JSA CIVIL

Engineering | Planning | Management

Crash Champions

APN 501-44-993
Autoshow Drive
Surprise, Arizona

Final Drainage Report

PREPARED FOR

Crash Champions
601 Oakmont Lane, Suite 400
Westmont, IL 60559

PREPARED BY

JSA CIVIL

Engineering | Planning | Management

111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98501
CONTACT: CHARLIE SEVERS, PE
PHONE: 360|515|9600

SURPRISE APPROVAL

THIS REPORT HAS BEEN REVIEWED FOR COMPLIANCE WITH CITY REQUIREMENTS PRIOR TO ISSUANCE OF PERMITS. THE CITY NEITHER ACCEPTS NOR ASSUMES ANY LIABILITY FOR ERRORS OR OMISSIONS. THIS COMPLIANCE APPROVAL SHALL NOT PREVENT THE CITY ENGINEER FROM REQUIRING CORRECTIONS OF ERRORS OR OMISSIONS IN REPORTS FOUND TO BE IN VIOLATION OF LAWS OR ORDINANCES.

_____

CITY OF SURPRISE ENGINEER

_____

DATE

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

March 10, 2025

Prepared by Daniel Phillips Date

March 10, 2025

Reviewed by Charlie Severs Date

Contents

Appendices

Introduction

Crash Champions is proposing to a new commercial development on a 3.52 acre parcel, APN 501-44-993, on the south side of Autoshow Drive in the City of Surprise. The project is located in the Prasada PAD, Prasada Gateway Village 3 (PGV-3).

Project Description

Project Name and Address

The project site is located on the south side of Autoshow Drive and the address is not yet assigned. The parcel is APN 501-44-993, and is Lot 1C of the AEO Powersports subdivision.

Location and Topography

The site is within a portion of the southwest quarter of Section 13, Township 3 North, Range 2 West, Gila and Salt River Meridian, City of Surprise, Maricopa County Arizona. See Figure **1** for a vicinity map. The site is undeveloped and is historically farm field. To the north and east of the site there is commercial development. To the west and south of the site remains undeveloped farm fields. The land slopes from northwest to southeast gently at slopes of less than 1%. An existing ditch runs from north to south on the east side of the site, discharging to the parcel to the south.

Figure 1: Vicinity Map

Purpose

Crash Champions proposes to construct a ±22,000 square foot building that will house an autobody repair facility. A detached ±1,900 square foot covered wash bay is proposed on the site.

Existing/Ongoing Studies

There are no known ongoing studies that include the project site.
The project site has been included in two previous studies, the Prasada Master Drainage Report and the Loop 303/White Tanks Area Drainage Master Plan.

A geotechnical investigation for the project site has been performed by Terracon, dated December 13, 2024. The report is in Appendix 7.

Regional Drainage Plan Characteristics

State Route 303 is located to the east of the site. The construction of Route 303 included a regional concrete trapezoidal drainage channel. The channel is located in Arizona DOT right-of-way to the east of the project site.

Site Location Relative to Known FEMA Flood Hazard Zones

The project site is located in FEMA Zone X (Shaded). The site is included on FEMA's Flood Insurance Rate Map (FIRM) number 04013C1660L, with an effective date of October 16, 2013. A FIRMette map is included in Appendix 1.

Reference to Established Benchmark

A topographic survey of the site was performed by S&F Land Services. The map dated Nov. 27, 2024 is included in Appendix 2. The survey map references local benchmarks.

Hydrologic Analysis – Offsite Hydrology

Impacts to Proposed Site

An existing drainage channel cross the site from the adjacent offsite farm fields. This ditch is being routed around the site to its original discharge location at the south-west corner of the site.

Per the requirements of the City of Surprise the stormwater from the half-street along the project's frontage is brought on to the site and conveyed to the site's retention facility and infiltrated on-site.

Development and Conveyance of Off-Site Peak Discharges

Off-site peak discharges are calculated using the rational method. The half-street frontage is conveyed by gutter to a proposed catch basin with a curb inlet that is located at the site's north-east corner. Stormwater is collected in the catch basin and conveyed to the on-site underground retention facility. The peak discharge calculations for the offsite basin are found in Appendix 3, and the Basin Area Map is found in Appendix 4.

Discharge at the Entrance and Exit Points

An existing drainage channel cross the site from the adjacent offsite farm fields. This ditch is being routed around the site to its original discharge location at the south-west corner of the site.

The peak discharge from the site in its existing condition has been calculated using the rational method, and only includes the parcel since the offsite drainage ditch is being routed around the site, perpetuating the existing offsite flow through the site. The peak discharge from the site in its existing condition is 1.12 cfs in the 100-year, 2-hour storm event. Detailed calculations are found in Appendix 3.

Existing Land Use

To the north and east of the site there is commercial development. These sites manage their stormwater on-site. To the west and south of the site remains undeveloped farm fields.

Hydrologic Analysis - On-site Hydrology

Methodology and Criteria

The proposed stormwater improvements have been designed according to the City of Surprise Engineering Development Standards, Chapter 5, Storm Water Standards. The criteria include retaining the 100-year, 2-hour storm on-site. The required storage volume is calculated using the equation from Chapter 5.9 (2.), with no reduction in the calculated storage volume for infiltration.

The Rational Method is used to calculate the peak flows. Runoff coefficients (C) for calculations are taken from the Drainage Design Manual for Maricopa County, Volume I, Hydrology, Table 3.2. For Pavements and Rooftops a C value of 0.95 is used. For permeable areas, a C value of 0.5 corresponding to Desert Landscaping 2 is used.

Rainfall intensity is taken from the NOAA Atlas 14, Volume 1, Version 5 Point Precipitation Frequency Estimates for Arizona retrieved from NOAA's PFDS webpage. The rainfall intensities are tabulated in Table 1.

Table 1: NOAA Atlas 14, Volume 1, Version 5 Rainfall Intensities

Storm Event	Intensity (inches/hour)
10-year, 2-hour	0.674
50-year, 2-hour	0.94
100-year, 2, hour	1.06

The design storm is the 100-year, 2-hour storm. The 10-year, 2-hour and 50-year, 2-hour storms are also presented in the following sections per City of Surprise requirements.

Existing Conditions Discharges

The design storm is the 100-year, 2-hour storm. The existing conditions discharges for the 10-year, 2-hour and 50-year, 2-hour storms are also tabulated, see Table 2.

Detailed Calculations are included in Appendix 3.

Table 2: Existing Conditions Peak Discharges from Site

Storm Event	Peak Discharge
10-year, 24-hour	0.59 cfs
50-year, 24-hour	0.90 cfs
100-year, 24-hour	1.12 cfs

Proposed Conditions Discharges

The design storm is the 100-year, 2-hour storm. The stormwater collection system captures all of the stormwater runoff from the improved impervious surfaces on the site. The western and southern pervious areas of the site bypass the collection system and discharge at rates that are less than the predeveloped 100-year, 2-hour storm, in compliance with the EDS. The proposed conditions discharges from the 10-year, 2-hour and 50-year, 2-hour storms are also tabulated, see Table 3.

Detailed Calculations are included in Appendix 3.

Table 3: Proposed Conditions Peak Discharges from Site

Storm Event	Peak Discharge
10-year, 24-hour	0.15 cfs
50-year, 24-hour	0.23 cfs
100-year, 24-hour	0.29 cfs

The proposed conditions peak discharges from the entire project site are found in Table 4.

Table 4: Proposed Conditions Peak Flow Rates Onsite

Storm Event	Peak Discharge
10-year, 24-hour	2.14 cfs
50-year, 24-hour	3.03 cfs
100-year, 24-hour	3.47 cfs

Proposed/Future Land Use

The proposed land use is commercial, which is an approved land use for the parcel.

The site will be fully developed by this project, and no future land use other than commercial is anticipated.

Proposed Drainage Infrastructure

Conveyance of Runoff Through the Site

Street Conveyance

The half-street along the project's frontage will sheet flow from the roadway centerline to the existing gutter. A valley gutter is proposed across the driveway approach that will allow stormwater to continue to flow along the gutter line. A catch basin is proposed to be added at the east limit of the project's frontage in order to capture the half-street frontage stormwater. This stormwater is conveyed to the on-site retention facility.

Proposed Storm Drain Conveyance

The proposed storm drain conveyance system is required for this project to ensure compliance with the City of Surprise's development standards and to protect existing and proposed properties from damage. The storm drain conveyance system is designed to collect and convey storm water from the project site and the half-street frontage to the onsite retention facility and to the two Maxwell Plus drywell systems that are proposed to infiltrate storm water. The conveyance system is designed to manage the 100-year, 2-hour storm within the pipes and structures.

The storm drain system plans are found in Appendix 5.

Inlet Sizing

The proposed storm drain inlets are 2'x2' steel bar grate inlets. The largest catchment to a single catch basin is approximately 0.7 acres. Using the rational method, the peak flow to this inlet during the 100-year, 2-hour storm is 0.70 cfs. The head at the inlet at this flow rate is 0.1', which is acceptable. Inlet sizing calculations are found in Appendix 3.

Onsite Retention/Detention Requirements

The proposed onsite retention facility is comprised of StormTech MC-7200 stormwater chambers surrounded by stone backfill. The underground gallery is wrapped in nonwoven geotextile. The City of Surprise's requirements for underground retention are found in Appendix 5-4 of the City's Engineering Development Standards (EDS). Underground retention storage must be provided for the volume of the 100-year, 2-hour storm, calculated using the equation found in Chapter 5.9 (2.) of the EDS, with no reduction for anticipated percolation volume during the storm duration. The system must drain completely in 36 hours. The system is drained through two Maxwell Plus drywells, each assumed to infiltrate stormwater at a rate of 0.1 cfs, in accordance with the EDS.

Proposed Basin Geometry and Freeboard

The underground gallery is 73.89'W x 87.24'L x 7'D. The MC-7200 chamber geometry is found in Appendix 6. The top 1' of the gallery is not used for storage of the 100-year, 2-hour storm event, providing 1' of freeboard.

Required Retention Volume

The required retention volume is to be computed using the following formula from EDS Chapter 5.9 (2.):

$V = (C \cdot P \cdot A) / 12$

Where:

V = volume in acre-feet

C = weighted runoff coefficient per FCDMC Hydrology Manual, calculated to be 0.85.

P = rainfall depth in inches, for the 100-year, 2-hour storm per FCDMC Hydrology Manual Appendix A, found to be 2.25 from Figure A.56.

A = area in acres, which 3.69

The required retention volume is calculated to be:

V = [(0.85 x 2.25 x 3.69) / 12] x 43,560 square feet per acre = **25,648 cubic feet**

The required retention volume is 25,648 cubic feet.

Provided Retention Volume

The total provided retention volume in calculated using the storage volume of the MC-7200 storage chambers, the MC-7200 end caps, and the stone backfill below, around, and above the chambers. A porosity of 40% is used for the stone. The provided retention volume is calculated to be **28,147 cf**.

Sufficient retention volume is provided for the 100-year, 2-hour storm event with no allowance for percolation. The calculation of the provided retention volume is found in Appendix 3.

Dissipation of Stored Runoff

Per the EDS, the stormwater retention facility must completely drain in 36 hours. Stormwater is percolated into the ground using two Maxwell Plus dual chamber drywells. Each drywell can percolate 0.1 cfs per the requirements of the EDS. The total percolation capacity is 0.2 cfs. The drain time is calculated:

Drain Time = (25,648 cf / 0.2 cfs) * (1 hour/3,600 seconds) = 35.6 hours

The drain time is 35.6 hours, which is less than the 36 hours maximum allowable drain time.

The retention system and drywells are shown in the plans found in Appendix 5.

Ultimate Basin Outfall

In the event of a non-design storm which causes the retention system to be overcharged excess stormwater will fill the on-site conveyance system until it reaches the elevation of the rim of the lowest stormwater structure. This is the rim of the structure PC 2, the primary chamber of one of the Maxwell Drywells. It has a rim elevation of 1,221.08. Stormwater that runs out of the rim of PC 2 will flow to the ditch that is routing existing offsite flows around the site, where it will discharge to the same location that the existing ditch drains to in the southwest corner of the site. The lowest catch basin grate on the site is CB #10, with a rim elevation of 1,221.38. Should water be released through this rim it would pond to a depth of 0.5' (Elevation 1,221.88) before running over the curb and being collected by the ditch. The proposed building finished floor elevation is 1,223.60.

Interim Condition Drainage Concept

This project will fully develop the site. No phasing is planned.

Special Issues or Considerations

401/404 Permit

The project does not contain or affect waters if the United States.

NPDES Permit

The project disturbs more than one acre, therefore an NPDES/AZPDES Construction Activity General Permit (CGP) for Stormwater will be required for the project.

Downstream and Upstream Impacts of Proposed Improvements

The proposed improvements do not have negative downstream or upstream impacts.

Floodplain Use Permit with FCDMC

The site is not in a flood plain and does not require a Floodplain Use Permit with FCDMC.

Drywell Registration with ADEQ

The constructed drywells will be registered with ADEQ after installation.

Summary and Conclusions

The proposed project has been designed in conformance with the City of Surprise Engineering Development Standards. This report documents compliance with the stormwater aspects of the EDS. The proposed facilities will retain the 100-year, 2-hour storm event onsite from the project site and the half-street frontage to the site. The proposed retention facility will drain in less than 36 hours as required. The proposed improvements will perpetuate offsite drainage through the site The proposed improvements are protected from flooding and do not harm parcels upstream or downstream of the project site.

-End of Report-

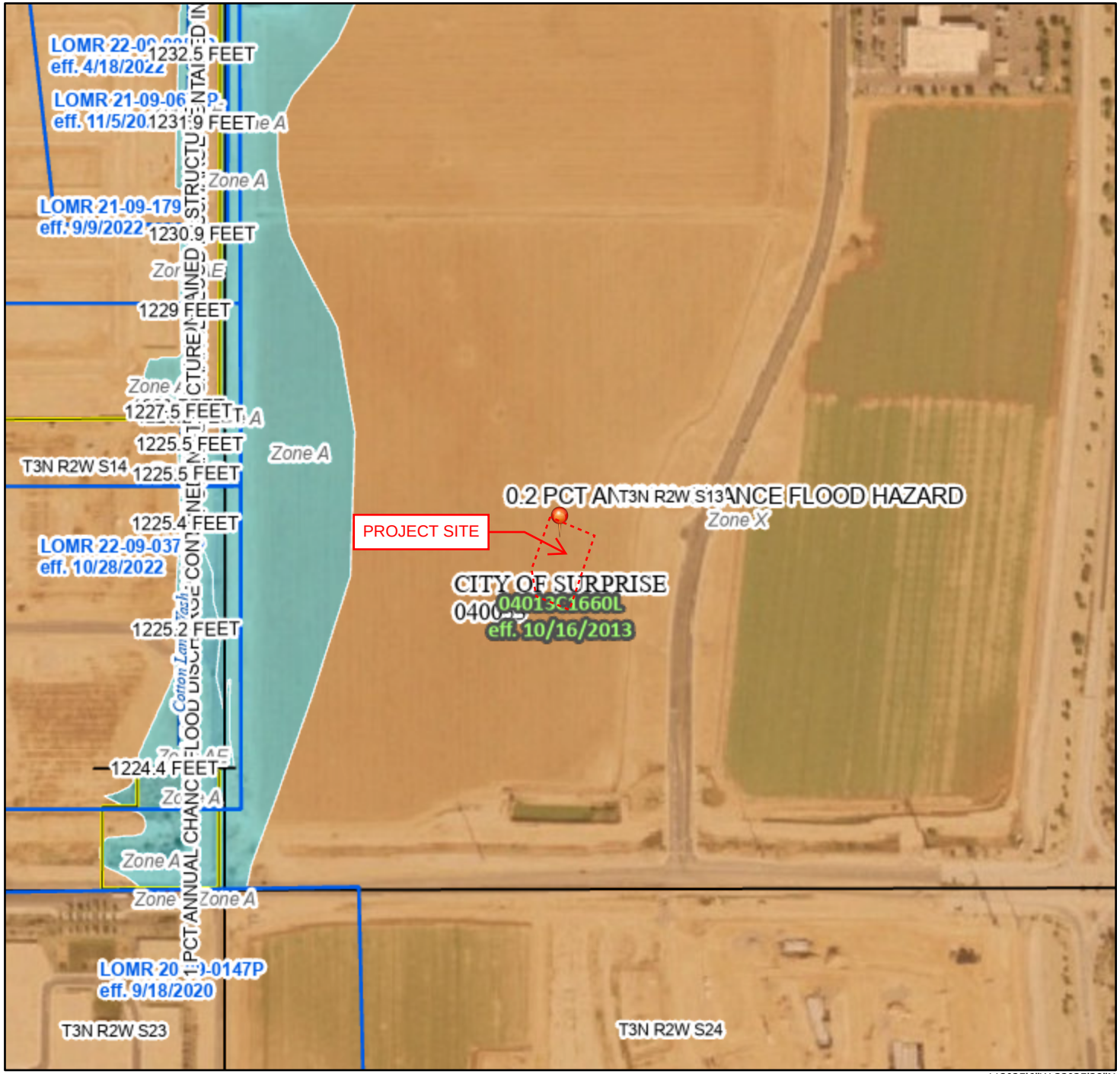
Appendix 1

FEMA FIRMette Map

National Flood Hazard Layer FIRMette

FEMA

112°25'44"W 33°36'8"N



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

1:6,000

112°25'6"W 33°35'38"N

Basemap Imagery Source: USGS National Map 2023

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 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 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 3/4/2025 at 9:35 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.

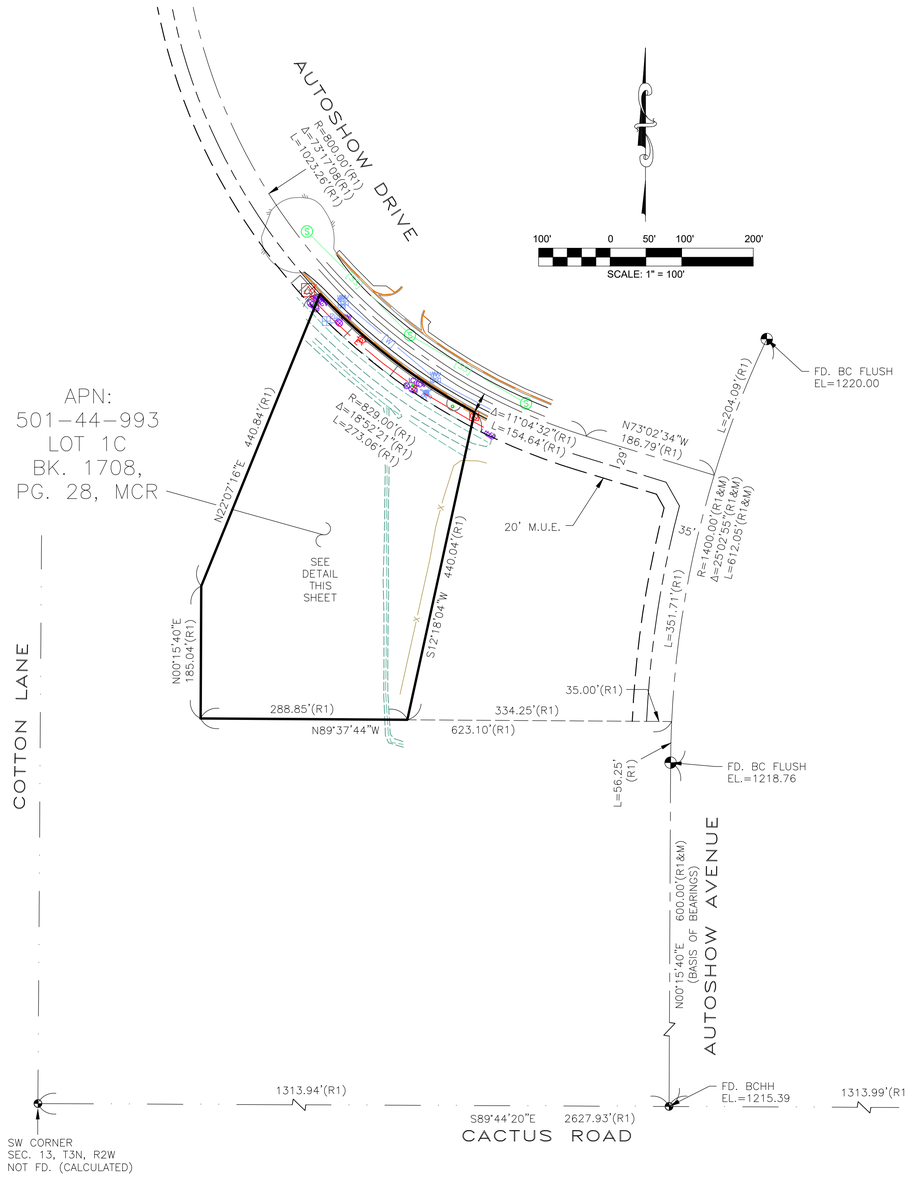
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory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

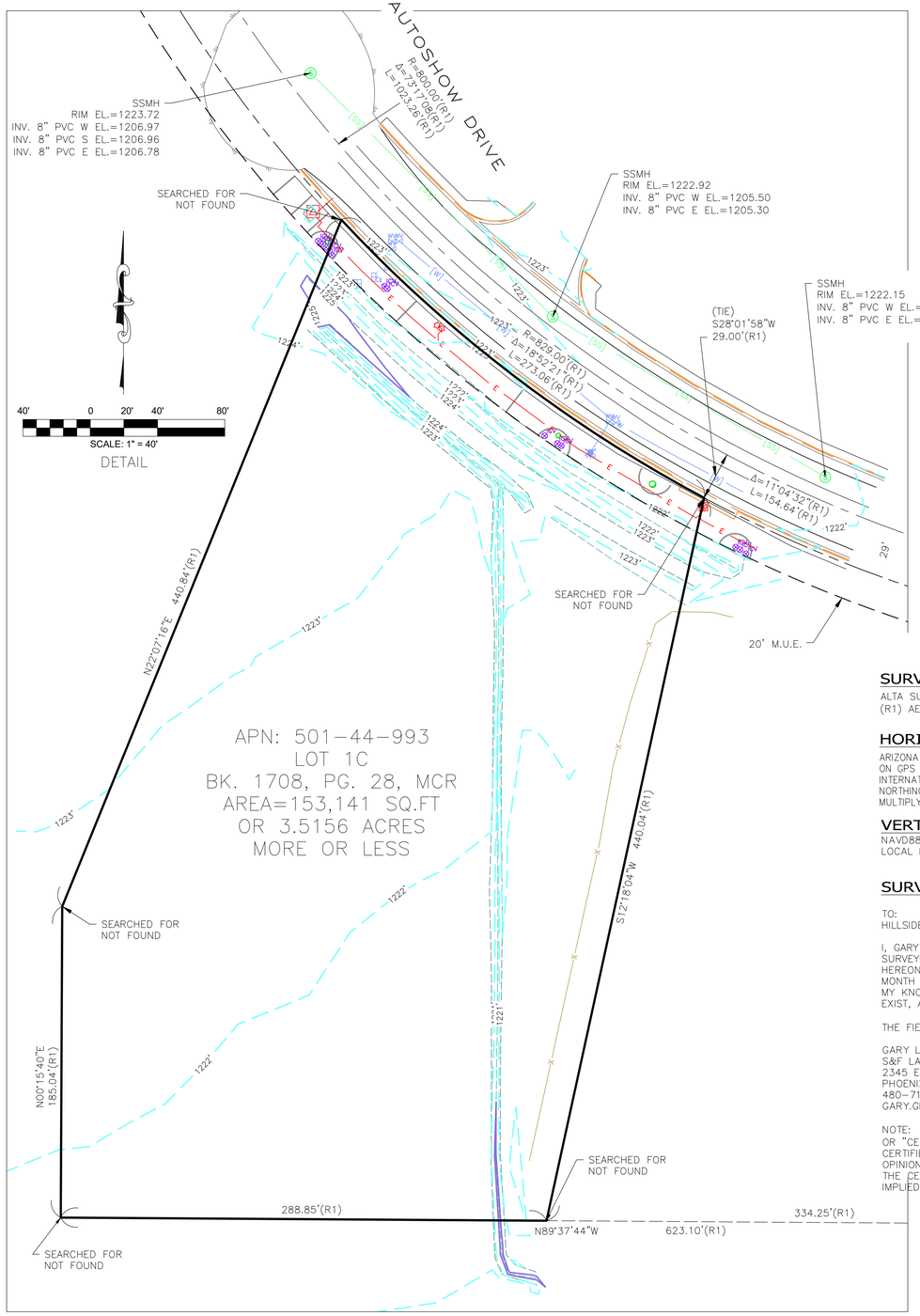
Appendix 2
Topographic Survey

RESULTS OF TOPOGRAPHIC SURVEY A PORTION OF THE SOUTHWEST QUARTER, SECTION 13, T3N, R2W, GILA AND SALT RIVER MERIDIAN MARICOPA COUNTY, ARIZONA

LEGEND:

SECTION LINE	POWER METER
CENTERLINE	POWER TRANSFORMER
RIGHT OF WAY	LIGHT–LAMP POST
BOUNDARY LINE	SANITARY SEWER MANHOLE
LOT/PARCEL LINE	WATER AIR RELEASE VALVE
FLOW LINE CURB	FIRE HYDRANT
EXTRUDED CURB	WATER METER
STANDARD CURB	WATER VALVE
EDGE OF PAVEMENT	TREE – DECIDUOUS
WATER	IRRIGATION CONTROL VALVE
ELECTRIC	M.U.E. MUNICIPAL USE EASEMENT
SANITARY SEWER	FD. FOUND
MAJOR CONTOUR	SSMH SANITARY SEWER MANHOLE
MINOR CONTOUR	INV. INVERT
FENCE (TEMPORARY CONSTRUCTION)	EL. ELEVATION





NOTES:

1. FIELD WORK WAS COMPLETED ON NOVEMBER 22, 2024.
2. SANITARY SEWER PIPE SIZES AND MATERIALS WERE DERIVED FROM THE FIELD SURVEY.
3. THE LOCATION OF EXISTING UNDERGROUND UTILITY FACILITIES SHOWN HEREON ARE BASED ON FIELD MEASUREMENTS BETWEEN UTILITY STRUCTURES AND LOCATE MARKS REQUESTED FOR THIS SURVEY PER ONE CALL PUBLIC LOCATE TICKET 2024111101604. THE SURVEYOR ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE DELINEATION OF SUCH UNDERGROUND UTILITIES BY THE RESPECTIVE UTILITY OWNERS/BUILDERS, NOR FOR THE EXISTENCE OF BURIED OBJECTS WHICH WERE NOT DELINEATED BY SAID UTILITY OWNERS/BUILDERS. PER S&F LAND SERVICES STANDARDS POLICIES, STAFF ARE PROHIBITED FROM ENTERING ALL CONFINED SPACES AS DEFINED BY OSHA, THUS, INFORMATION SHOWN HEREON IS SUBJECT TO AN UNCERTAINTY IN ACCURACY DEPENDING ON DEPTH, SIZE, FLOW, AND CONSTRUCTION OF MANHOLES.THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITY LINES BETWEEN STRUCTURES. ALL UTILITY LOCATIONS SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

SURVEY REFERENCES:

ALTA SURVEY BY KIMLEY HORN DATED 8–15–24 FOR EASEMENT LOCATIONS.
(R1) AEO POWERSPORTS PLAT (BOOK 1708, PAGE 28, MCR)

HORIZONTAL DATUM (BASIS OF BEARINGS):

ARIZONA STATE PLANE COORDINATE SYSTEM CENTRAL ZONE, NAD83 (2011), BASED ON GPS OBSERVATIONS. DISTANCES SHOWN HEREON ARE GROUND DISTANCES, INTERNATIONAL FEET, SCALED ABOUT CONTROL POINT NO 99.
NORTHING=945755.437, EASTING=545446.345. TO CONVERT TO GRID DISTANCES MULTIPLY BY THE COMBINED FACTOR OF 0.9998735369.

VERTICAL DATUM:

NAVD88 BASED ON STATIC GPS OBSERVATION
LOCAL BENCHMARKS SHOWN HEREON

SURVEYOR'S CERTIFICATE

TO:
HILLSIDE ARCHITECTURE

I, GARY L. GREEN, DO HEREBY CERTIFY THAT I AM A REGISTERED LAND SURVEYOR IN THE STATE OF ARIZONA, THAT THE SURVEY SHOWN HEREON WAS COMPLETED UNDER MY DIRECT SUPERVISION DURING THE MONTH OF NOVEMBER, 2024, IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, THAT THE MONUMENTS SHOWN ACTUALLY EXIST, AND THAT THIS SURVEY CAN BE RETRACED.

THE FIELDWORK WAS COMPLETED ON 11/22/2024.

GARY L. GREEN PLS #54334
S&F LAND SERVICES
2345 E. THOMAS ROAD, STE.150
PHOENIX, AZ 85016
480–717–8830
GARY.GREEN@SFLANDS.COM

NOTE: A.R.S. 32–151 STATES THAT THE USE OF THE WORD "CERTIFY" OR "CERTIFICATION" BY A PERSON OR FIRM THAT IS REGISTERED OR CERTIFIED BY THE BOARD IS AN EXPRESSION OF PROFESSIONAL OPINION REGARDING FACTS OR FINDINGS THAT ARE THE SUBJECT OF THE CERTIFICATION AND DOES NOT CONSTITUTE AN EXPRESS OR IMPLIED WARRANTY OR GUARANTEE.

S&F Land Services
Land Surveying & Remote Sensing
2345 E. THOMAS ROAD STE. 150
PHOENIX, AZ 85016
(602) 805–8921
WWW.SFLANDS.COM EMAIL: INFO@SFLANDS.COM

DATE	JOB NO.	FIELD	DRAWN	CHECKED
NOV. 27, 2024	2024–771–01	AC	GLG	CCS

2477101_GROUND.dwg

SURVEY FOR: HILLSIDE ARCHITECTURE
CRASH CHAMPIONS

A PORTION OF THE SOUTHWEST QUARTER,
OF SECTION 13, T3N, R2W
SALT AND GILA MERIDIAN
MARICOPA COUNTY, ARIZONA

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
54334
GARY L GREEN
ARIZONA, U.S.A.

Appendix 3
Calculations

Use the Rational Method to Determine Peak Discharges
Q = CiA
C values from Table 3.2 of the Drainage Design Manual for Maricopa County
i from NOAA PFDS

I. Offsite Basin - Half Street Frontage

10-year, 2-hour

Runoff Coefficient (C):	0.85	
Rainfall Intensity (i):	0.674	in/hr
Area (A):	0.18	acres
Peak Discarge (Q):	*0.10*	*cfs*

50-year, 2-hour

Runoff Coefficient (C):	0.95	
Rainfall Intensity (i):	0.940	in/hr
Area (A):	0.18	acres
Peak Discarge (Q):	*0.16*	*cfs*

100-year, 2-hour

Runoff Coefficient (C):	0.95	
Rainfall Intensity (i):	1.06	in/hr
Area (A):	0.18	acres
Peak Discarge (Q):	*0.18*	*cfs*

II. Existing Conditions Discharges

10-year, 2-hour

Runoff Coefficient (C):	0.24		Weighted C Value
Rainfall Intensity (i):	0.674	in/hr	
Area (A):	3.69	acres	
Peak Discarge (Q):	*0.59*	*cfs*	

50-year, 2-hour

Runoff Coefficient (C):	0.26		Weighted C Value
Rainfall Intensity (i):	0.940	in/hr	
Area (A):	3.69	acres	
Peak Discarge (Q):	*0.90*	*cfs*	

100-year, 2-hour

Runoff Coefficient (C):	0.29		Weighted C Value
Rainfall Intensity (i):	1.06	in/hr	
Area (A):	3.69	acres	
Peak Discarge (Q):	*1.12*	*cfs*	

III. Proposed Conditions Discharges

10-year, 2-hour

Runoff Coefficient (C):	0.86		Weighted C Value
Rainfall Intensity (i):	0.674	in/hr	
Area (A):	3.69	acres	
Peak Discarge (Q):	*2.14*	*cfs*	

50-year, 2-hour

Runoff Coefficient (C):	0.87		Weighted C Value
Rainfall Intensity (i):	0.940	in/hr	
Area (A):	3.69	acres	
Peak Discarge (Q):	*3.03*	*cfs*	

100-year, 2-hour

Runoff Coefficient (C):	0.89		Weighted C Value
Rainfall Intensity (i):	1.06	in/hr	
Area (A):	3.69	acres	
Peak Discarge (Q):	*3.47*	*cfs*	

Area that Bypasses Detention

10-year, 2-hour

Runoff Coefficient (C):	0.40	
Rainfall Intensity (i):	0.674	in/hr
Area (A):	0.55	acres
Peak Discarge (Q):	*0.15*	*cfs*

50-year, 2-hour

Runoff Coefficient (C):	0.44	
Rainfall Intensity (i):	0.940	in/hr
Area (A):	0.55	acres
Peak Discarge (Q):	*0.23*	*cfs*

100-year, 2-hour

Runoff Coefficient (C):	0.50	
Rainfall Intensity (i):	1.06	in/hr
Area (A):	0.55	acres
Peak Discarge (Q):	*0.29*	*cfs*

All peak discharges from the bypass area are less than the predeveloped site during the 100-year, 2-hour storm.

Crash Champions — Design Calculations
Surprise Arizona — Retention System

I. Calculate required retention volume

	Area	C	
Impervious	117400	0.95	Pavement, Roofs, Sidewalk - Onsite
Pervious	35741	0.5	Desert Landscaping 2
Frontage	7780	0.95	Pavement
Total Area	160921		
Weighted Coefficient		0.85	

C	0.85	
P	2.25	From Figure A.56, Drainage Design Manual for Maricopa County
A	3.69	

$V_{REQUIRED}$	25648 cf

II. Calculate Storage Provided

6446 sf	Footprint of gallery
7 ft	Depth of gallery
45122 cf	Gallery volume
176 cf	Storage per chamber
7 ft	Chamber length
25 cf	Chamber storage/foot of chamber length
640 ft	Length of chamber proposed, excluded end caps
16198 cf	Volume of chamber storage
40 cf	Storage per endcap
16	Number of end caps
632 cf	Volume of end cap storage
16830 cf	Total volume of chamber & end cap storage
28292 cf	Volume of stone in gallery
40%	Stone porosity
11317 cf	Volume of stone void storage
28147 cf	Total storage volume provided

III. Drain time and Drywell Calcs
Discharge rate required to drain in 36 hours:
0.198 cfs

Max Allowable is 0.1 cfs per drywell for underground detention

Drywells Required
2 Drywells required

Drain Time
35.6 Hours

Point precipitation frequency estimates (inches/hour)
NOAA Atlas 14 Volume 1 Version 5
Data type: Precipitation intensity
Time series type: Partial duration
Project area: Southwest
Location na Arizona USA
Station Name: -
Latitude: 33.5980 Degree
Longitude: -112.4238 Degree
Elevation (USGS): 1223 ft

PRECIPITATION FREQUENCY ESTIMATES

by duration	1	2	5	10	25	50	100	200	500	1000
5-min:	2.16	2.81	3.83	4.61	5.68	6.5	7.37	8.24	9.42	10.3
10-min:	1.64	2.14	2.91	3.51	4.32	4.95	5.6	6.28	7.16	7.84
15-min:	1.36	1.77	2.41	2.9	3.57	4.09	4.63	5.18	5.92	6.48
30-min:	0.914	1.19	1.62	1.95	2.4	2.75	3.12	3.49	3.99	4.36
60-min:	0.565	0.737	1	1.21	1.49	1.7	1.93	2.16	2.47	2.7
2-hr:	0.326	0.42	0.563	0.674	0.824	0.94	1.06	1.19	1.36	1.49
3-hr:	0.227	0.289	0.383	0.457	0.559	0.641	0.729	0.821	0.951	1.06
6-hr:	0.131	0.166	0.214	0.253	0.306	0.347	0.391	0.437	0.501	0.553
12-hr:	0.073	0.092	0.118	0.137	0.164	0.184	0.205	0.227	0.256	0.28
24-hr:	0.047	0.059	0.077	0.09	0.109	0.124	0.139	0.155	0.177	0.195
2-day:	0.025	0.031	0.041	0.049	0.059	0.068	0.076	0.085	0.098	0.108
3-day:	0.018	0.023	0.03	0.036	0.044	0.051	0.057	0.065	0.075	0.083
4-day:	0.015	0.019	0.025	0.03	0.037	0.042	0.048	0.054	0.063	0.07
7-day:	0.009	0.012	0.016	0.019	0.023	0.027	0.03	0.034	0.04	0.044
10-day:	0.007	0.009	0.012	0.014	0.018	0.02	0.023	0.026	0.03	0.033
20-day:	0.004	0.005	0.007	0.008	0.01	0.012	0.013	0.014	0.016	0.018
30-day:	0.003	0.004	0.006	0.007	0.008	0.009	0.01	0.011	0.013	0.014
45-day:	0.003	0.003	0.004	0.005	0.006	0.007	0.008	0.008	0.009	0.01
60-day:	0.002	0.003	0.004	0.004	0.005	0.006	0.006	0.007	0.008	0.008

Date/time (GMT): Wed Mar 5 00:24:33 2025
pyRunTime: 0.0181882381439209

Nyloplast Inlet Capacity Table

DISCLAIMER: SAFETY FACTORS ARE NOT INCLUDED IN THESE CALCULATIONS. ACTUAL CALCULATIONS SHOULD BE CARRIED OUT AND VERIFIED BY THE DESIGN ENGINEER TAKING INTO ACCOUNT ALL LOCAL CONDITIONS. NYLOPLAST RECOMMENDS USING A MINIMUM SAFETY FACTOR OF 1.25 FOR PAVED AREAS AND 2.0 FOR TURF AREAS. ADS/NYLOPLAST IS NOT RESPONSIBLE FOR MISUSE OF THIS TOOL.

Input	
Type of Grate	2'x2' Steel Bar/MAG
Head (ft)	0.1

Properties	
Orifice Flow Area (in)	**323.04**
Orifice Flow Area (ft)	**2.24**
Weir Flow Perimeter (in)	**90.00**
Weir Flow Perimeter (ft)	**7.50**

Solution	
Capacity (cfs)	**0.79**
Capacity (gpm)	**354.45**

$$Q_{weir} = CLH^{3/2}$$

$C = 3.33\ Weir\ Discharge\ Coefficient$

$L = Perimeter\ of\ Grate\ Opening\ (ft)$

$H = Flow\ Height\ of\ Water\ Surface\ Above\ Weir\ (ft)$

$$Q_{orifice} = CA\sqrt{2gh}$$

$C = 0.60\ Orifice\ Discharge\ Coefficient$

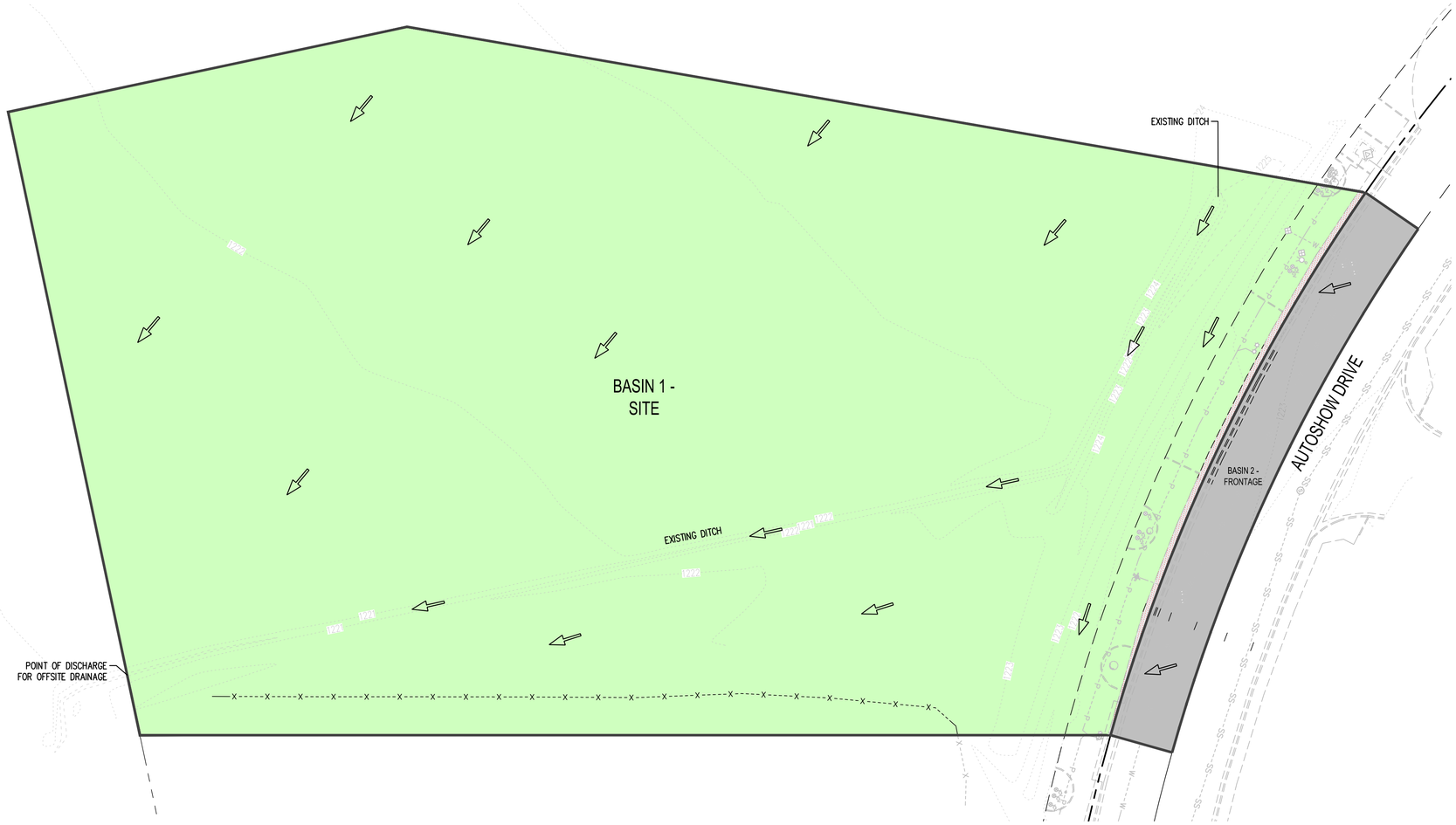
$A = Area\ of\ the\ Orifice\ (ft^2)$

$g = Gravitational\ Constant\ \left(32.2\frac{ft}{s^2}\right)$

$H = Depth\ of\ Water\ Above\ Center\ of\ Orifice\ (ft)$

REV 2.1.21

Appendix 4
Basin Area Maps



AREAS LEGEND	
	PERVIOUS
	EXISTING SIDEWALK – IMPERVIOUS
	EXISTING PAVEMENT – IMPERVIOUS

BASIN AREAS			
BASIN	COVERAGE	AREA (SF)	AREA (AC)
1	IMPERVIOUS	7,780	0.18
	PERVIOUS	0	0.00
2	IMPERVIOUS	722	0.02
	PERVIOUS	152,419	3.49
TOTAL		160,921	3.69

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

VERTICAL DATUM
NAVD 88

Mar 06, 2025 4:07:21pm – User: DanPhillips
N:\2 – PROJECTS\21 HILLSIDE ARCHITECTURE\121.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\EXHIBITS\2025-0305 BASIN AREA EXHIBIT_121.044 EX. BASIN AREA EXHIBIT.DWG

REVISIONS

PROJECT NO.
121.044
DRAWN
C. DAHM
CHECKED
D. PHILLIPS
SUBMITTAL DATES

OTB DATE
–

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP
Registered Professional Engineer (Civil)
CERTIFICATE NO.
82534
CHARLIE
SEVERS
Date Signed
ARIZONA, U.S.A.

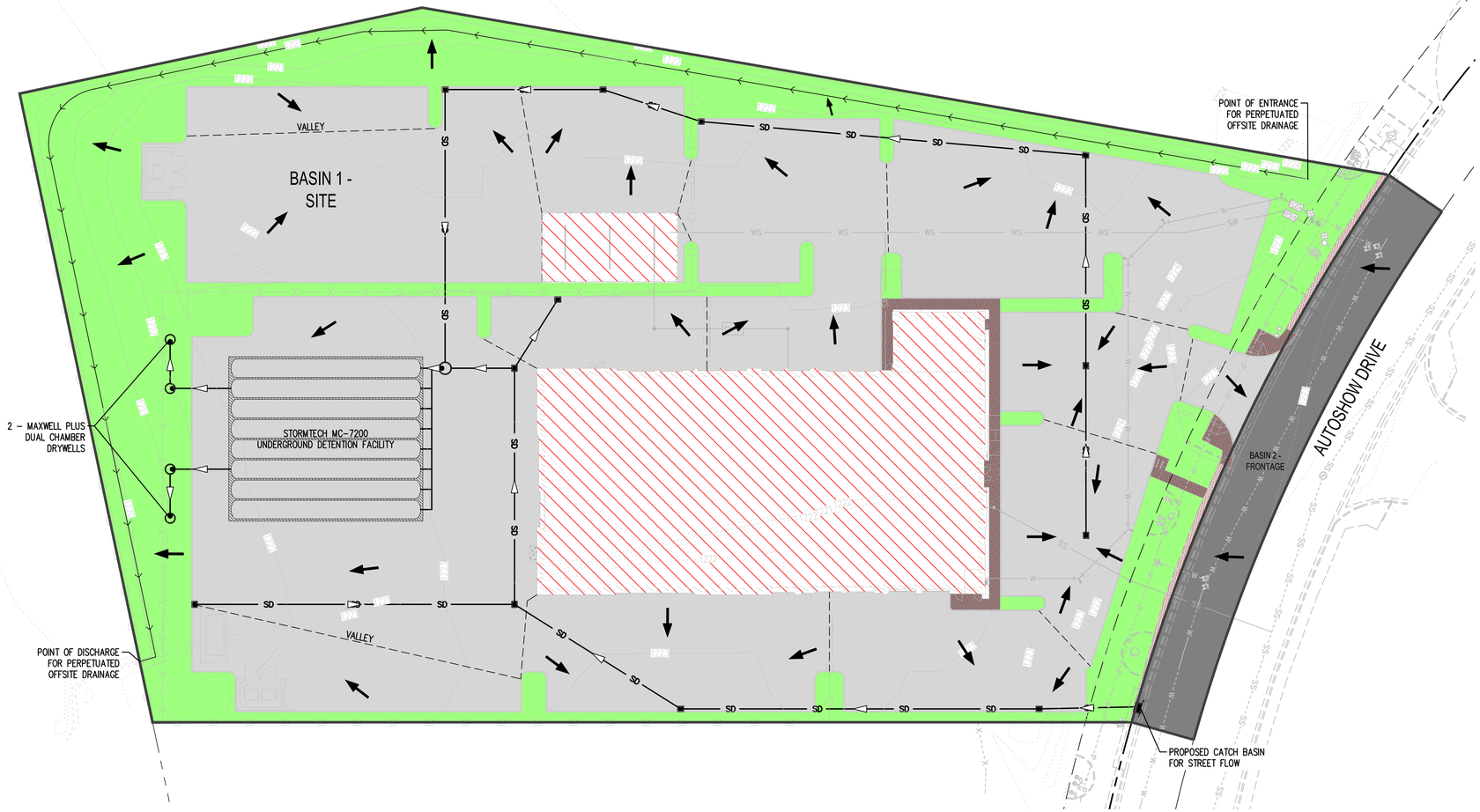
CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture plc

SHEET TITLE
EXISTING
BASIN MAP

SHEET
EX-01

FSXX-XXXX



N

0 30 60

SCALE IN FEET

LEGEND

- PROPERTY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- GRADE BREAK
- WATER LINE
- WATER SERVICE LINE
- SEWER LINE
- STORM LINE
- PIPE FLOW ARROW
- STORM STRUCTURES
- PROPOSED SURFACE FLOW ARROW

AREAS LEGEND

PERVIOUS
PROPOSED PAVEMENT – IMPERVIOUS
BUILDING ROOF – IMPERVIOUS
PROPOSED SIDEWALK – IMPERVIOUS
EXISTING SIDEWALK – IMPERVIOUS
EXISTING PAVEMENT – IMPERVIOUS

BASIN AREAS

BASIN	COVERAGE	AREA (SF)	AREA (AC)
1	IMPERVIOUS	7,780	0.18
	PERVIOUS	0	0.00
2	IMPERVIOUS	117,400	2.70
	PERVIOUS	35,741	0.82
TOTAL		160,921	3.69

Contact Arizona 811 at least two full working days before you begin excavation

ARIZONA811 BLUE STAKE, INC.

Call 811 or click Arizona811.com

VERTICAL DATUM
NAVD 88

Mar 06, 2025 4:10:45pm – User: DanPhillips
N:\2 - PROJECTS\121 HILLSIDE ARCHITECTURE\121.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\EXHIBITS\2025-0305 BASIN AREA EXHIBIT_121.044 PROP. BASIN AREA EXHIBIT.DWG

REVISIONS

PROJECT NO.
121.044
DRAWN
C. DAHM
CHECKED
D. PHILLIPS
SUBMITTAL DATES

OTB DATE
–

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP

Registered Professional Engineer (Civil)
CERTIFICATE NO.
82534
CHARLIE
SEVERS
Date Signed
ARIZONA, U.S.A.

CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture plic

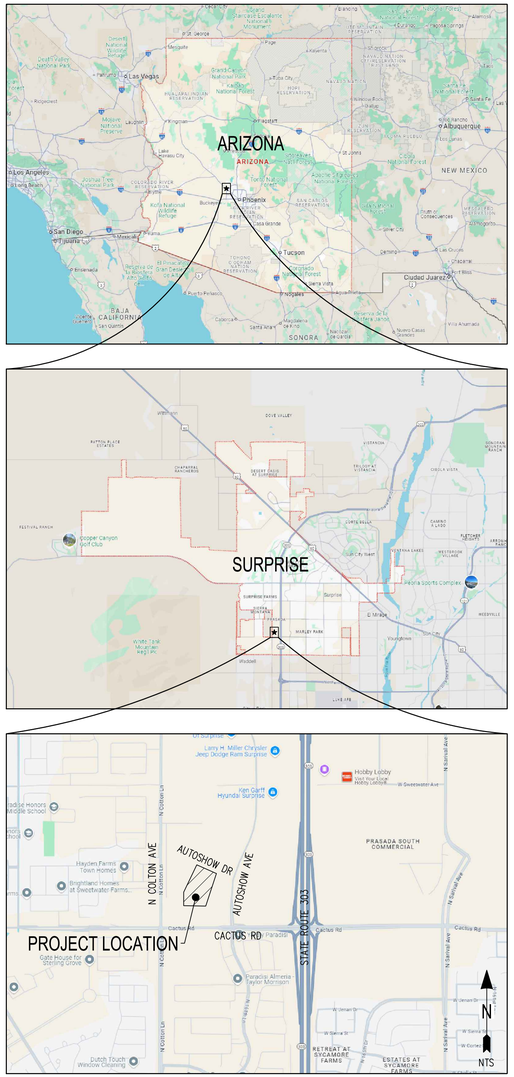
SHEET TITLE
PROPOSED
BASIN MAP

SHEET
EX-02

FSXX-XXXX

Appendix 5
Stormwater Plans

CRASH CHAMPIONS
CIVIL CONSTRUCTION DOCUMENTS
SURPRISE, ARIZONA



APPLICANT
LRG INVESTORS
822 A1A NORTH, SUITE 310
PONTE VEDRA, FL 32082
PHONE: 312.404.6066
CONTACT: JOE BRADY

ENGINEER
JSA CIVIL, LLC
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512
PHONE: 360.515.9600
CONTACT: CHARLIE SEVERS

ARCHITECT
HILLSIDE ARCHITECTURE, PLLC
345 W BOBWHITE CT, SUITE 120
BOISE, ID 83706
PHONE: 208.810.7745
CONTACT: DANIEL ZIMMERMANN

LANDSCAPE ARCHITECT
STACK ROCK GROUP
404 S 8TH STREET, SUITE 154
BOISE, ID 83702
PHONE: 208.716.4787
CONTACT: JESSE BUSTER

GEOTECHNICAL
TERRACON
4685 S ASH AVE, SUITE H-4
TEMPE, ARIZONA 85282
PHONE: 480-897-8200
CONTACT: EDDY RAMIREZ

SURVEYOR
S&F LAND SERVICES
2345 E THOMAS RD, SUITE 150
PHOENIX, AZ
PHONE: 602.805.8921
CONTACT: GARY GREEN

GOVERNING AGENCY
CITY OF SURPRISE
16000 N CIVIC CENTER PLAZA
SURPRISE, AZ 85374
PHONE: 623.222.3244
CONTACT: LINSEY CARLOS

UTILITIES
SEWER
CITY OF SURPRISE
PHONE: 623.222.6000

WATER
EPCOR
PHONE: 1.800.383.0834

POWER
ARIZONA PUBLIC SERVICE
PHONE: 602.371.6140

NATURAL GAS
SOUTHWEST GAS CORPORATION
PHONE: 877.860.6020

EPCOR
2355 WEST PINNACLE PEAK ROAD, SUITE 300
PHOENIX, ARIZONA 85027
PHONE: 623.445.2400

SITE INFORMATION
ADDRESS: 303 AUTOMOTIVE DR
SURPRISE, ARIZONA
PARCEL: 501-44-993
ACRES: ±3.52
ZONING: PRASADA PAD
PRASADA GATEWAY VILLAGE 3 (PGV-S)

LEGAL DESCRIPTION
LOT 1X, AEO POWERSPORTS, ACCORDING TO BOOK 1708 OF MAPS, PAGE 28, RECORDS OF MARICOPA COUNTY, ARIZONA

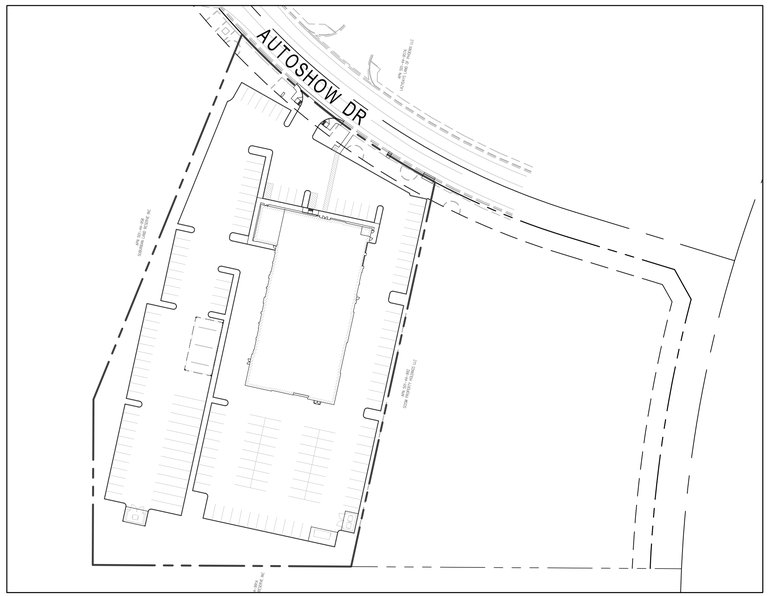
EXCEPT ALL MINERALS, COAL CARBONS, HYDROCARBONS, OIL, GAS, CHEMICAL ELEMENTS AND COMPOUNDS WHETHER IN SOIL, LIQUID OR GASEOUS FORM, ADD ALL STEAM AND OTHER FORMS OF THERMAL ENERGY ON, IN, OR UNDER THE LAND, AS RESERVED IN DEED RECORDED IN RECORDING NO. 20071019342, RECORDS OF MARICOPA COUNTY

HORIZONTAL DATUM
ARIZONA STATE PLANE COORDINATE SYSTEM CENTRAL ZONE NAD83 (2011), SEE TOPOGRAPHIC SURVEY

VERTICAL DATUM
NAVD88, SEE TOPOGRAPHIC SURVEY

BENCHMARKS
SEE TOPOGRAPHIC SURVEY

FEMA FLOOD ZONE
ZONE X
MAP NUMBER: 0413C1660L
EFFECTIVE DATE: OCTOBER 16, 2013



OVERALL SITE PLAN
1"=80'

SHEET INDEX	
SHEET	TITLE
CV-01	COVER SHEET
GN-01	GENERAL NOTES & ABBREVIATIONS
GN-02	GENERAL NOTES
SV-01	TOPOGRAPHIC SURVEY
EC-01	EROSION CONTROL PLAN
EC-02	EROSION CONTROL NOTES & DETAILS
SP-01	SITE & PAVING PLAN
SP-02	HORIZONTAL CONTROL PLAN
SP-03	SITE & PAVING DETAILS
SP-04	SITE & PAVING DETAILS
SP-05	PUBLIC SAFETY SITE PLAN
CG-01	GRADING PLAN
CG-02	DETAILED GRADING PLAN
CG-03	GRADING DETAILS
UT-01	UTILITY PLAN
SD-01	STORMWATER PLAN
SD-02	STORMWATER DETAILS
SD-03	STORMWATER DETAILS
SD-04	STORMWATER DETAILS
WT-01	WATER PLAN
WT-02	WATER DETAILS
WT-03	WATER DETAILS
WT-04	WATER DETAILS
SS-01	SEWER PLAN
SS-02	SEWER DETAILS

ADEQ NPDES GENERAL CONSTRUCTION PERMIT & SWPPP NOTE
A NOTICE OF INTENT (NOI) TO DISCHARGE STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITIES UNDER THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY'S 2020 CONSTRUCTION GENERAL PERMIT (CGP) SHALL BE SUBMITTED FOR AND SECURED BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION ACTIVITIES. A PROJECT SPECIFIC STORMWATER POLLUTION PREVENTION PLAN (SWPPP) SHALL BE PREPARED BY THE CONTRACTOR AND INCLUDED WITH THE NOI APPLICATION. THE CONTRACTOR IS REQUIRED TO PROVIDE A QUALIFIED EMPLOYEE(ES) MEETING THE REQUIREMENTS OF THE CGP. THE CONTRACTOR SHALL NOTIFY ARIZONA DEQ TO ALL CHANGES/REVISIONS TO THE SWPPP THAT ARE COMPLETED BY THE CONTRACTOR. A COPY OF COVERAGE UNDER THE CGP AND SWPPP SHALL BE SUBMITTED TO THE CITY OF OF SURPRISE PRIOR TO START OF CONSTRUCTION ACTIVITIES BY THE CONTRACTOR. THE CONTRACTOR IS REQUIRED TO PREPARE AND SUBMIT ALL REQUIRED REPORTS TO THE DEQ AND SUBMIT FOR THE NOTICE OF TERMINATION (NOT) ONCE THE SITE IS FULLY STABILIZED.

DEWATERING NOTE
THE CONTRACTOR SHALL UTILIZE APPROPRIATE DEWATERING SYSTEMS AND TECHNIQUES TO MAINTAIN THE EXCAVATED AREA SUFFICIENTLY DRY FROM GROUNDWATER AND/OR SURFACE RUNOFF SO AS NOT TO ADVERSELY AFFECT CONSTRUCTION PROCEDURES OR CAUSE EXCESSIVE DISTURBANCE OF UNDERLYING NATURAL GROUND. THE CONTRACTOR SHALL REPAIR ANY DAMAGE RESULTING FROM THE FAILURE OF THE DEWATERING OPERATIONS OR FROM A FAILURE TO MAINTAIN ALL THE AREAS OF WORK IN A SUITABLE DRY CONDITION. UNLESS OTHERWISE SPECIFIED, CONTINUE DEWATERING UNINTERRUPTED UNTIL THE STRUCTURES, PIPES, AND APPURTENANCES TO BE BUILT HAVE BEEN PROPERLY INSTALLED, BACKFILLED, AND COMPACTED. WHERE SUBGRADE MATERIALS ARE UNABLE TO MEET THE SUBGRADE DENSITY REQUIREMENTS DUE TO IMPROPER DEWATERING TECHNIQUES, REMOVE AND REPLACE THE MATERIALS AS DIRECTED BY THE ENGINEER.

TRAFFIC CONTROL NOTE
THE CONTRACTOR SHALL PROVIDE ALL FLAGGERS, SIGNS, AND OTHER TRAFFIC CONTROL DEVICES AS NECESSARY TO COMPLETE THE WORK. THE CONTRACTOR SHALL ERECT AND MAINTAIN ALL CONSTRUCTION SIGNS, WARNING SIGNS, DETOUR SIGNS, AND OTHER TRAFFIC CONTROL DEVICES NECESSARY TO WARN AND PROTECT THE PUBLIC AT ALL TIMES FROM INJURY OR DAMAGE AS A RESULT OF THE CONTRACTOR'S OPERATIONS THAT MAY OCCUR IN HIGHWAYS, ROADS, OR STREETS. NO WORK SHALL BE DONE ON OR ADJACENT TO THE ROADWAY UNTIL ALL NECESSARY SIGNS AND TRAFFIC CONTROL DEVICES ARE IN-PLACE. THE CONTRACTOR SHALL NOT CLOSE DOWN THROUGH TRAFFIC ON CITY/COUNTY/STATE ROADS. ACCESS FOR BOTH VEHICULAR AND PEDESTRIAN TRAFFIC SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE THE CONTRACTOR OBTAINS PERMISSION TO TEMPORARILY CLOSE A SIDEWALK. THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN TO THE CITY OF SURPRISE AND EPCOR FOR REVIEW AND APPROVAL PRIOR TO STARTING ANY WORK IN THE RIGHT-OF-WAY.

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

CALL BEFORE YOU DIG
THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

VERTICAL DATUM
NAVD 88

WATER/SEWER "AS-BUILT" CERTIFICATION
I HEREBY CERTIFY THAT THE "AS-BUILT" MEASUREMENTS AS SHOWN HEREIN WERE MADE UNDER MY SUPERVISION OR AS NOTED, AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AFTER DUE REVIEW. ADDITIONALLY, I HEREBY CERTIFY THAT ALL MAINS AND SERVICES HAVE BEEN INSTALLED WITHIN THE LIMITS OF EASEMENTS DEDICATED TO EPCOR WATER ARIZONA INC., OR INSIDE DEDICATED STREET RIGHT-OF-WAY OR PUBLIC UTILITY EASEMENT

THIS SET OF PLANS HAS BEEN REVIEWED FOR COMPLIANCE WITH CITY REQUIREMENTS PRIOR TO ISSUANCE PF PERMITS. THE CITY NEITHER ACCEPTS NOR ASSUMES ANY LIABILITY FOR ERRORS OR OMISSIONS. THE COMPLIANCE APPROVAL SHALL NOT PREVENT THE CITY ENGINEER FROM REQUIRING CORRECTIONS OF ERRORS OR OMISSIONS IN PLANS FOUND TO BE IN VIOLATION OF LAWS OR ORDINANCES

CITY OF SURPRISE ENGINEER _____ DATE _____

REVISIONS

PROJECT NO. 121.044
DRAWN C. DAHM
CHECKED D. PHILLIPS
SUBMITTAL DATES
OTB DATE —

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP
Registered Professional Engineer (Civil) CERTIFICATE NO. 67234 CHARLIE SEVERS Date Signed ARIZONA, U.S.A.
03/10/2025

CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture pllc

SHEET TITLE
COVER SHEET

SHEET
CV-01

FSXX-XXXX

Mar 10, 2025 - 1:59:12pm - User: CoreDahm
N:\2 - PROJECTS\121 HILLSIDE ARCHITECTURE\121.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\121.044 CV-01.DWG

JSA CIVIL GENERAL CONSTRUCTION NOTES

1. ALL WORK, WORKMANSHIP AND MATERIALS FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH THE LATEST VERSION OF THE FOLLOWING MANUAL(S) AND DOCUMENT(S):

   CITY OF SURPRISE ENGINEERING DEVELOPMENT STANDARDS MANUAL, 2021 EDITION
   HTTPS://CONTENT.CIVICPLUS.COM/API/ASSETS/549EDDEE-FD24-4C43-9C6B-036AC02221E0

   CITY OF SURPRISE SUPPLEMENTAL ENGINEERING DEVELOPMENT STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION, JANUARY 2022
   HTTPS://CONTENT.CIVICPLUS.COM/API/ASSETS/AZ-SURPRISE/A828718E-22E1-48D4-BE5F-85186C4288DB

   CITY OF SURPRISE PLANNING AND ENGINEERING DESIGN STANDARDS
   HTTPS://CONTENT.CIVICPLUS.COM/API/ASSETS/2F8891FE-D71A-49ED-8949-1600B5A81FAF?SCOPE=ALL

   EPCOR 2020 DEVELOPER & ENGINEERING GUIDE
   HTTPS://WWW.EPCOR.COM/CONTENT/DAM/EPCOR/DOCUMENTS/SUPPORTING-DOCUMENTS/2020_DEVELOPER-ENGINEERING-GUIDE.PDF

   MARICOPA ASSOCIATION OF GOVERNMENTS (MAG) UNIFORM STANDARD SPECIFICATIONS AND DETAILS FOR PUBLIC WORKS CONSTRUCTION (2024)
   HTTPS://AZMAG.GOV/PORTALS/0/DOCUMENTS/MAGCONTENT/2020_MAG_UNIFORM_STANDARD_DETAILS_FOR_PUBLIC_WORKS_CONSTRUCTION_SPECS_FINAL.PDF?VER=2019-12-30-103511-830

   FCDMC DRAINAGE DESIGN MANUAL FOR MARICOPA COUNTY, VOLUME III, EROSION CONTROL
   HTTPS://WWW.MARICOPA.GOV/DOCUMENTCENTER/VIEW/2368/DRAINAGE-DESIGN-MANUAL-FOR-MARICOPA-COUNTY-VOLUME-III-EROSION---REVISED-73018-PDF

   PRASADA PLANNED AREA DEVELOPMENT
   HTTPS://CONTENT.CIVICPLUS.COM/API/ASSETS/97DF4DF1-4DC3-41F6-8359-D9A131D6EE73?CACHE=1800

   GEOTECHNICAL REPORT FINALIZED BY TERRACON ON DECEMBER 13, 2024

2. ALL GOVERNMENTAL SAFETY REGULATIONS SHALL BE STRICTLY ADHERED TO INCLUDING OSHA.

3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DULY NOTIFY THE CITY OF SURPRISE AND EPCOR IN ADVANCE OF THE COMMENCEMENT OF ANY AUTHORIZED WORK AND TO SCHEDULE REQUIRED INSPECTIONS. ANY REQUIRED INSPECTION TEST WILL BE PERFORMED AT THE CONTRACTOR'S EXPENSE.

4. THE APPROVAL OF THESE PLANS BY THE CITY OF SURPRISE AND EPCOR DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO COMPLY WITH THE REQUIREMENTS OF OTHER GOVERNING AGENCIES.

   CAUTION – NOTICE TO CONTRACTOR

5. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON THE PROJECT SURVEY AND OTHER RECORDS OF UTILITIES. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL CALL FOR UTILITY LOCATES 48 HOURS PRIOR TO PLANNED EXCAVATIONS.

6. THE DESIGN SHOWN IS BASED UPON THE ENGINEER'S UNDERSTANDING OF THE EXISTING CONDITIONS. THE EXISTING CONDITIONS SHOWN ON THIS PLAN SET ARE BASED UPON COMPILED SURVEY DATA. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING FIELD CONDITIONS PRIOR TO BIDDING THE PROPOSED WORK IMPROVEMENTS. IF CONFLICTS ARE DISCOVERED, THE CONTRACTOR SHALL NOTIFY THE OWNER OR OWNER'S REPRESENTATIVE.

7. EXISTING UTILITIES ARE SHOWN FOR REFERENCE ONLY. THE CONTRACTOR SHALL VERIFY EXACT LOCATION, DIAMETER, LENGTH, CONDITION, PIPE TYPE, SLOPE AND VERTICAL AND HORIZONTAL ALIGNMENT OF THE EXISTING ALIGNMENT OF THE PROPOSED POINTS OF CONNECTION PRIOR TO CONNECTION AND REPORT ANY DISCREPANCIES TO ENGINEER PRIOR TO INSTALLATION OF THE PROPOSED UTILITIES.

8. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL OBTAIN ALL NECESSARY LOCAL, STATE, AND FEDERAL APPROVALS AND PERMITS.

9. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE A COPY OF THE APPROVED PLANS, SPECIFICATIONS, CONSTRUCTION SWPPP, AND CONTRACT DOCUMENTS AT THE CONSTRUCTION SITE AT ALL TIMES.

10. CONSTRUCTION SIGNING AND TRAFFIC CONTROL SHALL BE PER THE CURRENT COPY OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). THE CONTRACTOR SHALL PREPARE AND SUBMIT A TRAFFIC CONTROL PLAN TO THE CITY OF SURPRISE AND EPCOR AND OBTAIN APPROVAL PRIOR TO BEGINNING CONSTRUCTION ACTIVITIES.

11. ALL VEHICLES AND EQUIPMENT SHALL BE KEPT WITHIN THE WORK AREAS ESTABLISHED FOR THAT WORK SHIFT UNLESS TRAVELING TO OR FROM THE SITE. UNDER NO CIRCUMSTANCES SHALL VEHICLES BE PARKED OR EQUIPMENT BE STORED OUTSIDE OF THESE AREAS.

12. OTHER CONSTRUCTION PROJECTS MAY OCCUR NEAR THE PROJECT SITE AND MAY BE IN PROGRESS CONCURRENT WITH THE PROJECT. THE CONTRACTOR SHALL COOPERATE AS NECESSARY AND NOT INTERFERE OR HINDER THE PROGRESS OR COMPLETION OF WORK BEING PERFORMED BY OTHER CONTRACTORS.

13. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING ALL MATERIALS, LABOR, AND EQUIPMENT NECESSARY TO COMPLETE THE WORK SHOWN ON THESE DRAWINGS AND TO OBTAIN ACCEPTANCE BY THE CITY OF SURPRISE AND EPCOR AND THE PROJECT OWNER.

14. ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL "PRE CONSTRUCTION" STATE OR BETTER.

15. DRIVEWAY ACCESS AND UTILITY SERVICE TO EXISTING HOMES AND BUSINESSES SHALL BE MAINTAINED AT ALL TIMES.

16. THE CONTRACTOR SHALL ASSUME THAT A PORTION OF THE SOILS WILL NOT PROVIDE SUFFICIENT STABILITY TO STAND UP IN VERTICAL TRENCH WALLS. THIS WILL RESULT IN WIDER TRENCHES, GREATER EARTHWORK VOLUMES, AND MORE SURFACE DISTURBANCE. THE CONTRACTOR SHALL ASSUME THAT A PORTION OF NATIVE SOILS WILL INCLUDE BOULDERS/COBBLES WHICH ARE GREATER THAN 24 INCHES IN DIAMETER WHICH WILL SLOW DOWN THE CONTRACTOR'S PROGRESS. THIS WILL RESULT IN WIDER TRENCHES, GREATER EARTHWORK VOLUMES, MORE SURFACE DISTURBANCE, AND MORE SURFACE RESTORATION THAN WHAT MAY BE SHOWN ON THE DRAWINGS.

17. THE REMOVAL, LOADING, AND HAULING OF EXCESS MATERIALS AS A RESULT OF DEMOLITION, TRENCHING, AND EXCAVATION ACTIVITIES SHALL BE DISPOSED OF AT A CONTRACTOR-PROVIDED WASTE SITE AT NO ADDITIONAL COST TO THE OWNER.

18. THE EXISTING CONDITIONS SHOWN ON THESE DRAWINGS ARE BASED ON A ALTA/NSPS LAND TITLE SURVEY FROM S&F LAND SERVICES, DATED NOVEMBER 27, 2024. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO BIDDING AND ALERT THE ENGINEER IMMEDIATELY IF DISCREPANCIES ARE FOUND

19. THE CONTRACTOR SHALL PROVIDE PRODUCT SUBMITTALS AND SHOP DRAWINGS TO THE JURISDICTION HAVING AUTHORITY FOR REVIEW AND APPROVAL FOR UTILITIES THAT WILL BE PUBLICLY OWNED AND MAINTAINED PRIOR TO ORDERING MATERIALS

ABBREVIATIONS

&	AND	KWH	KILOWATT HOURS
Ð	ANGLE		
±	APPROXIMATELY	L	LENGTH
@	AT	LB(S)	POUND(S)
℄	CENTERLINE	LF	LINEAR FEET
°	DEGREE	LP	LOW POINT ELEVATION
=	EQUALS	LT	LEFT
'	FOOT		
>	GREATER THAN	MAG	MARICOPA ASSOCIATION PF GOVERNMENTS
"	INCH	MAX	MAXIMUM
#	NUMBER	MFR	MANUFACTURER
%	PERCENT	MH	MANHOLE
		MIN	MINIMUM, MINUTE
AC	ASPHALTIC CONCRETE	MISC	MISCELLANEOUS
ADD'L	ADDITIONAL	MON	MONUMENT IN CASE
ADJT	ADJACENT		
AFF	ABOVE FINISH FLOOR	N	NORTH, NORTHING
AP	ANGLE POINT	N/A	NOT APPLICABLE
APPROX	APPROXIMATE	NE	NORTHEAST
ARCH	ARCHITECT	NEMA	NATIONAL ELECTRICAL MANUFACTURER ASSOCIATION
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	NIC	NOT IN CONTRACT
ATB	ASPHALT TREATED BASE COURSE	NO	NUMBER
AVE	AVENUE	NTS	NOT TO SCALE
		NW	NORTHWEST
BCR	BEGIN CURB RETURN		
BFV	BUTTERFLY VALVE	OC	ON CENTER
BGS	BELOW GROUND SURFACE	OD	OUTSIDE DIAMETER
BLK	BLOCK(S)	OSHA	OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
BLDG	BUILDING		
BM	BENCHMARK	P	POWER, POWER VAULT
BVC	BEGIN VERTICAL CURB	PC	POINT OF CURVATURE
		PCC	POINT OF COMPOUND CURVE OR PORTLAND CEMENT CONCRETE
C	CONDUIT		
CB	CATCH BASIN	PED	PEDESTAL
CF	CUBIC FEET	PI	POINT OF INTERSECTION
CIRC	CIRCUIT, CIRCULA(R, TION)	℗	PROPERTY LINE
CIP	CAST-IN-PLACE	POC	POINT OF CONNECTION
CIP MON	CAST-IN-PLACE MONUMENT	PP	POWER POLE
CJ	CENTER JOINT	PRC	POINT OF REVERSE CURVATURE
℄	CENTER LINE	PROP	PROPERTY
CL	CROWNLINE	PSI	POUNDS PER SQUARE INCH
CLR	CLEAR	PT	POINT OF TANGENCY
CO	CLEANOUT	PVC	POINT OF VERTICAL CURVE
COMM	COMMUNICATION	PVI	POINT OF VERTICAL INTERSECTION
COMPT	COMPACTED	PVT	POINT OF VERTICAL TANGENT
CONC	CONCRETE	PVMT	PAVEMENT
CONST	CONSTRUCT	PWR	POWER
CONT	CONTINU(E, ED, OUS, ATION)	QTY	QUANTITY
COORD	COORDINATE		
CSBC	CRUSHED SURFACING BASE COURSE	R	RADIUS
CSTC	CRUSHED SURFACING TOP COURSE	RD	ROAD, ROADWAY
CULV	CULVERT	REF	REFERENCE
CU YD	CUBIC YARD	REINF	REINFORC(E, ED, ING, MENT)
		REQ'D	REQUIRED
D/W	DRIVEWAY	REV	REVISION
DEF	DEFLECTION	RIM	STRUCTURE RIM ELEVATION
DEG	DEGREE	RT	RIGHT TURN
DEMO	DEMOLISH/DEMOLITION	R/W, ROW	RIGHT OF WAY
DIA	DIAMETER		
DIM	DIMENSION(S)	S	SOUTH OR SLOPE
D.I.	DUCTILE IRON PIPE	SCHED	SCHEDULE
DR	DRIVE	SD, SDMH	STORM DRAIN, STORM DRAIN MANHOLE
DWG(S)	DRAWING(S)	SE	SOUTHEAST
		SECT	SECTION(S)
E	EAST OR ELECTRICAL	SHT	SHEET
EA	EACH	SP	SPRINKLER
ECR	END CURB RETURN	SQ	SQUARE
EHH	ELECTRICAL HANDHOLE	SQ FT	SQUARE FEET
EL, ELEV	ELEVATION	SQ IN	SQUARE INCH
ELEC	ELECTRIC(AL)	SS	SANITARY SEWER
ENGR	ENGINEER	SSMH	SANITARY SEWER MANHOLE
EOP	EDGE OF PAVEMENT	ST	STREET
EQ	EQUAL(LY)	STA	STATION
EQUIP	EQUIPMENT	STD	STANDARD
ESMT	EASEMENT	STRUCT	STRUCTUR(E, AL)
EVC	END VERTICAL CURVE	SW	SOUTHWEST
EX, EXIST	EXISTING	SYS	SYSTEM
EXP	EXPANSION		
		T	TELEPHONE OR TELEPHONE VAULT
FDC	FIRE DEPARTMENT CONNECTION	TBD	TO BE DETERMINED
FDN	FOUNDATION	TBM	TEMPORARY BENCH MARK
FF	FINISH FLOOR	TC	TOP OF CURB ELEVATION
FG	FINISH GRADE ELEVATION	TELE	TELEPHONE
FH	FIRE HYDRANT	TEMP	TEMPORARY
FIN	FINISH(ED)	TP, T/P	TOP OF PIPE
FL	FIRE LINE/FLANGE	TYP	TYPICAL
FT	FOOT/FEET	TW	TOP OF WALL ELEVATION
G	GAS	UDG	UNDERGROUND
GALV	GALVANIZED		
GRND	GROUND	VAP	VERTICAL ANGLE POINT
GV	GATE VALVE	VC	VERTICAL CURVE
		VERT	VERTICAL
HH	HANDHOLE	VOL	VOLUME
HMA	HOT MIX ASPHALT		
HORIZ	HORIZONTAL		
HT	HEIGHT	W	WEST, WIDTH, WIDE OR WATER
		W/	WITH
IE	INVERT ELEVATION	W/O	WITHOUT
IN	INCH	WM	WATER MAIN OR WILLAMETTE MERIDIAN
		WV	WATER VALVE
JB, J-BOX	JUNCTION BOX		
JT	JOINT TRENCH	XFMR	TRANSFORMER
KV	KILOVOLTS		
KW	KILOWATT		

DRAFTING SYMBOLS

XX .....CONSTRUCTION NOTE NUMBER

XX
X

XX–A .....SECTION NUMBER

XX–01 .....SHEET NUMBER SECTION IS LOCATED ON

REVISIONS

PROJECT NO. 121.044
DRAWN C. DAHM
CHECKED D. PHILLIPS
SUBMITTAL DATES

OTB DATE --

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP

Registered Professional Engineer (Civil) CERTIFICATE NO. 42524 CHRISTOPHER J. SEVERS Date Signed ..... ARIZONA, U.S.A.

03/10/2025

CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture plc

SHEET TITLE

GENERAL NOTES & ABBREVIATIONS

SHEET

GN-01

FSXX-XXXX

Mar 10, 2025 1:59:27pm – User: CoreDahm
N:\2 - PROJECTS\121 HILLSIDE ARCHITECTURE\121.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\121.044 GN-01.DWG

GENERAL ENGINEERING NOTES:

1. ALL CONSTRUCTION MUST CONFORM TO MARICOPA ASSOCIATION OF GOVERNMENT (MAG) SPECIFICATIONS AND DETAILS AND LATEST REVISIONS UNLESS OTHERWISE STATED ON PLANS.
2. THE ENGINEER WILL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES OR FOR SAFETY PRECAUTIONS OR PROGRAMS UTILIZED IN CONNECTION WITH THE WORK, AND THEY WILL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S FAILURE TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING ALL OVERHEAD AND UNDERGROUND UTILITY LOCATIONS WHERE CONSTRUCTION OCCURS. SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT ALL UTILITIES ARE AVOIDED. UTILITY LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE AND NOT FOR CONSTRUCTION PURPOSES. ANY DAMAGE TO EXISTING UTILITIES SHALL BE REPAIRED AND OR REPLACED AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL COMPLY WITH ALL CURRENT ARIZONA UNDERGROUND FACILITIES LAWS (ARIZONA REVISED STATUTES TITLE 40, CHAPTOR 2, ARTICLE 6.3, SECTION 40-360.21-32). CALL ARIZONA 811 FOR FIELD LOCATION BY DIAL 811.
4. THE CITY OF SURPRISE ENGINEERING SERVICES OF PUBLIC WORKS SHALL BE NOTIFIED FORTY-EIGHT (48) HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION WORK AT 623-222-6150.
5. THE ENGINEER AND APPLICABLE AGENCY MUST APPROVE, PRIOR TO CONSTRUCTION, ANY ALTERATION OR VARIATION FROM THESE PLANS. ANY VARIATION FROM THESE PLANS SHALL BE PROPOSED AND RESUBMITTED FOR REVIEW AND APPROVAL.
6. THE CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING UTILITIES ON THE SITE. ANY DAMAGE TO EXISTING UTILITIES, WHETHER SHOWN OR NOT ON THE DRAWING, SHALL BE REPAIRED/REPLACED AT THE CONTRACTOR'S EXPENSE. EXISTING SURFACE FEATURES AND FENCING SHALL BE REPLACED IN KIND.
7. ANY INSPECTION BY THE CITY, COUNTY, OR THE ENGINEER, SHALL NOT IN ANY WAY RELIEVE THE CONTRACTOR FROM ANY OBLIGATION TO PERFORM THE WORK IN STRICT COMPLIANCE WITH THE APPLICABLE CODES AND AGENCY REQUIREMENTS.
8. THE CONTRACTOR IS TO LOCATE ALL EXISTING LANDSCAPING, LANDSCAPING IRRIGATION LINES, PROPERTY MONUMENTS, FENCING OR SURFACE FEATURES PRIOR TO CONSTRUCTION. ANYTHING DISTURBED DURING CONSTRUCTION SHALL BE REPLACED IN KIND AT THE CONTRACTOR'S EXPENSE.
9. NOTHING CONTAINED IN THE CONTRACT DOCUMENTS SHALL CREATE, NOR SHALL BE CONSTRUED TO CREATE, ANY CONTRACTUAL RELATIONSHIP BETWEEN THE ENGINEER AND THE CONTRACTOR OR ANY SUBCONTRACTOR.
10. ALL CONSTRUCTION WATER USED WITHIN THE CITY OF SURPRISE WATER SERVICE AREA REQUIRES APPROVAL BY THE CITY OF SURPRISE PUBLIC WORKS DEPARTMENT AND MAY BE SUBJECT TO VOLUME AND TIME RESTRICTIONS. PLEASE SEE THE CITY OF SURPRISE CONSTRUCTION WATER GUIDELINES FOR ADDITIONAL INFORMATION. THE GUIDELINES CAN BE OBTAINED FROM THE PUBLIC WORKS DEPARTMENT AT 623-222-7000.
11. TRAFFIC CONTROL SHALL BE MAINTAINED IN ACCORDANCE WITH MAG SPECIFICATION 401, THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, AND THE "TEMPORARY WORK ZONE TRAFFIC MANAGEMENT POLICY" (LATEST EDITION).
12. PRIOR TO FINAL APPROVAL AND ACCEPTANCE OF THE WORK, THE DEVELOPER/CONTRACTOR WILL BE REQUIRED TO CLEAN AND REPAIR ADJACENT (OFF-PROJECT) ROADWAYS USED OR DAMAGED DURING THE COURSE OF CONSTRUCTION.

DATE REVISED: 1/2022	SURPRISE ARIZONA	GENERAL ENGINEERING NOTES	DETAIL NO: 2-04 SHEET 1 OF 2

GENERAL ENGINEERING NOTES (CONTINUED):

13. EMERGENCY VEHICLE ACCESS (E.V.A.) MUST BE PROVIDED BY THE DEVELOPER/CONTRACTOR THROUGHOUT THE PROJECT SITE. E.V.A. ROADS AND SIGNAGE SHALL BE MAINTAINED BY THE DEVELOPER/CONTRACTOR AT ALL TIMES. SIGNAGE SHALL BE POSTED AT THE POINT OF ENTRY TO THE SITE AND AT ALL LOCATIONS WHERE A CHANGE IN DIRECTION OCCURS.
14. THE PLANS SHALL COMPLY WITH THE AMERICANS WITH DISABILITIES ACT'S ACCESSIBILITY GUIDELINES, AS PUBLISHED IN THE FEDERAL REGISTER ON SEPTEMBER 15, 2010.

DATE REVISED: 1/2022	SURPRISE ARIZONA	GENERAL ENGINEERING NOTES	DETAIL NO: 2-04 SHEET 2 OF 2

GENERAL TEMPORARY TRAFFIC CONTROL NOTES:

1. TEMPORARY TRAFFIC CONTROL SHALL BE PLACED AND MAINTAINED BY A COMPANY CERTIFIED BY THE CITY OF SURPRISE FOR TEMPORARY TRAFFIC CONTROL. ALL TEMPORARY TRAFFIC CONTROL SHALL BE PLACED AND MAINTAINED IN ACCORDANCE WITH THE MOST CURRENT REVISION OF THE CITY OF SURPRISE TEMPORARY WORK ZONE TRAFFIC MANAGEMENT POLICY OR AS DIRECTED BY THE CITY TRAFFIC ENGINEER OR DESIGNEE.
2. WHERE LANES ARE RESTRICTED, RESTRICTION OF THE LANES SHALL BE ACCOMPLISHED BY USING REFLECTIVE VERTICAL PANELS. CONES SHALL NOT BE CONSIDERED ACCEPTABLE DEVICES FOR TRAFFIC DELINIATION ON ARTERIAL OR COLLECTOR STREETS.
3. ALL TRAFFIC CONTROL SIGNS SHALL BE VIP DIAMOND GRADE SHEETING (TYPE IX) OR APPROVED EQUAL WHEN IN USE DURING NIGHTTIME HOURS.
4. ADJUSTMENTS TO THE DETAILS OF THESE TRAFFIC CONTROL PLANS AND REQUIREMENTS MAY BE NECESSARY DUE TO CONSTRUCTION ACTIVITIES. ALL ADJUSTMENTS SHALL BE APPROVED BY THE CITY TRAFFIC ENGINEER OR DESIGNEE PRIOR TO IMPLEMENTATION.
5. THE ROADWAY SURFACE SHALL BE SWEPT, AND CLEANED BY AIR-JET BLOWING, IMMEDIATELY PRIOR TO PLACEMENT OF TEMPORARY MARKINGS.
6. WHEN TRAFFIC CONTROL DEVICES ARE NOT IN USE, THEY SHALL BE MOVED AT LEAST THIRTY (30) FEET FROM THE EDGE OF TRAVEL WAY AND TURNED AWAY SO THE LEGENDS ARE NOT VISIBLE TO THE TRAVELING MOTORISTS. WHERE A THIRTY (30) FOOT DISTANCE CANNOT BE ACHIEVED, THE DEVICES SHALL BE MOVED AWAY AS FAR AS POSSIBLE WITHOUT INTERFERING WITH THE SIDEWALK, DRIVEWAYS OR OTHER FACILITIES. NO TRAFFIC CONTROL DEVICES SHALL BE LEFT IN THE MEDIAN.
7. SPEED LIMIT REDUCTION SIGNING IS SUBJECT TO REVIEW AND CHANGE BY THE CITY TRAFFIC ENGINEER OR DESIGNEE AS DICTATED BY FIELD CONDITIONS.

DATE REVISED: 1/2022	SURPRISE ARIZONA	GENERAL TEMPORARY TRAFFIC CONTROL NOTES	DETAIL NO: 2-12

GENERAL GRADING NOTES:

1. CONTRACTOR TO FOLLOW RECOMMENDATIONS LISTED IN THE PROJECT SPECIFIC GEOTECHNICAL REPORT. SHOULD ANY CONFLICTS ARISE BETWEEN THE SOILS INVESTIGATION REPORT AND THESE GRADING PLANS, THE CIVIL ENGINEER SHALL BE CONTACTED FOR CLARIFICATION.
2. THE ENGINEER MAKES NO REPRESENTATION OR GUARANTEE REGARDING EARTHWORK QUANTITIES OR THAT THE EARTHWORK FOR THIS PROJECT WILL BALANCE DUE TO UNFORESEEN FIELD CONDITIONS.
3. THE ENGINEER WILL PERFORM FIELD SURVEYS FOR PAD ELEVATION CERTIFICATIONS, UPON NOTIFICATION BY THE GRADING CONTRACTOR, THAT THE PADS ARE COMPLETE AND READY FOR CERTIFICATION. IT IS UNDERSTOOD THAT THE CERTIFICATION PROVIDES ONLY A REPRESENTATIVE ELEVATION OF THE AVERAGE GRADE OF EACH LOT, BUILDINGS, OR UNIT PAD, AND SHALL NOT BE CONSTRUED TO INCLUDE YARD AND STREET SUBGRADE CERTIFICATION OR CERTIFICATION THAT THE ENTIRE PAD IS LEVEL, THAT IT WAS CONSTRUCTED IN THE DESIGNED LOCATION OR WAS GRADED TO THE CROSS-SECTION SET FORTH ON THE PLANS OR AS DESIGNATED IN THE SOILS REPORT.
4. AN APPROVED GRADING AND DRAINAGE PLAN MUST BE ON THE JOB SITE AT ALL TIMES. DEVIATIONS FROM THIS PLAN MUST BE PRECEDED BY AN APPROVED PLAN REVISION.
5. ALL DRAINAGE FACILITIES SUCH AS SWALES, INTERCEPTOR DITCHES, PIPES, PROTECTIVE BERMS, BARRIER WALLS, CONCRETE CHANNELS, OR OTHER MEASURES DESIGNED TO PROTECT BUILDINGS FROM STORM RUNOFF MUST BE CONSTRUCTED PRIOR TO CONSTRUCTION OF ANY BUILDINGS.
6. A GRADING PERMIT IS REQUIRED. BEFORE A GRADING PERMIT IS ISSUED BY THE CITY OF SURPRISE ENGINEERING SERVICES, THE CONTRACTOR MUST FIRST OBTAIN A DUST CONTROL PERMIT FROM MARICOPA COUNTY ENVIRONMENTAL SERVICES-AIR QUALITY DIVISION.
7. HAUL PERMITS, WHEN REQUIRED, MUST BE OBTAINED PRIOR TO OR CONCURRENTLY WITH THE GRADING AND DRAINAGE PERMIT.
8. A SEPARATE PERMIT IS NECESSARY FOR ANY OFFSITE CONSTRUCTION.
9. CONTRACTOR SHALL PROVIDE LEVEL BOTTOM IN ALL RETENTION BASINS AT ELEVATIONS AS SHOWN ON THE PLANS. SIDE SLOPES IN ALL RETENTION BASINS SHALL NOT EXCEED 4:1 UNLESS NOTED OTHERWISE ON THE PLANS.
10. DRYWELLS, WHEN REQUIRED, MUST BE DRILLED A MINIMUM OF TEN (10) FEET INTO PERMEABLE POROUS STRATA OR PERCOLATION TESTS WILL BE REQUIRED. THE CIVIL INSPECTOR MUST BE PRESENT BEFORE BACKFILL OR WELL PIPES ARE PLACED WITHIN ANY DRYWELLS.

THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR REGISTERING THE DRYWELLS SHOWN ON THE PLAN WITH THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ).

11. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR MAINTENANCE OF DRYWELLS SHOWN ON THE PLAN.
12. ACCESS BARRIERS/TRASH RACKS ARE REQUIRED ON THE EXPOSED ENDS OF ALL STORM DRAINS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER. SEE DETAILS 5-04A, 5-04B, AND 5-04C. REFER TO MAG DETAILS 502-1 AND 502-2 FOR PIPES LESS THAN THIRTY (30) INCHES IN DIAMETER.
13. SOIL COMPACTION TEST RESULTS MUST BE SUBMITTED TO THE CITY OF SURPRISE ENGINEERING SERVICES FOR BUILDING PADS THAT HAVE ONE (1) FOOT OR MORE OF FILL MATERIAL INDICATED.

DATE REVISED: 1/2022	SURPRISE ARIZONA	GENERAL GRADING NOTES	DETAIL NO: 2-05 SHEET 1 OF 2

GENERAL GRADING NOTES (CONTINUED):

14. A PAD CERTIFICATION LETTER FOR EACH PHASE OR PARCEL MUST BE SUBMITTED TO THE CITY OF SURPRISE ENGINEERING SERVICES BY THE DEVELOPER STATING THAT EACH PAD HAS BEEN BUILT IN ACCORDANCE WITH THE SOILS INVESTIGATIVE REPORT AND CITY OF SURPRISE REQUIREMENTS .
15. APPROVAL OF THESE PLANS SHALL NOT PREVENT THE CITY FROM REQUIRING THE CORRECTION OF ERRORS IN THE PLANS WHERE SUCH ERRORS ARE SUBSEQUENTLY FOUND TO BE IN VIOLATION OF ANY LAW OR ORDINANCE.
16. ALL CONSTRUCTION SITES WITH DISTURBED AREAS OF ONE (1) ACRE OR GREATER SHALL HAVE A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ALL ASSOCIATED DOCUMENTS (SEE ENGINEERING AND PERMITTING APPLICATION PACKET).

CAUTION REGARDING STORM DRAIN PIPES: CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE PIPE FROM DAMAGE DURING THE CONSTRUCTION STAGE. THE COVER ON THE DRAINAGE PIPE IS DESIGNED FOR FINAL GRADE; THEREFORE, EXTRA CARE MUST BE EXERCISED DURING THE CONSTRUCTION PHASE TO MAINTAIN COVER OVER PIPES.

NOTE REGARDING CMU AND RETAINING WALLS: THE CITY OF SURPRISE REQUIRES ALL WALLS BE APPROVED BY THE COMMUNITY DEVELOPMENT DEPARTMENT (623-222-3000). BUILDING PERMITS AND INSPECTIONS ARE REQUIRED PER THE INTERNATIONAL BUILDING CODE.

DATE REVISED: 1/2022	SURPRISE ARIZONA	GENERAL GRADING NOTES	DETAIL NO: 2-05 SHEET 2 OF 2

REVISIONS

PROJECT NO. 121.044
DRAWN C. DAHM
CHECKED D. PHILLIPS
SUBMITTAL DATES
OTB DATE --

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP

Registered Professional Engineer CERTIFICATE NO. 67534 CHARLES SEVERS Date Signed ARIZONA, U.S.A.

03/10/2025

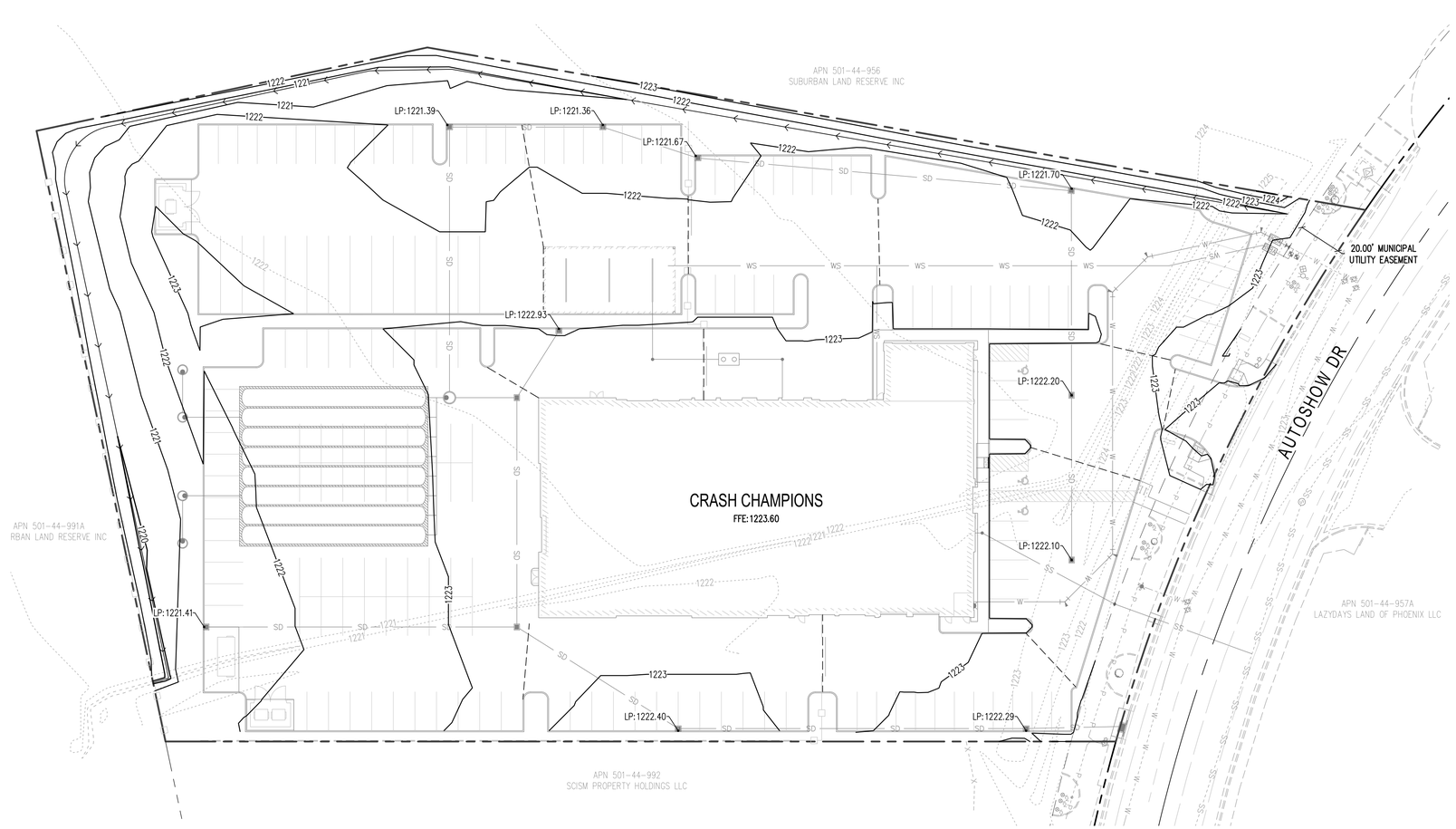
CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture plc

SHEET TITLE
GENERAL NOTES

SHEET
GN-02

FSXX-XXXX



N

0 30 60

SCALE IN FEET

LEGEND

- PROPERTY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- GRADE BREAK
- EXISTING CURB & GUTTER
- PROPOSED BUILDING
- CEMENT CONCRETE BARRIER CURB
- DITCH
- SD — STORM LINE
- CATCH BASIN

Contact Arizona 811 at least two full working days before you begin excavation

ARIZONA811 BLUE STAKE, INC.

Call 811 or click Arizona811.com

CALL BEFORE YOU DIG

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

VERTICAL DATUM
NAVD 88

Mar 10, 2025 2:03:43pm – User: CianDahm
N:\2 – PROJECTS\21 HILLSIDE ARCHITECTURE\21.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\21.044 CG-01.DWG

REVISIONS

PROJECT NO.
121.044
DRAWN
C. DAHM
CHECKED
D. PHILLIPS
SUBMITTAL DATES
OTB DATE
--

JSACIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP

Registered Professional Engineer (Civil) CERTIFICATE NO. 67524 CHRISTOPHER J. SEVERS Date Signed ARIZONA, U.S.A.

03/10/2025

CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecturepllc

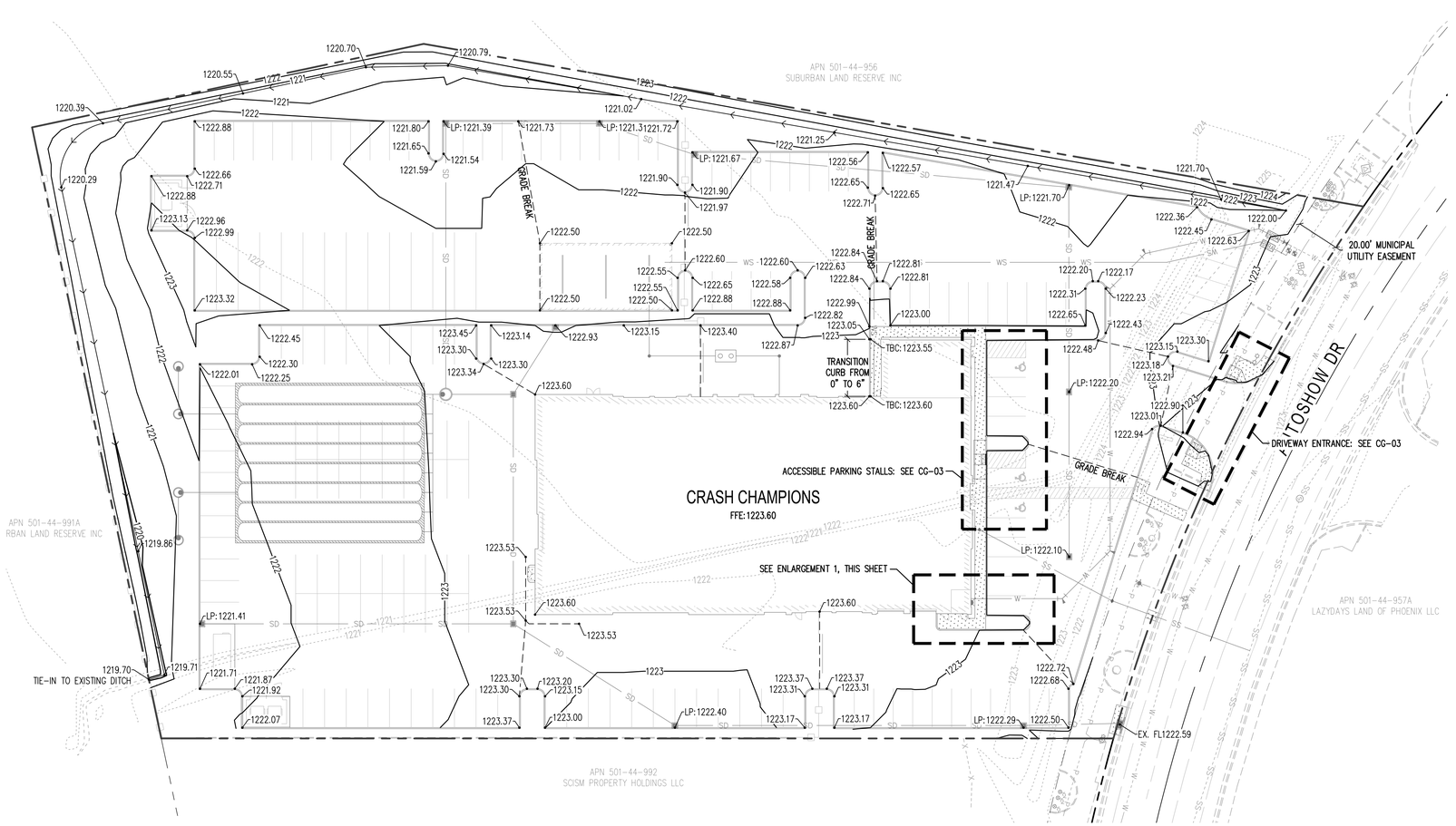
SHEET TITLE

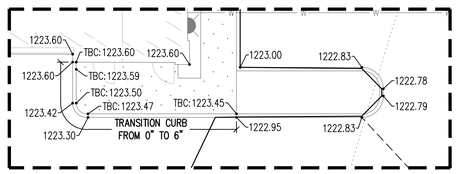
GRADING PLAN

SHEET

CG-01

FSXX-XXXX





ENLARGEMENT 1
1"=10'

N

0 30 60

SCALE IN FEET

LEGEND

- PROPERTY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- GRADE BREAK
- XX.XX SPOT ELEVATION
- X.X% SLOPE ARROW
- EXISTING CURB & GUTTER
- PROPOSED BUILDING
- CEMENT CONCRETE BARRIER CURB
- CEMENT CONCRETE SIDEWALK
- DITCH
- SD STORM LINE
- CATCH BASIN

GENERAL NOTES

1. SPOT ELEVATIONS REPRESENT FINISHED GRADE AT FLOW LINE UNLESS OTHERWISE NOTED
2. CATCH SLOPES TO EXISTING GRADE SHALL NOT EXCEED 3:1
3. CONTRACTOR SHALL NOT ALLOW WATER TO POND AT SUBGRADE OR BASE MATERIAL ADJACENT TO CURB INLETS AND CATCH BASINS PRIOR TO PLACEMENT OF PAVEMENT. TEMPORARY PROVISIONS SUCH AS DEWATERING AND INSTALLATION OF SUBDRAINS SHALL BE TAKEN TO KEEP THE SUBGRADE DRY DURING CONSTRUCTION.
4. ACRONYMS FOR SPOT ELEVATIONS:
   - BW: BOTTOM OF WALL
   - HP: HIGH POINT
   - LP: LOW POINT
   - MATCH EX: MATCH EXISTING GRADE
   - TBC: TOP BACK OF CURB
   - TW: TOP OF WALL
   - SW: SIDEWALK

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

CALL BEFORE YOU DIG

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

VERTICAL DATUM
NAVD 88

Mar 10, 2025 2:04:31pm – User: CarolDahm
N:\2 - PROJECTS\121 HILLSIDE ARCHITECTURE\121.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\121.044 CG-02.DWG

REVISIONS

PROJECT NO.
121.044
DRAWN
C. DAHM
CHECKED
D. PHILLIPS
SUBMITTAL DATES
OTB DATE
—

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP

Registered Professional Engineer (Civil)
CERTIFICATE NO.
67234
CHRISTOPHER J.
SEVERS
Date Signed
ARIZONA, U.S.A.

03/10/2025

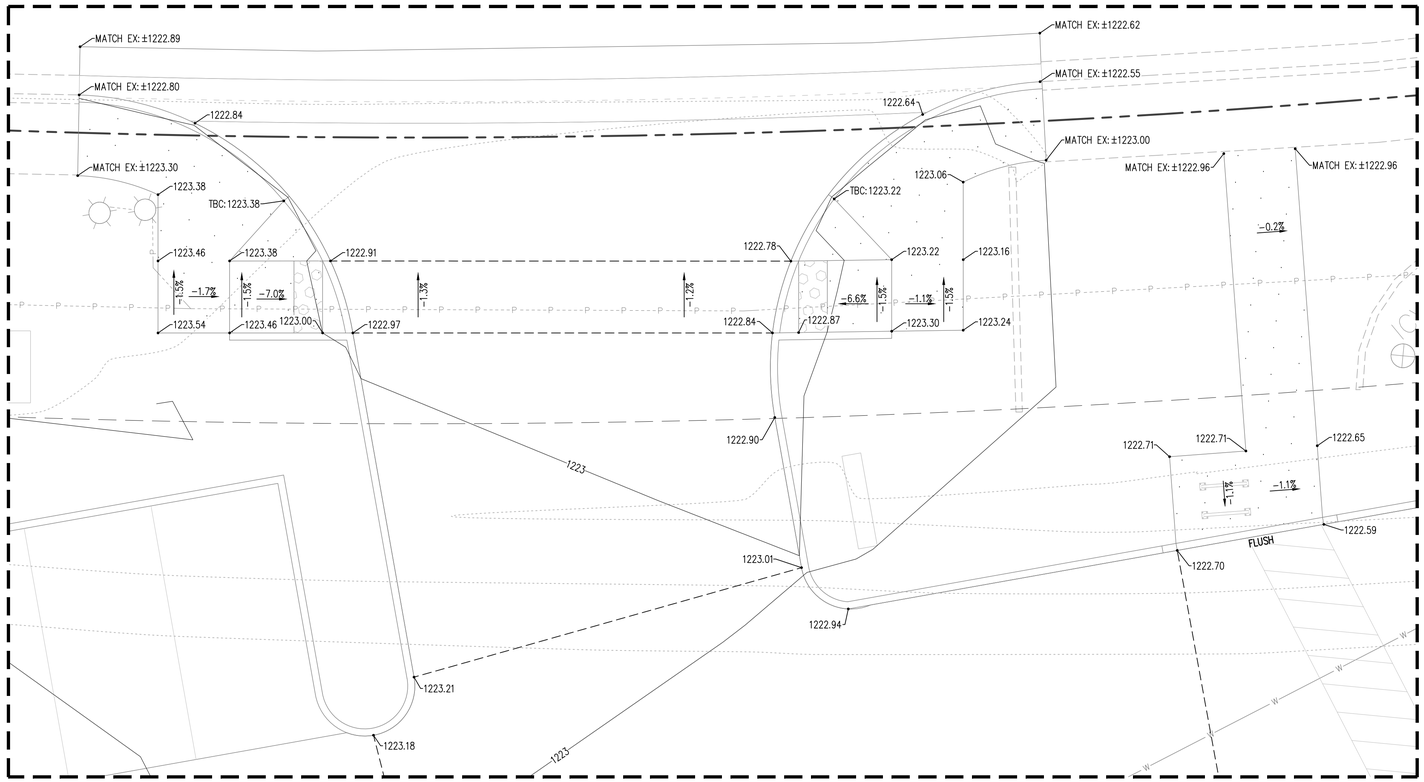
CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture plc

SHEET TITLE
DETAILED GRADING PLAN

SHEET
CG-02

FSXX-XXXX



DRIVEWAY ENTRANCE
1"=5'

N

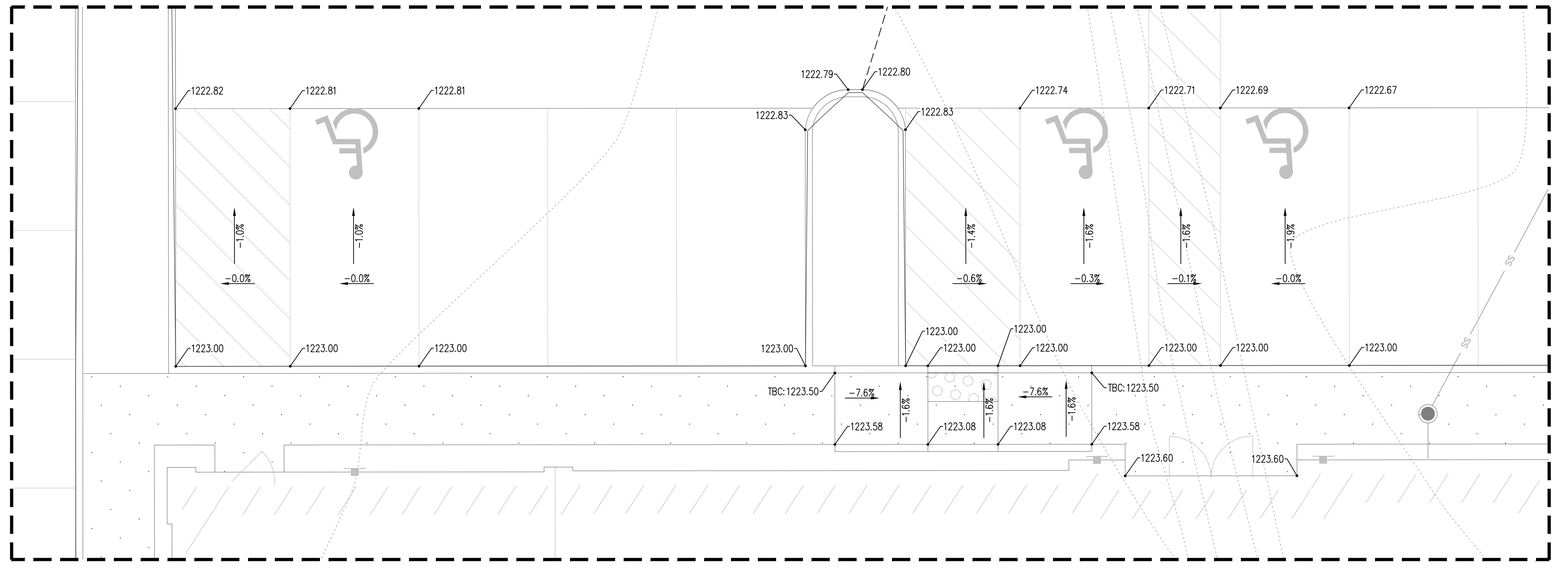
0 5 10
SCALE IN FEET

LEGEND

- PROPERTY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- GRADE BREAK
- XX.XX SPOT ELEVATION
- −X.X% SLOPE ARROW
- EXISTING CURB & GUTTER
- CEMENT CONCRETE BARRIER CURB
- CEMENT CONCRETE SIDEWALK

GENERAL NOTES

1. SPOT ELEVATIONS REPRESENT FINISHED GRADE AT FLOW LINE UNLESS OTHERWISE NOTED
2. CATCH SLOPES TO EXISTING GRADE SHALL NOT EXCEED 3:1
3. CONTRACTOR SHALL NOT ALLOW WATER TO POND AT SUBGRADE OR BASE MATERIAL ADJACENT TO CURB INLETS AND CATCH BASINS PRIOR TO PLACEMENT OF PAVEMENT. TEMPORARY PROVISIONS SUCH AS DEWATERING AND INSTALLATION OF SUBDRAINS SHALL BE TAKEN TO KEEP THE SUBGRADE DRY DURING CONSTRUCTION.
4. ACRONYMS FOR SPOT ELEVATIONS:
   - BW: BOTTOM OF WALL
   - HP: HIGH POINT
   - LP: LOW POINT
   - MATCH EX: MATCH EXISTING GRADE
   - TBC: TOP BACK OF CURB
   - TW: TOP OF WALL
   - SW: SIDEWALK



ACCESSIBLE PARKING STALLS
1"=5'

N

0 5 10
SCALE IN FEET

VERTICAL DATUM
NAVD 88

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

CALL BEFORE YOU DIG

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

REVISIONS

PROJECT NO.
121.044
DRAWN
C. DAHM
CHECKED
D. PHILLIPS
SUBMITTAL DATES
OTB DATE
--

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP
Registered Professional Engineer CERTIFICATE NO. 27534 STATE OF ARIZONA SEVERS Date Signed ARIZONA, U.S.A.
03/10/2025

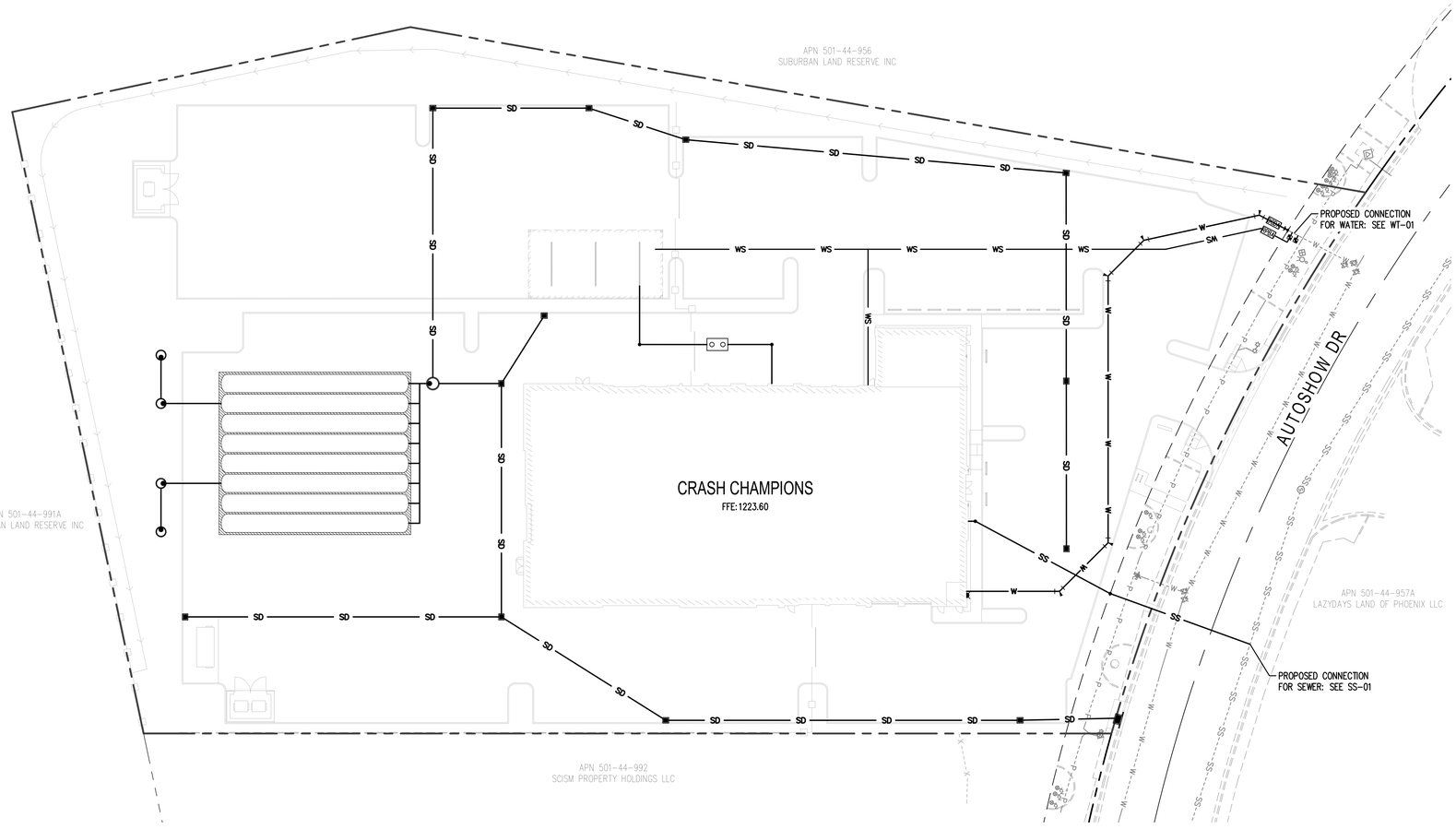
CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture plc

SHEET TITLE
GRADING DETAILS

SHEET
CG-03

FSXX-XXXX



N

0 30 60

SCALE IN FEET

LEGEND

- PROPERTY LINE
- EXISTING CURB & GUTTER
- EXISTING WATER LINE
- EXISTING POWER LINE
- EXISTING SEWER LINE
- EXISTING IRRIGATION CONTROL VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER
- EXISTING MANHOLE
- EXISTING LUMINAIRE
- EXISTING TRANSFORMER
- PROPOSED BUILDING
- CEMENT CONCRETE BARRIER CURB
- SD — STORM LINE
- W — WATER LINE
- WS — WATER SERVICE LINE
- SS — SEWER LINE

Contact Arizona 811 at least two full working days before you begin excavation

ARIZONA811 BLUE STAKE, INC.

Call 811 or click Arizona811.com

CALL BEFORE YOU DIG

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

VERTICAL DATUM
NAVD 88

Mar 10, 2025 2:46:16pm – User: CoreyDahm
N:\2 - PROJECTS\21 HILLSIDE ARCHITECTURE\121.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\121.044 UT-01.DWG

REVISIONS

PROJECT NO.
121.044

DRAWN
C. DAHM

CHECKED
D. PHILLIPS

SUBMITTAL DATES

OTB DATE
—

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP

Registered Professional Engineer
CERTIFICATE NO.
67524
DOUGLAS R.
SEVERS
Date Signed
ARIZONA, U.S.A.

03/10/2025

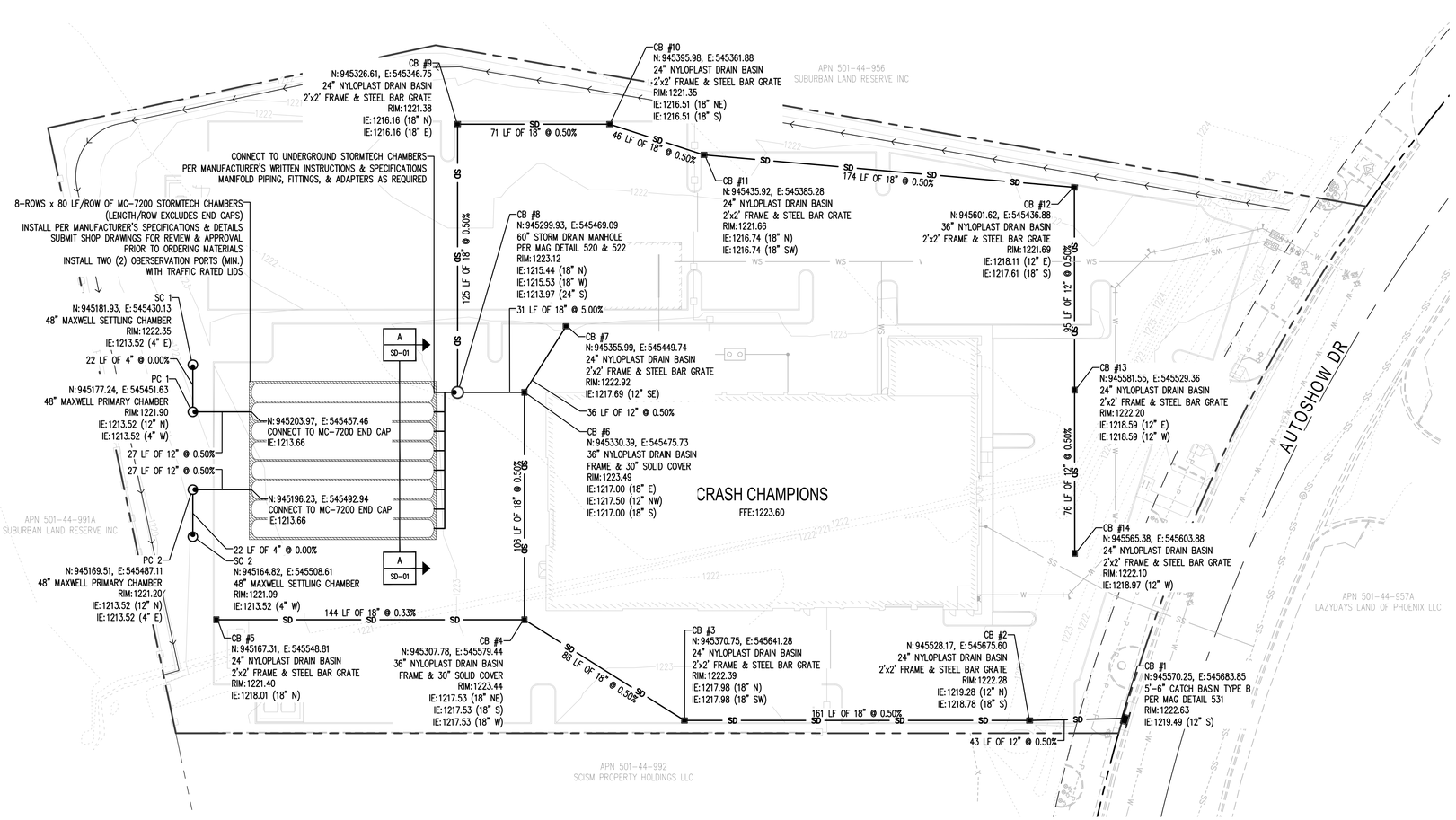
CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

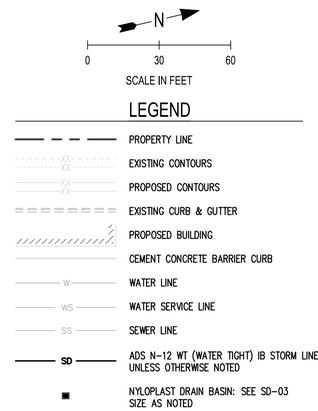
HillSide architecture plc

SHEET TITLE
UTILITY PLAN

SHEET
UT-01

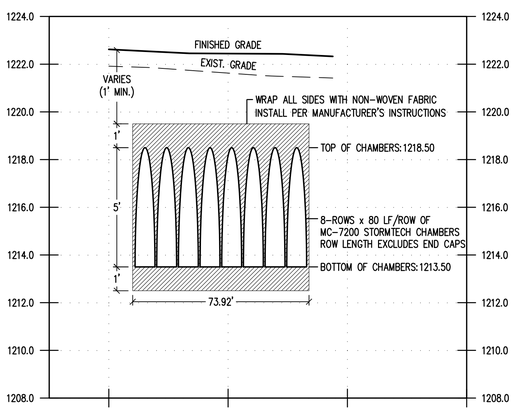
FSXX-XXXX





GENERAL NOTES

1. ALL UNDERGROUND STORAGE FACILITIES AND DISPOSAL FACILITIES SHOWN ON THIS PROJECT SHALL BE MAINTAINED BY THE OWNERS. THESE UNDERGROUND STORAGE FACILITIES SHALL BE MODIFIED, UPGRADED, OR REPLACED WITH SIMILAR OR OTHER APPROPRIATE DEVICES/MEASURES BY THE OWNERS WHEN THEY CEASE TO DRAIN THE WATER WITHIN A 36-HOUR PERIOD. REGULAR MAINTENANCE OF THE SILTING CHAMBER IS REQUIRED TO ACHIEVE THE BEST OPERATION OF THE DRYWELL/UNDERGROUND PERCOLATION CHAMBER(S)
2. DURING SITE DEVELOPMENT, ALL DRYWELLS/UNDERGROUND PERCOLATION CHAMBERS SHALL BE SECURELY COVERED WITH FILTER CLOTH OR OTHER MATERIAL TO PREVENT THE INTRODUCTION OF EXCESSIVE SEDIMENT INTO THE SETTLING CHAMBER.
3. STRUCTURES PC 1, PC 2, SC 1, AND SC 2 ARE PART OF A DRYWELL SYSTEM. THE DRYWELL SYSTEM SHALL BE A DUAL CHAMBER MAXWELL PLUS DRYWELL SYSTEM: SEE SD-03
4. MATERIALS AND METHODS FOR THE DRYWELL CONSTRUCTION INCLUDING, BUT NOT LIMITED TO, PRECAST CONCRETE COMPONENTS, CASTINGS, ROCK BACKFILL, PIPE, DRAINAGE SCREEN, AND ALL OTHER COMPONENTS REQUIRED TO CONSTRUCT THE DRYWELLS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS FOR MAXWELL PLUS DRYWELLS BY TORRENT RESOURCES, INC.
5. THE CONTRACTOR SHALL EMPLOY, AT THE CONTRACTOR'S EXPENSE A QUALIFIED, LICENSED CONTRACTOR TO CONSTRUCT AND INSTALL THE DRYWELLS WHICH SHALL BE TORRENT RESOURCES, INC., CALIFORNIA OR A PRIOR APPROVED A-GENERAL ENGINEERING CONTRACTOR WITH NOT LESS THAN THREE SUCCESSFULLY COMPLETED CONTRACTS WITH SIMILAR SOIL CONDITIONS, DEPTHS AND VOLUMES OF WORK CONTAINED IN THIS PROJECT. SUBMIT SATISFACTORY COMPLIANCE TO OWNER PRIOR TO ISSUANCE OF CONTRACT.
6. THE DRYWELLS SHALL BE CONSTRUCTED TO A FINAL DEPTH THAT PENETRATES, AT A MINIMUM, TEN FEET INTO CLEAN PERMEABLE POROUS SOILS TO THE TERMINATION OF THE WELL.
7. THE DRYWELLS SHALL BE DRILLED TO A SUFFICIENT DEPTH TO ACHIEVE A PERCOLATION RATE OF 0.1 CFS OR GREATER.



STORMTECH CROSS-SECTION A-A

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

CALL BEFORE YOU DIG

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 811 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

VERTICAL DATUM
NAVD 88

Mar 10, 2025 2:06:56pm - User:CianDahm
N:\2 - PROJECTS\121 HILLSIDE ARCHITECTURE\121.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\121.044 SD-01.DWG

REVISIONS

PROJECT NO.
121.044
DRAWN
C. DAHM
CHECKED
D. PHILLIPS
SUBMITTAL DATES
OTB DATE
—

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP
Registered Professional Engineer
CERTIFICATE NO.
67524
CHRISTOPHER J.
SEVERS
Date Signed
ARIZONA, U.S.A.

03/10/2025

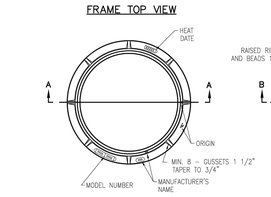
CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture plic

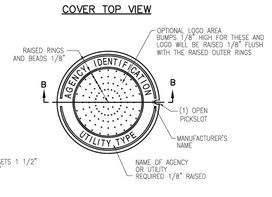
SHEET TITLE
STORMWATER PLAN

SHEET
SD-01

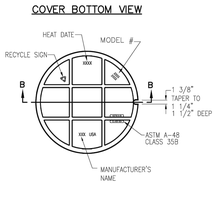
FSXX-XXXX



FRAME TOP VIEW



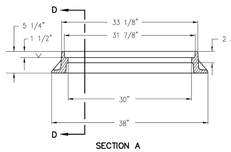
COVER TOP VIEW



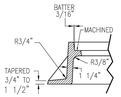
COVER BOTTOM VIEW

FRAME WT. (CL. 35) – 227 LBS

COVER WT. (CL. 35) – 210 LBS

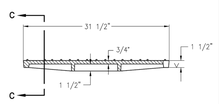


SECTION A



SECTION D

SECTION C

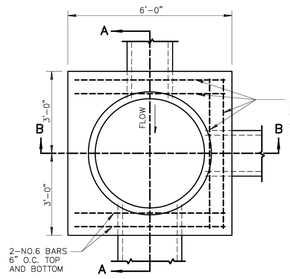


SECTION B

NOTE:

LETTERING ON MANHOLE COVER TO CONTAIN NAME OF AGENCY AND UTILITY FOR WHICH MANHOLE IS NEEDED, (I.E. "PHOENIX SANITARY SEWER"), OR AS DIRECTED. THE TOTAL WIDTH OF INDIVIDUAL LETTERS TO BE SUCH THAT LETTERS AND WORDS ARE EQUALLY SPACED AND BALANCED TO FORM A COMPLETE CIRCLE WITH SPACERS BEFORE AND AFTER THE WORD IDENTIFYING THE AGENCY INVOLVED. LETTERS TO BE 2" IN HEIGHT AND RAISED FLUSH W/ TOP OF COVER. TYPE OF LETTERS TO BE SUBMITTED FOR APPROVAL. WEIGHT OF CASTINGS SHALL BE NO MORE THAN 2% MORE OR LESS THAN THE APPROXIMATE WEIGHT SPECIFIED. CASTINGS SHALL CONFORM TO ASTM A-48, CLASS 35 AND AASHTO M306. THE BEARING SURFACES OF THE FRAMES AND COVERS SHALL BE MACHINED AND THE COVERS SHALL SEAT FIRMLY WITHOUT ROCKING. ALL DIMENSIONS SHALL HAVE A 1/16" TOLERANCE.

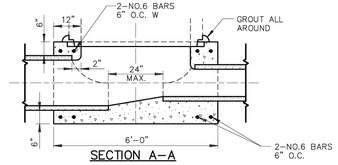
DETAIL NO.	STANDARD DETAIL		REVISED	DETAIL NO.
423–2	MARICOPA ASSOCIATION of GOVERNMENTS ENGLISH	30" CAST IRON MANHOLE FRAME AND COVER	01–01–2020	423–2



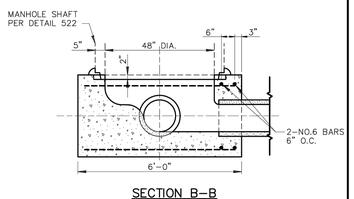
PLAN

NOTES

1. ALL CONCRETE TO BE CLASS 'A' PER SECT. 725, 505.
2. MATCH SPRING LINES OF PIPE ENTERING MANHOLE UNLESS OTHERWISE NOTED.
3. CUT PIPES TO ALLOW SETTING OF 4' DIA. CYLINDRICAL FORM FROM 6" ABOVE MAIN LINE PIPE TO SPRING LINE. CUT PIPE 2" LARGER THAN FORM TO ALLOW 2" CONCRETE OVER ENDS OF ALL CUT PIPE.
4. INVERT AND BASE OF MANHOLE TO BE POURED AND INVERT TO BE SHAPED BY HAND TO MAKE SMOOTH TRANSITION. FINISH WITH RUBBER FLOAT.
5. CENTER MANHOLE ON PIPE JOINT WHERE PIPE CHANGES SIZES, LEAVING A GAP OF 12" MINIMUM, 24" MAXIMUM.

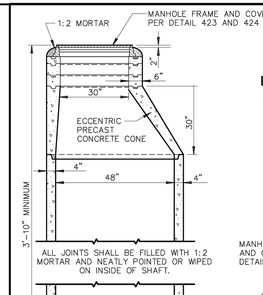


SECTION A–A

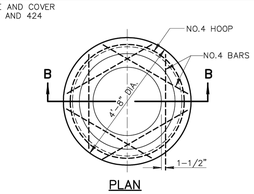


SECTION B–B

DETAIL NO.	STANDARD DETAIL		REVISED	DETAIL NO.
520	MARICOPA ASSOCIATION of GOVERNMENTS ENGLISH	STORM DRAIN MANHOLE BASE (48" AND SMALLER)	01–01–1998	520

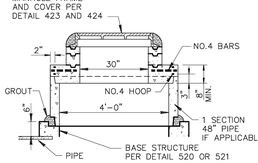


VERTICAL SECTION OF ECCENTRIC MANHOLE SHAFT



PLAN

USE WHERE THERE IS 3'–10" OR LESS COVER OVER PIPE

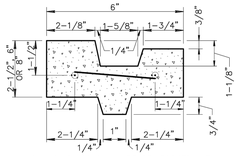


SECTION B–B

SHALLOW MANHOLE

NOTES:

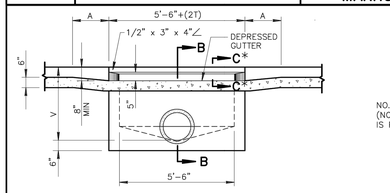
1. PRECAST CONCRETE CONES AND SECTIONS TO BE A.S.T.M. C–478.
2. BRICK MAY BE USED IN LIEU OF OR IN COMBINATION WITH CONCRETE ADJUSTING RINGS.
3. PRECAST CONCRETE SECTIONS 48" DIA PIPE MAY BE FURNISHED IN STANDARD LENGTHS.
4. UNLESS OTHERWISE SHOWN ON PLANS, USE (2) 2–1/2" PRECAST CONCRETE ADJUSTING RINGS ON IMPROVED STREETS AND (4) 2–1/2" RINGS ON UNIMPROVED STREETS.
5. CONCRETE SHALL BE CLASS A PER SECTION 725 AND 505.



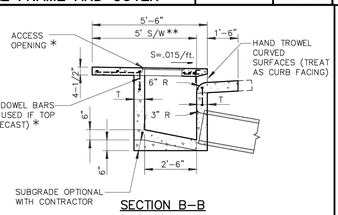
2–1/2" RINGS SHALL BE REINFORCED WITH TWO 1/4" ROUND STEEL HOOPS; 6" AND 8" RINGS SHALL BE REINFORCED WITH FOUR 1/4" HOOPS, TIED WITH NO. 14 A.S.& W. GAUGE WIRE 8" O.C.

REINFORCED CONCRETE ADJUSTING RING

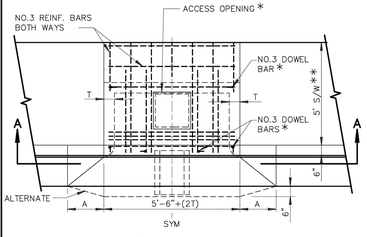
DETAIL NO.	STANDARD DETAIL		REVISED	DETAIL NO.
522	MARICOPA ASSOCIATION of GOVERNMENTS ENGLISH	STORM DRAIN MANHOLE SHAFT	01–01–2015	522



SECTION A–A



SECTION B–B



PLAN VIEW

NOTES:

1. THE ENTIRE CATCH BASIN COVER MAY BE POURED IN PLACE OR PRECAST.
2. CONNECTION PIPES MAY BE PLACED IN ANY POSITION AROUND THE WALLS PROVIDED THE POSITION IS CONSISTENT WITH THE PLAN.
3. OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE CONCRETE IS POURED.
4. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
5. ALL STRUCTURAL STEEL TO BE PAINTED ONE SHOP COAT OF NO. 1 D PAINT AND TWO FIELD COATS OF NO. 10 PAINT AS PER SECT. 790.
6. CONCRETE SHALL BE CLASS A PER SECTION 725.

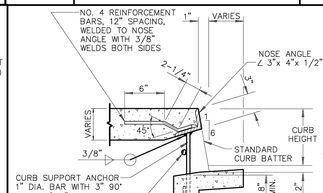
CURB	A
4"	3'–3"
6"	1'–9"
7"	1'–0"

DIMENSIONS

T=6" IF V=4' OR LESS
T=8" IF V IS BETWEEN 4' AND 8'
T=10" IF V IS 8' OR MORE (IF V EXCEEDS 10' SPECIAL DESIGN IS REQUIRED)
V=3'–6" UNLESS OTHERWISE SPECIFIED.

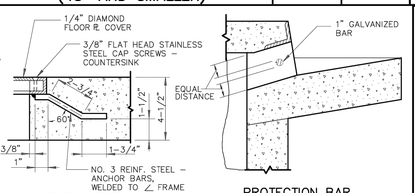
* SEE DETAILS 536–1 AND 536–2 FOR DETAILS AND SECTIONS COMMON TO ALL CURB OPENING CATCH BASINS.
** 4' LOCATIONS WHERE 4' S/W IS REQUIRED.

DETAIL NO.	STANDARD DETAIL		REVISED	DETAIL NO.
531	MARICOPA ASSOCIATION of GOVERNMENTS ENGLISH	5'–6" CURB OPENING CATCH BASIN – TYPE 'B'	01–01–1998	531



SECTION C–C

FOR DETAILS 531, 532 AND 533

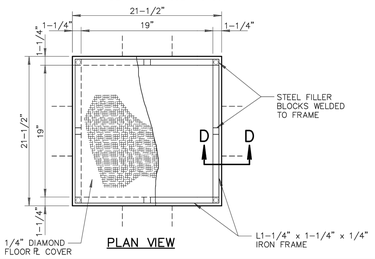


SECTION D–D

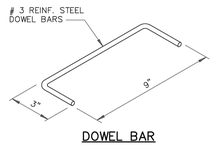
PROTECTION BAR

NOTES:

1) HORIZONTAL PLAIN ROUND GALVANIZED STEEL PROTECTION BAR SHALL BE USED WHEN CURB FACE IS 9" OR MORE.
2) THE BAR SHALL BE EMBEDDED 5" AT EACH END.

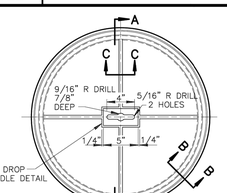


PLAN VIEW

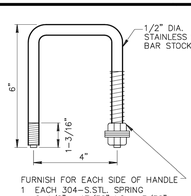


DOWEL BAR

DETAIL NO.	STANDARD DETAIL		REVISED	DETAIL NO.
536–1	MARICOPA ASSOCIATION of GOVERNMENTS ENGLISH	COMMON DETAILS AND SECTIONS FOR CURB OPENING CATCH BASINS	01–01–1999	536–1

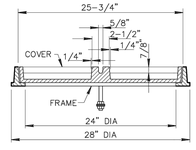


PLAN VIEW

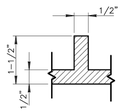


FURNISH FOR EACH SIDE OF HANDLE
1 EACH 304–S.STL. SPRING 2–1/2" x 17/32" I.C. x 3/32"
2 EACH 1/2" HEX NUT
3 EACH 1/2" FLAT WASHER
1 EACH 1/2" LOCK WASHER

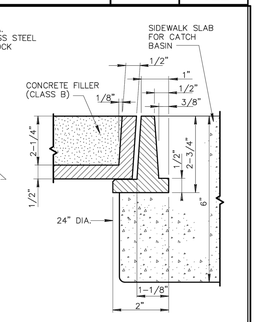
DROP HANDLE



SECTION A–A



SECTION C–C



SECTION B–B

NOTES:

1. FRAME SHALL BE NON–LOCKING.
2. FRAME AND COVER SHALL BE CAST IRON OR ASTM A–36 STRL. HORIZONTAL SURFACE OF COVER IN CONTACT WITH FRAME SHALL BE MACHINED. ASA B–46 ROUGHNESS SHALL NOT EXCEED 1/32".
3. COVER SHALL BE FILLED WITH CONCRETE AND BROOM FINISHED.
4. SMALL VARIATIONS IN DIMENSIONS OF FEATURES OF A MINOR NATURE THAT ARE PART OF THE FOUNDRY'S CASTING ARE PERMISSIBLE.

DETAIL NO.	STANDARD DETAIL		REVISED	DETAIL NO.
536–2	MARICOPA ASSOCIATION of GOVERNMENTS ENGLISH	ALTERNATE COVER FOR CURB OPENING CATCH BASINS	01–01–1998	536–2

REVISIONS

PROJECT NO. 121.044
DRAWN C. DAHM
CHECKED D. PHILLIPS
SUBMITTAL DATES
OTB DATE —

JSACIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP

03/10/2025

CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture plc

SHEET TITLE
STORMWATER DETAILS

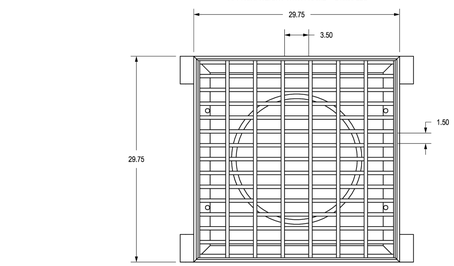
SHEET
SD-02

FSXX-XXXX

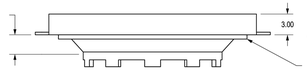
Mar 10, 2025 - 2:07:34pm - User: CarolynAnn
N:\2 - PROJECTS\121 HILLSIDE ARCHITECTURE\121.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\121.044 SD-02.DWG

3299CGSQSB

APPROX. GRATE DRAIN AREA = 551.25 SQ IN
*APPROX. WEIGHT WITH FRAME = 249.00 LBS



TOP OF BASE PLATE TO TOP OF DRAIN BASIN
12BASEG: 2.82
18BASEG: 2.82
18BASEG: 2.82
24BASEG: 2.82
30BASEG: .38



*WEIGHT DOES NOT INCLUDE DUCTILE IRON BASE PLATE
12BASEG: APPROX. 109.00 LBS
18BASEG: APPROX. 98.00 LBS
18BASEG: APPROX. 85.00 LBS
24BASEG: APPROX. 93.00 LBS
30BASEG: APPROX. 82.00 LBS

ALL DIMENSIONS IN INCHES UNLESS NOTED OTHERWISE
GRATE MEETS H-20 LOAD RATING
QUALITY: FRAME & GRATE MATERIALS SHALL CONFORM TO ASTM A-36 STEEL, BASE PLATE MATERIALS SHALL CONFORM TO ASTM A536 GRADE 70-50-05 DUCTILE IRON
LOCKING DEVICE AVAILABLE UPON REQUEST SEE DRAWING NO. 7001-110-256

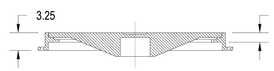
DRAWN BY	CJA
DATE	02-28-03
REVISED BY	CCA
DATE	09-04-13
DWG SIZE	A
MATERIAL	
PROJECT NO./NAME	
SCALE	1:10
SHEET	1 OF 1

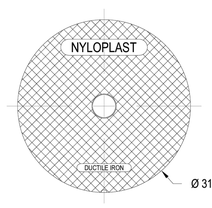
ADS Nyloplast
3130 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

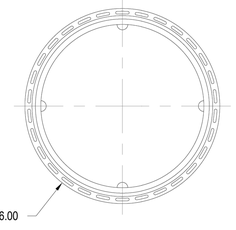
TITLE: 2 FT X 2 FT STEEL BAR GRATE ASSEMBLY
DWG NO. 7001-110-258 REV F

3099CGC

APPROX. WEIGHT WITH FRAME = 262.50 LBS







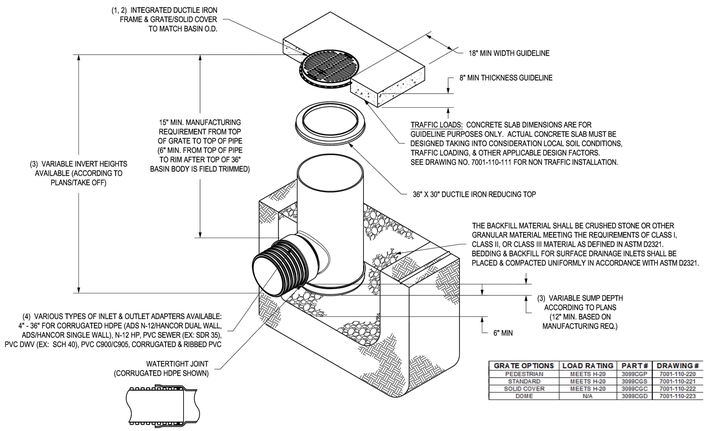
DIMENSIONS ARE FOR REFERENCE ONLY
ACTUAL DIMENSIONS MAY VARY
DIMENSIONS ARE IN INCHES
COVER MEETS H-20 LOAD RATING
QUALITY: MATERIALS SHALL CONFORM TO ASTM A536 GRADE 70-50-05
PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT
LOCKING DEVICE AVAILABLE UPON REQUEST SEE DRAWING NO. 7001-110-026

STANDARD DETAIL
NYLOPLAST 30 IN SOLID COVER ASSEMBLY – TYPE B
DRAWING NUMBER 7001-110-222

ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026

DRAWN BY	NMH
DATE	03-06-23
DES BY	
DATE	
SCALE	NTS
SHEET	1 OF 1

NYLOPLAST 36" DRAIN BASIN: 2836AG _ _X



GRATE OPTIONS	LOAD RATING	PART #	DRAWING #
PEDESTRIAN	MEETS H-20	3099CGP	7001-110-220
STANDARD	MEETS H-20	3099CGS	7001-110-221
SOLID COVER	MEETS H-20	3099CGC	7001-110-222
DOME	N/A	3099CGD	7001-110-223

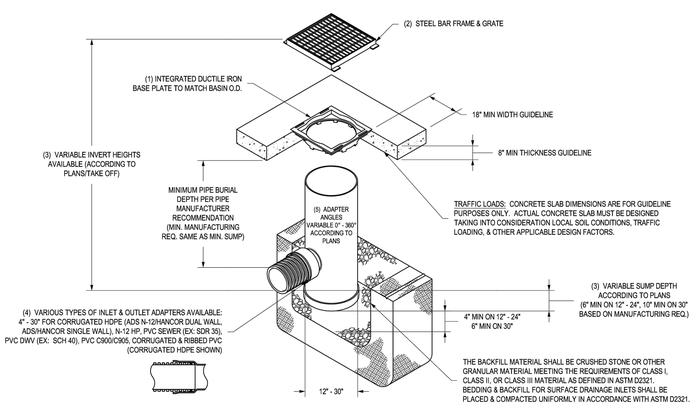
1 - GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2 - FRAMES & REDUCING TOP SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASIN BODIES OVER 84" DUE TO SHIPPING RESTRICTIONS.
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER.
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.

DRAWN BY	NMH
DATE	9-21-18
APPD BY	NMH
DATE	9-21-18
REVISD BY	NMH
DATE	10-04-21
APPD BY	NMH
DATE	10-04-21
DWG SIZE	A
MATERIAL	
PROJECT NO./NAME	
SCALE	1:40
SHEET	1 OF 1

ADS Nyloplast
3130 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

TITLE: 36" DRAIN BASIN QUICK SPEC INSTALLATION DETAIL
DWG NO. 7001-110-526 REV B

NYLOPLAST DRAIN BASIN WITH 2 FT X 2FT STEEL BAR GRATE



1 - 12" - 30" BASE PLATES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2 - FRAME & GRATE SHALL BE STEEL PER ASTM A36.
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS.
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER (4" - 24").
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.
6 - STEEL BAR GRATE SHALL MEET H-20 LOAD RATING.

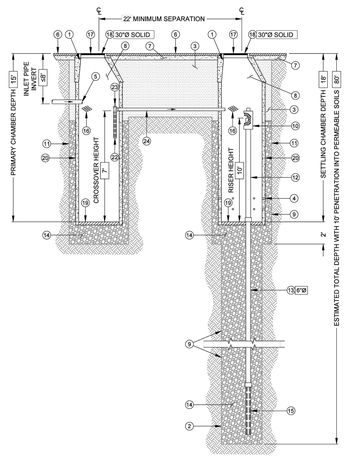
DRAWN BY	EBC
DATE	03-22-10
REVISED BY	NMH
DATE	03-16-16
DWG SIZE	A
MATERIAL	
PROJECT NO./NAME	
SCALE	1:40
SHEET	1 OF 1

ADS Nyloplast
3130 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

TITLE: DRAIN BASIN WITH 2 FT X 2 FT STEEL BAR GRATE QUICK SPEC INSTALLATION DETAIL
DWG NO. 7001-110-394 REV D

The MaxWell® Plus

DRAINAGE SYSTEM DETAILS AND SPECIFICATIONS
Crash Champions
303 Autoshow Drive, Surprise, AZ



ITEM NUMBERS

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **MIN. 4' Ø DRILLED SHAFT.**
3. **STABILIZED BACKFILL** - ONE SACK SLURRY MIX.
4. **6 PERFORATIONS MINIMUM PER ROW, 2 ROWS MINIMUM.**
5. **INLET PIPE** (BY OTHERS). SEE SEPARATE PLAN FOR INVERT ELEVATIONS.
6. **GRADED BASIN OR PAVING** (BY OTHERS).
7. **COMPACTED BASE MATERIAL.** IF REQUIRED (BY OTHERS).
8. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE SETTLING CHAMBER DEPTH AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE RISER PIPE.
9. NOT USED.
10. **PUREFLO® DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL 0.265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED.**
11. **MIN. 6' Ø DRILLED SHAFT.**
12. **RISER PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
13. **DRAINAGE PIPE** - ADS HIGHWAY GRADE OR SCH. 40 PVC WITH TRI-A COUPLER. SUSPEND PIPE DURING BACKFILL OPERATIONS. DIAMETER AS NOTED.
14. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2".
15. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH MIN. 32 SLOTS PER ROW/FT. OVERALL LENGTH VARIES, UP TO 120" WITH TRI-B COUPLER.
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY.
17. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION. GRATED ONLY.
18. **BOLTED RING & GRATE/COVER** - DIAMETER & TYPE AS SHOWN. CLEAN CAST IRON WITH WORDING "STORMWATER ONLY" IN RAISED LETTERS. BOLTED IN 2 LOCATIONS AND SECURED TO CONE WITH MORTAR. RIM ELEVATION ±0.02' OF PLANS.
19. **BASE SEAL** - GEOTEXTILE.
20. **PRE-CAST LINER** - 4000 PSI CONCRETE 48" ID. X 54" ID. CENTER IN HOLE AND ALIGN SECTIONS.
21. NOT USED.
22. **INTAKE SCREEN** - 4"Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH MIN. 32 SLOTS PER ROW/FT. 48" OVERALL LENGTH WITH TRI-C END CAP.
23. **VENTED ANTI-SIPHON INTAKE WITH FLOW REGULATOR.**
24. **CONNECTOR PIPE** - 4" Ø SCH. 40 PVC.

Manufactured and Installed by
TorrentResources, A CRH COMPANY
An evolution of McGuckin Drilling
www.torrentresources.com

DETAIL	PL-4-SS-AZ	REVIEWED BY:	NJT
DRAWN ON	09-17-24	REVISED DATE	03-06-25
SCALE	N.T.S		

Mar 10, 2025 2:07:40pm – User:CarolDahm
N:\2 – PROJECTS\21 HILLSIDE ARCHITECTURE\21\044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\21044 SD-02.DWG

REVISIONS

PROJECT NO. 121.044
DRAWN C. DAHM
CHECKED D. PHILLIPS
SUBMITTAL DATES
OTB DATE —

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP

03/10/2025

CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture pllc

SHEET TITLE
STORMWATER DETAILS

SHEET
SD-03

FSXX-XXXX

Advanced Drainage Systems, Inc.

SiteASSIST™
FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

MC-7200 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-7200.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a. "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/IN/IN. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418 AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-7200 CHAMBER SYSTEM

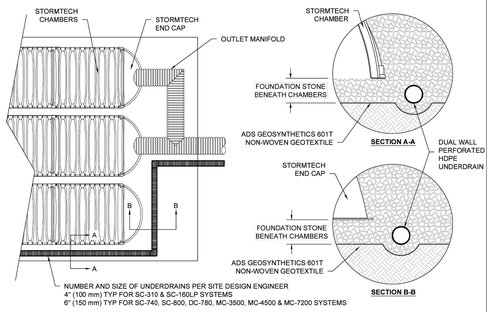
1. STORMTECH MC-7200 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
10. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
11. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
12. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

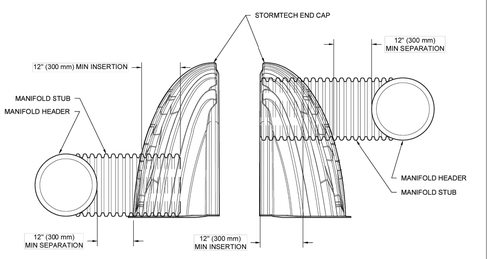
1. STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-7200 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

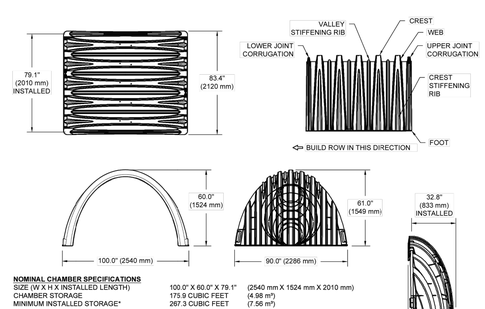


5 UNDERDRAIN DETAIL



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

6 MC-SERIES END CAP INSERTION DETAIL



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 79.1"	(2540 mm X 1524 mm X 2010 mm)
CHAMBER STORAGE	175.9 CUBIC FEET	(4.98 m³)
MINIMUM INSTALLED STORAGE*	267.3 CUBIC FEET	(7.56 m³)
WEIGHT (NOMINAL)	205 lbs.	(92.9 kg)

NOMINAL END CAP SPECIFICATIONS

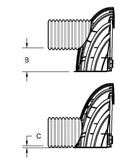
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

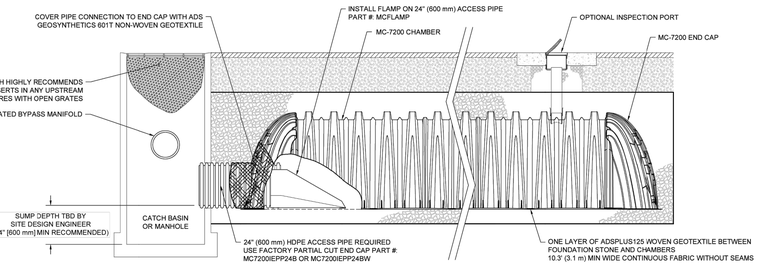
PART #	STUB	B	C
MC7200EPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC7200EPP06B		---	0.86" (22 mm)
MC7200EPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC7200EPP08B		---	1.01" (26 mm)
MC7200EPP10T	10" (250 mm)	38.37" (975 mm)	---
MC7200EPP10B		---	1.33" (34 mm)
MC7200EPP12T	12" (300 mm)	35.69" (907 mm)	---
MC7200EPP12B		---	1.55" (39 mm)
MC7200EPP15T	15" (375 mm)	32.72" (831 mm)	---
MC7200EPP15B		---	1.70" (43 mm)
MC7200EPP18T	18" (450 mm)	29.36" (746 mm)	---
MC7200EPP18TW			
MC7200EPP18B		---	1.97" (50 mm)
MC7200EPP18BW			
MC7200EPP24T	24" (600 mm)	23.05" (585 mm)	---
MC7200EPP24TW			
MC7200EPP24B		---	2.26" (57 mm)
MC7200EPP24BW			
MC7200EPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC7200EPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC7200EPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL

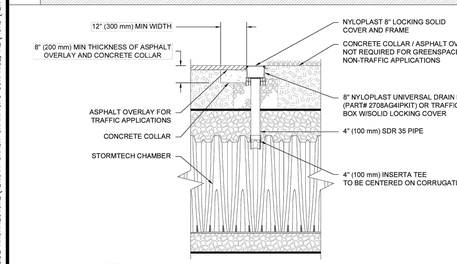


CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

2 MC-7200 TECHNICAL SPECIFICATIONS



3 MC-7200 ISOLATOR ROW PLUS DETAIL



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

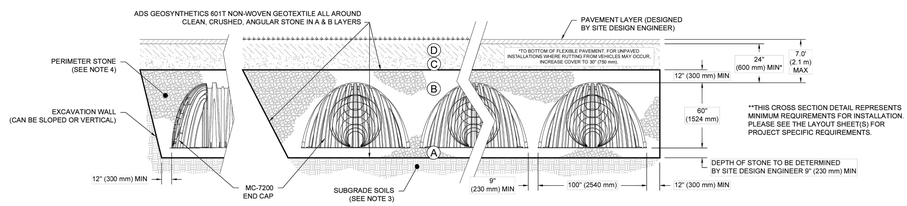
1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

4 4" PVC INSPECTION PORT DETAIL (MC SERIES CHAMBER)

ACCEPTABLE FILL MATERIALS: STORMTECH MC-7200 CHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-7200 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

1 MC-7200 CROSS SECTION DETAIL

DRAWN: JLM | DATE: 01/10/24
REVIEWED: JLM | PROJECT NO:
REV: | NOT TO SCALE

MC-7200 STANDARD DETAILS

StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026

SHEET 1

REVISIONS

PROJECT NO. 121.044
DRAWN C. DAHM
CHECKED D. PHILLIPS
SUBMITTAL DATES
OTB DATE —

JSA CIVIL
Engineering | Planning | Management
111 TUMWATER BLVD SE, SUITE B203
TUMWATER, WA 98512

STAMP

03/10/2025

CRASH CHAMPIONS
COMMERCIAL DEVELOPMENT PROJECT
303 AUTOSHOW DRIVE
SURPRISE, ARIZONA

HillSide architecture plc

SHEET TITLE
STORMWATER DETAILS

SHEET
SD-04

FSXX-XXXX

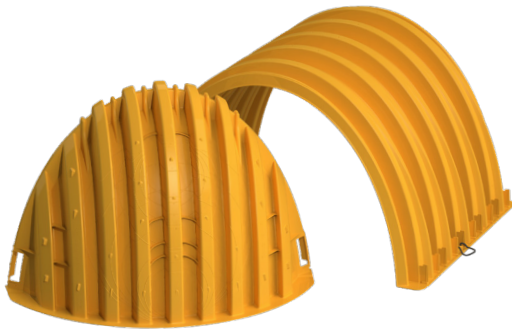
Mar 10, 2025 2:08:31pm – User: CoreDotNet
N:\2 – PROJECTS\121 HILLSIDE ARCHITECTURE\121.044 CRASH CHAMPIONS SURPRISE, AZ\ACAD\121.044 SD-02.DWG

Appendix 6

StormTech MC-7200 Data Sheets

StormTech® MC-7200 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



Nominal Chamber Specifications
(not to scale)

Size (L x W x H)
83” x 100” x 60”
2108 mm x 2540 mm x 1524 mm

Chamber Storage
175.9 ft³ (4.98 m³)

Min. Installed Storage*
267.3 ft³ (7.57 m³)

Weight
202 lbs (91.6 kg)

Shipping
7 chambers/pallet
5 end caps/pallet
6 pallets/truck

*Assumes a minimum of 12” (300 mm) of stone above, 9” (230 mm) of stone below chambers, 9” (230 mm) of stone between chambers/end caps and 40% stone porosity.

Nominal End Cap Specifications
(not to scale)

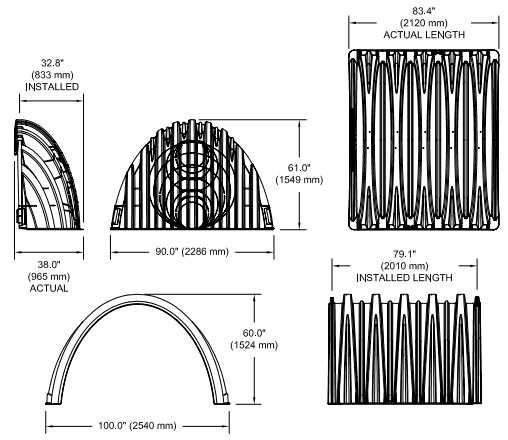
Size (L x W x H)
38” x 90” x 61”
965 mm x 2286 mm x 1549 mm

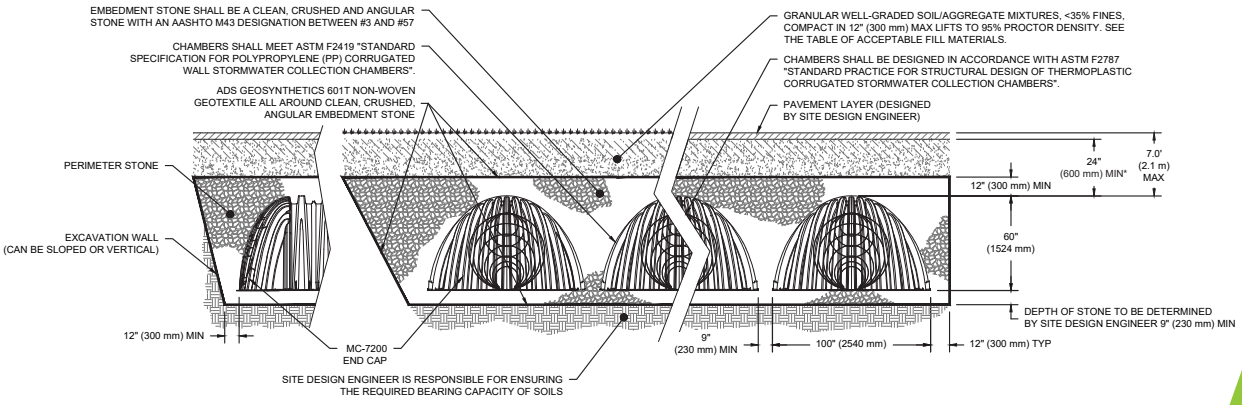
End Cap Storage
39.5 ft³ (1.12 m³)

Min. Installed Storage*
115.3 ft³ (3.26 m³)

Weight
Nominal 90.0 lbs (40.8 kg)

*Assumes a minimum of 12” (300 mm) of stone above, 9” (230 mm) of stone below, 12” (300 mm) of stone perimeter, 9” (230 mm) of stone between chambers/end caps and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR. INCREASE COVER TO 30" (750 mm).

ADS StormTech™

StormTech MC-7200 Specifications

Storage Volume Per Chamber

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)			
		9 in (230 mm)	12 in (300 mm)	15 in (375 mm)	18 in (450 mm)
Chamber	175.9 (4.98)	267.3 (7.57)	273.3 (7.74)	279.3 (7.91)	285.3 (8.08)
End Cap	39.5 (1.12)	115.3 (3.26)	118.6 (3.36)	121.9 (3.45)	125.2 (3.54)

Note: Assumes 9" (230 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume. End cap volume assumes 12" (300 mm) stone perimeter in front of end cap.

Amount of Stone Per Chamber

English Tons (yds³)	Stone Foundation Depth			
	9 in	12 in	15 in	18 in
Chamber	12.1 (8.5)	12.9 (9.0)	13.6 (9.6)	14.3 (10.1)
End Cap	9.8 (7.0)	10.2 (7.3)	10.6 (7.6)	11.1 (7.9)
Metric Kilograms (m³)	**230 mm**	**300 mm**	**375 mm**	**450 mm**
Chamber	10977 (6.5)	11703 (6.9)	12338 (7.3)	12973 (7.7)
End Cap	8890 (5.3)	9253 (5.5)	9616 (5.8)	10069 (6.0)

Note: Assumes 12" (300 mm) of stone above and 9" (230 mm) row spacing and 12" (300 mm) of perimeter stone in front of end caps. 1 yd³ = 1.42 english tons.

Volume Excavation Per Chamber yd³ (m³)

	Stone Foundation Depth			
	9 in (230 mm)	12 in (300 mm)	15 in (375mm)	18 in (450 mm)
Chamber	17.2 (13.2)	17.7 (13.5)	18.3 (14.0)	18.8 (14.4)
End Cap	9.7 (7.4)	10.0 (7.6)	10.3 (7.9)	10.6 (8.1)

Note: Assumes 9" (230 mm) of separation between chamber rows, 12" (300 mm) of perimeter in front of the end caps, and 24" (600 mm) of cover. The volume of excavation will vary as depth of cover increases.

ADS StormTech products, manufactured in accordance with ASTM F2418 or ASTMF2922, comply with all requirements in the Build America, Buy America (BABA) Act.

Working on a project?
Visit us at adspipe.com/stormtech and utilize the Design Tool

ADS StormTech™

adspipe.com
800-821-6710

Appendix 7

Geotechnical Engineering Report

Proposed Crash Champions – Surprise, AZ

Geotechnical Engineering Report

December 13, 2024 | Terracon Project No. CP245069

Prepared for:

LRG Investors
822 A1A North, Suite 310
Ponte Vedra Beach, Florida 32082

EXPIRES 9/30/2026

Terracon
Explore with us

Nationwide
Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials

4685 S. Ash Avenue, Suite H-4
Tempe, Arizona 85282
Phone: (480) 897-8200
Terracon.com

December 13, 2024

LRG Investors
822 A1A North, Suite 310
Ponte Vedra Beach, Florida 32082

Attn: Mr. Joe Brady
Phone: 312-404-6066
Email: Joe@lrginvestors.com

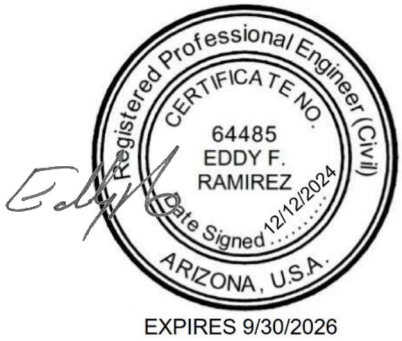
Re: Geotechnical Engineering Report
Proposed Crash Champions – Surprise, AZ
303 Autoshow Avenue
Surprise, Arizona
Terracon Project No. CP245069

Dear Mr. Brady:

Terracon Consultants, Inc. (Terracon) has completed the Geotechnical Engineering Services for the above referenced project in general accordance with Terracon Proposal No. PCP245069 dated October 30, 2024. This geotechnical engineering report presents the findings of the subsurface exploration and provides geotechnical engineering recommendations concerning earthwork and the design and construction of foundations, floor slabs, and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon



EXPIRES 9/30/2026

Joaquin Perez Solis, E.I.T.
Geotechnical Staff Engineer

Eddy F. Ramirez, P.E.
Geotechnical Department Manager

Table of Contents

Figures

Attachments

Note: This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Report Summary

Topic [1]	Overview Statement [2]
Project Description	Based on the information provided, we understand the project will consist of a single-story building with a footprint of approximately 20,000 square feet. The new building will be used primarily as a collision repair building and a small portion will be an Enterprise car rental office. Other improvements to the site will include paved parking and drives.
Geotechnical Characterization	■ The on-site soils encountered throughout the depths explored at the boring locations generally consisted of loose to dense sand with variable amounts of silt and clay, and medium stiff to hard sandy lean clay. ■ Groundwater was not encountered during the field exploration to a maximum boring depth of 20½ feet. ■ The near surface soils exhibited low to significant hydro-compaction (collapse) potential at in-situ moisture content and density. These same soils indicate moderate compression under typical foundation pressures. ■ The surface and near surface sandy lean clay and clayey sand soils encountered at the site exhibited medium plasticity characteristics. The sandy lean clay soils exhibited moderate expansive potential when compacted, subjected to light loading conditions such as those imposed by lightly loaded floor slabs, and in response to wetting.
Earthwork	■ Due to high collapse potential, we recommend shallow foundations for the proposed project be supported on recompacted engineered fill. Engineered fill should be placed as described in the **Earthwork** section of this report. ■ Because of the expansive characteristics of the on-site soils, we recommend interior slab-on-grade floor slabs be supported on imported low volume change materials. As an alternative to imported low volume change materials, the existing subgrade soils beneath the interior slab-on-grade floor slabs could be stabilized with the use of lime. A lime stabilization mix design should be conducted prior to construction. Refer to the **Earthwork** section of the report for site preparation recommendations.

Expansive Soils	■ Expansive soils are present on this site. This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. However, even if these procedures are followed, some movement and (at least minor) cracking in the structure and pavements should be anticipated. ■ The severity of cracking and other (cosmetic) damage, such as uneven floor slabs and pavement failures, will probably increase if any modification of the site results in excessive wetting or drying of the expansive soils. The report details measures to reduce the potential of distress being caused by expansive soil conditions.
Shallow Foundations	Shallow spread footing recommendations are outlined in the **Shallow Foundation** section of the report. Subgrade preparation for shallow foundations is outlined in the **Earthwork** section of the report.
Pavements	Based on the anticipated traffic data outlined in this report and with subgrade prepared as noted in **Earthwork** section of the report, the following outlines recommended minimum pavement sections: Asphalt: ■ 3.0" AC over 5" ABC in Automobile Drives and Parking Areas ■ 3.5" AC over 6" ABC in Main Drives & Light Truck Areas Concrete: ■ 5" PCC over 4" ABC in Automobile Drives and Parking Areas ■ 6" PCC over 4" ABC in Main Drives & Light Truck and Trash Enclosure Areas
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering Services performed for the Proposed Crash Champions – Surprise, AZ project to be located at 303 Autoshow Avenue in Surprise, Arizona. The approximate location of the project is shown on the attached **Site Location** map. The purpose of these services was to provide information and geotechnical engineering recommendations relative to the following:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Foundation design and construction
- Seismic site classification per IBC
- Floor slab design and construction
- Lateral earth pressures
- Pavement design and construction

Our geotechnical engineering scope of work for this project included drilling 10 borings to approximate depths ranging from 5½ to 20½ feet below the existing ground surface for subsurface exploration, laboratory testing, geotechnical engineering analysis, and preparation of this report.

The boring locations are shown on the attached **Exploration Plan**. A log of each boring is included in the **Exploration and Laboratory Results** section of this report. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are summarized in part on the boring logs and are provided in graphical and tabular form in the **Exploration and Laboratory Results** section of this report.

Project Description

Our initial understanding of the project was provided in our proposal and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	The following information was provided: ■ "Crash Champion_SD Arch Set_20241009" a PDF prepared by Hillside Architecture dated 10/9/2024
Project Description	Based on the information provided, we understand the following project will consist of a single-story building with a footprint of approximately 20,000 square feet. The new building will be used primarily as a collision repair building and a small portion will be an Enterprise car rental office. Other improvements to the site will include paved parking and drives.
Proposed Structure	We anticipate the proposed building is planned as a steel frame and/or masonry superstructure supported by a reinforced concrete foundation system and shallow spread footings. We anticipate the floor of the proposed building will be a concrete slab-on-grade. We understand the parking and drive areas will generally consist of asphalt concrete or portland cement concrete pavements.
Finished Floor Elevation	We understand finished floor elevation will be at or slightly above the existing ground surface.
Maximum Loads (Assumed)	■ Columns: 85 kips ■ Walls: 3 kips per linear foot (klf) ■ Slabs: 150 pounds per square foot (psf)
Grading/Slopes	The site is relatively flat and grading operations across the site are anticipated to generally include relatively minor cuts and fills on the order of up to two feet.
Below-Grade Structures	None are planned.
Free-Standing Retaining Walls	None are planned.
Pavements	On-site drives and parking area pavements for automobile and truck traffic are anticipated to consist of asphalt concrete and portland cement concrete. Traffic loading information was not provided. Therefore, the following are the assumed design equivalent single axle loads (ESALs) for the on-site pavements: ■ Automobile Drives and Parking Areas: 7,000 ESALs ■ Light Truck Drives: 27,000 ESALs, and possibly greater depending on site specific truck traffic information The assumed design traffic is over a 20-year pavement design period.
Stormwater Retention Basins	None are planned. The information provided did not include storm-water retention basin details (locations, size, etc.). Therefore, this geotechnical engineering report excludes recommendations for storm-water retention basins.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available topographic maps. We also collected photographs of depicting selected site conditions at the time of our field exploration program. Representative photos are provided in our **Photography Log**.

Item	Description
Project Site Information	The project is located at 303 Autoshow Avenue in Surprise, Arizona. See **Site Location** for additional site location information.
Existing Improvements	The site is currently agricultural land. Surrounding improvements include construction on the east side of the project site, and a commercial development north of the project boundary.
Current Ground Cover	The current ground cover across the site generally consists of bare soil and possible fallow agricultural crops.
Existing Topography	The site was relatively flat.

Geotechnical Characterization

Regional Geology

The project area is located in the Basin and Range physiographic province ([1]Cooley, 1967) of the North American Cordillera ([2]Stern, et al, 1979) of the southwestern United States. The southern portion of the Basin and Range province is situated along the southwestern flank of the Colorado Plateau and is bounded by the Sierra Nevada Mountains to the west. Formed during middle and late Tertiary time (100 to 15 million years ago), the Basin and Range province is dominated by fault-controlled topography. The topography consists of mountain ranges and relatively flat alluviated valleys. These mountain ranges and valleys have evolved from generally complex movements and associated erosional and depositional processes. Drainage flows to the Gila River during late Tertiary time, coupled with structural activity discussed above, are generally responsible for the present-day topography within the basin.

Typically, the ranges in this area are of small areal extent but protrude significantly above adjacent wide alluviated plains and valleys. The basin rims are formed by the

[1] Cooley, M.E., 1967, **Arizona Highway Geologic Map**, Arizona Geological Society.
[2] Stern, C.W., et al, 1979, **Geological Evolution of North America**, John Wiley & Sons, Santa Barbara, California.

mountain ranges which consist of sedimentary, igneous and metamorphic materials which have been subjected to recurrent faulting and tilting, and in some places volcanic and intrusive events. As a result of erosion, the valleys have experienced partial infilling with sedimentary material which has been deposited as alluvial fans. Dominant features in the province consist of:

Feature	Description
Pediments	Gently dipping slopes formed due to an underlying rock erosional surface
Alluvial fans	Sediments deposited in outwash plains at areas of low water velocity
Bajadas	Alluvial fans which combine at the base of mountains
Inselbergs	Isolated hills or mountains, usually that maintain their relief after erosion of surrounding rock

Site Specific Geology

Based on review of U.S. Geological Survey (USGS) geological maps, surficial geologic conditions mapped at the site consist of Holocene surficial deposits. These deposits consist of unconsolidated deposits associated with modern fluvial systems. This unit consists primarily of fine-grained, well-sorted sediment on alluvial plains, but also includes gravelly channel, terrace, and alluvial fan deposits on middle and upper piedmonts.

Land Subsidence and Earth Fissures

The site is located in the Phoenix Western metropolitan area, portions of which have experienced historic and documented groundwater decline. The depletion of the groundwater table has resulted in compression of the aquifer material and the phenomenon known as areal subsidence. Based on a review of the digital map of the Western Metropolitan Phoenix, Maricopa County, Arizona ([3]ADWR, 2024) prepared by ADWR, total land subsidence in the vicinity of the project site was approximately 0 to 0.8 inches from May 8, 2010 to April 12, 2024.

Earth fissures are fractures or cracks that form in alluvial basins due to substantial groundwater overdrafts that produce local subsidence. Earth fissures develop within

[3] Arizona Department of Water Resources (ADWR), 2024. **Total Land Subsidence in the Western Metropolitan Phoenix, Maricopa County; Based on Radarsat-2 Satellite Interferometric Synthetic Aperture Radar (InSAR) Data; Time Period of Analysis: 14.0 Years 05/08/2010 to 04/12/2024** Created 5/3/2024 by Arizona Department of Water Resources.

land subsidence areas where a significant thickness of compressible alluvium overlies shallow irregular bedrock surfaces such as ridges and fault scarps or other subsurface features. Based on a review of available Arizona Geological Survey (AZGS) earth fissure maps, the site is within the Luke Special Study earth fissure zone. No earth fissures are mapped on the site or were observed during the field exploration. The nearest mapped earth fissure is located approximately 1¼ miles southeast of the project site.

Subsurface Conditions

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration and Laboratory Results** section of this report and the GeoModel can be found in the **Figures** attachment of this report. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Based on conditions encountered in the borings, subsurface conditions on the project site can be generalized as follows:

Model Layer	Layer Name	General Description
1	**Sand**	Loose to dense sand with variable amounts of clay and silt. Zones of weak cementation.
2	**Clay**	Medium stiff to hard sandy lean clay. Zones of weak cementation.

Summary of Laboratory Test Results

Laboratory tests were performed on selected soil samples and the test results are presented in the **Exploration and Laboratory Results** section of this report. The results of the laboratory testing of soil samples obtained from the borings were used for geotechnical engineering analysis for the proposed project. The following is a brief summary of laboratory testing performed on selected soils samples obtained from the borings:

Laboratory Test	Description of Test Results
Atterberg Limits/ Gradation	The surface and near surface soils consisted of sandy lean clays and clayey sands and exhibited medium plasticity characteristics.

Laboratory Test	Description of Test Results
Moisture Content/Dry Density	Testing of ring samples obtained from the borings at depths within the near surface soils (upper 10 feet) indicated in-situ moisture contents ranging from approximately 4.2 to 15.8 percent with an average of approximately 9.7 percent; and in-situ dry densities ranging from approximately 94 to 117 pounds per cubic foot (pcf) with an average of approximately 104 pcf.
Consolidation/ Compression	In response to wetting of relatively undisturbed samples while supporting typical foundation pressures, the near surface soils exhibited low to significant hydro-compaction (collapse) potentials. Hydro-compactive soils (sometimes referred to as collapsible soils) are capable of supporting typical building loads at natural moisture contents. However, these same materials undergo volume decrease (settlement/consolidation) when subjected to increases in moisture content under constant load. These same soils also indicate moderate compression under typical foundation pressures.
Remolded Swell	When water was added to samples of laboratory compacted on-site surface and near surface sandy lean clay soils, the compacted sandy lean clay soils exhibited moderate expansive potential when subjected to light loading conditions such as those imposed by lightly loaded floor slabs and in response to wetting.

Groundwater Conditions

Groundwater was not observed in any of the test borings at the time of our field exploration, nor when checked upon completion of drilling. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations. Groundwater conditions can change with varying seasonal and weather conditions, and other factors.

Based on information obtained from the Arizona Department of Water Resources – Groundwater Data website (**https://gisweb.azwater.gov/waterresourcedata/GWSI.aspx**), the depth to regional groundwater was most recently measured in December 2, 2002 to be approximately 412 feet below the ground surface (approximate elevation of 819 feet above mean sea level) at an Arizona Department of Water Resources (ADWR) monitored well site (Local I.D.: B-03-02 23AAA) located approximately 1,050 feet southwest of the site.

Seismic Site Class

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil properties observed at the site and as described on the exploration logs and results, our professional opinion is that a **Seismic Site Classification of D** be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 20½ feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to potentially modify the recommended seismic site classification outlined above.

Corrosivity

The following table lists the results of laboratory testing for pH, minimum electrical resistivity, soluble sulfate, and soluble chloride. The values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Boring	Sample Depth (feet)	Soil Description	pH	Minimum Electrical Resistivity (Ω-cm)	Soluble Sulfate (mg/kg)	Soluble Chloride (mg/kg)
B-3	0-4	Sandy Lean Clay	8.2	1,678	124	106

Results of soluble sulfate testing indicate that samples of the on-site soils tested classify as S0 according to Table 19.3.1.1 of Section 318 of the American Concrete Institute (ACI) Building Code Requirements for Structural Concrete. Therefore, American Society for Testing and Materials (ASTM) Type I/II portland cement is considered suitable for concrete at the site in contact with similar soluble sulfate concentrations. Concrete should be designed in accordance with the provisions of the ACI Building Code Requirements for Structural Concrete, Section 318, Chapter 19.

These values should be used to help determine potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction. Refer to Summary of Laboratory Results contained in **Exploration and Laboratory Results** section of this report for the complete results of the corrosivity testing performed on the site soils in conjunction with this geotechnical exploration. The corrosion information presented is specific to the samples tested. If the actual soils that will be in contact with the structures at the site are different than those tested, then additional corrosion testing should be performed. Terracon is not a corrosion engineer, and our scope of work was limited to performing corrosion laboratory tests on selected samples, presenting these results, and providing a brief comparison of the results to selected criteria. A qualified corrosion engineer should be consulted if corrosion of underground utilities and structures is a concern.

Geotechnical Overview

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings and provided our geotechnical engineering recommendations contained in this report are properly implemented in the design and construction phases of this project. The following provides an outline of geotechnical considerations for the project:

- Based on our laboratory testing, the shallow natural site soils exhibited a low to significant collapse potential. Therefore, we recommend shallow foundations systems be supported on compacted engineered fill as outlined in the **Earthwork** section of this report.
- The on-site near surface soils exhibited moderate expansion potential. These materials are not considered suitable for use as engineered fill beneath lightly loaded interior floor slabs. Therefore, the upper 14 inches of subgrade soils beneath interior slab-on-grade floor slabs and the recommended aggregate subbase course should consist of imported low volume change materials. As an alternative to imported low volume change materials, the upper 14 inches of the subgrade soils could be stabilized with the use of lime. A lime stabilization mix design should be conducted prior to construction. Refer to the **Earthwork** section of the report for site preparation recommendations.
- The on-site sandy lean clay and clayey sand soils are considered suitable for use as engineered fill in all construction areas, with the exception of the upper 14 inches below interior floor slab and the recommended aggregate subbase course.

- Expansive soils are present on this site. This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. However, even if these procedures are followed, some movement and (at least minor) cracking in the structure should be anticipated. The severity of cracking and other damage such as uneven floor slabs will probably increase if modification of the site results in excessive wetting or drying of the expansive soils. Eliminating the risk of movement and distress may not be feasible, but it may be possible to further reduce the risk of movement if significantly more expensive measures are used during construction. Some of these options are discussed in this report such as complete replacement of expansive soils.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration and Laboratory Results**), engineering analyses, and our current understanding of the proposed project. The **General Comments** section provides an understanding of the report limitations.

Earthwork

The following presents recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project. The recommendations presented for design and construction of earth supported elements including foundations, slabs and pavements are contingent upon following the recommendations outlined in this section. All grading for the structures should incorporate the limits of the proposed structure plus a minimum pad extension of 5 feet beyond proposed perimeter building walls and any exterior columns and appurtenant slabs (i.e., building envelope).

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

Site Preparation

Strip and remove existing vegetation, agricultural crops, debris, disturbed soils, and other deleterious materials from proposed building, pavement areas and other structural areas of the project. Stripped materials consisting of vegetation and organic materials should be wasted from the site. The site should be initially graded to create a relatively level surface to receive fill, and to provide for a relatively uniform thickness of fill

beneath proposed building, pavements and other structures. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

Although evidence of fills or underground facilities such as septic tanks, cesspools, basements, and utilities was not observed during the site reconnaissance, such features could be encountered during construction. If unexpected fills or underground facilities are encountered, such features should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Subgrade Preparation

Due to the variable low to significant collapse potential and the moderate compression of the surface and near surface soils, shallow foundations should be supported on engineered (compacted) fill. If engineered fill is used to raise grades in foundation areas, the engineered fill should provide equal or greater strength properties than the native soils and should provide a uniform thickness and bearing surface underlying the foundation footprint area. Engineered fill should extend below proposed foundations within the geometric configurations and depths indicated in the following table:

Foundation Type	Depth of Engineered Fill Below Footing	Lateral Extent of Engineered Fill Beyond Edge of Footing
Column and Wall Footings	A minimum depth of 2½ feet below the bottom of the proposed footings or 4 feet below existing grade, whichever is deeper.	A minimum of 2 feet horizontally beyond the edges of footings

If engineered fill is placed beneath the entire building, it should extend horizontally a minimum distance of 5 feet beyond the outside edge of perimeter footings, foundations, sidewalks and appurtenant exterior slabs.

The upper 14 inches of subgrade soils beneath interior slab-on-grade floor slabs and the recommended aggregate subbase course should consist of imported low volume change materials. As an alternative to imported low volume change materials, the upper 14 inches of the subgrade soils could be stabilized with the use of lime. A lime stabilization mix design should be conducted prior to construction.

Subgrade soils beneath pavements should be scarified, moisture conditioned and compacted to a minimum depth of 10 inches. The moisture content and compaction of subgrade soils should be maintained until pavement construction.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 6 inches, conditioned to near optimum moisture content, and compacted. Alternatively, exposed areas can be proof-

rolled provided compaction is met to a minimum depth of 6 inches. Exposed surfaces which will receive fill should be observed and approved by Terracon prior to placement of engineered fill. If the subgrade scarification and compaction and/or proof-rolling identify areas of continuously low density, loose, soft or otherwise unsuitable soils, then these (unsuitable) soils should be removed and replaced as engineered fill as directed by the project Geotechnical Engineer or their representative.

Exterior Slab Subgrade Preparation

Compacted subgrade consisting of the existing sandy lean clay and clayey sand surface soils will expand with increasing moisture content; therefore, exterior concrete slabs may heave, resulting in cracking or vertical offsets. The potential for damage would be greatest where exterior slabs are constructed adjacent to the building or other structural elements. To reduce the potential for damage caused by movement, we recommend the following:

- Placement of exterior slabs on a minimum of 14 inches of imported low volume change materials
- Strict moisture-density control during placement of subgrade fills;
- Placement of effective control joints on relatively close centers and isolation joints between slabs and other structural elements;
- Provision for adequate drainage in areas adjoining the slabs;
- Use of designs which allow vertical movement between the exterior slabs and adjoining structural elements.

Lime Stabilized Subgrade

Lime stabilized subgrade, if utilized on the project, should be treated in accordance with Section 309 of the MAG Standard Specification 2020 ([4]MAG, 2020). A lime stabilization mix design should be conducted prior to construction.

Fill Material Types

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than 4 inches in size. Pea gravel or other similar non-cementitious, poorly-graded

[4] Maricopa Association of Governments, 2020, **Uniform Standard Specifications and Details for Public Works Construction**, Arizona.

materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Clean on-site soils or approved imported materials may be used as fill material for the following:

Fill Type [1]	USCS Classification	Acceptable Location for Placement
On-Site Soils	CL, SC	The on-site sandy lean clay and clayey sand soils are considered suitable for use as engineered fill with the exception of within the upper 14 inches of finished subgrade beneath floor slabs and aggregate base course.
	SM	The on-site soils are considered suitable for use as engineered fill in all construction areas.
Low Volume Change: Imported Material	Varies	All locations and elevations

1. Controlled, compacted fill should consist of approved materials that are free of organic matter, debris, and oversized materials. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation.

Imported soils for use as fill material on the project should conform to low volume change materials as indicated in the following specifications.

Gradation	**Percent Finer by Weight (ASTM C 136)**
4"	100
No. 4 Sieve	50-100
No. 200 Sieve	15 (min) to 45 (max)

- Liquid Limit ..... 30 (max)
- Plasticity Index ..... 12 (max)
- Maximum expansive potential (%)* 1.5

*Measured on a sample compacted to approximately 95 percent of the ASTM D698 maximum dry density at about 3 percent below optimum water content. The sample is confined under a 100 psf surcharge and submerged/inundated.

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed 10 inches loose thickness.

Aggregate Base (and Subbase) Course should conform to the Maricopa Association of Governments (MAG) specifications or other equivalent and applicable local municipality specification.

Fill Placement and Compaction Requirements

Recommended compaction and moisture content criteria for engineered fill materials are as follows:

Material Type and Location	Per the Standard Proctor Test (ASTM D698)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction (referenced from optimum moisture content)	
		Minimum	Maximum
On-site soils:			
Beneath foundations	95	-2%	+2%
Beneath interior floor or exterior slabs at depths greater than 14 inches	95	At optimum	+3%
Beneath pavements	95	-2%	+2%
Approved imported low volume change soils:			
Beneath foundations	95	-3%	+3%
Beneath floor slabs	95	-2%	+2%
Beneath pavements	95	-2%	+2%
Aggregate base course (beneath concrete slabs)	95	-3%	+3%
Aggregate base course (beneath asphalt pavements)	100	-2%	+2%
Aggregate base course (beneath concrete pavements)	95	-3%	+3%
Miscellaneous backfill	95	-3%	+3%

1. The moisture content and compaction should be measured for each lift of engineered fill during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. The Standard Proctor is generally used and accepted as common practice locally, therefore, recommendations for compaction will be based on the Standard Proctor test.

Utility Trench Backfill

Utility trenches are a common source of water infiltration and migration. Utility trenches penetrating beneath the planned building should be effectively sealed to restrict water intrusion and flow through the trenches, which could migrate below the building. The trench should provide an effective trench plug that extends at least 5 feet from the face of the building exterior. The plug material should consist of cementitious flowable fill or low permeability clay. The trench plug material should be placed to surround the utility line. If used, the clay trench plug material should be placed and compacted to comply with the water content and compaction recommendations for engineered fill stated previously in this report.

Grading and Drainage

All grades must provide effective drainage away from the building and other structures during and after construction and should be maintained throughout the life of the development. Infiltration of water into utility trenches or foundation excavations should be prevented during construction. Water retained next to the building (or other structural elements) can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. Estimated movements described in this report are based on effective drainage for the life of the structure and cannot be relied upon if effective drainage is not maintained.

The roof on the building should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building. Sprinkler systems should not be installed within 5 feet of foundation walls. Landscaped irrigation adjacent to the foundation systems should be minimized or eliminated. Planters and other surface features which could retain water in areas adjacent to the building or pavements should be sealed or eliminated.

In areas where sidewalks or paving do not immediately adjoin the structure, we recommend that protective slopes be provided with a minimum grade of approximately five percent for at least 10 feet from perimeter walls. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment.

If unstable conditions exist or develop, workability may be improved by scarifying and drying. Over-excavation of wet zones and replacement with granular materials may be necessary. Use of lime, fly ash, cement, geotextiles or geogrid could also be considered as a stabilization technique. Laboratory evaluation is recommended to determine the effect of chemical stabilization on subgrade soils prior to construction. Lightweight excavation equipment may be required to reduce subgrade pumping.

Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations. The contractor should be aware that slope height, slope inclination, and excavation depth should in no instance exceed those specified by these safety regulations. Flatter slopes than those dictated by these regulations may be required depending upon the soil conditions encountered and other external factors. These regulations are strictly enforced and if they are not followed, the owner, contractor, and/or earthwork and utility subcontractor could be liable and subject to substantial penalties.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials such as vegetation, agricultural crops, topsoil, debris, and other

deleterious materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at the minimum frequencies outlined in the following table:

Building Footprint Square Footage	Minimum Number of Tests Per Lift or Minimum Frequency Per Lift, with the greater number of tests to govern
Less than 20,000	3 tests or 1 test every 5,000 square feet
20,000 to 50,000	4 tests or 1 test every 7,500 square feet

In pavement areas, each lift of fill should be tested for density and water content at the minimum frequencies of 1 test per lift for every 10,000 square feet of compacted fill. Where not specified by local ordinance, 1 density and water content test should be performed for every 100 linear feet of compacted utility trench backfill and a minimum of 1 test performed for every 12 vertical inches of compacted backfill. If the full-time earthwork observations are not being performed, the testing frequency should be increased.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Shallow Foundations

If the site has been prepared in accordance with the requirements noted in the **Earthwork** section of this report, the following design parameters are applicable for shallow foundations for the proposed project.

Shallow Spread Footing Design Parameters

Item	Description
Maximum Net Allowable Bearing Pressure [1, 2]	2,500 psf
Minimum Embedment below Finished Grade [3]	18 inches
Required Bearing Stratum	Compacted engineered fill placed within the geometric configurations and depths below footings as outlined in the **Earthwork** section of this report.
Minimum Foundation Dimensions	Isolated Column Footings: 24 inches Continuous Wall Footings: 18 inches
Ultimate Passive Resistance[4] **(equivalent fluid pressures)**	390 pcf
Sliding Resistance [5]	0.40
Estimated Total Settlement from Structural Loads [2]	Approximately 1 inch or less
Estimated Differential Settlement [2, 6]	About ¾ of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. The allowable bearing pressure may be increased by one-third when considering the alternative load combinations of Section 1605.3.2 of the 2018 International Building Code, however, it should not be increased when loads are determined by the basic allowable stress design load combinations of Section 1605.3.1.
2. Values provided are for maximum loads noted in **Project Description**. Additional geotechnical consultation will be necessary if higher loads are anticipated.
3. Finished grade is defined as the lowest adjacent grade within 5 feet of the foundation for perimeter (or exterior) footings and finished floor level for interior footings.
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face. The passive earth pressure does not include any factor of safety, assumes drained conditions, and is not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if such conditions are to be included in the design.
5. The coefficient of base sliding should be reduced to 0.30 when used in conjunction with passive pressure.
6. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

Footings and walls should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in walls is recommended.

Foundation Construction Considerations

As noted in **Earthwork** section of this report, the footing excavations should be evaluated under the observation of the Geotechnical Engineer or their representative. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required to be provided by the Geotechnical Engineer. If unsuitable bearing soils are observed at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations.

Floor Slabs

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed.

Floor Slab Design Parameters

Item	Description
Interior floor system	Slab-on-grade concrete.
Subbase	A minimum of 4 inches of compacted aggregate base course materials.
Floor Slab Support[1]	Because of the expansive characteristics of the on-site soils, the upper 14 inches of subgrade soils beneath interior slab-on-grade floor slabs and aggregate subbase should consist of low volume change materials and placed in accordance with the **Earthwork** section of this report. As an alternative to imported low volume change materials, the upper 14 inches of the subgrade soils could be stabilized with the use of lime. A lime stabilization mix design should be conducted prior to construction. Subgrade preparation of native soils (or engineered fill) should be in accordance with the **Earthwork** section of this report.
Estimated Modulus of Subgrade Reaction [2]	150 pounds per square inch per inch (psi/in) for point loads

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in the **Earthwork** section of this report, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

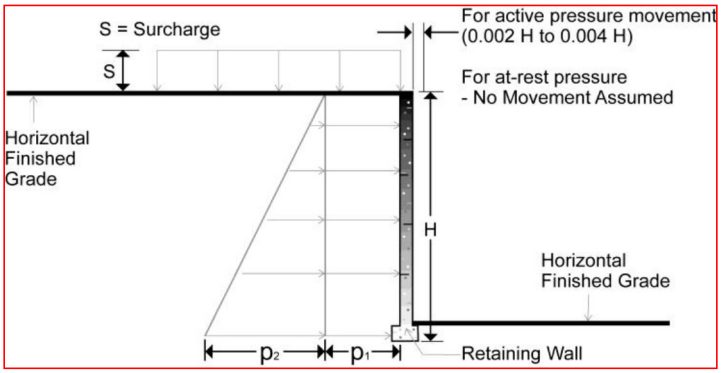
Some differential movement of a slab-on-grade floor system is possible should the subgrade soils become elevated in moisture content. Such movements are anticipated to be within general tolerance for normal slab-on-grade construction. To reduce potential slab movements, the subgrade soils should be prepared as outlined in the **Earthwork** section of this report.

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer or their representative should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

Lateral Earth Pressures

Structures with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to values indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction, and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown in the diagram below. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement and is commonly used for basement walls, loading dock walls, or other walls restrained at the top. The lateral earth pressure recommendations herein are applicable to the design of footings and rigid retaining walls subject to slight rotation, such as cantilever, or gravity type concrete walls.



Earth Pressure Condition [1]	Coefficient for Backfill Type [2]	Surcharge Pressure [3] p_1 (psf)	Equivalent Fluid Pressures, p_2 (psf) [2,4]	
			Unsaturated [5]	Submerged [5]
Active (Ka)	On-Site Soils – 0.32	(0.32)S	(40)H	(80)H
Passive (Kp)	On-Site Soils – 3.12	---	(390)H	(260)H
At-Rest (Ko)	On-Site Soils – 0.48	(0.48)S	(60)H	(95)H

1. For active earth pressure, wall must rotate about base, with top lateral movements 0.002 H to 0.004 H, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance. Clay or other expansive soils should not be used as backfill behind the wall.
2. Uniform, horizontal backfill, with a maximum unit weight of 125 pcf for on-site soils.
3. Uniform surcharge, where S is surcharge pressure.
4. Loading from heavy compaction equipment is not included.
5. The retaining wall should include adequate drainage in order to design the wall for "Unsaturated" conditions. Otherwise, "Submerged" conditions are recommended for the design.

The recommended design lateral earth pressures do not include a factor of safety, assume horizontal backfill, and do not provide for possible hydrostatic pressure on the walls (unless stated). Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For the granular values to be valid, the granular backfill must extend out and up from the base of the wall at an angle of at least 45 degrees from vertical for the active case.

Fill against foundations and retaining walls should be compacted to densities specified in the Earthwork section of this report. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors.

Pavements

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section of this report.

Support characteristics of subgrade for pavement design do not account for shrink/swell movements of an expansive clay subgrade, such as soils observed on this project. Thus, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade.

Pavement Design Parameters

The design of flexible pavements for the project was based on the procedures of the National Asphalt Pavement Association (NAPA). These design procedures are specific to low-volume (low traffic) pavements such as those that will be constructed at this site. Portland Cement Concrete (PCC) pavement thicknesses are based on the American Concrete Institute (ACI) design recommendations.

The design of the recommended pavement sections was based on the following NAPA and ACI criteria:

- NAPA Traffic Class I (ACI Category A) for automobile drives and parking areas includes a maximum of 7,000 Equivalent Single 18-kip Axle Loads (ESAL's) over the design life of the pavement (Light-Duty); Average Daily Truck Traffic (ADTT)=1

- NAPA Traffic Class II (ACI Category B) for main drives, light truck drives, and trash enclosures areas includes a maximum of 27,000 ESAL's over the design life of the pavement (Medium-Duty); Average Daily Truck Traffic (ADTT)=25
- A soil characterization of "poor" based on the subgrade soils encountered at the site and expected at pavement subgrade elevation
- A Modulus of Subgrade Reaction, *k*, of 150 pci based on the soil classification of subgrade soils
- A concrete modulus of rupture of 505 psi based on a concrete compressive strength of 4,000 psi; and,
- A pavement design life of 20 years.

Pavement Section Thicknesses

The following table provides the recommended minimum thicknesses for AC pavements:

Asphaltic Concrete Design

Layer	Thickness (inches)	
	Traffic Class I	Traffic Class II
AC [2]	3.0	3.5
Aggregate Base	5.0	6.0
Total	8.0	9.5

The following table provides the recommended minimum thicknesses for PCC pavements.

Portland Cement Concrete Design

Layer	Thickness (inches)	
	Traffic Category A	Traffic Category B
PCC	5.0	6.0
Aggregate Base	4.0	4.0
Total	9.0	10.0

These pavement sections are considered minimal sections based upon the expected traffic and the existing subgrade conditions. However, they are expected to function with periodic maintenance and overlays if good drainage is provided and maintained.

Design and Construction Considerations

Materials and construction of pavements for the project should be in accordance with the requirements and specifications of the Maricopa Association of Governments ([5]MAG, 2020). Base course or pavement materials should not be placed when the surface is wet. Surface drainage should be provided away from the edge of paved areas to reduce lateral moisture transmission into the subgrade.

All concrete for rigid pavements should have a minimum 28-day compressive strength of 4,000 psi (i.e. MAG AA or equivalent) and be placed with a maximum slump of 4 inches. Although not required for structural support, a minimum 4-inch thick base course layer is recommended to help reduce potential for slab curl, shrinkage cracking, and subgrade pumping through joints. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer. PCC pavement details for joint spacing, joint reinforcement, and joint sealing should be prepared in accordance with ACI 330 and ACI 325.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.

[5] Maricopa Association of Governments, 2020, **Uniform Standard Specifications and Details for Public Works Construction**, Arizona.

- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third

parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

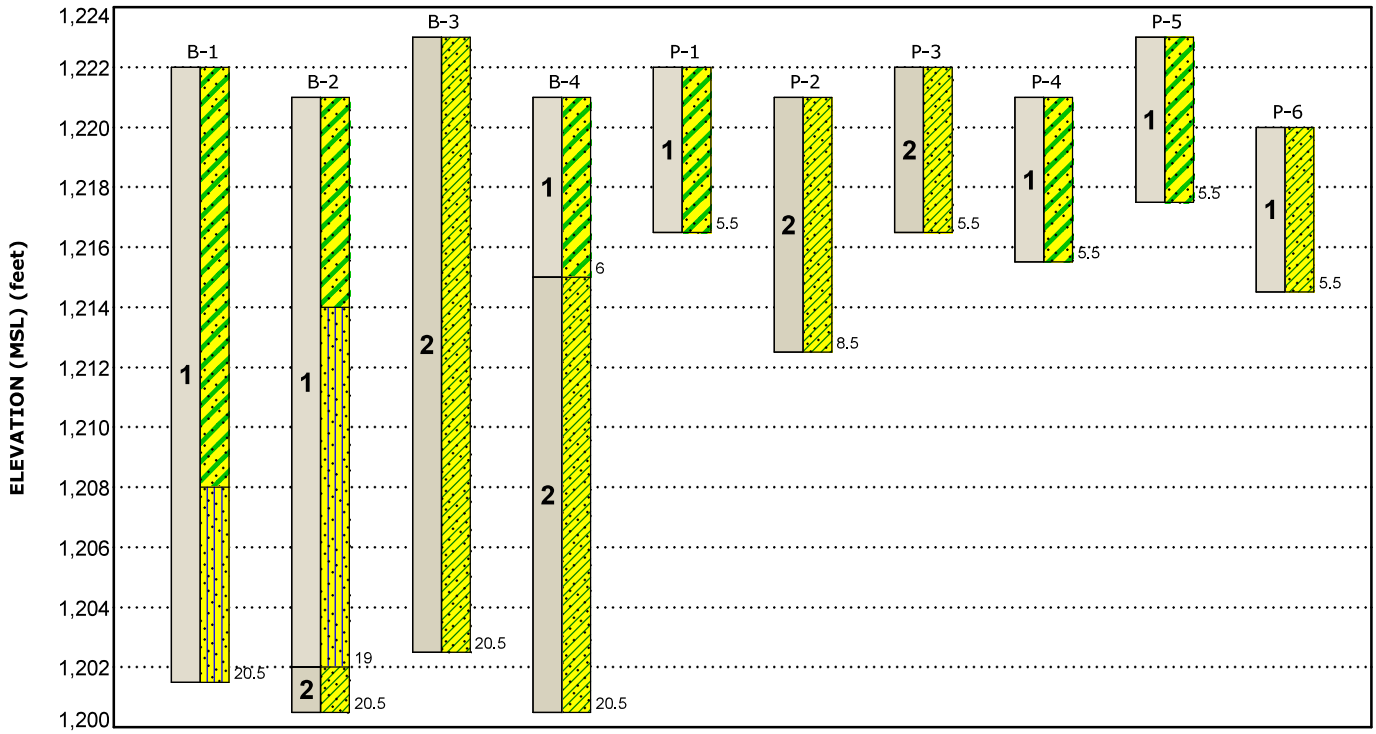
Figures

Contents:

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Sand	Loose to dense sand with variable amounts of clay and silt. Zones of weak cementation.
2	Clay	Medium stiff to hard sandy lean clay. Zones of weak cementation.

Legend

Clayey Sand
Silty Sand
Sandy Lean Clay

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

A total of 10 test borings were drilled at the project site on November 13, 2024. The approximate boring locations at the project site are shown on the **Exploration Plan**, and the location and depth of the borings are summarized in the following table:

Number of Borings	Boring ID Nos.	Approximate Boring Depth (feet)	Location
4	B-1 through B-4	20½	Proposed Building Footprint
6	P-1 through P-6	5½ to 8½	Proposed Pavement Areas

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (with estimated horizontal accuracy of about ±15 feet) and referencing existing site features. Approximate ground surface elevations were obtained using Google Earth Pro. If a more precise boring layout or elevations are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: The borings were advanced with a truck-mounted CME-75 drill rig utilizing 8-inch outside diameter hollow-stem augers. At selected intervals, samples of the subsurface materials were taken at each boring location by driving split-spoon (SPT) or ring-lined barrel samplers in general accordance with ASTM Standards. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. A 3-inch O.D. split-barrel sampling spoon with a 2.5-inch I.D. ring lined sampler was also used for sampling the soil borings. Ring-lined, split-barrel sampling procedures are similar to the standard split spoon sampling procedure; however, blow counts are typically recorded for 6-inch intervals for a total of 12 inches of penetration.

Bulk samples of subsurface materials were obtained from all the borings. Groundwater was not encountered during the field exploration. For safety purposes, the borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and

taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

Samples retrieved during the field exploration were classified in accordance with the Unified Soil Classification System (USCS) and taken to the laboratory for further observation by the project geotechnical engineer. At that time, the field descriptions were confirmed or modified as necessary, and an applicable laboratory testing program was formulated to determine the engineering properties of the subsurface materials.

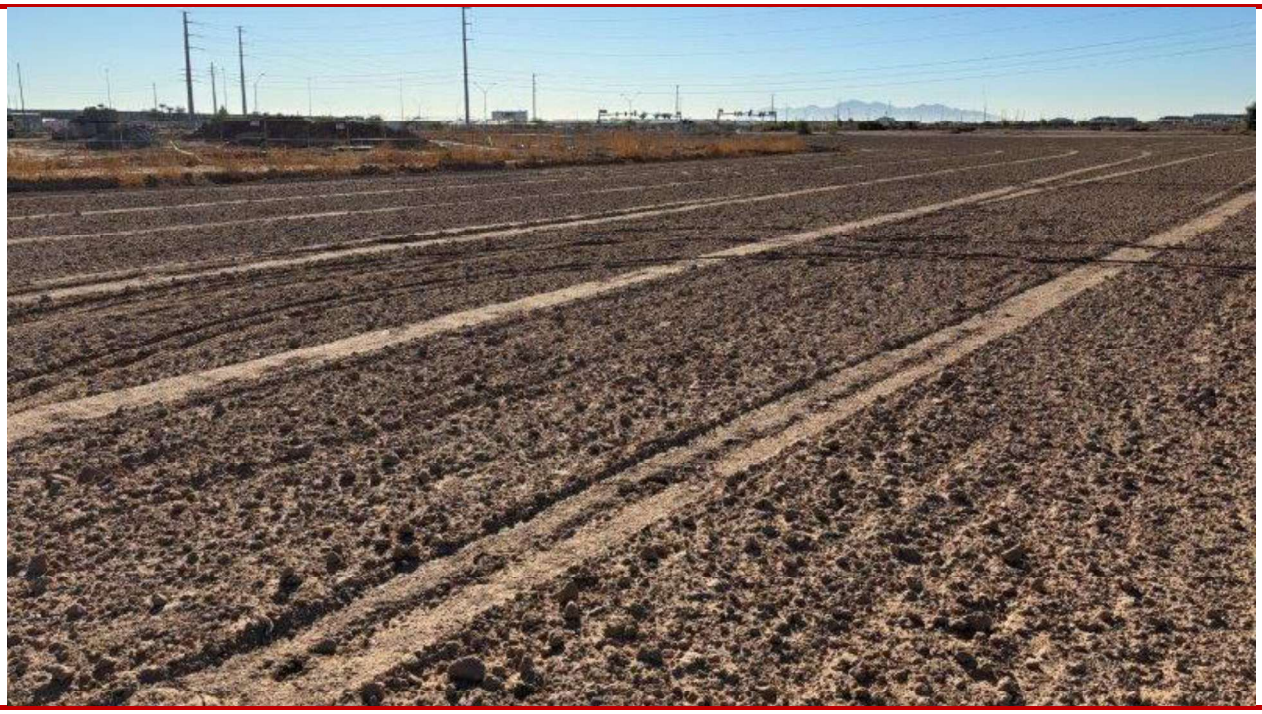
Laboratory tests were conducted on selected soil samples and the test results are presented in the **Exploration and Laboratory Results** section of this report. These results were used for the geotechnical engineering analyses, and the development of the geotechnical engineering recommendations presented in this report. Laboratory tests were performed in general accordance with the applicable ASTM, local, or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Moisture Content
- Dry Unit Weight
- Atterberg Limits
- Grain Size Analysis
- Laboratory Moisture-Density Relationships (Standard Proctor)
- One-Dimensional Consolidation
- Remolded Swell
- Soil Corrosivity (pH, Minimum Electrical Resistivity & Soluble Sulfate & Chloride)

Photography Log

At Pavement Boring P-3 Facing East



At Boring B-3 Facing Southeast

At Pavement Boring P-3 Facing East

At Boring B-1 Facing West

Site Location and Exploration Plans

Contents:

Site Location

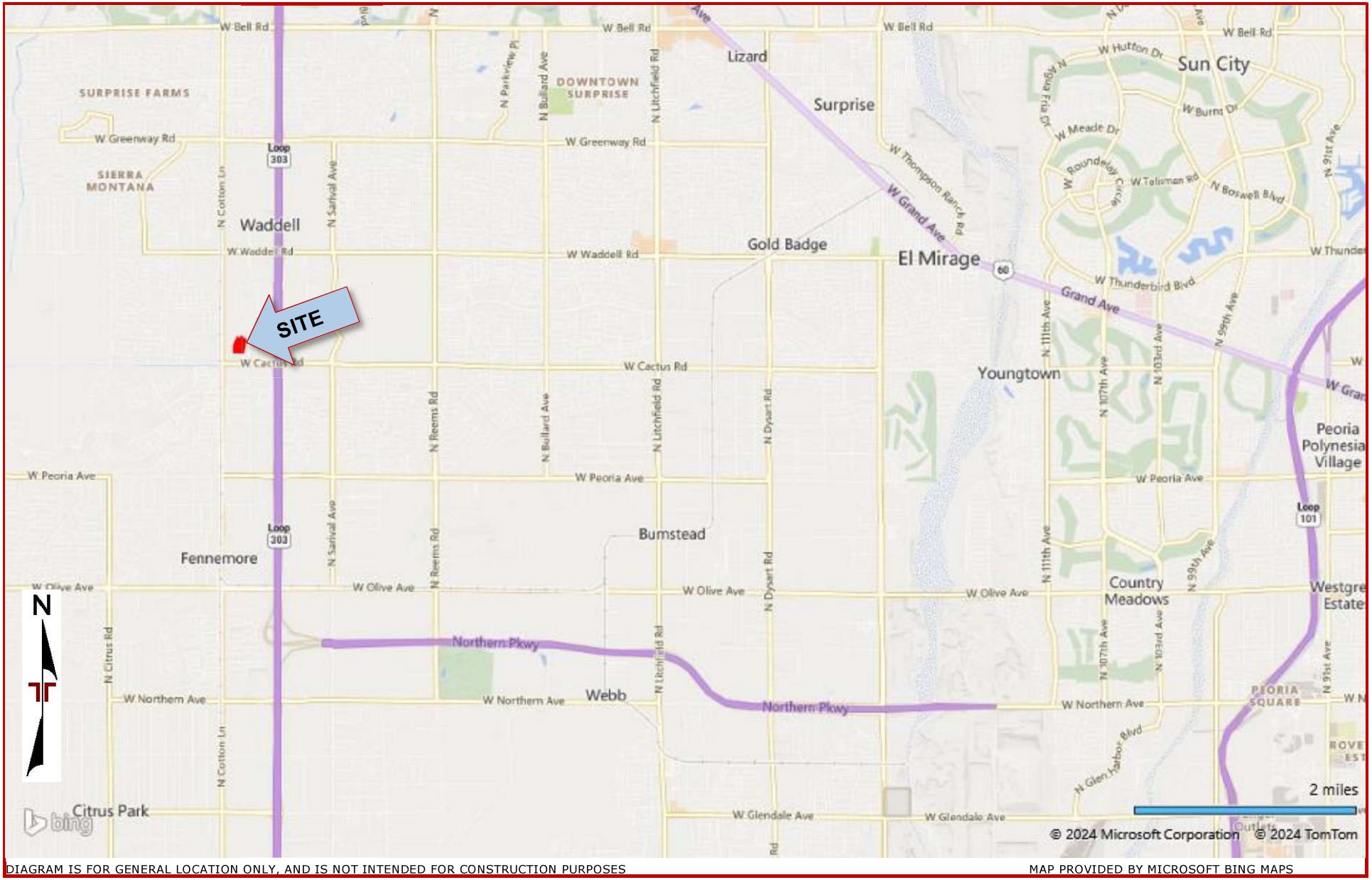


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Note: All attachments are one page unless noted above.

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. B-1

Location: See Exploration Plan

Latitude: 33.5981° Longitude: -112.4240°

Depth (Ft.) Elevation: 1222 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		0							
					3-6	6.3	99	30-15-15	44
					8-9	11.9	109		
		5			12-17	11.4	117		
		10			3-3-3 N=6				
		15			7-12-13 N=25				
		20			8-13-15 N=28				

CLAYEY SAND (SC), trace gravel, fine to coarse sand, fine gravel, medium plasticity, brown, loose

tan, medium dense

brown, stratified with sandy lean clay

low plasticity, reddish brown, loose

14.0 1208

SILTY SAND (SM), trace gravel, fine to coarse sand, fine gravel, nonplastic, reddish brown, medium dense

low plasticity, brown, stratified with silty clayey sand

20.5 1201.5

Boring Terminated at 20.5 Feet

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

Boring Started
11-13-2024

Boring Completed
11-13-2024

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. B-2

Location: See Exploration Plan

Latitude: 33.5981° Longitude: -112.4237°

Depth (Ft.) Elevation: 1221 (Ft.) +/-

Model Layer	Graphic Log		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**CLAYEY SAND (SC)**, trace gravel, fine to coarse sand, fine gravel, low plasticity, brown, medium dense								
						14-15	6.1	103		
		tan, dense, weak cementation	5			25-32	5.8	102		
		7.0 1214								
		SILTY SAND (SM), with gravel, fine to coarse sand, fine to coarse gravel, nonplastic, tan, medium dense				6-9	4.2	109		
		trace gravel, low plasticity, reddish brown, dense	10			16-22-25 N=47				
			15			10-14-20 N=34				
		19.0 1202								
2		**SANDY LEAN CLAY (CL)**, fine to medium sand, medium plasticity, brown, very stiff	20			7-12-14 N=26				
		20.5 1200.5								
		Boring Terminated at 20.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

Boring Started
11-13-2024

Boring Completed
11-13-2024

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. B-3

Location: See Exploration Plan

Latitude: 33.5976° Longitude: -112.4241°

Depth (Ft.) Elevation: 1223 (Ft.) +/-

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SANDY LEAN CLAY (CL)**, trace gravel, fine to coarse sand, fine gravel, medium plasticity, brown, medium stiff			5-5	13.1	100	32-17-15	58
		low plasticity, tan, stiff, weak cementation, stratified with clayey sand			9-14	11.5	108		
		medium plasticity, very stiff			14-20	15.8	100		
		fine to medium sand, weak cementation			7-9-12 N=21				
		brown, hard			7-13-19 N=32				
		very stiff, stratified with lean clay with sand			7-11-15 N=26				
		20.5 1202.5							
		Boring Terminated at 20.5 Feet							

5
10
15
20

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

Boring Started
11-13-2024

Boring Completed
11-13-2024

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. B-4

Location: See Exploration Plan

Latitude: 33.5975° Longitude: -112.4238°

Depth (Ft.) Elevation: 1221 (Ft.) +/-

Model Layer	Graphic Log		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**CLAYEY SAND (SC)**, fine to coarse sand, medium plasticity, brown, medium dense								
						12-11	7.4	103		
		tan, weak cementation				12-16	7.2	94		
		6.0 1215	5							
2		**SANDY LEAN CLAY (CL)**, fine to coarse sand, medium plasticity, tan, very stiff, weak cementation				19-26	14.3	107		
		brown, hard				9-15-17 N=32				
			10							
		fine to medium sand, very stiff				5-7-9 N=16				
			15							
		stratified with lean clay with sand, increase in plasticity				5-7-13 N=20				
		20.5 1200.5	20							
		Boring Terminated at 20.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

Boring Started
11-13-2024

Boring Completed
11-13-2024

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. P-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.5983° Longitude: -112.4242° Depth (Ft.) Elevation: 1222 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**CLAYEY SAND (SC)**, trace gravel, fine to coarse sand, fine gravel, medium plasticity, brown, loose				3-6	4.6	102		
		low plasticity, light brown, medium dense, weak cementation	5			9-9-9 N=18				
		5.5 1216.5 ***Boring Terminated at 5.5 Feet***								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

Boring Started
11-13-2024

Boring Completed
11-13-2024

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. P-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.5981° Longitude: -112.4236° Depth (Ft.) Elevation: 1221 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SANDY LEAN CLAY (CL)**, trace gravel, fine to coarse sand, fine gravel, medium plasticity, light brown, stiff				8-9	7.3	116	27-15-12	56
			5			6-10-17 N=27				
		reddish brown, medium stiff to stiff 8.5 1212.5				5-4-4 N=8				
		Boring Terminated at 8.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

Boring Started
11-13-2024

Boring Completed
11-13-2024

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. P-3

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.5978° Longitude: -112.4244° Depth (Ft.) Elevation: 1222 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
2		**SANDY LEAN CLAY (CL)**, trace gravel, fine to coarse sand, fine gravel, medium plasticity, brown, medium stiff				3-4	9.4	111	35-16-19	51
		light brown, stiff, weak cementation 5.5 1216.5	5			4-6-8 N=14				
		Boring Terminated at 5.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

Boring Started
11-13-2024

Boring Completed
11-13-2024

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. P-4

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.5975° Longitude: -112.4242° Depth (Ft.) Elevation: 1221 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**CLAYEY SAND (SC)**, fine to coarse sand, medium plasticity, brown, very loose				2-3	13.3	95		
		tan, medium dense, weak cementation	5			7-11-13 N=24				
		5.5 1215.5 ***Boring Terminated at 5.5 Feet***								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.
Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

Boring Started
11-13-2024

Boring Completed
11-13-2024

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. P-5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.5973° Longitude: -112.4245° Depth (Ft.) Elevation: 1223 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**CLAYEY SAND (SC)**, fine to coarse sand, medium plasticity, brown, loose				5-6	11.4	96		
		tan, medium dense 5.5 1217.5	5			7-10-14 N=24				
		Boring Terminated at 5.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

Boring Started
11-13-2024

Boring Completed
11-13-2024

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Boring Log No. P-6

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.5972° Longitude: -112.4239° Depth (Ft.) Elevation: 1220 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**SANDY LEAN CLAY (CL)**, trace gravel, fine to coarse sand, fine gravel, medium plasticity, brown, medium stiff								
						2-4	12.7	104	34-13-21	60
		medium plasticity, tan, very stiff	5			7-9-11 N=20				
		5.5 1214.5								
		Boring Terminated at 5.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Reference: Elevations obtained froom Google Earth Pro

Water Level Observations
Groundwater not encountered

Drill Rig
CME 75

Hammer Type
Automatic

Driller
RCS

Notes

Advancement Method
8" O.D. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
B. Elliott

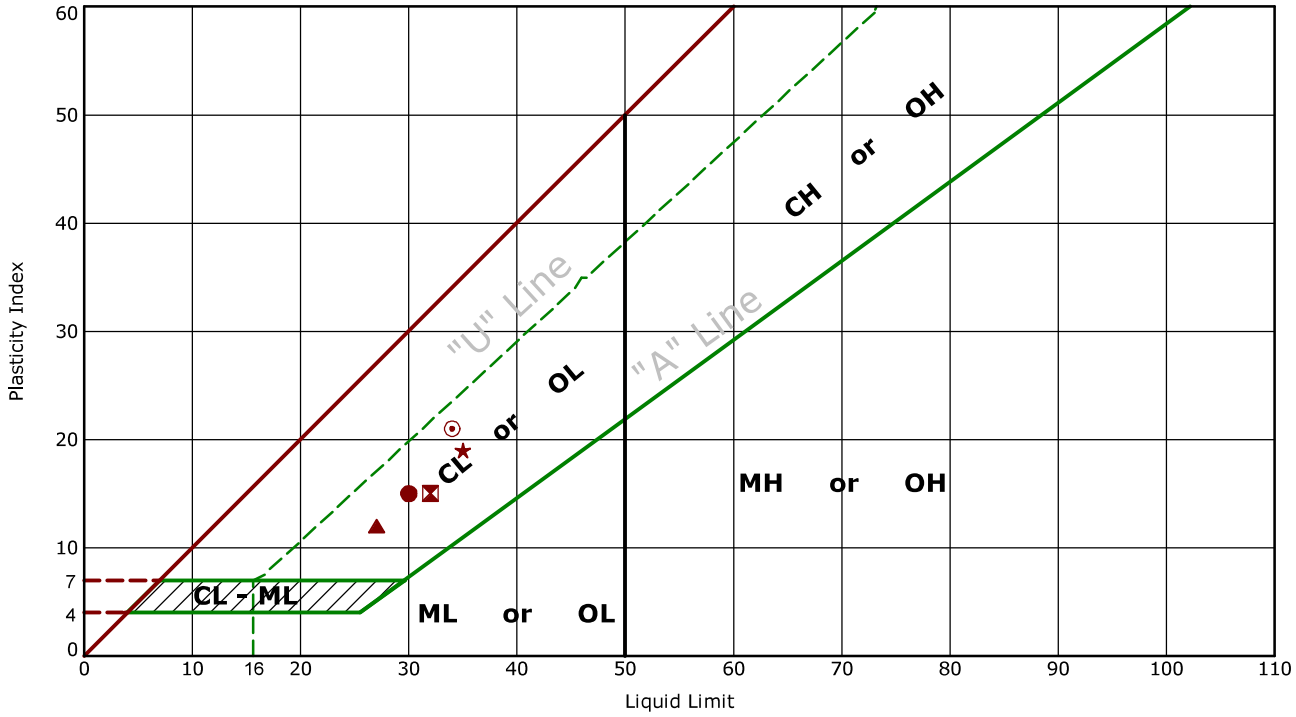
Boring Started
11-13-2024

Boring Completed
11-13-2024

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Atterberg Limit Results

ASTM D4318



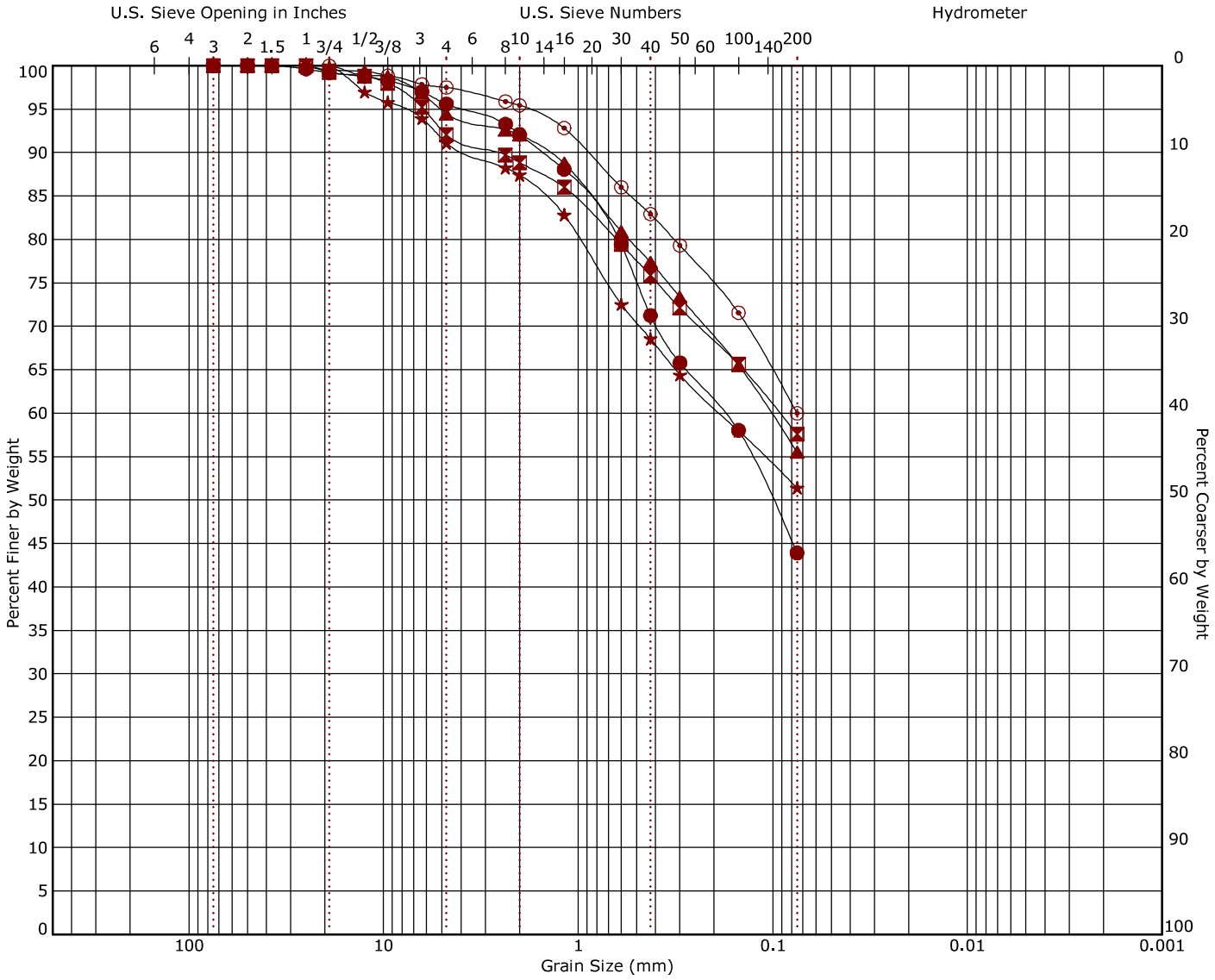
	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-1	0 - 4	30	15	15	43.9	SC	CLAYEY SAND
⊠	B-3	0 - 4	32	17	15	57.6	CL	SANDY LEAN CLAY
▲	P-2	0 - 4	27	15	12	55.5	CL	SANDY LEAN CLAY
★	P-3	0 - 4	35	16	19	51.4	CL	SANDY LEAN CLAY
⊙	P-6	1 - 2	34	13	21	60.0	CL	SANDY LEAN CLAY

Proposed Crash Champions - Surprise, AZ
303 Autoshow Avenue | Surprise, Arizona
Terracon Project No. CP245069

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

Grain Size Distribution

ASTM D422 / ASTM C136 / AASHTO T27



Cobbles	Gravel		Sand			Silt or Clay
	coarse	fine	coarse	medium	fine	

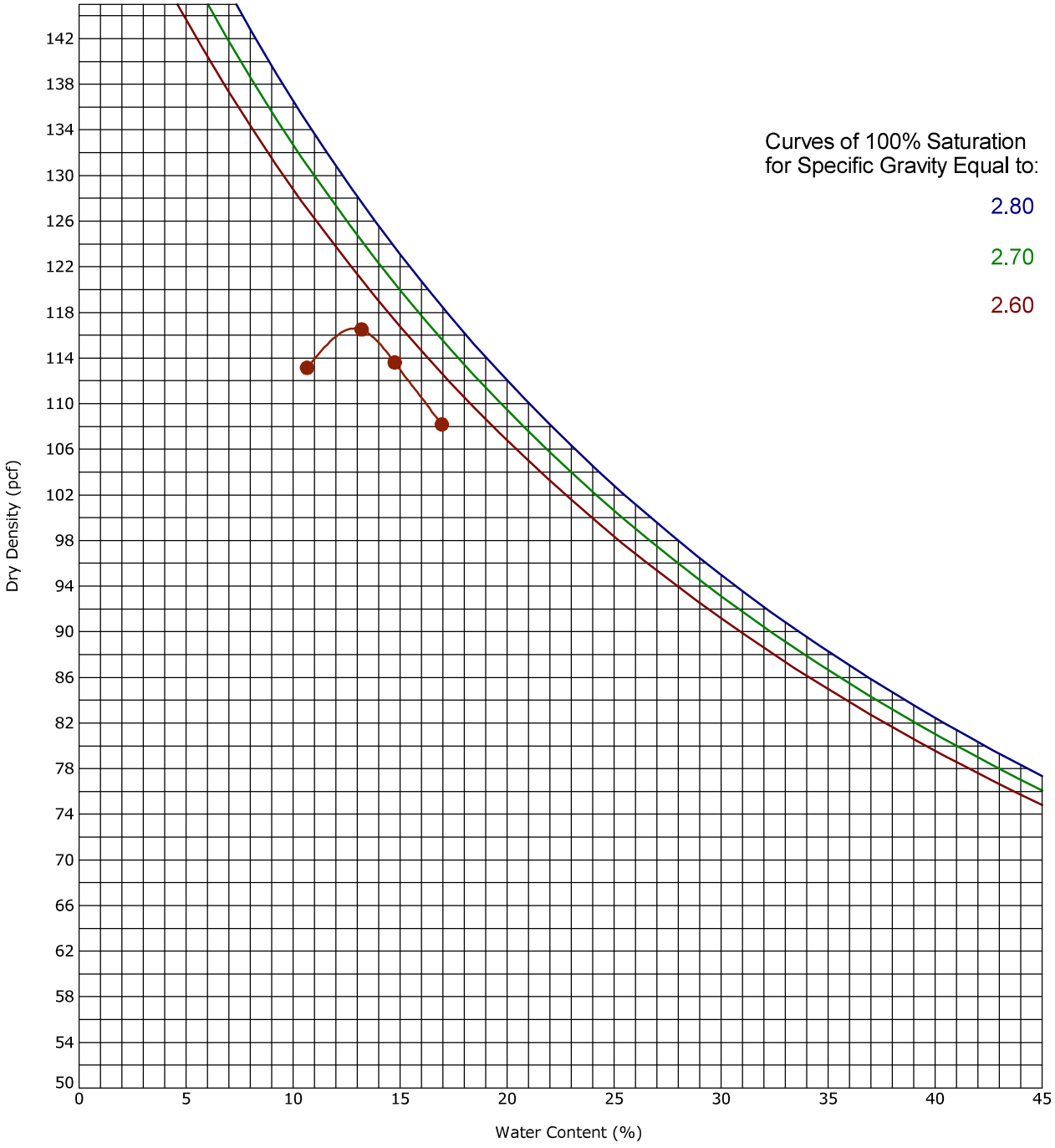
Boring ID		Depth (Ft)	Description	USCS	LL	PL	PI	Cc	Cu
●	B-1	0 - 4	CLAYEY SAND	SC	30	15	15		
⊠	B-3	0 - 4	SANDY LEAN CLAY	CL	32	17	15		
▲	P-2	0 - 4	SANDY LEAN CLAY	CL	27	15	12		
★	P-3	0 - 4	SANDY LEAN CLAY	CL	35	16	19		
⊙	P-6	1 - 2	SANDY LEAN CLAY	CL	34	13	21		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay
●	B-1	0 - 4	75	0.179			0.0	4.4	51.7	43.9		
⊠	B-3	0 - 4	75	0.092			0.0	7.9	34.5	57.6		
▲	P-2	0 - 4	75	0.102			0.0	5.5	38.9	55.5		
★	P-3	0 - 4	75	0.186			0.0	8.9	39.7	51.4		
⊙	P-6	1 - 2	75	0.075			0.0	2.5	37.5	60.0		

1050 N Fairway Dr Ste G103
Avondale, AZ

Moisture-Density Relationship

ASTM D698-Method A



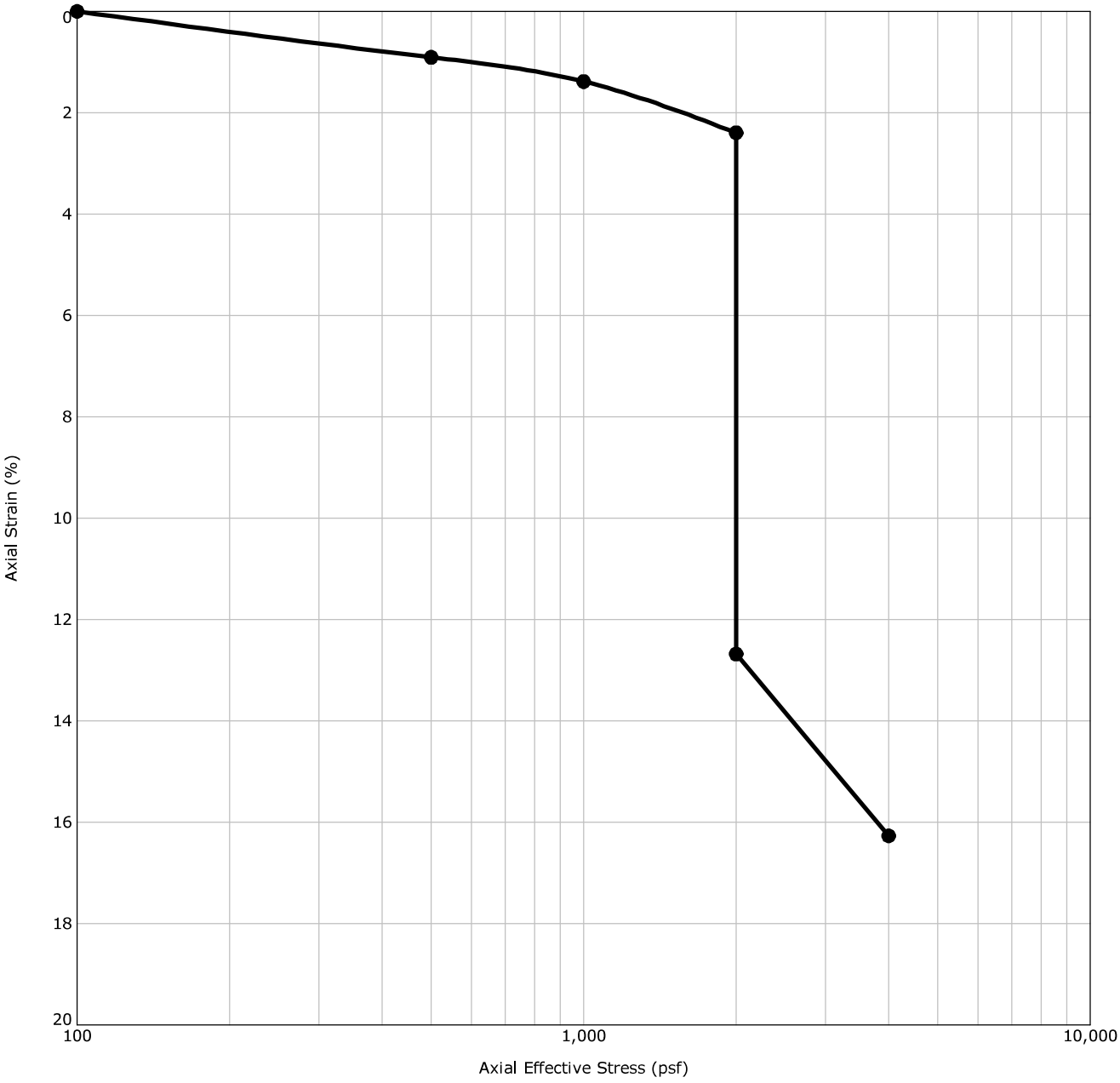
Boring ID	Depth (Ft)	Description of Materials
B-3	0 - 4	SANDY LEAN CLAY(CL)

Fines (%)	Fraction >4.75 mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
58	7.9	32	17	15	ASTM D698-Method A	116.6	12.9

1050 N Fairway Dr Ste G103
Avondale, AZ

One-Dimensional Consolidation Test

ASTM D2435



Boring ID	Depth (Ft)	Specimen #	Material Description	USCS	AASHTO
B-1	1 - 2		Clayey Sand	SC	

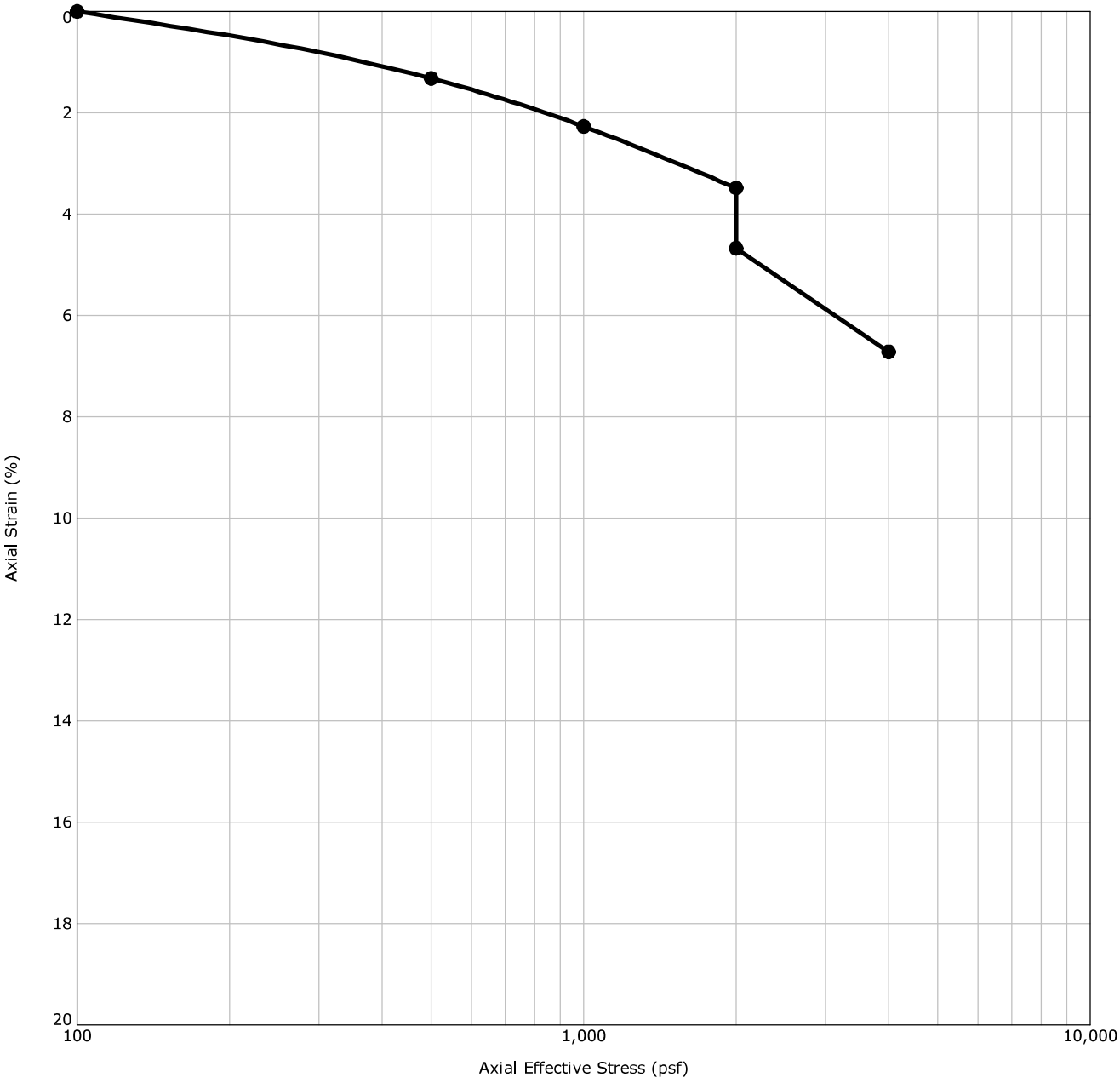
Natural		Initial Dry Density (pcf)	LL	PI	Specific Gravity	Overburden (psf)	P_c (psf)	C_c (% / log stress)	C_r (% / log stress)	Initial Void Ratio
Saturation (%)	Moisture (%)									
	7.8	94.7								

Notes: Water added at 2,000 psf.

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ

One-Dimensional Consolidation Test

ASTM D2435



Boring ID	Depth (Ft)	Specimen #	Material Description	USCS	AASHTO
B-1	3 - 4		Clayey Sand	SC	

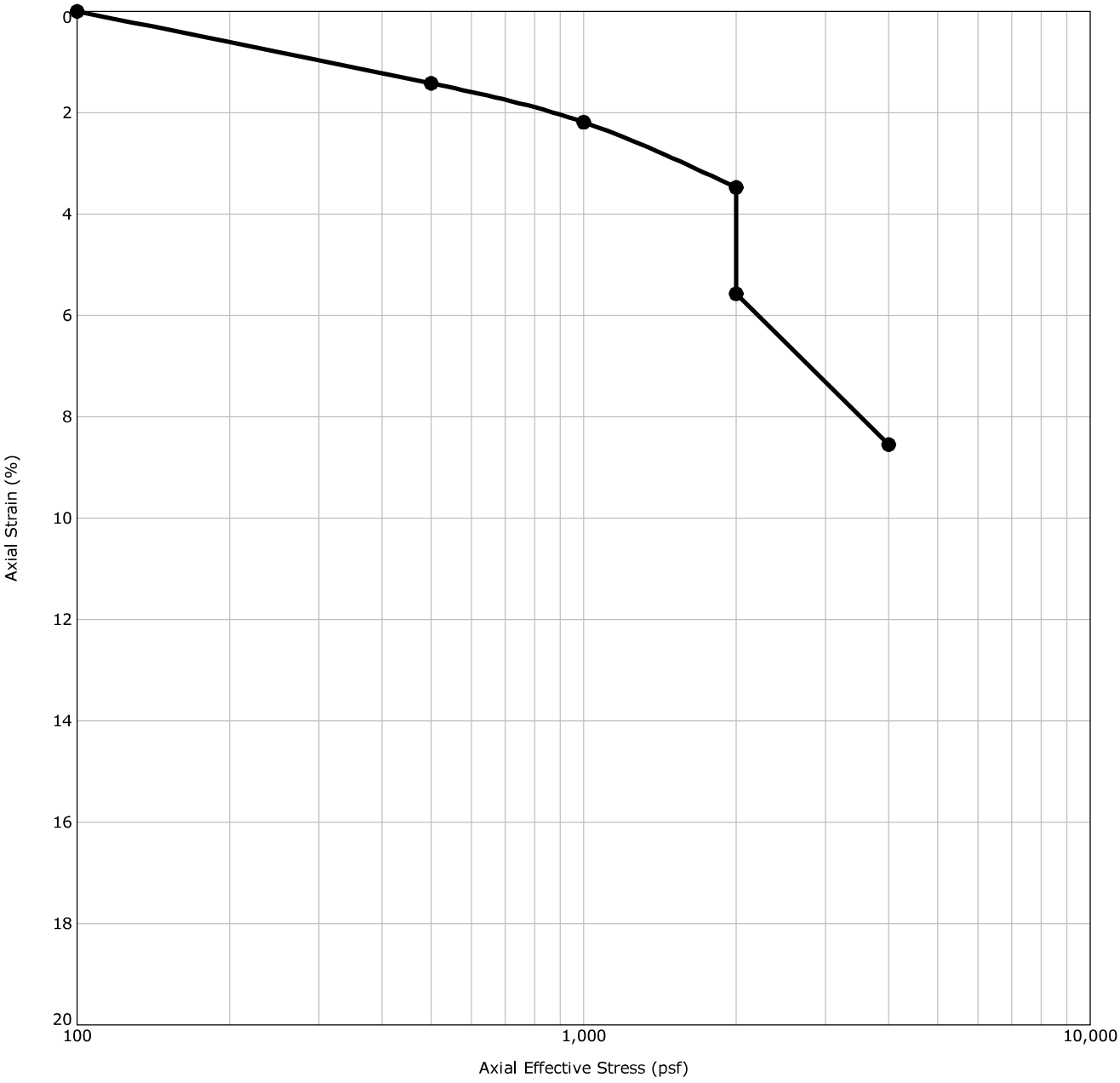
Natural		Initial Dry Density (pcf)	LL	PI	Specific Gravity	Overburden (psf)	P_c (psf)	C_c (% / log stress)	C_r (% / log stress)	Initial Void Ratio
Saturation (%)	Moisture (%)									
	12.6	101.8								

Notes: Water added at 2,000 psf.

1050 N Fairway Dr Ste G103
Avondale, AZ

One-Dimensional Consolidation Test

ASTM D2435



Boring ID	Depth (Ft)	Specimen #	Material Description	USCS	AASHTO
B-3	2 - 3		Sandy Lean Clay	CL	

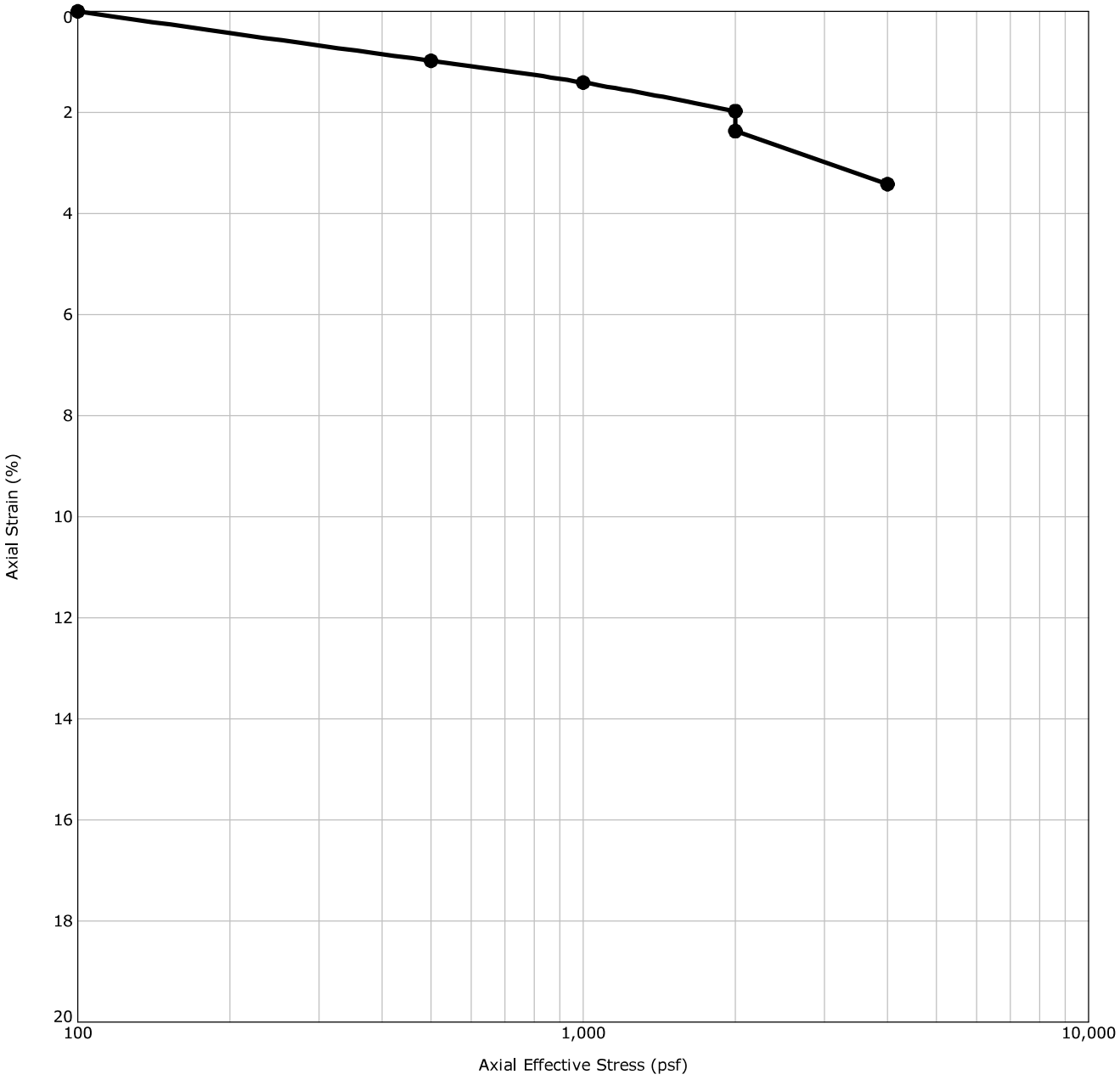
Natural		Initial Dry Density (pcf)	LL	PI	Specific Gravity	Overburden (psf)	P_c (psf)	C_c (% / log stress)	C_r (% / log stress)	Initial Void Ratio
Saturation (%)	Moisture (%)									
	13.4	99.6								

Notes: Water added at 2,000 psf.

1050 N Fairway Dr Ste G103
Avondale, AZ

One-Dimensional Consolidation Test

ASTM D2435



Boring ID	Depth (Ft)	Specimen #	Material Description	USCS	AASHTO
B-3	4 - 5		Sandy Lean Clay	CL	

Natural		Initial Dry Density (pcf)	LL	PI	Specific Gravity	Overburden (psf)	P_c (psf)	C_c (% / log stress)	C_r (% / log stress)	Initial Void Ratio
Saturation (%)	Moisture (%)									
	11.8	102.0								

Notes: Water added at 2,000 psf.

SUMMARY OF LABORATORY RESULTS

Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity				Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	Atterberg Limits			Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI_{50}	pH	Resistivity (ohm-cm)	Sulfates (mg/kg)	Chlorides (mg/kg)	
						LL	PL	PI										
B-1	0.0 - 4.0	SC			44	30	15	15										
B-1	1.0 - 2.0	SC	99	6														1, 2
B-1	3.0 - 4.0	SC	109	12														1, 2
B-1	6.0 - 7.0	SC	117	11														1, 2
B-2	2.0 - 3.0	SC	103	6														1, 2
B-2	4.0 - 5.0	SC	102	6														1, 2
B-2	7.0 - 8.0	SM	109	4														1, 2
B-3	0.0 - 4.0	CL			58	32	17	15	111	9.9	100	2.8		8.2	1678	124	106	
B-3	2.0 - 3.0	CL	100	13														1, 2
B-3	4.0 - 5.0	CL	108	12														1, 2
B-3	7.0 - 8.0	CL	100	16														1, 2
B-4	1.0 - 2.0	SC	103	7														1, 2
B-4	3.0 - 4.0	SC	94	7														1, 2
B-4	6.0 - 7.0	CL	107	14														1, 2
P-1	1.0 - 2.0	SC	102	5														1, 2
P-2	0.0 - 4.0	CL			56	27	15	12										
P-2	1.0 - 2.0	CL	116	7														1, 2
P-3	0.0 - 4.0	CL			51	35	16	19										
P-3	1.0 - 2.0	CL	111	9														1, 2
P-4	1.0 - 2.0	SC	95	13														1, 2
P-5	1.0 - 2.0	SC	96	11														1, 2
P-6	1.0 - 2.0	CL	104	13	60	34	13	21										1

REMARKS

1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
2. Visual Classification.
3. Submerged to approximate saturation.
4. Expansion Index in accordance with ASTM D4829-95.
5. Air-Dried Sample

PROJECT: Proposed Crash Champions - Surprise, AZ

SITE: 303 Autoshow Avenue
Surprise, Arizona

Terracon
1050 N Fairway Dr Ste G103
Avondale, AZ
PH. 480-897-8200

PROJECT NUMBER: CP245069

CLIENT: LRG Investors LLC
Ponte Vedra Beach, FL

Supporting Information

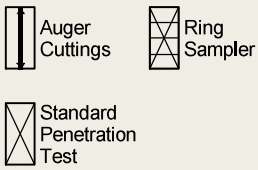
Contents:

Note: All attachments are one page unless noted above.

Terracon
4685 S Ash Ave, Ste H-4
Tempe, AZ

General Notes

Sampling



Water Level

- Water Initially Encountered
- Water Level After a Specified Period of Time
- Water Level After a Specified Period of Time
- Cave In Encountered

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

Field Tests

N	Standard Penetration Test Resistance (Blows/Ft.)
(HP)	Hand Penetrometer
(T)	Torvane
(DCP)	Dynamic Cone Penetrometer
UC	Unconfined Compressive Strength
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils
(More than 50% retained on No. 200 sieve.)
Density determined by Standard Penetration Resistance

Relative Density	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)
Very Loose	0 - 3	0 - 5
Loose	4 - 9	6 - 14
Medium Dense	10 - 29	15 - 44
Dense	30 - 50	45 - 75
Very Dense	> 50	> 75

Consistency of Fine-Grained Soils
(50% or more passing the No. 200 sieve.)
Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance

Consistency	Unconfined Compressive Strength Qu (psf)	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)
Very Soft	less than 500	0 - 1	< 3
Soft	500 to 1,000	2 - 4	3 - 6
Medium Stiff	1,000 to 2,000	4 - 8	7 - 12
Stiff	2,000 to 4,000	8 - 15	13 - 23
Very Stiff	4,000 to 8,000	15 - 30	24 - 45
Hard	> 8,000	> 30	> 45

Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.