BIG RED DOG
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PRELIMINARY GRADING AND DRAINAGE REPORT

FOR

"DISTRICT AT THE QUARTER"

NEC OF GREENWAY HAYDEN LOOP & DIAL BOULEVARD
SCOTTSDALE, MARICOPA COUNTY, ARIZONA

Plan # _____
Case # 12-MD-2016
Q-S # _____
☑ Accepted
☐ Corrections
N. BARONAS 10-25-16
Reviewed By Date

Registered Professional Engineer (Civil)
CERTIFICATE NO.
53520
BRADLEY
LINGVAI
DATE SIGNED 8/3/2016
ARIZONA U.S.A.
Bradley J Lingvai
Expires: 6/30/2018

PREPARED FOR:

KAPLAN ACQUISITIONS, LLC
7150 EAST CAMELBACK ROAD, SUITE 444
SCOTTDALE, MARICOPA COUNTY, ARIZONA 85251

PREPARED BY:

BIG RED DOG ENGINEERING | CONSULTING, INC.
2021 E. 5TH STREET SUITE 110
AUSTIN, TEXAS 78702
ARIZONA ENGINEERING FIRM NO. 19744
BRD H001.008

AUGUST 2016

BIG RED DOG
ENGINEERING | CONSULTING

August 2016 H001.008

City of Scottsdale
Planning and Development
7447 E Indian School Rd
Scottsdale, AZ 85251

RE: Preliminary Engineering Report
District at the Quarter
NEC Greenway Hayden Loop & N. Dial Blvd
Scottsdale, Maricopa County, Arizona

To Whom It May Concern:

Please let this letter and enclosed report serve as our formal Final Grading and Drainage Report for the proposed development, District at the Quarter, at the northeast corner of N. Greenway Hayden Loop and N. Dial Boulevard. The proposed development will include the demolition of the existing structures followed by the construction of a ± 620 unit multi-story apartment complex which will be composed of (2) buildings wrapped around (2) structural parking garages along with all associated grading, drainage, utility, landscape, and hardscape improvements.

The subject site is currently zoned Industrial Park (I-1) and is in the process of being rezoned to Planned Unit Development (PUD). The associated General Plan Amendment and Rezoning Applications are currently under as application numbers 3-GP-2016 and 8-ZN-2016.

Comments were issued on June 29, 2016, and are addressed in the Final Grading and Drainage Reports and include with this submittal package.

Please feel free to contact me at 832-730-1901 or at Patrick.Byrne@BIGREDDOG.com if you have any questions or concerns in regards to the information contained herein. We appreciate you working with us as we move forward with the associated development.

Sincerely,

BIG RED DOG Engineering | Consulting

Patrick Byrne

Patrick Byrne
Principal

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Appendix 1

Appendix 2

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BIG RED DOG
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A. INTRODUCTION

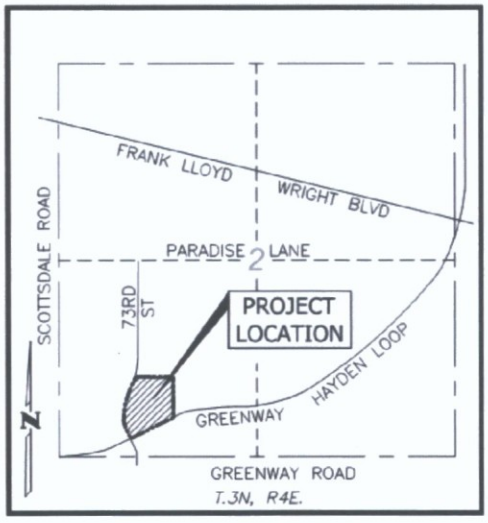
H001.008

1. Site Location / Description

The subject site associated with this Preliminary Grading and Drainage Report is for a proposed development, District at the Quarter, located at the northeast corner of N. Greenway Hayden Loop and N. Dial Blvd., in the Full Purpose Limits of the City of Scottsdale, AZ (see vicinity map and aerial below). The ±8.84 acre site is currently developed with a ±129,689 SF Office Building / Warehouse space, with associated utilities, desert landscaping, roadways and 4 retention ponds located throughout the site.

The proposed development will include the demolition of all existing structures followed by the construction of a ±620 unit multi-story apartment complex which will be composed of (2) buildings wrapped around (2) structural parking garages along with all associated grading, drainage, utility, landscape, and hardscape improvements.

The subject site is currently zoned Industrial Park (I-1) and is in the process of being rezoned to Planned Unit Development (PUD). The associated General Plan Amendment and Rezoning Applications are currently underway as application numbers 3-GP-2016 and 8-ZN-2016.



VICINITY MAP
NOT TO SCALE

2. Purpose / Objective

The purpose and objective of this Preliminary Grading and Drainage Report is to analyze the current drainage conditions at the subject site (onsite and offsite) and then compare the results to the proposed final design associated with the District at The Quarter Multi-Family Project. To complete this analysis, the report will focus on:

- Existing Drainage Patterns on the current development.
- Surrounding Drainage Patterns on the neighboring developments.
- Estimates of required retention volumes and where the volumes will be provided on the proposed site.

- Peak Discharge Calculations using the Rational Method for existing and proposed conditions.
- Private storm infrastructure layouts and conveyance analysis.
- Compliance with the City of Scottsdale and Maricopa County Drainage Requirements.

B. EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

1. **Existing On-Site Drainage**

The subject site is currently fully developed and appears to generally slope from the northeast to the southwest. Developed flows are conveyed to (4) retention ponds located throughout the site as referenced in *Existing Conditions* within Appendix 1, Exhibit 2. Based off of a preliminary review of the existing conditions, and of the existing volume provided within the (4) aforementioned retention ponds, the existing infrastructure appears to have been designed to be in compliance with Chapter 4-1.402.A.1 of the COS Design Standards & Policies Manual in that the ponds "store runoff and rainfall events up to and including the 100-year, two hour duration event." It is anticipated that the existing site requires a runoff volume of 1.25 acre-ft. due to an impervious cover of 75%. Refer to the Stormwater Storage Requirements for calculations. Existing pond volume for the site is 1.13 ac-ft. It is anticipated that the remaining volume is captured in the storm infrastructure.

2. **Existing Drainage / Watershed / Floodplain**

The subject tract is located within a 100-year FEMA Zone X as shown on FIRM Panel No. 04013C1320L (October 16, 2013), although the site is not within a FEMA Special Flood Hazard Area. Reference the *FEMA Map* in the Appendix 1, Figure 4. It has also been observed through the Flood Control District of Maricopa County that the limits of the FEMA 100-Yr Floodplain are located north of Bell Rd. / Frank Lloyd Wright Blvd. The District at the Quarter is located in the limits of the Verde River Watershed. This watershed encompasses 6,624 square miles with primary land uses of open range grazing, irrigated agriculture, recreation, forestry, and some mining.

3. **Off-Site Drainage**

The subject site is adjacent to existing fully developed parcels to the north and east and is then continuous to the ROW of N. Dial Blvd. and Greenway Hayden Loop to the west and south, respectively. Based off of review of as-built drawings and existing topography within the area, developed flows from the neighboring tracts to the north and the east appear to be conveyed to the public ROW via underground infrastructure and sheet flow conditions without passing through the subject site.

The subject site to the north conveys flows to the ROW of E. Tierra Buena Lane which ultimately discharges to the infrastructure within N. Dial Blvd. The subject site to the east conveys flows to the ROW of Greenway Hayden Loop which contains an extensive underground storm sewer system. Due to the limited underground storm infrastructure within N. Dial Blvd, an offsite drainage area map has been prepared to analyze the peak flows entering the storm infrastructure within N. Dial Blvd. near the southwest corner of the site. The analysis utilized the rational method and is based on existing topographic information obtained from the City of Scottsdale. The Offsite Drainage Area Map may be found in Appendix 1, as *Exhibit 4 – Offsite Watershed Map*.

No existing or future developed flows from neighboring parcels of the subject site are anticipated to impact the drainage patterns of the proposed development.

C. PROPOSED DRAINAGE CONDITIONS

1. General Description

The proposed development will begin with demolition of the existing structures, including all retention areas throughout the site. Demolition will be followed by the construction of the two phased development consisting of a total of ±620 apartment units within a multi-story complex which will be composed of (2) buildings wrapped around (2) structural parking garages along with all associated grading, drainage, detention, utility, landscape, and hardscape improvements.

Phase I will consist of ±328 apartment units within the building at the southwest corner of the site while Phase II will consist of ±290 apartment units towards the northeast corner of the site. Each phase will contain its own independent underground detention system which will be sized to efficiently store onsite runoff of the 100-yr, 2-hr rainfall event from each phase, respectively.

With the proposed project being a multi-family development which will have a private onsite facilities maintenance group, all the criteria to qualify for Underground Stormwater Storage within Section 4-1.403 (Underground Stormwater Storage Policy) of the COS Design Standards and Policies Manual are substantially met.

The detention systems used within both Phase I and Phase II will consist of a combination of Chamber Systems, varying in size, as well as oversized pipe to gain the required volume. Storm drainage from each phase will be captured via storm inlets as well as underground roof drain connections from the buildings and courtyards. Phase I consists of ADS MC-4500 Chamber System, located in the southwestern corner, and 24" HDPE pipe along the western and southern property lines for conveyance. This system captures a total of 0.74 ac-ft. Phase II, located along the northern and eastern property lines will have ADS MC-3500 Chamber Systems and 48" HPDE. The total detention provided is 0.47ac-ft. Additional detention for Phase II will be constructed in Phase I via 54" CMP along the center of the interior fire lane. This internal system will provide an additional 0.19 ac-ft. for the entire 8.84 acres. Reference the Overall Grading and Drainage Plan for design. The breakdown of Phase I and Phase II Pond Volume Table is in the Conclusion Section of this Report.

Construction of Phase I will include the Phase I system as well as the Phase II system in the internal fire lane. A "tee" manhole will be constructed at the intersection of both systems and flow will be conveyed to the southwest, and will enter the public system near the intersection of N. Greenway Hayden Loop and N. Dial Blvd. The construction of Phase II will include the system along the north and will discharge to N. Greenway Hayden Loop. Detention in the interior fire lane will then be capped and plugged at Phase I, and rerouted northeast to Phase II. Both discharge points will gravity flow and be regulated by an orifice plate with a minimum diameter of 6 inches. Restrictor plates will insure the ponds drain within 12 to 24 hours of the rainfall as required in Section 4-1.402B of the City of Scottsdale Design Manual.

Please refer to the *Drainage Area Map* located in Appendix 1, Exhibit 5 to view the proposed location of the underground Chamber System, proposed underground stormwater system, and orifice locations and discharge rates. An overall exhibit is included for the entire project buildout as well as individual exhibits for Phase I and Phase II to clearly show how each phase operates independently.

2. **Adjacent Tracts**

Based on existing site conditions and as-built drawings, the adjacent lots to the subject site appear to be fully developed and consist of commercial shopping centers, offices, and other commercial developments. These existing developments do not appear to drain onto, or across, the subject site and therefore offsite flows are not anticipated to impact the proposed development.

At this time, it is also our understanding that no redevelopment plans are proposed for any of the adjacent developments. However, if these sites were to be redeveloped in the future, they will be required to comply with the COS Design Standards and Policies Manual which is not anticipated to allow any future stormwater discharge from the adjacent properties onto the subject site.

3. **Stormwater Storage Requirements**

To determine the runoff volume of the entire site, as well as broken up by Phase I and Phase II, the Standard Formula for Runoff Volumes within section 4-1.807 of the COS Design Standards and Policies Manual was used. The calculated runoff volume for the entire site is 1.40 AC-FT (Phase I = 0.74 AC-FT, Phase II = 0.66 AC-FT). The associated weighted runoff coefficient (C) and precipitation amount values were obtained from the Appendix 4-1D and Figure 4.1-4 of the COS Design Standards and Policies Manuals.

A summary of the runoff volume calculations may be found below and detailed information in regards to the calculations for the weighted runoff coefficient may be found within Appendix 2 of this report.

Runoff Volume (Vr)= $\left(\frac{P}{12}\right) AC$
P=Precipitation amount for 100-year, 2 hour interval
A=Area in acres
C=Weighted Runoff coefficient

Total Runoff Volume

$$Vr = \left(\frac{2.27}{12}\right)(8.84)(0.83)$$
$$Vr = 1.39\ Acre - ft$$

Phase I

$$Vr = \left(\frac{2.27}{12}\right)(4.94)(0.79)$$
$$Vr = 0.74\ Acre - ft$$

Phase II

$$Vr = \left(\frac{2.27}{12}\right)(3.9)(0.89)$$
$$Vr = 0.66\ Acre - ft$$

Existing Development

$$Vr = \left(\frac{2.27}{12}\right)(8.84)(0.75)$$
$$Vr = 1.25\ Acre - ft$$

Both systems will capture the 100-YR, 2-hour rainfall event for each of their respective phases. Each system, and associated conveyance pipe, will be designed to comply with the COS requirements of a 75-year life-time and a minimum 5-ft cover.

4. **Stormwater Runoff Requirements**

The orifice equation has determined a flow of 2.62 cfs for Phase I and 2.50 cfs for Phase II, using the minimum orifice size of 6 inch. To achieve a drawdown time of 24 hours, the orifice would need to be 0.53" for Phase I and 0.46" for Phase II. Refer to orifice equation below.

Orifice Equation $Q = CA(2GH)^{1/2}$
Q= Release Rate in ft^3/s
C= Orifice Constant
A=Area of Orifice in ft^2
G=Gravitational Constant ft^2/s
H=Head on Orifice in ft

Reference Appendix 2 for Drawdown calculations and orifice sizing.

5. **Pre and Post Runoff Characteristics**

Existing onsite stormwater runoff is captured by (4) existing above ground detention ponds located throughout the site. These detention ponds prevent stormwater from the 100-YR, 2-hour event from leaving the subject site and having any adverse impacts downstream.

The proposed project associated with this report does not proposed to change this stormwater management method from a macro scale. Since the project is phased, (2) independently operating underground detention ponds will be constructed with Phase I and Phase II of the project to capture the 100-YR, 2 hour event from each applicable phase.

No offsite flows currently enter the subject site and no offsite flows are anticipated to enter the proposed development in the future.

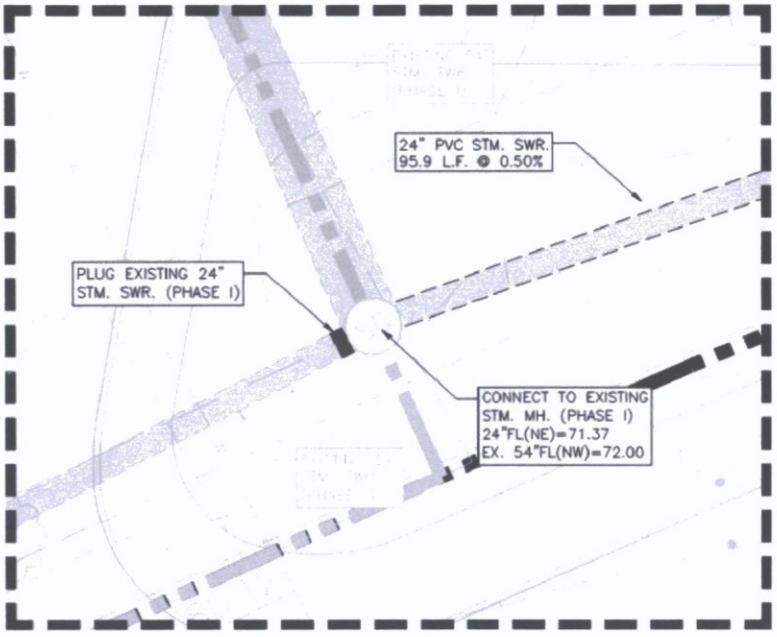
Although the internal conveyance of the stormwater within the subject site is being altered, runoff characteristics from existing conditions to proposed conditions on the subject site will not change with this project.

6. **Proposed Drainage Structures**

As mentioned previously, the proposed project will be composed of (2) phases. Each phase will propose its own underground stormwater detention system which will function independently of the other.

7. **Project Phasing**

A private drainage easement will be proposed for the drainage/detention system along the proposed property line within Phase I and Phase II. These system will capture the runoff from the fire lane/private drive and will convey the stormwater to the Phase I detention pond, along the western and southern property lines. When Phase II is built, the system will be routed to go into Phase II detention along the eastern property line. The connection of Phase I and that of the private drainage easement will be capped and plugged, and a new line will be installed to connect to Phase II. Roof drainage from Phase II will tie directly into the Phase II detention pond on all sides of the building. Hence no flows from buildings/courtyards of Phase II will connect to the Phase I pond infrastructure.



SUMMARY OF PHASE I AND PHASE II DETENTION VOLUMES

PHASE	REQUIRED	PROVIDED W/ PHASE I	PROVIDED W/ PHASE II
	AC-FT	AC-FT	AC-FT
I	0.74	0.74	0.00
II	0.66	0.23	0.47
TOTAL	1.40	0.97	0.47

D. SPECIAL CONDITIONS

No special conditions have been identified for this site.

E. DATA ANALYSIS METHODS

The proposed drainage system was designed based off of existing topographic information on, and off, the subject site as well as based on observed drainage characteristic within the vicinity of the site. The hydrologic analyses were based on the following methodologies:

- Drainage improvements associated with the proposed development were designed in accordance with the City of Scottsdale Design Standards and Policies Manual (specifically Chapter 4). Design was also done in accordance with the Drainage Design Manual for Maricopa County, Volumes I and II.
- Analysis of the offsite runoff was completed by using the 1 ft. interval topographic CAD file provided by the City of Scottsdale.
- The precipitation amount for the 100-YR, 2-hr storm was obtained using the isopluvials from Figure 4.1-4 of the COS Design Standards and Policies Manual. The corresponding P value for District at the Quarter location is approximately 2.27.
- On-site weighted runoff coefficients (C) for use in the Runoff Volume Calculations were calculated in accordance with Appendix 4-1D of the COS Design Standards and Policies Manual as well as the Drainage Design Management System (DDMSW) software from the Flood Control District of Maricopa County.
- Total required detention volume calculations were based on the Standard Formula for Runoff Volumes within Section 4-1.807 of the COS Design Standards and Policies Manual.

The preliminary design submittal will include in-depth hydraulic analysis which will include, but are not limited to, conveyance and pipe capacity calculations, backwater modeling, inlet sizing and capacity, head loss incorporation, HGL analysis, etc. Reference the Preliminary Grading and Drainage Plan in the Appendix.

F. CONCLUSIONS

1. Overall Project

The District at the Quarter is a proposed ±620 unit multi-family apartment development on ±8.84 acres of developed land located at the northeast corner of N. Greenway Hayden Loop and N. Dial Blvd. A summary of the associated drainage report are below for your reference:

- All components of the design and report are, to our knowledge, in full compliance with Chapter 4 – Grading and Drainage Criteria – of the City of Scottsdale Design Standards and Policies Manual.
- The existing subject site is currently fully developed and currently captures the 100-YR, 2-hr storm event within (4) existing above ground detention ponds with a combined volume of 1.13 ac-ft.
- No offsite flows currently anticipate the subject site.
- No offsite flows are anticipated to impact the proposed improvements.
- Underground stormwater detention is proposed with both Phase I and Phase II of the project. Each system will operate independently and will consist of a combination of a variety of Chamber Systems and oversized conveyance pipes.
- It has been determined by calculation of the orifice size that 0.53 in radius will allow onsite detention to discharge within 24 hours. Although, 6 in diameter is proposed per Section 4-

1.402B of the City of Scottsdale Design Manual. Reference Appendix 2 for Drawdown and Sizing calculations.

- A summary of the proposed detention volumes follow.

BREAKDOWN OF PHASE I AND PHASE II POND VOLUMES

PHASE	COMPONENT	VAULT AREA (SF)	PIPE LF	DEPTH (FT)	VOLUME	
					CF	AC-FT
I	SWC CHAMBER SYSTEM (MC-4500)	7,834	-	12	32,124	0.74
II	E. CHAMBER SYSTEM (MC-3500)	1,841	-	6.7	7,730	0.18
	48" PIPE	-	1015	6	12,755	0.29
	54" PIPE (TO BE BUILT W/ PHASE I)	-	520	7.5	10,210	0.23

SUMMARY OF DETENTION POND VOLUMES

PHASE	VOLUME REQ'D		VOLUME PROVIDED	
	CF	AC-FT	CF	AC-FT
I	32,234	0.74	32,124	0.74
II	28,750	0.66	30,695	0.70
TOTAL	60,984	1.40	62,819	1.44

- Once finalized, final finished floor elevations will be designed at a minimum of (1) foot above the drainage area overflow to insure there will be no onsite stormwater which ponds into the proposed buildings.
- Both the Phase I and Phase II ponds will be privately maintained by the property owner. Formal maintenance agreements will be provided at the time of the formal submittal and prior to permit issuance.

Should you have any questions regarding this project or application, please do not hesitate to contact our office.

G. WARNING AND DISCLAIMER OF LIABILITY

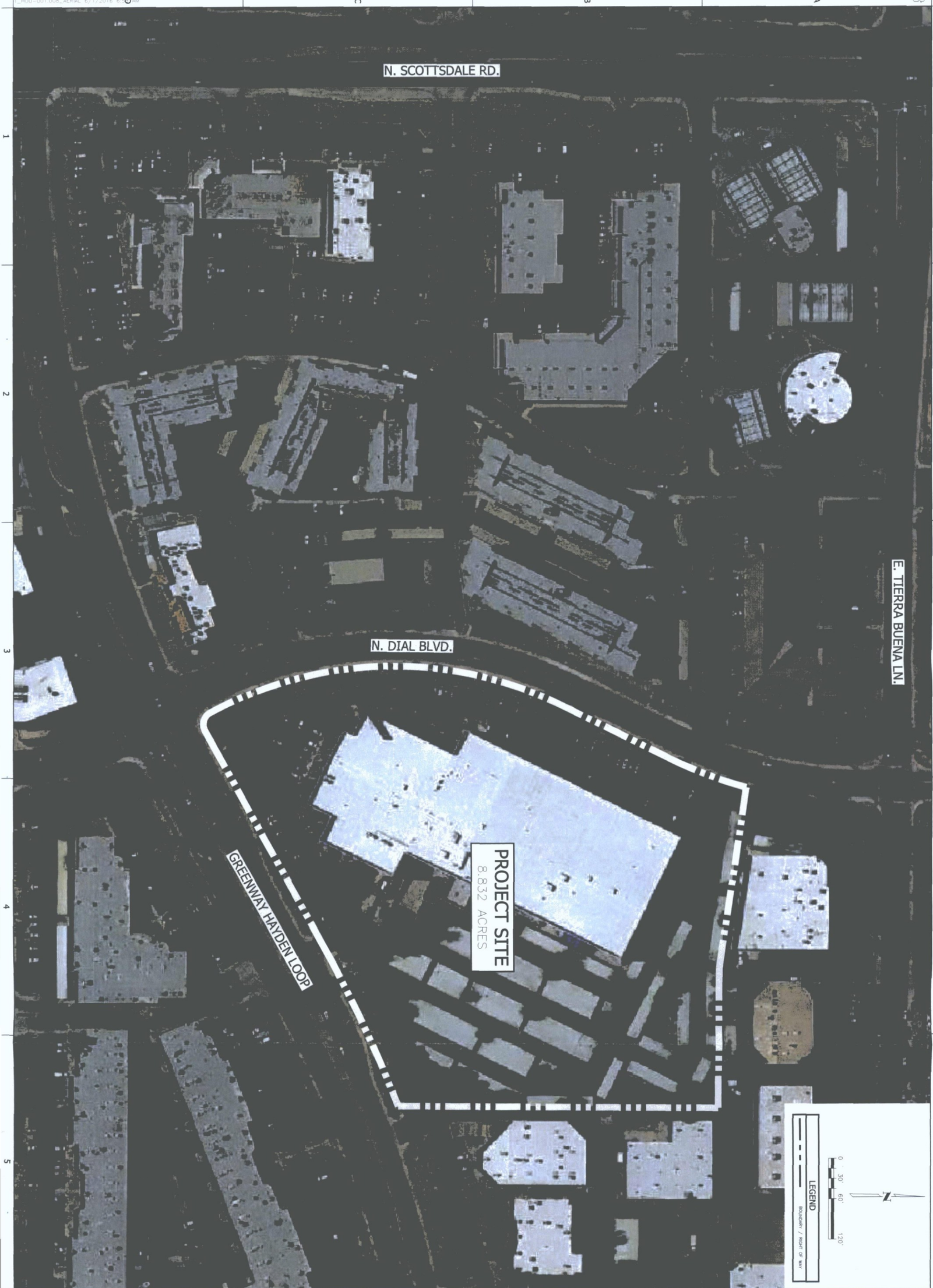
See Warning and Disclaimer of Liability as provided by the City of Scottsdale within the Appendix of this report.

H. REFERENCES

- City of Scottsdale, Design Standards and Policies Manual: Chapter 4 – Grading and Drainage – January 2010
- Flood Control District of Maricopa County Map Viewer
- City of Scottsdale GIS/Topographic Data.
- Drainage Design Management System (DDMSW) design software from the Flood Control District of Maricopa County.
- FEMA Flood Map Service Center

APPENDIX 1: EXHIBITS

Aerial Map | **1**



DISTRICT AT THE QUARTER
15510 N. 73RD STREET
SCOTTSDALE, MARICOPA COUNTY, ARIZONA

AERIAL EXHIBIT

SHEET
EX-1
1 OF 1

512.669-5560
WWW.BIGREDDOG.COM
ARIZONA FIRM NO. 19744
BIG RED DOG
ENGINEERING | CONSULTING
2021 E. 5TH STREET, SUITE 110, AUSTIN, TEXAS 78702
ARIZONA FIRM NO. 19744

NO.	DATE	REVISION	BY

Existing Conditions | **2**

Overall Site Plan w/ Phasing | **3**

FEMA Map | 4

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET METE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1320L

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA

AND INCORPORATED AREAS

PANEL 1320 OF 4425

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

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

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

MAP NUMBER
04013C1320L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

Off-Site Watershed | **5**

N

0 30' 60' 120'

LEGEND

- BOUNDARY / RIGHT OF WAY
- P-1 / 1.00 Ac. / 0% — DRAINAGE AREA NAME; DRAINAGE AREA SIZE; DRAINAGE AREA IMPERVIUOS COVER
- DRAINAGE AREA BOUNDARY LINE
- (A) — ANALYSIS POINT

NO.	DATE	REVISION	BY

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ARIZONA FIRM NO. 19744

CERTIFICATE NO. 53520
BRADLEY LINDVAI
SIGNED 5/2/2016
ARIZONA U.S.A.
Bradley J. Lindvai
Expires: 6/30/2018

DISTRICT AT THE QUARTER
15510 N. 73RD STREET
SCOTTSDALE, MARICOPA COUNTY, ARIZONA 85260

OFFSITE WATERSHED MAP

SHEET
EX-1
1 OF 1

Proposed Drainage Plan | 6

EX-1 – Overall Proposed Development

EX-2 – Phase I

EX-3 – Phase II

Appendix 2: CALCULATIONS

Drainage Analysis | **1**

Flood Control District of Maricopa County
Drainage Design Management System
PROJECT DEFAULTS

Project

Reference	
Title	DISTRICT AT THE QUART
Location	NEC OF N. GRENWAY HAYDEN LOOP & N. DIAL BLVD.
Agency	FLOOD CONTROL DISTRICT OF MARIPOCA COUNTY

Project Defaults

Model	RATIONAL
Land use Agency	FCDMC
Rainfall	NOAA14
Roads Agency	MCDOT
Inlets Agency	MCDOT

(stRanMulti.rpt)

Flood Control District of Maricopa County
Drainage Design Management System
RAINFALL DATA
Project Reference: DISTRICT AT THE QUAR

 4/28/2016

ID	Method	Duration	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
DEFAULT	NOAA14	5 MIN	0.250	0.336	0.404	0.494	0.563	0.634
	NOAA14	10 MIN	0.380	0.512	0.614	0.751	0.856	0.965
	NOAA14	15 MIN	0.471	0.634	0.761	0.931	1.061	1.196
	NOAA14	30 MIN	0.634	0.854	1.025	1.254	1.429	1.611
	NOAA14	1 HOUR	0.785	1.057	1.269	1.552	1.769	1.994
	NOAA14	2 HOUR	0.912	1.212	1.442	1.760	1.995	2.243
	NOAA14	3 HOUR	1.004	1.309	1.552	1.894	2.166	2.446
	NOAA14	6 HOUR	1.193	1.521	1.786	2.143	2.420	2.710
	NOAA14	12 HOUR	1.331	1.680	1.952	2.320	2.602	2.895
	NOAA14	24 HOUR	1.566	2.014	2.373	2.874	3.269	3.682

(stRanMulti.rpt)

Map Index No. 64
Cell No. 926-927

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: DISTRICT AT THE QUAR

5/26/2016

Sub Basin	Land Use Code	Area (acres)	Area (%)	Kb	Runoff Coefficient C						Description
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	
Major Basin ID: 01											
BUILD	190	5.54	100.0	0.035	0.67*	0.67*	0.67*	0.74*	0.80*	0.83*	Very High Density Residential - Multi Family (> 15 du per ac
		5.540	**100.0**								
OPEN	700	2.17	100.0	0.075	0.40	0.40	0.40	0.44	0.48	0.50	General Open Space (Open space where no detail available)
		2.170	**100.0**								
ROAD	2002	1.13	100.0	0.040	0.76*	0.76*	0.76*	0.84*	0.91*	0.95*	Pavement and Rooftops
		1.130	**100.0**								

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: DISTRICT AT THE QUAR

6/1/2016

Sub Basin	Land Use Code	Area (acres)	Area (%)	Kb	Runoff Coefficient C						Description
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	
Major Basin ID: 01											
BUILD	190	2.96	100.0	0.035	0.67*	0.67*	0.67*	0.74*	0.80*	0.83*	Very High Density Residential - Multi Family (> 15 du per ac
		2.960	**100.0**								
OPEN	700	1.68	100.0	0.075	0.40	0.40	0.40	0.44	0.48	0.50	General Open Space (Open space where no detail available)
		1.680	**100.0**								
ROAD	2002	0.30	100.0	0.040	0.76*	0.76*	0.76*	0.84*	0.91*	0.95*	Pavement and Rooftops
		0.300	**100.0**								

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
LAND USE
Project Reference: DISTRICT AT THE QUAR

6/1/2016

Sub Basin	Land Use Code	Area (acres)	Area (%)	Kb	Runoff Coefficient C						Description
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	
Major Basin ID: 01											
BUILD	190	2.58	100.0	0.035	0.67*	0.67*	0.67*	0.74*	0.80*	0.83*	Very High Density Residential - Multi Family (> 15 du per ac
		2.580	**100.0**								
OPEN	700	0.48	100.0	0.075	0.40	0.40	0.40	0.44	0.48	0.50	General Open Space (Open space where no detail available)
		0.480	**100.0**								
ROAD	2002	0.83	100.0	0.040	0.76*	0.76*	0.76*	0.84*	0.91*	0.95*	Pavement and Rooftops
		0.830	**100.0**								

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
Agency: FCDMC - LAND USE DEFAULTS
Project Reference: DISTRICT AT THE QUAR

Code	Description	Rational Method C						Resistance Coefficient Kb
		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	
Agriculture								
750	Agriculture	0.20	0.20	0.20	0.22	0.24	0.25	LOW
Commercial								
200	General Commercial (Commercial where no detail available)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
210	Specialty Commercial (<=50,000 sq. ft.)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
220	Neighborhood Commercial (50,000 to 100,000 sq. ft.)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
230	Community Commercial (100,000 to 500,000 sq. ft.)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
240	Regional Commercial (500,000 to 1,000,000 sq. ft.)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
250	Super-Regional Commercial (>= 1,000,000 sq. ft.)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
Industrial								
300	General Industrial (Industrial where no detail available)	0.80	0.80	0.80	0.88	0.95	0.95	MIN
310	Warehouse/Distribution Centers	0.85	0.85	0.85	0.94	0.95	0.95	MIN
320	Industrial	0.80	0.80	0.80	0.88	0.95	0.95	MIN
Institutional								
520	Educational (Public schools, private schools and universitie	0.75	0.75	0.75	0.83	0.90	0.94	MIN
530	Institutional (Includes hospitals and churches)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
550	Public Facilities(Include community centers, power substatio	0.85	0.85	0.85	0.94	0.95	0.95	MIN
Landscaping								
2000	Landscaping with impervious under treatment	0.85	0.85	0.85	0.94	0.95	0.95	MIN
2001	Landscaping w/o impervious under treatment	0.40	0.40	0.40	0.44	0.48	0.50	MIN
Office								
400	Office General (Office where no detail available)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
410	Office Low Rise (1-4 stories)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
420	Office Mid Rise (5-12 stories)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
430	Office High Rise (13 stories or more)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
810	Business Park (Includes enclosed industrial, office or retai	0.85	0.85	0.85	0.94	0.95	0.95	MIN
Open Space								
540	Cemeteries	0.25	0.25	0.25	0.28	0.30	0.31	LOW
700	General Open Space (Open space where no detail available)	0.40	0.40	0.40	0.44	0.48	0.50	LOW
710	Active Open Space (Includes parks)	0.25	0.25	0.25	0.28	0.30	0.31	MIN
720	Golf courses	0.25	0.25	0.25	0.28	0.30	0.31	MIN
730	Passive Open Space (Includes mountain preserves and washes)	0.55	0.55	0.55	0.61	0.66	0.69	MAX
740	Water	1.00	1.00	1.00	1.00	1.00	1.00	MIN
900	Vacant (Existing land use database only)	0.40	0.40	0.40	0.44	0.48	0.50	LOW
NDR	Undeveloped Desert Rangeland, Little topographic relief, slopes < 5%	0.40	0.40	0.40	0.44	0.48	0.50	LOW
NHS	Hillslopes, Sonoran Desert, Moderate topographic relief, slopes > 5%	0.55	0.55	0.55	0.61	0.66	0.69	HI
NMT	Mountain Terrain, High topographic relief, slopes > 10%	0.80	0.80	0.80	0.88	0.95	0.95	MAX
Other								
560	Special Events (Includes stadiums, sports complexes and fair	0.85	0.85	0.85	0.94	0.95	0.95	MIN
Other Employment								
570	Other Employment - low (Proving grounds and land fills)	0.85	0.85	0.85	0.94	0.95	0.95	MIN
580	Other Employment - medium	0.85	0.85	0.85	0.94	0.95	0.95	MIN
590	Other Employment - high	0.85	0.85	0.85	0.94	0.95	0.95	MIN
Residential								
110	Rural Residential (<= 1/5 du per acre)	0.42	0.42	0.42	0.46	0.50	0.53	MIN
120	Estate Residential (1/5 du per acre to 1 du per acre)	0.42	0.42	0.42	0.46	0.50	0.53	MIN
130	Large Lot Residential - Single Family (1 du per acre to 2 du	0.48	0.48	0.48	0.53	0.58	0.60	MIN
140	Medium Lot Residential - Single Family (2-4 du per acre)	0.65	0.65	0.65	0.72	0.78	0.80	MIN

Flood Control District of Maricopa County
Drainage Design Management System
Agency: FCDMC - LAND USE DEFAULTS
Project Reference: DISTRICT AT THE QUAR

Code	Description	Rational Method C						Resistance Coefficient Kb
		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr	
150	Small Lot Residential - Single Family (4-6 du per acre)	0.68	0.68	0.68	0.75	0.80	0.84	MIN
160	Very Small Lot Residential - Single Family (>6 du per acre-i	0.75	0.75	0.75	0.83	0.90	0.94	MIN
170	Medium Density Residential - Muli Family (5-10 du per acre)	0.75	0.75	0.75	0.83	0.90	0.94	MIN
180	High Density Residential - Multi Family (10-15 du per acre)	0.75	0.75	0.75	0.83	0.90	0.94	MIN
190	Very High Density Residential - Multi Family (> 15 du per ac	0.75	0.75	0.75	0.83	0.90	0.94	MIN
Tourist								
510	Tourist and Visitor Accommodations (Hotels, motels and resor	0.85	0.85	0.85	0.94	0.95	0.95	MIN
Transportation								
600	General Transportation (Transportation where no detail avail	0.95	0.95	0.95	0.95	0.95	0.95	MIN
610	Transportation (Includes railroads, railyards, transit cente	0.95	0.95	0.95	0.95	0.95	0.95	MIN
620	Airports (Includes public use airports)	0.80	0.80	0.80	0.88	0.95	0.95	MIN
630	Transportation	0.95	0.95	0.95	0.95	0.95	0.95	MIN
2002	Pavement and Rooftops	0.95	0.95	0.95	0.95	0.95	0.95	MIN
2003	Gravel Vehicular travel lanes and shoulders	0.70	0.70	0.70	0.77	0.84	0.88	MIN

Drainage Calculations | 2

BIG RED DOG
ENGINEERING | CONSULTING

Project Name: District at the Quarter
Address: NEC of N. Greenway Hayden Loop and N. Dial Blvd.
BRD Job #: H001.008

Weighted Runoff Coefficient

$$C_W = \frac{A_1C_1 + A_2C_2 + A_3C_3}{A_1 + A_2 + A_3}$$

C_w Weighted Runoff Coefficient
A Area per Land Classification
C Runoff Coefficient per Land Classification - Reference Fig 4.1-4 of the COS DS&PM

Overall Runoff Coefficient

Land Use	Runoff Coefficient (C)100 Year	Area (Acres)
Apartments & Condominimum (R-3, R-5)	0.94	5.54
Undisturbed natural desert or desert landscaping	0.45	2.16
Paved streets, parking lots (concrete or asphalt), roofs, drive-ways, etc.	0.95	1.13

Cw = 0.82

Phase I Weighted Runoff Coefficient

Land Use	Runoff Coefficient (C) 100 Year	Area (Acres)
Apartments & Condominimum (R-3, R-5)	0.94	2.96
Undisturbed natural desert or desert landscaping	0.45	1.68
Paved streets, parking lots (concrete or asphalt), roofs, drive-ways, etc.	0.95	0.3

Cw = 0.77

Phase II Weighted Runoff Coefficient

Land Use	Runoff Coefficient (C)100 Year	Area (Acres)
Apartments & Condominimum (R-3, R-5)	0.94	2.58
Undisturbed natural desert or desert landscaping	0.45	0.48
Paved streets, parking lots (concrete or asphalt), roofs, drive-ways, etc.	0.95	0.83

Cw = 0.88

Flood Control District of Maricopa County
Drainage Design Management System
RATIONAL METHOD FLOW SUMMARY - ALL
Project Reference: DISTRICT AT THE QUAR

5/11/2016

Type ID	Length (ft)	Conveyance Velocity (ft/sec)	Tpipe (min)	Combine		Return Period (Years) 2	5	10	25	50	100
Maior Basin ID: 01											
Sub Basin	-	-	-	-	Q (cfs)	9.8	13.8	17.0	23.8	29.8	35.0
BUILD					CA (ac)	3.71	3.71	3.71	4.10	4.43	4.60
					Tc (min)	7.4	6.5	6.0	5.4	5.1	5.0
					i (in/hr)	2.63	3.72	4.59	5.80	6.72	7.61
Sub Basin	-	-	-	-	Q (cfs)	2.6	3.5	4.2	5.6	7.0	8.3
OPEN					CA (ac)	0.87	0.87	0.87	0.95	1.04	1.09
					Tc (min)	5.1	5.0	5.0	5.0	5.0	5.0
					i (in/hr)	2.98	4.03	4.85	5.93	6.76	7.61
Sub Basin	-	-	-	-	Q (cfs)	2.4	3.3	4.1	5.6	7.0	8.1
ROAD					CA (ac)	0.86	0.86	0.86	0.95	1.03	1.07
					Tc (min)	6.6	5.8	5.3	5.0	5.0	5.0
					i (in/hr)	2.75	3.86	4.77	5.93	6.76	7.61

* First Pipe

Flood Control District of Maricopa County
Drainage Design Management System
RATIONAL METHOD FLOW SUMMARY - ALL
Project Reference: DISTRICT AT THE QUAR

6/1/2016

Type ID	Length (ft)	Conveyance Velocity (ft/sec)	Tpipe (min)	Combine		Return Period (Years) 2	5	10	25	50	100
Maior Basin ID: 01											
Sub Basin	-	-	-	-	Q (cfs)	5.1	7.3	9.0	12.6	15.8	18.7
BUILD					CA (ac)	1.98	1.98	1.98	2.19	2.37	2.46
					Tc (min)	7.6	6.6	6.1	5.6	5.3	5.0
					i (in/hr)	2.60	3.70	4.56	5.74	6.65	7.61
Sub Basin	-	-	-	-	Q (cfs)	0.3	0.5	0.6	0.8	0.9	1.1
OPEN					CA (ac)	0.12	0.12	0.12	0.13	0.14	0.15
					Tc (min)	5.6	5.0	5.0	5.0	5.0	5.0
					i (in/hr)	2.90	4.03	4.85	5.93	6.76	7.61
Sub Basin	-	-	-	-	Q (cfs)	3.5	5.0	6.1	8.4	10.3	12.2
ROAD					CA (ac)	1.28	1.28	1.28	1.41	1.53	1.60
					Tc (min)	6.5	5.7	5.2	5.0	5.0	5.0
					i (in/hr)	2.76	3.88	4.80	5.93	6.76	7.61

* First Pipe

Flood Control District of Maricopa County
Drainage Design Management System
RATIONAL METHOD FLOW SUMMARY - ALL
Project Reference: DISTRICT AT THE QUAR

6/1/2016

Type ID	Length (ft)	Conveyance Velocity (ft/sec)	Tpipe (min)	Combine		Return Period (Years) 2	5	10	25	50	100
Maior Basin ID: 01											
Sub Basin	-	-	-	-	Q (cfs)	4.5	6.4	7.9	11.0	13.7	16.2
BUILD					CA (ac)	1.73	1.73	1.73	1.91	2.06	2.14
					Tc (min)	7.7	6.7	6.2	5.6	5.3	5.1
					i (in/hr)	2.59	3.68	4.54	5.74	6.65	7.57
Sub Basin	-	-	-	-	Q (cfs)	0.6	0.8	0.9	1.2	1.6	1.8
OPEN					CA (ac)	0.19	0.19	0.19	0.21	0.23	0.24
					Tc (min)	5.5	5.0	5.0	5.0	5.0	5.0
					i (in/hr)	2.92	4.03	4.85	5.93	6.76	7.61
Sub Basin	-	-	-	-	Q (cfs)	1.7	2.4	3.0	4.2	5.1	6.0
ROAD					CA (ac)	0.63	0.63	0.63	0.70	0.76	0.79
					Tc (min)	6.7	5.8	5.4	5.0	5.0	5.0
					i (in/hr)	2.73	3.86	4.74	5.93	6.76	7.61

* First Pipe

Drawdown Calculations and Orifice Sizing | **3**

Drawdown time for Phase I Detention through Orifice

Pond ID: Phase I

Maximum pond elevation: 1477.02 ft
Maximum Pond Volume: 32124 cu-ft
Pond outlet elevation: 1469.3 ft

Shape of Orifice: Circle

Dimensions of Orifice: 0.044 R, ft 0.53 in
0.021 n/a

Number of Oricices 1

Q = RELEASE RATE = $CA(2GH)^{1/2}$

G = GRAVITATIONAL CONSTANT = 32.2 FT/S^2
C = ORIFICE COEFFICIENT = 0.6
A = AREA OF ORIFICE = 0.01
H = HEAD ON ORIFICE MAXIMUM = 7.675981
MINIMUM = 0

Pond Elevation	Cum.Pond Volume	Inc. Pond Volume	Head	Flowrate	Time
ft	ac-ft	ac-ft	ft	CFS	minutes
1477.02	0.7374656	0.008	7.68	0.081	73.4
1476.92	0.7292715	0.008	7.58	0.081	73.9
1476.82	0.7210774	0.008	7.48	0.080	74.3
1476.72	0.7128834	0.008	7.38	0.079	74.8
1476.62	0.7046893	0.008	7.28	0.079	75.4
1476.52	0.6964953	0.008	7.18	0.078	75.9
1476.42	0.6883012	0.008	7.08	0.078	76.4
1476.32	0.6801071	0.008	6.98	0.077	77.0
1476.22	0.6719131	0.008	6.88	0.077	77.5
1476.12	0.6637190	0.008	6.78	0.076	78.1
1476.02	0.6555249	0.008	6.68	0.076	78.7
1475.92	0.6473309	0.008	6.58	0.075	79.3
1475.82	0.6391368	0.008	6.48	0.074	79.9
1475.72	0.6309428	0.008	6.38	0.074	80.5
1475.62	0.6227487	0.008	6.28	0.073	81.1
1475.52	0.6145546	0.008	6.18	0.073	81.8
1475.42	0.6063606	0.008	6.08	0.072	82.5
1475.32	0.5981665	0.008	5.98	0.072	83.2
1475.22	0.5899725	0.008	5.88	0.071	83.9
1475.12	0.5817784	0.008	5.78	0.070	84.6
1475.02	0.5735843	0.008	5.68	0.070	85.3
1474.92	0.5653903	0.008	5.58	0.069	86.1
1474.82	0.5571962	0.008	5.48	0.068	86.9
1474.72	0.5490021	0.008	5.38	0.068	87.7
1474.62	0.5408081	0.008	5.28	0.067	88.5
1474.52	0.5326140	0.008	5.18	0.067	89.4
1474.42	0.5244200	0.008	5.08	0.066	90.2
1474.32	0.5162259	0.008	4.98	0.065	91.1
1474.22	0.5080318	0.008	4.88	0.065	92.1
1474.12	0.4998378	0.008	4.78	0.064	93.0
1474.02	0.4916437	0.008	4.68	0.063	94.0
1473.92	0.4834496	0.008	4.58	0.063	95.0
1473.82	0.4752556	0.008	4.48	0.062	96.1
1473.72	0.4670615	0.008	4.38	0.061	97.2
1473.62	0.4588675	0.008	4.28	0.061	98.3
1473.52	0.4506734	0.008	4.18	0.060	99.5
1473.42	0.4424793	0.008	4.08	0.059	100.7
1473.32	0.4342853	0.008	3.98	0.058	101.9
1473.22	0.4260912	0.008	3.88	0.058	103.3
1473.12	0.4178972	0.008	3.78	0.057	104.6
1473.02	0.4097031	0.008	3.68	0.056	106.0
1472.92	0.4015090	0.008	3.58	0.055	107.5
1472.82	0.3933150	0.008	3.48	0.055	109.0
1472.72	0.3851209	0.008	3.38	0.054	110.6

1472.62	0.3769268	0.008	3.28	0.053	112.3
1472.52	0.3687328	0.008	3.18	0.052	114.1
1472.42	0.3605387	0.008	3.08	0.051	115.9
1472.32	0.3523447	0.008	2.98	0.050	117.8
1472.22	0.3441506	0.008	2.88	0.050	119.9
1472.12	0.3359565	0.008	2.78	0.049	122.0
1472.02	0.3277625	0.008	2.68	0.048	124.3
1471.92	0.3195684	0.008	2.58	0.047	126.7
1471.82	0.3113743	0.008	2.48	0.046	129.2
1471.72	0.3031803	0.008	2.38	0.045	131.9
1471.62	0.2949862	0.008	2.28	0.044	134.7
1471.52	0.2867922	0.008	2.18	0.043	137.8
1471.42	0.2785981	0.008	2.08	0.042	141.1
1471.32	0.2704040	0.008	1.98	0.041	144.6
1471.22	0.2622100	0.008	1.88	0.040	148.4
1471.12	0.2540159	0.008	1.78	0.039	152.5
1471.02	0.2458219	0.008	1.68	0.038	157.0
1470.92	0.2376278	0.008	1.58	0.037	161.9
1470.82	0.2294337	0.008	1.48	0.036	167.3
1470.72	0.2212397	0.008	1.38	0.034	173.3
1470.62	0.2130456	0.008	1.28	0.033	180.0
1470.52	0.2048515	0.008	1.18	0.032	187.5
1470.42	0.1966575	0.008	1.08	0.030	196.0
1470.32	0.1884634	0.008	0.98	0.029	205.8
1470.22	0.1802694	0.008	0.88	0.027	217.2
1470.12	0.1720753	0.008	0.78	0.026	230.8
1470.02	0.1638812	0.008	0.68	0.024	247.2
1469.92	0.1556872	0.008	0.58	0.022	267.8
1469.82	0.1474931	0.008	0.48	0.020	294.6
1469.72	0.1392991	0.008	0.38	0.018	331.5
1469.62	0.1311050	0.008	0.28	0.015	387.0
1469.52	0.1229109	0.008	0.18	0.012	484.6
1469.42	0.1147169	0.008	0.08	0.008	720.0

Drawdown time for Phase II Detention through Orifice

Pond ID: Phase II

Maximum pond elevation:	1477.56 ft	
Maximum Pond Volume:	28750 cu-ft	
Pond outlet elevation:	1470.51 ft	
Shape of Orifice:	Circle	
Dimensions of Orifice:	0.038 R, ft	0.46 in
	0.021 n/a	
Number of Oricices	1	

Q = RELEASE RATE = $CA(2GH)^{1/2}$

G = GRAVITATIONAL CONSTANT =	32.2	FT/S^2
C = ORIFICE COEFFICIENT =	0.6	
A = AREA OF ORIFICE =	0.005	
H = HEAD ON ORIFICE	MAXIMUM = 7.011728	
	MINIMUM = 0	

Pond Elevation	Cum.Pond Volume	Inc. Pond Volume	Head	Flowrate	Time
ft	ac-ft	ac-ft	ft	CFS	minutes
1477.56	0.660	0.007	7.01	0.059	90.9
1477.46	0.653	0.007	6.91	0.058	91.5
1477.36	0.645	0.007	6.81	0.058	92.2
1477.26	0.638	0.007	6.71	0.057	92.9
1477.16	0.631	0.007	6.61	0.057	93.6
1477.06	0.623	0.007	6.51	0.056	94.3
1476.96	0.616	0.007	6.41	0.056	95.0
1476.86	0.609	0.007	6.31	0.056	95.8
1476.76	0.601	0.007	6.21	0.055	96.6
1476.66	0.594	0.007	6.11	0.055	97.3
1476.56	0.587	0.007	6.01	0.054	98.2
1476.46	0.579	0.007	5.91	0.054	99.0
1476.36	0.572	0.007	5.81	0.053	99.8
1476.26	0.565	0.007	5.71	0.053	100.7
1476.16	0.557	0.007	5.61	0.052	101.6
1476.06	0.550	0.007	5.51	0.052	102.5
1475.96	0.543	0.007	5.41	0.051	103.5
1475.86	0.535	0.007	5.31	0.051	104.4
1475.76	0.528	0.007	5.21	0.051	105.4
1475.66	0.521	0.007	5.11	0.050	106.4
1475.56	0.513	0.007	5.01	0.050	107.5
1475.46	0.506	0.007	4.91	0.049	108.6
1475.36	0.499	0.007	4.81	0.049	109.7
1475.26	0.491	0.007	4.71	0.048	110.9
1475.16	0.484	0.007	4.61	0.048	112.1
1475.06	0.477	0.007	4.51	0.047	113.3
1474.96	0.469	0.007	4.41	0.046	114.6
1474.86	0.462	0.007	4.31	0.046	115.9
1474.76	0.455	0.007	4.21	0.045	117.3
1474.66	0.447	0.007	4.11	0.045	118.7
1474.56	0.440	0.007	4.01	0.044	120.2
1474.46	0.433	0.007	3.91	0.044	121.7
1474.36	0.425	0.007	3.81	0.043	123.3
1474.26	0.418	0.007	3.71	0.043	124.9
1474.16	0.411	0.007	3.61	0.042	126.6
1474.06	0.403	0.007	3.51	0.041	128.4
1473.96	0.396	0.007	3.41	0.041	130.3
1473.86	0.389	0.007	3.31	0.040	132.2
1473.76	0.381	0.007	3.21	0.040	134.3
1473.66	0.374	0.007	3.11	0.039	136.4
1473.56	0.367	0.007	3.01	0.038	138.7
1473.46	0.359	0.007	2.91	0.038	141.0
1473.36	0.352	0.007	2.81	0.037	143.5
1473.26	0.345	0.007	2.71	0.036	146.1

1473.16	0.337	0.007	2.61	0.036	148.9
1473.06	0.330	0.007	2.51	0.035	151.9
1472.96	0.323	0.007	2.41	0.034	155.0
1472.86	0.315	0.007	2.31	0.034	158.3
1472.76	0.308	0.007	2.21	0.033	161.8
1472.66	0.301	0.007	2.11	0.032	165.6
1472.56	0.293	0.007	2.01	0.031	169.7
1472.46	0.286	0.007	1.91	0.031	174.1
1472.36	0.279	0.007	1.81	0.030	178.8
1472.26	0.271	0.007	1.71	0.029	183.9
1472.16	0.264	0.007	1.61	0.028	189.6
1472.06	0.257	0.007	1.51	0.027	195.7
1471.96	0.249	0.007	1.41	0.026	202.6
1471.86	0.242	0.007	1.31	0.025	210.1
1471.76	0.235	0.007	1.21	0.024	218.6
1471.66	0.227	0.007	1.11	0.023	228.3
1471.56	0.220	0.007	1.01	0.022	239.3
1471.46	0.213	0.007	0.91	0.021	252.0
1471.36	0.205	0.007	0.81	0.020	267.1
1471.26	0.198	0.007	0.71	0.019	285.3
1471.16	0.191	0.007	0.61	0.017	307.7
1471.06	0.183	0.007	0.51	0.016	336.4
1470.96	0.176	0.007	0.41	0.014	375.1
1470.86	0.169	0.007	0.31	0.012	431.0
1470.76	0.161	0.007	0.21	0.010	523.0
1470.66	0.154	0.007	0.11	0.007	720.0
1470.56	0.147	0.000	0.01	0.002	0.0

Appendix 3

Warning and Disclaimer of Liability | 1

Appendix 4-1C

WARNING & 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 man-made 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.

8-24-2016 3-GP-2016		
Plan Check No.	Owner or Agent	Date 8/3/2016