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TIMA
Abbreviated Water & Sewer Need Report
Archaeological Resources
Airport Vicinity Development Checklist
Parking Study
Trip Generation Comparison
Parking Master Plan
Water Study
Wastewater Study
Stormwater Waiver Application



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To: Heath Reed
 K. Hovnanian Homes

From: Jamie Blakeman, PE, PTOE

Job Number: 15.0822

RE: NEC of 68th Street and McDowell Road
 Traffic Impact & Mitigation Analysis

Date: August 27, 2015



EXPIRES 6-30-16



INTRODUCTION

J2 Engineering and Environmental Design (J2) has prepared a Traffic Impact and Mitigation Analysis for the proposed residential development located on the northeast corner of 68th Street and McDowell Road in Scottsdale, Arizona. The proposed residential development will include 81 single-family detached homes. See the attached proposed site plan.

The objective of this Traffic Impact and Mitigation Analysis is to analyze the traffic related impacts to the adjacent roadway network.

EXISTING CONDITIONS

Currently, this parcel is a vacant lot. It was formerly an auto dealership, which appears to have been in operation until approximately 2008.

McDowell Road adjacent to the proposed residential development provides three through lanes for each direction of travel with a raised median and dedicated left-turn lanes. There is a posted speed limit of 40 mph.

68th Street adjacent to the property provides one through lane in each direction of travel with a two-way left-turn lane. There is a posted speed limit of 35 mph.

The 2014 Average Daily Traffic (ADT) along 68th Street between McDowell Road and Oak Street is 6,900 vehicles per day, and along McDowell Road between 68th Street and Scottsdale Road is 27,700 vehicles per day.

15-ZN-2015
8/31/15





PROPOSED DEVELOPMENT

The proposed residential development site plan indicates there will be one driveway entrance off of McDowell Road at the existing median break. This is designated as the primary gated entry. There is a proposed westbound dedicated right-turn deceleration lane, which currently does not exist. This driveway will also allow for egress.

Currently the existing site provides three driveways along McDowell Road. Therefore, the proposed development eliminates two of these driveways.

The proposed development includes a driveway access along 68th Street and another along 69th Street. Both of these driveways will be gated and only allow egress from the proposed development.

TRIP GENERATION (FORMER AUTO DEALERSHIP)

The trip generation for the former auto dealership was calculated utilizing the Institute of Transportation Engineers (ITE) publication entitled *Trip Generation, 9th Edition*. The ITE rates are based on studies that measured the trip generation characteristics for various types of land uses. The rates are expressed in terms of trips per unit of land use type. This publication is considered to be the standard for the transportation engineering profession.

The square footage for the former auto dealership was determined from the parcel information attained from the Maricopa County Assessors website (www.mcassessor.maricopa.gov). See **Attachment A**. The square footage for the auto dealership was calculated by summing the square footage of all the buildings, with the exception of the parking structure. This results in a total of 46,044 square feet.

For Land Use 841 – Automobile Sales, the fitted curve equations were not given, only the average rates were provided. The trips generated by the former auto dealership are shown in **Table 1**.

Table 1 –Trip Generation for Former Auto Dealership

Land Use	ITE Code	Qty	Unit	Weekday	AM Peak Hour			PM Peak Hour		
				Total	Total	In	Out	Total	In	Out
Automobile Sales	841	46.04	1,000 Sq Ft GFA	1,487	88	66	22	121	48	73



TRIP GENERATION (C-3 LAND USES)

The existing parcel is currently zoned for C-3 land uses, which allow a maximum floor area ratio (FAR) of 0.80 square feet according to the Section 5.1504 of the Scottsdale Zoning Code. Section 5.1503 also lists the type of land uses permitted or allowed under conditional use for the C-3 zoning. See **Attachment B**.

According to the Maricopa County Assessors website the parcel proposed for development is in reality three separate parcels. The lot sizes and the maximum floor area ratio is calculated for the three parcels and shown in **Table 2**.

Table 2 - FAR Calculation

Parcel	129-08-052B	129-08-05C	129-08-052D
Lot Size (sf)	20,080	163,819	20,277
Applying FAR 0.80 (sf)	16,064	131,055	16,222

Selecting land uses that are reasonable considering the surrounding area, the trip generation was calculated for the build out of C-3 land uses within the allowable 0.80 FAR. The average rates were used for these calculations. The results are provided in **Table 3**.

Table 3 –Trip Generation for C-3 Land Uses

Land Use	ITE Code	Qty	Unit	Weekday	AM Peak Hour			PM Peak Hour		
				Total	Total	In	Out	Total	In	Out
High-Turnover (Sit-Down) Restaurant	932	9	1,000 Sq Ft GFA	1,144	97	54	43	89	53	36
Fast-Food w/Drive-Through	934	3.5	1,000 Sq Ft GFA	1,736	159	81	78	114	59	55
Fast-Food w/Drive-Through	934	3.5	1,000 Sq Ft GFA	1,736	159	81	78	114	59	55
129-08-052B TOTAL				4,617	415	216	199	317	171	146
General Office Building	710	131	1,000 Sq Ft GFA	1,445	204	180	24	195	33	162
129-08-052C TOTAL				1,445	204	180	24	195	33	162
Medical-Dental Office Building	720	16	1,000 Sq Ft GFA	578	38	30	8	57	16	41
129-08-052D TOTAL				578	38	30	8	57	16	41
TOTAL				6,640	658	426	232	570	220	350





PROPOSED TRIP GENERATION

The proposed residential development will have 81 single-family detached homes. The fitted curve equations were more appropriate to use than the average rate. The trips generated by the proposed development are shown in **Table 4**.

Table 4 – Trip Generation for Proposed Development

Land Use	ITE Code	Qty	Unit	Weekday	AM Peak Hour			PM Peak Hour		
				Total	Total	In	Out	Total	In	Out
Single-Family Detached Housing	210	81	Dwelling Units	865	66	17	49	87	55	32

TRIP GENERATION COMPARISON

A comparison between the trips generated by the former auto dealership and the proposed 81 single-family dwelling unit residential development is shown in **Table 5**.

Table 5 – Trip Generation Comparison (Former Auto Dealership vs. Proposed Development)

Land Use	ITE Code	Qty	Unit	Weekday	AM Peak Hour			PM Peak Hour		
				Total	Total	In	Out	Total	In	Out
Automobile Sales Lot	841	46.04	1,000 Sq Ft GFA	1487	88	66	22	121	48	73
Single-Family Detached Housing	210	81	Dwelling Units	865	66	17	49	87	55	32
Difference				-622	-22	-49	27	-34	7	-41

There is an even greater trip generation difference between the trips generated by the potential C-3 land uses and the proposed 81 single-family dwelling unit residential development as shown in **Table 6**.

Table 6 - Trip Generation Comparison (Potential C-3 Land Uses vs. Proposed Development)

Land Use	ITE Code	Qty	Unit	Weekday	AM Peak Hour			PM Peak Hour		
				Total	Total	In	Out	Total	In	Out
Potential C-3 Land Uses				6,640	658	426	232	570	220	350
Single-Family Detached Housing	210	81	Dwelling Unit	865	66	17	49	87	55	32
Difference				-5,775	-591	-409	-182	-483	-165	-318





SUMMARY

The proposed development with 81 single-family detached homes is anticipated to generate 622 less weekday daily trips than the former auto dealership, which is an approximate reduction of 41.8%. The trips generated with reasonable C-3 land uses appropriate for the surrounding area and within the maximum allowable FAR show the proposed 81 single-family homes generating 5,772 less weekday daily trips. This is more than an 85% reduction in the number of daily trips. Therefore, the proposed residential development on the northeast corner of 68th Street and McDowell Road will have less impact to the traffic operations along the adjacent roadway network than the former auto dealership and potential C-3 developments.

The proposed single-family detached housing is anticipated to generate 865 weekday daily trips with 66 occurring during the AM peak hour and 87 occurring during the PM peak hour. Since the parcel is currently vacant, the 2014 ADT along McDowell Road of 27,700 vehicles per day does not include any trips from this parcel. With the build out of the proposed development, it is anticipated the ADT along McDowell Road will increase at most to 28,565 vehicles per day, which is an approximate increase of 3.1%. In comparison, if the former auto dealership were to be in operation today, the ADT along McDowell Road would increase at most to 29,187 vehicles per day, which is an approximate increase of 5.4%. If other C-3 land uses such as restaurant and office developments were to occur, the ADT along McDowell Road may increase to as much as 34,340 vehicles per day, which is an approximate increase of 24%.

There are three driveways for the proposed development that allow exiting, one along McDowell Road, one along 68th Street and one along 69th Street. The 68th Street and 69th Street driveways are exit only. Approximating a third of all trips exiting the proposed development utilizing the 68th Street driveway results in approximately 145 weekday trips, increasing the 68th Street ADT from 6,900 to 7,045 vehicles per day, which is an approximately increase of approximately 2.1%. Using the same logic, if the former auto dealership were to be in operation today, the ADT along 68th Street would increase by 248 weekday trips to 7,148 vehicles per day, which is an approximate increase of 3.6%. If other C-3 land uses such as restaurant and office developments were to occur, the ADT along 68th Street would increase by 1,107 weekday trips to 8,007 vehicles per day, which is an approximate increase of 16%.

In conclusion, the proposed 81-unit single family residential development on the northeast corner of 68th Street and McDowell Road in Scottsdale, Arizona is anticipated to have the least impact to the traffic operations along the adjacent roadway network in comparison to the former auto dealership as well as potential C-3 restaurant and office land uses.



Attachment A

129-08-052-C

Parcel Type: Commercial

EJG INVESTMENTS LLC

6850 E MCDOWELL RD SCOTTSDALE 85257

Property Information

MCR #: 7124
 Address: 6850 E MCDOWELL RD SCOTTSDALE 85257
 Latitude/Longitude: 33.46574789|-111.93326066
 Description: STEWART PLAZA TR A EX BEG SW COR SW4 SE4 SEC 34 2N 4E TH N ALG W LN 85' E 40' TO PT ON W LN TR A TRUE POB TH N 125' E 145' S 145' W 125' TO PT TH ALG CUR TO R HAV TANG 20' TO POB & EX BEG NE COR OF SD TR TH SELY ALG E LN 255.83' TO BEG OF CURVE TO RT TO PT OF TANG ON S LN TH W 80' N 275' E 58' TO POB
 Lot Size (Sq Ft): 163,819
 Zoning: C-3
 Section, Township, Range: 34 2N 4E
 Associated Parcel(s): 129-08-052C,129-08-052B,129-08-052D
 Market Area/Neighborhood: 19/007
 Subdivision: STEWART PLAZA
 Lot #: Not Available
 High School District: SCOTTSDALE UNIFIED #48
 Elementary School District: SCOTTSDALE UNIFIED SCHOOL DISTRICT
 Local Jurisdiction: SCOTTSDALE
 Owner: EJG INVESTMENTS LLC
 Mailing Address: PO BOX 8449 , SCOTTSDALE, AZ 85257
 Deed #: 121175008
 Deed Date: December 26, 2012
 Sale Date: None
 Sale Price: \$0

Valuation Data

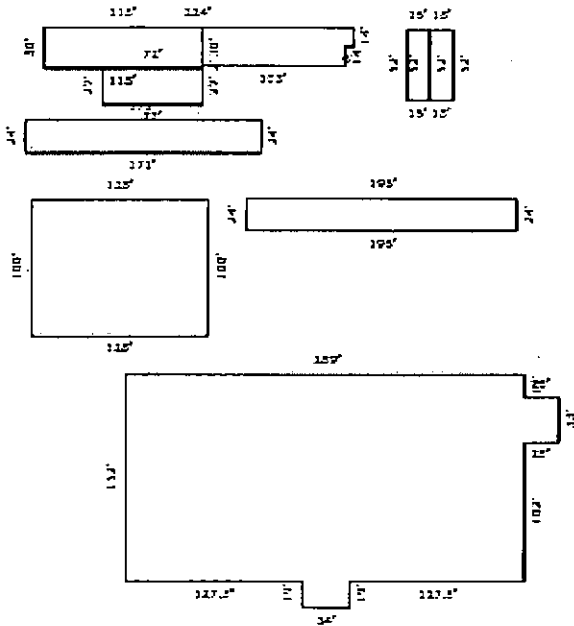
Tax Year:	2016	2015	2014	2013	2012
Full Cash Value:	\$3,963,700	\$3,305,500	\$2,718,785	\$2,718,785	\$2,513,500
Limited Property Value:	\$2,997,460	\$2,854,724	\$2,718,785	\$2,718,785	\$2,513,500
Legal Class:	1	1	1	1	1
Description:	COMMERCIAL / OTHER R/P	COMMERCIAL / OTHER R/P	COMMERCIAL / OTHER R/P	COMMERCIAL / OTHER R/P	COMMERCIAL / OTHER R/P
Assessment Ratio:	18%	18.5%	19%	19.5%	20%
Assessed FCV:	\$0	\$0	\$516,569	\$530,163	\$502,700
Assessed LPV:	\$539,543	\$528,124	\$516,569	\$530,163	\$502,700
Property Use Code:	1820	1820	1820	1820	1820
PU Description:	Auto/Light Truck Sales	Auto/Light Truck Sales	Auto/Light Truck Sales	Auto/Light Truck Sales	Auto/Light Truck Sales
Tax Area Code:	481400	481400	481400	481400	481400

Commercial Characteristics/Improvements

Description	Number	Model	Quality Rank	Age	Sq Footage
Office Building		344	2	33	9,868
Drive-Thru Carwash		435	2	36	832
Office Building		344	1	36	936
Lt. Commercial Utility Building		471	1	32	4,104
Automotive Center		410	1	32	25,600
Storage Warehouse		406	1	32	4,704
Parking Structure		345	1	27	45,399
Commercial Yard Improvements		353	2	35	1

Notice: The values displayed on this page may not reflect constitutional or statutory adjustments.

Property Sketches



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incorrect so that appropriate corrections can be addressed. Please note that a statutory process is also available to correct errors pursuant to Arizona Revised Statutes 42-16254.

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Attachment B

Sec. 5.1504. - Property development standards.

The following property development standards shall apply to all land and buildings in the C-3 District:

- A. *Floor area ratio.* Maximum: 0.80.
- B. *Building height (excluding rooftop appurtenances).* Maximum: thirty-six (36) feet.
- C. *Required open space.*
 - 1. *Total open space.*
 - a. Minimum: 0.10 multiplied by the net lot area.
 - b. For building heights over twelve (12) feet: the minimum open space requirement plus 0.004 multiplied by the net lot area for each foot of building height over twelve (12) feet.
 - 2. Total open space is distributed as follows:
 - a. Frontage open space minimum: 0.50 multiplied by the total open space requirement.
 - b. The remainder of the total open space, less the frontage open space, shall be common open space.
 - 3. Parking areas and parking lot landscaping are not included in the required open space.
 - 4. NAOS may be included in the open space requirements.
- D. *Yards.*
 - 1. *Side and rear yards.*
 - a. Minimum fifty (50) feet, including any alley width, from a single-family residential district shown on Table 4.100.A., or the single-family residential portion of a Planned Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the single-family residential districts shown on Table 4.100.A.
 - b. Minimum twenty-five (25) feet, including any alley width, from a multiple-family residential district.
- E. *Screening.*
 - 1. Except as otherwise specified, all operations and storage shall be conducted within a completely enclosed building or within an area contained by a wall or fence as determined by Development Review Board approval.

(Ord. No. 4043, § 1(Res. No. 9209, § 1(Exh. A, § 2), 10-16-12)

Sec. 5.1503. - Use regulations.

A. The uses allowed in the C-3 District are shown in Table 5.1503.A. with additional limitations on uses as listed.

B. Drive-through and drive-in services are not permitted in the Downtown Area.

Table 5.1503.A. Use Table

Land Uses	Permitted (P) or Conditional Use (CU)
1. Adult uses	CU
2. Amusement park	CU
3. Auction sales	P
4. Bar	CU
5. Big box	P (1), CU (1)
6. Bowling alley	P
7. Bus station, excluding overnight parking and storage of buses	CU
8. Carwash	CU
9. Civic and social organization	P (2)
10. Community buildings and recreational facilities not publicly owned	CU
11. Courier and messenger	P
12. Cultural institution	P (2)
13. Day care center with drop off or outdoor play area farther than 100 feet from a residential district shown on Table 4.100.A., or the residential portion of a Planned Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the residential districts shown on Table 4.100.A.	P (2)

14. Day care center with drop off or outdoor play area within 100 feet of a residential district shown on Table 4.100.A., or the residential portion of a Planned Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the residential districts shown on Table 4.100.A.	CU (2)
15. Educational service, elementary and secondary school	P (2) (3)
16. Educational service, other than elementary and secondary school	P
17. Equipment sales, rental, and storage yard	CU
18. Financial institution, including drive-through and drive-in service	P
<u>19.</u> Funeral home and funeral services	CU
20. Furniture and home furnishing sales	P
<u>21.</u> Game center	CU
<u>22.</u> Gas station	CU
<u>23.</u> Gun shop	P
<u>24.</u> Health and fitness studio	P
25. Internalized community storage	P
26. Live entertainment	CU
27. Medical and diagnostic laboratory	P
28. Miniature golf course	CU
29. Multimedia production without communication tower	P
30. Municipal use	P
<u>31.</u> Office	P
32. Outdoor sales display area	CU
33. Pawnshop	P

34. Personal care service	P
35. Place of worship	P (2)
36. Plant nursery	P
37. Pool hall	CU
38. Repair and maintenance	P
39. Residential health care facility	P (2) (4)
40. Restaurant, including drive-through and including drive-in	P
41. Retail	P
42. Seasonal art festival	CU
43. Sports arena	CU (2)
44. Swimming pool sales office, including display pools only; but excluding construction equipment storage yard	P
45. Teen dance center	CU
46. Theater	P (2)
47. Travel accommodation	P (2)
48. Vehicle leasing, rental or sales with indoor vehicle display and storage located in an enclosed building	P (5)
49. Vehicle leasing, rental or sales with outdoor vehicle display and storage located more than 150 feet from a residential district shown on Table 4.100.A., or the residential portion of a Planned Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the residential districts shown on Table 4.100.A., measured from the property boundary to the zoning district line all within the City limits	P (5)
50. Vehicle leasing, rental or sales with outdoor vehicle display and storage located 150 feet or less from a residential district shown on Table 4.100.A., or the residential portion of a Planned	CU

Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the residential districts shown on Table 4.100.A., measured from the property boundary to the zoning district line all within the City limits	
51. Vehicle repair, located more than 150 feet from a residential district shown on Table 4.100.A., or the residential portion of a Planned Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the residential districts shown on Table 4.100.A., measured from the property boundary to the zoning district line all within the City limits	P (6)
52. Vehicle repair, located 150 feet or less from a residential district shown on Table 4.100.A., or the residential portion of a Planned Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the residential districts shown on Table 4.100.A., measured from the property boundary to the zoning district line all within the City limits	CU
53. Vehicle storage facility	CU (7)
54. Veterinary and pet care service	P (8)
55. Wholesale sales	P
56. Wireless communications facility, Type 1, 2, and 3	P
57. Wireless communications facility, Type 4	CU

Use Limitations:

- (1) Big box retail sales are not allowed in the Environmentally Sensitive Lands Overlay District and are subject to a conditional use permit if:
 - a. Primary access is from a local residential street, or
 - b. Residential property is located within 1,300 feet of the big box property line, except where the residential property is developed with nonresidential uses or separated from the big box by the Loop 101 Pima Freeway.
- (2) Uses are allowed except in the AC-3 area as described in the City's procedures for development near the Scottsdale Airport and Chapter 5 of the Scottsdale Revised Code, as amended.

- (3) Educational services, elementary and secondary school, are subject to the following standards:
 - a. The facility shall be located not less than five hundred (500) feet from any adult use.
 - b. The net lot area for the facility shall be a minimum of forty-three thousand (43,000) square feet.
 - c. The facility shall not have outdoor speaker systems or bells.
 - d. A maximum of one-third (1/3) of the required parking may be shared parking with other uses located within six hundred (600) feet of the building front entrance.
 - e. Outdoor playgrounds and recreation areas shall be:
 - i. Located not less than fifty (50) feet from any residential district shown on Table 4.100.A., or the residential portion of a Planned Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the residential districts shown on Table 4.100.A;
 - ii. Located within the rear or side yard; and
 - iii. Enclosed and screened by a six-foot wall or fence.
 - f. A drop-off area accommodating a minimum of five (5) vehicles shall be located along a sidewalk or landing area connected to the main entrance to the facility. This area shall not include internal site traffic aisles, parking spaces, or fire lanes.
 - g. Public trails or pedestrian connections shall link to the front door of the main building, subject to Development Review Board approval.
 - h. The circulation plan shall show minimal conflicts among the student drop-off area, any vehicle drop-off area, parking, access driveways, pedestrian and bicycle paths on site.
 - i. Facilities located in the AC-2 area, described in the City's procedures for development near the Scottsdale Airport and Chapter 5 of the Scottsdale Revised Code, as amended, shall be constructed with sound transmission requirements of the International Building Code (IBC).
- (4) Residential health care facilities.
 - a. Specialized residential health care facilities.
 - i. The number of beds shall not exceed eighty (80) per acre of gross lot area.
 - ii. Required open space.
 - (1) Minimum open space: 0.24 multiplied by the net lot area distributed as follows:
 - (a) Frontage open space minimum: 0.50 multiplied by the total open space, except as follows:
 - (i) Minimum: twenty (20) square feet per one (1) linear foot of public street frontage.
 - (ii) Not required to exceed fifty (50) square feet per one (1) linear foot of public street frontage.
 - (b) The remainder of the minimum open space, less the frontage open space, shall be provided as common open space.
 - iii. The site shall be designed, to the maximum extent feasible, so that on-site parking is oriented to the building(s) to provide convenient pedestrian access for residents, guests, and visitors.
 - b. Minimal residential health care facilities.
 - i. The gross lot area shall not be less than one (1) acre.

- ii. The number of units shall not exceed forty (40) dwelling units per acre of gross lot area.
- iii. Required open space.
 - (1) Minimum open space: 0.24 multiplied by the net lot area distributed as follows.
 - (a) Frontage open space minimum: 0.50 multiplied by the total open space, except as follows:
 - (i) Minimum: twenty (20) square feet per one (1) linear foot of public street frontage.
 - (ii) Not required to exceed fifty (50) square feet per one (1) linear foot of public street frontage.
 - (b) The remainder of the minimum open space, less the frontage open space, shall be provided as common open space.
 - iv. The site shall be designed, to the maximum extent feasible, so that on-site parking is oriented to the building(s) to provide convenient pedestrian access for residents, guests, and visitors.
- (5) Vehicle leasing, rental or sales with indoor vehicle display and storage is subject to the following:
 - a. Required parking shall not be used for vehicle storage and display.
 - b. None of the above criteria shall prohibit the Development Review Board from considering an application to reconstruct or remodel an existing vehicle leasing, rental or sales with indoor vehicle display and storage facility.
- (6) Vehicle repair is subject to the following:
 - a. All repairs shall be performed within an enclosed building.
 - b. Vehicles may only enter the rear of the building, except vehicles may enter the side of the building if the lot is:
 - i. A corner lot,
 - ii. A lot abutting a residential district shown on Table 4.100.A.,
 - iii. A lot abutting the residential portion of a Planned Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the residential districts shown on Table 4.100.A., or
 - iv. Separated by an alley from one (1) of the districts set forth in subsection ii. or iii. above.
 - c. If the lot meets any requirement of subsection b. above, and side entry bays are proposed, the side entry repair bays shall be screened from street views by solid masonry walls, and the landscape plan shall demonstrate to the Development Review Board's satisfaction, that the proposed screening does not impact the streetscape by exposing repair bays, unassembled vehicles, vehicle repair activities, or vehicle parts.
 - d. All vehicles awaiting repair shall be screened from view by a masonry wall or landscape screen.
 - e. Required parking shall not be used for vehicle storage.
 - f. None of the above criteria shall prohibit the Development Review Board from considering an application to reconstruct or remodel an existing vehicle repair facility.
- (7) Vehicle storage facilities may include an apartment/office for on-site supervision but no vehicle shall be used as a dwelling, even temporarily.
- (8)

Veterinary and pet care services are permitted if all facilities are within a soundproof building. However, outdoor activities are permitted if:

- a. An employee or pet owner shall accompany an animal at all times when the animal is outside the building.
- b. The property owner and operator maintain all outdoor areas in a clean and sanitary condition, including immediate and proper disposal of animal waste.
- c. The outdoor areas are set back at least one hundred (100) feet from any lot line abutting a residential district, or the residential portion of a Planned Community P-C, or any portion of a Planned Residential Development PRD with an underlying zoning district comparable to the residential districts shown on Table 4.100.A., measured from the property boundary to the zoning district line all within the City limits.
- d. There is no outdoor kennel boarding.

(Ord. No. 4043, § 1(Res. No. 9209, § 1(Exh. A, § 2), 10-16-12; Ord. No. 4143, § 1(Res. No. 9678, Exh. A, §§ 90, 91), 5-6-14)



PRELIMINARY WATER CAPACITY REPORT

Aire on McDowell

Single-Family Attached Homes
NEC 68th Street & McDowell Road
Scottsdale, AZ

Prepared For:



Accepted w/ Comments

Prepared by:

City of Scottsdale
Water Resources Administration
9379 E. San Salvador
Scottsdale, AZ 85258



David MANN 9.10.15

EXPIRES 12-31-15

Sustainability Engineering Group

8280 E. Gelding Drive, Suite 101
Scottsdale, AZ 85260
480.588.7226 www.azSEG.com

Project Number: 150799

Original Submittal Date: August 21, 2015

Case No.: Plan Check No.: TBD



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APPENDIX II - WaterCAD Modeling Analysis
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1. INTRODUCTION

1.1 SUMMARY OF PROPOSED DEVELOPMENT:

Proposed development consists of a maximum of eighty-one (81) single-family attached homes fronting on forty-six (46) feet wide internal vehicular tracts. The purpose of this water capacity design report is to provide an analysis of the impact that this development will have on the City's water system.

1.2 LEGAL DESCRIPTION:

The project property consists of three parcels of land located in the SE ¼ of Section 34, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona; Parcel ID numbers are APN: 129-08-052B; 129-08-052C; and 129-08-052D.

The project is located at the NEC of N. 68th Street and E. McDowell Road in Scottsdale, AZ. The site is further bound by the Village Grove 6 residential subdivision to the north and N. 69th Street to the east. Refer to **FIGURE 1 - Vicinity Map** for the project's location with respect to major cross streets.

1.3 EXISTING AND PROPOSED SITE ZONING AND LAND USES:

The overall project parcel is zoned C-3 (Highway Commercial) with an abandoned car dealership. Rezoning to R-5 (Multiple-family Residential) is proposed.

1.4 REFERENCES:

The project falls within Mixed-Use Neighborhoods conceptual land use district of the City's General Plan.

2. DESIGN DOCUMENTATION

2.1 DESIGN COMPLIANCE:

The proposed water system is designed to meet the criteria of the City of Scottsdale ("the City") Water Resources Department, the Arizona Department of Environmental Quality ("ADEQ"), and Maricopa County Environmental Services Department ("MCESD").

2.2 PROCEDURES, POLICIES AND METHODOLOGIES:

The general methodology used to design this public water infrastructure consists of modeling a network of water distribution mains to meet the City's pressure, head loss, and water demand requirements during daily demands and fire events. The connection to the water system is modeled as a reservoir and pump. The pump will simulate the pressure drop and the available flow from the existing water system as depicted by the fire flow test. Refer to **APPENDIX I** for a copy of the fire flow test results.

2.3 SOFTWARE ACKNOWLEDGEMENT:

Bentley WaterCAD® Version 8i is the computer modeling tool used in this water study.

3. EXISTING CONDITIONS

3.1 EXISTING ZONING & LAND USE:

Land ownership, as defined by ALTA/ACSM Land Title Survey by Arizona Surveying & Mapping dated 05/05/15 includes 5.11+/- acres of commercially developed land. City of Scottsdale zoning map designates this parcel as C-3.

3.2 EXISTING TOPOGRAPHY, VEGETATION AND LANDFORM FEATURES:

This site is fully developed as a car dealership that is currently vacant. The topography generally slopes from the west-northwest to the southeast corner at approximately one-percent with a change in elevation of approximately eight (8) feet. Typical desert landscaping existing at the perimeter of the site. Refer to **FIGURE 2** for an aerial of the overall project existing conditions.

3.3 EXISTING WATER MAIN:

Water: City of Scottsdale (QS 13-44)

- An existing 12" ACP water main under the jurisdiction of the City of Scottsdale (COS) is located in McDowell Road approximately 20' south of the southerly property line, running east-west along the entire frontage.
- An 8" ACP main is located just west of the project west property line running north-south in the N. 68th Street R.O.W. along the entire site frontage.
- A hydrant exists at the northeast corner of the site, across 69th Street. However, there is not main located along the site frontage. *Part of Connection Also*
- A 6" CIP line is located approximately mid-way within the site, entering from McDowell Road, and services an existing fire hydrant.

Refer to **FIGURE 4** for COS existing QS 13-44 water locations.

3.4 CERTIFIED FLOW TEST RESULTS OF EXISTING WATER SYSTEM:

Certified fire hydrant flow testing was performed on August 18, 2015 by Arizona flow Testing LLC at McDowell Road, with the flow hydrant located on-site. The test was performed at 9:00 a.m. The actual flow test documentation is included in the **APPENDIX I**.

4. PROPOSED CONDITIONS

4.1 SITE PLAN:

The property is proposed to be re-developed with new lot configurations into 81 multi-family residential townhomes. Development will include 20' to 24' wide roads with rolled curbs. Refer to **FIGURE 3** for proposed site layout.

4.2 PROPOSED WATER SYSTEM:

The water system is proposed to be an 8 inch DIP main tying into the existing 12" ACP located in McDowell road, looping within the site, and tying into the 8" ACP main in 68th Street. *And the 6" water*

LINE At the NEC of project (69th St)



4.3 SECOND SOURCE:

A second source of water is not anticipated for this project.

3 points of connection will provide redundancy

4.4 WATER REQUIREMENTS:

The City's design standards governs the fire flow rates used for all buildings per Section 6-1.500 of the City of Scottsdale's Design Standards & Policies Manual ("DS&PM"), dated January 2010. The fire flow to be used is 1,500 gpm minimum for multi-family residential properties located in the county per Section 6-1.501 of the DS&PM.

4.5 MAINTENANCE RESPONSIBILITIES:

The on-site water main for the proposed development will be public and located within easements to the City of Scottsdale. Therefore, the on-site and off-site water system will be maintained by the City.

5. WATER SYSTEM COMPUTATIONS

Note: separate meters for each unit providing domestic + fire service

5.1 WATER DEMANDS:

The Proposed development at the site consists of Single-Family attached homes(15.9 Dwelling units per Acre) with a demand of 227.6 gpd per unit described in Section 6-1.205 of the City of Scottsdale's Design Standards & Policies Manual ("DS&PM"), dated January 2010. A summary of the total water demands for the site are presented below in Table 1.

Table 1 -Total Demand for the Site

Max. No. of Units	Avg. Day Demand (GPD)	Max. Day Demand (GPD)	Peak Hour (GPD)	Avg. Demand (GPM)	Max. Demand (GPM)	Peak Hour (GPD)
81	18,436	36,872	64,526	12.8	25.6	44.8

- The max. day demand is calculated based on 2 times the average day demand.
- The peak hour demand is calculated based on 3.5 times the average day demand.

5.2 SOFTWARE MODELING:

Bentley WaterCAD® Version 8i is the computer modeling tool used in this study.

Network analysis input parameters included the following:

1. Pipe diameters (inches)
2. Pipe lengths (feet)
3. Pipes invert elevations (feet – MSL)
4. General Purpose Valve to model Water Meter and Reduce Principal Head loss
5. A reservoir and a pump to model the fire flow test performed
6. System demands (gpm)



7. Fire flows (gpm)
8. Model piping is ductile iron pipe using Hazen-Williams frictional losses (C = 130)

Output parameters included but were not limited to:

1. Pressure (psig)
2. Flow rates (gpm)
3. Velocities (fps)
4. Head loss (fee)

5.3 MINIMUM PRESSURE REQUIREMENTS:

The following system pressure requirements are in accordance with the City's design standards:

- Average day, maximum day and peak hour flow demands:
 - Minimum pressure = 50 psig
 - At the highest finished floor level to be served by the system pressure during normal daily operating conditions.
 - Maximum pressure = 120 psig
- Maximum day plus coincident fire flow demand:
 - Minimum pressure = 30 psig
 - At the highest ceiling level to be served by the system pressure during normal daily operating conditions.
 - Maximum pressure = 120 psig
- Daily scenario head loss shall not exceed 10 feet per 1,000 feet length of pipe.

Refer to APPENDIX II for computer modeling results.

5.4 WATER SYSTEM ANALYSIS:

A summary of the modeling results are presented below in Table 2. Detailed WaterCAD® results are presented in APPENDIX II.

Table 2 - WaterCAD® Analysis Results

Demand Scenario	Water Demand (gpm)	Pressure (psig)				Head Loss Gradient (ft/ft)	
		Min.	Node	Max.	Node	Max.	Pipe
Average Day	12.8	84.6	J-5	87.8	J-9	0	P-3
Maximum Day	25.60	84.6	J-5	87.8	J-9	0	P-6
Peak Hour	44.80	84.6	J-5	87.8	J-9	0	P-6
Max. + Fire Flow	1,500 + Max Day.	73.7	J-5	79.9	J-1	NA	NA

These results indicate that the proposed water system meets the City's criteria for daily water usage and fire flow events.

6. SUMMARY

6.1 SUMMARY OF PROPOSED WATER IMPROVEMENTS:

- The proposed water main is designed in accordance with City of Scottsdale's design standards and policies².
- The results shown in the modeling summary (refer to Section 5.4) indicate that the proposed water system meets the City's criteria for Daily water usage and fire flow events as described in Section 5.3.
- Individual PRV's are required at each house based on water system analysis showing that pressures are exceeding 80 psig for the average demand.

6.2 PROJECT SCHEDULE:

As a residential development the infrastructure is proposed to be constructed in a single phase to accommodate dwelling unit growth. The dwelling units will be phased based on consumer demand.

7 SUPPORTING MAPS

7.1 SITE UTILITY PLAN

Refer to Preliminary Utility Plan in **APPENDIX III**.

8 REFERENCES

1. *COS Water and Sewer Plan number 13-44*
 2. *City of Scottsdale Design Standards & Policies Manual, 2010 (Chapter 6 – Water)*
-

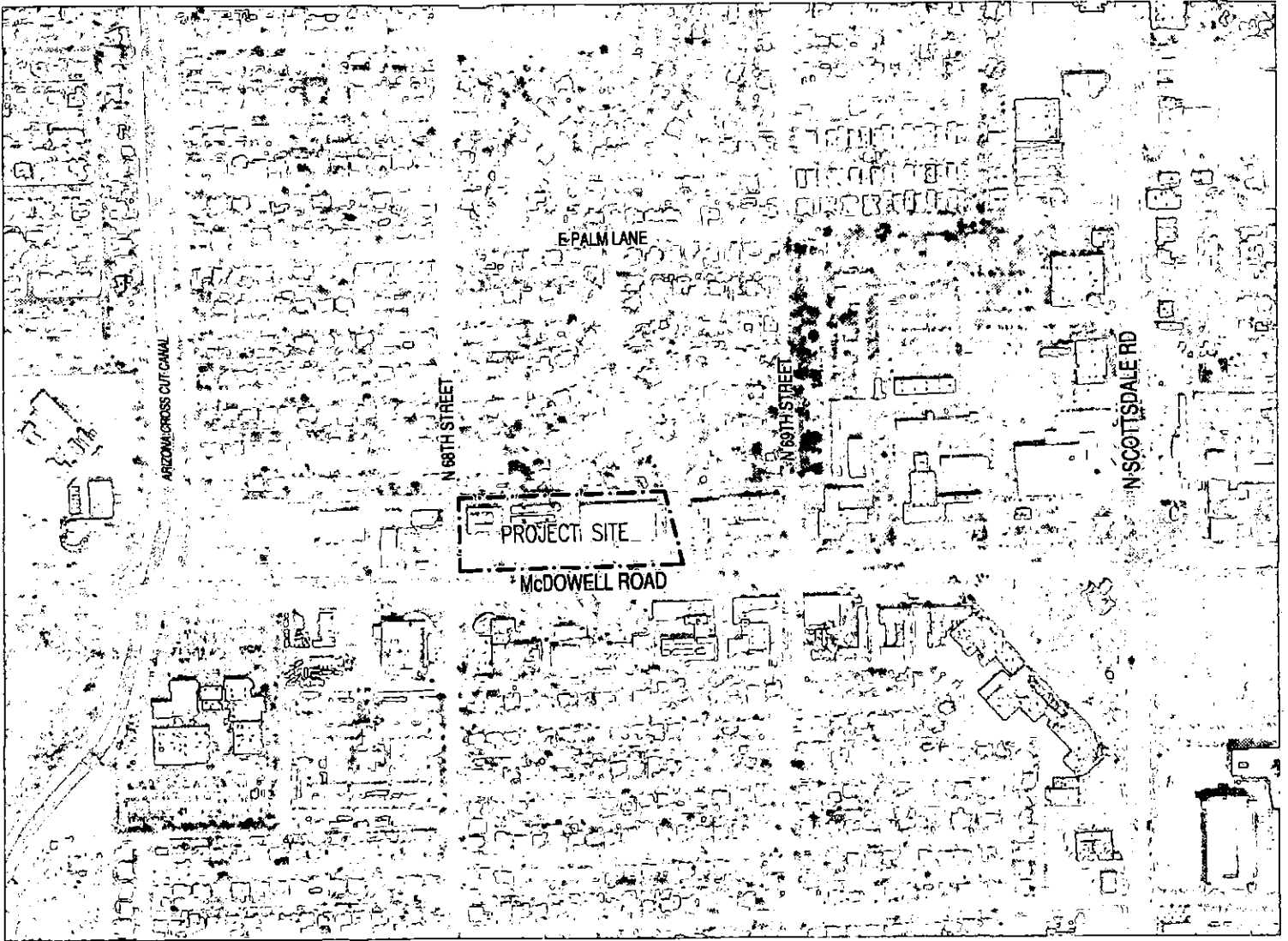


FIGURE 1. VICINITY MAP





E McDowell Rd & N 68th St

PROJECT LOCATION

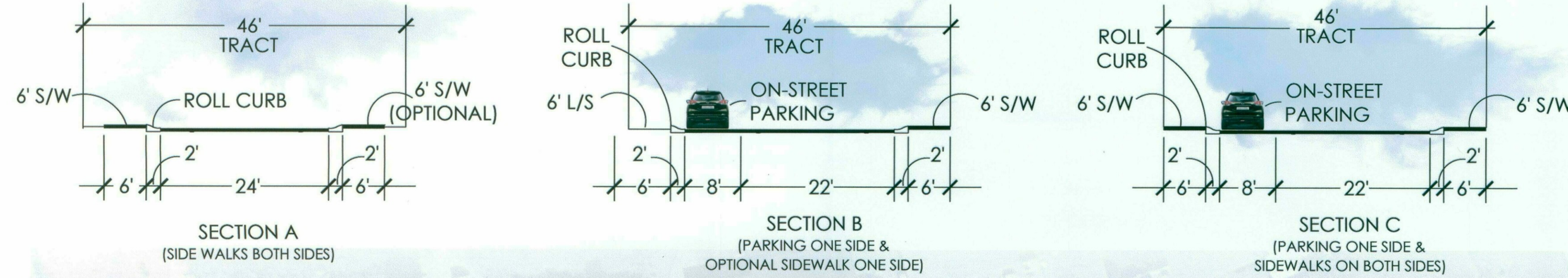
FIGURE 2
AERIAL

SITE DATA

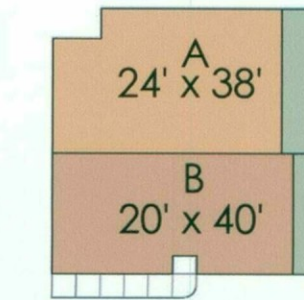
SITE AREA (NET): 5.1 AC. ±
 PROPOSED # OF LOTS: 81
 NET DENSITY: 15.9 DU/AC.
 CURRENT ZONING: C-3
 PROPOSED ZONING: R-5
 GUEST PARKING: 27

FRONTAGE OPEN SPACE

REQUIRED: 1,361 LF X 20' = 27,220 SQ FT
 PROVIDED:



TYP PRODUCT DIMENSIONS
 (NOT INCLUDING REAR YARD)

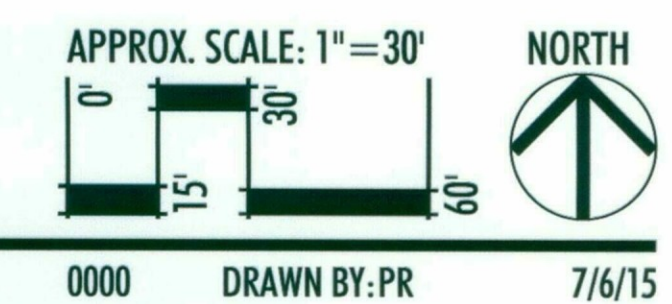


NOTE: THIS SITE PLAN IS CONCEPTUAL AND WILL REQUIRE THE CITY TO GRANT RELIEF FROM VARIOUS CITY STANDARDS

LVA urban design studio
 land planning • development entitlements • landscape architecture
 120 south ash avenue • tempe, arizona 85281 • 480.994.0994

AIRE ON MCDOWELL
 CONCEPTUAL SITE PLAN

FIGURE 3



PRELIMINARY-NOT FOR CONSTRUCTION - SUBJECT TO ENGINEERING AND CITY REVIEW AND APPROVAL - © COPYRIGHT LVA URBAN DESIGN STUDIO, L.L.C.
 This document, together with the concepts and designs presented herein, as an instrument of service, is intended only for the specific purpose and client for which it is prepared. Re-use of and improper reliance on this document without written authorization and adoption by LVA Urban Design Studio, LLC shall be without liability to LVA Urban Design Studio, LLC.
 S:\1517-68th & McDowell\CAD\LVA\SITE ANALYSIS\Conceptual Site Plan -2015-30-6.dwg Jul 6, 2015



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APPENDIX I
Flow Test Data

8280 E. Gelding Dr., Suite 101
Scottsdale, AZ 85260

info@azSEG.com 480.588.7226 www.azSEG.com

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name: KHOV
Project Address: 6850 East McDowell Road, Scottsdale, Arizona 85257
Client Project No: Not Provided
Arizona Flow Testing Project No.: 15100
Flow Test Permit No.: C48287
Date and time flow test conducted: August 18, 2015 @ 9:00 AM
Data is current and reliable until: February 18, 2016
Conducted by: Floyd Vaughan-Arizona Flow Testing, LLC (480-250-8154)
Witnessed by: Phil Cipolla-City of Scottsdale-Inspector (602-828-0847)

Raw Test Data

Static Pressure: *HGL 1445* **84.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **74.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **33.0 PSI**
(Measured in pounds per square inch)

Diffuser Orifice Diameter: One (4 inch)
(Measured in inches)

Coefficient of Diffuser: .90

Flowing GPM: **2,468 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **6,726 GPM**

Data with 12 PSI Safety Factor

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **62.0 PSI**
(Measured in pounds per square inch)

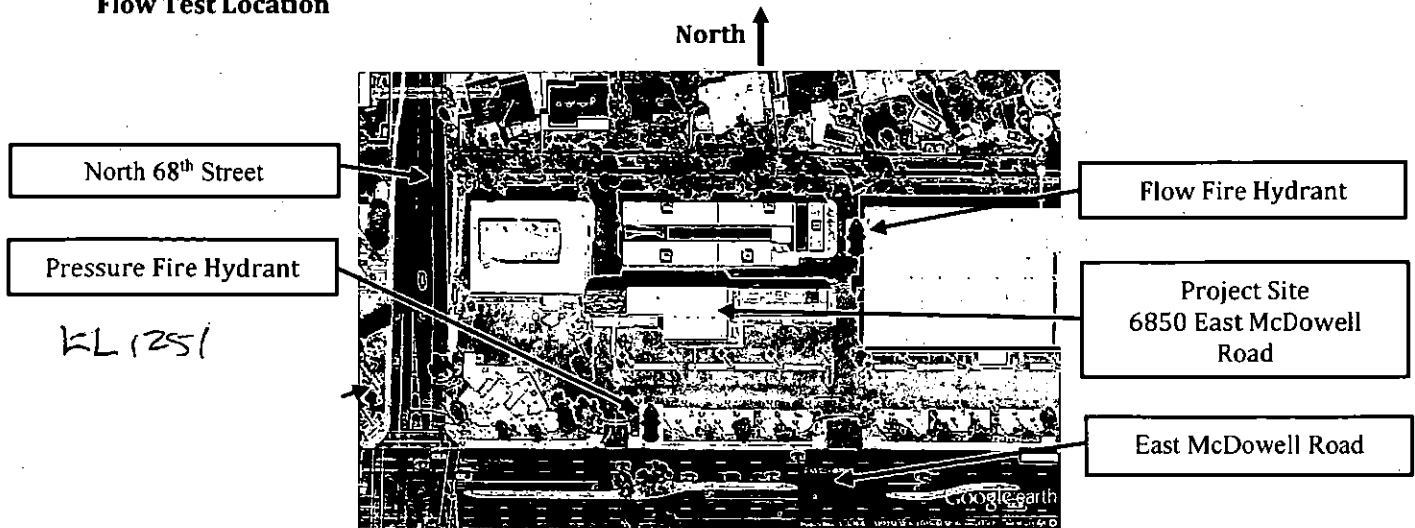
Distance between hydrants: 435 Feet

Main size: Not Provided

Flowing GPM: **2,468 GPM**

GPM @ 20 PSI: **6,013 GPM**

Flow Test Location



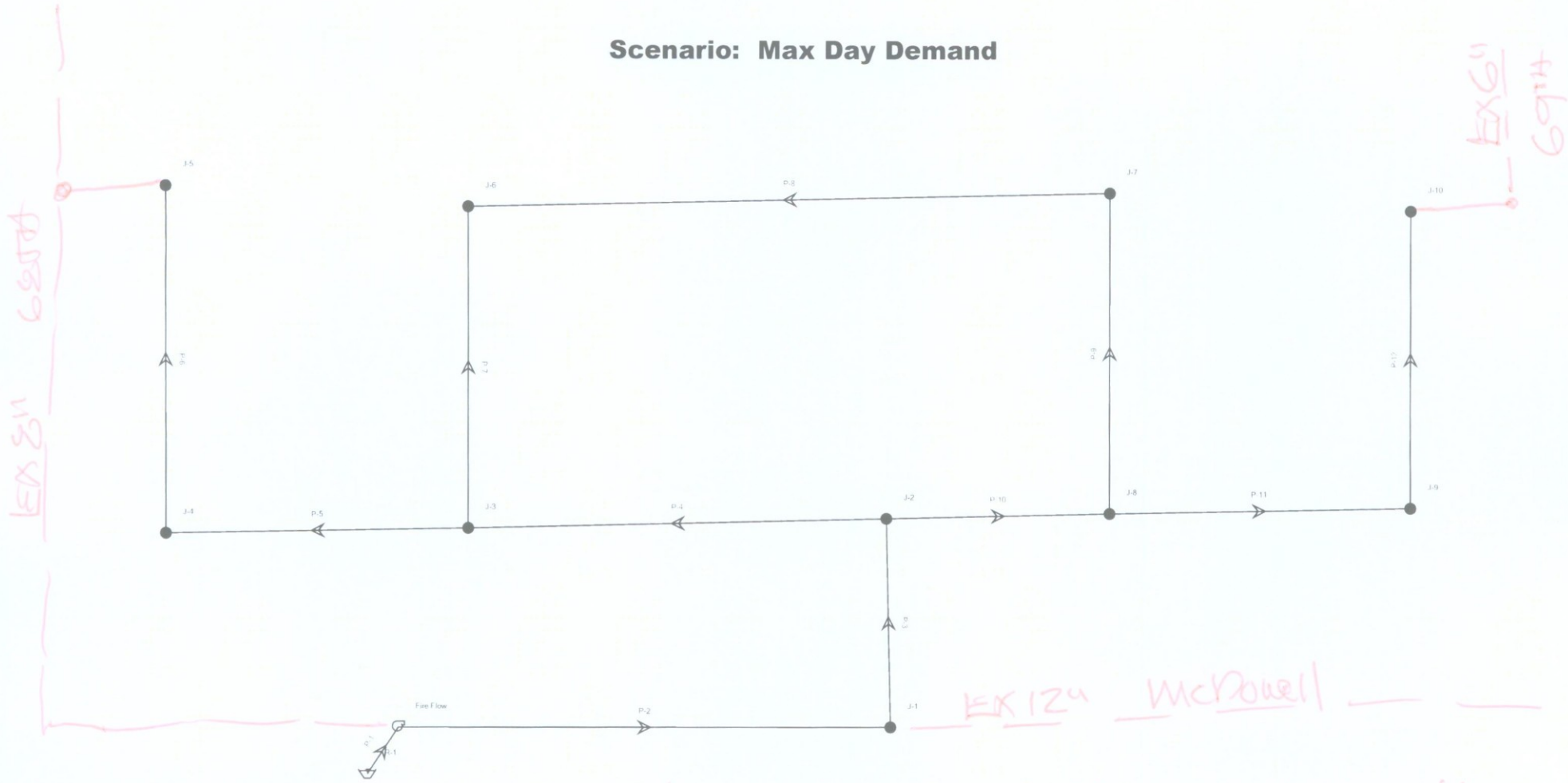


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APPENDIX II

WaterCAD Modeling Analysis

Scenario: Max Day Demand



Showing 3 points of connection will help but the model looks okay w/ 1 source.
 => construction will require the 3 POC's

Pump Definition Detailed Report: Fire Flow

Element Details

ID	52	Notes
Label	Fire Flow	

Pump Curve

	Flow (gpm)	Head (ft)	
	0	194.04	
	2,468	170.94	
	6,726	46.20	

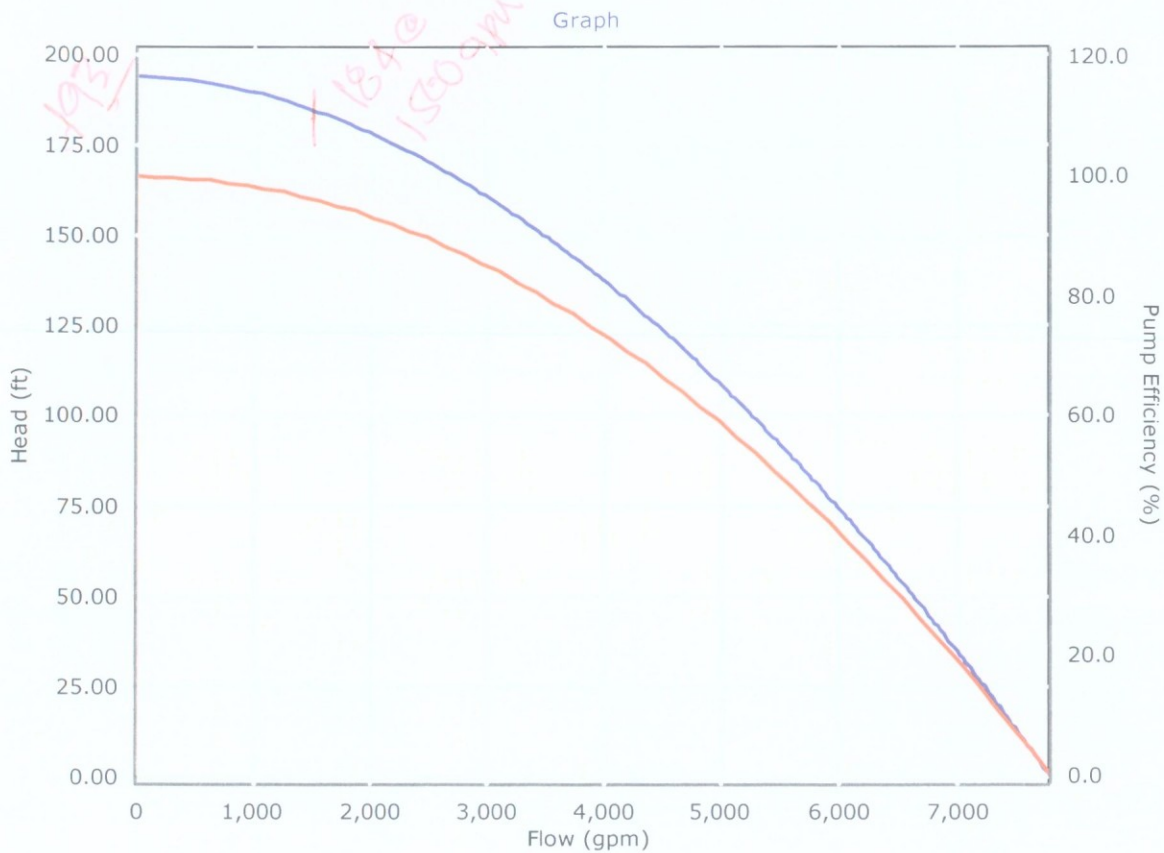
Pump Efficiency

Pump Efficiency	Best Efficiency Point	Motor Efficiency	100.0 %
BEP Efficiency	100.0 %	Is Variable Speed Drive?	False
BEP Flow	0 gpm		

Transient (Physical)

Inertia (Pump and Motor)	0.000 lb-ft ²	Specific Speed	SI=25, US=1280
Speed (Full)	0 rpm	Reverse Spin Allowed?	True

Pump Definition Detailed Report: Fire Flow



FlexTable: Junction Table (Khovian 08-20-15.wtg)

Active Scenario: Average Day Demand

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-5	51.50	1	247.05	84.6
J-4	50.60	2	247.05	85.0
J-6	47.84	1	247.05	86.2
J-2	47.44	1	247.05	86.4
J-3	47.30	2	247.05	86.4
J-7	46.92	1	247.05	86.6
J-8	45.60	2	247.05	87.2
J-1	45.50	0	247.05	87.2
J-10	44.30	1	247.05	87.7
J-9	44.00	1	247.05	87.8

FlexTable: Pipe Table (Khovian 08-20-15.wtg)

Active Scenario: Average Day Demand

Current Time: 0.000 hours

Label	Start Node	Stop Node	Diameter (in)	Length (ft)	Hazen- Williams C	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)
P-3	J-1	J-2	8.0	104	130.0	0.08	0.00	0.000
P-10	J-8	J-2	8.0	112	130.0	0.04	0.00	0.000
P-2	Fire Flow	J-1	12.0	247	130.0	0.04	0.00	0.000
P-4	J-2	J-3	8.0	210	130.0	0.03	0.00	0.000
P-5	J-3	J-4	8.0	151	130.0	0.02	0.00	0.000
P-11	J-8	J-9	8.0	151	130.0	0.02	0.00	0.000
P-9	J-7	J-8	8.0	161	130.0	0.01	0.00	0.000
P-6	J-4	J-5	8.0	173	130.0	0.01	0.00	0.000
P-12	J-9	J-10	8.0	149	130.0	0.01	0.00	0.000
P-8	J-6	J-7	8.0	322	130.0	0.01	0.00	0.000
P-7	J-3	J-6	8.0	161	130.0	0.00	0.00	0.000
P-1	R-1	Fire Flow	48.0	28	130.0	0.00	0.00	0.000

FlexTable: Junction Table (Khovian 08-20-15.wtg)

Active Scenario: Max Day Demand

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-5	51.50	2	247.04	84.6
J-4	50.60	3	247.04	85.0
J-6	47.84	3	247.04	86.2
J-2	47.44	3	247.04	86.4
J-3	47.30	4	247.04	86.4
J-7	46.92	3	247.04	86.6
J-8	45.60	4	247.04	87.2
J-1	45.50	0	247.04	87.2
J-10	44.30	2	247.04	87.7
J-9	44.00	3	247.04	87.8

FlexTable: Pipe Table (Khovian 08-20-15.wtg)

Active Scenario: Max Day Demand

Current Time: 0.000 hours

Label	Start Node	Stop Node	Diameter (in)	Length (ft)	Hazen- Williams C	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)
P-3	J-1	J-2	8.0	104	130.0	0.16	0.00	0.000
P-10	J-8	J-2	8.0	112	130.0	0.08	0.00	0.000
P-2	Fire Flow	J-1	12.0	247	130.0	0.07	0.00	0.000
P-4	J-2	J-3	8.0	210	130.0	0.07	0.00	0.000
P-5	J-3	J-4	8.0	151	130.0	0.03	0.00	0.000
P-11	J-8	J-9	8.0	151	130.0	0.03	0.00	0.000
P-9	J-7	J-8	8.0	161	130.0	0.03	0.00	0.000
P-6	J-4	J-5	8.0	173	130.0	0.01	0.00	0.000
P-12	J-9	J-10	8.0	149	130.0	0.01	0.00	0.000
P-8	J-6	J-7	8.0	322	130.0	0.01	0.00	0.000
P-7	J-3	J-6	8.0	161	130.0	0.01	0.00	0.000
P-1	R-1	Fire Flow	48.0	28	130.0	0.00	0.00	0.000

FlexTable: Junction Table (Khovian 08-20-15.wtg)

Active Scenario: Peak hour

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-5	51.50	3	247.03	84.6
J-4	50.60	6	247.03	85.0
J-6	47.84	5	247.03	86.2
J-2	47.44	4	247.03	86.4
J-3	47.30	7	247.03	86.4
J-7	46.92	4	247.03	86.6
J-8	45.60	7	247.03	87.1
J-1	45.50	0	247.03	87.2
J-10	44.30	3	247.03	87.7
J-9	44.00	5	247.03	87.8

FlexTable: Pipe Table (Khovian 08-20-15.wtg)

Active Scenario: Peak hour

Current Time: 0.000 hours

Label	Start Node	Stop Node	Diameter (in)	Length (ft)	Hazen- Williams C	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)
P-3	J-1	J-2	8.0	104	130.0	0.29	0.01	0.000
P-10	J-8	J-2	8.0	112	130.0	0.14	0.00	0.000
P-2	Fire Flow	J-1	12.0	247	130.0	0.13	0.00	0.000
P-4	J-2	J-3	8.0	210	130.0	0.11	0.00	0.000
P-5	J-3	J-4	8.0	151	130.0	0.06	0.00	0.000
P-11	J-8	J-9	8.0	151	130.0	0.05	0.00	0.000
P-9	J-7	J-8	8.0	161	130.0	0.05	0.00	0.000
P-6	J-4	J-5	8.0	173	130.0	0.02	0.00	0.000
P-12	J-9	J-10	8.0	149	130.0	0.02	0.00	0.000
P-8	J-6	J-7	8.0	322	130.0	0.02	0.00	0.000
P-7	J-3	J-6	8.0	161	130.0	0.01	0.00	0.000
P-1	R-1	Fire Flow	48.0	28	130.0	0.01	0.00	0.000

Fire Flow Node FlexTable: Fire Flow Report (Khovian 08-20-15.wtg)

Active Scenario: Max Day Demand

Current Time: 0.000 hours

Label	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)
J-4	True	1,500	1,510	1,513	74.1	20.0	73.7	J-5
J-5	True	1,500	1,510	1,512	70.8	20.0	74.1	J-4
J-3	True	1,500	1,510	1,514	78.1	20.0	76.3	J-5
J-6	True	1,500	1,510	1,513	77.4	20.0	76.8	J-5
J-7	True	1,500	1,510	1,513	78.1	20.0	77.4	J-5
J-9	True	1,500	1,510	1,513	77.6	20.0	77.4	J-10
J-10	True	1,500	1,510	1,512	74.9	20.0	77.6	J-9
J-8	True	1,500	1,510	1,514	79.5	20.0	77.7	J-5
J-2	True	1,500	1,510	1,513	79.8	20.0	78.0	J-5
J-1	True	1,500	1,510	1,510	82.5	20.0	79.9	J-5



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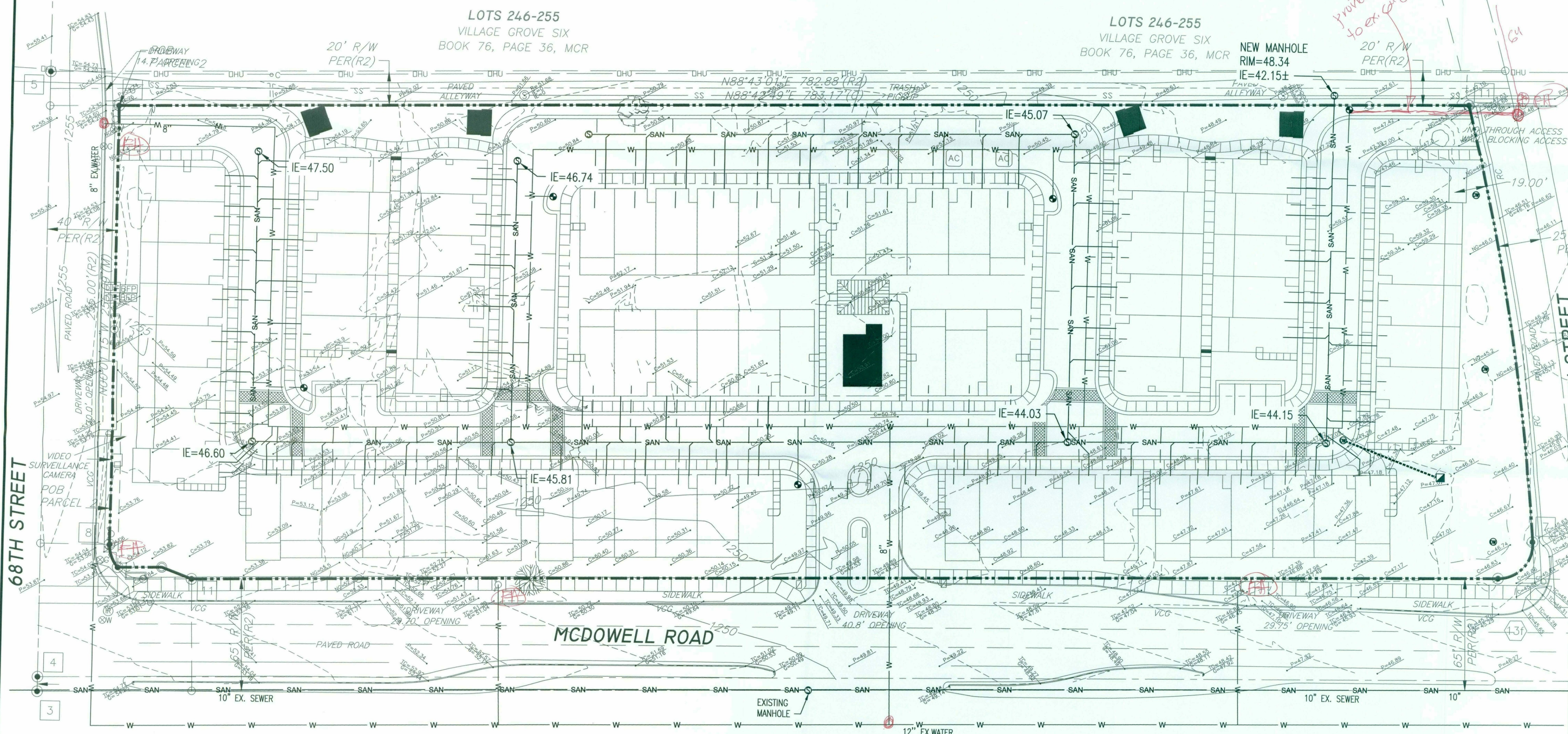
APPENDIX III

Preliminary Utility Plan

8280 E. Gelding Dr., Suite 301
Scottsdale, AZ 85260

PRELIMINARY UTILITIES PLAN

AIRE ON McDOWELL
68TH & McDOWELL ROAD, SCOTTSDALE, AZ

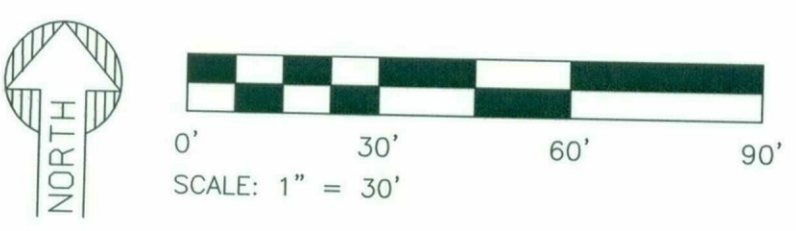


LEGEND

- W — PROPOSED WATER LINE
- SAN — PROPOSED SANITARY SEWER
- ⊙ PROPOSED SEWER MANHOLE
- ⊙ PROPOSED FIRE HYDRANT
- ▣ CATCH BASIN
- ⊙ DRY WELL
- IE=XX.XX INVERT ELEVATION

C-3

NOTE:
SANITARY & WATER LOCATIONS SHOWN IN PUBLIC RIGHT OF WAY ARE FROM QS 13-44 C.O.S. MAPS & ARE NOT FIELD VERIFIED.



Call at least two full working days before your final acceptance.

ARIZONA811
Arizona 811 Inc.
Dial 8-1-1 or 1-800-874-ARIZ (752-8348)
In Maricopa County (602) 263-1100

NOTE TO CONTRACTOR:
THIS SET OF DRAWINGS AND DOCUMENTS IS INTENDED AS A SET OF GUIDELINES FOR THE PROJECT AND ARE INTENDED TO BE USED IN CONJUNCTION WITH A SET OF CONSTRUCTION SPECIFICATIONS TO BE SUPPLIED BY OWNER. THEY MUST BE READ TO INCORPORATE ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES AND TO MANUALLY SOLI CONDITIONS OR FIELD LOGS. THE FAILURE OF THIS SET OF DRAWINGS TO REFLECT SIGNIFICANT CHANGES TO THESE DOCUMENTS IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO CONFORM TO ALL APPLICABLE CODES AND TO VERIFY THE ACCURACY OF ALL INFORMATION. ANY QUESTIONS OR CLARIFICATIONS WHICH ARE DESIRED, CONTRACTORS SHALL ALSO VISIT THE SITE BEFORE BEING. CONTRACTORS ARE REQUIRED TO KNOW ALL APPLICABLE CONDITIONS AND APPLICABLE CODES.

SUSTAINABILITY
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8280 E GELDING DR #101, SCOTTSDALE, ARIZONA 85260
WWW.AZSEEG.COM TEL: 480.588.7226

PROJECT	AIRE ON McDOWELL
LOCATION	68TH & McDOWELL ROAD SCOTTSDALE, AZ
DRAWN	CASTELLO
DESIGNED	CASTELLO
CHECKED	COUNSELL
PROJ. MGR.	FAKIH
DATE:	8/21/2015
ISSUED FOR:	OWNER REVIEW
REVISION NO.:	DATE:
JOB NO.:	150799
SHEET TITLE:	PRELIMINARY UTILITIES PLAN
SHEET NO.:	

THIS DRAWING IS AN INSTRUMENT OF SERVICE AND THE PROPERTY OF SUSTAINABILITY ENGINEERING GROUP, AND SHALL REMAIN THEIR PROPERTY. THE USE OF THIS DRAWING SHALL BE RESTRICTED TO THE ORIGINAL SITE FOR WHICH IT IS PREPARED AND PUBLICATION THEREOF IS EXPRESSLY LIMITED TO SUCH USE.

PRELIMINARY SEWER CAPACITY REPORT

Aire on McDowell

Single-Family Attached Homes
NEC 68th Street & McDowell Road
Scottsdale, AZ

Prepared For:



Prepared by:



A handwritten signature in black ink, enclosed in a hand-drawn oval.

Accepted for

City of Scottsdale
Water Resources Administration
9379 E. San Salvador
Scottsdale, AZ 85258

08-21-15

EXPIRES 12-31-15

Doug Mann 9.10.15

Sustainability Engineering Group

8280 E. Gelding Drive, Suite 101
Scottsdale, AZ 85260
480.588.7226 www.azSEG.com

Project Number: 150799

Original Submittal Date: August 21, 2015

Case No.: Plan Check No.: TBD

15-ZN-2015
8/31/15



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08-21-15

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- FIGURE 6 - Preliminary Utility Plan

1. INTRODUCTION

1.1 SUMMARY OF PROPOSED DEVELOPMENT:

Proposed development consists of a maximum of eighty-one (81) single-family attached homes fronting on forty-six (46) feet wide internal vehicular tracts. The purpose of this sewer capacity design report is to provide analysis of the impact that this development will have on the City's sewer system and to obtain a letter of capacity assurance from the City of Scottsdale.

1.2 LEGAL DESCRIPTION:

The project property consists of three parcels of land located in the SE ¼ of Section 34, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona; Parcel ID numbers are APN: 129-08-052B; 129-08-052C; and 129-08-052D.

The project is located at the NEC of N. 68th Street and E. McDowell Road in Scottsdale, AZ. The site is further bound by the Village Grove 6 residential subdivision to the north and N. 69th Street to the east. Refer to **FIGURE 1 - Vicinity Map** for the project's location with respect to major cross streets.

1.3 EXISTING AND PROPOSED SITE ZONING AND LAND USES:

The overall project parcel is zoned C-3 (Highway Commercial). Rezoning to R-5 (Multiple-family Residential) is proposed. An abandoned car dealership currently exists on the property. The site will be totally demolished for the redevelopment into a residential use.

1.4 REFERENCES:

The project falls within Mixed-Use Neighborhoods conceptual land use district of the City's General Plan.

2. DESIGN DOCUMENTATION

2.1 DESIGN COMPLIANCE:

The analysis of the proposed and existing sewer system is done in compliance with Chapter 7 – Wastewater of the City of Scottsdale 2010 update of the Design Standards & Policies Manual (DS&PM). Design flow calculations for the on-site system will be based on the recommendations in Section 7-1.403 of the DS&PM.

3. EXISTING CONDITIONS

3.1 EXISTING ZONING & LAND USE:

Land ownership, as defined by ALTA/ACSM Land Title Survey by Arizona Surveying & Mapping dated 05/05/15 includes 5.11+/- acres of commercially developed land. City of Scottsdale zoning map designates this parcel as C-3.

3.2 EXISTING TOPOGRAPHY, VEGETATION AND LANDFORM FEATURES:

This site is fully developed as a car dealership that is currently vacant. The topography generally slopes from the west-northwest to the southeast corner at approximately one-percent with a change in elevation of approximately eight (8) feet. Typical desert landscaping existing at the perimeter of the site. Refer to **FIGURE 2** for an aerial of the overall project existing conditions.



FIRM Map Number 04013C2235L dated October 16, 2013 indicates this site is designated as Zone "X". As such, it is defined as areas outside of the 0.2% annual chance of flooding. Refer to **FIGURE 3** for the FIRM.

3.3 EXISTING UTILITIES:

Sanitary Sewer: QS 13-44 City of Scottsdale

- An 8" VCP sanitary sewer is available approximately six (6) feet north of the north property line. A ✓ manhole is located off both the NW corner and NE corner of the subject site. Depth to invert is approximately 6'.
- A 10" main is located just south of the McDowell Road centerline. The invert elevations of the service ✓ are not shown on the quarter section map.
- Two sanitary manholes are indicated on-site on the Quarter Section map. However, there is no ✓ indication of a tap to the public system from these manholes.
- An existing 4" sewer tap to the north public system is indicated on as-built plans provided in a ✓ feasibility study prepared by Hoskin-Ryan Consultants, Inc.

Refer to **FIGURE 4** for the City quarter section map (QS 13-44)

Refer to **FIGURE 4a** for as-built plan of 4" service lead.

4. PROPOSED CONDITIONS

4.1 SITE PLAN:

The property is proposed to be re-developed with new lot configurations into 81 multi-family residential townhomes. Development will include 20' to 24' wide roads with rolled curbs. Refer to **FIGURE 5** for proposed site layout.

4.2 PROPOSED SEWER SYSTEM:

For the purposes of this preliminary report, it is assumed that on-site sewer will consist of 8" pipe at a minimum slope of 0.52% to maintain access to the public sewer to the north.

Refer to **FIGURE 6** for the Preliminary Utility Plan.

OK
NOTE: The existing main in McDowell Road is the City's preferred system to tie into, having adequate capacity. However, City staff has indicated that potholing is recommended to verify sewer depth and to investigate the possibility of an existing storm system in McDowell Road. A development to the west of the subject parcel encountered the existing storm system at approximately the same elevation as the sewer main. For the purposes of this report, the public system to the north is the assumed discharge point until additional information becomes available on the system in McDowell Road.

4.3 MAINTENANCE RESPONSIBILITIES:

At this time it is assumed that the on-site sewer line for the proposed development will be public and located within right-of-way or easements to the ✓ City of Scottsdale. Therefore, the on-site and off-site sanitary sewer will be maintained by the City.

5. SANITARY SYSTEM COMPUTATIONS

5.1. SEWER FLOW DEMANDS:

DS&PM, Chapter 7 – Wastewater specifies that for residential uses, sanitary sewer lines 8 to 12 inches in diameter will be designed using 100 gallons per capita per day (gpdpc) and a peaking factor of 4. Residential densities are to assume 2.5 persons per dwelling unit (du).

Therefore the average proposed design flow is:

$$81 \text{ units} \times 2.5 \text{ persons/du} \times 100 \text{ gpdpc} = \mathbf{20,250 \text{ gpd (Average)}}$$

$$\text{Peak Flow: } 20,250 \text{ gpd} \times 4 = \mathbf{81,000 \text{ gpd (Peak)}}$$

The existing commercial buildings total approximately 32,500 s.f. in area. Per the referenced manual, sewer demands are 0.5 per sq.ft. with a peaking factor of 3 for commercial use.

Therefore the average original design flow was:

$$32,500 \text{ s.f.} \times 0.5 = \mathbf{16,250 \text{ gpd (Average)}}$$

$$\text{Peak Flow: } 16,250 \text{ gpd} \times 3 = \mathbf{48,750 \text{ gpd (Peak)}}$$

This represents a 4,000 gpd increase (average daily flow) or 32,250 gpd (peak) over the existing development contributions.

5.2. VARIANCE FROM STATED DESIGN FLOWS:

Stated design flows for the on-site system will be used as recommended.

5.3. SEWER SYSTEM ANALYSIS (Off-Site):

- No off-site contributions will be carried through the proposed on-site system.
- Off-site contribution to the existing public main:
 - 85 ○ 84 single family units from the west side of 68th Street and 25 single family units north of the subject parcel contribute to the public sewer at the anticipated tie-in point of this project.
 - Additionally, 5 single family units and 100 condominium units (Wonderland) contribute to the 8" main downstream.
 - This system then ties into a 10" sewer in Palm Lane that collects additional contributions from the north / northwest and then ties into an 18" sewer in Scottsdale Road.
- Therefore, total demand on the existing public 8" main is:
 - 84+25+5+100 (existing) + 81 (proposed) = 295 units.
 - 295 units x 2.5 x 100 gpd = 73,750 gpd (Average)
 - 73,750 gpd x 4 = 295,000 gpd (Peak) 200 gpm ✓

The proposed sanitary sewer demands contribute a relatively small additional quantity toward the overall existing 8" sewer capacity. Refer to Section 5.5 below for the approximate capacity of the existing main.



5.4. DEMAND FACTORS:

DS&PM requires a peak factor of 4. Refer to Section 5.1 above for calculations.

5.5. SEWER CAPACITY CALCULATIONS

An 8" diameter sanitary sewer pipe at $s=0.52\%$ ($n=0.013$) has a flow capacity of approximately 730,000 gpd, providing adequate capacity for the on-site and existing off-site systems.

A Letter of Capacity Assurance (Will Serve) will be obtained from the City of Scottsdale upon their final design review and acceptance of the Sanitary Capacity Report.

6. SUMMARY

6.1 SUMMARY OF PROPOSED IMPROVEMENTS:

- The proposed wastewater improvement was designed based on the current City of Scottsdale's design standards and policies.
- The existing sanitary main being tied into is capable of supporting the projected average flow for the development.

6.2 PROJECT SCHEDULE:

As a residential development the infrastructure is proposed to be constructed in a single phase to accommodate dwelling unit growth. The dwelling units will be phased based on consumer demand.

7 SUPPORTING MAPS

7.1 CONCEPTUAL SITE PLAN

Refer to **FIGURE 5** for a Concept Site Plan

7.2 PRELIMINARY UTILITY PLAN

Refer to **FIGURE 6** for a Preliminary Utility Plan

8 REFERENCES

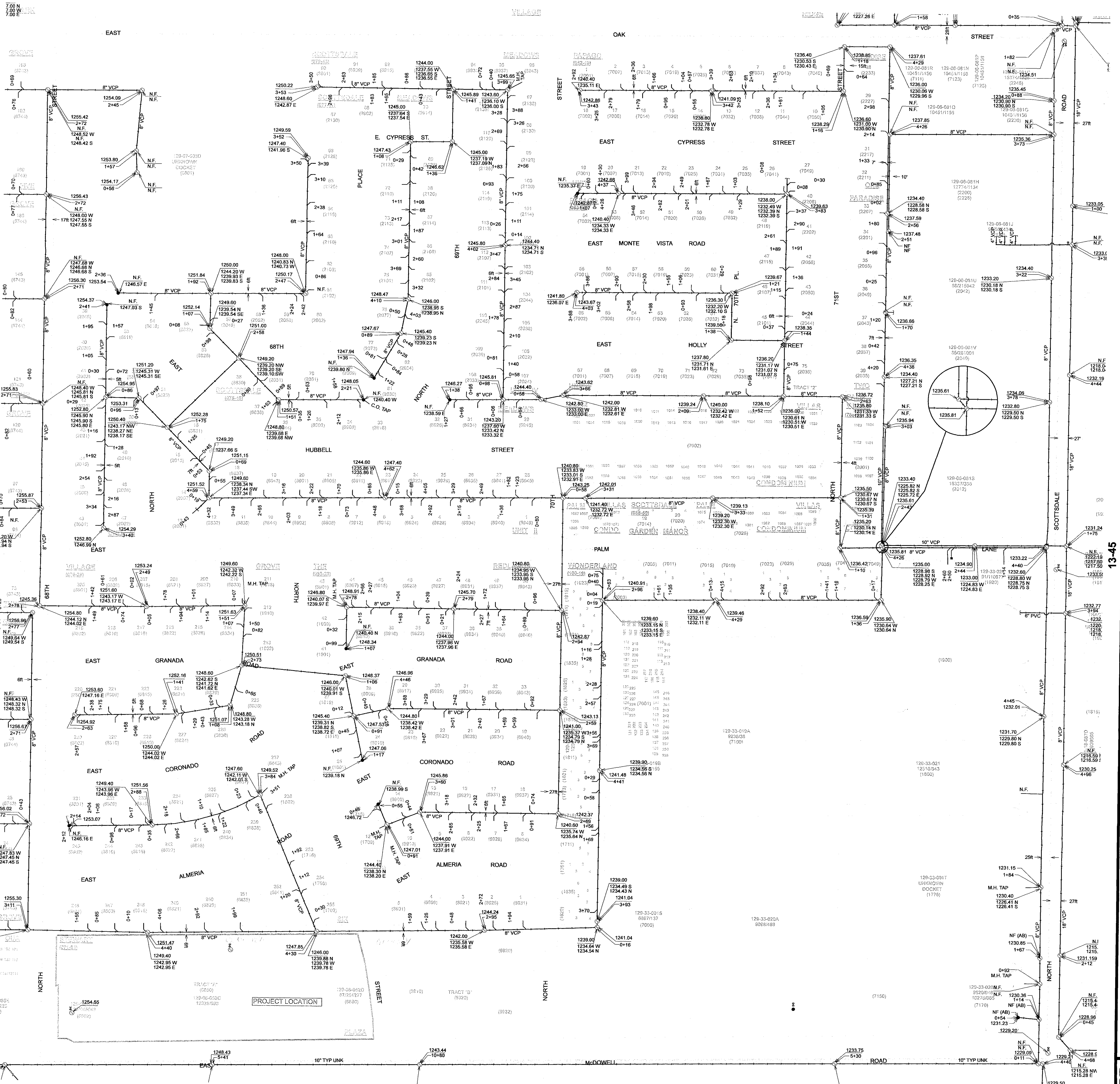
1. *COS QS Sewer Plan number 13-44*
2. *City of Scottsdale Design Standards & Policies Manual, 2010 (Chapter 7 – Wastewater)*



E McDowell Rd & N 68th St

PROJECT LOCATION

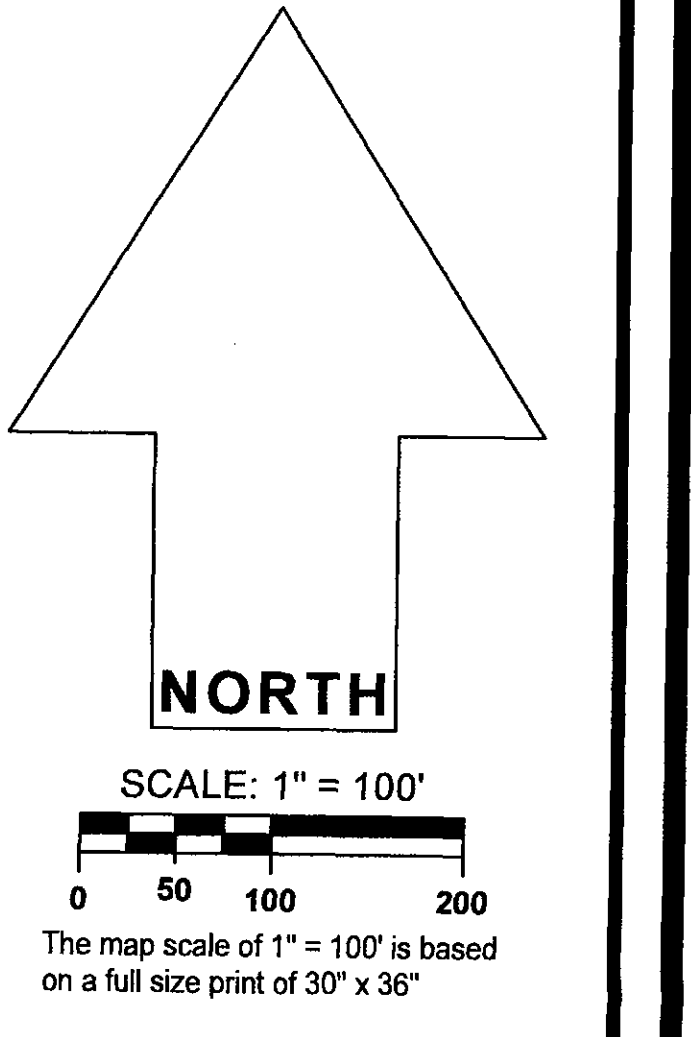
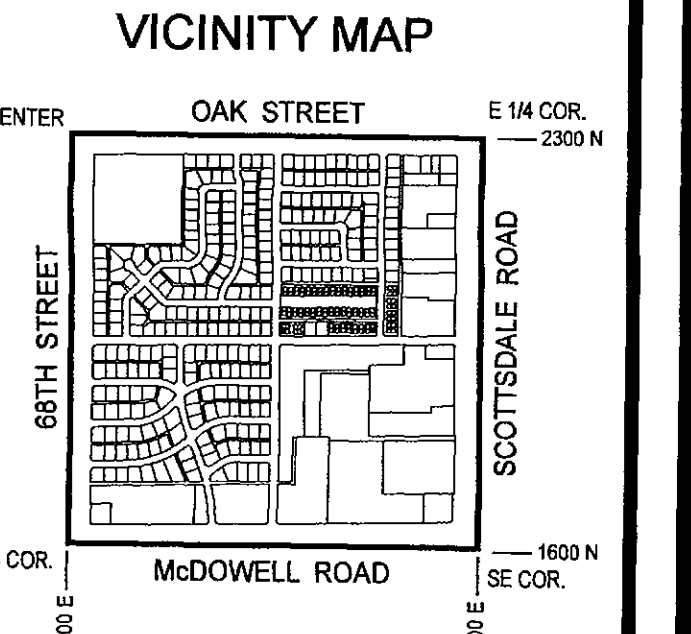
FIGURE 2
AERIAL



GENERAL NOTES:
 THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.
 THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS CALCULATED ON THE MAP.

LEGEND:

- Cleanout
- Lift Station
- Manhole
- Non-GPS Point
- Plug
- Sewer Service Point
- Sewer Tap Point
- Sewer Valve
- Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Sewer Main - Private
- Not found per improvement plans
- Not found per improvement plans and/or Q.S. maps
- Found in field no reference
- Map Error Point



SEWER
QUARTER SECTION MAP
13-44
 SE 1/4 SEC. 34 T2N R4E

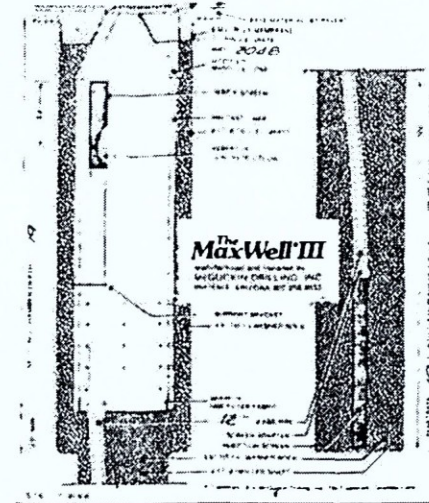
FIGURE 4

THIS DOCUMENT IS PROVIDED FOR GENERAL INFORMATION PURPOSES ONLY. THE CITY OF SCOTTSDALE DOES NOT WARRANT THE ACCURACY OF THE INFORMATION FOR ANY PARTICULAR PURPOSE. IT SHOULD NOT BE RELIED UPON WITHOUT FIELD VERIFICATION.
 THE CITY OF SCOTTSDALE
 08-AUG-15

The following general notes and modifications to the specifications and/or the standards shall apply and appear on ALL GRADING PLANS:

- All construction is to conform to the latest Maricopa Association of Governments (M.A.G.) "Uniform Standard Specifications and Details for Public Works Construction" with Scottsdale amendments, if applicable.
- The Engineering Services Director does not verify any quantities shown on plans.
- Minimum density shall be 90% or that which is specified by the soils engineer, whichever is greater.
- The contractor shall obtain a written letter of acceptance of the project from the Engineering Services Director.
- "As-built" drawings made by a Civil Engineer registered with the State of Arizona shall be certified by the Civil Engineer registered with the State of Arizona that it has been constructed as the situation shown on this plan. Certification shall be made prior to the pre-pub inspection.
- Approval of plan is for six months time only. If construction is not started within six months, the plan shall be resubmitted for reapproval.
- Traffic Control shall conform to the City of Phoenix Traffic Control Manual.
- Inspection is to be done by City of Scottsdale Field Engineering.
- Field Engineering shall be notified 24 hours prior to the starting of any construction work (984-1553).
- A grading permit shall be issued by the Building Division for a fee as determined from the Uniform Building Code, latest edition.
- Finished floor elevations shall be certified by a Civil Engineer registered in the State of Arizona that it has been constructed as the situation shown on this plan. Certification shall be made prior to the pre-pub inspection.
- A construction permit shall be issued by Private Development Engineering authorizing the construction and inspection of improvements shown herein for a fee of \$100.
- The design of these plans are only approved in scope and not in detail.

NOTE TO CONTRACTOR: Encroachments permits are required for work in the right-of-way. Prior to obtaining an encroachment permit, the contractor must have on file with the Engineering Services Director a certificate of insurance covering the following coverage: \$100,000 for death of any person, \$100,000 for any one person, \$500,000 for death of any person, \$100,000 for any one person, \$100,000 for property damage. City of Scottsdale must be named as additionally insured party.



INJECTION WELL SPECIFICATIONS

1. The well shall be constructed in accordance with the specifications of the City of Scottsdale Engineering Department.

2. The well shall be constructed of 12" diameter concrete pipe with a minimum wall thickness of 1/2".

3. The well shall be filled with 1/4" to 1/2" gravel to a depth of 10 feet below the bottom of the casing.

4. The well shall be sealed with a minimum of 18" of concrete at the top and bottom.

5. The well shall be installed in a location approved by the City of Scottsdale Engineering Department.

6. The well shall be installed in a location that does not interfere with any existing structures or utilities.

7. The well shall be installed in a location that is accessible for future inspection and maintenance.

8. The well shall be installed in a location that is safe and secure.

9. The well shall be installed in a location that is free from any obstructions.

10. The well shall be installed in a location that is free from any other structures or utilities.

11. The well shall be installed in a location that is free from any other structures or utilities.

12. The well shall be installed in a location that is free from any other structures or utilities.

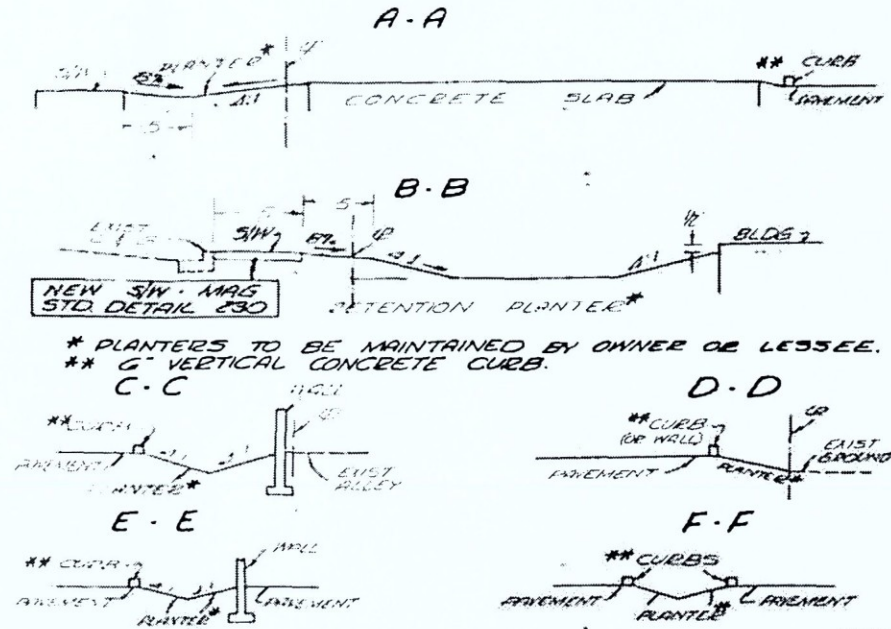
13. The well shall be installed in a location that is free from any other structures or utilities.

LEGAL:
PART OF TRACT 2,
STEWART PLAZA, PER
BOOK 71 OF MAPS,
PAGE 24, M.C.E.,
LOCATED WITHIN THE
SE 1/4 OF SECTION
34, T.8N., R.8E.

LEGEND:
A-A INDICATES FINISHED
ELEVATION OF ASPHALT
PAVEMENT (ADD 0.50
FOR ADJOINING TOP
OF CURB OR SIM.).
B-B INDICATES FINISHED
ELEVATION AT PLANTER
C-C INDICATES EXISTING
ELEVATION.
D-D INDICATES FINISHED
ASPHALT DRIVEIN
E-E INDICATES NEW
ASPHALT PAVEMENT

NOTE:
SEE JOB NO 3787
FOR PROPERTY
SURVEY.

TYPICAL SECTIONS
SCALE: 1" = 4'



* PLANTERS TO BE MAINTAINED BY OWNER OR LESSEE.
** 6" VERTICAL CONCRETE CURB.

GRADING AND DRAINAGE PLAN

AUTO SALES AND SERVICE FACILITY - 6850 EAST MCDOWELL
OWNER: MR. BRUCE WALLACE
ARCHITECT: MR. RICHARD BRITT

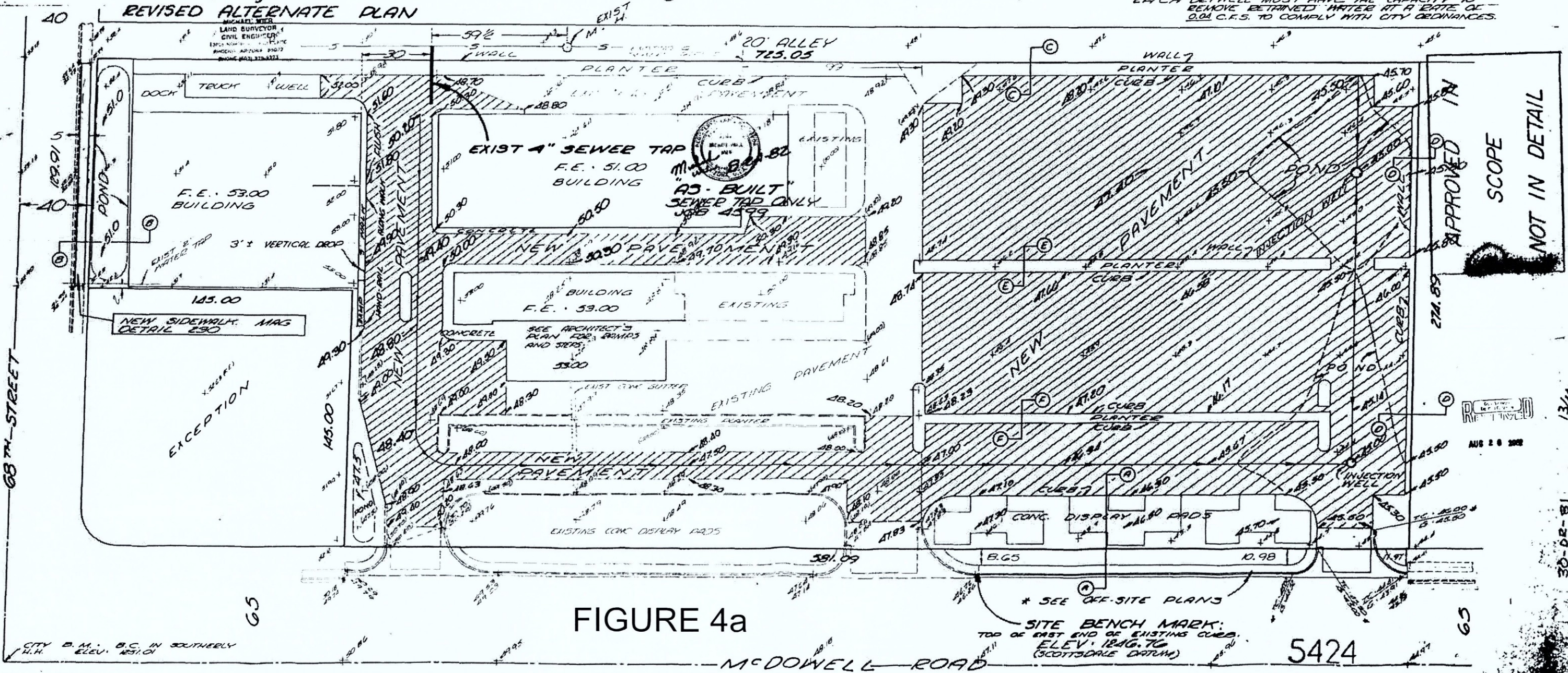
SCALE: 1" = 25' JOB NO. 4800

MICHAEL WIER - CIVIL ENGINEER
811 W. THOMAS - PHONE: 274-9879

CITY OF SCOTTSDALE		
REVIEWED BY		RECOMMENDED APPROVAL BY
FIRE DEPARTMENT	PRIVATE DEVELOPMENT ENGINEERING	PRIVATE DEVELOPMENT ENGINEERING MANAGER
TRAFFIC ENGINEERING	PLANNING DEPARTMENT	
FIELD SERVICES	MUNICIPAL UTILITIES DEPARTMENT	
PARKS DEPARTMENT	CAPITOL IMPROVEMENTS	ENGINEERING SERVICES DIRECTOR

PERCOLATION TEST RESULTS MUST BE SUBMITTED TO PRIVATE DEVELOPMENT ENGINEERING PRIOR TO THE CERTIFICATE OF OCCUPANCY BEING ISSUED.

EACH DEYWELL MUST HAVE THE CAPACITY TO REMOVE RETAINED WATER AT A RATE OF 0.04 C.F.S. TO COMPLY WITH CITY ORDINANCES.



REVISED ALTERNATE PLAN

LAND SURVEYOR
CIVIL ENGINEER
MICHAEL WIER
1830 N. WILSON
PHOENIX, ARIZONA 85012
PHONE: 948-333-1371

FIGURE 4a

* SEE OFF-SITE PLANS
SITE BENCH MARK:
TOP OF EAST END OF EXISTING CURB.
ELEV: 1246.70
(SCOTTSDALE DATUM)

5424

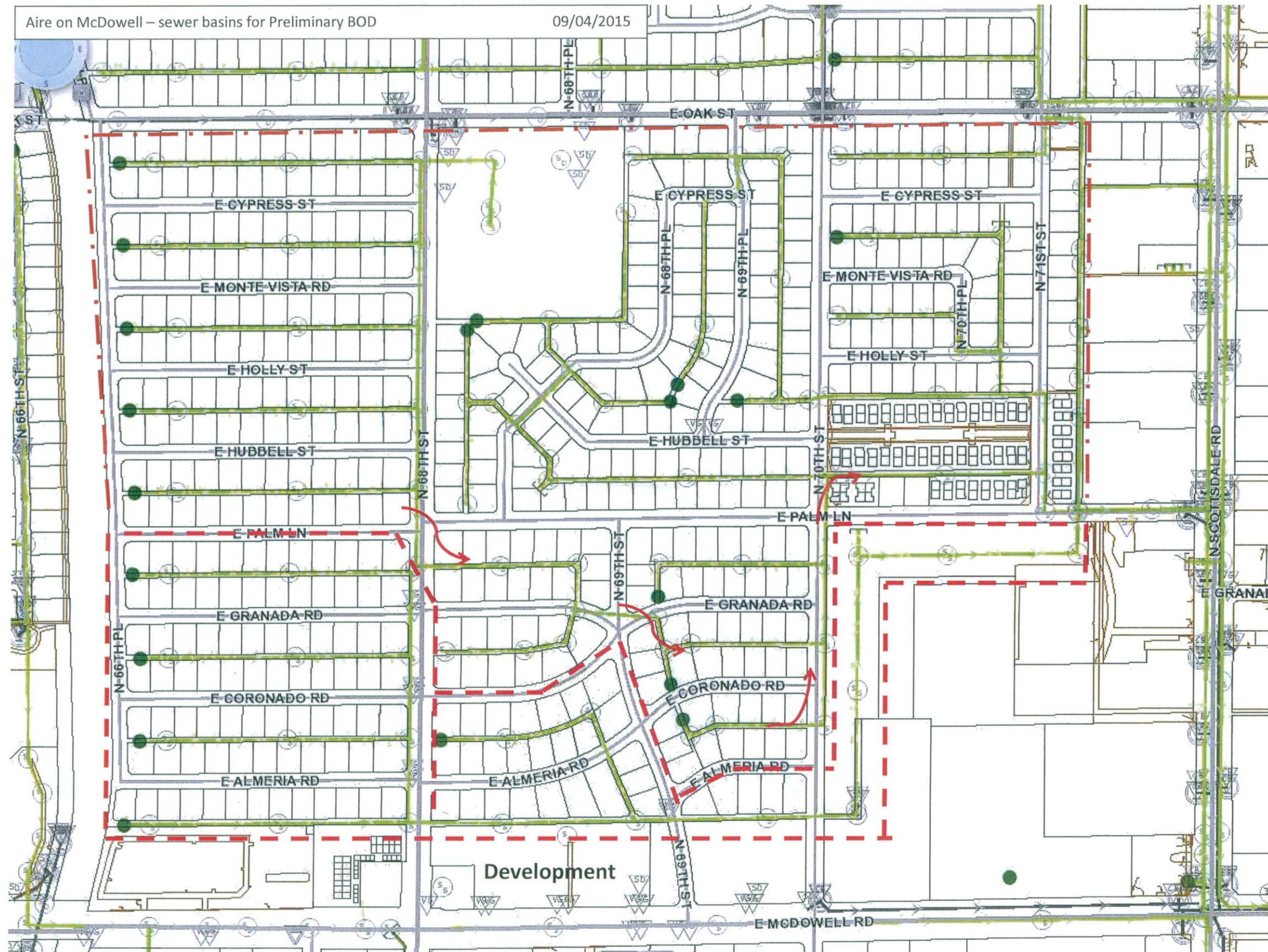
APPROVED IN SCOPE
NOT IN DETAIL

AUG 28 1980

13/44

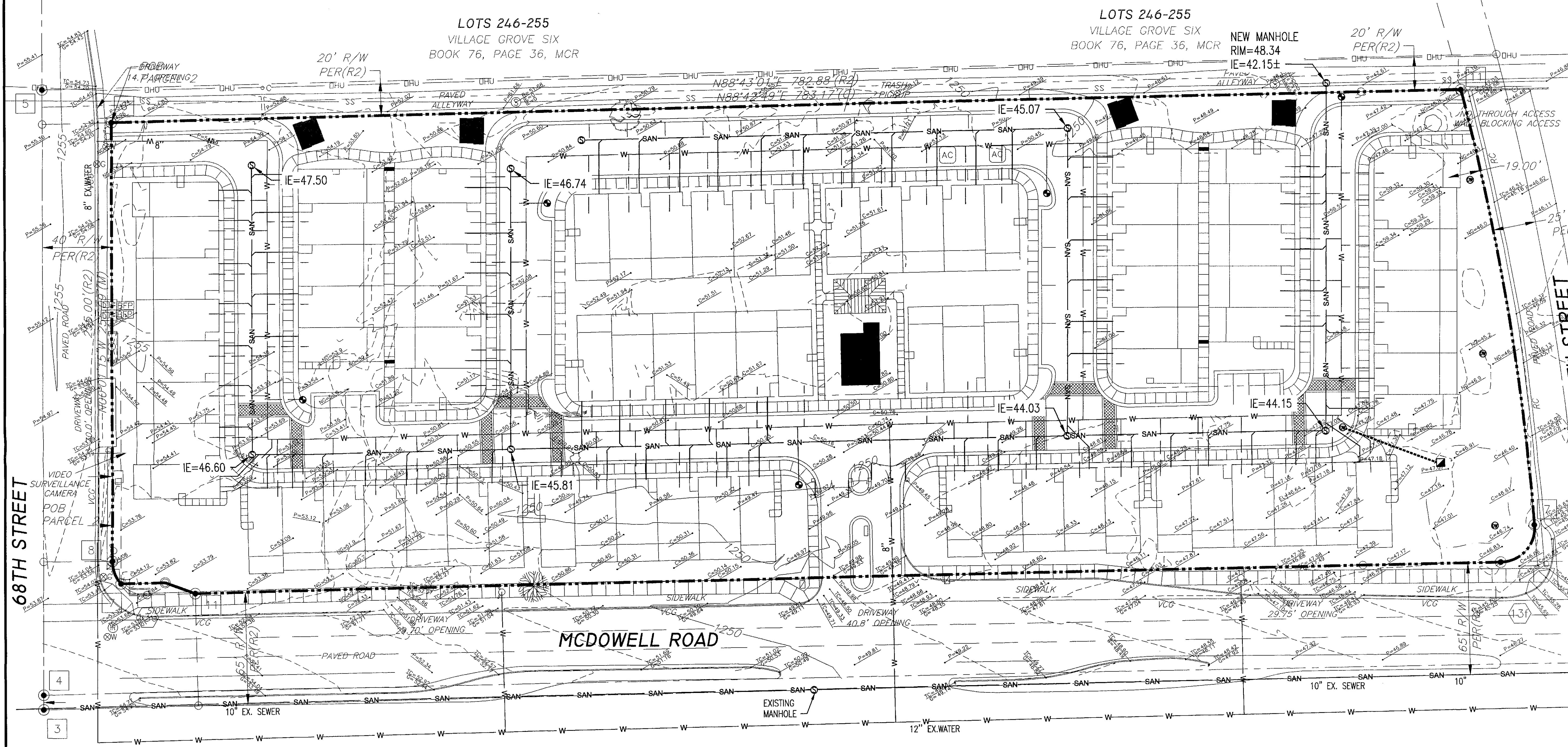
30-DR-B1

05002.P11



PRELIMINARY UTILITIES PLAN

AIRE ON McDOWELL
68TH & McDOWELL ROAD, SCOTTSDALE, AZ



- LEGEND**
- W — PROPOSED WATER LINE
 - SAN — PROPOSED SANITARY SEWER
 - ⊙ PROPOSED SEWER MANHOLE
 - ⊙ PROPOSED FIRE HYDRANT
 - ▣ CATCH BASIN
 - ⊙ DRY WELL
 - IE=XX.XX INVERT ELEVATION

C-3

NOTE:
SANITARY & WATER LOCATIONS SHOWN IN PUBLIC RIGHT OF WAY ARE FROM QS 13-44 C.O.S. MAPS & ARE NOT FIELD VERIFIED.



Call at least two full working days before you begin excavation.

ARIZONA 811

800-4-A-ARIZONA or 1-800-874-ARIZONA (752-8348) in Maricopa County (602) 255-1100

NOTE TO CONTRACTOR:
THIS SET OF DRAWINGS AND DOCUMENTS IS INTENDED AS A SET OF GUIDELINES FOR THE PROJECT AND ARE INTENDED TO BE USED IN CONJUNCTION WITH A SET OF CONSTRUCTION SPECIFICATIONS TO BE SUPPLIED BY OWNER. THIS MUST BE READ TO DISCLOSE ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES INCLUDING FEDERAL A.E.A. REQUIREMENTS. THIS SET ASSUMES THAT THERE ARE NO UNLAWFUL E.C.A. CONDITIONS OR VIOLATIONS. THE FAILURE OF THE CONTRACTOR TO COMPLY WITH THESE REQUIREMENTS OR TO OBTAIN ALL APPLICABLE CODES AND TO INFORM THE OWNER/ARCHITECT OF ANY QUESTIONS OR CLARIFICATIONS REQUIRED, CONTRACTOR SHALL ASSUME THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO OBTAIN ALL APPLICABLE CODES AND TO INFORM THE OWNER/ARCHITECT OF ANY QUESTIONS OR CLARIFICATIONS REQUIRED. CONTRACTOR SHALL ALSO VISIT THE SITE BEFORE BIDDING. CONTRACTOR IS REQUIRED TO KNOW ALL APPLICABLE CONDITIONS AND APPLICABLE CODES.

SUSTAINABILITY ENGINEERING GROUP

SEG

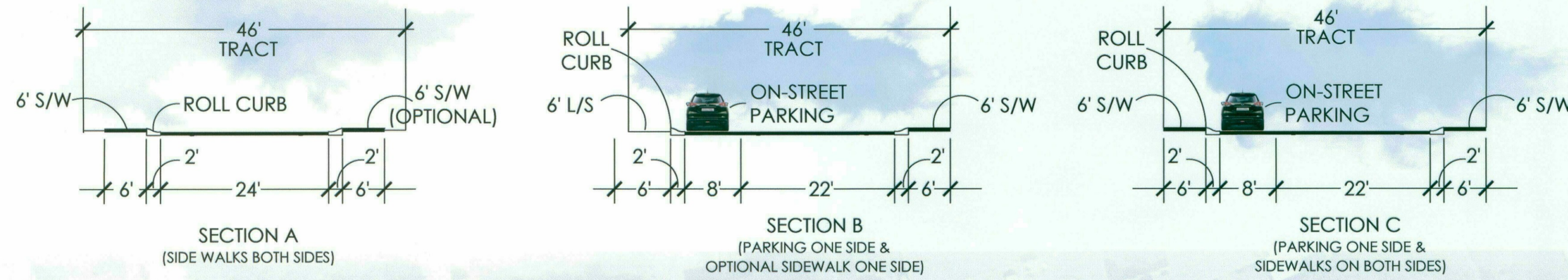
8280 E GELDING DR #101, SCOTTSDALE, ARIZONA 85260
WWW.AZSEG.COM TEL. 480.988.7226

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PROJ. MGR.	FAKIH
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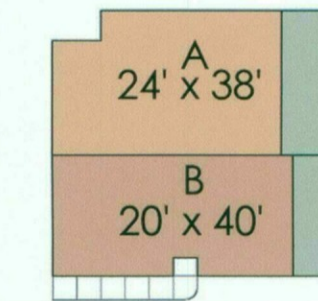
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SITE DATA

SITE AREA (NET): 5.1 AC. ±
 PROPOSED # OF LOTS: 81
 NET DENSITY: 15.9 DU/AC.
 CURRENT ZONING: C-3
 PROPOSED ZONING: R-5
 GUEST PARKING: 27
FRONTAGE OPEN SPACE
 REQUIRED: 1,361 LF X 20= 27,220 SQ FT
 PROVIDED:



TYP PRODUCT DIMENSIONS
 (NOT INCLUDING REAR YARD)



NOTE: THIS SITE PLAN IS CONCEPTUAL AND WILL REQUIRE THE CITY TO GRANT RELIEF FROM VARIOUS CITY STANDARDS