CITY OF SCOTTSDALE

Drainage Reports

Michael P. Leary, LTD

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Scottsdale, Arizona 85255

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michaelpleary@cox.net

Date: November17, 2020
To: Joe Phillips, Project Manager
Meredith Tessier, Senior Planner
From: Mike Leary
Subject: **DC Ranch Park – shared stormwater detention basin**

Colleagues, I hope that you view my following comments as nothing more than an opportunity to solve a significant drainage problem to the City's benefit and not an attempt to obfuscate the plans for constructing post-haste the Bell Road Sports Complex. I understand the City's objective to have the fields ready for parking the January 2022 Barrett-Jackson auction. However, I am concerned that the rush might overlook the opportunity to accomplish significantly more than just the proposed lake in DC Ranch Park.

As background I was the development coordinator for the Hampton Group which acquired the adjoining 125-acre ASLD lease back in 2007 (and defaulted in 2009). As part of the EPICENTER infrastructure master planning by the engineering firm of Coe & Van Loo, it was discovered that the existing 100-year flow through the culverts at the northeast corner of Bell Toad and the Pima Freeway far exceeded its capacity. The culvert has a 100-year capacity between 900 and 1,000 cfs but incoming flows between 1,400 and 1,700 cfs. In essence during a 100-year event the intersection and the up and downstream properties will be flooded and the City might be liable for damages as a result of not having rectified the problem that they have been aware of since 2008.

The use of the DC Ranch Park site to mitigate the significant overage was first approved with the Epicenter Master Drainage Plan in 2008. A highlighted abstract of the Executive Report is below:

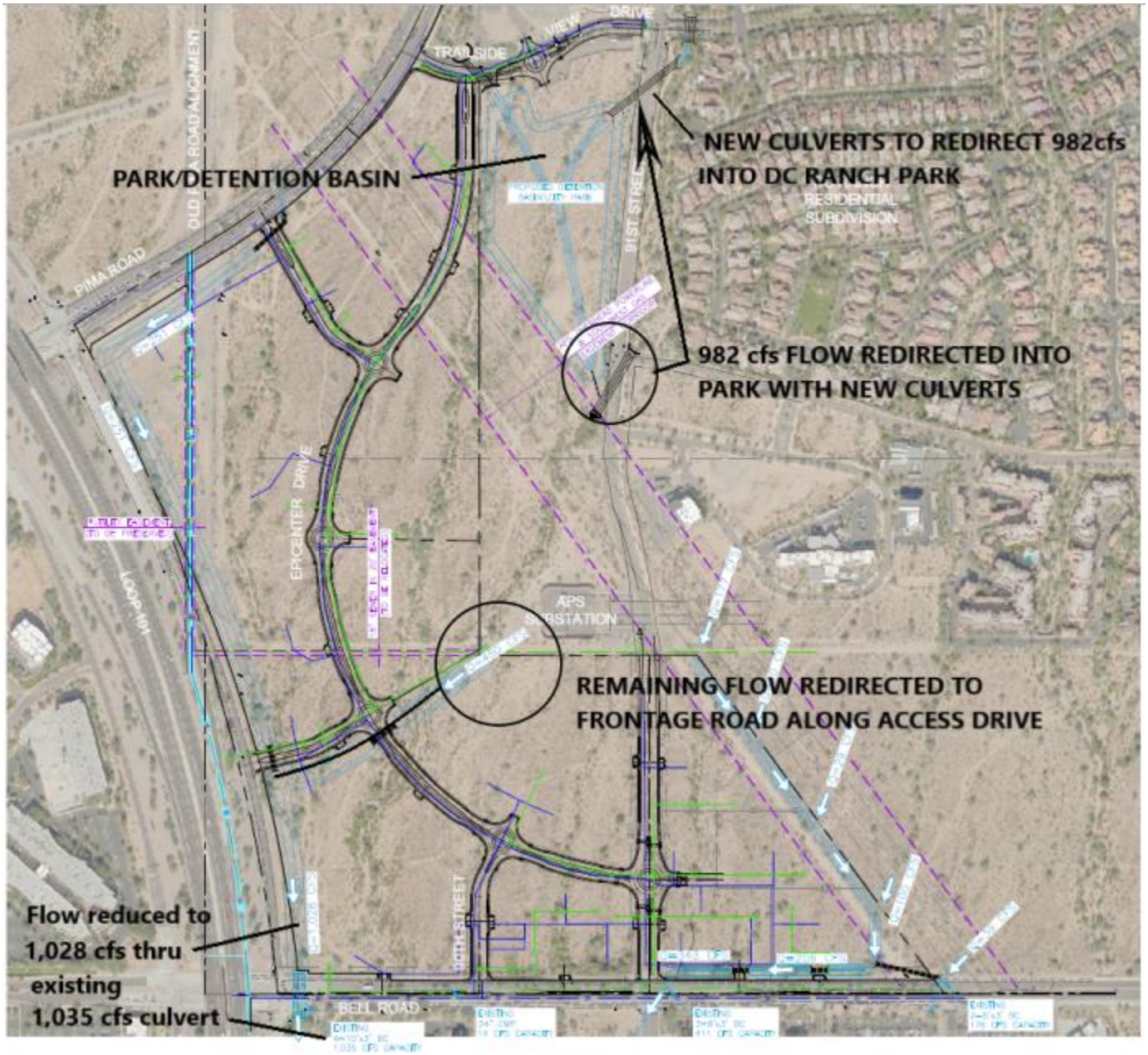
2.0 SCOTTSDALE EPICENTER UPSTREAM DRAINAGE BACKGROUND

In order to gain understanding of the upstream watershed for the site, CVL referred to the drainage reports for DC Ranch (Reference 1) and the Preliminary Drainage Design Report for the Pima Road Realignment Project (Reference 2). According to these reports, the 100-year off-site flows of **491 cfs (CP-C1B), 993 cfs (CP-CC2E)**, and **251 cfs (CP1MA3)** are directed through the site toward a four-barrel, 10-foot by 3-foot box culvert located at Bell Road immediately east of the Loop 101 frontage road. In addition, **300 cfs (CP-API1)** from the site itself is directed to the same culvert under the existing non-developed site conditions. Refer to Plate 1 for the location of the HEC-1 concentration points.

In order to calculate the existing 100-year 6-hour flow upstream of the above mentioned box culvert, CVL combined the DC Ranch contributing drainage area, the Pima Road contributing drainage area, and the site's existing condition contributing drainage area in a HEC-1 model and included it within the approved Master Drainage Report for Scottsdale Epicenter (Reference 3). The box culverts, as well as the downstream channel and two additional culvert crossings south of Epicenter, were designed to carry a 100-year flow of **1,035 cfs** (References 4 & 5). The 100-year 6-hour flow in the existing condition box culverts is **1,719 cfs** (Reference 3). This flow exceeds the capacity of the culvert as well as the channel and three other downstream culverts, causing a potential flood hazard for Scottsdale Epicenter, Bell Road, and properties downstream of Bell Road.

In order to eliminate the flood hazard described above, the City of Scottsdale has agreed to use the future DC Ranch Park (hereafter referred to as the "City of Scottsdale Park"), located at the southwest corner of the intersection of 91st Street and Trailside View Drive, as a detention basin to attenuate the upstream peak flows. Initially, 55 acre-feet of volume was proposed to be detained in this park to reduce the proposed condition 100-year peak flow at the upstream end of the Bell Road culverts to less than 1,035 cfs (Reference 3).

Below is a graphic from Coe & Van Loo illustrating the use of the park as a detention basin to mitigate the existing 100-year flooding (comments in black are mine):



In December 2017 I represented another group wanting to purchase the same ASLD property and had a formal pre-application meeting with City department staff. The use of DC Ranch Park for a drainage basin was reconfirmed by Stormwater's Ashley Couch. If the upstream flow isn't mitigated, the existing 1,400 to 1,700 flow will simply be conveyed through the ASLD property to the undersized Bell Road culverts with the City continuing to have the flooding problem to solve or not to solve.

The latest timeline from ASLD is that the north and south half of the 125-acres will be auctioned the first and second quarter of 2021. For a second time I am the development coordinator for the applicant on the south parcel and part of our the diligence is to confirm again that the DC Ranch Park is available for detention as previously approved.

The point of my letter is to make decision-makers aware that the plan below to construct a first phase lake does not address how the lake and other park improvements work with the long-planned and needed detention basin.

If the park is developed without consideration of the detention basin, the lake/waterlines/site improvements may need to be relocated or reconstructed which would be unnecessary, avoidable and costly. Detention basins for park facilities have been a common and successful dual-use throughout the City. In this case, there might also be another opportunity for a nominal amount of event parking for the January events.

There may be a similar opportunity for dual-use of the Bell Road Fields to absorb some of the flow from the existing wash on the east side thereby reducing the flows into Westworld.

In summary there are multiple benefits to be considered. The City still gets its lake for the Bell Sports Complex. The City eliminates the existing flooding hazard and liability at the Bell/101 culverts. DC Ranch gets greater and earlier park improvements. The Jauary seasonal parking might get to use some portion of the 14-acre park site. All of these benefits could be achieved less expensively if coordinated and not disjointed.

So thems my thoughts. I'm copying quite a few folks so that everyone has the same information. Hope this helps. ML

Cc: City Councilmembers
Jim Thompson, City Manager
Bill Murphy, Assistant. City Manager
Kroy Ekblaw, Special Projects
Dan Worth, Executive Director
Ashley Couch, Drainage/Flood Control Manager
Rich Anderson, Stormwater Engineering Manager
Randy Grant, Planning and Development Director
Tim Curtis, Current Planning Manager

Case File Report

HILGARTWILSON
ENGINEER | PLAN | SURVEY | MANAGE

Registered Professional Engineer (Civil) CERTIFICATE NO. 59301 BRIAN BROCKMAN DATE SIGNED 3/13/17 ARIZONA U.S.A.
Expires: 3/31/18

TECHNICAL MEMORANDUM

To: City of Scottsdale

From: HILGARTWILSON

Date: March 13th, 2017

RE: Great Hearts Academies – Scottsdale Preparatory Field Preliminary Drainage Analysis

Introduction and Background

This technical memorandum has been prepared in support of the Great Hearts Academies (GHA) proposed athletic field (the Project) located southwest of Trailside View and 91st Street, east of Pima Road and the 101 Highway, in the City of Scottsdale (the City). Refer to Figure 1 (Vicinity Map). Specifically, this memorandum discusses the regulatory framework in which the Project will be designed in accordance with as well as preliminary drainage considerations.

Future drainage reports will be prepared in accordance with the most current version of the City of Scottsdale (COS) Design Standards & Policies Manual (DSPM) and the Flood Control District of Maricopa County's (FCDMC) current versions of the Drainage Policies and Standards (DPSM), Drainage Design Manuals (DDM) for Maricopa County, - Hydrology and - Hydraulics.

Hydrologic Flow Determination

In July 2013, T.Y. Lin prepared the *Pinnacle Peak South Area Drainage Master Study Draft* (ADMS) (T.Y. Lin 2013) on behalf of the FCDMC that details the hydrologic and hydraulic conditions of a 45 square mile drainage area extending from Frank Lloyd Wright Boulevard to Dynamite Boulevard and from Scottsdale Road into the McDowell Mountains. The primary goal of the study was to characterize regional flows using the most up to date hydrologic study of the watershed referencing the most current land uses, rainfall data, detailed topography, and analysis. The hydrologic and hydraulic analysis for the study area was completed using FLO-2D, a volume conserving, two-dimensional flood routing modeling program best suited for simulating shallow, distributary flows within a watershed. The ADMS reported a worst case scenario flow of 488 cfs entering the northwest corner of the Project via box culverts beneath, as well as overtopping, Trailside View from the north. The ADMS also reported smaller flows for the 100-year, 6-hour and 24-hour events of 217cfs and 257cfs respectively. FLO-2D results from the ADMS are included as Attachment 1.

Site Location Relative to Known FEMA Flood Hazard Zones

The property is located within the Federal Emergency Management Agency's (FEMA) Special Flood Hazard Area (SFHA) Zone AO as delineated on the FEMA Flood Insurance Rate Maps (FIRMs) panel number 04013C1320L, revised October 16, 2013, which are presented on Figure 2 (FEMA Flood Map). The SFHA Zone associated with this Project is defined below.

Zone AO:

> The flood insurance rate zone that corresponds to areas subject to inundation by 1-percent annual chance (100-year storm event) shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone.

As the entire Project is located in a FEMA SFHA AO Zone, lowest floor elevations of nonresidential structures shall be elevated to conform to Chapter 37, Article I. Floodplain Management - Special Flood Hazard Areas, Section 37-22 of the Scottsdale Revised Ordinance Code.

Hydraulic Analysis

The 100-year water surface extents of the watercourse through the site were determined in order to identify the anticipated flooding impacts to the proposed field. The preliminary hydraulic analyses for the Project was performed using Hydraflow with parameters referenced from obtained topographic data for the Project. The top widths specified in the Hydraflow results were used to delineate the washes approximate water surface extents. The supporting hydraulic calculations are included as Attachment 2 and the estimated watersurface extents shown on Figure 3 (Drainage Summary Exhibit). It can be seen that based on the current field and parking lot layout, the worst case scenario flows crossing Trailside View do not impact the Project.

Onsite Design Requirements

The proposed Project will comply with the City's required drainage standards as well as Maricopa County Planning and Development Design guidelines and regulations. In accordance with the approved regional drainage report entitled DC Ranch Planning Unit I Part 4 Drainage Plan Study and stormwater storage waiver for the site, onsite stormwater storage is not anticipated to be required.

References

T.Y. Lin, 2013. *Pinnacle Peak South Area Drainage Master Study (Draft).* Phoenix, Arizona. July 2013.

Attachments

Figure 1: Vicinity Map
Figure 2: FEMA Flood Map
Figure 3: Drainage Summary Exhibit
Attachment 1: Pinnacle Peak South ADMS FLO-2D Results
Attachment 2: Hydraflow Calculations

HILGARTWILSON, LLC
2141 E Highland Avenue, Suite 250
Phoenix, Arizona 85016-4736
Phone: 602-490-0535

PROJ.NO.:	1792
DATE:	MAR 2017
SCALE:	1" = 600'
DRAWN BY:	SL
CHECKED BY:	AT

GREAT HEARTS ACADEMIES
SCOTTSDALE PREPATORY FIELD
SCOTTSDALE, ARIZONA

FIG. 1: VICINITY MAP

HILGARTWILSON
2141 E. HIGHLAND AVE., STE. 250
PHOENIX, AZ 85016
P: 602.490.0535 / F: 602.368.2436

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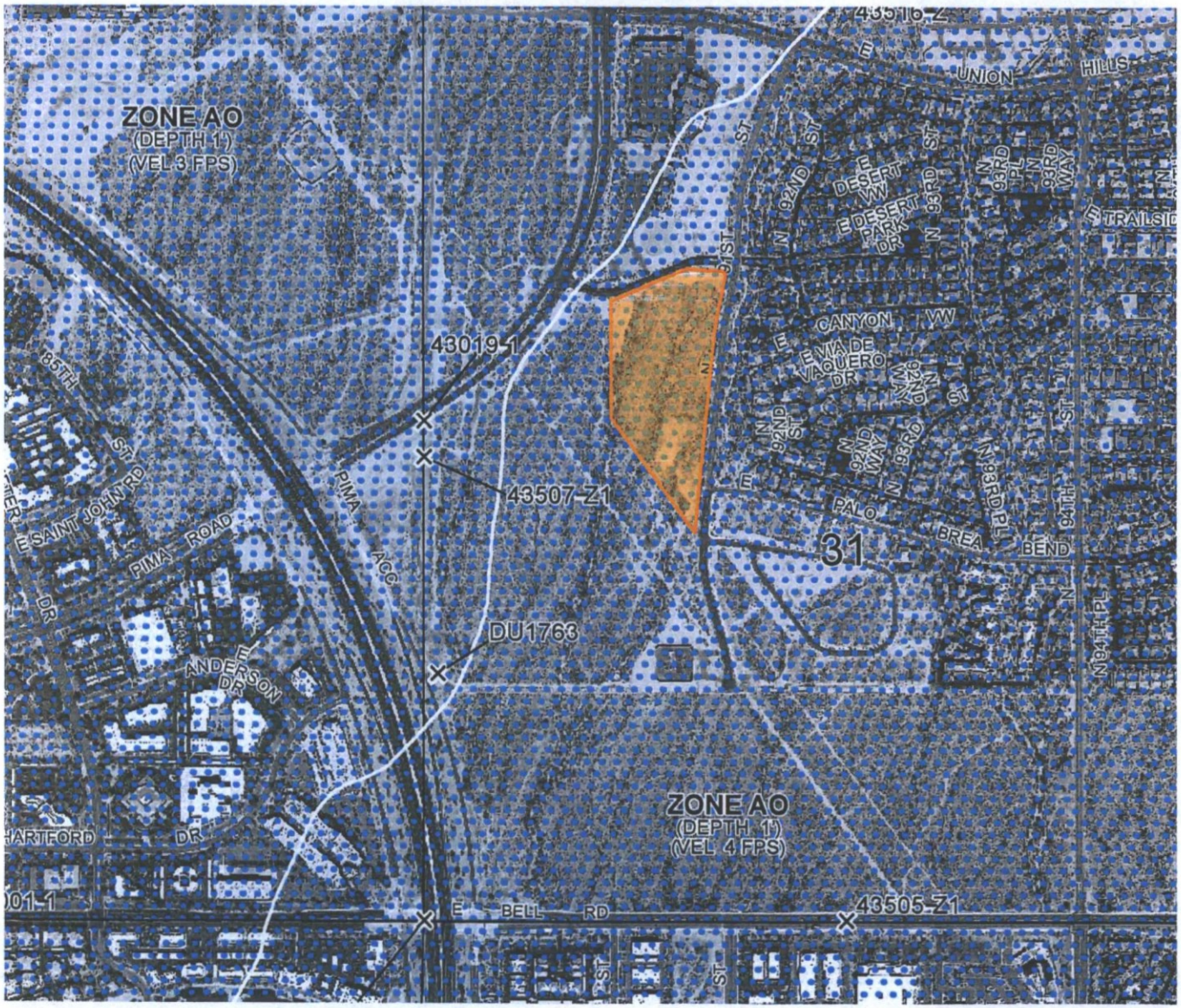
10/6/2020



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1320L

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1320 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1320	L
PHOENIX, CITY OF	040051	1320	L
SCOTTSDALE, CITY OF	045012	1320	L

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C1320L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

LEGEND

PROJECT LIMITS

N

600 300 0 600

SCALE FEET

HILGARTWILSON
2141 E. HIGHLAND AVE., STE. 250
PHOENIX, AZ 85016
P: 602.490.0535 / F: 602.368.2436

GREAT HEARTSACADEMY
SCOTTSDALE PREPATORY FIELD
SCOTTSDALE, ARIZONA

FIG. 2: FEMA FLOOD MAP

PROJ. NO.:	1792
DATE:	MAR 2017
SCALE:	1" = 600'
DRAWN BY:	SL
CHECKED BY:	AT

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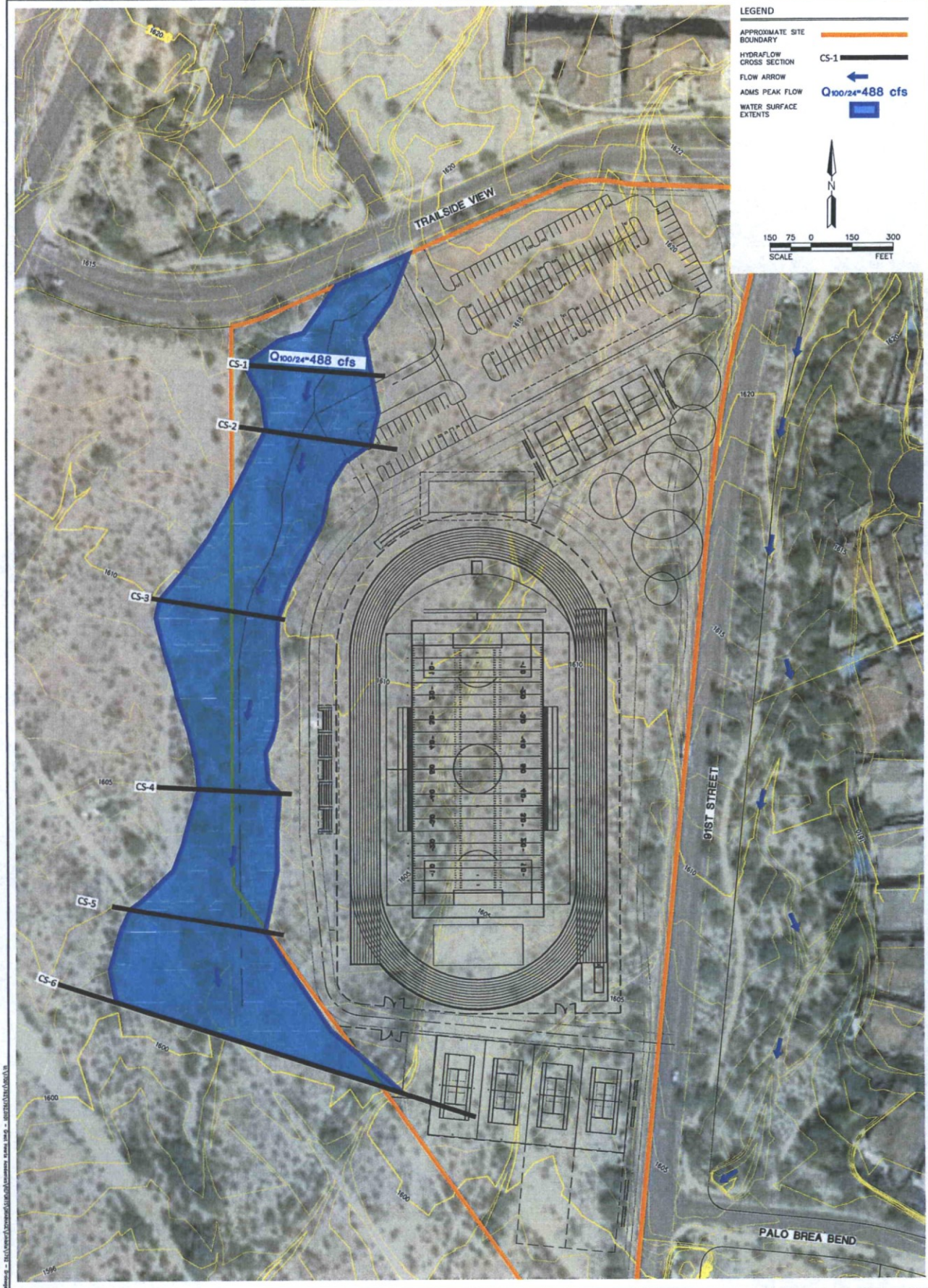


HILGARTWILSON	GREAT HEARTS ACADEMIES	HILGARTWILSON ENGINEER | PLAN | SURVEY | MANAGE	REV.:
PROJ NO.: 1792	SCOTTSDALE PREPATORY FIELD	2141 E. HIGHLAND AVE., STE. 250 PHOENIX, AZ 85016	
DATE: MAR. 2017	SCOTTSDALE, ARIZONA	P: 602.490.0535 / F: 602.368.2436	
SCALE: 1" = 50'		www.hilgartwilson.com	
DRAWN: BB	FIG. 3: PRELIMINARY DRAINAGE SUMMARY EXHIBIT		
DESIGNED: HW			
APPROVED: AT			

SHT. OF DWG. NO.

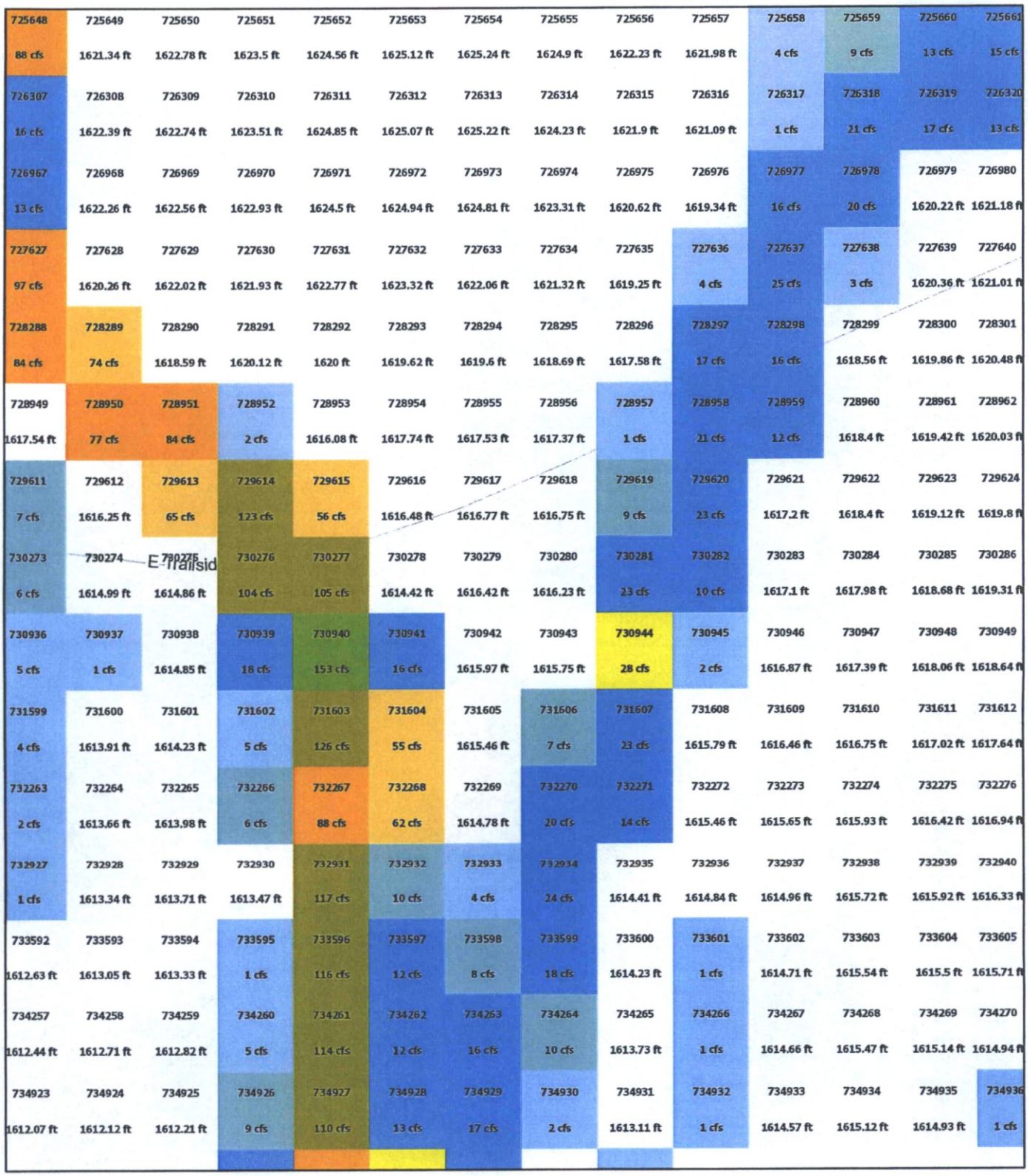
14-UP-2020
10/6/2020

HILGARTWILSON
ENGINEER | PLAN | SURVEY | MANAGE

ATTACHMENT 1
PINNACLE PEAK SOUTH ADMS FLO-2D RESULTS

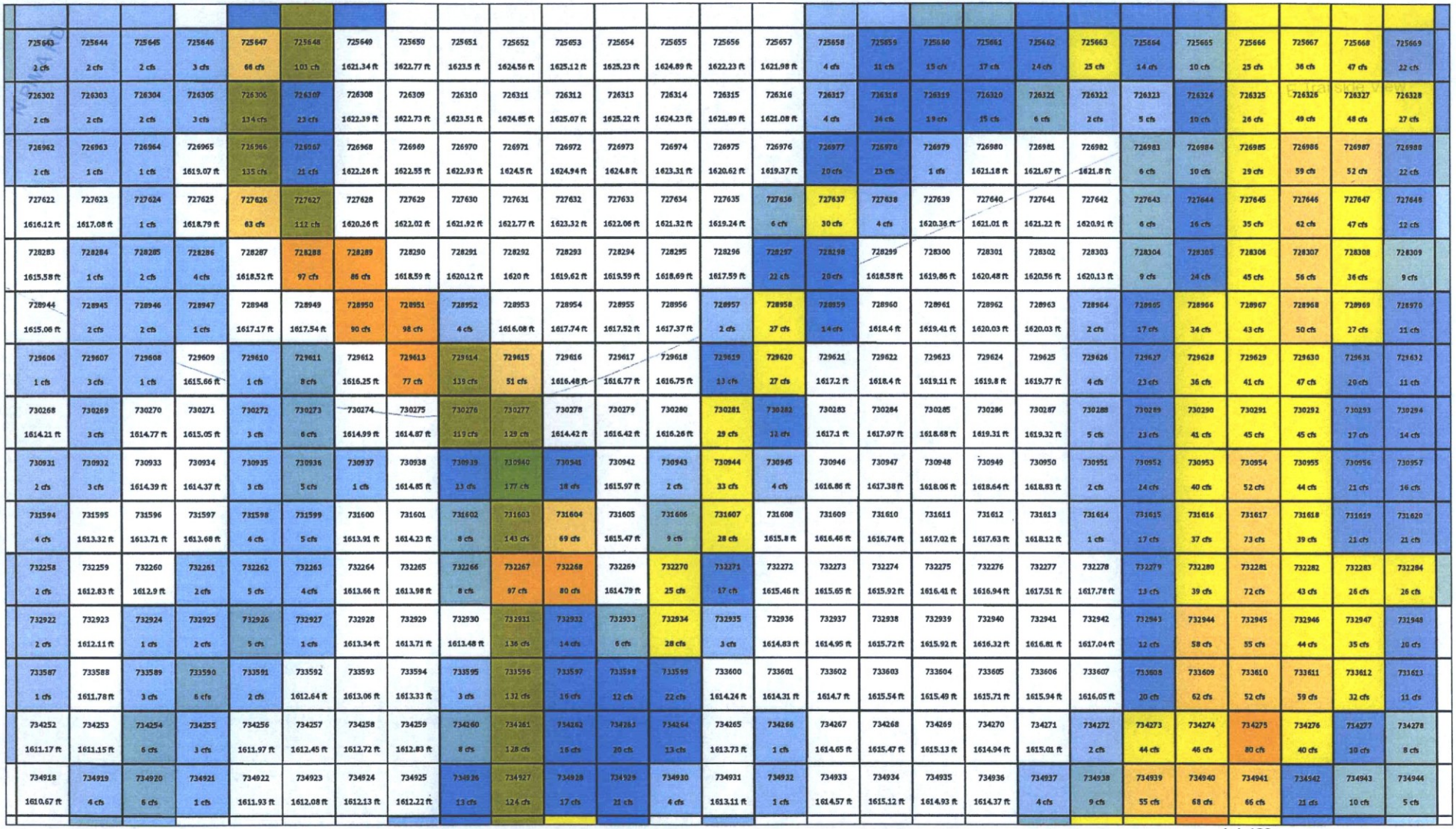
Flo2D Viewer

Model: 2D_PinnaclePeakSouth/100YR6HR_P



Flo2D Viewer

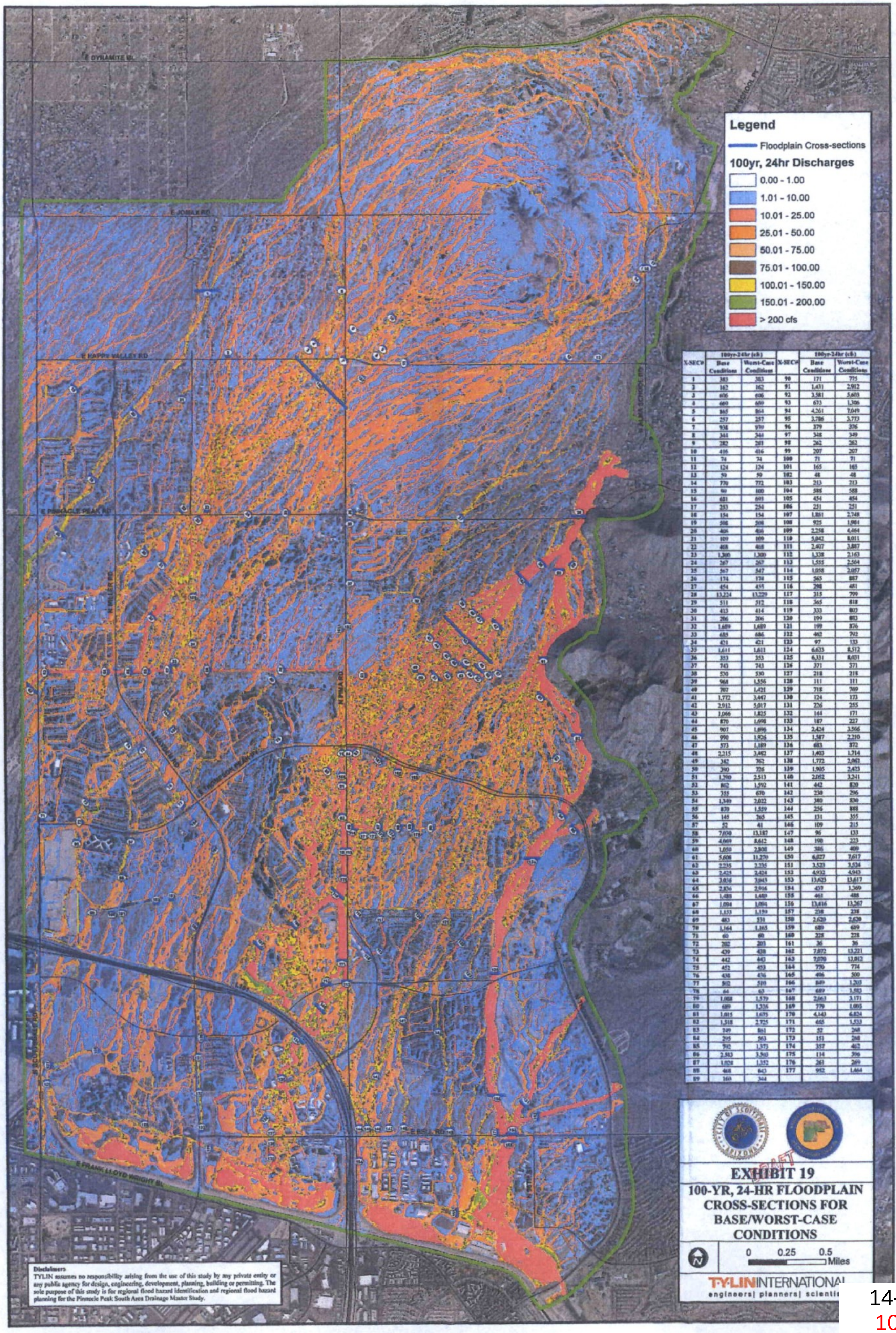
Model: 2D_PinnaclePeakSouth/100YR24HR_P



1:1,132

0 0.0075 0.015 0.03 mi

PINNACLE PEAK SOUTH ADMS



Legend

- Floodplain Cross-sections

100yr, 24hr Discharges

- 0.00 - 1.00
- 1.01 - 10.00
- 10.01 - 25.00
- 25.01 - 50.00
- 50.01 - 75.00
- 75.01 - 100.00
- 100.01 - 150.00
- 150.01 - 200.00
- > 200 cfs

X-SEC#	100yr-24hr (cfs)		X-SEC#	100yr-24hr (cfs)	
	Base Conditions	Worst-Case Conditions		Base Conditions	Worst-Case Conditions
1	383	383	90	171	775
2	162	162	91	1,431	2,912
3	606	606	92	3,581	5,603
4	669	669	93	673	1,306
5	865	864	94	4,261	7,049
6	257	257	95	3,786	3,773
7	938	939	96	379	376
8	344	344	97	348	349
9	282	281	98	262	262
10	416	416	99	207	207
11	74	74	100	71	71
12	124	124	101	165	165
13	59	59	102	48	48
14	770	772	103	213	213
15	90	100	104	588	588
16	681	693	105	454	454
17	253	254	106	251	251
18	154	154	107	1,851	2,748
19	508	508	108	925	1,984
20	406	406	109	2,258	4,464
21	109	109	110	5,042	8,011
22	468	468	111	2,407	3,887
23	1,300	1,300	112	1,338	2,163
24	267	267	113	1,535	2,564
25	567	547	114	1,058	2,057
26	174	174	115	565	887
27	454	455	116	298	481
28	13,224	13,229	117	315	799
29	511	512	118	365	818
30	413	414	119	333	803
31	206	206	120	199	883
32	1,689	1,689	121	199	876
33	685	686	122	462	792
34	421	421	123	97	133
35	1,611	1,611	124	6,633	8,512
36	353	353	125	6,331	8,031
37	743	743	126	371	371
38	530	530	127	218	218
39	968	1,556	128	111	111
40	707	1,421	129	718	789
41	1,772	3,447	130	124	173
42	2,912	5,017	131	226	255
43	1,066	1,825	132	144	171
44	870	1,698	133	187	227
45	907	1,696	134	2,424	3,566
46	990	1,926	135	1,587	2,210
47	573	1,189	136	683	872
48	2,215	3,482	137	1,403	1,714
49	382	762	138	1,772	2,062
50	390	726	139	1,905	2,423
51	1,290	2,513	140	2,052	3,241
52	862	1,592	141	442	820
53	355	670	142	230	296
54	1,349	2,022	143	380	830
55	870	1,559	144	256	898
56	145	265	145	131	355
57	52	41	146	109	215
58	7,030	13,187	147	96	133
59	4,069	8,612	148	198	223
60	1,050	2,808	149	386	409
61	5,608	11,279	150	6,027	7,617
62	2,235	2,235	151	3,523	3,524
63	2,425	2,424	152	4,932	4,943
64	3,036	3,043	153	13,625	13,617
65	2,836	2,916	154	437	1,369
66	1,488	1,489	155	461	488
67	1,094	1,094	156	13,416	13,267
68	1,153	1,159	157	238	238
69	483	531	158	2,620	2,620
70	1,164	1,165	159	689	689
71	60	60	160	228	228
72	202	203	161	36	36
73	439	438	162	7,072	13,221
74	442	443	163	7,070	13,012
75	452	453	164	770	774
76	438	436	165	496	500
77	502	519	166	849	1,203
78	64	63	167	689	1,583
79	1,058	1,579	168	2,063	3,171
80	689	1,236	169	779	1,085
81	1,015	1,675	170	4,143	6,824
82	1,518	2,725	171	655	1,533
83	749	861	172	52	268
84	295	563	173	151	268
85	792	1,373	174	357	462
86	2,583	3,563	175	114	396
87	1,028	1,352	176	261	269
88	468	643	177	952	1,464
89	160	344			

DRAFT

EXHIBIT 19

100-YR, 24-HR FLOODPLAIN CROSS-SECTIONS FOR BASE/WORST-CASE CONDITIONS

0 0.25 0.5 Miles

T·Y·LIN INTERNATIONAL
engineers | planners | scientists

Disclaimers
TYLIN assumes no responsibility arising from the use of this study by any private entity or any public agency for design, engineering, development, planning, building or permitting. The sole purpose of this study is for regional flood hazard identification and regional flood hazard planning for the Pinnacle Peak South Area Drainage Master Study.

14-UP-2020
10/6/2020

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ENGINEER | PLAN | SURVEY | MANAGE

ATTACHMENT 2
HYDRAFLOW CALCULATIONS

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 13 2017

CS-1

User-defined

Invert Elev (ft)	= 1614.00
Slope (%)	= 1.75
N-Value	= 0.032

Calculations

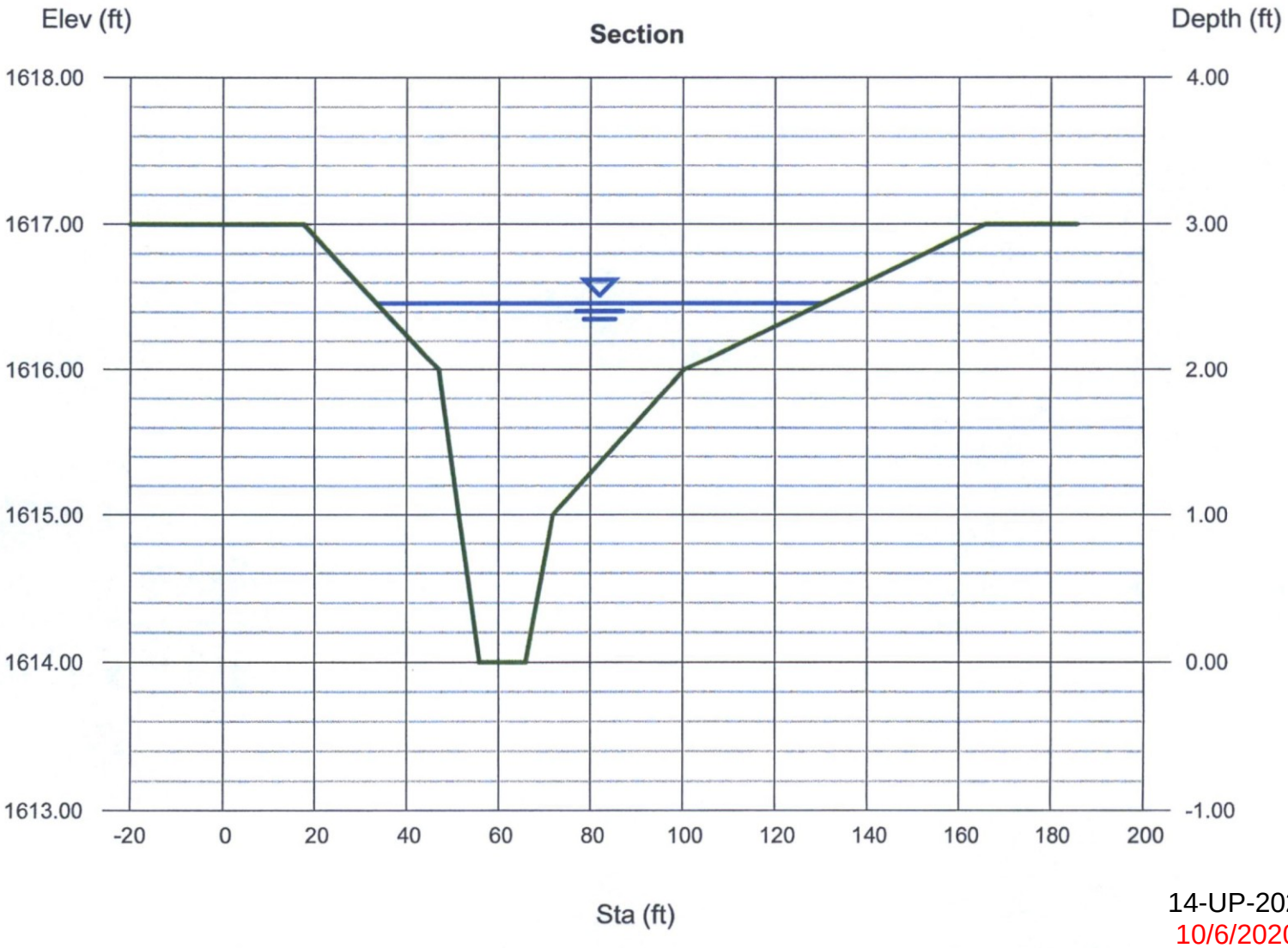
Compute by:	Known Q
Known Q (cfs)	= 488.00

Highlighted

Depth (ft)	= 2.46
Q (cfs)	= 488.00
Area (sqft)	= 86.59
Velocity (ft/s)	= 5.64
Wetted Perim (ft)	= 97.24
Crit Depth, Yc (ft)	= 2.51
Top Width (ft)	= 96.90
EGL (ft)	= 2.95

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

(0.00, 1617.00)-(17.60, 1617.00, 0.032)-(47.00, 1616.00, 0.032)-(51.40, 1615.00, 0.032)-(55.90, 1614.00, 0.032)-(65.90, 1614.00, 0.032)-(71.80, 1615.00, 0.032)-(100.30, 1616.00, 0.032)-(165.70, 1617.00, 0.032)



14-UP-2020
10/6/2020

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 13 2017

CS-2

User-defined

Invert Elev (ft)	= 1611.00
Slope (%)	= 1.13
N-Value	= 0.032

Calculations

Compute by:	Known Q
Known Q (cfs)	= 488.00

Highlighted

Depth (ft)	= 2.89
Q (cfs)	= 488.00
Area (sqft)	= 109.68
Velocity (ft/s)	= 4.45
Wetted Perim (ft)	= 128.42
Crit Depth, Yc (ft)	= 2.77
Top Width (ft)	= 128.13
EGL (ft)	= 3.20

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

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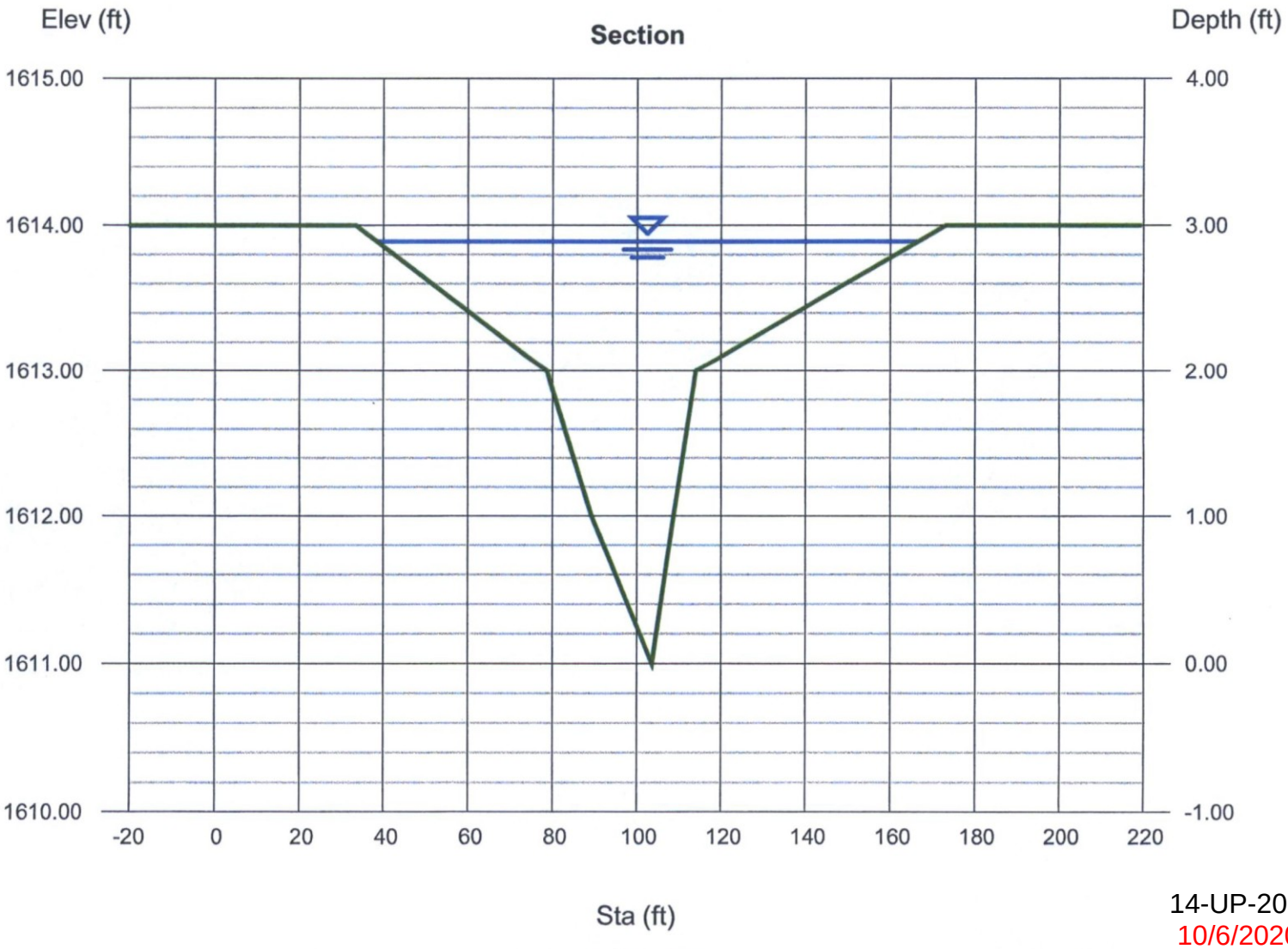

14-UP-2020
10/6/2020

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 13 2017

CS-3

User-defined

Invert Elev (ft)	= 1608.00
Slope (%)	= 2.33
N-Value	= 0.032

Calculations

Compute by:	Known Q
Known Q (cfs)	= 488.00

Highlighted

Depth (ft)	= 1.63
Q (cfs)	= 488.00
Area (sqft)	= 93.31
Velocity (ft/s)	= 5.23
Wetted Perim (ft)	= 145.94
Crit Depth, Yc (ft)	= 1.70
Top Width (ft)	= 145.79
EGL (ft)	= 2.06

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

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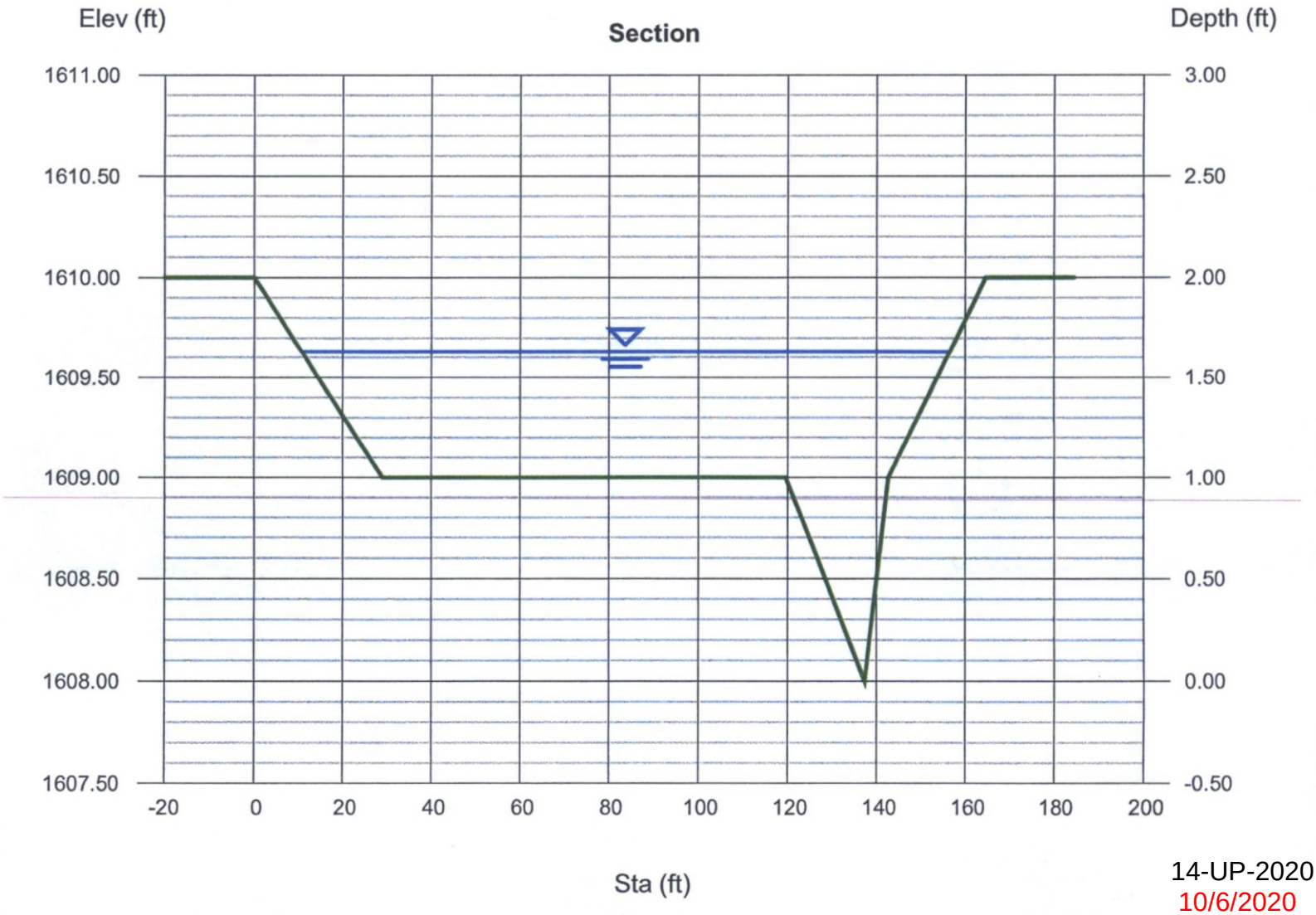

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10/6/2020

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 13 2017

CS-4

User-defined

Invert Elev (ft)	= 1604.00
Slope (%)	= 2.06
N-Value	= 0.032

Calculations

Compute by:	Known Q
Known Q (cfs)	= 488.00

Highlighted

Depth (ft)	= 1.68
Q (cfs)	= 488.00
Area (sqft)	= 83.56
Velocity (ft/s)	= 5.84
Wetted Perim (ft)	= 101.03
Crit Depth, Yc (ft)	= 1.77
Top Width (ft)	= 100.97
EGL (ft)	= 2.21

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

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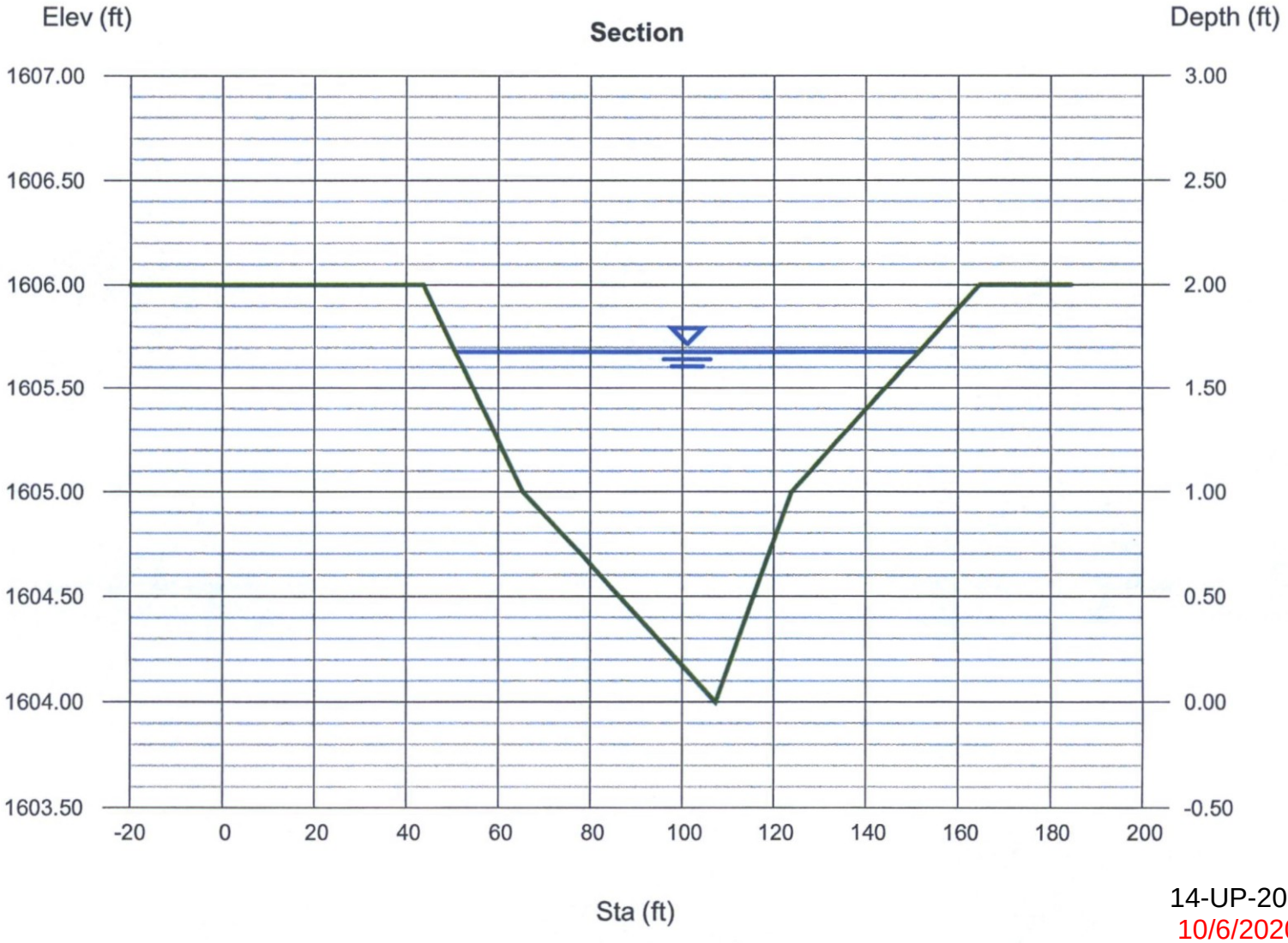

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10/6/2020

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 13 2017

CS-5

User-defined

Invert Elev (ft)	= 1601.00
Slope (%)	= 1.82
N-Value	= 0.032

Calculations

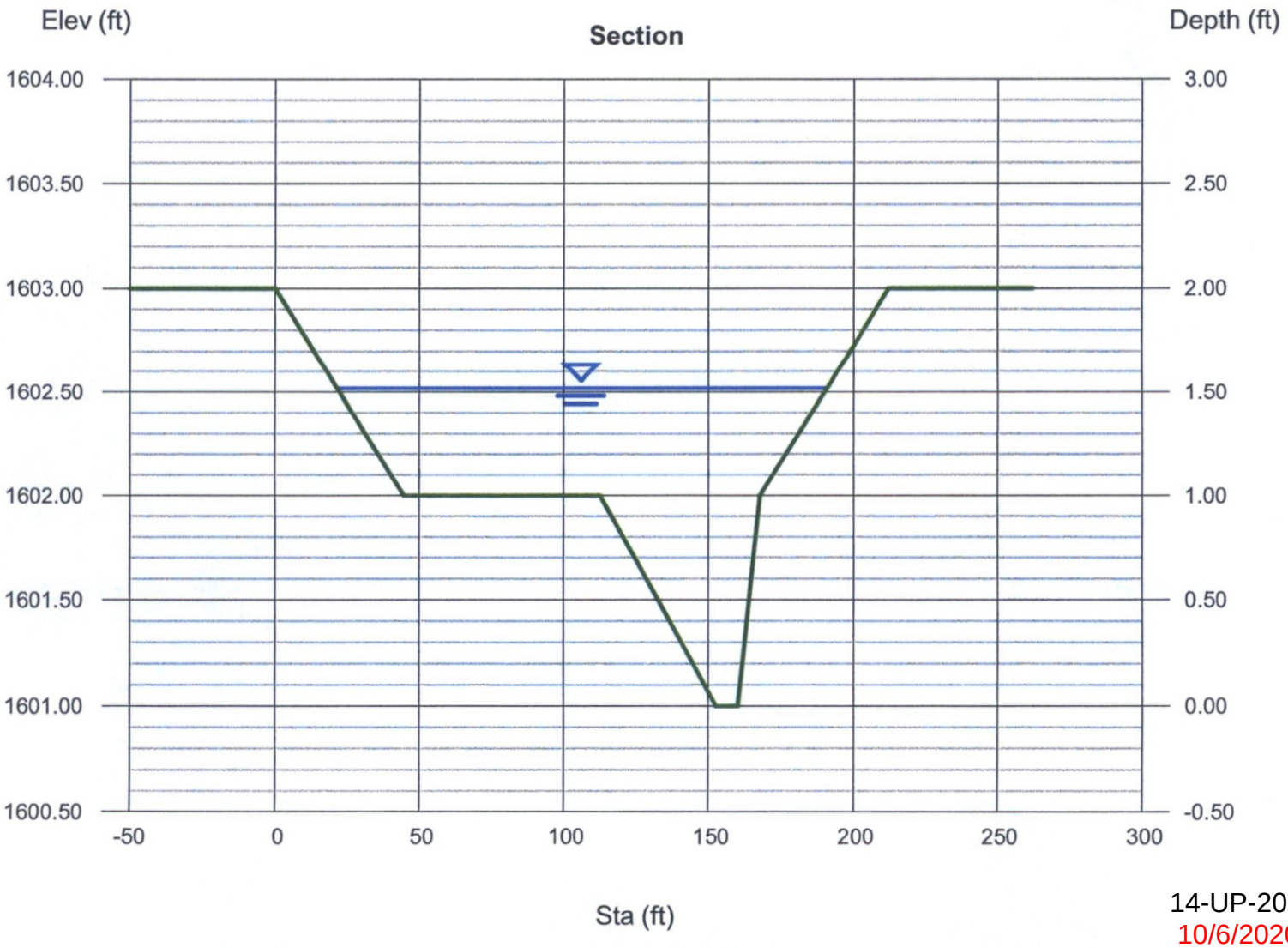
Compute by:	Known Q
Known Q (cfs)	= 488.00

Highlighted

Depth (ft)	= 1.52
Q (cfs)	= 488.00
Area (sqft)	= 107.17
Velocity (ft/s)	= 4.55
Wetted Perim (ft)	= 169.48
Crit Depth, Yc (ft)	= 1.53
Top Width (ft)	= 169.39
EGL (ft)	= 1.84

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

(0.00, 1603.00)-(44.70, 1602.00, 0.032)-(112.80, 1602.00, 0.032)-(152.80, 1601.00, 0.032)-(160.20, 1601.00, 0.032)-(167.70, 1602.00, 0.032)-(212.20, 1603.00, 0.0



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Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 13 2017

CS-6

User-defined

Invert Elev (ft)	= 1600.00
Slope (%)	= 1.62
N-Value	= 0.032

Calculations

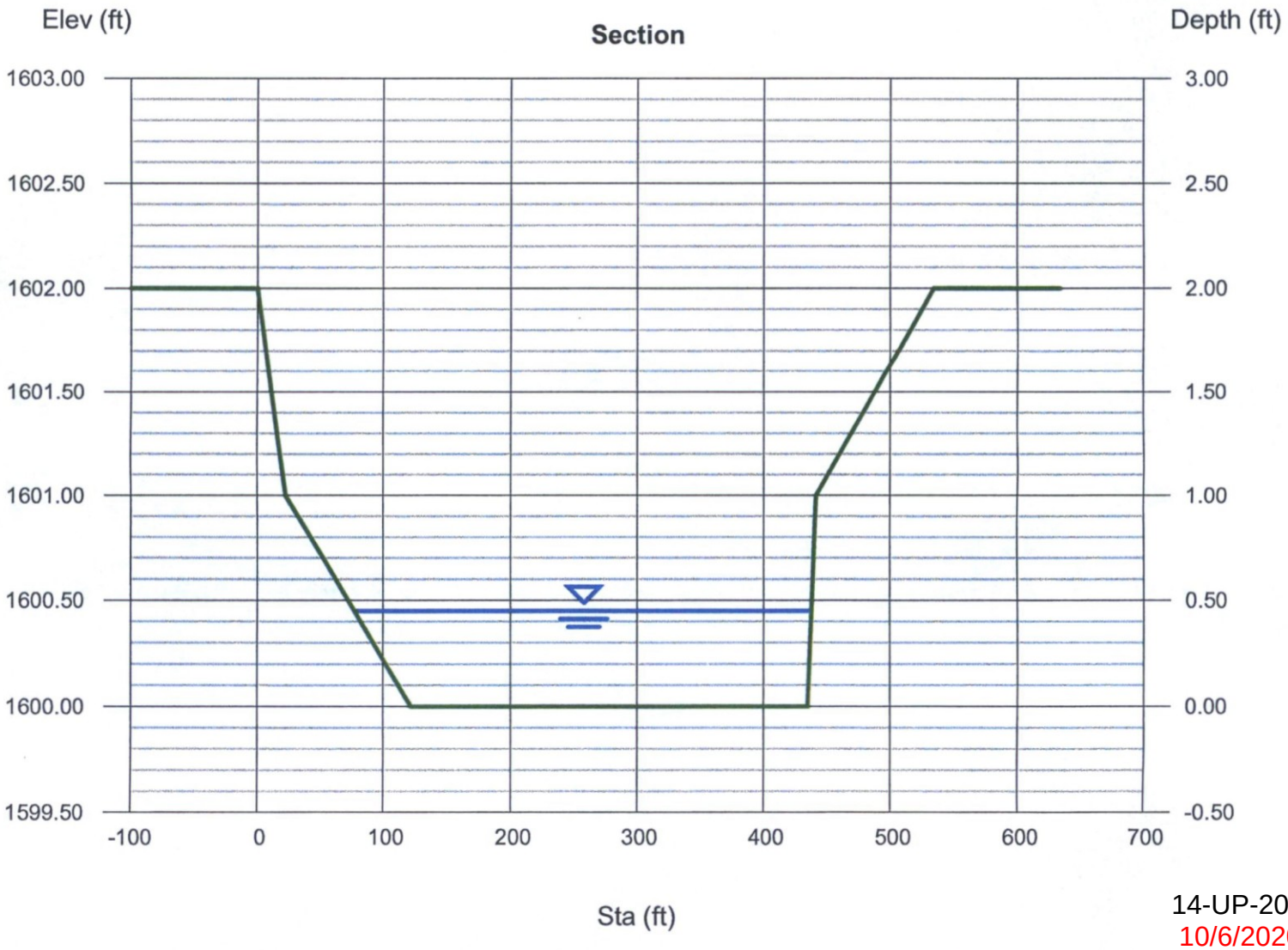
Compute by:	Known Q
Known Q (cfs)	= 488.00

Highlighted

Depth (ft)	= 0.45
Q (cfs)	= 488.00
Area (sqft)	= 151.55
Velocity (ft/s)	= 3.22
Wetted Perim (ft)	= 360.69
Crit Depth, Yc (ft)	= 0.42
Top Width (ft)	= 360.65
EGL (ft)	= 0.61

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

(0.00, 1602.00)-(22.60, 1601.00, 0.032)-(122.10, 1600.00, 0.032)-(435.10, 1600.00, 0.032)-(441.50, 1601.00, 0.032)-(534.40, 1602.00, 0.032)



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