PRELIMINARY DRAINAGE REPORT

The Maza
Scottsdale, Arizona

Prepared For:

Toll Brothers Apartment Living
8767 E. Via De Ventura, Suite 390
Scottsdale, AZ 85258

Plan # _____

Case # 5-DR-2022

Q-S # _____

X
____ Approved

____ Corrections

Richard M. Anderson Prepared by: 10/03/2022
Reviewed By Date

Kimley»Horn

291245002
August 2022

5-DR-2022
8/10/2022

The Maza

PRELIMINARY DRAINAGE REPORT

AUGUST 2022

Prepared By:

Kimley»Horn

5-DR-2022
8/10/2022

Kimley»Horn

Contents

Appendices

1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

Toll Brothers Apartment Living is proposing to construct a multi-family development at the northwest corner of 6th Avenue and Miller Road in Scottsdale, Arizona. The Maza, the "project", is anticipated to consist of a five-story apartment building, a two-level underground parking garage, and utility infrastructure improvements.

1.2 SITE LOCATION

The proposed development encompasses approximately 1.26 net acres in a portion of the Southwest Quarter of Section 23, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian in Maricopa County, Arizona. The proposed development consists of a previously developed commercial parcel zoned C-3. More specifically, the development site is bounded on the west by a private access drive and a commercial development zoned C-3, on the south by 6th Avenue, on the east by Miller Road, and on the north by commercial developments zoned PNC. The site slopes from the northwest to the southeast at approximately 1.3%. See **Appendix A** for the Site Location Map. See Figure 1 in **Appendix F** for a Context Aerial Map.

1.3 PURPOSE

This Final Drainage Report is intended to satisfy City of Scottsdale requirements. This report provides a description of the current stormwater drainage patterns and a description of the required and proposed drainage improvements.

1.4 OBJECTIVES

This report provides a drainage plan for the site that is intended to meet the drainage standards and guidelines of the City of Scottsdale and the Flood Control District of Maricopa County (FCDMC). In particular, this report will demonstrate the following:

1. Any existing off-site flows from the adjacent properties will be handled and conveyed in a way consistent with the current drainage patterns.

2. The proposed site drainage patterns will remain consistent with the current drainage patterns.

3. This proposed site is required to maintain the existing on-site storm water storage volume provided by the 1980 Valley Bank As-builts.

4. Building finish floor elevations will be determined in accordance with City of Scottsdale and FEMA Flood Zone requirements (if applicable).

2.0 DESCRIPTION OF EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

2.1 EXISTING ON-SITE DRAINAGE CONDITIONS

The site consists of a vacant commercial development that was previously used as a restaurant. There is an existing building, parking lot, utilities, and limited landscaping on-site. The site slopes from the northwest to the southeast at approximately 1.3%.

Stormwater from the site currently sheet flows to the south property line and southeast corner of the site, flows through multiple curb openings, overtops adjacent sidewalks and is collected in the City of Scottsdale storm drain system via two catch basins near the intersection of 6th Avenue and Miller Road. Minimal surface retention and stormwater infrastructure currently exist on the site.

Refer to Figure 2 in **Appendix F** for the Existing Conditions Exhibit.

2.2 EXISTING OFF-SITE DRAINAGE CONDITIONS

The proposed site is not impacted by off-site stormwater runoff.

The adjacent half street portions of 6th Avenue and Miller Road convey off-site storm water from areas to the west and north of the site. Stormwater runoff from the adjacent half-street portion of 6th Avenue is conveyed east via curb and gutter to and existing catch basin approximately 20 feet west of the intersection of 6th Avenue and Miller Road. Stormwater runoff from the adjacent half-street portion of Miller Road is conveyed south via curb and gutter to and existing catch basin approximately 20 feet north of the intersection of 6th Avenue and Miller Road. The City storm drain system includes an existing 21-inch and 36-inch RGRCP storm drain pipe in 6th Avenue and a 24-inch RGRCP storm drain pipe in Miller Road. The adjacent portions of 6th Avenue and Miler Road are all crowned near their respective centerlines and Miller Road includes a raised median. Stormwater from the existing commercial properties to the west and north do not impact the existing site.

The existing off-site flows for both 6th Avenue and Miller Road are modeled in the Maricopa County Flood Control District Flo-2D Drainage Map under the 679_LIBW South 100YR-6HR model. The adjacent off-site flows per the Flo-2d Map are below:

- 10 cfs flowing east in the north half-street of 6th Avenue
- 7 cfs flowing south in the west half-street of Miller Road

These above flows were analyzed for the respective street using Bentley Systems FlowMaster to model the street cross section and determine the water surface elevations of the 100-year 6-hour storm event adjacent to the proposed site. Section A includes the proposed driveway entrance to the below grade parking garage on 6th Avenue and Section B includes the building finished floor adjacent to Miller Road. The water surface elevation in 6th Avenue is approximately 1254.25 and the driveway breakover is at elevation 1254.50. Also note that the 6th Avenue crown elevation is lower than the driveway breakover and

will overtop prior to any off-site flow entering the below grade garage. Section B water surface elevation in Miller Road is at 1253.25, more than 3-feet lower than the proposed finished floor.

Per the Flo-2D modeling, the east half-street of Miller Road conveys approximately 20 cfs of stormwater flow through the adjacent multi-family complex east of the site, and ultimately to the Lower Indian Bend Wash. The larger flows in the Miller Road east half-street will not impact the proposed development due to the raised median in Miller Road, and the elevated finished floor of the proposed building. Note that the Flo-2d modeling system does not account for the raised median. The raised median is identified based on survey elevation information. The Flo-2D model does not accurately capture the 6th Avenue low point at the intersection of Miller Road and 6th Avenue. The misrepresentation of the Flo-2D model does not affect the intent of analysis for the off-site stormwater impact to the proposed site.

Refer to Figure 2 in **Appendix F** for the Existing Conditions Exhibit and **Appendix D** for the Street Capacity Analysis

2.3 FEMA FLOOD HAZARD AREAS

The site is located in Flood Zone “X” according to the Flood Insurance Rate Map 04013C1770M, dated September 18, 2020. Zone “X” is designated by FEMA as “areas of minimal flood hazard.” Refer to **Appendix B** for the FEMA FIRMette map for the site.

3.0 PROPOSED FINAL DRAINAGE PLAN

3.1 GENERAL DESCRIPTION

In the analysis of the proposed drainage conditions the following items are considered:

- Area Types (concrete pavement, building, and desert landscaping)
- Magnitude of areas
- Slopes

3.2 PROPOSED SITE CONDITIONS

According to the City of Scottsdale's Design Standards and meetings with City staff, the site will be required to maintain storm water storage consistent with the as-built grading and drainage plans for the Valley National Bank development from 1980. According to the as-built plans, the Valley Bank development had provided a total of 1,995 cubic feet of surface retention in five basins. Refer to **Appendix C** for Valley Bank As-Builts retention calculations.

The site area is 1.26 net acres, and the developed site will consist of building and landscape areas. The project is not anticipated to contribute storm water contaminants to the City's municipal storm drain system due to the residential use of the site, the fully stabilized condition, the small site area, and the first flush treatment requirement.

Storm water runoff from the west portion of building and amenity areas on-site will discharge from one roof drain on the north side of the building and will be conveyed in HDPE storm drain pipes and retained in a seven-foot diameter CMP underground detention tank. The detention tank will only capture stormwater runoff from the building roof. The detention tank will discharge to the City storm drain infrastructure in 6th Avenue.

Storm water runoff from the east portion of building and amenity areas on-site will discharge from one roof drain on the south side of the building and will be pass through an Old Castle DVS-60 or approved equal storm water quality unit sized to treat the first flush runoff. The first flush flow rate has been calculated to be 1.6 cfs, and the DVS-60 model has a Treated Flow Capacity of 2.50 cfs. The storm water quality unit will include a bypass pipe for flows in excess of the first flush. Refer to **Appendix C** for the First Flush Flow Calculations.

Nuisance storm water runoff from the below-grade parking areas will pass through a sand and oil interceptor, thereby limiting contaminants from autos and surface parking. The sand and oil interceptor is a part of the MEP scope.

Storm water runoff from roof areas, hardscape, and outdoor patio areas and will be collected internally and routed to the proposed underground tanks and storm water quality units. A combination of a gravity storm drain system for surface flows and a storm drain pump in the bottom floor of the parking garage will connect to the storm water quality unit. The garage floor storm drain pump will collect nuisance stormwater and is

included in the plumbing plans. Any storm water flows in excess of the first flush condition will bypass the storm water quality unit and enter the City of Scottsdale storm drain system at the existing catch basin near the intersection of 6th Avenue and Miller Road, consistent with historical drainage patterns.

The building finished floor will vary between 1254.50 and 1262.00 and the ultimate site outfall is 1253.08 located at the existing sidewalk at the southeast corner of the site. The building finished floor will be a minimum of 17 inches above the ultimate site outfall.

Refer to Figure 3 in **Appendix F** for the Grading and Drainage Plan and **Appendix E** for the Old Castle Storm Water Quality Unit specification sheets.

3.3 PROPOSED OFF-SITE CONDITIONS

There are no proposed improvements to the off-site conditions.

3.4 STORMWATER STORAGE REQUIREMENTS

As previously noted, the proposed development will be required to maintain storm water storage volumes consistent with the as-built grading and drainage plans for the Valley National Bank development from 1980 and provide treatment for first flush stormwater flows.

3.5 PRE- AND POST-DEVELOPMENT RUNOFF CHARACTERISTICS AT CONCENTRATION POINTS

The pre-development runoff condition consists of an existing building with asphalt parking lot and minimal landscaping. Current topography indicates the site drains from the northwest to the southeast. The concentration point for the existing runoff is at the southeast corner of the site. The existing site does not retain storm water on-site, rather all runoff is conveyed to the City of Scottsdale storm drain system.

The post-development runoff condition consists of roof drainage and landscaping. Storm water from the western portion of the site will be collected in an underground detention tank that will bleed off to the City storm drain system in 6th Avenue. If the capacity of the detention tank is exceeded, storm water will surface flow to the 6th Avenue storm drain system, which is consistent with the pre-development drainage patterns. Storm water from the eastern portion of the site will be routed to a storm water quality unit that will treat the first flush flow rate before discharging to the existing catch basin near the northwest corner of 6th Avenue and Miller Road. Flows in excess of the first flush flow rate will bypass the storm water quality unit and flow directly to the catch basin, in accordance with the pre-development drainage patterns. The post-development condition improves the pre-development condition reducing and treating stormwater runoff discharged to the City of Scottsdale storm drain system. The Pre vs Post runoff conditions were analyzed for the entire site as a whole and a weighed runoff coefficient was calculated for both the Pre and Post development conditions.

Table 1: Pre and Post Development Runoff

Basin	Pre-Development Runoff Coefficient	Post Development Runoff Coefficient	Pre Development Q100	Post Development Q100
Site	0.86	0.83	6.2 cfs	6.0 cfs

Refer to Figure 2 in **Appendix F** for the Existing Conditions Exhibit, Pre-Development and Post-Development runoff exhibits.

3.6 ADEQ AZPDES REQUIREMENTS

Prior to construction an executed Notice of Intent (NOI) shall be submitted to Arizona Department of Environmental Quality (ADEQ) in conformance with the Arizona Pollution Discharge Elimination System Permit (AZPDES) permit. The NOI and associated stormwater management best management practices will remain active on the site until construction is complete and a Notice of Termination is filed with ADEQ in conformance with AZPDES permit.

3.7 PROJECT PHASING

This project will be constructed in a single phase.

4.0 SPECIAL CONDITIONS

4.1 404 DISCUSSION

Due to the previous development of the project site, no 404 washes are anticipated.

5.0 DATA ANALYSIS METHODS

5.1 HYDROLOGIC PROCEDURES, PARAMETER SELECTION, AND ASSUMPTIONS

Hydrologic calculations for the site were performed using the rational equation in the FCDMC Drainage Design Manual Volume I, which is limited to drainage areas of up to 160 acres.

For analysis of the development, the onsite storm drain pipes connecting to roof storm drain discharge locations were sized to convey the 100 year, 2-hour storm event runoff flows.

The following criteria were used to size the proposed storm drain pipes for on-site stormwater conveyance:

- A maximum allowable 100-year ponding depth of six inches above the catch basin grate.
- A minimum of 12 inches of freeboard between the 100-year ponding depth and the building finish floor elevation.
- The tailwater condition for the 100-year event will be assumed to be the hydraulic grade line at the pipe connection location.

The software program StormCAD, by Bentley Systems, was used for the hydraulic modeling of the storm drain handling off-site flows. Refer to Appendix C for the 10-year and 100-year off-site storm drain model results.

The peak flows generated by this site were calculated to be approximately 5.3+/- cfs through the rational equation, 2.4 cfs and 2.9 cfs for the west and east portions of the building respectively. The minimal area of site generated runoff will sheet flow to the adjacent rights-of-way consistent with historical drainage patterns.

Refer to **Appendix C** for Rational Equation calculations and Storm CAD results.

5.2 STORM WATER DETENTION REQUIREMENTS

As previously noted, the proposed site will be required to provide storm water storage to meet the volume provided by the previous development. A review of the prior as-built plans determined this volume to be 1,995 CF. An underground 7-foot diameter detention tank will be used to store the site-generated stormwater for the west portion of the building while an Old Castle DVS-60 or approved equal storm water quality unit will provide treatment for the east portion of the building. The underground detention tank connects to an 18" HDPE storm drain pipe that provides additional storm water storage. The 18" HDPE storm drain pipe connects to a catch basin with a three-inch orifice plate installed at the outlet of the catch-basin to drain the underground detention tank at a rate of 0.5 cfs. Storm water flows in excess of first flush will bubble up near the west driveway on 6th Avenue and sheet flow to the municipal storm drain system consistent with historical drainage patterns.

The underground detention tank or underground stormwater storage tanks (USST) will meet the City of Scottsdale USST policy in Section 4-1.202 of the City of Scottsdale DSPM which includes:

- A drainage easement will be provided over the limits of the USST. See Grading and Drainage Plans for the drainage easement location.
- The USST will be designed for a 75-year life and including the smooth interior floor lining per Maricopa Association of Governments (MAG) supplemental standard detail 2554
- The USST will have two access risers.
- Signs will be installed at each end of the USST.
- An O&M Manual will be prepared for the USST.

5.3 FIRST FLUSH STORM WATER CALCULATIONS

Storm water from the eastern portion of the site will be routed to a storm water quality unit before discharging to an existing City catch basin at the southeast corner of the site.Per City of Phoenix Storm Water Policies and Standards Manual (2013) Section 6.8.3 first flush flow is calculated as follows:

$Q_{FF} = C \times I \times A$

Where:

Q_{FF} = minimum First Flush discharge in cfs

C = Runoff Coefficient, 1.00 for First Flush

I = Rainfall Intensity: (0.5 inches/hour x 60 minutes/hour) / TC

A = Contributing area (acres)

Tc = Time of Concentration (minutes), minimum of 10 minutes

Refer to **Appendix C** for First Flush calculations.

6.0 CONCLUSION

6.1 OVERALL PROJECT

Based on the results of this Final Drainage Report, the following can be concluded:

- Off-site stormwater will not impact the proposed site.
- Storm water from the western portion of the site will be detained in an underground tank and will discharge by bleed-off to the City storm drain system.
- The required detention volume is based on the as-built plans from the previous development at this site.
- Storm water from the eastern portion of the site will be routed through a storm water quality unit that will treat the first flush flow rate prior to discharge to the City storm drain system.
- Based on the current Flood Insurance Rate Map (FIRM), the site is located in the Zone “X”.
- The building finish floor elevations will be greater than fourteen inches above the ultimate site outfall elevation.

This report is intended to provide a level of assurance that the site will adhere to all appropriate reviewing agency guidelines with respect to drainage and flood protection.

7.0 REFERENCES

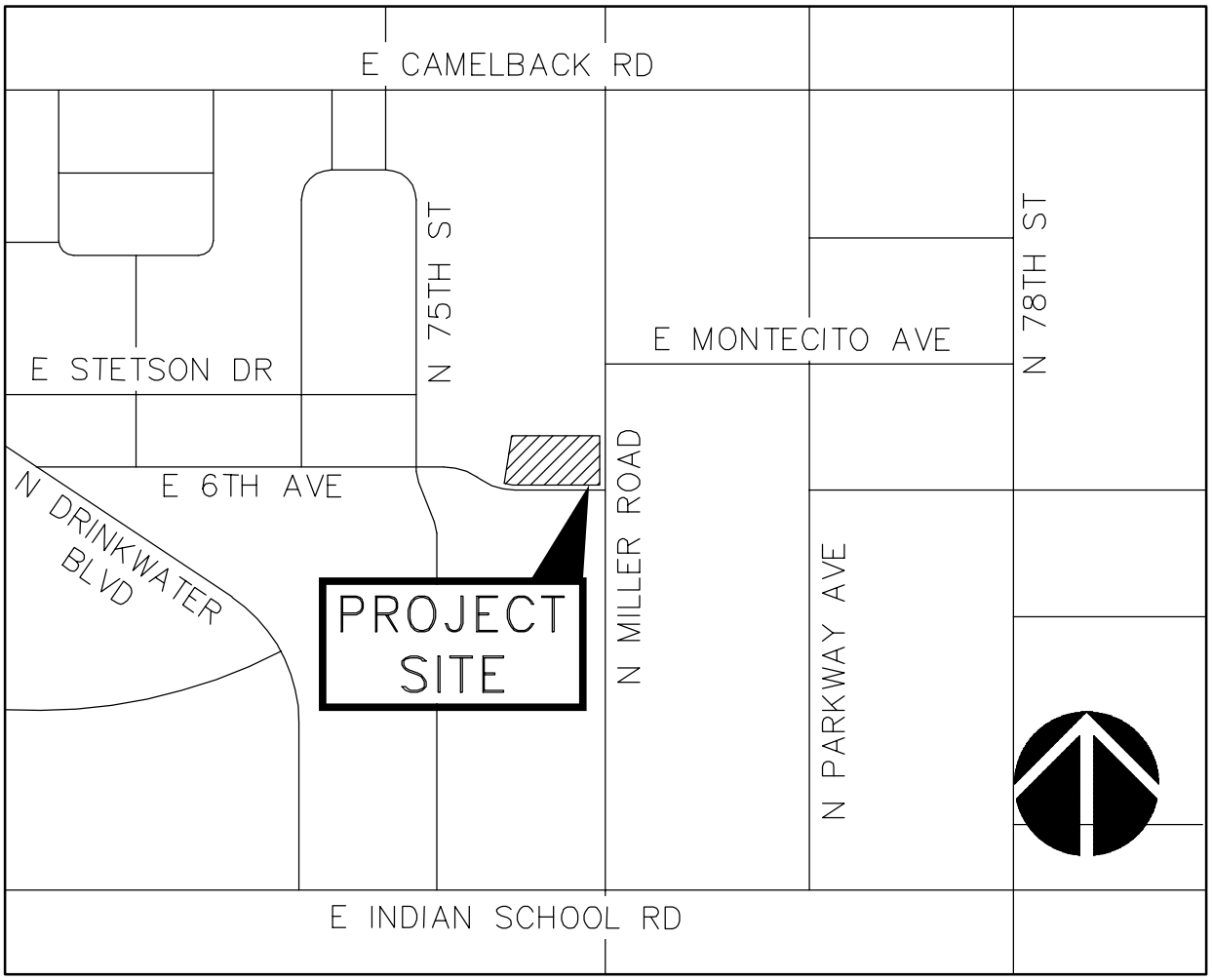
1. City of Scottsdale, *Design Standards and Policies Manual, Chapter 4: Grading and Drainage,* January 2018.

2. Federal Emergency Management Agency (FEMA), *Flood Insurance Rate Map (FIRM) of Maricopa County, Arizona and Incorporated Areas, Panel 1320 of 4425, Map Number 0413C1320L*, October 16, 2013.

3. Flood Control District of Maricopa County (FCDMC), *Drainage Design Manual for Maricopa County, Hydrology Volume, February*, 2008.

4. Flood Control District of Maricopa County (FCDMC), *Drainage Design Manual for Maricopa County, Hydraulics Volume,* January, 1996.

Appendix A – Site Location Map



VICINITY MAP

SCOTTSDALE, AZ
N.T.S.

Kimley»Horn

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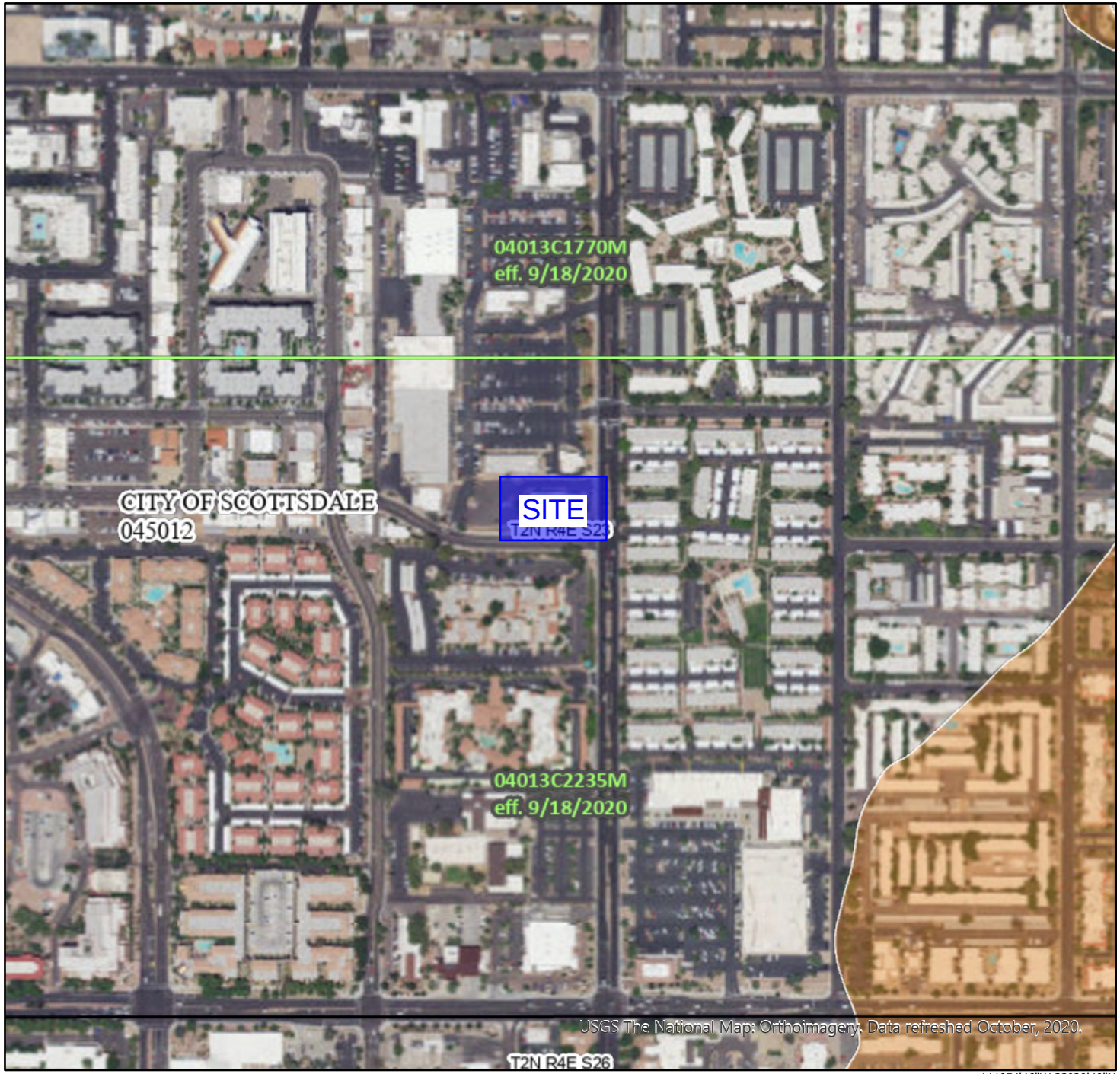
8/10/2022

Appendix B – FEMA Flood Insurance Rate Map (FIRM)

National Flood Hazard Layer FIRMette

FEMA

111°55'23"W 33°30'10"N



111°54'46"W 33°29'40"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/8/2021 at 1:25 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

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Appendix C – Hydrologic/Hydraulic Calculations

Toll Brothers Maza - Overall Retention Summary				
Drainage Area	Land Use	Required Storage (V_{REQ} =		Retention Basin
		cf	ac-ft	
Site	Commercial	1,995	0.05	UG

*Per City of Scottsdale Planning Commission Report (1-ZN-2021) Dated Septemeber 22, 2021, "The 1980 as-builts for this site include five storm water basins. Per City code, the volume provided by these basins must be maintained as part of the redevelopment of the site. The final report will need to estimate the approved volumes based on the as-built plan and be updated to reflect this storage requirement.

Underground Retention Summary						
Retention Basin	Required Volume	Diameter	Required	Provided	Provided	Surplus
	cf	ft	lf	lf	cf	cf
UG	1,995	7	52	46	1770	-225
18" Diameter	0	1.5	0	133	235	235
Total	1995				2005	10

First Flush Flow Calculations								
Location	**Runoff Coefficient (C)**	**Contributing Area (A)**	**Overland Flow Time of Concentration (T_{C1})**	**Pipe Flow Time of Concentration (T_{C2})**	**Total Time of Concentration, Minimum 10 min ($Tc=T_{C1}+T_{C2}$)**	**Rainfall Intensity (I)**	**First Flush Flow (Q_{FF})**	**Oldcastle Dual-Vortex Separator Size**
		AC	Min	Min	Min		CFS	
DA-1	1.00	0.44	5.00	2.90	10.00	3.00	1.3	UG TANK
DA-2	1.00	0.53	5.00	2.90	10.00	3.00	1.6	DVS-60
DA-3	1.00	0.14	5.00	2.90	10.00	3.00	0.4	R/W
DA-4	1.00	0.15	5.00	2.90	10.00	3.00	0.4	R/W

Per City of Phoenix Storm Water Policies and Standards Manual (2013) Section 6.8.3:

$Q_{FF} = C \times I \times A$

Where:

Q_{FF}= minimum First Flush discharge in cfs

C = Runoff Coefficient, 1.00 for First Flush

A = Contributing Area in acres

T_C = Time of Concentration (minutes), minimum of 10 minutes

I = Rainfall Intensity: (0.5 inches/hour x 60 minutes/hour) / T_C

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Peak Flow Calculations Using The Rational Method

Project:	Maza Toll Brothers
Proj #:	291245002
Date:	5/25/21
Prep by:	BEQ
Check by:	BEQ

Base Sheet Prepared By GA, Version 2

Source of Rainfall Data --->NOAA Atlas 14

Rainfall Depth-Duration-Frequency (D-D-F), (inch)					
Storm Fequency	Time				
	5 min	10 min	15 min	30 min	60 min
10-Yr	0.39	0.60	0.74	1.00	1.24
100-Yr	0.62	0.95	1.17	1.58	1.96
Derived Rainfall Intensity-Duration-Frequency (I-D-F), (in/hr)					
10-Yr	4.72	3.59	2.96	2.00	1.24
100-Yr	7.46	5.68	4.68	3.16	1.96

Attach source and supporting data for rainfall depths

AF for Cw per $Cw_{10\text{-}Yr}$		
Freq.	Typical	Applic.
2-Yr	1.00	1.00
5-Yr	1.00	1.00
10-Yr	1.00	1.00
25-Yr	1.10	1.00
50-Yr	1.20	1.00
100-Yr	1.25	1.00

AF=Frequency Adjustment Factor

Drainage Area ID: -----

Tc,calc method: 1=Papadakis and Kazan, 2=Avg Veloc.

1 Tc,calc=11.4*L^0.5*Kb^0.52*S^-0.31*i^-0.38

10-Yr | 100-Yr

Cw for each frequency is adjusted as a function of the 100-year value per the table above

Concent. Point #	Contributing Sub-basins	Total Area (ac)	Base Cw (2-10 yr)	Flow Path, L (ft)	Approx High pt (ft)	Approx Low pt (ft)	Average Slope ft/ft	K_b Class A-->D	m	b	K_b	Initial/lot Tc (min)	10-Yr: Minim allowed Tc,tot =			10.0	Q	100-Yr: Minim allowed Tc,tot =			10.0	Q
													Cw AF=1.00	Tc,calc (min)	Tc,tot (min)	i (in/hr)	10-Yr (cfs)	Cw AF=1.00	Tc,calc (min)	Tc,tot (min)	i (in/hr)	100-Yr (cfs)
DA-1	BLDG	0.44	1.00	100	1	0	0.0100	A	-0.00625	0.04	0.0422	0	0.95	2.9	10.0	3.59	1.5	0.95	2.5	10.0	5.68	2.4
DA-2	BLDG	0.53	1.00	100	1	0	0.0100	A	-0.00625	0.04	0.0417	0	0.95	2.9	10.0	3.59	1.8	0.95	2.5	10.0	5.68	2.9
DA-3	LSCP	0.14	1.00	100	1	0	0.0100	A	-0.00625	0.04	0.0453	0	0.95	3.1	10.0	3.59	0.5	0.95	2.6	10.0	5.68	0.8
DA-4	LSCP	0.15	1.00	100	1	0	0.0100	A	-0.00625	0.04	0.0452	0	0.95	3.1	10.0	3.59	0.5	0.95	2.6	10.0	5.68	0.8
Pre Dev	Site	1.26	0.86	100	1.0	0.0	0.0100	A	-0.00625	0.04	0.0394	0	0.86	2.8	10.0	3.59	3.9	0.86	2.4	10.0	5.68	6.2
Post Dev	Site	1.26	0.83	100	1.0	0.0	0.0100	A	-0.00625	0.04	0.0394	0	0.83	2.8	10.0	3.59	3.8	0.83	2.4	10.0	5.68	6.0

Worksheet for Circular Orifice - 1

Project Description	
Solve For	Discharge

Input Data	
Headwater Elevation	52.64 ft
Centroid Elevation	45.62 ft
Tailwater Elevation	48.00 ft
Discharge Coefficient	0.600
Diameter	3.0 in

Results	
Discharge	0.51 cfs
Headwater Height Above Centroid	7.02 ft
Tailwater Height Above Centroid	2.38 ft
Flow Area	0.0 ft²
Velocity	10.37 ft/s

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GRADING AND DRAINAGE NOTES

1. "A GRADING PERMIT IS REQUIRED UNDER ORDINANCE 1131."
2. "EXCAVATING CONTRACTOR MUST GIVE LOCATION FOR WASTING EXCESS EXCAVATION AND A LETTER FROM THE OWNER GIVING PERMISSION FOR DUMPING PRIOR TO STARTING ON-SITE CONSTRUCTION."
3. "CITY ENGINEER'S OFFICE SHALL BE NOTIFIED BEFORE ANY ON-SITE CONSTRUCTION BEGINS."
4. "CONTRACTOR SHALL BE RESPONSIBLE FOR THE APPOINTMENT OF A LICENSED SURVEYOR WHO SHALL CERTIFY STAKING PAD AND A FINISHED FLOOR ELEVATION, AND WHO SHALL SUBMIT CERTIFICATION OF CONSTRUCTED BUILDING PAD ELEVATIONS PRIOR TO CITY ACCEPTANCE OF PROJECT."
5. "A SEPARATE PERMIT IS NECESSARY FOR ANY OFF-SITE CONSTRUCTION."
6. "A GRADING AND DRAINAGE PLAN SHALL BE ON THE JOBSITE AT ALL TIMES. DEVIATIONS FROM THE PLAN MUST BE PRECEEDED BY AN APPROVED PLAN REVISION."
7. OWNER: VALLEY NATIONAL BANK
   15 EAST MONROE
   PHOENIX, ARIZONA 85004 261-8368
8. CUT AND FILL CUT: 220 C.Y. FILL: 275 C.Y.

ESTIMATED STORAGE VOLUME PROVIDED ON AS-BUILT PLANS : 1,995 CF

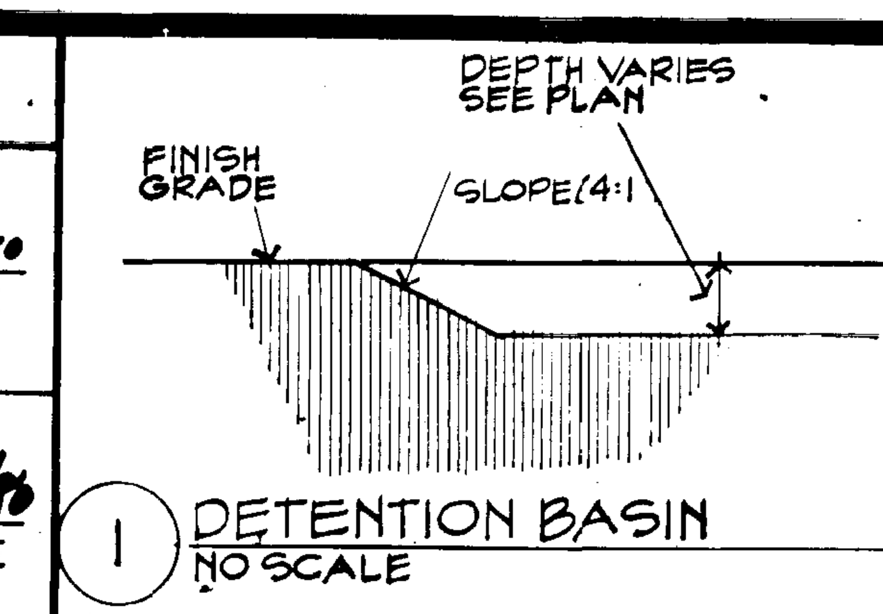
CITY OF SCOTTSDALE

REVIEWED BY			
FIRE DEPARTMENT		PRIVATE DEVELOPMENT ENGINEERING	
TRAFFIC ENGINEERING		PLANNING DEPARTMENT	
FIELD SERVICES		MUNICIPAL UTILITIES DEPARTMENT	
PARKS DEPARTMENT		CAPITOL IMPROVEMENTS	

RECOMMENDED APPROVAL BY
9/12/80
PRIVATE DEVELOPMENT ENGINEERING MANAGER — DATE

APPROVED BY
9/15/80
ENGINEERING SERVICES DIRECTOR — DATE

REVISED MAY 1980



NET ACREAGE ON SITE
1.264 ACRES

WATER DETENTION CALCS
SEE DRAINAGE REPORT FOR ALL DETENTION INFORMATION.

SYMBOLS
90.00 EXISTING ELEV.
91.00 FINISHED ELEV.
POLE LIGHT 12'-0" HIGH APPROX.
DRAINAGE SLOPE -TYP-

BENCH MARK
TOP OF BRASS CAP SET IN CONC. ELEVATION = 1253.20 CITY OF SCOTTSDALE DATUM

GENERAL NOTES
SLOPE EARTH AWAY FROM BUILDING.
4" Φ SCHED 40 PVC UNDERGROUND INTERCONNECT PIPE
DF - DOUBLE FACED
SF - SINGLE "
'A' - SEE 1/G2
DIRECTIONAL SIGNS and ARROWS N.I.C.

GRADING and DRAINAGE PLAN
SCALE: 1"=16'-0"

REVISED 1 AUG 1980 TO SHOW SEWER and WATER TAPS FROM P.1. and C/SCOTTSDALE APPROVAL BLOCK ADDED.

REVISED 28 AUG TO SHOW DIRECTIONAL SIGNS, DRY-WELL and ASPHALTE REPLACEMENT

5069

1149-DR-79

9-15-80

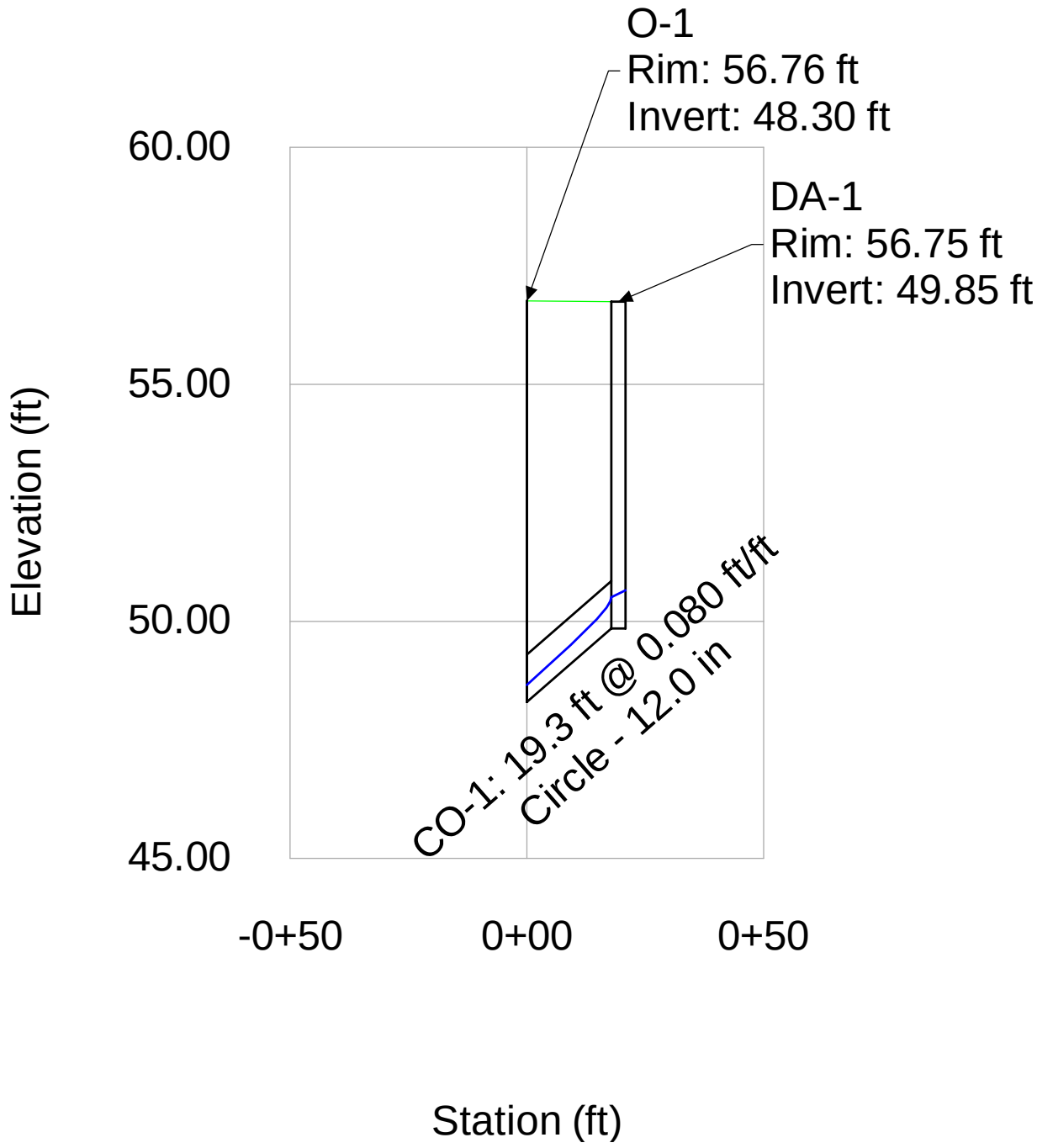
THE ORCUTT/WINSLOW PARTNERSHIP
ARCHITECTS A.I.A. PLANNERS
PHOENIX, ARIZONA

VALLEY NATIONAL BANK
CAMELBACK-MILLER OFFICE
SCOTTSDALE, ARIZONA

GRADING and DRAINAGE PLAN				SHEET NUMBER
DRAWN HRW	CHECKED HO	DATE 23 MAY 80	JOB NO. 7929	G1 OF 2

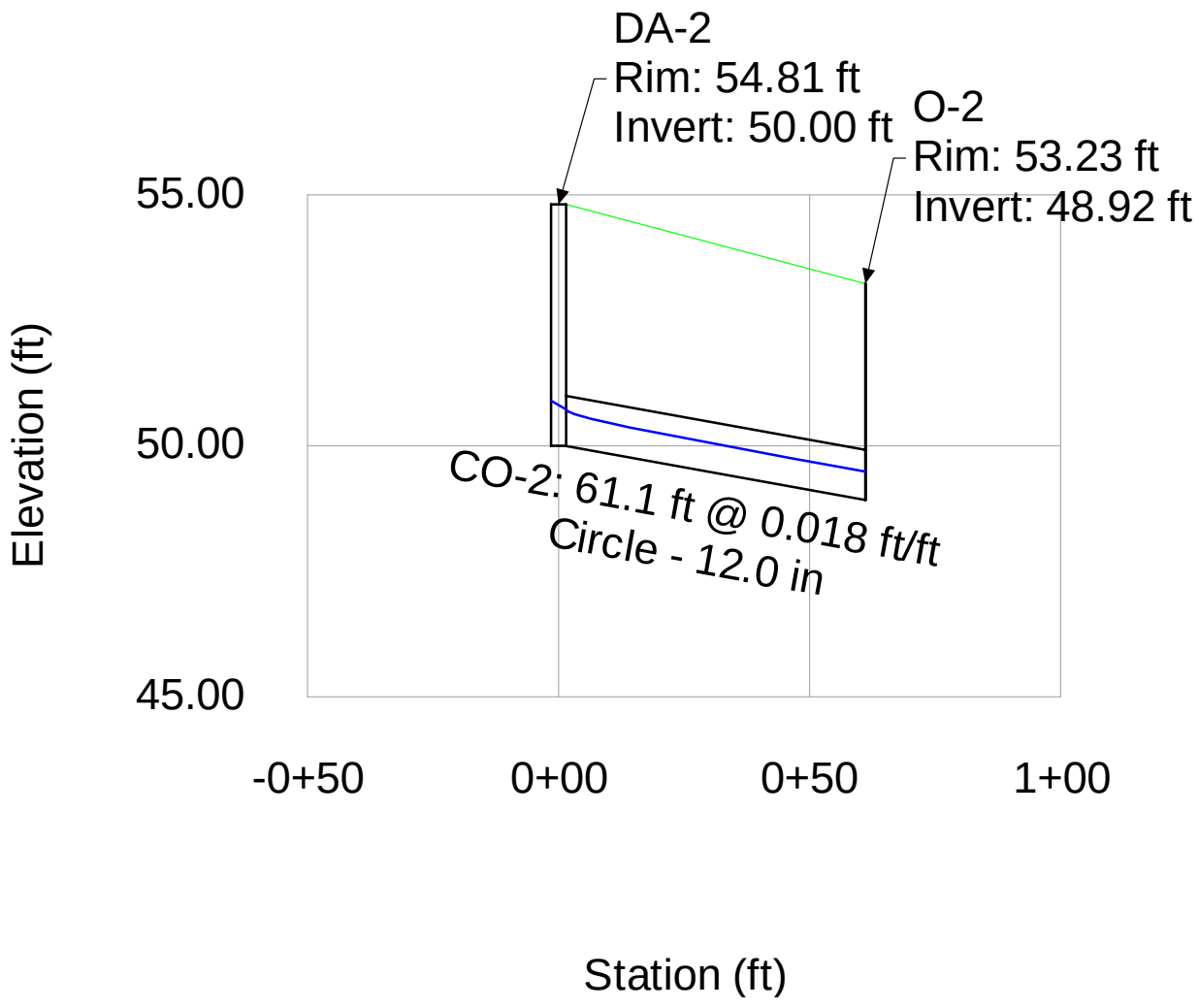
5-DR-2022
8/10/2022

Profile Report
Engineering Profile - DA-1 (2022-05-26 Storm Cad.stsw)



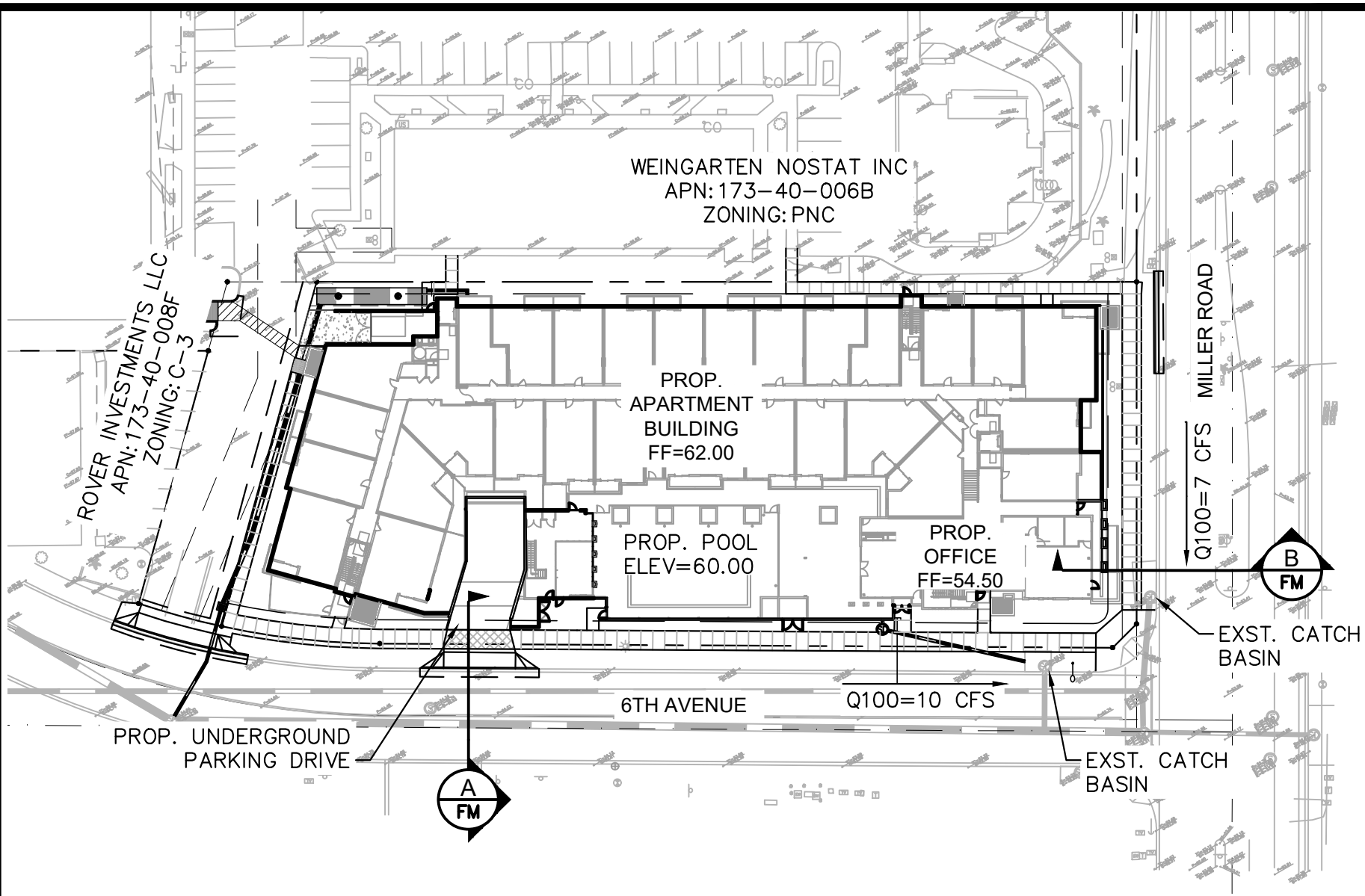
5-DR-2022
8/10/2022

Profile Report
Engineering Profile - DA- 2 (2022-05-26 Storm Cad.stsw)



5-DR-2022
8/10/2022

Appendix D – Street Capacity Analysis



FLOWMASTER CROSS SECTION EXHIBIT

Kimley»Horn

K:\PHX_Civil\291245002 - Scottsdale Miller Plaza\CADD\Exhibits\Flowmaster Sections.dwg Aug 09, 2022 Carlos.Ambrizc
XREFS: X245002BM X245002GD X245002UT x245002vf

5-DR-2022
8/10/2022

Worksheet for Section A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.006 ft/ft
Discharge	10.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+05.0	54.40
0+10.0	54.50
0+21.0	53.80
0+23.0	54.00
0+41.0	54.30

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+05.0, 54.40)	(0+21.0, 53.80)	0.013
(0+21.0, 53.80)	(0+23.0, 54.00)	0.016
(0+23.0, 54.00)	(0+41.0, 54.30)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	5.4 in
Roughness Coefficient	0.015
Elevation	54.25 ft
Elevation Range	53.80 to 54.50 ft
Flow Area	4.2 ft²
Wetted Perimeter	24.30 ft
Hydraulic Radius	2.1 in
Top Width	24.27 ft
Normal Depth	5.4 in
Critical Depth	5.4 in
Critical Slope	0.006 ft/ft
Velocity	2.36 ft/s
Velocity Head	0.09 ft
Specific Energy	0.54 ft

5-DR-2022
8/10/2022

Worksheet for Section A

Results	
Froude Number	0.998
Flow Type	Subcritical

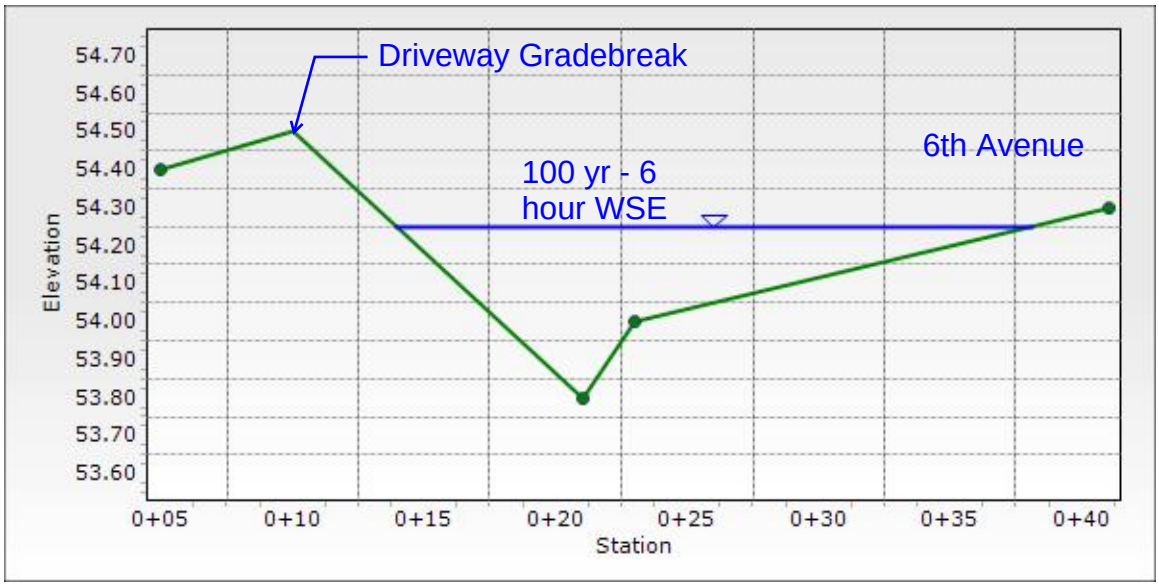
GVF Input Data	
Downstream Depth	0.0 in
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.4 in
Critical Depth	5.4 in
Channel Slope	0.006 ft/ft
Critical Slope	0.006 ft/ft

Cross Section for Section A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.006 ft/ft
Normal Depth	5.4 in
Discharge	10.00 cfs



5-DR-2022
8/10/2022

Worksheet for Section B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.005 ft/ft
Discharge	7.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	54.50
0+10.0	54.50
0+21.0	53.34
0+28.0	53.24
0+28.5	52.74
0+30.0	52.84
0+60.0	54.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 54.50)	(0+21.0, 53.34)	0.035
(0+21.0, 53.34)	(0+30.0, 52.84)	0.016
(0+30.0, 52.84)	(0+60.0, 54.00)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	6.0 in
Roughness Coefficient	0.016
Elevation	53.24 ft
Elevation Range	52.74 to 54.50 ft
Flow Area	2.9 ft²
Wetted Perimeter	12.54 ft
Hydraulic Radius	2.7 in
Top Width	12.32 ft
Normal Depth	6.0 in
Critical Depth	5.8 in
Critical Slope	0.006 ft/ft
Velocity	2.45 ft/s

Worksheet for Section B

Results	
Velocity Head	0.09 ft
Specific Energy	0.59 ft
Froude Number	0.897
Flow Type	Subcritical

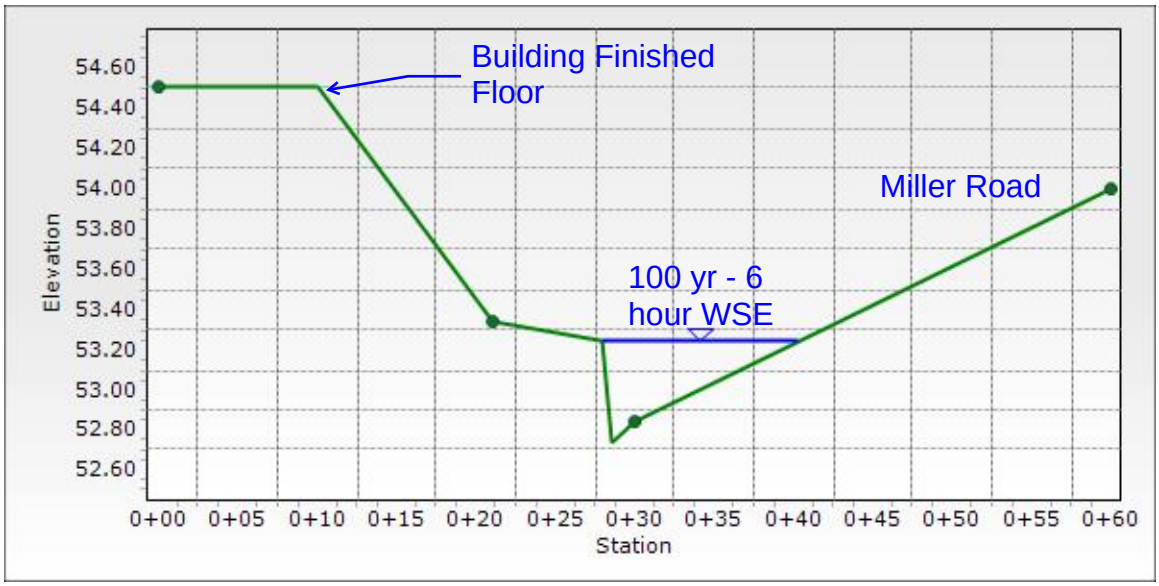
GVF Input Data	
Downstream Depth	0.0 in
Length	0.00 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.0 in
Critical Depth	5.8 in
Channel Slope	0.005 ft/ft
Critical Slope	0.006 ft/ft

Cross Section for Section B

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Channel Slope	0.005 ft/ft
Normal Depth	6.0 in
Discharge	7.00 cfs



5-DR-2022
8/10/2022

Appendix E – Old Castle Storm Water Quality Unit

FloGard® Dual-Vortex Hydrodynamic Separator

Characteristics and Capacities (English)

Model	ID	Depth Below Invert	Treated Flow Capacity[1]			Total Flow Capacity[3]	Max. Pipe Size	Sediment Storage	Oil/ Floatable Storage
	ft	*ft*	*67 µm cfs*	*110 µm cfs*	*Peak[2] cfs*	*cfs*	*in*	*yd³*	*gal*
DVS-36	3	3.75	0.12	0.35	0.50	4	12	0.3	18
DVS-48	4	5.00	0.25	0.75	1.25	9	18	0.7	43
DVS-60	5	6.25	0.45	1.30	2.50	16	24	1.3	83
DVS-72	6	8.25	0.70	2.00	4.25	27	36	2.2	141
DVS-84[4]	7	9.50	1.00	3.00	6.50	40	42	3.5	294
DVS-96	8	10.75	1.40	4.20	9.50	57	48	5.3	337
DVS-120[4]	10	13.50	2.50	7.30	16.80	99	48	9.7	917
DVS-144[4]	12	16.00	3.90	11.60	26.40	154	60	15.5	1825

Characteristics and Capacities (Metric)

Model	ID	Depth Below Invert	Treated Flow Capacity[1]			Total Flow Capacity[3]	Max. Pipe Size	Sediment Storage	Oil/ Floatable Storage
	m	*m*	*67 µm L/s*	*110 µm L/s*	*Peak[2] L/s*	*L/s*	*mm*	*m³*	*L*
DVS-36	0.9	1.14	3.5	10	14	113	300	0.23	68
DVS-48	1.2	1.52	7	21	35	255	450	0.54	163
DVS-60	1.5	1.91	13	37	71	453	600	1.00	314
DVS-72	1.8	2.51	20	57	120	765	900	1.70	534
DVS-84[4]	2.1	2.90	30	85	184	1133	1050	2.70	1113
DVS-96	2.4	3.28	40	120	269	1614	1200	4.00	1276
DVS-120[4]	3.0	4.11	70	205	475	2800	1200	7.40	3471
DVS-144[4]	3.7	4.88	110	330	750	4360	1500	11.90	6908

[1]Treated Flow Capacity is based on 80% removal of suspended sediment with the approximate mean particle size shown. The appropriate flow capacity should be selected based on expected site sediment characteristics.
[2] Maximum flow prior to bypass. Correlates approximately to 80% removal of suspended sediment with a 250 µm particle size mean.
[3] Total design flow to the system should not exceed the Peak Flow Capacity.
[4]Call Kristar representative for availability in your area.

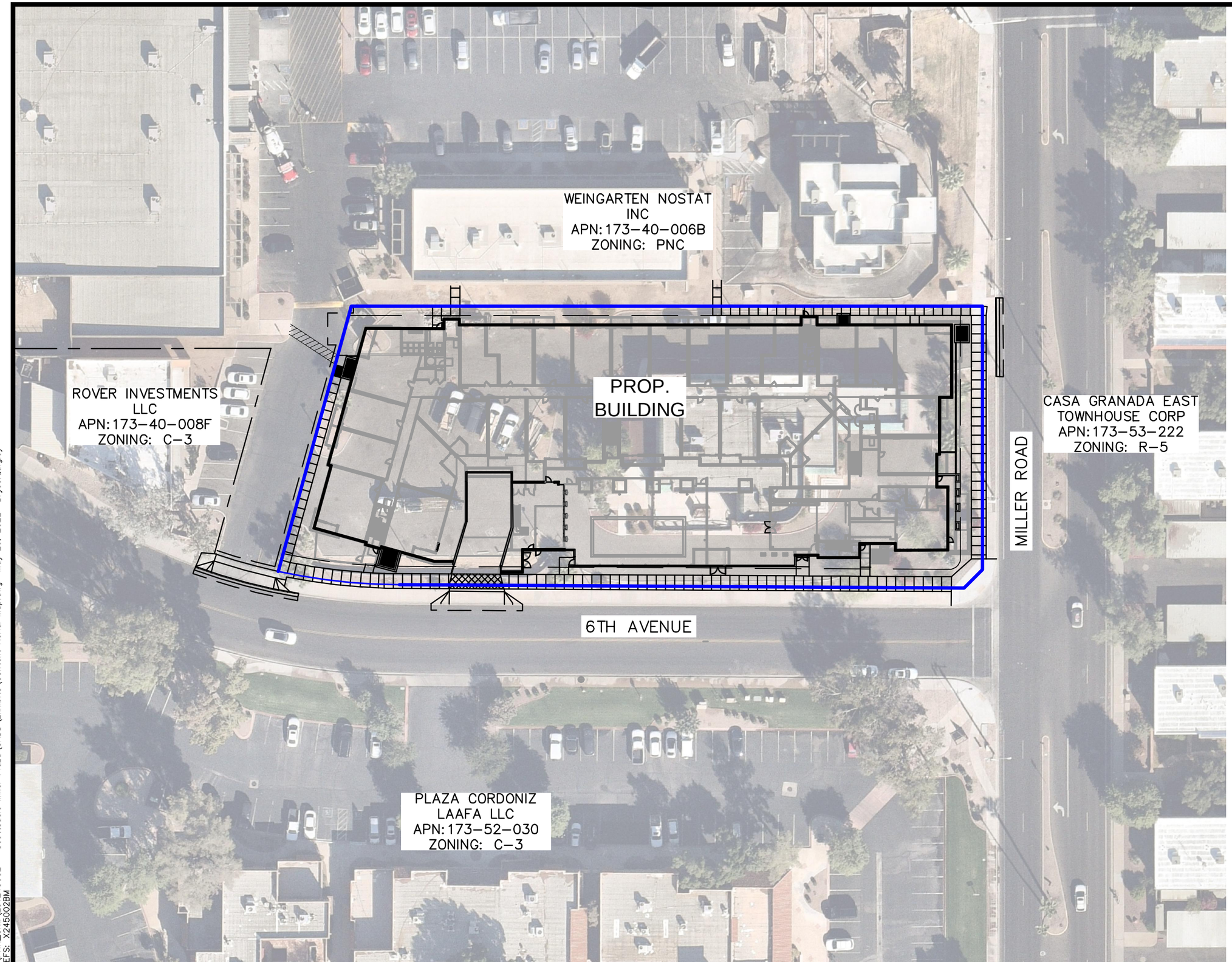
Notes: Systems may be sized based on a water quality flow (i.e. 1-inch design storm) or on net annual sediment load removal depending on local regulatory requirements.
Contact Kristar for the most accurate and cost effective sizing for your project location.

When sizing system based on a water quality flow, the required flow to be treated must be less than or equal to the Treated Flow Capacity for the selected unit.

360 Sutton Place, Santa Rosa, CA, 95407, (800) 579-8819
REV DVCC 020111

5-DR-2022
8/10/2022

Appendix F – Figures



SITE LIMITS

NORTH

GRAPHIC SCALE IN FEET
0 25 50 100

CONTEXT AERIAL MAP

Kimley»Horn

5 DR 2022
8/10/2022

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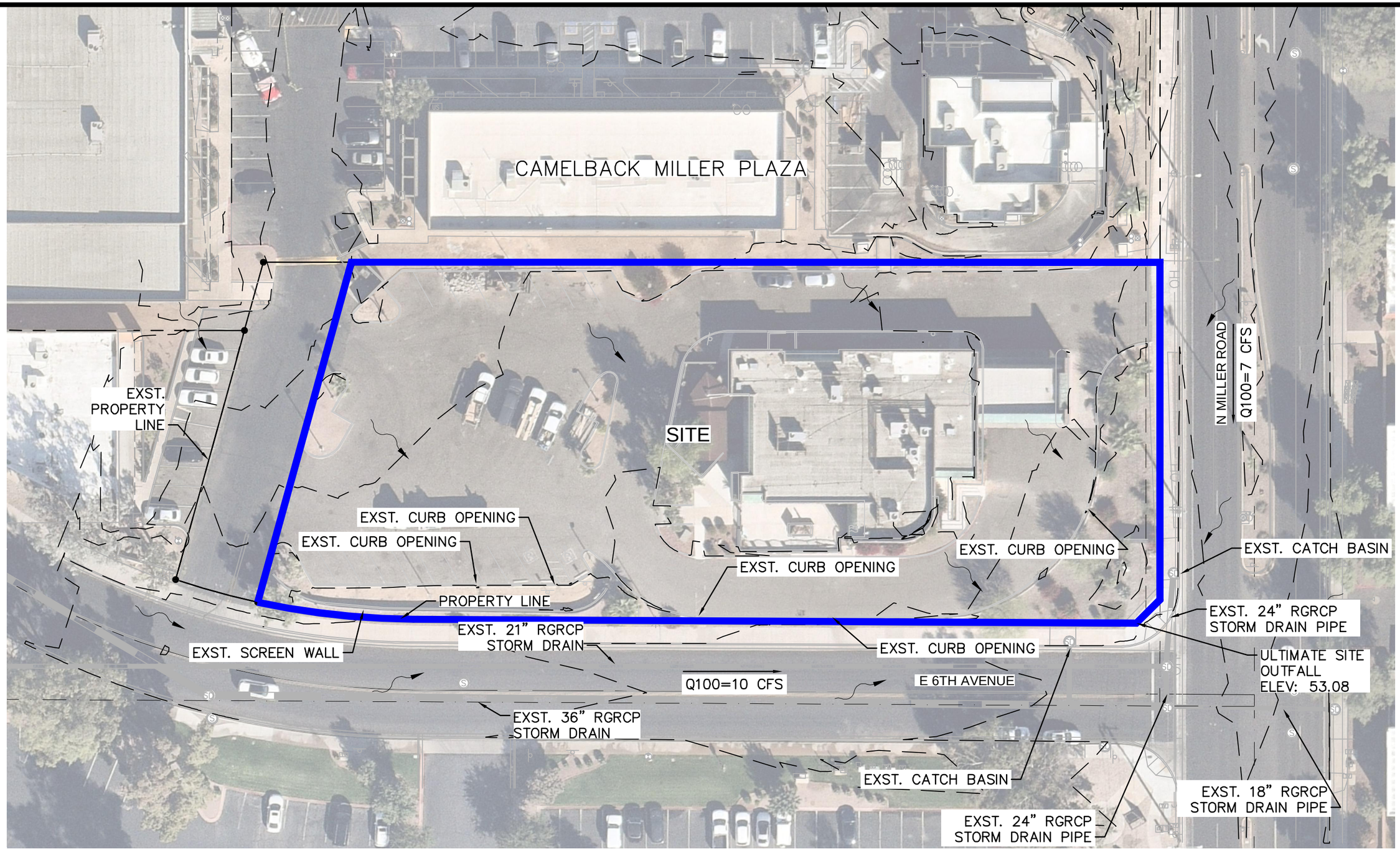
XREFS: X245002BM



GRAPHIC SCALE IN FEET
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NORTH

EXISTING CONDITIONS

02/02/21

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5-DR-2022
8/10/2022

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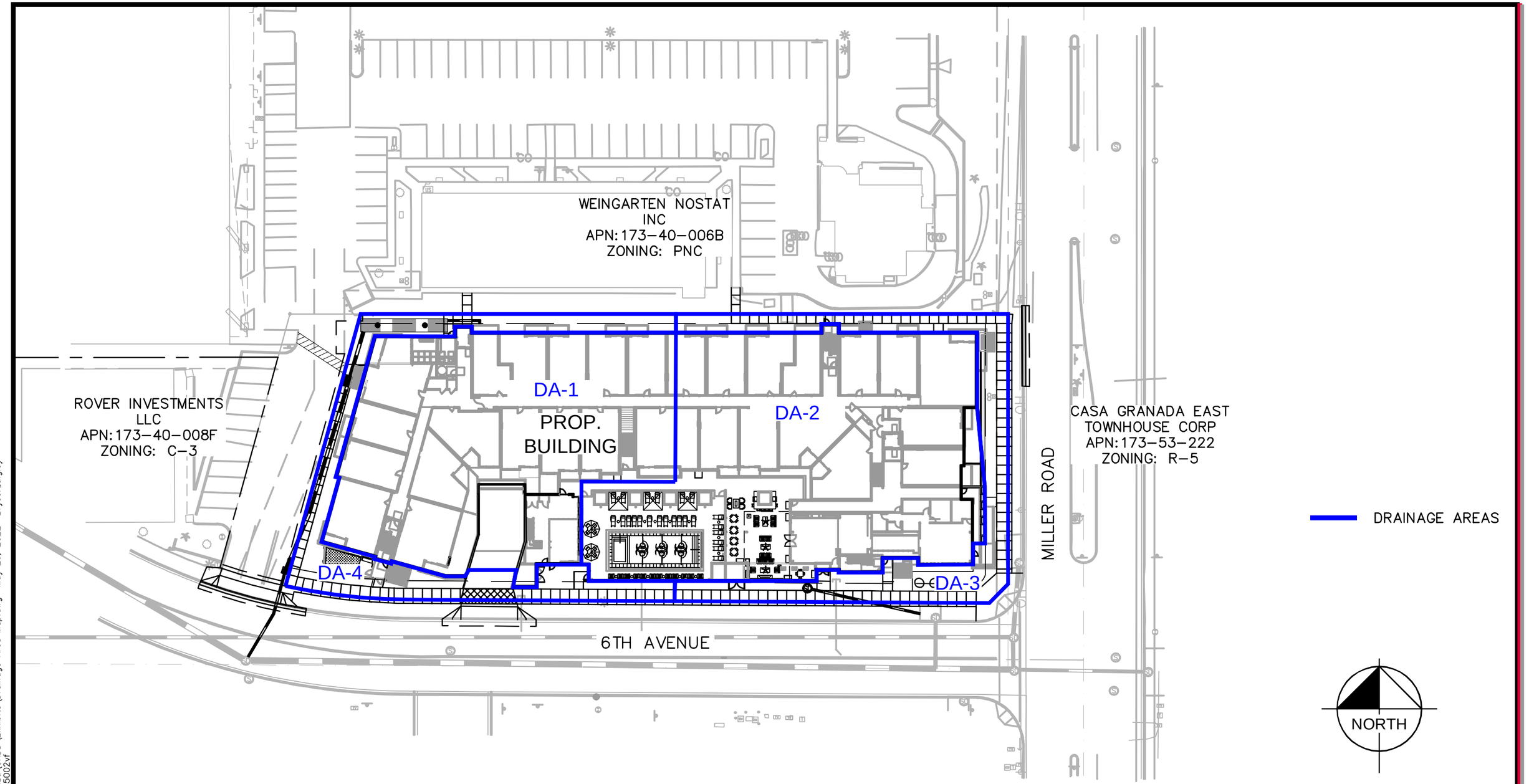

DRAINAGE AREA MAP

Kimley»Horn

5-DR-2022
8/10/2022

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MILLER ROAD

6TH AVENUE

exst curb opening

Site Generated Q100 = 6.2 cfs

DRAINAGE AREA	LAND USE	DRAINAGE AREA sf	ac	RUNOFF COEFFICIENT	
1	Pavement/Building	7615.82	0.23	0.95	PRE-DEVELOPMENT COEFFICIENT
2	Landscape	7512.15	0.16	0.43	
3	Landscape	873.89	0.02	0.43	
4	Landscape	1819.72	0.04	0.43	0.86
5	Pavement/Building	37842.08	0.87	0.95	

GRAPHIC SCALE IN FEET
0 20 40 80

NORTH

DRAINAGE AREAS

PRE-DEVELOPMENT DRAINAGE AREA MAP

Kimley»Horn

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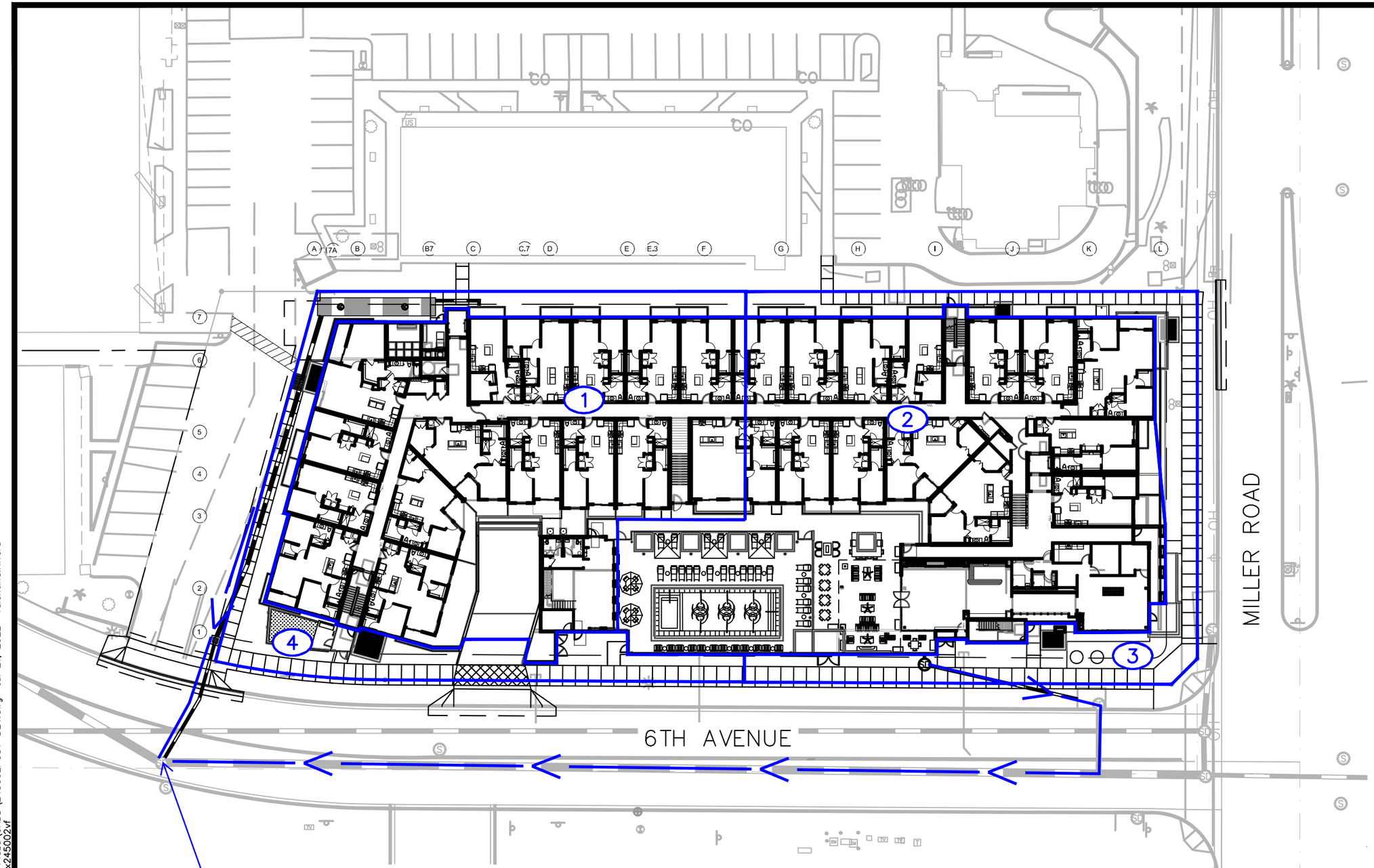
XREFS: x245002vf X245002BM

5-DR-2022
8/10/2022



Site Generated Q100 = 6.0 cfs

DRAINAGE AREA	LAND USE	DRAINAGE AREA sf	ac	RUNOFF COEFFICIENT	POST-DEVELOPMENT COEFFICIENT
1	Pavement/Building	19327.71	0.44	0.95	0.83
2	Pavement/Building	23116.16	0.53	0.95	
3	Landscape	6273.26	0.14	0.43	
4	Landscape	6357.01	0.15	0.43	

POST-DEVELOPMENT DRAINAGE AREA MAP

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5-DR-2022
8/10/2022

COMMUNITY NUMBER	COUNTY NUMBER	PANEL # PANEL DATE	SUFFIX	DATE OF FIRM (INDEX DATE)	FIRM ZONE	BASE FLOOD ELEVATION (IN AO ZONE USE DEPTH)
5012	04013C	2235	M	SEPTEMBER 9, 2020	X	N/A

ENGINEER'S CERTIFICATION:

THE LOWEST FLOOR ELEVATION(S) AND/OR FLOOD PROOFING ELEVATION(S) ON THIS PLAN ARE SUFFICIENTLY HIGH TO PROVIDE PROTECTION FROM FLOODING CAUSED BY A 100-YEAR STORM, AND ARE IN ACCORDANCE WITH SCOTTSDALE REVISED CODE, CHAPTER 37 – FLOODPLAIN AND STORMWATER REGULATION.

NOTES

1. ADD 1200' TO ALL ELEVATIONS.
2. ADD 0.5' TO PAVEMENT (P) ELEVATIONS TO OBTAIN TOP OF CURB ELEVATIONS, UNLESS OTHERWISE NOTED.

GRADING AND DRAINAGE NOTES

1. INSTALL HDPE STORM DRAIN PIPE. LENGTH, SIZE, AND SLOPE PER PLAN.
2. CONNECTION TO EXISTING CATCH BASIN.
3. PROP. SAWCUT LINE, 2' MIN.
4. PROPOSED CL-1 TWO WAY DRIVEWAY PER CITY OF SCOTTSDALE DETAIL 2256.
5. PROPOSED OLD CASTLE DVS-60 STORMWATER QUALITY UNIT.
6. INSTALL BUILDING ROOF DRAIN AIR BREAK, INVERT PER PLAN. REF MEP PLANS FOR CONTINUATION.
7. STORM DRAIN CONNECTION TO UNDERGROUND RETENTION TANKS, INVERT PER PLAN.

GRADING AND DRAINAGE NOTES

9. CONNECTION TO EXISTING STORM DRAIN MANHOLE.
10. INSTALL CATCH BASIN STRUCTURE WITH 3" ORIFICE PLATE ON DOWNSTREAM PIPE.
11. INSTALL 7' DIAMETER CMP 16-GAUGE UNDERGROUND RETENTION TANKS, LENGTH AND SLOPE PER PLAN. TANK INVERT TO BE LINED.
13. INSTALL UNDERGROUND RETENTION ACCESS RISER WITH GRATED COVER.
15. INSTALL HDPE STORM DRAIN BEND, SIZE TO MATCH ADJOINING PIPES. INVERT AND ANGLE PER PLAN.

LEGEND

- PROPERTY LINE
- RIGHT OF WAY LINE
- STREET CENTERLINE
- EASEMENT LINE
- EXISTING SEWER MAIN
- EXISTING PUBLIC WATER MAIN
- PROPOSED WATER MAIN
- PROPOSED SEWER MAIN
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- HIGH POINT
- PROPOSED CONTOUR
- EXISTING CONTOURS
- 50.00 FG — PROPOSED PAVEMENT SPOT ELEVATION
- EXISTING SPOT ELEVATION
- EXISTING SANITARY SEWER MANHOLE
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- PROPOSED CATCH BASIN
- SURFACE FLOW DIRECTION
- EXISTING STORM DRAIN MANHOLE

DEVELOPER/OWNER

TOLL BROTHERS APARTMENT LIVING
8767 E. VIA DE VENTURA, SUITE 390
SCOTTSDALE, AZ 85258
PH: (480) 951-0782
CONTACT: RICK CORDOVA

LAND SURVEYOR

ANTHONY SLATER
22425 N. 16TH STREET, SUITE 1
PHOENIX, ARIZONA 85024
PHONE: 480-922-0780
TONYS@SIGSURVEYAZ.COM

CIVIL ENGINEER

KIMLEY-HORN AND ASSOCIATES, INC
7740 N. 16TH STREET, SUITE 300
PHOENIX, ARIZONA 85020
PH: (602) 944-5500
CONTACT: TRAVER JONES, PE

ARCHITECT

ORB ARCHITECTURE, LLC.
2944 N 44TH ST, STE 101
PHOENIX, ARIZONA 85018
PH: (602) 957-4530
CONTACT: RICH BARBER, AIA

FLOOD INFORMATION

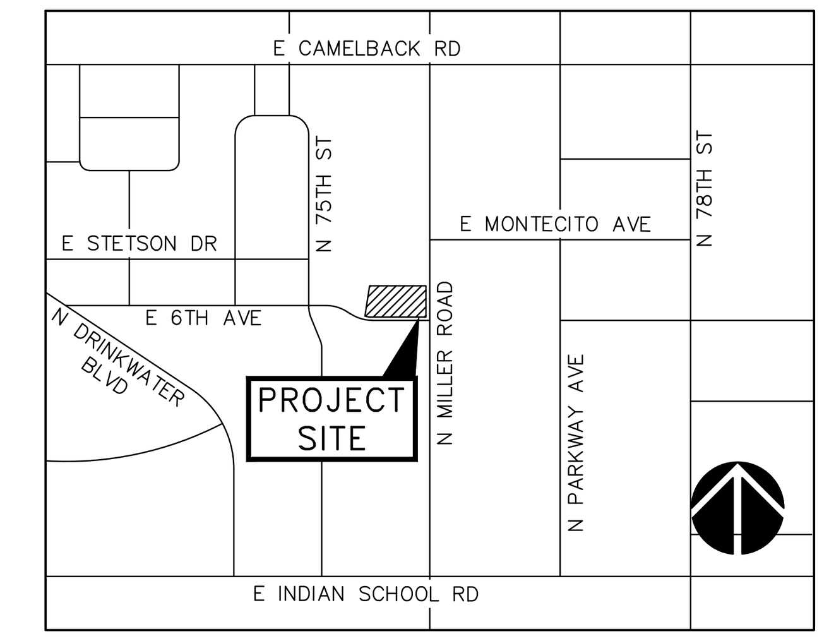
ACCORDING TO THE FLOOD INSURANCE RATE MAP #04013C2235M DATED SEPTEMBER 9, 2020 THIS PROPERTY IS LOCATED IN FLOOD ZONE "X": AREA OF MINIMAL FLOOD HAZARD.

BENCHMARK

PER SURVEY INNOVATION GROUP INC., THE BENCHMARK IS A FOUND BRASS CAP IN HANDHOLE AT THE INTERSECTION OF 6TH AVENUE AND MILLER ROAD.

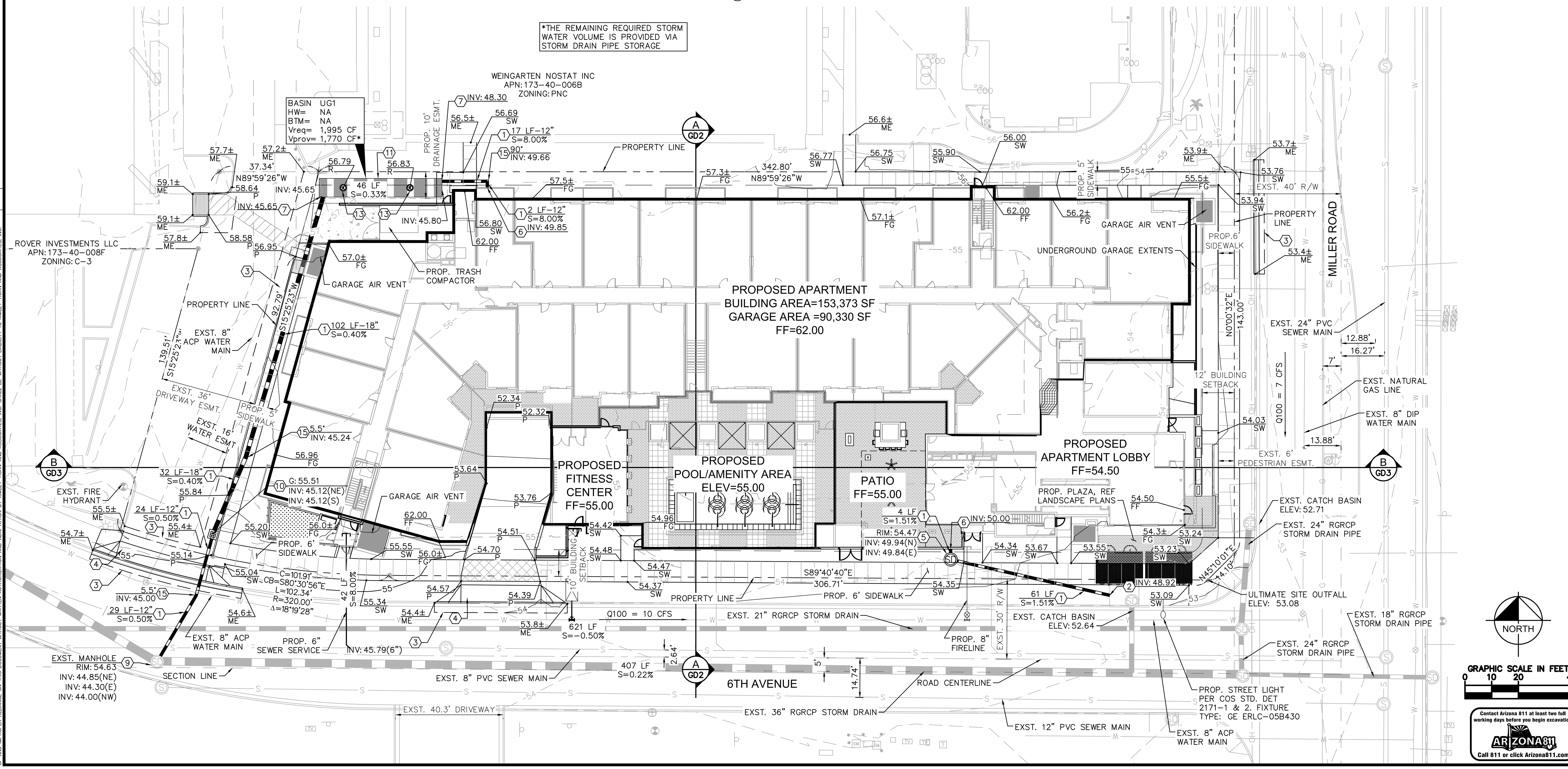
BASIS OF BEARING

PER SURVEY INNOVATION GROUP INC., THE BASIS OF BEARING IS THE EAST LINE OF THE SOUTHWEST QUARTER OF SECTION 23, AS SHOWN IN BOOK 192, PAGE 49, MARICOPA COUNTY RECORDS. SAID LINE BEARS NORTH 00 DEGREES 00 MINUTES 32 SECONDS EAST.



VICINITY MAP

SCOTTSDALE, AZ
N.T.S.



NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

Contact Arizona 811 at least two full working days before you begin excavation
ARIZONA811
Call 811 or click Arizona811.com

Kimley»Horn

7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

7570 E. 6TH AVENUE
PRELIMINARY GRADING AND DRAINAGE PLAN
SCOTTSDALE, ARIZONA 85251

PROJECT No.	291245002
SCALE (H):	NONE
SCALE (V):	NONE
DRAWN BY:	BEQ
DESIGN BY:	BEQ
CHECK BY:	TMJ
DATE:	08/08/2022

245002GD.dwg

GD1
1 OF 3 SHEETS

REV | DESCRIPTION | BY | DATE | APPR

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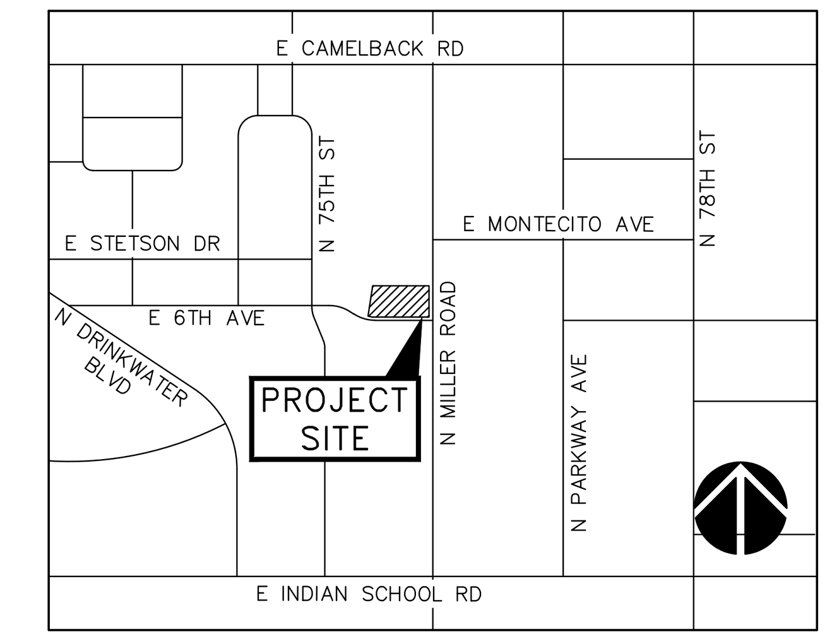
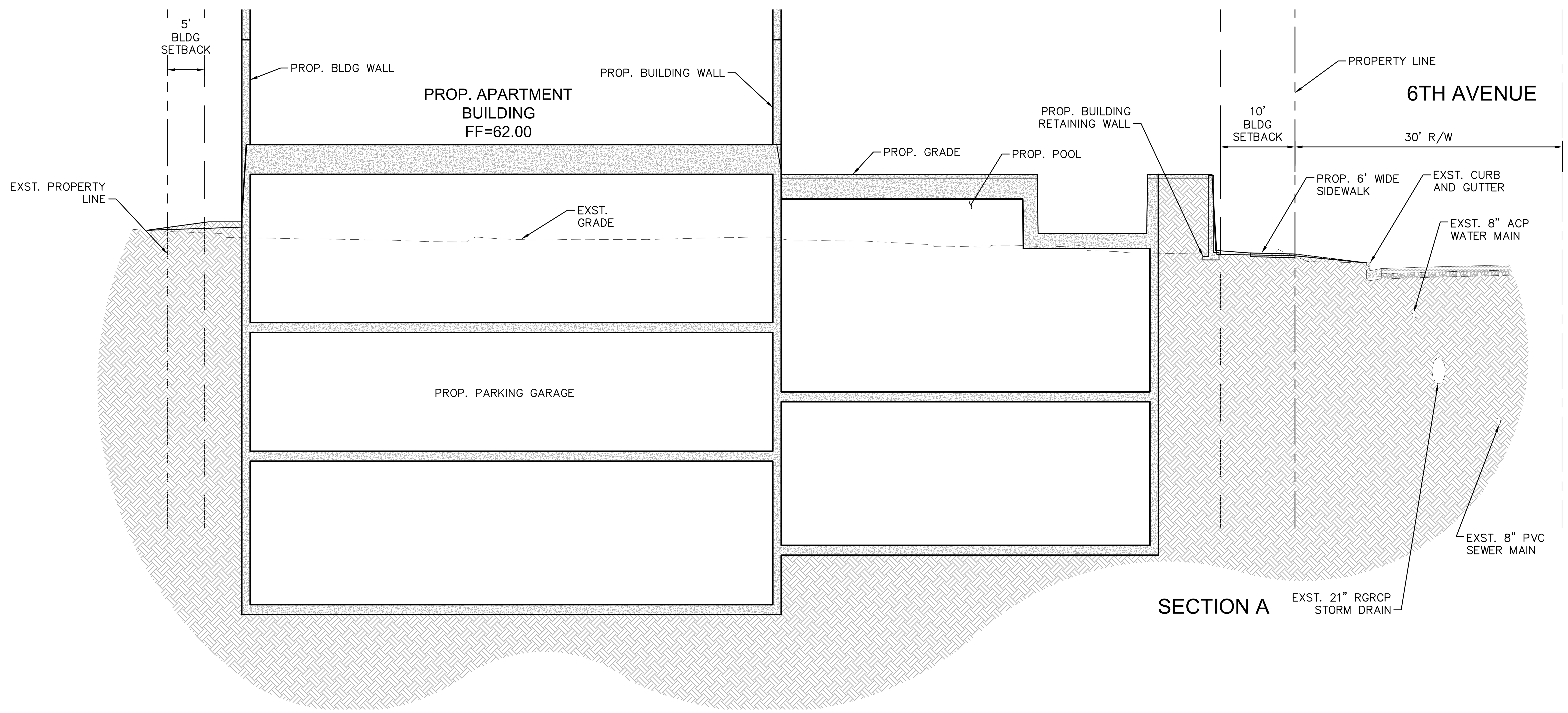
5-DR-2022
8/10/2022



VICINITY MAP

SCOTTSDALE, AZ
N.T.S.



SECTION A

REV	DESCRIPTION	BY	DATE	APPR

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Phoenix, Arizona 85020 (602) 944-5500

7570 E. 6TH AVENUE

SECTIONS

SCOTTSDALE, ARIZONA 85251

PROJECT No.
291245002

SCALE (H): NONE
SCALE (V): NONE
DRAWN BY: BEQ
DESIGN BY: BEQ
CHECK BY: TMJ
DATE: 08/08/2022

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Call 811 or click Arizona811.com

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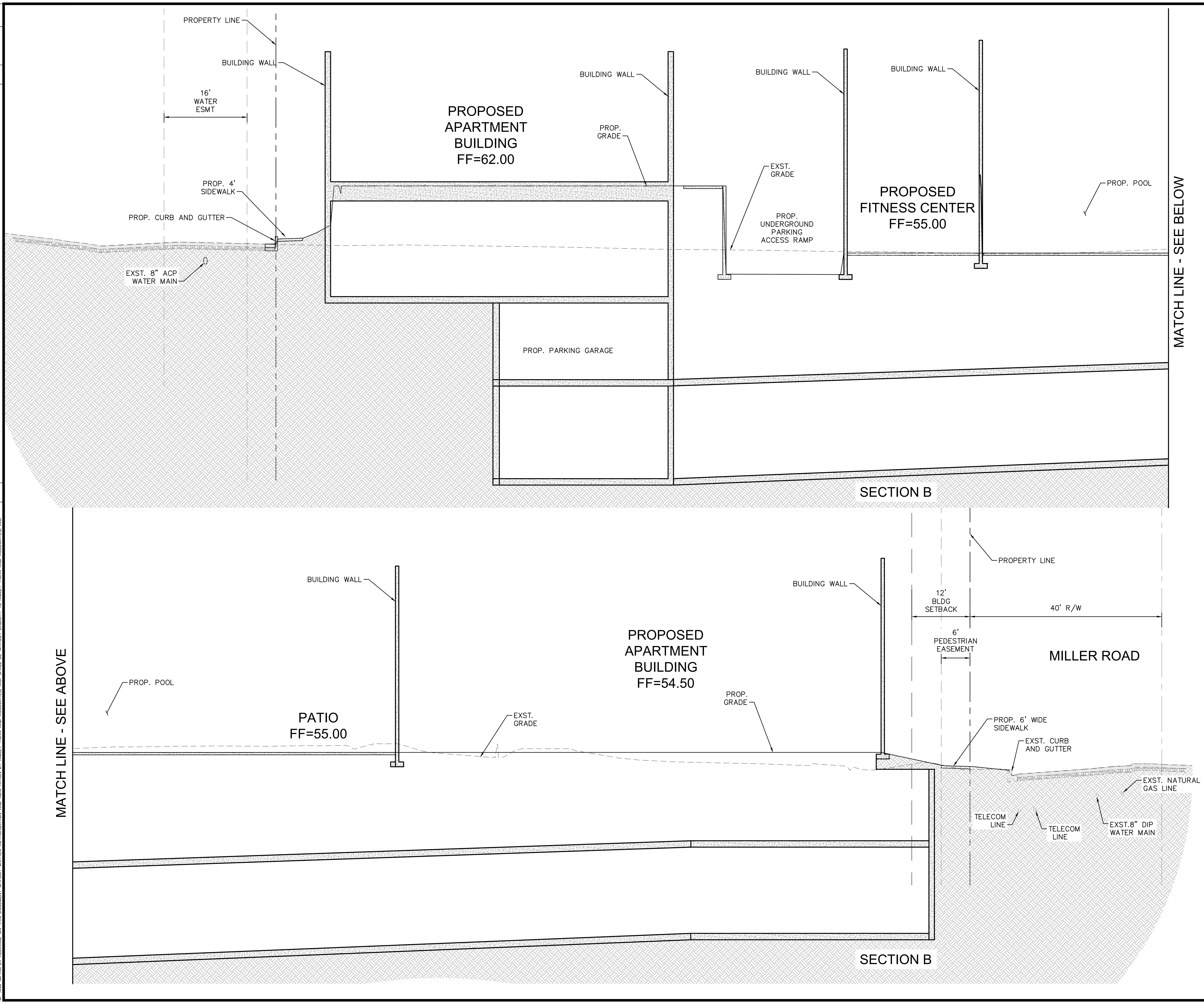
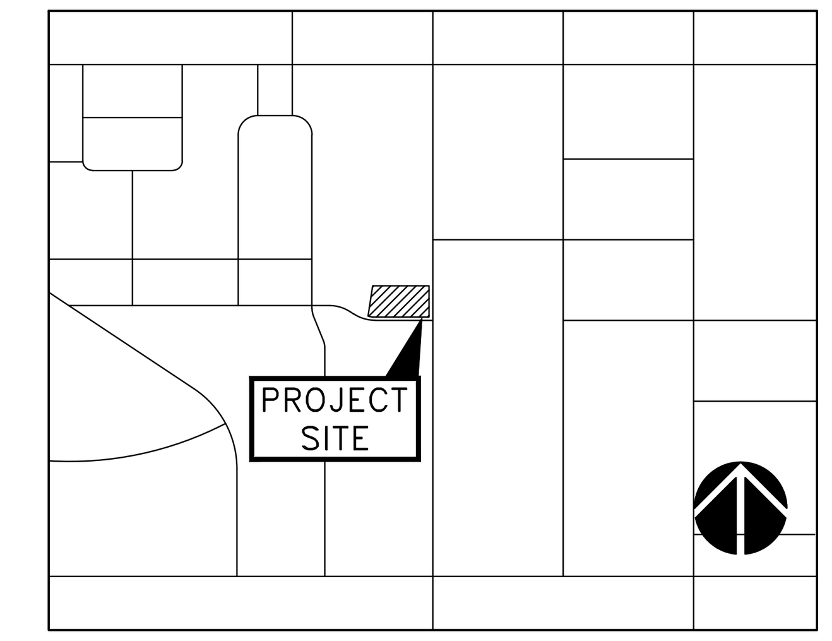
GD2

2 OF 3 SHEETS

5-DR-2022
8/10/2022





VICINITY MAP
SCOTTSDALE, AZ
N.T.S.

Kimley»Horn

7740 North 16th Street, Suite 300
Phoenix, Arizona 85020 (602) 944-5500

7570 E. 6TH AVENUE

SECTIONS

SCOTTSDALE, ARIZONA 85251

PROJECT No. 291245002	
SCALE (H): NONE	
SCALE (V): NONE	
DRAWN BY: BEQ	
DESIGN BY: BEQ	
CHECK BY: TMJ	
DATE: 08/08/2022	

REV | DESCRIPTION | BY | DATE | APPR

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Call 811 or click Arizona811.com

245002GD.dwg

GD3

3 OF 3 SHEETS

5-DR-2022
8/10/2022