C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

115 Sandford Fleming Drive, Suite 200
Collingwood, Ontario L9Y 5A6
Tel: (705) 444-2565
Fax: (705) 444-2327
Email: info@cctatham.com
Web: www.cctatham.com

February 15, 2017

via email (a.sorensen@greysauble.on.ca) & courier
CCTA File 116227

Andrew Sorensen
Environmental Planning Coordinator
Grey Sauble Conservation Authority
237897 Inglis Falls Road RR 4
Owen Sound, Ontario N4K 5N6

Re: Lot 51 Sunset Boulevard, Town of The Blue Mountains, Grey County
Natural Hazard Study

Dear Andrew:

C.C. Tatham & Associates Ltd. (CCTA) has been retained by Vince Macchia to prepare a Natural Hazard Study for the above noted property in support of the proposed construction of a single family residential dwelling. The subject property is located on Sunset Boulevard in the Town of The Blue Mountains. The purpose of the Natural Hazard Study is to establish the Regulatory flood elevation, as well as other applicable natural hazard setbacks and to demonstrate that the proposed lot development can occur while adequately addressing potential hazards.

In September 2016, CCTA completed a topographic survey of the tributary throughout the site and of the Sunset Boulevard tributary crossing. The location of the site and surveyed channel cross-sections are illustrated on the enclosed Drawing FM-1.

To establish the flood hazard limit, a hydrologic analysis of the drainage area upstream of the subject property was completed along with a hydraulic analysis of the watercourse through the property. The hydrologic and hydraulic analysis were completed as per the agreed upon Terms of Reference established for this study. The results of the completed analysis are discussed in the following sections:

## Hydrologic Analysis

The watercourse traverses the site and flows north where it outlets into Georgian Bay. As part of the Natural Hazard Study, a Visual OTTHYMO model was created for the subject property. The contributing drainage area was determined to be 176.3 ha. The catchment delineation was determined using available 5m contours from Ontario Base Mapping and confirmed with contour data from the Grey County Mapping tool. The hydrologic model calculated the Regulatory storm event to be 11.49 $m^3/s$.

The drainage area is shown on Drawing DP-1 and the detailed model results are attached in Appendix A along with the hydrologic model input parameters.

## Existing Condition Hydraulic Analysis

The site is currently covered in trees and brush with no existing driveway access or development on the site. As noted above, a watercourse traverses the site and crosses Sunset Boulevard though a 2.9.x 1.45 m corrugated metal pipe arch culvert. The HEC-RAS hydraulic model was used to determine the existing Regulatory Storm elevation in the vicinity of the site. The HEC-RAS hydraulic model was established using the topographic survey data collected and the peak flows generated from the hydrologic analysis. Channel cross sections were established roughly every 15 m and extend to an elevation that contains the Regulatory storm event. The cross sections used in the hydraulic analysis are shown on the enclosed Drawing FM-1.

The Regulatory peak flow rate of 11.49 $m^3/s$, which was determined by the Visual OTTHYMO model was applied to the hydraulic model upstream of the subject property. A Manning's roughness coefficient "n" of 0.035 was selected for the main channel based on a straight channel that has some weeds and stones. A roughness coefficient of 0.06 was selected for the right overbank based on the presence of light brush and trees and 0.05 for the left overbank based on scattered brush areas.

During the Regulatory Storm, the Sunset Boulevard crossing does not have sufficient capacity and will cause flows to back up and overtop the road. This condition sets the flood elevation for the site.

The existing Regulatory Storm flood elevation at each cross section is shown on Drawing FM-1. A summary of the HEC-RAS model results is provided in Table 1. Additional results from the existing conditions HEC-RAS hydraulic model are included in Appendix B.

## Proposed Condition Hydraulic Analysis

A proposed condition HEC-RAS hydraulic model was created to ensure the fill associated with the proposed driveway and house will have not adversely impact adjacent properties under the Regulatory Storm event. In the proposed conditions model, a driveway and house were added to the relevant sections across the site. The proposed building and fill pad will be floodproofed to an elevation of 179.06 m, which is approximately 0.3 m above the Regulatory Storm elevation of 178.76 m. The preliminary site grading plan, Drawing LG-1, is attached.

It was found that the proposed development will result in no change to water levels under the Regulatory Storm. A summary of the HEC-RAS model results are provided in Table 1. Additional results from the proposed conditions HEC-RAS hydraulic model are included in Appendix C.

Table 1: HEC-RAS Hydraulic Model Water Surface Elevations

| Cross Section ID | Existing Regulatory Storm Elevation (m) | Proposed Regulatory Storm Elevation (m) |
|---|---|---|
| 1000.0 | 179.67 | 179.67 |
| 971.2 | 179.11 | 179.11 |
| 963.6 | 178.87 | 178.87 |
| 948.1 | 178.90 | 178.90 |
| 936.3 | 178.69 | 178.69 |
| 909.0 | 178.76 | 178.76 |
| 902.3 | 178.76 | 178.76 |
| 892.8 | 177.99 | 177.99 |
| 829.8 | 177.90 | 177.90 |

The proposed building pad and driveway result in a minor decrease to floodplain storage. The changes to the site result in a decrease in floodplain storage of approximately 62 $m^3$ which is a minor reduction. For comparison, the total floodplain storage across the subject property is approximately 1,030 $m^3$. The close proximity between the site and the ultimate receiver, Georgian Bay, should also be considered. The fill in the floodplain does not alter the regulatory flood elevation under the proposed conditions.

## Erosion Hazard Limit

The erosion hazard limit established for the site has been defined in accordance with Section 3.1 of the Provincial Policy Statement, and specifically supporting technical guidance document, Ontario Ministry of Natural Resources (MNR) Technical Guide for River & Stream Systems: Erosion Hazard Limit. The tributary is a confined river system and the erosion hazard limit for this reach is defined as the sum of the toe erosion allowance, stable slope allowance and erosion access allowance.

Along the watercourse there is evidence of active erosion and the channel bankfull width is between 4 and 7 m. Given the site soils, a toe erosion allowance of 5.0 m was applied. In the absence of a geotechnical report, the stable slope allowance for this assessment has been defined as a horizontal distance equal to three times the height of slope measured farther landward from the toe erosion allowance. Similarly, a 3 m erosion access allowance has also been used at the top of slope for this assessment with additional space used for grading to the proposed building pad. The erosion hazard limit is approximately 11 m from the toe of the watercourse bank. The existing vegetation along the bank will remain to stabilize the bank.

To help prevent future erosion of the bank, cobbles and boulders can be added along the channel side slopes, if required. The addition of the cobbles or boulders would have a negligible impact on erosion of adjacent properties as the Manning's roughness coefficient "n" would only increase from 0.035 to 0.040. The site is also 110 m from the ultimate receiver and subject to backwater conditions from Georgian Bay under higher lake levels, which decreases the risk of impact on adjacent properties.

## Site Grading

An irregular shaped building pad of approximately 242 $m^2$ is proposed to be created at an elevation of 179.06 m. As noted above, the Regulatory Flood elevation is 178.76 m at the fill pad location. The fill pad elevation will be set 0.3 m above the Regulatory Flood elevation (179.06 m) and the finished floor elevation will be set at 179.36 m. A driveway has been graded to provide safe access/egress during the Regulatory Storm event. We note that because the lot is in a backwater area associated with the overtopping of Sunset Boulevard, flow velocities in the vicinity of the areas of fill placement will be low, thus no additional erosion protection is proposed on the fill slopes.

All proposed grading will take place outside the erosion hazard setback.

## Conclusions

The natural hazard study has defined the Regulatory Storm elevation and an erosion hazard setback for the subject site. A building pad has been established at an elevation of 179.06 m to provide dry floodproofing and the finished floor elevation has been set at 179.36 m. It has been demonstrated that the required fill will not adversely impact upstream properties. Safe access can be provided along Sunset Boulevard and the proposed driveway.

We believe we have demonstrated that the proposed lot development can take place in a manner that satisfies natural hazard concerns. We trust that this study and the enclosed documentation are sufficient for your review and approval. If you have any questions or concerns, please do not hesitate to contact the undersigned.

Yours truly,
C.C. Tatham & Associates Ltd.

ALK/AW:mw
copy: Enzo Macchia (via email macchia@rogers.com)
I:\2016 Projects\116227 - Lot 51 Sunset Blvd - Floodplain Study\Documents\Letters\L - GSCA - Sunset Blvd Flood Study.docx

# APPENDIX A:
# EXISTING CONDITIONS HYDROLOGY CALCULATIONS

C.C. Tatham & Associates Ltd.
Consulting Engineers

Collingwood Bracebridge Orillia Barrie

| | |
|---|---|
| **Project:** | Sunset Blvd Flood Study |
| **File No.:** | 116227 |
| **Date:** | 03-Oct-16 |
| **Designed By:** | AW |
| **Checked By:** | ALK |
| **Subject:** | CN Calculator |

## Sunset Blvd Flood Study
## CURVE NUMBER, INITIAL ABSTRACTION & TIME TO PEAK CALCULATIONS

**CONDITIONS**

**Catchment** 101 **Area** 176.30 ha

**WEIGHTED CN VALUE**

| Soil Series | Soil Series | Hydrologic Soil Group | Soil Texture | Runoff Coefficient Type | Catchment Soil Characteristics | | Forest/Woodland | | | Pasture/Lawns | | | Meadows | | | Cultivated | | | Impervious | | | Wetland/Lakes/SWMF | | | Average CN for Soil Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Area | Percent | Area | Percent | CN | Area | Percent | CN | Area | Percent | CN | Area | Percent | CN | Area | Percent | CN | Area | Percent | CN | |
| brs | BRIGHTON | A | Sand | 1 | 8.815 | 0.05 | 4.848 | 0.55 | 32 | 3.526 | 0.4 | 49 | 0 | 0 | 38 | 0 | 0 | 62 | 0.441 | 0.05 | 100 | 0 | 0 | 50 | 42.2 |
| kc | KEMBLE | D | Clay Loam or Clay | 3 | 26.445 | 0.15 | 6.611 | 0.25 | 79 | 0 | 0 | 84 | 0 | 0 | 81 | 18.51 | 0.7 | 86 | 1.322 | 0.05 | 100 | 0 | 0 | 50 | 84.95 |
| bc | BROOKSTON | C | Clay Loam | 3 | 26.445 | 0.15 | 23.8 | 0.9 | 73 | 1.322 | 0.05 | 79 | 0 | 0 | 76 | 0 | 0 | 82 | 1.322 | 0.05 | 100 | 0 | 0 | 50 | 74.65 |
| vsc | VINCENT | C | Silty Clay Loam | 3 | 70.52 | 0.4 | 40.2 | 0.57 | 73 | 0 | 0 | 79 | 0 | 0 | 76 | 28.21 | 0.4 | 82 | 2.116 | 0.03 | 100 | 0 | 0 | 50 | 77.41 |
| duc | DUNEDIN | D | Clay Loam or Clay | 3 | 44.075 | 0.25 | 30.85 | 0.7 | 79 | 0 | 0 | 84 | 0 | 0 | 81 | 13.22 | 0.3 | 86 | 0 | 0 | 100 | 0 | 0 | 50 | 81.1 |
| | | | Totals | | 176.3 | 1 | 106.309 | 0.603 | | 4.84825 | 0.0275 | | 0 | 0 | | 59.942 | 0.34 | | 5.20065 | 0.0295 | | 0 | 0 | | 77.3 |

**Time of Concentration Calculations**

**For Runoff Coefficients greater than 0.4**

**Bransby-Williams Formula**

| | | |
|---|---|---|
| Maximum Catchment Elevation | 370 | m |
| Minimum Catchment Elevation | 180 | m |
| Catchment length | 3550 | m |
| Catchment Slope | 5% | |
| Catchment Area | 176.3 | ha |
| **Time of Concentration (Minutes)** | **86.25** | |
| **Time of Concentration (Hours)** | **1.44** | |
| **Time to Peak (2/3 x Time of Concentration)** | **0.96** | |

| **Time to Peak** | **0.96 hrs** |
|---|---|

**For Runoff Coefficients less than 0.4**

**Airport Method**

| | |
|---|---|
| Maximum Catchment Elevation | 370 m |
| Minimum Catchment Elevation | 180 m |
| Catchment length | 3550 m |
| Catchment Slope | 5% |
| Catchment Area | 176.3 ha |
| **Time of Concentration (Minutes)** | **68.85** |
| **Time of Concentration (Hours)** | **1.15** |
| **Time to Peak (2/3 x Time of Concentration)** | **0.77** |

| **Initial Abstraction** | **8.61 mm** |
|---|---|

| | |
|---|---|
| Wetlands | 12 |
| Woods | 10 |
| Meadows | 8 |
| Cultivated | 7 |
| Lawns | 5 |
| Impervious | 2 |

| **Runoff Coefficient** | **0.48** |
|---|---|

| Landuse Type | Soil Series | | | | |
|---|---|---|---|---|---|
| | brs | kc | bc | vsc | duc |
| | 1 | 3 | 3 | 3 | 3 |
| Forest/Woodland | 0.120 | 42 | 0.42 | 0.420 | 42 |
| Cultivated | 0.3 | 0.6 | 0.6 | 0.6 | 0.6 |
| Pasture/Lawn | 0.150 | 45 | 0.45 | 0.450 | 45 |
| Impervious | 0.950 | 95 | 0.95 | 0.950 | 95 |
| Wetland/Lake/SWMF | 0.050 | 05 | 0.05 | 0.050 | 05 |
| Meadows | 0.140 | 44 | 0.44 | 0.000 | 00 |
| Soil Series Total | 0.174 | 0.5725 | 0.448 | 0.508 | 0.474 |

**Existing Conditions OTTHYMO Model Schematic**


AREA = 176.3

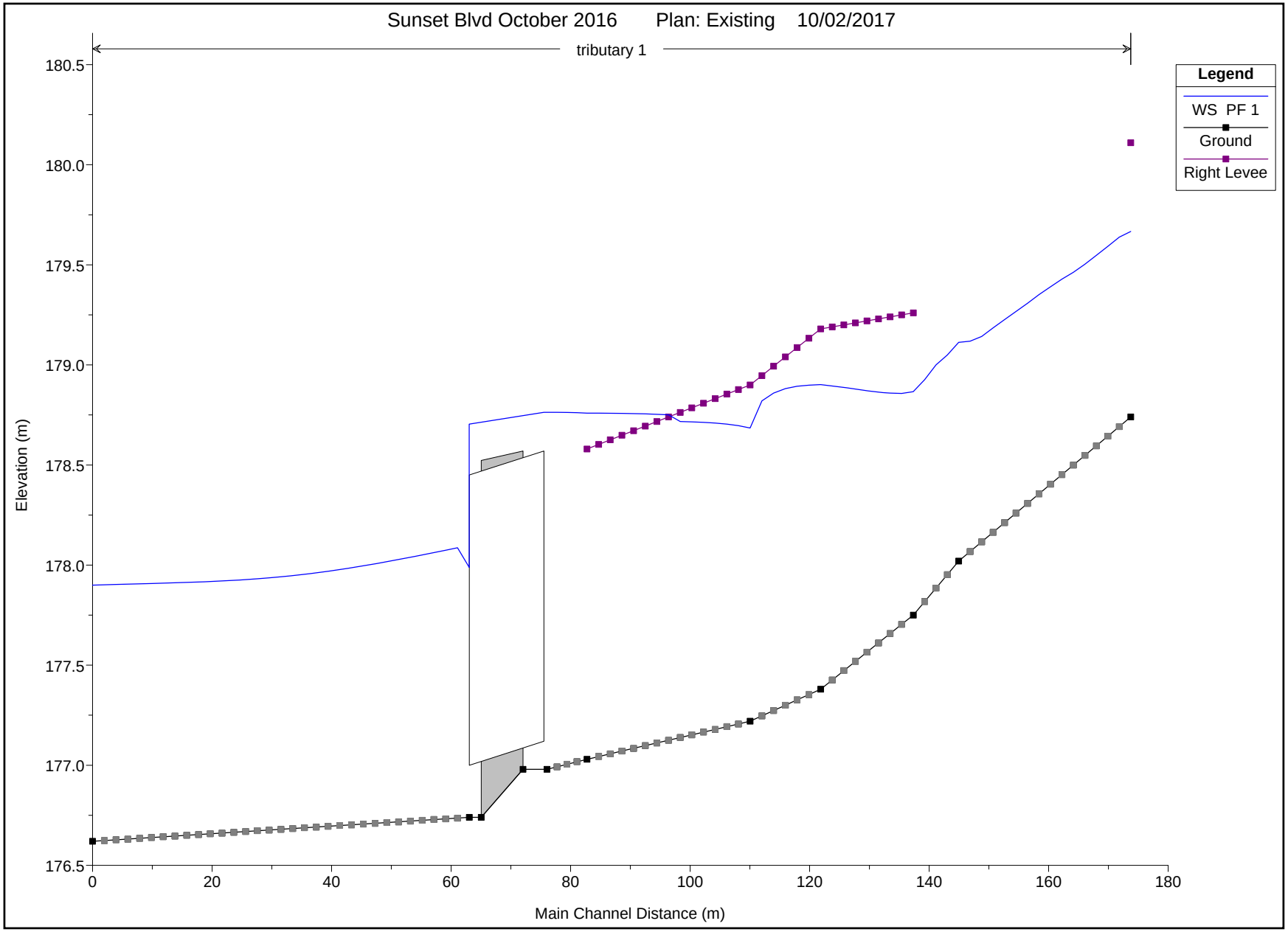
101

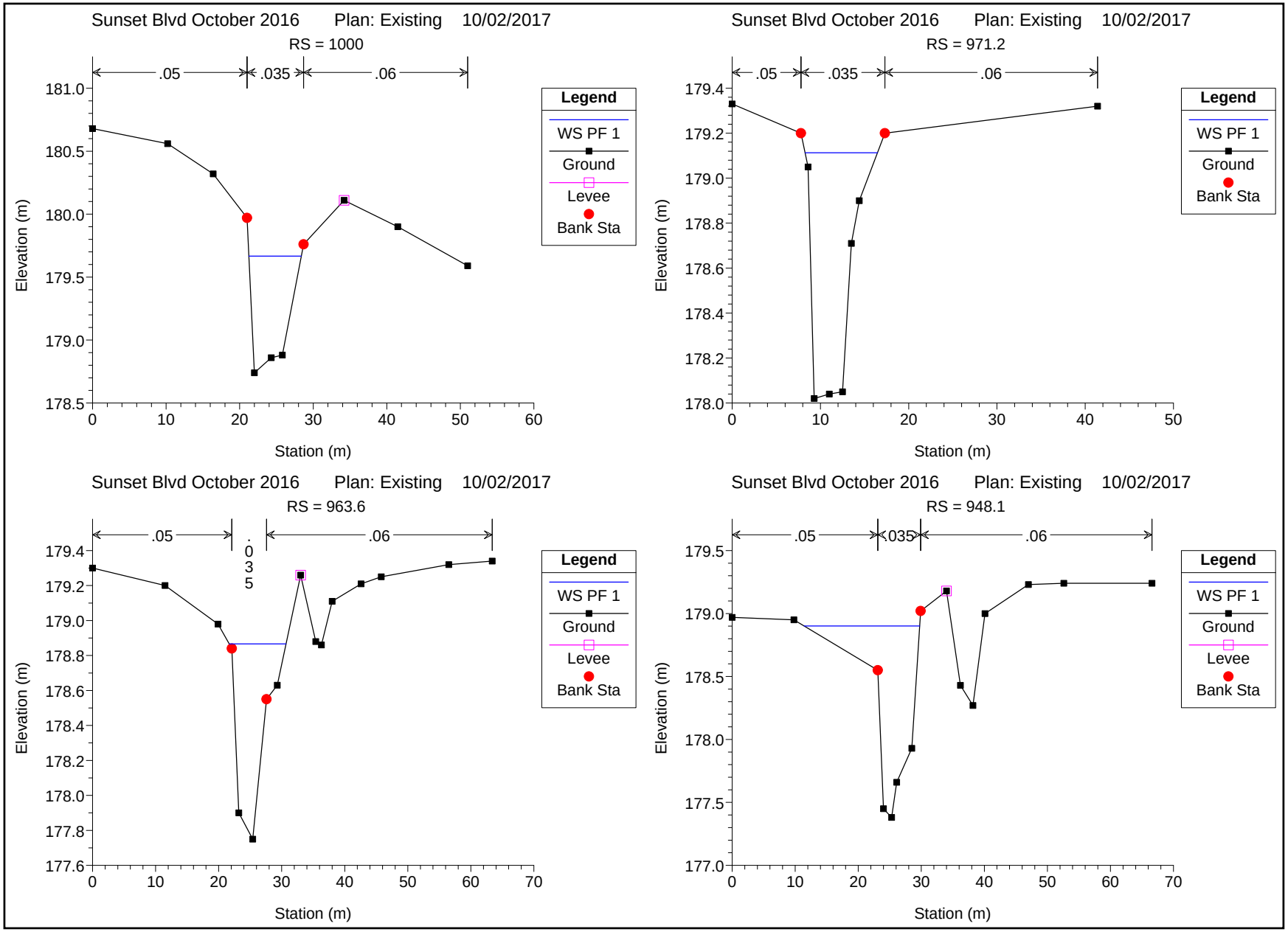
```
 V    V   I    SSSSS  U   U    A    L
 V    V   I    SS     U   U   A A   L
  V  V    I     SS    U   U  AAAAA  L
  V  V    I      SS   U   U  A   A  L
   VV     I    SSSSS  UUUUU  A   A  LLLLL

  OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO
 O   O    T      T    H   H   Y Y   MM MM  O   O
 O   O    T      T    H   H    Y    M M M  O   O
  OOO     T      T    H   H    Y    M   M   OOO

Developed and Distributed by Clarifica Inc.
Copyright 1996, 2007 Clarifica Inc.
All rights reserved.

                  ***** S U M M A R Y   O U T P U T *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 2.3.2\voin.dat
  Output  filename: I:\2016PR~1\116227~1\Design\HYDROL~1\116227~1\Existing Condition.out
  Summary filename: I:\2016PR~1\116227~1\Design\HYDROL~1\116227~1\Existing Condition.sum

DATE: 18/10/2016                          TIME: 3:13:22 PM

USER:

COMMENTS: _____________________________________________________

  ****************************
  ** SIMULATION NUMBER:   1 **
  ****************************

  W/E COMMAND             HYD ID   DT    AREA   Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha     cms   hrs     mm          cms

      START @   .00 hrs
      --------------------
      READ STORM                 6.0
      [ Ptot= 71.77 mm ]
      fname : I:\2016 Projects\116227 - Lot 51 Sunset Blvd - Floodplain Study\Design\Hydrology\storms
\OSCHI100.4HR
      remark: OWEN SOUND 100 YEAR 4 HOUR DURATION CHICAGO STORM
*
  **  CALIB NASHYD       0101  1  5.0  176.30    6.55  3.00  28.97  .40    .000
      [CN=77.3       ]
      [ N = 3.0:Tp  .96]
*
  ****************************
  ** SIMULATION NUMBER:   2 **
  ****************************

  W/E COMMAND             HYD ID   DT    AREA   Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha     cms   hrs     mm          cms

      START @   .00 hrs
      --------------------
      MASS STORM                15.0
      [ Ptot= 98.20 mm ]
*
  **  CALIB NASHYD       0101  1  5.0  176.30    7.28 12.67  48.90  .50    .000
      [CN=77.3       ]
      [ N = 3.0:Tp  .96]
*
  ****************************
  ** SIMULATION NUMBER:   3 **
  ****************************

  W/E COMMAND             HYD ID   DT    AREA   Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha     cms   hrs     mm          cms

      START @   .00 hrs
      --------------------
      READ STORM                60.0
      [ Ptot=193.00 mm ]
      fname : I:\2016 Projects\116227 - Lot 51 Sunset Blvd - Floodplain Study\Design\Hydrology\storms\Timmins.stm
      remark: REGIONAL STORM TIMMINS - 12 hour storm
*
  **  CALIB NASHYD       0101  1  5.0  176.30   11.48  7.67 131.29  .68    .000
      [CN=77.3       ]
      [ N = 3.0:Tp  .96]
*
 FINISH
```

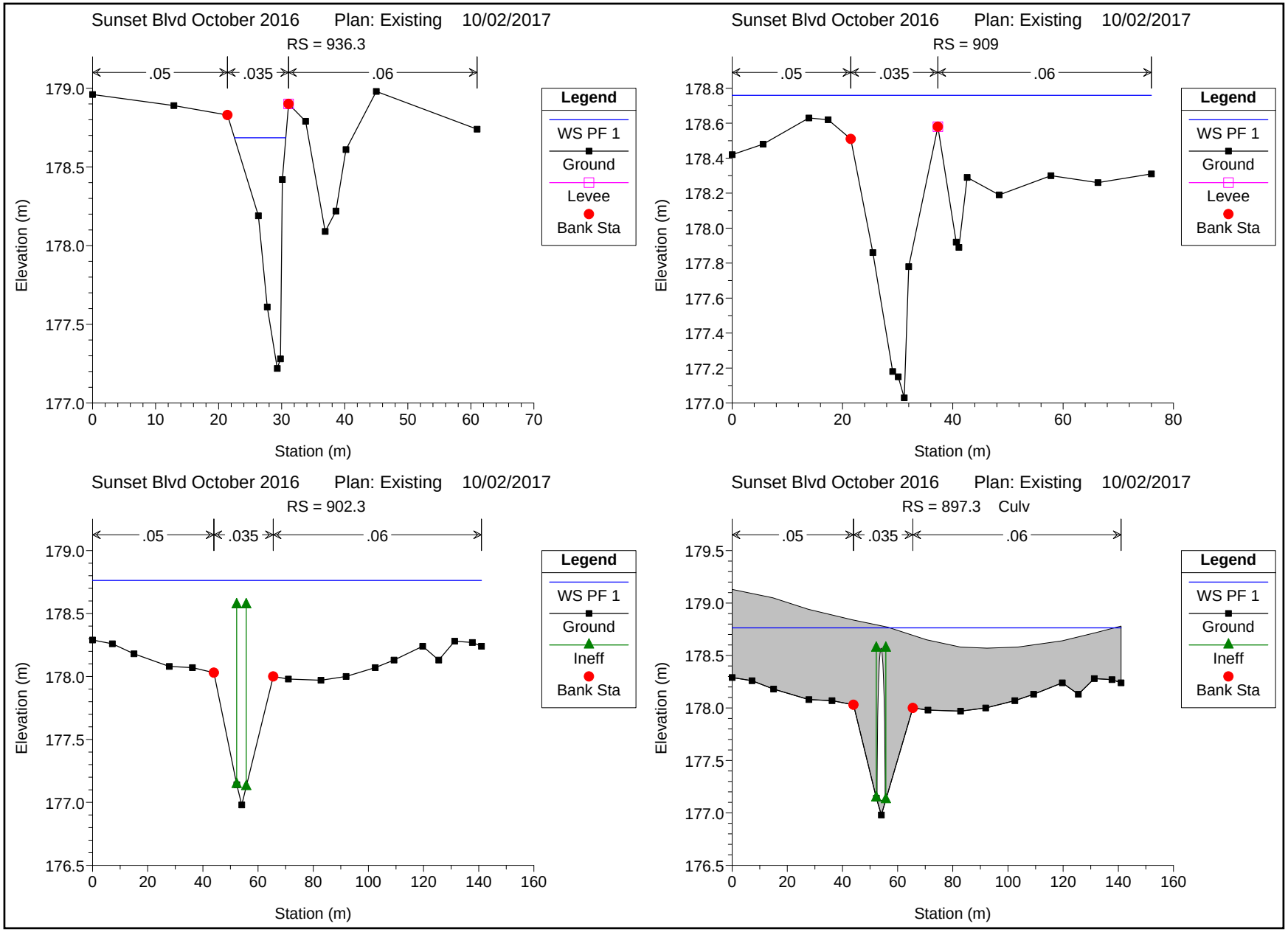
# APPENDIX B:
# EXISTING CONDITION HEC-RAS SUMMARY OUTPUT

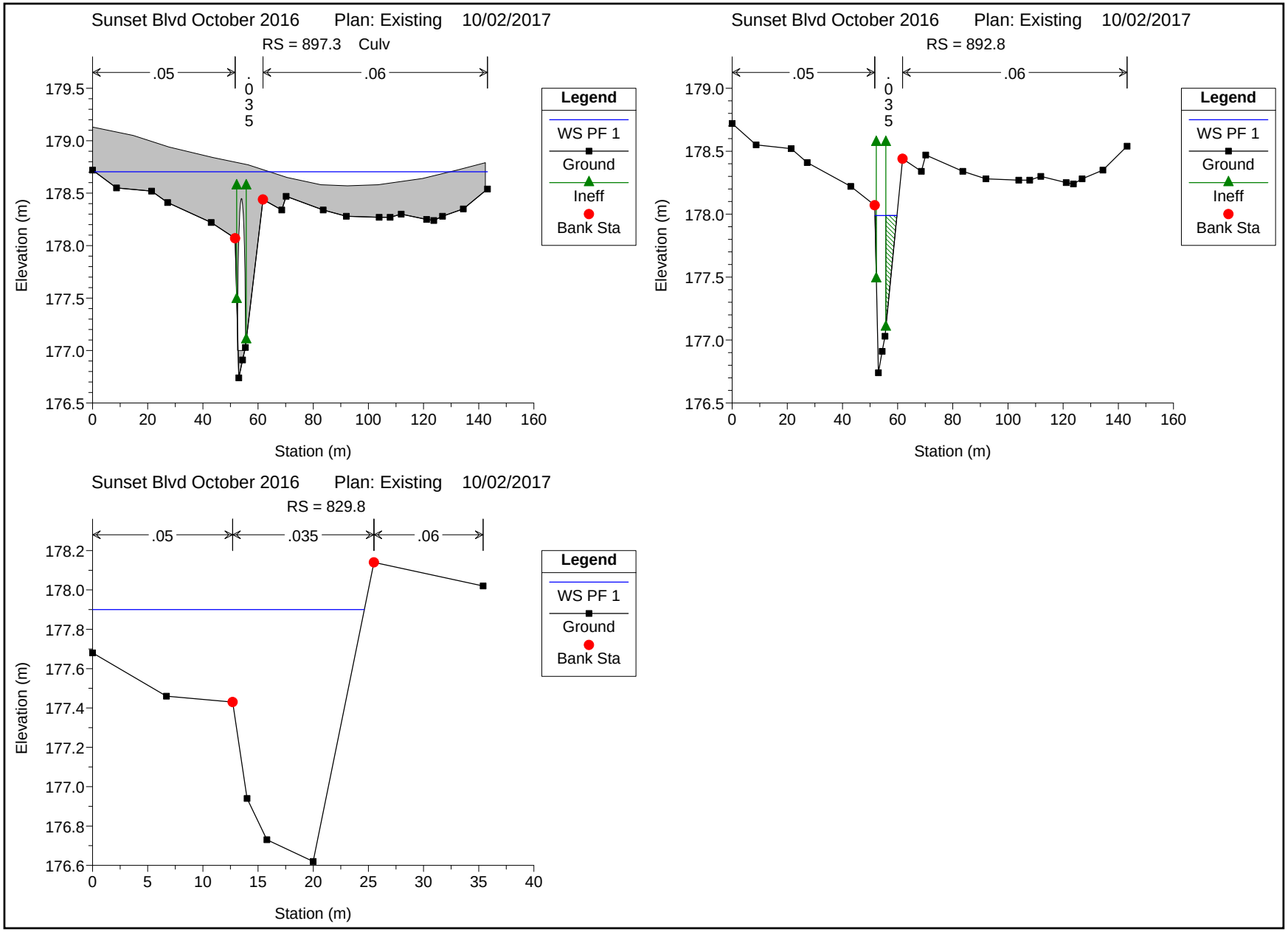
HEC-RAS Plan: Ex Con River: tributary Reach: 1 Profile: PF 1

| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| 1 | 1000 | PF 1 | 11.49 | 178.74 | 179.67 | 179.67 | 179.99 | 0.015680 | 2.52 | 4.56 | 7.15 | 1.01 |
| 1 | 971.2 | PF 1 | 11.49 | 178.02 | 179.11 | 179.05 | 179.37 | 0.013316 | 2.26 | 5.09 | 8.19 | 0.91 |
| 1 | 963.6 | PF 1 | 11.49 | 177.75 | 178.87 | 178.85 | 179.18 | 0.011644 | 2.51 | 5.05 | 9.00 | 0.90 |
| 1 | 948.1 | PF 1 | 11.49 | 177.38 | 178.90 | 178.47 | 179.01 | 0.003055 | 1.51 | 9.17 | 18.34 | 0.47 |
| 1 | 936.3 | PF 1 | 11.49 | 177.22 | 178.69 | 178.63 | 178.94 | 0.013710 | 2.25 | 5.11 | 8.14 | 0.91 |
| 1 | 909 | PF 1 | 11.49 | 177.03 | 178.76 | 178.09 | 178.77 | 0.000347 | 0.49 | 38.66 | 76.00 | 0.16 |
| 1 | 902.3 | PF 1 | 11.49 | 176.98 | 178.76 | 178.10 | 178.76 | 0.000035 | 0.20 | 104.85 | 141.00 | 0.06 |
| 1 | 897.3 | | Culvert | | | | | | | | | |
| 1 | 892.8 | PF 1 | 11.49 | 176.74 | 177.99 | 177.99 | 178.51 | 0.013507 | 3.20 | 3.59 | 7.97 | 1.00 |
| 1 | 829.8 | PF 1 | 11.49 | 176.62 | 177.90 | 177.36 | 177.94 | 0.001120 | 0.89 | 15.89 | 24.63 | 0.30 |


Sunset Blvd October 2016 Plan: Existing 10/02/2017
tributary 1
Legend
WS PF 1
Ground
Right Levee
Elevation (m)
180.5
180.0
179.5
179.0
178.5
178.0
177.5
177.0
176.5
0
20
40
60
80
100
120
140
160
180
Main Channel Distance (m)


Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 1000
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Levee
Bank Sta
Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 971.2
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Bank Sta
Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 963.6
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Levee
Bank Sta
Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 948.1
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Levee
Bank Sta

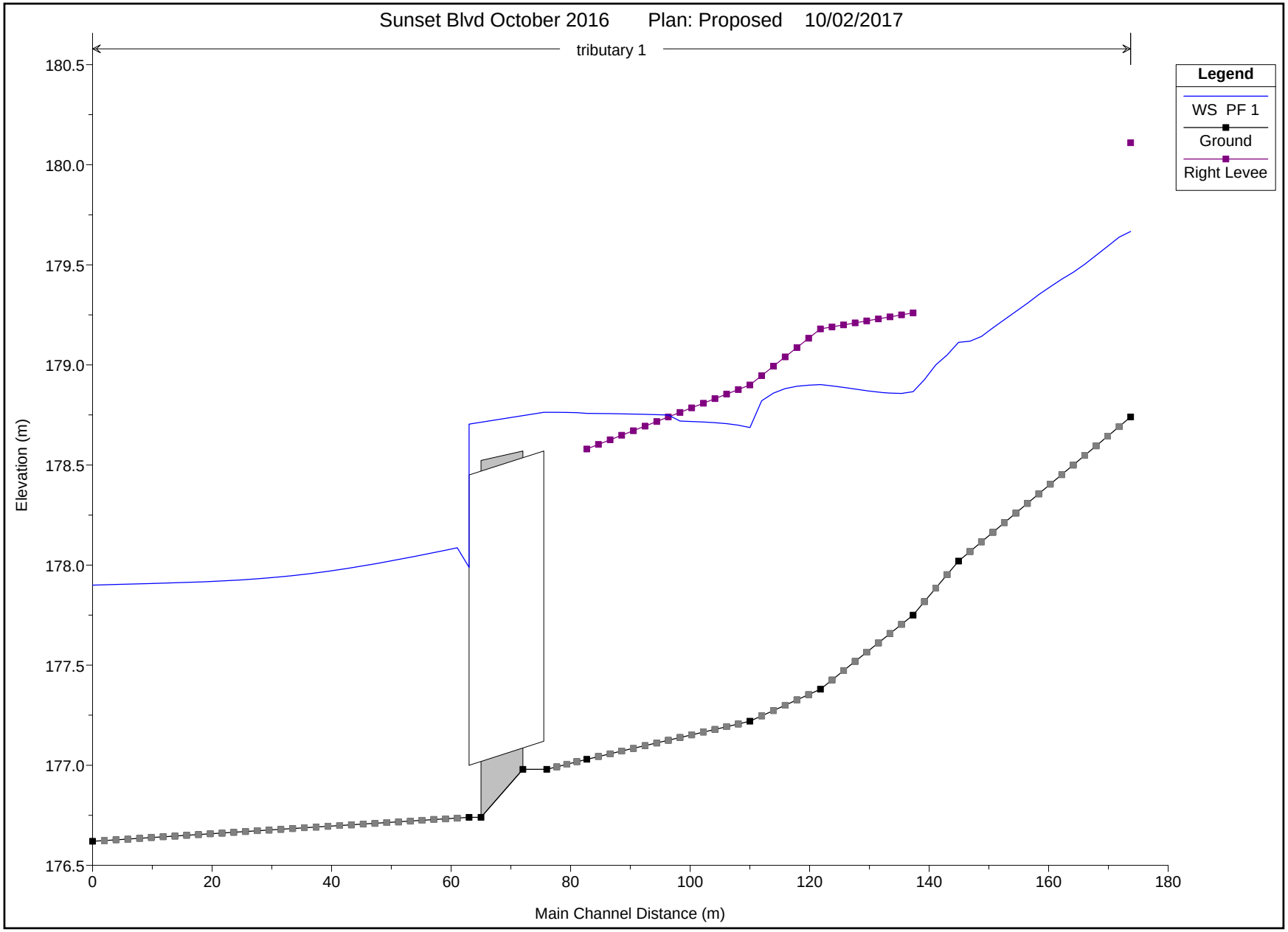

Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 936.3
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Levee
Bank Sta
Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 909
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Levee
Bank Sta
Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 902.3
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 897.3 Culv
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta

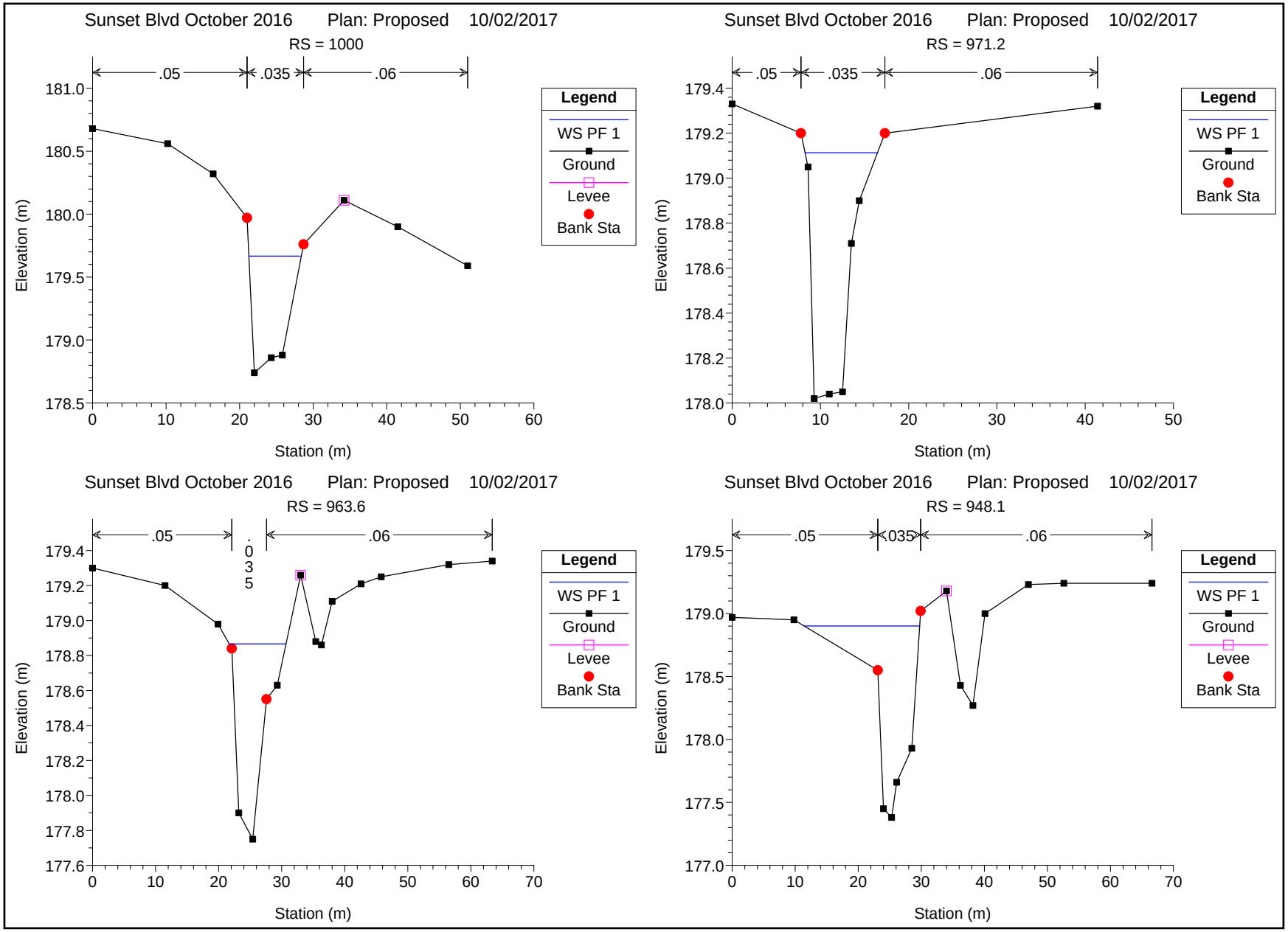

Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 897.3 Culv
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 892.8
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Sunset Blvd October 2016 Plan: Existing 10/02/2017
RS = 829.8
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Bank Sta

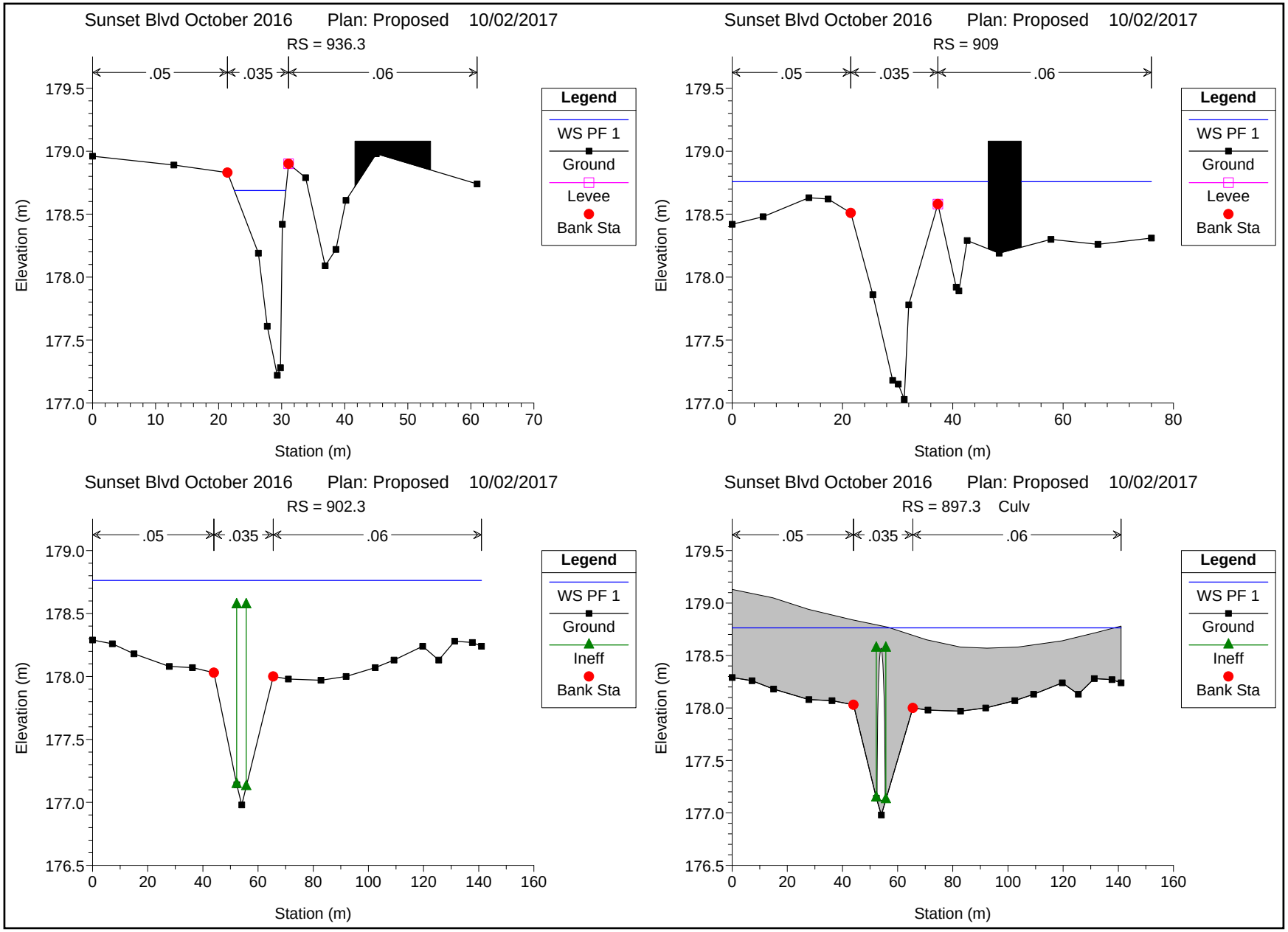
# APPENDIX C:
# PROPOSED CONDITION HEC-RAS SUMMARY OUTPUT

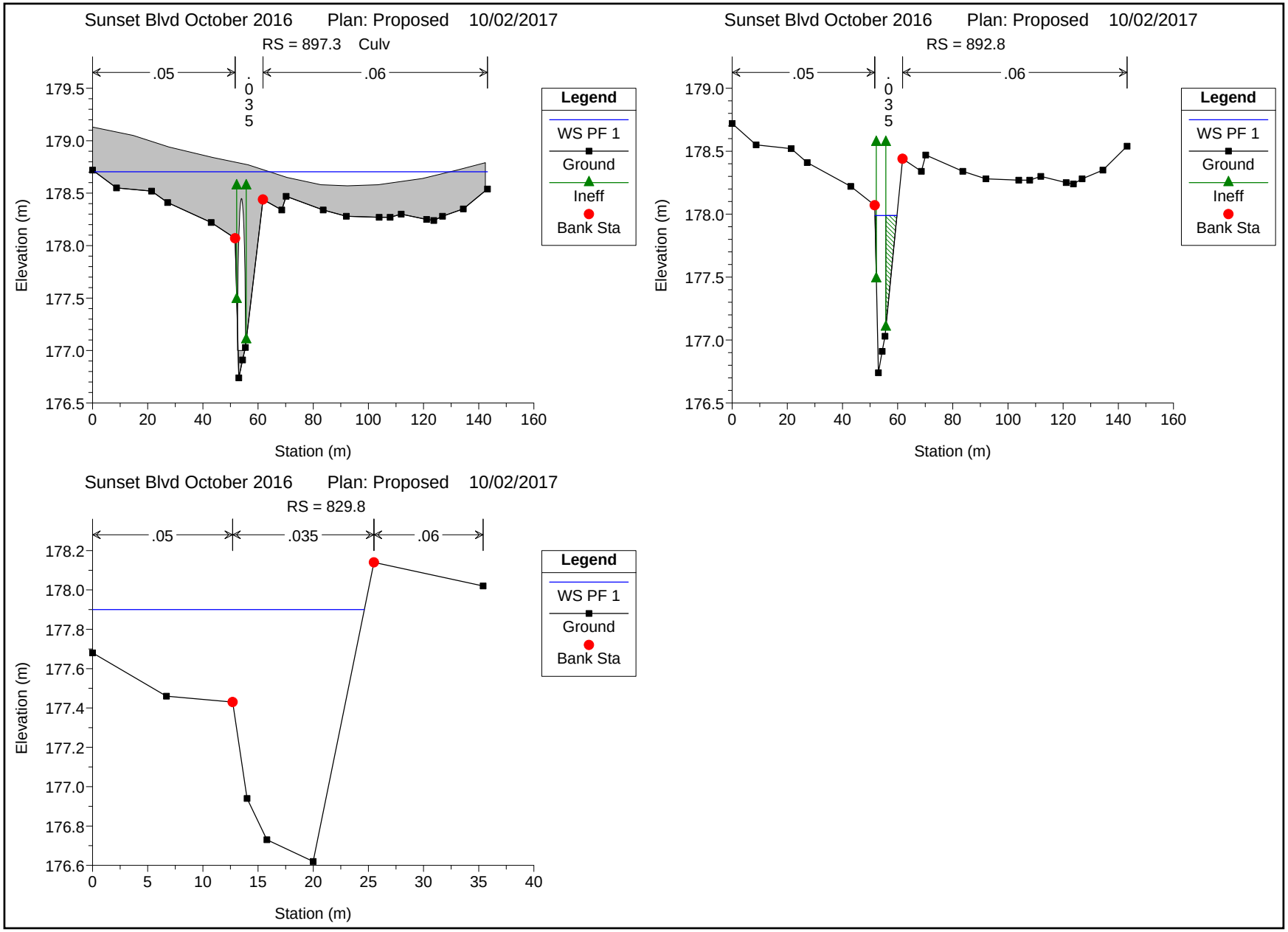
HEC-RAS Plan: pr con River: tributary Reach: 1 Profile: PF 1

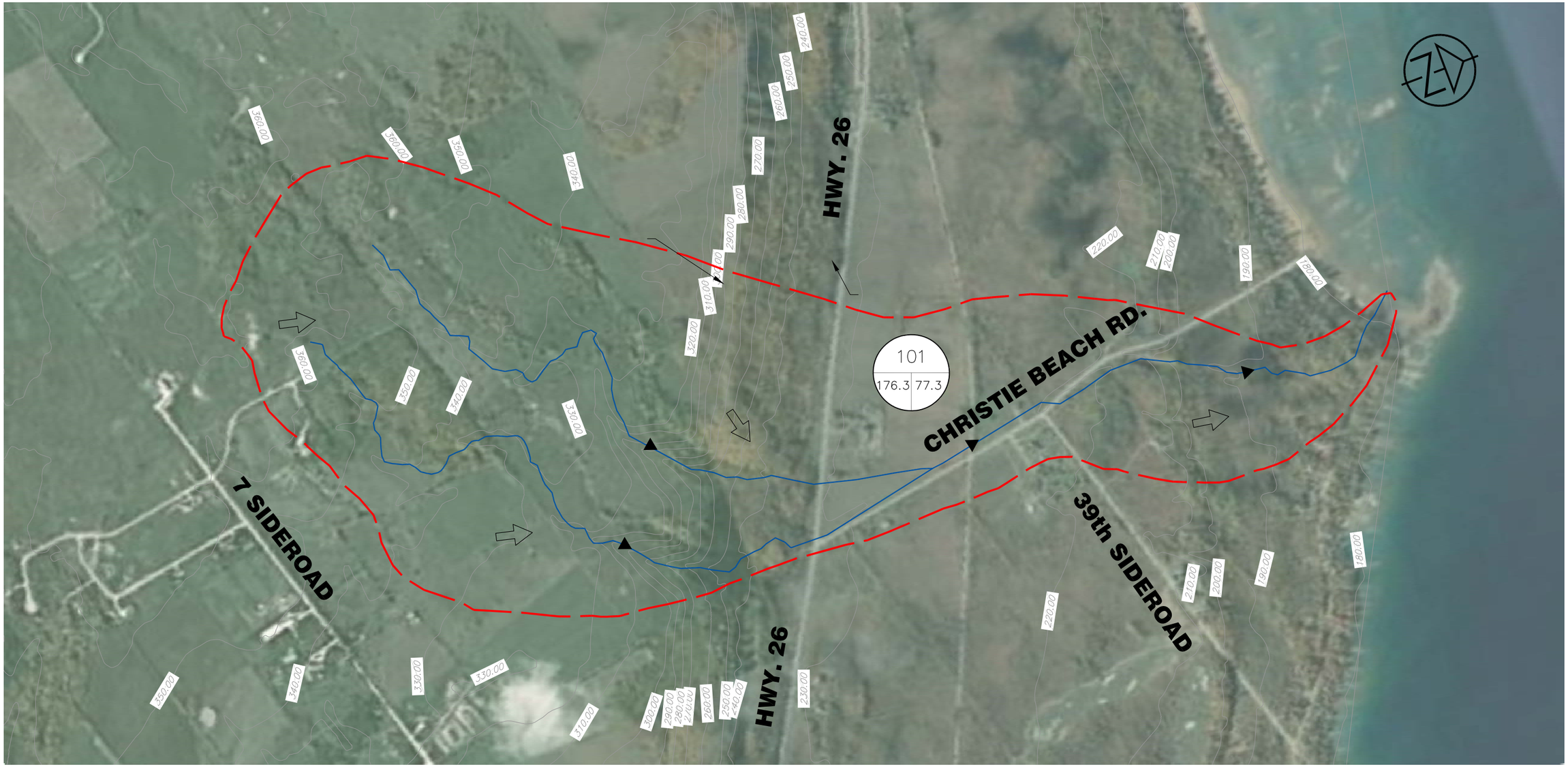
| Reach | River Sta | Profile | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | (m3/s) | (m) | (m) | (m) | (m) | (m/m) | (m/s) | (m2) | (m) | |
| 1 | 1000 | PF 1 | 11.49 | 178.74 | 179.67 | 179.67 | 179.99 | 0.015680 | 2.52 | 4.56 | 7.15 | 1.01 |
| 1 | 971.2 | PF 1 | 11.49 | 178.02 | 179.11 | 179.05 | 179.37 | 0.013316 | 2.26 | 5.09 | 8.19 | 0.91 |
| 1 | 963.6 | PF 1 | 11.49 | 177.75 | 178.87 | 178.85 | 179.18 | 0.011635 | 2.51 | 5.05 | 9.00 | 0.90 |
| 1 | 948.1 | PF 1 | 11.49 | 177.38 | 178.90 | 178.47 | 179.01 | 0.003053 | 1.51 | 9.17 | 18.34 | 0.47 |
| 1 | 936.3 | PF 1 | 11.49 | 177.22 | 178.69 | 178.63 | 178.94 | 0.013592 | 2.24 | 5.13 | 8.16 | 0.90 |
| 1 | 909 | PF 1 | 11.49 | 177.03 | 178.76 | 178.09 | 178.77 | 0.000399 | 0.52 | 35.30 | 70.00 | 0.18 |
| 1 | 902.3 | PF 1 | 11.49 | 176.98 | 178.76 | 178.10 | 178.76 | 0.000035 | 0.20 | 104.85 | 141.00 | 0.06 |
| 1 | 897.3 | | Culvert | | | | | | | | | |
| 1 | 892.8 | PF 1 | 11.49 | 176.74 | 177.99 | 177.99 | 178.51 | 0.013507 | 3.20 | 3.59 | 7.97 | 1.00 |
| 1 | 829.8 | PF 1 | 11.49 | 176.62 | 177.90 | 177.36 | 177.94 | 0.001120 | 0.89 | 15.89 | 24.63 | 0.30 |


Sunset Blvd October 2016 Plan: Proposed 10/02/2017
tributary 1
Legend
WS PF 1
Ground
Right Levee
Elevation (m)
180.5
180.0
179.5
179.0
178.5
178.0
177.5
177.0
176.5
0
20
40
60
80
100
120
140
160
180
Main Channel Distance (m)


Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 1000
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Levee
Bank Sta
Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 971.2
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Bank Sta
Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 963.6
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Levee
Bank Sta
Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 948.1
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Levee
Bank Sta


Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 936.3
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Levee
Bank Sta
Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 909
Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 902.3
Ineff
Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 897.3 Culv


Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 897.3 Culv
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 892.8
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Sunset Blvd October 2016 Plan: Proposed 10/02/2017
RS = 829.8
.05
.035
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Bank Sta




LEGEND

- CATCHMENT AREA
- OVERLAND FLOW DIRECTION
- WATERCOURSE FLOW DIRECTION
- 101 / 176.3 77.3 — CATCHMENT ID / CN NUMBER / CATCHMENT AREA (ha)

CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.



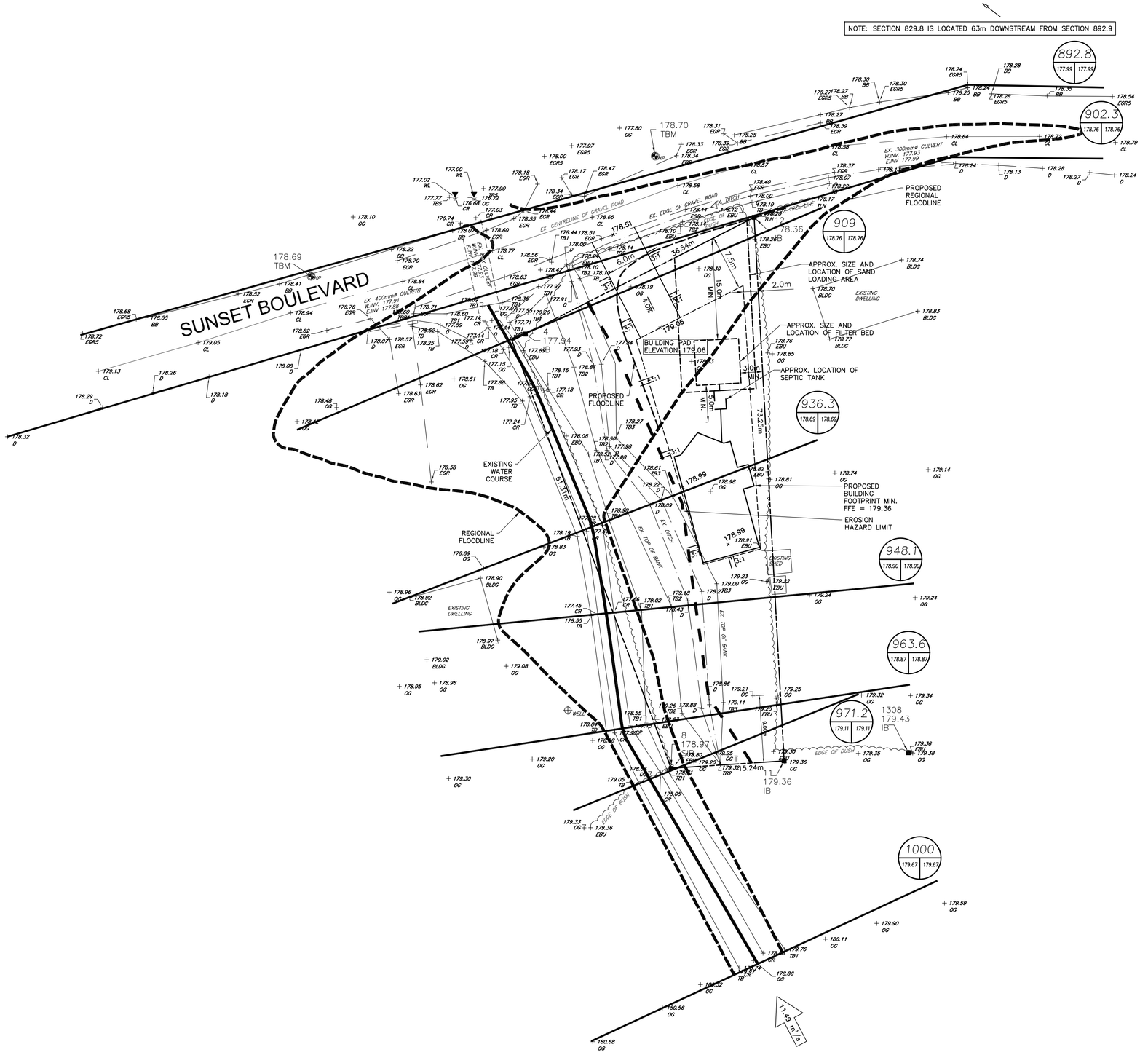
C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

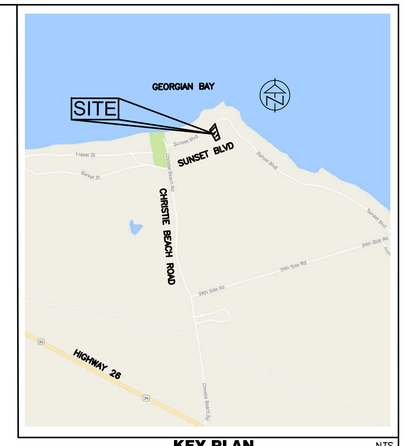
# DRAINAGE PLAN

DWG. No. DP-1

SCALE: 1:10000 | DRAWN: SD | DATE: OCT. 2016 | JOB NO. 116227

NOTE: SECTION 829.8 IS LOCATED 63m DOWNSTREAM FROM SECTION 892.9




KEY PLAN NTS

## LEGEND

- 971.2 / 179.11 | 179.11 — HEC RAS CROSS SECTION ID; PROPOSED REGIONAL STORM FLOOD ELEVATION (m); EXISTING REGIONAL STORM FLOOD ELEVATION (m)
- + 178.18 D — TOPOGRAPHIC SURVEY ELEVATIONS BY CCTA
- REGIONAL FLOODLINE
- EROSION HAZARD LIMIT
- 11.49 m³/s — REGIONAL STORM PEAK FLOW
- PROPERTY LINE
- BUILDING PAD
- EXISTING WATER COURSE

NOTES:

1. FINAL GRADING OF THE PROPERTY SHALL BE COMPLETED SUCH THAT THE EXISTING DRAINAGE PATTERN IS MAINTAINED AND/OR CONTROLLED TO A POSITIVE OUTLET.
2. SEDIMENT AND EROSION CONTROL SHALL BE IMPLEMENTED AS REQUIRED TO PREVENT MIGRATION OF SILT AND SEDIMENT FROM THE SUBJECT LOT TO ANY ADJACENT LOT OR R.O.W.
3. ALL DOWNSPOUTS, SUMP PUMP AND OTHER DRAINAGE DISCHARGE POINTS SHALL DISCHARGE TO SPLASH PADS.
4. ALL DISTURBED AREAS ARE TO BE SODDED OR SEEDED OVER A MINIMUM 150mm OF TOPSOIL.
5. A COPY OF THE "ACCEPTED FOR CONSTRUCTION" LOT GRADING PLAN IS TO BE ON SITE FOR REFERENCE AT ALL TIMES DURING CONSTRUCTION.
6. ENSURE UNDERSIDE OF FOOTING ELEVATION IS A MINIMUM 1.22m BELOW GRADE FOR FROST PROTECTION.
7. BUILDER TO VERIFY LOCATION OF ALL HYDRANTS, STREETLIGHTS, TRANSFORMERS AND OTHER SERVICES. IF MINIMUM CLEARANCES ARE NOT MAINTAINED THE BUILDER SHALL BE RESPONSIBLE FOR RELOCATION AT HIS/HER OWN EXPENSE.
8. ELEVATIONS TO BE CONFIRMED WITH CONTRACTOR PRIOR TO CONSTRUCTION.

TBM 1 ELEVATION 178.64
TOP OF IRON BAR LOCATED AT NORTHEAST CORNER OF PROPERTY.

THE OWNER/BUILDER IS RESPONSIBLE TO CONFIRM THAT THE LAYOUT OF THE PROPOSED DWELLING (INCLUDING ALL COVERED AREAS, PORCHES, STAIRS AND OVERHANGS) AS SHOWN ON THIS PLAN IS IN ACCORDANCE WITH THE TOWN'S ZONING REQUIREMENTS.

### CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.



DRAWING REFERENCES:

1. LEGAL BOUNDARY INFORMATION SHOWN ON THIS DRAWING ARE TAKEN FROM A PLAN PREPARED BY ZUBEK, EMO, PATTEN & THOMSEN LTD. OLS, DATED FEBRUARY 2, 2004.
2. TOPOGRAPHICAL INFORMATION TAKEN FROM TOPOGRAPHIC SURVEY COMPLETED BY C.C. TATHAM & ASSOCIATES SEPTEMBER 19, 2016.
3. HOUSE PLAN INFORMATION SHOWN ON THIS PLAN ARE TAKEN FROM A SET OF DRAWINGS PREPARED BY

| NO. | REVISIONS | DATE | INITIAL |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| 1. | ISSUED FOR GSCA REVIEW | FEB 10/17 | ALK |

APPROVED

LICENSED PROFESSIONAL ENGINEER — A. L. KELLETT — 100123897 — Feb 15, 2017 — PROVINCE OF ONTARIO

**MACCHIA RESIDENCE**
**LOT 51 SUNSET BOULEVARD**
**TOWN OF THE BLUE MOUNTAINS**

FLOOD PLAN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

| | | | |
|---|---|---|---|
| SCALE: 1 : 300 | | JOB NO. | 116227 |
| DESIGN: AW | CHECKED: ALK | DWG. | FM-1 |
| DRAWN: DDOH | DATE: NOV. 2016 | | |