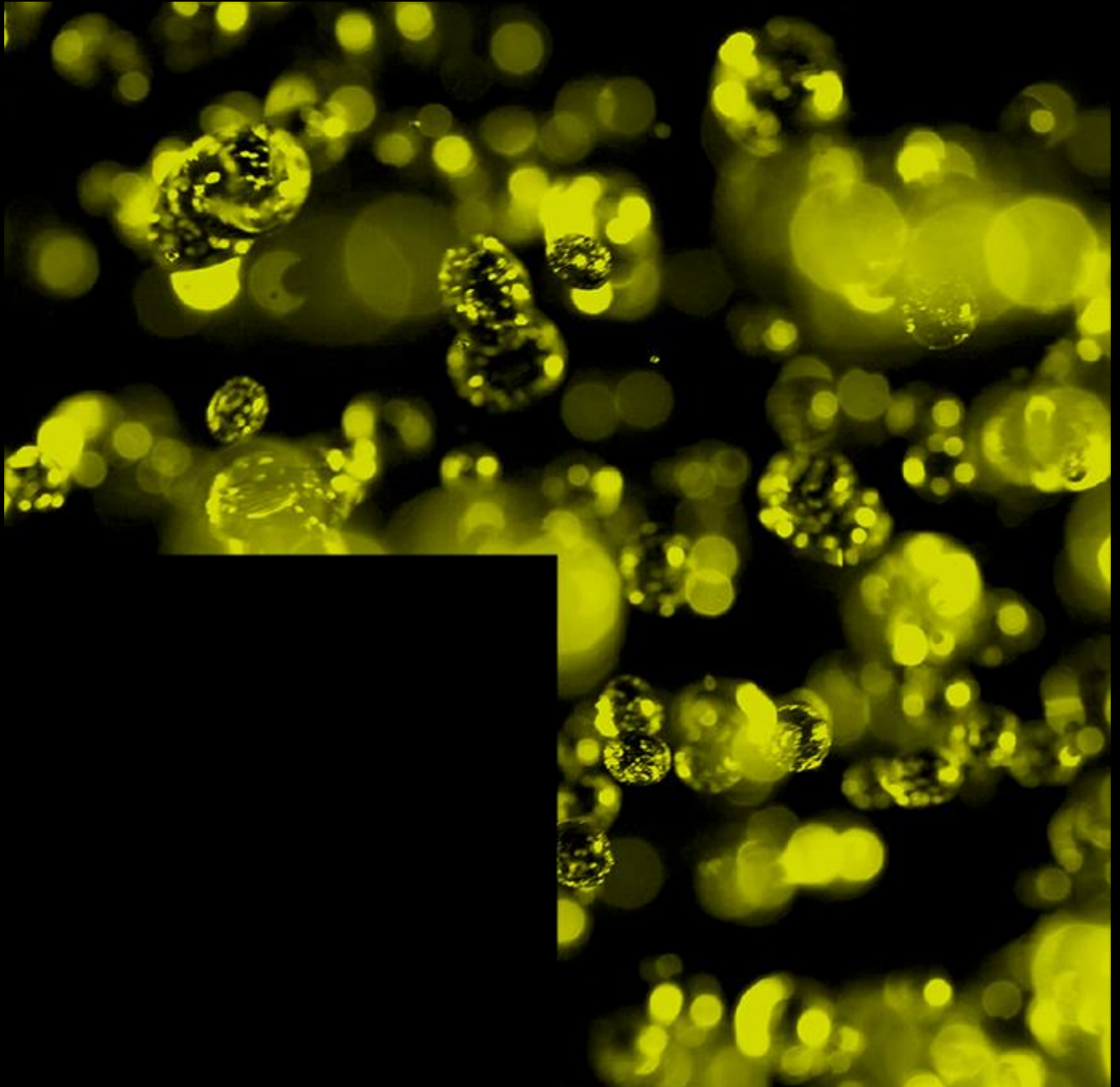


DONEGAL STUD STAGE 14

Stormwater

Minimum Floor Levels Report

Hugh Green Limited



DOCUMENT CONTROL RECORD

CLIENT	Hugh Green Limited
PROJECT	Donegal Stud Stage 14
HG PROJECT NO.	1050-146689-01
HG DOCUMENT NO.	R001v1-146689-01-MFL
DOCUMENT	Stormwater Report – Minimum Floor Levels

ISSUE AND REVISION RECORD

DATE OF ISSUE	29 October 2021
STATUS	Final



ORIGINATOR	Will Kirk – Graduate Civil Engineer
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REVIEWED	Daniel Scott – Technical Manager
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APPROVED FOR ISSUE	Daniel Scott – Technical Manager
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1.0 INTRODUCTION

This Stormwater Report has been prepared to fulfil the requirements of the Auckland Council Condition of Consent 65 – Minimum Floor Levels (BUN60356333).

The purpose of the report is to satisfy the requirements set out under Condition 65 as follows:

- (i) The 1% AEP flood level for the site and the surrounding road reserves;
- (ii) A layout plan of the overland flow paths for the site and the adjacent land along the boundary in accordance with the approved EPA before Section 223 approval;
- (iii) The overland flow path plan shall include as built cross sections of all roads including the ponding areas with levels before overtopping;
- (iv) As built longitudinal plan and cross sections for shall be provided for overland flow path locations;
- (v) The minimum floor level of all habitable buildings must be at least 150mm for flows below 2m³ per second and 100 mm deep and where flows exceed this, the minimum floor level of habitable buildings must be increased to at least 500mm. This may be enforced through a consent notice on the property unless the building consents have already been issued; and
- (vi) Where either existing or proposed overland flow paths cross lot boundaries, the consent holder is to provide the Council with plans to accompany easement(s) to be registered in favour of the Council.

2.0 RESPONSE TO REQUIREMENTS

2.1 IDENTIFICATION OF 1% AEP FLOOD LEVEL

1% AEP – Road Flows

The secondary flows, up to and including the 1% AEP storm event, are contained within the road (i.e. kerb to kerb), as shown in overland flow path as-built plans and cross-section drawings AB455-456 and AB 465-467 in Appendix 1 & 2 for Roads 1, 2, 3, 4, and 5.

1% AEP – Flows outside the Road Reserve

There are two deliberate low points in the site; one on Road 1 and the other on Road 2 where in a 1% AEP flood event, road flows may overspill the kerb. The flows from Roads 1 and 2 are to discharge to the adjacent stream, and Murphy's Bush, respectively.

2.2 OLFP LAYOUT PLAN

A layout plan of the as-built OLFPs for this site and adjacent land along the boundary can be seen in as-built drawings AB465-467 in Appendix 1.

2.3 AS-BUILT CROSS SECTIONS

The as-built cross-sections of all roads with levels, depth, width, and velocity of flow can be seen in as-built drawings AB455-456 in Appendix 2.

2.4 MINIMUM FLOOR LEVELS

Where flows exceed $2 \text{ m}^3/\text{s}$, the minimum floor level of any habitable buildings must be 500mm above the 1% AEP flood level to comply with Chapter 4 of the Code of Practice for Land Development and Subdivision 2015. Overland flows generated from this subdivision are less than $2 \text{ m}^3/\text{s}$, so a minimum of 150 mm freeboard must be provided.

In this residential subdivision there are no private lots that require a specified minimum floor level.

3.0 SUMMARY

This stormwater report for Minimum Floor Levels was prepared to satisfy Auckland Council Resource Consent (BUN60356333), specifically condition 65. This report addresses how this condition is met on the Donegal Stud Stage 14 residential subdivision.

The 1% AEP flood event is entirely contained within the road reserve. The overall layout plan in Appendix 2 and cross-sections in Appendix 1 show both the flow directions and the depths of the overland flow through the road sections. Appendix 3 is the calculations for the overland flows.



APPENDICES



APPENDIX 1

OVERLAND FLOW PATH & 1% AEP

AS-BUILT PLANS

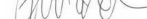
1. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946

ORIGIN OF LEVELS
SS 66 SO 48643
RL 54.50
2. CATCHMENT AREAS AND DISCHARGE FLOWS INCORPORATE FUTURE OVERLAND FLOWPATH GENERATION FROM UPSTREAM DEVELOPMENT.
3. ALL FLOWPATHS ARE WITHIN THE LEGAL ROAD WIDTH.

OVERLAND FLOWPATH
LEVEL IN 1% AEP
STORM EVENT

I CERTIFY THAT THESE ASBUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN $\pm 50\text{mm}$.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN $\pm 25\text{mm}$.


Signed:
REGISTERED PROFESSIONAL SURVEYOR

Date: 29/10/2021

Name: STEPHEN JAMES WARDLE

Phone: 09-917-5000

Email: s.wardle@harrisonsjrierson.com



A	AS-BUILT	WXX	29.10.2018
REF	REVISIONS	BY	DATE

PROJECT:

HUGH GREEN LIMITED
DONEGAL STAGE 14
36 TIR CONAILL AVENUE, FLAT BUSH

TITLE:

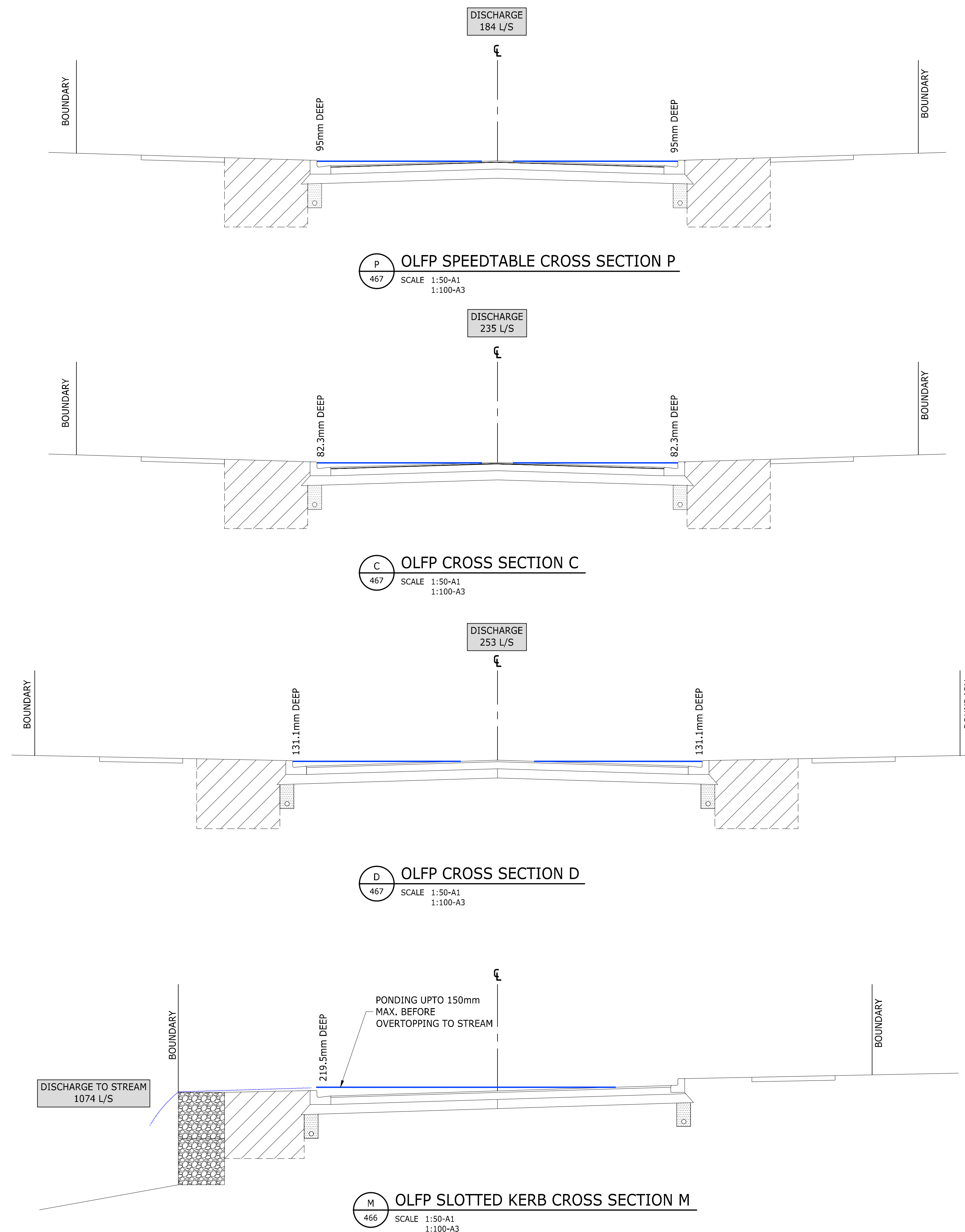
OVERLAND FLOW PATH
AS-BUILT CROSS SECTIONS
SHEET 1 OF 2


ORIGINATOR: DDS	DATE: 12.2020	SIGNED:	PLOT BY:
DRAWN: WXK	DATE: 28.09.21	SIGNED:	PLOT DATE: 28.10.
CHECKED: DAS	DATE: 30.09.21	SIGNED:	SURVEY BY:
APPROVED: DAS	DATE: 30.09.21	SIGNED:	SURVEY DATE: 08.20

DATE	ISSUED	BY	FOR
ISSUE STATUS:		AS-BUILT	

PROJECT No: 1050-146689-01	SCALES: AS SHOWN	A1
-------------------------------	------------------	----

DRAWING No:	REV
146689-14-AB455	A





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NOTES:

1. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946

ORIGIN OF LEVELS
SS 66 SO 48643
RL 54.50

2. CATCHMENT AREAS AND DISCHARGE FLOWS INCORPORATE FUTURE OVERLAND FLOWPATH GENERATION FROM UPSTREAM DEVELOPMENT.

3. ALL FLOWPATHS ARE WITHIN THE LEGAL ROAD WIDTH.

LEGEND


OVERLAND FLOWPATH
LEVEL IN 1% AEP
STORM EVENT

ENGINEERING APPROVAL
ENG-60363080

I CERTIFY THAT THESE ASBUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

• THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.

• THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±25mm.

Signed: 

REGISTERED PROFESSIONAL SURVEYOR

Date: 29/10/2021

Name: STEPHEN JAMES WARDLE

Phone: 09-917-5000

Email: s.wardle@harrisingrierson.com

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A	AS-BUILT	WXX	29.10.21
REF	REVISIONS	BY	DATE

PROJECT:

HUGH GREEN LIMITED
DONEGAL STAGE 14
36 TIR CONAILL AVENUE, FLAT BUSH

TITLE:

OVERLAND FLOW PATH
AS-BUILT CROSS SECTIONS
SHEET 2 OF 2

ORIGINATOR: DDS	DATE: 12.2020	SIGNED:	PLOT BY: WXX
DRAWN: WXX	DATE: 28.09.21	SIGNED:	PLOT DATE: 28.10.21
CHECKED: DAS	DATE: 30.09.21	SIGNED:	SURVEY BY: DW
APPROVED: DAS	DATE: 30.09.21	SIGNED:	SURVEY DATE: 08.2021

ISSUE STATUS:

AS-BUILT

PROJECT No: 1050-146689-01	SCALES: AS SHOWN	A1
DRAWING No:	REV	

146689-14-AB456

A

REFER TO APPROVED MASTER DRAWINGS FOR ORIGINAL SIGNATURES File: DATA\LOCAL\AUTODESK\C3D 2021\ENU\TEMPLATE N:\1050\146689_A\CAD\AS BUILTS\STAGE 14\146689-14-AB455-456.DWG

APPENDIX 2

OVERLAND FLOW AS-BUILT CROSS SECTIONS



1. REFER TO FLOWPATH CALCULATIONS AND HYRDAFLOW EXPRESS REPORTS FOR DETAILS ON EXTENT OF FLOWPATHS WITHIN ROADS.
2. ALL FLOWPATHS ARE WITHIN THE LEGAL ROAD WIDTH.

STAGE BOUNDARIES
 CATCHMENT BOUNDARIES
 OVERLAND FLOWPATHS
 EXISTING WATERCOURSE

ENGINEERING APPROVAL
ENG-60363080

Email: s.wardle@harrisingrierson.com



A	AS-BUILT	WXK	29.10.2017
RFF	REVISIONS	BY	DATE

REF	REV
PROJECT:	

HUGH GREEN LIMITED
DONEGAL STAGE 14
36 TIR CONAILL AVENUE, FLATBUSH

TITLE:

100 YEAR OVERLAND FLOWPATH
OVERALL PLAN
AS-BUILT

ORIGINATOR: WVK	DATE: 31.05.21	SIGNED:	PLOT BY: WVK
DRAWN: MNP	DATE: 15.09.21	SIGNED:	PLOT DATE: 29.10.21
CHECKED: WVK	DATE: 28.09.21	SIGNED:	SURVEY BY: DEMPSEY WOOD
APPROVED: DAS	DATE: 30.09.21	SIGNED:	SURVEY DATE: 05.2022

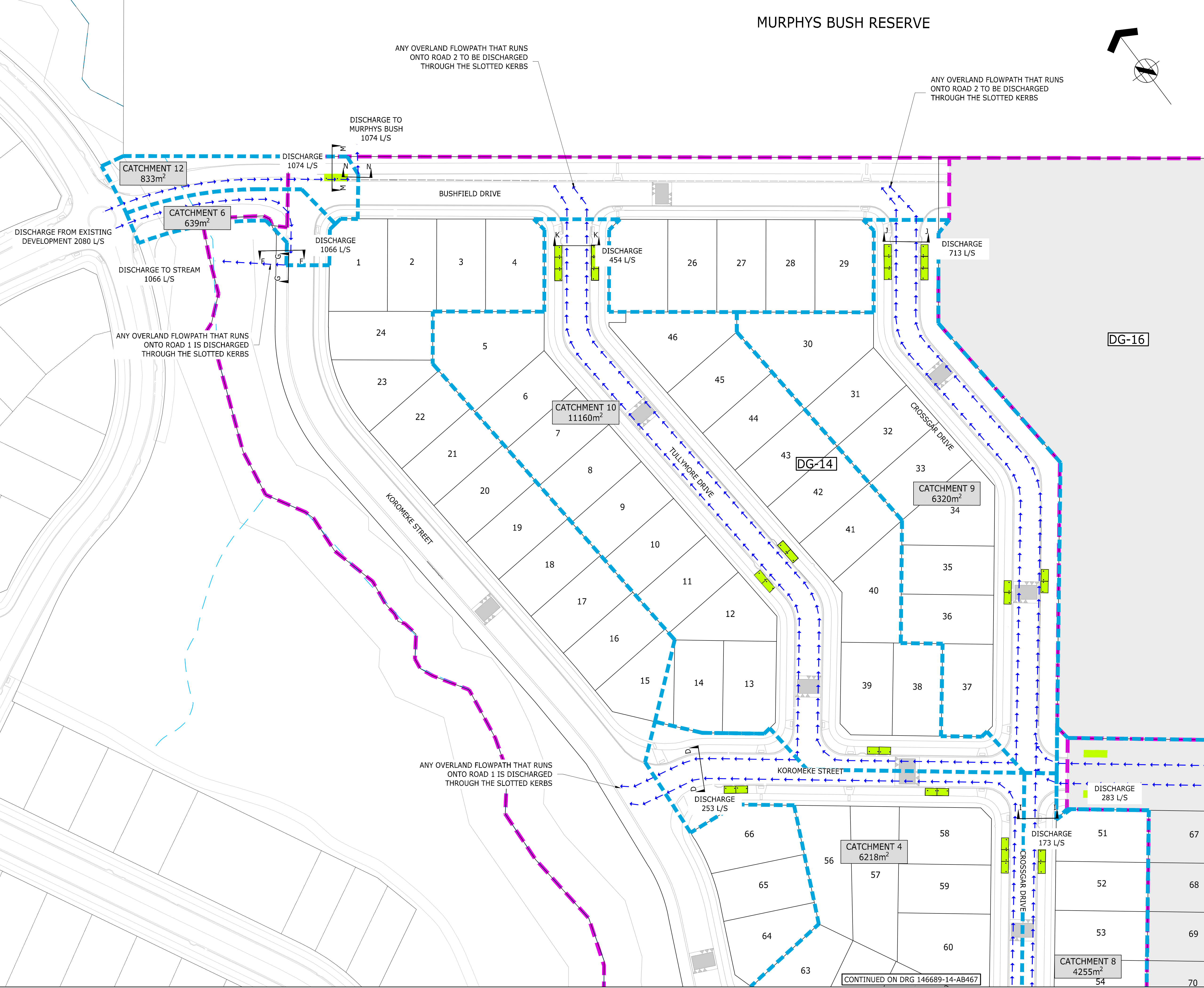
ISSUE STATUS:

AS-BUILT

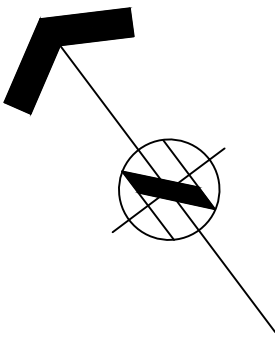
PROJECT No: 1050-146689-01	SCALES: 1:1000-A1 1:2000-A3	A1
DRAWING No:		REV

146689-14-AB465

A



MURPHYS BUSH RESERVE





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- NOTES:
- REFER TO FLOWPATH CALCULATIONS AND HYDRAFLOW EXPRESS REPORTS FOR DETAILS ON EXTENT OF FLOWPATHS WITHIN ROADS.
 - ALL FLOWPATHS ARE WITHIN THE LEGAL ROAD WIDTH.

- LEGEND:
- STAGE BOUNDARIES
 - CATCHMENT BOUNDARIES
 - OVERLAND FLOWPATHS
 - EXISTING WATERCOURSE

ENGINEERING APPROVAL
ENG-60363080

I CERTIFY THAT THESE ASBUILT PLANS ARE AN ACCURATE RECORD OF THE WORKS UNDERTAKEN AND THAT:

- THE COORDINATES (X,Y) ARE IN TERMS OF NZTM ON NZGD (2000), AND ARE WITHIN ±50mm.
- THE LEVELS (Z) ARE IN TERMS OF THE AUCKLAND 1946 (MSL) LINZ DATUM (DOSLI DATUM), AND ARE WITHIN ±25mm.

Signed: 
REGISTERED PROFESSIONAL SURVEYOR

Date: 29/10/2021
Name: STEPHEN JAMES WARDLE
Phone: 09-917-5000
Email: s.wardle@harrisonsgrimson.com



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A	AS-BUILT	WJK	29.10.21
REF	REVISIONS	BY	DATE

PROJECT:
**HUGH GREEN LIMITED
DONEGAL STAGE 14
36 TIR CONAILL AVENUE, FLATBUSH**

TITLE:
**100 YEAR OVERLAND FLOWPATH
AS-BUILT PLAN
SHEET 1 OF 2**

ORIGINATOR: WJK	DATE: 31.05.21	SIGNED:	PLOT BY: WJK
DRAWN: MNP	DATE: 15.09.21	SIGNED:	PLOT DATE: 29.10.21
CHECKED: WJK	DATE: 28.09.21	SIGNED:	SURVEY BY: DEMPSEY WOOD
APPROVED: DAS	DATE: 30.09.21	SIGNED:	SURVEY DATE: 05.2021

ISSUE STATUS:
AS-BUILT

PROJECT No: 1050-146689-01	SCALES: 1:500-A1 1:1000-A3	A1
DRAWING No:		REV

146689-14-AB466

A



APPENDIX 3

OVERLAND FLOW CALCULATIONS

36 Tir Conaill Av. - Donegal 14, 15A & 15B

HG PROJECT NUMBER: 1050-146689-01
DATE: 2/04/2020



Runoff Coefficient - C	0.8	
Rainfall Intensity (100year) - I	183	mm/hour
Total Catchment Area	6.14	ha

$Q = CIA \times 2.78/1000$

CATCHMENT	AREA (ha)
1	1.4427
2	0.4793
3	0.5782
4	0.6218
6	0.0639
7	0.6943
8	0.4255
9	0.632
10	1.116
12	0.0833

CROSS SECTION	CATCHMENT	AREA (Ha)	Q (m³/s)	EXISTING DISCHARGE	CUMALATIVE FLOW
A	1	1.443	0.587		
B	2	0.479	0.195		
C	3	0.578	0.235		
D	4	0.622	0.253		
F	6	0.064	0.026	1.040	1.066
G					1.066
H	7	0.694	0.283		
I	8	0.426	0.173		
J	9	0.632	0.257		0.713
K	10	1.116	0.454		
M	12	0.083	0.034	1.040	1.074
N					1.074

Notes:

Discharge Point

Discharge Point

*OLF Path & Catchment plans refer to drawings:
146689-465
146689-466
146689-467
146689-468

CROSS SECTIONS AT SPEED TABLES

	0.785
	0.451
	0.319

O		0.785	0.319		
P		0.451	0.184		
Q		0.319	0.130		

Channel Report

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Wednesday, Jul 22 2020

Section A-A

User-defined

Invert Elev (m) = 64.2900
Slope (%) = 5.3000
N-Value = 0.013

Calculations

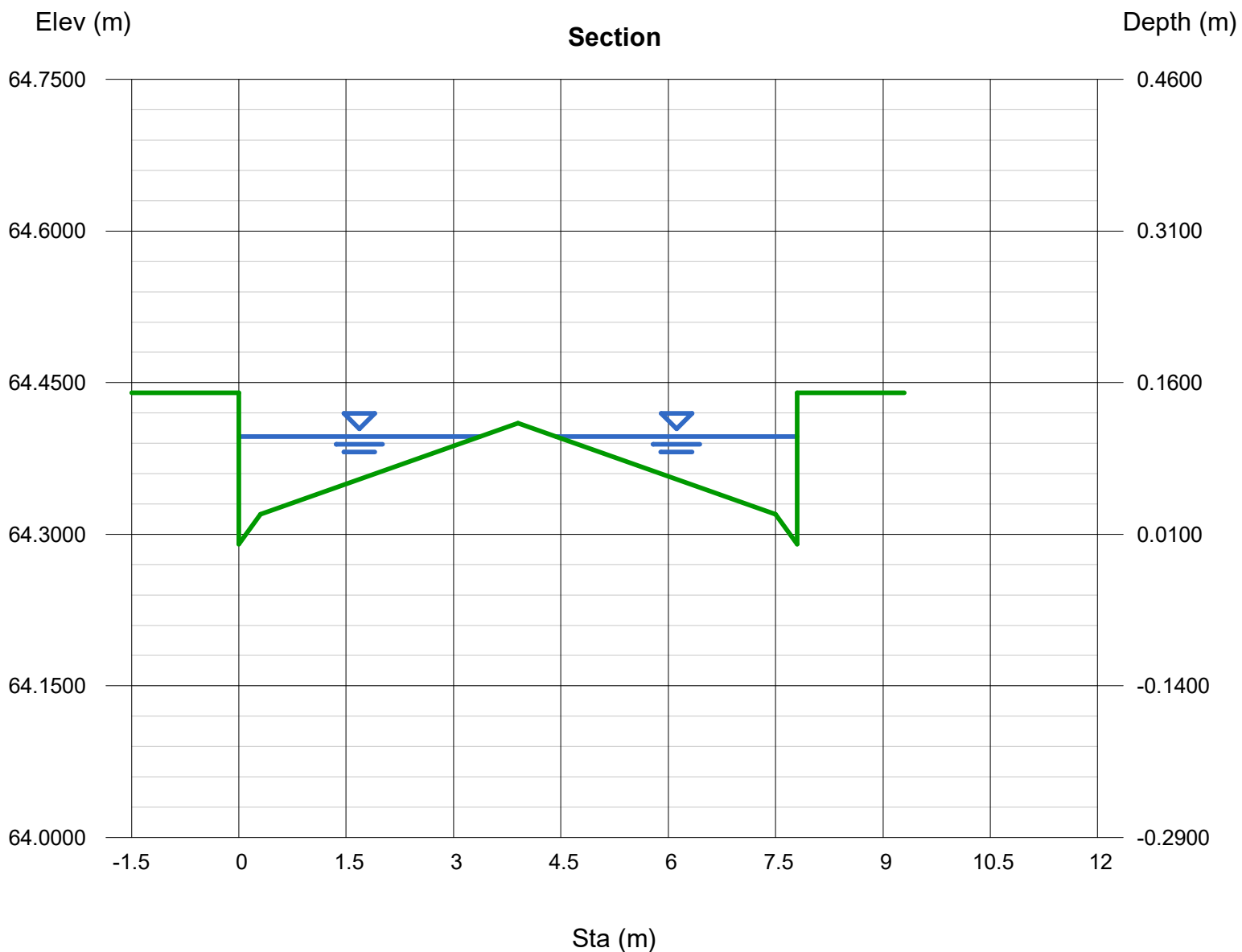
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Highlighted

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Wetted Perim (m) = 6.9527
Crit Depth, Yc (m) = 0.1500
Top Width (m) = 6.7344
EGL (m) = 0.3154

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Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Apr 8 2020

Section B-B

User-defined

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Slope (%) = 6.1000
N-Value = 0.013

Calculations

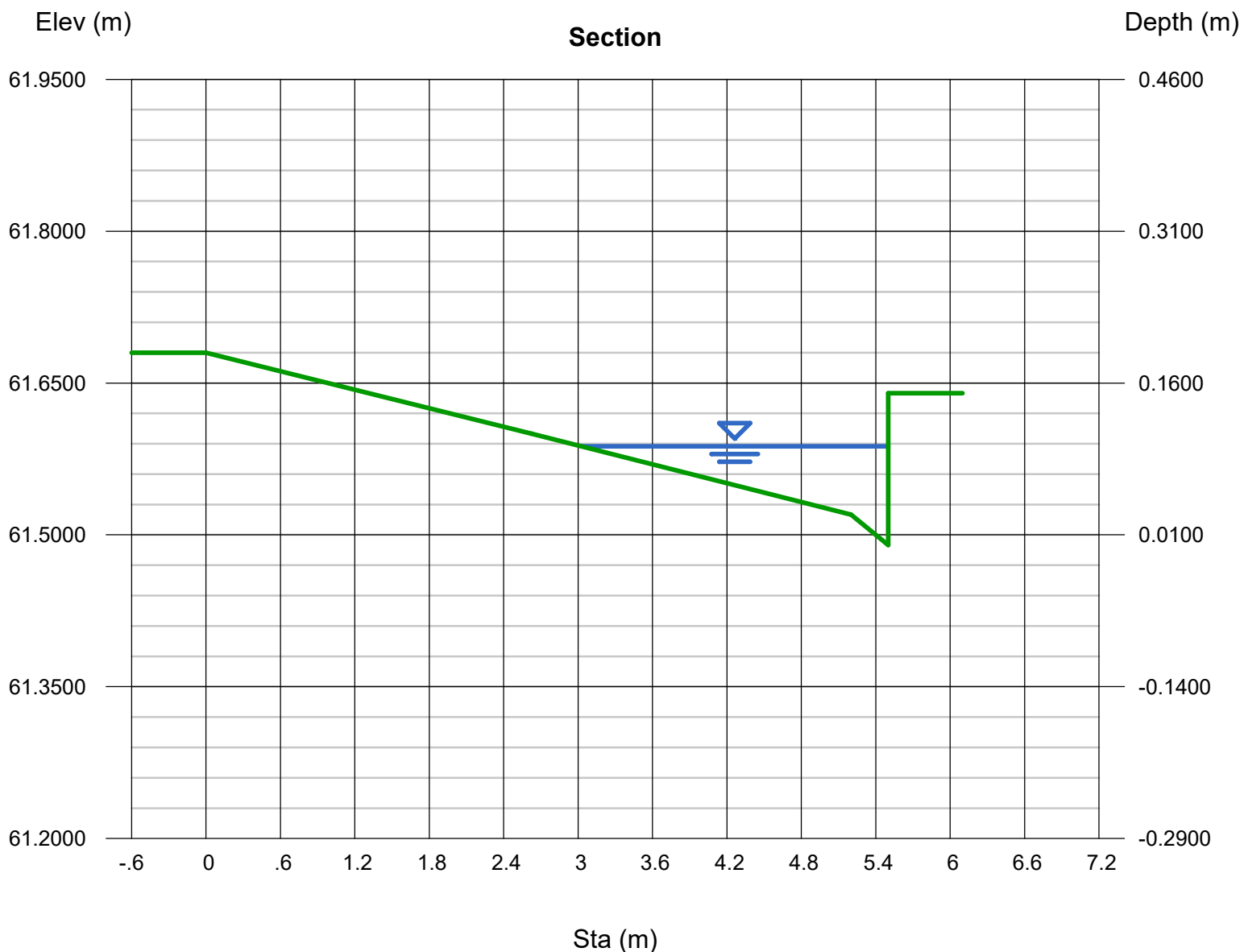
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Known Q (cms) = 0.1950

Highlighted

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Area (sqm) = 0.0982
Velocity (m/s) = 1.9862
Wetted Perim (m) = 2.5740
Crit Depth, Yc (m) = 0.1463
Top Width (m) = 2.4740
EGL (m) = 0.2988

(Sta, El, n)-(Sta, El, n)...

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Channel Report

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Wednesday, Apr 8 2020

Section C-C

User-defined

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Slope (%) = 5.7000
N-Value = 0.013

Calculations

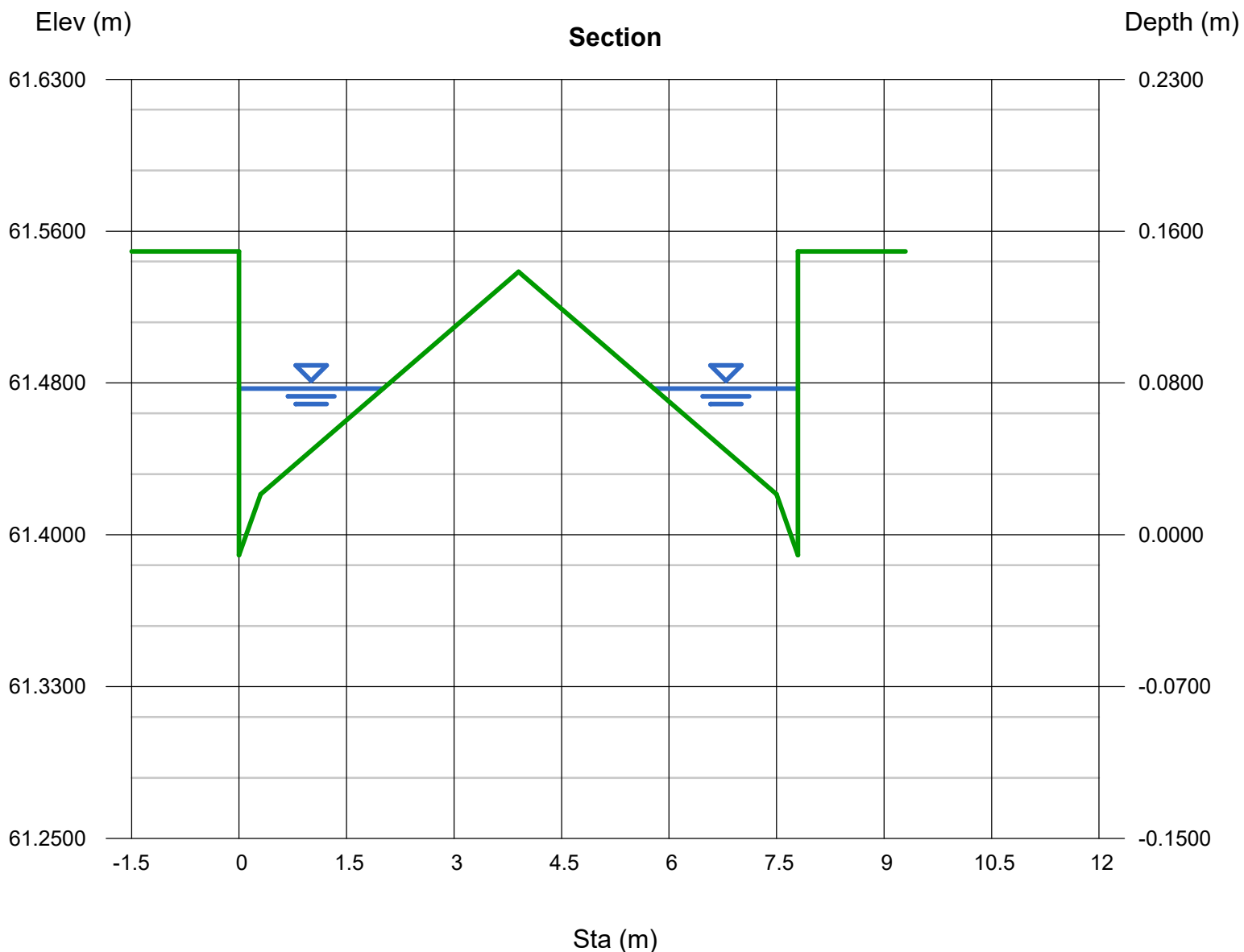
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Velocity (m/s) = 1.8092
Wetted Perim (m) = 4.1923
Crit Depth, Yc (m) = 0.1219
Top Width (m) = 4.0231
EGL (m) = 0.2493

(Sta, El, n)-(Sta, El, n)...

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Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Apr 8 2020

Section D-D

User-defined

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Slope (%) = 1.0000
N-Value = 0.013

Calculations

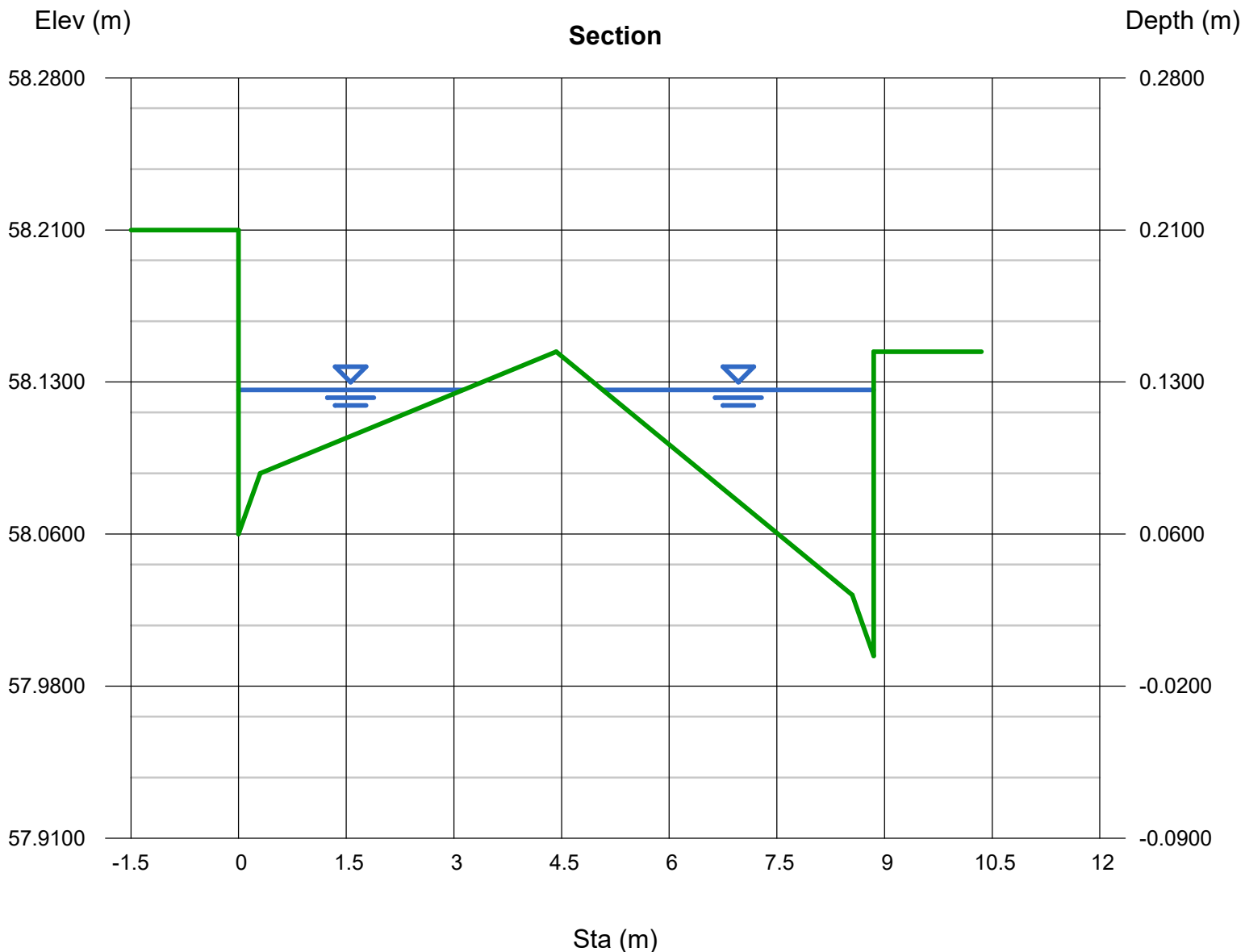
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Highlighted

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Q (cms) = 0.253
Area (sqm) = 0.2851
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Wetted Perim (m) = 7.1039
Crit Depth, Yc (m) = 0.1433
Top Width (m) = 6.8970
EGL (m) = 0.1712

(Sta, El, n)-(Sta, El, n)...

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Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Apr 8 2020

Section F-F

User-defined

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Slope (%) = 2.7000
N-Value = 0.013

Calculations

Compute by: Known Q
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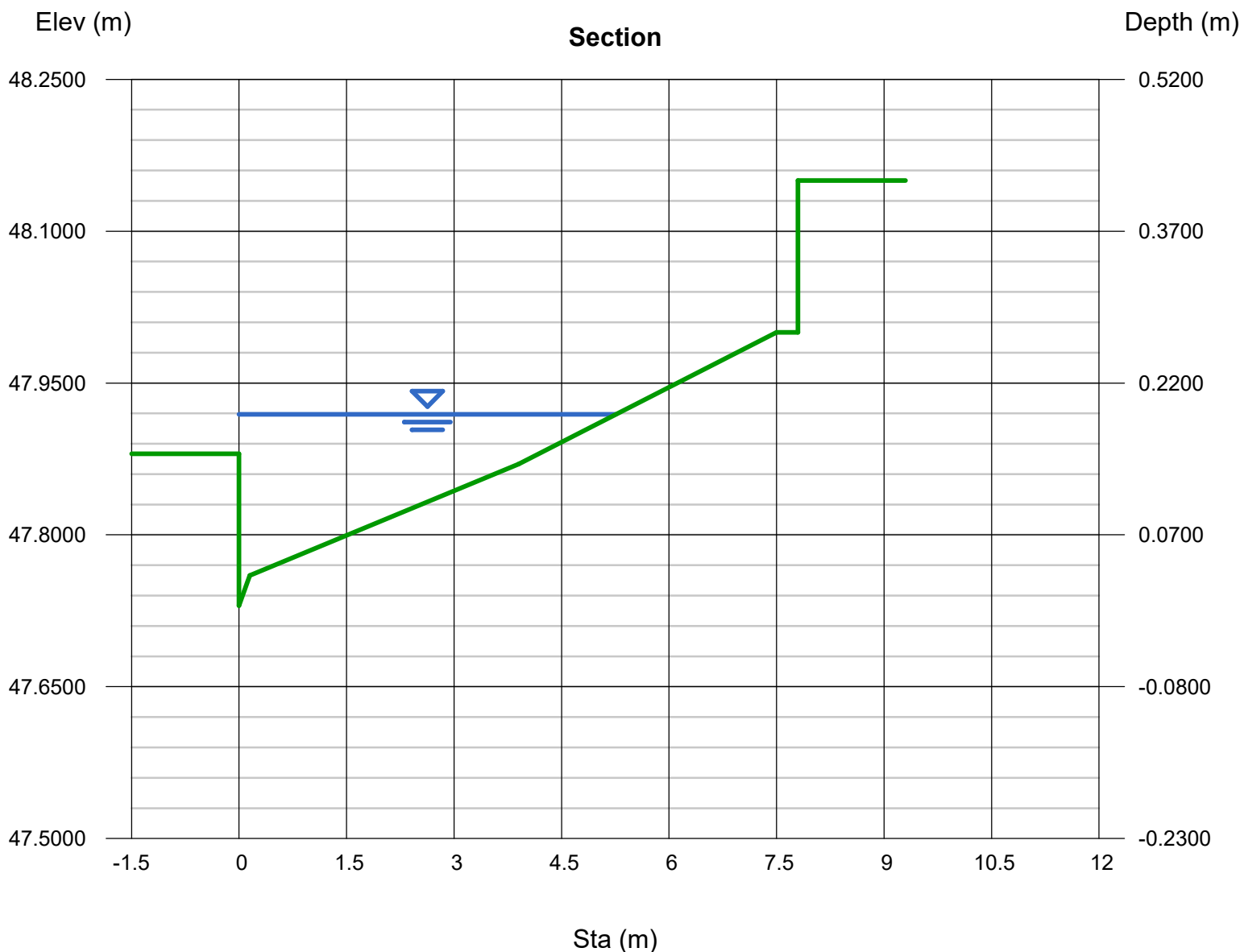
Highlighted

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Area (sqm) = 0.4492
Velocity (m/s) = 2.3730
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Crit Depth, Yc (m) = 0.2682
Top Width (m) = 5.2562
EGL (m) = 0.4762

(Sta, El, n)-(Sta, El, n)...

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looks like over toopping the kerb
and go into the stream



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Apr 8 2020

Section H-H

User-defined

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Slope (%) = 2.2000
N-Value = 0.013

Calculations

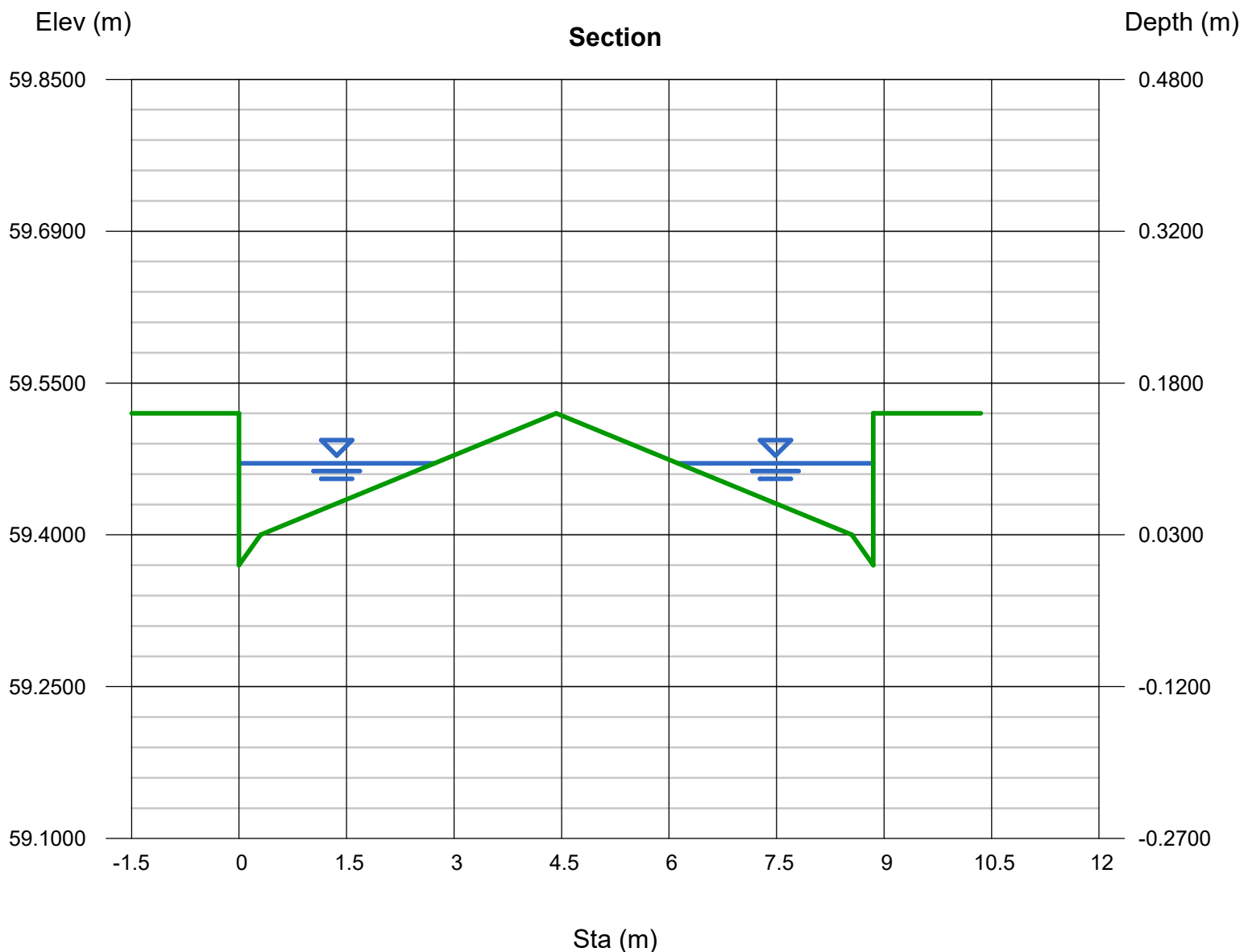
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Highlighted

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Velocity (m/s) = 1.2713
Wetted Perim (m) = 5.6588
Crit Depth, Yc (m) = 0.1280
Top Width (m) = 5.4526
EGL (m) = 0.1830

(Sta, El, n)-(Sta, El, n)...

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Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Apr 8 2020

Section I-I

User-defined

Invert Elev (m) = 60.2000
Slope (%) = 4.9000
N-Value = 0.013

Calculations

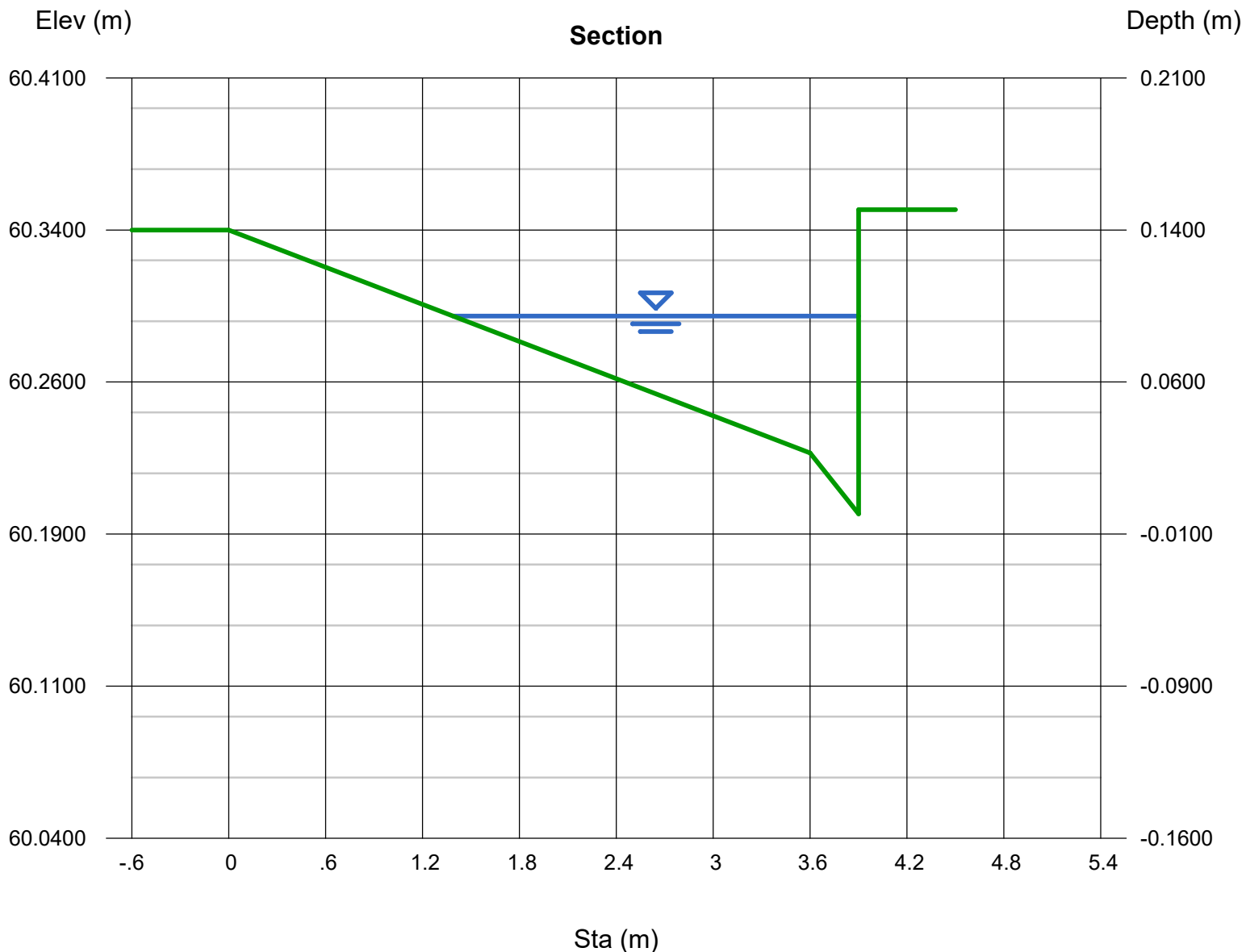
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Highlighted

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Wetted Perim (m) = 2.6104
Crit Depth, Yc (m) = 0.1402
Top Width (m) = 2.5104
EGL (m) = 0.2520

(Sta, El, n)-(Sta, El, n)...

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Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Apr 8 2020

Section J-J

User-defined

Invert Elev (m) = 51.7000
Slope (%) = 4.9000
N-Value = 0.013

Calculations

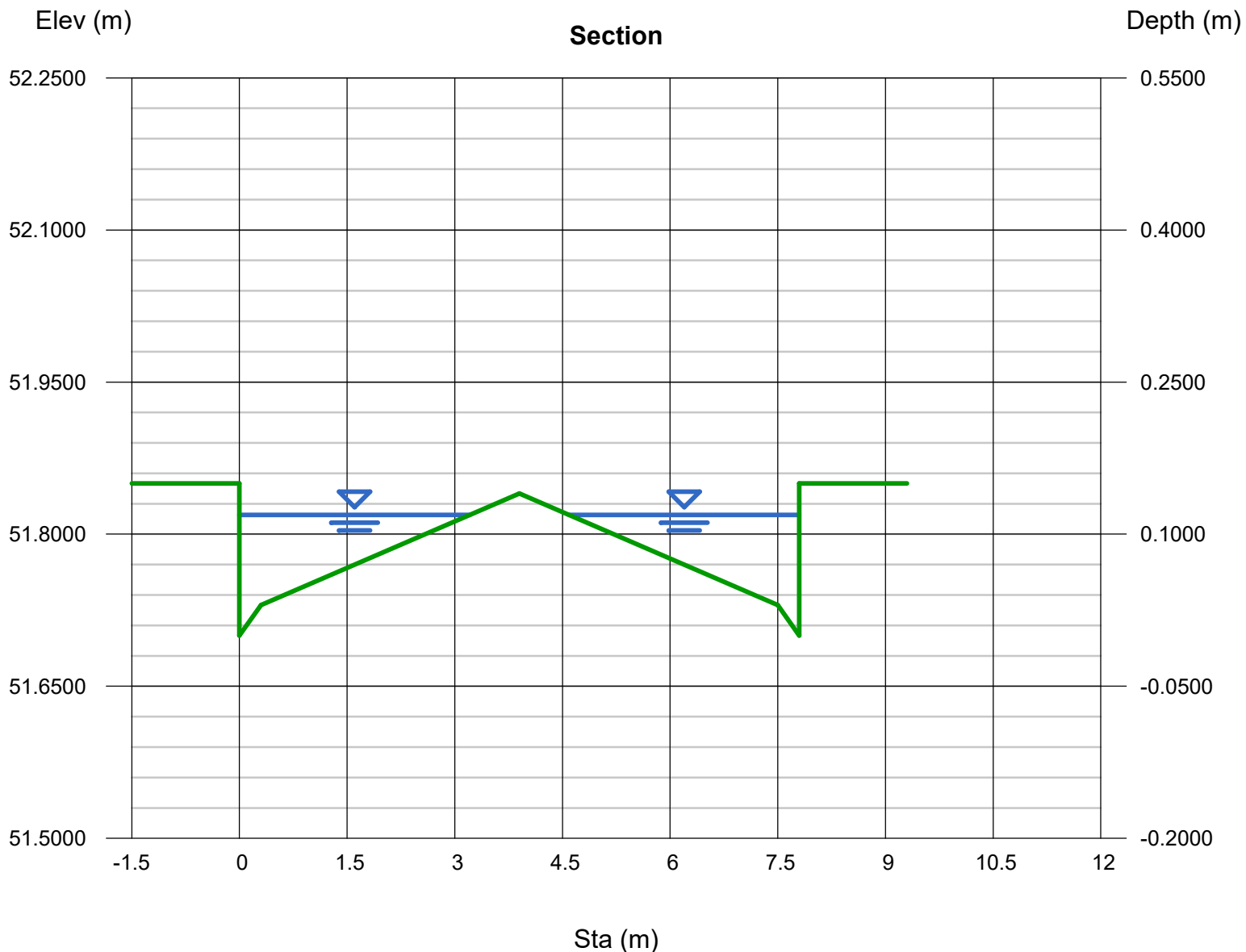
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Crit Depth, Yc (m) = 0.1500
Top Width (m) = 6.4173
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(Sta, El, n)-(Sta, El, n)...

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Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Apr 8 2020

Section K-K

User-defined

Invert Elev (m) = 49.8300
Slope (%) = 3.0000
N-Value = 0.013

Calculations

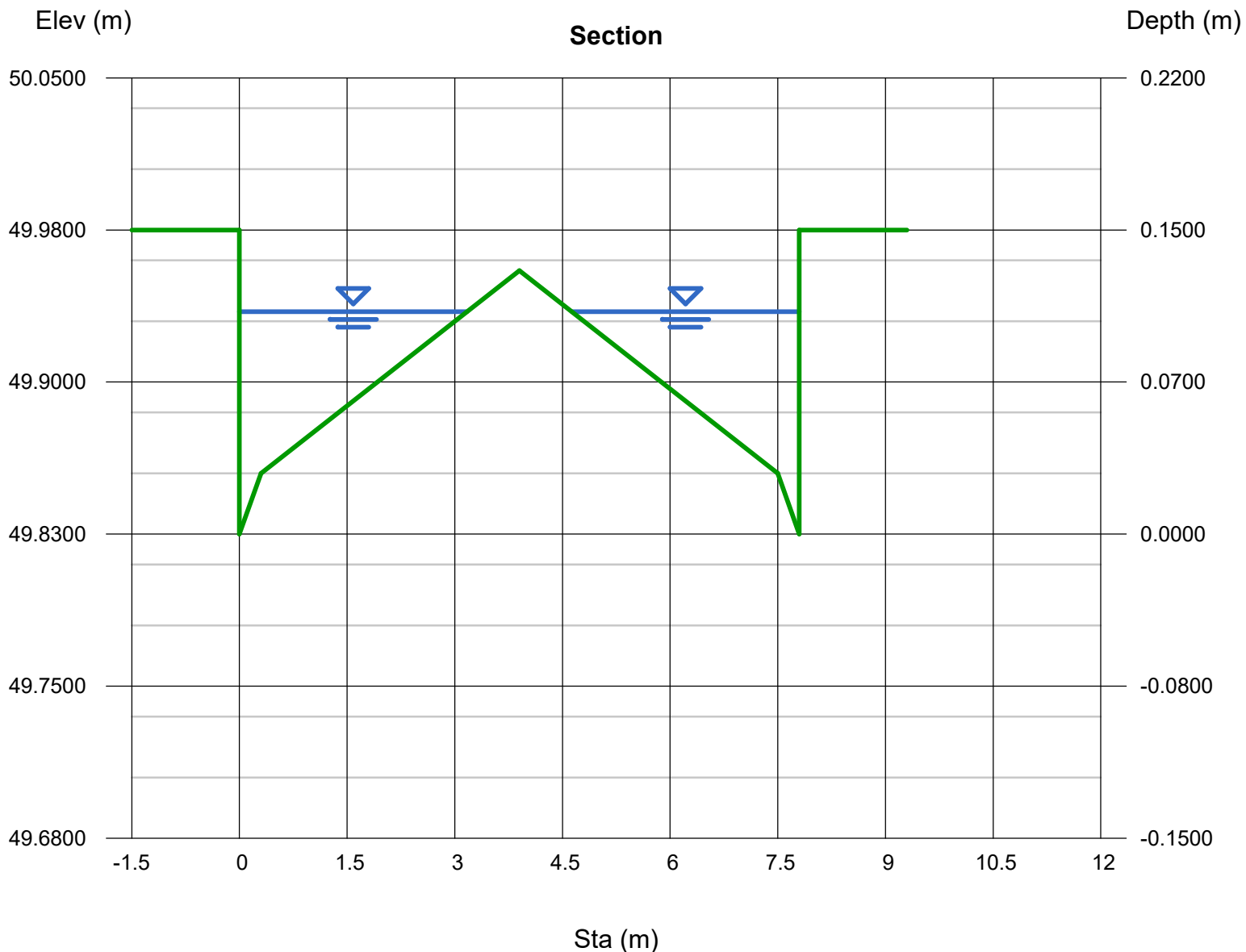
Compute by: Known Q
Known Q (cms) = 0.4540

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Depth (m) = 0.1097
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Velocity (m/s) = 1.5891
Wetted Perim (m) = 6.5653
Crit Depth, Yc (m) = 0.1463
Top Width (m) = 6.3406
EGL (m) = 0.2385

(Sta, El, n)-(Sta, El, n)...

(0.0000, 49.9800)-(0.3000, 49.8600, 0.013)-(3.9000, 49.9600, 0.013)-(7.5000, 49.8600, 0.013)-(7.8000, 49.8300, 0.013)-(7.8000, 49.9800, 0.013)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Apr 15 2020

Section M-M

User-defined

Invert Elev (m) = 48.1100
Slope (%) = 0.9000
N-Value = 0.013

Calculations

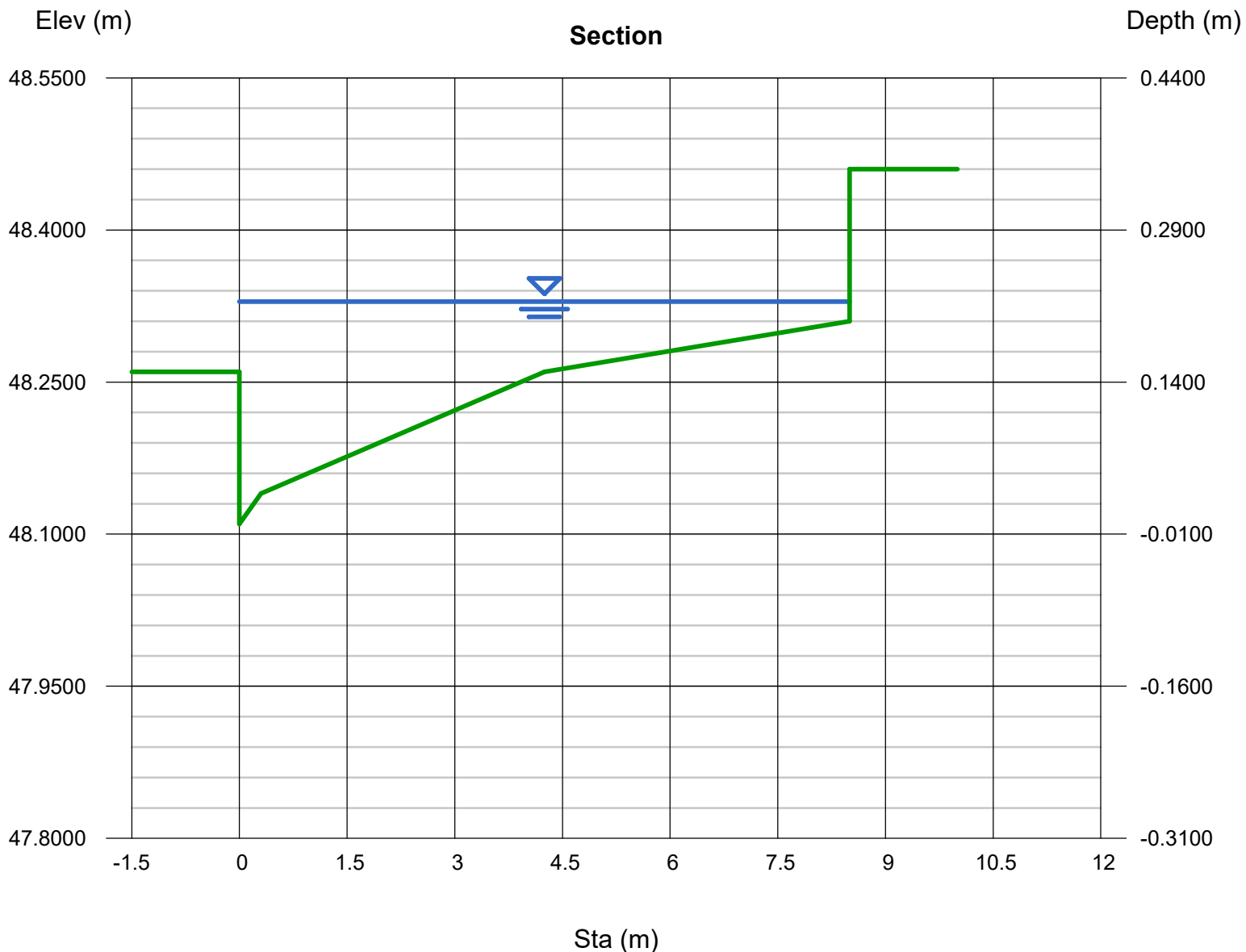
Compute by: Known Q
Known Q (cms) = 1.0740

Highlighted

Depth (m) = 0.2195
Q (cms) = 1.0740
Area (sqm) = 0.7616
Velocity (m/s) = 1.4101
Wetted Perim (m) = 8.6731
Crit Depth, Yc (m) = 0.2499
Top Width (m) = 8.5000
EGL (m) = 0.3209

(Sta, El, n)-(Sta, El, n)...

(0.0000, 48.2600)-(0.3000, 48.1400, 0.013)-(4.2500, 48.2600, 0.013)-(8.5000, 48.3100, 0.013)-(8.5000, 48.4600, 0.013)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Jul 22 2020

Section O-O

User-defined

Invert Elev (m) = 66.7600
Slope (%) = 5.0000
N-Value = 0.013

Calculations

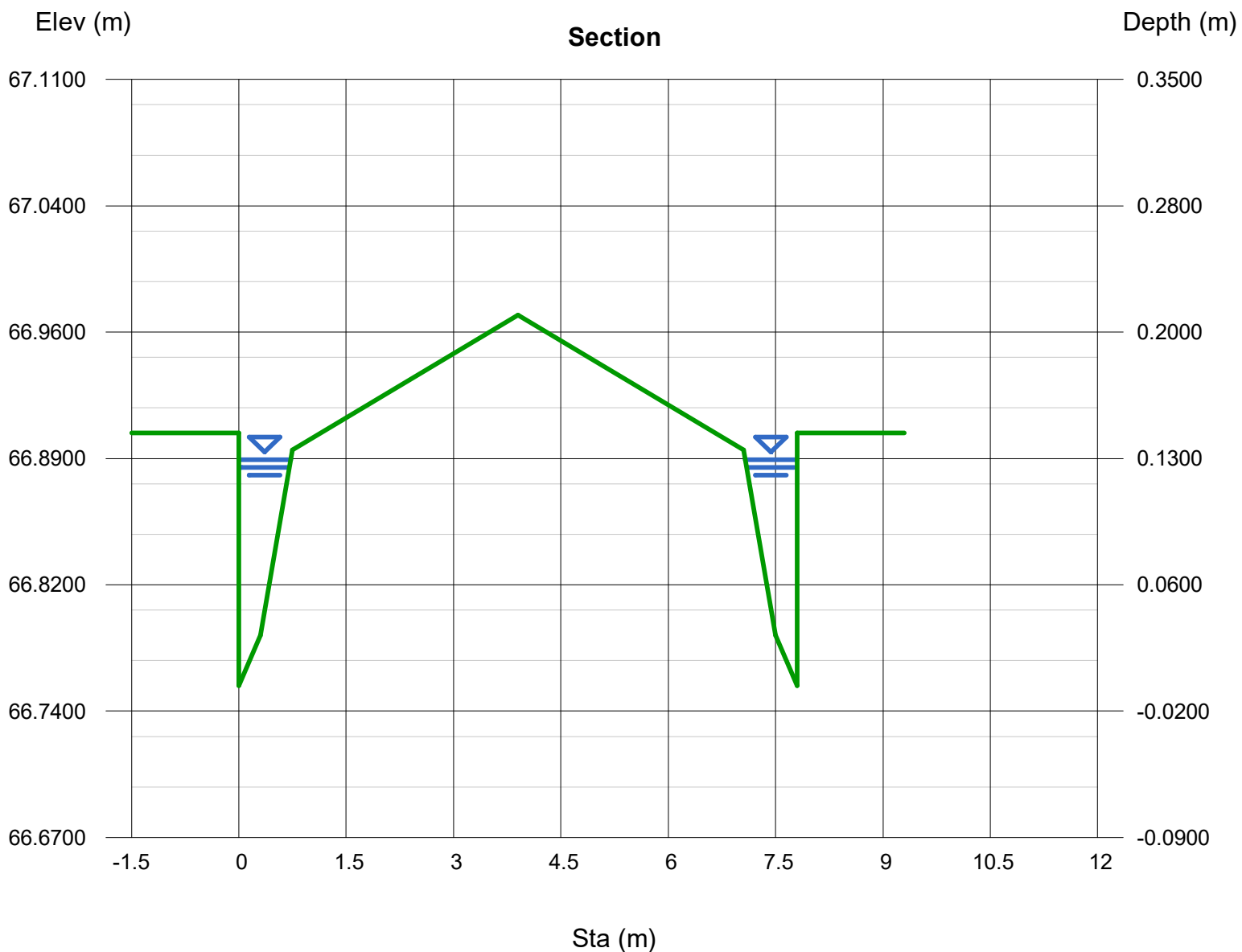
Compute by: Known Q
Known Q (cms) = 0.3200

Highlighted

Depth (m) = 0.1341
Q (cms) = 0.3200
Area (sqm) = 0.1158
Velocity (m/s) = 2.7632
Wetted Perim (m) = 1.7481
Crit Depth, Yc (m) = 0.2103
Top Width (m) = 1.4518
EGL (m) = 0.5236

(Sta, El, n)-(Sta, El, n)...

(0.0000, 66.9100)-(0.3000, 66.7900, 0.013)-(0.7500, 66.9000, 0.013)-(3.9000, 66.9800, 0.013)-(7.0500, 66.9000, 0.013)-(7.5000, 66.7900, 0.013)-(7.8000, 66.7900, 0.013)-(7.8000, 66.9100, 0.013)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Jul 22 2020

Section P-P

User-defined

Invert Elev (m) = 62.0800
Slope (%) = 5.7000
N-Value = 0.013

Calculations

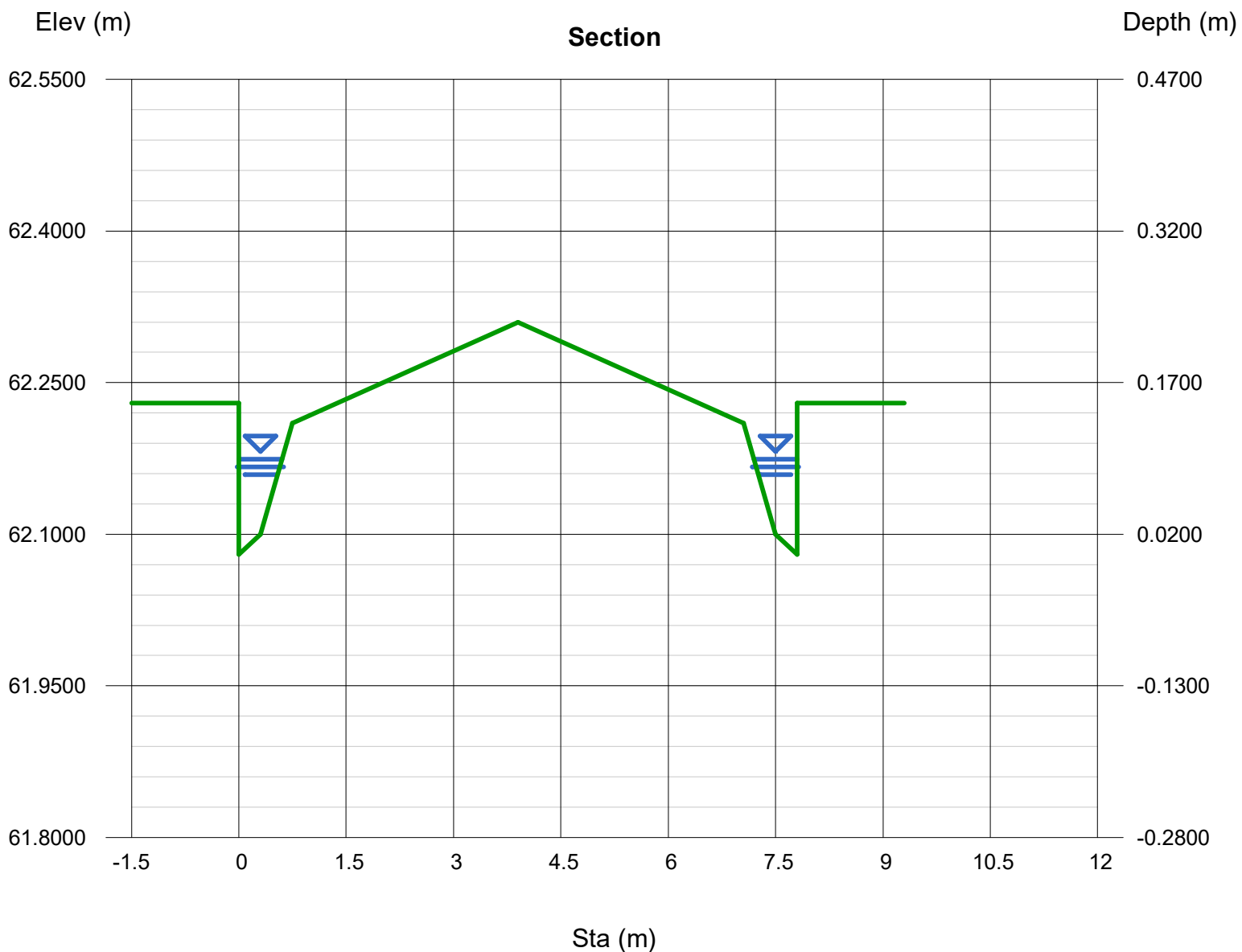
Compute by: Known Q
Known Q (cms) = 0.1840

Highlighted

Depth (m) = 0.0945
Q (cms) = 0.184
Area (sqm) = 0.0734
Velocity (m/s) = 2.5070
Wetted Perim (m) = 1.4177
Crit Depth, Yc (m) = 0.1737
Top Width (m) = 1.2095
EGL (m) = 0.4151

(Sta, El, n)-(Sta, El, n)...

(0.0000, 62.2300)-(0.3000, 62.1000, 0.013)-(0.7500, 62.2100, 0.013)-(3.9000, 62.3100, 0.013)-(7.0500, 62.2100, 0.013)-(7.5000, 62.1000, 0.013)-(7.8000, 62.0800, 0.013)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Wednesday, Jul 22 2020

Section Q-Q

User-defined

Invert Elev (m) = 63.0200
Slope (%) = 8.1000
N-Value = 0.013

Calculations

Compute by: Known Q
Known Q (cms) = 0.1300

Highlighted

Depth (m) = 0.0762
Q (cms) = 0.130
Area (sqm) = 0.0526
Velocity (m/s) = 2.4695
Wetted Perim (m) = 1.2271
Crit Depth, Yc (m) = 0.1554
Top Width (m) = 1.0598
EGL (m) = 0.3873

(Sta, El, n)-(Sta, El, n)...

(0.0000, 63.1700)-(0.3000, 63.0400, 0.013)-(0.7500, 63.1500, 0.013)-(3.9000, 63.2400, 0.013)-(7.0500, 63.1500, 0.013)-(7.5000, 63.0400, 0.013)-(7.8000, 63.0400, 0.013)-(7.8000, 63.1700, 0.013)

