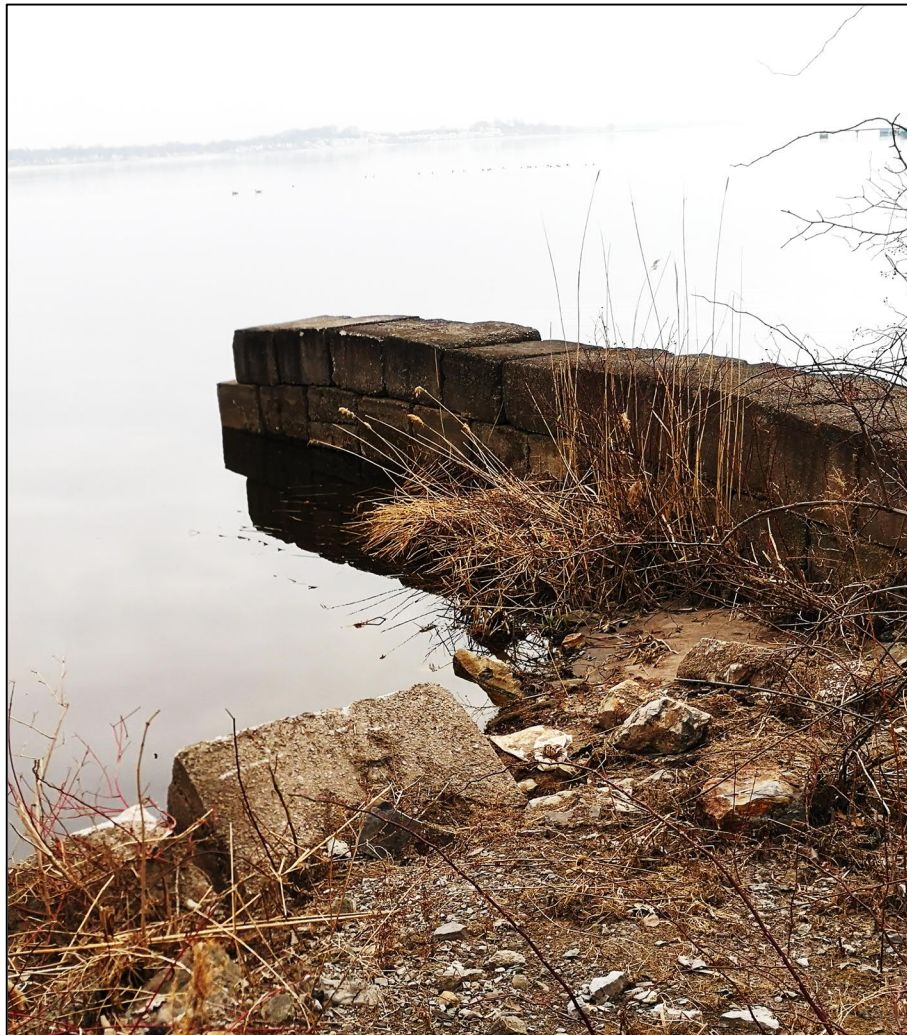


Point Abino Drain Baseline Report

City of Port Colborne

Town of Fort Erie



December 16, 2021

Project No: EWB-199997

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1 Introduction

This report is the Baseline Drainage Report and provides a summary assessment of the existing condition and drainage issues of the Point Abino Drain, originally named as the Point Abino Marsh Drain (PAM Drain) hereafter (Drainage Engineers Report) referred to as the Point Abino Drain. The Baseline Drainage Report presents the current, as of 2021, baseline or reference condition from which all proposed improvements will be reviewed, planned and designed to address. In some cases, a drainage issue may be identified in the Baseline Report but deferred from a specific implementation in the specific Drain Engineer's report. The Baseline Report provides the total needs of the drain works but does not provide specific recommendations on implementation.

1.1 Drain History

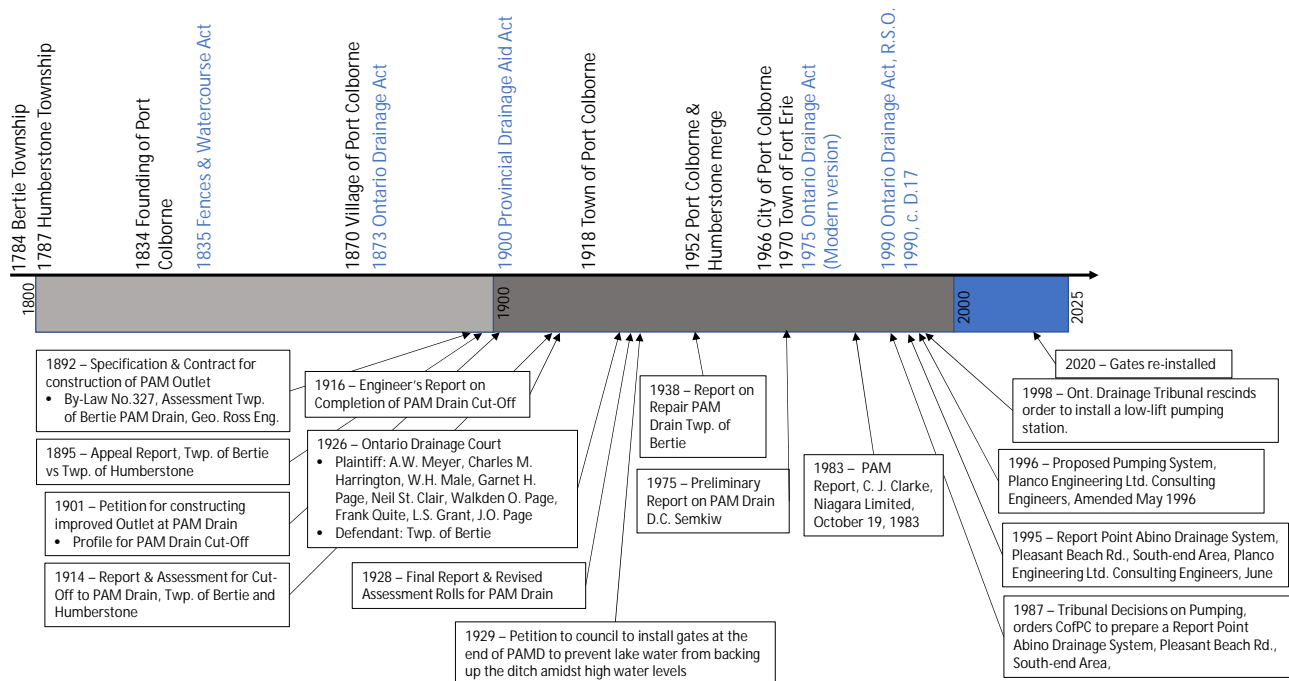


Figure 1 Point Abino Marsh Drain History Timeline

- 1892 Specification & Contract for construction of Point Abino Marsh Outlet
 - By-Law No.327, Assessment Twp. of Bertie, Point Abino Marsh Drain, Geo. Ross Eng., July 16th
- 1895 Appeal Report Twp. of Bertie vs Twp. of Humberstone
- 1901 Petition for constructing improved Outlet at Point Abino Marsh Drain
 - Profile for Point Abino Marsh Drain Cut-Off, May 7th

- 1914 Report & Assessment for Cut-Off to Point Abino Marsh Drain, Twp. of Bertie and Humberstone, Nov 2nd
- 1916 Engineer's Report on Completion of Point Abino Marsh Drain Cut-Off, Oct 12th
- 1926 Ontario Drainage Court
- Plaintiff: A.W. Meyer, Charles M. Harrington, W.H. Male, Garnet H. Page, Neil St. Clair, Walkden O. Page, Frank Quite, L.S. Grant, J.O. Page
 - Defendant: Twp. of Bertie
- 1928 Final Report & Revised Assessment Rolls for Point Abino Marsh Drain, Aug 1st
- 1929 Petition to council to install gates at the end of Point Abino Marsh Drain to prevent lake water from backing up the ditch amidst high water levels
- 1938 Report on Repair Point Abino Marsh Drain Twp. of Bertie, Mar 10th
- 1975 Preliminary Report on Point Abino Marsh Drain, D.C. Semkiw, Feb 5th
- 1983 C. J. Clarke, Niagara Limited, dated October 19, 1983, which report was adopted by the Council of Fort Erie and the Council of the City of Port Colborne in accordance with By-law 64-84 of the Town of Fort Erie and By-law 1420/83 of the City of Port Colborne
- 1995 Report Point Abino Drainage System, Pleasant Beach Rd., South-end Area, Planco Engineering Ltd. Consulting Engineers, June, 1995
- 1996 City of Port Colborne, Report on the Point Abino Drainage System Proposed Pumping Station at Point Abino Road, Planco Engineers Ltd., May 1996.
- 1998 An application to the Ontario Drainage Tribunal by the City of Port Colborne requesting the Tribunal issue an Order rescinding the September 15, 1987 order of the Tribunal directing the City of Port Colborne to install a low lift pumping station in the Town of Fort Erie on the Point Abino Drain.
- 2020 Point Abino Gates re-installed. Beaver dams removed.

Notes: There are references to an 1892 Outlet along Point Abino Road at the site of the present day Point Abino Road pumping station but no record drawings were found to illustrate it. A possible original path may be shown on the 1983 CJ Clarke Plan No2 as a double line but this is outside of the watershed by that time.

1915 Hurley Outlet was noted. It is shown in the 1925 plan as an outlet along the Townline Road between Bertie and Humberstone.

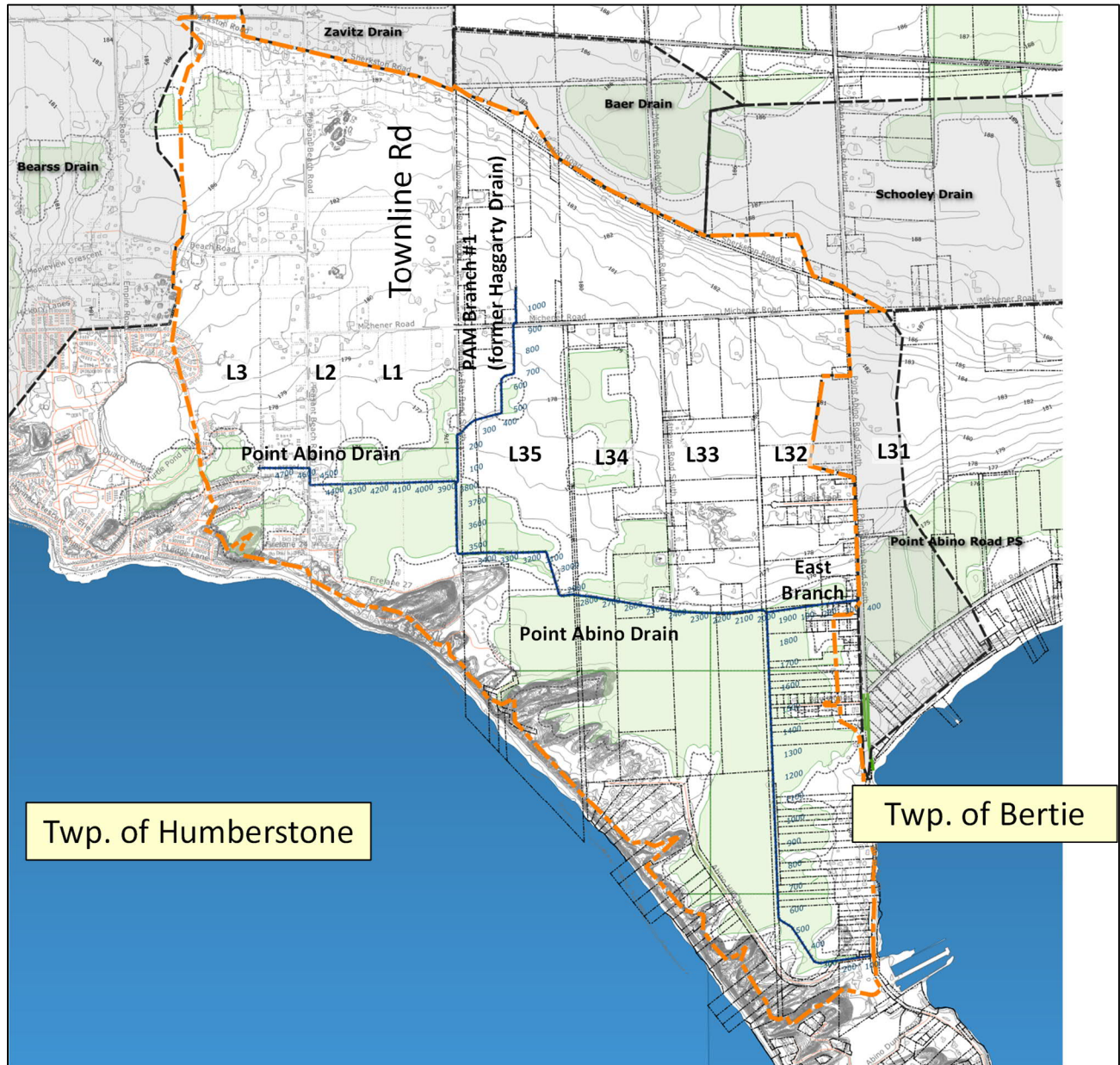


Figure 2 Point Abino Marsh (PAM) Drain Historical References

The modern boundary between Fort Erie and Port Colborne is the same as the historical boundary between Humberstone Township and Bertie Township.

1.2 Point Abino Drain Basics:

The Point Abino Drain serves an area of 805 hectares based on the defined drain boundary. The main branch of the drain is 4715m in length from the drain outlet into Lake Erie to the furthest channel point, which is west of Pleasant Beach Rd.

The watershed boundary or high point is approximately the south side of Sherkston Rd and the Friendship Trail with a contour elevation of 189m. This represents 15m of fall to the outlet, 5217m as the crow flies.

The outlet at the lake varies with the change in Lake Levels but the recorded average lake level is given as 174.15 GL. The lake level fluctuates and is currently higher than historic high levels and influences the water surface profile upstream from the lake.

- Watershed average fall (slope) is given as 0.24% or 2.4m per 1000m
- Drain average fall (slope) is given as 0.0384% or 0.38m per 1000m

This slope characterises the Point Abino Drain as very low slope or slow watershed. The lower portion of the drain is highly influenced by Lake Erie's water elevation.

The Point Abino Drain can be segregated into several distinct geographic areas as follows:

- Uplands area, (green) the portion of the drain that is above the 176.0m contour line, and which features a positive overland flow towards the south. This area is the Branch #1 formerly the Haggarty drain.
- Western shore boundary, (gold) the area composed of sand dunes along the western edge boundary between Lake Erie and the inshore lands.
- Western Drain, the portion of the Drain that is east / west orientation that serves the westernmost portion of the lands past Pleasant Beach Rd. to the eastern most point where the drain turns south.
- South Drain to outlet, the last 1912m to outlet.

These zones are described in more detail in Section 3 Point Abino Drain.

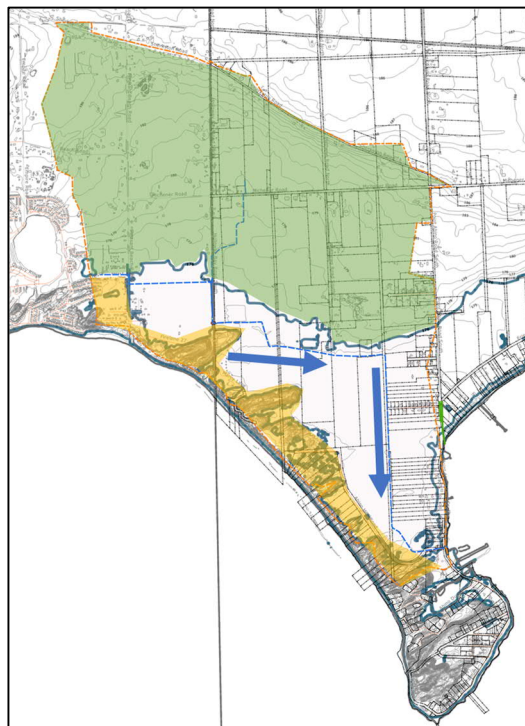


Figure 3 Point Abino watershed areas and drain segments

1.3 RFP Drainage Issue Identification

The following items are referenced in the RFP as topics for investigation and potential resolution in the drain report.

1. Consideration for Pumping
2. The 0% Grade to outlet in South Drain segment.
3. The former outlet to Point Abino Rd. which was reversed and the existing Point Abino Road Pumping Station
4. Consideration for improving the drainage service to Sherkston Shore and focused on in the areas of Pleasant Beach Rd and Holloway Bay Rd.
5. Investigate options for improving the outlet flows.

2 Study Approach

All drainage work is legislated by the Provincial Drainage Act.

A one-third agricultural grant is available to all eligible farmlands to help with the cost of drainage repairs and capital projects through the Agricultural Drainage Infrastructure Program (ADIP) managed by the Ontario Ministry of Agriculture Food and Rural Affairs (OMAFRA).

Work is done within the guidelines established by the Department of Fisheries and Oceans (DFO) and the Endangered Species Act as established by the Ministry of Natural Resources and Forestry (MNR). Design is to be compliant with the requirements. Design work is prepared and submitted for review by the relevant Conservation Authority (NPCA) for compliance with Section 28 Regulations and in accordance with the 'Drainage Act and Conservation Authorities Act Protocol'.

The Municipal Drainage Act requires a specific process for establishing and making alterations to a Municipal Drain. The Act was prepared with a specific process to be followed. The process for a drainage project improvement under Section 78 of the Act is as follows:

- Under Section 78 of the Act, Council appoints an Engineer to initiate a study and to prepare a report.
- On Site Meeting; notice required by the clerk.
- Preparation of a Preliminary Report
 - Identification of the issues to be improved.
 - The preferred method for improvement.
 - An estimate of the costs for improvement, and
 - The principles for revising, changing or otherwise adjusting the drainage schedule of cost sharing.
- Field Survey
- Detailed Design
- Final Drainage Report Preparation
- Drainage Report Review and Consideration
- Contract Tendering
- Construction
- Post Construction Final Documentation of the Drainage Report

Drainage Act and Conservation Authorities Act Protocol

Working as part of a multi-stakeholder Drainage Act & Section 28 Regulations Team (DART), co-chaired by the Ministry of Natural Resources and the Ministry of Agriculture, Food and Rural Affairs, Conservation Authorities, in partnership with representatives from the drainage sector, agricultural sector, and municipalities have completed a protocol for drain maintenance and repair activities.

The purpose of this provincially approved document is to improve communications, promote best practices, and streamline the permitting process under the Conservation Authorities Act for municipal drain maintenance and repair work performed under the Drainage Act.

Read the report *Drainage Act and Conservation Authorities Act Protocol*, online at:

<https://conservationontario.ca/>

The appointed Engineer has conducted a drainage wide site review, summarized in this baseline document.

The preliminary Report and Engineer's Drain Report has been segregated into three sub-reports as follows:

1. Baseline Report, presents clear identification of the current drain with particular emphasis on current drain issues that are to be resolved through the improvement works. Also included in this report are environmental criteria and constraints that will or may impact the preferred solution(s).
2. Drain Hydrology and Hydraulics Assessment Report, establishes the current performance of the drain against selected standards.
3. Drain Report, proposed preferred solution including plan & profiles.

2.1 Methodology

The baseline assessment is performed from site inspections and a technical review of the available data.

The culvert inventory and assessment are preliminary at this time. Depending on the findings, more detailed assessments may be performed.

2.1.1 Drainage Objectives:

The objective of a drain is to provide a clear unobstructed flow with depth to provide adequate private drain connection outlets. The following image exemplifies a traditional "good" drain profile and cross-section with contributory flows from a tile drain connected to the drain.



Figure 4 Example of clear drain

The presence of ash trees allowed to grow within the drain banks previously, which are now dead or dying from the emerald ash borer will provide a source of wood debris that may potentially block the drain and cause backwater or other degradations in performance.

It's not desirable from an equipment and drain maintenance view point to have trees within the working allowance. The purpose of the allowance is for machine access to conduct future maintenance of the drain working from the preferred side of a drain. However, it is not environmentally sustainable or appropriate to remove all trees from the working allowance. Trees provide several benefits to the function of drains while also posing a risk to drain function depending on type of tree and placement. All trees growing within a constructed drain between the top of banks are to be avoided. Where a mature tree is already established and is an individual tree, it can be accommodated by having drainage machinery work around the tree.

New trees can be planted adjacent to a drain following two key criteria:

- The trees are planted back from the top of bank, (the exact distance is determined by tree type and local conditions).
- The trees are planted with adequate space to provide future maintenance. Grouping of planted trees is encouraged given that the spacing of the trees and the arrangement permits future maintenance. This is accomplished by providing an angled approach along the tree edge line to the drain and increasing the tree plant density only as the distance from the drain increases.

From Chatham Kent website, providing advice on tree placement within drain influences.

“Individual hardwood trees may be allowed every 100 feet. Trees of any type shall not be planted within 25’ of an existing tile drain (solid tile, wrap joints) or 35’ from existing open drain. In certain circumstances where an owner owns property on both sides of the open drain, upon consultation with the Drainage Superintendent, a windbreak may be permitted on one side. On existing drains where windbreaks exist, costs due to trucking material will be the direct responsibility of the owner and not the upstream ratepayers.”

The presence of existing trees on an existing drain does not require a clear cut approach to improving the function of the drain. Trees can be selectively removed to achieve a drain benefit, such as the case with the lower reach of the Point Abino Drain at various locations.

Individual trees that are currently healthy and with a good expectation for continued good health should be preserved and protected during construction. Trees that group both side of the drain and create an obstruction to flow are to be removed.

Tree Benefits to Drains

While trees can impede flow and through dead limbs or other debris cause problems with backwater effects, there is an overall recognized benefit for trees on a municipal drain. The primary benefit is through soil stabilization by tree roots, although it is not uncommon for a drain under a meander influence to erode the soil from under

the tree roots, depending on the sinuosity of the streamflow. There are trees, such as willows, whose roots will seek out water and these trees should be avoided along closed conduit drains, as the roots will potentially clog the drain.

There is a recognized benefit from trees to provide shade or canopy to protect the drain with standing water from having a detrimental effect on fish species. While many drains are more likely to be a habitat for warmwater species, there is a real benefit from trees providing shade. As such, there is a stated preferred side for trees based on this benefit, which is the south and west side of a drain.

2.1.2 Municipal Drains and Environmental Improvements

In the past, Municipal Drains have been created to convert functioning wetlands to functioning farmland. Examples of this can be seen at significant scales in Ontario; Holland Marsh area, Thedford area (former Lake Smith) and throughout Chatham Kent area.

There is an unquestionable contradiction between removing the water to promote farming and retaining the water to support native flora and fauna. The engineering and drainage community have come to appreciate that a straight line to the lake with the highest grade possible to move the most water the fastest off the fields may not be in the best interest of all ratepayers. There is an expectation that drainage can be used to ensure that farming practices are achieved to a reasonable extent on designated lands. However, drainage does not have to negatively impact existing native flora and fauna for the benefit of the community as a whole.

The distinction is made in the pursuit of water management strategies within the Drainage Act and not to just focus on moving water away from farmland for the benefit of landowners. The issue is managing the water cycle through all stages:

- Spring Freshet: snow meltwater runoff potentially with spring rain.
- Summer Convective storm: high intensity sudden but short and not widespread thundershowers.
- Large Air mass precipitation event: longer duration lower intensity but high yield precipitation event.
- Drought: time between precipitation events.

Water management practices change as our understanding of the hydrologic cycle and land management practices improve through research. The following describes past stages of water management practices:

- Pre- 1940 introduction of farming to areas that require drainage to grow crops. From introduction of the drainage act, areas previously identified as bogs, swamps or lakes are drained to provide high quality soil for farming.
- 1950s to 60s sought to move water off the land as quickly as possible, leading to erosion and quality problems as well as environmental degradation.

- 1970s and 80s introduced urban areas to stormwater management ponds which decreased peak runoff but increased erosion and geomorphological forms. Ponds also increased temperature in the resulting runoff as well as changing stream chemistry.
- 1990s to 00s implemented geomorphological assessment of streams to enhance and to mimic natural systems including profile of cold water and warm water streams through modelling of baseflow contributions to runoff and baseflow management. SWM in urban areas with a treatment train approach to water management to address both quantity and quality of runoff.
- 2010 to present features low impact development and soil conservation practices through buffer strips and low tillage practices. Low impact development practices use runoff control techniques to reduce runoff impacts through a watershed as well as controlling through end point practices such as SWM ponds.

The following figure illustrates features associated with a traditional approach to ditching or a typical view of a ditch.

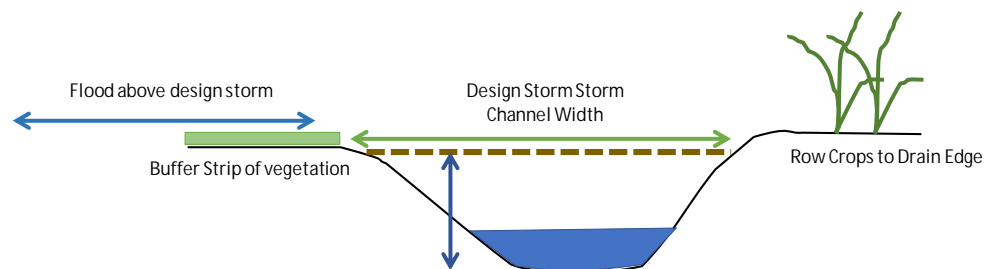


Figure 5 Cross-section ditch view



Figure 6 Trapezoidal Ditching Under Construction

The traditional ditch has the following features:

- A trapezoidal channel design with a bottom width, a depth and a top width that defines the capacity of the ditch.
- The illustration shows a farm use that occurs up to the ditch edge while the opposite bank illustrates a buffer strip of vegetation between the row crops and the ditch top of bank.
- Where the storm exceeds the ditch capacity, the flooding spills out to either side on to the ratepayer lands. The ditch requires an easement equal to the top width of the ditch, which determines the total capacity.

The following figure illustrates a naturalized channel design approach to a ditch or creek channel.

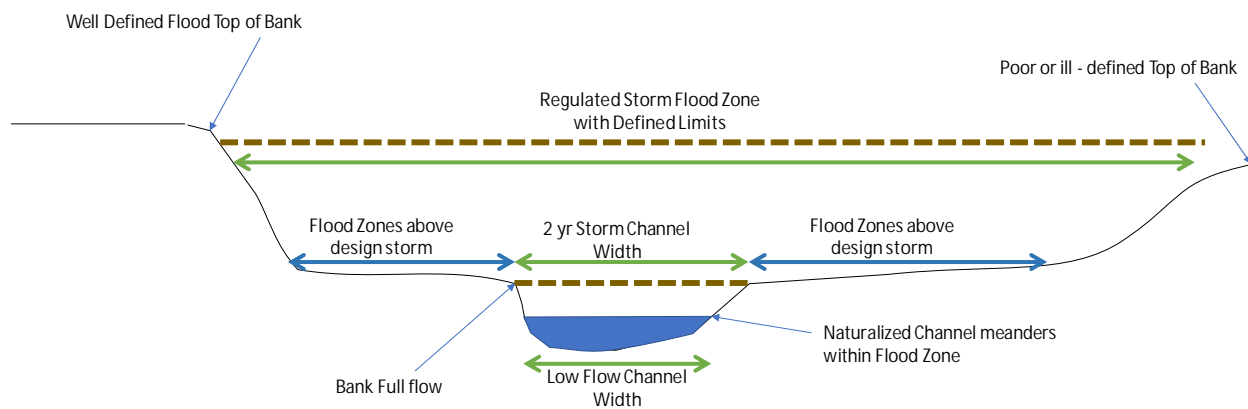


Figure 7 Naturalized Channel cross-section



Figure 8 Naturalized Channel with Pools and Riffles

A naturalized channel design has the following features:

- The natural channel has a pool and riffle design that alternates through a sinusoidal pattern defined by the size, type of watershed and geologic materials composing the watershed.

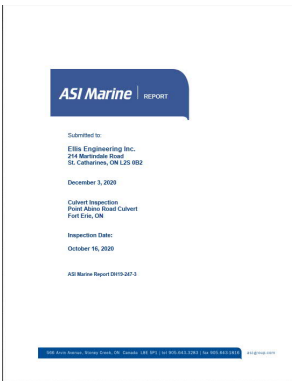
- The channel is designed to mimic a natural stream that would occur had the creek or stream occurred through geological processes.
- The area above the channel is a flood zone.
- The channel has a specific design capacity while the flood zone has a larger design capacity and the risk to flooding is defined by these capacities.
- Tree and vegetation plantings will grow into a mature canopy that provides shade at the planned locations within the flood zone.

These changes in practice and expectation have resulted in greater analysis requirements during drainage design to assess not only the basic drain performance but it's potential negative or positive impact on the environment. Negative or positive impacts are regulated under various legislation within Canada but the primary bodies that implement the regulations are:

- Government of Canada Fisheries and Oceans (DFO), specifically approvals on culverts to assess potential negative impacts on fish habitats and species. Important to recognize that habitat impacts can be assessed whether the fish species is present in the specific portion of the stream or not.
- Government of Ontario Ministry of Natural Resources and Forestry (MNRF) can assess habitat impacts of proposed projects that affect terrestrial or aquatic habitats.
- Niagara Peninsula Conservation Authority, NPCA is responsible for regulated flood zones, lands within the designated areas.
- Ministry of the Environment, Conservation and Parks, MECP may request that a Environmental Compliance Approval (ECA) be sought for drains that include 50% of the area as urban lands instead of agricultural lands.
- Lastly, the Government of Ontario Ministry of Agriculture, Food and Rural Affairs OMAFRA has responsible oversight under the Drainage Act of Ontario

2.2 Document Record

The following is a list of the documents that are relevant to the Point Abino Drain. Presented in the following table are selected highlight text of the documents available. *(Full documents are accessible online or on request.)*



Dive Inspection Report for Point Abino Road Bridge (Structure No. S033B). ELLIS File No.: 906-4
ELLIS Engineering Inc.
March 29, 2021

Deterioration: Above the waterline (inspection 2019 OSIM)

The following details of the 2019 inspection report are provided for background information:

- The interior of the structure was not inspected due to high water levels at the time of inspection.
- It was noted in 2015 that the visible portions of the deck soffit appeared to be generally in fair condition with cracking and efflorescent staining and medium to severe scaling
- In 2015, the visible portions of the abutment sidewalls appeared to be in fair to poor condition with severe scaling, medium to severe concrete deterioration, and areas of undermining.
- The concrete block retaining walls are in poor condition.

Overall, the visible portions of the structure above the waterline were found to be in fair to poor condition.

Effects of Deterioration – At and Below the Waterline Retaining Walls on East Side

The following is a summary of the underwater inspection findings:

Retaining Walls on East Side

- Retaining walls exhibit areas of undermining and voids up to 1.2m in depth.

North Cell

- There is medium to severe scour throughout the north cell sidewalls, especially at the bases.
- There is medium to severe scaling (20-30mm deep) along the majority of the sidewalls.
- There are areas of cracking, spalling, concrete deterioration and exposed reinforcing steel in the north sidewall.
- There are voids in the north sidewall at 0+003 (approx.. 1m long, 0.3m high and 0.25m deep), 0+006 (approx.. 3m long 1m long, 0.3m high and 0.25m deep), 0+065 (0.6m high and 0.25m deep), 0+070 (multiple locations 0.3m high and 0.25m deep), and 0+080 (1.5m long, 0.4m high and 0.25m deep). There are multiple areas of severe scour and voids in the north wall from 0+080 to 0+087.
- At 0+080 the hole in the north sidewall has a large void behind it and granular material was noted to be spilling into the culvert.
- There are multiple holes through the centre wall between 0.5m-1m long and 0.3m high at 0+012.

- Corrugated steel pipe (CSP) running perpendicular to the culvert across the soffit at 0+076. There are vertical cracks below the CSP on the north and south sidewalls.

South Cell

- There is medium to severe scour throughout the south cell sidewalls, especially at the bases.
- There is medium to severe scaling (20-30mm deep) along the majority of the sidewalls.
- There is a spall on the centre wall approximately 0.4m above the culvert floor that is 0.08m high, 0.12m deep with exposed rebar at 0+010.
- Corrugated pipe (CSP) running perpendicular across the soffit.

Overall, the **north cell and centre sidewall portions** of the structure at and below the waterline were found to be in **poor condition**. The **south cell** portion of the structure at and below the waterline was found to be in **fair to poor condition**.

Recommendations

The underwater dive inspection of Point Abino Road Bridge identified extensive areas of deterioration throughout the sidewalls and centre wall. Based on the findings, we recommend replacing the portion of the structure below the roadway allowance (24m in length from the east end) in 1-5 years. We recommend the west end of the structure (63m in length) be replaced or removed in 1-5 years. Due to the presence of multiple voids through the north sidewall, the roadway should be monitored for settlement or sinkholes until the structure is replaced.

Point Abino Drain (RE), 1998 ONAFRAST 28 (CanLII)

File number: **1998-28**

Date: **1998-07-28**

An application to the Ontario Drainage Tribunal by the City of Port Colborne requesting the Tribunal issue an Order rescinding the September 15, 1987 order of the Tribunal directing the City of Port Colborne to install a low lift pumping station in the Town of Fort Erie on the Point Abino Drain.

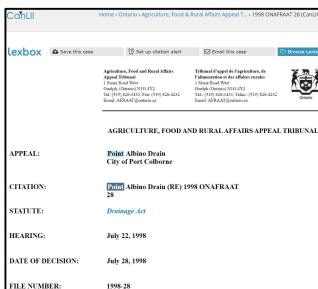
DECISION OF THE TRIBUNAL

(summary)

2. All persons who receive the notice were invited to file written submissions to the Tribunal regarding
 - a) the adoption of one of the alternatives proposed in the Engineer's May 8, 1996 report
 - b) the abandonment of the Engineer's report, and
 - c) the payment of costs to date.

The reasons for this decision are:

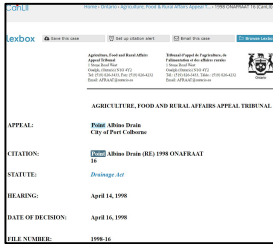
1. The Tribunal was convinced by:
 - the documentation filed indicating substantial opposition to the proposed project from the landowners in the area that would be assessed for this work and



- the passage of substantial time, without significant problems for the area, since the original order of the Tribunal to install the pump that a pump on the outlet of the Point Abino Drain is not required at this time.

2. If a pump proves to be necessary in the future, the current report can be updated and used so the work to date has provided some value to the landowners in the drainage area.

Dated at Chatham, Ontario this 28th day of July, 1998.



Point Albino Drain (RE), 1998 ONAFRAAT 16 (CanLII)

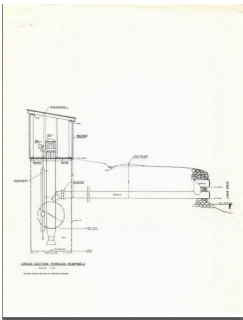
File number: **1998-16**

Date: **1998-04-16**

DECISION OF THE TRIBUNAL

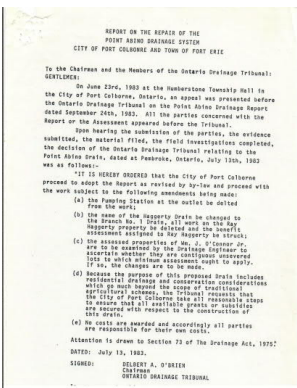
(summary)

After careful consideration the Tribunal decided that it does not have sufficient information to make a decision in this application. In particular, the Tribunal wishes to receive submissions from all landowners, and other persons entitled to notice pursuant to the Drainage Act with regard to the Engineer's May 8, 1996 report, with regard to how the costs to date should be assessed in the event the report is abandoned.



Pump Station General Arrangement Plan

Not built as per Tribunal.



Report on the Repair of the Point Abino Drainage System

To Chairman and the Members of the Ontario Drainage Tribunal:

June 23, 1983 appeal presented at Humberstone Township Hall and this response to the decision found at Pembroke July 13th, 1983 as follows:

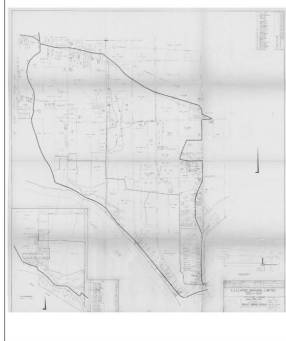
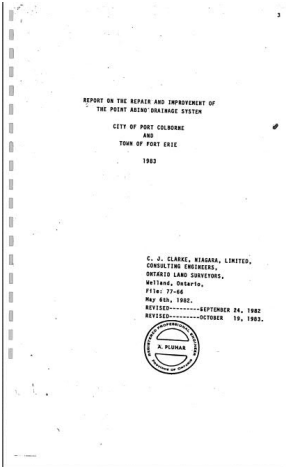
During our field investigation we found that the existing drain from Lake Erie up to Sta 61+00 is below grade, but the Westerly portion of the drain from Sta 61+00 to Sta 155+66 has become partially filled in and obstructed by weeds and shrubs so badly that it no longer provides adequate drainage.

To provide efficient drainage for all lands affected, the drain should be deepened from Sta 61+00 to the west end, but the removal of weeds and shrubs is required over the entire length.

The attached Dwg. No. 1 shows that the first part of the drain up to Sta 61+00 will not improve hydraulically by deepening but the removal of the shrubs and some of the tree branches will help during the peak run-offs.

Report On the Repair and Improvement of the Point Abino Drainage System

1983
CJ Clarke (A. Pluhar)



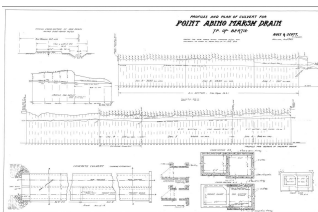
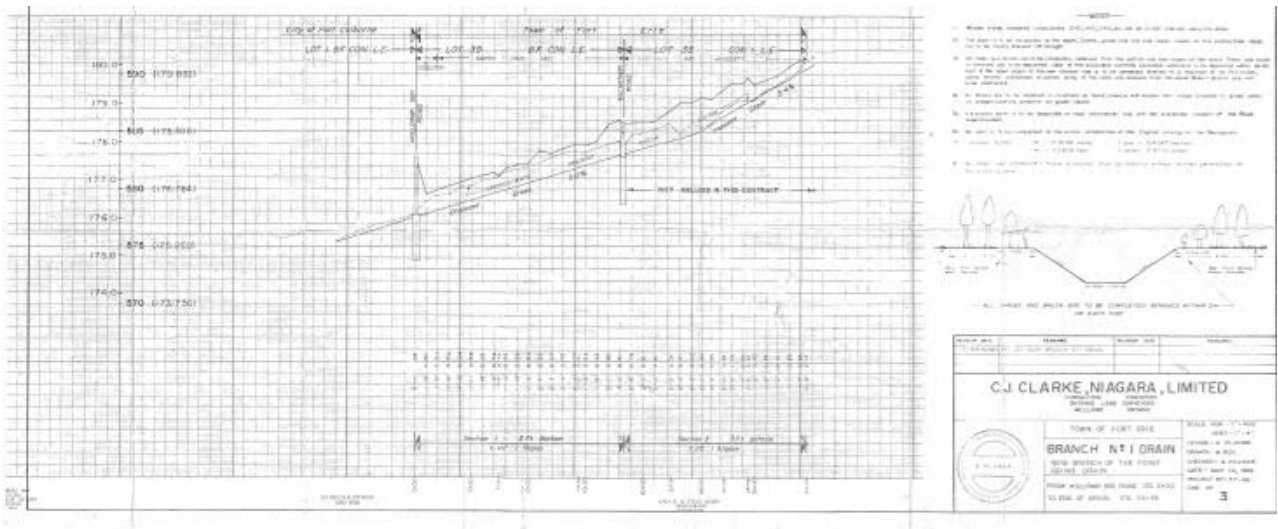
Point Abino Drain Boundaries
1983 CJ Clarke
DWG No 2 and No 3

REVISION DATE	REMARKS	REVISION DATE	REMARKS
MAY 12, 1980	REVISE OWNERS	MAY 21, 1982	DRAINAGE AREA FOR HAGGERTY DRAIN
SEPT 17, 1980	DRAINAGE AREA CORRECTED	DEC 23, 1982	REVISE OWNERS
FEB 10, 1982	PUMPING STATION SITE SHOWN	OCT 19, 1983	REVISED NAME BRANCH N#1 DRAIN

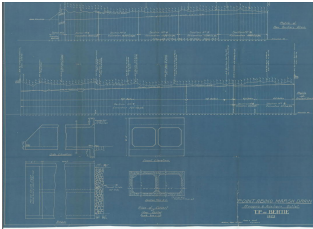
C. J. CLARKE, NIAGARA, LIMITED
CONSULTING ENGINEERS
ONTARIO LAND SURVEYORS
WELLAND, ONTARIO

CITY OF PORT COLBORNE
AND
TOWN OF FORT ERIE

SCALE HOR - 1"=500'
VERT -
DESIGN - A. PLUHAR
DRAWN - J. C. LUNDY
CHECKED - A. PLUHAR
DATE - OCT. 1978
PROJECT N# - 77-66
DWG N# 2



Point Abino Marsh Drain
Ross and Scott Engineers
August 23, 1927



**Point Abino Marsh Drain
Repairs and Auxiliary Outlet**
Twp. of Bertie
1923



**Plan showing land drained to upper part of Point Abino Marsh Drain
in the Townships of Humberstone and Bertie**

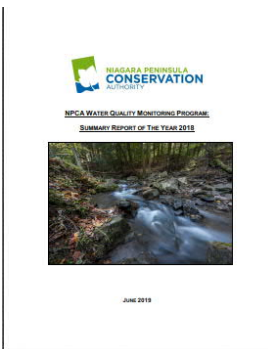
Scale, 1,000 ft = 1 inch

September 12, 1916

Geo. Ross Engineer

Shows original outlet at Point Abino Road from the West and crossing to the lake north of the existing outlet.

Other Reference Works:



**NPCA Water Quality Monitoring Program: Summary Report of the
Year 2018**

June 2019

NPCA

PA001 Point Abino Drain

WQI Rating: Fair

BioMAP Rating: Impaired

FACTORS AFFECTING WATER QUALITY

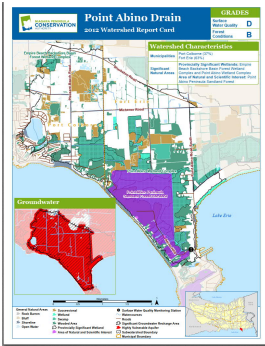
Exceedances in E. coli, nitrate, total phosphorus (87%), and total suspended solids

Potential stressors include: agricultural and rural run-off

Site is influenced by backflow from Lake Erie which is likely improving water quality

TREND

- Decreasing total suspended solids concentrations
- Stable chloride, E. coli, total phosphorus and total suspended solid concentrations
- Increasing chloride concentrations



Point Abino Drain 2012 Watershed Report Card

NPCA
Port Colborne 37%
Fort Erie 63%

Provincially significant Wetlands:

Empire Beach Backshore Basin Forest Wetland Complex and Point Abino Wetland Complex

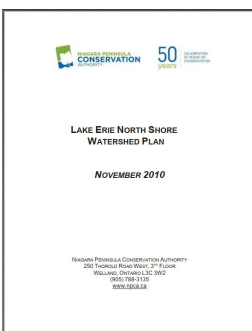
Surface Water Quality Grade D

Surface water quality monitoring of Point Abino Drain on Point Abino Road was initiated in 2007 and was given an overall grade of D. The water quality at this station regularly exceeded provincial guideline for phosphorus but met the guideline for E. coli. This watershed also had occasional exceedances of total suspended solids and copper. The benthic community found at this station mainly consisted of pollutant tolerant animals and indicated impaired water quality.

Watershed initiatives that reduce nutrient contamination will improve the water quality of Point Abino Drain.

Forest Conditions Grade B

The forest condition indicators for Point Abino Drain watershed produced an overall grade of B, among the highest in the entire Lake Erie North Shore watershed. The Forest Cover % received an excellent grade of A which exceeded the provincial target. The Forest Interior % with a grade of B was also very good. The greatest contributing factor to these grades is the contiguous tracks of diverse, mature upland and lowland forest running from Michener Road to the forested dunes on Lake Erie. Riparian Zone Forested % was given a grade of C. This grade is likely due to the successional nature of vegetation along the municipal drain network.



Lake Erie North Shore Watershed Plan, November 2010

NPCA

Flood zones not delineated within Point Abino watershed.



Impacts of agricultural drain maintenance in Beaver Creek on Grass Pickerel (*Esox americanus vermiculatus*), a fish species at risk Regional Peer Review – Central and Arctic Region

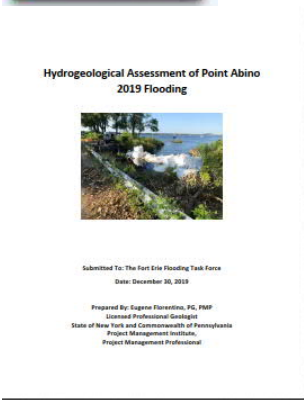
October 4-5, 2016, Burlington, ON

There was concern that the drainage works may have a significant impact on Grass Pickerel populations present in this system. Fisheries and Oceans Canada (DFO) Species at Risk Program has requested advice from DFO Science to help assess the impacts of the drain maintenance

and reconstruction activities on Grass Pickerel in Beaver Creek and determine appropriate monitoring techniques for assessing adverse effects on the species.

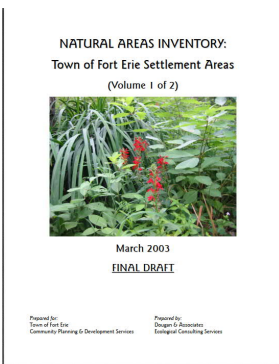


The Soils of The Regional Municipality of Niagara Volume 2
Ministry of Agriculture and Food,
David Ramsay, Minister
Report No. 60 of the Ontario Institute of Pedology
1989



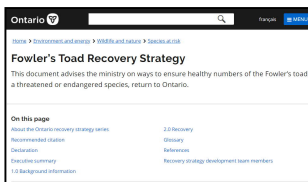
Email correspondence
Dave Maiden, Drainage Superintendent, Town of Fort Erie
July 27, 2020

Hydrogeological Assessment of Point Abino 2019 Flooding
The Fort Erie Flooding Task Force
December 30, 2019
Prepared By: Eugene Florentino, PG, PMP



NATURAL AREAS INVENTORY: Town of Fort Erie Settlement Areas, March 2003
Dougan & Associates

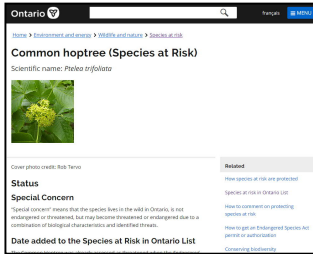
Volume 1 of this report presents a summary of our inventory methods, including an explanation of the Natural Areas Designation Criteria, followed by our findings and final recommendations based on the results of applying these criteria to the habitats identified and characterized in the study. The text is supplemented by mapping of the natural areas showing both ELC communities and the larger consolidated habitat blocks, while Volume 2 contains appendices with supporting detailed methodologies, summary sheets for each habitat block, and species lists for vegetation and wildlife.



Fowler's Toad Recovery Strategy

This document advises the ministry on ways to ensure healthy numbers of the Fowler's toad, a threatened or endangered species, return to Ontario.
<https://www.ontario.ca/page/fowlers-toad-recovery-strategy>





Common hoptree (Species at Risk)

Scientific name: *Ptelea trifoliata*

<https://www.ontario.ca/page/common-hoptree-species-risk>

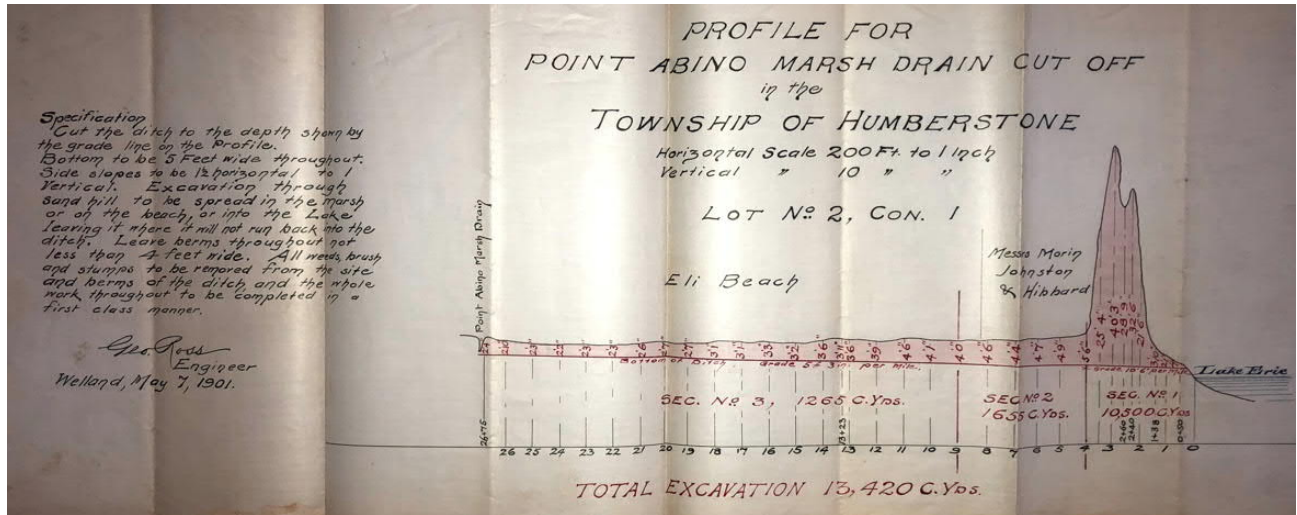


For a complete correspondence record, please refer to Appendix A for a summary listing.

3 Point Abino Drain

This section describes the original drain design through the stages of development based on the record information provided.

1901 Point Abino Marsh Drain Cut Off Profile



1914 Profile of Cut-off Point Abino Marsh Drain

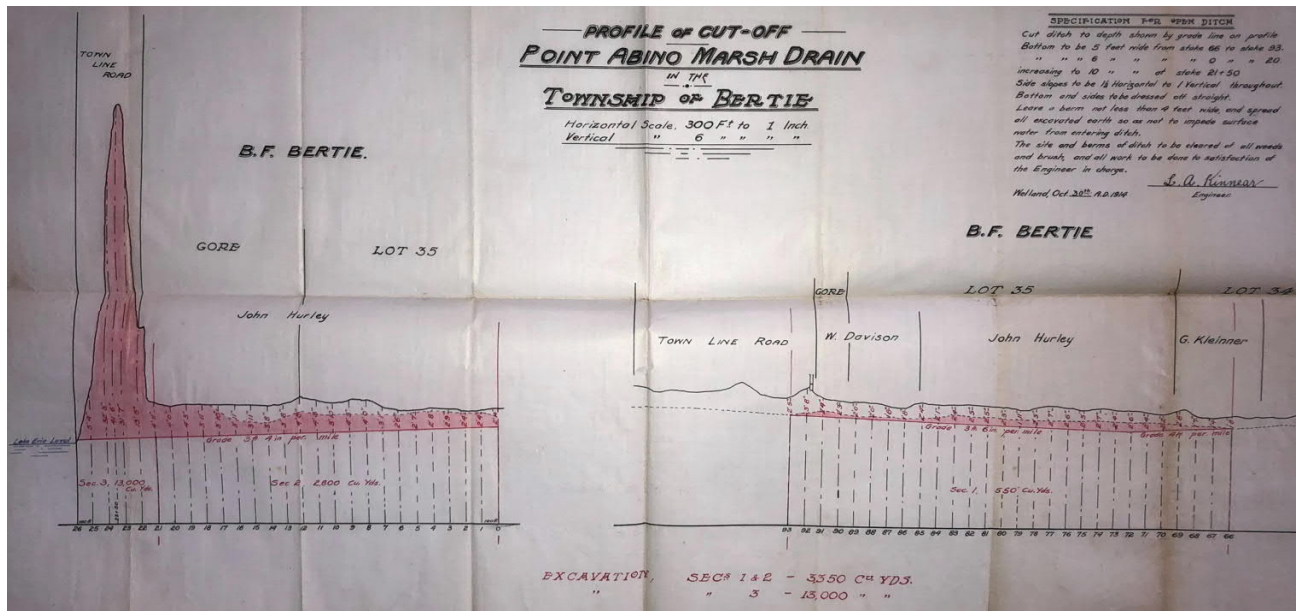


Figure 9 Point Abino Marsh Drain Profile for Cut-Off -1901-1914

1915 Plan lands drained Point Abino Marsh Drain

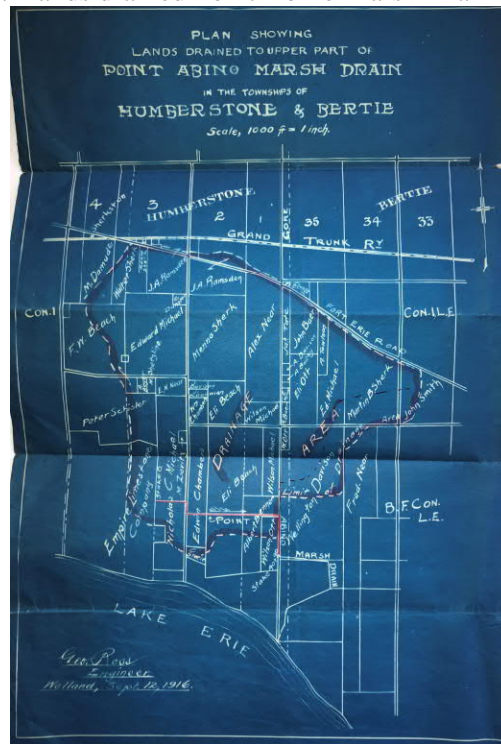


Figure 10 Point Abino Marsh Drain Plan View - 1915

The drain extends to the west as far as midway of Lot 3 Humberstone. The outlet is shown proceeding to the lake at the Townline Rd. between Bertie and Humberstone.

1925 Plan Point Abino Marsh Drain – Proposed Auxiliary Drain Outlet



Figure 11 Point Abino Marsh Drain Plan View - 1925

Shows the existing outlet as being just south of Erie Road off of Point Abino Rd. Hurley cut off is shown as the outlet along Townline Rd. Proposed alignment for new outlet is shown as proposed and different from 1927 report.

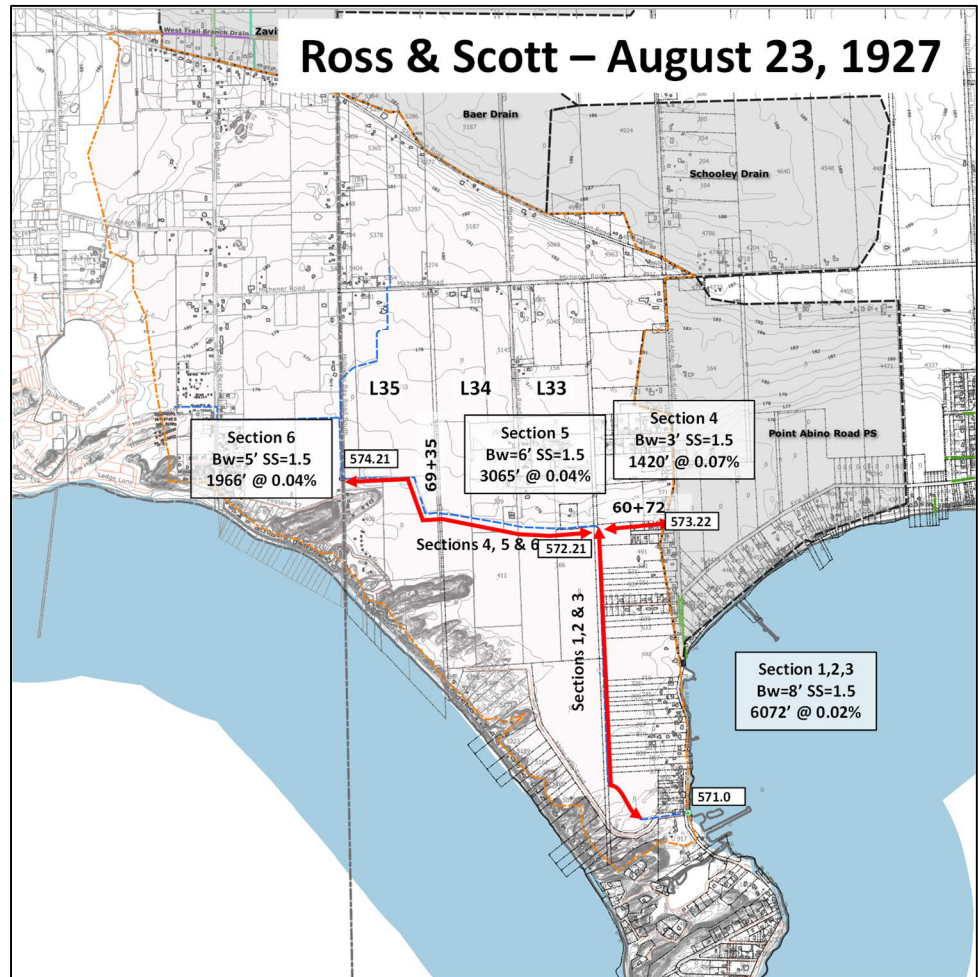


Figure 12 Drain Composition 1927

This is the beginning of the modern Point Abino Marsh drain. Before this work, the drain had its outlet along Point Abino Road approximately where the Point Abino Rd Pumping Station is presently located.

This design reversed the segment leading to the east and connected it to a south leg with an outlet. The design identified 6 segments in total.

- Segments 1, 2 and 3 were composed of 6072 ft at 0.02% with a bottom width of 8 ft.
- Segment 4 reversed the east portion.
- Segments 5 and 6 extended west to Holloway Bay Rd. Segment 5 with a 6 foot bottom and segment 6 with a 5 foot bottom and both at 0.04% slope.

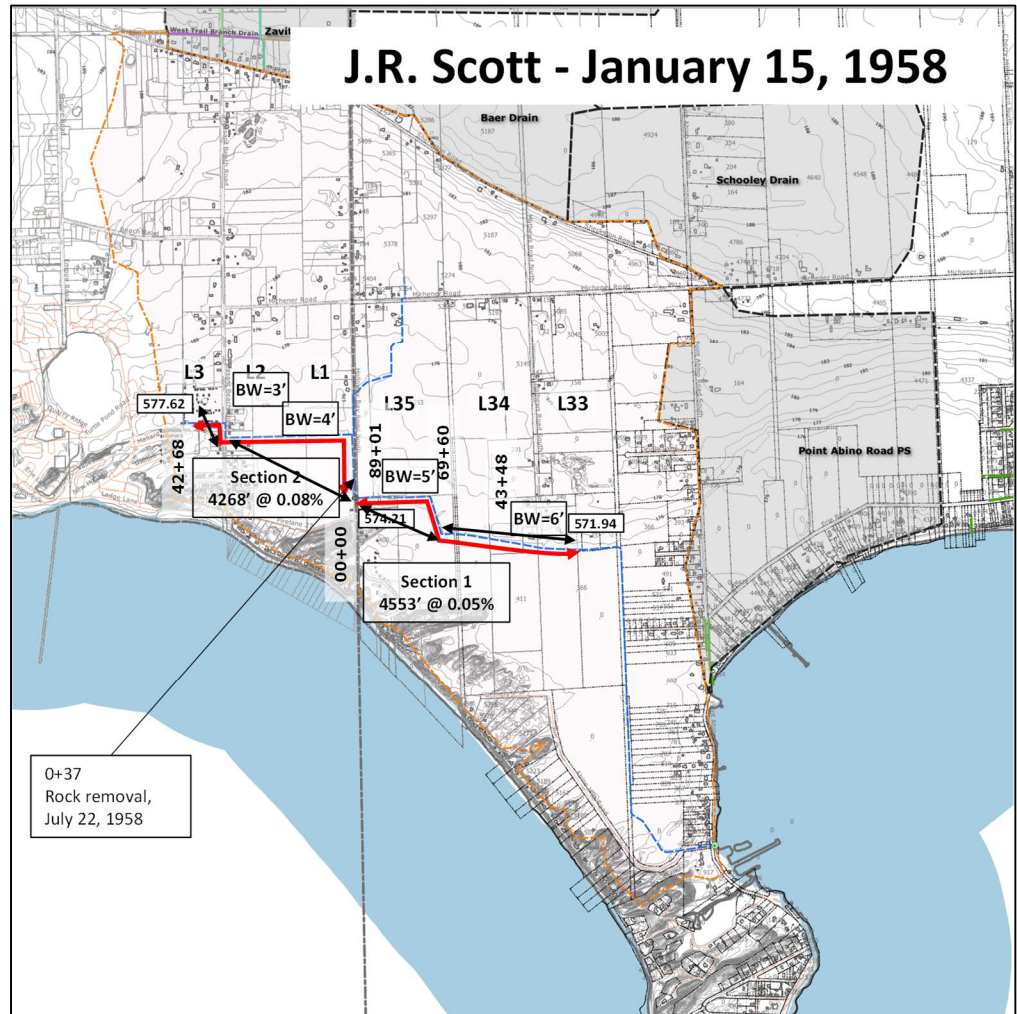


Figure 13 JR Scott Drainage Works 1958

In 1958, the Engineers Report extended the drain westward and re-graded original sections 5 and 6 into new sections 1 and 2 with increased grades 0.05% and 0.08% respectively. This also included some rock removal along the north section parallel to Holloway Bay Rd.

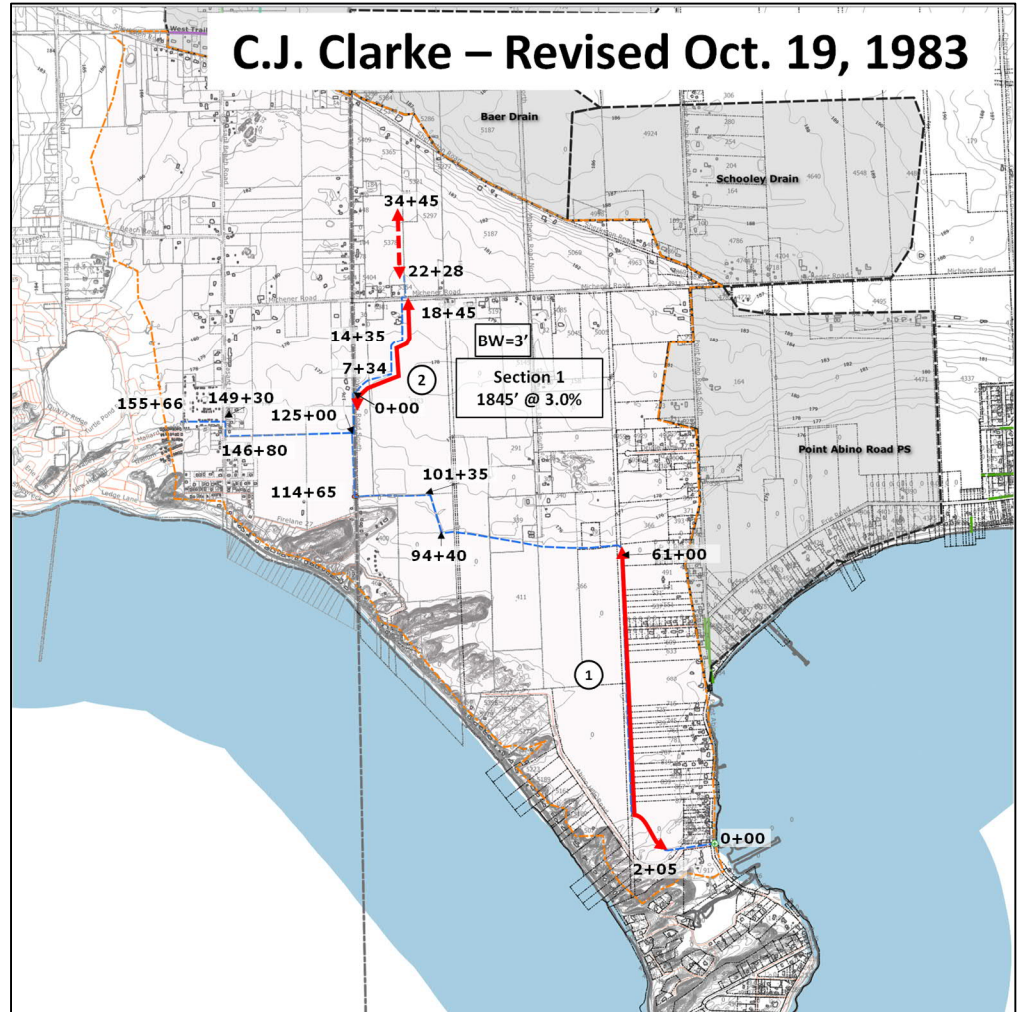


Figure 14 CJ Clarke Drainage works 1983

The Clarke works of 1983 is the last updated and recorded watershed boundary, used later to allocated costs from future reports. Also there were two segments of work completed.

Segment 1 is the lower reach as described in the report.

The attached Dwg. No. 1 shows that the first part of the drain up to Sta 61+00 will not improve hydraulically by deepening it, but the removal of the shrubs and some of the tree branches will help during the peak run-offs.

The attached Dwg. No. 2 shows that the character of the land is changing from agricultural to suburban -[particularly along Lake Erie and along Point Abino Road] - and much of the property is being developed for summer residential purposes. This, of course, produces a faster run-off and it also will require a higher standard of drainage be provided in the near future. This could be provided by a regular maintenance program including a regular inspection over the entire length of this drain.

Segment 2 is the extension of the drain northwards.

BRANCH NO. 1 [New Branch of the Point Abino Municipal Drain]

In accordance with your instructions, we have made a re-examination and survey of the ditch which appeared to commence on the property of Mr. Ray Haggerty in Lot 35, Concession 1, L.E. Town of Fort Erie, crosses over Marcy Properties Inc. in Lot 35, B.F. Concession L.E., Town of Fort Erie, runs south on the West side of Holloway Bay Road [Townline Road] as a roadside drainage system and empties into the Point Abino Drain at Sta 125+00.

Following the work completed in 1983, there were several years of high water levels, (see Figure 28 Lake Erie monthly mean water levels, m to IGLD 1985) and an associated request for solutions.

The report identifies solutions to the drainage issues within the Point Abino Drain Watershed. Two primary solutions are recommended:

- Providing a new outlet by gravity
- Providing an outlet by pumping station

Pleasant Beach Road Pumping Station Preliminary Estimate of Cost: 1995 \$155,000 (CPI adjusted 2021: \$ 247,355.) Excluding:

- Property acquisition
- Legal
- Geotechnical
- Environmental requirements

There were three Tribunal hearings as follows:

Three Tribunal Hearings; June 18, 23 and August 28, 1987

“It is further ordered that the City of Port Colborne have a Preliminary Report prepared to investigate the advisability of an outlet incorporating a pump at either Pleasant Beach Road or the Holloway Bay Road.

It is finally ordered that the Drainage Engineer be empowered to extend the pump discharge pipe of the Abino Drain offshore into the Bay at his discretion.

No costs awarded.”

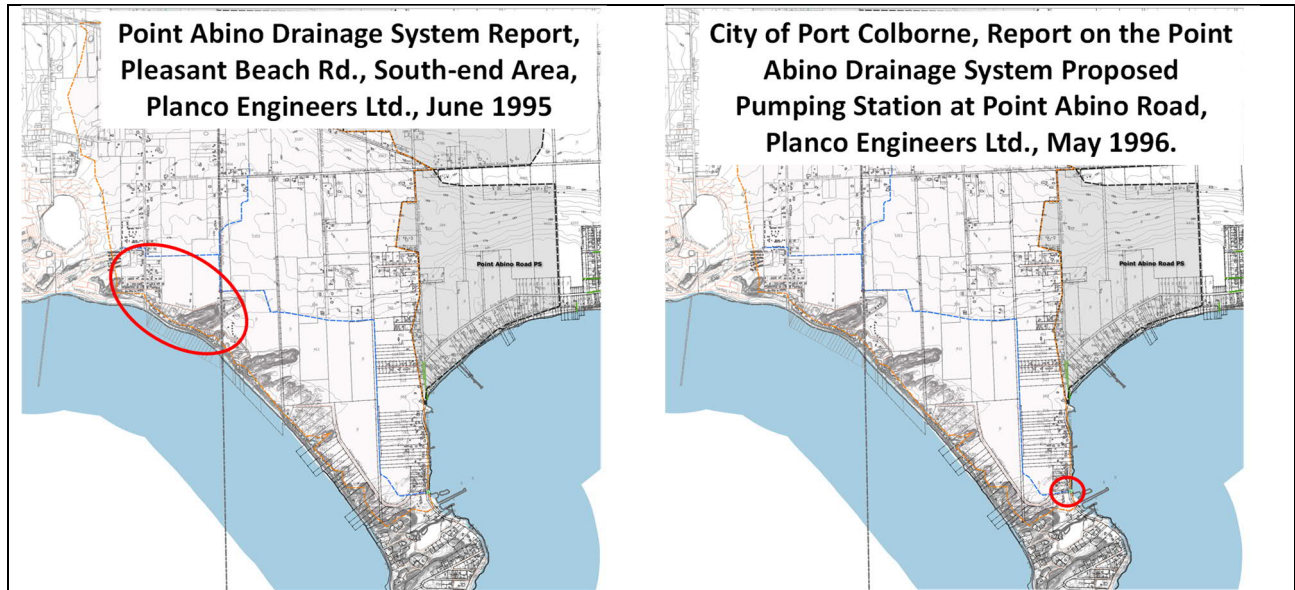


Figure 15 Proposed Pumping Options 1995/1996

The report generated in 1996 resulted in a Tribunal with the following result recorded.

HEARING: July 22, 1998

DATE OF DECISION: July 28, 1998

FILE NUMBER: 1998-28

An application to the Ontario Drainage Tribunal by the City of Port Colborne requesting the Tribunal issue an Order **rescinding** the September 15, 1987 order of the Tribunal directing the City of Port Colborne to install a low lift pumping station in the Town of Fort Erie on the Point Abino Drain.

As stated by CJ Clarke in 1983, the drain may have originally served agriculture land but is now largely a rural residential area with limited agriculture being conducted within the Watershed. Marcy's wood remains one of the more consistent features identified on maps over the past 50 years.

This is the last recorded effort for works to be performed on the Drain other than maintenance works carried out by the respective Drainage Superintendents. This recently includes the repair and restoration of the two existing flap gates mounted on the discharge of the outlet culverts. It also includes trapping and removal of nuisance beavers causing a backup of waters within the lower reach of the drain.

Port Colborne completed a full maintenance of its section in 2005 or 2006. The City of Port Colborne completed a half maintenance of debris removal from upper portion of the drain in 2016. Town of Fort Erie performed maintenance on the outlet in 2020 and removed a beaver dam from the lower reach.

The existing Drain structure is for a main drain with branches. Branches can be one of four possible types of branches:

- Municipal Branch Drain connection; forms part of the regulated drain with schedule assessments reflecting area, connection adjacency, etc.
- ROW ditches that connect to the Drain but are not part of the regulated drain.
- Private drain connections that depend on the Municipal Drain but are not part of the Drain. Ideally, each of these will have an established and recognized connection elevation to suit the upstream grade.
- Municipal Drain Features that form part of the drain but are technically ancillary to the drain itself. Examples include:
 - Flood Gate Control structures, including flap gates,
 - Pumping stations,
 - Water Quality control features such as;
 - Stormwater Management Control Ponds,
 - Sediment Basins,
 - Drain related wetlands, and
 - Other runoff quality control measures.
 - Culverts and Bridges.

Generally, the drainage system has a well defined course throughout its length, consisting of natural open water courses, artificially made open ditches, roadside ditches, and roadway and private crossings. Typically, the channel cross-sections are well defined, trapezoidal in shape, with typically steep to almost vertical side slopes in variable depths and lengths.

3.1 Drainage Needs

Maintenance Activities Performed Under an Existing Engineer's Report may include:

- Brushing of banks
- Bottom cleanout of sediment
- Culvert repairs
- Erosion control
- Catch basin repairs
- Tile flushing

Construction Activities Requiring an Engineer's Report may include:

- Construction of new tile drains
- Construction of new culverts
- Realignment of open ditches
- Wetland restoration projects
- Excavation and brushing of open ditches

The opportunity to add water quality control features as part of the drain should be investigated and assessed wherever the opportunity is identified. Where such features may require future maintenance, such as sedimentation basins, the Engineer's report is to be explicit on frequency and trigger points for maintenance activities.

3.2 Catchment Soils

There are really three primary soils zones within the watershed;

- Shoreline areas, including sand and residential properties (not mapped – NM)
- Upland clay type soils with poor to moderate drainage, and
- Organic soils typical of wetlands in the lower reach of the drain.

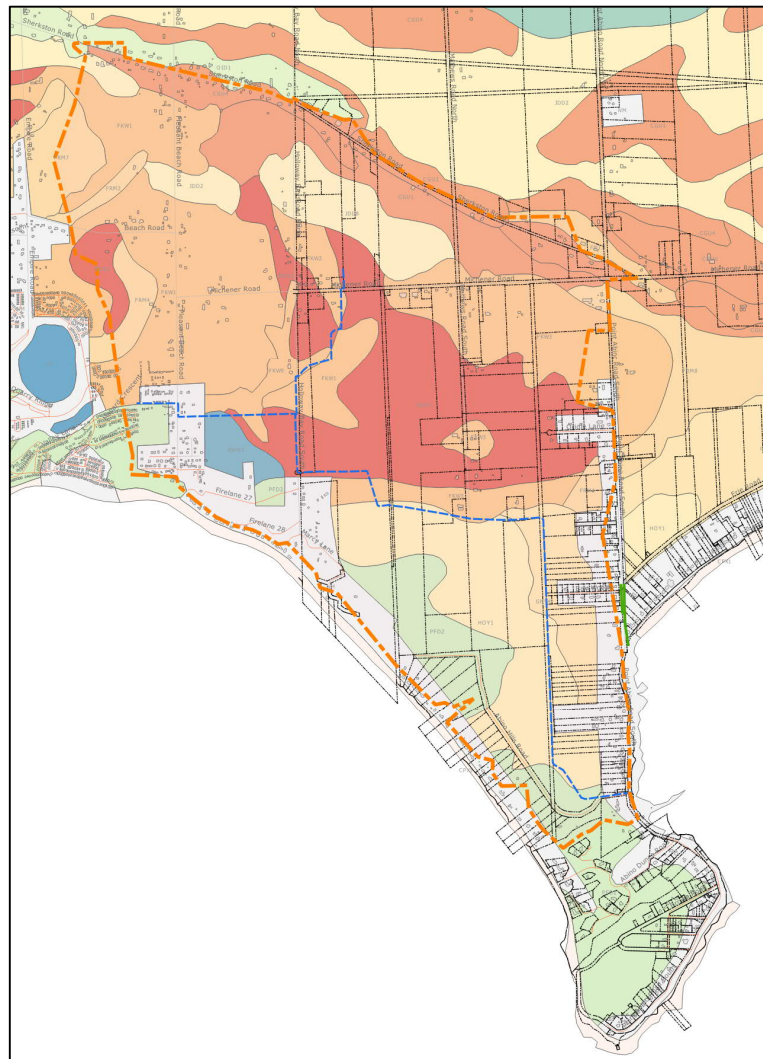







Figure 16 Point Abino Watershed Soils

The uplands zone features soils with lobes of Chingcousy, Farmington and Franktown (light shades) around a central Brooke soil. The grey is a series labeled 'not mapped' and is generally representative of the residential areas along the Lake Erie shoreline, which was deemed unsuitable for farming and thus not mapped.

Table 1 Point Abino Soils Table

Point Abino Drain Baseline Report

 BOK	Brooke Soil, 50 to 100cm variable textures over mainly limestone and dolostone bedrock.
 CHINGUACOUSY	Mainly clay loam till. Imperfectly drained.
 FARMINGTON Loam	10 to 20cm variable textures over mainly limestone and dolostone bedrock. Drainage is rapid. Brunisolic Gray Brown Luvisol
	20 to 50 cm variable textures over mainly limestone and dolostone bedrock. Imperfectly drain. Gleyed Melanci Brunisol
	Holly Soil (HOY) Organic soil, swamp associated, 40 to 160cm deep over loamy mineral soil materials. Very poor Drainage Terric Mesisol
	Plainfield Soil (PFD) Mostly eolian fine sand at least 1m thick Rapid Drainage Brunisolic Gray Brown Luvisol
 WELLAND Clay	Mainly reddish-hued lacustrine heavy clay. Drainage is poor.
	Shore edge area not analyzed for agriculture.
 NM	Not Mapped, covers all of the urban area, sand dune along Firelane, the Chicken processing lands and the former golf course.

From The Soils of Regional Municipality of Niagara, volume 2, dated 1989, from which the GIS data is shown.

3.3 Catchment Boundary

The last report dealing with catchment areas was prepared by CJ Clarke in 1983. The NPCA published 1m contour lines based on Orthophotography production of a 20m Digital Elevation Model (DEM) basis. This data was published in 2012 and used for flood mapping studies in some of the Lake Erie shoreline catchments. From this new data, we conducted a review of the 1983 catchment and have prepared a new boundary.

The boundary from the 1983 report, the old boundary, is shown as a green shaded area with a black dotted line for the boundary. The proposed updated boundary is shown as an orange dashed line. The catchment boundary is updated using the NPCA contour lines to identify local high points and follow the perpendicular flow paths to create a breakline from which surface water will flow in towards the drain or outwards and away from the drain. This can be complicated by flows paths that are not a direct line to the drain but flow in a particular direction and then flow towards the drain. Some flow paths are blocked by roads, rail lines or other linear

infrastructure that then forms the boundary unless a culvert or other flow path is also constructed. There are existing drain reports that are more recent than 1983 and those boundaries where they exist are used to butt up against and establish an updated boundary.

The boundary along the Lake Erie shoreline has been refined based on the contour lines but the change is not significant and follows mainly the original path.

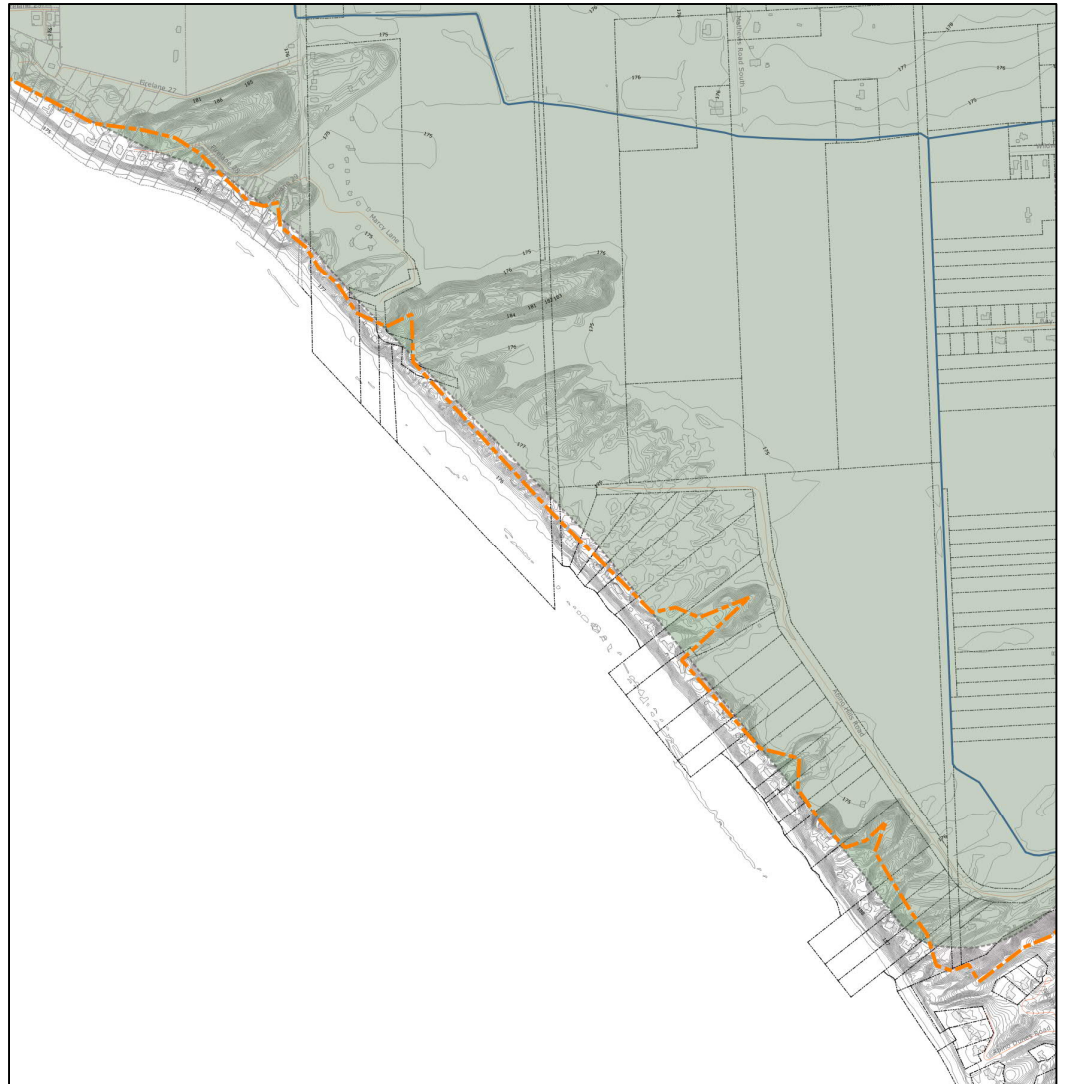


Figure 17 Lake Erie Boundary

A change to relocate the boundary further west based on the NPCA contours was made.

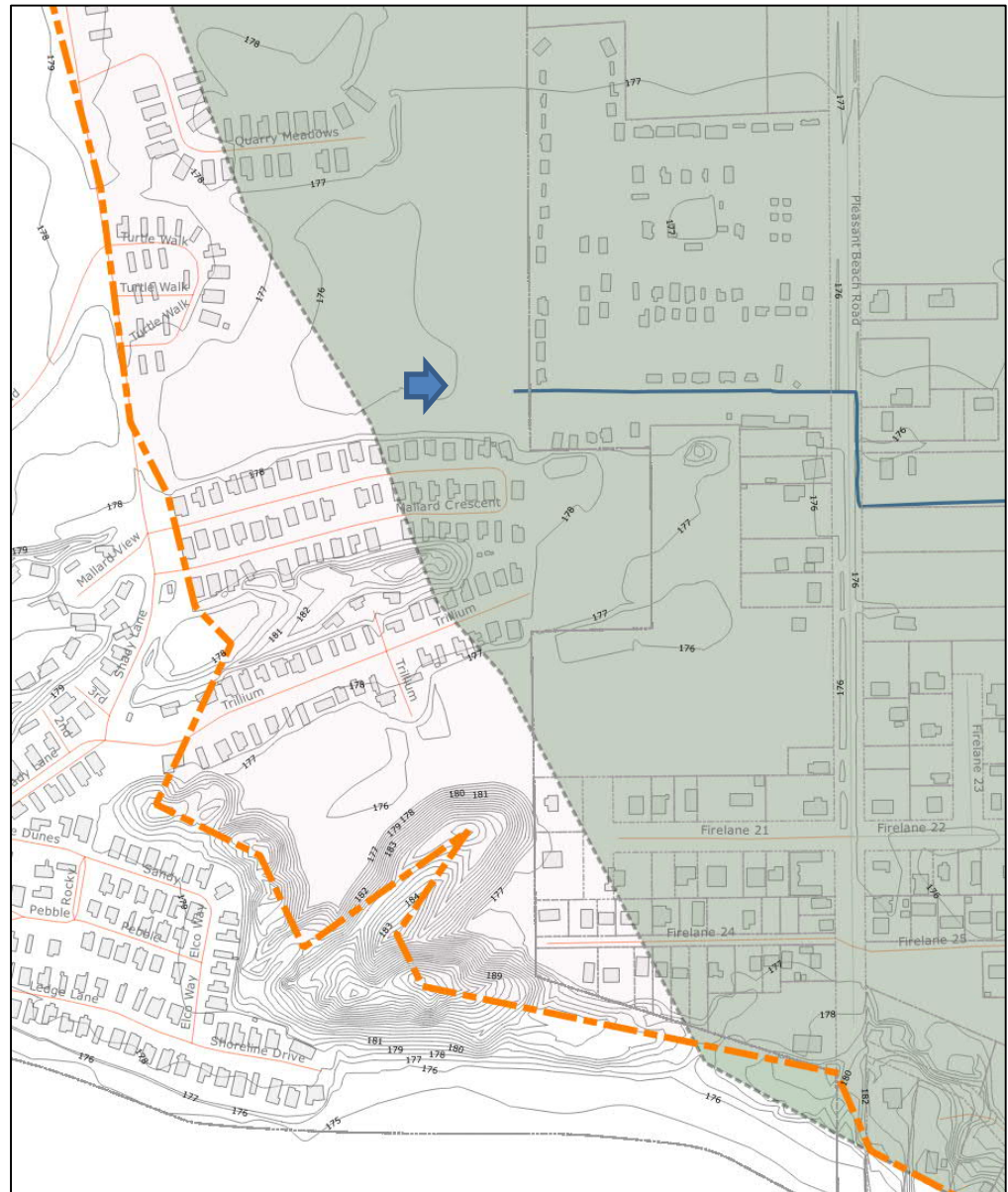


Figure 18 Sherkston Shores western catchment boundary

This boundary was adjusted west to the centreline of Shady Lane which as a roadway within Sherkston Sores is a constructed boundary based on the contour lines; 179, 178, 177 and 176. The end of the drain approaches the 176m boundary. The lowest surveyed bottom point for the drain end was 175.81m.

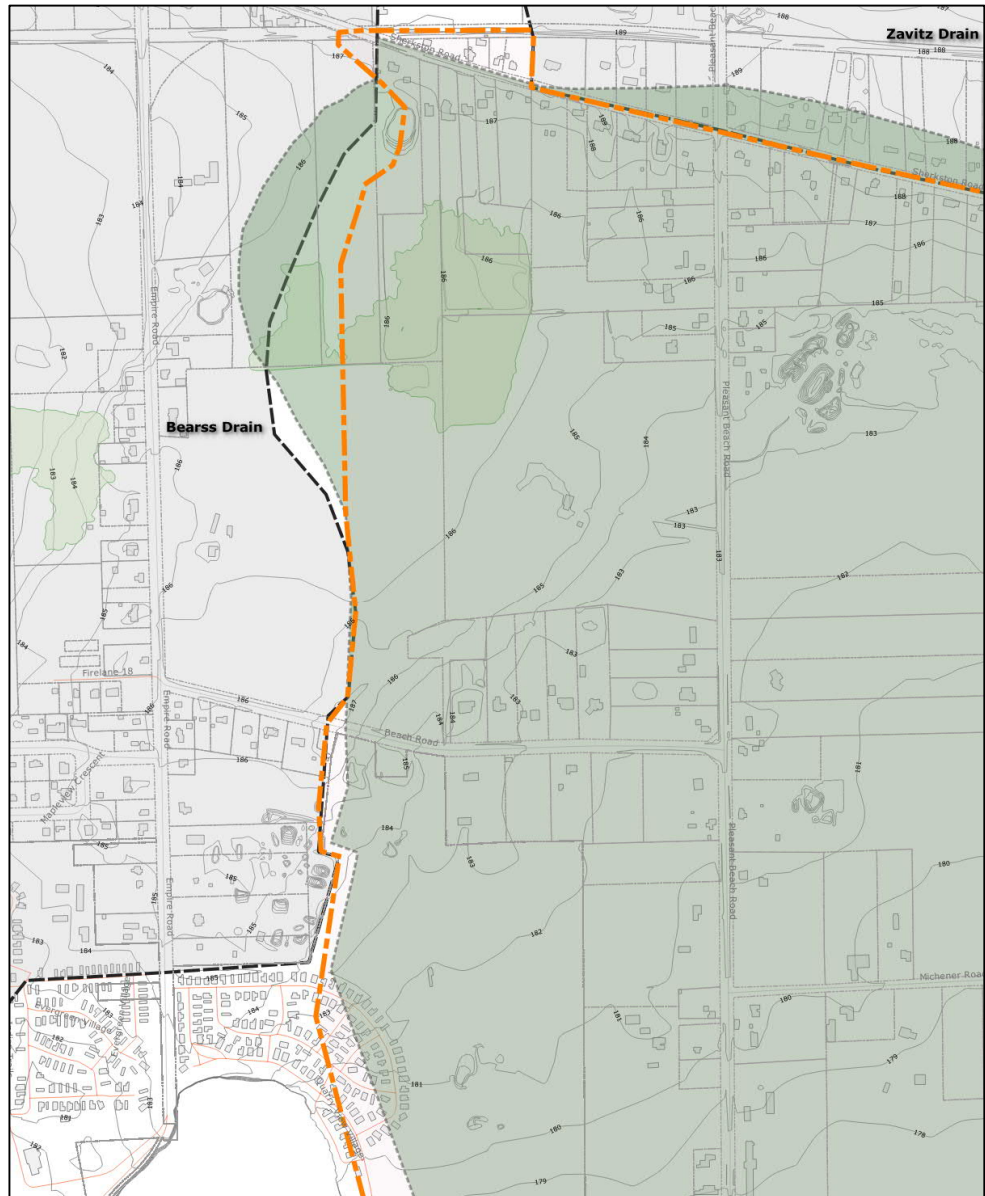


Figure 19 Point Abino Drain Catchment western boundary - adjusted

South of Sherston Rd the contour line for 186m is used to align the breakline. The flow direction appears to be north and west based on the 186 to 185 lines west of the drawn boundary line. This reduces the former catchment to the east.

The boundary along Sherston Rd is updated based on existing drainage boundaries for the Zavitz, Baer and Schooley Drains, which in their updated forms is different from the CJ Clarke 1983 report.

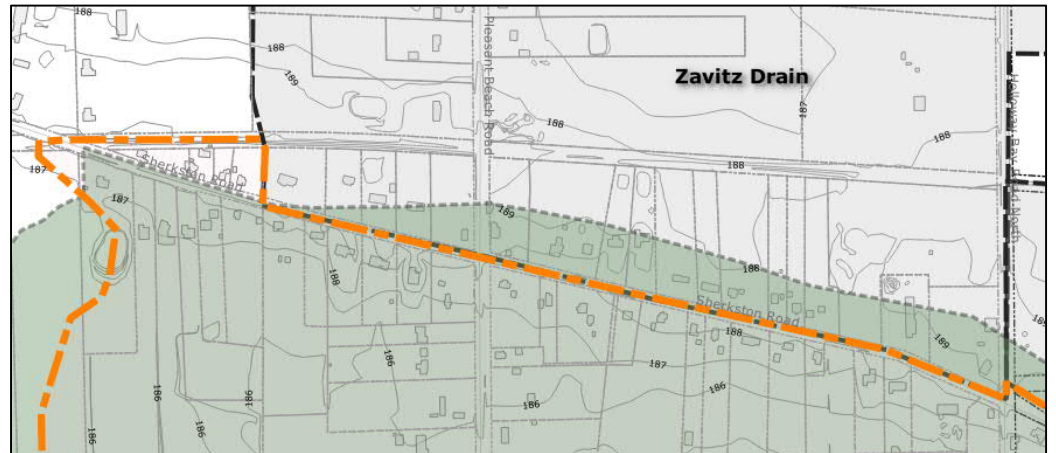


Figure 20 Catchment co-boundary with Zavitz Drain

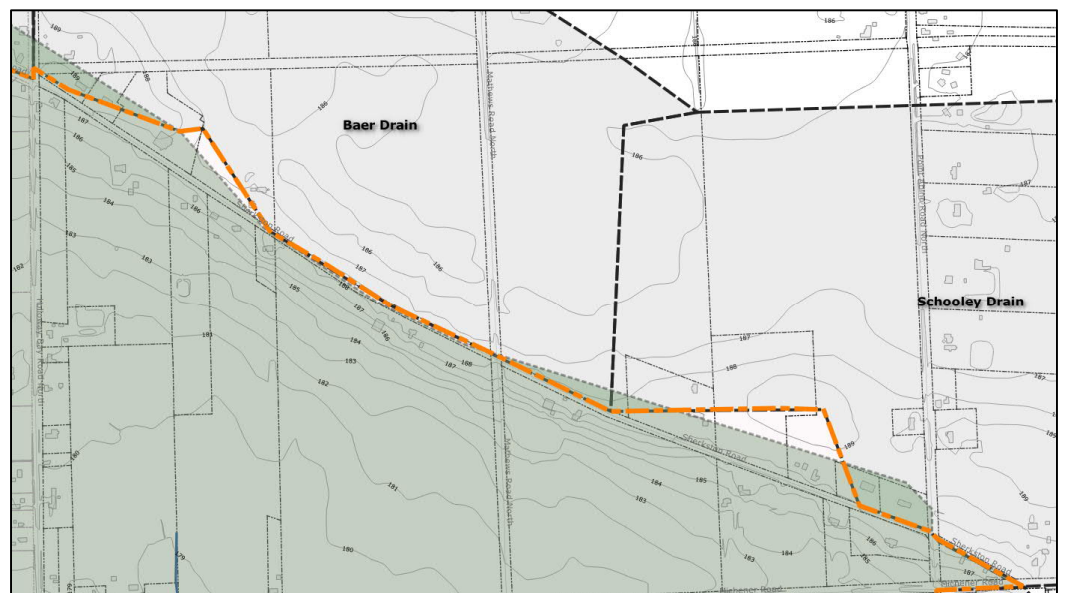


Figure 21 Catchment co-boundary with Baer and Schooley Drains

Currently the Town of Fort Erie is conducting a study of the Point Abino Rd Pumping Station. The first stage of this study is to define the catchment boundaries for which the pumping station is a receiver. Based on information provided by the Point Abino PS study, we have made the Point Abino Drain boundary coincident.

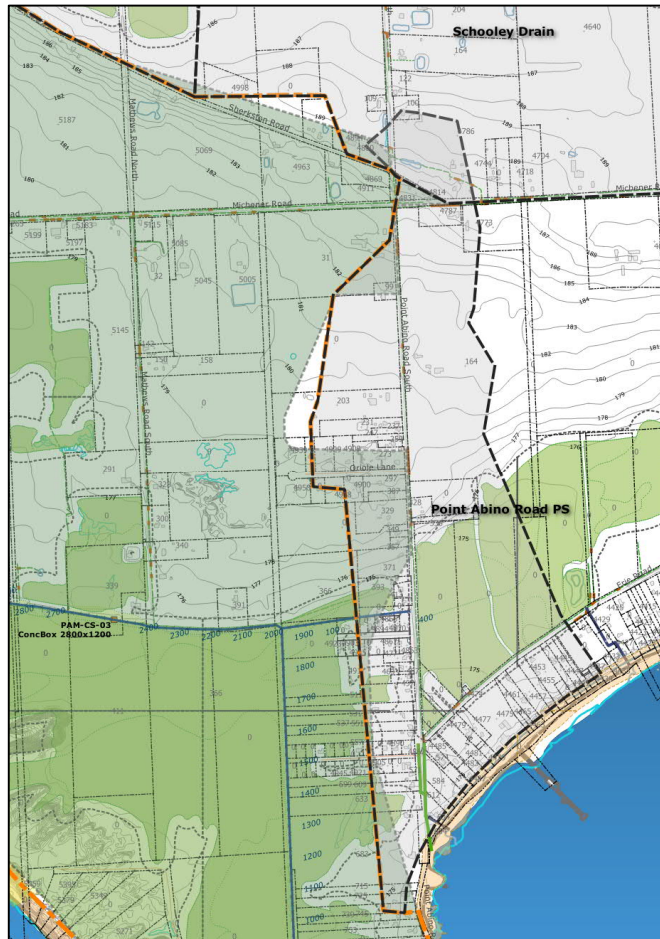


Figure 22 Point Abino Rd PS and eastern catchment boundary

The boundary as shown will be used for all future progress analysis and assessments; however, final updates will be based on the design data and information provided by the Town of Fort Erie.

3.4 Channel Appraisal

The following describes both the existing open channel condition through the drain but also the structures that are a key feature of the drain.

3.4.1 Drain Grades

The Point Abino Drain Grade is distinct for the extremely low grade at the outlet, 0.04%.

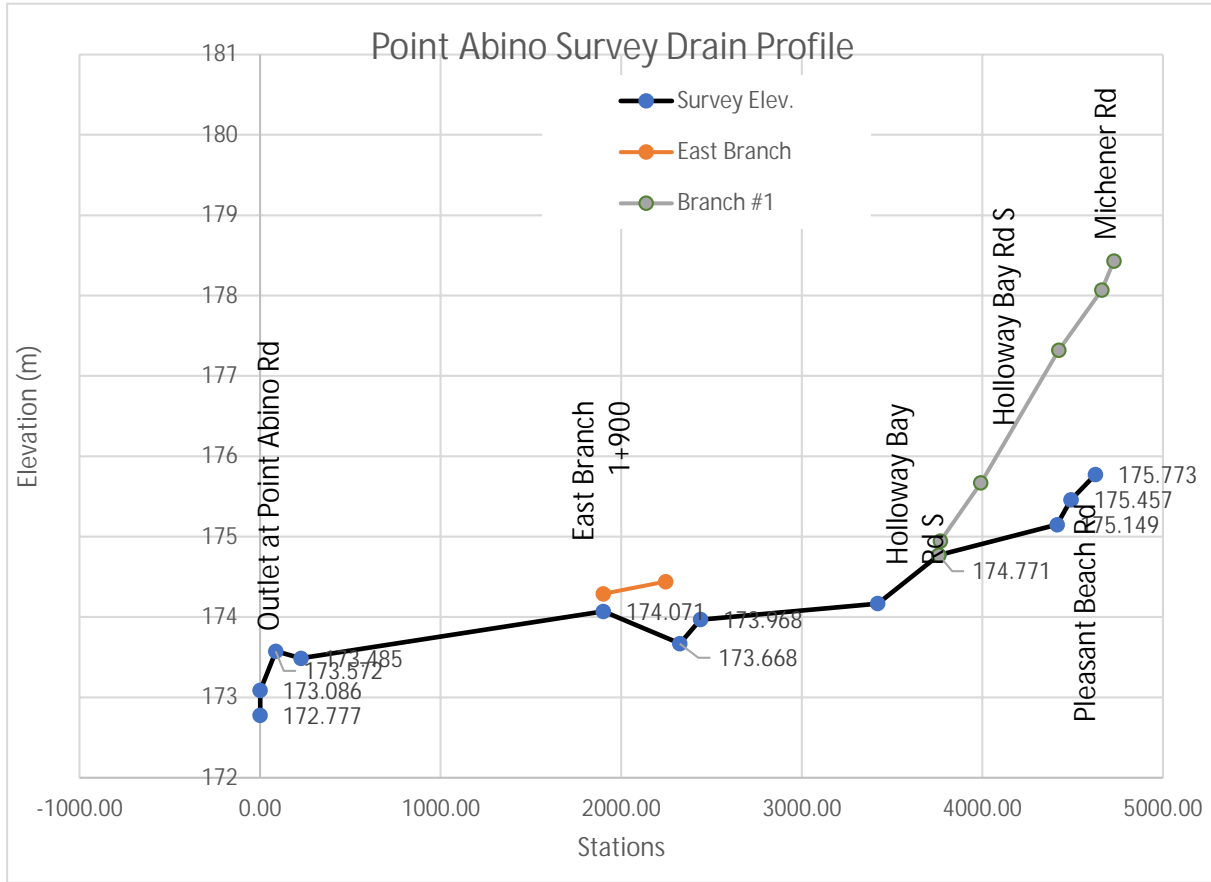


Figure 23 Point Abino Drain Profile

The points located at station 2+300 are located adjacent to the existing Mathews Rd South culvert, (see Figure 33 Mathews Rd S Drain Crossing PAM-CS-03). The survey was not conducted through the low areas of the drain. A supplemental survey completed by the Town of Fort Erie in fall of 2021 provided survey points for the East Branch and confluence. Additional survey of the outlet completed in 2016

3.4.2 Channel Condition

From the history review conducted above, a review of the historical drainage design was prepared from the available technical information. The following chart shows the survey data collected and compared against the original design values.

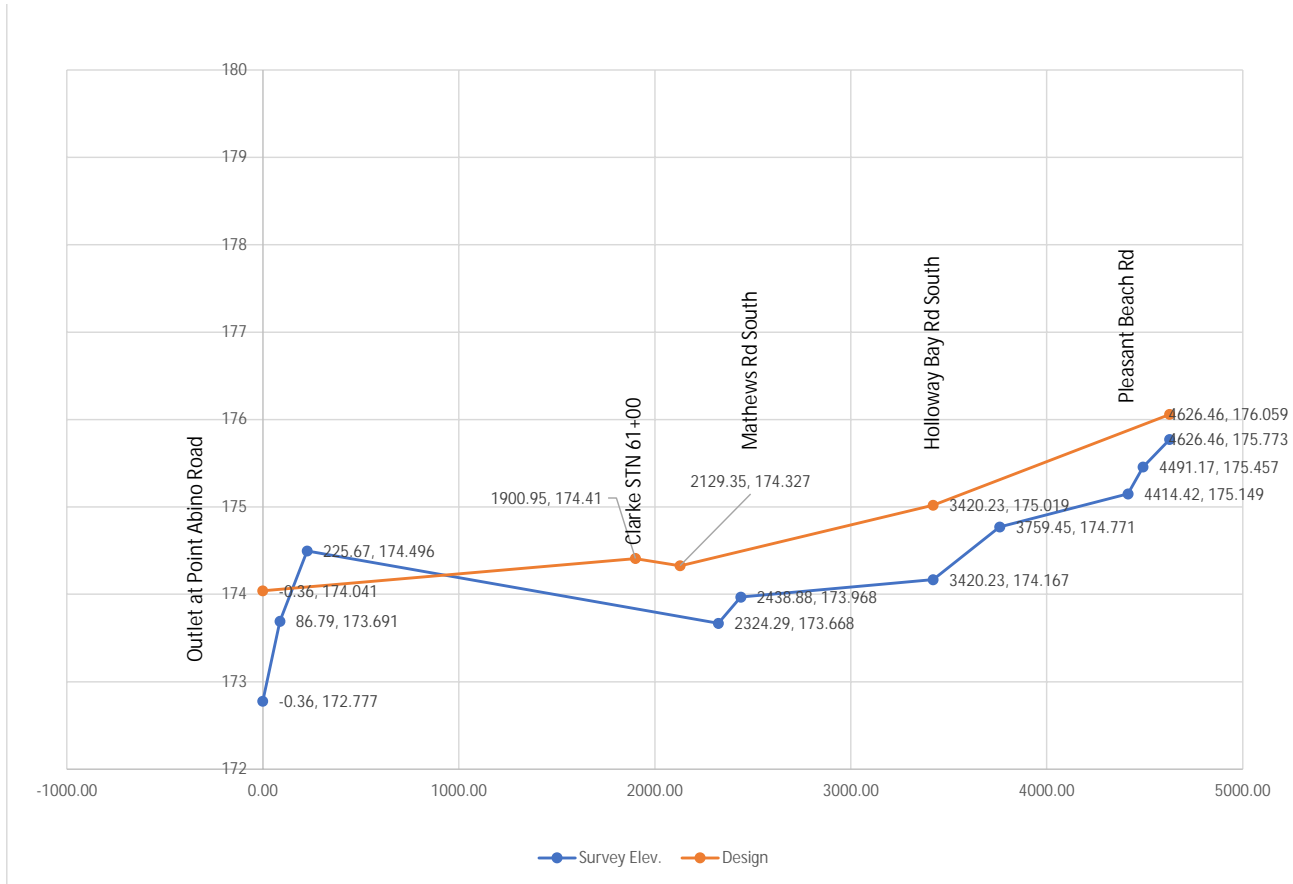


Figure 24 Point Abino Drain Survey vs. Design

Capacity of the channel is influenced by the selection of the Manning’s ‘n’ used in the formula. There’s significant information available for selecting ‘n’ but the following shows the range of values for a ‘natural’ stream.

- Natural streams - clean and straight 0.030
- Natural streams - major rivers 0.035
- Natural streams - sluggish with deep pools 0.040
- Natural channels, very poor condition 0.060

From the MTO Drainage Manual the suggested value for n of an earth channel with grass and some weeds is 0.030 to 0.035. This compared to the following for a “not maintained” channel:

- Clean bottom, brush on sides 0.05 - 0.08
- Some weeds, heavy brush on banks 0.05 – 0.07
- For tree within channel with branches submerged add 0.01 to 0.02.

To illustrate the impact that the Manning’s n has on design capacity. The cross-section from the survey is as shown in the following figure.

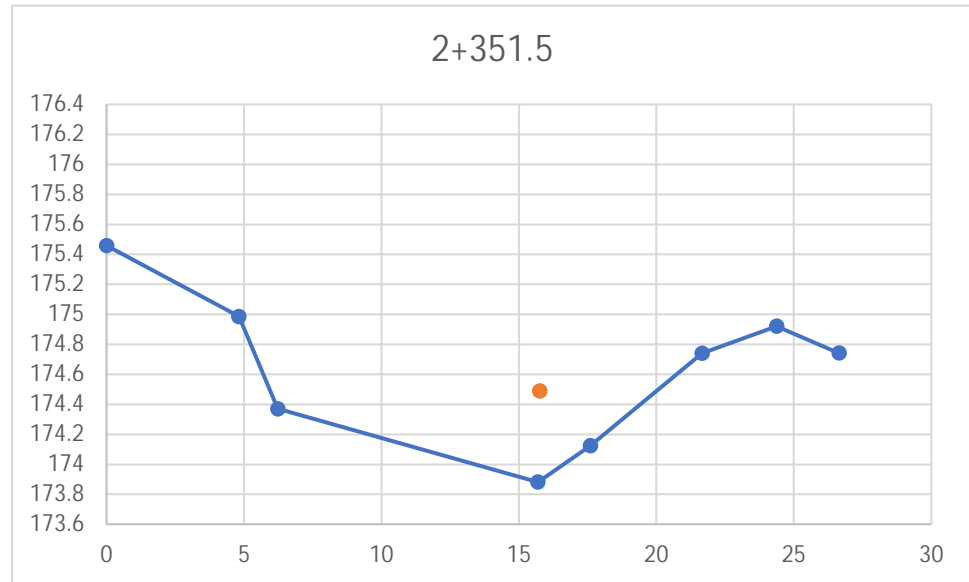


Figure 25 Cross-Section STA 2+351.5

If we assume the channel is clean and clear, then we can calculate the capacity of the channel using Manning's n of 0.035. For a channel that has trees growing within the banks, specifically Ash Trees, then we can assess the channel capacity using a Manning's n of 0.048.

Clean n = 0.035	Capacity = 3.157 cms
Overgrown n = 0.065	Capacity = 1.700 cms

For the purposes of assessing the available channel capacity based on the survey data collected, we selected the following sections as typical for the drain and combined the data in spreadsheet (included in Appendix C) to calculate the capacity of each section using an 'n' value of 0.040.

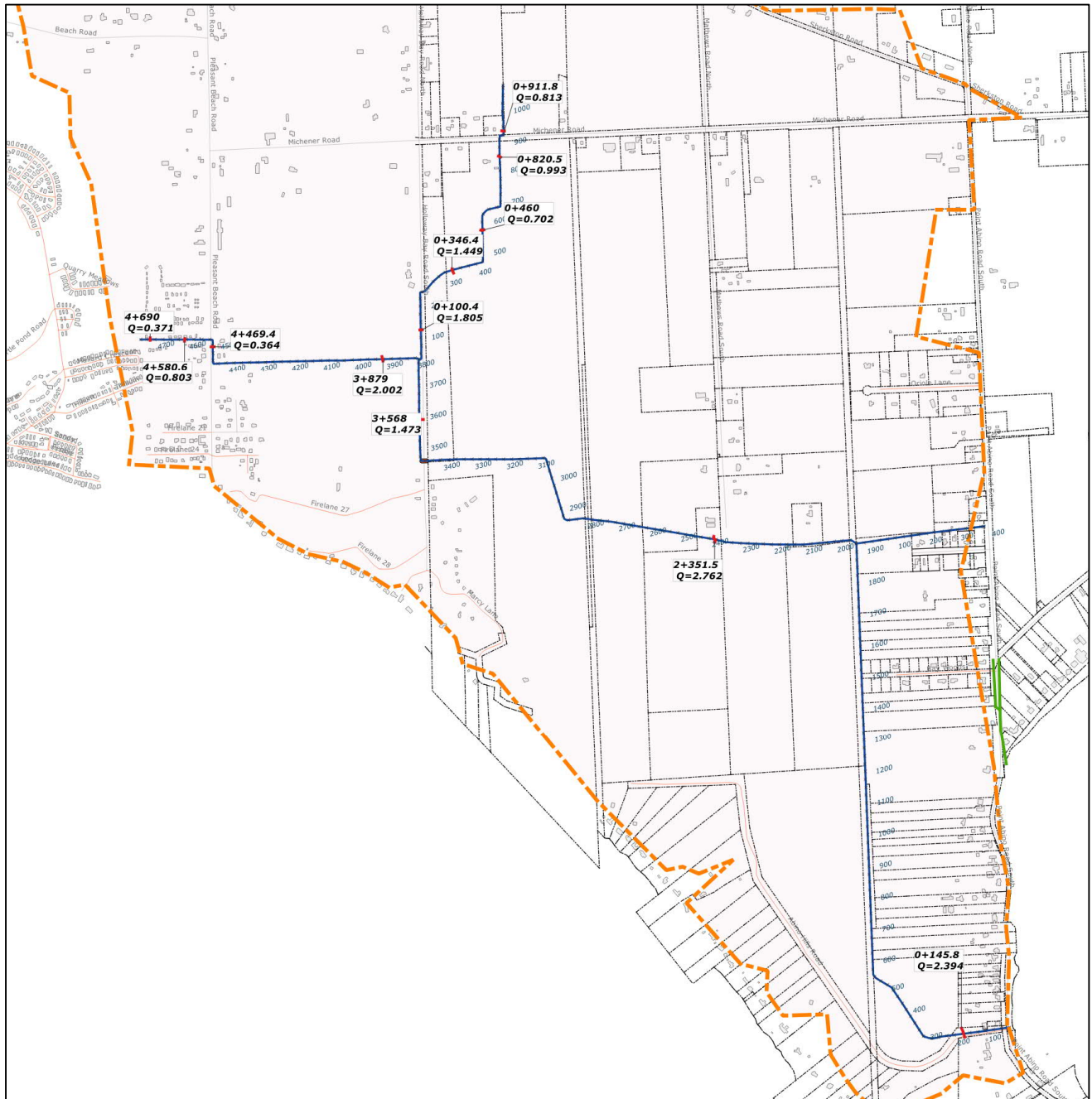


Figure 26 Existing Drain Channel Capacity Calculations

There are significant gaps in the survey between station 0+200 and 2+100 and 2+400 to 3+400, which were excluded from the survey scope. This information is dependent on the scope of the final design assignment.

3.4.3 Point Abino Outlet Structure

The primary outlet elements include the following infrastructure features:

- Steel Flap Gates with Passive operation
- Twin CIP chambers ~1500x1300 86m with an invert at 173.691.

- Open trapezoidal channel with triple CSP culverts for an access lane crossing.

The Point Abino Drain outlet is composed a twin culvert rectangular concrete box with a mounted steel flap gate on the face of the outlet.



Figure 27 Point Abino Drain Outlet

Lake Erie Levels

In geologic time, Lake Erie levels have varied depending on glaciation and on the various flow sills that have existed into and out of the Great Lakes basin. These sills have changed in elevation as landforms rebounded from the effects of glaciation. In the modern period, Lake Erie levels are dominated by flows out of Lake Huron and out of Lake Erie into the Niagara River and Welland Canal system.

The following historic Lake levels are provided by the Government of Canada Fisheries & Oceans Hydrographic Service based on 100+ years of monitoring data and statistics. The values are quoted in monthly mean water levels reference to IGLD 1985.

Yearly Average

Minimum Monthly

Maximum Monthly

174.15

173.18

175.04

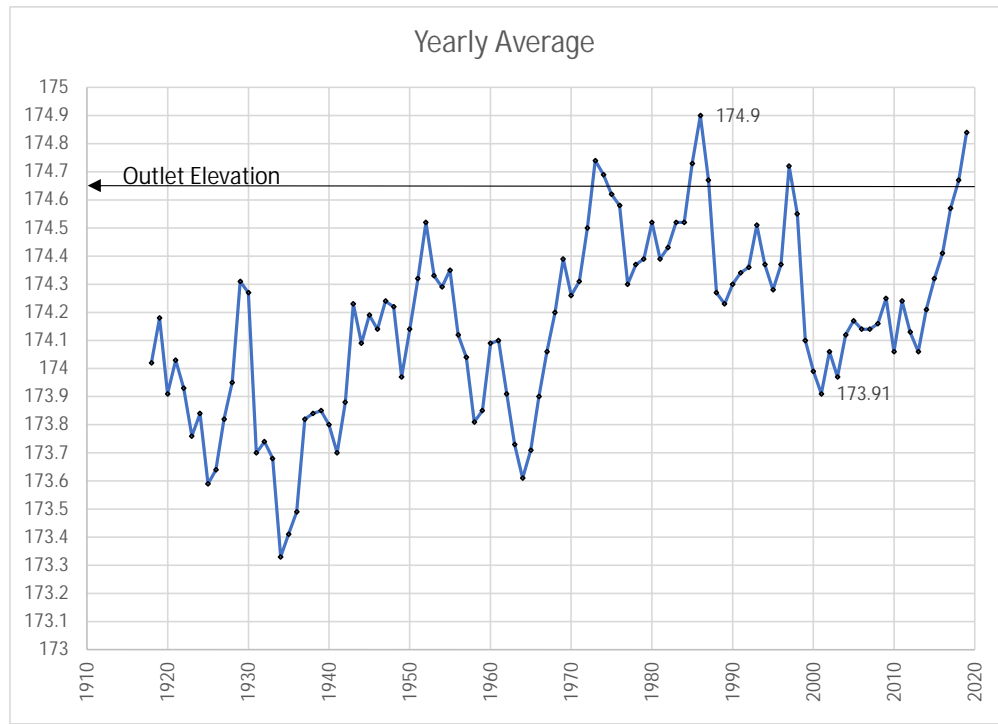


Figure 28 Lake Erie monthly mean water levels, m to IGLD 1985

The chart shows that for the past two years, water levels are above average conditions. Adding wave set up to this further influences the Point Abino Marsh Drain outlet.

The Point Abino Drain Control Structure is designed to reduce seiche event water levels from driving back into the drain. However this level is protected to a height defined by the elevation of the Point Abino Roadway. Once the seiche or surge is above the road then back flooding of the Lake into the land will occur.

The chart datum used for the hydrographic level is different than the drain survey elevations as a result of alternate earth referencing systems and this distinct varies from location to location; however, if we neglect this distinction and convert the chart datum for a peak elevation that would impact the control gate we have the following result.

Chart datum 173.5m + peak observed flow above datum 3.0m = 176.5m.

This is 0.7m higher than the top of the opening for the gate structure shown in the following diagram.

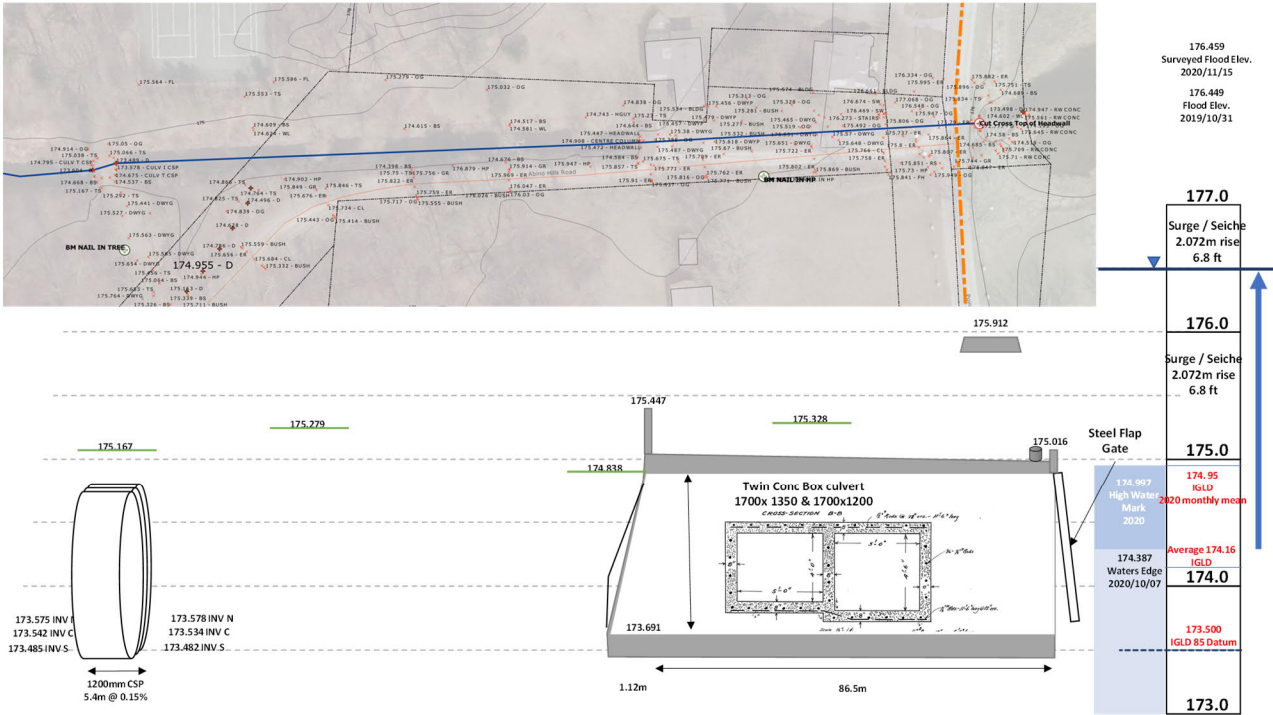


Figure 29 Point Abino Drain Outlet Structure with flap gate

This underwater assessment identified several defects in the existing concrete structure. Defects such as holes in the concrete walls with soil voids detected.



Figure 30 Underwater inspection defect North wall

To further demonstrate the key function of the control gate, the follow figure shows the contour lines of areas impacted by a storm surge of 176.5m by highlighting the NPCA contour lines 176.0 and 177.0.

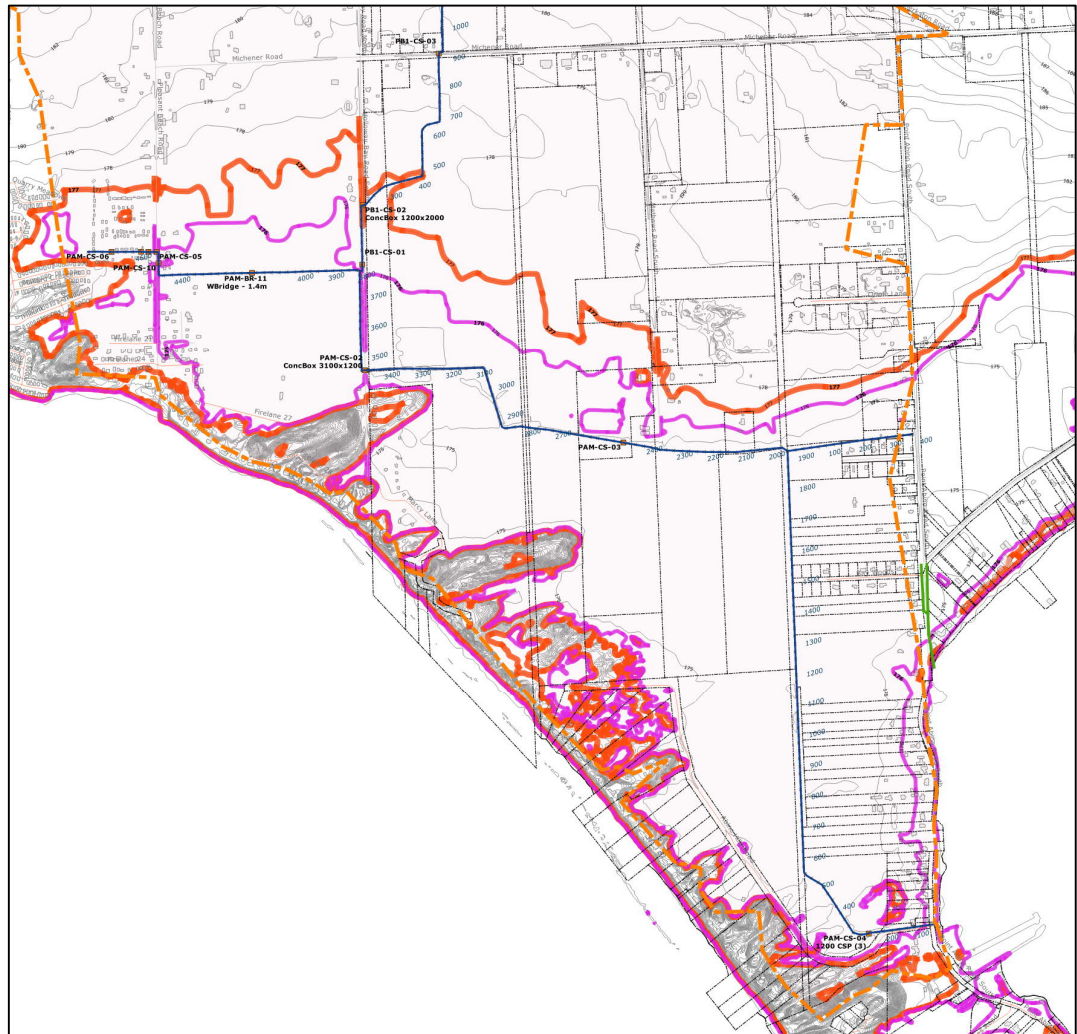


Figure 31 Storm Surge Potential Impact to 176.5m

The storm surge based on past observations of storms in 2019 and 2020 being 176.5m and without the existing flap gate or other back flow protection system, the extent of inundation would be between the pink and orange lines in Figure 31 Storm Surge Potential Impact to 176.5m. This represents a very significant impact on the drain and helps to explain the view presented in Figure 33 Mathews Rd S Drain Crossing PAM-CS-03.

From this the existing function of the gate control structure is a required element of the drain.

There are two defects identified with the current Point Abino outlet.

1. The barrier to the lake is only protected to the height of the road, which is 175.912m, nearly a metre less than the NPCA recommended 100 yr. flood level and 0.6m less than the recent storm surge in 2019/2020.
2. The existing concrete structure is recommended for replacement within 5 years at an estimated cost of \$2M. Prorating this cost on a per metre basis reveals that \$600,000 would be the portion assessed to the Town of Fort Erie

for the crossing of Point Abino Rd. and the remainder \$1.4M would be the cost of replacing the existing 63m closed section.
The primary beneficiary of this closed portion are the properties adjacent to the drain. This closed portion does not benefit upstream landowners and the assessment would not be allocated to the entire watershed, while the cost of the replacement / remounting of the existing gates is a benefit to the entire watershed.

3.4.4 Point Abino Drain Structures

An inventory of existing drain crossings is presented. An assessment of crossing capacities will be included in the Watershed Report.

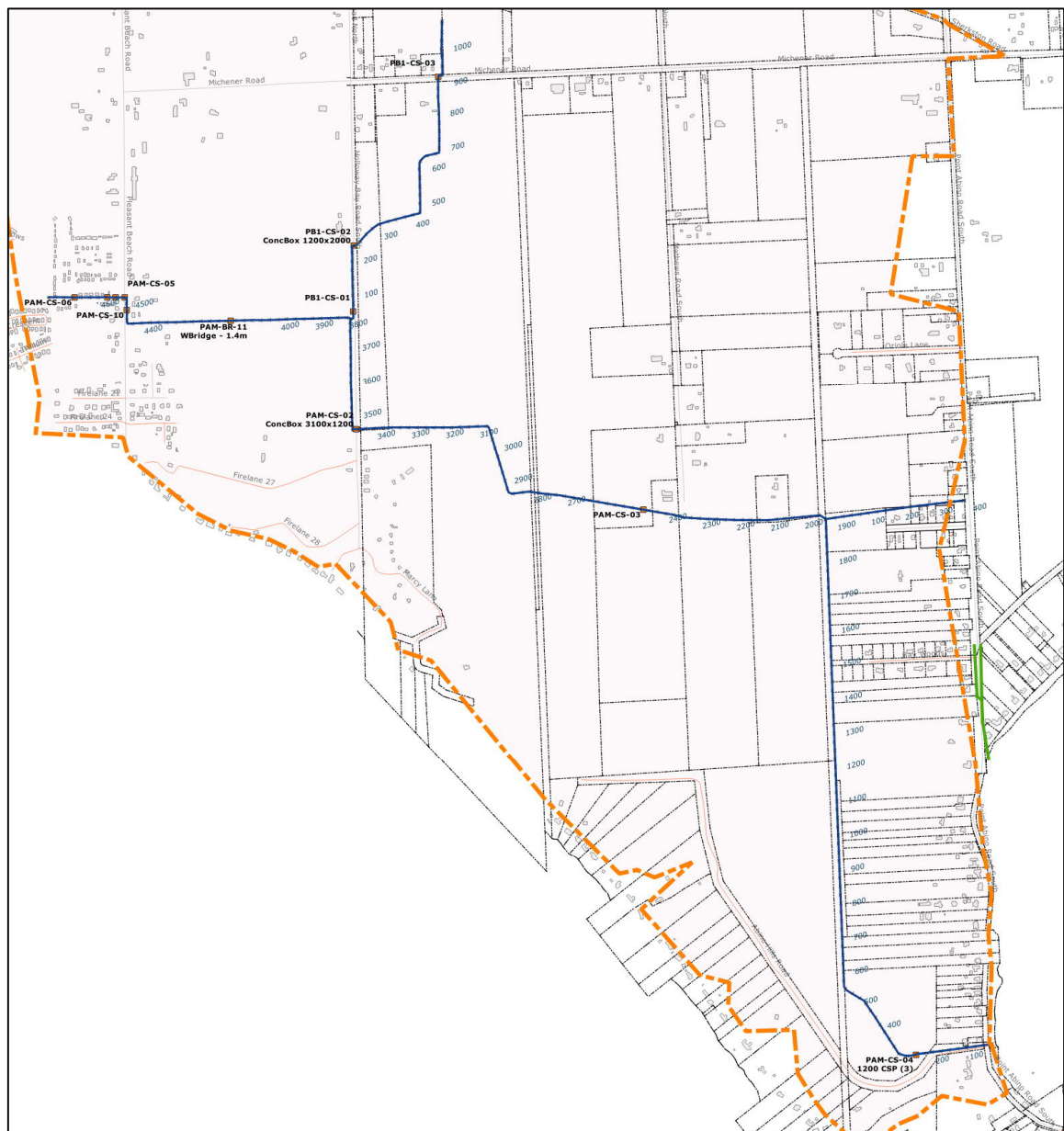


Figure 32 Point Abino Drain Bridge and Culvert Drain Structures

The existing culvert located on the drain for crossing the Mathews Rd. S ROW is shown but the function would appear to be compromised based on the photo collected in the fall of 2020.



Figure 33 Mathews Rd S Drain Crossing PAM-CS-03

Culverts are organized into two classes; those that are part of the drain and those that complementary to the drain but assigned to the Road Right of Way (ROW) for their functional purpose and assessment. ROW culverts are not assessed.

Table 2 Point Abino Drain Culverts

id	Name ID	Crossing	Crossing Height	Drain	Culv_desc	Station	Length
5	PAM-CS-04	Private	175.115	PAM	1200 CSP (3)	0+225	5.6
3	PAM-CS-03	Private		PAM	ConcBox 2800x1200	2+435	2.7
2	PAM-CS-02	Holloway Bay Road		PAM	ConcBox 3100x1200	3+340	15.5
15	PAM-BR-11	Private		PAM	WBridge - 1.4m	4+135	1.4
16	PAM-CS-10	Private		PAM	CSP825	4+480	6
6	PAM-CS-05	Pleasant Beach Road	176.5	PAM	CSP 1200	4+500	14
9	PAM-CS-08	Private		PAM	ConcBox 900x1200	4+525	7
8	PAM-CS-07	Private		PAM	ConcBox 900x Missing width from survey	4+550	2
7	PAM-CS-06	Private		PAM	Conc 600	4+640	6
1	PB1-CS-01	Private		Branch #1	CSP 900	20+010	5.8
10	PB1-CS-02	Holloway Bay Road		Branch #1	ConcBox 1200x2000	20+225	10.7
11	PB1-CS-04	Private	178.4	Branch #1	PE 525	20+775	5.2
12	PB1-CS-03	Michener Road		Branch #1	ConcBox 1000x600	20+890	7

3.5 Overall Drain Performance

The following sections describe the existing Point Abino Drain and compliance with accepted design standards and practices.

- Compliance with design objectives; the drain is providing a service to all ratepayers within the watershed on a multi-objective basis that includes both quantity and quality objectives.
- Report on design storm criteria
 - Quantity criteria are considered to be acceptable risk factors:
 - 1 in 2 year flood for channels through agricultural lands.
 - 1 in 5 year flood for channels through residential fringe lands.
 - 1 in 5 year flood of private crossings, (with an option to consider 1 in 2 year flow capacities).
 - 1 in 10 year flood for municipal road crossings.
 - 1 in 25 year flood of Regional Road crossings.
 - Quality Objectives include:
 - Suspended Solids and Sediment (often referred to as Total Suspended Solids or TSS) TSS is often related to types of agricultural practices and the presence or absence of drain buffers that reduce direct runoff contributions of TSS. Mitigations through effective design and practices are recommended for implementation in the Design Report.
 - Phosphorous and Nitrogen are nutrients and part of the natural cycle. They are applied to farm land as commercial fertilizers that may runoff and cause excess growth of aquatic plants that affect watershed and receiving water as an ecosystem. Reductions at source is the best practice but practices including the use of wetlands aid in treating excess contributions of these nutrients to the watershed and receiving waters.

3.5.1 Quantity Issues

Improving or enhancing flow capacities within the drain is a challenge. From the 1983 report, it was identified that the drain can't be deepened in order to increase capacity. The last segment of the drain, is a very low grade to outlet with frequent periods of standing water.

The primary methodology for addressing increasing runoff is to apply source reduction techniques to limit the imperviousness of upstream areas or to introduce detention capabilities close to the lands that create runoff. This can include features such as:

- Permeable paving, infiltration enhancements for hard surfaces.
- Private side rain gardens.
- Offline spill storage areas; ponds, wetlands, volume detention facilities.

Addressing peak flows within the drain system itself can include:

- Capacity limitations on culverts to store runoff.
- Offline spill zones such as wetlands, ponds, etc.
- Inline capacities; enhance flood zone areas.

Introduction of mechanical pumping is an option to address peak flow issues and/or reduction of standing water. Traditional sizing of a pump using the 6.5 to 13mm per watershed method indicates a pumping station with a forecasted peak capacity of 600 lps to 1200 lps.

3.5.2 Quality Issues

From the NPCA quality report, an overall grade was recorded as D from influences of high phosphorus with occasional exceedances of TSS and copper identified. As the upstream area has a relatively small agricultural lands relative to the history of the drain, pollutant sources are likely to include contributions from rural residential properties, roadways in addition to those lands still under agricultural cultivation with row crops.

Watershed initiatives to address water quality may include the following options:

- Sediment basins to collect and remove sediment contributed by runoff from upstream areas.
- Vegetation buffer strips between cultivated areas and the drain.
- Wetland complexes within the drain that can be maintained or enhanced.
- Introduction of stream flow pacing techniques, riffles and pools that function during low flows but do not impact bank full flow conditions.

3.6 Environmental Appraisal

The improvement of the drain should be performed while minimizing or mitigating any negative environmental effects. The existing drain has been functioning in much the same way as it is now for more than 100 years and is proposed to continue to function.

The Port Colborne/Fort Erie area has environmental issues historically that are well documented. The relevant issues for the Point Abino Drain are:

- Water Quality in the receiving water of Lake Erie. Algae blooms have occurred.
- The drain relationship with the Marcy's Wood nature lands.

- The historic and still present sand dune border for the drain catchment located on the south and west boundary.

3.6.1 Conservation Authority

Niagara Peninsula Conservation Authority provides control through regulated authority on a variety of environmental areas including the following;

- Wetlands; designated or not.
- Watercourses; including shorelines of the Great Lakes and inland lakes.
- Regulated areas adjacent to wetlands and watercourses.
- Hazardous lands, and
- Other areas that could interfere with the hydrologic function of the wetland.

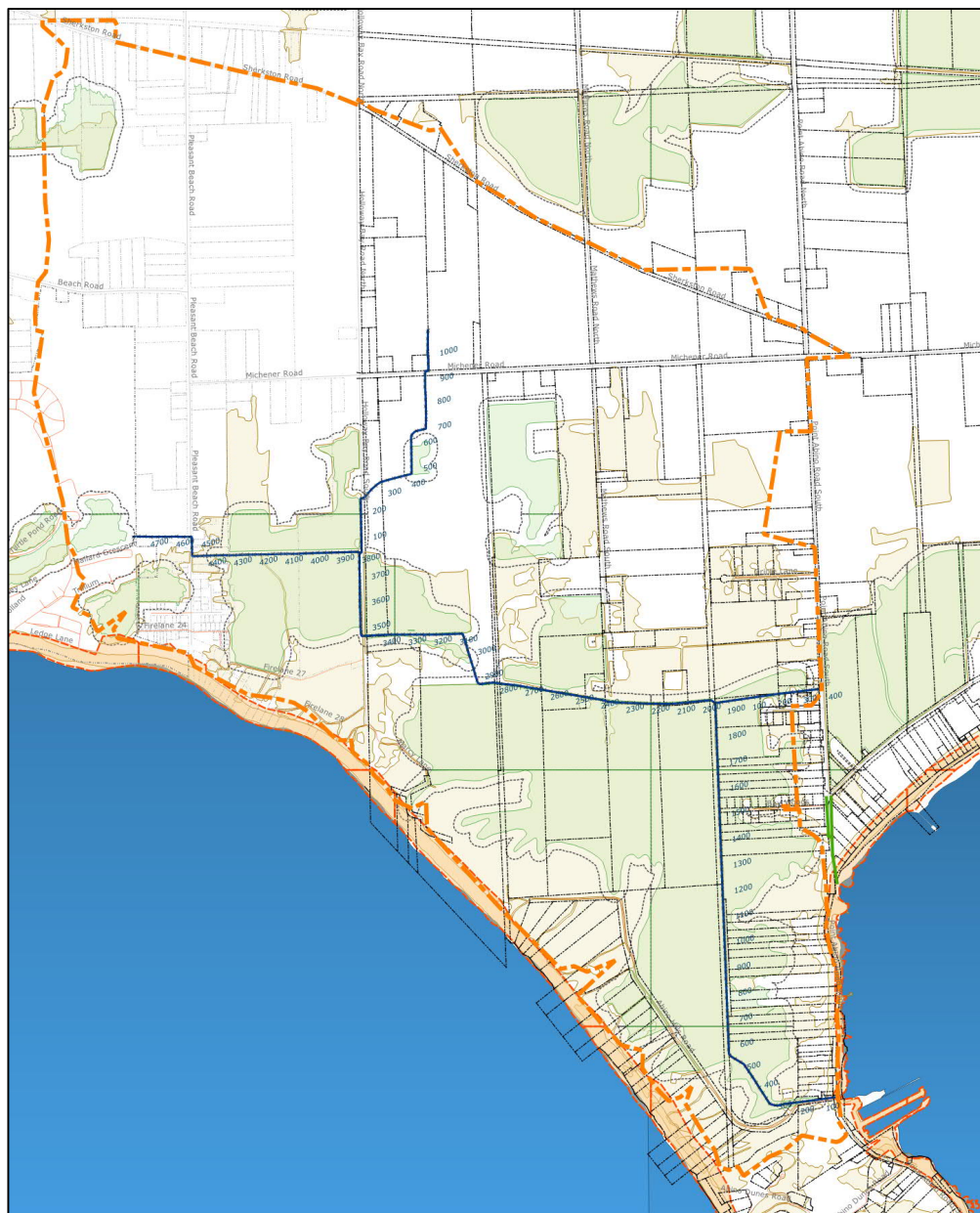


Figure 34 Environmental Influences on Point Abino Drain

Data provided by NPCA.

3.6.2 Ministry of Natural Resources and Forestry

SAR assessment can consider three activities of:

- I. Habitat Inventory
- II. Potential SAR on the property
- III. SAR Surveys

For more information on Species at Risk in Niagara, contact a Management Biologist at the local Ontario Ministry of Natural Resources and Forestry, Vineland Office. Online resources indicative of local Fort Erie species are:

- Fowlers Toad Stewardship Guide
- Fowlers Toad ID Card
- Black Rat Snake Homeowners Brochure
- American Water Willow ID Card
- American Water Willow Stewardship Guide
- Common Hoptree ID Card
- American Chestnut ID Card
- Flowering Dogwood ID Card
- Butternut ID Card
- Allegheny Mountain Dusky Salamander ID Card
- Cucumber Tree ID Card
- Blanding's Turtle ID Card
- Gray Ratsnake ID Card
- Flowering Dogwood ID Card
- Five-Lined Skink ID Card
- Spotted Turtle ID Card
- Northern Dusky ID Card
- Northern Ribbonsnake ID Card
- Eastern Milksnake ID Card
- Eastern Massasauga Rattlesnake ID Card
- Spotted Wintergreen ID Card
- Virginia Mallow ID Card
- Swamp Rose-Mallow ID Card



<https://landcareniagara.com/programs/species-at-risk/>

3.6.2.1 Species At Risk (SARs)

The following is the information provided in the past by MNR for designated species at risk within the project area.

Prothonotary Warbler

As of 2021 species at risk is allocated to MECP and the list of species at risk are shown at the following link (URL).

<https://www.ontario.ca/page/species-risk-ontario>

If any of these species are known to be present within the watershed, then a submission for a permit for additional works is required and/or documentation that proposed maintenance of existing infrastructure poses no additional negative effects.

The drainage works, as considered from past works and general construction practices are not forecast to impact bird species in any direct way. There is a clear risk of work in and around the drainage system that could impact amphibians and reptiles and for this we will specify mitigating measures to be implemented during construction.

Those mitigation measures may include:

- Pre-construction survey to confirm that no species at risk are present and/or put at risk through construction. The pre-construction survey will be conducted within a specific time window relative the construction work being undertaken.
- Intervention during construction will occur if a reptile or amphibian is found within the construction site. A qualified person will assess the animal and determine if it is or is not a species at risk and a local re-location effort will occur.

3.6.3 Federal Species at Risk (SAR)

The SAR from the Federal web site listing for Ontario location is provided in Appendix C. Not all species will be likely to occur in the Fort Erie / Port Colborne area, and not in the specific habitats of the Point Abino Drains. The drain constructor (maintenance or improvement) will be directed to this information with a requirement to ensure that no species at risk are adversely affected.

3.6.4 Fisheries

The long history of the drain confirms that the works being considered are unlikely to cause a change in environment that is distinctly different from what is currently in existence. Historically, fish have been seen and documented within the Point Abino Drain.

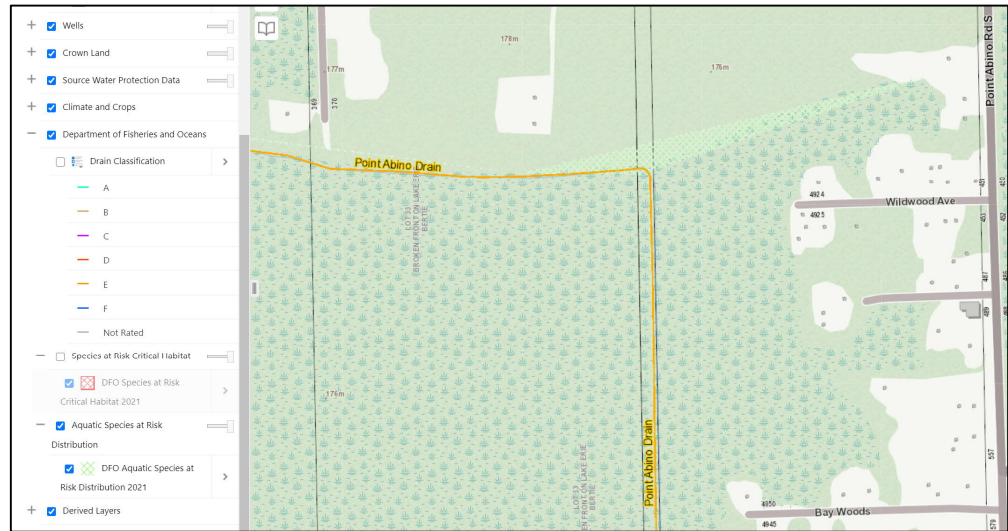


Figure 35 DFO Fisheries at Risk inventory

From this figure, there is an expectation of special measures or requirements to be addressed either by design or during construction for the protection of special significant species. This identifies two zones for Grass Pickerel being of Special Concern, the upper watershed and the lower watershed being listed as two separate areas.

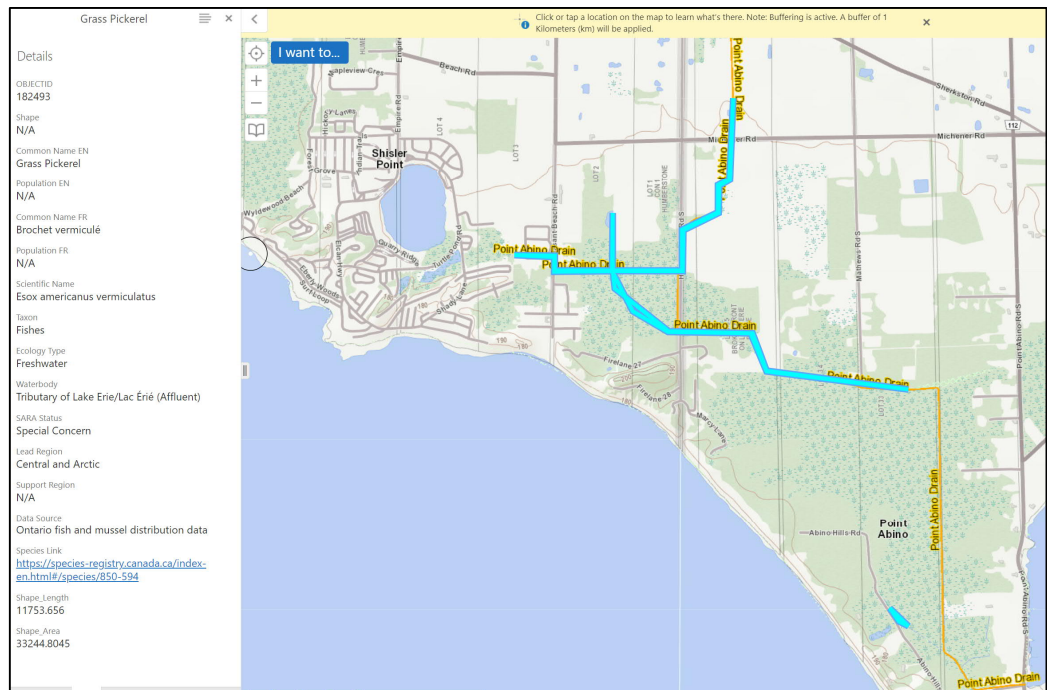


Figure 36 Grass Pickerel Special Concern area

From the DFO and the Ontario Agricultural Information Atlas the Point Abino Drain classification (see figure Figure 37 Ontario Agricultural Information Atlas – DFO Drain Classification)

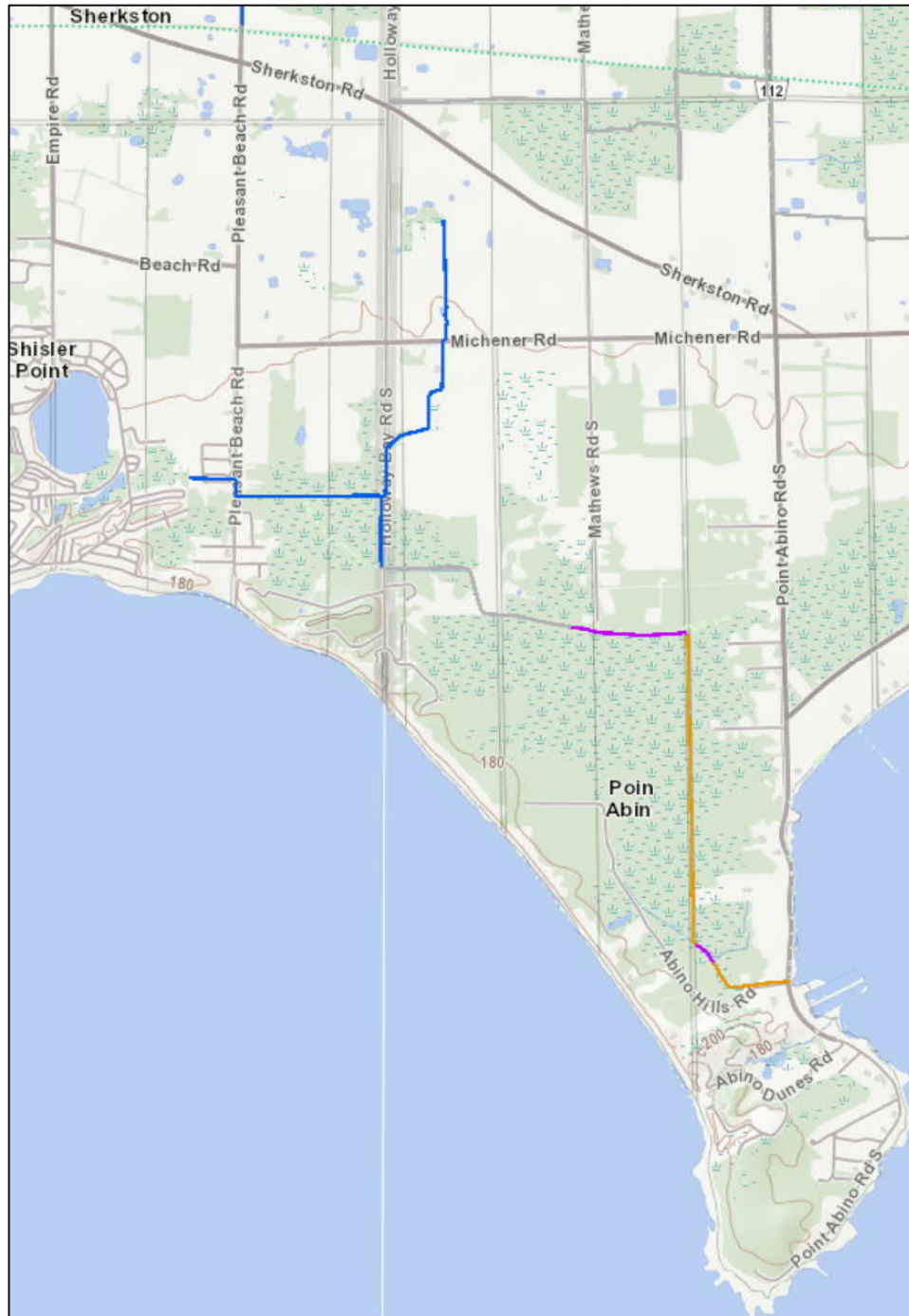


Figure 37 Ontario Agricultural Information Atlas – DFO Drain Classification
From DFO Advisory Report 2013/061

Agricultural watercourses in Ontario have been designated as municipal drains. To streamline regulatory processes for maintenance works, these watercourses are classified based on temperature, permanency of flow, and fish species present. Currently, maintenance works on three drain types require a site specific review by Fisheries and Oceans Canada (DFO) including Types D and E drains. These drain types contain sensitive fish species or may have species at risk

(SAR) present and/or mapped critical habitat [includes fishes and/or mussels that are listed as Threatened or Endangered under the Species at Risk Act (SARA)]. These three drain types are more sensitive to municipal drain maintenance works, which typically involve dredging the bottom of the drain and removing excess sediment. Drain types D and E are classified based on temperature and fish data that have been collected in the field. SAR presence is determined by using the Species at Risk Maps, or by detecting species at risk during fish sampling. If either source indicates the presence of SAR, then a SAR class will be applied.

Table 1. Summary of key characteristics of each drain classification.

TYPE	Flow	Spawning Period	Species	Time Since Last Clean-out	Authorization
A	Permanent	Fall or Combination Spring / Fall	No sensitive fish species present	N/A	Class A
B*	Permanent	Spring	Sensitive species present	Less than 10 years	Class B
C	Permanent	Spring	No sensitive species present	N/A	Class C
D	Permanent	Fall or Combination Spring / Fall	Sensitive species present	N/A	Project specific
E	Permanent	Spring	Sensitive species present	N/A	Project specific
F	Intermittent	N/A	N/A	N/A	None required (work done in dry or low flow)
Not Rated	Unknown	Unknown	Unknown	Unknown	Site specific or assess drain
SAR	N/A	N/A	Species at risk present	N/A	Site specific

* Note: No new Class B drains will be assigned, and any existing Class B drains will not change classification unless new data becomes available to support the reclassification to Class A, C, D, or SAR. Time since last clean out is no longer collected as part of the Drain Classification Project as per a decision made by the Drainage Action Working Group in 2010.

3.6.5 Migratory Birds Convention Act

The Migratory Birds Convention Act, 1994 (MBCA) provides protection to migratory birds, their eggs and nests. The Act is Federal and administered by Environment Canada and Climate Change Canada (ECCC).

From their website the following identifies two primary consideration for the drain improvement works considered for Point Abino Drain

- General Nesting period mid-March to late August (with regional variations.)
- Exceptions include:
 - Species that may nest earlier, such as Great Blue Heron and American Woodcock in March, or those which may nest later such as Cedar Waxwing, Bohemian Waxwing, Pine Siskin, American Goldfinch, Common Murre and Great Blue Heron until the end of September, or Leach’s Storm-Petrel, Fork-tailed Storm-Petrel and Northern Gannet in October;

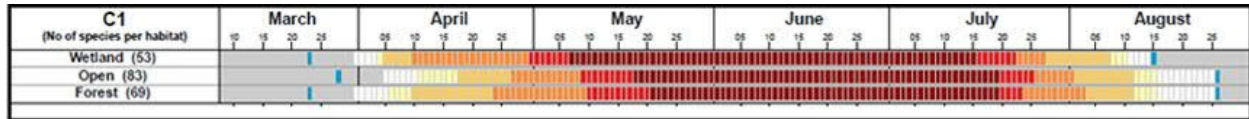


Figure 38 Nesting Period for C1 applicable to Port Colborne

The proposed work of reducing the dead ash within the drain could have a nesting impact if conducted within the general nesting period. Work to remove trees will be scheduled outside of the general nesting period and effort to ensure exceptions to the general nesting are not impacted will be made by a qualified person.

Topside vegetation removal; trunk, limbs, branches will occur prior to the general nesting period and preferably during frozen ground conditions. Some vegetation removal could be scheduled after the nesting period for the following construction year; however, preceding construction is preferred. Full removal of the stump will be scheduled with excavations associated with the drainage works.

Warning

The technical information contained in the "General nesting periods of migratory birds in Canada" published on this web site is general information that constitutes advice only. All persons must adhere to all pertinent laws (for example provincial or territorial laws), regulations and permit requirements including but not restricted to the [Migratory Birds Convention Act, 1994](#) (MBCA) and the [Migratory Birds Regulations](#) (MBR). It is important to note that some species of birds protected under the MBCA have also been listed in [Schedule 1](#) of the [Species at Risk Act](#) (SARA). These species receive protection from both the MBCA and SARA. This information does not provide an authorization for harming or killing migratory birds or for the disturbance, destruction or taking of nests or eggs as prohibited under the MBR. This information does not provide a guarantee that the activities will avoid contravening the MBR or other laws and regulations. This is general information not intended to be relied on as official advice concerning the legal consequences of any specific activity. It is not a substitute for the MBCA, the MBR, or any other legislation.

It is the responsibility of individuals and companies to assess their risk with regards to migratory birds and design relevant avoidance and mitigation measures (see [the Specific consideration related to determining the presence of nests](#) and [the Guide for Developing Beneficial Management Practices for Migratory Bird Conservation](#)). Since the "General nesting periods of migratory birds in Canada" applies to large geographical areas, it is possible that local nesting periods could have a different starting date and/or duration than published dates due to micro-climatic conditions in specific areas (e.g. high elevation sites or coastal sites) as well as inter-annual variation due to factors such as early spring or cold, wet summer. The technical information published on this web site will be updated as new data become available, which could result in the changing of dates and/or limits of the nesting zones.

Please contact [Environment and Climate Change Canada's Wildlife Service office](#) in your region for further technical information.

Ontario Region
Canadian Wildlife Service
Environment and Climate Change Canada
4905 Dufferin Street
Toronto ON
M3H 5T4

3.6.6 Ministry of Environment, Conservation and Parks

Works carried out under the Drainage Act are exempt from seeking an Environmental Compliance Approval (ECA formerly CofA) issued by the MOECP.

Under the Ontario Water Resources Act, 1990 consideration to Water Taking Permits will be reviewed during the design period. Note that there are none shown for the Point Abino Drain at this time. Also the discharge of deleterious substances including excess sediment will be given consideration in the design and specifications for construction execution practices to minimize and/or mitigate construction impacts downstream.

Permits to Take Water

The following figure is from the MOE website providing map based review of approved Permits.

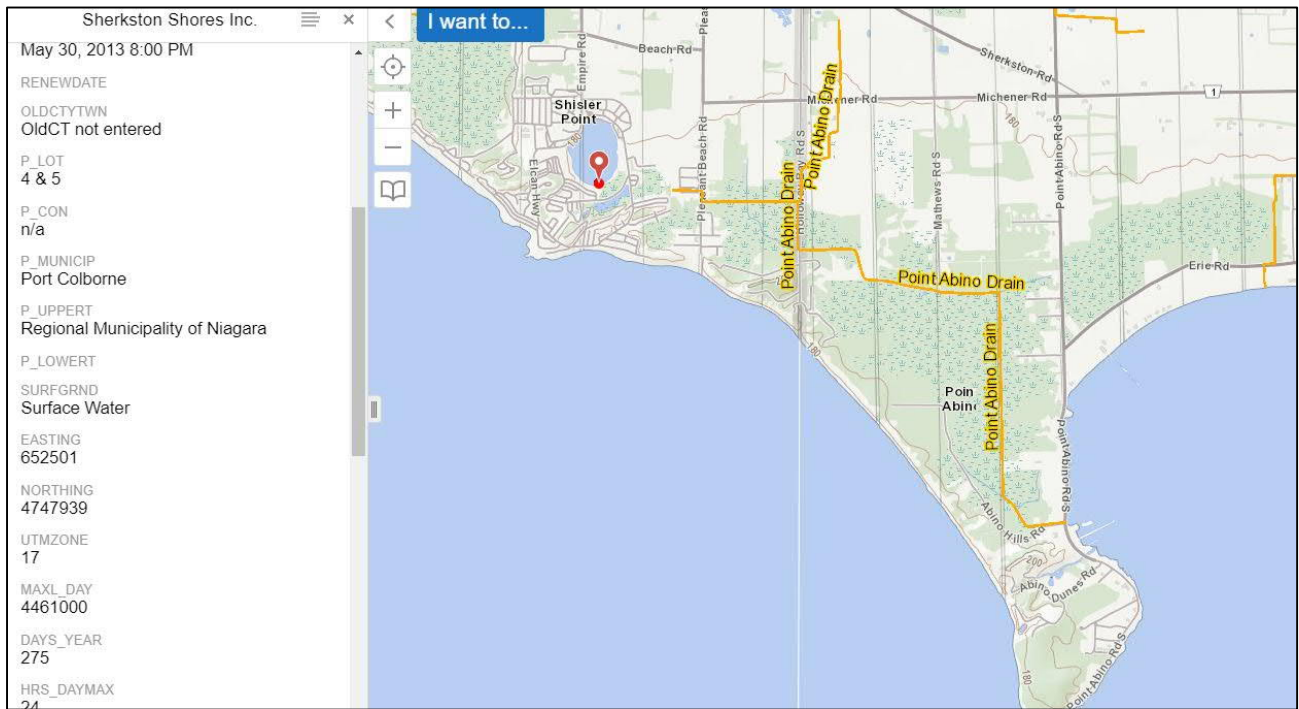


Figure 39 Permits to Take Water

There are no indicated PPTW within the Point Abino watershed.

The following figure shows the placement of water well records within the area of drains.

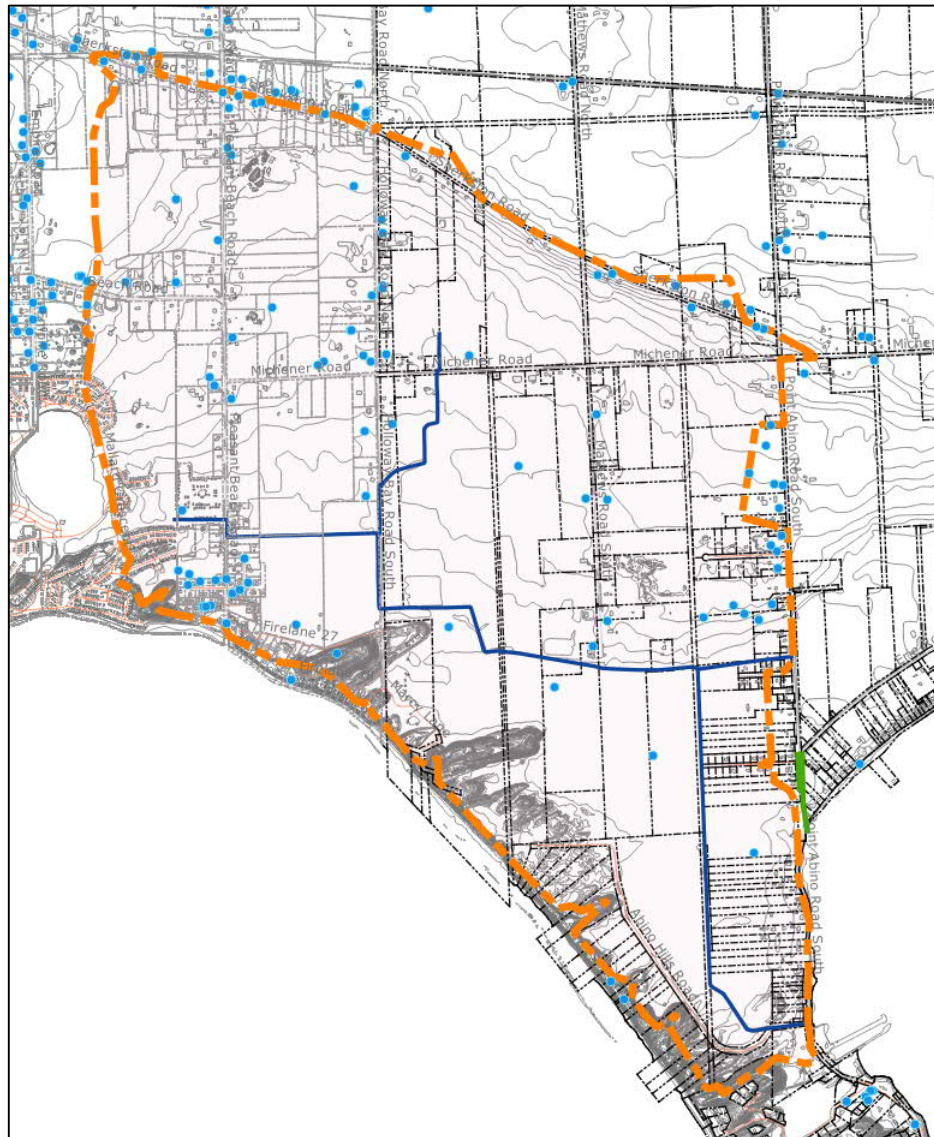


Figure 40 Water Well Records

The presence of the overlying limestone series Onondaga, that is above a rock series that is very low permeability along with the parent soil material of predominately clay suggests that interactions with local municipal drains are unlikely to be a consideration for negative groundwater effects.

The watershed western boundary being the Lake Erie sand dunes is considered to be a 'leaky' edge that includes regular groundwater contributions into the watershed depending on the lake's elevation relative to the elevation of water within the drain. (See Figure 31 Storm Surge Potential Impact to 176.5m)

3.6.7 Cultural Heritage Resources

The drains already exist and cultural heritage impacts may have already been affected by past construction activities. Where a drain is to be moved on to a new path, then a pre-construction investigation will be conducted prior to the start of construction.

During construction in the event that specific artifacts are uncovered by excavation or other works, then a qualified person will be contacted, attend the site and make a determination of the potential significance along with recommending specific measures to continue construction.

3.7 Stakeholders

All ratepayers within the watershed are stakeholders. Additional interests as potential stakeholders as discussed in the following sections.

3.7.1 Niagara Peninsula Conservation Authority (NPCA)

There are no regulated flood hazard lands within the Point Abino Watershed. There are cut and fill permit requirements within portions of the Point Abino Watershed, (reference the discussion with NPCA during the meeting in 2020).

A DART process for works on the drain within the wetland designated areas would be required as part of the proposed works for improvement under Section 78 (Improvement) and Section 74 (Maintenance).

3.7.2 Ministry of Environment Conservation and Parks (MOECP)

A discussion regarding the need for and value of a ECA for the drain will be reviewed with the MOECP.

The requirements for protecting species at risk and environmental protection requirements in general.

<https://www.ontario.ca/page/species-risk>

3.7.3 Ministry of Natural Resources and Forestry (MNRF)

Consultation to confirm any requirements but none are identified at this time.

3.7.4 Navigable Waters

Under the revised legislation, Navigation Protection Act, 1985 (2012 amendments).

The Point Abino Drain is not listed and specific approval for the works is not considered required with the exception of the outlets to the Lake Erie. Works in and around the Point Abino Drain outlet may require application for approval under the Minor Works Order. As regular mechanical maintenance is required to keep the outlet free flowing a standing Minor Work Order should already be in place and a review of this requirement will be referenced under the maintenance section of the Engineer's Report.

3.7.5 Ministry of Transportation

There are no MTO roadways within the watershed.

3.7.6 Regional Municipality of Niagara

There are no Regional roadways within the watershed. There are identified water distribution system pipe along Point Abino drain that cross the existing outlet. Wastewater system assets do not extend into the Point Abino watershed but do reach Point Abino Rd. part of the Erie Rd Pumping Station catchment.

3.7.7 Potential Utility Conflicts

Utility companies operating in the area will be contacted for information regarding existing plant once a based program of work is prepared as part of the design phase. It is expected that Bell, Gas and Niagara Power, (Fortis) all have underground plant and overhead infrastructure in this area. This information will be carried forward and shown on the design drawings. It will be the contractor's responsibility to obtain locates of existing buried infrastructure and to ensure that all required measures to ensure existing infrastructure is protected and not disturbed or disrupted during construction.

Niagara Regional Broadband network is known to exist along the Friendship Trail.

3.8 Drainage Needs

Maintenance Activities Performed Under an Existing Engineer's Report may include:

- Brushing of banks
- Bottom cleanout of sediment
- Culvert repairs
- Erosion control
- Catch basin repairs
- Tile flushing

Construction Activities Requiring an Engineer's Report may include:

- Construction of new tile drains
- Construction of new culverts
- Realignment of open ditches
- Wetland restoration projects
- Excavation and brushing of open ditches

The opportunity to add water quality control features as part of the drain should be investigated and assessed wherever the opportunity is identified. Where such features may require future maintenance, such as sedimentation basins, the Engineer's report is to be explicit on frequency and trigger points for maintenance activities.

The following are descriptions of specific needs to resolve for the Point Abino Drain:

1. A technical review of the cost vs benefit of a pumping station to reduce the impact of high lake levels.
2. A review of opportunities to improve flows to the lake for the lower portion of the drain.
3. A review of improvements / maintenance west of Holloway Bay Rd to ensure a State of Good Repair (SOGR) is achieved.
4. A hydrologic and hydraulic model implementation to assess existing capacity and/or potential bottlenecks in flow, including culvert capacity assessments.
5. Maintenance and Grade line improvements (if possible) for the East Branch.
6. Road Culvert replacement of the outlet crossing on Point Abino Road.
7. Consideration of replacement of the structure upstream of the Point Abino Rd. crossing as open channel or closed.

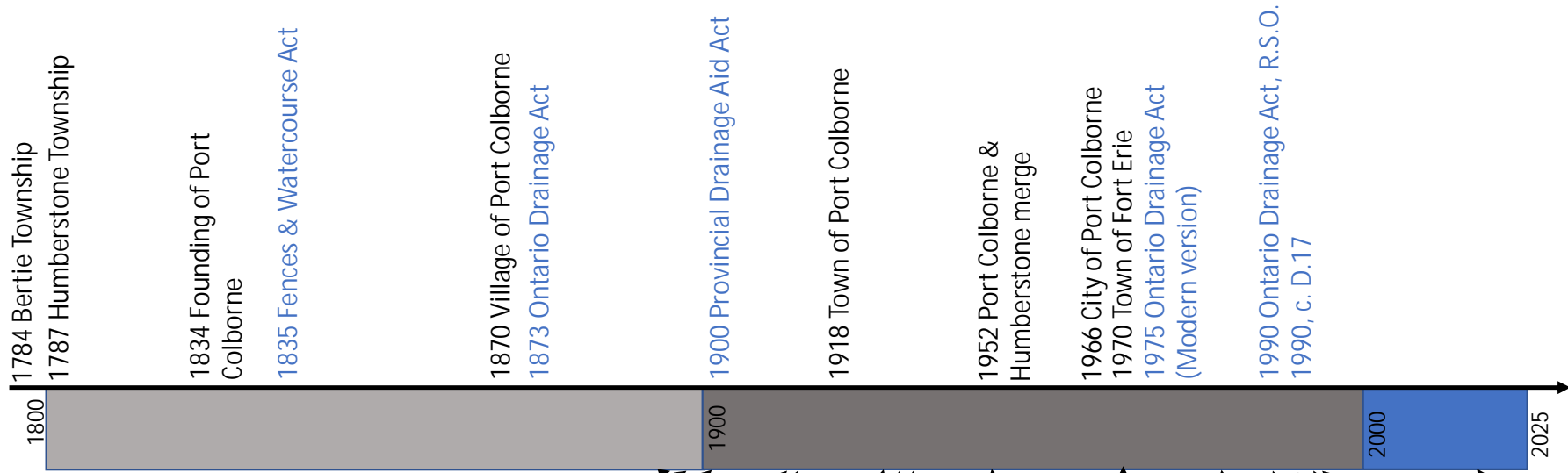
4 Point Abino Drain Baseline Summary

The Point Abino Drain continues to function and provide service to the residents and businesses within the watershed; however, these services are currently compromised or performing below desired service levels.

1. Additional Data for investigation:
 - a. A spot ditch grade line survey of the existing drain for specific transects to profile existing capacity in the lower reach of the drain STA 0+300 to 1+800, (3 recommended, bottom, middle and top).
 - b. A survey of the existing Eastern Branch Drain and confirmation that it is still part of the drain and was not abandoned by previous report.
 - c. A spot ditch grade line survey of the existing drain for specific transects to profile existing capacity between STA 2+600 and 3+400, (two minimum).
 - d. Select key points of investigation on the existing outlet.
2. Species at Risk (SAR) list of potential impacts needs to be specific to Point Abino. Refine through additional search and consultation with relevant agencies.
3. It is recommended that the drain capacity be modelled and assessed for adequate capacity and to model specific aspects of water storage within the system. The model should include aspects of stage discharge relationships for all storage elements within the watershed such as ponds but also for culverts across roads that restrict flows and create impoundments of water behind them.
4. The following are Section 4 improvements that will require 50% of property owners to sign a petition for drainage improvements for the Point Abino Drain.
 - a. Inclusion of a pumping system at the existing Point Abino outlet. (Planco 1996)
 - b. A relief outlet and / or pumping station at Holloway Bay Rd. (Planco 1996)
5. The identified preferred alternative, based on the baseline review of available documentation, is a drain improvement project by Section 78; Improving, upon examination and report of engineer for the Point Abino Drain.
6. It is recommended the Baseline Report including the Preliminary Plan & Profile drawings be circulated for comment to the relevant authorities;
 - a. DFO, Drain Class A – C, E authorization for maintenance and repair.
 - b. MECP, Species At Risk review, ECA indication. Habitat assessment and stream quality improvement recommendations.
 - c. NPCA, Section 28 of CAA. Regulated Areas review. DART Protocol.

7. Conduct a review of Water Quality potential impacts from upstream land uses and identify potential areas for quality improvement projects to be considered in the Hydrology and Hydraulics report of the Point Abino Drain watershed
8. Existing Gate Structure is functioning after repairs completed in 2020. It's recommended to prepare a replacement plan for inclusion in the Assessment portion of the Drain report. The Point Abino Rd portion can be replaced independently from the private property portion.

**Appendix A:
Point Abino Drain History**



1892 – Specification & Contract for construction of PAM Outlet
 • By-Law No.327, Assessment Twp. of Bertie PAM Drain, Geo. Ross Eng.

1895 – Appeal Report, Twp. of Bertie vs Twp. of Humberstone

1901 – Petition for constructing improved Outlet at PAM Drain
 • Profile for PAM Drain Cut-Off

1914 – Report & Assessment for Cut-Off to PAM Drain, Twp. of Bertie and Humberstone

1916 – Engineer’s Report on Completion of PAM Drain Cut-Off

1926 – Ontario Drainage Court
 • Plaintiff: A.W. Meyer, Charles M. Harrington, W.H. Male, Garnet H. Page, Neil St. Clair, Walkden O. Page, Frank Quite, L.S. Grant, J.O. Page
 • Defendant: Twp. of Bertie

1928 – Final Report & Revised Assessment Rolls for PAM Drain

1929 – Petition to council to install gates at the end of PAMD to prevent lake water from backing up the ditch amidst high water levels

1938 – Report on Repair PAM Drain Twp. of Bertie

1975 – Preliminary Report on PAM Drain D.C. Semkiw

1983 – PAM Report, C. J. Clarke, Niagara Limited, October 19, 1983

1998 – Ont. Drainage Tribunal rescinds order to install a low-lift pumping station.

1996 – Proposed Pumping System, Planco Engineering Ltd. Consulting Engineers, Amended May 1996

1995 – Report Point Abino Drainage System, Pleasant Beach Rd., South-end Area, Planco Engineering Ltd. Consulting Engineers, June

1987 – Tribunal Decisions on Pumping, orders CofPC to prepare a Report Point Abino Drainage System, Pleasant Beach Rd., South-end Area,

2020 – Gates re-installed

Point Abino Record Review

Format for the record review is as follows:

Box

File Folder

Items

Descriptions

Box #1

P Abino Scans



P Abino Drain

Brown Folder – No Label

1892, Specifications for the Outlet of Point Abino Drain

June 28, 1892, Quantities Point Abino Marsh Drain Humberstone

White Folder – No Label

July 16, 1892, By-Law 327.

June 1892, Point Abino Marsh Drain Longitudinal Section through Outlet



Brown Folder – No Label

March 12, 1895, Re. Appeal Report Township of Bertie vs Township of Humberstone,

Oct 15, 1894, Assessment in the Tp. of Bertie for Point Abino Marsh Drain

Oct 15, 1894, Report on Assessment in Tp. Of Bertie for Point Abino Marsh Drain

White Folder – No Label

June 20, 1895, By-Law Chapter 637. provide outlet for draining south parts of Lots #1,2,3 in Tp. Of Humberstone, and portions of Lots #24-35 and Gore in the broken front and 1st Concession Law Erie, Tp. of Bertie, and for borrowing credit of the Municipality, the sum of \$1332.

Point Abino Drain - 1897

1898, Assessment for cleaning Point Abino Marsh Drain under section 74 of the Municipal Drainage act 1894

July 27, 1898, Petition of Point Abino Marsh Drain

Brown Folder – No Label

May 7, Ma, Profile for Point Abino Marsh Drain Cut Off



May 1901, Quantities Point Abino Marsh Drain Cut Off

Jan 14, 1901, Petition for construction of improved outlet of Point Abino Marsh Drain

Point Abino Marsh Drain – Humberstone Tp.

June 7, 1915, By-Law 454.

Nov 2, 1914, Report & Assessment for cut-off to Point Abino Marsh drain in Tp. of Bertie & Humberstone

Point Abino Drain – 1915

July 5, 1917, Debenture By-Law 475. Authorize issue of debentures amount of \$1204.30 for new outlet to otherwise improve Point Abino Marsh Drain in Tp. Humberstone

Dec 15, 1916, By-Law 472. to amend By-Law 454 Point Abino Marsh Drain cut-off

Oct 12, 1916, Engineer's Final Report on Point Abino Marsh Drain

Jan 11, 1916, Engineer's Report on the Completion of the Point Abino Marsh Drain cut-off

Oct 11, 1915, Engineer's Report on the Completion of the Point Abino Marsh Drain cut-off

Feb 4, 1915, By-Law 861.

Nov 2, 1914, Report & Assessment for cut-off to Point Abino Marsh Drain in Tp. Bertie & Humberstone



Brown Folder – No Label

Sept 14, 1916, By-Law 469. & Engineer's Report

White Folder – No Label

Dec 15, 1916, By-Law 473. To amend By-Law 469. For upper portion of Point Abino Marsh Drain

Nov 4, 1916, Contractor's agreements for rock cutting and excavation & upper portion of Point Abino Marsh Drain



Sept 14, 1916, By-Law 469. To provide for the improvement of the upper portion of Point Abino Marsh Drain in Tp. of Humberstone

June 26, 1916, Petition to repair the upper portion of Point Abino Marsh Drain

Brown Folder – No Label

Sept 15, 1925, Petition for the cleaning and improvement of upper portion of Point Abino Marsh Drain

White Folder – No Label

Sept 4, 1926, Report on repair, Point Abino Marsh Drain Cut-Off

P Abino Marsh Drain 1927 By-Law 585 – 9-3-16

Empty

Brown Folder – No Label

Apr 1, 1929, Debenture By-Law 612. To provide for borrowing \$2,263.29 upon debentures to pay for the repairs to the Point Abino Marsh Drain and for the construction of a new outlet to Lake Erie under provisions of the Municipal Drainage Act

Jan 21, 1929, Grant on Point Abino Marsh Drain By-Law 585., 16.5% of cost

Sept 20, 1928, Assessment in the Tp. of Humberstone for the Oct 6, 1928 Point Albino Marsh Drain

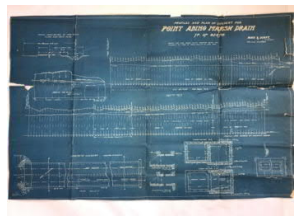
Sept 18, 1928, By-Law 600 to amend By-Law 585.

Aug 1, 1928, Final Report and revised assessment rolls for the Point Abino Marsh Drain

Oct 3, 1927, By-Law 585

Nov 12 1927, Statutory Declaration in the matter of By-Law 585.

Sept 1, 1927, By-Law 1084.



Sept 1, 1925, Report on Point Abino Marsh Drain



Nov 5, 1926, Witness signature

Oct 28, 1926, Ontario Drainage Court Between, Plaintiff: A.W. Meyer, Charles M. Harrington, W.H. Male, Garnet H. Page, Neil St. Clair, Walkden O. Page, Frank Quite, L.S. Grant, and J.O. Page & Defendant: The Corporation of the Tp. of Bertie



Brown Folder – No Label

Apr 6, 1929, List of appeals against the assessment for the repair of the Point Abino Marsh Drain (all overcharged in respect of assessment):

1. Martin Sherk Pt.24 1 L.E.
2. Eli Ott Pt. 35 1 L.E.
3. Perry J. Tait Pt. Gore 1 L.E.
4. Geo. Wintemute Pt. 35 1 L.E.
5. Winfred A. Carver Pt. 35 1 L.E.

Feb 28, 1929, Assessment roll for Point Abino Marsh Drain

Oct 8, 1928, Contractor's agreement for the Point Abino Marsh Drain, By-Law 596. with specifications attached

Sept 29, 1928, Tender's wanted

Aug 6, 1928, By-Law 596 and Report on Improvement of the Point Abino Marsh Drain

Aug 1, 1928, Report on Repair of Point Abino Marsh Drain



Aug 1, 1928, Report on Improvement of Point Abino Marsh Drain, to make use of the enlarged drain in Tp. of Bertie, and in order to drain lands on its course, the costly part will be removal of rock along Town Line Rd.

1928, Report of Assessment Roll and By-Law 596. Tp. of Humberstone

Jan 7, 1928, Petition upper portion of Point Abino Marsh Drain

Point Abino Marsh Drain – Bertie Tp.

June 28, 1929, Letter to Mr. J.R. Scott, Mr. Geo. J. Buck and others have petitioned the Council to install gates at the end of PAMD to prevent lake water from backing up the ditch. The council wants J.R. Scott's opinion

July 9, 1929, Letter to Mr. George A. Mcubbin. C.E., Re. Gates on Drains Discharging into Lake Erie, We would appreciate having your opinion in regard to the assessments above. This is in connection with the PAMD and other drains of similar character, being a demand for installation of manually operated flood gates on account of high level of Lake Erie, from Ross & Scott

July 10, 1929, Letter to J.R. Scott, I would be inclined assess the greater portion of the cost against the low lands protected by the flood gate against the backing up of high water, No fault could be found with charging a portion of the cost against the high lands on the ground that drain through the lower lands they must carry their water to sufficient outlet, from Geo. A. Mcubbin

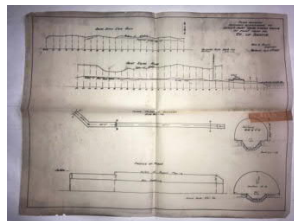
July 24, 1929, Letter to Mr. K. Ellsworth, Re. Flood Gates – PAMD, flood gates would be a distinct benefit during the present high lake levels, when the lake returns to the low level of 1925 there would be few times during the year the flood gates would be of value, fair division of cost would be one-third charged against lands subject to flooding from the lake, and the balance on the on the drainage area as a whole in the proportion of the last revised roll, from Ross & Scott

Point Abino Marsh Drain – 1928

Aug 6, 1928, By-Law 611. to amend By-Law 596.

July 20, 1929, Oath, John Russel, Engineer, City of Welland

Brown Folder – No Label



White Folder – No Label

Feb 20, 1932, Letter to Mr. Ernest Ott, Re. Hurley Cut-Off PAMD, portion of the above drain, north of the covered outlet has been filled in by Dr. W.H. Marcy, who is under the impression that this portion of the drainage is abandoned, any person placing an obstruction in this drain

becomes responsible under Section 81. Of the Municipal Drainage Act, Tp. Of Humberstone should notify Bertie that Section 81. be applied

Brown Folder – No Label

July 31, 1939, By-Law 733



Abino Marsh Drain – 1938-39

Apr 25, 1942, Assessments, PAMD bill to be paid by Apr 25, 1942, Special rate as set out in By-Law 733

Mar 10, 1938, Report on Repair of Point Abino Marsh Drain, Tp. Bertie

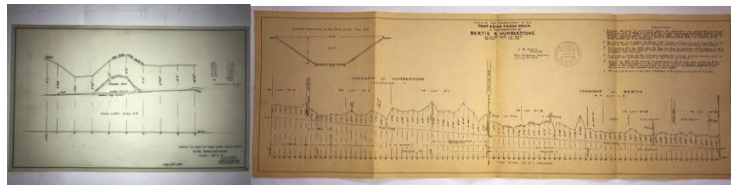
More copies of By-Law 733

Point Abino Drain – 1939-1958

Jan 30, 1958, By-Law 1109

Feb 21, 1958, Letter to Ernest F. Ott, regarding financing

Tp. of Bertie-Humberstone – PAMD



Pt. Abino Drain – 77-106

Apr 6, 1977, Letters back and forth regarding Point Abino Road Drainage Culvert, Mr. Wm. Johnston, D. Lampman, Mr. W.S. Leach

Feb 28, 1977, Road Improvements and Storm Sewer Lake Street St. Catharines, Drainage – Niagara Rd 112 (Point Abino Rd South) Town of Fort Erie, Population Figures – 1976, Tender Award Contract 77-T-1 Supply of Tires, Tubes and Tires Service

Point Abino Drain – Revised 1982

Feb 5, 1975, Preliminary Report on Point Abino Marsh Drain, D.C. Semkiw

Point Abino Drain – 1977

May 6, 1982, Report on the Repair and Improvement of the Point Abino Drainage System, C.J. Clarke, Niagara Ltd., Revised – Sept 24, 1982, Revised – Oct 19, 1983, A. Pluhar, P. Eng.

Point Abino Drain – Old By-Laws & Reports 1980,1982 (Before Final)

Assorted

Point Abino Drain – 11-183

Assorted

Box #2

Pt. Abino-Alternate Outlet at Pleasant Beach Rd – Preliminary Report

Apr 9, 1996, Memo to Peter Senese from René Landry, RE: Printing and Postage Costs – Various Drains

Feb 2, 1996, Letter to Mr. Andrew Pluhar from René Landry, P. Eng., RE: Grant Application for Preliminary Report Point Abino Drainage System Pleasant Beach Rd, City is applying for grant available under Section 85(c) of The Drainage Act

Sept 28, 1995, Letter to Len Hunt, RE: Pt. Abino Appeal

Aug 2, 1995, Operational Services Dep. Report #94-64, Preliminary report on the Pt. Abino Drainage System Pleasant Beach Rd., South End Area, Approved by council Aug 14, 1995, L.C. Hunt

June 1995, City of Port Colburne, Report on the Pt. Abino Drainage System, Pleasant Beach Rd., South End Area, Planco Engineering Ltd. Consulting Engineers

June 23, 1995, Letter to Robert Cotterill from A. Pluhar, P. Eng., RE: Pt. Abino Drainage System, City of Port Colburne & Town of Fort Erie

June 6, 1994, Invoice #172, Mr. Rene Landry, RE: Point Abino Pump Station

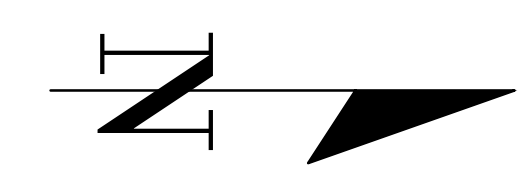
Aug 30, 1995, Invoice #223, Mr. Rene Landry, RE: Report on the Point Abino Drainage System, Pleasant Beach Rd, South End Area

Apr 19, 1995, RE: Point Abino Pumping Station, Report on Investigation, received Apr 19, 1995

**Appendix B:
Point Abino Drain Drawings
and Figures**

CONCESSION 1

CONCESSION 2



PORT COLBORNE
 66 Charlotte St. Port
 Colborne ON, L3K 3C8
 905-835-2900

LEGEND

- PROJECT DRAIN CENTRELINE
- ADJACENT DRAIN CENTRELINE
- WATERSHED BOUNDARY
- INTERIOR WATERSHED LINES
- ADJACENT WATERSHED BOUNDARIES
- 1983 CLARKE REPORT WATERSHED
- ROAD/STREET
- ROAD ALLOWANCE LIMITS
- ROAD**
- 829200
- PROPERTY ASSESSMENT ROLL NUMBERS

NOTES

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FINAL BASELINE REPORT	01	2021/12/20	PM
ISSUED FOR/REVISIONS	No.	YYYY/MM/DD	BY

CONTROL POINTS:

CONSULTANT:

EWA Engineering Inc.
 647.400.2824 www.ewaeeng.com

DESIGN BY:	STAMP:
DRAWN BY: AVAL	
CHECKED BY: P.M.	
APPROVED BY: P.M.	
DATE:	

POINT ABINO DRAIN

OVERALL WATERSHED PLAN

HOR. SCALE - 1:7500 VERT. SCALE - N/A

STN: N/A TO: N/A

PROJECT NO: 19-9997

DWG NO: DWG-001

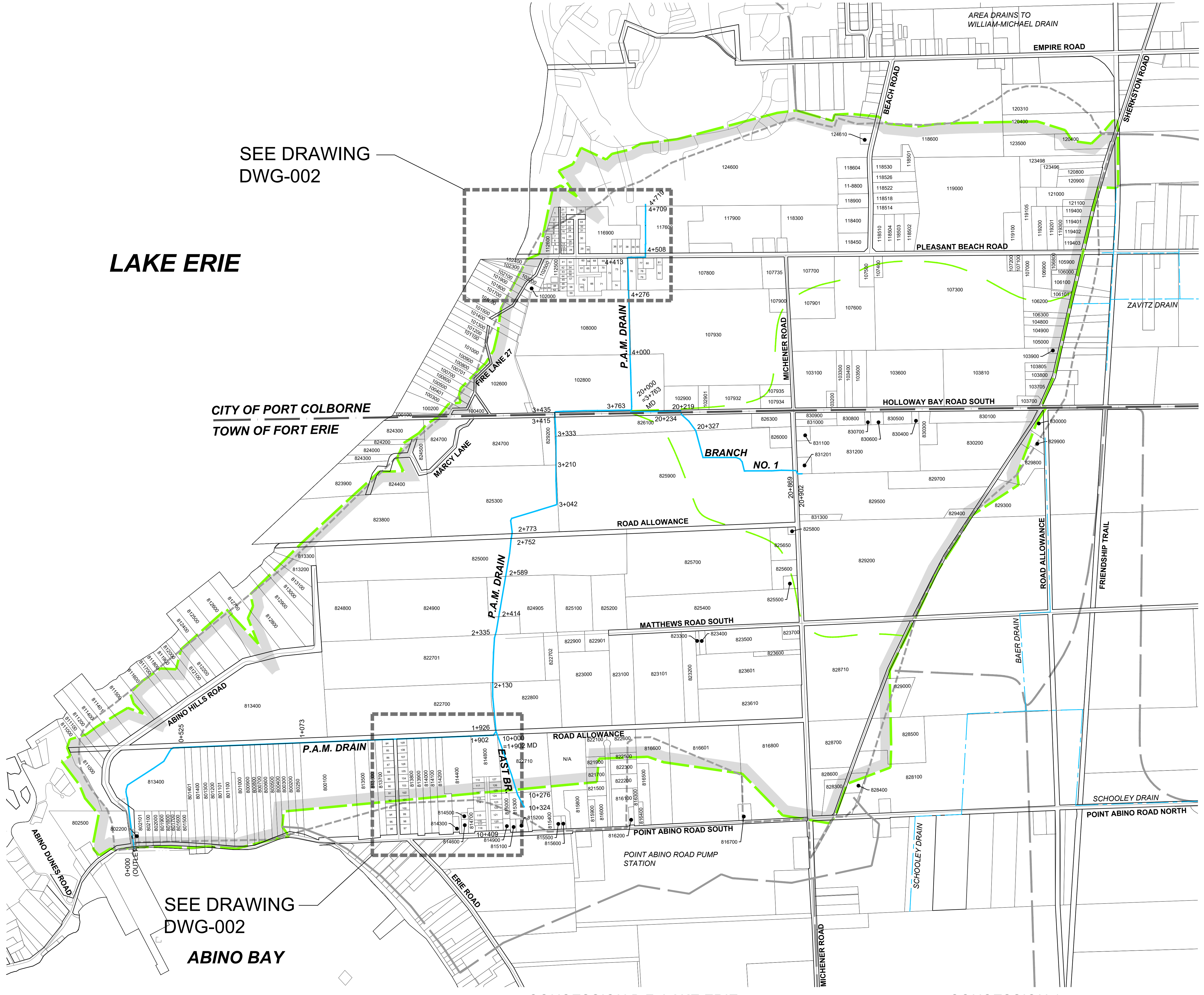
SEE DRAWING
DWG-002

LAKE ERIE

CITY OF PORT COLBORNE
TOWN OF FORT ERIE

SEE DRAWING
DWG-002

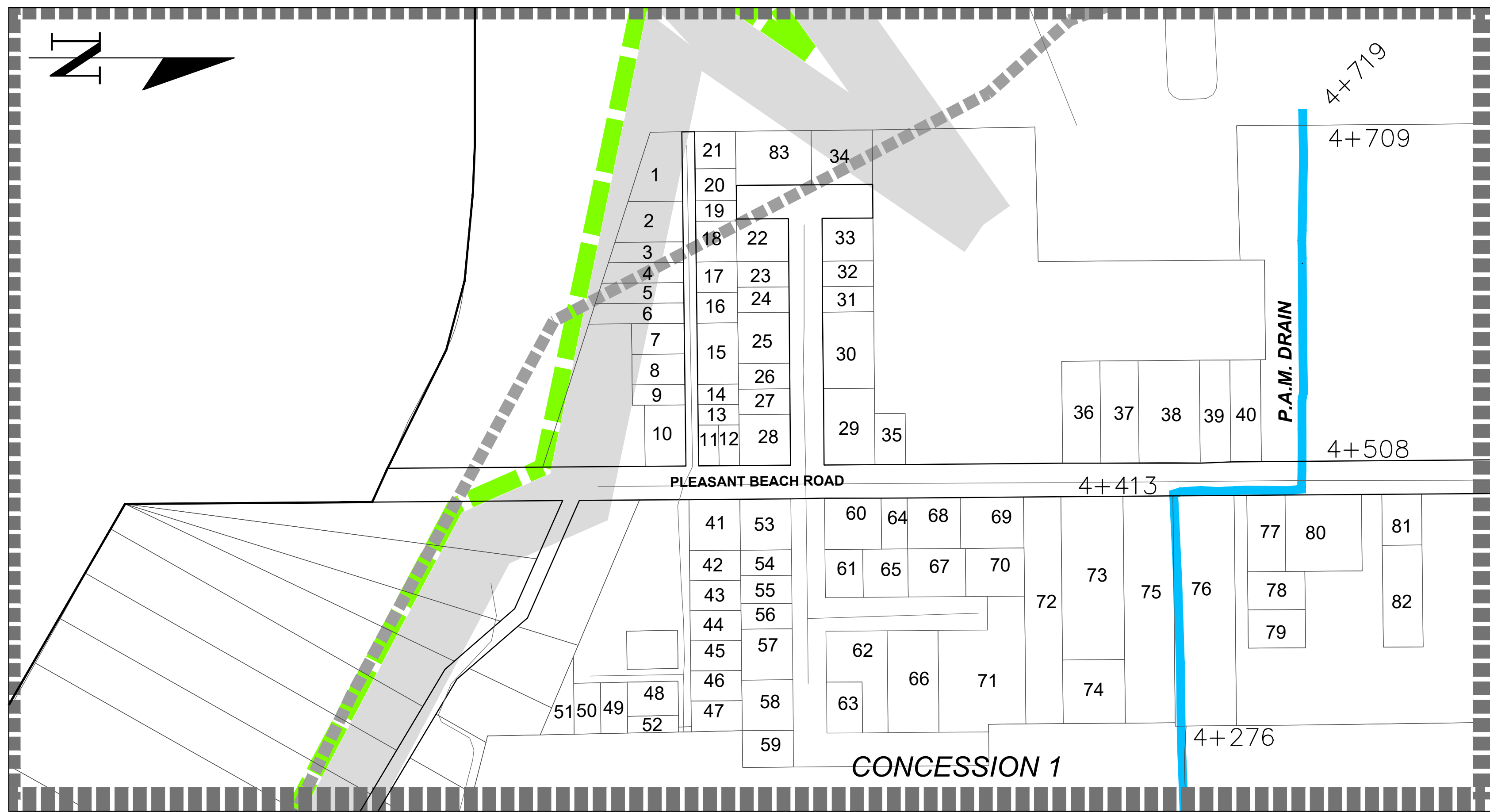
ABINO BAY



CONCESSION B.F. LAKE ERIE

CONCESSION 1

LOT 5
LOT 4
LOT 3
LOT 2
LOT 35
LOT 34
LOT 33
LOT 32
LOT 31
LOT 30



LOT 3

LOT 2

PARCEL INFORMATION			
#	ASSESSMENT ROLL NUMBER	MUN. ADDRESS	AREA (Ha.)
1	271104000114200	5325 FIRELANE 24	0.10
2	271104000114300	5333 FIRELANE 24	0.09
3	271104000114400	5345 FIRELANE 24	0.05
4	271104000114500	5351 FIRELANE 24	0.06
5	271104000114600	5357 FIRELANE 24	0.06
6	271104000114700	-	0.07
7	271104000114800	5373 FIRELANE 24	0.06
8	271104000114900	5385 FIRELANE 24	0.06
9	271104000115000	5395 FIRELANE 24	0.04
10	271104000115100	5401 FIRELANE 24	0.09
11	271104000112800	258 PLEASANT BEACH RD	0.03
12	271104000112700	260 PLEASANT BEACH RD	0.03
13	271104000112900	-	0.03
14	271104000113000	-	0.03
15	271104000113100	5384 FIRELANE 24	0.09
16	271104000113100	-	0.04
17	271104000113600	5350 FIRELANE 24	0.04
18	271104000113700	5340 FIRELANE 24	0.06
19	271104000113800	5330 FIRELANE 24	0.03
20	271104000113900	5320 FIRELANE 24	0.05
21	271104000114000	5304 FIRELANE 24	0.05
22	271104000115900	5331 FIRELANE 21	0.08
23	271104000115800	-	0.04
24	271104000115700	5359 FIRELANE 21	0.04
25	271104000115600	5373 FIRELANE 21	0.08
26	271104000115500	5389 FIRELANE 21	0.04
27	271104000115400	5399 FIRELANE 21	0.04
28	271104000115300	262 PLEASANT BEACH RD	0.09
29	271104000116700	5416 FIRELANE 21	0.09
30	271104000116500	5386 FIRELANE 21	0.04
31	271104000116400	5352 FIRELANE 21	0.04
32	271104000116300	5360 FIRELANE 21	0.04
33	271104000116200	5340 FIRELANE 21	0.08
34	271104000116100	5308 FIRELANE 21	0.12
35	271104000116800	284 PLEASANT BEACH RD	0.06
36	271104000117100	312 PLEASANT BEACH RD	0.13
37	271104000117000	318 PLEASANT BEACH RD	0.11
38	271104000117200	328 PLEASANT BEACH RD	0.22
39	271104000117300	332 PLEASANT BEACH RD	0.11
40	271104000117500	338 PLEASANT BEACH RD	0.11

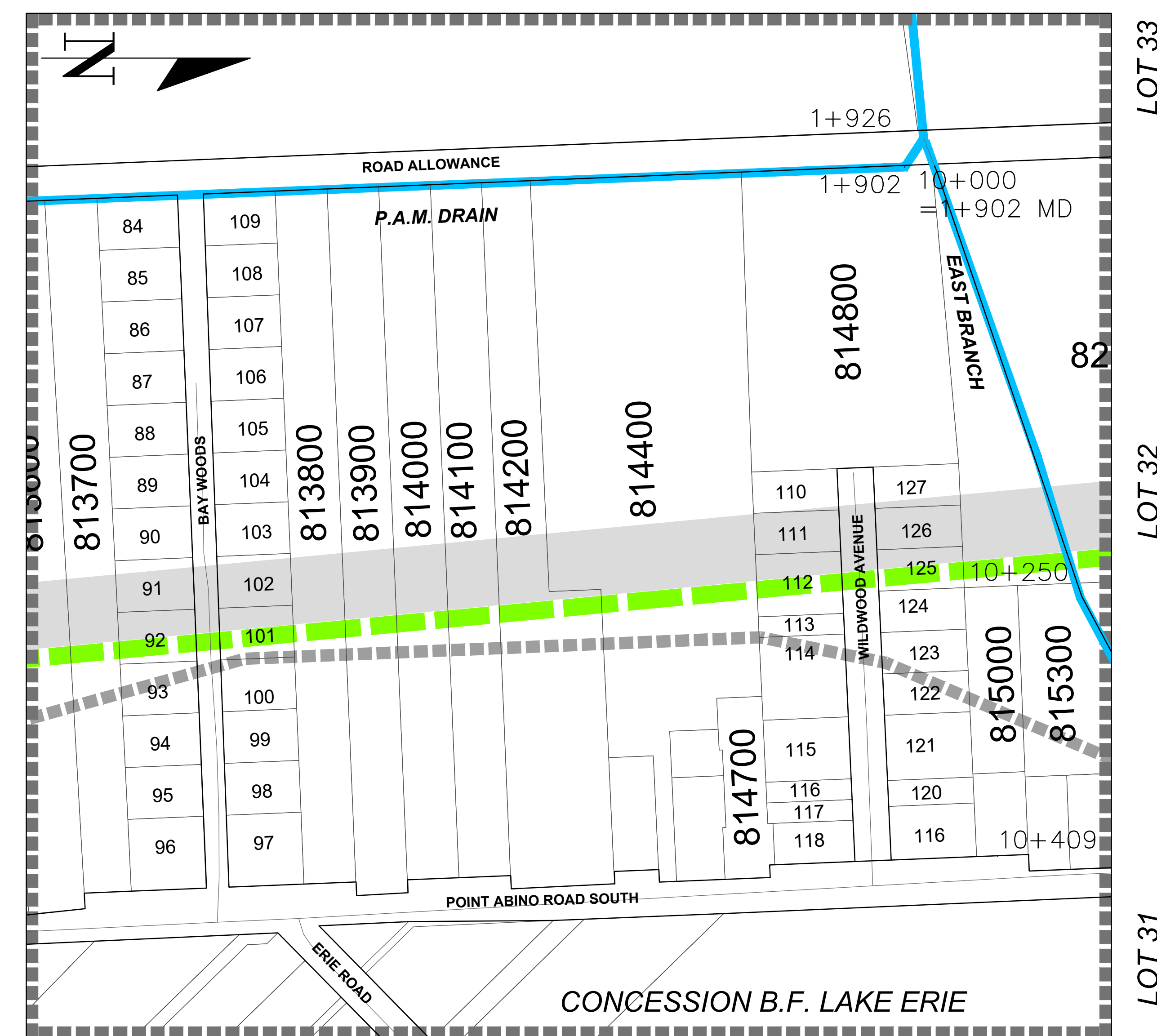
41	271104000112000	257 PLEASANT BEACH RD	0.09
42	271104000111300	5468 FIRELANE 25	0.05
43	271104000111400	5488 FIRELANE 25	0.05
3	271104000111500	5502 FIRELANE 25	0.05
45	271104000111600	5516 FIRELANE 25	0.05
46	271104000111700	5534 FIRELANE 25	0.05
47	271104000111800	-	0.05
48	271104000111900	-	0.05
49	271104000112100	249 FIRELANE 26	0.06
49	271104000112100	243 FIRELANE 26	0.05
50	271104000112200	239 FIRELANE 26	0.05
51	271104000112300	237 FIRELANE 26	0.05
52	271104000111900	5551 FIRELANE 25	0.03
53	271104000110400	267 PLEASANT BEACH RD	0.09
54	271104000110300	5465 FIRELANE 22	0.05
55	271104000110200	5479 FIRELANE 22	0.05
56	271104000110100	5501 FIRELANE 22	0.05
57	271104000110000	5521 FIRELANE 22	0.09
58	271104000109900	5537 FIRELANE 22	0.09
59	271104000109800	5565 FIRELANE 22	0.07
60	271104000109500	-	0.10
61	271104000110900	277 FIRELANE 23	0.07
62	271104000109600	5474 FIRELANE 22	0.16
63	271104000109700	5548 FIRELANE 22	0.07
64	271104000110500	-	0.05
65	271104000110800	282 FIRELANE 23	0.08
66	271104000111000	289 FIRELANE 23	0.18
67	271104000110700	288 FIRELANE 23	0.10
68	271104000110501	-	0.10
69	271104000109400	-	0.10
70	271104000110600	296 FIRELANE 23	0.10
71	271104000111100	297 FIRELANE 23	0.35
72	271104000109300	307 PLEASANT BEACH RD	0.30
73	271104000109100	-	0.36
74	271104000109200	311 PLEASANT BEACH RD	0.14
75	271104000109000	-	0.40
76	271104000108600	333 PLEASANT BEACH RD	0.50
77	271104000108500	341 PLEASANT BEACH RD	0.10
78	271104000108800	341.5 PLEASANT BEACH RD	0.08
79	271104000108900	345 PLEASANT BEACH RD	0.08
80	271104000108400	-	0.21
81	271104000108200	357 PLEASANT BEACH RD	0.07
82	271104000108300	-	0.14
83	271104000116000	5303 FIRELANE 21	1466.6713

LEGEND

- PROJECT DRAIN CENTRELINE
- ADJACENT DRAIN CENTRELINE
- WATERSHED BOUNDARY
- INTERIOR WATERSHED LINES
- ADJACENT WATERSHED BOUNDARIES
- 1983 CLARKE REPORT WATERSHED
- ROAD/STREET
- ROAD ALLOWANCE LIMITS
- PROPERTY ASSESSMENT ROLL NUMBERS

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LOT 33

LOT 32

LOT 31

PARCEL INFORMATION			
#	ASSESSMENT ROLL NUMBER	MUN. ADDRESS	AREA (Ha.)
84	270302001818200	-	0.10
85	270302001818100	-	0.09
86	270302001818000	-	0.05
87	270302001817900	-	0.06
88	270302001817800	4945 BAY WOODS	0.06
89	270302001817700	-	0.07
90	270302001817600	4921 BAY WOODS	0.06
91	270302001817500	-	0.06
92	270302001817400	4905 BAY WOODS	0.04
93	270302001817300	4895 BAY WOODS	0.09
94	270302001817200	-	0.03
95	270302001817100	-	0.03
96	270302001817000	571 POINT ABINO ROAD SOUTH	0.03
97	270302001816400	4862 BAY WOODS	0.03
98	270302001816300	4874 BAY WOODS	0.09
99	270302001816200	4890 BAY WOODS	0.04
100	270302001816100	-	0.04
101	270302001815900	4906 BAY WOODS	0.06
102	270302001815800	4912 BAY WOODS	0.03
103	270302001815700	-	0.05
104	270302001815600	-	0.05
105	270302001815500	-	0.08
106	270302001815400	4950 BAY WOODS	0.04
107	270302001815300	-	0.04
108	270302001815200	-	0.08
109	270302001815100	-	0.04
110	270302001820500	4923 WILDWOOD AVE.	0.04
111	270302001820400	4915 WILDWOOD AVE.	0.09
112	270302001820300	4903 WILDWOOD AVE.	0.09
113	270302001820200	-	0.04
114	270302001820100	-	0.04
115	270302001820000	4873 WILDWOOD AVE.	0.04
116	270302001819900	4867 WILDWOOD AVE.	0.08
117	270302001819800	4863 WILDWOOD AVE.	0.12
118	270302001819700	-	0.06
119	270302001820600	4854 WILDWOOD AVE.	0.13
120	270302001820700	4866 WILDWOOD AVE.	0.11
121	270302001820800	4870 WILDWOOD AVE.	0.22
122	270302001820900	4882 WILDWOOD AVE.	0.11
123	270302001821000	4894 WILDWOOD AVE.	0.11
124	270302001821100	-	0.09
125	270302001821200	-	0.05
126	270302001821300	4920 WILDWOOD AVE.	0.05
127	270302001821400	-	0.05
128	271104000111600	5516 FIRELANE 25	0.05

FINAL BASELINE REPORT	01	2021/12/20	PM
ISSUED FOR/REVISIONS	No.	YYYY/MM/DD	BY

CONTROL POINTS:

CONSULTANT:

EWA Engineering Inc.
 647.400.2824 www.ewaeeng.com

DESIGN BY:	STAMP:
DRAWN BY: AVAL	
CHECKED BY: P.M.	
APPROVED BY: P.M.	
DATE:	

POINT ABINO DRAIN

OVERALL WATERSHED PLAN - ENLARGEMENT

HOR. SCALE - N.T.S. VERT. SCALE - N.T.S.

STN: N/A TO: N/A

PROJECT NO: 19-9997

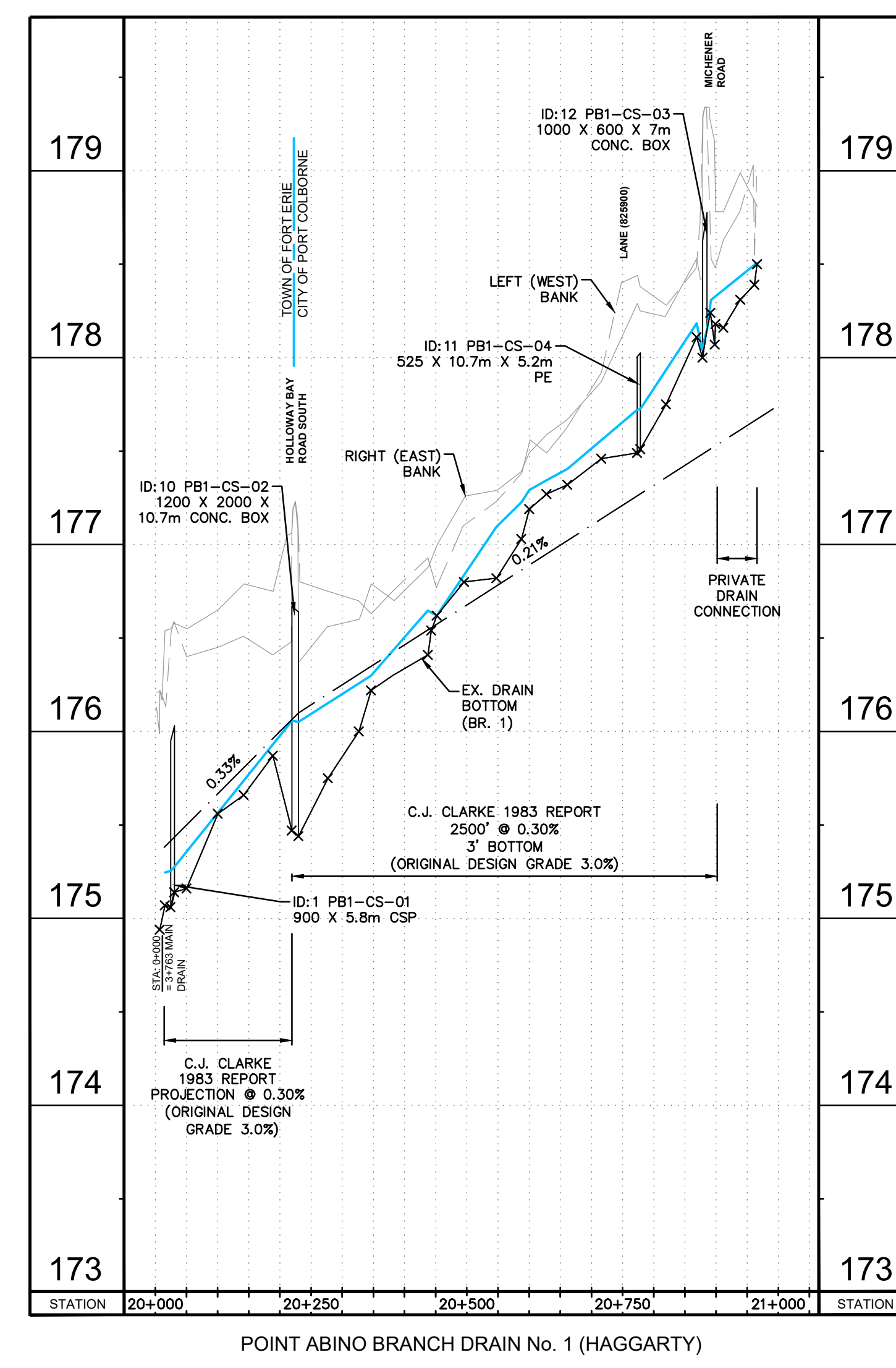
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LEGEND

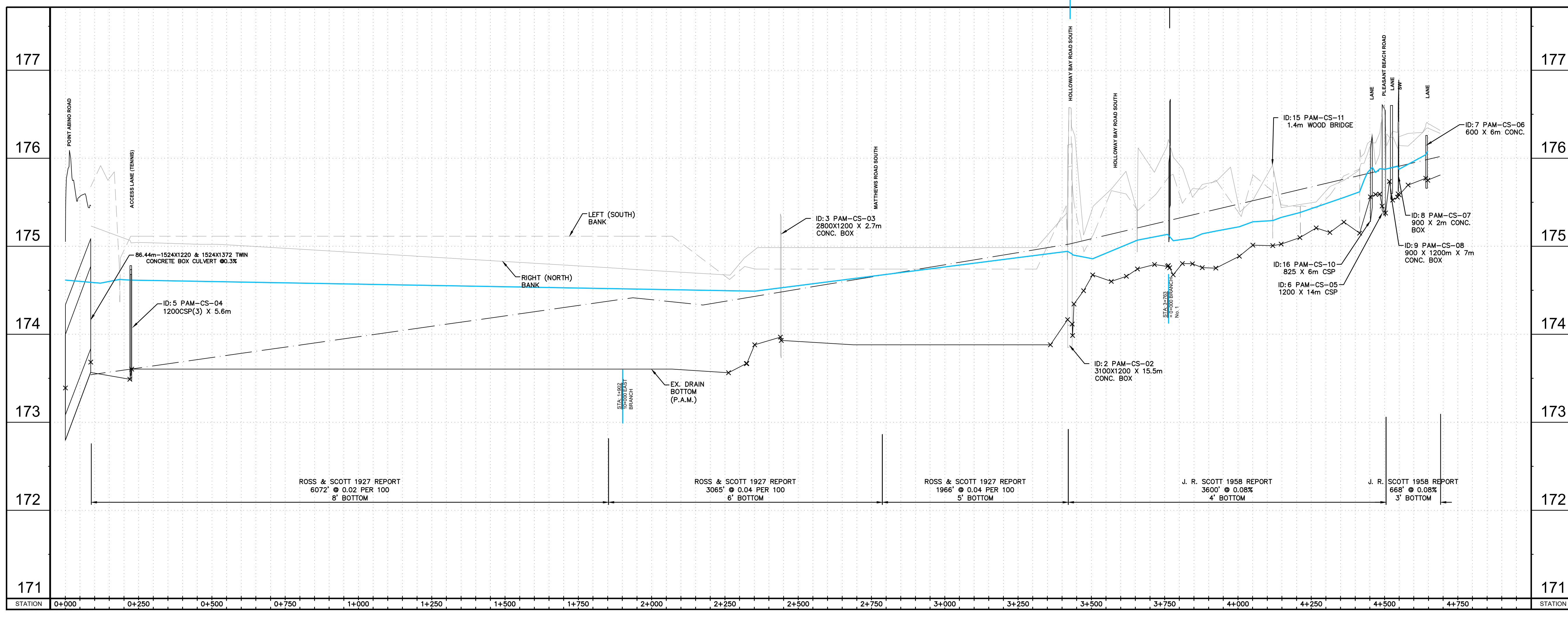
	EX. WATER LEVEL
	EX. DESIGN BOTTOM
	EX. DITCH BOTTOM
	EX. TOP OF BANK

NOTES

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POINT ABINO BRANCH DRAIN No. 1 (HAGGARTY)



POINT ABINO MARSH DRAIN

FINAL BASELINE REPORT	01	2021/12/20	PM
ISSUED FOR/REVISIONS	No.	YYYY/MM/DD	BY

CONTROL POINTS:

CONSULTANT:

EWA Engineering Inc.
 647.400.2824 www.ewaeeng.com

DESIGN BY:	STAMP:
DRAWN BY: AVAL	
CHECKED BY: P.M.	
APPROVED BY: P.M.	
DATE:	

POINT ABINO DRAIN

POINT ABINO DRAIN OVERALL PROFILE

HOR. SCALE - 1:7500 VERT. SCALE - 1:50

STN: N/A TO: N/A

PROJECT NO: 19-9997

DWG NO: DWG-003

LEGEND

-  EX. WATER LEVEL
-  EX. DESIGN BOTTOM
-  EX. DITCH BOTTOM
-  EX. TOP OF BANK


NOTES

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ISSUED FOR/REVISIONS	No.	YYYY/MM/DD	BY

CONTROL POINTS:

CONSULTANT:



EWA Engineering Inc.
 647.400.2824 www.ewaseng.com

DESIGN BY:	STAMP:
DRAWN BY: AVAL	
CHECKED BY: P.M.	
APPROVED BY: P.M.	
DATE:	

POINT ABINO DRAIN

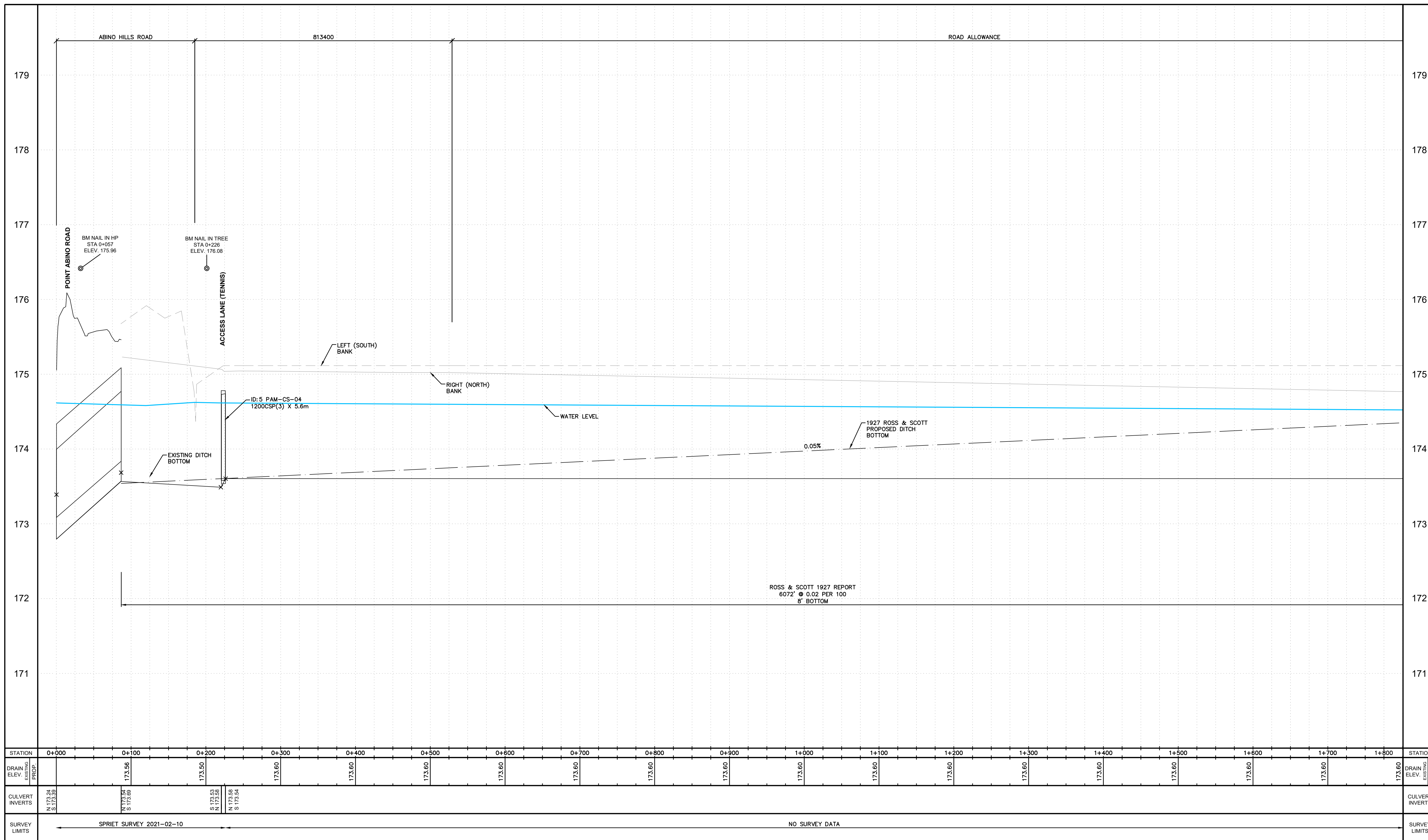
**POINT ABINO DRAIN
 PROFILE 1 OF 3**

HOR. SCALE - 1:2500 VERT. SCALE - 1:25

STN: 0+000 TO: 1+800

PROJECT NO: 19-9997

DWG NO: DWG-004



STATION	0+000	0+100	0+200	0+300	0+400	0+500	0+600	0+700	0+800	0+900	1+000	1+100	1+200	1+300	1+400	1+500	1+600	1+700	1+800	STATION	
DRAIN ELEV. EXISTING																					DRAIN ELEV. PROP.
CULVERT INVERTS	N 173.34 S 173.39	N 173.56 S 173.56	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60	N 173.60 S 173.60		CULVERT INVERTS
SURVEY LIMITS	SPRIET SURVEY 2021-02-10										NO SURVEY DATA										

LEGEND

- EX. WATER LEVEL
- EX. DESIGN BOTTOM
- EX. DITCH BOTTOM
- EX. TOP OF BANK

NOTES

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FINAL BASELINE REPORT	01	2021/12/20	PM
ISSUED FOR/REVISIONS	No.	YYYY/MM/DD	BY

CONTROL POINTS:

CONSULTANT:



DESIGN BY:	STAMP:
DRAWN BY: AVAL	
CHECKED BY: P.M.	
APPROVED BY: P.M.	
DATE:	

POINT ABINO DRAIN

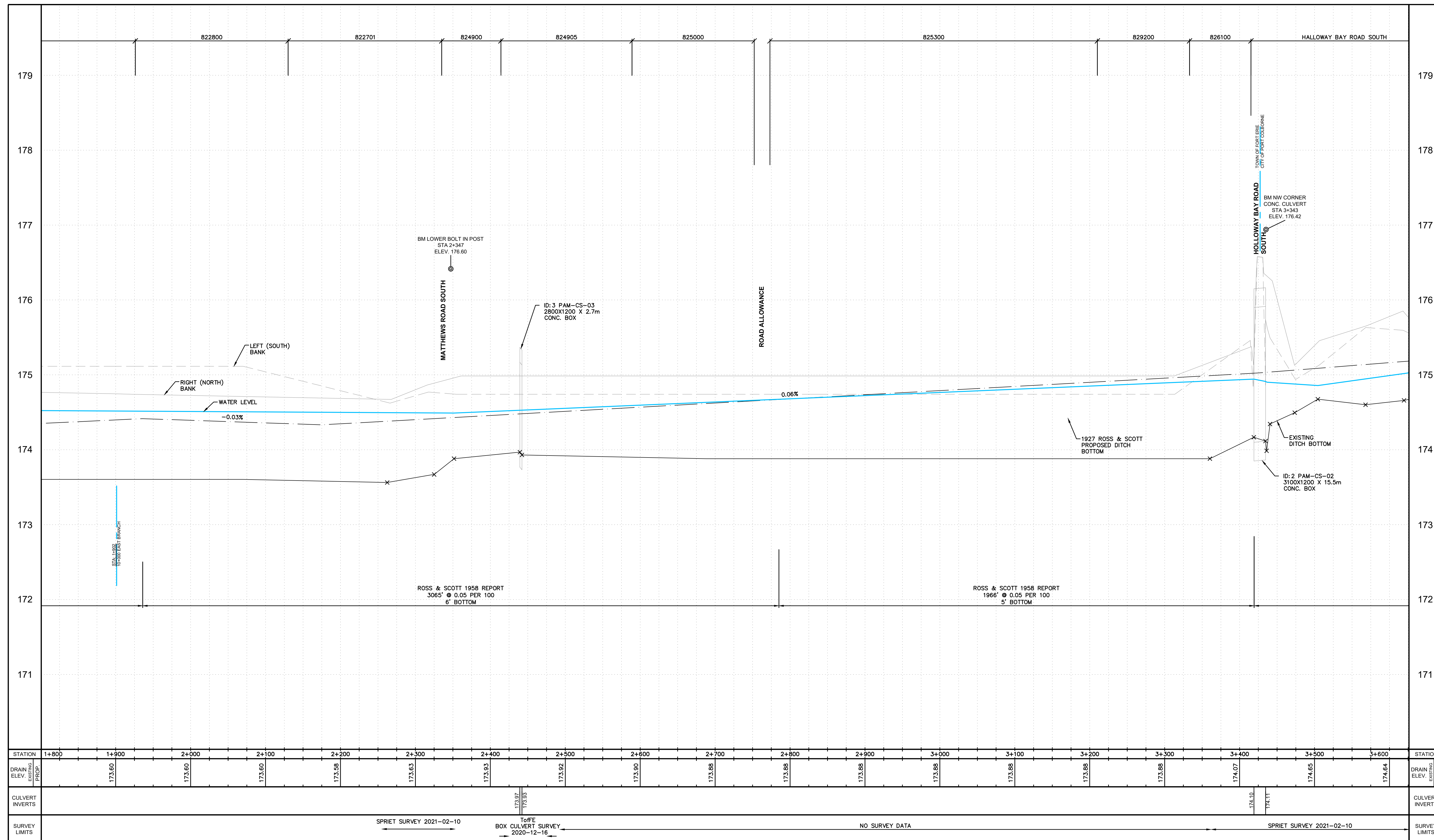
**POINT ABINO DRAIN
 PROFILE 2 OF 3**

HOR. SCALE - 1:2500 VERT. SCALE - 1:25

STN: 1+800 TO: 3+600

PROJECT NO: 19-9997

DWG NO: DWG-005



LEGEND

- EX. WATER LEVEL
- - - - - EX. DESIGN BOTTOM
- - - - - EX. DITCH BOTTOM
- - - - - EX. TOP OF BANK

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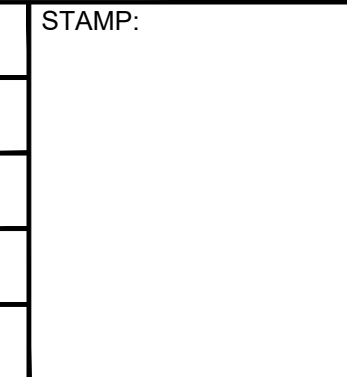
FINAL BASELINE REPORT	01	2021/12/20	PM	
ISSUED FOR/REVISIONS	No.	YYYY/MM/DD	BY	

CONTROL POINTS:

CONSULTANT:



EWA Engineering Inc.
647.400.2824 www.ewaseng.com

DESIGN BY:	STAMP:
DRAWN BY: AVAL	
CHECKED BY: P.M.	
APPROVED BY: P.M.	
DATE:	

POINT ABINO DRAIN

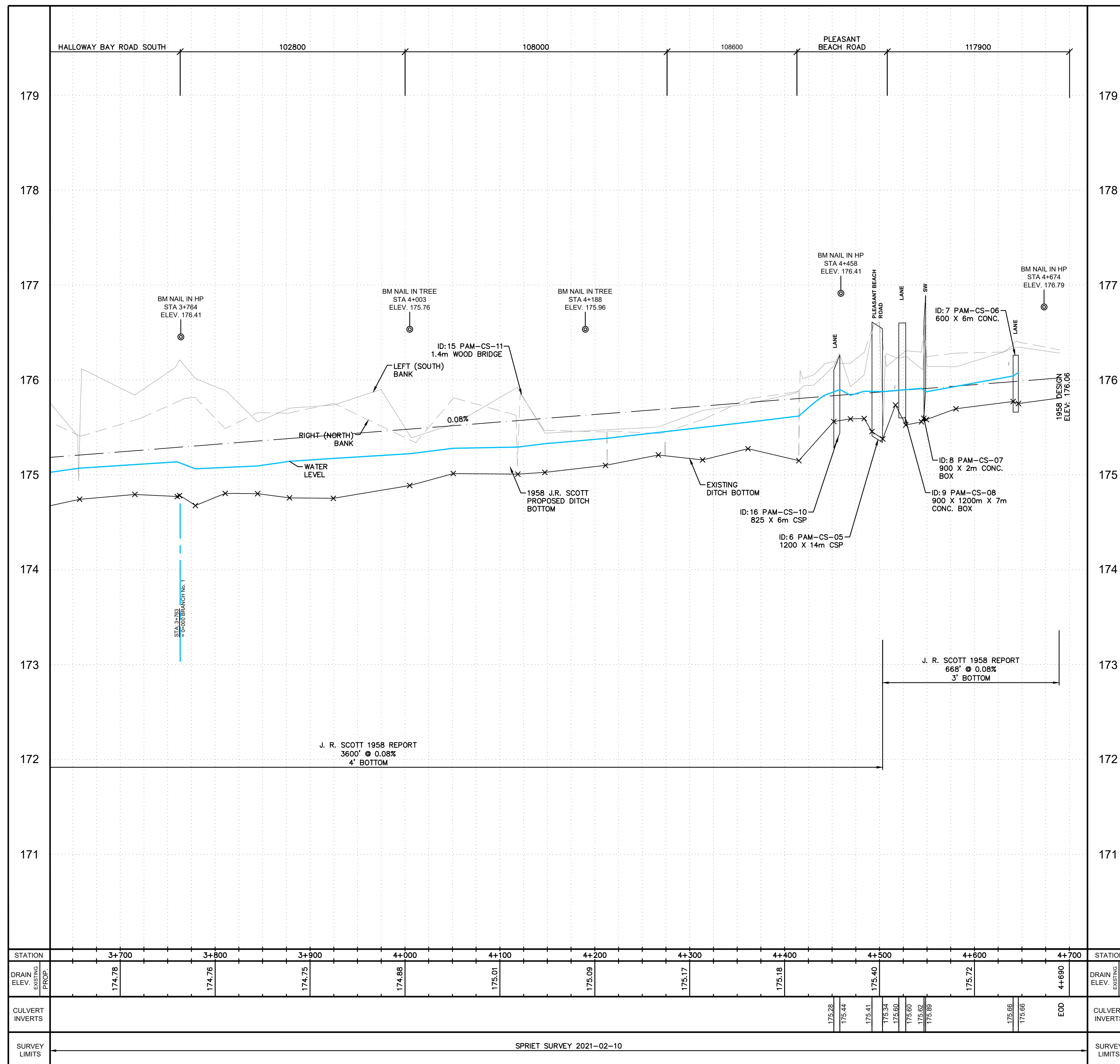
POINT ABINO DRAIN
PROFILE 3 OF 3

HOR. SCALE - 1:2500 VERT. SCALE - 1:25

STN: 3+600 TO: 4+700

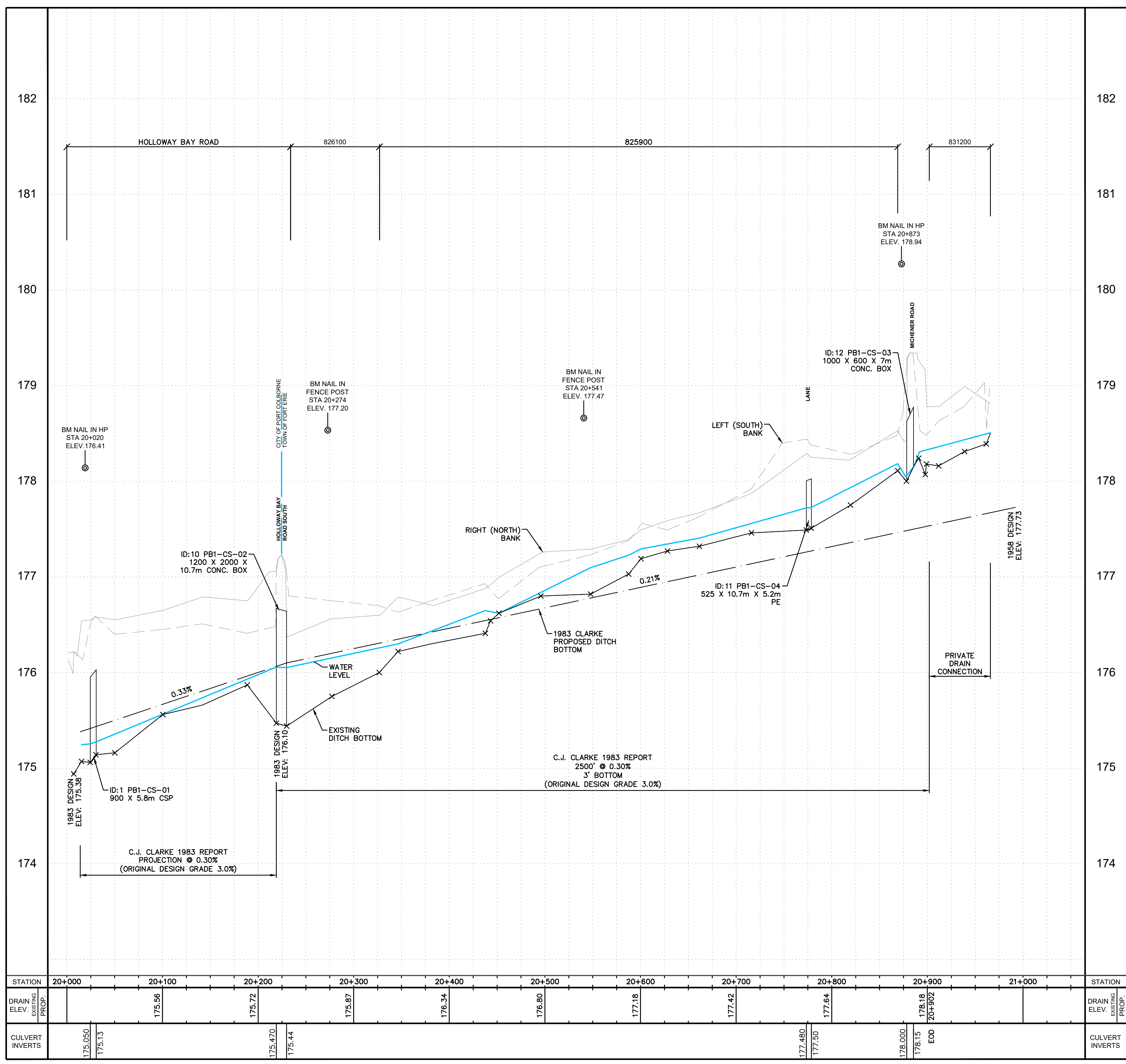
PROJECT NO: 19-9997

DWG NO: DWG-006

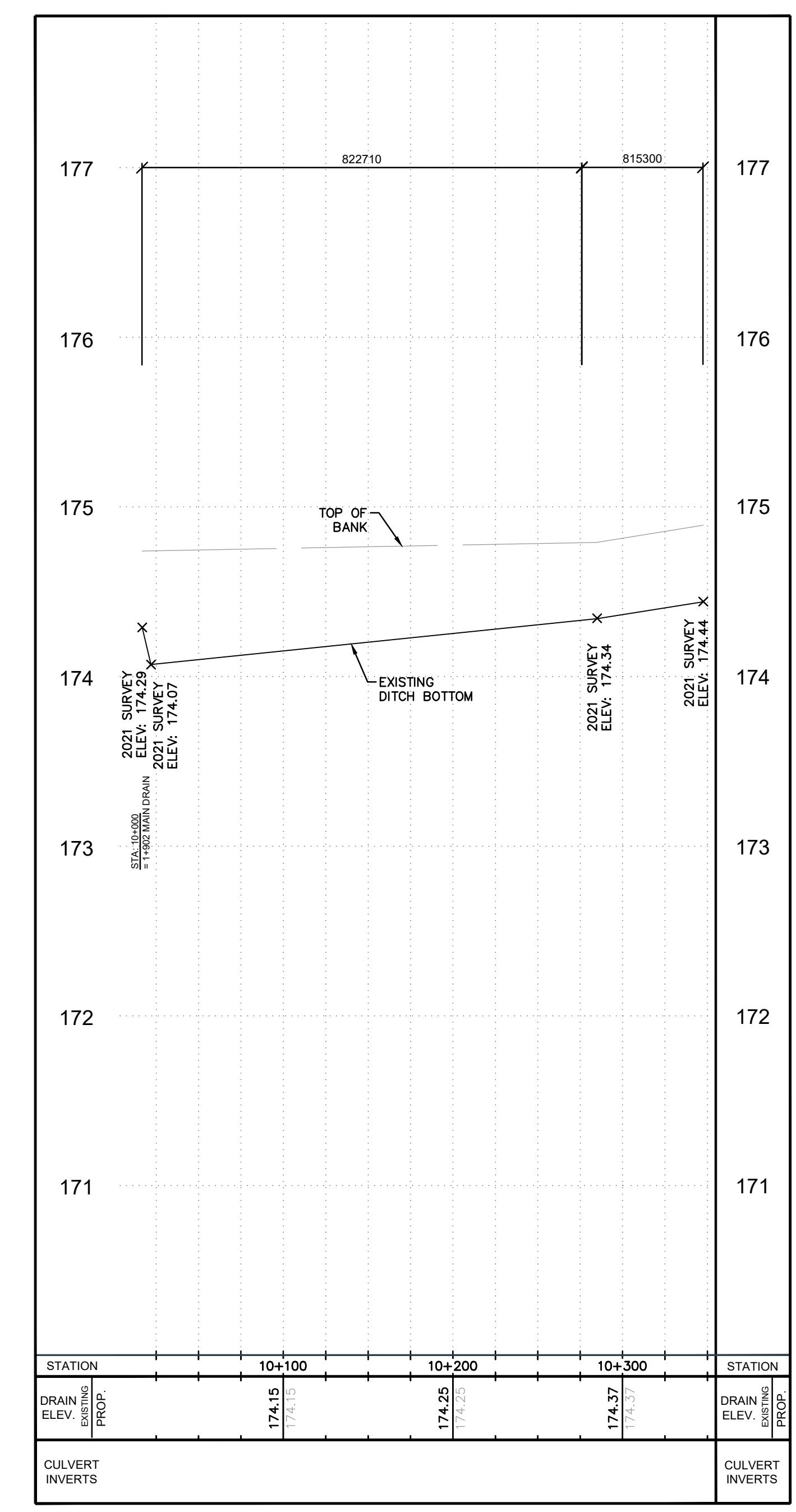


STATION	3+700	3+800	3+900	4+000	4+100	4+200	4+300	4+400	4+500	4+600	4+700	STATION	
DRAIN ELEV. PROP.	174.78	174.78	174.75	174.68	175.01	175.09	175.17	175.18	175.40	175.72	175.69	DRAIN ELEV. PROP.	
CULVERT INVERTS									175.28 175.44 175.41 175.34 175.60 175.07 175.63 175.89			175.68 175.68 EOD	CULVERT INVERTS
SURVEY LIMITS	SPRIET SURVEY 2021-02-10										SURVEY LIMITS		





BRANCH No. 1



EAST BRANCH



LEGEND

-  EX. WATER LEVEL
-  EX. DESIGN BOTTOM
-  EX. DITCH BOTTOM
-  EX. TOP OF BANK

NOTES

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REPORT TYPE	NO.	DATE	BY
FINAL BASELINE REPORT	01	2021/12/20	PM
ISSUED FOR/REVISIONS		YYYY/MM/DD	BY

CONTROL POINTS:

CONSULTANT:



EWA Engineering Inc.
647.400.2824 www.ewaeng.com

DESIGN BY:	STAMP:
DRAWN BY: AVAL	
CHECKED BY: P.M.	
APPROVED BY: P.M.	
DATE:	

POINT ABINO DRAIN
EAST BRANCH AND
BRANCH NO. 1
PROFILE

HOR. SCALE - 1:2500 VERT. SCALE - 1:25

STN: 20+000 TO: 21+000

PROJECT NO: 19-9997

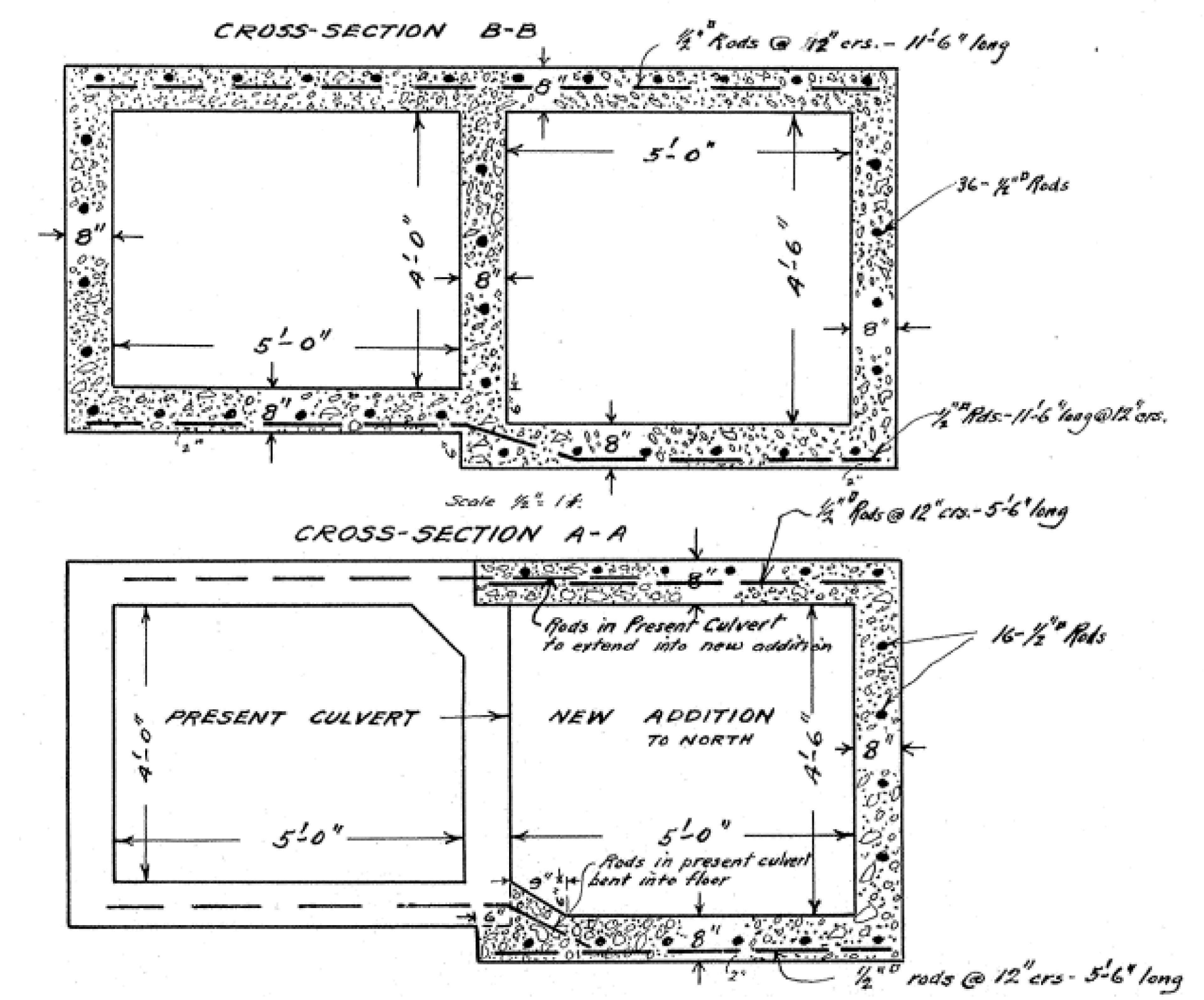
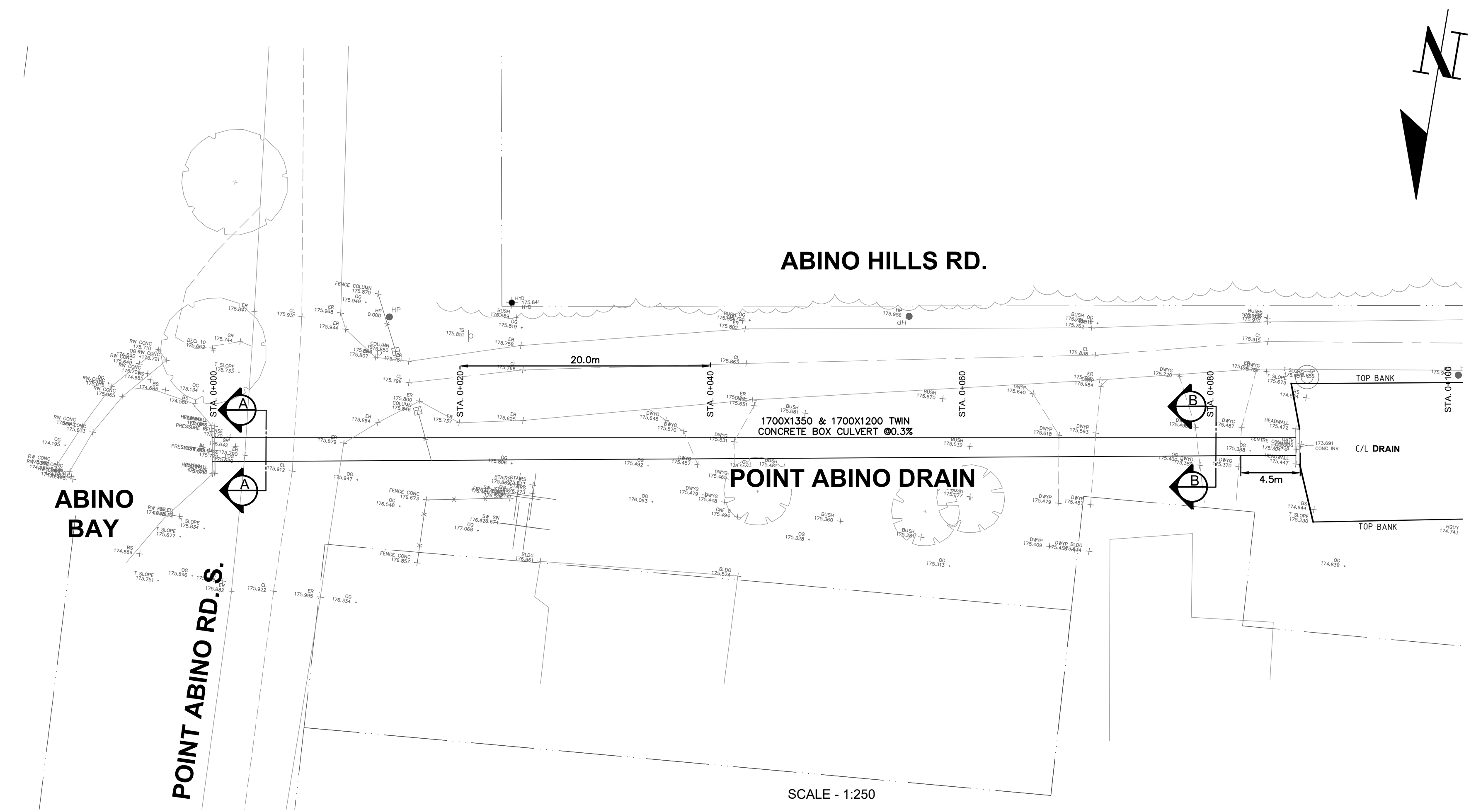
DWG NO: DWG-007

LEGEND

— SAN	SANITARY SEWER	— GUY	GUY WIRE, UTILITY POLE
— ST	STORM SEWER	— LS	LIGHT STANDARD
— W	WATERMAIN	— TB	TRAFFIC SIGNAL
— WS	WATER SERVICE	— TV	TRAFFIC SIGNAL
— G	NATURAL GAS LINE	— GV	GAS VALVE
— UH	UNDERGROUND POWER LINE	— UP	UTILITY PEDESTAL
— OH	OVERHEAD POWER LINE		
— FO	UNDERGROUND FIBRE OPTIC LINE		
— T	UNDERGROUND BELL LINE		
— C	UNDERGROUND CABLE LINE		
— D/S	DITCH/SWALE		
—	TOE OF SLOPE, TOP OF BANK		
—	FENCE		
—	EDGE OF GRAVEL		
—	CURB, DROPPED CURB		
—	EDGE OF PAVEMENT		
—	MAINTENANCE HOLE		
—	CLEAN OUT		
—	CATCH BASIN		
—	WATER VALVE		
—	CURB STOP		
—	HYDRANT		
—	TRANSFORMER		
—	SURVEY BARS		
—	CONIFEROUS, DECIDUOUS TREE		
—	SHRUB		
—	EDGE OF BUSH/DRIP LINE		

NOTES

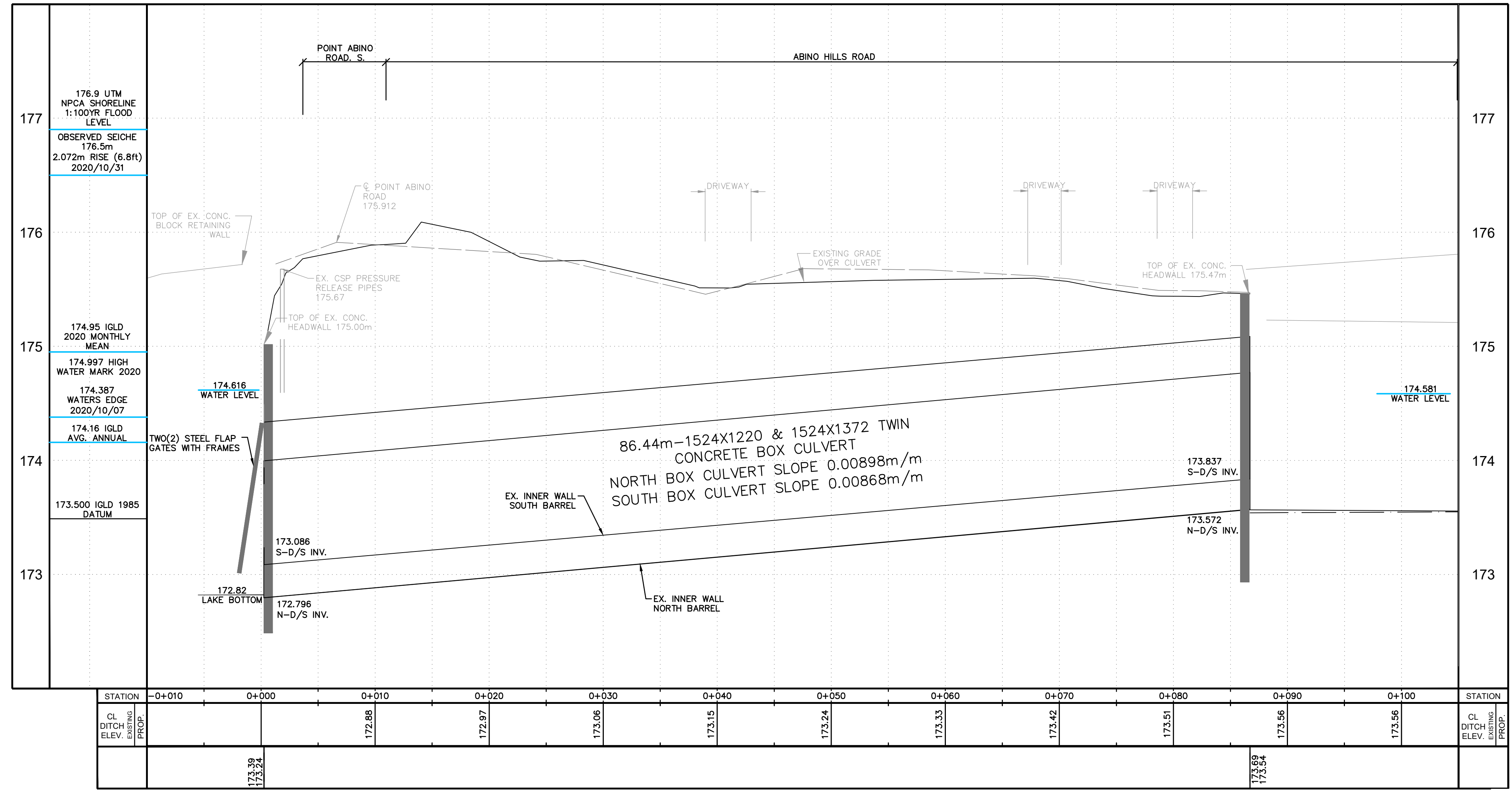
DRAWINGS ARE BASED ON INFORMATION PROVIDED BY THE CITY OF PORT COLBORNE, TOWN OF FORT ERIE AND OPEN DATA FROM ONTARIO, NIAGARA PENINSULA CONSERVATION AUTHORITY, REGIONAL MUNICIPALITY OF NIAGARA AND OTHER ACCESSIBLE DATA. ALL OTHER INFORMATION IS PROVIDED FOR PROJECT REFERENCE BUT IS NOT TO BE RELIED ON FOR CONSTRUCTION OR ANY OTHER PURPOSE OTHER THAN INCLUSION IN THE BASELINE REPORT.



CULVERT CROSS SECTIONS (1927 REPORT)
 N.T.S.



OUTLET OF CULVERT



FINAL BASELINE REPORT	01	2021/12/20	PM
ISSUED FOR/REVISIONS	No.	YYYY/MM/DD	BY

CONTROL POINTS:

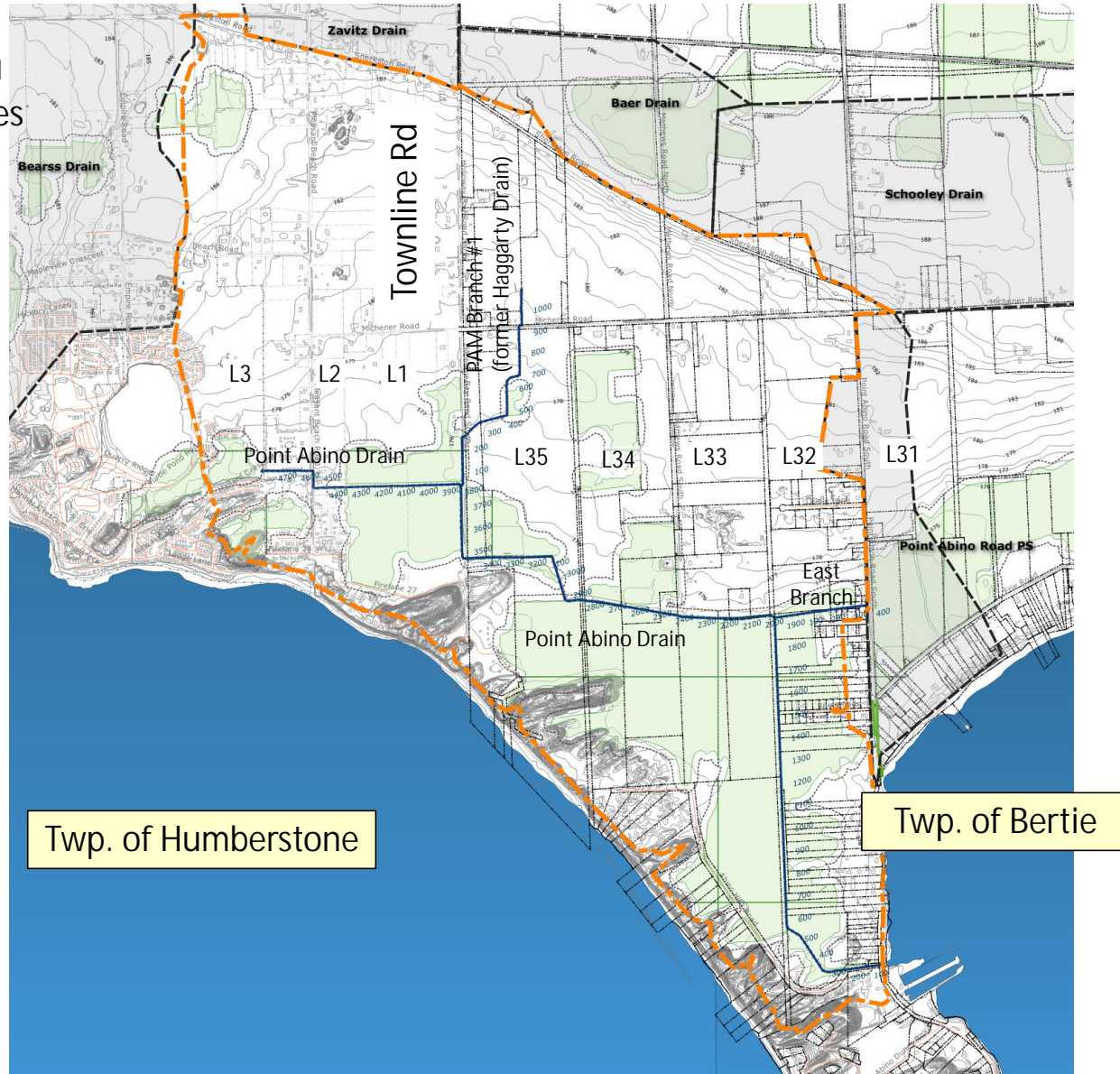
CONSULTANT:
EWA Engineering Inc.
 647.400.2824 www.ewaeeng.com

DESIGN BY:	STAMP:
DRAWN BY: AVAL	
CHECKED BY: P.M.	
APPROVED BY: P.M.	
DATE:	

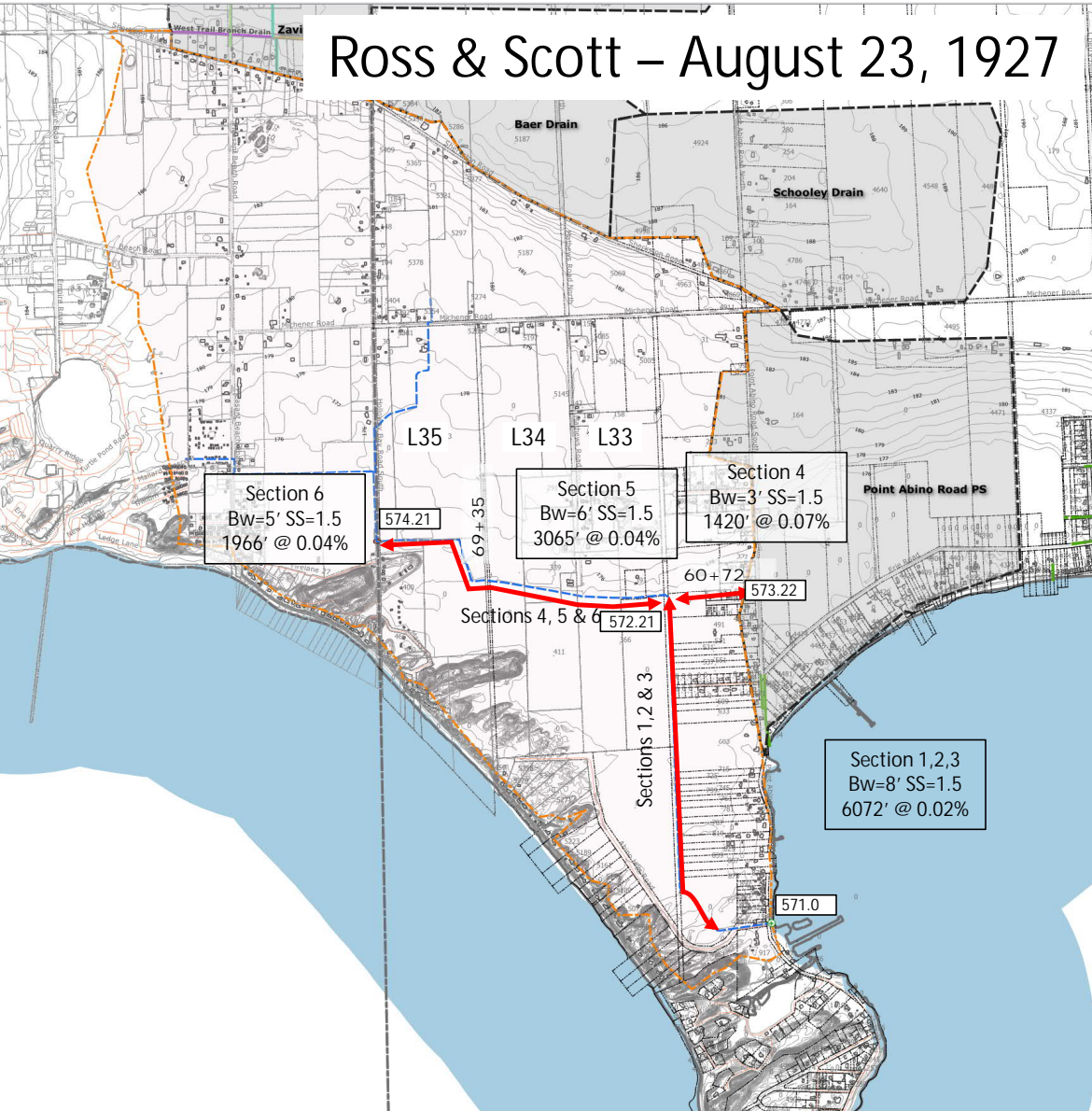
POINT ABINO DRAIN
POINT ABINO DRAIN
PLAN/PROFILE - OUTLET
CULVERT
 HOR. SCALE - 1:250 VERT. SCALE - 1:25
 STN: - 0+010 TO: 0+100
 PROJECT NO: 19-9997
 DWG NO: DWG-008

Appendix C:
Relevant Reports

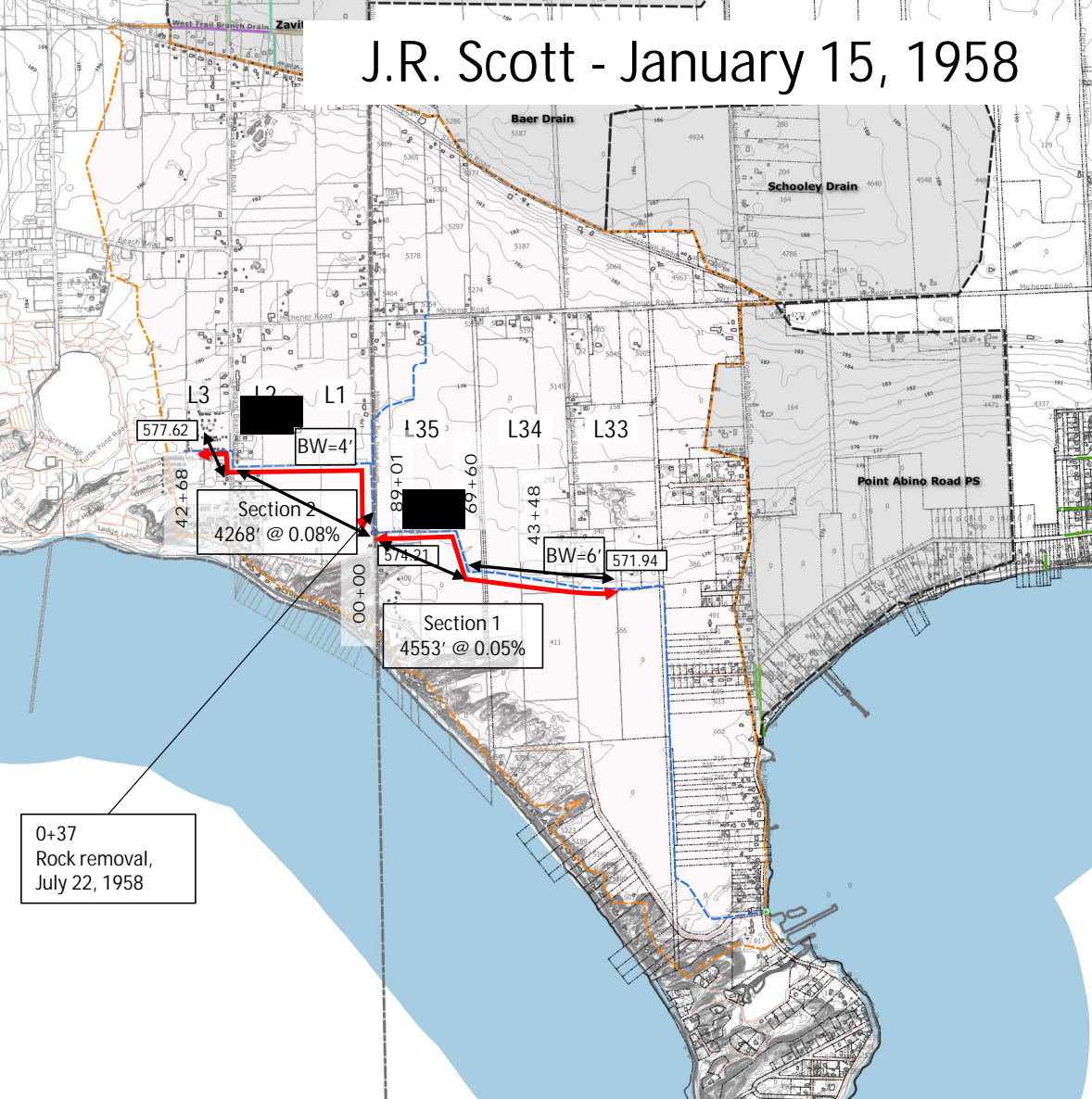
Point Abino Drain Historical map references



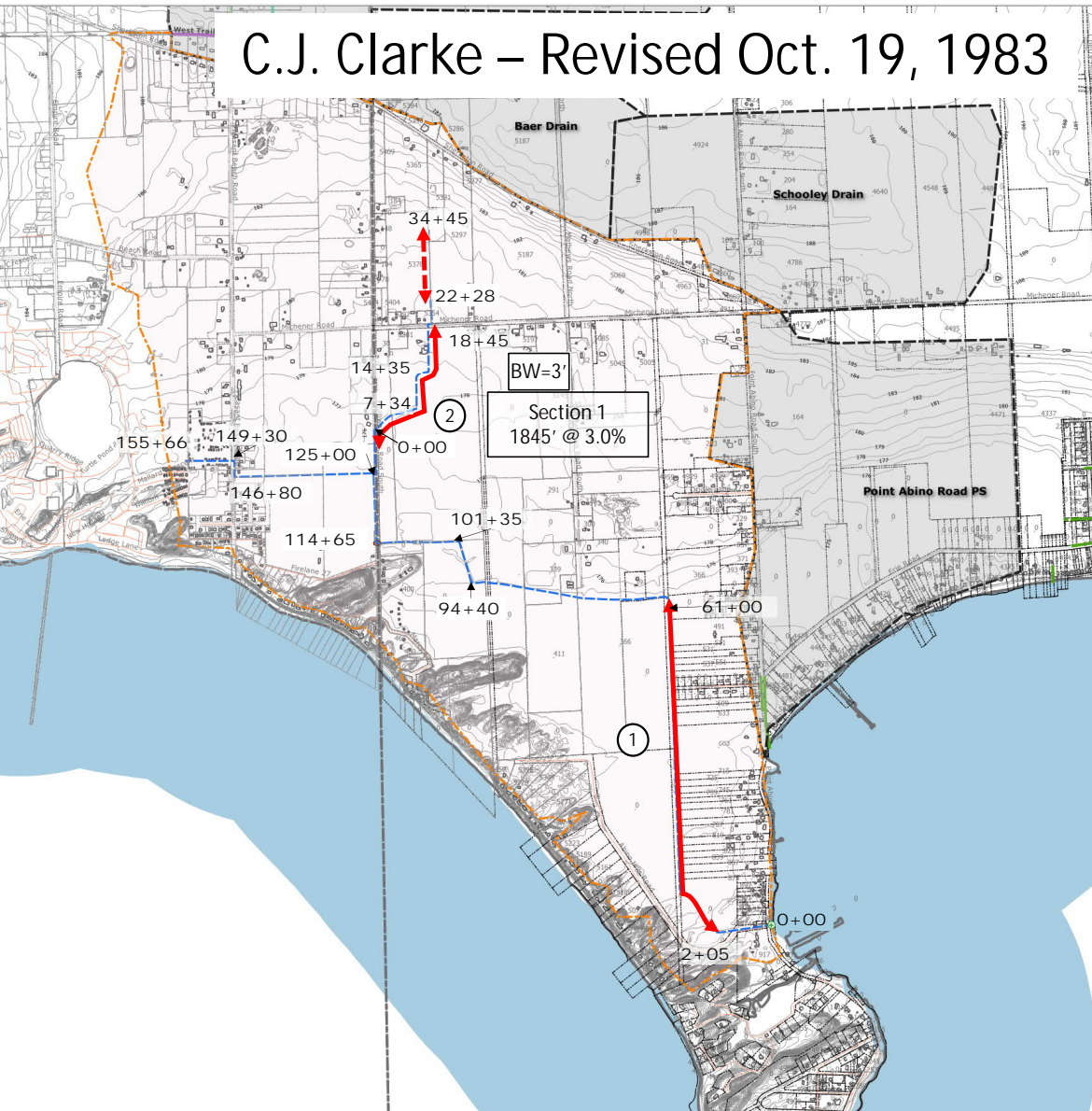
Ross & Scott – August 23, 1927



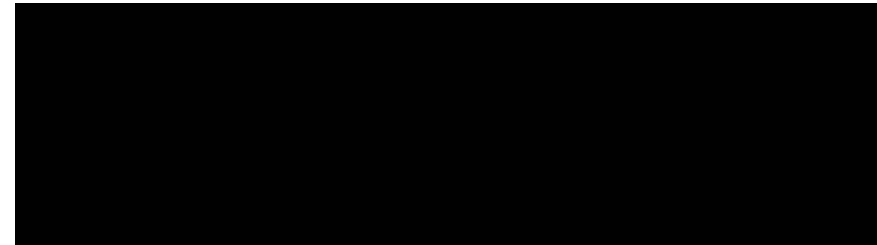
J.R. Scott - January 15, 1958



C.J. Clarke – Revised Oct. 19, 1983



The attached Dwg. No. 1 shows that the first part of the drain up to Sta 61+00 will not improve hydraulically by deepening it, but the removal of the shrubs and some of the tree branches will help during the peak run-offs.



BRANCH NO. 1 [New Branch of the Point Abino Municipal Drain]

In accordance with your instructions, we have made a re-examination and survey of the ditch which appeared to commence on the property of Mr. Ray Haggerty in Lot 35, Concession 1, L.E. Town of Fort Erie, crosses over Marcy Properties Inc. in Lot 35, B.F. Concession L.E., Town of Fort Erie, runs south on the West side of Holloway Bay Road [Townline Road] as a roadside drainage system and empties into the Point Abino Drain at Sta 125+00.

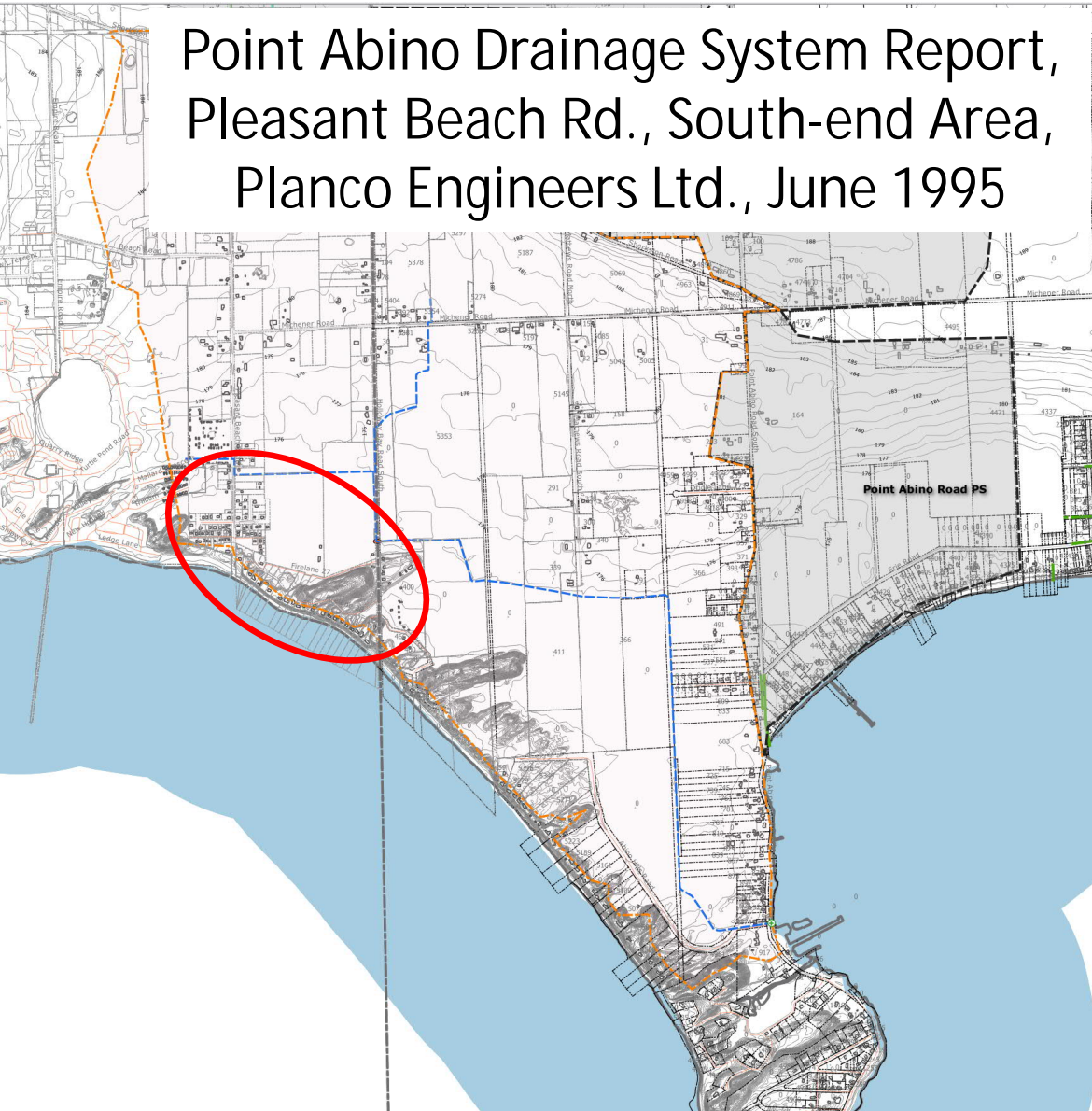
Bylaw 1420/113/83

Project cost: \$91,650.00

Today's value: \$224,177.52 (inflation adj.)

* This is the report used by the Tribunal in 1998 to assess costs to the upstream owners for the engineering report prepared but not implemented.

Point Abino Drainage System Report, Pleasant Beach Rd., South-end Area, Planco Engineers Ltd., June 1995



Three Tribunal Hearings; June 18, 23 and August 28, 1987

"It is further ordered that the City of Port Colborne have a Preliminary Report prepared to investigate the advisability of an outlet incorporating a pump at either Pleasant Beach Road or the Holloway Bay Road.

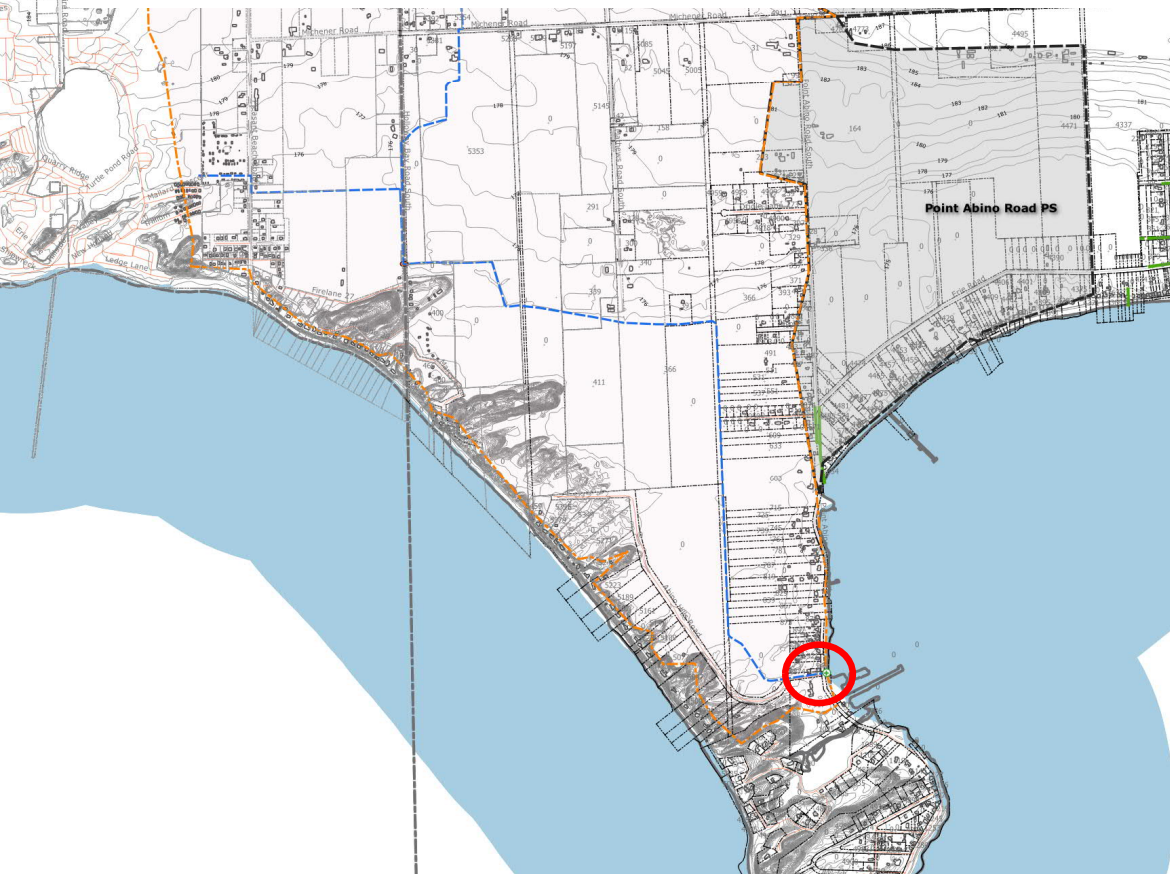
It is finally ordered that the Drainage Engineer be empowered to extend the pump discharge pipe of the Abino Drain offshore into the Bay at his discretion.

No costs awarded."

The report identifies solutions to the drainage issues within the Point Abino Drain Watershed. Two primary solutions are recommended:

- Providing a new outlet by gravity
 - Providing an outlet by pumping station
- Pleasant Beach Road Pumping Station Preliminary Estimate of Cost: 1995 \$155,000 (CPI adjusted 2021: \$ 247,355.)
- Excluding:
- Property acquisition
 - Legal
 - Geotechnical
 - Environmental requirements

City of Port Colborne, Report on the Point
Abino Drainage System Proposed
Pumping Station at Point Abino Road,
Planco Engineers Ltd., May 1996.



HEARING: July 22, 1998

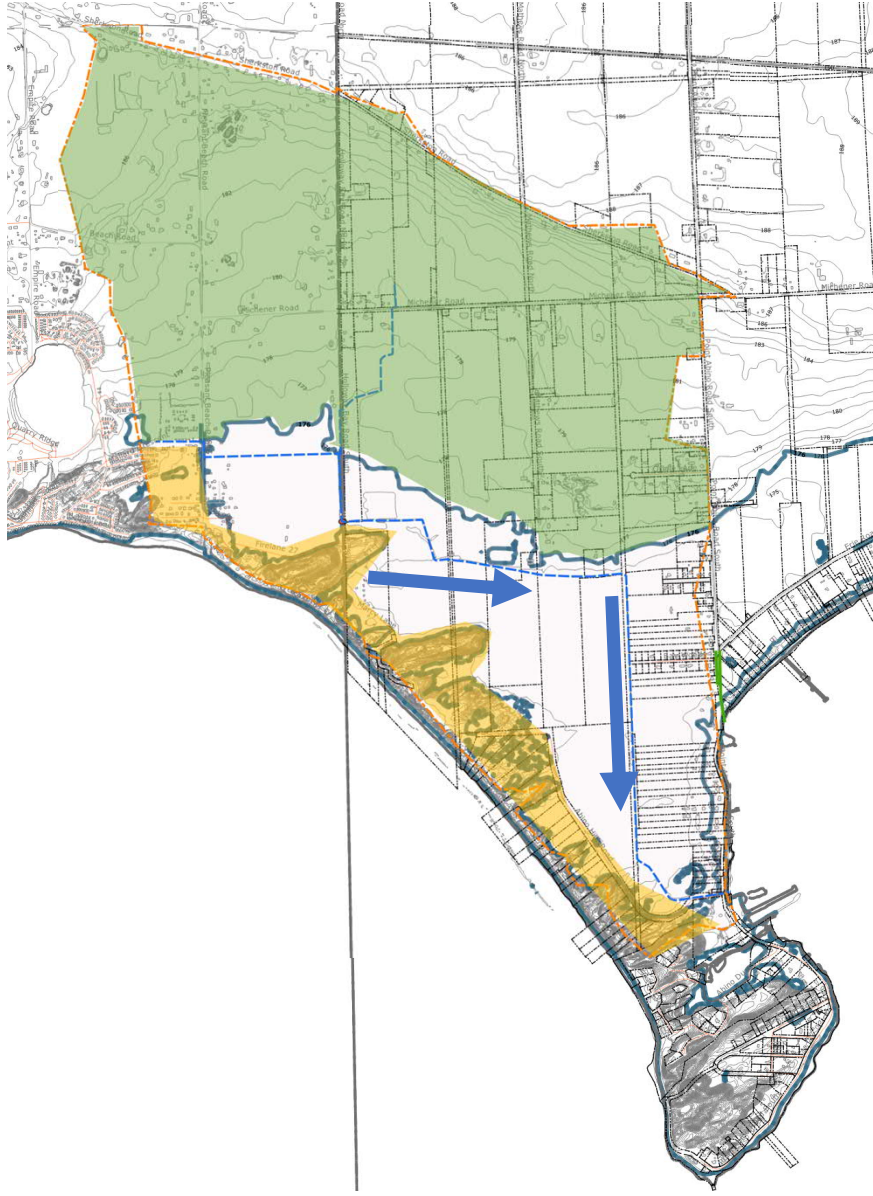
DATE OF DECISION: July 28, 1998

FILE NUMBER: 1998-28

An application to the Ontario Drainage Tribunal by the City of Port Colborne requesting the Tribunal issue an Order rescinding the September 15, 1987 order of the Tribunal directing the City of Port Colborne to install a low lift pumping station in the Town of Fort Erie on the Point Abino Drain.

Proposed pump station cost 1996: \$190,000

2021 CPI adjusted: \$298,386.36



Appendix D:
Environmental Mapping

Point Abino Drain

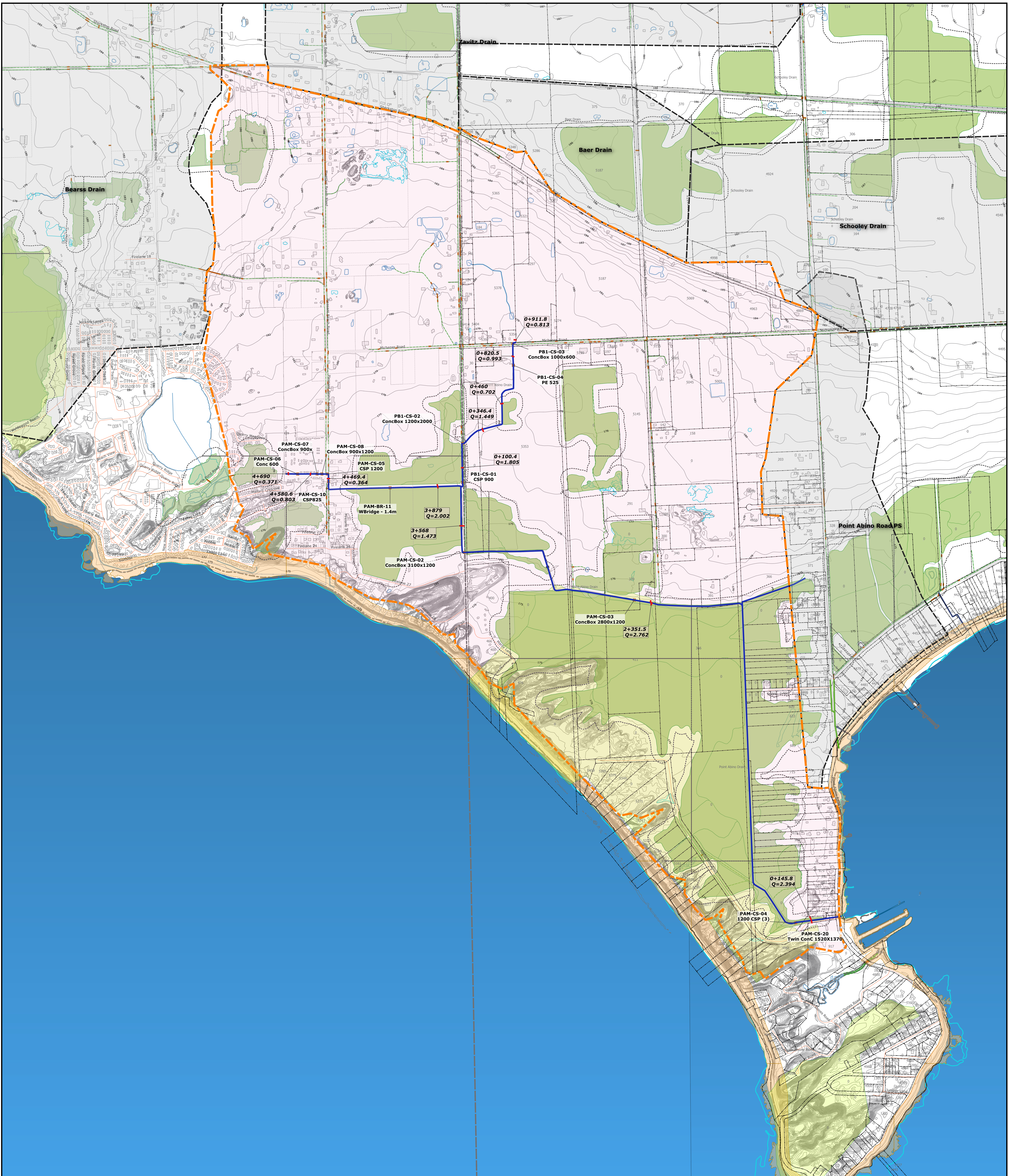


Figure Point Abino Municipal Drain
Map Scale: 1:6,000

- | | | | | | |
|---|---|---|---|--|---|
| <ul style="list-style-type: none"> — Xsections — Ptalbino_catch — ad_catch — Assessment_Parcel — PT Abino Drain Centreline — PAM crossings | <ul style="list-style-type: none"> Teranet parcel fab June 2016-2020 - Troy's Teranet parcel fab June 2016-2020 - Troy's entities House Numbers updated July 2016 Municipal Drain Name Teranet parcel fab June 2016-2020 - Troy's entities 1-parcel fab | <ul style="list-style-type: none"> TOFE-STORM_SEWER-LINE NPCA Env features GR_WetlandAllowance_NPCA GR_RegulatedWetlands_NPCA CNH_EnvProtAreas Regulated_Shoreline_Extent | <ul style="list-style-type: none"> ContemporaryMappingofWatercourses Bridge/Overpass Conduit Culvert Ditch - Other Ditch - Roadside Island | <ul style="list-style-type: none"> Open Storm Channel Pipe/Inlet/Outlet/Outfall Pond - Agricultural Pond - Other Retaining Wall Rural Drainage Slough | <ul style="list-style-type: none"> Stream/Creek Swale Waterbody - Great Lakes Waterbody - Seasonal Wharf/Pier/Dock BuildingFootprints MUNICIPAL_BOUNDARY_LOWER_AND_SINGLE_TIER |
|---|---|---|---|--|---|