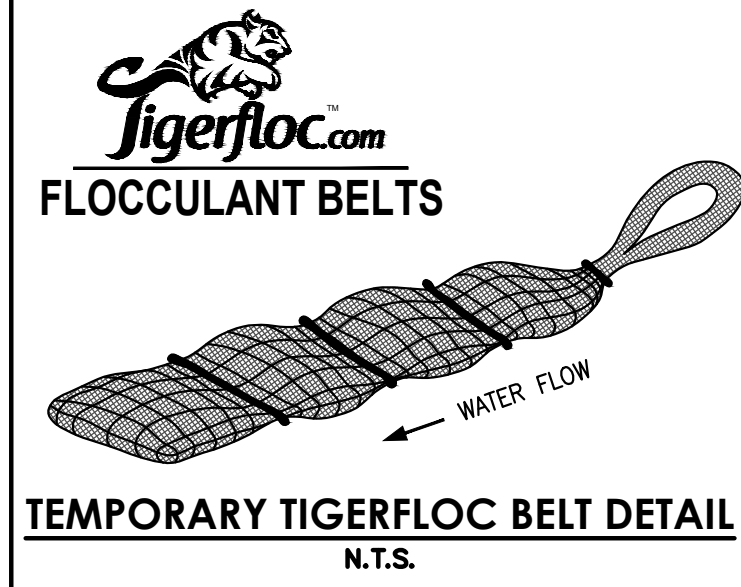
**NOT FOR CONSTRUCTION**

0m 10m 20m 30m 40m 50m  
SCALE: 1:500

THE DEVELOPER AND/OR CONTRACTOR SHALL NOTIFY BOTH THE ENGINEER AND ESC SUPERVISOR PRIOR TO COMMENCEMENT OF THE CLEARING AND GRUBBING STAGE. THE DEVELOPER SHALL PROVIDE THE CLEARING AND GRUBBING CONTRACTOR WITH A COPY OF THE ESC PERMIT, APPROVED ESC DRAWINGS AND THE TREE CUTTING PERMIT PRIOR TO COMMENCEMENT OF THE CLEARING AND GRUBBING STAGE. NO CLEARING AND GRUBBING WORKS ARE TO PROCEED ONSITE UNTIL ALL SEDIMENT CONTROL WORKS SHOWN ON THIS CLEARING AND GRUBBING STAGE HAVE BEEN INSTALLED AND HAVE BEEN APPROVED BY THE ENGINEER OR ESC SUPERVISOR.

LEGAL BENCHMARK	No.	REVISIONS / SUBMISSIONS	DATE	CLIENT	ENGINEER-OF-RECORD	PROJECT NAME	ENGINEER'S SEAL	CITY OF SURREY	
								EROSION & SEDIMENT CONTROL PLAN	
ALL ELEVATIONS ARE GEODETIC AND REFER TO SURVEY MONUMENT NUMBER: 1277J LOCATED AT: ON S. END OF PATTULLO BRIDGE AT LAMP STANDARD AND HAVING ELEVATION OF: 12.856m				<b>GOODRICH TERMINAL</b> 9985 GRACE ROAD SURREY, BC V3V 3V7 TEL: 604-588-0132	 <b>CENTRAS</b> Engineering Ltd CROYDON BUSINESS CENTRE #216-2630 CROYDON DRIVE SURREY, BC V3S 6T3 PH: 604-782-6927 EMAIL: info@centras.ca	<b>OUTDOOR LUMBER STORAGE YARD</b>  <b>PROJECT SITE ADDRESS</b> 10880 DYKE RD AND 21780 SOUTH WESTMINSTER SHORE, SURREY, BC	 February 17, 2020	DESIGN: SBO	DRAWING NUMBER: <b>18079-ESC1</b>
	PARSBO A (PLAN IN ABSOLUTE FEES PARSBO BOOK 12 FOLIO 75 NO. 4114F) PARSBO B (PLAN IN ABSOLUTE FEES PARSBO BOOK 12 FOLIO 75 NO. 4115F) PARSBO C (PLAN IN ABSOLUTE FEES PARSBO BOOK 12 FOLIO 93 NO. 4222F) ALL IN DISTRICT 5 & CRP 2; PARSBO C (PLAN IN ABSOLUTE FEES PARSBO BOOK 12 FOLIO 78 NO. 4128F) DISTRICT 101 5 GROUP 2 EXCEPT: PARSBO ONE (STATUTORY RIGHT OF WAY PLAN W/198158) NWD	ADDRESS REVIEW COMMENTS ISSUED FOR REVIEW	JAN 14, 2020 MAY 5, 2019					CHECKED: SBO ENGINEER: SBO	HOR. SCALE: 1:500 VER. SCALE:

DESTROY ALL PRINTS BEARING PREVIOUS REVISION NUMBER



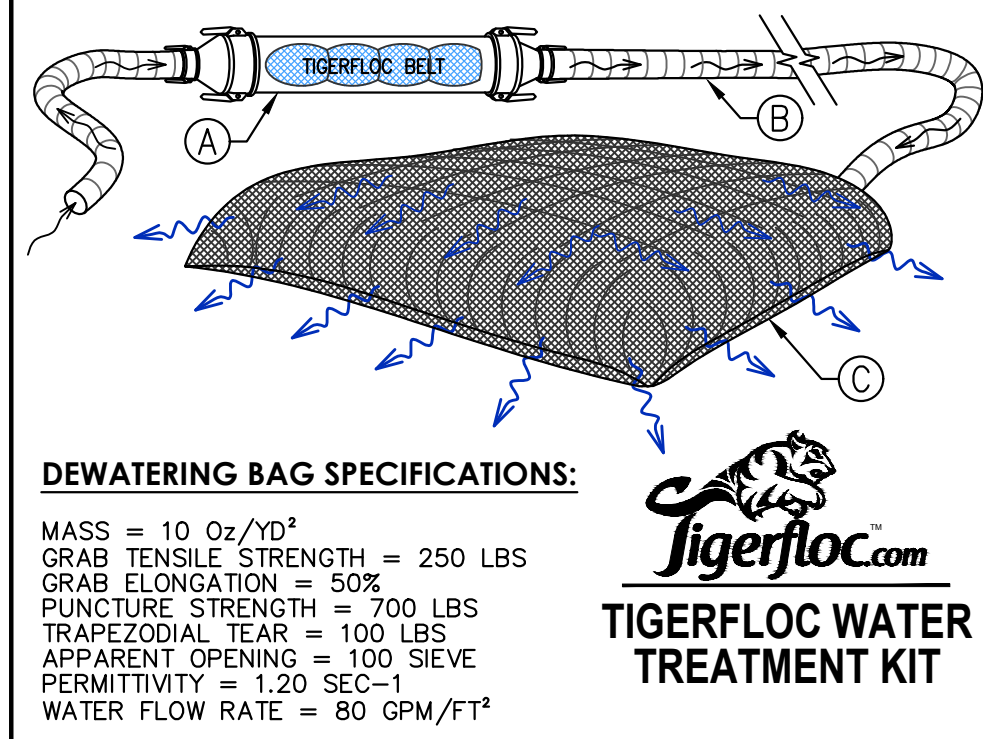
**USES:**  
INTRODUCED WITH CONSTRUCTION WATER WHERE TURBIDITY, HEAVY METALS, AND HYDROCARBONS EXIST TO ACCELERATE PARTICLE DEPOSITION AND REDUCE TURBIDITY LEVELS FOR STORM WATERS DISCHARGING INTO DOWNSTREAM WATERCOURSES.

**PRODUCT DESCRIPTION:**  
SEWN NYLON MESH WITH FOUR 1 LB. SEALED POUCHES OF TIGERFLOC INSERTED ALONG THE FLOCCULANT BELT LENGTH. NYLON LOOP AT TOP FOR ATTACHMENT EASE TO HOOKS, CARABINERS, STRING, ETC. FOR OPTIMAL PERFORMANCE. MAINTAIN THE TIGERFLOC BELT MOIST AT ALL TIMES.

**APPROXIMATE PRODUCT DIMENSIONS:**  
36" (L) x 5.5" (W) x 2" (H)

**TIGERFLOC SPECIFICATIONS:**  
SODIUM MONTMORILLONITE AND OTHER PROPRIETARY INGREDIENTS. 1-5% CRYSTALLINE SILICA. TOXICITY TO FISH: PIMPHALES PROMELAS LC 50/96 HOURS > 13,000 Mg/L.

**FIRST AID PROCEDURES:**  
IF THE TIGERFLOC POUCHES ARE PUNCTURED AND THE FLOCCULANT COMES IN CONTACT CAUSING IRRITATION:  
- SKIN: WASH THOROUGHLY WITH SOAP AND CLEAN WATER UNTIL THE CONTACT AREA BECOMES CLEAN.  
- EYES: FLUSH WITH CLEAN WATER UNTIL IRRITATION CEASES. IF IRRITATION PERSISTS, CONTACT A PHYSICIAN.  
- INHALATION: MOVE TO AN AREA FREE OF DUST. IF SYMPTOMS OF IRRITATION PERSIST, CONTACT A PHYSICIAN. INHALATION MY AGGRAVATE EXISTING RESPIRATORY ILLNESSES.



**USES:**  
BY INSERTING A TIGERFLOC BELT INTO THE TUBE WHICH THEN LEADS THROUGH A MICRO-PORED DEWATERING BAG, THE RESULT IS REMOVING MOST SEDIMENT FROM CONSTRUCTION STORM WATER OR SITE DISCHARGE FROM EXCAVATION PUMPING. THE TIGERFLOC TUBE AND DEWATERING BAG UNIT IS DESIGNED FOR A 2" ELECTRIC PUMP AND IS PORTABLE AND EASY TO USE BY ONE PERSON ELIMINATING HIGH MOBILITY AND SERVICE CHARGES. EXITING WATER FLOW FROM THE DEWATERING BAG CAN BE DIRECTED CONSTRUCTING A 6m x 6m OR LARGER WOOD FRAME WITH AN OPENING, LINED WITH POLY SHEETING, COIR MATTING, OR CLEAR GRAVEL TO MAXIMIZE THE DEWATERING BAG SURFACE AREA (FLOW RATE).

**PRODUCT DESCRIPTION:**  
REFER TO THE REFERENCE LETTERS "A", "B" AND "C" ON THE DETAIL SHOWN TO THE LEFT.

**A** TIGERFLOC TUBE: 60" (L) x 4" (W) LAYFLAT HOSE OR PVC SCHEDULE 80 PIPE SECURED WITH 2"-4" CAMLOCK FITTINGS.

**B** 2" PUMP HOSE: MINIMUM 50' LENGTH FROM OUTLET CAMLOCK OF THE TIGERFLOC TUBE TO THE INLET OF TIGERFLOC DEWATERING BAG FOR OPTIMAL AGITATION AND PRODUCT PERFORMANCE.

**C** DEWATERING BAG: 15' x 15' SIZE MANUFACTURED BY FLOC SYSTEMS INC. THE DEWATERING BAGS ARE CUSTOM CUT AND ASSEMBLED WITH SEAM FOLD TO ENSURE SEDIMENT MATERIAL DOES NOT ESCAPE AT THE SEAM AS IT DOES WITH OTHER DEWATERING BAGS.

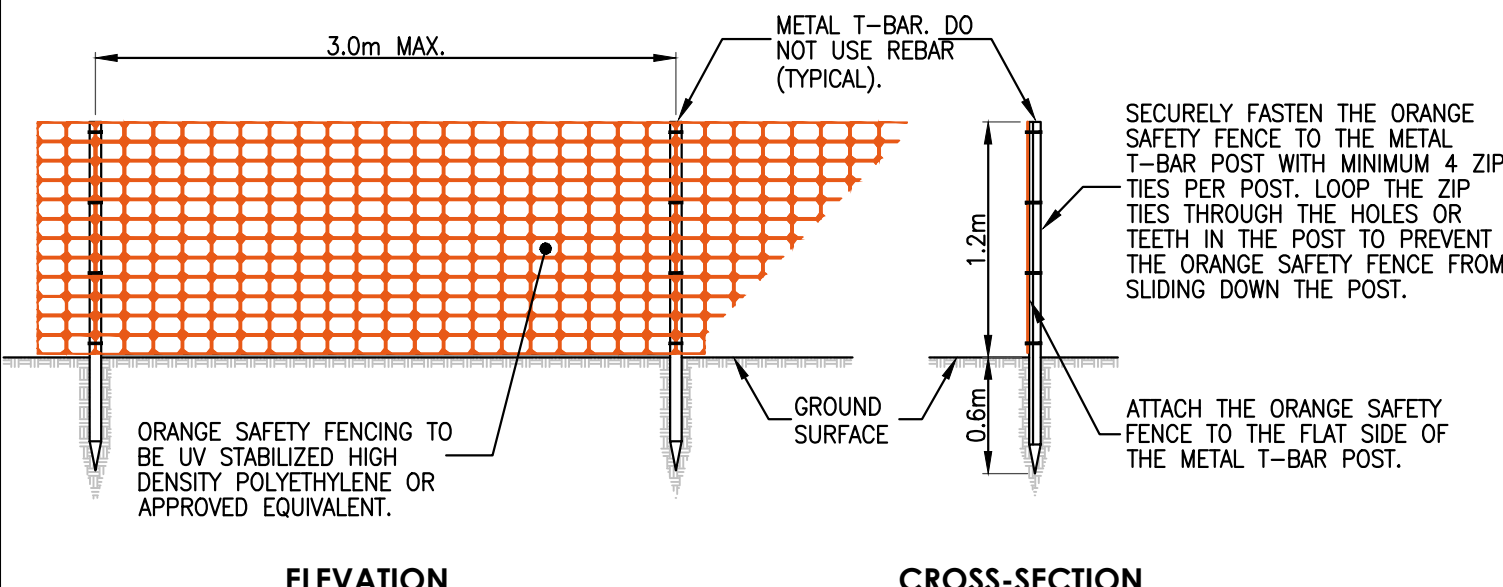
**DEWATERING BAG SPECIFICATIONS:**  
MASS = 10 Oz/YD<sup>2</sup>  
GRAB TENSILE STRENGTH = 250 LBS  
GRAB ELONGATION = 50%  
PUNCTURE STRENGTH = 700 LBS  
TRAPEZOIDAL TEAR = 100 LBS  
APPARENT OPENING = 100 SIEVE  
PERMITTIVITY = 1.20 SEC-1  
WATER FLOW RATE = 80 GPM/FT<sup>2</sup>



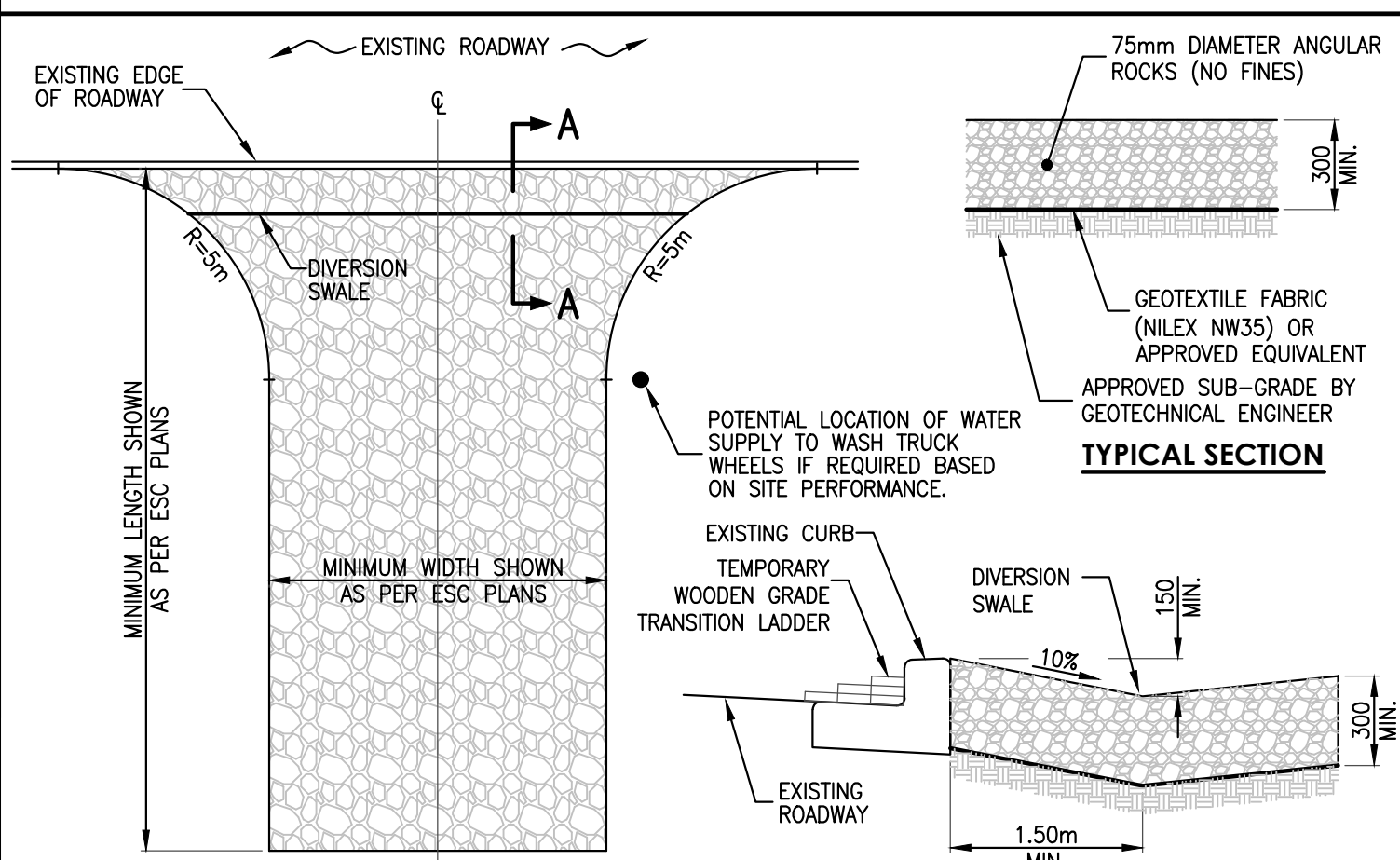
**TIGERFLOC WATER TREATMENT KIT**

FOR ADDITIONAL PRODUCT INFORMATION AND ORDERING, VISIT WWW.FLOCSYSTEMS.COM OR CALL 778-230-4174.

**TEMPORARY TIGERFLOC WATER TREATMENT KIT DETAIL**  
N.T.S.



**TEMPORARY ORANGE SAFETY FENCING DETAIL**  
N.T.S.



**TEMPORARY ROCK ACCESS/EXIT PAD DETAIL**  
N.T.S.

- NOTES:**
- THE TEMPORARY ROCK ACCESS/EXIT PAD SHALL BE CONSTRUCTED PRIOR TO ANY LICENSED PLATED VEHICLES TRAVERSING ONSITE. LICENSED PLATED VEHICLES ARE STRICTLY PROHIBITED TO TRAVERSE ON ROCK, GRAVEL AND/OR ASPHALT SURFACES ONLY.
  - REMOVE ALL TOPSOIL AND OVER BURDEN WITHIN THE ROCK PAD LOCATION TO APPROVED SUB-GRADE AS RECOMMENDED AND FIELD REVIEWED BY THE GEOTECHNICAL ENGINEER.
  - INSTALL GEOTEXTILE FABRIC (NILEX NW35 OR APPROVED EQUIVALENT) WITHIN THE ROCK ACCESS/EXIT PAD LOCATION OR AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
  - INSTALL A MINIMUM OF 300mm THICK OF 75mm CLEAN ANGULAR ROCKS (NO FINES) WITHIN THE SPECIFIED ROCK ACCESS/EXIT PAD LOCATION. THE 300mm ROCK THICKNESS SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL THE ROCK PAD HAS BEEN APPROVED FOR DECOMMISSION.
  - THE USE OF 75mm MINUS ROAD MULCH CONTAINING FINES AS A ROCK ACCESS PAD IS STRICTLY PROHIBITED.
  - CONSTRUCTION EQUIPMENT AND VEHICLES TRAVELING OVER THE ROCK ACCESS/EXIT PAD SHALL MAINTAIN A SLOW AND CONSTANT SPEED.
  - ROCK(S) LODGED BETWEEN VEHICLE TIRES, ESPECIALLY OF DUAL WHEEL VEHICLES, SHALL BE REMOVED PRIOR TO LEAVING THE CONSTRUCTION SITE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW EACH TRUCK'S TIRES FOR ROCKS PRIOR TO LEAVING THE SITE TO THE EXISTING OFFSITE PUBLIC ROADWAYS.
  - A MECHANICAL STREET SWEEPER SHALL BE UTILIZED ONSITE UNTIL SUBSTANTIAL CONSTRUCTION COMPLETION. ALL ASPHALT AND CONCRETE SURFACES (BOTH OFFSITE AND ONSITE) SHALL BE SWEEPED CLEAN IMMEDIATELY AFTER ANY SEDIMENT AND/OR TRACKING. IT SHALL NOT BE REMOVED FROM PAVED OR CONCRETE SURFACES BY MEANS OF PRESSURIZED WATER FLUSHING.
  - OVERLAND SURFACE WATER FLOWS SHALL BE PREVENTED FROM PASSING THROUGH THE ROCK PAD AND THEY SHALL BE DIVERTED AWAY, UNDER AND/OR AROUND THE ROCK PAD BY MEANS OF SWALES AND/OR A TEMPORARY CULVERT AND STORM DRAINAGE PIPE.
  - BASED ON SITE PERFORMANCE, THE CONTRACTOR TO OBTAIN A TEMPORARY HYDRANT USE PERMIT FROM THE MUNICIPALITY OR UTILIZE THE EXISTING WATER SERVICE CONNECTION COMPLETE WITH A BACK FLOW PREVENTER AND WATER METER TO MANUALLY RINSE TRUCK TIRES ON THE ROCK PAD PRIOR TO THE VEHICLES LEAVING THE SITE.
  - THE ROCK PAD(S) SHALL BE SITE REVIEWED DAILY DURING DRY WEATHER CONDITIONS AND PERIODICALLY THROUGHOUT THE DAY DURING WET WEATHER CONDITIONS.
  - THE CONTRACTOR SHALL ADD ADDITIONAL ANGULAR ROCK AND/OR REMOVE/RE-INSTALL THE ROCK PAD AS REQUIRED IF THE ROCK PAD BECOMES BURIED AND/OR SATURATED WITH SEDIMENT.

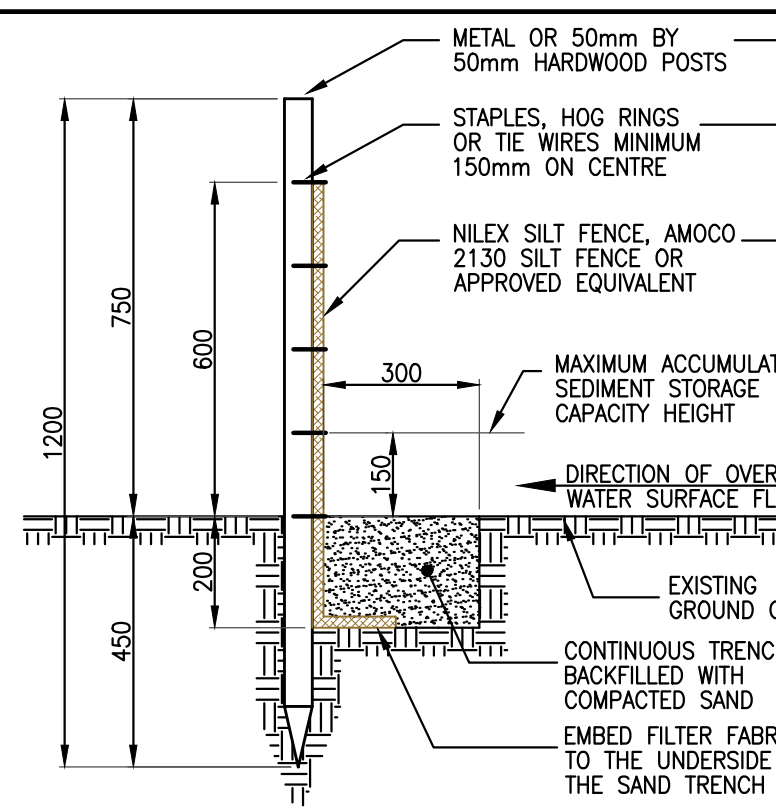
- NOTES:**
- ALL CATCH BASIN AND LAWN DRAIN SEDIMENT TRAPS SHALL BE FLEXSTORM INLET FILTERS OR APPROVED EQUIVALENT.
  - FOR WRITTEN SPECIFICATIONS AND ORDERING, VISIT: WWW.INLETFILTERS.COM SUPPLIED BY ADS CANADA.
  - CATCH BASIN INLET FILTER SEDIMENT TRAP TO HAVE INTERNAL OVERFLOW CAPABILITIES.

- INSTALLATION INSTRUCTIONS:**
- REMOVE THE METAL INLET GRATE FROM THE CATCH BASIN GRATE FRAME.
  - CLEAN STONE AND DIRT FROM THE LEDGE (LIP) OF DRAINAGE STRUCTURE.
  - DROP THE FLEXSTORM INLET FILTER THROUGH THE CLEAR OPENING SUCH THAT THE HANGERS REST FIRMLY ON THE LIP OF THE STRUCTURE.
  - REPLACE THE GRATE AND CONFIRM IT IS NOT ELICATED MORE THAN 3mm, THE THICKNESS OF THE STEEL HANGERS.

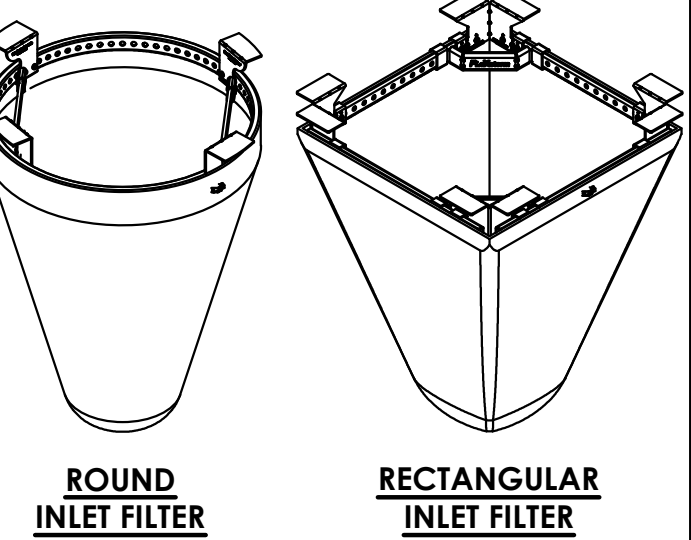
- FREQUENCY OF INSPECTION:**
- INSPECTION SHALL OCCUR FOLLOWING ANY RAINFALL EVENTS > 10mm OF TOTAL RAINFALL. AT LEAST ONCE PER WEEK DURING THE COURSE OF CONSTRUCTION AND PRIOR TO ANY ANTICIPATED RAINFALL EVENTS.

- MAINTENANCE GUIDELINES:**
- EMPTY OUT THE SEDIMENT BAG IF MORE THAN 50% FILLED WITH SEDIMENT AND DEBRIS, OR AS DIRECTED BY THE ESC SUPERVISOR.
  - CATCH BASIN INLET FILTER SEDIMENT TRAPS SHALL REMAIN IN PLACE UNTIL ASPHALT PAVING AND FINAL LANDSCAPING WORKS ARE COMPLETED.
  - DO NOT EMPTY/CLEANOUT TEMPORARY CATCH BASIN SEDIMENT TRAPS INTO ANY SWAMPS, STORM DRAINAGE SYSTEMS, CREEKS, STREAMS, ETC.

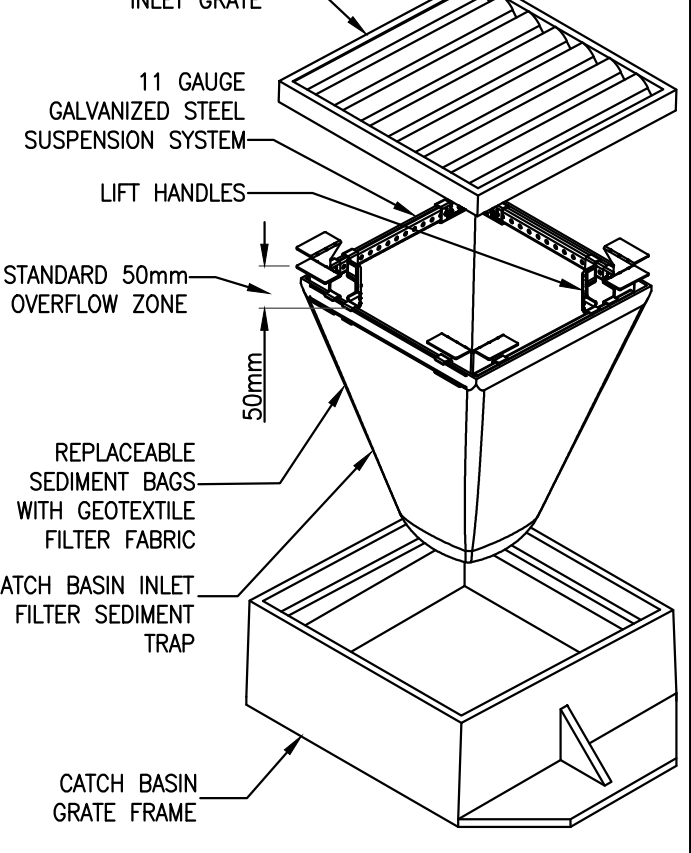
**TEMPORARY CATCH BASIN SEDIMENT TRAP DETAIL**  
N.T.S.



- NOTES:**
- SILT FENCING FABRIC MATERIAL SHALL BE NILEX SILT FENCE, AMOCO 2130 OR APPROVED EQUIVALENT.
  - TEMPORARY SILT FENCE SHALL BE INSTALLED ALONG EXISTING GROUND SURFACE CONTOURS, UNLESS OTHERWISE SHOWN OR NOTED ON THE ESC PLANS.
  - THE CONTINUOUS COMPACTED SAND TRENCH LINE SHALL BE EXCAVATED IN EXISTING UNDISTURBED GROUND COVER AND SHALL BE A 300mm WIDE BY 200mm DEEP AND SHALL BE INSTALLED ON THE UPHILL SIDE OF THE SILT FENCE.
  - INSTALL THE ENDS OF THE SILT FENCE FABRIC ENDS FACING UPHILL WITHIN THE BOTTOM OF THE CONTINUOUS COMPACTED SAND TRENCH LINE. THE FABRIC SHALL EXTEND AT LEAST 300mm INTO THE CONTINUOUS COMPACTED SAND TRENCH LINE. PLACE AND COMPACT SAND OVER THE TOE OF THE SILT FENCE FABRIC.
  - VERTICAL POSTS SHALL BE 50mm BY 50mm HARDWOOD POSTS AND/OR METAL POSTS.
  - SILT FENCING FABRIC SHALL BE CUT FROM A CONTINUOUS SILT FENCE FABRIC ROLL TO REDUCE THE NUMBER OF FABRIC JOINTS. WHERE SILT FENCE FABRIC JOINTS ARE REQUIRED, FABRIC JOINTS SHALL ONLY BE PLACED AT POSTS WITH A MINIMUM 300mm FABRIC OVERLAP AND BOTH ENDS OF THE FABRIC ENDS SECURELY FASTENED TO THE VERTICAL POST.
  - THE SILT FENCE FILTER FABRIC AND/OR WIRE MESH SUPPORT FENCE SHALL BE FASTENED TO THE UPHILL SIDE OF THE POSTS BY EITHER STAPLES, HOG RINGS AND/OR THE WIRES MINIMUM 150mm ON CENTRE.
  - AT END POSTS, THE SILT FENCE FABRIC SHALL BE WRAPPED AROUND TWO POSTS AT LEAST WITH ONE FULL REVOLUTION.
  - WHERE STANDARD STRENGTH SILT FENCE FABRIC TO BE INSTALLED, A 50mm BY 50mm 14 GAUGE WIRE MESH BACKING SUPPORT SHALL ALSO BE USED AND SECURELY FASTENED TO THE UPHILL SIDE OF THE POSTS AND ON THE DOWNHILL SIDE OF THE SILT FENCE FABRIC. THE WIRE MESH SHALL EMBED AT LEAST 50mm INTO THE CONTINUOUS COMPACTED SAND TRENCH.
  - SILT FENCE SHALL BE CONSTRUCTED AT LEAST 1.0m AWAY FROM THE TOE A FILL SLOPE AND/OR ANY SOIL STOCKPILE.
  - ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED AT A STABILIZED LOCATION PRIOR TO SEDIMENT STORAGE REACHING A HEIGHT OF 150mm ABOVE THE CONTINUOUS COMPACTED SAND TRENCH LINE.
  - THE CONTRACTOR SHALL FACILITATE ANY NECESSARY REPAIRS AND MAINTENANCE WORKS IMMEDIATELY WITHIN 24 HOURS.
  - THE SILT FENCES SHALL BE FIELD REVIEWED BY THE CONTRACTOR PRIOR TO ANY ANTICIPATED RAINFALL EVENTS.



**TEMPORARY SOIL STOCKPILE COVER DETAIL**  
N.T.S.



**TEMPORARY SOIL STOCKPILE COVER DETAIL**  
N.T.S.

- NOTES:**
- TEMPORARY SOIL STOCKPILES SHALL HAVE THEIR ENTIRE EXPOSED SURFACES ADEQUATELY COVERED AND ANCHORED WITH POLYETHYLENE TARPS AND/OR HYDRO SEED. DO NOT LEAVE TEMPORARY SOIL STOCKPILES UNCOVERED FOR PERIODS LONGER THAN 48 HOURS.
  - SITUATE THE TEMPORARY SOIL STOCKPILES ON THE HIGH END OF THE CONSTRUCTION SITE IF AND WHERE POSSIBLE AND AWAY FROM DRAINAGE DITCHES AND STREAMS.
  - INSTALL A TEMPORARY SILT FENCE A MINIMUM 1.0m AWAY FROM THE TOE OF THE FILL SLOPE AROUND THE ENTIRE PERIMETER OF THE TEMPORARY SOIL STOCKPILE. REFER TO THE TEMPORARY SILT FENCE DETAIL ON THIS SHEET.
  - POLYETHYLENE TARPS SHALL BE SECURELY ANCHORED TO THE SOIL STOCKPILE TO PREVENT THE STOCKPILE FROM BEING UNCOVERED. POLY TARP EDGES SHALL OVERLAP EACH OTHER BY 1.5m MINIMUM.
  - TEMPORARY SOIL STOCKPILES SHALL ONLY BE EXPOSED AND MOVED DURING DRY WEATHER CONDITIONS.

- TEMPORARY SOIL STOCKPILE COVER DETAIL**  
N.T.S.

**NOT FOR CONSTRUCTION**

C:\Users\Steve\_O\OneDrive\Desktop\18079 ESC - Details\18079 ESC - Details.dwg [ESC - DETAILS] 2/17/2020 2:34PM

BENCHMARK	ALL ELEVATIONS ARE GEODETIC AND REFER TO SURVEY MONUMENT NUMBER: 1277J
	LOCATED AT: ON S. END OF PATTULLO BRIDGE AT LAMP STANDARD AND HAVING ELEVATION OF: 12.856m
	PARBISO A (PLAN IN ABSOLUTE FEES PARBISO BOOK 12 FOLIO 75 NO. 4114F)
	PARBISO B (PLAN IN ABSOLUTE FEES PARBISO BOOK 12 FOLIO 75 NO. 4115F)
	PARBISO C (PLAN IN ABSOLUTE FEES PARBISO BOOK 12 FOLIO 75 NO. 4227F)
LEGAL	PARBISO A (PLAN IN ABSOLUTE FEES PARBISO BOOK 12 FOLIO 75 NO. 4114F) PARBISO B (PLAN IN ABSOLUTE FEES PARBISO BOOK 12 FOLIO 75 NO. 4115F) PARBISO C (PLAN IN ABSOLUTE FEES PARBISO BOOK 12 FOLIO 75 NO. 4227F) ALL IN DISTRICT LOT 5 GRP 2 PARBISO C (PLAN IN ABSOLUTE FEES PARBISO BOOK 12 FOLIO 75 NO. 4128F) DISTRICT LOT 5 GROUP 2 EXCEPT PARBISO ONE (STATUTORY RIGHT OF WAY PLAN W/198158) NWD

No.	REVISIONS / SUBMISSIONS	DATE
▲		
▲		
▲		
▲		
▲	ADDRESS REVIEW COMMENTS	JAN 14, 2020
▲	ISSUED FOR REVIEW	MAY 5, 2019

**CLIENT**  
**GOODRICH TERMINAL**  
9985 GRACE ROAD  
SURREY, BC V3V 3V7  
TEL: 604-588-0132

**ENGINEER-OF-RECORD**  
**CENTRAS**  
Engineering Ltd  
CROYDON BUSINESS CENTRE  
#216-2630 CROYDON DRIVE  
SURREY, BC V3S 6T3  
PH: 604-782-6927 EMAIL: info@centras.ca

**PROJECT NAME**  
**OUTDOOR LUMBER STORAGE YARD**  
**PROJECT SITE ADDRESS**  
**10880 DYKE RD AND 21780 SOUTH WESTMINSTER SHORE, SURREY, BC**

**ENGINEER'S SEAL**  
**February 17, 2020**

<b>CITY OF SURREY</b>			
<b>EROSION &amp; SEDIMENT CONTROL DETAILS</b>			
DESIGN:	SBO	DRAWING NUMBER	<b>18079-ESC2</b>
DRAWN:	SBO	HOR. SCALE	1:500
CHECKED:	SBO	VER. SCALE	
ENGINEER:	SBO	REV.	1

DESTROY ALL PRINTS BEARING PREVIOUS REVISION NUMBER

1.0 RESPONSIBILITIES

- 1.1 THE ESC SUPERVISOR IS RETAINED BY THE OWNER/DEVELOPER TO MONITOR, PROVIDE ADVICE AND REPORT ON THE SITE'S PERFORMANCE UNDER THE ESC PERMIT...
1.2 IT IS THE OBLIGATION OF THE OWNER/DEVELOPER TO RETAIN THE SERVICES OF AN ESC SUPERVISOR AT ALL TIMES...
1.3 IN ACCORDANCE WITH THE CITY'S ESC BY-LAW, THE OWNER/DEVELOPER IS ULTIMATELY RESPONSIBLE FOR ALL THE SITE ACTIVITIES THAT RESULT IN A BREACH OF COMPLIANCE AS DEFINED WITHIN THE ESC BYLAW...
1.4 THE OWNER/DEVELOPER ARE RESPONSIBLE TO ADDRESS AND RECTIFY ANY ESC FACILITY DEFICIENCIES AS IDENTIFIED BY THE ESC SUPERVISOR AND/OR CITY WITHIN THE SPECIFIED TIME FRAME THAT RESULT IN NON-COMFORMANCE WITH THE PERMIT...
1.5 FOR INDIVIDUAL SINGLE FAMILY LOTS WITHIN A PARENT DEVELOPMENT, THE OWNER/DEVELOPER OF THE PARENT DEVELOPMENT ARE RESPONSIBLE DURING THE HOUSE BUILDING CONSTRUCTION FOR EACH HOUSE BUILDER TO IMPLEMENT INDIVIDUAL LOT ESC FACILITIES TO ENSURE THAT ANY STORM WATER RUNOFF FROM THESE INDIVIDUAL LOTS ARE IN COMPLIANCE PER ALL THE ESC BY-LAW REQUIREMENTS.

2.0 OFFENCES AND ENFORCEMENT

- 2.1 THE GENERAL MANAGER OF ENGINEERING, A DESIGNATED STAFF FROM THE ENGINEERING DEPARTMENT OF THE CITY, OR ANY CITY BY-LAW ENFORCEMENT OFFICER MAY ENTER UPON ANY LAND TO CARRY OUT FIELD MEASUREMENTS AND CONDUCT SITE REVIEWS AS ARE REASONABLY NECESSARY TO ASCERTAIN WHETHER THERE IS COMPLIANCE WITH THE PROVISIONS OF THIS BY-LAW OR AN ESC PERMIT ISSUED PURSUANT TO THIS BY-LAW...
2.2 UPON FIELD MEASUREMENTS, OR ESC FACILITIES INSPECTION WHERE THE OWNER AND/OR DEVELOPER HAS FAILED TO MAINTAIN THE VALIDITY OF THE ESC PERMIT OR MEET THE PROVISIONS OF THIS BY-LAW, THE GENERAL MANAGER OF ENGINEERING, A DESIGNATED STAFF FROM THE ENGINEERING DEPARTMENT OF THE CITY, OR ANY CITY BY-LAW ENFORCEMENT OFFICER MAY SERVE ON THE OWNER, DEVELOPER, OR ESC SUPERVISOR A NOTICE TO COMPLY, WHICH REQUIRES THE OWNER AND/OR DEVELOPER TO REMEDY THE NON-COMPLIANCE WITHIN 24 HOURS...
2.3 FOLLOWING ISSUANCE OF A NOTICE TO COMPLY, ALL CONSTRUCTION ON THE LAND SHALL CEASE EXCEPT FOR THOSE WORKS NECESSARY TO ACHIEVE COMPLIANCE...
2.4 THE NOTICE TO COMPLY MUST BE SERVED ON THE OWNER AND/OR DEVELOPER AND/OR THE NAMED ESC SUPERVISOR BY PERSONAL SERVICE OR RETURN REGISTERED MAIL TO THE ADDRESS OF THE OWNER AND/OR DEVELOPER AND/OR ESC SUPERVISOR OF THE ESC PERMIT AS IT APPEARS ON THE ESC PERMIT APPLICATION...
2.5 THE CITY MAY NOTIFY THE DEPARTMENT OF FISHERIES AND OCEANS CANADA AND THE BRITISH COLUMBIA MINISTRY OF ENVIRONMENT OF THE ISSUANCE OF ANY NOTICE TO COMPLY...
2.6 IF THE OWNER AND/OR DEVELOPER FAILS TO COMPLY WITH THE NOTICE TO COMPLY, THE CITY MAY UTILIZE ALL OR PART OF THE SECURITY DEPOSIT TO TAKE WHATEVER ACTION THE CITY DEEMS NECESSARY TO PROTECT THE DRAINAGE SYSTEM, THE CITY MAY CONCURRENTLY PURSUE ANY OTHER LEGAL REMEDY IT MAY BELIEVE IS NECESSARY INCLUDING ISSUING VIOLATION TICKETS...
2.7 PROSECUTION OF THE OWNER AND/OR DEVELOPER DOES NOT EXEMPT THE OWNER AND/OR DEVELOPER FROM REMEDIATING THE NON-COMPLIANCE WITHIN 24 HOURS OR AS SET OUT IN THE NOTICE TO COMPLY...
2.8 ALL PERSONS WHO COMMIT AN OFFENCE AGAINST THE CITY ESC BY-LAW SHALL BE SUBJECT TO A VIOLATION TICKET IN THE AMOUNT AND FOR OFFENCES PRESCRIBED IN THE CITY TICKETING BY-LAW...
2.9 ANY PERSON WHO VIOLATES A PROVISION OF THEIR ESC PERMIT OR THE CITY ESC BY-LAW COMMITS AN OFFENCE PUNISHABLE ON SUMMARY CONVICTION AND SHALL BE LIABLE TO A FINE OF NOT LESS THAN TWO THOUSAND (\$2,000) DOLLARS AND NOT MORE THAN TEN THOUSAND (\$10,000) DOLLARS FOR EACH DAY ON WHICH AN OFFENCE EXISTS OR IS CONTINUING, TOGETHER WITH SUCH COSTS AS A COURT OF COMPETENT JURISDICTION MAY ORDER, FOR THE PURPOSES OF ENFORCING ANY JUDGEMENT OF A COURT OR COLLECTING ANY FINE LEVIED HEREUNDER, THE PROVISIONS OF THE OFFENCE ACT, R.S.B.C. 1996 c.338, AS AMENDED, SHALL APPLY. WHERE AN OFFENCE IS A CONTINUING OFFENCE, EACH DAY THAT THE OFFENCE CONTINUES SHALL CONSTITUTE A SEPARATE AND DISTINCT OFFENCE WITH THE SAME MINIMUM AND MAXIMUM FINES NOTED ABOVE.

3.0 GENERAL

- 3.1 CONSTRUCTION ONSITE CAN ONLY COMMENCE UNDER THE GUIDANCE OF THE ESC SUPERVISOR TO ENSURE THE PROACTIVE IMPLEMENTATION OF ESC FACILITIES AS SPECIFIED ON THE APPROVED ESC DRAWINGS...
3.2 A RECOMMENDED CONSTRUCTION SEQUENCE FOR STARTING CONSTRUCTION ONSITE IS TO HOLD A PRE-CONSTRUCTION MEETING, POST THE WATERPROOF ESC PERMIT, FLAG OR FENCE CLEARING LIMITS, INSTALL CATCH BASIN PROTECTION, GRADE AND INSTALL CONSTRUCTION ENTRANCE(S), INSTALL PERIMETER PROTECTION SUCH AS SWALES AND SEDIMENT FENCING, CONSTRUCT SEDIMENT PONDS AND TRAPS, GRADE AND STABILIZE CONSTRUCTION Haul ROADS AND CONSTRUCT SURFACE WATER CONTROLS SIMULTANEOUSLY WITH CLEARING AND GRADING FOR THE PROJECT DEVELOPMENT...
3.3 DEVELOPER AND/OR CONTRACTOR SHALL NOTIFY BOTH THE ENGINEER OF RECORD AND THE ESC SUPERVISOR PRIOR TO COMMENCEMENT OF THE CLEARING AND GRUBBING STAGE...
3.4 IF THERE IS CITY PARKLAND ON OR ADJACENT TO THE SITE, THE CONTRACTOR SHALL CONTACT THE CITY'S PARKS DEPARTMENT TO DISCUSS AND CONFIRM ANY PARKS SPECIFIC REQUIREMENTS THAT MAY NOT BE SHOWN ON THE ESC PLANS...
3.5 THE CONTRACTOR SHALL ENSURE THAT ALL WORK UNDER THIS PROJECT IS UNDERTAKEN AND COMPLETED IN SUCH A MANNER AS TO PREVENT THE RELEASE OF ANY SEDIMENT LADEN WATER INTO ANY WATER COURSE, STORM SEWER, OR DRAINAGE SYSTEM WHICH EXCEEDS CITY, DFO, AND MOE CRITERIA...
3.6 ALL CONSTRUCTION, MAINTENANCE, DECOMMISSIONING, AND SITE CLEANING WORKS ARE TO BE PERFORMED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE...
3.7 NO STORM SEWER CONNECTION IS TO BE MADE FROM THE SITE WHICH ALLOWS WATER TO LEAVE THE SITE UNTIL THE WORKS SHOWN ON THE ESC PLAN HAVE BEEN INSTALLED...
3.8 PUMPING WATER FROM THE SITE IS ONLY PERMITTED FOR CLEAN WATER THAT HAS TRAVELED THROUGH A SEDIMENT CONTROL SYSTEM...
3.9 WORK SHOULD BE COMPLETED IN DRY WEATHER CONDITIONS WHENEVER POSSIBLE TO MINIMIZE SEDIMENT LADEN WATER...
3.10 EXISTING GROUND COVER SHALL REMAIN IN PLACE UNTIL IT IS NECESSARY FOR CONSTRUCTION...
3.11 THE CONTRACTOR SHALL PREPARE HAUL ROADS TO FACILITATE ACCESS AND CIRCULATION THROUGHOUT THE SITE...
3.12 IN GROUND SEDIMENT PONDS SHALL BE EXCAVATED INTO UNDISTURBED NATIVE SOIL...
3.13 IN SEDIMENT IS TRACKED ON TO PAVED SURFACES, IT MUST BE REMOVED IMMEDIATELY USING SWEEPING OR SHOVELS AND/OR OTHER APPROVED METHODS UNTIL THE PAVEMENT IS CLEAN...
3.14 ALL EXPOSED SURFACES LANDSCAPE AREAS SHALL BE IMMEDIATELY TOP SOILED AND SEEDED OR SPRAYED WITH MULCH ONCE THEY ARE SET TO SUBGRADE LEVEL...
3.15 THE CONTRACTOR IS RESPONSIBLE SUPPLY AND INSTALL ALL SEDIMENT CONTROL WORKS SHOWN IN THE SEDIMENT CONTROL DRAWINGS...

4.0 MAINTENANCE

- 4.1 THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL ESC FACILITIES AT ALL TIMES DURING CONSTRUCTION TO ENSURE THAT THEY ARE WORKING PROPERLY TO PREVENT SEDIMENT LADEN DISCHARGE...
4.2 THE CONTRACTOR IS RESPONSIBLE TO RECTIFY ANY DEFICIENCIES NOTED BY THE ESC SUPERVISOR, ENGINEER-OF-RECORD, CITY INSPECTOR, AND/OR OWNER/DEVELOPER OR ANY DEFICIENCY IDENTIFIED ON SITE...
4.3 IF ANY ESC MEASURE IS DAMAGED OR BLOCKED WHICH CAUSES IT TO NOT FUNCTION AS INTENDED, THE CONTRACTOR IS TO IMMEDIATELY RECTIFY THE ESC MEASURE AND ENSURE IT IS WORKING AS INTENDED...
4.4 ANY ACCUMULATED SEDIMENT THAT REQUIRES REMOVAL FROM ANY ESC FACILITY SHALL BE DISPOSED SO THAT IT WILL NOT ENTER THE SITE DRAINAGE SYSTEM...

5.0 FINAL GRADING STAGE THROUGH TO SUBSTANTIAL COMPLETION

- 5.1 AFTER FINAL LOT GRADING IS COMPLETED, ALL DISTURBED AREAS ARE TO BE PROTECTED AS PER THE ESC PLAN OR LANDSCAPE PLAN (AS APPLICABLE)...
5.2 CONTRACTOR TO CO-ORDINATE THE ELIMINATION OF TEMPORARY ESC FACILITIES AS THEY ARE NO LONGER REQUIRED WITH THE ENGINEER-OF-RECORD AND THE ESC SUPERVISOR...
5.3 AT FINAL SITE INSPECTION PRIOR TO THE SITE GOING ON TO MAINTENANCE (IF APPLICABLE), THE ENGINEER-OF-RECORD AND THE ESC SUPERVISOR IN ASSOCIATION WITH THE DRAINAGE AND ENVIRONMENT STAFF TO INSPECT AND SIGN OFF ON ESC MEASURES PRIOR TO THE SITE GOING ON TO MAINTENANCE...
5.4 DEVELOPER TO ENSURE THAT THE LOT OWNER AND/OR BUILDER ARE NOTIFIED OF EXISTING ESC FACILITIES AND THEIR RESPONSIBILITIES TO ENSURE THAT INDIVIDUAL PRIVATE ON-SITE SEDIMENT CONTROL MEASURES ARE PUT IN PLACE AND PERFORM TO THE STANDARD OF THE ESC BYLAW...
5.5 DEVELOPER TO RETAIN THE SERVICES OF THE ESC SUPERVISOR UNTIL 95% OF BUILDING CONSTRUCTION INCLUDING LANDSCAPING OF THE LOT(S) HAS BEEN COMPLETED...

6.0 ENVIRONMENTAL SAMPLING PARAMETERS

- 6.1 TURBIDITY (NTU'S): WATER TURBIDITY WILL BE PRIMARILY USED AS AN IN-SITU INDICATOR FOR THE LEVEL OF SEDIMENT CONCENTRATION WITHIN SITE STORM WATER DISCHARGE...
6.2 TOTAL SUSPENDED SOLIDS (TSS): THE ESC BY-LAW SPECIFIES NO DISCHARGE OF SEDIMENT-LADEN WATER FROM CONSTRUCTION SITES GREATER THAN 75mg/L OF TOTAL SUSPENDED SOLIDS (TSS)...
6.3 pH: THE pH OF SITE STORM WATER DISCHARGE IS TO BE INCLUDED IN THE MONITORING SCHEDULE WHEN EITHER FLOCCULENTS ARE USED AS PART OF THE ESC TREATMENT TRAIN OR WHEN ANY DE-WATERING/DISCHARGE FROM THE SITE HAS BEEN IN CONTACT WITH RAW OR CURING CONCRETE...
6.4 WATER TEMPERATURE: BETWEEN THE MONTHS OF JUNE THROUGH SEPTEMBER, WATER TEMPERATURE DISCHARGE IS TO BE ADDED TO THE MONITORING REPORTS FROM OPEN SEDIMENT FACILITIES...
6.5 SAMPLING EQUIPMENT: SCIENTIFIC EQUIPMENT UTILIZED FOR THE MONITORING OF IN-SITU TURBIDITY ARE TO BE CONDUCTED USING METERS THAT GENERATE A DIGITAL READ OUT...

TSS MEASUREMENTS ARE TO BE ANALYZED BY A REGISTERED 3RD PARTY LABORATORY AND ALL SAMPLES ARE TO BE ACCOMPANIED BY A CHAIN OF CUSTODY FORM.

DISCHARGE pH MONITORING SHOULD BE CONDUCTED USING A SUITABLE ANALYTICAL PROBE CAPABLE OF A DIGITAL READ OUT. LITMUS PAPER AND INDICATOR SOLUTIONS THAT REQUIRE SUBJECTIVE INTERPRETATION ARE NOT SUFFICIENT.

7.0 MONITORING

- 7.1 THE STANDARD SITE MONITORING REQUIREMENTS FOR ACTIVE SITES IS AT LEAST ONCE EVERY SEVEN (7) DAYS AND WITHIN 24 HOURS FOLLOWING A SIGNIFICANT RAINFALL EVENT...
7.2 A SIGNIFICANT RAINFALL EVENT (SRE) IS CATEGORIZED AS 25mm OF TOTAL RAINFALL WITHIN A 24 HOUR PERIOD...
7.3 THE RAINFALL RAIN GAUGE STATION ASSIGNED TO THE SITE IS SET AT THE TIME OF PREPARING THE ESC PLANS...
7.4 DURING THE DRY MONTHS OF SUMMER, GENERALLY LATE JUNE TO EARLY SEPTEMBER, THE STANDARD ESC MONITORING FREQUENCY CAN BE REDUCED TO BI-WEEKLY INTERVALS...
7.5 ANY REQUESTS TO DEVIATE FROM THIS FREQUENCY NOTED ABOVE WILL ONLY BE CONSIDERED BY THE CITY FOR EXEMPLARY SITES...
7.6 ONCE ALL OF THE ESC FACILITIES ARE CONSTRUCTED AND IMPLEMENTED AS SHOWN ON THE APPROVED ESC PLANS...
7.7 THROUGHOUT THE DURATION OF CONSTRUCTION UNTIL SUBSTANTIAL CONSTRUCTION COMPLETION, THE CONTRACTOR SHALL FIELD REVIEW EACH ESC FACILITY AT LEAST ONCE A WEEK...

8.0 SAMPLING

- 8.1 TURBIDITY SAMPLES OF STORM WATER RUNOFF SHALL BE TAKEN AT THE PRESCRIBED LOCATIONS SHOWN ON THE ESC PLANS WHICH MAY INCLUDE ANY CATCH BASIN DIRECTLY CONNECTED TO AN OFFSITE MUNICIPAL DRAINAGE SYSTEM...
8.2 THE ESC SUPERVISOR SHALL PERFORM WATER SAMPLING WHENEVER THERE ARE ANY OBSERVED DISCHARGES FROM THE SITE ENTERING INTO A MUNICIPAL DRAINAGE SYSTEM...
8.3 IF THE FIELD MEASURED NTU'S AND/OR TSS'S EXCEED THE LIMITS DEFINED IN THE ESC BY-LAW...
8.4 SEDIMENT LADEN WATER THAT EXCEEDS THE ALLOWABLE NTU READINGS SHALL BE COLLECTED BY THE ESC SUPERVISOR INTO A CLEAN LABORATORY BOTTLE...

9.0 REPORTING

- 9.1 THE ESC SUPERVISOR IS RESPONSIBLE FOR MAINTAINING UP TO DATE RECORDS OF ALL SITE REVIEWS, MAINTENANCE/INSTALLATION DEFICIENCIES AND REMEDIAL RECOMMENDATIONS PROVIDED TO THE CONTRACTOR AND OWNER/DEVELOPER...
9.2 AS PART OF THEIR OBLIGATIONS UNDER THE ESC BY-LAW, THE ESC SUPERVISOR IS REQUIRED TO IMMEDIATELY NOTIFY THE CITY OF ANY INFRACTION AGAINST THE BYLAW AND THE PROVISIONS OF THE ESC PERMIT...
9.3 ESC MONITORING REPORTS ARE REQUIRED TO INCLUDE THE MINIMUM FOLLOWING DETAILS:
- DATE AND TIME OF SITE REVIEW
- PROJECT LOCATION AND ESC PERMIT NUMBER
- ESC SITE REVIEWERS CONTACT DETAILS
- WEATHER CONDITIONS AT THE TIME OF SITE REVIEW INCLUDING RAINFALL TOTALS FROM LAST 7 DAYS AND 24 HOURS
- STAGE OF CONSTRUCTION (IE. BULK EARTHWORKS, UTILITY CONSTRUCTION, BUILDING CONSTRUCTION ETC.)
- GENERAL SITE CONDITIONS
- SITE REVIEW DETAILS PERTAINING TO ESC FACILITIES ADDRESSING INSTALLATION, MAINTENANCE, CONDITION, PERFORMANCE, ETC.
- REMEDIAL ACTIONS REQUIRED INCLUDING TIME FRAMES FOR THE COMPLETION OF SPECIFIED WORKS
- SITE DISCHARGE MONITORING PARAMETERS INCLUDING THE MAKE AND MODEL OF THE TURBIDIMETER USED AND MONITORING LOCATIONS
- SITE PERSONNEL, OWNER/DEVELOPER, ETC WHO RECEIVE THE REPORT...
9.4 FOLLOWING ALL ESC SITE REVIEWS, THE ESC SUPERVISOR IS REQUIRED TO SUBMIT A COPY OF THE SITE REVIEW REPORT TO THE CITY WITHIN 24 HOURS OF THE SITE REVIEW.

10.0 CLOSURE OF ESC PERMIT

- 10.1 FOR ALL ESC PERMITS, THE PERMIT CAN ONLY BE CLOSED UPON THE COMPLETION OF ALL CONSTRUCTION WORKS, ALL ERODIBLE SURFACES HAVE BEEN STABILIZED AND ALL TEMPORARY ESC FACILITIES HAVE BEEN REMOVED FROM THE SITE...
10.2 WHEN THE ESC PERMIT IS ATTACHED TO A LAND DEVELOPMENT SINGLE-FAMILY SUBDIVISION, THE ESC PERMIT REMAINS EFFECTIVE UNTIL SUBSTANTIAL COMPLETION OF ALL CONSTRUCTION WITHIN THE ORIGINAL EXTENT OF THE PERMIT...
10.3 ONCE THE PROJECT HAS REACHED A STAGE WHERE THE ESC SUPERVISOR HAS DETERMINED THE TEMPORARY ESC FACILITIES ARE NO LONGER REQUIRED...
10.4 AFTER SUCCESSFUL COMPLETION OF THE DECOMMISSIONING WORKS, THE ESC SUPERVISOR IS REQUIRED TO CONDUCT A SITE REVIEW TO ENSURE ALL TEMPORARY ESC FACILITIES ARE REMOVED AND THERE ARE NO OUTSTANDING DEFICIENCIES...
10.5 THE ESC PERMIT CLOSURE REQUEST MUST BE IN THE FORM OF A LETTER ADDRESSED TO THE CITY SIGNED AND SEALED BY THE ESC SUPERVISOR STATING THE FOLLOWING:
- ALL CONSTRUCTION RELATED WORKS ARE COMPLETE,
- THE SITE IS STABILIZED AND POSES NO FURTHER RISK TO THE DRAINAGE SYSTEM FROM SEDIMENT LADEN STORMWATER RUNOFF,
- THERE ARE NO OUTSTANDING DEFICIENCIES,
- ALL TEMPORARY ESC FACILITIES HAVE BEEN REMOVED FROM THE SITE.
ONCE THE CITY HAS RECEIVED THE ESC PERMIT CLOSURE REQUEST, THE CITY WILL THEN INSPECT THE SITE BEFORE AUTHORIZING THE CLOSURE OF THE ESC PERMIT AND RELEASING THE HELD ESC SECURITIES.

EROSION & SEDIMENT CONTROL NOTES
ALL REFERENCES TO CITY/MUNICIPALITY REFER TO CITY OF SURREY
ALL EROSION AND SEDIMENT CONTROL WORKS SHALL BE COMPLETED IN COMPLIANCE WITH THE APPROVED EROSION & SEDIMENT CONTROL PLANS, EROSION & SEDIMENT CONTROL DETAILS & NOTES, EROSION & SEDIMENT CONTROL BY-LAW 2008 No. 16138 AND THE CITY OF SURREY'S WATER COURSE PROTECTION BY-LAW No. 2518.
CITY OF SURREY'S DISCHARGE CRITERIA IS AS FOLLOWS:
- TURBIDITY: 65 NTU
- TOTAL SUSPENDED SOLIDS: 75mg/L
- pH: 6.5 to 9.0
CITY OF SURREY RAIN GAUGE STATION: KWANTLEN PARK

NOT FOR CONSTRUCTION

City of Surrey, British Columbia | 2/17/2020, 2:34PM

Table with columns: LEGAL, BENCHMARK, REVISIONS / SUBMISSIONS, DATE, CLIENT, ENGINEER-OF-RECORD, PROJECT NAME, ENGINEER'S SEAL, CITY OF SURREY. Includes details for GOODRICH TERMINAL project, CENTRAS Engineering Ltd, and revision history.



# **APPENDIX E. CDS Maintenance Guide**



## **CDS<sup>®</sup> System**

### **Maintenance**

#### **Procedures For General Inspection and Cleaning**

# Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping will slow accumulation.

## **Inspection**

Inspection is the key to effective maintenance and is easily performed. Pollutant deposition and transport may vary from year to year and regular inspections will help insure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall), however; more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Additionally, installations where excessive amounts of trash are expected should be inspected more frequently.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions to inlet and/or separation screen. The inspection should also identify evidence of vector infestation and accumulations of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If sorbent material is used for enhanced removal of hydrocarbons then the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of a permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (center cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained behind the screen. For units possessing a sizable depth below grade (depth to pipe), a single manhole access point would allow both sump cleanout and access behind the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded; however, it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine if the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

## **Cleaning**

Cleaning of the CDS systems should be done during dry weather conditions when no flow is entering the system. Cleanout of the CDS with a vacuum truck is generally the most effective and convenient method of excavating pollutants from the system. Simply remove the manhole

covers and insert the vacuum hose into the sump through the center cylinder. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should be pumped out also if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use adsorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash can be netted out if you wish to separate it from the other pollutants. If the screen requires cleaning, it can be washed from the surface or from the CDS inlet structure through the center cylinder.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure proper safety precautions. Confined Space Entry procedures need to be followed.

Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

## SAMPLE INSPECTION & MAINTENANCE LOG

DATE/ INSPECTOR	FUNCTIONALITY/ COMPONENTS	FLOATABLES LAYER THICKNESS (IN)	DEPTH TO SEDIMENT (A) (FT)	SEDIMENT CAPACITY USED ((B-A)/D*100) %	SORBENT DISCOLORATION	MAINTENANCE PERFORMED
11/1/06/TPG	OK	.5	14	33	SLIGHT	NONE
5/1/07	OK	1	13	67	MODERATE	NONE
10/1/07	OK	2	12.5	83	HIGH	CLEANING SCHEDULED
11/1/07	OK	0	15	0	NONE	SYSTEM CLEANED

(B) DEPTH FROM GROUND SURFACE TO BOTTOM OF SUMP: 15 (FT)

(C) DEPTH FROM GROUND SURFACE TO TOP SUMP: 12 (FT)

(D) HEIGHT OF SUMP = B - C = 3 (FT)

OBSERVATIONS OF FUNCTION: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## CDS SYSTEM INSPECTION AND MAINTENANCE LOG

DATE/ INSPECTOR	FUNCTIONALITY/ COMPONENTS	FLOATABLES LAYER THICKNESS (IN)	DEPTH TO SEDIMENT (A) (FT)	SEDIMENT CAPACITY USED ((B-A)/D*100) %	SORBENT DISCOLORATION	MAINTENANCE PERFORMED

(B) DEPTH FROM GOUND SURFACE TO BOTTOM OF SUMP: \_\_\_\_\_ (FT)

(C) DEPTH FROM GROUND SURFACE TO TOP SUMP: \_\_\_\_\_ (FT)

(D) HEIGHT OF SUMP = B - C = \_\_\_\_\_ (FT)

OBSERVATIONS OF FUNCTION: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_