

PRELIMINARY DRAINAGE REPORT

Case #: 10-DR-2022

Review Cycle: 2

Status: Accepted

Reviewed By: GA

Date: 08/08/2022

This report includes the grading and drainage plans

Edits have been added to this accepted drainage report for some clarifications or for correcting minor errors to be incorporated at the time of preparing the final drainage report

68TH and ISR

6824 E. Indian School Road,
Scottsdale, AZ 85251

Prepared For:



2435 E. Southlake Blvd. S. 150
Southlake, Texas. 76092

Prepared by:



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Project Number: 210903

Submittal Date: July 1, 2022

Case No.: 10-DR-2022

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1. INTRODUCTION

This Preliminary Drainage Report represents the storm water analysis for the 68th and ISR development proposed in Scottsdale, Arizona, at the northeast corner of 68th Street and Indian School Road (ISR). The purpose of this report is to provide the hydrologic and hydraulic analysis, required by the City of Scottsdale, to support the proposed DRB application for said development. This report includes discussions and calculations defining the storm water management concepts for the collection and conveyance necessary to comply with the drainage requirements of the City of Scottsdale and Maricopa County. Preparation of this report has been done in accordance with the requirements of the City of Scottsdale Design Standards & Policies Manual (DS&PM) 2018 ¹, and the Drainage Design Manuals for Maricopa County, Arizona, Volumes I² and Volume II³.

2. LOCATION AND PROJECT DESCRIPTION

2.1 LOCATION:

The subject property consists of land located at the northeast corner of 68th St. and E. Indian School Road in Scottsdale, AZ:

- A portion of the Northeast 1/4 of Section 22, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Scottsdale, Arizona.
- Parcel ID: Parcel 173-48-048J; AZ Ocean View LLC, Zoning is D/DMU-2 PBD DO.
Parcel 173-48-048G; AZ Ocean View LLC, Zoning is D/DMU-2 PBD DO.
- Address: 6824 E. Indian School Road, Scottsdale, AZ 85251

Refer to **FIGURE 1 - Vicinity Map** for the project's location with respect to major cross streets

2.2 EXISTING AND PROPOSED DEVELOPMENTS SURROUNDING THE SITE:

- South: Across Indian School Road is Hotel Valley; Zoning is C-3 DO HP.
- East: Northeast, adjacent to the site is Parcel 173-48-025B; BODI Gym; Zoning is C-2 DO.
Across 5th Avenue is Proctorio; Zoning is C-2.
- North: The Arizona Canal
- West: 68th Street and the Arizona Canal

2.3 EXISTING SITE DESCRIPTION:

The project area includes approximately 41,886 sq. ft. (0.96 acres) of land designated as C-2 per COS Zoning Map 17. The site is currently vacant and includes a public access road along the north boundary of the site. Per Topographic Survey prepared by Survey Innovation Group Inc., the site slopes from north to south at approximately 0.50%. Elevation varies from approximately 1,271.87' at the west corner to approximately 1,269.74' at the southeast corner. The site drains towards the southeast corner at the intersection of Indian School Road and 5th Avenue and continues to flow east along Indian School Road. The topographic survey depicts one catch basin located at the northeast corner of the site, as shown on the Existing Conditions Drainage Area Map. The existing catch basin conveys runoff through a 24" RGRC pipe that runs along the alley through a ~~15'~~_{6'} drainage easement. The 24" pipe connects to the existing

storm system within 5th Avenue. No other drainage structures were depicted onsite. Refer to **FIGURE 2** attached for an aerial of the site.

2.4 PROPOSED SITE DEVELOPMENT:

Site development includes the demolition of the existing structures and their designated parking lots, which has already taken place, and construction of a new 4-story residential building and one 900 sq.ft. retail building. The proposed development contains one point of access from the surrounding streets. The existing alley located northeast of the site will provide access from 5th Avenue to the development. Refer to **Appendix III - Preliminary Grading and Drainage Plan** for site layout.

2.5 FLOOD HAZARD ZONE:

FIRM Map Number 04013C2235L dated September 18, 2020 indicates the site is designated as Zone "X". As such, it is defined as areas determined to be outside the 0.2% annual chance floodplain and therefore is not in a special flood hazard area.

Refer to **FIGURE 3** for the FIRM.

3. EXISTING DRAINAGE CONDITIONS

3.1 OFF-SITE DRAINAGE PATTERNS

The topographic survey provides the following information for offsite drainage:

- There is an existing alley approximately 30' wide, adjacent to the eastern boundary of the site, that slopes from northwest to southeast. The alley conveys drainage from the alley onto 5th Avenue, where it is captured and conveyed to the existing storm drain system.
- The existing sidewalks to the south and east of the site drain into their adjacent streets, Indian School Road and 5th Avenue, respectively.
- Adjacent roads have curb and gutters conveying flow within the rights-of-way.
- The site is not affected by any offsite flow adjacent to the property.

3.2 ON-SITE DRAINAGE

Based on the topographic information provided, it appears that the existing onsite catch basin, EX. CB-1 at the NE corner of the site, captures runoff along the public access road, drainage area EX-2, and conveys it to the existing storm drain system along 5th Avenue. Drainage area EX-1 encompasses the remainder of the project site consisting of undeveloped area. Drainage area EX-1 drains from north to southeast, where it ultimately outfalls onto Indian School Road. The Rational Method was utilized to compute the on-site peak discharges. The Rational Method equation is calculated as shown below:

$$Q=C_{wt}IA$$

Where: C_{wt} = The runoff coefficient relating runoff to rainfall

I = Average rainfall intensity in inches/hour, lasting for T_c

T_c = The time of concentration

A = The contributing drainage area in acres

Table 1 below is a summary of existing 100-yr storm runoff and required storage volume for the site under existing conditions:

TABLE 1:

Pre-Development Peak Flows Using the Rational Method

~~Rational & Existing Required Storage Volume Calculations~~

						$V_r = 1 * (P/12) * C_w * A$
						P=100-yr, 2-hr=2.16 in.
Drainage	Area	C _w	intensity	Q	Volume Req.	Volume Req.
Area ID	(acres)	(-)	(in/hr)	(cfs)	(acre-ft)	(CF)
Outlet: Indian School Road						
EX-1	0.79	0.86	7.44	5.05	0.122	5,318.48
Outlet: EX. CB-1						
EX-2	0.14	0.71	7.44	0.72	0.017	757.63

Refer to the Existing Cwt Exhibit and Existing Conditions Drainage Area Map in Appendix II.

4. PROPOSED STORM WATER MANAGEMENT

4.1 DESIGN INTENT:

On-site drainage, in excess of stormwater storage requirements, will be directed via overland flow to the historical outlets. This is a re-development of existing commercial land; therefore, the City of Scottsdale specifies that on-site retention shall be provided to store a runoff volume that equals to the capacity of any existing storage basin plus the difference between the pre vs. post development runoff volume from the 100-year 2-hour storm event if increased or first flush volume, when applicable, whichever is greater.

The majority of the entire site is proposed impervious with minor increases in runoff compared to existing conditions. There is no retention under existing conditions; however, onsite retention will be provided under proposed conditions. basins

A drainage easement around the retention basin, and required access, will be dedicated. The dedication will be completed during final plans.

Refer to Appendix II for Proposed Conditions Drainage Area Map.

STORMWATER STORAGE

4.2 DESIGN STORM REQUIREMENTS:

In accordance with City of Scottsdale requirements, stormwater storage for the 100-year 2-hour storm event is required based on maintaining existing retention volume plus the difference between pre-development versus post development runoff volumes C-values is required or first flush volume, when applicable, whichever is greater. Required stormwater storage volume is discussed in section 4.4

4.3 LAND CHARACTERISTICS:

Based on the DS&PM, runoff coefficients for the 100-year storm event used are as follows:

- C=0.95 for roof areas
- C=0.95 for paved surface
- C=0.45 for undisturbed natural desert or desert landscape

HYDROLOGIC ANALYSIS: The hydrologic analysis is determined using the procedures in the City of Scottsdale Design Standards & Policies Manual and the Drainage Design Manual for Maricopa County, Arizona, Volume I. The Rational Method was utilized to compute the on-site peak discharges. The Rational Method equation is displayed as shown below:

$$Q=C_{wt}IA$$

Where: C_{wt} = The runoff coefficient relating runoff to rainfall

I = Average rainfall intensity in inches/hour, lasting for T_c

T_c = The time of concentration

A = The contributing drainage area in acres

Table 2 below is a summary of Proposed Q100 runoff ~~and required storage volume:~~

TABLE 2:

~~Rational & Proposed Required Storage Volume Calculations~~

Post-Development Peak Flows, Using the Rational Method

						$V_r=1*(P/12)*C_w*A$
						P=100-yr, 2-hr=2.16 in.
Drainage	Area	C_w	intensity	Q	Volume Req.	Volume Req.
Area ID	(acres)	(-)	(in/hr)	(cfs)	(acre-ft)	(CF)
Outlet: Indian School Road						
A	0.69	0.92	7.44	4.70	0.114	4,955.20
B	0.06	0.63	7.44	0.28	0.007	297.01
C	0.04	0.95	7.44	0.28	0.007	297.95
Totals	0.79	0.90		5.27	0.127	5,550.16
Outlet: EX. CB-1						
D	0.14	0.71	7.44	0.72	0.017	757.63
Totals	0.14	0.71		0.72	0.017	757.63

Refer to the **Proposed Cwt Exhibit, Proposed Conditions Drainage Area Map** and Calculations in **Appendix II.**

REQUIRED
4.4 PRE VS. POST STORMWATER RETENTION:

Per the COS– DS&PM, section 4-1.202, the proposed site is less than one acre, and therefore, first flush mitigation is not required for this site.

Onsite required storm water retention will be determined based on pre vs. post C-weight comparison. The existing condition and proposed development storage requirements for the 100-yr storm event are calculated as follows:

Pre vs. Post Required Storage Volume Calculations				
Drainage	Area	C _w	Volume Req.	
<u>Area ID</u>	<u>(acres)</u>	<u>(-)</u>	<u>(acre-ft)</u>	<u>(CF)</u>
Post-Development				
A	0.69	0.92	0.114	4955.20
B	0.06	0.63	0.007	297.01
C	0.04	0.95	0.007	297.95
Totals	0.79	0.90	0.127	5,550.16
Pre-Development				
EX-1	0.79	0.86	0.122	5318.48
Pre vs Post Required Volume			0.005	232.00

4.5 PRE VS. POST STORMWATER RUNOFF:

In case of overflow during the 100-yr storm event, the runoff will outflow through the weir at the south end of Basin A.

4.6 STORMWATER RETENTION:

BASINS PROVIDED

Basin A1 (Open Retention):

In accordance with COS design requirements, an open basin is limited to three (3) feet maximum depth with maximum side slopes of 4:1 (6:1 near streets) with one (1) foot freeboard and include an emergency overflow outlet.

- The volume for open basins is calculated using the area-sum volume method based on design contours.

BASIN A1					
ELEV.	AREA	DEPTH	AVG V	SUM V	COMMENT
(FT)	(SF)	(FT)	(CF)	(CF)	
68.70	62			0.00	Bottom
		1.00	242.33		
69.70	422			242	Top

The above summary indicates there is approximately **242 c.f.** of storage volume available. The provided volume of 242 c.f. is larger than 232 c.f. required and therefore will be adequate for the pre vs. post calculated required storage.

STORMWATER RETENTION DISCHARGE:

Per City of Scottsdale requirements, a percolation test will need to be conducted to show the basin can percolate within 36 hours since water depth in the basin exceeds 0.5'. In case of overflow, the basin will overflow along 5th Avenue, and towards the ultimate outfall at the intersection of 5th Avenue and Indian School Road.

4.7 ADEQ NOI REQUIREMENTS

The total disturbed area of this site is approximately 1.00 acres. The Arizona Department of Environmental Quality requires that any site disturbance over an acre is required to submit an NOI. An NOI will be submitted to ADEQ for this site after the first submittal of the construction documents as this site disturbance is over 1 acre.

5. FLOOD SAFETY FOR DWELLINGS**5.1 FINISHED FLOOR ELEVATIONS**

This project lies in an "X" Flood Zone. Therefore, proposed building finished floor elevations will be set a minimum of 12 inches above the 100-year high-water elevation of any adjacent streets and drainage paths. This will ensure that each building will be well above the 100-year water level. The ultimate outfall elevation is set at the southeast corner at an elevation of 1,269.86', and the lowest finish floor is set at 1,271.75 allowing about 1.83 ft of difference from the high-water elevation.

6. CONCLUSIONS**6.1 OVERALL PROJECT:**

1. The finish floor elevations will be designed a minimum of 12 inches above the 100-year water surface in adjacent streets.
2. On-site storm water storage will be provided for the pre vs post calculated required storage and discharge within 36 hours.

6.2 PROJECT PHASING:

This project will be constructed in a single phase.

7. WARNING AND DISCLAIMER OF LIABILITY

RE: following page.

8. REFERENCES

1. *Design Standards & Policies Manual, City of Scottsdale – January 2018*
2. *Drainage Design Manual for Maricopa County, Arizona, Volume I, Hydrology, Flood Control District of Maricopa County, Fourth Edition, December 14, 2018.*
3. *Drainage Design Manual for Maricopa County, Arizona, Volume II, Hydraulics, Flood Control District of Maricopa County, December 14, 2018.*

GRADING & DRAINAGE LANGUAGE

WARNING AND DISCLAIMER OF LIABILITY

The City’s Stormwater and Floodplain Management Ordinance is intended to minimize the occurrence of losses, hazards and conditions adversely affecting the public health, safety and general welfare which might result from flooding. The Stormwater and Floodplain Management Ordinance identifies floodplains, floodways, flood fringes and special flood hazard areas. However, a property outside these areas could be inundated by floods. Also, much of the city is a dynamic flood area; floodways, floodplains, flood fringes and special flood hazard areas may shift from one location to another, over time, due to natural processes.

WARNING AND DISCLAIMER OF LIABILITY

The flood protection provided by the Stormwater and Floodplain Management Ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Floods larger than the base flood can and will occur on rare occasions. Floodwater heights may be increased by constructed or natural causes. The Stormwater and Floodplain Management Ordinance does not create liability on the part of the city, any officer or employee thereof, or the federal, state or county government for any flood damages that result from reliance on the Ordinance or any administrative decision lawfully made thereunder.

Compliance with the Stormwater and Floodplain Management Ordinance does not ensure complete protection from flooding. Flood-related problems such as natural erosion, streambed meander, or constructed obstructions and diversions may occur and have an adverse effect in the event of a flood. You are advised to consult your own engineer or other expert regarding these considerations.

I have read and understand the above.

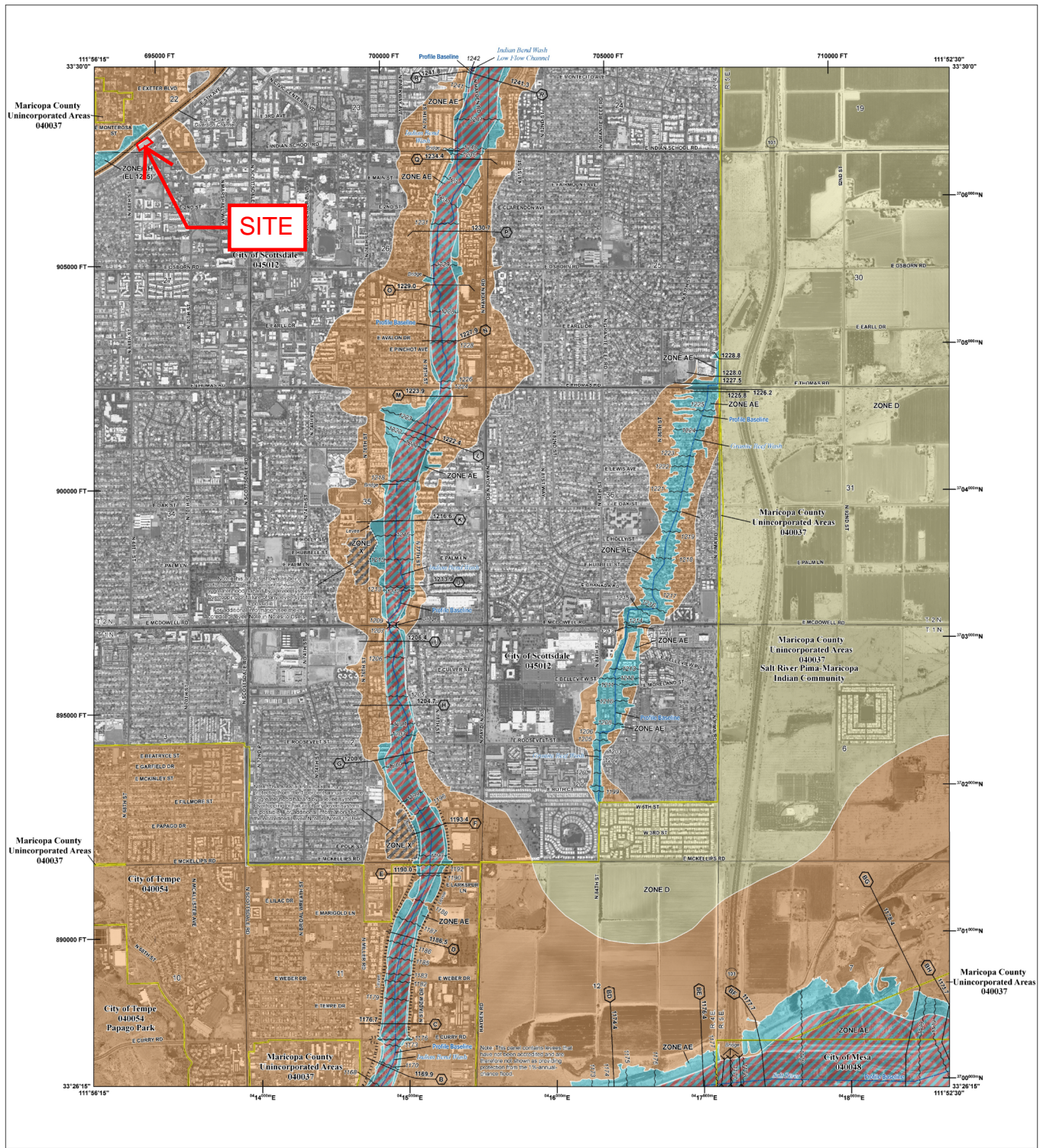
Plan Check #	Owner	Date



FIGURE 1
VICINITY MAP



FIGURE 2
AERIAL MAP



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
[HTTPS://MSC.FEMA.GOV](https://msc.fema.gov)

- SPECIAL FLOOD HAZARD AREAS**
 - Without Base Flood Elevation (BFE) Zone A, AE, AH, AO, AV, VE, AR
 - With BFE or Depth Zone AE, AO, AH, VE, AR
 - Regulatory Floodway
 - 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 D
 - Area with Flood Risk due to Levee Zone D
- OTHER AREAS OF FLOOD HAZARD**
 - Area of Minimal Flood Hazard Zone X
 - Area of Undetermined Flood Hazard Zone D
- OTHER AREAS**
 - Channel, Culvert, or Storm Sewer Levee, Dike, or Floodwall
 - Cross Sections with 1% Annual Chance Water Surface Elevation
 - Coastal Transect
 - Coastal Transect Baseline
 - Profile Baseline
 - Hydrographic Feature
 - Base Flood Elevation Line (BFE)
 - Limit of Study
 - Jurisdiction Boundary
- GENERAL STRUCTURES**
 - 18.2
 - 17.5
- OTHER FEATURES**
 - 18.2
 - 17.5

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Service Center website at <https://msc.fema.gov>. Available products may include previously issued editions of Map Changes, Flood Insurance Study Reports, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities occupying land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be obtained directly from the Flood Map Service Center at the number listed above.

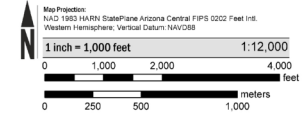
For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-368-6622.

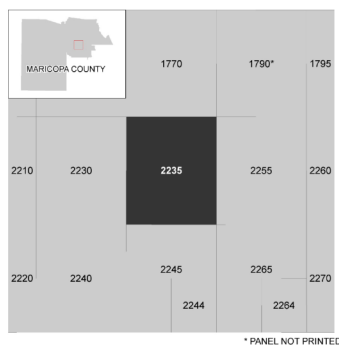
Base map information shown on this FIRM was derived from U.S. Census Bureau TIGER files, dated 2014, and digital data provided by the Flood Control District of Maricopa County. Digital orthophotography was provided by the Flood Control District of Maricopa County. The imagery was from 1st Feb 2013 and was processed with a 0.6 foot ground sample distance.

ACCEPTED LEGISLATION NOTES TO USERS: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1 percent-annual-chance level) and Emergency Action Plans, on the levee generally shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at <http://www.fema.gov/national-flood-insurance-program>.

SCALE



PANEL LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
 and Incorporated Areas
 PANEL 2235 OF 4425

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	2235	M
MESA, CITY OF	040048	2235	M
SCOTTSDALE, CITY OF	040012	2235	M
TEMPE, CITY OF	040054	2235	M

VERSION NUMBER
 2.3.3.2
 MAP NUMBER
 04013C2235M
 MAP REVISED
 September 18, 2020

APPENDIX I
Rainfall Data



NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.4952°, Longitude: -111.9337°
Elevation: m/ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Tryppaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.183 (0.154-0.223)	0.240 (0.202-0.291)	0.326 (0.273-0.395)	0.392 (0.326-0.472)	0.481 (0.394-0.577)	0.550 (0.444-0.657)	0.620 (0.492-0.739)	0.692 (0.540-0.824)	0.788 (0.598-0.940)	0.862 (0.641-1.03)
10-min	0.279 (0.234-0.339)	0.364 (0.307-0.443)	0.495 (0.415-0.600)	0.596 (0.496-0.719)	0.732 (0.599-0.878)	0.837 (0.676-1.00)	0.944 (0.748-1.12)	1.05 (0.821-1.25)	1.20 (0.911-1.43)	1.31 (0.976-1.57)
15-min	0.345 (0.290-0.420)	0.452 (0.381-0.549)	0.614 (0.514-0.744)	0.739 (0.614-0.891)	0.907 (0.743-1.09)	1.04 (0.838-1.24)	1.17 (0.928-1.39)	1.31 (1.02-1.55)	1.49 (1.13-1.77)	1.63 (1.21-1.94)
30-min	0.465 (0.390-0.565)	0.608 (0.513-0.740)	0.827 (0.692-1.00)	0.995 (0.827-1.20)	1.22 (1.00-1.47)	1.40 (1.13-1.67)	1.58 (1.25-1.88)	1.76 (1.37-2.09)	2.00 (1.52-2.39)	2.19 (1.63-2.61)
60-min	0.575 (0.483-0.700)	0.753 (0.635-0.915)	1.02 (0.857-1.24)	1.23 (1.02-1.49)	1.51 (1.24-1.82)	1.73 (1.40-2.07)	1.95 (1.55-2.32)	2.18 (1.70-2.59)	2.48 (1.88-2.95)	2.71 (2.02-3.24)
2-hr	0.666 (0.569-0.795)	0.863 (0.736-1.03)	1.16 (0.983-1.37)	1.38 (1.16-1.64)	1.69 (1.40-1.99)	1.92 (1.57-2.26)	2.16 (1.75-2.54)	2.41 (1.91-2.82)	2.74 (2.12-3.21)	2.99 (2.27-3.54)
3-hr	0.724 (0.614-0.870)	0.929 (0.793-1.12)	1.22 (1.04-1.47)	1.45 (1.22-1.74)	1.78 (1.47-2.11)	2.04 (1.66-2.41)	2.31 (1.85-2.73)	2.59 (2.04-3.06)	2.98 (2.28-3.52)	3.29 (2.46-3.91)
6-hr	0.873 (0.756-1.03)	1.11 (0.962-1.30)	1.42 (1.23-1.66)	1.67 (1.43-1.95)	2.01 (1.70-2.33)	2.28 (1.90-2.63)	2.56 (2.10-2.95)	2.84 (2.28-3.28)	3.23 (2.53-3.74)	3.53 (2.71-4.11)
12-hr	0.977 (0.855-1.13)	1.23 (1.08-1.44)	1.57 (1.36-1.81)	1.82 (1.58-2.11)	2.17 (1.86-2.50)	2.44 (2.07-2.81)	2.72 (2.27-3.13)	3.00 (2.47-3.45)	3.37 (2.71-3.91)	3.67 (2.89-4.28)
24-hr	1.17 (1.05-1.32)	1.49 (1.33-1.68)	1.93 (1.72-2.18)	2.28 (2.02-2.56)	2.76 (2.43-3.11)	3.14 (2.75-3.53)	3.54 (3.08-3.97)	3.95 (3.41-4.44)	4.53 (3.86-5.08)	4.98 (4.20-5.60)
2-day	1.26 (1.13-1.43)	1.62 (1.44-1.82)	2.12 (1.89-2.39)	2.53 (2.24-2.84)	3.09 (2.73-3.47)	3.54 (3.11-3.98)	4.02 (3.50-4.52)	4.51 (3.90-5.08)	5.21 (4.45-5.87)	5.76 (4.88-6.51)
3-day	1.34 (1.19-1.51)	1.71 (1.52-1.93)	2.25 (2.00-2.53)	2.69 (2.38-3.02)	3.30 (2.91-3.70)	3.79 (3.32-4.25)	4.32 (3.75-4.84)	4.87 (4.20-5.47)	5.64 (4.80-6.34)	6.26 (5.28-7.06)
4-day	1.41 (1.25-1.59)	1.80 (1.60-2.04)	2.38 (2.11-2.68)	2.85 (2.52-3.20)	3.51 (3.08-3.94)	4.04 (3.53-4.53)	4.61 (4.00-5.17)	5.22 (4.49-5.86)	6.07 (5.16-6.82)	6.77 (5.69-7.61)
7-day	1.57 (1.39-1.77)	2.00 (1.78-2.26)	2.64 (2.34-2.98)	3.16 (2.80-3.56)	3.90 (3.43-4.38)	4.49 (3.92-5.04)	5.12 (4.44-5.75)	5.79 (4.98-6.51)	6.73 (5.72-7.57)	7.49 (6.30-8.45)
10-day	1.70 (1.51-1.92)	2.18 (1.94-2.45)	2.87 (2.55-3.23)	3.44 (3.04-3.86)	4.22 (3.71-4.73)	4.85 (4.24-5.43)	5.52 (4.79-6.18)	6.22 (5.36-6.98)	7.21 (6.14-8.08)	8.00 (6.74-8.99)
20-day	2.09 (1.87-2.34)	2.69 (2.40-3.01)	3.55 (3.17-3.97)	4.20 (3.74-4.69)	5.08 (4.50-5.67)	5.76 (5.08-6.42)	6.44 (5.65-7.19)	7.14 (6.23-7.98)	8.08 (6.99-9.05)	8.81 (7.56-9.88)
30-day	2.44 (2.17-2.74)	3.14 (2.80-3.52)	4.14 (3.68-4.63)	4.90 (4.35-5.47)	5.92 (5.23-6.60)	6.70 (5.89-7.47)	7.51 (6.57-8.36)	8.32 (7.25-9.27)	9.42 (8.14-10.5)	10.3 (8.81-11.5)
45-day	2.83 (2.53-3.16)	3.64 (3.26-4.07)	4.80 (4.29-5.36)	5.66 (5.04-6.32)	6.78 (6.02-7.57)	7.63 (6.76-8.52)	8.49 (7.49-9.49)	9.35 (8.21-10.5)	10.5 (9.13-11.8)	11.3 (9.82-12.7)
60-day	3.13 (2.81-3.49)	4.04 (3.63-4.51)	5.32 (4.76-5.92)	6.24 (5.58-6.95)	7.45 (6.64-8.29)	8.34 (7.41-9.29)	9.24 (8.17-10.3)	10.1 (8.91-11.3)	11.3 (9.87-12.6)	12.1 (10.6-13.6)

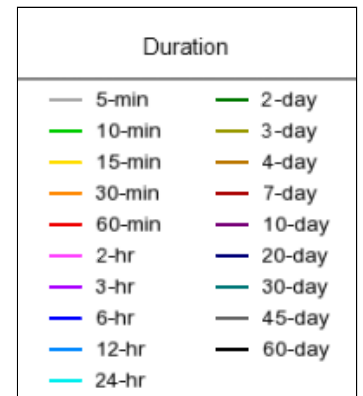
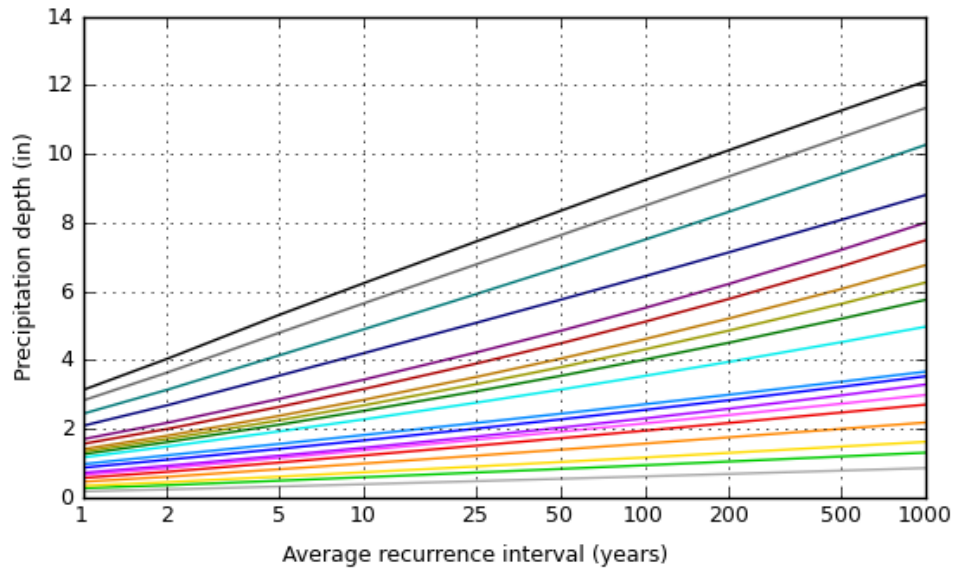
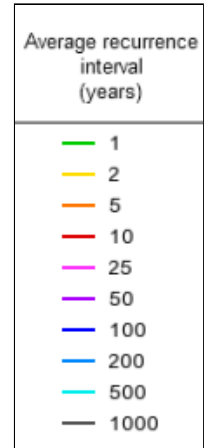
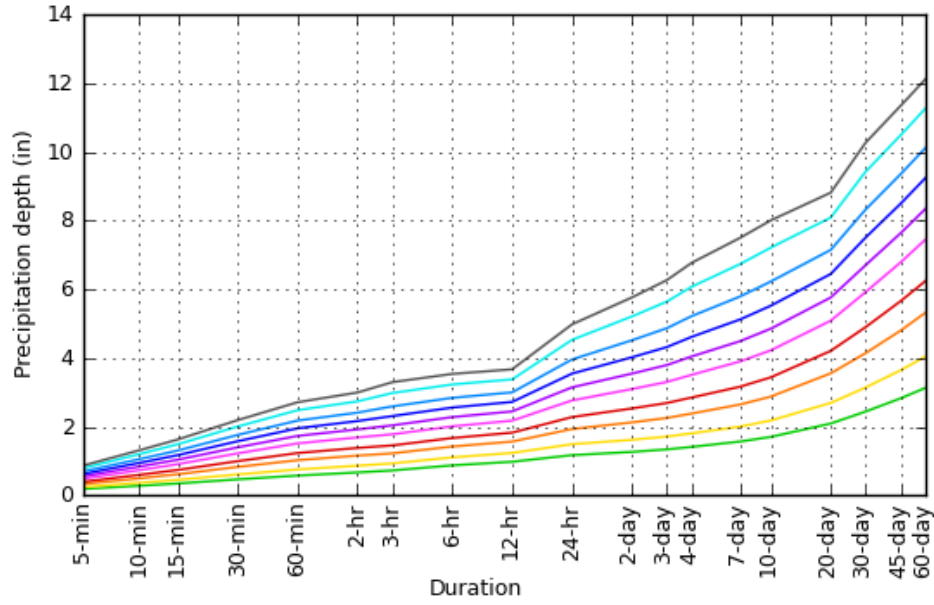
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 33.4952°, Longitude: -111.9337°



[Back to Top](#)

Maps & aerials

Small scale terrain



NOAA Atlas 14, Volume 1, Version 5
Location name: Scottsdale, Arizona, USA*
Latitude: 33.4952°, Longitude: -111.9337°
Elevation: 1268.96 ft**



* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Tryppaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	2.20 (1.85-2.68)	2.88 (2.42-3.49)	3.91 (3.28-4.74)	4.70 (3.91-5.66)	5.77 (4.73-6.92)	6.60 (5.33-7.88)	7.44 (5.90-8.87)	8.30 (6.48-9.89)	9.46 (7.18-11.3)	10.3 (7.69-12.3)
10-min	1.67 (1.40-2.03)	2.18 (1.84-2.66)	2.97 (2.49-3.60)	3.58 (2.98-4.31)	4.39 (3.59-5.27)	5.02 (4.06-6.00)	5.66 (4.49-6.74)	6.32 (4.93-7.52)	7.19 (5.47-8.58)	7.87 (5.86-9.40)
15-min	1.38 (1.16-1.68)	1.81 (1.52-2.20)	2.46 (2.06-2.98)	2.96 (2.46-3.56)	3.63 (2.97-4.36)	4.15 (3.35-4.96)	4.68 (3.71-5.58)	5.22 (4.07-6.22)	5.95 (4.52-7.09)	6.50 (4.84-7.76)
30-min	0.930 (0.780-1.13)	1.22 (1.03-1.48)	1.65 (1.38-2.00)	1.99 (1.65-2.40)	2.44 (2.00-2.93)	2.79 (2.26-3.34)	3.15 (2.50-3.75)	3.52 (2.74-4.18)	4.00 (3.04-4.77)	4.38 (3.26-5.23)
60-min	0.575 (0.483-0.700)	0.753 (0.635-0.915)	1.02 (0.857-1.24)	1.23 (1.02-1.49)	1.51 (1.24-1.82)	1.73 (1.40-2.07)	1.95 (1.55-2.32)	2.18 (1.70-2.59)	2.48 (1.88-2.95)	2.71 (2.02-3.24)
2-hr	0.333 (0.284-0.398)	0.432 (0.368-0.516)	0.578 (0.492-0.687)	0.690 (0.580-0.818)	0.842 (0.700-0.992)	0.960 (0.787-1.13)	1.08 (0.872-1.27)	1.20 (0.954-1.41)	1.37 (1.06-1.61)	1.50 (1.13-1.77)
3-hr	0.241 (0.204-0.290)	0.309 (0.264-0.374)	0.407 (0.345-0.489)	0.484 (0.407-0.578)	0.592 (0.491-0.703)	0.678 (0.554-0.803)	0.768 (0.616-0.909)	0.862 (0.680-1.02)	0.992 (0.759-1.17)	1.10 (0.818-1.30)
6-hr	0.146 (0.126-0.172)	0.185 (0.161-0.217)	0.237 (0.205-0.278)	0.279 (0.239-0.325)	0.335 (0.284-0.389)	0.380 (0.317-0.439)	0.427 (0.350-0.493)	0.474 (0.381-0.548)	0.539 (0.423-0.625)	0.590 (0.452-0.686)
12-hr	0.081 (0.071-0.094)	0.102 (0.090-0.119)	0.130 (0.113-0.150)	0.151 (0.131-0.175)	0.180 (0.154-0.208)	0.203 (0.172-0.233)	0.226 (0.188-0.260)	0.249 (0.205-0.287)	0.280 (0.225-0.324)	0.304 (0.240-0.355)
24-hr	0.049 (0.044-0.055)	0.062 (0.055-0.070)	0.080 (0.072-0.091)	0.095 (0.084-0.107)	0.115 (0.101-0.129)	0.131 (0.115-0.147)	0.148 (0.128-0.166)	0.165 (0.142-0.185)	0.189 (0.161-0.212)	0.207 (0.175-0.233)
2-day	0.026 (0.023-0.030)	0.034 (0.030-0.038)	0.044 (0.039-0.050)	0.053 (0.047-0.059)	0.064 (0.057-0.072)	0.074 (0.065-0.083)	0.084 (0.073-0.094)	0.094 (0.081-0.106)	0.108 (0.093-0.122)	0.120 (0.102-0.136)
3-day	0.019 (0.017-0.021)	0.024 (0.021-0.027)	0.031 (0.028-0.035)	0.037 (0.033-0.042)	0.046 (0.040-0.051)	0.053 (0.046-0.059)	0.060 (0.052-0.067)	0.068 (0.058-0.076)	0.078 (0.067-0.088)	0.087 (0.073-0.098)
4-day	0.015 (0.013-0.017)	0.019 (0.017-0.021)	0.025 (0.022-0.028)	0.030 (0.026-0.033)	0.037 (0.032-0.041)	0.042 (0.037-0.047)	0.048 (0.042-0.054)	0.054 (0.047-0.061)	0.063 (0.054-0.071)	0.071 (0.059-0.079)
7-day	0.009 (0.008-0.011)	0.012 (0.011-0.013)	0.016 (0.014-0.018)	0.019 (0.017-0.021)	0.023 (0.020-0.026)	0.027 (0.023-0.030)	0.030 (0.026-0.034)	0.034 (0.030-0.039)	0.040 (0.034-0.045)	0.045 (0.037-0.050)
10-day	0.007 (0.006-0.008)	0.009 (0.008-0.010)	0.012 (0.011-0.013)	0.014 (0.013-0.016)	0.018 (0.015-0.020)	0.020 (0.018-0.023)	0.023 (0.020-0.026)	0.026 (0.022-0.029)	0.030 (0.026-0.034)	0.033 (0.028-0.037)
20-day	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.007-0.008)	0.009 (0.008-0.010)	0.011 (0.009-0.012)	0.012 (0.011-0.013)	0.013 (0.012-0.015)	0.015 (0.013-0.017)	0.017 (0.015-0.019)	0.018 (0.016-0.021)
30-day	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.009-0.012)	0.012 (0.010-0.013)	0.013 (0.011-0.015)	0.014 (0.012-0.016)
45-day	0.003 (0.002-0.003)	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.006-0.007)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.008-0.011)	0.011 (0.009-0.012)
60-day	0.002 (0.002-0.002)	0.003 (0.003-0.003)	0.004 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.005-0.006)	0.006 (0.006-0.007)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.008 (0.007-0.009)

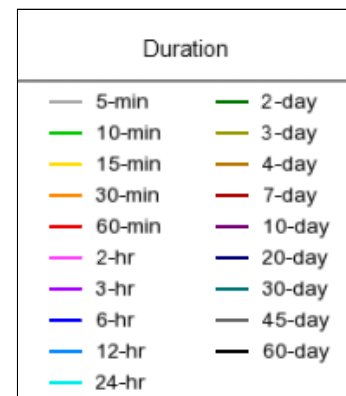
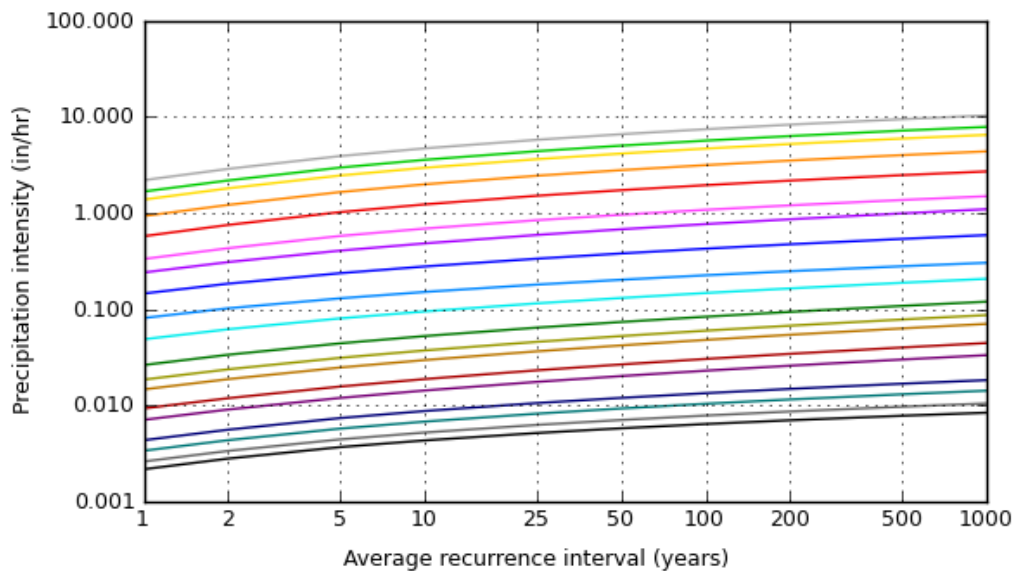
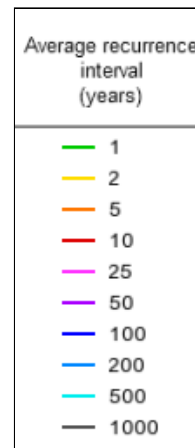
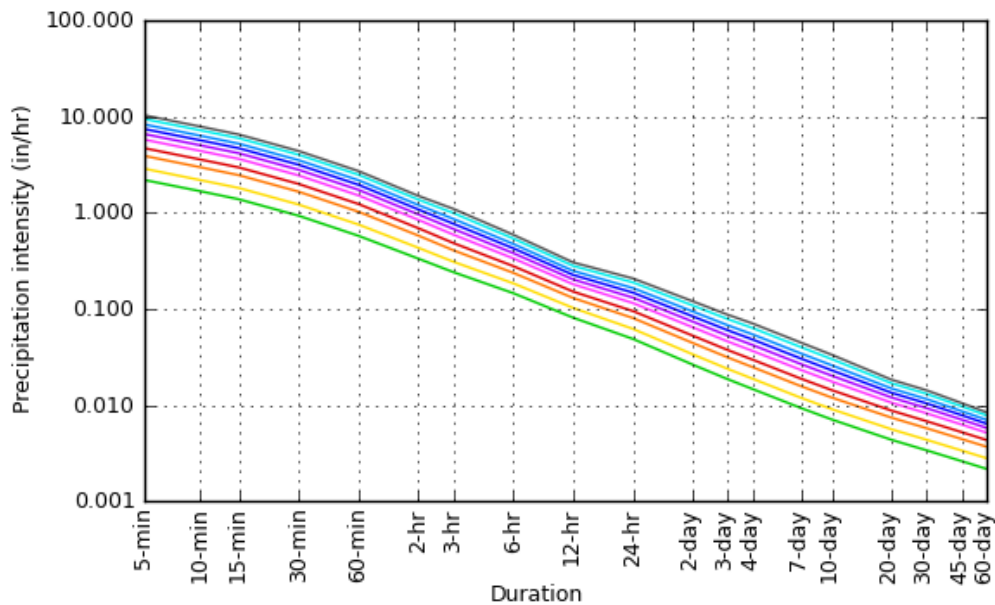
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based intensity-duration-frequency (IDF) curves

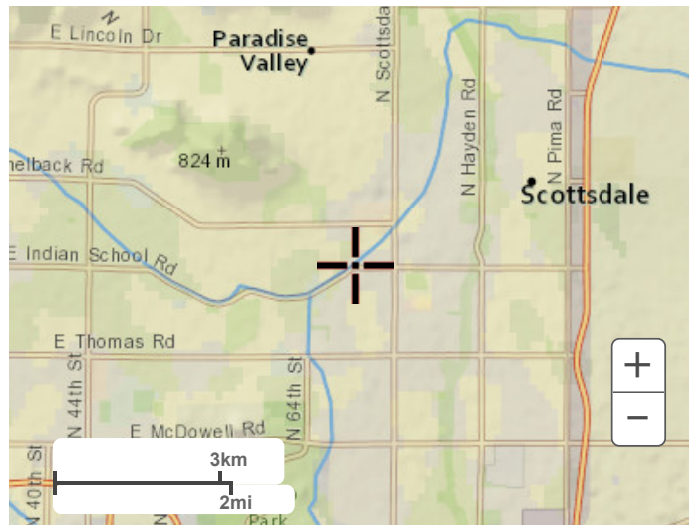
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Maps & arials

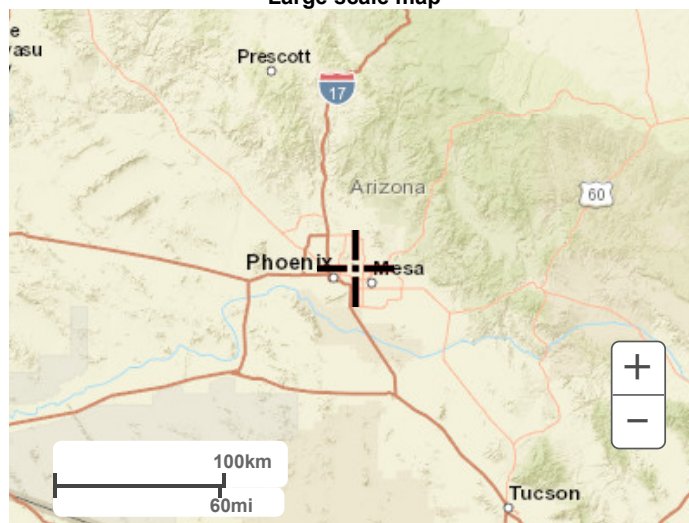
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

APPENDIX II

Calculations

2. A rainfall runoff model using the USACE’s HEC 1 Flood Hydrograph Package (generally used for watersheds that are larger than 160 acres, irregular in shape and contour, or if routing of flows is necessary).

B. Watershed Conditions

Watersheds are subject to change. Grading and drainage plans shall consider all watershed conditions that would result in the greatest peak discharge rate, to:

1. Size drainage facilities, and
2. Determine lowest floor elevations.

C. Split-Flow Conditions

Projects in northern parts of Scottsdale must address split-flow channel conditions where applicable. These splits in the alluvial channels usually include highly erosive soils and are generally unstable and unpredictable. In setting lowest floor elevations relative to upstream splits, assume that 100% of the flow could go either direction in any given flood event. For infrastructure design, the estimate of the actual split, based on a hydraulic analysis of the current channel cross sections, must include a minimum safety factor of 30% of the total flow. If there are extenuating factors affecting the stability of the split, the safety factor should be increased accordingly.

D. Environmentally Sensitive Lands

For special considerations regarding Environmentally Sensitive Lands, refer to the City Zoning Ordinance and DSPM Chapter 2 Section 2-2. Modification of natural watercourses with a flow of 50 cfs or greater are addressed in the City Zoning Ordinance.

E. The Rational Method

1. Precipitation. Precipitation input is rainfall intensity, “i,” and can be obtained directly from [NOAA 14](#).
2. Time of Concentration. Time of concentration “ t_c ” is the total time of travel from the most hydraulically remote part of the watershed to the concentration point of interest. The calculation of “ t_c ” must follow FCDMC Hydrology Manual procedures.
3. Runoff Coefficients. Use Fig. 4-1.5, Runoff Coefficients for Use with Rational Method, or equivalent to obtain the runoff coefficients or “C” values. Composite “C” values for the appropriate zoning category or weighted average values calculated for the specific site are both acceptable approaches.

RUNOFF COEFFICIENTS – “C” VALUE

LAND USE	STORM FREQUENCY		
	2-25 Year	50 Yea r	100 Yea r
Composite Area-wide Values			
Commercial & Industrial Areas	0.80	0.83	0.86
Residential Areas – Single Family, slopes 10% or less			
R1-190	0.33	0.50	0.53
R1-130	0.35	0.51	0.59

R1-70	0.37	0.52	0.60
R1-43	0.38	0.55	0.61
R1-35	0.40	0.56	0.62
R1-18	0.43	0.58	0.64
R1-10	0.47	0.62	0.70
R1-7	0.51	0.66	0.80
R1-5	0.54	0.69	0.86
<hr/>			
Residential Areas – Single Family, slopes greater than 10%			
R1-190	0.65	0.74	0.82
R1-130	0.68	0.76	0.84
R1-70	0.69	0.77	0.85
R1-43	0.70	0.77	0.85
R1-35	0.70	0.78	0.85
R1-18	0.71	0.79	0.86
R1-10	0.75	0.82	0.88
R1-7	0.81	0.86	0.91
R1-5	0.85	0.89	0.92
Townhouse (R-2, R-4)	0.63	0.74	0.94
Apartments & Condominiums (Condos) (R-3, R-5)	0.76	0.83	0.94
<hr/>			
Specified Surface Type Values			
Paved streets, parking lots (concrete or asphalt), roofs, driveways, etc.	0.90	0.93	0.95
Lawns, golf courses, & parks (grassed areas)	0.20	0.25	0.30
Undisturbed natural desert or desert landscaping (no impervious weed barrier)	0.37	0.42	0.45
Desert landscaping (with impervious weed barrier)	0.63	0.73	0.83
Mountain terrain - slopes greater than 10%	0.60	0.70	0.80
Agricultural areas (flood irrigated fields)	0.16	0.18	0.20
Gravel floodways and shoulders	0.68	0.78	0.82

FIGURE 4-1.5 RUNOFF COEFFICIENTS FOR RATIONAL METHOD

F. HEC-1 Model

1. Minimum submittals
 - a. A printout of the input data.
 - b. A schematic (routing) diagram of the stream network.
 - c. The runoff summary output table, including drainage basin name, area, 2, 10, and 100- year flow values.
 - d. Electronic input file(s) on compact disc (CD) or digital versatile/video disc (DVD).
 - e. Supporting documentation and source material for parameter selection.

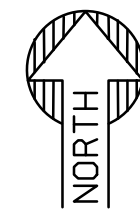
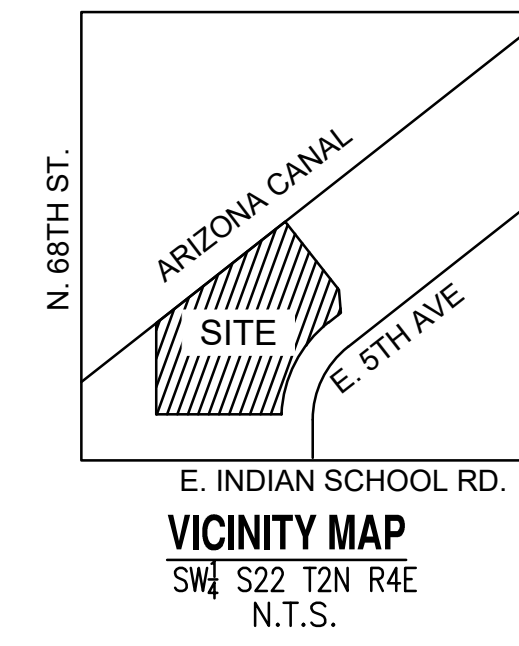
OWNER
 MAGNOLIA PROPERTY CO.
 2435 E. SOUTHLAKE BLVD. SUITE 150
 SOUTHLAKE, TEXAS. 76092
 PHONE: 817-769-2580

CIVIL ENGINEER
 SUSTAINABILITY ENGINEERING GROUP
 8280 E. GELDING DR, SUITE 101
 SCOTTSDALE, ARIZONA 85260
 PHONE: 480-237-2507
 ATTN: ALI FAKIH

ARCHITECT
 WILDER ARCHITECTS, LLC.
 16904 CLUB HILL DR.
 DALLAS, TEXAS. 75248
 PHONE: 214-616-5196

SURVEYOR
 MLC SERVICES, LLC.
 3231 S. COUNTRY CLUB WAY., SUITE 103
 TEMPE, ARIZONA. 85282
 PHONE: 602-393-2030
 ATTN: CHRISTOPHER J. WILSON

68TH AND ISR MFR
 EXISTING CONDITIONS C_{WT} EXHIBIT



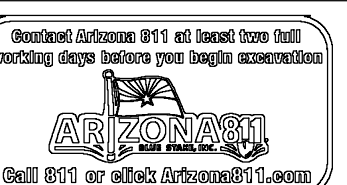
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PROJECT: 68TH AND ISR
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DRAWN: PG 06/16/2022
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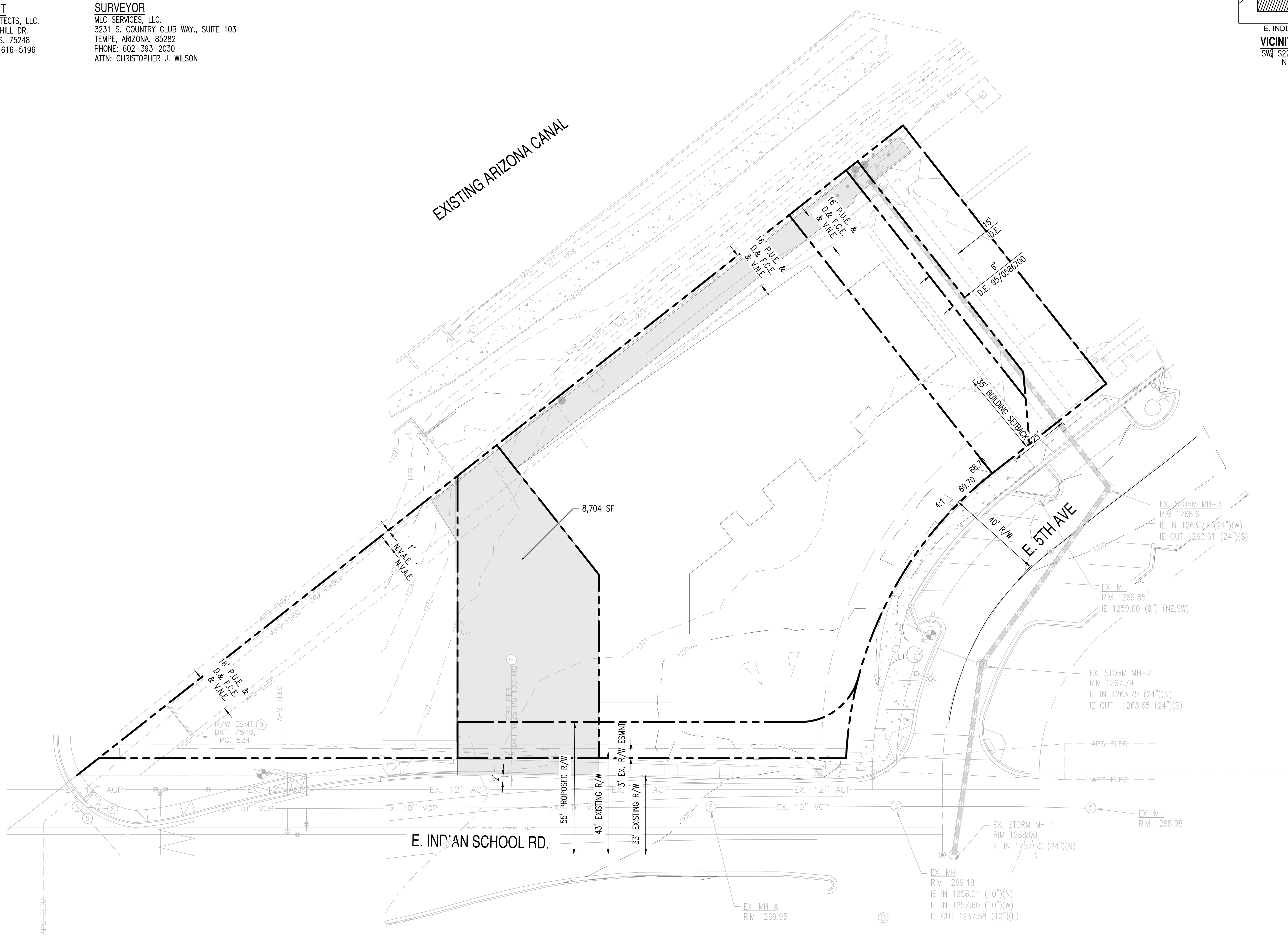
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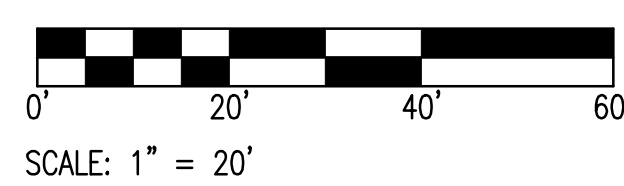
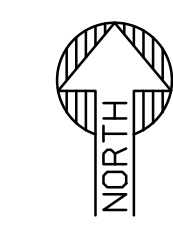
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PAGE NO.: SHEET NO.: EX-CWT



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	IMPERVIOUS = 31,410 SF @ Cwt=0.95 (0.72 AC)
	Cwt= 40,114 SF @ Cwt=0.84 (0.92 AC)



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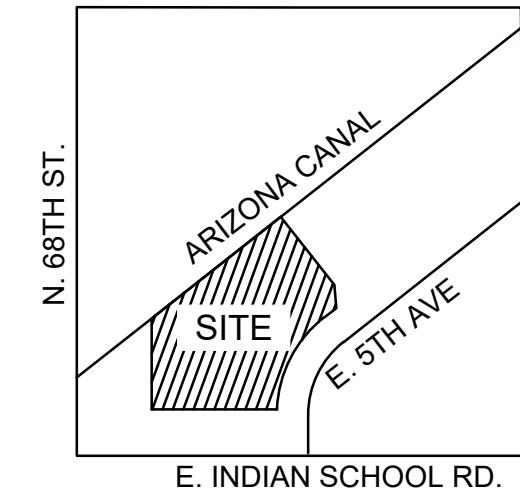
OWNER
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 SOUTHLAKE, TEXAS. 76092
 PHONE: 817-769-2580

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 SCOTTSDALE, ARIZONA 85260
 PHONE: 480-237-2507
 ATTN: ALI FAKIH

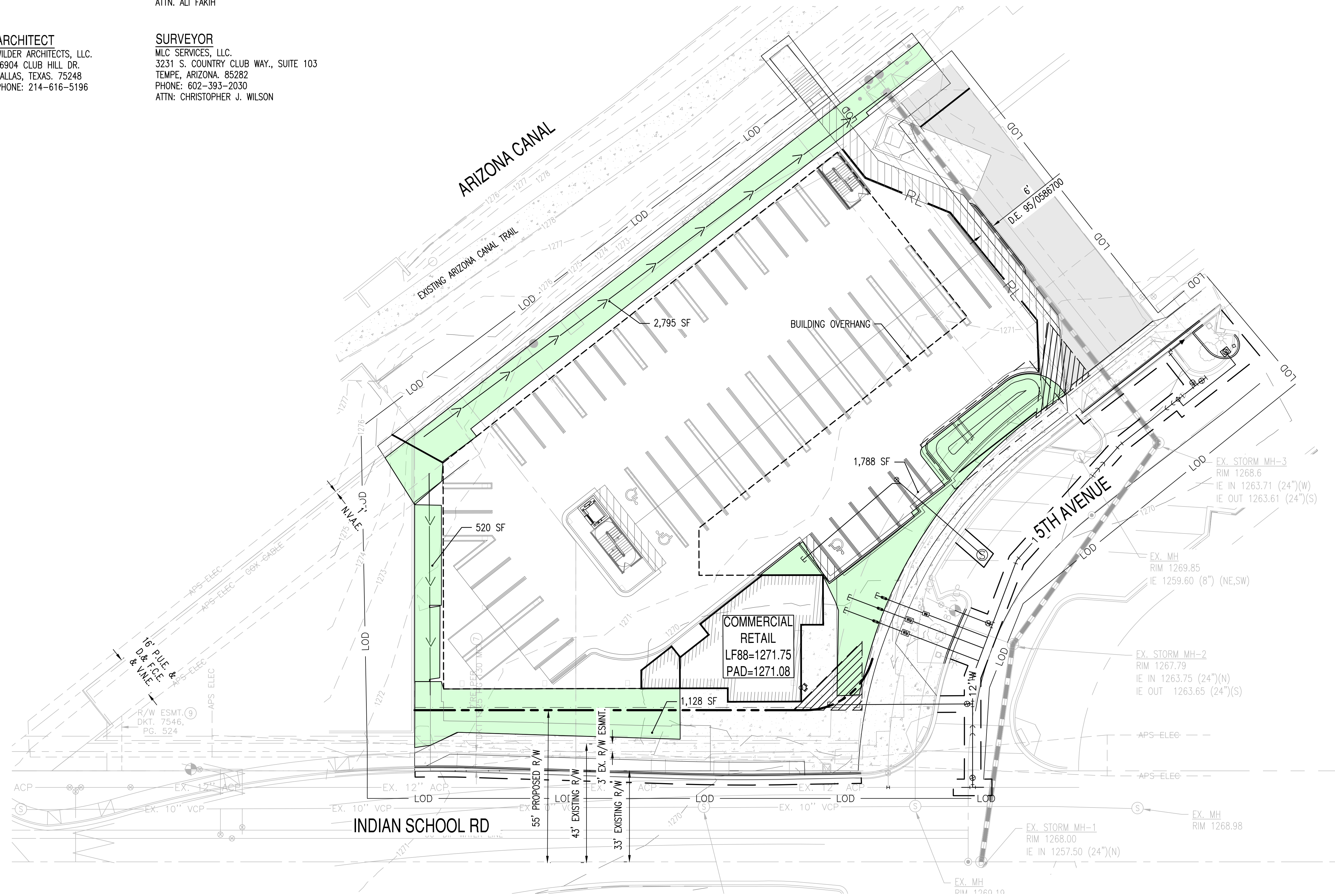
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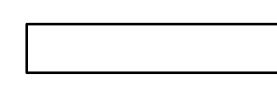
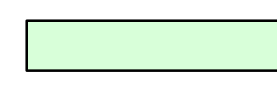
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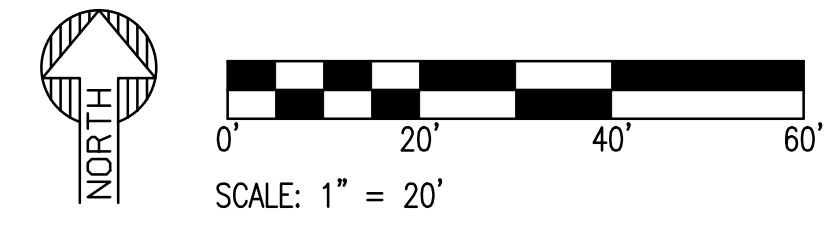
68TH AND ISR MFR
PROPOSED CONDITIONS C_{WT} EXHIBIT



VICINITY MAP
 SW 522 T2N R4E
 NTS



	IMPERVIOUS =	34,048 SF	@ Cwt=0.95
		(0.78 AC)	
	DESERT LSCP=	6,231 SF	@ Cwt=0.45
		(0.14 AC)	
	TOTAL Cwt =	40,123 SF	@ Cwt=0.87
		(0.92 AC)	



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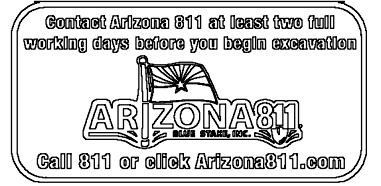
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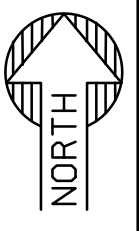
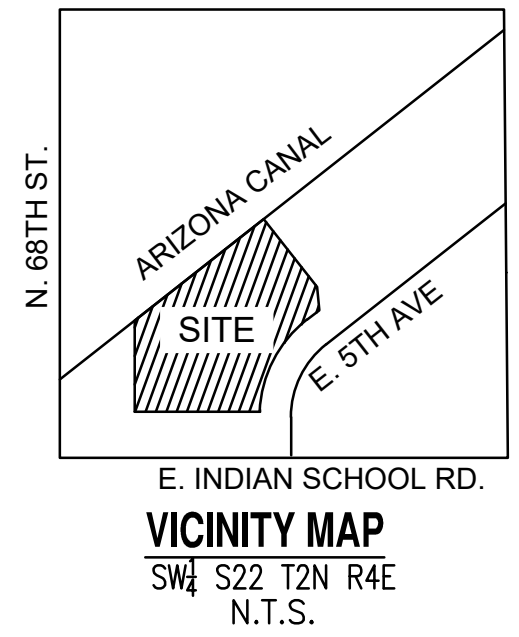
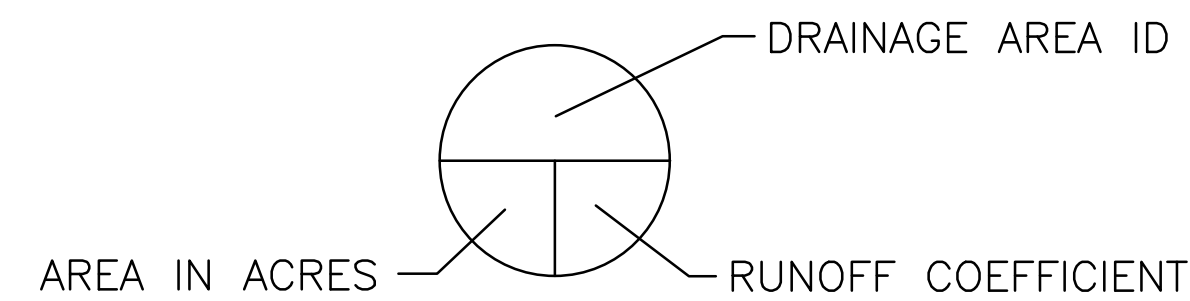
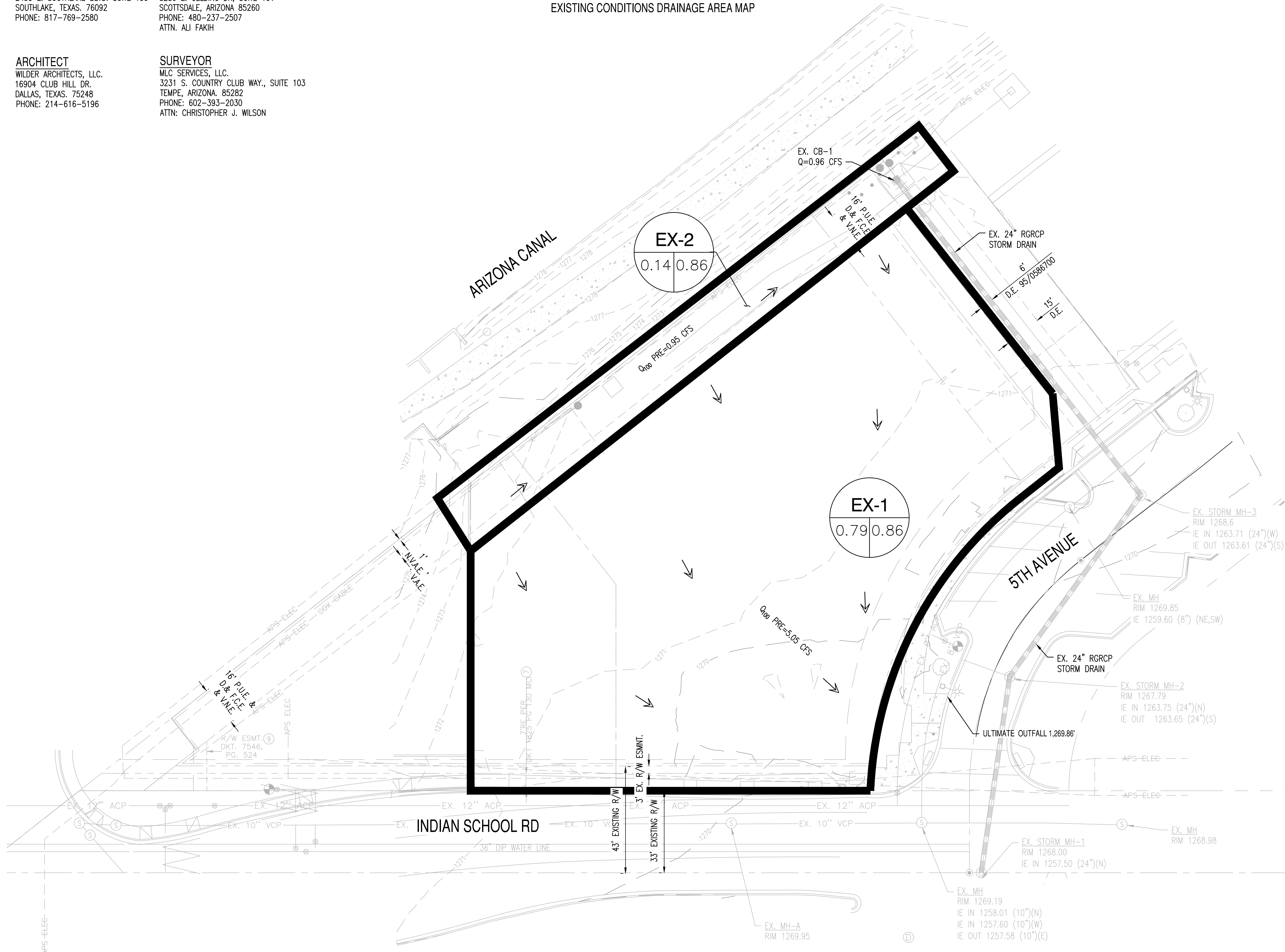
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68TH AND ISR MFR
EXISTING CONDITIONS DRAINAGE AREA MAP



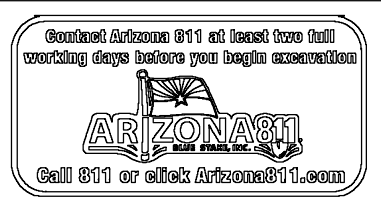
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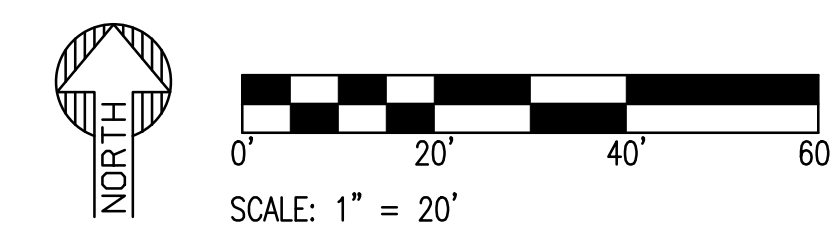


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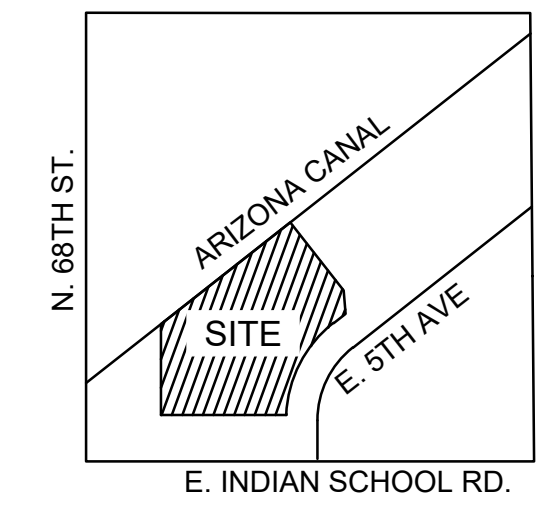
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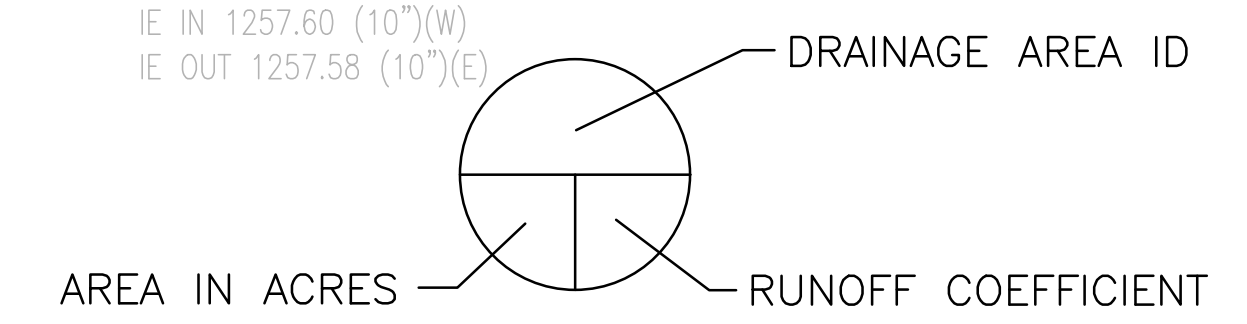
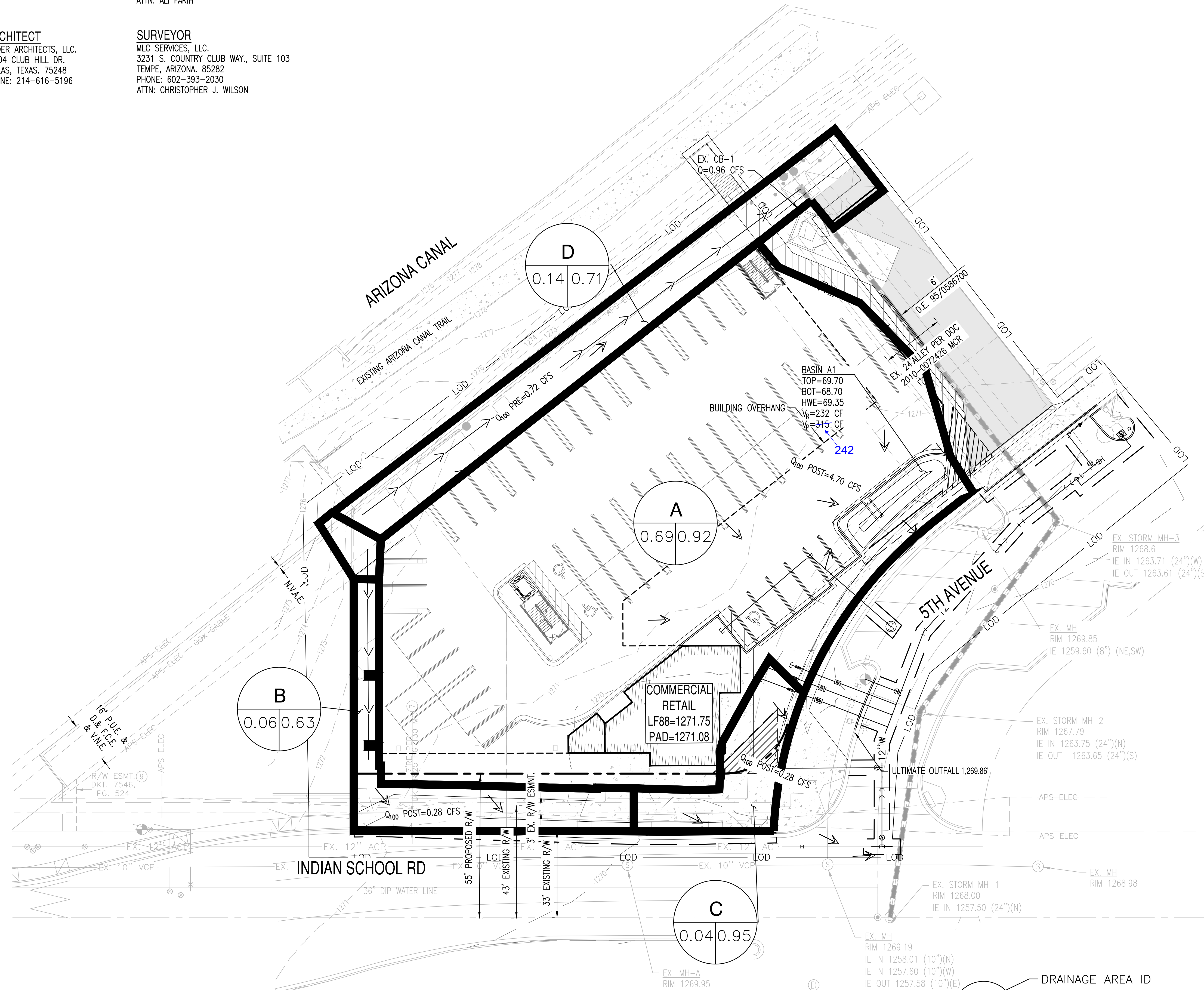
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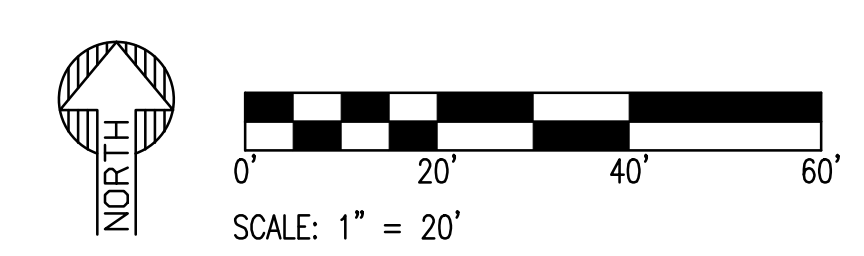
68TH AND ISR MFR
 PROPOSED CONDITIONS DRAINAGE AREA MAP



VICINITY MAP
 SW 1/4 S22 T2N R4E
 NTS



DRAINAGE AREA KEY



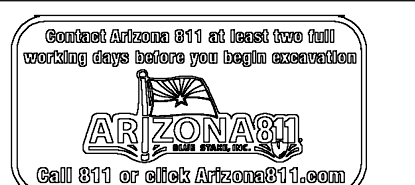
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Weighted Runoff Coefficient-Calculations (C_w)

PROPOSED OVERALL SITE C_w				
	BUILDING CONCRETE OR ASPHALT	DESERT LANDSCAPE	TOTAL AREA	C _w
C-VALUE	0.95	0.45		
AREA (ac)	0.78	0.14	0.92	0.87
A	0.65	0.04	0.69	0.92
B	0.02	0.04	0.06	0.63
C	0.04	0.00	0.04	0.95
D	0.07	0.06	0.14	0.71

EXISTING OVERALL SITE C_w				
	BUILDING or CONCRETE	DESERT LANDSCAPE	TOTAL AREA	C _w
C-VALUE	0.95	0.45		
AREA (ac)	0.72	0.20	0.92	0.84
EX-1	0.65	0.14	0.79	0.86
EX-2	0.07	0.06	0.14	0.71



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APPENDIX III

PRELIMINARY GRADING PLAN

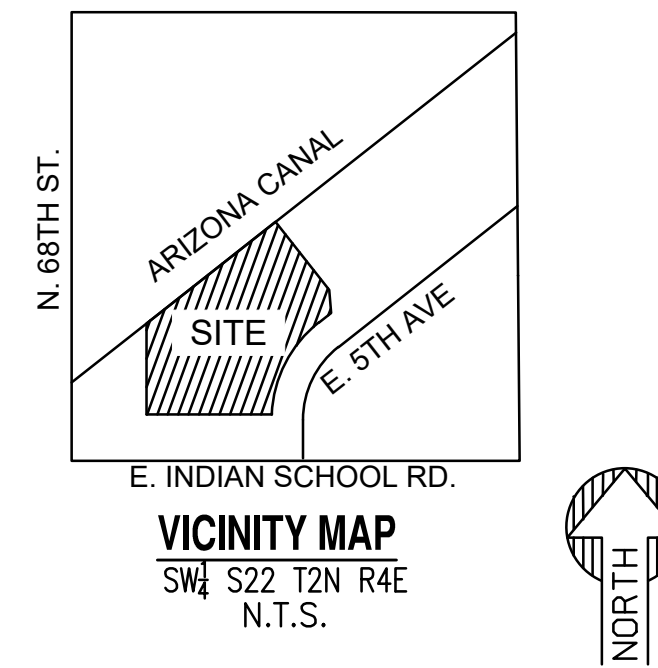
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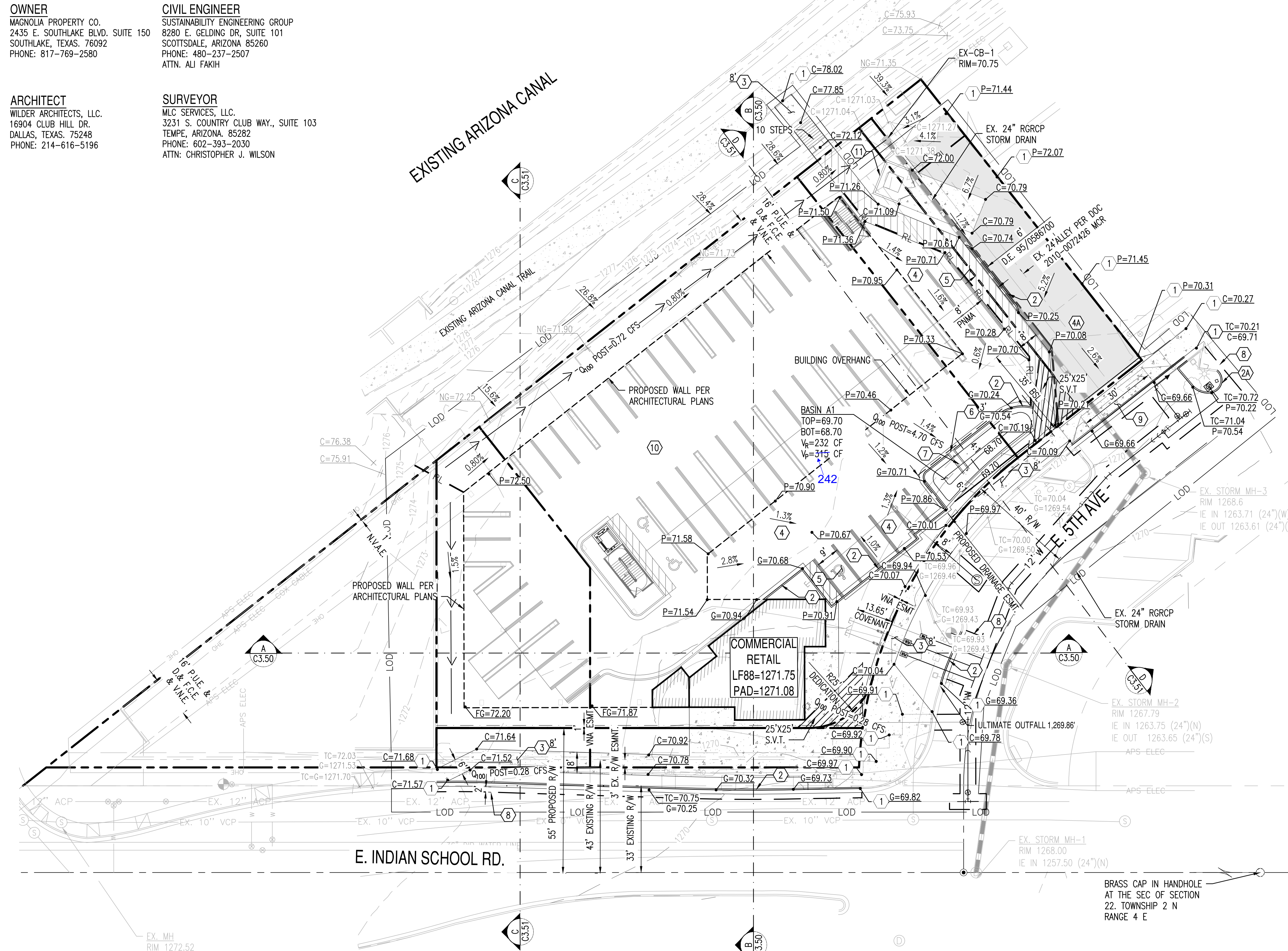
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GRADING KEY NOTES

- ① MATCH EXISTING GRADE; CONTRACTOR TO VERIFY IN FIELD ALL GRADES PRIOR TO CONSTRUCTION ACTIVITIES AND CONTACT ENGINEER IN CASE OF ANY DISCREPANCIES.
- ② 6" CONCRETE CURB AND GUTTER
- ②A 6" SINGLE CURB
- ③ CONCRETE SIDEWALK. WIDTH PER PLAN.
- ④ 3" AC ON 4" ABC ON COMPACTED SUBGRADE DET.1/C3.20. PAVEMENT SECTION TO BE VERIFIED WITH GEOTECHNICAL REPORT. (LIGHT DUTY PAVEMENT).
- ④A 3" AC ON 6" ABC ON COMPACTED SUBGRADE DET.1/C3.20. PAVEMENT SECTION TO BE VERIFIED WITH GEOTECHNICAL REPORT.(HEAVY DUTY PAVEMENT).
- ⑤ PAVEMENT WITH 2% MAXIMUM SLOPE IN ANY DIRECTION AT ACCESSIBLE PARKING STALLS AND 2% MAXIMUM CROSS SLOPE AT ADA ACCESSIBLE ROUTE.
- ⑥ CURB OPENING PER DETAIL 2/C3.20; LENGTH PER PLAN.
- ⑦ CONCRETE SPILLWAY. REFER TO DETAIL 2/C3.20
- ⑧ SAWCUT EXISTING PAVEMENT TO PROVIDE STRAIGHT VERTICAL EDGES, FREE FROM IRREGULARITIES.
- ⑨ PROPOSED DRIVEWAY ENTRANCE PER C.O.S. STD. DET. 2256 CL-1.
- ⑩ INTERIOR COVERED PARKING AREA.
- ⑪ TRASH ENCLOSURE PER C.O.S. STD. DET. 2146-1.



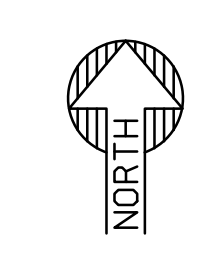
EXISTING LEGEND:

- | | | | | | |
|--------------|------------------------|-------|---------------|---------|-------------------|
| --- XXXX --- | EX. MAJOR CONTOURS | EX. S | SEWER LINE | --- --- | STORM DRAIN LINE |
| --- XXXX --- | EX. MINOR CONTOURS | ⊙ | SEWER MANHOLE | ● | STORM CATCH BASIN |
| P=XX.XX | EX. SPOT ELEVATION | EX. W | WATER LINE | ⊙ | STORM MANHOLE |
| --- | EASEMENT LINE AS NOTED | ⊗ | WATER VALVE | ⊙ | STREET LIGHT |
| | | ⊕ | FIRE HYDRANT | --- | ROAD CENTERLINE |

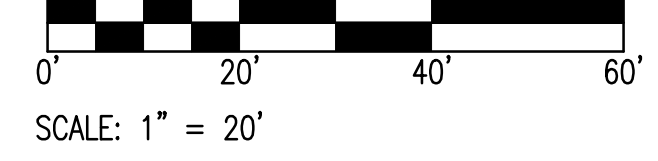
PROPOSED GRADING LEGEND:

- | | | | | | | | | | | | | | |
|---------|-------------------------------|-----|-----------------|-----|-----|-----|-----------------------------|-----|--------------|-----|---------------------|-----|------|
| G=XX.XX | GUTTER ELEVATION, TC = G+0.5' | --- | PROPERTY LINE | --- | LOD | --- | LIMIT OF ONSITE DISTURBANCE | ⊕ | WATER METER | --- | RIP-RAP | --- | PNMA |
| P=XX.XX | PAVEMENT ELEVATION | --- | CURB AND GUTTER | --- | XX | --- | MAJOR CONTOUR | ⊗ | GATE VALV | --- | CONCRETE PAVEMENT | --- | |
| C=XX.XX | CONCRETE ELEVATION | --- | VERTICAL CURB | --- | XX | --- | MINOR CONTOUR | ⊕ | FIRE HYDRANT | --- | HEAVY DUTY PAVEMENT | --- | |
| | | --- | RL | --- | --- | --- | FLOW ARROW | --- | --- | --- | --- | --- | |

BRASS CAP IN HANDHOLE AT THE SEC OF SECTION 22. TOWNSHIP 2 N RANGE 4 E



PRELIMINARY GRADING AND DRAINAGE PLAN



NOTES:

1. A PERCOLATION TEST WILL BE COMPLETED TO DETERMINE IF A DRY-WELL WILL BE REQUIRED FOR THE PROPOSED RETENTION BASIN.

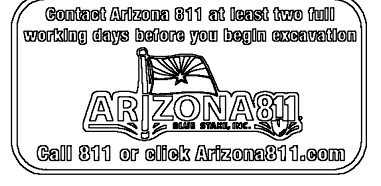
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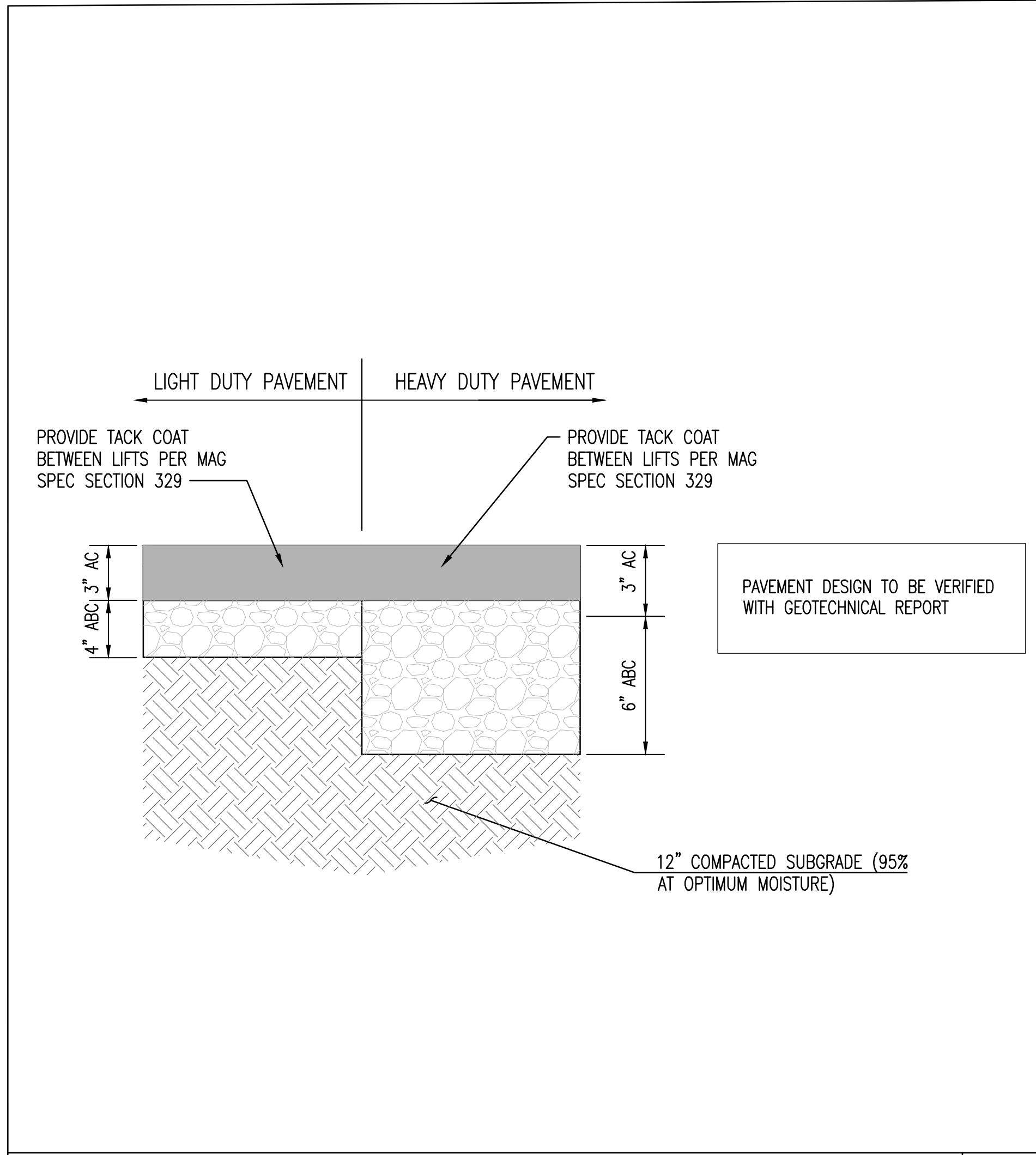
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PRELIMINARY GRADING AND DRAINAGE PLAN

PAGE NO.: 1 OF 6
SHEET NO.: C3.10

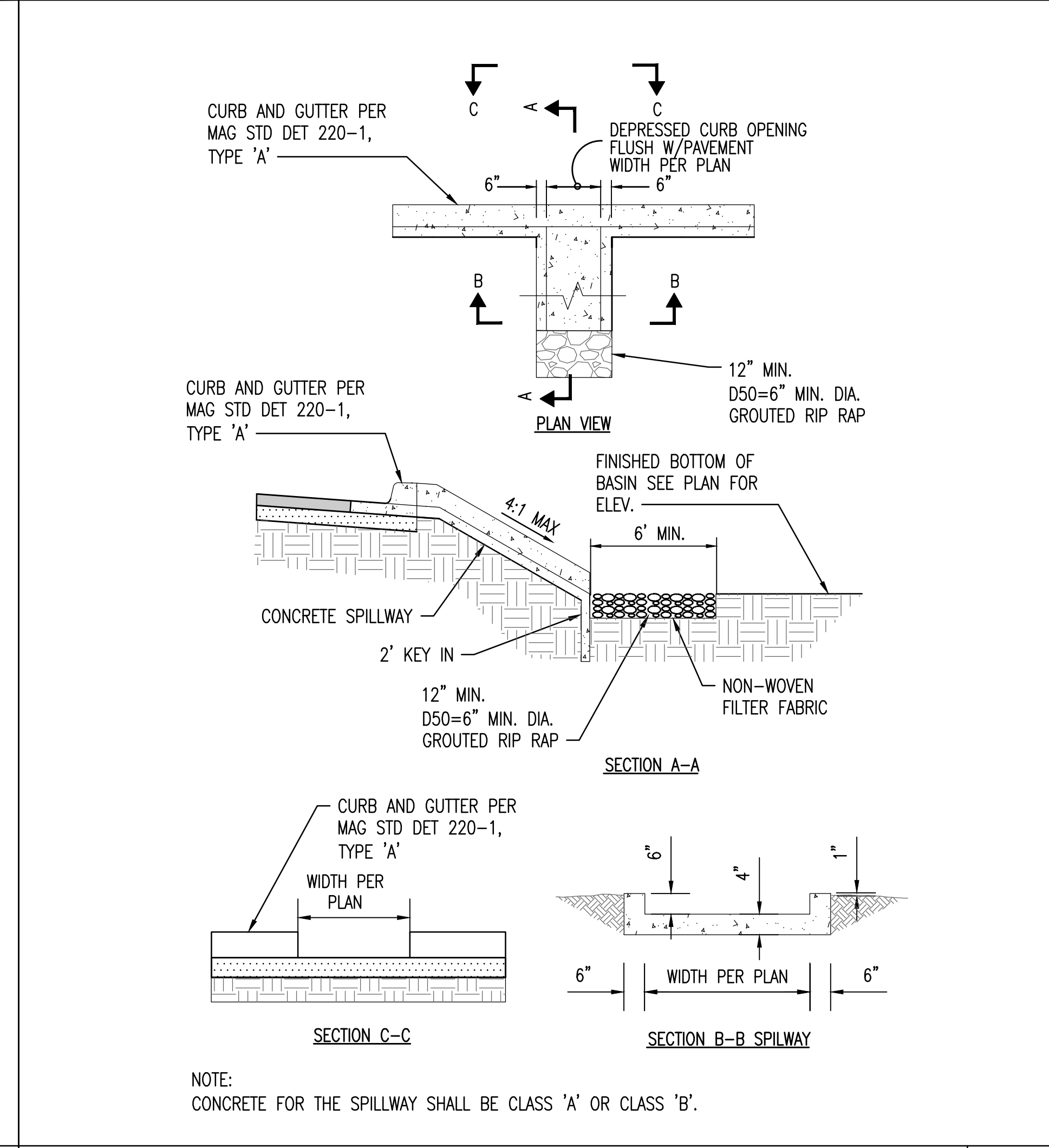
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ASPHALT PAVEMENT SECTION



1



CURB OPENING CONCRETE SPILLWAY



2

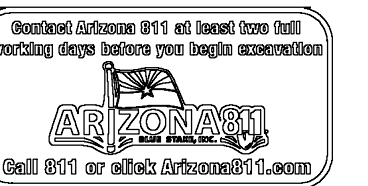
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GRADING AND
DRAINAGE DETAILS**

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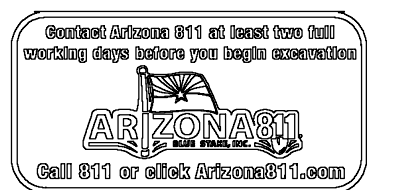
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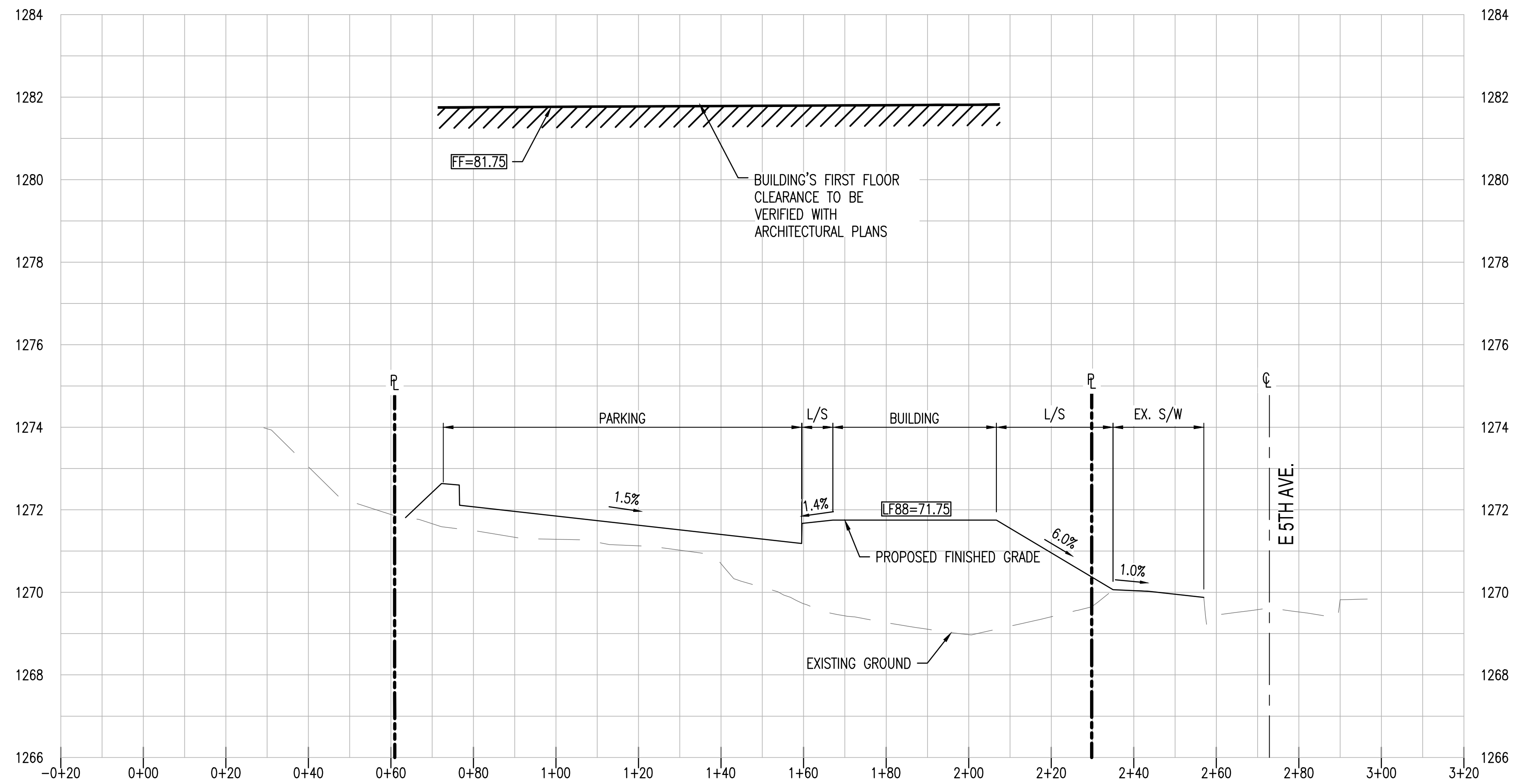
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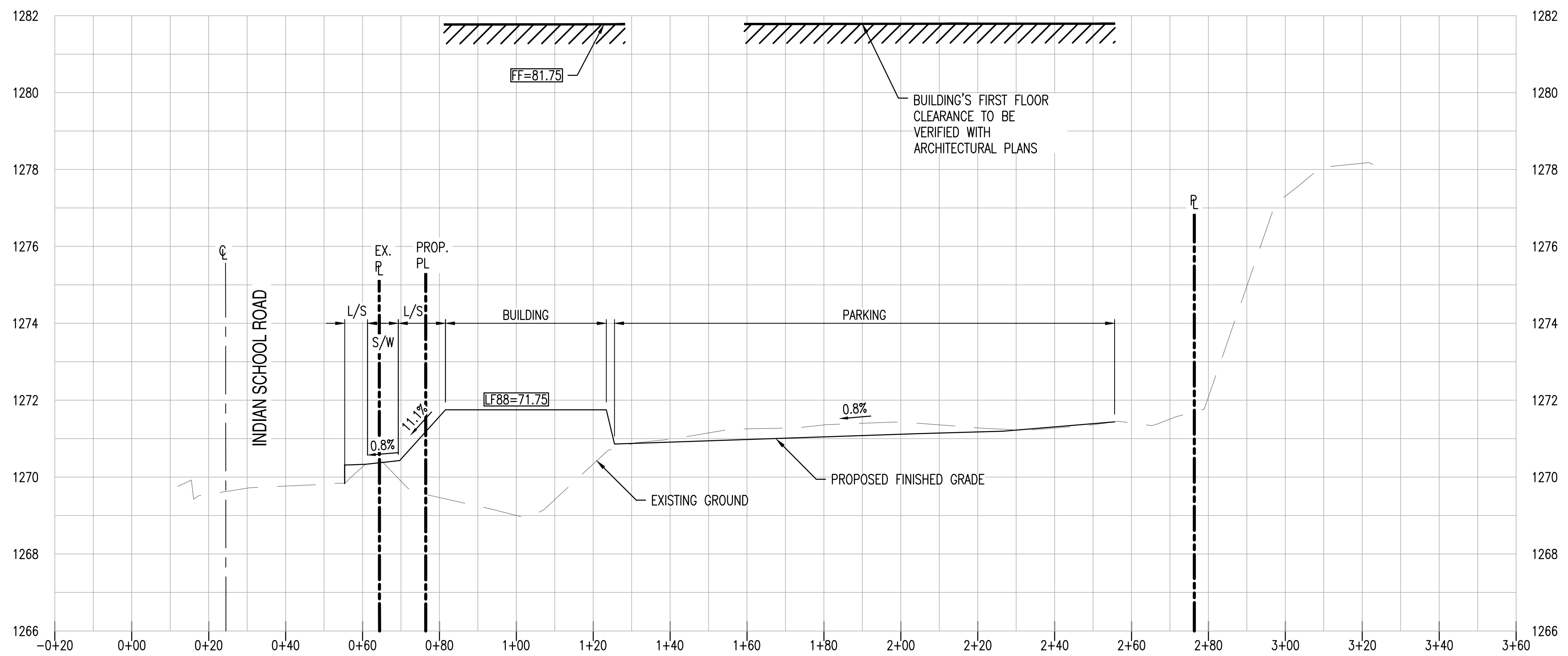
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SECTION A-A C3.10
HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 2'



SECTION B-B C3.10
HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 2'

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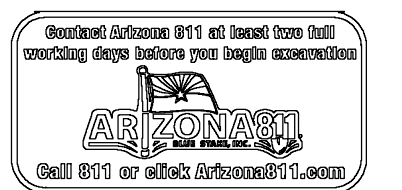
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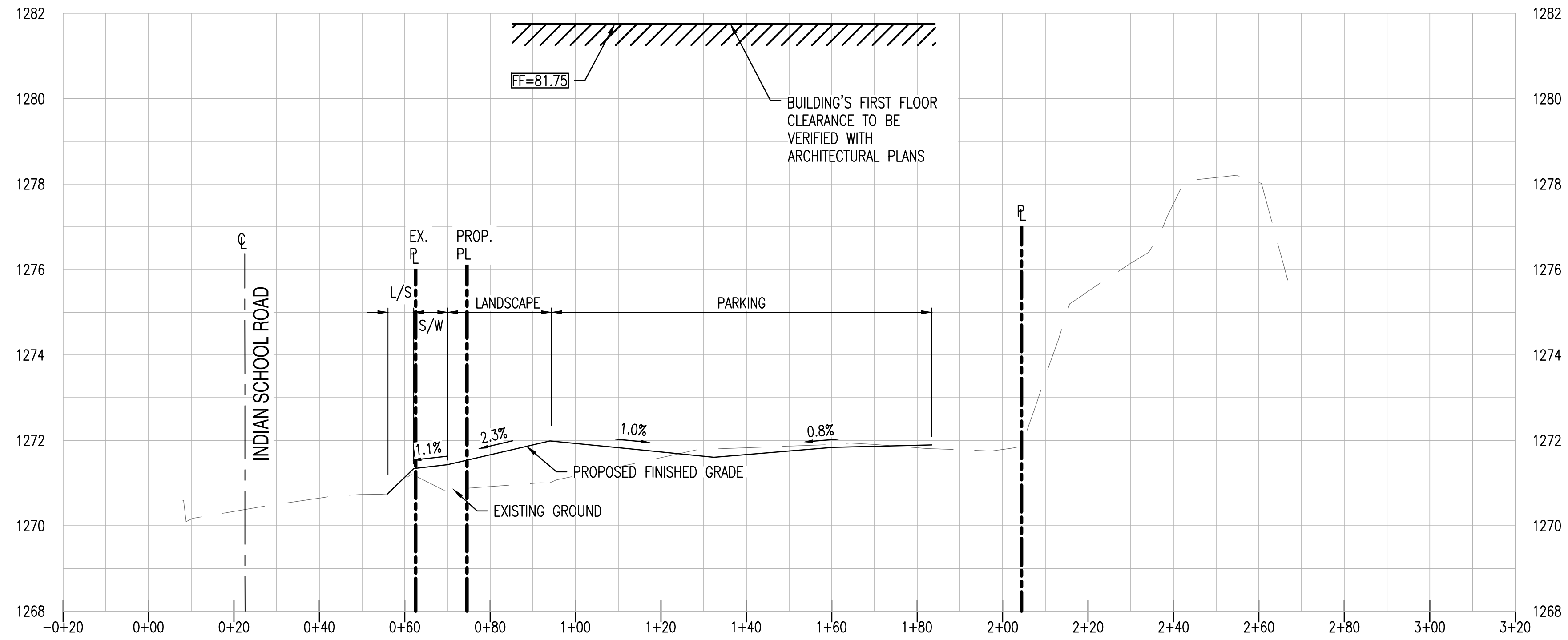


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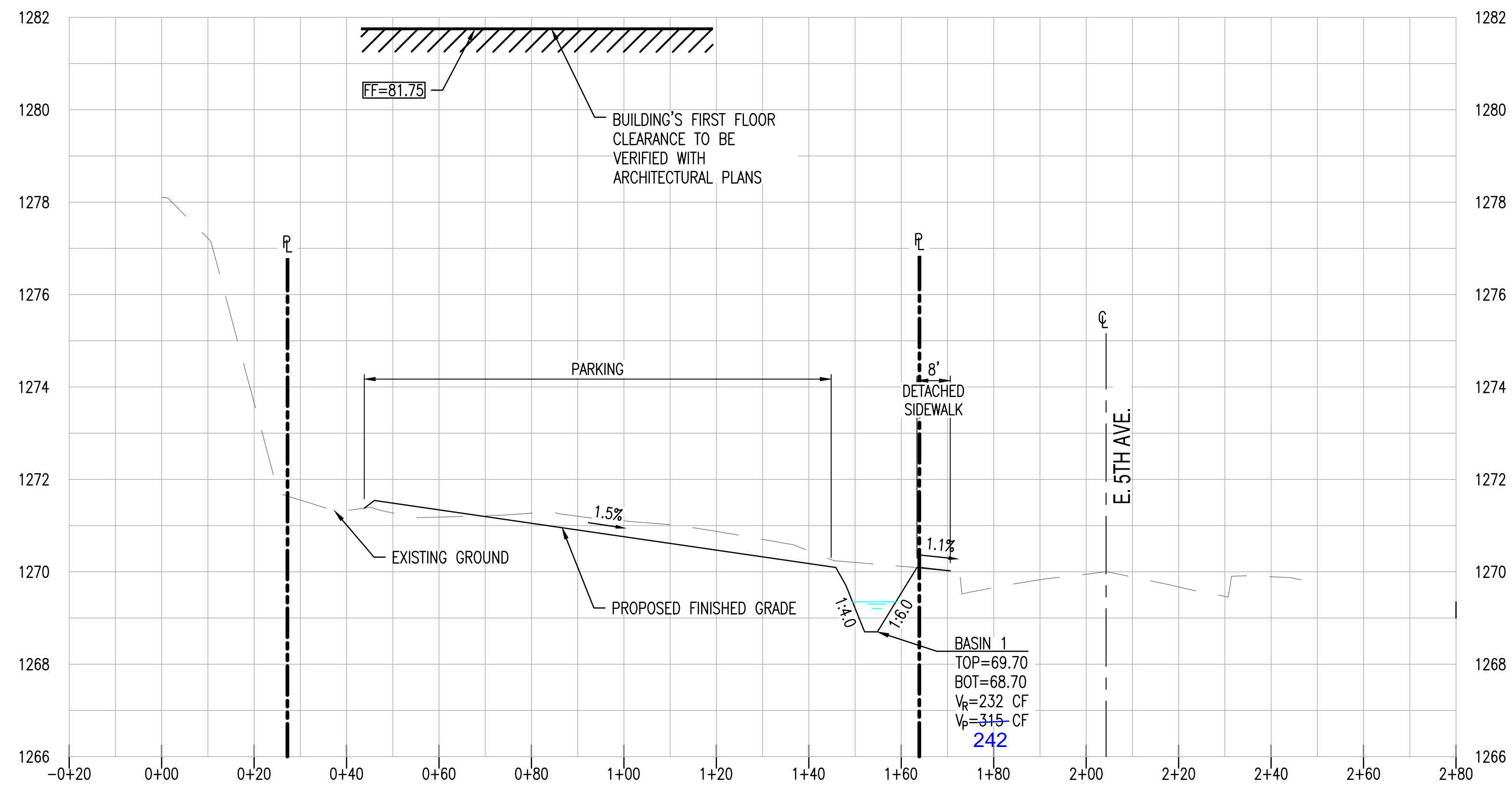
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VERTICAL SCALE: 1" = 2'



SECTION D-D C3.10
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VERTICAL SCALE: 1" = 2'