Shephard Wesnitzer, Inc.

75 Kallof Place
Sedona, AZ 86336

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Engineering an environment of excellence

Final
Drainage Report
for
PARK PLACE

Sedona, Yavapai County, Arizona

Prepared for:
Miramonte Homes
4578 North First Street, Suite 160
Tucson, AZ 85781

September 2019
Job # 17186

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FIGURES

APPENDICES

INTRODUCTION

Park Place Presidio, L.L.C. is proposing the development of a 9.73-acre parcel near Foothills South, in Sedona, Arizona. The site parallels the south side of State Route 89A between Calle Del Belleza and Calle Feliz, in the west 1/2 of Section 15, T17N, R5E, G&SRB&M, Yavapai County. The purchased tax parcel number is 408-11-140Z. Single-family residential zoning surrounds the site in all directions. The site is bound by State Route 89A to the northwest and El Camino Real to the southeast.

The project consists of 60 residential condominiums clustered into 21 units, served by approximately 2300-ft of primary 20-ft wide roadway. Primary access is from State Route 89A, near the mid-point of the property. The two existing cluster units at the main entrance share common driveways from the primary roadway to underground parking structures. The remaining proposed 21 cluster units have aboveground parking garages from the primary roadway.

METHODOLOGY

Local hydrology was estimated with Haestad Method's PondPack, version 8.0, using a variation of the Rational Method. Runoff coefficients for the developed condition were selected from the Heavy Urban curve shown in Figure 2-3 of the Highway Drainage Design Manual, Hydrology. Existing condition coefficients were selected from the D-30% curve shown in Figure 2-7 of the manual. All concentration times for local hydrology were assumed to be 5-minues. Intensity-Duration-Frequency rainfall table was generated by NOAA Atlas 14, Volume 1, Version 5. Hydraulic analysis was done with StormCad (v3.0) and FlowMaster (2005), both Haestad Method products. Inlet structures and storm drains are sized to adequately convey 100-year runoff from the roadways.

EXISTING CONDITIONS

The 9.73-acre site is currently undeveloped and generally slopes towards 89A between 5% and 30%. Ground cover consists of pinon, juniper, mountain laurel, scrub oak and manzanita. The geology of the site is typical for the Sedona area, consisting of reddish dark silty loam from the Coconino and Supai Sandstone formations, hydrological soil group D.

Offsite runoff influencing the proposed development includes accumulations from the southeast, across from El Camino Real, entering the site at design points 6 and 7. At design point 6, runoff is carried beneath El Camino Real with a 28-inch by 21-inch metal arch culvert. A 24-inch by 16-inch metal arch culvert carries runoff beneath the roadway at design point 7, with only about 6-inches of headwater above the top of the pipe. Flows exceeding the headwater elevation continue northeast down the roadside ditch, along the south side of El Camino Real.

Onsite runoff concentrates at five points around the perimeter of the development, noted as design points 1 through 5. Runoff at design points 2 and 3 concentrate at the existing screen wall along 89A. Runoff passes through openings in the screen wall and enters catch basins along 89A, which have corrugated metal pipes carrying runoff beneath the highway. Runoff at design points 1 and 4 concentrate at low points on the property line near northeast and northwest corners of the property. Runoff from these areas is conveyed with open channels to catch basins along 89A outside the project area. Flow concentrations at design point 5 enter a depression on the west side of Calle Feliz at the intersection with El Camino Real. A 21-inch by 13-inch metal arch culvert conveys runoff from this depression beneath Calle Feliz. Figure 1 shows the existing condition hydrology.

PROPOSED CONDITIONS

Runoff will be conveyed from the site with three separate storm drains systems. Detention is provided as necessary at the property outfalls to keep runoff rates at or below existing levels.

Onsite runoff will be collected with catch basins and spillways then routed to the detention areas with storm drains. Roll curb will be used everywhere on the primary roadway except for the south side of the roadway at the east end. Runoff will be collected in the driveways with transverse slot drains and piped to the underground storm drains. Street and pavement calculations can be found in Appendix C.

Offsite runoff from design point 6 will be intercepted with a manhole and routed, via storm drain, to the detention area at design point 2. Off-site runoff from design point 7 will be intercepted with a manhole and routed, via storm drain, to the detention area at design point 4.

Detention is proposed at design points 1 through 4. The above ground storage reservoirs at points 1, 2 and 3 consist of new retaining walls along the property line with excavation on the property side to maximize storage volumes. The underground storage reservoir at design point 4 consists of 642-feet of 60-inch diameter corrugated metal pipe. Discharges from the detention area at design points 1 is above ground through openings in the new retaining wall. Discharges from the detention areas at points 2 and 4 are underground to existing catch basins along 89A. The existing catch basin at design point 2 will be raised to accommodate the new entry, including sidewalks and ramps. A storm drain must be constructed along 89A between the detention area at point 4 to an existing catch basins approximately 200-ft east of the project boundary.

The summary runoff table below shows existing and developed peak runoff from the site. Detention provisions will mitigate increases in peak runoff from the site resulting from increased impervious area. Detailed calculations can be found in Appendix E.

Table 4.1 – Summary Runoff and Detention Performance Table

Design Point	Drainage Area (acres)		Return Period									
			2 Year					10 Year				
	Exist	Dev	Q Exist	Q Dev	Max Vol (ac-ft)	Provided Vol (ac-ft)	Elev (ft)	Q Exist	Q Dev	Vol (ac-ft)	Provided Vol (ac-ft)	Elev (ft)
1	1.74	2.14	1.94	0.23	0.036	0.148	4483.02	3.19	0.26	0.061	0.148	4483.27
2	15.41	15.19	21.71	17.32	0.019	0.50	4485.23	35.72	28.62	0.039	0.50	4486.75
3	1.91	0.47	2.27	0.82	N/A	N/A	N/A	3.74	1.36	N/A	N/A	N/A
4	9.11	10.95	11.79	7.86	0.079	0.289	4461.41	19.4	11.40	0.147	0.289	4462.35
5	0.68	0.10	0.93	0.15	N/A	N/A	N/A	1.53	0.24	N/A	N/A	N/A

Design Point	Drainage Area (acres)		Return Period									
			25 Year					100 Year				
	Exist	Dev	Q Exist	Q Dev	Vol (ac-ft)	Provided Vol (ac-ft)	Elev (ft)	Q Exist	Q Dev	Vol (ac-ft)	Provided Vol (ac-ft)	Elev (ft)
1	1.74	2.14	4.04	0.29	0.087	0.148	4483.52	5.42	0.34	0.128	0.148	4483.98
2	15.41	15.19	45.19	33.02	0.062	0.50	4487.53	60.59	36.48	0.171	0.50	4488.26
3	1.91	0.47	4.73	1.91	N/A	N/A	N/A	6.34	2.79	N/A	N/A	N/A
4	9.11	10.95	24.55	16.14	0.192	0.289	4463.00	32.92	25.81	0.25	0.289	4463.93
5	0.68	0.10	1.93	0.34	N/A	N/A	N/A	2.59	0.50	N/A	N/A	N/A

As evidenced by the table, peak runoff rates from the site will be kept below existing levels for the 2-, 10-, 25- and 100-year recurrence intervals. Total detention provisions for the 100-year recurrence interval are 0.55 acre-feet.

CONCLUSIONS AND RECOMMENDATIONS

The design concepts in this report will ensure that the drainage integrity of the site is sustained with proper maintenance activity. Activities include frequent clearing of debris and sediment from the storm drain inlets and detention areas, disturbed slope treatment and erosion control. Frequent monitoring will ensure expedient remedies to common problems such as erosion, sedimentation, and flow obstructions.

Construction of the town homes must include positive surface runoff and adequate foundation drainage for the underground parking areas. Landscaping and final grading must ensure that positive drainage from residential structures is maintained throughout the site.

A Storm Water Pollution Prevention Plan (SWPPP) is provided to mitigate erosion and sedimentation associated with construction of the development. Permanent water quality mitigation devices may include slope treatment, rock check dams and inlet protection. Regular maintenance will consist of the removal of sediment deposits, vegetative material, or any other obstructions that may restrict flow capacity. Earthwork activities should verify compliance with Section 404 of the Clean Water Act.

References

Publications

Yavapai County Drainage Design Manual, 2015.

Arizona Department of Transportation Highway Drainage Design Manual, Hydrology, 2005

Computer Software

PondPack V8i, Bentley Systems, Inc.

FlowMaster, Bentley Systems, Inc.

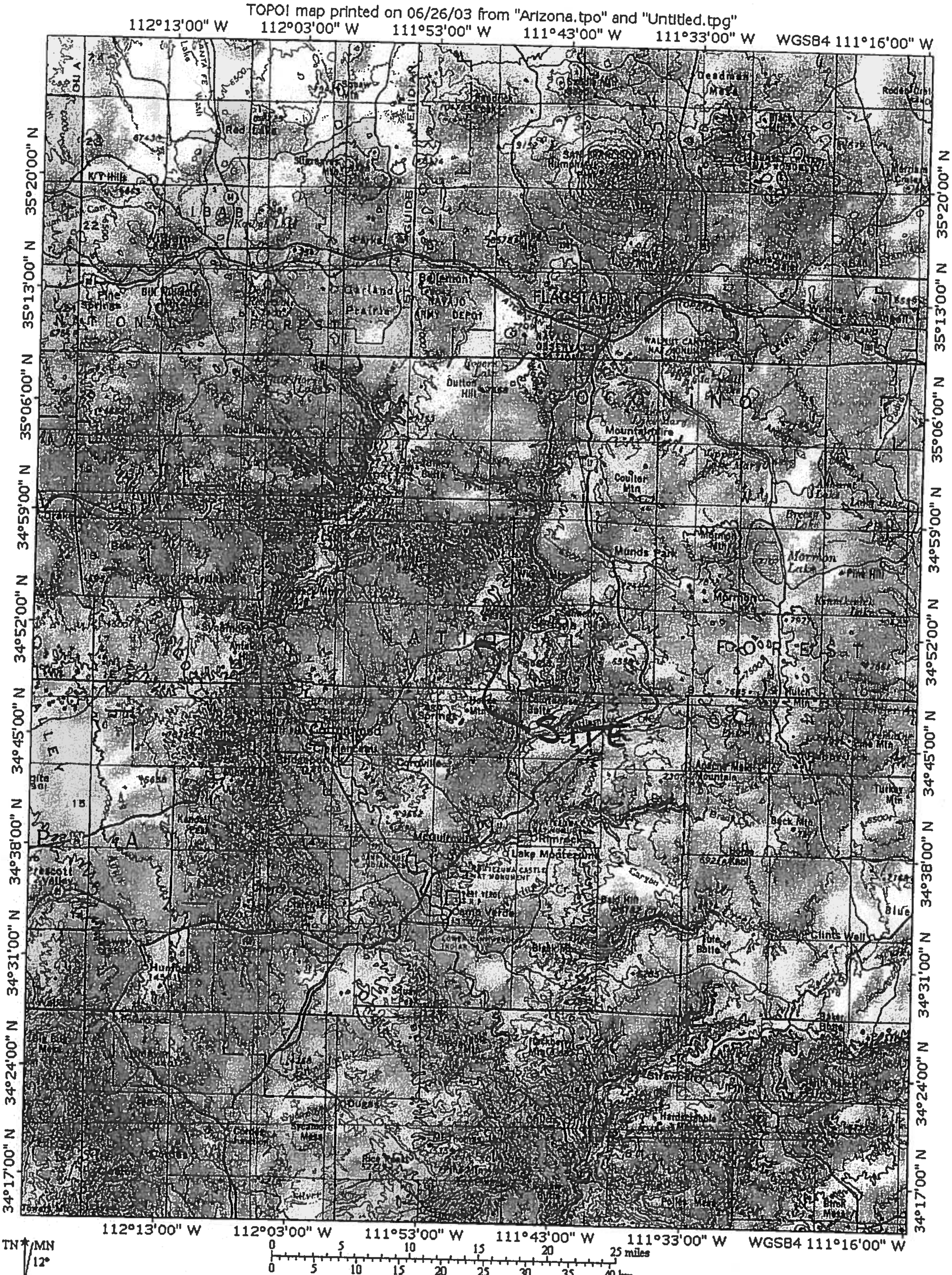
Autodesk StormCAD, 2005.

Final Drainage Report
For
Park Place

SWI Project # 17186

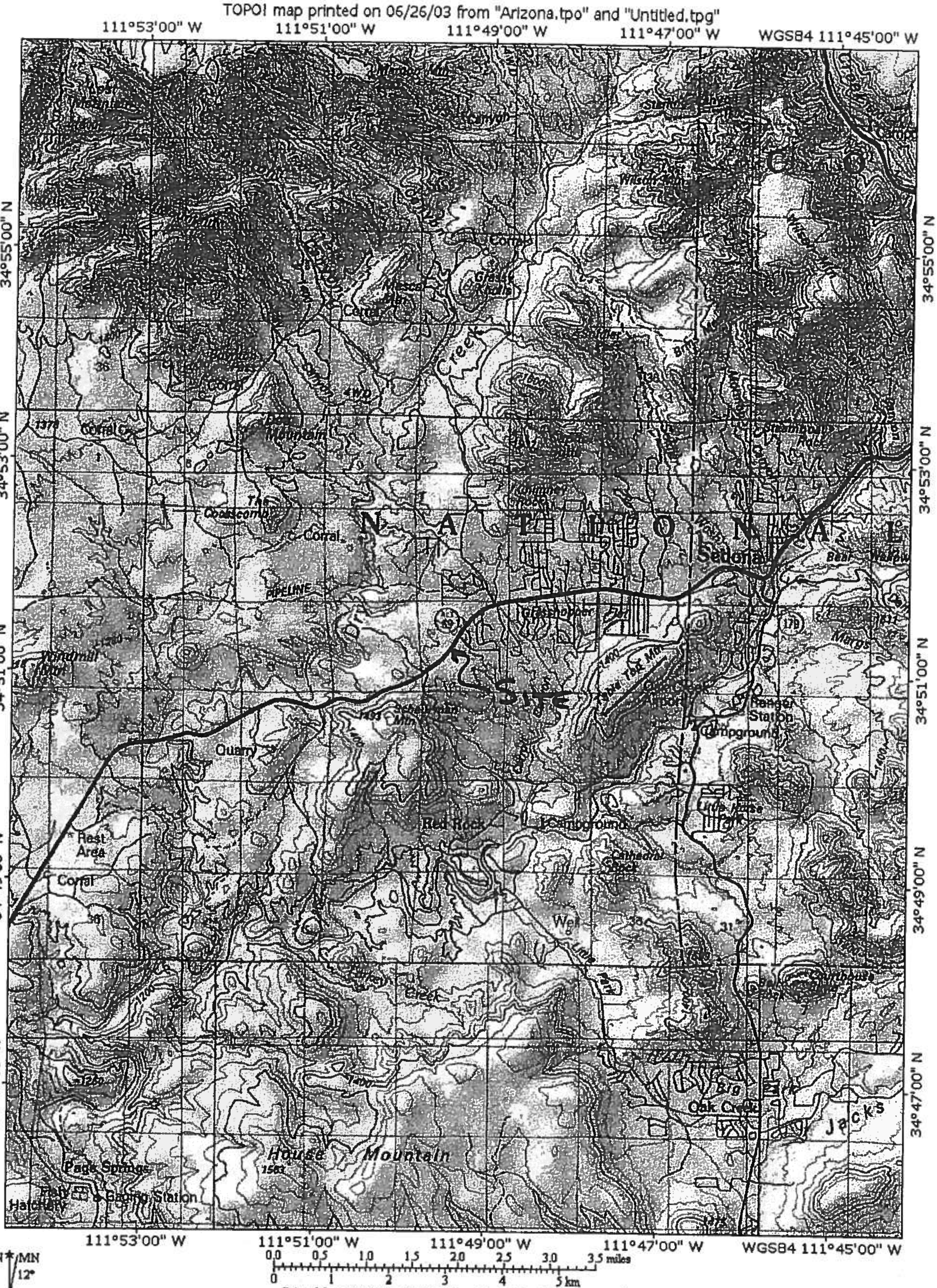
APPENDIX A
Reference Material

TOPO! map printed on 06/26/03 from "Arizona.tpo" and "Untitled.tpg"



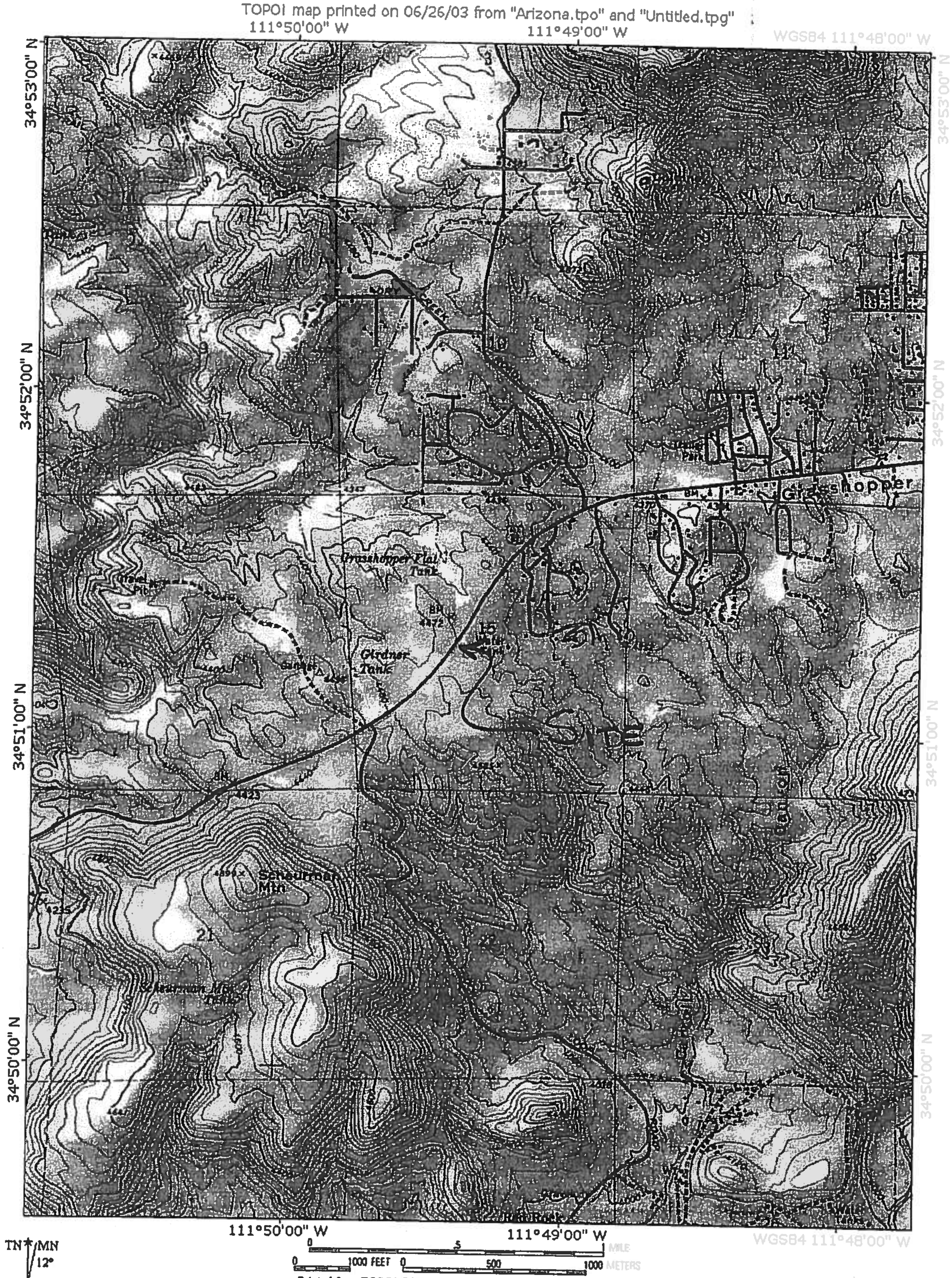
Printed from TOPO! ©2000 Wildflower Productions (www.topo.com)

TOPO! map printed on 06/26/03 from "Arizona.tpo" and "Untitled.tpg"

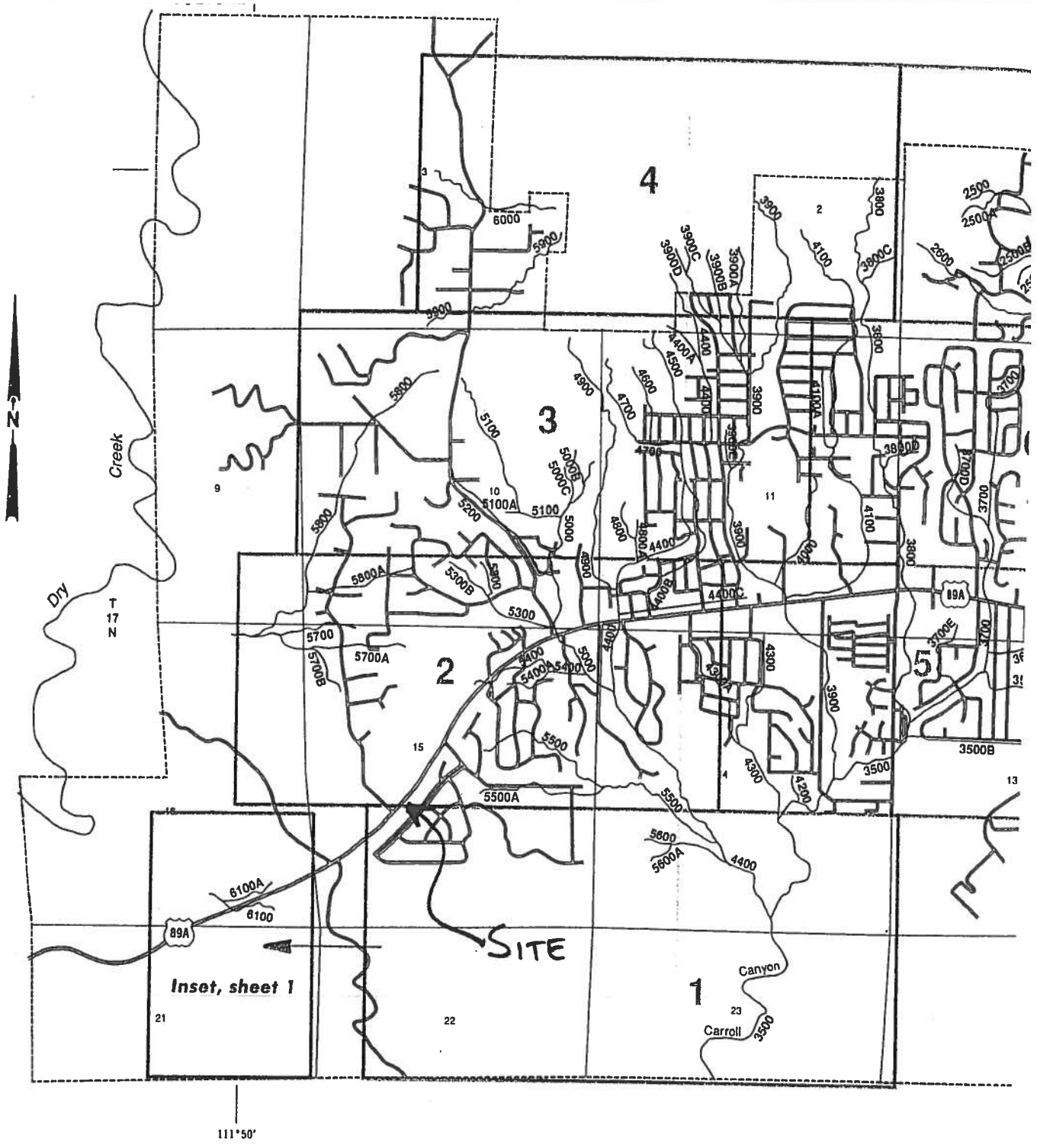


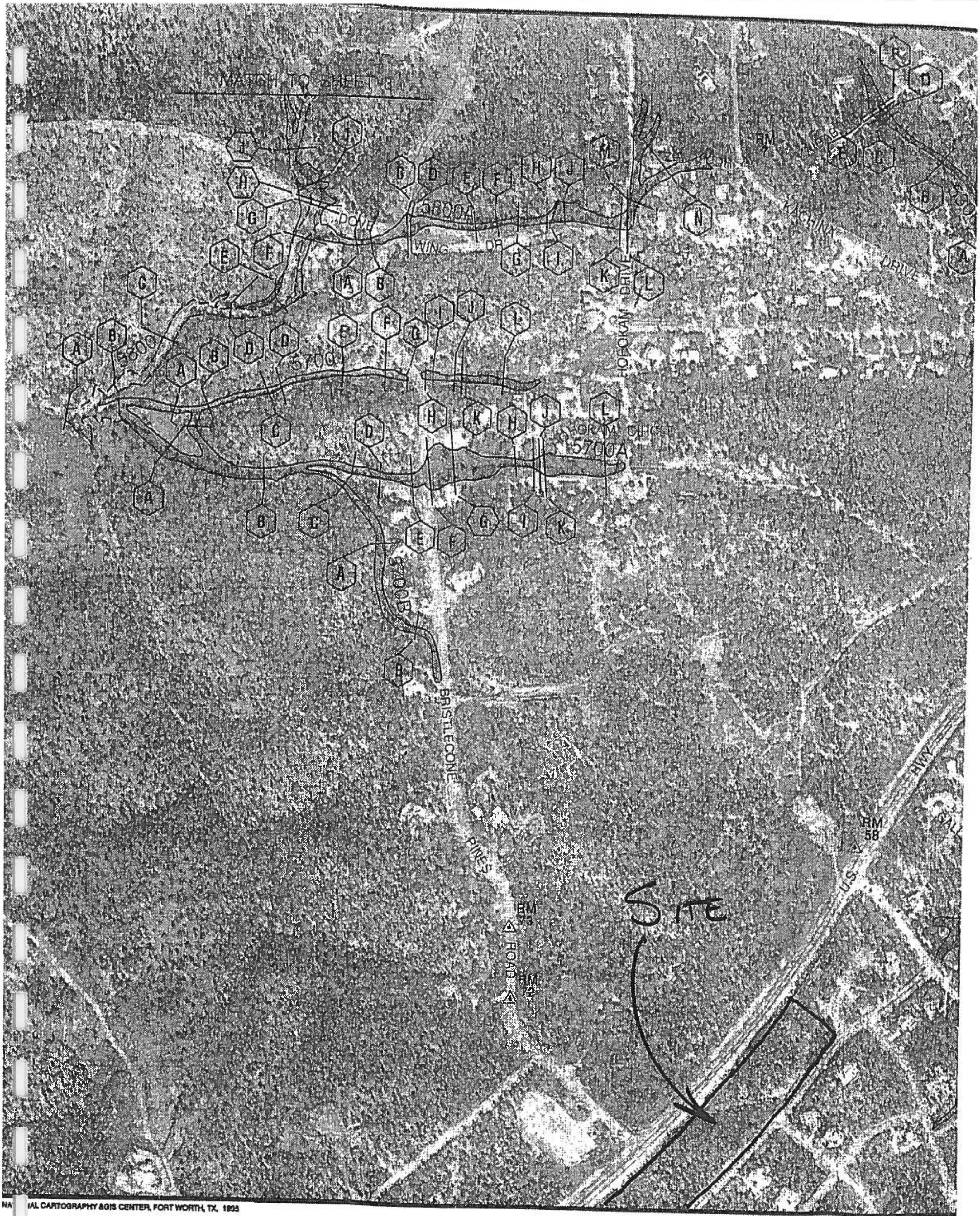
Printed from TOPO! ©2000 Wildflower Productions (www.topo.com)

TOPO! map printed on 06/26/03 from "Arizona.tpo" and "Untitled.tpg"



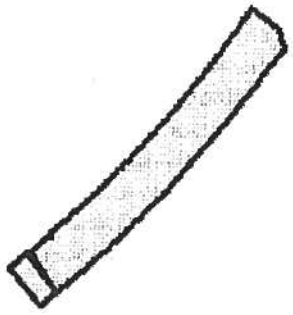
Printed from TOPO! ©2000 Wildflower Productions (www.topo.com)


N
Dry Creek
T 17 N
SITE
Inset, sheet 1
89A
Canyon
Carroll
111°50'
VICINITY MAP
SOURCE:
BASE COMPILED FROM 1:24,000 USGS QUADRANGLE SHEETS AND A 1993 CITY OF SEDONA ENGINEERING DEPARTMENT MAP
POLYCONIC PROJECTION



NATIONAL CARTOGRAPHY & GIS CENTER, FORT WORTH, TX, 1995

Yavapai County Parcel Information



PARCEL:	408-11-140Z
OWNER:	MILLER BROS LLC
MAILING ADDRESS:	15 CULTURAL PARK P
CITY:	SEDONA
STATE:	AZ
ZIP:	86336

PARCEL ID	1340811140268
SECONDARY OWNER	N/A
SUBDIVISION	N/A
ACRES	9.66
2004 FULL CASH VALUE	$825,664
2003 FULL CASH VALUE	$825,664
2004 LIMITED VALUE	$825,664
2003 LIMITED VALUE	$825,664
LEGAL CLASS	02.R
ASSESSMENT RATIO	16
2002 TAXES BILLED	N/A
2004 NET ASSESSED FULL CASH VALUE	$132,106
2004 NET ASSESSED LIMITED VALUE	$132,106
LAST TRANSFER DOCUMENT DOCKET	3802
LAST TRANSFER DOCUMENT PAGE	8
RECORDED DATE	12/28/2000
INSTRUMENT TYPE	6

NOAA Atlas 14, Volume 1, Version 5
Location name: Sedona, Arizona, USA*
Latitude: 34.8524°, Longitude: -111.8247°
Elevation: 4518.2 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	**2.53** (2.14-2.99)	**3.26** (2.75-3.85)	**4.40** (3.70-5.21)	**5.36** (4.50-6.34)	**6.73** (5.59-7.91)	**7.87** (6.49-9.25)	**9.10** (7.43-10.7)	**10.4** (8.40-12.3)	**12.4** (9.77-14.7)	**14.0** (10.9-16.7)
10-min	**1.92** (1.63-2.27)	**2.48** (2.09-2.93)	**3.35** (2.81-3.97)	**4.08** (3.43-4.82)	**5.12** (4.26-6.02)	**5.99** (4.94-7.03)	**6.92** (5.65-8.15)	**7.94** (6.39-9.35)	**9.41** (7.43-11.2)	**10.6** (8.29-12.7)
15-min	**1.59** (1.34-1.88)	**2.05** (1.72-2.43)	**2.77** (2.33-3.28)	**3.37** (2.83-3.98)	**4.23** (3.52-4.97)	**4.95** (4.08-5.81)	**5.72** (4.67-6.73)	**6.56** (5.28-7.73)	**7.78** (6.14-9.23)	**8.80** (6.85-10.5)
30-min	**1.07** (0.904-1.27)	**1.38** (1.16-1.63)	**1.86** (1.57-2.21)	**2.27** (1.91-2.68)	**2.85** (2.37-3.35)	**3.33** (2.75-3.91)	**3.85** (3.14-4.53)	**4.42** (3.56-5.20)	**5.24** (4.14-6.21)	**5.92** (4.61-7.07)
60-min	**0.663** (0.559-0.785)	**0.855** (0.719-1.01)	**1.15** (0.970-1.37)	**1.41** (1.18-1.66)	**1.76** (1.47-2.07)	**2.06** (1.70-2.42)	**2.38** (1.95-2.81)	**2.73** (2.20-3.22)	**3.24** (2.56-3.85)	**3.67** (2.85-4.37)
2-hr	**0.391** (0.340-0.452)	**0.494** (0.428-0.574)	**0.653** (0.566-0.756)	**0.788** (0.676-0.910)	**0.981** (0.837-1.13)	**1.14** (0.962-1.32)	**1.32** (1.10-1.53)	**1.51** (1.24-1.75)	**1.80** (1.45-2.09)	**2.03** (1.61-2.36)
3-hr	**0.280** (0.247-0.322)	**0.354** (0.313-0.408)	**0.455** (0.400-0.523)	**0.542** (0.475-0.621)	**0.667** (0.578-0.764)	**0.772** (0.664-0.883)	**0.889** (0.755-1.02)	**1.02** (0.851-1.17)	**1.20** (0.989-1.40)	**1.36** (1.10-1.58)
6-hr	**0.170** (0.152-0.190)	**0.211** (0.189-0.236)	**0.263** (0.234-0.294)	**0.308** (0.274-0.344)	**0.374** (0.330-0.417)	**0.426** (0.374-0.476)	**0.484** (0.420-0.542)	**0.546** (0.467-0.613)	**0.637** (0.535-0.721)	**0.711** (0.587-0.810)
12-hr	**0.108** (0.097-0.121)	**0.134** (0.120-0.149)	**0.163** (0.147-0.182)	**0.188** (0.168-0.209)	**0.222** (0.198-0.246)	**0.248** (0.220-0.275)	**0.276** (0.242-0.306)	**0.303** (0.264-0.338)	**0.343** (0.294-0.384)	**0.376** (0.319-0.423)
24-hr	**0.067** (0.061-0.074)	**0.084** (0.076-0.093)	**0.105** (0.095-0.116)	**0.121** (0.109-0.134)	**0.144** (0.130-0.159)	**0.162** (0.145-0.179)	**0.181** (0.161-0.200)	**0.200** (0.177-0.221)	**0.226** (0.198-0.251)	**0.246** (0.214-0.274)
2-day	**0.039** (0.035-0.043)	**0.048** (0.044-0.053)	**0.060** (0.055-0.067)	**0.070** (0.063-0.077)	**0.083** (0.075-0.091)	**0.094** (0.084-0.103)	**0.104** (0.093-0.115)	**0.115** (0.103-0.127)	**0.131** (0.115-0.144)	**0.142** (0.124-0.158)
3-day	**0.028** (0.025-0.031)	**0.035** (0.032-0.038)	**0.043** (0.040-0.048)	**0.050** (0.046-0.055)	**0.060** (0.054-0.066)	**0.068** (0.061-0.074)	**0.076** (0.068-0.083)	**0.084** (0.075-0.092)	**0.095** (0.084-0.105)	**0.104** (0.091-0.115)
4-day	**0.022** (0.020-0.024)	**0.028** (0.025-0.031)	**0.035** (0.032-0.038)	**0.041** (0.037-0.044)	**0.048** (0.044-0.053)	**0.055** (0.049-0.060)	**0.061** (0.055-0.067)	**0.068** (0.061-0.075)	**0.078** (0.069-0.086)	**0.085** (0.075-0.094)
7-day	**0.015** (0.014-0.016)	**0.019** (0.017-0.020)	**0.023** (0.021-0.025)	**0.027** (0.024-0.029)	**0.032** (0.029-0.035)	**0.036** (0.032-0.039)	**0.040** (0.036-0.044)	**0.044** (0.040-0.048)	**0.050** (0.044-0.055)	**0.055** (0.048-0.060)
10-day	**0.012** (0.011-0.013)	**0.015** (0.014-0.016)	**0.018** (0.017-0.020)	**0.021** (0.019-0.023)	**0.025** (0.022-0.027)	**0.027** (0.025-0.030)	**0.030** (0.027-0.033)	**0.033** (0.030-0.036)	**0.037** (0.033-0.041)	**0.040** (0.035-0.044)
20-day	**0.008** (0.007-0.008)	**0.010** (0.009-0.010)	**0.012** (0.011-0.013)	**0.013** (0.012-0.014)	**0.015** (0.014-0.016)	**0.017** (0.015-0.018)	**0.018** (0.016-0.020)	**0.019** (0.017-0.021)	**0.021** (0.019-0.023)	**0.022** (0.020-0.024)
30-day	**0.006** (0.006-0.007)	**0.008** (0.007-0.008)	**0.009** (0.008-0.010)	**0.010** (0.010-0.011)	**0.012** (0.011-0.013)	**0.013** (0.012-0.014)	**0.014** (0.013-0.016)	**0.015** (0.014-0.017)	**0.017** (0.015-0.018)	**0.017** (0.016-0.019)
45-day	**0.005** (0.004-0.005)	**0.006** (0.005-0.007)	**0.007** (0.007-0.008)	**0.008** (0.008-0.009)	**0.010** (0.009-0.011)	**0.011** (0.010-0.012)	**0.011** (0.010-0.013)	**0.012** (0.011-0.014)	**0.013** (0.012-0.015)	**0.014** (0.013-0.016)
60-day	**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** (0.008-0.010)	**0.010** (0.009-0.011)	**0.010** (0.009-0.011)	**0.011** (0.010-0.012)	**0.012** (0.010-0.013)

[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.

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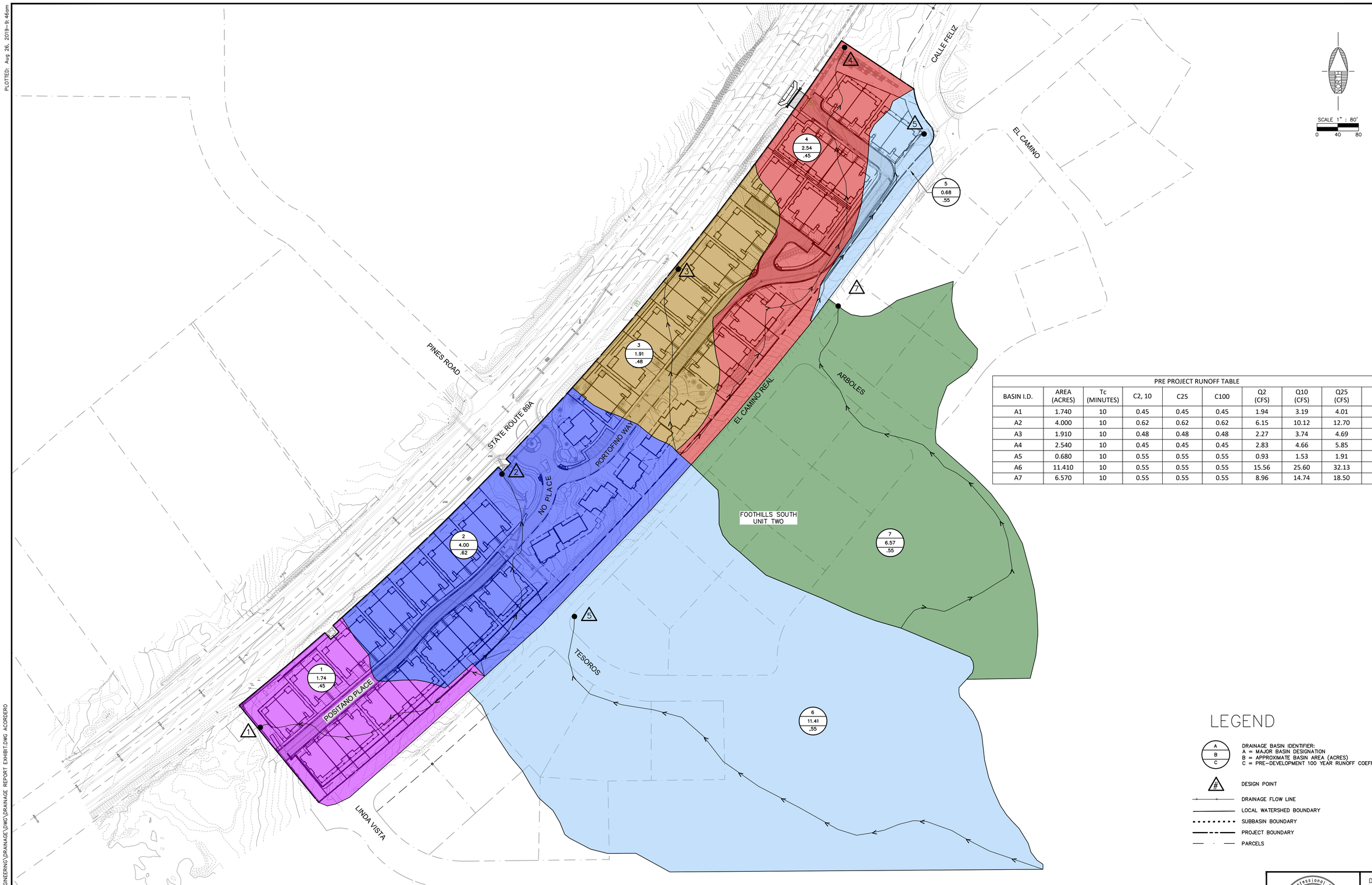
Final Drainage Report
For
Park Place
SWI Project # 17186

APPENDIX B
Pre-/Post- Drainage Basin Exhibits

PLOTTED: Aug 26, 2019 - 9:46am



PRE PROJECT RUNOFF TABLE									
BASIN I.D.	AREA (ACRES)	Tc (MINUTES)	C2, 10	C25	C100	Q2 (CFS)	Q10 (CFS)	Q25 (CFS)	Q100 (CFS)
A1	1.740	10	0.45	0.45	0.45	1.94	3.19	4.01	5.42
A2	4.000	10	0.62	0.62	0.62	6.15	10.12	12.70	17.16
A3	1.910	10	0.48	0.48	0.48	2.27	3.74	4.69	6.34
A4	2.540	10	0.45	0.45	0.45	2.83	4.66	5.85	7.91
A5	0.680	10	0.55	0.55	0.55	0.93	1.53	1.91	2.59
A6	11.410	10	0.55	0.55	0.55	15.56	25.60	32.13	43.43
A7	6.570	10	0.55	0.55	0.55	8.96	14.74	18.50	25.01

LEGEND

- A / B / C — DRAINAGE BASIN IDENTIFIER:
  A = MAJOR BASIN DESIGNATION
  B = APPROXIMATE BASIN AREA (ACRES)
  C = PRE-DEVELOPMENT 100 YEAR RUNOFF COEFFICIENT
- # — DESIGN POINT
- DRAINAGE FLOW LINE
- LOCAL WATERSHED BOUNDARY
- SUBBASIN BOUNDARY
- PROJECT BOUNDARY
- PARCELS

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)

REVISIONS			
NO.	DESCRIPTION	DATE	BY

Shephard Wesnitzer, Inc.
75 Kallof Place
Sedona, AZ 86336
928.282.1061
928.282.2058 fax
www.swiaz.com

JOB NO:	17186
DATE:	AUG 19
SCALE:	1" = 80'
DRAWN:	AKC
DESIGN:	AHB
CHECKED:	AHB

17186

CITY OF SEDONA
ARIZONA

PRE-DEVELOPMENT DRAINAGE BASINS

Registered Professional Engineer — CERTIFICATE NO. 28658 — ARTHUR H. BECKWITH — Date Signed 08-26-19 — ARIZONA, U.S.A.

DRAWING NO. 1

SHT NO. 1 OF 2

FILE: P:\2017\17186\ENGINEERING\DRAINAGE\DWG\DRAINAGE REPORT EXHIBIT.DWG ACORDERO

PLOTTED: Aug 26, 2019 - 9:48am

POST PROJECT RUNOFF TABLE									
BASIN I.D.	AREA	Tc	C2, 10	C25	C100	Q2 (CFS)	Q10 (CFS)	Q25 (CFS)	Q100 (CFS)
1	0.110	5	0.80	0.89	0.95	0.29	0.47	0.66	0.95
2	0.071	5	0.68	0.76	0.81	0.16	0.26	0.36	0.53
3	0.249	5	0.58	0.64	0.69	0.47	0.77	1.08	1.57
4	0.933	5	0.72	0.80	0.86	2.20	3.62	5.04	7.29
5	0.106	5	0.44	0.50	0.54	0.15	0.25	0.36	0.52
6	11.410	10	0.55	0.55	0.55	15.56	25.60	32.13	43.43
7	6.570	10	0.55	0.55	0.55	8.96	14.74	18.50	25.01
8	0.371	5	0.53	0.60	0.65	0.65	1.06	1.50	2.19
9	0.295	5	0.56	0.62	0.67	0.54	0.88	1.24	1.81
10	0.701	5	0.71	0.79	0.84	1.62	2.67	3.72	5.38
11	0.107	5	0.57	0.63	0.68	0.20	0.32	0.45	0.66
12	0.108	5	0.56	0.63	0.68	0.20	0.33	0.46	0.67
13	0.111	5	0.56	0.62	0.67	0.20	0.33	0.47	0.68
14	0.110	5	0.56	0.62	0.67	0.20	0.33	0.46	0.68
15	0.184	5	0.56	0.63	0.67	0.33	0.55	0.77	1.13
16	0.046	5	0.80	0.89	0.95	0.12	0.20	0.27	0.40
17	0.285	5	0.45	0.50	0.55	0.41	0.68	0.97	1.42
18	0.251	5	0.38	0.44	0.48	0.31	0.52	0.74	1.09
19	0.124	5	0.80	0.89	0.95	0.32	0.53	0.74	1.07
20	1.565	5	0.75	0.83	0.89	3.81	6.27	8.72	12.62
21	0.140	5	0.57	0.64	0.69	0.26	0.43	0.60	0.88
22	0.110	5	0.56	0.62	0.67	0.20	0.33	0.46	0.68
23	0.108	5	0.56	0.63	0.68	0.20	0.33	0.46	0.67
24	0.108	5	0.56	0.63	0.68	0.20	0.33	0.46	0.67
25	0.288	5	0.54	0.60	0.65	0.50	0.83	1.17	1.70
26	0.148	5	0.58	0.64	0.69	0.28	0.46	0.64	0.93
27	3.449	5	0.62	0.69	0.74	6.97	11.46	16.04	23.33
28	0.492	5	0.45	0.51	0.55	0.72	1.19	1.69	2.48
9a	0.295	5	0.69	0.77	0.84	0.67	1.10	1.52	2.26

LEGEND

- DRAINAGE BASIN IDENTIFIER: A = MAJOR BASIN DESIGNATION; B = APPROXIMATE BASIN AREA (ACRES); C = PRE-DEVELOPMENT 100 YEAR RUNOFF COEFFICIENT
- DESIGN POINT
- DRAINAGE FLOW LINE
- LOCAL WATERSHED BOUNDARY
- SUBBASIN BOUNDARY
- PROJECT BOUNDARY
- PARCELS

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)

REVISIONS			
NO.	DESCRIPTION	DATE	BY

Shephard Wesnitzer, Inc.
75 Kallof Place
Sedona, AZ 86336
928.282.1061
928.282.2058 fax
www.swiaz.com

JOB NO:	17186
DATE:	AUG 19
SCALE:	1" = 80'
DRAWN:	AKC
DESIGN:	AHB
CHECKED:	AHB

17186

CITY OF SEDONA
ARIZONA

Post-DEVELOPMENT DRAINAGE BASINS

Registered professional engineer
CERTIFICATE NO. 28658
ARTHUR H. BECKWITH
Date Signed 08-26-19
ARIZONA, U.S.A.

DRAWING NO. 2

SHT NO. 2 OF 2

FILE: P:\2017\17186\ENGINEERING\DRAINAGE\DWG\DRAINAGE REPORT EXHIBIT.DWG ACORDERO

Final Drainage Report
For
Park Place
SWI Project # 17186

APPENDIX C
Pavement Drainage/Inlet Hydraulics

Worksheet for Positano Place Street Capacity within ROW

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.03000	ft/ft
Normal Depth	0.43	ft

Section Definitions

Station (ft)	Elevation (ft)
0+37	4488.65
0+38	4488.65
0+39	4488.32
0+39	4488.33
0+50	4488.11
0+61	4487.89
0+62	4487.88
0+63	4488.21
0+63	4488.21
0+68	4488.31

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+37, 4488.65)	(0+68, 4488.31)	0.015

Options

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

Results

Discharge	28.89	ft³/s
Elevation Range	4487.88 to 4488.65 ft	
Flow Area	5.19	ft²

Worksheet for Positano Place Street Capacity within ROW

Results

Wetted Perimeter		28.06	ft
Hydraulic Radius		0.18	ft
Top Width		28.00	ft
Normal Depth		0.43	ft
Critical Depth		0.57	ft
Critical Slope		0.00490	ft/ft
Velocity		5.57	ft/s
Velocity Head		0.48	ft
Specific Energy		0.91	ft
Froude Number		2.28	
Flow Type	Supercritical		

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	0.43	ft
Critical Depth	0.57	ft
Channel Slope	0.03000	ft/ft
Critical Slope	0.00490	ft/ft

Cross Section for Positano Place Street Capacity within ROW

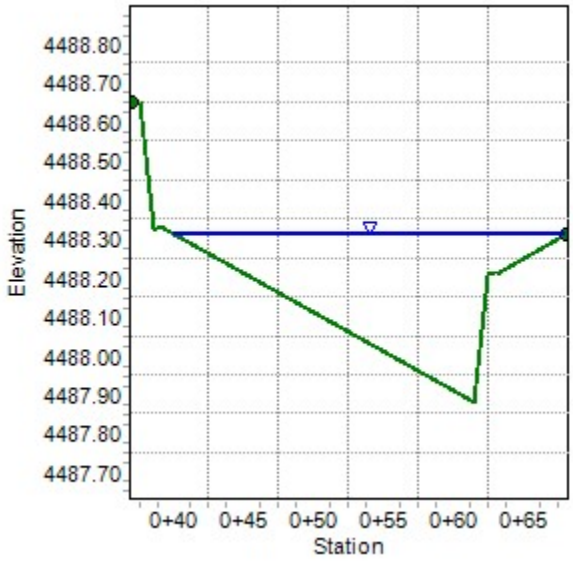
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.03000	ft/ft
Normal Depth	0.43	ft
Discharge	28.89	ft³/s

Cross Section Image



Worksheet for Portofino Way Street Capacity within ROW

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.07410	ft/ft
Normal Depth	0.50	ft

Section Definitions

Station (ft)	Elevation (ft)
0+32	4470.60
0+37	4470.50
0+38	4470.50
0+39	4470.16
0+39	4470.17
0+50	4469.73
0+61	4469.51
0+63	4469.45
0+63	4469.95
0+63	4469.95

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+32, 4470.60)	(0+63, 4469.95)	0.015

Options

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

Results

Discharge	55.22	ft³/s
Elevation Range	4469.45 to 4470.60 ft	
Flow Area	4.94	ft²

Worksheet for Portofino Way Street Capacity within ROW

Results

Wetted Perimeter		18.51	ft
Hydraulic Radius		0.27	ft
Top Width		18.00	ft
Normal Depth		0.50	ft
Critical Depth		0.87	ft
Critical Slope		0.00424	ft/ft
Velocity		11.18	ft/s
Velocity Head		1.94	ft
Specific Energy		2.44	ft
Froude Number		3.76	
Flow Type	Supercritical		

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	0.50	ft
Critical Depth	0.87	ft
Channel Slope	0.07410	ft/ft
Critical Slope	0.00424	ft/ft

Cross Section for Portofino Way Street Capacity within ROW

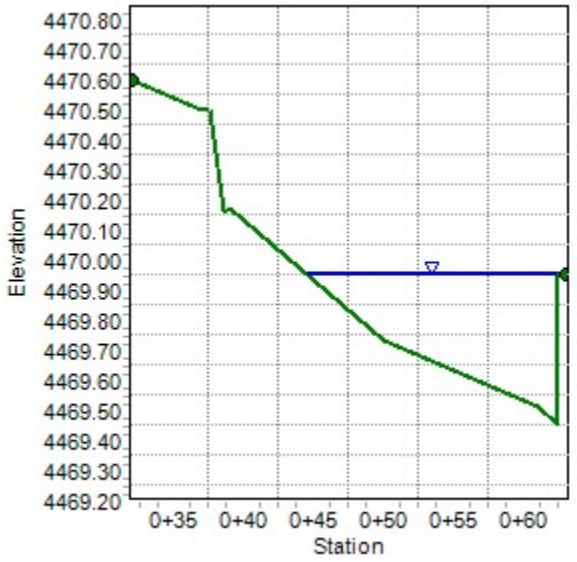
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.07410	ft/ft
Normal Depth	0.50	ft
Discharge	55.22	ft³/s

Cross Section Image



Worksheet for Positano Place STA 0+20 Pond 1 Entrance - 2 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03000	ft/ft
Discharge	2.20	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+37	4488.65
0+38	4488.65
0+39	4488.32
0+39	4488.33
0+50	4488.11
0+61	4487.89
0+62	4487.88
0+63	4488.21
0+63	4488.21

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+37, 4488.65)	(0+63, 4488.21)	0.015

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	0.16	ft
Elevation Range	4487.88 to 4488.65 ft	
Flow Area	0.69	ft²
Wetted Perimeter	8.57	ft

Worksheet for Positano Place STA 0+20 Pond 1 Entrance - 2 Year

Results

Hydraulic Radius		0.08	ft
Top Width		8.54	ft
Normal Depth		0.16	ft
Critical Depth		0.21	ft
Critical Slope		0.00696	ft/ft
Velocity		3.20	ft/s
Velocity Head		0.16	ft
Specific Energy		0.32	ft
Froude Number		1.99	
Flow Type	Supercritical		

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	0.16	ft
Critical Depth	0.21	ft
Channel Slope	0.03000	ft/ft
Critical Slope	0.00696	ft/ft

Cross Section for Positano Place STA 0+20 Pond 1 Entrance - 2 Year

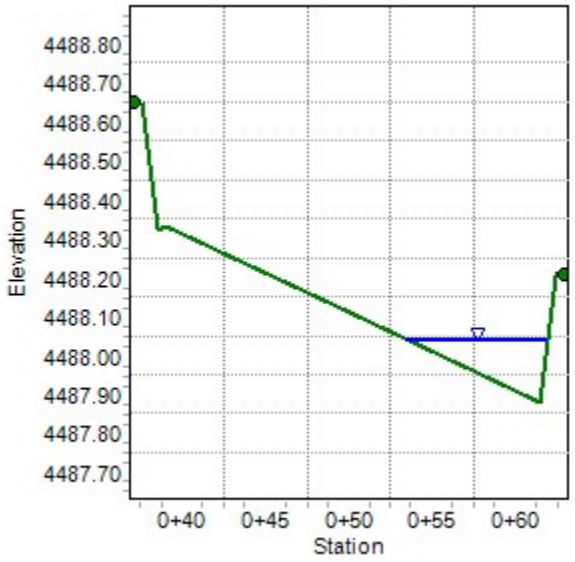
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03000	ft/ft
Normal Depth	0.16	ft
Discharge	2.20	ft³/s

Cross Section Image



Worksheet for Positano Place STA 0+20 Pond 1 Entrance - 100 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03000	ft/ft
Discharge	7.29	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+37	4488.65
0+38	4488.65
0+39	4488.32
0+39	4488.33
0+50	4488.11
0+61	4487.89
0+62	4487.88
0+63	4488.21
0+63	4488.21

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+37, 4488.65)	(0+63, 4488.21)	0.015

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	0.25	ft
Elevation Range	4487.88 to 4488.65 ft	
Flow Area	1.69	ft²
Wetted Perimeter	13.44	ft

Worksheet for Positano Place STA 0+20 Pond 1 Entrance - 100 Year

Results

Hydraulic Radius		0.13	ft
Top Width		13.39	ft
Normal Depth		0.25	ft
Critical Depth		0.34	ft
Critical Slope		0.00597	ft/ft
Velocity		4.31	ft/s
Velocity Head		0.29	ft
Specific Energy		0.54	ft
Froude Number		2.14	
Flow Type	Supercritical		

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	0.25	ft
Critical Depth	0.34	ft
Channel Slope	0.03000	ft/ft
Critical Slope	0.00597	ft/ft

Cross Section for Positano Place STA 0+20 Pond 1 Entrance - 100 Year

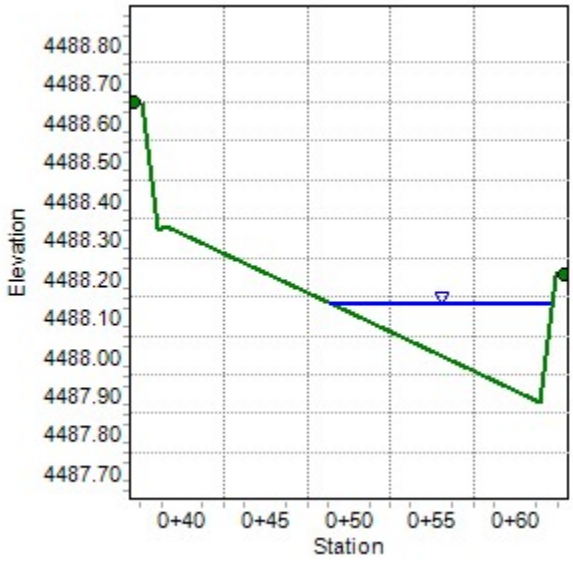
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.03000	ft/ft
Normal Depth	0.25	ft
Discharge	7.29	ft³/s

Cross Section Image



Worksheet for Positano Place STA 6+00 CATCH BASIN 1 - 2 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02840	ft/ft
Discharge	1.62	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+37	4492.32
0+38	4492.32
0+39	4491.99
0+39	4492.00
0+50	4492.00
0+61	4492.00
0+62	4491.99
0+63	4492.32
0+63	4492.32

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+37, 4492.32)	(0+63, 4492.32)	0.015

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	0.05	ft
Elevation Range	4491.99 to 4492.32 ft	
Flow Area	0.87	ft²
Wetted Perimeter	23.30	ft

Worksheet for Positano Place STA 6+00 CATCH BASIN 1 - 2 Year

Results

Hydraulic Radius		0.04	ft
Top Width		23.29	ft
Normal Depth		0.05	ft
Critical Depth		0.06	ft
Critical Slope		0.00875	ft/ft
Velocity		1.87	ft/s
Velocity Head		0.05	ft
Specific Energy		0.10	ft
Froude Number		1.71	
Flow Type	Supercritical		

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	0.05	ft
Critical Depth	0.06	ft
Channel Slope	0.02840	ft/ft
Critical Slope	0.00875	ft/ft

Cross Section for Positano Place STA 6+00 CATCH BASIN 1 - 2 Year

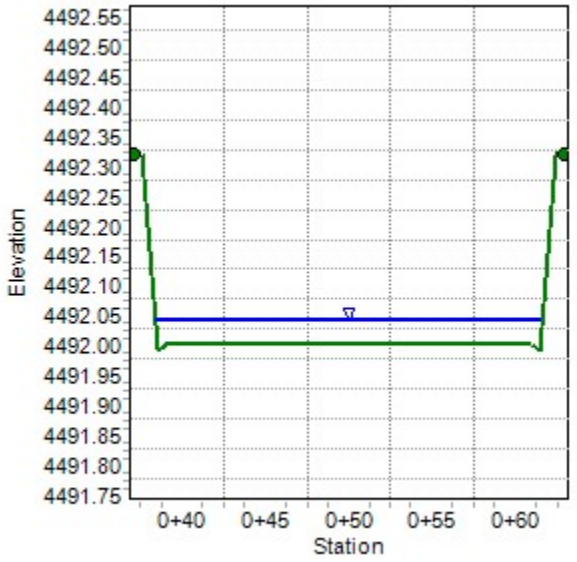
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02840	ft/ft
Normal Depth	0.05	ft
Discharge	1.62	ft³/s

Cross Section Image



Worksheet for Positano Place STA 6+00 CATCH BASIN 1 - 100 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02840	ft/ft
Discharge	5.38	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+37	4492.32
0+38	4492.32
0+39	4491.99
0+39	4492.00
0+50	4492.00
0+61	4492.00
0+62	4491.99
0+63	4492.32
0+63	4492.32

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+37, 4492.32)	(0+63, 4492.32)	0.015

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	0.09	ft
Elevation Range	4491.99 to 4492.32 ft	
Flow Area	1.79	ft²
Wetted Perimeter	23.55	ft

Worksheet for Positano Place STA 6+00 CATCH BASIN 1 - 100 Year

Results

Hydraulic Radius		0.08	ft
Top Width		23.53	ft
Normal Depth		0.09	ft
Critical Depth		0.13	ft
Critical Slope		0.00672	ft/ft
Velocity		3.00	ft/s
Velocity Head		0.14	ft
Specific Energy		0.23	ft
Froude Number		1.92	
Flow Type	Supercritical		

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	0.09	ft
Critical Depth	0.13	ft
Channel Slope	0.02840	ft/ft
Critical Slope	0.00672	ft/ft

Cross Section for Positano Place STA 6+00 CATCH BASIN 1 - 100 Year

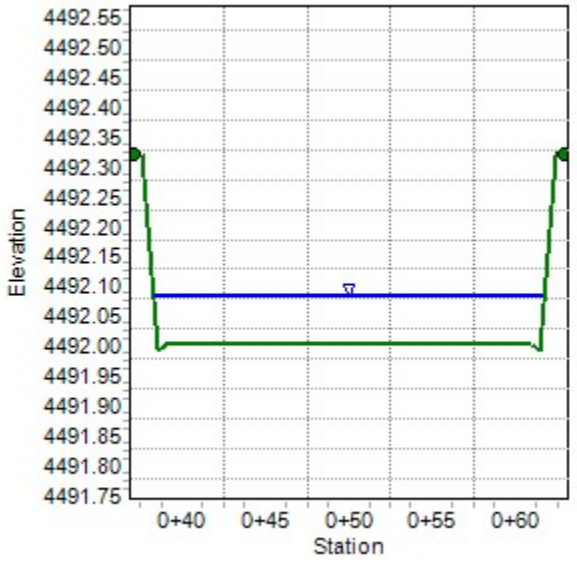
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02840	ft/ft
Normal Depth	0.09	ft
Discharge	5.38	ft³/s

Cross Section Image



Worksheet for Portofino Way STA 8+90 CATCH BASIN 5 - 2 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07410	ft/ft
Discharge	4.87	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+37	4470.50
0+38	4470.50
0+39	4470.16
0+39	4470.17
0+50	4469.73
0+61	4469.51
0+63	4469.45
0+63	4469.95
0+63	4469.95

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+37, 4470.50)	(0+63, 4469.95)	0.015

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	0.22	ft
Elevation Range	4469.45 to 4470.50 ft	
Flow Area	0.88	ft²
Wetted Perimeter	9.49	ft

Worksheet for Portofino Way STA 8+90 CATCH BASIN 5 - 2 Year

Results

Hydraulic Radius		0.09	ft
Top Width		9.27	ft
Normal Depth		0.22	ft
Critical Depth		0.32	ft
Critical Slope		0.00625	ft/ft
Velocity		5.53	ft/s
Velocity Head		0.47	ft
Specific Energy		0.69	ft
Froude Number		3.16	
Flow Type	Supercritical		

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	0.22	ft
Critical Depth	0.32	ft
Channel Slope	0.07410	ft/ft
Critical Slope	0.00625	ft/ft

Cross Section for Portofino Way STA 8+90 CATCH BASIN 5 - 2 Year

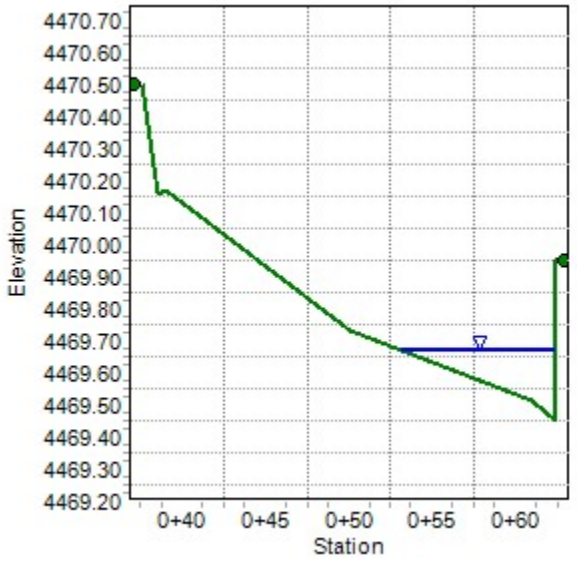
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07410	ft/ft
Normal Depth	0.22	ft
Discharge	4.87	ft³/s

Cross Section Image



Worksheet for Portofino Way STA 8+90 CATCH BASIN 5 - 100 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07410	ft/ft
Discharge	18.46	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+37	4470.50
0+38	4470.50
0+39	4470.16
0+39	4470.17
0+50	4469.73
0+61	4469.51
0+63	4469.45
0+63	4469.95
0+63	4469.95

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+37, 4470.50)	(0+63, 4469.95)	0.015

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	0.33	ft
Elevation Range	4469.45 to 4470.50 ft	
Flow Area	2.30	ft²
Wetted Perimeter	14.20	ft

Worksheet for Portofino Way STA 8+90 CATCH BASIN 5 - 100 Year

Results

Hydraulic Radius		0.16	ft
Top Width		13.86	ft
Normal Depth		0.33	ft
Critical Depth		0.55	ft
Critical Slope		0.00508	ft/ft
Velocity		8.02	ft/s
Velocity Head		1.00	ft
Specific Energy		1.33	ft
Froude Number		3.47	
Flow Type	Supercritical		

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	0.33	ft
Critical Depth	0.55	ft
Channel Slope	0.07410	ft/ft
Critical Slope	0.00508	ft/ft

Cross Section for Portofino Way STA 8+90 CATCH BASIN 5 - 100 Year

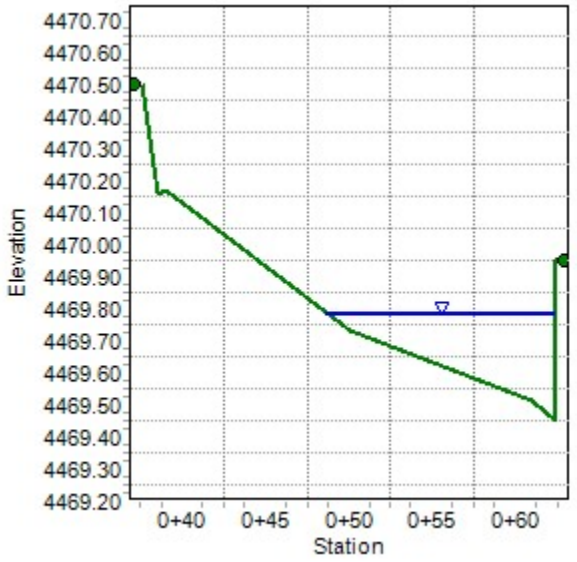
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07410	ft/ft
Normal Depth	0.33	ft
Discharge	18.46	ft³/s

Cross Section Image



Worksheet for Portofino Way STA 9+05 CATCH BASIN 5 - 2 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07410	ft/ft
Discharge	1.45	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+37	4469.84
0+38	4469.84
0+38	4469.34
0+39	4469.40
0+50	4469.65
0+61	4470.20
0+62	4470.19
0+63	4470.53
0+63	4470.53

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+37, 4469.84)	(0+63, 4470.53)	0.015

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	0.15	ft
Elevation Range	4469.34 to 4470.53 ft	
Flow Area	0.34	ft²
Wetted Perimeter	5.48	ft

Worksheet for Portofino Way STA 9+05 CATCH BASIN 5 - 2 Year

Results

Hydraulic Radius		0.06	ft
Top Width		5.33	ft
Normal Depth		0.15	ft
Critical Depth		0.22	ft
Critical Slope		0.00737	ft/ft
Velocity		4.24	ft/s
Velocity Head		0.28	ft
Specific Energy		0.43	ft
Froude Number		2.95	
Flow Type	Supercritical		

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	0.15	ft
Critical Depth	0.22	ft
Channel Slope	0.07410	ft/ft
Critical Slope	0.00737	ft/ft

Cross Section for Portofino Way STA 9+05 CATCH BASIN 5 - 2 Year

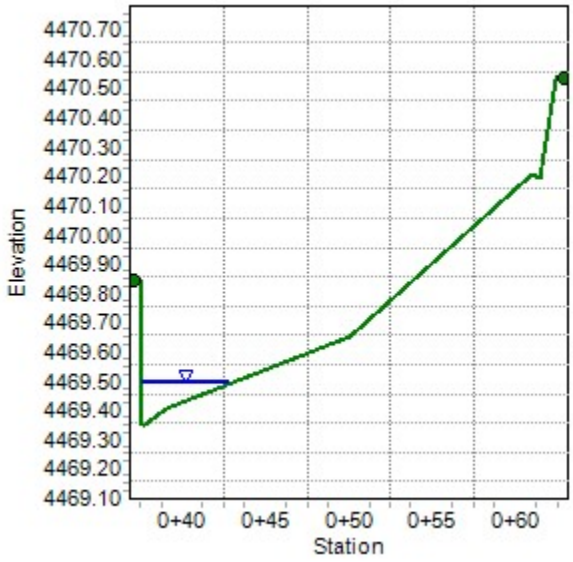
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07410	ft/ft
Normal Depth	0.15	ft
Discharge	1.45	ft³/s

Cross Section Image



Worksheet for Portofino Way STA 9+05 CATCH BASIN 5 - 100 Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07410	ft/ft
Discharge	5.51	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+37	4469.84
0+38	4469.84
0+38	4469.34
0+39	4469.40
0+50	4469.65
0+61	4470.20
0+62	4470.19
0+63	4470.53
0+63	4470.53

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+37, 4469.84)	(0+63, 4470.53)	0.015

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	0.23	ft
Elevation Range	4469.34 to 4470.53 ft	
Flow Area	0.94	ft²
Wetted Perimeter	9.22	ft

Worksheet for Portofino Way STA 9+05 CATCH BASIN 5 - 100 Year

Results

Hydraulic Radius		0.10	ft
Top Width		8.99	ft
Normal Depth		0.23	ft
Critical Depth		0.35	ft
Critical Slope		0.00608	ft/ft
Velocity		5.88	ft/s
Velocity Head		0.54	ft
Specific Energy		0.77	ft
Froude Number		3.21	
Flow Type	Supercritical		

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	0.23	ft
Critical Depth	0.35	ft
Channel Slope	0.07410	ft/ft
Critical Slope	0.00608	ft/ft

Cross Section for Portofino Way STA 9+05 CATCH BASIN 5 - 100 Year

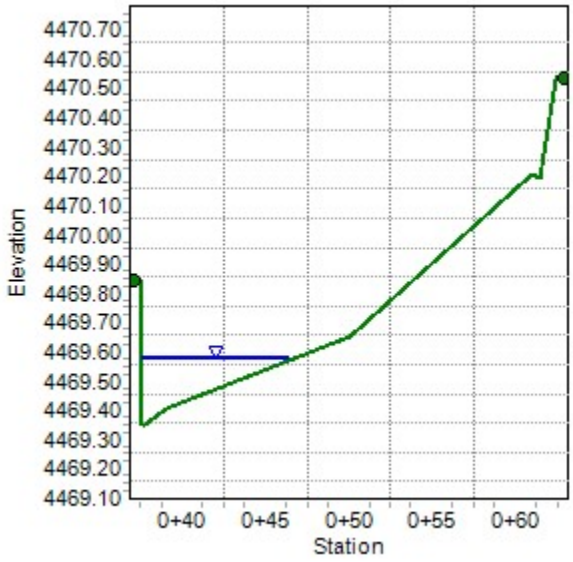
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.07410	ft/ft
Normal Depth	0.23	ft
Discharge	5.51	ft³/s

Cross Section Image



Worksheet for STA 6+00 Curb Inlet

Project Description

Solve For	Spread

Input Data

Discharge		2.67	ft³/s
Gutter Width		1.50	ft
Gutter Cross Slope		0.02	ft/ft
Road Cross Slope		0.02	ft/ft
Curb Opening Length		9.00	ft
Opening Height		0.42	ft
Curb Throat Type	Horizontal		
Local Depression		2.00	in
Local Depression Width		9.00	ft
Throat Incline Angle		90.00	degrees

Results

Spread	7.66	ft
Depth	0.13	ft
Gutter Depression	0.00	ft
Total Depression	0.17	ft

Worksheet for STA 9+00 Inlet On Grade

Project Description

Solve For	Efficiency

Input Data

Discharge		11.46	ft³/s
Slope		0.07410	ft/ft
Gutter Width		2.00	ft
Gutter Cross Slope		0.03	ft/ft
Road Cross Slope		0.03	ft/ft
Roughness Coefficient		0.013	
Local Depression		2.00	in
Local Depression Width		3.00	ft
Grate Width		2.00	ft
Grate Length		3.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%
Curb Opening Length		20.00	ft

Options

Calculation Option	Use Both
Grate Flow Option	Exclude None

Results

Efficiency	76.50	%
Intercepted Flow	8.77	ft³/s
Bypass Flow	2.69	ft³/s
Spread	9.25	ft
Depth	0.26	ft
Flow Area	1.20	ft²
Gutter Depression	0.00	ft
Total Depression	0.17	ft
Velocity	9.53	ft/s
Splash Over Velocity	6.99	ft/s
Frontal Flow Factor	0.77	
Side Flow Factor	0.01	
Grate Flow Ratio	0.48	
Equivalent Cross Slope	0.05538	ft/ft
Active Grate Length	1.50	ft
Length Factor	0.31	
Total Interception Length	58.83	ft

Final Drainage Report
For
Park Place
SWI Project # 17186

APPENDIX D
Storm Drain Hydraulics

Scenario: Base

>>>> Info: Subsurface Network Rooted by: O-1
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

>>>> Info: Subsurface Network Rooted by: O-3
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

>>>> Info: Subsurface Network Rooted by: O-2
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-3	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-4	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-16	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-8	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-6	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-5	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-7	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-9	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-10	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-17	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-15	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-11	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-12	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-13	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-14	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-3

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-6	1	24 inch	Circular	23.83	6.52	2.08	4,489.42	4,489.35
P-4	1	36 inch	Circular	89.50	44.49	6.29	4,489.64	4,489.35
P-5	1	24 inch	Circular	81.62	6.14	1.95	4,489.66	4,489.45
P-3	1	36 inch	Circular	72.46	44.49	6.29	4,490.24	4,490.00
P-7	1	24 inch	Circular	17.55	4.81	1.53	4,490.26	4,490.24
P-2	1	36 inch	Circular	12.53	39.68	5.61	4,490.27	4,490.24
P-32	1	36 inch	Circular	65.49	39.68	5.61	4,490.73	4,490.56
P-31	1	24 inch	Circular	26.62	36.45	11.60	4,490.49	4,490.00

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-3	51.01	4,487.00	4,489.35	4,489.35
I-3	6.52	4,489.50	4,489.45	4,489.42
J-2	44.49	4,490.50	4,490.00	4,489.64
I-2	6.14	4,489.50	4,489.50	4,489.50
J-4	44.49	4,491.50	4,490.24	4,490.24
I-4	4.81	4,491.50	4,490.26	4,490.26
J-1	39.68	4,491.40	4,490.56	4,490.27
I-16	39.68	4,490.00	4,490.00	4,490.00

I-1	36.45	4,501.00	4,490.49	4,490.49

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-16	1	18 inch	Circular	42.72	1.24	0.70	4,484.68	4,484.66
P-15	1	18 inch	Circular	22.20	1.24	0.70	4,484.70	4,484.69
P-18	1	12 inch	Circular	48.53	0.22	1.98	4,484.70	4,484.70
P-14	1	18 inch	Circular	155.15	1.02	1.64	4,484.74	4,484.70
P-13	1	18 inch	Circular	83.05	0.64	1.45	4,484.75	4,484.74
P-17	1	12 inch	Circular	32.12	0.38	1.30	4,484.76	4,484.74
P-12	1	18 inch	Circular	55.22	0.64	1.43	4,484.77	4,484.75
P-11	1	18 inch	Circular	73.01	0.43	1.13	4,484.78	4,484.77
P-19	1	12 inch	Circular	30.10	0.21	0.27	4,484.77	4,484.77
P-10	1	18 inch	Circular	67.24	0.25	1.22	4,484.79	4,484.78
P-33	1	12 inch	Circular	29.14	0.18	3.55	4,487.67	4,484.78
P-20	1	12 inch	Circular	69.17	0.00	0.00	4,484.84	4,484.79
P-9	1	18 inch	Circular	128.80	0.25	1.11	4,485.08	4,484.79
P-8	1	12 inch	Circular	59.25	0.25	1.15	4,485.32	4,485.08

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	1.24	4,487.00	4,484.66	4,484.66
J-5	1.24	4,487.60	4,484.69	4,484.68
J-6	1.24	4,488.40	4,484.70	4,484.70
I-5	0.22	4,486.70	4,484.70	4,484.70
J-7	1.02	4,493.00	4,484.74	4,484.74
J-8	0.64	4,496.00	4,484.75	4,484.75
I-6	0.38	4,486.17	4,484.76	4,484.76
J-9	0.64	4,498.20	4,484.77	4,484.77
J-10	0.43	4,497.60	4,484.78	4,484.78
I-7	0.21	4,496.20	4,484.77	4,484.77
J-11	0.25	4,494.50	4,484.79	4,484.79
I-10	0.18	4,490.20	4,487.67	4,487.67
I-9	0.00	4,486.20	4,484.84	4,484.84
J-12	0.25	4,491.40	4,485.08	4,485.08
I-8	0.25	4,487.60	4,485.32	4,485.32

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-2

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-27	1	48 inch	Circular	112.57	32.96	2.62	4,464.13	4,463.93
P-26	1	48 inch	Circular	181.79	32.96	2.62	4,464.46	4,464.13
P-30	1	12 inch	Circular	56.03	0.00	0.00	4,464.54	4,464.54
P-25	1	36 inch	Circular	36.65	32.26	4.56	4,464.84	4,464.54
P-29	1	24 inch	Circular	12.15	11.10	16.41	4,465.48	4,464.84
P-24	1	24 inch	Circular	225.48	21.16	9.68	4,476.82	4,465.06
P-23	1	18 inch	Circular	112.85	0.16	0.96	4,476.82	4,476.82
P-34	1	12 inch	Circular	32.85	21.00	26.74	4,483.57	4,476.82
P-22	1	18 inch	Circular	110.15	0.16	1.56	4,477.66	4,476.82
P-28	1	12 inch	Circular	61.15	0.00	0.00	4,476.82	4,476.82
P-21	1	12 inch	Circular	41.48	0.16	1.59	4,478.19	4,477.69

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)

O-2	32.96	4,468.00	4,463.93	4,463.93
J-17	32.96	4,475.00	4,464.13	4,464.13
I-15	32.96	4,467.70	4,464.54	4,464.46
I-14	0.00	4,464.70	4,464.54	4,464.54
J-16	32.26	4,468.20	4,464.84	4,464.84
I-13	11.10	4,468.40	4,465.48	4,465.48
J-15	21.16	4,480.40	4,476.82	4,476.82
J-14	0.16	4,484.20	4,476.82	4,476.82
I-17	21.00	4,485.00	4,483.57	4,483.57
J-13	0.16	4,488.00	4,477.69	4,477.66
I-12	0.00	4,479.20	4,476.82	4,476.82
I-11	0.16	4,480.70	4,478.19	4,478.19

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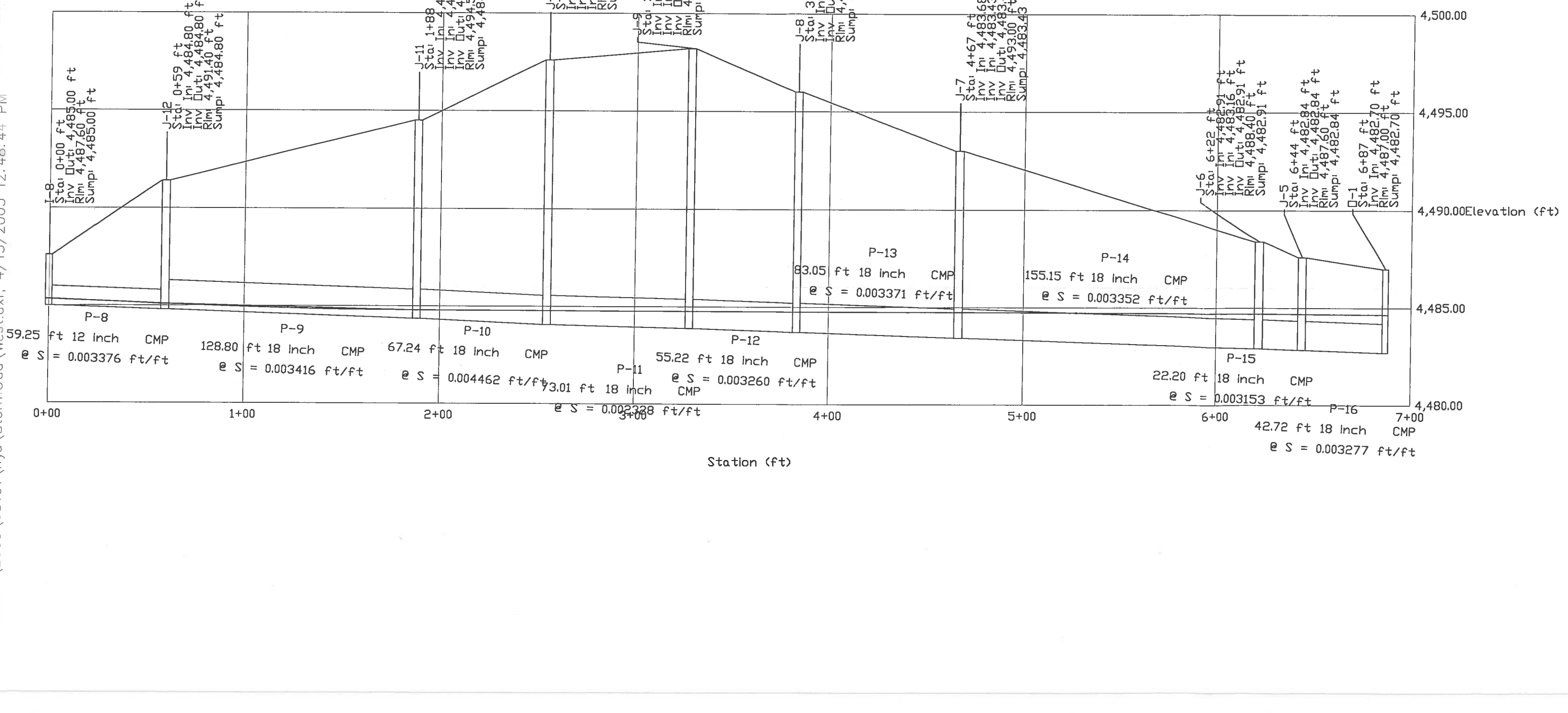
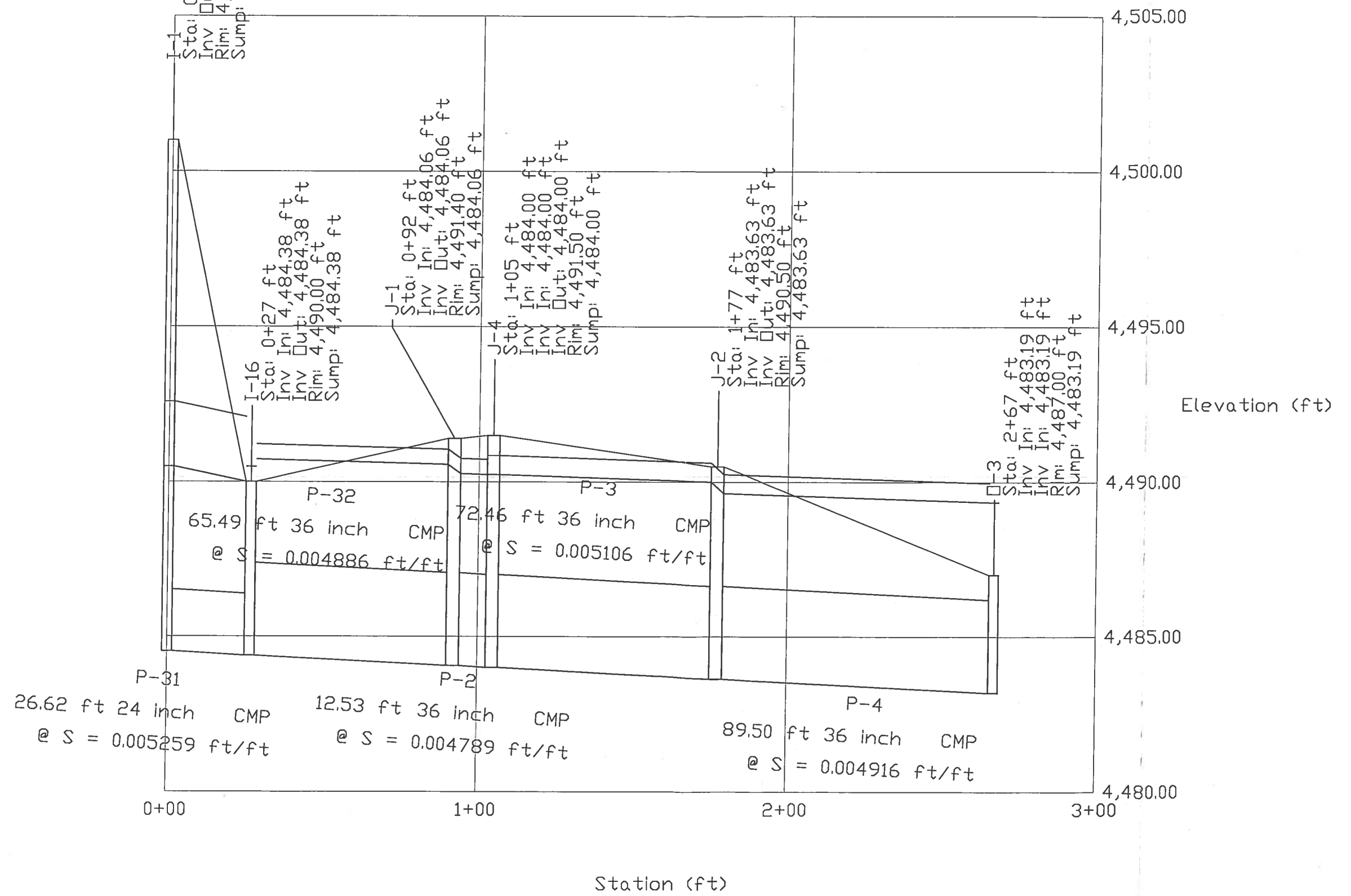
Profile: West
Scenario: Base

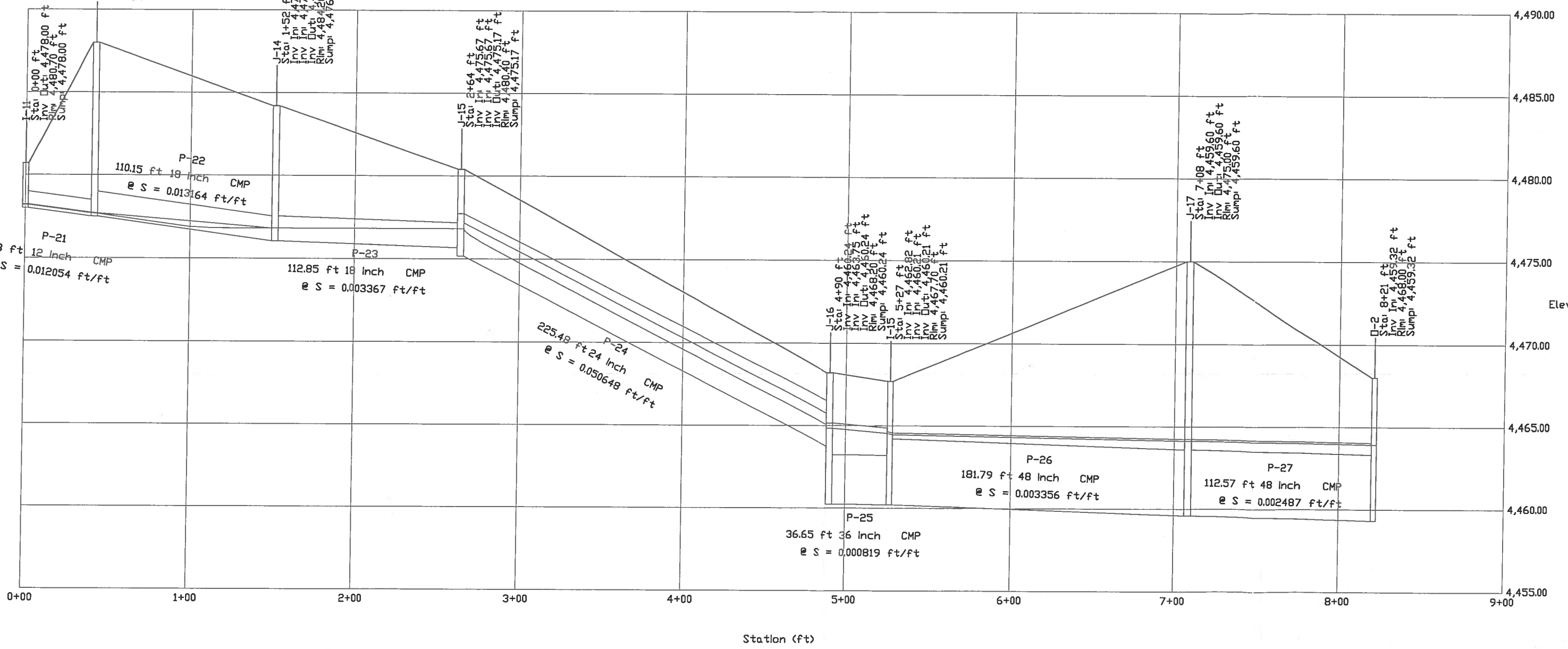


Profile: Middle

Scenario: Base



Profile: East
Scenario: Base



Final Drainage Report
For
Park Place
SWI Project # 17186

APPENDIX E
Detention Hydrology/Hydraulics

Park Place

Project Summary	
Title	Park Place
Engineer	Adam Cordero
Company	Shephard-Wesnitzer, Inc.
Date	10/8/2018

Notes	Original storm drain impervious areas have been updated to reflect the new Park Place buildings.

Table of Contents

Table of Contents

Park Place

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (hours)	Peak Flow (ft^3/s)
1PI	IDF Storms - I-D-F Table, 2 yrs	2	1,537.000	0.167	1.96
1PI	IDF Storms - I-D-F Table, 10 yrs	10	2,529.000	0.167	3.22
1PI	IDF Storms - I-D-F Table, 25 yrs	25	3,174.000	0.167	4.04
1PI	IDF Storms - I-D-F Table, 100 yrs	100	4,290.000	0.167	5.46
2PI	IDF Storms - I-D-F Table, 2 yrs	2	4,869.000	0.167	6.20
2PI	IDF Storms - I-D-F Table, 10 yrs	10	8,011.000	0.167	10.20
2PI	IDF Storms - I-D-F Table, 25 yrs	25	10,053.000	0.167	12.80
2PI	IDF Storms - I-D-F Table, 100 yrs	100	13,587.000	0.167	17.30
6PI	IDF Storms - I-D-F Table, 2 yrs	2	12,322.000	0.167	15.69
6PI	IDF Storms - I-D-F Table, 10 yrs	10	20,271.000	0.167	25.81
6PI	IDF Storms - I-D-F Table, 25 yrs	25	25,439.000	0.167	32.39
6PI	IDF Storms - I-D-F Table, 100 yrs	100	34,382.000	0.167	43.78
3PI	IDF Storms - I-D-F Table, 2 yrs	2	1,800.000	0.167	2.29
3PI	IDF Storms - I-D-F Table, 10 yrs	10	2,961.000	0.167	3.77
3PI	IDF Storms - I-D-F Table, 25 yrs	25	3,716.000	0.167	4.73
3PI	IDF Storms - I-D-F Table, 100 yrs	100	5,023.000	0.167	6.40
4PI	IDF Storms - I-D-F Table, 2 yrs	2	2,244.000	0.167	2.86
4PI	IDF Storms - I-D-F Table, 10 yrs	10	3,692.000	0.167	4.70
4PI	IDF Storms - I-D-F Table, 25 yrs	25	4,633.000	0.167	5.90
4PI	IDF Storms - I-D-F Table, 100 yrs	100	6,262.000	0.167	7.97
7PI	IDF Storms - I-D-F Table, 2 yrs	2	7,095.000	0.167	9.03
7PI	IDF Storms - I-D-F Table, 10 yrs	10	11,672.000	0.167	14.86
7PI	IDF Storms - I-D-F Table, 25 yrs	25	14,648.000	0.167	18.65

Park Place

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (hours)	Peak Flow (ft^3/s)
7PI	IDF Storms - I-D-F Table, 100 yrs	100	19,797.000	0.167	25.21
5PI	IDF Storms - I-D-F Table, 2 yrs	2	734.000	0.167	0.94
5PI	IDF Storms - I-D-F Table, 10 yrs	10	1,208.000	0.167	1.54
5PI	IDF Storms - I-D-F Table, 25 yrs	25	1,516.000	0.167	1.93
5PI	IDF Storms - I-D-F Table, 100 yrs	100	2,049.000	0.167	2.61
1DI	IDF Storms - I-D-F Table, 2 yrs	2	1,798.000	0.083	4.57
1DI	IDF Storms - I-D-F Table, 10 yrs	10	2,956.000	0.083	7.52
1DI	IDF Storms - I-D-F Table, 25 yrs	25	4,111.000	0.083	10.46
1DI	IDF Storms - I-D-F Table, 100 yrs	100	5,944.000	0.083	15.12
2DI	IDF Storms - I-D-F Table, 2 yrs	2	3,273.000	0.083	8.33
2DI	IDF Storms - I-D-F Table, 10 yrs	10	5,381.000	0.083	13.69
2DI	IDF Storms - I-D-F Table, 25 yrs	25	7,463.000	0.083	18.98
2DI	IDF Storms - I-D-F Table, 100 yrs	100	10,909.000	0.083	27.75
6DI	IDF Storms - I-D-F Table, 2 yrs	2	12,337.000	0.167	15.68
6DI	IDF Storms - I-D-F Table, 10 yrs	10	20,297.000	0.167	25.80
6DI	IDF Storms - I-D-F Table, 25 yrs	25	25,471.000	0.167	32.38
6DI	IDF Storms - I-D-F Table, 100 yrs	100	34,425.000	0.167	43.76
5DI	IDF Storms - I-D-F Table, 2 yrs	2	60.000	0.083	0.15
5DI	IDF Storms - I-D-F Table, 10 yrs	10	99.000	0.083	0.25
5DI	IDF Storms - I-D-F Table, 25 yrs	25	141.000	0.083	0.36
5DI	IDF Storms - I-D-F Table, 100 yrs	100	206.000	0.083	0.53
4DI	IDF Storms - I-D-F Table, 2 yrs	2	3,340.000	0.083	8.49
4DI	IDF Storms - I-D-F Table, 10 yrs	10	5,491.000	0.083	13.97

Park Place

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
4DI	IDF Storms - I-D-F Table, 25 yrs	25	7,712.000	0.083	19.62
4DI	IDF Storms - I-D-F Table, 100 yrs	100	11,218.000	0.083	28.54
7DI	IDF Storms - I-D-F Table, 2 yrs	2	7,095.000	0.167	9.03
7DI	IDF Storms - I-D-F Table, 10 yrs	10	11,672.000	0.167	14.86
7DI	IDF Storms - I-D-F Table, 25 yrs	25	14,648.000	0.167	18.65
7DI	IDF Storms - I-D-F Table, 100 yrs	100	19,797.000	0.167	25.21
3DI	IDF Storms - I-D-F Table, 2 yrs	2	340.000	0.083	0.87
3DI	IDF Storms - I-D-F Table, 10 yrs	10	559.000	0.083	1.42
3DI	IDF Storms - I-D-F Table, 25 yrs	25	790.000	0.083	2.01
3DI	IDF Storms - I-D-F Table, 100 yrs	100	1,153.000	0.083	2.93

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
1PO	IDF Storms - I-D-F Table, 2 yrs	2	1,538.000	0.170	1.93
1PO	IDF Storms - I-D-F Table, 10 yrs	10	2,530.000	0.170	3.17
1PO	IDF Storms - I-D-F Table, 25 yrs	25	3,175.000	0.170	3.98
1PO	IDF Storms - I-D-F Table, 100 yrs	100	4,292.000	0.170	5.38
2PO	IDF Storms - I-D-F Table, 2 yrs	2	17,198.000	0.170	21.56
2PO	IDF Storms - I-D-F Table, 10 yrs	10	28,293.000	0.170	35.47
2PO	IDF Storms - I-D-F Table, 25 yrs	25	35,505.000	0.170	44.51
2PO	IDF Storms - I-D-F Table, 100 yrs	100	47,988.000	0.170	60.16
3PO	IDF Storms - I-D-F Table, 2 yrs	2	1,801.000	0.170	2.26
3PO	IDF Storms - I-D-F Table, 10 yrs	10	2,963.000	0.170	3.71

Park Place

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (hours)	Peak Flow (ft^3/s)
3PO	IDF Storms - I-D-F Table, 25 yrs	25	3,718.000	0.170	4.66
3PO	IDF Storms - I-D-F Table, 100 yrs	100	5,025.000	0.170	6.30
4PO	IDF Storms - I-D-F Table, 2 yrs	2	9,343.000	0.170	11.71
4PO	IDF Storms - I-D-F Table, 10 yrs	10	15,371.000	0.170	19.27
4PO	IDF Storms - I-D-F Table, 25 yrs	25	19,289.000	0.170	24.18
4PO	IDF Storms - I-D-F Table, 100 yrs	100	26,070.000	0.170	32.68
5PO	IDF Storms - I-D-F Table, 2 yrs	2	735.000	0.170	0.92
5PO	IDF Storms - I-D-F Table, 10 yrs	10	1,209.000	0.170	1.52
5PO	IDF Storms - I-D-F Table, 25 yrs	25	1,517.000	0.170	1.90
5PO	IDF Storms - I-D-F Table, 100 yrs	100	2,050.000	0.170	2.57
1DO	IDF Storms - I-D-F Table, 2 yrs	2	1,852.000	0.280	0.23
1DO	IDF Storms - I-D-F Table, 10 yrs	10	3,046.000	0.310	0.26
1DO	IDF Storms - I-D-F Table, 25 yrs	25	4,236.000	0.320	0.29
1DO	IDF Storms - I-D-F Table, 100 yrs	100	6,126.000	0.340	0.34
2DO	IDF Storms - I-D-F Table, 2 yrs	2	15,614.000	0.180	17.32
2DO	IDF Storms - I-D-F Table, 10 yrs	10	25,684.000	0.180	28.62
2DO	IDF Storms - I-D-F Table, 25 yrs	25	32,940.000	0.190	33.02
2DO	IDF Storms - I-D-F Table, 100 yrs	100	45,342.000	0.220	36.48
4DO	IDF Storms - I-D-F Table, 2 yrs	2	10,435.000	0.220	7.86
4DO	IDF Storms - I-D-F Table, 10 yrs	10	17,164.000	0.230	11.40
4DO	IDF Storms - I-D-F Table, 25 yrs	25	22,360.000	0.220	16.14
4DO	IDF Storms - I-D-F Table, 100 yrs	100	31,015.000	0.200	25.81
5DO	IDF Storms - I-D-F Table, 2 yrs	2	62.000	0.080	0.15

Park Place

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
5DO	IDF Storms - I-D-F Table, 10 yrs	10	102.000	0.080	0.24
5DO	IDF Storms - I-D-F Table, 25 yrs	25	146.000	0.080	0.34
5DO	IDF Storms - I-D-F Table, 100 yrs	100	213.000	0.080	0.50
3DO	IDF Storms - I-D-F Table, 2 yrs	2	351.000	0.080	0.82
3DO	IDF Storms - I-D-F Table, 10 yrs	10	577.000	0.080	1.36
3DO	IDF Storms - I-D-F Table, 25 yrs	25	816.000	0.080	1.91
3DO	IDF Storms - I-D-F Table, 100 yrs	100	1,190.000	0.080	2.79

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
P1 (IN)	IDF Storms - I-D-F Table, 2 yrs	2	1,856.000	0.080	4.36	(N/A)	(N/A)
P1 (OUT)	IDF Storms - I-D-F Table, 2 yrs	2	1,852.000	0.280	0.23	4,483.02	1,574.000
P1 (IN)	IDF Storms - I-D-F Table, 10 yrs	10	3,052.000	0.080	7.16	(N/A)	(N/A)
P1 (OUT)	IDF Storms - I-D-F Table, 10 yrs	10	3,046.000	0.310	0.26	4,483.27	2,662.000
P1 (IN)	IDF Storms - I-D-F Table, 25 yrs	25	4,244.000	0.080	9.96	(N/A)	(N/A)
P1 (OUT)	IDF Storms - I-D-F Table, 25 yrs	25	4,236.000	0.320	0.29	4,483.52	3,774.000
P1 (IN)	IDF Storms - I-D-F Table, 100 yrs	100	6,138.000	0.080	14.41	(N/A)	(N/A)
P1 (OUT)	IDF Storms - I-D-F Table, 100 yrs	100	6,126.000	0.340	0.34	4,483.98	5,561.000

Park Place

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
P2 (IN)	IDF Storms - I-D-F Table, 2 yrs	2	15,614.000	0.170	18.03	(N/A)	(N/A)
P2 (OUT)	IDF Storms - I-D-F Table, 2 yrs	2	15,614.000	0.180	17.32	4,485.23	822.000
P2 (IN)	IDF Storms - I-D-F Table, 10 yrs	10	25,684.000	0.170	29.65	(N/A)	(N/A)
P2 (OUT)	IDF Storms - I-D-F Table, 10 yrs	10	25,684.000	0.180	28.62	4,486.75	1,687.000
P2 (IN)	IDF Storms - I-D-F Table, 25 yrs	25	32,940.000	0.170	37.77	(N/A)	(N/A)
P2 (OUT)	IDF Storms - I-D-F Table, 25 yrs	25	32,940.000	0.190	33.02	4,487.53	2,689.000
P2 (IN)	IDF Storms - I-D-F Table, 100 yrs	100	45,342.000	0.160	51.74	(N/A)	(N/A)
P2 (OUT)	IDF Storms - I-D-F Table, 100 yrs	100	45,342.000	0.220	36.48	4,488.26	7,434.000
P4 (IN)	IDF Storms - I-D-F Table, 2 yrs	2	10,435.000	0.090	11.76	(N/A)	(N/A)
P4 (OUT)	IDF Storms - I-D-F Table, 2 yrs	2	10,435.000	0.220	7.86	4,461.41	3,455.000
P4 (IN)	IDF Storms - I-D-F Table, 10 yrs	10	17,164.000	0.090	19.33	(N/A)	(N/A)
P4 (OUT)	IDF Storms - I-D-F Table, 10 yrs	10	17,164.000	0.230	11.40	4,462.35	6,383.000
P4 (IN)	IDF Storms - I-D-F Table, 25 yrs	25	22,360.000	0.090	26.22	(N/A)	(N/A)
P4 (OUT)	IDF Storms - I-D-F Table, 25 yrs	25	22,360.000	0.220	16.14	4,463.00	8,374.000
P4 (IN)	IDF Storms - I-D-F Table, 100 yrs	100	31,015.000	0.090	37.33	(N/A)	(N/A)

Park Place

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
P4 (OUT)	IDF Storms - I -D-F Table, 100 yrs	100	31,015.000	0.200	25.81	4,463.93	10,879.000

Park Place

Subsection: I-D-F Table
Label: IDF Storms

Return Event: 10 years
Storm Event: IDF Storms - 10 Year

I-D-F Curve

Time (hours)	Intensity (in/h)
0.083	5.360
0.167	4.080
0.250	3.370
0.500	2.270
1.000	1.410
2.000	0.788
3.000	0.542
6.000	0.308
12.000	0.188
24.000	0.121

Park Place

Subsection: I-D-F Table
Label: IDF Storms

Return Event: 100 years
Storm Event: IDF Storms - 100 Year

I-D-F Curve

Time (hours)	Intensity (in/h)
0.083	9.100
0.167	6.920
0.250	5.720
0.500	3.850
1.000	2.380
2.000	1.320
3.000	0.889
6.000	0.484
12.000	0.276
24.000	0.181

Park Place

Subsection: I-D-F Table
Label: IDF Storms

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

I-D-F Curve

Time (hours)	Intensity (in/h)
0.083	3.260
0.167	2.480
0.250	2.050
0.500	1.380
1.000	0.855
2.000	0.494
3.000	0.354
6.000	0.211
12.000	0.134
24.000	0.084

Park Place

Subsection: I-D-F Table
Label: IDF Storms

Return Event: 25 years
Storm Event: IDF Storms - 25 Year

I-D-F Curve

Time (hours)	Intensity (in/h)
0.083	6.730
0.167	5.120
0.250	4.230
0.500	2.850
1.000	1.760
2.000	0.981
3.000	0.667
6.000	0.374
12.000	0.222
24.000	0.144

Park Place

Subsection: Elevation vs. Volume Curve
Label: P1

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
4,482.00	0.000
4,483.00	1,492.250
4,483.90	5,424.310
4,484.50	6,444.000

Park Place

Subsection: Elevation vs. Volume Curve
Label: P2

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
4,483.19	0.000
4,484.00	87.120
4,485.00	653.400
4,486.00	1,393.920
4,487.00	1,785.960
4,487.50	2,526.480
4,488.00	5,401.440
4,489.00	13,285.800
4,490.00	21,780.000

Park Place

Subsection: Pipe Volume
Label: P4

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

Volume Results (Pipe)	
Pipe Storage Upstream Invert	4,460.21 ft
Pipe Storage Downstream Invert	4,459.45 ft
Pipe Storage Length	642.00 ft
Pipe Storage Diameter	60.0 in
Pipe Storage Number of Barrels	1
Pipe Storage Slice Width	0.10 ft
Pipe Storage Vertical Increment	1.00 ft

Elevation (ft)	Perpendicular Downstream Depth (ft)	Perpendicular Downstream Area (ft²)	Wetted Length (ft)	Filled Length (ft)	Perpendicular Upstream Depth (ft)	Perpendicular Upstream Area (ft²)	Total Volume (ft³)
4,459.45	0.00	0.0	0.00	0.00	0.00	0.0	0.000
4,460.45	1.00	2.8	642.00	0.00	0.24	0.3	935.000
4,461.45	2.00	7.3	642.00	0.00	1.24	3.8	3,549.000
4,462.45	3.00	12.3	642.00	0.00	2.24	8.5	6,686.000
4,463.45	4.00	16.8	642.00	0.00	3.24	13.5	9,758.000
4,464.45	5.00	19.6	642.00	0.00	4.24	17.8	12,115.000
4,465.21	5.00	19.6	642.00	642.00	5.00	19.6	12,606.000

Requested Pond Water Surface Elevations	
Minimum (Headwater)	4,482.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	4,484.50 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	O1	Forward	TW	4,482.00	4,484.50
Rectangular Weir	O0	Forward	TW	4,484.00	4,484.50
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: O0 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	4,484.00 ft
Weir Length	1.33 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: O1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	3.0 in
Length	0.67 ft
Length (Computed Barrel)	0.67 ft
Slope (Computed)	0.000 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.500
Kb	0.199
Kr	0.500
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0078
M	2.0000
C	0.0379
Y	0.6900
T1 ratio (HW/D)	1.135
T2 ratio (HW/D)	1.296
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	4,482.28 ft	T1 Flow	0.09 ft³/s
T2 Elevation	4,482.32 ft	T2 Flow	0.10 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	40
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	4,483.19 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	4,490.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	C0	Forward	TW	4,483.19	4,490.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Park Place

Subsection: Outlet Input Data
Label: R2

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

Structure ID: C0 Structure Type: Culvert-Circular	
Number of Barrels	2
Diameter	18.0 in
Length	10.00 ft
Length (Computed Barrel)	10.00 ft
Slope (Computed)	0.006 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.500
Kb	0.062
Kr	0.500
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0078
M	2.0000
C	0.0379
Y	0.6900
T1 ratio (HW/D)	1.133
T2 ratio (HW/D)	1.293
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	4,484.89 ft	T1 Flow	7.58 ft³/s
T2 Elevation	4,485.13 ft	T2 Flow	8.66 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	40
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Requested Pond Water Surface Elevations	
Minimum (Headwater)	4,459.45 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	4,465.21 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Culvert-Circular	C0	Forward	TW	4,459.45	4,465.21
Culvert-Circular	C1	Forward	TW	4,462.00	4,465.21
Tailwater Settings	Tailwater			(N/A)	(N/A)

Park Place

Subsection: Outlet Input Data
Label: R4

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

Structure ID: C0 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	20.80 ft
Length (Computed Barrel)	20.80 ft
Slope (Computed)	0.008 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.500
Kb	0.062
Kr	0.500
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0078
M	2.0000
C	0.0379
Y	0.6900
T1 ratio (HW/D)	1.132
T2 ratio (HW/D)	1.293
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	4,461.15 ft	T1 Flow	7.58 ft³/s
T2 Elevation	4,461.39 ft	T2 Flow	8.66 ft³/s

Park Place

Subsection: Outlet Input Data
Label: R4

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

Structure ID: C1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	24.0 in
Length	20.80 ft
Length (Computed Barrel)	20.80 ft
Slope (Computed)	0.005 ft/ft

Outlet Control Data	
Manning's n	0.024
Ke	0.500
Kb	0.042
Kr	0.500
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0078
M	2.0000
C	0.0379
Y	0.6900
T1 ratio (HW/D)	1.133
T2 ratio (HW/D)	1.294
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	4,464.27 ft	T1 Flow	15.55 ft³/s
T2 Elevation	4,464.59 ft	T2 Flow	17.77 ft³/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	40
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Park Place

Subsection: C and Area
Label: 1DI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Proposed	0.650	2.140	(N/A)
Weighted C & Total Area --->	0.650	2.140	1.391

Park Place

Subsection: C and Area
Label: 1PI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Existing	0.450	1.740	(N/A)
Weighted C & Total Area --->	0.450	1.740	0.783

Park Place

Subsection: C and Area
Label: 2DI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Proposed	0.670	3.780	(N/A)
Weighted C & Total Area --->	0.670	3.780	2.533

Park Place

Subsection: C and Area
Label: 2PI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Existing	0.620	4.000	(N/A)
Weighted C & Total Area --->	0.620	4.000	2.480

Park Place

Subsection: C and Area
Label: 3DI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
	0.560	0.470	(N/A)
Weighted C & Total Area --->	0.560	0.470	0.263

Park Place

Subsection: C and Area
Label: 3PI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Existnig	0.480	1.910	(N/A)
Weighted C & Total Area --->	0.480	1.910	0.917

Park Place

Subsection: C and Area
Label: 4DI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Proposed	0.590	4.380	(N/A)
Weighted C & Total Area --->	0.590	4.380	2.584

Park Place

Subsection: C and Area
Label: 4PI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Existing	0.450	2.540	(N/A)
Weighted C & Total Area --->	0.450	2.540	1.143

Park Place

Subsection: C and Area
Label: 5DI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Proposed	0.440	0.106	(N/A)
Weighted C & Total Area --->	0.440	0.106	0.047

Park Place

Subsection: C and Area
Label: 5PI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Existing	0.550	0.680	(N/A)
Weighted C & Total Area --->	0.550	0.680	0.374

Park Place

Subsection: C and Area
Label: 6DI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Existing	0.550	11.410	(N/A)
Weighted C & Total Area --->	0.550	11.410	6.276

Park Place

Subsection: C and Area
Label: 6PI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Existing	0.550	11.410	(N/A)
Weighted C & Total Area --->	0.550	11.410	6.276

Park Place

Subsection: C and Area
Label: 7DI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Existing	0.550	6.570	(N/A)
Weighted C & Total Area --->	0.550	6.570	3.614

Park Place

Subsection: C and Area
Label: 7PI

Return Event: 2 years
Storm Event: IDF Storms - 2 Year

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Existing	0.550	6.570	(N/A)
Weighted C & Total Area --->	0.550	6.570	3.614