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April 28, 2023

Capital Regional District
490 Atkins Avenue
Victoria, BC V9B 2Z8

Attention: Mr. Stuart Walsh, Park Operations Supervisor

RE: Island View Beach Regional Park - Comparison of 2011 and 2022 Ditch Surveys

GreatPacific Consulting Ltd. (GreatPacific) was retained in 2022 by the Capital Regional District (CRD) to complete a drainage assessment at Island View Beach Regional Park (IVBRP, or, the Park) and has subsequently been providing engineering support for various tasks relating to the Park's drainage system. At CRD request, GreatPacific prepared this memorandum to provide a comparison of both recent, and historical topographic survey of the ditching system at IVBRP.

1 Background:

IVBRP is a well utilized public recreational area operated and maintained by the CRD, which contains a network of ditch systems understood to have been constructed circa 1930's to provide drainage for the Park lands. The Park exhibits flat topography, and is low lying relative to sea level, with much of the park elevations being below high tide, and much of the ditch system existing below mean sea level. The low lying, and flat nature of the park lands and associated ditching poses drainage challenges.

In Spring 2022, GreatPacific undertook a drainage study at IVBRP, the results of which were presented in the report entitled *Ditch Drainage Study - Island View Beach Regional Park* (GreatPacific, July 2022). Within the scope of the drainage study, GreatPacific completed topographic survey of the Park's ditch system utilizing a Real-Time Kinematic topographic survey instrument (Hemisphere S321) to supplement previous historical survey of the park.

Previous topographic survey within the park was completed in August 2011 by Andy Blaine Consulting. This 2011 survey was undertaken throughout the Park, as well as areas of "Puckle Farm", and the adjacent Island View Beach Municipal Park (Central Saanich). The 2011 survey was reported to have been completed with a Leica 1105 total station.

Although the general elevation and drainage trends between the two surveys co-aligned, differences in elevations of channel bottoms were evident between the two surveys, with ditch bottom elevations varying in select locations by up to approximately 35 centimeters.

2 Comparison Results:

Elevation profiles of the IVBRP ditch system incorporating survey points from both the 2011 and 2022 surveys are presented in Appendix A. The surveys generally conformed with one another with respect to drainage and flow pathways. Notable discrepancies between the two surveys may generally be explained by natural transport/accretion of sediment, as well as from ongoing debris removal and cleaning efforts by the CRD.

It was apparent in both surveys that there were areas of non-positive gradients towards the outfall, meaning there were depressions within the ditch channels. In some cases, depressions were lower than downstream culvert inverts, which are intended to drain the upstream areas. This could result in ponded water behind a culvert, below its pipe invert.

3 Limitations and Survey Notes

In considering the comparison between the 2011 and 2022 surveys, some important limitations and considerations should be recognized, which include:

- Survey point shots, from both surveys, were taken intermittently, spaced along the ditches. The 2022 survey points were not in the same locations as the 2011 survey points. Gradients were linearly interpolated between survey point shots, and localized features (i.e. depressions, high points) between survey shots may not be entirely represented.
- Both the 2011 and 2022 surveys contained areas of ditching which were unable to be accessed due to the presence of dense vegetation. Some of the areas which could not be accessed in 2011 were able to be captured in the 2022 survey, and vice versa. However there remained some ditch areas which were not surveyed in either of the individual surveys (these areas are identified in the Appendix - Figure 1).
- The 2022 survey was limited to the CRD IVBRP lands. The 2011 survey covered ditching in the IVBRP area, as well as a small fenced-in area of "Puckle Farm", and lands of the neighboring Island View Beach Municipal Park (Central Saanich). Neither survey evaluated the ditching system of the neighboring Tsawout Nation Lands.
- The presence of sediments and debris within the ditches can affect the accuracy of ditch invert elevation measurements. There were potential errors introduced to the data such as being able to identify the exact lowest point in the ditch channels inundated with water, the degree of penetration of the survey rod into very soft sediments, and the accuracy of the survey instruments.

4 Closing

We thank you for the ongoing opportunity to work with the CRD at Island View Beach Regional Park. We trust this provided memo is sufficient to assist the CRD in their ongoing management of the Park. Should there be any questions please do not hesitate to contact the undersigned.

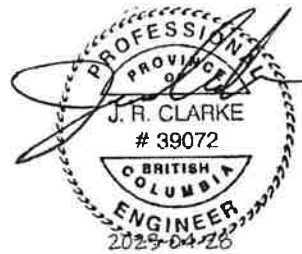
Sincerely,

Reviewed by,



Permit to Practice: 1000737

Brandon Powers, P.Eng.
Civil Engineer


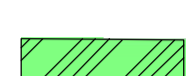
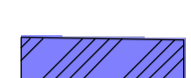



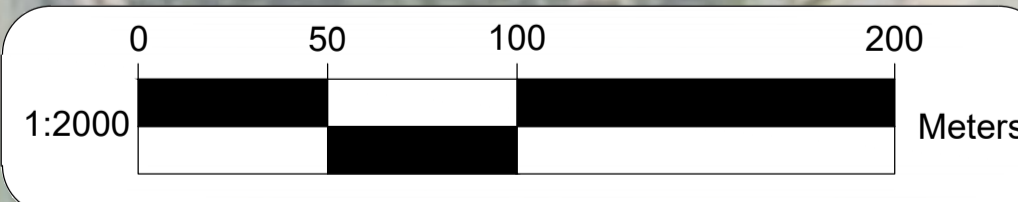
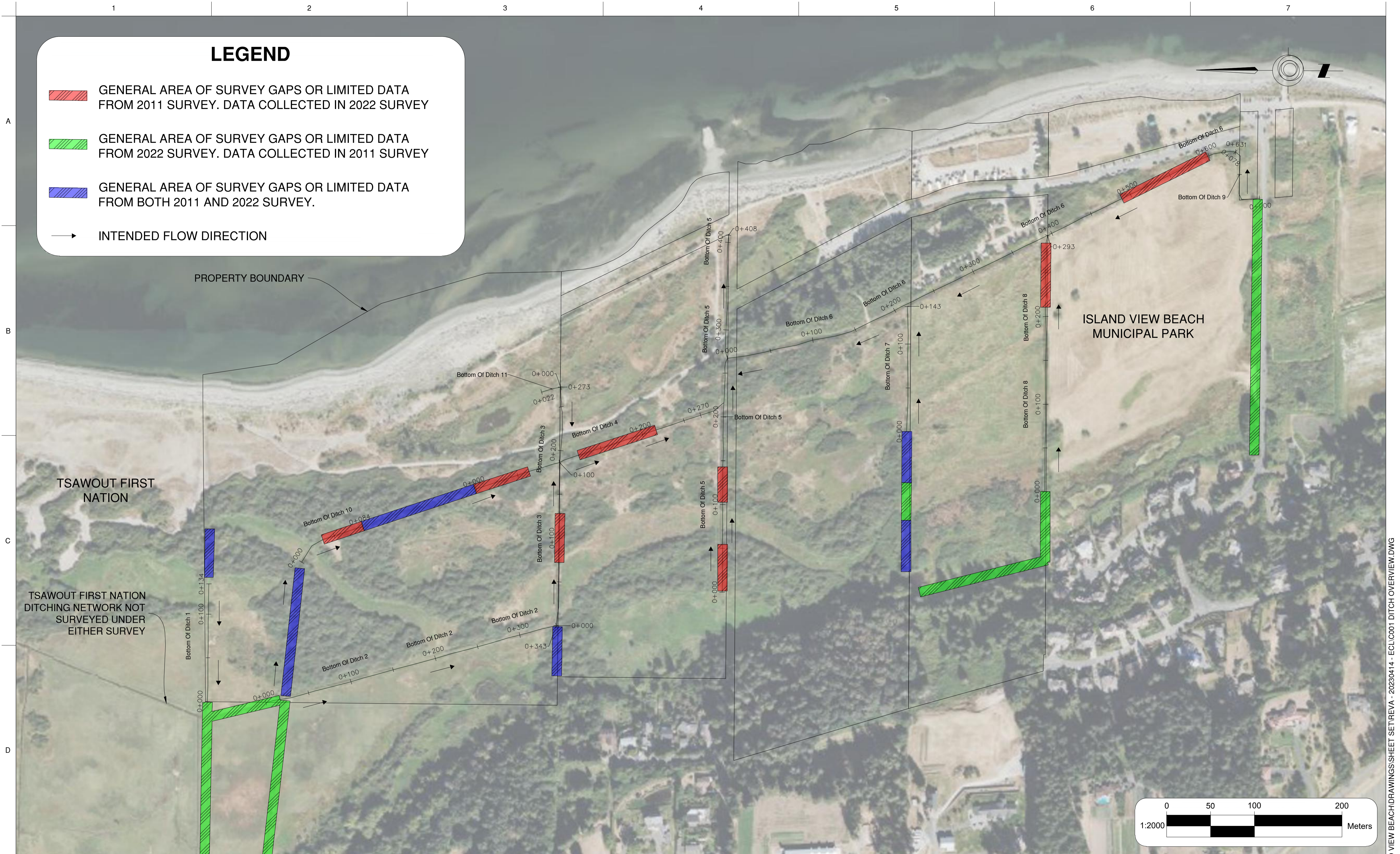
Jason Clarke, P.Eng.
Director/ Marine Pipelines and Aquatic Sciences

Appended:

Figure 1: Ditch Overview
Figure 2, 3: Ditch Profiles

LEGEND

-  GENERAL AREA OF SURVEY GAPS OR LIMITED DATA FROM 2011 SURVEY. DATA COLLECTED IN 2022 SURVEY
-  GENERAL AREA OF SURVEY GAPS OR LIMITED DATA FROM 2022 SURVEY. DATA COLLECTED IN 2011 SURVEY
-  GENERAL AREA OF SURVEY GAPS OR LIMITED DATA FROM BOTH 2011 AND 2022 SURVEY.
-  INTENDED FLOW DIRECTION



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PERMIT/STAMP:

- GENERAL NOTES:
1. SURVEY PERFORMED BY GREATPACIFIC ON 2022/04/22 & 2022/05/03 USING HEMISPHERE S321 RTK WITH LOCALIZATION TO NAD 83 UTM ZONE 10 & CGVD 1928 DATUM'S PROVIDED BY CANADIAN PRECISE POINT POSITIONING.
 2. ALL ELEVATIONS MEASURED IN METERS FROM GEODETIC (CGVD 28) DATUM.
 3. HISTORICAL SURVEY PERFORMED 2011/08/20 IN GEODETIC DATUM

CLIENT:



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ISLAND VIEW BEACH
REGIONAL PARK
TOPOGRAPHIC SURVEY
DITCH OVERVIEW

DRAWING NUMBER: **FIGURE 1**

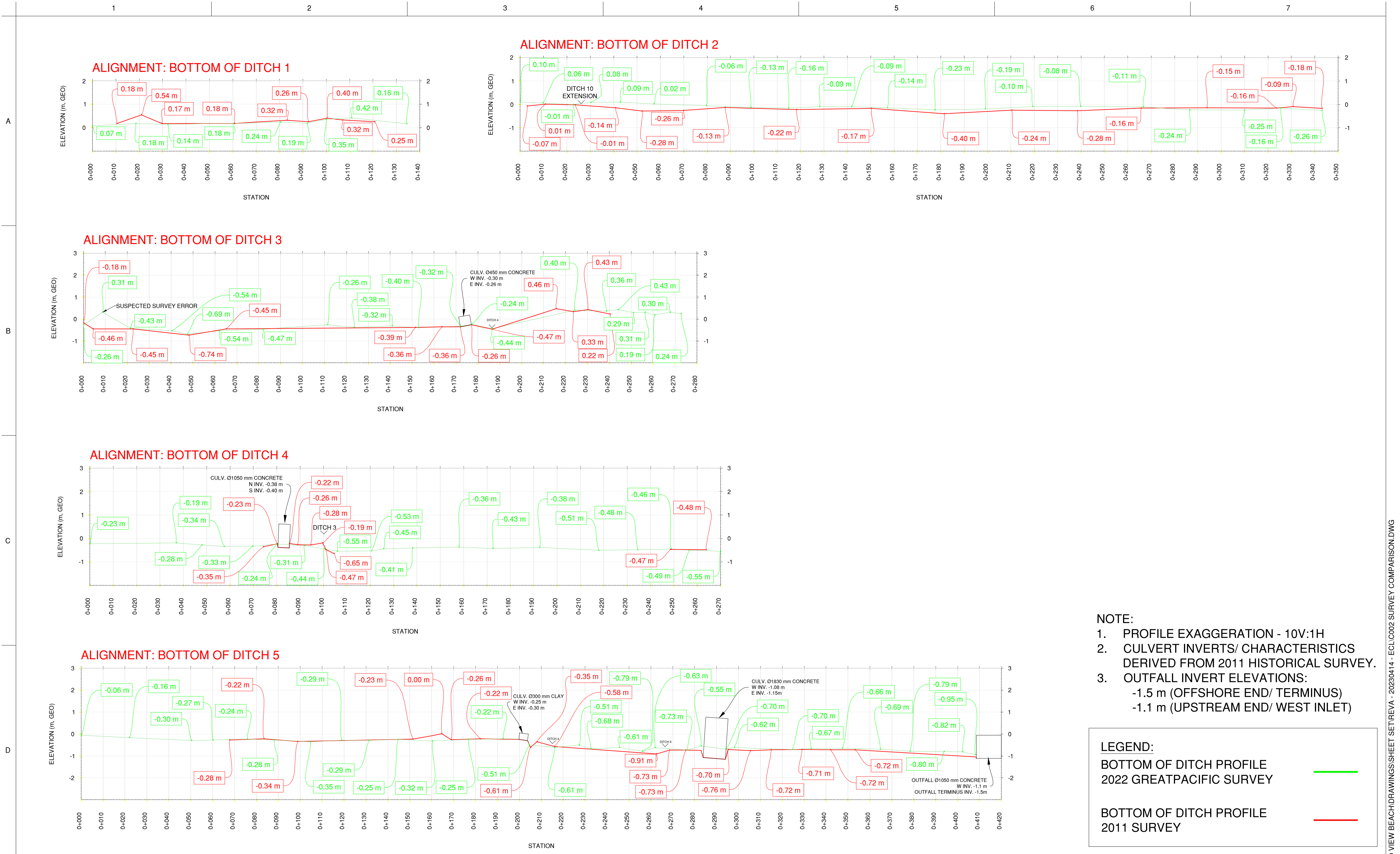
PROJECT NUMBER: 1039 - 004

SCALE: 1:2000

REV: 0

23-04-28	REFERENCE FIGURE	SJM/ECL	BP	BP
DATE	DESCRIPTION	DRAWN	DESIGNED	APPROVED

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LAST SAVED: 4/28/2023 2:38:42 PM
LAST SAVED BY: SAM.MONCUR



- NOTE:**
1. PROFILE EXAGGERATION - 10V:1H
 2. CULVERT INVERTS/ CHARACTERISTICS DERIVED FROM 2011 HISTORICAL SURVEY.
 3. OUTFALL INVERT ELEVATIONS:
 -1.5 m (OFFSHORE END/ TERMINUS)
 -1.1 m (UPSTREAM END/ WEST INLET)

LEGEND:

BOTTOM OF DITCH PROFILE
 2022 GREATPACIFIC SURVEY —

BOTTOM OF DITCH PROFILE
 2011 SURVEY —

23-04-28	REFERENCE FIGURE	SJM/ECL	BP	BP
DATE	DESCRIPTION	DRAWN	DESIGNED	APPROVED

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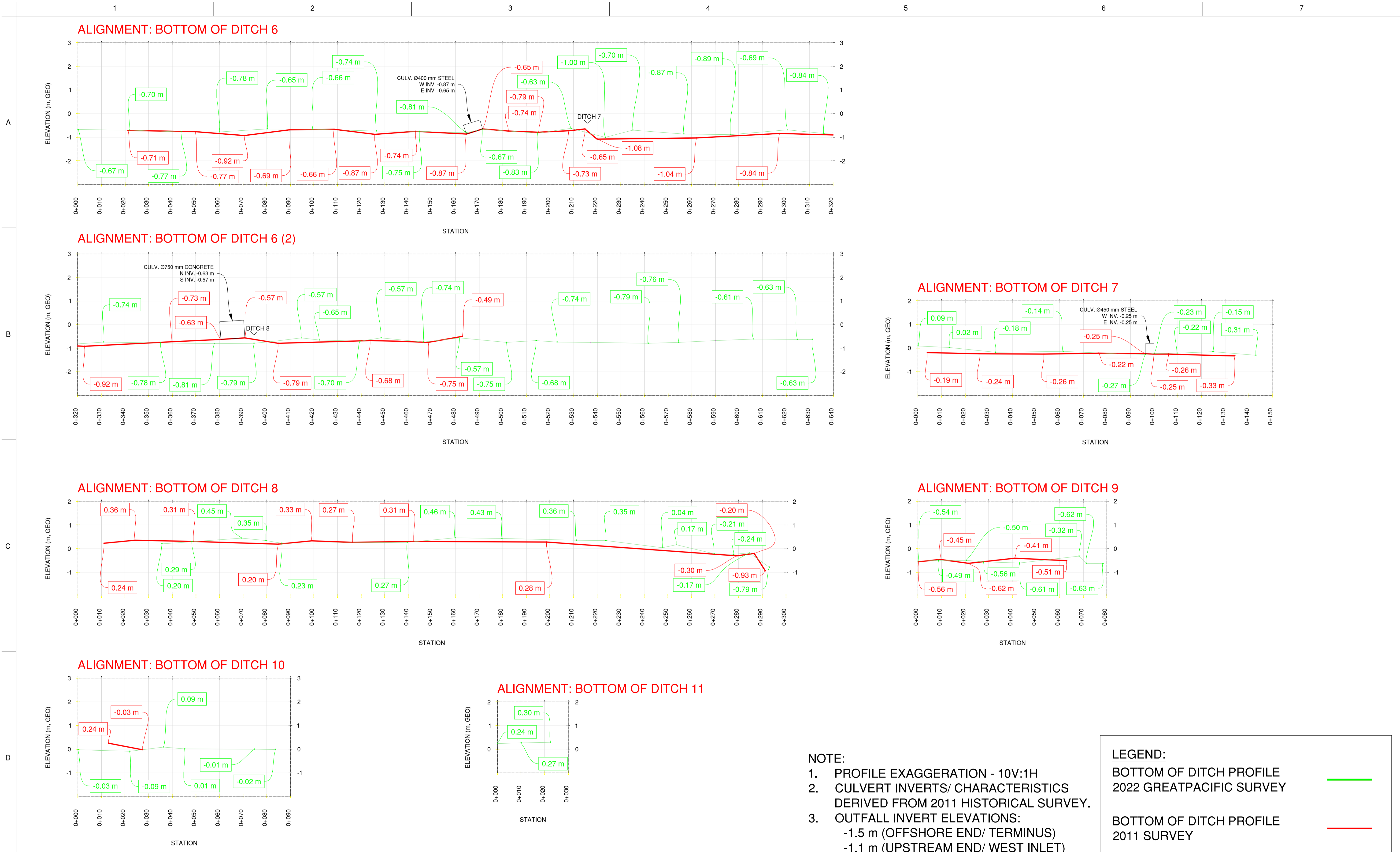
PROJECT NUMBER: 1039 - 004

ISLAND VIEW BEACH
REGIONAL PARK
 TOPOGRAPHIC SURVEY COMPARISON
 DITCH PROFILE VIEWS 1

DRAWING NUMBER: **FIGURE 2**

SCALE: 1:750, 10V:1H

REV: 0



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LEGEND:

BOTTOM OF DITCH PROFILE 2022 GREATPACIFIC SURVEY	—
BOTTOM OF DITCH PROFILE 2011 SURVEY	—

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ISLAND VIEW BEACH
REGIONAL PARK
TOPOGRAPHIC SURVEY COMPARISON
DITCH PROFILE VIEWS 2

DRAWING NUMBER: **FIGURE 3**

SCALE: 1:750, 10V:1H

REV: 0