CYPRESS CIVIL

SITE CONSULTING
SURVEY
SITE ENGINEERING

15 March 2021

City of Scottsdale Development Services
7447 East Indian School Road
Scottsdale, Arizona 85251

RE: Drainage Memo – Lot 4 – One Scottsdale

Cypress Civil has reviewed the Final Drainage Report for One Scottsdale prepared by Civil & Environmental Consultants, Inc, dated January 21st, 2021. This research has been completed in support of the development of Lot 4, a pad site within the One Scottsdale Development ('Master Development').

Per the Final Drainage Report, all necessary drainage infrastructure will be installed for the fully developed Master Development during the initial phase of construction.

The Preliminary Improvement Plans for Natural Result Surgery Center & Medical Spa demonstrate recognition of, and compliance with, the proposed drainage scheme within the Final Drainage Report and acknowledges the infrastructure will be existing prior to final construction. No new drainage facilities or stormdrain are to be constructed with this Project.

The Final Drainage Report has been included as the following attachment to assist with quick reviewer reference.

If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,
Cypress Civil Development

Jeff Hunt, PE
Principal

Attachment 1 – Location Map
Attachment 2 – Final Drainage Report for One Scottsdale – CEC Consultants, Inc

Final Drainage Report

For

One Scottsdale

Southeast Corner of Scottsdale Road and Thompson Peak Parkway
Scottsdale, Arizona

Prepared for

DMB
7600 E Doubletree Ranch Road, Suite 300
Scottsdale, AZ 85258

January 21, 2021

CEC P# 180-168

Civil & Environmental Consultants, Inc.

Phoenix | 11811 N. Tatum Boulevard, Suite 3057 | Phoenix, AZ 85028 | p: 602-760-2324 f: 602-760-2330 | www.cecinc.com

Table of Contents

1.0 INTRODUCTION

The One Scottsdale project is a proposed 21.73 net acre commercial/retail project located southeast of the intersection of Hayden Road and Thompson Peak Parkway in Scottsdale, Arizona. The site is further described as a portion of the NW1/4 of Section 26, Township 4 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. Refer to the Vicinity Map on the following page.

The site will consist of Class A office buildings, underground and above ground parking structures, a hotel, and retail pads. Phase I of the project will incorporate the storm drain, drives and rough pad preparation for Pad A, Shops A, Pad B & Shops B. This Final Drainage Report will document onsite and offsite drainage requirements to meet City of Scottsdale drainage guidelines and ordinance criteria for the entire project and will describe Phase I improvements that will be interim until final build out is accomplished.

This report is also based on prior calculations and assumptions as determined in the "One Scottsdale Master Drainage Plan", prepared by Wood/Patel revised June 20, 2013, the "Drainage Report for TDI at One Scottsdale, Phase I dated May 17, 2012, prepared by Wood/Patel, and the "Final Drainage Report for One Scottsdale PU III Infrastructure Improvements" (PUIII), prepared by Bowman Consulting, dated July 23, 2012. The TDI Phase I and II projects are located directly east of the project site on the east side of 73rd Street (a private drive with public access). Only drainage from the TDI project and offsite flows from Thompson Peak Parkway and Scottsdale Road will affect the site. TDI drainage is directed to the east and south.

Offsite flows that will impact the project site have been calculated and quantified by HELM. These results are included in Appendix H. These impacts will be discussed in more detail later in this report.

It should be mentioned that this property does not have to provide onsite retention or detention. A stormwater storage waiver and subsequent construction of downstream improvements along with payment of in-lieu fees have satisfied this requirement. First flush retention or treatment is required

for the runoff from the first ½" of precipitation as stated in City Code Chapter 37 Article III. Treatment has been selected and will be accomplished through the use of vortex hydrodynamic separator structures. In addition, the 100-year HELM report flows are greater than the Master Drainage Plan HEC-1 models so in comparison are in compliance with the approval of it. Copies of correspondence and the Stormwater Storage Waiver are located in Appendix A.

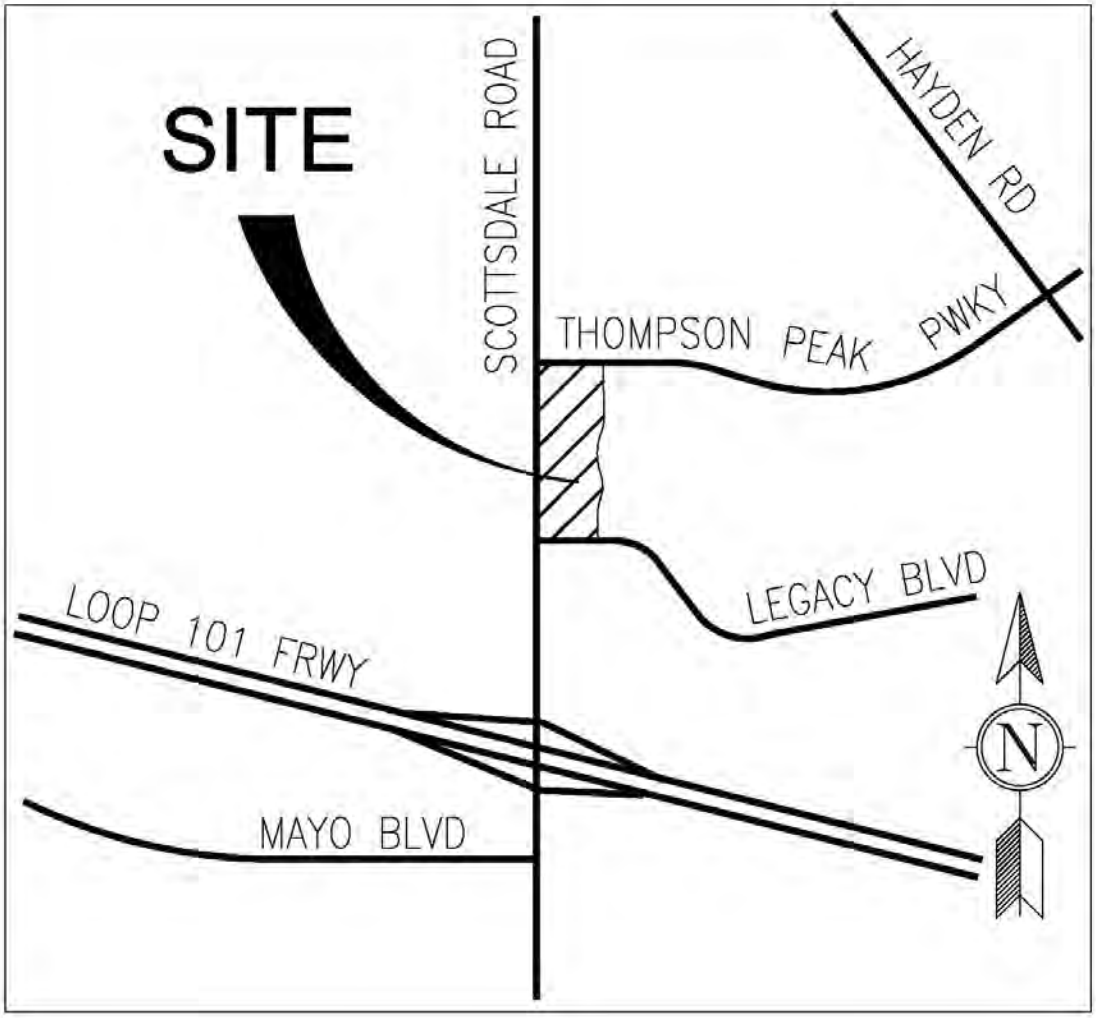
This site is currently located within a Zone "AO" designation as identified on Flood Insurance Rate Map (FIRM) panel number 1320L (Maricopa County) dated October 16, 2013 from the Federal Emergency Management Agency (FEMA) and labeled "Zone AO, Depth 1', Velocity 3 FPS". Zone AO is described as, "Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined." Refer to the FIRM in Appendix E.

The proposed lowest habitable finished floors will be set a minimum of 2 feet above the highest existing natural adjacent grade elevation on the upstream side of each building or structure. Earthen fill will be incorporated to provide the correct elevation for finished floor protection. Underground parking structures will also be flood proofed to 2 feet above the highest adjacent existing ground elevation along with any entry points into the parking structure. Refer to the FEMA Structure Exhibit in Appendix E and the Highest Adjacent Grade Exhibit (HAG) at the back of this report. This exhibit shows the anticipated finished floor elevations for each proposed building envelope for this development. The topographic base map was compiled in the pre-development existing condition and the datum is on current City of Scottsdale and Maricopa County standards and is reflected on the exhibit. All buildings will be structurally independent and will be flood-proofed to 2 feet above highest adjacent natural grade within the regulatory floodplain Zone AO – Depth=1 foot.

Drainage flow paths and storm drain pipe will be provided around the exterior of the buildings that will allow storm water to flow around the buildings and through the parking lots. Drainage/Pedestrian easements will be dedicated over the exterior drainage swales/culverts/pedestrian paths and on a proposed storm drain that conveys flows from the TDI Phase I project across the site to the west

culverts along the east side of Scottsdale Road. Refer to the final plat for locations and approximate widths.

The low lot outfall on the site is 1635.17 at the southwest corner of the site on Scottsdale Road. Lowest finished floors for the overall site range from 1665.80 on the north to 1644.90 on the southwest. Currently, the site is unimproved with desert vegetation. The site generally slopes form the northeast to the southwest at approximately 1.5%.



VICINITY MAP

N.T.S.

2.0 OFFSITE DRAINAGE AND EXISTING IMPROVEMENTS

Offsite Drainage

The offsite drainage analysis was prepared by Wood, Patel & Associates, Inc., in the "One Scottsdale Master Drainage Plan", revised June 20, 2013. Pre- and Post-development 100-year, 6-hour discharges were computed in a HEC-1 models prepared with that report. Future build-out of the development was taken into account within that model. Two additional reports, "Final Drainage Report for One Scottsdale PU III Infrastructure Improvements"(PUIII), prepared by Bowman Consulting, dated July 23, 2012; and "Drainage Report for TDI at One Scottsdale, Phase I"(TDII), prepared by Wood/Patel, dated May 17, 2012. Flo-2D data was also used to analyze offsite drainage by HELM. It was calculated that there is 135 cfs coming into the site at the Southwest corner of the intersection of Thompson Peak and 73rd Street. This current analysis is included in Appendix H. These reports addressed offsite flows that will impact the One Scottsdale Commercial site. The following table identifies the major 100-year, 6-hour and 24-hour post-development flows and locations where they enter or exit the site.

Existing Offsite Flows from Master Drainage HEC-1 Model/Flo 2D

Location	Structure	HEC-1 ID (WP Master Report)	100-yr, 6-hr Q, cfs (WP Master-Post Developed)	100-yr, 24hr Q, cfs Flo 2D, 5' Grid (Post Developed)
Thompson Peak Parkway (just east of Scottsdale Road)	3-36" RGRCP	CPOFF3	138 (enter)	101 (enter)
73rd Street (just south of Thompson Peak Parkway)	3-36" RGRCP	33A.1	11 (enter)	135 (enter)
73rd Street (660' south of Thompson Peak Parkway	36" RGRCP	33A.2	34 (enter)	(not modeled)
Scottsdale Road(north of Legacy Drive-Convey Flows Southwest)	8'x4'RCBC	33A3	226 (exit)	229 (exit box) 38 (exit surface)

Existing Offsite Flows from TDI and PU III

Location	Structure	Report	100-yr, 24&6-hr Q,cfs (Post Developed)	100-yr, 24hr Q, cfs (Post Developed) Flo 2D, 5' Grid
73rd Street (just south of Thompson Peak Parkway)	3-36" RGRCP	PU III	106.6	135
73rd Street (660' south of Thompson Peak Parkway	36" RGRCP	TDI Phase I	45.4	(not modeled)

Excerpts from the "One Scottsdale Master Drainage Plan", "Drainage Report for TDI at One Scottsdale-Phase I", and Final Drainage Report for One Scottsdale PU III Infrastructure improvements are included in Appendix G for reference of the above flows.

The 3-36" culverts that cross 73rd Street were sized based on the PU III project. The City of Scottsdale directed Bowman Consultants to account for 119.4 cfs, the channel capacity, within a 30' drainage swale and the culverts were sized accordingly to convey flow to the west. Since then, HELM studied this area using Flo 2D data. It was determined that there is 71 cfs in these pipes. They have been analyzed using HY8 and the results are shown in Appendix F.

The TDI Phase I report shows flows were collected from within the north portion of the apartment complex and conveyed to a 36" outlet storm drain that crosses 73rd Street onto the One Scottsdale site.

There are a number of curb openings located along 73rd Street that take the street section flows into the project site and are conveyed southwesterly across the site to the existing wash along the east side of Scottsdale Road. Curb openings on Scottsdale Road drain the half street section of Scottsdale Road itself directly into the adjacent wash. These flows are then conveyed south to the existing 8' x 4' box

culvert that crosses Scottsdale Road to the southwest.

A scupper is located on Thompson Peak Parkway (just west of 73rd Street) and directs flow into an existing swale on the south side of the road. Catch basins are located on the north and south side of Thompson Peak Parkway, just east of Scottsdale Road, and tie into the existing pipe crossing of Thompson Peak Parkway. 3-36" Existing RGRCP's collect flows from the north of Thompson Peak Parkway and convey them to the wash located on the site just east of Scottsdale Road.

Catch basins are also located on Legacy Boulevard just east of Scottsdale Road and tie directly to the existing 8' x 4' box culvert. The 8' x 4' box culvert collects flows and directs them southwest across Scottsdale Road to an existing wash. Refer to the Drainage Exhibit in the envelope at the back of this report for locations of existing drainage structures.

3.0 PROPOSED DRAINAGE AND INFRASTRUCTURE IMPROVEMENTS

Build-Out Condition Noted

A number of drainage improvements are anticipated with this project and consist of the following:

- A combination of wash and 4-36" HDPE pipe culverts with a drop inlet structure along the east side of Scottsdale Road (Phase 1).
- New catch basins at two locations along Scottsdale Road connecting to the adjacent culvert and two new scuppers South of Thompson Peak and North of Legacy, connecting to existing curb openings. Existing catch basin on the North side of Legacy Boulevard will remain (Phase 1).
- New catch basin on Thompson Peak Parkway west of 73rd Street connecting to proposed 3-36" storm drains onsite. This will replace the existing scupper at that location (Future Phase).
- Detention basins and swale along 73rd Street (Phase 1 North & Future Phase South).
- 3-36" HDPE Storm drain pipes and channel along the south side of Thompson Peak Parkway to convey 135 cfs to the West (Phase 1-channel, Future Phase-Pipes & swale).
- 24" HDPE Storm drain pipe and swale along the north side of Legacy Boulevard to convey

flows to the west (Future Phase).

- Catch basins and 15”-42” HDPE pipe within the Northern portion of the Phase 1 development to drain parking lot, buildings, northern portion of 73rd Street, and offsite flow from TDI Phase-I (Phase 1).
- Catch basins and 15”-36” HDPE pipe within the Southern portion of the Phase 1 development (Phase 1).
- Existing Curb cuts to remain with adding native riprap spillways to drain the roadway drainage areas along 73rd Street (Future Phase).
- Loose or grouted native indigenous stone to protect the slope face, spillways, and culvert or storm drain inflow and outflow points (Phase 1 & Future Phase).

These drainage infrastructure items are incorporated to provide an overall drainage design that will help to protect the One Scottsdale project during the 100-year storm event. Finished floors will be elevated a minimum of 2 feet above the highest adjacent existing natural grade for each building and proposed adjacent grades outside buildings will be at a maximum of 1 foot below that to protect the buildings within the FEMA Zone AO floodplain. Underground parking structures will be flood proofed to the same finished floor standards and will withstand hydrostatic pressures and buoyancy effects. Structural calculations will be submitted with the final improvement plans (future phase) to justify the design.

First Flush

First flush treatment will be handled using vortex stormwater quality structures. The ultimate build out condition will have a total of two vortex structures. These structures have been sized according to the FCDMC first flush treatment discharge equation with using the time of concentration from the 2-YR storm I-D-F curve data for 0.5”/hr intensity as directed by the City of Scottsdale.

Hydrology

Onsite 100-year peak flows were calculated for each sub basin area. Hydrology calculations were performed utilizing the Rational Method with a weighted runoff coefficient. These onsite hydrology calculations are located in Appendix C.

Culvert peak flows were determined from the HELM Analysis Flo-2D mapping with the addition of pre-versus post runoff of the site at that same time of concentration. This provides an increased peak flow calculation which is based on increased times of concentration for the larger overall contributing watershed to those specific points. These flows are greater than but conform closely to the Master Report HEC-1 analysis peak flows for sizing the downstream infrastructure.

Hydraulics

Catch basins will consist of MAG Std. Det. 537 type G with single, double, and triple grates. At a depth of 0.5', these catch basins can intercept 6.1 cfs, 8.61 cfs, and 12.13 cfs respectively with a 50% clogging factor applied. Subbasin drainage areas will be smaller than the capacities of these catch basins and may have break over depths less than 0.5'. A typical calculation for onsite catch basin capacity is located in Appendix D.

Curb opening catch basins in Scottsdale Road are generally the size of the existing curb opening at each location. The northern two catch basins/scupper in Scottsdale Road receive 82 cfs of offsite flow, consistent with the Flo-2D model, and capture 25.44 cfs combined. The remaining 56.56 cfs of flow continues south. The southern two catch basins in Scottsdale Road receive local half street flow. A 25% clogging factor was applied to each inlet. See Appendix D for Hydraulic Toolbox 4.1 Curb and Gutter Analysis of the inlets.

The culvert capacities along Scottsdale Road were calculated using the Federal Highway Administration HY-8 computer program. Drop inlet headwalls are utilized to help keep the wash slope

flatter and erosive velocities within reasonable parameters and to provide cover under the driveways. A small sediment basin is incorporated ahead of the drop structure to help settle out sand and small rocks that typically occur within these types of washes. Refer to the channel calculations in Appendix D.

Loose riprap will also be utilized at inflow and out flow locations to help prevent erosion in those areas. Riprap sizing and lengths are shown in Appendix D. A multi-use trail will meander near the bottom of the wash and will incorporate stabilized decomposed granite along with a turndown edge and riprap along the flow line side in some spots as needed to help prevent erosion against the trail edge.

Onsite storm drain sizing utilizes peak flows and were calculated using AutoCAD Storm Analysis. Storm drain pipes were sized based on the addition of contributing subbasin areas downstream. Final hydraulic grade line calculations and profiles have been be performed and are included in Appendix D.

Refer to the Drainage Exhibit at the back of this report for locations of the drainage infrastructure and to Appendix D for calculations. Roof leaders will connect to the onsite storm drain and will be sized during each pad final design. Drops may be incorporated at manhole or catch basin locations due to the natural steep nature of the site. This will help to reduce slopes and velocities within the system.

Wash and swale capacities were computed with Hydraulic Toolbox 4.1. This includes the main wash along Scottsdale Road and smaller swales on the east side. Cross section locations, water surface elevations, and limits of inundation are shown on the Drainage Exhibit and calculations are included in Appendix D. Velocities are generally below the 5 fps range for 100-year peak flows to keep with the non-erosive velocity regime. Swales on the north and south side of the Phase I project area are typically more of a catchment area design and stormwater will be collected in catch basins or small swales and conveyed to the west or south. These are small subbasins and will not convey any significant flow. Inflow areas to the main west wash will still require riprap to prevent tail water cutting into the channel edge that will have higher elevations than the bottom of the wash.

404 Discussion

A 404 jurisdictional delineation was previously performed on the entire Scottsdale One project, referred to as Stack 40. A letter was received from the U.S. Army Corps of Engineers dated February 5th, 2002 and states that no Section 404 permit is required due to flows being cut off by the Grayhawk development. A copy of the Section 404 Certification for this project and the Corps letter is included in Appendix B

Water Quality Requirements /NOI /CND Discussion

Per new criteria implemented by ADEQ and the new Waters of the US determination (WOTUS), a No Discharge Certificate (NDC) can be acquired for this project since there are not discharges directly to a WOTUS designated river or stream. A Maricopa County Dust Control Permit will need to be obtained prior to any construction. Street sweeping for construction track-out will be addressed in the SWPPP Report as well.

4.0 CONCLUSIONS

The One Scottsdale commercial project is designed in accordance with the approved "One Scottsdale Master Drainage Plan", prepared by Wood/Patel dated June 20, 2013, the "Drainage Report for TDI at One Scottsdale, Phase I dated May 17, 2012, prepared by Wood/Patel, and the "Final Drainage Report for One Scottsdale PU III Infrastructure Improvements" (PUIII), prepared by Bowman Consulting, dated July 23, 2012.

The intent of the drainage design for this project is to provide protection for buildings in a Zone "AO" floodplain, depth = 1', velocity = 3 fps. The lowest habitable finished floor of the buildings are set at a minimum of 2 foot above the highest adjacent existing grades. Entry points for the future phase

underground parking will also be elevated/flood proofed to this elevation for each structure that has underground parking incorporated within the footprint.

100-year flows will be directed around the exterior of the project in swales, washes, culverts and storm drain pipe. Interior flows will be conveyed away from the edges of the building to parking lots and drive lanes that will collect flows in catch basins and storm drain pipe and convey them to the low lot outfall elevation of 1635.17 at the southwest corner of the site where an existing 8' x 4' box culvert conveys flows southwest across Scottsdale Road.

Culverts with a drop inlet structure will be constructed along the west wash at the north driveway location. An 8' multi-use path and 8' sidewalk will be implemented within this corridor and stabilized with granite and riprap along the side of the path will be incorporated to reduce erosion of this multi-use trail amenity. Drainage easements will be required on any wash or storm drain conveying more than 50 cfs. Easements for storm drains will be determined based on size and depth of the storm drain. Overlapping drainage and public utility easements may occur in certain instances.

The lowest finished floors for the overall site range from 1665.8 on the north to 1643.9 on the southwest. Curb openings with native stone riprap spillways or catch basins will be provided at locations around the perimeter of the project to accept adjacent half street flows.

No detention or retention is required on this site as prior improvements have been constructed and an in-lieu fee contribution has been paid to the City of Scottsdale. First flush will be handled using Vortex structures in the ultimate condition. A 404 jurisdictional delineation has previously been performed on the overall project and no 404 washes are present. Water quality and sediment reduction is addressed in the final design construction documents.

APPENDIX A – STORMWATER STORAGE WAIVER AND CORRESPONDENCE

November 28, 2011

Mr. Ashley Couch, P.E.
Stormwater Planning Director
City of Scottsdale
7447 East Indian School Road
Suite 205
Scottsdale, AZ 85251

Phone: (480) 312-4317
Email: acouch@scottsdaleaz.gov

Re: One Scottsdale Regional Drainage Channel
WP# 073022, 113713.02

This letter is prepared by Wood, Patel & Associates Inc. (Wood/Patel) under contract to One Scottsdale Holdings, LLC for civil engineering services related to One Scottsdale, a 160-acre mixed use project. This letter is in response to a request by your office to communicate a professional opinion of any potential impacts to the approved watershed for One Scottsdale and its approved contract documents and drainage reports. Specifically, this letter provides an overview of the writer's belief of lack of substantial changes in the watershed pertaining to the Final Drainage Report for Interim Regional Drainage Channel dated October 1, 2008 which has been reviewed and approved by the City of Scottsdale (C.O.S. Plan Check # 1672-08-1).

The following items or matters are noted or observed:

- It is assumed all new projects and public infrastructure completed within the watershed were subject to City of Scottsdale drainage regulations and policies, therefore historic watershed boundaries did not change and drainage discharges were not increased.

- A review of aerial maps dated 2008 when compared to maps dated 2010 displayed a limited number of new projects in the watershed, none of which are believed to cause watershed boundary changes or create higher peak discharges.

I hereby certify that to the best of my knowledge and based on my understanding of the items disclosed above that the watershed is in substantial conformance to the watershed referenced in the Wood/Patel 2008 report.

Sincerely,

Wood, Patel & Associates, Inc.

Darrel E. Wood, P.E., R.L.S.
Principal

DEW/xxx

CC: Jill Kusy Hegardt

C:\Users\SAudsley\Desktop\One Scottsdale Regional Drainage Channel.doc

Stormwater Management

7447 E. Indian School Road, Suite 125
Scottsdale, AZ 85251

PHONE 480-312-2500
FAX 480-312-7781
WEB www.ScottsdaleAZ.gov

June 5, 2013

Via Electronic Mail: jhegardt@dmbinc.com

Attention: Jill Kusy Hegardt, Vice President of Entitlements, DMB Associates, Inc.

Subject: Permanency of Stormwater Storage Waiver for One Scottsdale

Dear Ms. Kusy-Hegardt:

Pursuant to your request, I am writing to document that the regional drainage improvements along the east side of Scottsdale Road, from Mayo Boulevard to approximately 375 feet north of the centerline of Princess Boulevard, have been completed. This work has received a passing final inspection by the city. Therefore, the conditions that justify the approved partial stormwater storage waiver shown in the attached exhibit have been satisfied. Provided that development in One Scottsdale proceeds consistent with the latest approved stormwater master plan for One Scottsdale, no additional stormwater storage will be required. The city's approval of the attached waiver will not expire.

The city's agreement with DMB Associates, Inc., and the Arizona State Land Department regarding this matter is attached for reference.

Please let me know if I can be of further assistance.

Best regards,

C. Ashley Couch

C. Ashley Couch, PE, CFM
Stormwater Manager and Floodplain Administrator

CAC/cac

c: Kroy Ekblaw, Executive Assistant for Strategic Projects
Derek Earle, Acting Public Works Director
Randy Grant, Planning, Neighborhood, and Transportation Administrator
Michael Clack, Director of Development Services
Joe Padilla, Senior Assistant City Attorney
Mohammad Rahman, Senior Stormwater Engineer

Attachments: Approved Stormwater Storage Waiver for One Scottsdale
City's agreement with DMB Associates, Inc., and ASLD regarding construction of a regional drainage conveyance facility

Ref 6787-06-17 ASLD

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers: 1672-08-4

55 - PA - 2008 19 - ZN - 2002 ___ - UP - ___ ___ - DR - ___ ___ - PP - ___ PC# ___

The applicant/developer must complete and submit this form to the city for processing and obtain approval of waiver request ***before submitting improvement plans.*** Denial of the waiver may require the developer to submit a revised site plan to the Development Review Board.

Date 1.5.12 Project Name ONE SCOTTSDALE

Project Location NEC S.R.101 + Scottsdale Rd.

Applicant Contact Darrel Wood Company Name WOOD/PATEL

Phone 602.335.8500 Fax ~ E-mail dwood@woodpatel.com

Address 2051 W. Northern PHX AZ 85021

Waiver Criteria

A project must meet at least one of four criteria listed below for the city to consider waiving some or all required stormwater storage. **However, regardless of the criteria, a waiver will only be granted if the applicant can demonstrate that the effect of a waiver will not increase the potential for flooding on any property.** Check the applicable box and provide a signed engineering report and supporting engineering analysis that demonstrate the project meets the criteria and that the effect of a waiver will not increase the potential for flooding on any property.

If the runoff for the project has been included in a storage facility at another location, the applicant must demonstrate that the stormwater storage facility was specifically designed to accommodate runoff from the subject property and that the runoff will be conveyed to this location through an adequately designed conveyance facility.

- [X] 1. The development is adjacent to a watercourse or channel that an engineering analysis shows is designed and constructed to handle the additional runoff. (will be)
- [ ] 2. The development is on a parcel less than one-half acre in size.
- [ ] 3. Stormwater storage requirements conflict with requirements of the Environmentally Sensitive Lands Ordinance (ESLO). A conflict with ESLO is limited to:
  - Property located in the hillside landform as defined in the city Zoning Ordinance.
  - Property where more than thirty-five (35) percent is covered by required natural area open space as defined in the city Zoning Ordinance.
- [ ] 4. The project is located within the Downtown Area as delineated by the Figure 1 below.

By signing below, I certify that the stated project meets the waiver criteria selected above as demonstrated by the attached documentation.

Engineer Darrel S. Wood Date 1.5.12

Planning, Neighborhood & Transportation Division
7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone: 480-312-7000 • Fax: 480-312-7088

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers: 1672-08-4

____ - PA - ____ ____ - ZN - ____ ____ - UP - ____ ____ - DR - ____ ____ - PP - ____ PC# ____

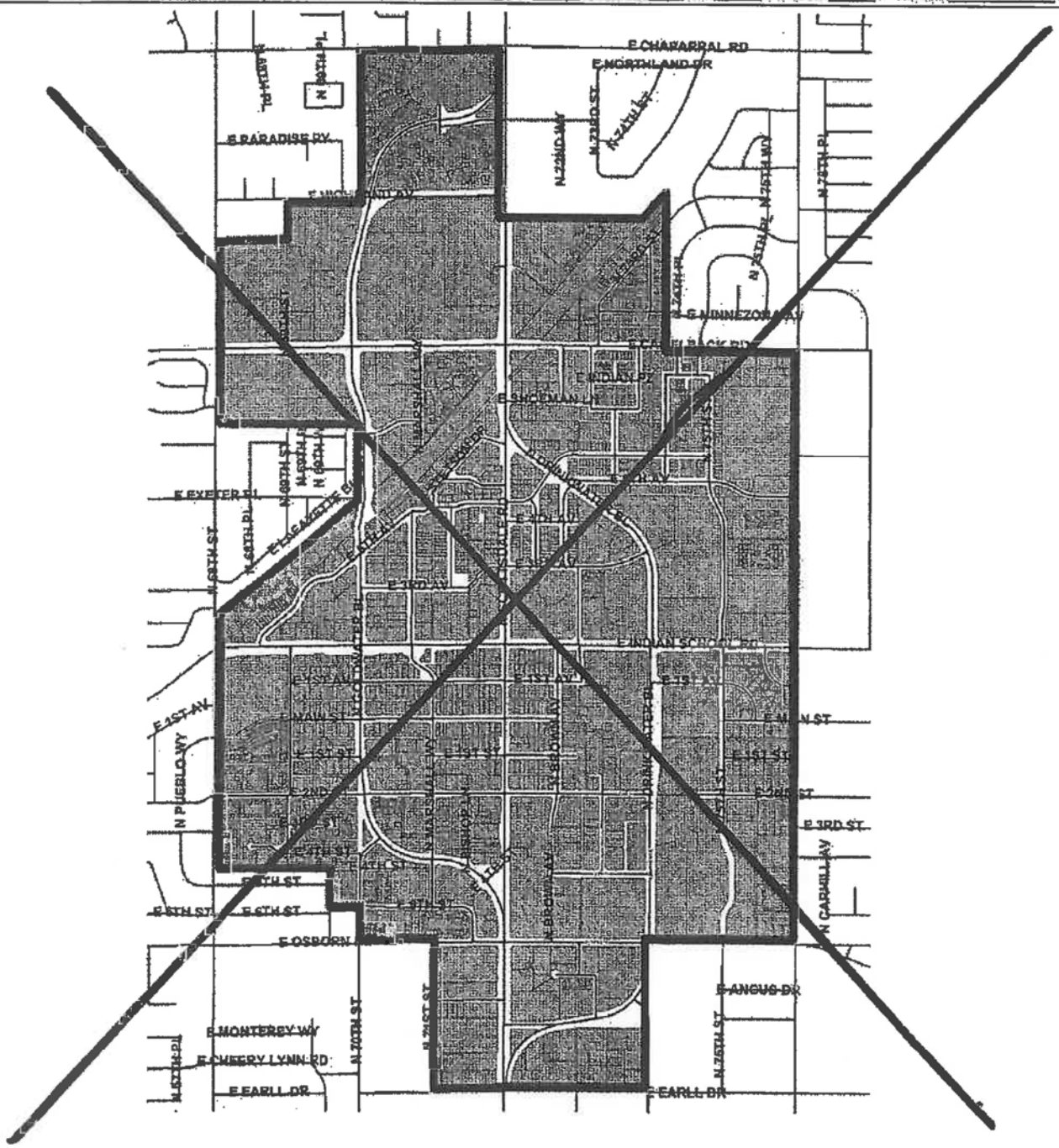


Figure 1. Designated Area for Downtown Stormwater Storage Waivers

Planning, Neighborhood & Transportation Division

7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone: 480-312-7000 • Fax: 480-312-7088

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers: 1072-08-4

___ - PA - ___ ___ - ZN - ___ ___ - UP - ___ ___ - DR - ___ ___ - PP - ___ PC#_____

CITY STAFF TO COMPLETE THIS PAGE

Project Name ONE SCOTTSDALE

Check Appropriate Boxes:

☑ Meets waiver criteria (specify): ☑1 ☐2 ☐3 ☐4

☑ Recommend approve waiver.

☐ Recommend deny waiver:
- ☐ None of waiver criteria met.
- ☐ Downstream conditions prohibit waiver of any storage.
- ☐ Other:

Explain: _____

☐ Return waiver request:
- ☐ Insufficient data provided.
- ☐ Other: _____

Explain: _____

Recommended Conditions of Waiver:
- ☐ All storage requirements waived.
- ☐ Pre development conditions must be maintained.
- ☑ Other:

Explain: Please see attachment.

☑ **Waiver approved per above conditions.**

☐ **Waiver denied.**

C. Ashley Covell — Floodplain Administrator or Designee

1/31/2012 — Date

Planning, Neighborhood & Transportation Division
7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone: 480-312-7000 • Fax: 480-312-7088

Request for Stormwater Storage Waiver

City of Scottsdale Case Numbers: 1672-08-4

___ - PA - ___ ___ - ZN - ___ ___ - UP - ___ ___ - DR - ___ ___ - PP - ___ PC# ___

In-Lieu Fee and In-Kind Contributions

If the city grants a waiver, the developer is required to calculate and contribute an in-lieu fee based on what it would cost the city to provide the waived storage volume, including costs such as land acquisition, construction, landscaping, design, construction management, and maintenance over a 75-year design life. The fee for this cost is $3.22 per cubic foot of stormwater storage waived. This unit cost will be updated annually, but the city reserves the right to revise the unit cost at any time.

The Floodplain Administrator considers in-kind contributions on a case-by-case basis. An in-kind contribution can serve as part of or instead of the calculated in-lieu fee. In-kind contributions must be stormwater related and must constitute a public benefit. In-lieu fees and in-kind contributions are subject to the approval of the Floodplain Administrator or designee.

Project Name ONE SCOTTSDALE

The waived stormwater storage volume is calculated as follows:

V = CRA; where
V = stormwater storage volume required, in cubic feet,
C = weighted average runoff coefficient over disturbed area,
R = 100-year/2-hour precipitation depth, in feet (DSPM, Appendix 4-1D, page 11), and
A = area of disturbed ground, in square feet

Furthermore,

$V_w = V - V_p$; where
V_w = volume waived,
V = volume required, and
V_p = volume provided

C = ___
A = ___
V = 12.6 AC FT
V_p = 8.3 AC FT
V_w = 8.3 AC FT

___ An in-lieu fee will be paid, based on the following calculations and supporting documentation:
in-lieu fee ($) = V_w (cu. ft.) x $3.22 per cubic foot = $2,126,390.

X An in-kind contribution will be made, as follows:
See Attachment dated Jan 4, 2012
documenting regional drainage costs of $3,300,000.

___ No In-Lieu Fee is required. Reason:

Approved by: C Ashley Couch 1/31/2012

Floodplain Administrator or Designee — Date

Planning, Neighborhood and Transportation Division
7447 E Indian School Road, Suite 105, Scottsdale, AZ 85251 • Phone: 480-312-7000 • Fax: 480-312-7088

Prepared by Wood, Patel & Associates, Inc. January 4, 2012
WP#113713.02

Attachment to Stormwater Storage Wavier
Regional Drainage Solution

This project completes the City of Scottsdale's regional drainage improvements initially constructed a few years ago beginning at the south side of ADOT State Route 101 (just east of Scottsdale Road) and ending just south of Union Hills Road (east of Scottsdale Road). Specifically this project extends a drainage channel along Union Hills Drive and Scottsdale Road; to regional flood control improvements just north of Princess Drive (see Exhibit 1). Drainage will be conveyed to its historic location which is the north side of U.S. Bureau's Central Arizona Project (C.A.P.). Completion of the regional drainage system increases public health and safety with regard to potential regional drainage issues and serves Scottsdale Road, as well, affords reduced detention requirements for two parcels. The ASLD Core South parcel benefits by having 32.5 acres not require onsite detention, the One Scottsdale project benefits by having an outlet thus allowing its detention requirements to be reduced. The privately funded regional drainage solution completes the regional drainage solution for the area and becomes a valuable asset to the residents and businesses in the community at large. .

The land area designated for the extension of the drainage channel on the Core South parcel could become the permanent location or the drainage channel could be relocated to another portion of Core South during the land planning process for the parcel. Accordingly, it is anticipated that at the time of disposition of the Core South parcel, a City of Scottsdale drainage easement will be retained for the permanent location of the drainage channel.

- Summary:

Total Cost Value

To Complete Regional Drainage Improvements = $2,300,000 [1]

COS In Lieu Fee = $2,126,390 [2]

---

[1] Design Costs: $200,000
Channel Construction Cost: $500,000
Land Easement Value $1,600,000
$2,300,000

[2] 15.16 acre ft, (reduced detention) x $3.22/cu ft. = $2,126,390
Of the 15.16 acre ft of detention being waived; 6.86 ac ft applies to ASLD's 32.5 acres (Exhibit 1) and 8.3 ac ft applies to One Scottsdale. (8.3 + 6.86 = 15.16 ac ft)

DMB

A Passion for Great Places

January 30, 2012

Mr. Darrel Wood
Wood/Patel
2051 West Northern
Phoenix, AZ 85021

RE: One Scottsdale – Regional Drainage Channel

Dear Darrel:

This letter is in response to your request for information regarding the drainage channel construction estimate submitted as part of the regional drainage channel storm water waiver.

As you know, in late spring of 2011, the potential buyer of the State Land parcel obtained estimates from 5 different construction companies for the cost of the work shown on the approved regional drainage channel drawings prepared by your firm. The information provided to DMB wasn't acceptable to us, but did result in several estimates near the $500,000 amount.

Since the information provided by the potential buyer was the estimated cost of the channel, DMB assembled a complete bid package to determine the cost of the work. The package was delivered in May of 2011 to the following qualified bidders:

Achen Gardner
Hunter
Markham
DCS Contracting

The analysis of the bids resulted in four qualified bids with total costs between $413,083.75 and $643,935.90. Based estimates and bids indicating a construction cost of less than $500,000, DMB, the City of Scottsdale and the State Land Department agreed on a maximum contribution from DMB towards the construction of the channel at $500,000.

Hopefully, this letter will serve to provide you with the back-up support for the construction costs of the channel requested by the City. Let us know if you required additional information.

Very truly yours,

Michael F. Burke
Vice President of Development
DMB Associates, Inc,
Manager of One Scottsdale Holdings, LLC

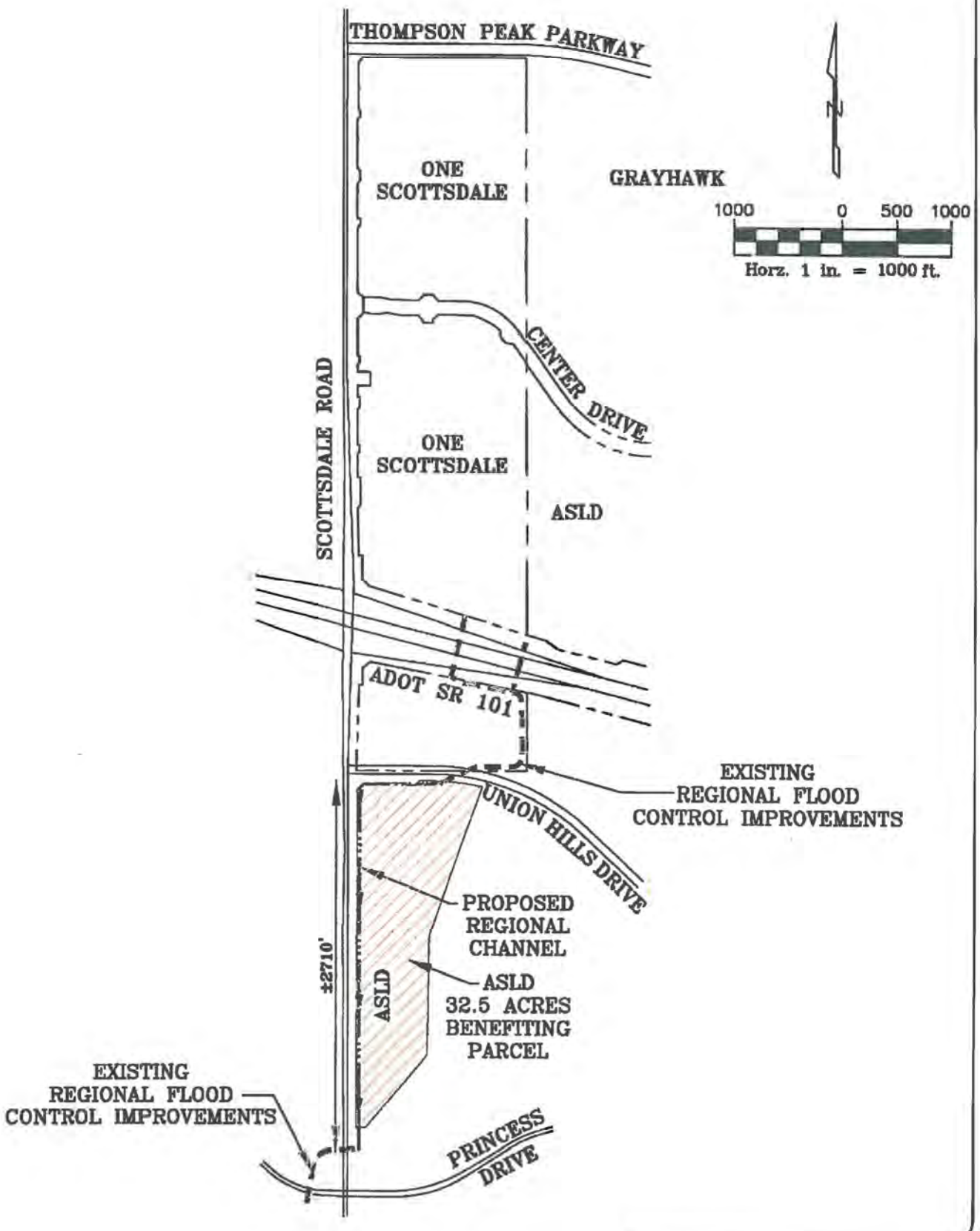


EXHIBIT 1

PROPOSED REGIONAL DRAINAGE SOLUTION	WOOD/PATEL
JOB # 113713.02 DATE: 01/03/12	

APPENDIX B – 404 CERTIFICATION AND LETTER

Section 404 Certification

Before the City issues development permits for a project, the developer's Engineer or the property owner must certify that it complies with, or is exempt from, Section 404 of the Clean Water Act of the United States. Section 404, administered by the U.S. Army Corps of Engineers (COE), regulates the discharge of dredged or fill material into a wetland, lake, (including dry lakes), river, stream (including intermittent streams, ephemeral washes, and arroyos), or other waters of the United States.

Prior to submittal of improvement plans to Project Review the form below must be completed (and submitted with the improvement plans) as evidence of compliance

Certification of Section 404 Permit Status

Owner's Name: Ryan Companies U.S, Inc. Phone No. 602-322-6100

Project Name/Description: One Scottsdale Plan Check No.

Project Location/Address: SE Corner Intersection Scottsdale Road & Thompson Peak Parkway

A registered Engineer or the property Owner must check the applicable condition and certify by signing below that:

1. **Section 404 <u>does</u> apply to the project because there will be a discharge of dredged or fill material to waters of the U.S., and:**

   ☐ A Section 404 Permit has already been obtained for this project.

   -or-

   ☐ This project qualifies for a "Nationwide Permit," and this project will meet all terms and conditions of the applicable nationwide permit.

2. **Section 404 <u>does not</u> apply to the project because:**

   ☐ No watercourses or other waters of the U.S. exist on the property.

   ☒ No jurisdictional waters of the U.S. exist on the property. Attached is a copy of the COE's Jurisdictional Determination.

   ☐ Watercourses or other waters of the U.S. do exist on the property, but the project will not involve the discharge of dredged or fill material into any of these waters.

I certify that the above statement is true.

Engineer's Signature and Seal, or Owner's Signature

Registered Professional Engineer CERTIFICATE NO. 23980 JEFFREY S. ERICKSON DATE SIGNED 11.19.15 ARIZONA U.S.A. Expires 9/30/2017

11.19.15
Date

Planning & Development Services Department
7447 E Indian School Road, Suite 100, Scottsdale, AZ 85251 • Phone: 480-312-2500 • Fax: 480-312-7088

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
ARIZONA-NEVADA AREA OFFICE
3636 NORTH CENTRAL AVENUE, SUITE 760
PHOENIX, ARIZONA 85012-1936

REPLY TO
Office of the Chief
Regulatory Branch

February 5, 2002

Corrigan Real Estate Investment LLC
and Corrigan Land & Livestock Limited Partnership
C/O Robert D. Anderson
Withey, Anderson & Morris
3101 North Central Avenue, Suite 1690
Phoenix, Arizona 85012-2615

File Number: 2002-00484-RWF

Dear Mr. Anderson:

Reference is made to your letter of July 5, 2001 and the accompanying information provided by Wood, Patel & Associates in which you inquired as to whether or not a Clean Water Act Section 404 permit is required from the U.S. Army Corps of Engineers to construct a commercial development within a 160 acre parcel (Stack 40) situated along Scottsdale Road, north of the Central Arizona Project aqueduct at (Section 26, T4N, R4E), Scottsdale, Maricopa County, Arizona.

We have reviewed our records and have determined that the waters of the United States that historically transversed the subject property have been impacted and redirected by the construction of the GrayHawk development. The washes observed on the Stack 40 parcel are remnants of watercourses that no longer receive upstream flows. Since there are no longer any waters of the United States within the Stack 40 proposed project area, no Section 404 permit is required from our office.

The receipt of your application and/or letter is appreciated. If you have questions, please contact Ron Fowler at (602) 640-5385 x 226.

Sincerely,

Cindy Lester

Cindy Lester
Chief, Arizona Section
Regulatory Branch

Enclosure

EXHIBIT 2

APPENDIX C – HYDROLOGY CALCULATIONS

One Scottsdale
CEC JOB: 180-168
DATE: January 20, 2021
PREPARED BY: RMH
CHECKED BY: TJP

Q = C*I*A
C = weighted I = intensity, in/hr
A = Area, Acre

DRAINAGE AREA I.D.	AREA (sf)	AREA (ac)	Tc (min.)	I_{10} (in/hr)	I_{100} (in/hr)	C_{10}	C_{100}	Q_{10} (cfs)	Q_{100} (cfs)
A1	60,077	1.38	10	3.81	5.98	0.90	0.95	4.73	7.84
A2	7,497	0.17	10	3.81	5.98	0.85	0.90	0.56	0.93
A3	6,491	0.15	10	3.81	5.98	0.85	0.90	0.48	0.80
A4	4,034	0.09	10	3.81	5.98	0.85	0.90	0.30	0.50
A5	11,731	0.27	10	3.81	5.98	0.40	0.45	0.41	0.72
A6	16,992	0.39	10	3.81	5.98	0.90	0.95	1.34	2.22
A7	12,798	0.29	10	3.81	5.98	0.90	0.95	1.01	1.67
A8	30,654	0.70	10	3.81	5.98	0.40	0.45	1.07	1.89
A9	26,014	0.60	10	3.81	5.98	0.90	0.95	2.05	3.39
A10	9,864	0.23	10	3.81	5.98	0.75	0.80	0.65	1.08
A11	7,086	0.16	10	3.81	5.98	0.76	0.81	0.47	0.79
A12	3,904	0.09	10	3.81	5.98	0.68	0.73	0.23	0.39
A13	47,049	1.08	10	3.81	5.98	0.90	0.95	3.70	6.14
A14	82,620	1.90	10	3.81	5.98	0.85	0.90	6.14	10.21
B1	19,088	0.44	10	3.81	5.98	0.80	0.85	1.34	2.23
B2	38,644	0.89	10	3.81	5.98	0.83	0.88	2.79	4.65
B3	62,909	1.44	10	3.81	5.98	0.86	0.91	4.73	7.85
B4	26,891	0.62	10	3.81	5.98	0.80	0.85	1.89	3.14
B5	28,931	0.66	10	3.81	5.98	0.86	0.91	2.17	3.60
B6	36,202	0.83	10	3.81	5.98	0.90	0.95	2.85	4.72
B7	17,439	0.40	10	3.81	5.98	0.85	0.90	1.30	2.15
B8	37,139	0.85	10	3.81	5.98	0.85	0.90	2.76	4.59
B9	6,934	0.16	10	3.81	5.98	0.85	0.90	0.52	0.86
C1	14,410	0.33	10	3.81	5.98	0.90	0.95	1.13	1.88
C2	35,062	0.80	10	3.81	5.98	0.90	0.95	2.76	4.57
C3	27,019	0.62	10	3.81	5.98	0.40	0.45	0.95	1.67
C4	4,053	0.09	10	3.81	5.98	0.85	0.90	0.30	0.50
C5	23,518	0.54	10	3.81	5.98	0.90	0.95	1.85	3.07
C6	7,405	0.17	10	3.81	5.98	0.40	0.45	0.26	0.46
C7	60,077	1.38	10	3.81	5.98	0.90	0.95	4.73	7.84

C8	15,780	0.36	10	3.81	5.98	0.46	0.51	0.63	1.10
C9	10,011	0.23	10	3.81	5.98	0.48	0.53	0.42	0.72
D1	5,075	0.12	10	3.81	5.98	0.90	0.95	0.40	0.66
D2	29,592	0.68	10	3.81	5.98	0.90	0.95	2.33	3.86
D3	46,099	1.06	10	3.81	5.98	0.90	0.95	3.63	6.01
D4	61,812	1.42	10	3.81	5.98	0.40	0.45	2.16	3.82
D5	13,617	0.31	10	3.81	5.98	0.85	0.90	1.01	1.68
D6	27,408	0.63	10	3.81	5.98	0.90	0.95	2.16	3.57
D7	60,059	1.38	10	3.81	5.98	0.48	0.53	2.51	4.35
D8	28,249	0.65	10	3.81	5.98	0.90	0.95	2.22	3.68
D9	54,475	1.25	10	3.81	5.98	0.49	0.54	2.33	4.04
D10	6,091	0.14	10	3.81	5.98	0.71	0.76	0.38	0.63
D11	37,663	0.86	10	3.81	5.98	0.90	0.95	2.96	4.91
D12	26,228	0.60	10	3.81	5.98	0.40	0.45	0.92	1.62

Flow Increase for Offsite Time of Concentration

A	326,811	7.50	126	0.72	1.13	0.41	0.41	2.21	3.47
B	274,176	6.29	126	0.72	1.13	0.45	0.45	2.03	3.19

First Flush Flow Calculations

SYSTEM I.D.	**AREA** (sf)	**AREA** (ac)	**Tc** (hr.)	**P_{FF}** (in)	**C_{100}**	**Q_{FF}** (cfs)
A	326,811	7.50	1.9	0.50	0.86	1.70
B	274,176	6.29	1.9	0.50	0.90	1.49

$Q_{FF} = C*P_{FF}*A / T_C$

C = weighted P_{FF} = 0.5 in

A = Area, Acre Tc = Time of Concentration, hours

C = ((0.95)(C.A.) + (0.5)(L.A.)) / T.A.

Concrete	C_{100}=0.95
	C_{10}=0.90
Landscape	C_{100}=0.45
	C_{10}=0.40

WEIGHTED C CALCULATIONS

DRAINAGE AREA I.D.	TOTAL AREA (sf)	CONCRETE AREA (sf)	LANDSCAPE AREA (sf)	C_{10}	C_{100}
A1	60,077	60,077	0	0.90	0.95
A2	7,497	6,747	750	0.85	0.90
A3	6,491	5,842	649	0.85	0.90
A4	4,034	3,631	403	0.85	0.90
A5	11,731	0	11,731	0.40	0.45
A6	16,992	16,992	0	0.90	0.95
A7	12,798	12,798	0	0.90	0.95
A8	30,654	0	30,654	0.40	0.45
A9	26,014	26,014	0	0.90	0.95
A10	9,864	6,918	2,946	0.75	0.80
A11	7,086	5,069	2,017	0.76	0.81
A12	3,904	2,175	1,729	0.68	0.73
A13	47,049	47,049	0	0.90	0.95
A14	82,620	74,360	8,260	0.85	0.90
B1	19,088	15,370	3,718	0.80	0.85
B2	38,644	32,937	5,707	0.83	0.88
B3	62,909	57,775	5,133	0.86	0.91
B4	26,891	21,592	5,299	0.80	0.85
B5	28,931	26,433	2,498	0.86	0.91
B6	36,202	36,202	0	0.90	0.95
B7	17,439	15,687	1,752	0.85	0.90
B8	37,139	33,425	3,714	0.85	0.90
B9	6,934	6,241	693	0.85	0.90
C1	14,410	14,410	0	0.90	0.95
C2	35,062	35,062	0	0.90	0.95
C3	27,019	0	27,019	0.40	0.45
C4	4,053	3,648	405	0.85	0.90
C5	23,518	23,518	0	0.90	0.95
C6	7,405	0	7,405	0.40	0.45
C7	60,077	60,077	0	0.90	0.95

C8	15,780	1,854	13,925	0.46	0.51
C9	10,011	1,521	8,490	0.48	0.53
D1	5,075	5,075	0	0.90	0.95
D2	29,592	29,592	0	0.90	0.95
D3	46,099	46,099	0	0.90	0.95
D4	61,812	0	61,812	0.40	0.45
D5	13,617	12,255	1,362	0.85	0.90
D6	27,408	27,408	0	0.90	0.95
D7	60,059	9,315	50,744	0.48	0.53
D8	28,249	28,249	0	0.90	0.95
D9	54,475	9,774	44,701	0.49	0.54
D10	6,091	3,728	2,363	0.71	0.76
D11	37,663	37,663	0	0.90	0.95
D12	26,228	0	26,228	0.40	0.45

A	326,811	267,672	59,139	0.81	0.86
B	274,176	245,662	28,515	0.85	0.90

NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.6672°, Longitude: -111.9242°
Elevation: 1651.8 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**2.38** (1.97-2.90)	**3.10** (2.59-3.79)	**4.18** (3.46-5.11)	**5.00** (4.13-6.11)	**6.13** (4.97-7.44)	**6.98** (5.59-8.41)	**7.86** (6.18-9.46)	**8.74** (6.77-10.5)	**9.92** (7.49-11.9)	**10.8** (8.00-13.1)
10-min	**1.81** (1.50-2.21)	**2.35** (1.97-2.89)	**3.18** (2.63-3.89)	**3.81** (3.14-4.64)	**4.66** (3.78-5.66)	**5.32** (4.25-6.40)	**5.98** (4.70-7.19)	**6.65** (5.15-7.99)	**7.55** (5.69-9.08)	**8.24** (6.09-9.93)
15-min	**1.49** (1.24-1.83)	**1.94** (1.63-2.39)	**2.63** (2.18-3.21)	**3.15** (2.59-3.84)	**3.85** (3.12-4.68)	**4.39** (3.52-5.29)	**4.94** (3.89-5.95)	**5.50** (4.25-6.60)	**6.24** (4.70-7.51)	**6.81** (5.03-8.21)
30-min	**1.00** (0.834-1.23)	**1.31** (1.10-1.61)	**1.77** (1.46-2.16)	**2.12** (1.75-2.58)	**2.59** (2.10-3.15)	**2.96** (2.37-3.56)	**3.33** (2.62-4.00)	**3.70** (2.86-4.45)	**4.20** (3.17-5.06)	**4.58** (3.39-5.53)
60-min	**0.621** (0.516-0.761)	**0.811** (0.678-0.995)	**1.09** (0.906-1.34)	**1.31** (1.08-1.60)	**1.61** (1.30-1.95)	**1.83** (1.47-2.21)	**2.06** (1.62-2.48)	**2.29** (1.77-2.75)	**2.60** (1.96-3.13)	**2.84** (2.10-3.42)
2-hr	**0.362** (0.306-0.436)	**0.469** (0.396-0.566)	**0.624** (0.524-0.748)	**0.744** (0.617-0.890)	**0.906** (0.744-1.08)	**1.03** (0.834-1.22)	**1.16** (0.920-1.37)	**1.28** (1.01-1.52)	**1.46** (1.11-1.72)	**1.59** (1.19-1.89)
3-hr	**0.266** (0.224-0.325)	**0.341** (0.288-0.418)	**0.445** (0.374-0.544)	**0.528** (0.439-0.641)	**0.644** (0.527-0.777)	**0.736** (0.595-0.883)	**0.831** (0.659-0.998)	**0.932** (0.727-1.12)	**1.07** (0.809-1.28)	**1.18** (0.871-1.41)
6-hr	**0.160** (0.138-0.190)	**0.202** (0.174-0.241)	**0.258** (0.221-0.305)	**0.303** (0.257-0.356)	**0.364** (0.304-0.426)	**0.411** (0.339-0.480)	**0.460** (0.373-0.536)	**0.511** (0.407-0.596)	**0.579** (0.449-0.675)	**0.632** (0.480-0.739)
12-hr	**0.090** (0.078-0.106)	**0.114** (0.098-0.133)	**0.144** (0.123-0.168)	**0.167** (0.143-0.194)	**0.198** (0.168-0.231)	**0.223** (0.186-0.258)	**0.248** (0.204-0.287)	**0.273** (0.222-0.316)	**0.307** (0.243-0.357)	**0.333** (0.259-0.390)
24-hr	**0.053** (0.046-0.061)	**0.067** (0.059-0.078)	**0.087** (0.076-0.101)	**0.103** (0.089-0.119)	**0.125** (0.107-0.144)	**0.142** (0.121-0.164)	**0.160** (0.136-0.185)	**0.179** (0.150-0.207)	**0.206** (0.169-0.238)	**0.227** (0.184-0.264)
2-day	**0.029** (0.025-0.033)	**0.037** (0.032-0.042)	**0.048** (0.042-0.055)	**0.057** (0.049-0.066)	**0.070** (0.060-0.080)	**0.080** (0.068-0.092)	**0.091** (0.076-0.105)	**0.102** (0.085-0.118)	**0.118** (0.096-0.136)	**0.130** (0.105-0.152)
3-day	**0.021** (0.018-0.024)	**0.026** (0.023-0.030)	**0.035** (0.030-0.040)	**0.041** (0.036-0.047)	**0.051** (0.044-0.058)	**0.059** (0.050-0.067)	**0.067** (0.057-0.077)	**0.076** (0.064-0.087)	**0.088** (0.073-0.102)	**0.098** (0.080-0.114)
4-day	**0.017** (0.015-0.019)	**0.021** (0.019-0.024)	**0.028** (0.025-0.032)	**0.034** (0.029-0.038)	**0.042** (0.036-0.047)	**0.048** (0.042-0.055)	**0.055** (0.047-0.063)	**0.063** (0.053-0.072)	**0.073** (0.061-0.084)	**0.082** (0.067-0.095)
7-day	**0.011** (0.009-0.012)	**0.014** (0.012-0.016)	**0.018** (0.016-0.021)	**0.022** (0.019-0.025)	**0.027** (0.023-0.031)	**0.031** (0.027-0.036)	**0.036** (0.030-0.041)	**0.041** (0.034-0.047)	**0.048** (0.040-0.055)	**0.053** (0.044-0.062)
10-day	**0.008** (0.007-0.009)	**0.010** (0.009-0.012)	**0.014** (0.012-0.016)	**0.017** (0.014-0.019)	**0.020** (0.018-0.023)	**0.024** (0.020-0.027)	**0.027** (0.023-0.031)	**0.031** (0.026-0.035)	**0.036** (0.030-0.041)	**0.040** (0.033-0.046)
20-day	**0.005** (0.004-0.006)	**0.006** (0.006-0.007)	**0.009** (0.008-0.010)	**0.010** (0.009-0.012)	**0.012** (0.011-0.014)	**0.014** (0.012-0.016)	**0.016** (0.014-0.018)	**0.018** (0.015-0.020)	**0.020** (0.017-0.023)	**0.022** (0.018-0.026)
30-day	**0.004** (0.003-0.004)	**0.005** (0.004-0.006)	**0.007** (0.006-0.008)	**0.008** (0.007-0.009)	**0.010** (0.008-0.011)	**0.011** (0.010-0.012)	**0.012** (0.011-0.014)	**0.014** (0.012-0.016)	**0.016** (0.013-0.018)	**0.017** (0.014-0.020)
45-day	**0.003** (0.003-0.003)	**0.004** (0.004-0.005)	**0.005** (0.005-0.006)	**0.006** (0.005-0.007)	**0.007** (0.007-0.008)	**0.008** (0.007-0.010)	**0.009** (0.008-0.011)	**0.010** (0.009-0.012)	**0.012** (0.010-0.014)	**0.013** (0.011-0.015)
60-day	**0.003** (0.002-0.003)	**0.003** (0.003-0.004)	**0.004** (0.004-0.005)	**0.005** (0.005-0.006)	**0.006** (0.005-0.007)	**0.007** (0.006-0.008)	**0.008** (0.007-0.009)	**0.008** (0.007-0.010)	**0.010** (0.008-0.011)	**0.010** (0.009-0.012)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

APPENDIX D – HYDRAULIC CALCULATIONS

Hydraulic Analysis Report

Project Data

Project Title: 180168 One Scottsdale

Designer:

Project Date: Friday, January 15, 2021

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Section 1 Thompson Peak Dirt Channel

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

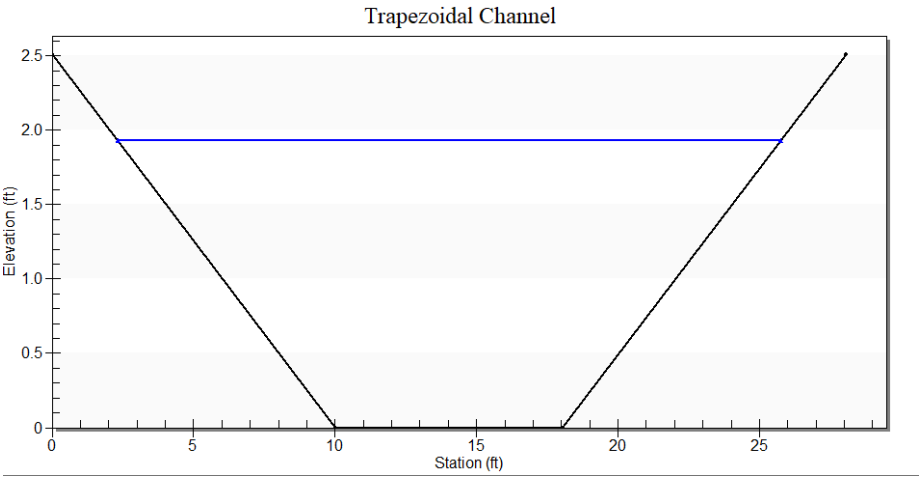
Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0080 ft/ft

Manning's n: 0.0350

Flow: 135.0000 cfs



Result Parameters

Depth: 1.9302 ft

Area of Flow: 30.3435 ft^2

Wetted Perimeter: 23.9166 ft

Hydraulic Radius: 1.2687 ft

Average Velocity: 4.4491 ft/s

Top Width: 23.4413 ft

Froude Number: 0.6891

Critical Depth: 1.5838 ft

Critical Velocity: 5.9462 ft/s

Critical Slope: 0.0177 ft/ft

Critical Top Width: 20.67 ft

Calculated Max Shear Stress: 0.9635 lb/ft^2

Calculated Avg Shear Stress: 0.6333 lb/ft^2

Channel Analysis: Section 2 Thompson Peak Dirt Channel

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 10.5000 ft

Longitudinal Slope: 0.0080 ft/ft

Manning's n: 0.0350

Flow: 135.0000 cfs

Result Parameters

Depth: 1.7607 ft

Area of Flow: 30.8885 ft^2

Wetted Perimeter: 25.0194 ft

Hydraulic Radius: 1.2346 ft

Average Velocity: 4.3706 ft/s

Top Width: 24.5859 ft

Froude Number: 0.6872

Critical Depth: 1.4284 ft

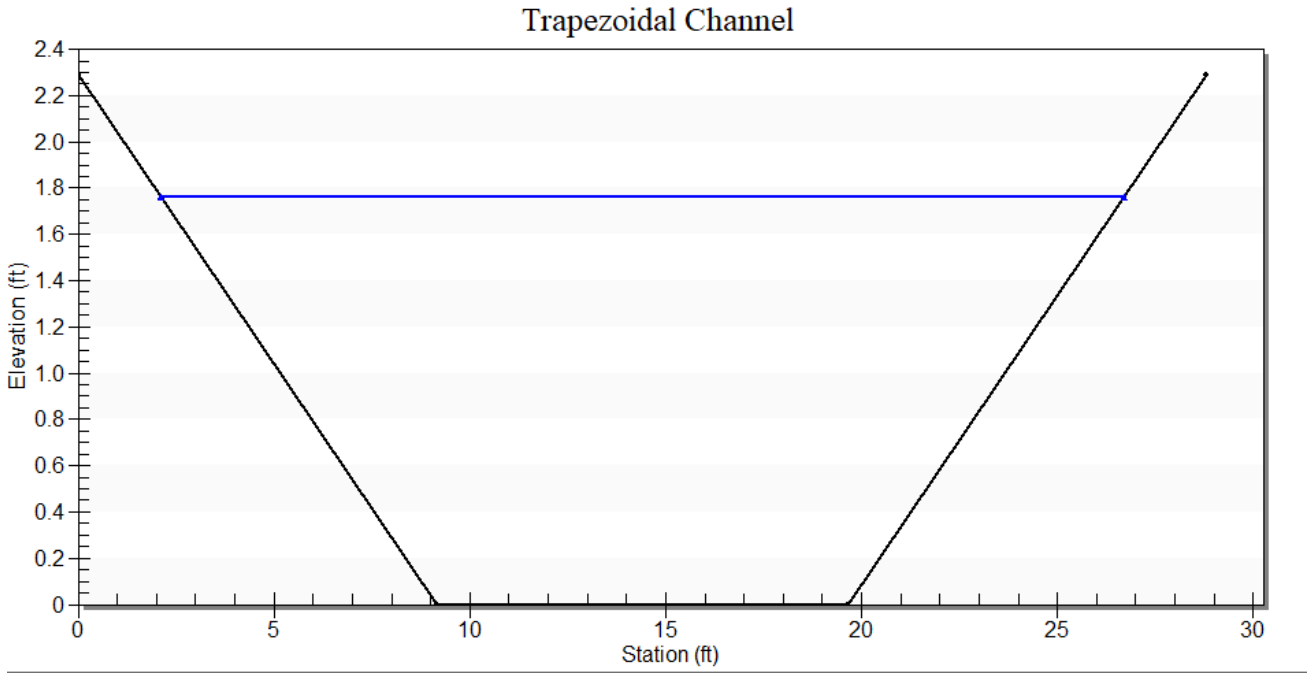
Critical Velocity: 5.8290 ft/s

Critical Slope: 0.0179 ft/ft

Critical Top Width: 21.93 ft

Calculated Max Shear Stress: 0.8790 lb/ft^2

Calculated Avg Shear Stress: 0.6163 lb/ft^2



Channel Analysis: Section 3 Thompson Peak Dirt Channel

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 14.6500 ft

Longitudinal Slope: 0.0080 ft/ft

Manning's n: 0.0350

Flow: 135.0000 cfs

Result Parameters

Depth: 1.5384 ft

Area of Flow: 32.0034 ft^2

Wetted Perimeter: 27.3357 ft

Hydraulic Radius: 1.1708 ft

Average Velocity: 4.2183 ft/s

Top Width: 26.9569 ft

Froude Number: 0.6823

Critical Depth: 1.2279 ft

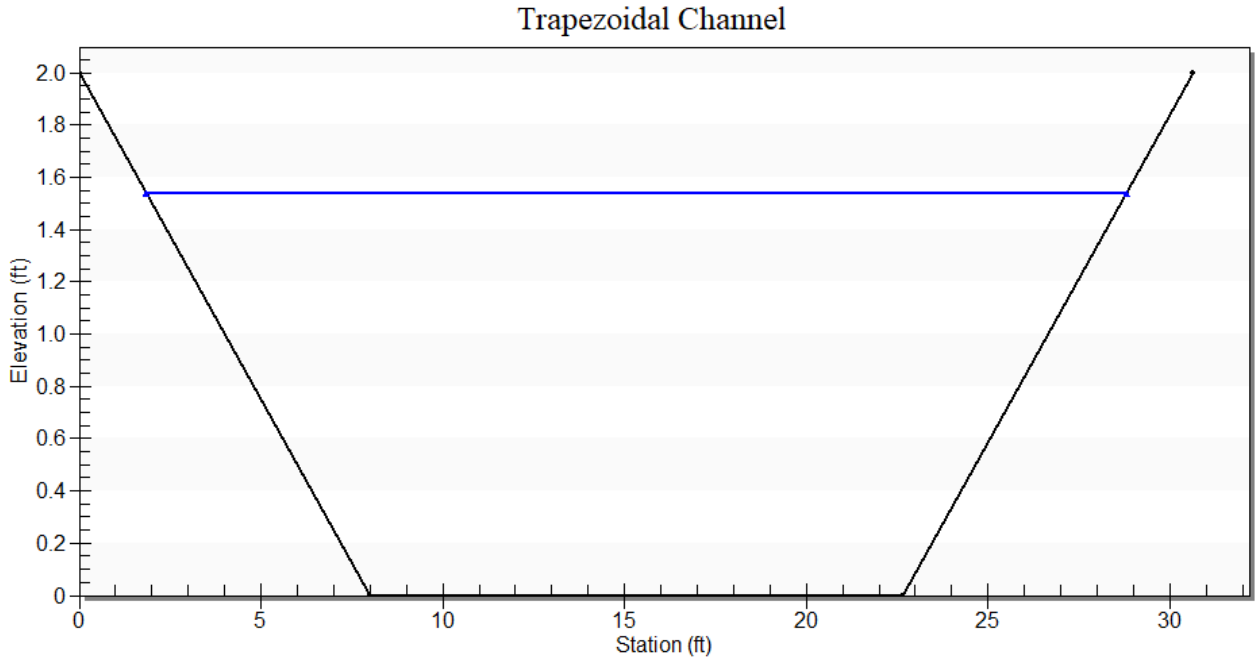
Critical Velocity: 5.6205 ft/s

Critical Slope: 0.0183 ft/ft

Critical Top Width: 24.47 ft

Calculated Max Shear Stress: 0.7680 lb/ft^2

Calculated Avg Shear Stress: 0.5844 lb/ft^2



Channel Analysis: Section 4 Thompson Peak Dirt Channel

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 19.2900 ft

Longitudinal Slope: 0.0080 ft/ft

Manning's n: 0.0350

Flow: 135.0000 cfs

Result Parameters

Depth: 1.3529 ft

Area of Flow: 33.4196 ft^2

Wetted Perimeter: 30.4465 ft

Hydraulic Radius: 1.0976 ft

Average Velocity: 4.0395 ft/s

Top Width: 30.1134 ft

Froude Number: 0.6757

Critical Depth: 1.0645 ft

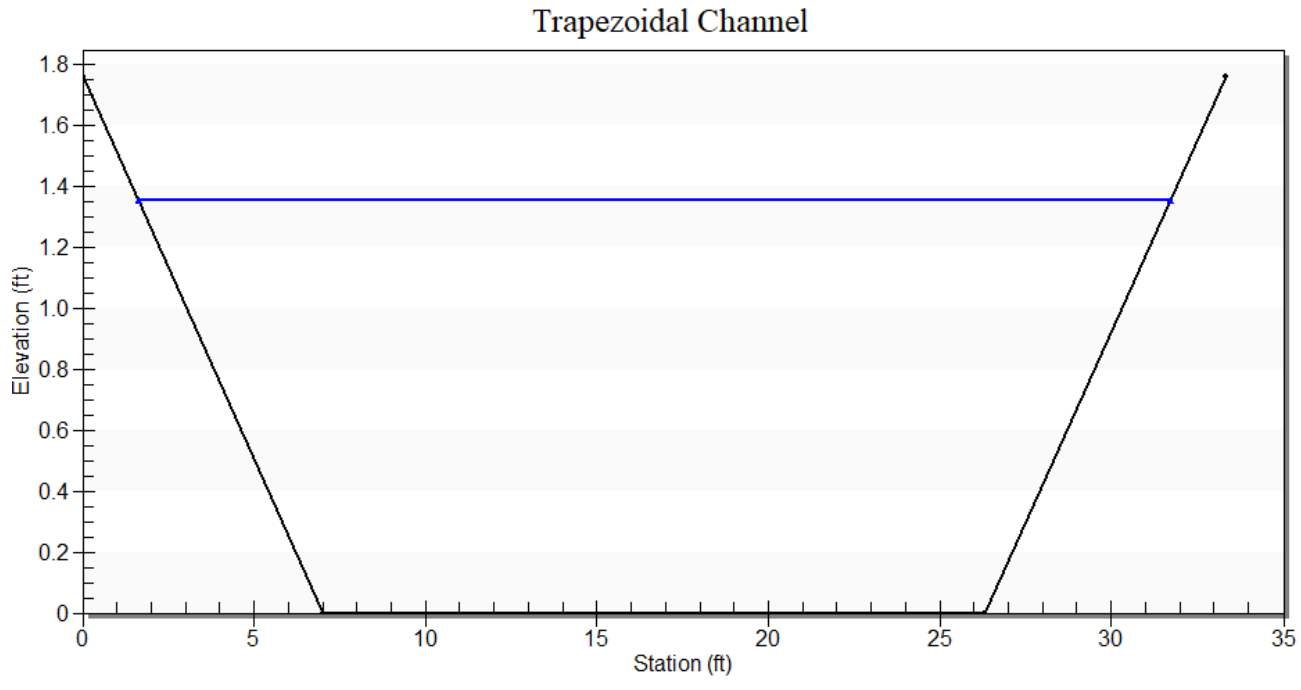
Critical Velocity: 5.3857 ft/s

Critical Slope: 0.0187 ft/ft

Critical Top Width: 27.81 ft

Calculated Max Shear Stress: 0.6754 lb/ft^2

Calculated Avg Shear Stress: 0.5479 lb/ft^2

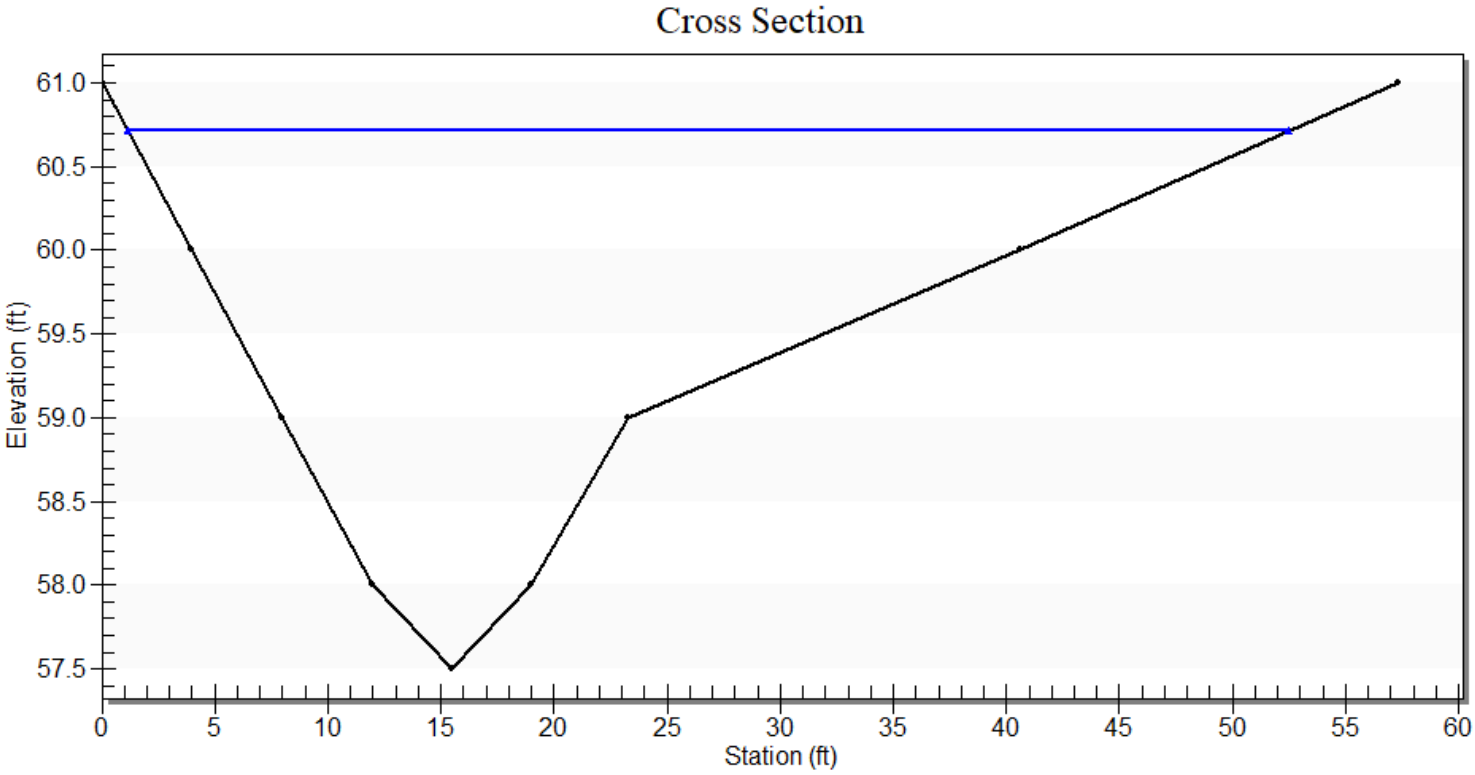


Channel Analysis: Section 5 Scottsdale Road North of Culvert

Notes:

Input Parameters

Channel Type: Custom Cross Section



Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	61.00	0.0350
4.00	60.00	0.0350
8.00	59.00	0.0350
12.00	58.00	0.0350
15.50	57.50	0.0350
19.00	58.00	0.0350
23.30	59.00	0.0350
40.60	60.00	0.0350
57.30	61.00	-----

Longitudinal Slope: 0.0042 ft/ft

Flow: 236.0000 cfs

Result Parameters

Depth: 3.2121 ft

Area of Flow: 70.1625 ft^2

Wetted Perimeter: 51.9109 ft

Hydraulic Radius: 1.3516 ft

Average Velocity: 3.3636 ft/s

Top Width: 51.3410 ft

Froude Number: 0.5071

Critical Depth: 2.5341 ft

Critical Velocity: 5.8839 ft/s

Critical Slope: 0.0177 ft/ft

Critical Top Width: 37.31 ft

Calculated Max Shear Stress: 0.8418 lb/ft^2

Calculated Avg Shear Stress: 0.3542 lb/ft^2

Composite Manning's n Equation: Lotter method

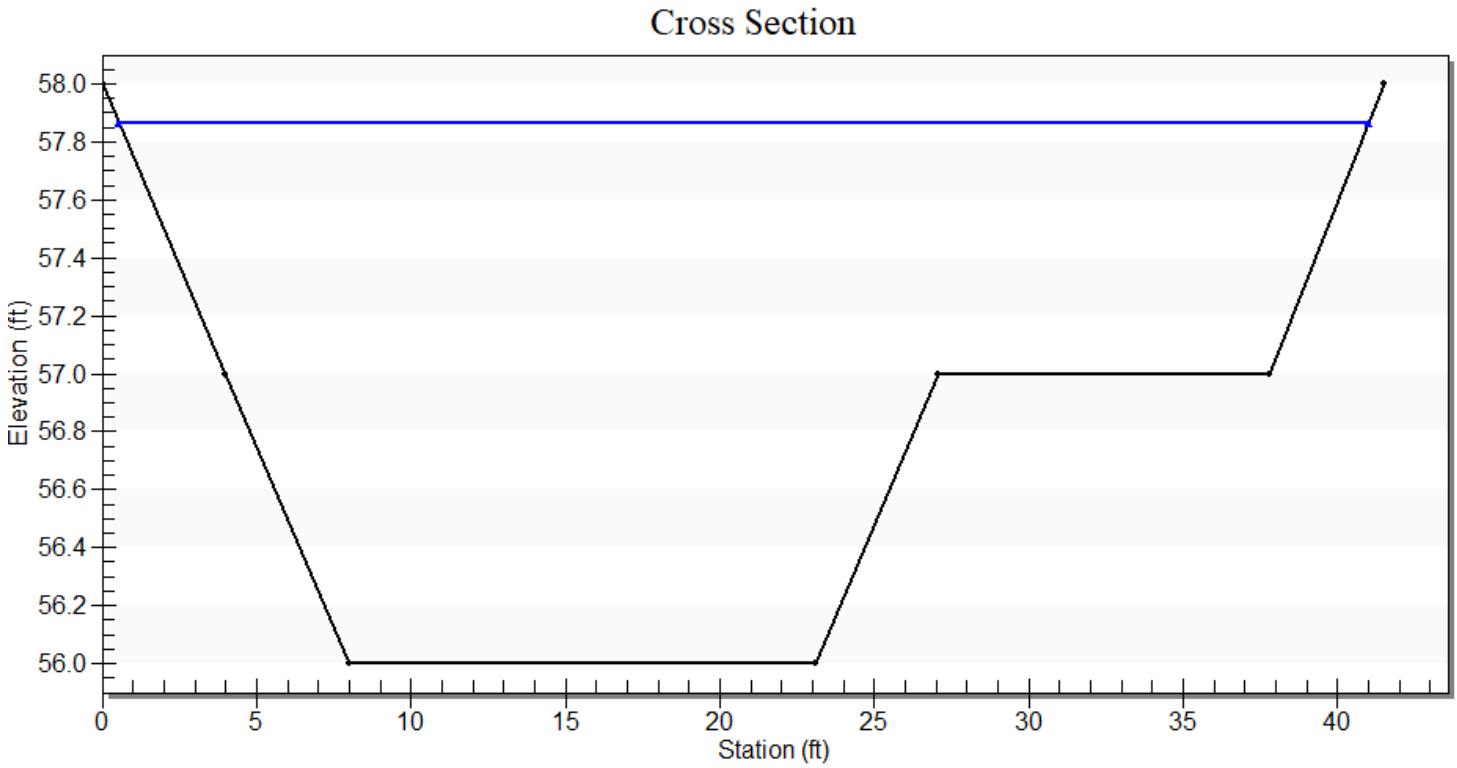
Manning's n: 0.0350

Channel Analysis: Section 6 Scottsdale Road North of Culvert

Notes:

Input Parameters

Channel Type: Custom Cross Section



Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	58.00	0.0350
4.00	57.00	0.0350
8.00	56.00	0.0350
23.10	56.00	0.0350
27.10	57.00	0.0350
37.80	57.00	0.0350
41.50	58.00	-----

Longitudinal Slope: 0.0088 ft/ft

Flow: 236.0000 cfs

Result Parameters

Depth: 1.8618 ft

Area of Flow: 51.0897 ft^2

Wetted Perimeter: 40.9029 ft

Hydraulic Radius: 1.2490 ft

Average Velocity: 4.6193 ft/s

Top Width: 40.4361 ft

Froude Number: 0.7242

Critical Depth: 1.5924 ft

Critical Velocity: 5.8311 ft/s

Critical Slope: 0.0178 ft/ft

Critical Top Width: 38.36 ft

Calculated Max Shear Stress: 1.0224 lb/ft^2

Calculated Avg Shear Stress: 0.6859 lb/ft^2

Composite Manning's n Equation: Lotter method

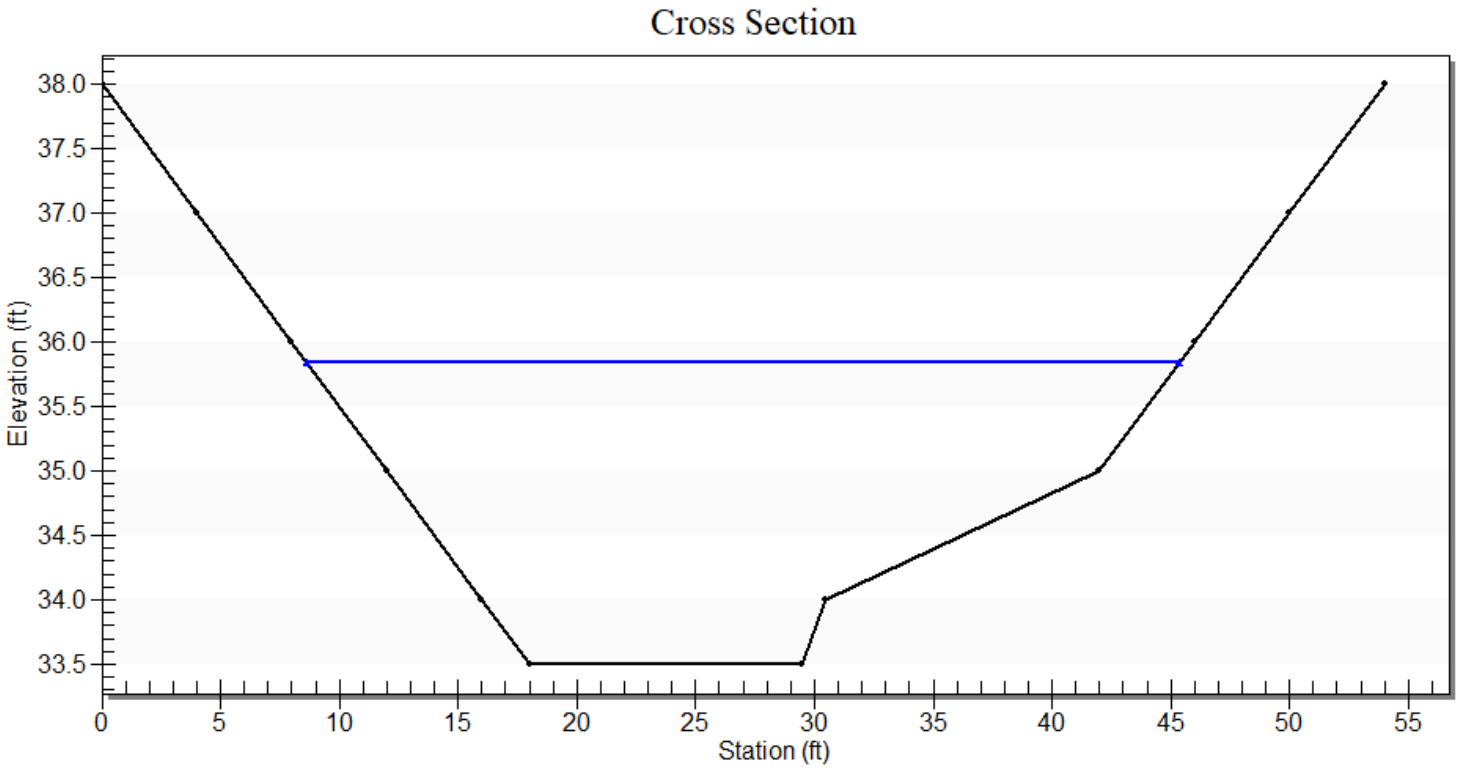
Manning's n: 0.0350

Channel Analysis: Section 7 Scottsdale Road South of Culvert

Notes:

Input Parameters

Channel Type: Custom Cross Section



Cross Section Data

Elevation (ft)	Elevation (ft)	Manning's n
0.00	38.00	0.0350
4.00	37.00	0.0350
8.00	36.00	0.0350
12.00	35.00	0.0350
16.00	34.00	0.0350
18.00	33.50	0.0350
29.50	33.50	0.0350
30.50	34.00	0.0350
42.00	35.00	0.0350
46.00	36.00	0.0350
50.00	37.00	0.0350
54.00	38.00	-----

Longitudinal Slope: 0.0070 ft/ft

Flow: 268.5500 cfs

Result Parameters

Depth: 2.3463 ft

Area of Flow: 57.0054 ft^2

Wetted Perimeter: 37.3252 ft

Hydraulic Radius: 1.5273 ft

Average Velocity: 4.7110 ft/s

Top Width: 36.7707 ft

Froude Number: 0.6668

Critical Depth: 1.9221 ft

Critical Velocity: 6.3750 ft/s

Critical Slope: 0.0168 ft/ft

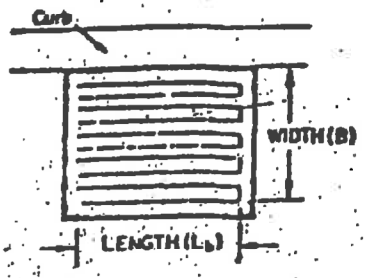
Critical Top Width: 33.38 ft

Calculated Max Shear Stress: 1.0249 lb/ft^2

Calculated Avg Shear Stress: 0.6671 lb/ft^2

Composite Manning's n Equation: Lotter method

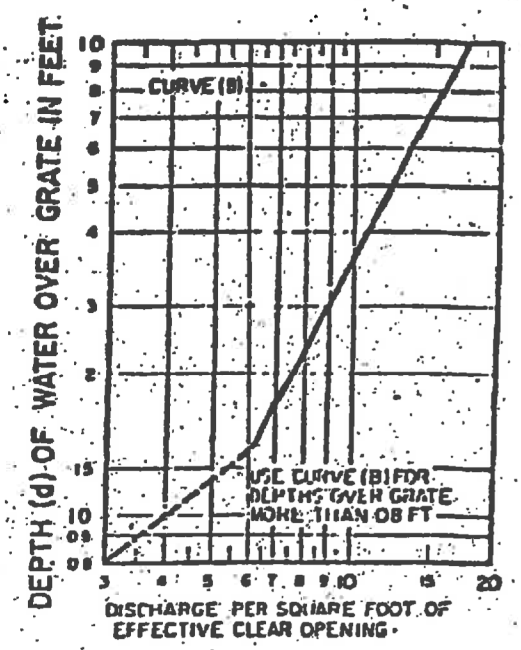
Manning's n: 0.0350



P = $2B + L_b$

A = AREA OF CLEAR OPENING IN GRATE TO ALLOW FOR CLOGGING DIVIDE P OR A BY 2 BEFORE OBTAINING A.

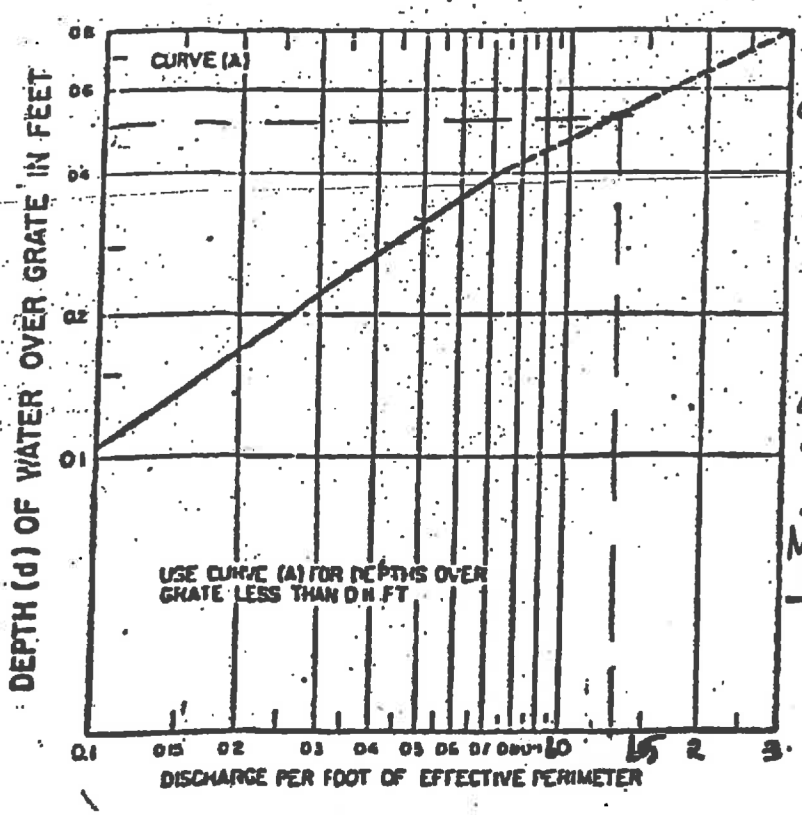
WITHOUT CURB P = $2(B + L_b)$



MAG 537, Type G
@ 0.5' Depth
Q/L = 1.3
Q = 1.3 × 9.33
Q = 12.2 cfs/2
Q = 6.1 cfs

MAG 535, Type F
@ 0.5' Depth
Q/L = 1.3
Q = 1.3 × 11.83
Q = 15.4 cfs/2
Q = 7.7 cfs

Neenah 2554
@ 0.5' Depth
Q/L = 1.3
Q = 1.3 × 6.30
Q = 8.2 cfs/2
Q = 4.1 cfs



GRATE TYPE	AREA	P
"F"	5.42	11.83
"26"	7.28	13.25
"G"	3.64	9.33
"N"	5.09	10.00
"2N"	10.18	17.33
"3N"	15.27	24.00
Neenah 2554	1.90	6.30

BUREAU OF PUBLIC ROADS
REV. AUG. 1968

HYDRAULIC CAPACITY OF GRATE INLET IN SUMP

Hydraulic Analysis Report

Project Data

Project Title: 180168 One Scottsdale

Designer:

Project Date: Friday, January 15, 2021

Project Units: U.S. Customary Units

Notes:

Channel Analysis: B8 Curb Opening

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

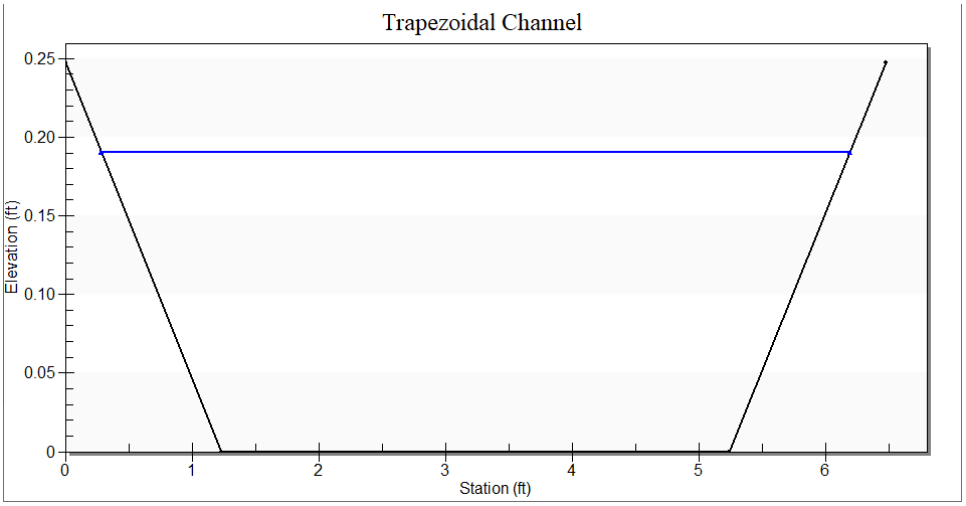
Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 4.0000 ft

Longitudinal Slope: 0.0280 ft/ft

Manning's n: 0.0150

Flow: 4.5900 cfs



Result Parameters

Depth: 0.1903 ft

Area of Flow: 0.9426 ft^2

Wetted Perimeter: 5.9412 ft

Hydraulic Radius: 0.1586 ft

Average Velocity: 4.8697 ft/s

Top Width: 5.9035 ft

Froude Number: 2.1477

Critical Depth: 0.3018 ft

Critical Velocity: 2.7606 ft/s

Critical Slope: 0.0054 ft/ft

Critical Top Width: 7.02 ft

Calculated Max Shear Stress: 0.3326 lb/ft^2

Calculated Avg Shear Stress: 0.2772 lb/ft^2

Channel Analysis: B9 Curb Opening

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 4.0000 ft

Longitudinal Slope: 0.0200 ft/ft

Manning's n: 0.0150

Flow: 0.8600 cfs

Result Parameters

Depth: 0.0801 ft

Area of Flow: 0.3523 ft^2

Wetted Perimeter: 4.8165 ft

Hydraulic Radius: 0.0731 ft

Average Velocity: 2.4410 ft/s

Top Width: 4.8006 ft

Froude Number: 1.5879

Critical Depth: 0.1077 ft

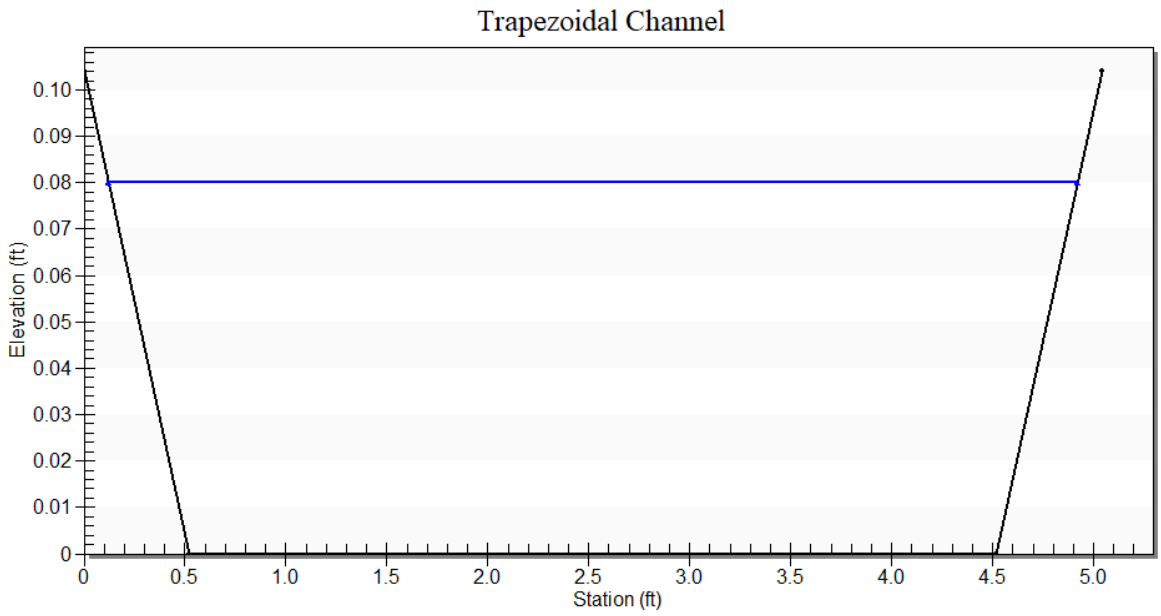
Critical Velocity: 1.7596 ft/s

Critical Slope: 0.0072 ft/ft

Critical Top Width: 5.08 ft

Calculated Max Shear Stress: 0.0999 lb/ft^2

Calculated Avg Shear Stress: 0.0913 lb/ft^2



Channel Analysis: D5 Curb Opening

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 4.0000 ft

Longitudinal Slope: 0.0232 ft/ft

Manning's n: 0.0150

Flow: 1.6800 cfs

Result Parameters

Depth: 0.1133 ft

Area of Flow: 0.5174 ft^2

Wetted Perimeter: 5.1555 ft

Hydraulic Radius: 0.1004 ft

Average Velocity: 3.2470 ft/s

Top Width: 5.1330 ft

Froude Number: 1.8023

Critical Depth: 0.1641 ft

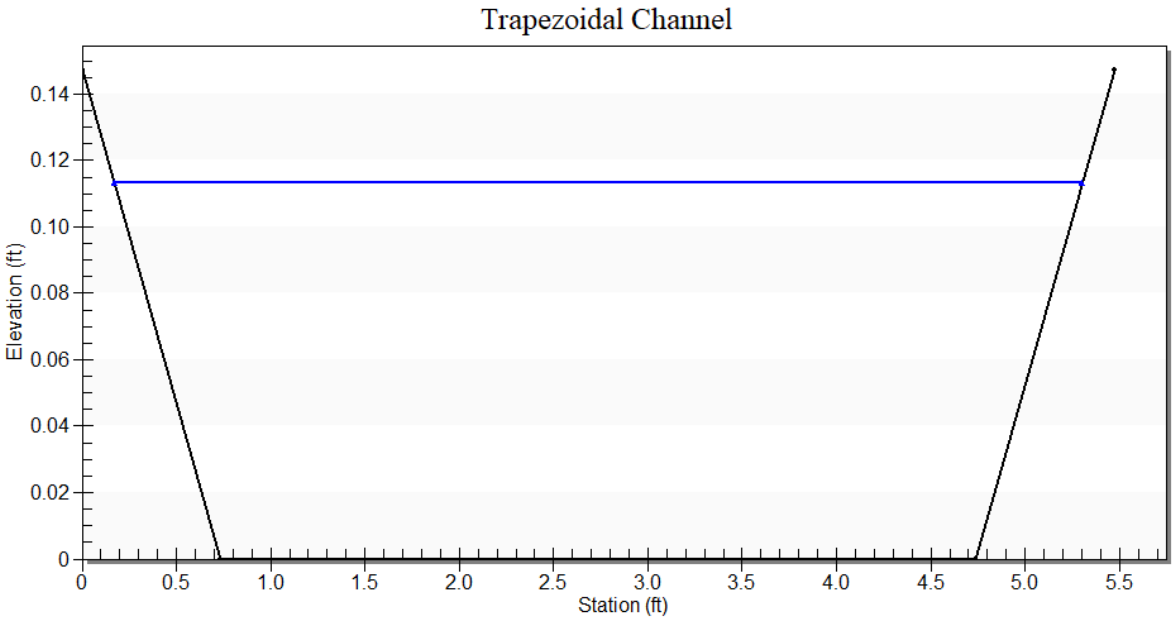
Critical Velocity: 2.1241 ft/s

Critical Slope: 0.0064 ft/ft

Critical Top Width: 5.64 ft

Calculated Max Shear Stress: 0.1640 lb/ft^2

Calculated Avg Shear Stress: 0.1453 lb/ft^2



Channel Analysis: D10 Curb Opening

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 4.0000 ft

Longitudinal Slope: 0.0250 ft/ft

Manning's n: 0.0150

Flow: 0.6300 cfs

Result Parameters

Depth: 0.0621 ft

Area of Flow: 0.2678 ft^2

Wetted Perimeter: 4.6335 ft

Hydraulic Radius: 0.0578 ft

Average Velocity: 2.3528 ft/s

Top Width: 4.6212 ft

Froude Number: 1.7225

Critical Depth: 0.0883 ft

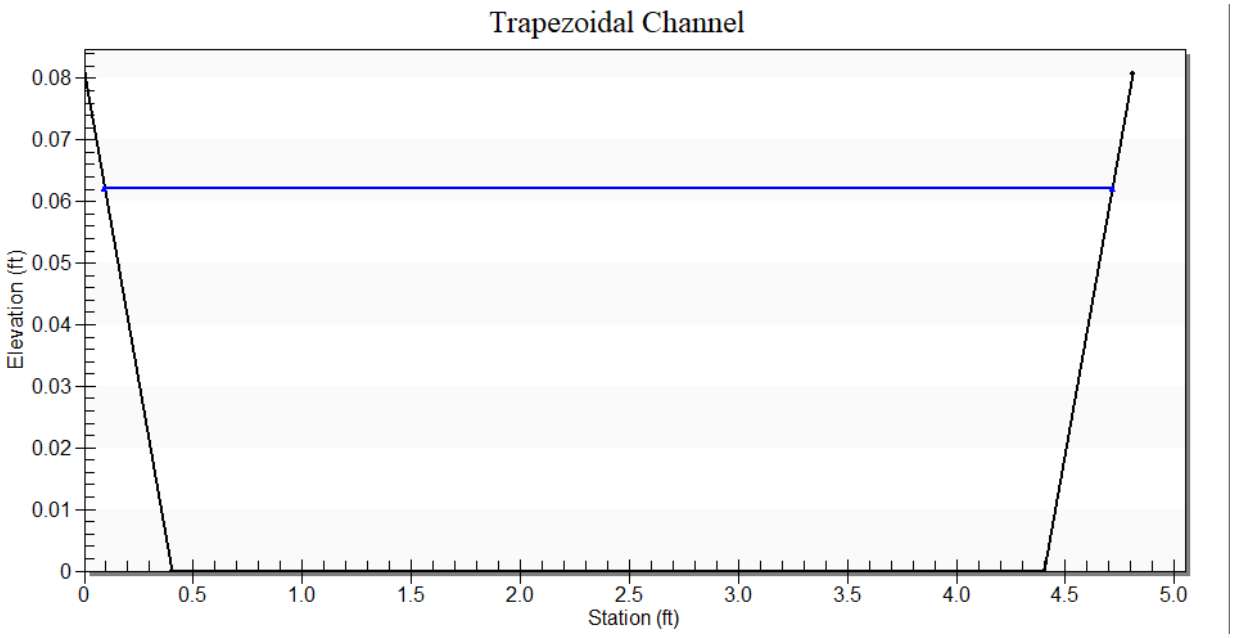
Critical Velocity: 1.6066 ft/s

Critical Slope: 0.0076 ft/ft

Critical Top Width: 4.88 ft

Calculated Max Shear Stress: 0.0969 lb/ft^2

Calculated Avg Shear Stress: 0.0902 lb/ft^2



One Scottsdale

CEC Job: 180-168

Date: Jan 20, 2020

Prepared by: RMH

checked by: TJP

Rip-Rap Analysis

$$d_{50} = 0.0191\, V_a^2 \left[\frac{\gamma_w}{\gamma_s - \gamma_w}\right]$$

equation 6.36 Maricopa County Drainage Design Manual: Hydraulics

$$= 0.191 \left(11.2\ ft/s\right)^2 \left(\frac{62.4\ lb/ft^3}{157\ lb/ft^3 - 62.4\ lb/ft^3}\right)$$

d_{50} = diameter, ft

V_a = average velocity (ft/s)

γ_s = Specific weight of stone, 157 lb/ft^3

γ_w = Specific weight of water, 62.4 lb/ft^3

$d_{50} = 1.58$ ft

$d_{50} = 18$ in

* $V_a = 11.2$ ft/s per HY8 data for 250 cfs in culvert

Table 8.6

Apron length = 6.67D for d_{50} of 18 in D = 36 in Culvert pipe

Apron length = 20.01 ft

Apron thickness = $2.067\, d_{50}$

Apron thickness = 3.27 ft use 3.3 ft

Hydraulic Analysis Report

Project Data

Project Title: 180168 One Scottsdale

Designer:

Project Date: Friday, January 15, 2021

Project Units: U.S. Customary Units

Notes:

Curb and Gutter Analysis: Inlet D3 - 16ft Opening -100 yr

Notes: 82 CFS comes from Flo-2D model.
Curb opening captures 13.90 cfs and bypasses 68.10 cfs to curb opneing D6.

(16ft curb opening reduced 25% for clogging)

Gutter Input Parameters

Longitudinal Slope of Road: 0.0219 ft/ft

Cross-Slope of Pavement: 0.0180 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Design Flow: 82.0000 cfs

Gutter Result Parameters

Width of Spread: 33.8661 ft

Gutter Depression: 0.0000 in

Area of Flow: 10.3222 ft^2

Eo (Gutter Flow to Total Flow): 0.1500

Gutter Depth at Curb: 7.3151 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 12.0000 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 13.8973 cfs

Bypass Flow: 68.1027 cfs

Efficiency: 0.1695

Curb and Gutter Analysis: Inlet D6 - 13ft Opening -100 yr

Notes: 68.10 cfs comes from bypass flow of inlet D3.
Inlet D6 captures 11.55 cfs and bypasses 56.56 cfs.
The bypass flow breaks over Scottsdale Road and travels west.

(13ft curb opening reduced 25% for clogging)

Gutter Input Parameters

Longitudinal Slope of Road: 0.0153 ft/ft

Cross-Slope of Pavement: 0.0188 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Width of Spread: 32.8788 ft

Gutter Result Parameters

Design Flow: 68.1000 cfs

Gutter Depression: 0.0000 in

Area of Flow: 10.1615 ft^2

Eo (Gutter Flow to Total Flow): 0.1543

Gutter Depth at Curb: 7.4175 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 9.7500 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 11.5446 cfs

Bypass Flow: 56.5554 cfs

Efficiency: 0.1695

Curb and Gutter Analysis: Inlet D8 - 13ft Opening -100 yr

Notes: Inlet receives 3.68 cfs from drainage area D8.
Inlet D8 captures 2.55 cfs and bypasses 1.13 cfs.

(13ft curb opening reduced 25% for clogging)

Gutter Input Parameters

Longitudinal Slope of Road: 0.0173 ft/ft

Cross-Slope of Pavement: 0.0230 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Design Flow: 3.6800 cfs

Gutter Result Parameters

Width of Spread: 9.4829 ft

Gutter Depression: 0.0000 in

Area of Flow: 1.0342 ft^2

Eo (Gutter Flow to Total Flow): 0.4687

Gutter Depth at Curb: 2.6173 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 9.7500 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 2.5541 cfs

Bypass Flow: 1.1259 cfs

Efficiency: 0.6940

Curb and Gutter Analysis: Inlet D11 - 12ft Opneing -100 yr

Notes: Inlet receives 4.91 cfs from drainage area D11 plus 1.13 cfs from inlet D8 bypass flow.
Inlet D11 captures 3.18 cfs and by passes 2.86 cfs that continues south on Scottsdale Road.

(12ft curb opening reduced 25% for clogging)

Gutter Input Parameters

Longitudinal Slope of Road: 0.0191 ft/ft

Cross-Slope of Pavement: 0.0240 ft/ft

Uniform Gutter Geometry

Manning's n: 0.0150

Gutter Width: 2.0000 ft

Design Flow: 6.0400 cfs

Gutter Result Parameters

Width of Spread: 10.9151 ft

Gutter Depression: 0.0000 in

Area of Flow: 1.4297 ft^2

Eo (Gutter Flow to Total Flow): 0.4175

Gutter Depth at Curb: 3.1435 in

Inlet Input Parameters

Inlet Location: Inlet on Grade

Inlet Type: Curb Opening

Length of Inlet: 9.0000 ft

Local Depression: 2.0000 in

Inlet Result Parameters

Intercepted Flow: 3.1780 cfs

Bypass Flow: 2.8620 cfs

Efficiency: 0.5262

Project Description

File Name	180168_Stormdrain_Analysis.SPF

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	EPA SWMM
EPA SWMM Infiltration Method	SCS Curve Number
Link Routing Method	Kinematic Wave
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Jan 19, 2021	00:00:00
End Analysis On	Jan 20, 2021	00:00:00
Start Reporting On	Jan 19, 2021	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	1	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	0
Nodes	25
Junctions	23
Outfalls	2
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	23
Channels	0
Pipes	23
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-A	Junction	1635.40	1642.03	1635.40	1642.03	0.00	32.93	1637.12	0.00	4.92	0 00:00	0.00	0.00
2	CB-B	Junction	1635.89	1643.94	1635.89	1643.94	0.00	6.87	1636.86	0.00	7.08	0 00:00	0.00	0.00
3	CB-C	Junction	1636.64	1645.50	1636.64	1645.50	0.00	21.47	1641.94	0.00	3.56	0 00:00	0.00	0.00
4	CB-D	Junction	1643.20	1649.20	1643.20	1649.20	0.00	17.87	1644.34	0.00	4.86	0 00:00	0.00	0.00
5	CB-E	Junction	1644.19	1649.00	1644.19	1649.00	0.00	7.85	1645.11	0.00	3.89	0 00:00	0.00	0.00
6	CB-F	Junction	1640.40	1648.07	1640.40	1648.07	0.00	83.97	1642.82	0.00	5.25	0 00:00	0.00	0.00
7	CB-H	Junction	1640.85	1647.66	1640.85	1647.66	0.00	83.97	1643.25	0.00	4.41	0 00:00	0.00	0.00
8	CB-I	Junction	1642.36	1649.96	1642.36	1649.96	0.00	82.89	1644.66	0.00	5.30	0 00:00	0.00	0.00
9	CB-J	Junction	1644.75	1653.10	1644.75	1653.10	0.00	82.89	1648.71	0.00	4.39	0 00:00	0.00	0.00
10	CB-P	Junction	1645.34	1651.09	1645.34	1651.09	0.00	6.88	1646.15	0.00	4.94	0 00:00	0.00	0.00
11	CB-Q	Junction	1645.68	1651.53	1645.68	1651.53	0.00	2.23	1646.18	0.00	5.35	0 00:00	0.00	0.00
12	CB-R	Junction	1646.69	1655.87	1646.69	1655.87	0.00	66.54	1649.46	0.00	6.41	0 00:00	0.00	0.00
13	CB-S	Junction	1647.06	1656.04	1647.06	1656.04	0.00	62.76	1649.68	0.00	6.36	0 00:00	0.00	0.00
14	CB-U	Junction	1647.98	1655.61	1647.98	1655.61	0.00	61.97	1650.32	0.00	5.29	0 00:00	0.00	0.00
15	CB-V	Junction	1634.93	1641.95	1634.93	1641.95	0.00	33.79	1636.59	0.00	5.36	0 00:00	0.00	0.00
16	CV-1	Junction	1634.64	1640.43	1634.64	1640.43	0.00	33.79	1636.24	0.00	4.19	0 00:00	0.00	0.00
17	CV-2	Junction	1640.64	1648.18	1640.64	1648.18	0.00	83.97	1643.06	0.00	5.12	0 00:00	0.00	0.00
18	MH-1	Junction	1634.81	1641.64	1634.81	1641.64	0.00	33.79	1636.47	0.00	5.17	0 00:00	0.00	0.00
19	MH-2	Junction	1636.79	1646.67	1636.79	1646.67	0.00	4.72	1637.55	0.00	9.11	0 00:00	0.00	0.00
20	MH-3	Junction	1650.21	1656.65	1650.21	1656.65	0.00	6.14	1651.09	0.00	5.56	0 00:00	0.00	0.00
21	MH-4	Junction	1647.24	1655.59	1647.24	1655.59	0.00	61.97	1649.83	0.00	5.76	0 00:00	0.00	0.00
22	ST-2	Junction	1636.94	1638.66	1636.94	1638.66	0.00	4.72	1637.70	0.00	0.96	0 00:00	0.00	0.00
23	ST-5	Junction	1651.37	1653.09	1651.37	1653.09	0.00	6.14	1652.16	0.00	0.94	0 00:00	0.00	0.00
24	Out-143	Outfall	1640.35					83.97	1642.67					
25	Out-163 (1)	Outfall	1634.10					33.79	1635.15					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Reported Condition
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)	
1	13	Pipe	CB-P	CB-D	304.20	1645.34	1643.30	0.6700	24.000	0.0120	6.88	20.07	0.34	5.79	0.81	0.40	0.00	Calculated
2	15	Pipe	CB-D	CB-C	174.21	1643.20	1640.80	1.3800	24.000	0.0120	17.87	28.77	0.62	9.64	1.14	0.57	0.00	Calculated
3	17	Pipe	CB-C	CB-A	207.50	1636.64	1635.60	0.5000	30.000	0.0120	21.47	31.42	0.68	6.89	1.52	0.61	0.00	Calculated
4	24	Pipe	CB-E	CB-D	89.22	1644.19	1643.30	1.0000	18.000	0.0120	7.85	11.38	0.69	6.94	0.92	0.61	0.00	Calculated
5	35	Pipe	CB-R	CB-J	185.94	1646.69	1645.95	0.4000	42.000	0.0120	66.54	68.93	0.97	8.16	2.77	0.79	0.00	Calculated
6	37	Pipe	CB-J	CB-I	204.47	1644.75	1642.46	1.1200	42.000	0.0120	82.89	115.47	0.72	13.05	2.20	0.63	0.00	Calculated
7	39	Pipe	CB-I	CB-H	144.21	1642.36	1640.95	0.9800	42.000	0.0120	82.89	107.66	0.77	12.34	2.30	0.66	0.00	Calculated
8	41	Pipe	CB-H	CV-2	11.53	1640.85	1640.74	0.9800	42.000	0.0120	83.97	107.82	0.78	12.39	2.32	0.66	0.00	Calculated
9	41 (1)	Pipe	CV-2	CB-F	13.84	1640.64	1640.50	0.9800	42.000	0.0120	83.97	107.82	0.78	12.39	2.32	0.66	0.00	Calculated
10	43	Pipe	CB-F	Out-143	5.16	1640.40	1640.35	0.9800	42.000	0.0120	83.97	107.82	0.78	12.39	2.32	0.66	0.00	Calculated
11	62	Pipe	CB-A	CB-V	74.50	1635.40	1634.93	0.6300	36.000	0.0120	32.93	57.19	0.58	8.37	1.63	0.54	0.00	Calculated
12	62 (1)	Pipe	CB-V	MH-1	19.38	1634.93	1634.81	0.6300	36.000	0.0120	33.79	57.19	0.59	8.42	1.66	0.55	0.00	Calculated
13	63	Pipe	MH-1	CV-1	25.20	1634.81	1634.64	0.7000	36.000	0.0120	33.79	60.43	0.56	8.78	1.60	0.53	0.00	Calculated
14	63 (1)	Pipe	CV-1	Out-163 (1)	16.59	1634.64	1634.10	3.2000	36.000	0.0120	33.79	129.31	0.26	15.39	1.05	0.35	0.00	Calculated
15	64	Pipe	CB-B	CB-A	77.04	1635.89	1635.40	0.6300	18.000	0.0120	6.87	9.03	0.76	5.63	0.98	0.65	0.00	Calculated
16	65	Pipe	MH-2	CB-B	138.57	1636.79	1635.89	0.6500	18.000	0.0120	4.72	9.17	0.51	5.23	0.76	0.51	0.00	Calculated
17	66	Pipe	ST-2	MH-2	22.46	1636.94	1636.79	0.6500	18.000	0.0120	4.72	9.17	0.51	5.23	0.76	0.51	0.00	Calculated
18	81	Pipe	MH-3	CB-J	245.26	1650.21	1645.95	1.7400	18.000	0.0120	6.14	15.00	0.41	8.06	0.67	0.45	0.00	Calculated
19	82	Pipe	ST-5	MH-3	106.10	1651.37	1650.31	1.0000	18.000	0.0120	6.14	11.38	0.54	6.56	0.78	0.52	0.00	Calculated
20	83	Pipe	CB-Q	CB-P	35.52	1645.68	1645.44	0.6700	18.000	0.0120	2.23	9.31	0.24	4.33	0.50	0.33	0.00	Calculated
21	84	Pipe	CB-S	CB-R	92.71	1647.06	1646.69	0.4000	42.000	0.0120	62.76	68.93	0.91	8.11	2.62	0.75	0.00	Calculated
22	84 (1)	Pipe	MH-4	CB-S	44.15	1647.24	1647.06	0.4000	42.000	0.0120	61.97	68.93	0.90	8.10	2.60	0.74	0.00	Calculated
23	86	Pipe	CB-U	MH-4	123.90	1647.98	1647.34	0.5200	42.000	0.0120	61.97	78.65	0.79	9.06	2.34	0.67	0.00	Calculated

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	CB-A	1635.40	1642.03	6.63	1635.40	0.00	1642.03	0.00	0.00	43.62
2	CB-B	1635.89	1643.94	8.06	1635.89	0.00	1643.94	0.00	0.00	78.65
3	CB-C	1636.64	1645.50	8.86	1636.64	0.00	1645.50	0.00	0.00	32.40
4	CB-D	1643.20	1649.20	6.00	1643.20	0.00	1649.20	0.00	0.00	46.80
5	CB-E	1644.19	1649.00	4.81	1644.19	0.00	1649.00	0.00	0.00	39.70
6	CB-F	1640.40	1648.07	7.67	1640.40	0.00	1648.07	0.00	0.00	48.84
7	CB-H	1640.85	1647.66	6.82	1640.85	0.00	1647.66	0.00	0.00	38.59
8	CB-I	1642.36	1649.96	7.60	1642.36	0.00	1649.96	0.00	0.00	48.00
9	CB-J	1644.75	1653.10	8.35	1644.75	0.00	1653.10	0.00	0.00	43.86
10	CB-P	1645.34	1651.09	5.75	1645.34	0.00	1651.09	0.00	0.00	44.99
11	CB-Q	1645.68	1651.53	5.85	1645.68	0.00	1651.53	0.00	0.00	52.19
12	CB-R	1646.69	1655.87	9.18	1646.69	0.00	1655.87	0.00	0.00	68.14
13	CB-S	1647.06	1656.04	8.98	1647.06	0.00	1656.04	0.00	0.00	65.76
14	CB-U	1647.98	1655.61	7.63	1647.98	0.00	1655.61	0.00	0.00	49.57
15	CB-V	1634.93	1641.95	7.02	1634.93	0.00	1641.95	0.00	0.00	48.18
16	CV-1	1634.64	1640.43	5.79	1634.64	0.00	1640.43	0.00	0.00	33.49
17	CV-2	1640.64	1648.18	7.54	1640.64	0.00	1648.18	0.00	0.00	47.32
18	MH-1	1634.81	1641.64	6.83	1634.81	0.00	1641.64	0.00	0.00	45.99
19	MH-2	1636.79	1646.67	9.88	1636.79	0.00	1646.67	0.00	0.00	100.50
20	MH-3	1650.21	1656.65	6.44	1650.21	0.00	1656.65	0.00	0.00	58.14
21	MH-4	1647.24	1655.59	8.36	1647.24	0.00	1655.59	0.00	0.00	57.10
22	ST-2	1636.94	1638.66	1.72	1636.94	0.00	1638.66	0.00	0.00	2.66
23	ST-5	1651.37	1653.09	1.72	1651.37	0.00	1653.09	0.00	0.00	2.66

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	CB-A	32.93	4.59	1637.12	1.72	0.00	4.92	1637.12	1.72	0 00:13	0 00:00	0.00	0.00
2	CB-B	6.87	2.15	1636.86	0.97	0.00	7.08	1636.86	0.97	0 00:07	0 00:00	0.00	0.00
3	CB-C	21.47	3.60	1641.94	5.30	0.00	3.56	1641.94	5.30	0 00:12	0 00:00	0.00	0.00
4	CB-D	17.87	3.14	1644.34	1.14	0.00	4.86	1644.34	1.14	0 00:12	0 00:00	0.00	0.00
5	CB-E	7.85	7.85	1645.11	0.92	0.00	3.89	1645.11	0.92	0 00:00	0 00:00	0.00	0.00
6	CB-F	83.97	0.00	1642.82	2.42	0.00	5.25	1642.82	2.42	0 00:08	0 00:00	0.00	0.00
7	CB-H	83.97	1.08	1643.25	2.40	0.00	4.41	1643.25	2.40	0 00:08	0 00:00	0.00	0.00
8	CB-I	82.89	0.00	1644.66	2.30	0.00	5.30	1644.66	2.30	0 00:08	0 00:00	0.00	0.00
9	CB-J	82.89	10.21	1648.71	3.96	0.00	4.39	1648.71	3.96	0 00:07	0 00:00	0.00	0.00
10	CB-P	6.88	4.65	1646.15	0.81	0.00	4.94	1646.15	0.81	0 00:02	0 00:00	0.00	0.00
11	CB-Q	2.23	2.23	1646.18	0.50	0.00	5.35	1646.18	0.50	0 00:00	0 00:00	0.00	0.00
12	CB-R	66.54	3.78	1649.46	2.77	0.00	6.41	1649.46	2.77	0 00:04	0 00:00	0.00	0.00
13	CB-S	62.76	0.79	1649.68	2.62	0.00	6.36	1649.68	2.62	0 00:03	0 00:00	0.00	0.00
14	CB-U	61.97	61.97	1650.32	2.34	0.00	5.29	1650.32	2.34	0 00:00	0 00:00	0.00	0.00
15	CB-V	33.79	0.86	1636.59	1.66	0.00	5.36	1636.59	1.66	0 00:13	0 00:00	0.00	0.00
16	CV-1	33.79	0.00	1636.24	1.60	0.00	4.19	1636.24	1.60	0 00:13	0 00:00	0.00	0.00
17	CV-2	83.97	0.00	1643.06	2.42	0.00	5.12	1643.06	2.42	0 00:08	0 00:00	0.00	0.00
18	MH-1	33.79	0.00	1636.47	1.66	0.00	5.17	1636.47	1.66	0 00:13	0 00:00	0.00	0.00
19	MH-2	4.72	0.00	1637.55	0.76	0.00	9.11	1637.55	0.76	0 00:01	0 00:00	0.00	0.00
20	MH-3	6.14	0.00	1651.09	0.88	0.00	5.56	1651.09	0.88	0 00:04	0 00:00	0.00	0.00
21	MH-4	61.97	0.00	1649.83	2.59	0.00	5.76	1649.83	2.59	0 00:03	0 00:00	0.00	0.00
22	ST-2	4.72	4.72	1637.70	0.76	0.00	0.96	1637.70	0.76	0 00:00	0 00:00	0.00	0.00
23	ST-5	6.14	6.14	1652.16	0.79	0.00	0.94	1652.16	0.79	0 00:00	0 00:00	0.00	0.00

Pipe Input

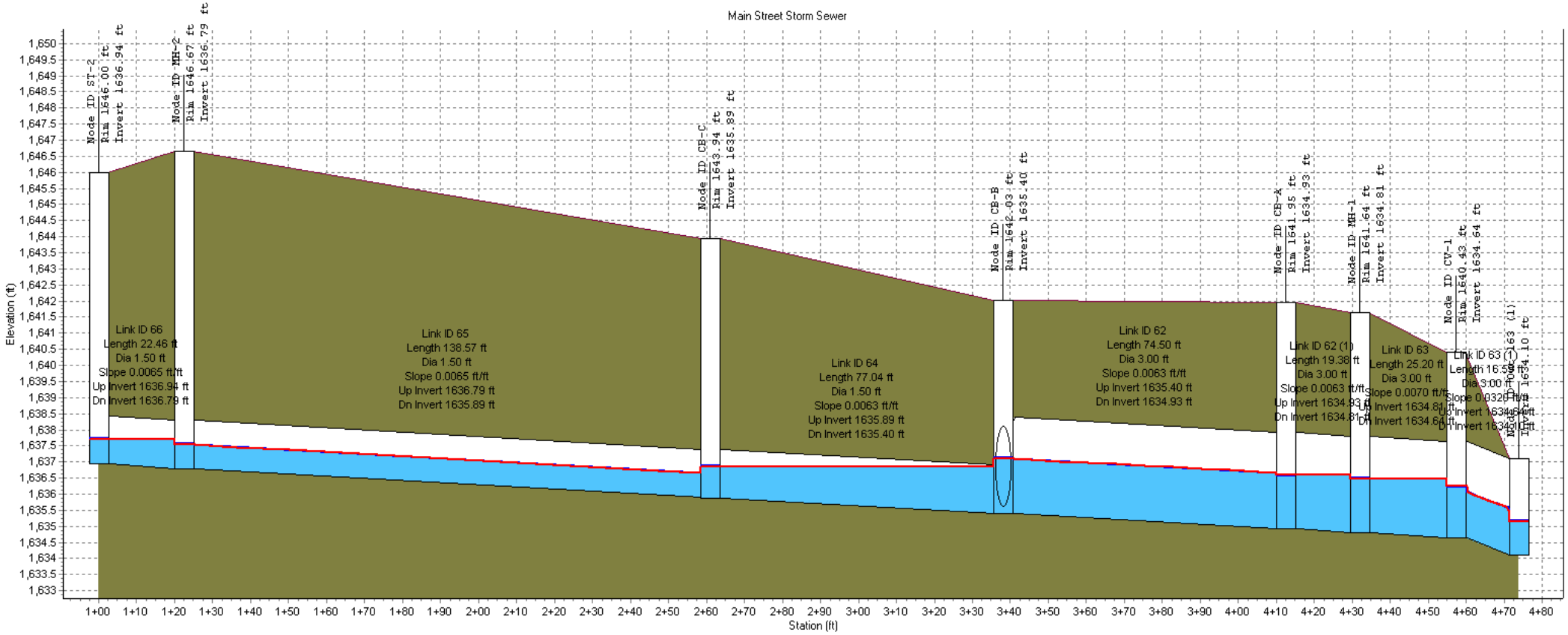
SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	13	304.20	1645.34	0.00	1643.30	0.10	2.04	0.6700	CIRCULAR	24.000	24.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
2	15	174.21	1643.20	0.00	1640.80	4.16	2.40	1.3800	CIRCULAR	24.000	24.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
3	17	207.50	1636.64	0.00	1635.60	0.20	1.04	0.5000	CIRCULAR	30.000	30.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
4	24	89.22	1644.19	0.00	1643.30	0.10	0.89	1.0000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
5	35	185.94	1646.69	0.00	1645.95	1.20	0.74	0.4000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
6	37	204.47	1644.75	0.00	1642.46	0.10	2.30	1.1200	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
7	39	144.21	1642.36	0.00	1640.95	0.10	1.41	0.9800	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
8	41	11.53	1640.85	0.00	1640.74	0.10	0.11	0.9800	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
9	41 (1)	13.84	1640.64	0.00	1640.50	0.10	0.14	0.9800	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
10	43	5.16	1640.40	0.00	1640.35	0.00	0.05	0.9800	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
11	62	74.50	1635.40	0.00	1634.93	0.00	0.47	0.6300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
12	62 (1)	19.38	1634.93	0.00	1634.81	0.00	0.12	0.6300	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
13	63	25.20	1634.81	0.00	1634.64	0.00	0.18	0.7000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
14	63 (1)	16.59	1634.64	0.00	1634.10	0.00	0.53	3.2000	CIRCULAR	36.000	36.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
15	64	77.04	1635.89	0.00	1635.40	0.00	0.49	0.6300	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
16	65	138.57	1636.79	0.00	1635.89	0.00	0.90	0.6500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
17	66	22.46	1636.94	0.00	1636.79	0.00	0.15	0.6500	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
18	81	245.26	1650.21	0.00	1645.95	1.20	4.26	1.7400	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
19	82	106.10	1651.37	0.00	1650.31	0.10	1.06	1.0000	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
20	83	35.52	1645.68	0.00	1645.44	0.10	0.24	0.6700	CIRCULAR	18.000	18.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
21	84	92.71	1647.06	0.00	1646.69	0.00	0.37	0.4000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
22	84 (1)	44.15	1647.24	0.00	1647.06	0.00	0.18	0.4000	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1
23	86	123.90	1647.98	0.00	1647.34	0.10	0.65	0.5200	CIRCULAR	42.000	42.000	0.0120	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	13	6.88	0 00:12	20.07	0.34	5.79	0.88	0.81	0.40	0.00		Calculated
2	15	17.87	0 00:12	28.77	0.62	9.64	0.30	1.14	0.57	0.00		Calculated
3	17	21.47	0 00:13	31.42	0.68	6.89	0.50	1.52	0.61	0.00		Calculated
4	24	7.85	0 00:03	11.38	0.69	6.94	0.21	0.92	0.61	0.00		Calculated
5	35	66.54	0 00:07	68.93	0.97	8.16	0.38	2.77	0.79	0.00		Calculated
6	37	82.89	0 00:08	115.47	0.72	13.05	0.26	2.20	0.63	0.00		Calculated
7	39	82.89	0 00:08	107.66	0.77	12.34	0.19	2.30	0.66	0.00		Calculated
8	41	83.97	0 00:08	107.82	0.78	12.39	0.02	2.32	0.66	0.00		Calculated
9	41 (1)	83.97	0 00:08	107.82	0.78	12.39	0.02	2.32	0.66	0.00		Calculated
10	43	83.97	0 00:08	107.82	0.78	12.39	0.01	2.32	0.66	0.00		Calculated
11	62	32.93	0 00:13	57.19	0.58	8.37	0.15	1.63	0.54	0.00		Calculated
12	62 (1)	33.79	0 00:13	57.19	0.59	8.42	0.04	1.66	0.55	0.00		Calculated
13	63	33.79	0 00:13	60.43	0.56	8.78	0.05	1.60	0.53	0.00		Calculated
14	63 (1)	33.79	0 00:13	129.31	0.26	15.39	0.02	1.05	0.35	0.00		Calculated
15	64	6.87	0 00:07	9.03	0.76	5.63	0.23	0.98	0.65	0.00		Calculated
16	65	4.72	0 00:07	9.17	0.51	5.23	0.44	0.76	0.51	0.00		Calculated
17	66	4.72	0 00:01	9.17	0.51	5.23	0.07	0.76	0.51	0.00		Calculated
18	81	6.14	0 00:08	15.00	0.41	8.06	0.51	0.67	0.45	0.00		Calculated
19	82	6.14	0 00:04	11.38	0.54	6.56	0.27	0.78	0.52	0.00		Calculated
20	83	2.23	0 00:02	9.31	0.24	4.33	0.14	0.50	0.33	0.00		Calculated
21	84	62.76	0 00:04	68.93	0.91	8.11	0.19	2.62	0.75	0.00		Calculated
22	84 (1)	61.97	0 00:04	68.93	0.90	8.10	0.09	2.60	0.74	0.00		Calculated
23	86	61.97	0 00:03	78.65	0.79	9.06	0.23	2.34	0.67	0.00		Calculated

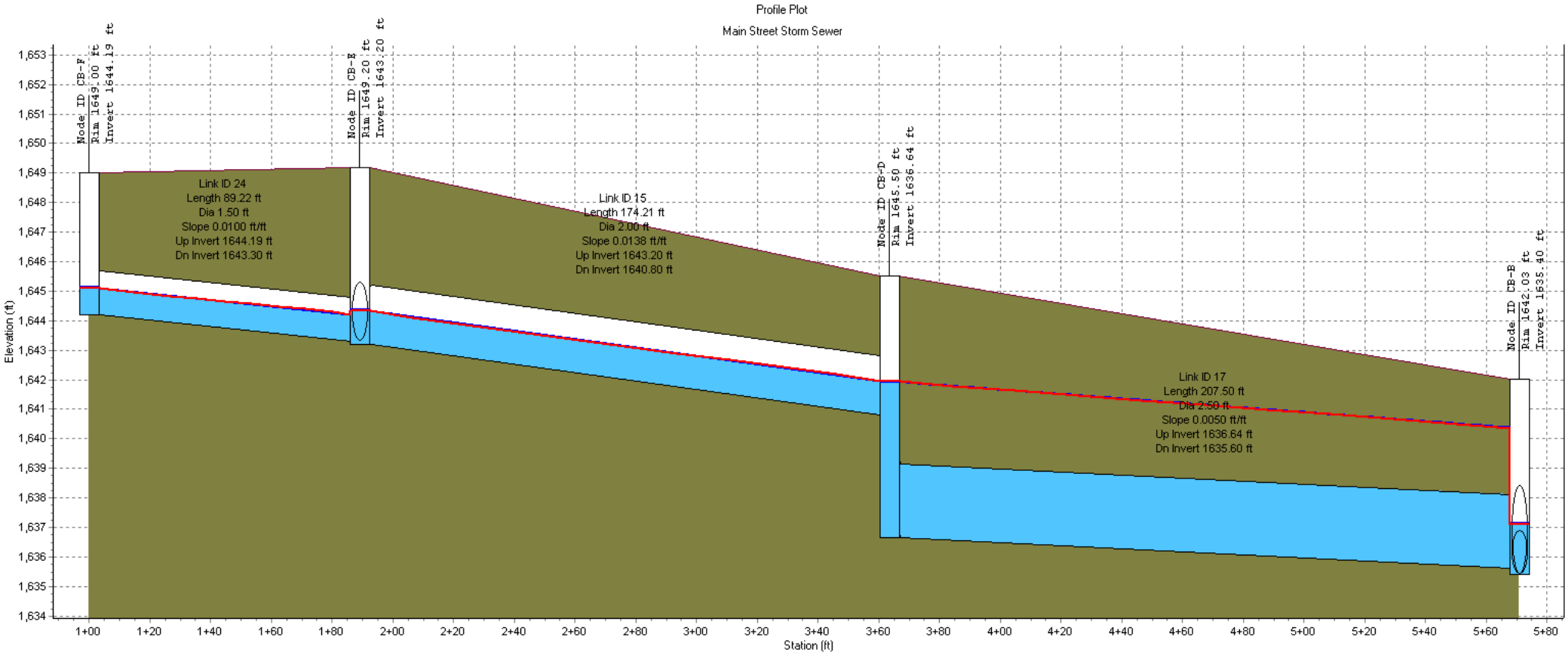
Profile Plot

Main Street Storm Sewer



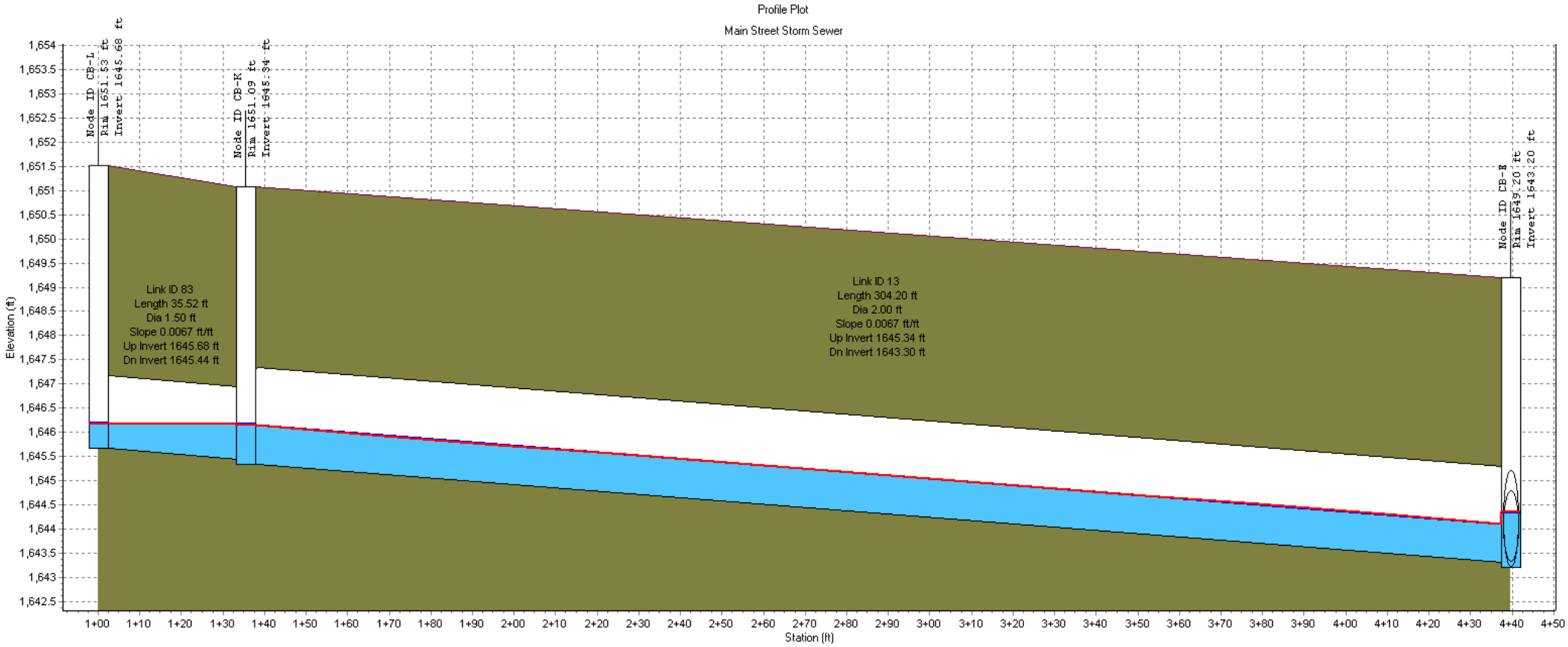
Node ID:	ST-2	MH-2	CB-C	CB-B	CB-A	MH-1	CV-1	Out-163 (1)
Rim (ft):	1646.00	1646.67	1643.94	1642.03	1641.95	1641.64	1640.43	
Invert (ft):	1636.94	1636.79	1635.89	1635.40	1634.93	1634.81	1634.64	1634.10
Min Pipe Cover (ft):	7.56	8.38	6.55	3.63	4.02	3.83	2.79	
Max HGL (ft):	1637.70	1637.55	1636.86	1637.12	1636.59	1636.47	1636.24	1635.15

Link ID:	66	65	64	62	62 (1)	63	63 (1)
Length (ft):	22.46	138.57	77.04	74.50	19.38	25.20	16.59
Dia (ft):	1.50	1.50	1.50	3.00	3.00	3.00	3.00
Slope (ft/ft):	0.0065	0.0065	0.0063	0.0063	0.0063	0.0070	0.0320
Up Invert (ft):	1636.94	1636.79	1635.89	1635.40	1634.93	1634.81	1634.64
Dn Invert (ft):	1636.79	1635.89	1635.40	1634.93	1634.81	1634.64	1634.10
Max Q (cfs):	4.72	4.72	6.87	32.93	33.79	33.79	33.79
Max Vel (ft/s):	5.23	5.23	5.63	8.37	8.42	8.78	15.39
Max Depth (ft):	0.76	0.76	0.98	1.63	1.66	1.60	1.05



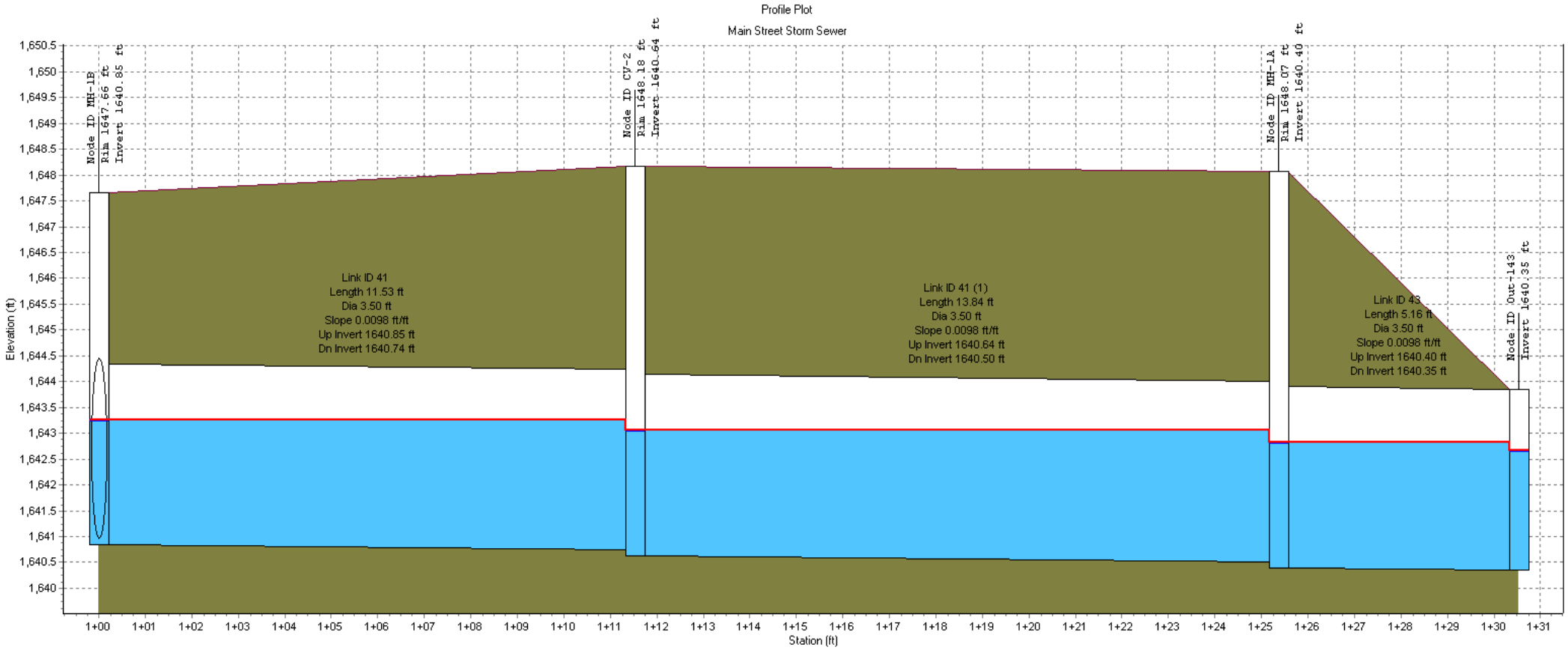
Node ID:	CB-F	CB-E	CB-D	CB-B
Rim (ft):	1649.00	1649.20	1645.50	1642.03
Invert (ft):	1644.19	1643.20	1636.64	1635.40
Min Pipe Cover (ft):	3.31	3.90	2.70	3.63
Max HGL (ft):	1645.11	1644.34	1641.94	1637.12

Link ID:	24	15	17
Length (ft):	89.22	174.21	207.50
Dia (ft):	1.50	2.00	2.50
Slope (ft/ft):	0.0100	0.0138	0.0050
Up Invert (ft):	1644.19	1643.20	1636.64
Dn Invert (ft):	1643.30	1640.80	1635.60
Max Q (cfs):	7.85	17.87	21.47
Max Vel (ft/s):	6.94	9.64	6.89
Max Depth (ft):	0.92	1.14	1.52



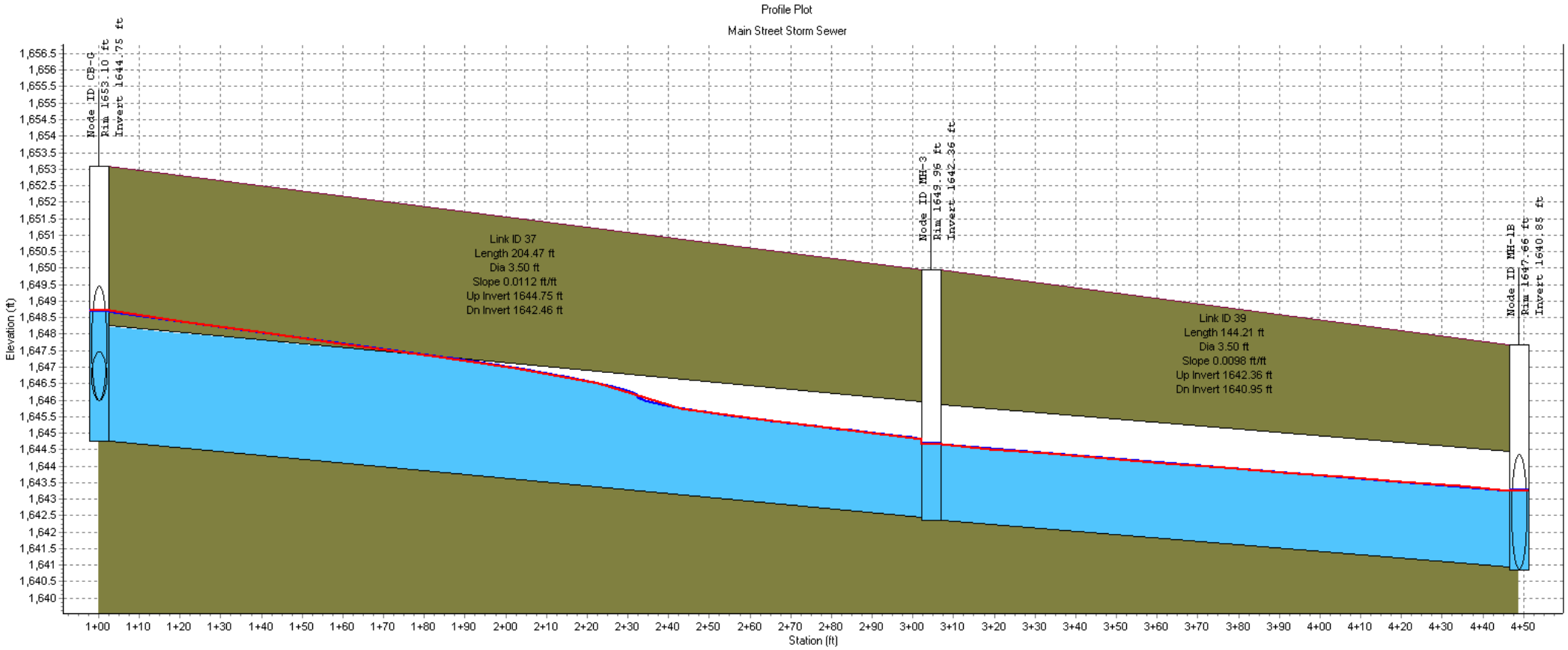
Node ID:	CB-L	CB-K	CB-E
Rim (ft):	1651.53	1651.09	1649.20
Invert (ft):	1645.68	1645.34	1643.20
Min Pipe Cover (ft):	4.35	3.75	3.90
Max HGL (ft):	1646.18	1646.15	1644.34

Link ID:	83	13
Length (ft):	35.52	304.20
Dia (ft):	1.50	2.00
Slope (ft/ft):	0.0067	0.0067
Up Invert (ft):	1645.68	1645.34
Dn Invert (ft):	1645.44	1643.30
Max Q (cfs):	2.23	6.88
Max Vel (ft/s):	4.33	5.79
Max Depth (ft):	0.50	0.81



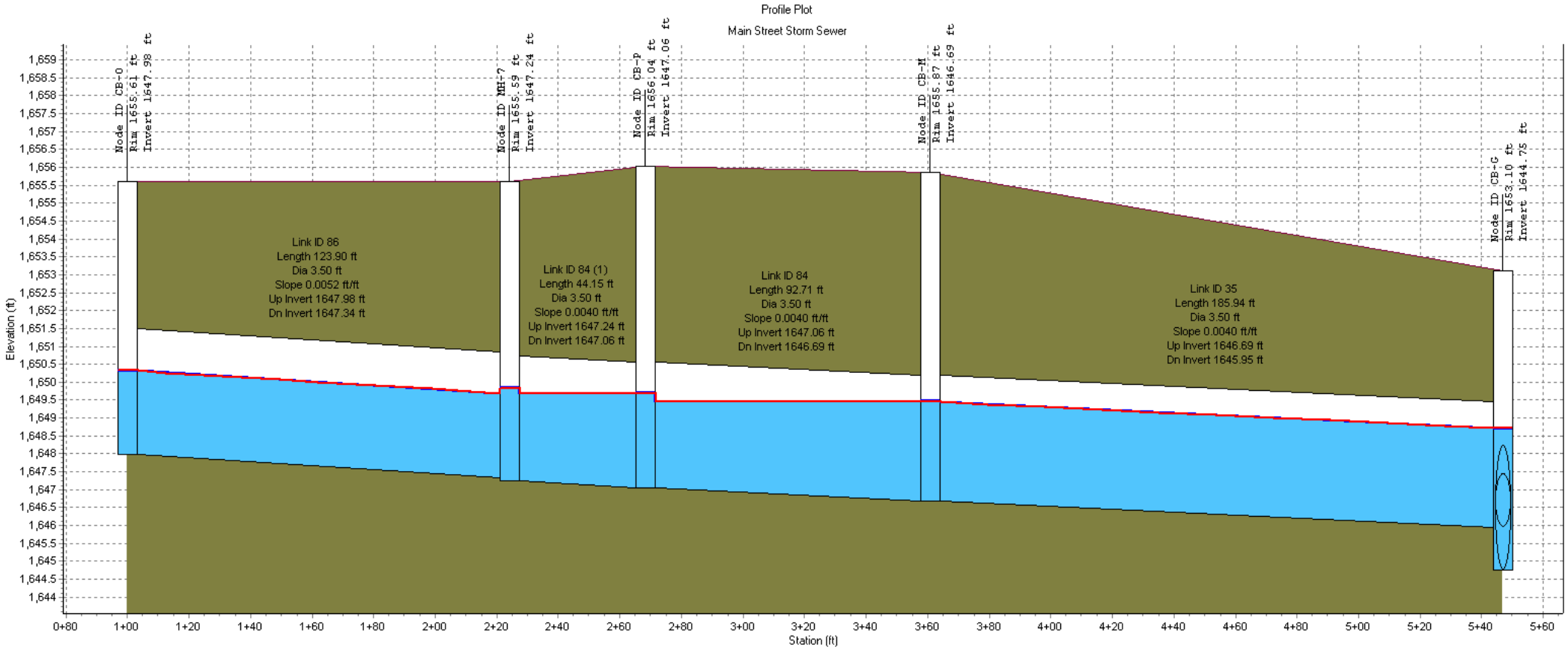
Node ID:	MH-1B	CV-2	MH-1A	Out-143
Rim (ft):	1647.66	1648.18	1648.07	
Invert (ft):	1640.85	1640.64	1640.40	1640.35
Min Pipe Cover (ft):	3.22	3.94	4.07	
Max HGL (ft):	1643.25	1643.06	1642.82	1642.67

Link ID:	41	41 (1)	43
Length (ft):	11.53	13.84	5.16
Dia (ft):	3.50	3.50	3.50
Slope (ft/ft):	0.0098	0.0098	0.0098
Up Invert (ft):	1640.85	1640.64	1640.40
Dn Invert (ft):	1640.74	1640.50	1640.35
Max Q (cfs):	83.97	83.97	83.97
Max Vel (ft/s):	12.39	12.39	12.39
Max Depth (ft):	2.32	2.32	2.32



Node ID:	CB-G	MH-3	MH-1B
Rim (ft):	1653.10	1649.96	1647.66
Invert (ft):	1644.75	1642.36	1640.85
Min Pipe Cover (ft):	3.65	4.00	3.22
Max HGL (ft):	1648.71	1644.66	1643.25

Link ID:	37	39
Length (ft):	204.47	144.21
Dia (ft):	3.50	3.50
Slope (ft/ft):	0.0112	0.0098
Up Invert (ft):	1644.75	1642.36
Dn Invert (ft):	1642.46	1640.95
Max Q (cfs):	82.89	82.89
Max Vel (ft/s):	13.05	12.34
Max Depth (ft):	2.20	2.30

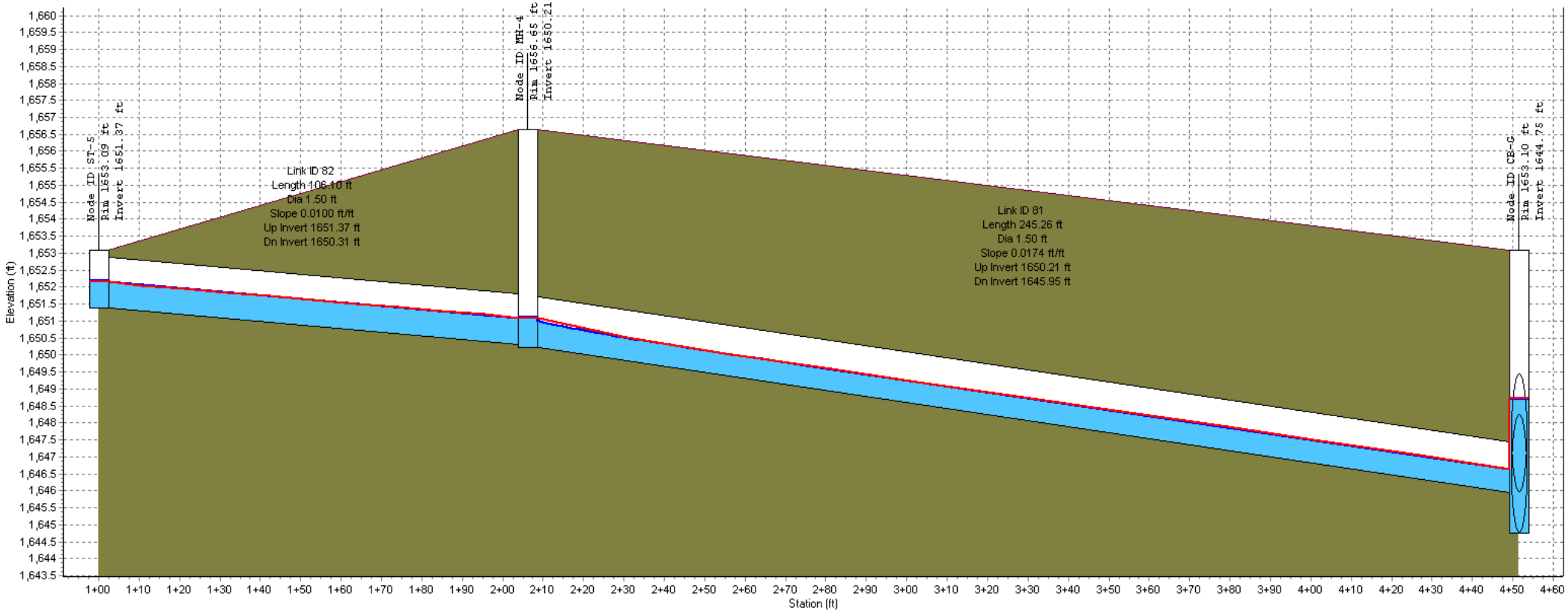


Node ID:	CB-O	MH-7	CB-P	CB-M	CB-G
Rim (ft):	1655.61	1655.59	1656.04	1655.87	1653.10
Invert (ft):	1647.98	1647.24	1647.06	1646.69	1644.75
Min Pipe Cover (ft):	4.13	4.76	5.48	5.68	3.65
Max HGL (ft):	1650.32	1649.83	1649.68	1649.46	1648.71

Link ID:	86	84 (1)	84	35
Length (ft):	123.90	44.15	92.71	185.94
Dia (ft):	3.50	3.50	3.50	3.50
Slope (ft/ft):	0.0052	0.0040	0.0040	0.0040
Up Invert (ft):	1647.98	1647.24	1647.06	1646.69
Dn Invert (ft):	1647.34	1647.06	1646.69	1645.95
Max Q (cfs):	61.97	61.97	62.76	66.54
Max Vel (ft/s):	9.06	8.10	8.11	8.16
Max Depth (ft):	2.34	2.60	2.62	2.77

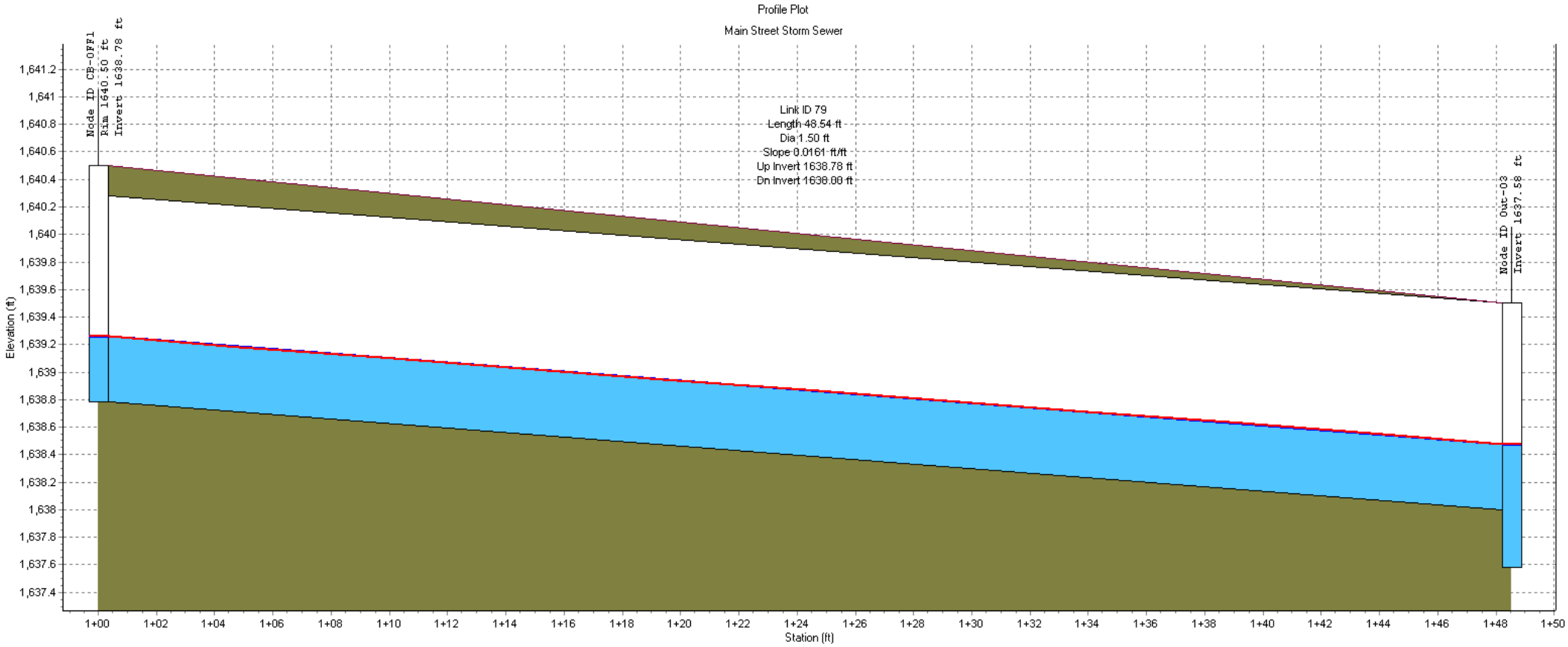
Profile Plot

Main Street Storm Sewer



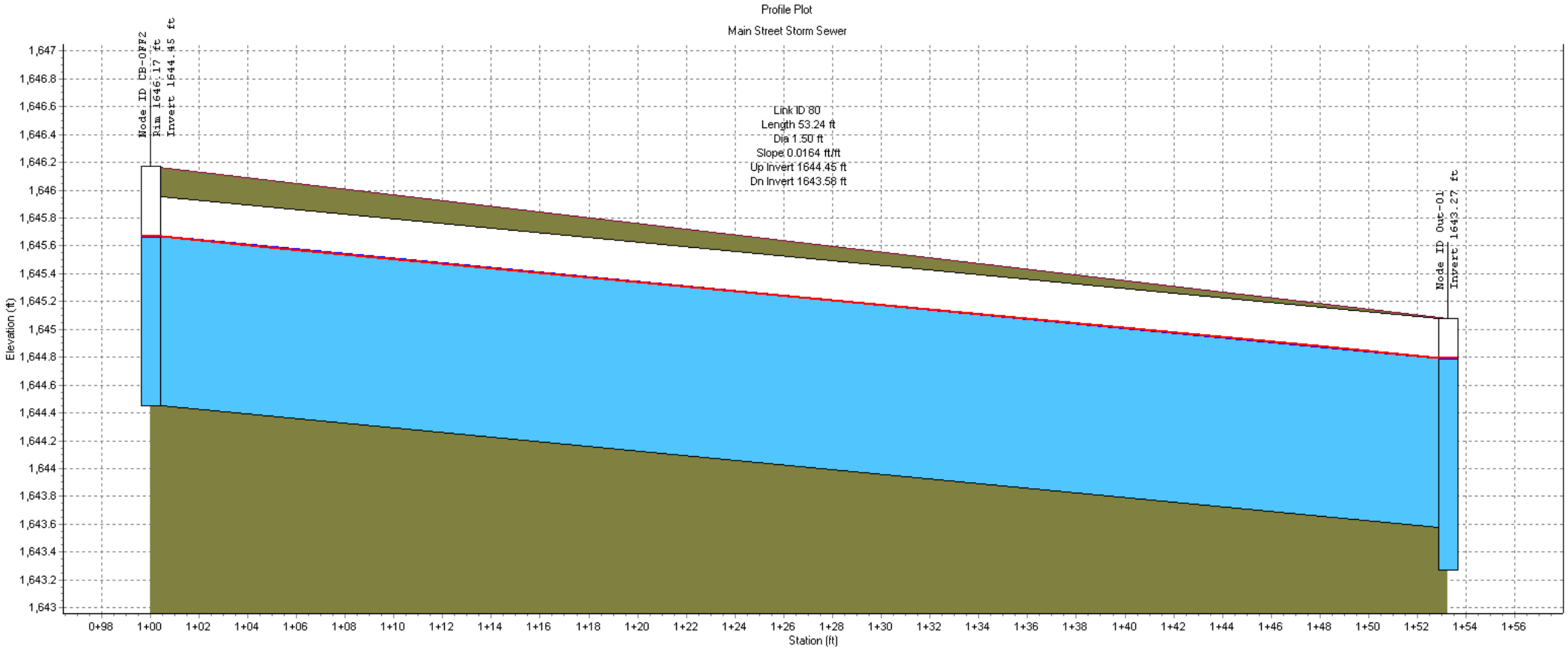
Node ID:	ST-5	MH-4	CB-G
Rim (ft):	1653.09	1656.65	1653.10
Invert (ft):	1651.37	1650.21	1644.75
Min Pipe Cover (ft):	0.22	4.84	3.65
Max HGL (ft):	1652.16	1651.09	1648.71

Link ID:	82	81
Length (ft):	106.10	245.26
Dia (ft):	1.50	1.50
Slope (ft/ft):	0.0100	0.0174
Up Invert (ft):	1651.37	1650.21
Dn Invert (ft):	1650.31	1645.95
Max Q (cfs):	6.14	6.14
Max Vel (ft/s):	6.56	8.06
Max Depth (ft):	0.78	0.67



Node ID:	CB-OFF1		Out-03
Rim (ft):	1640.50		
Invert (ft):	1638.78		1637.58
Min Pipe Cover (ft):	0.22		
Max HGL (ft):	1639.26		1638.48

Link ID:	79
Length (ft):	48.54
Dia (ft):	1.50
Slope (ft/ft):	0.0161
Up Invert (ft):	1638.78
Dn Invert (ft):	1638.00
Max Q (cfs):	2.55
Max Vel (ft/s):	5.25
Max Depth (ft):	0.48



Node ID:	CB-OFF2		Out-01
Rim (ft):	1646.17		
Invert (ft):	1644.45		1643.27
Min Pipe Cover (ft):	0.22		
Max HGL (ft):	1645.67		1644.80
Link ID:		80	
Length (ft):		53.24	
Dia (ft):		1.50	
Slope (ft/ft):		0.0164	
Up Invert (ft):		1644.45	
Dn Invert (ft):		1643.58	
Max Q (cfs):		11.54	
Max Vel (ft/s):		7.52	
Max Depth (ft):		1.22	

APPENDIX E – FIMA FIRM MAP AND STRUCTURE EXHIBIT

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METE

ONE SCOTTSDALE

PANEL 1320L

NFIP NATIONAL FLOOD INSURANCE PROGRAM

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.

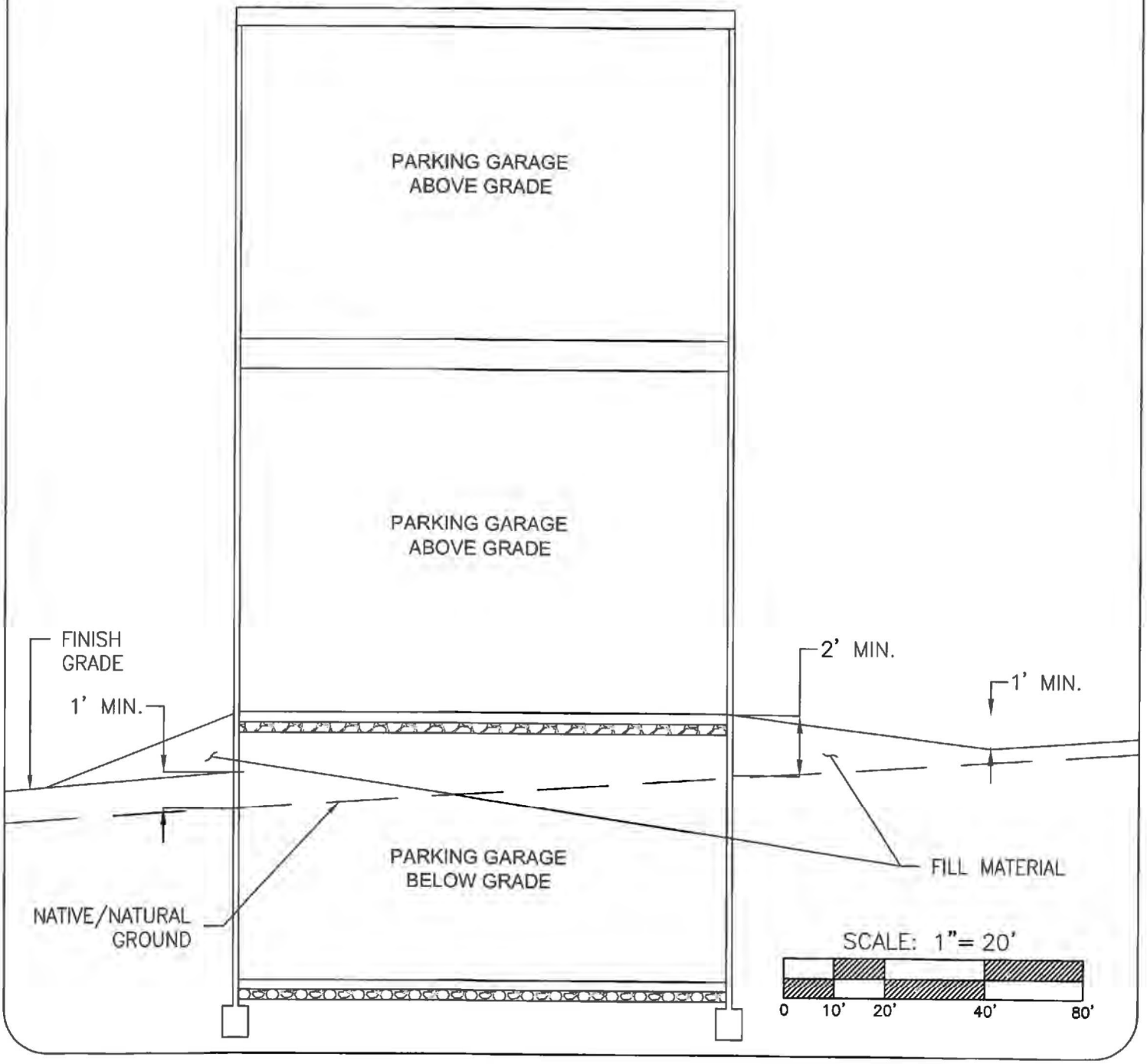
MAP NUMBER
04013C1320L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

REGULATORY FLOODPLAIN NOTE:

ALL BUILDINGS WILL BE STRUCTURALLY INDEPENDENT AND WILL BE FLOODPROOFED TO 2 FEET ABOVE THE HIGHEST ADJACENT NAUTRAL GRADE WITHIN THE REGULATORY FLOODPLAIN – ZONE AO, DEPTH=1 FOOT.



PRELIMINARY
NOT FOR CONSTRUCTION
OR RECORDING

ONE
SCOTTSDALE

FEMA STRUCTURE
EXHIBIT

EME

Erickson & Meeks
Engineering, L.L.C.

APPENDIX F – HY8 REPORTS

Thompson Peak Parkway

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow
Minimum Flow: 0 cfs
Design Flow: 170 cfs
Maximum Flow: 170 cfs

Table 1 - Summary of Culvert Flows at Crossing: Thompson Peak

Headwater Elevatio	Total Discharge (c	3-36 Discharge (c	Roadway Dischar (cfs)	Iterations
60.00	0.00	0.00	0.00	1
61.02	17.00	17.00	0.00	1
61.47	34.00	34.00	0.00	1
61.90	51.00	51.00	0.00	1
62.26	68.00	68.00	0.00	1
62.60	85.00	85.00	0.00	1
62.93	102.00	102.00	0.00	1
63.41	119.00	119.00	0.00	1
63.70	136.00	136.00	0.00	1
64.15	153.00	153.00	0.00	1
64.75	170.00	161.68	8.27	7
64.20	154.03	154.03	0.00	Overtopping

Rating Curve Plot for Crossing: Thompson Peak

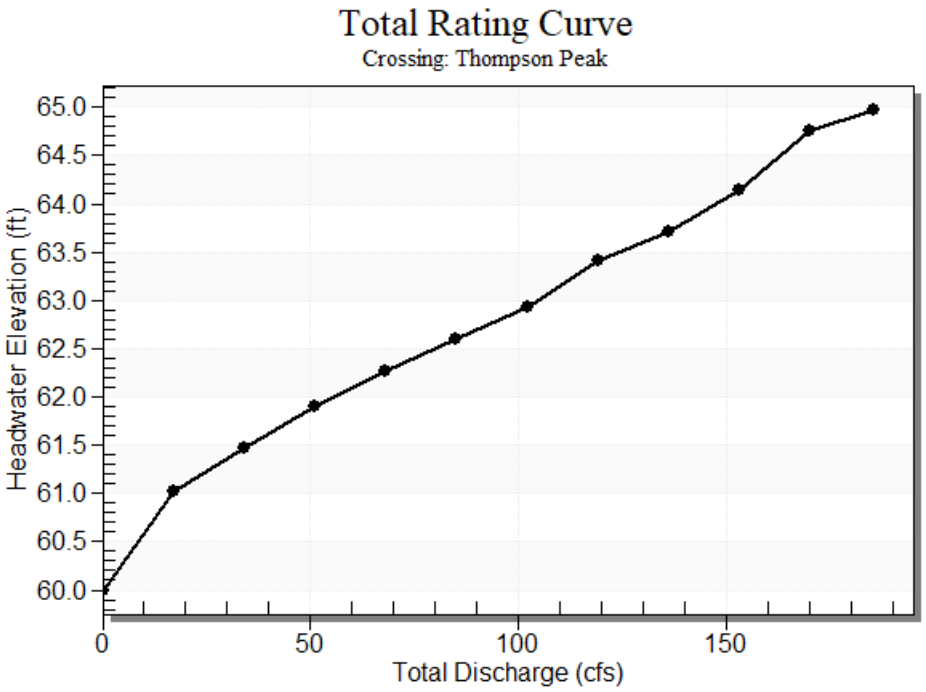


Table 2 - Culvert Summary Table: 3-36

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	60.00	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
17.00	17.00	61.02	1.018	0.0*	1-S2n	0.697	0.744	0.697	0.333	4.388	2.394
34.00	34.00	61.47	1.472	0.0*	1-S2n	0.994	1.062	0.994	0.501	5.344	3.084
51.00	51.00	61.90	1.896	0.0*	1-S2n	1.238	1.317	1.238	0.635	5.968	3.563
68.00	68.00	62.26	2.262	0.267	1-S2n	1.459	1.531	1.459	0.751	6.428	3.939
85.00	85.00	62.60	2.598	0.868	1-S2n	1.671	1.719	1.671	0.854	6.784	4.252
102.00	102.00	62.93	2.928	1.546	1-S2n	1.885	1.890	1.885	0.948	7.053	4.522
119.00	119.00	63.41	3.274	3.408	7-M2	2.113	2.048	2.048	1.035	7.714	4.760
136.00	136.00	63.70	3.652	3.704	7-M2	2.388	2.191	2.191	1.117	8.197	4.975
153.00	153.00	64.15	4.072	4.148	7-M2	3.000	2.320	2.320	1.194	8.693	5.170
170.00	161.68	64.75	4.306	4.752	7-M2	3.000	2.382	2.382	1.268	8.956	5.349

* Full Flow Headwater elevation is below inlet invert.

****

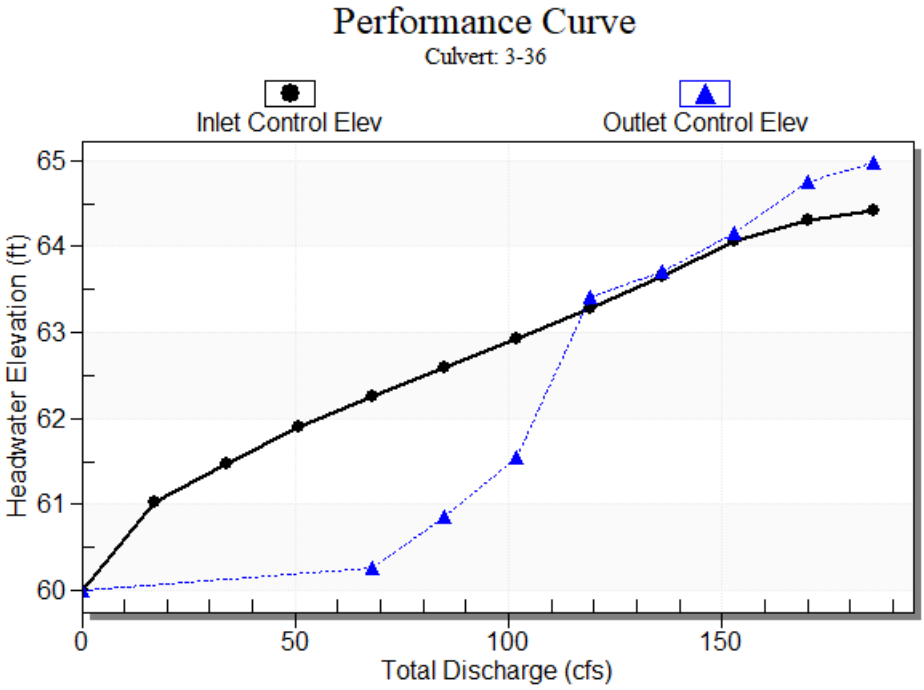
Straight Culvert

Inlet Elevation (invert): 60.00 ft, Outlet Elevation (invert): 58.00 ft

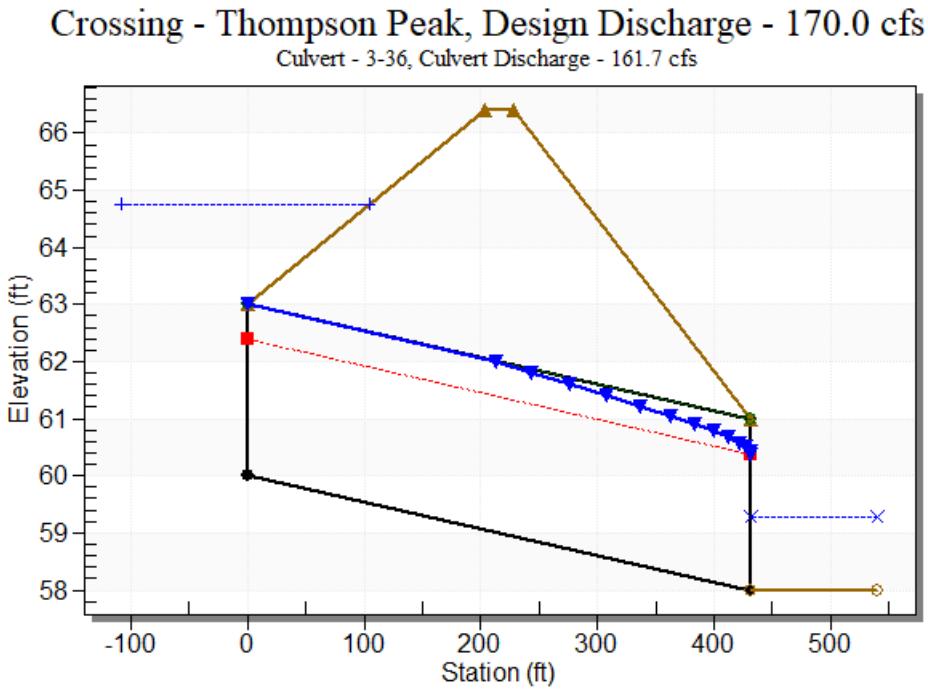
Culvert Length: 432.00 ft, Culvert Slope: 0.0046

****

Culvert Performance Curve Plot: 3-36



Water Surface Profile Plot for Culvert: 3-36



Site Data - 3-36

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 60.00 ft
Outlet Station: 432.00 ft
Outlet Elevation: 58.00 ft
Number of Barrels: 3

Culvert Data Summary - 3-36

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Smooth HDPE
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Thompson Peak)

Flow (cfs)	Water Surfac Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	58.00	0.00	0.00	0.00	0.00
17.00	58.33	0.33	2.39	0.31	0.75
34.00	58.50	0.50	3.08	0.47	0.80
51.00	58.63	0.63	3.56	0.59	0.83
68.00	58.75	0.75	3.94	0.70	0.85
85.00	58.85	0.85	4.25	0.80	0.87
102.00	58.95	0.95	4.52	0.89	0.88
119.00	59.04	1.04	4.76	0.97	0.89
136.00	59.12	1.12	4.97	1.05	0.90
153.00	59.19	1.19	5.17	1.12	0.91
170.00	59.27	1.27	5.35	1.19	0.92

Tailwater Channel Data - Thompson Peak

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 20.00 ft
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0150
Channel Manning's n: 0.0350
Channel Invert Elevation: 58.00 ft

Roadway Data for Crossing: Thompson Peak

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Roadway Surface: Paved
Roadway Top Width: 24.00 ft

Scottsdale Road North Section B

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow
Minimum Flow: 50 cfs
Design Flow: 356 cfs
Maximum Flow: 356 cfs

Table 1 - Summary of Culvert Flows at Crossing: Scottsdale Road North Redu

Headwater Elevatio	Total Discharge (c	4-36 North 356 cfs Discharge (cfs)	Roadway Dischar (cfs)	Iterations
51.05	50.00	50.00	0.00	1
51.59	80.60	80.60	0.00	1
52.05	111.20	111.20	0.00	1
52.50	141.80	141.80	0.00	1
52.98	172.40	172.40	0.00	1
53.54	203.00	203.00	0.00	1
54.18	233.60	233.60	0.00	1
54.93	264.20	264.20	0.00	1
55.47	294.80	283.85	10.78	10
55.64	325.40	290.06	35.13	8
55.77	356.00	294.42	61.25	6
55.10	270.60	270.60	0.00	Overtopping

Rating Curve Plot for Crossing: Scottsdale Road North Reduced Flow

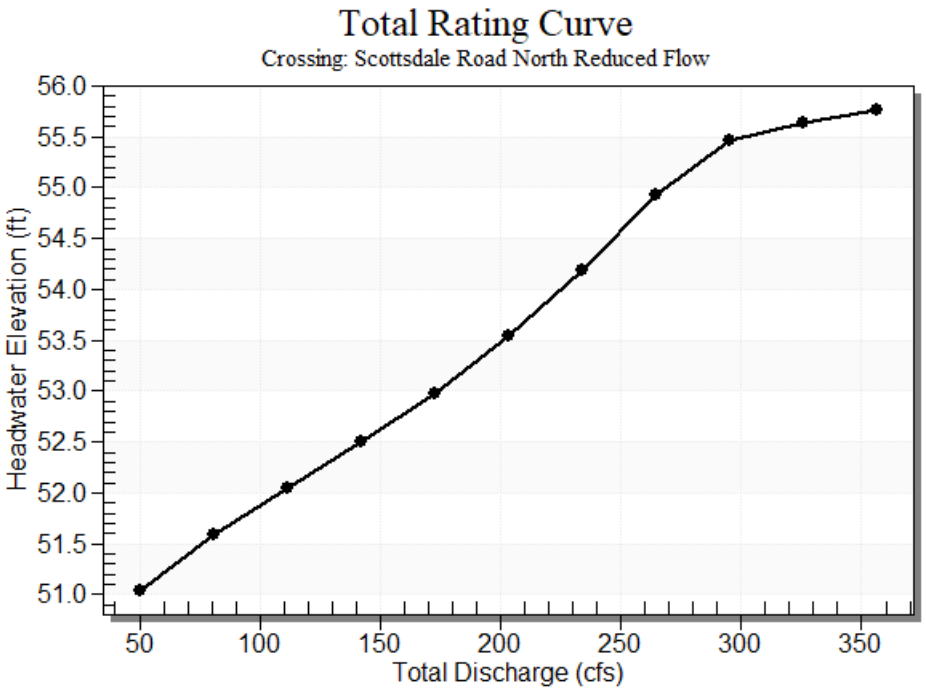


Table 2 - Culvert Summary Table: 4-36 North 356 cfs

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
50.00	50.00	51.05	1.547	0.0*	1-S2r	0.775	1.119	0.775	0.647	8.323	5.153
80.60	80.60	51.59	2.090	0.0*	1-S2r	0.993	1.441	0.993	0.871	9.523	6.170
111.20	111.20	52.05	2.552	0.0*	1-S2r	1.180	1.702	1.180	1.066	10.406	6.953
141.80	141.80	52.50	2.999	0.0*	1-S2r	1.352	1.931	1.352	1.244	11.093	7.601
172.40	172.40	52.98	3.483	0.0*	5-S2r	1.515	2.136	1.570	1.409	11.141	8.157
203.00	203.00	53.54	4.037	0.0*	5-S2r	1.675	2.315	1.675	1.565	12.111	8.648
233.60	233.60	54.18	4.683	0.524	5-S2r	1.837	2.470	1.889	1.714	12.081	9.088
264.20	264.20	54.93	5.430	2.172	5-S2r	2.004	2.601	2.004	1.856	12.788	9.488
294.80	283.85	55.47	5.965	3.325	5-S2r	2.119	2.670	2.119	1.994	12.928	9.856
325.40	290.06	55.64	6.143	3.705	5-S2r	2.156	2.690	2.156	2.128	12.974	10.196
356.00	294.42	55.77	6.271	3.976	5-S2r	2.184	2.703	2.184	2.258	12.991	10.513

* Full Flow Headwater elevation is below inlet invert.

****

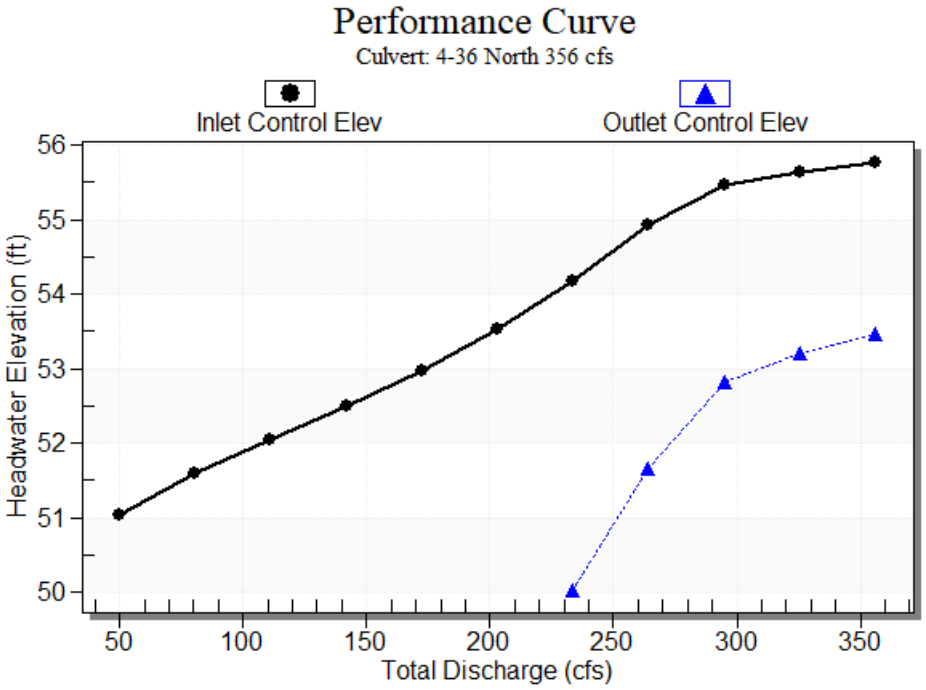
Straight Culvert

Inlet Elevation (invert): 49.50 ft, Outlet Elevation (invert): 41.62 ft

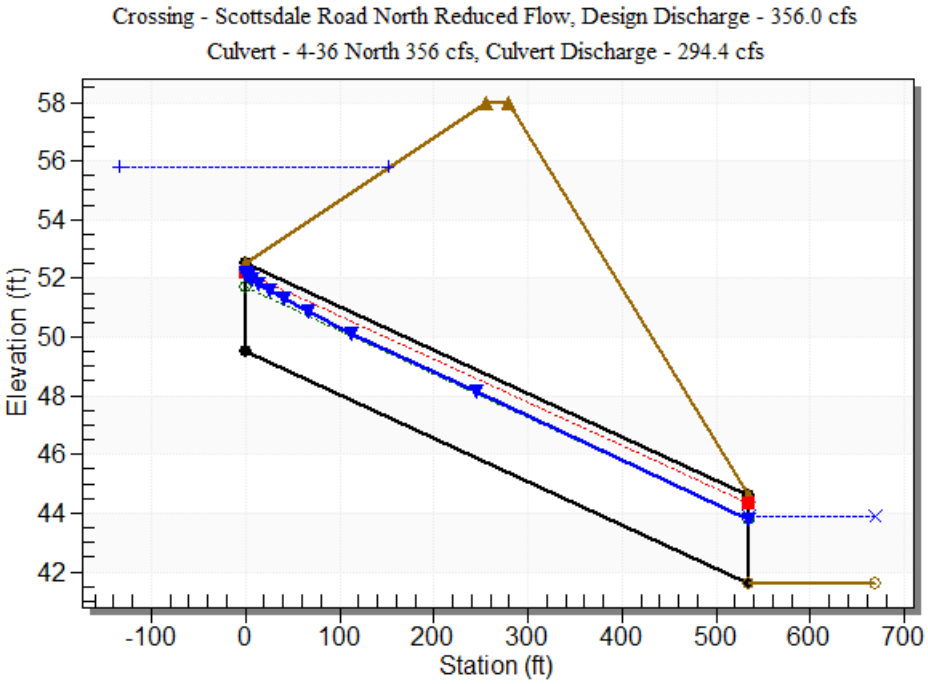
Culvert Length: 535.06 ft, Culvert Slope: 0.0147

****

Culvert Performance Curve Plot: 4-36 North 356 cfs



Water Surface Profile Plot for Culvert: 4-36 North 356 cfs



Site Data - 4-36 North 356 cfs

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 49.50 ft
Outlet Station: 535.00 ft
Outlet Elevation: 41.62 ft
Number of Barrels: 4

Culvert Data Summary - 4-36 North 356 cfs

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Smooth HDPE
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Scottsdale Road North

Flow (cfs)	Water Surfac Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
50.00	42.27	0.65	5.15	0.61	1.13
80.60	42.49	0.87	6.17	0.82	1.17
111.20	42.69	1.07	6.95	1.00	1.19
141.80	42.86	1.24	7.60	1.16	1.20
172.40	43.03	1.41	8.16	1.32	1.21
203.00	43.18	1.56	8.65	1.46	1.22
233.60	43.33	1.71	9.09	1.60	1.22
264.20	43.48	1.86	9.49	1.74	1.23
294.80	43.61	1.99	9.86	1.87	1.23
325.40	43.75	2.13	10.20	1.99	1.23
356.00	43.88	2.26	10.51	2.11	1.23

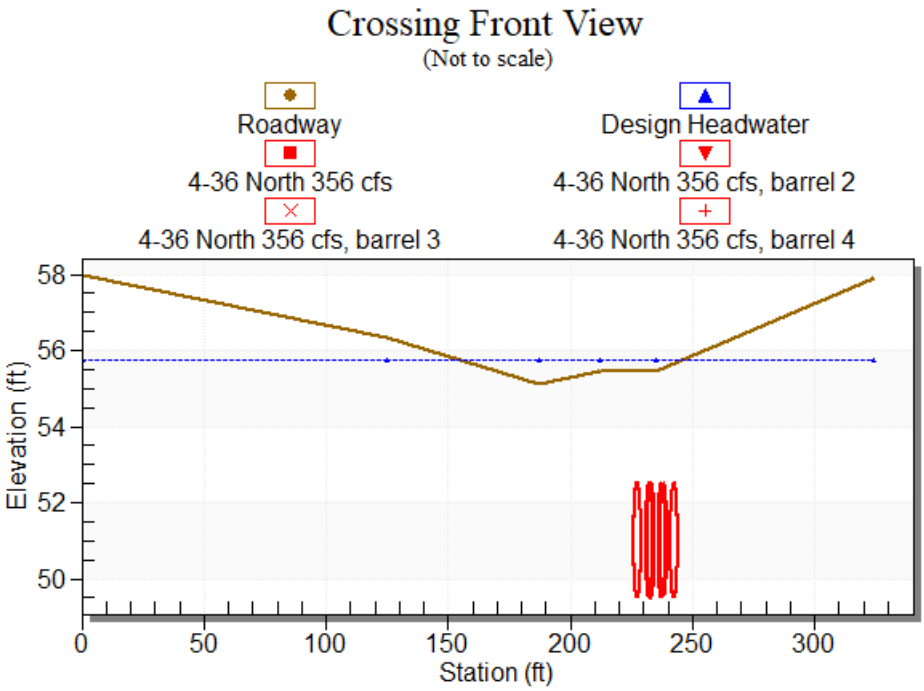
Tailwater Channel Data - Scottsdale Road North Reduced Flow

Tailwater Channel Option: Rectangular Channel
Bottom Width: 15.00 ft
Channel Slope: 0.0150
Channel Manning's n: 0.0250
Channel Invert Elevation: 41.62 ft

Roadway Data for Crossing: Scottsdale Road North Reduced Flow

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Roadway Surface: Paved
Roadway Top Width: 24.00 ft

Crossing Front View (Roadway Profile): Scottsdale Road North Reduced Flow



Scottsdale Road North Section D

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 50 cfs

Design Flow: 447 cfs

Maximum Flow: 447 cfs

Table 1 - Summary of Culvert Flows at Crossing: Scottsdale Road Middle Redu

Headwater Elevatio	Total Discharge (c	4-36 Middle 447 cf Discharge (cfs)	Roadway Discharg (cfs)	Iterations
43.17	50.00	50.00	0.00	1
43.86	89.70	89.70	0.00	1
44.44	129.40	129.40	0.00	1
45.05	169.10	169.10	0.00	1
45.78	208.80	208.80	0.00	1
46.66	248.50	248.50	0.00	1
47.71	288.20	288.20	0.00	1
49.04	327.90	326.28	1.50	16
49.50	367.60	333.55	33.80	9
49.69	407.30	336.54	70.52	8
49.83	447.00	338.69	107.81	6
48.85	323.34	323.34	0.00	Overtopping

Rating Curve Plot for Crossing: Scottsdale Road Middle Reduced Flow

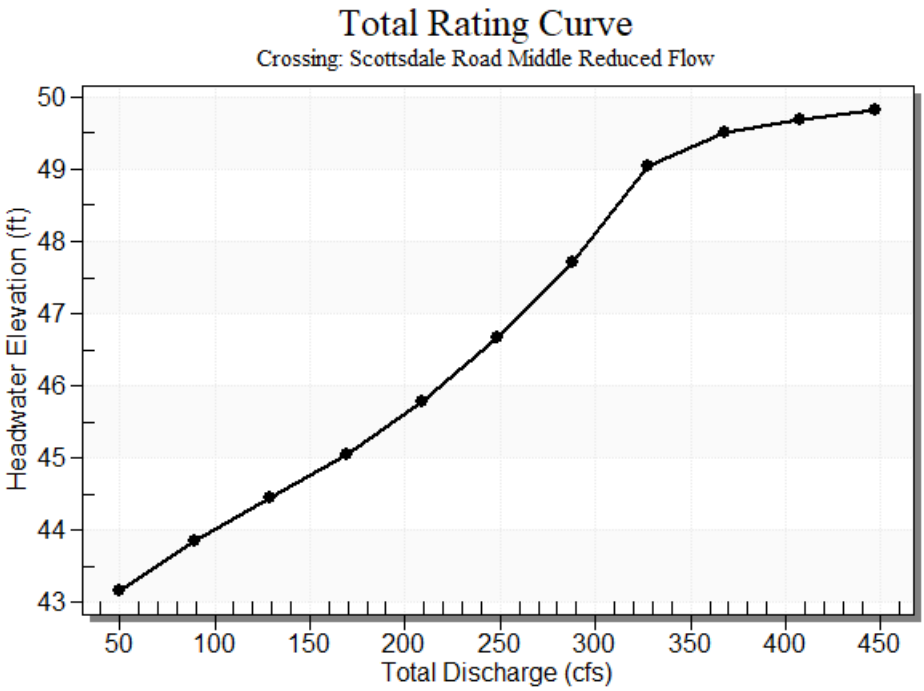


Table 2 - Culvert Summary Table: 4-36 Middle 447 cfs

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (f	Outlet Control Depth (f	Flow Type	Normal Depth (f	Critical Depth (f	Outlet Depth (f	Tailwater Depth (f	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
50.00	50.00	43.17	1.551	0.0*	1-S2r	0.824	1.119	0.824	0.491	7.639	6.787
89.70	89.70	43.86	2.237	0.0*	1-S2r	1.120	1.523	1.120	0.705	8.999	8.485
129.40	129.40	44.44	2.821	0.0*	1-S2r	1.374	1.843	1.417	0.886	9.524	9.739
169.10	169.10	45.05	3.433	0.0*	5-S2r	1.611	2.115	1.611	1.048	10.585	10.756
208.80	208.80	45.78	4.157	1.516	5-S2r	1.846	2.346	1.846	1.198	11.094	11.622
248.50	248.50	46.66	5.038	3.261	5-S2r	2.097	2.537	2.154	1.338	11.124	12.380
288.20	288.20	47.71	6.094	5.420	7-M2c	3.000	2.684	2.684	1.471	10.800	13.059
327.90	326.28	49.04	7.268	7.419	7-M2c	3.000	2.785	2.785	1.599	11.919	13.673
367.60	333.55	49.50	7.509	7.880	7-M2c	3.000	2.802	2.802	1.721	12.140	14.236
407.30	336.54	49.69	7.610	8.069	7-M2c	3.000	2.804	2.804	1.840	12.242	14.756
447.00	338.69	49.83	7.683	8.210	7-M2c	3.000	2.808	2.808	1.955	12.311	15.241

* Full Flow Headwater elevation is below inlet invert.

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Straight Culvert

Inlet Elevation (invert): 41.62 ft, Outlet Elevation (invert): 36.50 ft

Culvert Length: 442.03 ft, Culvert Slope: 0.0116

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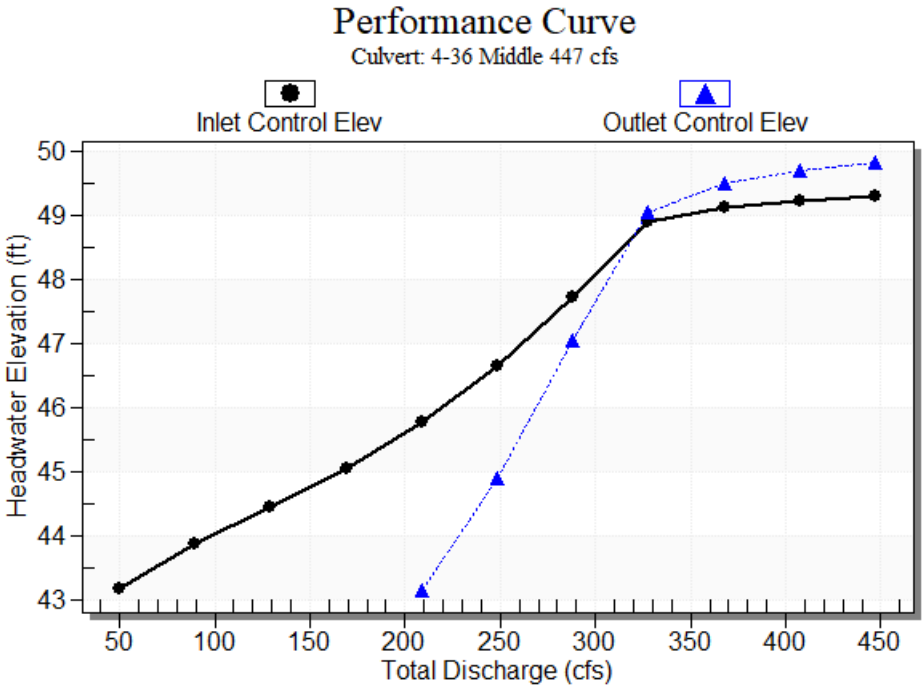
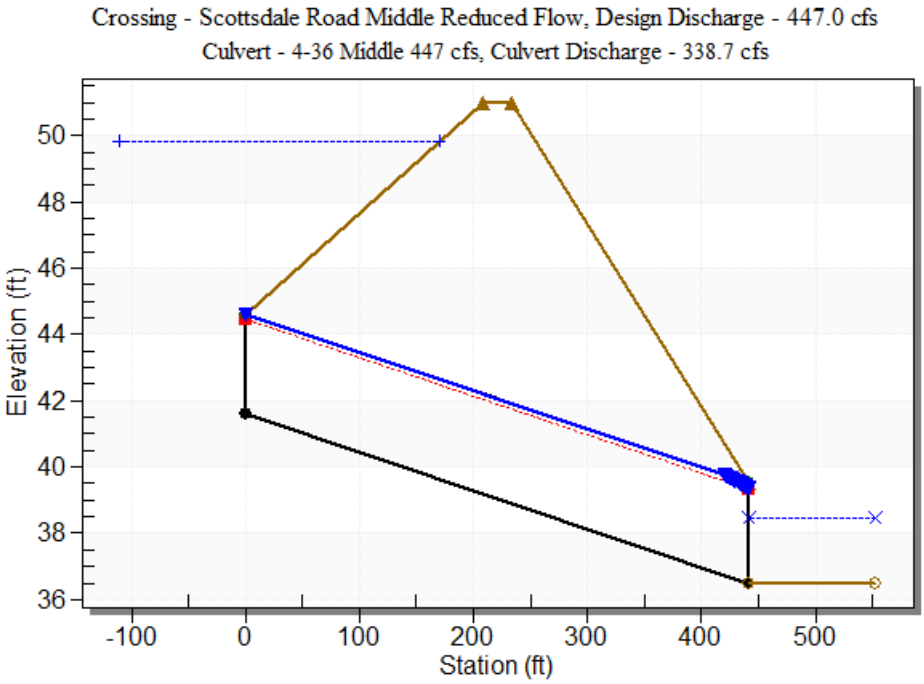
Culvert Performance Curve Plot: 4-36 Middle 447 cfs



Water Surface Profile Plot for Culvert: 4-36 Middle 447 cfs



Site Data - 4-36 Middle 447 cfs

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 41.62 ft
Outlet Station: 442.00 ft
Outlet Elevation: 36.50 ft
Number of Barrels: 4

Culvert Data Summary - 4-36 Middle 447 cfs

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Smooth HDPE
Embedment: 0.00 in
Barrel Manning's n: 0.0130
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Scottsdale Road Midd

Flow (cfs)	Water Surfac Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
50.00	36.99	0.49	6.79	0.46	1.71
89.70	37.20	0.70	8.48	0.66	1.78
129.40	37.39	0.89	9.74	0.83	1.82
169.10	37.55	1.05	10.76	0.98	1.85
208.80	37.70	1.20	11.62	1.12	1.87
248.50	37.84	1.34	12.38	1.25	1.89
288.20	37.97	1.47	13.06	1.38	1.90
327.90	38.10	1.60	13.67	1.50	1.91
367.60	38.22	1.72	14.24	1.61	1.91
407.30	38.34	1.84	14.76	1.72	1.92
447.00	38.46	1.96	15.24	1.83	1.92

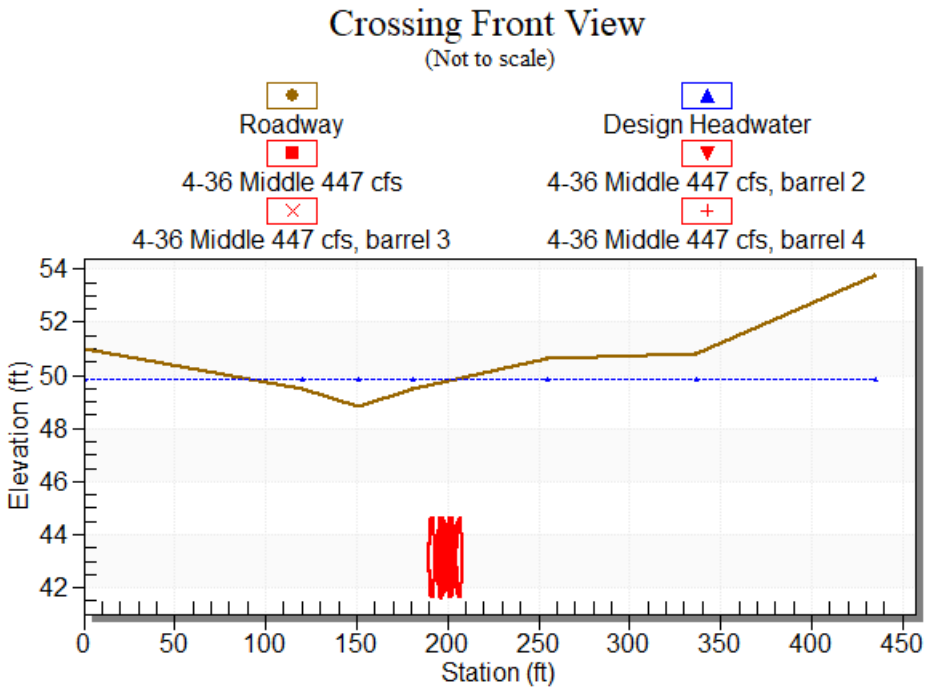
Tailwater Channel Data - Scottsdale Road Middle Reduced Flow

Tailwater Channel Option: Rectangular Channel
Bottom Width: 15.00 ft
Channel Slope: 0.0150
Channel Manning's n: 0.0160
Channel Invert Elevation: 36.50 ft

Roadway Data for Crossing: Scottsdale Road Middle Reduced Flow

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Roadway Surface: Paved
Roadway Top Width: 24.00 ft

Crossing Front View (Roadway Profile): Scottsdale Road Middle Reduced Flow



APPENDIX G – EXCERPTS FROM ONE SCOTTSDALE MASTER DRAINAGE PLAN, DRAINAGE REPORT FOR TDI AT ONE SCOTTSDALE, PHASE I, AND FINAL DRAINAGE REPORT FOR ONE SCOTTSDALE PU III INFRASTRUCTURE IMPROVEMENTS (PUIII)

ONE SCOTTSDALE
MASTER DRAINAGE PLAN

Revised June 20, 2013
Revised March 26, 2012
Revised April 13, 2009
September 26, 2006
WP# 021584

Submitted to:

City of Scottsdale
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Prepared for:

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WOOD/PATEL
MISSION: CLIENT SERVICE

TABLE OF CONTENTS

PLATES

EXHIBITS

APPENDICES

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Y:\WP\Reports\Hydrology\021584 One Scottsdale Master Drainage Plan_Revised_June2013.doc

1	0410	51	79.	*	1	1025	126	5.	*	1	1640	201	1.	*	1	2255	276	0.
1	0415	52	74.	*	1	1030	127	5.	*	1	1645	202	1.	*	1	2300	277	0.
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1	0425	54	67.	*	1	1040	129	5.	*	1	1655	204	1.	*	1	2310	279	0.
1	0430	55	65.	*	1	1045	130	4.	*	1	1700	205	1.	*	1	2315	280	0.
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1	0610	75	33.	*	1	1225	150	3.	*	1	1840	225	0.	*	2	0055	300	0.
				*					*					*				

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
(CFS)	(HR)					
		(CFS)				
111.	3.67		43.	13.	12.	12.
		(INCHES)	46.262	53.855	53.871	53.871
		(AC-FT)	21.	25.	25.	25.

CUMULATIVE AREA = .01 SQ MI

100-YEAR -6 HOUR POST-DEVELOPED PEAK FLOWS FROM HEC-1 MASTER

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
					6-HOUR	24-HOUR	72-HOUR			
	HYDROGRAPH AT	1A1	44.	3.17	4.	1.	1.	.02		
	ROUTED TO	DET1A1	12.	3.50	4.	1.	1.	.02		
									1.73	3.50
	ROUTED TO	RA1-C4	11.	3.50	4.	1.	1.	.02		
									.91	3.50
	HYDROGRAPH AT	1C4	9.	3.17	1.	0.	0.	.00		
	2 COMBINED AT	CP1C4	15.	3.17	4.	1.	1.	.02		
	ROUTED TO	RC4-C3	15.	3.25	4.	1.	1.	.02		
									1.05	3.25
	HYDROGRAPH AT	1Da3	38.	3.08	3.	1.	1.	.01		
	ROUTED TO	DE1Da3	3.	3.67	2.	1.	1.	.01		
									2.51	3.67
	HYDROGRAPH AT	1Da4	29.	3.08	2.	1.	1.	.01		
	2 COMBINED AT	CP1Da4	30.	3.08	4.	1.	1.	.02		
	ROUTED TO	DE1Da4	6.	3.58	4.	1.	1.	.02		
									3.14	3.58
	HYDROGRAPH AT	1Da5	7.	3.17	1.	0.	0.	.00		
	3 COMBINED AT	CP1C3I	25.	3.17	9.	3.	3.	.05		
	ROUTED TO	RC3-C3	24.	3.25	9.	3.	3.	.05		
									1.52	3.25
	HYDROGRAPH AT	Off-1A	21.	3.08	2.	0.	0.	.01		
	HYDROGRAPH AT	1A2	11.	3.08	1.	0.	0.	.00		
	HYDROGRAPH AT	1A3	18.	3.08	1.	0.	0.	.01		

+	3 COMBINED AT	CPA3	50.	3.08	4.	1.	1.	.02	
+	ROUTED TO	DET1A3	33.	3.17	4.	1.	1.	.02	2.84 3.17
+	ROUTED TO	RA3-A6	35.	3.25	4.	1.	1.	.02	.60 3.25
+	HYDROGRAPH AT	1A6	12.	3.08	1.	0.	0.	.00	
+	2 COMBINED AT	CP1A6	40.	3.25	5.	1.	1.	.03	
+	ROUTED TO	DET1A6	35.	3.33	5.	1.	1.	.03	2.87 3.33
+	HYDROGRAPH AT	1A5	42.	3.08	4.	1.	1.	.02	
+	2 COMBINED AT	CP1A5	59.	3.25	8.	2.	2.	.04	
+	ROUTED TO	DET1A5	53.	3.33	8.	2.	2.	.04	2.96 3.33
+	HYDROGRAPH AT	1A4	27.	3.08	2.	1.	1.	.01	
+	ROUTED TO	RA4-A7	25.	3.17	2.	1.	1.	.01	.50 3.17
+	ROUTED TO	DET1A4	14.	3.33	2.	1.	1.	.01	2.65 3.33
+	HYDROGRAPH AT	1A7	21.	3.08	2.	0.	0.	.01	
+	3 COMBINED AT	CP1A7	74.	3.33	12.	3.	3.	.06	
+	ROUTED TO	DET1A7	66.	3.42	12.	3.	3.	.06	3.62 3.42
+	HYDROGRAPH AT	1C1	57.	3.17	5.	1.	1.	.02	
+	2 COMBINED AT	CP1C1	85.	3.33	17.	4.	4.	.08	
+	ROUTED TO	DET1C1	78.	3.50	16.	4.	4.	.08	4.86 3.50
+	HYDROGRAPH AT	1C2	54.	3.17	5.	1.	1.	.02	
+	2 COMBINED AT	CP1C2	92.	3.50	21.	6.	5.	.11	
+	ROUTED TO	DE1C2A	93.	3.50	21.	6.	5.	.11	5.05 3.50
+	ROUTED TO	DE1C2B	90.	3.50	21.	6.	5.	.11	5.02 3.50
+	ROUTED TO	DE1C2C	92.	3.50	21.	6.	5.	.11	5.04 3.50
+	HYDROGRAPH AT	1C3	68.	3.08	5.	1.	1.	.03	
+	3 COMBINED AT	CP1C3	128.	3.50	33.	10.	9.	.19	
+	ROUTED TO	DET1C3	109.	3.67	33.	10.	9.	.19	2.55 3.67
+	ROUTED TO	RC3COM	108.	3.67	33.	10.	9.	.19	11.14 3.67
+	HYDROGRAPH AT	COMM	110.	3.08	10.	2.	2.	.03	
+	ROUTED TO	DETCOM	11.	3.67	7.	2.	2.	.03	2.55 3.67
+	2 COMBINED AT	CPCOM	119.	3.67	41.	12.	12.	.22	

+	ROUTED TO	COMOF1	119.	3.75	41.	12.	12.	.22		
+									11.20	3.75
+	HYDROGRAPH AT	OFF1	84.	3.08	6.	2.	2.	.02		
+	ROUTED TO	DEOFF1	11.	3.50	6.	2.	2.	.02		
+									2.61	3.50
+	2 COMBINED AT	CPOFF1	130.	3.75	46.	14.	13.	.24		
+	ROUTED TO	OF1OF3	129.	3.75	46.	14.	13.	.24		
+									11.31	3.75
+	HYDROGRAPH AT	OFF3	58.	3.08	5.	1.	1.	.02		
+	ROUTED TO	DEOFF3	10.	3.50	5.	1.	1.	.02		
+									2.20	3.50
+	2 COMBINED AT	CPOFF3	138.	3.75	51.	15.	14.	.25		
+	ROUTED TO	33A1	137.	3.83	51.	15.	14.	.25		
+	HYDROGRAPH AT	33A	150.	3.17	15.	4.	4.	.05		
+	HYDROGRAPH AT	33A.1	11.	3.17	1.	0.	0.	.00		
+	HYDROGRAPH AT	33A.2	34.	3.08	3.	1.	1.	.01		
+	ROUTED TO	33A2	30.	3.08	3.	1.	1.	.01		
+	4 COMBINED AT	33A3	226.	3.17	67.	20.	19.	.31		
+	HYDROGRAPH AT	1Db	104.	3.08	8.	2.	2.	.04		
+	ROUTED TO	DE1Db	13.	3.58	7.	2.	2.	.04		
+									2.99	3.58
+	HYDROGRAPH AT	1Da1	25.	3.08	2.	0.	0.	.01		
+	ROUTED TO	DE1Da1	4.	3.50	2.	0.	0.	.01		
+									2.95	3.50
+	HYDROGRAPH AT	1Da2	5.	3.17	0.	0.	0.	.00		
+	3 COMBINED AT	CP1Dab	18.	3.50	9.	3.	3.	.05		
+	ROUTED TO	RDabE2	18.	3.50	9.	3.	3.	.05		
+									.75	3.50
+	HYDROGRAPH AT	1Ea1	44.	3.17	4.	1.	1.	.02		
+	ROUTED TO	DE1Ea1	4.	3.75	3.	1.	1.	.02		
+									2.81	3.75
+	HYDROGRAPH AT	1Ea2	65.	3.08	5.	1.	1.	.02		
+	2 COMBINED AT	CP1Ea2	66.	3.08	7.	2.	2.	.04		
+	ROUTED TO	DE1Ea2	16.	3.50	7.	2.	2.	.04		
+									3.25	3.50
+	2 COMBINED AT	CP1Ea2	34.	3.50	46.	5.	5.	.09		
+	HYDROGRAPH AT	PARK	37.	3.08	3.	1.	1.	.02		
+	HYDROGRAPH AT	SCHOOL	59.	3.08	5.	1.	1.	.01		
+	ROUTED TO	DETSCH	12.	3.42	4.	1.	1.	.01		
+									2.84	3.42
+	ROUTED TO	SCH12	12.	3.42	4.	1.	1.	.01		
+									10.43	3.42

+	HYDROGRAPH AT	1Ec	33.	3.08	3.	1.	1.	.01	
+	ROUTED TO	DE1Ec	9.	3.33	3.	1.	1.	.01	
+									2.47 3.33
+	2 COMBINED AT	CP1Ec	21.	3.42	7.	2.	2.	.02	
+	ROUTED TO	1EcEa2	21.	3.42	7.	2.	2.	.02	
+									10.59 3.42
+	3 COMBINED AT	CP1Ea	67.	3.17	26.	7.	7.	.14	
+	ROUTED TO	REaTPP	67.	3.17	26.	7.	7.	.14	
+									10.92 3.17
+	HYDROGRAPH AT	1Eb	151.	3.17	14.	4.	3.	.06	
+	ROUTED TO	DET1Eb	39.	3.50	13.	4.	3.	.06	
+									2.26 3.50
+	HYDROGRAPH AT	OFF2	121.	3.08	11.	3.	3.	.03	
+	ROUTED TO	DEOFF2	11.	3.67	8.	3.	3.	.03	
+									2.59 3.67
+	3 COMBINED AT	CPOFF2	115.	3.50	46.	14.	13.	.23	
+	ROUTED TO	1Kr.1	115.	3.50	46.	14.	13.	.23	
+	HYDROGRAPH AT	1Kr	118.	3.17	13.	3.	3.	.05	
+	ROUTED TO	DET1K	18.	3.75	11.	3.	3.	.05	
+									2.77 3.75
+	2 COMBINED AT	1Kr.2	133.	3.50	57.	17.	16.	.28	
+	ROUTED TO	1Kr.3	133.	3.50	57.	17.	16.	.28	
+	HYDROGRAPH AT	33E.3	45.	3.08	4.	1.	1.	.01	
+	2 COMBINED AT	1Kr.4	148.	3.17	60.	18.	17.	.29	
+	ROUTED TO	1Kr.5	147.	3.17	60.	18.	17.	.29	
+	HYDROGRAPH AT	33E.4	28.	3.08	2.	0.	0.	.01	
+	2 COMBINED AT	1Kr.6	161.	3.17	62.	18.	18.	.30	
+	ROUTED TO	1Mr.1	160.	3.17	62.	18.	18.	.30	
+	HYDROGRAPH AT	33E	68.	3.08	5.	1.	1.	.01	
+	2 COMBINED AT	1Mr.2	207.	3.08	66.	19.	19.	.32	
+	ROUTED TO	1Mr.3	203.	3.08	66.	19.	19.	.32	
+	HYDROGRAPH AT	1Mr	152.	3.17	14.	4.	3.	.05	
+	ROUTED TO	DET1M	49.	3.42	13.	4.	3.	.05	
+									3.70 3.42
+	HYDROGRAPH AT	33BE	3.	3.17	0.	0.	0.	.00	
+	3 COMBINED AT	33E.2	219.	3.17	80.	23.	22.	.37	
+	ROUTED TO	R33E.2	219.	3.17	80.	23.	22.	.37	
+	HYDROGRAPH AT	33D	61.	3.17	5.	1.	1.	.04	
+	HYDROGRAPH AT	S40ST	76.	3.08	6.	1.	1.	.02	
	HYDROGRAPH AT								

+		S40CN	180.	3.08	14.	4.	3.	.04	
+	4 COMBINED AT	CT13.0	472.	3.08	103.	30.	28.	.47	
+	HYDROGRAPH AT	33C	115.	3.08	9.	2.	2.	.03	
+	2 COMBINED AT	CT13.1	587.	3.08	111.	32.	31.	.50	
+	DIVERSION TO	P-PIPE	70.	3.08	56.	18.	17.	.50	
+	HYDROGRAPH AT	D_BAS	517.	3.08	55.	14.	13.	.50	
+	DIVERSION TO	D-BAS2	77.	3.08	2.	1.	0.	.50	
+	HYDROGRAPH AT	D_BAS1	517.	3.08	53.	13.	13.	.50	
+	DIVERSION TO	D-SUBF	517.	3.33	22.	5.	5.	.50	
+	HYDROGRAPH AT	D_SURF	251.	3.33	31.	8.	8.	.50	
+	HYDROGRAPH AT	B_PIPE	70.	2.75	56.	18.	17.	.00	
+	HYDROGRAPH AT	B_SURF	77.	2.92	2.	1.	0.	.00	
+	3 COMBINED AT	CS40B	321.	3.33	90.	26.	25.	.50	
+	ROUTED TO	S40BAS	237.	3.67	89.	26.	25.	.50	
+									5.71 3.67
+	DIVERSION TO	D33C.2	109.	3.67	41.	12.	12.	.50	
+	HYDROGRAPH AT	33E.1	128.	3.67	48.	14.	14.	.50	
+	HYDROGRAPH AT	R33C.2	109.	3.67	41.	12.	12.	.00	
+	HYDROGRAPH AT	S40WT	40.	3.08	3.	1.	1.	.01	
+	2 COMBINED AT	33C.2	111.	3.67	43.	13.	12.	.01	

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAO	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
33A1	MANE	1.55	137.77	227.80	2.21	5.00	136.79	230.00	2.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2975E+02 EXCESS= .0000E+00 OUTFLOW= .2975E+02 BASIN STORAGE= .2975E-02 PERCENT ERROR= .0

33A	MANE	1.40	150.51	189.00	2.92	5.00	150.01	190.00	2.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7359E+01 OUTFLOW= .7348E+01 BASIN STORAGE= .1343E-02 PERCENT ERROR= .1

33A.1	MANE	2.44	11.88	191.75	2.92	5.00	11.36	190.00	2.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5457E+00 OUTFLOW= .5452E+00 BASIN STORAGE= .1375E-04 PERCENT ERROR= .1

33A.2	MANE	.34	35.43	185.97	2.92	5.00	34.38	185.00	2.92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1356E+01 OUTFLOW= .1354E+01 BASIN STORAGE= .8482E-04 PERCENT ERROR= .1

33A2	MANE	.69	33.99	186.47	2.93	5.00	29.73	185.00	2.93

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1356E+01 EXCESS= .0000E+00 OUTFLOW= .1357E+01 BASIN STORAGE= .5409E-05 PERCENT ERROR= -.1

1Kr.1	MANE	.33	115.27	209.94	2.20	5.00	115.26	210.00	2.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2702E+02 EXCESS= .0000E+00 OUTFLOW= .2702E+02 BASIN STORAGE= .3385E-03 PERCENT ERROR= .0

1Kr.3	MANE	.21	132.52	210.12	2.22	5.00	132.51	210.00	2.22

FLOW SUMMARY			
STORM EVENT	CONCENTRATION POINT	PRE-EXISTING FLOW (CFS)	POST-DEVELOPED FLOW (CFS)
10-YR, 6-HOUR	33A3	128	201
	33B	6	0
	33C-2	44	56
	33E [1]	36	41
50-YR, 6-HOUR	33A3	208	195
	33B	12	0
	33C-2	96	81
	33E [1]	96	83
100-YR, 6-HOUR	33A3	242	228
	33B	16	0
	33C-2	115	91
	33E [1]	130	126

NOTES:
1. ESTIMATED PRE-DEVELOPMENT PEAK FLOWS AND RUNOFF VOLUMES PER HEC-1 MODELS INCLUDED IN APPENDIX A-HYDROLOGY.
2. CONCENTRATION POINTS INDICATED ARE ALONG DOWNSTREAM SITE BOUNDARY. REFER TO EXHIBIT 1a - OFFSITE WATERSHED MAP AND EXISTING CONDITIONS HEC-1 SCHEMATIC MAP - FOR LOCATION OF PRE-DEVELOPMENT CONCENTRATION POINTS. REFER TO EXHIBIT 1b - ONSITE WATERSHED MAP AND PROPOSED CONDITION HEC-1 SCHEMATIC MAP - FOR LOCATION OF POST-DEVELOPMENT CONCENTRATION POINTS.
3. CONCENTRATION POINT 33E1 REFLECTS COMBINATION OF 33E AND 33D WHICH COMBINE IN AN OPEN CHANNEL IMMEDIATELY DOWNSTREAM OF THE ADOT 101 FREEWAY.

OFF-SITE CULVERT SUMMARY		
CULVERT ID	CULVERT SIZE AND TYPE	NOTES
1	5-10'x6' RCB	EXISTING CULVERTS
2	1-8'x4' RCB	EXISTING CULVERT
3	1-42" RCP	EXISTING CULVERT
4	3-10'x7' RCB	EXISTING ADOT CULVERT
5	4-8'x6' RCB	EXISTING ADOT CULVERT
6	4-8'x6' RCB	EXISTING ADOT CULVERT
7	5-10'x6' RCB	EXISTING CULVERTS

LEGEND

- POST-DEVELOPMENT CONDITION FLOW ARROW
- SUBBASIN BOUNDARY
- (1E3) SUBBASIN
- (DEATP1) CHANNEL ROUTE
- (DEDAT1) STORAGE ROUTE
- (CP1C1) COMBINE
- (540B) (33E1) DIVERSION

N

200 0 100 200
Horz. 1 in. = 200 ft.

ONE SCOTTSDALE
ONSITE WATERSHED MAP AND PROPOSED CONDITION HEC-1 SCHEMATIC MAP

Wood, Patel & Associates, Inc.
8501 West Raymond, Suite 150
Phoenix, Arizona 85043 (602) 335-8500

Exhibit 1.b

THOMPSON PEAK PARKWAY

SCOTTSDALE ROAD

75' ROW
SCENIC CORRIDOR

31st ST

LEGACY BLVD

TDI PHASE I

TDI PHASE II

EXISTING DIAL BUILDING

STORAGE BASIN

PUMP STATION

PIMA FREEWAY

3-36" RCP (EXISTING)
Q_{100} =138cfs
Q_{50} =101cfs
Q_{10} =50cfs
CP OFF.3 (1)

6'X4' RCBC (EXISTING)
Q_{100} =226cfs
Q_{50} =199cfs
Q_{10} =125cfs
33A3 (2)

24" RCP (EXISTING)
Q_{100} =0cfs
Q_{50} =0cfs
Q_{10} =0cfs
33B (3)

Q_{100} =115cfs
Q_{50} =99cfs
Q_{10} =65cfs
33C

Q_{100} =40cfs
Q_{50} =35cfs
Q_{10} =25cfs
S40WT
FLOWS DIRECTLY TO CULVERT 4

5.75' WEIR
EXISTING BASIN OUTLET

24" PIPE
EXISTING BASIN OUTLET

Q_{100} =111cfs
Q_{50} =81cfs
Q_{10} =56cfs
INV=1600.58
33C.2 (4)

6.75' WEIR
EXISTING BASIN OUTLET
30" PIPE WITH
26.4" ORIFICE PLATE
EXISTING BASIN OUTLET

EMERGENCY OUTFALL

(5) INV=1599.22

(6) INV=1599.22

3-36" RCP (EXISTING)
Q_{100} =115cfs
Q_{50} =96cfs
Q_{10} =62cfs
CP OFF.2 (7)

EAST DRAINAGE STORM DRAIN

Q_{100} =133cfs
Q_{50} =110cfs
Q_{10} =72cfs
CP IKr.2
OFFSITE FLOW FROM ADJACENT STORAGE BASIN

Q_{100} =48cfs
Q_{50} =126cfs
Q_{10} =8cfs
CP IKr.4
ONSITE FLOW FROM SUBBASIN 33E.3

SWALE ALONG EASTERN BOUNDARY
SEE CROSS SECTION A

Q_{100} =161cfs
Q_{50} =138cfs
Q_{10} =86cfs
CP IKr.6
ONSITE FLOW FROM SUBBASIN 33E.4

60" CIPP (PROPOSED)

Q_{100} =207cfs
Q_{50} =176cfs
Q_{10} =111cfs
CP IMr.2
ONSITE FLOW FROM SUBBASIN 33E

Q_{100} =219cfs
Q_{50} =190cfs
Q_{10} =124cfs
CP 33E.2
AT EXISTING CATCH BASINS (OFFSITE FLOW FROM ADJACENT STORAGE BASIN)

2 EA 54" EXISTING

2 EA 54" EXISTING

Q_{100} =76cfs
Q_{50} =65cfs
Q_{10} =43cfs
S40ET

SWALE ALONG EASTERN BOUNDARY
SEE CROSS SECTION B

2 EA 54" EXISTING

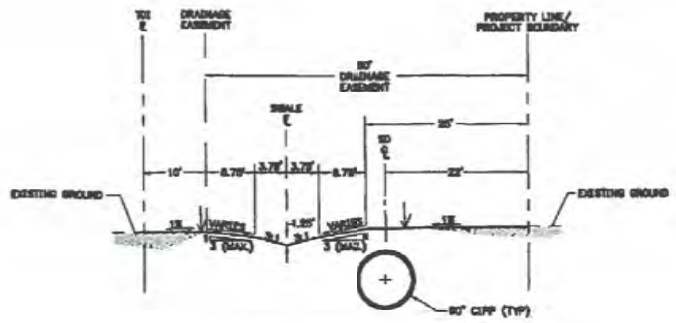
Q_{100} =472cfs
Q_{50} =400cfs
Q_{10} =256cfs
CP CT13.0
AT JUNCTION STRUCTURE

3 EA 54" TO STORAGE BASIN PUMP STATION

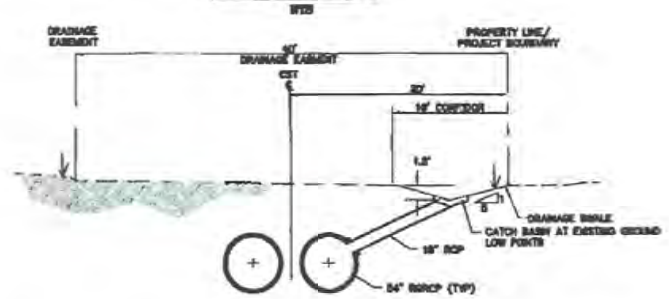
EXISTING 2 EA 54" WITH ORIFICE PLATES CONNECTED TO ADOT BOX CULVERT

COMBINED FLOWS
Q_{100} =128cfs
Q_{50} =93cfs
Q_{10} =41cfs
33E.1

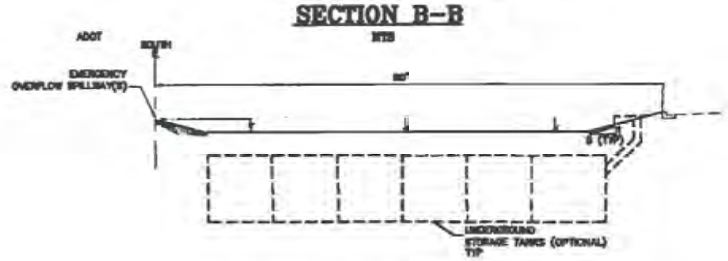
200 0 100 200
Horz. 1 in. = 200 ft.



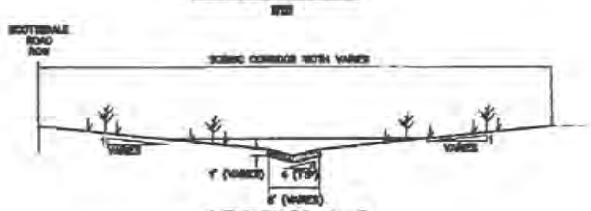
SECTION A-A
NTS



SECTION B-B
NTS



SECTION C-C
NTS



SECTION D-D
NTS

OFFSITE CULVERT SUMMARY		
CULVERT ID	CULVERT SIZE AND TYPE	NOTES
1	3-36" RCP	EXISTING CULVERTS
2	6'X4' RCBC	EXISTING CULVERT
3	24" RCP	EXISTING CULVERT
4	5-36"ø RCP	EXISTING ADOT CULVERT
5	2-60" RCP	EXISTING ADOT CULVERT
6	2-60" RCP	EXISTING ADOT CULVERT
7	3-36"ø RCP	EXISTING CULVERTS

LEGEND

- SUBBASIN BOUNDARY
- 33A SUBBASIN
- E40ET POST-DEVELOPMENT CONDITION HEC-1 CONCENTRATION POINT
- B TYPICAL CROSS-SECTION. SEE EXHIBIT I.d FOR CROSS-SECTION DETAILS.
- POST-DEVELOPMENT CONDITION FLOW ARROW
- PROPOSED CHANNEL/SWALE CONCEPTUAL LAYOUT

NOTES:
1. ALL STORM DRAINS SHOWN ARE CONCEPTUAL AND ARE SUBJECT TO CHANGE.
2. CHANNEL LAYOUT IS CONCEPTUAL AND IS SUBJECT TO CHANGE.

S:\2007\07584-04\Project Support\Drainage MP\HEC_Update_Jun2009\Exhibit\ EXHIBIT - ID - 2009-06-11.dwg

ONE SCOTTSDALE
PROPOSED DRAINAGE FACILITIES AND CROSS-SECTIONS

Wood, Patel & Associates, Inc.
7033 East Hartford, Suite 120
Phoenix, Arizona 85254 (602) 335-8300

Exhibit I.d

1415-12-2

2nd 5/7/12 TSS

DRAINAGE

DRAINAGE REPORT
FOR
TDI AT ONE SCOTTSDALE, PHASE I
SCOTTSDALE, ARIZONA

May 17, 2012
WP# 113738

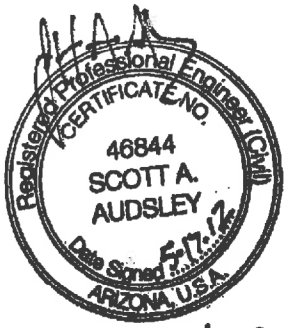
Plan # 1415-12-2
Case # _____
O-S # _____
[X] Accepted
[ ] Corrections
M. Rahman 6/5/12
Reviewed By Date

WOOD/PATEL
MISSION: CLIENT SERVICE™

TABLE OF CONTENTS

APPENDICES

EXHIBITS



Expires 9/30/2013

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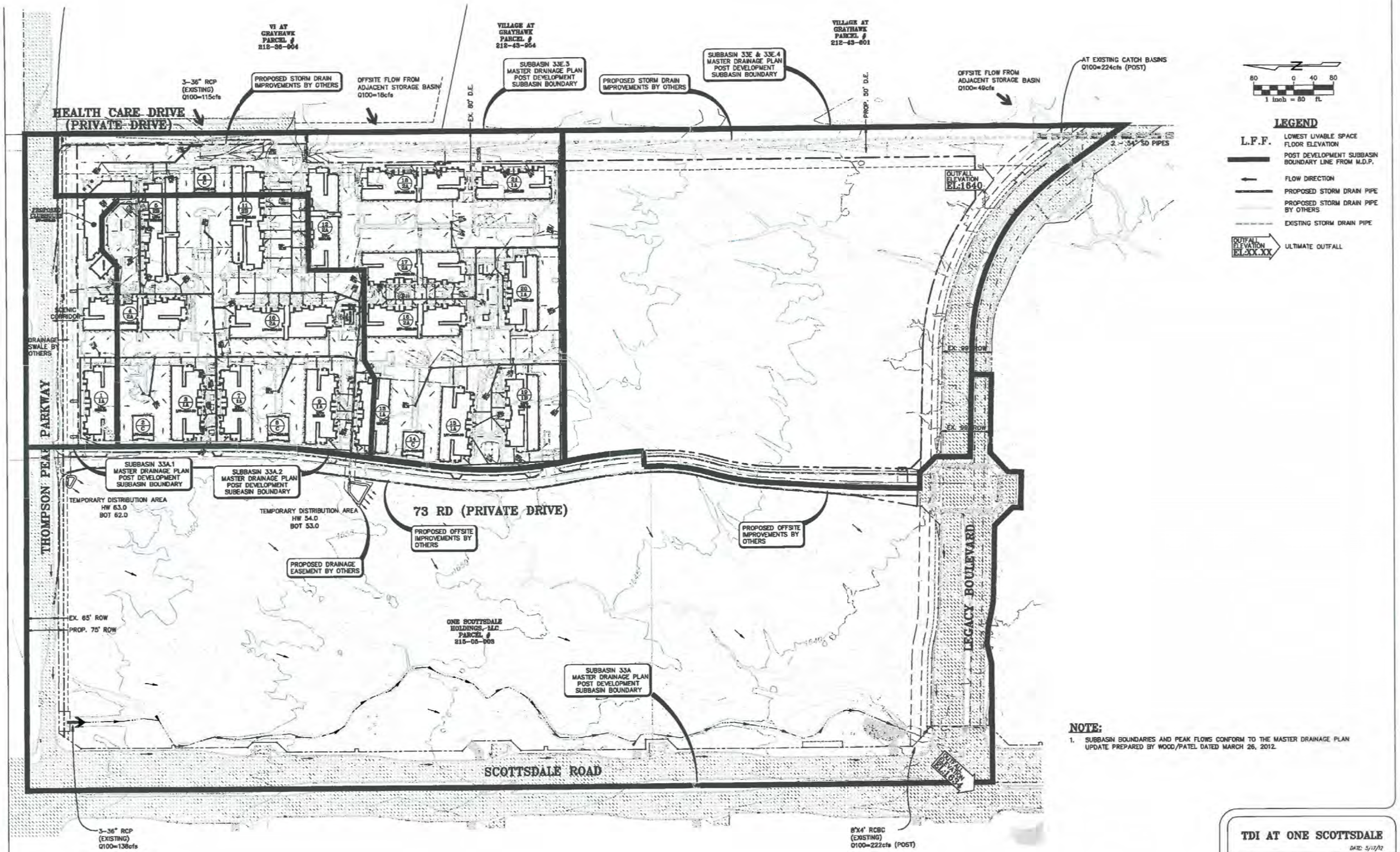


NOTE:

1. SUBBASIN BOUNDARIES AND PEAK FLOWS CONFORM TO THE MASTER DRAINAGE PLAN UPDATE PREPARED BY WOOD/PATEL DATED MARCH 26, 2012.

TDI AT ONE SCOTTSDALE

DATE: 5/17/12

FINAL DRAINAGE MAP (1 OF 2)	WOOD/PATEL

40 0 20 40

1 inch = 40 ft

LEGEND

L.F.F.	LOWEST LIVABLE SPACE FLOOR ELEVATION
	TDI PHASE 1 MAJOR SUBBASIN BOUNDARY LINE
B19	TDI PHASE 1 MAJOR SUBBASIN BOUNDARY ID (SITE)
R3	TDI PHASE 1 MAJOR SUBBASIN BOUNDARY ID (ROOF)
	TDI PHASE 1 MINOR SUBBASIN BOUNDARY LINE
B19A	TDI PHASE 1 MINOR SUBBASIN BOUNDARY ID (SITE)
R3A	TDI PHASE 1 MINOR BASIN BOUNDARY ID (ROOF)
CB19B	STORMCAD INLET ID
OF-3	STORMCAD OUTFALL ID
	FLOW DIRECTION
	PROPOSED STORM DRAIN PIPE
	PROPOSED STORM DRAIN PIPE BY OTHERS
	EXISTING STORM DRAIN PIPE
OUTFALL ELEVATION EL.XX.XX	ULTIMATE OUTFALL

TABLE 1: LOWEST LIVABLE SPACE FLOOR ELEVATIONS

BUILDING ID	LOWEST LIVABLE SPACE FLOOR ELEVATION (LFF)	HIGHEST NATURAL GRADE ADJACENT TO BUILDING (HG)	ELEVATION DIFFERENCE (LFF - HG)	HIGHEST FINISH GRADE ADJACENT TO BUILDING (FG)	ELEVATION DIFFERENCE (LFF - FG)
1	1668.0	1666.9	2.1	1669.0	1.0
2	1668.9	1665.0	3.9	1667.0	1.0
3	1667.0	1664.0	3.0	1666.0	1.0
4	1669.0	1667.0	2.0	1668.0	1.0
5	1668.0	1666.0	2.0	1667.0	1.0
6	1667.0	1664.1	2.9	1666.0	1.0
7	1665.0	1662.7	2.3	1664.0	1.0
8	1664.0	1660.6	3.4	1663.0	1.0
9	1663.0	1659.4	3.6	1662.0	1.0
10	1664.0	1661.6	2.4	1663.0	1.0
11	1666.0	1663.3	2.7	1665.0	1.0
12	1664.0	1662.0	2.0	1663.0	1.0
13	1661.0	1657.5	3.5	1660.0	1.0
14	1659.0	1656.2	4.8	1658.0	1.0
15	1659.0	1654.6	4.4	1658.0	1.0
16	1660.0	1658.0	2.0	1659.0	1.0
17	1662.0	1658.4	3.6	1661.0	1.0
18	1662.2	1660.2	2.0	1661.2	1.0
19	1658.0	1652.5	3.5	1655.0	1.0
20	1658.0	1656.2	2.8	1657.0	1.0
21	1659.2	1656.2	3.0	1658.2	1.0
CLUBHOUSE	1670.0	1668.0	2.0	1669.0	1.0

NOTE:

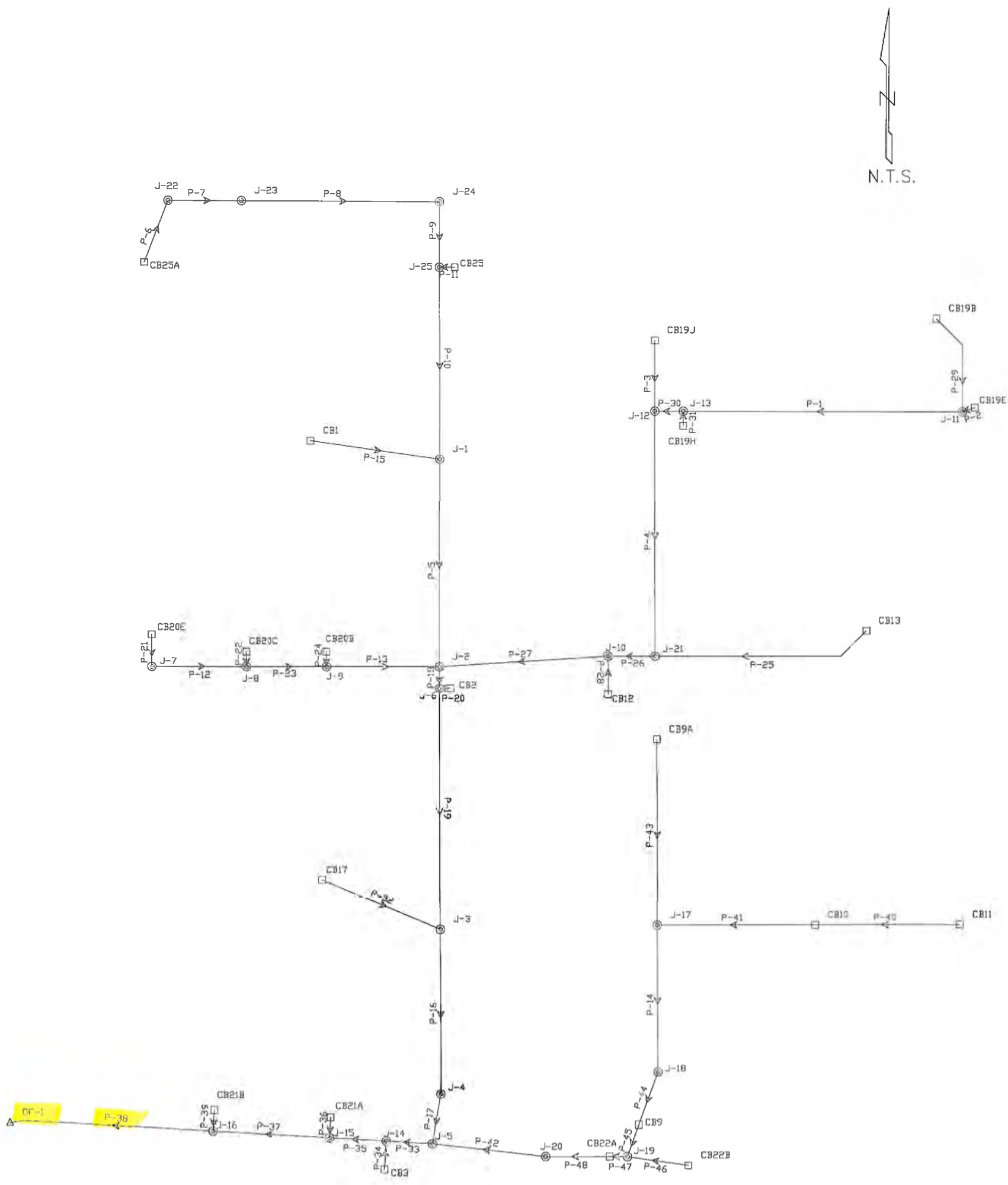
1. SUBBASIN BOUNDARIES AND PEAK FLOWS CONFORM TO THE MASTER DRAINAGE PLAN UPDATE PREPARED BY WOOD/PATEL DATED MARCH 28, 2012.

TDI AT ONE SCOTTSDALE

DATE: 5/17/12

FINAL DRAINAGE MAP (2 OF 2)

WOOD/PATEL



NOT
FOR CONSTRUCTION
OR RECORDING

TDI AT ONE SCOTTSDALE
PHASE 1

WEST OUTFALL
STORMCAD MODEL
SCHEMATIC

WOOD/PATEL
CIVIL ENGINEERS
HYDROLOGISTS
LAND SURVEYORS
CONSTRUCTION MANAGERS
(602) 335-8500
PHOENIX • MESA • GOODYEAR • TUCSON

Scenario: 100 YR Storm
WEST OUTFALL
Pipe Report

Label	Upstream Node	Downstream Node	Length (ft)	Slope (ft/ft)	Diameter (in)	Material	Manning's n	Total System Flow (ft³/s)	Upstream Invert (ft)	Downstream Invert (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Average Velocity (ft/s)
P-36	CB21A	J-15	12.0	0.121	12.0	Corrugated HDPE (Smooth Interior)	0.012	1.71	1,655.90	1,654.45	1,656.63	1,656.66	11.72
P-37	J-15	J-16	69.0	0.005	36.0	Corrugated HDPE (Smooth Interior)	0.012	43.53	1,653.45	1,653.10	1,656.21	1,656.03	8.17
P-38	J-16	OF-1	121.0	0.005	36.0	Corrugated HDPE (Smooth Interior)	0.012	45.42	1,653.10	1,652.50	1,655.31	1,654.70	8.14
P-39	CB21B	J-16	12.0	0.117	12.0	Corrugated HDPE (Smooth Interior)	0.012	1.89	1,655.50	1,654.10	1,656.09	1,656.03	11.92
P-40	CB11	CB10	85.0	0.009	18.0	Corrugated HDPE (Smooth Interior)	0.012	2.88	1,658.00	1,657.22	1,658.75	1,658.79	5.21
P-41	CB10	J-17	93.0	0.005	18.0	Corrugated HDPE (Smooth Interior)	0.012	5.60	1,657.22	1,656.76	1,658.63	1,658.42	4.90
P-42	J-20	J-5	67.0	0.005	24.0	Corrugated HDPE (Smooth Interior)	0.012	11.40	1,655.09	1,654.75	1,657.75	1,657.61	3.63
P-43	CB9A	J-17	111.0	0.010	18.0	Corrugated HDPE (Smooth Interior)	0.012	1.90	1,659.41	1,658.30	1,659.93	1,658.71	4.78
P-44	J-18	CB9	33.0	0.005	24.0	Corrugated HDPE (Smooth Interior)	0.012	7.50	1,655.59	1,655.43	1,658.25	1,658.22	2.39
P-45	CB9	J-19	20.0	0.005	24.0	Corrugated HDPE (Smooth Interior)	0.012	10.40	1,655.43	1,655.33	1,658.10	1,658.06	3.31
P-46	CB22B	J-19	36.0	0.005	18.0	Corrugated HDPE (Smooth Interior)	0.012	0.31	1,656.01	1,655.83	1,658.06	1,658.06	0.18
P-47	J-19	CB22A	11.0	0.005	24.0	Corrugated HDPE (Smooth Interior)	0.012	10.71	1,655.33	1,655.28	1,658.01	1,657.99	3.41
P-48	CB22A	J-20	38.0	0.005	24.0	Corrugated HDPE (Smooth Interior)	0.012	11.40	1,655.28	1,655.09	1,657.84	1,657.76	3.63

Bowman
CONSULTING

FINAL DRAINAGE REPORT
FOR
ONE SCOTTSDALE PU III INFRASTRUCTURE IMPROVEMENTS

SEC, SCOTTSDALE ROAD & THOMPSON PEAK PARKWAY
SCOTTSDALE, ARIZONA

Prepared for:
ONE SCOTTSDALE HOLDINGS LLC
7600 E. Doubletree Ranch Road, Suite 300
Scottsdale, Arizona 85258
480-367-7000

Prepared by:
BOWMAN CONSULTING
3010 South Priest Drive, Suite 103
Tempe, Arizona 85282
480-629-8830

Plan # 1411-12-5
Case # _____
O-S # _____
☒ Accepted
☐ Corrections
M. Rahman 8/7/12
Reviewed By Date

35156
SHERRI L.
KOSHIOL
7-23-12
ARIZONA U.S.A.

July 23, 2012
Project No. 9622
3rd Submittal

III. PROPOSED DRAINAGE PLAN

Post-developed Drainage Conditions

A. Streets and Drainage Tracts Flows

The private drive (73rd Street) has been designed to convey the 10-year flow below the top of curb and the 100-year peak flows within the roadway tract area at a maximum depth of 8 inches. Refer to Appendix B for these calculations. On-grade curb openings are proposed at several locations along the private roadway to remove storm water runoff from the travel lanes and allow it to flow over existing ground to the outlet under Scottsdale Road north of Legacy Drive. These curb openings will have rip-rap protection to mitigate potential erosion. Curb openings design calculations for both the 10-year and 100-year storm conditions are included in Appendix B. The curb opening locations are shown on Figure 5 – Proposed Onsite Drainage Map.

In the future, these street flows may be conveyed to the outfall location under Scottsdale Road through a variety of means including but not limited to: storm drain pipes, channel systems, detention basin areas or any combination thereof. The ultimate design of the property between Scottsdale Road and 73rd Avenue will need to accommodate these flows through the site or within a drainage tract alongside the roadways.

A catchbasin is proposed along Scottsdale Healthcare Drive to intercept upstream contributing areas and convey them to an existing stormdrain system. The location of this catchbasin is shown on Figure 5. Hydraulic calculations are included in Appendix B. As discussed in Offsite Drainage Conditions of Section II of this report, the flow from drainage subbasin 33.A1 (Q100 = 11 cfs) is planned to be conveyed in a drainage channel along the south side of Thompson Peak Parkway and then into a pipe culvert under 73rd Street. Per City of Scottsdale recommendations, the proposed drainage channel has been optimized within the available space to provide a capacity estimated to be 119.4 cfs (100-year flow), which exceeds the contributing flow. Three 36-inch pipes are proposed under 73rd Street to accommodate this channel capacity. Hydraulic calculations for the drainage channel and pipes are included in Appendix B.

A 24-inch pipe culvert is proposed under a sidewalk in the drainage tract located along the north side of Legacy Boulevard. This pipe culvert was sized to accommodate the flow generated within the drainage tract only(subbasin 8 on Figure 5). Hydraulic calculations for the drainage channel and pipe culvert are included in Appendix B.

B. Stormwater Detention

As detailed in the *One Scottsdale Master Drainage Plan* and as approved by the City of Scottsdale, the drainage plan concept for the large master planned mixed use project, and thereby for this individual site development project, was based on waiving retention requirements and maintaining post-development peak flows to

NORMAL DEPTH CALCULTIONS IN CHANNELS

USING MANNING EQUATION

Data Sheet Prepared By: GA

Project :	One Scottsdale PU IR
Proj. No :	9622
Date :	5/21/12
By:	GA

Sec # **Channel Along South Side of Thompson Peak Pkwy**

Enter 1 if "n" varies by banks (LB,CH,& RB), or 2 if by station: 1

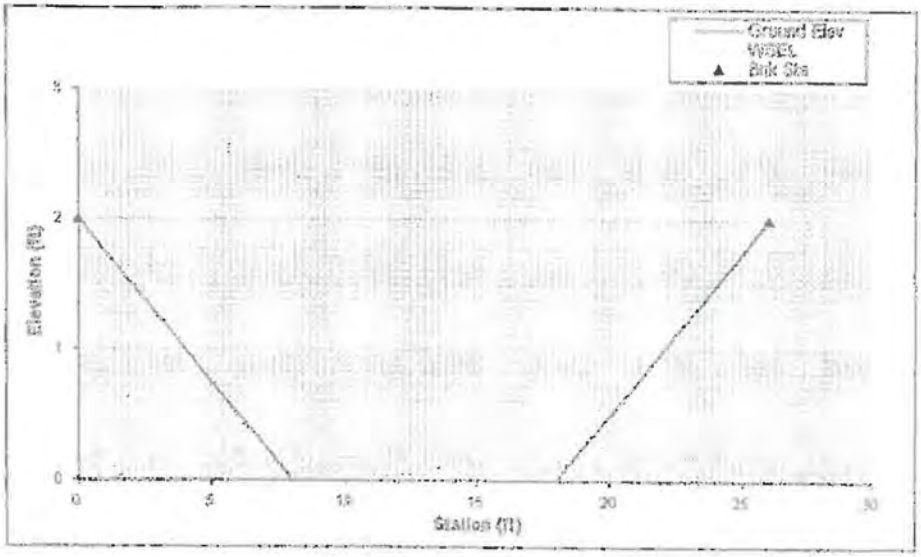
Point no.	Elev. (FT)	Sta. (FT)		n by sta N/A	Left Bank Sta. (ft)		Right Bank Sta. (ft)
1	2.00	0.00	*		0.00		26.00
2	0.00	2.00			n-LB	* n-CH *	n-RB
3	0.00	18.00			0.028	0.028	0.028
4	2.00	26.00	*		Cleveland-n method:		HEC-RAS
					S	0.0060	ft/ft

Solve for : (d or Q)		Q
d =	2.000	ft

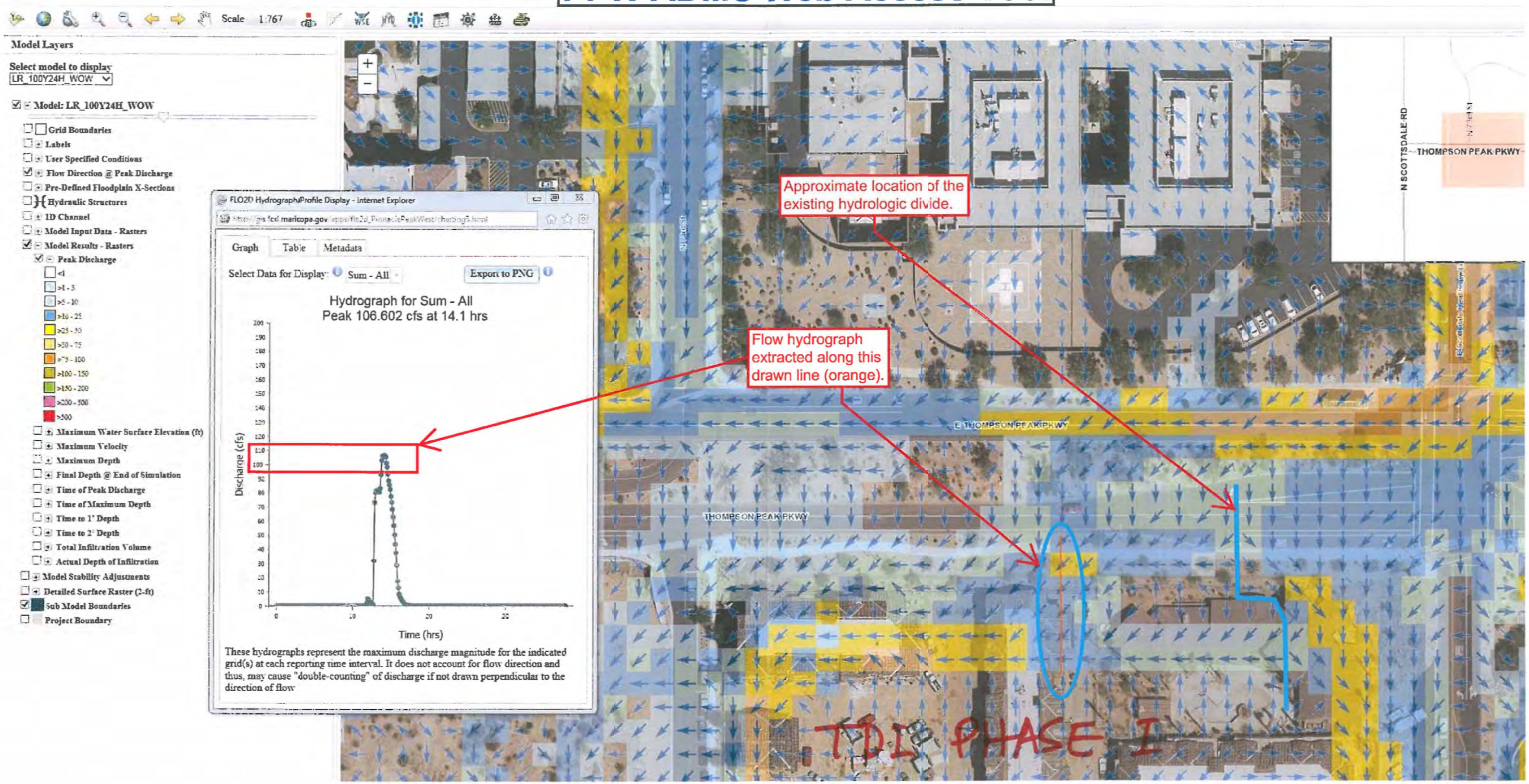
Qcalc.	119.4	cfs
WSEL	2.00	ft
V_{chnl}	4.3	fps
Fr	0.50	---

HYDRAULIC SUMMARY:

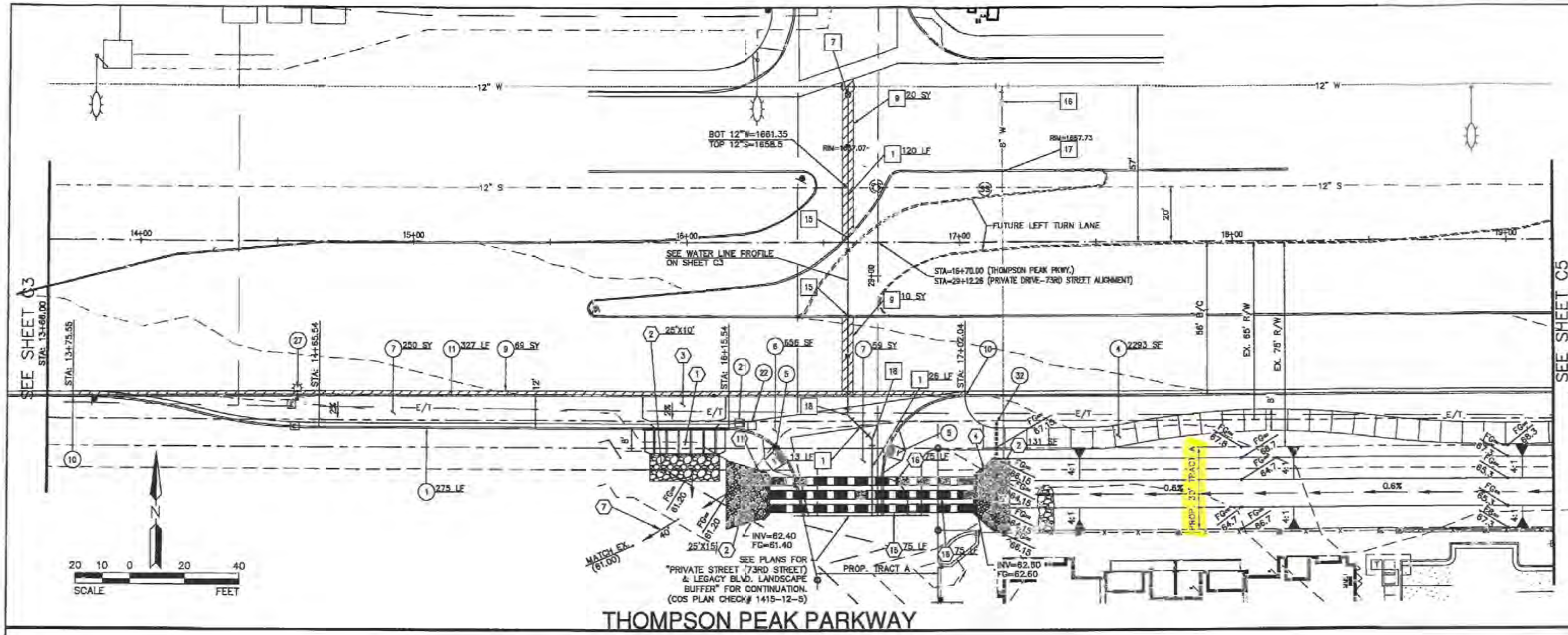
Calc. Flow (cfs)	Q_{calc}	119.4
L-Bank Flow (cfs)	Q_L	0.0
Chan Flow (cfs)	Q_{chan}	119.4
R-Bank Flow (cfs)	Q_R	0.0
Avg Section Vel (fps)	V_{avg}	3.3
Main Channel Vel (fps)	V_{chn}	4.3
Weighted Manning nn.	n_w	0.0426
Slope (ft/ft)	S	0.0060
Max Flow Depth (ft)	d	2.00
WSEL (ft)	WSEL	2.00
Min Elev (ft)	Min Elv	0.00
Area (sf)	A	36.0
Wet. Perim. (ft)	P	26.5
Hyd. Radius	R	1.36
Froude No.	Fr	0.50
L1 Floodplain Sta. (ft)	FP_{L1}	0.0
R2 Floodplain Sta. (ft)	FP_{R1}	26.0
Floodplain Width (ft)	W_{FP}	26.0

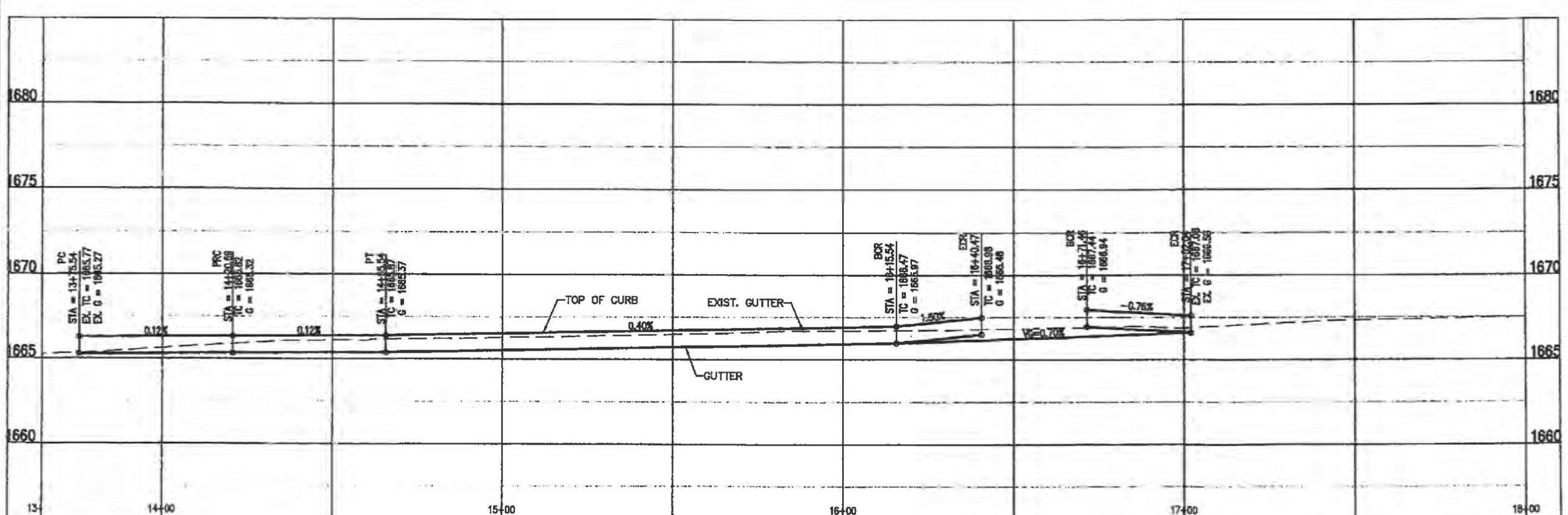


PPW ADMS Web Access Tool



PPW ADMS Flo 2D Viewer





PAVING NOTES

(1)	CONSTRUCT 6 - INCH VERTICAL CURB & GUTTER PER MAG STD. DET. 220 TYPE A.	275 LF
(4)	CONSTRUCT MEANDERING SIDWALK PER MAG STD. DET. 230. SEE LANDSCAPE PLANS FOR ADDITIONAL DETAILS.	2293 SF
(5)	CONSTRUCT SIDEWALK RAMP PER C.O.S. DETAIL 2234.	2 EA
(6)	CONSTRUCT 6 - FOOT WIDE CONCRETE VALLEY GUTTER PER C.O.S. DETAIL 2240.	856 SF
(7)	INSTALL NEW AC PAVEMENT - SEE DETAIL SHEET C2.	309 SY
(9)	SAWCUT AND REMOVE 2 - FOOT MINIMUM EXISTING ASPHALT PAVEMENT.	89 SY
(10)	MATCH EXISTING CURB AND GUTTER.	
(11)	REMOVE EXISTING CURB AND GUTTER.	327 LF
(21)	EXISTING CTV BOX TO BE RELOCATED BY OTHERS.	
(22)	EXISTING ELECTRIC BOX TO BE RELOCATED BY OTHERS.	
(27)	EXISTING STREET LIGHT TO BE RELOCATED PER PLANS BY WRIGHT ENGINEERING CORPORATION.	
(32)	LANDSCAPE IRRIGATION SLEEVES. SEE LANDSCAPE PLANS FOR DETAILS.	

STORM DRAIN NOTES

(1)	CONSTRUCT SCUPPER PER MAG STD DETS. 206-1 & 206.2 (WIDTH=22 FEET; EXCLUDE SPILLWAY).	1 EA
(2)	INSTALL EROSION PROTECTION PER DETAIL SHEET C2.	406 SF
(3)	REMOVE EXISTING SCUPPER.	1 EA
(4)	CONSTRUCT HEADWALL PER MAG STD. DET. 501-2 MODIFIED FOR 3-36" PIPES. WITH "U" TYPE WINGS (L1=10' 0"). INSTALL HANDRAIL PER C.O.S. DETAIL 2508	1 EA
(7)	GRADE TO DRAIN AS SHOWN	
(11)	CONTRUCT HEADWALL PER MAG STD. DET. 501-2 MODIFIED FOR 3 - 36" PIPES. WITH "U" TYPE WINGS (L1=3' 4") - INSTALL HANDRAIL PER C.O.S. DETAIL 2508	1 EA
(16)	INSTALL 36 - INCH RGRCP CLASS V STORM DRAIN PIPE	225 LF

WATER NOTES

1	INSTALL 12 - INCH D.I.P. (CLASS 350) WATER PIPE WITH JOINT RESTRAINTS PER MAG STD. DETS. 302 & 303.	159 LF
7	INSTALL 12"x12" T.S.V.B. & COVER PER MAG STD. DETS. 340 & 391-1-TYPE C.	1 EA
9	REMOVE AND REPLACE EXISTING PAVEMENT FOR UTILITY INSTALLATION PER C.O.S. DETAIL 2200.	30 SY
15	BORE UNDER EXISTING CONCRETE CURB.	2 EA
16	REMOVE EXISTING VALVE, BOX & COVER. PLUG EXISTING WATER LINE AT TEE.	1 EA
17	EXISTING 8 - INCH WATER LINE TO BE ABANDONED IN PLACE.	
18	INSTALL 12"X45° BEND.	2 EA

NO.	REVISION	DATE

Bowman CONSULTING

ONE SCOTTSDALE PU III

THOMPSON PEAK PARKWAY & SCOTTSDALE HEALTHCARE DRIVE

CIVIL IMPROVEMENT PLANS

PROJECT NO: 8522 | SCALE H: 1"=20 V: 1"=4' | SHEET NO. C4 OF 7 | FILE NO.

DRAWN: JAS | CHECK: JAS | APPROVED: GB

1415-12-4, 52-DR-2011, 359-SA-2011,376-SA-2011,377-SA-2011,378-SA-2011, Q.S. 40-45, 12-NP-1415

CAD FILE NAME: P:\8522 - One Scottsdale\8522-01-001 (ENG)\Engineering\Engineering Plans\TPP-SCHC\8522-EP-004-PPP.dwg

APPENDIX H – OFFSITE FLOW ANALYSIS

Date: March 4, 2020

To: Kaley Euson, PE, CEC

From: Hari Raghavan, PhD, PE, CFM, HELM

Re: **One Scottsdale FLO-2D Modeling Update Phase II**

Ms. Euson:

Civil and Environmental Consultants Inc. (CEC) contracted Holistic Engineering and Land Management Inc. (HELM) to perform the **One Scottsdale FLO-2D Modeling Update Phase II** project. The purpose of this memorandum is to document the details of the FLO-2D modeling updates performed as part of the **One Scottsdale FLO-2D Modeling Update Phase II** project and describe the procedure adopted in extracting the discharge estimates from the updated modeling.

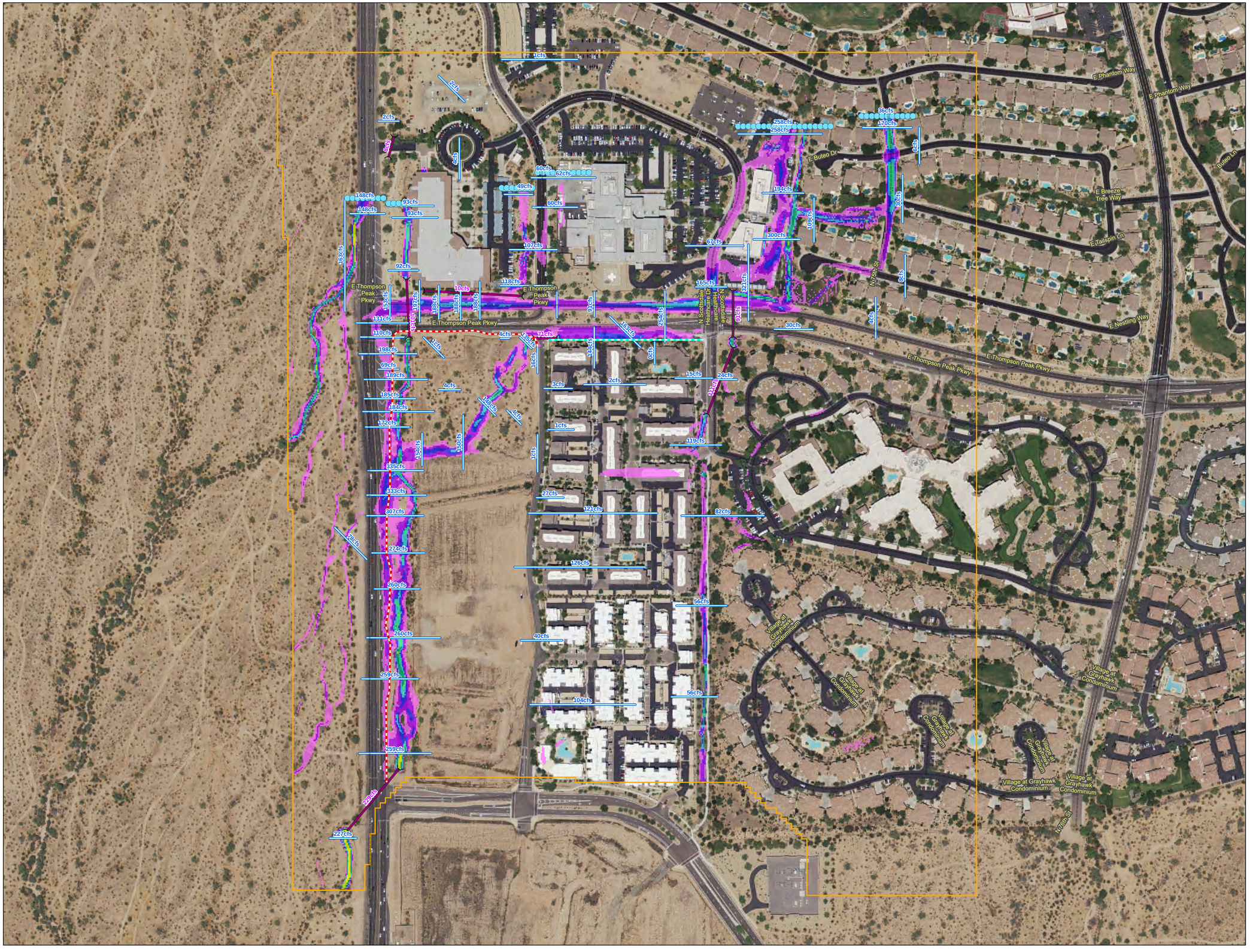
The **One Scottsdale FLO-2D Modeling Update Phase II** project involves drainage discharge estimation for a proposed site development at One Scottsdale Road located southeast of N. Scottsdale Road and N Thompson peak road intersection. The purpose of this project is to provide assistance in updating FLO-2D modeling and aid CEC in estimation of 100-year 24-hour discharges that may reach the project site along N Thompson Peak Road from the east. The existing conditions drainage is estimated using the planning level FLO-2D model developed by Flood Control District of Maricopa County (FCDMC) as part of the Pinnacle Peak West Area Drainage Master Plan (PPW ADMP). The following describes the procedure adopted for the FLO-2D modeling update and the extraction discharge estimates from the (updated) modeling results:

- The PPW ADMP without-walls 100-year 24-hour FLO-2D (LR_100Y24H_WOW) model was used as the base model for this project. A new FLO-2D model has been developed for the area of interest. Cell size is set at 5'. All relevant data were derived from the base model. Some of the data that derived from the base model are: Manning's roughness, Building blockages, Rainfall loss/Infiltration, Hydraulic structure, rainfall and flow inflows. Adjustments to the inputs were also made as needed to incorporate the data into this new 5' FLO-2D model.
- Additional floodplain cross-sections were added at locations upstream of the area of interest into the base LR_100Y24H_WOW model. This base model was run for a simulation duration of 18 hours which was deemed adequate to capture the peak discharges in the modeling results in the area of interest.
- Flow hydrographs were extracted from this base model run at selected cross-sections upstream of the area of interest.
- A 3x36" RCP culvert located under 73rd Street south of Thompson Peak intersection was added to model. Rating curve for this culvert was developed using HY8 culvert analysis program.
- A FLO-2D submodel was developed for the area of interest using most of the inputs from the base model with the following exceptions:

  - Inflow for the submodels were obtained from the flow hydrographs at upstream cross-sections from the base model (placed into the base model as explained above).
  - The One Scottsdale development site topography was updated based on topography received from CEC. The CAD topographic data was horizontally georeferenced to NAD83 using shifting to a visual match of the roadway alignment. A topographic surface was generated using the contours and the point elevation data. Grid average elevations were then derived from this surface. Grid elevations obtained in this manner were then used to update the grid cell elevations in the FLO-2D FPLAIN.DAT file.
  - The topography in the adjacent property located east of the One Scottsdale site has undergone significant changes since the original PPW FLO-2D model development. Historic aerials and a review of the topography used in the PPW FLO-2D model indicated a presence of a potential fill. As part of the submodel development, this fill was removed in an approximate manner. The topography outside of the deemed fill limits was retained as-is from the base PPW model.
  - The base PPW model consisted of 1-D channels in certain locations with that model boundary limits. However, the submodel boundary limits did not include any 1-D channels and, therefore, this option was turned off in CONT.DAT. Consequently, there are no CHAN.DAT, CHANBANK.DAT and XSEC.DAT inputs in the submodel.
  - Additional cross-sections were added to FPXSEC.DAT provide discharge estimates at various locations in the area of interest.
  - Floodwall of 6 feet height and curb of 6 inches height were included in the submodel using LEVEE.DAT. The floodwall height of 6-feet is assigned to block all flows from upstream. The curb height of 6 inches was assumed and set approximately along the curb edge as seen in the aerial. The LEVEE.DAT option simulates obstructions with weir type overtopping above the specified levee height. This approach is approximate in nature for the modeling of the curb.
  - Outflow nodes were assigned along the south and west outer boundaries of the submodel.
- The submodel was run for a storm duration of 18 hours and discharge estimates were extracted from the CROSSMAX.OUT at floodplain cross sections specified in the FPXSEC.DAT. Preliminary model runs with the FLOPRO.EXE from PPW ADMS displayed significant presence of numerical instabilities. It is anticipated that these numerical instabilities are due to reduction in the cell size to 5 ft. Therefore, the FLOPRO.EXE of FLO-2D Build No. 16.06.16 was used for the purpose of this project.
- Maps of the discharge and flow-depth estimates from the updated model are included with this memorandum as exhibits.

ONE SCOTTSDALE
UPDATED FLO-2D
SUB-MODELRESULTS

DISCHARGE ESTIMATES
(100-YR 24-HR NO WALLS)



Legend

- FLO-2D Submodel Boundary
- Inflow Cells
- Floodwall
- 6 inch Curb
- FP Cross-section Peak Discharge (cfs)
- Hydraulic Structure Peak Discharge (cfs)

Max. Combined Discharge

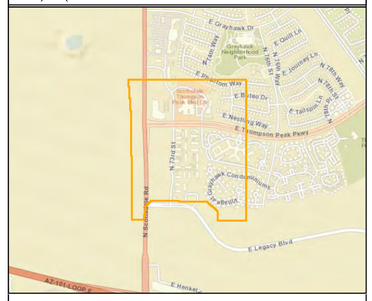
(cfs)

- 0 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200

N

0 250 500

Feet



ONE SCOTTDALE

Date: March 2020

Prepared For:

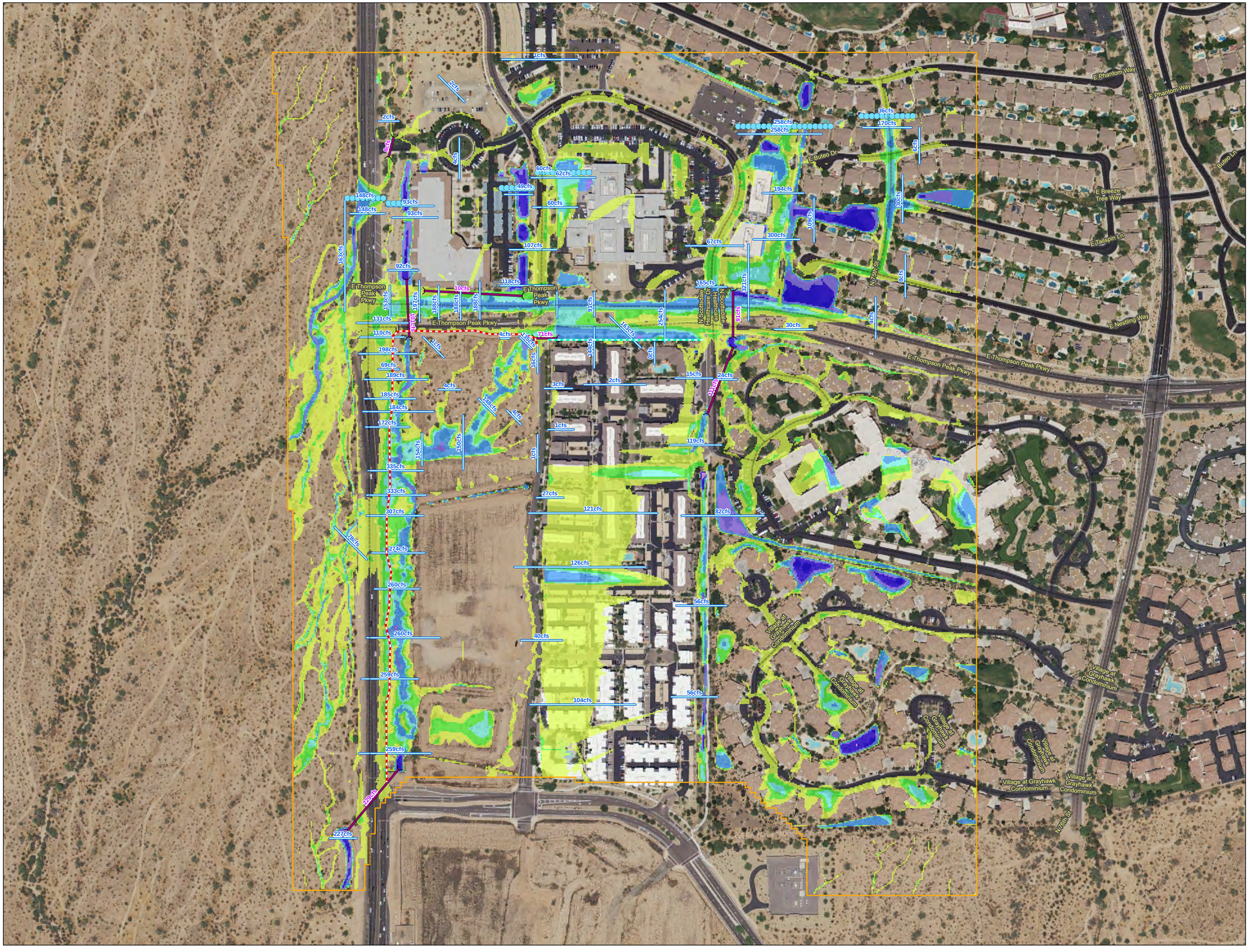
Civil & Environmental Consultants, Inc.

HELM

14040 North Cave Creek Road, Ste. 104
Phoenix, Arizona 85022

ONE SCOTTSDALE
UPDATED FLO-2D
SUB-MODELRESULTS

FLOW DEPTH ESTIMATES
(100-YR 24-HR NO WALLS)



Legend

- FLO-2D Submodel Boundary
- Inflow Cells
- Floodwall
- 6 inch Curb
- FP Cross-section Peak Discharge (cfs)
- Hydraulic Structure Peak Discharge (cfs)

Max. Flow Depth

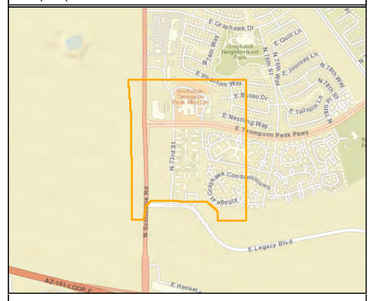
(ft)

- 0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 2
- 2 - 3
- 3 - 5
- 5 - 10
- 10 - 15
- > 15

N

0 250 500

Feet



ONE SCOTTDALE

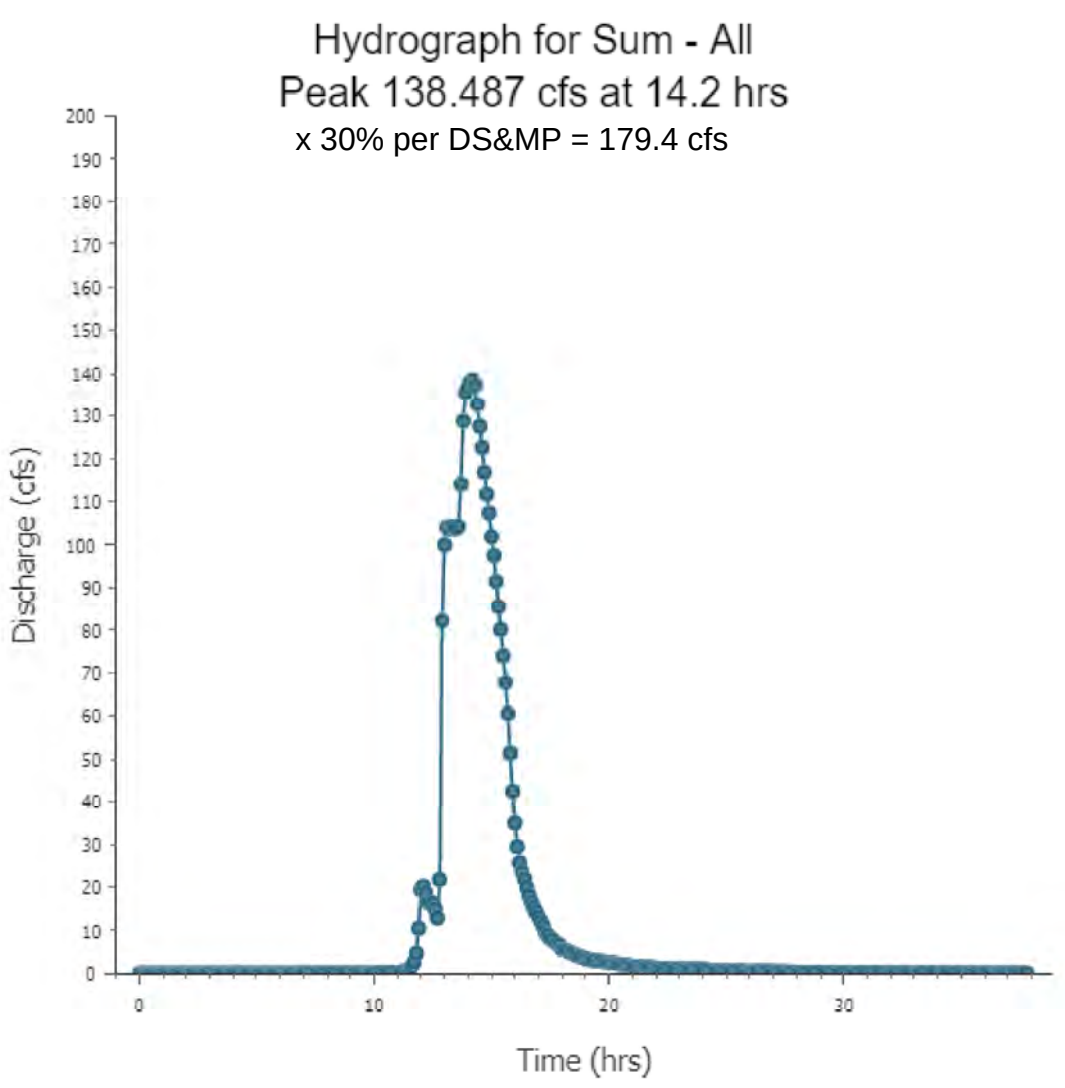
Date: February 2020

Prepared For:

Civil & Environmental Consultants, Inc.

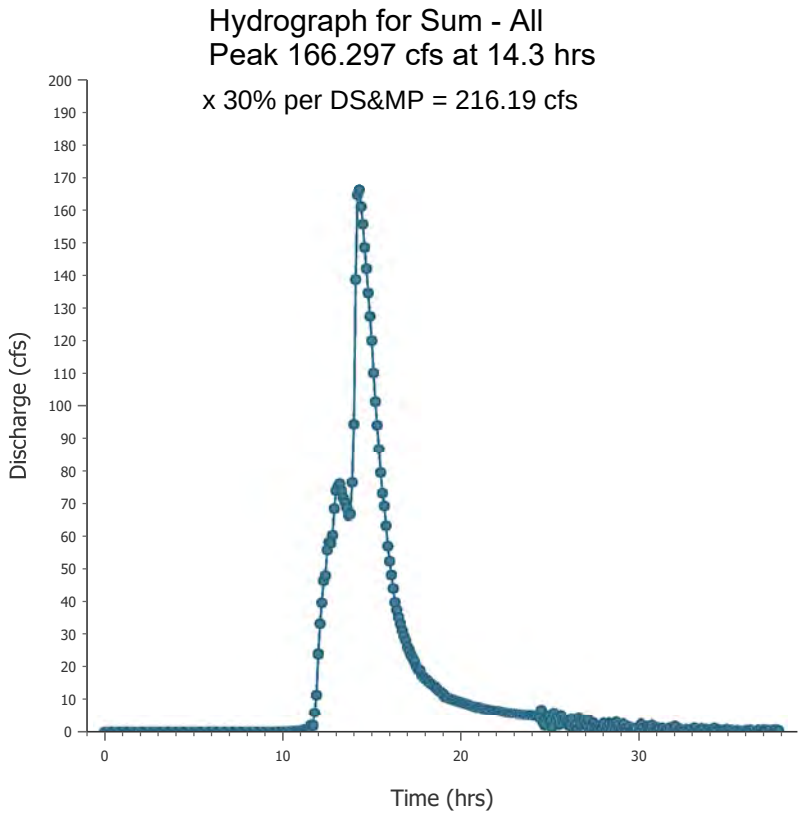
HELM

14040 North Cave Creek Road, Ste. 104
Phoenix, Arizona 85022


Hydrograph for Sum - All
Peak 138.487 cfs at 14.2 hrs
x 30% per DS&MP = 179.4 cfs
Discharge (cfs)
Time (hrs)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30

Read-me | Graph | Table

Select Data for Display: Sum - All



These hydrographs represent the maximum discharge magnitude for the indicated grid(s) at each reporting time interval. It does not account for flow direction and thus, may cause "double-counting" of discharge if not drawn perpendicular to the direction of flow

SCOTTSDALE ROAD

LEGACY BLVD

THOMPSON PEAK PKWY

73RD ST

EX. 8'x3' CONCRETE BOX CULVERT

EX. 3-36" RCCP Q100=101 CFS

EX. CB

FUTURE (3) 36" HDPE SD Q100=135 CFS

FUTURE 36" HDPE SD Q100=64 CFS

FUTURE 30" HDPE SD Q100=21.81 CFS

FUTURE 12" HDPE SD Q100=0.72 CFS

FUTURE 30" HDPE SD Q100=21.09 CFS

FUTURE 18" HDPE SD Q100=7.84 CFS

FUTURE 24" HDPE SD Q100=13.25 CFS

FUTURE 12" HDPE SD Q100=1.10 CFS

FUTURE 24" HDPE SD Q100=12.15 CFS

FUTURE 24" HDPE SD Q100=12.15 CFS

FUTURE 24" HDPE SD Q100=8.12 CFS

36" HDPE SD63 Q100=33.79 CFS V=15.39 FPS

36" HDPE SD62(1) Q100=33.79 CFS V=8.42 FPS

36" HDPE SD62 Q100=32.93 CFS V=8.37 FPS

18" HDPE SD64 Q100=6.87 CFS V=5.63 FPS

30" HDPE SD17 Q100=21.47 CFS V=6.89 FPS

18" HDPE SD65 Q100=4.72 CFS V=5.23 FPS

FUTURE 12" HDPE SD Q100=2.15 CFS

18" HDPE SD66 Q100=4.72 CFS V=5.23 FPS

18" HDPE SD3A Q100=2.55 CFS V=5.25 FPS

(4) 36" HDPE SD

18" HDPE SD3B Q100=11.55 CFS V=7.52 FPS

(4) 36" HDPE SD

42" HDPE SD43 Q100=83.97 CFS V=12.39 FPS

42" HDPE SD41 Q100=83.97 CFS V=12.39 FPS

42" HDPE SD39 Q100=82.89 CFS V=12.34 FPS

24" HDPE SD15 Q100=17.87 CFS V=9.64 FPS

18" HDPE SD24 Q100=7.85 CFS V=6.94 FPS

42" HDPE SD37 Q100=82.89 CFS V=13.05 FPS

42" HDPE SD35 Q100=66.54 CFS V=8.16 FPS

18" HDPE SD81 Q100=6.14 CFS V=8.06 FPS

18" HDPE SD82 Q100=6.14 CFS V=6.56 FPS

24" HDPE SD13 Q100=6.88 CFS V=5.79 FPS

FUTURE 12" HDPE SD Q100=3.39 CFS

FUTURE 18" HDPE SD Q100=8.77 CFS

FUTURE 18" HDPE SD Q100=7.84 CFS

42" HDPE SD84 Q100=82.76 CFS V=8.11 FPS

42" HDPE SD84(1) Q100=61.97 CFS V=8.10 FPS

FUTURE 24" HDPE SD Q100=9.57 CFS

42" HDPE SD86 Q100=61.97 CFS V=9.06 FPS

FUTURE 24" HDPE SD Q100=10.07 CFS

18" HDPE SD83 Q100=2.23 CFS V=4.33 FPS

EX. 36" HDPE Q100=45.40 CFS

FUTURE 12" HDPE SD Q100=0.72 CFS

FUTURE (3) 36" HDPE SD Q100=71 CFS

FF=46.60 PAD=45.93

FF=50.50 PAD=49.83

FF=54.40 PAD=53.73

FF=57.40 PAD=56.73

D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14

B1 B2 B3 B4 B5 B6 B7 B8 B9

C1 C2 C3 C4 C5 C6 C7 C8 C9

MH-1 MH-1A MH-1B MH-2 MH-3 MH-4 MH-7

CB-A CB-B CB-C CB-D CB-E CB-F CB-G CB-K CB-L CB-M CB-O CB-P

C.O. C.O. CB CB EX. C.O.

LEGEND:

- PROPOSED STORM DRAIN PIPE
- DIRECTION OF PROPOSED DRAINAGE
- D1 — PROPOSED DRAINAGE AREA IDENTIFICATION
- PROPOSED DRAINAGE AREA BOUNDARY
- PROPOSED CURB OPENING
- PROPOSED CATCH BASIN
- PROPOSED CULVERT AND HEADWALLS
- 24" RGRCP SD15 Q100=18.69 CFS — STORM DRAIN IDENTIFICATION

NORTH

SCALE IN FEET

0 60 120

Call at least two full working days before you begin excavation. ARIZONA 811 Arizona Blue Stake, Inc. Dial 8-1-1 or 1-800-STAKE-IT (782-5348) In Maricopa County: (602) 263-1100

*HAND SIGNATURE ON FILE

REGISTERED PROFESSIONAL ENGINEER CERTIFICATE NO. 37881 TIMOTHY J. POE Date Signed 01/20/21 ARIZONA U.S.A. CIVIL

Timothy J. Poe

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
11811 N. Tatum Blvd., Suite 3057 - Phoenix, AZ 85028
Ph: 602.760.2324 - 877.231.2324 - Fax: 602.760.2330
www.ceiinc.com

ONE SCOTTSDALE - PHASE 1
CIVIL IMPROVEMENT PLANS
SCOTTSDALE, AZ

DRAINAGE EXHIBIT

DATE:	01/20/21	LAR
DWG SCALE:	1"=60'	DRS
PROJECT NO.		180-168
APPROVED BY:		TJP

DRAWING NO.: DX

SHEET 1 OF 1

7-PP-2007#3 2062-20

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SCOTTSDALE ROAD

EX. 8'x3' CONCRETE BOX CULVERT Q100=229 CFS

Q_{100}= 58.56 CFS

Q_{100}= 39.55 CFS

Q_{100}= 268.55 CFS

SEC 7

(4) 36" HDPE SD Q100=265.55 CFS

(4) 36" HDPE SD Q100=261.55 CFS

18" HDPE SD Q100=11.55 CFS

(4) 36" HDPE SD Q100=250 CFS

Q_{100}= 13.9 CFS

Q_{100}= 82 CFS

SEC 6

SEC 5

Q_{100}= 250 CFS

Q_{100}= 236 CFS

Q_{100}= 101 CFS

FF=46.60 PAD=45.93

FF=50.50 PAD=49.83

FF=54.40 PAD=53.73

FF=57.40 PAD=56.73

D

A

C

B

A

POST DEVLEOPMENT FLOW INCREASE Q100=3 CFS

POST DEVLEOPMENT FLOW INCREASE Q100=4 CFS

SEC 4

SEC 3

SEC 2

SEC 1

Q_{100}= 135 CFS

Q_{100}= 84 CFS

LEGACY BLVD

THOMPSON PEAK PKWY

73RD ST

EX. 36" HDPE Q100=45.40 CFS

Q_{100}= 16 CFS

S431 LF @ 0.80%

LEGEND:

- PROPOSED STORM DRAIN PIPE
- DIRECTION OF PROPOSED DRAINAGE
- D1 — PROPOSED DRAINAGE AREA IDENTIFICATION
- PROPOSED DRAINAGE AREA BOUNDARY
- PROPOSED CURB OPENING
- PROPOSED CATCH BASIN
- PROPOSED CULVERT AND HEADWALLS

NORTH

SCALE IN FEET

0 60 120

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Timothy J. Poe

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11811 N. Tatum Blvd., Suite 3057 - Phoenix, AZ 85028
Ph: 602.760.2324 - 877.231.2324 - Fax: 602.760.2330
www.cecinc.com

ONE SCOTTSDALE - PHASE 1
CIVIL IMPROVEMENT PLANS
SCOTTSDALE, AZ

OFFSITE DRAINAGE EXHIBIT

DATE:	01/20/21	DRAWN BY:	LAR
DWG SCALE:	1"=60'	CHECKED BY:	DRS
PROJECT NO:			180-168
APPROVED BY:			TJP

DRAWING NO.: DX

SHEET 1 OF 1

7—PP—2007#3 2062—20

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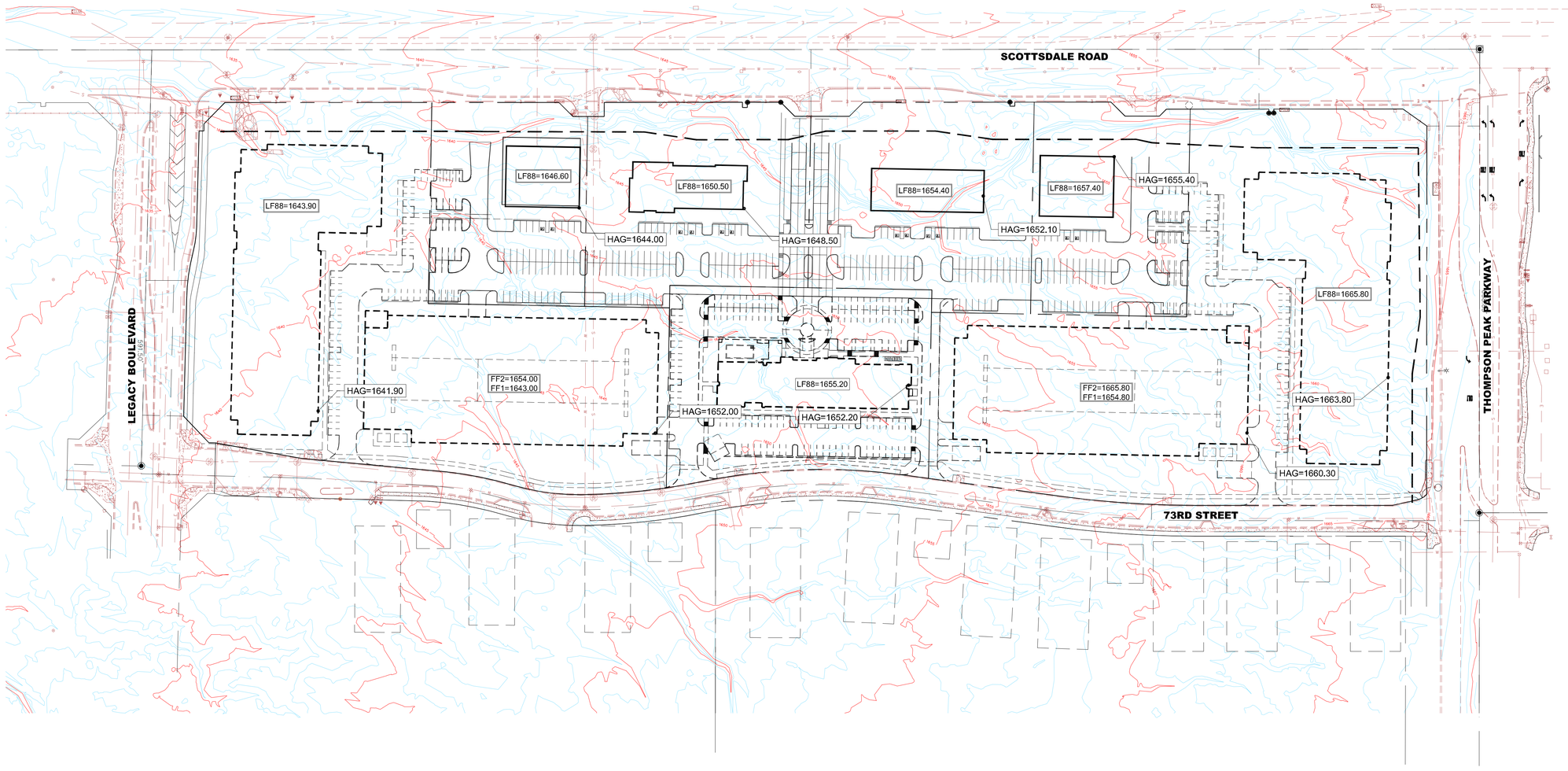

BENCHMARK

MARICOPA COUNTY HIGHWAY DEPARTMENT BRASS CAP IN HANDHOLE, SCOTTSDALE GPS POINT 2272, LOCATED AT THE INTERSECTION OF SCOTTSDALE ROAD AND THOMPSON PEAK PARKWAY, HAVING AN ELEVATION OF 1662.878, CITY OF SCOTTSDALE NAVD 88 DATUM.

LOWEST FLOOR ELEVATIONS AND FLOODPROOFING IN NONRESIDENTAL STRUCTURES

IN FLOOD HAZARD ZONE AO, THE LOWEST FLOOR SHALL BE ELEVATED TO OR ABOVE THE RFD, OR ELEVATED AT LEAST TWO (2) FEET ABOVE THE HIGHEST ADJACENT GRADE IF NO DEPTH NUMBER IS SPECIFIED, THIS SITE IS LOCATED IN ZONE AO WITH A DEPTH OF 1.0', VEL=3.0 FPS.

NONRESIDENTIAL CONSTRUCTION, NEW OR SUBSTANTIAL IMPROVEMENT, SHALL EITHER BE ELEVATED TO CONFORM WITH SECTION 37-25 ABOVE, OR, TOGETHER WITH ATTENDANT UTILITY AND SANITARY FACILITIES, SHALL:

(1) BE FLOODPROOFED BELOW THE ELEVATION RECOMMENDED ABOVE SO THAT THE STRUCTURE IS WATERTIGHT WITH WALL SUBSTANTIALLY IMPERMEABLE TO THE PASSAGE OF WATER;
(2) HAVE STRUCTURAL COMPONENTS CAPABLE OF RESISTING HYDROSTATIC AND HYDRODYNAMIC LOADS AND EFFECTS OF BUOYANCY; AND
(3) BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER OR ARCHITECT THAT THE STANDARDS OF THIS SECTION ARE SATISFIED. SUCH CERTIFICATION SHALL BE PROVIDED TO THE FLOODPLAIN ADMINISTRATOR.

NORTH

SCALE IN FEET
0 80 160

Call at least two full working days before you begin excavation.
ARIZONA811
Arizona Blue Stake, Inc.
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In Maricopa County (602) 263-1100

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REGISTERED PROFESSIONAL ENGINEER
CERTIFICATE NO.
37881
TIMOTHY J. POE
Date Signed 01/20/21
ARIZONA U.S.A.

Timothy J. Poe

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ONE SCOTTSDALE - PHASE 1
CIVIL IMPROVEMENT PLANS
SCOTTSDALE, AZ

HAG EXHIBIT

DRAWN BY:	LAR
CHECKED BY:	DRS
DWG SCALE:	1"=80'
PROJECT NO:	180-168
APPROVED BY:	T.JP
DATE:	01/20/21

DRAWING NO.:
HAG
SHEET 1 OF 1

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7-PP-2007#3 2062-20