CITY COPY

PRELIMINARY DRAINAGE DESIGN REPORT
FOR
71ST STREET & EARLL DRIVE
PRELMINARY DESIGN

A proposed residential subdivision located in the City of
Scottsdale, Arizona

Stormwater Review By:
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FAX 480-312-9202
E-MAIL rianderson@ScottsdaleAZ.gov
Review Cycle _____ Date 12/3/15

Prepared:

Approved

November 17, 2015

Prepared for:

K. Hovnanian Great Western Homes, LLC
20830 North Tatum Blvd, Suite 250
Scottsdale, Arizona
Tel: (480)824-4200

Prepared by:

Hoskin Ryan Consultants, Inc.
6245 N. 24th Parkway, Suite 100
Phoenix, AZ 85016
(602)252-8384

Registered Professional Engineer (Civil)
CERTIFICATE NO.
32836
PAUL M.
HAAS
Date Signed 11-17-15
ARIZONA, U.S.A.

EXP. 9-30-16

HRC 15-015-02

Gallery - 12/9/15 Review

Preliminary report and plan lacking detail normally required (90%)
- basin loc
- " outfall

Will be able to make things work in OC areas

Required volume is
V = 2.16/12 (1.07 ac.) 43,560 (0.94 - 0.67)*
= 2,205 ☐ ft³
* entire site previously dev. at R1-7

Will need to show effective attenuation of proposed basin

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1 INTRODUCTION

Hoskin Ryan Consultants, Inc. (HRC) has been contracted by K Hovnanian Great Western Homes, L.L.C., to provide preliminary drainage services for a 1.2-acre property within the City of Scottsdale (the City). The Gallery (Site) is located within Section 27, Township 2N and Range 4E (Figure 1). The Site is bounded on the north by Earll Drive, on the east by Vinson Automotive and a dirt parking lot, on the west by the Earll Street Residences Condominium, and on the south by an automotive collision repair specialist. The purpose of this report is to document the hydrologic & hydraulic conditions of the Site, and to demonstrate that the Site may be developed in accordance with drainage criteria established by the City of Scottsdale.

2 EXISTING DRAINAGE CONDITIONS

2.1 Flood Insurance Rate Map

The Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas, Map Number 04013C2235L (Figure 2), dated October 16, 2013, as published by the Federal Emergency Management Agency (FEMA) (Ref. 1), displays The Site in a Zone "X" , as defined below:

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

2.2 Off-Site Flow

Off-site flow is not anticipated to flow across the Site. The existing development intercepts off-site flows from the east and west. The Earll Drive right-of-way intercepts off-site flows from the north. A 90-inch RCP storm drain pipe lies beneath Earll Drive and terminates in the Indian Bend Wash. Catch basins along Earl Drive drain into this 90-inch pipe.

2.3 On-Site Flow

On-site runoff sheet flows across the Site from the northwest to the southeast. The Site has a gradient fall of approximately 2-feet from the northwest to the southeast. See Figure 3 for existing conditions.

3 PROPOSED DRAINAGE PLAN

The analysis and discussion in this report are based on the preliminary on- & off-site drainage map (Figure 3) and meet the drainage requirements outlined in the City of Scottsdale's *Design Standards and Policies Manual* (Ref. 2).

3.1 Off-Site Flow

The existing drainage system along Earll Drive intercepts off site flows from the north.

3.2 On-Site Flow

The Site will be graded to split the lot into two subbasins. The high point will be located near the center of the site and will direct runoff to the north and south. Lots will drain towards the street that will convey flow towards Earll Drive and to a storm water storage basin in the southwest corner. Existing catch basins in Earll Drive will direct the flow into the existing 90-inch RCP.

4 SPECIAL CONDITIONS

On-site storage for the 100-year 2-hour discharge volume is typically required for the entire site. However, the City is allowing a reduction in the required storage volume based on previous development of the site.

5 DATA ANALYSIS METHODS

All hydrologic and hydraulic methods used for this report are in accordance with the *Design Standards and Policies Manual for the City of Scottsdale* (Ref. 2), the *Flood Control District of Maricopa County Hydrology Manual* (Ref. 4) and the *Flood Control District of Maricopa County Hydraulic Manual* (Ref. 5).

5.1 Hydrology

Hydrologic analyses were performed using the rational method in accordance with procedures and parameters recommended in the *Design Standards and Policies Manual for the City of Scottsdale* (Ref. 2), as shown below. On-site flows were determined for the 2, 10, 25, and 100-year storms. Calculations are provided in Appendix B and summarized in Table 1.

$$Q = C\,i\,A$$

where: Q = computed runoff in cfs
C = runoff coefficient
i = rainfall intensity (inches)
A = sub-basin area (acres)

The runoff "C" coefficients employed are from Figure 4.1-4 of the *Scottsdale Design Standards and Policies Manual* (Ref. 2). These "C" values correspond to the proposed R-5 zoning. The "C" value for 2, 10, and 25-year storms is 0.76. The "C" value for the 100-year storm is 0.94. Existing and proposed runoff from the Site is summarized in Table 1.

Table 1: Peak Discharge Summary

Scenario	Peak Discharge (cfs)			
	2-yr	10-yr	25-yr	100-yr
Existing Flow	1	1	2	3
Proposed Flow	1	2	2	4

Onsite storm water storage is required for the 100-year, 2-hour storm event for previously undisturbed portions of the site. Storm water storage is not required for previously disturbed areas. Figure 4 shows an estimate of the previously undisturbed and disturbed areas based on an aerial photograph from the 1970s. The amount of undisturbed area is estimated to be 23,000 square feet. The required amount of storage is 3,874 cubic feet; see Appendix C for calculations. Storm water storage will be provided in three onsite retention basins.

5.2 Hydraulics

Flows up to the 100-year 2 hour storm will be contained within the street cross section. Calculations for street capacities are shown in Appendix D.

6 CONCLUSIONS

1) Storm water storage basins will be constructed to retain the runoff from the 100-year, 2-hour storm from historically undisturbed area on the site.
2) Off-site flow will not affect the site.
3) The street cross section will adequately contain and convey the 100-year 2-hour storm runoff.
4) The site will be developed per City requirements.

7 WARNING AND DISCLAIMER OF LIABILITY

A completed Warning and Disclaimer of Liability form is included in Appendix G of this report.

8 REFERENCES

1. Federal Emergency Management Agency, *"Flood Insurance Rate Maps for Maricopa County Arizona, and Incorporated Areas, Map Number 04013C2235L"*, October 16, 2013.

2. City of Scottsdale, *"Design Standards and Policies Manual"*, February 2010.

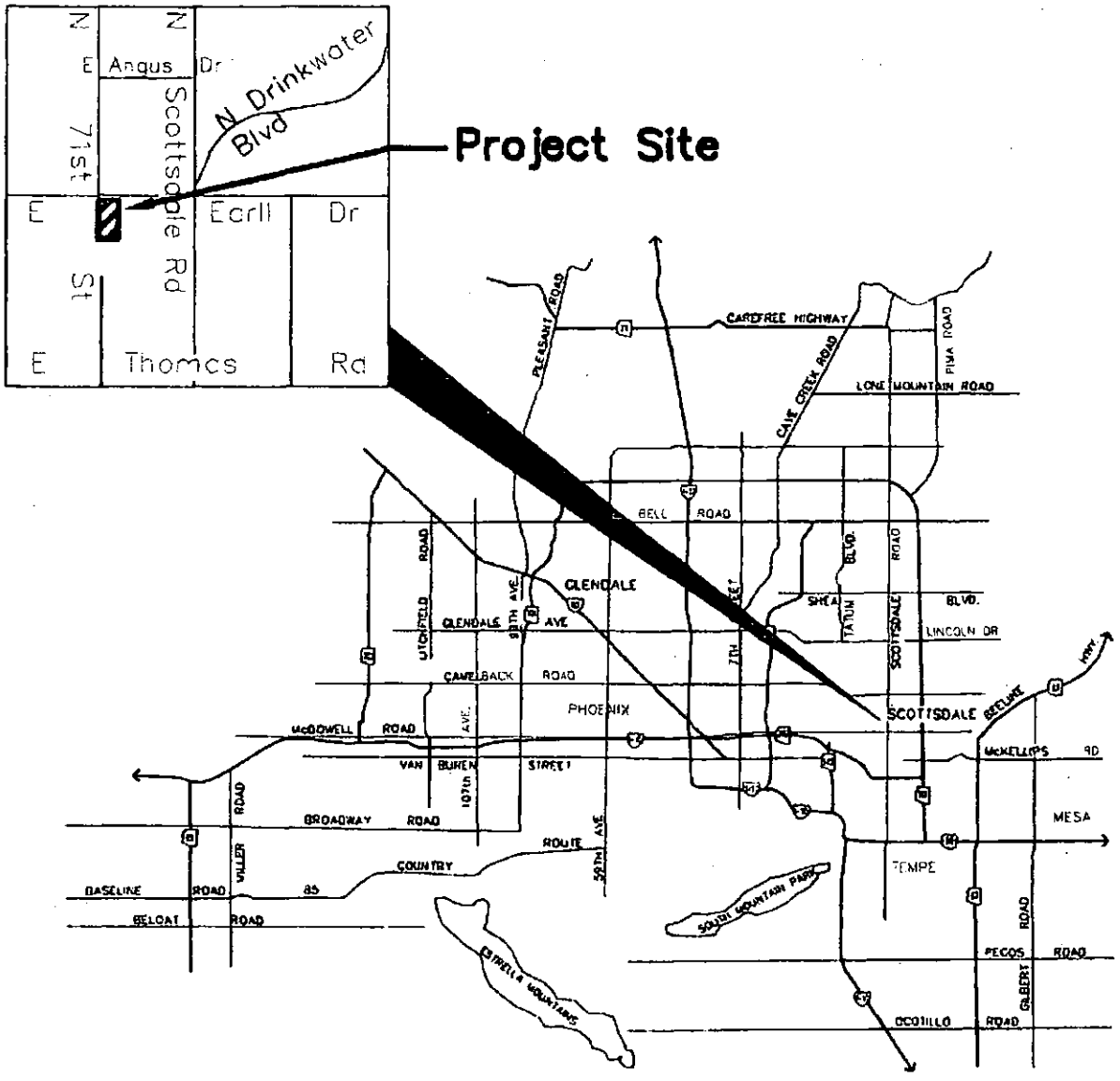
3. Parsons Brinckerhoff, *Osborn Road Storm Drain, Final Design Report*, March 31, 2000.

4. The Flood Control District of Maricopa County, *"Drainage Design Manual for Maricopa County, Arizona, Volume I Hydrology"*, August 15, 2013.

5. The Flood Control District of Maricopa County, *"Drainage Design Manual for Maricopa County, Arizona, Volume II Hydraulics"*, August 15, 2013.

6. National Oceanic and Atmospheric Administration, *NOAA Atlas 14, Precipitation-Frequency Atlas of the United States, Volume 1 Version 4.0: Semiarid Southwest (Arizona, Southeast California, Nevada, New Mexico, Utah)*, 2006.

7. Parsons Brinkerhoff, *"As-Built" Plans for the Construction of Osborn Road Storm Drain, Phase II, Thomas Road and 61st Place to Indian Bend Wash*, April 28, 2000.



NO SCALE

Hoskin • Ryan Consultants
creative engineering solutions

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The Gallery
At 71st St & Earll Dr
Location and Vicinity Map

FIGURE 1

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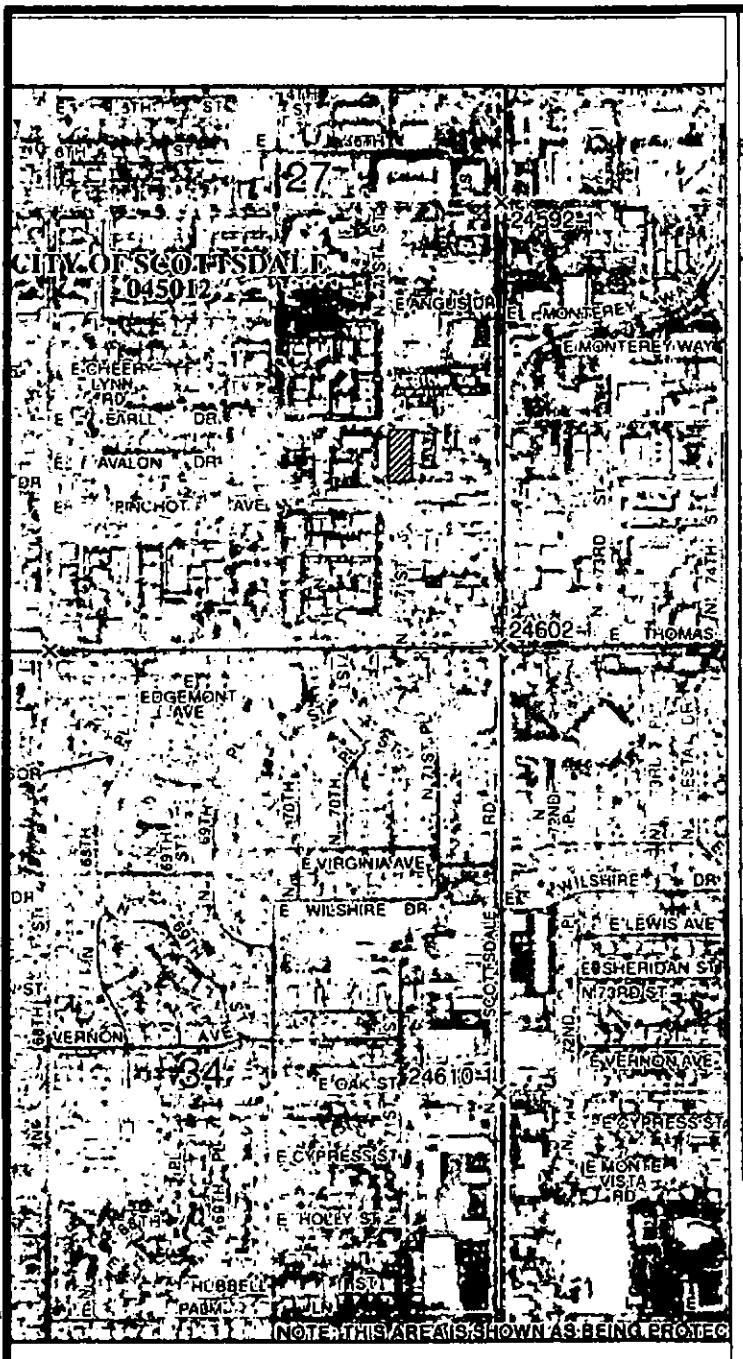

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET METE

NFIP

PANEL 2235L

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA

AND INCORPORATED AREAS

PANEL 2235 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
[illegible]	[illegible]	[illegible]	[illegible]

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

MAP NUMBER
04013C2235L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

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The Gallery At 71st & Earll Dr

FLOOD INSURANCE RATE MAP

FIGURE 2

FILE: g:\projects\15\15-015 71st street & earll\02- preliminary engineering\hydro\e-fig2.dwg
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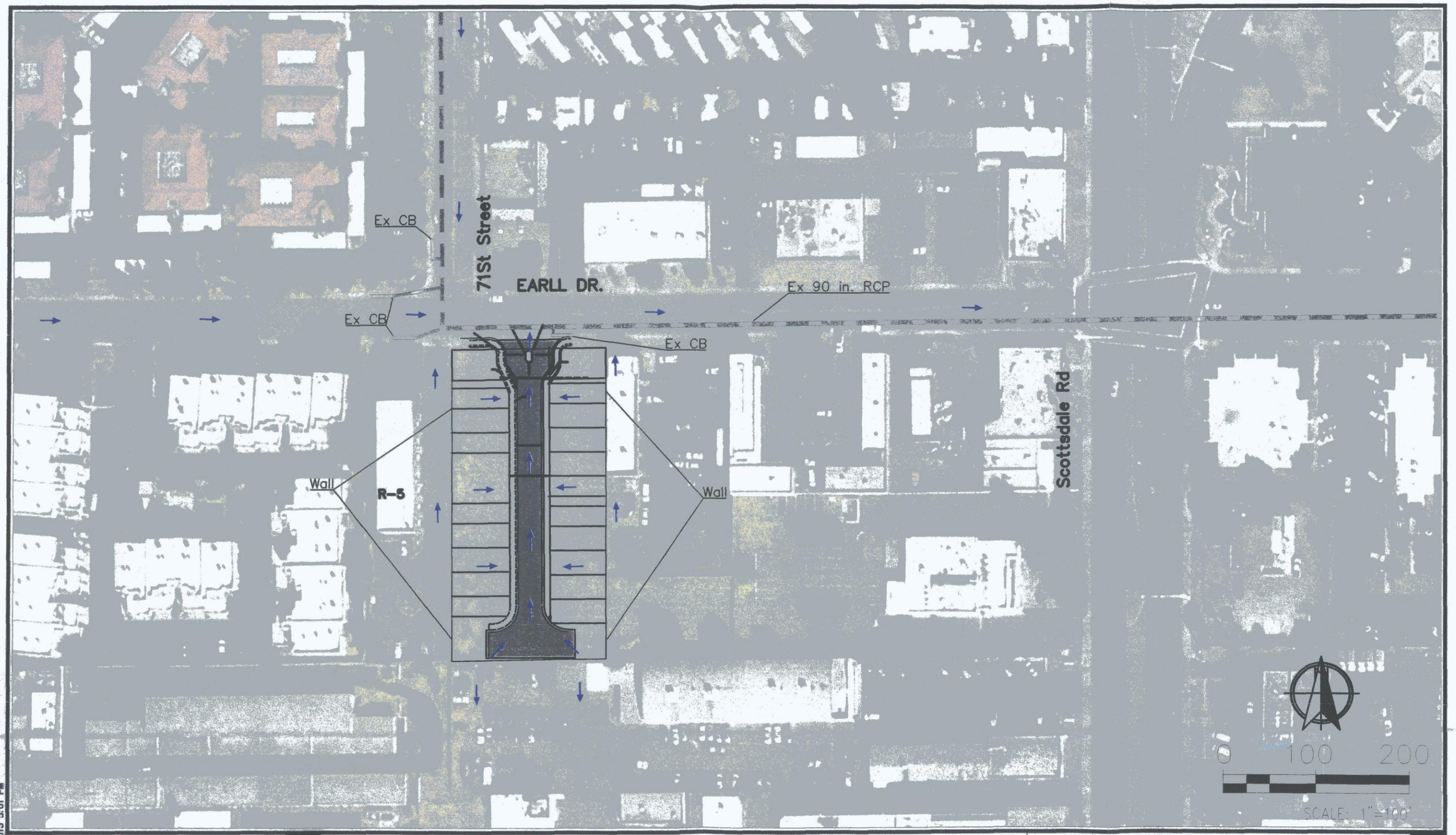

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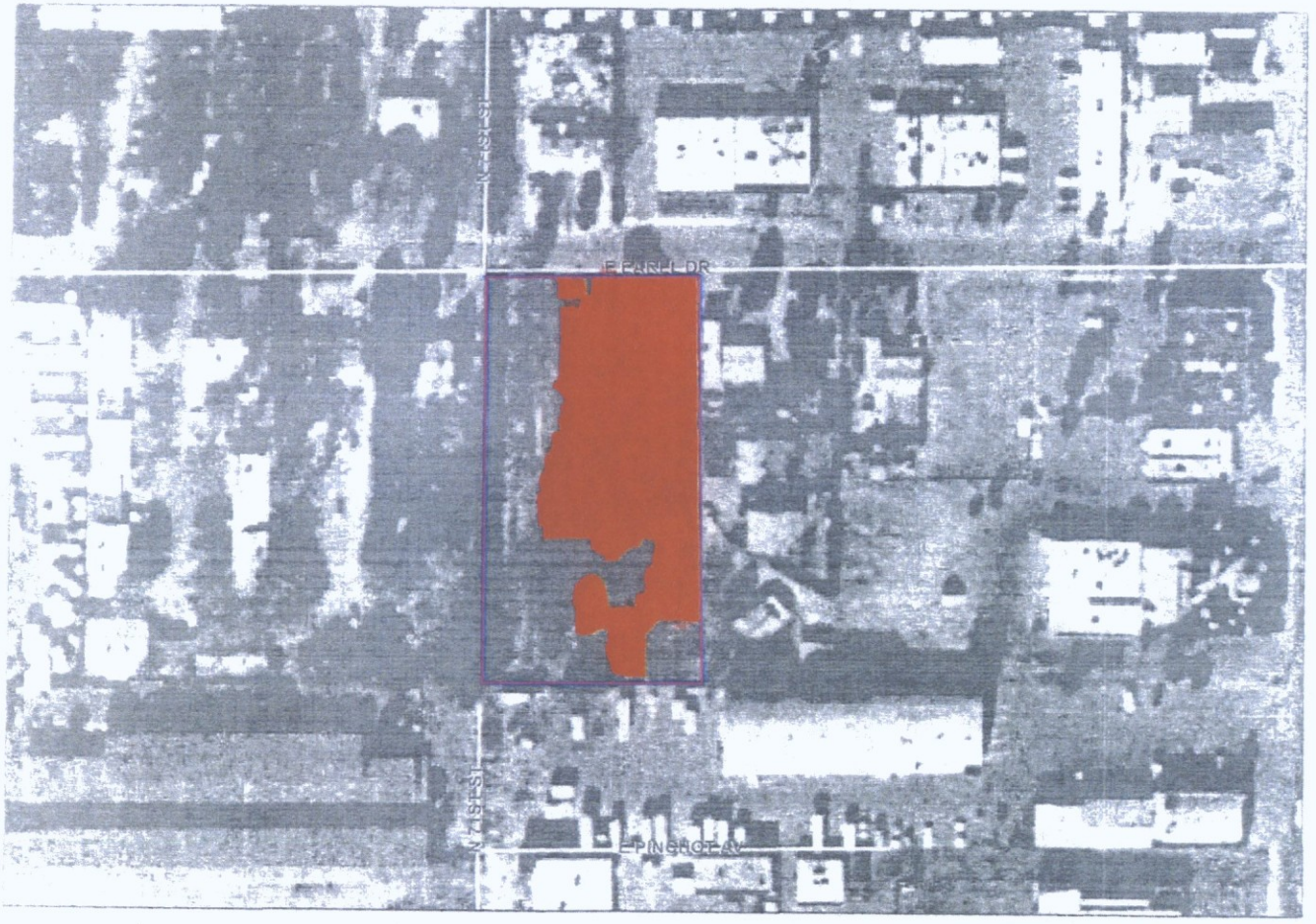
LEGEND

Existing Storm Drain Pipe
Wall
Flow Direction Arrow
Existing Man hole

The Gallery
Preliminary Drainage Map On-Site & Off-Site

FIGURE 3



PREVIOUSLY DEVELOPED AREA

AREA OF INTEREST BOUNDARY

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GALLERY PREVIOUSLY DEVELOPED AREA

FIGURE 4

Appendix A: NOAA Rainfall Precipitation

NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, US*
Latitude: 33.4835°, Longitude: -111.9281°
Elevation: 1244 ft*
* source: Google Maps

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	0.183 (0.153-0.222)	0.239 (0.202-0.290)	0.324 (0.272-0.394)	0.390 (0.325-0.471)	0.480 (0.393-0.576)	0.549 (0.444-0.656)	0.619 (0.491-0.738)	0.691 (0.538-0.822)	0.787 (0.598-0.938)	0.860 (0.641-1.03)
10-min	0.278 (0.233-0.338)	0.363 (0.307-0.442)	0.494 (0.414-0.599)	0.594 (0.495-0.717)	0.730 (0.598-0.876)	0.835 (0.675-0.998)	0.941 (0.747-1.12)	1.05 (0.820-1.25)	1.20 (0.909-1.43)	1.31 (0.975-1.56)
15-min	0.344 (0.289-0.419)	0.450 (0.380-0.546)	0.612 (0.513-0.742)	0.737 (0.613-0.889)	0.905 (0.741-1.09)	1.04 (0.837-1.24)	1.17 (0.926-1.39)	1.30 (1.02-1.55)	1.48 (1.13-1.77)	1.62 (1.21-1.94)
30-min	0.464 (0.389-0.564)	0.607 (0.512-0.738)	0.825 (0.691-1.00)	0.992 (0.826-1.20)	1.22 (0.998-1.46)	1.39 (1.13-1.67)	1.57 (1.25-1.87)	1.75 (1.37-2.08)	2.00 (1.52-2.38)	2.19 (1.63-2.61)
60-min	0.574 (0.481-0.698)	0.751 (0.633-0.913)	1.02 (0.855-1.24)	1.23 (1.02-1.48)	1.51 (1.24-1.81)	1.73 (1.39-2.06)	1.95 (1.54-2.32)	2.17 (1.69-2.59)	2.47 (1.88-2.95)	2.71 (2.01-3.23)
2-hr	0.654 (0.567-0.792)	0.861 (0.735-1.03)	1.15 (0.981-1.37)	1.38 (1.16-1.63)	1.68 (1.40-1.98)	1.92 (1.57-2.25)	2.16 (1.74-2.53)	2.40 (1.90-2.82)	2.73 (2.11-3.21)	2.99 (2.26-3.53)
3-hr	0.722 (0.613-0.867)	0.926 (0.790-1.12)	1.22 (1.03-1.46)	1.45 (1.22-1.73)	1.77 (1.47-2.10)	2.03 (1.66-2.40)	2.30 (1.85-2.72)	2.58 (2.04-3.05)	2.97 (2.27-3.51)	3.29 (2.45-3.90)
6-hr	0.869 (0.754-1.02)	1.10 (0.959-1.30)	1.41 (1.23-1.66)	1.66 (1.43-1.94)	2.00 (1.70-2.32)	2.27 (1.89-2.62)	2.55 (2.09-2.94)	2.83 (2.28-3.27)	3.22 (2.53-3.73)	3.52 (2.70-4.10)
12-hr	0.972 (0.851-1.13)	1.23 (1.08-1.43)	1.56 (1.36-1.80)	1.82 (1.58-2.10)	2.17 (1.86-2.49)	2.43 (2.06-2.79)	2.71 (2.26-3.11)	2.99 (2.46-3.44)	3.38 (2.70-3.89)	3.66 (2.88-4.26)
24-hr	1.16 (1.04-1.31)	1.48 (1.32-1.67)	1.92 (1.71-2.15)	2.26 (2.01-2.54)	2.74 (2.42-3.07)	3.12 (2.74-3.49)	3.52 (3.06-3.93)	3.93 (3.39-4.39)	4.49 (3.84-5.03)	4.94 (4.18-5.54)
2-day	1.26 (1.12-1.42)	1.61 (1.44-1.81)	2.11 (1.88-2.37)	2.51 (2.23-2.82)	3.07 (2.72-3.44)	3.52 (3.09-3.94)	3.99 (3.48-4.46)	4.48 (3.88-5.03)	5.17 (4.43-5.81)	5.72 (4.85-6.45)
3-day	1.33 (1.19-1.50)	1.70 (1.52-1.91)	2.24 (1.99-2.51)	2.67 (2.37-2.99)	3.28 (2.90-3.67)	3.77 (3.30-4.21)	4.28 (3.73-4.80)	4.83 (4.17-5.41)	5.60 (4.78-6.26)	6.21 (5.25-6.99)
4-day	1.40 (1.25-1.58)	1.79 (1.60-2.02)	2.36 (2.10-2.65)	2.93 (2.51-3.17)	3.48 (3.07-3.90)	4.01 (3.52-4.49)	4.58 (3.98-5.12)	5.18 (4.47-5.80)	6.02 (5.13-6.74)	6.71 (5.66-7.53)
7-day	1.55 (1.38-1.75)	1.98 (1.77-2.24)	2.62 (2.33-2.94)	3.13 (2.78-3.52)	3.86 (3.41-4.33)	4.44 (3.90-4.98)	5.07 (4.41-5.68)	5.73 (4.95-6.43)	6.66 (5.68-7.48)	7.42 (6.25-8.34)
10-day	1.69 (1.51-1.90)	2.16 (1.93-2.43)	2.85 (2.54-3.20)	3.41 (3.02-3.81)	4.18 (3.69-4.67)	4.81 (4.22-5.37)	5.47 (4.76-6.11)	6.16 (5.33-6.89)	7.14 (6.10-7.99)	7.92 (6.70-8.86)
20-day	2.07 (1.88-2.32)	2.67 (2.39-2.98)	3.52 (3.15-3.93)	4.17 (3.71-4.64)	5.04 (4.47-5.61)	5.71 (5.05-6.35)	6.39 (5.62-7.12)	7.08 (6.20-7.89)	8.01 (6.95-8.95)	8.72 (7.51-9.76)
30-day	2.42 (2.16-2.71)	3.12 (2.79-3.48)	4.11 (3.66-4.57)	4.86 (4.33-5.40)	5.87 (5.20-6.52)	6.64 (5.86-7.38)	7.44 (6.54-8.26)	8.25 (7.21-9.16)	9.34 (8.10-10.4)	10.2 (8.75-11.3)
45-day	2.81 (2.52-3.13)	3.62 (3.25-4.03)	4.76 (4.27-5.31)	5.61 (5.02-6.25)	6.73 (6.00-7.49)	7.57 (6.73-8.43)	8.42 (7.45-9.38)	9.27 (8.16-10.3)	10.4 (9.08-11.6)	11.2 (9.76-12.6)
60-day	3.11 (2.80-3.46)	4.01 (3.61-4.46)	5.28 (4.74-5.88)	6.20 (5.55-6.88)	7.39 (6.61-8.21)	8.28 (7.37-9.19)	9.17 (8.13-10.2)	10.0 (8.87-11.2)	11.2 (9.81-12.5)	12.0 (10.5-13.4)

[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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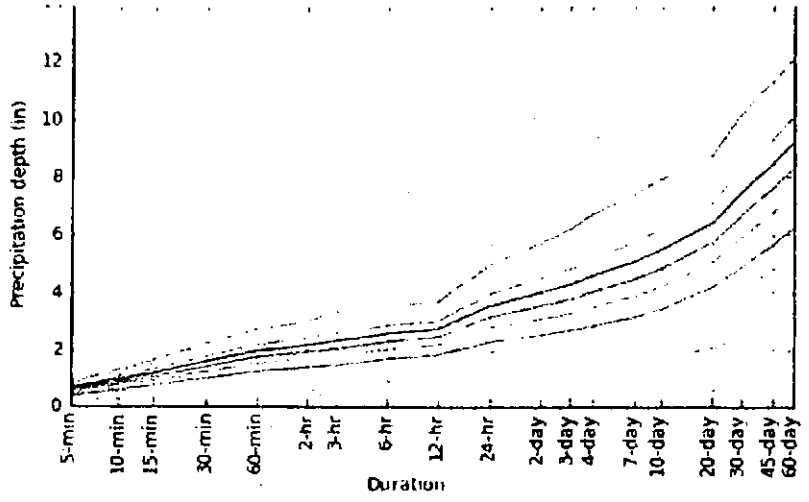
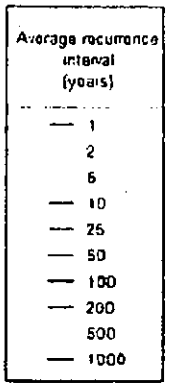
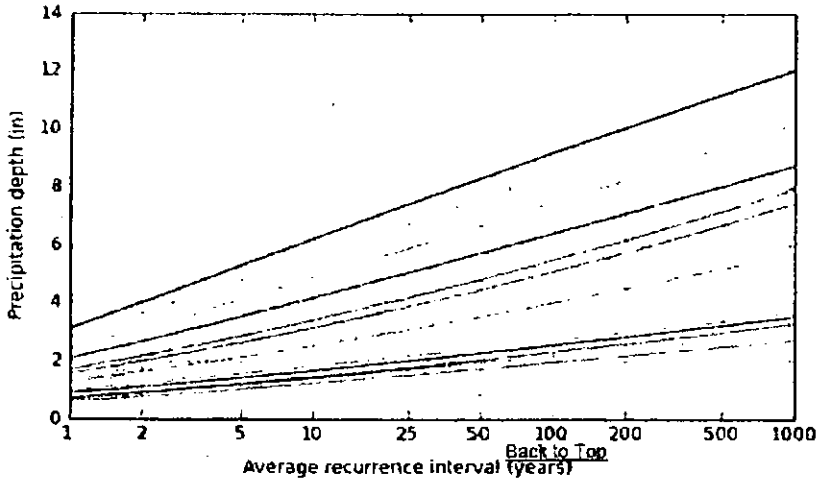
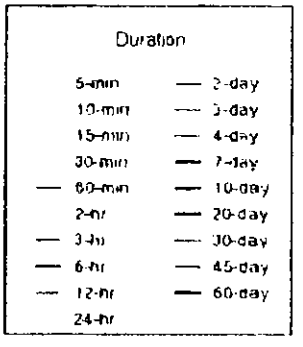
PF graphical









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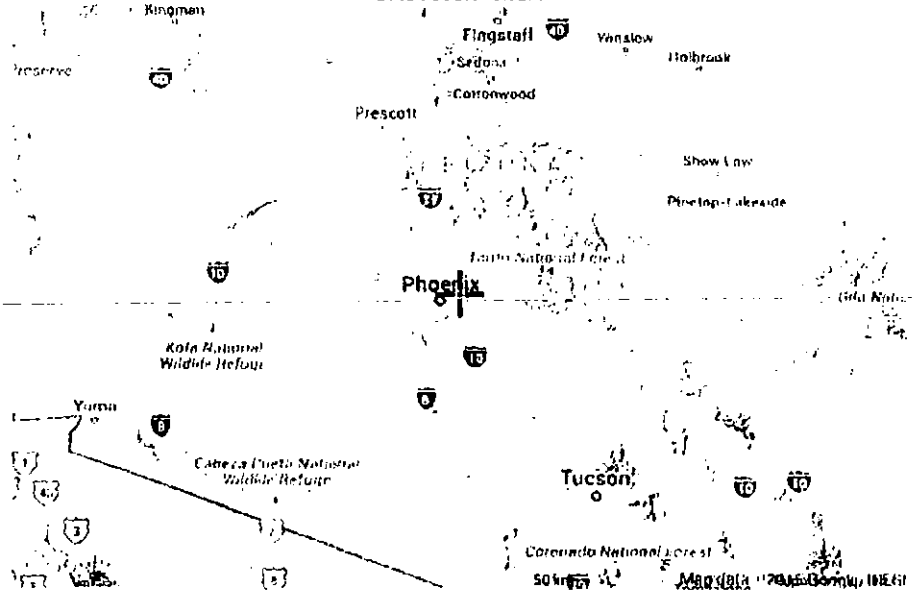
NOAA Atlas 14, Volume 1, Version 5

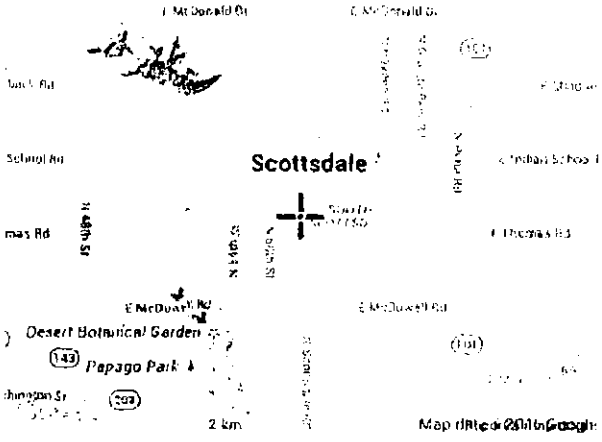
Maps & aerials

Created (GMT): Mon Jul 6 18:55:36 2015

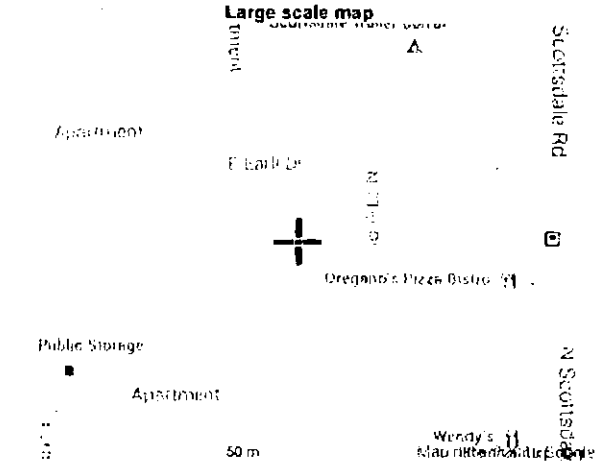
Small scale terrain



Large scale terrain



Large scale map



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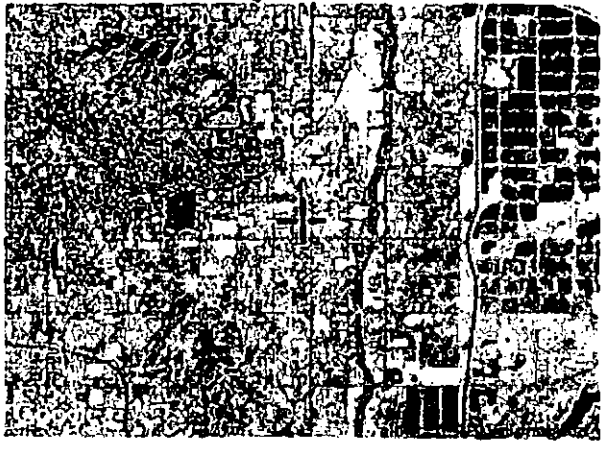

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
Office of Hydrologic Development
1325 East West Highway
Silver Spring, MD 20910

Appendix B: Hydrologic Calculations

The Gallery Proposed Conditions Flow
RATIONAL METHOD CALCULATIONS

References:
1. City of Scottsdale, *Drainage Standards and Policies Manual*, February 2010.
2. FCDMC, *Drainage Design Manual-Hydrology*, August 15, 2013.
3. NOAA Atlas 14, *Point Precipitation Frequency Estimates*, http://hdsc.nws.noaa.gov/hdsc/pfds/sa/az_pfds.html, extracted July 2015.

$Q = C i A$

C = runoff coefficient, from Table 3.2 FCDMC Manual
i = rainfall intensity (in/hr)
A = area (ac)

$Tc = 11.4 (L^{0.5}) (Kb^{0.52}) (S^{-0.31}) (i^{-0.38})$
Tc min = 5 min
L = longest flow path length (mi)
Kb = watershed resistance coefficient, $K_b = m \log_{10} A + b$
S = slope of longest flow path (ft/mi)
Kb MIN per Table 3.1 FCDMC hydrology Manual
m = -0.0063
b = 0.04

Sub-Basin I.D.	Area, A (Ac)	Runoff Coefficient, C				Flow Path					Time of Concentration, Tc					Rainfall Intensity, I (in/hr)				Peak Discharge (cfs)			
						Length, L		Elevations		Slope,		Calculated Tc (min)											
		2-Yr	10-Yr	25-Yr	100-Yr	(ft)	(mi)	High	Low	S (ft/mi)	Kb	2-Yr	10-Yr	25-Yr	100-Yr	2-Yr	10-Yr	25-Yr	100-Yr	2-Yr	10-Yr	25-Yr	100-Yr
1	0.53	0.76	0.76	0.76	0.94	155	0.03	43.3	42.9	14	0.042	7	6	5	5	2.59	4.46	5.76	7.43	1	2	2	4
2	0.52	0.76	0.76	0.76	0.94	140	0.03	43.3	42.7	23	0.042	6	5	5	5	2.59	4.46	5.76	7.43	1	2	2	4

GALLERY
Storm Water Storage Calculations

Reference: FCDMC, *Drainage Policies and Standards for Maricopa County*, Draft November 13, 2006.

V = C (P/12) A
where: C = Weighted Runoff Coefficient
P = 100-year, 2-hour Precipitation Depth = 2.15 inches
A = Drainage Area, acres

Sub-Basin I.D.	Drainage Area (Ac)	100-Year Runoff Coefficient	Retention Volume Required (AF)	Retention Volume Required (CF)	Basin Ponding Depth (ft)	Retention Volume Provided (AF)	Excess Volume (AF)	Note
Retention Area	0.53	0.94	0.09					
Total	0.53	0.94	0.09	3874	3.0	3900	26	Storage will be provided in 3 separate basins

1. The amount of storm water storage required is for the area of undeveloped land based on an aerial photograph from 1970.

Appendix D: Street Flow Calculations

GALLERY
STREET CAPACITY TABLES

Residential Subdivision Street - 4-Inch Roll Curb Design Criteria: Flow to Top of Curb	
Top of Curb	4 "
Half Street Width to B/C =	14.00 ft
Street Cross-Slope, Sx =	2.00%
Crown Height (ht. above low gutter) =	3.38 "
Flow Area to Top of Curb =	2.62 ft^2
Wetted Perimeter =	13.42 ft
Manning's 'n' value =	0.015

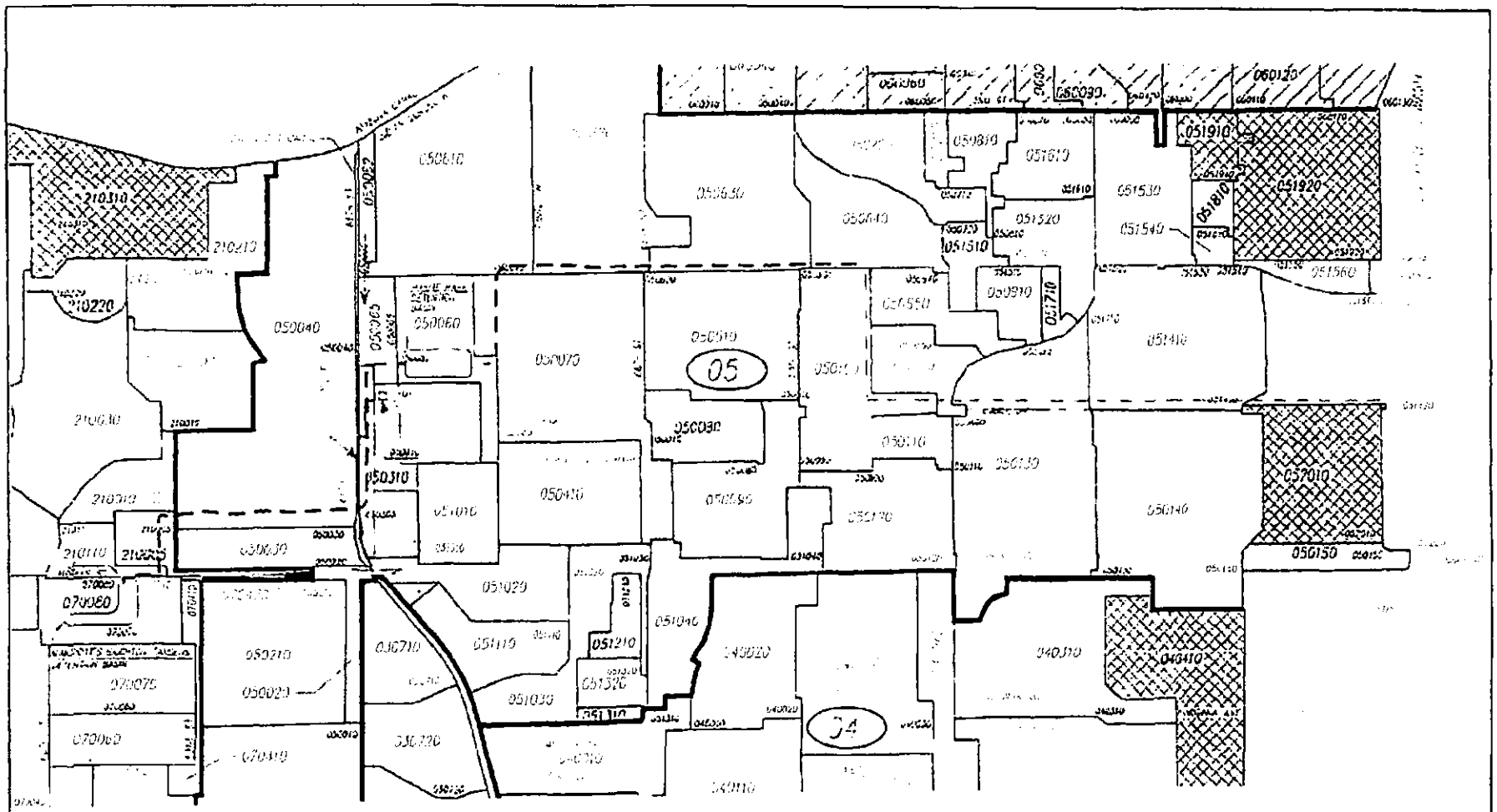
Residential Subdivision Street - 4-Inch Roll Curb Design Criteria: Flow to ROW	
Top of Curb	4 "
Half Street Width to B/C =	14.00 ft
Street Cross-Slope, Sx =	2.00%
Crown Height (ht. above low gutter) =	3.38 "
Sidewalk Width =	4.00 ft
Sidewalk Slope =	1.50%
CL to ROW Width =	20.00 ft
Remaining ROW Width =	2.00 ft
ROW Slope =	0.30%
Flow Depth at Gutter =	4.79 "
Flow Area to ROW =	4.23 ft2
Wetted Perimeter	20.00 ft
Manning's 'n' value =	0.018

Longitudinal Slope (ft/ft)	Velocity of Flow (fps)	Half-Street Flow Rate (cfs)
0.15%	1.21	3.17
0.20%	1.40	3.66
0.25%	1.57	4.09
0.30%	1.71	4.49
0.35%	1.85	4.84
0.40%	1.98	5.18
0.45%	2.10	5.49
0.50%	2.21	5.79
0.55%	2.32	6.07
0.60%	2.43	6.34
0.65%	2.52	6.60
0.70%	2.62	6.85
0.75%	2.71	7.09
0.80%	2.80	7.32
0.85%	2.89	7.55
0.90%	2.97	7.77
0.95%	3.05	7.98
1.00%	3.13	8.19
1.05%	3.21	8.39
1.10%	3.28	8.59
1.15%	3.36	8.78
1.20%	3.43	8.97
1.25%	3.50	9.16
1.30%	3.57	9.34
1.35%	3.64	9.52
1.40%	3.70	9.69
1.45%	3.77	9.86
1.50%	3.83	10.03
1.55%	3.90	10.20
1.60%	3.96	10.36
1.65%	4.02	10.52
1.70%	4.08	10.68
1.75%	4.14	10.83
1.80%	4.20	10.99
1.85%	4.26	11.14
1.90%	4.32	11.29
1.95%	4.37	11.44

Longitudinal Slope (ft/ft)	Velocity of Flow (fps)	Half-Street Flow Rate (cfs)
0.15%	1.17	4.95
0.20%	1.35	5.71
0.25%	1.51	6.39
0.30%	1.65	7.00
0.35%	1.79	7.56
0.40%	1.91	8.08
0.45%	2.03	8.57
0.50%	2.14	9.03
0.55%	2.24	9.47
0.60%	2.34	9.90
0.65%	2.44	10.30
0.70%	2.53	10.69
0.75%	2.62	11.06
0.80%	2.70	11.43
0.85%	2.79	11.78
0.90%	2.87	12.12
0.95%	2.95	12.45
1.00%	3.02	12.78
1.05%	3.10	13.09
1.10%	3.17	13.40
1.15%	3.24	13.70
1.20%	3.31	13.99
1.25%	3.38	14.28
1.30%	3.45	14.57
1.35%	3.51	14.84
1.40%	3.58	15.12
1.45%	3.64	15.38
1.50%	3.70	15.65
1.55%	3.76	15.91
1.60%	3.82	16.16
1.65%	3.88	16.41
1.70%	3.94	16.66
1.75%	4.00	16.90
1.80%	4.05	17.14
1.85%	4.11	17.38
1.90%	4.16	17.61
1.95%	4.22	17.84

Minimum Street Slope Assumed for

Appendix E: Excerpts from Previous Reports



PORTION OF ORIGINAL DRAINAGE MAP FROM
STEPHENS WATERSHED STUDY
WILEY HORN 1997
PARSONS BRINCKERHOFF ANNOTATIONS IN RED

DRAINAGE MAP

PB PARSONS BRINCKERHOFF

FIGURE 3

+	DIVERSION TO	05Qspl	0.	3.83	0.	0.	0.	0.45
+	HYDROGRAPH AT	05Qpip	103.	3.83	43.	27.	27.	0.45
+	ROUTED TO	05DETA	103.	3.83	43.	27.	27.	0.45
+	HYDROGRAPH AT	050610	99.	3.17	10.	6.	6.	0.08
+	2 COMBINED AT	050610	137.	3.17	53.	32.	32.	0.54
+	ROUTED TO	05062A	136.	3.20	53.	32.	32.	0.54
+	HYDROGRAPH AT	050620	110.	3.17	12.	7.	7.	0.10
+	2 COMBINED AT	050620	243.	3.17	64.	39.	39.	0.63
+	ROUTED TO	05063A	243.	3.20	64.	39.	39.	0.63
+	HYDROGRAPH AT	050630	120.	3.13	9.	6.	6.	0.06
+	2 COMBINED AT	050630	342.	3.17	74.	45.	45.	0.70
+	ROUTED TO	05064A	339.	3.20	74.	45.	45.	0.70
+	HYDROGRAPH AT	050640	15.	3.10	1.	1.	1.	0.01
+	2 COMBINED AT	050640	349.	3.20	75.	46.	46.	0.70
+	ROUTED TO	05066A	347.	3.23	75.	46.	46.	0.70
+	HYDROGRAPH AT	050100	79.	3.17	6.	4.	4.	0.03

+	2 COMBINED AT	050660	411.	3.20	81.	49.	49.	0.74
+	ROUTED TO	05013A	409.	3.23	81.	49.	49.	0.74
+	HYDROGRAPH AT	050131	55.	3.13	4.	3.	3.	0.02
+	2 COMBINED AT	050131	447.	3.23	85.	52.	52.	0.76
+	ROUTED TO	05141A	443.	3.27	85.	52.	52.	0.76
+	HYDROGRAPH AT	051410	178.	3.13	13.	8.	8.	0.07
+	2 COMBINED AT	051410	556.	3.23	98.	60.	60.	0.83
+	ROUTED TO	05142A	551.	3.27	98.	60.	60.	0.83

1

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

SUMMARIES REMOVED FOR PRINTOUT- SEE ELECTRONIC FILE

1

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 210ST
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	0.00	1.00	1.00
STORAGE	0.	8.	8.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	0.55	0.00	4.	3.	0.00	9.97	0.00

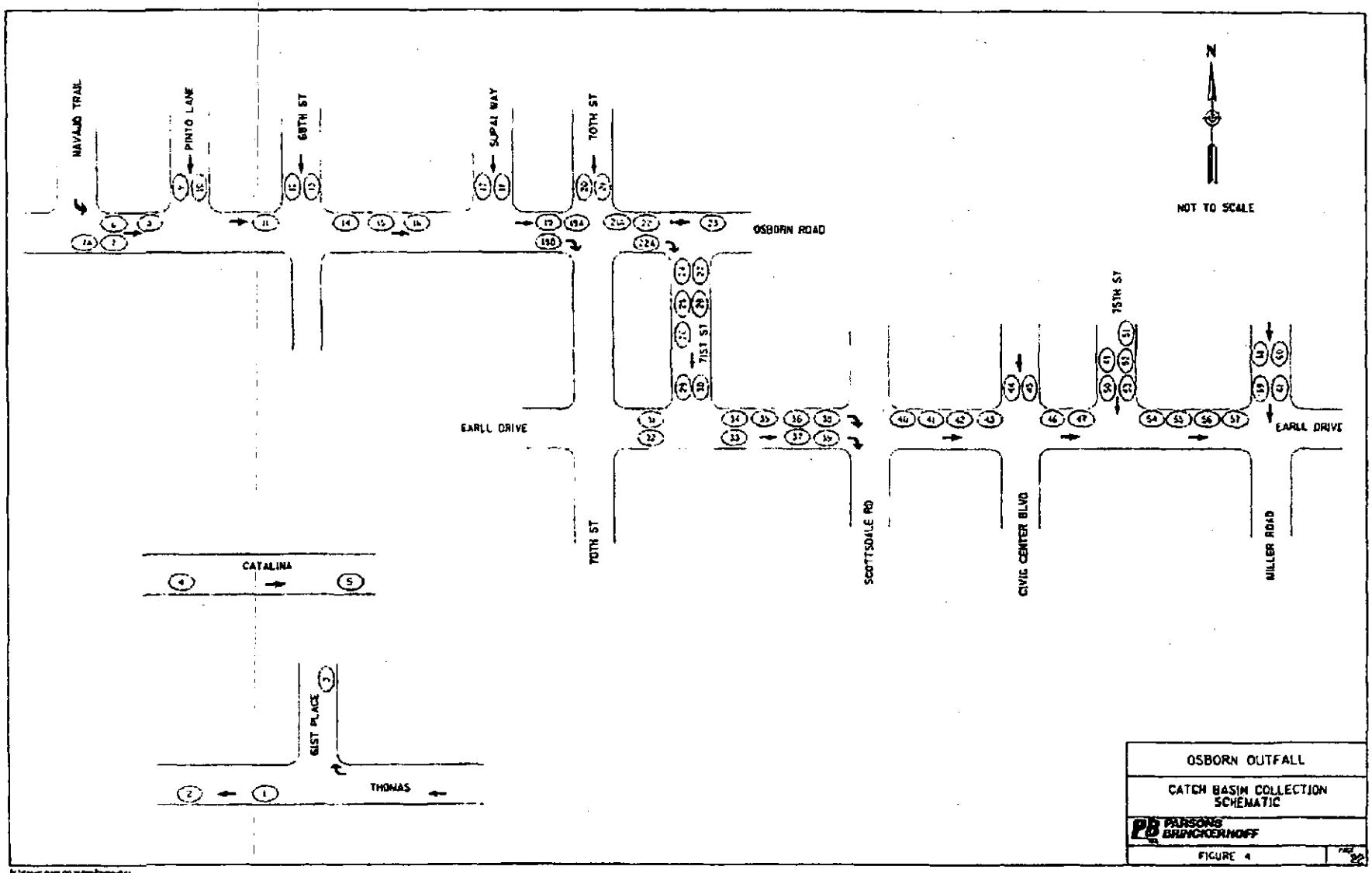

NAVAJO TRAIL
PINTO LANE
68TH ST
SUPAI WAY
70TH ST
OSBORN ROAD
EARLL DRIVE
71ST ST
70TH ST
SCOTTSDALE RD
CIVIC CENTER BLVD
75TH ST
MILLER ROAD
EARLL DRIVE
CATALINA
THOMAS
61ST PLACE
N
NOT TO SCALE
OSBORN OUTFALL
CATCH BASIN COLLECTION SCHEMATIC
PARSONS BRINCKERHOFF
FIGURE 4

Table 5
Check of Hydraulic Grade Line at Inlets

Inlet	Flow Captured (cfs)	Connector Size (in)	Connector Length (ft)	Friction Loss (ft)[1]	Entrance Loss (ft)[2]	HGL at Connection (ft)[3]	HGL at Inlet (ft)	Inlet Elevation (ft)	Freeboard (ft)
[illegible]	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
3	2	Modeled by Storm Cad					1254.7	1257.5	[illegible]
4	2	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
6	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7 & 7A	[illegible]	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	2	12	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.0
9	4	12	27	[illegible]	0.04	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	15	[illegible]	[illegible]	0.04	[illegible]	[illegible]	[illegible]	3.3
11	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	4	15	5	0.02	[illegible]	[illegible]	[illegible]	[illegible]	3.4
13	4	12	16	[illegible]	0.04	1251.6	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	0.01	0.02	[illegible]	[illegible]	[illegible]	[illegible]
15	2	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
16	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1250.0	[illegible]
17	2	[illegible]	33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	1.5	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.3
19 & 19A	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
19B	[illegible]	[illegible]	[illegible]	0.02	[illegible]	[illegible]	[illegible]	[illegible]	3.6
20	1	12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	15	35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21A	[illegible]	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	2	15	42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1	12	22	0.02	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	8	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	7	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	4	[illegible]	[illegible]	0.04	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1240.6	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	12	[illegible]	0.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		15	37	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36	3	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1238.6	[illegible]	[illegible]	[illegible]
38	3	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	12	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1234.0	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	3	[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	Modeled by Storm Cad					[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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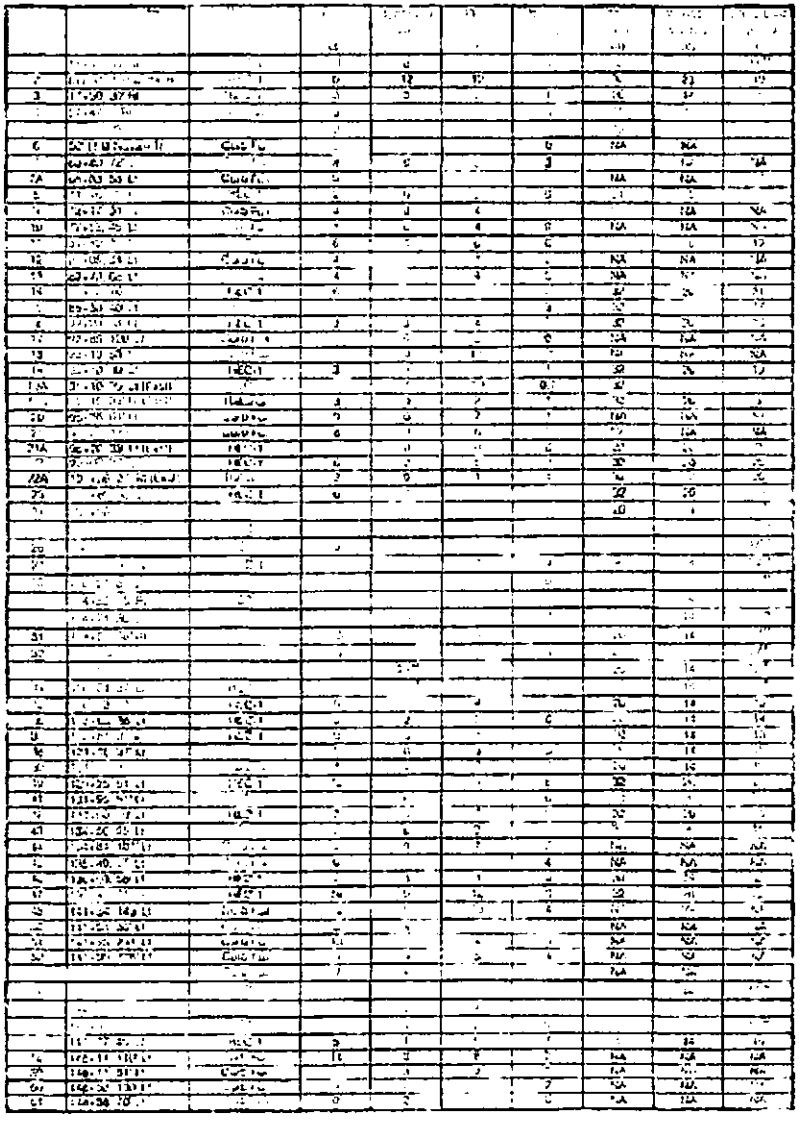
[illegible]	[illegible]	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[1] [illegible]
[2] [illegible]
[3] [illegible]

Table 4
Catch Basin Bypass Relationships



Appendix F: Warning and Disclaimer of Liability

Appendix 4-C

Warning and Disclaimer of Liability

The Drainage and Floodplain Regulations and Ordinances of the City of Scottsdale are intended to "minimize the occurrence of losses, hazards and conditions adversely affecting the public health, safety and general welfare which might result from flooding caused by the surface runoff of rainfall" (Scottsdale Revised Code §37-16).

As defined in S.R.C. §37-17, a flood plain or "*Special flood hazard* area means an area having flood and/or flood related erosion hazards as shown on a FHBM or FIRM as zone A, AO, A1-30, AE, A99, AH, or E, and those areas identified as such by the floodplain administrator, delineated in accordance with subsection 37-18(b) and adopted by the floodplain board." It is possible that a property could be inundated by greater frequency flood events or by a flood greater in magnitude than a 100-year flood. Additionally, much of the Scottsdale area is a dynamic flood area; that is, the floodplains may shift from one location to another, over time, due to natural processes.

WARNING AND DISCLAIMER OF LIABILITY PURSUANT TO S.R.C §37-22
"The degree of flood protection provided by the requirements in this article 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 manmade or natural causes. This article (Chapter 37, Article II) shall not create liability on the part of the city, any officer or employee thereof, or the federal government for any flood damages that result from reliance on this article or any administrative decision lawfully made thereunder."

Compliance with Drainage and Floodplain Regulations and Ordinances does not insure complete protection from flooding. The Floodplain Regulations and Ordinances meet established local and federal standards for floodplain management, but neither this review nor the Regulations and Ordinances take into account such flood related problems as natural erosion, streambed meander or man-made obstructions and diversions, all of which may have an adverse affect 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. If I am an agent for an owner I have made the owner aware of and explained this disclaimer.

Plan Check No.	Owner or Agent	Date