Cactus Flower Solar, LLC
Hydrologic & Hydraulic Assessment
-
Completed for:
Cactus Flower Solar, LLC

Completed By:



Sierra Overhead Analytics, Inc.
PO Box 1716, Twain Harte, CA 95393
Phone: +1.415.413.7558

Sierra Overhead Analytics, Inc.
PO Box 1716, Twain Harte, CA 95393
Phone: +1.415.413.7558

Introduction

On behalf of Cactus Flower Solar, LLC, Sierra Overhead Analytics, Inc. (SOA) has prepared this hydrology and hydraulics report (report) for the Cactus Flower Solar, LLC Project, located in Pinal County, near Eloy, Arizona. The approximate center point of the project is located at: 32.623° N, -111.581° W. This report summarizes the results of the hydrology study which was performed to assess peak flows and flood risk across the project site. A two-dimensional (2D) hydraulic model developed in HEC-RAS was used to assess on-site depth and velocity during a 100-year 24-hour recurrence interval storm event.

Executive Summary

The results of SOA's model showed a slight deviation from FEMA's historical floodplain delineation. This discrepancy may be attributed to the different methodologies used. While FEMA likely only utilized a flow hydrograph for Greene Canal, SOA's model incorporated both an external flow hydrograph boundary condition and an internal precipitation boundary condition. Additionally, there is uncertainty about the peak flowrate used by FEMA for the 100-year storm delineation. SOA employed USGS StreamStats and local gaging stations to estimate the peak flowrate, which exceeded the highest readings on local gaging stations. Given the size and complexity of the influencing watersheds for the project, SOA believes its peak influent estimates represent the best available data.

In the analysis of the 100-year 24-hour storm event, the total precipitation depth was 3.81 inches, with 1.76 inches infiltrating and 2.29 inches resulting in runoff. The infiltration rates varied between 0 and 3.56 inches per hour. General depths and velocities on site were less than 0.5 foot depth and 0.5 feet per second, respectively. General depths and velocities around the gen-tie line were less than 2.0 foot depth, and 2.0 feet per second, respectively.

Site Data

Topography and Drainage

SOA utilized site specific topo data tied with Arizona State 2017 photogrammetry point cloud data for the region. The site area is fairly flat, with a general slope of 0.01 ft/ft from west to east. Several man-made ditches drain the site area, and water flows from the site towards Greene Canal, south of the site. Greene Canal flows west to its confluence with Greene Wash. The site falls in FEMA Zones A (1 percent annual chance flood hazard, no base flood elevations determined)and X (0.2 percent annual chance flood hazard), and it is partially within the 100-year floodplain. The surrounding areas are also classified as Zone A and X. Flood zones are shown in Appendix A, Figure 1.

Site Soils and Land Use

Soils data was downloaded from United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) SSURGO database. The majority of the soils on site are classified as hydrologic soil group C, which is characterized by low infiltration rates. Some site soils are classified as hydrologic soil groups A and B, which are characterized by high and moderate infiltration rates, respectively. Hydrologic soil types are shown in Appendix A, Figure 2. The NRCS Soil Survey map and report is included in Appendix B. According to ANS Geo's geotechnical report from May 2, 2024,

observed subsurface conditions are a combination of sandy lean clay, sandy silty clay, and silty clayey sand.

The USGS National Land Cover Database (NLCD) was used to determine land use for the 2D model domains. The modeled areas are mostly classified as Cultivated Crops.

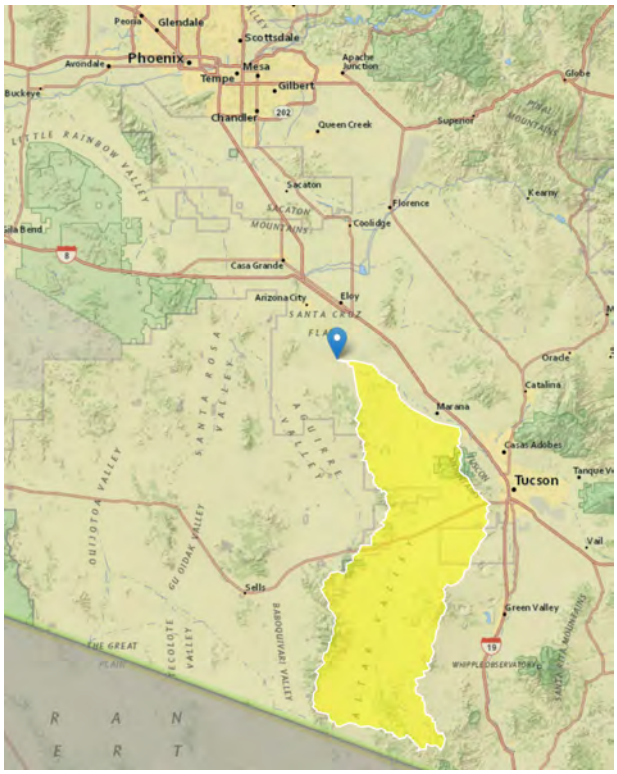
Precipitation

NOAA Atlas 14 publicly available rainfall data was used to determine precipitation depths for the 100-year 24-hour storm event in the center of the 2D model area. The 100-year 24-hour precipitation depth was found to be 3.81 inches. This precipitation amount was temporally distributed through use of the Type-II, 24-hour storm.

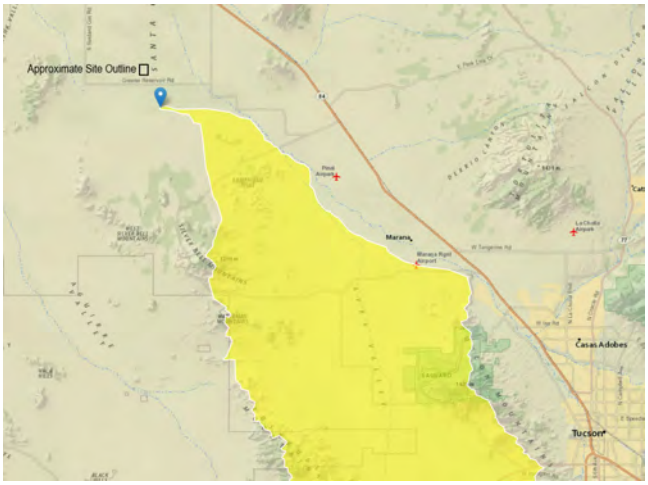
Model Setup

2D Hydraulic Modeling

HEC-RAS was used to develop a 2D hydraulic model for the 100-year storm event to model maximum depths and velocities across the site. The United States Geological Survey (USGS) StreamStats Application was used to delineate the watershed (yellow area) that drains to a pour point (blue marker) in Greene Canal near the southeast corner of the site (black box), as seen in the images below.



The pour point shown in the images above was chosen because it provides the best approximation of the area contributing flow with the potential to affect the site. To represent the flow-contributing



watershed, the 100-year storm peak flow, 35,500 cfs, was used in the model as an external boundary condition. Additional information about the watershed delineation parameters and outputs are in the StreamStats report, which is included in Appendix B. The model area was drawn based on the StreamStats watershed output and the FEMA Zone A area. For the larger 2D model domain, grid cells of approximately 200 feet by 200 feet were used. For the site outline, a refinement region with grid cells of approximately 25 feet by 25 feet were used. Breaklines with grid cells of 15 feet by 15 feet were used for in the canals and ditches. Topography was interpolated to the grid cells based on the photogrammetry data. A land use layer and soil layer were developed using the data described above, and they were combined to form an infiltration layer. Each land use was associated with a Manning's n value as shown in Table 1.

Table 1: *Land Cover Types and Associated Manning's n Values*

Land Cover	Manning's n
Cultivated Crops	0.05
Developed, Open Space	0.035
Developed, Low Intensity	0.08
Pasture/Hay	0.045
Mixed Forest	0.12
Shrub/Scrub	0.05
Woody Wetlands	0.07
Open Water	0.035
Emergent Herbaceous Wetlands	0.045
Barren Land Rock/Sand/Clay	0.03
Developed, Medium Intensity	0.12
Grassland/Herbaceous	0.04
Deciduous Forest	0.1
Evergreen Forest	0.15
Developed, High Intensity	0.15

Hydrologic soil group data was combined with land use data to assign a curve number (CN) to each

land use/hydrologic soil group combination, as shown in Table 2. These CN values were used in the infiltration layer. The average CN for the model domain was 85.6. All cells were assigned an initial abstraction value of 0.2.

Table 2: *Curve Numbers*

Land Use	CN Soil Type A	CN Soil Type B	CN Soil Type C	CN Soil Type D
Open Water	100	100	100	100
Perennial Ice-Snow	40	40	40	40
Developed, Open Space	49	69	79	84
Developed, Low Intensity	77	86	91	94
Developed, Medium Intensity	89	92	94	95
Developed, High Intensity	98	98	98	98
Barren Land Rock-Sand-Clay	77	86	91	94
Deciduous Forest	32	48	57	63
Evergreen Forest	39	58	73	80
Mixed Forest	46	60	68	74
Shrub-Scrub	49	68	79	84
Grassland-Herbaceous	64	71	81	89
Pasture-Hay	49	69	79	84
Cultivated Crops	71	80	87	90
Woody Wetlands	88	89	90	91
Emergent Herbaceous Wetlands	89	90	91	92

The 100-year 24-hour precipitation event was simulated as spatially constant across the 2D model domain using an internal precipitation boundary condition. Infiltration was modeled using the SCS Curve Number method. The edges of the model domain were used as an external boundary condition of normal depth where friction slope = 0.002 to 0.003.

Two-dimensional unsteady flow routing was performed in HEC-RAS using the Diffusion Wave Equations, as described in the HEC-RAS Hydraulic Reference Manual. Model stability was maintained through variable timestepping dictated by maximal and minimal Courant numbers where the Courant number (C) is equal to:

$$C = \frac{V \cdot \Delta T}{\Delta X} \tag{1}$$

V is the flood wave velocity, ΔT is the computational time step, ΔX is the average computational grid cell size. The maximum Courant number was set to 0.85 and the minimum was set to 0.35. The cell size of the computational grid dictated a moderate timestep, on average around 8 seconds.

Results

2D Hydraulic Model Results

Of the total 100-year 24-hour storm precipitation depth of 3.81 inches, on average, 1.76 inches infiltrated and 2.29 inches was runoff. Modeled minimum infiltration rates ranged from 0 to 3.56 inches per hour, as shown in Appendix A, Figure 4. HEC-RAS outputs for maximum depth, velocity, and

scour are shown in Appendix A Figures 5 through 7 (site boundary) and 8 through 10 (site boundary and Gen-Tie Line).

Scour depth was calculated using the methods of Chapter 7 of the HEC-18 Scour Manual. K1, K2, and K3 were calculated to be 1.1, 1.3, and 1.1 respectively, and a box pile of dimensions a=1/2' and L=1/3' were used. For simplicity, the angle of attack was assumed to be zero for all piles. The proper excerpt pages are included in Appendix B.

For the 100-year 24-hour storm event, on-site flow depths reached about 12.5 feet in a large depression in the site's southwest corner but were generally less than 0.5 feet. On-site flow velocities reached approximately 6.5 ft/s in same large depression where depths were highest but were, on average, less than 0.5 feet per second. The highest on-site scour depth, approximately 1.6 feet, occurred in the large depression where velocity was highest but were generally less than 0.5 feet.

During the 100-year 24-hour storm event, the highest depth along the path of the Gen-tie line, approximately 7.5 feet occurred in the ditch that runs east to west approximately 1 mile west of the site. Generally, depths along the Gen-tie line's path were less than 2 feet. The highest velocity along the Gen-Tie line's path, approximately 6.5 feet per second, occurred in the same ditch where depths were highest, approximately 2 miles west of the site. On average, velocities near the Gen-tie line were less than 2 feet per second. The highest scour depth along the Gen-tie's path, approximately 1.8 feet, occurred where velocity was highest. Generally, scour depths were less than 1 foot.

The results of SOA's model deviated slightly from the historical FEMA floodplain delineation. Although the exact reasoning for the deviation is unclear due to lack of knowledge about the data used by FEMA, FEMA likely only used a flow hydrograph for Greene Canal, whereas our model incorporated both an external flow hydrograph boundary condition and an internal precipitation boundary condition. Additionally, we do not know the peak flowrate FEMA used for delineating the 100-year storm. SOA used USGS StreamStats and applicable gaging stations to try and accurately delineate the 100-year flood event. The peak flowrate used in the model exceeded the highest readings seen on local gaging stations. Given the size and complexity of the influencing watersheds for the project, we feel, at this time, our peak influent estimates represent the best available data.

Stormwater Management

The site is not within the County's designated MS4 area. General stormwater management processes still apply and are briefly summarized below. Pinal County and the Arizona Department of Environmental Quality (ADEQ) can provide more specific guidance.

Before filing a Notice of Intent (NOI) with ADEQ, develop and implement a Stormwater Pollution Prevention Plan (SWPPP) for every construction activity within the urbanized unincorporated areas of the county as described by the Pinal County Stormwater Management Ordinance (SMO). Complete Pinal County's construction site approval process and submit a pre-construction and construction phase site plan, as detailed in Section 6.10 of the SMO.

During construction, allow the Pinal County Public Works Department ready access to all parts of the premises to perform compliance monitoring, and adhere to construction and operation responsibilities as outlined in Chapter 11.35 of the SMO. Ensure that erosion control measures conform with BMPs as defined by EPA, ADEQ, Pinal County Drainage Manual, or a locally approved method. All structures, panels, and electrical equipment must be protected from the 100-year flood event with minimum

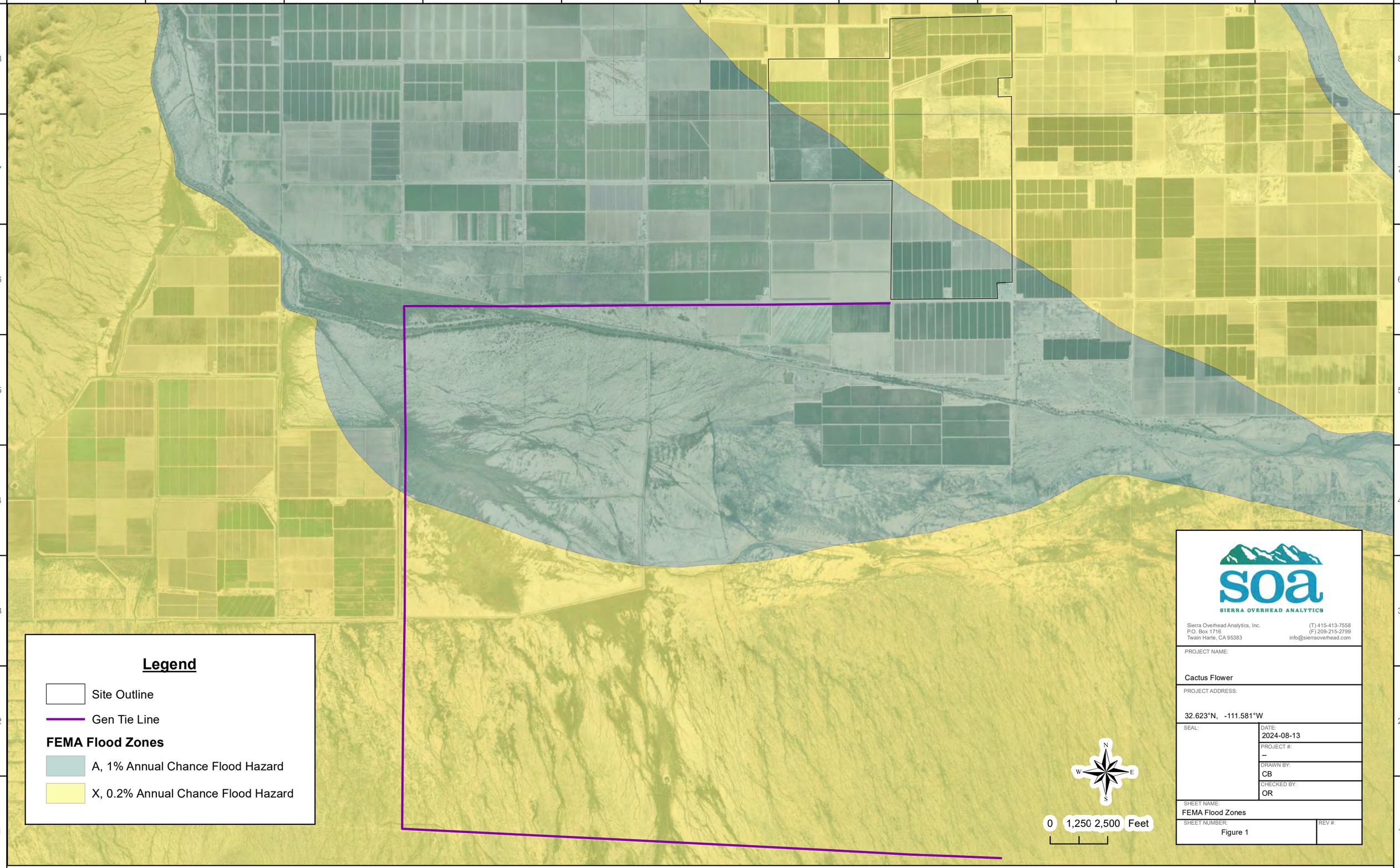
finished floor elevations 1 foot above the base-flood (100 year flood) elevation and adjacent grades at or above the base-flood elevation.

Post-construction, refer to Title 11 of the SMO: maintain and restore natural drainage patterns, minimize the magnitude and extent of grading, disturbance, and impervious cover, use BMPs to reduce pollutant loadings from developed sites, treat and release stormwater as close to the runoff's source as possible, and promote effective operation and maintenance of stormwater facilities. Obtain a post-construction permit, adhere to the general requirements outlined in Chapter 11.30 of the SMO, submit a report that includes information listed in Chapter 11.40 with the stormwater permit application, submit an actual "as-built" plan based on a field survey for all Stormwater Management Systems or Facilities per the approved Post-Construction Stormwater Site Plan, and prepare and record an operation and maintenance plan according to section 11.50.040 and 11.50.050 of the SMO.

If the project site discharges into Pinal County Flood Control District (FCD) owned or operated structures, the minimum level of control, referred to as 'First Flush', must be met. Specifically, the first 0.5 inches of direct runoff from a storm event must be retained or treated and dissipated within 36 hours to prevent vector problems. Discharging into FCD structures requires written approval in the form of a license, permit, or easement. Any off-site runoff passing through the site must be discharged in the same manner (velocity, flow area, direction, etc.) as it was in pre-construction conditions.

APPENDIX A - Figures

Figure 1 - FEMA Flood Zones
Figure 2 - Hydrologic Soil Groups
Figure 3 - NLCD Land Cover
Figure 4 - Infiltration Depth
Figure 5 - 100yr 24hr Flow Event Depth
Figure 6 - 100yr 24hr Flow Event Velocity
Figure 7 - 100yr 24hr Flow Event Scour
Figure 8 - With Gen Tie Line: 100yr 24hr Flow Event Depth
Figure 9 - With Gen Tie Line: 100yr 24hr Flow Event Velocity
Figure 10 - With Gen Tie Line: 100yr 24hr Flow Event Scour



soa
SIERRA OVERHEAD ANALYTICS
Sierra Overhead Analytics, Inc.
P.O. Box 1716
Twain Harte, CA 95383
(T) 415-413-7558
(F) 209-215-2799
info@sierraoverhead.com

PROJECT NAME:
Cactus Flower

PROJECT ADDRESS:
32.623°N, -111.581°W

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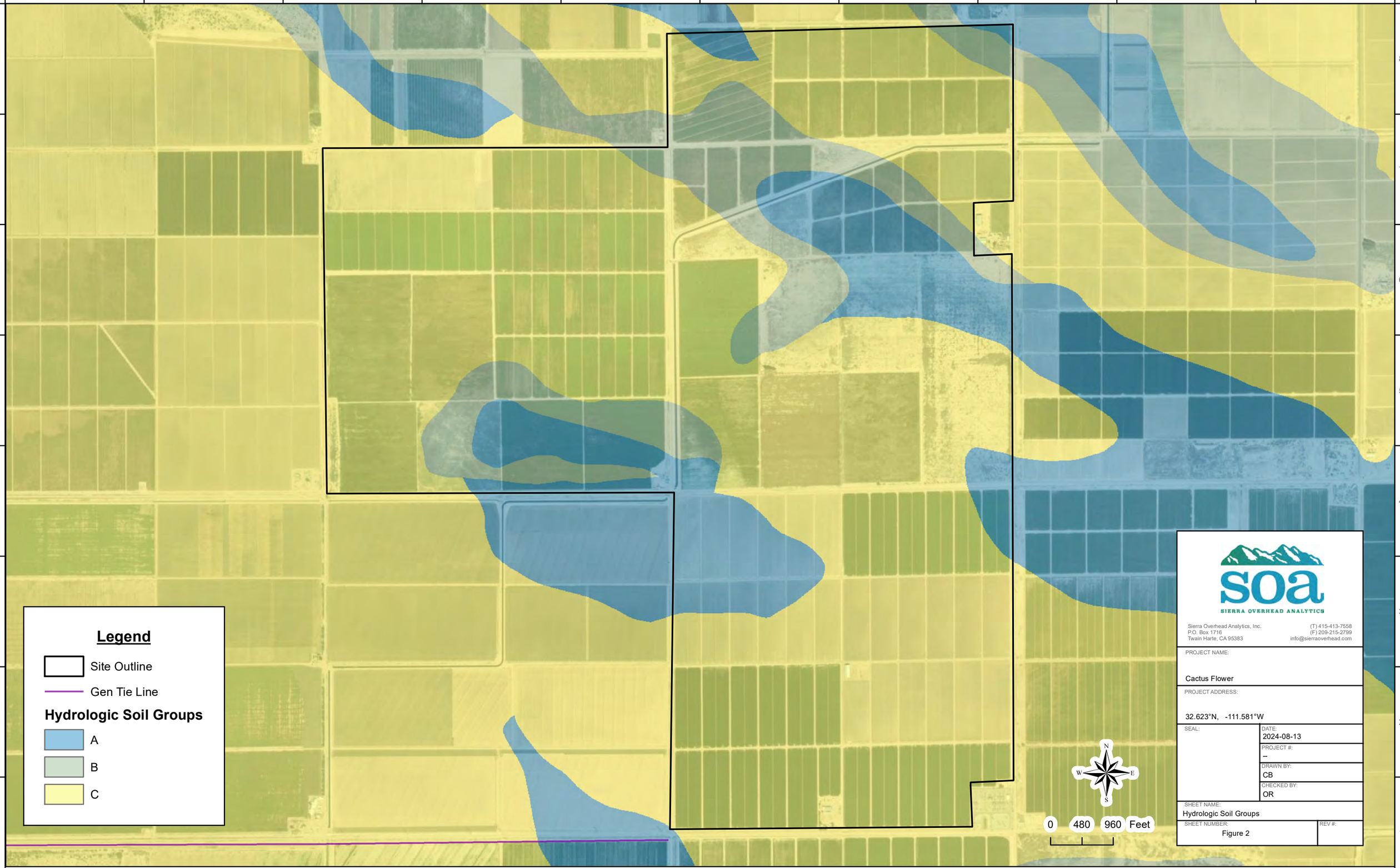
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FEMA Flood Zones

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Figure 1

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SIERRA OVERHEAD ANALYTICS

Sierra Overhead Analytics, Inc.
P.O. Box 1716
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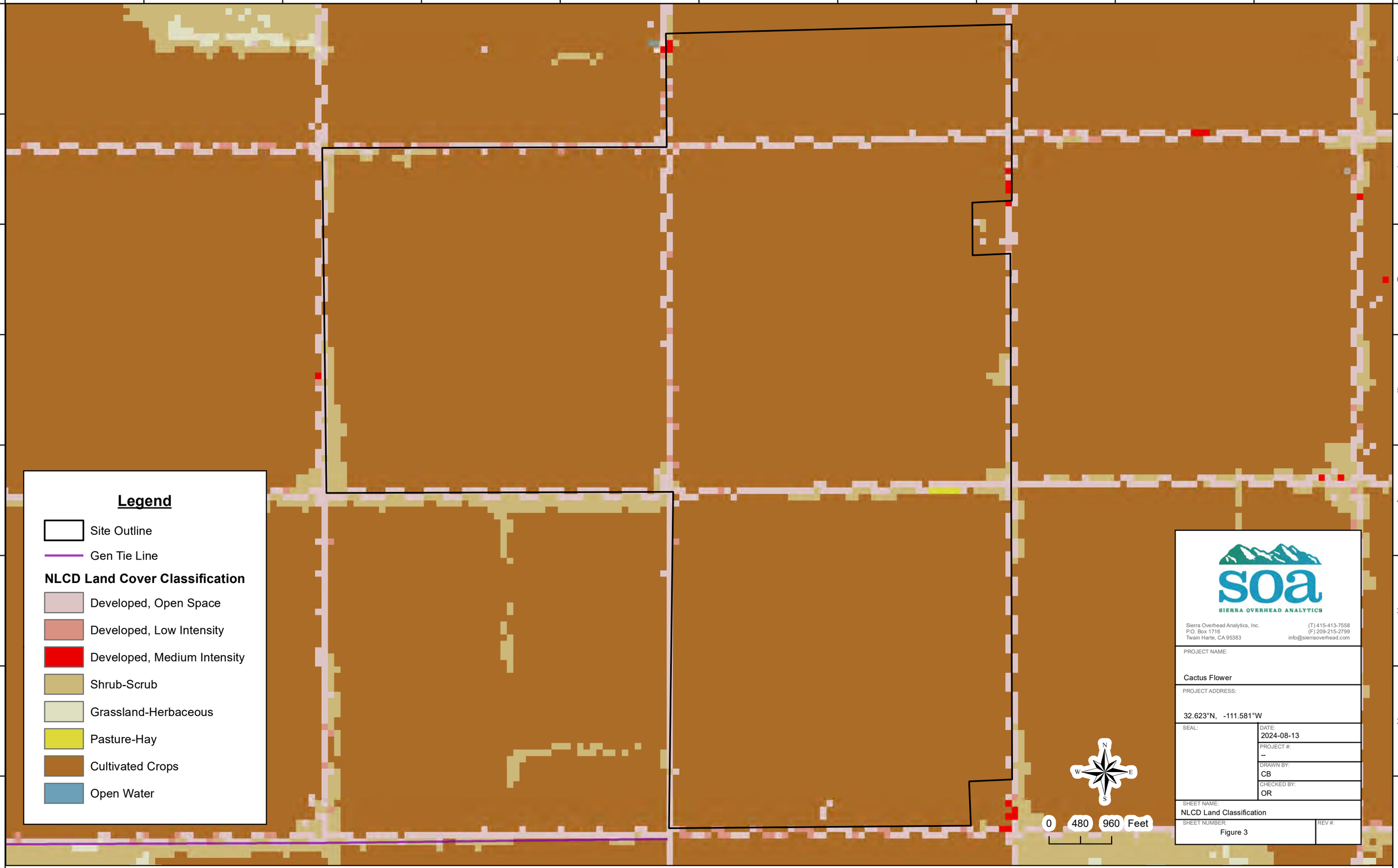
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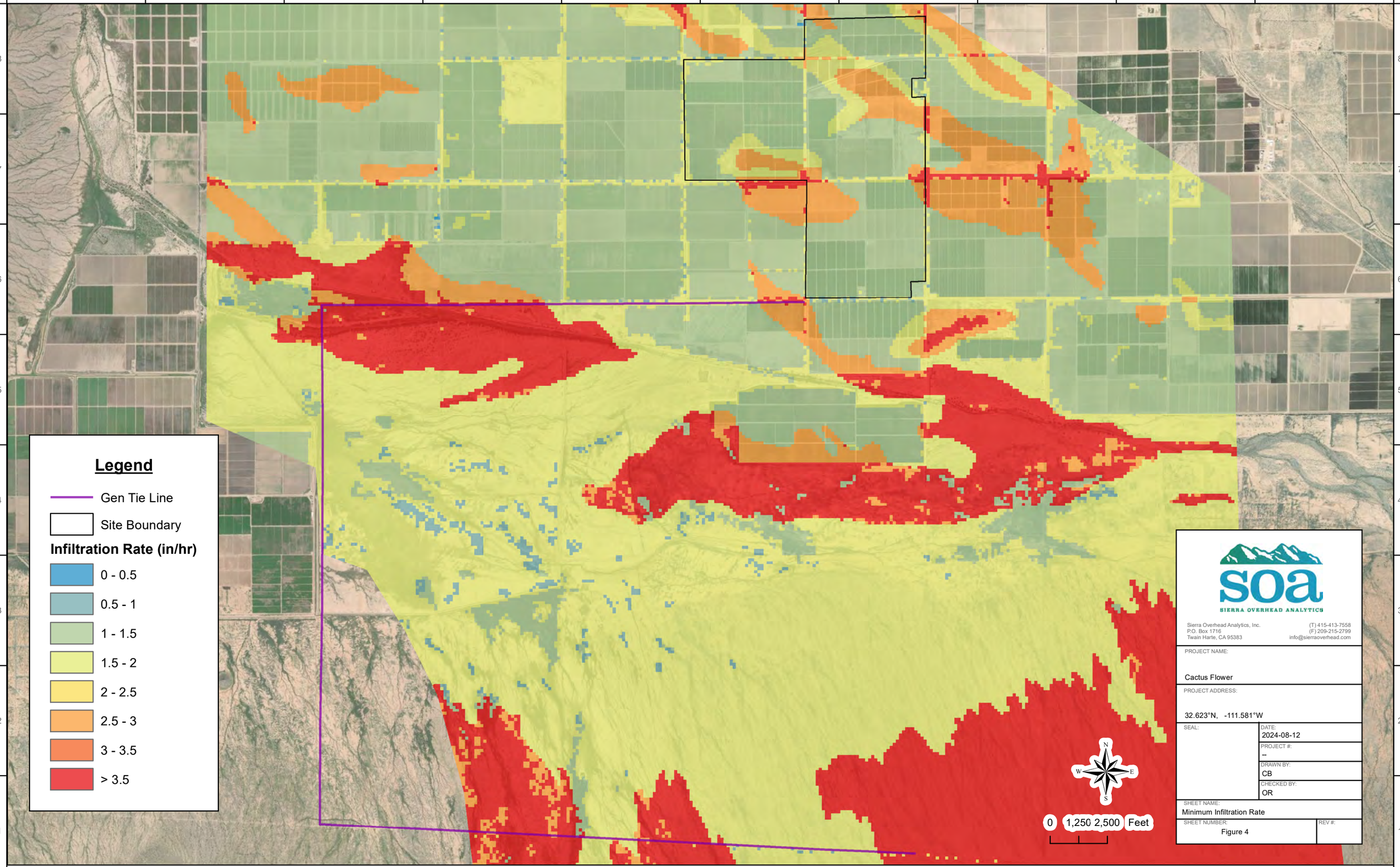
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NLCD Land Classification

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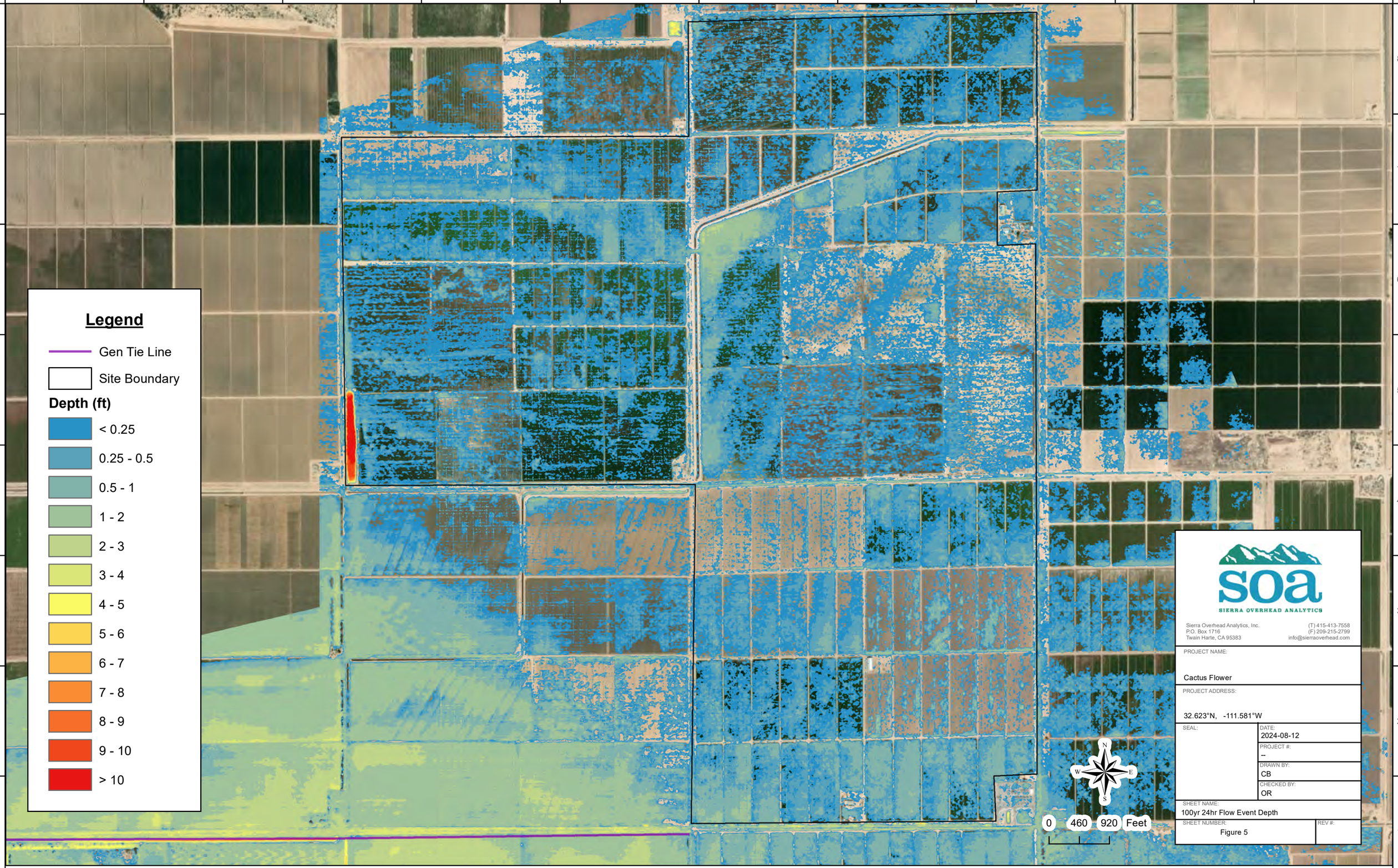
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Minimum Infiltration Rate

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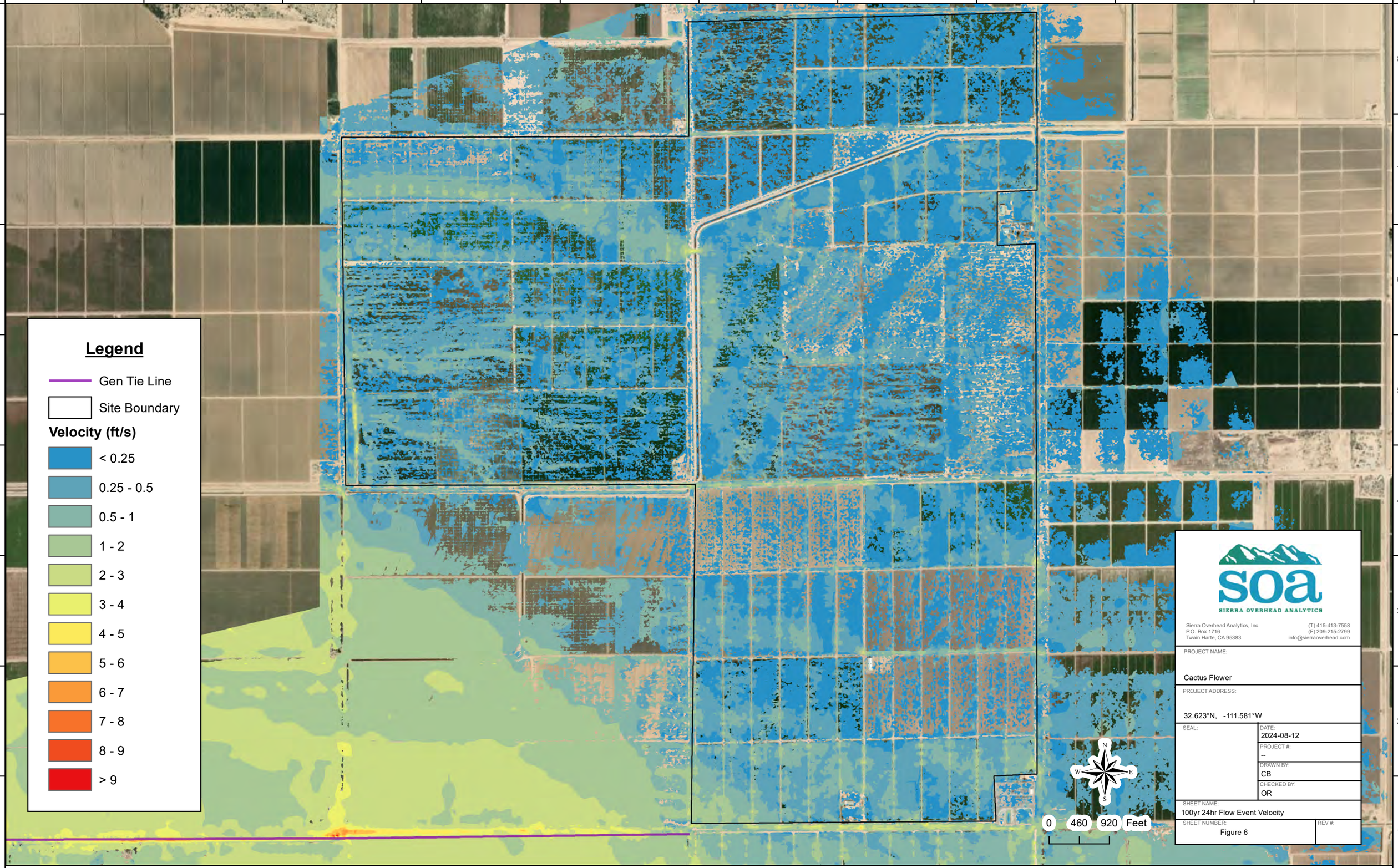
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SHEET NAME: 100yr 24hr Flow Event Velocity
SHEET NUMBER: Figure 6
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Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet Intl Basemap Source: ESRI Land Ownership and PLSS Source: BLM SEZ Source: Argonne National Laboratory

Legend

Gen Tie Line

Site Boundary

Scour (ft)

- < 0.25
- 0.25 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- > 3

N

W E

S

0 460 920 Feet

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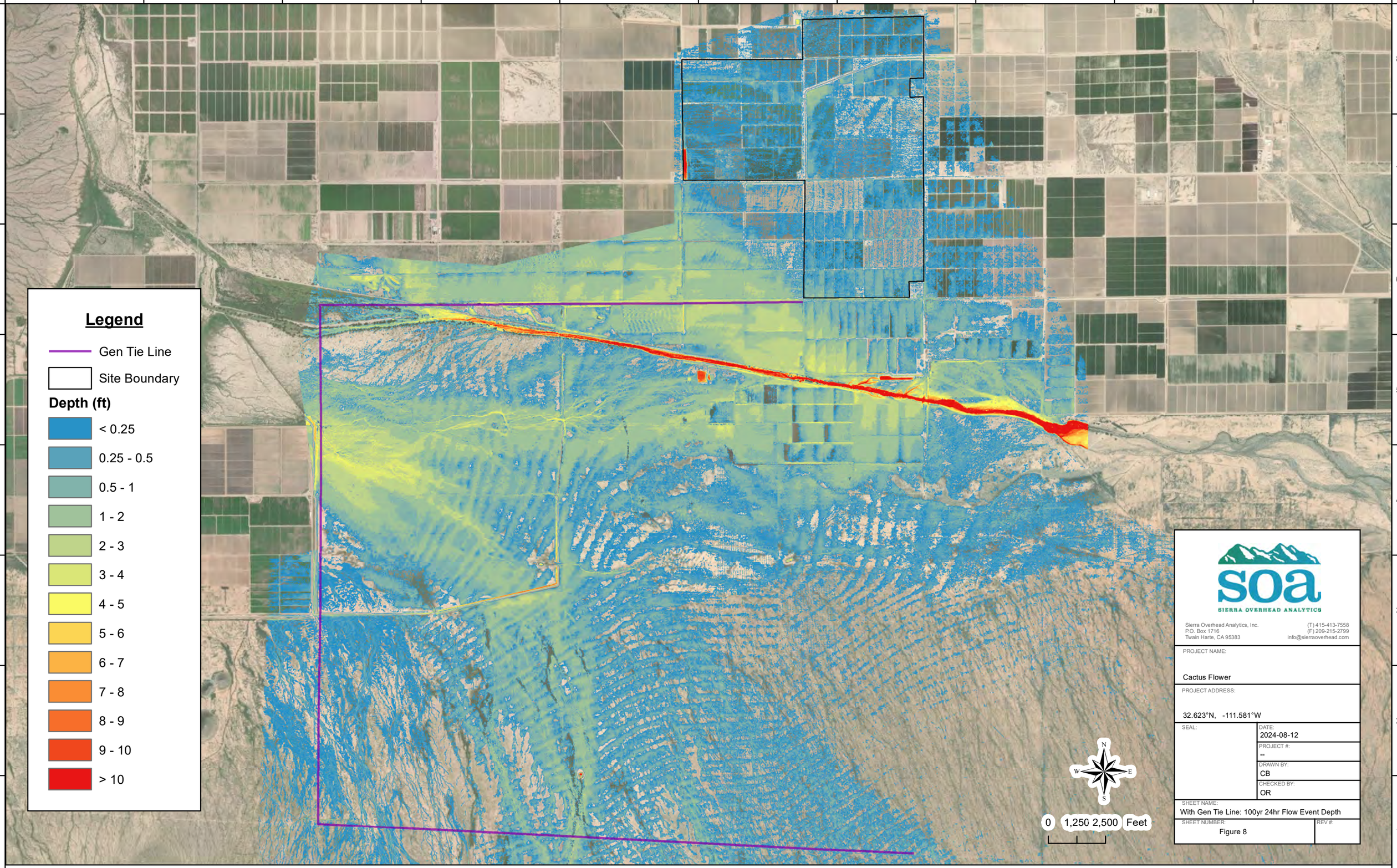
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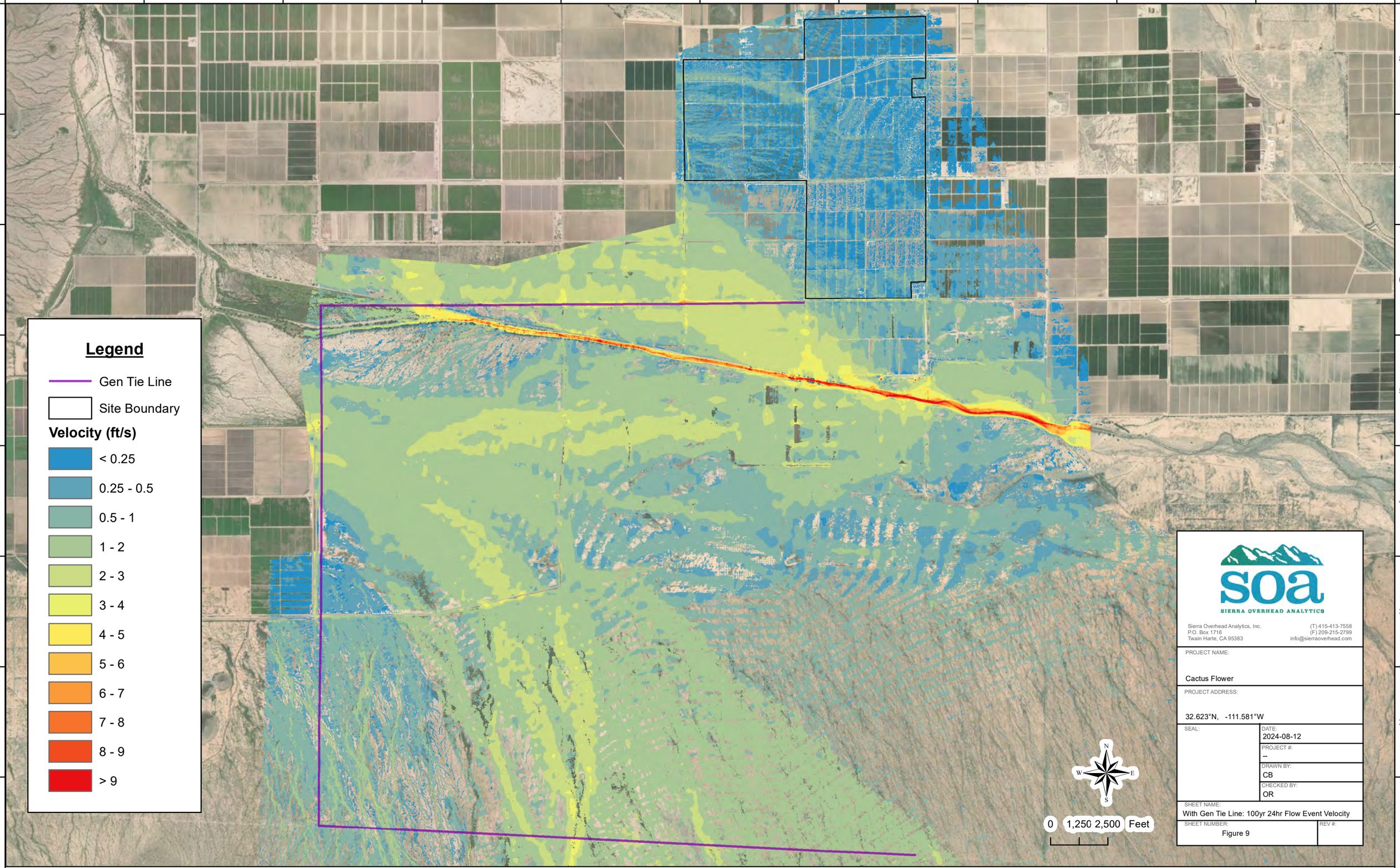
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SHEET NAME:
With Gen Tie Line: 100yr 24hr Flow Event Depth

SHEET NUMBER: Figure 8
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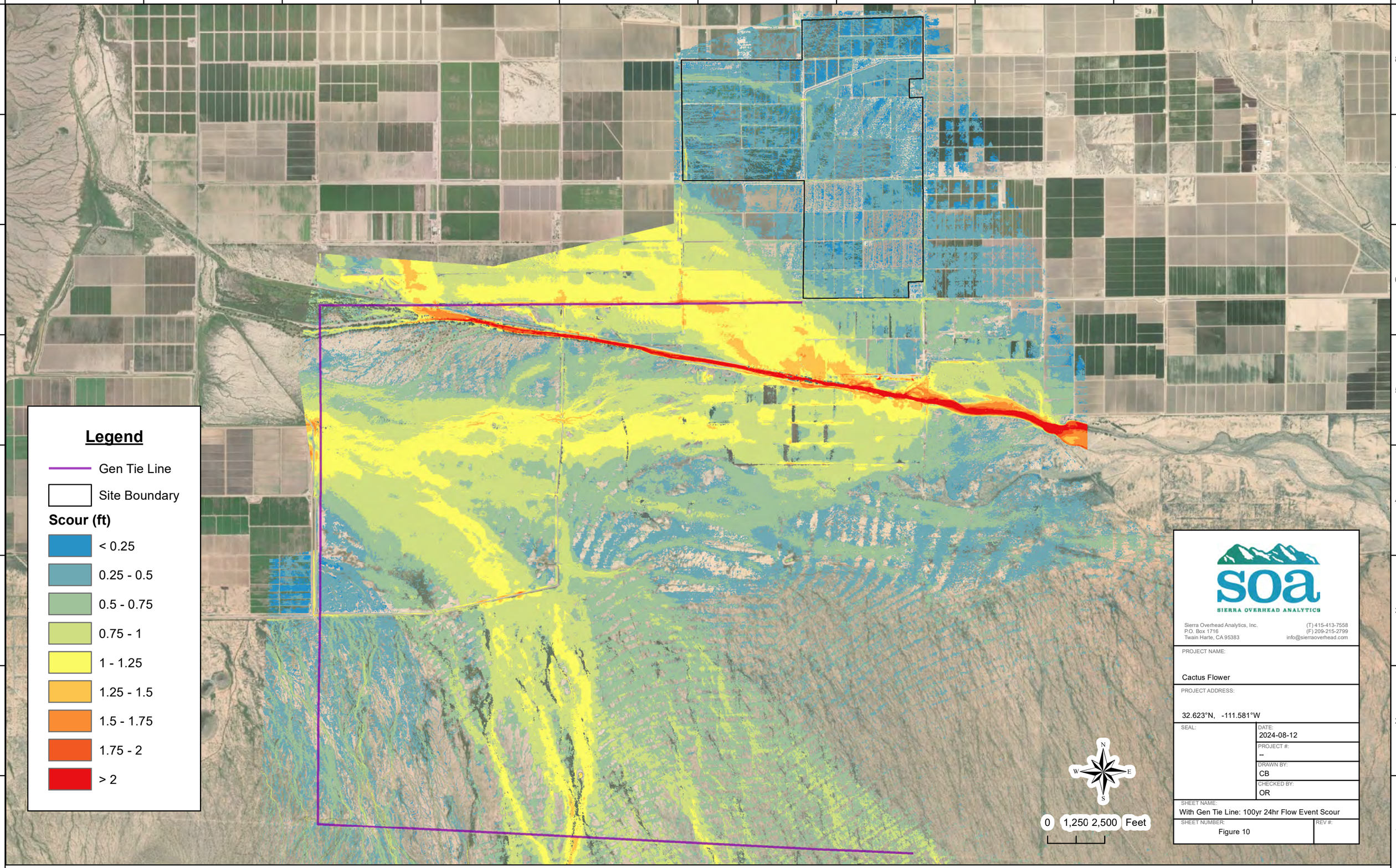
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With Gen Tie Line: 100yr 24hr Flow Event Velocity

SHEET NUMBER: Figure 9
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SHEET NAME:
With Gen Tie Line: 100yr 24hr Flow Event Scour

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Figure 10

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Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet Intl Basemap Source: ESRI Land Ownership and PLSS Source: BLM SEZ Source: Argonne National Laboratory

APPENDIX B - Supporting Documentation

NRCS Custom Soil Resource Report for Pinal County, Arizona, Western Part
ANS Geo Preliminary Geotechnical Report (May 5, 2024)
TR-55 Chapter 2, Urban Hydrology For Small Watersheds (Excerpt)
HEC-18 Scour Manual, Chapter 7 (Excerpt)
USGS StreamStats Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Pinal County, Arizona, Western Part



November 19, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

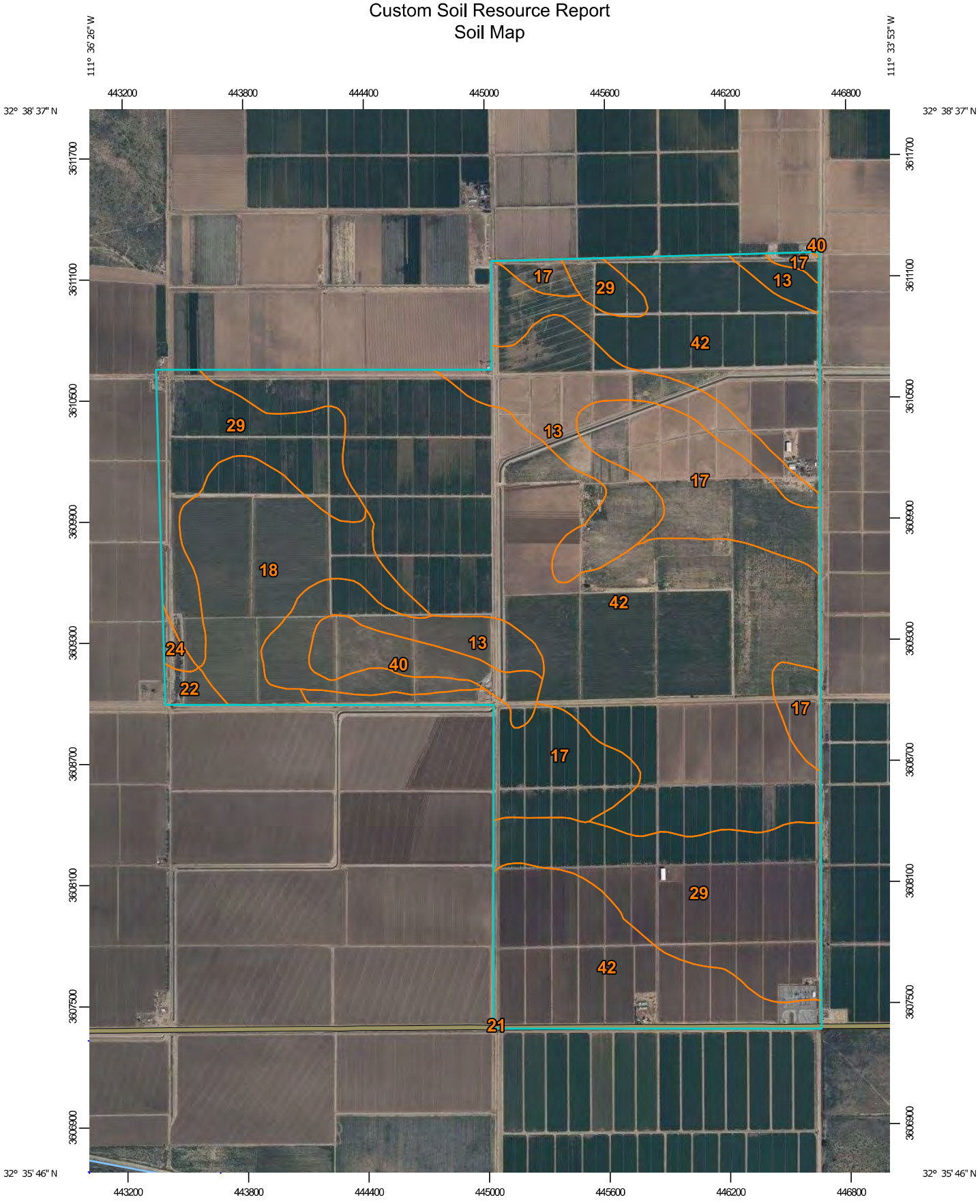
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:25,700 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 350 700 1400 2100

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pinal County, Arizona, Western Part
Survey Area Data: Version 18, Sep 16, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 18, 2020—Mar 7, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13	Dateland fine sandy loam	265.1	11.9%
17	Denure fine sandy loam, 0 to 1 percent slopes	252.6	11.3%
18	Denure clay loam, 0 to 1 percent slopes	175.2	7.9%
21	Gilman fine sandy loam, 0 to 2 percent slopes	0.3	0.0%
22	Gilman clay loam	10.7	0.5%
24	Glenbar clay loam, 0 to 2 percent slopes	6.1	0.3%
29	Marana silty clay loam	367.2	16.5%
40	Rositas loamy fine sand	55.3	2.5%
42	Sasco silt loam	1,095.4	49.2%
Totals for Area of Interest		**2,227.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit

descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Pinal County, Arizona, Western Part

13—Dateland fine sandy loam

Map Unit Setting

National map unit symbol: 1sq0
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Dateland and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dateland

Setting

Landform: Fan terraces, stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stream and fan alluvium

Typical profile

A - 0 to 2 inches: fine sandy loam
Bk - 2 to 40 inches: fine sandy loam
C - 40 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: R040XB207AZ - Limy Fan 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

17—Denure fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1sq4
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Denure and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Denure

Setting

Landform: Stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed stream alluvium

Typical profile

A - 0 to 2 inches: fine sandy loam
Bk - 2 to 54 inches: sandy loam
2Btk - 54 to 60 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: R040XB207AZ - Limy Fan 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 15 percent
Hydric soil rating: No

18—Denure clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1sq5
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Denure and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Denure

Setting

Landform: Stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed stream alluvium

Typical profile

Ap - 0 to 15 inches: clay loam
Bk - 15 to 54 inches: sandy loam
2Btk - 54 to 60 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R040XB207AZ - Limy Fan 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

21—Gilman fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tdtw
Elevation: 800 to 2,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Gilman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilman

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed fan and stream alluvium

Typical profile

Ap1 - 0 to 3 inches: fine sandy loam
Ap2 - 3 to 13 inches: loam
C1 - 13 to 26 inches: loam
C2 - 26 to 44 inches: loam
C3 - 44 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneOccasional
Frequency of ponding: None
Calcium carbonate, maximum content: 4 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: A
Ecological site: R040XB211AZ - Loamy Swale 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 15 percent
Hydric soil rating: No

22—Gilman clay loam

Map Unit Setting

National map unit symbol: 1sqb
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Gilman and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilman

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Dip
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Mixed stream alluvium

Typical profile

Ap - 0 to 12 inches: clay loam
C - 12 to 60 inches: stratified sandy loam to very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C
Ecological site: R040XB211AZ - Loamy Swale 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

24—Glenbar clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tdtq
Elevation: 980 to 2,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Glenbar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Glenbar

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stream alluvium

Typical profile

Ap - 0 to 7 inches: clay loam
Ck1 - 7 to 18 inches: clay loam
Ck2 - 18 to 31 inches: silty clay loam
Ck3 - 31 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneOccasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R040XB211AZ - Loamy Swale 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 15 percent
Hydric soil rating: No

29—Marana silty clay loam

Map Unit Setting

National map unit symbol: 1sqk
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F

Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Marana and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Marana

Setting

Landform: Stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stream alluvium

Typical profile

A - 0 to 2 inches: silty clay loam
C - 2 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R040XB213AZ - Loamy Upland 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

40—Rositas loamy fine sand

Map Unit Setting

National map unit symbol: 1sqz
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Rositas and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rositas

Setting

Landform: Dunes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed eolian deposits

Typical profile

A1 - 0 to 2 inches: loamy fine sand
C2 - 2 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: R040XB217AZ - Sandy Upland 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

42—Sasco silt loam

Map Unit Setting

National map unit symbol: 1sr1
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Sasco and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sasco

Setting

Landform: Stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stream silty alluvium

Typical profile

A - 0 to 2 inches: silt loam
Bw - 2 to 47 inches: silt loam
2Btb - 47 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R040XB213AZ - Loamy Upland 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 15 percent
Hydric soil rating: No

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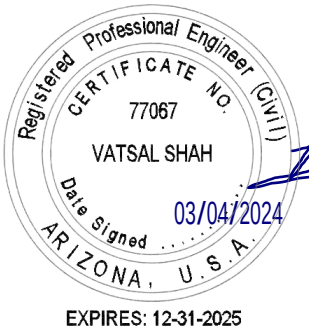
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PRELIMINARY GEOTECHNICAL REPORT

Cactus Flower Solar Project

Pinal County, Arizona

May 2, 2024



EXPIRES: 12-31-2025

Vatsal Shah, PE, Ph.D
AZ PE License No. 77067

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Attachments

Attachment A-1 – Site Vicinity Map
Attachment A-2 – Investigation Location Plan
Attachment A-3 – FEMA Flood Hazard Map
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Attachment C – Soil Boring Logs
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Attachment E – Electrical Resistivity Test Results
Attachment F – Pile Load Test Logs
Attachment G – Seismic Hazard Report
Attachment H – NRCS Soil Survey

1 Executive Summary

ANS Geo, Inc. is pleased to provide this Geotechnical Report (Report) to Cypress Creek Renewables (CCR) to summarize the results of our preliminary geotechnical investigation program in support of the proposed Cactus Flower Solar and Battery Energy Storage System (BESS) project located in Pinal County, Arizona. ANS Geo has summarized some of the critical geotechnical items and observations which may impact project design and construction within this Executive Summary from our observations during the completion of the field investigation at the project site.

1. ANS Geo advanced a total of 17 soil borings across the proposed array, substation and BESS areas. An investigation location plan is provided as **Attachment A-2**, and soil boring logs are presented as **Attachment C.**
2. The soils encountered were predominantly medium stiff to stiff, low to moderate plasticity clay, silt and sand mixtures. A summary of encountered subsurface conditions and laboratory test results is provided in **Section 4**, and **Section 5**, respectively.
3. Groundwater was not encountered in soil borings conducted during the investigation. Notwithstanding, groundwater and the presence of perched water due to lower-permeability soil lenses is possible during specific seasons and weather events, therefore, it is recommended that permeability testing be performed during future investigations to evaluate the soil's ability to drain readily.
4. Pile load testing (PLT) was completed at eight (8) test locations across the proposed array areas. A total of eight (8) piles (one (1) pile at each test location) were embedded to between 7 and 10 feet below grade and tested for both uplift and lateral capacities.
5. Based on corrosivity lab testing and field electrical resistivity measurements, the soil conditions generally indicate that soils are "moderately corrosive". It is anticipated that appropriate protective measures for buried steel, such as increased galvanic coating or similar, will be employed. Results of corrosivity testing and discussion of results are provided in **Section 5.3** and **Section 8.1**.
6. It is recommended that foundations be over-excavated by at least twelve (12) inches and backfilled with compacted structural fill over geotextile separation fabric to improve the bearing capacity within/under areas of proposed foundations (ie. concrete slabs, inverter pads, substation foundations), and to provide free-draining material beneath foundations to avoid softening during times of precipitation as well as well as a capillary break between native silty soils and the foundation bases. Traditional and mat shallow foundation recommendations are presented in **Section 8.5**.
7. ANS Geo has provided Substation and BESS Deep Foundation Recommendations in **Table A** directly preceding our provided Attachments. Deep foundation considerations are discussed in **Section 8.6.**
8. Access road subgrades are generally expected to consist of brown to light brown sandy silty clay, sandy silt, and silty, clayey sand. Subgrades may be loose and cohesionless in some areas throughout the site. Various access road constructions and granular base thicknesses are presented in **Section 9.5**, **Table 15**. Cement stabilized subgrade may be desired in areas where cohesionless silty sand subgrades are difficult to handle or compact.
9. The frost depth within the project area is mapped as 12 inches below grade, which may influence bearing or embedment depths for shallow foundations. Shrink/swell of expansive soils was evaluated; soil movements resulting from shrink/swell of clay soils is not anticipated to be of substantial concern at this site. Additional discussion is provided in **Sections 8.2** and **8.3**.

2 Project Description

ANS Geo, Inc. (ANS Geo) is pleased to provide this Geotechnical Report (Report) to Cypress Creek Renewables, LLC (CCR) to summarize the results of our preliminary geotechnical investigation program in support of the proposed Cactus Flower Solar, LLC, to be located in Pinal County, Arizona.

ANS Geo, in collaboration with CCR, developed a geotechnical investigation program intended to provide geotechnical design recommendations and discuss construction considerations for the proposed solar and BESS facility.

Our understanding of project details comes from meetings and email communications with Mr. Mario Carreon, P.E., and Melissa Kempe, Project Developers for CCR. Authorization to proceed with field investigations was received during the project kick-off meeting dated February 21, 2024; scope for testing was completed as detailed in "Option B" as presented in "Proposal for Geotechnical Engineering Services – Cactus Flower Solar, LLC," dated February 13, 2024 (Rev1).

The Cactus Flower Solar project is expected to encompass roughly 2,015 footprint acres for the development of a photovoltaic (PV) facility and was expected to generate 351 megawatts (MW) of renewable energy. Site vicinity is shown in Figure 1, below, and **Attachment A-1**, Site Proximity Map.

ANS Geo's geotechnical investigation program included a study of local geologic conditions using publicly available maps and information; soil borings, pile load testing, in-situ electrical resistivity testing conducted at the site; and laboratory testing of soil for thermal resistivity, corrosivity suite, California Bearing Ratio (CBR), and index properties. Our targeted test locations were focused within solar array areas. A General Location Plan is provided as **Attachment A-2**.

Figure 1: Project Vicinity Map



Area overview with project site limits outlined in yellow. Source: Google Earth, imagery date April 2013. Graphical scale.

2.1 Provided Documents

Prior to commencing our geotechnical investigations, ANS Geo was provided multiple project files from CCR. The referenced files are listed below:

- Exhibit B – Form of Statement of Work – dated 01/24/2024
- Cactus Flower_01-08-2024.kml – dated 01/24/2024
- CactusFlower_ZSP_2023-02-20.pdf – dated 02/21/2024

In addition to these project files, supplemental project information was provided on CCR's online Sharepoint "AZ_Cactus Flower". Site access, project coordination, and additional project details were communicated between ANS Geo and CCR via e-mail and phone conversations.

2.2 Project Assumptions

ANS Geo understands that the proposed solar development will include a solar photovoltaic (PV) system, Battery Energy Storage System (BESS), an underground cable collection system, transformers and similar electrical equipment, and supporting structures and equipment. We understand the project footprint spans across multiple parcels separated by existing county and state roads, and will include the development of unpaved, aggregate access roadways within the project parcels. ANS Geo assumes the project design life to be 35 years.

ANS Geo's scope of work was completed based on our proposal dated 02/13/2024 (Rev1). The recommendations herein presented are site-specific and based on our understanding of the project, communications with CCR, and our experience with solar and BESS developments in similar geological settings. Should the configuration of the system differ from our stated understanding, it is imperative that ANS Geo is contacted to review, confirm, and/or update our recommendations to reflect the planned development. For example, recommendations such as pile design parameters will change if alternate pile installation techniques than those presented in this report are considered, such as pre-drilling, screw piles, helical piles, compaction-and-backfilling, grouting, soil-cement mixing, or other methods; these changes may cause a material change in the design of foundation. Similarly, should the location of access roadways and expected traffic volumes and loading, assumed facility design life, or other site condition change, our recommendations may need to be updated.

3 Methodology

3.1 Soil Boring Explorations

ANS Geo advanced a total of 17 soil borings completed at select locations across the project area from March 9 to March 13, 2024. A total of 15 borings (B-01 through B-15) were advanced within the proposed array areas, each to a depth of 20 ft below ground surface (BGS); one (1) boring was advanced in the proposed BESS area to a depth of 30 ft BGS; one (1) boring was advanced in the proposed substation area to a depth of 30 ft BGS. The soil boring locations are depicted in the Investigation Location Plan, provided within **Attachment A-2**.

A Diedrich D-50 tracked drill rig was used to collect soil samples using the Standard Penetration Test (SPT) Method through solid stem augers (SSA) in general accordance with ASTM Standard D1586. Soil samples were collected continuously within the upper 10 feet in each boring, then in five-foot intervals thereafter to the termination depth. Soil boring locations, proposed by ANS Geo and confirmed by Cypress Creek Renewables, were distributed relatively evenly throughout the project's array areas. BESS and substation borings were completed in the planned BESS and substation areas. All soil borings were overseen and logged by an ANS Geo representative under the direction of a Professional Engineer licensed in the State of Arizona. Typed soil boring logs are presented as **Attachment C**.

3.2 Electrical Resistivity Testing

As part of our field investigation program, ANS Geo performed field Electrical Resistivity Testing (ERT) at 10 locations across the project site. In-situ soil resistivity measurements were obtained by utilizing the Wenner 4-Pin Method in accordance with ASTM G57 and IEEE Standard 81. Two (2) mutually perpendicular traverses were collected at each array area location utilizing electrode "a"-spacings of 2, 5, 10, 25 and 50 feet. In addition, to "a"-spacings of 100 and 150 ft were added in the BESS and substation ERTs, and spacings of 200 and 250 ft were completed in the substation ERT. ERT Test results are presented as **Attachment E**.

3.3 Pile Load Testing

3.3.1 Test Pile Installation

ANS Geo conducted pile load testing at eight (8) accessible locations (PT-01 through PT-08) across the proposed solar array areas. Each pile location included one (1) test pile embedded at various depths ranging between seven (7) and 10 feet below grade. All piles were tested for both uplift and lateral deflection versus load. The nongalvanized W6x9 steel sections ("piles") were installed through the overburden via direct push to significant resistance, then driven to their final depths using a GAYK HRE 4000 Pile Driver.

3.3.2 Uplift Load Testing

Once driven to the final embedment depth (varying between 7 and 10 feet below grade), an uplift load test was performed on each test pile in accordance with the ASTM D3689 (uplift) test method. The tension load was generally applied through the arm of a Pill Handler 12K which aligned the load concentrically to the pile using a chain attached to a dynamometer, as well as a "pacman" clamp attachment to secure the assembly to the pile. Uplift loads were applied in one-minute, 1,000-pound increments up to 15,000 pounds or one-inch of vertical displacement, whichever occurred first. Once achieved, the load was released, and final displacement was recorded.

As noted in our Proposal, for the purposes of analysis, uplift loads to achieve 0.5 in. of vertical deflection were interpolated from experimental results.

3.3.3 Lateral Load Testing

A lateral load test was performed on all piles at each location following each uplift load test, in accordance with ASTM D3966 (lateral) test method. Horizontal loads were applied at approximately four (4) feet above grade on each pile with the pulling force of a hydraulic ram fixed to the excavator. Each test load was applied in one-minute, 500-pound increments up to 5,500 pounds, or until a deflection of one-inch (measured at six inches above grade) was observed. Once achieved, the load was immediately released, and residual deflection was recorded.

As noted in our Proposal, for the purposes of analysis, lateral loads to achieve 0.75 in. of lateral deflection were interpolated from experimental results.

3.3.4 Removal of Piles

Upon completion of the pile load testing program, test piles were extracted. All scrap metal was properly disposed off-site. A summary of pile load testing results can be found in **Section 6**. Detailed pile load test logs including installed piles, uplift testing, lateral testing, and post pile removal are presented as **Attachment F**.

4 Geology, Surface, and Subsurface Conditions

Prior to site mobilization, ANS Geo conducted a brief desktop review of publicly available geologic maps and reports made available by the United States Geological Survey (USGS) and the Arizona Geological Survey online mapping, and other publicly available sources. Our desktop review is summarized herein, along with our observed, site-specific subsurface conditions as identified through our investigation. A discussion of geological and geotechnical hazards relative to solar development at this site is provided in **Section 4.7**.

4.1 Observed Site Conditions

Upon arriving at the site, ANS Geo performed a site walk through to gauge general site conditions and any potential access issues. The site consists of primarily open farmland in use in agricultural and pastoral capacities. Existing structures appear to be limited to sheds and farm equipment storage. The project area consisted of well-maintained access roads and concrete drainage channels between farm and pasture fields. In general, the project site appeared to be nearly level to gently sloping with minor slopes. Trucks could be driven on the majority of site, even following precipitation events.

4.2 Historic & Topographic Setting

The project area is located in Pinal County, Arizona, approximately 15.5 miles south of the city Eloy, Arizona. The site consists of five (5) parcels. These parcels collectively span approximately 2,015 acres of mostly level ground, active farming fields and general agricultural usage. The project site is bounded to the north, south, east, and west by W. Eames Road, Curtis Road, 11 Mile Corner Road, and S. Curry Road, respectively.

Much of the project site is nearly level to gently sloping to the west and north, with an elevation ranging from about 1,650 feet above mean sea-level (AMSL) in the southeast corner of the site, to approximately 1,615 in the northwest corner of the site. The project site is generally nearly level to gently sloping, with slopes averaging about 1%. The project site is approximately bounded by latitudes 32.6028°N to 32.6368°N and longitudes 111.6029°W to 111.5687°W.

4.3 Surficial Geology

ANS Geo reviewed geologic mapping made available by the Arizona Geological Survey (AZGS) and the United States Geological Survey (USGS) which indicate the project area is in the “valley floors” of the southern Basin and Range Province. The landscape of the region has been shaped by tectonic extension that started approximately 17 million years ago during the early Miocene era.

The near-surface sediments consist of Holocene-aged river alluvium and floodplain deposits. At the project site, near surface alluvium deposits of the Holocene age consist of unconsolidated to weakly consolidated sand and gravel in river channels, and sand, silt, and clay in floodplains.

ANS Geo additionally reviewed surficial soil mapping available from the Natural Resource Conservation Service (NRCS) Web Soil Survey application. The NRCS survey was initially created for agricultural purposes and is generally limited to the upper five (5) to six (6) feet BGS; however, the resource provides generalized information pertaining to the soil chemistry and properties. The NRCS mapping identifies the project area to be primarily comprised of the Sasco Silt Loam, Marana Silty Clay Loam, and Dateland fine Sandy Loam.

4.4 Bedrock Geology

ANS Geo reviewed geologic maps made available by the United States Geological Survey (USGS), which indicated the project area is not mapped within any shallow rock formations and rock is not expected to be encountered within the upper 100 feet of the surface. Additionally, bedrock was not encountered at the time of our investigation.

4.5 Observed Subsurface Conditions

ANS Geo has provided the generalized subsurface conditions within Table 1 based observations recorded within our geotechnical investigation program. Soil boring logs have been provided as **Attachment C** and should be reviewed for specific soil condition observations.

Table 1: Generalized Subsurface Profile

Stratum	General Depths Encountered (ft)	Material	Avg. Consistency/ Density	Description
I	0 ~ 12	Sandy Lean Clay (CL), Sandy, Silty Clay (CL-ML), Silty, Clayey Sand (SC-SM)	Soft to Stiff, Loose to Medium Dense	The uppermost soil layers consist of light brown to dark brown sand, silt, and clay mixtures ranging in relative density/hardness from soft to stiff and loose to medium dense. Relative compaction/hardness of alluvial deposits such as these may vary substantially over even short lateral and vertical distances. SPT N-Value generally ranged from 4 to 18 blows per foot (BPF) in this stratum. Groundwater was not encountered in this stratum.
II	12 ~ 25	Sandy Lean Clay (CL), Sandy, Silty Clay (CL-ML), Silty, Clayey Sand (SC-SM)	Stiff to Hard, Loose to Medium Dense	This stratum consists of brown to yellowish-red sand, clay, and silt mixtures. Relative density/hardness tends to increase with depth; soil composition is largely similar to those overlying this stratum. N-Values generally ranged from 9 to 31 BPF, with some fine-grained layers infrequently yielding blow counts in excess of 50 BPF, and with occasional softer/less dense layers. Groundwater was not encountered in this stratum.
III	25 ~ 50	Sandy Silty Clay (CL-ML), Silty, Clayey Sand (SC-SM)	Very stiff, Medium Dense to Dense	This stratum consists of brown to light brown medium dense to dense silty, clayey sand and very stiff sandy silty clay; soil lithology appears to tend to become sandier with depth. N-Values ranged from 26 to 43 BPF. Groundwater was not encountered in this stratum.

4.6 Groundwater

ANS Geo did not encounter static groundwater during the geotechnical investigation. ANS Geo notes that near-surface groundwater conditions may be ephemeral and fluctuate due to seasonal and climate influences. Therefore, some fluctuation should be considered.

4.7 Summary of Geohazards

ANS Geo assessed publicly available information, results of the geotechnical investigation and the site conditions during the investigation to evaluate any potential geotechnical or geological hazards. Most common geohazards for solar project sites and site-specific assessments of these hazards are summarized in **Table 2**.

Table 2: Geohazard Summary Table

Hazard	Relative Risk to Site	Comment
Corrosive Soil	Moderate to Low	Corrosion testing and electrical resistivity testing reveal that the project site soils are moderately corrosive to steel and negligibly corrosive to concrete. NRCS maps indicate that the project site is generally considered to have low to moderate corrosivity.
Flooding	Moderate	FEMA Flood Hazard maps indicate that portions of the proposed project footprint area fall within the 1% annual chance flood hazard (referred to as the 100-year flood hazard zone. These designated flood hazard areas are specifically confined to the southern and western parcels of the project site and run diagonally in a northwest-southeast direction through the central part of the parcels. The remainder of the project site is not subject to flood risk according to current FEMA flood hazard classification. See **Attachment A-3** for a FEMA Flood Hazard Map. This site may be relatively prone to flash flooding, especially in "monsoon" season (usually from June to September).
Earthquake – Seismicity	Low	The project area is mapped within a low hazard zone based on the USGS "2018 Long-term National Seismic Hazard Map". ANS Geo does not anticipate any impact to the proposed facility.
Liquefaction	Low	Given the soils encountered during our investigation and the seismic setting of the site, the site can be considered low to negligible-risk for liquefaction.
Frost Action	Low	The frost depth in Pinal County, Arizona is mapped at approximately 12 inches below grade. Foundations should be constructed considering the frost related forces or with proper remediation against frost. A detailed discussion is provided in **Section** Error! Reference source not found..
Slope Failure	Low	The project site consists of farmlands that have a relatively flat topography.
Collapsible Soil	None	The sand soil units encountered on site are not expected to have collapse potential.
Expansive Soils	None	The soil encountered during the geotechnical investigation did not show any properties associated with swelling soil. Additionally, the Swelling Clays Map of the Conterminous Unites States published by the USGS was reviewed for risk of expansive clays on site. Based on this map, it appears that the project site is mapped within material that contains little or no swelling clay.
Subsidence – Pumping	None	There are no mapped or known mines within the project vicinity which could cause subsidence. However, the site has a gas line running underneath which must be considered when developing the site. This can be done through 811 call-before-you-dig to ensure hazard mitigation for potential gas line rupturing.
Subsidence – Mining	None	Based on online mining databases, there are no known mines within the project boundary. The nearest mines to the site are open pit mines of Silver Bell Mountain, which is located about 14 miles south of the site. ANS Geo does not anticipate any impact due to mining activity to the proposed facility.
Subsidence – Caves/Karst/Gypsum	None	Based on the USGS Mineral Resources On-Line Spatial Database, no karst feature, or formations are mapped near the area. Moreover, no bedrock was encountered at any of the boreholes, and is not expected to be encountered during construction at this site.
Quick Clay	None	Quick clay is a type of clay that when disturbed can suddenly liquefy without warning leading to potential landslides and other hazards. There is no known quick clay within the project area.

5 Laboratory Results

Representative soil samples were collected during our investigation and submitted to ANS's accredited materials testing laboratory. Soil samples will be retained for a period of three (3) months following the initial submission of this Report.

5.1 Soil Index Testing

A summary of the index laboratory test results has been provided within **Table 3** and **Table 4**. As-received laboratory test results are included within **Attachment D**.

Table 3: Soil Index Testing Summary (Sieve Analysis, ASTM D6913)

Location ID	Sample ID	Depth (ft)	% Gravel	% Sand	% Fines	In-Situ Moisture Content (%)
B-02	S - 6	13 - 15	3.3	67.0	29.7	7.6
B-05	S - 3	4 – 6	0.1	63.6	36.3	8.7
B-08	S - 2	2 - 4	0.0	31.3	68.7	4.4
B-10	S - 3	4 – 6	0.0	65.3	34.7	3.8
B-11	S - 2	2 – 4	1.1	83.9	15.0	3.6
B-12	S - 3	4 – 6	0.0	76.7	23.3	6.6
B-BESS-01	S - 9	28 – 30	3.0	75.7	21.3	4.7
B-SS-01	S - 8	23 - 25	10.7	78.2	11.1	3.8

Table 4: Soil Index Testing Summary (Atterberg Limits, ASTM D4318)

Boring ID	Sample ID	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	In-Situ Moisture Content (%)	USCS
B-01	S - 5	13 – 15	20	16	4	16.0	CL-ML
B-02	S - 6	13 – 15	23	16	7	7.6	SC-SM
B-03	S - 4	6 – 8	29	22	7	19.5	CL-ML
B-05	S - 3	4 – 6	NV	NP	NP	8.7	SM
B-09	S - 2	2 – 4	24	16	8	11.8	CL
B-12	S - 7	18 – 20	24	16	8	17.1	CL
B-BESS-01	S - 3	4 – 6	NV	NP	NP	21.1	SM
B-BESS-01	S - 9	28 – 30	22	16	6	4.7	SC-SM
B-SS-01	S - 3	4 – 6	32	21	11	21.1	CL

5.2 Thermal Resistivity Testing

ANS Geo collected bulk samples from ten (10) locations within the project area from three (3) to five (5) feet below grade for laboratory testing of Thermal Resistivity. Bulk soil samples were collected in a five-gallon bucket and delivered to ANS's accredited laboratory for testing. The soil was compacted to 85 percent of its Standard Proctor Density in accordance with ASTM D698, and Thermal Resistivity Testing was conducted in accordance with IEEE Standard 442-2017 and ASTM D5334. Results of the thermal testing summarized within **Table 5**. Complete, as-received results are provided within **Attachment D**.

Table 5: Thermal Resistivity Testing Summary (ASTM D5334)

Location ID	Material Type	% water (°C-cm/W)	% water (°C-cm/W)	% water (°C-cm/W)	% water (°C-cm/W)	% water (°C-cm/W)	Received Moisture Content (%)	Re-Molded Dry Density (lb/ft^3)
B-SS-01	Brown Clay and Silt w/ Sand	0.0	4.3	8.7	13.0	17.3	13.8	90.9
		234.1	**163.6**	**70.3**	**56.9**	**52.9**		
B-BESS-01	Brown Clay and Silt w/ Sand	0.0	4.1	8.1	12.2	16.2	14.5	88.4
		207.3	**167.1**	**90.3**	**67.4**	**61.3**		
B-02	Brown Clay and Silt w/ Sand	0.0	5.0	9.9	14.9	19.8	13.8	88.1
		221.6	**154.8**	**71.2**	**58.9**	**54.6**		
B-03	Brown Clay and Silt w/ Sand	0.0	4.0	8.0	12.0	16.0	14.6	89.7
		214.3	**165.0**	**78.3**	**60.4**	**55.7**		
B-05	Brown Clay and Silt w/ Sand	0.0	3.7	7.4	11.0	14.7	9.7	93.4
		232.6	**147.7**	**63.2**	**54.6**	**51.6**		
B-06	Brown Clay and Silt w/ Sand	0.0	4.2	8.3	12.4	16.5	10.4	91.0
		214.6	**153.5**	**70.6**	**58.7**	**54.8**		
B-08	Brown Clay and Silt w/ Sand	0.0	3.9	7.7	11.6	15.4	7.4	89.3
		217.1	**159.3**	**75.2**	**62.6**	**58.6**		
B-09	Brown Clay and Silt w/ Sand	0.0	4.6	9.1	13.7	18.2	13.3	86.9
		207.7	**159.7**	**79.9**	**63.2**	**58.3**		
B-12	Brown Clay and Silt w/ Sand	0.0	4.7	9.5	14.2	18.9	12.9	89.8
		236.2	**169.7**	**83.4**	**68.1**	**62.6**		
B-15	Brown Clay and Silt w/ Sand	0.0	4.3	8.7	13.0	17.3	11.4	91.2
		225.8	**165.2**	**81.5**	**66.8**	**61.7**		

5.3 Corrosivity Testing

ANS Geo collected bulk samples from two (2) to three (3) feet grade at eleven (11) locations for corrosivity testing. The results of the testing, completed by ANS, are summarized within **Table 6** and detailed within **Attachment D**.

Table 6: Corrosivity Testing Summary

Location ID	pH	Sulfate (mg/kg)	Chloride (mg/kg)	Oxidation Reduction Potential (mV)	Soil Box (Calculated Resistivity) (Ω-cm)
B-01	7.5	360	531	213	270
B-04	7.5	390	349	151	1,420
B-05	7.9	60	246	169	4,290

Location ID	pH	Sulfate (mg/kg)	Chloride (mg/kg)	Oxidation Reduction Potential (mV)	Soil Box (Calculated Resistivity) (Ω-cm)
B-06	8.0	<15	201	190	3,820
B-07	8.5	510	75	212	3,170
B-08	8.3	630	48	227	9,820
B-10	8.2	<15	174	190	4,810
B-11	8.6	330	66	214	9,010
B-12	7.8	750	204	225	1,200
B-13	8.1	30	138	206	2,990
B-15	7.6	900	258	227	1,440

5.4 California Bearing Ratio

ANS Geo collected bulk samples from one (1) to three (3) feet below grade at five (5) locations for testing of California Bearing Ratio (CBR) in accordance with ASTM D1883 at approximately 95 percent of its Standard Proctor Density (ASTM D698). The results of the testing have been summarized within **Table 7** and are detailed within **Attachment D**. CBR testing was completed on soaked samples. Soak CBR values are generally lower than unsoaked CBR values.

Table 7: California Bearing Ratio Summary

CBR Sample ID	Associated Boring ID	CBR Ratio* (%)	Visual-Manual Soil Description
CBR-01	B-SS-01	3.1	Brown silty clay, little sand, trace gravel
CBR-02	B-BESS-01	3.9	Brown silty clay, trace sand
CBR-03	B-01	2.0	Brown silty clay, trace sand
CBR-04	B-10	4.7	Brown silty clay, little sand
CBR-05	B-11	15.4	Brown silty, clayey sand, trace gravel

*at 95% of Standard Proctor Density, soaked

6 Pile Load Testing Results

Table 8 presents the summarized results of the pile load testing program at each test location. Complete load testing logs are provided as **Attachment F** and should be referenced for detailed information.

Table 8: Pile Load Testing Summary

Pile Test ID	Pushed-to Depth (ft)	Target Pile Embedment Depth (ft)	Final Embedment Depth (ft)	Average Drive Time* (sec/ft)	Approx. Uplift Load at 0.5-inch Displacement** (lbs.)	Approx. Lateral Load at 0.75-inch Deflection*** (lbs.)
PT-01	0.5	7.0	7.0	2.6	8,100	3,950
PT-02	1.5	8.0	8.0	1.7	4,050	2,600
PT-03	2.0	9.0	9.0	1.5	7,800	3,800
PT-04	1.5	10.0	10.0	2.4	10,500	3,525
PT-05	1.0	7.0	7.0	2.8	7,400	3,950
PT-06	0.5	8.0	8.0	3.4	>12,000	5,725
PT-07	1.5	9.0	9.0	4.0	>12,000	4,175
PT-08	0.5	10.0	10.0	3.5	6,300	3,225

*Time per ft to advance pile via vibration from pushed-to depth to final embedment depth

Presented values are interpolated to 0.5 inches; see discussion in **Section 3.3.2 and below. Presented values rounded to nearest 25 pound increment.
*** Presented values are interpolated to 0.75 inches; see discussion in **Section 3.3.3** and below

Piles were tested for uplift capacity with load test limits of one (1) inch of vertical displacement or 12,000 lbs. vertical load, whichever was encountered first. Lateral load response was tested for up to 1 in. of lateral deflection or up to 5,500 lbs, whichever was encountered first.

ANS Geo noted the following general observations based on our pull-out testing campaign:

- All eight (8) piles were driven in less than 35 seconds. No piles encountered refusal during installation.
- Pushed-to depths at this site ranged from 0.5 to two (2.0) feet below grade with an average pushed-to depth of about 1.1 feet below grade; piles were subsequently advanced via vibration to final embedment depth.
    - Pushed-to depths of greater than about three (3) ft during installation may indicate relatively soft or loose soil at an installation location with associated lower uplift or lateral capacity.
- Observations and comments on uplift/tensile load testing:
    - During uplift/tensile load testing, the failure envelope tended to transition from a relatively elastic strain response into a plastic strain response after about 0.1 to 0.3 in. of vertical deflection.
    - Residual uplift deflection (deflection measured after last applied uplift load was released) generally ranged from about 0.3 to 0.8 inches.
    - Six (6) of eight (8) vertical pile load tests were arrested after reaching maximum allowable uplift of one (1.0) inch; the remaining two (2) piles reached the maximum uplift test value of 12,000 lbs.
- Observations and comments on lateral loads testing:
    - During lateral load testing, the failure envelope was relatively constant from zero (0) inches deflection until about 0.6 inches deflection; failure envelopes for two piles (PT-05 & PT-07) exhibited an inflection point at about 0.6 to 0.7 inches, after which the strain regime appears to transition to a more plastic strain-response.
    - Seven (7) of the eight (8) tested piles achieved the 1.0 lateral deflection limit prior to achieving the 5,500 lbs. load limit.
    - Residual deflection (deflection measured after final lateral load was released) generally ranged from about 0.2 to 0.4 inches.

For the purposes of analysis, vertical deflection limit is taken to be 0.5 inches, and lateral load limit is taken to be 0.75 inches.

7 Seismic Considerations

7.1 Site Classification

Based on the observations recorded within our subsurface investigation program and our familiarity with the project area, Site Class D is assumed as the average condition across the project site. Risk Category “II” was selected.

The seismic ground motion values for this this were obtained from the USGS Seismic Hazard Maps, referenced in ASCE 7-16 Standard, and provided as **Attachment G,** and are as follows:

- 0.2 second spectral response acceleration, S_S = 0.197 g
- 1 second spectral response acceleration, S_1 = 0.070 g
- Maximum spectral acceleration for short periods, S_{MS} = 316 g
- Maximum spectral acceleration for a 1-second period, S_{M1} = 0.167 g
- 5% damped design spectral acceleration at short periods, S_{DS} = 0.210 g
- 5% damped design spectral acceleration at 1-second period, S_{D1} = 0.111 g

7.2 Historic Seismic Events

According to the United States Geological Survey (USGS) earthquake catalog, there is no earthquakes that occurred within 50-mile radius in the last 50 years in Pinal County, Arizona.

7.3 Preliminary Seismic Evaluation

The designated seismic site class is anticipated based on results from our investigation program and using select areas of the site which have been investigated by ANS Geo. Based on our observation of subsurface conditions, estimated Site Class ratings, and review of USGS's 2018 National Seismic Hazard Map and publicly available information, ANS Geo concludes that the area is generally considered to be a low seismic hazard zone.

8 Foundation Design Considerations

ANS Geo anticipates that, as typical with solar farm construction, embedded posts, such as W6x9 H-piles, will be used to support the proposed solar panels. Conventional shallow foundations such as sonotubes, spread footings, or systems may also be utilized for equipment pads and associated support structures. Deep foundations consisting of drilled, cast-in-place concrete are anticipated for heavily-loaded structures in the substation and BESS area.

8.1 Corrosion Considerations

8.1.1 Buried Steel

Given the available testing results measuring the soil pH level, sulfate and chloride concentrations, resistivity, and redox potential summarized in **Table 6** in **Section 5.3**, in consideration with the soil and moisture conditions observed, the in-situ soil conditions generally indicate soils that are "moderately corrosive" to ferrous materials. It is anticipated that hot dipped galvanized steel with a minimum zinc coating thickness in accordance with ASTM A123 may be able to provide some protection prior to the increased rate of expected bare-steel corrosion loss over the project design life. However, we recommend evaluating the need for increased sacrificial steel thickness or an increased zinc coating thickness of 5-mil to meet the corrosion allowance for steel. For structural steel shapes, a minimum zinc coating thickness typically ranges from 3-mil to 4-mil depending on the steel section size as specified by ASTM A123. For example, a W6x9 shall contain a minimum zinc coating grade of 75 micrometers, or a 3-mil thick coating.

Steel section loss in piles decreases the structural load carrying capacity of the member as well as increases the member deflections. Therefore, it is recommended that the final structural design considers the useful life of galvanized (zinc) coating, followed by the anticipated loss of steel due to corrosion to ensure the structural integrity is maintained throughout the service life. Thicker pile sections, increased zinc coating thickness, or other corrosion protection measures may be necessary to accommodate any

reduction in structural capacity. For example, it is possible that a W6x12 pile with a standard zinc coating thickness could corrode to W6x9-equivalent section throughout the service life depending on the corrosion-related soil properties.

Soil Corrosion:

- **Soil corrosion induced loss of zinc (per side):**
    - **3 mil coating:** ~0.401 mil/year (depletion of zinc occurs in ~7.5 years)
    - **5 mil coating:** ~0.17 mil/year (depletion of zinc occurs in ~31 years)
- **Bare steel loss due to soil corrosion *after* loss of zinc (per side)**: 1.321 mil/year
    - **With 0 mil coating:** ~46.24 mil (at end of 35 years of design life)
    - **With 3 mil coating:** ~36.36 mil (at end of 35 years of design life)
    - **With 5 mil coating:** ~7.31 mil (at end of 35 years of design life)

Atmospheric Corrosion:

- **Atmospheric corrosion loss of zinc**: 0.002 to 0.016 mil/year (Category C2 - Zinc will last over 30 years)

Based on the limited corrosivity and resistivity testing results, it is our professional opinion that a 75-micrometer (3-mil) zinc coating would maintain an approximate lifespan of about seven and one-half (7-1/2) years prior to full depletion. Upon depletion of the zinc coating, bare steel loss would occur at an estimated rate of 1.321 mils (0.0013 inches) per year. For context, under these assumed conditions, a 3-mil coated W6x9 steel pile would experience approximately 36.36 mils (0.036 inches) of steel loss (per side) within a 35-year lifespan.

It is recommended that a separate, detailed corrosion evaluation report be developed by ANS Geo, or others, to interpret the soil corrosivity test results and estimate the rate of corrosion for zinc and bare steel resulting from exposure to the surrounding environment. This detailed corrosion evaluation may be provided to Cypress Creek and/or foundation engineer to incorporate the test results into the design and selection of pile foundations, or other buried steel across the site.

8.1.2 Buried Concrete

Corrosive soils can have a significant impact on below-grade concrete foundations by potentially damaging or weakening the concrete. One of the primary forms of concrete deterioration due to exposure to corrosive soils is sulfate attack. Sulfate attack is a common form of concrete deterioration which occurs when concrete comes in contact with water or soil containing sulfates. Sulfates are typically found in some soils, in seawater, and in wastewater treatment plants. The principal factors which affect the rate and severity of sulfate attack are permeability of concrete, concentration of sulfates, tricalcium aluminate (C_3A) content, and calcium hydroxide content. When sulfates react with C_3A, it will form ettringite which will expand and create internal tension within the concrete that eventually leads to cracking. Therefore, a low C_3A content is one of the main considerations when selecting cement for sulfate resistance.

Recommended concrete properties, including cement type, to resist sulfate attack are based on the site-specific sulfate exposure class, as per ACI 318-19, Table 19.3.1.1. The severity of the exposure of concrete to sulfate is divided into four classes (S0 through S3) depending on the water-soluble sulfate in soil (percent by mass) or dissolved sulfates in water (ppm).

Results of ANS Geo's laboratory testing indicate that water-soluble concentration within soil at two to three feet were equal to or lower than **900 mg/kg.** A sulfate exposure class of **S0 (Water-Soluble Sulfate (SO_4^{2-}) in soil, percent by mass < 0.1%)** is expected to be appropriate for concrete in contact with soil similar to those studied during this investigation. For sulfate exposure class **S0**, external sulfate attack is not likely to be of concern, and there are no recommended restrictions on cement type. It should be noted that the

upper tested limit of 900 mg/kg is on the high end of sulfate exposure class S0. Additionally, multiple samples tested were on the higher end of sulfate exposure class S0. It is recommended that additional testing be completed at the site to determine if S0 is a suitable sulfate exposure design risk classification across the project site.

ANS Geo recommends that concrete adheres to the requirements of ACI 318-19, Table 19.3.2.1 for concrete properties including maximum water-cement ratio, minimum compressive strength (psi), and cement type for the site-specific sulfate exposure class. These recommendations do not consider acidic or basic soils, aggregate attack, or other concrete degradation caused by chemical change which should additionally be considered during cement aggregate selection and mix design. For as-received results of corrosivity testing, see **Attachment D**.

8.2 Frost Considerations

8.2.1 Frost Depth

According to the Department of Development Services of Arizona, the local frost depth within Pinal County, Arizona, is mapped to exist at approximately 12 inches below grade. ANS Geo recommends that all shallow (non-pile) foundations should be embedded at least to this depth. Shallower foundation depths may also be accommodated, provided they are appropriately frost-protected by way of appropriately designed haunched edges, foam insulation, and/or free-draining structural fill extending to the frost depth. Adequate drainage away from structure driplines and foundations is imperative for structure performance.

For shallow foundations which are not load-bearing or sensitive to movement, such foundations may be able to be founded at shallower depths. ANS Geo should be contacted to provide recommendations for minimum embedment depth in this scenario.

8.3 Soil Shrink & Swell Potential

Shrinkage and swelling of soils refer to the volumetric change (decrease and increase) exhibited in primarily fine-grained soils due to a change in moisture conditions. The extent of shrinking and swelling is largely influenced by the type and amount of clay present in the native near-surface soils. Higher-risk soils generally include fine-grained material with a high clay content, greater than 50 percent by weight, and liquid limits of 50 percent or higher (fat clays).

Based on laboratory results and onsite observations, the Stratum I and Stratum II soils throughout the project site did not show properties associated with soil shrink/swell.

8.4 Recommended Parameters for PV Array Pile Design

Based on our interpretation of the subsurface conditions observed within our limited investigation program, and the laboratory testing results, ANS Geo recommends that the soil parameters in **Table 9** be considered for axial and lateral preliminary driven pile designs within array areas only.

Table 9: Recommended LPILE Parameters for Array-Area Driven Pile Design

Depth (ft)	Material Model	Total Unit Weight (pcf)	Internal Friction Angle	Cohesion (psf)	Soil Modulus, k_{static} (pci)	Allowable End Bearing[1,2] (psf)	Allowable Side Resistance[1,2] (psf)
0 – 1	Sand (Reese, et al.)	100	31°	--	[default]	--	--
1 – 3	Sand (Reese, et al.)	110	34°	--	[default]	--	200
3 – 5	Silt/Cemented Soil	115	35°	1,250	[default]	--	275

Depth (ft)	Material Model	Total Unit Weight (pcf)	Internal Friction Angle	Cohesion (psf)	Soil Modulus, k_{static} (pci)	Allowable End Bearing[1,2] (psf)	Allowable Side Resistance[1,2] (psf)
5 - 7	Silt/Cemented Soil	118	35°	1,500	[default]	2,000	300
7 – 10	Silt/Cemented Soil	120	36°	1,500	[default]	2,500	375
10 – 15	Silt/Cemented Soil	120	36°	1,650	[default]	3,000	400

1. These recommendations consider a minimum factor of safety of 1.5 for skin friction conditions on the basis of experimental field data collected for this study. Allowable end-bearing is presented on the basis of soil borings utilizing a minimum factor of safety of 2.5.
2. Equivalent box perimeter area approach was utilized for axial capacities.
3. Allowable end bearing values are recommended based on strain compatibility with mobilized allowable side resistances.
4. Soil parameters from 10 feet to 15 feet are recommended based on soil boring data; no pile load testing was completed within this zone

While no groundwater was encountered during the time of this investigation, if groundwater is encountered at a later investigation date, a design effective unit weight value (calculated by subtracting the unit weight of water, 62.4 lb/ft^3, total unit weight values prescribed in **Table 9**) should be considered for soil layers below the design (average) groundwater table, if applicable.

ANS Geo recommends that allowable side resistance within the upper 12 inches be neglected due to potential erosion, frost impact, or surficial disturbance. For lateral design considerations, ANS Geo additionally recommends that lateral resistance within the upper 12 inches be neglected to account for potential scour; this depth should be confirmed in the Civil Engineer of Record's hydrology study. Pile load testing results and subsurface observations were evaluated by ANS Geo using LPILE software to provide these refined soil parameters. ANS Geo notes that the soil parameters depicted within Table 9 represent values calibrated to curve-fit our lateral load test data; these parameters should not be relied upon for other site foundation designs. It is our recommendation that a verification load testing program and detailed structural calculations, using the intended pile sections and design loads, be performed prior to construction to confirm these recommendations.

ANS Geo notes that these recommendations are based on typical criteria we have observed through our professional experience; once a racking vendor has been selected, the racking vendor's specific criteria should govern over our recommendations.

8.5 Recommended Soil Parameters – Shallow Foundations

ANS Geo anticipates that shallow foundations such as concrete footings, pads, or sonotubes will be used to support transformers, inverters, and similar equipment. As such, we recommend the soil parameters provided in Table 10 be considered for such foundation designs. The parameters apply across site-wide shallow foundations and are based on unsaturated, worst-case observed soil conditions. The foundation depths presented in Table 10 are based on grades existing at the time of our investigation. Load-bearing foundations should be installed atop properly prepared subgrade as indicated in Section 9.3.

Table 10: Recommended Soil Parameters for Shallow Foundations

Stratum	Depth (ft)	Material	Max. Allowable Bearing Pressure (psf)		Vertical Subgrade Modulus	Soil / Concrete Friction Factor
			Strip Footings/ Grade Beams	Isolated Square/ Circular Footings		
I	1 to 2	Lean Clay (CL), Silty Clay (CL-ML) Silt (ML), Silty Sand (SM)	1,000	1,250	20	0.33
I	2 to 3	Lean Clay (CL), Silty Clay (CL-ML) Silt (ML), Silty Sand (SM)	1,250	1500	40	0.33
I	3 to 4	Lean Clay (CL), Silty Clay (CL-ML) Silt (ML), Silty Sand (SM)	1,500	1,750	50	0.35
I	4 +	Lean Clay (CL), Silty Clay (CL-ML) Silt (ML), Silty Sand (SM)	2,000	2,500	60	0.35

The depths and associated allowable bearing pressures presented in **Table 10** are relative to ground surface existing at the time of our study. If final site grading differs from grade existing at the time of our investigation by more than plus or minus two (2) feet, we should be contacted so that these recommendations may be reviewed and, if necessary, updated.

ANS Geo notes that **Table 10** includes bearing capacities for layers which may be impacted by frost. For foundations which are founded within the frost zone (as noted in **Section 8.2**), these foundations should be frost-protected by way of appropriately designed haunched edges, foam insulation, and/or free-draining structural fill extending to the frost depth. Should the maximum allowable bearing capacity be lower than required, ANS Geo recommends over-excavating below the recommended excavation depth and replacement of native material using additional structural fill placed and prepared as noted in **Section 9.3**. For each additional 12-inches of over-excavation and replacement of native sand or clay subgrade with structural fill beyond the recommended minimum recommended 12-inch structural fill pad, an increase of 250 psf can be achieved. For example, if existing subgrade is overexcavated to a depth of two (2) feet and backfilled with structural fill, allowable bearing capacity may be increased from 1,000 psf to 1,250 psf. Structural fill must be consistent with gradation, plasticity, placement, and compaction requirements detailed in this report,

The capacities and parameters noted in **Table 10** are based on foundation considerations and assumptions detailed in **Section 9.3**. The above recommendation in **Table 10** is based on isolated spread footings and strip footings, with strip footings having dimensions producing more than 100 square feet.

8.5.1 Mat Foundations

Mat foundations (100 square feet or larger, such as larger substation slabs) should be founded on at least 18 inches of properly compacted structural fill as indicated in **Section 9.3**. Recommended soil parameters for mat foundations can be found in **Table 11** below. Allowable bearing capacities as presented are applicable to foundation elements bearing on native, undisturbed soil.

Table 11: Recommended Soil Parameters for Mat Foundations

Stratum	Depth (ft)	Material	Max. Allowable Bearing Pressure (psf)		Vertical Subgrade Modulus	Soil / Concrete Friction Factor
			100 to 500 sq. ft	> 500 sq. ft		
I	1.5 to 2	Lean Clay (CL), Silty Clay (CL-ML) Silt (ML), Silty Sand (SM)	750	1,000	20	0.33
I	2 to 4	Lean Clay (CL), Silty Clay (CL-ML) Silt (ML), Silty Sand (SM)	1,000	1,250	40	0.35

Rigid mat foundations placed on properly compacted fill may be designed for a maximum allowable bearing capacity indicated above will experience a maximum settlement of two (2) inches. The mat foundation should be constructed on the compacted structural fill layer. Adequate construction joints and reinforcement should be provided to reduce the potential for cracking of the floor slab due to differential movement.

Lastly, sliding resistance of any shallow foundations will be largely provided by the friction between the concrete foundation and the underlying subgrade soils. Although the concrete foundation will be separated from the native soil by a compacted structural fill layer, we have conservatively considered direct contact on native fine-grained soils for purposes of obtaining a design value. The base friction coefficient for the foundation on native soils are provided in the above table. The strains required to mobilize base friction are not compatible with the strains required to mobilize passive resistance. Therefore, we recommend that passive earth pressure be ignored.

8.6 Recommended Soil Parameters – Deep Foundations

If critical substation structures or transmission poles are subjected to heavy compressive and/or overturning loads, it is recommended that drilled pier foundations be used. Geotechnical design values have been created for use in Ensoft LPILE, Fad Tool's MFAD, or CAISSON software. These parameters have been provided in **Table A** immediately preceding the attachments.

8.6.1 Deep Foundation Capacities

Design capacities can be calculated using the diameter of the shaft, depth of the shaft, installation method, and various geotechnical parameters, provided in **Table A**, that define how the soil will behave under load. A summary of the recommended ultimate skin friction and end bearing values for drilled shaft design is provided in **Table A**. Piers should extend a minimum of 1.5 pier diameters into a given soil stratum to fully develop the recommended design end bearing strengths. Please note that the skin-friction and end-bearing values presented in **Table A** are *ultimate* (not allowable). A minimum factor of safety of two (2) must be applied to the skin friction values and three (3) to the end bearing capacities for design purposes.

Post-construction settlement for drilled piers designed for end bearing should be limited to one (1) inch or less, based on the recommended capacities provided herein. Foundation loads and dimensions would be required to calculate an explicit anticipated settlement. ANS Geo should be consulted with the final dimensions and loading of the proposed foundations to allow calculation of the anticipated settlement of each structure and confirm the settlement remains within a serviceable limit.

8.6.2 Deep Foundation Construction

Based on the presence of sandy soils encountered across the project area and at all explored boring depths, temporary casing may be required, depending on the design embedment depth of the piers, to maintain borehole integrity prior to placement of reinforcing steel and concrete. Contractors should be required to provide bid prices for varying sizes and lengths of temporary casing based on the design depths and diameters of deep foundation elements. Piers should be poured the same day they are drilled and must not be left open overnight. If a pier cannot be poured on the same day as drilling, they may be loosely backfilled and re-drilled the following day for installation.

Pier holes should be inspected for verticality (plumbness), proper depth of drilling, proper bearing strata, and cleanliness of the bottom of the excavation prior to introduction of reinforcing steel or concrete. ANS Geo encourages that concrete should be placed via tremie method to avoid consolidation or segregation of the aggregates in the concrete. Concrete should not be allowed to freefall more than 6 feet.

9 Construction Recommendations

9.1 Excavation

Depending on proposed foundation configurations, degree of earthwork, and depth of utilities, some excavations may extend deeper than four (4) feet below grade. Temporary excavations deeper than four (4) feet should be shored or sloped and benched, in accordance with OSHA regulations, to ensure safe working conditions within the excavations. For benching purposes, overburden clays may be considered as “Type A” material and should be sloped no steeper than 3/4H:1V (horizontal to vertical). Clayey sands, “Type B”, should be limited to 1H:1V or flatter. “Type C”, flowing (non-cohesive) sands, should utilize 1-1/2H:1V or shallower. All OSHA soil classifications should be field-determined by the contractor’s “competent person” prior to excavation. Any proposed shoring systems should be designed by the contractor’s “competent person”, be certified by a Professional Engineer licensed in the State of Arizona and should be submitted to the engineer for review.

9.2 Dewatering

At the time of our geotechnical investigation, perched water and/or groundwater was not encountered within any soil borings. As such, dewatering is not anticipated for shallow excavations. Notwithstanding, the contractor should be prepared to manage groundwater, perched water, and/or infiltrated stormwater as needed using localized sump-and-pump, wellpoint, or similar techniques to allow for concrete foundation construction in-the-dry. Water discharge should be managed in compliance with applicable state and local regulations. The contractor should be sure to grade the surface as necessary to divert stormwater away from open excavation to the extent possible.

In addition, ANS Geo notes that the presence of standing water or shallow water may exist across the site during construction and development. The presence of this shallow water or standing water may make the native soil subgrade softer, and it may require additional site preparation to allow vehicles and equipment to pass. Furthermore, based on the season and time of construction, precipitation may cause wetter soil conditions which need to be considered and managed. The Contractor should take these conditions into consideration, including the need for additional access stone and/or cement or lime for the stabilization of these conditions.

9.3 Subgrade Preparation and Compaction

Prior to the installation of shallow concrete foundations, ANS Geo recommends over-excavating the subgrade by at least 12 inches, proof-rolling the subgrade, lining the exposed material with a geotextile

separation fabric, and bringing the subgrade back up to the design foundation elevation with compacted structural fill as specified within **Table 12**.

Exposed subgrades should be proof-rolled to verify subgrade conditions and identify weak, soft, or compressible subgrade areas. Subgrades should be scarified to a depth of at least eight (8) inches, moisture conditioned to within plus or minus two (2) percent of optimum moisture, and to ≥95% of maximum density, each as determined by ASTM D698 Standard Proctor.

If geotextile fabric is not desired, an additional two (2) inches of stone should be provided to account for some impregnation of the stone into native soil, to maintain a capillary break, and maintain drainage.

Native material beneath the separation fabric should be inspected for unsatisfactory conditions such as standing water, frozen soil, unsuitable soil, organics, protruding cobbles or boulders, or deleterious materials. Should any unsatisfactory conditions exist within the native subgrade, the excavation should be undercut an additional six (6) inches (18 total inches beneath proposed foundation depth) prior to placement of the geotextile separation fabric.

Table 12: Recommended Specification of Structural Fill

Sieve Size	Percent Passing
3-inch	100
¾ inch	60 – 100
No. 8	35 – 80
No. 200	0 – 12
Max. Liquid Limit	**Max. Plasticity Index**
30	10

Should structural fill material not be available in accordance with the specifications highlighted in **Table 12**, ANS Geo should be contacted to evaluate alternate materials. Structural fill should be placed in loose lifts not exceeding 12-inches if using large equipment, or 8-inches if using hand-operated tools such as jumping jacks, tamping plates, or similar equipment. Structural fill should be placed within plus or minus two (±2) percent of its optimum moisture content and be compacted to at least 95 percent of its Proctor Density (ASTM D698). The subgrade preparation (over-excavation, fabric, and structural fill) should horizontally extend at least two (2) times the compacted vertical structural fill thickness beyond each edge of the foundation. For example, a six (6)-inch over-excavation and compacted structural fill thickness should extend at least 12 inches laterally beyond each foundation edge.

9.4 Backfilling and Compaction

9.4.1 Re-Use of Native Soils

ANS Geo notes that any native soils with considerable fine-grained content (more than 20 percent) may be difficult to handle, place, and compact without proper moisture conditioning and protection. ANS Geo recommends the following measures be considered to reduce the adverse impacts of moisture-sensitive soils:

- Positive measures should be implemented and maintained to intercept and direct surface water away from moisture-sensitive subgrade surfaces.
- Subgrade surfaces should be sloped and, as appropriate, seal-rolled to facilitate proper drainage. Surfaces should be properly prepared in anticipation of inclement weather. Moisture should not be allowed to collect on subgrade surfaces.
- To the extent practical, the limits of exposed subgrade should be minimized.
- Construction traffic should be limited to properly constructed haul roads.
- Disturbed soils should be removed and replaced with compacted controlled fill material.
- In place moisture contents should be maintained with two percent wet/dry of the optimum moisture content as determined by the Proctor Test (ASTM D698).

Native Stratum I or Stratum II soils may be re-used across the project area for fill in landscaped areas; however, native soil should not be used under foundations or load-bearing structures, where imported structural fill typically specified. Native material used as backfill for cable trenches should be handled and placed at a moisture content at or above its optimum value to ensure representative thermal properties are maintained. Native soils may also be used in required "fill" areas within the project limits, provided that the material is placed and compacted consistent with the "general backfill" recommendations described herein, and that recompacted native soils are not supporting foundation elements. The recommendations for foundations bearing in native soils as presented in **Table 9**, **Table 10**, **Table 11**, and **Table A** may not be appropriate for re-worked or replaced and recompacted native soils.

9.4.2 General Backfill

In areas around and above installed foundations, large utilities, and other buried site features, ANS Geo recommends well-graded granular soils with less than 20 percent fine-grained content may be used as general backfill. Native soils meeting these criteria, if and where present, may also be used. General backfill material should be screened of any cobbles, boulders, and any particles larger than 3 inches in diameter, and should not be used beneath any load-bearing structures. General backfill should be placed in loose lift thicknesses not exceeding eight (8) inches and be compacted to at least 95 percent of maximum density as determined by Standard Proctor (ASTM D698). Soil used as backfill should not be handled when frozen and should be free of excessive moisture, organics, and deleterious material.

In fill areas beneath foundations and load-bearing structures, ANS Geo recommends structural fill as described in **Section 9.3** and **Table 12**. Granular flexible base for access road construction should be composed and placed as described in **Section 9.5**.

9.4.3 Compaction Testing

Compaction testing should be performed at each discrete equipment foundation location for each compacted lift at a minimum of one test per 2,500 square feet. For linear sections such as trenches, the contractor and/or the owner's representative should perform a visual trench bottom inspection along the length of the trench to confirm no angular, sharp, deleterious, frozen, trash, organic material, or standing water exists at the bottom of trench. For backfilling and compaction of trenches, a minimum of one compaction test per 500 linear feet and minimum one per lift, should be performed. In all cases, the subgrade should be maintained, covered, or protected if concrete is not immediately placed. Excessively wet or dry material should be removed or improved prior to the placement of foundations.

9.5 Access Roads

ANS Geo understands that, as part of the work, access roads will be constructed to provide access for heavy equipment such as a main power transformer, poles, and other ancillary structures, as well as long-term access for site maintenance purposes. It is expected that new, unpaved paths will be constructed of aggregate material placed on native, compacted and proof-rolled subgrade stripped of topsoil and other organic material.

During construction, the delivery and movement of heavier loads such as transformers, inverters, delivery of steel and concrete, and transportation of cabling is expected. Construction loads and vehicles are larger and heavier than the expected vehicles during long-term operation; however, the duration of these activities will be much shorter considering the access road life. Designing for short-duration, construction-phase access road would require increased thickness of aggregate, the use of geogrid, or other soil improvement, but these increased roads would be over-designed for long-term operation including routine light-duty trucks, maintenance vehicles, and infrequent accessibility to emergency personnel including fire-fighting rigs. Therefore, it is typical for access road design to be completed considering the thickness of road base required for long-term use since it is expected that the site subcontractor will be able to maintain serviceable access roads throughout construction and at turn-over of the facility by backfilling ruts greater than two-

inches, back-blading and re-compacting loose and rutted areas, re-shaping roads to promote drainage and safe passage of traffic, and other improvements.

Considering the above, ANS Geo has performed an evaluation of the required access road thickness based on infrequent emergency access for firefighting vehicles as well as occasional light vehicular traffic. Our preliminary road evaluation for a post-construction access road assumed the following:

Table 13: Access Road Design Considerations

Design Consideration	Design Assumption
Equivalent Single-Axle Loads (ESALs)	5,000
Allowable Rut Depth	2 inches
Service Life	35 years
Subgrade Soil	Proof-rolled Stratum I brown to light brown Silt (ML), Clay (CL, CL-ML), or Silty, Clayey Sand (SC-SM)
Assumed Min. Design Subgrade CBR	3% (following proof-roll and compaction)

ANS Geo recommends that road base material (flexible base) consists of clean, crushed stone or roadbase material with particle size distribution as presented in **Table 14**.

Table 14: Gradation of Crushed Stone for Access Roads

Sieve Size	Percent Passing
1 ½-in.	100
¾-in.	55 – 90
No. 4	25 – 50
No. 50	5 – 20
No. 200	3 – 10
1 ½-in.	100

Alternatively, access road flexible base/aggregate stone gradation and maximum plasticity index requirements may conform to the requirements for Aggregate Class 1, 2, 4, or 5 of Table 303-1 within Section 303 of the Arizona Department of Transportation (ADOT) *Standard Specifications for Road and Bridge Construction, 2021*.

ANS Geo has provided a number of access road configurations in **Table 15** based on the assumptions in **Table 13**. The use of a woven geotextile fabric such as a Mirafi 270, or similar, is recommended and presented within our evaluation. In addition, it is possible and likely that certain subgrade areas will require stabilization or additional crushed stone thickness. The overall cross-sectional thickness may be reduced by the use of a Class II geogrid (such as Tensar BX1200 or TX7). Cement can also be utilized to reduce the access road crushed stone thickness. This access road thickness can also be reduced if a greater rut depth is allowed to minimize the access road thickness as long as maintenance is performed to restore the roadway to a serviceable condition as damage occurs. A comparison of various options and configurations has been provided in **Table 15.**

Table 15 – Recommended Aggregate Thickness for Permanent Site Access Roads

Aggregate Construction Option	Access Road Cross Section
Aggregate on prepared native soil	17 inches of Crushed Stone
Aggregate with geotextile fabric	10 inches of Crushed Stone over non-woven geotextile
Aggregate with Class II geogrid and geotextile fabric	6 inches of Crushed Stone over Class II geogrid atop non-woven geotextile
Aggregate over Cement-Stabilized Subgrade	10-inch cement treatment depth of native subgrade w/ 7-9% cement by weight + 4 inches Crushed Stone for wearing surface

Prior to roadway construction, the subgrade should be stripped of vegetation and topsoil, and should be confirmed to maintain a minimum CBR value assumed in **Table 13** and compaction to 95 percent of

maximum density as determined by Standard Proctor (ASTM D698). Should the desired CBR and/or target compaction not be achieved, ANS Geo first recommends that the upper 10-inches be scarified, moisture-conditioned (dried or wetted to within +/- 2% of optimum moisture content), and re-placed and re-compacted. Should this not produce the desired minimum CBR and subgrade performance, soil improvement such as additional stone, and/or additional stabilization may be required to meet ANS Geo's minimum design recommendations. Crushed stone should be placed in loose lifts not exceeding eight (8) inches in height and be compacted to ensure a minimum CBR of 35 percent is achieved.

When using geogrid, it is recommended that a nonwoven geotextile fabric be placed between the clay subgrade and the geogrid to provide separation and avoid the stone aggregate to be blinded with fines. If geotextile fabric is not desired, an additional two (2) inches of stone should be provided to account for some impregnation of the stone into native soil. When geogrid is used, it should be placed in accordance with manufacturer's recommendations such as three (3) foot overlap, fastening overlapping areas, and material storage and handling.

If chemical stabilization is performed, the contractor should perform any necessary due diligence to confirm their design, means, and methods. The subgrade should be verified below the treatment depth to evaluate the CBR value of the subgrade prior to treatment. In addition, the recommended chemical stabilization application rate should be taken as an assumed average. The actual application rate should be determined by the contractor and may vary based on the tested and desired subgrade CBR along the proposed roadway, the treatment depth required, and the moisture content. The application rate and treatment depth should be evaluated by performing several test strips at the project site prior to the start of construction and testing the test strips in the field using a dynamic cone penetrometer or plate load test to confirm the CBR. Then, once the application rate and depth are evaluated, verification and calibration testing should be performed using the dynamic cone penetrometer at intervals of no less than 500-linear feet along the access roadway.

ANS Geo understands that chemically-stabilized subgrades have been shown to deteriorate over time, and the performance of the treated subbase may require some additional maintenance during the design life of the project. Should chemically-stabilized roads be used, ANS Geo recommends that some maintenance (such as adding additional stone, where needed) be considered; or, an additional two inches of crushed stone can be added to the wear course to accommodate the potential deterioration of the chemically-stabilized subgrade.

Field conditions should be verified at the time of construction. Subgrade conditions could vary based on excavation depths, weather, drainage, and construction practices that disturb the subgrade. Dynamic cone penetrometer (DCP) testing should be completed on the prepared subgrade per ASTM D6951 and in a consistent manner by trained personnel to obtain useful and reliable data. ANS Geo recommends that, at minimum, DCP testing should be completed at a frequency of one test per each 500-linear feet of access roadway. Should conditions vary, this frequency may be increased or decreased based on observations from the site, or at the discretion of the Geotechnical Engineer of Record, Civil/Structural Engineer of Record or Owners Engineer. The tests should be staggered across the width of the road at outer wheel-tracks (left and right) and the centerline. However, the variability of the road subgrade strength will only become fully apparent when the tests have been carried out. In order to ensure statistical reliability, at least ten tests should be taken in each uniform section. The use of DCP testing may also be used to decrease the thickness of access road stone, if the prepared subgrade is stiffer (is confirmed to have a higher CBR) than ANS Geo's design assumption and no visible surface water or pumping is observed in the section of roadway being tested. ANS Geo can be contacted to provide a table of access road stone thickness compared to field-confirmed CBR.

ANS Geo notes that the presence of standing water may exist across the site around times of precipitation, during construction and development. The presence of water may make the native soil subgrade softer, and it may require additional site preparation to allow vehicles and equipment to pass. The Contractor should take these conditions into consideration, including the need for additional access stone and/or cement or lime for the stabilization of these conditions.

9.5.1 Cement-Stabilized Subgrade

In areas where silty, clayey sand subgrades are cohesionless and difficult to place or compact, stabilization of the subgrade may be desired in order to make access road subgrades more workable and accessible, while also decreasing the required thickness of granular flexible base/crushed stone. Cement treatment may follow the procedure and testing requirements outlined in Section 302 of the ADOT *Standard Specifications for Road and Bridge Construction, 2021*. Verification of subgrade following cement treatment may be completed by dynamic cone penetrometer taken at regular intervals along the application alignment. Actual application rate should be determined by the contractor and may vary based on the treatment depth required, moisture content, or variations in soil composition.

9.6 Pile Installation Considerations

ANS Geo anticipates that, as typical with solar farm construction, solar panels will be supported by steel H-Piles (wide-flanged sections) driven to approximately 8 to 10 feet below grade. These steel piles are typically installed via direct-push, vibration, and/or percussive hammer methods. ANS Geo recommends verification load testing prior to construction using final design loads, the intended pile profile, and the planned pile depth.

10 Limitations

ANS Geo notes that the findings and recommendations presented within this Geotechnical Report are based on our investigation programs conducted between December 2022 and February 2023, and our engineering judgment. In addition, the current level of investigation does not represent the level of investigation to support a final design, and it is expected that a final, detailed-level geotechnical investigation will be completed at the site prior to final design and start of construction by an EPC to confirm and further define the recommendations provided herein. If ANS Geo's limited and preliminary investigation is used for final design, our recommendations shall only be valid for the exact and specific locations at which field investigations or laboratory testing was completed. All other areas and regions of the site which are not investigated under a final investigation to confirm if our preliminary and limited investigation is valid for the entire project site will be at the risk of the individual or entity using this Report.

If actual site subsurface conditions differ from the inferred conditions on which ANS Geo has based our confirmation-dependent recommendations, ANS Geo will need to modify our confirmation-dependent recommendations to develop final recommendations.

Table A

Recommended Substation Foundation Parameters

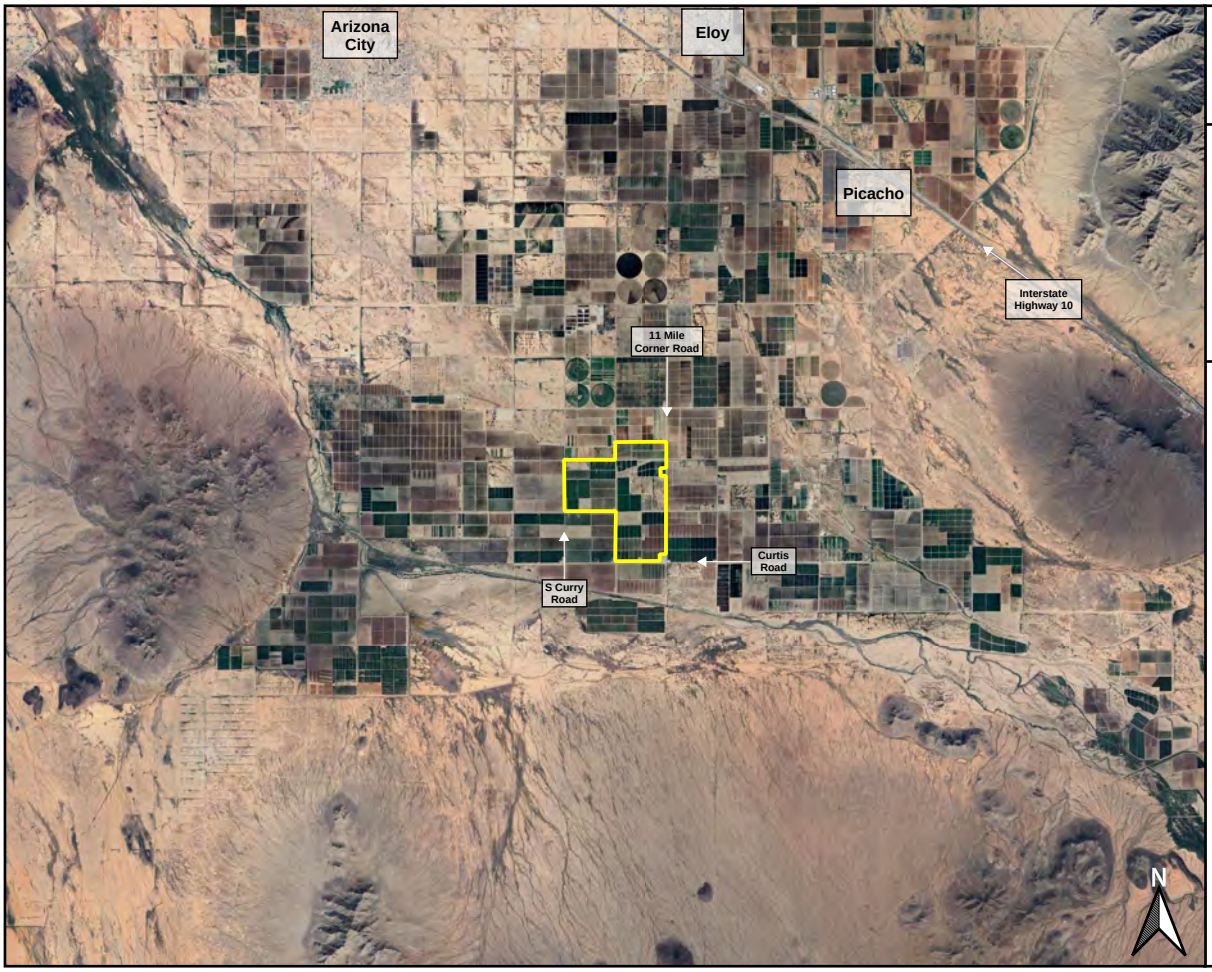
Table A - Recommended Deep Foundation Geotechnical Parameters

Appr. Depth to Top of Layer [ft]	Appr. Depth to Bottom of Layer [ft]	LPILE Material Model	LPile / MFAD			MFAD	Drilled Shafts (Lpile)			Active Earth Pressure Coefficient, K_a	Passive Earth Pressure Coefficient, K_p	Drilled Shafts	
			Effective Unit Weight[1] [pcf]	Friction Angle soil or rock [°]	Cohesion of soil [psf]	Deformation Modulus, Ed [ksi]	p-y Modulus, k (Static Loading) [pci]	p-y Modulus, k (Cyclic Loading) [pci]	Strain Factor, e50			Ultimate Skin Friction [3, 5] [ksf]	Ultimate End Bearing [4, 5] [ksf]
0	1	Stiff Clay w/o Free Water	100	--	500	0.3	--	--	0.02	1.00	1.00	---	---
1	2	Stiff Clay w/o Free Water	105	--	500	0.3	--	--	0.02	1.00	1.00	0.17	--
2	6	Stiff Clay w/o Free Water	110	--	1,000	0.6	--	--	0.009	1.00	1.00	0.39	--
6	16.5	Stiff Clay w/o Free Water	116	--	1,500	0.7	--	--	0.007	1.00	1.00	0.65	7.7
16.5	26.5	Sand (Reese)	120	30	--	0.5	60	--	--	0.33	3.00	0.50	10.6
26.5	36.5	Sand (Reese)	125	34	--	1.6	165	--	--	0.28	3.54	0.80	19.9
36.5	50	Sand (Reese)	130	37	--	2.1	200	--	--	0.25	4.02	1.10	28.4

1. Although groundwater was not encountered in our borings in the vicinity of the substation and BESS area, soil effective unit weight should be reduced by 62.4 pcf for soil below groundwater elevation.
2. Side Resistance within the upper one (1) foot should be neglected due to antipated erosion and frost considerations.
3. ANS Geo recommends that a safety factor of 2.0 be applied to passive earth pressure coefficients and Ultimate Side Resistance values presented herein.
4. ANS Geo recommends that a safety factor of 3.0 be applied to the Ultimate End Bearing values presented herein.
5. ANS Geo recommends any foundation embed a minimum of 1.5 times the diameter of the shaft into a given layer to fully develop the design end bearing capacity.

Attachment A

Site Investigation Mapping



ANS GEO

Client:

CYPRESS CREEK RENEWABLES

ATTACHMENT A-1
SITE VICINITY MAP

CYPRESS CREEK RENWABLES CACTUS FLOWER SOLAR PROJECT
PINAL COUNTY, ARIZONA

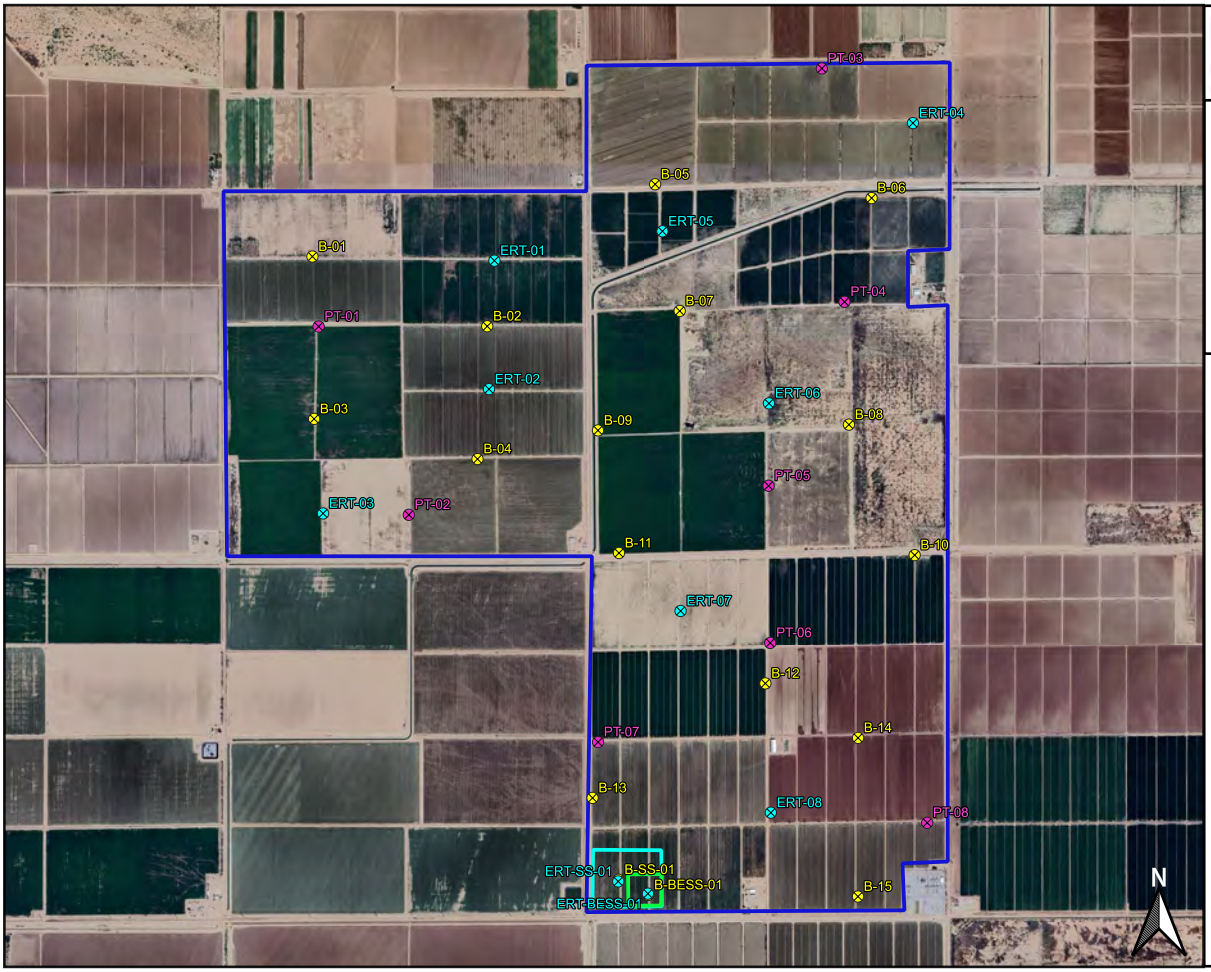
Legend

Project Boundary

0 5,000 10,000 ft

Absolute Scale: 1 inch = 10,000 feet
Scale at 11" x 17" AS SHOWN

Prepared by: Pete Suarez
Date: March 22, 2024
Drawing Number: Site Vicinity Map Rev.0



ANS GEO

Client:

CYPRESS CREEK RENEWABLES

ATTACHMENT A-2
INVESTIGATION LOCATION PLAN

CYPRESS CREEK RENEWABLES
CACTUS FLOWER SOLAR PROJECT
PINAL COUNTY, ARIZONA

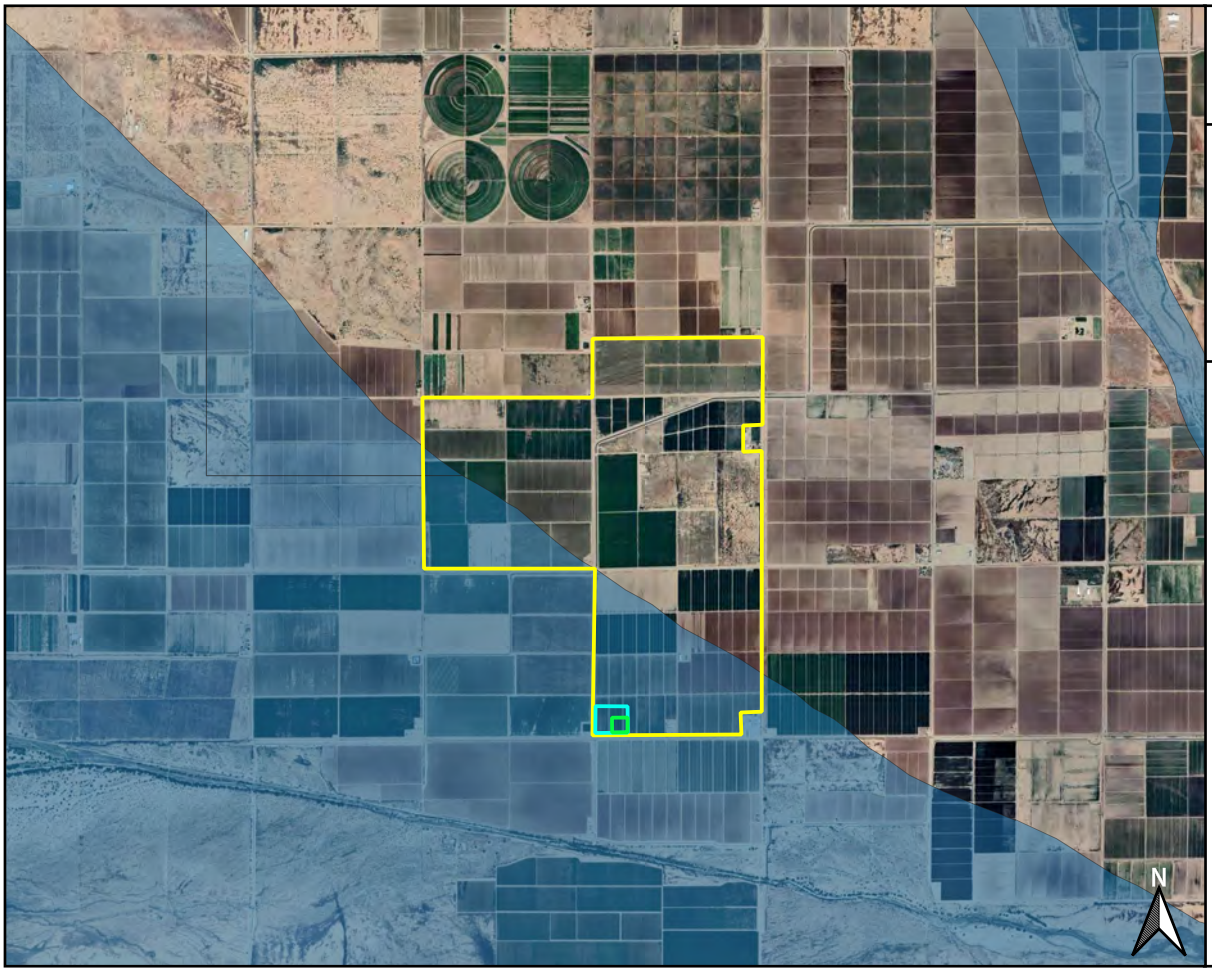
Legend

- Project Boundary
- Substation Boundary
- BESS Boundary
- Soil Boring Locations
- Pile Load Test Locations
- Electrical Resistivity Test Locations

0 1,000 2,000 ft

Absolute Scale: 1 inch = 2000 feet
Scale at 11'' x 17'' AS SHOWN

Prepared by: Amna Al-Ashkhari
Date: February 21, 2024
Drawing Number: ILP-1 Rev.3



ANS GEO

Client:

CYPRESS CREEK RENEWABLES

ATTACHMENT A-3
FEMA FLOOD HAZARD MAP

CYPRESS CREEK RENEWABLES
CACTUS FLOWER SOLAR PROJECT
PINAL COUNTY, ARIZONA

Legend

- Project Boundary
- Substation Boundary
- BESS Boundary

Special Flood Hazard Areas

- 1% Annual Chance Flood Hazard

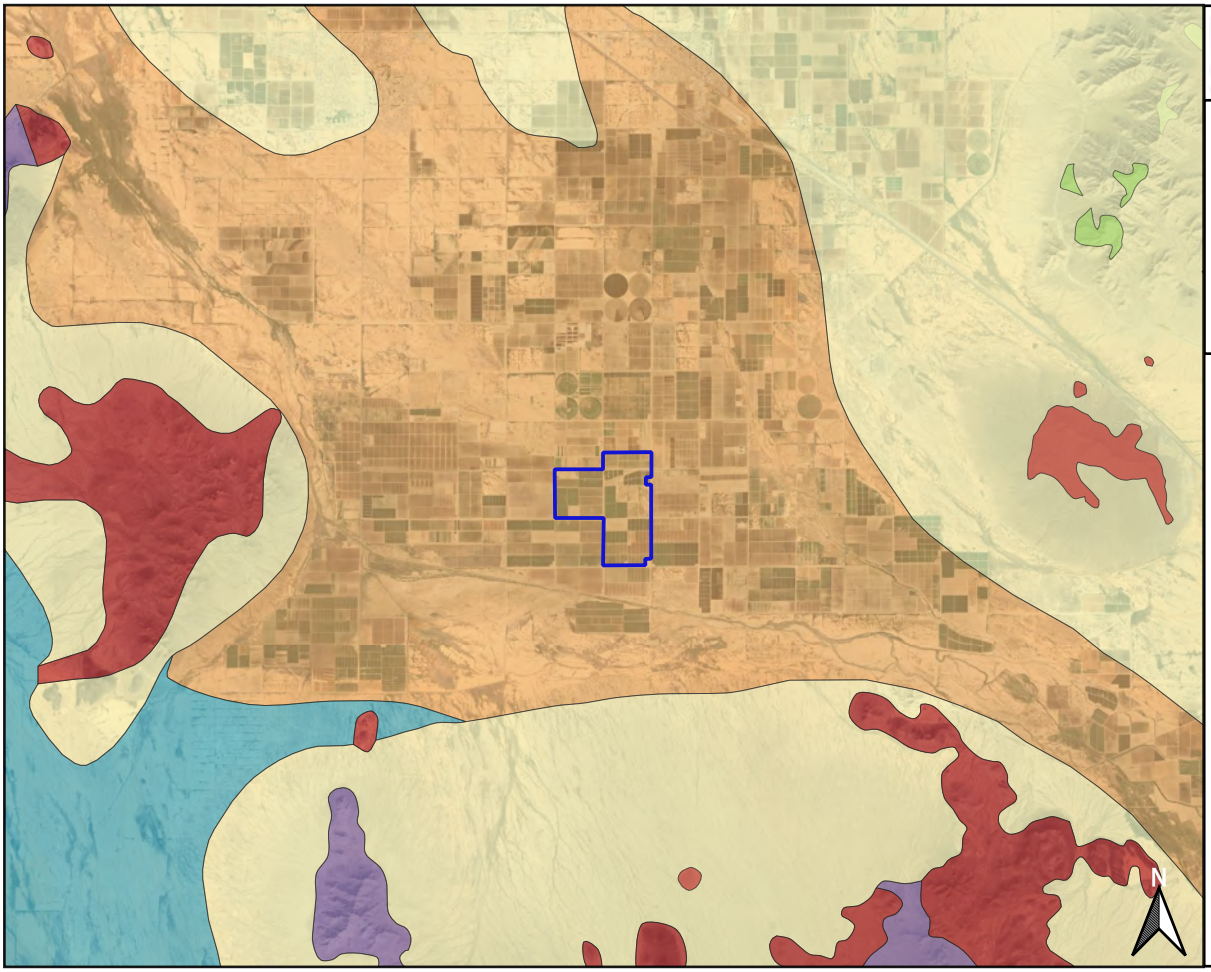
0 1,500 3,000 ft

Absolute Scale: 1 inch = 3,000 feet
Scale at 11" x 17" AS SHOWN

Prepared by: Pete Suarez
Date: March 21, 2024
Drawing Number: FEMA Flood Hazard Map Rev.0

Attachment B

Geologic Mapping



ANS GEO

Client:

CYPRESS CREEK RENEWABLES

GEOLOGIC MAP

CYPRESS CREEK RENEWABLES
CACTUS FLOWER SOLAR PROJECT
PINAL COUNTY, ARIZONA

Legend

- Project Boundary
- Holocene river alluvium
- Mid Miocene to Oligocene Volcanic Rocks
- Tertiary to Early Proterozoic gneissic rocks
- Quaternary surficial deposits, undivided
- Holocene surficial deposits
- Middle Proterozoic granitic rocks

0 10,000 20,000 ft

Absolute Scale: 1 inch = 20000 feet
Scale at 11'' x 17'' AS SHOWN

Prepared by: Amna Al-Ashkhari
Date: February 21, 2024
Drawing Number: GM-1 Rev.0
Source: USGS

Attachment C

Soil Boring Logs

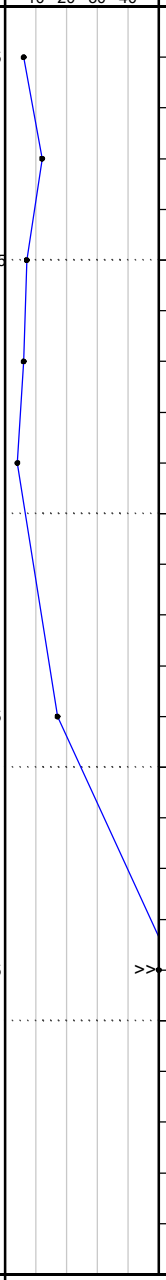
Soil Boring Log

B-01

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.62906 N, -111.59886 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/10/2024 10:30:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/10/2024 11:15:00 AM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
0	S-1	16	3 2 4 4	6	CL	Medium stiff, brown CLAY, little Silt, little medium to fine Sand, moist (CL)	L	M	3.0	0.25
	S-2	17	4 6 6 4	12	ML	Stiff, brown SILT, trace medium to fine Sand, moist (ML)	L		1.5	0.3
5	S-3	22	3 4 3 3	7		Medium stiff, brown SILT, trace coarse to fine Sand, moist (ML)	L		1.0	0.225
	S-4	10	3 3 3 3	6		Medium stiff, brown SILT, some coarse to fine Sand, moist (ML)	L			
	S-5	24	2 1 3 5	4		Soft, brown SILT, trace fine Sand, moist (ML)	L		1.0	0.1
10	S-6	24	6 8 9 12	17	CL	Very stiff, yellowish red Silty CLAY, trace fine Sand, moist (CL)	L	M	2.5	0.55
15	S-7	10	50/6"	> 50	ML	Hard, brown SILT, little coarse to fine Sand, moist (ML)	L		>4.5	0.75
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

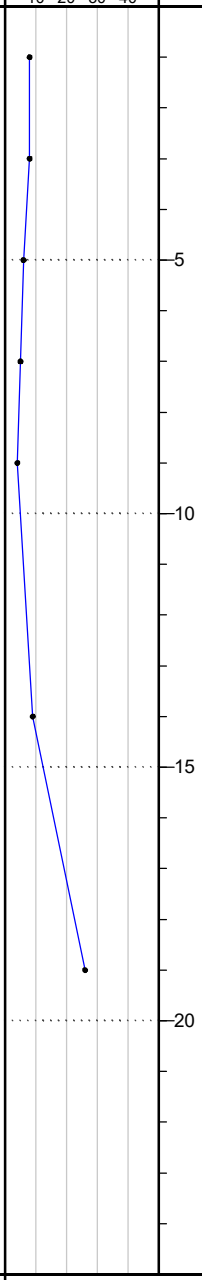
Soil Boring Log

B-02

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.62627 N, -111.59055 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/10/2024 1:40:00 PM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/10/2024 2:05:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	9	5 3 5 4	8	CL	Medium stiff, brown CLAY, some Silt, trace fine Sand, moist (CL)	L	M	3.0	5
	S-2	20	3 4 4 5	8	ML	Medium stiff, brown SILT, little fine Sand, moist (ML)	L		0.5	
5	S-3	20	3 2 4 4	6		Medium stiff, brown SILT, some fine Sand, moist (ML)	L		0.5	
	S-4	19	4 2 3 3	5	SM	Very loose, brown Silty medium to fine SAND, trace Clay, dry (SM)				
	S-5	22	2 1 3 2	4	ML	Soft, brown SILT, some fine Sand, moist (ML)	L			
10										
	S-6	24	4 4 5 7	9	SM	Loose, brown Silty and Clayey coarse to fine SAND, trace fine Gravel, dry (SC-SM)				
15										
	S-7	20	18 15 11 14	26		Medium dense, brown Silty and Clayey coarse to fine SAND, dry (SC-SM)				
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Calcium carbonate spots present in sample.
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

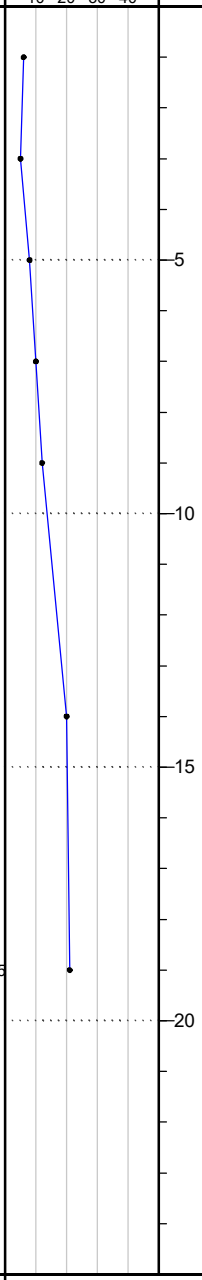
Soil Boring Log

B-03

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.62256 N, -111.59878 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/10/2024 11:30:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/10/2024 12:15:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	17	3 3 3 4	6	ML	Medium stiff, brown SILT, trace fine Sand, moist (ML)	L		0.75	
	S-2	13	2 2 3 4	5		Medium stiff, brown SILT, trace fine Sand, moist (ML)	L		0.75	
5	S-3	24	3 3 5 8	8		Medium stiff, brown SILT, moist (ML)	L			
	S-4	20	4 5 5 4	10		Stiff, brown SILT, some Clay, trace fine Sand, moist (ML)	L		0.5	
	S-5	23	5 5 7 6	12		Stiff, dark brown SILT, trace fine Sand, moist (ML)	L		1.0	
10						Stiff, dark brown SILT, trace fine Sand, moist (ML)				
	S-6	23	5 9 11 11	20		Very stiff, brown SILT, some fine Sand, moist (ML)	L		3.5	0.3
15										
	S-7	24	8 10 11 14	21	CL	Very stiff, dark brown CLAY, little Silt, trace fine Sand, moist (CL)	L	M	3.0	0.625
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Calcium carbonate spots present in sample.
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

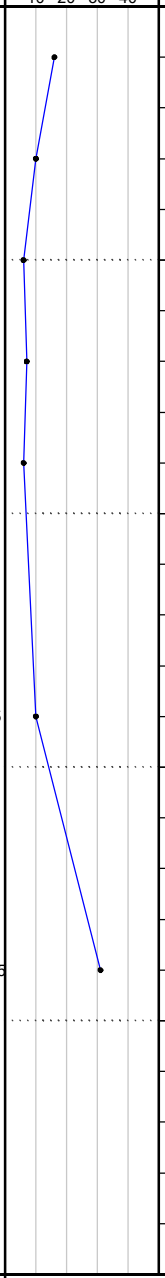
Soil Boring Log

B-04

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.62095 N, -111.59101 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/10/2024 12:35:00 PM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/10/2024 1:10:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
0	S-1	16	7 8 8 8	16	CL	Very stiff, brown to dark brown CLAY, some fine Sand, little Silt, moist (CL)	M	M	>4.5	
	S-2	23	4 5 5 4	10	ML	Stiff, brown to light brown SILT, some fine Sand, moist (ML)	L			
5	S-3	21	2 2 4 6	6		Medium stiff, dark brown SILT, moist (ML)	L		1.0	
	S-4	19	3 3 4 4	7	SM	Loose, dark brown to brown fine SAND, some Silt, trace Clay, dry (SM)				
	S-5	22	3 3 3 4	6	ML	Medium stiff, brown to light brown SILT, some fine Sand, moist (ML)	L		0.5	
10										
	S-6	24	4 4 6 8	10	CL	Stiff, yellowish red Silty CLAY, trace fine Sand, moist (CL)	L	M	1.5	0.25
15										
	S-7	24	11 11 20 21	31		Hard, brown to yellowish red Silty CLAY, little fine Sand, moist (CL)	L	M	3.75	0.325
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

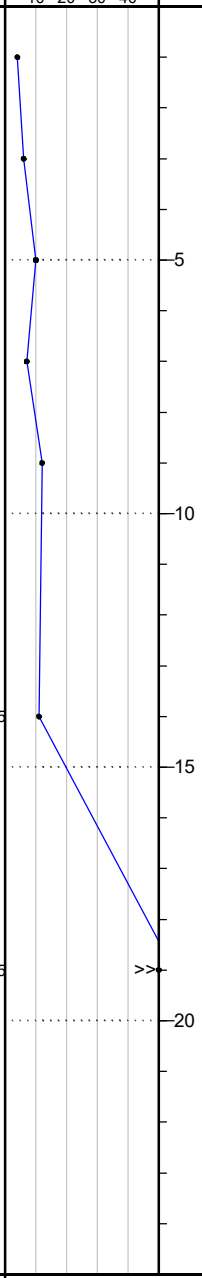
Soil Boring Log

B-05

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.63195 N, -111.58257 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/11/2024 10:25:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/11/2024 11:15:00 AM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	24	1 2 2 2	4	SM	Very loose, light brown to brown Silty coarse to fine SAND, dry (SM)				
	S-2	20	1 2 4 3	6		Loose, brown Silty coarse to fine SAND, trace fine Gravel, dry (SM)				
5	S-3	24	4 4 6 6	10		Loose, brown Silty coarse to fine SAND, trace fine Gravel, dry (SM)				
	S-4	13	3 2 5 5	7	SP	Loose, brown coarse to fine SAND, little coarse to fine Gravel, dry (SP)				
	S-5	15	5 5 7 7	12		Loose, brown coarse to fine SAND, little coarse to fine Gravel, dry (SP)				
10						Medium dense, brown to light brown coarse to fine SAND, little coarse to fine Gravel, trace Silt, dry (SP)				
	S-6	23	7 7 4 8	11	CL	Stiff, yellowish red Silty CLAY, some medium to fine Sand, moist (CL)	L	M	1.5	0.225
15										
	S-7	24	17 18 39 27	> 50		Hard, yellowish red Silty CLAY, some medium to fine Sand, moist (CL)	L	M	4.25	0.525
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

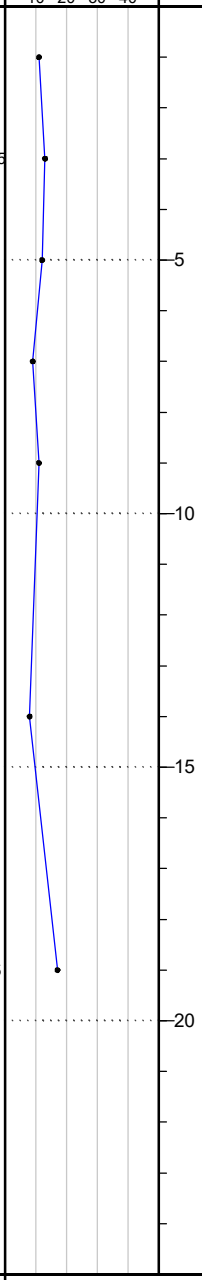
Soil Boring Log

B-06

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.6314 N, -111.57229 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/11/2024 11:37:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/11/2024 12:15:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
0	S-1	23	4 5 6 7	11	SM	Medium dense, light brown medium to fine SAND, some Silt, dry (SM)				
	S-2	12	7 7 6 6	13	ML	Stiff, light brown to brown SILT, little medium to fine Sand, moist (ML)	L		2.75	0.625
5	S-3	17	7 7 5 6	12		Stiff, brown to light brown SILT, some medium to fine Sand, moist (ML)	L			
	S-4	14	4 3 6 7	9	SM	Loose, light brown medium to fine SAND, little Silt, dry (SM)				
	S-5	13	4 4 7 7	11		Medium dense, light brown medium to fine SAND, little Silt, dry (SM)				
10										
	S-6	22	3 3 5 5	8		Loose, light brown fine SAND, little Silt, dry (SM)				
15										
	S-7	19	4 7 10 15	17	ML	Very stiff, brown to yellowish red SILT, some medium to fine Sand, moist (ML)	L		1.5	0.35
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

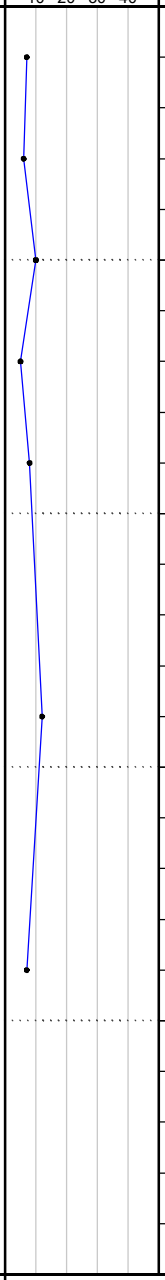
Soil Boring Log

B-07

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.62666 N, -111.58111 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/11/2024 12:44:00 PM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/11/2024 1:20:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	16	3 4 3 3	7	ML	Medium stiff, brown SILT, little fine Sand, moist (ML)	L			
	S-2	23	2 3 3 2	6		Medium stiff, brown SILT, little fine Sand, moist (ML)	L			
5	S-3	21	4 4 6 5	10		Stiff, brown SILT, little fine Sand, moist (ML)	L		0.5	
	S-4	14	3 2 3 3	5		Medium stiff, brown SILT, little fine Sand, moist (ML)	L			
	S-5	17	3 4 4 5	8		Medium stiff, brown SILT, trace fine Sand, moist (ML)	L			
10										
	S-6	24	3 5 7 4	12	SM	Medium dense, yellowish red to light brown medium to fine SAND, little Silt, little fine Gravel, dry (SM)				
15										
	S-7	24	4 3 4 3	7	SP	Loose, yellowish red coarse to fine SAND, some coarse to fine Gravel, dry (SP)				
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

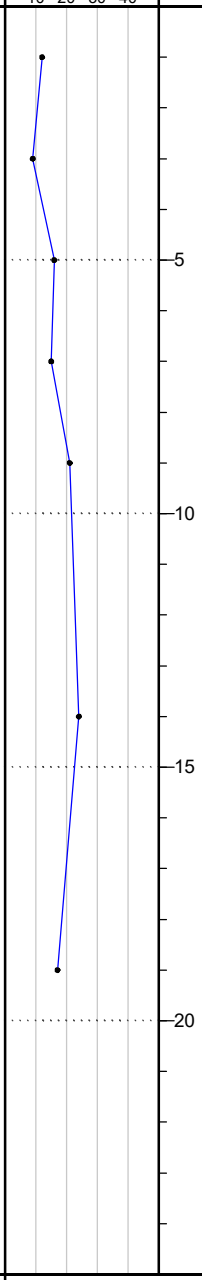
Soil Boring Log

B-08

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.62233 N, -111.57336 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/12/2024 8:40:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/12/2024 9:20:00 AM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	15	4 5 7 7	12	ML	Stiff, brown Sandy SILT, moist (ML)				
	S-2	19	4 5 4 6	9		Stiff, brown Sandy SILT, moist (ML)				
5	S-3	15	4 8 8 10	16		Very stiff, brown SILT, little coarse to fine Sand, moist (ML)				
	S-4	20	7 7 8 9	15		Stiff, brown SILT, little coarse to fine Sand, moist (ML)				
	S-5	24	9 10 11 13	21		Very stiff, brown SILT, little coarse to fine Sand, moist (ML)				
10										
	S-6	12	9 10 14 16	24		Very stiff, light brown SILT, little coarse to fine Sand, moist (ML)	M			
15										
	S-7	22	9 9 8 9	17	SM	Medium dense, yellowish red to light brown Silty coarse to fine SAND, little fine Gravel, dry (SM)				
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

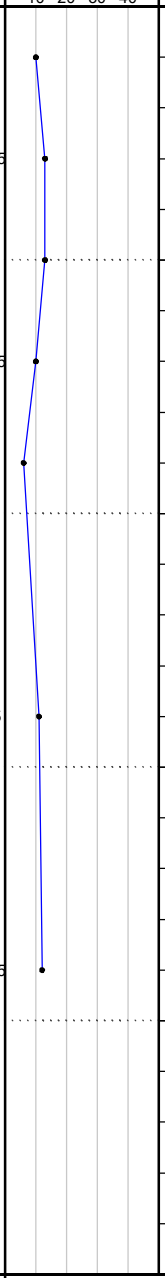
Soil Boring Log

B-09

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.6221 N, -111.58526 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/10/2024 2:35:00 PM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/10/2024 3:15:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	10	7 6 4 4	10	CL	Stiff, pale brown Silty CLAY, little coarse to fine Sand, moist (CL)	L	M	3.25	
	S-2	16	6 6 7 8	13		Stiff, pale brown Silty CLAY, little coarse to fine Sand, moist (CL)	L	M	4.5	0.475
5	S-3	24	5 6 7 8	13	ML	Stiff, light brown to brown SILT, little medium to fine Sand, moist (ML)	L		1.0	0.1
	S-4	24	4 4 6 3	10		Stiff, light brown to brown SILT, little medium to fine Sand, moist (ML)	L		1.5	0.125
	S-5	24	4 3 3 4	6		Medium stiff, light brown to brown SILT, trace fine Sand, moist (ML)	L		1.75	
10										
	S-6	19	6 6 5 7	11	CL	Stiff, brown Silty CLAY, trace fine Sand, moist (CL)	L	M	2.25	0.25
15										
	S-7	18	4 4 8 7	12		Stiff, brown Silty CLAY, trace fine Sand, moist (CL)	L	M	2.0	0.325
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

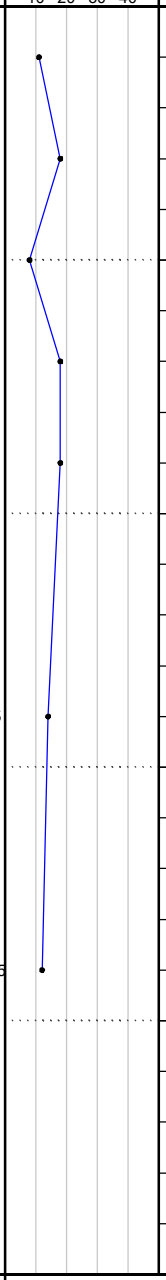
Soil Boring Log

B-10

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.61711 N, -111.57024 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/12/2024 9:45:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/12/2024 10:25:00 AM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	10	3 4 7 8	11	ML	Stiff, brown SILT, some medium to fine Sand, moist (ML)	M		2.25	
	S-2	17	8 8 10 11	18		Very stiff, brown to light brown SILT, little medium to fine Sand, moist (ML)	L			
5	S-3	19	3 4 4 5	8	SM	Loose, pale brown Silty medium to fine SAND, dry (SM)				
	S-4	22	7 8 10 12	18		Medium dense, pale brown Silty medium to fine SAND, dry (SM)				
	S-5	16	6 8 10 10	18		Medium dense, pale brown Silty medium to fine SAND, dry (SM)				
10										
	S-6	23	4 6 8 10	14	ML	Stiff, dark brown SILT, some medium to fine Sand, moist (ML)	L		2.25	0.15
15					SM					
	S-7	24	4 4 8 6	12		Medium dense, brown Silty coarse to fine SAND, trace fine Gravel, dry (SM)				
					ML	Stiff, yellowish red SILT, some coarse to fine Sand, trace fine Gravel, moist (ML)	L		1.75	0.125
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Calcium carbonate spots present in sample.
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

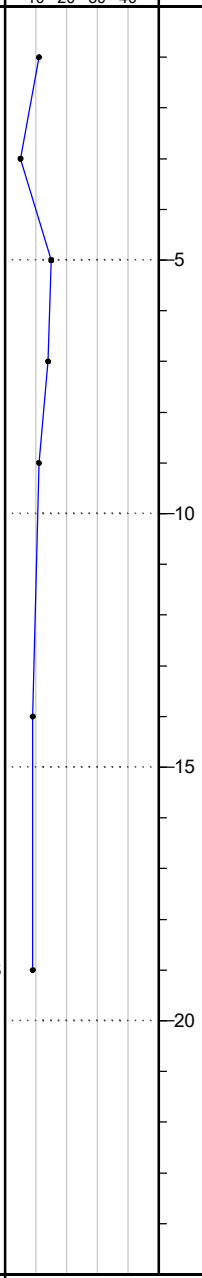
Soil Boring Log

B-11

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.61719 N, -111.58429 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/10/2024 3:30:00 PM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/10/2024 4:10:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
0	S-1	19	5 6 5 3	11	SM	Medium dense, brown coarse to fine SAND, little Silt, trace fine Gravel, dry (SM)				
	S-2	24	3 2 3 2	5		Very loose, brown coarse to fine SAND, little Silt, trace fine Gravel, dry (SM)				
5	S-3	24	5 7 8 9	15		Medium dense, brown Silty coarse to fine SAND, trace fine Gravel, dry (SM)				
	S-4	22	8 8 6 5	14		Medium dense, brown Silty coarse to fine SAND, trace fine Gravel, dry (SM)				
	S-5	24	4 5 6 7	11		Medium dense, brown Silty coarse to fine SAND, trace fine Gravel, dry (SM)				
10					ML	Stiff, brown SILT, moist (ML)	L			
	S-6	24	4 4 5 6	9						
15					CL	Stiff, brown Silty CLAY, moist (CL)				
	S-7	24	3 3 6 8	9			L	M	2.0	0.25
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

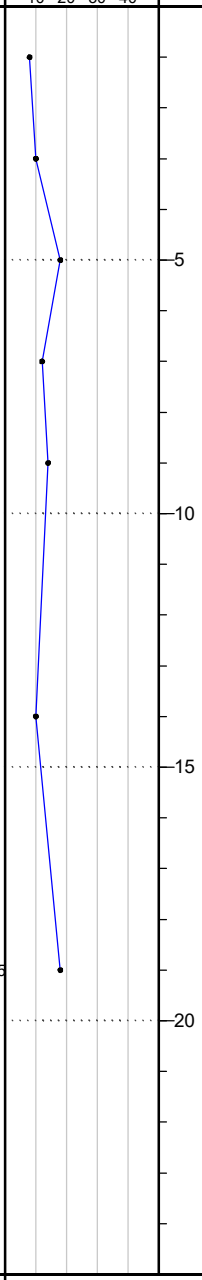
Soil Boring Log

B-12

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.61194 N, -111.57694 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/12/2024 10:47:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/12/2024 11:30:00 AM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Graphic Log	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)	Drilling & Strata Notes
	S-1	17	4 4 4 2	8	ML		Medium stiff, brown SILT, little coarse to fine Sand, moist (ML)	M		3.75	0.5	
	S-2	18	4 4 6 6	10	SM		Loose, browm coarse to fine SAND, some Silt, dry (SM)					
5	S-3	14	6 8 10 11	18			Medium dense, brown coarse to fine SAND, some Silt, dry (SM)					
	S-4	16	4 4 8 7	12			Medium dense, brown coarse to fine SAND, some Silt, dry (SM)					
	S-5	17	4 6 8 9	14			Medium dense, brown Silty coarse to fine SAND, dry (SM)					
10												
	S-6	24	4 4 6 8	10			Loose, brown Silty coarse to fine SAND, trace fine Gravel, dry (SM)					
15												
	S-7	24	6 8 10 11	18	CL		Very stiff, brown Silty CLAY, trace coarse to fine Sand, moist (CL)	L	M	3.0	0.225	
20							End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.					



In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

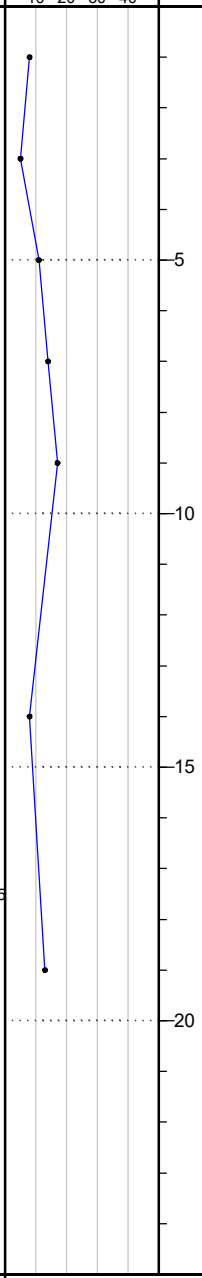
Soil Boring Log

B-13

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.60739 N, -111.58555 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/12/2024 1:30:00 PM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/12/2024 2:00:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	7	4 4 4 5	8	ML	Medium stiff, brown SILT, trace fine Sand, moist (ML)	L		4.0	
	S-2	17	3 2 3 3	5		Medium stiff, brown SILT, some fine Sand, moist (ML)	L			
5	S-3	24	3 5 6 7	11		Stiff, brown SILT, trace fine Sand, moist (ML)	L			
	S-4	16	5 6 8 7	14		Stiff, brown SILT, trace fine Sand, moist (ML)	L		1.0	
	S-5	13	6 8 9 10	17	SM	Medium dense, light brown Silty coarse to fine SAND, dry (SM)				
10										
	S-6	23	3 4 4 5	8		Loose, yellowish red Silty coarse to fine SAND, little fine Gravel, dry (SM)				
15										
					ML		L		4.0	0.625
	S-7	24	5 6 7 7	13		Stiff, brown SILT, some coarse to fine Sand, trace fine Gravel, moist (ML)				
					SM	Medium dense, yellowish red Silty coarse to fine SAND, some coarse to fine Gravel, dry (SM)				
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

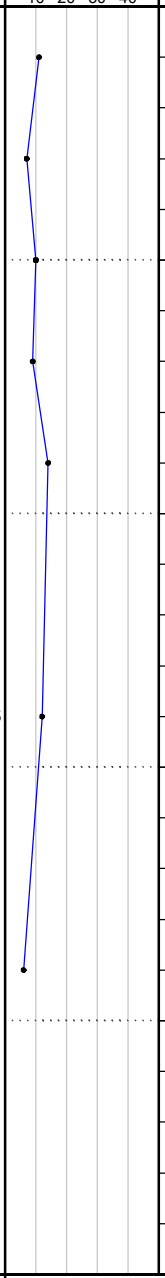
Soil Boring Log

B-14

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.60979 N, -111.57293 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/12/2024 12:40:00 PM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/12/2024 1:05:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
0	S-1	9	4 5 6 8	11	CL	Stiff, brown Silty CLAY, trace fine Sand, moist (CL)	L	M	3.5	0.6
	S-2	18	4 4 3 4	7	ML	Medium stiff, brown SILT, some fine Sand, moist (ML)	L		1.5	
5	S-3	14	4 4 6 8	10		Stiff, brown SILT, some fine Sand, moist (ML)	L		1.0	
	S-4	13	4 4 5 4	9		Stiff, brown SILT, some fine Sand, moist (ML)	L			
	S-5	22	6 6 8 9	14		Stiff, brown SILT, some fine Sand, moist (ML)	L		0.75	
10										
	S-6	23	5 5 7 8	12		Stiff, brown SILT, trace fine Sand, moist (ML)	L		1.78	0.45
15										
	S-7	24	3 3 3 3	6	SM	Loose, yellowish red Silty coarse to fine SAND, little fine Gravel, dry (SM)				
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

Soil Boring Log

B-15

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.60344 N, -111.57301 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/12/2024 2:40:00 PM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/12/2024 3:10:00 PM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	24	3 3 3 3	6	ML	Medium stiff, light brown SILT, little fine Sand, trace fine Gravel, moist (ML)	L		2.0	0.075
	S-2	15	3 4 5 5	9		Stiff, light brown SILT, trace fine Sand, moist (ML)	L		0.75	
5	S-3	18	4 4 4 4	8		Medium stiff, light brown to brown SILT, trace fine Sand, moist (ML)	L		1.0	
	S-4	16	6 8 7 9	15		Stiff, brown SILT, trace fine Sand, moist (ML)	L			
	S-5	14	5 6 8 9	14		Stiff, brown SILT, trace fine Sand, moist (ML)	L			
10										
	S-6	24	4 4 7 8	11		Stiff, brown SILT, trace fine Sand, moist (ML)	L		1.25	
15										
	S-7	17	4 4 5 5	9	SM	Loose, yellowish red Silty medium to fine SAND, little fine Gravel, dry (SM)				
20						End of boring at 20 feet BGS. Borehole backfilled with soil cuttings.				

N-Value

10 20 30 40

Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)

BGS = Below Ground Surface

Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

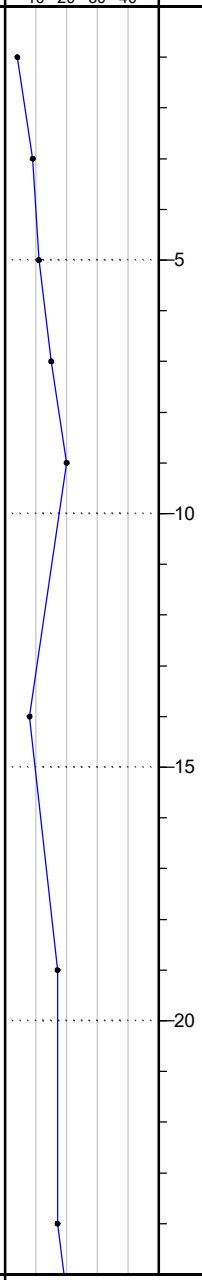
Soil Boring Log

B-BESS-01

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.60351 N, -111.5829 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/13/2024 7:45:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/13/2024 9:25:00 AM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	15	3 2 2 2	4	ML	Soft, brown SILT, little fine Sand, moist (ML)	L	M	1.75	
	S-2	18	4 4 5 6	9		Stiff, brown SILT, little fine Sand, moist (ML)	L	M		
5	S-3	16	4 5 6 6	11	SM	Medium dense, brown fine SAND, some Silt, moist (SM)				
	S-4	17	5 7 8 10	15		Medium dense, light brown fine SAND, some Silt, moist (SM)				
	S-5	14	7 9 11 11	20		Medium dense, light brown fine SAND, some Silt, moist (SM)				
10										
	S-6	22	4 4 4 4	8	ML	Medium stiff, yellowish red SILT, some coarse to fine Sand, little fine Gravel, moist (ML)			1.0	
15										
	S-7	17	7 8 9 8	17		Very stiff, brown SILT, little fine Sand, moist (ML)				
					SM	Medium dense, light brown Silty coarse to fine SAND, little fine Gravel, dry (SM)				
20										
	S-8	11	9 9 8 7	17		Medium dense, light brown Silty coarse to fine SAND, little fine Gravel, dry (SM)				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Calcium carbonate spots present in sample.
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

Soil Boring Log

B-BESS-01
(Continued)

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.60351 N, -111.5829 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/13/2024 7:45:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/13/2024 9:25:00 AM	**Vert. Datum:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)	N-Value 10 20 30 40	Drilling & Strata Notes
					SM							
					ML	Very stiff, brown SILT, some medium to fine Sand, little fine Gravel, moist (ML)	L	M				
	S-9	16	11 13 15 18	28								
30					SC-SM	Medium dense, brown Silty and Clayey coarse to fine SAND, trace fine Gravel, dry (SC-SM)						
						End of boring at 30 feet BGS. Borehole backfilled with soil cuttings.						
35												
40												
45												
50												

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Calcium carbonate spots present in sample.
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

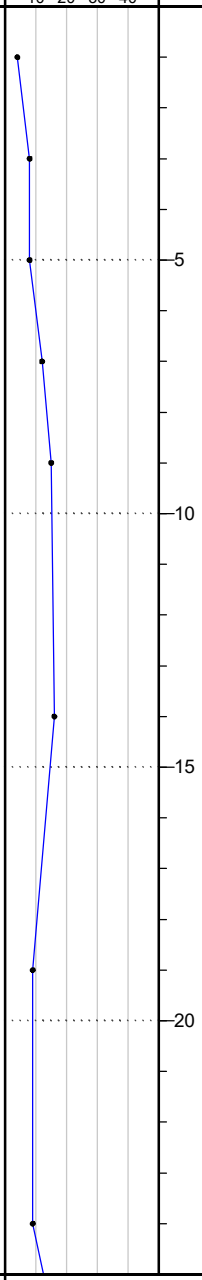
Soil Boring Log

B-SS-01

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.60411 N, -111.58431 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/13/2024 9:46:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/13/2024 10:30:00 AM	**Vert. Datum:**	N/A

Rig Model:	Diedrich D-50	**Sampler Type:**	Split Spoon	**Casing Type:**	N/A
Rig Type:	Track	**Sampler Length:**	24 inches	**Casing Length:**	N/A
Drill Method:	Solid Stem Auger	**Sampler I.D.:**	1.375 inches	**Casing I.D.:**	N/A
Hammer Type:	Automatic	**Hammer Wt.:**	140 pounds	**Hammer Wt.:**	N/A
Drilling Fluid:	None	**Hammer Fall:**	30 inches	**Hammer Fall:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)
	S-1	19	3 2 2 2	4	ML	Soft, light brown SILT, trace fine Sand, moist (ML)	L		0.75	
	S-2	11	3 4 4 5	8	CL	Medium stiff, brown Silty CLAY, trace fine Sand, moist (CL)	L	M	4.0	
5	S-3	18	4 4 4 8	8		Medium stiff, brown Silty CLAY, trace fine Sand, moist (CL)	L	M	1.25	
	S-4	24	4 5 7 7	12		Stiff, brown Silty CLAY, trace fine Sand, moist (CL)	L	M		
	S-5	19	6 7 8 10	15		Stiff, brown Silty CLAY, little coarse to fine Sand, moist (CL)	L	M	1.25	
10										
	S-6	18	6 7 9 10	16	ML	Very stiff, yellowish red SILT, some coarse to fine Sand, little fine Gravel, moist (ML)	L		2.75	
15										
	S-7	17	5 5 4 5	9	SM	Loose, brown Silty coarse to fine SAND, some fine Gravel, dry (SP-SM)				
20										
	S-8	15	4 5 4 5	9		Loose, brown Silty coarse to fine SAND, some fine Gravel, dry (SP-SM)				



Drilling & Strata Notes

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

Soil Boring Log

B-SS-01
(Continued)

Client:	Cypress Creek Renewables	**Drilling Firm:**	Core Co. USA	**Coordinates:**	32.60411 N, -111.58431 E
Project:	Cactus Flower Solar Project	**Drill Crew:**	Chris Tillery / Yobani Rosas	**Horiz. Datum:**	WGS84
Location:	Pinal County, Arizona	**Boring Start:**	3/13/2024 9:46:00 AM	**Elevation:**	Grade
Inspector:	Sanket Pawar	**Boring End:**	3/13/2024 10:30:00 AM	**Vert. Datum:**	N/A

Depth (ft)	Sample No.	Rec. (in)	Blows per 6"	N-Value	USCS Symbol	Visual Classification	Toughness	Plasticity	PP (tsf)	TV (tsf)	Drilling & Strata Notes
					SM						
	S-9	24	10 12 14 16	26	SP	Medium dense, light brown coarse to fine SAND, some coarse to fine Gravel, dry (SP)					
30											
	S-10	17	12 17 15 21	32		Dense, light brown coarse to fine SAND, some coarse to fine Gravel, dry (SP)					
35											
	S-11	24	15 23 20 26	43	SM	Dense, light brown Silty coarse to fine SAND, some coarse to fine Gravel, dry (SM)					
40											
	S-12	24	15 18 21 28	39		Dense, light brown Silty coarse to fine SAND, little fine Gravel, dry (SM)					
45											
	S-13	23	14 17 23 29	40		Dense, light brown Silty coarse to fine SAND, little fine Gravel, dry (SM)					
50						End of boring at 50 feet BGS. Borehole backfilled with soil cuttings.					

N-Value: 10 20 30 40

In-Borehole Water Levels

Date / Time	Casing Tip (ft)	Bot. of Hole (ft)	Water Lvl (ft)

General Notes

▼ = Water Level (if observed)
BGS = Below Ground Surface
Groundwater not encountered at time of boring.

Toughness: Low (L), Medium (M), High (H)
Plasticity: Non-Plastic (NP), Low (L), Medium (M), High (H)
PP = Pocket Penetrometer, measured in tons per square ft.
TV = Torvane (Shear Vane), measured in tons per square ft.

Attachment D

Lab Test Results

MOISTURE CONTENT ANALYSIS RESULTS

ANS CONSULTANTS, INC.
4405 South Clinton Avenue
South Plainfield, NJ 07080
Tel: (800) 585-ATUL
(908) 754-8383
Fax: (908) 754-8633
NJ EDA Approved Testing Laboratory • MBE/DBE Certified • NJ DEP Certified

Laboratory Determination of Water (Moisture) Content of Soil and Rock (ASTM D2216)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Investigation ID	B-SS-01	B-BESS-01	B-01	B-10	B-11
Sample ID	CBR-01	CBR-02	CBR-03	CBR-04	CBR-05
Wet soil + Tare (g)	266.2	249.2	228.8	223.6	200.1
Dry soil + Tare (g)	241.3	224.5	195.6	207.7	190.2
Wt. of Tare (g)	15.1	15.1	15.4	15.6	14.9
Moisture Content	**11.0%**	**11.8%**	**18.4%**	**8.3%**	**5.6%**

Investigation ID	B-SS-01	BBESS-01	B-02	B-03	B-05
Sample ID	TRT-01	TRT-02	TRT-03	TRT-04	TRT-05
Wet soil + Tare (g)	253.3	236.2	263.9	293.1	317.4
Dry soil + Tare (g)	224.4	208.3	233.7	257.6	290.7
Wt. of Tare (g)	15.0	15.1	15.2	15.5	15.2
Moisture Content	**13.8%**	**14.5%**	**13.8%**	**14.6%**	**9.7%**

Investigation ID	B-06	B-08	B-09	B-12	B-15
Sample ID	TRT-06	TRT-07	TRT-08	TRT-09	TRT-10
Wet soil + Tare (g)	279.9	246.5	303.3	268.9	252.1
Dry soil + Tare (g)	254.9	230.6	269.4	239.9	227.9
Wt. of Tare (g)	15.2	15.3	15.0	15.4	15.2
Moisture Content	**10.4%**	**7.4%**	**13.3%**	**12.9%**	**11.4%**

Tested By: ES
Checked By: ANS

ANS CONSULTANTS, INC.
4405 South Clinton Avenue
South Plainfield, NJ 07080
Tel: (800) 585-ATUL
(908) 754-8383
Fax: (908) 754-8633
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Laboratory Determination of Water (Moisture) Content of Soil and Rock (ASTM D2216)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Investigation ID	B-01	B-04	B-05	B-06	B-07
Sample ID	CORR-01	CORR-02	CORR-03	CORR-04	CORR-05
Wet soil + Tare (g)	208.1	208.2	165.0	243.1	206.6
Dry soil + Tare (g)	170.9	179.4	152.4	224.2	183.0
Wt. of Tare (g)	15.2	15.1	15.0	15.2	15.4
Moisture Content	**23.9%**	**17.5%**	**9.1%**	**9.0%**	**14.1%**

Investigation ID	B-08	B-10	B-11	B-12	B-13
Sample ID	CORR-06	CORR-07	CORR-08	CORR-09	CORR-10
Wet soil + Tare (g)	201.9	264.4	219.5	218.2	208.5
Dry soil + Tare (g)	191.6	242.1	209.3	194.3	188.0
Wt. of Tare (g)	15.4	14.9	15.3	15.2	15.2
Moisture Content	**5.9%**	**9.8%**	**5.3%**	**13.3%**	**11.9%**

Investigation ID	B-15
Sample ID	CORR-11
Wet soil + Tare (g)	234.9
Dry soil + Tare (g)	210.4
Wt. of Tare (g)	15.3
Moisture Content	**12.6%**

Tested By: ES
Checked By: ANS

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Laboratory Determination of Water (Moisture) Content of Soil and Rock (ASTM D2216)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-034
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/22/2024

Sample ID	B-01, S-5	B-02, S-6	B--03, S-4	B-05, S-3	B-08, S-2
Depth	8'-10'	13'-15'	6'-8'	4'-6'	2'-4'
Wet soil + Tare (g)	239.7	777.9	219.0	610.4	912.7
Dry soil + Tare (g)	208.7	736.0	185.8	576.0	881.7
Wt. of Tare (g)	15.4	187.6	15.3	182.2	177.8
Moisture Content	**16.0%**	**7.6%**	**19.5%**	**8.7%**	**4.4%**

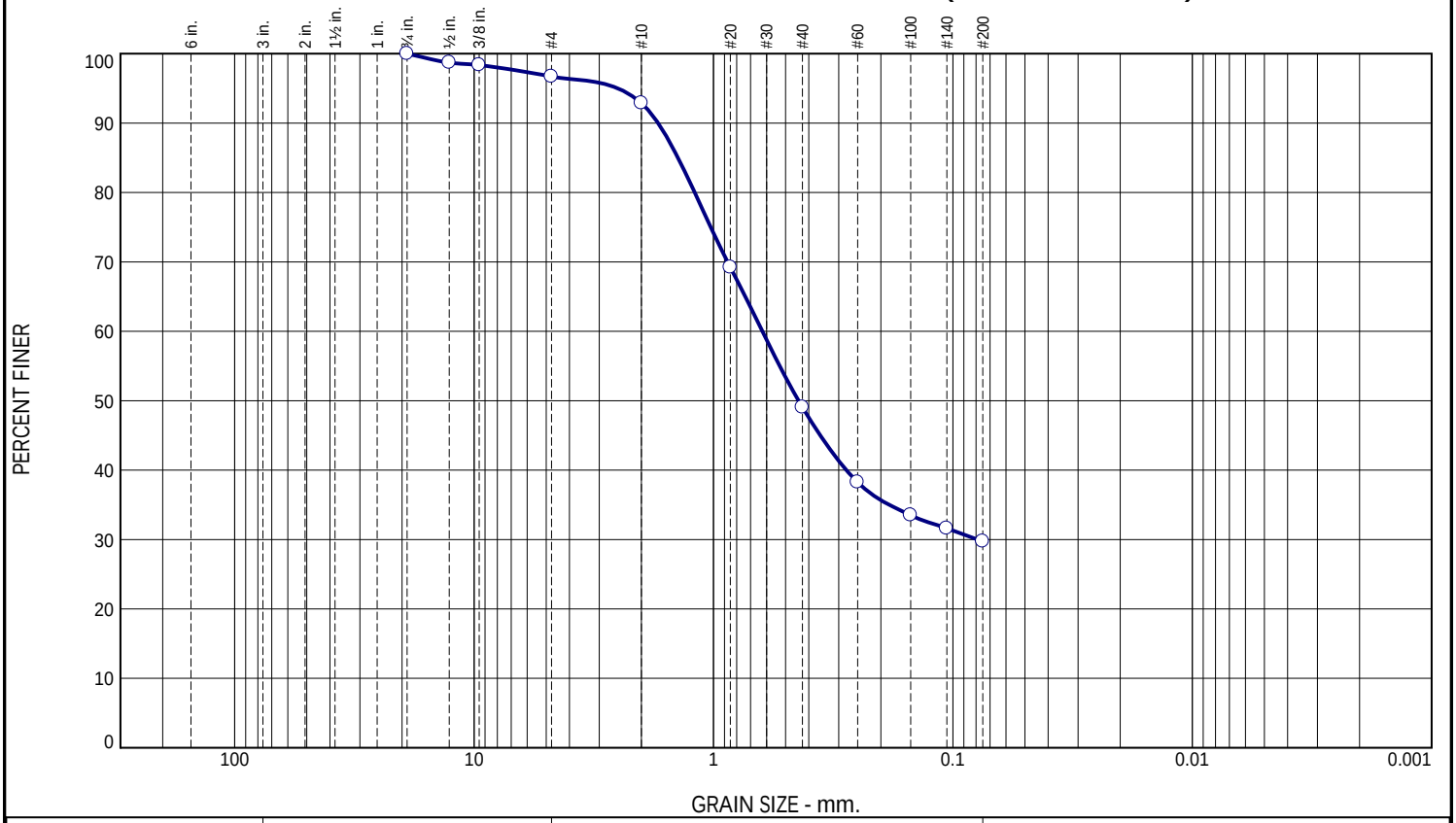
Sample ID	B-09, S-2	B-10, S-3	B-11, S-2	B-12, S-3	B-12, S-7
Depth	2'-4'	4'-6'	2'-4'	4'-6'	18'-20'
Wet soil + Tare (g)	189.7	767.5	885.8	814.7	233.8
Dry soil + Tare (g)	171.3	746.2	861.6	775.6	201.8
Wt. of Tare (g)	15.5	186.4	185.9	183.4	15.4
Moisture Content	**11.8%**	**3.8%**	**3.6%**	**6.6%**	**17.1%**

Sample ID	B-SS-01, S-3	B-SS-01, S-8	B-BESS-01, S-3	B-BESS-01, S-9
Depth	4'-6'	23'-25'	4'-6'	28'-30'
Wet soil + Tare (g)	186.1	935.7	252.5	619.2
Dry soil + Tare (g)	167.8	908.6	211.1	599.3
Wt. of Tare (g)	15.4	187.3	15.2	178.7
Moisture Content	**12.0%**	**3.8%**	**21.1%**	**4.7%**

Tested By: ES
Checked By: ANS

SIEVE ANALYSIS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.3	3.8	43.9	19.3	29.7	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75"	100.0		
0.5"	98.7		
0.375"	98.4		
#4	96.7		
#10	92.9		
#20	69.2		
#40	49.0		
#60	38.2		
#100	33.5		
#140	31.6		
#200	29.7		

* (no specification provided)

Soil Description

Brown silty, clayey sand

Atterberg Limits

PL= 16 LL= 23 PI= 7

Coefficients

D_{90}= 1.7033 D_{85}= 1.4073 D_{60}= 0.6251
D_{50}= 0.4415 D_{30}= 0.0789 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-2-4(0)

Remarks

Sample Number: B-02, S-6 Depth: 13'-15'

Date: 3/22/2024

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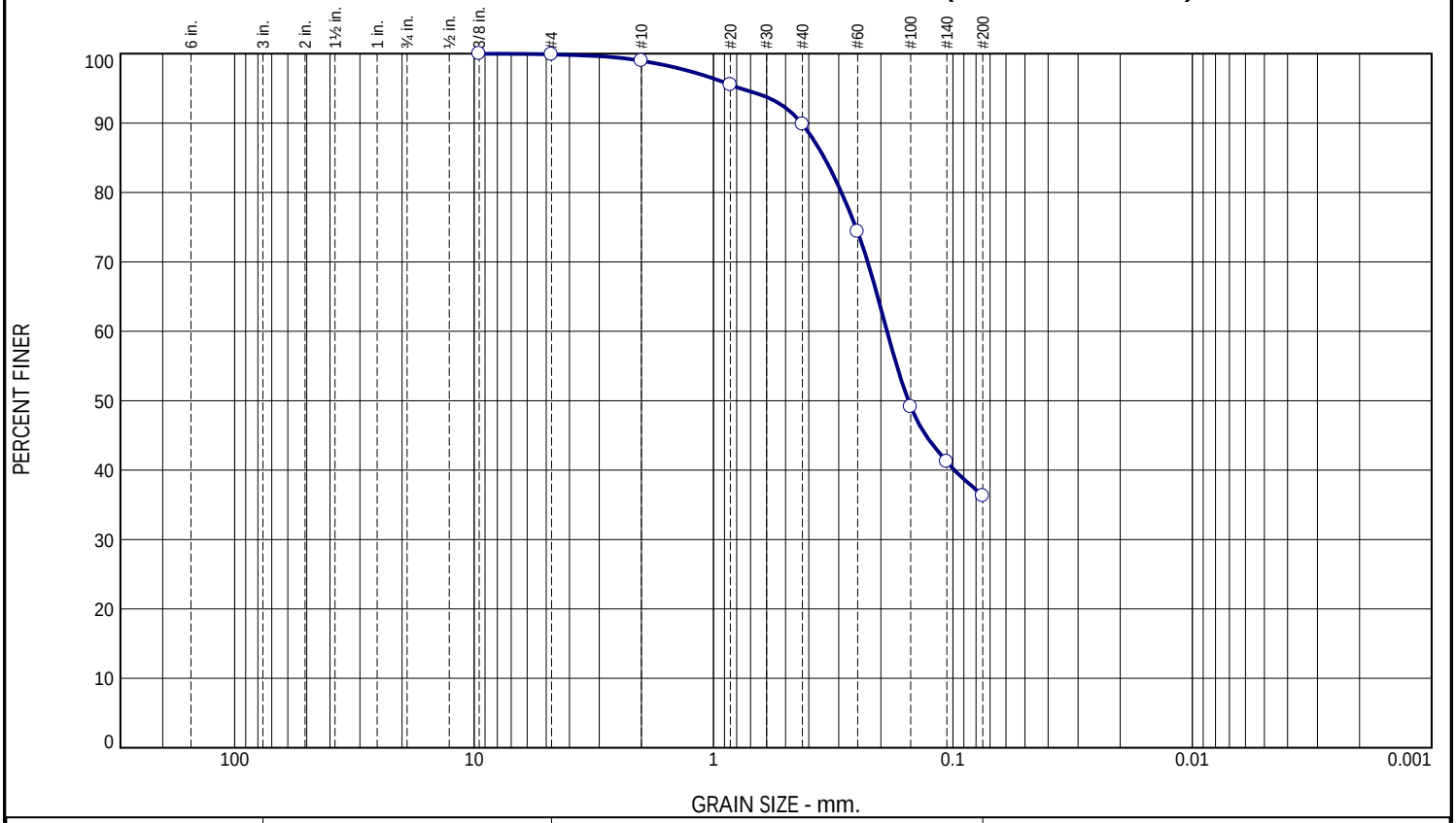
South Plainfield, New Jersey

Client: Cypress Creek Renewables, LLC
Project: Cactus Flower Solar, Pinal County, AZ

Project No: IRN 24-T-034 Figure

Tested By: JE Checked By: ANS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.9	9.2	53.5	36.3	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375"	100.0		
#4	99.9		
#10	99.0		
#20	95.5		
#40	89.8		
#60	74.4		
#100	49.1		
#140	41.2		
#200	36.3		

* (no specification provided)

Soil Description

Brown silty sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.4288 D_{85}= 0.3442 D_{60}= 0.1883
D_{50}= 0.1536 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Sample Number: B-05, S-3 Depth: 4'-6'

Date: 3/22/2024

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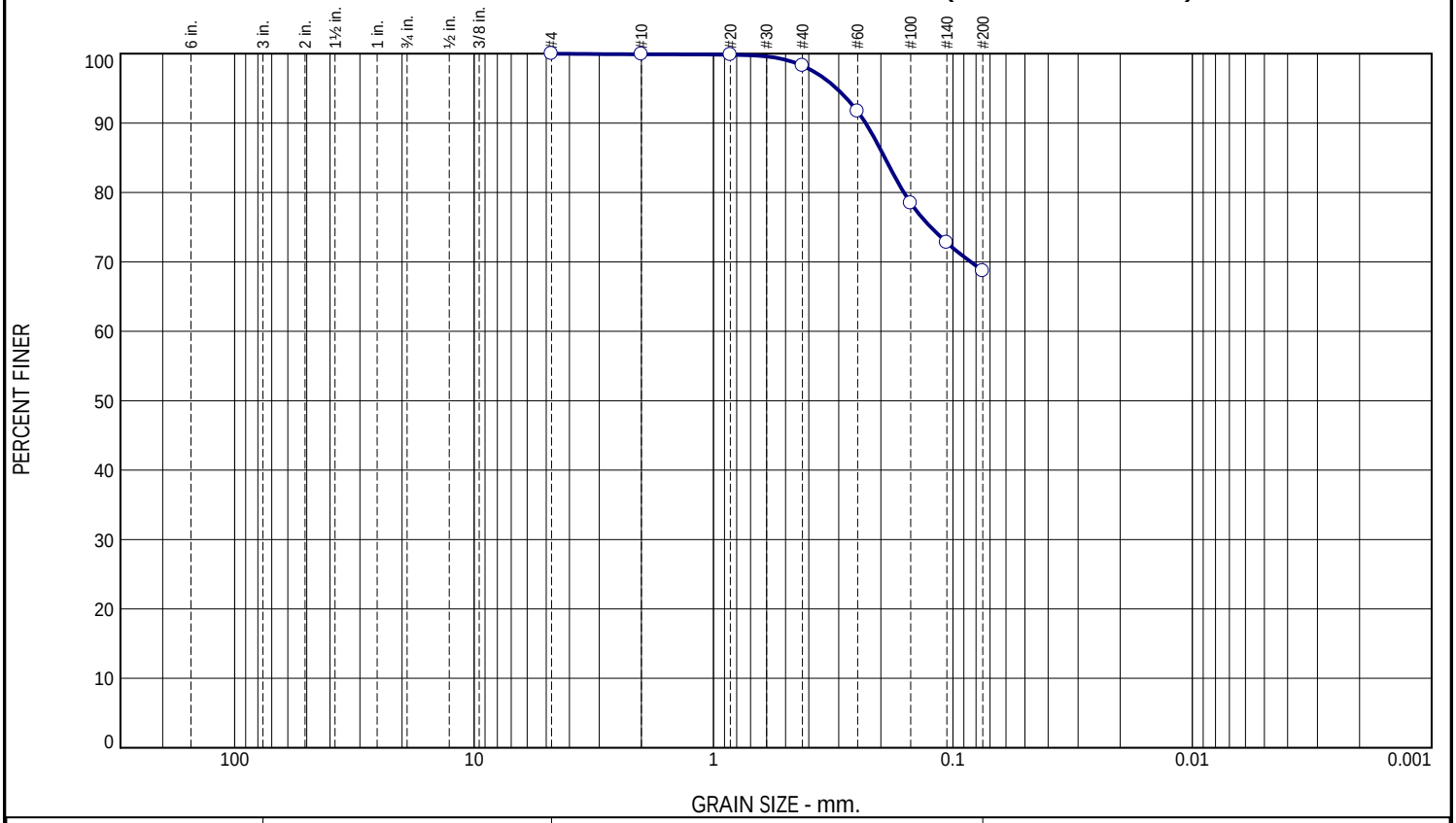
South Plainfield, New Jersey

Client: Cypress Creek Renewables, LLC
Project: Cactus Flower Solar, Pinal County, AZ

Project No: IRN 24-T-034 Figure

Tested By: JE Checked By: ANS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.6	29.6	68.7	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.8		
#40	98.3		
#60	91.7		
#100	78.5		
#140	72.8		
#200	68.7		

* (no specification provided)

Soil Description

Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2313 D_{85}= 0.1923 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-08, S-2 Depth: 2'-4'

Date: 3/22/2024

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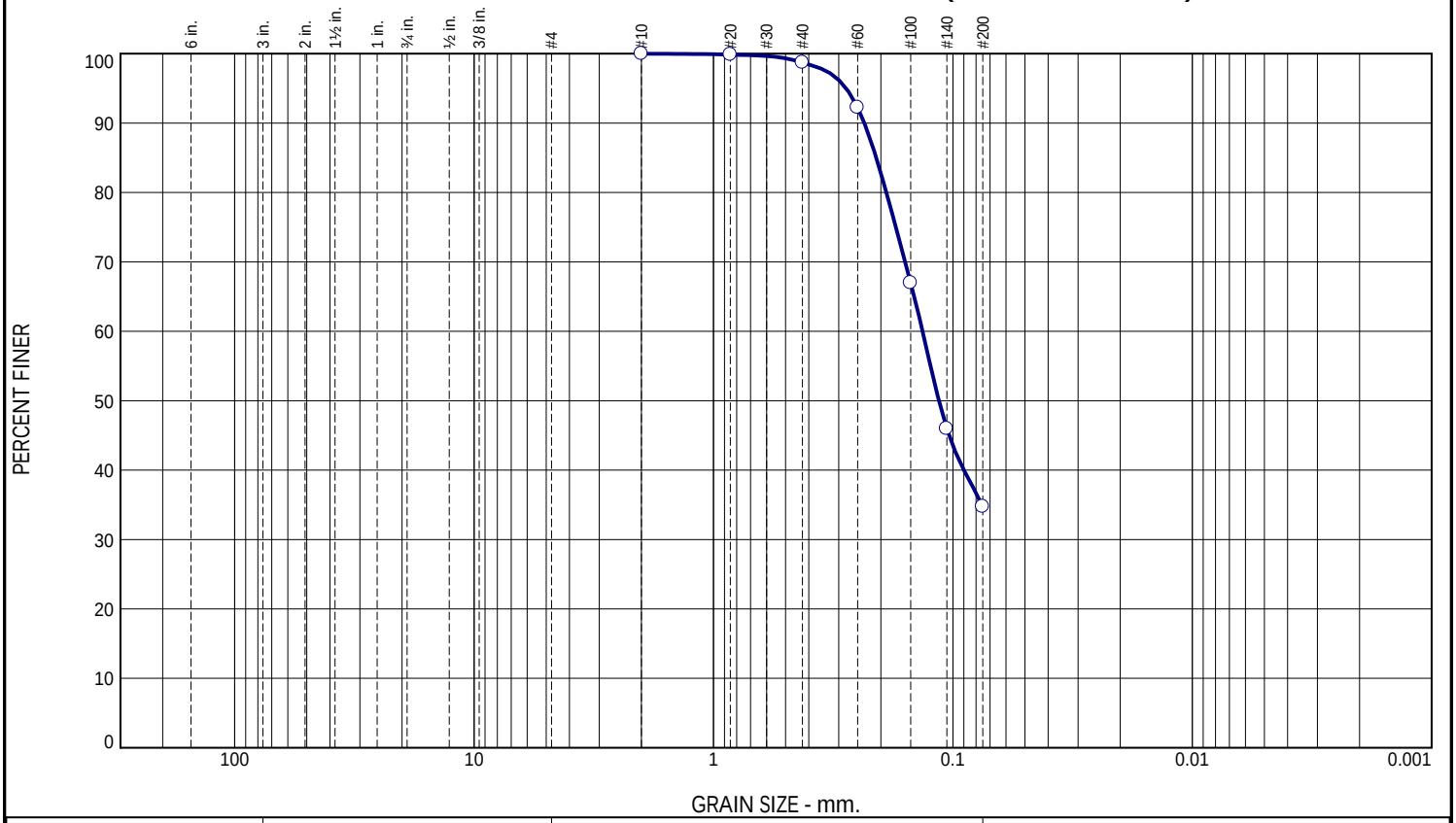
South Plainfield, New Jersey

Client: Cypress Creek Renewables, LLC
Project: Cactus Flower Solar, Pinal County, AZ

Project No: IRN 24-T-034 Figure

Tested By: JE Checked By: ANS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.3	64.0	34.7	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	98.7		
#60	92.2		
#100	67.0		
#140	46.0		
#200	34.7		

* (no specification provided)

Soil Description

Pale Brown silty sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.2344 D_{85}= 0.2090 D_{60}= 0.1338
D_{50}= 0.1144 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Sample Number: B-10, S-3 Depth: 4'-6'

Date: 3/22/2024

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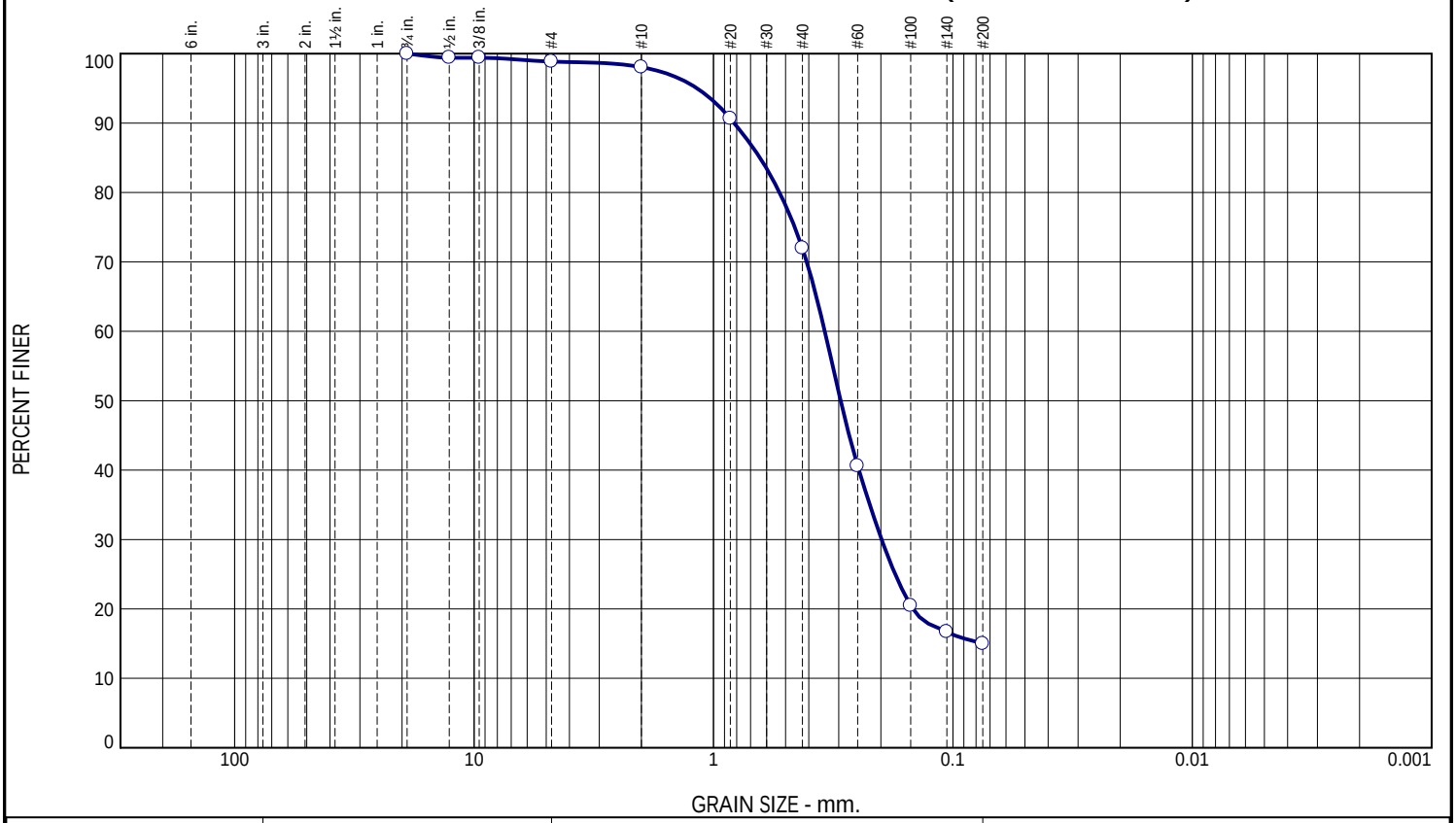
South Plainfield, New Jersey

Client: Cypress Creek Renewables, LLC
Project: Cactus Flower Solar, Pinal County, AZ

Project No: IRN 24-T-034 Figure

Tested By: JE Checked By: ANS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	0.8	26.1	57.0	15.0	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75"	100.0		
0.5"	99.4		
0.375"	99.4		
#4	98.9		
#10	98.1		
#20	90.6		
#40	72.0		
#60	40.6		
#100	20.5		
#140	16.7		
#200	15.0		

* (no specification provided)

Soil Description

Brown silty sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.8200 D_{85}= 0.6397 D_{60}= 0.3429
D_{50}= 0.2942 D_{30}= 0.1985 D_{15}= 0.0755
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Sample Number: B-11, S-2 Depth: 2'-4'

Date: 3/22/2024

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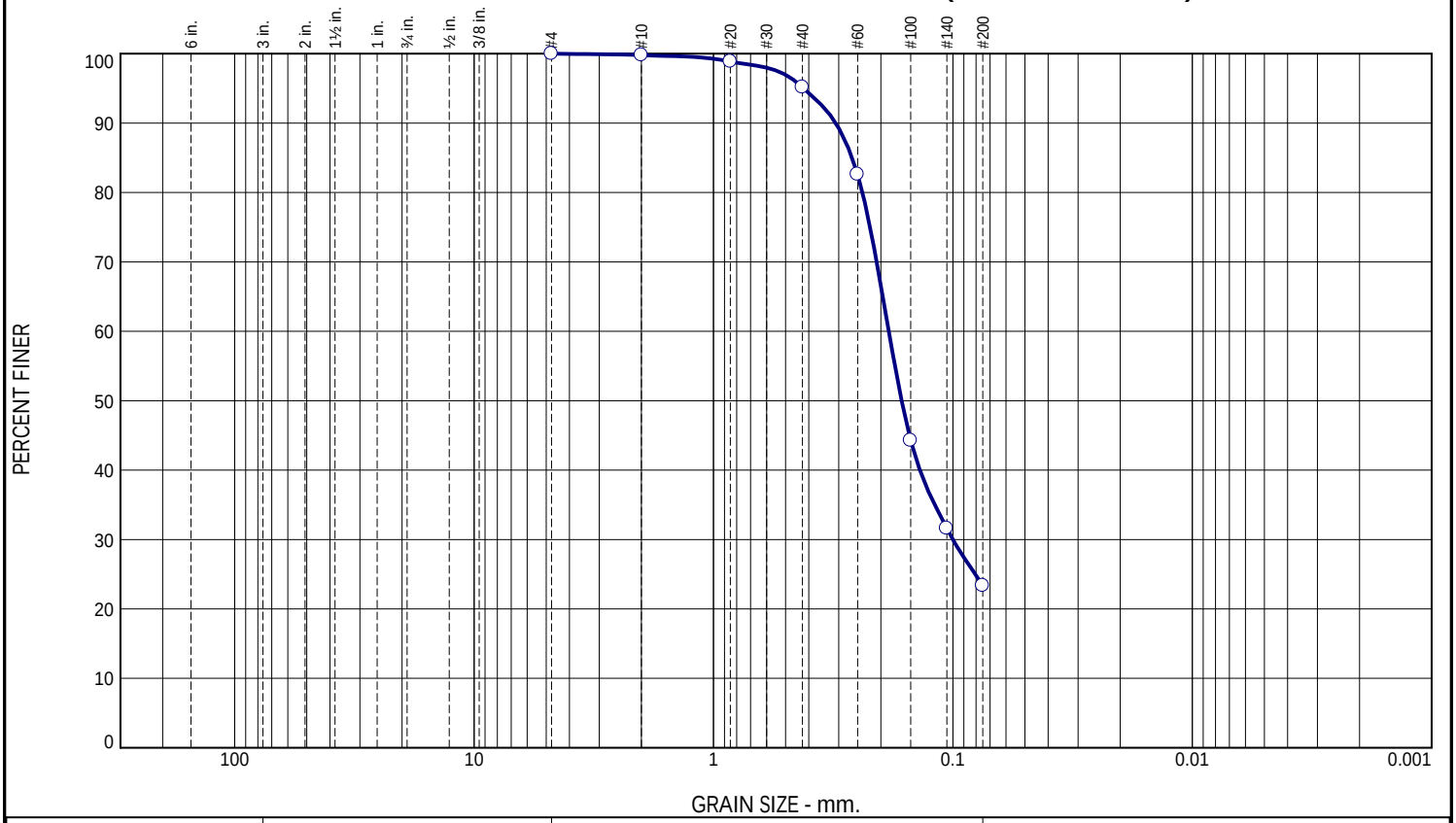
South Plainfield, New Jersey

Client: Cypress Creek Renewables, LLC
Project: Cactus Flower Solar, Pinal County, AZ

Project No: IRN 24-T-034 Figure

Tested By: JE Checked By: ANS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	4.6	71.9	23.3	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	98.9		
#40	95.2		
#60	82.6		
#100	44.2		
#140	31.6		
#200	23.3		

* (no specification provided)

Soil Description

Brown silty sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3084 D_{85}= 0.2636 D_{60}= 0.1852
D_{50}= 0.1638 D_{30}= 0.1001 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Sample Number: B-12, S-3 Depth: 4'-6'

Date: 3/22/2024

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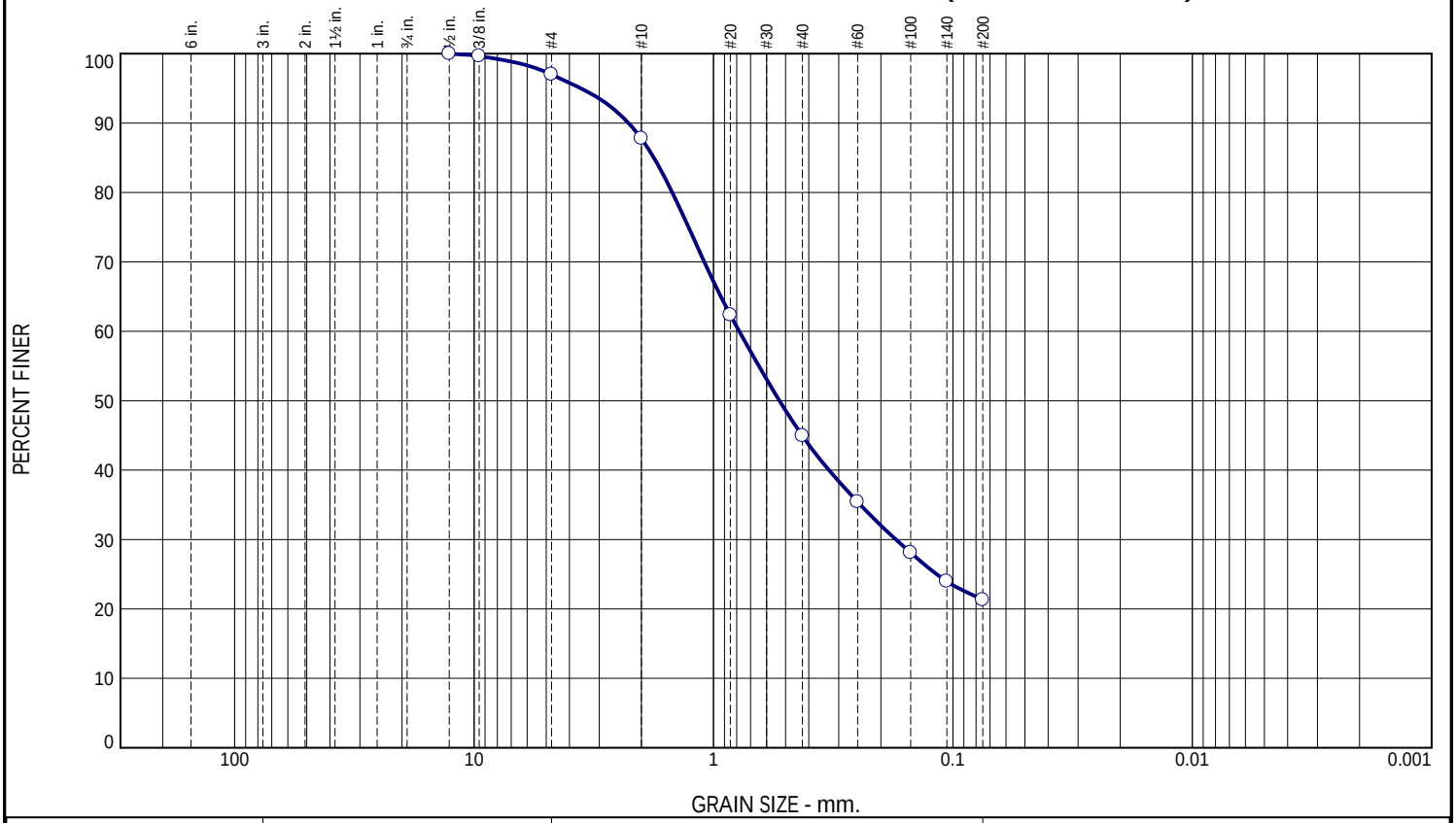
South Plainfield, New Jersey

Client: Cypress Creek Renewables, LLC
Project: Cactus Flower Solar, Pinal County, AZ

Project No: IRN 24-T-034 Figure

Tested By: JE Checked By: ANS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.0	9.2	42.9	23.6	21.3	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5"	100.0		
0.375"	99.7		
#4	97.0		
#10	87.8		
#20	62.3		
#40	44.9		
#60	35.4		
#100	28.1		
#140	24.0		
#200	21.3		

* (no specification provided)

Soil Description

Brown silty, clayey sand

Atterberg Limits

PL= 16 LL= 22 PI= 6

Coefficients

D_{90}= 2.2631 D_{85}= 1.7731 D_{60}= 0.7799
D_{50}= 0.5302 D_{30}= 0.1729 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-1-b

Remarks

Sample Number: B-BESS-01, S-9 Depth: 28'-30'

Date: 3/22/2024

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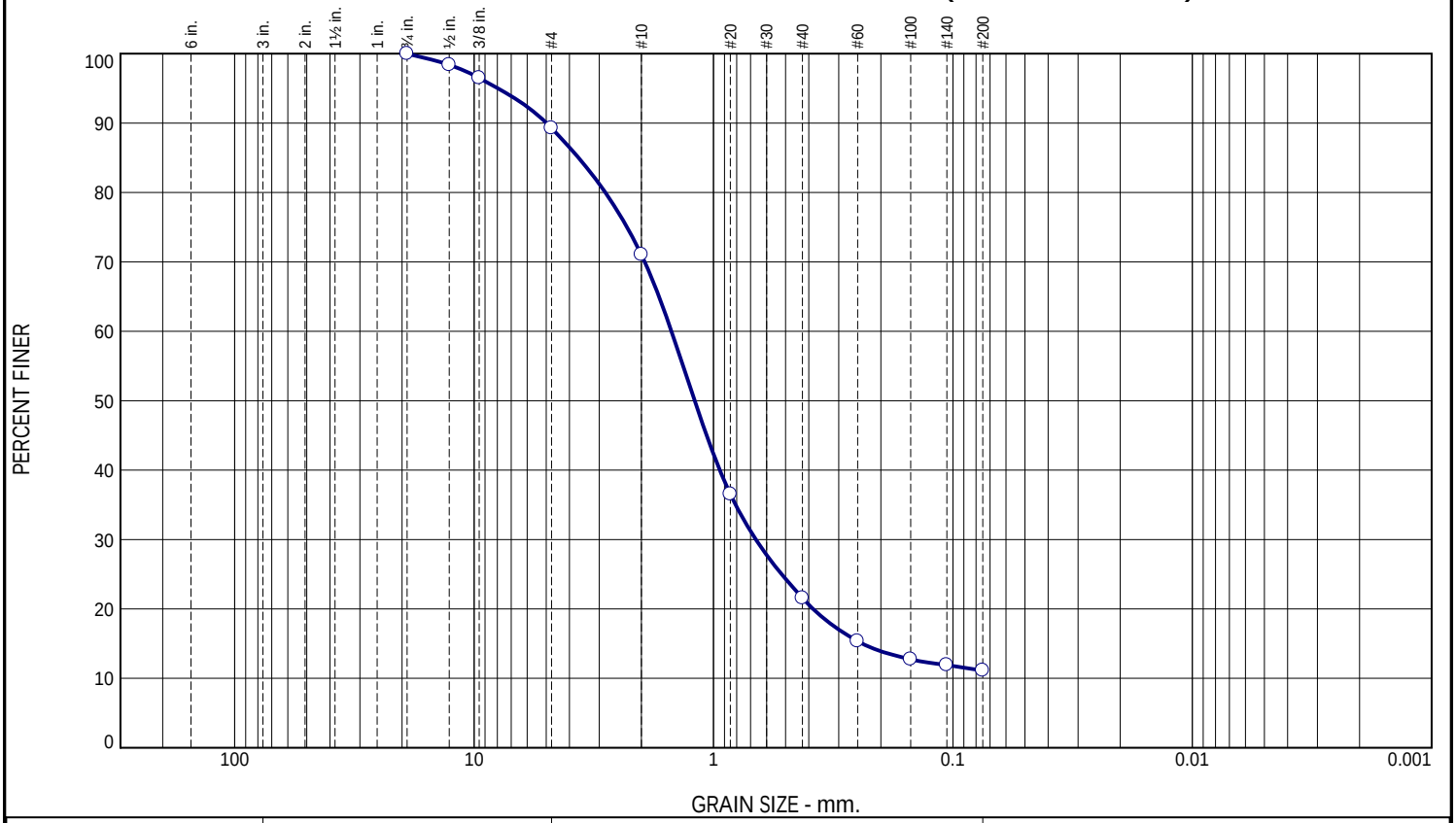
South Plainfield, New Jersey

Client: Cypress Creek Renewables, LLC
Project: Cactus Flower Solar, Pinal County, AZ

Project No: IRN 24-T-034 Figure

Tested By: JE Checked By: ANS

PARTICLE SIZE DISTRIBUTION REPORT (ASTM D6913)



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.7	18.3	49.4	10.5	11.1	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75"	100.0		
0.5"	98.4		
0.375"	96.5		
#4	89.3		
#10	71.0		
#20	36.5		
#40	21.6		
#60	15.4		
#100	12.7		
#140	11.9		
#200	11.1		

* (no specification provided)

Soil Description

Pale Brown poorly graded sand with silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 4.9800 D_{85}= 3.6611 D_{60}= 1.4985
D_{50}= 1.1982 D_{30}= 0.6656 D_{15}= 0.2390
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

Sample Number: B-SS-01, S-8 Depth: 23'-25'

Date: 3/22/2024

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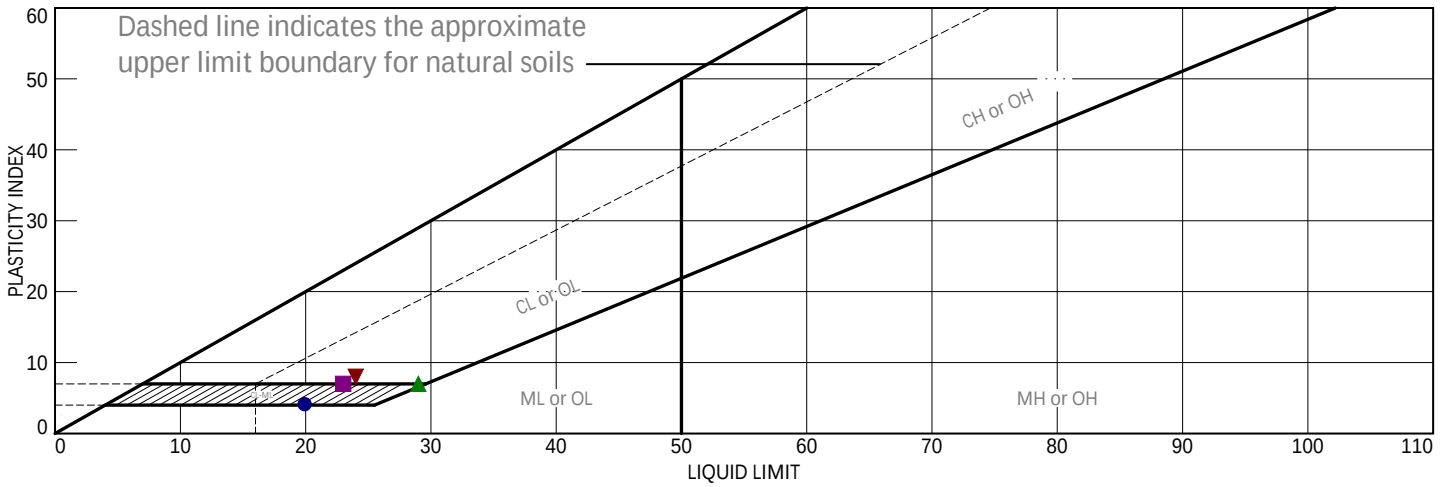
Client: Cypress Creek Renewables, LLC
Project: Cactus Flower Solar, Pinal County, AZ

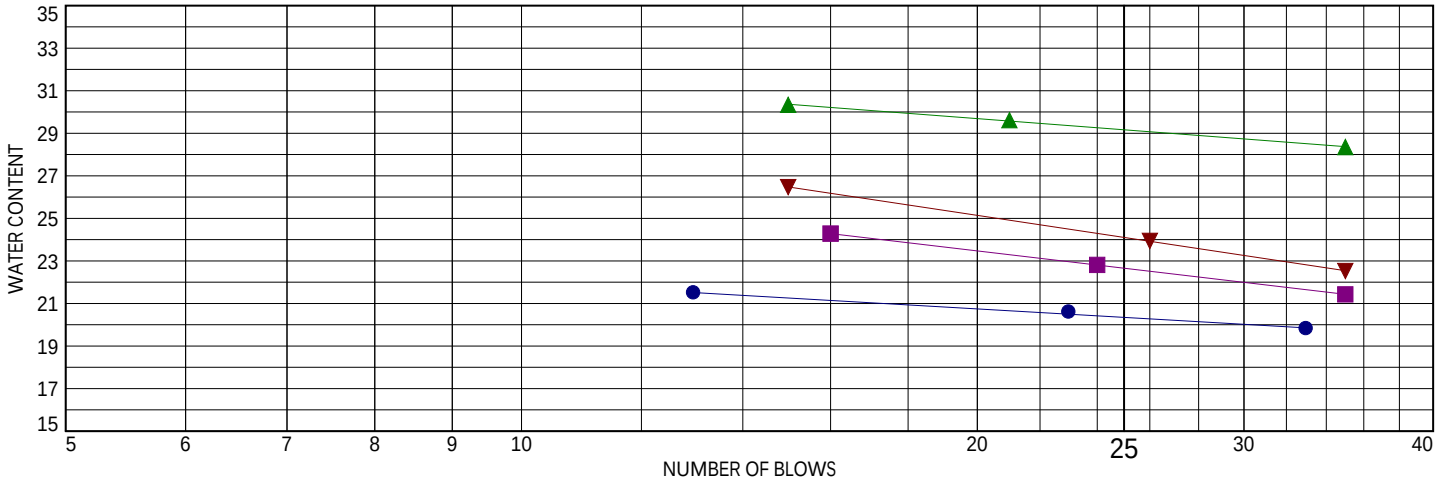
Project No: IRN 24-T-034 Figure

Tested By: JE Checked By: ANS

ATTERBERG
LIMITS RESULTS

LIQUID AND PLASTIC LIMITS TEST REPORT (ASTM D4318)





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown cmf Sand, and Silt & Clay (Visual)	20	16	4			
■	Brown silty, clayey sand	23	16	7	49.0	29.7	SC-SM
▲	Brown cmf Sand, and Silt & Clay (Visual)	29	22	7			
◆	Brown silty sand	NV	NP	NP	89.8	36.3	SM
▼	Pale Brown cmf Sand, and Silt & Clay (Visual)	24	16	8			

Project No. IRN 24-T-034 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

●Depth: 13'-15' Sample Number: B-01, S-5
■Depth: 13'-15' Sample Number: B-02, S-6
▲Depth: 6'-8' Sample Number: B-03, S-4
◆Depth: 4'-6' Sample Number: B-05, S-3
▼Depth: 2'-4' Sample Number: B-09, S-2

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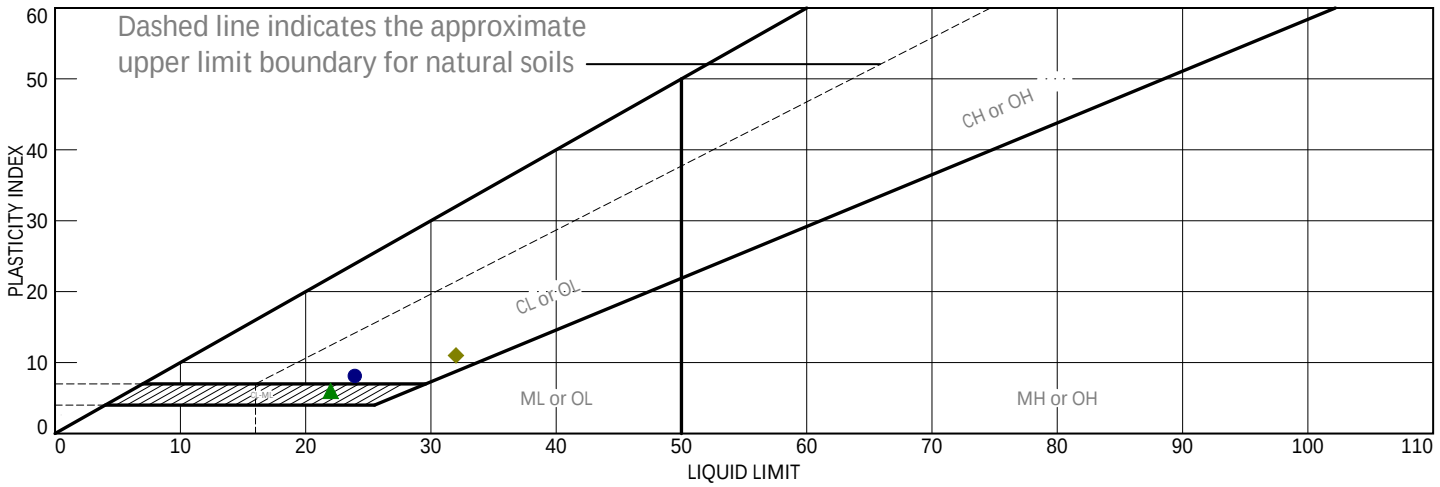
Remarks:

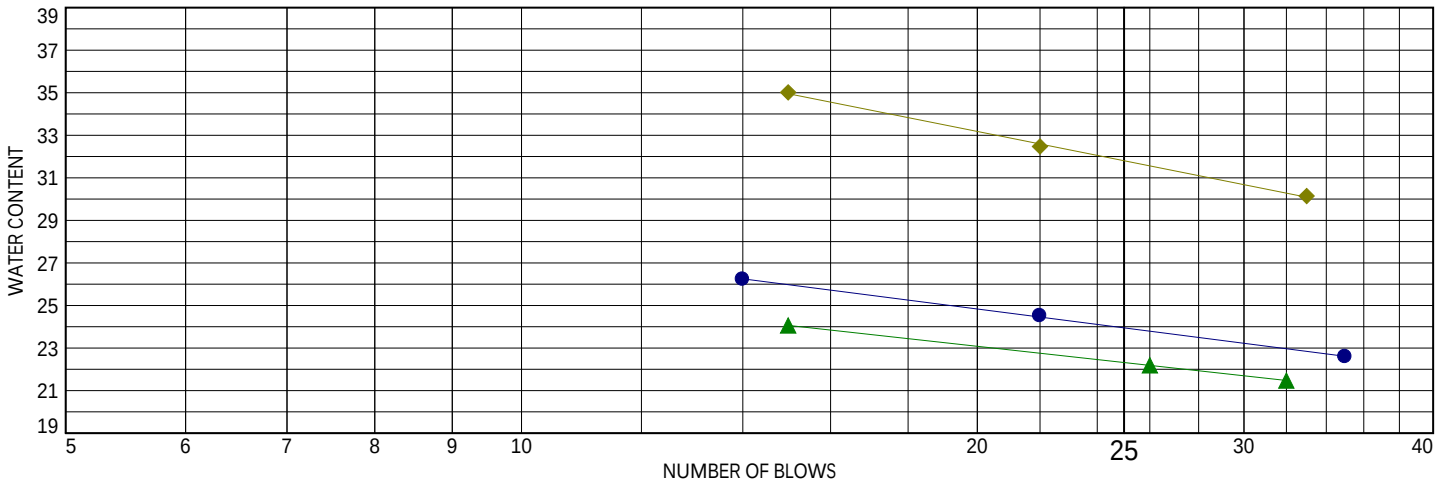
●ASTM D4318 - Sample Air-Dried, LL Device: Manual, PL Rolling Method: Hand-Rolled, Grooving Tool: Metal
3/22/2024

Figure

Tested By: JE Checked By: ANS

LIQUID AND PLASTIC LIMITS TEST REPORT (ASTM D4318)





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown cmf Sand, and Silt & Clay (Visual)	24	16	8			
■	Brown cmf Sand, some(-) Silt & Clay (Visual)	NV	NP	NP			
▲	Brown silty, clayey sand	22	16	6	44.9	21.3	SC-SM
◆	Brown Clay & Silt, little(+) cmf Sand (Visual)	32	21	11			

Project No. IRN 24-T-034 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

● Depth: 18'-20' Sample Number: B-12, S-7

■ Depth: 4'-6' Sample Number: B-BESS-01, S-3

▲ Depth: 28'-30' Sample Number: B-BESS-01, S-9

◆ Depth: 4'-6' Sample Number: B-SS-01, S-3

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South Plainfield, New Jersey

Remarks:

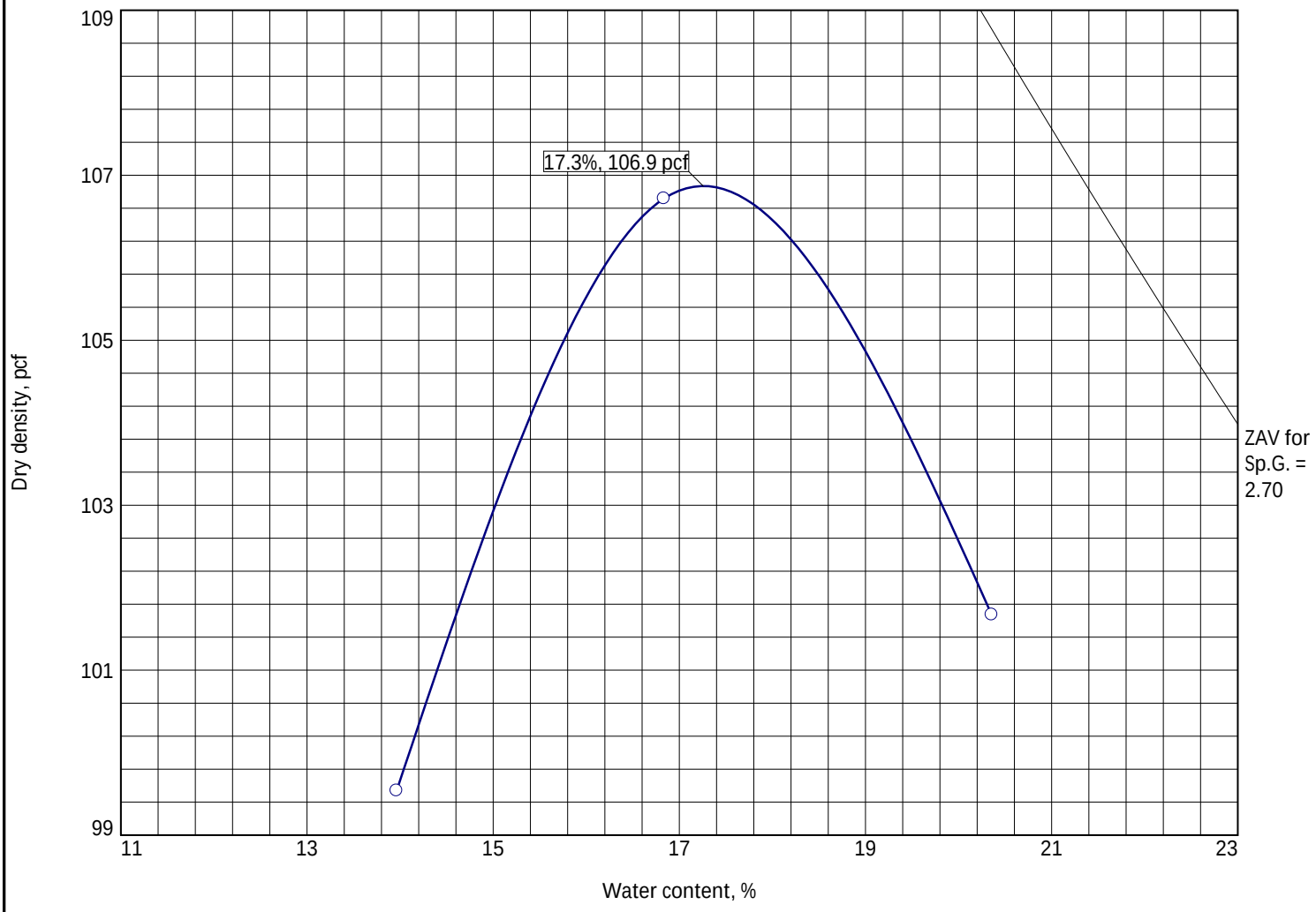
● ASTM D4318 - Sample Air-Dried, LL Device: Manual, PL Rolling Method: Hand-Rolled, Grooving Tool: Metal
3/22/2024

Figure

Tested By: JE Checked By: ANS

THERMAL RESISTIVITY RESULTS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 106.9 pcf Optimum moisture = 17.3 %	Brown Clay & Silt, little cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-SS-01, TRT-01

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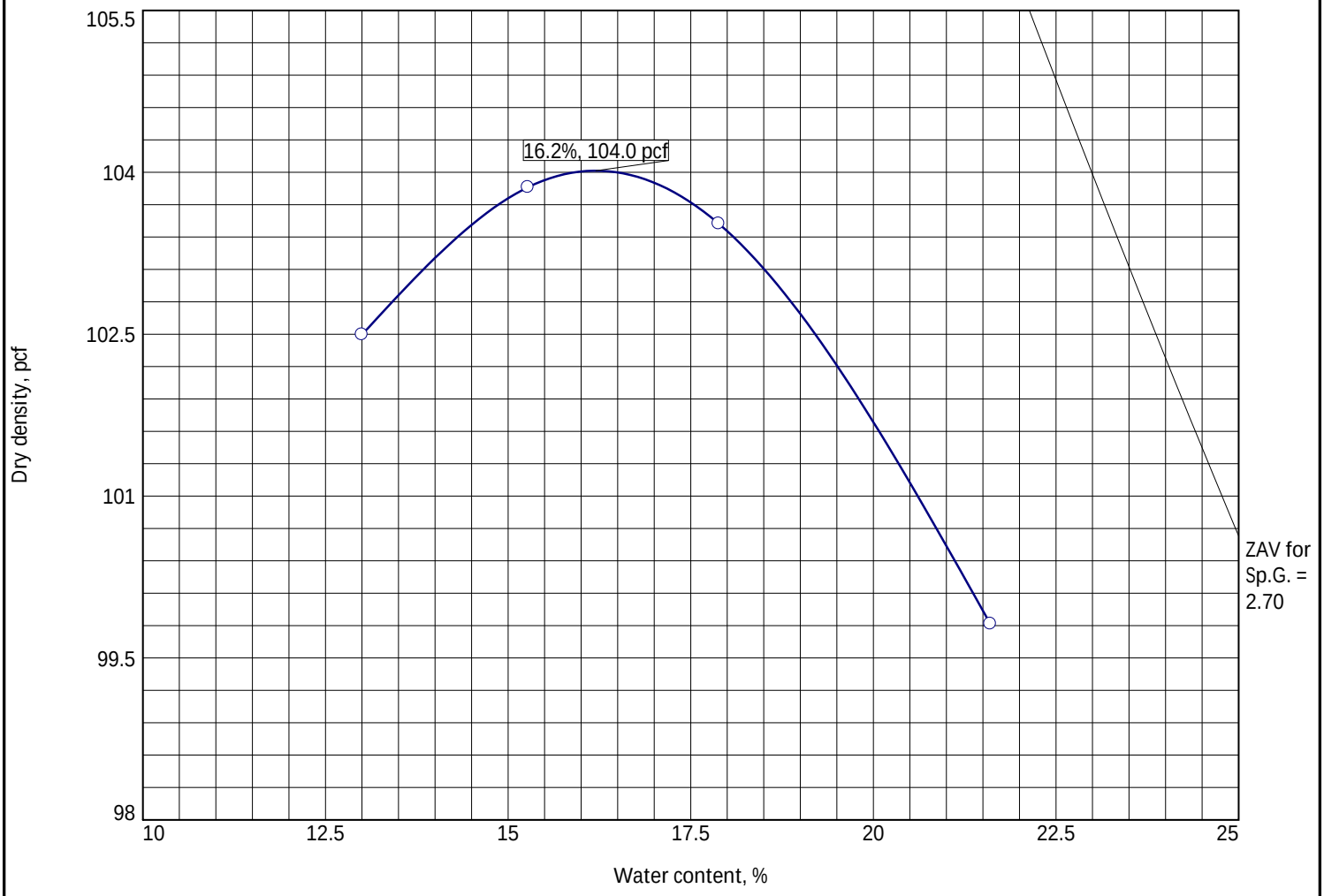
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 104.0 pcf Optimum moisture = 16.2 %	Brown Silt & Clay, little cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-BESS-01, TRT-02

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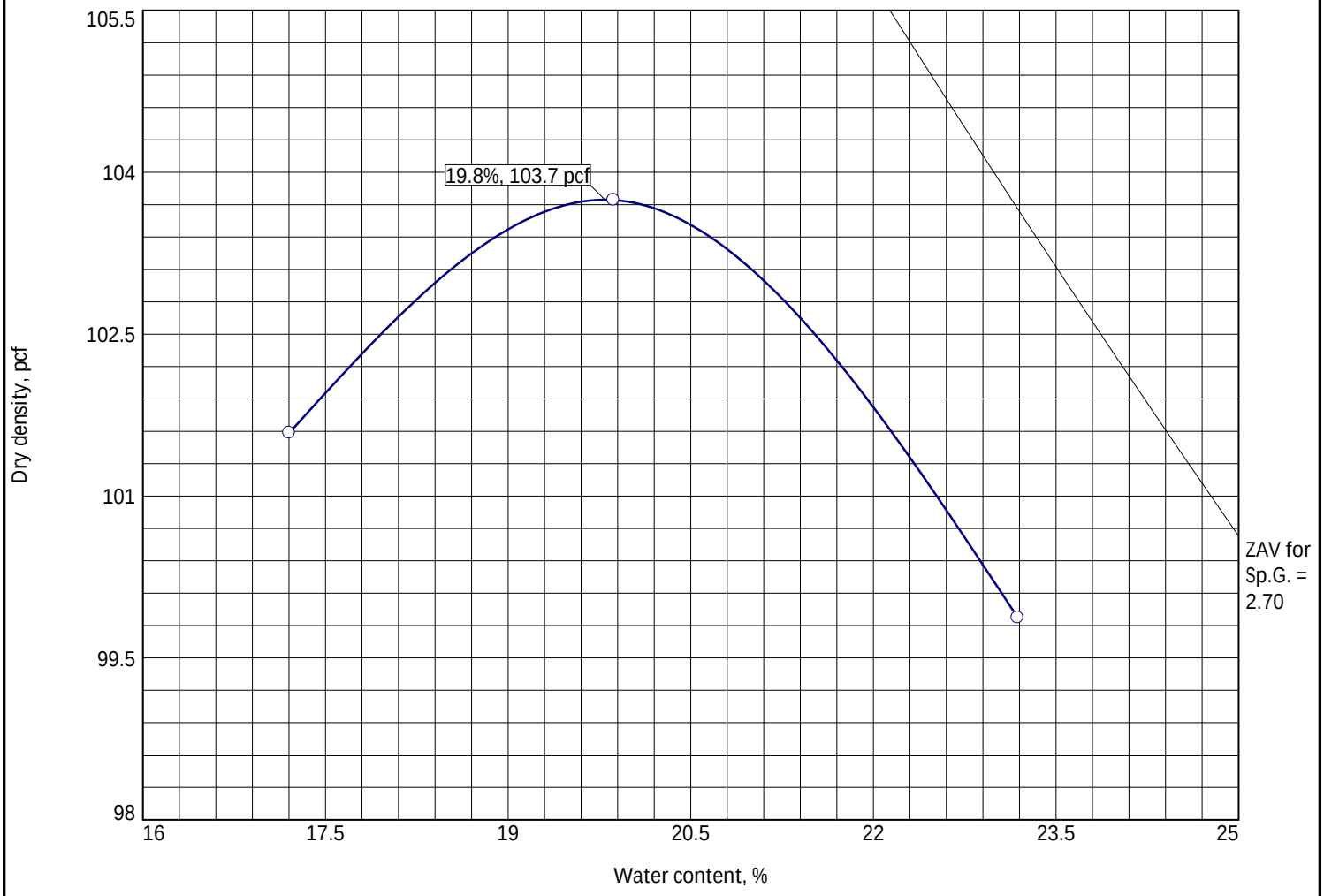
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 103.7 pcf Optimum moisture = 19.8 %	Brown Clay & Silt, trace cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-02, TRT-03

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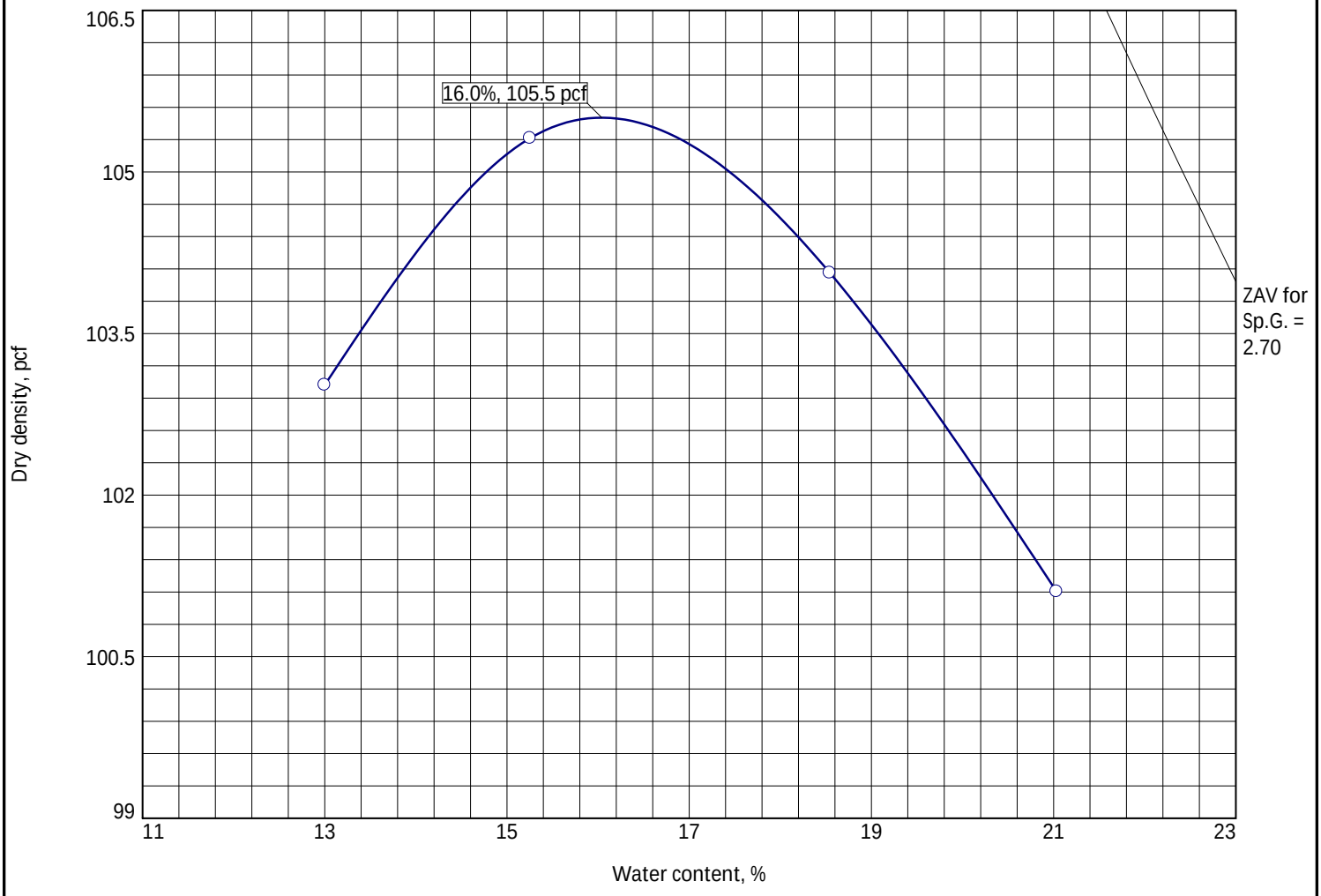
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 105.5 pcf Optimum moisture = 16.0 %	Brown Silt & Clay, little cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-03, TRT-04

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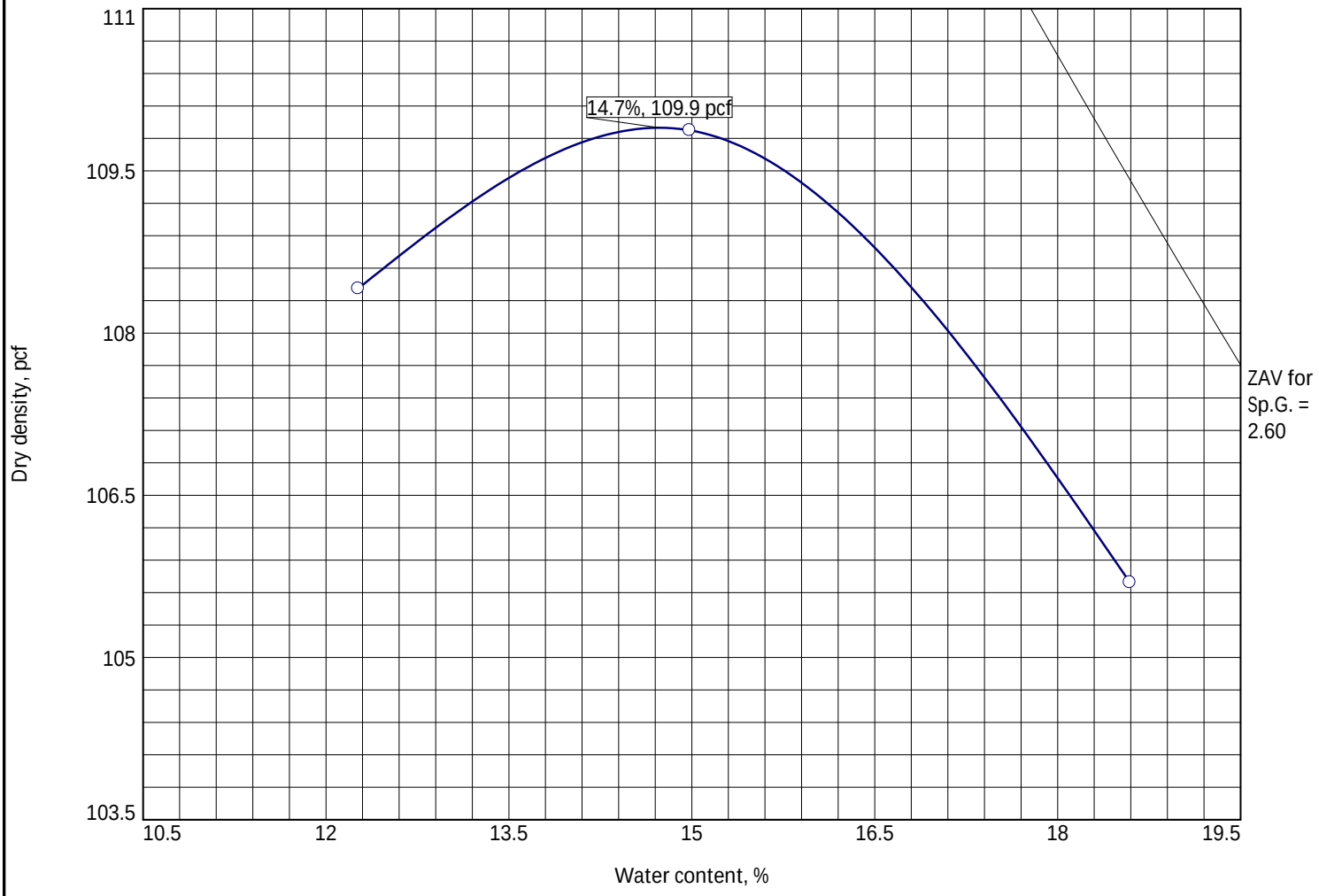
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 109.9 pcf Optimum moisture = 14.7 %	Brown Silt & Clay, little cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-05, TRT-05

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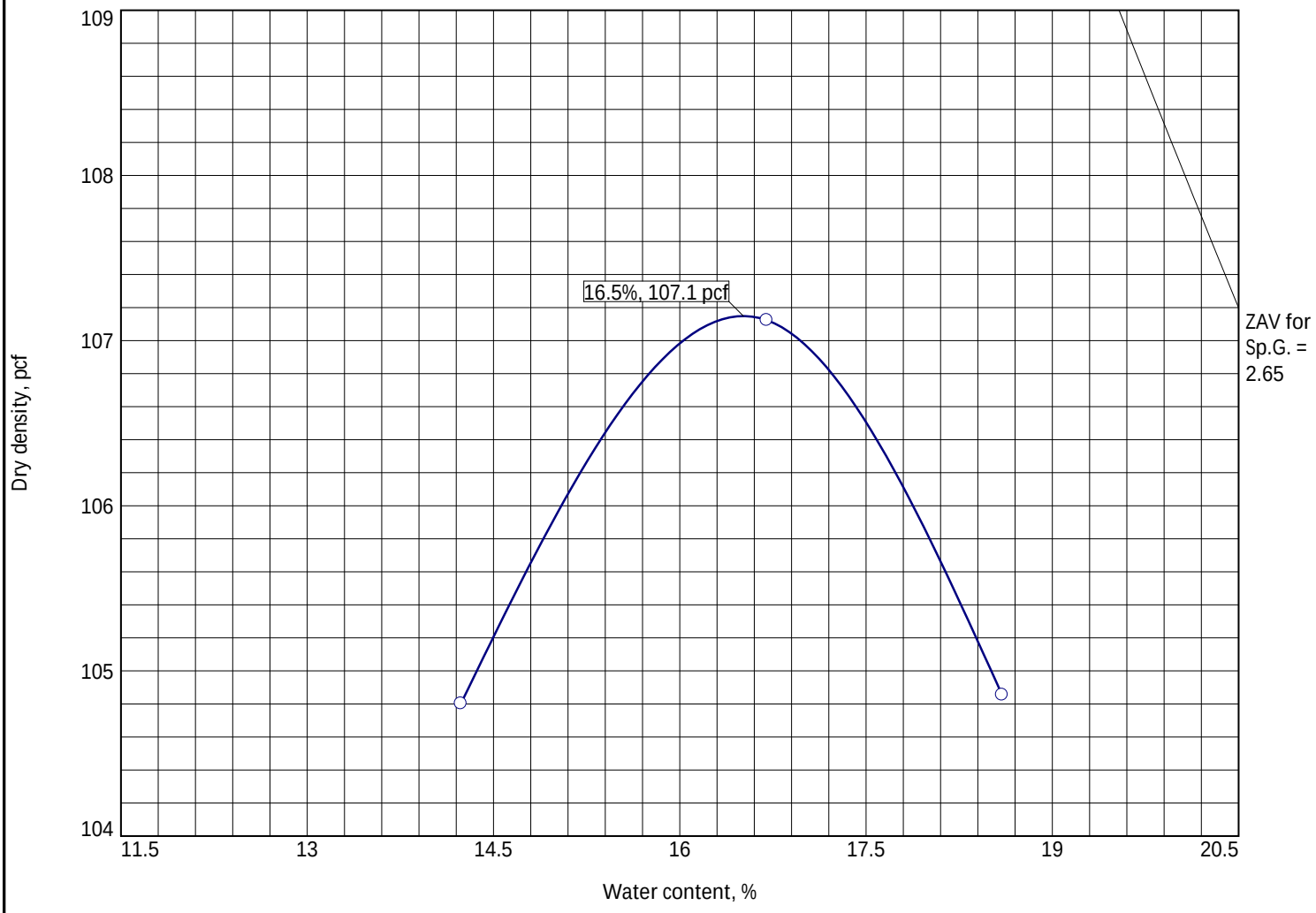
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 107.1 pcf Optimum moisture = 16.5 %	Brown Silt & Clay, little cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-06, TRT-06

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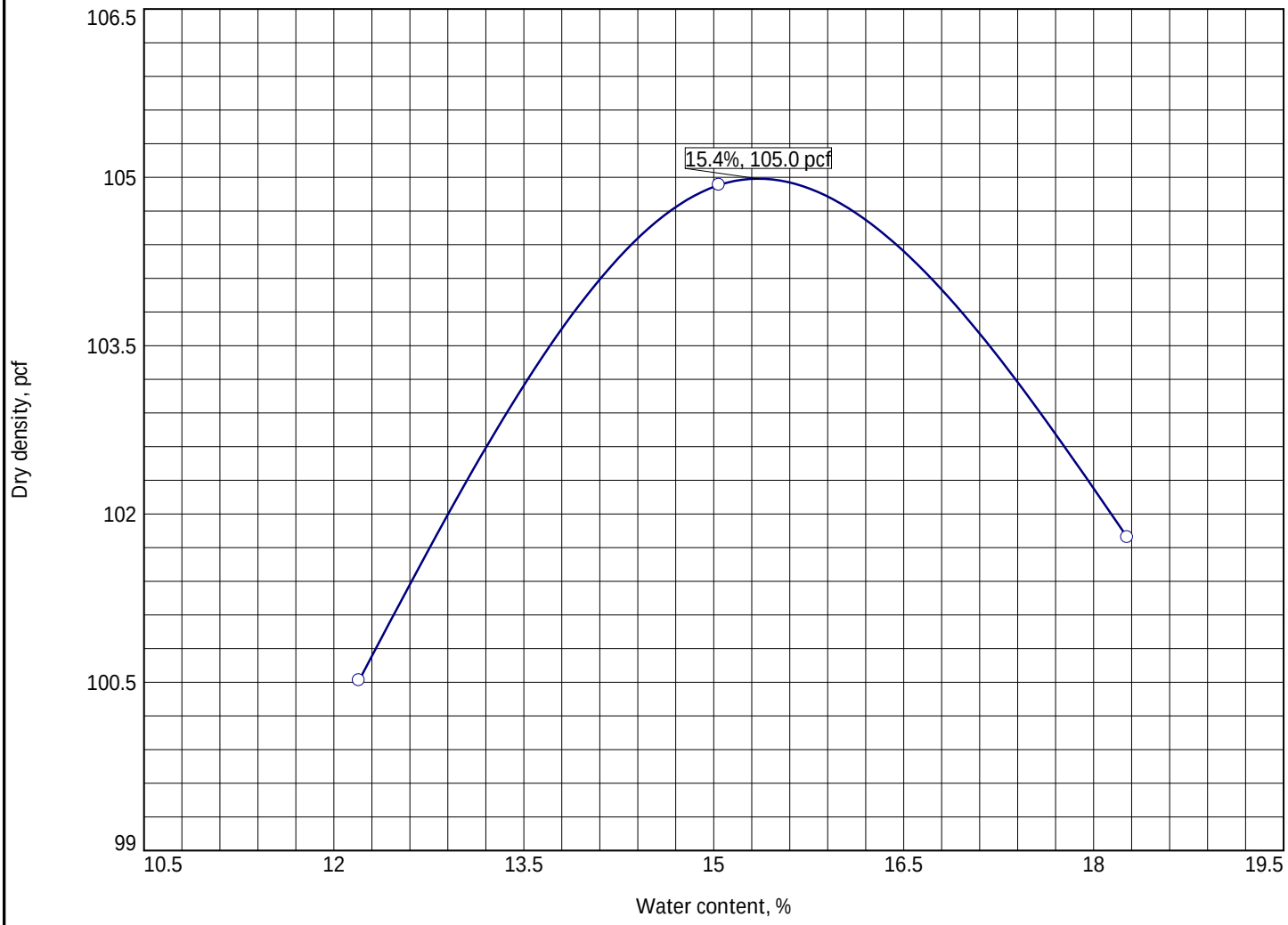
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 105.0 pcf Optimum moisture = 15.4 %	Brown Silt & Clay, little cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-08, TRT-07

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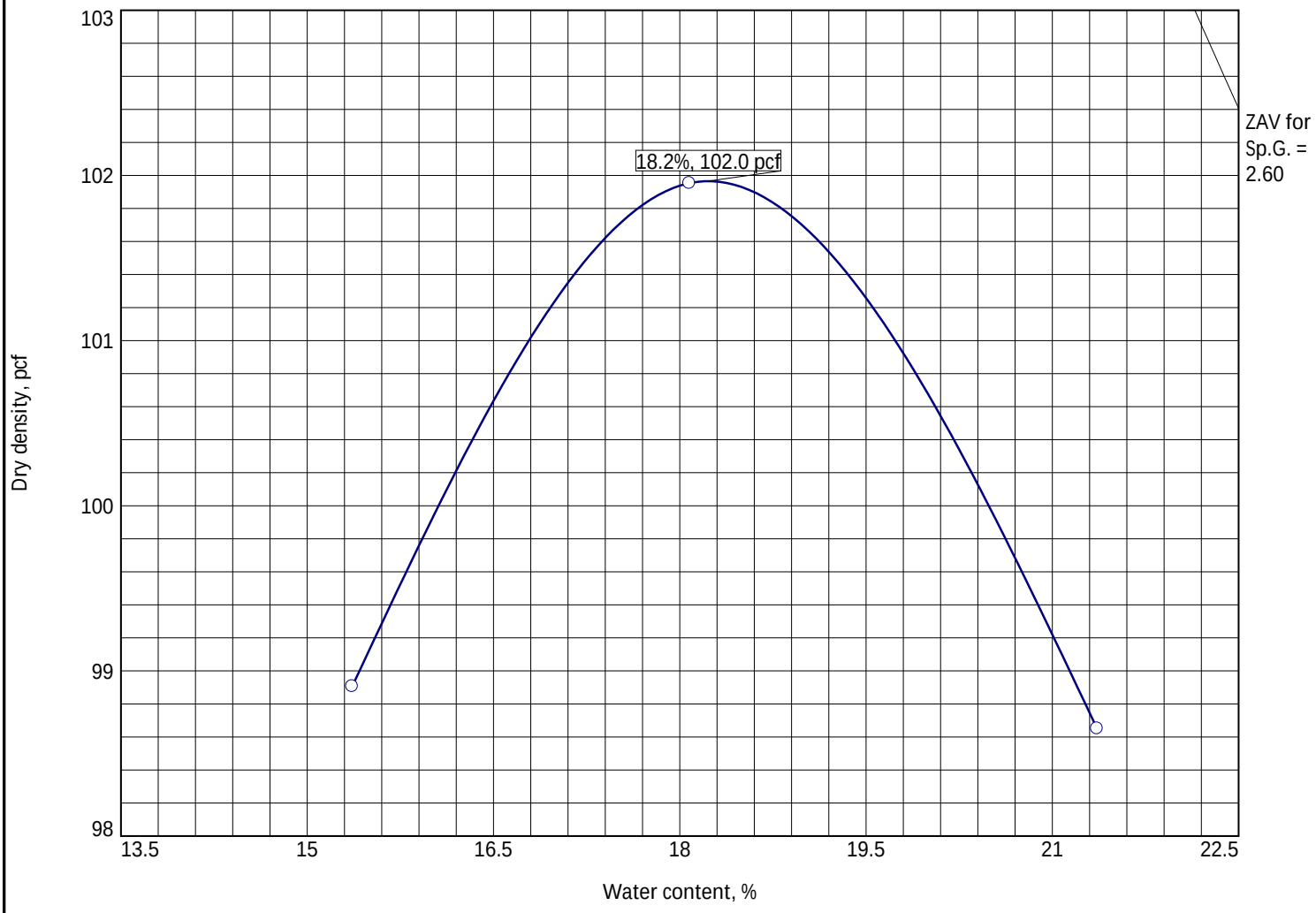
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 102.0 pcf Optimum moisture = 18.2 %	Brown Clay & Silt, trace cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-09, TRT-08

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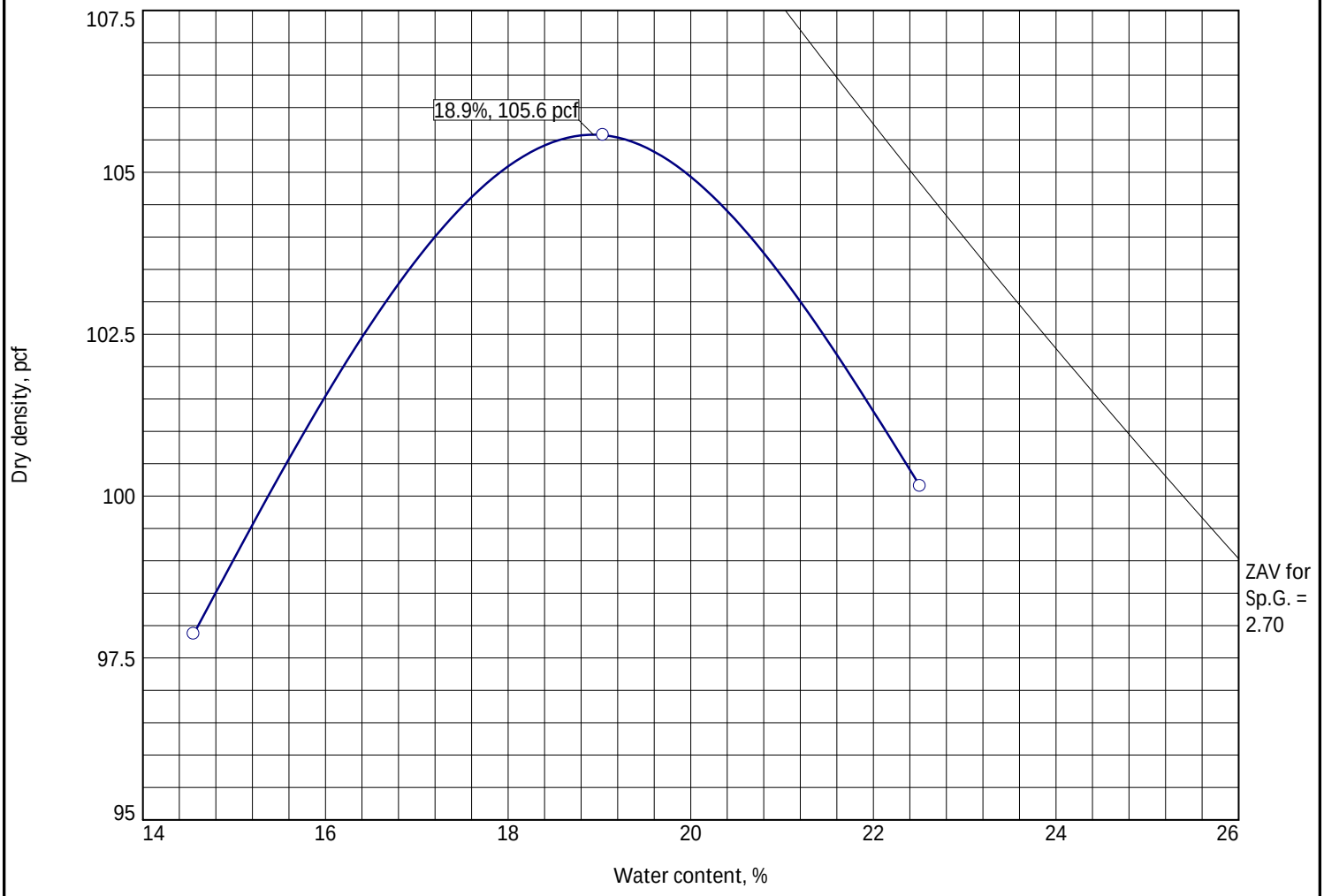
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 105.6 pcf Optimum moisture = 18.9 %	Brown Clay & Silt, little cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-12, TRT-09

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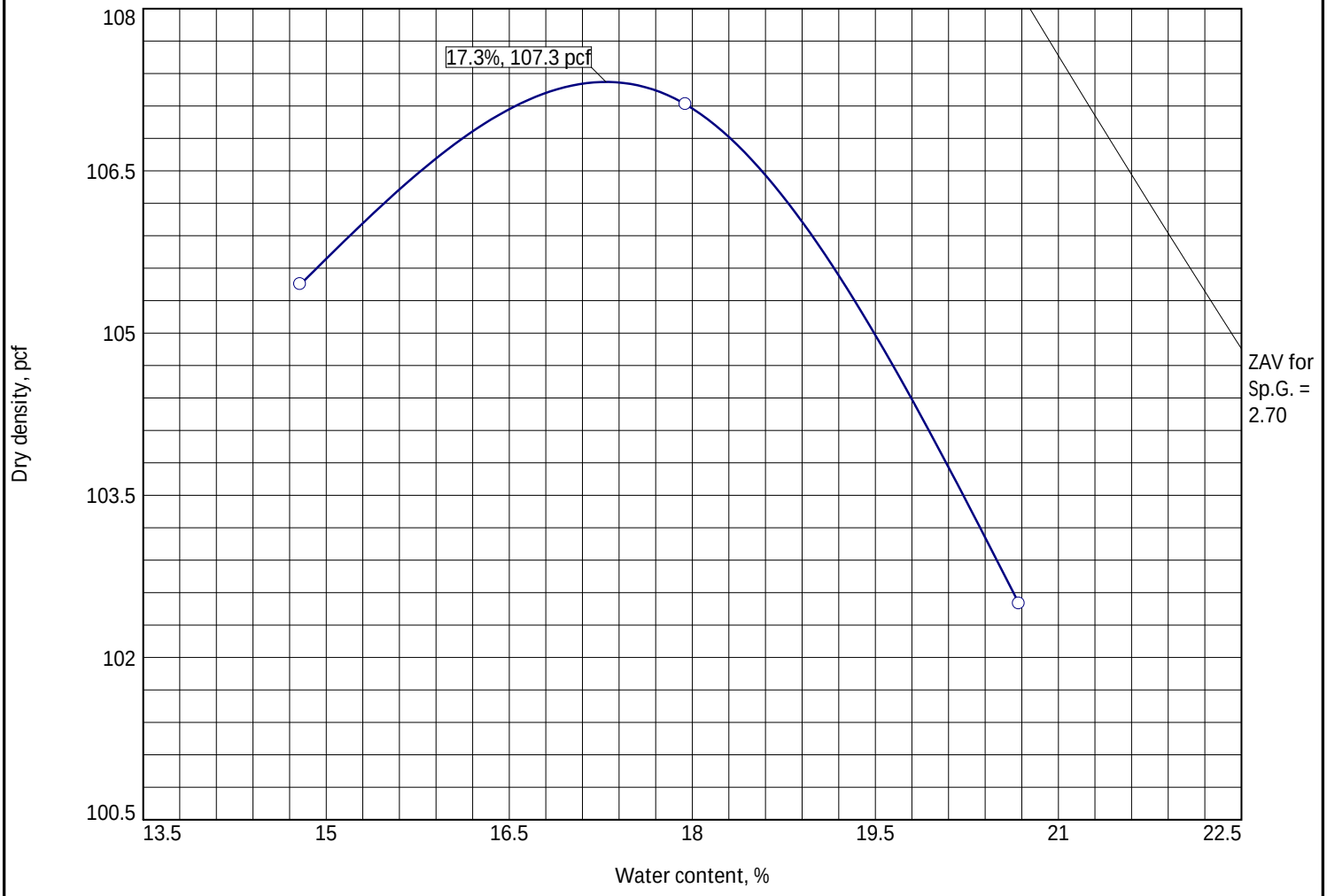
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 107.3 pcf Optimum moisture = 17.3 %	Brown Clay & Silt, little cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-15, TRT-10

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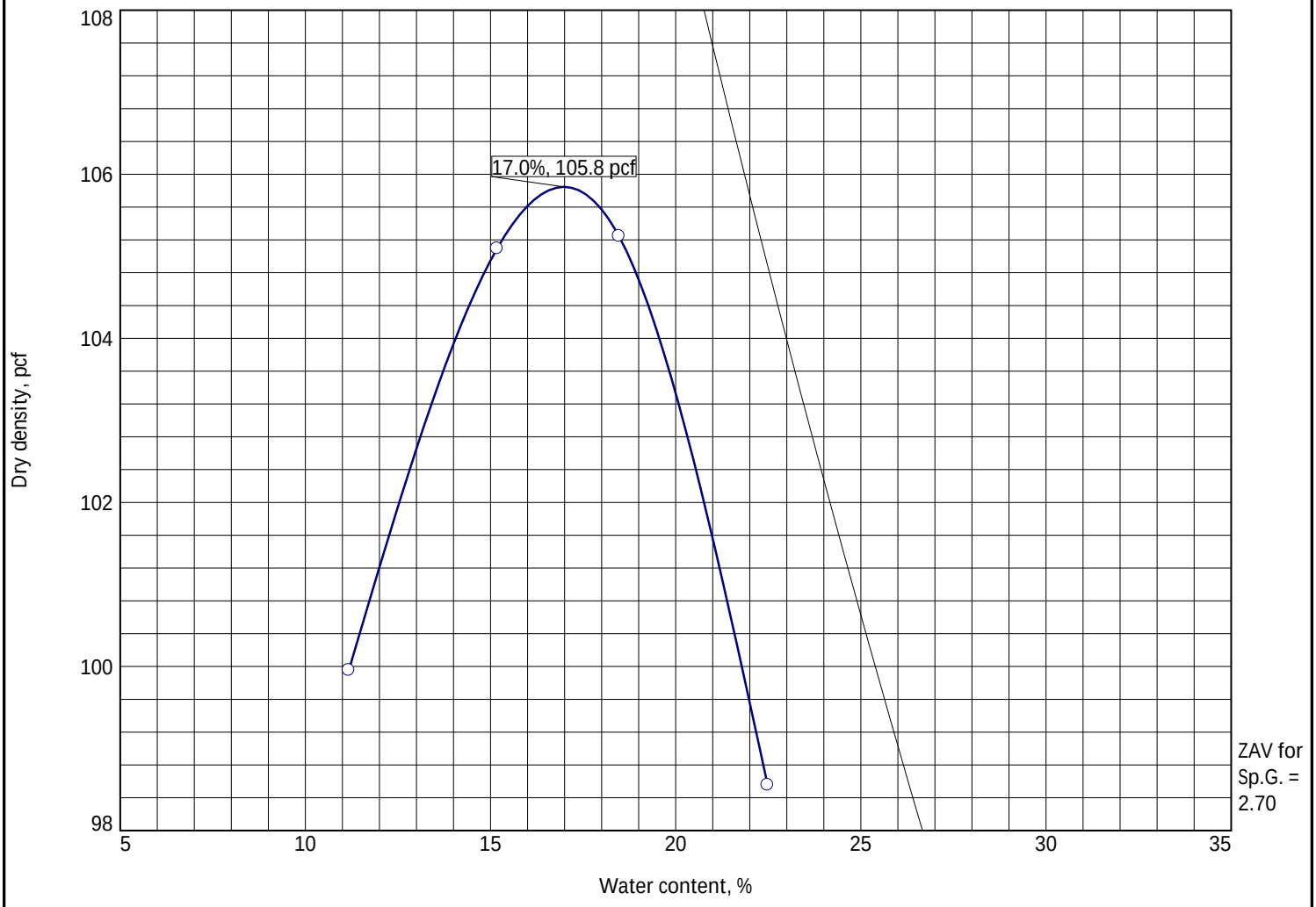
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: JS Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 105.8 pcf Optimum moisture = 17.0 %	Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-SS-01, CBR-01

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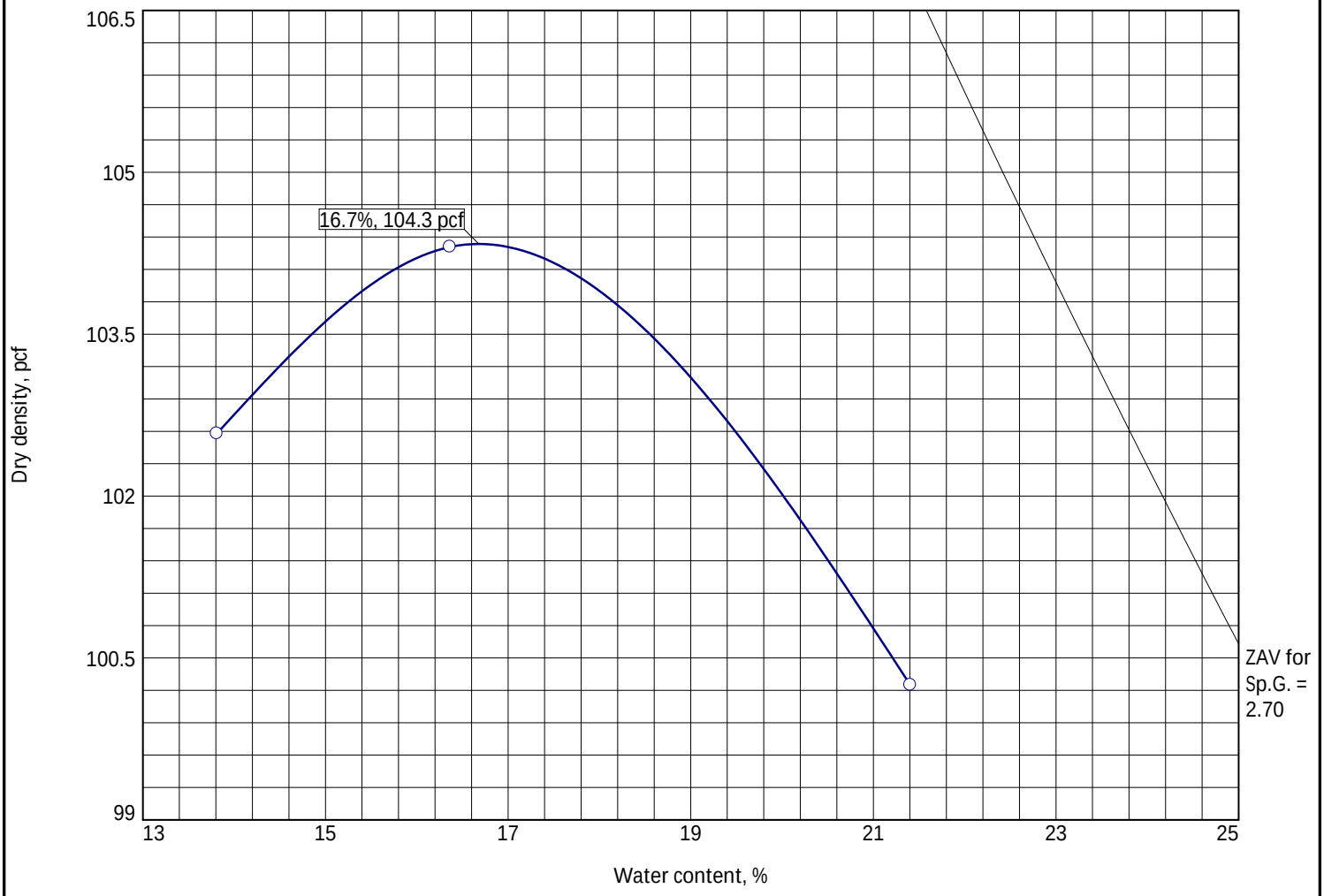
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: HC Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 104.3 pcf Optimum moisture = 16.7 %	Brown Silt & Clay, trace cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-BESS-01, CBR-02

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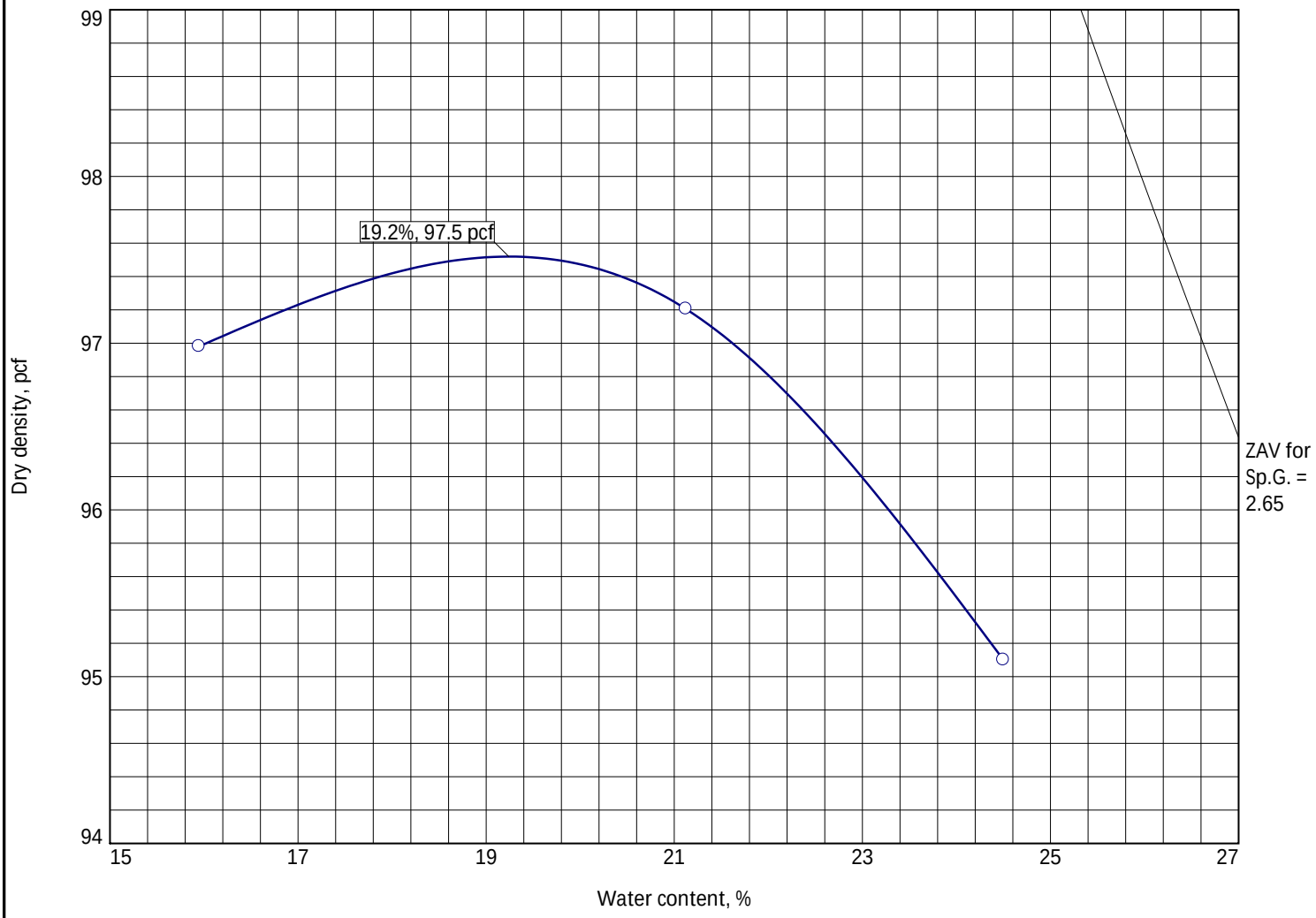
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: ES Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 97.5 pcf Optimum moisture = 19.2 %	Brown Clay & Silt, trace cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-01, CBR-03

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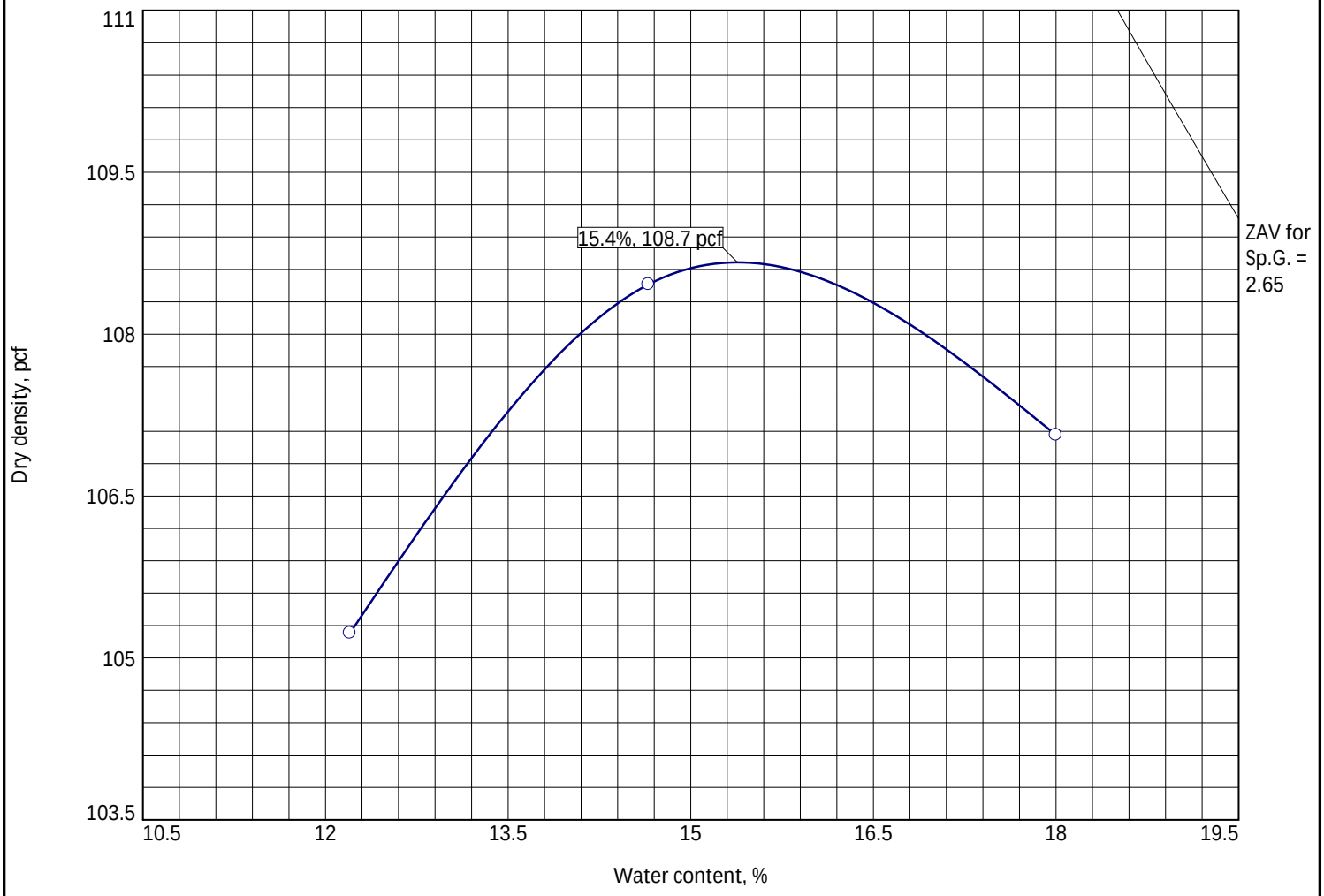
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: ES Checked By: ANS

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			0	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 108.7 pcf Optimum moisture = 15.4 %	Brown Silt & Clay, little cmf Sand (Visual)

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC

Project: Cactus Flower Solar, Pinal County, AZ

Date: 3/28/2024

○ Sample Number: B-10, CBR-04

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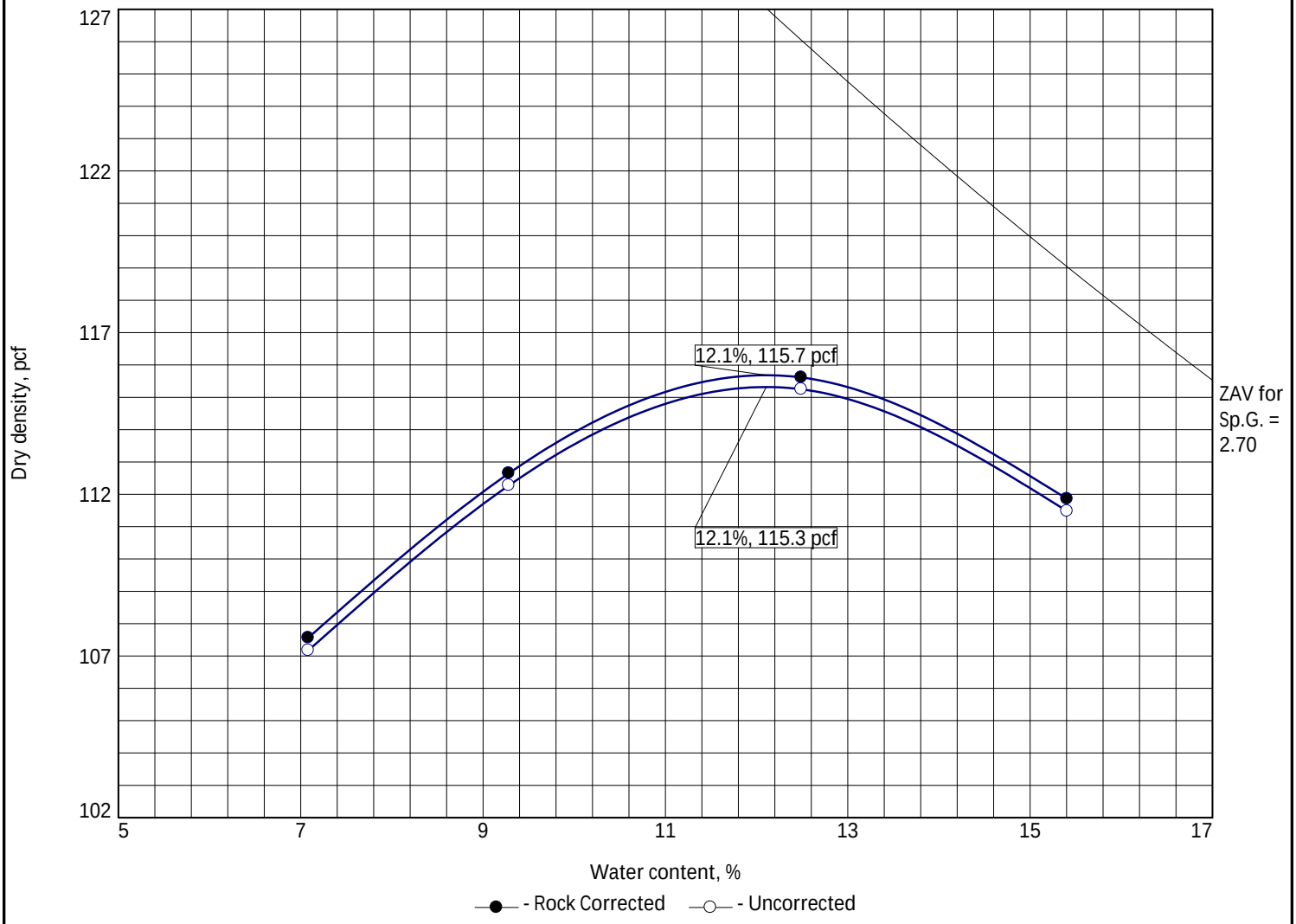
South Plainfield, New Jersey

Remarks:
SG Assumed

Figure

Tested By: ES

COMPACTION TEST REPORT



Test specification: ASTM D 698-12 Method B Standard
ASTM D4718-15 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
				2.7			1	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 115.7 pcf	115.3 pcf	Brown cmf Sand, some Silt & Clay, trace mf Gravel (Visual)
Optimum moisture = 12.1 %	12.1 %	

Project No. IRN 24-T-035 Client: Cypress Creek Renewables, LLC
Project: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024
○ Sample Number: B-11, CBR-05

Remarks:
SG Assumed

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Figure

Tested By: ES Checked By: ANS

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South Plainfield, NJ 07080
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NJ EDA Approved Testing Laboratory • MBE/DBE Certified • NJ DEP Certified

Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-SS-01, TRT-01
Description: Brown Clay & Silt, little cmf Sand (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 90.9 PCF
In-Situ Moisture: 13.8 %
Optimum Moisture: 17.3 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4272	234.1
2	¼ OMC	4.3	0.6114	163.6
3	½ OMC	8.7	1.4231	70.3
4	¾ OMC	13.0	1.7583	56.9
5	OMC	17.3	1.8921	52.9

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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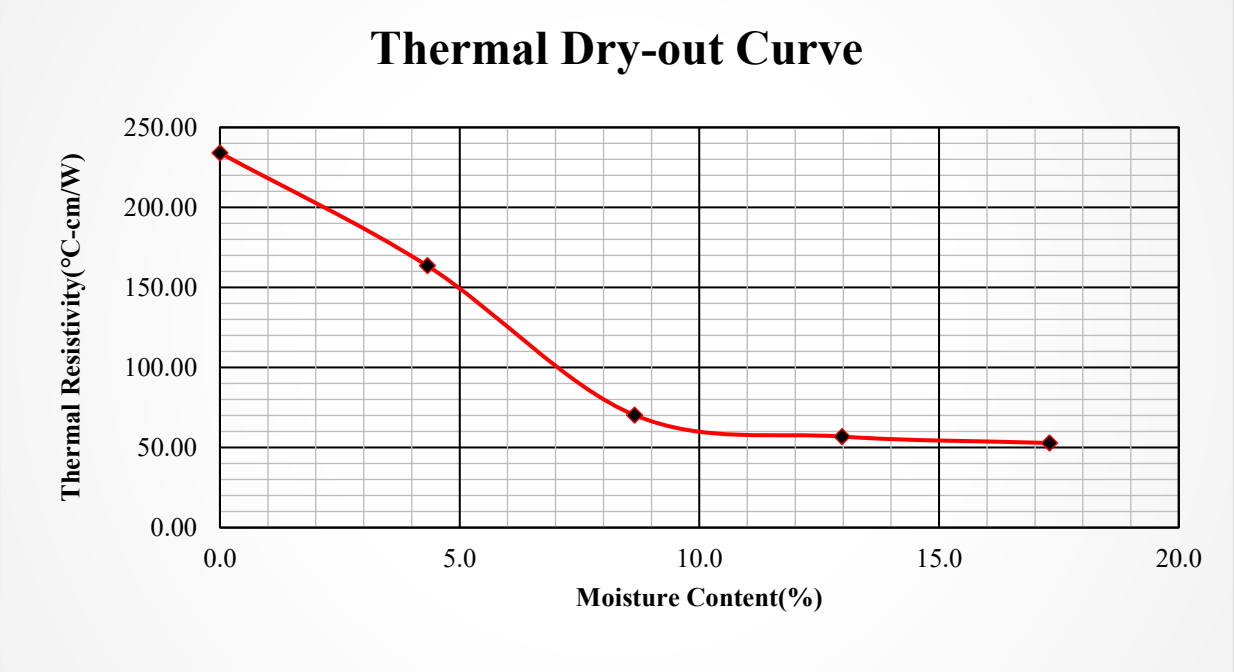
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-SS-01, TRT-01

Description: Brown Clay & Silt, little cmf Sand (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	90.9 PCF
In-Situ Moisture:	13.8 %	Optimum Moisture:	17.3 %



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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-BESS-01, TRT-02
Description: Brown Silt & Clay, little cmf Sand (Viusal)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 88.4 PCF
In-Situ Moisture: 14.5 %
Optimum Moisture: 16.2 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4823	207.3
2	¼ OMC	4.1	0.5984	167.1
3	½ OMC	8.1	1.1075	90.3
4	¾ OMC	12.2	1.4847	67.4
5	OMC	16.2	1.6303	61.3

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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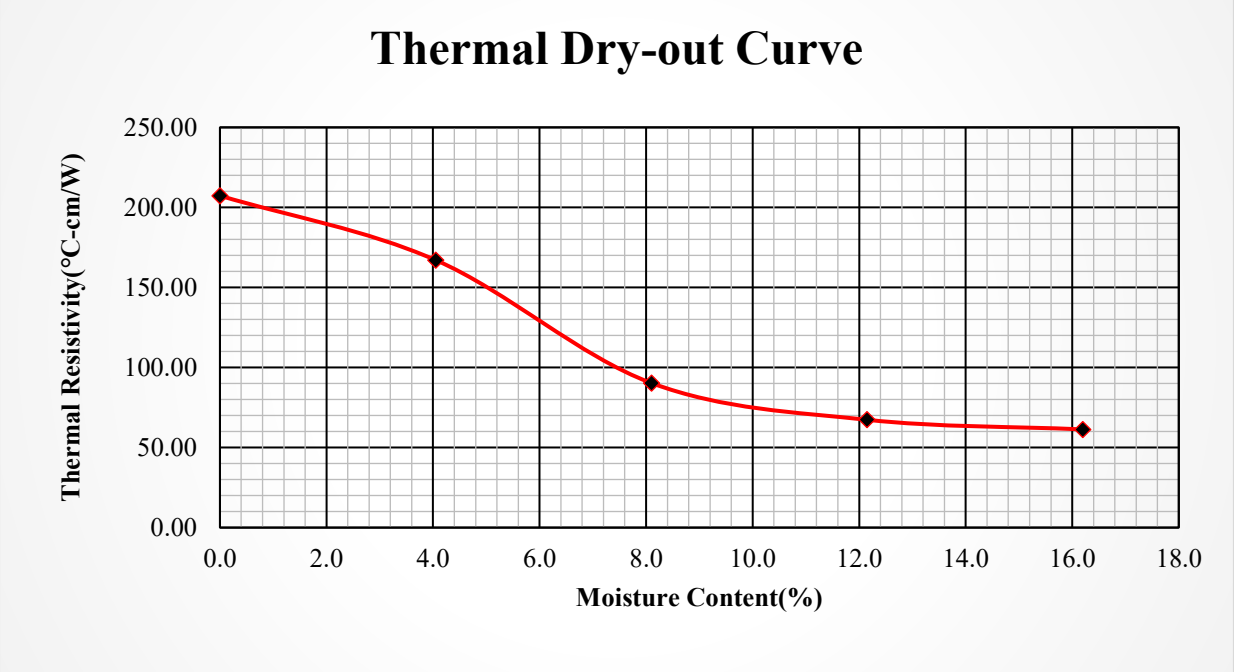
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-BESS-01, TRT-02

Description: Brown Silt & Clay, little cmf Sand (Viusal)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	88.4 PCF
In-Situ Moisture:	14.5 %	Optimum Moisture:	16.2 %



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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-02, TRT-03
Description: Brown Clay & Silt, trace cmf Sand (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 88.1 PCF
In-Situ Moisture: 13.8 %
Optimum Moisture: 19.8 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4512	221.6
2	¼ OMC	5.0	0.6458	154.8
3	½ OMC	9.9	1.4040	71.2
4	¾ OMC	14.9	1.6978	58.9
5	OMC	19.8	1.8304	54.6

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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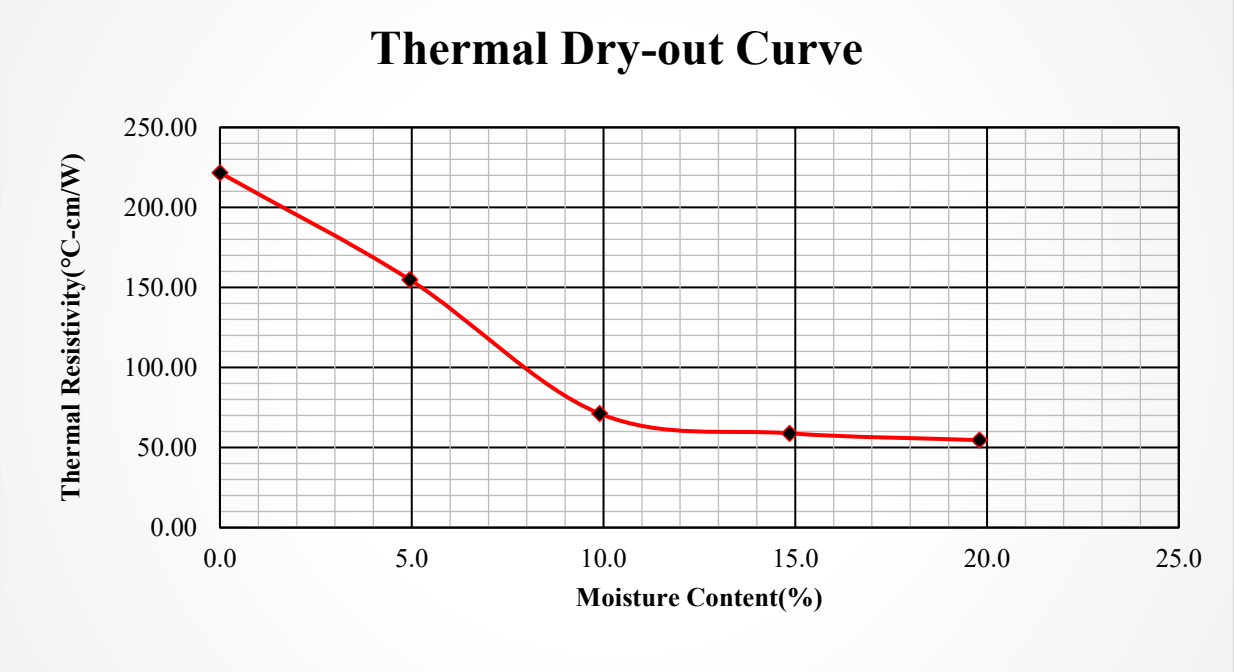
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-02, TRT-03

Description: Brown Clay & Silt, trace cmf Sand (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	88.1 PCF
In-Situ Moisture:	13.8 %	Optimum Moisture:	19.8 %



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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-03, TRT-04
Description: Brown Silt & Clay, little cmf Sand (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 89.7 PCF
In-Situ Moisture: 14.6 %
Optimum Moisture: 16.0 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4666	214.3
2	¼ OMC	4.0	0.6060	165.0
3	½ OMC	8.0	1.2778	78.3
4	¾ OMC	12.0	1.6562	60.4
5	OMC	16.0	1.7952	55.7

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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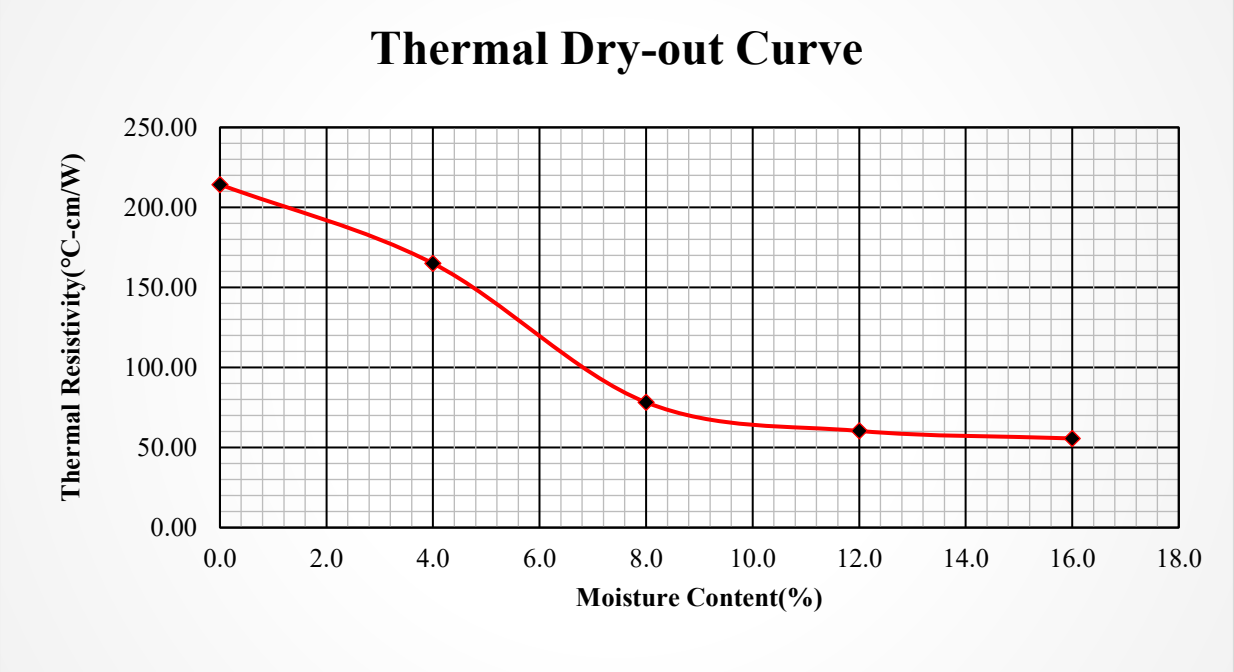
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-03, TRT-04

Description: Brown Silt & Clay, little cmf Sand (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	89.7 PCF
In-Situ Moisture:	14.6 %	Optimum Moisture:	16.0 %



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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-05, TRT-05
Description: Brown Silt & Clay, little cmf Sand (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 93.4 PCF
In-Situ Moisture: 9.7 %
Optimum Moisture: 14.7 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4300	232.6
2	¼ OMC	3.7	0.6769	147.7
3	½ OMC	7.4	1.5811	63.2
4	¾ OMC	11.0	1.8312	54.6
5	OMC	14.7	1.9406	51.5

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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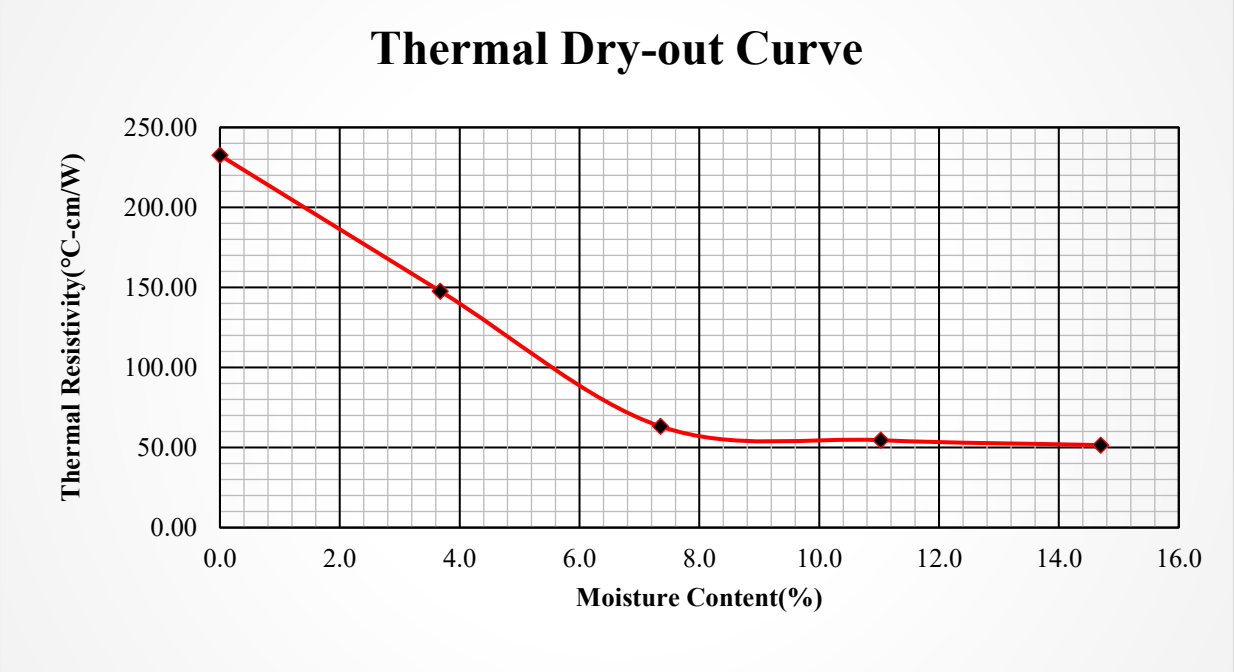
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-05, TRT-05

Description: Brown Silt & Clay, little cmf Sand (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	93.4 PCF
In-Situ Moisture:	9.7 %	Optimum Moisture:	14.7 %



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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-06, TRT-06
Description: Brown Silt & Clay, little cmf Sand (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 91.0 PCF
In-Situ Moisture: 10.4 %
Optimum Moisture: 16.5 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4659	214.6
2	¼ OMC	4.1	0.6513	153.5
3	½ OMC	8.3	1.4158	70.6
4	¾ OMC	12.4	1.7030	58.7
5	OMC	16.5	1.8248	54.8

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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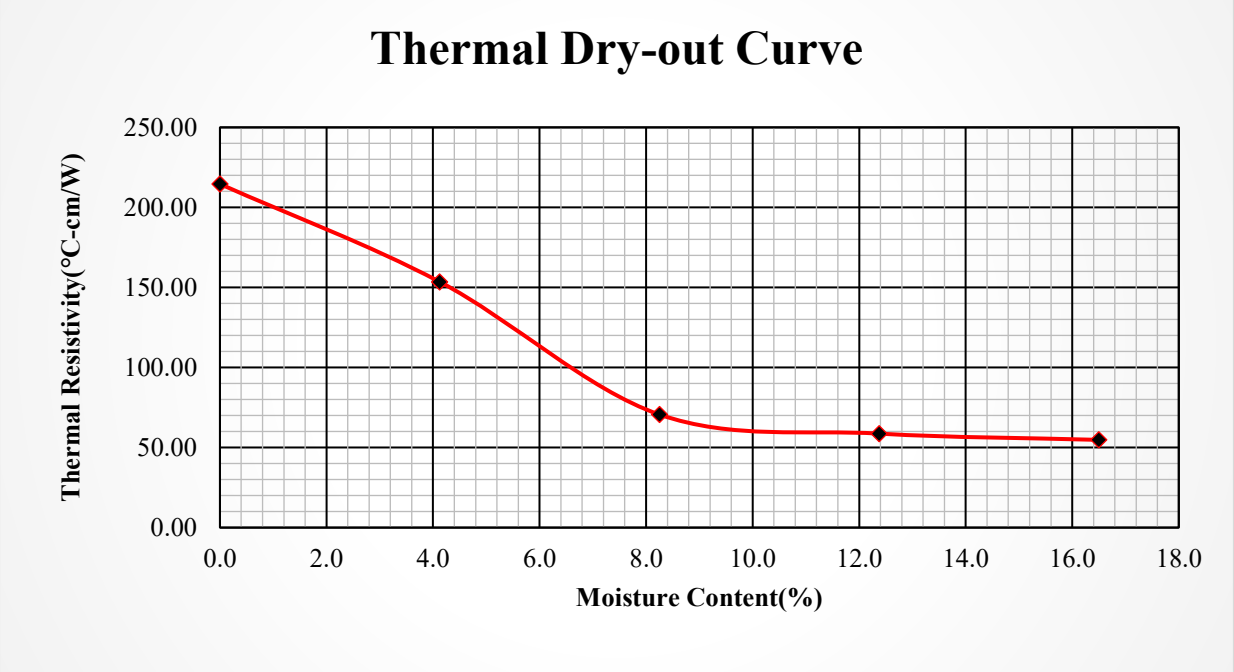
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-06, TRT-06

Description: Brown Silt & Clay, little cmf Sand (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	91.0 PCF
In-Situ Moisture:	10.4 %	Optimum Moisture:	16.5 %



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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-08, TRT-07
Description: Brown Silt & Clay, little cmf Sand (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 89.3 PCF
In-Situ Moisture: 7.4 %
Optimum Moisture: 15.4 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4606	217.1
2	¼ OMC	3.9	0.6279	159.3
3	½ OMC	7.7	1.3304	75.2
4	¾ OMC	11.6	1.5964	62.6
5	OMC	15.4	1.7070	58.6

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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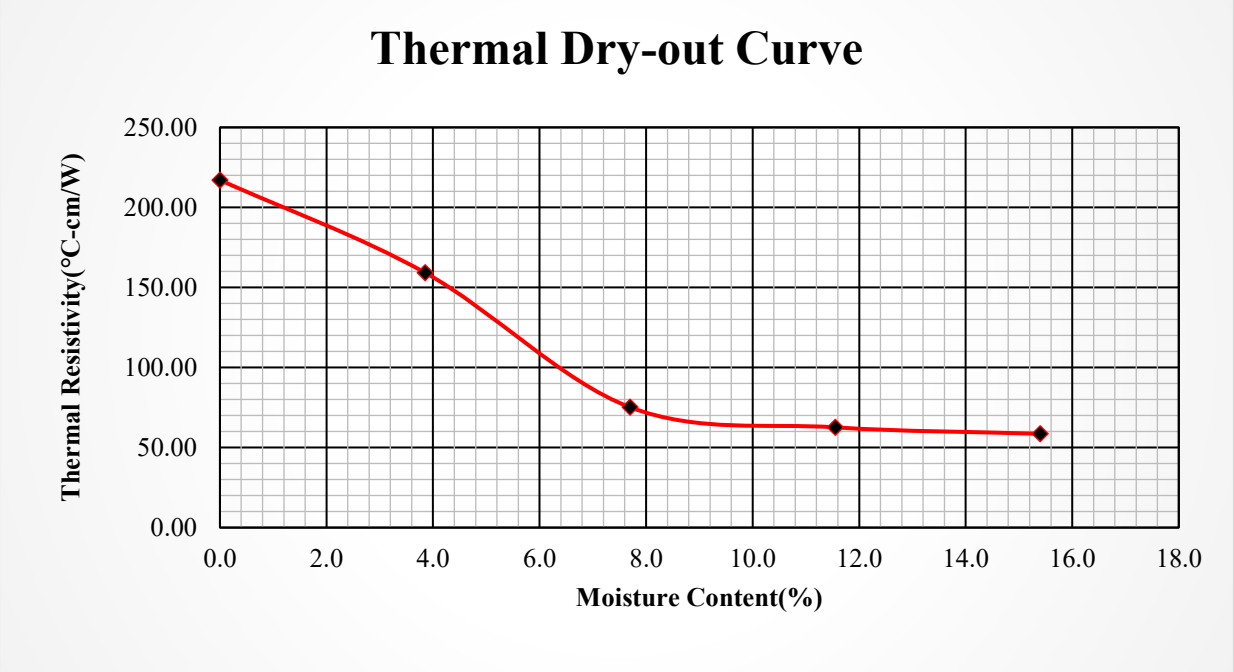
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-08, TRT-07

Description: Brown Silt & Clay, little cmf Sand (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	89.3 PCF
In-Situ Moisture:	7.4 %	Optimum Moisture:	15.4 %



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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-09, TRT-08
Description: Brown Clay & Silt, trace cmf Sand (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 86.9 PCF
In-Situ Moisture: 13.3 %
Optimum Moisture: 18.2 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4814	207.7
2	¼ OMC	4.6	0.6260	159.7
3	½ OMC	9.1	1.2508	79.9
4	¾ OMC	13.7	1.5814	63.2
5	OMC	18.2	1.7150	58.3

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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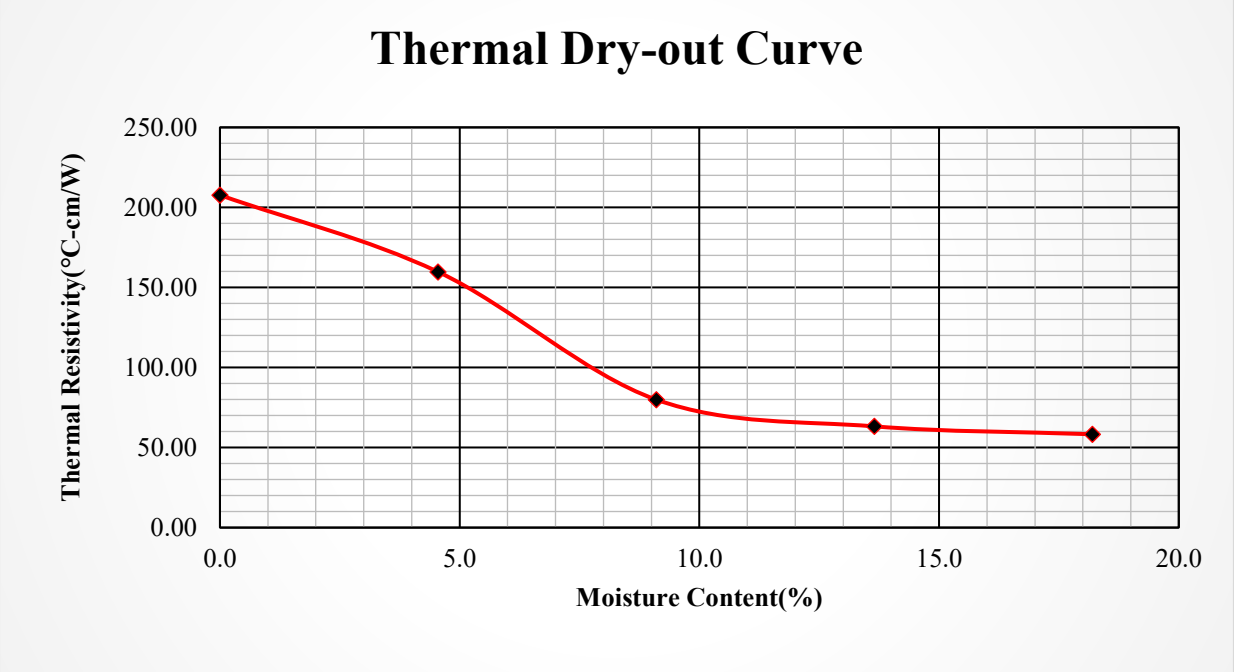
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-09, TRT-08

Description: Brown Clay & Silt, trace cmf Sand (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	86.9 PCF
In-Situ Moisture:	13.3 %	Optimum Moisture:	18.2 %



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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-12, TRT-09
Description: Brown Clay & Silt, little cmf Sand (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 89.8 PCF
In-Situ Moisture: 12.9 %
Optimum Moisture: 18.9 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4233	236.2
2	¼ OMC	4.7	0.5893	169.7
3	½ OMC	9.5	1.1989	83.4
4	¾ OMC	14.2	1.4681	68.1
5	OMC	18.9	1.5969	62.6

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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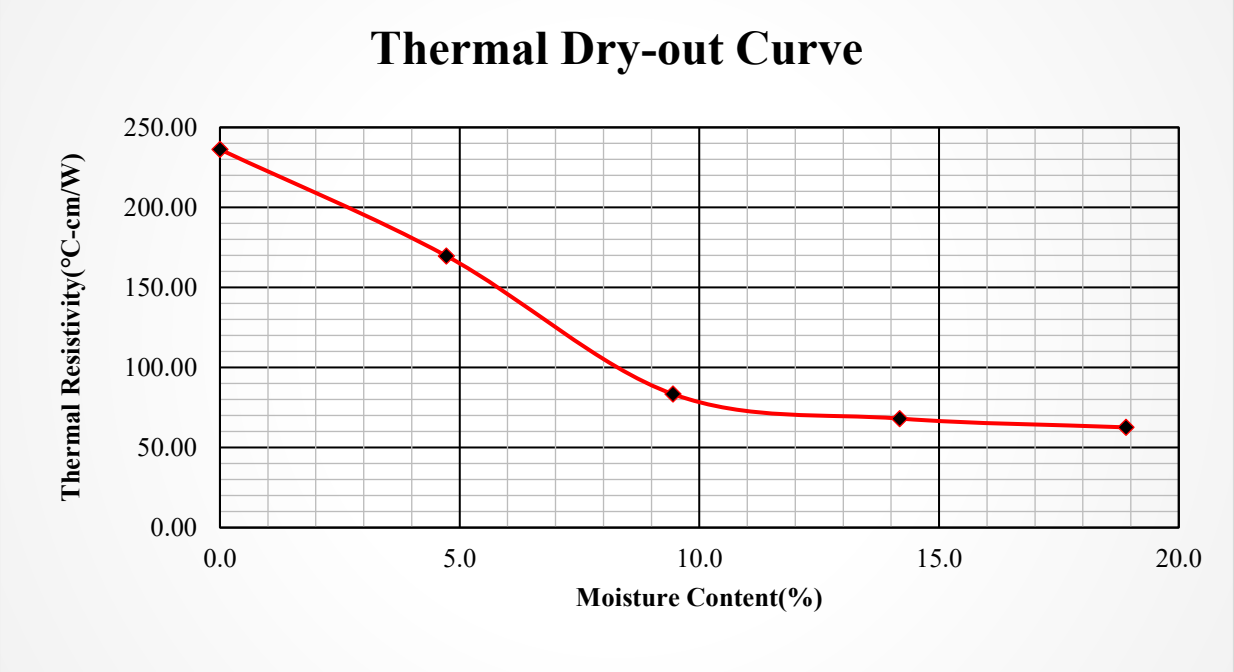
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-12, TRT-09

Description: Brown Clay & Silt, little cmf Sand (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	89.8 PCF
In-Situ Moisture:	12.9 %	Optimum Moisture:	18.9 %



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Determination of Thermal Conductivity of Soil and Rock by Thermal Needle Probe (ASTM D5334)

Client Name: Cypress Creek Renewables, LLC
LAB IRN: 24-T-035
Project Name: Cactus Flower Solar, Pinal County, AZ
Date: 3/28/2024

Sample ID: B-15, TRT-10
Description: Brown Clay & Silt, little cmf Sand (Visual)

Specimen type: Reconstituted (85% D698)
Recompaction Dry Density: 91.2 PCF
In-Situ Moisture: 11.4 %
Optimum Moisture: 17.3 %

S.No.	Moisture (%)		Thermal Conductivity (W/m-K)	Thermal Resistivity (°C-cm/W)
1	Dry	0.0	0.4429	225.8
2	¼ OMC	4.3	0.6054	165.2
3	½ OMC	8.7	1.2270	81.5
4	¾ OMC	13.0	1.4965	66.8
5	OMC	17.3	1.6206	61.7

Remarks:

1. Needle size: 2.4 mm diameter × 100 mm length.
2. Thermal grease used: High-density polysynthetics silver thermal compound
3. Tested under controlled room temperature conditions (20°C to 22°C).

Tested By: JS/JE
Checked By: ANS

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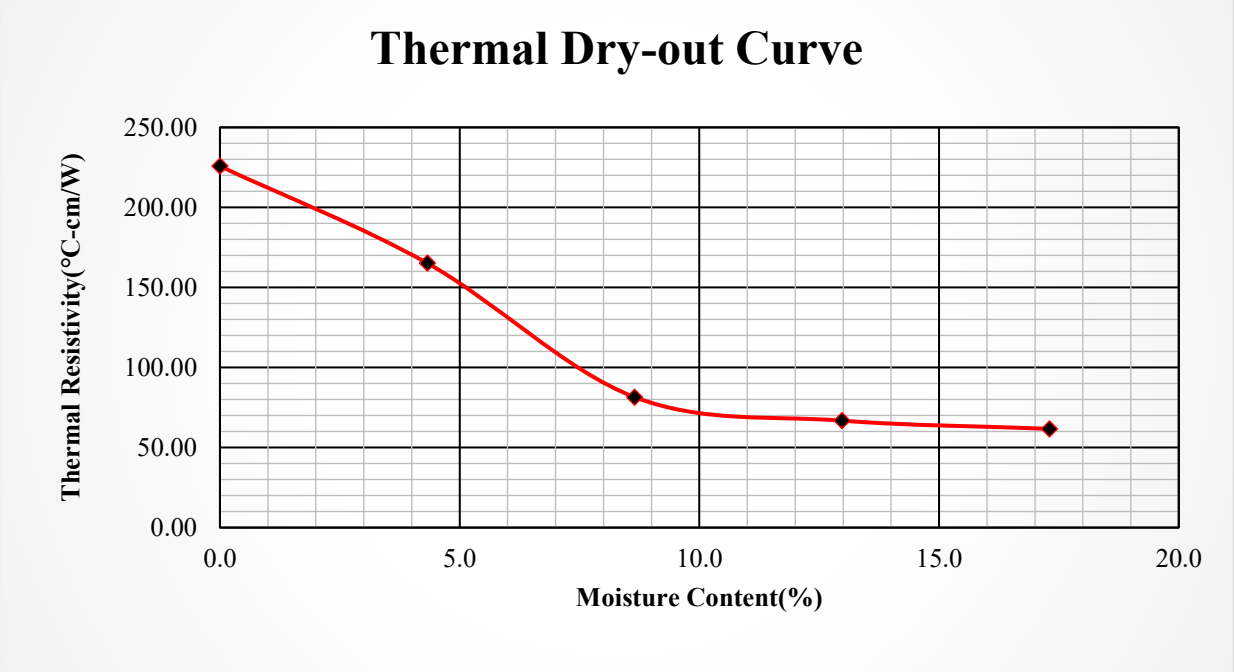
Thermal Dryout Curve (ASTM D5334)

Client Name:	Cypress Creek Renewables, LLC	LAB IRN:	24-T-035
Project Name:	Cactus Flower Solar, Pinal County, AZ	Date:	3/28/2024

Sample ID: B-15, TRT-10

Description: Brown Clay & Silt, little cmf Sand (Visual)

Specimen type:	Reconstituted (85% D698)	Recompaction Dry Density:	91.2 PCF
In-Situ Moisture:	11.4 %	Optimum Moisture:	17.3 %



CORROSIVITY SUITE RESULTS

ANS CONSULTANTS, INC.
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Corrosivity Testing of Soil

Client Name: Cypress Creek Renewables, LLC
Project Name: Cactus Flower Solar, Pinal County, AZ
LAB IRN: 24-T-035
Date: 3/28/2024

S.No.	Investigation ID	Sample ID	Soil Resistivity (ohm-cm)	pH of Soil	Sulfate Content (mg/kg)	Chloride Content (mg/kg)	Oxidation-Reduction Pot. (mV)
		Natural Moisture	ASTM G187	ASTM G51	ASTM C1580	AASHTO T291	ASTM G200
1	B-01	CORR-1	270	7.5	360	531	213
		23.9%		Dark Brown C&S, trace cmf Sand (Visual)			
2	B-04	CORR-2	1,420	7.5	390	349	151
		17.5%		Brown S&C, little cmf Sand (Visual)			
3	B-05	CORR-3	4,290	7.9	60	246	169
		9.1%		Brown S&C, little cmf Sand (Visual)			
4	B-06	CORR-4	3,820	8.0	<15	201	190
		9.0%		Brown S&C, little cmf Sand (Visual)			
5	B-07	CORR-5	3,170	8.5	510	75	212
		14.1%		Brown S&C, little cmf Sand (Visual)			
6	B-08	CORR-6	9,820	8.3	630	48	227
		5.9%		Pale Brown cmf Sand, some C&S (Visual)			
7	B-10	CORR-7	4,810	8.2	<15	174	190
		9.8%		Brown S&C, little cmf Sand (Visual)			
8	B-11	CORR-8	9,010	8.6	330	66	214
		5.3%		Brown cmf Sand, some C&S (Visual)			
9	B-12	CORR-9	1,200	7.8	750	204	225
		11.9%		Brown C&S, little cmf Sand (Visual)			

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Corrosivity Testing of Soil

Client Name: Cypress Creek Renewables, LLC
Project Name: Cactus Flower Solar, Pinal County, AZ
LAB IRN: 24-T-035
Date: 3/28/2024

S.No.	Investigation ID	Sample ID	Soil Resistivity (ohm-cm)	pH of Soil	Sulfate Content (mg/kg)	Chloride Content (mg/kg)	Oxidation-Reduction Pot. (mV)
		Natural Moisture	ASTM G187	ASTM G51	ASTM C1580	AASHTO T291	ASTM G200
10	B-13	CORR-10	2,990	8.1	30	138	206
		12.6%		Brown S&C, little cmf Sand (Visual)			
11	B-15	CORR-11	1,440	7.6	900	258	227
		12.6%		Brown C&S, trace cmf Sand (Visual)			

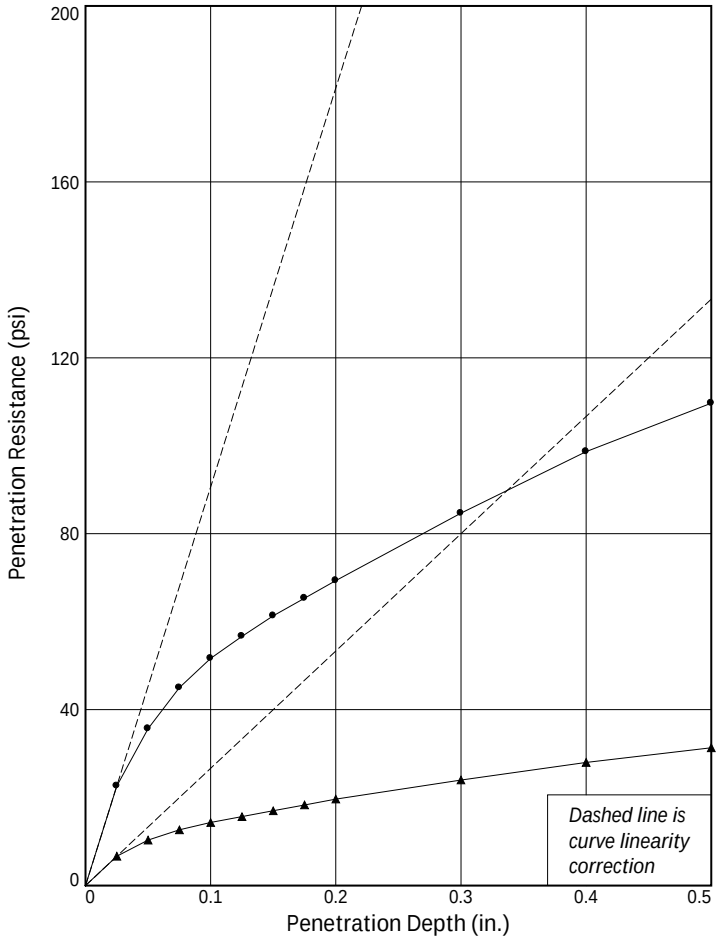
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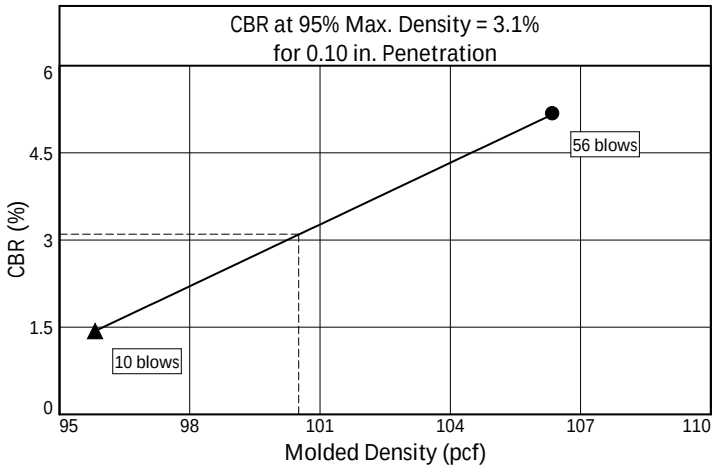
1. Turbidimetric procedure used for ASTM C1580.
2. Mohr's procedure with Silver Nitrate used for AASHTO T291.
3. Miller 400D Resistance Meter used for Resistivity testing, Multiplication factor = 1.
4. Tests conducted under standard laboratory conditions of temperature (72°F) and humidity.

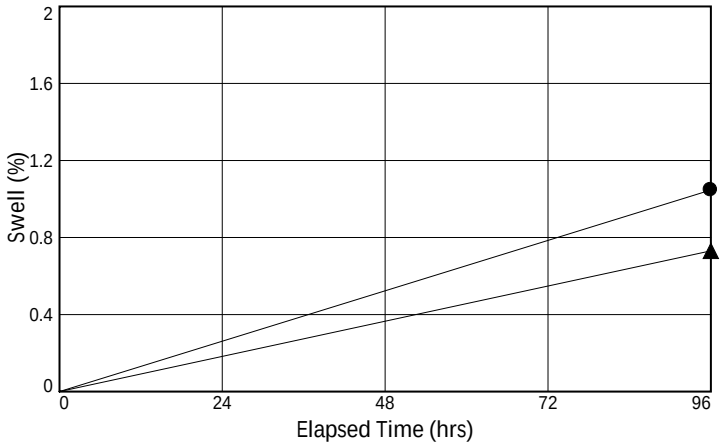
Tested By: HC/JE
Checked By: ANS

CALIFORNIA BEARING RATIO

BEARING RATIO TEST REPORT
ASTM D1883-21







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	106.4	100.6	17.0	105.3	99.5	23.7	5.2	4.6	0.000	10	1
2 ▲	95.8	90.5	17.0	95.1	89.9	29.0	1.4	1.3	0.000	10	0.7
3 ■											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Brown Clay & Silt, little cmf Sand, trace mf Gravel (Visual)		105.8	17.0		

Project No: IRN 24-T-035
Project: Cactus Flower Solar, Pinal County, AZ
Sample Number: B-SS-01, CBR-01

Date: 3/28/2024

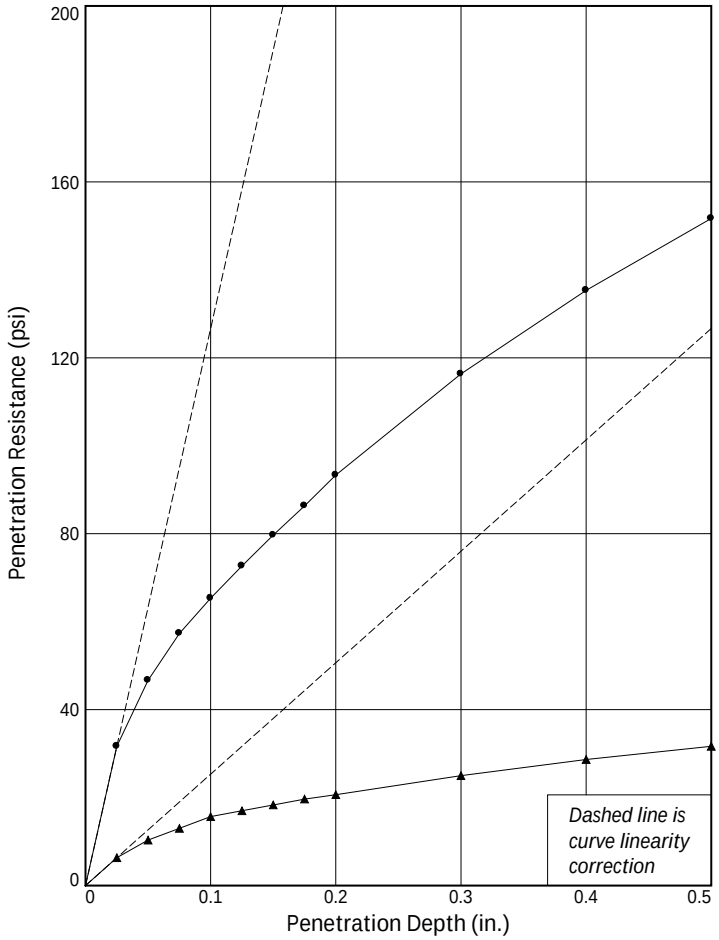
BEARING RATIO TEST REPORT
ANS CONSULTANTS, INC.

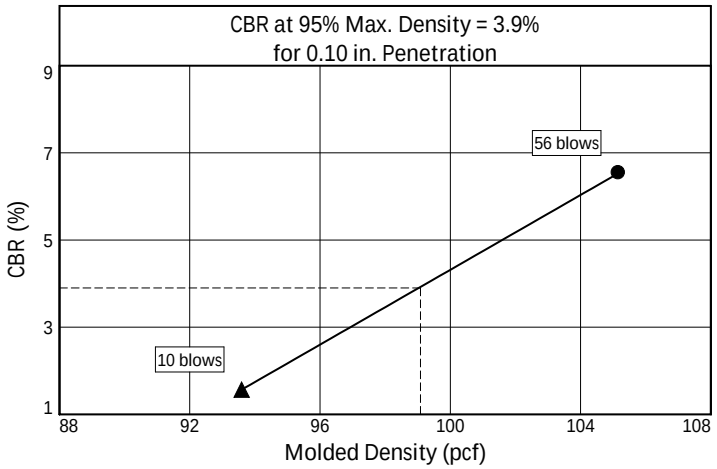
Test Remarks:
Saturation Period: 96 Hours

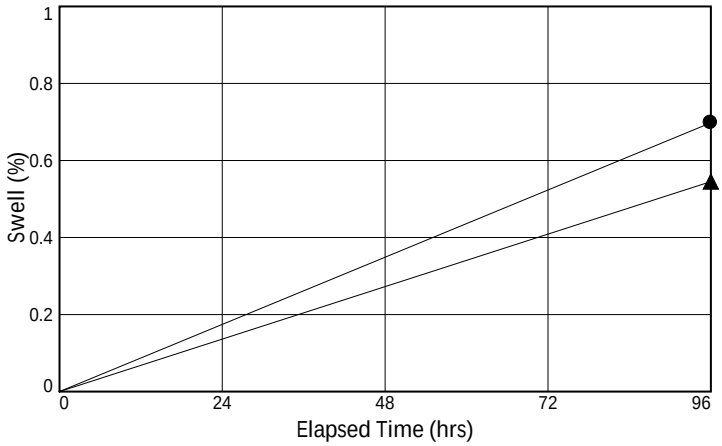
Figure _____

Tested By: ES Checked By: ANS

BEARING RATIO TEST REPORT
ASTM D1883-21







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	105.2	100.9	16.8	104.4	100.1	23.0	6.5	6.2	0.000	10	0.7
2 ▲	93.6	89.7	16.8	93.1	89.2	27.8	1.6	1.4	0.000	10	0.5
3 ■											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Brown Silt & Clay, trace cmf Sand (Visual)		104.3	16.7		

Project No: IRN 24-T-035
Project: Cactus Flower Solar, Pinal County, AZ
Sample Number: B-BESS-01, CBR-02

Date: 3/28/2024

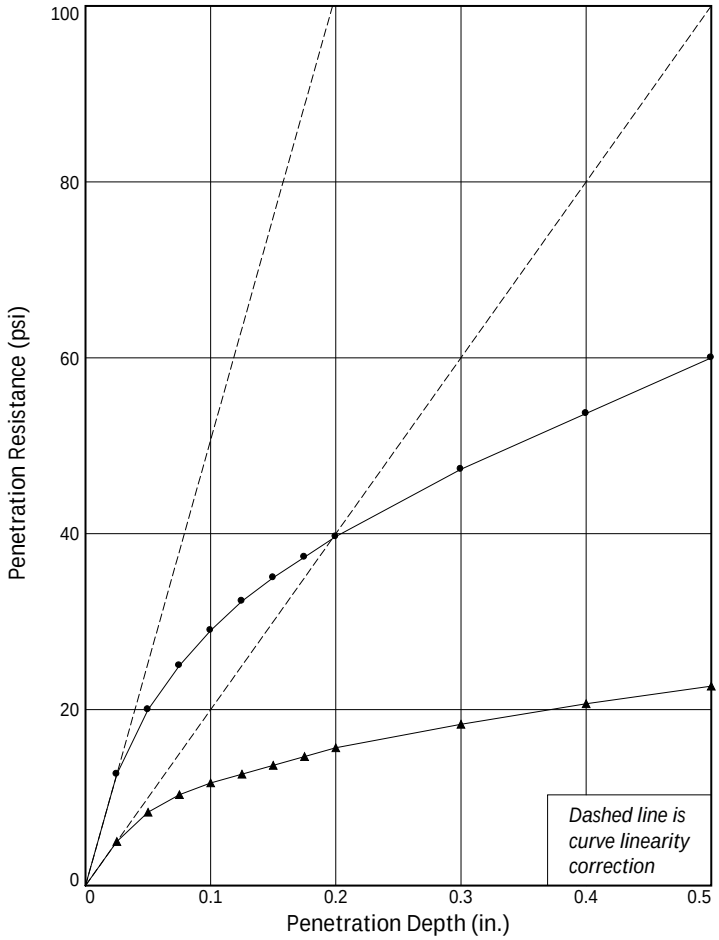
BEARING RATIO TEST REPORT
ANS CONSULTANTS, INC.

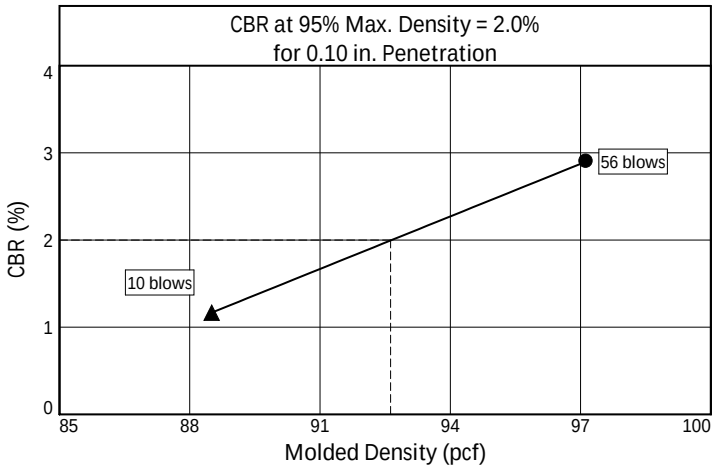
Test Remarks:
Saturation period: 96 Hours

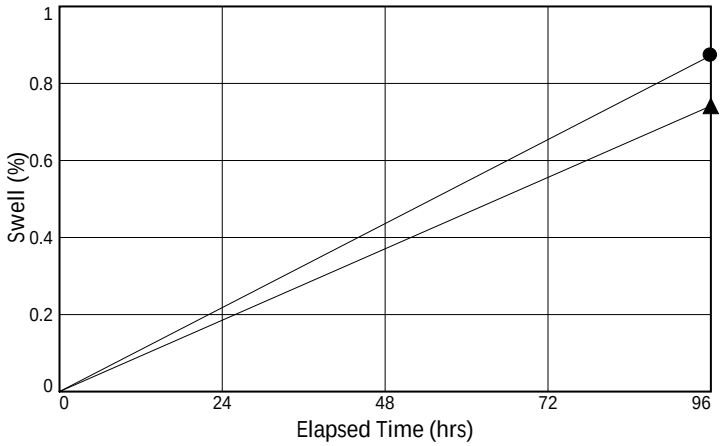
Figure _____

Tested By: HC Checked By: ANS

BEARING RATIO TEST REPORT
ASTM D1883-21







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	97.1	99.6	19.2	96.3	98.8	30.5	2.9	2.6	0.000	10	0.9
2 ▲	88.5	90.8	19.2	87.9	90.1	33.6	1.2	1.0	0.000	10	0.7
3 ■											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Brown Clay & Silt, trace cmf Sand (Visual)		97.5	19.2		

Project No: IRN 24-T-035
Project: Cactus Flower Solar, Pinal County, AZ
Sample Number: B-01, CBR-03

Date: 3/28/2024

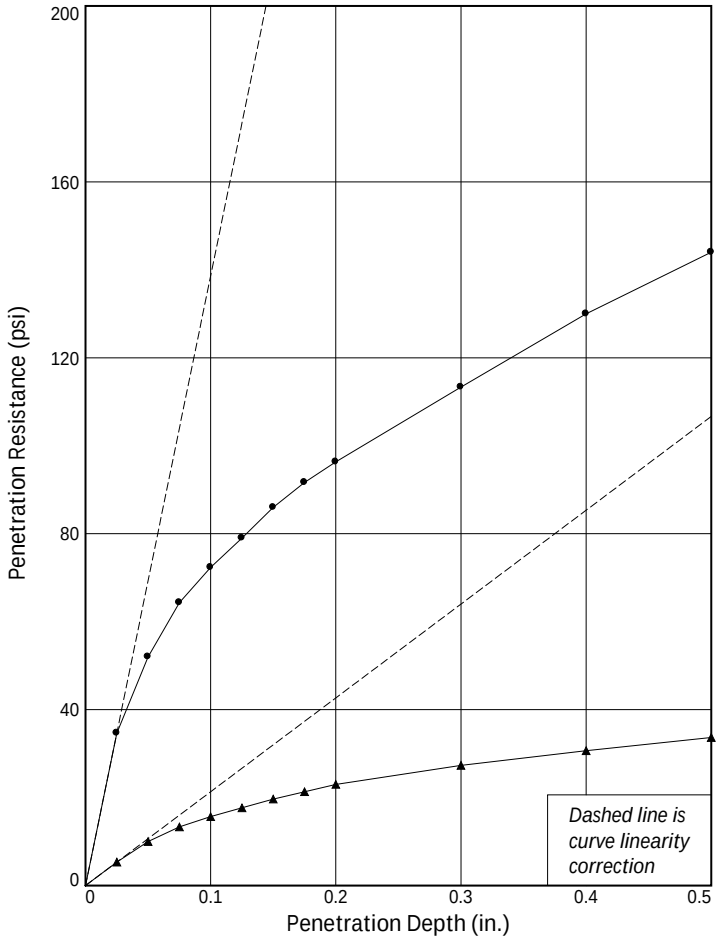
BEARING RATIO TEST REPORT
ANS CONSULTANTS, INC.

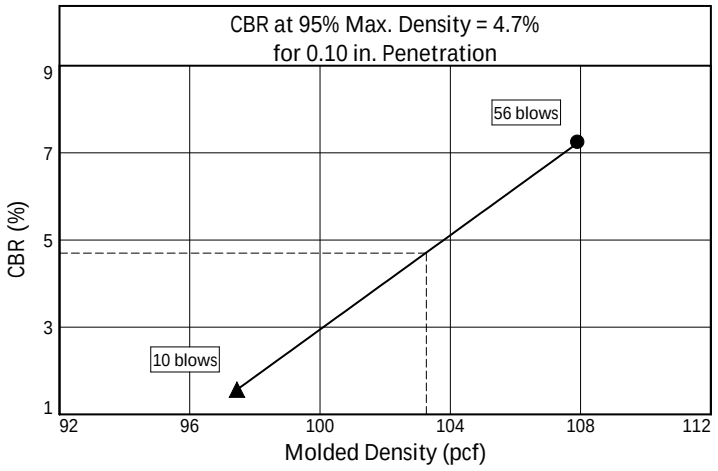
Test Remarks:
Saturation period: 96 Hours

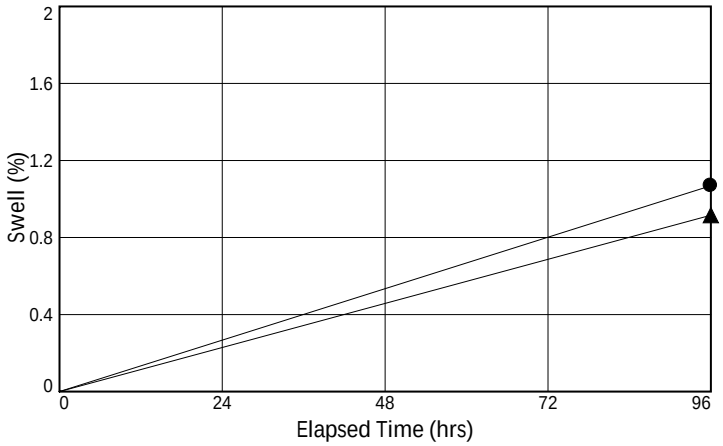
Figure _____

Tested By: HC Checked By: ANS

BEARING RATIO TEST REPORT
ASTM D1883-21







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	107.9	99.3	16.4	106.8	98.2	21.2	7.2	6.4	0.000	10	1.1
2 ▲	97.4	89.6	16.4	96.6	88.8	25.7	1.6	1.5	0.000	10	0.9
3 ■											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Brown Silt & Clay, little cmf Sand (Visual)		108.7	15.4		

Project No: IRN 24-T-035
Project: Cactus Flower Solar, Pinal County, AZ
Sample Number: B-10, CBR-04

Date: 3/28/2024

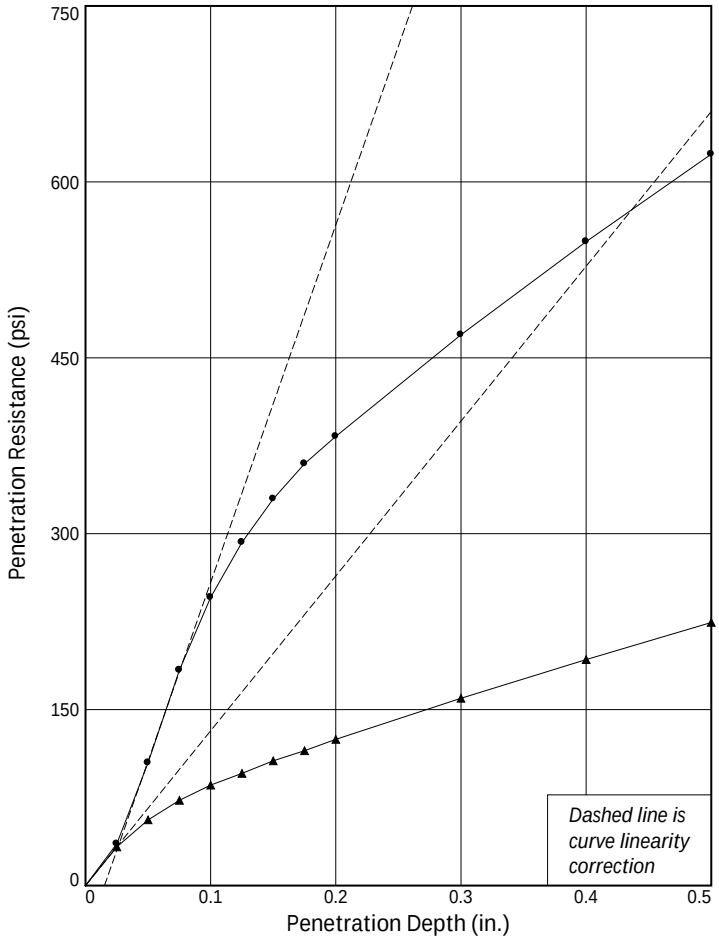
BEARING RATIO TEST REPORT
ANS CONSULTANTS, INC.

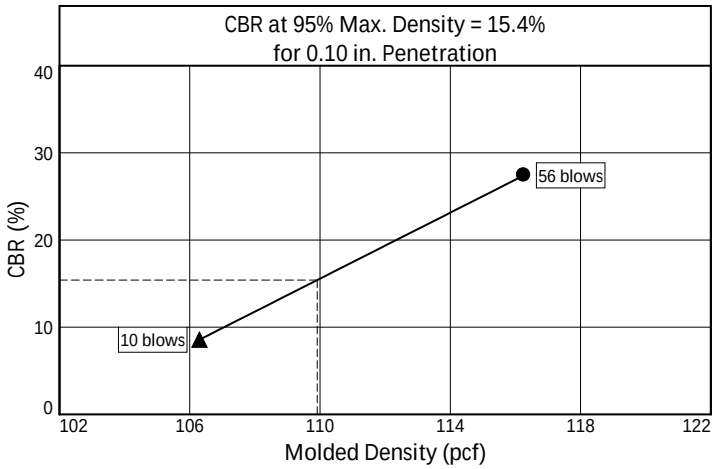
Test Remarks:
Saturation period: 96 Hours

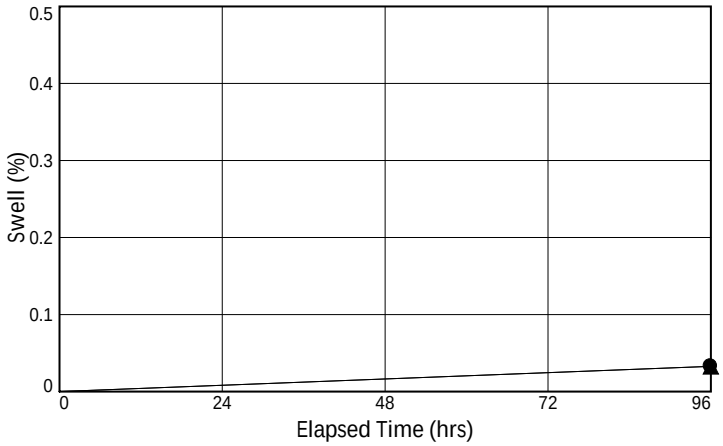
Figure _____

Tested By: ES Checked By: ANS

BEARING RATIO TEST REPORT
ASTM D1883-21







	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ●	116.3	100.5	12.1	116.2	100.5	13.4	27.4	26.4	0.015	10	0
2 ▲	106.3	91.9	12.1	106.3	91.8	16.3	8.6	8.3	0.000	10	0
3 ■											

Material Description	USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Brown cmf Sand, some Silt & Clay, trace mf Gravel (Visual)		115.7	12.1		

Project No: IRN 24-T-035
Project: Cactus Flower Solar, Pinal County, AZ
Sample Number: B-11, CBR-05

Date: 3/28/2024

BEARING RATIO TEST REPORT
ANS CONSULTANTS, INC.

Test Remarks:
Saturation period: 96 Hours

Figure _____

Tested By: ES Checked By: ANS

Attachment E

Electrical Resistivity Test Results

Soil Resistivity Results

Client:	Cypress Creek Renewables	Date:	3/11/2024
Project Name:	Cactus Flower Solar	Weather:	Sunny
Project Location:	Pinal County, Arizona	Temperature:	65°F
Equipment:	L and R Instruments Mini Res		
Test Method:	Wenner 4 Electrode Array		

Array		Data	Array spacing (ft)				
			2.00	5.00	10.00	25.00	50.00
ERT-01	N-S	Measured Resistance (Ω)	8.493	3.228	1.692	1.038	0.613
		Apparent Resistivity (Ω-m)	32.53	30.91	32.40	49.70	58.70
	E-W	Measured Resistance (Ω)	8.07	3.13	1.67	1.13	0.73
		Apparent Resistivity (Ω-m)	30.93	29.97	31.90	54.03	69.45
ERT-02	N-S	Measured Resistance (Ω)	5.144	2.119	0.893	0.649	0.4
		Apparent Resistivity (Ω-m)	19.70	20.29	17.10	31.07	38.30
	E-W	Measured Resistance (Ω)	2.33	2.008	1.28	0.75	0.445
		Apparent Resistivity (Ω-m)	8.92	19.23	24.51	35.91	42.61
ERT-03	N-S	Measured Resistance (Ω)	12.882	6.571	3.55	1.21	0.782
		Apparent Resistivity (Ω-m)	49.34	62.92	67.99	57.93	74.88
	E-W	Measured Resistance (Ω)	11.894	6.859	3.426	1.3194	0.7941
		Apparent Resistivity (Ω-m)	45.56	65.68	65.61	63.17	76.04
ERT-04	N-S	Measured Resistance (Ω)	13.62	9.285	6.588	2.235	0.772
		Apparent Resistivity (Ω-m)	52.17	88.91	126.17	107.01	73.92
	E-W	Measured Resistance (Ω)	13.918	9.342	5.793	2.047	0.68
		Apparent Resistivity (Ω-m)	53.31	89.46	110.94	98.01	65.11
		Site Average (Ω)	9.54	5.32	3.11	1.30	0.65
		Site Average (Ω-m)	36.56	50.92	59.58	62.10	62.38

Soil Resistivity Results

Client:	Cypress Creek Renewables	Date:	3/12/2024
Project Name:	Cactus Flower Solar	Weather:	Sunny
Project Location:	Pinal County, Arizona	Temperature:	65°F
Equipment:	L and R Instruments Mini Res		
Test Method:	Wenner 4 Electrode Array		

Array		Data	Array spacing (ft)				
			2.00	5.00	10.00	25.00	50.00
ERT-05	N-S	Measured Resistance (Ω)	11.781	6.504	3.919	1.302	0.386
		Apparent Resistivity (Ω-m)	45.12	62.28	75.05	62.34	36.96
	E-W	Measured Resistance (Ω)	12.11	6.51	3.59	1.07	0.40
		Apparent Resistivity (Ω-m)	46.38	62.33	68.79	51.42	38.11
ERT-06	N-S	Measured Resistance (Ω)	18.418	10.374	6.232	1.641	0.502
		Apparent Resistivity (Ω-m)	70.55	99.34	119.35	78.57	48.07
	E-W	Measured Resistance (Ω)	18.17	9.188	5.978	1.71	0.501
		Apparent Resistivity (Ω-m)	69.60	87.98	114.49	81.87	47.97
ERT-07	N-S	Measured Resistance (Ω)	21.7	13.876	9.111	2.514	0.622
		Apparent Resistivity (Ω-m)	83.12	132.87	174.49	120.36	59.56
	E-W	Measured Resistance (Ω)	22	14.992	8.275	2.464	0.542
		Apparent Resistivity (Ω-m)	84.27	143.56	158.48	117.97	51.90
ERT-08	N-S	Measured Resistance (Ω)	3.595	2.396	1.645	0.886	0.568
		Apparent Resistivity (Ω-m)	13.77	22.94	31.50	42.42	54.39
	E-W	Measured Resistance (Ω)	3.56	2.282	1.673	0.948	0.574
		Apparent Resistivity (Ω-m)	13.64	21.85	32.04	45.39	54.96
		Site Average (Ω)	13.92	8.27	5.05	1.57	0.51
		Site Average (Ω-m)	53.30	79.14	96.77	75.04	48.99

Soil Resistivity Results

Client:	Cypress Creek Renewables			Date:	3/12/2024
Project Name:	Cactus Flower Solar			Weather:	Sunny
Project Location:	Pinal County, Arizona			Temperature:	65°F
Equipment:	L and R Instruments Mini Res				
Test Method:	Wenner 4 Electrode Array				

Array		Data	Array spacing (ft)								
			2.00	5.00	10.00	25.00	50.00	100.00	150.00	200.00	250.00
ERT-SS-01	N-S	Measured Resistance (Ω)	6.251	3.112	2.33	1.369	1.018	0.582	0.367	0.258	0.18
		Apparent Resistivity (Ω-m)	23.94	29.80	44.62	65.54	97.48	111.46	105.43	98.82	86.18
	E-W	Measured Resistance (Ω)	4.969	2.888	2.252	1.402	1.017	0.59	0.363	0.257	0.167
		Apparent Resistivity (Ω-m)	1.51	0.88	0.69	0.43	0.31	0.18	0.11	0.08	0.05
		Site Average (Ω)	5.61	3	2.291	1.3855	1.0175	0.586	0.365	0.2575	0.1735
		Site Average (Ω-m)	12.73	15.34	22.65	32.99	48.89	55.82	52.77	49.45	43.12

Soil Resistivity Results

Client:	Cypress Creek Renewables	Date:	3/12/2024
Project Name:	Cactus Flower Solar	Weather:	Sunny
Project Location:	Pinal County, Arizona	Temperature:	65°F
Equipment:	L and R Instruments Mini Res		
Test Method:	Wenner 4 Electrode Array		

Array		Data	Array spacing (ft)						
			2.00	5.00	10.00	25.00	50.00	100.00	150.00
ERT-BESS-01	N-S	Measured Resistance (Ω)	6.52	2.876	1.666	0.952	0.737	0.413	0.317
		Apparent Resistivity (Ω-m)	24.97	27.54	31.91	45.58	70.57	79.09	91.06
	E-W	Measured Resistance (Ω)	6.892	2.81	1.641	0.93	0.74	0.435	0.308
		Apparent Resistivity (Ω-m)	2.10	0.86	0.50	0.28	0.23	0.13	0.09
		Site Average (Ω)	6.706	2.843	1.6535	0.941	0.7385	0.424	0.3125
		Site Average (Ω-m)	13.54	14.20	16.20	22.93	35.40	39.61	45.58

Attachment F

Pile Load Test Logs

Pile Load Test Log

Project Name:	Cypress Creek - Cactus Flower Solar	Embedment Depth (ft):	7.0	Pile ID:	PT-01
Site Location:	Pinal County, Arizona	Pushed to Depth (ft):	0.5	Pile Section:	W6x9
Date Installed:	3/7/2024	Pre-Excavation Depth (ft):	N/A	Pile Length (ft):	15.0
Date Tested:	3/9/2024	Pre-Drill Diameter (in):	N/A	Total Drive Time (sec):	16.83
Location:	32.626262°, -111.598568°	Pre-Drill Depth (ft):	N/A	Avg. Installation Rate (sec/ft):	2.6

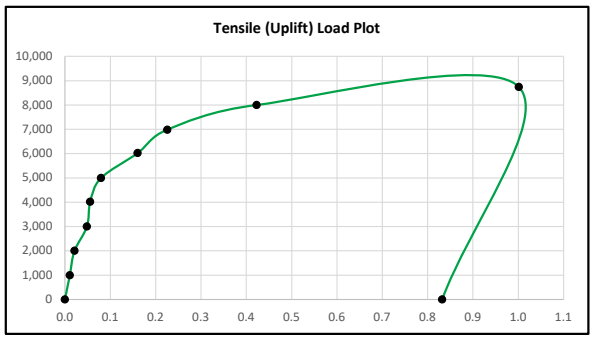
Embedment Data

Depth (ft)	Time (s)
1	2.74
2	2.58
3	2.11
4	1.97
5	3.27
6	4.16
Total Time (s) =	16.83

Field Notes

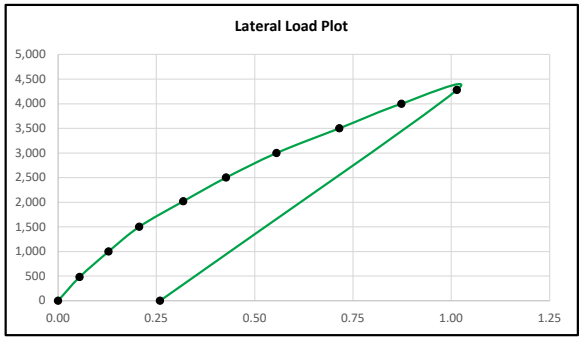
Tensile (Uplift) Testing

Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	1,000	1,000	0.0175	0.0035	0.0105
1	2,000	2,000	0.0355	0.0065	0.0210
1	3,000	3,000	0.0750	0.0220	0.0485
1	4,000	4,020	0.0850	0.0265	0.0558
1	5,000	5,000	0.1120	0.0475	0.0798
1	6,000	6,020	0.1975	0.1235	0.1605
1	7,000	6,980	0.2635	0.1875	0.2255
1	8,000	8,000	0.4625	0.3830	0.4228
1	9,000	8,740	1.0160	0.9865	1.0013
	0	0	0.8660	0.7980	0.8320



Lateral Testing

Lateral Load Height Above Grade (ft):		4.0	Deflection Gauge Height (in):		6
Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	500	480	0.0920	0.0170	0.0545
1	1,000	1,000	0.1880	0.0690	0.1285
1	1,500	1,500	0.2715	0.1415	0.2065
1	2,000	2,020	0.3855	0.2510	0.3183
1	2,500	2,500	0.4910	0.3630	0.4270
1	3,000	3,000	0.6080	0.5035	0.5558
1	3,500	3,500	0.7380	0.6920	0.7150
1	4,000	4,000	0.8585	0.8880	0.8733
1	4,500	4,280	0.9900	1.0380	1.0140
	0	0	0.2235	0.2945	0.2590



ANS GEO

Pile Load Test Log

Project Name:	Cypress Creek - Cactus Flower Solar	Embedment Depth (ft):	8.0	Pile ID:	PT-02
Site Location:	Pinal County, Arizona	Pushed to Depth (ft):	1.5	Pile Section:	W6x9
Date Installed:	3/7/2024	Pre-Excavation Depth (ft):	N/A	Pile Length (ft):	15.0
Date Tested:	3/9/2024	Pre-Drill Diameter (in):	N/A	Total Drive Time (sec):	10.73
Location:	32.618727°, -111.594281°	Pre-Drill Depth (ft):	N/A	Avg. Installation Rate (sec/ft):	1.7

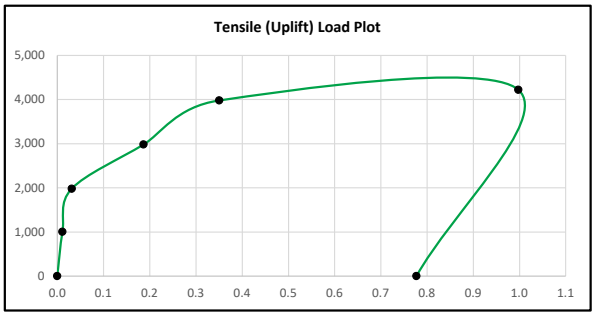
Embedment Data

Depth (ft)	Time (s)
2	2.14
3	1.57
4	1.43
5	1.66
6	1.79
7	2.14
Total Time (s) =	10.73

Field Notes

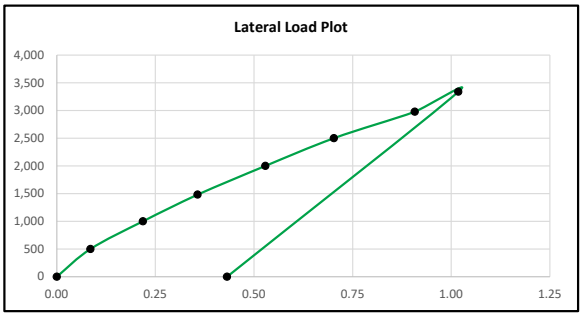
Tensile (Uplift) Testing

Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	1,000	1,000	0.0185	0.0040	0.0113
1	2,000	1,980	0.0495	0.0130	0.0313
1	3,000	2,980	0.2115	0.1620	0.1868
1	4,000	3,980	0.3755	0.3250	0.3503
1	5,000	4,220	1.0600	0.9350	0.9975
	0	0	0.7625	0.7920	0.7773



Lateral Testing

Lateral Load Height Above Grade (ft):	4.0	Deflection Gauge Height (in):		6
Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	500	500	0.1555	0.0160	0.0858
1	1,000	1,000	0.3985	0.0380	0.2183
1	1,500	1,480	0.5485	0.1655	0.3570
1	2,000	2,000	0.7140	0.3430	0.5285
1	2,500	2,500	0.8675	0.5370	0.7023
1	3,000	2,980	1.0440	0.7705	0.9073
1	3,500	3,340	1.1360	0.9000	1.0180
	0	0	0.3550	0.5085	0.4318



Pile Load Test Log

Project Name:	Cypress Creek - Cactus Flower Solar	Embedment Depth (ft):	9.0	Pile ID:	PT-03
Site Location:	Pinal County, Arizona	Pushed to Depth (ft):	2.0	Pile Section:	W6x9
Date Installed:	3/7/2024	Pre-Excavation Depth (ft):	N/A	Pile Length (ft):	15.0
Date Tested:	3/9/2024	Pre-Drill Diameter (in):	N/A	Total Drive Time (sec):	10.69
Location:	32.636588°, -111.574658°	Pre-Drill Depth (ft):	N/A	Avg. Installation Rate (sec/ft):	1.5

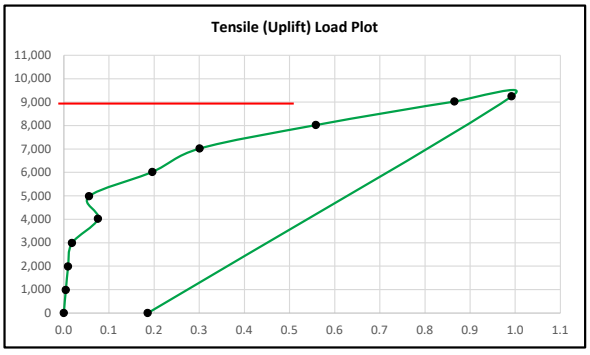
Embedment Data

Depth (ft)	Time (s)
3	1.54
4	1.26
5	1.15
6	1.36
7	1.61
8	1.24
9	2.53
Total Time (s) =	10.69

Field Notes

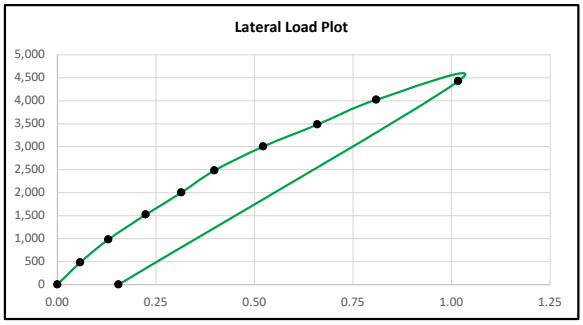
Tensile (Uplift) Testing

Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	1,000	980	0.0045	0.0050	0.0048
1	2,000	1,980	0.0070	0.0125	0.0098
1	3,000	2,980	0.0120	0.0245	0.0183
1	4,000	4,020	0.0625	0.0890	0.0758
1	5,000	4,980	0.0990	0.0129	0.0560
1	6,000	6,020	0.1825	0.2105	0.1965
1	7,000	7,020	0.2860	0.3160	0.3010
1	8,000	8,020	0.5455	0.5720	0.5588
1	9,000	9,020	0.8470	0.8840	0.8655
1	10,000	9,240	0.9750	1.0090	0.9920
	0	0	0.1565	0.2150	0.1858



Lateral Testing

Lateral Load Height Above Grade (ft):		4.0	Deflection Gauge Height (in):		6
Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	500	480	0.0675	0.0480	0.0578
1	1,000	980	0.1715	0.0860	0.1288
1	1,500	1,520	0.2790	0.1690	0.2240
1	2,000	2,000	0.3585	0.2700	0.3143
1	2,500	2,480	0.4300	0.3660	0.3980
1	3,000	3,000	0.5270	0.5165	0.5218
1	3,500	3,480	0.6270	0.6920	0.6595
1	4,000	4,020	0.7350	0.8825	0.8088
1	4,500	4,420	0.9855	1.0475	1.0165
	0	0	0.0190	0.2900	0.1545



ANS GEO

Pile Load Test Log

Project Name:	Cypress Creek - Cactus Flower Solar	Embedment Depth (ft):	10.0	Pile ID:	PT-04
Site Location:	Pinal County, Arizona	Pushed to Depth (ft):	1.5	Pile Section:	W6x9
Date Installed:	3/7/2024	Pre-Excavation Depth (ft):	N/A	Pile Length (ft):	15.0
Date Tested:	3/9/2024	Pre-Drill Diameter (in):	N/A	Total Drive Time (sec):	20.56
Location:	32.627250°, -111.573580°	Pre-Drill Depth (ft):	N/A	Avg. Installation Rate (sec/ft):	2.4

Embedment Data

Depth (ft)	Time (s)
1	0.92
2	1.08
3	1.27
4	1.33
5	1.47
6	2.46
7	6.48
8	3.95
9	1.6
Total Time (s) =	20.56

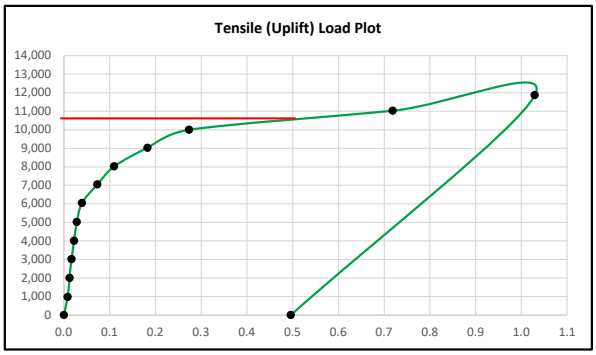
Field Notes

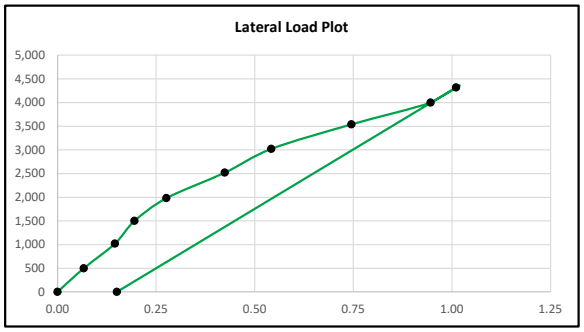
Tensile (Uplift) Testing

Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	1,000	980	0.0065	0.0100	0.0083
1	2,000	2,000	0.0085	0.0160	0.0123
1	3,000	3,020	0.0125	0.0205	0.0165
1	4,000	4,000	0.0150	0.0290	0.0220
1	5,000	5,020	0.0195	0.0370	0.0283
1	6,000	6,040	0.0235	0.0550	0.0393
1	7,000	7,040	0.0545	0.0910	0.0728
1	8,000	8,020	0.0930	0.1270	0.1100
1	9,000	9,020	0.1675	0.1975	0.1825
1	10,000	10,000	0.2595	0.2880	0.2738
1	11,000	11,020	0.4480	0.9895	0.7188
1	12,000	11,860	0.9985	1.0600	1.0293
	0	0	0.1345	0.8570	0.4958

Lateral Testing

Lateral Load Height Above Grade (ft):	4.0	Deflection Gauge Height (in):		6
Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	500	500	0.0980	0.0350	0.0665
1	1,000	1,020	0.1455	0.1450	0.1453
1	1,500	1,500	0.1845	0.2060	0.1953
1	2,000	1,980	0.2480	0.3045	0.2763
1	2,500	2,520	0.3725	0.4760	0.4243
1	3,000	3,020	0.4660	0.6180	0.5420
1	3,500	3,540	0.6300	0.8605	0.7453
1	4,000	4,000	0.7855	1.1070	0.9463
1	4,500	4,320	0.8085	1.2125	1.0105
	0	0	0.0105	0.2900	0.1503





ANS GEO

Pile Load Test Log

Project Name:	Cypress Creek - Cactus Flower Solar	Embedment Depth (ft):	7.0	Pile ID:	PT-05
Site Location:	Pinal County, Arizona	Pushed to Depth (ft):	1.0	Pile Section:	W6x9
Date Installed:	3/7/2024	Pre-Excavation Depth (ft):	N/A	Pile Length (ft):	15.0
Date Tested:	3/9/2024	Pre-Drill Diameter (in):	N/A	Total Drive Time (sec):	16.71
Location:	32.619890°, -111.577190°	Pre-Drill Depth (ft):	N/A	Avg. Installation Rate (sec/ft):	2.8

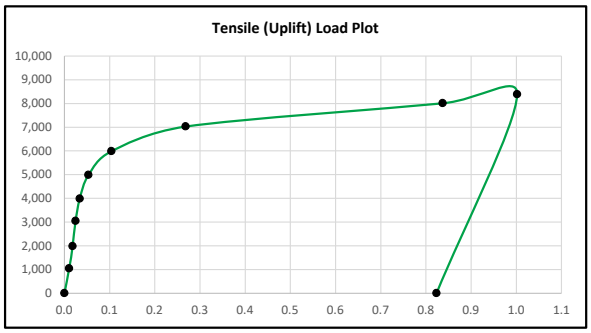
Embedment Data

Depth (ft)	Time (s)
2	2.33
3	2.22
4	2.72
5	3.01
6	2.54
7	3.89
Total Time (s) =	16.71

Field Notes

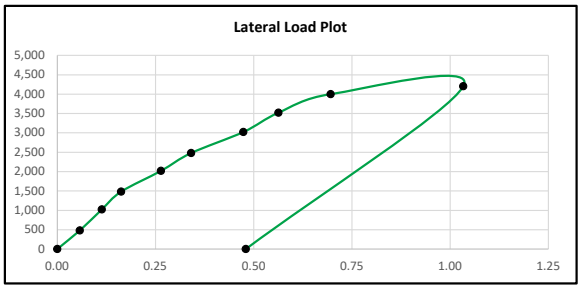
Tensile (Uplift) Testing

Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	1,000	1,040	0.0150	0.0065	0.0108
1	2,000	1,980	0.0270	0.0095	0.0183
1	3,000	3,040	0.0365	0.0130	0.0248
1	4,000	3,980	0.0500	0.0180	0.0340
1	5,000	4,980	0.0775	0.0295	0.0535
1	6,000	5,980	0.1365	0.0715	0.1040
1	7,000	7,020	0.3030	0.2340	0.2685
1	8,000	8,000	0.8680	0.8060	0.8370
1	9,000	8,380	1.0060	0.9980	1.0020
	0	0	0.8795	0.7675	0.8235



Lateral Testing

Lateral Load Height Above Grade (ft):	4.0	Deflection Gauge Height (in):	6	
Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	500	480	0.1090	0.0065	0.0578
1	1,000	1,020	0.1805	0.0460	0.1133
1	1,500	1,480	0.2335	0.0920	0.1628
1	2,000	2,020	0.3065	0.2215	0.2640
1	2,500	2,480	0.3530	0.3280	0.3405
1	3,000	3,020	0.4295	0.5175	0.4735
1	3,500	3,520	0.4490	0.6765	0.5628
1	4,000	4,000	0.5225	0.8690	0.6958
1	4,500	4,200	0.7600	1.3060	1.0330
	0	0	0.1195	0.8405	0.4800



ANS GEO

Pile Load Test Log

Project Name:	Cypress Creek - Cactus Flower Solar	Embedment Depth (ft):	8.0	Pile ID:	PT-06
Site Location:	Pinal County, Arizona	Pushed to Depth (ft):	0.5	Pile Section:	W6x9
Date Installed:	3/7/2024	Pre-Excavation Depth (ft):	N/A	Pile Length (ft):	15.0
Date Tested:	3/9/2024	Pre-Drill Diameter (in):	N/A	Total Drive Time (sec):	26.33
Location:	32.613600°, -111.577110°	Pre-Drill Depth (ft):	N/A	Avg. Installation Rate (sec/ft):	3.5

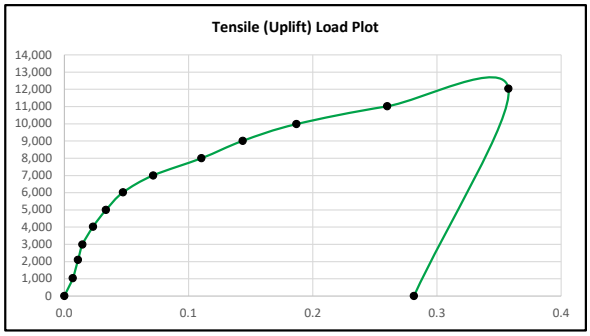
Embedment Data

Depth (ft)	Time (s)
1	3.38
2	4.15
3	3.45
4	3.42
5	3.36
6	3.76
7	4.81
Total Time (s) =	26.33

Field Notes

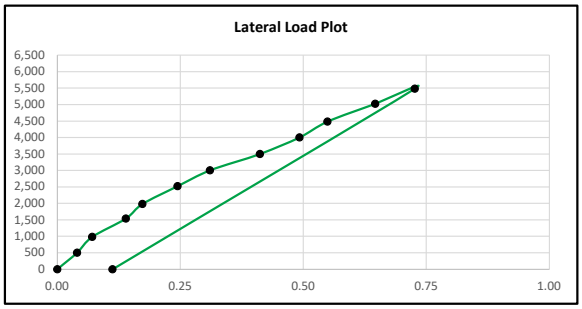
Tensile (Uplift) Testing

Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	1,000	1,040	0.0090	0.0045	0.0068
1	2,000	2,100	0.0160	0.0060	0.0110
1	3,000	2,980	0.0215	0.0075	0.0145
1	4,000	4,020	0.0325	0.0135	0.0230
1	5,000	5,000	0.0495	0.0175	0.0335
1	6,000	6,020	0.0685	0.0260	0.0473
1	7,000	7,000	0.0950	0.0480	0.0715
1	8,000	8,000	0.1355	0.0850	0.1103
1	9,000	9,000	0.1690	0.1180	0.1435
1	10,000	9,980	0.2130	0.1605	0.1868
1	11,000	11,020	0.2855	0.2345	0.2600
1	12,000	12,040	0.3845	0.3305	0.3575
		0	0.2875	0.2755	0.2815



Lateral Testing

Lateral Load Height Above Grade (ft):		4.0	Deflection Gauge Height (in):		6
Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	500	500	0.0790	0.0015	0.0403
1	1,000	980	0.1185	0.0235	0.0710
1	1,500	1,540	0.1855	0.0935	0.1395
1	2,000	1,980	0.2160	0.1300	0.1730
1	2,500	2,520	0.2790	0.2100	0.2445
1	3,000	3,000	0.3345	0.2865	0.3105
1	3,500	3,500	0.4170	0.4070	0.4120
1	4,000	4,000	0.4825	0.5020	0.4923
1	4,500	4,480	0.5270	0.5715	0.5493
1	5,000	5,020	0.6026	0.6900	0.6463
1	5,500	5,480	0.6675	0.7855	0.7265
	0	0	0.0900	0.1345	0.1123



ANS GEO

Pile Load Test Log

Project Name:	Cypress Creek - Cactus Flower Solar	Embedment Depth (ft):	9.0	Pile ID:	PT-07
Site Location:	Pinal County, Arizona	Pushed to Depth (ft):	1.5	Pile Section:	W6x9
Date Installed:	3/7/2024	Pre-Excavation Depth (ft):	N/A	Pile Length (ft):	15.0
Date Tested:	3/9/2024	Pre-Drill Diameter (in):	N/A	Total Drive Time (sec):	30.37
Location:	32.609630°, -111.585290°	Pre-Drill Depth (ft):	N/A	Avg. Installation Rate (sec/ft):	4.0

Embedment Data

Depth (ft)	Time (s)
2	1.21
3	2.06
4	5.24
5	4.17
6	4.05
7	4.44
8	6.46
9	2.74
Total Time (s) =	30.37

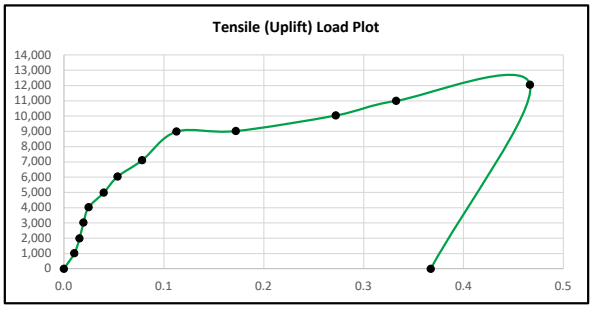
Field Notes

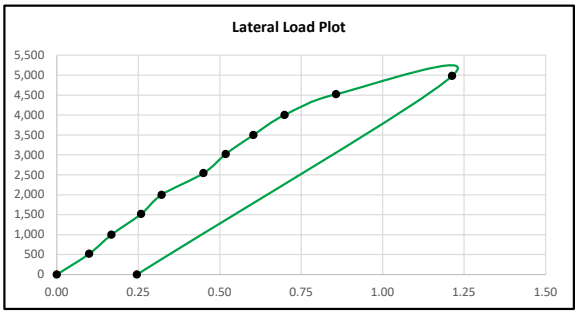
Tensile (Uplift) Testing

Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	1,000	1,020	0.0060	0.0150	0.0105
1	2,000	1,980	0.0090	0.0220	0.0155
1	3,000	3,020	0.0100	0.0290	0.0195
1	4,000	4,020	0.0130	0.0365	0.0248
1	5,000	4,980	0.0190	0.0605	0.0398
1	6,000	6,040	0.0285	0.0790	0.0538
1	7,000	7,100	0.0385	0.1180	0.0783
1	8,000	8,980	0.0700	0.1555	0.1128
1	9,000	9,020	0.1245	0.2195	0.1720
1	10,000	10,040	0.2195	0.3250	0.2723
1	11,000	11,000	0.2790	0.3860	0.3325
1	12,000	12,040	0.4095	0.5235	0.4665
	0	0	0.3050	0.4295	0.3673

Lateral Testing

Lateral Load Height Above Grade (ft):	4.0	Deflection Gauge Height (in):		6
Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	500	520	0.0630	0.1360	0.0995
1	1,000	1,000	0.1240	0.2115	0.1678
1	1,500	1,520	0.2135	0.3040	0.2588
1	2,000	2,000	0.2750	0.3680	0.3215
1	2,500	2,540	0.3970	0.5030	0.4500
1	3,000	3,020	0.4605	0.5760	0.5183
1	3,500	3,500	0.5395	0.6670	0.6033
1	4,000	4,000	0.6240	0.7740	0.6990
1	4,500	4,520	0.7510	0.9625	0.8568
1	5,000	4,980	0.0.8535	1.2130	1.2130
	0	0	0.1175	0.3745	0.2460





ANS GEO

Pile Load Test Log

Project Name:	Cypress Creek - Cactus Flower Solar	Embedment Depth (ft):	10.0	Pile ID:	PT-08
Site Location:	Pinal County, Arizona	Pushed to Depth (ft):	1.5	Pile Section:	W6x9
Date Installed:	3/7/2024	Pre-Excavation Depth (ft):	N/A	Pile Length (ft):	15.0
Date Tested:	3/9/2024	Pre-Drill Diameter (in):	N/A	Total Drive Time (sec):	29.6
Location:	32.606400°, -111.569650°	Pre-Drill Depth (ft):	N/A	Avg. Installation Rate (sec/ft):	3.5

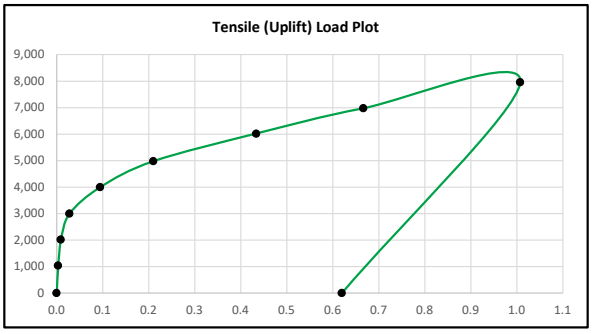
Embedment Data

Depth (ft)	Time (s)
2	0.68
3	3.72
4	3.22
5	2.9
6	3.19
7	3.04
8	3.77
9	3.95
10	5.13
Total Time (s) =	29.6

Field Notes

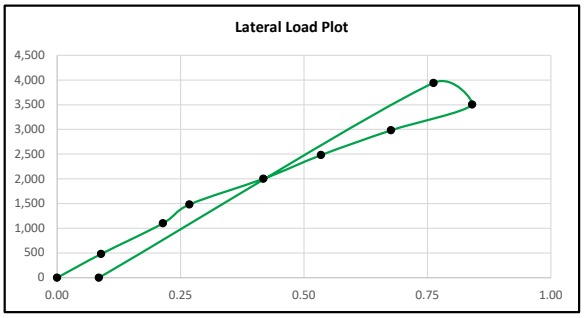
Tensile (Uplift) Testing

Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	1,000	1,040	0.0055	0.0010	0.0033
1	2,000	2,020	0.0125	0.0060	0.0093
1	3,000	3,000	0.0330	0.0230	0.0280
1	4,000	4,000	0.1030	0.0865	0.0948
1	5,000	4,980	0.2195	0.2010	0.2103
1	6,000	6,020	0.4440	0.4235	0.4338
1	7,000	6,980	0.6775	0.6555	0.6665
1	8,000	7,960	0.9665	1.0485	1.0075
	0	0	0.6115	0.6280	0.6198



Lateral Testing

Lateral Load Height Above Grade (ft):		4.0	Deflection Gauge Height (in):		6
Hold Time (min)	Target Load (lbs)	Applied Load (lbs)	Deflection 1 (in.)	Deflection 2 (in.)	Average Deflection (in.)
1	0	0	0.0000	0.0000	0.0000
1	500	480	0.1590	0.0195	0.0893
1	1,000	1,100	0.3145	0.1145	0.2145
1	1,500	1,480	0.3720	0.1640	0.2680
1	2,000	2,000	0.5205	0.3150	0.4178
1	2,500	2,480	0.6240	0.4445	0.5343
1	3,000	2,980	0.7435	0.6085	0.6760
1	3,500	3,500	0.8750	0.8065	0.8408
1	4,000	3,940	0.4980	1.0270	0.7625
	0	0	0.0305	0.1385	0.0845



Attachment G

Seismic Support Data

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16	**Latitude:**	32.617641
Risk Category:	II	**Longitude:**	-111.585532
Soil Class:	D - Stiff Soil	**Elevation:**	1636.6146140777028 ft (NAVD 88)





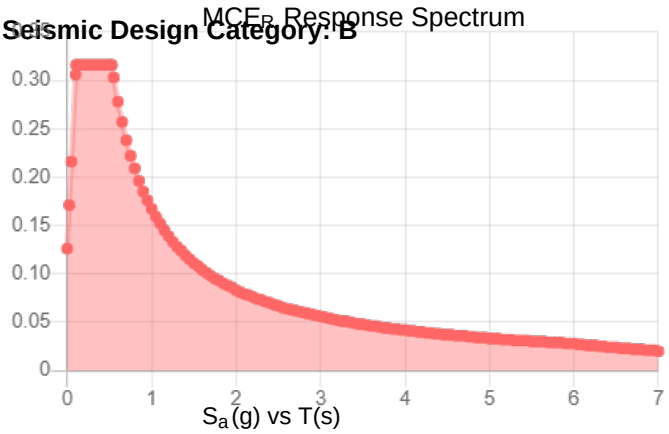
Seismic

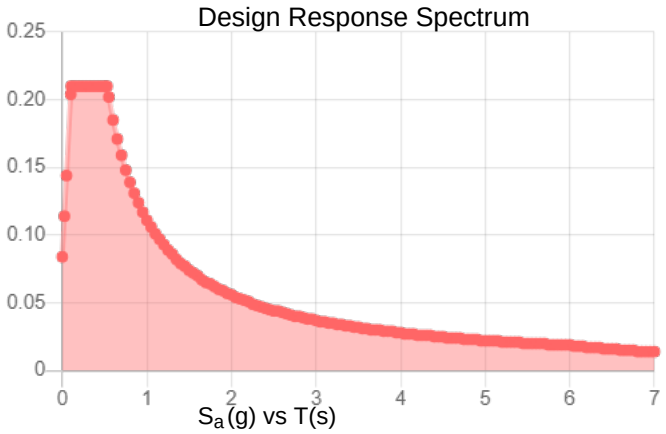
Site Soil Class: D - Stiff Soil

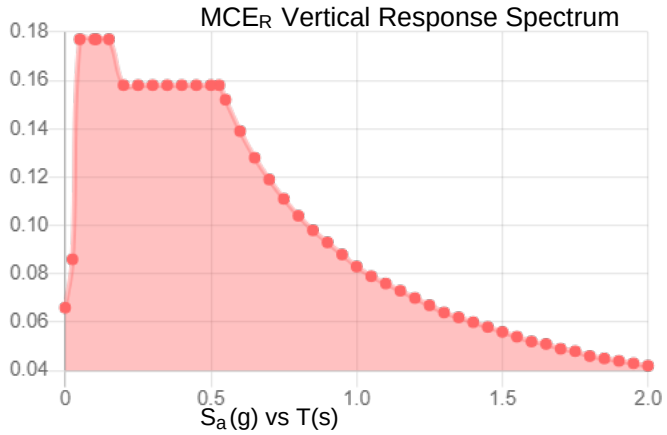
Results:

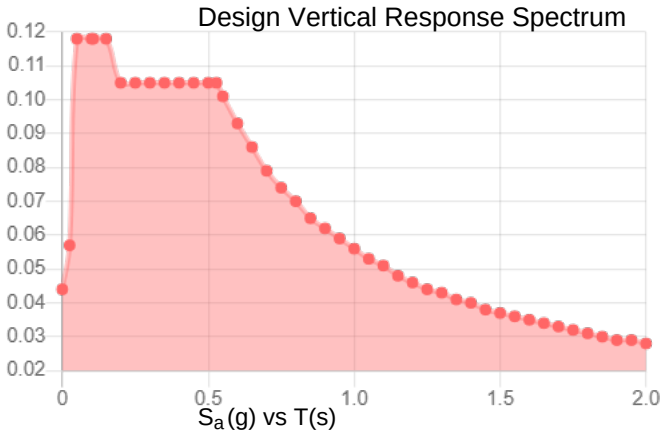
S_S :	0.197	S_{D1} :	0.111
S_1 :	0.07	T_L :	6
F_a :	1.6	PGA :	0.087
F_v :	2.4	PGA_M :	0.139
S_{MS} :	0.316	F_{PGA} :	1.6
S_{M1} :	0.167	I_e :	1
S_{DS} :	0.21	C_v :	0.7

Seismic Design Category: B









Data Accessed: **Tue Mar 19 2024**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

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Attachment H

NRCS Mapping

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Pinal County, Arizona, Western Part



March 4, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

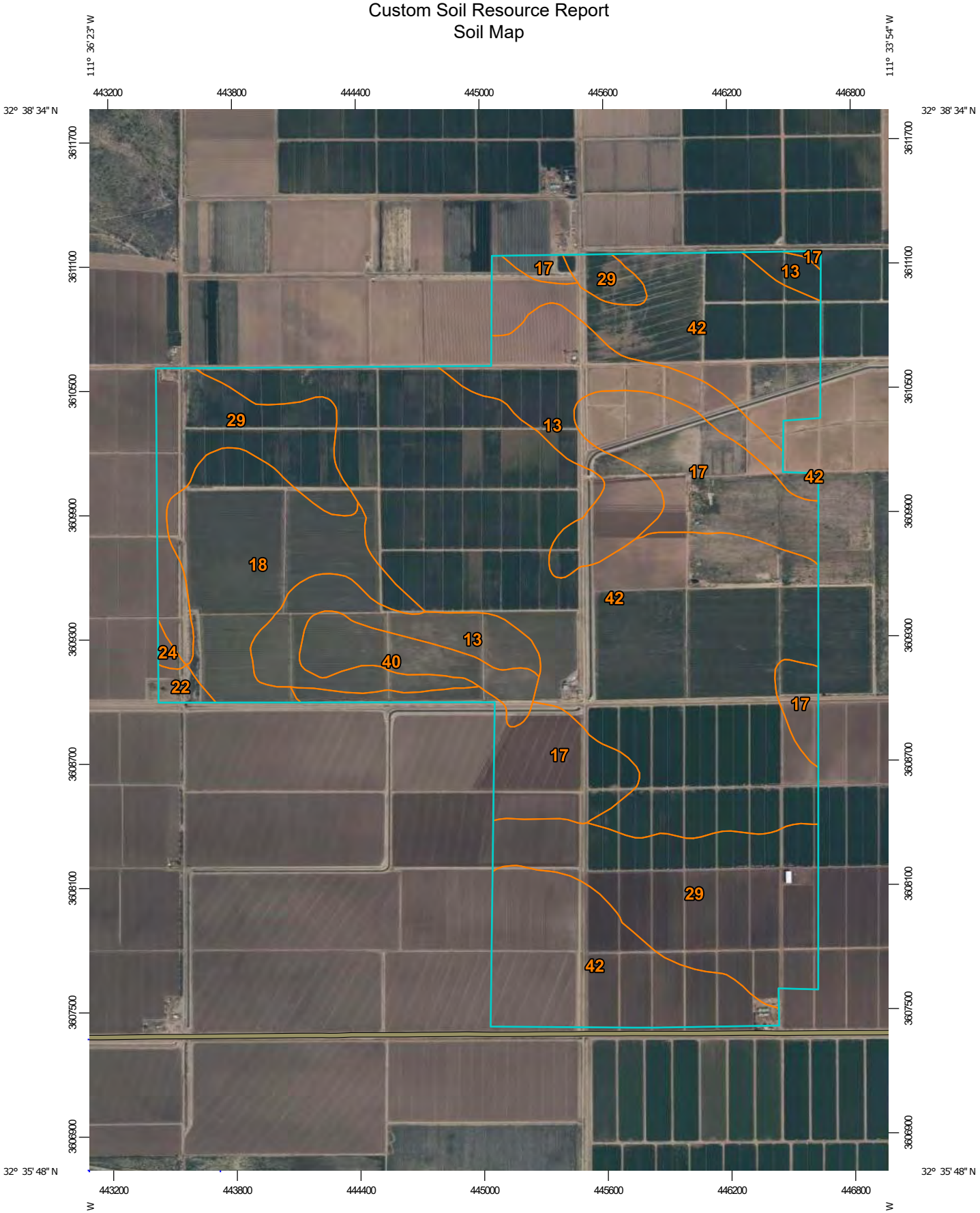
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:25,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 350 700 1400 2100

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pinal County, Arizona, Western Part
Survey Area Data: Version 20, Sep 8, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 18, 2020—Mar 7, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13	Dateland fine sandy loam	257.3	12.3%
17	Denure fine sandy loam, 0 to 1 percent slopes	235.1	11.2%
18	Denure clay loam, 0 to 1 percent slopes	174.8	8.3%
22	Gilman clay loam	8.8	0.4%
24	Glenbar clay loam, 0 to 2 percent slopes	3.7	0.2%
29	Marana silty clay loam	334.6	15.9%
40	Rositas loamy fine sand	55.2	2.6%
42	Sasco silt loam	1,030.5	49.1%
Totals for Area of Interest		**2,100.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not

mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Pinal County, Arizona, Western Part

13—Dateland fine sandy loam

Map Unit Setting

National map unit symbol: 1sq0
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Dateland and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dateland

Setting

Landform: Fan terraces, stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stream and fan alluvium

Typical profile

A - 0 to 2 inches: fine sandy loam
Bk - 2 to 40 inches: fine sandy loam
C - 40 to 60 inches: fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: R040XB207AZ - Limy Fan 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

17—Denure fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1sq4
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Denure and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Denure

Setting

Landform: Stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed stream alluvium

Typical profile

A - 0 to 2 inches: fine sandy loam
Bk - 2 to 54 inches: sandy loam
2Btk - 54 to 60 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: R040XB207AZ - Limy Fan 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 15 percent
Hydric soil rating: No

18—Denure clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1sq5
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Denure and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Denure

Setting

Landform: Stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed stream alluvium

Typical profile

Ap - 0 to 15 inches: clay loam
Bk - 15 to 54 inches: sandy loam
2Btk - 54 to 60 inches: sandy clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: R040XB207AZ - Limy Fan 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

22—Gilman clay loam

Map Unit Setting

National map unit symbol: 1sqb
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Gilman and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gilman

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stream alluvium

Typical profile

Ap - 0 to 12 inches: clay loam
C - 12 to 60 inches: stratified sandy loam to very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C
Ecological site: R040XB211AZ - Loamy Swale 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

24—Glenbar clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tdtq
Elevation: 980 to 2,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 70 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Glenbar and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Glenbar

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Mixed stream alluvium

Typical profile

Ap - 0 to 7 inches: clay loam
Ck1 - 7 to 18 inches: clay loam
Ck2 - 18 to 31 inches: silty clay loam
Ck3 - 31 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Gypsum, maximum content: 2 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R040XB211AZ - Loamy Swale 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 15 percent
Hydric soil rating: No

29—Marana silty clay loam

Map Unit Setting

National map unit symbol: 1sqk
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Marana and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Marana

Setting

Landform: Stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stream alluvium

Typical profile

A - 0 to 2 inches: silty clay loam
C - 2 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R040XB213AZ - Loamy Upland 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

40—Rositas loamy fine sand

Map Unit Setting

National map unit symbol: 1sqz
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days

Farmland classification: Farmland of unique importance

Map Unit Composition

Rositas and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rositas

Setting

Landform: Dunes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed eolian deposits

Typical profile

A1 - 0 to 2 inches: loamy fine sand
C2 - 2 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: R040XB217AZ - Sandy Upland 7"-10" p.z.
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

42—Sasco silt loam

Map Unit Setting

National map unit symbol: 1sr1
Elevation: 1,130 to 1,990 feet
Mean annual precipitation: 6 to 8 inches
Mean annual air temperature: 68 to 72 degrees F
Frost-free period: 240 to 325 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Sasco and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sasco

Setting

Landform: Stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed stream silty alluvium

Typical profile

A - 0 to 2 inches: silt loam
Bw - 2 to 47 inches: silt loam
2Btb - 47 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: R040XB213AZ - Loamy Upland 7"-10" p.z.

Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 15 percent
Hydric soil rating: No

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Building Site Development

Building site development interpretations are designed to be used as tools for evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its described condition and does not consider present land use. Example interpretations can include corrosion of concrete and steel, shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

Corrosion of Concrete

ENG

Engineering

AGR

Agronomy

"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the concrete in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."


111° 36' 23" W
111° 33' 54" W
443200
443800
444400
445000
445600
446200
446800
32° 38' 34" N
32° 35' 48" N
3611700
3611100
3610500
3609900
3609300
3608700
3608100
3607500
3606900
17
29
13
42
18
24
40
22
Map Scale: 1:25,000 if printed on A portrait (8.5" x 11") sheet.
N
0
350
700
1400
2100
Meters
0
1000
2000
4000
6000
Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- High
- Moderate
- Low
- Not rated or not available

Soil Rating Lines
- High
- Moderate
- Low
- Not rated or not available

Soil Rating Points
- High
- Moderate
- Low
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pinal County, Arizona, Western Part
Survey Area Data: Version 20, Sep 8, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 18, 2020—Mar 7, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Corrosion of Concrete

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13	Dateland fine sandy loam	Low	257.3	12.3%
17	Denure fine sandy loam, 0 to 1 percent slopes	Low	235.1	11.2%
18	Denure clay loam, 0 to 1 percent slopes	Low	174.8	8.3%
22	Gilman clay loam	Moderate	8.8	0.4%
24	Glenbar clay loam, 0 to 2 percent slopes	Low	3.7	0.2%
29	Marana silty clay loam	Low	334.6	15.9%
40	Rositas loamy fine sand	Moderate	55.2	2.6%
42	Sasco silt loam	Low	1,030.5	49.1%
Totals for Area of Interest			**2,100.1**	**100.0%**

Rating Options—Corrosion of Concrete

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Corrosion of Steel

ENG

Engineering

AGR

Agronomy

"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."

Custom Soil Resource Report
Map—Corrosion of Steel



Map Scale: 1:25,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 350 700 1400 2100

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- High
- Moderate
- Low
- Not rated or not available

Soil Rating Lines
- High
- Moderate
- Low
- Not rated or not available

Soil Rating Points
- High
- Moderate
- Low
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Survey Area Data: Version 20, Sep 8, 2023

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Date(s) aerial images were photographed: Feb 18, 2020—Mar 7, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Corrosion of Steel

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13	Dateland fine sandy loam	Moderate	257.3	12.3%
17	Denure fine sandy loam, 0 to 1 percent slopes	Moderate	235.1	11.2%
18	Denure clay loam, 0 to 1 percent slopes	Moderate	174.8	8.3%
22	Gilman clay loam	High	8.8	0.4%
24	Glenbar clay loam, 0 to 2 percent slopes	Moderate	3.7	0.2%
29	Marana silty clay loam	Moderate	334.6	15.9%
40	Rositas loamy fine sand	Moderate	55.2	2.6%
42	Sasco silt loam	Moderate	1,030.5	49.1%
Totals for Area of Interest			**2,100.1**	**100.0%**

Rating Options—Corrosion of Steel

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Land Management

Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Erosion Hazard (Off-Road, Off-Trail)

The ratings in this interpretation indicate the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. The ratings are based on slope, soil erosion factor K, and an index of rainfall erosivity (R). The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance.

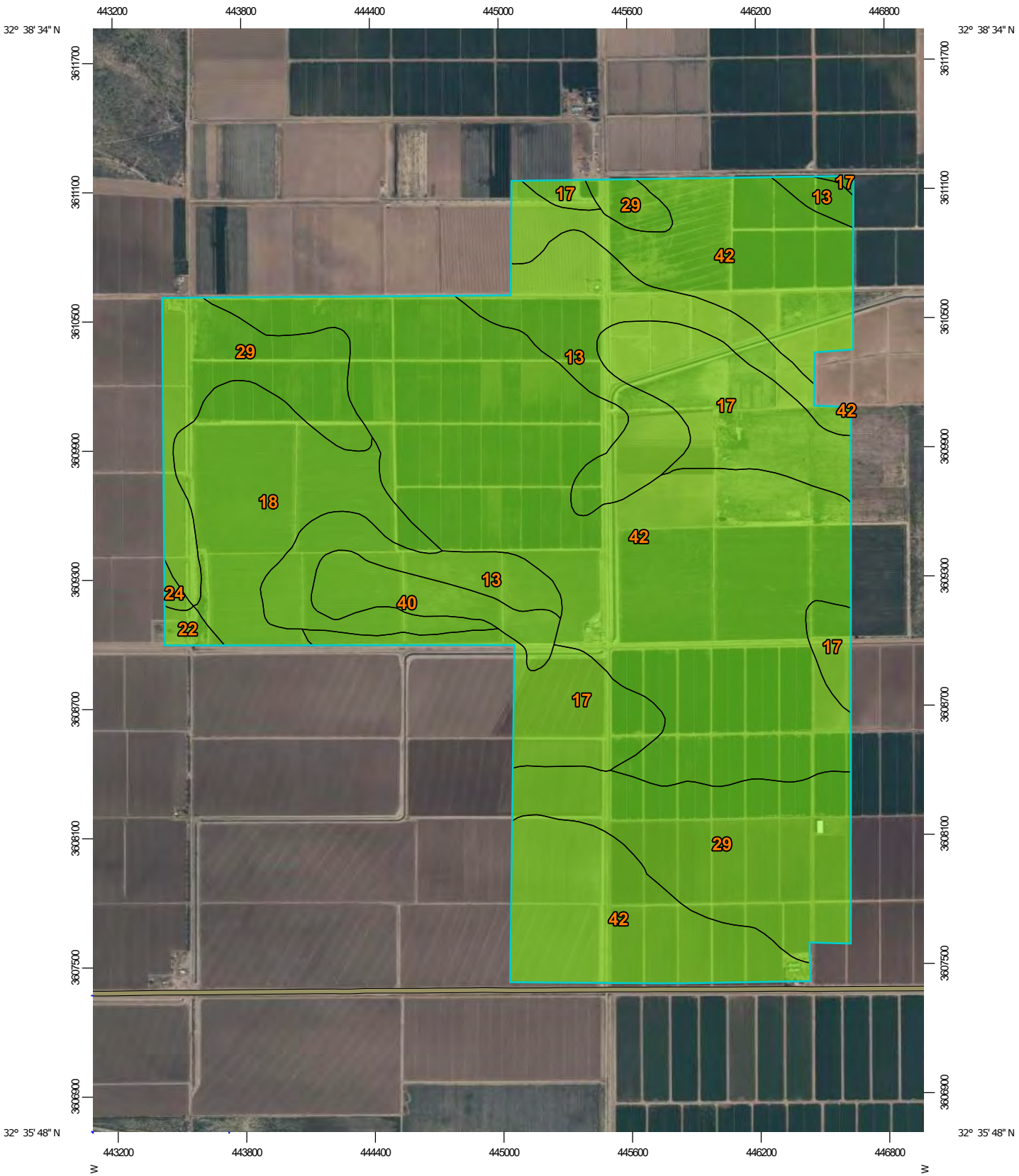
The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," "severe," or "very severe." A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Custom Soil Resource Report
Map—Erosion Hazard (Off-Road, Off-Trail)



Map Scale: 1:25,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 350 700 1400 2100

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Lines
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Points
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 20, Sep 8, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 18, 2020—Mar 7, 2020

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Tables—Erosion Hazard (Off-Road, Off-Trail)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
13	Dateland fine sandy loam	Slight	Dateland (90%)		257.3	12.3%
17	Denure fine sandy loam, 0 to 1 percent slopes	Slight	Denure (85%)		235.1	11.2%
18	Denure clay loam, 0 to 1 percent slopes	Slight	Denure (95%)		174.8	8.3%
22	Gilman clay loam	Slight	Gilman (95%)		8.8	0.4%
24	Glenbar clay loam, 0 to 2 percent slopes	Slight	Glenbar (85%)		3.7	0.2%
29	Marana silty clay loam	Slight	Marana (90%)		334.6	15.9%
40	Rositas loamy fine sand	Slight	Rositas (95%)		55.2	2.6%
42	Sasco silt loam	Slight	Sasco (85%)		1,030.5	49.1%
Totals for Area of Interest					**2,100.1**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Slight	2,100.0	100.0%
Totals for Area of Interest	**2,100.1**	**100.0%**

Rating Options—Erosion Hazard (Off-Road, Off-Trail)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Erosion Hazard (Road, Trail)

FOR - Forestry

The ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments.

The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely;

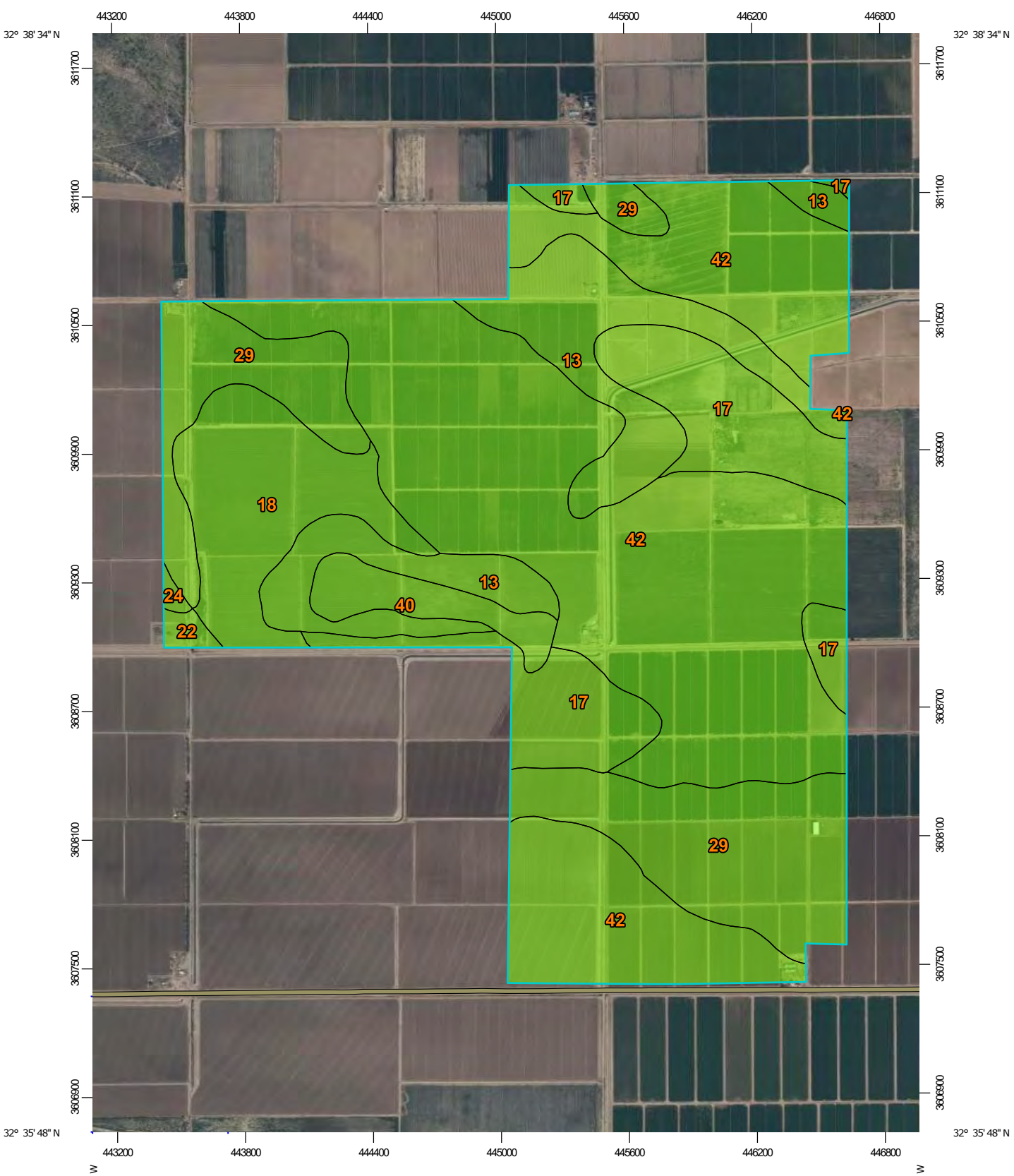
"moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Custom Soil Resource Report
Map—Erosion Hazard (Road, Trail)



Map Scale: 1:25,000 if printed on A portrait (8.5" x 11") sheet.

N

0 350 700 1400 2100 Meters

0 1000 2000 4000 6000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Lines
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Points
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 20, Sep 8, 2023

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Date(s) aerial images were photographed: Feb 18, 2020—Mar 7, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Erosion Hazard (Road, Trail)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
13	Dateland fine sandy loam	Slight	Dateland (90%)		257.3	12.3%
17	Denure fine sandy loam, 0 to 1 percent slopes	Slight	Denure (85%)		235.1	11.2%
18	Denure clay loam, 0 to 1 percent slopes	Slight	Denure (95%)		174.8	8.3%
22	Gilman clay loam	Slight	Gilman (95%)		8.8	0.4%
24	Glenbar clay loam, 0 to 2 percent slopes	Slight	Glenbar (85%)		3.7	0.2%
29	Marana silty clay loam	Slight	Marana (90%)		334.6	15.9%
40	Rositas loamy fine sand	Slight	Rositas (95%)		55.2	2.6%
42	Sasco silt loam	Slight	Sasco (85%)		1,030.5	49.1%
Totals for Area of Interest					**2,100.1**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Slight	2,100.0	100.0%
Totals for Area of Interest	**2,100.1**	**100.0%**

Rating Options—Erosion Hazard (Road, Trail)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

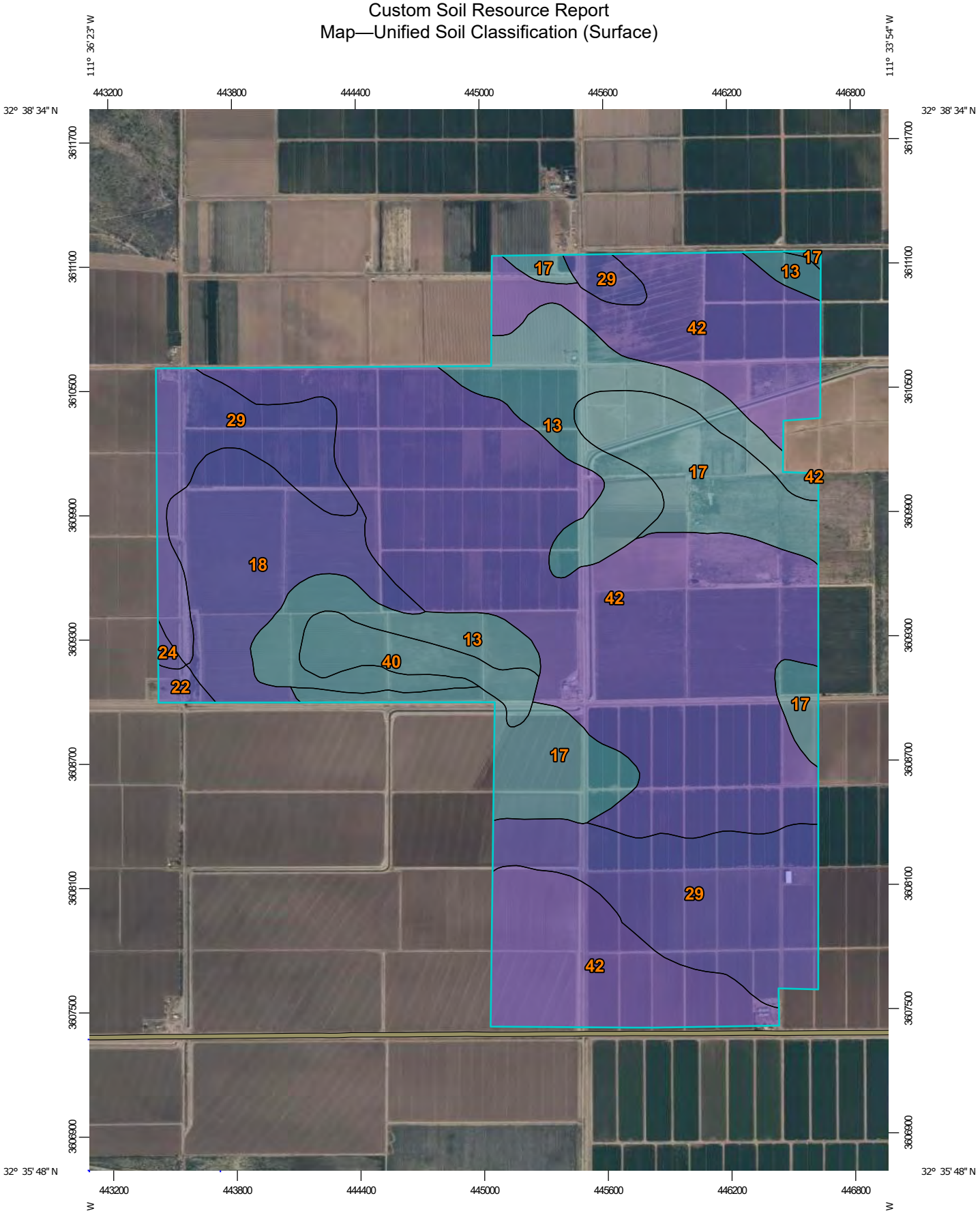
Unified Soil Classification (Surface)

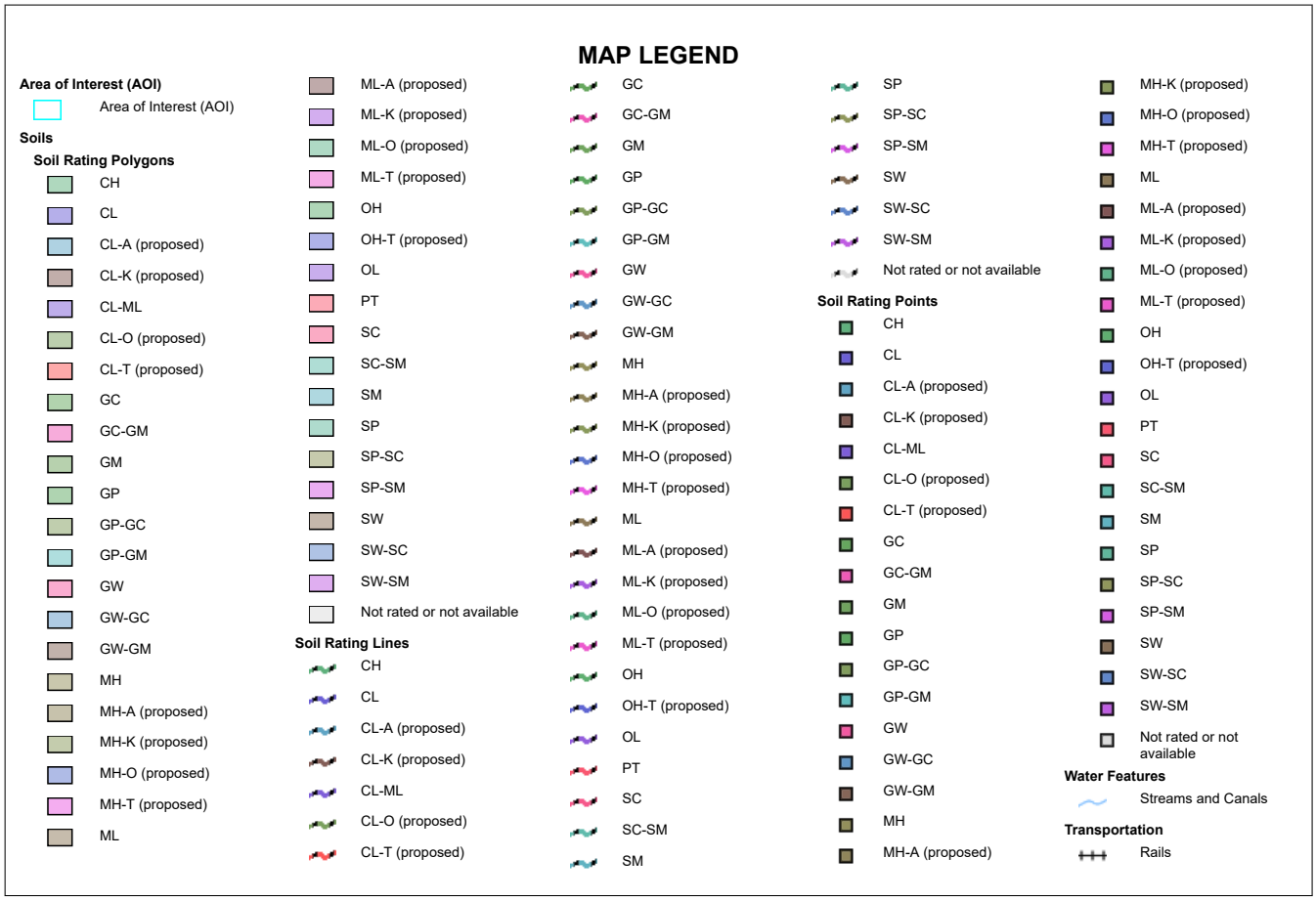
The Unified soil classification system classifies mineral and organic mineral soils for engineering purposes on the basis of particle-size characteristics, liquid limit, and plasticity index. It identifies three major soil divisions: (i) coarse-grained soils having less than 50 percent, by weight, particles smaller than 0.074 mm in diameter; (ii) fine-grained soils having 50 percent or more, by weight, particles smaller than 0.074 mm in diameter; and (iii) highly organic soils that demonstrate certain organic characteristics. These divisions are further subdivided into a total of 15 basic soil groups. The major soil divisions and basic soil groups are determined on the basis of estimated or measured values for grain-size distribution and Atterberg limits. ASTM D 2487 shows the criteria chart used for classifying soil in the Unified system and the 15 basic soil groups of the system and the plasticity chart for the Unified system.

The various groupings of this classification correlate in a general way with the engineering behavior of soils. This correlation provides a useful first step in any field or laboratory investigation for engineering purposes. It can serve to make some general interpretations relating to probable performance of the soil for engineering uses.

For each soil horizon in the database one or more Unified soil classifications may be listed. One is marked as the representative or most commonly occurring. The representative classification is shown here for the surface layer of the soil.

Map—Unified Soil Classification (Surface)




MAP LEGEND
Area of Interest (AOI)
Area of Interest (AOI)
Soils
Soil Rating Polygons
CH
CL
CL-A (proposed)
CL-K (proposed)
CL-ML
CL-O (proposed)
CL-T (proposed)
GC
GC-GM
GM
GP
GP-GC
GP-GM
GW
GW-GC
GW-GM
MH
MH-A (proposed)
MH-K (proposed)
MH-O (proposed)
MH-T (proposed)
ML
ML-A (proposed)
ML-K (proposed)
ML-O (proposed)
ML-T (proposed)
OH
OH-T (proposed)
OL
PT
SC
SC-SM
SM
SP
SP-SC
SP-SM
SW
SW-SC
SW-SM
Not rated or not available
Soil Rating Lines
CH
CL
CL-A (proposed)
CL-K (proposed)
CL-ML
CL-O (proposed)
CL-T (proposed)
GC
GC-GM
GM
GP
GP-GC
GP-GM
GW
GW-GC
GW-GM
MH
MH-A (proposed)
MH-K (proposed)
MH-O (proposed)
MH-T (proposed)
ML
ML-A (proposed)
ML-K (proposed)
ML-O (proposed)
ML-T (proposed)
OH
OH-T (proposed)
OL
PT
SC
SC-SM
SM
SP
SP-SC
SP-SM
SW
SW-SC
SW-SM
Not rated or not available
Soil Rating Points
CH
CL
CL-A (proposed)
CL-K (proposed)
CL-ML
CL-O (proposed)
CL-T (proposed)
GC
GC-GM
GM
GP
GP-GC
GP-GM
GW
GW-GC
GW-GM
MH
MH-A (proposed)
MH-K (proposed)
MH-O (proposed)
MH-T (proposed)
ML
ML-A (proposed)
ML-K (proposed)
ML-O (proposed)
ML-T (proposed)
OH
OH-T (proposed)
OL
PT
SC
SC-SM
SM
SP
SP-SC
SP-SM
SW
SW-SC
SW-SM
Not rated or not available
Water Features
Streams and Canals
Transportation
Rails

MAP INFORMATION

Interstate Highways

US Routes

Major Roads

Local Roads

Background


Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Pinal County, Arizona, Western Part
Survey Area Data: Version 20, Sep 8, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 18, 2020—Mar 7, 2020

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Table—Unified Soil Classification (Surface)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
13	Dateland fine sandy loam	SM	257.3	12.3%
17	Denure fine sandy loam, 0 to 1 percent slopes	SM	235.1	11.2%
18	Denure clay loam, 0 to 1 percent slopes	CL	174.8	8.3%
22	Gilman clay loam	CL	8.8	0.4%
24	Glenbar clay loam, 0 to 2 percent slopes	CL	3.7	0.2%
29	Marana silty clay loam	CL	334.6	15.9%
40	Rositas loamy fine sand	SM	55.2	2.6%
42	Sasco silt loam	CL-ML	1,030.5	49.1%
Totals for Area of Interest			**2,100.1**	**100.0%**

Rating Options—Unified Soil Classification (Surface)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

References

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Attachment I

Investigation Photo Log


ANS
GEO

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1] Average runoff condition, and $I_a = 0.2S$.

[2] The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

[3] CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

[4] Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

[5] Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1/]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2/]	Hydrologic condition [3/]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1] Average runoff condition, and I_a=0.2S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2/]	A [3/]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a, = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

Figure 2-3 Composite CN with connected impervious area.

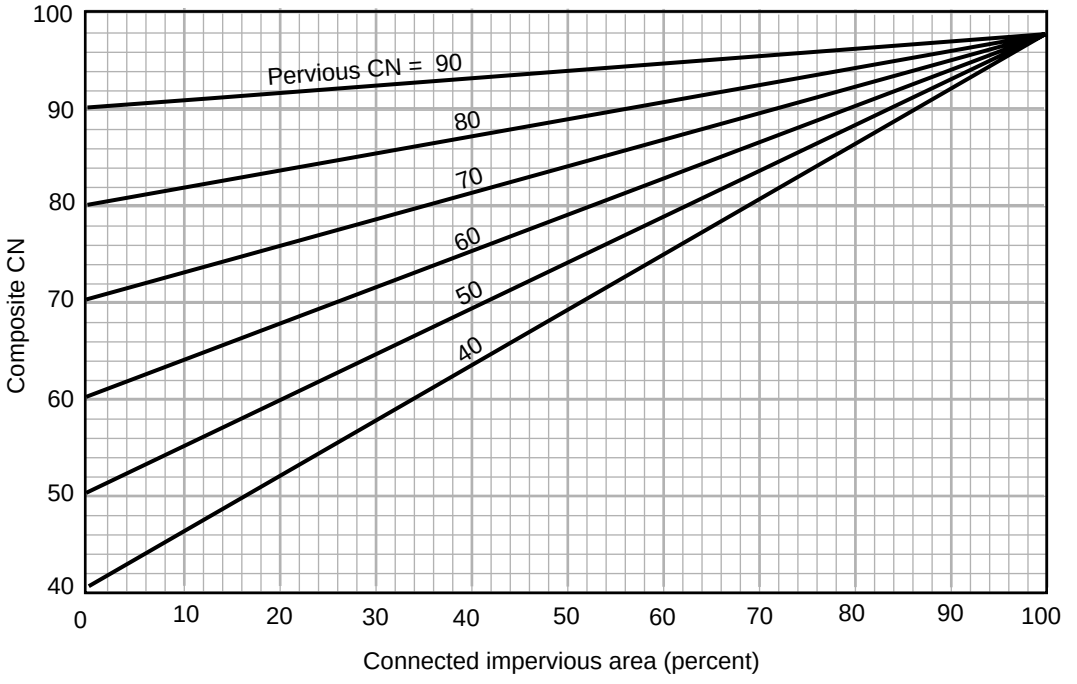
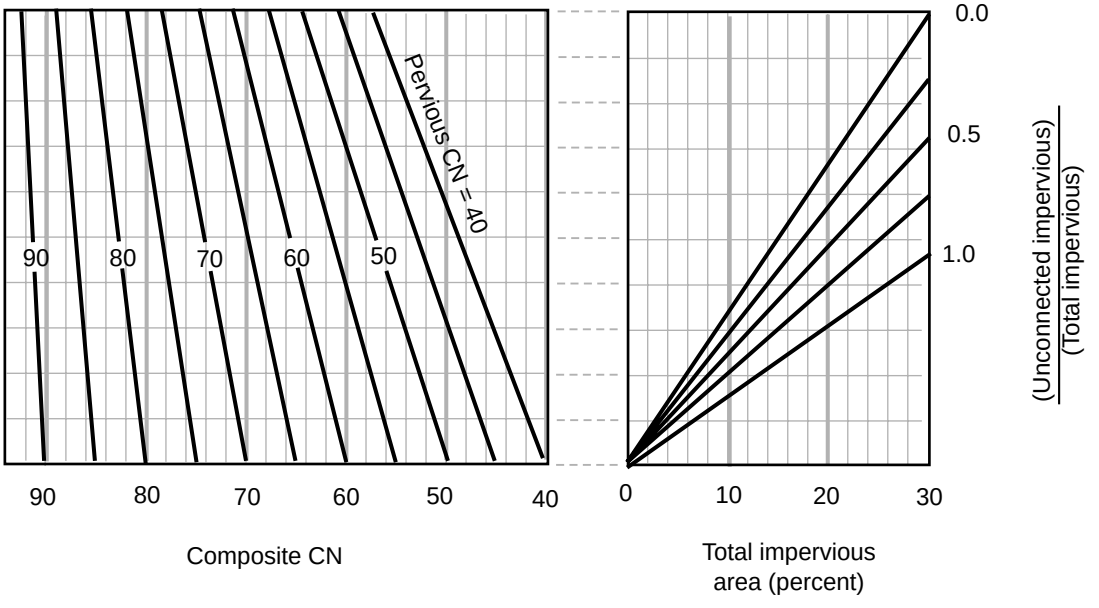


Figure 2-4 Composite CN with unconnected impervious areas and total impervious area less than 30%



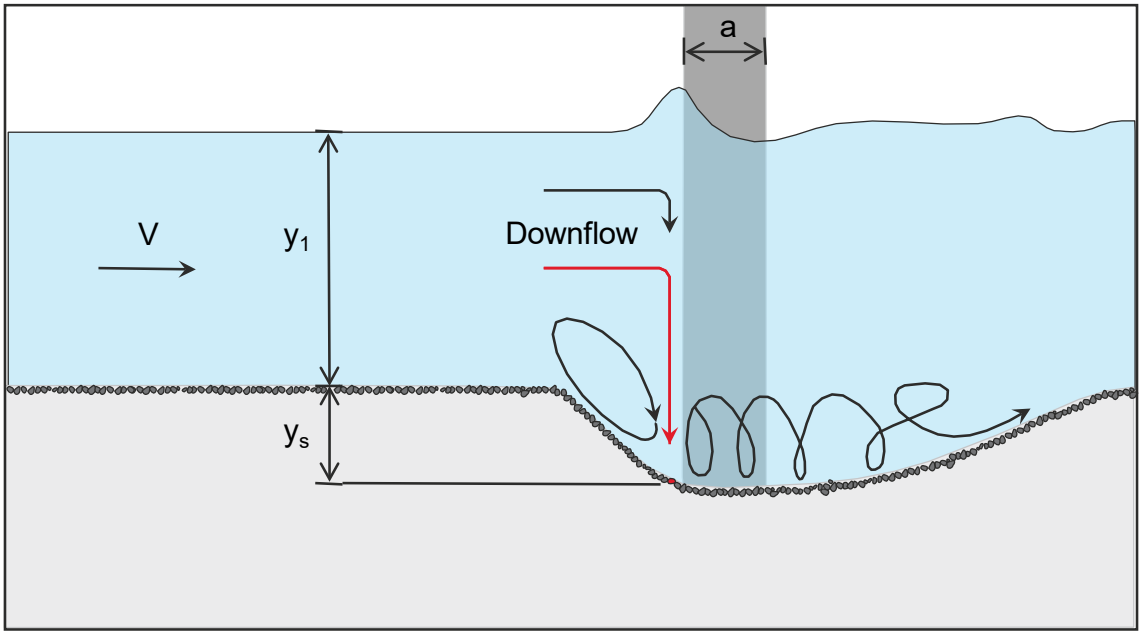


Figure 7.2. Definition sketch for pier scour.

The HEC-18 equation is:

$$\frac{y_s}{y_1} = 2.0\ K_1\ K_2\ K_3 \left(\frac{a}{y_1}\right)^{0.65} Fr_1^{0.43} \qquad (7.1)$$

As a Rule of Thumb, the maximum scour depth for round nose piers aligned with the flow is:

$y_s \leq 2.4$ times the pier width (a) for $Fr \leq 0.8$ (7.2)
$y_s \leq 3.0$ times the pier width (a) for $Fr > 0.8$

In terms of y_s/a, Equation 7.1 is:

$$\frac{y_s}{a} = 2.0\ K_1\ K_2\ K_3 \left(\frac{y_1}{a}\right)^{0.35} Fr_1^{0.43} \qquad (7.3)$$

where:

y_s = Scour depth, ft (m)
y_1 = Flow depth directly upstream of the pier, ft (m)
K_1 = Correction factor for pier nose shape from Figure 7.3 and Table 7.1
K_2 = Correction factor for angle of attack of flow from Table 7.2 or Equation 7.4
K_3 = Correction factor for bed condition from Table 7.3
a = Pier width, ft (m)
L = Length of pier, ft (m)
Fr_1 = Froude Number directly upstream of the pier = $V_1/(gy_1)^{1/2}$
V_1 = Mean velocity of flow directly upstream of the pier, ft/s (m/s)
g = Acceleration of gravity (32.2 ft/s^2) (9.81 m/s^2)

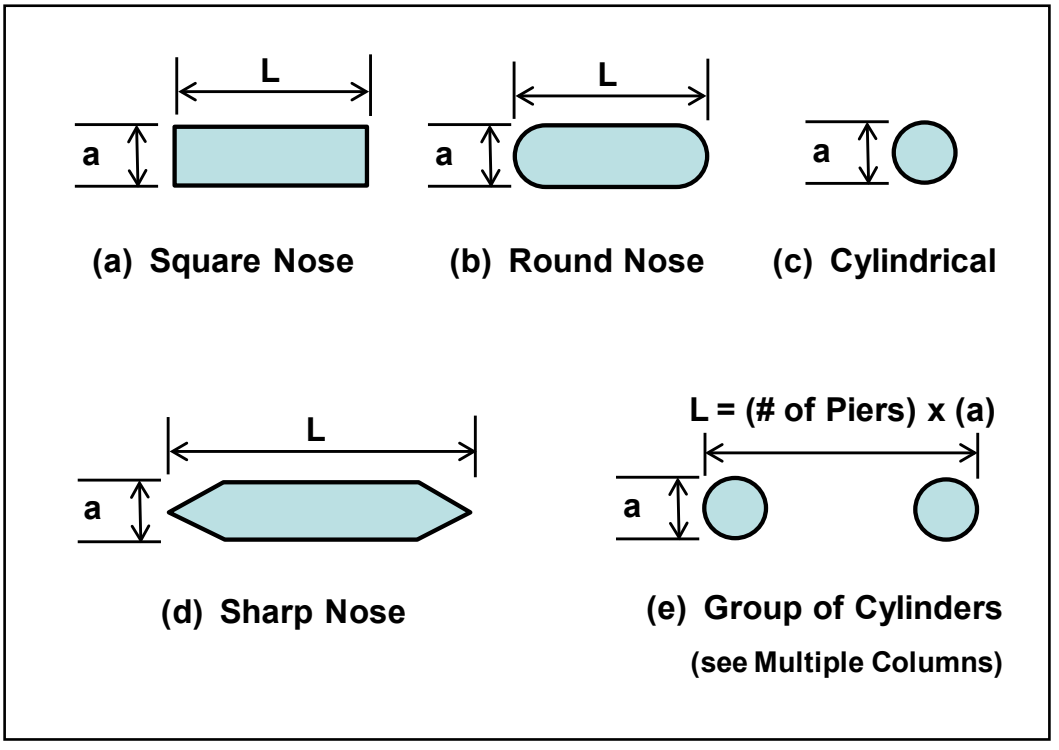


Figure 7.3. Common pier shapes.

The correction factor, K_2, for angle of attack of the flow, 2, is calculated using the following equation:

$$K_2 = (\text{Cos}\ \theta + \frac{L}{a}\ \text{Sin}\ \theta)^{0.65} \qquad (7.4)$$

If L/a is larger than 12, use L/a = 12 as a maximum in Equation 7.4 and Table 7.2. Table 7.2 illustrates the magnitude of the effect of the angle of attack on local pier scour.

Table 7.1. Correction Factor, K_1, for Pier Nose Shape.

Shape of Pier Nose	K_1
(a) Square nose	1.1
(b) Round nose	1.0
(c) Circular cylinder	1.0
(d) Group of cylinders	1.0
(e) Sharp nose	0.9

Table 7.2. Correction Factor, K_2, for Angle of Attack, 2, of the Flow.

Angle	L/a=4	L/a=8	L/a=12
0	1.0	1.0	1.0
15	1.5	2.0	2.5
30	2.0	2.75	3.5
45	2.3	3.3	4.3
90	2.5	3.9	5.0

Angle = skew angle of flow
L = length of pier

Table 7.3. Increase in Equilibrium Pier Scour Depths, K_3, for Bed Condition.		
Bed Condition	Dune Height ft	K_3
Clear-Water Scour	N/A	1.1
Plane bed and Antidune flow	N/A	1.1
Small Dunes	$10 > H \geq 2$	1.1
Medium Dunes	$30 > H \geq 10$	1.2 to 1.1
Large Dunes	$H \geq 30$	1.3

Notes:

1. The correction factor K_1 for pier nose shape should be determined using Table 7.1 for angles of attack up to 5 degrees. **For greater angles, K_2 dominates and K_1 should be considered as 1.0**. If L/a is larger than 12, use the values for L/a = 12 as a maximum in Table 7.2 and Equation 7.4.

2. The values of the correction factor K_2 should be applied only when the field conditions are such that the entire length of the pier is subjected to the angle of attack of the flow. Use of this factor will result in a significant over-prediction of scour if (1) a portion of the pier is shielded from the direct impingement of the flow by an abutment or another pier; or (2) an abutment or another pier redirects the flow in a direction parallel to the pier. For such cases, judgment must be exercised to reduce the value of the K_2 factor by selecting the effective length of the pier actually subjected to the angle of attack of the flow. **Equation 7.4 should be used for evaluation and design**. Table 7.2 is intended to illustrate the importance of angle of attack in pier scour computations and to establish a cutoff point for K_2 (i.e., a maximum value of 5.0).

3. The correction factor K_3 results from the fact that for plane-bed conditions, which is typical of most bridge sites for the flood frequencies employed in scour design, the maximum scour may be 10 percent greater than computed with Equation 7.1. In the **unusual** situation where a dune bed configuration **with large dunes** exists at a site during flood flow, the maximum pier scour may be 30 percent greater than the predicted equation value. This may occur on very large rivers, such as the Mississippi. For smaller streams that have a dune bed configuration at flood flow, the dunes will be smaller and the maximum scour may be only 10 to 20 percent larger than equilibrium scour. For antidune bed configuration the maximum scour depth may be 10 percent greater than the computed equilibrium pier scour depth.

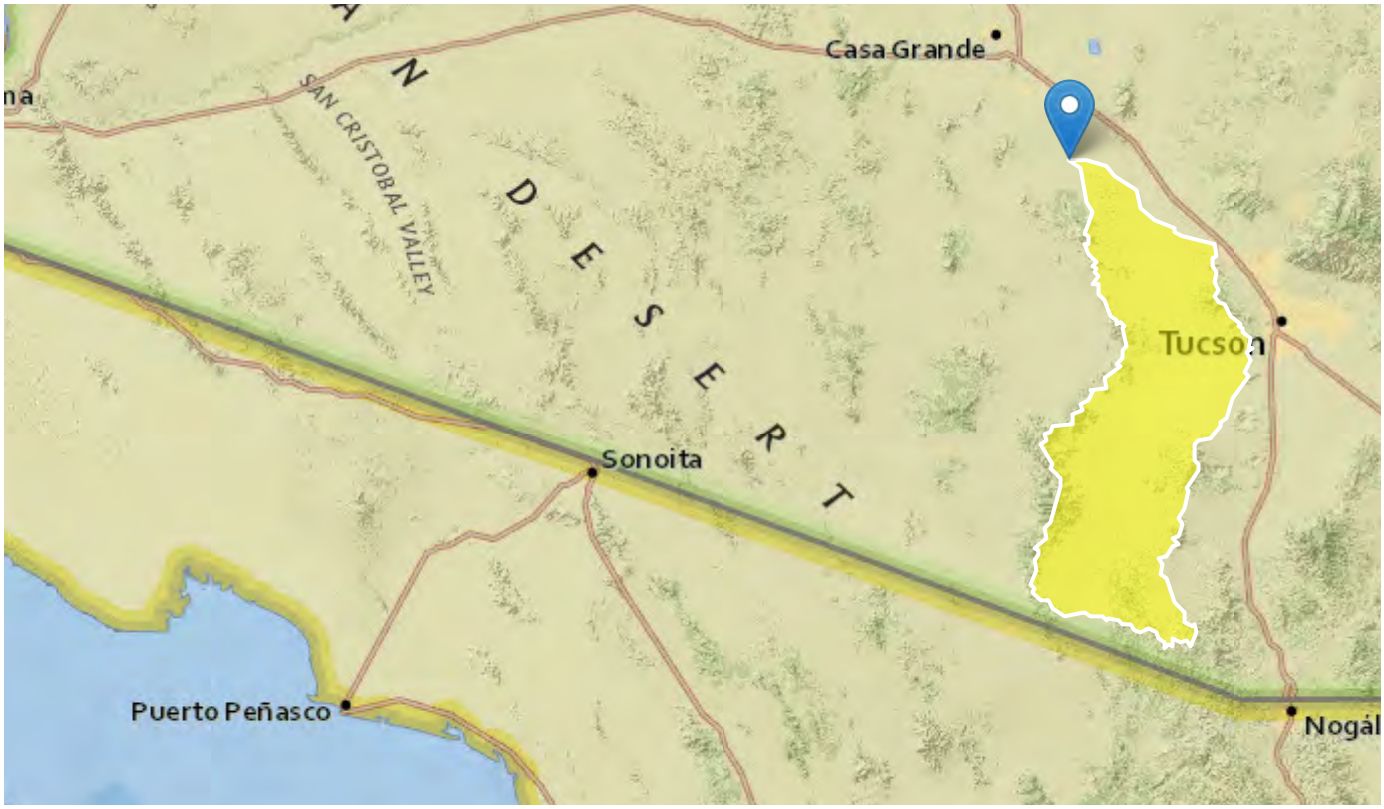
4. Piers set close to abutments (for example at the toe of a spill through abutment) must be carefully evaluated for the angle of attack and velocity of the flow coming around the abutment.

7.3 FLORIDA DOT PIER SCOUR METHODOLOGY

Equation 7.1 has been included in all previous versions of HEC-18 and has been used for bridge scour evaluations and bridge design for countless bridges in the U.S. and worldwide. This equation, which was developed and modified over several decades, could be improved by including bed material size and a more detailed consideration of the bridge pier flow field (see Section 3.6.2). An NCHRP study (NCHRP 2011a) evaluated 22 pier scour equations and found that although the HEC-18 equation did well in comparison to the other equations, the Sheppard and Miller (2006) equation generally performed better for both laboratory and

StreamStats Report

Region ID: AZ
Workspace ID: AZ20211104173111263000
Clicked Point (Latitude, Longitude): 32.58773, -111.55212
Time: 2021-11-04 10:31:41 -0700



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CONTDA	Area that contributes flow to a point on a stream	1442.65	square miles
ELEV	Mean Basin Elevation	3102.098	feet
DRNAREA	Area that drains to a point on a stream	1442.65	square miles

Peak-Flow Statistics Parameters [100.0 Percent (1440 square miles) Peak Region 5 SE Basin Range 2014 5211]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	1442.65	square miles	0.155	2925
ELEV	Mean Basin Elevation	3102.098	feet		

Peak-Flow Statistics Flow Report [100.0 Percent (1440 square miles) Peak Region 5 SE Basin Range 2014 5211]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIl	PIu	ASEp
50-percent AEP flood	3370	ft^3/s	148	76500	86.6
20-percent AEP flood	8110	ft^3/s	1000	65700	61.5
10-percent AEP flood	12800	ft^3/s	2120	77200	52.4
4-percent AEP flood	20500	ft^3/s	4060	103000	45.8
2-percent AEP flood	27600	ft^3/s	5910	129000	43.5
1-percent AEP flood	35500	ft^3/s	7900	160000	42.6
0.5-percent AEP flood	45600	ft^3/s	9750	213000	42.4
0.2-percent AEP flood	60000	ft^3/s	12800	281000	43.2

Peak-Flow Statistics Citations

Paretti, N.V., Kennedy, J.R., Turney, L.A., and Veilleux, A.G.,2014, Methods for estimating magnitude and frequency of floods in Arizona, developed with unregulated and rural peak-flow data through water year 2010: U.S. Geological Survey Scientific Investigations Report 2014-5211, 61 p., http://dx.doi.org/10.3133/sir20145211. (http://pubs.usgs.gov/sir/2014/5211/)

Bankfull Statistics Parameters [Intermontane Plateau D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1442.65	square miles	3.62934	7579.9152

Bankfull Statistics Parameters [Basin and Range P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1442.65	square miles	3.949803	5008.971825

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1442.65	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Intermontane Plateau D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	111	ft
Bieger_D_channel_depth	3.44	ft
Bieger_D_channel_cross_sectional_area	363	ft^2

Bankfull Statistics Flow Report [Basin and Range P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	123	ft
Bieger_P_channel_depth	3.13	ft
Bieger_P_channel_cross_sectional_area	368	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	160	ft
Bieger_USA_channel_depth	5.68	ft
Bieger_USA_channel_cross_sectional_area	868	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Bieger_D_channel_width	111	ft
Bieger_D_channel_depth	3.44	ft
Bieger_D_channel_cross_sectional_area	363	ft^2
Bieger_P_channel_width	123	ft
Bieger_P_channel_depth	3.13	ft
Bieger_P_channel_cross_sectional_area	368	ft^2
Bieger_USA_channel_width	160	ft
Bieger_USA_channel_depth	5.68	ft
Bieger_USA_channel_cross_sectional_area	868	ft^2

Bankfull Statistics Citations

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_can

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Application Version: 4.6.2
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

Leo Lew
County Manager

PINAL COUNTY
WIDE OPEN OPPORTUNITY

Mary Ellen Sheppard
Deputy County Manager

Himanshu Patel
Deputy County Manager

Open Space, Trails & Regional Parks Department
Development Review Comment Letter

Project Name: Cactus Flower Solar, LLC
Case Number: PZ-PA-007-24
Reviewed By: Kelley Fox, Urban Wildlife Planner
Review Type: Major Comprehensive Plan Amendment Application
08/01/2024

Comment #	RESPOND TO ALL COMMENTS
1	Canal and irrigation systems have been shown to provide movement corridors and habitat for wildlife. A 50ft buffer around canal/irrigation districts and wildlife friendly fencing is recommended to be incorporated into the project development plan.
2	Noxious weeds, such as *Oncosiphon piluliferum,* have become increasingly problematic in areas of development/ large projects where vegetation management plans are not created or maintained. Due to the increasing threat noxious weeds, have on the Sonoran desert and Pinal County landscape it is recommended that the applicant incorporate invasive species/noxious weed management plans for development. Information regarding noxious weeds and the state legislation associated with them can be found on the Arizona Department of Agriculture's website.
3	Incorporating current guidelines (and any updated publications) for Solar development within Arizona provided by Arizona Game and Fish Department is highly recommended. These guidelines can be found at https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/planningFor/wildlifeFriendlyGuidelines/FinalSolarGuidelines03122010.pdf
4	Review AZGFD fencing guidelines which are in consonance with Pinal County expectations below: https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/planningFor/wildlifeFriendlyGuidelines/110125_AGFD_fencing_guidelines.pdf
5	Any clarifications regarding these comments or recommended guidelines can be directed towards Kelley Fox via email Kelley.fox@pinal.gov or via phone at 520-866-6661

Project Name: Cactus Flower
Case Number: PZ-PA-007-24
Reviewed By: Arizona Game and Fish Department
Major Comprehensive Plan Amendment 60 day agency review

	Comments
General	The Department would like to work closely with Pinal County and project proponents throughout the preliminary area evaluation, site characterization and design, construction, operation, and decommissioning of the facility. Project proponents should refer to the Solar Communications Framework for a guide on how to maintain effective communication with the Department throughout the life of a solar project.
General	Although each of these projects individually may have a minimal impact on the broader landscape, these projects cumulatively could result in loss of habitat, impact wildlife movements, and affect wildlife-related recreation. Additionally, long-term effects to wildlife can extend several kilometers beyond the footprint of a solar project area (Sawyer et al. 20221).
Genera;	Department also encourages consideration and incorporation of setbacks and design recommendations from the Pinal County Open Space, Parks and Trails Plan (Pinal 2007), Pinal County Open Space and Recreation Area Guideline Manual (2012), Pinal County Floodplain Management Ordinance (2019), and lighting ordinances to be consistent with the vision of Pinal County.
	The Department offers the following recommendations to reduce potential impacts to wildlife and habitat for all proposed projects:
General	The Department recommends conducting surveys in the project areas to determine species presence. These surveys should be of sufficient duration and intensity to adequately assess all habitat types and potential wildlife species occurrence in and adjacent to the project area. Department staff are available to assist project proponents in determining appropriate surveys to conduct and design features and best management practices that can help minimize potential
Wildlife	The Sonoran pronghorn, listed as endangered under the Endangered Species Act, could occur in the project area and adjacent lands for Cactus Flower Solar. Sonoran pronghorn have specific habitat requirements based on their life history and survival strategy. The Department would like to work with the project proponent to minimize any potential impacts to this species. The Department recommends scheduling construction activities outside the fawning season for Sonoran pronghorn (February 1 to July 15) and requests coordination prior to construction activities in order to exchange information on current Sonoran pronghorn use in the project area. If pronghorn are

	detected during project activities, please notify the U.S. Fish and Wildlife Service (USFWS) and the Department's Sonoran Pronghorn Program Lead (rgardner@azgfd.gov) as soon as possible.
	Suitable habitat for the western burrowing owl, a special status species that is regulated under the Migratory Bird Treaty Act (MBTA), is present within or adjacent to the project area for Cactus Flower Solar. The Department recommends conducting occupancy surveys for this species in advance of the design phase to understand distribution of burrowing owls in the project site; avoidance of a large burrowing owl population may be advisable over removal or other conservation measures. Guidelines for conducting this survey are found in *Burrowing Owl Project Clearance Guidance for Landowners*. Please note that the survey should be conducted by a surveyor who is certified by the Department or has similar training and qualifications. If an active burrowing owl burrow is detected, please contact the Department and the USFWS for direction, in accordance with the guidelines.
Wildlife	The Department recommends conducting surveys for nesting birds prior to vegetation removal and/or construction activities that occur during the breeding season. The vegetation within the project area may provide nesting opportunities for avian species that are regulated under the Migratory Bird Treaty Act (MBTA). If it is anticipated the project will not be in compliance with MBTA, the Department recommends contacting the USFWS for technical assistance.
Wildlife	Burrowing mammals could occur within the project area and could be influenced by construction activities and by loss of habitat. Surveys for these species are recommended to determine their presence and to inform pre-construction activities. Department staff are available to assist in identifying suitable conservation measures, such as one-way exclosures on burrows that allow wildlife to exit the burrows and disperse to adjacent lands in advance of construction.
Site Plan	The Department recommends incorporating open unfenced corridors across the project area into the project design to facilitate wildlife movement, including within upland habitats as well as maintaining the ephemeral washes that occur in the project area in their natural state without fencing or other barriers to wildlife movement. These washes serve multiple functions in the ecosystem, including landscape-level conveyance corridors for wildlife movement.
Site Plan	For all projects, the Department recommends conducting minimal grading in the project area. For solar projects, it is recommended that to the extent possible habitat features are retained underneath solar panels, including vegetation and soils. The topography in the majority of the project sites is flat

	and would require minimal trimming of shrubs and existing vegetation to install the panels. Keeping the existing soil and root structures intact would serve to minimize erosional run-off and help reduce biodiversity loss within the site (Grodsky and Hernandez 20208).
Site Plan	The Department's Wildlife Compatible Fencing Guidelines provide information on how fencing impacts wildlife, ways to design fencing to prevent wildlife entanglement and impalement, and to ensure wildlife movement is not restricted. Department personnel are available as resources to help determine appropriate fencing design and layout that will achieve its objective while reducing impact on wildlife, such as leaving a 6–8-inch gap between the ground surface and bottom of the fence to allow for smaller wildlife species to move freely through the area and make use of any habitat within the project boundary.
Site Plan	The Department recommends designing power lines and substations to be bird safe by following standards established by the Avian Power Line Interaction Committee (APLIC) for new power lines, which can be found in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*[12] and *Reduced Avian Collisions with Power Lines: The State of the Art in 2012*[13]. Birds of prey, such as raptors, owls, vultures, and eagles, are vulnerable to powerline strikes and electrocution during construction and operation of transmission lines and substations; power poles can also serve as perches for birds of prey. Tuk Jacobson, the Department's Raptor Coordinator, can provide further information on specific design features and best management practices; he can be contacted at raptors@azgfd.gov or 623-236-7575.
Vegetation	Please ensure the Project complies with Arizona Native Plant Law regulations. A Native Plant Inventory may also be needed to be conducted to identify, record, and coordinate plant salvage efforts for species that are Protected under the Arizona Native Plant Law.
Vegetation	To minimize the potential introduction or spread of exotic invasive species, including aquatic and terrestrial plants, animals, insects, and pathogens, the Department encourages taking precautions to wash and/or decontaminate equipment before entering and leaving the site. See the Arizona Department of Agriculture website for a list of prohibited and restricted noxious weeds and the Arizona Native Plant Society for recommendations on how to control them. To view a list of documented invasive species or to report invasive species in or near the Project area, visit iMapInvasives, which is a national cloud-based application for tracking and managing invasive species.
Vegetation	The Department recommends revegetating disturbed areas with native drought-tolerant species that represent the natural surrounding landscape. Landscaping with native plants can help support wildlife and pollinator species

	in the area while reducing dust and erosion. In addition, the applicable land management agencies should be consulted regarding guidelines for revegetation efforts.
Conservation	Additionally, maximizing the spacing between solar panels can reduce the appearance of the array as a body of water. The Department would like to emphasize the recommendation that a qualified biologist survey for bird species within the project area to better understand potential impacts from this project. It is also encouraged that the developer implements post-construction monitoring for avian injuries and fatalities.
Conservation	Recommendations for monitoring design and frequency can be found in the U.S. Geological Survey's 2016 Mortality Monitoring Design for Utility-Scale Solar Power Facilities. Any avian injuries or fatalities should be reported both to the Department and by using the USFWS Injury and Mortality Reporting website. Department staff are available to assist in developing the monitoring protocol and to further refine the monitoring and reporting recommendations in order to develop feasible and repeatable protocols to be implemented during operations. The Department is also available to help determine adaptive management measures based on results of the post-construction monitoring. For example, the U.S. Geological Survey has been conducting research that indicates birds are most attracted to solar arrays around midday, and tilting of panels during key times of strikes could reduce bird attraction.
Decommission	The decommissioning plan should include management of invasive species, revegetation with a weed free native seed mix that is commensurate with the surrounding area. The plan should also include fencing removal with other recycling components.
	Guidelines for Solar development within Arizona provided by Arizona Game and Fish Department can be found at in Guidelines for Solar Development in Arizona

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

21 August 2024

Mr. Christopher P. Toale
Director, Community Initiatives Team
56th Fighter Wing
14185 W. Falcon Street
Luke AFB AZ 85309-1629

Mr. Kendall Riley
Pinal County Development Services
85 N. Florence St.
Florence, AZ 85132

Re: PZ-PA-007-24; Cactus Flower Solar

Dear Mr. Riley

Thank you for allowing Luke AFB to comment on the Cactus Flower Solar project which proposes to re-designate 2,148± acres from Residential to Green Energy Production for a photovoltaic Solar Power Plant. The site is located 8 miles south of Eloy and approximately 7 miles south of I-10 in the unincorporated area of Pinal County, AZ.

A portion of this project is located underneath a low-level military training route (VR241); therefore, Luke AFB requests the project be submitted for an informal review through the DoD Siting Clearinghouse for Energy, Installations, and Environment by sending the project narrative, to include coordinates and heights of transmission towers, for review to: osd.dod-siting-clearinghouse@mail.mil. Our determination of no impact is conditional upon their review/inputs.

If you have any questions, please contact Mr. Mark James at (623) 856-6175.

Sincerely

CHRISTOPHER P. TOALE

cc:
Colonel Matthew Johnston, Deputy Commander, 56th Fighter Wing
Ms. Demetria Themistocles, GS-13, General Law Attorney, 56th Fighter Wing

NOTICE OF PUBLIC HEARING BY THE PINAL COUNTY CITIZENS ADVISORY COMMITTEE AT 6:00 P.M. ON THE **5TH** DAY OF **SEPTEMBER 2024**, AT THE IRONWOOD ROOM, (HISTORIC COURT HOUSE) 135 NORTH PINAL STREET, FLORENCE, ARIZONA 85132, TO CONSIDER AN APPLICATION FOR **MAJOR COMPREHENSIVE PLAN AMENDMENT** TO THE PINAL COUNTY COMPREHENSIVE PLAN.

PZ-PA-007-24 – PUBLIC HEARING/ACTION: Cypress Creek Renewables, LLC, applicant/agent, Heather Wise, requesting a Major Comprehensive Plan Amendment to amend the Land Use Plan and re-designate 2,148.94± acres of land from Very Low Density Residential (VLDR, 0-1 du/ac) and Moderate Low Density Residential (MLDR, 1-3.5 du/ac) to Green Energy Production for a utility scale photovoltaic Solar Power Plant, situated on a portions of sections 13, 23, 24, and 25, T09S, R07E of the Gila and Salt River Base and Meridian (legal on file) tax parcels: 408-11-025B, 408-11-025C, 408-11-025D,408-11-024A, 408-11-024C, 408-11-0230, 408-15-0020, 408-15-0010, 408-12-0020, 408-12-0030 located eight miles south of Eloy and approximately seven miles south of interstate 10 within the unincorporated area of Pinal County.

ALL PERSONS INTERESTED IN THIS MATTER MAY APPEAR AND SPEAK AT THE PUBLIC HEARING AT THE DATE, TIME, AND PLACE DESIGNATED ABOVE.

DOCUMENTS PERTAINING TO THIS CASE CAN BE FOUND ON THE NOTICE OF HEARING PAGE FOR THE P&Z COMMISSION AT:
https://www.pinal.gov/236/Notice-of-Hearings

DATED THIS **5th** DAY OF **AUGUST 2024**, by Pinal County Community Development Department.

TO QUALIFY FOR FURTHER NOTIFICATION IN THIS LAND USE MATTER YOU MUST FILE WITH THE PLANNING DEPARTMENT A WRITTEN STATEMENT OF SUPPORT OR OPPOSITION TO THE SUBJECT APPLICATION. YOUR STATEMENT **MUST** CONTAIN THE FOLLOWING INFORMATION:

1) Planning Case Number (see above)
2) Your name, address, telephone number and property tax parcel number **(Print or type)**
3) A brief statement of reasons for supporting or opposing the request
4) Whether or not you wish to appear and be heard at the hearing

WRITTEN STATEMENTS MUST BE FILED WITH:
PINAL COUNTY DEVELOPMENT SERVICES DEPARTMENT
85 N. FLORENCE STREET, PO BOX 749.
FLORENCE, AZ 85132

Contact for this matter: Sangeeta Deokar, Senior Planner
E-mail address: Sangeeta.deokar@pinal.gov
Phone # (520) 866-6641

[*Anything below this line is not for publication*.]

TO BE PUBLISHED:
Pinal Central Dispatch
Arizona Republic

Pinal Central Dispatch

AFFIDAVIT OF PUBLICATION

State of Texas, County of Bexar, ss:

Hayden Lipsky, being first duly sworn, deposes and says: That (s)he is a duly authorized signatory of Column Software, PBC, duly authorized agent of Pinal Central Dispatch, a newspaper published at Casa Grande, Pinal County, Arizona,Thursday of each week; that a notice, a full, true and complete printed copy of which is hereunto attached, was printed in the regular edition of said newspaper, and not in a supplement thereto, for 1 issues. The publications thereof having been on the following dates:

PUBLICATION DATES:
Aug. 15, 2024

NOTICE ID: ItCg8YnmUEimhAtYr09u
NOTICE NAME: PZ-PA-007-24

(Signed) Hayden Lipsky

VERIFICATION

State of Texas
County of Bexar

NOTARY PUBLIC STATE OF TEXAS
Robert Hollie III
ID NUMBER
133582194
COMMISSION EXPIRES
February 10, 2026

Subscribed in my presence and sworn to before me on this: 08/16/2024

Notary Public
Electronically signed and notarized online using the Proof platform.

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PINAL COUNTY DEVELOPMENT SERVICES DEPARTMENT
85 N. FLORENCE STREET, PO BOX 749.
FLORENCE, AZ 85132
Contact for this matter: Sangeeta Deokar, Senior Planner

E-mail address: Sangeeta.deokar@pinal.gov
Phone # (520) 866-6641
No. of publications: 1: date of publication: Aug 15, 2024

LocaliQ
Arizona
GANNETT

PO Box 632099, Cincinnati, OH 45263-2099

AFFIDAVIT OF PUBLICATION

Meaghan Austin
Swca Environmental Consultants
1645 S Plaza WAY
Flagstaff AZ 86001-7102

STATE OF WISCONSIN, COUNTY OF BROWN

The Arizona Republic, a newspaper published in the city of Phoenix and general circulation in the counties of Maricopa, Coconino, Pima and Pinal, State of Arizona, and personal knowledge of the facts herein state and that the notice hereto annexed was Published in said newspapers in the issue:

08/10/2024

and that the fees charged are legal.
Sworn to and subscribed before on 08/10/2024

Legal Clerk

Notary, State of WI, County of Brown

2.1428

My commission expires

Publication Cost:	$1643.00	
Tax Amount:	$0.00	
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THIS IS NOT AN INVOICE!

Please do not use this form for payment remittance.

KEEGAN MORAN
Notary Public
State of Wisconsin

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PINAL COUNTY DEVELOPMENT SERVICES DEPARTMENT
85 N. FLORENCE STREET, PO BOX 749.
FLORENCE, AZ 85132
Contact for this matter:
Sangeeta Deokar, Senior Planner
E-mail address:
Sangeeta.deokar@pinal.gov
Phone # (520) 866-6641
Pub: Aug 10, 2024

AFFIDAVIT OF POSTING OF BROADCAST SIGN

I, _____, Applicant for case PZ-PA-007-24 (Case number), personally caused 34 sign(s) to be posted in a visible place on or near the proposed project site on Tommy Blassingame (Date), at least 28 days before the Planning and Zoning Commission Public Hearing, regarding the proposed Green Energy Solar (Type of application), in unincorporated Pinal County

The notice was posted as indicated on the attached map and photograph.

T Blassingame
Applicant

Notary Public State of Arizona
Maricopa County
Dorena Marie Mello
My Commission Expires 05/28/2025
Commission Number 604187

STATE OF ARIZONA)
) ss:
COUNTY OF PINAL)

Subscribed and sworn to me by Tommy Blassingame this 14 day of August, 2024.

Dorena Mello
Notary Public

My Commission Expires: 05/28/2025

AFFIDAVIT OF MAILING OF PUBLIC NOTICES

I, FedEx Corporation, on behalf of Applicant for case PZ-PA-007-24 (Case number), personally caused thirteen public notices to be mailed to landowners on or near the proposed project site on 08/19/2024 (Date), at least 15 days before the Citizen Advisory Committee Public Hearing, regarding the proposed Major Comprehensive Plan Amendment (Type of application), in unincorporated Pinal County.

The notice was mailed to landowners as indicated in the attached mailing list.

Aaron Freeman

FedEx Corporation Rep.

STATE OF ~~ARIZONA~~ Washington)

COUNTY OF ~~PINAL~~ Whatcom) ss:

Subscribed and sworn to me by Aaron D Freeman this 20 day of August, 20 24.

Notary Public

My Commission Expires: 04-24-28

NICKOLAS T. ELKE
License 20104407
NOTARY PUBLIC
Expires 04-24-28
STATE OF WASHINGTON

Parcel	Name	Address	City	State	Zip Code
408170020	TRICO ELECTRIC CORP	PO BOX 930	MARANA	AZ	85653
40817001A	VALENTIC WILLIAM	PO BOX 2966	CHANDLER	AZ	85244
40811024D	USA	12155 WEST ALAMEDA PARKWAY	LAKEWOOD	CO	80228
40811025C, 40811025D, 40811024C, 40811025B, 40811024A	CURTIS 1035 LLC	PO BOX 1969	QUEEN CREEK	AZ	85142
40811026A, 40811027B, 40811026B, 40816001A	LOCOMOTIVE FARMS LLC	2100 MCKINNEY AVE STE 1500	DALLAS	TX	75201
408150020, 408110230	GORDITA L P C/O ANIMAL NUTRITION SYSTEMS	571 N 54TH ST	CHANDLER	AZ	85226
408150010	STAMBAUGH FARMS LLC	27830 S 11 MILE CORNER RD	ELOY	AZ	85131
411320120	WALKER PLOW LTD PSHIP LLP	PO BOX 1652	HIGLEY	AZ	85236
408120020, 408120030	TOONE FAMILY LTD PSHIP #3	817 N YORK CIR	MESA	AZ	85213
40811012A	BARNES HARVESTING LLC	3095 S TREKELL RD	CASA GRANDE	AZ	85193
408130030	JOHN M FOSTER TURF OF ARIZONA LLC	PO BOX 4563	PALM DESERT	CA	92261
408120010, 411320110	WALKER PLOW LTD PSHIP LLP	PO BOX 1652	HIGLEY	AZ	85236
41135001D	DONLEY JOHN PATRICK & MELINDA REV TRUST	10475 W QUARTZ DR	CASA GRANDE	AZ	85193

Meter Report

FedEx Store #2306 – Cactus Flower DM

Date	QTY	Description	Rate	Postage
8/16/24	13	5.5" x 8.5" Postcard	$0.73 ea.	1st Class Letter