



Stantec Consulting Ltd.
49 Frederick Street, Kitchener ON N2H 6M7

December 22, 2015
File: 1609-60595

Attention: Mr. Sean Fairfield
Director, Project Planning and Permitting
Algonquin Power Co.
354 Davis Road
Oakville, ON L6J 2X1

Dear Mr. Fairfield,

**Reference: Amherst Island Wind Project
Dock Construction Stormwater Management Brief
Loyalist Township, Ontario**

Stantec Consulting Ltd. (Stantec) was retained by Algonquin Power Co. (Algonquin) to assess the need for and, if necessary, provide a plan detailing erosion and sediment control (ESC) and stormwater management (SWM) measures associated with the proposed development of the Amherst Island Wind Project (herein referred to as the "Project"). This brief is intended to address the requirements for SWM measures as described in Section H of the project's REA Approval (REA Number 7123-9W9NH2).

This report focuses on the proposed SWM and ESC measures for construction of docks on the mainland and on Amherst Island to support construction and maintenance of the proposed Wind Project.

INTRODUCTION

Mainland Dock

The proposed works include the installation of a temporary mainland dock, on Lake Ontario, approximately 125 m south of Highway 33 as shown on Drawing C-200 (attached). Access to the dock from Highway 33 is provided by the mainland dock access road which is proposed to be upgraded to accommodate the dock installation and construction traffic.

Island Dock

The proposed works include the installation of a permanent island dock, on Lake Ontario, approximately 220 m north of Front Road as shown on Drawing C-201 (attached). Access to the dock from Front Road is provided by a proposed island dock access road.



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BACKGROUND

A variety of sources have been referenced during the preparation of this ESC/SWM Report, including project-specific documentation, such as the various reports submitted in support of the REA application, and more general industry-standard design guidance documentation and/or literature references, as follows:

General Guidance Documentation / Literature

- *Low Impact Development Stormwater Management Planning and Design Guide*, Credit Valley Conservation and Toronto and Region Conservation, 2011
- *Erosion and Sediment Control Guideline for Urban Construction (ESC Guidelines)*, Greater Golden Horseshoe Conservation Authorities, Dec. 2006
- *Stormwater Management Planning and Design Manual (SWMPD Manual)*, Ontario Ministry of the Environment, March 2003
- *Guidelines for Evaluating Construction Activities on Water Resources*, Ontario Ministry of the Environment, January 1995

Discussions and conclusions reached herein related to the relevance/significance of impervious coverage and its relative impact on the hydrology of receiving systems are based upon widely available literature, readily obtained in any Internet search for related terms such as "impervious coverage and aquatic systems". Two excellent examples include:

- *Impacts of Impervious Cover on Aquatic System, Watershed Protection Research Monograph No. 1*, Schueler, T., Center for Watershed Protection, March 2003.
- *The Importance of Imperviousness, from Watershed Protection Techniques, Vol.1, No.3 – Fall 1994*, Schueler, T., Centre for Watershed Protection, 1994

Project-Specific Consultation / Documentation

- *Amherst Island Wind Energy Project – Project Description Report*, Stantec Consulting Ltd., December 2013
- *Amherst Island Wind Energy Project – Design and Operations Report*, Stantec Consulting Ltd., December 2013



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- *Amherst Island Wind Energy Project – Water Assessment and Waterbody Report*, Stantec Consulting Ltd., December 2013
- *Amherst Island Wind Energy Project – Construction Plan Report*, Stantec Consulting Ltd., December 2013

EXISTING CONDITIONS

Mainland Dock

Under existing conditions runoff from the south side of Bath Road (Highway 33) is conveyed by a roadside ditch towards the existing mainland access road from both the east and the west. The existing access road consists of a 6 m wide gravel lane with grassed embankments. Ditches along the access road convey runoff in a southerly direction towards an existing asphalt lane along the shoreline of Lake Ontario. Singular 350 mm diameter corrugated steel pipe (CSP) culverts from both the east and west ditches convey drainage towards a catchbasin at the intersection of the access road and asphalt lane, which discharges directly to Lake Ontario via a singular 350 mm diameter CSP culvert. Under larger, less frequent storm events, runoff will pond at the intersection of the access road and asphalt lane until overtopping and draining overland towards Lake Ontario.

Island Dock

Under existing conditions the location of proposed island dock access road is pasture with grasses and shrubs, a topographic high approximately 70 m north of Front Road forms a drainage divide directing runoff to the north and south. Land to the north of this divide drains overland as sheet flow directly to Lake Ontario, while land to the south of this divide drains overland as sheet flow to a roadside ditch along Front Road discharging to an unnamed tributary under a private laneway to Lake Ontario approximately 200 m to the east of the intersection of the proposed island dock access road and Front Road.

PROPOSED CONDITIONS

Mainland Dock

The proposed works include re-grading of the existing mainland access road to match the proposed mainland dock abutment as shown on Drawing C-200 (attached). Under proposed conditions, existing drainage patterns will be maintained to the existing CSP culverts, however due to the proposed re-grading of the road, the catchbasin at the intersection of the proposed mainland dock access road and the asphalt lane will be capped. A 3 m long – 500 mm diameter CSP extension to the existing Lake Ontario outlet is proposed to convey runoff through the dock

Design with community in mind



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**Reference: Amherst Island Wind Project
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abutment embankment. Following completion of the construction phase of the Project, the mainland dock access road will be restored to existing conditions.

Island Dock

The proposed works include construction of the proposed, 6 m wide, island dock access road as shown on drawing C-201 (attached). Under proposed conditions road embankments will drain to grassed roadside swales draining runoff to the north and south. The drainage divide will match the existing conditions drainage divide, approximately 70 m north of Front Road.

WATER QUANTITY CONTROLS

As indicated previously, existing drainage patterns will be maintained under proposed conditions. The existing mainland access road is proposed to be regraded to meet the proposed dock abutment elevation and upgraded with structural fill to accommodate heavier loads. No increase in impervious coverage is proposed. Any incidental increase in runoff as a result of access road construction will be attenuated and filtered through downstream vegetated conveyance systems. The gravel surface characteristics of the access roads will provide infiltration opportunities for runoff which will also help mitigate any increases in offsite surface water flows. No formal stormwater management controls are proposed due to the proximity of the sites to Lake Ontario. The proposed access roads represent a relatively small portion of the lake catchment area and the project will have negligible impacts on the hydrology of the receiving systems.

The proposed island dock access road will result in a minor increase in impervious coverage of the area draining to the Front Road roadside ditch (and ultimately Lake Ontario to the east) than under existing conditions. This includes approximately 0.04 ha of permanent access road (70 m long x 6 m wide access road) and a temporary 0.02 ha wide-radius turning lane off front road to be used during construction. An impervious coverage analysis was completed to determine the amount of impervious coverage directed to the Front Road roadside ditch. The analysis was completed by delineating the drainage catchment of the roadside ditch from its discharge point to the unnamed tributary to the east, and measuring the existing, during-construction, and proposed impervious coverage under all conditions. The results of the analysis are included in Table 1 below.



**Reference: Amherst Island Wind Project
Dock Construction Stormwater Management Brief
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Table 1: Front Road (Island Dock) Roadside Ditch Impervious Coverage

| Catchment | Catchment Area (ha) | Existing Impervious Area (ha) / Percent Impervious (%) | During Construction Impervious Area (ha) / Percent Impervious (%) | Proposed Impervious Area (ha) / Percent Impervious (%) |
|---------------------------|---------------------|--|---|--|
| Front Road Roadside Ditch | 1.77 | 0.14 / 8% | 0.20 / 11% | 0.18 / 10% |

Industry-standard approaches to assessing the potential for hydrologic impacts related to changes in the amount of urban impervious coverage, as supported by literature (see references in Section 1.2), generally conclude that watersheds typically maintain pre-development hydrology characteristics until they exceed 10-15% impervious coverage. As illustrated in Table 1, the impervious coverage to the Front Road roadside ditch remains below 15% during construction, which has the highest level of imperviousness. With the removal of the temporary wide-radius turning lane, it is to be expected that impervious coverage will be 10% over the life of the Project. It is also noted that the unnamed tributary to Lake Ontario receives runoff from over 80 ha of agricultural lands to the south of the proposed runoff access road, further reducing the anticipated impact of this minor increase in impervious coverage to the downstream system. It is concluded, therefore, that the development of the Project will have negligible impact on the hydrology of the area and receiving systems.

WATER QUALITY CONTROLS

Site impacts to water quality are considered to be negligible, as the increase in impervious coverage represents a relatively small portion of the drainage area to the downstream receiver (Lake Ontario). Water quality control for the access roads will be provided through the use of vegetated swales proposed at the toe of the access road embankments. Water quality benefits are achieved as a result of the runoff / vegetation interaction which slows the velocity of runoff, as compared to a piped system, thereby promoting sedimentation of particulate matter. The vegetation also provides nutrient uptake benefits to help reduce biological pollutants such as nitrogen and phosphorous.

EROSION AND SEDIMENTATION CONTROL (ESC)

Assessment of Erosion Potential

An assessment of the erosion potential of the construction area was completed following the methodology outlines in the *ESC Guideline for Urban Construction* (GGHACA, 2006). The erosion



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potential is based on an assessment of three primary factors, namely slope gradient, slope length and soil texture (erodibility), with the resultant designation of either “low”, “medium”, or “high” erosion potential. The relative level of erosion potential dictates, to some extent, the comprehensiveness of the resultant ESC system design, monitoring and maintenance program.

Beyond the three-parameter approach described by the *Guidelines*, it is often also appropriate to account for the relative sensitivity of the receiving systems as it relates to potential sediment transport offsite during construction. While never leading to a *reduction* in assessed erosion potential, such an assessment could result in a conclusion that diligence in excess of that already assessed is warranted. In this particular case, the receiving system is Lake Ontario which, should a spill occur, presents cleanup challenges if any sediment is to migrate into the Lake. It would be incumbent upon the proponent and contractor to elevate the level of attention paid to protecting the Lake against construction related impacts.

The existing and proposed (post-construction) condition gradients on the Project site can be classified as moderate (2 – 10% - Overland flow paths) to steep (>10% - Access road embankments), with predominantly long slopes (greater than 30 m). Although geotechnical investigations were not carried out specifically at the two proposed dock access road locations, soils for the entire Amherst Island Wind Project Geotechnical Investigation generally were found to be sand and silt tills, which are considered to represent a high erodibility potential (Table A1, ESC Guidelines). Therefore, based on this classification, the site has a “high” erosion potential.

Erosion and Sedimentation Control Plan

As described in the *Construction Plan Report*, the various construction activities required to develop the site include topsoil removal, grading activities, infrastructure installation, construction of access roads, and general construction traffic.

Erosion control will be achieved primarily by limiting the duration of exposure of disturbed sub-soils inherent in the construction process. For example, access roads construction includes the removal of topsoil and sub-soils as necessary to achieve a competent base, followed by the placement of granular material to proposed grade elevations. At any given location, these works will be completed in short order (1-2 days expected, pending weather conditions), providing little opportunity for sub-soils to be disturbed and entrained in storm runoff.

In addition to limiting the potential for erosion, sediment control measures will be implemented prior to any grading or servicing works commencing as shown on the accompanying Plans, and include, but not necessarily be limited to, the following items:



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- Sediment and erosion control measures should be implemented prior to construction and maintained during the construction phase to prevent entry of sediment into the water:
 - Erect double layer silt fence on the downstream sides of disturbed areas and around entirety of temporarily stockpiled soils;
 - Install temporary straw bale check dams (per OPSD 219.180) upstream and downstream of new culvert construction and along proposed grassed drainage swales
 - No equipment should be permitted to enter any natural areas beyond the silt fencing during construction;
 - Topsoil stockpiles should be sufficiently distant from watercourses to preclude sediment inputs due to erosion of stored soil materials;
 - If the sediment and erosion control measures are not functioning properly, no further work should occur until the sediment and/or erosion problem is addressed;
- All in-water work should be completed within MNR timing windows to protect local fish populations during their spawning and egg incubation periods. Section H of the Project's REA approval indicates a restriction on in-water works related to dock construction from April 1 to June 30 annually.
- All materials and equipment used for the purpose of site preparation and Project construction should be operated and stored in a manner that prevents any deleterious substance (e.g., petroleum products, silt, etc.) from entering the water:
 - Any stockpiled materials should be stored and stabilized away from the water;
 - Refuelling and maintenance of construction equipment should occur a minimum of 100 m from a water body;
 - As appropriate, spills should be reported to the MOE Spills Action Centre;
 - Any part of equipment entering the water should be free of fluid leaks and externally cleaned/degreased to prevent any deleterious substance from entering the water; and
 - Only clean material, free of fine particulate matter should be placed in the water.
- Stabilize roadside embankments immediately following construction with a minimum 50 mm of topsoil, stabilizing vegetation and coir matting.



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- Revegetate all disturbed areas where construction is not expected for 30 days with a minimum 50 mm of topsoil and hydro-seeding or other stabilizing vegetation / erosion protection measures (per OPSS 804). If, given seasonal restriction or other revegetation limiting factors, the disturbed area should be stabilized against erosion impacts by non-vegetated means such as erosion control blankets.

The ESC measures shall be maintained in good repair during the entire construction period, and removed as contributing drainage areas are restored and stabilized. ESC measures shall not be removed until a qualified inspector determines that the measures are no longer required and the risk of surface water and environmental impacts from construction activities are negligible. In addition, the condition of erosion control works, their overall performance, and any repairs replacement or modifications to the installed item shall be noted in logbooks to be kept on-site.

Erosion and Sedimentation Control Monitoring Plan

In order to ensure the effectiveness of the various erosion and sediment control measures, a routine program should be implemented which includes the inspection of the erosion and sediment controls after each significant rainfall event (25 mm) or weekly, whichever is more frequent, and immediate repair of any deficiencies. This program will consist of the following activities:

- Turbidity levels are to be measured immediately upstream and downstream of the construction activity
 - If the average mean daily turbidity downstream of the construction activity is greater than 8 NTU from that measured upstream, additional erosion control measures shall be implemented to reduce or mitigate sediment related impacts.
- Inspection of vegetation protection and silt fencing to ensure that they are maintained in good repair.
- Removal of construction debris that may accumulate.
- Implementation of remedial measures including erosion stabilization, repair of damaged fencing and any other remediation, where required.

If the monitoring program outlined above indicates a persistent problem then the following process should be undertaken to determine appropriate mitigative measures:

1. Analysis of the monitoring information and field visits as required, determine the cause of the problem, and develop a mitigation plan to address the issue.



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2. Convene a meeting with the appropriate review agencies to discuss the problem.
3. Develop a consensus on a proposed plan of action to resolve the problem in consultation with agency staff.
4. Implement additional mitigation measures and monitor the results.



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CONCLUSION

Based on the preceding brief, the following conclusions can be drawn:

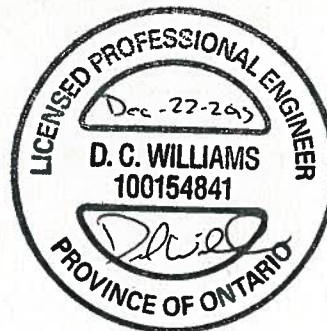
- Due to the proximity of the sites to Lake Ontario and the relatively small size of the construction area in relation to the drainage area of the downstream receivers, no formal water quantity controls are recommended
- Water quality control will be provided through the use of vegetated (grassed) swales
- An erosion and sediment control plan has been developed to mitigate migration of sediments offsite to downstream receivers

Based on the findings of this brief it is recommended that the proposed stormwater management and erosion and sediment control measures be implemented for the proposed mainland and island dock and associated access road construction.

Regards,

STANTEC CONSULTING LTD.

Dave Williams, P.Eng.
Water Resources Engineer, Community Development
Phone: (519) 585-7320
Fax: (519) 579-8664
Dave.Williams@stantec.com



Attachment: Figure 1 – Surface Water Catchment Area – Front Road Roadside Ditch
Drawing C-200 – Mainland Dock Plan and Profile
Drawing C-201 – Island Dock Plan and Profile
Drawing C-300 – Erosion and Sediment Control Notes

c. Ms. Kerrie Skillen and Mr. Rob Rowland, Stantec Consulting Ltd.

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ATTACHMENTS



- Legend**
- Surface Water Catchment Area
 - Project Component
- Existing Features**
- Road
 - Ground Surface Contour (metres ASL)
 - Watercourse
 - Property Line
 - Regulation Limit (CRCA)

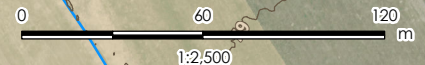
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2015; © Cataraqui Region Conservation Authority, 2015.
 3. Orthoimagery © Cataraqui Region Conservation Authority, 2015. Imagery taken in 2014.

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Client/Project
Windlectric Inc.
Amherst Island Wind Energy Project

Figure No.
1

Title
**Surface Water Catchment Area -
Front Road Roadside Ditch**



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 Revised: 2015-12-17 By: pworthell

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- THE REQUIREMENTS FOR THE REMOVAL, REINSTALLATION AND/OR DISPOSAL OF EXISTING FEATURES IN CONFLICT WITH THE CONSTRUCTION AREA WILL BE CONFIRMED IN THE FIELD DURING CONSTRUCTION.
- UTILITY AND OTHER CONFLICTS HAVE NOT BEEN ADDRESSED IN THESE DRAWINGS, AND WILL BE RESOLVED IN THE FIELD USING VERIFIED UTILITY LOCATIONS AND OTHER SITE INFORMATION.
- TOPOGRAPHICAL SURVEY COMPLETED BY MINTOSH PERRY CONSULTING ENGINEERS, DATED 2015. (UTM ZONE 18 NAD83 (CRSR) 1997.0)
- SEE DRAWING "CIVIL ACCESS ROAD - DETAIL SHEET" (DRAWING C300) FOR ADDITIONAL EROSION AND SEDIMENTATION CONTROL NOTES AND DETAILS.

Legend

- EXISTING OVERLAND FLOW/DITCH DIRECTION
- PROPOSED DITCH FLOW
- EXISTING GROUND CONTOURS
- TEMPORARY OVERBUILD AREA

****For PHCL and Windlectric Use Only****

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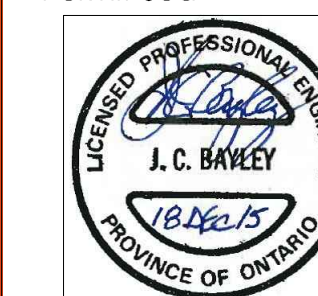
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| <input type="checkbox"/> Reviewed - Incorporate comments and resubmit | Date [dd-mm-yy] |
| <input type="checkbox"/> Reviewed - Not accepted | Date [dd-mm-yy] |
| Project Manager - PHCL | Date [dd-mm-yy] |
| Project Manager - Windlectric | Date [dd-mm-yy] |

Owner: Windlectric Inc.

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| Revision | | By | Appd. | YY.MM.DD |

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Permit-Seal



Client/Project

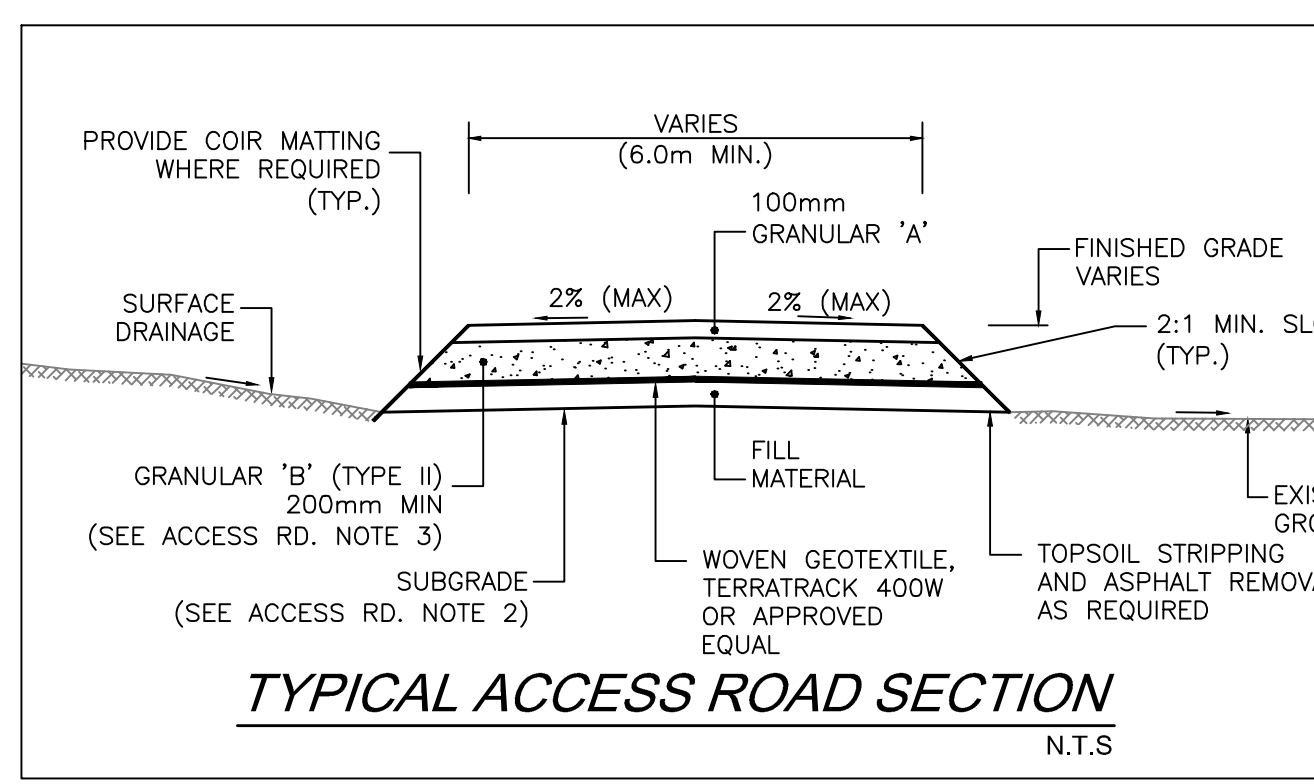
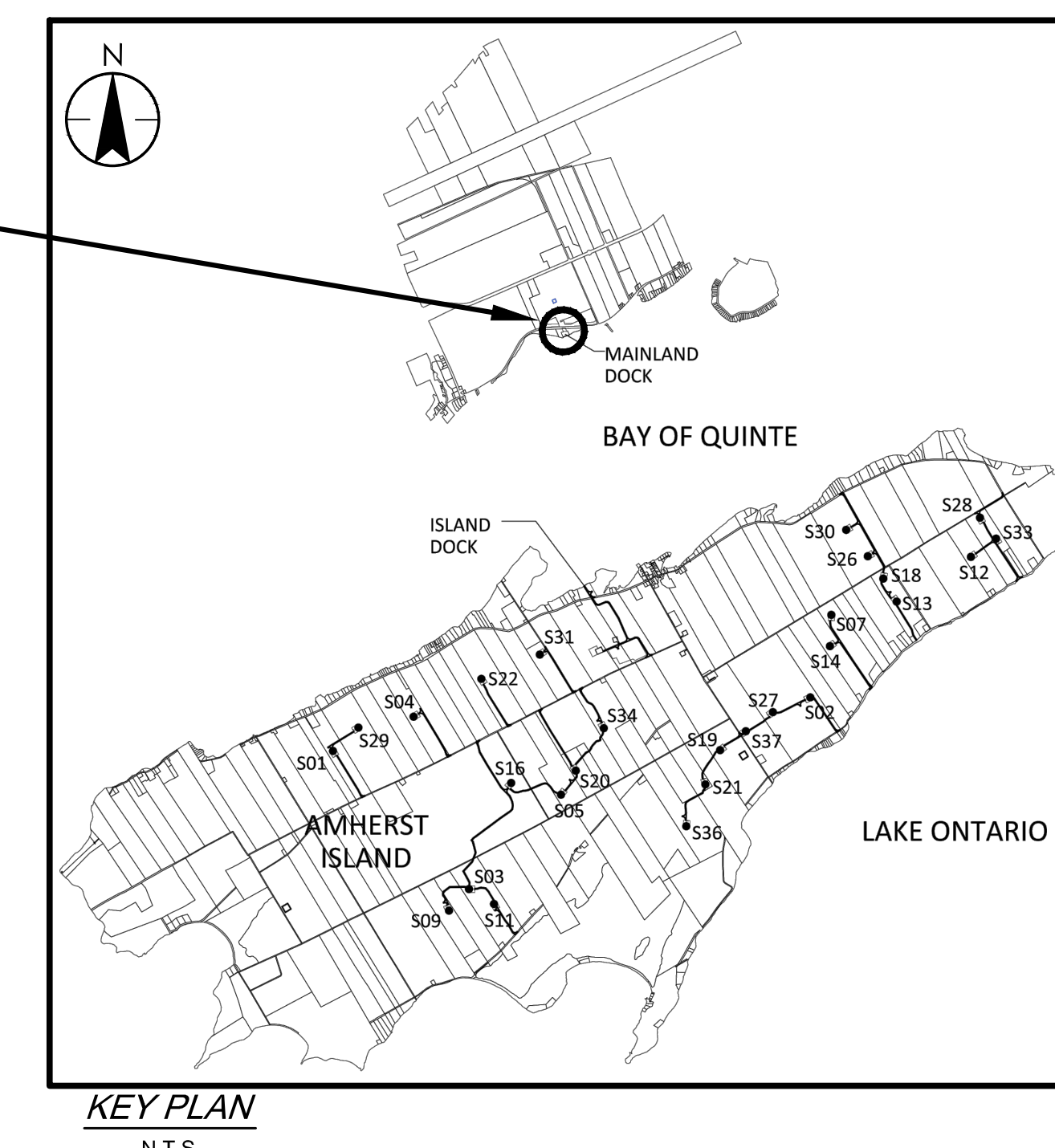
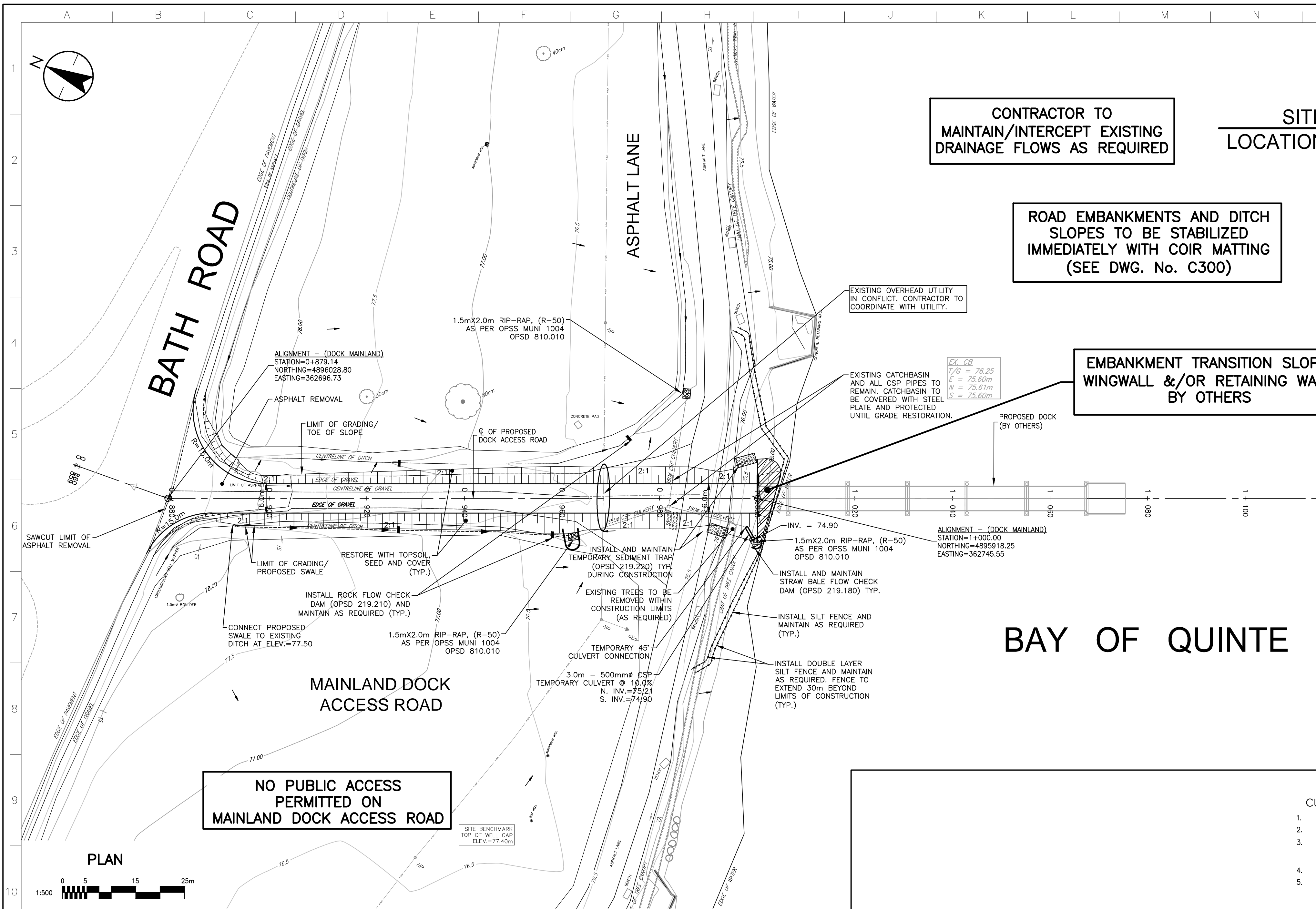


AMHERST ISLAND WIND PROJECT
75MW WIND FARM
Amherst Island, Loyalist Township, Ontario

Title

TEMPORARY ACCESS ROAD
MAINLAND DOCK
PLAN AND PROFILE

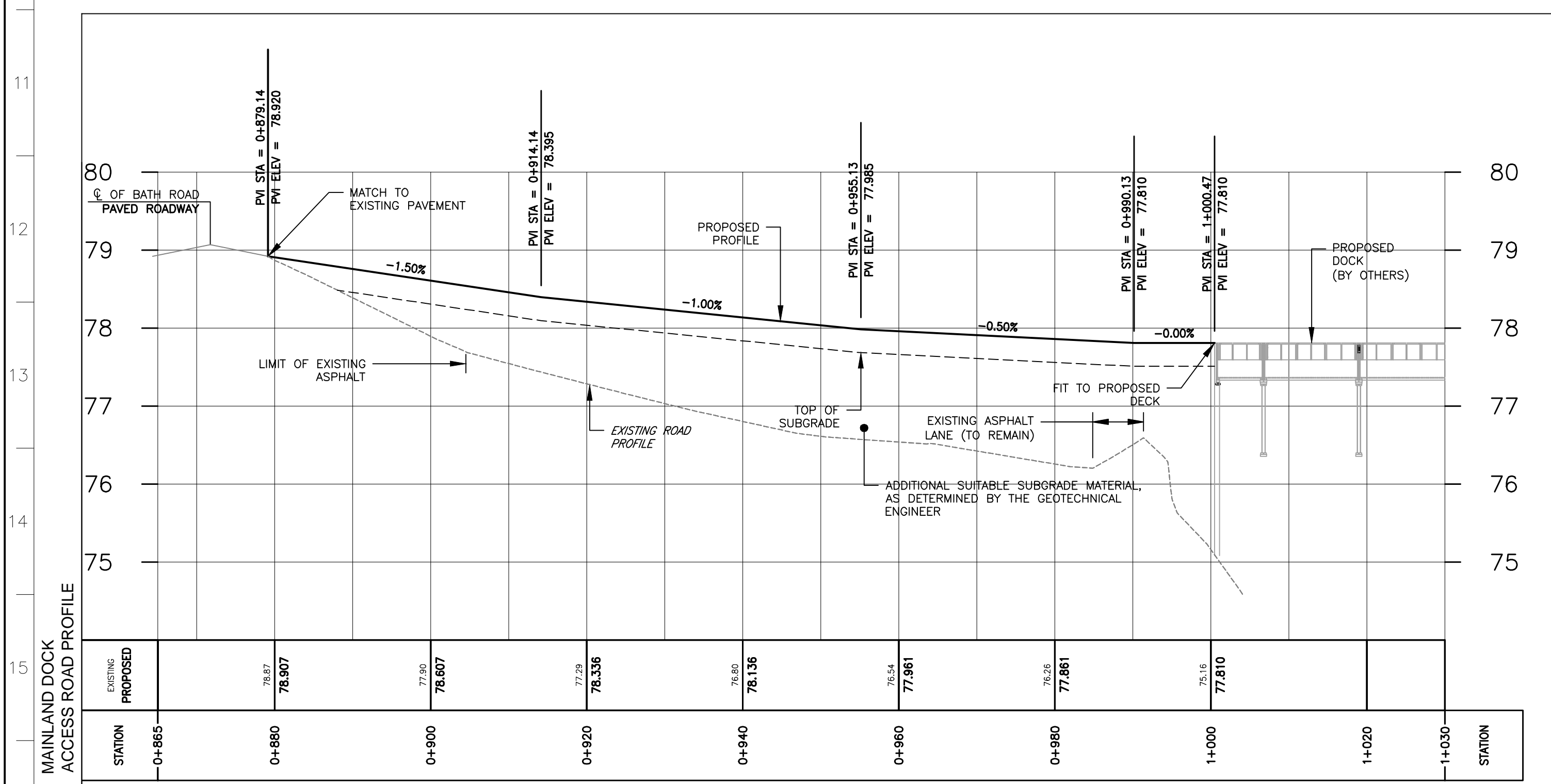
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| Drawing No. | Sheet |
| | Revision |



BAY OF QUINTE

- CULVERT NOTES:
- CULVERT SLOPE TO MATCH EXISTING DITCH GRADE UNLESS OTHERWISE NOTED.
 - CULVERT TO BE EMBEDDED 10% OF PIPE DIAMETER BELOW DITCH INVERT.
 - CULVERTS TO BE CORRUGATED STEEL PIPE (CSP). PIPE MATERIAL TO BE GALVANIZED STEEL AND HAVE A 68mm x 13mm CORRUGATION WITH 1.6mm METAL THICKNESS.
 - PIPE TO BE INSTALLED IN ACCORDANCE WITH OPSS 802.010.
 - CULVERT ELEVATIONS ARE APPROXIMATE AND ARE TO BE FINALIZED IN THE FIELD.

- ACCESS ROAD NOTES:
- ACCESS ROAD AREAS TO BE STRIPPED OF TOPSOIL WITHIN APPROVED BUILDABLE AREA.
 - PRIOR TO GRANULAR PLACEMENT, SUBGRADE TO BE PROOF-ROLLED AND WEY/UNSTABLE AREAS REMOVED AND REPLACED WITH ADDITIONAL SUITABLE SUB-BASE MATERIAL.
 - GRANULAR 'B' SUB-BASE THICKNESS TO BE ADJUSTED TO SUIT LOCAL CONDITIONS.
 - ACCESS ROAD SIDE SLOPES TO BE 3:1 UNLESS OTHERWISE NOTED ON PLAN DRAWINGS.
 - COMPACTION REQUIREMENTS:
SUBGRADE - 95% STANDARD PROCTOR DENSITY
GRANULARS - 98% STANDARD PROCTOR DENSITY
 - CLEARING AND GRUBBING TO BE COMPLETED IN ACCORDANCE WITH OPSS 201.
 - EARTH EXCAVATION/GRADING TO BE COMPLETED IN ACCORDANCE WITH OPSS 206.



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- TOPOGRAPHICAL SURVEY COMPLETED BY MANTOSH PERRY CONSULTING ENGINEERS, DATED 2015. (UTM ZONE 18 NAD83 (CRS) 1997.0)
- SEE DRAWING "CIVIL ACCESS ROAD - DETAIL SHEET" (DRAWING C300) FOR ADDITIONAL EROSION AND SEDIMENTATION CONTROL NOTES AND DETAILS.

Legend

- EXISTING OVERLAND FLOW/DITCH DIRECTION
- PROPOSED DITCH FLOW
- EXISTING GROUND CONTOURS
- TEMPORARY OVERBUILD AREA

******For PHCL and Windlectric Use Only******

Review with no comments does not constitute approval of design details, calculations or methods. It is the responsibility of the consultant to ensure all information contained within the drawings are in full compliance with contractual obligations.

- Reviewed - No comments
- Reviewed - Incorporate comments and resubmit
- Reviewed - Not accepted

Reviewed By: _____ Date: [dd-mm-yy]

Project Manager - PHCL Date: [dd-mm-yy]

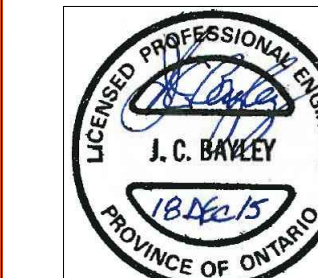
Project Manager - Windlectric Date: [dd-mm-yy]

Owner: Windlectric Inc.

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Permit-Seal



Client/Project

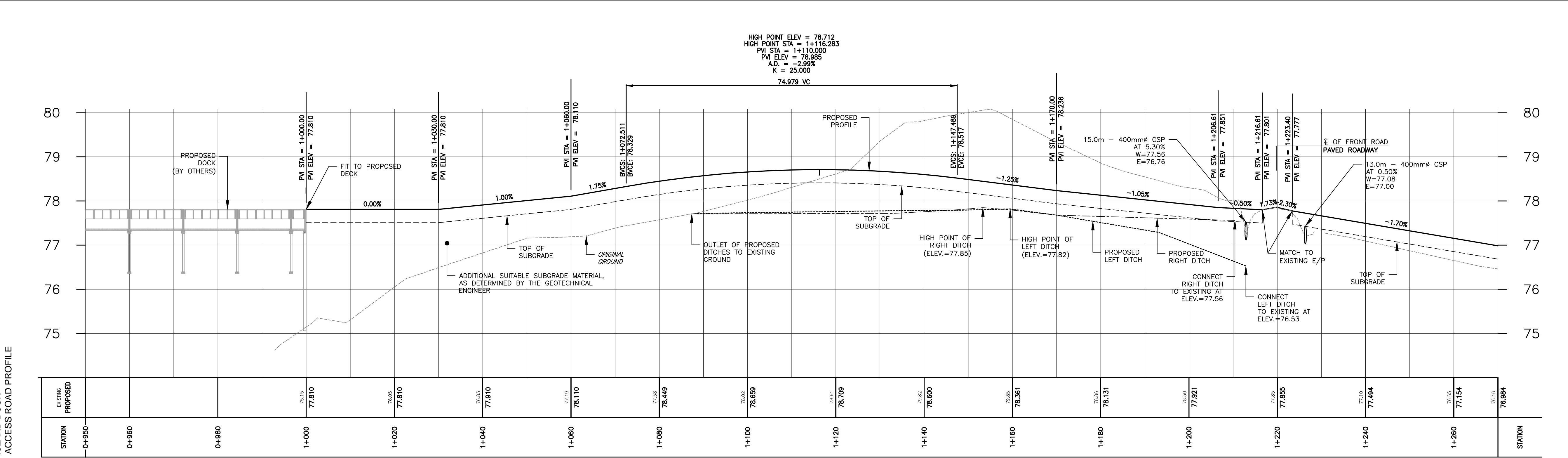
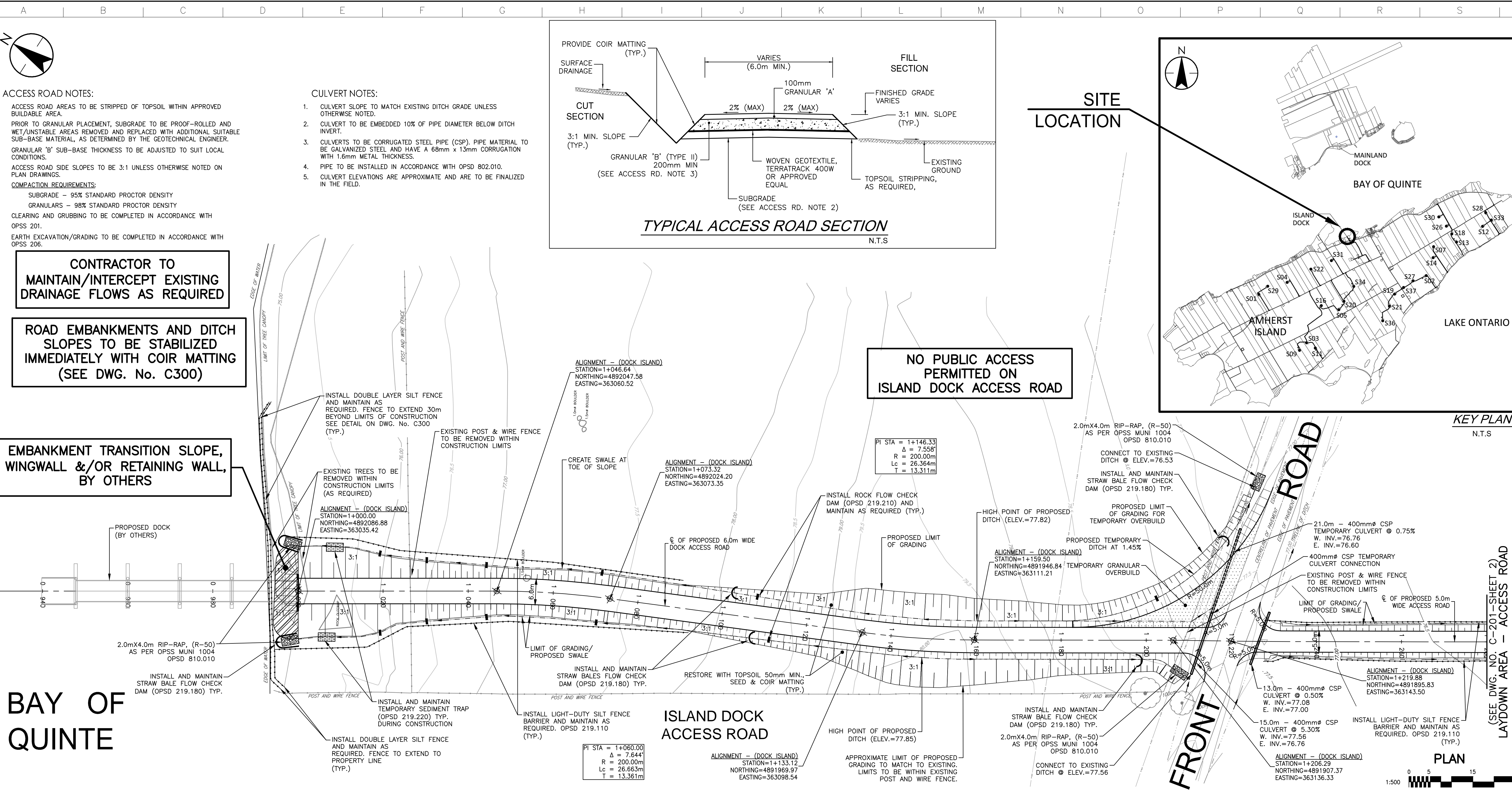


AMHERST ISLAND WIND PROJECT
75MW WIND FARM
Amherst Island, Loyalist Township, Ontario

Title

ACCESS ROAD
ISLAND DOCK
PLAN AND PROFILE

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| Project No. 13356100 | Scale 1:500H 1:50V | Sheet 0 5 15 25m 0 0.5 1.5 2.5m | Revision |
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Notes

ROCK CHECK DAMS

- REFER TO OPSD 219.210 FOR TEMPORARY ROCK FLOW CHECK DAM, WITH V-DITCH.
- A SERIES OF CHECK DAMS SHOULD BE USED FOR SWALES/DITCHES WITH SIGNIFICANT GRADIENT OR SLOPE LENGTH.
- HEIGHT OF SUBSEQUENT CHECK DAMS MUST BE EQUAL TO THE ELEVATION OF THE BASE OF THE PREVIOUS DAM.
- SEDIMENT MONITORING AND REMOVAL, REQUIRED FROM THE BASE OF THE STRUCTURE, WHEN ACCUMULATION BECOMES VISIBLE (MAX. 300mm DEPTH).
- INSPECTION SHOULD TAKE PLACE WEEKLY AND AFTER EVERY RAINFALL AND SIGNIFICANT SNOWMELT EVENT TO IDENTIFY ANY PROBLEM AREAS.
- REPAIR TO THE SEDIMENT TRAP SHOULD TAKE PLACE WITHIN 24 HOURS OF DETERMINING THE DEFICIENCY.

HYDRAULIC MULCH NOTES

- COORDINATE/CONSULT WITH OWNER PRIOR TO UTILIZING ANY HYDRAULIC MULCH. TIMELINES AND SEEDING METHODS NEED TO BE CAREFULLY CONSIDERED PRIOR TO IMPLEMENTATION.
- ENSURE THAT A TACKIFIER IS USED TO KEEP PRODUCT IN PLACE.
- APPLY SEED MIX PRIOR TO MULCH WITH TACKIFIER.
- HYDRAULIC MULCH IS TO BE APPLIED AS SOON AS GRADING AND SEEDING WORK IS COMPLETE TO ENSURE STABILIZATION OF SOILS.
- RE-APPLY HYDRAULIC MULCH IF THE SUBJECT AREA IS DAMAGED OR ERODED BY WIND OR WATER.

AREA GRADING NOTES

PRIOR TO SITE WORKS

- INSTALL ALL SILT FENCE AND PROTECTIVE FENCING AS SHOWN ON THE PLANS AND MAINTAIN DURING CONSTRUCTION.
- MONTHLY EROSION AND SEDIMENT CONTROL REPORTS (QUARTERLY DURING PERIODS OF INACTIVITY) ARE TO BE SUBMITTED TO THE AUTHORITY UNTIL THE SITE HAS BEEN BUILT OUT (90%-100%) AND STABILIZED. REPORTS TO BE BASED ON FREQUENT INSPECTIONS PARTICULARLY AFTER RAINFALL>5mm.

DURING AREA GRADING

- TOPSOIL IS TO BE STRIPPED ONLY IN AREAS REQUIRING EARTHWORKS AND PLACED IN STOCKPILES AT THE LOCATIONS SHOWN ON THE PLANS OR AS APPROVED BY THE "DESIGNATED" QUALIFIED ENVIRONMENTAL SITE INSPECTOR.
- TEMPORARY TOPSOIL STOCKPILES ARE TO HAVE CONTINUOUS SILT FENCE PLACED IMMEDIATELY AROUND THE ENTIRE PERIMETER.
- ROADWAYS AND LAYDOWN YARDS ARE TO BE PLACED ON NATIVE GROUND AFTER TOPSOIL HAS BEEN STRIPPED.
- ALL TOPSOIL IS TO BE RE-SPREAD ON CONSTRUCTION IMPACTED AREAS AFTER FINAL GRADING IS COMPLETE TO A MINIMUM DEPTH OF 150mm (INCREASE IF ADDITIONAL TOPSOIL IS AVAILABLE).
- SILT FENCE AND EROSION CONTROL STRUCTURES TO BE CHECKED WEEKLY AND AFTER EACH RAINFALL>5mm FOR UNDERMINING OR DETERIORATION OF THE FABRIC. SEDIMENT SHALL BE REMOVED WHEN THE LEVEL OF SEDIMENT DEPOSITION REACHES ONE THIRD OF THE WAY TO THE TOP OF THE BARRIER (MAX. 300mm DEPTH).

AFTER AREA GRADING

- FOLLOWING AREA GRADING, SEED EXPOSED SOIL AREAS WITH NATIVE GRASS MIX.
- REMOVAL OF SEDIMENT CONTROL MEASURES AND COLLECTION OF ACCUMULATED SEDIMENT SHALL OCCUR FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION (90%-100%) AND SITE STABILIZATION TO 90%.

GENERAL

- EQUIPMENT AND CONSTRUCTION MATERIAL SHALL BE STORED AWAY FROM THE WATER IN A MANNER THAT PREVENTS ANY DELETERIOUS SUBSTANCE FROM ENTERING THE WATER. REFUELING OF MACHINERY AND GENERATORS SHALL NOT BE CONDUCTED WITHIN 100m OF A WATERBODY AND SHALL BE COMPLETED IN A CONTROLLED MANNER WITH ADEQUATE SPILL PROTECTION ON SITE.

EROSION AND SEDIMENT CONTROL NOTES:

(SEE DETAILS THIS SHEET)

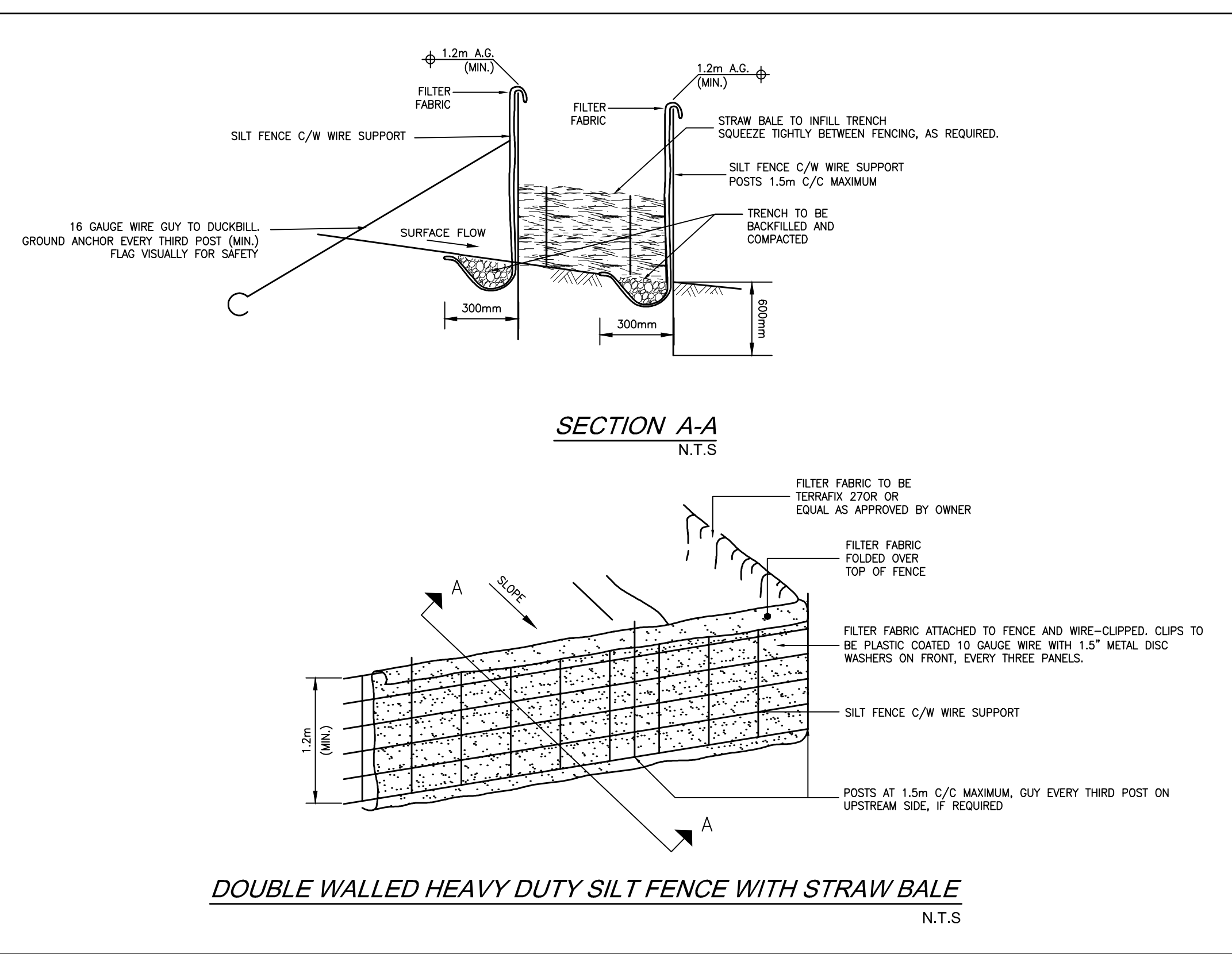
- THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE PROTECTION OF THE AREA DRAINAGE SYSTEM DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT AND DURATION OF EXPOSED SOIL AND INSTALLING SILT FENCES AND OTHER SEDIMENT TRAPS/FILTERS SIMILAR TO THOSE ILLUSTRATED HEREIN.
- EROSION AND SEDIMENT CONTROL WORKS SHALL BE INSTALLED AND IN WORKING CONDITION PRIOR TO COMMENCEMENT OF CONSTRUCTION RELATED ACTIVITIES.
- SEDIMENT CONTROL MEASURES ADJACENT TO CONSTRUCTION AREAS MAY REQUIRE REMOVAL / RELOCATION IN ORDER TO COMPLETE SPECIFIC CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL ENSURE THAT ADEQUATE SEDIMENT CONTROL MEASURES ARE IN PLACE AT ALL TIMES.
- EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE MAINTAINED AND IMPROVED AS NECESSARY TO KEEP THEM EFFECTIVE AND MINIMIZE THE POTENTIAL FOR EROSION AND MIGRATION OF SEDIMENT TO THE DOWNSTREAM NATURAL ENVIRONMENT.
- AT THE DISCRETION OF THE OWNER OR OWNER'S CONSULTANT, ADDITIONAL SILT CONTROL DEVICES SHALL BE INSTALLED AT DESIGNATED LOCATIONS.
- SEDIMENT THAT IS ACCUMULATED BY THE TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED IN A MANNER THAT AVOIDS ESCAPE OF THE SEDIMENT TO THE DOWNSTREAM SIDE OF THE CONTROL MEASURE AND AVOIDS DAMAGE TO THE CONTROL MEASURE. ALL SEDIMENT SHALL BE REMOVED AND TOPSOIL WITH SEED TO BE ADDED IF NECESSARY.
 - A) ACCUMULATED SEDIMENT IS TO BE REMOVED AND DISPOSED OF AS PER OPSS 180, PRIOR TO THE REMOVAL OF ANY CONTROL MEASURE.
- STOCKPILED MATERIAL IS TO BE STORED AWAY FROM POTENTIAL RECEIVERS (E.G. WATERCOURSES), AND BE SURROUNDED BY EROSION CONTROL MEASURES WHERE MATERIAL IS TO BE LEFT IN PLACE IN EXCESS OF 10 DAYS OR PRIOR TO A RAIN EVENT, WHICHEVER OCCURS SOONER.
- REMOVAL OF SEDIMENT CONTROL MEASURES AND COLLECTION OF ACCUMULATED SEDIMENT SHALL OCCUR FOLLOWING SUBSTANTIAL COMPLETION OF CONSTRUCTION (90%-100%) AND SITE STABILIZATION TO 90%.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN AND BOLSTER EROSION AND SEDIMENT CONTROL MEASURES AS NECESSARY TO KEEP THEM EFFECTIVE AND MINIMIZE THE POTENTIAL FOR EROSION.
 - SILT FENCE
 - FILTER CLOTH
 - PUMPS
 - CLEAN RIP-RAP (FREE OF FINES) FOR ROCK CHECK DAMS
- IN ADDITION TO BEING RESPONSIBLE FOR ENSURING THAT THE PRESCRIBED MEASURES ARE INSTITUTED AND FUNCTIONING AS INTENDED, THE CONTRACTOR IS ALSO RESPONSIBLE FOR IMPLEMENTING ANY INTERIM OR EMERGENCY MEASURES AS NECESSARY, TO ENSURE THAT NO SEDIMENT IS DISCHARGED TO THE NATURAL ENVIRONMENT. THE FOLLOWING EXTRA EQUIPMENT/MATERIALS ARE TO BE KEPT ON SITE AS A CONTINGENCY, IN CASE THE PROPOSED CONTROL MEASURES ARE BREACHED.

SLOPE PROTECTION NOTES

- ROLLED EROSION CONTROL PRODUCTS (RECP) ARE TO BE USED ON SLOPES GREATER THAN 3:1, UNLESS OTHERWISE NOTED.
- RECP PRODUCTS ARE TO BE BIODEGRADABLE.
- RECP PRODUCTS ARE TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS. INSTALLATION TO BE INSPECTED AND REPAIRED AS NEEDED.
- RECP ARE TO BE APPLIED AS SOON AS POSSIBLE FOLLOWING GRADING AND SEEDING OF SUBJECT AREAS.
- SURFACES ARE TO BE SMOOTH AND FREE OF STONES AND DEBRIS OR OTHER WEED CLUMPS PRIOR TO RECP PRODUCTS BEING INSTALLED.
- CONTRACTOR TO ENSURE THAT RILLING/GULLYING IS RECTIFIED PRIOR TO RECP INSTALLATION. CONTRACTOR TO MONITOR RUNOFF UNDER THE RECP FOLLOWING INSTALLATION.
- CONTRACTOR TO ENSURE THAT RECP IS SECURED AT THE TOP OF THE SLOPE IN A TRENCH AND OVERLAP (SIDE TO SIDE AND BOTTOM TO TOP).
- CONTRACTOR TO INSPECT THE SITE WEEKLY OR AFTER EVERY RAINFALL EVENT AND IDENTIFY AREAS OF EROSION OR POTENTIAL EROSION. BEST MANAGEMENT PRACTICES ARE TO BE USED TO CONTROL THE EROSION. METHODS OF CONTROL MAY INCLUDE THE USE OF EROSION CONTROL BLANKETS C/W SEEDING, HYDRAULIC MULCH, STRAW MULCH, OR SOIL BINDER. SOILS ARE TO BE STABILIZED AS SOON AS AREAS ARE IDENTIFIED TO PREVENT FURTHER EROSION.

SILT FENCE NOTES (SEE DETAIL OPSD 219.110)

- STAKES ARE TO BE INSTALLED ON THE DOWNSTREAM SIDE OF THE BARRIER.
- CONTRACTOR TO MONITOR SILT FENCE FOR UV DEGRADATION.
- SILT FENCE IS TO BE CLEANED OUT ONCE SEDIMENT REACHES MAXIMUM 1/3 OF THE FENCE HEIGHT (MAX. 300mm DEPTH).



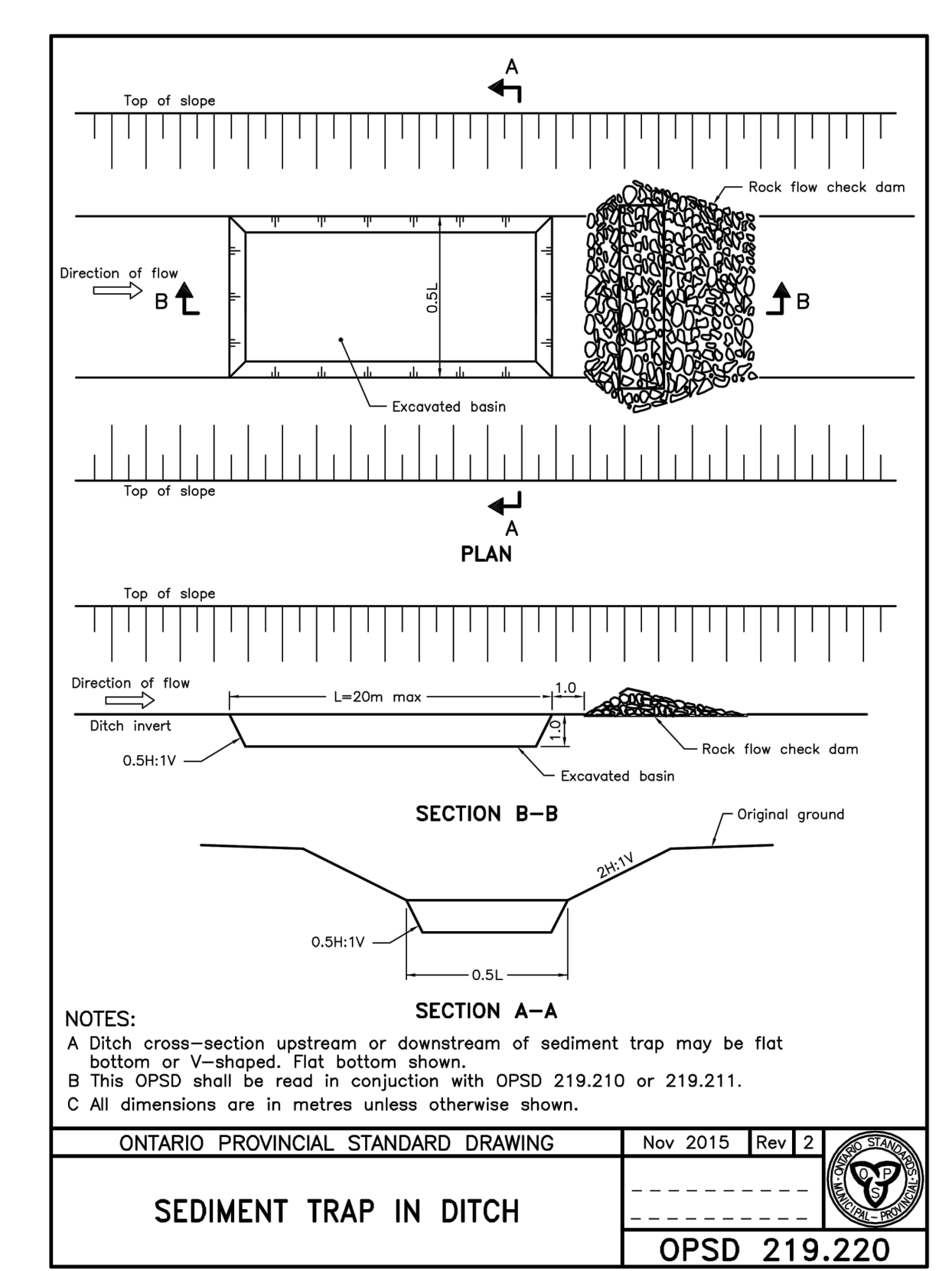
DOUBLE WALLED HEAVY DUTY SILT FENCE WITH STRAW BALE
N.T.S.

COIR MATTING

- PROVIDE COIR FIBER MATTING TO MEET THE FOLLOWING SPECIFICATIONS:

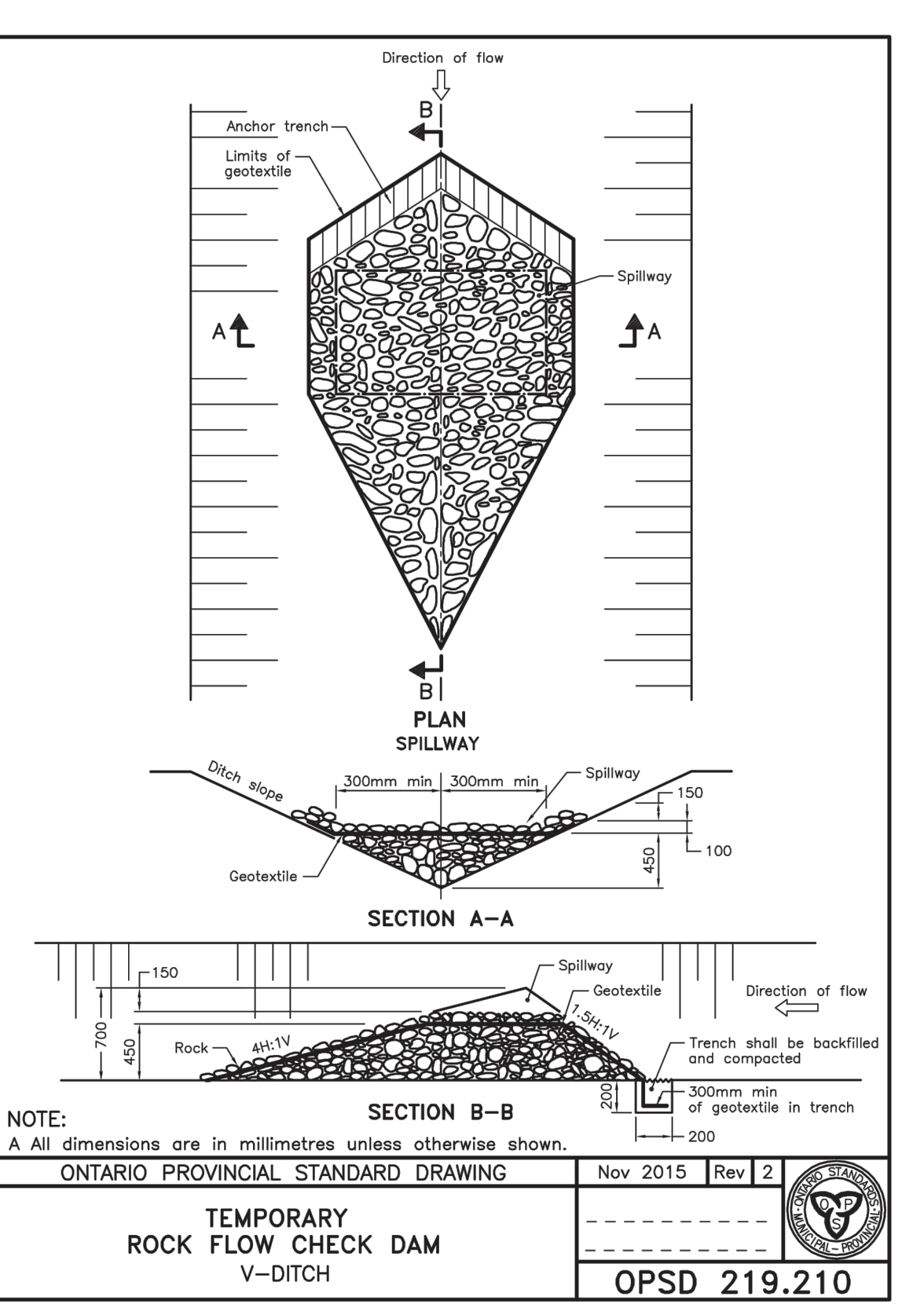
| Physical Specification (Roll) | |
|-------------------------------|---|
| Material | 100 percent coir twine woven into high strength mat [matting] |
| Thickness | 7.6 mm |
| Tensile Strength | 22.1 kN/m x 1.5.1 kN/m |
| Elongation | 69% x 34% |
| Flexibility | 65030 x 29590 mg/cm |
| Flow Velocity | Observed 11 ft./sec. (3.4 m/s) |
| Weight | 29 oz/sq yd (890 g/sq m) |
| Size | 2 m x 50 m (100 m ²) |
| C Factor | 0.002 |
| Open Area (measured) | 50% |

- STAKES PROVIDED, ARE TO BE MADE OF WOOD OR OTHER BIODEGRADABLE MATERIAL, WITH A HOOK TO ANCHOR MATTING. STAKES TO BE INSTALLED, SHALL BE NO LESS THAN 0.60m IN LENGTH. ECOSTAKES (OR EQUIVALENT) AND STAPLES SHALL NOT BE USED UNLESS AS SUPPLEMENTAL TO WOOD STAKES.
- APPLY SEED MIX AND STRAW PRIOR TO INSTALLING MATTING.
- INSTALL THE COIR FIBER MATTING IMMEDIATELY UPON FINAL GRADING. PROVIDE A SMOOTH SOIL SURFACE THAT IS FREE FROM STONES, CLOUDS, OR OTHER EXTRUDING DEBRIS THAT WILL PREVENT THE MATTING FROM CONTACTING THE SOIL.
- BEGIN INSTALLATION AT THE TOP OF THE SLOPE BY ANCHORING THE TOP OF THE MATTING IN A 0.15m DEEP x 0.60m WIDE TRENCH. STAKE MATTING IN PLACE WITH EVENLY SPACED STAKES EVERY 0.60m. BACKFILL AND COMPACT THE TRENCH AFTER STAKING.
- THE EDGES OF THE PARALLEL MATTING MUST BE STAKED WITH APPROXIMATELY 0.15m OF OVERLAP SUCH THAT THE EDGE OF THE DOWNSTREAM MATTING IS UNDER THE ONE JUST UPSTREAM. WHEN MATTING MUST BE SPLICED DOWN THE SLOPE, INSTALL MATTING END-OVER-END (SHINGLE STYLE) WITH APPROXIMATELY 0.15m OF OVERLAP.
- INSTALL STAKES APPROXIMATELY 0.60m APART ACROSS THE MATTING AND AT ENDS, JUNCTIONS, AND TRENCHES. INSTALL STAKES ALONG THE OUTER EDGES, DOWN THE CENTRE OF EACH STRIP OF MATTING AND ALONG ALL LAPPED EDGES APPROXIMATELY 0.60m APART. EXCESS MATTING SHALL BE TRIMMED, ANCHORED, AND TRENCHED AT THE END OF THE SLOPE.
- THE OWNER OR OWNER'S REPRESENTATIVE MAY REQUIRE ADJUSTMENTS IN THE TRENCHING OR STAKING REQUIREMENTS TO FIT INDIVIDUAL SITE CONDITIONS.



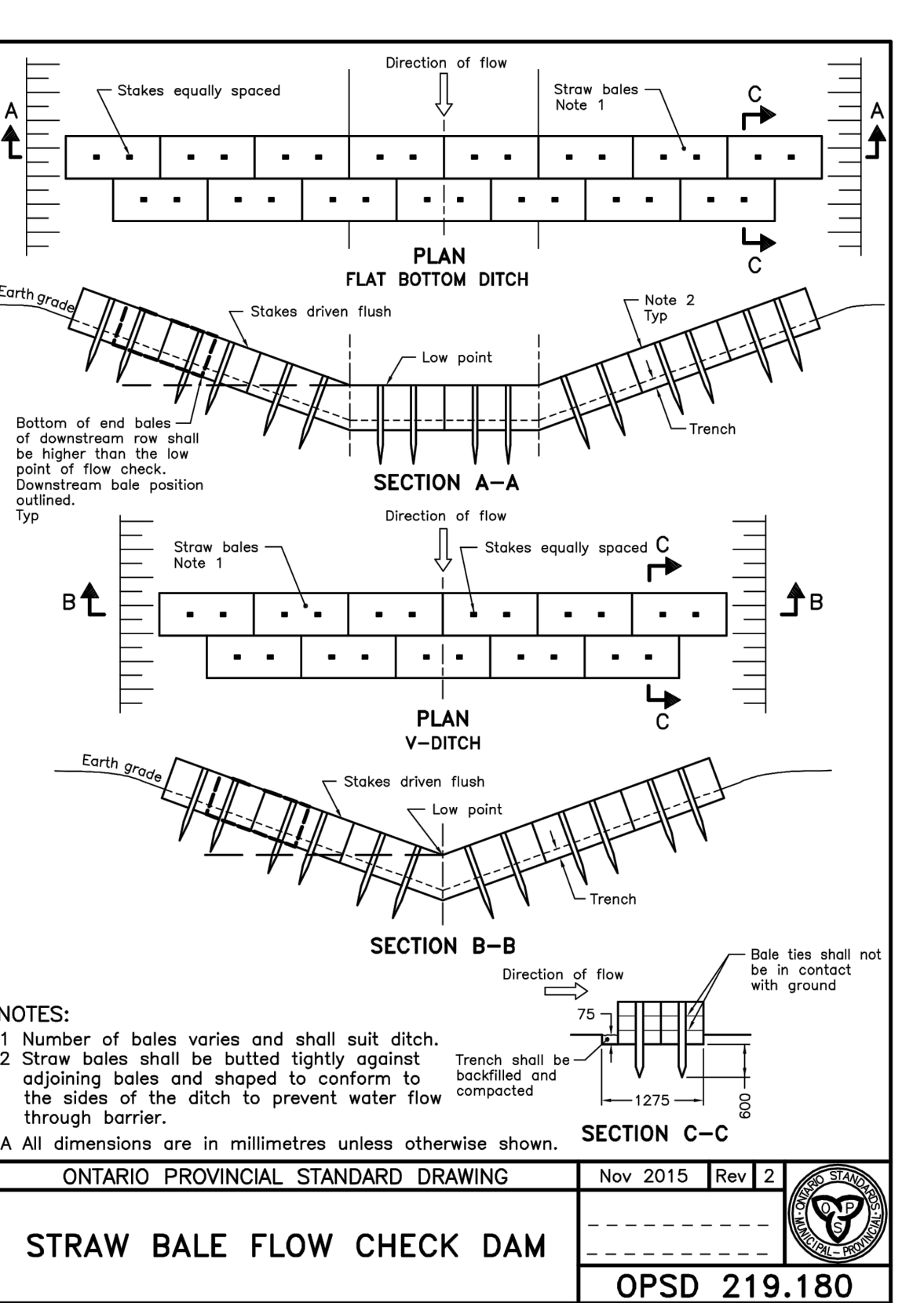
NOTES:
A Ditch cross-section upstream or downstream of sediment trap may be flat bottom or V-shaped. Flat bottom shown.
B This OPSD shall be read in conjunction with OPSD 219.210 or 219.211.
C All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING Nov 2015 Rev 2
SEDIMENT TRAP IN DITCH
OPSD 219.220



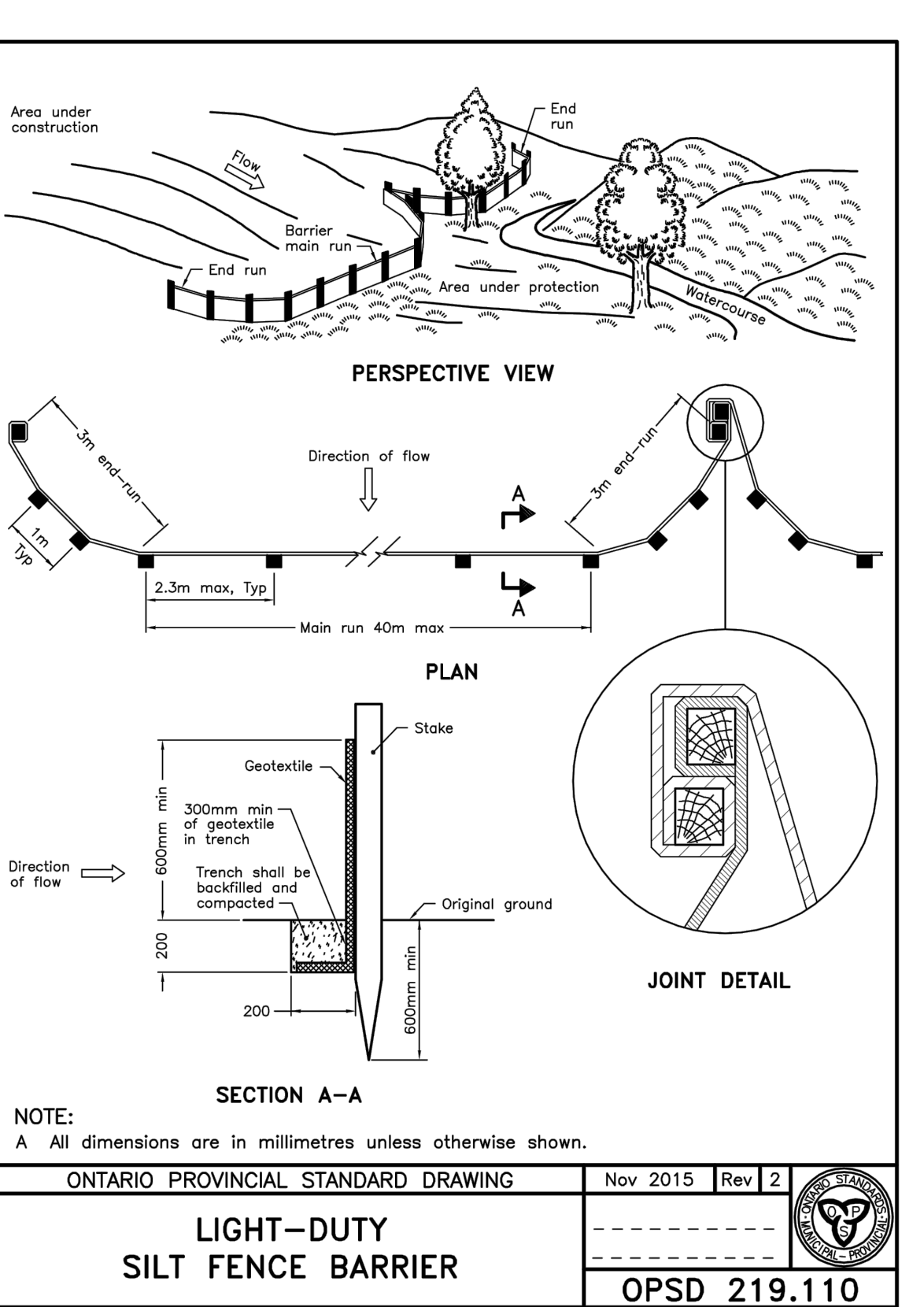
NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING Nov 2015 Rev 2
TEMPORARY ROCK FLOW CHECK DAM V-DITCH
OPSD 219.210



NOTES:
1 Number of bales varies and shall suit ditch.
2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING Nov 2015 Rev 2
STRAW BALE FLOW CHECK DAM
OPSD 219.180



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING Nov 2015 Rev 2
LIGHT-DUTY SILT FENCE BARRIER
OPSD 219.110

****For PHCL and Windlectric Use Only****

Review with no comments does not constitute approval of design details, calculations or methods. It is the responsibility of the consultant to ensure all information contained within the drawings are in full compliance with contractual obligations.

Reviewed - No comments
 Reviewed - Incorporate comments and resubmit
 Reviewed - Not accepted

Reviewed By: _____ Date: [dd-mm-yyyy]

Project Manager - PHCL _____ Date: [dd-mm-yyyy]

Project Manager - Windlectric _____ Date: [dd-mm-yyyy]

Owner: _____
Windlectric Inc.

Client/Project
PENNECON HEAVY CIVIL
AMHERST ISLAND WIND PROJECT
75MW WIND FARM
Amherst Island, Loyalist Township, Ontario

Title
**CIVIL ACCESS ROAD
DETAIL SHEET**

Project No. 133560100 Scale N.T.S.
Drawing No. _____ Sheet _____ Revision _____