CITY OF SCOTTSDALE

Drainage Reports

3 engineering

planning civil engineering surveying

SOUTHDALE

Preliminary Drainage Report

3 engineering Job #: 1872

June 29, 2020

COS #: 5-ZN-2020

5-ZN-2020
07/1/20

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SOUTHDALE

7000 E. MCDOWELL ROAD, SCOTTSDALE, AZ 85257

PRELIMINARY DRAINAGE REPORT

Prepared for:

Hawkins Companies LLC
4700 S. McClintock Drive #160
Scottsdale, Arizona 85257
Contact: Mark Mitchell
Phone: (480) 223-8239

Daniel G. Mann, P.E.

June 29, 2020

Submittal to:
City of Scottsdale
7447 E. Indian School Road, Suite 105
Scottsdale, AZ 85251

Prepared by:
3 engineering, LLC
6370 E. Thomas Road, Suite #200
Scottsdale, Arizona 85251
Contact: Dan G. Mann, P.E.

Job Number 1872

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Table of Contents

Appendix

1. Introduction

The purpose of this report is to present the existing and proposed drainage plan for the project site, Southdale. It is our opinion the proposed grading and drainage concept is in accordance with the City of Scottsdale drainage requirements.

The project site, Southdale, is located in the southeast quarter of Section 34, Township 2 North, Range 4 East of the Gila and Salt River Meridian, Maricopa County, Arizona within the City of Scottsdale. The project is located at 7000 E. McDowell Road, Scottsdale, AZ 85257. The site is bounded on the north by an apartment complex, on the east by a commercial development, on the south by McDowell Road, and on the west by 70th Street. See Appendix A for a vicinity map and Appendix G for offsite aerial photographs.

The existing zoning is C-3. The land is currently used as a commercial development. The proposed zoning is PUD. The City of Scottsdale 2001 General Plan shows the site as a Mixed-Use Neighborhood. The proposed site is a 267-unit apartment complex with office and retail space. The site currently lies within the "Zone X" floodplain designation.

2. Site Description

Existing

The project site currently consists of a fully developed commercial development with landscaping, drive aisles, parking, and utilities. The existing topography of the site generally slopes from northwest to southeast at approximately 1.0 percent (1.0%). The site currently does not retain stormwater and discharges flows to McDowell Road at the site outfall located at the southeast corner of the site. The site does not show any signs of containing waters of the US (404 washes). See Appendix F for an aerial photograph of the site.

Federal Emergency Management Agency (FEMA) Designation

According to FEMA Flood Insurance Rate Map (FIRM) # 04013C2235L, dated October 16, 2013, the site is located within the "Zone X" floodplain designation.

"Zone X" is described as follows:

"Areas determined to be outside the 0.2% annual chance floodplain."

Refer to the updated Flood Insurance Rate Map information in Appendix B.

Proposed

The proposed project includes constructing a 267-unit multi-family apartment complex with office and retail space. The site also includes drive aisles, surface parking, a parking structure, and landscape. See the proposed improvements in the Onsite Drainage Area Map in Appendix H.

3. Drainage Design - Offsite

The site is not considered to be affected by offsite flows. The Maricopa County Flood Control District Flo-2d maps from the Lower Indian bend Wash Study show offsite flows entering the site from the west. See Appendix K for Flo-2d maps. The physical conditions of the site differ from the assumptions in the Flo-2d analysis. The site is blocked from offsite flows and is discussed below.

Flows are generated within an offsite drainage area west of the site that travel east toward 70th Street through Coronado Road, Almeria Road and an alley south of Almeria Road. See Watershed Delineation and Topography Map in Appendix D. The peak discharge for the

drainage area was determined to be 23 cfs for the 100-year storm event using the FCDMC DDMSW HEC-1 Model, which is consistent with the flows shown in the Flo-2d map. The flow is conveyed to the west half of 70th Street which has a capacity of 18.15 cfs (cross section A). Therefore, 4.85 cfs breaks over to the east side of 70th Street. With a flow of 4.85 cfs, the water surface elevation in the east side of 70th street is at an elevation of 42.19 at the location of a 20-ft wide driveway to the apartment complex north of the site (cross section B). The back of the driveway has an elevation of 42.17. The breakover was modeled as a weir with a width of 20-ft and a depth of 0.02-ft, resulting in a flow of 0.17 cfs that enters the apartment complex (weir section B). The remaining 4.68 cfs travels south in the east half of 70th street, adjacent to the site, which has a capacity of 7.95 cfs (cross section C). There is a block wall/solid building walls that extend the entire property line between the project site and the apartment complex. There is an opening at a foot-gate along the wall, however it is 1.3-ft above the adjacent catch basin in the apartment complex drive aisle. Therefore, no offsite flows affect the site. There is a drywell in the alley behind the existing apartment complex to the northwest that dissipates any storm water in this area.

Refer to Appendix D for a Watershed Delineation and Topography map and Appendix E for Offsite Drainage Calculations including HEC-1 Results and Flowmaster Calculations. Cross section locations are shown in the Onsite Drainage Area Map, Appendix H.

Hydraulic Parameters

Bentley Flowmaster V8i was used to calculate the street capacity for sections in 70th Street for 100-year flows. The Flood Control District of Maricopa County Drainage Design Management System for Windows (DDMSW) was used to determine the flow for 100-year storm event . See results in Appendix E.

4. ***Drainage Design - Onsite***

The City of Scottsdale Design Standards and Policies Manual and the Drainage Design Manual for Maricopa County, Volume 1 was followed in designing on-site drainage facilities for the site.

Refer to the Preliminary Grading and Drainage Plan in Appendix L, the Onsite Drainage Map in Appendix H and Inlet Area Exhibit in Appendix I for the following discussion. The proposed site is required to provide retention for the pre- vs. post-project runoff for the 100-year, 2-hour storm or the 0.5" First Flush Storm (with weighted runoff coefficient), whichever is greater. The c value for the proposed site is less than the existing site, so the pre- vs. post- runoff method results in no required volume. Therefore, the First Flush Storm is used. There is no retention provided for the "true rooftop" areas with no amenities, see Appendix H for areas. See Appendix J for Onsite Drainage Calculations.

The required retention volume for Drainage Area A is 2,697 c.f. There is 2,764 c.f. provided in 220-L.F. of 48" storm drain pipe. Flows generated within this drainage area are conveyed via roof drains and surface flow to five catch basins that connect directly into the underground retention pipe. In a storm event greater than the 0.5" first flush the retention pipe will fill and overflow through the southernmost catch basin to McDowell Road. The system is modeled in Bentley StormCAD using a tail water elevation of 6" above the highpoint breakover at the driveway. A proposed dry-well will provide a dry up time of 36 hours with an infiltration rate of 0.02 cfs. Additionally, the two courtyard areas have secondary overflow catch basins elevated 0.25-ft above the primary catch basin. The overflow catch basins will not receive flow until the

underground retention is full or the primary catch basins are clogged. The overflow catch basin in the north courtyard, area A-4, is conveyed to a bubble-up outlet in the fire lane west of the building. The bubble-up structure is connected to the underground retention with a bleed off pipe and does not require an additional drywell. The overflow catch basin for the south courtyard, area A-5, outlets to the right of way in McDowell Road.

The required retention volume for Drainage Area B is 517 c.f. There is 702 c.f. provided in 143-L.F. of 30" storm drain pipe. Flows generated within this drainage area are conveyed via surface flow to two catch basins that connect directly into the underground retention pipe. In a storm event greater than the 0.5" first flush the retention pipe will fill and overflow through the north catch basin to 70th Street. The system is modeled in Bentley StormCAD using a tail water elevation of 0.13-ft above the highpoint breakover at the driveway. A proposed dry-well will provide a dry up time of 36 hours with an infiltration rate of 0.01 cfs.

The proposed finish floor of the new building is 1243.00, which is 12" above the highest adjacent catch basin inlet elevation of 1242.00. Therefore, the finish floor meets the requirement of 12" above the adjacent high-water elevation per the Maricopa County Drainage Standards. Additionally, the proposed finish floor elevations are greater than 14" above the site outfall of 1237.85, exceeding the Maricopa County Drainage Standard requirement.

Hydraulic Parameters

For onsite peak flows, the Rational Method will be used as follows:

$Q=CiA$

where: C = Composite runoff coefficient = weighted by ground cover

i = Intensity corresponding to T_c

T_c = Time of concentration (10 minute minimum used)

A = Area in acres

The 100-year runoff coefficient for this development to be used is 0.95 for impervious areas and 0.45 for pervious areas per the Maricopa County Drainage Policies and Standards. The rainfall is based upon the NOAA Atlas 14, Volume 1, Version 5, dated 2011, 90% confidence interval, mean partial duration time series data.

Determination of Catch Basin capacity operating as a weir by using the following formula: $Q=C_wxPxd^{1.5}$ x (1-CF)

where: C_w = Weir coefficient (3.0)
Q = Discharge Capacity (cfs)
P = Inlet Perimeter
d = Flow depth
CF = Clogging Factor. 40% clogging (or 0.40) used

Please refer to APPENDIX J for catch basin computations.

The on-site storm drain pipes are designed to accommodate flows resulting from the 100-year storm event. To calculate the capacity of the storm drain pipes, StormCAD V8i by Bentley Systems, Inc. was used, see results in Appendix J. The 100-year flow calculated for a given drainage area was assigned to the corresponding catch basin. Inlet areas are shown in the Inlet Area Exhibit in Appendix I. The tailwater for each outlet of the retention pipes were set above the adjacent driveway breakover elevations.

5. Conclusions

The following is a summary of the Southdale Preliminary Drainage Report.

- The site currently lies within the "Zone X" floodplain designation.
- Retention is provided for the 0.5" first flush storm for the site.
- No offsite flows affect the site.
- The finish floors are safe from the 100-year storm event.

6. References

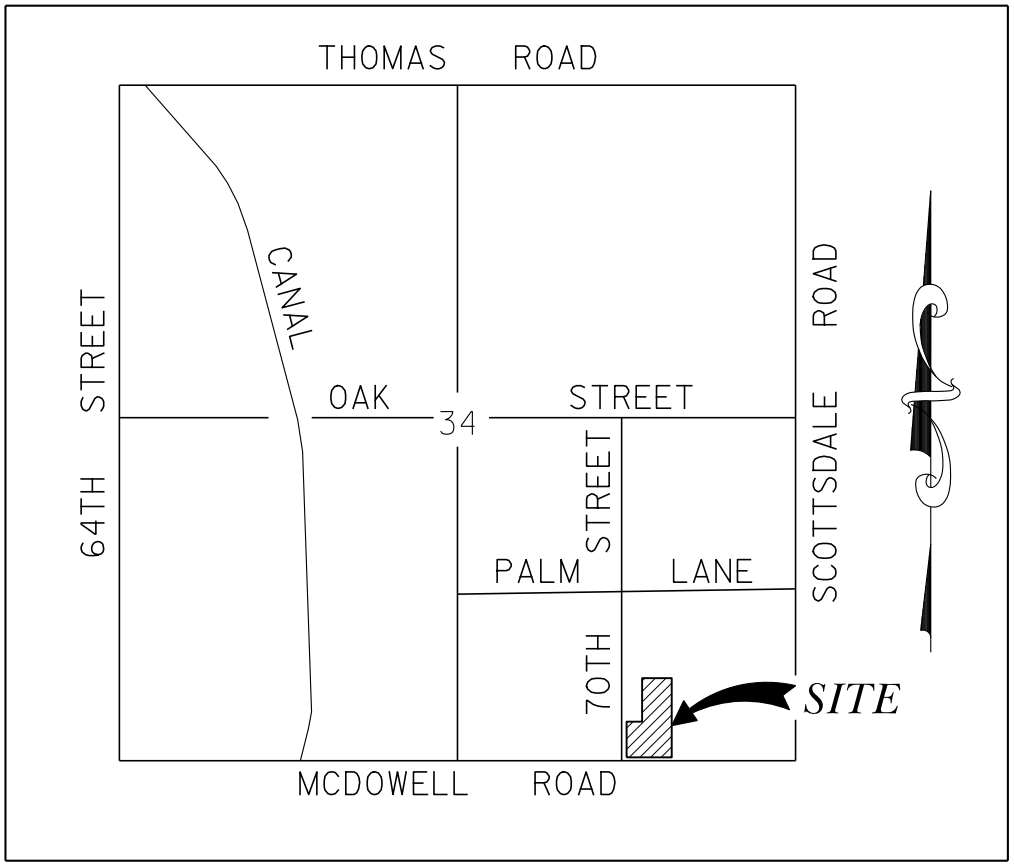
1. City of Scottsdale, *Design Standards and Policies Manual,* 2018.

2. Maricopa County, Drainage Policies and Standards, August 2018.

3. Maricopa County Flood Control District Flo-2d maps from the Lower Indian bend Wash Study

APPENDIX A

Vicinity Map



VICINITY MAP

N.T.S.

APPENDIX B

FEMA FIRM Map

5-ZN-2020
07/1/20

5-ZN-2020
07/1/20

APPENDIX C

Warning and Disclaimer of Liability

GRADING & DRAINAGE LANGUAGE

WARNING AND DISCLAIMER OF LIABILITY

The City's Stormwater and Floodplain Management Ordinance is intended to minimize the occurrence of losses, hazards and conditions adversely affecting the public health, safety and general welfare which might result from flooding.

The Stormwater and Floodplain Management Ordinance identifies floodplains, floodways, flood fringes and special flood hazard areas. However, a property outside these areas could be inundated by floods. Also, much of the city is a dynamic flood area; floodways, floodplains, flood fringes and special flood hazard areas may shift from one location to another, over time, due to natural processes.

WARNING AND DISCLAIMER OF LIABILITY

The flood protection provided by the Stormwater and Floodplain Management Ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Floods larger than the base flood can and will occur on rare occasions. Floodwater heights may be increased by constructed or natural causes. The Stormwater and Floodplain Management Ordinance does not create liability on the part of the city, any officer or employee thereof, or the federal, state or county government for any flood damages that result from reliance on the Ordinance or any administrative decision lawfully made thereunder.

Compliance with the Stormwater and Floodplain Management Ordinance does not ensure complete protection from flooding. Flood-related problems such as natural erosion, streambed meander, or constructed obstructions and diversions may occur and have an adverse effect in the event of a flood. You are advised to consult your own engineer or other expert regarding these considerations.

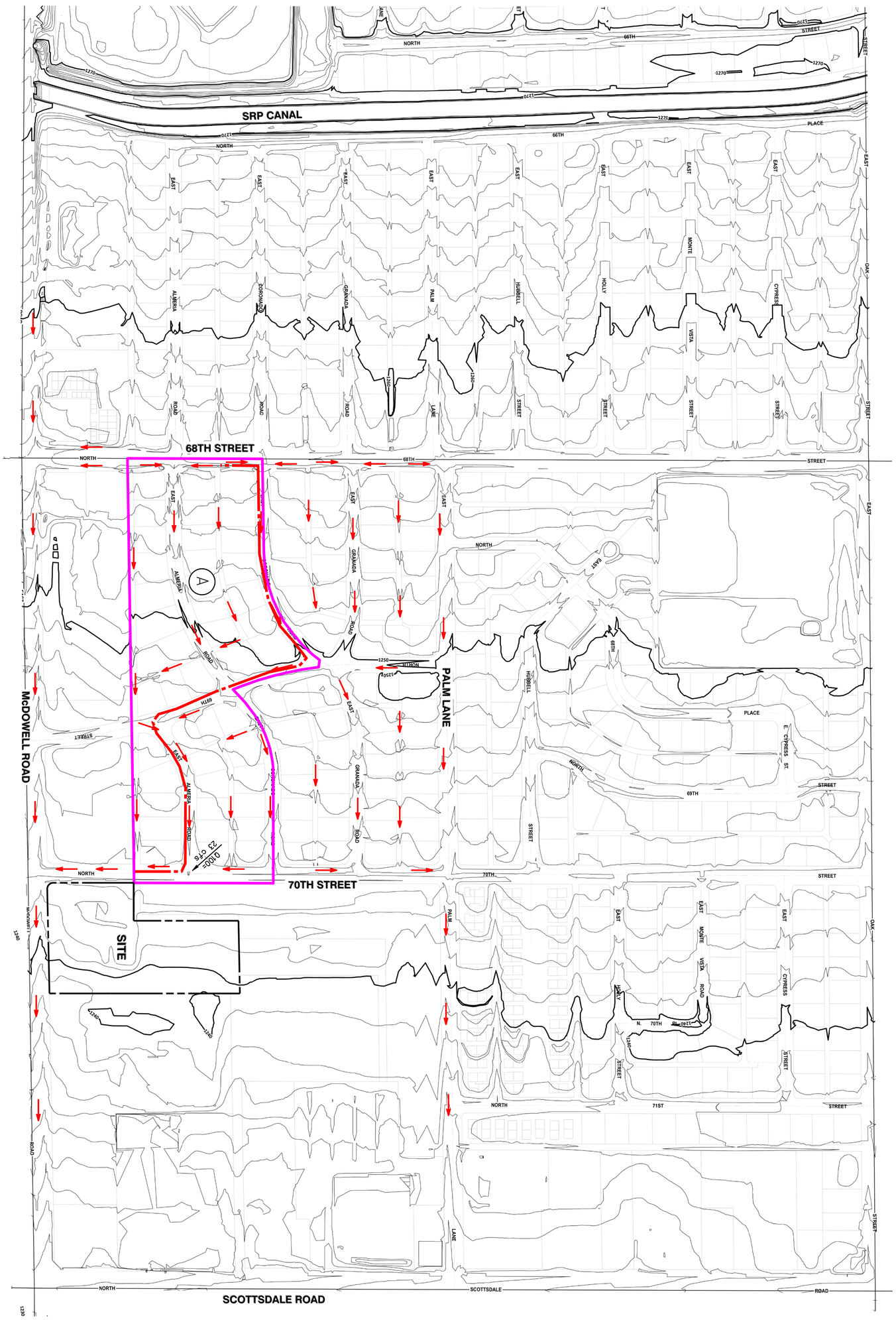
I have read and understand the above.

Plan Check # Owner Date

APPENDIX D

Watershed Delineation and Topography Map

C:\My SecuriSync\Projects\1872_70th_St_McDowell_Apartments\Reports\Preliminary Drainage\1872exb_watershed_delineation.dgn



SCALE: 1" = 150'

0' 75' 150' 300'

SHEET NO.	WS01 1 of 1
PROJECT NO.	1872
DATE	06/25/20

3 ENGINEERING, LLC
8777 E. ZURAS ROAD
SUITE 215
SCOTTSDALE, ARIZONA 85251
PHONE: (602) 354-4287
FAX: (602) 910-3220
WWW.3ENGINEERING.COM

3engineering
planning civil engineering surveying

SOUTHDALE

7000 E. MCDOWELL ROAD, SCOTTSDALE, AZ 85257

WATERSHED DELINEATION AND TOPOGRAPHY MAP

5-ZN-2020
07/120

APPENDIX E

Offsite Drainage Calculations

```
1****************************************                ****************************************
 *                                      *                *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                *    U.S. ARMY CORPS OF ENGINEERS      *
 *               JUN   1998             *                *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                *          609 SECOND STREET           *
 *                                      *                *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   10JUN20  TIME  09:11:31  *                *           (916) 756-1104             *
 *                                      *                *                                      *
 ****************************************                ****************************************

                                X     X  XXXXXXX   XXXXX          X
                                X     X  X        X     X        XX
                                X     X  X        X              X
                                XXXXXXX  XXXX     X        XXXXX  X
                                X     X  X        X              X
                                X     X  X        X     X        X
                                X     X  XXXXXXX   XXXXX         XXX

 THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                              HEC-1 INPUT                                                PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID        Flood Control District of Maricopa County
            2           ID        1872 SOUTHDALE -
            3           ID        100 YEAR
            4           ID        6 Hour  Storm
            5           ID        Unit Hydrograph: Clark
            6           ID        Storm: Multiple
            7           ID        06/10/2020
                        *DIAGRAM
            8           IT       5  1JAN99       0    2000
            9           IO       5
           10           IN      15
```

5-ZN-2020
07/1/20

```
                     *
            11       JD   2.540  0.0001
            12       PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            13       PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            14       PC   0.962   0.972   0.983   0.991   1.000
            15       JD   2.525  0.5000
            16       PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
            17       PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
            18       PC   0.962   0.972   0.983   0.991   1.000
                     *

            19       KK       1   BASIN
            20       BA   0.021
            21       LG    0.25    0.25    3.95    0.59      45
            22       UC   0.338   0.453
            23       UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
            24       UA     100
                     *
            25       ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    19           1

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *               JUN   1998             *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   10JUN20  TIME  09:11:31  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************
```

Flood Control District of Maricopa County
1872 SOUTHDALE -
100 YEAR
6 Hour Storm
Unit Hydrograph: Clark
Storm: Multiple

5-ZN-2020
07/1/20

```
 9 IO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                     NMIN           5  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1JAN99  STARTING DATE
                    ITIME        0000  STARTING TIME
                       NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      7JAN99  ENDING DATE
                   NDTIME        2235  ENDING TIME
                   ICENT           19  CENTURY MARK

                 COMPUTATION INTERVAL    0.08 HOURS
                      TOTAL TIME BASE  166.58 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT

11 JD          INDEX STORM NO. 1
                     STRM        2.54  PRECIPITATION DEPTH
                     TRDA        0.00  TRANSPOSITION DRAINAGE AREA

12 PI            PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.01      0.01      0.01      0.01      0.01      0.01      0.03
                    0.03      0.03      0.05      0.05      0.05      0.15      0.15      0.15      0.03      0.03
                    0.03      0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00

15 JD          INDEX STORM NO. 2
                     STRM        2.53  PRECIPITATION DEPTH
                     TRDA        0.50  TRANSPOSITION DRAINAGE AREA

16 PI            PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03
0.03	0.03	0.05	0.05	0.05	0.15	0.15	0.15	0.03	0.03
0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00								

1

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

		PEAK	TIME OF	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN	MAXIMUM	TIME OF
OPERATION	STATION	FLOW	PEAK	6-HOUR	24-HOUR	72-HOUR	AREA	STAGE	MAX STAGE
HYDROGRAPH AT									
+	1	23.	4.17	4.	1.	0.	0.02		

*** NORMAL END OF HEC-1 ***

Map Scale: 1:2,240 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

5-ZN-2020
07/1/20

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Eastern Maricopa and Northern Pinal Counties Area, Arizona
Survey Area Data: Version 12, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 1, 2018—Jun 1, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
LaA	Laveen loam, 0 to 1 percent slopes	1.9	14.2%
RiA	Rillito gravelly loam, 0 to 1 percent slopes	11.7	85.8%
Totals for Area of Interest		**13.7**	**100.0%**

Cross Section for 70th Street Section A

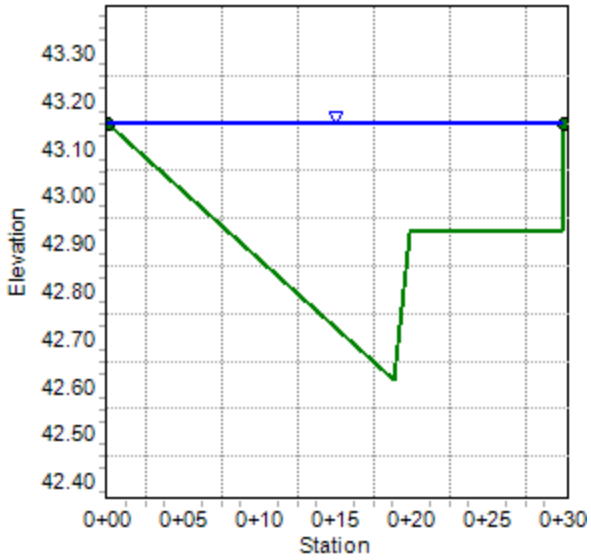
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.25000	%
Normal Depth	0.54	ft
Discharge	18.15	ft³/s

Cross Section Image



5-ZN-2020
07/1/20

Worksheet for 70th Street Section A

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.25000	%
Normal Depth	0.54	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	43.15
0+19	42.61
0+20	42.92
0+30	42.92
0+30	43.15

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 43.15)	(0+30, 43.15)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	18.15	ft³/s
Elevation Range	42.61 to 43.15 ft	
Flow Area	7.83	ft²
Wetted Perimeter	30.28	ft
Hydraulic Radius	0.26	ft
Top Width	30.00	ft
Normal Depth	0.54	ft
Critical Depth	0.50	ft

5-ZN-2020
07/1/20

Worksheet for 70th Street Section A

Results

Critical Slope		0.00405	ft/ft
Velocity		2.32	ft/s
Velocity Head		0.08	ft
Specific Energy		0.62	ft
Froude Number		0.80	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.54	ft
Critical Depth	0.50	ft
Channel Slope	0.25000	%
Critical Slope	0.00405	ft/ft

Cross Section for 70th Street Section B

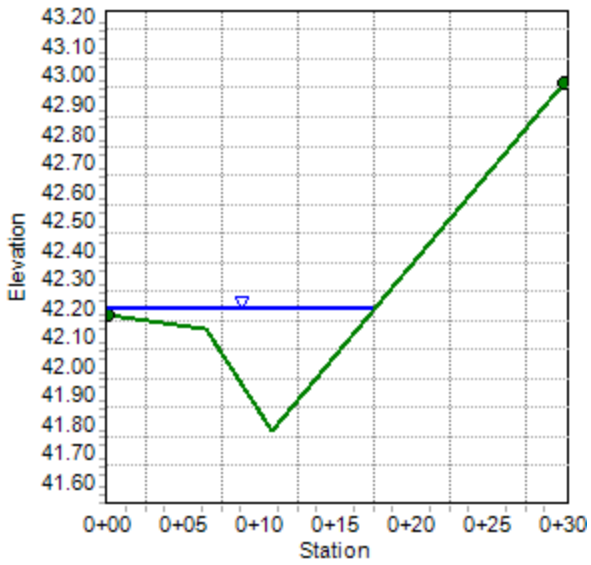
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.25000	%
Normal Depth	0.42	ft
Discharge	4.85	ft³/s

Cross Section Image



5-ZN-2020
07/1/20

Worksheet for 70th Street Section B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.25000	%
Discharge	4.85	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	42.17
0+06	42.12
0+11	41.77
0+30	42.97

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 42.17)	(0+30, 42.97)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.42	ft
Elevation Range	41.77 to 42.97 ft	
Flow Area	2.85	ft²
Wetted Perimeter	17.61	ft
Hydraulic Radius	0.16	ft
Top Width	17.56	ft
Normal Depth	0.42	ft
Critical Depth	0.39	ft
Critical Slope	0.00471	ft/ft

5-ZN-2020
07/1/20

Worksheet for 70th Street Section B

Results

Velocity		1.70	ft/s
Velocity Head		0.04	ft
Specific Energy		0.47	ft
Froude Number		0.74	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.39	ft
Channel Slope	0.25000	%
Critical Slope	0.00471	ft/ft

5-ZN-2020
07/1/20

Cross Section for Section B Weir

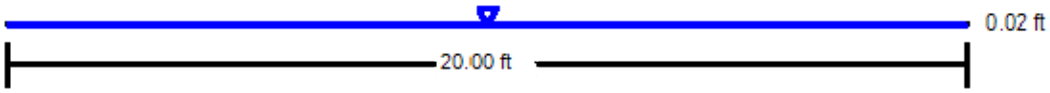
Project Description

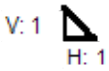
Solve For	Discharge

Input Data

Discharge	0.17	ft³/s
Headwater Elevation	0.02	ft
Crest Elevation	0.00	ft
Tailwater Elevation	0.00	ft
Weir Coefficient	3.00	US
Crest Length	20.00	ft
Number Of Contractions	0	

Cross Section Image





5-ZN-2020
07/1/20

Worksheet for Section B Weir

Project Description

Solve For	Discharge

Input Data

Headwater Elevation	0.02	ft
Crest Elevation	0.00	ft
Tailwater Elevation	0.00	ft
Weir Coefficient	3.00	US
Crest Length	20.00	ft
Number Of Contractions	0	

Results

Discharge	0.17	ft^3/s
Headwater Height Above Crest	0.02	ft
Tailwater Height Above Crest	0.00	ft
Flow Area	0.40	ft^2
Velocity	0.42	ft/s
Wetted Perimeter	20.04	ft
Top Width	20.00	ft

5-ZN-2020
07/1/20

Cross Section for 70th Street Section C

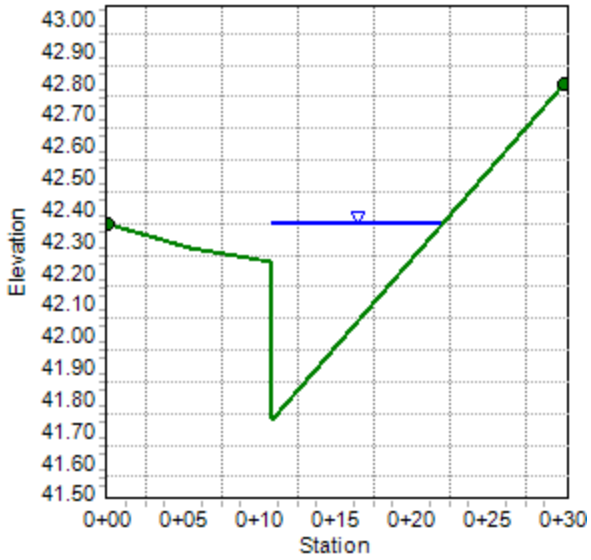
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.25000	%
Normal Depth	0.62	ft
Discharge	7.95	ft³/s

Cross Section Image



5-ZN-2020
07/1/20

Worksheet for 70th Street Section C

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.25000	%
Normal Depth	0.62	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	42.35
0+05	42.27
0+11	42.23
0+11	41.73
0+30	42.79

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 42.35)	(0+30, 42.79)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	7.95	ft³/s
Elevation Range	41.73 to 42.79 ft	
Flow Area	4.24	ft²
Wetted Perimeter	22.55	ft
Hydraulic Radius	0.19	ft
Top Width	22.03	ft
Normal Depth	0.62	ft
Critical Depth	0.57	ft

5-ZN-2020
07/1/20

Worksheet for 70th Street Section C

Results

Critical Slope		0.00451	ft/ft
Velocity		1.88	ft/s
Velocity Head		0.05	ft
Specific Energy		0.67	ft
Froude Number		0.75	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.57	ft
Channel Slope	0.25000	%
Critical Slope	0.00451	ft/ft

APPENDIX F

Aerial Site Photographs

1"=80'

5-ZN-2020

07/1/20

SOUTHDALE

7000 E. MCDOWELL ROAD, SCOTTSDALE, AZ 85257

AERIAL SITE PHOTOGRAPHS

3engineering

planning civil engineering surveying

3 ENGINEERING, LLC
6370 E. THOMAS ROAD, SUITE # 200- PHOENIX, ARIZONA 85251
PHONE: (602) 334-4387 - FAX: (602) 490-3230
WWW.3ENGINEERING.COM

DATE:	PROJECT NO.
04/09/20	1872

APPENDIX G

Offsite Aerial Photographs

1" = 600'

SOUTHDALE

7000 E. MCDOWELL ROAD, SCOTTSDALE, AZ 85257

AERIAL SITE PHOTOGRAPHS

3engineering
planning civil engineering surveying

3 ENGINEERING, LLC
6370 E. THOMAS ROAD, SUITE # 200- PHOENIX, ARIZONA 85251
PHONE: (602) 334-4387 - FAX: (602) 490-3230
WWW.3ENGINEERING.COM

DATE:	PROJECT NO.
04/09/20	1872

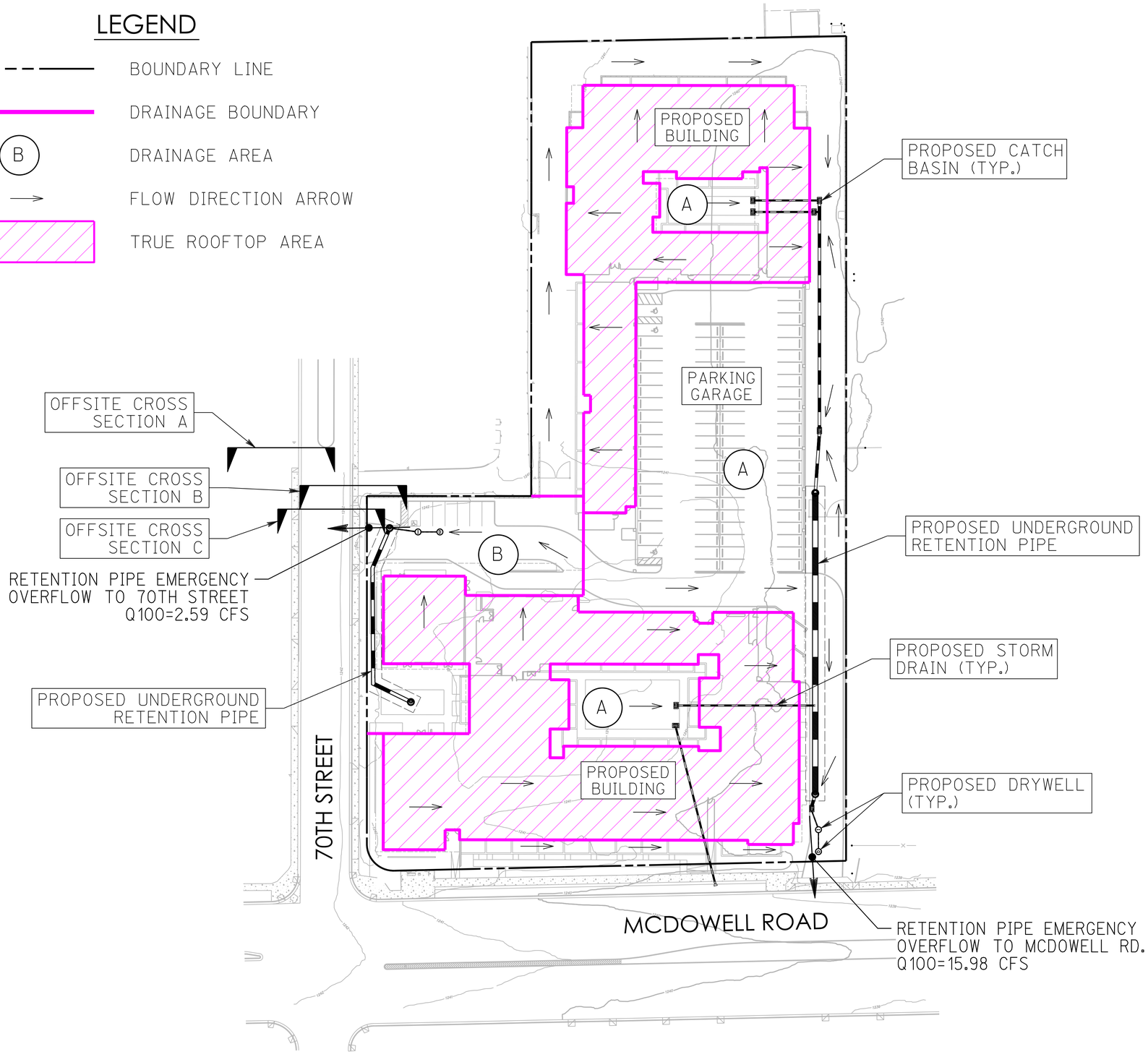
5-ZN-2020
07/1/20

APPENDIX H

Onsite Drainage Area Map

LEGEND

- BOUNDARY LINE
- DRAINAGE BOUNDARY
- (B) DRAINAGE AREA
- FLOW DIRECTION ARROW
- TRUE ROOFTOP AREA



SCALE: 1"= 80'

0' 40' 80' 160'

SOUTHDALE

7000 E. MCDOWELL ROAD, SCOTTSDALE, AZ 85257

DRAINAGE AREA MAP

3engineering
planning civil engineering surveying

3 ENGINEERING, LLC
6370 E. THOMAS ROAD, SUITE # 200 - SCOTTSDALE, ARIZONA 85251
PHONE: (602) 334-4857 - FAX: (602) 496-3230
WWW.3ENGINEERING.COM

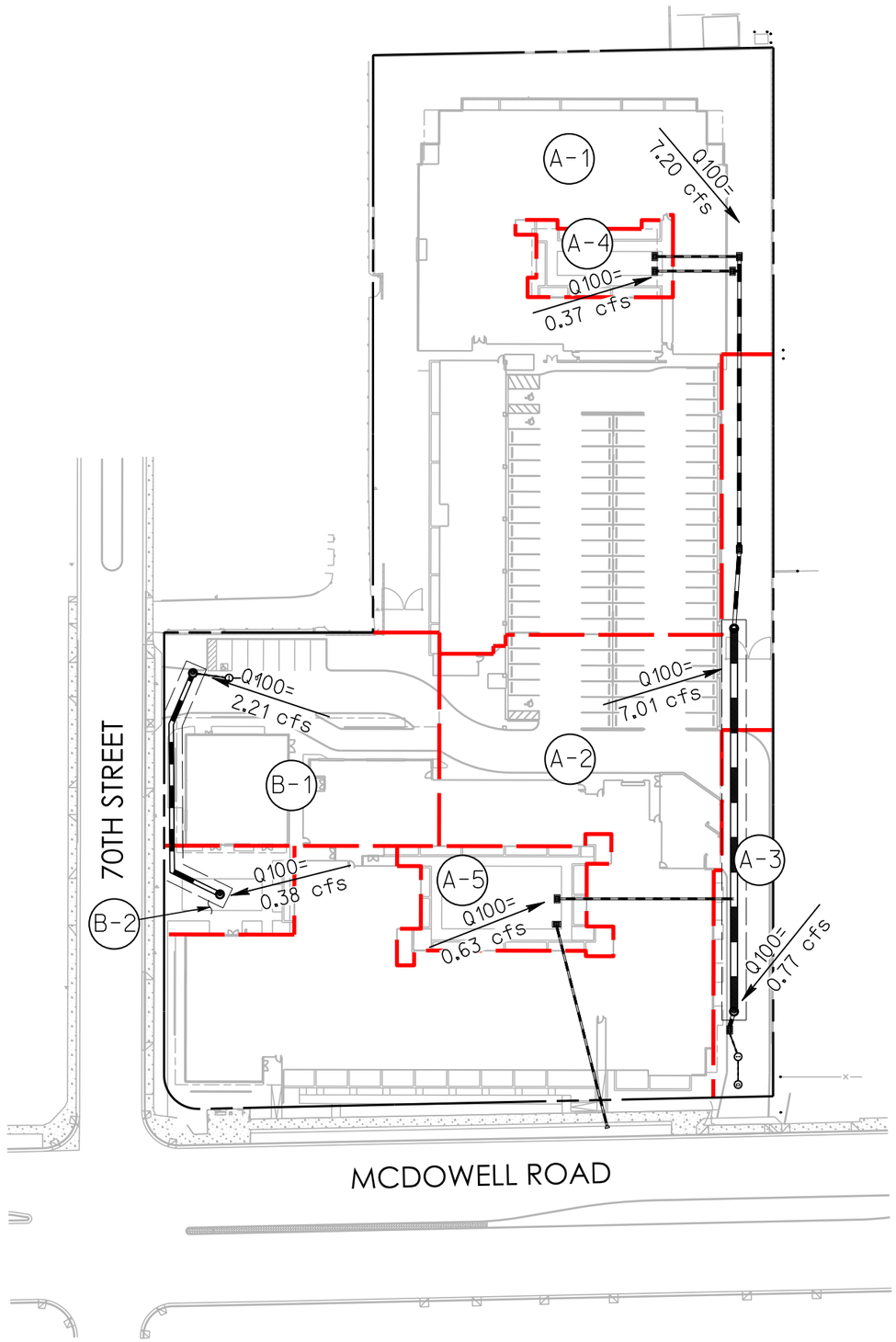
DATE: 06/29/20

PROJECT NO. 1872

5-ZN-2020
07/1/20

APPENDIX I

Inlet Area Exhibit



LEGEND

- BOUNDARY LINE
- DRAINAGE BOUNDARY
- DRAINAGE SUB-BOUNDARY
- (B-1) DRAINAGE INLET SUB-AREA

SCALE: 1"= 80'

0' 40' 80' 160'

SOUTHDALE

7000 E. MCDOWELL ROAD, SCOTTSDALE, AZ 85257

INLET AREA EXHIBIT

3engineering
planning civil engineering surveying

3 ENGINEERING, LLC
6370 E. THOMAS ROAD, SUITE #200 - SCOTTSDALE, ARIZONA 85251
PHONE: (602) 314-4867 - FAX: (602) 496-3230
WWW.3ENGINEERING.COM

DATE: 06/29/20

PROJECT NO. 1872

APPENDIX J

Onsite Drainage Calculations

Post-Development Rational Method Calculations

Sub-Area	Area	C_{10}	C_{100}	Tc	i_{10}	i_{100}	Q_{10}	Q_{100}
	(acre)	(weighted)	(weighted)	(min)	(in/hr)	(in/hr)	(cfs)	(cfs)
A-1	1.59	0.76	0.81	10	3.53	5.6	4.26	7.20
A-2	1.42	0.83	0.88	10	3.53	5.6	4.17	7.01
A-3	0.16	0.83	0.88	10	3.53	5.6	0.46	0.77
A-4	0.08	0.78	0.83	10	3.53	5.6	0.22	0.37
A-5	0.15	0.69	0.74	10	3.53	5.6	0.37	0.63
B-1	0.44	0.84	0.89	10	3.53	5.6	1.31	2.21
B-2	0.09	0.73	0.78	10	3.53	5.6	0.22	0.38

On-Site Retention for the First Flush Storm

Sub-Area	Area	C_{100}	P		Total Vol. Req.	Surface Vol. Prov.	U.G. Retention Provided	Total Vol. Prov.
	(acre)		(in)		(cf)	(cf)	(cf)	(cf)
A	1.96	0.76	0.50		2,697	-	2,764	2,764
B	0.35	0.82	0.50		517	-	702	702

PRE V. POST RETENTION CALCULATIONS

C = 0.95 (IMPERVIOUS), C = 0.45 (PERVIOUS)
P = 2.14 IN
AREA OF LOT = 171,290 SF

PRE (EXISTING)

AREA OF IMPERVIOUS = 161,857 SF
AREA OF PERVIOUS = 9,433 SF

$$\text{WEIGHTED C} = \left(\frac{(161{,}857 \times 0.95) + (9{,}433 \times 0.45)}{171{,}290}\right)$$

WEIGHTED C = 0.92

POST (PROPOSED)

AREA OF IMPERVIOUS = 134,825 SF
AREA OF PERVIOUS = 36,465 SF

$$\text{WEIGHTED C} = \left(\frac{(134{,}825 \times 0.95) + (36{,}465 \times 0.45)}{171{,}290}\right)$$

WEIGHTED C = 0.84

$$(0.84-0.92)\left(\frac{2.14}{12}\right)(171{,}290) = \boxed{0 \text{ CF REQUIRED}}$$

Grated Inlet Capacity - Weir Condition

Inlet Type	Inlet	Q_{100}	Inlet Capacity w/ 40% Clogging	d	Cw	P
		(cfs)	(cfs)	(ft)		(ft)
M.A.G. type "F"	A-1	7.20	7.53	0.50	3	11.83
M.A.G. type "F"	A-2	7.01	7.53	0.50	3	11.83
M.A.G. type "F"	A-3	0.77	7.53	0.50	3	11.83
M.A.G. type "F"	A-4	0.37	2.66	0.25	3	11.83
M.A.G. type "F"	A-5	0.63	2.66	0.25	3	11.83
30" Grated Inlet	B-1	2.21	5.00	0.50	3	7.85
30" Grated Inlet	B-2	0.38	3.71	0.41	3	7.85

Q=Cw*P*d^1.5

Cw= 3.0 weir coefficient
Q = discharge capacity
P = inlet perimeter
d = flow depth

Weighted C Coefficient Calculations

	Overall Area (s.f.)	Building & Parking Area (s.f.)	Landscape Area (s.f.)	Overall Area (Ac.)	C_{10}	C_{100}
A	85398	52,605	32,793	1.96	0.71	0.76
B	15049	11,269	3,779	0.35	0.77	0.82
A-1	69250	49,721	19,529	1.59	0.76	0.81
A-2	61955	53,296	8,658	1.42	0.83	0.88
A-3	6850	5,835	1,015	0.16	0.83	0.88
A-4	3408	2,618	790	0.08	0.78	0.83
A-5	6638	3,890	2,748	0.15	0.69	0.74
B-1	19371	16,912	2,459	0.44	0.84	0.89
B-2	3818	2,498	1,320	0.09	0.73	0.78

C=((Building & Hardscape Area x 0.95) + (Landscape Area x 0.45)) / Overall Area

C_{100} Building & Hardscape = 0.95
C_{100} Landscape = 0.45

Drywell Percolation Rates

Sub-Area	Total Basin Vol.	Dry-Up Time	# of Drywells Provided	Drywell Perc Rate Required
	(cf)	(hr)		(cf/s)
A	2,764	36.00	1	0.02
B	702	36.00	1	0.01

NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.4662°, Longitude: -111.93°
Elevation: 1237.91 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)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.180 (0.152-0.218)	0.235 (0.199-0.286)	0.321 (0.269-0.387)	0.386 (0.322-0.464)	0.475 (0.390-0.567)	0.544 (0.440-0.647)	0.613 (0.487-0.727)	0.684 (0.535-0.812)	0.780 (0.594-0.926)	0.853 (0.637-1.02)
10-min	0.274 (0.231-0.332)	0.359 (0.303-0.435)	0.488 (0.410-0.589)	0.588 (0.491-0.705)	0.722 (0.593-0.864)	0.827 (0.670-0.984)	0.933 (0.742-1.11)	1.04 (0.815-1.24)	1.19 (0.904-1.41)	1.30 (0.969-1.55)
15-min	0.340 (0.286-0.412)	0.444 (0.376-0.538)	0.606 (0.508-0.730)	0.729 (0.608-0.874)	0.895 (0.735-1.07)	1.02 (0.831-1.22)	1.16 (0.920-1.37)	1.29 (1.01-1.53)	1.47 (1.12-1.75)	1.61 (1.20-1.92)
30-min	0.457 (0.385-0.555)	0.598 (0.506-0.725)	0.815 (0.684-0.983)	0.982 (0.819-1.18)	1.21 (0.990-1.44)	1.38 (1.12-1.64)	1.56 (1.24-1.85)	1.74 (1.36-2.06)	1.98 (1.51-2.35)	2.17 (1.62-2.58)
60-min	0.566 (0.477-0.686)	0.740 (0.626-0.897)	1.01 (0.847-1.22)	1.22 (1.01-1.46)	1.49 (1.23-1.78)	1.71 (1.39-2.03)	1.93 (1.53-2.29)	2.15 (1.68-2.55)	2.45 (1.87-2.91)	2.68 (2.00-3.19)
2-hr	0.657 (0.563-0.781)	0.851 (0.728-1.01)	1.14 (0.974-1.35)	1.36 (1.15-1.61)	1.67 (1.39-1.95)	1.90 (1.56-2.22)	2.14 (1.73-2.50)	2.38 (1.89-2.78)	2.71 (2.10-3.17)	2.96 (2.25-3.49)
3-hr	0.712 (0.606-0.850)	0.912 (0.781-1.10)	1.20 (1.02-1.44)	1.43 (1.21-1.70)	1.75 (1.46-2.07)	2.00 (1.65-2.36)	2.27 (1.83-2.68)	2.55 (2.02-3.00)	2.94 (2.26-3.46)	3.25 (2.43-3.84)
6-hr	0.857 (0.745-1.00)	1.09 (0.949-1.27)	1.40 (1.21-1.63)	1.64 (1.42-1.91)	1.98 (1.68-2.29)	2.24 (1.88-2.58)	2.52 (2.07-2.90)	2.80 (2.26-3.23)	3.18 (2.51-3.68)	3.49 (2.68-4.05)
12-hr	0.961 (0.843-1.11)	1.22 (1.07-1.41)	1.54 (1.35-1.78)	1.80 (1.56-2.07)	2.15 (1.84-2.47)	2.41 (2.05-2.77)	2.69 (2.25-3.08)	2.96 (2.44-3.41)	3.34 (2.68-3.85)	3.63 (2.86-4.22)
24-hr	1.16 (1.04-1.30)	1.47 (1.32-1.65)	1.90 (1.70-2.13)	2.25 (2.00-2.51)	2.72 (2.41-3.04)	3.10 (2.73-3.45)	3.49 (3.05-3.89)	3.90 (3.38-4.34)	4.46 (3.82-4.97)	4.90 (4.16-5.47)
2-day	1.25 (1.12-1.40)	1.60 (1.44-1.79)	2.10 (1.88-2.35)	2.50 (2.23-2.79)	3.06 (2.71-3.41)	3.50 (3.08-3.91)	3.97 (3.48-4.44)	4.45 (3.87-4.98)	5.14 (4.41-5.76)	5.68 (4.83-6.40)
3-day	1.32 (1.19-1.48)	1.69 (1.52-1.90)	2.22 (1.99-2.49)	2.65 (2.37-2.96)	3.26 (2.89-3.63)	3.74 (3.30-4.17)	4.26 (3.73-4.75)	4.80 (4.17-5.36)	5.56 (4.77-6.21)	6.17 (5.24-6.92)
4-day	1.39 (1.25-1.56)	1.78 (1.60-2.00)	2.35 (2.10-2.62)	2.81 (2.50-3.13)	3.46 (3.07-3.85)	3.98 (3.51-4.43)	4.55 (3.98-5.06)	5.14 (4.46-5.73)	5.98 (5.12-6.67)	6.66 (5.65-7.45)
7-day	1.54 (1.38-1.73)	1.97 (1.77-2.20)	2.60 (2.32-2.90)	3.10 (2.77-3.47)	3.82 (3.39-4.27)	4.40 (3.88-4.91)	5.02 (4.39-5.60)	5.67 (4.92-6.33)	6.60 (5.65-7.36)	7.34 (6.22-8.21)
10-day	1.68 (1.50-1.87)	2.14 (1.92-2.40)	2.83 (2.53-3.15)	3.38 (3.01-3.76)	4.14 (3.68-4.61)	4.76 (4.20-5.30)	5.42 (4.75-6.03)	6.11 (5.31-6.80)	7.07 (6.07-7.88)	7.85 (6.67-8.76)
20-day	2.06 (1.85-2.29)	2.65 (2.38-2.94)	3.49 (3.13-3.88)	4.13 (3.70-4.58)	4.99 (4.45-5.54)	5.65 (5.02-6.27)	6.33 (5.59-7.03)	7.01 (6.16-7.79)	7.93 (6.91-8.84)	8.64 (7.47-9.64)
30-day	2.40 (2.15-2.67)	3.09 (2.78-3.44)	4.07 (3.65-4.51)	4.82 (4.31-5.33)	5.82 (5.18-6.44)	6.59 (5.84-7.28)	7.37 (6.51-8.15)	8.17 (7.18-9.04)	9.25 (8.07-10.2)	10.1 (8.71-11.2)
45-day	2.79 (2.51-3.10)	3.59 (3.24-3.99)	4.73 (4.26-5.25)	5.57 (5.00-6.18)	6.68 (5.98-7.41)	7.52 (6.70-8.33)	8.36 (7.42-9.27)	9.20 (8.13-10.2)	10.3 (9.04-11.5)	11.1 (9.72-12.4)
60-day	3.09 (2.79-3.42)	3.99 (3.60-4.42)	5.25 (4.73-5.81)	6.16 (5.54-6.81)	7.35 (6.59-8.13)	8.23 (7.35-9.11)	9.11 (8.11-10.1)	9.97 (8.84-11.0)	11.1 (9.78-12.3)	11.9 (10.5-13.3)

[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

5-ZN-2020
07/1/20

NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.4662°, Longitude: -111.93°
Elevation: 1237.91 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	**2.16** (1.82-2.62)	**2.82** (2.39-3.43)	**3.85** (3.23-4.64)	**4.63** (3.86-5.57)	**5.70** (4.68-6.80)	**6.53** (5.28-7.76)	**7.36** (5.84-8.72)	**8.21** (6.42-9.74)	**9.36** (7.13-11.1)	**10.2** (7.64-12.2)
10-min	**1.64** (1.39-1.99)	**2.15** (1.82-2.61)	**2.93** (2.46-3.53)	**3.53** (2.95-4.23)	**4.33** (3.56-5.18)	**4.96** (4.02-5.90)	**5.60** (4.45-6.64)	**6.25** (4.89-7.41)	**7.12** (5.42-8.46)	**7.79** (5.81-9.28)
15-min	**1.36** (1.14-1.65)	**1.78** (1.50-2.15)	**2.42** (2.03-2.92)	**2.92** (2.43-3.50)	**3.58** (2.94-4.28)	**4.10** (3.32-4.88)	**4.63** (3.68-5.49)	**5.16** (4.04-6.12)	**5.88** (4.48-6.99)	**6.44** (4.80-7.66)
30-min	**0.914** (0.770-1.11)	**1.20** (1.01-1.45)	**1.63** (1.37-1.97)	**1.96** (1.64-2.36)	**2.41** (1.98-2.88)	**2.76** (2.24-3.29)	**3.11** (2.48-3.70)	**3.48** (2.72-4.12)	**3.96** (3.02-4.71)	**4.34** (3.24-5.16)
60-min	**0.566** (0.477-0.686)	**0.740** (0.626-0.897)	**1.01** (0.847-1.22)	**1.22** (1.01-1.46)	**1.49** (1.23-1.78)	**1.71** (1.39-2.03)	**1.93** (1.53-2.29)	**2.15** (1.68-2.55)	**2.45** (1.87-2.91)	**2.68** (2.00-3.19)
2-hr	**0.328** (0.282-0.390)	**0.426** (0.364-0.506)	**0.571** (0.487-0.676)	**0.682** (0.575-0.804)	**0.832** (0.694-0.977)	**0.949** (0.780-1.11)	**1.07** (0.866-1.25)	**1.19** (0.947-1.39)	**1.35** (1.05-1.59)	**1.48** (1.12-1.75)
3-hr	**0.237** (0.202-0.283)	**0.304** (0.260-0.365)	**0.400** (0.340-0.478)	**0.476** (0.402-0.566)	**0.582** (0.485-0.689)	**0.667** (0.548-0.787)	**0.757** (0.610-0.892)	**0.849** (0.673-0.999)	**0.978** (0.751-1.15)	**1.08** (0.811-1.28)
6-hr	**0.143** (0.124-0.168)	**0.181** (0.158-0.213)	**0.233** (0.203-0.272)	**0.274** (0.236-0.319)	**0.330** (0.281-0.382)	**0.374** (0.313-0.431)	**0.420** (0.346-0.484)	**0.467** (0.377-0.539)	**0.532** (0.419-0.615)	**0.582** (0.448-0.676)
12-hr	**0.080** (0.070-0.092)	**0.101** (0.089-0.117)	**0.128** (0.112-0.148)	**0.150** (0.130-0.172)	**0.178** (0.153-0.205)	**0.200** (0.170-0.229)	**0.223** (0.186-0.256)	**0.246** (0.203-0.283)	**0.277** (0.223-0.320)	**0.301** (0.237-0.350)
24-hr	**0.048** (0.043-0.054)	**0.061** (0.055-0.069)	**0.079** (0.071-0.089)	**0.094** (0.083-0.105)	**0.113** (0.100-0.127)	**0.129** (0.114-0.144)	**0.145** (0.127-0.162)	**0.162** (0.141-0.181)	**0.186** (0.159-0.207)	**0.204** (0.173-0.228)
2-day	**0.026** (0.023-0.029)	**0.033** (0.030-0.037)	**0.044** (0.039-0.049)	**0.052** (0.046-0.058)	**0.064** (0.056-0.071)	**0.073** (0.064-0.081)	**0.083** (0.072-0.092)	**0.093** (0.081-0.104)	**0.107** (0.092-0.120)	**0.118** (0.101-0.133)
3-day	**0.018** (0.016-0.021)	**0.023** (0.021-0.026)	**0.031** (0.028-0.035)	**0.037** (0.033-0.041)	**0.045** (0.040-0.050)	**0.052** (0.046-0.058)	**0.059** (0.052-0.066)	**0.067** (0.058-0.074)	**0.077** (0.066-0.086)	**0.086** (0.073-0.096)
4-day	**0.015** (0.013-0.016)	**0.019** (0.017-0.021)	**0.024** (0.022-0.027)	**0.029** (0.026-0.033)	**0.036** (0.032-0.040)	**0.041** (0.037-0.046)	**0.047** (0.041-0.053)	**0.054** (0.046-0.060)	**0.062** (0.053-0.069)	**0.069** (0.059-0.078)
7-day	**0.009** (0.008-0.010)	**0.012** (0.011-0.013)	**0.015** (0.014-0.017)	**0.018** (0.016-0.021)	**0.023** (0.020-0.025)	**0.026** (0.023-0.029)	**0.030** (0.026-0.033)	**0.034** (0.029-0.038)	**0.039** (0.034-0.044)	**0.044** (0.037-0.049)
10-day	**0.007** (0.006-0.008)	**0.009** (0.008-0.010)	**0.012** (0.011-0.013)	**0.014** (0.013-0.016)	**0.017** (0.015-0.019)	**0.020** (0.018-0.022)	**0.023** (0.020-0.025)	**0.025** (0.022-0.028)	**0.029** (0.025-0.033)	**0.033** (0.028-0.036)
20-day	**0.004** (0.004-0.005)	**0.006** (0.005-0.006)	**0.007** (0.007-0.008)	**0.009** (0.008-0.010)	**0.010** (0.009-0.012)	**0.012** (0.010-0.013)	**0.013** (0.012-0.015)	**0.015** (0.013-0.016)	**0.017** (0.014-0.018)	**0.018** (0.016-0.020)
30-day	**0.003** (0.003-0.004)	**0.004** (0.004-0.005)	**0.006** (0.005-0.006)	**0.007** (0.006-0.007)	**0.008** (0.007-0.009)	**0.009** (0.008-0.010)	**0.010** (0.009-0.011)	**0.011** (0.010-0.013)	**0.013** (0.011-0.014)	**0.014** (0.012-0.016)
45-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** (0.006-0.007)	**0.007** (0.006-0.008)	**0.008** (0.007-0.009)	**0.009** (0.008-0.009)	**0.010** (0.008-0.011)	**0.010** (0.009-0.012)
60-day	**0.002** (0.002-0.002)	**0.003** (0.002-0.003)	**0.004** (0.003-0.004)	**0.004** (0.004-0.005)	**0.005** (0.005-0.006)	**0.006** (0.005-0.006)	**0.006** (0.006-0.007)	**0.007** (0.006-0.008)	**0.008** (0.007-0.009)	**0.008** (0.007-0.009)

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

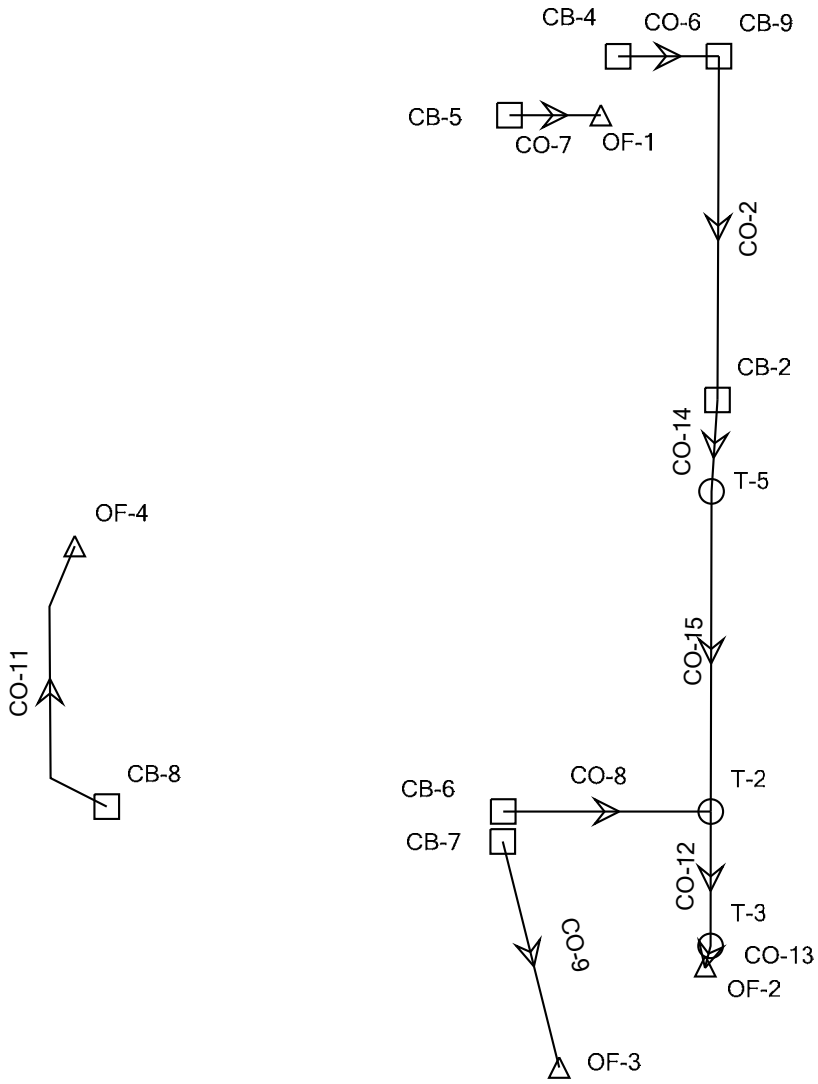
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper 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

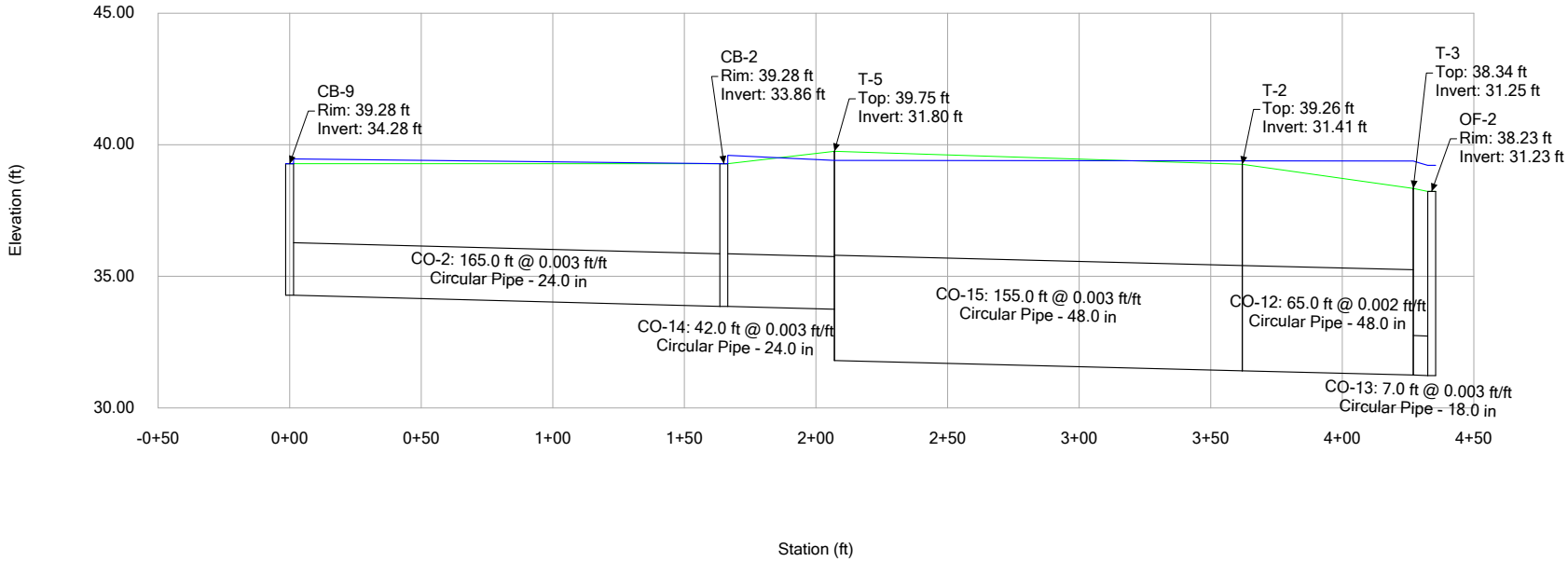
5-ZN-2020
07/1/20

Scenario: Base



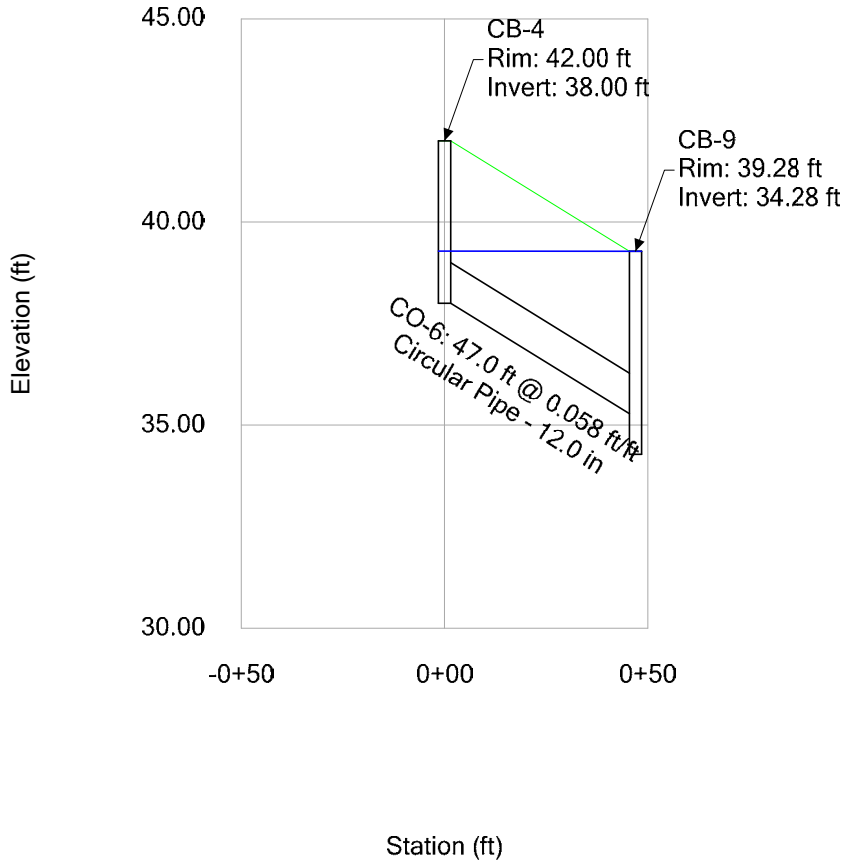
5-ZN-2020
07/1/20

Profile Report
Engineering Profile - East Retention Pipe (1872.stc)



5-ZN-2020
07/1/20

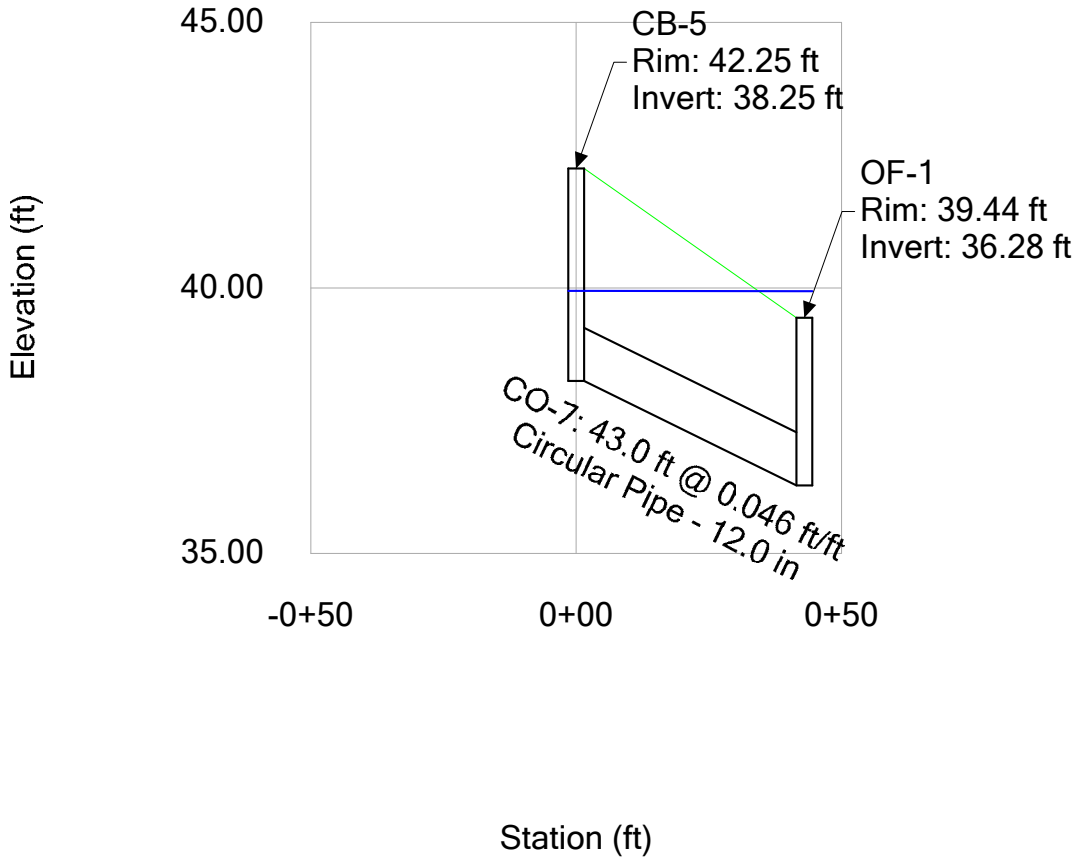
Profile Report
Engineering Profile - North Courtyard Inlet (1872.stc)



5-ZN-2020
07/1/20

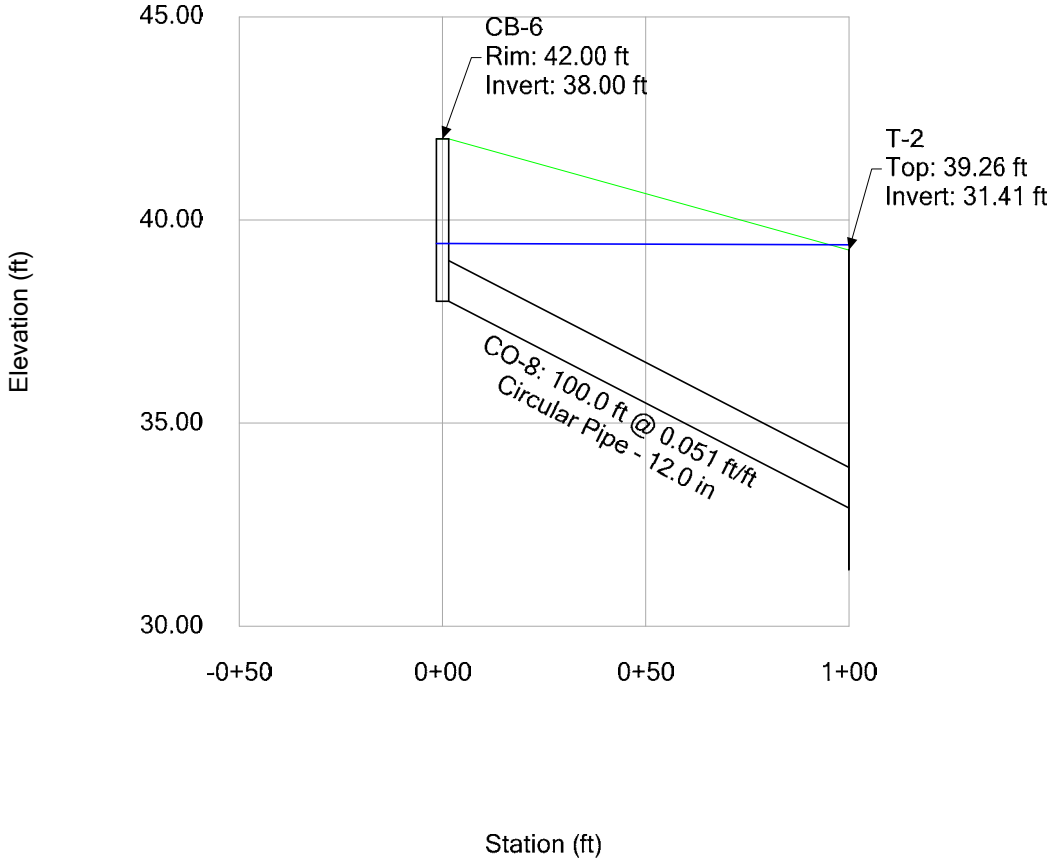
Profile Report

Engineering Profile - North Courtyard Overflow Pipe (1872.stc)



5-ZN-2020
07/1/20

Profile Report
Engineering Profile - South Courtyard Inlet (1872.stc)



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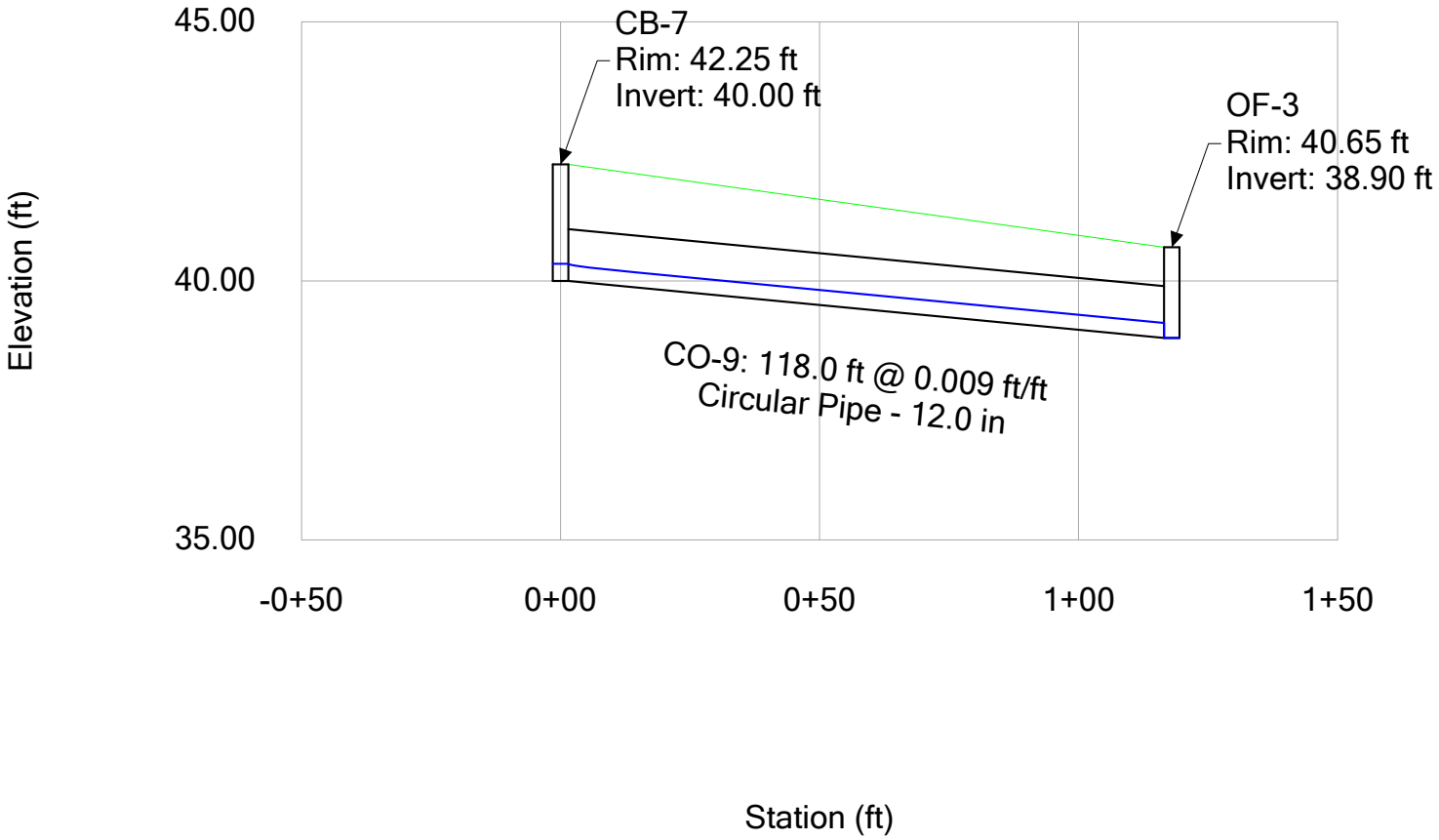
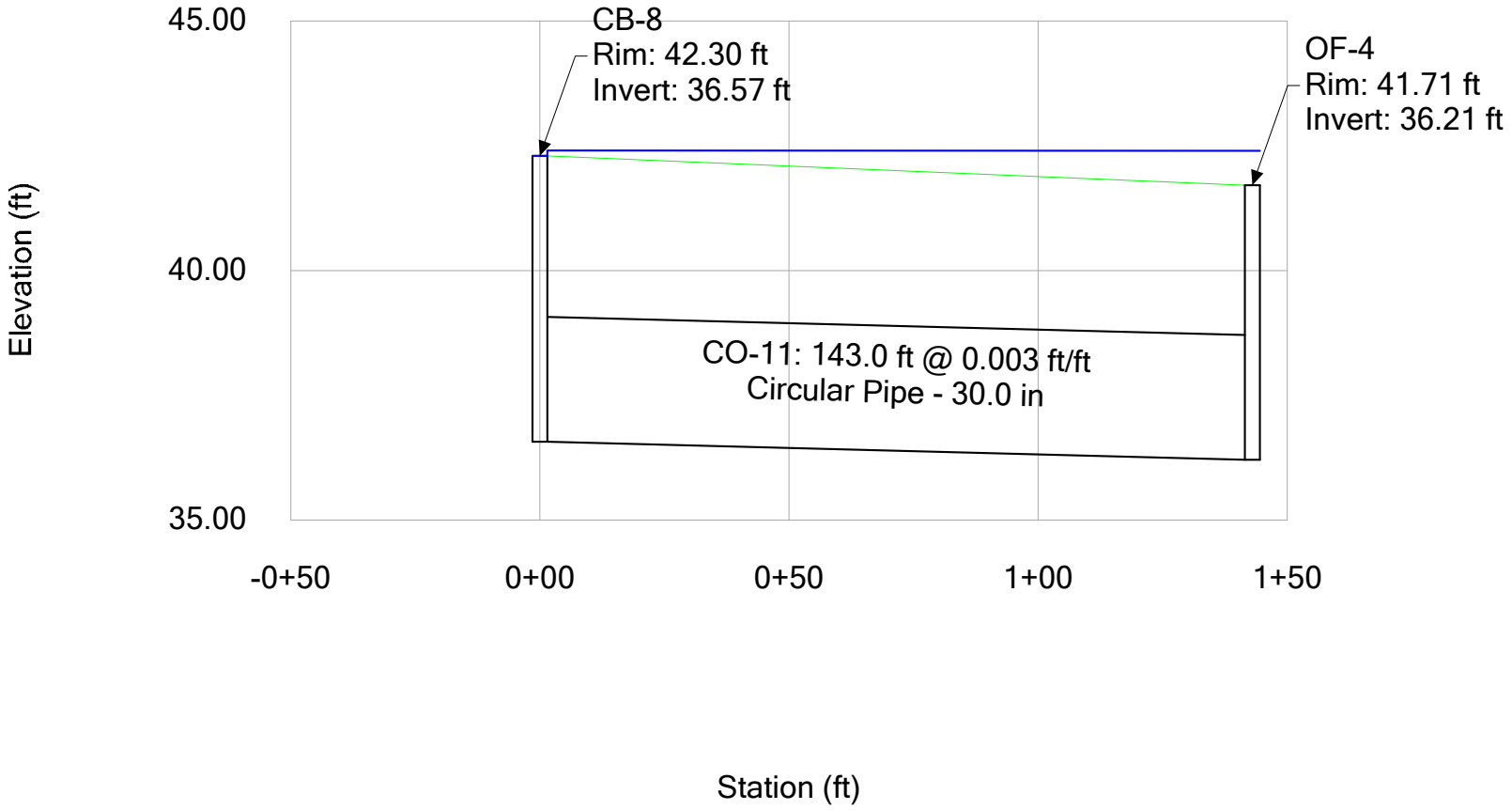


5-ZN-2020
07/1/20

Profile Report

Engineering Profile - West Retention Pipe (1872.stc)



5-ZN-2020
07/1/20

Conduit FlexTable: Combined Pipe/Node Report (1872.stc)

Label	Start Node	Stop Node	Length (Unified) (ft)	Total Flow (ft^3/s)	Rise (Unified) (in)	Capacity (Full Flow) (ft^3/s)	Velocity (Average) (ft/s)	Invert (Upstream) (ft)	Invert (Downstream) (ft)	Slope (ft/ft)	Manning's n	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-9	CB-7	OF-3	118.0	0.63	12.0	3.44	3.33	40.00	38.90	0.009	0.013	40.33	39.19
CO-7	CB-5	OF-1	43.0	0.37	12.0	7.63	0.47	38.25	36.28	0.046	0.013	39.94	39.94
CO-11	CB-8	OF-4	143.0	2.59	30.0	20.58	0.53	36.57	36.21	0.003	0.013	42.41	42.40
CO-8	CB-6	T-2	100.0	0.63	12.0	8.04	0.80	38.00	32.91	0.051	0.013	39.42	39.39
CO-6	CB-4	CB-9	47.0	0.37	12.0	8.57	0.47	38.00	35.28	0.058	0.013	39.29	39.28
CO-2	CB-9	CB-2	165.0	7.57	24.0	11.41	2.41	34.28	33.86	0.003	0.013	39.46	39.28
CO-14	CB-2	T-5	42.0	15.35	24.0	11.58	4.89	33.86	33.75	0.003	0.013	39.60	39.41
CO-15	T-5	T-2	155.0	15.35	48.0	72.28	1.22	31.80	31.41	0.003	0.013	39.41	39.39
CO-12	T-2	T-3	65.0	15.98	48.0	71.26	1.27	31.41	31.25	0.002	0.013	39.39	39.38
CO-13	T-3	OF-2	7.0	15.98	18.0	5.61	9.04	31.25	31.23	0.003	0.013	39.38	39.22

FlexTable: Catch Basin Table (1872.stc)

Label	Station (Calculated) (ft)	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Additional) (ft³/s)	Carryover Additional Flow (ft³/s)	Flow (Known) (ft³/s)	Inlet Type	Maximum Inflow (ft³/s)
CB-2	2+69	39.28	True	39.28	33.86	7.78	0.00	0.00	Percent Capture	0.00
CB-4	4+81	42.00	True	42.00	38.00	0.37	0.00	0.00	Percent Capture	0.00
CB-5	0+43	42.25	True	42.25	38.25	0.37	0.00	0.00	Percent Capture	0.00
CB-6	1+72	42.00	True	42.00	38.00	0.63	0.00	0.00	Percent Capture	0.00
CB-7	1+18	42.25	True	42.25	40.00	0.63	0.00	0.00	Percent Capture	0.00
CB-8	1+43	42.30	True	42.30	36.57	2.59	0.00	0.00	Percent Capture	0.00
CB-9	4+34	39.28	True	39.28	34.28	7.20	0.00	0.00	Percent Capture	0.00

Capture Efficiency (%)	Inlet Location	Desired Sump Depth (ft)	Depth (In) (ft)	Depth (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
100.0	On Grade	0.00	5.42	5.42	39.28	39.28
100.0	On Grade	0.00	1.29	1.29	39.29	39.29
100.0	On Grade	0.00	1.69	1.69	39.94	39.94
100.0	On Grade	0.00	1.42	1.42	39.42	39.42
100.0	On Grade	0.00	0.33	0.33	40.33	40.33
100.0	On Grade	0.00	5.73	5.73	42.30	42.30
100.0	On Grade	0.00	5.00	5.00	39.28	39.28

5-ZN-2020
07/1/20

FlexTable: Outfall Table (1872.stc)

Label	Station (ft)	Elevation (Ground) (ft)	Set Rim to Ground Elevation	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (Tailwater) (ft)	Flow (Outfall) (ft³/s)
OF-1	0+00	39.44	True	36.28	User Defined Tailwater	39.94	0.37
OF-2	0+00	38.23	True	31.23	User Defined Tailwater	39.22	15.98
OF-3	0+00	40.65	True	38.90	Free Outfall	0.00	0.63
OF-4	0+00	41.71	True	36.21	User Defined Tailwater	42.40	2.59

FlexTable: Transition Table (1872.stc)

Label	Elevation (Ground) (ft)	Elevation (Top) (ft)	Elevation (Invert) (ft)	Transition Length (ft)	Headloss Method	Hydraulic Grade Line (Out) (ft)
T-2	39.26	39.26	31.41	0.0	Absolute	39.39
T-3	38.34	38.34	31.25	0.0	Absolute	39.38
T-5	39.75	39.75	31.80	0.0	Absolute	39.41

APPENDIX K

Flo-2d Maps

679_LIBW - South 100YR6HR

March 24, 2020

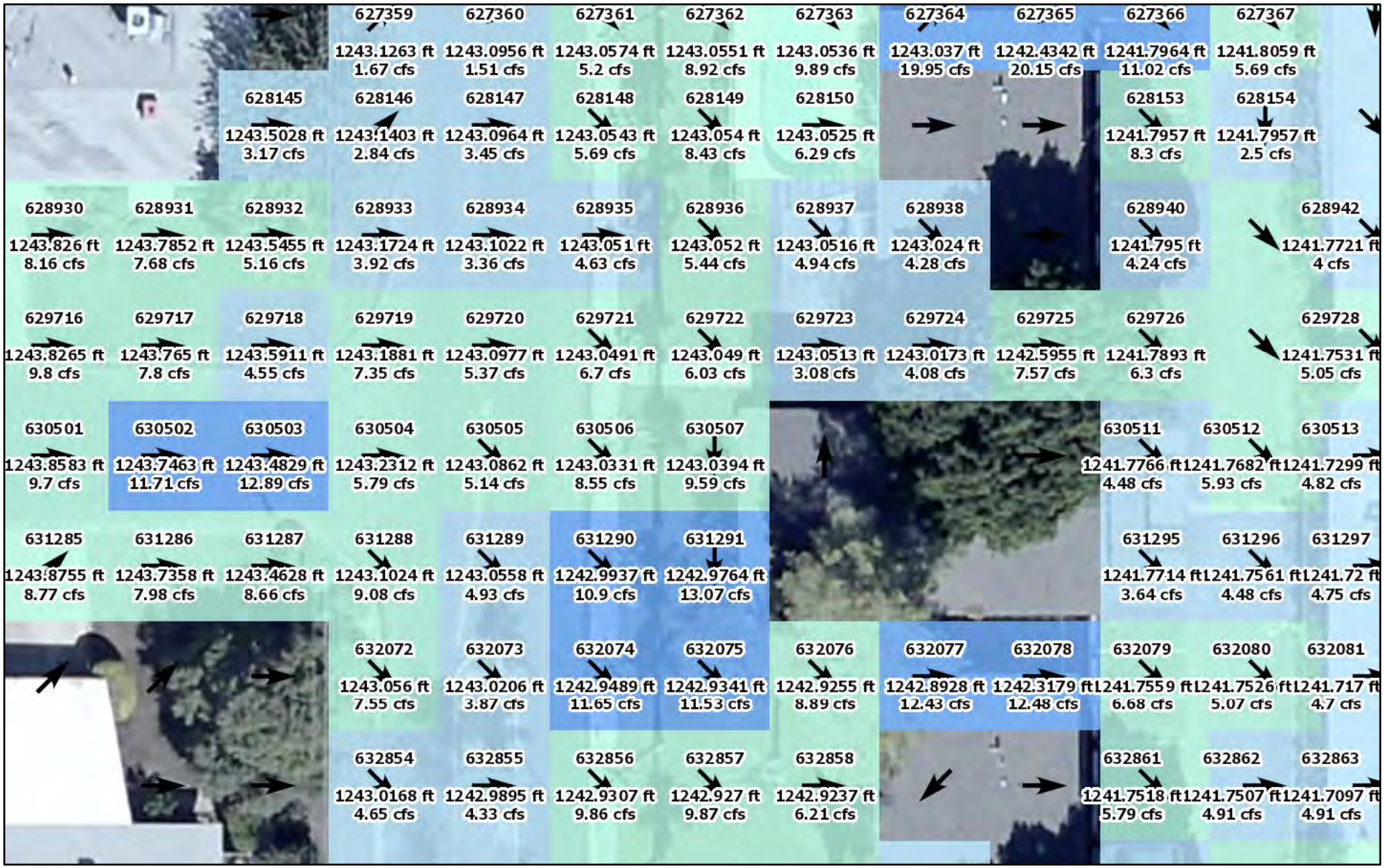
1:300

0 12.5 25 50 ft

0 4.25 8.5 17 m

5-ZN-2020
07/1/20

679_LIBW - South 100YR6HR



March 24, 2020

1:300

0 12.5 25 50 ft

0 4.25 8.5 17 m

5-ZN-2020

07/1/20

679_LIBW - South 100YR6HR

March 24, 2020

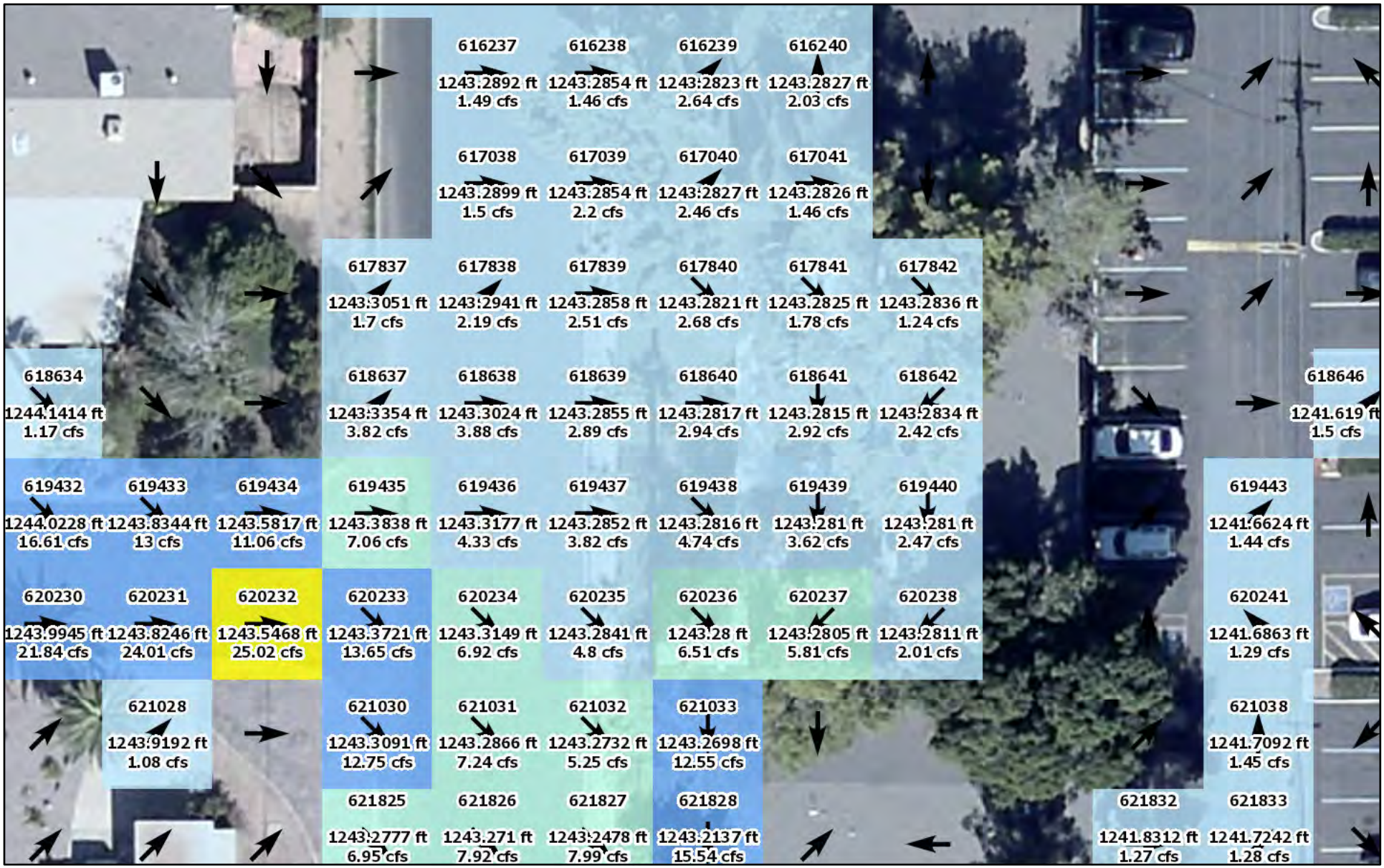
1:300

0 12.5 25 50 ft

0 4.25 8.5 17 m

5-ZN-2020
07/1/20

679_LIBW - South 100YR6HR



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5-ZN-2020
07/1/20

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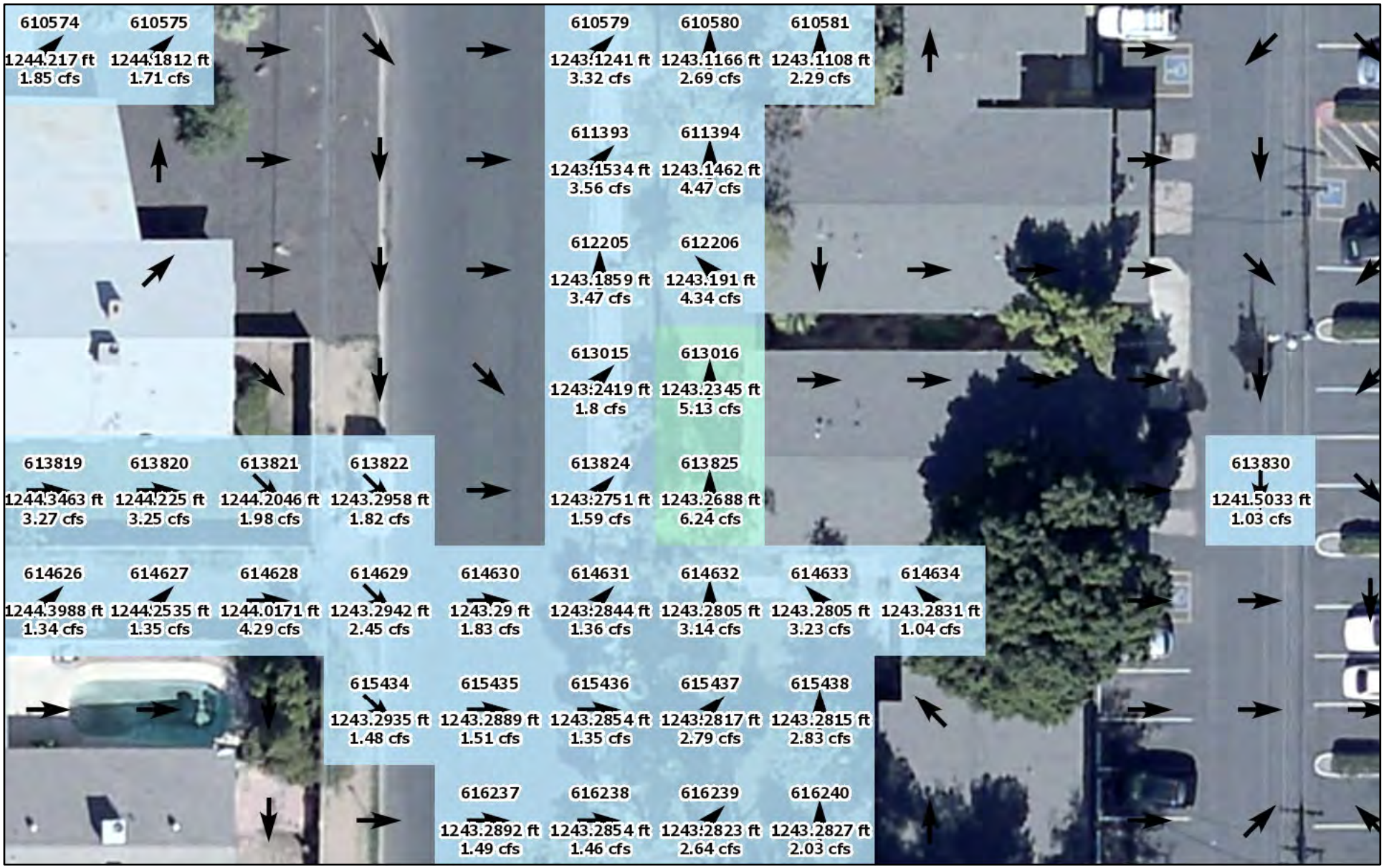

March 24, 2020

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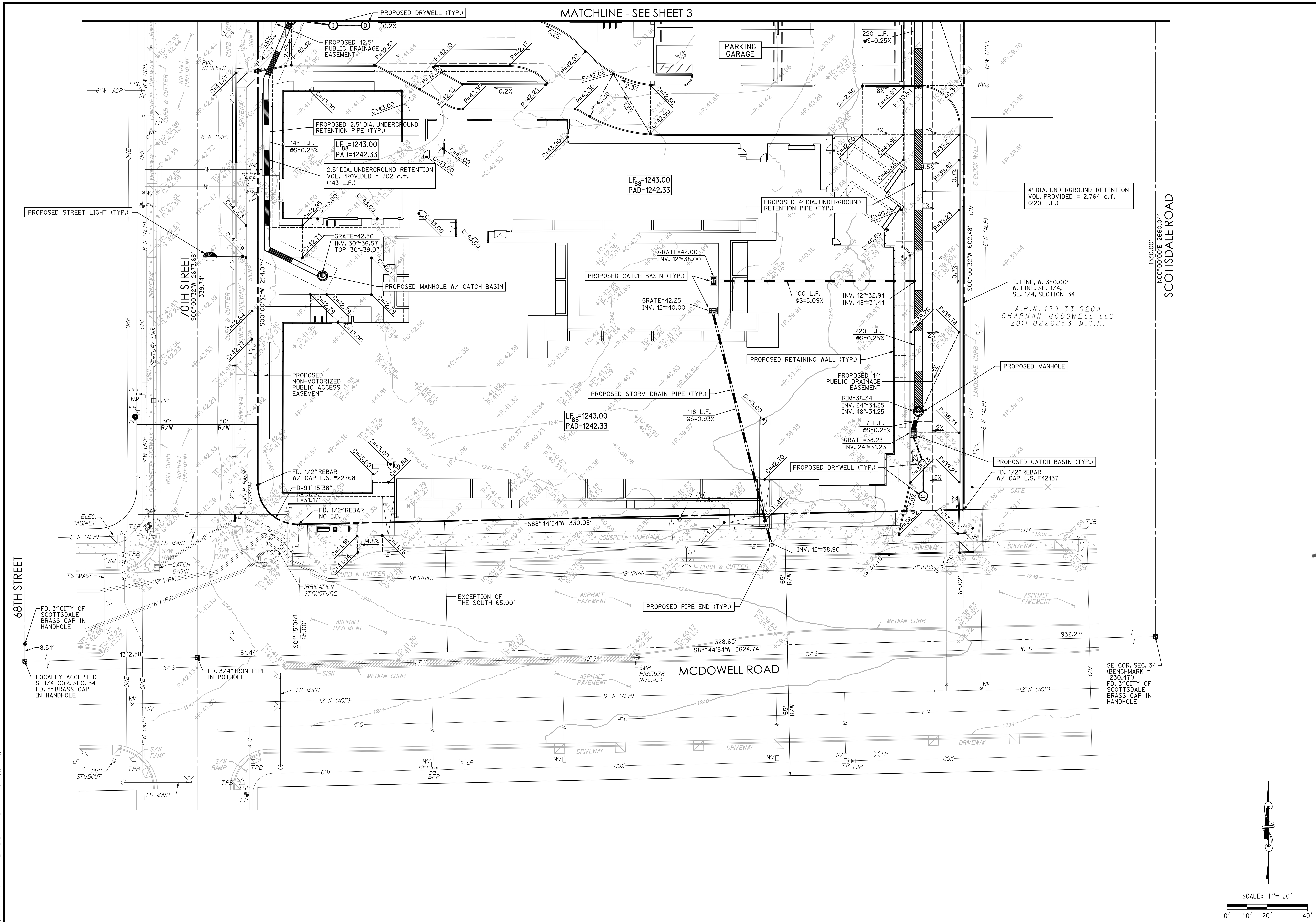
5-ZN-2020
07/1/20

APPENDIX L

Preliminary Grading and Drainage Plans



Contact Arizona 811 at least two full working days before you begin excavation
Call 811 or click Arizona811.com

REVISIONS

SOUTHDALE

7000 E. MCDOWELL ROAD, SCOTTSDALE, AZ 85257

PRELIMINARY GRADING & DRAINAGE PLAN

Registered Professional Engineer — Certificate No. 46857 — DANIEL G. MANN — 6/29/20 — Arizona, U.S.A.

3 engineering
planning · civil engineering · surveying

ENGINEER: D. MANN | DESIGNER: D. MANN | CAD TECH: PHILIP V.

3 ENGINEERING, LLC
6370 E. THOMAS ROAD SUITE # 200
SCOTTSDALE, ARIZONA 85251
PHONE: (602) 334-4387
FAX: (602) 490-3230
WWW.3ENGINEERING.COM

DATE: 06/29/20

PROJECT NO. 1872

SHEET NO. PGD102 2 of 3

Q.S. #13-44

C:\My SecurSync\Projects\1872_70th_St_McDowell_Apartments\1872pgrd02.dgn

5-ZN-2020
07/1/20

OAK STREET

E 1/4 COR. SEC. 34
FD. 3" CITY OF SCOTTSDALE
BRASS CAP IN HANDHOLE

1330.03'

FD. 3" CITY OF SCOTTSDALE
BRASS CAP IN FLUSH

PALM LANE
S 89°03'15" W 2624.03'
1312.02'

LOT 1 WONDERLAND
BK. 100, PG. 19, M.C.R.
A.P.N. 129-33-018B
CAPITAL REAL ESTATE-DWELL LLC
2016-0940342 M.C.R.

A.P.N. 129-33-019B
CAPITAL REAL ESTATE-DWELL LLC
2016-0940342 M.C.R.

A.P.N. 129-33-019A
CHAPMAN MCDOWELL LLC
2011-0226253 M.C.R.

SMH
RIM: 41.36
INV 8" N: 34.98
INV 8" S: 34.99

N. LINE, S. 1/2,
SE. 1/4, SE. 1/4,
SECTION 34

N88°54'05"E 230.06'

EXISTING BUILDING

FD. NAIL IN
WASHER L.S. #42137

PROPOSED RETAINING WALL (TYP.)

LF88=1243.00
PAD=1242.33

PROPOSED RETAINING WALL (TYP.)

PROPOSED STORM DRAIN PIPE (TYP.)

E. LINE, W. 380.00'
W. LINE, SE. 1/4,
SE. 1/4, SECTION 34

GRATE=42.00
INV. 12"=38.00

47 L.F.
@S=5.79%

PROPOSED CATCH BASIN (TYP.)

GRATE=39.28
INV. 12"=35.28
INV. 24"=34.28

LF88=1243.00
PAD=1242.33

43 L.F.
@S=4.58%

GRATE=39.44
INV. 12"=36.28

PROPOSED CATCH BASIN (TYP.)

GRATE=42.25
INV. 12"=38.25

PROPOSED CATCH BASIN (TYP.)

PROPOSED RETAINING WALL (TYP.)

70TH STREET
S00°00'32"W 2673.68'
997.27'

FD. 1/2" REBAR
NO I.D.

S00°00'32"W 955.77'

PARKING GARAGE

165 L.F.
@S=0.25%

S00°00'32"W 602.48'

N00°00'00"E 2660.04'
1330.00'

SCOTTSDALE ROAD

A.P.N. 129-33-020A
CHAPMAN MCDOWELL LLC
2011-0226253 M.C.R.

PROPOSED STORM DRAIN PIPE (TYP.)

LF88=1243.00
PAD=1242.33

5' ELECTRIC
EASEMENT
PER REC. NO.
2000-0291367

SMH
RIM: 40.74
INV 8" N: 36.07
INV 8" S: 36.17

SMH
RIM: 40.88
INV 8" N: 36.39
INV 8" W: 36.46

FD. 1/2" REBAR
W/ CAP
L.S. #21081

FD. 1/2" REBAR
W/ CAP
L.S. #42137

PARKING GARAGE

GRATE=39.28
INV. 24"=33.86

PROPOSED CATCH BASIN (TYP.)

PROPOSED MANHOLE

42 L.F.
@S=0.25%

SMH
RIM: 43.86
8" E: 37.29
8" W: 37.32

30.00'
PROPOSED
NON-MOTORIZED
PUBLIC ACCESS
EASEMENT

N89°59'28"W 419.98'

RIM=39.75
INV. 24"=33.75
INV. 48"=31.80
TOP 48"=35.80

PROPOSED 4' DIA. UNDERGROUND
RETENTION PIPE (TYP.)

PROPOSED 14'
PUBLIC DRAINAGE
EASEMENT

GRATE=41.71
INV. 30"=36.21

PROPOSED MANHOLE W/ CATCH BASIN

MATCHLINE - SEE SHEET 2

SCALE: 1"= 20'
0' 10' 20' 40'

Contact Arizona 811 at least two full working days before you begin excavation
Call 811 or click Arizona811.com

SNOISIA3d

SOUTHDALE
7000 E. MCDOWELL ROAD, SCOTTSDALE, AZ 85257

PRELIMINARY GRADING & DRAINAGE PLAN

Registered Professional Engineer (Civil)
CERTIFICATE NO.
46857
DANIEL G. MANN
6/29/20
DATE SIGNED
ARIZONA, U.S.A.

3engineering
civil engineering surveying planning
3 ENGINEERING, LLC
6370 E. THOMAS ROAD
SUITE # 200
SCOTTSDALE, ARIZONA 85251
PHONE: (602) 334-4387
FAX: (602) 490-3230
WWW.3ENGINEERING.COM

CAD TECH: PAULIE S.
DESIGNER: D. MANN
ENGINEER: D. MANN

DATE: 06/29/20

PROJECT NO.
1872

SHEET NO.
PGD103
3 of 3

Q.S.#13-44

5-ZN-2020
07/1/20

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