Larson Engineering, Inc.
6380 E. Thomas Road, Suite 300
Scottsdale, AZ 85251
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FILE COPY

Water Basis of Design Report

For

Christian Brothers Automotive

Scottsdale, ARIZONA

PREPARED FOR:

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

PREPARED BY:

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October 11, 2018

Registered Professional Engineer (Civil)
CERTIFICATE NO.
46279
MICHAEL J.
HREHA
Date Signed 10/11/18
ARIZONA, U.S.A.
EXPIRES: 12/31/19

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26-DR-2018
10/15/2018

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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:

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

Water Design Flows are based on criteria provided in the City of Scottsdale's Design Standards & Policies Manual Chapter 6 dated 2018. Specifically, the criteria used are as follows:

- Building Square Feet 5,832 SF

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• Demand Bldg (interior + exterior)	6.5 GPM
• Pressure at Peak Flow	52.9 PSI
• Fire Flow Requirement	1,500 GPM
• Static Pressure from Flow Test	72 PSI
• Residual Pressure from Flow Test	60 PSI
• Pipe Material	1 ½ " Copper 6" D.I.P.

Water Calculations are attached in the Appendix. Existing service line size, backflow preventer and building supply sizes will need to be verified and if needed upgraded and identified prior to final plan approval. The site proposes to install one fire hydrant onsite in addition to an FDC and a fire sprinkler line. See the attached Utility Plan in the Appendix for details.

Existing Conditions

The Project will not alter the existing zoning, which is C-3.

The existing site is undeveloped land. The proposed building will tie into the existing 8" waterline in Williams Drive. The site will be adding a water meter to the existing meter box and utilizing the existing backflow preventer. The backflow preventer has already been installed and a box for the water meter is also existing.

The fire line will utilize a 6-inch Ductile Iron Pipe for the fire sprinkler system.

Proposed Conditions

The attached Water Exhibit shows the tie in locations for the domestic water, fire sprinkler system and fire hydrant. This Project proposes to use 1 ½ inch Copper pipe. The tie in will be at the existing water meter box, see the attached Water Exhibit. All maintenance of the private onsite system is the responsibility of the owner.

Calculations

Based on the attached calculations, the projected pressure and flow will meet the building's needs. The proposed Water distribution system is designed to provide adequate capacity to serve the proposed Project.

Summary

The Proposed Water Distribution System has been analyzed to ensure all City of Scottsdale Design Standards and Policies Manual Chapter 6 requirements are being met. Figure 6.1-2 of that manual provided the water demand and peaking factors included in the analysis and stated in this report. The Appendix includes calculations of pressure loss, the hydrant flow test and a water exhibit showing proposed water and fire line.

The Project is expected to be completed in late 2018.

Enclosed is a set of drawings and spreadsheets which summarize the design and capacity of the system. The spreadsheets show the use, average daily flow rate and peak flow rates for the project. This project is proposed to start as soon as approval is obtained and completed within 6 months. Please refer to the attached Water exhibit for layout of the lines and connections.

Thank you for your prompt review of the proposed water collection system.

Sincerely,

Larson Engineering, Inc.

Mike Hreha, P.E.
Land Development Manager

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Utility Plan

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CALCULATIONS

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Christian Brothers Automotive

Water Calculations

Description	Bldg Sqft	*Demand (GPM/SF) Inside	*Demand (GPM/SF) Exterior	Demand Bldg + Exterior (GPM)	Max Day Demand (GPM)	Peak Day Demand (GPM)	Residual Pressure (P.S.I.)	**1 1/2" Meter Loss	**Backflow Pressure Loss (P.S.I.)	Friction Loss (P.S.I.)	Total Pressure Loss (P.S.I.)	Peak Hour (P.S.I.)
Commercial Building	5,832	0.000973	0.000139	6.5	13.0	19.5	60	0.1000	4	3.8	7.9	52.1

*Based on City of Scottsdale Design and Engineering Manual Chapter 6

Christian Brothers Automotvie

Water + Fire Flow

Description	Bldg Sqft	Max Day Demand (GPM)		*Fire Flow Requirement (GPM)	Max Day Demand + Fire Flow Requirement (GPM)	Peak Day Demand (GPM)	Peak Day + Fire Flow Demand (GPM)	Hydrant Flow Test Results (GPM)
Commercial Building	5,832	13.0		1,500	1,513.0	19.5	1,519.5	2,201

*Per IFC 2015 Table B105.1 (2)

$f = 0.2083\ (100 / c)^{1.852}\ q^{1.852} / d_h^{4.8655}$

where

f = friction head loss in feet of water per 100 feet of pipe (ft_{H2O}/100 ft pipe)

c = Hazen-Williams roughness constant — 140 Copper

q = volume flow (gal/min)

dh = inside hydraulic diameter (inches) — 2*radius — 1.5

Hydrant Flow Test

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E·J | Flow Test Summary

Project Name:	EJFT 18120
Project Address:	7300 E Williams Dr, Scottsdale, AZ 85255
Date of Flow Test:	2018-06-06
Time of Flow Test:	7:42 AM
Data Reliable Until:	2018-12-06
Conducted By:	Austin Gourley & Eder Cueva (EJ Flow Tests) 602.999.7637
Witnessed By:	Jim Tunnell (City of Scottsdale) 602.819.7718
City Forces Contacted:	City of Scottsdale (602.819.7718)
Permit Number:	C55571
Note	Scottsdale requires a max static pressure of 72 psi for safety factor

Raw Flow Test Data

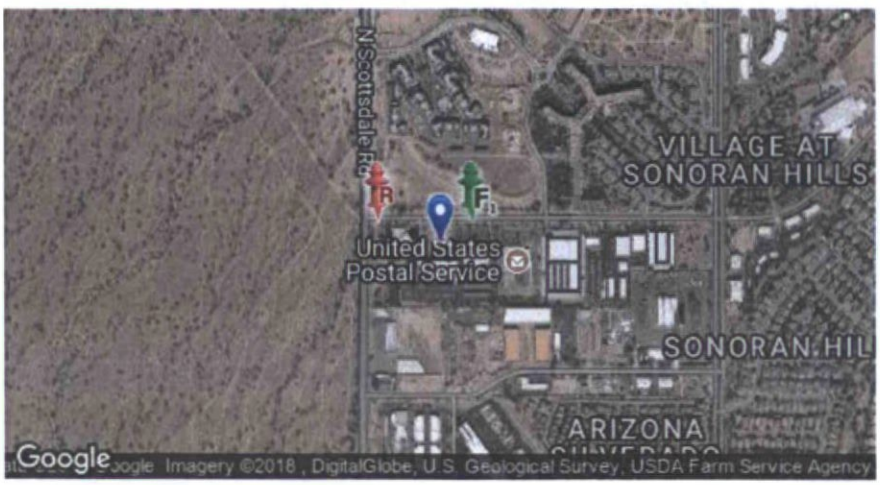
Static Pressure:	94.0 PSI
Residual Pressure:	82.0 PSI
Flowing GPM:	2,201
GPM @ 20 PSI:	5,879

Data with a 22 PSI Safety Factor

Static Pressure:	72.0 PSI
Residual Pressure:	60.0 PSI
Flowing GPM:	2,201
GPM @ 20 PSI:	4,859

Hydrant F_1

Pitot Pressure (1):	42	PSI
Coefficient of Discharge (1):	0.9	
Hydrant Orifice Diameter (1):	2.5	inches
Pitot Pressure (2):	44	PSI
Coefficient of Discharge (2):	0.9	
Hydrant Orifice Diameter (2):	2.5	inches



Project Site

Static-Residual Hydrant

Flow Hydrant

Main Size
8 inches

Distance Between F_1 and R
705 ft (measured linearly)

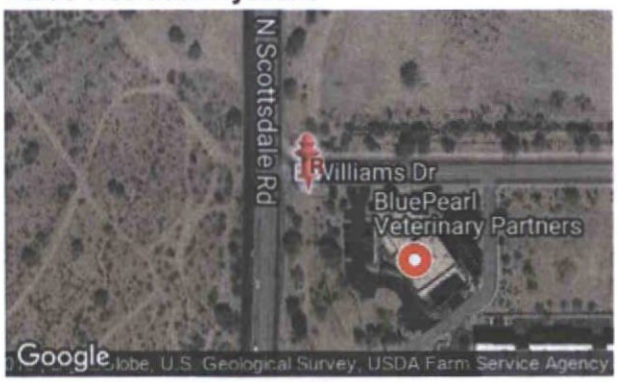
Static-Residual Elevation
1789 ft (above sea level)

Flow Hydrant (F_1) Elevation
1798 ft (above sea level)

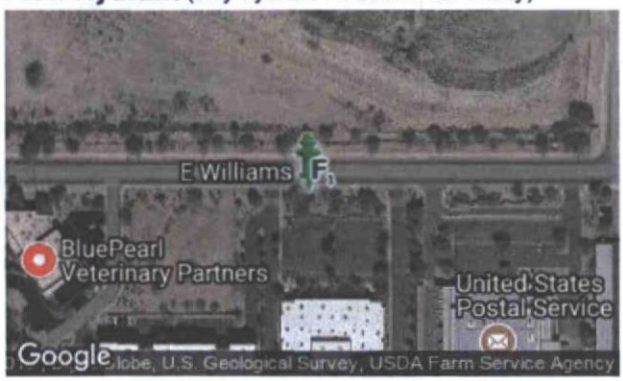
Elevation & distance values are approximate

E·J | Flow Test Summary

Static-Residual Hydrant



Flow Hydrant (only hydrant F1 shown for clarity)



Approximate Project Site

Water Supply Curve $N^{1.85}$ Graph