Plan # 26-DR-2018

Corrections

Ryan 10/30/18
Reviewed By Date

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Drainage Report

Christian Brothers Automotive

7225 E Williams Drive
Scottsdale, AZ 85255

Provide schematic for weighted C Calculation

PREPARED FOR:

SRA 360, PLLC
5450 E. High Street, Suite 200
Phoenix, Arizona 85054

Provide DWD w drainage report

PREPARED BY:

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October 11, 2018

Registered Professional Engineer (Civil)
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ARIZONA, U.S.A.

EXPIRES: 6/30/19

Larson

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City of Scottsdale Design Criteria

City of Scottsdale Isopluvial Map

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Introduction

The proposed Christian Brothers Automotive (The Project) is located at 7225 East Williams Drive in Scottsdale Road. The parcel number for this project is 212-02-983. The Project consists of adding a building, curbing, refuse container, valley gutter, utilities, catch basin, storm drain pipe, retention basin, drywell and landscaping. The building is 5,832 square feet in size. The Project is located just East of the intersection of Scottsdale Road at Williams Drive. See Location Map below:

Figure 1 Location Map

The Project will not alter the existing zoning, which is C-3. The surrounding area at his locations is commercial businesses and consists of commercial services and offices. The existing site is undeveloped land. The new building will remain consistent with the City of Scottsdale's general plan. The adjacent parcel to the north is currently undeveloped land that consists of dirt. The project proposes. The project proposes 16,196 square feet of open space/ landscape area and 38,621 square feet of impervious area.

Design Documentation

Drainage Design Flows are based on criteria provided in the City of Scottsdale's Design Standards & Policies Manual Chapter 4 dated 2009 and the Flood Control District of Maricopa County Volume I & II. Specifically, the criteria used are as follows:

This project will utilize the existing topography to convey stormwater runoff to one retention basin in the southwest portion of the property. The proposed condition will capture all required runoff for the 100 year 2 hour storm.

The elevations for this design are based on the survey performed by Synergy Surveying LLC., performed on May 11, 2018. The benchmark used Name 2153 and is a brass cap in hand hole at Williams Drive and Scottsdale Road (down 0.79') at NAVD 88 EL = 1791.03.

Existing Conditions

The Project will not alter the existing zoning, which is C-3. The existing site is currently undeveloped land. The area to the north of the Project is undeveloped land. The other surrounding areas are commercial developments.

Currently, the site has a small retention area provided where water is collected and conveyed to the retention basin to the southwest. The proposed condition will replace this area with a retention basin sized to handle the 100 year 2 hour storm for the developed condition. A drywell is also included to percolate the runoff within 36 hours.

A portion of the parking lot for this property is located in a FEMA Zone AO floodplain with a depth of 1 foot and velocity of 4 feet per second. The building and majority of the project lie in a FEMA designated Zone X area. See Appendix for Grading Plan showing FEMA Flood Zone Area and FEMA FIRM. As part of this design all proposed structures will remain outside of the Zone AO floodplain.

FEMA Information

According to the FEMA Flood Insurance Rate Map (FIRM), panel number 04013C1310L. Dated October 16, 2013 part of the project site, including the building, is within a Zone "X". A Zone "X" is described as follows:

> "Areas of 0.2% annual chance of flood; areas of 1% annual chance of flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood."

A portion of the parking lot is located in FEMA Zone AO with a depth of 1 foot and velocity of 4 feet per second. See FEMA FIRM in Appendix.

Proposed Conditions

The proposed condition includes a 5,832 square foot building, curbing, refuse container, valley gutter, utilities, catch basin, storm drain pipe, retention basin, drywell and landscaping. The site is proposed to have slopes of around 0.5-6%. Stormwater will be conveyed away from the building into the retention basin. Most runoff is conveyed via overland flow, however, on the southern portion of the site the runoff is captured via a precast catch basin and conveyed via a 12" HDPE pipe. The parking lot will drain into curb openings and down a rip-rap spillway into the

basins.

The building finish floor has been designed to be protected during the 100 year peak runoff event. The building finish floor is set at 3.3' above the site outfall.

The proposed retention basin will include a drywell to ensure drainage within 36 hours. This drywell will drain the basin by gravity. The drywell will be governed by the City of Scottsdale Design Standard s and Policy Manual and the FCD of Maricopa County Hydraulic Manual. The drywell must be permitted through ADEQ. The maintenance of the dry well will be the sole responsibility of the property owner.

Calculations

The Project has been designed to provide positive drainage away from the building. The project will convey runoff into an above ground retention basin with a depth of 3 feet. The grading plan shows the proposed retention basin with high water and bottom elevations and volume provided. The appendix includes the calculations for the required retention of 8,722 cubic feet and the provided retention of 8,981 cubic feet. The basin includes a drywell to percolate water within 36 hours of a storm event.

The proposed site is broken down by open space and a weighted C value is calculated and included. The grading plan includes callouts for the proposed landscaping and square footage and a calculations sheet for the proposed C factor. The proposed project includes 16,196 square feet of landscaping area and 38,621 square feet of concrete, roof, asphalt and impervious area. Utilizing the City of Scottsdale's Design Standards & Policies Manual Chapter 4 Figure 4.1-4 yields the C values utilized for the calculations. The Depth of precipitation was gathered from the City's Isopluvial Map in the Design Standards & Policies Manual Appendix 4-1D, which has been included in the appendix of this report.

Summary

Based on the results of the Project Drainage design, the following can be concluded:

- The Project building resides in a FEMA Designated Zone X per the FIRM panel number 04013C2235L Dated October 16, 2013 and the parking lot resides in a FEMA Zone AO
- The 100 year 2 hour storm event retention has been provided for the developed condition

GRADING PLAN

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CALCULATIONS

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Christian Brothers Automotive			
Retention Basin			
TOP AREA (SF)	BOTTOM AREA (SF)	DEPTH (FT)	VOLUME (CF)
4,672	1,315	3	**8,981**
TOTAL			**8,981**

Christian Brothers Automotive Weighted C Value				
CONDITION	**TOTAL AREA(SF)**	**AREA (SF)**	**C FACTOR**	**WEIGHTED 'C'**
Desert L/S	54,817	16,196	0.45	0.80
Impervious		38,621	0.95	
TOTAL		54,817		0.80

Christian Brothers Automotive				
Retention Calculations				
TOTAL AREA (SF)	*D (IN)	Weighted 'C' Factor	**REQUIRED RETENTION VOLUME (CF)	RETENTION PROV'D (CF)
54,817	2.40	0.80	8,796	8,981

*D from City of Scottsdale Isopluvial Map located in Appendix

**Retention required = C*D/12*A

FEMA FIRM

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Zone AE
1833.6 FEET
1829 FEET
1824.3 FEET
1819.6 FEET
1819 FEET
Zone AO
(DEPTH 1 Feet)
(VEL 4 Feet / Second)
Zone AO
(DEPTH 1 Feet)
(VEL 4 Feet / Second)
T4N R4E S15
T4N R4E S14
0.2 PCT ANNUAL CHANCE FLOOD HAZARD
LOMR 16-09-2931X
eff. 8/31/2016
CITY OF SCOTTSDALE
045012
Project Location
Zone AO
(DEPTH 1 Feet)
(VEL 4 Feet / Second)
LOMR 17-09-0074P
eff. 8/25/2017
Zone AO
(DEPTH 1 Feet)
Streets
USDA FSA, DigitalGlobe, CNES/Airbus DS
POWERED BY esri

CITY OF SCOTTSDALE DESIGN CRITERIA

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2. Time of Concentration

Time of concentration "**Tc**" is the total time of travel from the most hydraulically remote part of the watershed to the concentration point of interest. The calculation of "Tc" must follow FCDMC Hydrology Manual procedures.

***Note:** **Do not add a standard set amount of time to the estimated "Tc" for lot runoff delay (such as 5 or 10 minutes).** Natural land slopes are too variable in Scottsdale to add a set amount of time for lot runoff.

3. Runoff Coefficients

Use Figure 4.1-4 or equivalent to obtain the runoff coefficients or "**C**" values. Composite "**C**" values for the appropriate zoning category or weighted average values calculated for the specific site are both acceptable approaches.

RUNOFF COEFFICIENTS - "C" VALUE

Land Use	Storm Frequency		
Composite Area-wide Values	2-25 Year	50 Year	100 Year
Commercial & Industrial Areas	0.80	0.83	0.86
Residential Areas-Single Family (average lot size)			
R1-1-1901	0.33	0.50	0.53
R1-130	0.35	0.51	0.59
R1-70	0.37	0.52	0.60
R1-43	0.38	0.55	0.61
R1-35 (35,000 square feet/lot)	0.40	0.56	0.62
R1-18 (18,000 square feet/lot)	0.43	0.58	0.64
R1-10 (10,000 square feet/lot)	0.47	0.62	0.67
R1-7 (7,000 square feet/lot)	0.51	0.64	0.94
Townhouses (R-2, R-4)	0.63	0.74	0.94
Apartments & Condominiums (R-3, R-5)	0.76	0.83	0.94
Specific Surface Type Values			
Paved streets, parking lots (concrete or asphalt), roofs, drive-ways, etc.	0.90	0.93	0.95
Lawns, golf courses, & parks (grassed areas)	0.20	0.25	0.30
Undisturbed natural desert or desert landscaping (no impervious weed barrier)	0.37	0.42	045
Desert landscaping (with impervious weed barrier)	0.63	0.73	0.83
Mountain terrain – slopes greater than 10%	0.60	0.70	0.80
Agricultural areas (flood-irrigated fields)	0.16	0.18	0.20

FIGURE 4.1-4 RUNOFF COEFFICIENTS FOR USE WITH RATIONAL METHOD

CITY OF SCOTTSDALE ISOPLUVIAL MAP

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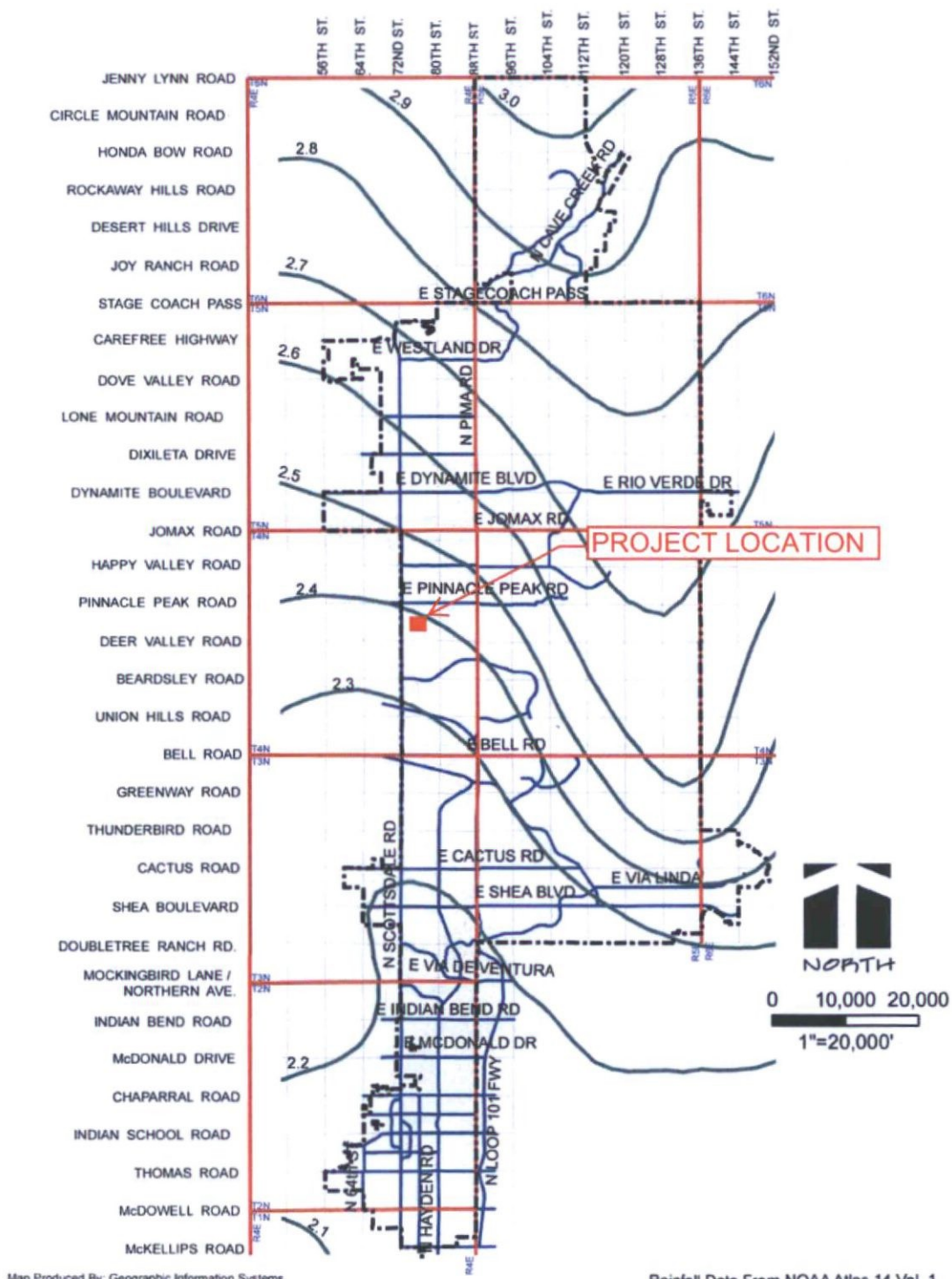
ISOPLUVIALS

100 Year 2 Hour Precipitation in Inches



Map Produced By: Geographic Information Systems
04/03/2009

Rainfall Data From NOAA Atlas 14 Vol. 1